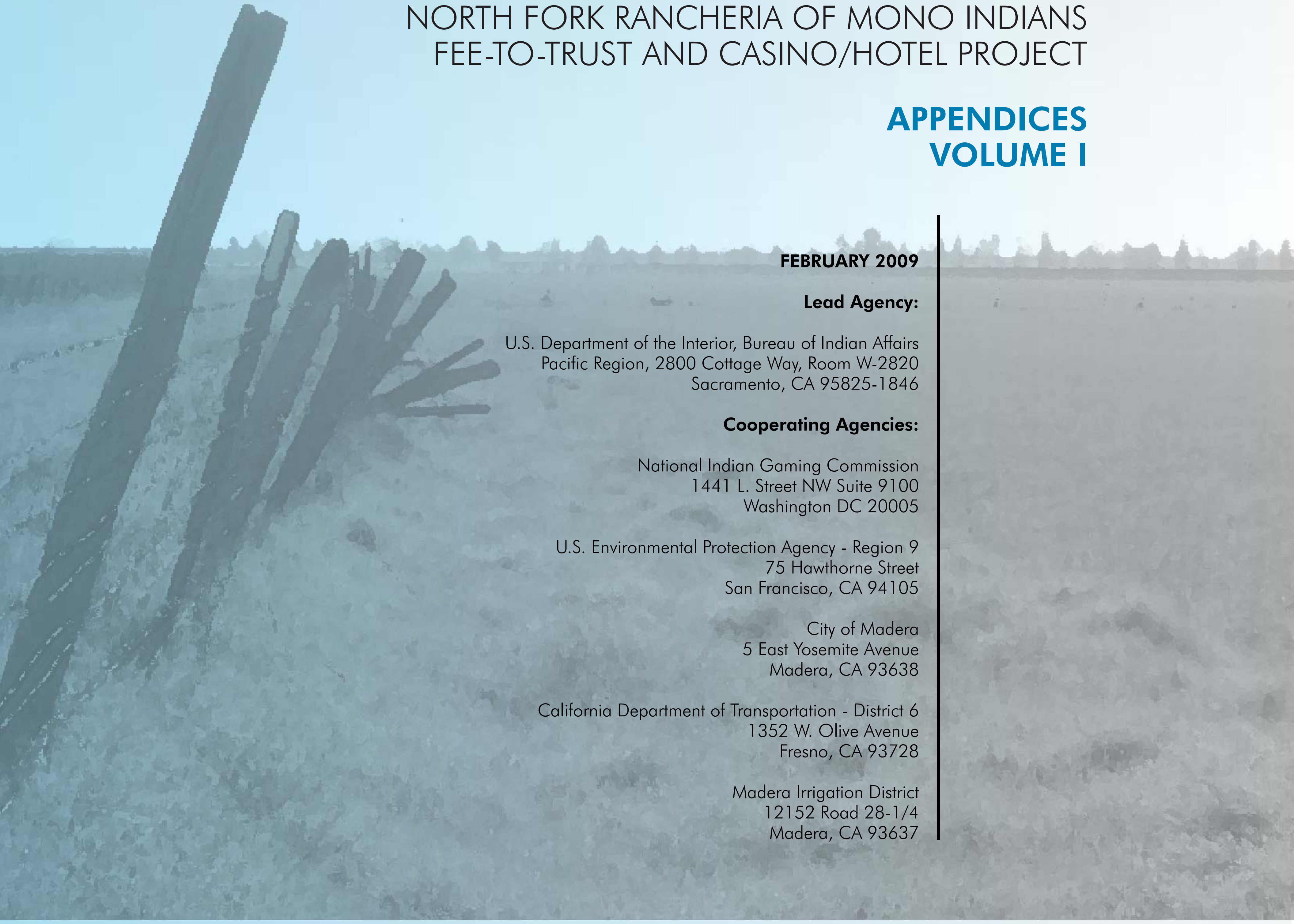
FINAL
ENVIRONMENTAL IMPACT STATEMENT

NORTH FORK CASINO

NORTH FORK RANCHERIA OF MONO INDIANS FEE-TO-TRUST AND CASINO/HOTEL PROJECT

APPENDICES
VOLUME I



FEBRUARY 2009

Lead Agency:

U.S. Department of the Interior, Bureau of Indian Affairs
Pacific Region, 2800 Cottage Way, Room W-2820
Sacramento, CA 95825-1846

Cooperating Agencies:

National Indian Gaming Commission
1441 L. Street NW Suite 9100
Washington DC 20005

U.S. Environmental Protection Agency - Region 9
75 Hawthorne Street
San Francisco, CA 94105

City of Madera
5 East Yosemite Avenue
Madera, CA 93638

California Department of Transportation - District 6
1352 W. Olive Avenue
Fresno, CA 93728

Madera Irrigation District
12152 Road 28-1/4
Madera, CA 93637

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APPENDICES

NORTH FORK RANCHERIA CASINO AND HOTEL FINAL ENVIRONMENTAL IMPACT STATEMENT

VOLUME I

APPENDIX A

Cooperating Agency Correspondence

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

Office of Transportation Planning, District 6
Department of Transportation
1352 West Olive Avenue
P.O. Box 12616
Fresno, CA 93778-2616

MAY 26 2005

Dear Sir:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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The BIA will serve as the Lead Agency for National Environmental Policy Act (NEPA) compliance, with the National Indian Gaming Commission (NIGC), which is responsible for approval of the gaming management contract, acting as a Cooperating Agency. At this time, we are also extending invitations to the City of Madera, Madera, Planning Department, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Army Corps of Engineers, and Madera Irrigation District to participate in the EIS process as a Cooperating Agencies. Please inform this office by June 6, 2005, as to your willingness to accept this role.

If you have any questions or need additional information, please contact Patrick O'Mallan, Environmental Protection Specialist, at (916) 978-6044, or John Rydzik, Chief, Division of Environmental, Cultural Resources Management and Safety, at (916) 978-6042.

Sincerely,

/s/ Clayton Gregory

Regional Director

cc: Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

MAY 26 2005

Leon Lancaster
City Engineer and Director of Community Development
City of Madera
205 West fourth Street
Madera, CA 93637

Dear Mr. Lancaster:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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If you have any questions or need additional information, please contact Patrick O'Mallan, Environmental Protection Specialist, at (916) 978-6044, or John Rydzik, Chief, Division of Environmental, Cultural Resources Management and Safety, at (916) 978-6042.

Sincerely,

/s/ Clayton Gregory

Regional Director

cc: Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

MAY 2 6 2005

Raybum Beach
Planning Director, Planning Department
Madera County
2037 West Cleveland Avenue MS-G
Madera, CA 93637

Dear Mr. Beach:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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If you have any questions or need additional information, please contact Patrick O'Mallan, Environmental Protection Specialist, at (916) 978-6044, or John Rydzik, Chief, Division of Environmental, Cultural Resources Management and Safety, at (916) 978-6042.

Sincerely,

/s/ Clayton Gregory

Regional Director

cc: Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

MAY 26 2005

Ronald H. Pistoresi
President, Board of Directors
Madera Irrigation District
12152 Road 28 ¼
Madera, CA 93637-9199

Dear Mr. Pistoresi:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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Sincerely,

/s/ Clayton Gregory

Regional Director

cc: Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

MAY 2 6 2005

Fred W. Stuckwisch
Director of Contracts
National Indian Gaming Commission
1441 L Street NW, 9th Floor
Washington, D.C. 20005

Dear Mr. Stuckwisch:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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Sincerely,

/s/ Clayton Gregory

Regional Director

cc: Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

MAY 20 2005

Laura Whitney, Project Manager
U.S. Army Corps of Engineers
Regulatory Branch
1325 "J" Street, RM1480
Sacramento, CA 95814-2922

Dear Ms. Whitney:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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Sincerely,

/s/ Clayton Gregory

Regional Director

cc:
Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

Karen Vitulano, CED-2
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105-39101

MAY 20 2005

Dear Ms. Vitulano:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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Sincerely,

/s/ Clayton Gregory

Regional Director

cc:
Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

MAY 20 2005

U.S. Fish and Wildlife Service
Sacramento Field Office
Attn: Field Supervisor
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Dear Sir:

The Bureau of Indian Affairs (BIA), is seeking your participation as Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed 305.49-acre Fee-to-Trust Transfer and Casino/Hotel Project in Madera County, California. The Tribe proposes to construct a casino/hotel and conduct gaming on the property subsequent to the trust acquisition. The gaming facility would be managed by SC Madera Management, LLC on behalf of the Tribal Government pursuant to the terms of a management agreement between the Tribal Government and SC Madera Management, LLC.

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Sincerely,

/s/ Clayton Gregory

Regional Director

cc: Regional Realty Officer, Pacific Region
Lead Realty Specialist, Pacific Region
Superintendent, Central California Agency
Chairman, North Fork Rancheria

RECEIVED
05 JUN -6
SACRAMENTO

June 2, 2005

United States Department of the Interior
Bureau of Indian Affairs
Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825

Dear Regional Director

Please be advised that the City of Madera would be pleased to participate as a Cooperating Agency in collaboration with the North Fork Rancheria Environmental Impact Statement for a proposed 305.5 acre Casino/Hotel Project in Madera County, California.

If you have any questions or need additional information, please contact this office at 559-661-5423. I apologize for using Regional Director in the salutation but the signature of the Regional Director is not legible in the letter.

Very truly yours,

Leon P. Lancaster, P.E.
Community Development Director/
City Engineer

205 W. Fourth Street • Madera, CA 93637 • TEL (559) 661-5400 • FAX (559) 674-2972
www.cityofmadera.org

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

June 8, 2005

John Rydzik, Chief
Division of Environmental, Cultural
Resource Management and Safety
Bureau of Indian Affairs
2800 Cottage Way
Sacramento, CA 95825

Subject: Request for Cooperating Agency Participation in the North Fork Rancheria Proposed 309-acre Fee-to-Trust Transfer and Casino/Hotel Project Environmental Impact Statement (EIS), Madera County, California

Dear Mr. Rydzik:

We are in receipt of your letter dated May 26, 2005 inviting the U.S. Environmental Protection Agency (EPA) to serve as a cooperating agency for the subject EIS. Since EPA is the permitting authority for Clean Water Act (CWA) permits required for the project, we accept your invitation. However, resource constraints limit our involvement to the review of selected administrative documents with a focus on our area of jurisdiction, in this case, impacts to water resources. Please be aware that EPA's status as a cooperating agency does not affect our independent responsibilities under Section 309 of the Clean Air Act to review and comment publically on all Draft EISs.

It is EPA policy to enter into a written agreement for all projects where EPA acts as a cooperating agency. We are preparing a Memorandum of Understanding (MOU) for this project and will forward a signed copy in the near future.

We appreciate the Bureau of Indian Affairs' interest in working with EPA. If you have any questions, please contact Karen Vitulano, the lead reviewer for this project, at (415) 947-4178.

Sincerely,

Nova Blazej, Acting Manager
Environmental Review Office
Communities and Ecosystems Division

cc: Elaine Fink, Chairperson, North Fork Rancheria
Mary Adelzadeh, Environmental Director, North Fork Rancheria

July 26, 2005

Patrick O'Mallan
Environmental Protection Specialist
Bureau of Indian Affairs, Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825

Dear Mr. O'Mallan:

On June 2nd 2005, the National Indian Gaming Commission (NIGC) received your invitation to participate in the Environmental Impact Statement (EIS) for the North Fork Rancheria's proposed Casino-Hotel Project in Madera, California. At this time, the NIGC accepts your invitation to participate as a Cooperating Agency.

All information regarding the EIS should be sent to me at the address below. I can be reached via phone at 202-632-7003 (Ext 256). If you have any questions or need additional information, please feel free to contact me.

Sincerely,

Brad Mehaffy, REM
NEPA Compliance Officer
National Indian Gaming Commission

NATIONAL HEADQUARTERS: 1441 I St. NW, Suite 9100, Washington DC 20005 Tel: 202 632-7003 Fax: 202 632-7066 WWW.NIGC.GOV

REGIONAL OFFICES: Portland, OR, Sacramento, CA, Phoenix, AZ, St. Paul, MN, Tulsa, OK

MADERA IRRIGATION DISTRICT
12152 ROAD 28 1/4 • MADERA, CA 93637-9199 • (559) 673-3514 • (559) 268-2483 • FAX (559) 673-0564

BOARD OF DIRECTORS
RONALD H. PISTORESI
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GARY BURSEY
Vice President
ROGER F. GALLEANO
CARL JANZEN
THOMAS J. PETRUCCI
LEGAL COUNSEL
MICHAEL A. CAMPOS

05 OCT 11 PM 2:21

October 6, 2005

Clay Gregory
Pacific Regional Director
Bureau of Indian Affairs
2800 Cottage Way
Sacramento, CA 95825

Attn: John Rydzik, Regional Director
Bureau of Indian Affairs

Dear John:

On May 26, 2005, Madera Irrigation District was invited to become a cooperating agency on the Environmental Impact Statement for the North Fork Rancheria Hotel and Casino Development.

Madera Irrigation District is pleased to accept this invitation to be a cooperating agency.

Sincerely,

Ron Pistoresi

Ron Pistoresi
President

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
1352 WEST OLIVE AVENUE
P.O. BOX 12616
FRESNO, CA 93778-2616
PHONE (559) 445-5868
FAX (559) 488-4088
TTY (559) 488-4066

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June 1, 2005

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NORTH FORK CASINO

Reg Dir 4 ✓
Dep Reg Dir I ald ✓
Reg Adm Ofcr
Route DECRMS
Response Required NO
Due Date
Name ______ Ltr.
Code

Mr. Clay Gregory, Director
United State Department of Interior
Bureau of Indian Affairs
2800 Cottage Way
Sacramento, CA 95825

Dear Mr. Gregory:

We have received your invitation to participate as a Cooperating Agency (CA) in collaboration with the North Fork Rancheria (Tribe) Environmental Impact Statement (EIS) for a proposed Fee-to-Trust and Hotel/Casino project in Madera County. Caltrans looks forward to working cooperatively with both the Bureau and the Tribe on this project.

Please include Caltrans in any forthcoming meetings, preliminary reviews, etc. pertaining to this project. If you have any questions, please call me at (559) 445-5868.

Sincerely,

MICHAEL NAVARRO
Office of Transportation Planning
District 06

"Caltrans improves mobility across California"

APPENDIX B

Updated Public Notices

- March 03, 2008, 6–8:30 p.m.
- March 10, 2008, 6–8:30 p.m.
- March 12, 2008, 6–8:30 p.m.
- March 13, 2008, 6–8:30 p.m.
- March 17, 2008, 6–8:30 p.m.

ADDRESSES: You may mail or hand carry written comments to Gerald Henrikson, Project Manager, Bureau of Indian Affairs, 911 Northeast 11th Avenue, Portland, Oregon 97232. You may also fax your comments to (503) 231–6791, or submit them electronically at the project Web site, *http://www.gorgecasinoEIS.com.* (Note: The BIA cannot receive electronic comments directly via e-mail at this time.) Please include your name, return address and the caption, "DEIS Comments, Confederated Tribes of the Warm Springs Reservation of Oregon Trust Acquisition and Resort/Casino Project," on the first page of your written comments.

The locations of the public hearings are as follows:

- March 03—Kah-Nee-Ta High Desert Resort and Casino, Warm Springs, OR.
- March 10—Port of Cascade Locks, Gorge Pavilion, Marine Park, 355 Wa–Na–Pa Street, Cascade Locks, OR.
- March 12—Rock Creek Center, 710 SW Rock Creek Drive, Stevenson, WA.
- March 13—Doubletree Hotel, Lloyd Center, 1000 NE Multnomah, Portland, OR.
- March 17—Hood River Middle School Auditorium, 1602 May Street, Hood River, OR.

If you would like to obtain a copy of the DEIS, please write or call Gerald Henrikson at the BIA address above or the telephone number for him provided below. An electronic version of the DEIS may be viewed at *http://www.gorgecasinoEIS.com.*

Copies of the DEIS are available for review at the BIA address above and at the following locations.

- Port of Cascade Locks, 710 Lucy Lane, Cascade Locks, OR 97014.
- Federal Highway Administration, 530 Center Street, Room 100, Salem, OR 97301.
- Cascade Locks Library, 140 SE Wa–Na–Pa Street, Cascade Locks, OR 97031.
- Multnomah County Library, Central Branch, 801 SW 10th Street, Portland, OR 97205.
- Gresham Library, 385 NW Miller Avenue, Gresham, OR 97030.
- Vancouver Community Library, 1007 E Mill Plain Boulevard, Vancouver, WA 98663.
- Hood River County, 601 State Street, Hood River, OR 97031.
- Oregon Department of Transportation, Region 1, 123 NW Flanders, Portland, OR 97209.
- Hood River County Library, 502 State Street, Hood River, OR 97014.
- Mosier City Library, 3rd Street, Mosier, OR 97040.
- Stevenson Community Library, 120 NW Vancouver Avenue, Stevenson, WA 98648.
- Fairview—Columbia Library, 1520 NE Village Street, Fairview, OR 97024.
- White Salmon Valley Community Library, #5 Town and Country Square, White Salmon, WA 98672.

Copies of the DEIS have also been sent to agencies and individuals who participated in the scoping process and to all others who had requested copies.

FOR FURTHER INFORMATION CONTACT: Gerald Henrikson, (503) 231–6927.

SUPPLEMENTARY INFORMATION: The Tribes have requested that the BIA take 25 acres of land in the City of Cascade Locks, Oregon, into trust on behalf of the Tribes. The Tribes would develop a resort and casino on the newly acquired trust land and lease adjacent lands (approximately 35 acres) from the Port of Cascade Locks for parking and other facilities related to the resort and casino development. The proposed casino project also would include a new interchange on Interstate 84 (I–84) and local transportation system improvements.

A range of project alternatives is considered in the DEIS, including: (1) The proposed Cascade Locks Resort and Casino Project, (2) a Hood River alternative, (3) a Warm Springs alternative, and (4) no action. The DEIS addresses the potential effects of each of these alternatives on geology and soils, land use, water resources, air quality, noise, plants and wildlife, endangered species, cultural resources, socioeconomic conditions (including environmental justice), transportation, public services, the visual environment, and hazardous wastes and materials. The DEIS examines the direct, indirect, and cumulative effects of each alternative on these resources and identifies mitigation measures to address adverse impacts.

Public Comment Availability

Comments, including names and addresses of respondents, will be available for public review at the mailing address shown in the **ADDRESSES** section during regular business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Authority

This notice is published in accordance with section 1503.1 of the Council on Environmental Quality regulations (40 CFR Parts 1500 through 1508) implementing the procedural requirements of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), and the Department of Interior Manual (516 DM 1–6), and is in the exercise of authority delegated to the Assistant Secretary—Indian Affairs by 209 DM 8.1.

Dated: January 28, 2008.

Carl J. Artman,

Assistant Secretary—Indian Affairs.

[FR Doc. E8–2834 Filed 2–14–08; 8:45 am]

BILLING CODE 4310–W7–P

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Draft Environmental Impact Statement for the North Fork Rancheria's Proposed 305 Acre Trust Acquisition and Hotel/Casino Project, Madera County, CA

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice.

SUMMARY: This notice advises the public that the Bureau of Indian Affairs (BIA) as lead agency, with the North Fork Rancheria of Mono Indians (Tribe), California Department of Transportation, Madera Irrigation District, City of Madera, National Indian Gaming Commission and U. S. Environmental Protection Agency (EPA) as cooperating agencies, intends to file a Draft Environmental Impact Statement (DEIS) with the EPA for the proposed 305 acre trust acquisition and the construction of a hotel/casino project to be located in unincorporated Madera County, just north of the City of Madera, California, and that the DEIS is now available for public review. Public review of the DEIS is part of an administrative process designed to evaluate tribal applications that seek to have the United States to take land into Federal trust pursuant to 25 CFR part 151. Reviewers are advised that we will consider public comments carefully

prior to deciding whether to approve or disapprove this application. This notice also announces a public hearing to receive comments on the DEIS.

DATES: Written comments on the scope and implementation of this proposal must arrive by March 31, 2008. The public hearing will be held March 12, 2008, from 6 p.m. to 9 p.m., or until the last public comment is received.

ADDRESSES: You may mail or hand carry written comments to Amy Dutschke, Acting Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825. Please include your name, return address, and the caption, "DEIS Comments, North Fork Rancheria's Hotel/Casino Project," on the first page of your written comments.

The public hearing will be at the Hatfield Hall, Madera District Fairgrounds, 1850 West Cleveland Avenue, Madera, California.

The DEIS is available for review at the Madera County Public Library, 121 N. G. Street, Madera, California 93637, and at the Madera County Public Library, Chowchilla Branch, 300 Kings Ave., Chowchilla, California 93610. General information for the Madera County Public Library may be obtained by calling (559) 675–7871, and for the Madera County Public Library, Chowchilla Branch, by calling (559) 665–2630.

If you would like to obtain a copy of the DEIS, please write or call John Rydzik, Chief of the Division of Environmental, Cultural Resource Management and Safety, at the BIA address above or the telephone number provided below. An electronic version of the DEIS may be viewed at *http://www.NorthForkEIS.com.*

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978–6042.

SUPPLEMENTARY INFORMATION: The Tribe has requested that the BIA take into Federal trust 305 acres of land currently held in fee by the Tribe, on which the Tribe proposes to construct a hotel, casino, parking areas and other facilities. The proposed project is located in unincorporated Madera County, California, just north of the City of Madera and adjacent to State Route 99 (SR–99). The project site is bounded on the north by Avenue 18, rural residential land, light industrial land, and vacant land; on the east by Golden State Boulevard and SR–99; on the south by agricultural land and residential land; and on the west by Road 23 and agricultural land.

The proposed action includes the development of an approximately 472,000 square foot hotel and casino resort and associated facilities, which would include a main gaming hall, food and beverage services, retail space, banquet/meeting space, and administration space. Food and beverage facilities would include three full service restaurants, a five-tenant food court, a buffet, four bars and a lounge. The hotel would include 200 rooms, a resort style pool area and a spa. Approximately 4,500 parking spaces would be provided. Regional access to the project site is via SR–99. Road 23, Avenue 18, and Golden State Boulevard would provide direct access to the hotel/casino resort.

A range of project alternatives is considered in the DEIS, including: (1) Preferred hotel/casino; (2) reduced casino; (3) commercial development; (4) North Fork Rancheria alternate site; and (5) no action. Environmental issues addressed in the DEIS include land resources, water resources, air quality, biological resources, cultural resources, socioeconomic conditions, environmental justice, transportation, land use, agriculture, public services, noise, hazardous materials, visual resources, cumulative effects, indirect effects, growth inducing effects and mitigation measures. Input from the public, including that from a public scoping meeting the BIA held on November 15, 2004, in Madera, California, was included in the development of these alternatives and issues.

Public Comment Availability

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the **ADDRESSES** section, during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Authority

This notice is published in accordance with section 1503.1 of the Council of Environmental Quality Regulations (40 CFR parts 1500 through 1508) implementing the procedural requirements of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4371 et seq.), Department of the Interior Manual (516 DM 1–6), and is in the exercise of authority delegated to the Assistant Secretary—Indian Affairs by 209 DM 8.1.

Dated: January 28, 2008.

Carl J. Artman,

Assistant Secretary—Indian Affairs.

[FR Doc. E8–2828 Filed 2–14–08; 8:45 am]

BILLING CODE 4310–W7–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[WY–923–1310–FI; WYW148913]

Wyoming: Notice of Proposed Reinstatement of Terminated Oil and Gas Lease

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of proposed reinstatement of terminated oil and gas lease.

SUMMARY: Under the provisions of 30 U.S.C. 188(d) and (e), and 43 CFR 3108.2–3(a) and (b)(1), the Bureau of Land Management (BLM) received a petition for reinstatement from Devon Energy Production Company, L.P. and Kerr-McGee Oil & Gas Onshore LP for competitive oil and gas lease WYW148913 for land in Converse County, Wyoming. The petition was filed on time and was accompanied by all the rentals due since the date the lease terminated under the law.

FOR FURTHER INFORMATION CONTACT: Bureau of Land Management, Pamela J. Lewis, Chief, Branch of Fluid Minerals Adjudication, at (307) 775–6176.

SUPPLEMENTARY INFORMATION: The lessee has agreed to the amended lease terms for rentals and royalties at rates of $10.00 per acre, or fraction thereof per year, and 16⅔ percent, respectively. The lessee has paid the required $500 administrative fee and $163 to reimburse the Department for the cost of this **Federal Register** notice. The lessee has met all the requirements for reinstatement of the lease as set out in Sections 31(d) and (e) of the Mineral Lands Leasing Act of 1920 (30 U.S.C. 188), and the Bureau of Land Management is proposing to reinstate lease WYW148913 effective October 1, 2007, under the original terms and conditions of the lease and the increased rental and royalty rates cited counties, UT, Montrose County, CO, and Uinta County, WY.

Summary: EPA has environmental concerns about potential water quality impacts and recommends that the final EIS evaluate and compare the environmental impacts by alternative, of removing interim protections from the 86 eligible stream segments. Rating EC1.

Final EISs

EIS No. 20070530, ERP No. F–COE-E39071–00, Wolf Creek Dam/Lake Cumberland Project, Emergency Measures in Response to Seepage, Mississippi River, South Central Kentucky and Central Tennessee.

Summary: EPA continues to have environmental concerns about water quantity and water quality impacts.

EIS No. 20070556, ERP No. F–NGB-E11062–MS, Camp Shelby Joint Force Training Center, Implementation of Installation Mission Support Activities, Renewal of Special Use Permit, De Soto National Forest, in portions of Forrest, George and Perry Counties, MS.

Summary: EPA's previous issues have been resolved; therefore, EPA does not object to the proposed action.

EIS No. 20070557, ERP No. F–IBW-G36112–TX, PROGRAMMATIC—Rio Grande Flood Control Projects, Proposing a Range of Alternatives for Maintenances Activities and Future Improvements, along the Texas-Mexico Border.

Summary: No formal comment letter was sent to the preparing agency.

Dated: February 12, 2008.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E8–2950 Filed 2–14–08; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–6695–9]

Environmental Impacts Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–7167 or *http://www.epa.gov/compliance/nepa/.*

Weekly receipt of Environmental Impact Statements filed 02/04/2008 through 02/08/2008 pursuant to 40 CFR 1506.9.

EIS No. 20080044, Draft EIS, BIA, OR, Cascade Locks Resort and Casino Project, Application for the Fee-to-Trust Transfer of 25 Acres of Land within the City of Cascade Locks, Confederated Tribes of the Warn Springs Reservation of Oregon, Cascade Locks, Hood River County, OR, *Comment Period Ends:* 05/15/2008, *Contact:* Gerald Henrikson 503–231–6927.

EIS No. 20080045, Draft EIS, BIA, CA, North Fork Rancheria of Mono Indians Fee-to-Trust and Casino/Hotel Project, Proposed 305-Acres-Fee-to-Trust Land Acquisition in Unincorporated Madera County, CA, *Comment Period Ends:* 03/31/2008, *Contact:* John Rydzik 916–978–6042.

EIS No. 20080046, Final Supplement, WAP, CA, Sacramento Area Voltage Support Project, Selected Preferred Alternative B, Proposal to Build a Double-Circuit 230-kV Transmission Line, Placer, Sacramento and Sutter Counties, CA, *Wait Period Ends:* 03/17/2008, *Contact:* Catherine Cunningham 720–962–7260.

EIS No. 20080047, Draft EIS, USN, 00, Atlantic Fleet Active Sonar Training Program, To Provide Mid- and High-Frequency Active Sonar Technology and the Improved Ext ended Echo Ranging (IEER) System during Atlantic Fleet Training Exercises, Along the East Coast of United States (US) and in the Gulf of Mexico, *Comment Period Ends:* 03/31/2008, *Contact:* Karen Foskey 703–602–2859.

EIS No. 20080048, Draft EIS, BLM/DEQ, MT, Montana Tunnels Mine Project, Proposed M-Pit Mine Expansion to Existing Mine Pit to Access and Mine Additional Ore Resources, Jefferson County, MT, *Comment Period Ends:* 03/31/2008, *Contact:* David Williams 406–533–7655. Bureau Land Management and the Montana Department of Environmental (DEQ) are Co-Lead Agencies for the above project.

This document is available on the Internet at: http://www.deq.mt.gov.

EIS No. 20080049, Draft EIS, FRC, 00, Midcontinent Express Pipeline Project, (Docket Nos. CP08–6–000), Construction and Operation to Facilitate the Transport of 1,500, 000 dekatherms per day of Natural Gas from Production Fields in eastern TX, OK, and AR to Market Hub, located in various counties and parishes in OK, TX, LA, MS and AL , *Comment Period Ends:* 03/31/2008, *Contact:* Andy Black 1–866–208–3372.

EIS No. 20080050, Draft EIS, FRA, NJ, Portal Bridge Capacity Enhancement Project, To Replace the nearly 100-Year-Old Portal Bridge and Eliminate Capacity Constraints on the Northeast Corridor between Swift Interlocking and Psychics Transfer Station, Hackensack River, Hudson County, NJ, *Comment Period Ends:* 03/31/2008, *Contact:* David Valenstein 202–493–6368.

EIS No. 20080051, Final EIS, AFS, MT, Beaverhead-Deerlodge National Forest Draft Revised Land and Resource Management Plan, Implementation, Beaverhead, Butte-Silver Bow, Deerlodge, Granite, Jefferson, Madison Counties, MT, *Wait Period Ends:* 03/17/2008, *Contact:* Leaf Magnuson 406–683–3950.

EIS No. 20080052, Final EIS, FTA, FL, Tier 1 Programmatic—Jacksonville Rapid Transit System (RTS), Improvement to Transportation in Four Primary Transit Corridors Radiating from Downtown Jacksonville, Duval County, FL, *Wait Period Ends:* 03/17/2008, Contact: Tajsha LaShore 404–865–5606.

EIS No. 20080053, Draft EIS, FHW, DC, South Capitol Street Project, Replacement of the Fredrick Douglass Memorial Bridge, from Firth Sterling Avenue, SE. to Independence Avenue and the Suitland Parkway from Martin Luther King, Jr. Avenue, SE. to South Capitol Street, Washington, District of Columbia, *Comment Period Ends:* 03/31/2008, *Contact:* Michael Hicks 202–219–3513.

EIS No. 20080054, Draft EIS, DOE/DEQ, MT, MATL 230-kV Transmission Line Project, To Construct, Operate, Maintain, and Connect a 230-kV Electric Transmission Line, Issuance of Presidential Permit for Right-to-Way Grant, Cascade, Teton, Chouteau, Pondera, Toole and Glacier Counties, MT, *Comment Period Ends:* 03/31/2008, *Contact:* Ellen Russell 202–586–9624. Department of Energy and the Montana Department of Environmental Quality (DEQ) are Co-Lead Agencies for the above project.

EIS No. 20080055, Final EIS, AFS, 00, National Forest System Land Management Planning, Implementation, Proposed Land Management Planning Rule at 36 CFR Part 219 to Finish Rulemaking, *Wait Period Ends:* 03/17/2008, *Contact:* Dave Sire 202–205–1006.

EIS No. 20080056, Final EIS, AFS, AK, Tongass Land and Resource Management Plan, Plan Amendment, Implementation, Tongass National Forest, AK, *Wait Period Ends:* 03/17/2008, *Contact:* Lee Kramer 907–789–6246.

Amended Notices

EIS No. 20080025, Draft EIS, FTA, TX, Northwest Corridor Light Rail Transit Line (LRT) to Irving/Dallas/Fort Worth International Airport, Construction, Dallas County, TX, *Comment Period Ends:* 03/11/2008, *Contact:* A.J. Ossi 202–366–1613.

Revision of FR Notice Published on 01/25/2008: Correction to Lead Agency from FAA to FTA.

EIS No. 20080040, Draft EIS, IBR, CA, Folsam Lake State Recreation Area & Folsam Powerhouse State Historic Park, General Plan/Resource Management Plan, Implementation, Placer County, CA, *Comment Period Ends:* 03/24/2008, *Contact:* Laura Cabollero 916–989–7172. *Revision to FR Notice Published 02/08/2008:* Correction to the County and State.

Dated: February 12, 2008.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E8–2951 Filed 2–14–08; 8:45 am]

BILLING CODE 6560–50–P

EXPORT-IMPORT BANK OF THE UNITED STATES

Notice of Open Special Meeting of the advisory Committee of the Export-Import Bank of the United States (Ex-Im Bank).

SUMMARY: The advisory committee was established by Public Law 98–181, November 30, 1983, to advise the Export-Import Bank on its programs and to provide comments for inclusion in the reports of the Export-Import Bank of the United States to Congress

Time and Place: Wednesday, March 5, 2008 from 9 a.m. to 12 p.m. The meeting will be held at Ex-Im Bank in the Main Conference Room 1143, 811 Vermont Avenue, NW., Washington, DC 20571.

Agenda: Agenda items include an understanding of the ECA environment and the factors to consider when designing credit underwriting processes and programs.

Public Participation: The meeting will be open to public participation, and the last 10 minutes will be set aside for oral questions or comments. Members of the public may also file written statement(s) before or after the meeting. If you plan to attend, a photo ID must be presented at the guard's desk as part of the clearance process into the building, and you may contact Susan Houser to be placed on an attendee list. If any person wishes auxiliary aids (such as a sign language interpreter) or other special accommodations, please contact, prior to February 25, 2008, Susan Houser, Rom 1273, 811 Vermont Avenue, NW., Washington, DC 20571, Voice: (202) 565–3232 or TDD (202) 565-3377.

Further Information: For further information, contact Susan Houser, Room 1273, 811 Vermont Ave., NW., Washington, DC 20571, (202) 565–3232.

Howard A. Schweitzer,

General Counsel.

[FR Doc. 08–681 Filed 2–14–08; 8:45 am]

BILLING CODE 6690–01–M

FEDERAL DEPOSIT INSURANCE CORPORATION

Statement of Policy on Bank Merger Transactions

AGENCY: Federal Deposit Insurance Corporation ("FDIC").

ACTION: Amendment of statement of policy.

SUMMARY: The FDIC is amending its Statement of Policy on Bank Merger Transactions ("Statement of Policy") in order to conform it to the Bank Merger Act, as amended by the Financial Services Regulatory Relief Act of 2006 ("FSRRA"). The FSRRA (i) eliminated the need for the FDIC to obtain a competitive factors report from the other three Federal banking agencies in processing a merger application and (ii) eliminated both the post-approval waiting period and the need to obtain any competitive factors reports, when the merger solely involves an insured depository institution and one or more affiliates. In addition, the FDIC is amending its Statement of Policy in order to remove any discussion of "Oakar Transactions" since the Federal Deposit Insurance Reform Act of 2005 consolidated the former Savings Association Insurance Fund ("SAIF") and the former Bank Insurance Fund ("BIF") into the Deposit Insurance Fund. Finally, the FDIC is amending its Statement of Policy in order to conform the description of the factors to be considered in evaluating a merger more closely to the language of the Bank Merger Act, and for other technical reasons.

DATES: February 15, 2008.

FOR FURTHER INFORMATION CONTACT: Brett A. McCallister, Review Examiner (816) 234–8099 x4223, in the Division of Supervision and Consumer Protection; Julia E. Paris, Senior Attorney (202) 898–3821 or Robert C. Fick, Counsel, (202) 898–8962, in the Legal Division.

SUPPLEMENTARY INFORMATION:

I. Background

On October 13, 2006, the President signed into law the FSRRA, Public Law No. 109–351. The stated purpose of the law is to reduce regulatory burden and improve productivity for insured depository institutions. Many of the provisions of this law amended statutes that the FDIC administers. One of those statutes is the Bank Merger Act.[1] In addition, the Federal Deposit Insurance Reform Act of 2005 ("FDIRA")[2] consolidated the SAIF and the BIF into the Deposit Insurance Fund. As a result, the FDIC is amending its Statement of Policy[3] to conform it to the Bank Merger Act, as amended by FSRRA, and to the changes made by FDIRA. The FDIC is not seeking comment on the amendments that it is making to the Statement of Policy, and the amendments are effective upon publication in the **Federal Register**.

II. FSRRA Amendments to the Bank Merger Act

A. Section 606 of FSRRA

Four Federal banking agencies must utilize the Bank Merger Act to approve merger transactions subject to their respective jurisdiction; those agencies are the FDIC, the Federal Reserve Board ("FRB"), the Office of the Comptroller of the Currency ("OCC"), and the Office of Thrift Supervision ("OTS"). Prior to FSRRA, the Federal banking agency responsible for processing a particular merger application had to request and obtain a competitive factors report from each of the other three Federal banking agencies. Section 606 of FSRRA amended section 18(c)(4) of the Federal Deposit Insurance Act ("FDI Act"), 12 U.S.C. 1828(c)(4), to eliminate that requirement. Section 606 did not, however, eliminate the requirement that the responsible agency obtain a competitive factors report from the Attorney General of the United States; that requirement remains unchanged. In addition, section 606 also added the requirement that in processing a merger application, the FRB, the OCC, or the OTS, as the case may be, must submit a copy of each request for a competitive factors report to the FDIC.

Section 606 also made two changes to the Bank Merger Act that apply to mergers that solely involve an insured depository institution and one or more affiliates ("Affiliate Mergers"). First, for Affiliate Mergers, section 606 amended section 18(c)(4) of the FDI Act, 12 U.S.C. 1828(c)(4), to eliminate the need for the responsible Federal banking agency to request competitive factors reports from either the other Federal banking agencies or the Attorney General of the

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[1] Section 18(c) of the Federal Deposit Insurance Act, 12 U.S.C. 1828(c).

[2] Pub. L. 109–171, 120 Stat. 9 (Feb. 8, 2006).

[3] The FDIC's Statement of Policy on Bank Merger Transactions was published in the **Federal Register** at 63 FR 44761 on August 20, 1998; subsequent amendments were published at 67 FR 48178 on July 23, 2002 and at 67 FR 79278 on December 27, 2002.

Proof of Publication

(2015.5 C.C.P)

4-27-05 [illegible]

NOTICE OF INTENT TO PREPARE ENVIRONMENTAL IMPACT STATEMENT RE: NORTH FORK RANCHERIA BUREAU OF INDIAN AFFAIRS

STATE OF CALIFORNIA)
) ss.
County of Madera)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Madera Tribune, a newspaper of general circulation, published in the City of Madera, County of Madera, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Madera, State of California, under the date of November 9, 1966, Case Number 4875 that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

APRIL 8, 2005

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Ellen Beach

Signature

Date: April 8, 2005

Proof of Publication - The Madera Tribune, P.O. Box 269, Madera, CA
Adjudged a newspaper of general circulation by court decree No. 4875
The Madera Tribune

Notice of Intent To Prepare an Environmental Impact Statement for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, California; Correction

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice.

SUMMARY: This notice advises the public of a correction to the Bureau of Indian Affairs' (BIA) Notice of Intent to prepare an Environmental Impact Statement (EIS) for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, California, published in the Federal Register on October 27, 2004 (69 FR 62721), which described the proposed action. The October notice is corrected to include statements concerning project alternatives, which are provided in the SUPPLEMENTARY INFORMATION section. This notice also re-opens public scoping to identify potential issues, concerns and alternatives to be considered in the EIS.

DATES: Written comments must arrive by May 6, 2005.

ADDRESSES: You may mail or hand carry written comments to Clay Gregory, Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-6042.

SUPPLEMENTARY INFORMATION: The proposed action and a reasonable range of alternatives, including a no-action alternative, will be analyzed in the EIS. Other possible alternatives currently under consideration are a reduced-intensity alternative, an alternate-use alternative and an off-site alternative. The range of issues and alternatives may be expanded based on comments received during the scoping process. Additional supplemental information, including maps of the project site, may be obtained from John Rydzik at (916) 978-6042.

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the ADDRESSES section during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by the law. We will not, however, consider anonymous comments. All sub-

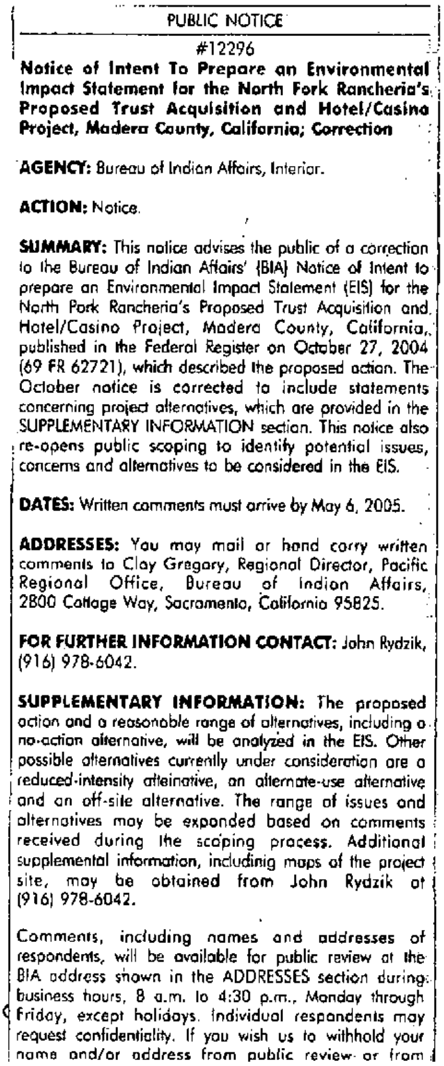
ANALYTICAL ENVIRONMENTAL
SERVICES, 2021 "N" STREET
ATTN: SUSAN ENGELKE
SACRAMENTO , CA 95814

PROOF OF PUBLICATION

received
4/14/05

COUNTY OF FRESNO
STATE OF CALIFORNIA

EXHIBIT A.



PUBLIC NOTICE

#12296

Notice of Intent To Prepare an Environmental Impact Statement for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, California; Correction

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice.

SUMMARY: This notice advises the public of a correction to the Bureau of Indian Affairs' (BIA) Notice of Intent to prepare an Environmental Impact Statement (EIS) for the North Pork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, California, published in the Federal Register on October 27, 2004 (69 FR 62721), which described the proposed action. The October notice is corrected to include statements concerning project alternatives, which are provided in the SUPPLEMENTARY INFORMATION section. This notice also re-opens public scoping to identify potential issues, concerns and alternatives to be considered in the EIS.

DATES: Written comments must arrive by May 6, 2005.

ADDRESSES: You may mail or hand carry written comments to Clay Gregory, Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-6042.

SUPPLEMENTARY INFORMATION: The proposed action and a reasonable range of alternatives, including a no-action alternative, will be analyzed in the EIS. Other possible alternatives currently under consideration are a reduced-intensity alteinative, an alternate-use alternative and an off-site alternative. The range of issues and alternatives may be expanded based on comments received during the scoping process. Additional supplemental information, includinig maps of the project site, may be obtained from John Rydzik at (916) 978-6042.

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the ADDRESSES section during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.

The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 22, 1994, Action No. 520058-9.

The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

April 9, 2005

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated APRIL 10, 2005

Cathy Aguilera

COUNTY OF FRESNO
STATE OF CALIFORNIA

EXHIBIT A.

PUBLIC NOTICE

#12296

Notice of Intent To Prepare an Environmental Impact Statement for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, California; Correction

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice.

SUMMARY: This notice advises the public of a correction to the Bureau of Indian Affairs' (BIA) Notice of Intent to prepare an Environmental Impact Statement (EIS) for the North Pork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, California, published in the Federal Register on October 27, 2004 (69 FR 62721), which described the proposed action. The October notice is corrected to include statements concerning project alternatives, which are provided in the SUPPLEMENTARY INFORMATION section. This notice also re-opens public scoping to identify potential issues, concerns and alternatives to be considered in the EIS.

DATES: Written comments must arrive by May 6, 2005.

ADDRESSES: You may mail or hand carry written comments to Clay Gregory, Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-6042.

SUPPLEMENTARY INFORMATION: The proposed action and a reasonable range of alternatives, including a no-action alternative, will be analyzed in the EIS. Other possible alternatives currently under consideration are a reduced-intensity alternative, an alternate-use alternative and an off-site alternative. The range of issues and alternatives may be expanded based on comments received during the scoping process. Additional supplemental information, includinig maps of the project site, may be obtained from John Rydzik at (916) 978-6042.

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the ADDRESSES section during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by the law. We will not, however, consider anonymous comments. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

This notice is published in accordance with section 1503.1 of the Council of Environmental Quality Regulations (40 CFR parts 1500 through 1508) implementing the procedural requirements of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4371 et seq.), Department of the Interior Manual (516 DM 1-6), and is in the exercise of authority delegated to the Principal Deputy Assistant Secretary-Indian Affairs by 209 DM 8.1.

(PUB: April 9, 2005)

FPROC

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.

The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 22, 1994, Action No. 520058-9.

The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

April 9, 2005

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated APRIL 10, 2005

Cathy Aguilera

Proof of Publication

(2015.5 C.C.P.)

NOTICE OF INTENT TO PREPARE EIS
NORTH FORK RANCHERIA TRUST
ACQUISITION & HOTEL/CASINO PROJECT

STATE OF CALIFORNIA)
) ss.
County of Madera)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Madera Tribune, a newspaper of general circulation, published in the City of Madera, County of Madera, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Madera, State of California, under the date of November 9, 1966, Case Number 4875 that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

NOVEMBER 12, 2004

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Ellen Beach
Signature

Date: November 12, 2004

Proof of Publication - The Madera Tribune, P.O. Box 269, Madera, CA 9
Adjudged a newspaper of general circulation by court decree No. 4875 d
The Madera Tribune

Notice of Intent To Prepare an Environmental Impact Statement for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, CA

AGENCY: Bureau of Indian Affairs,
Interior

ACTION: Notice.

SUMMARY: This notice advises the public that the Bureau of Indian Affairs (BIA) intends to gather information necessary for preparing an Environmental Impact Statement (EIS) for the proposed 305 acre trust acquisition and casino development project to be located within unincorporated Madera County, California. The purpose of the proposed action is to help provide for the economic development of the North Fork Rancheria of Mono Indians (Tribe). This notice also announces a public scoping meeting to identify potential issues and content for inclusion in the EIS.

DATES: Written comments on the scope and implementation of this proposal must arrive by November 26, 2004. The public scoping meeting will be held November 15, 2004, from 6 p.m. to 9 p.m., or until the last public comment is received.

ADDRESSES: You may mail or hand carry written comments to Clay Gregory, Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825. The public scoping meeting will be at the Hatfield Hall, Madera District Fairgrounds, 1850 West Cleveland Avenue, Madera, California.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-0042.

SUPPLEMENTARY INFORMATION: The Tribe proposes that 305 acres of land be taken into trust and that a casino, parking, hotel, and other facilities supporting the [illegible] constructed on the trust acquisition property. The 305 acres, which are made up of 7 parcels of land, are located within unincorporated Madera County, California, just north of the City of Madera and adjacent to State Route 99 (SR-99). The site is bounded on the north by Avenue 18, rural residential land, light industrial land, and vacant land; on the east by Golden State Boulevard and SR-99; on the south by agricultural land and residential land; and on the west by Road 23 and agricultural land.

The proposed action is to develop an approximately 472,000 square foot hotel and casino resort and associated facilities, which would include a main gaming hall, food and beverage services, retail space, banquet/meeting space, administration space, and a hotel. Food and beverage facilities would include three full service restaurants, a five-tenant food court, a buffet, four bars and a lounge. The hotel would include 200 rooms, a resort-style pool area and a spa. Approximately 4,500 parking spaces would be provided. Regional access to the project site is via SR-99. Road 23, Avenue 18, and Golden State Boulevard would provide direct access to the hotel/casino resort.

Proof of Publication

(2015.5 C.C.P.)

NOTICE RE:

NORTH FORK RANCHERIA

BUREAU OF INDIAN AFFAIRS, INTERIOR

EIS

STATE OF CALIFORNIA)
) ss.
County of Madera)

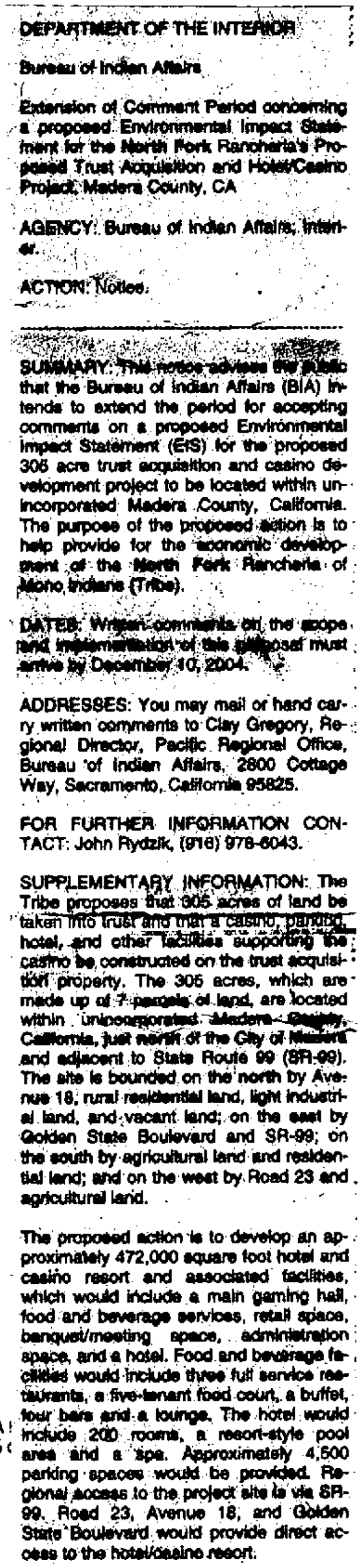
I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Madera Tribune, a newspaper of general circulation, published in the City of Madera, County of Madera, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Madera, State of California, under the date of November 9, 1966, Case Number 4875 that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

NOVEMBER 29, 2004

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Ellen Beach
Signature

Date: November 29, 2004



DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Extension of Comment Period concerning a proposed Environmental Impact Statement for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, CA

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice.

SUMMARY: This notice advises the public that the Bureau of Indian Affairs (BIA) intends to extend the period for accepting comments on a proposed Environmental Impact Statement (EIS) for the proposed 305 acre trust acquisition and casino development project to be located within unincorporated Madera County, California. The purpose of the proposed action is to help provide for the economic development of the North Fork Rancheria of Mono Indians (Tribe).

DATES: Written comments on the scope and implementation of this proposal must arrive by December 10, 2004.

ADDRESSES: You may mail or hand carry written comments to Clay Gregory, Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-6043.

SUPPLEMENTARY INFORMATION: The Tribe proposes that 305 acres of land be taken into trust and that a casino, parking, hotel, and other facilities supporting the casino be constructed on the trust acquisition property. The 305 acres, which are made up of 7 parcels of land, are located within unincorporated Madera County, California, just north of the City of Madera and adjacent to State Route 99 (SR-99). The site is bounded on the north by Avenue 18, rural residential land, light industrial land, and vacant land; on the east by Golden State Boulevard and SR-99; on the south by agricultural land and residential land; and on the west by Road 23 and agricultural land.

The proposed action is to develop an approximately 472,000 square foot hotel and casino resort and associated facilities, which would include a main gaming hall, food and beverage services, retail space, banquet/meeting space, administration space, and a hotel. Food and beverage facilities would include three full service restaurants, a five-tenant food court, a buffet, four bars and a lounge. The hotel would include 200 rooms, a resort-style pool area and a spa. Approximately 4,500 parking spaces would be provided. Regional access to the project site is via SR-99. Road 23, Avenue 18, and Golden State Boulevard would provide direct access to the hotel/casino resort.

Proof of Publication - The Madera Tribune, P.O. Box 269, Madera, CA
Adjudged a newspaper of general circulation by court decree No. 4875
The Madera Tribune

Areas of environmental concern to be addressed in the EIS include land use, geology and soils, water resources, agricultural resources, biological resources, cultural resources, mineral resources, paleontological resources, traffic and transportation, noise, air quality, public health/environmental hazards, public services and utilities, hazardous waste and materials, socio-economics, environmental justice, and visual resources/aesthetics. The range of issues addressed may be expanded based on comments received during the scoping process.

Public Comment Availability

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the ADDRESSES section, during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by the law. We will not, however, consider anonymous comments. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

No. 5279 - Nov. 29, 2004

Proof of Publication

(2015.5 C.C.P.)

DEPT. OF INTERIOR

BUREAU OF INDIAN AFFAIRS

RE: EXTENSION OF COMMENT PERIOD

NORTH FORK RANCHERIA

STATE OF CALIFORNIA)
) ss.
County of Madera)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Madera Tribune, a newspaper of general circulation, published in the City of Madera, County of Madera, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Madera, State of California, under the date of November 9, 1966, Case Number 4875 that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

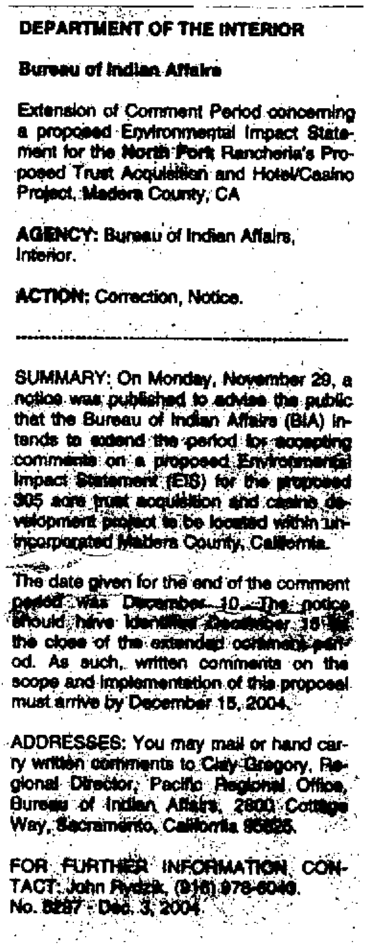
DECEMBER 3, 2004

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Ellen Beard

Signature

Date: December 3, 2004



DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Extension of Comment Period concerning a proposed Environmental Impact Statement for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, CA

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Correction, Notice.

SUMMARY: On Monday, November 29, a notice was published to advise the public that the Bureau of Indian Affairs (BIA) intends to extend the period for accepting comments on a proposed Environmental Impact Statement (EIS) for the proposed 305 acre trust acquisition and casino development project to be located within unincorporated Madera County, California.

The date given for the end of the comment period was December 10. The notice should have identified December 15 as the close of the extended comment period. As such, written comments on the scope and implementation of this proposal must arrive by December 15, 2004.

ADDRESSES: You may mail or hand carry written comments to Clay Gregory, Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825.

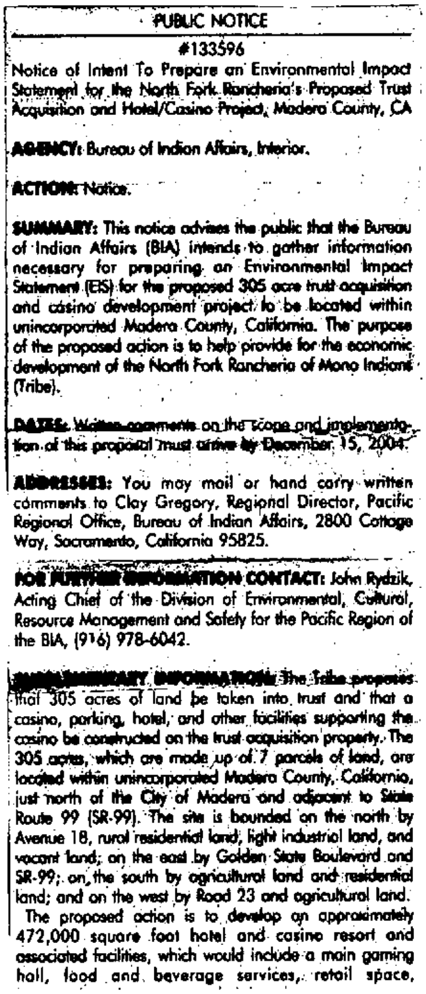
FOR FURTHER INFORMATION, CONTACT: John Rydzik, (916) 978-6040.
No. 5287 - Dec. 3, 2004

ANALYTICAL ENVIRONMENTAL
SERVICES, 2021 "N" STREET
ATTN: CHAD BROUSSARD
SACRAMENTO , CA 95814

PROOF OF PUBLICATION

COUNTY OF FRESNO
STATE OF CALIFORNIA

EXHIBIT A.



PUBLIC NOTICE

#133596

Notice of Intent To Prepare an Environmental Impact Statement for the North Fork Rancheria's Proposed Trust Acquisition and Hotel/Casino Project, Madera County, CA

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice.

SUMMARY: This notice advises the public that the Bureau of Indian Affairs (BIA) intends to gather information necessary for preparing an Environmental Impact Statement (EIS) for the proposed 305 acre trust acquisition and casino development project to be located within unincorporated Madera County, California. The purpose of the proposed action is to help provide for the economic development of the North Fork Rancheria of Mono Indians (Tribe).

DATES: Written comments on the scope and implementation of this proposal must arrive by December 15, 2004.

ADDRESSES: You may mail or hand carry written comments to Clay Gregory, Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825.

FOR FURTHER INFORMATION CONTACT: John Rydzik, Acting Chief of the Division of Environmental, Cultural, Resource Management and Safety for the Pacific Region of the BIA, (916) 978-6042.

SUPPLEMENTARY INFORMATION: The Tribe proposes that 305 acres of land be taken into trust and that a casino, parking, hotel, and other facilities supporting the casino be constructed on the trust acquisition property. The 305 acres, which are made up of 7 parcels of land, are located within unincorporated Madera County, California, just north of the City of Madera and adjacent to State Route 99 (SR-99). The site is bounded on the north by Avenue 18, rural residential land, light industrial land, and vacant land; on the east by Golden State Boulevard and SR-99; on the south by agricultural land and residential land; and on the west by Road 23 and agricultural land.

The proposed action is to develop an approximately 472,000 square foot hotel and casino resort and associated facilities, which would include a main gaming hall, food and beverage services, retail space,

FPROOFAD

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.

The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 22, 1994, Action No. 520058-9.

The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

December 7, 2004

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated DECEMBER 7, 2004

banquet/meeting space, administration space, and a hotel. Food and beverage facilities would include three full service restaurants, a five-tenant food court, a buffet, four bars and a lounge. The hotel would include 200 rooms, a resort-style pool area and a spa. Approximately 4,500 parking spaces would be provided. Regional access to the project site is via SR-99. Road 23, Avenue 18, and Golden State Boulevard would provide direct access to the hotel/casino resort.

Areas of environmental concern to be addressed in the EIS include land use, geology and soils, water resources, agricultural resources, biological resources, cultural resources, mineral resources, paleontological resources, traffic and transportation, noise, air quality, public health/environmental hazards, public services and utilities, hazardous waste and materials, socio-economics, environmental justice, and visual resources/aesthetics. The range of issues addressed may be expanded based on comments received during the scoping process.

Public Comment Availability

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the ADDRESSES section, during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by the law. We will not, however, consider anonymous comments. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Authority

This notice is published in accordance with section 1503.1 of the Council of Environmental Quality Regulations (40 CFR parts 1500 through 1508) implementing the procedural requirements of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4371 et seq.), Department of the Interior Manual (516 DM 1-6), and is in the exercise of authority delegated to the Principal Deputy Assistant Secretary--Indian Affairs by 209 DM 8.1.

(PUB: December 7, 2004)

Proof of Publication

(2015.5 C.C.P.)

DRAFT EIR STATEMENT

RE: NORTH FORK TRUST ACQUISITION

& HOTEL/CASINO PROJECT

STATE OF CALIFORNIA)
) ss.
County of Madera)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Madera Tribune, a newspaper of general circulation, published in the City of Madera, County of Madera, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Madera, State of California, under the date of November 9, 1966, Case Number 4875 that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

FEBRUARY 15, 2008

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Signature

Date: February 15, 2008

DEPARTMENT OF THE INTERIOR
Bureau of Indian Affairs

Draft Environmental Impact Statement for the Proposed 305± acre Rancheria's North Fork Trust Acquisition and Hotel/Casino Project, Madera County, California.

AGENCY: Bureau of Indian Affairs, Interior
ACTION: Notice

SUMMARY: This notice advises the public that the Bureau of Indian Affair (BIA) intends to file a Draft Environmental Impact Statement (DEIS) with the U.S. Environmental Protection Agency for the proposed 305± acre trust acquisition and casino development project to be located within unincorporated Madera County, California, and that the DEIS is now available for public review. The purpose of the proposed action is to help provide for the economic development of the North Fork Rancheria of Mono Indians (Tribe). This notice also announces a hearing for the public to provide comments on the DEIS.

DATES: Written comments on the DEIS must arrive by March 31, 2008. The public hearing will be held March 12, 2008, from 6:00 p.m. to 9:00 p.m., or until the last public comment is received.

ADDRESSES: You may mail or hand carry written comments to Amy Dutschke, Acting Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825. Please include your name, return address, and the caption, "DEIS Comments, North Fork Casino Project," on the first page of your written comments.

The public hearing will be held at the Hatfield Hall, Madera District Fairgrounds, 1850 W. Cleveland Ave., Madera, California.

The DEIS will be available for review at the Madera County Public Library, 121 N. G St., Madera, CA 93637, and at the Madera County Public Library, Chowchilla Branch, 300 Kings Ave, Chowchilla, CA 93610. General information for the Madera County Public Library can be obtained by calling (559) 675-7871 and for the Madera County Public Library Chowchilla Branch by calling (559) 665-2630.

If you would like to obtain a copy of the DEIS, please write or call John Rydzik, Chief, Division of Environmental, Cultural Resource Management and Safety, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Room W-2820, Sacramento, CA 95823, telephone (916) 978-6042. An electronic version of the DEIS may be viewed at http://www.northforkeis.com.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-6042.

SUPPLEMENTARY INFORMATION: The Tribe has requested that the BIA take into trust 305± acres of land currently held in fee by the Tribe, on which the Tribe proposes to construct a casino, hotel, parking areas and other facilities. The proposed project is located in unincorporated Madera County, just north of the City of Madera and adjacent to State Route 99.

The proposed project includes the development of a 472,000 square foot resort hotel and casino which would include a space, administrative space and a hotel. Multiple food and beverage facilities are planned, including three full service restaurants, a five-tenant food court, a buffet, four bars and a lounge. The hotel would include 200 rooms, a resort-style pool area and a spa. Approximately 4,500 parking spaces would be provided. Regional access to the site is via State Route 99. Road 23, Ave 18 and Golden State Boulevard would provide direct access.

A range of project alternatives are considered in the DEIS, including: (A) the proposed project; (B) reduced intensity/smaller scale version of A; (C) mixed use retail development with no gaming component; (D) North Fork site development (smaller-scale version of Alternative A, without retail, high limit gaming, entertainment, hotel, or pool components, on an 80 acre site near the community of North Fork); and (E) no action. Environmental issues addressed in the DEIS include land resources, water resources, air quality, biological resources, cultural resources, socioeconomic conditions, environmental justice, transportation, land use, agriculture, public services, noise, hazardous materials, visual resources, cumulative effects, indirect effects, growth inducing effects and mitigation measures.

The BIA serves as the Lead Agency for compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.), with the National Indian Gaming Commission, the California Department of Transportation, the Madera Irrigation District, the U.S. Environmental Protection Agency, and the City of Madera serving as Cooperating Agencies. A public scoping meeting for the EIS was held by the BIA on November 15, 2004 at the Hatfield Hall, Madera District Fairgrounds, Madera, California.

Public Comment Availability

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the **ADDRESSES** section, during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by the law. We will not, however, consider anonymous comments. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Authority

This notice is published in accordance with section 1503.1 of the Council on Environmental Quality Regulations (40 CFR Parts 1500 through 1508) implementing, the procedural requirements of the National Environmental Policy Act of 1969, as amended (12 U.S.C. 4371 et Seq.), and the Department of the Interior Manual (516 DM 1-6), and is in the exercise of authority delegated to the Principal Deputy Assistant Secretary - Indian Affairs by 209 DM 8.1.
No. 9533 - Feb. 15, 2008

Notice of Completion

See NOTE Below

SCH #

Mail to: State Clearinghouse, 1400 Tenth Street, Sacramento, CA 95814 916/445-0613

Project Title: North Fork Rancheria of Mono Indians Fee-to-Trust Casino/Hotel Project

Lead Agency: Bureau of Indian Affairs, Pacific Region
2800 Cottage Way, Rm. W-2820
Sacramento, CA 95825

Contact Person: John Rydzik
Phone: (916) 978-6042

Project Location

County: Madera
Nearest Community: Madera
Cross Streets: Avenue 18 and Road 23
Total Acres: 305
Assessor's Parcel No. 033-030-010-000; 033-030-011-000; 033-030-012-000; 033-030-013-000; 033-030-014-000; 033-030-015-000; 033-030-017-000
Township: 8 South Range: 23 East
Base: Mount Diablo
Within 2 Miles:
Waterways: Schmidt Creek – on-site; Dry Creek - .5 miles northwest
Airports: 1.5 miles south
Railways: 1 mile east
Schools: NA

Document Type

RECEIVED
FEB 14 2008
4:40pm
STATE CLEARING HOUSE

CEQA:
☐NOP
☐Early Cons
☐Neg Dec
☐Draft EIR
☐Supplement/Subsequent
☐EIR (Prior SCH No.)
☐Other

NEPA:
☐NOI
☐EA
☒Draft EIS
☐FONSI

Other:
☐Joint Document
☐Final Document
☐Other

Local Action Type

☐General Plan Update
☐General Plan Amendment
☐General Plan Element
☐Community Plan
☐Specific Plan
☐Master Plan
☐Planned Unit Development
☐Site Plan
☐Rezone
☐Prezone
☐Use Permit
☐Land Division (Subdivision, Parcel Map, Tract Map, etc.)
☐Annexation
☐Redevelopment
☐Coastal Permit
☐Other

Development Type

☐Residential: *Units*______ *Acres*
☐Office: *Sq.ft.*______ *Acres*_____ *Employees*
☒Commercial: *Sq.ft.*493,010 *Acres* 45 *Employees* 1461
☐Industrial: *Sq.ft.*______ *Acres*_____ *Employees*
☐Educational
☐Recreational
☒Water Facilities: *Type* on-site wells *GD* 400,000
☐Transportation: *Type*
☐Mining: *Mineral*
☐Power: *Type*______ *Watts*
☐Waste Treatment: *Type*
☐Hazardous Waste: *Type*
Other:

Project Issues Discussed in Document

☒Aesthetic/Visual
☒Agricultural Land
☒Air Quality
☒Archaeological/Historical
☐Coastal Zone
☒Drainage/Absorption
☒Economic/Jobs
☒Fiscal
☒Flood Plain/Flooding
☒Forest Land/Fire Hazard
☒Geologic/Seismic
☒Minerals
☒Noise
☒Population/Housing Balance
☒Public Services/Facilities
☐Recreation/Parks
☒Schools/Universities
☐Septic Systems
☒Sewer Capacity
☒Soil Erosion/Compaction/Grading
☒Solid Waste
☒Toxic/Hazardous
☒Traffic/Circulation
☒Vegetation
☒Water Quality
☒Water Supply/Groundwater
☒Wetland/Riparian
☒Wildlife
☒Growth Inducing
☒Land Use
☒Cumulative Effects
☒Other

Present Land Use/Zoning/General Plan Use

Present Land Use – Agriculture
Zoning/General Plan Designation – Agricultural, Rural, Exclusive, Twenty Acre District (ARE-20)/Agricultural

Project Description Acquisition of approximately 305 acres into trust for the North Fork Rancheria of Mono Indians for the purposes of the development of a casino and hotel with related facilities.

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Reviewing Agencies Checklist

KEY

S = Document sent by lead agency
X = Document sent by SCH
✠= Suggested distribution

Resources Agency
☐Boating & Waterways
☐Coastal Commission
☐Coastal Conservancy
☐Colorado River Board
☒Conservation
☒Fish & Game
☒Forestry
☒Office of Historic Preservation
☐Parks & Recreation
☐Reclamation
☐S.F. Bay Conservation & Development Commission
☒Water Resources (DWR)

Business, Transportation & Housing
☒Aeronautics
☒California Highway Patrol
☒CALTRANS
☒Department of Transportation Planning (headquarters)
☒Housing & Community Development

Food & Agriculture

Health & Welfare
☒Health Services

State & Consumer Services
☒General Services
☒OLA (Schools)

Environmental Affairs
☒Air Resources Board
☒APCD/AQMD
☒California Waste Management Board
☐SWRCB: Clean Water Grants
☐SWRCB: Delta Unit
☐SWRCB: Water Quality
☐SWRCB: Water Rights
☒Regional WQCB: Central Valley
☒SYCSD: Wastewater

Youth & Adult Corrections
☐Corrections

Independent Commissions & Offices
☒Energy Commission
☒Native American Heritage Commission
☒Public Utilities Commission
☐Santa Monica Mountains Conservancy
☒State Lands Commission
☐Tahoe Regional Planning Agency

☐Other:

Public Review Period

Starting Date February 15, 2008
Signature

Ending Date March 31, 2008
Date

Lead Agency:
Bureau of Indian Affairs
Consulting Firm: Analytical Environmental Services
Address: 1801 "7" Street, Suite 100
Sacramento, CA 95811
Contact: David Zweig
Phone: (916) 447-3479

Applicant:
North Fork Rancheria
Address: Tribal Office
P.O. Box 929
City/State/Zip: North Fork, CA93643
Phone: (559) 877-2461

For SCH Use Only:

Date Received at SCH
Date Review Starts
Date to Agencies
Date to SCH
Clearance Date
Notes:

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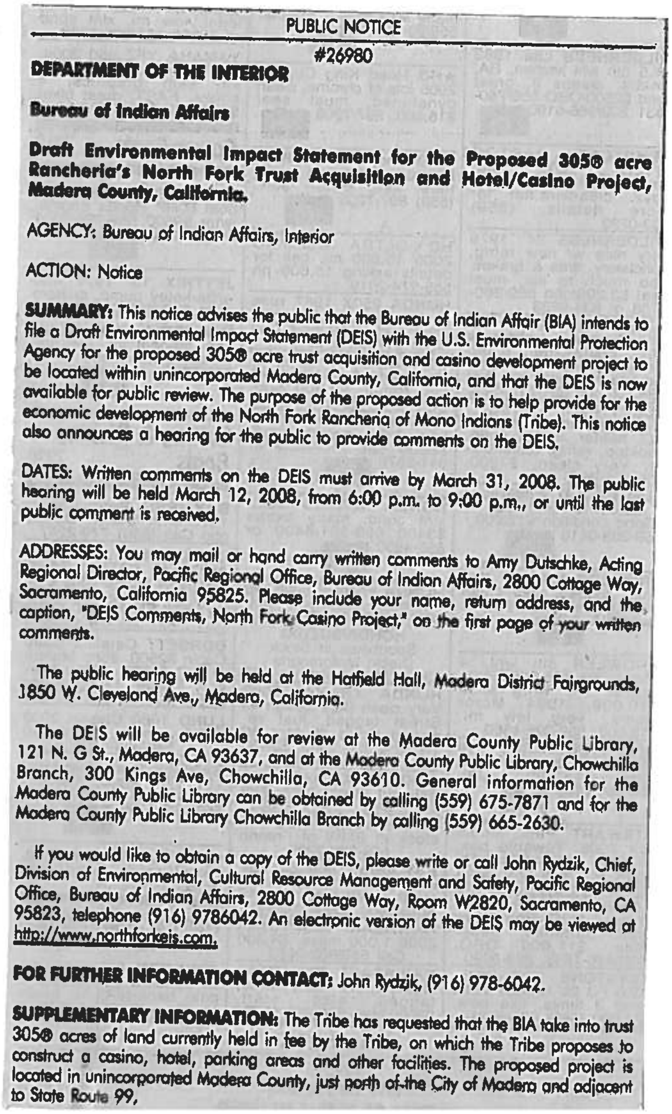
ANALYTICAL ENVIRONMENTAL
SERVICES
1801 7TH STREET, STE 100
SACRAMENTO , CA 95811

PROOF OF PUBLICATION

COUNTY OF FRESNO
STATE OF CALIFORNIA

EXHIBIT A.



PUBLIC NOTICE

#26980

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Draft Environmental Impact Statement for the Proposed 305® acre Rancheria's North Fork Trust Acquisition and Hotel/Casino Project, Madera County, California.

AGENCY: Bureau of Indian Affairs, Interior

ACTION: Notice

SUMMARY: This notice advises the public that the Bureau of Indian Affair (BIA) intends to file a Draft Environmental Impact Statement (DEIS) with the U.S. Environmental Protection Agency for the proposed 305® acre trust acquisition and casino development project to be located within unincorporated Madera County, California, and that the DEIS is now available for public review. The purpose of the proposed action is to help provide for the economic development of the North Fork Rancheria of Mono Indians (Tribe). This notice also announces a hearing for the public to provide comments on the DEIS.

DATES: Written comments on the DEIS must arrive by March 31, 2008. The public hearing will be held March 12, 2008, from 6:00 p.m. to 9:00 p.m., or until the last public comment is received.

ADDRESSES: You may mail or hand carry written comments to Amy Dutschke, Acting Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825. Please include your name, return address, and the caption, "DEIS Comments, North Fork Casino Project," on the first page of your written comments.

The public hearing will be held at the Hatfield Hall, Madera District Fairgrounds, 1850 W. Cleveland Ave., Madera, California.

The DEIS will be available for review at the Madera County Public Library, 121 N. G St., Madera, CA 93637, and at the Madera County Public Library, Chowchilla Branch, 300 Kings Ave, Chowchilla, CA 93610. General information for the Madera County Public Library can be obtained by calling (559) 675-7871 and for the Madera County Public Library Chowchilla Branch by calling (559) 665-2630.

If you would like to obtain a copy of the DEIS, please write or call John Rydzik, Chief, Division of Environmental, Cultural Resource Management and Safety, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Room W2820, Sacramento, CA 95823, telephone (916) 9786042. An electronic version of the DEIS may be viewed at http://www.northforkeis.com.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-6042.

SUPPLEMENTARY INFORMATION: The Tribe has requested that the BIA take into trust 305® acres of land currently held in fee by the Tribe, on which the Tribe proposes to construct a casino, hotel, parking areas and other facilities. The proposed project is located in unincorporated Madera County, just north of the City of Madera and adjacent to State Route 99,

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.

The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 22, 1994, Action No. 520058-9.

The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

February 15, 2008

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated FEBRUARY 15, 2008

Cathy Aguilera

The proposed project includes the development of a 472,000 square foot resort hotel and casino which would include a main gaming hall, food and beverage services, retails space, banquet/meeting space, administrative space and a hotel. Multiple food and beverage facilities are planned, including three full service restaurants, a five-tenant food court, a buffet, four bars and a lounge. The hotel would include 200 rooms, a resort-style pool area and a spa. Approximately 4,500 parking spaces would be provided, Regional access to the site is via State Route 99, Road 23, Ave 18 and Golden State Boulevard would provide direct access,

A range of project alternatives are considered in the DEIS, including: (A) the proposed project; (B) reduced intensity/smaller scale version of A; (C) mixed use retail development with no gaming component; (D) North Fork site development (smaller-scale version of Alternative A, without retail, high limit gaming, entertainment, hotel, or pool components, on an 80 acre site near the community of North Fork); and (E) no action. Environmental issues addressed in the DEIS include land resources, water resources, air quality, biological resources, cultural resources, socioeconomic conditions, environmental justice, transportation, land use, agriculture, public services, noise, hazardous materials, visual resources, cumulative effects, indirect effects, growth inducing effects and mitigation measures.

The BIA serves as the Lead Agency for compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. Section 4321 et seq.), with the National Indian Gaming Commission, the California Department of Transportation, the Madera Irrigation District, the U.S. Environmental Protection Agency, and the City of Madera serving as Cooperating Agencies. A public scoping meeting for the EIS was held by the BIA on November 15, 2004 at the Hatfield Hall, Madera District Fairgrounds, Madera, California.

Public Comment Availability

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the **ADDRESSES** section, during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by the law. We will not, however, consider anonymous comments. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Authority

This notice is published in accordance with section 1503.1 of the Council on Environmental Quality Regulations (40 CFR Parts 1500 through 1508) implementing, the procedural requirements of the National Environmental Policy Act of 1969, as amended (12 U.S,C. 4371 et Seq.), and the Department of the Interior Manual (516 DM 16), and is in the exercise of authority delegated to the Principal Deputy Assistant Secretary Indian Affairs by 209 DM 8.1.

(PUB: February 15, 2008)

Proof of Publication

(2015.5 C.C.P.)

DRAFT EIR STATEMENT
RE: NORTH FORK TRUST ACQUISITION
& HOTEL/CASINO PROJECT

STATE OF CALIFORNIA)
) ss.
County of Madera)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Madera Tribune, a newspaper of general circulation, published in the City of Madera, County of Madera, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Madera, State of California, under the date of November 9, 1966, Case Number 4875 that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

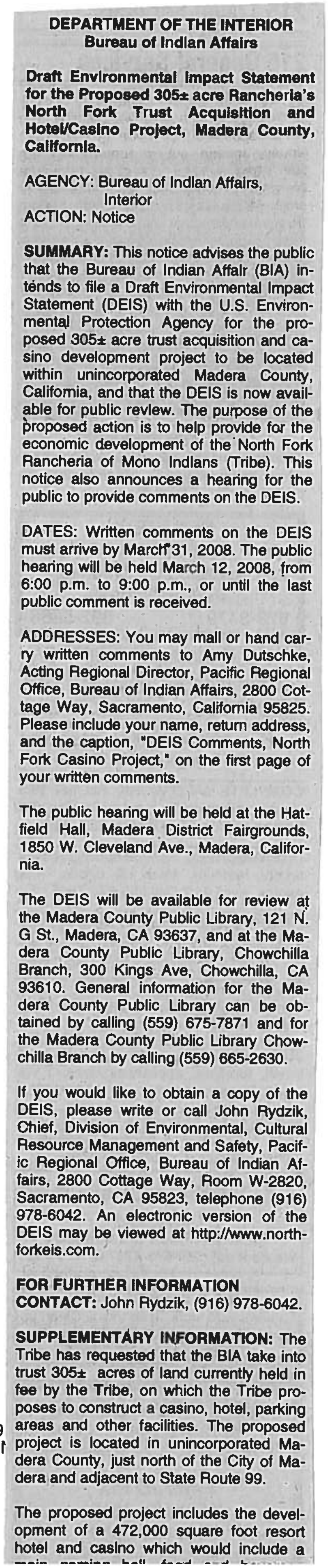
FEBRUARY 15, 2008

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Ellen Beach

Signature

Date: February 15, 2008



DEPARTMENT OF THE INTERIOR
Bureau of Indian Affairs

Draft Environmental Impact Statement for the Proposed 305± acre Rancheria's North Fork Trust Acquisition and Hotel/Casino Project, Madera County, California.

AGENCY: Bureau of Indian Affairs, Interior
ACTION: Notice

SUMMARY: This notice advises the public that the Bureau of Indian Affair (BIA) intends to file a Draft Environmental Impact Statement (DEIS) with the U.S. Environmental Protection Agency for the proposed 305± acre trust acquisition and casino development project to be located within unincorporated Madera County, California, and that the DEIS is now available for public review. The purpose of the proposed action is to help provide for the economic development of the North Fork Rancheria of Mono Indians (Tribe). This notice also announces a hearing for the public to provide comments on the DEIS.

DATES: Written comments on the DEIS must arrive by March 31, 2008. The public hearing will be held March 12, 2008, from 6:00 p.m. to 9:00 p.m., or until the last public comment is received.

ADDRESSES: You may mail or hand carry written comments to Amy Dutschke, Acting Regional Director, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Sacramento, California 95825. Please include your name, return address, and the caption, "DEIS Comments, North Fork Casino Project," on the first page of your written comments.

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If you would like to obtain a copy of the DEIS, please write or call John Rydzik, Chief, Division of Environmental, Cultural Resource Management and Safety, Pacific Regional Office, Bureau of Indian Affairs, 2800 Cottage Way, Room W-2820, Sacramento, CA 95823, telephone (916) 978-6042. An electronic version of the DEIS may be viewed at http://www.northforkeis.com.

FOR FURTHER INFORMATION CONTACT: John Rydzik, (916) 978-6042.

SUPPLEMENTARY INFORMATION: The Tribe has requested that the BIA take into trust 305± acres of land currently held in fee by the Tribe, on which the Tribe proposes to construct a casino, hotel, parking areas and other facilities. The proposed project is located in unincorporated Madera County, just north of the City of Madera and adjacent to State Route 99.

The proposed project includes the development of a 472,000 square foot resort hotel and casino which would include a

Proof of Publication - The Madera Tribune, P.O. Box 269, Madera, CA 93639
Adjudged a newspaper of general circulation by court decree No. 4875 dated
The Madera Tribune

space, administrative space and a hotel. Multiple food and beverage facilities are planned, including three full service restaurants, a five-tenant food court, a buffet, four bars and a lounge. The hotel would include 200 rooms, a resort-style pool area and a spa. Approximately 4,500 parking spaces would be provided. Regional access to the site is via State Route 99. Road 23, Ave 18 and Golden State Boulevard would provide direct access.

A range of project alternatives are considered in the DEIS, including: (A) the proposed project; (B) reduced intensity/smaller scale version of A; (C) mixed use retail development with no gaming component; (D) North Fork site development (smaller-scale version of Alternative A, without retail, high limit gaming, entertainment, hotel, or pool components, on an 80 acre site near the community of North Fork); and (E) no action. Environmental issues addressed in the DEIS include land resources, water resources, air quality, biological resources, cultural resources, socioeconomic conditions, environmental justice, transportation, land use, agriculture, public services, noise, hazardous materials, visual resources, cumulative effects, indirect effects, growth inducing effects and mitigation measures.

The BIA serves as the Lead Agency for compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.), with the National Indian Gaming Commission, the California Department of Transportation, the Madera Irrigation District, the U.S. Environmental Protection Agency, and the City of Madera serving as Cooperating Agencies. A public scoping meeting for the EIS was held by the BIA on November 15, 2004 at the Hatfield Hall, Madera District Fairgrounds, Madera, California.

Public Comment Availability

Comments, including names and addresses of respondents, will be available for public review at the BIA address shown in the **ADDRESSES** section, during business hours, 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish us to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by the law. We will not, however, consider anonymous comments. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Authority

This notice is published in accordance with section 1503.1 of the Council on Environmental Quality Regulations (40 CFR Parts 1500 through 1508) implementing, the procedural requirements of the National Environmental Policy Act of 1969, as amended (12 U.S.C. 4371 et Seq.), and the Department of the Interior Manual (516 DM 1-6), and is in the exercise of authority delegated to the Principal Deputy Assistant Secretary - Indian Affairs by 209 DM 8.1.

No. 9533 - Feb. 15, 2008

APPENDIX C

Memoranda of Understanding

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is made this 16 day of August, 2004, by and between Madera County, California, and the North Fork Rancheria of Mono Indians of California. (The capitalized terms not otherwise defined herein shall have the meanings set forth in Section 1 below.)

RECITALS

WHEREAS, the Tribe is a federally recognized Indian tribe; and

WHEREAS, the federal government terminated its government-to-government relationship with the Tribe pursuant to the California Rancheria Act of 1958; and

WHEREAS, pursuant to litigation, the federal government's government-to-government relationship with the Tribe has been restored; and

WHEREAS, the Secretary does not hold title to land in trust for the benefit of the Tribe which is eligible for gaming; and

WHEREAS, the Tribe has identified the Property, which is located in an unincorporated area of the County, as land which the Tribe desires to be taken into trust for the purposes of gaming; and

WHEREAS, the Tribe currently intends to request that the Secretary accept title to the Property in trust for the benefit of the Tribe, determine that the Trust Property is eligible for gaming under IGRA, and prepare an EIS pursuant to NEPA as part of the Trust Acquisition process; and

WHEREAS, after the Trust Acquisition Date, the Tribe intends to use the Trust Property for the development, construction and operation of the Project; and

WHEREAS, the Tribe does not intend to make any physical changes to the environment on the Property prior to the Trust Acquisition Date; and

WHEREAS, the Tribe has not requested the County to issue, the County does not intend to commit itself to issue, and the Tribe would be able to consummate the Trust Acquisition and develop, construct and operate the Project if the County does not issue, any lease, permit, license, certificate or other entitlement for use relating to the Trust Acquisition, the Federal and State Actions or the Project; and

WHEREAS, by executing, delivering and performing this MOU, the County does not intend to exercise discretionary judgment over the Trust Acquisition, the Federal and State Actions or the Project; and

AUG 1 6 2004

WHEREAS, the Trust Acquisition, the Federal and State Actions and the Project are not "projects" of the County within the meaning of CEQA and are not subject to the discretionary approval of the County; and

WHEREAS, after the Trust Acquisition Date, the County does not have the legal authority to assess real property taxes against the Trust Property or to collect other taxes or assessments from the Tribe; and

WHEREAS, although not legally required to do so, the Tribe nevertheless desires to make voluntary contributions to the County to mitigate potential impacts of the Trust Acquisition and Project on the County; and

WHEREAS, the Tribe intends that the total amount of the contributions which the Tribe will make to the County pursuant to this MOU exceeds the total amount of the taxes, fees and other assessments the County would receive from a private developer of a comparable project; and

WHEREAS, but for this MOU, the County would not receive such contributions from the Tribe; and

WHEREAS, the Tribe is not legally required to enter into this MOU in order to consummate the Trust Acquisition and the Federal and State Actions or develop, construct and operate the Project; and

WHEREAS, the County has met and conferred with the Cities and the Madera Unified School District prior to the approval and execution of this MOU; and

WHEREAS, the County has determined after two public hearings that it is in the best interests of the County to enter into this MOU and for the Tribe to develop, construct and operate the Project; and

WHEREAS, the County and the Tribe desire to establish a cooperative and mutually respectful government-to-government relationship and to address other governmental issues of mutual interest to the County and the Tribe.

NOW, THEREFORE, the Parties hereby agree as follows:

1. Definitions

The terms not defined elsewhere in this MOU shall have the following meanings:

"CEQA" means the California Environmental Quality Act (California Public Resources Code § 21000 et seq.) and the guidelines promulgated thereunder, as the same may be amended or modified from time to time.

"Cities" means the City of Madera, California, and the City of Chowchilla, California, which Cities are the only cities located within the boundaries of the County.

"County" means Madera County, California, a political subdivision of the State, and its Departments, agencies and subdivisions.

"Construction Date" means the later of the date (i) the Tribe closes a loan to obtain funds from a financial institution (other than Developer) to finance construction of the Project, (ii) the Tribe commences vertical construction of the Project, (iii) the Tribe enters into a Tribal-State Compact, or (iv) the Chairman of the NIGC approves the Management Agreement between the Tribe and SC Madera Management, LLC.

"CPI Adjustment" means an annual adjustment in the applicable dollar amount which (i) is effective as of July 1 of each year, as applicable, during the term of this MOU and (ii) is equal to the percentage change in the U.S. Department of Labor's Consumer Price Index for all Urban Consumers (CPI-U), U.S. city average for all items, for the previous May to May period, rounded to the nearest Thousand Dollars.

"Developer" means any or all of SC Madera Development, LLC and SC Madera Management, LLC (which are both independent contractors of the Tribe) and their respective affiliates, successors and assigns.

"EIS" means an environmental impact statement prepared by the Secretary as part of the Trust Acquisition process.

"Escrow Arrangement" means a payment arrangement pursuant to which the Tribe or its designee provides the County or its designee (which could be the Tribe or its contractor) with assurance of payment on terms, conditions and payment schedules (after the Construction Date and consistent with the County's requirements) agreed to by the Tribe and the County, including, without limitation, an escrow account, letter of credit or payment bond arrangement.

"Facility" means the gaming facility and those rooms, buildings, and areas, including parking lots and walkways, a principal purpose of which is to serve the activities of the gaming facility which are located on the Trust Property and described in the EIS.

"Federal and State Actions" means (i) the consummation of the Trust Acquisition, (ii) the NIGC Approvals, (iii) the negotiation and execution of the Tribal-State Compact by the State Governor, the ratification of the Tribal-State Compact by the State legislature and the approval of the Tribal-State Compact by the Secretary, and (iv) the issuance or completion by federal, state or regional Public Agencies of approvals, permits, licenses, certifications, opinions or consultations requested by the Tribe in connection with the Trust Acquisition or the Project.

"IGRA" means the Indian Gaming Regulatory Act of 1988 (25 U.S.C. § 2701 *et seq.*) and the regulations promulgated thereunder, as the same may be amended or modified from time to time.

"MOU" means this Memorandum of Understanding, as the same may be amended by written agreement of the County and the Tribe from time to time.

"NEPA" means the National Environmental Policy Act (42 USC § 4321 *et seq.*) and the regulations promulgated thereunder, as the same may be amended or modified from time to time.

"NIGC" means the National Indian Gaming Commission established pursuant to IGRA.

"NIGC Approvals" means (i) the approval by the NIGC of the Tribe's Tribal Gaming Ordinance and (ii) the approval by the Chairman of the NIGC of the Management Agreement between the Tribe and SC Madera Management, LLC.

"Opening Date" means the date on which the Tribe commences commercial gaming operations open to the public on the Trust Property.

"Party" means the County or the Tribe.

"Parties" means the County and the Tribe.

"Project" means the development, construction and operation of the Facility on the Property or the Trust Property.

"Property" means a parcel of approximately 305 acres of land which is located within the unincorporated area of the County and which is identified by the legal description set forth on Exhibit A hereto, or any portion of such land.

"Public Entity" means any federal, State, regional or local government entity, public authority, public agency, public corporation or any subdivision thereof, including, without limitation, the County and the Cities.

"Secretary" means the Secretary of the United States Department of the Interior or his or her representative.

"State" means the State of California.

"Tribe" means the North Fork Rancheria of Mono Indians of California, a federally recognized tribe listed in the Federal Register as the Northfork Rancheria of Mono Indians of California.

"Tribal-State Compact" means all Tribal-State Gaming Compacts for the Project entered into between the Tribe and the State pursuant to IGRA, as approved by the Secretary or allowed to become effective by operation of law pursuant to IGRA.

"Trust Acquisition" means (i) the acquisition by the United States of title to the Property in trust for the benefit of the Tribe, and (ii) the determination by the Secretary or the NIGC that the Trust Property is eligible for gaming pursuant to the requirements of IGRA.

"Trust Acquisition Date" means the date on which the deed to the Property has been conveyed to and executed by the Secretary such that (i) the Trust Property is held in trust for the benefit of the Tribe and (ii) the Secretary or the NIGC has determined that the Trust Property is eligible for gaming pursuant to the requirements of IGRA.

"Trust Property" means, after the Trust Acquisition Date, that portion of the Property which is owned by the United States in trust for the benefit of the Tribe.

2. Non-Recurring Mitigation Contributions

(a) Total Non-Recurring Contribution

In order to mitigate potential impacts of the Project on the County and the surrounding communities and in lieu of any taxes, fees, charges, cost reimbursements, service fees and other assessments, the Tribe shall, as a government funding mechanism, make non-recurring contributions to the County or its designee as set forth in this Section 2.

(i) Non-Recurring Public Safety Resources Contribution

In order to mitigate potential impacts of the Project on fire protection, emergency medical, first responder and law enforcement resources of the County and the surrounding communities, the Tribe shall, as a government funding mechanism, make non-recurring contributions pursuant to an Escrow Arrangement totaling One Million

Nine Hundred Fifteen Thousand Dollars ($1,915,000). Such funds may, in the County's discretion, be drawn upon and used by the County or its designee to supplement the County's budget for the purposes of (i) acquiring land for, constructing, and/or equipping (including, without limitation, acquiring fire apparatus and law enforcement vehicles) a fire protection and public safety facility located within a five minute response time to the Facility at a location to be selected by the County after meeting and conferring with the Tribe or (ii) such other public safety-related purposes as shall hereafter be mutually agreed upon by the County and the Tribe. Nothing in this MOU obligates or commits, or shall be construed to obligate or commit, the County to construct or approve any facilities or to make or approve any physical changes in the environment. Based on the preliminary information available to the Parties as of the date of this MOU, the Parties acknowledge and agree that (i) neither the Trust Acquisition, the Federal or State Actions, the Project nor this MOU, in and of themselves, create a need to acquire land for or construct a fire protection and/or public safety facility, (ii) the Tribe would be able to develop, construct and operate the Project if any such fire protection and/or public safety facility was not constructed, and (iii) the Tribe could develop, construct and operate its own fire protection and/or public safety facility on the Trust Property.

(ii) Non-Recurring Transportation Resources Contribution

In order to mitigate potential impacts of the Project on road and other transportation resources of the County which are not owned by the California Department of Transportation or the Cities, the Tribe shall, as a government funding mechanism, make non-recurring contributions after the Construction Date pursuant to an Escrow Arrangement equal to an amount estimated between Four Million Dollars ($4,000,000) and Fifteen Million Dollars ($15,000,000) based upon a traffic study and related environmental analyses and reports prepared in connection with the Project. Such funds may, in the County's discretion, be drawn upon and used by the County or its designee (i) to pay the actual costs of construction, improvement, equipping and environmental reports and analysis of County roads and other transportation resources which the County elects to complete on the basis of a traffic study after meeting and conferring with the Tribe, or such lesser amount as constitutes the Tribe's fair share (as determined by the traffic study) of such actual costs, and (ii) for such other road and transportation-related purposes as shall hereafter be mutually agreed upon by the County and the Tribe. The County agrees to explore the concept of the establishment of an area of benefit requiring late comer developers to reimburse the Tribe for a portion of the contributions made pursuant to this Subsection. Nothing in this MOU obligates or commits, or shall be construed to obligate or commit, the County to construct or approve any construction or improvement of road and other transportation resources or to make or approve any physical changes in the environment. Based on the preliminary information available to the Parties as of the date of this MOU, the Parties acknowledge and agree that (i) neither the Trust Acquisition, the Federal and State Actions, the Project nor this MOU, in and of themselves, create a need to construct or improve road and other transportation resources, and (ii) the Tribe would be able to develop, construct and operate the Project if no such construction or improvement of road and transportation resources were to occur.

(iii) Non-Recurring Road Contribution Consistent with County Ordinances

In order to mitigate additional potential impacts of the Project on the County's budget for roads and in lieu of road impact fees, the Tribe shall, not later than thirty (30) days after the Construction Date, contribute to the County a one-time cash contribution of Six Hundred Thousand Dollars ($600,000).

(iv) Non-Recurring Recreation Contribution

In order to mitigate additional potential impacts of the Project on the County's budget for certain recreational properties, the Tribe shall, not later than thirty (30) days after the Construction Date, contribute to the County a one-time cash contribution of Two Hundred Thousand Dollars ($200,000) to be used for expenditures related to the Courthouse Park and the Ahwahnee property.

(v) Non-Recurring School Contribution

In order to mitigate additional potential impacts of the Project on the Madera Unified School District's budget for schools and in lieu of school impact fees, the Tribe shall, not later than thirty (30) days after the Construction Date, contribute to the Madera Unified School District a one-time cash contribution of One Hundred Fifty Thousand Dollars ($150,000).

(b) Annual Adjustment

The dollar amounts of the contributions referenced in Section 2(a) shall be subject to the CPI Adjustment as of July 1, 2005 and each July 1 thereafter.

(c) County Legal Fees Reimbursement

Commencing thirty (30) days after the date of this MOU, the Tribe agrees to reimburse the County up to Fifty Thousand Dollars ($50,000) for the cost of outside counsel retained by the County prior to and including the Construction Date to assist the County in negotiating this MOU and consummating the transactions contemplated hereby. If the County requests reimbursement under this provision, it shall present to the Tribe, along with its request for reimbursement, a copy of invoices submitted by the outside counsel retained for such purposes.

3. Recurring Mitigation Contributions

(a) Total Recurring Contributions

In order to mitigate potential impacts of the Project on the County and the surrounding communities, and in lieu of any taxes, fees, charges, cost reimbursements, service fees and other assessments, the Tribe shall make recurring contributions of up to a maximum of Four Million Thirty-Five Thousand Dollars ($4,035,000) per annum as set forth in this Section 3(a).

(i) North Fork Rancheria Charitable Foundation Recurring Contribution

Not later than thirty (30) days after the Opening Date, the Tribe shall establish the North Fork Rancheria Charitable Foundation (the "Charitable Foundation") pursuant to the State nonprofit corporation law. The Tribe shall make a recurring contribution to the Charitable Foundation of Two Hundred Thousand Dollars ($200,000) per annum. The Charitable Foundation shall be governed by a board of directors (the "Charitable Foundation Board") consisting of two (2) members designated by the Tribe, two (2) members designated by the County and one (1) member selected by the other members; provided, however, that the Parties shall consult with each other with respect to the designation of such members. All decisions of the Charitable Foundation shall be made by majority vote of the Charitable Foundation Board. The funds in the Charitable Foundation shall be used to supplement monies otherwise available to recipients of such funds and shall be used for purposes which mitigate potential social impacts of the Project or otherwise benefit the County, including recreation, park services, senior centers, youth programs, service club projects, or such other programs or activities as may be agreed upon by the Charitable Foundation Board. At least Seventy-Five Thousand Dollars ($75,000) of such annual contributions shall be invested annually in programs or activities suggested by County representatives on the Charitable Foundation Board and at least Seventy-Five Thousand Dollars ($75,000) of such annual contributions shall be invested annually in programs or activities suggested by the Tribe's representatives on the Charitable Foundation Board. All funds shall be allocated by a majority vote of the Charitable Foundation Board.

(ii) North Fork Rancheria Economic Development Foundation Recurring Contribution

Not later than thirty (30) days after the Opening Date, the Tribe shall establish the North Fork Rancheria Economic Development Foundation (the "Economic Development Foundation") pursuant to the State nonprofit corporation law. The Tribe shall make a recurring contribution to the Economic Development Foundation of Two Hundred Fifty Thousand Dollars ($250,000) per annum. The Economic Development

Foundation shall be governed by a board of directors (the "Economic Development Foundation Board") consisting of two (2) members designated by the Tribe, two (2) members designated by the County and one (1) member selected by the other members; provided, however, that the Parties shall consult with each other with respect to the designation of such members. All decisions of the Economic Development Foundation shall be made by a majority vote of the Economic Development Foundation Board. The funds in the Economic Development Foundation shall be used County-wide for purposes which mitigate potential impacts of the Project, benefit the County, or are unanimously agreed upon by the Economic Development Foundation Board.

(iii) North Fork Rancheria Educational Foundation Recurring Contribution

Not later than thirty (30) days after the Opening Date, the Tribe shall establish the North Fork Rancheria Educational Foundation (the "Educational Foundation") pursuant to the State nonprofit corporation law. The Tribe shall make a recurring contribution to the Educational Foundation of Four Hundred Thousand Dollars ($400,000) per annum. The Educational Foundation shall be governed by a board of directors (the "Educational Foundation Board") consisting of two (2) members designated by the Tribe, two (2) members designated by the County (one of whom who shall be a member of the Madera Unified School District and the other of whom shall be a member of the Chawanakee School District) and one (1) member who shall be the County Superintendent of Schools. All decisions of the Educational Foundation shall be made by a majority vote of the Educational Foundation Board. The funds in the Educational Foundation shall be used to supplement monies which would otherwise be available to recipients of such funds and shall be used for purposes which provide funding to support the instructional programs of the local school districts, to support work force development and training programs or to mitigate potential impacts of the Project.

(iv) North Fork Rancheria Unincorporated Area Foundation Recurring Contribution

Not later than thirty (30) days after the Opening Date, the Tribe shall establish the North Fork Rancheria Unincorporated Area Foundation (the "Unincorporated Area Foundation") pursuant to the State nonprofit corporation law. The Tribe shall make a recurring contribution to the Unincorporated Area Foundation of Two Hundred Fifty Thousand Dollars ($250,000) per annum. The Unincorporated Area Foundation shall be governed by a board of directors (the "Unincorporated Area Foundation Board") consisting of three (3) members designated by the Tribe and two (2) members designated by the County; provided, however, that the Parties shall consult with each other with respect to the designation of such members. All decisions of the Unincorporated Area Foundation shall be made by a majority vote of the Unincorporated Area Foundation Board. The funds in the Unincorporated Area Foundation shall be used for purposes which mitigate potential impacts of the Project, benefit unincorporated areas of the County or are unanimously agreed upon by the Unincorporated Area Foundation Board, including community development, education, beautification, infrastructure, parks/recreation, business relations/development/attraction, and assistance to other non-profit organizations.

(v) <u>Certain Recurring Contributions</u>

In order to mitigate potential impacts of the Project within the County, the Tribe shall, as a government funding mechanism, contribute to the County recurring contributions in the following amounts per annum:

(A) Two Hundred Fifty Thousand Dollars ($250,000) to be used to establish or supplement the County's budget for neighborhood housing or other workforce programs;

(B) commencing one hundred and eighty (180) days prior to the estimated Opening Date, the lesser of (1) Four Hundred Fifteen Thousand Dollars ($415,000) or (2) the costs to the County of the salary and benefits (including all service expenses and supply expenses) of one-half (½) of a sergeant position and five (5) deputy positions, which contributions shall be used to supplement the County's budget for law enforcement;

(C) commencing ninety (90) days prior to the estimated Opening Date, the lesser of (1) One Million Two Hundred Thousand Dollars ($1,200,000) or (2) the costs to the County of the salary and benefits (including all service expenses and supply expenses) of three (3) fire captains/fire apparatus engineers and six (6) firefighters/fire apparatus engineer positions, which contributions shall used to supplement the County's budget for fire protection;

(D) Fifty Thousand Dollars ($50,000) to be redistributed to the County Department of Behavioral Health Services or its successor department to be used to supplement the Department's budget for alcohol education and the treatment and prevention of problem gambling and gambling disorders;

(E) Seventy Thousand Dollars ($70,000) to be used for the maintenance, operation and preservation of open space within the Courthouse Park and the Ahwahnee property; and

(F) One Hundred Thousand Dollars ($100,000) to be used to fund additional public safety support/administrative positions with the County's public protection budget.

(vi) Additional Recurring Contributions

In order to mitigate additional potential impacts of the Project on the County and the Cities, the Tribe shall, as a government funding mechanism, contribute to the County a recurring contribution in the amount of Eight Hundred Fifty Thousand Dollars ($850,000) per annum to be distributed by the County as follows:

County	$500,000
City of Madera	$250,000
City of Chowchilla	$100,000

The contributions which are made by the Tribe to the County pursuant to this Subsection and which are to be used by the County shall be used to supplement the County's general fund public facilities budget. Twenty percent (20%) of the contributions which are made by the Tribe to the County pursuant to this Subsection and which are redistributed by the County to the City of Madera shall be used for the transportation budget of the City of Madera. Twenty percent (20%) of the contributions which are made by the Tribe to the County pursuant to this Subsection and which are redistributed by the County to the City of Chowchilla shall be used for the transportation budget of the City of Chowchilla and the remainder of such contributions shall be used to supplement the public facilities budget of the City of Chowchilla. The County has determined that the contributions referenced in Sections 2 and 3 are, in the opinion of the County after consultation with the Cities, sufficient to mitigate additional potential non-recurring and recurring impacts of the Trust Acquisition and the Project on the County and the Cities which are not specifically identified or mitigated elsewhere in this MOU.

(b) Annual Adjustment

The dollar amounts of the contributions referenced in Section 3(a) shall be adjusted by the CPI Adjustment as of the July 1 following the Opening Date and each July 1 thereafter.

(c) Payment Terms

Where recurring contributions are to be made on a per annum basis, the contribution shall be made in twelve (12) equal monthly installments, unless the recipient agrees otherwise. The first recurring contribution shall be prorated for the applicable period. Unless otherwise specified, the first recurring contribution shall be made thirty (30) days after the Opening Date.

4. Contribution Matters

(a) Distribution of Contributions

Except for contributions to improve roads of the Cities or the State, the Parties intend for the contributions referenced in Sections 2 and 3 to constitute all of the contributions which the Tribe shall make to all County Departments, agencies and subdivisions and to all other local and regional Public Entities which are located within, or have jurisdiction within the boundaries of, the County, including, without limitation, the Cities. The County shall be responsible for distributing such contributions to the appropriate County Departments, agencies, subdivisions and Cities.

(b) Contribution Terms

The Parties acknowledge and agree that the Project and the Tribe's contribution and other obligations as set forth in this MOU are, and shall be, contingent upon (i) the Secretary accepting trust title to the Trust Property, (ii) the occurrence of the Construction Date, (iii) the Tribe and the State entering into a Tribal-State Compact, and (iv) in the case of the recurring contributions set forth in Section 3 (unless otherwise specified in Subsection 3(a)(v)), the occurrence of the Opening Date. In the event the Construction Date or the Opening Date does not occur for any reason, contributions payable after the Construction Date or the Opening Date, as the case may be, shall not be due. The County shall make good faith efforts to segregate and identify expenditures made with contributions provided to the County by the Tribe under this MOU and to publicly attribute such expenditures to the Tribe.

(c) Deductions

The Tribe may deduct the following amounts from the next contribution which the Tribe would otherwise be required to make pursuant to Sections 2 and 3:

(i) the amount which the Tribe pays the County in excess of the amounts identified in Sections 2 and 3;

(ii) the amount of any contribution which the Tribe pays in advance of the dates set forth in Sections 2, 3 and 4, plus interest on such amount at the prime lending rate of Bank of America from the date the payment is made until the date the payment would otherwise have been due;

(iii) sixty percent (60%) of the amount of any payments which the County receives from the Indian Gaming Special Distribution Fund established pursuant to California Government Code Section 12714 or similar funds which are attributable to or earmarked for the Tribe or the Project;

(iv) the amount of any payments which the Tribe receives, or is entitled to receive, from state, federal or other sources and directs to be paid to the County; and

(v) should a late comer developer make contribution(s) to fund the same items set forth in Subsections 2(a)(i) and 2(a)(ii), the Tribe shall be entitled to a dollar-for-dollar deduction or refund until such time as the Tribe recovers up to sixty percent (60%) of the contributions made by the Tribe under Subsections 2(a)(i) and 2(a)(ii).

(d) No Other Payments

Except as is expressly set forth in Section 2 or 3, the Tribe shall not be required pursuant to this MOU or otherwise to:

(i) make any payments, reimbursements, contributions or investment to, through or on behalf of the County for any taxes, fees, charges, cost reimbursements, service fees or other assessments;

(ii) pay the County any other contributions or payments in mitigation of any economic or other impacts of the Project or any other developments on the Trust Property; or

(iii) acquire rights to any real property, grant or transfer to the County any rights to any real property, place any conservation or other easement on any real property, or otherwise agree to forgo any rights with respect to any real property.

5. Environmental Review

(a) NEPA Matters

The Parties acknowledge their understanding that (i) in connection with the Secretary's decision with respect to whether to accept trust title to the Property, the Secretary will be required to comply with NEPA, (ii) the Secretary will accept the Tribe's request to prepare an EIS, as distinguished from a less comprehensive environmental assessment, (iii) the Secretary will provide public notices relating to the preparation of an EIS in accordance with NEPA, (iv) the Secretary will provide the County, the Cities, other Public Entities and the public with the opportunity to comment on the draft EIS, and (v) the County's opportunity to comment on the draft EIS will include the opportunity to comment on the adequacy of any proposed mitigation measures intended to mitigate potential impacts of the Trust Acquisition and the Project.

(b) Environmental Laws

In connection with the Tribe's application to the Secretary to accept trust title to the Property, the Tribe shall provide the Secretary with such information, assistance and cooperation as shall be necessary or appropriate to enable the Secretary to comply with the following federal statutes, Executive Orders, regulations, standards and processes, to the extent applicable:

(i) the Endangered Species Act;

(ii) the Farmland Protection Policy Act;

(iii) the National Historic Preservation Act;

(iv) the Clean Air Act;

(v) the National Ambient Air Quality Standards;

(vi) Executive Order No. 11988 (Floodplain Management);

(vii) Executive Order No. 11990 (Protection of Wetlands);

(viii) Section 404 of the Clean Water Act; and

(ix) Executive Order No. 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations).

(c) CEQA Matters

(i) The Trust Acquisition, the Federal and State Actions, the Project and the approval, execution, delivery, performance and consummation of the transactions contemplated by this MOU are not activities that, within the meaning of CEQA, (A) are directly undertaken by the County and the surrounding communities, (B) are supported, in whole or in part, through contracts, grants, subsidies, loans or other forms of assistance from the County or the surrounding communities, or (C) involve the issuance of a lease, permit, license, certificate or other entitlement for use by the County or the surrounding communities.

(ii) By approving, executing, delivering, performing and consummating the transactions contemplated by this MOU, the County does not, and does not commit itself to, (A) issue any lease, permit, license, certificate or entitlement for use, (B) develop, construct or improve any facilities or cause any other physical changes to the environment, or (C) approve, shape, deliberate on or otherwise exercise judgment over the Trust Acquisition, the Federal and State Actions or the Project.

(iii) The Trust Acquisition, the Federal and State Actions and the Project, the approval, execution and delivery of this MOU and the performance and consummation of the transactions contemplated by this MOU are not "projects" (as such term is defined in CEQA) of the County.

(iv) This MOU should be construed to be a government payment and funding mechanism which does not commit the County or the Cities to make any physical changes in the environment.

(v) The County does not, in any event, have sufficient information as of the date of this MOU to make any commitment to the Tribe to make any physical changes in the environment.

(vi) If and to the extent the County hereafter determines that it is required to comply with CEQA with respect to any "project" (as such term is defined in CEQA) which causes a physical change in the environment, the County fully intends to comply with CEQA at such time.

(d) Identification of Certain Issues

Based on the preliminary investigation of the Property which the Tribe has conducted as of the date of this MOU, the Tribe has not identified on the Property any of the following: (i) land subject to a Williamson Act (California Gov. Code § 51200 *et. seq.*) contract or a conservation easement; (ii) unique, rare or threatened plant species or plant communities; (iii) prehistoric, paleontological, archeological, historic or cultural resources; (iv) mineral resources; (v) human remains, (vi) hazardous materials; or (vii) active fault lines or areas with active fault movement.

(e) Further Investigations

Nothing in this MOU is intended to prejudge the results of further investigations of the Property, or to state or imply that resources, potential impacts or other matters referenced in this Section may not be identified in the future based on further investigation. Also, nothing in this MOU is intended to state or imply that the County's decision to enter into this MOU depends in any way upon the results of the Tribe's preliminary investigation of the Property to date or that any given consequence would or would not follow from the identification of any of the resources, potential impacts or other matters referenced in this Section.

6. Additional Tribal Covenants

(a) County Services

The Parties acknowledge that, under the current design of the Project, the Tribe has not requested and does not intend to request the County to provide, and the County does not hereby commit itself to provide, water, wastewater, electricity, natural gas or telecommunications services to the Project, the Property or the Trust Property.

(b) City of Madera Water and Wastewater Services

The Parties acknowledge that the Tribe has not yet determined whether it intends to request the City of Madera to provide water or wastewater services to the Project, the Property or the Trust Property. Any such arrangements for City of Madera water or wastewater services shall be made solely by and between the Tribe and the City of Madera, shall not involve or require approval of the County, shall be addressed by separate arrangements, and shall not entitle the Tribe to any deduction of, or offset against, contributions required by this MOU. The Parties further acknowledge and agree that, based on the information available to the Parties as of the date of this MOU, the Tribe would be able to develop, construct and operate its own water and wastewater systems on the Property or the Trust Property and, therefore, the Tribe would be able to develop, construct and operate the Project if it did not obtain water or wastewater services from the City of Madera.

(c) Other Wastewater Matters

In the event the Tribe develops and constructs its own wastewater treatment system on the Trust Property, the Tribe shall (i) obtain a National Pollution Discharge Elimination System permit for wastewater discharge if and as required by the Clean Water Act (33 U.S.C. § 1311) from the United States Environmental Protection Agency, and (ii) construct a tertiary treatment system or similar system. To the extent feasible and commercially reasonable (as determined by the Tribe), the Project shall incorporate measures to minimize wastewater flows and use recycled water.

(d) Solid Waste Disposal Matters

Unless otherwise agreed by the County, the Tribe agrees to obtain solid waste services from the County's solid waste service franchisee at such franchisee's standard terms and rates and shall implement single stream recycling and green waste diversion. Payment by the Tribe for waste disposal shall not entitle the Tribe to any deduction of, or offset against, contributions required by this MOU.

(e) Building Codes and Other Arrangements

In the event that the Tribal-State Compact does not contain provisions which are substantially similar or identical to (i) the minimum gaming age provisions of Section 6.3 of the 1999 model State compact (with the minimum gaming age being 21), (ii) the food and beverage handling provisions and the safe drinking water standards of Sections 10.2(a) and (b) of the 1999 model State compact, and (iii) the building code and inspection provisions of Subsections 6.4.2(d) through (k) of the June 2004 State compact amendments, the County may request that the Tribe enter into negotiations with the County, in which event the Tribe shall enter into good faith negotiations with the County, to execute and deliver an agreement or other arrangement with the County on mutually agreeable terms relating to the topics addressed in those compact or compact amendment provisions, which agreements or arrangements shall not, in any event, be less favorable to the County than the provisions set forth in the referenced compact or compact amendment provisions.

(f) Gaming Age Limitation

The Tribe shall prohibit persons under the age of 21 years from entering and remaining in any area in which gaming activities are being conducted.

(g) No Golf Course

The Tribe does not intend to, and, unless otherwise agreed by the City of Madera, the Tribe shall not, construct a golf course on the Trust Property until the earlier of (i) twenty (20) years from the date of this MOU, (ii) the date on which the aggregate number of rounds of golf played on the Madera Municipal Golf Course in any given calendar year exceeds 60,000 18-hole equivalent rounds, or (iii) the date on which the Madera Municipal Golf Course is sold or ceases operations.

(h) No Water Park

The Tribe does not intend to, and, unless otherwise agreed by the County, the Tribe shall not, develop, construct or operate a water park on the Trust Property within twenty (20) years from the date of this MOU.

(i) Employment of County Residents

The Tribe shall work in good faith with the Cities and the County to employ qualified residents of the County at the Facility to the extent permitted by applicable law. The goal will be that fifty percent (50%) of the new hires will be County residents to the extent permitted by applicable law. Prior to the opening of the Facility, the Tribe shall offer training programs to assist County residents to become qualified for employment. Nothing in this Section shall be interpreted to limit or modify the Tribe's policy of Indian preference in employment.

(j) No Submission to Jurisdiction

The Parties acknowledge and agree that nothing in this MOU shall be construed as constituting a submission by the Tribe to the jurisdiction of the County (except as expressly set forth in Sections 14(d) and 15 herein with respect to the Tribe's submission to the jurisdiction of certain courts). Nothing in this MOU shall be construed to state or imply that the Tribe would be required to make the contributions or covenants set forth in this MOU other than pursuant to the terms and conditions of this MOU.

7. Mutual Aid Arrangements

(a) Mutual Aid

Upon the request of the Tribe, the County or its departments will enter into good faith negotiations with the Tribe, and will encourage the Cities and other local or regional Public Entities or their subdivisions to enter into good faith negotiations with the Tribe, to execute and deliver a mutual aid agreement or other arrangements with the Tribe on mutually agreeable terms relating to fire protection, emergency medical, first responder and law enforcement responses.

(b) Law Enforcement

Upon the request of the Tribe, the County or its departments will, and will encourage the Cities and other local Public Entities or their subdivisions to, enter into good faith negotiations with the Tribe to execute and deliver agreements or arrangements on mutually agreeable terms relating to investigation, jurisdictional or other similar issues. The Tribe acknowledges that, pursuant to, and to the extent set forth in, federal Public Law 280 as in effect and construed as of the date of this MOU, most State criminal laws will have the same force and effect on the Trust Property as they have elsewhere in the State and the County Sheriff's Department will have jurisdiction over most offenses committed by or against Indians on the Trust Property. However, nothing in this Subsection or any agreement entered into pursuant to this Subsection does or is intended to create County, State or other Public Entity jurisdiction over the Tribe on the Trust Property.

(c) Additional Mutual Aid Arrangement Matters

The Parties do not intend that (i) the Tribe shall make any contributions or payments to the County or any other entity pursuant to the mutual aid or other agreements or arrangements contemplated by this Section or (ii) the Tribe shall be required to include the County as a party to, or obtain the approval of the County for, any such mutual aid or other agreements or arrangements between the Tribe and any entity other than the County. The County acknowledges that it currently has mutual aid agreements or arrangements with the Cities and the counties surrounding the County relating to fire protection, emergency medical, first responder and law enforcement responses.

8. Term

(a) Effective Date

This MOU shall not become effective unless and until the following events have occurred:

(i) this MOU has been approved or ratified by the County Board of Supervisors, approved as to form by the County Counsel, and executed and delivered by the County; and

(ii) this MOU has been approved or ratified by the Tribe's Tribal Council, approved as to form by legal counsel to the Tribe, and executed and delivered by the Tribe.

(b) Expiration Date

Subject to the early termination provisions of this MOU, this MOU shall expire on the later of (i) the twentieth (20th) anniversary of the date of this MOU, or (ii) the date of the expiration or termination of the Tribal-State Compact.

9. Termination Events

Unless otherwise agreed by the Parties, this MOU shall automatically terminate in the event, and on the date, that:

(a) after the Trust Acquisition Date, (i) the Trust Property (A) is thereafter no longer "Indian country" within the meaning of federal law, (B) is removed from trust or restricted status such that the Trust Property is no longer held in trust by the United States for the benefit of the Tribe, or (C) is not eligible for the development or operation of the Project or the Facility for any reason and (ii) the Tribe ceases gaming operations on the Trust Property; or

(b) the Tribe submits a written notice to the County to the effect that the Tribe has permanently decided (i) to withdraw or not submit any application requesting that the Secretary accept trust title to the Property for the benefit of the Tribe or (ii) to otherwise cease the development or operation of the Project; or

(c) after the Tribal-State Compact becomes effective, such Tribal-State Compact expires or terminates for any reason or is determined by the Secretary or any court of competent jurisdiction to be unlawful or otherwise ineffective for any reason; or

(d) the Tribe ceases gaming operations on the Trust Property.

10. Suspension Events

If, due to Force Majeure (as hereinafter defined), an act of God, valid business considerations, or the events listed in Section 11, a material portion of the gaming operations previously conducted by the Tribe on the Trust Property are suspended or terminated, the Parties' obligations under this MOU shall be suspended as of the date of such suspension or termination until such time as such operations are resumed. For the purposes of this Section, the term "Force Majeure" shall include, without limitation, the following: earthquake; flood; fire; other natural disasters; changes in law, regulation or governmental policy that has a material adverse affect on the Project; riots; war; or terrorism. Nothing in this Section shall reduce the Tribe's liability for contributions or other payments which become due and payable prior to the date such gaming operations are suspended or terminated.

11. Renegotiation Provision

(a) Tribe Renegotiation Events

The Tribe may request that the County renegotiate one or more of the provisions of this MOU if there is a change in law or other circumstances which has a significant and adverse financial impact on the Project or the Facility. Such changes shall be deemed to include, without limitation, the following:

(i) any change in State or federal constitutions, laws, rules or regulations, guidelines or bulletins, or the construction or interpretation thereof, relating to IGRA or gaming on Indian lands, or ending the prohibition on Class III gaming (as defined in IGRA) or the operation of gaming devices by non-Indians in the State;

(ii) a reduction in the scope of gaming permitted on the Trust Property, whether pursuant to a change in federal, State or local constitutions, laws, rules or regulations, the Tribal-State Compact or otherwise; or

(iii) the Tribal-State Compact, as amended or interpreted from time to time, (A) does not authorize the Tribe to conduct the scope of Class III (as defined in IGRA) gaming activities authorized by the State 1999 model Tribal-State Gaming Compact, or (B) does not authorize the Tribe to operate at least 2000 gaming devices.

(b) County Renegotiation Events

At the County's request, the Tribe shall renegotiate one or more of the provisions of this MOU if the Tribe materially expands the public spaces of the Facility.

(c) Effect of Expiration or Termination

Upon the expiration or termination of this MOU, and except for Sections 6(c), 6(d), 6(e), 6(i), 6(j), 14, 15 and 16 (which Sections and Subsections shall survive such expiration or termination for a period of twenty (20) years after such expiration or termination), the provisions of this MOU shall be of no further force or effect and none of the provisions of this MOU shall survive such expiration or termination; provided, however, that the Tribe shall continue to make contributions pursuant to the terms of this MOU which became due and payable prior to any expiration or termination date. Subsections 6(g) and 6(h) of this MOU shall survive for twenty (20) years from the date of this MOU.

(d) Renegotiation Procedures

All requests by either Party to renegotiate or amend this MOU shall be by written notice addressed to the other Party and shall identify the provisions of this MOU to be negotiated. Upon receipt of such notice, the Parties shall be obligated to renegotiate this MOU in good faith. The Parties shall confer promptly and determine a schedule for commencing negotiations within fifteen (15) days of receipt of notice. The Parties are hereby authorized to designate the person or agency responsible for conducting the negotiations, and shall execute any documents necessary to do so. The purpose of the negotiations will be to renegotiate the provisions of this MOU in good faith so that the Parties will retain substantially the same rights and economic benefits in the aggregate from the Project as contemplated on the date of execution of this MOU.

12. Severability

(a) If any provision of this MOU is held by the Secretary, the arbitrators or a court of competent jurisdiction to be illegal, invalid, unenforceable, or unauthorized under present or future laws, the remaining provisions of this MOU shall remain in full force and effect and shall not be affected by the illegal, invalid, unenforceable, unauthorized or non-compliant provision or by its severance from this MOU. In the event of any such determination, the Parties shall enter into good faith negotiations to replace the invalid provision with a valid provision, the economic effect of which comes as close as possible to that of the invalid provision, which negotiations shall be conducted pursuant to the provisions of Subsection 11(d) of this MOU.

(b) In the event that the entire MOU is declared null and void or is unauthorized, the Parties shall enter into good faith negotiations to negotiate a new memorandum of understanding.

13. Scope

This MOU is intended to apply and shall be construed to apply solely to the Property and, after the Trust Acquisition Date, solely to the Trust Property and shall not be construed to apply to any other property.

14. Dispute Resolution Provisions

(a) Dispute Resolution

In an effort to foster good government-to-government relationships and to assure that the Tribe is not unreasonably prevented from engaging in gaming and other commercial activities and benefiting therefrom, the Parties agree to the dispute resolution procedures set forth in this Section.

(b) Meeting

The Parties shall make their best efforts to resolve any dispute specifically arising under this MOU by good faith negotiations whenever possible. The parties shall meet and confer in good faith to resolve any disputes arising under the MOU or concerning its terms or administration as follows:

(i) A Party shall give the other Party, as soon as possible after the dispute arises, written notice setting forth, with specificity, the Party's claims.

(ii) The Parties shall meet and confer in a good faith attempt to resolve such dispute through negotiation not later than 10 days after receipt of notice, unless the Parties agree in writing to an extension of time.

(c) Arbitration

If such dispute is not resolved to the satisfaction of the Parties within thirty (30) calendar days after the first meeting, then the Parties may seek to have the dispute resolved by arbitration in accordance with the following procedures:

(i) Upon the request of a Party in writing, the dispute shall be submitted to binding arbitration in accordance with this Subsection.

(ii) The disputes to be submitted to arbitration shall be limited to disputes specifically arising under this MOU.

(iii) In the event that there is any dispute as to whether a matter is subject to the arbitration provisions of this MOU, or any dispute concerning the scope of the matter or matters to be arbitrated, the disagreement as to whether the dispute is subject to the arbitration provisions of this MOU or the scope of such arbitration shall be resolved by the courts referenced in Subsection (d) of this Section.

(iv) The arbitration shall be administered by three (3) arbitrators. The Tribe and the County shall each select one (1) arbitrator and those two (2) arbitrators shall select the third arbitrator. All arbitrators shall be generally familiar with federal Indian law, and commercial business transactions and shall have no interest in the matter.

(v) The arbitration shall be held in Fresno, California, or at such other location as is mutually agreeable to the Parties.

(vi) The arbitration shall be administered in accordance with the Commercial Arbitration Rules of the American Arbitration Association, as modified by the provisions of this MOU.

(vii) The provisions of Section 1283.05 of the California Code of Civil Procedure shall apply; provided that no discovery authorized by that section may be conducted without leave of the arbitrators.

(viii) Each side shall bear its own costs, attorneys' fees and one-half the costs and expenses of the arbitrators.

(ix) Subject to the provisions of this Section, the arbitrators shall be empowered to grant (A) compensatory and declaratory relief, and (B) specific performance as to the covenants in Sections 6, 11 and 12 of this MOU.

(x) The decision of the arbitrators shall be in writing and shall give reasons for the decision.

(d) <u>Confirmation of Decisions</u>

Any Party to an arbitration in which a decision has been made pursuant to this Section may petition the federal District Court for the Eastern District of California or the State Superior Court for Madera County to affirm the decision. The Parties expressly consent to be sued in such Courts for affirmation of any such decision. A decision shall be affirmed, provided that:

(i) The decision is limited to matters specifically arising under this MOU.

(ii) No monetary damages may be awarded except those which require the payment of sums pursuant to breaches of obligations of the Parties under this MOU and which are not inconsistent with Section 17 and the Tribe's limited waiver of sovereign immunity as set forth in Subsection 16(b).

(iii) No person or entity other than the Parties or the Developer is party to the action, unless failure to join a third party would deprive the court of jurisdiction; provided that nothing herein shall be construed to constitute a waiver of the sovereign immunity of the Parties in respect to any such third party other than the Developer.

If an award is affirmed, judgment shall be entered in conformity therewith. The judgment so entered has the same force and effect as, and is subject to all the provisions of law relating to, a judgment in a civil action and may be enforced like any other judgment of the court in which it is entered.

(e) Actions

The express waivers and consents provided for in this Section and Sections 15 and 16 shall only extend to the following: civil actions specifically arising under this MOU; civil actions to compel arbitration; civil actions to determine whether a matter is subject to arbitration or determine the scope of the arbitration; any arbitration proceeding as provided herein; any action to confirm or enforce any judgment or arbitration award as provided herein; and any appellate proceedings emanating from a matter in which an immunity waiver has been granted. Except as stated herein or elsewhere in this MOU, no other waivers or consents to be sued, either express or implied, are granted by either Party.

(f) Other Dispute Resolutions

This Section may not be construed to waive, limit, or restrict the ability of the Parties to pursue, by mutual agreement, any other method of dispute resolution, including, but not limited to, mediation or utilization of a technical advisor to the Parties; provided, however, that no Party is under an obligation to agree to such alternative method of dispute resolution.

(g) Confidentiality

The Parties agree that any dispute resolution meetings or communications, arbitration proceedings, or agreements among the Parties settling or otherwise relating to any claims of breach of this MOU or otherwise shall be and remain confidential to the extent not prohibited by applicable law.

15. Expedited Procedure for Threats to Public Safety

(a) Judicial Litigation

If the County or the Tribe reasonably believes that the other's violation of Section 6 of this MOU has caused or will cause an imminent and significant threat to public health or safety, resolution of which cannot be delayed for time periods otherwise specified in Section 14, the complaining Party may proceed with judicial litigation consistent with the provisions of this Section 15.

(b) Consent to Jurisdiction

The Parties consent to the jurisdiction of the courts identified in Section 14(d) for purposes of obtaining declaratory relief and specific performance under this Section. Service of process in any such judicial proceeding is waived in favor of delivery of court documents by Certified Mail - Return Receipt Requested in accordance with the notice provisions of Section 18 of this MOU.

(c) Suspension or Termination

Except as provided in this Section and notwithstanding any other provision of this MOU, the County will not have the right to seek a decision from an arbitrator or court order to suspend or terminate the Project, the Facility or the Tribe's gaming operations.

16. Limited Waiver of Sovereign Immunity

(a) Waiver

Subject to the provisions of this Section, the Tribe expressly and irrevocably waives sovereign immunity (and any defenses based thereon) in favor of the County (but not as to any other person or entity) as to any disputes specifically arising under this MOU and not as to any other actions, matters or disputes.

(b) Limitations on Tribe's Waiver

The Tribe's waiver of sovereign immunity in favor of the County is specifically limited to permitting, and does permit, the decisions referenced in Subsection 14(c)(ix) and actions referenced in Subsection 14(e). The arbitrators and the courts will have no authority or jurisdiction to issue any monetary award or damages or order the execution or enforcement of any monetary award or damages against any assets or revenues of the Tribe except for the Tribe's share of the net revenues (as defined by IGRA) from the Facility. The Tribe does not waive its sovereign immunity with respect to (i) actions by third parties, or (ii) disputes between the Tribe and the County which do not specifically arise under this MOU.

(c) Tribal Council Resolution

The Tribe represents to the County that that Tribal Council of the Tribe has adopted a resolution in accordance with the Tribe's Constitution which provides that (i) the Tribal Council has the authority to act on behalf of the Tribe in connection with the execution and delivery of this MOU, (ii) the Tribal Council delegates authority to the Chairperson of the Tribe to execute and deliver this MOU on behalf of the Tribe and (iii) the Tribe waives sovereign immunity on a limited basis as set forth in this MOU. A certified copy of the resolution is attached to this MOU as Exhibit B.

17. Damages

The Parties hereby agree that, in the event of default, any damages awarded or arising under this MOU shall be exclusively limited to actual direct damages incurred and which have been demonstrated with substantial certainty. In no instance shall the Parties to this MOU be entitled to special, incidental, indirect, consequential or punitive damages, lost profits or attorney's fees. By acceptance and execution of this MOU, the Parties hereby agree that the only monetary damages contemplated by the Parties as arising from this MOU are actual or direct damages which do not, in any event, exceed the contribution amounts expressly stated in this MOU and that the Parties are precluded from asserting any claims for additional or other monetary damages.

18. Indemnification

The Tribe agrees to indemnify, defend and hold harmless the County from and against any and all claims, losses, proceedings, damages, causes of action, liability, costs and expenses (including reasonable attorneys' fees) arising from any action or proceeding filed against the County which challenges the County's approval, execution or delivery of this MOU on the basis of claims related to CEQA; provided, however, that the County's defense shall be conducted by outside legal counsel selected by the Tribe and acceptable to the County.

19. Third Party Matters

The County acknowledges and agrees that Developer does not have any obligations or liabilities under, or with respect to, this MOU. This MOU is not intended to, and will not be construed to, create any right on the part of any other third party to bring any action or to otherwise enforce any of its terms.

20. Binding MOU

This MOU is intended to be, and shall be construed to be, binding upon the Parties and all successors and successors-in-interest of each Party, including, in the case of the County, future County Boards of Supervisors, and, in the case of the Tribe, future Tribal Councils. The County intends that its approval, execution, delivery and performance of this MOU shall (i) be construed to be administrative actions, as distinguished from legislative actions, and (ii) not be construed to be an express or implied enactment, adoption or amendment of any zoning ordinance, general plan, special plan or elements thereof.

21. Notice

All notices required by this MOU will be deemed to have been given when made in writing and delivered or mailed to the Party and its representatives at their respective addresses as set forth below, or such other address as they may provide to the other Party from time to time:

For the Tribe:

North Fork Rancheria of Mono Indians of California
P.O. Box 929
North Fork, California 93643
Telephone: (559) 877-2461
Fax: (559) 877-2467
Attention: Chairperson

With a copy to:

California Indian Legal Services

510 16th Street, Fourth Floor
Oakland, California 94612
Telephone: (510) 835-0284
Fax: (510) 835-8045
Attention: John A. Maier, Esq.

For the County:

County of Madera California
209 W. Yosemite Avenue
Madera, CA 93637
Telephone: (599) 675-7703
Fax: (599) 673-3302
Attention: Chairman of the Board of Supervisors
County Counsel

22. Governing Law

This MOU shall be governed by, and construed in accordance with, the laws of the State.

23. Construction of MOU

This MOU, together with all Exhibits hereto, constitutes the entire agreement between the Parties relating to the subject matter hereof and supersedes all prior negotiations, representations or other agreements, whether written or oral. In the event of a dispute between the Parties as to the language of this MOU or the construction or meaning of any term hereof, this MOU shall be deemed to have been drafted by the Parties in equal parts so that no presumptions or inferences concerning its terms or interpretation may be construed against, or in favor of, any Party based on the preparation or negotiation of this MOU. The headings contained in this MOU are for convenience of reference only and shall not affect the construction or interpretation hereof.

24. Tribal County Advisory Committee

(a) Jurisdiction

The County and the Tribe agree to establish a permanent committee to be known as the Tribal County Advisory Committee. Matters within the jurisdiction of the Tribal

County Advisory Committee shall include questions related to implementation of this MOU and concerns over any matter within the scope of this MOU.

(b) Composition

The Tribal County Advisory Committee shall be composed of three (3) representatives of the County and three (3) representatives of the Tribe.

(c) Meeting Times

The Tribal County Advisory Committee shall meet on an as-needed basis, but not, in any event, less than annually, in accordance with procedures established by such Committee.

(d) Authority

The Tribal County Advisory Committee may make recommendations to the Tribe and the County which both Parties shall consider before implementing any actions concerning the subject matter of this MOU.

25. Approval by the Department of the Interior

Although the Parties believe approval is not required, the Parties will submit this MOU to the Department of the Interior for either (a) approval pursuant to 25 U.S.C. §81 or (b) a written response that this MOU does not require approval under 25 U.S.C. §81.

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the Parties have executed this MOU as of the date first set forth above.

MADERA COUNTY, CALIFORNIA

Date: August 16, 2004

By: ______________________
Ronn Dominici
Chairman of the Board of Supervisors

APPROVED AS TO LEGAL FORM BY
MADERA COUNTY COUNSEL:

Date: August 16, 2004

By: ______________________
David A. Prentice, Esq.
County Counsel

NORTH FORK RANCHERIA OF MONO
INDIANS OF CALIFORNIA

Date: August 16, 2004

By: ______________________
Judy E. Fink
Chairperson

APPROVED AS TO LEGAL FORM BY
LEGAL COUNSEL TO THE TRIBE:

Date: August 16, 2004

By: ______________________
John A. Maier, Esq.
California Indian Legal Services
Legal Counsel to the Tribe

EXHIBIT A
TO MEMORANDUM OF UNDERSTANDING

PROPERTY DESCRIPTION

Real Property in the unincorporated area of the County of Madera, State of California, described as follows:

Parcel No. 1: APN: 033-030-010 thru 015 and 017

Parcels 1, 2, 3, 4, 5, 6 and 8 of Parcel Map 3426 in the unincorporated area of the County of Madera, State of California, as per map recorded September 7, 1995, in Book 44, Pages 15 and 16 of Parcel Maps, in the office of the County Recorder of said county.

EXHIBIT B
TO MEMORANDUM OF UNDERSTANDING
TRIBAL COUNCIL RESOLUTION

RESOLUTION 04-05

Resolution Authorizing a Limited Waiver of Sovereign Immunity with Respect to the Approval of a Memorandum of Understanding with the County of Madera

WHEREAS: The North Fork Rancheria of Mono Indians of California (the "Tribe") is a federally recognized Indian tribe organized pursuant to the Constitution of the Tribe (the "Constitution"); and

WHEREAS: Article III, Section 2 of the Constitution provides that the governing body of the Tribe is the Tribal Council; and

WHEREAS: Article VI, Section 1 of the Constitution provides the Tribal Council with the authority, on behalf of the Tribe, to negotiate, execute and deliver agreements with local governments and to provide a limited waiver of the Tribe's sovereign immunity; and

WHEREAS: The Tribe desires to enter into a legally binding intergovernmental agreement with the County of Madera (the "County") to mitigate any off-reservation impacts of its proposed gaming facility to be located on Indian lands located near Avenue 17 and Highway 99 in an unincorporated area of the County; and

WHEREAS: The Tribal Council, with the assistance of counsel, has negotiated a Memorandum of Understanding (the "MOU") between the Tribe and the County; and

WHEREAS: The Tribal Council has determined that it is in the best interests of the Tribe to enter into the MOU with the County; and

WHEREAS: The Tribal Council recognizes the need for the Tribe to provide a limited waiver of sovereign immunity with regard to disputes specifically arising under the MOU, and to consent to arbitration and to the limited jurisdiction of the courts as provided and to the extent set forth in the MOU.

NOW, THEREFORE, BE IT RESOLVED, the Tribal Council, as provided and to the extent set forth in the MOU, hereby: (i) grants a limited waiver of the Tribe's sovereign immunity in favor of the County (but not as to any other person or entity) pertaining solely to disputes specifically arising under the MOU, and (ii) consents to arbitration and to the limited jurisdiction of the courts; and

BE IT FURTHER RESOLVED, the Tribal Council hereby approves the MOU on behalf of the Tribe and authorizes Judy E. Fink, the Chairperson of the Tribe, to execute and deliver the MOU to the appropriate County officials on behalf of the Tribe; and

BE IT FURTHER RESOLVED, any material amendments to the MOU shall be brought back to the Tribal Council for consideration and approval.

CERTIFICATION

As Tribal Secretary of the North Fork Rancheria of Mono Indians of California, I certify that at a meeting of the Tribal Council of the North Fork Rancheria of Mono Indians of California, called and convened on the 16th day of August, 2004, at which a legal quorum was present, this resolution was adopted by a vote of 5 For 0 Against, and 0 Abstaining, and said resolution has not been rescinded or amended in any way.

Jacqueline Van Huss
Jacqueline Van Huss, Secretary

August 16, 2004
Date

Attested to by:

Judy E. Fink
Judy E. Fink, Tribal Chairperson

August 16, 2004
Date

MEMORANDUM OF AGREEMENT

THIS MEMORANDUM OF AGREEMENT ("Agreement") is made and entered into and operative on this 31 day of January, 2006 by and between the North Fork Rancheria of Mono Indians of California (the "Tribe"), a federally recognized Indian tribe, on behalf of itself and its affiliates, and UNITE HERE International Union (the "Union") on behalf of itself and its affiliates, and pertains to the tribal gaming facility and other related facilities providing hospitality or recreational services to the casino guests, the only significant purpose of which is to facilitate patronage of the class III gaming operations (the "Casino") operated or to be operated by the Tribe or any legal entity substantially under the control of the Tribe in Madera County, California. The Tribe and the Union are collectively the "Parties."

RECITALS

A. The Tribe is a federally recognized Indian tribe which has requested that the Secretary of the Interior accept the Property, which is located in an unincorporated area of Madera County, California, into trust for the benefit of the Tribe.

B. The Tribe desires to engage in tribal gaming on the Property pursuant to the Indian Gaming Regulatory Act, 25 U.S.C. § 2701 *et seq.*, and has requested a tribal-state compact with the State of California authorizing Class III gaming activities

C. The Compact will require the Tribe to adopt a Tribal Labor Relations Ordinance ("TLRO"), which will be attached as an exhibit to the Compact.

D. The Tribe is planning to develop a commercial entertainment enterprise (the "Complex") on the property to include a gaming facility.

E. The Union organizes employees for the purposes of bettering workers' wages, hours and other conditions of employment.

F. The Union represents an effective ally and beneficial partner in the Tribe's efforts to engage in economic development.

NOW, THEREFORE, THIS AGREEMENT is made and entered into by and between the Union and the Tribe.

1. Pursuant to the terms of this Agreement, employees shall have the right to self--organization, to form, join, or assist the Union, to bargain collectively through the Union, and to engage in other concerted activities for the purpose of collective bargaining or other mutual aid or protection. The Tribe shall refrain from any interference with, restraint or coercion of employees in the exercise of these rights, provided that employees have the right to refrain from any and all activities described in this Section, and the Union agrees not to restrain or coerce employees in the exercise of the rights described in

this Section. The exclusive remedy for a violation of these obligations shall be the procedure set forth within this Agreement.

2. The term "Employees" is defined to include all individuals employed at the Complex except supervisors, guards, confidential employees, any employee of the Tribal Gaming Commission, any employee of the security or surveillance department (other than those who are responsible for the technical repair and maintenance of equipment), any cash operations employee who is a "cage" employee or money counter or any casino auditor or any dealer.

3. The bargaining unit contemplated by this Agreement shall be a single unit of all Complex employees listed in Exhibit A.

4. The parties agree that they have created a system for resolving all problems that may arise during the term of this Agreement. Therefore, there does not exist the need for either party to resort to practices intended to exert economic pressure on the other party in order to resolve a problem or achieve a goal. The Tribe shall not lockout the employees or take other economic actions designed to coerce the union. The Union agrees that it will not engage in strikes, sympathy strikes, picketing, boycotts, or other adverse economic activity at the Complex.

5. The Tribe will not do any action nor make any statement that will directly or indirectly state or imply any opposition by the Tribe to the selection of the Union as the exclusive bargaining agent of the employees The Union also agrees that, neither the Union nor any of its officers, representatives, agents or employees will express publicly any negative comments concerning the motives, integrity or character of the Tribe, the Tribe's management contractor, in its capacity as the Tribe's management contractor, or any of their officers, agents, directors or employees. The Union and its representatives will not directly or indirectly coerce or threaten any employee in an effort to obtain authorization cards.

6. If the Union provides written notice to the Tribe of its intent to organize Employees covered by this Agreement, the Tribe shall provide access to its premises and to such Employees by the Union. The Union may engage in organizing efforts in non-public areas of the Hotel during Employees' non-working times (before work, after work, and during meals and breaks) and/or during such other periods as the parties may mutually agree upon.

7. The Tribe shall provide, upon request, to the Union the names, addresses, telephone numbers and work classification or titles of each employee within ten (10) working days after such request. Additionally, the Tribe shall provide updated lists monthly.

8. On or after the first date the Tribe has a substantial and representative complement of employees engaged in regular work duties, the Tribe shall recognize the Union as the exclusive representative of the employees and negotiate in good faith with the Union over

employee wages, hours and other terms and conditions of employment for the purpose of reaching a collective bargaining agreement, provided that the Union submits to an arbitrator selected pursuant to Section 12 or other impartial person selected pursuant to the terms of this Agreement, written, signed and dated authorizations from a majority of the employees authorizing the Union to serve as their representative; and provided further that the arbitrator or other impartial person shall verify the authenticity of the authorizations and the majority status of the Union. The right to manage the Employer's business and the direction of its employees, including, but not limited to, the following rights, are reserved to the Employer for the 60-day period following the first date the Employer is obligated to commence negotiations with the Union. Such rights include the right to: direct, plan and control Hotel operations; to determine the number of employees to be employed, to assign them to work as needed; and to determine the means, methods and schedules of operations; to introduce or establish new equipment, facilities, technological changes, procedures or processes; to hire, terminate, classify, reclassify, schedule, assign, promote, transfer, layoff and/or rehire employees.

9. Negotiations shall commence when the Union is recognized or sixty (60) days after the Casino opens to the public, whichever is later. If the parties are unable to reach agreement within sixty (60) days following commencement of negotiations for a collective bargaining agreement, or such longer period as the parties agree mutually, all unresolved issues shall be submitted for resolution to the Tribal forum designated by the Tribe pursuant to the TLRO. If the Tribal forum does not resolve all the issues to the mutual satisfaction of the Tribe and the Union within sixty (60) working days of submission, then the remaining issues shall be submitted to arbitration. The arbitrator shall be selected pursuant to the procedure set forth in Section 12, below. The arbitrator shall employ all appropriate and reasonable methods to facilitate agreement by the parties.

10. In any arbitration proceeding under Section 9, the arbitrator shall consider, but not be limited to, the following factors:

    i. Wages, hours and other terms and conditions of employment of the Tribe's competitors, and/or other businesses in California and surrounding states, a list of which shall be mutually agreed upon by the Union and the Tribe or which shall be established by the arbitrator.

    ii. Size and type of Complex operations;

    iii. Ability to pay, if placed at issue by the Tribe;

    iv. Regional and local market conditions;

    v. Ability of employees, through a combination of wages, hours and benefits, to earn a living wage to sustain themselves and their families;

vi. Cost of living;

vii. The Complex's costs or revenues, if raised by the Tribe;

viii. Factors uniquely applicable to the security needs of a gaming facility;

ix. Stipulations of the parties; and

x. Such other factors, not confined to the foregoing, which are normally or traditionally taken into consideration in the determination of wages, hours and conditions of employment through voluntary collective bargaining, mediation, fact-finding, arbitration or otherwise between the parties.

The arbitrator shall select the final proposal(s) of one of the parties and shall issue an award incorporating those proposals without modification.

11. It is recognized that the Tribe and the Union have a common interest in protecting work opportunities for all employees covered by this Agreement and employed on a regular basis. Therefore, no work customarily performed by employees covered by this Agreement shall be performed under any sublease, subcontract, or other agreement unless the terms of any lease, contract or other agreement specifically state that (a) all such work shall be performed only by members of the bargaining unit covered by this Agreement, and (b) the Tribe shall at all times hold and exercise full control of the terms and conditions of employment of all such employees pursuant to the terms of this Agreement. The provisions of this Article apply to all operations on the Tribe's premises covered by this Agreement, regardless of location or displacement of employees or prior use of the area occupied by such operations. Notwithstanding the foregoing provisions hereof, the Employer may purchase from outside sources for use in its establishment convenience foods, prepared frozen foods, pre-mixed salads and peeled vegetables because this is work not customarily performed by bargaining unit employees.

12. The Employer and the Union shall submit to final and binding arbitration any and all questions or disputes arising under this Agreement. The arbitrator shall enforce and apply the terms of this Agreement, but shall not modify, add to or subtract from this Agreement. The arbitrator shall be selected from the California Tribal Labor Panel, in accordance with the procedures of the American Arbitration Association. All parties to the arbitration shall share equally in the fees and expenses of the arbitrator, but bearing their own fees and expenses for their own representation. Any decision, award or order by the arbitrator shall be enforceable in any state or federal court of competent jurisdiction, including state courts in California. The arbitrator shall have the right and power to determine and order all questions of procedure and to frame all issues on matters submitted for arbitration. Where an arbitrator determines that the Tribe or the Union have materially violated this Agreement, the arbitrator shall determine an appropriate remedy consistent with the terms of this Agreement.

13. THE TRIBE'S LIMITED WAIVER OF SOVEREIGN IMMUNITY. By this Agreement, the Tribe does not waive, limit, or modify its sovereign immunity from suit except as provided in this Section. The Tribe expressly waives in a limited manner its immunity from suit and consents to be sued in any court of competent jurisdiction, including federal and state courts in California, without exhausting tribal remedies, with respect to matters arising out of this Agreement and/or any collective bargaining agreement or other agreement entered into by the Tribe and the Union. Said waiver is specifically limited to the following actions and remedies:

A. MONETARY DAMAGES. The enforcement of an award of money damages by arbitration pursuant to this Agreement; provided that the arbitrator(s) and/or court shall have no authority or jurisdiction to execute against any assets of the Tribe except for assets of the Complex (not including the real property or the physical building structure or fixtures) and future undistributed proceeds of the Complex.

B. INJUNCTIVE RELIEF AND SPECIFIC PERFORMANCE. The enforcement of a determination by arbitration pursuant to this Agreement that mandates the Tribe to specifically perform any obligation under this Agreement.

C. ACTION TO COMPEL ARBITRATION. An action to compel arbitration pursuant to this Agreement.

14. The Union hereby agrees to actively support before the appropriate federal, state, and local administrative, bureaucratic, regulatory and legislative bodies for the Tribe's efforts to remain competitive in, and gain entry to, casino and related markets in which the Tribe chooses to participate pursuant to the IGRA. For purposes of this Agreement "active support" includes letter writing, consultation with and lobbying of elected and appointed officials, availability of members for events in furtherance of the Tribe's goals, opposition to competitor's efforts to prohibit the Tribe's entry into tribal government gaming on its lands in Madera County, California, and assistance with local government relations.

15. If any provision of this Agreement is held invalid by operation of law or by a final decision of a state or federal court of competent jurisdiction, the remainder of this Agreement shall not be affected thereby; and the parties shall immediately meet for the purpose of negotiating a mutually satisfactory replacement for said provision.

16. The terms of this Agreement apply only to the Complex in Madera County, California. The terms of this Agreement do not apply to any other business, operation or venture operated and/or managed by the Tribe in any other locations.

Executed and dated in Sacramento, California, this 31 day of January 2006.

FOR THE TRIBE

By: Judy E. Fink

Its: North Fork Rancheria

Date: January 31, 2006

FOR THE UNION

By: Jack Gribbon

Its: California Political Director

Date: January 31, 2006

EXHIBIT A

Classifications of Casino Service Employees Eligible under this Agreement:

1. All food and beverage positions including: cooks, runners, dishwashers, wait persons, hosts, hostesses, cashiers, buspersons, bartenders and cocktail servers.
2. Housekeeping positions including: janitors, carpet cleaners or any other non-management cleaning personnel.
3. PBX operators.
4. Change persons.
5. Gift shop clerks.
6. Wardrobe clerks and seamers.
7. Valet parkers.
8. Groundskeepers.

Classifications of Hotel Service Employees Eligible under this Agreement:

1. All food and beverage positions including: cooks, runners, dishwashers, wait persons, hosts, hostesses, cashiers, buspersons, bartenders and cocktail servers.
2. All housekeeping positions including: room cleaners, inspectresses, porters, janitors, carpet cleaners, and housemen.
3. Wardrobe clerks and seamers.
4. Linen room attendants.
5. PBX operators.
6. Front Desk clerks.
7. Bell hops.
8. Doormen and valet parkers.
9. Groundskeepers.

PROJECT LABOR AGREEMENT

FOR

NORTH FORK RANCHERIA OF MONO INDIANS

RESORT CASINO AND HOTEL PROJECT

MADERA COUNTY, CALIFORNIA

1. INITIAL PROVISIONS

1.1. This Project Labor Agreement ("Agreement") is entered into by the North Fork Rancheria of Mono Indians ("Primary Employer" or "the Tribe") and the Fresno, Madera, Kings and Tulare Counties Building and Construction Trades Council ("Council") and its affiliated local unions who have executed this Agreement, all of whom are referred to collectively as the "Unions."

1.2. The Project is a casino and hotel resort to be located on land located in Madera, County, California, and includes any other associated buildings or facilities, such as a water treatment plant or a sewage treatment plant (the "Project"). The Primary Employer is the owner of the Project.

1.3. The Project will be constructed on Tribal land, and the Tribe, through its employees or agents, will exercise control over the site and retain overall authority for the construction of the Project. The Tribe requires that the hiring/referral/layoff preference for qualified Native Americans in performing construction work on the Project provided in Sections 5.5 and 5.6 be observed by all Unions and Employers signatory to this Agreement. In addition, subject to the provisions of an Applicable Agreement (as defined in Section 3.1), the Tribe shall retain the right to control and coordinate all Project construction work by determining work scheduling, including uniform start times, the necessity for and the times of shift work, by directly enforcing any drug and alcohol abuse policy which is agreed to by any contractor or subcontractor and the Council, and otherwise directly removing any employee whether employed directly or by any contractor or subcontractor for breach of reasonable rules promulgated by the Tribe governing conduct on the job. The Tribe shall have the right upon receipt of the written complaint of any employee to order corrective action necessary to maintain reasonable and lawful standards for work place health and safety. The Tribe will also have the right to participate in monthly labor/management meetings, participate in pre-job conferences and mark-up meetings, and, at its sole option, to participate in the resolution of any grievances. The Tribe shall have the authority to inspect the site at any time.

1.4. As provided below, contractors and subcontractors performing certain construction work on the Project will be subject to this Agreement by executing the attached Employer Agreement to be Bound (all of whom, including the Primary Employer, are individually and collectively referred to as "Employer" or "Employers").

1.5. The Unions are labor organizations whose members are construction industry employees.

1.6. It is understood and agreed by and between the Parties to this Agreement that the final plans for the Project may be subject to modifications and approval by those public agencies possessing lawful approval authority over the Project and that this Agreement applies to the Project as it is finally approved by such entities and agencies.

1.7. A large labor pool represented by the Unions will be required to execute the work involved in the Project. Employers wish, and it is the purpose of this Agreement, to ensure that a sufficient supply of skilled craft workers are available at the Project, that all construction work and related work performed by the members of the Unions on this Project shall proceed continuously, without interruption, in a safe and efficient manner, economically with due consideration for the protection of labor standards, wages and working conditions.

1.8. In furtherance of these purposes and to secure optimum productivity, harmonious relations between the parties and the orderly performance of the work, the parties to this Agreement agree to establish adequate and fair wage levels and working conditions and to protect the Project against strikes and lockouts and other interference with the process of the work.

1.9. In the interest of the future of the construction industry in the local area, of which the Unions are a vital part, and to maintain the most efficient and competitive posture possible, the Unions pledge to work and cooperate with the management of the Project to produce the most efficient utilization of labor and equipment in accordance with this Agreement.

2. SCOPE OF AGREEMENT

2.1. This Agreement covers all on-site construction, alteration, painting or repair of buildings, structures and other works and related activities for the Project which is within the craft jurisdiction of one of the Unions and which is directly or indirectly part of the Project, including pipelines (including those in linear corridors built to serve the Project), pumps, pump stations, site preparation, survey work and soils and material inspection and testing, demolition, all on-site fabrication work provided such work is within the fabrication provision of a local master or national agreement of one of the Unions, demolition of existing structures, and all construction, demolition or improvements required to be performed as a condition of approval by any public agency. On-site fabrication work includes work done for the Project in temporary yards or areas near the Project. All fabrication work over which the Owner possesses the right of control, including the fabrication of air-handling systems and ducts, and HVAC sheet metal work, and which is traditionally claimed as on-site fabrication shall be performed on-site, but excluding all fabrication work for the Primary Employer's gaming, surveillance and security operations. For the convenience of the Primary Employer or other Employers, such work may be performed off-site, provided it shall be performed in accordance with the union standards established by this Agreement for the appropriate craft Union or by a fabrication agreement approved by the craft's International Union. On site construction shall also include the site of any batch plant constructed solely to supply materials to the Project. All work within the scope of this Agreement is referred to as "Covered Work" in this Agreement.

2.2. Notwithstanding any other provision of this Agreement, this Agreement shall not apply to:

2.2.1. Work of non-manual employees, including but not limited to superintendents, supervisors, staff engineers, inspectors and testers, quality control, quality assurance personnel, timekeepers, guards, safety personnel, emergency medical and first aid technicians and other professional, engineering, administrative, security and management employees.

2.2.2. Work performed and undertaken by state, county, city or other governmental bodies, or their contractors or by public utilities and/or telephone companies or their contractors on or near or leading to or into the Project site covered by this Agreement.

2.2.3. All off-site maintenance on leased equipment and on site supervision of such work.

2.2.4. Work performed by an equipment vendor's own labor forces for warranty, installation, repair or maintenance of the vendor's equipment if required by the vendor's warranty agreement.

2.2.5. Calibration, testing, laboratory or specialty testing or inspections, checking and start-up of gaming, security and surveillance equipment or systems.

2.2.6. Specialized or technical work requiring specialized training, unique skills, or a level of specific technical experience which employees represented by the Unions do not possess.

2.2.7. Employees and entities engaged in off-site manufacture, modifications, repair, maintenance, assembly, painting, handling or fabrication of gaming, security or surveillance equipment, materials or machinery or involved in deliveries to and from the Project site, excepting local deliveries of all major construction materials including fill, ready mix, aggregate, concrete and asphalt which are covered by this Agreement and local deliveries of furniture, fixtures and equipment from any offsite warehouse maintained by the Employers.

2.2.8. Employees of the Employers (or third party specialty vendors) engaged in on-site equipment installation and warranty work for data processing, internal communication, gaming equipment electronics and software installation, all other electronic devises, and all low voltage wiring related in any way to the Primary Employer's gaming, security and surveillance operations, provided, however, that rough-in work for such equipment and devises is Covered Work.

2.2.9. Employees of "Artisans" who are individuals or entities who the Employers may (or may not) employ directly to create unique, one-of-a-kind decorative elements for incorporation into the building. The design, illustration, and detailing of these one-of-a-kind decorative elements can only be fully completed in the field and can only be performed by that individual or entity. The duties of Artisans shall be to direct trades people, as well as provide assistance in the unloading, assembly, installation, and distribution of unique, one-of-a-kind decorative elements as defined above. Artisans shall perform all final adjustments, finishing touches, and final painting of such one-of kind decorative elements, provided they are assisted by a trades person.

2.2.10. The following activities which are generally associated with casino installation and furnishing:

2.2.10.1. Slot Machines

1. Transport & unloading
2. Bolting & unbolting
3. Drilling of holes
4. Mounting of bill changers
5. Repair & installation of plastic laminate
6. Installation of top sections and additions
7. Installation & removal of all slot machines including slant tops and novelty machines
8. Furnish, unload & installation of all slot signage
9. Furnish, unload & installation of all security cameras and devices.

2.2.10.2. Slot Machine Bases

1. Transportation & unloading
2. Fastening together
3. Drilling of holes
4. Cutting, altering, repair & modification
5. Installation of filler pieces
6. Repair & installation of laminate and corner guards installation & removal of all slot machine bases

2.2.10.3. Gaming Tables and Furniture

1. Transportation & unloading
2. Assembly & disassembly
3. Cutting, alteration, repair & modification
4. Installation of all gaming tables and fixed furniture
5. Repair and installation of laminates, upholstery and fabrics
6. Installation & removal of all gaming tables and furniture, including but not limited to Black Jack, Roulette Pai Gow, Poker, Baccarat, Mini Baccarat, Big Six Wheel Tables, Caribbean Stud, etc.,

including all fixed stools & chairs, etc. that accompany gaming tables

7. All pit stands and related fixed furniture accessories

2.2.10.4. Figurines, Statues, Table Ornaments, Artifacts, Wall Hangings and Ornamentations

1. Transportation & unloading
2. Assembly and disassembly
3. Installation & removal
4. Cutting, alterations, repair & modification
5. The building and fabrication of all landscaping items, e.g. rock scapes, trees, etc.
6. The installation of all decorative items in accordance with Schedule A

2.2.10.5. Locks and Locking Devices

1. Installation, repair, removal and reinstallation, transportation, movement, record keeping, etc., prior to occupancy

3. SUBCONTRACTING

3.1. Primary Employer and each other Employer agree that it will subcontract Covered Work only to a person, firm, or corporation who is or becomes party to this Agreement and who is or becomes signatory to either: (1) a local multi-employer collective bargaining agreement with the craft Union having traditional and customary jurisdiction over the work, (2) an area agreement with the craft Union having traditional and customary jurisdiction over the work, (3) a regional agreement with the craft Union having traditional and customary jurisdiction over the work (collectively the local, area or regional agreement is referred to as the "Master Agreement"), or, only in the case of a national contractor, (4) a national agreement with the International Union of the craft Union having traditional and customary jurisdiction over the work. Any Employer performing Covered Work on the Project shall, as a condition to working on the Project, become signatory to and perform all work under the terms of this Agreement and the applicable local, area, regional or national agreement (the "Applicable Agreement"). Before being authorized to perform any Covered Work, Employers (other than Primary Employer) shall become a party to this Agreement by signing an Employer Agreement to be Bound, which is provided as Attachment A to this Agreement. Every Employer shall notify the Council and the State Council in writing within three business days after it has subcontracted work, and shall at the same time provide to the Council and the State Council a copy of the executed Employer Agreement to be Bound.

3.2. Notwithstanding Section 3.1, an Employer who: (a) is signatory to a master, area, or regional agreement with one or more of the Unions signatory to this Agreement, or is signatory to a national agreement with one or more of the International Unions of the craft Unions signatory to this Agreement, and (b) contracts for Covered Work within the traditional and customary jurisdiction of one or more of the signatory Unions but those Unions are not parties to the Applicable Agreement with that Employer, then (c) the Employer shall comply with the terms and conditions of the agreements allowed by 3.1 above for those Unions with traditional and customary jurisdiction over that Covered Work for the duration of the work, but need not become signatory to those additional agreements allowed by 3.1 above. All provisions of Article 14, Jurisdiction, continue to apply to all Covered Work.

3.3. Notwithstanding Section 3.1 and 3.2, any Employer not already bound to an Applicable Agreement, who signs and becomes bound to such a multi-employer, area, regional, or national agreement to participate on this Project, shall not be required to apply the terms of that agreement to any other construction project in which such Employer is already engaged, or which such Employer has already been contractually bound to perform.

3.4. Nothing in this Agreement shall in any manner whatsoever limit the rights of the Primary Employer, or any other Employer, to subcontract work or to select its contractors or subcontractors, provided, however, that all Employers, at all tiers, performing Covered Work shall be required to comply with the provisions of this Agreement. Primary Employer and every other Employer shall notify each of its contractors and subcontractors of the provisions of this Agreement and require as a condition precedent to the award of any construction contract or subcontract for Covered Work or allowing any subcontracted Covered Work to be performed, that all such contractors and subcontractors at all tiers become signatory to this Agreement and the Master Agreement. If any Employer fails to provide the Council and State Council with the Employer Agreement to be Bound executed by its subcontractor, that Employer shall be liable for any contributions to any trust funds that the subcontractor, or any subcontractor to that subcontractor, fails to make.

4. WAGES AND BENEFITS

4.1. All employees covered by this Agreement (including foremen and general foremen if they are covered by the Master Agreement) shall be classified and paid wages, other compensation including but not limited to travel, subsistence, show up and shift premium pay, and contributions made on their behalf to multi-employer trust funds, all in accordance with the then current multi-employer Master Agreement of the applicable Union.

4.2. Any special interest bargaining which establishes wage rates, classifications, zones, or wage escalations which apply exclusively to the Project will not be recognized.

5. UNION RECOGNITION

5.1. The Employers recognize the Unions signatory to this Agreement as the sole and exclusive collective bargaining agents for their respective construction craft employees performing Covered Work for the Project, and further recognize the traditional and customary craft jurisdiction of each Union.

5.2. All employees performing Covered Work shall be or shall become and then remain members in good standing of the appropriate Union as a condition of employment on or before the eighth (8th) day of employment, or the eighth (8th) day following the execution of this Agreement, whichever is later.

5.3. The Unions shall be the source of all craft employees for Covered Work for the Project. Employers agree to be bound by the hiring practices of the respective Union, including hiring of apprentices, and to utilize its registration facilities and referral systems. The Employer shall have the right to determine the competency of all employees, to determine the number of employees required and to select the employees to be hired.

5.4. In the event the referral facilities maintained by the Unions do not refer the employees as requested by the Employer within a forty eight (48) hour period after such requisition is made by the Employer (Saturdays, Sundays and Holidays excepted), the Employer may employ applicants from any source.

5.5. The Unions represent that hiring halls and referral systems will be operated in a non-discriminatory manner, and in full compliance with all applicable laws and regulations that require equal employment opportunities and prohibit discrimination on the basis of union membership. The Unions further agree that for work on the Project they shall offer a referral and/or hiring preference to qualified Native Americans pursuant to Section 5.6.

5.6. The Employers and Unions shall provide Native Americans living on or near

Tribal land with a referral, hiring and layoff preference for all Covered Work for which the Native American is qualified. Native Americans will be classified and assigned work that they are qualified to perform. The Employers and Unions shall provide Native Americans employed on the Project with information about the requirements and procedures for enrolling in apprenticeship programs operated by Employers and Unions.

5.7. All job and/or referral applicants who fail a pre-employment drug test shall be given a second test at the Employer's direction and/or discretion.

6. STRIKES AND LOCKOUTS

6.1. During the life of this Agreement, the Unions, their agents, their representatives and their employees agree that they shall not incite, encourage, condone or participate in any strike, walkout, slowdown, sit-down, stay-in, boycott, sympathy strike, picketing or other work stoppage for any cause whatsoever with respect to this Project; and it is expressly agreed that any such action is in violation of this Agreement. In the event of a violation of this provision, any Employer shall be entitled to seek relief in court, specifically including injunctive relief, to restrain any such action on the part of the Union(s), and/or any of its agents, representatives or employees.

6.1.1. Failure of the Unions or any employee to cross any picket line established by the Unions and/or any union, signatory or non-signatory to this Agreement, or the picket or demonstration line of any other organization, at or in proximity to the Project is a violation of this Agreement. Employers and Unions shall take all steps necessary to ensure compliance with this section, and to ensure uninterrupted construction and the free flow of traffic in the Project area for the duration of this Agreement.

6.1.2. Employers may discharge any employee violating Section 6.1, and any such employee will not be eligible thereafter for referral and/or employment at the Project for a period of 100 days.

6.2. Notwithstanding the provisions of Section 6.1 above, it is agreed that a Union retains the right to withhold the services of its members from a particular contractor or subcontractor who fails to make timely payments to the Union's benefit plans, or fails to timely pay its weekly payroll, in accordance with its agreements with the Union; provided, however, that the Union shall give four (4) days notice to the Primary Employer prior to withholding the services of its members, and that in the event the Union or any of its members withholds their services from such contractor or subcontractor, Primary Employer shall have the right to replace such contractor or subcontractor with any other contractor or subcontractor who executes the Agreement to be Bound.

6.3. In the event that any applicable labor agreement expires and the parties to that agreement fail to reach agreement on a new contract by the date of expiration, a Union shall continue to provide employees to the Employers working on the Project under all the terms of the expired agreement until a new agreement is negotiated, at which time all terms and conditions of that new agreement shall be applied to Covered Work at the Project, except to the extent they conflict with any provision of this Agreement. In addition, if the new labor agreement provides for wage or benefit increases, then any Employer shall pay to its employees who performed Covered Work at the Project during the hiatus between the effective dates of such labor agreements, an amount equal to any such wage and benefit increases established by the new labor agreement for such work performed. The Unions agree that there will be no strikes, work stoppages, sympathy actions, picketing, slowdowns or other disruptive activity or other violations of Article 6 affecting the Project by any local Union involved in the renegotiation of area local collective bargaining agreements.

7. SHIFT TIMES AND HOLIDAYS

7.1. The standard work day shall consist of eight (8) hours of work between 7:00 a.m. and 5:30 p.m. with one-half hour designated as an unpaid period for lunch. The standard work week shall be five (5) consecutive days of work commencing on Monday. Nothing herein shall be construed as guaranteeing any employee eight (8) hours of work per day or forty (40) hours of work per week.

7.2. Recognized holidays shall be as follows: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Fourth of July, Labor Day, Veterans' Day, Thanksgiving Day, Day after Thanksgiving and Christmas Day. In the event a holiday falls on Sunday, the following day, Monday, shall be observed as such holiday. In the event a holiday falls on Saturday, the previous day, Friday, shall be observed as such holiday. In no event shall work be performed on Labor Day, except in cases involving an immediate threat to life or property.

8. GRIEVANCE PROCEDURE

8.1. It is mutually agreed that any question arising out of and during the term of this Agreement involving its interpretation and application (other than jurisdictional disputes or successorship) shall be considered a grievance. Questions arising out of or involving the interpretation of a Master Agreement shall be resolved under the grievance procedure provided in that Master Agreement.

8.2. A grievance shall be considered null and void if not brought to the attention of the

Contractor(s) within five (5) working days after the incident that initiated the alleged grievance occurred or was discovered.

8.3. Grievances shall be settled according to the following procedure:

Step 1

The Steward and the grievant shall attempt to resolve the grievance with the craft supervisor.

Step 2

In the event the matter remains unresolved in Step 1 above, within five (5) working days after notice to the Unions, the alleged grievance in writing may then be referred to the Business Manager of the Craft Union and the Labor Relations representative at the Contractor for discussion and resolution. A copy of the written grievance shall also be mailed/faxed to the Primary Employer.

Step 3

In the event the matter remains unresolved in Step 2 above within five (5) working days, the grievance in writing may then be referred to the representative of the Craft Union involved and the Manager of Labor Relations of the Contractor or the Manager's designated representative, and the Primary Employer for discussion and resolution.

Step 4

If the grievance is not settled in the preceding steps within five (5) working days, either party may request the dispute be submitted to arbitration or the time may be extended by mutual consent of both parties. The request for arbitration and/or the request for an extension of time must be in writing with a copy to the Primary Employer. An Arbitrator selected from a permanent panel of Arbitrators consisting of Ken Silbert, William Engler, Barbara Chvany and Bonnie Bogue will hear grievances filed pursuant to this Article. The arbitrator will be selected by rotation from the permanent panel, rotating in the order set forth above. The Primary Employer shall keep a record of the sequence and shall notify the parties to the grievance as to the next arbitrator in the order of rotation. In the event, the Arbitrator is not available in a reasonable time to hear the grievance and the parties have not mutually agreed to extend the time for arbitration, the next arbitrator in order of rotation will be selected. A reasonable time is defined as fifteen (15) days where the grievance concerns employment discharge and thirty (30) days for all other grievances.

8.4. The Arbitrator's decision shall be submitted in writing and shall be final and binding on all parties signatory to this Agreement. The expense of arbitration, including the cost of the Arbitrator and the cost of necessary expenses required to pay for facilities for the hearing of cases, shall be borne equally by both parties. The Arbitrator's decisions shall be confined to the question posed by the grievance and the Arbitrator shall not have authority to modify, amend, alter, add to or subtract from, any provision of this Agreement.

8.5. The Primary Employer and other Employers, as well as the Unions, may bring forth grievances under this Article.

8.6. Any award or resolution under Article 9 shall be prospective and shall not require any back pay for work performed unless the assignment is a knowing violation of a well-established resolution under the Plan.

9. JURISDICTIONAL DISPUTES

9.1. The assignment of work will be solely the responsibility of the Employer performing the work involved; and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") or any successor Plan.

9.2. All jurisdictional disputes between or among the Building and Construction Trades Unions and their employees, parties to this Agreement, shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department or any other plan or method of procedure that may be adopted in the future by the Building and Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractors and Unions parties to this Agreement.

9.3. All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, or slow-down of any nature, and the Contractor's assignment shall be adhered to until the dispute is resolved. Individuals violating this section shall be subject to immediate discharge.

9.4. Each Contractor will conduct a pre-job conference with the Council prior to commencing work. The Primary Employer and any general contractor will be advised in advance of all such conferences and may participate if they wish.

9.5. In case of a jurisdictional dispute involving a Union or Unions not party to the Plan, such dispute will be referred to the General Presidents of the Unions involved and the Employer for resolution.

9.6. The Unions and the Employers, in making their determination regarding jurisdiction, shall have no authority to assign work to a double crew, that is, to more employees than the minimum required to perform the work involved, or to assign work to employees who are not qualified to perform the work involved. This does not prohibit establishment of composite crews where more than one (1) employee is needed for the job, so long as assignments of work are consistent with Section 9.1.

9.7. This Article 9 shall be enforceable in any court of competent jurisdiction, and shall not be subject to the grievance procedure of Article 8.

10. JOINT LABOR/MANAGEMENT MEETINGS

10.1. During the period of any work performed under this Agreement, a joint Labor/Management meeting will be held on an approximately monthly basis or more frequently as needed between the Primary Employer, the contractors and subcontractors, and the signatory Unions. The purpose of these meetings is to promote harmonious labor/management relations, ensure adequate communications and advance the proficiency and efficiency of the craft workers and contractors performing work at the Project. These monthly (or more frequent) meetings will also include discussion of the scheduling and productivity of work performed at the Project.

10.2. A Pre-Job Conference will be held prior to the commencement of work to establish the scope of work in each Contractor's contract. When a contract has been let to a Contractor(s) covered by this Agreement, a Pre-Job Conference and/or Mark-Up Meeting shall be required upon request of any Union, Contractor or the Primary Employer.

10.3. The Primary Employer will schedule and attend all Pre-Job Conferences and Mark-Up Meetings.

11. SUCCESSORSHIP

11.1. This Agreement is and shall be binding and legally effective upon any successor in interest to Primary Employer whether by merger or acquisition and upon any entity which acquires title to the Project whether by sale, lease, or other transfer, or contribution to partnership, joint venture or other entity; provided, however, that this Agreement shall not be binding upon any successor or transferee who takes title to the Project by reason of the default of Primary Employer pursuant to any loan or partnership agreement or because of the bankruptcy or insolvency of Primary Employer. Any agreement for a sale, lease, or other transfer, or contribution of Primary Employer or an agreement for a merger or acquisition including ownership or control of Primary Employer shall include an express assumption of the obligations of this Agreement, including this successorship provision. Primary Employer shall provide the State Council and the Council with notice in writing at the close of any sale, acquisition, merger, lease, other transfer or contribution covered by this Agreement and an original executed assumption of this Agreement. Any sham transfer is a breach of this clause.

11.2. The parties hereto agree that in the event Primary Employer breaches Section 11.1 above, the actual damages to the Unions or their members would be unreasonably difficult, costly, inconvenient, or impracticable to calculate. Accordingly, the parties agree to liquidated damages which bear a reasonable relationship to the actual harm suffered.

11.3. In the event of a breach of Section 11.1 above, Primary Employer shall pay $30.00 for each hour that work was performed on the Project within the scope of this Agreement by employees of contractors or subcontractors who are not signatory to this Agreement. The liquidated damages shall be paid as follows: Fifteen Dollars ($15.00) per hour to the qualified pension plan and fifteen Dollars ($15.00) per hour to the qualified health and welfare plan of the Union(s) having jurisdiction over the work performed by the contractor(s) or subcontractor(s) not signatory to this Agreement. The parties agree that a Union shall enforce, collect and receive liquidated damages pursuant to Article 11 on behalf of its qualified pension plan and its qualified health and welfare plan. The qualified pension plans and the qualified health and welfare plans shall have no right to independently enforce the provisions, including but not limited to, the liquidated damage provisions contained in Article 11.

11.4. In no event shall the liquidated damages payable under this Section exceed a total amount of $6,000,000. In the event that pending claims would result in a payment in excess of $6,000,000, the total claims shall be prorated based on the number of hours worked by contractors or subcontractors in violation of Article 3.1 so that the total payment of claims does not exceed $6,000,000.

11.5. Upon execution and delivery of an agreement assuming all the obligations of this Agreement by a financially responsible successor pursuant to the requirements of Section 11.1, Primary Employer shall be released from liability for the payment of liquidated damages under

Section 11.3 and Primary Employer shall have no liability for any breach of this Agreement by a successor employer or contractor.

11.6. This Article 11 shall be enforceable in any court of competent jurisdiction, and shall not be subject to the grievance procedure of Article 8.

12. SUPPLEMENTAL DUES

12.1. Each Employer at every tier who performs Covered Work, in addition to any other wage or fringe benefit obligations, shall pay an additional five cents ($.05) for each hour worked by employees covered by this Agreement. In the event that an employee executes a voluntary dues deduction authorization and assignment of wages form in favor of a Union, the sum of five cents ($.05) for each hour of work performed pursuant to this agreement as and for dues, shall be transmitted by the Employer to the Union. The voluntary dues deduction authorization and assignment of wages form executed by the employee shall be deposited with the appropriate Trust Fund Office and the Employer shall be notified in writing at the time of the dispatch (or later in the event the voluntary dues deduction authorization and assignment of wages form is executed after dispatch) of the name, Social Security number, and effective date for the commencement of supplemental dues deductions. Dues deductions made by the Employer pursuant to this provision shall be reported and paid to the appropriate Trust Fund Office at the same time and with the same reporting form used for all other trust fund payments.

13. GENERAL PROVISIONS

13.1. If any article or provision of this Agreement shall be declared invalid, inoperative, or unenforceable by any competent authority of the executive legislative, judicial or administrative branch of the federal or state government, the Employers, the Council and the Unions shall suspend the operation of such article or provisions during the period of its invalidity and shall substitute by mutual consent, in its place and stead, an article or provision which will satisfy the objections to its validity and which, to the greatest extent possible, will be in accord with the intent and purpose of the article or provision in question.

13.2. If any article or provision of this Agreement shall be held invalid, inoperative or unenforceable by operation of law, or by any of the above mentioned tribunals of competent jurisdiction, the remainder of the Agreement or application of such article or provision to persons or circumstances other than to which it has been held invalid, inoperative or unenforceable shall not be affected thereby.

13.3. Except as enumerated in this Agreement, all other terms and conditions of employment described in the Master Agreement shall apply.

13.4. The provisions of this Agreement shall take precedence over conflicting provisions of any Applicable Agreement with respect to a Union.

13.5. Each person executing this Agreement represents and warrants that he or she is authorized to execute this Agreement on behalf of the party or parties indicated.

13.6. This Agreement may be executed in counterparts.

13.7. Any notices required under this Agreement shall be given as follows: To Primary Employer:

Judy E. Fink, Tribal Chairperson
North Fork Rancheria of Mono Indians
P.O. Box 929
North Fork, CA 93643

To the Council:

Fresno, Madera, Kings and Tulare Counties
Building and Construction Trades Council
AFL-CIO
3600 Tulare Street
Suite 110
Fresno, CA 93721

With a copy to (which shall not constitute

With a copy to:

notice to a party):

John A. Maier, Esq. California Indian Legal Services 510 – 16th Street, Fourth Floor Oakland, CA 94612 Telephone: (510) 835-0284 Facsimile: (510) 835-8045	Barry Bennet, Esq. 925 N Street, Suite 150 Fresno, CA 93721 Telephone: (559) 485-0120 Facsimile: (559) 485-5823

Either party may notify the other in writing if its person designated to receive notice is changed.

14. MANAGEMENT RIGHTS

14.1. Except as expressly limited by a specific provision of this Agreement, the Primary Employer and each other Employer retains full and exclusive authority for the management of operations including, but not limited to: the right to direct the work force, determine the number of employees to be hired and the qualifications thereof; the promotion, transfer, layoff of employees; or the discipline or discharge for just cause of employees; the assignment and schedule of work; the promulgation of reasonable work rules; timing and number of employees to be utilized for overtime work; the right to enforce any drug and alcohol abuse policies which are agreed to by any contractor or subcontractor and a Union; and otherwise to directly remove any employee whether employed directly or by any contractor or subcontractor for breach of reasonable rules promulgated by Employers governing conduct on the job. No rules, customs, or practices, which limit or restrict productivity or efficiency of the individual, as determined by the Employers and/or joint working efforts with other employees shall be permitted or observed, so long as assignments of work are consistent with Section 9.1.

15. LIMITED WAIVER OF SOVEREIGN IMMUNITY

15.1. By this Agreement, the Tribe does not waive, limit, or modify its sovereign immunity from suit except as provided in this Article. The Tribe expressly waives in a limited manner its immunity from suit and consents to be sued in any court of competent jurisdiction, including federal and state courts in California with respect to matters arising out of this Agreement. Said waiver is specifically limited to the parties to this Agreement and to the following actions and remedies:

15.1.1. MONETARY DAMAGES. The enforcement of an award of money damages by arbitration pursuant to this Agreement; provided that the arbitrator(s) and/or court shall have no authority or jurisdiction to execute against any assets of the Tribe except for assets of the casino and related facilities as defined herein (not including the real property or the physical building structure or fixtures) and future undistributed proceeds of the casino and related facilities as defined herein.

15.1.2. INJUNCTIVE RELIEF AND SPECIFIC PERFORMANCE. The enforcement of a determination by arbitration pursuant to this Agreement that mandates the Tribe to specifically perform any obligation under this Agreement.

15.1.3. ACTION TO COMPEL ARBITRATION. An action to compel arbitration provided by this Agreement.

15.1.4. ACTION TO ENFORCE ARTICLES 9 AND 11. An action to enforce the provisions of Article 9 or Article 11 of this Agreement.

16. TERM OF AGREEMENT

16.1. The term of this Agreement shall commence on the date indicated below as the date of execution, and shall continue in effect for a period of five (5) years ("the Continuation

Period") following completion of all Covered Work as defined in Article 2. Covered Work shall be deemed completed upon "final acceptance" of the Project by the owner. During the Continuation Period, "Covered Work" shall be limited to Covered Work that is contracted out to a contractor in the construction industry and that costs at least $50,000, unless there are no union contractors able to perform the construction maintenance work in a timely manner acceptable to the Primary Employer, or in the case of an emergency where the work must be performed immediately.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed and effective as of Sept 6, 2005:

North Fork Rancheria of Mono Indians
Primary Employer

By: Judy E. Fink
Tribal Chairperson

Fresno, Madera, Kings and Tulare Counties
Building and Construction Trades Council AFL-CIO

By: John Hutson
Union Representative

UNIONS

[insert names of local unions]

ATTACHMENT A
AGREEMENT TO BE BOUND

PROJECT LABOR AGREEMENT
NORTH FORK RANCHERIA OF MONO INDIANS
CASINO AND HOTEL PROJECT

The undersigned, as a contractor or subcontractor (hereafter "Contractor") on the North Fork Rancheria of Mono Indians Casino And Hotel Project, as defined in Section 1.2 (hereafter "Project"), of the Project Labor Agreement (hereafter "Agreement"), for and in consideration of the award to it of a contract to perform work on said Project, and in further consideration of the promises made in the Agreement and all attachments a copy of which was received and is acknowledged, hereby:

1. Accepts and agrees to be bound by the terms and conditions of the Agreement, together with any and all amendments and supplements now existing or which are later made thereto.
2. The Contractor agrees to be bound by the legally established trust agreements designated in local master collective bargaining agreements. The Contractor authorizes the parties to such local trust agreements to appoint trustees and successor trustee to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor.
3. Certifies that it has no commitments or agreements that would preclude its full and complete compliance with the terms and conditions of said Agreement.
4. Agrees to secure from any Contractor(s) (as defined in said Agreement) which are or become a subcontractor (of any tier) to it, a duly executed Agreement to be Bound in form identical to this document.

DATED:_______________ Name of Contractor ______________________________

____
(Authorized Officer & Title)

____

____

____
(Address)

UNIONS

Asbestos Workers, Local 16

Bricklayers, Tile Setters & Allied Crafts, Local 3

Carpenters, Local 701

Ironworkers, Local 155

Lathers, Local 9083

Operating Engineers, Local 3

Pile Drivers, Local 34

Plumbers & Pipefitters, Local 246

Roofers, Local 27

Teamsters, Local 431

Glaziers, Local 169

Boilermakers, Local 549

Electricians, Local 100

Laborers, Local 294

Millwrights, Local 102

Painters, Tapers & Floor Covers, Local 294

Plasterers and Cement Masons, Local [illegible] 300

Road Sprinkler Fitters, Local 669

Sheet Metal Workers, Local 162

APPENDIX D

California Natural Diversity Data Base, U.S. Fish & Wildlife Service, and California Native Plant Society Lists: Madera Site

California Department of Fish and Game
Natural Diversity Database
Selected Elements by Scientific Name
Special-status species within the "Kismet, CA" 7.5' USGS quadrangle and the eight surrounding quads: Le Grand, Raynor Creek, Raymond, Berenda, Bonita Ranch, Madera, Daulton, and Gregg

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Actinemys marmorata western pond turtle	ARAAD02030			G3G4	S3	SC
2	Ambystoma californiense California tiger salamander	AAAAA01180	Threatened		G2G3	S2S3	SC
3	Antrozous pallidus pallid bat	AMACC10010			G5	S3	SC
4	Aquila chrysaetos golden eagle	ABNKC22010			G5	S3	SC
5	Athene cunicularia burrowing owl	ABNSB10010			G4	S2	SC
6	Atriplex cordulata heartscale	PDCHE040B0			G2?	S2.2?	1B.2
7	Atriplex minuscula lesser saltscale	PDCHE042M0			G1	S1.1	1B.1
8	Atriplex persistens vernal pool smallscale	PDCHE042P0			G2	S2.2	1B.2
9	Atriplex subtilis subtle orache	PDCHE042T0			G2	S2.2	1B.2
10	Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
11	Branchinecta mesovallensis midvalley fairy shrimp	ICBRA03150			G2	S2	
12	Buteo swainsoni Swainson's hawk	ABNKC19070		Threatened	G5	S2	
13	Calycadenia hooveri Hoover's calycadenia	PDAST1P040			G2	S2.2	1B.3
14	Castilleja campestris ssp. succulenta succulent owl's-clover	PDSCR0D3Z1	Threatened	Endangered	G4?T2	S2.2	1B.2
15	Clarkia rostrata beaked clarkia	PDONA050Y0			G2	S2.1	1B.3
16	Delphinium recurvatum recurved larkspur	PDRAN0B1J0			G2	S2.2	1B.2
17	Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
18	Dipodomys heermanni dixoni Merced kangaroo rat	AMAFD03062			G3G4T12T	S2S3	
19	Dipodomys nitratoides exilis Fresno kangaroo rat	AMAFD03151	Endangered	Endangered	G3T1	S1	
20	Eryngium spinosepalum spiny-sepaled button-celery	PDAPI0Z0Y0			G2	S2.2	1B.2
21	Gambelia sila blunt-nosed leopard lizard	ARACF07010	Endangered	Endangered	G1	S1	
22	Haliaeetus leucocephalus bald eagle	ABNKC10010	Delisted	Endangered	G5	S2	
23	Lasiurus cinereus hoary bat	AMACC05030			G5	S4?	SC

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
24	Lepidurus packardi vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
25	Leptosiphon serrulatus Madera leptosiphon	PDPLM09130			G1?	S1?	1B.2
26	Linderiella occidentalis California linderiella	ICBRA06010			G3	S2S3	
27	Lytta moesta moestan blister beetle	IICOL4C020			G2	S2	
28	Lytta molesta molestan blister beetle	IICOL4C030			G2	S2	
29	Navarretia nigelliformis ssp. radians shining navarretia	PDPLM0C0J2			G4T2T3	S2S3.2	1B.2
30	Northern Hardpan Vernal Pool	CTT44110CA			G3	S3.1	
31	Orcuttia inaequalis San Joaquin Valley orcutt grass	PMPOA4G060	Threatened	Endangered	G2	S2.1	1B.1
32	Orcuttia pilosa hairy orcutt grass	PMPOA4G040	Endangered	Endangered	G2	S2.1	1B.1
33	Phacelia ciliata var. opaca Merced phacelia	PDHYD0C0S2			G5T1	S1.2	1B.3
34	Phalacrocorax auritus double-crested cormorant	ABNFD01020			G5	S3	SC
35	Spea hammondii western spadefoot	AAABF02020			G3	S3	SC
36	Taxidea taxus American badger	AMAJF04010			G5	S4	SC
37	Tuctoria greenei Greene's tuctoria	PMPOA6N010	Endangered	Rare	G2	S2.2	1B.1
38	Valley Sacaton Grassland	CTT42120CA			G1	S1.1	
39	Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2T3	S2S3	

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

January 16, 2008

Document Number: 080116034315

Sean Marquis
Analytical Environmental Services
1801 7th Street, Suite 100
Sacramento, CA 95811

Subject: Not specified

Dear: Mr. Marquis

We are sending this official species list in response to your January 16, 2008 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 15, 2008.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

TAKE PRIDE IN AMERICA

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 080116034315

Database Last Updated: December 12, 2007

Quad Lists

Listed Species

Invertebrates

- *Branchinecta conservatio*
  - Conservancy fairy shrimp (E)
  - Critical habitat, Conservancy fairy shrimp (X)
- *Branchinecta lynchi*
  - Critical habitat, vernal pool fairy shrimp (X)
  - vernal pool fairy shrimp (T)
- *Desmocerus californicus dimorphus*
  - valley elderberry longhorn beetle (T)
- *Lepidurus packardi*
  - Critical habitat, vernal pool tadpole shrimp (X)
  - vernal pool tadpole shrimp (E)

Fish

- *Hypomesus transpacificus*
  - delta smelt (T)
- *Oncorhynchus mykiss*
  - Central Valley steelhead (T) (NMFS)

Amphibians

- *Ambystoma californiense*
  - California tiger salamander, central population (T)
  - Critical habitat, CA tiger salamander, central population (X)
- *Rana aurora draytonii*
  - California red-legged frog (T)

Reptiles

- *Gambelia (=Crotaphytus) sila*
  - blunt-nosed leopard lizard (E)
- *Thamnophis gigas*
  - giant garter snake (T)

Mammals

- *Dipodomys nitratoides exilis*
  - Fresno kangaroo rat (E)
- *Vulpes macrotis mutica*
  - San Joaquin kit fox (E)

Plants

- *Castilleja campestris ssp. succulenta*
  - Critical habitat, succulent (=fleshy) owl's-clover (X)
  - succulent (=fleshy) owl's-clover (T)
- *Orcuttia inaequalis*
  - Critical habitat, San Joaquin Valley Orcutt grass (X)
  - San Joaquin Valley Orcutt grass (T)
- *Orcuttia pilosa*
  - Critical habitat, hairy Orcutt grass (X)

hairy Orcutt grass (E)

Tuctoria greenei

Critical habitat, Greene's tuctoria (=Orcutt grass) (X)

Greene's tuctoria (=Orcutt grass) (E)

Quads Containing Listed, Proposed or Candidate Species:

GREGG (379B)

MADERA (380A)

BONITA RANCH (380B)

RAYMOND (399B)

DAULTON (399C)

RAYNOR CREEK (400A)

LE GRAND (400B)

BERENDA (400C)

KISMET (400D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 15, 2008.

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

v7-07d 10-18-07

Status: search results - Wed, Jan. 16, 2008 14:39 c

{QUADS_123} =~ m/400D|380A|380B|399B|399C|379B|400A|400B Search

Tip: Want to search by habitat? Try the **Checkbox and Preset** search page.[all tips and help.][search history]

Your Quad Selection: Kismet (400D) 3712011, Madera (380A) 3612081, Bonita Ranch (380B) 3612082, Raymond (399B) 3711928, Daulton (399C) 3711918, Gregg (379B) 3611988, Raynor Creek (400A) 3712021, Le Grand (400B) 3712022, Berenda (400C) 3712012

Hits 1 to 14 of 14

Requests that specify topo quads will return only Lists 1-3.

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

Selections will appear in a new window.

open	save	hits	scientific	common	family	CNPS
📂	☐	1	**Atriplex cordulata** 📷	heartscale	Chenopodiaceae	List 1B.2
📂	☐	1	**Atriplex minuscula** 📷	lesser saltscale	Chenopodiaceae	List 1B.1
📂	☐	1	**Atriplex persistens** 📷	vernal pool smallscale	Chenopodiaceae	List 1B.2
📂	☐	1	**Atriplex subtilis** 📷	subtle orache	Chenopodiaceae	List 1B.2
📂	☐	1	**Calycadenia hooveri** 📷	Hoover's calycadenia	Asteraceae	List 1B.3
📂	☐	1	**Castilleja campestris** ssp. **succulenta** 📷	succulent owl's-clover	Scrophulariaceae	List 1B.2
📂	☐	1	**Delphinium recurvatum** 📷	recurved larkspur	Ranunculaceae	List 1B.2
📂	☐	1	**Eryngium spinosepalum**	spiny-sepaled button-celery	Apiaceae	List 1B.2
📂	☐	1	**Leptosiphon serrulatus**	Madera leptosiphon	Polemoniaceae	List 1B.2
📂	☐	1	**Navarretia nigelliformis** ssp. **radians** 📷	shining navarretia	Polemoniaceae	List 1B.2
📂	☐	1	**Orcuttia inaequalis** 📷	San Joaquin Valley Orcutt grass	Poaceae	List 1B.1
📂	☐	1	**Orcuttia pilosa** 📷	hairy Orcutt grass	Poaceae	List 1B.1
📂	☐	1	**Phacelia ciliata** var. **opaca**	Merced phacelia	Hydrophyllaceae	List 1B.2
📂	☐	1	**Tuctoria greenei**	Greene's tuctoria	Poaceae	List 1B.1

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

Selections will appear in a new window.

APPENDIX E

Biological Constraints Analysis: Madera Site

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

July 27, 2004

Analytical Environmental Services
Attn: Chad Broussard
2021 N. Street, Suite 200
Sacramento, California 95814
916-447-3479

SUBJECT: Brown Property Biological Constraints Analysis, Project 2410-01

Dear Mr. Broussard:

The developmental potential of the Brown Property in Madera County is under review by Analytical Environmental Services (AES). The purpose of H. T. Harvey & Associates' analysis was to provide an overview of existing biological and regulated resources that may pose a potential constraint to site development to assist with this review in compliance with the National Environmental Policy Act (NEPA). H. T. Harvey & Associates conducted a reconnaissance-level survey of the Brown Property located north of Madera, California on June 16 and 24, 2004 (Figure 1). The property was surveyed for potentially regulated habitats and the habitats' potential to support special-status species. A map of biotic and regulated habitats was prepared using the rectified aerial photo provided by AES (Figure 2). The following report describes the habitats on the 305-acre site, identifies potential effects to biotic resources resulting from developing the site, describes recommended focused surveys, and discusses whether agency consultation is likely to be required.

SITE OVERVIEW

The Brown property is located approximately seven miles north of Madera, California, between Avenue 17 and Avenue 18, west of Highway 99 (Figure 1). The project vicinity is dominated by agriculture that includes dryland crops, vineyards, and orchards. The property is mostly flat and is underlain primarily by San Joaquin sandy loam and areas of Atwater loamy sand, Hanford sandy loam, and Tujunga sandy loam. The San Joaquin, Atwater, and Hanford soils are all underlain by hardpans, while the Tujunga soil is associated with former and current stream courses. A historic alignment of Schmidt Creek transects the property from the southeast corner of the site diagonally to the northwest along a narrow band of Tujunga and Hanford soils. The creek has been realigned as a ditch that extends to the western boundary of the parcel and beyond (Figure 2). The limited areas of existing development and Schmidt Creek ditch are dominated by ruderal habitat. The remainder of the parcel is planted with dryland wheat.

Map Copyrighted 1997 by the California State Automobile Association Reproduced by permission

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Brown Property: Site / Vicinity Map

File No. 2410-01	Date 7/12/04	Figure 1

Dryland Wheat Fields

Vegetation. Dryland wheat (*Triticum aestivum*) dominates the majority of the 305-acre site except those areas where it has not been planted, including within the Schmidt Creek ditch and disturbed and developed areas of the property. The density of the wheat precludes the establishment of herbaceous grassland species, though various invasive annual forbs form large patches within the fields. These forbs include black mustard (*Brassica nigra*), charlock (*Sinapsis arvensis*), wild radish (*Raphanus sativus*), and rancher's fireweed (*Amsinckia menziesii*). These species occur along historic drainages and broad depressions where more water may be available.

Two isolated depressions underlain by the Atwater and Hanford soils were found in the southern half of the property (Figure 2). These depressions are dominated by seasonal hydrophytic (water-loving) plants including toad rush (*Juncus bufonius*), slender popcorn-flower (*Plagiobothrys stipitatus*), rabbitsfoot grass (*Polypogon monspeliensis*), and Italian rye (*Lolium multiflorum*), as well as wheat and other annual grasses and forbs.

A hardpan layer associated with the underlying soils may be responsible for winter ponding in these areas but the vegetation in these depressions is not representative of vernal pool or seasonal wetland habitat. Much of the underlying hardpan has been broken by repeated tillage over many decades, further increasing the drainage afforded by the sandy soils on site. While most of the southern half of the project site has a hardpan underlying the sandy soils, no other depressions or vernal pool topography was observed on site.

Wildlife. Cultivated fields are frequently disturbed and provide limited habitat for wildlife. Frequent plowing for cultivation and weed control disrupts burrows and groundcover. Species that occur in cultivated habitats are generally widespread and accustomed to disturbances, such as American Kestrels (*Falco sparverius*), American Crows (*Corvus brachyrhynchos*), Killdeer (*Charadrius vociferous*), Mourning Doves (*Zenaida macroura*), Western Meadowlarks (*Sturnella neglecta*), Brewer's Blackbirds (*Euphagus cyanocephalus*), and House Finches (*Carpodacus mexicanus*).

Developed Areas

Vegetation. For the purpose of this assessment, Schmidt Creek ditch was considered a developed feature on site because of its purpose and origin as a ditch excavated in uplands. Schmidt Creek formerly began as swale topography on the Brown property and flowed to the southeast according to the USGS Kismet quadrangle map. Realignment of the creek likely occurred decades ago. The creek currently extends beyond the property boundary and is contiguous with Dry Creek, approximately 0.5 miles to the west. The ditch has a sandy bottom that lies approximately three feet below the surrounding grade and is bordered by sandy spoils dredged from the creek.

Schmidt Creek ditch is dominated by ruderal (disturbance-loving) vegetation. Dominant species within the ditch include rattail fescue (*Vulpia myuros*), ripgut brome (*Bromus diandrus*), soft chess brome (*Bromus hordeaceus*), Bermuda grass (*Cynodon dactylon*), heliotrope

(*Heliotropium curassavicum*), Meditteranean barley (*Hordeum marinum*), curly dock (*Rumex crispus*), and rancher's fireweed. While some of these species are hydrophytic, they do not form distinct seasonal wetland habitat anywhere within the ditch. A small thicket of willows (*Salix* spp.) and Fremont cottonwood trees (*Populus fremontii*) exists within the eastern half of the ditch, but many of the trees are dead or in poor health due to the limited hydrology.

A ranch house with adjacent pastures and outbuildings occurs in the southeast corner of the site. Trees, including willows, blue gum (*Eucalyptus globulus*), and walnut (*Juglans* spp.) exist around the ranch house in addition to the non-native grasses and forbs described above. A dumping ground west of the ranch is infested with rancher's fireweed. Finally, an irrigation canal is located parallel to Road 23, just inside the western property boundary. Water, up to two-feet deep, was flowing in the canal. The water in this canal is diverted underneath Schmidt Creek ditch through a vault structure and is not hydrologically connected to the ditch.

Wildlife. Homesteads typically provide habitat for common species accustomed to human disturbance. Common backyard birds such as Western Scrub-jays (*Aphelocoma californica*), American Robin (*Turdus migratorius*), Northern Mockingbirds (*Mimus polyglottos*), House Finches, and House Sparrows (*Passer domesticus*) are likely to be present at these sites. Where there are wood or brush piles, species such as western fence lizards (*Sceloporus occidentalis*) and desert cottontails (*Sylvilagus audobonii*) may be present. The homesteads and agricultural habitats of the project site are too disturbed to provide important habitat for migrating birds, though some common migrating birds in the region such as Wilson's Warblers (*Wilsonia pusilla*), Western Tanagers (*Piranga ludoviciana*), and Bullock's Orioles (*Icterus bullockii*) may be present during spring and fall migrations.

SPECIAL-STATUS PLANT SPECIES ASSESSMENT

Reconnaissance-level surveys were conducted on June 16, 2004 for special-status plant species (state and/or federally threatened or endangered, federal candidate species, and California Native Plant Society List 1B species) blooming at the time of the survey and for habitats capable of supporting them. A query of the California Natural Diversity Database (CNDDB 2004) was performed to identify special-status plant species potentially occurring in the project vicinity in the USGS Kismet quadrangle and the surrounding quadrangles. The only habitat specified in the query was valley and foothill grassland. This habitat was chosen for the similarity of its constituent species to those on the site. In addition, the California Native Plant Society Inventory (CNPS 2001) was used to identify and assess additional species occurring in similar habitats in Madera County.

Eighteen special-status plant species were identified in these queries, nine of which were dismissed due to the absence of vernal pool, clayey, and/or alkaline habitats on site. The remaining nine species considered potentially occurring within the project area include heartscale (*Atriplex cordulata*), lesser saltscale (*Atriplex minuscula),* subtle orache (*Atriplex subtilis*), Hoover's calycadenia (*Calycadenia hooveri*), Hoover's cryptantha (*Cryptantha hooveri*), gypsum-loving larkspur (*Delphinium gypsophilum* ssp. *gypsophilum*), Ewan's larkspur (*Delphinium hansenii* ssp. *ewanianum*), spiny-sepaled button-celery (*Eryngium spinosepalum*), and large-flowered linanthus (*Linanthus grandiflorus*). None of these species are listed as state or federal endangered or threatened, nor have they been documented as occurring within five miles of the Brown property (CNDDB 2004). Due to the intensive farming and disturbed nature of the Brown property and surrounding areas, none of these species occur on site and protocol-level surveys are not recommended.

Finally, two sensitive habitats identified in the CNDDB query included northern hardpan vernal pools and valley sacaton grassland, neither of which were observed on site. While most of the site is underlain by acidic iron and silica cemented hardpan according to the soil series descriptions, which is characteristic of northern hardpan vernal pools geology, no vernal pool topography or associated vegetation was observed on site. Fragments of hardpan were found along the southwest boundary of the site and in the adjacent vineyard, but these were likely surfaced as the adjacent parcel was ripped to install the vineyard. Hardpan was encountered within 12 inches of the surface during soil sampling in the isolated depression in the southwest corner of the site, but the depth to the hardpan is expected to be deeper across most of the site. No evidence of a hardpan was observed within Schmidt Creek ditch, which lies at least three-feet below the surrounding grade throughout much of its alignment within the site.

SPECIAL-STATUS WILDLIFE SPECIES

Reconnaissance surveys were conducted on June 16, 2004 for habitats capable of supporting special-status wildlife species. A query of the CNDDB (2004) was performed to assist with identify special-status animal species potentially occurring in the project vicinity in the USGS Kismet quadrangle and the surrounding quadrangles. Ten special-status wildlife species were identified by the CNDDB as potentially occurring in the project vicinity (Table 1) and six more species were added to this list based on our experience with projects in the vicinity.

There are records of four special-status vernal pool crustaceans, conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), and California linderiella (*Linderiella occidentalis*) from near the proposed project site (CNDDB 2004). However, vernal-pool habitat is absent from the proposed project site and thus, none of these species occur on the site.

The Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), a federally threatened species, has been recorded on the San Joaquin River north of Herndon. This beetle requires mature elderberry plants (*Sambucus mexicana*) that are absent from the current project site. Therefore, the Valley elderberry longhorn beetle does not occur on the project site.

Table 1. Special-status Wildlife Species Reviewed for Potential Occurrence within the Footprint of the Proposed Effluent Storage Pond.

Scientific Name	Common Name	Listing Status
Crustaceans		
Branchinecta conservatio	Conservancy fairy shrimp	FE
Branchinecta lynchi	Vernal pool fairy shrimp	FT
Lepidurus packardi	Vernal pool tadpole shrimp	FE
Linderiella occidentalis	California linderiella	SSC
Insects		
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT
Amphibians		
Ambystoma californiense	California tiger salamander	FC, SSC
Scaphiopus hammondii	Western spadefoot	SSC
Reptiles		
Gambelia sila	Blunt-nosed leopard lizard	FE, SE, SFP
Birds		
Agelaius tricolor	Tricolored Blackbird	SSC
Athene cunicularia	Burrowing Owl	SSC
Buteo swainsoni	Swainson's Hawk	ST
Circus cyaneus	Northern Harrier	SSC
Eremophila alpestris actia	California Horned Lark	SSC
Lanius ludovicianus	Loggerhead Shrike	SSC
Mammals		
Perognathus inornatus inornatus	San Joaquin pocket mouse	SSC
Vulpes macrotis mutica	San Joaquin kit fox	FE, ST

Listing Status

FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
FC = Federal Candidate
SE = State Listed as Endangered
ST = State Listed as Threatened
SSC= State Species of Special Concern
SFP= State Fully Protected

The California tiger salamander (*Ambystoma californiense*) occurs in the vicinity of the project site. The California tiger salamander is a Candidate Species for listing by the U.S. Fish and Wildlife Service. For purposes of environmental review, the California Department of Fish and Game (CDFG) considers the California tiger salamander at the same level as species actually listed as threatened.

California tiger salamanders require pond environments such as vernal pools or stock ponds for breeding. A pool must be present for a minimum of three months during the winter or early spring to provide adequate habitat for egg laying and maturation of larval salamanders. Streams, ditches, and canals do not provide breeding habitat. Additionally, California tiger salamanders require nearby burrows excavated by small mammals such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gophers (*Thomomys bottae*) for aestivation. Appropriate breeding and aestivation habitat are absent from the site and its immediate vicinity. The California tiger salamander, therefore, is absent from the project site.

The western spadefoot is a toad considered by the State to be a Species of Special Concern. As with the California tiger salamander, the western spadefoot requires temporary pools for breeding. The western spadefoot is absent because the site lacks suitable breeding habitat.

The endangered blunt-nosed leopard lizard (*Gambelia sila*) inhabits open, sparsely vegetated areas within non-native grassland, valley sink scrub, valley needlegrass grassland, and alkali playa communities on the floor of the San Joaquin Valley. The lizards also inhabit the Saltbush Scrub communities within the foothills of the southern San Joaquin Valley and the adjacent Carrizo Plain. Blunt-nose leopard lizards are typically absent where habitat conditions include steep slopes, dense vegetation, or areas subject to seasonal flooding. The density of vegetation on the project site, repeated disturbance associated with cultivation, and the paucity of small burrows preclude Blunt-nose leopard lizards from occurring on the site.

Tricolored Blackbirds (*Agelaius tricolor*) typically nests in tall, dense, stands of cattails or tules, but also nests in blackberry, wild rose bushes, and tall herbs. Nesting colonies are typically located near standing or flowing freshwater. Vegetation that would provide suitable nesting habitat for Tricolored Blackbirds is absent from the site, though the wheat field does provide potential foraging habitat.

The Burrowing Owl (*Athene cunicularia*) is a small, terrestrial owl of open country. Burrowing Owls favor flat, open grassland or gentle slopes and sparse-shrubland ecosystems. These owls prefer annual and perennial grasslands, typically with sparse or nonexistent tree or shrub canopies. In California, Burrowing Owls are found in close association with California ground squirrels. Owls use the abandoned burrows of ground squirrels for shelter and nesting. Burrows suitable for Burrowing Owls were absent from the project site. Burrowing Owls do not occur on the project site.

The Swainson's Hawk (*Buteo swainsoni*) is listed as threatened by the state of California and occurs in the greater project area. Nest sites in the Central Valley are generally associated with riparian habitat (Bloom 1980) that is in proximity to foraging habitat. Swainson's Hawks require large amounts of foraging habitat, preferably grassland or pasture habitats, and may occasionally range up to 18 miles from the nest in search of prey (Estep 1989, Babcock 1993). Their preferred prey items are voles (*Microtus* sp), gophers, birds, and insects such as grasshoppers (Estep 1989). They have also adapted to some croplands, particularly alfalfa, hay, and pasture. Crops such as grains, tomatoes, beets, and other row crops can be used extensively for short periods at, or after, harvest when prey is made accessible, but are generally not used before harvest (Estep 1989). Crops such as cotton, corn, orchards, and vineyards are not suitable foraging habitat because they either lack suitable prey or the prey is unavailable to Swainson's Hawks due to the crop structure. Generally, crops greater than two feet tall create an impenetrable barrier for foraging Swainson's Hawks (Estep 1989).

Swainson's Hawks are unlikely to forage on the site. The nearest modern CNDDB record describes a nest on the Fresno County side of the San Joaquin River, approximately 15 miles from the project site. During the reconnaissance-level survey, an assessment of potential Swainson's Hawk foraging habitat within a five-mile radius of the project site was made by driving the major roads in an area bordered approximately by Avenue 26 on the north, Road 28 ½ on the east, Avenue 12 on the South, and Road 16 on the west. The area within a five-mile radius is comprised primarily of orchards, vineyards and isolated cultivated fields (both planted and fallow) and pastures, and developed lands (residential and light industrial). Crops providing quality foraging habitat, such as alfalfa and pasture, were rare within a five-mile radius of the project site and in small (up to 20 acres) isolated plots.

A Northern Harrier was observed foraging over the site, but breeding habitat was not found on the site. Northern Harriers (*Circus cyaneus*) are commonly found in open grasslands, agricultural areas and marshes. This Species of Special Concern nests on the ground in areas where long grasses or marsh plants provide cover and protection. Harriers hunt for a variety of prey, including rodents, birds, frogs, reptiles, and insects by flying low and slow in a traversing manner utilizing both sight and sound to detect prey items.

California Horned Larks (*Eremophila alpestris actia*) are a Species of Special Concern in California. Horned larks occur over nearly all of North America in bare ground habitats with sometimes contain several subspecies. This subspecies is a widespread breeder along the coast and in the Central Valley of California. California Horned Larks are not likely to use the project site when it is planted with wheat, but could be present when the site is fallow.

Shrikes may forage on the site. Loggerhead Shrikes (*Lanius ludovicianus*), a Species of Special Concern, are a predatory songbird inhabiting much of lower 48 states of the United States of America. They prefer open habitats interspersed with shrubs, trees, poles, fences, or other perches from which they can hunt. Some populations of the Loggerhead Shrike, primarily those in eastern North America, have declined significantly over the last 20 years. Other populations, including those in western North America, appear to be decreasing as well. Even with this trend, Loggerhead Shrikes are still considered a fairly common species in California. A Loggerhead Shrike was observed within a quarter of a mile of the project site.

San Joaquin pocket mice are absent from the project site. San Joaquin pocket mice (*Perognathus inornatus inornatus*) occur in grasslands and blue oak savannas that have friable soils. Pocket mice live in shallow burrows, often in small colonies. The frequent ground disturbance associated with cultivation has removed suitable habitat from the project site and its vicinity.

The federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*) occurs in grasslands or grassy open stages with scattered shrubs. San Joaquin kit fox do not occur on the project site. Cultivation has precluded the formation of burrows for denning and a suitable prey base comprised of small mammals such as California ground squirrels and kangaroo rats is absent from the project site and its vicinity. The site and vicinity are comprised of croplands dominated by orchards and vineyards interspersed with smaller parcels of row crops and developed areas. The nearest reported occurrence is from grassland habitats approximately eleven miles southwest of the site.

REGULATED HABITATS

Army Corps of Engineers Jurisdiction

The project site was surveyed for areas that may meet the regulatory definition of "Waters of the United States" (*i.e.*, jurisdictional waters) subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the U.S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3).

Areas typically not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328).

RESULTS

Schmidt Creek ditch is a realignment of the historic Schmidt Creek watercourse that was formerly a natural tributary of Dry Creek with the confluence situated approximately one-half mile to the west. The 1985 USGS Kismet quadrangle depicts Schmidt Creek as a blue-line stream course terminating on the Brown property, but the older (1946) Madera County soil survey aerial photo depicts the watercourse as being contiguous with Dry Creek. Currently, the portion of Schmidt Creek ditch on the site connects the natural watercourse of Schmidt Creek upstream with Dry Creek downstream. Schmidt Creek is currently dry upstream of the property, except within the long box culvert under Highway 99 which has standing water. Dry Creek has running water at least two feet deep and abundant wetland vegetation. Schmidt Creek ditch is expected to receive stormwater runoff during the winter and may occasionally be used to deliver irrigation water as evidenced by two pump stations along its alignment. Since the realigned course of Schmidt Creek connects two well-defined watercourses, the ditch on site is considered a potential Waters of the U.S.

Hydrophytic plants were observed throughout the Schmidt Creek ditch alignment, including Bermuda grass, heliotrope, Meditteranean barley, and curly dock. These species are only scattered in their occurrence throughout the ditch and do not form distinct wetland habitat. In addition, none of the soils underlying the ditch are known to be hydric according to the state list of hydric soils (SCS, 1995); only the Tujunga soil series is known to have a hydric phase, which does not occur on site. Therefore, since the ditch is otherwise dominated by ruderal (disturbance-loving) vegetation, and does not have any physical evidence of hydric soil development, no potential Section 404 wetlands exist within the Schmidt Creek ditch.

Finally, an irrigation canal is located parallel to Road 23, just inside the western property boundary. The reach of this canal on site is excavated in uplands and is only expected to have artificial hydrology. Water was being pumped into the canal at the time of the survey. Furthermore, the water in this canal is diverted underneath Schmidt Creek ditch through a vault structure and is not hydrologically connected to the ditch. For these reasons, the canal is not considered potentially jurisdictional.

California Department of Fish and Game Jurisdiction

The site was also examined for areas containing a definable bed, bank, or channel that are under the regulatory jurisdiction of CDFG (1994a). CDFG potentially extends the definition of stream to include "intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blue-line streams mapped on USGS quadrangles, and watercourses with subsurface flows. Canals, aqueducts, irrigation ditches, and other means of water conveyance can also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife" (CDFG 1994).

Because Schmidt Creek ditch was formerly mapped as a USGS blue-line stream course, and currently supports limited riparian vegetation, the ditch alignment is considered to be within the jurisdiction of the CDFG.

CONCLUSION

The purpose of H. T. Harvey & Associates' analysis was to provide an overview of existing biological and regulated resources that may pose a potential constraint to site development to assist with this review and aid site planning efforts. A summary of potential constraints by resource is provided below.

Special-Status Plants

Special-status plants do not pose a constraint to development. Special-status plant species are not expected to occur on site due to the intensive farming and disturbed nature of the Brown property and surrounding areas. Species considered, but rejected, include heartscale, lesser saltscale, subtle orache, Hoover's calycadenia, Hoover's cryptantha, gypsum-loving larkspur, Ewan's larkspur, spiny-sepaled button-celery, and large-flowered linanthus. No further surveys are warranted for these species.

Special-Status Wildlife

Vernal pool crustaceans, Valley elderberry longhorn beetles, California Tiger Salamander, western spadefoot, blunt-nosed leopard lizard, Burrowing Owl, San Joaquin pocket mouse, and San Joaquin kit fox do not occur on the project site due to lack of suitable habitat. Development of the project site would not adversely affect these species, nor would these species constrain development.

Breeding habitat for Tricolored Blackbirds, Northern Harriers, California Horned Larks, and Loggerhead Shrike is absent from the site. Suitable foraging habitat for these birds is present. Minor reductions in forging habitat for Tricolored Blackbirds, Northern Harriers, California Horned Larks, and Loggerhead Shrikes would not constitute a significant adverse effect under NEPA and would not constrain the project.

Development of the proposed site will not significantly affect the Swainson's Hawk and potential use of the site for foraging by Swainson's Hawks should not constrain site development. Swainson's Hawks are unlikely to forage within the proposed project site and the density of orchards and development within a five-mile radius of the site decreases its value as foraging habitat, especially given the availability of much larger acreages of suitable foraging habitat 10 to 15 miles from the site. New nesting activity within 10 miles of the site prior to construction could cause constraints. If a breeding pair of Swainson's Hawks is observed within 10 miles of the site prior to construction, the project proponent may be required to preserve off-site foraging habitat. The amount of land to be preserved would depend on the distance between the nest and the project site, but would not exceed one and a half acres of land preserved for each acre developed (CDFG 1994b).

Regulated Habitats

Regulated habitats would constrain development. Based on the clear hydrologic connection between Schmidt Creek and Dry Creek, and recent conversations with representatives of the Sacramento District of the USACE, Schmidt Creek ditch meets the regulatory definition of waters of the U.S.; as such, any activities conducted within this drainage feature may be under the regulatory jurisdiction of the USACE under Section 404 of the Clean Water Act. Schmidt Creek ditch may also be within the jurisdiction of the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act and within the jurisdiction of the CDFG under Section 1600 of the California Fish and Game code. Activities occurring within the bed and banks of Schmidt Creek ditch would require either a Nationwide Permit or an Individual Permit from the USACE, depending on the nature of proposed impacts. Such activities may also require a Section 401 Water Quality Certification permit, and a Streambed Alteration Agreement with CDFG. Furthermore, activities within the creek may require compliance with USACE Nationwide Permit Conditions regarding endangered species.

Avoiding the regulated habitat, while constraining, would prevent the project proponent from having to obtain state and federal permits. Preparing the permit applications and obtaining approval from federal and/or state agencies is a time consuming process and could delay construction by several months.

Laws and Regulations Protecting Avian Species

Several avian species that are not considered special-status species are likely to nest on the site. These species would include Killdeer, Mourning Doves, Western Kingbirds, and House Finches.

Laws and regulations protecting avian species pose a minor constraint to development. The federal Migratory Bird Treaty Act (MBTA; 16 U.S.C., §703, Supp. I, 1989) prohibits killing, possessing or trading in migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. Migratory birds are also protected in and by the state of California. The State Fish and Game Code §3503 (and other sections and subsections) emulates the MBTA and protects birds' nests and eggs from all forms of take.

Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment, a violation of the MBTA. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "take" by the CDFG. The compliance measure described below should be implemented to comply with laws and regulations protecting raptors or other birds nesting on or immediately adjacent to the sites.

Measure 1. Avoid Construction During Nesting Season. Construction should be scheduled to avoid the nesting season to the extent feasible. The nesting season for most birds, including raptors, extends from January through August.

Measure 2. Pre-construction/Pre-disturbance Surveys. If demolition and construction cannot be scheduled between August and January, pre-construction surveys for nesting birds should be conducted by a qualified ornithologist to ensure that no nests will be disturbed during project implementation. This survey should be conducted no more than 14 days prior to the initiation of demolition/construction activities during the early part of the breeding season (January through April) and no more than 30 days prior to the initiation of these activities during the late part of the breeding season (May through August). During this survey, the ornithologist should inspect all trees and other potential habitats (e.g., grasslands, buildings) in, and immediately adjacent to, the impact areas for nests. If an active nest is found sufficiently close to work areas to be disturbed by these activities, the ornithologist, in consultation with CDFG, should determine the extent of a construction-free buffer zone to be established around the nest to ensure that no nests of species protected by the MBTA or CDFG Code will be disturbed during project implementation.

Measure 3. Inhibiting Nesting. If vegetation is to be removed by the project and all necessary approvals have been obtained, potential nesting substrate (e.g., bushes, trees, grass, burrows) that will be removed by the project should be removed outside of the nesting season to help preclude nesting. Pre-removal surveys are required for some species.

LITERATURE CITED

Babcock, K. W. 1993. Home range and habitat analysis of Swainson's hawks in West Sacramento. Michael Brandman Associates report prepared for the Southport Property Owner's Group, City of West Sacramento, CA 21 pp.

Bloom, P. H. 1980. The Status of the Swainson's Hawk in California, 1979. Federal Aid in Wildlife Restoration, Project W-54-R-12, Final Report 11-8-0. California Department Of Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section. Sacramento. 24 pp.

[CDFG] California Department of Fish & Game. 1994a. A Field Guide to Lake and Streambed Alteration Agreements, Sections 1600-1607. Environmental Services Division. Sacramento, California

[CDFG] California Department of Fish & Game. 1994b. Staff report regarding mitigation for impacts to Swainson's Hawks (*Buteo swainsoni*) in the Central Valley of California. Sacramento, California.

[CNDDB] California Natural Diversity Data Base. 2004. Rarefind. California Department of Fish and Game.

[CNPS] California Native Plant Society. 2001. Inventory of Rare and Endangered Vascular Plants of California (6th edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, California.

Estep, J. A. 1989. Biology, Movements and Habitat Relationships of the Swainson's Hawk in the Central Valley of California, 1986-1987. California Department Of Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section. 52 pp.

Feel welcome to contact me with any questions that you might have.

Sincerely,

Brian B. Boroski, Ph.D.
Project Manager

APPENDIX F

USACE Correspondence Letter and Identification of Waters of the U.S.: Madera Site

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

January 10, 2006

Regulatory Branch (200501033)

Brian B. Boroski
H.T. Harvey Ecological Consultants
San Joaquin Valley Regional Office
423 W. Fallbrook Avenue, Suite 200
Fresno, California 93711

Dear Mr. Boroski:

We are responding to your consultant's request for an approved jurisdictional determination for the Brown Property Development Project site. This approximately 350 acre site is located on or near Schmidt Creek in Section 4, Township 10 South, Range 17 East, MDB&M, Latitude 37° 0′ 24.3″, Longitude 120° 7′ 11.8″, Madera County, California.

Based on available information, we concur with the estimate of waters of the United States, as depicted on the **22 April 2005 delineation drawing, titled, Brown Property, Identification of Waters of the U.S.**, prepared by **H.T. Harvey & Associates**. Approximately 8.51 acres of waters of the United States, including wetlands, are present within the survey area. These waters are regulated under Section 404 of the Clean Water Act since they are tributary and/or adjacent to Schmidt Creek, a tributary to Dry Creek, a water of the United States, in accordance with 33 CFR 328.3 (a)(5).

This verification is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. A *Notification of Administrative Appeal Options and Process and Request for Appeal* form is enclosed. If you wish to appeal this approved jurisdictional determination, please follow the procedures on the form. You should provide a copy of this letter and notice to all other affected parties, including any individual who has an identifiable and substantial legal interest in the property.

This determination has been conducted to identify the limits of Corps of Engineers' Clean Water Act jurisdiction for the particular site identified in this request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

Please refer to identification number 200501033 in any correspondence concerning this project. If you have any questions, please contact me at the San Joaquin Valley Office, 1325 J Street, Room 1480, Sacramento, California 95814-2922, email *Kevin.J.Roukey@usace.army.mil*, or telephone 916-557-5266. You may also use our website: *www.spk.usace.army.mil/regulatory.html*.

Sincerely,

Kevin J Roukey

Kevin J. Roukey
Chief, San Joaquin Valley Office

Enclosure(s)

Copy furnished without enclosure(s):

Dale Harvey, California Regional Water Quality Control Board, 1685 E Street, Fresno, California 93706-2020
U.S. Fish and Wildlife Service, Wetlands Branch, 2800 Cottage Way, Suite W2605, Sacramento, California 95825-3901

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

received
9/12/05 [illegible]

TRANSMITTAL MEMORANDUM

TO: Chad Broussard
Analytical Environmental Associates
2021 N Street
Sacramento, CA 95814

DATE: September 9, 2005

PROJECT NAME: Brown Property Identification of Waters of the U.S.

FROM: Brian Boroski

PROJECT NUMBER: 2410-02

WE ARE TRANSMITTING:

☒ Herewith	☒ Via Mail	☐ Via Fax	#of pages: _____
☐ Under Separate Cover	☐ To Be Picked Up	☐ Fed Ex	(including cover letter)

THE FOLLOWING:

Technical report: *Brown Property Identification of Waters of the U.S.* and copy of cover letter to U.S. Army Corps of Engineers

☐ As Requested	☐ For Payment	☐ For Review And Comments
☐ For Signature/Return	☐ For Approval	☐ Returned For Corrections
☒ For Your Use/Information	☐ For Your Records	☐ CONFIDENTIAL!

REMARKS:

Dear Chad,

Please find enclosed a copy of the report titled *Brown Property Identification of Waters of the U.S.* and a copy of the letter sent to the U.S. Army Corps of Engineers. Please feel welcome to call if you should have any questions.

Sincerely,

Brian Boroski
Ext. 507

COPIES TO:

Fresno Office
423 W. Fallbrook Ave • Suite 202
Fresno, CA 93711 • 559-449-1423 • Fax: 559-449-8248

BROWN PROPERTY
IDENTIFICATION OF WATERS OF THE U.S.

Prepared by:

H. T. HARVEY & ASSOCIATES

Patrick J. Boursier, Ph.D., Principal, Senior Plant Ecologist
Brian B. Boroski, Ph.D. Project Manager
Andrew Dilworth, B.S., Wetland Ecologist

Prepared for:

Chad Broussard
Analytical Environmental Services
2021 N. Street, Suite 200
Sacramento, CA 95814

September 9, 2005

Project No. 2410-02

TABLE OF CONTENTS

FIGURES:

TABLES:

EXECUTIVE SUMMARY

H. T. Harvey & Associates surveyed the 305-acre Brown Property on April 13, 2005 for areas meeting the regulatory definition of Waters of the U.S. Potentially jurisdictional waters were identified within the project boundaries and included approximately 6.82 acres of "other waters", and 1.69 acres of wetlands. The remainder of the study area (296.49 acres) was entirely upland in character.

INTRODUCTION

PROJECT AREA DESCRIPTION

The Brown Property is located approximately seven miles north of Madera, California, between Avenue 17 and Avenue 18, and Road 23 and Highway 99 (Figure 1). The majority of the 305-acre property is dominated by dryland wheat except within a few disturbed and developed areas of the property, and within the current alignment of Schmidt Creek. The developed areas and Schmidt Creek ditch are dominated by ruderal herbaceous habitat. Adjacent land uses include different forms of agriculture including production of dryland crops, vineyards, and orchards.

The site occurs on the U.S. Geological Survey (U.S.G.S.) quadrangle maps Kismet and Berenda (1961), California (Figure 2; township 10 south; range 17 east; section 4). The elevation on site is approximately 250 feet National Geodetic Vertical Datum. The average annual precipitation for this area of Madera County is approximately 10 to 12 inches per year (Soil Conservation Service; SCS 1990) and the average annual temperature is 62°-Fahrenheit (F). There are 308 days in the growing season in the Madera area, based on the 28° F freezing temperature. Therefore, the minimum number of consecutive days required to meet soil saturation criteria is 15.4, based on the 5 percent minimum number of days for saturation during the growing season.

The site is underlain by four soil series (Figure 3) including San Joaquin and Hanford sandy loams, and Atwater and Tujunga loamy sands, all having 0 to 3 percent slopes (SCS 1990); a complex of San Joaquin and Alamo soils also occurs in a highly limited area of the property. The San Joaquin sandy loam covers most of the site and is moderately well-drained and rapidly permeable, but has very slow permeability deeper in the profile due to an unrelated iron-silica hardpan between 19 and 23 inches below the surface. The Hanford sandy loam is highly similar to the San Joaquin soil except that the depth to the hardpan is at least 36 inches. The Atwater and Tujunga loamy sands occur along present and historic watercourses, and are also well to excessively drained, and rapidly permeable. The Tujunga loamy sand typically occurs along more narrow watercourses such as depicted on the soils map for Brown property (Figure 3), and may also be underlain by the same unrelated hardpan as the San Joaquin sandy loam. All of these soils are used for dry farming and range, and where the underlying hardpan has been broken and/or removed they are often used for irrigated pasture and crops.

Of these four series, only the Atwater and San Joaquin series occurring on site are listed as being hydric soils in Madera County (Natural Resource Conservation Service; NRCS 2004). Specifically, the Atwater loamy sand is considered hydric when it is subject to prolonged flooding during the growing season. Such conditions may occur when this soil type underlies watercourses. The San Joaquin sandy loam is considered hydric when the depth to the water table is less than one foot from the soil surface during the growing season. Other phases of the Tujunga and Hanford series are also considered hydric but none of these have been mapped as occurring on the site. Finally, the U.S. Fish and Wildlife Service has not classified any wetland resources on site under the National Wetland Inventory (NWI) System for the Berenda and Kismet quadrangles on which the property occurs (Figure 4). This is despite the fact that active hydrology is known to occur in upstream reaches of Schmidt Creek, east of Highway 99, as well as in Dry Creek downstream of the Brown Property.

SURVEY PURPOSE

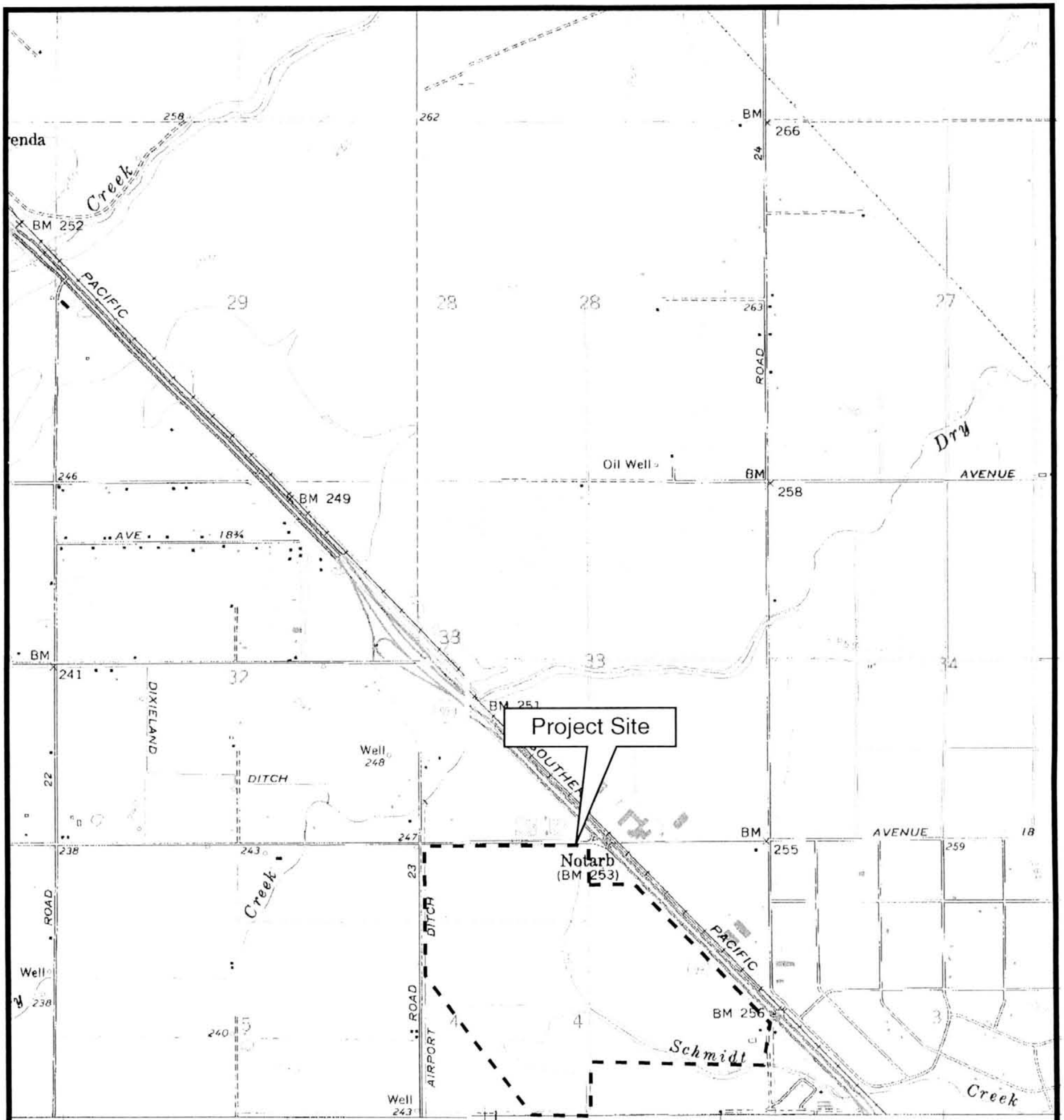
H. T. Harvey & Associates' biologists conducted reconnaissance-level surveys of the Brown Property on 16 and 24 June 2004 to assess the extent of active hydrology on the site at that time. Enhanced-level field surveys were subsequently conducted on 13 April 2005 to further document field characteristics used in the determination of potential jurisdictional waters. The primary purpose of our work was to identify the extent and location of potential jurisdictional waters within the project boundaries under conditions existing at the time of the survey.

Map Copyrighted 1997 by the California State Automobile Association Reproduced by permission

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Brown Property: Site / Vicinity Map

File No. 2410-02	Date 4/22/05	Figure 1



N

0 2000 feet

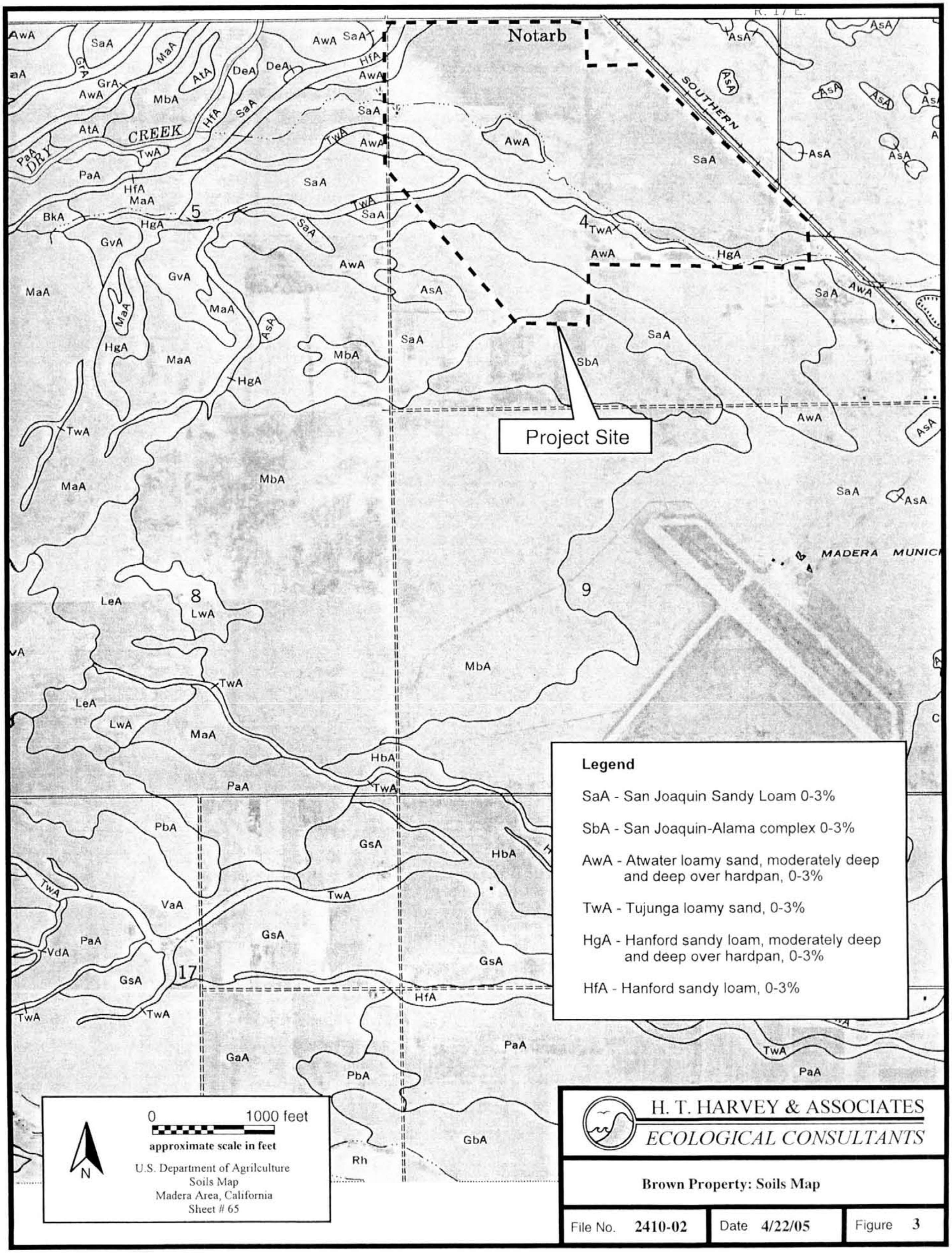
approximate scale in feet

USGS Quadrangle Map
7.5 Minute Series
Kismet and Berenda Quad

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Brown Property: USGS Quad Map

File No. 2410-02	Date 4/22/05	Figure 2



Legend

SaA - San Joaquin Sandy Loam 0-3%

SbA - San Joaquin-Alama complex 0-3%

AwA - Atwater loamy sand, moderately deep and deep over hardpan, 0-3%

TwA - Tujunga loamy sand, 0-3%

HgA - Hanford sandy loam, moderately deep and deep over hardpan, 0-3%

HfA - Hanford sandy loam, 0-3%

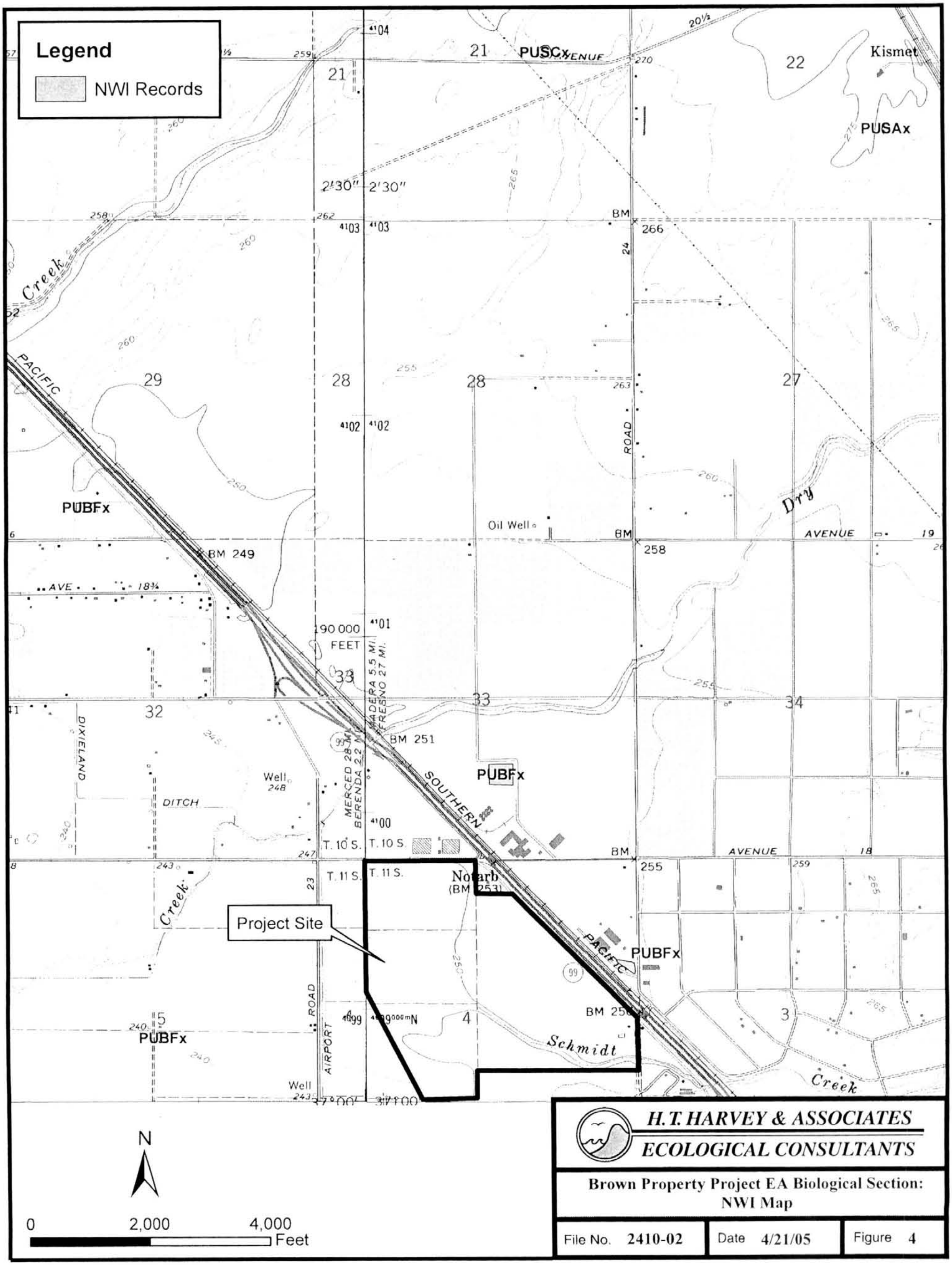
approximate scale in feet

U.S. Department of Agrilculture
Soils Map
Madera Area, California
Sheet # 65

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Brown Property: Soils Map

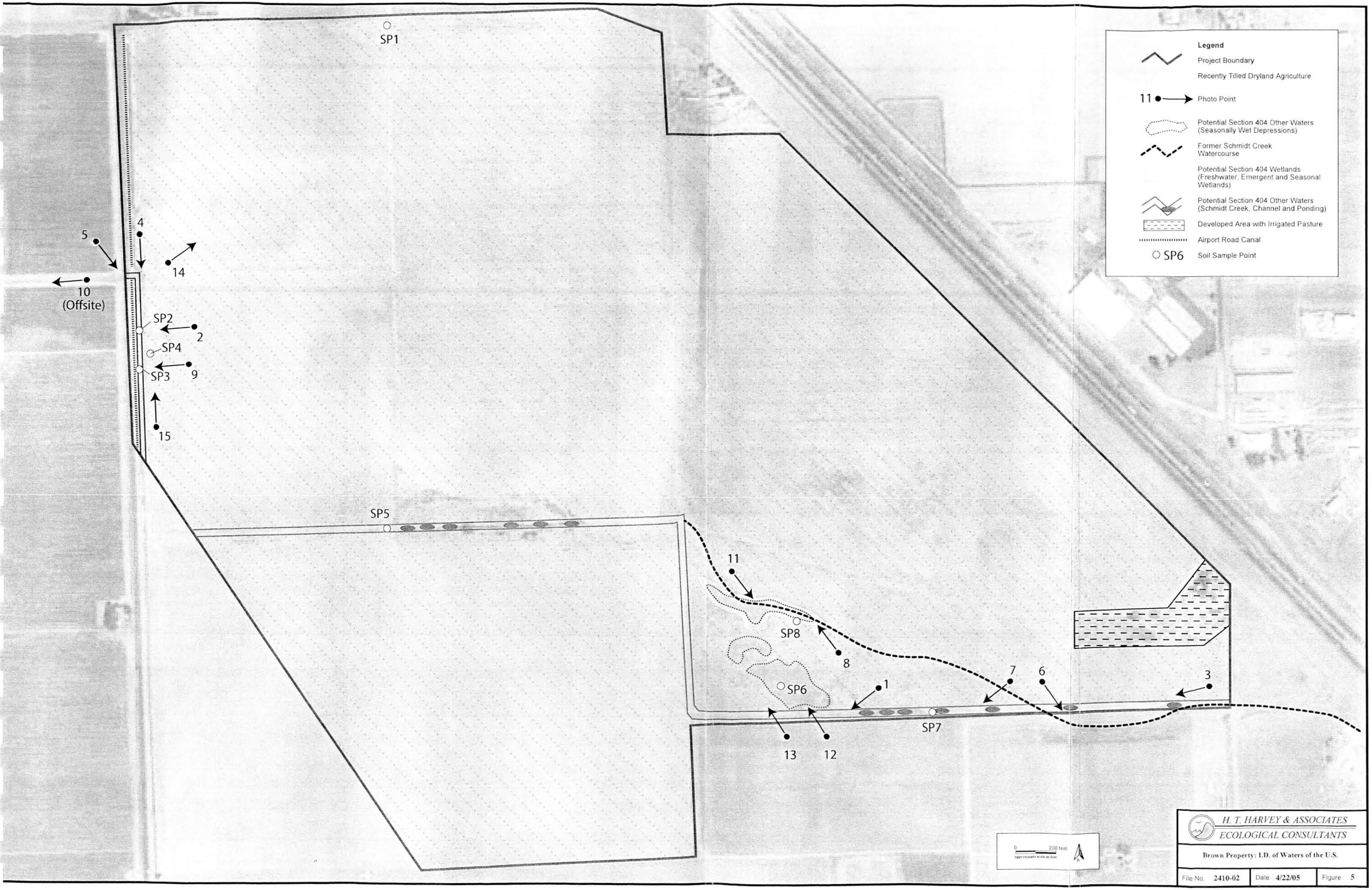
File No. **2410-02**	Date **4/22/05**	Figure **3**



H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Brown Property Project EA Biological Section: NWI Map

File No. **2410-02** Date **4/21/05** Figure **4**



H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Brown Property: I.D. of Waters of the U.S.

File No. 2410-02 Date 4/22/05 Figure 5

SOIL SURVEY

Madera Area California

OUR SOIL ★ OUR STRENGTH

THIS SURVEY IS AN EXACT REPRODUCTION OF THE PREVIOUS ISSUE. NO NEW INFORMATION HAS BEEN ADDED.

ALL SCS PROGRAMS AND SERVICES ARE OFFERED ON A NONDISCRIMINATORY BASIS, WITHOUT REGARD TO RACE, COLOR, NATIONAL ORIGIN, RELIGION, SEX, AGE, MARITAL STATUS, OR HANDICAP.

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
CALIFORNIA AGRICULTURAL EXPERIMENT STATION

SURVEY METHODS

Surveys for field characteristics used in the identification of jurisdictional waters were conducted on 13 April 2005 using methodologies approved by the U.S. Army Corps of Engineers (USACE). The survey was conducted by H. T. Harvey & Associates' wetland ecologist Andrew Dilworth (B.S.). Field studies were conducted at a level of effort sufficient for review by the USACE.

Generally, surveys conducted on non-disturbed sites examine the vegetation, soils, and hydrology using the "Routine Determination Method, On-Site Inspection Necessary" (Section D) outlined in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). This multi-parameter approach to identifying wetlands is based upon the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. This report was compiled for the Sacramento District of the USACE using guidance contained in *Information Needed for Verification of Corps Jurisdiction* (February 2000).

Alternatively, upland sites (non-wetlands) that subsequently developed some characteristics of wetlands, due to intentional or incidental human activities, are examined for wetlands using the techniques described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) for "Atypical Situations: Man-Induced Wetlands" (Part IV, Section F, Subsection 4). An example of an atypical situation is "man-induced" wetlands created by purposeful or incidental impoundment of water, which lack hydric soil indicators. The majority of such wetlands involve a significant change in the hydrologic regime, which may either increase or decrease the wetness of an area.

Prior to site surveys, topographic maps, and aerial photos of the project area were obtained. These sources included the U.S.G.S. Quadrangle Maps and the National Wetlands Inventory Map for the Kismet and Berenda quadrangles in California, an aerial photo provided by the client, and aerial photograph soil map sheets from the *Soil Survey, Madera Area, California* (SCS 1990).

A brief overview of the USACE regulations specifically applicable to the identification of jurisdictional waters on the project site is summarized below.

WATERS OF THE UNITED STATES REGULATIONS OVERVIEW

Areas meeting the regulatory definition of "Waters of the United States" are subject to the regulatory jurisdiction of the USACE. The USACE, under provisions of Section 404 of the Clean Water Act (1972), has jurisdiction over "Waters of the United States" (jurisdictional waters). These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the U.S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3).

Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328). This definition may also include wetland areas subject to artificial irrigation that would revert to upland if the irrigation ceased.

IDENTIFICATION OF JURISDICTIONAL WATERS

Below we provide a detailed description of the methodology used in the identification of jurisdictional waters, having the potential of occurring on site, including Section 404 jurisdictional wetlands and other waters.

A) Identification of Section 404 Jurisdictional Wetlands (Special Aquatic Sites)

Surveys were conducted within the project boundaries for areas that meet the technical criteria of jurisdictional wetlands. The vegetation, soils, and hydrology of the site were examined following the guidelines outlined in the "Routine Determination Method" and/or "Atypical Situation" (Section F) in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987).

The property was examined for topographic features, drainages, alterations to site hydrology, and areas of significant recent disturbance by hiking the entire site. A determination was then made as to whether normal environmental conditions were present at the time of the field surveys. Data were used to document which portions of the site were wetlands.

Vegetation. Plants observed at each of the sample sites were identified to species using *The Jepson Manual* (Hickman 1993). Additional references included *A Flora of the Marshes of California* (Mason 1969), *Manual of the Grasses of the United States* (Hitchcock 1971), and *Weeds of California* (Robbins, *et al.* 1970). The wetland indicator status of each species was obtained from the 1987 Wetland Plant List, California (Reed 1988). The names of plants generally were not taken from *The Jepson Manual* (Hickman 1993) because not all of these names are consistent with scientific names used in the *1988 Wetland Plant List, California* (Reed 1988), and the *National List of Scientific Plant Names* (Smithsonian Inst. 1982). A list of species for each observation area was then compiled and an assessment of the dominant species made (Appendix A). It was then determined which of the observation areas supported wetland vegetation.

Wetland indicator species are so designated according to their frequency of occurrence in wetlands. For instance, a species with a presumed frequency of occurrence of 67 percent to 99 percent in wetlands is designated a facultative wetland indicator species. The wetland indicator groups, indicator symbol, and the frequency of occurrence of species within them in wetlands are as follows:

Table 1. Wetland Indicator Status Categories for Vascular Plants.*

INDICATOR CATEGORY	SYMBOL	FREQUENCY OF OCCURRENCE
OBLIGATE	OBL	greater than 99%
FACULTATIVE WETLAND	FACW	67 - 99%
FACULTATIVE	FAC	34 - 66%
FACULTATIVE UPLAND	FACU	1 - 33%
UPLAND	UPL	less than 1%

*Based upon information contained in *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). "NOL" = not on the list; "NI" = not an indicator.

Obligate and facultative wetland indicator species are hydrophytes that occur "in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (Environmental Laboratory 1987). Facultative indicator species may be considered wetland indicator species when found growing in hydric soils that experience periodic saturation. A complete list of the vascular plants of the project site, and their current indicator status has been provided in Appendix A.

Soils. Where possible, the top 22 inches of the soil profile was examined for hydric characteristics. Such characteristics include the presence of organic soils (Histosols), histic epipedons, aquic or peraquic moisture regime, presence of soil on hydric soil list, and mottling indicated by the presence of gleyed or bright spots of colors (in the former case, blue grays; in the latter case, orange red, or red brown) within the soil horizons observed. Mottling of soils usually indicates poor aeration and lack of good drainage. Munsell Soil Notations (Kollmorgen Instr. Corp. 1990) were recorded for the soil matrix for each soil sample. The last digit of the Munsell Soil Notation refers to the chroma of the sample. This notation consists of numbers beginning with 0 for neutral grays and increasing at equal intervals to a maximum of about 20. Chroma values of the soil matrix which are one (1) or less, or of two (2) or less when mottling is present, are typical of soils which have developed under anaerobic conditions.

In sandy soils, such as alluvial deposits in the bottom of drainage channels, hydric soil indicators include high organic matter content in the surface horizon and streaking of subsurface horizons by organic matter. All soil colors indicated in this report were taken under clear, sunny skies using moistened soil samples.

The *Soil Survey, Madera Area, California* (SCS 1990) was consulted in order to determine which soil types have been mapped on the project site. Descriptions of soil mapping units and the list of hydric soils in the Madera Area, California (NRCS 2004) are included in Appendix B.

Hydrology. Each of the sample sites was examined for positive field indicators of wetland hydrology. Such indicators might include visual observation of inundation and/or soil saturation, seeping or flowing water, water marks on sandstone rock and physical structures, drift lines, water-borne sediment deposits, water-stained leaves, and drainage patterns within wetlands.

B) Identification of Other Waters

"Other waters" include lakes, seasonal ponds, channels, tributary waters, and seasonal springs. Such areas are identified by the presence of standing or running water and generally lack hydrophytic vegetation. The regulatory jurisdiction within "Other waters" extends to the ordinary high water (OHW) mark on opposing channel banks in non-tidal areas and to the high tide line in tidal areas. The OHW mark is typically indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in character of soil, destruction of vegetation, exposed roots on the bank, deposition of leaf litter and other debris materials or lower limit of moss growth on channel banks. The project site was surveyed for areas meeting the regulatory definition of "other waters."

SURVEY RESULTS

Potential jurisdictional waters subject to provisions of Section 404 of the Clean Water act were identified within the project boundaries (Figure 5). This includes approximately 1.69 acres of potentially jurisdictional wetlands in the northwest corner of the site. A total of eight sample points (Appendix C) were taken throughout the project site and adjacent areas (Figure 5). In addition, approximately 6.82 acres of "other waters" were identified on site. Information pertinent to the identification of jurisdictional waters assembled during the investigations is presented in appendixes attached to the rear of this report and comprises:

- Appendix A – Plant List
- Appendix B – Soils Information
- Appendix C – Field Data Forms
- Appendix D – Photographs

OBSERVATIONS/RATIONALE/APPROACH/ASSUMPTIONS

- The wetland delineation was performed throughout the project site according to the "Routine Method of Determination" utilizing three parameters, as outlined in the 1987 Corps of Engineers Wetland Delineation Manual. Normal conditions were assumed.
- Schmidt Creek originates in gently sloping, valley watershed topography beginning at Road 600, approximately 6 miles northeast of Madera. The creek flows to the southwest through a residential neighborhood north of Madera, until it crosses under Highway 99, then turns toward the northwest and transects the Brown Property. Schmidt Creek historically transected the property as a wash entering the property at the southeast corner of the site, continuing on northwest towards Dry Creek. That reach of the Schmidt Creek watercourse on site is a channelized earthen ditch, excavated in uplands, which parallels part of the southern and western boundaries of the site and continues under Road 23 towards its confluence with Dry Creek (Photo 1). An irrigation canal also occurs along the western boundary of the site but it flows under Schmidt Creek through a vault structure and is therefore not connected to the creek.
- Dry Creek is a perennial watercourse which flows through its historic watercourse and irrigation canals towards its confluence with the Fresno River approximately 6 miles to the southwest.
- According to the 1962 aerial photo from the *Madera Area Soil Survey*, Schmidt Creek is portrayed as an unnamed intermittent stream that may have been contiguous with Dry Creek (Figure 3). The actual course of the stream may have flowed through various washes across the property, based on the distribution of Tujunga soils on site. Schmidt Creek appeared to terminate on the Brown Property according to the 1961 Kismet USGS quadrangle map, further suggesting the creek flows were highly ephemeral or that the creek course separated into various washes. The larger scale (1:250,000) Monterey USGS quadrangle also depicts Schmidt Creek as an unnamed watercourse which terminated just upstream of Highway 99. Despite the previously isolated nature of Schmidt Creek, it is now connected to downstream Waters of the U.S., and is expected to flow up to 20 cubic feet per second following winter

storms (pers. comm. Dennis Savala, Madera Irrigation District). The flows in Schmidt Creek are expected to be largely attributable to storm water runoff from the adjacent development upstream of the property, as well as irrigation runoff.

- An iron-silica hardpan underlies the entire site (Photo 2) and forms the ditch bottom which lies approximately three feet below the surrounding grade and is bordered by sandy spoils dredged from the creek course (Photo 3). The hardpan is partially obscured in reaches of the creek by sands deposited up to 18 inches deep. The hardpan slows or prevents downward percolation of incident rainfall, and storm water and irrigation runoff. This causes saturation and inundation to occur in areas of the site where the depth to the hardpan is relatively shallow.
- Schmidt Creek is transected by at least two irrigation canals, including the Airport Road ditch along Road 23 forming the western project boundary (Photo 4), and the 24-2 canal that is located approximately one mile upstream of the Brown Property. The Airport Road ditch passes under Schmidt Creek through a concrete vault structure (Photo 5), while the 24-2 canal is siphoned under the creek; the 24-2 canal is depicted on the Kismet quadrangle (Figure 2). Therefore, neither the Airport Road ditch nor the 24-2 canal is contiguous with Schmidt Creek (pers. comm. Dennis Savala, Madera Irrigation District).

AREAS MEETING THE REGULATORY DEFINITION OF JURISDICTIONAL WATERS

A) Identification of Section 404 Potential Jurisdictional Wetlands (Special Aquatic Sites)

Potential Section 404 jurisdictional wetlands (approximately 1.69 acres) were identified and mapped within various sections of Schmidt Creek, and along a portion of the former Schmidt Creek watercourse (Figure 5). The potential wetlands within Schmidt Creek comprise low freshwater emergent marsh, while the potential wetlands outside the creek course are seasonal in nature. For the purpose of this delineation, wetland determination was based on the three parameters of hydrophytic vegetation, wetland hydrology, and hydric soils, as per the methods for delineating under "normal circumstances," as described above. As such, all three parameters identifying Section 404 wetlands were observed at four out of eight sample points (SP) including SP2, SP3, SP7, and SP8 (Appendix C). Hydrophytic vegetation was absent in the remaining sample point areas, though indicators of wetland hydrology and/or hydric soils were sometimes present. The eight sample point locations are depicted in Figure 5.

Vegetation. Approximately 0.95 acres of freshwater emergent marsh wetland habitat is present in two reaches of Schmidt Creek. These include the north-south reach parallel to Road 23, and in the eastern-third of the creek alignment (Photo 6). These reaches are dominated by creeping spikerush (*Eleocharis macrostachya*; OBL), Baltic rush (*Juncus balticus*; OBL), and watercress (*Rorippa nasturtium-aquatica*; OBL). Less dominant hydrophytic species occurring within the creek bed include common monkeyflower (*Mimulus guttatus*; OBL), coast popcorn-flower (*Plagiobothrys undulatus*; FACW+), and Himalayan knotweed (*Polygonum polystachyum*; FAC). Sandbar willows (*Salix exigua*; OBL) and Fremont cottonwoods (*Populus fremontii*; FACW) are also growing in a few areas of the creek bottom but do not form contiguous riparian habitat (Photo 7). Approximately 0.74 acres of seasonal wetland occurs within a low area of the historical creek course, and is dominated by Mediterranean barley (*Hordeum marinum* ssp.

gussoneanum; FAC), toad rush (*Juncus bufonius*; FACW+), and slender popcorn-flower (*Plagiobothrys stipitatus*; OBL) (Photo 8).

Hydrology. Standing water was observed as isolated ponds in the creek bed and was up to 24 inches deep (Photo 3). The water is perched by the underlying hardpan, and causes adjacent areas of deposited sands to remain saturated for extended periods during the winter, allowing hydrophytes to become established (Photo 9). Drift lines and water marks also exist within the creek bed, but water is only expected to flow in the creek temporarily following storm events. Scouring and shifting of deposited sands in the creek bed during flash flows may cause the distribution of wetlands within the creek to change from year to year. Elsewhere, areas of the former creek course supporting seasonal wetland habitat were found to be highly saturated, and have standing water in the soil sample pits. These areas were somewhat lower in elevation compared to the rest of the project site, and only lie approximately 1-foot above the elevation of the creek bed. As such, the depth to the hardpan is relatively shallow, and the saturation of these areas is attributable to the perching of incident rainfall by the underlying hardpan.

Soils. The presence of the underlying dark brown (7.5YR 3/4) iron-silica hardpan (Photo 2) served as the primary hydric soil criteria, since the soils are subject to long duration flooding, particularly where the hardpan depth is shallower (NRCS 2004). While the sandy loams and loamy sands on site were predominantly light brownish gray to very dark grayish brown (10YR 6/2 to 10YR 3/2), many of the areas of potential wetlands have been saturated long enough during the growing season to develop sulfidic odor, also implying the presence of reducing conditions and aquic moisture regime (Photo 9). In addition, the wetlands in Schmidt Creek mostly correspond to the Atwater and San Joaquin soil phases on site, which are considered hydric, were found overlying unbroken hardpan (NRCS 2004). The seasonal wetlands along the former creek course are primarily underlain by the Tujunga soil series that is also considered hydric when overlying hardpan. The soils survey does not identify the Tujunga soil phase occurring on site as having an underlying hardpan, but the presence of one was confirmed in the field, which meets the hydric soil criteria for wetlands occurring along the former creek course.

B) Identification of Other Waters

The ditch across the property is a realignment of the historic Schmidt Creek watercourse that was formerly a natural tributary of Dry Creek. Dry Creek occurs approximately one-half mile to the west of the edge of the property (Figure 2). According to the *Madera Area Soil Survey* aerial photo from 1946, the watercourse was depicted as being contiguous with Dry Creek (Figure 3). However, the 1985 USGS Kismet quadrangle depicts Schmidt Creek as a blue-line stream course terminating on the Brown property. Nevertheless, Schmidt Creek has since been channelized through uplands; it flows into a Waters of the U.S. downstream. Dry Creek has running water at least two feet deep and abundant wetland vegetation year-round (Photo 10).

Schmidt Creek is mostly dry upstream of the project site, except within the long box culvert under Highway 99 which has standing water year-round. As mentioned above, the creek is expected to flow up to 20 cubic feet per second following winter storms (pers. comm. Dennis Savala, Madera Irrigation District). In addition, Schmidt Creek is expected to receive regular stormwater runoff during the winter from upstream residential areas and may occasionally be used to deliver irrigation water as evidenced by two pump stations along its alignment. Because the realigned course of Schmidt Creek connects two well-defined watercourses, and has an ordinary high water mark, the ditch on site is considered a potential 'other waters.'

Finally, the depth to the underlying hardpan in the former Schmidt Creek low-flow channel (Photos 8 and 11) and adjacent wash areas (Photo 12) of the former watercourse are shallow enough to result in seasonal ponding. The seasonal ponds persist long enough to inhibit the establishment of both hydrophytes and upland species, and prohibit annual tillage (Photo 13), and are therefore also considered potential 'other waters.' The signature of these ponded areas is evident in the photo contained in the soil survey (Figures 3 and 5).

AREAS NOT MEETING THE REGULATORY DEFINITION OF JURISDICTIONAL WATERS

The remainder of the site (approximately 296.49 acres) met none of the regulatory definitions of jurisdictional waters. At the time of the delineation, most of the site had been recently tilled (Figure 5). During the June 2004 site visit, the field was planted to dryland wheat (*Triticum aestivum*) (Photo 14). The density of the wheat precluded the establishment of herbaceous grassland species, though various invasive annual forbs formed large patches within the fields later in the season. These forbs included black mustard (*Brassica nigra*; NOL), charlock (*Sinapsis arvensis*; NOL), wild radish (*Raphanus sativus*; NOL), and rancher's fireweed (*Amsinckia menziesii*; NOL). The perimeter of the property (Photo 15), and untilled irrigation pipe alignments transecting the site were clearly dominated by upland species at the time of the delineation including California brome (*Bromus californicus*; NOL), ripgut brome (*Bromus diandrus*; NI), cheeseweed (*Malva parviflora*; NOL), white-leaf filaree (*Erodium moschatum*; NOL), and Italian rye (*Lolium multiflorum*).

Two isolated depressions underlain by the Atwater and Hanford soils were found in the southern half of the property during the June 2004 site visit. These depressions were previously dominated by seasonal hydrophytes including toad rush, slender popcorn-flower, and rabbitsfoot grass (*Polypogon monspeliensis*; FAC), as well as wheat and other annual grasses and forbs. These areas have since been plowed and are no longer present. A similar area was observed during the delineation at SP 4 that was dominated by Mediterranean barley and Italian rye, and had algal matting over a widespread area (Photo 15). Elsewhere, a small area of irrigated pasture is located next to the ranch home at the east end of the property. This area is also dominated by seasonal hydrophytes, but is expected to revert to uplands in the absence of continued irrigation. Temporary ponding capable of supporting seasonal wetland vegetation or algal matting may occur in isolated upland areas where the depth to the hardpan is slightly reduced due to uneven tillage from year to year, but these areas are not expected to persist. Therefore, no evidence of active hydrology was observed in any of the agricultural areas of the site at the time of the delineation.

Finally, the "Airport Ditch" parallel to Road 23 is an irrigation canal located just inside the western property boundary (Photo 4). The reach of this canal on site is excavated in uplands and is only expected to have artificial hydrology. Standing water was observed in the canal at the time of the survey. The water in this canal is siphoned underneath Schmidt Creek through a vault structure and is not hydrologically connected to the ditch (Photo 5). For these reasons, the canal is not considered potentially jurisdictional.

CONCLUSION

Currently, the 305-acre Brown property includes approximately 8.51 acres of jurisdictional waters. These jurisdictional waters include 0.95 acres of potentially jurisdictional wetlands located in various sections of Schmidt Creek, and 0.74 acres of seasonal wetland habitat in the former Schmidt Creek watercourse. In addition, potentially jurisdictional "other waters" occur as tributary water habitat throughout Schmidt Creek (4.55 acres). Ponding within the former Schmidt Creek watercourse and adjacent "wash" areas (2.27 acres) was observed in these areas. The hydrology supporting these areas is due to perching of incident rainfall, storm water runoff, and ordinary high water flows in various areas of the current and former Schmidt Creek watercourses. Specifically, the underlying hardpan forms the bed of the creek causing areas of deposited sands within the creek to remain saturated for extended periods during the winter, sustaining emergent species well into the growing season. The depth to the underlying hardpan has also remained shallow under the former watercourse since it was dewatered, resulting in extended saturation of these areas that support seasonal hydrophytes. The depth to the hardpan underlying the rest of the site is sufficiently deep enough to prevent perched hydrology from supporting wetland vegetation.

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APPENDIX A.

PLANTS OBSERVED ON THE BROWN PROPERTY

Appendix A. Plants Observed on the Brown Property, Madera County, California.

FAMILY NAME	SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS
Boraginaceae	*Amsinckia menziesii*	rancher's fireweed	NOL
	Plagiobothrys stipitatus	slender popcorn-flower	OBL
	Plagiobothrys undulatus	coast popcorn-flower	FACW+
Brassicaceae	*Brassica nigra*	black mustard	NOL
	Raphanus sativus	wild radish	NOL
	Rorippa nasturtium-aquaticum	watercress	OBL
	Sinapis arvensis	charlock	NOL
Cyperaceae	*Eleocharis macrostachya*	creeping spikerush	OBL
Geraniaceae	*Erodium moschatum*	white-leaf filaree	NOL
Juncaceae	*Juncus balticus*	Baltic rush	OBL
	Juncus bufonius	toad rush	FACW
Lythraceae	*Lythrum portula*	water purslane	NOL
Malvaceae	*Malva parviflora*	cheeseweed	NOL
Poaceae	*Avena* sp.	oats	---
	Bromus californicus	California brome	NOL
	Bromus diandrus	ripgut brome	NI
	Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	FAC
	Lolium multiflorum	Italian ryegrass	FAC
	Polypogon monspeliensis	rabbitsfoot grass	FAC
	Triticum aestivum	dryland wheat	NOL
Polygonaceae	*Polygonum polystachyum*	Himalayan knotweed	FAC
	Rumex crispus	curly dock	FACW-
Salicaceae	*Populus fremontii* spp. *fremontii*	Fremont cottonwood	FACW
	Salix exigua	sandbar willow	OBL
Scrophulariaceae	*Mimulus guttatus*	common monkeyflower	OBL

The species are arranged alphabetically by family name for all vascular plants encountered during the plant survey. Plants are also listed alphabetically within each family. In some cases, it was not possible to accurately identify a particular plant to the species level due to the absence of specific anatomic structures required for identification.

NOL = Not on List

APPENDIX B.

SOILS OF THE BROWN PROPERTY

unit IIIw-5; natural land type C_{14}; Storie index rating 13)

Atwater Series

The soils of the Atwater series are well drained and very deep. They were derived from somewhat older, wind-reworked, granitic alluvium and typically occur on the leeward side of present or abandoned stream courses, principally on low terraces. The slopes are typically undulating to gently sloping. The surface soil is coarse textured, but there is enough clay in the subsoil to increase the water-holding capacity and fertility. In places, a hardpan substratum of an older, unrelated soil underlies the profile. Annual grasses and herbs are the principal vegetation.

The related but more recent Delhi soils have no accumulation of clay in the subsoil. They are more rapidly permeable than the Atwater soils and consequently are droughty.

The Atwater soils are used mainly for dryfarmed grain and for range. Wind erosion of fallow fields is a problem. Small areas have been planted to irrigated crops, including cotton, barley, alfalfa, grain sorghum, grapes, and orchard crops.

Atwater loamy sand, 3 to 8 percent slopes (AtB).—This gently sloping soil is found principally along Berenda Creek, but smaller areas are scattered throughout the low terraces and alluvial fans of the Fresno and Chowchilla River systems.

Representative profile:

0 to 24 inches, pale-brown and soft (dark-brown and very friable when moist) loamy sand; slightly acid; very weak, very fine, granular structure when moist, and essentially massive when dry; very low in organic matter.

24 to 39 inches, pale-brown and hard (dark-brown and friable when moist) heavy sandy loam with colloidal coatings; neutral; weak, medium, subangular blocky structure.

39 to 60 inches +, yellowish-brown and slightly hard (dark yellowish-brown and very friable when moist) sandy loam; neutral; massive.

The principal variations are in the depth to and the clay content of the subsoil. The texture of the subsoil ranges from heavy sandy loam to heavy loam or light sandy clay loam.

This soil is well drained. Runoff is slow, and internal drainage is moderately rapid. The rooting zone is very deep, and the available water holding capacity and the natural fertility are moderate. The hazard of erosion, principally by wind, is severe if the soil is improperly cultivated. The soil is free of excess salts and alkali.

Use and management.—This soil is used mostly for dryfarmed grain, principally barley, and for range. A small area is irrigated and used chiefly for cotton, barley, alfalfa, grain sorghum, grapes, and orchard crops.

If dryfarmed this soil is not subject to water erosion, because of the rapid infiltration, but while the soil is fallow wind erosion is frequently severe, and adjacent roads are sometimes covered with sand. In spite of this, surface mulching is not a general practice, apparently because the soil is commonly used in conjunction with soils less susceptible to wind erosion. Wherever surface mulching to control soil drifting is possible, it should prove beneficial.

Commonly, dryfarmed small grain is not fertilized, but in extensive fertilization trials on Atwater soils it has generally shown a response to phosphorus. Nitrogen alone has not increased yields, but small amounts of nitrogen added to phosphorus have resulted in profitable yield increases. Potash has not increased yields.

Irrigated crops on Atwater soils are most likely to respond to nitrogen. If legumes have been turned under recently, the response to nitrogen is less. Phosphorus has not increased yields of nonleguminous crops, but it and sulfur may benefit legumes. Large heads of water are needed to irrigate this soil; consequently, care is needed to prevent erosion. The contour check method of irrigation is least likely to cause erosion. (Capability unit IIe-4; natural land type A_5; Storie index rating 68)

Atwater loamy sand, 0 to 3 percent slopes (AtA).—This soil is similar to Atwater loamy sand, 3 to 8 percent slopes, except for having more gentle slopes. Runoff is very slow.

Use and management.—This soil is used for the same crops as Atwater loamy sand, 3 to 8 percent slopes, but a larger proportion has been leveled and irrigated. Deep cuts have been made in places. As a result, the surface soil is variable in thickness, and the subsoil and, in places, the parent material are exposed. Because of this, the growth of crops is uneven, and such differences may persist for a considerable period after leveling. (Capability unit IIe-4; natural land type A_5; Storie index rating 76)

Atwater loamy sand, moderately deep and deep over hardpan, 3 to 8 percent slopes (AwB).—This soil is similar to Atwater loamy sand, 3 to 8 percent slopes, except that it is underlain, generally at depths of 40 to 50 inches, by a hardpan, or semiconsolidated substratum, similar to that underlying the San Joaquin and Madera soils. In a few places, the depth to the hardpan is as little as 18 inches, usually as a result of leveling. The root zone is moderately deep to deep. Where the hardpan is at a moderate depth, the water-holding capacity is somewhat reduced.

Use and management.—This soil is used in much the same way as Atwater loamy sand, 3 to 8 percent slopes. It cannot be leveled and irrigated so readily, because of the restricted depth to the hardpan. Yields are more variable. Care must be taken to prevent overirrigation, which can result in waterlogging and the formation of a temporary perched water table. (Capability unit IIIe-4; natural land type A_{11}; Storie index rating 65)

Atwater loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes (AwA).—Except for having gentler slopes, this soil is similar to Atwater loamy sand, moderately deep and deep over hardpan, 3 to 8 percent slopes. Runoff is very slow.

Use and management.—This soil is used in about the same way as Atwater loamy sand, moderately deep and deep over hardpan, 3 to 8 percent slopes. Many areas have been leveled and irrigated. This soil is best suited to shallow-rooted row and forage crops. Trees and vines grow somewhat unevenly because of the variable depth to the unrelated substratum. Care must be taken when irrigating to prevent waterlogging. (Capability unit IIIe-4; natural land type A_{11}; Storie index rating 72)

Chino soils. They are more strongly calcareous and more strongly affected by salts and alkali than the Temple soils. They lack the lime-silica hardpan that is typical of the Pozo soils. They have a thinner surface soil than the Chino soils, are more strongly affected by salts and alkali, and have more lime in the subsoil.

These soils are used mostly for range, but some areas have been leveled and planted to cotton, alfalfa, and grain sorghum. Yields are fair except where all the surface soil has been removed by leveling and the light-colored, very strongly calcareous subsoil is exposed.

Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes (RtA).—This dark-colored basin soil occupies a considerable acreage at a slightly higher elevation than the Temple soils and at a slightly lower elevation than the Pozo, Chino, and Fresno soils.

Representative profile:

0 to 3 inches, gray and very hard (very dark gray and friable when moist) silt loam; slightly calcareous; mildly alkaline; weak, fine, granular structure; moderately high in organic matter.

3 to 14 inches, gray and very hard (very dark gray and very firm when moist) clay loam; slightly calcareous; moderately alkaline; weak, medium, prismatic and strong, medium, subangular blocky structure; some segregated lime in small nodules and along root channels, the amount increasing with depth; a few strong-brown mottles in places.

14 to 38 inches, light-gray and hard (gray and firm when moist) clay loam; moderately alkaline; weak, fine, subangular blocky structure to massive; very strongly calcareous; hard nodules of lime, mainly at depths of more than 30 inches.

38 to 66 inches +, pale-yellow and slightly hard (light yellowish-brown and friable when moist) stratified loam and sandy loam; moderately calcareous; moderately alkaline; massive.

The thickness and color of the surface soil are somewhat variable. Typically, the surface soil is slightly calcareous, but it is noncalcareous in places. In number and size, the lime nodules in the lower part of the subsoil are variable.

Although this soil developed under poor drainage, almost all of it is now imperfectly drained as the result of the general lowering of the water table by extensive pumping for irrigation. Surface runoff is very slow, and internal drainage is slow. The root zone is deep. The water-holding capacity is high, and natural fertility is moderate. The erosion hazard is slight.

Use and management.—Range is the principal use. Because of the salts and alkali, only the most tolerant grasses, herbs, and shrubs will grow. Reclamation requires large quantities of water to leach the salts from the profile.

If reclaimed, this soil can be used for irrigated pasture and probably for salt- and alkali-tolerant crops, such as cotton, alfalfa, and sugar beets. Nonleguminous crops probably benefit most from nitrogen, and legumes from phosphorus. Leveling that exposes the light-colored, very strongly calcareous lower subsoil is not advisable. Crops growing on exposed subsoil are likely to require large amounts of both nitrogen and phosphorus, and some crops, such as grain sorghum, are likely to be chlorotic because of iron deficiency. (Capability unit IVw–6; natural land type $B_{2\text{-}2a}$; Storie index rating 26)

Rossi silt loam, moderately saline-alkali, 0 to 1 percent slopes (RsA).—This soil is like Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes, except that the concentrations of salts and alkali are only moderate.

Use and management.—This soil is used in about the same way as Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes, and has similar management problems. Somewhat smaller quantities of water are sufficient to leach the excess salts. (Capability unit IVw–6; natural land type $B_{2\text{-}2m}$; Storie index rating 51)

Rossi silt loam, slightly saline-alkali, 0 to 1 percent slopes (RrA).—Slight concentrations of salts and alkali characterize this soil, which is otherwise similar to Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes.

Use and management.—This soil is used in about the same way as Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes. The same methods of reclamation are applicable, but somewhat smaller amounts of water are sufficient. Some of the more salt- and alkali-tolerant crops, such as cotton, alfalfa, and sugar beets, can be grown, but irrigated pasture is probably the best use. (Capability unit IIIs–6; natural land type $B_{2\text{-}2s}$; Storie index rating 73)

Rossi clay loam, slightly saline-alkali, 0 to 1 percent slopes (RoA).—This soil has slower infiltration and slower internal drainage than Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes.

Use and management.—This soil is used in about the same way as Rossi silt loam, slightly saline-alkali, 0 to 1 percent slopes, and has similar management and reclamation problems. Because of the somewhat slower infiltration, however, somewhat larger quantities of water and a longer period of time are required for reclamation. (Capability unit IIIs–6; natural land type $B_{2\text{-}2s}$; Storie index rating 62)

Rossi clay loam, strongly saline-alkali, 0 to 1 percent slopes (RpA).—Except for finer surface texture and somewhat slower infiltration, this soil is similar to Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes; and, except for stronger salt and alkali concentration, it is similar to Rossi clay loam, slightly saline-alkali, 0 to 1 percent slopes.

Use and management.—This soil is all in range. It is managed in the same way as Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes, and can be reclaimed by the same methods. Because of finer surface texture and slower infiltration, reclamation is somewhat slower. Improvement of this soil should only be undertaken under the most favorable economic conditions. (Capability unit IVw–6; natural land type $B_{2\text{-}2a}$; Storie index rating 22)

San Joaquin Series

The San Joaquin series consists of shallow, iron-silica hardpan soils developed in old alluvium derived mostly from granitic rocks. These soils are extensive. They occupy hummocky, very gently sloping areas and remnants of rolling, dissected alluvial deposits in the old, low terraces. Water may stand in the small intermound areas during wet weather. Internal drainage is restricted by the impervious hardpan. The vegetation is chiefly annual grasses and herbs.

These soils are associated with the much darker colored, fine-textured Alamo soils, which occupy small depressions. They are similar to and associated with the brownish Madera soils. In some places San Joaquin soils

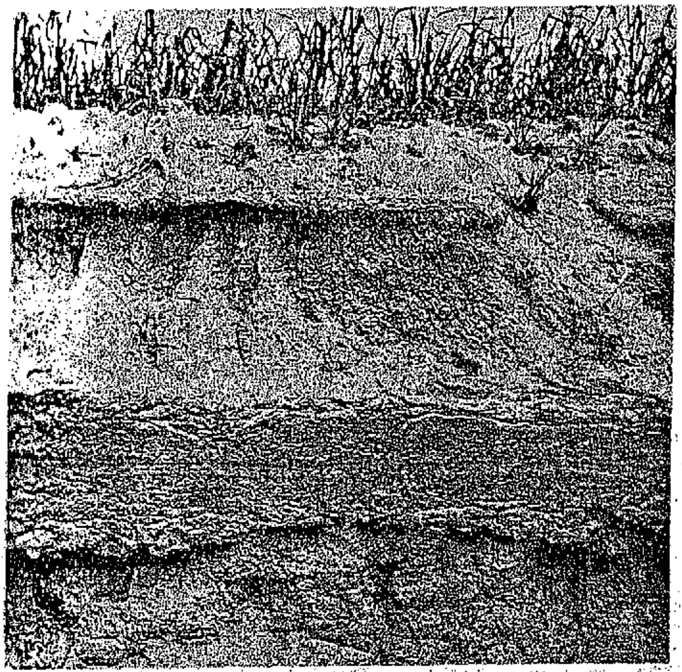

Figure 15.—Profile of San Joaquin sandy loams, 0 to 3 percent slopes.

cap low hills, the side slopes of which are occupied by the Whitney, Rocklin, and Cometa soils.

The San Joaquin soils are used mostly for range and dryfarmed grain. Some areas have been leveled, irrigated, and planted to pasture, cotton, figs, and grapes. Preparing these soils for irrigation is costly because of the hummocky microrelief and the hardpan. Breaking the hardpan is difficult, but in some places it has been broken and removed.

San Joaquin sandy loams, 0 to 3 percent slopes (SaA).—This complex includes fine sandy loam, sandy loam, and coarse sandy loam, so closely associated that separating them was impractical.

Representative profile (fig. 15) of San Joaquin sandy loam:

0 to 5 inches, yellowish-red and very hard (reddish-brown and very friable when moist) sandy loam; medium acid; very weak, very fine, granular structure when moist, and essentially massive when dry; low in organic matter.

5 to 11 inches, yellowish-red and hard (reddish-brown and friable when moist) loam; slightly acid; moderate, fine, subangular blocky structure.

11 to 19 inches, reddish-yellow and extremely hard (yellowish-red and firm when moist) sandy clay with colloidal coatings; slightly acid; medium, fine, blocky structure.

19 to 23 inches, reddish-yellow (red to yellowish-red when moist) hardpan, iron-silica cemented; smooth, very dense, and indurated in upper part; less strongly cemented in lower part; some dark-colored manganese stains; some segregated lime in lower part.

23 to 60 inches, light yellowish-brown and hard (dark yellowish-brown and firm when moist) gritty sandy loam; massive; softly consolidated; neutral to mildly alkaline; few yellowish-red mottles and stains, which are most prominent when soil is moist; less hard and less consolidated with increasing depth.

The color of the surface layer ranges from brown to reddish brown and yellowish red. Because of the hummocky microrelief, the hardpan is variable. It tends to be thinner, softer, and farther below the surface in the mounds and to be thicker, harder, and nearer the surface in the intermound areas. In some intermound areas the soil is finer textured and merges with small bodies of the Alamo soils. Small areas that have a loam surface layer are also included.

Drainage is good; surface runoff is very slow to slow, and internal drainage is very slow. The root zone is shallow, and the moisture-holding capacity and natural fertility are low. The erosion hazard is slight.

Use and management.—Range and dryfarmed grain are the principal uses of these soils. In some places, the surface has been leveled and the hardpan has been broken with heavy equipment or explosives. Such areas are used for irrigated crops, including pasture, alfalfa, cotton, figs, and grapes. Even where the hardpan has been removed, it is best to grow shallow-rooted crops because the substratum is softly consolidated. Pasture of shallow-rooted grasses and legumes is one of the best uses for irrigated areas, and ladino clover is one of the best suited legumes.

Fertility trials indicate that these soils are deficient in nitrogen, phosphorus, and, for legumes, sulfur. Under irrigation, legumes respond to phosphorus and sulfur; other crops respond to nitrogen and probably require phosphorus at the higher levels of production. Dryfarmed grain responds to phosphorus, alone or with small amounts of nitrogen. Range legumes are benefited by applications of phosphorus and sulfur, and the legumes supply the nitrogen needed by the grasses. (Capability unit IVs-3; natural land type C_{13}; Storie index rating 27)

San Joaquin-Alamo complex, 0 to 3 percent slopes (SbA).—This complex consists of small areas of Alamo clay within an area of San Joaquin sandy loams.

Use and management.—These soils are used principally for range and dryfarmed grain. They are extremely difficult to manage because of the wide range in texture of the surface layer. Some of the management practices suggested for San Joaquin sandy loams, 0 to 3 percent slopes, and Alamo clay, 0 to 1 percent slopes, are applicable. In most places, some compromise treatment is necessary.

The cost of preparing these soils for irrigation is high, and the benefits are likely to be small. Leveling is of little use unless the hardpan is broken and removed. Even if that is done, crop production may improve very little, because the substratum is softly consolidated. Substantial amounts of fertilizer, principally nitrogen, phosphorus, and sulfur, and possibly some lime are required.

Leveling tends to fill in the areas of Alamo soil and to make the whole complex more like the San Joaquin soil. (Capability unit IVs-3; natural land types C_{13}, C_{14}; Storie index rating 17)

San Joaquin-Whitney sandy loams, 0 to 8 percent slopes (ScB).—This complex consists of small, nearly level remnants of San Joaquin sandy loams capping gently sloping, low hills of Whitney fine sandy loam. The two soils occur in such a complex pattern that separating them was impractical.

Use and management.—This complex is mostly in range and dryfarmed grain. It is more easily managed than San Joaquin-Alamo complex, 0 to 3 percent slopes. Generally, the management practices suggested for San Joaquin sandy loams, 0 to 3 percent slopes, and Whitney fine sandy loam, 3 to 8 percent slopes, are applicable, though some compromises are necessary. (Capability unit IVe–3; natural land types C_{13}, E_1; Storie index rating 54)

Sesame Series

The Sesame series consists of well-drained soils in the lower foothills of the Sierra Nevada. The parent material weathered from the underlying coarse-grained granitic rocks. These soils are associated with the Vista soils, from which they differ chiefly in having a moderate amount of clay in the subsoil and a dark grayish-brown surface soil. Rock outcrops occur in places. Slopes are gentle to rolling. The vegetation consists of annual grasses and herbs and, in places, scattered oaks.

These soils are used for dryfarmed grain and for range.

Sesame sandy loam, 3 to 8 percent slopes (SyB).—This gently sloping soil is moderately shallow over granitic bedrock. It occurs principally in association with the Vista soils in the lower foothills of the Sierra Nevada.

Representative profile:

0 to 8 inches, dark grayish-brown and hard (very dark grayish-brown and friable when moist) heavy sandy loam; slightly acid; very weak, very fine, granular structure when moist, and essentially massive when dry; low in organic matter.

8 to 17 inches, dark-brown and very hard (dark yellowish-brown and very firm when moist) light sandy clay loam with colloidal coatings; slightly acid; moderate, medium, blocky structure.

17 to 27 inches, dark-brown and very hard (dark yellowish-brown and very firm when moist) light sandy clay loam with colloidal coatings; slightly acid; weak, medium, blocky structure.

27 to 40 inches +, varicolored, mostly slightly weathered, granitic bedrock with some soil material similar to that in layer above; grades into hard granitic bedrock.

The principal variations are in the depth to the subsoil, the amount of clay in the subsoil, and the depth to the parent rock. In places the lower part of the subsoil is sandy clay.

Drainage is good; surface runoff is slow, and internal drainage is moderately slow. The root zone is moderately deep, and the water-holding capacity and natural fertility are moderate. The erosion hazard is slight.

Use and management.—This soil is used for dryfarmed grain and for range. Dryfarmed grain responds to phosphorus, alone or with small amounts of nitrogen. Phosphorus and sulfur are beneficial to range legumes, and the legumes supply nitrogen for the grasses and herbs, thus increasing the quantity and improving the quality of the forage.

If irrigated, these soils would be best suited to legumes and grasses for hay or pasture. The legumes should respond to phosphorus and sulfur. Irrigated small grain and other nonleguminous field crops should respond to nitrogen. (Capability unit IIIe–1; natural land type E_1; Storie index rating 51)

Sesame rocky sandy loam, 3 to 8 percent slopes (SnB).—Except for having outcrops of granitic bedrock, this soil is like Sesame sandy loam, 3 to 8 percent slopes. The depth to bedrock is more variable, but in the rock-free areas the profiles of the two soils are comparable in depth.

Use and management.—This soil is suitable only for range. Cultivation with most kinds of mechanical equipment is difficult, so the possibilities for range improvements are limited. Range use and management are about the same as on Sesame sandy loam, 3 to 8 percent slopes. (Capability unit VIe–4; natural land type E_4; Storie index rating 32)

Sesame loam, 3 to 8 percent slopes (SeB).—Because of its finer textured surface layer, this soil is slightly higher in moisture-holding capacity and natural fertility than Sesame sandy loam, 3 to 8 percent slopes. The bedrock contains less quartz; this fact may partly account for the finer texture.

Use and management.—This soil is used in much the same way and has much the same management problems as Sesame sandy loam, 3 to 8 percent slopes. (Capability unit IIIe–1; natural land type E_1; Storie index rating 45)

Sesame loam, 8 to 15 percent slopes (SeC).—This soil is slightly shallower to bedrock than Sesame loam, 3 to 8 percent slopes. Runoff is medium, and the erosion hazard is moderate.

Use and management.—This soil is used for dryfarmed grain and for range. Range is probably the best use, because of the difficulties and hazards of cultivation. Considerable care is necessary to control erosion. In cultivation, the contour should be followed as closely as possible. Otherwise, this soil can be managed in about the same way as Sesame loam, 3 to 8 percent slopes. (Capability unit IVe–1; natural land type E_1; Storie index rating 43)

Sesame rocky loam, 8 to 15 percent slopes (SkC).—Except for having rock outcrops, this soil is similar to Sesame loam, 8 to 15 percent slopes. Except for having a finer textured surface soil and steeper slope, it is similar to Sesame rocky sandy loam, 3 to 8 percent slopes. The depth to bedrock is more variable, but in rock-free areas the profiles of the two rocky soils are comparable in depth.

Use and management.—This soil is suitable only for range. It can be managed in about the same way as Sesame rocky sandy loam, 3 to 8 percent slopes. (Capability unit VIe–4; natural land type E_4; Storie index rating 31)

Temple Series

The Temple series consists of dark-colored soils derived from mixed but mostly granitic alluvium. These soils occupy low parts of the valley near the San Joaquin River. Before these soils were farmed, periodic flooding and a high water table favored the accumulation of organic matter in the surface soil. Floods are now well controlled by a system of levees and by Friant Dam and Pine Flat Dam. The water table has been lowered by pumping ground water for irrigation and is in most places now too low to affect the soils. A perched water table occurs locally, however, because of overirrigation or lateral seepage above the slowly permeable substratum. The vegetation is grasses, herbs, and, in the swales, some rushes and tules. The saline spots support saltgrass and some salt-tolerant herbs.

fine sandy loam, 3 to 8 percent slopes. Runoff is medium, and the erosion hazard severe.

Use and management.—This soil is used in about the same way as Trigo fine sandy loam, 3 to 8 percent slopes. Precautions should be taken to minimize erosion. Range is probably the best use. (Capability unit IVe–3; natural land type E_5; Storie index rating 27)

Trigo-Cometa sandy loams, 3 to 8 percent slopes (TvB).—This complex consists of small bodies of Trigo and Cometa soils. It was impractical to separate them. The profiles are similar to those described under Trigo fine sandy loam, 3 to 8 percent slopes, and Cometa sandy loams, 3 to 8 percent slopes, respectively.

Use and management.—This complex is used for range and dryfarmed grain. Both soils are low in moisture-holding capacity and fertility, and hence have similar management problems. Grain is likely to respond to phosphorus, alone or with small amounts of nitrogen, and range legumes respond to phosphorus and sulfur. Responses are likely to be comparatively slight and to vary from year to year, depending on rainfall.

If these soils were irrigated, grass-legume pasture or shallow-rooted row and forage crops would be the best crops to grow. Irrigated legumes would respond to phosphorus and sulfur, and other irrigated crops to nitrogen. (Capability unit IVe–3; natural land type E_5; Storie index rating 34)

Tujunga Series

The Tujunga series consists of pale-brown, noncalcareous, coarse-textured, somewhat excessively drained soils derived from granitic sediments deposited on recent alluvial fans and flood plains. The profile is nearly uniform throughout, except for a small amount of organic matter in the surface layer and textural stratification during deposition of the material by swift-moving streams and flood waters. Although Tujunga soils in other areas contain stones and even boulders, those in the Madera Area contain no coarse fragments, except for gravel in the subsoil and substratum. The vegetation is chiefly annual grasses and herbs. Scattered trees grow along the stream courses. The slopes are typically gentle. The soils are free of excess salts and alkali.

Except for having a coarser texture, a lower organic-matter content, and lower moisture-holding capacity, these soils are similar to the Hanford soils, which formed from material derived from similar sources but of finer texture. In places the Tujunga soils occupy narrow, irregular, winding, present or old stream courses that traverse large bodies of the Hanford soils.

The Tujunga soils are used principally for irrigated pasture and for irrigated row, forage, vine, and orchard crops.

Tujunga loamy sand, 0 to 3 percent slopes (TwA).—This soil is similar to the Hanford fine sandy loams in many respects but is coarser textured, lower in organic matter, and lower in moisture-holding capacity. It usually occurs as narrow streaks traversing more extensive areas of Hanford and other soils.

Representative profile:

0 to 11 inches, pale-brown and loose (brown and loose when moist) loamy sand; neutral; single grained; very low in organic matter.

11 to 24 inches, pale-brown and loose (brown and loose when moist), stratified loamy sand and coarse sand; single grain; neutral.

24 to 60 inches, slightly lighter colored, stratified sand, coarse sand, and gravel; neutral; loose; single grained; generally many feet thick.

There is some variation in color, stratification, and organic-matter content. In places the surface soil and subsoil contain small amounts of gravel.

Natural drainage is somewhat excessive; surface runoff is very slow, and internal drainage is very rapid. The moisture-holding capacity and natural fertility are low. The root zone is very deep. The erosion hazard is severe.

Use and management.—Because most of it occurs in narrow, irregular areas, this soil is seldom farmed separately but is used with the surrounding soils, mostly for irrigated pasture, row, forage, vine, and orchard crops. Some operators carry water across the narrow areas by means of flumes or other bridging devices, but wider areas are difficult to cross in this way.

If the areas are large enough, this soil can be treated to correct its deficiencies, but water and fertilizer are needed in large amounts, and applying them is difficult and expensive. Generally, there is a deficiency of zinc for grapes and tree fruits. Many crops are likely to be damaged by nematodes. (Capability unit IIIe–4; natural land type A_5; Storie index rating 56)

Tujunga loamy sand, 3 to 8 percent slopes (TwB).—This soil consists of terrace facings along the major streams. Except for having steeper slopes, it is similar to Tujunga loamy sand, 0 to 3 percent slopes. Surface runoff is slow.

Use and management.—This soil is used mostly for range, but some of it is irrigated and contour planted to vines. Because of the steeper slopes and the low water-holding capacity, it is more difficult to manage than Tujunga loamy sand, 0 to 3 percent slopes. (Capability unit IIIe–4; natural land type A_5; Storie index rating 49)

Tujunga loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes (TxA).—This soil consists of 30 to 50 inches of stratified loamy sand over an unrelated hardpan like that in the Fresno, Madera, and San Joaquin soils. Otherwise, it is similar to Tujunga loamy sand, 0 to 3 percent slopes. The root zone is moderately deep to deep.

Use and management.—This soil is farmed with the surrounding soils because it occurs in narrow, winding bodies within areas of other soils. In use and management it is similar to Tujunga loamy sand, 0 to 3 percent slopes, but the loss of irrigation water and nutrients by percolation is somewhat less serious. The hardpan prevents very rapid percolation and is in that respect an asset instead of a liability. Nevertheless, careful irrigation practices are necessary to prevent waterlogging just above the hardpan. (Capability unit IIIe–4; natural land type A_{11}; Storie index rating 45)

Tujunga and Hanford soils, channeled, 0 to 8 percent slopes (TzB).—These soils occur along the major streams, in wooded or brushy areas subject to frequent flooding. Both the surface soil and the subsoil have a wide range in texture and vary within short distances. The microrelief is channeled because of the shifting of streams, and slopes are variable. The flood hazard is severe.

Use and management.—These soils are used primarily for grazing, but a few small areas have been leveled and used for irrigated field crops. The severe flood hazard and the wide range in texture limits their value for agriculture. (Capability unit IIIe-4; natural land type A_{5-5ch}; Storie index rating 32)

Tujunga loamy sand, moderately deep and deep over silt, 0 to 3 percent slopes (TyA) [5].—This soil is associated with and is similar to Hanford (Ripperdan) fine sandy loam, moderately deep and deep over silt, 0 to 3 percent slopes. It consists of single-grained loamy sand over a silty substratum. The depth to the silty substratum is normally 30 inches but ranges from 20 to 60 inches. Internal drainage is very rapid to the substratum, then slow to very slow. Surface runoff is very slow. The moisture-holding capacity and natural fertility are low, and the erosion hazard is severe.

Use and management.—This soil is used in much the same way as Hanford (Ripperdan) fine sandy loam, moderately deep and deep over silt, 0 to 3 percent slopes. Because of its low moisture-holding capacity and fertility, it is less productive than the associated soil. It needs smaller and more frequent applications of irrigation water and fertilizer. Such special treatment is usually difficult or impossible, because the areas are small and narrow and are surrounded by the Hanford soil and associated soils. If irrigation water flows across narrow areas of Tujunga soils, large quantities of water can be lost. To minimize the loss of water, fields should be arranged so that it will not be necessary to convey water across the Tujunga soil. If this is not possible, flumes or other bridging devices should be used.

There is generally a deficiency of zinc for grapes and orchard crops. Swabbing the fruiting stubs will correct this deficiency for Malaga grapes but not for the Thompson variety. It is advisable to use special rooting stock to get vines that can obtain moisture and nutrients from a large volume of soil. (Capability unit IIIe-4; natural land type A_{11}; Storie index rating 72)

Visalia Series

The soils of the Visalia series occupy swalelike and other nearly level positions on low, recent alluvial fans and flood plains. These soils were derived from sediments washed from granitic and other micaceous rocks. Under natural conditions they were imperfectly drained and subject to flooding and a periodic high water table, but, as a result of pumping, those in this Area are now mostly moderately well drained. Except for variations resulting from stratification, the profiles are moderately coarse textured and dark colored to considerable depths. The vegetation is mainly annual grasses and herbs and some moisture-loving plants.

These soils are similar to the Grangeville soils but have very little or no mottling in the subsoil and substratum and are typically lime free throughout. They also resemble the Hanford soils in many characteristics but are darker colored, higher in organic matter, and naturally less well drained. In many respects the Visalia soils are transitional between the Grangeville and Hanford soils.

These soils are used extensively for irrigated row, forage, pasture, vine, and orchard crops.

Visalia fine sandy loam, 0 to 1 percent slopes (VoA).—This soil occurs chiefly on low, recent alluvial fans or flood plains, in spots that naturally receive somewhat more moisture than the Hanford and Tujunga soils, the principal associated soils.

Representative profile:

0 to 12 inches, gray to dark-gray and slightly hard (very dark gray to almost black and very friable when moist) fine sandy loam; micaceous; neutral; weak, fine, granular structure when moist, and essentially massive when dry; moderately low in organic matter.

12 to 35 inches, grayish-brown to dark grayish-brown and slightly hard (very dark grayish-brown and very friable when moist) fine sandy loam; micaceous; mildly alkaline; weak, very fine, granular structure when moist, and essentially massive when dry; moderately low in organic matter.

35 to 60 inches, brown and slightly hard (dark-brown and very friable when moist) stratified sandy loam and fine sandy loam; micaceous; moderately alkaline; massive.

Variations in the profile are chiefly the results of stratification. Locally, a very small amount of lime may occur in the subsoil and substratum.

In its natural condition, this soil was imperfectly drained and subject to flooding and periodic high water tables. Extensive pumping has now eliminated the high water tables, and drainage is moderately good. Surface runoff is very slow, and internal drainage is moderately rapid. The root zone is very deep, and the water-holding capacity and natural fertility are moderate. The erosion hazard is slight, and there are no excess salts or alkali.

Use and management.—This soil is suited to many irrigated row, forage, vine, and orchard crops and to irrigated pasture. Legumes respond to phosphorus and sulfur, and other crops to nitrogen. (Capability unit I-1; natural land type A_1; Storie index rating 100)

Visalia sandy loam, 0 to 3 percent slopes (VdA).—This soil is slightly lower in moisture-holding capacity and natural fertility than Visalia fine sandy loam, 0 to 1 percent slopes, but is otherwise similar to it. Internal drainage is rapid.

Use and management.—To compensate for its lower water-holding capacity and natural fertility, this soil needs lighter and more frequent irrigation than Visalia fine sandy loam, 0 to 1 percent slopes, and somewhat more fertilizer. Otherwise, the two soils can be managed in about the same way. (Capability unit I-1; natural land type A_1; Storie index rating 95)

Visalia sandy loam, moderately deep over sand, 0 to 3 percent slopes (VnA).—This soil is similar to Visalia sandy loam, 0 to 3 percent slopes, but it overlies sand at depths of 18 to 36 inches. The water-holding capacity and natural fertility are low.

Use and management.—Managing this soil requires a compromise between the practices suitable for Visalia sandy loam, 0 to 3 percent slopes, and those suitable for

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[5] This soil was described under the series name "Ripperdan" in the University of California Soil Survey No. 12, Soils of Madera County, California, and in some other University of California publications.

Hydric Soils

Madera Area, California

[This report lists only those map unit components that are rated as hydric. Dashes (---) in any column indicate that the data were not included in the database. Definitions of hydric criteria codes are included at the end of the report]

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
AsA: Alamo clay, 0 to 1 percent slopes	Alamo	85	Depression	Yes	2B3
AwA: Atwater loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	Unnamed	2	--	Yes	4
AwB: Atwater loamy sand, moderately deep and very deep over hardpan, 3 to 8 percent slopes	Unnamed	2	---	Yes	4
BeA: Bear Creek loam, 0 to 3 percent slopes	Unnamed	2	---	Yes	4
BoA: Borden loam, slightly saline-alkali, 0 to 1 percent slopes	Unnamed	2	---	Yes	4
BvA: Buchenau fine sandy loam, slightly saline-alkali, 0 to 3 percen slopes	Unnamed	2	---	Yes	4
ByA: Buchenau fine sandy loam, strongly saline-alkali, 0 to 3 percen slopes	Unnamed	2	---	Yes	4
BzA: Buchenau loam, 0 to 3 percent slopes	Unnamed	2	—	Yes	4
CebA: Chino clay loam, moderately saline-alkali, 0 to 1 percent slope	Chino	85	Basin floor	Yes	2B3
	Foster	5	---	Yes	2B3
	Rossi	2	---	Yes	2B3, 4
	Temple	2	---	Yes	2B3, 4
CfbA: Chino fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes	Chino	85	Basin floor	Yes	2B3
	Rossi	2	---	Yes	2B3, 4
	Temple	2	---	Yes	2B3, 4

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
CgbA: Chino loam, moderately saline-alkali, 0 to 1 percent slopes	Chino	85	Basin floor	Yes	2B3
	Rossi	2	---	Yes	2B3, 4
	Temple	2	---	Yes	2B3, 4
CgcA: Chino loam, strongly saline-alkali, 0 to 1 percent slopes	Chino	85	Basin floor	Yes	2B3
	Rossi	2	---	Yes	2B3, 4
	Temple	2	---	Yes	2B3, 4
CmA: Columbia fine sandy loam, 0 to 1 percent slopes	Columbia	85	Flood plain	Yes	2B3, 4
	Temple	10	---	Yes	2B3, 4
	Riverwash	5	---	Yes	4
CmdA: Columbia fine sandy loam, moderately deep and deep over hardpan 0 to 1 percent slopes	Columbia	85	Flood plain	Yes	2B3, 4
	Riverwash	5	---	Yes	4
CmlA: Columbia fine sandy loam, moderately deep and deep over temple soils, 0 to 1 percent slopes	Columbia	85	Flood plain	Yes	2B3, 4
	Temple	10	---	Yes	2B3, 4
	Riverwaash	5	---	Yes	4
CoA: Columbia loamy sand, 0 to 1 percent slopes	Columbia	85	Flood plain	Yes	2B3, 4
	Tujunga	10	---	Yes	4
	Riverwash	5	---	Yes	4

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
CotA: Columbia loamy sand, over temple soils, 0 to 1 percent slopes	Columbia	85	Flood plain	Yes	2B3, 4
	Temple	10	---	Yes	2B3, 4
	Riverwash	5	---	Yes	4
CpA: Columbia sandy loam, 0 to 1 percent slopes	Columbia	85	Flood plain	Yes	2B3, 4
	Tujunga	10	---	Yes	4
	Riverwash	5	---	Yes	4
CpdA: Columbia sandy loam, moderately deep over sand, 0 to 1 percent slopes	Columbia	85	Flood plain	Yes	2B3, 4
	Tujunga	10	---	Yes	4
	Riverwash	5	---	Yes	4
CrB: Columbia soils, channeled, 0 to 8 percent slopes	Columbia soils	75	Flood plain	Yes	2B3, 4
	Riverwash	15	Flood plain	Yes	4
	Tujunga	5	---	Yes	4
CsB: Cometa gravelly sandy loam, 3 to 8 percent slopes	Unnamed ponded	2	---	Yes	3
CtB: Cometa loam, 3 to 8 percent slopes	Unnamed ponded	2	---	Yes	3
CuA: Cometa sandy loams, 0 to 3 percent slopes	Unnamed ponded	2	---	Yes	3
CuB: Cometa sandy loams, 3 to 8 percent slopes	Unnamed ponded	2	---	Yes	3
CuC: Cometa sandy loams, 8 to 15 percent slopes	Unnamed ponded	2	---	Yes	3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
CwB:					
Cometa-Whitney sandy loams, 3 to 8 percent slopes	Unnamed ponded	2	---	Yes	3
CwC:					
Cometa-Whitney sandy loams, 8 to 15 percent slopes	Unnamed ponded	2	—	Yes	3
CyA:					
Corning gravelly loam, 0 to 3 percent slopes	Unnamed ponded	2	—	Yes	3
CyB:					
Corning gravelly loam, 3 to 8 percent slopes	Unnamed ponded	2	—	Yes	3
DpA:					
Dinuba-El Peco fine sandy loams, slightly saline alkali, 0 to 1 percent slopes	Playas	1	—	Yes	3
DsA:					
Dinuba-El Peco fine sandy loams, moderately saline alkali, 0 to 1 percent slopes	Playas	1	—	Yes	3
DtA:					
Dinuba-El Peco loams, slightly saline alkali, 0 to 1 percent slopes	Playas	1	—	Yes	3
DuA:					
Dinuba-El Peco loams, moderately saline alkali, 0 to 1 percent slopes	Playas	1	—	Yes	3
EdA:					
El Peco-Dinuba fine sandy loams, strongly saline alkali, 0 to 1 percent slopes	Playas	1	—	Yes	3
FaA:					
Foster clay loam, 0 to 1 percent slopes	Foster	85	Flood plain	Yes	2B3
	Chino	5	—	Yes	2B3
	Columbia	5	—	Yes	2B3, 4
	Grangeville	5	—	Yes	2A, 4

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
FaaA: Foster clay loam, slightly saline-alkali, 0 to 1 percent slopes	Foster	85	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
	Grangeville	5	---	Yes	2A, 4
FabA: Foster clay loam, moderately saline-alkali, 0 to 1 percent slopes	Foster	85	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
	Grangeville	5	---	Yes	2A, 4
FacA: Foster clay loam, strongly saline-alkali, 0 to 1 percent slopes	Foster	85	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
	Grangeville	5	---	Yes	2A, 4
FbA: Foster loams, 0 to 1 percent slopes	Foster	45	Flood plain	Yes	2B3
	Foster	45	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
FbaA: Foster loams, slightly saline-Alkali, 0 to 1 percent slopes	Foster	45	Flood plain	Yes	2B3
	Foster	45	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
FbbA: Foster loams, moderately saline-Alkali, 0 to 1 percent slopes	Foster	45	Flood plain	Yes	2B3
	Foster	45	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
FbcA: Foster loams, strongly saline-Alkali, 0 to 1 percent slopes	Foster	45	Flood plain	Yes	2B3
	Foster	45	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
FbdA: Foster loams, sandy substratum, 0 to 1 percent slopes	Foster	45	Flood plain	Yes	2B3
	Foster	45	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
FbeA: Foster loams, moderately deep and deep over temple soils, 0 to percent slopes	Foster	45	Flood plain	Yes	2B3
	Foster	45	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4
FcbA: Foster loams, moderately deep and deep over temple soils, moderately saline-Alkali, 0 to 1 percent slopes	Foster	45	Flood plain	Yes	2B3
	Foster	45	Flood plain	Yes	2B3
	Chino	5	---	Yes	2B3
	Columbia	5	---	Yes	2B3, 4

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
FdcA: Foster-Chino loams, strongly saline alkali, 0 to 1 percent slopes	Chino	40	Basin floor	Yes	2B3
	Foster	40	Flood plain	Yes	2B3
	Columbia	10	---	Yes	2B3, 4
	Grangeville	10	---	Yes	2A, 4
FeaA: Fresno and El Peco fine sandy loams, slightly saline-alkali, 0 to 1 percent slopes	Pozo	10	---	Yes	2B3
	Playas	1	---	Yes	3
FebA: Fresno and El Peco fine sandy loams, moderately saline-alkali, to 1 percent slopes	Pozo	10	---	Yes	2B3
	Playas	1	---	Yes	3
FecA: Fresno and El Peco fine sandy loams, strongly saline-alkali, 0 to 1 percent slopes	Pozo	10	---	Yes	2B3
	Playas	1	---	Yes	3
FfaA: Fresno and El Peco loams, slightly saline-alkali, 0 to 1 percen slopes	Pozo	10	---	Yes	2B3
	Playas	1	---	Yes	3
FfbA: Fresno and El Peco loams, moderately saline-alkali, 0 to 1 percent slopes	Pozo	10	---	Yes	2B3
	Playas	1	---	Yes	3
FfcA: Fresno and El Peco loams, strongly saline-alkali, 0 to 1 percen slopes	Pozo	10	---	Yes	2B3
	Playas	1	---	Yes	3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
FgaA: Fresno, El Peco, and Chino soils, slightly saline-alkali, 0 to percent slopes	Chino	25	Drainageway	Yes	2B3
	Pozo	10	—	Yes	2B3
	Playas	1	—	Yes	3
FgbA: Fresno, El Peco, and Chino soils, moderately saline-alkali, 0 t 1 percent slopes	Chino	25	Drainageway	Yes	2B3
	Pozo	10	—	Yes	2B3
	Playas	1	—	Yes	3
FhbA: Fresno, El Peco, and Lewis soils, moderately saline-alkali, 0 t 1 percent slopes	Pozo	10	—	Yes	2B3
	Playas	1	—	Yes	3
FhcA: Fresno, El Peco, and Lewis soils, strongly saline-alkali, 0 to 1 percent slopes	Pozo	10	---	Yes	2B3
	Playas	1	---	Yes	3
FkaA: Fresno, El Peco, and Pozo soils, slightly saline-alkali, 0 to 1 percent slopes	Pozo	25	Basin floor	Yes	2B3
	Playas	1	—	Yes	3
FkbA: Fresno, El Peco, and Pozo soils, moderately saline-alkali, 0 to 1 percent slopes	Pozo	25	Basin floor	Yes	2B3
	Playas	1	—	Yes	3
GaA: Grangeville fine sandy loam, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	—	Yes	2B3
GbA: Grangeville fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	—	Yes	2B3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
GcA: Grangeville fine sandy loam, over traver soils, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
GdA: Grangeville fine sandy loam, over traver soils, slightly saline alkali, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
GeA: Grangeville fine sandy loam, moderately deep and deep over temple soils, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
GfA: Grangeville fine sandy loam, deep over hardpan, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
GhA: Grangeville fine sandy loam, deep over alkali hardpan, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
GkA: Grangeville fine sandy loam, deep over alkali hardpan, slightly saline-alkali, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
GmA: Grangeville sandy loam, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
GnA: Grangeville sandy loam, slightly saline-alkali, 0 to 1 percent slopes	Grangeville	85	Alluvial fan	Yes	2A, 4
	Foster	5	---	Yes	2B3
HmA: Hildreth sandy clay, 0 to 3 percent slopes	Hildreth	85	Fan remnant	Yes	2A, 3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
HnB: Hildreth-San Joaquin complex, 0 to 8 percent slopes	Hildreth	35	Fan remnant	Yes	2A, 3
	Unnamed ponded	1	---	Yes	3
HsB: Hornitos gravelly sandy loam, 3 to 8 percent slopes	Unnamed	1	---	Yes	3
HsD: Hornitos gravelly sandy loam, 8 to 30 percent slopes	Unnamed	1	---	Yes	3
HvD: Hornitos very rocky sandy loam, 8 to 30 percent slopes	Unnamed	1	---	Yes	3
JeA: Jesbel clay, 0 to 3 percent slopes	Unnamed	1	---	Yes	3
JgB: Jesbel gravelly clay, 3 to 8 percent slopes	Unnamed	1	---	Yes	3
JyA: Jesbel gravelly clay loam, 0 to 3 percent slopes	Unnamed	1	---	Yes	3
LeA: Lewis loam, slightly saline-alkali, 0 to 1 percent slopes	Unnamed	1	---	Yes	3
LwA: Lewis loam, moderately saline-alkali, 0 to 1 percent slopes	Unnamed	1	---	Yes	3
MaA: Madera fine sandy loam, 0 to 3 percent slopes	Unnamed ponded	1	---	Yes	3
MbA: Madera loam, 0 to 3 percent slopes	Unnamed ponded	1	---	Yes	3
McA: Madera-Alamo complex, 0 to 1 percent slopes	Alamo	35	Depression	Yes	2B3
	Unnamed ponded	1	---	Yes	3
MdA: Madera-Lewis complex, slightly saline alkali, 0 to 1 percent slopes	Unnamed ponded	1	---	Yes	3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
MtB: Montpellier coarse sandy loam, 3 to 8 percent slopes	Unnamed ponded	1	---	Yes	3
MtC: Montpellier coarse sandy loam, 8 to 15 percent slopes	Unnamed ponded	1	---	Yes	3
PfA: Porterville clay, 0 to 3 percent slopes	Unnamed ponded	1	---	Yes	3
PfB: Porterville clay, 3 to 8 percent slopes	Unnamed ponded	1	---	Yes	3
PhA: Pozo clay loam, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
PkA: Pozo clay loam, slightly saline, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
PmA: Pozo clay loam, moderately saline, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
PnA: Pozo clay loam, strongly saline, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
PoA: Pozo loam, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
PsA: Pozo loam, slightly saline, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
PtA: Pozo loam, moderately saline, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
PvA: Pozo loam, strongly saline, 0 to 1 percent slopes	Pozo	85	Basin floor	Yes	2B3
RaA: Ramona sandy loam, 0 to 3 percent slopes	Unnamed	1	---	Yes	3
RaB: Ramona sandy loam, 3 to 8 percent slopes	Unnamed	1	---	Yes	3
RbA: Ramona sandy loam, deep over hardpan, 0 to 3 percent slopes	Unnamed	1	---	Yes	3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
RdA: Redding gravelly loam, 0 to 3 percent slopes	Unnamed ponded	1	---	Yes	3
RdC: Redding gravelly loam, 3 to 15 percent slopes	Unnamed ponded	1	---	Yes	3
RfC: Redding gravelly sandy loam, 3 to 15 percent slopes	Unnamed ponded	1	---	Yes	3
Rh: Riverwash	Riverwash	100	Flood plain	Yes	4
RoA: Rossi clay loam, slightly saline-alkali, 0 to 1 percent slopes	Rossi	85	Basin floor	Yes	2B3, 4
	Pozo	5	---	Yes	2B3
	Temple	5	---	Yes	2B3, 4
RpA: Rossi clay loam, strongly saline-alkali, 0 to 1 percent slopes	Rossi	85	Basin floor	Yes	2B3, 4
	Pozo	5	---	Yes	2B3
	Temple	5	---	Yes	2B3, 4
RrA: Rossi silt loam, slightly saline-alkali, 0 to 1 percent slopes	Rossi	85	Basin floor	Yes	2B3, 4
	Pozo	5	---	Yes	2B3
	Temple	5	---	Yes	2B3, 4
RsA: Rossi silt loam, moderately saline-alkali, 0 to 1 percent slope	Rossi	85	Basin floor	Yes	2B3, 4
	Pozo	5	---	Yes	2B3
	Temple	5	---	Yes	2B3, 4

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
RtA: Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes	Rossi	85	Basin floor	Yes	2B3, 4
	Pozo	5	—	Yes	2B3
	Temple	5	---	Yes	2B3, 4
SaA: San Joaquin sandy loams, 0 to 3 percent slopes	Alamo	4	---	Yes	2B3
	Unnamed ponded	1	---	Yes	3
SbA: San Joaquin-Alamo complex, 0 to 3 percent slopes	Alamo	4	---	Yes	2B3
	Unnamed ponded	1	---	Yes	3
ScB: San Joaquin-Whitney sandy loams, 0 to 8 percent slopes	Unnamed ponded	1	---	Yes	3
TaA: Temple clay, 0 to 1 percent slopes	Temple	85	Basin floor	Yes	2B3, 4
	Columbia	5	---	Yes	4
	Foster	5	---	Yes	2B3
	Rossi	5	---	Yes	2B3, 4
TbA: Temple clay loam, 0 to 1 percent slopes	Temple	85	Basin floor	Yes	2B3, 4
	Columbia	5	---	Yes	4
	Foster	5	---	Yes	2B3
	Rossi	5	---	Yes	2B3, 4

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
TcA: Temple clay loam, slightly saline, 0 to 1 percent slopes	Temple	85	Basin floor	Yes	2B3, 4
	Columbia	5	—	Yes	4
	Foster	5	---	Yes	2B3
	Rossi	5	---	Yes	2B3, 4
TdA: Temple loam, 0 to 1 percent slopes	Temple	85	Basin floor	Yes	2B3, 4
	Columbia	5	---	Yes	4
	Foster	5	---	Yes	2B3
	Rossi	5	---	Yes	2B3, 4
TeA: Temple loam, slightly saline, 0 to 1 percent slopes	Temple	85	Basin floor	Yes	2B3, 4
	Columbia	5	---	Yes	4
	Foster	5	---	Yes	2B3
	Rossi	5	---	Yes	2B3, 4
TmA: Traver loam, slightly saline-alkali, 0 to 1 percent slopes	Playas	1	---	Yes	3
TnA: Traver loam, moderately saline alkali, 0 to 1 percent slopes	Playas	1	---	Yes	3
ToA: Traver loam, strongly saline-alkali, 0 to 1 percent slopes	Playas	1	---	Yes	3
TpA: Traver-Chino complex, slightly saline alkali, 0 to 1 percent slopes	Chino	40	Basin floor	Yes	2B3
	Playas	1	---	Yes	3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
TrA: Traver-Chino complex, moderately saline-alkali, 0 to 1 percent slopes	Chino	40	Basin floor	Yes	2B3
	Playas	1	---	Yes	3
TsA: Traver, Fresno, and El Peco fine sandy loams, moderately saline alkali, 0 to 1 percent slopes	Playas	1	---	Yes	3
TtA: Traver, fresno, el peco fine sandy loams, strongly saline-alkali, 0 to 1 percent slopes	Playas	1	---	Yes	3
TxA: Tujunga loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	Unnamed	1	---	Yes	4
TzB: Tujunga and Hanford soils, channeled, 0 to 8 percent slopes	Hanford	40	Alluvial fan	Yes	4
	Tujunga	40	Flood plain	Yes	4
VaA: Visalia fine sandy loam, 0 to 1 percent slopes	Visalia	85	Alluvial fan	Yes	2A, 4
VdA: Visalia sandy loam, 0 to 3 percent slopes	Visalia	85	Alluvial fan	Yes	2A, 4
VnA: Visalia sandy loam, moderately deep over sand, 0 to 3 percent slopes	Visalia	85	Alluvial fan	Yes	2A, 4
WfB: Whitney fine sandy loam, 3 to 8 percent slopes	Unnamed ponded	1	---	Yes	3
WfC: Whitney fine sandy loam, 8 to 15 percent slopes	Unnamed ponded	1	---	Yes	3
WmA: Whitney loam, 0 to 3 percent slopes	Unnamed ponded	1	---	Yes	3
WmB: Whitney loam, 3 to 8 percent slopes	Unnamed ponded	1	---	Yes	3
WmC: Whitney loam, 8 to 15 percent slopes	Unnamed ponded	1	---	Yes	3

Hydric Soils

Madera Area, California

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
WoC: Whitney and Rocklin gravelly sandy loams, 3 to 15 percent slope	Unnamed ponded	1	---	Yes	3
WrB: Whitney and Rocklin sandy loams, 3 to 8 percent slopes	Unnamed ponded	1	---	Yes	3
WrC: Whitney and Rocklin sandy loams, 8 to 15 percent slopes	Unnamed ponded	1	---	Yes	3
WtB: Whitney-Trigo fine sandy loams, 3 to 8 percent slopes	Unnamed ponded	1	---	Yes	3
WuA: Wunjey very fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	Unnamed	1	---	Yes	3
WvA: Wunjey very fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes	Unnamed	1	---	Yes	3
WxA: Wunjey very fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	Unnamed	1	---	Yes	3
WyB: Wunjey very fine sandy loam, strongly saline-alkali, channeled, 1 to 8 percent slopes	Unnamed	1	---	Yes	3, 4

Explanation of hydric criteria codes:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
    - A. are somewhat poorly drained and have a water table at the surface (0.0 feet) during the growing season, or
    - B. are poorly drained or very poorly drained and have either:
        - 1.) a water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or
        - 2.) a water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or
        - 3.) a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.
3. Soils that are frequently ponded for long or very long duration during the growing season.
4. Soils that are frequently flooded for long or very long duration during the growing season.

This table lists the map unit components that are rated as hydric soils in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).
The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that

Hydric Soils

have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 1998) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 2002).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

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APPENDIX C.

USACE DATA FORMS: ROUTINE DETERMINATION FOR THE BROWN PROPERTY

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
1

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: Non-native Grassland Perimeter
Transect ID :
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Bromus californicus*	H	NOL	9.		
2. *Bromus diandrus*	H	NI	10.		
3. *Avena sp.*	H	---	11.		
4. *Sinapis arvensis*	H	NOL	12.		
5. *Malva parviflora*	H	NOL	13.		
6. *Erodium moschatum*	H	NOL	14.		
7. *Lolium multiflorum*	H	NI	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0/7 = 0%

Remarks:
- Non-native grasses and ruderal species remain around the perimeter of property.
- Vegetation expected to be representative of fields on site, which were recently tilled at the time of the delineation.

HYDROLOGY

Recorded Data (describe in Remarks):
Stream, Lake, or Tide Gauge
Aerial Photographs
Other
No Recorded Data Available

Field Observation:
Depth of Surface Water: none (in.)
Depth to Free Water in Pit: >16 (in.)
Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
Inundated
Saturated
Water Marks
Drift Lines
Sediment Deposits
Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
Oxidized Root Channels in Upper 12 in.
Water-Stained Leaves
Local Soil Survey Data
FAC-Neutral Test
Other (Explain in Remarks)

Remarks:
- No hydrologic indicators observed except very slight ditch/swale topography that does not drain into any particular catchment system.

Sample Number
1

SOILS

Map Unit Name
(Series and Phase) San Joaquin sandy loam, 0-3%

Taxonomy (Subgroup):

Drainage Class: moderately well drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16	Ap	10 YR 3/2	n/a	none	sandy loam

Hydric Soil Indicators:

Histosol
Histic Epipedon
Sulfidic Odor
Aquic Moisture Regime
Reducing Conditions
Gleyed or Low-Chroma colors

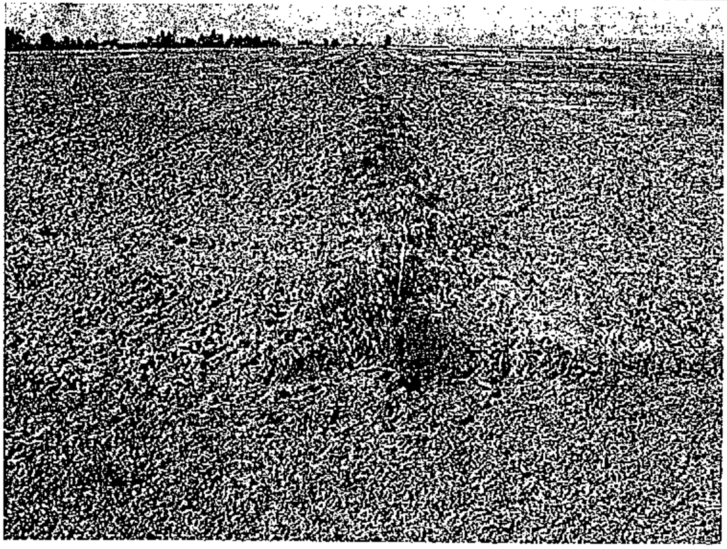
Concretions
High Organic Content in Surface Layer in Sandy Soils
Organic Streaking in Sandy Soils
Listed on Local Hydric Soils List
n/a Listed on National Hydric Soils List
Other (Explain in Remarks)

Remarks:
- Soil not considered hydric since the depth to hardpan is expected to be too deep to result in extended saturation from perched surface water.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	Yes [✓ No]
Wetland Hydrology Present?	Yes [✓ No]
Hydric Soils Present?	Yes [✓ No]
Is this Sampling Point Within a Wetland?	Yes [✓ No]

Remarks:
- Sample point located in an area representative of the upland agricultural fields covering most of the site; these fields have been recently tilled but were previously dominated by non-native grasses with some dryland crop species.
- Various strips of agricultural land were avoided during tillage operations in order to avoid damage to underground irrigation pipes.



DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
2

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: Fresh Water Emergent Wetland in Schmidt Creek Low-flow Channel
Transect ID :
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Eleocharis macrostachya*	H	OBL	9.		
2. *Rumex crispus*	H	FACW-	10.		
3. *Juncus balticus*	H	OBL	11.		
4. *Rorippa nasturtium-aquaticum*	H	OBL	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/4 = 100%

Remarks: • Fresh water emergent species scattered to patchy along this north-south reach of Schmidt Creek below OHW mark.
• Polygonum polystachyum occurs within creek, but is not dominant.

HYDROLOGY

Recorded Data (describe in Remarks):
Stream, Lake, or Tide Gauge
Aerial Photographs
Other
No Recorded Data Available

Field Observation:

Depth of Surface Water: none (in.)
Depth to Free Water in Pit: 6 (in.)
Depth to Saturated Soil 2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

Inundated
X Saturated
X Water Marks
X Drift Lines
X Sediment Deposits
X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
Oxidized Root Channels in Upper 12 in.
Water-Stained Leaves
Local Soil Survey Data
FAC-Neutral Test
X Other (Explain in Remarks)

Remarks: • Soil is still highly saturated due to presence of underlying hardpan 5 days following last significant rainfall.

Sample Number

2

SOILS

Map Unit Name
(Series and Phase) San Joaquin sandy loam, 0-3%

Taxonomy (Subgroup):

Drainage Class: moderately well drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6	A	10 YR 3/2	n/a	none	loamy sand
6+	Cm	7.5 YR 3/4	n/a	none	hardpan

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma colors

___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
X Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:
- Depth to hardpan varies between 2 and 12 inches in this reach of Schmidt Creek, depending on sedimentation.
- Hardpan lies approximately 2 feet below surrounding grade.
- Soil is considered hydric based on capacity of hardpan to cause ponding.

WETLAND DETERMINATION

(Circle)

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:
- Sample point located approximately 100 feet upstream of Road 23 Pump Station along creek.
- Despite the flash hydrology that occurs in this creek and its capacity to cause scouring of wetland vegation, the presence of perennial hydrophytes suggests emergent wetland is constantly established even if periodic scouring occurs.
- Fresh water wetland occurring below OHW mark.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number: 3

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No

Community ID: Fresh Water Emergent Wetland in Schmidt Creek Low-flow Channel

Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]

Transect ID :

Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Juncus balticus*	H	OBL	9.		
2. *Salix exigua*	S	OBL	10.		
3. *Rorippa nasturtium-aquaticum*	H	OBL	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 3/3 = 100%

Remarks:
- Fresh water emergent species scattered to patchy along this north-south reach of Schmidt Creek below OHW mark.
- Polygonum polystachyum occurs within creek, but is not dominant.
- Presence of Salix exigua here is isolated and not forming a distinct riparian habitat.

HYDROLOGY

___ Recorded Data (describe in Remarks):
  ___ Stream, Lake, or Tide Gauge
  ___ Aerial Photographs
  ___ Other
___ No Recorded Data Available

Field Observation:

Depth of Surface Water: none (in.)
Depth to Free Water in Pit: 14 (in.)
Depth to Saturated Soil 2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
___ Inundated
X Saturated
X Water Marks
X Drift Lines
X Sediment Deposits
X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 in.
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
X Other (Explain in Remarks)

Remarks:
- Soil is still highly saturated due to presence of underlying hardpan 5 days following last significant rainfall.

Sample Number
3

SOILS

Map Unit Name
(Series and Phase) Atwater loamy sand, moderately deep over hardpan, 0-3%
Taxonomy (Subgroup):

Drainage Class: excessively drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	O	10 YR 2/1	n/a	none	peaty sand
3-16	A	10 YR 4/2	n/a	none	loamy sand

Hydric Soil Indicators:

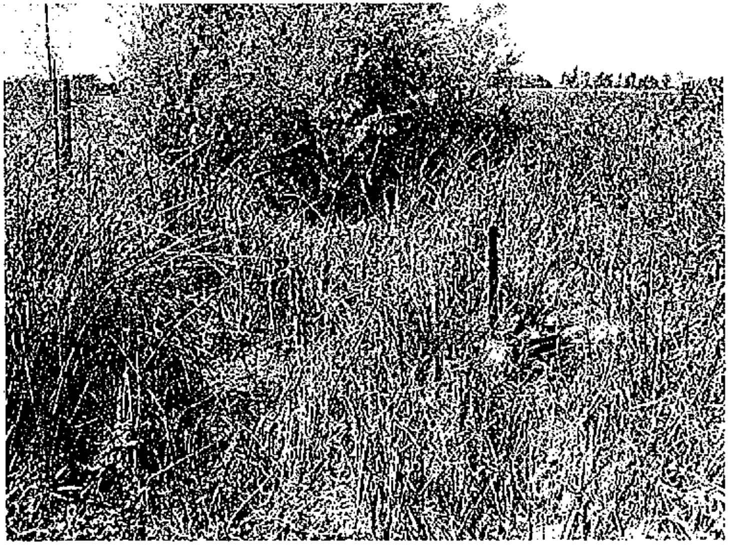
	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions	X	Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks:
- Presence of humus layer at surface here due to density of fresh water emergent species and annual dieback.
- Depth to hardpan deeper here compared to Sample Point 2. Depth due to increased sedimentation upstream of sandbar willow patch.
- Hardpan lies approximately 2 feet below surrounding grade.
- Soil is considered hydric based on capacity of hardpan to cause ponding.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	[✓ Yes] No
Wetland Hydrology Present?	[✓ Yes] No
Hydric Soils Present?	[✓ Yes] No
Is this Sampling Point Within a Wetland?	[✓ Yes] No

Remarks:
- Sample point located 300 feet upsream of Road 23 Pump Station.
- Despite the flash hydrology that occurs in this creek and its capacity to cause scouring of wetland vegation, the presence of perennial hydrophytes suggests emergent wetland is constantly established even if periodic scouring occurs.
- Fresh water wetland occurring below OHW mark.



DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number: 4

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: Non-native Grassland
Transect ID :
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lolium multiflorum*	H	NI	9.		
2. *Hordeum marinum ssp. gussoneanum*	H	FAC	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 1/2 = 50%

Remarks: • Mediterranean barley covering large area of single, remaining field in the process of being plowed.

HYDROLOGY

___ Recorded Data (describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observation:

Depth of Surface Water: none (in.)
Depth to Free Water in Pit: >16 (in.)
Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
___ Inundated
___ Saturated
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 in.
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
X Other (Explain in Remarks)

Remarks: • Algal matting occurs throughout this field, possibly due to temporary ponding above hardpan following significant rainfall events, but the field otherwise has no discernable hydrologic indicators.

Sample Number
4

SOILS

Map Unit Name
(Series and Phase) Atwater loamy sand, moderately deep over hardpan, 0-3%
Taxonomy (Subgroup):

Drainage Class: excessively drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6	Ap	10 YR 3/2	n/a	none	sandy loam
6-18+	A	10 YR 4/2	n/a	none	loamy sand

Hydric Soil Indicators:

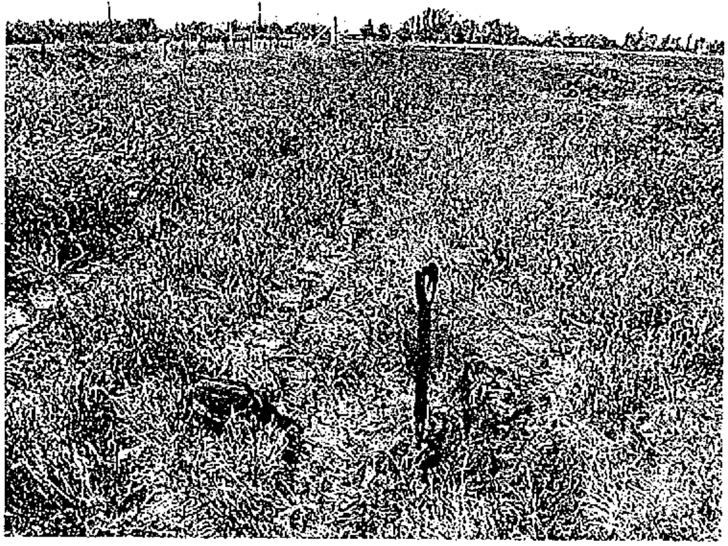
	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime	n/a	Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks:
- Soil not considered hydric since the depth to hardpan is expected to be too deep to result in extended saturation from perched surface water.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	Yes [✓ No]
Wetland Hydrology Present?	Yes [✓ No]
Hydric Soils Present?	Yes [✓ No]
Is this Sampling Point Within a Wetland?	Yes [✓ No]

Remarks:
- Sample point located at edge of unplowed field dominated by rye and barley not reminiscent of any wetland habitat.
- Underlying hardpan is sufficiently deep that extended ponding is highly limited.



DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
5

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No

Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: Schmidt Creek Low-flow Channel
Transect ID :
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lythrum portula*	H	NOL	9.		
2. *Mimulus guttatus*	H	OBL	10.		
3. *Plagiobothrys undulatus*	H	FACW+	11.		
4. *Eleocharis macrostachya*	H	OBL	12.		
5. *Polygonum polystachyum*	H	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). n/a, see remarks

Remarks: • None of the hydrohytic species occurring here are dominant or otherwise forming any contiguous wetland habitat.

HYDROLOGY

____ Recorded Data (describe in Remarks):
____ Stream, Lake, or Tide Gauge
____ Aerial Photographs
____ Other
____ No Recorded Data Available

Field Observation:

Depth of Surface Water: 24-0 (in.)

Depth to Free Water in Pit: 10 (in.)

Depth to Saturated Soil 2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

X Inundated
X Saturated
X Water Marks
X Drift Lines
X Sediment Deposits
X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
____ Oxidized Root Channels in Upper 12 in.
____ Water-Stained Leaves
____ Local Soil Survey Data
____ FAC-Neutral Test
____ Other (Explain in Remarks)

Remarks: • Isolated ponding in this reach of Schmidt Creek due to perched surface water remaining after upstream flows have ceased since last significant rainfall.
• Algal matting conspicuously absent here.

Sample Number
5

SOILS

Map Unit Name
(Series and Phase) Atwater loamy sand, moderately deep over hardpan, 0-3%
Taxonomy (Subgroup):

Drainage Class: excessively drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	C	10 YR 4/1	n/a	none	coarse sand
2-16	C	10 YR 6/1	n/a	none	coarse sand
16+	Cm	7.5 YR 3/4	n/a	none	hardpan

Hydric Soil Indicators:

	Histosol
	Histic Epipedon
X	Sulfidic Odor
X	Aquic Moisture Regime
X	Reducing Conditions
	Gleyed or Low-Chroma colors

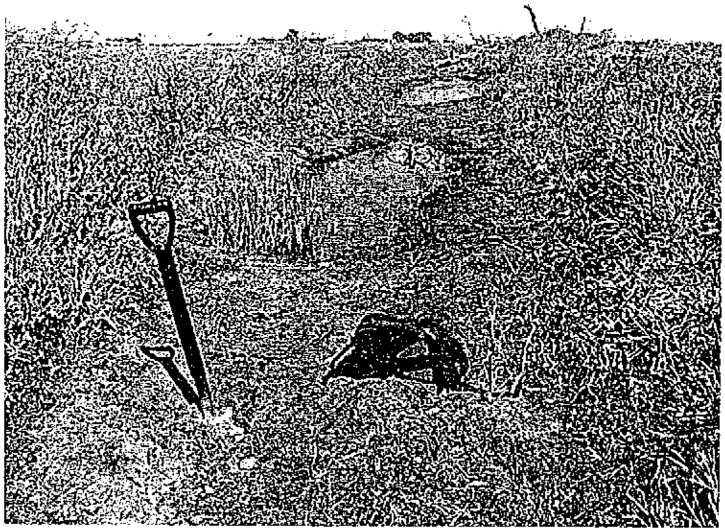
	Concretions
	High Organic Content in Surface Layer in Sandy Soils
	Organic Streaking in Sandy Soils
	Listed on Local Hydric Soils List
X	Listed on National Hydric Soils List
	Other (Explain in Remarks)

Remarks: • This reach of creek bed is subject to longer-duration saturation and ponding, allowing above hydric conditions to develop, but wetland habitat is conspicuously absent, possibly due to low fertility of sands deposited in creek.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	Yes [✓ No]
Wetland Hydrology Present?	[✓ Yes] No
Hydric Soils Present?	[✓ Yes] No
Is this Sampling Point Within a Wetland?	Yes [✓ No]

Remarks:
- Sample point is located in reach of creek with isolated ponding.
- Hydrophytes are too sparse and scattered to form distinct wetland habitat in this reach of Schmidt Creek.
- There is little evidence that fresh water emergent species have been established here due to paucity of dieback and scoured vegetation. This reach of creek is almost entirely bare with a sandy bottom.



DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
6

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: Non-native Grassland Depression
Transect ID :
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). none

Remarks:
- Sample point area is completely devoid of vegation except for Sinapsis arvensis dieback, which is expected to become reestablished later in the season.

HYDROLOGY

___ Recorded Data (describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observation:

Depth of Surface Water: none (in.)

Depth to Free Water in Pit: 16 (in.)

Depth to Saturated Soil 6 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- X Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks:
- Hydrology attributable to perching of incident rainfall above underlying hardpan in an isolated depression approximately 1-foot above the elevation of the adjacent creek.
- Extensive algal matting here suggests extending ponding occurred early during season.

SOILS

Sample Number
6

Map Unit Name
(Series and Phase) Atwater loamy sand, moderately deep over hardpan, 0-3%
Taxonomy (Subgroup):

Drainage Class: excessively drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4	Ap	10 YR 3/2	n/a	none	loamy sand
4-16+	C	2.5 Y 4/2	n/a	none	coarse sand

Hydric Soil Indicators:

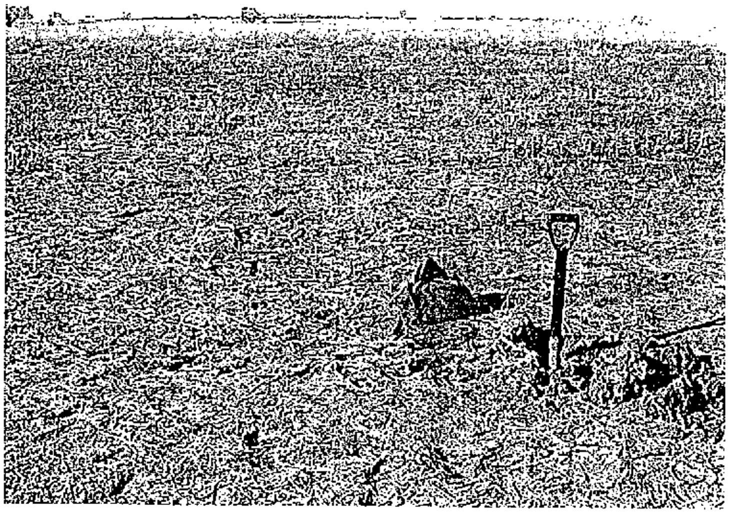
	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions	X	Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks:
- Hydric conditions here similar to those of Sample Point 5.
- This area of ponding is visible in the 1962 soil survey photo of the property.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	Yes [✓ No]
Wetland Hydrology Present?	[✓ Yes] No
Hydric Soils Present?	[✓ Yes] No
Is this Sampling Point Within a Wetland?	Yes [✓ No]

Remarks:
- Sample point located in an area of Atwater soil slightly lower in elevation than surrounding grade. Lowering of the grade here would result in ponding similar to that currently occurring in the creek.
- Extended duration of saturation in this area combined with infertility of sandy solum likely precludes establishment of wetland vegetation.
- This depressional area has apparently escaped plowing because its texture is unsuitable for tillage and likely remains saturated well into growing season.



DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
7

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No

Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: Fresh Water Emergent Wetland in Schmidt Creek Low-flow Channel
Transect ID :
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Eleocharis macrostachya*	H	OBL	9.		
2. *Rumex crispus*	H	FACW-	10.		
3. *Hordeum marinum ssp. gussoneanum*	H	FAC	11.		
4. *Polygonum polystachyum*	H	FAC	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/4 = 100%

Remarks:
- Fresh water emergent vegetation is semi-contiguous within the upstream east-west reach of the creek beginning at a small thicket of sandbar willow and Fremont cottonwood growing in the creek bed.
- Willows and cottonwood are not forming contiguous habitat.

HYDROLOGY

____ Recorded Data (describe in Remarks):
____ Stream, Lake, or Tide Gauge
____ Aerial Photographs
____ Other
____ No Recorded Data Available

Field Observation:

Depth of Surface Water: 12-0 (in.)

Depth to Free Water in Pit: 0 (in.)

Depth to Saturated Soil 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
X Inundated
X Saturated
X Water Marks
X Drift Lines
X Sediment Deposits
X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
____ Oxidized Root Channels in Upper 12 in.
____ Water-Stained Leaves
____ Local Soil Survey Data
____ FAC-Neutral Test
____ Other (Explain in Remarks)

Remarks:
- Isolated ponding in this reach of Schmidt Creek due to perched surface water remaining after upstream flows have ceased since last significant rainfall.

Sample Number

7

SOILS

Map Unit Name
(Series and Phase) Atwater loamy sand, moderately deep over hardpan, 0-3%
Taxonomy (Subgroup):

Drainage Class: excessively drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10 YR 3/2	n/a	none	loamy sand
2-10	C	2.5 YR 4/2	n/a	none	coarse sand
10+	Cm	7.5 YR 3/4	n/a	none	hardpan

Hydric Soil Indicators:

Histosol
Histic Epipedon
X Sulfidic Odor
X Aquic Moisture Regime
X Reducing Conditions
Gleyed or Low-Chroma colors

Concretions
High Organic Content in Surface Layer in Sandy Soils
Organic Streaking in Sandy Soils
Listed on Local Hydric Soils List
X Listed on National Hydric Soils List
Other (Explain in Remarks)

Remarks: • Depth to hardpan more shallow in this reach of Schmidt Creek, and hardpan is entirely exposed in some areas.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	[✓ Yes] No
Wetland Hydrology Present?	[✓ Yes] No
Hydric Soils Present?	[✓ Yes] No
Is this Sampling Point Within a Wetland?	[✓ Yes] No

Remarks: • Sample point located just upstream of willow/cottonwood thicket, but is representative of most of the upstream east-west reach of the creek, which is variably dominated by fresh water emegent wetlands within the low-flow channel.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
8

Project/Site: Brown Property
Applicant/Owner: Analytical Environmental Services
Investigator: A. Dilworth

Date: April 13, 2005
County: Madera
State: California

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situations?) Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: Seasonal Wetland within Historic Creek Course
Transect ID :
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lolium multiflorum*	H	NI	9.		
2. *Hordeum marinum ssp. gussoneanum*	H	FAC	10.		
3. *Plagiobothrys stipitatus*	H	OBL	11.		
4. *Juncus bufonius*	H	FACW+	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 3/4 = 75%

Remarks:
- Former creek course is variable dominated by Lolium multiflorum and Hordeum marinum ssp. gussoneanum with herbaceous wetland species at upper edge of saturated/inundated areas.
- Rumex crispus, Mimulus guttatus, and Lythrum portula all common here, but not dominant.

HYDROLOGY

Recorded Data (describe in Remarks):
Stream, Lake, or Tide Gauge
Aerial Photographs
Other
No Recorded Data Available

Field Observation:

Depth of Surface Water: 2-0 (in.)
Depth to Free Water in Pit: 10 (in.)
Depth to Saturated Soil 0-2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
X Inundated
X Saturated
X Water Marks
Drift Lines
X Sediment Deposits
X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
Oxidized Root Channels in Upper 12 in.
Water-Stained Leaves
Local Soil Survey Data
FAC-Neutral Test
X Other (Explain in Remarks)

Remarks:
- Hydrology attributable to perching of incident rainfall above underlying hardpan in historic creek watercourse approximately 1-foot above the elevation of the adjacent creek.

Sample Number

8

SOILS

Map Unit Name
(Series and Phase) Tujunga loamy sand, 0-3%

Taxonomy (Subgroup):

Drainage Class: excessively drained
Field Observations:
Confirm Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-20	C	10 YR 3/2	n/a	none	coarse sand

Hydric Soil Indicators:

Histosol
Histic Epipedon
X Sulfidic Odor
X Aquic Moisture Regime
X Reducing Conditions
Gleyed or Low-Chroma colors

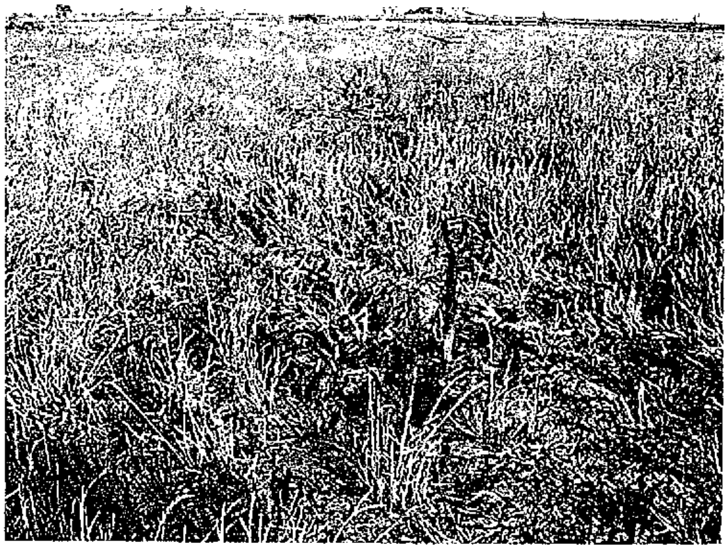
Concretions
High Organic Content in Surface Layer in Sandy Soils
Organic Streaking in Sandy Soils
Listed on Local Hydric Soils List
X Listed on National Hydric Soils List
Other (Explain in Remarks)

Remarks:
- Hydric conditions here similar to those of Sample Point 5.
- Historic creek course is visible in the 1962 soil survey photo of the property.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	[✓ Yes] No
Wetland Hydrology Present?	[✓ Yes] No
Hydric Soils Present?	[✓ Yes] No
Is this Sampling Point Within a Wetland?	[✓ Yes] No

Remarks:
- Sample point located in historic watercourse, which is still evident since the area is unplowable due to soil texture and extended saturation.
- Sample point area is where former creek terminated as a wash on site.
- Extended saturation and inundation combined with soil texture preclude establishment of wetland species along lowest elevation of watercourse.



APPENDIX D.

PHOTOGRAPHS OF THE BROWN PROPERTY

Photo 1. West view of Schmidt Creek channel, along the east-west southern property boundary. The creek bed in this reach of the channel consists of deep sand deposited over an underlying hardpan resulting in perched water with 1 foot of the creek bed.

Photo 2. Close up view of the rusty brown iron-silica hardpan underlying most of the project site. The photo was taken within the Schmidt Creek channel, where the depth to this hardpan varies with the sand deposition.

Photo 3. West view of the Schmidt Creek channel, from its upstream end. The hardpan underlying the property is exposed at this location, causing isolated ponding within the channel. Note the freshwater emergent vegetation growing in an area of sand deposition just downstream.

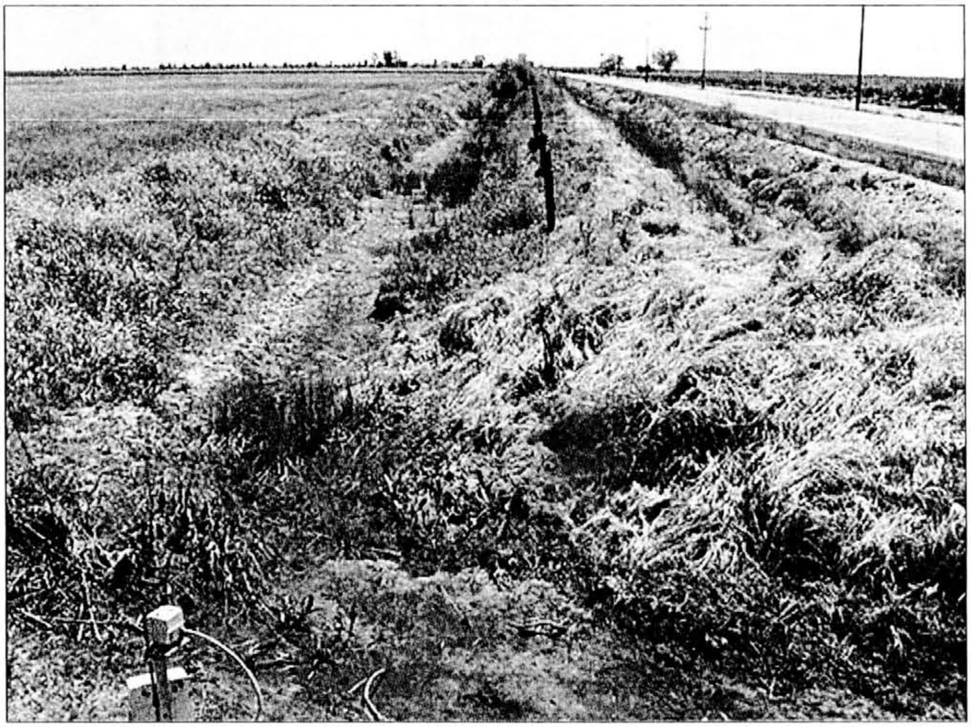


Photo 4. South view of the Schmidt Creek channel (left) and the adjacent Airport Ditch (right), along Road 23. The Airport Ditch is siphoned under the creek through a buried concrete in the right hand side of the photo. Thus, the two features are not contiguous. Note the freshwater emergent vegetation growing in an area of sand deposition just upstream.

Photo 5. Southeast view of the Schmidt Creek channel as it enters the culverts under Road 23. The headwall of the concrete vault siphon of the Airport Ditch is located in the upper-middle right hand corner of the photo.

Photo 6. Southeast view of the Schmidt Creek channel, along the east-west southern property boundary. Note the freshwater emergent vegetation and isolated ponding growing in an area of sand deposition throughout this upstream reach of the creek.

Photo 7. Southwest view of the Southeast view of the Schmidt Creek channel, along the east-west southern property boundary. The freshwater emergent vegetation in the channel is a continuation of the wetlands pictures in Photo 6. Note the isolated cottonwood and willow trees in the background. These trees do not form distinct riparian habitat.

Photo 8. Northwest view of the former watercourse of Schmidt Creek. The edges of the lo-flow channel are dominated by seasonal wetland habitat. The depth to the underlying hardpan has remained shallow in this area, providing adequate hydrology for wetland establishment due to perching of incident rainfall.

Photo 9. Close up view of soil pit of sample point 3, showing perched water and saturated sands which support low freshwater emergent marsh habitat in various reaches of the creek.

Photo 10. North view of the off-site confluence of the Schmidt Creek channel (right) and Dry Creek (left). Dry Creek is a perennial stream that ultimately flows into the Fresno River.

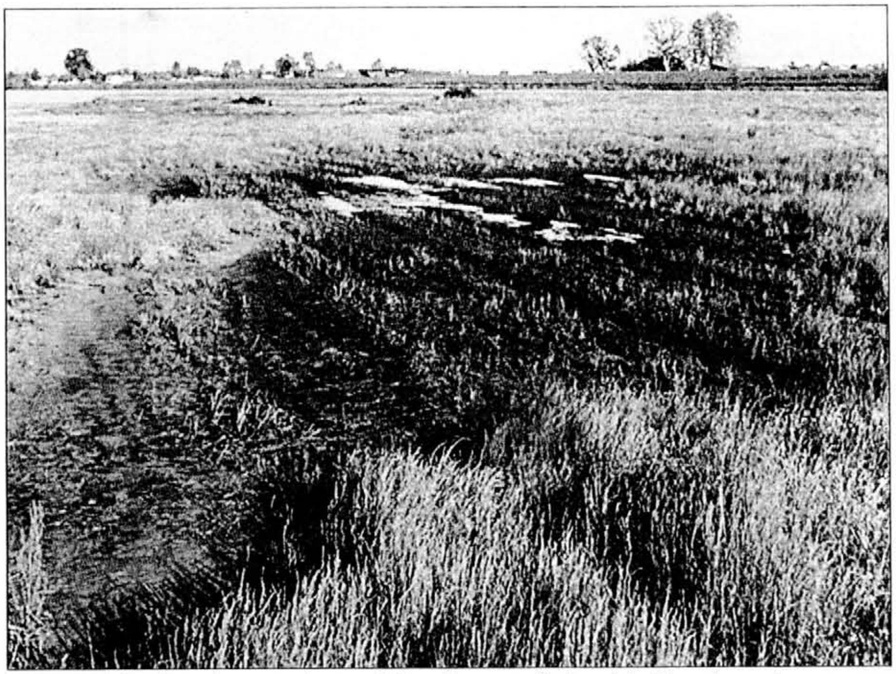


Photo 11. Southeast view of the former Schmidt Creek watercourse. The low-flow channel is no longer discernable, but the depth to the underlying hardpan remains shallow in this area and the perching of incident rainfall results in extended ponding, inhibiting vegetative growth until much later in the season. Such areas were considered areas of potential 'other water' jurisdiction.

Photo 12. Northwest view of an area of extensive sand deposition (wash), adjacent to the former Schmidt Creek watercourse. This area was completely saturated at the time of the delineation, due to the perching of incident rainfall above the shallow hardpan. Extended ponding is expected to occur in this area during winter. This area was considered potential 'other water' jurisdiction.

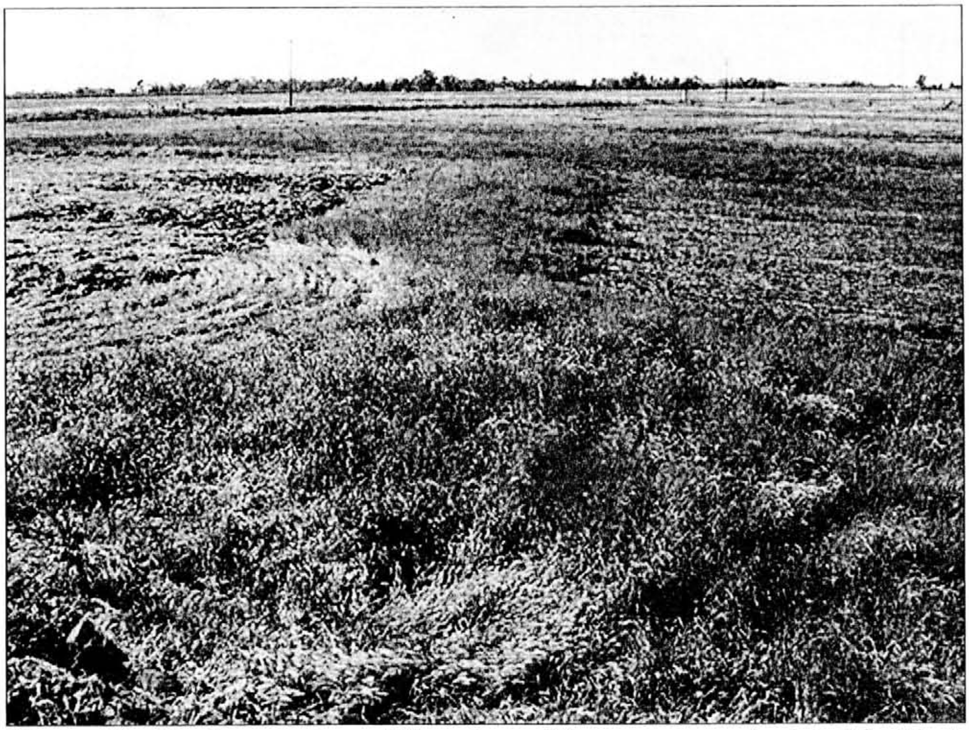


Photo 13. Northwest view of the edge of the same area depicted in Photo 12. Note the break in tillage separating the saturated wash from the adjacent upland. The saturation of the wash prohibits tillage until much later in the year.

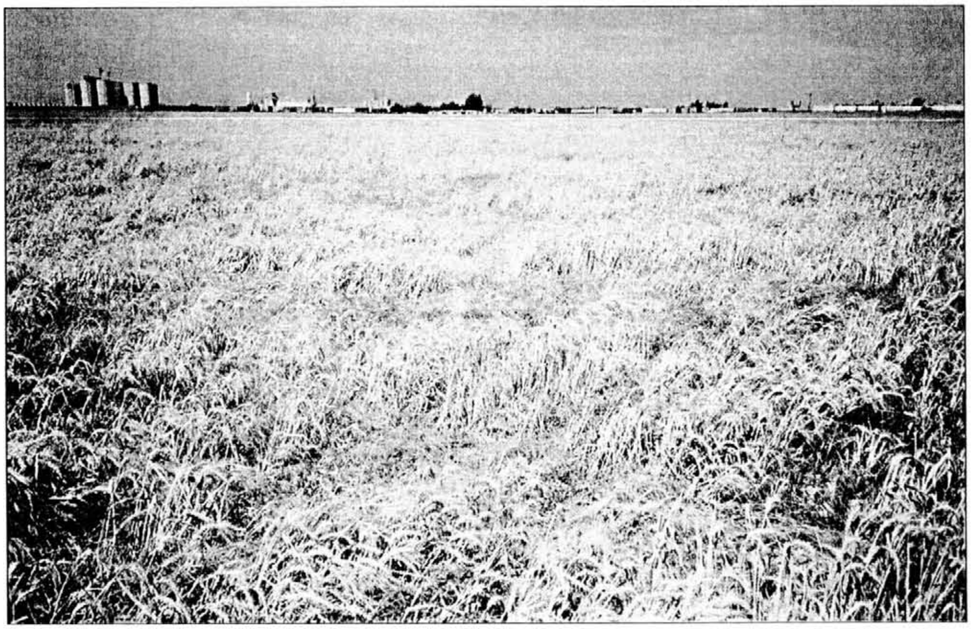


Photo 14. Northeast view of the dryland wheat crop, which is planted to the site later in the spring. This photo was taken in June 2004.

Photo 15. North view of sample point 4. Temporary ponding capable of supporting seasonal wetland vegetation or algal matting may occur in isolated upland areas such as this one where the depth to the hardpan is slightly reduced due to uneven tillage from year to year. These areas are not expected to persist and were not considered potential wetland.

APPENDIX G

California Natural Diversity Data Base, U.S. Fish & Wildlife Service, and California Native Plant Society Lists: North Fork Site

California Department of Fish and Game
Natural Diversity Database
Selected Elements by Scientific Name
Special-status species within the "Cascadel Point, CA" 7.5' USGS quadrangle and the eight surrounding quads: Shuteye Peak, Bass Lake, Auberry, Mammoth Pool Dam, North Fork, Millerton Lake East, Musick Mtn., and Shaver Lake

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Accipiter gentilis northern goshawk	ABNKC12060			G5	S3	SC
2	Actinemys marmorata western pond turtle	ARAAD02030			G3G4	S3	SC
3	Antrozous pallidus pallid bat	AMACC10010			G5	S3	SC
4	Aquila chrysaetos golden eagle	ABNKC22010			G5	S3	SC
5	Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
6	Calasellus longus An isopod	ICMAL34020			G1G2	S1S2	
7	Calyptridium pulchellum Mariposa pussypaws	PDPOR09060	Threatened		G1	S1.1	1B.1
8	Camissonia sierrae ssp. alticola Mono Hot Springs evening-primrose	PDONA031H1			G3T2	S2.2	1B.2
9	Carpenteria californica tree-anemone	PDHDR04010		Threatened	G2	S2.2	1B.2
10	Castilleja campestris ssp. succulenta succulent owl's-clover	PDSCR0D3Z1	Threatened	Endangered	G4?T2	S2.2	1B.2
11	Central Valley Drainage Hardhead/Squawfish Stream	CARA2443CA			G?	SNR	
12	Central Valley Drainage Rainbow Trout/Cyprinid Stream	CARA2422CA			G?	SNR	
13	Central Valley Drainage Resident Rainbow Trout Stream	CARA2421CA			G?	SNR	
14	Chrysis tularensis A cuckoo wasp	IIHYM72010			G1G2	S1S2	
15	Collomia rawsoniana Rawson's flaming trumpet	PDPLM02080			G2	S2.2	1B.2
16	Corynorhinus townsendii Townsend's big-eared bat	AMACC08010			G4	S2S3	SC
17	Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
18	Didymodon norrisii Norris' beard moss	NBMUS2C0H0			G2G3	S2.2	2.2
19	Empidonax traillii willow flycatcher	ABPAE33040		Endangered	G5	S1S2	
20	Eryngium spinosepalum spiny-sepaled button-celery	PDAPI0Z0Y0			G2	S2.2	1B.2
21	Erythronium pluriflorum Shuteye Peak fawn lily	PMLIL0U0Q0			G1	S1.3	1B.3
22	Euderma maculatum spotted bat	AMACC07010			G4	S2S3	SC

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
23 Eumops perotis californicus western mastiff bat	AMACD02011			G5T4	S3?	SC
24 Falco mexicanus prairie falcon	ABNKD06090			G5	S3	SC
25 Fissidens aphelotaxifolius brook pocket moss	NBMUS2W290			GU	S1.2	2.2
26 Gratiola heterosepala Boggs Lake hedge-hyssop	PDSCR0R060		Endangered	G3	S3.1	1B.2
27 Haliaeetus leucocephalus bald eagle	ABNKC10010	Delisted	Endangered	G5	S2	
28 Hulsea brevifolia short-leaved hulsea	PDAST4Z020			G3	S3.2	1B.2
29 Hydroporus leechi Leech's skyline diving beetle	IICOL55040			G1?	S1?	
30 Ivesia unguiculata Yosemite ivesia	PDROS0X0N0			G3	S3.2	4.2
31 Lepidurus packardi vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
32 Leptosiphon serrulatus Madera leptosiphon	PDPLM09130			G1?	S1?	1B.2
33 Lewisia disepala Yosemite lewisia	PDPOR04060			G2	S2.2	1B.2
34 Linderiella occidentalis California linderiella	ICBRA06010			G3	S2S3	
35 Lupinus citrinus var. citrinus orange lupine	PDFAB2B103			G2T2	S2.2	1B.2
36 Lytta molesta molestan blister beetle	IICOL4C030			G2	S2	
37 Martes americana sierrae Sierra marten	AMAJF01014			G5T3T4	S3S4	
38 Martes pennanti (pacifica) DPS Pacific fisher	AMAJF01021	Candidate		G5	S2S3	SC
39 Mimulus gracilipes slender-stalked monkeyflower	PDSCR1B1C0			G3	S3.2	1B.2
40 Myotis evotis long-eared myotis	AMACC01070			G5	S4?	
41 Myotis thysanodes fringed myotis	AMACC01090			G4G5	S4	
42 Myotis volans long-legged myotis	AMACC01110			G5	S4?	
43 Myotis yumanensis Yuma myotis	AMACC01020			G5	S4?	
44 Northern Basalt Flow Vernal Pool	CTT44131CA			G3	S2.2	
45 Oravelia pege Dry Creek cliff strider bug	IIHEM14010			G1	S1	

Special-status species within the "Cascadel Point, CA" 7.5' USGS quadrangle and the eight surrounding quads: Shuteye Peak, Bass Lake, Auberry, Mammoth Pool Dam, North Fork, Millerton Lake East, Musick Mtn., and Shaver Lake

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
46	Orcuttia inaequalis San Joaquin Valley orcutt grass	PMPOA4G060	Threatened	Endangered	G2	S2.1	1B.1
47	Pandion haliaetus osprey	ABNKC01010			G5	S3	SC
48	Rana boylii foothill yellow-legged frog	AAABH01050			G3	S2S3	SC
49	Rana sierrae Sierra Nevada yellow-legged frog	AAABH01340	Candidate		G1	S1	SC
50	Strix nebulosa great gray owl	ABNSB12040		Endangered	G5	S1	
51	Viburnum ellipticum oval-leaved viburnum	PDCPR07080			G5	S2.3	2.3
52	Viola pinetorum ssp. grisea grey-leaved violet	PDVIO04431			G4G5T1	S1.3	1B.3
53	Vulpes vulpes necator Sierra Nevada red fox	AMAJA03012		Threatened	G5T3	S1	

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

v7-07d 10-18-07

Status: search results - Wed, Jan. 16, 2008 12:19 c

{QUADS_123} =~ m/397B|417C|417D|398A|398D|418D|397A|397C [Search]

Tip: `+DNT Jun Jul` returns Del Norte taxa with those blooming both months listed first.[all tips and help.][search history]

Your Quad Selection: Cascadel Point (397B) 3711924, Shuteye Peak (417C) 3711934, Mammoth Pool Dam (417D) 3711933, North Fork (398A) 3711925, Millerton Lake East (398D) 3711915, Ahwahnee (418D) 3711936, Musick Mountain (397A) 3711923, Auberry (397C) 3711914, Shaver Lake (397D) 3711913

Hits 1 to 21 of 21

Requests that specify topo quads will return only Lists 1-3.

To save selected records for later study, click the ADD button.

[ADD checked items to Plant Press] [check all] [check none]

Selections will appear in a new window.

open	save	hits	scientific	common	family	CNPS
📂	☐	1	**Calyptridium pulchellum** 📷	Mariposa pussypaws	Portulacaceae	List 1B.1
📂	☐	1	**Camissonia sierrae ssp. alticola**	Mono Hot Springs evening-primrose	Onagraceae	List 1B.2
📂	☐	1	**Carex praticola** 📷	meadow sedge	Cyperaceae	List 2.2
📂	☐	1	**Carpenteria californica** 📷	tree-anemone	Philadelphaceae	List 1B.2
📂	☐	1	**Castilleja campestris ssp. succulenta** 📷	succulent owl's-clover	Scrophulariaceae	List 1B.2
📂	☐	1	**Collomia rawsoniana** 📷	flaming trumpet	Polemoniaceae	List 1B.2
📂	☐	1	**Didymodon norrisii**	Norris' beard-moss	Pottiaceae	List 2.2
📂	☐	1	**Eryngium spinosepalum**	spiny-sepaled button-celery	Apiaceae	List 1B.2
📂	☐	1	**Erythronium pluriflorum** 📷	Shuteye Peak fawn lily	Liliaceae	List 1B.3
📂	☐	1	**Fissidens aphelotaxifolius**	brook pocket-moss	Fissidentaceae	List 2.2
📂	☐	1	**Gratiola heterosepala** 📷	Boggs Lake hedge-hyssop	Scrophulariaceae	List 1B.2
📂	☐	1	**Hulsea brevifolia** 📷	short-leaved hulsea	Asteraceae	List 1B.2
📂	☐	1	**Jensia yosemitana** 📷	Yosemite tarplant	Asteraceae	List 3.2
📂	☐	1	**Leptosiphon serrulatus**	Madera leptosiphon	Polemoniaceae	List 1B.2
📂	☐	1	**Lewisia disepala** 📷	Yosemite lewisia	Portulacaceae	List 1B.2
📂	☐	1	**Lupinus citrinus var. citrinus** 📷	orange lupine	Fabaceae	List 1B.2
📂	☐	1	**Mimulus acutidens**	Kings River monkeyflower	Scrophulariaceae	List 3
📂	☐	1	**Mimulus gracilipes** 📷	slender-stalked monkeyflower	Scrophulariaceae	List 1B.2
📂	☐	1	**Orcuttia inaequalis** 📷	San Joaquin Valley Orcutt grass	Poaceae	List 1B.1
📂	☐	1	**Viburnum ellipticum** 📷	oval-leaved viburnum	Caprifoliaceae	List 2.3
📂	☐	1	**Viola pinetorum ssp. grisea** 📷	grey-leaved violet	Violaceae	List 1B.3

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

Selections will appear in a new window.

No more hits.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

January 16, 2008

Document Number: 080116125316

Sean Marquis
Analytical Environmental Services
1801 7th Street, Suite 100
Sacramento, CA 95811

Subject: Not specified

Dear: Mr. Marquis

We are sending this official species list in response to your January 16, 2008 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 15, 2008.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

TAKE PRIDE IN AMERICA

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 080116125316

Database Last Updated: December 12, 2007

Quad Lists

Listed Species

Invertebrates

Branchinecta conservatio
- Conservancy fairy shrimp (E)

Branchinecta lynchi
- Critical habitat, vernal pool fairy shrimp (X)

Desmocerus californicus dimorphus
- valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus
- delta smelt (T)

Oncorhynchus mykiss
- Central Valley steelhead (T) (NMFS)

Amphibians

Ambystoma californiense
- California tiger salamander, central population (T)
- Critical habitat, CA tiger salamander, central population (X)

Rana aurora draytonii
- California red-legged frog (T)

Reptiles

Gambelia (=Crotaphytus) sila
- blunt-nosed leopard lizard (E)

Mammals

Dipodomys nitratoides exilis
- Fresno kangaroo rat (E)

Plants

Calyptridium pulchellum
- Mariposa pussy-paws (T)

Castilleja campestris ssp. succulenta
- Critical habitat, succulent (=fleshy) owl's-clover (X)
- succulent (=fleshy) owl's-clover (T)

Orcuttia inaequalis
- Critical habitat, San Joaquin Valley Orcutt grass (X)

Pseudobahia bahiifolia
- Hartweg's golden sunburst (E)

Candidate Species

Amphibians

Rana muscosa
- mountain yellow-legged frog (C)

Mammals

Martes pennanti
- fisher (C)

Quads Containing Listed, Proposed or Candidate Species:

MUSICK MTN. (397A)
CASCADEL POINT (397B)
AUBERRY (397C)
SHAVER LAKE (397D)
NORTH FORK (398A)
MILLERTON LAKE WEST (398C)
SHUTEYE PEAK (417C)
MAMMOTH POOL DAM (417D)
BASS LAKE (418C)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.
(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
Critical Habitat - Area essential to the conservation of a species.
(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
(C) *Candidate* - Candidate to become a proposed species.
(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 15, 2008.

APPENDIX H

Biotic Assessment: North Fork Site

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

August 22, 2005

Analytical Environmental Services
Attn: Chad Broussard
2021 N. Street, Suite 200
Sacramento, California 95814
916-447-3479

SUBJECT: Alternative North Fork Project Site Biotic Assessment, Project 2410-02

Dear Mr. Broussard:

The development potential of the alternative North Fork project site in Madera County is under review by Analytical Environmental Services (AES). The purpose of H. T. Harvey & Associates' analysis is to provide an overview of existing biological and regulated resources that may pose potential constraints to site development in support of AES's review in compliance with the National Environmental Policy Act (NEPA). H. T. Harvey & Associates conducted a reconnaissance-level survey of the alternative project site located east of North Fork, California on May 11 and 12, 2005 (Figure 1). The property was surveyed for potentially regulated habitats and its potential to support special-status species. A map of biotic and regulated habitats was prepared using a digital, orthophoto, aerial image (Figure 2). The following report describes the habitats on the site, identifies potential effects to biotic resources resulting from project development, describes recommended focused surveys, and discusses whether agency consultation is likely to be required.

SITE OVERVIEW

The North Fork project site is located approximately two miles east of North Fork, Madera County, California, on the edge of the Sierra National Forest (Figure 1). The 79-acre (31.9-ha) site consists of variably sloping, southwest facing, foothill woodland and interior live oak woodland habitats between approximately 2,850 feet and 3,450 feet (900 m and 1050 m) above mean sea level (Figures 2). A large area of open foothill woodland habitat exists between these two habitats, and is transitional in nature (Figure 3). The eastern portion of the property (Figure 4) is steeply sloping, heavily wooded, and has several tributaries flowing to Whiskey Creek, approximately 1,300 feet (0.4 km) to the south (Figures 2, 5). One of these tributaries is shown as an ephemeral stream on the United States Geological Service Cascadel Point (397B) 7-1/2 Minute Quad. The central portion of the property is gradually sloping, open, and contains areas of thinned foothill woodland. Two residences and a large meadow that was partially cultivated in the past also occur within the central portion of the property. The western portion of the property is steeply sloping, heavily wooded, and has several tributaries flowing to Willow Creek, which is located approximately one mile (1.6 km) southwest of the project site (Figure 2). One of these tributaries to Willow Creek is depicted as an ephemeral stream on the Cascadel Point 7-1/2 Minute Quad. A man-made pond lies near the residence located near the center of the property (Figures 2, 6), and numerous springs were observed (Figure 7), although their presence is not indicated on the Cascadel Point 7-1/2 Minute Quad.

BIOTIC HABITATS

Foothill Pine Woodland

Vegetation. Approximately 22 acres (8.9 ha) of heavily wooded foothill pine woodland exists on the steeply sloped, eastern portion of the site (Figure 2). These slopes are dominated by foothill pine (*Pinus sabiniana*), interior live oak (*Quercus wislizenii*), and buckeye (*Aesculus californica*), which form a contiguous, multi-layered canopy. Various shrubs occur in the understory, including birch leaf mountain mahogany (*Cercocarpus betuloides* ssp. *betuloides*), yerba santa (*Eriodictyon californica*), California buckbrush (*Ceanothus cuneatus* ssp. *cuneatus*), and whiteleaf manzanita (*Arctostaphylos viscida*). A few native and non-native grasses also occur in the shrub-dominated openings, including California brome (*Bromus californicus*), melic grass (*Melica imperfecta*), soft chess brome (*Bromus hordeaceus*), and ripgut brome (*Bromus diandrus*). The understory is otherwise mostly shaded, and dominated extensively by poison oak (*Toxicodendron diversilobum*) and numerous forbs, including tincture plant (*Collinsia tinctoria*) and torilis (*Torilis arvensis*). Native wildflowers occurring in the understory include wallflower (*Erysimum capitatum* ssp. *capitatum*) and harlequin lupine (*Lupinus stiversii*).

The three tributaries of the Whiskey Creek watershed exhibited very little flowing water at the time of the survey; however, various pools were observed along each watershed reach. These tributaries are likely fed by springs located upslope (generally north) of the project site. Foothill pine woodland is contiguous across this watershed, but distinct riparian habitat is not present along any particular reach. Therefore, the tributaries are almost entirely shaded by foothill woodland trees and shrubs, as described above. Whereas wetland vegetation exists along each tributary, including common monkeyflower (*Mimulus guttatus*), miner's lettuce (*Claytonia* spp.), knotweed (*Polygonum* spp.), and greensheath sedge (*Carex feta*), these species only occur sporadically along each tributary and do not form contiguous wetland habitat.

Wildlife. Wildlife species typically associated with the foothill pine woodland habitat include the following year-round residents: Sierra Nevada ensatina (*Ensatina eschscholtzii platensis*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), common kingsnake (*Lampropeltis getula*), gopher snake (*Pituophis catenifer*), western rattlesnake (*Crotalus viridis*), Northern Pygmy Owl (*Glaucidium gnoma*), Western Screech-Owl (*Megascops kennicottii*), Anna's Hummingbird (*Calypte anna*), Acorn Woodpecker (*Melanerpes formicivorus*), Nuttall's Woodpecker (*Picoides nuttallii*), Hairy Woodpecker (*P .villosus*), Northern Flicker (*Colaptes auratus*), Hutton's Vireo (*Vireo huttoni*), Warbling Vireo (*V. gilvus*), Cassin's Vireo (*V. cassinii*), Western Scrub-Jay (*Aphelocoma californica*), Oak Titmouse (Oak Titmouse (*Baeolophus inornatus*), White-breasted Nuthatch (*Sitta carolinensis*), American Robin (*Turdus migratorius*), Purple Finch (*Carpodacus purpureus*), western gray squirrel (*Sciurus griseus*), Streator dusky-footed woodrat (*Neotoma fuscipes streatori*), North American deermouse (*Peromyscus maniculatus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis*

mephitis), bobcat (*Lynx rufus*), and mule deer (*Odocoileus hemionus*). Neotropical migratory birds breed in this habitat and spend the winter in the neotropics, including: Western Wood-Pewee (*Contopus sordidulus*), Ash-throated Flycatcher (*Myiarchus cinerascens*), Orange-crowned Warbler (*Vermivora celata*), Black-headed Grosbeak (*Pheucticus melanocephalus*), and Lesser Goldfinch (*Carduelis psaltria*). Several bird species are winter visitors that breed in more northerly latitudes, or at higher elevations in the Sierra Nevada. Such species include: Red-breasted Nuthatch (*Sitta canadensis*), Yellow-rumped Warbler (*Dendroica coronata*), White-crowned Sparrow (*Zonotrichia leucophrys*), Golden-crowned Sparrow (*Z. atricapilla*), Cassin's Finch (*Carpodacus cassinii*), Pine Siskin (*Carduelis pinus*), and Evening Grosbeak (*Coccothraustes vespertinus*). Other birds migrate through the habitat, but breed at higher latitudes or higher elevations, including: Hammond's, Gray, and Dusky flycatchers, Black-throated Gray Warbler (*Dendroica nigrescens*), Hermit Warbler (*Dendroica occidentalis*), and Western Tanager (*Piranga ludoviciana*).

The larger trees, particularly those with cavities or exfoliating bark, provide potential roosting and breeding habitat for several species of bats, including the California myotis (*Myotis californicus*), western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), Yuma myotis (*Myotis yumanensis*), silver-haired bat (*Lasionycteris noctivagans*), big-brown bat (*Eptesicus fuscus*), and pallid bat (*Antrozous pallidus*). Other species that are expected to migrate through the site, and possibly roost but not breed, include the hoary bat (*Lasiurus cinereus*), western red bat (*Lasiurus blossevillii*), and Mexican free-tailed bat (*Tadarida brasiliensis*). Because tall cliffs occur in areas adjacent to the project site, western mastiff bat (*Eumops perotis*) and spotted bat (*Euderma maculatum*) may forage over the site, although no roosting habitat occurs on the site for these cliff-roosting species.

Open Foothill Pine Woodland

Vegetation. Approximately 27 acres (10.7 ha) of the central portion of the site consist of large openings of grassland between foothill pine woodland and thickets of associated understory shrub species (Figure 3). This area is ecotonal between the dense foothill woodland upslope and the dense interior live oak habitat downslope, and therefore has many species in common with the adjacent woodlands. Abundant grasses and forbs in openings in the central portion of the site including soft chess brome, Italian rye (*Lolium multiflorum*), rattail fescue (*Vulpia myuros*), wild oats (*Avena fatua*), fewflower clover (*Trifolium oliganthum*), and Indian clover (*Trifolium albopurpureum*). Numerous wildflowers also occur, such as: Indian paintbrush (*Castilleja exserta*), purple globe-lily (*Calochortus amoenus*), chinese houses (*Collinsa heterophylla*), California dandelion (*Agoseris grandiflora*), fringepod (*Thysanocarpus curvipes*), sky lupine (*Lupinus bicolor*), bird's eye gilia (*Gilia tricolor*), and fiestaflower (*Pholistoma auritum*). In addition to the foothill woodland and grassland species, other common woody species occurring in this area include Mexican elderberry trees (*Sambucus mexicanus*), flannelbush (*Fremontodendron californicum* ssp. *californicum*), blue oak (*Quercus douglasii*), valley oak (*Quercus lobata*), and ponderosa pine (*Pinus ponderosa*).

Two wetland areas occur within this habitat, the largest of which is spring-fed and located next to the central residence on the site (Figure 2). This wetland area is approximately 0.25 acre (0.1 ha) in size. The spring is located on a slope just north of the eastern residence and drains into a man-made pond (Figure 6). A well is also located on this slope and may contribute to the hydrology of the wetland. The spring wetland is dominated primarily by meadow species, but the slope of the wetland is too steep to be considered meadow habitat that is ordinarily subject to flooding. The dominant wetland species include small wing sedge (*Carex microptera*), fragile sheath sedge (*Carex fracta*), slender rush (*Juncus tenuis*), meadow barley (*Hordeum brachyantherum*), knotweed, and common monkeyflower. Various upland grasses and forbs dominate the spring wetland, which suggests that the hydrology has ephemeral characteristics. A few other springs exist within the foothill woodland habitat, but have no associated wetland habitat.

The artificial pond (approximately 3,200 square feet (0.03 ha) located below this wetland was approximately two-feet (0.6-m) deep at the time of the survey (Figure 6). The pond exists by virtue of a small earthen dam built to collect runoff from the adjacent, upslope wetland, some of which enters through a buried culvert (Figure 6). The dam follows generally a north to south orientation (Figure 2). Water exits the dam and flows through a culvert (Figure 2), which is mostly buried by sediment, into one of the drainages flowing to Willow Creek. An overflow trench is located near the southern edge of the pond (Figure 6), but most of the water appears to percolate through the underlying sandy soil, as evidenced by saturation at the base of the dam. According to the residents on the site, water does not persist in the pond throughout the year. Vegetation within the pond was sparse except for a small patch of Baltic rush (*Juncus balticus*), sand-spurrey (*Spergularia* sp.), hyssop loosestrife (*Lythrum hyssopifolium*), and other upland species along the pond perimeter (Figure 6). Approximately 560 feet (170 m) downslope from the pond in a southwesterly direction within the same drainage is another, somewhat smaller meadow wetland (approximately 3,200 square feet (0.03 ha) (Figure 2). This wetland area is dominated by meadow wetland species similar to those in the wetland upstream.

Wildlife. The same species found in the foothill pine woodland are also typical of this habitat. However, additional species associated with larger and more open forest gaps and meadow interfaces include: Western Bluebird (*Sialia mexicana*), California Towhee (*Pipilo crissalis*), Lazuli Bunting (*Passerina amoena*), Lark Sparrow (*Chondestes grammacus*), and Bullock's Oriole (*Icterus bullockii*). Furthermore, larger species of bats, such as the big brown bat (*Eptesicus fuscus*) and hoary bat (*Lasiurus cinereus*) will forage primarily in these open habitats containing large meadows.

Interior Live Oak Woodland

Vegetation. Approximately 30 acres (12.2 ha) of the western portion of the site consist of dense interior live oak woodland forming contiguous canopy across three watershed drainages. This habitat is dominated primarily by interior live oak and buckeye; foothill pine, however, is conspicuously absent in this area. The understory is mostly impenetrable due to a high density of stiff-branched California buckbrush (*Ceanothus cuneatus*), whiteleaf manzanita (*Arctostaphylos viscida*), and poison oak (*Toxicodendron diversilobum*). Other common understory species associated with interior live oak woodland habitat include mountain misery (*Chamaebatia foliolosa*), bedstraw (*Galium* spp.), and tincture plant (*Collinsia tinctoria*). A few openings caused by large rock outcrops exist along the ridges between these drainages. These areas are dominated by many of the herbaceous species occurring in the open foothill woodland upslope, and other species commonly associated with rock outcrops. Such species include twining snakelily (*Dichelostemma volubile*), narrowleaf mule ears (*Wyethia angustifolia*), phacelia (*Phacelia* sp.), delphinium (*Delphinium* sp.), purple sanicle (*Sanicula bipinnatifida*), and slender cottonweed (*Micropus californicus*).

Water was flowing freely in each of the three drainages at the time of the survey, but will likely diminish in the summer. Many reaches of the drainages exist between large rock outcrops or are underlain by bedrock, and therefore support little to no vegetation. However, some reaches where sediment has collected support wetland vegetation similar to those drainages in the foothill woodland upslope, including common monkeyflower and miner's lettuce. None of these areas were large enough to be considered distinct wetland habitat.

Wildlife. The same species found in foothill pine woodland are also typical of this habitat. However, additional species associated with interior live oak woodlands include: Phainopepla (*Phainpepla nitens*), Blue-gray Gnatcatcher (*Polioptila caerulea*), and Rufous-crowned Sparrow (*Aimophila ruficeps*).

SPECIAL-STATUS PLANT AND WILDLIFE SPECIES

Special-status Species Regulation Overview

Federal and state endangered species legislation gives special status to several plant and animal species known to occur in the vicinity of the project site. In addition, state resource agencies and professional organizations, whose lists are recognized by agencies when reviewing environmental documents, have identified as sensitive some species occurring in the vicinity of the project site. Such species are referred to collectively as "species of special status" and include plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered under the Federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA); animals listed as "fully protected" under the California Fish and Game Code; animals designated as "Species of Special Concern" by the CDFG; and plants listed as rare or endangered by the CNPS in the *Inventory of Rare and Endangered Plants of California* (2001).

ESA provisions protect federally listed threatened and endangered species and their habitats from unlawful take. Under the ESA, "take" is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any of the specifically enumerated conduct." The U.S. Fish & Wildlife Service's (USFWS) regulations define harm to mean "an act which actually kills or injures wildlife." Such an act "may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (50 CFR § 17.3). Activities that may result in "take" of individuals are regulated by the USFWS. The USFWS produced an updated list of candidate species May 11, 2005 (USFWS 2005; 50 CFR Part 17). Candidate species are not afforded any legal protection under FESA; however, candidate species typically receive special attention from federal and state agencies during the environmental review process.

Provisions of CESA protect state-listed threatened and endangered species. CDFG regulates activities that may result in "take" of individuals (*i.e.*, "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill"). Habitat degradation or modification is not expressly included in the definition of "take" under the California Fish and Game Code. Additionally, the California Fish and Game Code contains lists of vertebrate species designated as "fully protected" (California Fish & Game Code §§ 3511 [birds], 4700 [mammals], 5050 [reptiles and amphibians], 5515 [fish]). Such species may not be taken or possessed.

In addition to federally and state-listed species, the CDFG also has produced a list of Species of Special Concern to serve as a "watch list." Species on this list either are of limited distribution or the extent of their habitats has been reduced substantially, such that threat to their populations may be imminent. Species of Special Concern may receive special attention during environmental review, but they do not have statutory protection. USFWS also uses the label Species of Concern, an informal term that refers to those species that might be in need of concentrated conservation actions. Species of Concern receive no legal protection as a result of their designation as Species of Special Concern, and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species. However, most, if not all, of these species are currently protected by state and federal laws.

Raptors (*e.g.*, eagles, hawks, and owls) and their nests are protected under both federal and state regulations. The federal Migratory Bird Treaty Act[1] (MBTA) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. Birds of prey are protected in California under the State Fish and Game Code.[2] Section 3503.5 of the code states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "take" by the CDFG.

Vascular plants listed as rare or endangered by the CNPS that may not have designated status under state endangered species legislation are defined as follows:

- List 1A. Plants considered by the CNPS to be extinct in California.
- List 1B. Plants rare, threatened, or endangered in California and elsewhere.
- List 2. Plants rare, threatened, or endangered in California, but more numerous elsewhere.
- List 3. Plants about which we need more information – A review list.

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[1] 16 U.S.C., Sec. 703, Supp. I, 1989.

[2] Section 3503.5, 1992.

Special-status Plant Species Assessment

Reconnaissance-level surveys were conducted on May 11 and 12, 2005 for special-status plant species. Special-status species include state and/or federally threatened or endangered species, federal candidate species, and California Native Plant Society List 1B species blooming at the time of the survey, and for habitats capable of supporting them. A query of the California Natural Diversity Database (CNDDB 2005) was performed to identify special-status plant species potentially occurring in the project vicinity in the USGS Cascadel Point quadrangle and surrounding quadrangles. The habitats specified in the query included valley and foothill grasslands, cismontane woodlands, and freshwater marsh. These habitats were chosen for the similarity of their constituent species to those on the site. In addition, the California Native Plant Society Inventory (CNPS 2001) was used to identify and assess additional species occurring in similar habitats in Madera County.

Thirty-five special-status plant species were identified in these queries, twenty of which were dismissed due to the absence of suitable habitat (e.g., lack of clay and/or alkaline soils). These include federally endangered species located within the Cascadel Point 7-1/2 minute Quad. The special-status plant species considered but rejected in this assessment are listed in Appendix A. The remaining fifteen species potentially occurring on the project site include Mariposa pussypaws (*Calyptridium pulchellum*), Sierra suncup (*Camissonia sierrae* ssp. *sierrae*), tree anemone (*Carpenteria californica*), Fresno mat (*Ceanothus fresnensis*), Small's southern clarkia (*Clarkia australis*), flaming trumpet (*Collomia rawsoniana*), gypsum-loving larkspur (*Delphinium gypsophilum* ssp. *gypsophilum*), Madera linanthus (*Linanthus serrulatus*), orange lupine (*Lupinus citrinus* var. *citrinus*), King's River monkeyflower (*Mimulus acutidens*), slender-stalked monkeyflower (*Mimulus gracilipes*), oak-leaved nemophila (*Nemophila parviflora* var. *quercifolia*), Farnsworth's jewel-flower (*Streptanthus farnsworthianus*), oval-leaved viburnum (*Viburnum ellipticum*), and Hall's mule-ears (*Wyethia elata*). Of these, the Mariposa pussypaws and tree anemone are federally threatened and state threatened respectively, whereas the other species are listed only by CNPS. Four of these special-status plant species have been documented as occurring within a 10-mile radius of the project site (CNDDB 2005), including tree anemone, orange lupine, flaming trumpet, and slender-stalked monkeyflower.

The presence of these special-status plants could constrain development. Some of these species may occur on the project site due to the relatively undisturbed and ecotonal nature of habitats comprising the site. To more fully assess whether any of these special-status species occur on the project site and would constrain development, protocol-level surveys are recommended.

The only potentially occurring sensitive habitat identified in the CNDDB query was northern basalt-flow vernal pool, which was not observed on the site. Because most of the site has slopes between 15 and 45 percent, and is entirely underlain by highly permeable, sandy loam soils of the Ahwahnee, Auberry, and Holland series, vernal-pool habitat and associated species are not expected to occur on the site.

Special-status Wildlife Species Assessment

Reconnaissance-level surveys were conducted on May 11 and 12, 2005 for special-status wildlife species. Wildlife species observed during the reconnaissance-level surveys are listed in Appendix C. No special-status wildlife species were detected during the reconnaissance-level survey and no proposed or designated critical habitat occurs within the project area. Nine species listed as endangered or threatened under ESA or CESA were reviewed for their potential for occurrence within the project area (Appendix B). Five of these species were determined to have no potential for occurrence within the project area due to the lack of suitable habitat. The remaining four endangered or threatened species potentially occurring on the project site include Bald Eagle (*Haliaeetus leucocephalus*), American Peregrine Falcon (*Falco peregrinus anatum*), Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and California red-legged frog (*Rana aurora draytonii*). Bald Eagles and American Peregrine Falcons may occasionally fly over the project area, but no suitable foraging or breeding habitat occurs within the project area or the vicinity. Therefore, these species would not constrain development and no further surveys are warranted.

California red-legged frogs have been extirpated from the region. Therefore, this species would not constrain development.

Elderberry shrubs (*Sambucus* species), which are a host plant of valley elderberry longhorn beetles (*Desmocerus californicus dimorphus)*, are present throughout the project area. No exit holes made by the beetles were observed during the reconnaissance-level surveys, but searching for exit holes on each elderberry shrub on the project site was beyond the scope of this study. The presence of the valley elderberry longhorn beetle's host plant and potential occurrence of the species on, and adjacent to, the project site have the potential to constrain development. Adverse effects to the beetle may be avoided if the proposed project is designed to avoid elderberry shrubs on, or adjacent to, the project site by at least 100 feet (refer to Appendix D: USFWS Conservation Guidelines for the Valley Elderberry Longhorn Beetle). Buffer zones must be protected during and after construction from any adverse project-related effects and effects from any encroachment into a buffer zone must be corrected. If complete avoidance is not possible, a set of additional mandatory protective measures is triggered and agency consultation is required. In this case, the USFWS must be consulted before any disturbance occurs within the buffer zone. Prior to consultation, surveys following the USFWS's conservation guidelines (Appendix D) will be required to identify site-specific constraints and potential mitigation requirements.

The Pacific fisher (*Martes pennanti pacifica*) was accorded federal candidate status on April 8, 2004 (USFWS 2004). A candidate is a species for which there is sufficient information to support a proposal to list the species under ESA as threatened or endangered, but the preparation of a proposal to list is precluded by higher priority listing actions. Candidate species do not receive the same federal protection as listed species, but state and federal agencies proposing activities within the historic range of the fisher are encouraged to give consideration to the fisher during the environmental planning process. Fishers are known to occupy forests with high canopy closure, large trees, and a high percentage of conifers. The project area and its vicinity lack a high percentage of conifers, which is indicative of the elevation of the project site. Radio-collared fishers on the Sierra National Forest have been detected within riparian areas below

3,000 feet that where contiguous with suitable, occupied habitat (Brian Boroski, personal observation). A focused assessment by a qualified mammalogist familiar with the ecology and habitat requirements of fishers is recommend to support the determination that the project is unlikely to adversely affect the species.

Forty-five species identified as California Species of Special Concern, USFWS Birds of Conservation Concern, and/or having designated priority by the Western Bat Working Group were reviewed for their potential for occurrence on the project site (Appendix B). Of these 45 species, 16 were determined to have no potential for occurrence on the project site due to the lack of suitable habitat. The remaining 29 consist of one amphibian, 2 reptiles, 12 birds, and 14 bats.

The foothill yellow-legged frog (*Rana boylii*) has a moderate potential to occur on the project site. Suitable habitat exists on the project site, but foothill yellow-legged frogs are rare in the region. Surveys for foothill yellow-legged frogs are recommended to confirm their presence or absence on the project site.

Western pond turtles (*Clemmys marmorata*) and California horned lizards (*Phrynosoma coronatum frontale*) have a low probability of occurrence on the project site. Only marginal aquatic habitat exists for the western pond turtle and the vegetative cover is much denser than that preferred by California horned lizards. Therefore, these species would not constrain development and no further surveys are recommended.

Of the 12 avian species identified as California Species of Special Concern or USFWS Birds of Conservation Concern, seven have a low probability of occurring on the project site because the project area is outside of their primary elevational range and/or the habitat is marginal for them. Those seven species are Golden Eagle (*Aquila chrysaetos*), Northern Goshawk (*Accipiter genilis*), California Spotted Owl (*Strix occidentalis occidentalis*), Vaux's Swift (*Chaetura vauxi*), Lewis's Woodpecker (*Melanerpes lewis*), Olive-sided Flycatcher (*Contopus cooperi*), and Purple Martin (*Progne subis*). The limited potential to adversely affect these species is not expected to constrain development.

Five of the 12 avian species identified as California Species of Special Concern or USFWS Birds of Conservation Concern have a moderate potential to occur on the project site; those being Cooper's Hawk (*Accipiter cooperii*), Merlin (*Falco columbarius*), Long-eared Owl (*Asio otus*), Rufous Hummingbird (*Selasphorus rufus*), and Lawrence's Goldfinch (*Carduelis lawrencei*). Merlins and Rufous Hummingbirds do not breed in California. Reductions in foraging habitat for these species would not constrain development. Cooper's Hawk, Long-eared Owl, and Lawrence's Goldfinch have the potential to nest and forage on the project site. Nesting and foraging habitat of similar quality is regionally abundant and the loss of habitat for these species would not constrain development.

Fourteen bat species, classified as California Species of Special Concern or having designated priority by the Western Bat Working Group, have the potential to occur on the project site. Hoary (*Lasiurus cinereus*), western red (*Lasiurus blossevillii*), Mexican free-tailed (*Tardarida brasiliensis*), fringed myotis (*Myotis thysanodes*), western mastiff (*Eumops perotis*), long-legged myotis (*Myotis volans*), and spotted bats (*Euderma maculatum*) are not expected to breed on the project site and loss of foraging habitat for these species would not constrain development.

Western small-footed myotis (*Myotis ciliolabrum*), California myotis (*Myotis californicus*), long-eared myotis (*Myotis evotis*), silver-haired (*Lasionycteris noctivagans*), Pallid (*Antrozous pallidus*), big brown (*Eptesicus fiscus*), and Yuma myotis bats (*Myotis yumanensis*) have the potential to breed on the project site. Surveys for bats were not conducted on the project site during reconnaissance-level surveys. Removing buildings and trees could potentially result in the direct loss of a maternity colony. The direct loss of individuals in a hibernaculum (winter roost) could eliminate an entire colony due to the loss of the pregnant females. A survey for roosting bats should be conducted prior to any removal of buildings, or removal of trees ≥12 inches in diameter at 4.5 feet above grade. The survey should be conducted by a qualified bat biologist (i.e., a biologist holding a CDFG collection permit and a Memorandum of Understanding with CDFG allowing the biologist to handle and collect bats). If no active roosts were found, then no further action would be warranted. If a maternity roost were present, a qualified bat biologist would determine the extent of construction-free zones around active nurseries, because this species can abandon young when disturbed. CDFG should also be notified of any active nurseries within the construction zone.

If active maternity roosts or hibernacula are found on the project site, the project could be redesigned to avoid the loss of the building or tree occupied by the roost. If an active nursery roost is located and the project cannot be redesigned to avoid removal of the occupied tree or structure, demolition of that tree should commence before maternity colonies form (i.e., prior to March 1) or after young are volant (flying) (i.e., after July 31). The disturbance-free buffer zones described above should be observed during the maternity roost season (March 1 - July 31).

If a non-breeding bat hibernaculum or winter roost is found in a tree scheduled for removal, the individuals should be safely evicted under the direction of a qualified bat biologist (as determined by a Memorandum of Understanding with CDFG). Trees with roosts that need to be removed should first be disturbed at dusk, just prior to removal that same evening, to allow bats to escape during the darker hours.

REGULATED HABITATS

Army Corps of Engineers Jurisdiction

The project area was surveyed for elements that may meet the regulatory definition of "Waters of the United States" (*i.e.*, jurisdictional waters) subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). These may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the U.S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3).

Areas typically not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328).

Of the six watershed drainages observed on the project site, only two are depicted as USGS blue-line stream courses on the USGS Cascadel Point quadrangle. These include the unnamed drainage just east of the central residence on the project site that flows to Whiskey Creek, and a similar drainage just north of the southern residence on the project site that flows to Willow Creek (Figure 2). Both of these drainages are steeply sloping, have prominent topographic incisions, and have ephemeral spring and runoff hydrology. Because these drainages are also contiguous with downstream Waters of the U.S., they are considered potentially jurisdictional 'other waters' as defined by USACE. The other four ephemeral drainages are contiguous with these blue-line stream courses, are similar in character, and are therefore also considered potential 'other waters'. The pond located below the central residence (Figures 2,6) lies within the blue-line watershed flowing to Willow Creek, and is also considered potential other waters.

Wetland areas typically support an assemblage of plant species different from surrounding, drier habitats (Mason 1957). Species growing in wetlands are often referred to as hydrophytic (water-loving) species. Although surface water is often visible in wetlands, standing water may not be present during some periods of the year. Because many wetland plant species only grow in such habitats, they are reliably indicative of habitats typically designated as wetlands.

Hydrophytic plants were scattered throughout the drainages on the project site. However, they only form distinct wetland habitat in two locations within the blue-line drainage flowing to Willow Creek (Figures 1, 2). These include the spring-fed wetland on the slope next to the central residence, and a meadow wetland in a level area farther downstream (Figure 2). The dominant wetland species in these wetlands and the drainages include small wing sedge, fragile sheath sedge, slender rush, meadow barley, knotweed, common monkeyflower, miners lettuce, knotweed, and greensheath sedge, many of which are obligate perennials.

Soils associated with wetlands areas typically have one or more characteristics that reflect their wetlands nature [NRSC 2005]. None of the soils underlying the wetlands on the project site are indicated as being hydric according to the state list of hydric soils [USDA 2005]. However, the extended saturation resulting from the spring hydrology appears to satisfy one of the criteria of hydric soils [NRCS 2005]. Therefore, both of these wetland areas are expected to be potential USACE jurisdictional wetlands.

California Department of Fish and Game Jurisdiction

The project area was also examined for areas containing a definable bed, bank, or channel that could be under the regulatory jurisdiction of CDFG (1994). CDFG potentially extends the definition of stream to include "intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blue-line streams mapped on USGS quadrangles, and watercourses with subsurface flows." "Canals, aqueducts, irrigation ditches, and other means of water conveyance can also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife" (CDFG 1994).

All of the drainages on the project site flow into USGS blue-line stream courses, and were flowing at the time of the survey. Water is expected to flow in at least the downstream reaches of these drainages year-round. As such, CDFG may have jurisdiction over all of the drainages. The lateral limits of CDFG jurisdiction is expected to be confined within the top-of-bank of each drainage, because the drainages are dominated by contiguous foothill woodland and interior live oak woodland habitat that contain few riparian tree species.

Regulated Habitat Summary

Based on the clear hydrologic connection between the drainages on the project site and Whiskey Creek and Willow Creek, all drainages meet the regulatory definition of waters of the U.S. Any activities conducted within this drainage feature may be under the regulatory jurisdiction of the USACE under Section 404 of the Clean Water Act. The drainages may also be within the jurisdiction of the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act and within the jurisdiction of the CDFG under Section 1600 of the California Fish and Game code. Activities occurring within the bed and banks of the drainages would require either a Nationwide Permit or an Individual Permit from the USACE, depending on the nature of proposed impacts. Such activities may also require a Section 401 Water Quality Certification permit and a Streambed Alteration Agreement with CDFG. Furthermore, activities within the creek may require compliance with USACE Nationwide Permit Conditions regarding endangered species.

Avoiding the regulated habitat, while constraining, would prevent the project proponent from having to obtain state and federal permits associated with regulated habitats. Preparing the permit applications and obtaining approval from federal and/or state agencies is a time consuming process and could delay construction by several months or longer.

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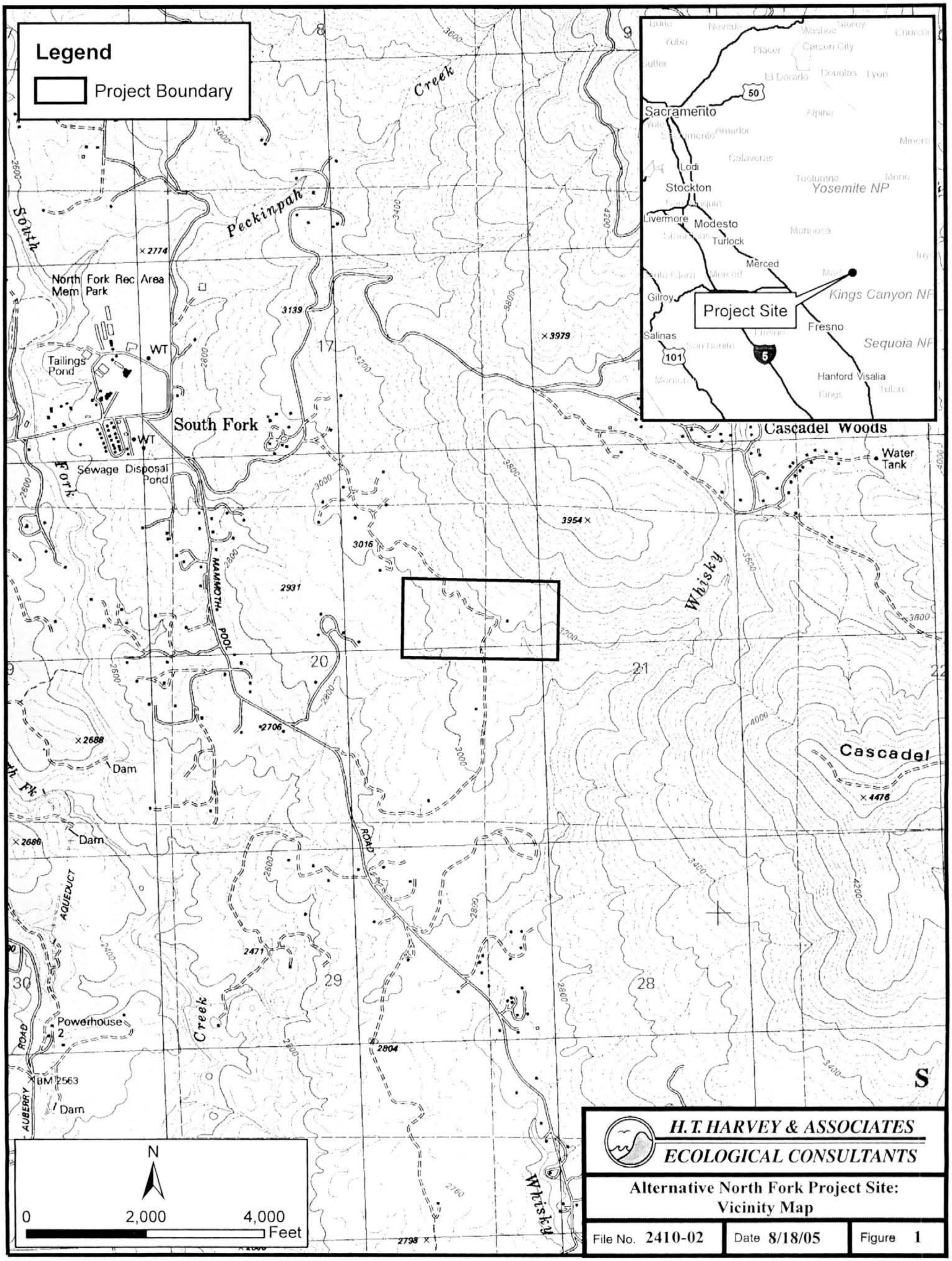
Feel welcome to contact me if you have questions regarding this assessment.

Sincerely,

Brian B. Boroski, Ph.D.
Project Manager



H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Alternative North Fork Project Site:
Vicinity Map

File No. 2410-02 | Date 8/18/05 | Figure 1

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Alternative North Fork Project Site: Biotic Habitats

File No. **2410-02** Date **8/18/05** Figure **2**

Figure 3. Oak woodlands and meadows on southwest-facing slopes.

Figure 4. Heavily wooded, steep, south-facing slopes on the eastern side of the site.

Figure 5. A small, ephemeral, tributary observed on the site.

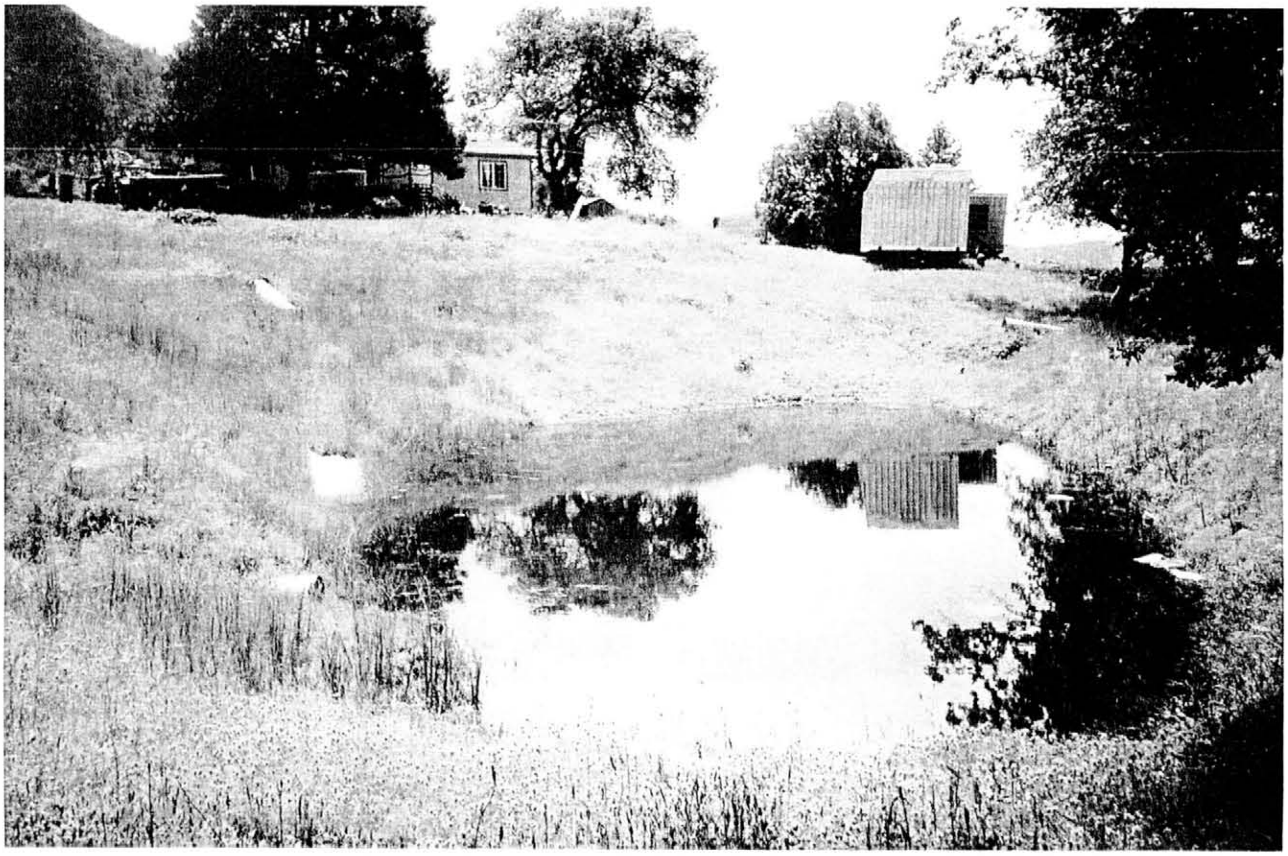


Figure 6. Artificial pond located west of one of the central (more northerly) home site.

Figure 7. One of many small springs situated on site.

Appendix A. Special-status Plant Species Considered but Rejected for Occurrence at the North Fork Project Site.

SCIENTIFIC NAME	COMMON NAME	Potential Habitat on Site too Degraded	General Habitat, Micro-habitat, and/or Genus not Observed on Site	Lack of Strongly Alkaline Soils	Other Edaphic Requirements	Outside the Elevation/Known Geographic Range	Associate Species Absent	Believed to Be Extirpated
Atriplex cordulata	heartscale		X	X		X		
Atriplex depressa	brittlescale		X	X		X		
Atriplex minuscula	lesser heartscale		X	X		X		
Atriplex subtilis	subtle orache		X			X		
Calycadenia hooveri	Hoover's calycadenia					X		
Carpenteria California	carpenteria							
Castilleja campestris ssp. *succulenta*	succulent owl's-clover		X			X		
Collomia rawsoniana	Rawson's flaming-trumpet							
Cordylanthus palmatus	palmate-bracted bird's-beak		X	X		X		
Cryptantha hooveri	Hoover's cryptantha		X			X		
Cypridedium montanum	mountain lady's slipper		X					
Delphinium hansenii ssp. *ewanianum*	Ewan's larkspur					X		
Eryngium spinosepalum	spiny-sepaled button-celery		X		X	X		
Goodmania luteola	golden goodmania		X	X				
Gratiola hetersosepala	Boggs Lake hedge-hyssop		X		X			
Lilium humboldtii ssp. *humboldtii*	Humbolt lily		X					
Linanthus grandiflorus	large-flowered linanthus		X					
Lupinus citrinus var. *citrinus*	orange lupine							
Monardella candicans	Sierra monardella					X		

Appendix A. Special-status Plant Species Considered but Rejected for Occurrence at the North Fork Project Site.

SCIENTIFIC NAME	COMMON NAME	Potential Habitat on Site too Degraded	General Habitat, Micro-habitat, and/or Genus not Observed on Site	Lack of Strongly Alkaline Soils	Other Edaphic Requirements	Outside the Elevation/Known Geographic Range	Associate Species Absent	Believed to Be Extirpated
Orcuttia inaequalis	San Joaquin Valley Orcutt grass		X		X	X		
Potamogeton robbinsii	Robbins's pondweed		X			X		
Pseudobahia bahiifolia	Hartweg's golden sunburst				X	X		

Appendix B. Status and Potential Occurrence of Special-Status Animal Species on the North Fork Project Site.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Federal or State Endangered Species			
Bald Eagle *Haliaeetus leucocephalus* (nesting and wintering)	SE, FT, FPD	Requires large bodies of water, or free-flowing rivers with abundant fish and adjacent snags and large trees for perching and nesting.	Low: breeding records from the region; no suitable breeding or foraging habitat within ½ mile of the project area
Willow Flycatcher *Empidonax traillii*	SE	Wet meadow and montane riparian habitats; dense willow thickets required for nesting and roosting.	None: below species' elevational range in the Sierra Nevada; no suitable breeding habitat
American Peregrine Falcon *Falco peregrinus anatum* (nesting)	SE	Forages in many habitats; requires cliffs for nesting.	Low: breeding records from the region; no suitable breeding or foraging habitat within ½ mile of the project area
Federal or State Threatened Species			
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT	Elderberry trees in the Central Valley.	Moderate: at upper elevational limit of species' range; suitable habitat occurs in project area
Delta smelt *Hyupmesus transpacificus*	FT	Shallow, tidal backwater sloughs, free-flowing rivers	None: no suitable habitat
Central Valley steelhead *Oncorhyunchus mykiss*	FT	Cool streams with suitable spawning habitat and conditions allowing migration.	None: no suitable habitat
California red-legged frog *Rana aurora draytonii*	FT	Streams, freshwater pools and ponds with overhanging vegetation.	Very Low: thought to be extirpated from region
Swainson's Hawk *Buteo swainsoni*	ST	Breeds in stands with few trees in juniper-sage flats, riparian areas, and oak savannah; forages in adjacent livestock pasture, grassland, or grain fields.	None: out of species' elevational range and no suitable habitat
Sierra Nevada red fox *Vulpes vulpes necator*	ST	Red fir and lodgepole pine forests in the sub-alpine zone and alpine fell-fields of the Sierra Nevada.	None: no suitable habitat; outside of species' elevational range
Federal Candidate Species			
Pacific fisher *Martes pennanti pacifica*	FC	Range widely in montane forested regions, preferring mixed conifer forests.	Low: marginally suitable habitat; at low end of species' elevational range in the Sierra Nevada
Species of Special Concern			
Kernbrook lamprey *Lampetra hubbsi*	CSC	Free-flowing rivers	None: no suitable habitat
Sacramento splittail *Pogonichthys macrolepidotus*	CSC	Shallow, dead-end sloughs with submerged vegetation.	None: out of species' elevational range and no suitable habitat

Appendix B. Status and Potential Occurrence of Special-Status Animal Species on the North Fork Project Site.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Longfin smelt *Spirinichus thaleichthys*	CSC	Sloughs of Suisun Bay and Delta	None: out of species' elevational range and no suitable habitat
Foothill yellow-legged frog *Rana boylii*	CSC	Rocky streams in a variety of habitats.	Moderate: aquatic habitat occurs on the project area
Western pond turtle *Clemmys marmorata*	CSC	Permanent or nearly permanent water in a variety of habitats.	Low: marginal aquatic habitat occurs in or near project area; and upland habitats on the site are generally too far from suitable aquatic habitat
California horned lizard *Phrynosoma coronatum frontale*	CSC	Frequents a wide variety of habitats; most common in lowlands along sandy washes with scattered low bushes.	Low: suitable habitat occurs on project site; within species' range; no records from project area.
Golden Eagle *Aquila chrysaetos* (nesting and wintering)	CSC	Breeds on cliffs or in large trees or electrical towers, forages in open areas.	Low: may forage in area; no suitable nest sites on or within ½ mile of project area
Osprey *Pandion haliaetus* (nesting)	CSC	Large snags and open trees near large bodies of water.	None: breeding records from the region; no suitable breeding or foraging habitat within ½ mile of the project area
Cooper's Hawk *Accipiter cooperii*	CSC	Nests in woodlands, forages in many habitats in winter and migration.	Moderate: suitable breeding and foraging habitat; did not observe species during field survey
Northern Goshawk *Accipiter genilis* (nesting)	BCC	Breeds in dense, mature conifer and deciduous forests, interspersed with meadows, other openings and riparian areas; nesting habitat includes north-facing slopes near water.	Low: may forage in area during winter or migration periods; outside of elevational range of species' breeding range
Merlin *Falco columbarius* (wintering)	CSC	Uses many habitats in winter and migration.	Moderate: does not breed in California; project area has suitable foraging habitat
Long-billed Curlew *Numenius americanus* (nesting)	CSC	Upland shortgrass prairies and wet meadows are used for nesting; coastal estuaries, open grasslands, and croplands are used in winter.	None: no suitable habitat; outside of species' elevational range
California Spotted Owl *Strix occidentalis occidentalis*	CSC, BCC	Dense, multi-layered mixed conifer, redwood, and Douglas-fir habitats with large overstory trees.	Low: marginally suitable habitat; at low end of species' elevational range in the Sierra Nevada
Flammulated Owl *Otus flammeolus*	BCC	Open yellow pine forests, Douglas fir and true fir forests	None: below species' elevational range in the Sierra Nevada; no suitable breeding

Appendix B. Status and Potential Occurrence of Special-Status Animal Species on the North Fork Project Site.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Long-eared Owl *Asio otus* (nesting)	CSC	Dense riparian and live oak thickets near meadow edges, and nearby woodland and forest habitats; also found in dense conifer stands at higher elevations.	Moderate: no nesting records for area; there is suitable nesting and foraging habitat in the project area; did not observe species during field survey
Western Burrowing Owl *Athene cunicularia hypugea* (burrow sites)	CSC, BCC	Grasslands and ruderal habitats.	None: no suitable breeding habitat; outside of species' elevational range
Black Swift *Cypseloides niger* (nesting)	CSC	Nests in moist crevice or cave or sea cliffs above the surf, or on cliffs behind, or adjacent to, waterfalls in deep canyons; forages widely over many habitats.	None: no suitable breeding habitat
Vaux's Swift *Chaetura vauxi* (nesting)	CSC	Nests in snags in coastal and montane coniferous forests or, occasionally, in chimneys; forages aerially.	Low: below species' primary elevational range in the Sierra Nevada
Rufous Hummingbird *Selasphorus rufus*	BCC	Migrates through all terrestrial habitats	Moderate: does not breed in California; may occur during fall migration
Lewis's Woodpecker *Melanerpes lewis*	BCC	Winters in blue and valley oak savanna; breeds in dry open yellow pine forests	Low: above species' primary elevational range in the Sierra Nevada; marginal habitat on site
White-headed Woodpecker *Picoides albolarvatus*	BCC	Resident in montane pine and fir forests	None: below species' elevational range in the Sierra Nevada; no suitable habitat
Williamson's Sapsucker *Sphyrapicus thyroideus*	BCC	Resident in montane pine and fir forests	None: below species' elevational range in the Sierra Nevada; no suitable habitat
Olive-sided Flycatcher *Contopus cooperi*	BCC	Breeds in coniferous forests	Low: below species' elevational range in the Sierra Nevada; no suitable breeding habitat; may occur during migration
Loggerhead Shrike *Lanius ludovicianus*	CSC	Agricultural landscapes; grasslands; open savannah	None: no suitable habitat; outside of species' elevational range
Purple Martin *Progne subis* (nesting)	CSC	Breeding habitat includes old-growth, multi-layered, open forest and woodland with snags; forages over riparian areas, forest, and woodlands.	Low: no documented breeding records from area; marginal breeding habitat
Yellow Warbler *Dendroica petechia brewsteri* (nesting)	CSC	Breeds in riparian woodlands, particularly those dominated by willows and cottonwoods.	None: no suitable breeding habitat

Appendix B. Status and Potential Occurrence of Special-Status Animal Species on the North Fork Project Site.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Yellow-breasted Chat *Icteria virens* (nesting)	CSC	Breeds in riparian habitats having dense understory vegetation, such as willow and blackberry.	None: no suitable breeding habitat
Black-chinned Sparrow *Spizella atrogularis*	BCC	Breeds in dry open chaparral, often with large rocks and patches of grass	None: no suitable breeding habitat
Tricolored Blackbird *Agelaius tricolor* (nesting colony)	CSC, BCC	Breeds near fresh water in dense emergent vegetation.	None: no suitable breeding habitat; outside of species' elevational range
Lawrence's Goldfinch *Carduelis lawrencei*	BCC	Breeds in riparian woodlands; open oak woodland	Moderate: no documented records from area
Spotted bat *Euderma maculatum*	CSC WBWG: HP	Ponderosa pine region of the western Sierra Nevada Mountains. Roosts in cracks/crevices of high cliffs and canyons.	Low: no suitable breeding habitat; may breed in nearby cliffs and may forage over project site
Western mastiff bat *Eumops perotis*	CSC WBWG: HP	Found in central and south coastal California. Roosts primarily in cliffs or high buildings.	Low: no suitable breeding habitat; may breed in nearby cliffs and may forage over project site
Western small-footed myotis bat *Myotis ciliolabrum*	CSC WBWG: MP	Variety of habitats including riparian, chaparral, and coniferous forests.	Moderate: potential breeding and roosting habitat present.
California myotis bat *Myotis californicus*	CSC WBWG: MP	Variety of habitats including riparian, oak woodland, rocky hillsides, and coniferous forests.	Moderate: potential breeding and roosting habitat present.
Long-eared myotis bat *Myotis evotis*	CSC WBWG: MP	Typically coniferous forests but also closed canopy oak woodland or other forests with trees with exfoliating bark or cavities. Also roosts in buildings.	Moderate: potential breeding and roosting habitat present.
Fringed myotis bat *Myotis thysanodes*	WBWG: HP	Coniferous forests with snags, or other undisturbed habitats associated with large trees.	Low: trees typically too small; no known caves or mines on the project site.
Long-legged myotis bat *Myotis volans*	WBWG: HP	Coniferous forests with snags, or other undisturbed habitats associated with large trees. Also uses mines, caves and rocky outcrops.	Low: trees typically too small; lacking rocky outcrops of adequate size.
Silver-haired bat *Lasionycteris noctivagans*	WBWG: HP	Coniferous forests with large trees or snags with exfoliating bark.	Moderate: potential breeding and roosting habitat present.
Pallid bat *Antrozous pallidus*	CSC WBWG: HP	Common in oak savannah, forages over many habitats; roosts in buildings, rocky outcrops, oaks other tree species, and rocky crevices in mines and caves.	High: potential breeding and roosting habitat present.

Appendix B. Status and Potential Occurrence of Special-Status Animal Species on the North Fork Project Site.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Big brown bat *Eptesicus fuscus*	WBWG: LP	Colonial species roosting in buildings, bridges, tree snags, caves, mines, and cliff faces.	High: potential breeding and roosting habitat present.
Yuma myotis bat *Myotis yumanensis*	FSC WBWG: MP	Riparian corridors; roosts in many habitats, including buildings and trees with exfoliating bark or cavities.	High: potential breeding and roosting habitat present.
Hoary bat *Lasiurus cinereus*	WBWG: MP	Widespread among forests in North America: typically migrates long distances between winter range and summer breeding range.	Moderate: does not breed in California; may roost during migration.
Western red bat *Lasiurus blossevillii*	WBWG: HP	Dependent upon intact riparian habitat, typically with large cottonwoods, willows, and sycamores.	Moderate: does not breed in California; may roost during migration.
Mexican free-tailed bat *Tardarida brasiliensis*	WBWG: LMP	Highly colonial; forages over most habitats. Maternity colonies in buildings, caves, and mines. Rarely roosts in trees.	Moderate: migrates locally and seasonally within California. Likely forages but not likely to breed on the site.

FT – Federal Threatened
FC – Federal Candidate
FPD – Federal Proposed for Delisting
FSC – Federal Special Concern
BCC – Fish and Wildlife Service Birds of Conservation Concern
SE – State Endangered
ST – State threatened
CSC – California Species of Special Concern

WBWG – Western Bat Working Group Designations (2005) for conservation measures
HP – Highest Priority
MP – Medium Priority
LMP – Low Medium Priority
LP – Low Priority

Appendix C. Results of Wildlife Reconnaissance Survey.

Common Name	Scientific Name	Status*	Number of individuals detected
Turkey Vulture	*Cathartes aura*	R	1
Red-tailed Hawk	*Buteo jamaicensis*	R	1
California Quail	*Callipepla californica*	R	2
Mourning Dove	*Zenaida macroura*	R	2
Anna's Hummingbird	*Calypte anna*	R	2
Acorn Woodpecker	*Melanerpes formicivorus*	R	2
Nuttall's Woodpecker	*Picoides nuttallii*	R	4
Hairy Woodpecker	*Picoides vilosus*	R	2
Northern Flicker	*Colaptes auratus*	R	2
Western Wood-Pewee	*Contopus sordidulus*	S	6
Dusky Flycatcher	*Empidonax oberholseri*	M	2
Ash-throated Flycatcher	*Myiarchus cinerascens*	S	4
Hutton's Vireo	*Vireo huttoni*	R	2
Warbling Vireo	*Vireo gilvus*	S	6
Cassin's Vireo	*Vireo cassinii*	S	1
Northern Raven	*Corvus corax*	R	1
Western Scrub-Jay	*Aphelocoma californica*	R	8
Oak Titmouse	*Baeolophus inornatus*	R	6
Bushtit	*Psaltriparus minimus*	R	4
Red-breasted Nuthatch	*Sitta canadensis*	W	1
White-breasted Nuthatch	*Sitta carolinensis*	R	1
Bewick's Wren	*Thryomanes bewickii*	R	2
House Wren	*Troglodytes aedon*	S	2
Blue-gray Gnatcatcher	*Polioptila caerula*	S	2
Western Bluebird	*Sialia mexicana*	R	2
American Robin	*Turdus migratorius*	R	2
Wrentit	*Chamaea fasciata*	R	2
Phainopepla	*Phainopepla nitens*	R	2
Orange-crowned Warbler	*Vermivora celata*	S	6
Nashville Warbler	*Vermivora ruficapilla*	S	4
Hermit Warbler	*Dendroica occidentalis*	M	1
Yellow-rumped Warbler	*Dendroica coronata*	W	1
Wilson's Warbler	*Wilsonia pusilla*	S	3
Western Tanager	*Piranga ludoviciana*	S	4
Spotted Towhee	*Pipilo maculatus*	R	4
California Towhee	*Pipilo crissalis*	R	1
Rufous-crowned Sparrow	*Aimophila ruficeps*	R	1
Chipping Sparrow	*Spizella passerina*	S	2
Lark Sparrow	*Chondestes grammacus*	R	4
Black-headed Grosbeak	*Pheucticus melanocephalus*	S	4

Lazuli Bunting	*Passerina amoena*	S	1
Brown-headed Cowbird	*Molothrus ater*	R	1
Bullock's Oriole	*Icterus bullockii*	S	4
Cassin's Finch	*Carpodacus cassinii*	W	1
Purple Finch	*Carpodacus purpureus*	R	1
Lesser Goldfinch	*Carduelis psaltria*	R	6
Evening Grosbeak	*Coccothraustes vespertinus*	W	1

***Status**
R = Resident breeding species
S = Summer only breeding species
M = Migrant only
W = Winter only

Survey Information:

Date: 5/11/2005	Date: 5/12/2005
John Sterling	John Sterling
2-5 PM	8-10 AM
60° F	64° F
overcast skies	clear skies
no wind	no wind

Appendix D:

July 1999
U.S. Fish and Wildlife Service
Conservation Guidelines for the Valley Elderberry Longhorn Beetle

United States Department of the Interior
Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Revised July 9, 1999

The following guidelines have been issued by the U.S. Fish and Wildlife Service (Service) to assist Federal agencies and non-federal project applicants needing incidental take authorization through a section 7 consultation or a section 10(a)(1)(B) permit in developing measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle. The Service will revise these guidelines as needed in the future. The most recently issued version of these guidelines should be used in developing all projects and habitat restoration plans. The survey and monitoring procedures described below are designed to avoid any adverse effects to the valley elderberry longhorn beetle. Thus a recovery permit is not needed to survey for the beetle or its habitat or to monitor conservation areas. If you are interested in a recovery permit for research purposes please call the Service's Regional Office at (503) 231-2063.

Background Information

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), was listed as a threatened species on August 8, 1980 (Federal Register 45: 52803-52807). This animal is fully protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The valley elderberry longhorn beetle (beetle) is completely dependent on its host plant, elderberry (Sambucus species), which is a common component of the remaining riparian forests and adjacent upland habitats of California's Central Valley. Use of the elderberry by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the elderberry's use by the beetle is an exit hole created by the larva just prior to the pupal stage. The life cycle takes one or two years to complete. The animal spends most of its life in the larval stage, living within the stems of an elderberry plant. Adult emergence is from late March through June, about the same time the elderberry produces flowers. The adult stage is short-lived. Further information on the life history, ecology, behavior, and distribution of the beetle can be found in a report by Barr (1991) and the recovery plan for the beetle (USFWS 1984).

Surveys

Proposed project sites within the range of the valley elderberry longhorn beetle should be surveyed for the presence of the beetle and its elderberry host plant by a qualified biologist. The beetle's range extends throughout California's Central Valley and associated foothills from about the 3,000-foot elevation contour on the east and the watershed of the Central Valley on the west (Figure 1). All or portions of 31 counties are included: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Madera, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba.

If elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level occur on or adjacent to the proposed project site, or are otherwise located where they may be directly or indirectly affected by the proposed action, minimization measures which include planting replacement habitat (conservation planting) are required (Table 1).

All elderberry shrubs with one or more stems measuring 1.0 inch or greater in diameter at ground level that occur on or adjacent to a proposed project site must be thoroughly searched for beetle exit holes (external evidence of beetle presence). In addition, all elderberry stems one inch or greater in diameter at ground level must be tallied by diameter size class (Table 1). As outlined in Table 1, the numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether a proposed project lies in a riparian or non-riparian area.

Elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level are unlikely to be habitat for the beetle because of their small size and/or immaturity. Therefore, no minimization measures are required for removal of elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level with no exit holes. Surveys are valid for a period of two years.

Avoid and Protect Habitat Whenever Possible

Project sites that do not contain beetle habitat are preferred. If suitable habitat for the beetle occurs on the project site, or within close proximity where beetles will be affected by the project, these areas must be designated as avoidance areas and must be protected from disturbance during the construction and operation of the project. When possible, projects should be designed such that avoidance areas are connected with adjacent habitat to prevent fragmentation and isolation of beetle populations. Any beetle habitat that cannot be avoided as described below should be considered impacted and appropriate minimization measures should be proposed as described below.

Avoidance: Establishment and Maintenance of a Buffer Zone

Complete avoidance (i.e., no adverse effects) may be assumed when a 100-foot (or wider) buffer is established and maintained around elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level. Firebreaks may not be included in the buffer zone. In buffer areas construction-related disturbance should be minimized, and any damaged area should be promptly restored following construction. The Service must be consulted before any disturbances within the buffer area are considered. In addition, the Service must be provided with a map identifying the avoidance area and written details describing avoidance measures.

Protective Measures

1. Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by the Service, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.

2. Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.

3. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.

4. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant.

Restoration and Maintenance

Restore any damage done to the buffer area (area within 100 feet of elderberry plants) during construction. Provide erosion control and re-vegetate with appropriate native plants.

Buffer areas must continue to be protected after construction from adverse effects of the project. Measures such as fencing, signs, weeding, and trash removal are usually appropriate.

No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.

The applicant must provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.

Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment).

Transplant Elderberry Plants That Cannot Be Avoided

Elderberry plants must be transplanted if they can not be avoided by the proposed project. All elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level must be transplanted to a conservation area (see below). At the Service's discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible the minimization ratios in Table 1 may be increased to offset the additional habitat loss.

Trimming of elderberry plants (e.g., pruning along roadways, bike paths, or trails) with one or more stems 1.0 inch or greater in diameter at ground level, may result in take of beetles. Therefore, trimming is subject to appropriate minimization measures as outlined in Table 1.

1. Monitor. A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry plants to insure that no unauthorized take of the valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the Service and to the California Department of Fish and Game.

2. Timing. Transplant elderberry plants when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.

3. Transplanting Procedure.

  a. Cut the plant back 3 to 6 feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems measuring 1.0 inch or greater in diameter at ground level should be replanted. Any leaves remaining on the plant should be removed.

  b. Excavate a hole of adequate size to receive the transplant.

  c. Excavate the plant using a Vemeer spade, backhoe, front end loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately at the conservation area. Move the plant only by the root ball. If the plant is to be moved and transplanted off site, secure the root ball with wire and wrap it with burlap. Dampen the burlap with water, as necessary, to keep the root ball wet. Do not let the roots dry out. Care should be taken to ensure that the soil is not dislodged from around the roots of the transplant. If the site receiving the transplant does not have adequate soil moisture, pre-wet the soil a day or two before transplantation.

  d. The planting area must be at least 1,800 square feet for each elderberry transplant. The root ball should be planted so that its top is level with the existing ground. Compact the soil sufficiently so that settlement does not occur. As many as five (5) additional elderberry plantings (cuttings or seedlings) and up to five (5) associated native species plantings (see below) may also be planted within the 1,800 square foot area with the transplant. The transplant and each new planting should have its own watering basin measuring at least three (3) feet in diameter. Watering basins should have a continuous berm measuring approximately eight (8) inches wide at the base and six (6) inches high.

  e. Saturate the soil with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substances, as the effects of these compounds on the beetle are unknown.

f. Monitor to ascertain if additional watering is necessary. If the soil is sandy and well-drained, plants may need to be watered weekly or twice monthly. If the soil is clayey and poorly-drained, it may not be necessary to water after the initial saturation. However, most transplants require watering through the first summer. A drip watering system and timer is ideal. However, in situations where this is not possible, a water truck or other apparatus may be used.

Plant Additional Seedlings or Cuttings

Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Minimization ratios are listed and explained in Table 1. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the conservation area. If the Service determines that the elderberry plants on the proposed project site are unsuitable candidates for transplanting, the Service may allow the applicant to plant seedlings or cuttings at higher than the stated ratios in Table 1 for each elderberry plant that cannot be transplanted.

Plant Associated Native Species

Studies have found that the beetle is more abundant in dense native plant communities with a mature overstory and a mixed understory. Therefore, a mix of native plants associated with the elderberry plants at the project site or similar sites will be planted at ratios ranging from 1:1 to 2:1 [native tree/plant species to each elderberry seedling or cutting (see Table 1)]. These native plantings must be monitored with the same survival criteria used for the elderberry seedlings (see below). Stock of saplings, cuttings, and seedlings should be obtained from local sources. If the parent stock is obtained from a distance greater than one mile from the conservation area, approval by the Service of the native plant donor sites must be obtained prior to initiation of the revegetation work. Planting or seeding the conservation area with native herbaceous species is encouraged. Establishing native grasses and forbs may discourage unwanted non-native species from becoming established or persisting at the conservation area. Only stock from local sources should be used.

Examples

Example 1

The project will adversely affect beetle habitat on a vacant lot on the land side of a river levee. This levee now separates beetle habitat on the vacant lot from extant Great Valley Mixed Riparian Forest (Holland 1986) adjacent to the river. However, it is clear that the beetle habitat located on the vacant lot was part of a more extensive mixed riparian forest ecosystem extending farther from the river's edge prior to agricultural development and levee construction. Therefore, the beetle habitat on site is considered riparian. A total of two elderberry plants with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The two plants have a total of 15 stems measuring over 1.0 inch. No exit holes were found on either plant. Ten of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are greater than 5.0 inches in diameter. The conservation area is suited for riparian forest habitat. Associated natives adjacent to the conservation area are box elder (Acer negundo californica), walnut (Juglans californica var. hindsii), sycamore (Platanus racemosa), cottonwood (Populus fremontii), willow (Salix gooddingii and S. laevigata), white alder (Alnus rhombifolia), ash (Fraxinus latifolia), button willow (Cephalanthus occidentalis), and wild grape (Vitis californica).

Minimization (based on ratios in Table 1):

- Transplant the two elderberry plants that will be affected to the conservation area.

- Plant 40 elderberry rooted cuttings (10 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

- Plant 40 associated native species (ratio of associated natives to elderberry plantings is 1:1 in areas with no exit holes):

  5 saplings each of box elder, sycamore, and cottonwood

  5 willow seedlings

  5 white alder seedlings

  5 saplings each of walnut and ash

  3 California button willow

  2 wild grape vines

  Total: 40 associated native species

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 80 plants must be planted (40 elderberries and 40 associated natives), a total of 0.33 acre (14,400 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Example 2

The project will adversely affect beetle habitat in Blue Oak Woodland (Holland 1986). One elderberry plant with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The plant has a total of 10 stems measuring over 1.0 inch. Exit holes were found on the plant. Five of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are between 3.0 and 5.0 inches in diameter. The conservation area is suited for elderberry savanna (non-riparian habitat). Associated natives adjacent to the conservation area are willow (Salix species), blue oak (Quercus douglasii), interior live oak (Q. wislizenii), sycamore, poison oak (Toxicodendron diversilobum), and wild grape.

Minimization (based on ratios in Table 1):

- Transplant the one elderberry plant that will be affected to the conservation area.

- Plant 30 elderberry seedlings (5 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

- Plant 60 associated native species (ratio of associated natives to elderberry plantings is 2:1 in areas with exit holes):

  20 saplings of blue oak, 20 saplings of sycamore, and 20 saplings of willow, and seed and plant with a mixture of native grasses and forbs

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 90 plants must be planted (30 elderberries and 60 associated natives), a total of 0.37 acre (16,200 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Conservation Area—Provide Habitat for the Beetle in Perpetuity

The conservation area is distinct from the avoidance area (though the two may adjoin), and serves to receive and protect the transplanted elderberry plants and the elderberry and other native plantings. The Service may accept proposals for off-site conservation areas where appropriate.

1. Size. The conservation area must provide at least 1,800 square feet for each transplanted elderberry plant. As many as 10 conservation plantings (i.e., elderberry cuttings or seedlings and/or associated native plants) may be planted within the 1800 square foot area with each transplanted elderberry. An additional 1,800 square feet shall be provided for every additional 10 conservation plants. Each planting should have its own watering basin measuring approximately three feet in diameter. Watering basins should be constructed with a continuous berm measuring approximately eight inches wide at the base and six inches high.

   The planting density specified above is primarily for riparian forest habitats or other habitats with naturally dense cover. If the conservation area is an open habitat (i.e., elderberry savanna, oak woodland) more area may be needed for the required plantings. Contact the Service for assistance if the above planting recommendations are not appropriate for the proposed conservation area.

No area to be maintained as a firebreak may be counted as conservation area. Like the avoidance area, the conservation area should connect with adjacent habitat wherever possible, to prevent isolation of beetle populations.

Depending on adjacent land use, a buffer area may also be needed between the conservation area and the adjacent lands. For example, herbicides and pesticides are often used on orchards or vineyards. These chemicals may drift or runoff onto the conservation area if an adequate buffer area is not provided.

2. Long-Term Protection. The conservation area must be protected in perpetuity as habitat for the valley elderberry longhorn beetle. A conservation easement or deed restrictions to protect the conservation area must be arranged. Conservation areas may be transferred to a resource agency or appropriate private organization for long-term management. The Service must be provided with a map and written details identifying the conservation area; and the applicant must receive approval from the Service that the conservation area is acceptable prior to initiating the conservation program. A true, recorded copy of the deed transfer, conservation easement, or deed restrictions protecting the conservation area in perpetuity must be provided to the Service before project implementation.

Adequate funds must be provided to ensure that the conservation area is managed in perpetuity. The applicant must dedicate an endowment fund for this purpose, and designate the party or entity that will be responsible for long-term management of the conservation area. The Service must be provided with written documentation that funding and management of the conservation area (items 3-8 above) will be provided in perpetuity.

3. Weed Control. Weeds and other plants that are not native to the conservation area must be removed at least once a year, or at the discretion of the Service and the California Department of Fish and Game. Mechanical means should be used; herbicides are prohibited unless approved by the Service.

4. Pesticide and Toxicant Control. Measures must be taken to insure that no pesticides, herbicides, fertilizers, or other chemical agents enter the conservation area. No spraying of these agents must be done within one 100 feet of the area, or if they have the potential to drift, flow, or be washed into the area in the opinion of biologists or law enforcement personnel from the Service or the California Department of Fish and Game.

5. Litter Control. No dumping of trash or other material may occur within the conservation area. Any trash or other foreign material found deposited within the conservation area must be removed within 10 working days of discovery.

6. Fencing. Permanent fencing must be placed completely around the conservation area to prevent unauthorized entry by off-road vehicles, equestrians, and other parties that might damage or destroy the habitat of the beetle, unless approved by the Service. The applicant must receive written approval from the Service that the fencing is acceptable prior to initiation of the conservation program. The fence must be maintained in perpetuity, and must be

repaired/replaced within 10 working days if it is found to be damaged. Some conservation areas may be made available to the public for appropriate recreational and educational opportunities with written approval from the Service. In these cases appropriate fencing and signs informing the public of the beetle's threatened status and its natural history and ecology should be used and maintained in perpetuity.

7. Signs. A minimum of two prominent signs must be placed and maintained in perpetuity at the conservation area, unless otherwise approved by the Service. The signs should note that the site is habitat of the federally threatened valley elderberry longhorn beetle and, if appropriate, include information on the beetle's natural history and ecology. The signs must be approved by the Service. The signs must be repaired or replaced within 10 working days if they are found to be damaged or destroyed.

Monitoring

The population of valley elderberry longhorn beetles, the general condition of the conservation area, and the condition of the elderberry and associated native plantings in the conservation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If conservation planting is done in stages (i.e., not all planting is implemented in the same time period), each stage of conservation planting will have a different start date for the required monitoring time.

Surveys. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist. Surveys must include:

1. A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.

2. A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.

3. An evaluation of the elderberry plants and associated native plants on the site, and on the conservation area, if disjunct, including the number of plants, their size and condition.

4. An evaluation of the adequacy of the fencing, signs, and weed control efforts in the avoidance and conservation areas.

5. A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive weed growth, etc.

The materials and methods to be used in the monitoring studies must be reviewed and approved by the Service. All appropriate Federal permits must be obtained prior to initiating the field studies.

Reports. A written report, presenting and analyzing the data from the project monitoring, must be prepared by a qualified biologist in each of the years in which a monitoring survey is required. Copies of the report must be submitted by December 31 of the same year to the Service (Chief of Endangered Species, Sacramento Fish and Wildlife Office), and the Department of Fish and Game (Supervisor, Environmental Services, Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814; and Staff Zoologist, California Natural Diversity Data Base, Department of Fish and Game, 1220 S Street, Sacramento, California 95814). The report must explicitly address the status and progress of the transplanted and planted elderberry and associated native plants and trees, as well as any failings of the conservation plan and the steps taken to correct them. Any observations of beetles or fresh exit holes must be noted. Copies of original field notes, raw data, and photographs of the conservation area must be included with the report. A vicinity map of the site and maps showing where the individual adult beetles and exit holes were observed must be included. For the elderberry and associated native plants, the survival rate, condition, and size of the plants must be analyzed. Real and likely future threats must be addressed along with suggested remedies and preventative measures (e.g. limiting public access, more frequent removal of invasive non-native vegetation, etc.).

A copy of each monitoring report, along with the original field notes, photographs, correspondence, and all other pertinent material, should be deposited at the California Academy of Sciences (Librarian, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118) by December 31 of the year that monitoring is done and the report is prepared. The Service's Sacramento Fish and Wildlife Office should be provided with a copy of the receipt from the Academy library acknowledging receipt of the material, or the library catalog number assigned to it.

Access. Biologists and law enforcement personnel from the California Department of Fish and Game and the Service must be given complete access to the project site to monitor transplanting activities. Personnel from both these agencies must be given complete access to the project and the conservation area to monitor the beetle and its habitat in perpetuity.

Success Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The Service will make any determination as to the applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

Service Contact

These guidelines were prepared by the Endangered Species Division of the Service's Sacramento Fish and Wildlife Office. If you have questions regarding these guidelines or to request a copy of the most recent guidelines, telephone (916) 414-6600, or write to:

U.S. Fish and Wildlife Service
Ecological Services
2800 Cottage Way, W-2605
Sacramento, CA 95825

Literature Cited

Barr, C. B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service; Sacramento, California.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

USFWS. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

USFWS. 1984. Recovery plan for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Endangered Species Program; Portland, Oregon.

Table 1: Minimization ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes.

Location	Stems (maximum diameter at ground level)	Exit Holes on Shrub Y/N (quantify) [1]	Elderberry Seedling Ratio[2]	Associated Native Plant Ratio[3]
non-riparian	stems >=1" & =<3"	No:	1:1	1:1
		Yes:	2:1	2:1
non-riparian	stems >3" & <5"	No:	2:1	1:1
		Yes:	4:1	2:1
non-riparian	stems >=5"	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems >=1" & <=3"	No:	2:1	1:1
		Yes:	4:1	2:1
riparian	stems > 3" & < 5"	No:	3:1	1:1
		Yes:	6:1	2:1

riparian	stems >=5"	No:	4:1	1:1
		Yes:	8:1	2:1

[1] All stems measuring one inch or greater in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

[2] Ratios in the Elderberry Seedling Ratio column correspond to the number of cuttings or seedlings to be planted per elderberry stem (one inch or greater in diameter at ground level) affected by a project.

[3] Ratios in the Associated Native Plant Ratio column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

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Click for range map

Endangered Species Div., Sacramento Fish & Wildlife Office, U.S. Fish & Wildlife Service

APPENDIX I

Revised North Fork Water and Wastewater Feasibility Study

North Fork
Water and Wastewater Feasibility Study

June 2008

Prepared for:

North Fork Rancheria of Mono Indians
P.O. Box 929
North Fork, California 93643
and
Analytical Environmental Services
2021 "N" Street, Suite 200
Sacramento, California

HydroScience Engineers, Inc.

Table of Contents

Appendices

A	Flow Calculations
B	Recycled Water Uses - Title 22
C	City of Madera Source Water Assessment
D	Water Balance Calculations
E	Waste Discharge Requirements, El Dorado Irrigation District and San Andreas Sanitary District

Figures

Tables

1.0 Introduction

HydroScience Engineers, Inc., (HSe) was retained by Analytical Environmental Services (AES), Inc. to prepare a water and wastewater feasibility study for the proposed North Fork hotel, casino, or retail alternatives at the North Fork Rancheria owned by the Mono Indians (Tribe) in Madera County, California. This includes a review of background site conditions, an evaluation of the facility requirements, and a preliminary design of key water and wastewater facilities. This report summarizes HSe's investigation and is organized into the following sections:

- Introduction
- Projected Flows
- Regulatory Requirements
- Water Supply Assessment
- Wastewater Assessment
- Conclusions and Recommendations
- Abbreviations
- References

1.1 Background

Two separate locations are being considered, one of which is near Madera (Madera site), and the other one is near North Fork (North Fork site). These locations are shown in **Figure 1-1**. The proposed site near the City of Madera is approximately 305-acres in size and is located along Highway 99 as shown in **Figure 1-2.** It is currently utilized for growing agricultural crops, and has a residence and associated outbuildings on the property's southeastern corner. An aerial photograph of the site is shown in **Figure 1-3.** The other proposed project site is located near the City of North Fork, in the Sierra Nevada foothills approximately 20 miles south of Yosemite National Park, as shown in **Figure 1-4**. The total project site is approximately 31-acres in size and is currently utilized as a rural residential area.

1.2 Project Description

Five alternatives are being considered for this project. Three of the alternatives are located near the City of Madera, and a fourth alternative is located near the City of North Fork. The fifth alternative is to take no action. The five alternatives are as follows:

- Alternative A – An approximately 250,000 square foot (ft^2) casino with a 200-room hotel at the Madera site as shown in **Figure 1-5.**
- Alternative B – An approximately 190,000 ft^2 casino at the Madera site as shown in **Figure 1-6.**
- Alternative C – A regional shopping center at the Madera site as shown in **Figure 1-7.**
- Alternative D – An approximately 26,000 ft^2 casino located near the City of North Fork as shown in **Figure 1-8.**
- Alternative E – No action alternative. Alternative E is not discussed further in this water and wastewater feasibility study because it is assumed that no additional water demands or wastewater flows will be generated from the proposed project sites under this alternative.

North Fork Site
(Alternative D)

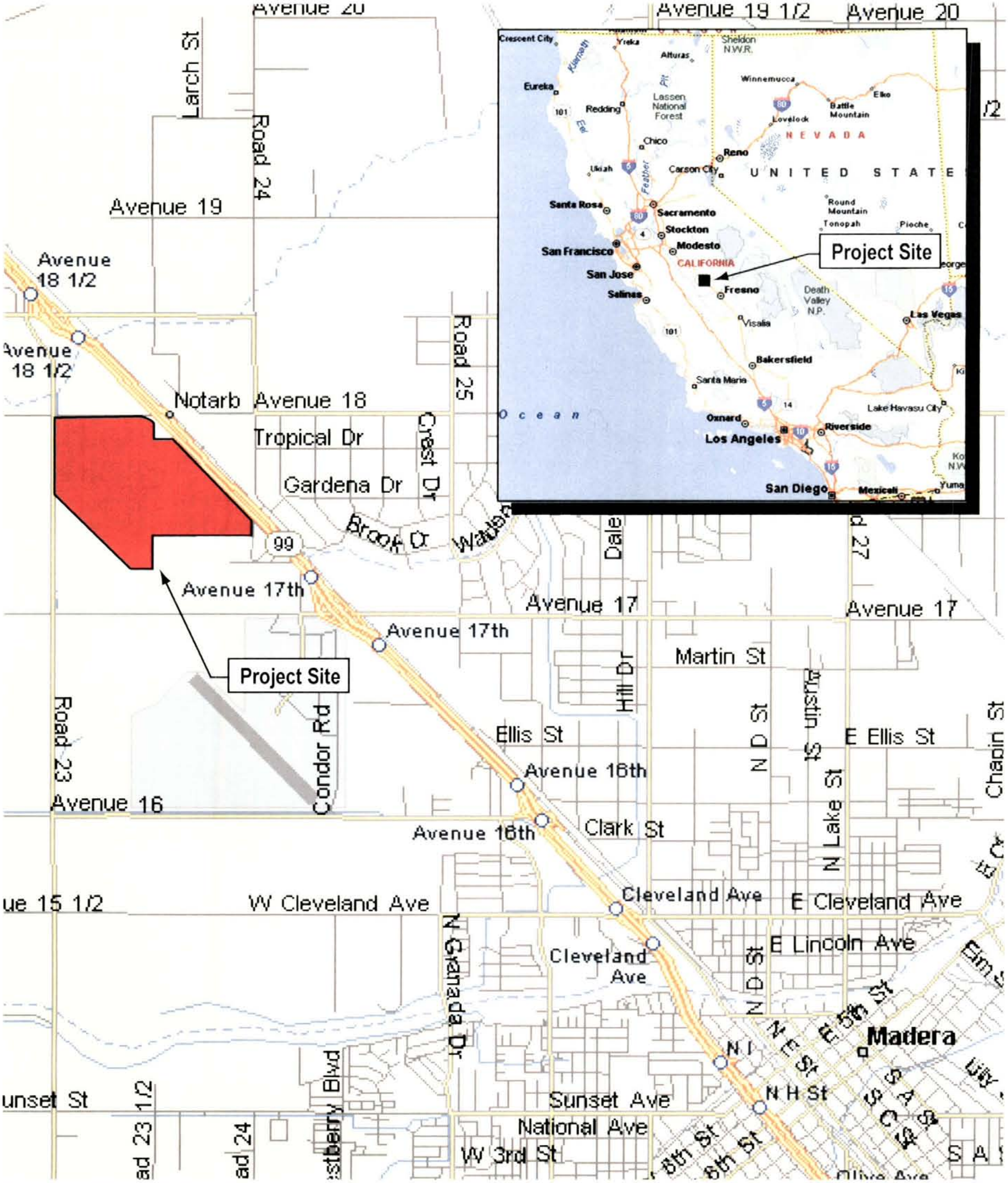
North Fork

Madera Site
(Alternatives A, B, and C)

s:\common\projects\North Fork Rancheria\Report\0611Report\v10\figures\fig1-1vicinity map.pdf

HydroScience Engineers, Inc.

Figure 1-1
North Fork
Water and Wastewater Feasibility Study
Vicinity Map



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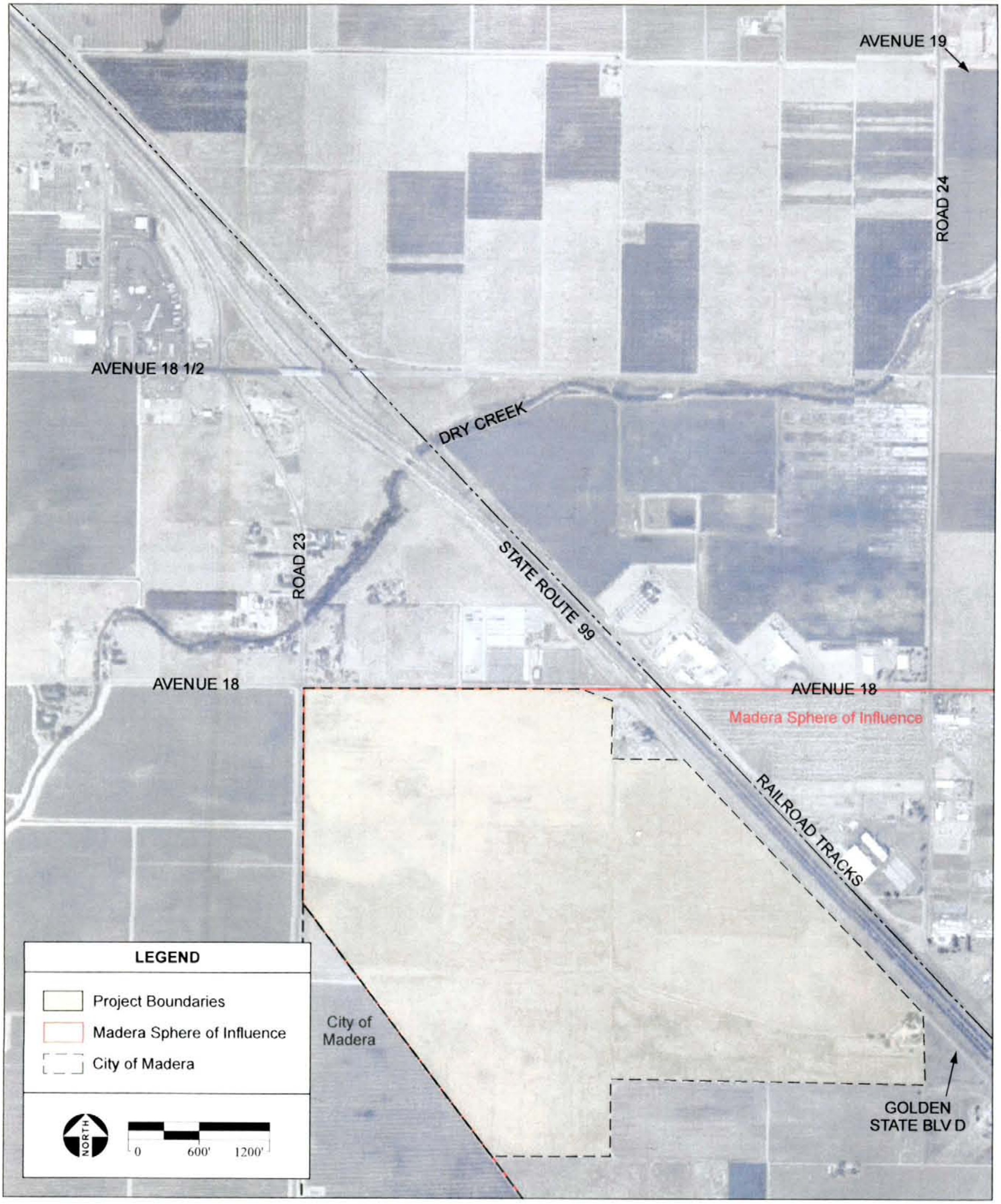
HydroScience Engineers, Inc.

Figure 1-2
North Fork
Water and Wastewater Feasibility Study
Vicinity and Location Map for Alternatives A, B, and C



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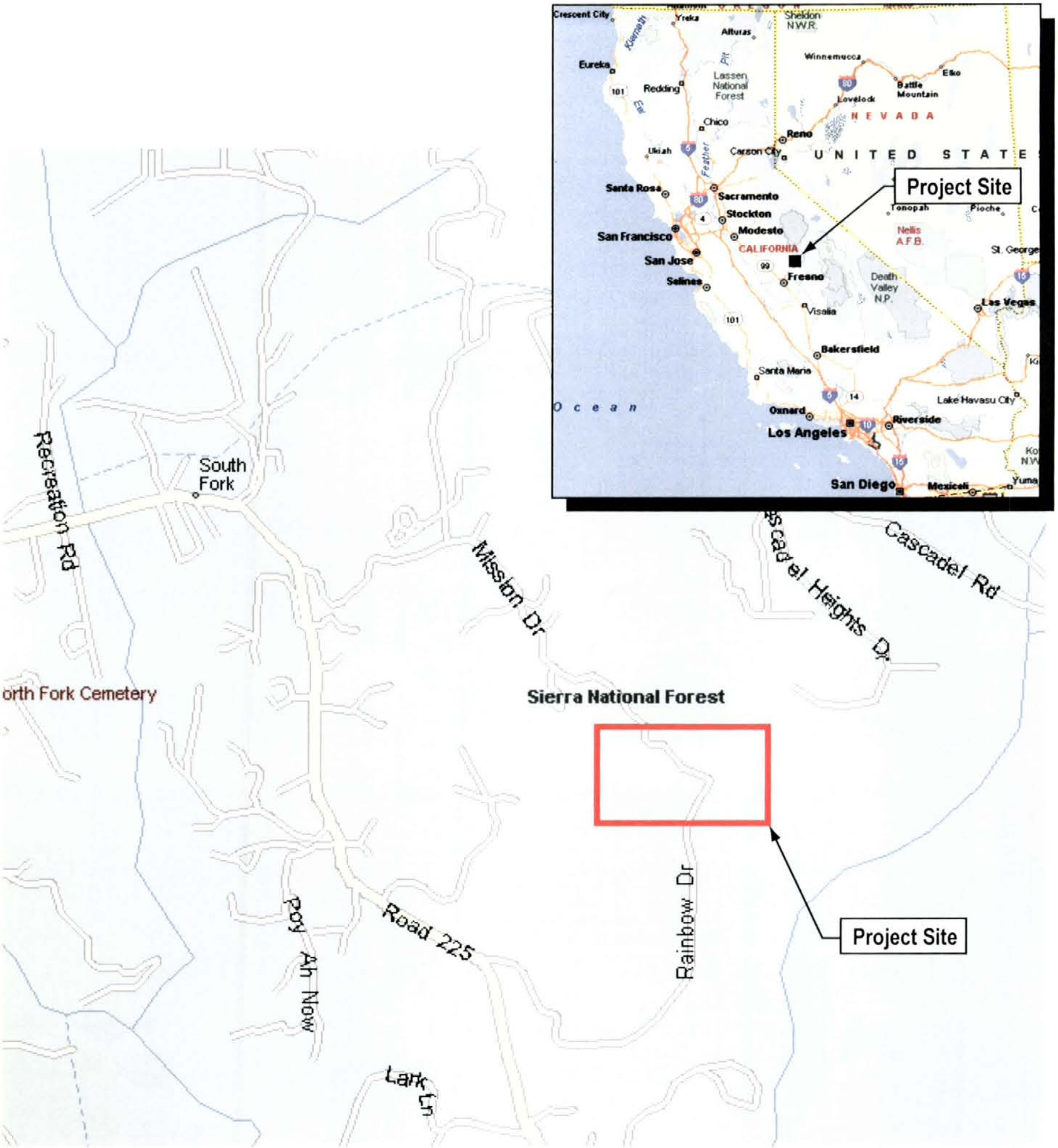
HydroScience Engineers, Inc.

Figure 1-3
North Fork
Water and Wastewater Feasibility Study
Aerial Site Map for Alternatives A, B, and C



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HydroScience Engineers, Inc.

Figure 1-4
North Fork
Water and Wastewater Feasibility Study
Vicinity and Location Map for Alternative D

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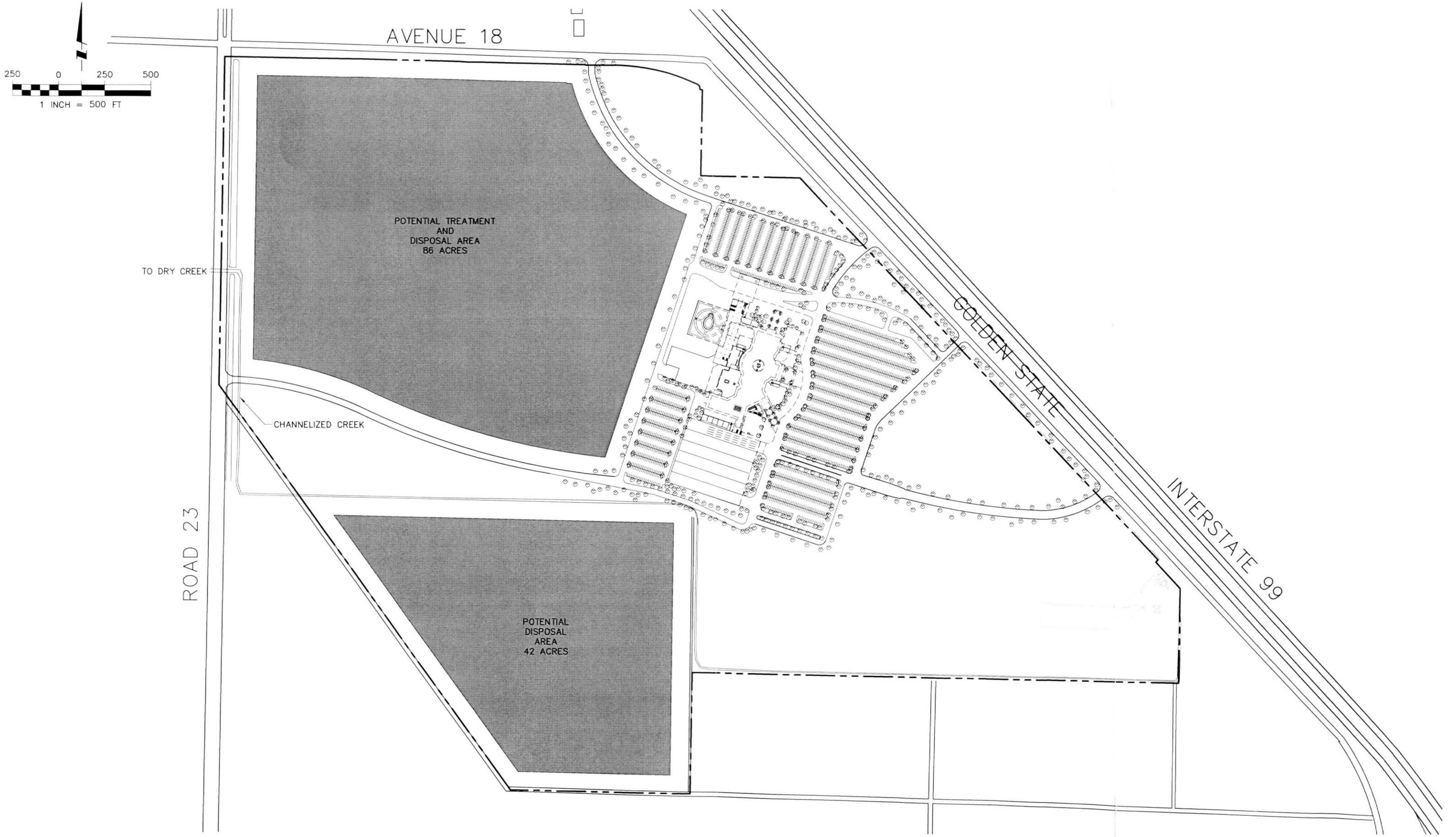


HydroScience Engineers, Inc.

Figure 1-5
North Fork
Water and Wastewater Feasibility Study
Alternative A Site Plan

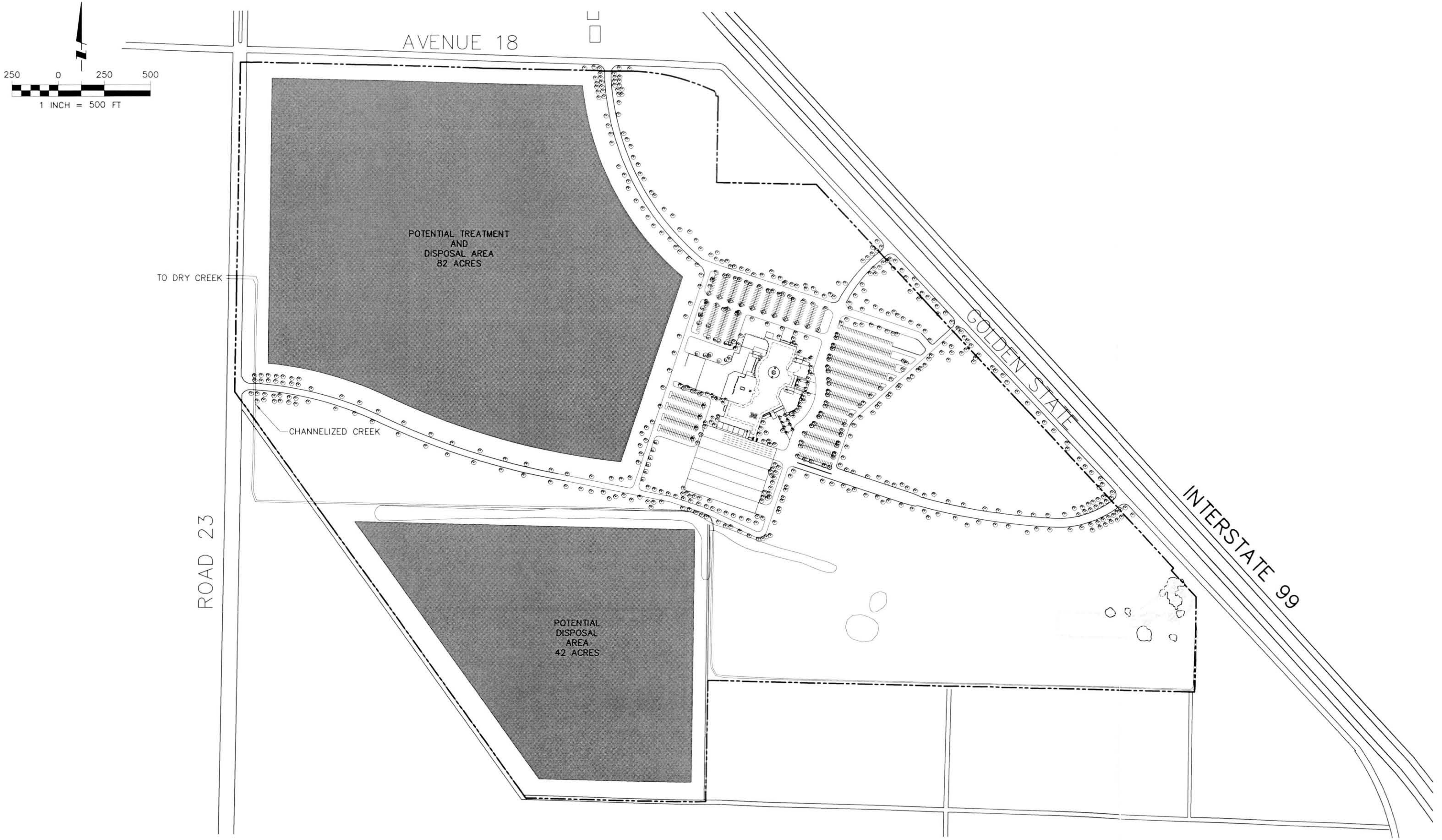
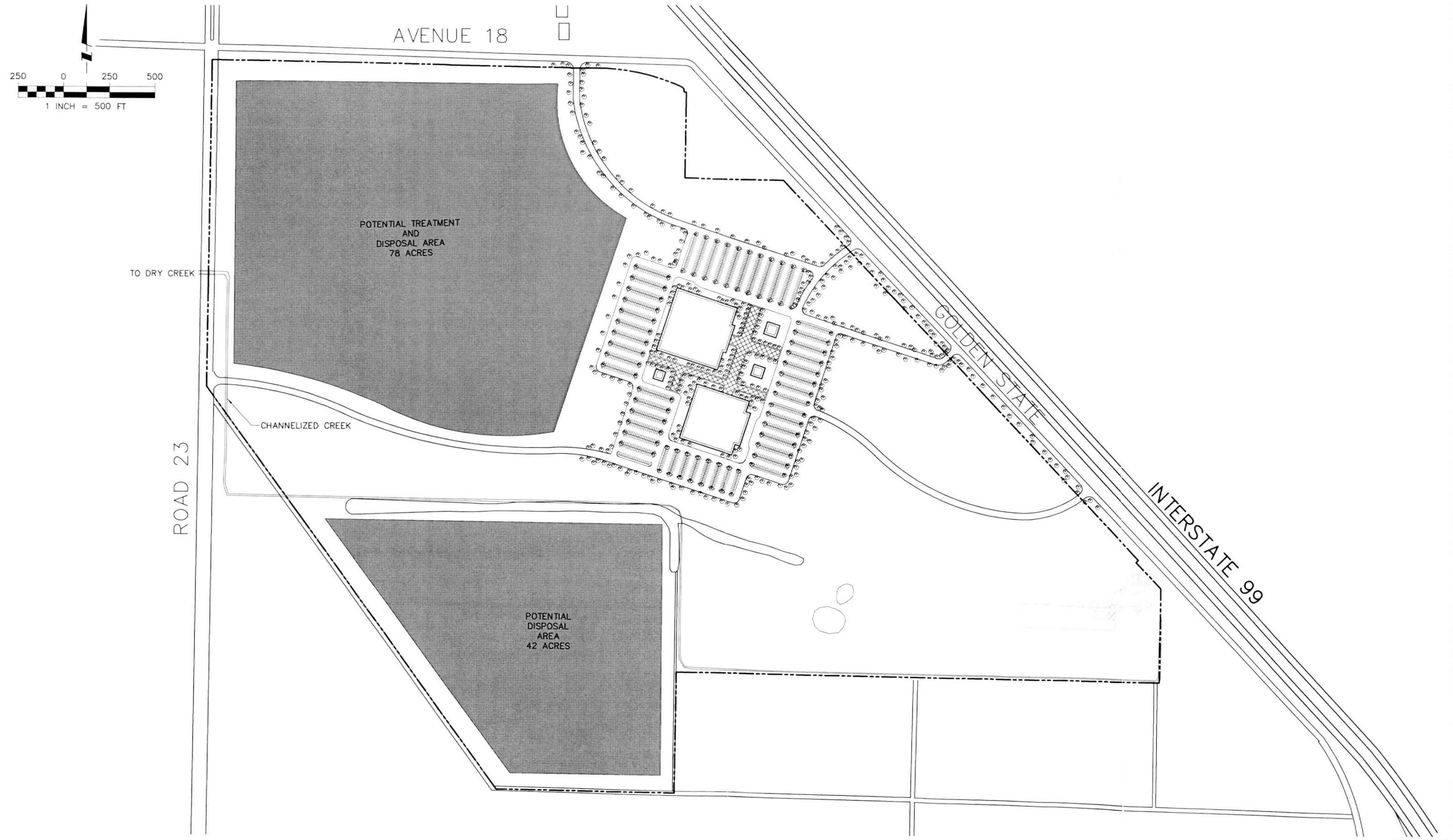


Figure 1-6
North Fork
Water and Wastewater Feasibility Study
Alternative B Site Plan

HydroScience Engineers, Inc.



HydroScience Engineers, Inc.

Figure 1-7
North Fork
Water and Wastewater Feasibility Study
Alternative C Site Plan

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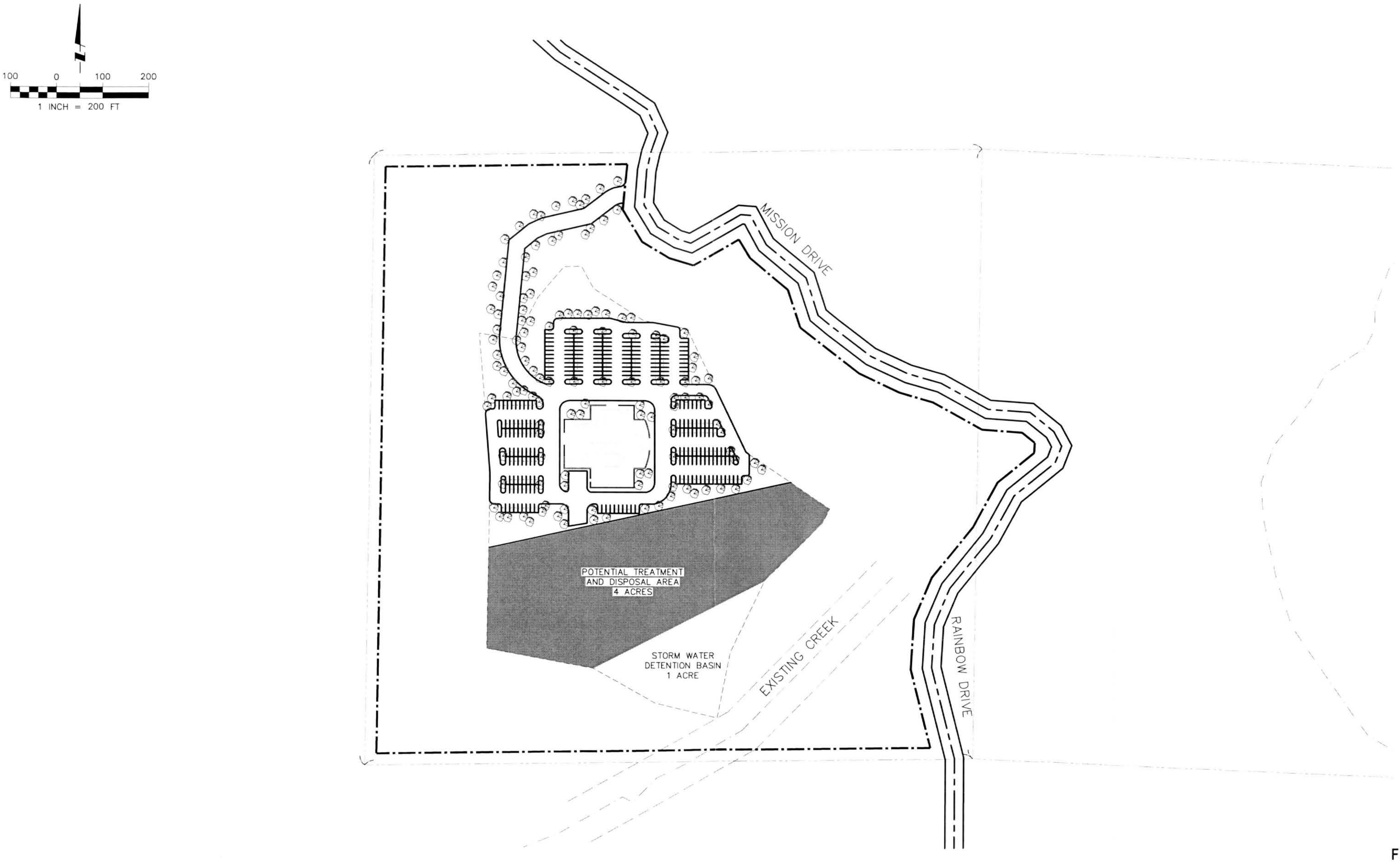


HydroScience Engineers, Inc.

Figure 1-8
North Fork
Water and Wastewater Feasibility Study
Alternative D Site Plan

Related facility area (square footage) estimates for each alternative are further summarized in **Table 1-1**.

Table 1-1: Facility Area Estimates

Facility	Alternative			
	A **(ft^2)**	**B** **(ft^2)**	**C** (ft^2)	**D** (ft^2)
Casino				
Casino Gaming	83,100	57,000	--	8,900
Support Areas	28,500	23,800	--	4,600
Food and Beverage	67,400	53,700	12,000	4,500
Public and Misc. Areas	10,000	9,500	--	2,000
Back of House	50,000	37,800	--	6,000
Retail	1,200	--	225,000	--
Entertainment/Lounge	7,000	7,000	--	--
Hotel	207,700	--	--	--
Pool and Spa	16,800	--	--	--
Central Plant/Cooling Towers	21,300	9,000	--	--
Project Total[a]	**493,000**	**198,000**	**237,000**	**26,000**

[a] Does not include parking.

1.3 Objectives

This water and wastewater feasibility study for the proposed North Fork Hotel, casino, or retail alternatives in Madera County, California will be a preliminary planning document and is not intended for purposes of design and construction. The objectives of this feasibility study are listed below.

- Estimate domestic water demands and any on-site storage requirements
- Evaluate wastewater flows based on the proposed facilities and comparable gaming facilities
- Develop preliminary sizing of key wastewater collection and treatment facilities
- Evaluate the potential for reducing water demands with reclaimed water
- Develop a water supply strategy
- Develop a wastewater treatment and disposal strategy

2.0 Projected Flows

This section outlines the design criteria and general assumptions for estimating the wastewater production and water demands anticipated for Alternatives A through D. The analysis begins with estimates of wastewater production, since unit wastewater flow for the various services and customers is more readily available than water usage information. This data is subsequently used to back-calculate the corresponding water demand.

In addition to the water and wastewater flows, recycled water demand and its influence on the water demand and wastewater disposal requirements were also evaluated. Reclamation has the dual advantage of reducing the net potable water demand and the wastewater disposal requirements, since potable water demand traditionally needed for landscape irrigation and toilet flushing, for instance, can be satisfied with recycled water. At the same time, treated wastewater that would normally require disposal can instead be applied for beneficial reuse. The extent to which the reclamation program affects the potable water demand and wastewater disposal requirements is also summarized in this section.

2.1 Wastewater Flows

Facility programs are used to calculate the wastewater flows for the proposed site layout alternatives. The facility program provided for each site alternative describes what type of restaurants are proposed and the respective number of seats, the number of hotel rooms, square footage of facility areas, retail areas, and the like. From these descriptions and quantities, unit wastewater flows (gallons per day per unit) can be estimated. **Tables 2-1 through 2-4** provide estimated wastewater flows for the four proposed site layout alternatives. Due to the size and complexity of the information used to generate the condensed results presented in **Tables 2-1 through 2-4**, refer to **Appendix A** for the complete versions of **Tables 2-1 through 2-4**.

Casinos differ from other business establishments in the hours that they are open, the type of services they provide and occupancy. The peak times of the day vary slightly depending on the surrounding community but there is a fairly typical pattern to the rate of occupancy for casinos in general. The occupancy or use of the casino typically varies depending on whether it is a weekday or a weekend. Occupancy and flows are usually the lowest during the weekdays of Monday through Friday. Normal two-day weekends (Saturday and Sunday) usually have the highest flows on a weekly basis.

A casino is open 24 hours a day and the number of guests varies throughout the day. Based on observed flows at other similar casinos there are times of the day when the casino has a lower or higher occupancy rate and these times are different, depending on whether it is during a weekday or a weekend. For example, during a typical weekday in the morning and early afternoon the casino has an occupancy rate of roughly 30 to 40 percent but starting in the late afternoon, and extending into the night, the casino may have a 60 to 70 percent occupancy rate.

Retail centers, however, are more typical business establishments in the hours that they are open, the type of services they provide and occupancy. Similar to casinos, the peak times of the day vary slightly depending on the surrounding community but there is a fairly typical pattern to the rate of occupancy for retail centers in general. The occupancy or use of the retail center typically varies depending on whether it is a weekday or a weekend. Occupancy and flows are usually the lowest during the weekdays of Monday through Friday. Normal two-day weekends (Saturday and Sunday) usually have the highest flows on a weekly basis.

A retail center is typically open 12-hours a day and the number of guests varies throughout the day. Based on flows at other retail centers there are times of the day when the shops have a lower or higher occupancy rate and these times are different, depending on whether it is during a weekday or a weekend. For example, during a typical weekday in the morning and early afternoon the retail center has an occupancy rate of roughly 30 to 40 percent but starting the late afternoon, and extending into the evening, the retail center may have a 60 to 70 percent occupancy rate.

For **Tables 2-1, 2-2, and 2-4**, the estimated flows are based on a summation of flows for two 12-hour cycles, a 12-hour morning (a.m.) cycle and a 12-hour evening (p.m.) cycle. The rates of occupancy for daily 12-hour cycles changes dramatically depending on whether it is during the weekday or a weekend day. For **Table 2-3,** the estimated flows are based on a summation of flows for a typical 12-hour business day for retail centers. The rates of occupancy for daily 12-hour cycles changes dramatically depending on whether it is during the weekday or a weekend day.

For all alternatives, an average estimated wastewater flow is calculated using the weekday and weekend flows. The average is weighted based on five days of weekday plus two days of weekend flows. The average wastewater flow is useful in determining the design average day water demand and design wastewater disposal flow.

Table 2-1: Estimated Wastewater Flows for Alternative A

	Area (ft^2)	Unit (gpd/ft^2)	Base Flow (gpd)	Typical WEEKDAY Flows [a] (gpd)	Typical WEEKEND Flows [a] (gpd)	AVERAGE Day Flows [b] (gpd)
Casino	121,630	1.25	151,700	87,200	128,900	99,100
Back of House	50,000	1.37	68,500	27,400	41,400	31,400
Retail	1,185	0.01	12	5	9	8
Food and Beverage	67,365	1.56	105,200	50,700	89,500	61,800
Entertainment/Lounge	7,000	0.54	3,780	1,500	2,400	1,800
Hotel	207,680	0.16	32,700	16,100	31,600	20,500
Pool and Spa	16,850	0.35	4,320	1,800	3,700	2,400
Central Plant/Cooling Towers	21,300	3.10	66,000	49,500	49,500	49,500
TOTAL [c]	**493,000**		**432,000**	**230,000**	**350,000**	**270,000**

[a] Used for calculation purposes only.

[b] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[c] Total wastewater flows rounded to nearest 10,000 gpd.

Table 2-2: Estimated Wastewater Flows for Alternative B

	Area	Unit	Base Flow	Typical WEEKDAY Flows [a]	Typical WEEKEND Flows [a]	AVERAGE Day Flows [b]
	(ft^2)	(gpd/ft^2)	(gpd)	(gpd)	(gpd)	(gpd)
Casino	90,255	1.02	91,820	52,800	78,100	60,000
Back of House	37,825	1.39	52,420	21,000	31,600	24,000
Retail	--	--	--	--	--	--
Food and Beverage	53,725	1.46	78,640	37,900	66,800	46,100
Entertainment/Lounge	7,000	0.54	3,780	1,500	2,400	1,800
Hotel	--	--	--	--	--	--
Pool and Spa	--	--	--	--	--	--
Central Plant/Cooling Towers	9,000	4.44	40,000	30,000	30,000	30,000
TOTAL [c]	**198,000**		**270,000**	**140,000**	**210,000**	**160,000**

[a] Used for calculation purposes only.

[b] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[c] Total wastewater flows rounded to nearest 10,000 gpd.

Table 2-3: Estimated Wastewater Flows for Alternative C

	Area	Unit	Base Flow	Typical WEEKDAY Flows [a]	Typical WEEKEND Flows [a]	AVERAGE Day Flows [b]
	(ft^2)	(gpd/ft^2)	(gpd)	(gpd)	(gpd)	(gpd)
Retail	225,000	0.12	27,700	11,100	17,300	12,900
Food and Beverage	12,000	0.63	7,500	3,600	6,400	4,400
TOTAL [c]	**237,000**		**35,000**	**15,000**	**24,000**	**17,000**

[a] Used for calculation purposes only.

[b] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[c] Total wastewater flows rounded to nearest 1,000 gpd.

Table 2-4: Estimated Wastewater Flows for Alternative D

	Area	Unit	Base Flow	Typical WEEKDAY Flows [a]	Typical WEEKEND Flows [a]	AVERAGE Day Flows [b]
	(ft^2)	(gpd/ft^2)	(gpd)	(gpd)	(gpd)	(gpd)
Casino	15,451	1.00	15,500	8,900	13,180	10,130
Back of House	6,000	1.18	7,050	2,820	4,260	3,230
Retail	--		--	--	--	--
Food and Beverage	4,550	2.87	13,050	6,280	11,090	7,660
Entertainment/Lounge	--		--	--	--	--
Hotel	--		--	--	--	--
Pool and Spa	--		--	--	--	--
Central Plant/Cooling Towers	--		--	--	--	--
TOTAL [c]	**26,000**		**36,000**	**18,000**	**29,000**	**21,000**

[a] Used for calculation purposes only.

[b] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[c] Wastewater flows rounded to nearest 1,000 gpd.

It is assumed that the casino heating and air conditioning system will include cooling towers. Cooling towers extract waste heat to the atmosphere through the cooling of a water stream to a lower temperature. A cooling tower allows a small portion of the water being cooled to evaporate into a moving air stream to provide significant cooling to the rest of that water stream. Cooled water is returned from the cooling tower to be reused and some water must be added to it to replace the portion of the flow that evaporates. Some water is also lost by droplets being carried out with the exhaust air (drift).

The heat from the water stream transferred to the air stream raises the air's temperature and its relative humidity to 100%, and this air is discharged to the atmosphere. Because only pure water evaporates, the concentration of dissolved minerals and other solids in the recirculating water increases. To counteract this increasing concentration of dissolved minerals and other solids, water is periodically flushed from the system in a process called blow-down and replaced with fresh water.

The make-up amount must equal the total of the evaporation, blow-down, drift, and other water losses such as wind blowout and leakage, to maintain a steady water level. In total, the makeup water supply required to maintain a steady water level equals the water lost to evaporation, blow-down waste, and drift loss. It is assumed that drift loss equals 5% of the water supplied to the cooling tower. The drift loss is the loss that is not accounted for by evaporation and waste (or blow-down water).

Inflow and infiltration (I&I) is typical in older gravity sewer collection systems or in areas of poor surface drainage and high groundwater. I&I is calculated as a percentage of the influent flow. However, because this project will be new construction, it is assumed that no I&I will occur.

2.2 Potable Water Demand

There are many uses for domestic water in the proposed alternatives. The water supplied or purveyed from the site will have uses that include:

- Cooking
- Bath Tubs
- Cleaning
- Restrooms
- Laundry
- Pools and Hot Tubs
- Dishwashing
- Sinks
- Landscaping
- Heating Units
- Consumption
- Janitorial
- Cooling Towers
- Showers
- Air Conditioning Units

The domestic water demands are calculated from the estimated wastewater flows. It is assumed that there is a 5 percent loss in the domestic water flow, as it becomes wastewater due to consumption, evaporation, and leakage. For the cooling towers, it is assumed that the total evaporation and drift loss is twice the assumed wasting rate (or blow down) of the cooling towers. No sizing of the cooling towers or water demands have been provided; therefore, it is assumed that Alternatives A and B will operate like similarly sized casinos based on the square footage provided.

No areas were provided for cooling towers for Alternatives C and D, therefore, no flows were assumed for cooling towers for those alternatives.

Table 2-5 shows estimated water demands as a function of estimated wastewater flows. Weekday, weekend, and average day flows are provided. It is assumed that 5 percent of water used is lost to consumption and other factors, and does not become part of the wastewater flow. These numbers are preliminary and are for planning purposes only.

Fire flow requirements (or guidelines) are set by the local fire authorities, based on the building's use and classification. Storage requirements for casinos are generally controlled by fire protection requirements plus domestic requirements. The fire protection requirements are not identified in this document so an assumed storage requirement based on similar facilities was made.

Table 2-5: Estimated Water Demands if Water is Not Recycled (gpd)

	Alternative			
	A	B	C	D
Weekday Day [a]	346,000	211,000	15,000	19,000
Weekend Day [b]	464,000	280,000	25,000	30,000
Average Day [c]	380,000	231,000	18,000	22,000
Landscape Irrigation [d]	20,000	20,000	5,000	5,000
Recommended Water Supply [e]	**400,000**	**251,000**	**23,000**	**27,000**

[a] Weekday Day Demand = (Weekday Wastewater Flow/0.95 + Cooling Tower Evaporation and Drift).

[b] Weekend Day Demand = (Weekend Wastewater Flow/0.95 + Cooling Tower Evaporation and Drift).

[c] Average Day Demand = (Average Wastewater Flow/0.95 + Cooling Tower Evaporation and Drift).

[d] Estimated at average daily demand of 5,000 gpd/acre landscaping. Type and acreage of landscaping assumed.

[e] Recommended supply = average day plus landscape irrigation.

Assumes water demand for evaporation and drift losses are equal to twice the blow down waste.

Water demands rounded to the nearest 1,000 gpd.

2.3 Recycled Water

Recycled water in this report means wastewater that has been treated sufficiently to meet the California Department of Health Services' (DHS) comprehensive recycled water regulations that define treatment processes, water quality criteria, and treatment reliability requirements for public use of recycled water. These regulations are contained in Title 22, Division 4, Chapter 3 of the California Administrative Code, more commonly referred to as Title 22.

Approved by the State in December 2000, Title 22 prescribes recycled water criteria and divides them into several categories based upon the extent of public access or risk of exposure. In general, Title 22 regulations are more stringent for uses with high potential for public contact and less stringent for uses with low potential for public contact. Depending on the use, Title 22 establishes four levels of treatment required for recycled water: undisinfected secondary, undisinfected secondary–23, undisinfected secondary–2.2, and disinfected tertiary. For more information on uses for these categories, see **Appendix B.**

Disinfected Tertiary Recycled Water. If on-site treatment is selected, this level of treatment is recommended because it provides greater flexibility in reuse and disposal options. This category of recycled water includes secondary effluent that has undergone tertiary treatment and has been disinfected to a level such that the median coliform bacteria in the water does not exceed 2.2 most probable number (MPN) per 100 milliliter (mL). Title 22 defines the tertiary treatment process as wastewater that has been oxidized, coagulated, clarified, and filtered. The recycled water turbidity should not exceed 2 nephelometric turbidity units (NTU) on average, should not exceed 5 NTU more than five percent of the time during any 24-hour period, and should never exceed 10 NTU.

2.3.1 Design Criteria

To estimate the extent of the potable water applications that could be substituted with recycled water, average water usage for each facility was broken down according to the possible applications. These applications and their typical usage breakdowns are summarized in **Table 2-6.** All toilet flushing and landscaping can be dual-plumbed for use with disinfected tertiary recycled water. It is assumed that approximately 50 percent of the water demand for the cooling towers can be converted to recycled water use. The percent reduction in potable water demand use is then estimated on a basis of percent replacement by recycled water.

Table 2-6: Breakdown in Typical Domestic Water Uses at Varying Facilities

Facility	Toilet Flushing [a]	Bathing	Cooking, drinking	Laundry, dishes	Cooling Towers [a]	Landscape Irrigation [a]	Water Demand Reduction Using Recycled Water
Casino	72% [b]	-	28%	-	-	-	72%
Events center	72% [b]	-	28%	-	-	-	72%
Restaurant	27%	-	53%	20%	-	-	27%
Retail	72% [b]	-	28%	-	-	-	72%
Cooling Towers	-	-	-	-	100%	-	50%
Landscape Irrigation						100%	100%

[a] Can be converted to recycled water service.
[b] Source: Irvine Ranch Water District
RW = Recycled Water

2.3.2 Recycled Water Demands

The use of recycled water at the proposed facilities for the use of flushing toilets, urinals, and the cooling towers would reduce the potable water demand. In similarly sized facilities the recycling of disinfected tertiary reclaimed wastewater equals approximately 40 percent of the wastewater flow. For the purpose of this estimate, it is assumed that 40 percent of the wastewater flow is recycled and used for such purposes. **Table 2-7** shows the calculated recycled water demands as a factor of the estimated wastewater flows. Note that due to the fact landscape irrigation does not contribute to the wastewater flow, it has not been included as part of the recycled water demand in **Table 2-7**.

Table 2-7: Estimated Recycled Water Demands Without Landscape Irrigation (gpd) [a]

	Alternative			
	A	B	C	D
Weekday Day	94,000	57,000	6,000	7,000
Weekend Day	139,000	84,000	9,000	11,000
Average Day	107,000	65,000	7,000	8,000

[a] Recycled water demand = 0.40 * wastewater flow.
Recycled water demands rounded to the nearest 1,000 gpd.

2.4 Water Demands with Recycled Water

Water is also used for landscaping irrigation. A total of 4.0-acres of landscaping with an average water demand of 5,000-gpd/acre for a total of 20,000-gpd is assumed for Alternatives A and B. A total of 1.0-acre of landscaping with an average water demand of 5,000-gpd/acre for a total of 5,000-gpd is assumed for Alternatives C and D. **Table 2-8** shows estimated average day recycled water demands as a function of estimated wastewater flows. Landscaping water demands will be supplied by recycled water as an alternative means of wastewater effluent disposal, thereby reducing the summer and dry weather disposal required.

Table 2-8: Estimated Water Demands if Water is Recycled

	Alternative			
	A	B	C	D
Weekday				
Water Demand [a]	366,000	231,000	20,000	24,000
Recycled Water Demand (with landscape irrigation demand)	114,000	77,000	11,000	12,000
Water demand if water is recycled [b]	252,000	154,000	9,000	12,000
Weekend				
Water Demand [a]	484,000	300,000	30,000	35,000
Recycled Water Demand (with landscape irrigation demand)	159,000	104,000	14,000	16,000
Water demand if water is recycled [b]	325,000	196,000	16,000	19,000
Average Day [c]				
Water Demand [a]	400,000	251,000	23,000	27,000
Recycled Water Demand (with landscape irrigation demand)	127,000	85,000	12,000	13,000
Water demand if water is recycled [b]	273,000	166,000	11,000	14,000

[a] Includes landscape irrigation. See Table 2-5.

[b] Recommended supply = average day domestic water less recycled water.

[c] 5/7 * week day + 2/7 * weekend day

Water demands rounded to the nearest 1,000 gpd.

3.0 Regulatory Requirements

This section identifies the typical regulatory requirements applicable for the North Fork alternatives with respect to the proposed wastewater treatment and disposal methods or reuse identified in this report. Regulatory requirements differ depending on the method of treatment and disposal. Land disposal by irrigation is discussed in Section 3.1, land disposal by subsurface application is discussed in Section 3.2, and surface water disposal is discussed in Section 3.3. This section also addresses regulatory requirements associated with water recycling in Section 3.4, and requirements associated with proposed drinking water supply systems for the Project in Sections 3.5 and 3.6. Because the proposed system is on Tribal lands ("trust land"), the primary regulatory agency would be the United States Environmental Protection Agency (USEPA).

3.1 Land Disposal

Wastewater disposal options which would make the Tribe subject to regulation for land disposal would include: spray application to a disposal field; irrigation of a crop grown on land; discharge to a percolation pond; or discharge to an evaporation pond. Land disposal on trust land is regulated by USEPA.

The Regional Water Quality Control Board (RWQCB) does not have discretionary authority over actions on trust land, however, USEPA is expected to include the Fresno office of RWQCB in the Permit development process in a consulting capacity. The local water quality goals and criteria which RWQCB is expected to recommend for implementation by USEPA are included in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (generally referred to as the Basin Plan).

Typical disposal system design features required by regulation include:

- Tailwater and runoff control
- Installation of ground water monitoring wells

Typical discharge prohibitions include:

- Discharge of pollutants or wastes to surface waters
- Bypass around, or overflow from, the treatment plant and spray disposal area of untreated or partially treated waste
- Resurfacing of wastewater percolating from the spray disposal field

Typical discharge specifications include:

- Wastewater spray drift from the WWTP or spray disposal field must not migrate out of the plant's property boundaries
- All tailwater and/or stormwater reaching the downgradient limit of the recycled water use areas must be collected and returned to the WWTP at all times when wastewater is being applied to the spray disposal field
- The discharger must not irrigate with recycled water during periods of extended rainfall and/or runoff
- The discharger must not irrigate with recycled water during periods of high winds
- Public contact with wastewater must be precluded through such means as fences, signs, and/or irrigation management practices (or other acceptable methods)
- Objectionable odors originating at this facility must not be perceivable beyond the boundary of the WWTP and disposal areas
- A limited-access buffer must be maintained around the spray disposal field's wetted area created during wastewater application

3.2 Subsurface Disposal

Wastewater disposal options which would trigger subsurface disposal regulations would include conventional leachfields, engineered leachfields, mound systems, evapo-transpiration systems, and injection wells. Subsurface disposal on trust land is regulated under USEPA's Federal Underground Injection Control (UIC) Program, not only because the project is on trust land, but also because California is a Direct Implementation State (40 CFR Part 144.83). Subsurface disposal is classified as a Class V injection well under the UIC Program. Injection wells are defined in California Water Code §13051 as any pit or hole in the ground, created by boring, drilling or shaft-driving, which has a circumference shorter than its depth.

The Class V UIC program is a permit by rule program in that no actual permits are issued. All Class V injection well owners in California, and on tribal land, are required to submit inventory information to USEPA Region 9. According to 40 CFR Part 144.82, a Class V well cannot allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of the primary drinking water standards under 40 CFR part 141, other health based standards, or may otherwise adversely affect the health of persons.

Historically, the USEPA considers groundwater quality degradation criteria based upon the State's local regional water quality control plan (the Basin Plan). The preparation and adoption of Basin Plans is required by the California Water Code Section 13240, and supported by the Federal Clean Water Act. Section 303 of the Clean Water Act requires states to adopt water quality standards that consider "the designated uses of the navigable water involved and the water quality criteria for such waters based upon such uses." Since beneficial uses, together with their corresponding water quality objectives, can be defined per Federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the State and Federal requirements for water quality control (40 CFR 131.20). One significant difference between the State and Federal programs is that California's basin plans establish standards for groundwaters in addition to surface waters.

RWQCB does not have discretionary authority over actions on trust land, however, USEPA is expected to include the Fresno office of RWQCB in the Permit development process in a consulting capacity. RWQCB is expected to recommend implementation of Basin Plan water quality criteria and goals for ground water.

Typical discharge prohibitions for subsurface disposal include:

- Discharge of wastes to surface waters or surface water drainage courses
- Discharge of wastes to areas other than the designated treatment and disposal areas
- Bypass or overflow of untreated or partially treated waste

Typical discharge specifications include:

- Objectionable odors originating from the WWTP must not be perceivable beyond the boundary of the WWTP and disposal areas
- Wastewater discharged to leachlines must remain underground at all times
- The distance between any unlined pond or leaching trench bottoms and the anticipated highest groundwater must be greater than 3 feet, or such distance as necessary to provide compliance with local groundwater limitations

3.3 Surface Water Disposal

Wastewater disposal options which would trigger surface water disposal regulations would include direct discharge to a river or stream, indirect discharge to a river through a riverbank infiltration gallery, or discharge to a dry ephemeral creek bed which drains to the waters of the U.S. Discharge to surface water would be subject to regulation under a National Pollutant Discharge Elimination System (NPDES) permit.

Surface water disposal on trust land is regulated by USEPA. An NPDES permit would impose the criteria of the California Toxics Rule (CTR) and the National Toxics Rule (NTR), two nearly identical lists of priority pollutants, many of which have numeric criteria which must be met in either the receiving water, the effluent, or both. As with the land-based disposal options discussed above, RWQCB is expected to recommend implementation of Basin Plan water quality criteria and goals. In addition, the discharge to surface water would also need to comply with the California State Implementation Plan (SIP). RWQCB does not have discretionary authority over actions on trust land, however, USEPA is expected to include the Fresno office of RWQCB in the Permit development process in a consulting capacity.

The permit process would involve performing an analysis to assess the downstream environmental impacts. The permit would likely contain mass-based discharge limitations. In addition to pollutant limitations, toxicity standards may also be established and monitored by bioassay. Since there would be no industrial discharges to the casino wastewater system, levels of metals and other toxic components are expected to be minimal; however, it can still be assumed that any new surface water discharge in the area would have to be treated to very high standards, such as tertiary levels, and disinfected before discharging to local surface waters.

3.4 Recycled Water

Wastewater management options that would trigger regulation as recycled water would include irrigating ornamental landscape plants, irrigating crops for animal or human consumption, flushing toilets, fire suppression, or cooling tower make-up.

Recycled water use on tribal land is regulated by USEPA. USEPA has typically mirrored their recycled water standards to California's Title 22 standards for similar projects in California. On fee land in California, recycled water use and enforcement of Title 22 provisions is under the authority of the California Department of Public Health (DPH). DPH does not have discretionary authority over actions on trust land, however, USEPA is expected to include the Visalia office of DPH in the Permit development process in a consulting capacity. DPH is expected to recommend implementation of the following water quality requirements, which are specific to a membrane bioreactor (MBR) treatment process. The WWTP would have to produce disinfected tertiary recycled water (DTRW) in accordance with full Title 22 requirements. DTRW meets the following water quality requirements, which are specific to a membrane bioreactor (MBR) treatment process expected for this project's wastewater treatment facility:

- Has been passed through a microfiltration, ultrafiltration (UF), nanofiltration (NF), or reverse osmosis (RO) membrane so that the turbidity of the filtered wastewater does not exceed any of the following:
    - 0.2 NTU more than 95 percent of the time within a 24-hour period; and
    - 0.5 NTU at any time.

- The filtered wastewater has been disinfected by either:
  - A chlorine disinfection process following filtration that provides a contact time ([CT] the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak dry weather design flow; or
  - A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration. The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 mL utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 mL in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 mL.

In addition to the aforementioned recycled water quality requirements, there are a number of operational, uses, and reporting restrictions identified in Title 22. However, it is not expected that any of these requirements will limit the viability of recycled water reuse on-site, and these requirements are typical for any recycled water use application. All uses of recycled water would have to be approved by USEPA. As long as DTRW is produced, there would appear to be no issues associated with this intended use.

3.5 Public Water System

Options that involve the development of a drinking water system using on-site wells would be classified as a public water system under the Safe Drinking Water Act (SDWA). A public water system is defined as any entity serving water for the purposes of human consumption to 15 or more active service connections or 25 or more people at least 60 days out of the year. More specifically, the drinking water system for the casino would be classified as a Non-Transient/Non-Community (NTNC) public water system under the SDWA because it is not a community water system and it will regularly serve at least the same 25 persons over 6 months per year.

Discussions have been initiated with the USEPA regarding the proposed NTNC public water system for the casino. During the design phase, the USEPA will require schematics of the system showing the well location, storage, any treatment (including disinfection), well construction details and drilling logs, anticipated visitor and employee population numbers, flow rate, and storage capacities. Planning for the sample points and dedicated sampling stations will be coordinated with the USEPA. Typically the USEPA will visit the site at least once and perform a walk-through of the entire facility.

Baseline monitoring will be submitted to the USEPA before the well goes online and the public uses the water. Similar facilities have requirements for monthly coliform testing, quarterly lead and copper testing and other testing that must be conducted annually. Monitoring requirements for the proposed casino will likely be similar, but will be determined by the USEPA based on the size of the facility, the anticipated population, and other factors specific to the project. The USEPA will assign a Public Water System Identification Number to the drinking water system. A monitoring plan would be submitted to the USEPA.

3.6 Source Water Protection Program

Source water is untreated water from streams, rivers, lakes, or underground aquifers, which is used to supply private wells and public drinking water. The USEPA's Office of Ground Water and Drinking Water administers the Source Water Protection Program to prevent contamination of drinking water supplies. The SDWA Amendments of 1996, P.L. 104-182, include amendments to section 1428, and a provision adding a new section 1453 to the Act. Section 1453 requires states to develop and submit Source Water Assessment Programs (SWAPs) to USEPA, and implement them after USEPA approval. While the statute does not explicitly require the tribes to implement SWAPs, USEPA recommends that each tribe implement such a program, to the extent appropriate resources are available to do so. Tribes also have the option of participating in a state SWAP, if they choose to do so.

The Source Water Protection Program outlines a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every community take these six steps:

1. Delineate their drinking water source protection area
2. Inventory known and potential sources of contamination within these areas
3. Determine the susceptibility of their water supply system to these contaminants
4. Notify and involve the public about threats identified in the contaminant source inventory and what they mean to their public water system
5. Implement management measures to prevent, reduce, or eliminate threat,
6. Develop contingency planning strategies to deal with water supply contamination or service interruption emergencies

4.0 Water Supply Assessment

This section describes components necessary to provide water supply service to the various project alternatives. It discusses on-site groundwater and off-site City sources of supply and water quality for the proposed project site in the vicinity of the City of Madera, as well as, the proposed project site in the vicinity of the City of North Fork. The final aspect is a preliminary evaluation of the water system requirements to deliver water to each of the project alternatives.

4.1 Water Supply Requirements

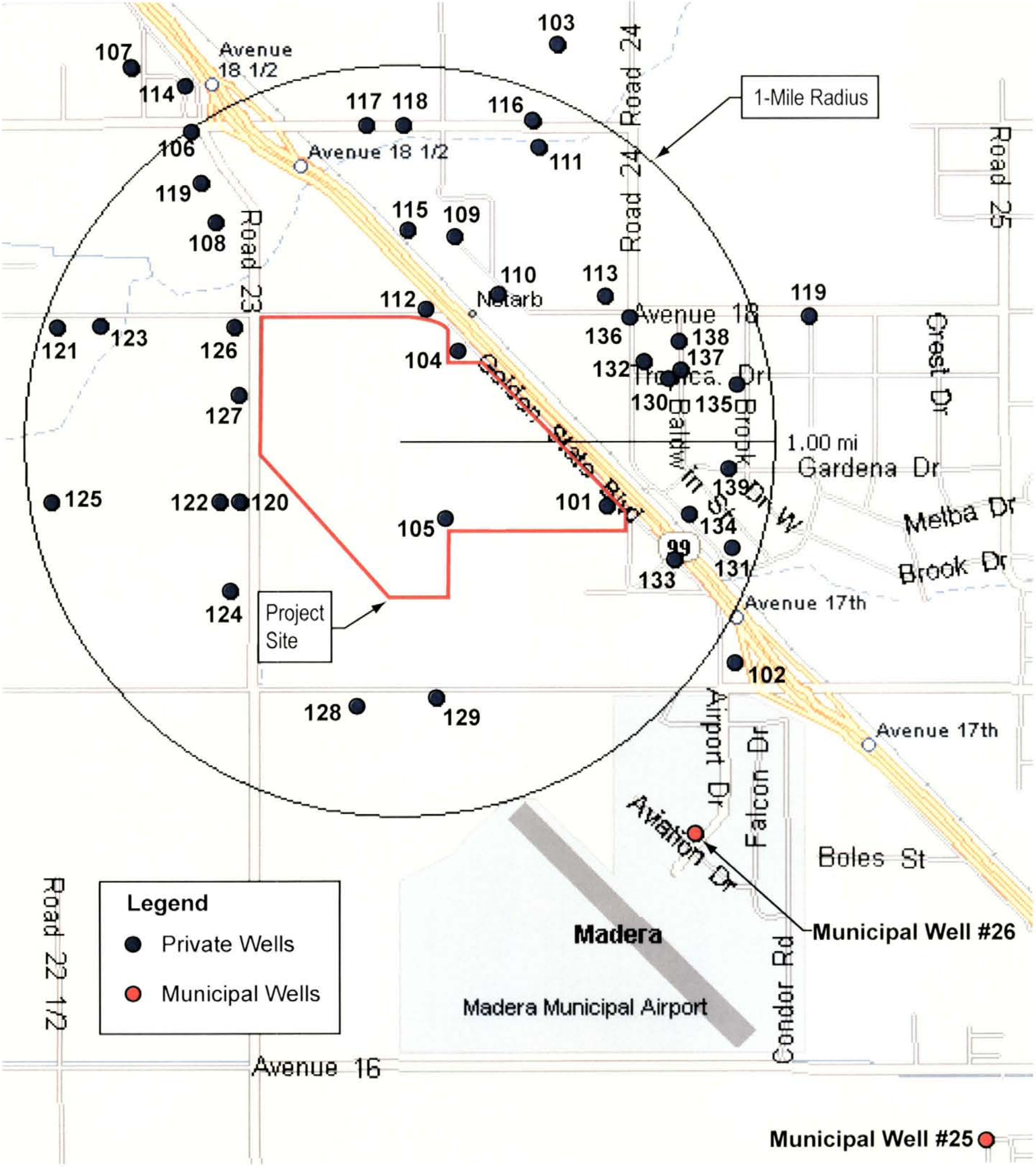
This section identifies preliminary water supply, water treatment, water storage, and pumping requirements to supply the project alternatives with potable water. The facilities identified in this section are based on HSe's experience with similar projects. One option is to maximize the reuse of recycled water in order to minimize the water supply requirements. The following water supply strategies were assessed for the four alternatives:

- On-site groundwater
- Off-site water supply from the City of Madera
- Off-site water supply from the City of North Fork

4.1.1 On-site Groundwater for Alternatives A, B, and C

Options that involve the development of a drinking water system using on-site wells would be classified as a public water system under the SDWA (Section 3.5). Siting and installing on-site wells will be done under the guidelines of the UIC program (Section 3.2), which is a crucial component of the Source Water Protection Program (Section 3.6). Wells within a one-mile radius of the proposed project alternatives near the City of Madera are shown in **Figure 4-1**, along with the nearest City of Madera municipal wells. There is one active agricultural well on the property, Well No. 105. It is not known which of the private wells surrounding the property are currently in operation. A summary of well data is included in **Table 4-1**.

Municipal Well No. 26 is located about a mile south of the Project site at the intersection of Airport Drive and Aviation Drive. This well is approximately 600 feet deep and has a capacity of approximately 1,300 gallons per minute (gpm). Municipal Well No. 25 is located about 1.5 miles southeast of the Project site. This well is approximately 500 feet deep and has a capacity of approximately 2,200 gpm. The groundwater level has been dropping in the region so a new on-site well with adequate capacity for the hotel, casino, or retail alternatives would probably need to be at least 600 feet deep. Groundwater quality is generally good but manganese levels tend to increase with depth north of the City and may require treatment.



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Well Source: Department of Water Resources

HydroScience Engineers, Inc.

Figure 4-1
North Fork
Water and Wastewater Feasibility Study
Groundwater Wells in the Vicinity of the Madera Site

Table 4-1: Existing Groundwater Wells at the Madera Site

	Screen Depth*						
Well Number	From (ft)	To (ft)	Diameter (inches)	Total Depth (ft)	Depth to Groundwater (ft)	Discharge Rate (gpm)	Year of Well Installation
101	240	252	8	272	112	-	1982
102	205	145	6	205	110	50	1979
103	182	220	3	345	96	-	1965
104	197	273	8	280	97	250	1979
105	199	291	12	295	95	-	1973
106	-	-	-	308	112	-	1982
107	240	340	16	600	-	-	1993
108	172	188	8	202	90	-	1973
109	295	420	14	450	108	-	1980
110	-	-	-	400	143	300	1990
111	210	408	14	416	110	-	1981
112	-	-	-	120	-	-	1977
113	372	384	12	415	134	300	1985
114	200	300	12	356	104	-	1978
115	216	224	10	228	88	-	1975
116	180	220	6	220	-	40	-
117	240	280	5	280	130	180	1988
118	273	333	11	-	168	-	1995
119	-	-	-	-	165	-	1998
120	228	236	10	290	90	-	1966
121	232	240	10	285	92	-	1966
122	220	570	10	591	97	-	1978
123	214	524	14	549	98	-	1978
124	265	696	16	700	-	-	1998
125	273	292	14	500	90	-	1971
126	264	708	16	716	155	-	1998
127	200	400	6	400	-	-	2001
128	90	152	-	225	66	1390	1956
129	270	300	16	510	-	-	1995
130	180	220	6	247	125	80	1987
131	280	360	6 5/8	360	245	70	1992
132	268[a]	-	8	292	141	150	1988
133	220	260	5	260	-	80	1988
134	160	180	6 5/8	275	90	-	1991
135	275	335	11	335	155	-	1993
136	268	328	11	333	165	-	1997
137	291	351	11	356	168	-	1997
138	300	360	6 5/8	360	168	100	2001
139	240	300	6	300	172	50	2001

*Some wells had multiple screens; screen nearest ground surface listed here.

Source: Department of Water Resources

[a] Open bottom, no screen.

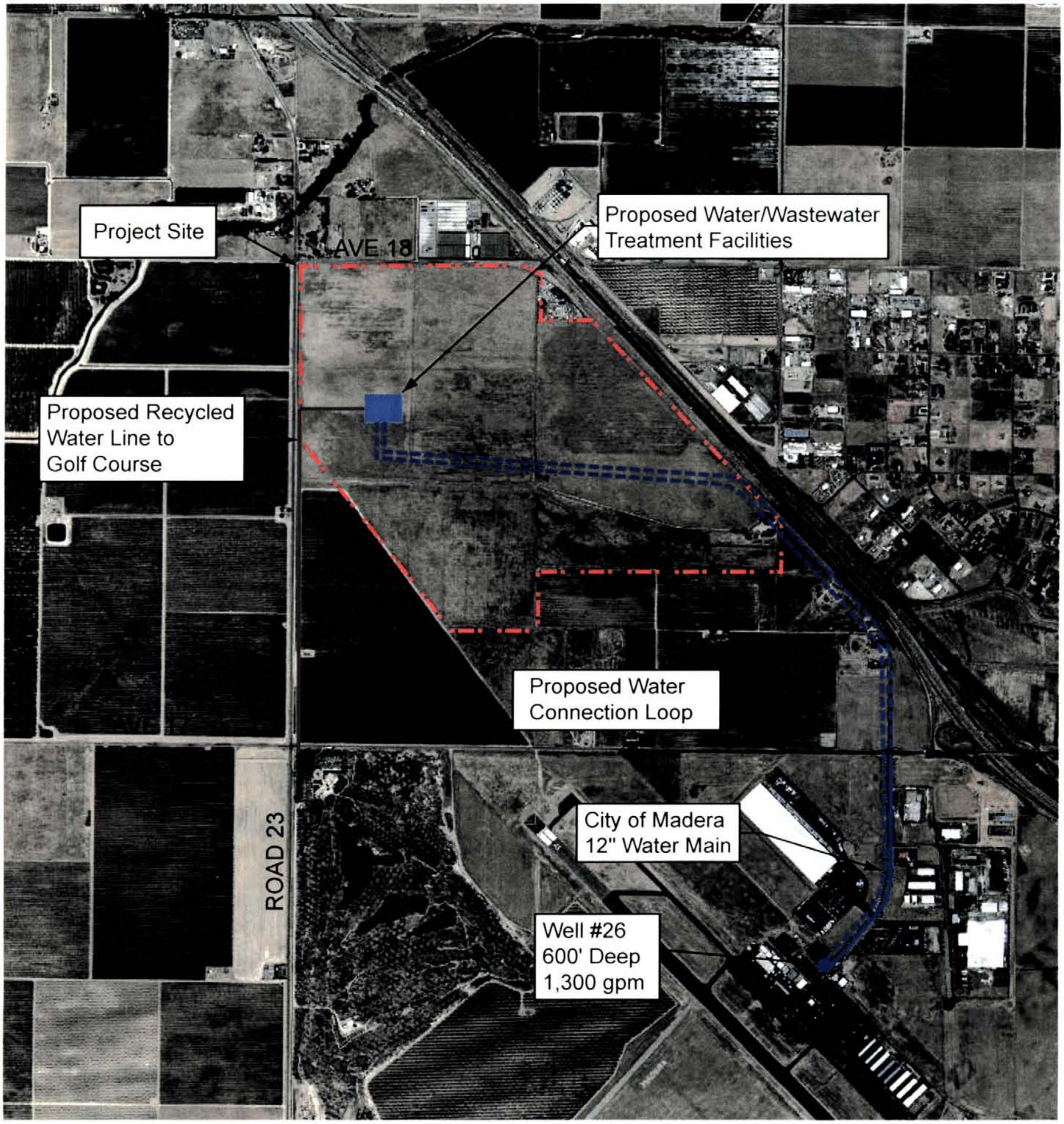
4.1.2 Off-site Water from the City of Madera

The City's nearest water well is Well No. 26 at Airport Drive, as shown in **Figure 4-1.** The well is approximately 600 feet deep and has a capacity of approximately 1,300 gpm. The City uses this well for standby and fire flow demands. The airport's water is supplied by Municipal Well No. 25, approximately a half-mile southeast of the airport. If the casino were to hook up to the City's water system, it is expected, based on discussions with City staff, that the City would require a looped system to the well as shown in **Figure 4-2.** The City would require the Tribe to fund the drilling and development of an on-site well that would be added to the casino loop to provide primary water supply. The City's existing Well No. 26 would be used solely for redundancy and fire flow capacity (it's current use in the City's water system). If fire flow capacity is not met, then either a second well or an on-site water storage tank will be required.

4.1.3 On-site Groundwater for Alternative D

Options that involve the development of a drinking water system using on-site wells would be classified as a public water system under the SDWA (Section 3.5). Siting and installing on-site wells will be done under the guidelines of the UIC program (Section 3.2), which is a crucial component of the Source Water Protection Program (Section 3.6). Wells located within a one-mile radius of the proposed project alternative near the City of North Fork are shown in **Figure 4-3**. A number of well logs did not provide adequate information to locate the wells on a map. However, they are within the one-mile radius based on the section number listed on the logs. A summary of well data is included in **Table 4-2**. The table indicates which wells are not included in the figure.

The County of Madera assessed the groundwater conditions in eastern Madera County (County of Madera, 2002). The following information is based on that study. Overall water balance and current water demands in the foothill region suggest that a sufficient quantity of water is available on a regional basis to meet current demands and support some future development. Planning for future development needs to examine the hydrologic conditions on a localized watershed and subwatershed basis in order to ensure an adequate water supply for local and downstream uses. The County's study included a detailed review of 1,492 well log records in the foothill region. The median well yield is 8.5 gpm and average well yield is 22 gpm. These well yields are based on drillers' airlift tests, so actual production may be lower. In terms of future development, caution should be used in assigning well yields to determine the amount of water available from a given well. In particular, bedrock well yields in excess of 10 to 20 gpm (and especially greater than 50 gpm) should be evaluated in more detail by means of 72-hour pumping tests with a consistent and constant pumping rate.



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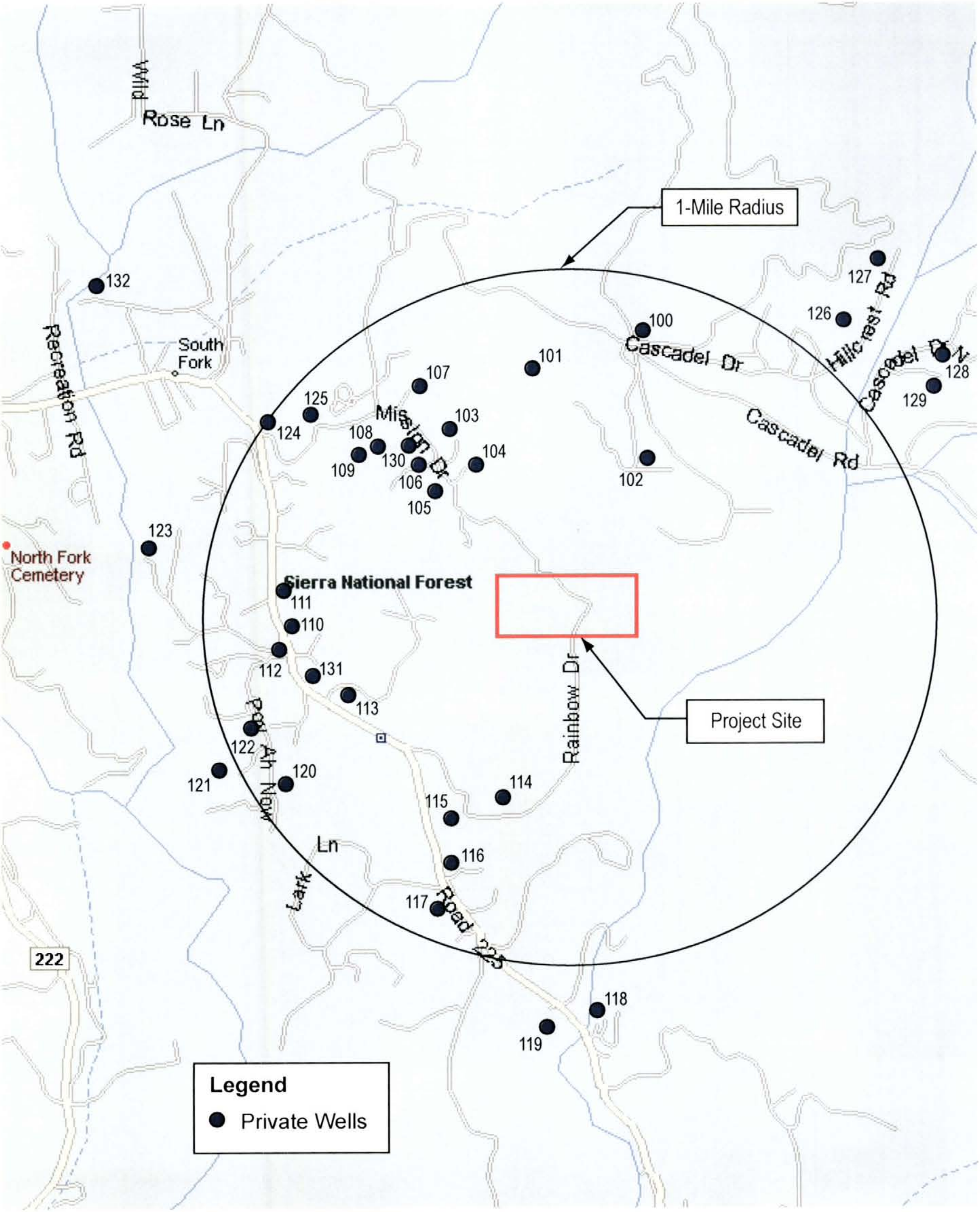
HydroScience Engineers, Inc.

Figure 4-2
North Fork
Water and Wastewater Feasibility Study
Public Water Facilities Option for Alternatives A, B, and C



Well Source: Department of Water Resources

Figure 4-3
North Fork
Water and Wastewater Feasibility Study
Groundwater Wells in the Vicinity of the North Fork Site

HydroScience Engineers, Inc.

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Table 4-2: Existing Groundwater Wells at the North Fork Site

Well Number	Screen Depth		Diameter (inches)	Total Depth (ft)	Depth to Groundwater (ft)	Discharge Rate (gpm)	Year of Well Installation
	From (ft)	To (ft)					
100	-	-	6 1/4	700	355	4	1993
101	-	-	6	100	38	25	1979
102	-	-	-	1075	440	5	1991
103	-	-	6 1/8	450	365	100	1995
104	-	-	6 5/8	275	220	15	1995
105	-	-	6	525	100	25	1995
106	-	-	6 1/8	375	300	15	1995
107	-	-	6	525	495	18	1996
108	-	-	6 1/2	275	85	5	1985
109	-	-	6 1/2	300	145	3	1985
110	-	-	6 5/8	120	-	30	1976
111	-	-	6 1/4	300	90	9	2002
112	-	-	6	460	107	2.5	1994
113	-	-	6 5/8	300	46	2	1972
114	-	-	6	450	-	1	1980
115	-	-	6 1/2	280	185	20	1987
116	-	-	6 5/8	675	-	15	1976
117	-	-	7	150	39	20	1980
118	-	-	6 1/2	475	120	6	1991
119	-	-	6 1/4	500	390	12	1994
120	-	-	-	350	-	1.5	1978
121	-	-	6 1/4	100	64	15	1994
122	-	-	6 1/4	150	90	30	2002
123	-	-	6 5/8	280	-	4	1976
124	-	-	6 5/8	550	81	25	1991
125	-	-	6 1/4	660	-	5	1991
126	-	-	-	600	-	40	1991
127	-	-	6 1/4	1000	-	4	1991
128	-	-	-	800	575	3	2002[a]
129	-	-	6 5/8	105	8	100	1988
130	-	-	6	400	65	10	1995
131	-	-	7	325	111	2	1981
132	-	-	8 5/8	891	66	171	1987
200[b]	-	-	6	155	-	-	1980
201[b]	-	-	6	355	65	3.5	1981
202[b]	-	-	6	300	31	1.5	1983
203[b]	-	-	-	74	33	5	1959
204[b]	-	-	7	220	21	1.5	1971
205[b]	-	-	7	170	27	6	1973[c]
206[b]	-	-	7	230	160	2	1973[c]
207[b]	-	-	7	200	18	1.5	1973[c]
208[b]	-	-	6 5/8	60	-	30	1972
209[b]	-	-	6	300	172	4	1983[d]

Source: Department of Water Resources

[a] Well was deepened.

[b] Not included on figure because location information on well log was incomplete.

[c] Well log indicated well was located within South Fork Indian Reservation.

[d] Well log indicated well was located within Indian Mission off Coscodel Road.

Note: Well locations shown in Figure 4-3 are approximate.

Groundwater quality is generally good in eastern Madera County. Concentrations of total dissolved solids (TDS) are in the 100 to 300 ppm range, but several wells in the Hillview Water Company sytems had TDS concentrations that exceeded 10,000 ppm. Although these levels do not present a health concern, a more mineralized taste may result. Some water quality problems do occur in the county systems, including elevated concentrations of total coliform bacteria, gross alpha/uranium, arsenic, iron, and manganese. Elevated iron and manganese concentrations may be due to elevated turbidity in the sample and may not reflect actual groundwater concentrations. Although naturally occurring and typically related to the granitic rocks of the Sierra Nevada, elevated concentrations of gross alpha uranium and arsenic have rendered some sources of supply nonpotable. Elevated concentrations of iron and manganese seem to correlate to elevated turbidity in the sample and may indicate iron and manganese that are in soil/rock particles in the sample and not actually dissolved in the water (County of Madera, 2002). Based on the groundwater quality of wells in the eastern area of Madera County, an on-site groundwater well may produce water requiring treatment.

4.1.4 Off-site Water from the City of North Fork

The Madera County Maintenance District 8A serves water to the town of North Fork and the U.S. Forest Service complex. The district has 49 residential connections, 9 commercial connections having 27.56 equivalent dwelling units (EDUs), and 22 standby connections. The water system has one well, designated the Library well, pumping 240 gpm into a 200,000-gallon storage tank. The well was drilled in 1994 to a depth of 520 feet. An additional existing well, known as the North Fork Center Well, is currently inactive but available for future use. Water shortages have not been an issue for this district (County of Madera, 2002). If the casino were to hook up to the City's water system (as shown in **Figure 4-4**), it is likely that the City will require an investigation to the North Fork Center Well's capacity and treatment requirements. The connection to the water line would be at the intersection of Minarets Road (Road 225) and Road 274. Additionally, if fire flow capacity is not met with the City's existing 200,000-gallon storage tank, then an on-site water storage tank will be required.

4.2 Potable Water Demand

As discussed in Section 2, two potable water demands were developed for each alternative: one as a total water demand and one with recycled water to supplement potable water consumption. **Table 4-3** presents a comparison of the average daily water demand with and without the use of recycled water for each alternative. The water demand presented is a weighted average between the weekday and weekend flows, and includes landscaping water demand.

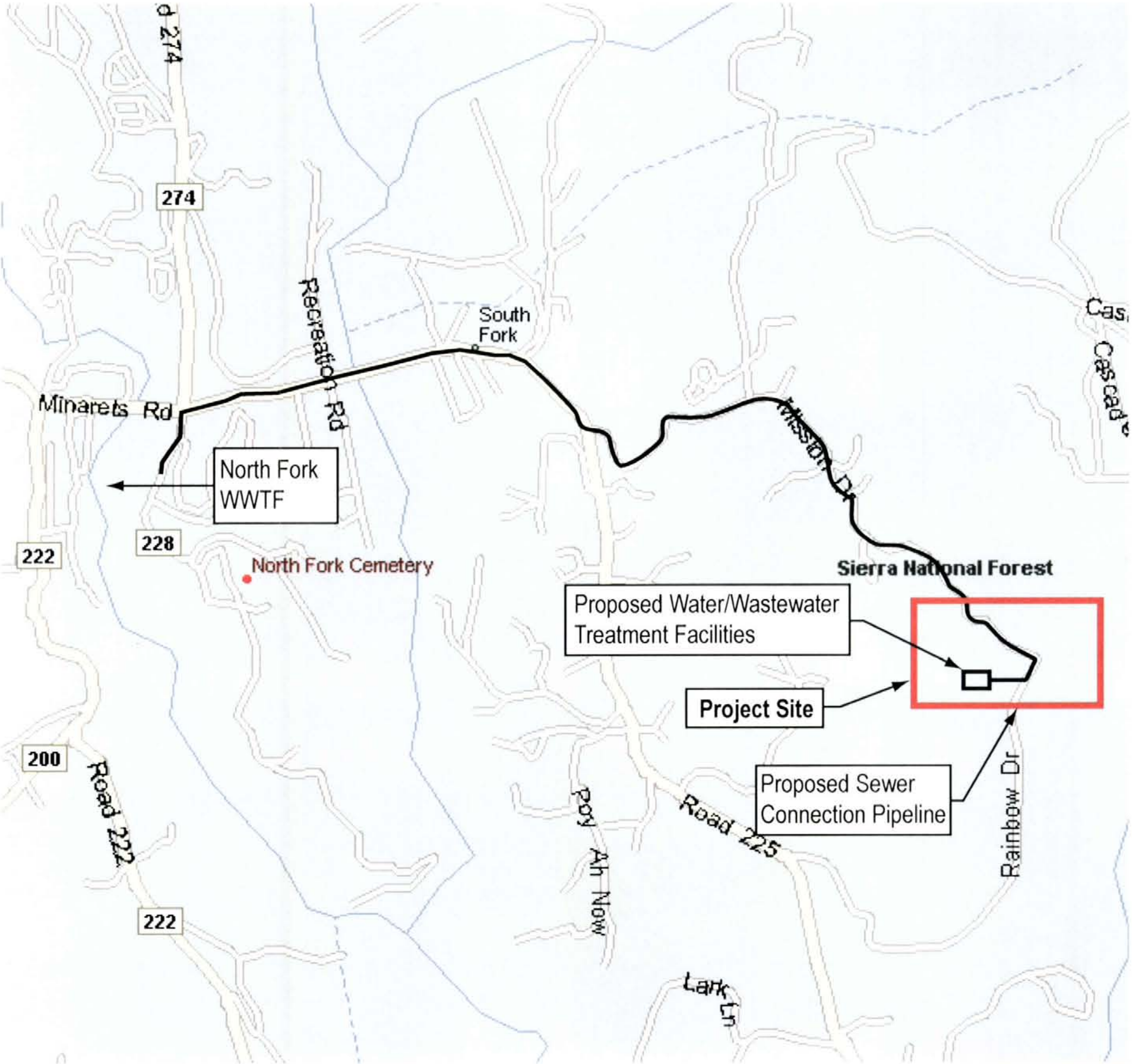
Table 4-3: Comparison of Average Day Water Demand with and without Recycled Water

	Alternative			
	A	B	C	D
Water demand [a]	400,000	251,000	23,000	27,000
Water demand if water is recycled [b]	273,000	166,000	11,000	14,000

[a] Includes landscape irrigation. See Table 2-5.

[b] Recycled water includes landscape irrigation, toilet flushing, and process water. See Table 2-8.

Water demands rounded to the nearest 1,000 gpd.



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HydroScience Engineers, Inc.

Figure 4-4
North Fork
Water and Wastewater Feasibility Study
Public Water/Wastewater Facilities Option for Alternative D

4.3 Water Treatment Plant

There are two viable water sources to fulfill potable water demands for the proposed facilities for Alternatives A, B, and C: (1) on-site groundwater; and (2) potable water from the City of Madera. Treatment may be necessary for on-site groundwater, therefore an on-site water treatment plant would need to be constructed. Manganese could be an issue based on other wells the City of Madera has recently drilled in the area, particularly at depths of greater than 600 feet. Manganese in water does not create a health hazard but in high concentrations will cause brownish-black staining of laundry, porcelain, dishes, utensils, and even glassware. Treatment is not required but is usually desirable. Groundwater sampling and analyses should be performed to determine if treatment is necessary. Potable water from the City of Madera would require no treatment. A Source Water Assessment of the City of Madera's potable water is included in **Appendix C.**

There are two viable water sources to fulfill potable water demands for the proposed facilities for Alternative D: (1) on-site groundwater; and (2) potable water from the City of North Fork. Treatment may be necessary for on-site groundwater; therefore an on-site water treatment plant would need to be constructed. Manganese could be an issue based on the water quality from the well supplying the City of North Fork. Groundwater sampling and analyses should be performed to determine if treatment is necessary.

4.4 Water Storage Tank and Pump Station

A water storage tank would be constructed for each project alternative to store water produced by any on-site wells. The actual required capacity of the tank is dependent on the project site's fire flow requirements; however, the anticipated capacity of the tank for each of the project alternatives is summarized in **Table 4-4**. The tank would be of welded steel construction, meeting all American Water Works Association (AWWA) specifications for welded steel tanks. A typical section of a tank is shown in **Figure 4-5**. It should be noted that the recommended capacity of the domestic water storage tank is affected by the use of recycled water to satisfy fire suppression and could reduce the domestic water storage tank requirements. The Madera Fire Marshall provided fire flow and storage requirements for each of the alternatives.

Table 4-4: Domestic Water Storage Requirements if Water is Recycled

	Alternative			
	A (gallons)	**B (gallons)**	**C (gallons)**	**D (gallons)**
Domestic water storage [a]	650,000	392,000	32,000	38,000
Fire suppression [b]	360,000 [b]	360,000 [b]	480,000 [c]	360,000 [d]
Domestic water storage tank capacity [e]	1,010,000	752,000	512,000	398,000
Recommended approximate domestic water storage tank capacity [f]	1,100,000	800,000	600,000	400,000

[a] 2.0 times the weekend day water demand if water is recycled. See Table 2-8.

[b] Based on Type 1 construction with a full automatic sprinkler system, per the Madera Fire Marshall, fire flow required is 1,500 gpm for 4 hours, resulting in storage requirement of 360,000 gallons.

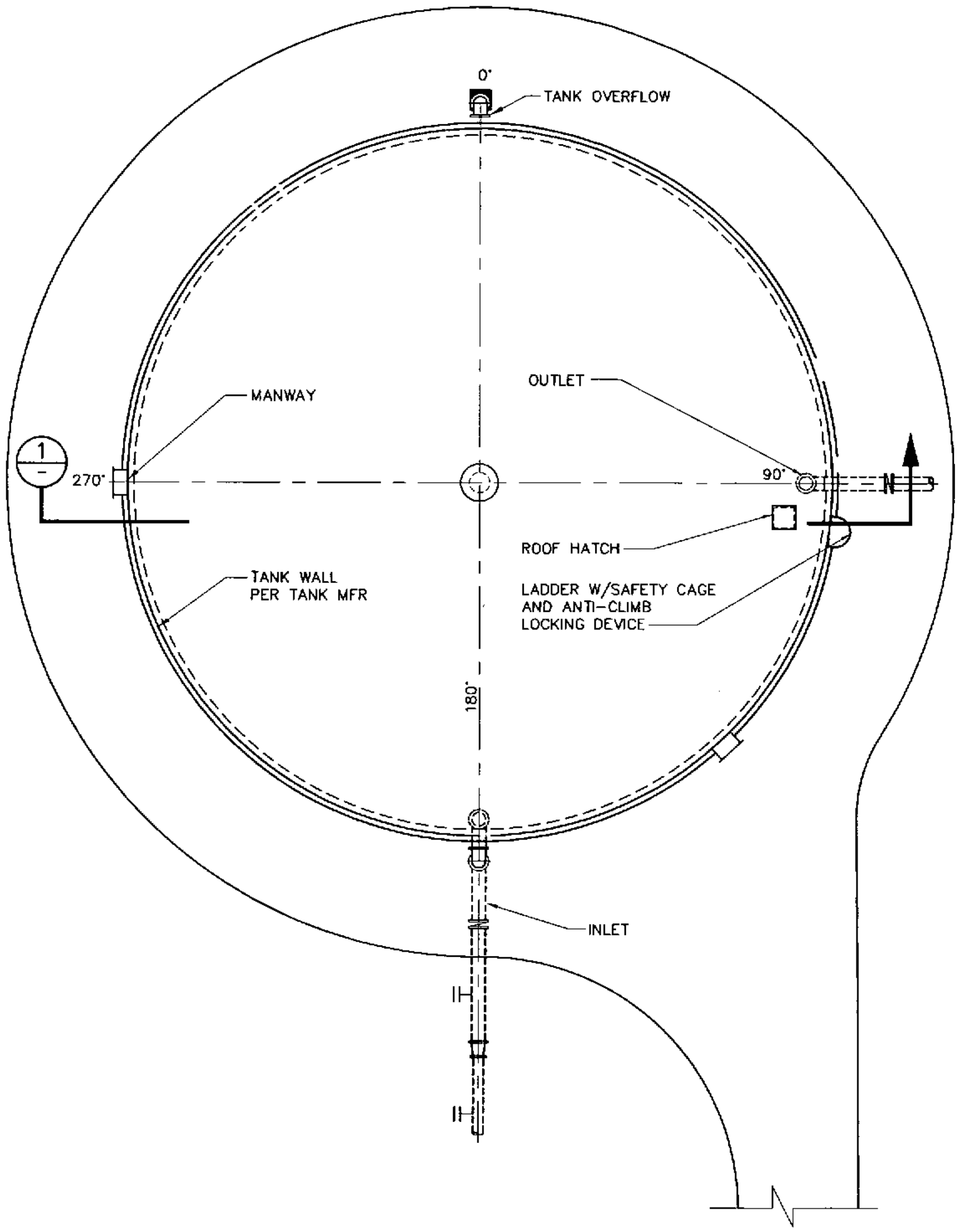
[c] Based on Type 3 construction with a full automatic sprinkler system, per the Madera Fire Marshall, fire flow required is 2,000 gpm for 4 hours, resulting in storage requirement of 480,000 gallons.

[d] Based on Type 3 construction with a full automatic sprinkler system, per the Madera Fire Marshall, fire flow required is 1,500 gpm for 4 hours, resulting in storage requirement of 360,000 gallons.

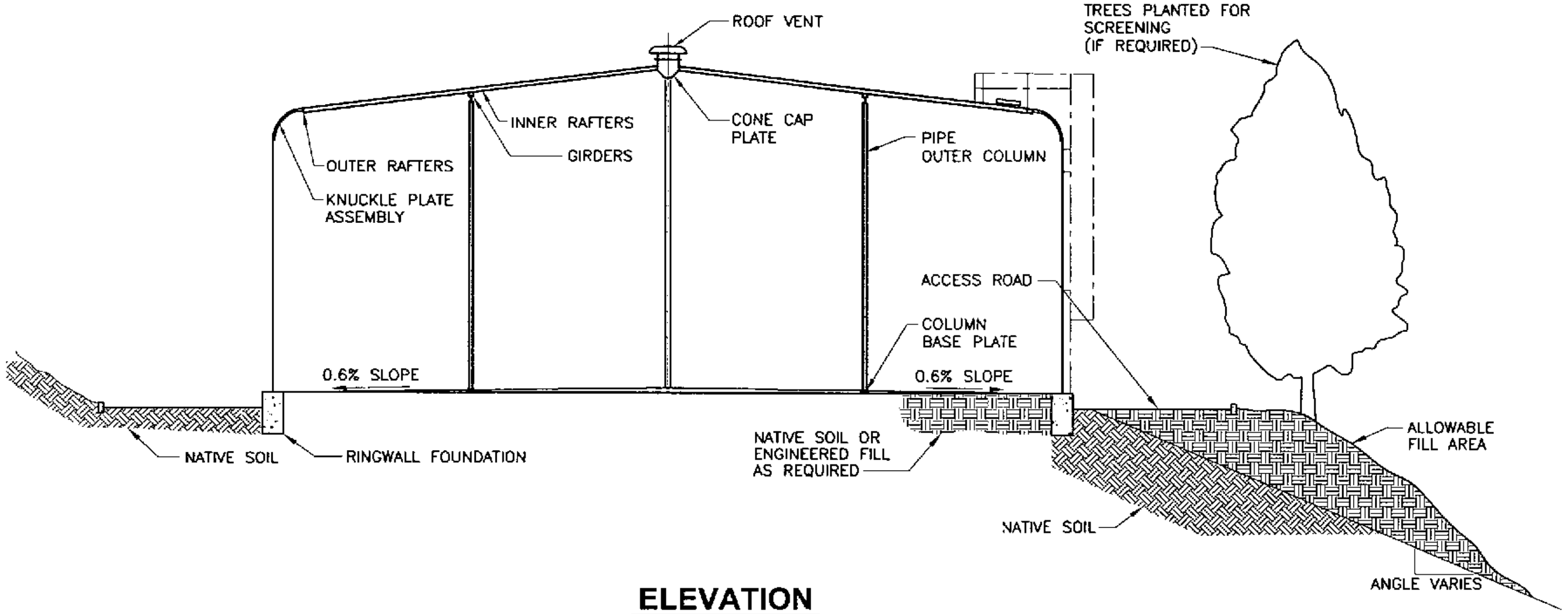
[e] Domestic water storage plus fire suppression.

[f] Rounded up to the nearest common tank size increment.

Water demands rounded up to the nearest 1,000 gal.



PLAN
NTS



ELEVATION
NTS

HydroScience Engineers, Inc.

Figure 4-5
North Fork
Water and Wastewater Feasiblity Study
Typical Welded Steel Water Storage Tank

The tank would be cylindrical. A shorter tank would be easier to hide and camouflage from the site's guests. The tank sizing would be based on standard pre-engineered tank dimensions, which are typically in 8-foot increments. It is also possible that the tank would be partially or completely buried, but for the purposes of this analysis, it is assumed that the tank would be located at grade. The Madera project site is relatively flat; therefore, it is recommended that a pump station be utilized to maintain pressure in the distribution system. The North Fork project site topography varies and a pump station may be required, if the storage tank cannot be placed in a location such that the distribution system is pressurized. This potable water pump station is required to convey water from the storage tank to the facilities and the ultimate pumping capacity will be dependent on fire flow requirements. These requirements would be satisfied by two fixed-speed high-service pumps that are half the capacity of the projected flow requirement. **Table 4-5** shows the design criteria for the water storage tank and pump station.

Table 4-5: Recommended Water Storage Tank and Pump Station Design Criteria

Parameter	Value	Unit
Water Storage Tank		
Approximate Size (Alternatives A, B, C, or D)	1.1, 0.8, 0.6, or 0.4	MG
Construction	Welded steel	NA
Potable Water Pump Station		
Low service pump quantity	2	pumps
Low service pump type	Variable speed centrifugal	NA
High service pump quantity	2	pumps
High service pump type	Constant speed	NA
Hydropneumatic tank approximate size	To be determined	gallons

The overall water facilities will be located based on the final design of the selected alternative. Note that the recycled water facilities are shown and described separately in Section 5. All of the recommended water supply facilities described in this section are preliminary, and should be utilized for planning purposes only.

5.0 Wastewater Assessment

This study evaluates the feasibility of various options for treated wastewater disposal, including on-site and off-site alternatives. The on-site alternatives were spray field disposal, leach field disposal, surface water discharge, and water reuse. Two off-site disposal alternatives were evaluated: connecting to the City of Madera WWTP and connecting to the City of North Fork WWTP. Section 5.1 summarizes the results of that evaluation and discusses the disposal options.

The remainder of Section 5 identifies the components necessary for on-site wastewater treatment of the projected wastewater flows for the various North Fork Hotel and Casino project alternatives. Any on-site wastewater facilities are to comply with all applicable permitting requirements. Maximizing on-site water reuse is evaluated. Also, the wastewater and recycled water facilities are to be designed in a manner that does not limit existing uses or future expansion.

The overall wastewater facilities would be located based on the final design of the project facilities for the selected alternative. All of the recommended treatment facilities described in this section are preliminary, and should be utilized for planning purposes only.

5.1 Wastewater Disposal Alternatives

Tertiary treatment utilizing an MBR was assessed because it provides the greatest flexibility for reuse and disposal. Tertiary treatment is typically defined as a process that has undergone primary treatment consisting of a gravity settling process, secondary treatment consisting of a biological process, and a tertiary process consisting of both filtration and disinfection.

A seasonal storage basin would be necessary for most of the disposal options or combinations of options. The regulatory requirements for the operation of seasonal storage basins are typically minor, and the primary consideration is the disposition of the effluent contained therein.

5.1.1 Spray Field Disposal

If spray fields are to be used for disposal of the treated effluent, water would be applied to the spray fields at agronomic rates throughout the year, which take into account plant uptake and nutrient use. During rain events, however, spray fields cannot be used. Spray fields will be designed so that all wastewater runoff is captured and not allowed to run off the site or enter waters of the U.S. This is a typical regulatory requirement for spray field disposal. Other anticipated regulatory requirements for this type of disposal are described in Section 3.1, Land Disposal. If no alternate discharges are utilized, a large seasonal storage basin will be necessary. Adding a seasonal discharge to a nearby surface water body, such as Dry Creek, which passes through the Madera site, or the unnamed tributary of Willow Creek, which passes through the North Fork site, would reduce the size of the seasonal storage basin required. The water balances for each project alternative for on-site disposal options is presented in more detail in Section 5.1.3.

The City of Madera's golf course is south of Avenue 17, between Road 23 and the municipal airport (**Figure 4-2**). Another spray field disposal alternative to on-site spray fields would be to irrigate the golf course. This would benefit the City because currently groundwater is being used for all of the golf course's irrigation demand, which is estimated to be 977,000 gpd in the summer. During the winter, irrigation with recycled water would have the same restrictions at the golf course as described above for the on-site spray fields. The casino's treated wastewater effluent could provide approximately 25% of the irrigation demand for the golf course.

5.1.2 Leach Field Disposal

As previously mentioned in Section 3.2, subsurface disposal is regulated under the Federal UIC program. The UIC Program, which is a crucial component of the Source Water Protection Program (Section 3.6) is administered by the USEPA.

Conventional and nonconventional leach fields are discussed in this section. In order to produce a disposal system design appropriate for the proposed project sites, soil testing is recommended for the selected project location. Soil testing would include mantle and percolation tests to define any confining soil layers, shallow groundwater table, soil types and soil structures, directions of water transport, and percolation rates. A general discussion of the area's geology and soils is presented below.

5.1.2.1 Geology for Madera Site for Alternatives A, B, and C

The United States Department of Agriculture (USDA) Soil Survey of the Madera Area was published in 1962 (USDA, 1962). Soils in the area are described in detail below based on that report; however, this may not be an entirely accurate representation of the site in spite of the level of detail in the soil descriptions. As mentioned previously, percolation and mantle testing should be performed at the selected project site.

Based on the maps in the USDA Soil Survey, approximately 85 percent of the surface and near-surface soils at the Madera site are San Joaquin sandy loams (SaA). The San Joaquin series consists of shallow, iron-silica hardpan soils developed in old alluvium derived mostly from granitic rocks. Internal drainage is restricted by the impervious hardpan. The San Joaquin sandy loams have the following representative profile:

- 0 to 5 inches, yellowish-red and very hard (reddish-brown and very friable when moist) sandy loam; medium acid; very weak, very fine, granular structure when moist, and essentially massive when dry; low in organic matter.
- 5 to 11 inches, yellowish-red and hard loam (reddish-brown and friable when moist); slightly acid; moderate, fine, subangular blocky structure.
- 11 to 19 inches, reddish-yellow and extremely hard (yellowish-red and firm when moist) sandy clay with colloidal coatings; slightly acid; medium, fine, blocky structure.
- 19 to 23 inches, reddish-yellow (red to yellowish-red when moist) hardpan, iron-silica cemented; smooth, very dense, and indurated in upper part; less strongly cemented in lower part; some dark-colored manganese stains; some segregated lime in lower part.
- 23 to 60 inches, light yellowish-brown and hard (dark yellowish-brown and firm when moist) gritty sandy loam; massive; softly consolidated; neutral to mildly alkaline; few yellowish-red mottles and stains, which are most prominent when soil is moist; less hard and less consolidated with increasing depth.

Approximately 10 percent of the surface soils are Atwater loamy sand (AwA), moderately deep and deep over hardpan. The soils of the Atwater series are well drained and very deep. They were derived from somewhat older, wind-reworked, granitic alluvium and typically occur on the leeward side of present or abandoned stream courses, principally on low terraces. In places, a hardpan substratum of an older, unrelated soil underlies the profile. The remaining surface soils are Hanford sandy loam (HgA), moderately deep and deep over hardpan, and Tujunga loamy sand (TwA). The soils of the Hanford series consist of moderately coarse textured recent alluvium derived chiefly from granitic rocks high in micaceous minerals. The alluvial deposits were stratified and channeled during deposition. The profile is nearly uniform throughout and shows little modification other than a slightly darker color and higher organic-matter content in the surface soil. The Tujunga loamy sand usually occurs as narrow streaks as is the case at this site. The Tujunga series consists of pale-brown, noncalcareous, coarse-textured, somewhat excessively drained soils derived from granitic sediments deposited on recent alluvial fans and flood plains. Except for having a coarser texture, a lower organic-matter content, and lower moisture-holding capacity, these soils are similar to the Hanford soils, which formed from material derived from similar sources but of finer texture. It consists of approximately five feet of pale-brown and loose loamy sand that is very low in organic matter, with coarse sand and gravel at a depth of two feet and deeper (USDA, 1962).

5.1.2.2 Geology for North Fork Site for Alternative D

The proposed project site for Alternative D lies just outside of the USDA Soil Survey of the Madera Area, which was published in 1962. The National Forest Service in cooperation with the USDA and the Regents of the University of California (Agricultural Experiment Station) conducted a soil survey of the Sierra National Forest Area (National Forest Service, 1962). The soils are described below based on the soils in the vicinity of the project site utilizing the National Forest Service report; however, this may not be an entirely accurate representation of the site in spite of the level of detail in the soil descriptions. As mentioned previously, percolation and mantle testing should be performed at the selected project site.

Based on the maps in the USDA Soil Survey, the surface and near-surface soils in the vicinity of the Alternative D project site are Holland sandy loams, 15 to 30 percent slopes (HoD). The Holland series consists of shallow residuum weathered from coarse-grained granitic rocks. They resemble the Auberry soils, which occur at lower elevations and are brownish throughout. Internal drainage is restricted by the impervious hardpan. The Holland sandy loams have the following representative profile:

- 0 to 6 inches, grayish-brown and slightly hard (very dark brown and friable when moist) sandy loam; slightly acidic; highly micaceous; moderate, medium and fine, granular structure; moderate in organic matter.
- 6 to 11 inches, brown and slightly hard (dark-brown and friable when moist) heavy sandy load; medium acid; weak fine, granular structure when moist, and nearly massive when dry; somewhat lower in organic matter than layer above.
- 11 to 22 inches, light-brown and hard (dark-brown and firm when moist) light sandy clay loam; medium acid; weak, coarse, subangular blocky structure.
- 22 to 44 inches, reddish-brown and very hard (yellowish-red and firm when moist) sand clay loam; strong acid; moderate, medium, subangular blocky structure.
- 44 to 58 inches, very pale brown and hard (yellowish-brown and friable when moist) sandy loam; medium acid; massive.
- 58 inches +, varicolored, weathered, disintegrating granitic rock, less altered with increasing depth.

The Auberry soils are well-drained upland and deep. The soils were derived from coarse-grained granitic rocks. The soils of Auberry have good natural drainage. Surface runoff is slow. Internal drainage is medium to moderately slow. The moisture-holding capacity and natural fertility are moderate, and the erosion hazard is slight (USDA, 1962).

5.1.2.3 Conventional Leach Fields

The USEPA would regulate conventional on-site subsurface leach fields as Class V injection wells under the UIC program (Section 3.2), which is a component of the Source Water Protection Program (Section 3.6). Subsurface disposal permitting would likely be based on groundwater quality degradation criteria. Successful permitting of subsurface disposal discharge may require a limited hydrogeological study to establish pollutant transport patterns in the nearest identifiable groundwater basin. An analysis may also be required to determine the downgradient environmental impacts to other beneficial users of the groundwater basin. The primary beneficial users of groundwater in this area are humans who use the groundwater for potable water.

In addition to good percolation, leach fields typically require a minimum of several feet of clearance above the highest groundwater levels. High groundwater is not anticipated at this site.

Leach fields are used to dispose of treated wastewater effluent by distributing it underground to the infiltrative soil surfaces. Conventional leach field design uses a series of looped or lateral trenches 1.5 to 3 feet wide and 2 to 5 feet deep. The trenches are filled with stone or gravel and covered to reduce surface water inflow. Perforated pipes run along the trenches to disperse the effluent into the soil. Conventional leach fields generally require large areas, well-drained soils, and mostly level ground to operate adequately. Based on the USDA Soil Survey, shallow hardpan encountered at this site would be at a depth of less than 2 feet in the San Joaquin sandy loams, so the leach field would provide drainage directly into the soils beneath the hardpan where drainage should be adequate in the sandy loam. Leach field design would be according to typical Madera County standards.

To utilize the shallow soils, the wastewater would need to be treated to a sufficient level that ensures compliance with the RWQCB's Basin Plan objectives for the protection of surrounding groundwater. Because effluent would be treated to tertiary levels prior to placement in the leach fields, further aerobic treatment in the soil, typical of conventional leach field design, would not be required. Typically, wastewater effluent treated to tertiary levels by Membrane Bioreactors contains low solids and nutrient concentrations. Consequently, the leach fields can be constructed within shallower soil cover and possibly loaded at much higher hydraulic rates, provided that the subsurface discharge of treated wastewater does not increase the risk of exceeding the RWQCB's groundwater objective for the area.

Leach Fields are advantageous because they provide a year-round or, at the very least, a winter disposal alternative. Used in conjunction with spray field or landscape irrigation disposal, leach fields can reduce or eliminate seasonal storage requirements. Before these leach fields can be developed, detailed geotechnical investigations at candidate sites would be required to locate and provide detailed design criteria for leach fields.

5.1.2.4 Non-conventional Leach Fields

Non-conventional leach fields are high-capacity designs that can accept higher hydraulic loading rates than conventional leach fields. This is possible since the water quality of the MBR effluent being discharged to the non-conventional leach field is treated to such a high level that reliance on the soil media to provide additional treatment, typical of a conventional leach field design, is not required. As a result, these non-conventional, high-capacity leach fields can and have been designed and installed throughout the country at much higher hydraulic loading rates than high organic loading rates. Table 4-3 of the USEPA Onsite Wastewater Treatment System Manual (USEPA, 2002) provides a chart for the hydraulic and organic loading rates based on soil types and structure. The USEPA would regulate non-conventional on-site subsurface leach fields as Class V injection wells under the UIC program (Section 3.2), which is a component of the Source Water Protection Program (Section 3.6).

5.1.3 Water Balance for On-Site Disposal

A water balance was performed to determine the disposal area requirements without recycling for each project alternative. Three combinations of disposal methods were considered for each project alternative, which were: (1) subsurface disposal and seasonal storage, (2) spray fields and seasonal storage, and (3) subsurface disposal, spray fields, and seasonal storage. **Table 5-1** summarizes the results from the water balance analyses performed by HSe. Copies of the more in-depth analyses are included in **Appendix D.** This is a preliminary estimate only. A final design by a licensed engineer would be necessary to determine actual size and placement.

Table 5-1: Water Balance and Estimated Wastewater Disposal Requirements

	Alternative			
	A	B	C	D
Average Day Disposal Flows [a]	270,000	160,000	20,000	20,000
Landscape Irrigation (acres) [b]	4	4	1	1
Spray Disposal Only (acres) [b]	29	18	2	2
Seasonal Storage Basin with Spray Disposal Only (MG)	43	28	4	4
Sub-Surface Disposal Only (acres)	78	46	5	5
Seasonal Storage Basin with Sub-Surface Disposal Only (MG)	4	4	2	2
Combination of Spray and Sub-Surface Disposal (acres)	31	15	2	2
Seasonal Storage Basin for Spray and Sub-Surface Disposal (MG)	31	21	3	3

[a] Disposal Flow without recycled water rounded to nearest 10,000. See Tables 2-1 through 2-4.

[b] Areas rounded to the nearest acre.

If spray fields are used at the site as the sole disposal option, they could be located on the various project sites as shown in **Figure 5-1a through Figure 5-1d.** Based on the water balance analyses, the spray field area required to dispose of the effluent from the WWTP ranges from 2 to 29 acres, depending on the project alternative. Additionally, a seasonal storage basin would be needed to store effluent during rain events.

If leach fields are the sole disposal option, then 5 to 78 acres would be required to dispose of the effluent from the WWTP. While this may be possible at the Madera site because it has at least 128 acres of potential disposal area (**Figure 1-5**) and at the North Fork site if some of the soil stabilization area is useable (**Figure 1-8**), field-testing may reveal that only certain portions of the respective sites have soils conducive to leach field disposal. Design of leach fields is dependent on the percolation characteristics of the soil. Different percolation rates yield varying hydraulic loading rates. In addition, hydraulic loading rates also vary depending on the effluent quality—untreated wastewater discharged to leach fields would require a lower hydraulic loading rate to allow additional treatment by microorganisms in the soil. For the proposed non-conventional leach field, a hydraulic loading of 0.3 gpd/ft^2 was selected for use in preliminary sizing. A preliminary location for leach fields and 4-MG seasonal storage basins are shown in **Figure 5-2a and Figure 5-2b. Figure 5-2c and Figure 5-2d** show the leach field areas required for Alternatives C and D, with 2-MG seasonal storage basins.

If spray fields are used in conjunction with leach fields and a seasonal storage basin, approximately 31-acres of spray field disposal, 31-acres of leach field disposal, and 31 MG of seasonal storage would be required for project Alternative A. A preliminary site plan for this configuration is shown in **Figure 5-3a.** Similarly, **Figure 5-3b through Figure 5-3d** show the combination leach field and spray field areas required to dispose of the effluent from the WWTP for project Alternatives B, C, and D. Note, these calculations are based on an assumed percolation rate of 0.3 gpd/ft^2 for the leach field and would need to be determined by field-testing.

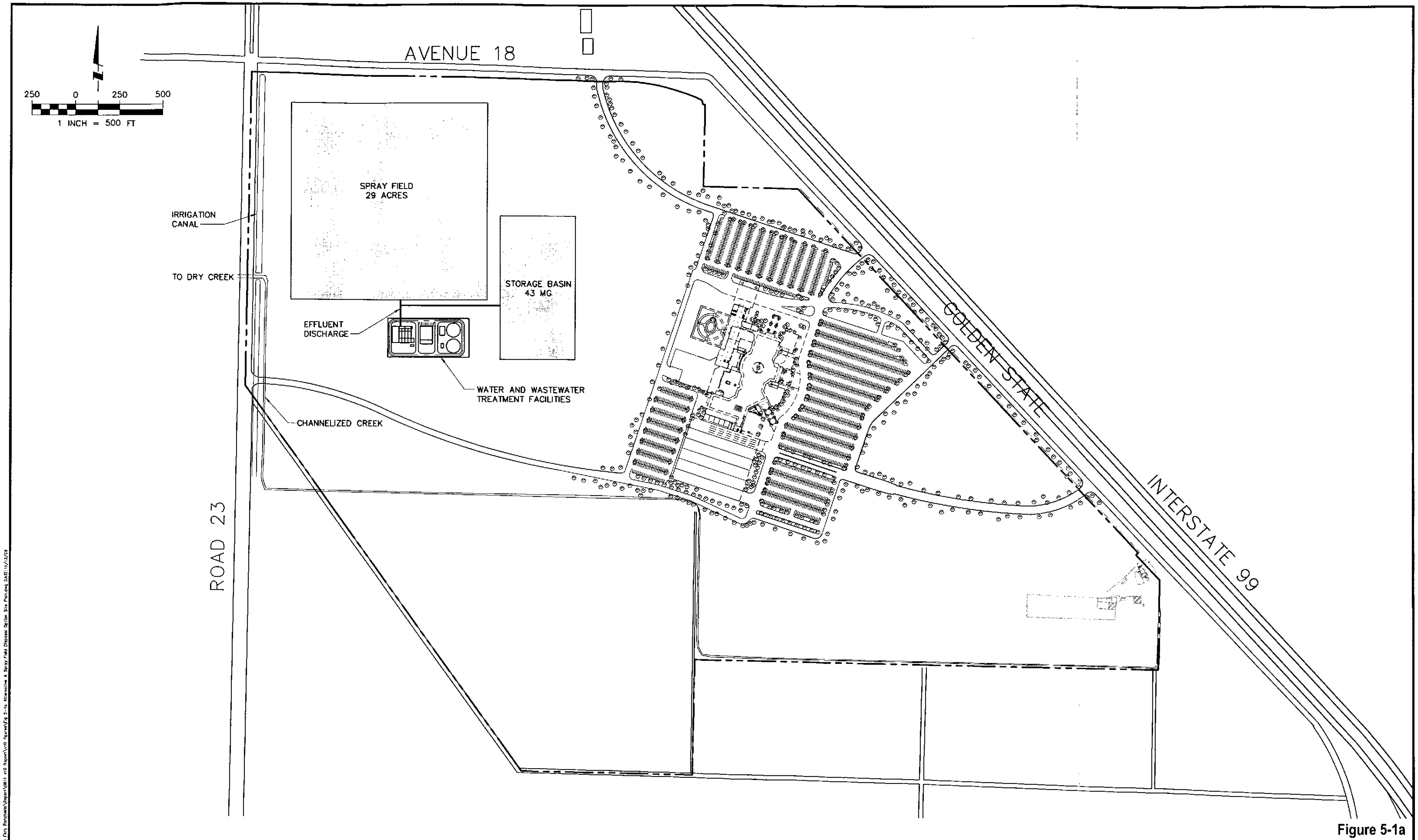


Figure 5-1a
North Fork
Water and Wastewater Feasibility Study
Alternative A - Spray Field Disposal Option Site Plan

HydroScience Engineers, Inc.

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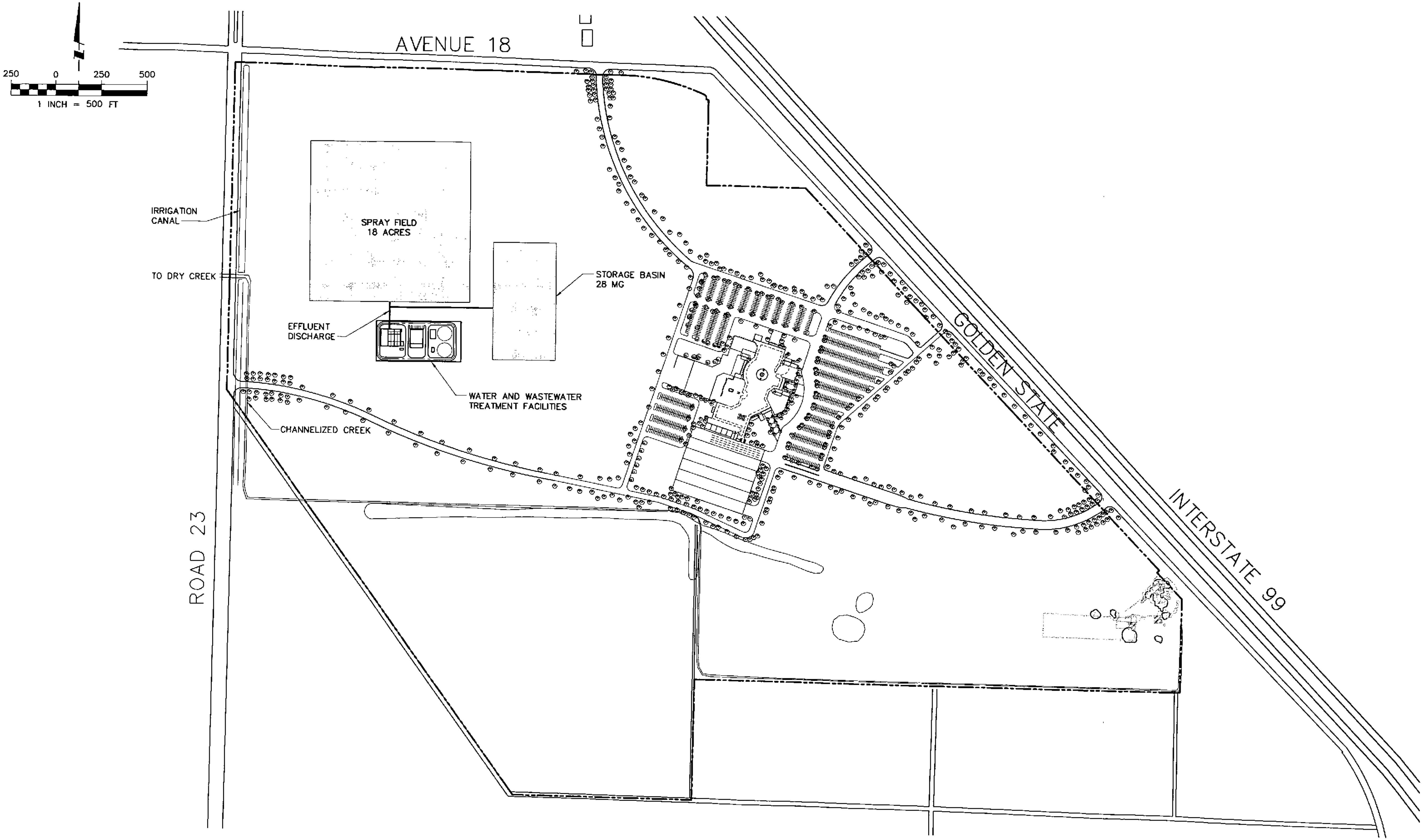

Figure 5-1b
North Fork
Water and Wastewater Feasibility Study
Alternative B - Spray Field Disposal Option Site Plan

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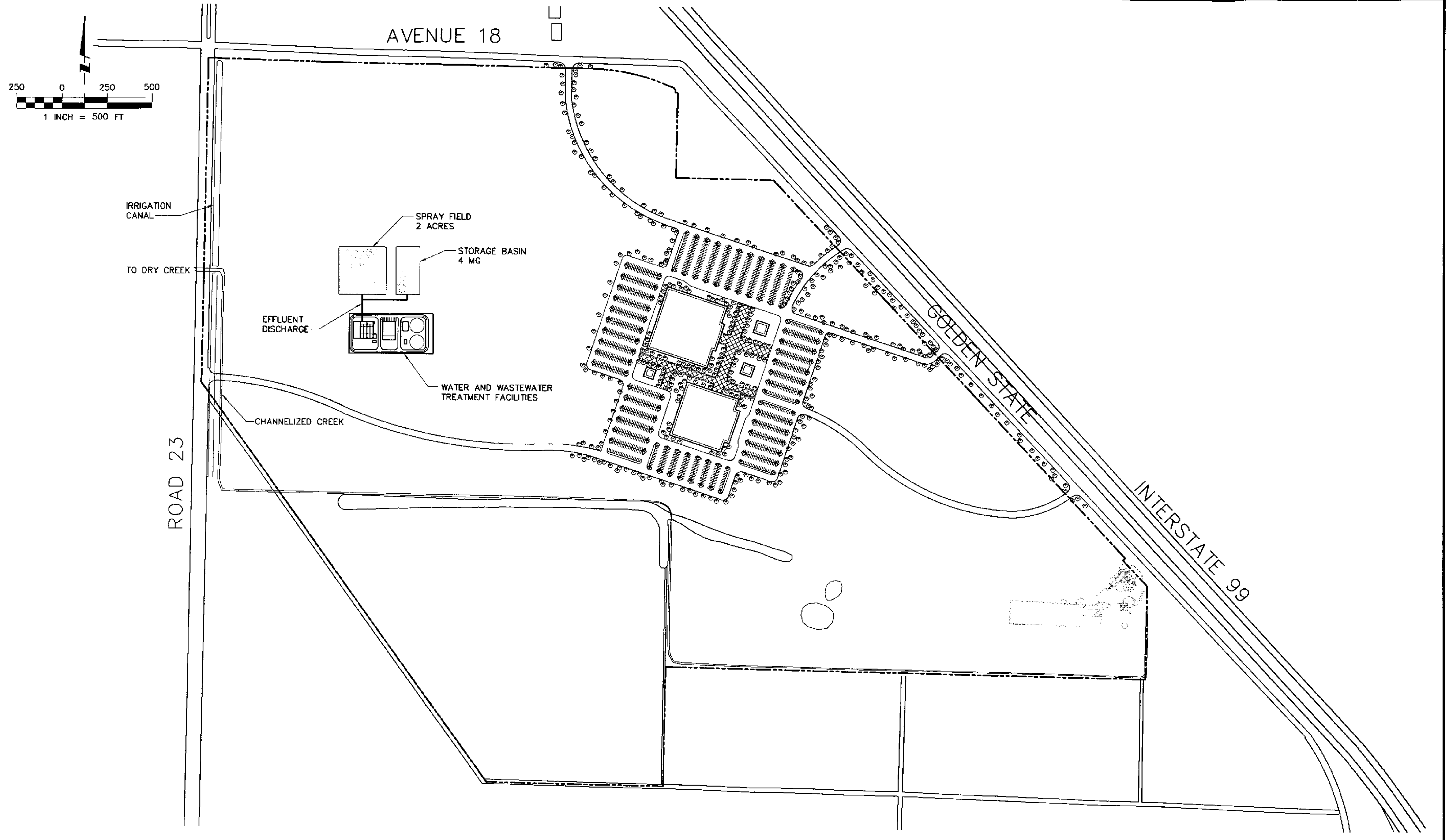

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Figure 5-1c
North Fork
Water and Wastewater Feasibility Study
Alternative C - Spray Field Disposal Option Site Plan

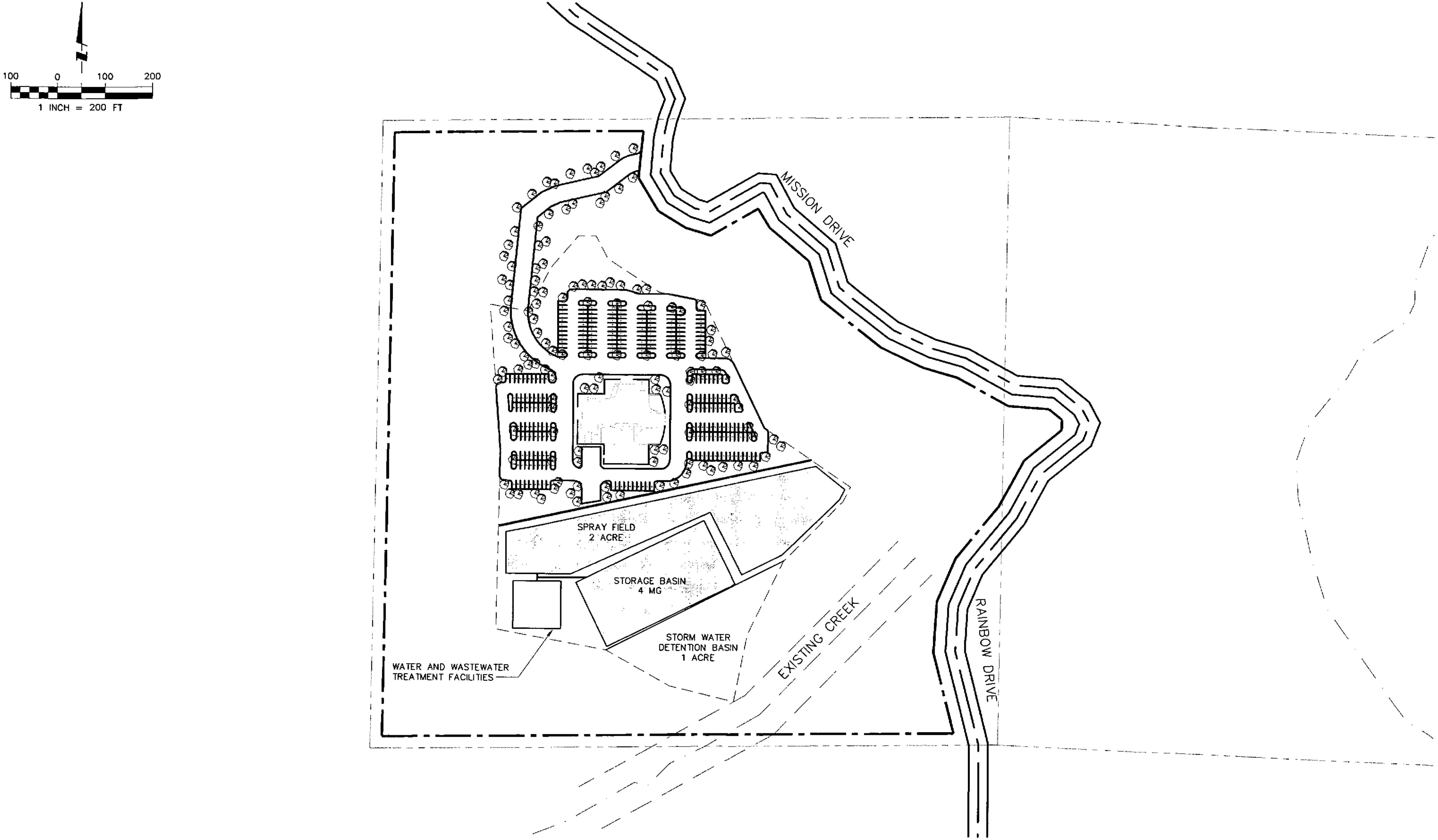

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Figure 5-1d
North Fork
Water and Wastewater Feasibility Study
Alternative D - Spray Field Disposal Option Site Plan

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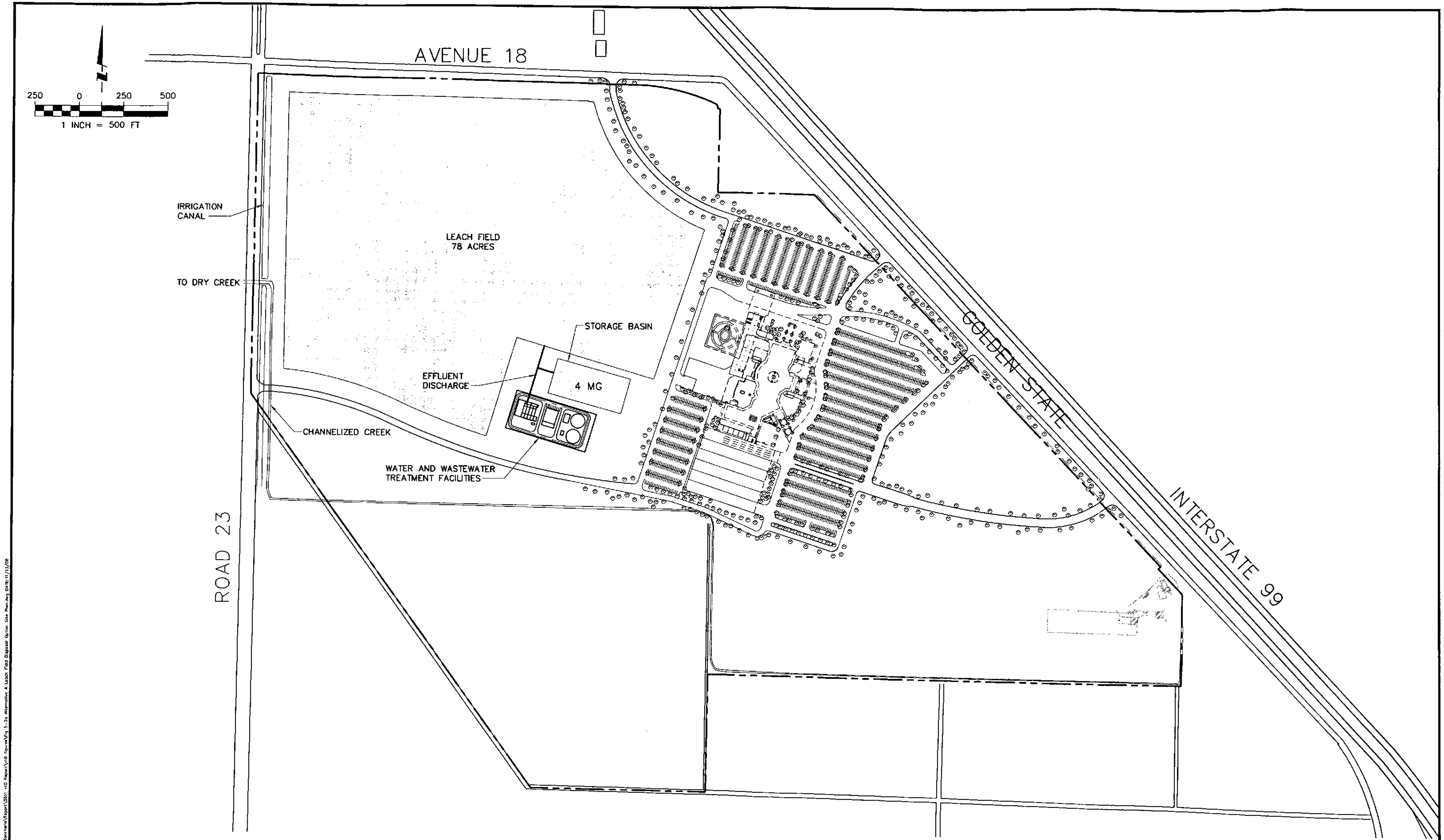

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Figure 5-2a
North Fork
Water and Wastewater Feasibility Study
Alternative A - Leach Field Disposal Option Site Plan

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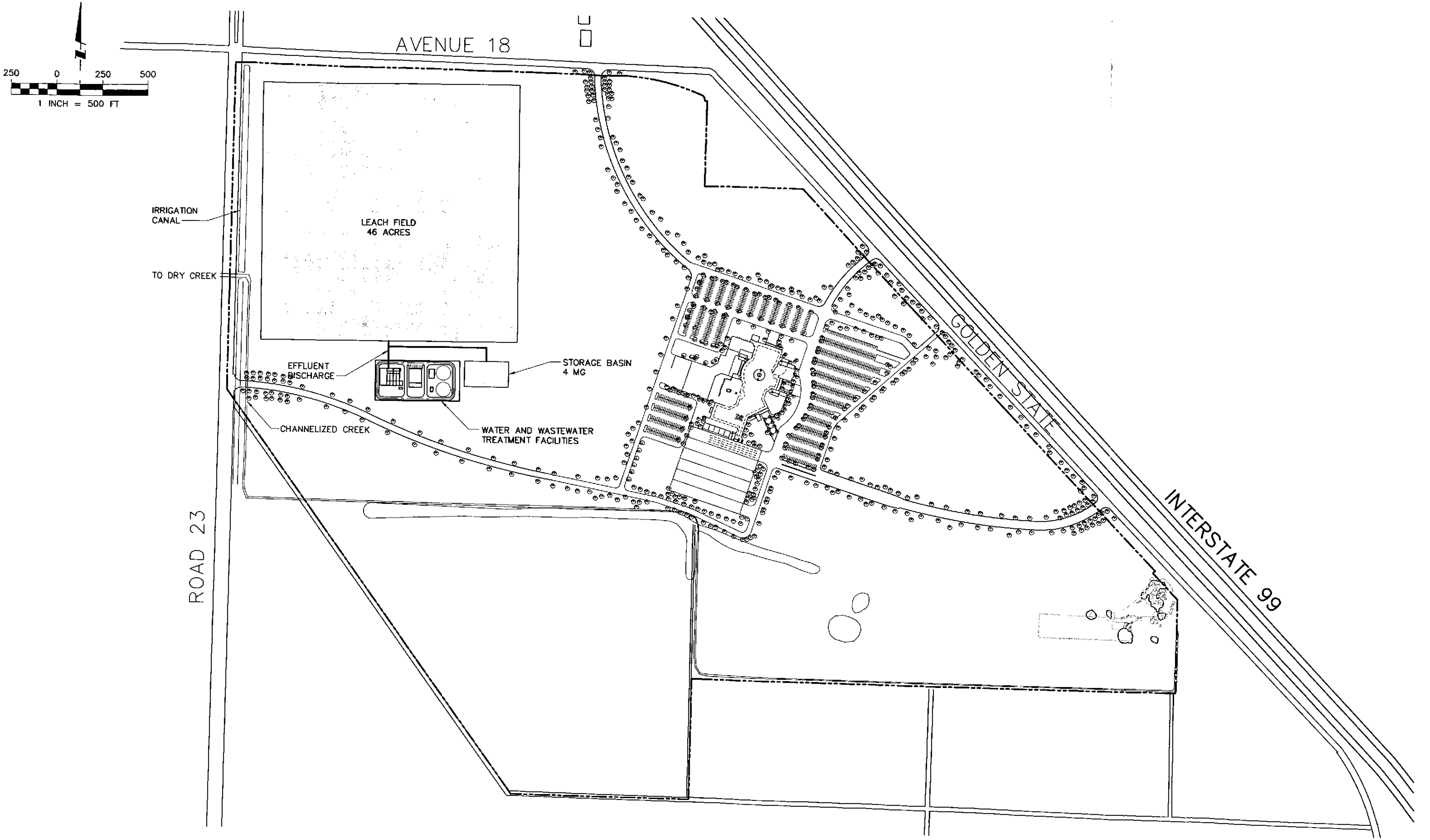

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Figure 5-2b
North Fork
Water and Wastewater Feasibility Study
Alternative B - Leach Field Disposal Option Site Plan

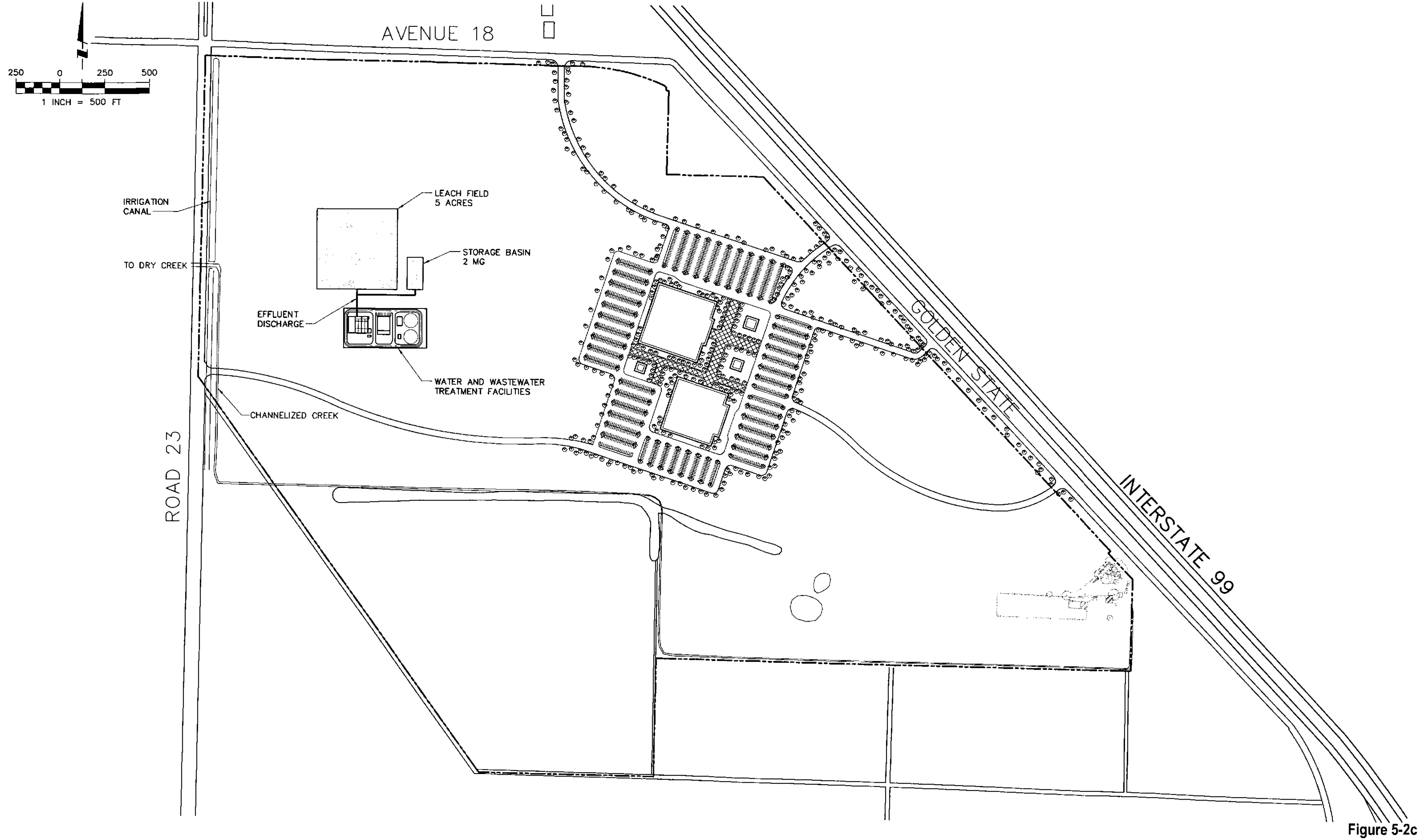

Figure 5-2c
North Fork
Water and Wastewater Feasibility Study
Alternative C - Leach Field Disposal Option Site Plan

HydroScience Engineers, Inc.

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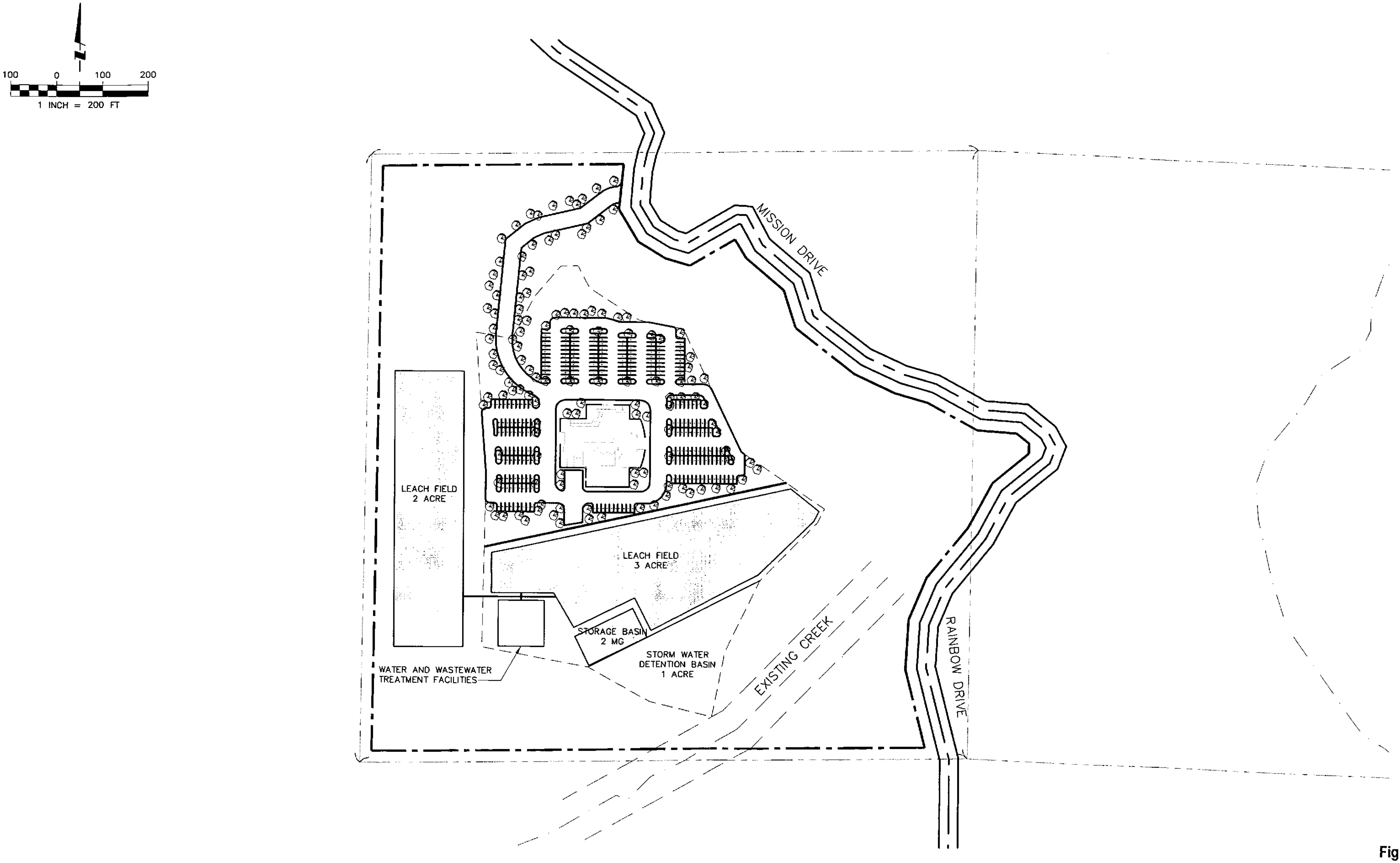

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Figure 5-2d
North Fork
Water and Wastewater Feasibility Study
Alternative D - Leach Field Disposal Option Site Plan

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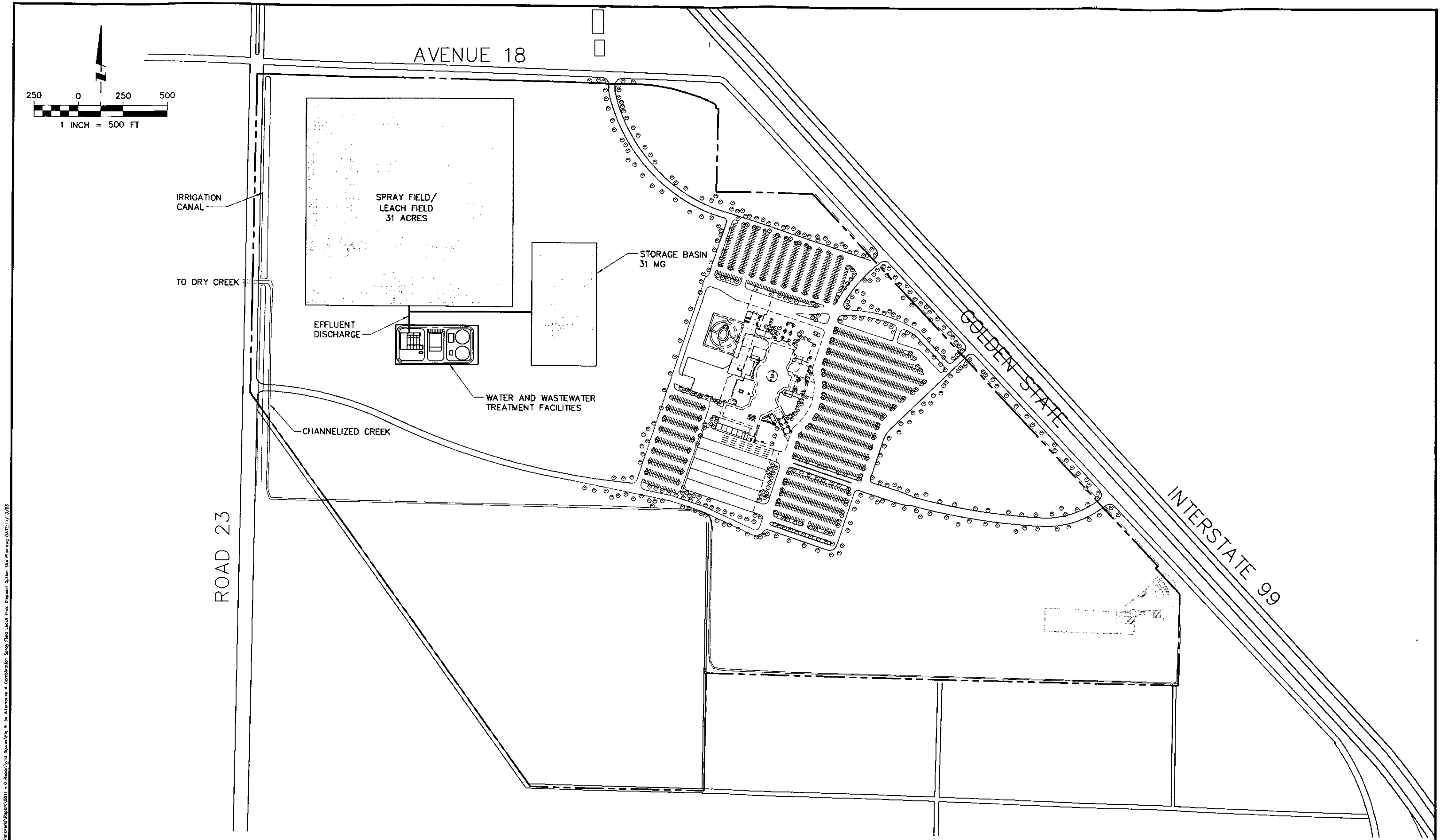

Figure 5-3a
North Fork
Water and Wastewater Feasibility Study
Alternative A - Combination Spray Field / Leach Field Disposal Option Site Plan

HydroScience Engineers, Inc.

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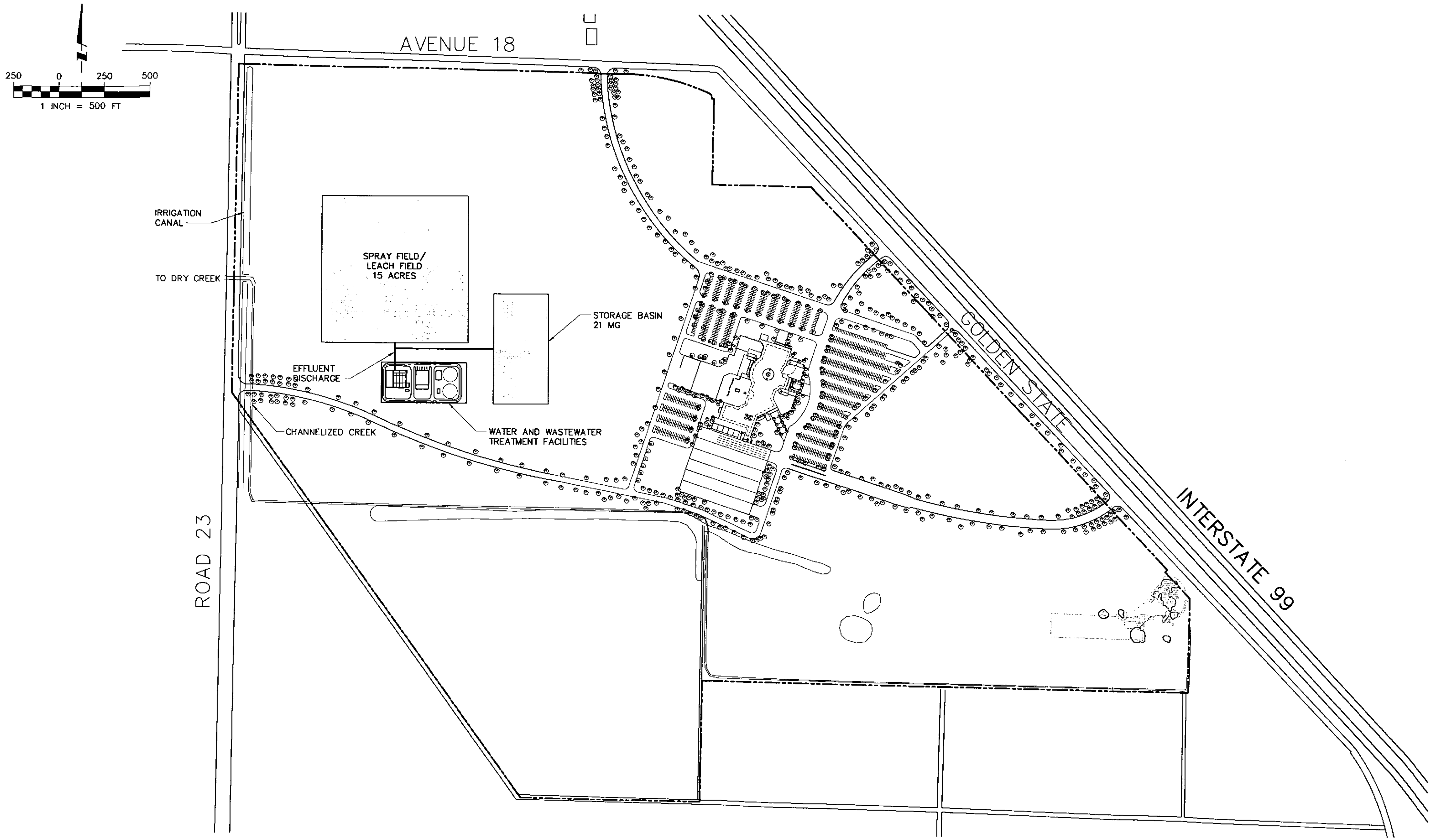

Figure 5-3b
North Fork
Water and Wastewater Feasibility Study
Alternative B - Combination Spray Field / Leach Field Disposal Option Site Plan

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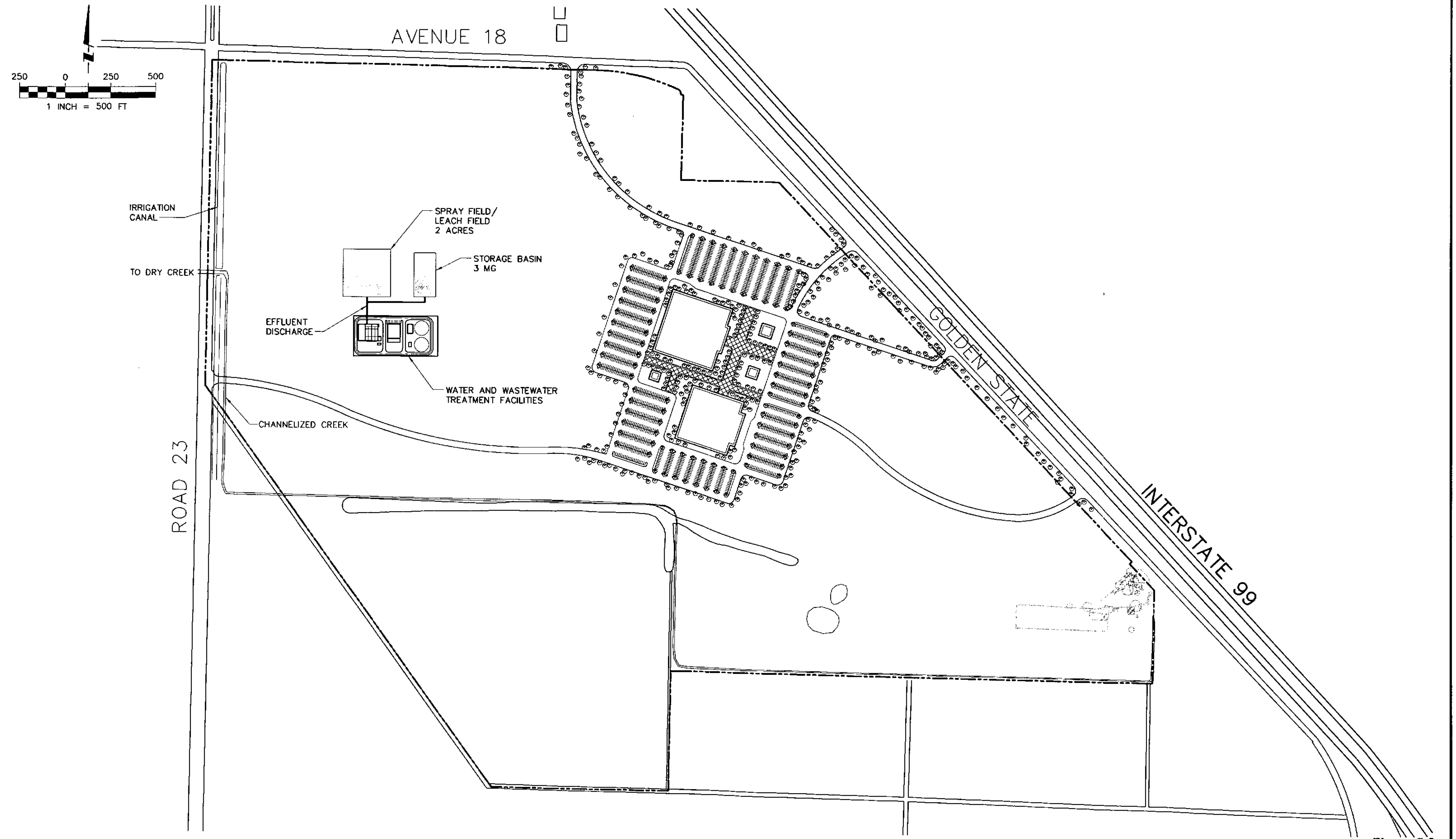

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Figure 5-3c
North Fork
Water and Wastewater Feasibility Study
Alternative C - Combination Spray Field / Leach Field Disposal Option Site Plan

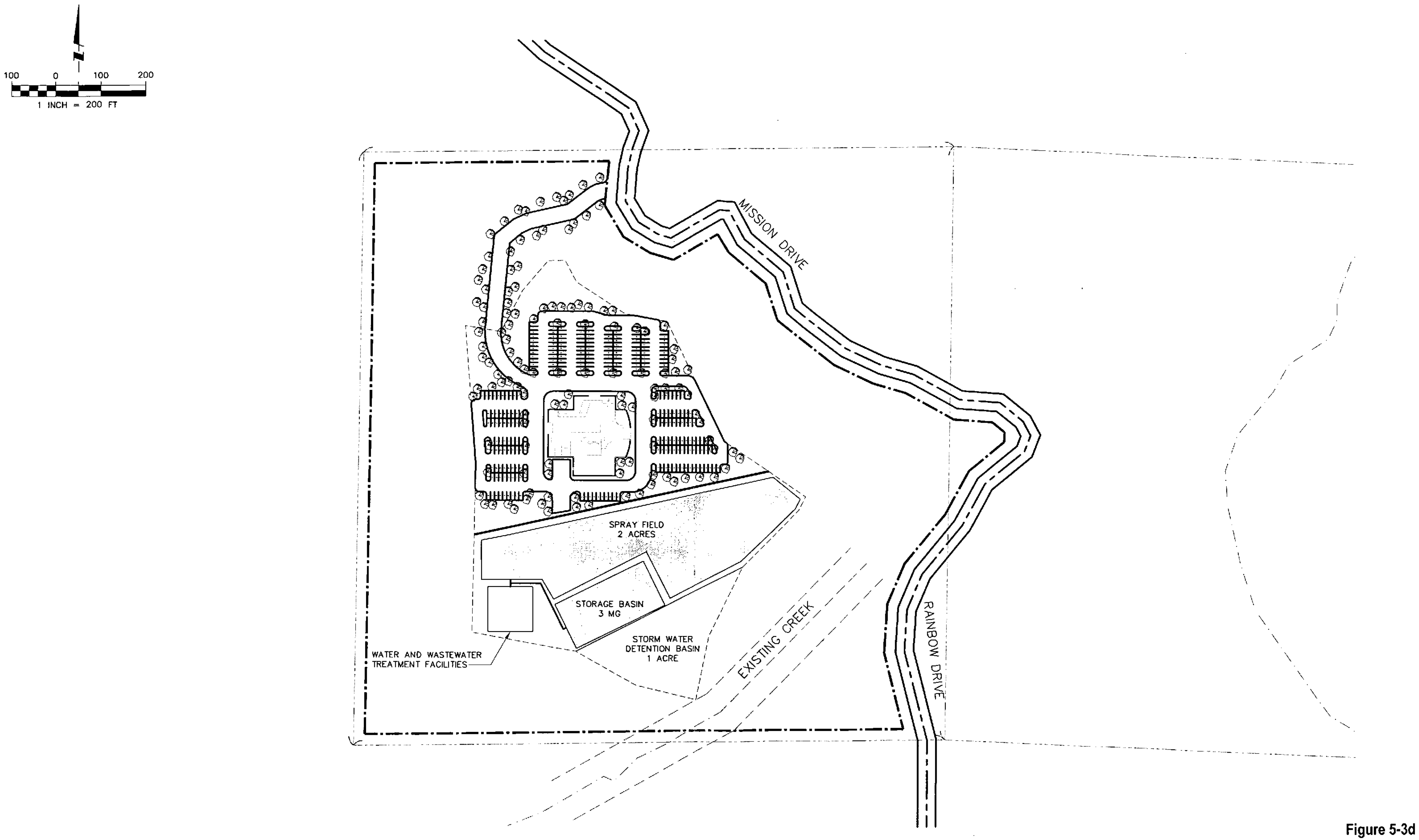

Figure 5-3d
North Fork
Water and Wastewater Feasibility Study
Alternative D - Combination Spray Field / Leach Field Disposal Option Site Plan

HydroScience Engineers, Inc.

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5.1.4 Surface Water Discharge

5.1.4.1 Alternatives A, B, and C

A channelized creek flows through the project site for Alternatives A, B, and C to Dry Creek, and then to the Fresno River as shown in **Figure 5-4**. The Fresno River is designated as a beneficial use surface water body for municipalities, communities, industries and warm freshwater habitat established along the river. The Fresno River is not designated as part of the RWQCB's 303(d) listing of impaired water bodies but it drains into the San Joaquin River, which is listed. The channelized creek is the proposed discharge point and is located within the Rancheria. In order to discharge wastewater produced on-site to local surface waters, and despite the discharge point being on trust lands; the receiving waters are designated by the RWQCB to have existing beneficial use, so an NPDES permit is required. Typically, the NPDES permit application process takes at least 1 to 2 years to complete. Since the treatment facilities and point of discharge are fully contained within trust lands, the NPDES permit will be issued and regulated by the USEPA instead of the local RWQCB. Normally, the USEPA sets treatment and discharge requirements in the NPDES permit in accordance with the requirements of the local RWQCB Basin Plan.

5.1.4.2 Alternative D

An unnamed tributary of Willow Creek flows through the project site for Alternative D, and then to the San Joaquin River upstream of Millerton Lake as shown in **Figure 5-5.** The San Joaquin River is designated as a beneficial use surface water body for municipalities, communities, industries, and warm freshwater habitat established along the river. The San Joaquin River is designated as part of RWQCB's 303(d) listing of impaired water bodies. The unnamed tributary is the proposed discharge point and is located within the Rancheria. In order to discharge wastewater produced on-site to local surface waters, and despite the discharge point being on trust lands; the receiving waters are designated by the RWQCB to have existing beneficial use, so an NPDES permit is required. Typically, the NPDES permit application process takes at least 1 to 2 years to complete. Since the treatment facilities and point of discharge are fully contained within trust lands, the NPDES permit will be issued and regulated by the USEPA instead of the local RWQCB. Normally, the USEPA sets treatment and discharge requirements in the NPDES permit in accordance with the requirements of the local RWQCB Basin Plan.

5.1.4.3 Anticipated NPDES Permit Effluent Limitations

Preliminary research was done to identify and obtain a copy of current NPDES permits. The El Dorado Sanitation District and the San Andreas Sanitation District have current NPDES permits for WWTPs within the Sacramento and San Joaquin River Basins and are governed by the same Basin Plan. These permits are included in **Appendix E**. The current permits aid in anticipating the requirements that would likely be placed on the North Fork Rancheria and also suggests that an on-site wastewater treatment facility could probably be permitted for surface water discharge. However, high quality effluent would probably be required. Moreover, pending additional stream flow data and additional engineering investigation, limitations on the discharge during low flow periods can be expected (i.e. seasonal discharge).

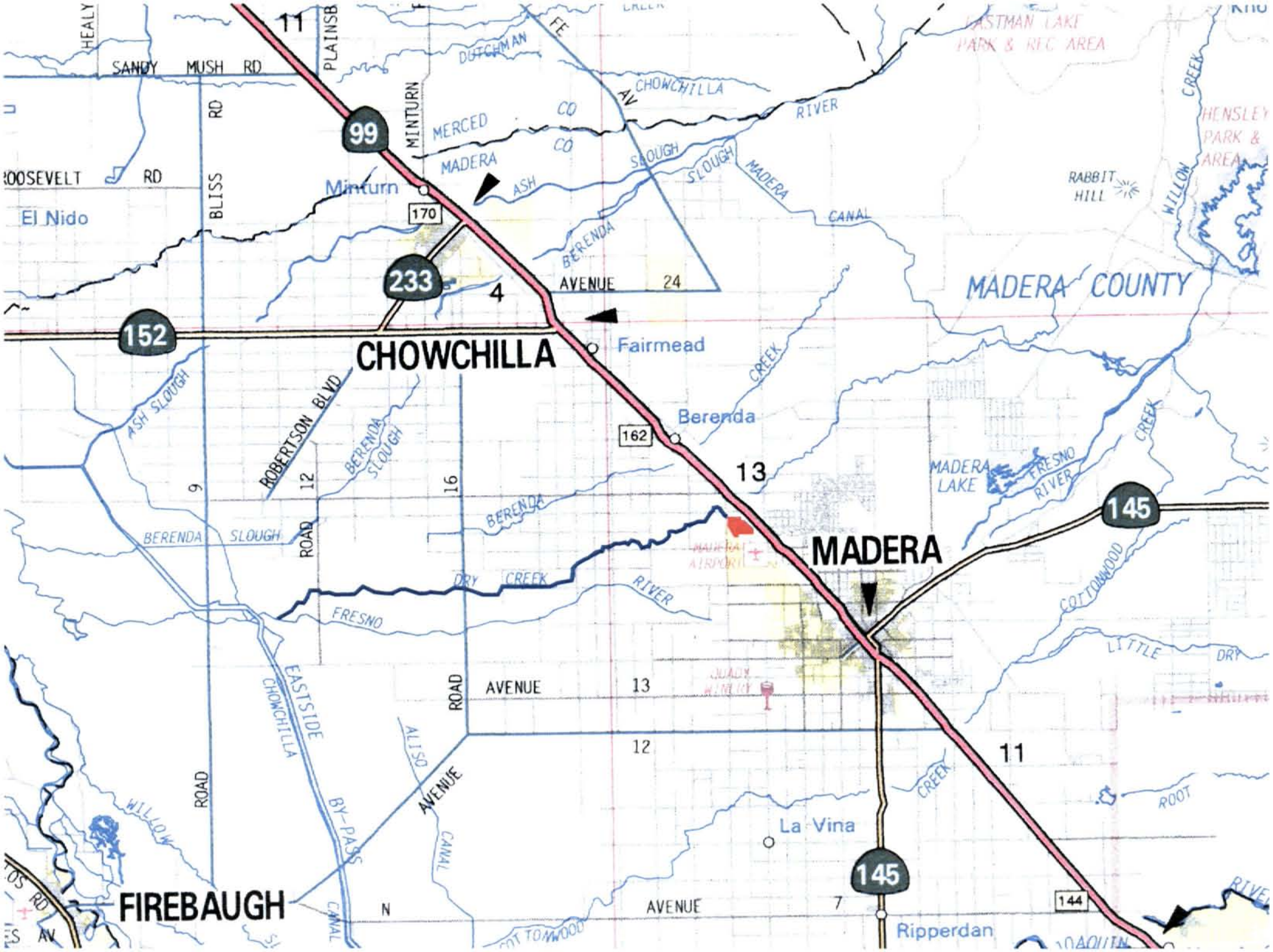

Figure 5-4
North Fork
Water and Wastewater Feasibility Study
Downstream Waterways of Project Alternatives A, B, and C

HydroScience Engineers, Inc.

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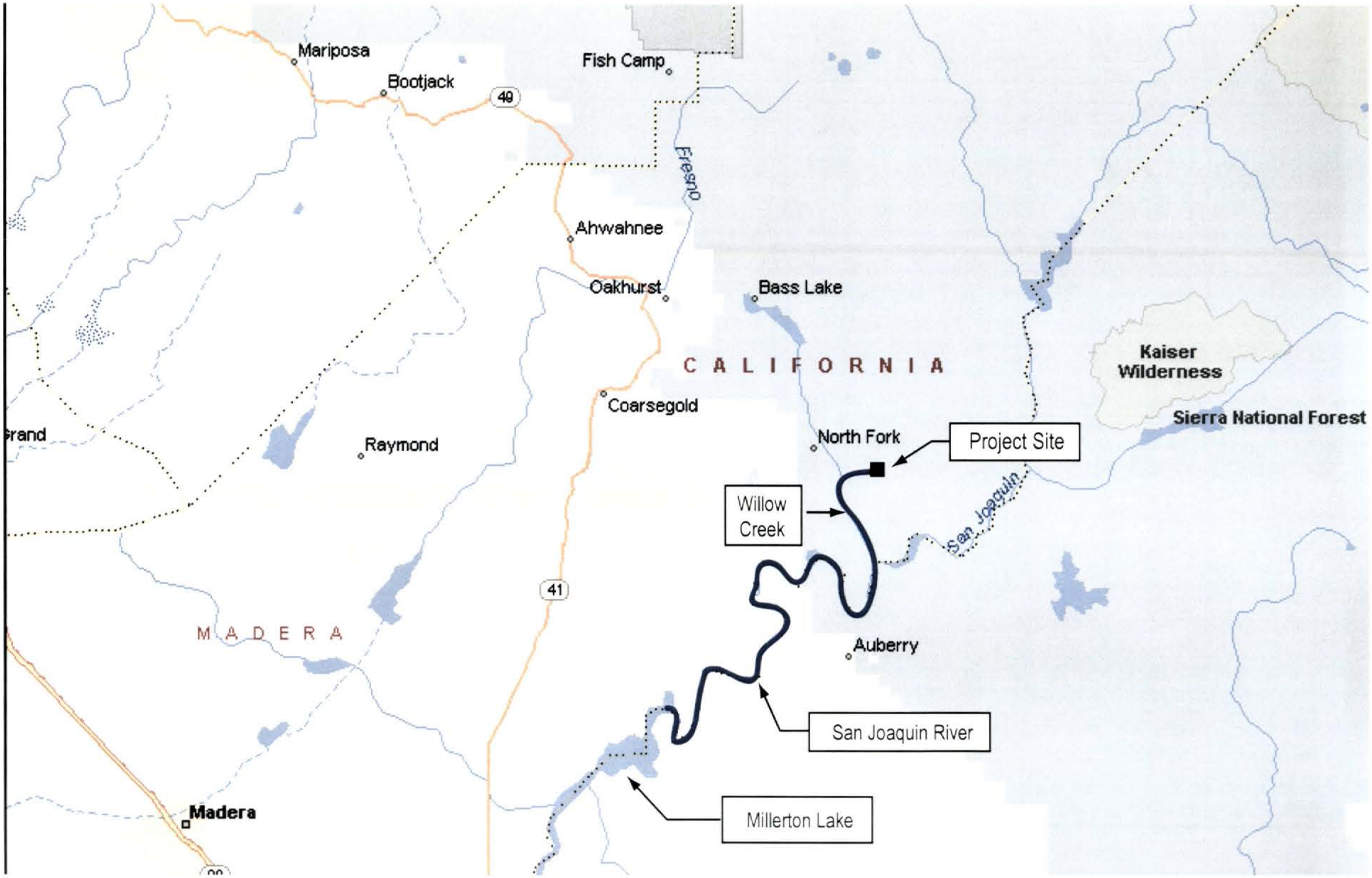

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Figure 5-5
Water and Wastewater Feasibility Study
Downstream Waterways of Project Alternative D

Table 5-2 sets forth some of the significant requirements and limitations anticipated in an NPDES Permit that may be issued for the on-site wastewater treatment facility. In addition to those considerations listed in **Table 5-2**, the CTR, which lists some 126 other constituents of wastewater that may be of concern, would also have to be evaluated. Although most of these CTR constituents are typically not present in significant quantities in domestic wastewater, they may be added by industrial discharges or may be present in the groundwater used to supply potable water.

The foregoing is an overview of the significant requirements and possible constraints to surface discharge of the treated wastewater. Additional data relating to dry weather flows in the stream would have to be obtained and evaluated in order to determine if year-round discharge would be permitted and the extent, if any, that dilution can be relied upon to achieve water quality objectives and standards. If this were the only discharge option used, discharge limitations could make a storage basin necessary. Alternatively, this discharge option could be used in combination with on-site disposal using either spray fields or leach fields, or a combination of both spray fields and leach fields. There appears to be enough acreage available for any combination of discharge options desired. The size of the basin and the spray field or leach field will depend on how they are used in combination with surface water discharge. Based upon the identified limitations and requirements for discharge to a stream, a tertiary wastewater treatment facility providing disinfection (ultraviolet [UV] or chlorination/ dechlorination) is required.

Table 5-2: Anticipated NPDES Limitations

Parameter	Anticipated Limitations
Biochemical Oxygen Demand (BOD)[a,b]	10 milligrams per liter (mg/L)
Suspended Solids [a,b]	10 mg/L
Turbidity [a,b]	<2 NTU increase in stream resulting from discharge
pH [a,b]	<0.5 pH unit change in stream resulting from discharge
Temperature [a,b]	<5 degree Fahrenheit increase in stream resulting from discharge
Conductivity/total dissolved solids[b]	< Approx. 700 Micromhos per centimeter (cm)/450 mg/L (450 ppm)
Total Coliform Bacteria [a,b]	< 2.2 MPN/100 ml (7-day median), 23 MPN/100ml (daily max)
Chlorine Residual [a,b]	None detected
Nitrite [a]	1 mg/L (as Nitrogen [N])
Nitrate + Nitrite [a,b]	<10 mg/L (as N)
Ammonia [b]	9 mg/L (Total)
Receiving Water Dilution Ratio [a,b]	20:1 minimum

[a] RWQCB Central Valley Region: WDRs for El Dorado Irrigation District Deer Creek WWTP, El Dorado County (Appendix E).

[b] RWQCB Central Valley Region: WDRs for San Andreas Sanitary District WWTP, Calaveras County (Appendix E).

5.1.5 Connect to City of Madera WWTP

The City of Madera has a WWTP approximately 5 miles southwest of the project site, at 13048 Road 21 ½ (at the intersection of Road 21 ½ and Avenue 13). The 7 MGD WWTP was recently expanded to 10.1 MGD. The expansion was completed in March 2008. The expanded WWTP features oxidation ditch technology, biological nitrogen removal, and mechanical sludge dewatering. The treated wastewater is conveyed to percolation beds for disposal.

The City of Madera Wastewater Treatment Plant Predesign Report (Boyle, 2004) presents estimated flows for the City of Madera. **Table 5-3** lists those flows along with the WWTP's capacity before and after expansion. The table also lists the North Fork Hotel and Casino (Alternative A) average daily flow estimates and the total combined flows.

There are a lot of unknown factors in long range planning. While the City's growth rate may vary and other conditions could change, a 10.1-MGD WWTP will probably be adequate for the City until the year 2023 without the North Fork flows. As can be seen in the table, the projected increase in flow from the year 2020 to 2023 for the City of Madera is 0.95 MGD, or 0.32 MGD per year. This is a flow of approximately 9.79 MGD for the City in 2022. If the 0.27 MGD North Fork flow is added to that, the combined flow in 2022 would be 10.1 MGD. Therefore, a 10.1-MGD WWTP will probably be adequate for the City and for the North Fork flows until the year 2022. By adding the North Fork flows to the City of Madera WWTP, the plant would probably exceed capacity approximately a year earlier than the City has projected.

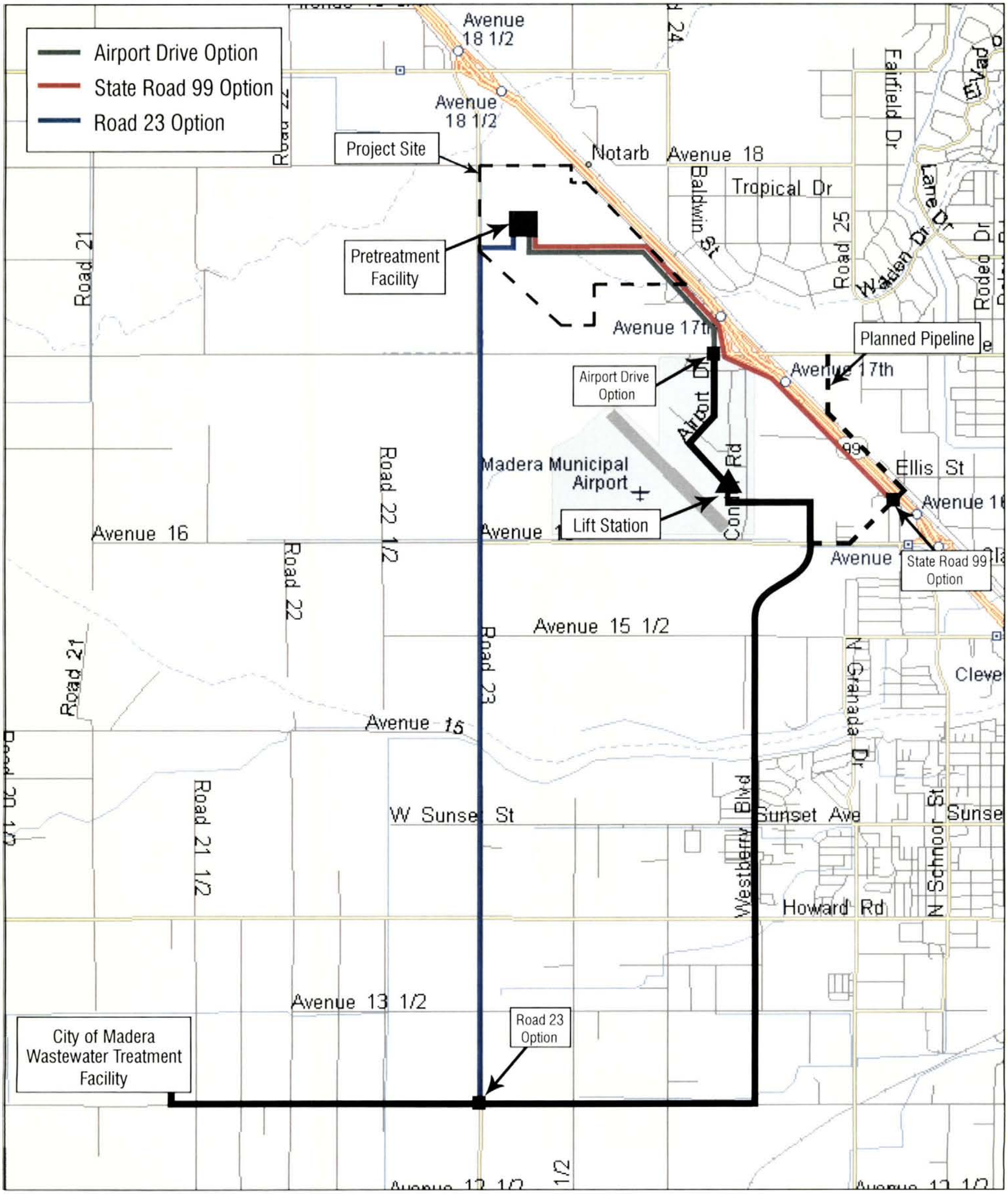
Table 5-3: Projected Flows for the City of Madera WWTP

Year	WWTP Capacity [a] (MGD)	City of Madera Projected Average Daily Flow [a] (MGD)	North Fork Hotel and Casino Projected Average Daily Flow (MGD)	Total Combined Flow (MGD)
2005	7	5.70	0.27	5.97
2010	10.1[b]	6.67	0.27	6.94
2015	10.1	7.81	0.27	8.08
2020	10.1	9.15	0.27	9.42
2023	10.1	10.1	0.27	10.37

[a] Source: City of Madera WWTP Predesign Report, July 22, 2004.

[b] Expansion is scheduled for completion in early 2007.

Conveyance to the WWTP would involve a connection to the City sewer system. Three options for wastewater transmission alignments from the North Fork project to the City of Madera WWTP are shown in **Figure 5-6**. Each option is summarized below.



S:\common\projects\North Fork Rancheria\Report\0611 v10 Report\v10 figures\WWFS Pipeline Alignment Alternates Figure 5-6

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Figure 5-6
North Fork
Water & Wastewater Feasibility Study
Preliminary Pipeline Alignment Options

Option 1 – Airport Drive Option. The first option would convey the Project's wastewater flows via a new 1.2-mile gravity sewer main from the Madera site and would connect to the City's existing 10-inch gravity sewer line at Airport Drive and Avenue 17. The Project flows would then drain southwest along Aviation Drive to the existing sewer lift station and then be pumped to the 30-inch Westberry Boulevard gravity main line.

Option 2 – State Route (SR) 99 Option. The second option would connect to the sewer line west of State Route 99. This 24-inch pipeline crosses beneath SR 99 from the northeast, traverses west along Avenue 16, and then flows into the Westberry Boulevard gravity main. This option would provide a new 2.6-mile gravity sewer main from the Madera site that would connect to the 24-inch sewer line west of SR 99.

Option 3 – Road 23 Option. The third option would be to construct a new sewer line from the Madera site west to Road 23, then south along Road 23 where it would connect to the 48-inch trunk mainline along Avenue 13. The new sewer line would require a Fresno River crossing at the existing Road 23 bridge as well as a new lift station. The new sewer line would be a 5-mile sewer force main.

In any case, only enough additional capacity is to be included in any of the options to fulfill the casino's requirements, and thus, not be growth inducing. An engineering analysis was performed to determine the best option for conveying wastewater to the City WWTP. Sewer alignments and capacities were analyzed for the three options. Option 1 and Option 2 do not require any lift station improvements. Option 3 would require a new lift station that could convey at least 250 gpm with a minimum total dynamic head of 100 feet. Option 1 is the preferred option based on the engineering analysis (HSe, 2008).

The City of Madera requires industrial users to pretreat wastewater if levels of BOD are above 200 mg/L and/or levels of TSS are above 180 mg/L. The Tribe would be required to pretreat wastewater to these levels, thereby incurring capital costs and operating costs in addition to fees for treatment of the wastewater at the City's WWTP. The City may be willing to make an agreement with the Tribe to impose a fee when levels of BOD and TSS exceed the allowable limits in lieu of the requirement to pretreat. See Section 5.2.2 for typical casino influent levels of BOD and TSS for a casino with a hotel. If the Tribe decides to pretreat the wastewater instead of incurring additional fees for the wastewater when levels exceed the City's requirements, then a pretreatment facility would be built at the location where the proposed water and wastewater treatment facilities are located for Alternatives A, B, and C (**Figures 5-1a, 5-1b**, and **5-1c**). A pretreatment facility would consist of a package plant placed within the boundary of the proposed on-site MBR treatment facilities. The package plant would consist of an overall 60-ft diameter tank that has a concentric clarifier in the center, and flow equalization, aeration, and sludge storage in the outer annulus. Other facilities not included in the package would be designed separately, including the piping and wiring outside the tanks, odor control, sludge dewatering, sludge digester, concrete slab, and landscaping. At least one operator would be needed to run the equipment, and periodically sludge would have to be hauled off-site to a landfill.

5.1.6 Connect to the County WWTP Serving the City of North Fork

The County-operated WWTP for North Fork has an extended aeration treatment plant approximately 1 mile northwest of the proposed Alternative D project site, near the intersection of Road 225 and Road 228. The 31,000 gallon per day (gpd) WWTP is composed of a raw sewage pump station, an extended aeration treatment process, chlorine disinfection, effluent pump station, storage pond, and a distribution pump station. The WWTP currently utilizes spray fields to dispose of the disinfected effluent.

Currently, the WWTP is near maximum capacity with 99 service connections and 22 standby connections. However, plans are underway to expand the existing WWTP to a capacity of 60,000 gpd (Dunavan, 2004). The WWTP expansion will use leachfields, in addition to the existing spray fields, for disposal of the disinfected effluent.

By adding the Alternative D wastewater flows to the expanded WWTP, the plant would be near capacity again and would require an additional expansion to the WWTP to allow further growth of the City of North Fork. Conveyance to the WWTP would involve a connection to the City sewer system, as shown previously in **Figure 4-4.**

5.2 On-Site Wastewater Treatment Plant

A new WWTP to treat wastewater discharge from the various uses planned for the proposed project is an alternative to connecting to the City of Madera or the City of North Fork. Various treatment designs are possible and process selection ultimately involves consideration of many factors, including:

- Wastewater strength,
- Effluent disposal,
- Process reliability,
- Operational requirements,
- Treatment flexibility,
- Available space,
- Solid waste disposal,
- Nuisance odor,
- Visual aesthetics,
- Noise, and
- Capital and operating costs.

Of the factors identified above, the method of effluent disposal and the restrictions imposed therein have the greatest impact on the type of treatment required. The production of recycled water that meets California Code of Regulations (CCR) Title 22 requirements ultimately requires advanced tertiary treatment of wastewater to produce effluent containing very low concentrations of organics, solids, nutrients, and pathogens. State and Federal governments generally encourage the use of existing regional wastewater treatment facilities, rather than multiple, individual systems, especially when septic systems are proposed. However, the quality of treatment proposed for this project is higher than that of the regional treatment plant. Therefore, it is assumed that the USEPA, as the permitting agency, would not have any issues permitting treatment through the proposed on-site facility rather than connecting into the existing regional facility. The USEPA has permitted similar facilities on Indian reservations. Some examples include Cache Creek Casino, Rolling Hills Casino, and Thunder Valley Casino.

5.2.1 Wastewater Collection System

A sewage transmission pipeline from the casino raw wastewater lift station will convey casino wastewater to the headworks of the WWTP. Due to the site topography, the main pipeline to the

WWTP at both of the proposed project locations will be a pressurized force main. It is likely that a triplex sewage lift station will be required to convey sanitary sewage to the treatment plant.

Recommended design criteria for the lift station are shown in **Table 5-4.** The station should be designed to lift the maximum daily flow with one pump out of service. **Figure 5-7** is an example of a typical sewage lift station and odor control equipment.

Table 5-4: Recommended Sanitary Sewage Lift Station Design Criteria

Parameter	Value
Purpose	Pump raw wastewater to WWTP facilities
Type	Submersible non-clog centrifugal
Quantity	Three (Lead-Lag configuration, 2 duty, 1 standby)
Controls	Constant speed, level switch start and shutoff
Other Features	Motorized Grinder, Odor Control, Remote control and monitoring

5.2.2 Wastewater Quality

The wastewater influent to the treatment plant is expected to have a strength exceeding that typically found in municipal wastewater. **Table 5-5** summarizes the expected range of influent wastewater quality. These concentrations are based on water qualities observed at other similar facilities.

Table 5-5: Typical Casino Influent Wastewater Quality and City of Madera Limits

	Units	TSS	BOD
Casino with Hotel	mg/L	250	430
City of Madera Limits	mg/L	180	200

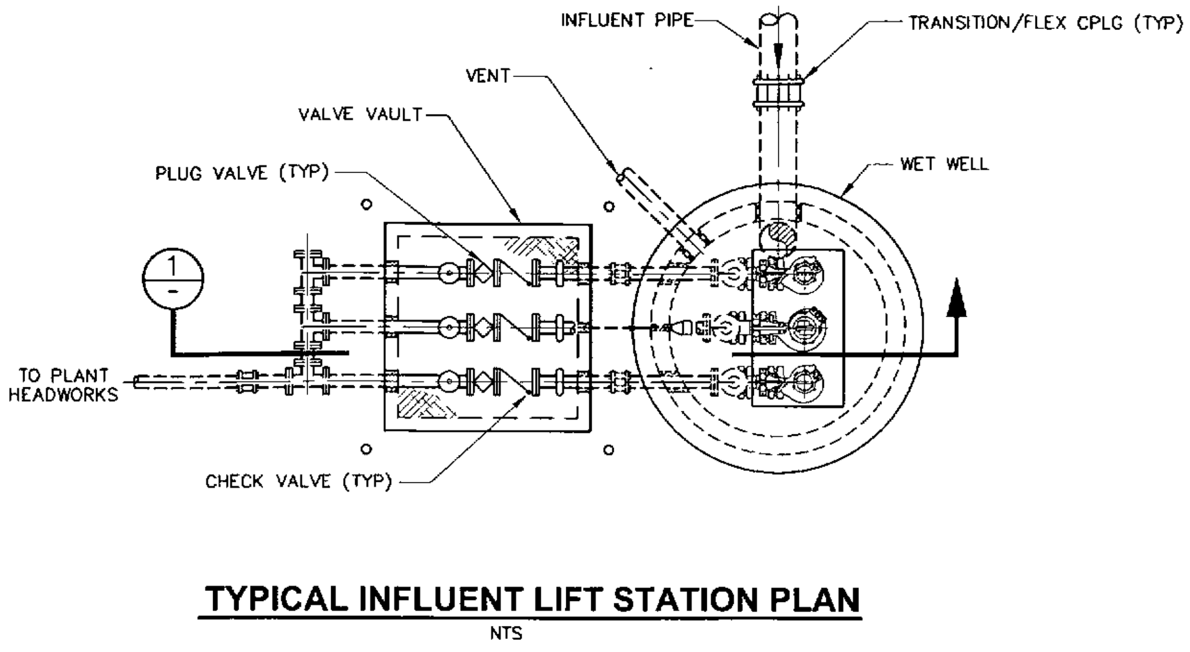
5.2.3 Wastewater Treatment Process

Due to its ability to reliably produce high-quality effluent, MBRs are recommended to treat wastewater for the project. They are widely used throughout the country for flows up to 5.0 million gallons per day (MGD) and are ideal for the project where reliable wastewater treatment is critical to meeting strict discharge standards. The primary reasons for selecting an MBR for wastewater treatment for the North Fork Hotel, casino, or retail alternatives are:

- Ability to comply with Title 22 criteria for on-site irrigation of landscaping
- Ability to nitrify/denitrify to meet low nitrate requirements in the Basin Plan – Central Valley Region 5 (RWQCB, 1998).

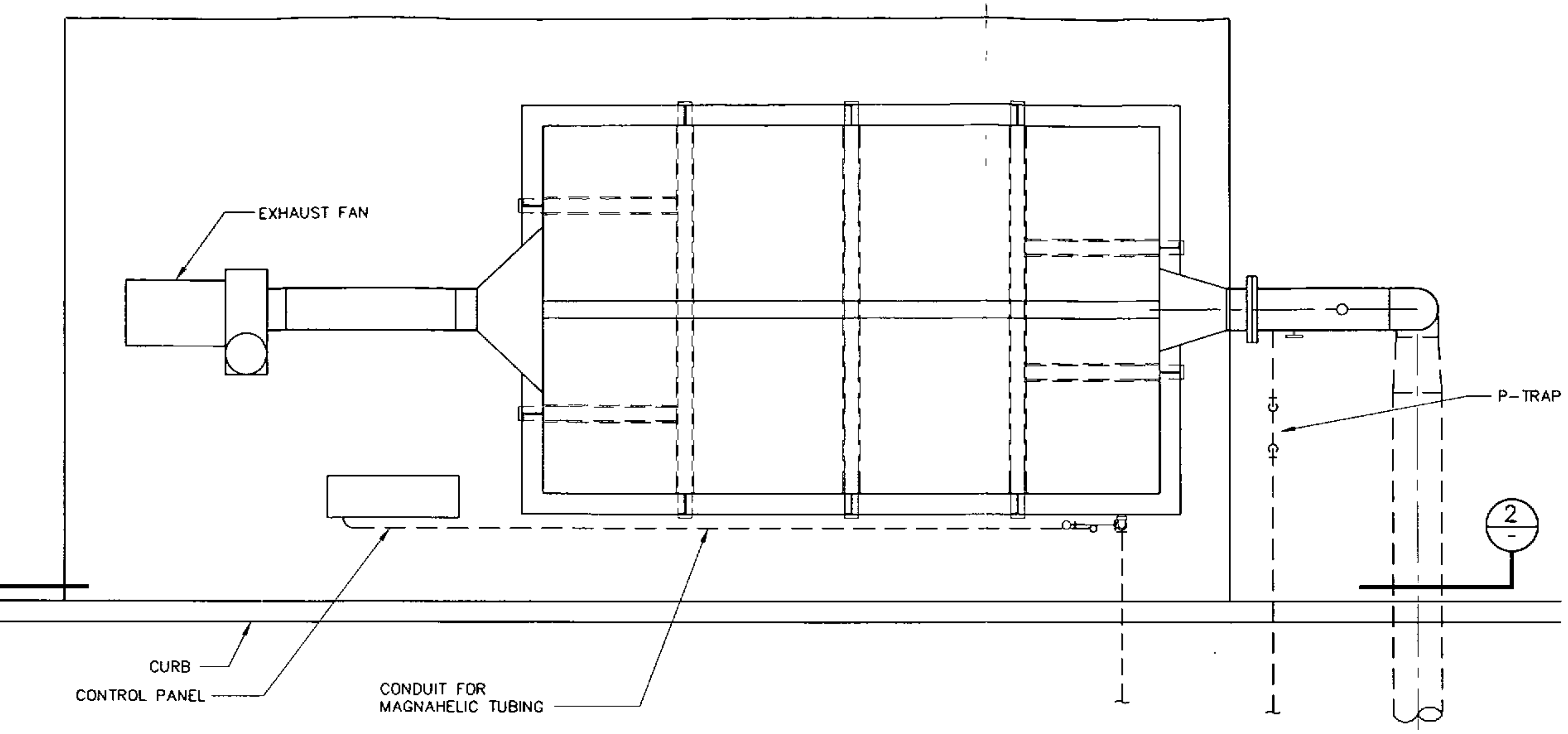
The MBR is a state-of-the-art, advanced wastewater treatment process that utilizes membrane technology, comparable to that used for production of potable water. The membranes are classified as microfiltration (MF) and have microscopic pores that strain solids greater than 0.1 micrometer (μm) to produce effluent with a very low solids concentration. MBRs are also known for high rates of organics removal and can be further designed to achieve removal of nutrients, such as nitrogen (e.g. ammonia, nitrates, and nitrite) and, to a limited extent, phosphorous. Typical effluent from an MBR process includes:

- < 1 mg/L BOD,
- < 0.2 mg/L NH_4 (Ammonium) –N,
- < 8 mg/L NO_3 (Nitrate),
- < 2.2 MPN/100 mL total coliform, and
- < 0.1 NTU.



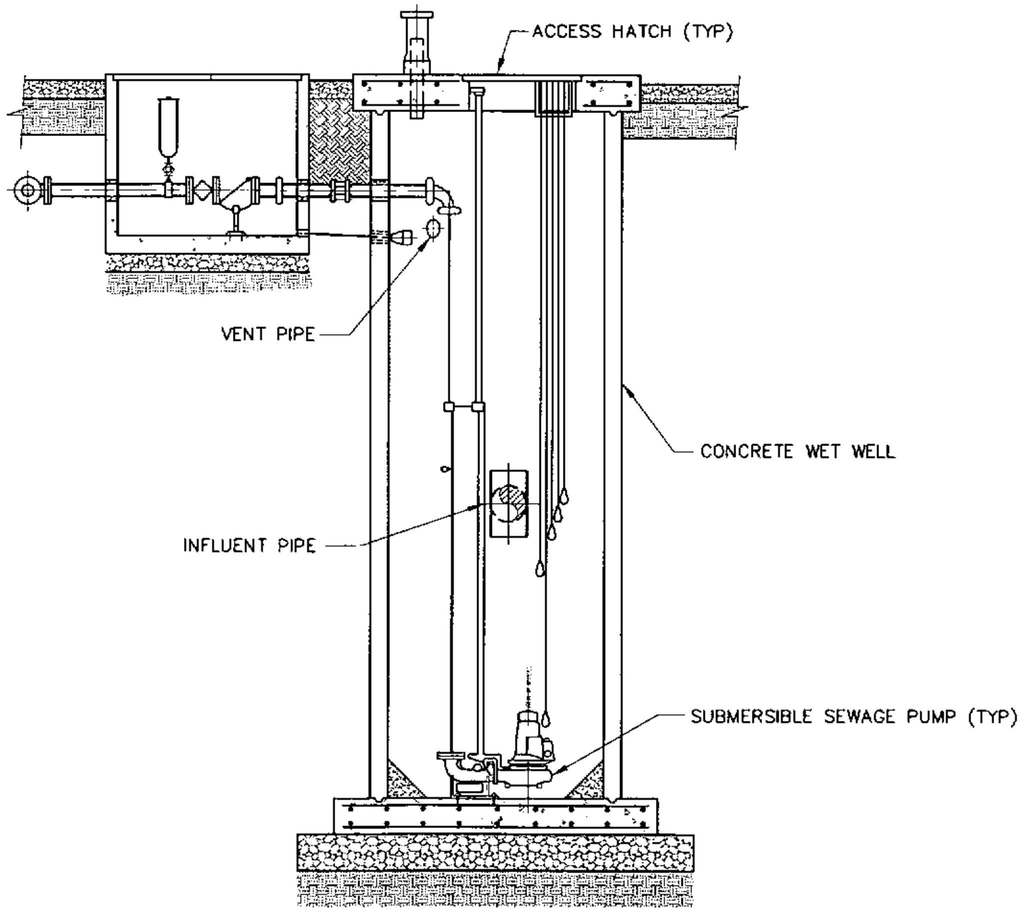
TYPICAL INFLUENT LIFT STATION PLAN

NTS



TYPICAL ODOR CONTROL FILTER PLAN

NTS



TYPICAL INFLUENT LIFT STATION SECTION

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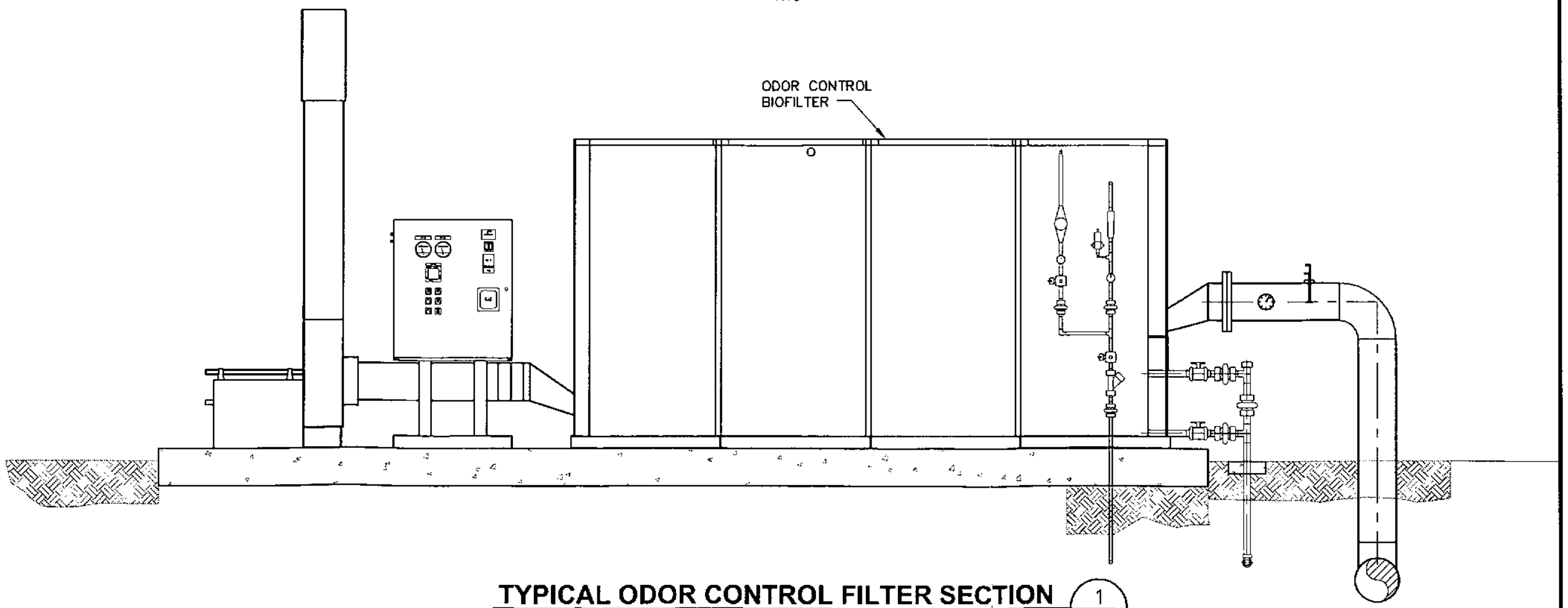

TYPICAL ODOR CONTROL FILTER SECTION

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Figure 5-7
North Fork Hotel and Casino
Water and Wastewater Feasiblity Study
Typical Influent Lift Station and Odor Control Filter Plan and Section

S:\common\projects\North Fork Rancheria\Figures\0611 v10 Figures\Fig 5-7 Influent Lift Station and Odor Control Filter.dwg DATE:11/13/06

Compared to alternative wastewater treatment designs, MBRs are able to more reliably and consistently produce high-quality effluent ideal for a variety of disposal and reuse alternatives. For systems treating to a tertiary level, the cost of the MBR system also becomes competitive with more conventional treatment processes. The non-economic advantages and disadvantages of the MBR system are summarized in **Table 5-6**.

Table 5-6: Non-Economic Advantages and Disadvantages of the MBR

Advantages	Disadvantages
Small footprint.	Requires fine screening.
Extremely high-quality effluent; state-of-the-art treatment.	Limited equipment manufacturers.
Achieves nitrogen removal.	Relatively new process.
Combines clarification and filtration with oxidation process.	Requires emergency storage basin.
High MLSS provides resistance to loading shocks.	
Does not produce an odor nuisance.	
Certified for CCR Title 22 use by California DHS.	
Significantly reduces disinfection requirements.	
Provides pretreatment for TDS removal by RO.	

While the area around the proposed site is rural to the north and west, a housing development is proposed to the southwest. Future urbanization may occur surrounding the site, so the proposed on-site wastewater treatment plant will be sited with this in mind. An MBR plant has a small footprint and can be above or below ground. Plant equipment can be shielded from sight with landscaping and operations buildings can be designed to be aesthetically pleasing. Even above ground MBR plants can be architecturally enhanced to blend with the site surroundings. For example, a plant in Europe was made to resemble an old cottage-like building and in the United States, a plant made to resemble a clubhouse was installed at a golf course. Wastewater treatment plants in the past were usually ponds where physical removal of suspended solids and organic matter by sedimentation occurred, where often there were objectionable odors that made it necessary to site them away from urban development. Even then, odor complaints were a common problem. The MBR process, however, does not produce odors. MBR plants have been used at numerous sites with no odor complaints. A local example in California is Thunder Valley Casino, which has an MBR plant adjacent to its parking lot.

This section provides a description of the recommended wastewater treatment facilities required for the North Fork project. A process flow diagram using an MBR for treatment and spray fields or subsurface leach fields for disposal is shown in **Figure 5-8.** A preliminary water and WWTP layout with recycled water is shown in **Figure 5-9.**

5.2.4 Headworks

The raw influent would be pumped by the collection system pump station through the headworks facility (**Figure 5-10**). After flow measurement, influent would be routed to a covered headworks influent box for distribution to two influent channels. During normal operation, one channel would be in-service, with the other available as a standby. Slide gates would control flow to each channel. Each headworks channel would be sized to match the hydraulic capacity of the plant. Within the channels would be fine screens to remove inorganic materials from the raw influent. **Table 5-7** shows some of the design criteria for the headworks facility.

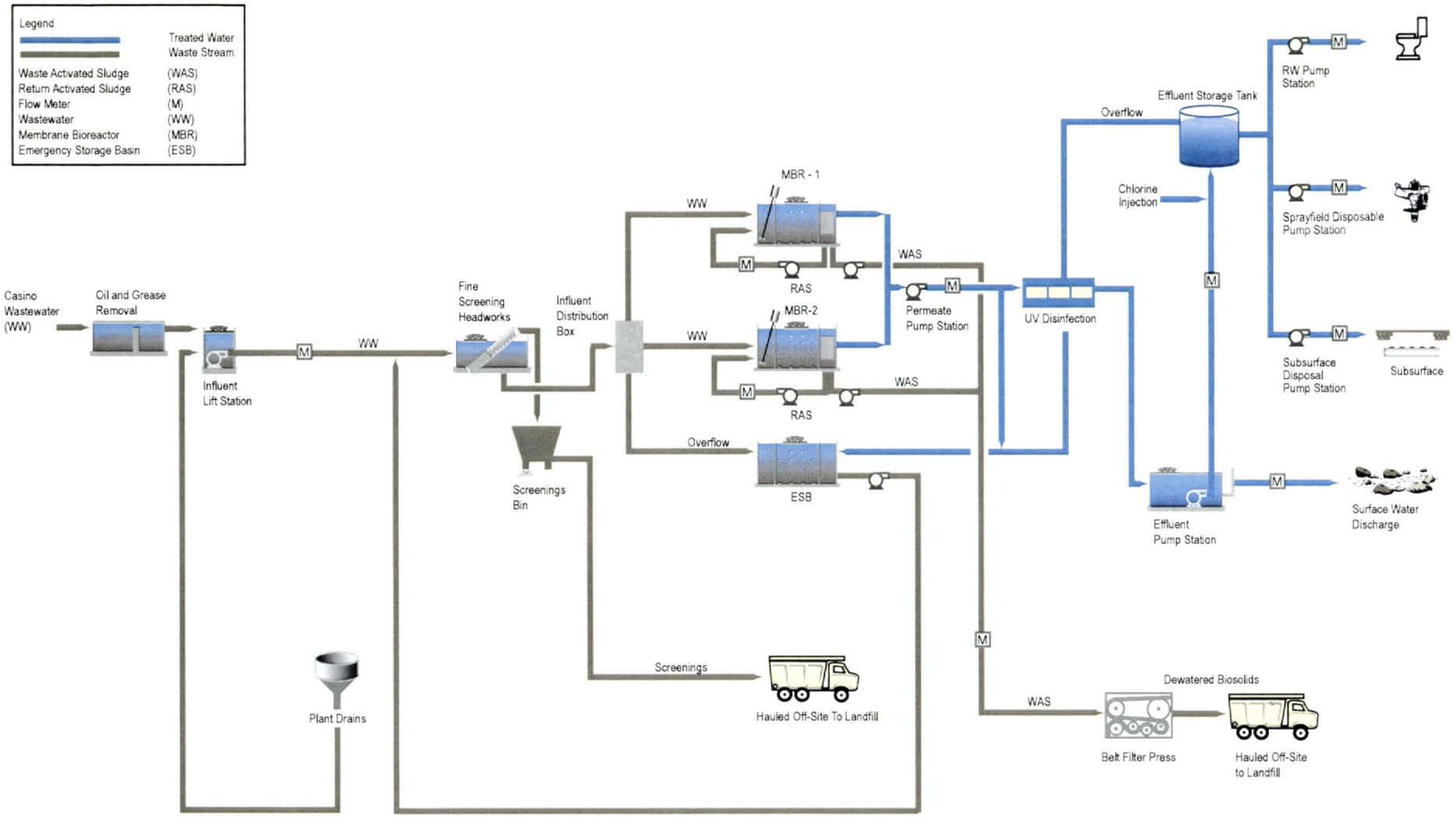

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Figure 5-8

North Fork

Water and Wastewater Feasibility Study

MBR Wastewater Treatment Process Flow Diagram

s:\common\projects\North Fork Rancheria\Report\0611Report\v10figures\fig5-8 MBR Treatment process.pdf

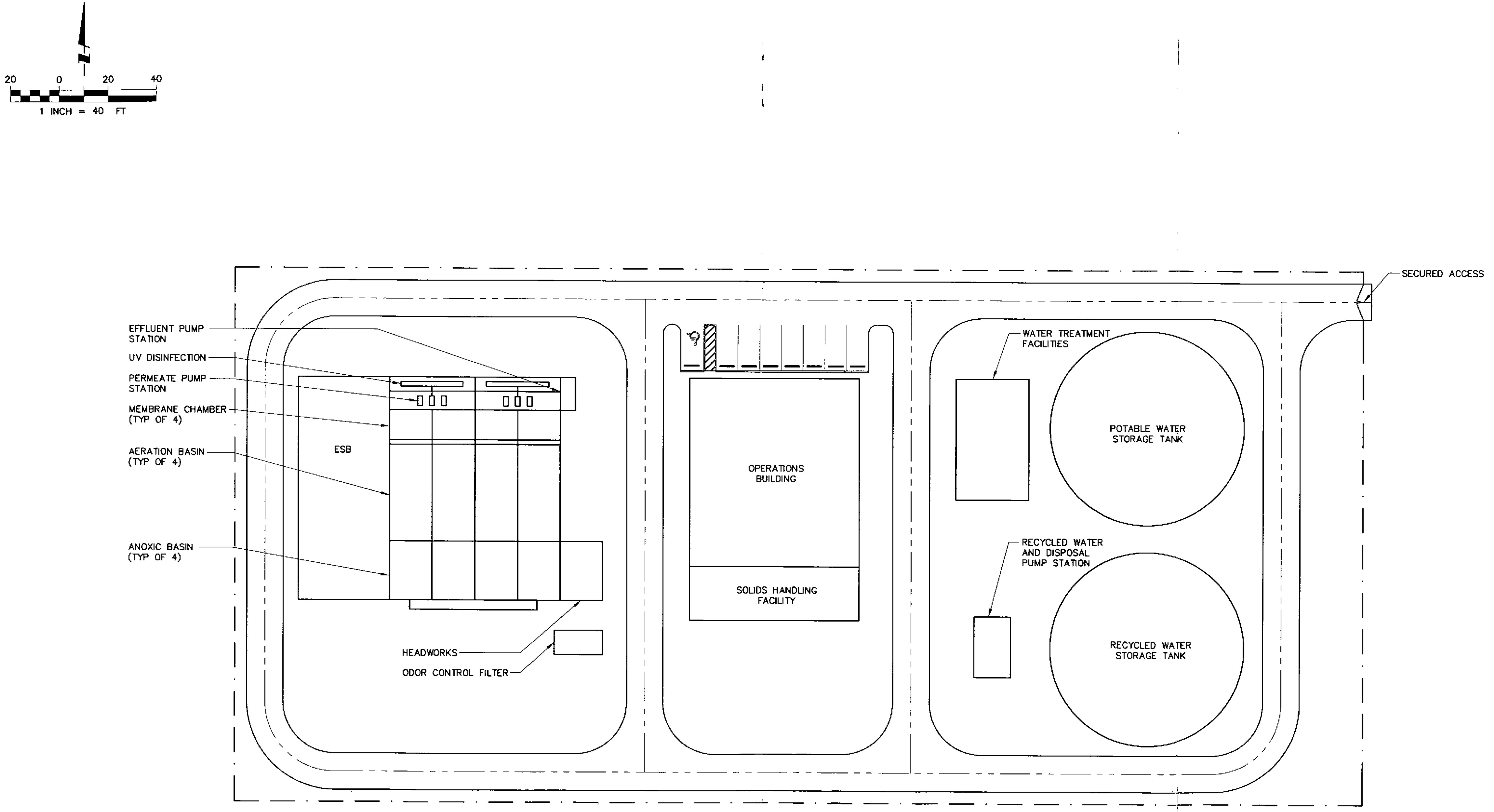

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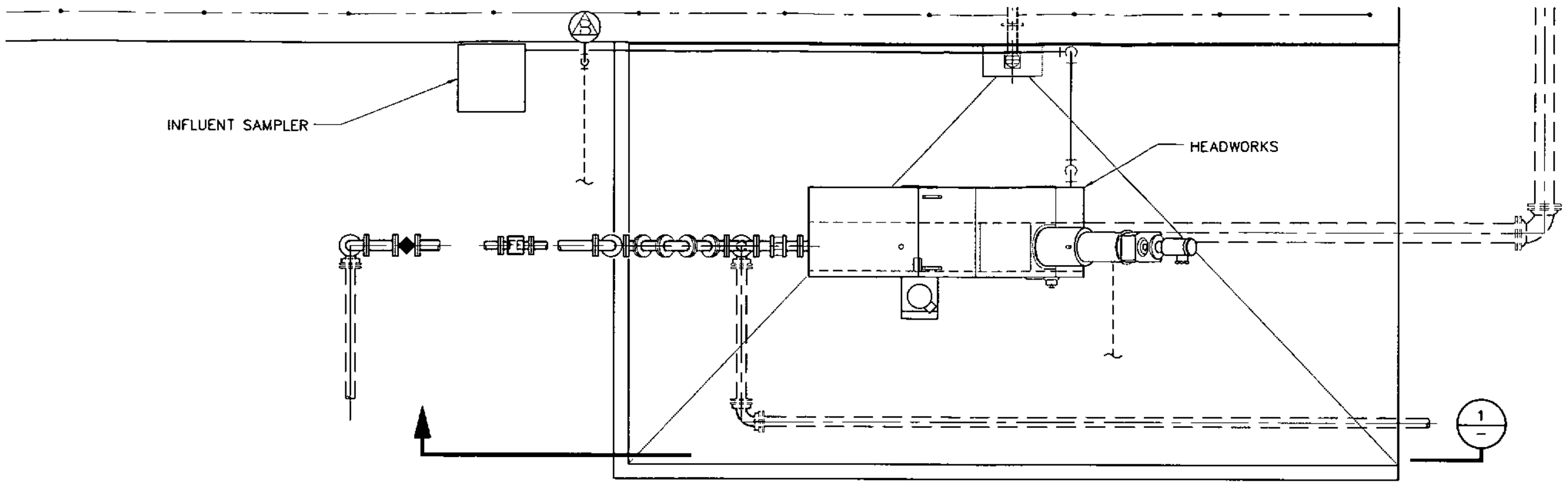
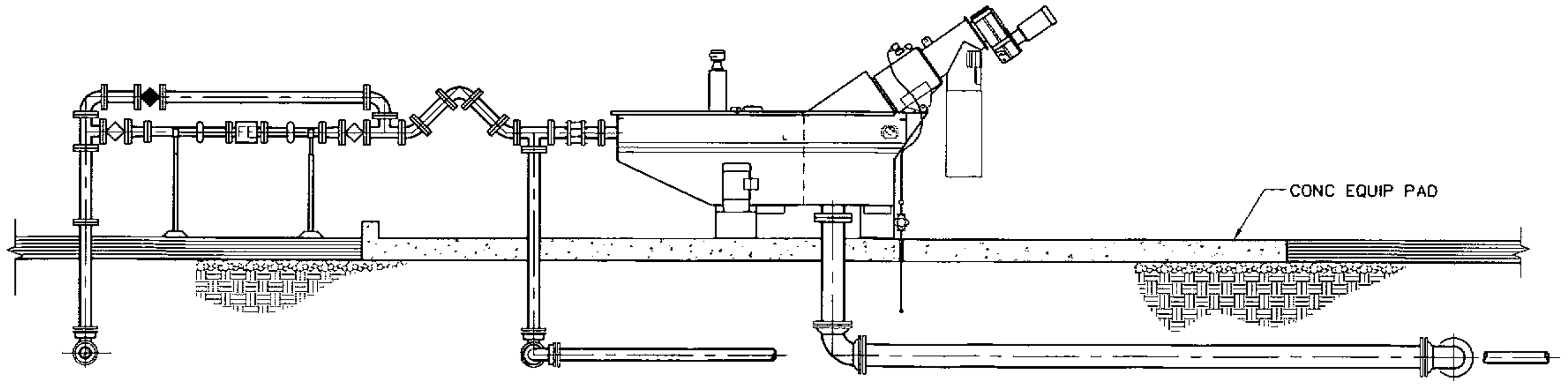
Figure 5-9
North Fork Hotel and Casino
Water and Wastewater Feasibility Study
Preliminary Water and Wastewater Treatment Plant Layout



TYPICAL INFLUENT
METERING STATION AND HEADWORKS PLAN
NTS



TYPICAL INFLUENT
METERING STATION AND HEADWORKS SECTION 1
NTS

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Figure 5-10
North Fork Hotel and Casino
Water and Wastewater Feasiblity Study
Typical Influent Metering Station and Headworks

Table 5-7: Headworks Design Criteria

Component	Criteria
Screening facilities	Enclosed cylindrical screen with 1 to 3-millimeter circular perforations, integral shaftless helical scraper/conveyor and compactor, mechanical washer to break up fecal material
Metering facilities	Magnetic flow meter on influent pipe
Odor control	Corrosion resistant plate covered channels, soil filter
Control	Continuous operation
Other Features	Equipping the treatment facility with an additional unit provides redundancy

5.2.5 Immersed Membrane Bioreactor System

An MBR WWTP is recommended because of the ease of permitting the plant due to the high quality effluent, and the effluent's potential suitability for either reuse or discharge. Sewage would travel between the headworks and the MBRs within a covered influent distribution force main. The force main would pass through headworks to an influent distribution box that would evenly distribute the flow to the two MBR process trains. Sluice gates would be provided to isolate basins for maintenance.

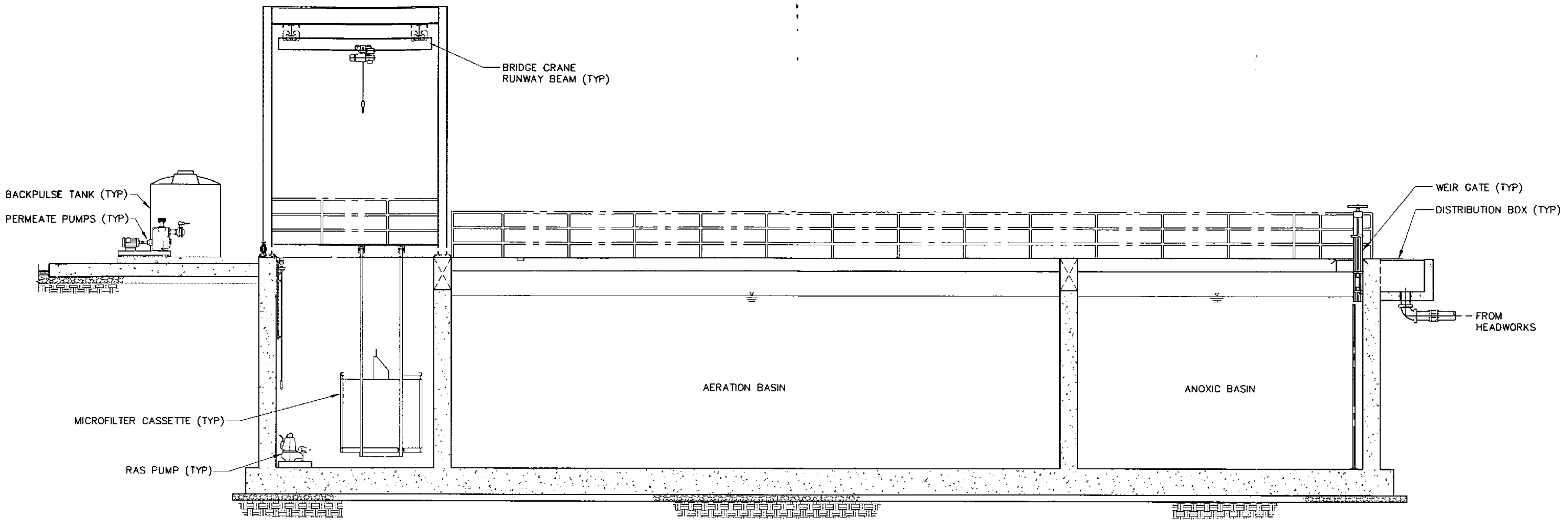
Each MBR process train is divided into two sections; an anoxic section, and an aerobic section containing the immersed membranes. Recommended minimum design criteria for MBRs are shown in **Table 5-8**. The project design engineer would determine final design criteria. A single process train is designed to handle peak wastewater flows, and a second train is often provided for full redundancy. Also, additional storage basins are typically designed into the system as emergency storage. These basins are designed to prevent leakage and are not located near drinking water wells under the Source Water Protection Program (Section 3.6). A typical MBR section is shown in **Figure 5-11** and a typical MBR plan is shown in **Figure 5-12**.

Table 5-8: Recommended Minimum MBR Design Criteria

		Alternative			
Parameter	Unit	A	B	C	D
Weekend day flow [a]	gpd	350,000	210,000	30,000	30,000
MBR Process Trains	trains	2	2	2	2
Process train basins		Anoxic basin, aeration/microfiltration membrane (all basins concrete).			

[a] See Tables 2-1 through 2-4. Rounded up to nearest 10,000.

Anoxic/Denitrification Basins: An anoxic/denitrification basin can be provided, if required, for nitrate removal in each process train. Nitrate removal will be accomplished by an anoxic suspended growth bacterial process. In the absence of oxygen, denitrifying bacteria obtain energy for cell growth from the conversion of nitrates to nitrogen gas. Recirculated mixed liquor from the membrane basins will be continuously pumped to the anoxic basin at a rate of approximately 3 (recirculated flow) to 1 (raw wastewater flow). The recirculation of mixed liquor provides a continuous feed of nitrified wastewater and bacteria for denitrification. The incoming raw wastewater provides a continuous carbon source for denitrifying bacteria cell synthesis. In addition, some carbon will be supplied in the recirculated biomass through endogenous decay. From the



TYPICAL SECTION
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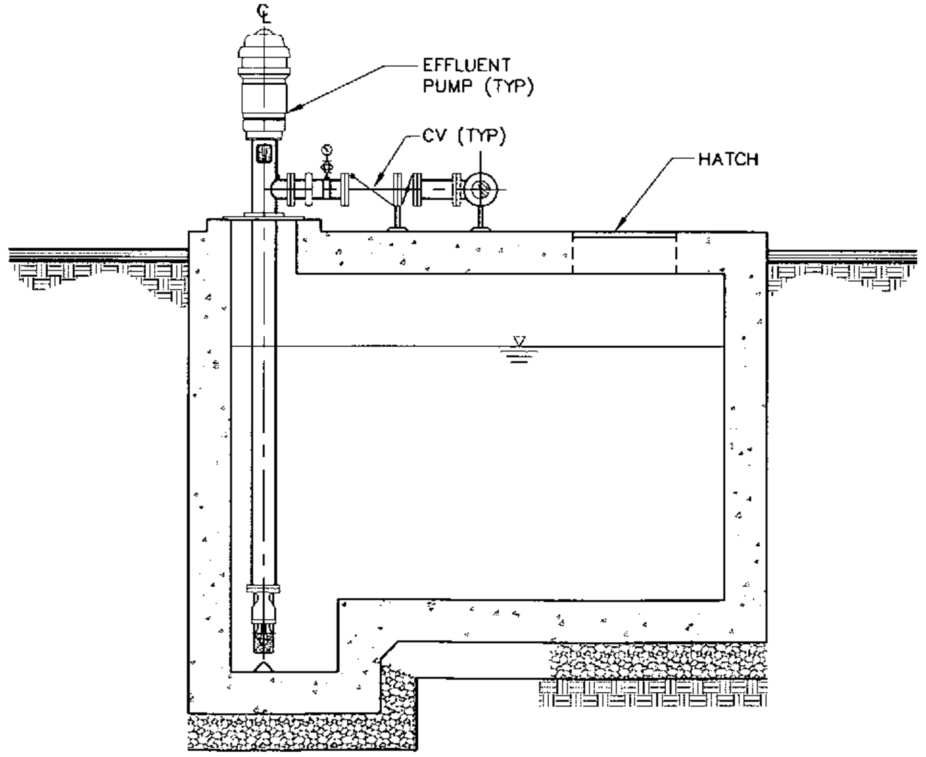

TYPICAL EFFLUENT PUMP STATION SECTION
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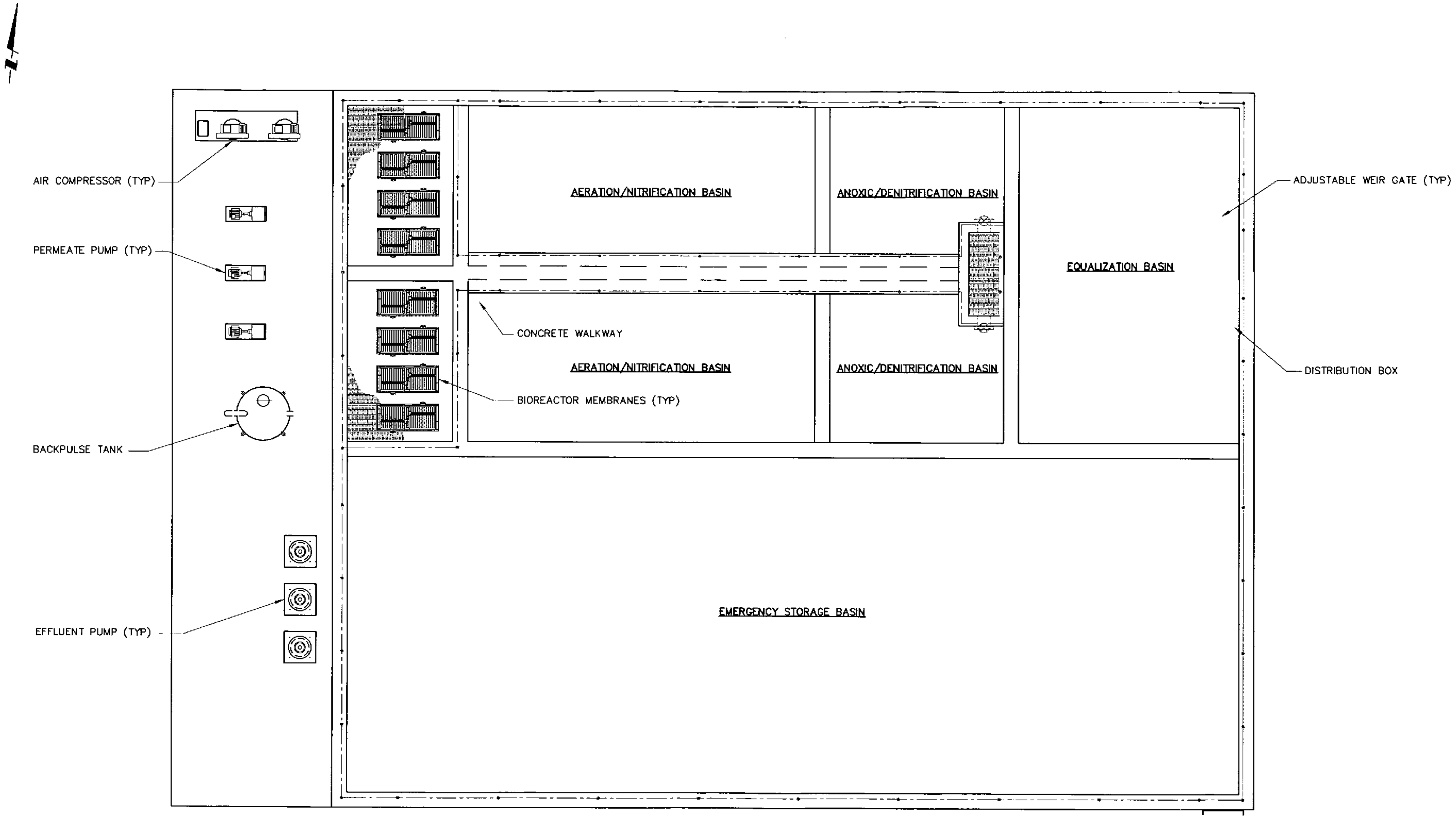
Figure 5-11
North Fork Hotel and Casino
Water and Wastewater Feasiblity Study
Typical MBR Section



PLAN

SCALE: 3/16" = 1'-0"

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Figure 5-12
North Fork
Water and Wastewater Feasibility Study
Typical MBR Plan

anoxic/denitrification basins, the wastewater flows through wall openings to the aeration basins. Typical anoxic basins are shown in **Figures 5-11 and 5-12**.

Aeration/Nitrification Basins: An aeration/nitrification basin will be provided for each process train. Dissolved BOD will be converted into filterable solid material by an aerobic suspended growth process. In this process, aerobes use carbon in the wastewater for energy and cellular synthesis. The recirculated mixed liquor entering the aeration basin from the anoxic basin provides a continuous source of bacteria. Conversion of ammonia to nitrates (nitrification) occurs in the aeration basin. Nitrifying aerobic bacteria incorporate ammonia-nitrogen into respiration and cell synthesis processes and produce nitrates as a byproduct. A fine bubble diffuser system will be installed at the bottom of the aeration tank to provide the oxygen required for the biological processes. Air will be supplied by process air blowers (see Blowers below). Typical aeration basins are shown in **Figures 5-11 and 5-12**.

Membranes: The membranes have a nominal pore size of 0.1 to 0.4 microns, depending on the manufacturer. The membranes are located at one end of the aeration basins, opposite the anoxic basins. Membrane cassettes are immersed in the mixed liquor in the membrane basin. Wastewater flows from outside through the membrane to the hollow inner portion. Wastewater that has passed through the membranes is called *permeate or tertiary-treated effluent.*

Scour Air: Scour air will be continuously applied (coarse bubble) at the bottom of the membrane cassettes. The air is supplied by a scour air blower (see *Blowers* below). As the scour air moves up through the membranes, the air removes solids that otherwise accumulate between and on the surface of the membrane modules. A typical microfiltration membrane layout is depicted in **Figures 5-10 and 5-11.**

Membrane Cleaning System: The membranes are periodically cleaned using a backpulse or relax mode, depending on the manufacturer. A PLC controls the timing and sequencing of the cleaning operation. Generally, membrane cleaning occurs every 15 minutes to an hour and lasts for approximately 1 or 2 minutes. During membrane cleaning, solids that accumulate on the surface of the membranes are removed.

Sodium hypochlorite will be injected into the backpulse flow during a period of the backpulse sequence to inhibit biogrowth in the membrane modules. One chemical metering pump is dedicated to the backpulsing cycle.

Process Equipment Area: The permeate pumps, backpulse storage tanks, piping, and valves associated with the MBR process are typically located on a concrete slab at the end of the MBR basins, as shown in **Figure 5-12.**

Blowers: As indicated above, a set of blowers supplies process air to the fine bubble diffuser systems in the aeration basins to support the biological treatment processes. A second set of blowers provides scour air to the microfiltration membranes. Positive displacement blowers driven by electric motors are proposed. Positive displacement blowers provide a constant airflow under varying water level (head) conditions. The blowers are located in a blower room in the Operations Building (**Figure 5-9**).

Solids Handling: The WAS will be dewatered using a belt filter press or other equivalent type of dewatering equipment prior to disposal into a waste bin. The dewatered solids will periodically be picked up and transferred to a landfill. A typical plan and section for a belt filter press is shown in **Figure 5-13**.

5.2.6 UV Disinfection

Disinfection to meet discharge and reclamation virus and coliform water quality standards would be provided by constructing an UV disinfection system adjacent to the MBR. UV disinfection facilities are typically contained within a long, narrow steel channel tank, with banks of UV lamps situated in a laminar flowing channel. A weir would control the water level in the channel, ensuring that the lamps are always submerged. Each UV lamp emits a light with a specific wavelength that is capable of inactivating bacteria and virus, preventing them from reproducing. **Table 5-9** shows a summary of the recommended UV disinfection design criteria. A typical UV disinfection plan is shown in **Figure 5-14**.

Table 5-9: UV Disinfection Design Criteria

Parameter	Value
Lamp location	Inline
Type of lamps	2020 Watt medium pressure UV lamps
Transmittance	65% through quartz sleeve
Flow metering	Magnetic flow meter

5.2.7 Chlorine Disinfection

Though the UV facilities would be designed to disinfect the treated wastewater, they do not continue to disinfect the wastewater after it leaves the UV channel. In order to prevent regrowth of bacteria in the recycled water distribution system, sodium hypochlorite is typically added in small quantities. The introduction of this chemical creates a residual concentration of chlorine that persists in the recycled water, and ensures that it is safe to use after it leaves the wastewater treatment facility.

Typical recycled water distribution systems require at least a positive chlorine residual at the point of use, and the dosing of sodium hypochlorite will be adjusted to meet this goal. It is believed that a dose of between 2-3 mg/l for recycled water used for on-site irrigation, cooling, or toilet/urinal flushing would suffice. Chlorine would be dosed at a location downstream of the UV disinfection facilities, and before recycled water is pumped to the recycled water storage tank.

5.2.8 Biosolids Disposal

If on-site wastewater treatment is selected, biosolids produced by the treatment plant must also be disposed of in accordance with the CCR, Water Code, Resource Conservation and Recovery Act, and the RWQCB policy. These regulations are commonly referred to as the 40 CFR Part 503 Biosolids Rule promulgated by the USEPA. It is not anticipated that biosolids produced by the project WWTP will be able to comply with these guidelines, due to the lack of a pathogen reduction process capable of producing Class A or Class B biosolids. The biosolids produced by the North Fork project will be dewatered, utilizing a belt filter press, and hauled off-site and disposed of at a designated landfill.

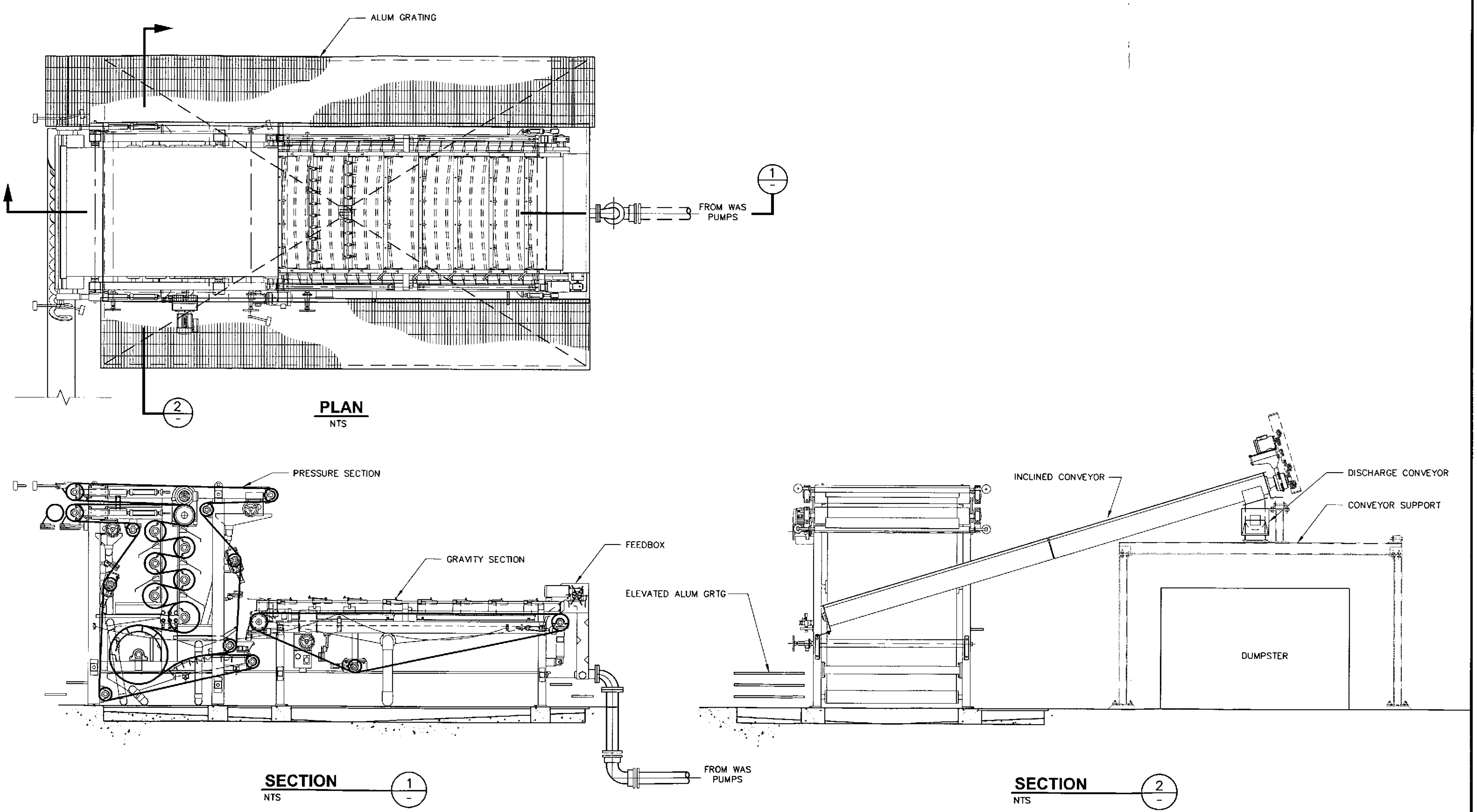

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Figure 5-13
North Fork
Water and Wastewater Feasibility Study
Typical Belt Filter Press Plan and Section

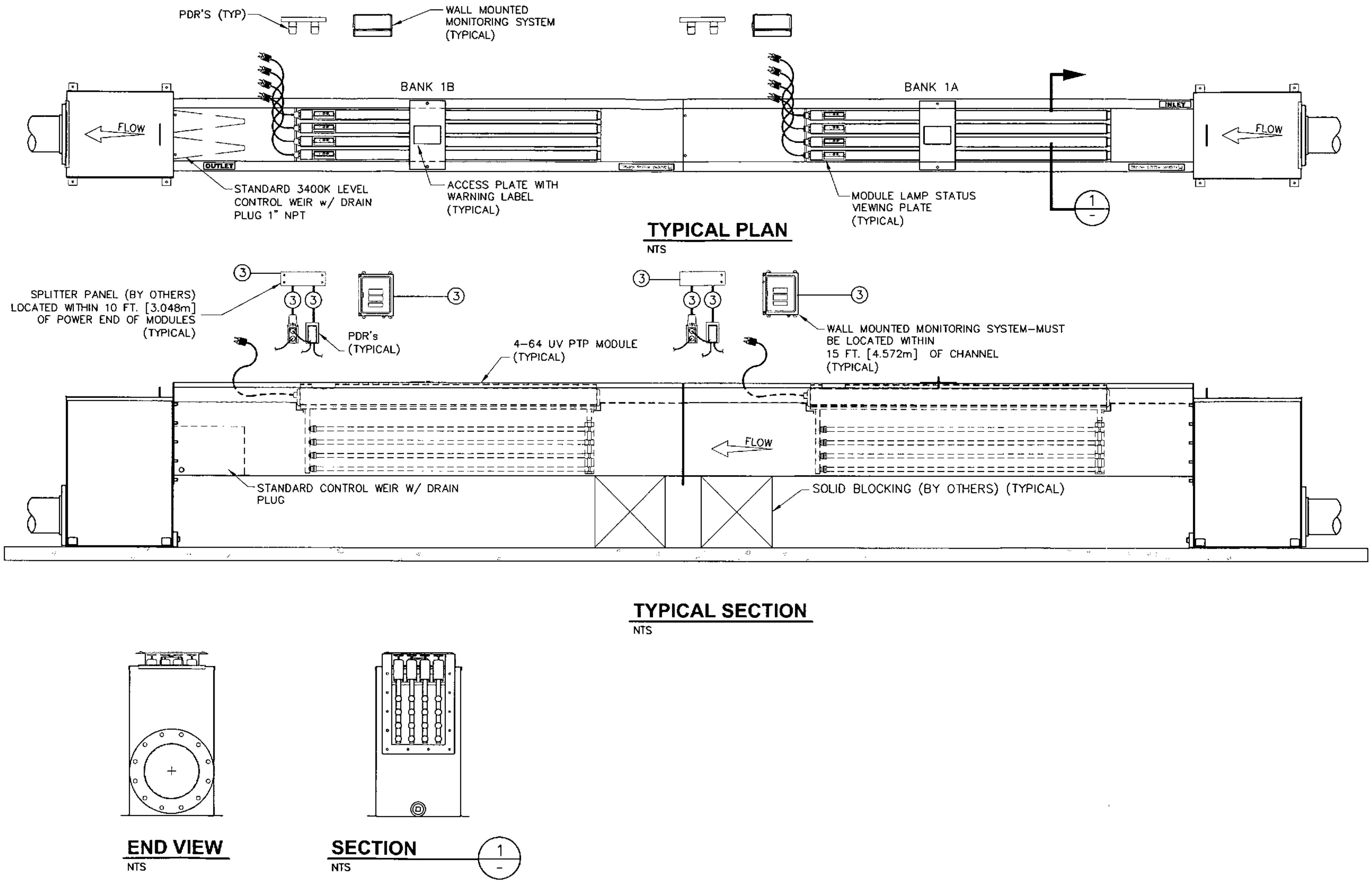

Figure 5-14
North Fork
Water and Wastewater Feasiblity Study
Typical UV Disinfection Plan and Section

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5.3 Effluent Disposal and Reuse Facilities

This section discusses the recommended design criteria for the North Fork project's recycled water facilities. The recommended on-site recycled water facilities include:

- Recycled Water Storage Tank
- Recycled Water Pump Station
- On-site Landscape Irrigation/Dual Plumbing Facilities
- Spray Fields
- Subsurface Leach Fields

Each of the recycled water facilities is described in the following sections. The overall recycled facilities will be located based on the final design of the project facilities. All of the recommended water supply facilities described in this Chapter are preliminary, and should be utilized for planning purposes only.

5.3.1 Recycled Water Storage Tank

The purpose of this tank would be to provide equalization storage for on-site recycled water use for toilet flushing, on-site landscaping, spray fields, subsurface leach fields, and other uses. If desired, recycled water could be utilized to supply water for fire protection, such as the sprinkler systems and fire hydrants.

A typical section for the tank would be similar to the potable water tank shown in **Figure 4-5.** The recycled water storage tank would be constructed near the water treatment plant site. Since the Madera site is relatively flat, the tank would not be able maintain pressure via gravity in the recycled water distribution system. The North Fork site varies in topography and depending on the elevation difference between the recycled storage tank and the various facilities, a recycled booster station may be required to maintain pressure in the recycled water distribution system. The storage tank would also be similar to the potable water storage tank with respect to construction methods. The preliminary estimates of the tank's dimensions are presented in **Table 5-10.** The final size of the recycled water tank is dependent on the recommended wastewater disposal strategy.

Table 5-10: Recycled Water Storage Tank Preliminary Design Criteria

	Alternative			
Parameter	**A**	**B**	**C**	**D**
Approximate size	900,000 gal	550,000 gal	100,000 gal	100,000 gal
Construction	Welded steel	Welded steel	Welded steel	Welded steel

5.3.2 Recycled Water Pump Station

Up to four separate recycled water pump stations are required for the recycled water facilities. All of the required pump sizes and the pump configuration would be determined during design. However, the strategy described below assumes that recycled water is produced and maximized on-site, and that the flows are similar to those identified in Section 2.

The first pump station would transfer tertiary disinfected treated wastewater from the WWTP to the recycled water storage tank. The second pump station would deliver water from the recycled water storage tank to the project's recycled water facilities. The third and fourth pumps would be used for disposal and if only one disposal alternative is selected, only one pump would be necessary. However, both pump stations would be needed if spray fields and subsurface leach fields were both used as part of the recommended wastewater disposal strategy.

5.3.3 On-site Recycled Water Facilities

If water is reused for the casino, then the casino building will need to be dual-plumbed with both potable and recycled water. The primary uses of recycled water will be for toilet flushing, on-site landscape irrigation, and cooling water. The on-site recycled water reuse facilities will be designed to ensure that they comply with all DHS standards. The required on-site facilities will be identified upon completion of a site plan and preliminary engineering. The primary on-site design requirements include:

- Recycled water irrigation facilities marked in a purple color.
- Signage informing the public recycled water is used.
- Pipelines in separate trenches a minimum distance away from other water pipelines.
- Labeling of recycled water valves, boxes, and sprinkler heads.

Within the building, the interior plumbing system will have to be plumbed separately from the building's potable water system, and contain no cross connections. The dual plumbing piping systems must be distinctly marked and color-coded.

5.3.4 Spray Field System

There is no existing network of recycled water conveyance pipes located on the proposed project sites. It will be necessary to construct recycled water transmission piping from the treatment plant site to the spray fields.

The spray fields would be irrigated using traditional rows of impact head sprinklers mounted on wheels. The sprinklers would be moved within the spray field site as needed to ensure even application of recycled water and to minimize the piping infrastructure required.

5.3.5 Subsurface Leach Fields

The loading rate of a subsurface disposal field or leach field is limited by the project site's soil characteristics and ability to accept and move water vertically and horizontally away from the disposal site. The quality of the wastewater effluent being sent to a leach field also greatly affects the loading rate. As a reference, Table 4-3 of the USEPA Onsite Wastewater Treatment System Manual (USEPA, 2002) shows higher soil loading rates for a high quality effluent with a BOD_5 of 30-mg/L than that from a conventional on-site system with a BOD_5 of 150-mg/L. The reduced organic loading on the leach field soils reduces the risk of soil clogging and system failure, increases the lifespan of the leach field, and increases the hydraulic loading rate. The higher loading rate allows for a smaller disposal field.

6.0 Conclusions and Recommendations

Each of the four project alternatives was evaluated and found to be feasible in terms of water, wastewater, and recycled water service. The potable water supply requirements can be satisfied through either on-site wells or from either the City of Madera or the City of North Fork. Wastewater service could be provided by the City of Madera or the County-operated WWTP serving the City of North Fork. Specific conclusions are summarized below.

6.1 Wastewater Treatment

It is recommended that wastewater treatment be one of the following for the selected project alternative:

1. City of Madera WWTP (Alternatives A, B, and C)
    a. See Section 5.1.5
    b. Requires a connection to the City sewer system (see **Figure 5-6**)
    c. May require expansion of an existing sewer lift station
    d. Requires monthly fees
    e. Advantages: (1) lower capital costs; and (2) disposal of treated wastewater and biosolids is the City's responsibility
    f. Disadvantages: (1) monthly fees; (2) no ability to recycle; (3) pretreatment or additional fees required to meet BOD and TSS limits; and (4) uncertainty of adequate capacity if future expansion is desired

2. County of Madera WWTP for the City of North Fork (Alternative D)
    a. See Section 5.1.6
    b. Requires expansion of existing or construction of new County WWTP
    c. Requires a connection to the North Fork sewer system
    d. May require expansion of existing or construction of new sewer lift stations
    e. Requires monthly fees
    f. Advantages: (1) lower capital costs; and (2) disposal of treated wastewater and biosolids is the County's responsibility
    g. Disadvantages: (1) monthly fees; (2) no ability to recycle water; and (3) uncertainty of adequate capacity if future expansion is desired

3. On-site WWTP (Alternatives A, B, C, and D)
    a. See Section 5.2.
    b. Requires conveyance and treatment facilities be built and operated on-site.
    c. Advantages: (1) provides tertiary-treated effluent, (2) recycled water may be used for toilets, urinals, cooling towers, and landscape irrigation, (3) provides greater flexibility for disposal options; and (4) can accommodate future expansion, if needed
    d. Disadvantages: (1) requires on-site construction; (2) requires on-site operation; and (3) responsible for disposal of treated wastewater and biosolids

If connection to a municipal or county wastewater treatment plant is infeasible, it is recommended that a tertiary wastewater treatment plant capable of producing high quality effluent suitable for reuse be constructed. As recycled water becomes available for use, it is recommended that it be supplemented for toilet flushing, landscape irrigation, and process water in the cooling towers.

If on-site treatment is selected, it is recommended that wastewater disposal be either (1) via surface water disposal; (2) spray field disposal; or (3) through a combination of spray field disposal, and leach field disposal. For any of these alternatives, it is recommended that water be recycled to reduce wastewater disposal requirements. **For on-site disposal, the following tasks should be performed concurrently**:

1. Conduct percolation testing for leach field design
2. Conduct a limited hydrogeological evaluation to identify possible siting constraints
3. Apply for an NPDES permit for discharge to the on-site creek at either site

6.1.1 Lift Stations

Wastewater collection would likely require lift stations. Due to the topography on the two proposed project sites, lift stations would likely be required to collect and convey raw wastewater from the facilities to the WWTP.

6.1.2 On-Site MBR WWTP

MBR technology is recommended for the on-site WWTP, if connection to the City of Madera or to the County WWTP serving the City of North Fork is infeasible. MBRs represent state-of-the-art technology for treatment of wastewater to extremely high levels of treatment. MBRs are easy to permit for multiple disposal options. MBRs have a history of successful performance at gaming facilities in California and have been approved by the California DHS for a wide range of reuse applications. This process not only produces high-quality effluent, but it does so consistently and reliably. MBR facilities are compact systems ideal for close proximity to populated areas. Noise from mechanical equipment, which is typically enclosed in buildings, can be attenuated and nuisance odors mitigated. Tertiary treatment using an MBR is recommended because it can produce treated water that is in compliance with Title 22 criteria for on-site irrigation of landscaping and provides greater flexibility for disposal and reuse options.

Table 6-1 contains a summary of the demands and flows for the four project alternatives. Preliminarily, the MBR should be sized for the weekend design capacity of the selected project alternative. The maximization of recycled water use reduces the potable water demand, thereby reducing impacts to on-site water sources and saving on the annual cost for water supplied by outside water distributors.

Table 6-1: Summary of Demands and Flows

		Alternative			
	Units	**A**	**B**	**C**	**D**
Recycled Water					
Average Day Recycled Water Demand (without landscape irrigation demand) [a]	gpd	107,000	65,000	7,000	8,000
Recycled Water Storage [b]	gal	900,000	550,000	100,000	100,000
Water					
Water Demand if Water is not Recycled [c]	gpd	400,000	260,000	20,000	30,000
Water Demand if Water is Recycled [d]	gpd	280,000	170,000	20,000	20,000
Recommended Pumping Rate without Recycled Water [e]	gpm	420	270	30	30
Recommended Pumping Rate with Recycled Water [e]	gpm	290	180	20	20
Domestic Water Storage [f]	MG	1.2	1.0	0.6	0.6
Wastewater Treatment					
Weekday flow [g]	gpd	240,000	150,000	10,000	20,000
Weekend flow [g h]	gpd	350,000	210,000	20,000	30,000
Average day flow [i]	gpd	270,000	160,000	20,000	20,000
Wastewater Disposal					
Average Day Disposal Flows if Water is not Recycled [g]	gpd	270,000	160,000	20,000	20,000
Landscape Irrigation [j]	acres	4	4	1	1
Spray Disposal Only [j]	acres	29	18	2	2
Seasonal Storage Basin for Spray Disposal Only [j]	MG	43	28	4	4
Sub-Surface Disposal Only [j]	acres	78	46	5	5
Seasonal Storage Basin for Sub-Surface Disposal Only [j]	MG	4	4	2	2
Combination of Spray and Sub-Surface Disposal [j]	acres	31	15	2	2
Seasonal Storage Basin for Spray and Sub-Surface Disposal [j]	MG	31	21	3	3

[a] Estimated at 40% of average day domestic water demand. See Table 2-7.

[b] Operational storage only. Does not include fire hydrant storage. See Table 5-10.

[c] Includes landscape irrigation. See Table 2-5. Rounded up to nearest 10,000 gpd.

[d] See Table 2-8. Rounded up to the nearest 10,000 gpd.

[e] Note that recommended pumping rate is based on weekend flow with a 1.5 safety factor to ensure that the well pump does not operate at full capacity 24-hours per day.

[f] 2.0 times weekend day demand plus 500,000 gal of fire storage. See Table 4-4.

[g] See Tables 2-1 through 2-4.

[h] See Table 5-8.

[i] 5/7 * weekday day + 2/7 * weekend day. See Tables 2-1 through 2-4.

[j] See Table 5-1 and Appendix D.

6.2 Wastewater Disposal

It is recommended that wastewater disposal be one of the following for the selected project alternative:

1. Surface Water Discharge
    a. See Section 5.1.4
    b. Requires an NPDES Permit
2. Sprayfields
    a. See Section 5.1.1
    b. An alternative to on-site sprayfields would be to irrigate part of the Madera City Golf Course (Section 5.1.1)
    c. Requires a geotechnical investigation
    d. Requires a seasonal storage basin
3. A combination of Leachfields and/or Sprayfields
    a. See Sections 5.1.1 and 5.1.2
    b. Requires a geotechnical investigation
    c. Requires a storage basin

It is recommended that water be recycled to significantly reduce wastewater disposal requirements. A process diagram with all discharge options is shown in **Figure 6-1**.

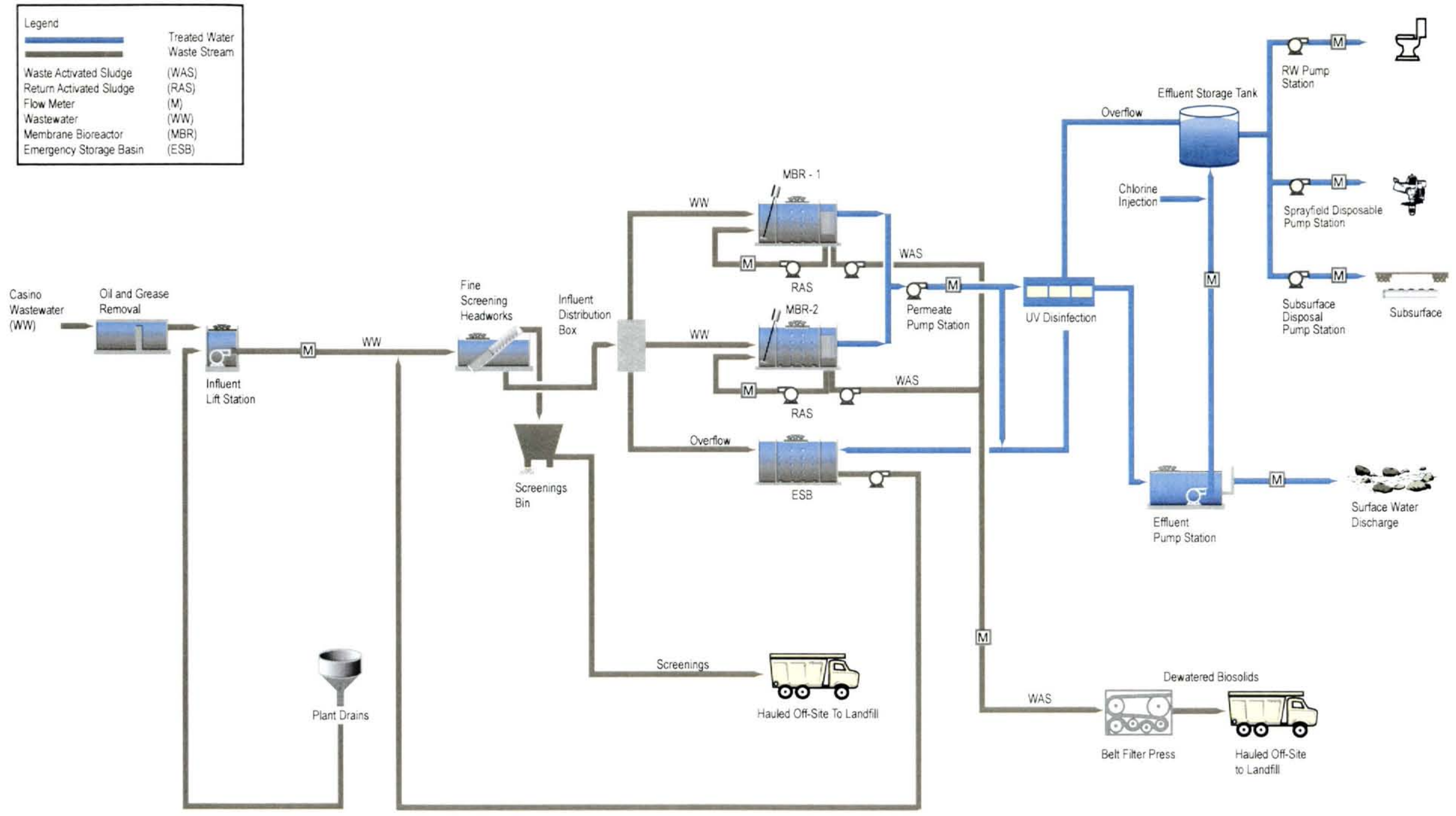
6.3 Water Supply

It is recommended that water be supplied by one of the following or a combination of these:

1. On-Site groundwater
    a. See Section 4.1.1 (Alternatives A, B, and C at the Madera site)
    b. See Section 4.1.3 (Alternative D at the North Fork site)
    c. Requires 72-hour drawdown testing
    d. Requires water quality analysis
    e. May require water treatment
2. Off-site water
    a. See Section 4.1.2 (Alternatives A, B, and C at the Madera site)
    b. See Section 4.1.4 (Alternative D at the North Fork site)
    c. Negotiate firm supply
    d. Design and construct a pipeline connection, including permits and easements

It is recommended that water be recycled to significantly reduce water demand. The use of recycled water for non-potable applications as an alternative water supply source significantly reduces potable water demand. The potable water demand with and without recycled water for each project alternative is also included in **Table 6-1**.

The project may require the construction of the following water supply facilities: on-site wells, on-site water treatment plant, a steel potable water storage tank, a water distribution pump station, a steel recycled water storage tank, and a recycled water distribution pump station.



HydroScience Engineers, Inc.

Figure 6-1
North Fork
Water and Wastewater Feasibility Study
Preliminary Process Flow Diagram

s:\common\projects\North Fork Rancheria\Report\0611Report\v10figures\fig6-1 Prelim process flow.pdf

7.0 Acronyms and Abbreviations

AES	Analytical Environmental Services
AwA	Atwater loamy sand
AWWA	American Water Works Association
BOD	biochemical oxygen demand
CCR	California Code of Regulations
cm	centimeter
CT	Contact Time (product of chlorine residual and modal contact time measured at the same point)
CTR	California Toxics Rule
DHS	Department of Health Services
DTRW	disinfected tertiary recycled water
EDU	equivalent dwelling unit
USEPA	Environmental Protection Agency
ft	feet
ft^2	feet squared
gal	gallon
gpd	gallons per day
gpm	gallons per minute
HgA	Hanford sandy loam
HSe	HydroScience Engineers, Inc.
I&I	inflow and infiltration
MBR	membrane bioreactor
MF	microfiltration
MG	million gallon
mg/L	milligrams per liter
MGD	million gallons per day
mL	milliliter
MPN	most probable number
N	Nitrogen
NF	nanofiltration
NH_4	Ammonium
NO_3	Nitrate
NPDES	National Pollutant Discharge Elimination System
NTNC	Non-Transient/Non-Community

NTU	nephelometric turbidity units
RO	reverse osmosis
ROWD	Report of Waste Discharge
RWQCB	Regional Water Quality Control Board
SaA	San Joaquin sandy loam
SDWQ	Safe Drinking Water Act
SR	State Route
SWAP	Source Water Assessment Programs
TDS	total dissolved solids
TwA	Tujunga loamy sand
UF	ultrafiltration
UIC	Underground Injection Control
μm	micrometer
USDA	United States Department of Agriculture
UV	ultraviolet
WAS	Waste activated sludge
WDR	Waste Discharge Requirement
WWTP	Wastewater Treatment Plant

8.0 References

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Appendix A

Flow Calculations

Table 2-1

Estimated Wastewater Flows for Alternative A

	Square Footage (ft^2)	Unit (gpd/ft^2)	Base Flow (gpd)	A.M. (%)	A.M. (gpd)	P.M. (%)	P.M. (gpd)	Typical WEEKDAY Flows (gpd)	A.M. (%)	A.M. (gpd)	P.M. (%)	P.M. (gpd)	Typical WEEKEND Flows (gpd)	A.M. (%)	A.M. (gpd)	P.M. (%)	P.M. (gpd)	AVERAGE Day Flows a (gpd)
CASINO / ENTERTAINMENT																		
Casino	121,630	1.25	151,680	45%	68,256	70%	106,176	87,216	70%	106,176	100%	151,680	128,928	52%	79,091	79%	119,177	99,134
Back of House	50,000	1.37	68,500	30%	20,550	50%	34,250	27,400	50%	34,250	71%	48,451	41,350	36%	24,464	56%	38,307	31,386
Retail	1,185	0.01	12	40%	5	50%	6	5	70%	8	80%	10	9	52%	6	79%	9	8
Food and Beverage	67,365	1.56	105,240	31%	32,934	65%	68,406	50,670	70%	73,668	100%	105,240	89,454	42%	44,571	75%	78,930	61,751
Entertainment/Lounge	7,000	0.54	3,780	30%	1,134	50%	1,890	1,512	50%	1,890	75%	2,835	2,363	36%	1,350	57%	2,160	1,755
HOTEL																		
Hotel Lobby	16,680	0.16	2,730	30%	819	50%	1,365	1,092	50%	1,365	70%	1,911	1,638	36%	975	56%	1,521	1,248
Hotel Rooms and Spa	191,000	0.16	30,000	50%	15,000	50%	15,000	15,000	100%	30,000	100%	30,000	30,000	64%	19,286	64%	19,286	19,286
Pool and Spa	16,850	0.35	4,320	32%	1,392	53%	2,304	1,848	70%	3,024	100%	4,320	3,672	43%	1,858	67%	2,880	2,369
Central Plant/Cooling Towers	21,300	3.10	66,000	50%	33,000	100%	66,000	49,500	50%	33,000	100%	66,000	49,500	50%	33,000	100%	66,000	49,500
GRAND TOTAL	493,010		432,262		173,090	gpd	295,397 gpd			283,381	gpd	410,446 gpd			204,600	gpd	328,271 gpd	
Subtotal Daily Flows							234,244 gpd	234,244				346,914 gpd	346,914				266,435 gpd	266,435
I&I						0%	0 gpd	0			0%	0 gpd	0			0%	0 gpd	0
Daily Flows					**Weekday Flow[b]**		**234,244 gpd**	**234,244**		**Weekend Flow[b]**		**346,914 gpd**	**346,914**		**Average Day flow**		**266,435 gpd**	**266,435**
Calculated Peaking Factor							1.0	1.0				1.48	1.48				1.14	1.14

[a] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[b] Used for calculation purposes only.

Peaking factors are back-calculated as an internal check only and are not used to calculate flows

Table 2-2

Estimated Wastewater Flows for Alternative B

	Square Footage	Unit	Base Flow	A.M.		P.M.		Typical WEEKDAY Flows	A.M.		P.M.		Typical WEEKEND Flows	A.M.		P.M.		AVERAGE Day Flows a
	(ft^2)	(gpd/ft^2)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
CASINO / ENTERTAINMENT																		
Casino	90,255	1.02	91,824	45%	41,321	70%	64,277	52,799	70%	64,277	100%	91,824	78,050	52%	47,880	79%	72,147	60,014
Food and Beverage	53,725	1.46	78,640	31%	24,610	65%	51,116	37,863	70%	55,048	100%	78,640	66,844	42%	33,306	75%	58,980	46,143
Entertainment	7,000	0.54	3,780	30%	1,134	50%	1,890	1,512	50%	1,890	75%	2,835	2,363	36%	1,350	57%	2,160	1,755
Back of House	37,825	1.39	52,415	30%	15,725	50%	26,208	20,966	50%	26,208	71%	37,074	31,641	36%	18,719	56%	29,312	24,016
HOTEL																		
Hotel Lobby	0	0.00	0	30%	0	50%	0	0	50%	0	70%	0	0	36%	0	56%	0	0
Hotel Rooms and Spa	0	0.00	0	50%	0	50%	0	0	100%	0	100%	0	0	64%	0	64%	0	0
Pool Area	0	0.00	0	32%	0	53%	0	0	70%	0	100%	0	0	43%	0	67%	0	0
Central Plant/Cooling Towers	9,000	4.44	40,000	50%	20,000	100%	40,000	30,000	50%	20,000	100%	40,000	30,000	50%	20,000	100%	40,000	30,000
GRAND TOTAL	197,805		266,659		102,789	gpd	183,490 gpd			167,422	gpd	250,373 gpd			121,255	gpd	202,600 gpd	
Subtotal Daily Flows							143,140 gpd	143,140				208,897 gpd	208,897				161,927 gpd	161,927
I&I						0%	0 gpd	0			0%	0 gpd	0			0%	0 gpd	0
Daily Flows						**Weekday Flow**[b]	**143,140 gpd**	**143,140**			**Weekend Flow**[b]	**208,897 gpd**	**208,897**			**Average Day flow**	**161,927 gpd**	**161,927**
Calculated Peaking Factor							1.0	1.0				1.46	1.46				1.13	1.13

[a] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[b] Used for calculation purposes only.

Peaking factors are back-calculated as an internal check only and are not used to calculate flows

Table 2-3

Estimated Wastewater Flows for Alternative C

	Square Footage	Unit	Base Flow	A.M.		P.M.		Typical WEEKDAY Flows	A.M.		P.M.		Typical WEEKEND Flows	A.M.		P.M.		AVERAGE Day Flows a
	(ft^2)	(gpd/ft^2)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
COMMERCIAL DEVELOPMENT																		
Food and Beverage	12,000	0.63	7,500	31%	2,347	65%	4,875	3,611	70%	5,250	100%	7,500	6,375	42%	3,176	75%	5,625	4,401
RETAIL	225,000	0.12	27,700	30%	8,310	50%	13,850	11,080	50%	13,850	75%	20,775	17,313	36%	9,892	57%	15,831	12,861
GRAND TOTAL	237,000		35,200		10,657	gpd	18,725 gpd			19,100	gpd	28,275 gpd			13,068	gpd	21,456 gpd	
Subtotal Daily Flows							14,691 gpd	14,691				23,688 gpd	23,688				17,262 gpd	17,262
I&I						0%	0 gpd	0			0%	0 gpd	0			0%	0 gpd	0
Daily Flows					**Weekday Flow**[b]		**14,691 gpd**	**14,691**		**Weekend Flow**[b]		**23,688 gpd**	**23,688**		**Average Day flow**		**17,262 gpd**	**17,262**
Calculated Peaking Factor							1.0	1.0				1.61	1.61				1.17	1.17

[a] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[b] Used for calculation purposes only.

Peaking factors are back-calculated as an internal check only and are not used to calculate flows

Table 2-4

Estimated Wastewater Flows for Alternative D

	Square Footage (ft^2)	Unit (gpd/ft^2)	Base Flow (gpd)	A.M. (%)	A.M. (gpd)	P.M. (%)	P.M. (gpd)	Typical WEEKDAY Flows (gpd)	A.M. (%)	A.M. (gpd)	P.M. (%)	P.M. (gpd)	Typical WEEKEND Flows (gpd)	A.M. (%)	A.M. (gpd)	P.M. (%)	P.M. (gpd)	AVERAGE Day Flows a (gpd)
CASINO / ENTERTAINMENT																		
Casino	15,451	1.00	*15,504*	45%	6,977	70%	10,853	8,915	70%	10,853	100%	15,504	13,178	52%	8,084	79%	12,182	10,133
Food and Beverage	4,550	2.87	13,050	31%	4,084	65%	8,483	6,283	70%	9,135	100%	13,050	11,093	42%	5,527	75%	9,788	7,657
Entertainment	0	0.00	0	30%	0	50%	0	0	50%	0	75%	0	0	36%	0	57%	0	0
Back of House	6,000	1.18	7,050	30%	2,115	50%	3,525	2,820	50%	3,525	71%	4,987	4,256	36%	2,518	56%	3,943	3,230
HOTEL																		
Hotel Lobby	0	0.00	0	30%	0	50%	0	0	50%	0	70%	0	0	36%	0	56%	0	0
Hotel Rooms and Spa	0	0.00	0	50%	0	50%	0	0	100%	0	100%	0	0	64%	0	64%	0	0
	0	0.00																
Pool Area	0	0.00	0	32%	0	53%	0	0	70%	0	100%	0	0	43%	0	67%	0	0
Central Plant/Cooling Towers	0	0.00	0	50%	0	100%	0	0	50%	0	100%	0	0	50%	0	100%	0	0
GRAND TOTAL	26,001		35,604		13,176	gpd	22,860 gpd			23,513	gpd	33,541 gpd			16,129	gpd	25,912 gpd	
Subtotal Daily Flows							18,018 gpd	18,018				28,527 gpd	28,527				21,020 gpd	21,020
I&I						0%	0 gpd	0			0%	0 gpd	0			0%	0 gpd	0
Daily Flows					**Weekday Flow**[b]		**18,018 gpd**	**18,018**		**Weekend Flow**[b]		**28,527 gpd**	**28,527**		**Average Day flow**		**21,020 gpd**	**21,020**
Calculated Peaking Factor							1.0	1.0				1.58	1.58				1.17	1.17

[a] Average Day Flow = 5/7 Weekday + 2/7 Weekend

[b] Used for calculation purposes only.

Peaking factors are back-calculated as an internal check only and are not used to calculate flows

Appendix B

Recycled Water Uses – Title 22

Recycled Water Use

Recycled water in this report means wastewater that has been treated sufficiently to meet the California Department of Health Services' (DHS) comprehensive recycled water regulations that define treatment processes, water quality criteria, and treatment reliability requirements for public use of recycled water. These regulations are contained in Title 22, Division 4, Chapter 3 of the California Administrative Code, more commonly referred to as Title 22.

Approved by the State in December 2000, Title 22 prescribes recycled water criteria and divides them into several categories based upon the extent of public access or risk of exposure. In general, Title 22 regulations are more stringent for uses with high potential for public contact and less stringent for uses with low potential for public contact. Depending on the use, Title 22 establishes four levels of treatment required for recycled water: undisinfected secondary, undisinfected secondary–23, undisinfected secondary–2.2, and disinfected tertiary.

Undisinfected Secondary Recycled Water. This category of recycled water is wastewater that has been treated to a secondary treatment level and is commonly referred to as secondary effluent. Secondary effluent is wastewater that contains dissolved oxygen (DO) and has undergone an oxidation process in which the organic matter content of the water has been stabilized and made nonputrescible.

Undisinfected Secondary–23 Recycled Water. This category of recycled water is secondary effluent that has been disinfected to a level such that the most probable number (MPN) of coliform bacteria in the water does not exceed 23 per 100 mL. Disinfection is the process whereby pathogenic bacteria and viruses are inactivated by chemical, physical, or biological means.

Disinfected Secondary–2.2 Recycled Water. This category of recycled water includes secondary effluent that has been disinfected to a level such that the coliform bacteria in the water does not exceed 2.2 MPN per 100 mL.

Disinfected Tertiary Recycled Water. This category of recycled water includes secondary effluent that has undergone tertiary treatment and has been disinfected to a level such that the median coliform bacteria in the water does not exceed 2.2 MPN per 100 mL. Title 22 defines the tertiary treatment process as wastewater that has been oxidized, coagulated, clarified, and filtered. The recycled water turbidity should not exceed 2 NTU on average, should not exceed 5 NTU more than five percent of the time during any 24-hour period, and should never exceed 10 NTU.

A summary of approved uses for various types of recycled water is presented in the following table.

SUITABLE USES OF RECYCLED WATER [A]

Use of recycled water	Treatment level		
	Tertiary	Secondary –2.2	Secondary –23
Irrigation of:			
Food crops—contact with edible portion of crop	Allowed	Not Allowed	Not Allowed
Parks and playgrounds	Allowed	Not Allowed	Not Allowed
School yards	Allowed	Not Allowed	Not Allowed
Residential landscaping	Allowed	Not Allowed	Not Allowed
Unrestricted access golf courses	Allowed	Not Allowed	Not Allowed
Any other irrigation uses not prohibited by other provisions of CCR	Allowed	Not Allowed	Not Allowed
Food crops—edible portion above ground/not in contact with reclaimed water	Allowed	Allowed	Not Allowed
Cemeteries	Allowed	Allowed	Allowed
Freeway landscaping	Allowed	Allowed	Allowed
Restricted-access golf courses	Allowed	Allowed	Allowed
Ornamental nursery stock and sod farms	Allowed	Allowed	Allowed
Pasture for milk animals	Allowed	Allowed	Allowed
Any nonedible vegetation with access control to prevent use, as if it were a park, playground, or schoolyard	Allowed	Allowed	Allowed
Orchards with no contact between edible portion and reclaimed water	Allowed	Allowed	Allowed
Vineyards with no contact between edible portion and reclaimed water	Allowed	Allowed	Allowed
Non–food bearing trees not irrigated <14 days of harvest	Allowed	Allowed	Allowed
Fodder crops (e.g., alfalfa) and fiber crops (e.g., cotton)	Allowed	Allowed	Allowed
Seed crops not eaten by humans	Allowed	Allowed	Allowed
Food crops that undergo commercial pathogen-destroying processing before human consumption (e.g., sugar beets)	Allowed	Allowed	Allowed
Food crops—contact with edible portion of crop	Allowed	Not Allowed	Not Allowed
Supply for impoundments:			
Nonrestricted rec. impound., with supplemental monitoring for pathogenic organisms	Allowed [b]	Not Allowed	Not Allowed
Restricted impoundment and fish hatcheries	Allowed	Allowed	Not Allowed
Landscape impoundment. Without decorative fountains	Allowed	Allowed	Allowed

SUITABLE USES OF RECYCLED WATER [A] (CONT'D)

Use of recycled water	Treatment level		
	Tertiary RW	**Secondary –2.2 RW**	**Secondary –23 RW**
Supply for cooling or air conditioning:			
Industrial or commercial cooling or air conditioning with cooling tower, evaporative condenser, or a spraying that creates a mist	Allowed [c]	Not Allowed	Not Allowed
Industrial or commercial cooling or air conditioning with cooling tower, evaporative condenser, or a spraying that does not create a mist	Allowed	Allowed	Allowed
Nonrestricted rec. impound., with supplemental monitoring for pathogenic organisms.	Allowed [b]	Not Allowed	Not Allowed
Other uses:			
Flushing toilets and urinals	Allowed	Not Allowed	Not Allowed
Priming drain tap	Allowed	Not Allowed	Not Allowed
Industrial process water that may contact workers	Allowed	Not Allowed	Not Allowed
Structural fire fighting	Allowed	Not Allowed	Not Allowed
Decorative fountains	Allowed	Not Allowed	Not Allowed
Commercial laundries	Allowed	Not Allowed	Not Allowed
Consolidation of backfill material around potable water pipelines	Allowed	Not Allowed	Not Allowed
Artificial snow-making for commercial outdoor uses	Allowed	Not Allowed	Not Allowed
Industrial boiler feed	Allowed	Allowed	Allowed
Nonstructural fire fighting	Allowed	Allowed	Allowed
Backfill consolidation around nonpotable piping	Allowed	Allowed	Allowed
Soil compaction	Allowed	Allowed	Allowed
Mixing concrete	Allowed	Allowed	Allowed
Dust control on roads and streets	Allowed	Allowed	Allowed
Cleaning roads, sidewalks, and outdoor work areas	Allowed	Allowed	Allowed
Flushing sanitary sewers	Allowed	Allowed	Allowed
Flushing toilets and urinals	Allowed	Not Allowed	Not Allowed
Priming drain tap	Allowed	Not Allowed	Not Allowed
Industrial process water that may contact workers	Allowed	Not Allowed	Not Allowed

[a] Refer to full text of the current version of Title 22.

[b] Additional monitoring may be necessary with conventional treatment.

[c] Drift eliminators and/or biocides are required if public or employees can be exposed to mist.

Appendix C

City of Madera
Source Water Assessment

CITY OF MADERA

SOURCE WATER ASSESSMENT

A source water assessment was conducted for the City of Madera water system during February and March 2004. A completed copy of this report may be viewed at or, you may request a summary copy by contacting:

Marvin Ward, Water Quality Specialist II
City of Madera, Public Works Department
1030 South Gateway Drive
Madera, CA 93637
(559) 661-5466

The summary for this assessment indicates that the following City of Madera water wells (sources) are considered most vulnerable to the following activities not associated with any detected contaminants:

1.1.1.1 Activities	1.1.1.2 Water Wells
Airports - Maintenance/fueling areas	#26
Automobile - Body shops, Historic gas stations, Machine shops, Junk/scrap salvage yards	#25
Automobile – Gas stations	#17, #18, #20, #21, #22, #26
Automobile - Repair shops	#18, #25
Boat services/repair/refinishing, sewer collection systems, pesticide/fertilizer/petroleum storage & transfer area	#18
Chemical/petroleum processing/storage, dry cleaners, injection wells/dry wells/sumps	#28
Dry cleaners, injection wells/dry wells/sumps	28
Fertilizer/pesticide/herbicide application, storm drain discharge points	#29
Grazing (>5 large animals or equivalent per acre)	#23
Historic waste dumps/landfills	#25, #26
Housing – high density (>1 house / 0.5 acres)	#15, #16, #29
Known contaminant plumes	#27
Metal plating/finishing/fabricating	#26, #27, #30
Military installations	#24
Transportation corridors - Road right - of - ways (herbicides use areas)	#15, #16, #17, #29

DISCUSSION OF VULNERABILITY

There are no current Maximum Contaminant Level (MCL) exceedances from the Water Quality Inquiry (WQI) database and from the State Department of Health Services system files for Water Wells #15, #16, #17, #18, #20, #22, #23, #24, #25, #26, #28, #29 and #30.

The following constituents were found by review of the current MCL exceedances reports from the Water Quality Inquiry (WQI) and from the State Department of Health Services system files.

1.1.1.3

1.1.1.4 Water Well	1.1.1.5 1.1.2 Chemical	1.1.1.6 Sample Date	1.1.1.7 Level Detected	1.1.2.1 MCL
#21	DBCP	5/11/00	0.30 ug/L	0.20 ug/L
#27	DBCP	2/19/03	0.24 ug/L	0.20 ug/L
#27	EDB	2/19/03	0.75 ug/L	0.05 ug/L

ADDITIONAL COMMENTS:

Water Well 21 A routine water well sample was collected for Dibromochloropropane (DBCP) on 5/11/00 and a confirmation sample was collected on 6/11/00. The average of those two samples exceeded the MCL. This well was then tested for DBCP monthly for six months, quarterly for six months and is now being tested annually. Water samples collected from Well #21 after 6/11/00 have not exceeded the MCL for DBCP.

Water Well 27 This water well is equipped with a granular activated carbon filtration system. This system has four vessels with approximately 20,000 pounds of carbon per vessel. Raw water from the well is filtered to remove all (DBCP) and Ethylene Dibromide (EDB) before it enters the City water distribution system. DBCP and EDB results for samples collected on 2/19/03 were for unfiltered water only. DBCP or EDB is non-detect in water routinely sampled from downstream of the filtration system.

Primary Standards	**MCL**	**PHG (MCLG)**	**RANGE OF DETECTION**			**AVERAGE**	**U.O.M.**	**TYPICAL SOURCE OF CONTAMINANT**
Arsenic	50.00	NA	N/D	TO	4.00	0.67	ug/L	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes.
Barium	1000.00	2000.00	N/D	TO	180.00	30.00	ug/L	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits.
Nitrate (as NO3)	45.00	45.00	3.00	TO	29.00	8.89	mg/L	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits.
Dibromochloropropane (DBCP)	0.20	NA	N/D	TO	0.20	0.02	ug/L	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit.
Ethylene dibromide (EDB)	0.05	0.01	0.00	TO	0.51	0.03	ug/L	
Tetrachloroethylene(PCE)	5.00	NA	N/D	TO	2.00	0.22	ug/L	Discharge from factories, dry cleaners, or auto shops
Secondary Standards								
Chloride	500.00		16.00	TO	42.00	22.40	mg/L	Runoff/leaching from natural deposits; seawater influence.
Iron	300.00		N/D	TO	220.00	14.67	ug/L	Leaching from natural deposits; industrial wastes.
Odor	3.00		1.00	TO	1.00	1.00	TON	Naturally occurring organic materials.
pH (Laboratory)	6.5 - 8.5		5.90	TO	7.40	6.55	Std. Units	
Specific Conductance	1600.00		190.00	TO	600.00	273.33	umho/cm	Substances that form ions when in water; seawater influence.
Total Filterable Residue (TDS)	1000.00		140.00	TO	400.00	200.00	mg/L	Runoff/Leaching from natural deposits
Sulfate	500.00		3.00	TO	17.00	6.75	mg/L	Runoff/leaching from natural deposits; industrial wastes.
Lab Turbity	5.00		0.00	TO	0.40	0.12	NTU	
Toatal Chromium			0.00	TO	4.00	1.53	ug/L	
General Minerals								
Bicarbonate			46.00	TO	200.00	88.53	mg/L	
Calcium			14.00	TO	57.00	24.20	mg/L	
Copper	1.30	0.17	0.0	TO	0.19	0.114	mg/L	Internal corrosion of household plumbing systems, erosion of natural deposits, leaching from wood preservatives.
Fluoride	2000.00	100.00	ND	TO	100.00	13.35	ug/L	Erosion of natural deposits, from water additive that promotes strong teeth.
Lead	0.02	0.002	ND	TO	0.01	0.0002	mg/L	Internal corrosion of household plumbing systems, discharge from industrial manufacturers, erosion of natural deposits.
Magnesium			4.40	TO	16.00	7.15	mg/L	
Potassium			1.50	TO	9.00	3.83	mg/L	
Sodium			18.00	TO	48.00	24.67	mg/L	
Total Alkalinity			46.00	TO	200.00	88.53	mg/L	
Total Hardness (as CaCO3)			53.00	TO	210.00	83.57	mg/L	

Primary Standards Organics	MCL	PHG (MCLG)	RANGE OF DETECTION			AVERAGE	U.O.M.	TYPICAL SOURCE OF CONTAMINANT
Tetrachloroethylene (PCE)	5.00	60.00	0.00	TO	2.00	0.22	ug/L	Discharge from factories, dry cleaners and auto shops (metal degreaser)
Radioactivity								
Gross Alpha	15 pCi/L		-0.24	TO	11.30	0.96	pCi/L	Erosion of natural and man-made deposits
Uranium	20 pCi/L		-0.05	TO	8.41	0.97	pCi/L	Erosion of natural deposits
Unregulated Organics								
1,2,3 Trichloropropane	N/A	0.005	0.00	TO	0.01	0.00	ug/L	
Methyl Ethyl Ketone	N/A	5.00	0.00	TO	16.00	1.23	ug/L	
Vanadium	N/A	3.00	10.00	TO	27.00	18.40	ug/L	
Unregulated Inorganics								
Hexavalent Chromium IV			ND	TO	2.50	0.69	ug/L	N/A

The State allows City to monitor for some contaminants less than once per year because the consentration of these contaminants do not change frequently. Some of the above data, though representative, is more than one year old, the data ranges from 1996 to 2005.

ABBREVIATION KEY

MCL = Maximum Contaminant Level
mg/L = Milligrams per Liter or parts per million
ug/L = Micrograms per Liter or parts per billion
NTU = Nephelometric Turbidity Units
PHG = Public Heath Goal
MCLG= Maximum Contaminant Level Goal

N/A = Not Aplicable
pCi/L =
N/D = Non-Detect
U.O.M. =
Ton =
umho/cm=

REQUIRED PUBLIC NOTICE

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders,some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their heath care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

DEFINITIONS

Maximum Contaminant Level or (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs(or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Primary Drinking Water Standard or PDWS: MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements

Public Health Goals or PHG: The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Maximum Contaminant Level Goal or MCLG: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

HEALTH EFFECTS FOR CONTAMINANTS

Nitrate: Nitrate in drinking water at levels above 45 mg/L is a health risk for infants of less than six months of age.
Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 45 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider.

TREATMENT

Chlorination: Each well site has a chlorine generation system which produces a 0.8% chlorine solution and doseage to the distribution system is set at 0.25 Parts Per Million.

GAC Filtration: Water Well No. 27 has a Granular Activated Carbon Filtration system. This system utilizes four vessels with approximately 20,000 pounds of Carbon each. Water passes through this filtration system where Dibromochloropropane(DBCP) and Ethylene dibromide(EDB) is removed. When this well is in use, it is tested weekly to ensure the effectiveness of the filter.

REQUIRED PUBLIC INFORMATION

1. The sources of drinking water(both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

2. Contaminants that could be present in source water include:

(a) Microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

(**b**) Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

(**c**) Pesticides and herbicides, that may come from a variety of sources such as agriculture, urban water runoff, and residential uses.

(**d**) Organic chemical contaminants, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.

(**e**) Radioactive contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

3. In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency(USEPA) and the State Department of Health Services (DHS) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Department regulations also establish limits for contaminants in bottled water that provide the same protection or public health.

4. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline 1(800) 426-4791.

Appendix D

Water Balance Calculations

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

270,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 0.0 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	0	0.00		
Sprayfield	224,213	28.9		
Landscaping	21,770	4.0		
Storage		11.0	12.0	42.9

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	20%	100%	0%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscapinc (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.89	0.00	8.10	*8.99*			0.08		0.77		*0.86*	8.13	8.13
December	31	0.96	0.00	8.37	*9.33*			0.03		0.31		*0.34*	8.98	17.12
January	31	1.17	0.00	8.37	*9.54*			0.05		0.41		*0.46*	9.09	26.20
February	28	1.18	0.00	7.56	*8.74*			0.07		0.60		*0.67*	8.07	34.28
March	31	1.20	0.00	8.37	*9.57*		0.01	0.11		1.04		*1.17*	8.40	42.68
April	30	0.30	0.00	8.10	*8.40*	1.02	0.78		6.46			*8.26*	0.14	42.82
May	31	0.13	0.00	8.37	*8.50*	1.81	1.17		12.01			*14.99*	-6.49	36.33
June	30	0.03	0.00	8.10	*8.13*	2.34	1.39		16.31			*20.05*	-11.92	24.42
July	31	0.00	0.00	8.37	*8.37*	2.58	1.45		17.68			*21.72*	-13.35	11.07
August	31	0.01	0.00	8.37	*8.38*	2.23	1.28		13.82			*17.33*	-8.95	2.12
September	30	0.07	0.00	8.10	*8.17*	1.58	0.94		8.29			*10.81*	-2.65	0.00
October	31	0.22	0.00	8.37	*8.59*	0.82	0.57		4.13			*5.52*	3.07	3.07
Average	30.4	0.51	0.00	8.21	*8.73*	1.03	0.63	0.03	6.56	0.26	0.00	8.51	0.21	21
Total	365	6.16	0.00	98.55	*104.71*	12.38	7.60	0.34	78.70	3.13	0.00	102.17	2.54	248
Max	31	1.20	0.00	8.37	*9.57*	2.58	1.45	0.11	17.68	1.04	0.00	21.72	9.09	42.82
Min	28	0.00	0.00	7.56	*8.13*	0.00	0.00	0.00	0.00	0.00	0.00	0.34	-13.35	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

270,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 77.1 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	251,913	19.28		
Sprayfield	0	0.0		
Landscaping	20,789	4.0		
Storage		0.8	12.0	3.2

SEASONAL OPERATIONAL USE			
Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	0%	0%	100%
% in use during dry weather (Apr-Oct)	100%	0%	100%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscapin (MG)	Out to winte landscapin (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.07	0.00	8.10	*8.17*			0.00	0.00	0.00	7.56	*7.56*	0.61	0.61
December	31	0.07	0.00	8.37	*8.44*			0.00	0.00	0.00	7.81	*7.81*	0.63	1.24
January	31	0.09	0.00	8.37	*8.46*			0.00	0.00	0.00	7.81	*7.81*	0.65	1.89
February	28	0.09	0.00	7.56	*7.65*			0.00	0.00	0.00	7.05	*7.05*	0.60	2.49
March	31	0.09	0.00	8.37	*8.46*			0.00	0.00	0.00	7.81	*7.81*	0.65	3.14
April	30	0.02	0.00	8.10	*8.12*	0.08	0.78	0.00	0.00	0.00	7.56	*8.41*	-0.29	2.85
May	31	0.01	0.00	8.37	*8.38*	0.14	1.17	0.00	0.00	0.00	7.81	*9.12*	-0.74	2.11
June	30	0.00	0.00	8.10	*8.10*	0.18	1.39	0.00	0.00	0.00	7.56	*9.13*	-1.02	1.09
July	31	0.00	0.00	8.37	*8.37*	0.19	1.45	0.00	0.00	0.00	7.81	*9.46*	-1.09	0.00
August	31	0.00	0.00	8.37	*8.37*	0.17	1.28	0.00	0.00	0.00	7.81	*9.26*	-0.89	0.00
September	30	0.01	0.00	8.10	*8.11*	0.12	0.94	0.00	0.00	0.00	7.56	*8.62*	-0.51	0.00
October	31	0.02	0.00	8.37	*8.39*	0.06	0.57	0.00	0.00	0.00	7.81	*8.44*	-0.05	0.00
Average	30.4	0.04	0.00	8.21	*8.25*	0.08	0.63	0.00	0.00	0.00	7.66	8.37	-0.12	1
Total	365	0.46	0.00	98.55	*99.01*	0.93	7.59	0.00	0.00	0.00	91.95	100.47	-1.46	15
Max	31	0.09	0.00	8.37	*8.46*	0.19	1.45	0.00	0.00	0.00	7.81	9.46	0.65	3.14
Min	28	0.00	0.00	7.56	*7.65*	0.00	0.00	0.00	0.00	0.00	7.05	7.05	-1.09	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

270,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 31.0 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	101,171	7.74		
Sprayfield	231,128	31.0		
Landscaping	20,789	4.0		
Storage		7.7	12.0	30.1

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	0%	0%	100%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscaping (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.62	0.00	8.10	*8.72*			0.00		0.00	3.04	*3.04*	5.69	5.69
December	31	0.67	0.00	8.37	*9.04*			0.00		0.00	3.14	*3.14*	5.90	11.59
January	31	0.82	0.00	8.37	*9.19*			0.00		0.00	3.14	*3.14*	6.06	17.65
February	28	0.83	0.00	7.56	*8.39*			0.00		0.00	2.83	*2.83*	5.56	23.20
March	31	0.84	0.00	8.37	*9.21*			0.00		0.00	3.14	*3.14*	6.08	29.28
April	30	0.21	0.00	8.10	*8.31*	0.71	0.78	0.00	6.93	0.00		*8.42*	-0.11	29.17
May	31	0.09	0.00	8.37	*8.46*	1.27	1.17	0.00	12.87	0.00		*15.31*	-6.85	22.32
June	30	0.02	0.00	8.10	*8.12*	1.64	1.39	0.00	17.48	0.00		*20.52*	-12.40	9.93
July	31	0.00	0.00	8.37	*8.37*	1.81	1.45	0.00	18.95	0.00		*22.22*	-13.85	0.00
August	31	0.00	0.00	8.37	*8.37*	1.56	1.28	0.00	14.81	0.00		*17.66*	-9.28	0.00
September	30	0.05	0.00	8.10	*8.15*	1.11	0.94	0.00	8.89	0.00		*10.94*	-2.79	0.00
October	31	0.15	0.00	8.37	*8.52*	0.58	0.57	0.00	4.43	0.00		*5.57*	2.95	2.95
Average	30.4	0.36	0.00	8.21	*8.57*	0.72	0.63	0.00	7.03	0.00	1.27	9.66	-1.09	13
Total	365	4.32	0.00	98.55	*102.87*	8.68	7.59	0.00	84.36	0.00	15.28	115.91	-13.04	152
Max	31	0.84	0.00	8.37	*9.21*	1.81	1.45	0.00	18.95	0.00	3.14	22.22	6.08	29.28
Min	28	0.00	0.00	7.56	*8.12*	0.00	0.00	0.00	0.00	0.00	0.00	2.83	-13.85	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

160,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 0.0 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	0	0.00		
Sprayfield	135,119	17.4		
Landscaping	21,770	4.0		
Storage		7.0	12.0	27.4

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	20%	100%	0%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscapinc (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.57	0.00	4.80	*5.37*			0.08		0.47		*0.55*	4.82	4.82
December	31	0.61	0.00	4.96	*5.57*			0.03		0.19		*0.22*	5.35	10.17
January	31	0.75	0.00	4.96	*5.71*			0.05		0.25		*0.29*	5.42	15.58
February	28	0.75	0.00	4.48	*5.23*			0.07		0.36		*0.43*	4.81	20.39
March	31	0.77	0.00	4.96	*5.73*		0.01	0.11		0.63		*0.76*	4.97	25.36
April	30	0.19	0.00	4.80	*4.99*	0.65	0.78		3.89			*5.32*	-0.33	25.03
May	31	0.08	0.00	4.96	*5.04*	1.16	1.17		7.24			*9.56*	-4.52	20.51
June	30	0.02	0.00	4.80	*4.82*	1.50	1.39		9.83			*12.72*	-7.90	12.61
July	31	0.00	0.00	4.96	*4.96*	1.65	1.45		10.66			*13.76*	-8.80	3.82
August	31	0.00	0.00	4.96	*4.96*	1.42	1.28		8.33			*11.03*	-6.07	0.00
September	30	0.04	0.00	4.80	*4.84*	1.01	0.94		5.00			*6.95*	-2.10	0.00
October	31	0.14	0.00	4.96	*5.10*	0.52	0.57		2.49			*3.58*	1.52	1.52
Average	30.4	0.33	0.00	4.87	*5.19*	0.66	0.63	0.03	3.95	0.16	0.00	5.43	-0.24	12
Total	365	3.93	0.00	58.40	*62.33*	7.90	7.60	0.34	47.43	1.89	0.00	65.17	-2.84	140
Max	31	0.77	0.00	4.96	*5.73*	1.65	1.45	0.11	10.66	0.63	0.00	13.76	5.42	25.36
Min	28	0.00	0.00	4.48	*4.82*	0.00	0.00	0.00	0.00	0.00	0.00	0.22	-8.80	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

160,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 45.1 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	147,466	11.28		
Sprayfield	0	0.0		
Landscaping	20,789	4.0		
Storage		1.0	12.0	3.9

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	0%	0%	100%
% in use during dry weather (Apr-Oct)	100%	0%	100%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscapinc (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.08	0.00	4.80	*4.88*			0.00	0.00	0.00	4.42	*4.42*	0.46	0.46
December	31	0.09	0.00	4.96	*5.05*			0.00	0.00	0.00	4.57	*4.57*	0.48	0.93
January	31	0.11	0.00	4.96	*5.07*			0.00	0.00	0.00	4.57	*4.57*	0.50	1.43
February	28	0.11	0.00	4.48	*4.59*			0.00	0.00	0.00	4.13	*4.13*	0.46	1.89
March	31	0.11	0.00	4.96	*5.07*			0.00	0.00	0.00	4.57	*4.57*	0.50	2.38
April	30	0.03	0.00	4.80	*4.83*	0.09	0.78	0.00	0.00	0.00	4.42	*5.29*	-0.47	1.92
May	31	0.01	0.00	4.96	*4.97*	0.16	1.17	0.00	0.00	0.00	4.57	*5.91*	-0.93	0.98
June	30	0.00	0.00	4.80	*4.80*	0.21	1.39	0.00	0.00	0.00	4.42	*6.03*	-1.23	0.00
July	31	0.00	0.00	4.96	*4.96*	0.23	1.45	0.00	0.00	0.00	4.57	*6.26*	-1.30	0.00
August	31	0.00	0.00	4.96	*4.96*	0.20	1.28	0.00	0.00	0.00	4.57	*6.06*	-1.10	0.00
September	30	0.01	0.00	4.80	*4.81*	0.14	0.94	0.00	0.00	0.00	4.42	*5.51*	-0.70	0.00
October	31	0.02	0.00	4.96	*4.98*	0.07	0.57	0.00	0.00	0.00	4.57	*5.21*	-0.23	0.00
Average	30.4	0.05	0.00	4.87	*4.91*	0.09	0.63	0.00	0.00	0.00	4.49	*5.21*	-0.30	1
Total	365	0.56	0.00	58.40	*58.96*	1.12	7.59	0.00	0.00	0.00	53.83	*62.54*	-3.58	10
Max	31	0.11	0.00	4.96	*5.07*	0.23	1.45	0.00	0.00	0.00	4.57	*6.26*	0.50	2.38
Min	28	0.00	0.00	4.48	*4.59*	0.00	0.00	0.00	0.00	0.00	4.13	*4.13*	-1.30	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

160,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 14.2 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	46,406	3.55		
Sprayfield	106,017	14.2		
Landscaping	20,789	4.0		
Storage		5.4	12.0	21.0

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	0%	0%	100%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscapinc (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.43	0.00	4.80	*5.23*			0.00		0.00	1.39	*1.39*	3.84	3.84
December	31	0.47	0.00	4.96	*5.43*			0.00		0.00	1.44	*1.44*	3.99	7.83
January	31	0.57	0.00	4.96	*5.53*			0.00		0.00	1.44	*1.44*	4.09	11.92
February	28	0.58	0.00	4.48	*5.06*			0.00		0.00	1.30	*1.30*	3.76	15.68
March	31	0.59	0.00	4.96	*5.55*			0.00		0.00	1.44	*1.44*	4.11	19.79
April	30	0.15	0.00	4.80	*4.95*	0.50	0.78	0.00	3.18	0.00		*4.45*	0.49	20.29
May	31	0.06	0.00	4.96	*5.02*	0.88	1.17	0.00	5.90	0.00		*7.96*	-2.94	17.35
June	30	0.02	0.00	4.80	*4.82*	1.15	1.39	0.00	8.02	0.00		*10.56*	-5.74	11.61
July	31	0.00	0.00	4.96	*4.96*	1.26	1.45	0.00	8.69	0.00		*11.41*	-6.45	5.16
August	31	0.00	0.00	4.96	*4.96*	1.09	1.28	0.00	6.79	0.00		*9.17*	-4.20	0.96
September	30	0.03	0.00	4.80	*4.83*	0.77	0.94	0.00	4.08	0.00		*5.79*	-0.96	0.00
October	31	0.11	0.00	4.96	*5.07*	0.40	0.57	0.00	2.03	0.00		*3.00*	2.07	2.07
Average	30.4	0.25	0.00	4.87	*5.12*	0.50	0.63	0.00	3.22	0.00	0.58	4.94	0.17	10
Total	365	3.01	0.00	58.40	*61.41*	6.05	7.59	0.00	38.70	0.00	7.01	59.34	2.07	117
Max	31	0.59	0.00	4.96	*5.55*	1.26	1.45	0.00	8.69	0.00	1.44	11.41	4.11	20.29
Min	28	0.00	0.00	4.48	*4.82*	0.00	0.00	0.00	0.00	0.00	0.00	1.30	-6.45	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

20,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 0.0 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	0	0.00		
Sprayfield	12,728	1.6		
Landscaping	5,442	1.0		
Storage		0.8	12.0	3.3

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	20%	100%	0%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscapinc (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.07	0.00	0.60	*0.67*			0.02		0.04		*0.06*	0.60	0.60
December	31	0.07	0.00	0.62	*0.69*			0.01		0.02		*0.03*	0.67	1.27
January	31	0.09	0.00	0.62	*0.71*			0.01		0.02		*0.03*	0.68	1.95
February	28	0.09	0.00	0.56	*0.65*			0.02		0.03		*0.05*	0.60	2.55
March	31	0.09	0.00	0.62	*0.71*		0.00	0.03		0.06		*0.09*	0.62	3.17
April	30	0.02	0.00	0.60	*0.62*	0.08	0.19		0.37			*0.64*	-0.02	3.15
May	31	0.01	0.00	0.62	*0.63*	0.14	0.29		0.68			*1.11*	-0.48	2.67
June	30	0.00	0.00	0.60	*0.60*	0.18	0.35		0.93			*1.45*	-0.85	1.82
July	31	0.00	0.00	0.62	*0.62*	0.20	0.36		1.00			*1.57*	-0.94	0.87
August	31	0.00	0.00	0.62	*0.62*	0.17	0.32		0.78			*1.28*	-0.66	0.22
September	30	0.01	0.00	0.60	*0.61*	0.12	0.24		0.47			*0.83*	-0.22	0.00
October	31	0.02	0.00	0.62	*0.64*	0.06	0.14		0.23			*0.44*	0.20	0.20
Average	30.4	0.04	0.00	0.61	*0.65*	0.08	0.16	0.01	0.37	0.01	0.00	0.63	0.02	2
Total	365	0.47	0.00	7.30	*7.77*	0.95	1.90	0.09	4.47	0.18	0.00	7.58	0.19	18
Max	31	0.09	0.00	0.62	*0.71*	0.20	0.36	0.03	1.00	0.06	0.00	1.57	0.68	3.17
Min	28	0.00	0.00	0.56	*0.60*	0.00	0.00	0.00	0.00	0.00	0.00	0.03	-0.94	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

20,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 4.4 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	14,275	1.09		
Sprayfield	0	0.0		
Landscaping	5,197	1.0		
Storage		0.4	12.0	1.4

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	0%	0%	100%
% in use during dry weather (Apr-Oct)	100%	0%	100%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	Net in (MG)	Out to evaporation (MG)	Out to landscapinc (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	Net out (MG)	Net (MG)	Accum storage (MG)
November	30	0.03	0.00	0.60	0.63			0.00	0.00	0.00	0.43	0.43	0.20	0.20
December	31	0.03	0.00	0.62	0.65			0.00	0.00	0.00	0.44	0.44	0.21	0.41
January	31	0.04	0.00	0.62	0.66			0.00	0.00	0.00	0.44	0.44	0.22	0.62
February	28	0.04	0.00	0.56	0.60			0.00	0.00	0.00	0.40	0.40	0.20	0.82
March	31	0.04	0.00	0.62	0.66			0.00	0.00	0.00	0.44	0.44	0.22	1.04
April	30	0.01	0.00	0.60	0.61	0.03	0.19	0.00	0.00	0.00	0.43	0.66	-0.05	0.99
May	31	0.00	0.00	0.62	0.62	0.06	0.29	0.00	0.00	0.00	0.44	0.79	-0.17	0.82
June	30	0.00	0.00	0.60	0.60	0.08	0.35	0.00	0.00	0.00	0.43	0.85	-0.25	0.57
July	31	0.00	0.00	0.62	0.62	0.08	0.36	0.00	0.00	0.00	0.44	0.89	-0.27	0.30
August	31	0.00	0.00	0.62	0.62	0.07	0.32	0.00	0.00	0.00	0.44	0.84	-0.22	0.09
September	30	0.00	0.00	0.60	0.60	0.05	0.24	0.00	0.00	0.00	0.43	0.71	-0.11	0.00
October	31	0.01	0.00	0.62	0.63	0.03	0.14	0.00	0.00	0.00	0.44	0.61	0.02	0.02
Average	30.4	0.02	0.00	0.61	0.62	0.03	0.16	0.00	0.00	0.00	0.43	0.63	0.00	0
Total	365	0.20	0.00	7.30	7.50	0.40	1.90	0.00	0.00	0.00	5.21	7.51	-0.01	6
Max	31	0.04	0.00	0.62	0.66	0.08	0.36	0.00	0.00	0.00	0.44	0.89	0.22	1.04
Min	28	0.00	0.00	0.56	0.60	0.00	0.00	0.00	0.00	0.00	0.40	0.40	-0.27	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

20,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 1.4 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	4,707	0.36		
Sprayfield	11,181	1.4		
Landscaping	5,442	1.0		
Storage		0.7	12.0	2.7

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	20%	100%	100%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscaping (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.06	0.00	0.60	*0.66*			0.02		0.04	0.14	*0.20*	0.46	0.46
December	31	0.06	0.00	0.62	*0.68*			0.01		0.02	0.15	*0.17*	0.51	0.97
January	31	0.07	0.00	0.62	*0.69*			0.01		0.02	0.15	*0.18*	0.52	1.48
February	28	0.08	0.00	0.56	*0.64*			0.02		0.03	0.13	*0.18*	0.46	1.94
March	31	0.08	0.00	0.62	*0.70*		0.00	0.03		0.05	0.15	*0.23*	0.47	2.41
April	30	0.02	0.00	0.60	*0.62*	0.06	0.19		0.32			*0.58*	0.04	2.45
May	31	0.01	0.00	0.62	*0.63*	0.12	0.29		0.60			*1.01*	-0.38	2.07
June	30	0.00	0.00	0.60	*0.60*	0.15	0.35		0.81			*1.31*	-0.71	1.36
July	31	0.00	0.00	0.62	*0.62*	0.16	0.36		0.88			*1.41*	-0.79	0.57
August	31	0.00	0.00	0.62	*0.62*	0.14	0.32		0.69			*1.15*	-0.53	0.04
September	30	0.00	0.00	0.60	*0.60*	0.10	0.24		0.41			*0.75*	-0.15	0.00
October	31	0.01	0.00	0.62	*0.63*	0.05	0.14		0.21			*0.40*	0.23	0.23
Average	30.4	0.03	0.00	0.61	*0.64*	0.07	0.16	0.01	0.33	0.01	0.06	0.63	0.01	1
Total	365	0.39	0.00	7.30	*7.69*	0.79	1.90	0.09	3.92	0.16	0.71	7.57	0.13	14
Max	31	0.08	0.00	0.62	*0.70*	0.16	0.36	0.03	0.88	0.05	0.15	1.41	0.52	2.45
Min	28	0.00	0.00	0.56	*0.60*	0.00	0.00	0.00	0.00	0.00	0.00	0.17	-0.79	0.00

Water Balance for Seasonal Storage and Disposal Sizing
North Fork

INITIAL CONDITIONS

20,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 0.0 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	0	0.00		
Sprayfield	0	1.7		
Landscaping	5,197	1.0		
Storage		0.9	12.0	3.5

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	0%	0%	0%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	Net in (MG)	Out to evaporation (MG)	Out to landscapinc (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	Net out (MG)	Net (MG)	Accum storage (MG)
November	30	0.07	0.00	0.60	0.67			0.00		0.00		0.00	0.67	0.67
December	31	0.08	0.00	0.62	0.70			0.00		0.00		0.00	0.70	1.37
January	31	0.10	0.00	0.62	0.72			0.00		0.00		0.00	0.72	2.09
February	28	0.10	0.00	0.56	0.66			0.00		0.00		0.00	0.66	2.75
March	31	0.10	0.00	0.62	0.72			0.00		0.00		0.00	0.72	3.47
April	30	0.02	0.00	0.60	0.62	0.08	0.19	0.00	0.39	0.00		0.67	-0.04	3.42
May	31	0.01	0.00	0.62	0.63	0.15	0.29	0.00	0.72	0.00		1.16	-0.53	2.89
June	30	0.00	0.00	0.60	0.60	0.19	0.35	0.00	0.98	0.00		1.52	-0.92	1.98
July	31	0.00	0.00	0.62	0.62	0.21	0.36	0.00	1.06	0.00		1.64	-1.02	0.96
August	31	0.00	0.00	0.62	0.62	0.18	0.32	0.00	0.83	0.00		1.33	-0.71	0.25
September	30	0.01	0.00	0.60	0.61	0.13	0.24	0.00	0.50	0.00		0.86	-0.26	0.00
October	31	0.02	0.00	0.62	0.64	0.07	0.14	0.00	0.25	0.00		0.46	0.18	0.18
Average	30.4	0.04	0.00	0.61	0.65	0.09	0.16	0.00	0.39	0.00	0.00	0.64	0.01	2
Total	365	0.51	0.00	7.30	7.81	1.02	1.90	0.00	4.72	0.00	0.00	7.64	0.17	20
Max	31	0.10	0.00	0.62	0.72	0.21	0.36	0.00	1.06	0.00	0.00	1.64	0.72	3.47
Min	28	0.00	0.00	0.56	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.02	0.00

Water Balance for Seasonal Storage and Disposal Sizing

North Fork

INITIAL CONDITIONS

20,000 Wastewater flow (gpd)
0% Percent RDI/I

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	14,810	1.13		
Sprayfield	0	0.0		
Landscaping	5,197	1.0		
Storage		0.4	12.0	1.4

Leachfield Area/25% efficiency = Total Leachfield Area 4.5 acres

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	0%	0%	100%
% in use during dry weather (Apr-Oct)	100%	0%	100%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscapin (MG)	Out to winte landscapin (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.03	0.00	0.60	*0.63*			0.00	0.00	0.00	0.44	*0.44*	0.18	0.18
December	31	0.03	0.00	0.62	*0.65*			0.00	0.00	0.00	0.46	*0.46*	0.19	0.38
January	31	0.04	0.00	0.62	*0.66*			0.00	0.00	0.00	0.46	*0.46*	0.20	0.58
February	28	0.04	0.00	0.56	*0.60*			0.00	0.00	0.00	0.41	*0.41*	0.18	0.76
March	31	0.04	0.00	0.62	*0.66*			0.00	0.00	0.00	0.46	*0.46*	0.20	0.96
April	30	0.01	0.00	0.60	*0.61*	0.03	0.19	0.00	0.00	0.00	0.44	*0.67*	-0.06	0.90
May	31	0.00	0.00	0.62	*0.62*	0.06	0.29	0.00	0.00	0.00	0.46	*0.81*	-0.19	0.71
June	30	0.00	0.00	0.60	*0.60*	0.08	0.35	0.00	0.00	0.00	0.44	*0.87*	-0.27	0.44
July	31	0.00	0.00	0.62	*0.62*	0.08	0.36	0.00	0.00	0.00	0.46	*0.91*	-0.29	0.16
August	31	0.00	0.00	0.62	*0.62*	0.07	0.32	0.00	0.00	0.00	0.46	*0.85*	-0.23	0.00
September	30	0.00	0.00	0.60	*0.60*	0.05	0.24	0.00	0.00	0.00	0.44	*0.73*	-0.13	0.00
October	31	0.01	0.00	0.62	*0.63*	0.03	0.14	0.00	0.00	0.00	0.46	*0.63*	0.00	0.00
Average	30.4	0.02	0.00	0.61	*0.62*	0.03	0.16	0.00	0.00	0.00	0.45	0.64	-0.02	0
Total	365	0.20	0.00	7.30	*7.50*	0.40	1.90	0.00	0.00	0.00	5.41	7.70	-0.20	5
Max	31	0.04	0.00	0.62	*0.66*	0.08	0.36	0.00	0.00	0.00	0.46	0.91	0.20	0.96
Min	28	0.00	0.00	0.56	*0.60*	0.00	0.00	0.00	0.00	0.00	0.41	0.41	-0.29	0.00

Water Balance for Seasonal Storage and Disposal Sizing
North Fork

INITIAL CONDITIONS

20,000 Wastewater flow (gpd)
0% Percent RDI/I

Leachfield Area/25% efficiency = Total Leachfield Area 1.6 acres

	Capacity (gpd)	Area (acre)	Depth (ft)	Capacity (MG)
Leachfield	5,132	0.39		
Sprayfield	12,191	1.6		
Landscaping	5,442	1.0		
Storage		0.7	12.0	2.6

SEASONAL OPERATIONAL USE

Period	Landscaping	Sprayfield	Leachfield
% in use during wet weather (Nov-Mar)	20%	100%	100%
% in use during dry weather (Apr-Oct)	100%	100%	0%

0.3 Soil application (hydraulic loading) rate for percolation (gpd/ft^2)

WATER BALANCE

Month (-)	Days (-)	In from rainfall (MG)	In from RDI/I (MG)	In from wastewater (MG)	*Net in (MG)*	Out to evaporation (MG)	Out to landscaping (MG)	Out to winte landscapinc (MG)	Out to sprayfield (MG)	Out to winter sprayfield (MG)	Out to leachfield (MG)	*Net out (MG)*	Net (MG)	Accum storage (MG)
November	30	0.05	0.00	0.60	*0.65*			0.02		0.04	0.15	*0.22*	0.44	0.44
December	31	0.06	0.00	0.62	*0.68*			0.01		0.02	0.16	*0.18*	0.49	0.93
January	31	0.07	0.00	0.62	*0.69*			0.01		0.02	0.16	*0.19*	0.50	1.43
February	28	0.07	0.00	0.56	*0.63*			0.02		0.03	0.14	*0.19*	0.44	1.86
March	31	0.07	0.00	0.62	*0.69*		0.00	0.03		0.06	0.16	*0.25*	0.44	2.31
April	30	0.02	0.00	0.60	*0.62*	0.06	0.19		0.35			*0.61*	0.01	2.32
May	31	0.01	0.00	0.62	*0.63*	0.11	0.29		0.65			*1.05*	-0.43	1.89
June	30	0.00	0.00	0.60	*0.60*	0.14	0.35		0.89			*1.37*	-0.77	1.12
July	31	0.00	0.00	0.62	*0.62*	0.15	0.36		0.96			*1.48*	-0.86	0.26
August	31	0.00	0.00	0.62	*0.62*	0.13	0.32		0.75			*1.21*	-0.58	0.00
September	30	0.00	0.00	0.60	*0.60*	0.09	0.24		0.45			*0.78*	-0.18	0.00
October	31	0.01	0.00	0.62	*0.63*	0.05	0.14		0.22			*0.42*	0.22	0.22
Average	30.4	0.03	0.00	0.61	*0.64*	0.06	0.16	0.01	0.36	0.01	0.06	0.66	-0.02	1
Total	365	0.37	0.00	7.30	*7.67*	0.74	1.90	0.09	4.28	0.17	0.77	7.95	-0.28	13
Max	31	0.07	0.00	0.62	*0.69*	0.15	0.36	0.03	0.96	0.06	0.16	1.48	0.50	2.32
Min	28	0.00	0.00	0.56	*0.60*	0.00	0.00	0.00	0.00	0.00	0.00	0.18	-0.86	0.00

Appendix E

Waste Discharge Requirements
El Dorado Irrigation District
and
San Andreas Sanitary District

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2002-0210

NPDES NO. CA 0078662

WASTE DISCHARGE REQUIREMENTS FOR EL DORADO IRRIGATION DISTRICT DEER CREEK WASTEWATER TREATMENT PLANT EL DORADO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds that:

BACKGROUND

1. El Dorado Irrigation District (hereafter Discharger) submitted a Report of Waste Discharge, dated 22 March 2002, and applied for a permit renewal to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the Deer Creek Wastewater Treatment Plant (DCWWTP). Supplemental information to complete filing of the application was submitted on 15 July 2002.

2. The Discharger owns and operates a wastewater collection, treatment, reclamation and disposal system, and provides sewerage service to the Cameron Park and Mother Lode Service Area. The treatment plant is in Section 16, T9N, R9E, MDB&M, as shown on Attachment A, a part of this Order. Treated municipal wastewater is discharged to Deer Creek, a water of the United States and a tributary to the Cosumnes River at the point, latitude N38°37'42" and longitude W120°59'11". Treated wastewater discharged for reclamation is regulated under separate waste discharge requirements and must meet the requirements of California Code of Regulations, Title 22.

3. The treatment system main components consists of an influent siphon, headworks, primary clarifier, three aeration basins, an emergency storage basin, three secondary clarifiers, eleven tertiary filters, two chlorine contact chambers, one primary sludge thickener, one waste activated sludge thickener, four aerobic digesters, two belt filter presses, two sludge lime addition stations, and a plant drain sump. Sludge is dewatered by the belt filter presses and disposed off-site on farmland or at the local landfill. The Report of Waste Discharge describes the discharge as follows:

Monthly Average Flow:	2.86	million gallons per day (mgd)
Daily Peak Wet Weather Flow:	8.04	mgd
Design Flow (dry weather):	2.5	mgd
Mean Effluent Temperature:	75.5°F Summer; 59.6 °F Winter	

Constituent	mg/l	lb/Day[2]
CBOD[1]	2.53	60.35
Total Suspended Solids	2.63	62.73

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[1] 5-day, 20°C biochemical oxygen demand

[2] Based on an average daily flow of 2.86 mgd

4. The DCWWTP has been significantly upgraded over the past five years. With the exception of the tertiary treatment system, improvements to the primary, secondary, and ancillary treatment processes have been constructed to accommodate an ADWF of 3.6 mgd. The environmental impact report for the expansion of the DCWWTP for 2.5 to 3.6 mgd states that the capacity of the existing tertiary filtration system is rated at 1.5 mgd. Additional filtration capacity is provided by using the tertiary filtration system that was designed and constructed for use as part of the reclamation treatment system, which can be utilized for discharge to Deer Creek when not being used to produce reclaimed water.

The Discharger has not accurately defined the capacity of the reclamation treatment system. There are occasions during peak wet weather flows when the filter capacity is exceeded. As an interim measure, until additional filter capacity is added, the Discharger modified the flow splitter to the tertiary filters so that flows that could not be handled by the filters are diverted from the secondary treatment system to a 1 million gallon seasonally used storage tank. When flows subside in the plant, the stored secondary treated wastewater is returned to the headworks, via the plant drain, for retreatment. After use as flow equalization in the winter, the storage tank is drain and cleaned before use as part of the reclamation distribution system.

The Discharger is in the initial stages of the process to add additional tertiary treatment capacity to accommodate an ADWF of 3.6 MGD. In addition, due to the variability of the receiving water dilution capacity, there are times when 20-to-1-dilution capacity is not available during peak wet weather events. Without this amount of dilution the effluent coliform limit of 2.2 MPN/100 ml (7-day median) will be required. Design parameters for the expanded tertiary system will have to take into consideration the peak wet weather events, when 20-to-1 dilution is not available, and the 2.2 MPN/100 ml (7-day median) is in effect.

A time schedule is included in the permit to allow the Discharger adequate time to construct the necessary facilities to fully expand to 3.6 MGD, and achieve compliance with the coliform limit. Upon completion of the upgrades to the tertiary treatment system, to be capable of treating both an average dry weather flow of 3.6 MGD, and peak wet weather flows, the capacity of the facility will be rated at 3.6 MGD. At that time mass limits will be calculated using 3.6 MGD. Upon completion of the improvements, the expansion of the facility shall be certified, by a Registered Civil Engineer with experience in the design and operation of wastewater treatment plants, that the facility expansion has been completed and the facility was designed and constructed to achieve the limits established in the permit.

5. The U.S. Environmental Protection Agency (EPA) and the Regional Board have classified this discharge as a major discharge.

6. The Regional Board adopted a *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

BENEFICIAL USES OF THE RECEIVING STREAM

7. The Basin Plan at page II-2.00 states: "Existing and potential beneficial uses which currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1. The beneficial uses of any specifically identified water body generally apply to its tributary streams." The Basin Plan does not specifically identify beneficial uses for Deer Creek, but the Basin Plan does identify present and potential uses for the Cosumnes River, to which is tributary.

   The Basin Plan identifies the following beneficial uses for the Cosumnes River: municipal and domestic supply; agricultural irrigation, agricultural stock watering, body contact water recreation, canoeing and rafting, non-contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, cold spawning habitat, and wildlife habitat. In addition, State Board Resolution No 88-63, incorporated into the Basin Plan pursuant to Regional Board Resolution 89-056, requires the Regional Board to assign the municipal and domestic supply use to water bodies that do not have beneficial uses listed in Table II-1.

   The Basin Plan on page II-1.00 states: "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning…" and with respect to disposal of wastewaters states that "...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses."

   In reviewing whether the existing and/or potential uses of the Cosumnes River apply to the Deer Creek, the Regional Board has considered the following facts:

   a. *Domestic Supply and Agricultural Supply*

      The State Water Resources Control Board (SWRCB) Resolution No. 88-63 "Sources of Drinking Water" provides that "All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards…"

      The SWRCB has issued water rights to existing water users along Deer Creek and the Cosumnes River downstream of the discharge for domestic and irrigation uses. Since Deer Creek is an ephemeral stream the creek likely provides groundwater recharge during periods of low flow. The groundwater is a source of drinking water. In addition to the existing water uses, growth in the area, downstream of the discharge is expected to continue, which presents a potential for increased domestic and agricultural uses of the water in Deer Creek.

b. *Water Contact and Noncontact Recreation and Esthetic Enjoyment*

The Regional Board finds that the discharge flows through residential areas, there is ready public access to Deer Creek, exclusion of the public are unrealistic and contact recreational activities currently exist along Deer Creek and downstream waters and these uses are likely to increase as the population in the area grows. Prior to discharge into the Cosumnes River, Deer Creek flows through areas of general public access, meadows, residential areas and parks, to the Cosumnes River. The Cosumnes River also offers recreational opportunities.

c. *Groundwater Recharge*

In areas where groundwater elevations are below the stream bottom, water from the stream will percolate to groundwater. Since Deer Creek is at times dry, it is reasonable to assume that the stream water is lost by evaporation, flow downstream and percolation to groundwater providing a source of municipal and irrigation water supply.

d. *Freshwater Replenishment*

When water is present in Deer Creek, there is hydraulic continuity between Deer Creek and the Cosumnes River. During periods of hydraulic continuity, Deer Creek adds to the water quantity and may impact the quality of water flowing down stream in the Cosumnes River.

e. *Preservation and Enhancement of Fish, Wildlife and Other Aquatic Resources.*

Deer Creek flows to the Cosumnes River. The California Department of Fish and Game (DFG) has verified that the fish species present in Deer Creek and downstream waters are consistent with both cold and warm water fisheries, that there is a potential for anadromous fish migration necessitating a cold water designation and that trout, a cold water species, have been found both upstream and downstream of the wastewater treatment plant. The Basin Plan (Table II-1) designates the Cosumnes River as being both a cold and warm freshwater habitat. Therefore, pursuant to the Basin Plan (Table II-1, Footnote (2)), the cold designation applies to Deer Creek. The cold-water habitat designation necessitates that the in-stream dissolved oxygen concentration be maintained at, or above, 7.0 mg/l.

Upon review of the flow conditions, habitat values, and beneficial uses of Deer Creek, and the facts described above, the Regional Board finds that the beneficial uses identified in the Basin Plan for the Cosumnes River are applicable to Deer Creek.

The Regional Board also finds that based on the available information and on the Discharger's application, that Deer Creek, absent the discharge, is an ephemeral stream. The ephemeral nature of Deer Creek means that the designated beneficial uses must be protected, but that no credit for receiving water dilution is available. Although the discharge, at times, maintains the aquatic habitat, constituents may not be discharged that may cause harm to aquatic life. At other times, natural flows within Deer Creek help support the aquatic life. Both conditions may exist within a short time span, where Deer Creek would be dry without the discharge and periods when sufficient background flows provide hydraulic continuity with the Cosumnes River. Dry conditions occur primarily in the summer months, but dry conditions may also occur throughout the year, particularly in low rainfall years. The lack of dilution results in more stringent effluent limitations to protect contact recreational uses, drinking water standards, agricultural water quality goals and aquatic life. Significant dilution may occur during and immediately following high rainfall events.

8. The beneficial uses of the underlying ground water are municipal and domestic, industrial service, industrial process and agricultural supply.

BASIN PLAN AMENDMENT PROCESS

9. Discharge from the DCWWTP can at times dominate the flow in Deer Creek. This condition caused violation of the Basin Plan water quality objectives for inland surface waters for pH, dissolved oxygen, temperature, and turbidity. The Discharger has made significant upgrades to the facility, however during low flow conditions in the creek, receiving water limitations for theses pollutants are not being consistently achieved. The Regional Board issued Cease and Desist Order (CDO) No. 95-255 on 7 December 1995 requiring the Discharger implement corrective actions to comply with these and other permit limitations. Subsequent to the CDO being issued, significant improvements to the facilities were made which brought the facility into compliance with the dissolved oxygen limit, however, pH, turbidity, and temperature remained problematic. When the current WDRs were issued in 1997, a CDO with compliance time schedules was also adopted to allow further time to comply with the Basin Plan objectives for pH, turbidity, and temperature.

The Discharger chose to pursue a Site-Specific Basin Plan Amendment (SSBPA) in lieu of making physical improvements to the treatment plant for compliance with Basin Plan objectives for pH, turbidity, and temperature. Due to the lengthy SSBPA process, the time schedule was modified to reflect the additional time needed to complete the Basin Plan Amendments (BPAs). CDO No. 5-000-033, Amendment 1, requires the Discharger to complete the BPAs by 30 December 2003. On 19 July 2002, the Regional Board adopted the BPAs for pH and turbidity. The State of California Office of Administrative Law (OAL) and U.S. EPA must also approve the BPAs before becoming effective.

The Regional Board has not yet considered the BPA for temperature. Since the existing Basin Plan Objectives for pH, turbidity, and temperature remain in effect, this Order contains limitations based those objectives.

EFFLUENT LIMITATIONS AND REASONABLE POTENTIAL

10. U.S. EPA adopted the *National Toxics Rule* (NTR) on 5 February 1993 and the *California Toxics Rule* (CTR) on 18 May 2000. These Rules contain water quality standards applicable to this discharge. The State Water Resources Control Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan (SIP)), which contains guidance on implementation of the NTR and the CTR.

11. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. This Order contains provisions that:

    a. require the Discharger to conduct a study to provide information as to whether the levels of NTR and CTR constituents, EPA Priority Pollutants, or other pollutants in the discharge have the reasonable potential to cause or contribute to an in-stream excursion above a water quality standard, including Basin Plan numeric and narrative objectives and NTR and CTR criteria;

    b. if the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard, require the Discharger to submit information to calculate effluent limitations for those constituents; and

    c. allow the Regional Board to reopen this Order and include effluent limitations for those constituents.

    On 10 September 2001, the Executive Officer issued a letter, in conformance with State Water Code, Section 13267, requiring the Discharger to prepare a technical report assessing water quality. This Order is intended to be consistent with the requirements of the technical report in requiring sampling for NTR, CTR, and additional constituents to determine the full water quality impacts of the discharge. The technical report requirements are intended to be more detailed, listing specific constituents, detection levels, and acceptable time frames and shall take precedence in resolving any conflicts.

12. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality objectives. Based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs the Regional Board finds that the discharge does have a reasonable potential to cause or contribute to an in-stream excursion above a water quality objective for ammonia, chloroform, coliform, copper, dichlorobromomethane, dibromochloromethane, and nitrates. Effluent limitations for these constituents are included in this Order.

13. Section 13263.6(a), California Water Code, requires that "the Regional Board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response

commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRKA) indicate as discharged into the POTW, for which the state board or the regional board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective".

The Regional Board has adopted a narrative objective for toxicity in the Basin Plan. The narrative toxicity objective and the Basin Plan *Policy for Application of Water Quality Objectives* provides that the objective may be translated using numerical limits published by other agencies and organizations. As detailed elsewhere in this Permit, available effluent quality data indicate that effluent concentrations of ammonia, chloroform, coliform, copper, dichlorobromomethane, dibromochloromethane, nitrate, and nitrite does have a reasonable potential to cause or contribute to an excursion above numeric or narrative water quality objectives. The EPCRKA Section 313 toxic chemical release data report indicates that ammonia, coliform, copper, and nitrate discharge into the Discharger's collection system. Effluent limitations for ammonia, chloroform, coliform, copper, dichlorobromomethane, dibromochloromethane, nitrate, and nitrite are included in this permit pursuant to CWC Section 13263.6(a).

14. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on existing water quality will be insignificant.

15. **Chlorine**- The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. The Discharger uses chlorine for disinfection of the effluent waste stream. Chlorine can cause toxicity to aquatic organisms. U.S. EPA Ambient Water Quality Criteria for the Protection of Fresh Water Aquatic Life recommends a maximum 1-hour average of 0.019 (0.02) mg/l and 4-day average of 0.011 (0.01) mg/l for chlorine. The use of chlorine as a disinfectant presents a reasonable potential that it could be discharged in toxic concentrations. Effluent Limitations for chlorine have been included in this Order to protect the receiving stream aquatic life beneficial uses. The effluent limitations have been established at the ambient water quality criteria for chlorine since Deer Creek is a low-flow stream and at times provides no dilution.

16. **Ammonia and Nitrates** - Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. Wastewater treatment plants commonly use nitrification to remove ammonia from the waste stream. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. Nitrate and nitrite are known to cause adverse health effects in humans. The Basin Plan prohibits the discharge of chemical constituents in concentrations that adversely affect beneficial uses. Domestic water supply is a beneficial use of Deer Creek. U.S. EPA has developed Drinking Water Standards for protection of human health for nitrite and nitrate and Ambient Water

Quality Criteria for ammonia. The discharge from the DCWWTP has a reasonable potential to cause or contribute to an in-stream excursion above water quality standards for ammonia, nitrite, and nitrate. Effluent limitations for ammonia, nitrite, and nitrate are included in this Order to assure the treatment process adequately nitrifies and denitrifies the waste stream to protect the beneficial uses of the receiving stream and to prevent aquatic toxicity.

Under current operational conditions, due to the variable inflow conditions of wastewater into the treatment plant, nitrification on a consistent basis has been achievable. In addition to nitrification, to achieve ammonia limits, de-nitrification is necessary to meet nitrate and nitrite limits. Upgrades to the facility will be necessary to achieve these limits.

17. **Coliform** - The beneficial uses of Deer Creek and the Cosumnes River include contact recreation uses and irrigation. To protect these beneficial uses, the Regional Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The principal infectious agents (pathogens) that may be present in raw sewage may be classified into three broad groups: bacteria, parasites, and viruses. Tertiary treatment, consisting of chemical coagulation, sedimentation, and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream. The wastewater must be treated to tertiary standards (filtered) to protect contact recreational and food crop irrigation uses. The method of treatment is not prescribed by Order No. R5-2002-0210; however, wastewater must be treated to a level equivalent to that specified in Title 22 and in other recommendations by the DHS.

The DHS is consulted by the Regional Board and makes recommendations for protection of the public's health when contacting wastewater effluent. Generally, DHS recommends that it is necessary to treat wastewater to a tertiary level or provide a 20-to-1 dilution for secondary treated wastewater, in order to protect the public health for contact recreational activities or the irrigation of food crops. The Discharger has been unable to quantify significant dilution within Deer Creek. The Discharger has, however, requested this Order contain secondary treatment effluent limitations to provide relief under a significant storm event when a 20-to-1 dilution is available. The Discharger will be required to establish an in-stream flow measuring system to accurately determine periods when 20-to-1 dilution exists. During these high flow periods, assimilative capacity has not been quantified for individual pollutants and end-of-pipe limits have been established. The BOD and TSS limits for secondary treatment are 30 mg/l as a monthly average and the total coliform limit is 23 MPN as a 7-day median. When there is less than 20-to-1 dilution full tertiary treatment is required. The tertiary limits for both BOD and TSS are 10 mg/l, and the effluent limit for total coliform organisms is 2.2 MPN/100 ml as a 7-day median. The effluent limits are based on the critical low flow, or zero dilution, and have also resulted in "end-of-pipe" limits.

The DHS has developed reclamation criteria, California Code of Regulations, Title 22, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 m*l* as a 7-day median. Title 22 is not directly applicable to surface waters; however, the Regional Board finds that it is appropriate to apply the DHS reclamation criteria because Deer Creek and the Cosumnes River are used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for the irrigation of food crops. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DHS.

In addition to coliform testing, a turbidity effluent limitation has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is also capable of reliably meeting a reduced turbidity limitation of 2 NTU as a daily average, 5 NTU at least 95 percent of the time within a day, and 10 NTU at all times. Failure of the filtration system, such that virus removal is impaired, would normally result in increased particles in the effluent and higher effluent turbidity. Turbidity monitoring has a major advantage over coliform monitoring for evaluating filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours to days to identify high coliform concentrations.

18. This Order requires a tertiary level of treatment or 20-to-1 dilution in order to meet the requirements of the beneficial uses of Deer Creek. Sampling at the facility has shown that it can meet the 7-day 2.2 MPN/100 ml coliform standard and the 2 NTU monthly averages for turbidity the majority of the time. There is not a correlation between receiving water dilution capacity and violation of the 7-day 2.2 MPN/100 ml coliform standard. The DCWWTP tertiary treatment system must be upgraded to achieve compliance with tertiary limits up to peak wet weather flow to insure compliance with the coliform limit. With the exception of the tertiary treatment portion of the facility, the DCWWTP has been upgraded to handle peak wet weather flows. Additional tertiary filtration capacity is necessary to insure full compliance with the coliform standard.

The Discharger is currently in the process of design to upgrade the tertiary system. A time schedule is included in this Order to achieve compliance with the 7-day 2.2 MPN/100 ml coliform standard. The Discharger has not defined the actual capacity of the existing tertiary filtration system. Based on the discharger self monitoring reports and other available information, the tertiary filtration system has consistently achieved compliance with the 7-day median 2.2 MPN/100 ml coliform standard when flows to the plant are less than or equal to 5.0 MGD. Until the upgrades are completed, an interim limit for coliform is included in this Order, as follows: when the average daily flow exceeds 5.0 MGD the daily coliform standard will be 23 MPN/100 ml; and, when the daily average flow subsides to less than 5.0 MGD, the 7-day 2.2 MPN/100 ml coliform standard applies. When calculating the 7-day median, days that exceed 5.0 MGD are excluded from the calculation.

19. This Order contains Effluent Limitations and a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. In accordance with California Water Code, Section 13241, the Regional Board has considered the following:

As stated in the above Findings, the past, present and probable future beneficial uses of the receiving stream include municipal and domestic supply, agricultural irrigation, agricultural stock watering, body contact water recreation, canoeing and rafting, non-contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, cold spawning habitat, and wildlife habitat.

The environmental characteristics of the hydrographic unit including the quality of water available will be improved by the requirement to provide tertiary treatment for this wastewater discharge. Tertiary treatment will allow for the reuse of the undiluted wastewater for food crop irrigation and contact recreation activities which would otherwise be unsafe according to recommendations from the DHS.

Fishable and swimable water quality conditions can be reasonably achieved through the coordinated control of all factors which affect water quality in the area.

The economic impact of requiring an increased level of treatment has been considered. The current monthly domestic sewer user fee is $42.94, approximately double the California average monthly domestic sewer user fee of $20.46. The Discharger has already expanded the capacity of the treatment facility to 3.6 MGD, except for the tertiary treatment system. In 2001 the District estimated the cost to expand the tertiary treatment capacity to be $4.9 million. The loss of beneficial uses within downstream waters, without the tertiary treatment requirement, include prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, would have a detrimental economic impact. In addition to pathogen removal to protect irrigation and recreation, tertiary treatment may also aid in meeting discharge limitations for other pollutants, such as heavy metals, reducing the need for advanced treatment.

The requirement to provide tertiary treatment for this discharge will not adversely impact the need for housing in the area. The potential to develop housing in the area will be facilitated by improved water quality, which protects the contact recreation and irrigation uses of the receiving water. DHS recommends that, in order to protect the public health, undiluted wastewater effluent must be treated to a tertiary level, for contact recreational and food crop irrigation uses. Without tertiary treatment, the downstream waters could not be safely utilized for contact recreation or the irrigation of food crops.

It is the Regional Board's policy, (Basin Plan, page IV-15.00, Policy 2) to encourage the reuse of wastewater. The Regional Board requires Dischargers to evaluate how reuse or land disposal of wastewater can be optimized. The need to develop and use recycled water is facilitated by providing a tertiary level of wastewater treatment, which will allow for a greater variety of uses in accordance with California Code of Regulations, Title 22.

20. In accordance with a previous permit, Order No, 97-211, the Discharger performed a study entitled "Phase II Effluent and Receiving Water Quality Assessment for the El Dorado Irrigation District's Deer Creek Wastewater Treatment Plant, dated 12 February 1999. The purpose of this report was to accurately identify contaminant levels in the treated effluent

discharged from the DCWWTP into Deer Creek, and to assess the potential for effluent discharges to cause a receiving water exceedance of the water quality standards, including chronic toxicity. The study provided a significant amount of data to determine compliance with the CTR and other applicable water quality objectives. From the study the following constituents were determined to have a reasonable potential to exceed water quality objectives.

a. **Total Trihalomethanes and Chloroform -** Municipal and domestic supply is a beneficial use of the receiving stream. The narrative toxicity objective and this beneficial use designation comprise a water quality standard applicable to pollutants in the receiving stream. The Basin Plan contains the *Policy for Application of Water Quality Objectives*, which provides that narrative objectives may be translated using numerical limits published by other agencies and organizations. The Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA) has published the Toxicity Criteria Database, which contains cancer potency factors for chemicals, including chloroform, that have been used as a basis for regulatory actions by the boards, departments and offices within Cal/EPA. The OEHHA cancer potency value for oral exposure to chloroform is 0.031 milligrams per kilogram body weight per day (mg/kg-day). By applying standard toxicologic assumptions used by OEHHA and USEPA in evaluating health risks via drinking water exposure of 70 kg body weight and 2 liters per day water consumption, this cancer potency factor is equivalent to a concentration in drinking water of 1.1 ug/L (ppb) at the 1-in-a-million cancer risk level. This risk level is consistent with that used by the DHS to set *de minimus* risks from involuntary exposure to carcinogens in drinking water in developing MCLs and Action Levels and by OEHHA to set negligible cancer risks in developing Public Health Goals for drinking water. The one-in-a-million cancer risk level is also mandated by USEPA in applying human health protective criteria contained in the NTR and the CTR to priority toxic pollutants in California surface waters. A recent decision by the State Water Resources Control Board, Order No. WQ2002-0015, found that application of a chloroform limitation for a discharge to an ephemeral stream based on a cancer risk analysis was not appropriate since the U.S. EPA is evaluating the science used to develop the CTR and has reserved application of a water quality standard. This Order establishes an Effluent Limitation at the maximum contaminate level (MCL) for total trihalomethanes, the sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane, based on protection of the municipal beneficial use of 80 μg/l. Based on information included in analytical laboratory results submitted by the Discharger, the discharge was found to have an average concentration of 48 μg/l, with a maximum concentration of 76 μg/l of chloroform. The discharge has a reasonable potential to cause or contribute to an in-stream excursion above the water quality objective for municipal uses by causing exceedance of the primary MCL for trihaolmethanes. Therefore, an Effluent Limitation for total trihalomethanes is included in this Order and is based on the Basin Plan objective for municipal use. If U.S. EPA or the State Board develop a water quality objective for chloroform and/or total trihalomethanes, this Order may be reopened and a new Effluent Limitation established.

b. **Chlorodibromomethane -** Based on information included in analytical laboratory results submitted by the Discharger, the discharge had an average concentration of 1.07 μg/l and a maximum concentration of 1.90 µg/l, and has a reasonable potential to cause or contribute to an in-stream excursion above water quality standards for chlorodibromomethane. The CTR establishes numeric water quality standards for chlorodibromomethane. The criterion for waters from which both water and organisms are consumed is 0.41 ug/l. An Effluent Limitation for chlorodibromomethane is included in this Order.

c. **Dichlorobromomethane** - Based on information included in analytical laboratory results submitted by the Discharger, the discharge was found to have a average concentration of 9.40 µg/l and a maximum concentration of 12.0 µg/l, and has a reasonable potential to cause or contribute to an in-stream excursion above water quality standards for dichlorobromomethane. The CTR establishes numeric water quality standards for dichlorobromomethane. The criterion for waters from which both water and organisms are consumed is 0.56 ug/l. An Effluent Limitation for dichlorobromomethane is included in this Order.

d. **Copper-** Based on analytical results of effluent samples collected by the Discharger, the discharge has been measured up to 30.7 µg/l, with an average concentration of 19.4 µg/l, and has a reasonable potential to cause or contribute to an in-stream excursion above the CTR standards for copper; therefore, effluent limitations for copper are included in the Order. At the worst-case hardness of 70 mg/l, the criterion continuous concentration and criterion maximum concentration limitations for copper are 6.6 µg/l and 9.6 µg/l, respectively. The CTR standards for metals are presented in dissolved concentrations. U.S. EPA recommends conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for copper in freshwater are 0.960 for both the acute and the chronic criteria. The effluent limitations for copper are presented in total recoverable concentrations, and are based on the CTR.

e. **Diethyl phthalate and Dimethyl phthalate-** Ten samples were taken monthly and analyzed for Diethyl phthalate and Dimethyl phthalate, all of the samples were non-detect except for the first sample taken. Diethyl phthalate and Dimethyl phthalate were present in the first round of samples at concentrations of 78 µg/l and 17 µg/l, respectively. Diethyl phthalate and Dimethyl phthalate are used in the manufacturing of plastics and polyvinyl chloride (PVC) pipe and tubing. The presence in the first round of sampling may have been due to the use of new sampling equipment that was not properly sanitized before it's first use. The CTR standards for Diethyl phthalate and Dimethyl phthalate are 23 mg/l and 313 mg/l, respectively. There is no reasonable potential to exceed the CTR standard.

GENERAL

21. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

22. The discharge is presently governed by Waste Discharge Requirements Order No. 99-130, adopted by the Regional Board on 17 September 1999.

23. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.), requiring preparation of an environmental impact report or negative declaration in accordance with Section 13389 of the California Water Code.

24. The El Dorado Irrigation District has certified a final environmental impact report (EIR) in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.), and the State CEQA Guidelines. The Regional Board has reviewed the EIR and concurs that with adoption of these waste discharge requirements there are no significant impacts on water quality.

25. The Regional Board has considered the information in the attached Information Sheet in developing the Findings of this Order. The attached Information Sheet is part of this Order.

26. The Regional Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

27. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

28. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect upon the date of hearing, provided EPA has no objections.

IT IS HEREBY ORDERED that Order No. 99-130 is rescinded and El Dorado Irrigation District, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of wastewater at a location or in a manner different from that described in the Findings is prohibited.

2. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by Standard Provision A.13. [See attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)"].

3. Neither the discharge nor its treatment shall create a nuisance as defined in Section 13050 of the California Water Code.

B. Effluent Limitations:

1. Wastewater shall be oxidized, coagulated and filtered, or equivalent treatment provided, and the effluent shall not exceed the following limits when flow Deer Creek provides less dilution than 20:1 (stream flow:effluent):

Constituents	Units	Monthly Average	Weekly Average	7-day Median[6]	Daily Maximum	1-hour Average
Ammonia[5]	mg/l	Table A	---	---	Table B	---
	lbs/day[3]	calculated	---	---	calculated	---
BOD[1]	mg/l	10[2]	15[2]	---	30[2]	---
	lbs/day[3]	208	313	---	626	---
Chlorine Residual	mg/l	---	0.01	---	---	0.02
	lbs/day[3]	---	0.21	---	---	0.42
Chlorodibromomethane[7]	µg/l	0.41	---	---	---	---
	lbs/day[3]	0.009	---	---	---	---
Copper[5]	µg/l	Table C	---	---	Table D	---
	lbs/day[3]	calculated	---	---	calculated	---
Dichlorobromomethane	µg/l	0.56	---	---	---	---
	lbs/day[3]	0.012	---	---	---	---
Nitrite (as N)	mg/l	1	---	---	---	---
	lbs/day[3]	21	---	---	---	---
Nitrate + Nitrite (as N)	mg/l	10	---	---	---	---
	lbs/day[3]	208	---	---	---	---
Settleable Solids	ml/l	0.1	---	---	0.2	---
Total Coliform Organisms	MPN/100 ml	---	---	2.2	23[6]	---
Total Suspended Solids	mg/l	10[2]	15[2]	---	30[2]	---
	lbs/day[3]	208	313	---	626	---
Total Trihalomethanes[7]	µg/l	80[7]	---	---	---	---
	lbs/day[3]	1.66	---	---	---	---
Turbidity[4]	NTU	2[4]	---	---	5[4]	---

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[1] 5-day, 20°C biochemical oxygen demand (BOD)

[2] To be ascertained by a 24-hour flow proportional composite sample.

[3] Based upon a design treatment capacity of 2.5 mgd (*x* mg/*l* x 8.345 x 2.5 mgd = *y* lbs/day)

[4] The daily average turbidity shall not exceed 2 NTU. Turbidity shall not exceed 5 NTU more than 5 percent of the time within a 24-hour period. At no time shall the turbidity exceed 10 NTU.

Footnotes continued on next page.

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[5] The mass limit (lb/day) for ammonia and copper shall be equal to the concentration limit (from Attachments) multiplied by the design flow of 2.5 mgd and the unit conversion factor of 8.345 (see footnote 3 for equation).

[6] 7-day median is based on the previous seven daily sample results. The total coliform organisms concentration shall not exceed 23 MPN/100 m*l* more than once in any 30-day period. No sample shall exceed a concentration of 240 MPN/100 m*l*.

[7] The monthly average for total trihalomethanes shall not exceed 80μg/l. Total trihalomethanes is the sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane.

2. When flow in Deer Creek provides a minimum dilution of 20:1 (stream flow:effluent) full secondary treatment shall be provided and the coagulation system and filters shall be used to the maximum extent possible and effluent shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average	7-day Median[5]	Daily Maximum	1-hour Average
Ammonia[4]	mg/l	Table A	---	---	Table B	---
	lbs/day[3]	calculated	---	---	calculated	---
BOD[1]	mg/l	30 [2]	45[2]	---	60[2]	---
	lbs/day[3]	625	938	---	1251	---
Chlorine Residual	mg/l	---	0.01	---	---	0.02
	lbs/day[3]	---	0.21	---	---	0.42
Chlorodibromomethane	μg/l	0.41	---	---	---	---
	lbs/day[3]	0.009	---	---	---	---
Copper[4]	μg/l	Table C	---	---	Table C	---
	lbs/day[3]	calculated	---	---	calculated	---
Dichlorobromomethane	μg/l	0.56	---	---	---	---
	lbs/day[3]	0.012	---	---	---	---
Nitrite (as N)	mg/l	1	---	---	---	---
	lbs/day [3]	21	---	---	---	---
Nitrate + Nitrite (as N)	mg/l	10	---	---	---	---
	lbs/day[3]	208	---	---	---	---
Settleable Solids	ml/l	0.1	---	---	0.2	---
Total Coliform Organisms	MPN/100 ml	---	---	23	230	---
Total Suspended Solids	mg/l	30[2]	45[2]	---	60[2]	---
	lbs/day[3]	250	376	---	750	---
Total Trihalomethanes[6]	μg/l	80[6]	---	---	---	---
	lbs/day[3]	1.66	---	---	---	---

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[1] 5-day, 20°C biochemical oxygen demand (BOD)

[2] To be ascertained by a 24-hour flow proportional composite sample.

[3] Based upon a design treatment capacity of 2.5 mgd (*x* mg/*l* x 8.345 x 2.5 mgd = *y* lbs/day)

[4] The mass limit (lb/day) for ammonia and copper shall be equal to the concentration limit (from Attachments) multiplied by the design flow of 2.5 mgd and the unit conversion factor of 8.345 (see footnote 3 for equation).

[5] 7-day median is based on the previous seven daily sample results.

[6] The monthly average for total trihalomethanes shall not exceed 80μg/l. Total trihalomethanes is the sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane.

3. The arithmetic mean of 20°C BOD (5-day) and total suspended solids in effluent samples collected over a monthly period shall not exceed 15 percent of the arithmetic mean of the

values for influent samples collected at approximately the same times during the same period (85 percent removal).

4. The discharge shall not have a pH less than 6.5 nor greater than 8.5.

5. The average dry weather discharge flow shall not exceed 2.5 million gallons per day. With the exception of the tertiary treatment system, the facility has been upgraded to 3.6 MGD (average daily flow). Upon completion of the upgrades to the tertiary treatment system, to be capable of treating both an average dry weather flow of 3.6 MGD, and peak wet weather flows, the capacity of the facility will be rated at 3.6 MGD. At that time mass limits will be calculated using 3.6 MGD. Upon completion of the improvements, the expansion of the facility shall certified, by a Registered Civil Engineer with experience in the design and operation of wastewater treatment plants, that the facility expansion has been completed and the facility was designed and constructed to achieve the limits established by this Order.

6. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

   Minimum for any one bioassay - - - - - - - - - 70%
   Median for any three or more consecutive bioassays - - - - 90%

C. Sludge Disposal:

1. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner approved by the Executive Officer, and consistent with *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* as set forth in Title 27, CCR, Division 2, Subdivision 1, Section 20005, et seq.

2. Any proposed change in sludge use or disposal practice from a previously approved practice shall be reported to the Executive Officer and EPA Regional Administrator at least **90 days** in advance of the change.

3. Use and disposal of sewage sludge shall comply with existing Federal and State laws and regulations, including permitting requirements and technical standards included in 40 CFR 503.

   If the State Water Resources Control Board and the Regional Water Quality Control Boards are given the authority to implement regulations contained in 40 CFR 503, this Order may be reopened to incorporate appropriate time schedules and technical standards. The Discharger must comply with the standards and time schedules contained in 40 CFR 503 whether or not they have been incorporated into this Order.

4. The Discharger is encouraged to comply with the "Manual of Good Practice for Agricultural Land Application of Biosolids" developed by the California Water Environment Association.

5. By 1 May 2003, the Discharger shall submit a sludge disposal plan describing the annual volume of sludge generated by the plant and specifying the disposal practices.

D. Receiving Water Limitations:

Receiving Water Limitations are based upon water quality objectives contained in the Basin Plan. As such, they are a required part of this permit.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 7.0 mg/l. The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration shall not fall below 75 percent of saturation.

2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.

3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

4. Esthetically undesirable discoloration.

5. Fungi, slimes, or other objectionable growths.

6. The turbidity to increase as follows:

    a. (The 30-day average turbidity to increase) More than 1 Nephelometric Turbidity Units (NTUs) where natural turbidity is between 0 and 5 NTUs.

    b. More than 20 percent where natural turbidity is between 5 and 50 NTUs.

    c. More than 10 NTUs where natural turbidity is between 50 and 100 NTUs.

    d. More than 10 percent where natural turbidity is greater than 100 NTUs.

7. The ambient pH to fall below 6.5, exceed 8.5, or the 30-day average ambient pH to change by more than 0.5 units.

8. The ambient temperature to increase more than 5°F.

9. Deposition of material that causes nuisance or adversely affects beneficial uses.

10. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations, Title 22; that harm human, plant, animal or

aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

11. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.

12. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

13. Violation of any applicable water quality standard for receiving waters adopted by the Regional Board or the State Water Resources Control Board pursuant to the CWA and regulations adopted thereunder.

14. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

15. The fecal coliform concentration in any 30-day period to exceed a geometric mean of 200 MPN/100 ml or cause more than 10 percent of total samples to exceed 400 MPN/100 ml.

E. Groundwater Limitations:

Release of waste constituents from any storage, treatment, or disposal component associated with the WWTP shall not degrade groundwater.

F. Provisions:

1. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.

2. There are indications that the discharge may contain constituents that have a reasonable potential to cause or contribute to an exceedance of water quality objectives. The constituents are specifically listed in a technical report requirement issued by the Executive Officer on 10 September 2001 and include NTR, CTR and additional constituents, which could exceed Basin Plan numeric or narrative water quality objectives. The Discharger shall comply with the following time schedule in conducting a study of these constituents potential effect in surface waters:

Task	Compliance Date
Submit Study Report	**1 March 2003**
Submit Study Report for dioxins	**1 March 2004**

This Order is intended to be consistent with the requirements of the 10 September 2001 technical report. The technical report requirements shall take precedence in resolving any conflicts. The Discharger shall submit to the Regional Board on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

If after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective this Order will be reopened and effluent limitations added for the subject constituents.

3. New or revised effluent limitations for coliform, copper, dichlorobromomethane, and dibromochloromethane, have been included in this Order. To comply with these limits, it will be necessary for the Discharger to modify the existing treatment facility.

Additional tertiary filtration capacity is necessary during peak wet weather events to achieve total coliform limits when 20-to-1 dilution is not available in Deer Creek. A time schedule is included in this Order for the Discharger to expand the tertiary capacity of the facility to comply with Effluent Limitation B.1. for total coliform. The facility has demonstrated that it can reliable comply with this limit up to 5.0 MGD. The Discharger can not achieve immediate compliance with the total coliform limit during peak wet weather events, therefore an interim limit is provided until the construction of the additional facilities are completed. The interim limit is as follows:

When the average daily flow exceeds 5.0 MGD the daily coliform standard will be 23 MPN/100 ml; and, when the daily average flow subsides to less than 5.0 MGD, the 7-day 2.2 MPN/100 ml coliform standard applies. When calculating the 7-day median, days that exceed 5.0 MGD are excluded from the calculation.

To allow for these modifications a time schedule to comply with these new limits and construction of additional tertiary capacity is included. The Discharger shall comply with the following time schedule to complete the necessary improvements and fully comply with the new discharge limits.

Task	Compliance Date
Submit Workplan and Time Schedule	**6 February 2003**
Identify and Scope of Projects	**31 December 2003**
Complete Facility Modifications	**30 September 2006**
Full Compliance	**30 December 2006**

The Discharger shall submit to the Board on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Board by letter when it returns to compliance with the time schedule.

4. The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger initiate a Toxicity Identification Evaluation (TIE) to identify the causes of toxicity. Upon completion of the TIE, the Discharger shall submit a workplan to conduct a Toxicity Reduction Evaluation (TRE) and, after Regional Board evaluation, conduct the TRE. This Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if a chronic toxicity water quality objective is adopted by the State Water Resources Control Board, this Order may be reopened and a limitation based on that objective included.

5. The Discharger shall report to the Regional Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "Emergency Planning and Community Right to Know Act of 1986.

6. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provisions."

7. The Discharger shall comply with Monitoring and Reporting Program No. R5-2002-2010, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

8. When requested by USEPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self Monitoring Reports.

9. This Order expires on **31 December 2007** and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 180 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.

10. The Discharger shall enforce the Pretreatment Standards promulgated under Sections 307(b), 307(c) and 307(d) of the Clean Water Act. The Discharger shall perform the pretreatment functions required by 40 CFR Part 403 including but not limited to:

    a. Adopting the legal authority required by 40 CFR 403.8(f)(1);

    b. Enforcing the Pretreatment Standards of 40 CFR 403.5 and 403.6;

c. Implementing procedures to ensure compliance as required by 40 CFR 403.8(f)(2); and

d. Providing funding and personnel for implementation and enforcement of the pretreatment program as required by 40 CFR 403.8(f)(3).

11. The Discharger shall implement its approved pretreatment program and the program shall be an enforceable condition of this permit. If the Discharger fails to perform the pretreatment functions, the Regional Water Quality Control Board (RWQCB), the State Water Resources Control Board (SWRCB) or the U.S. Environmental Protection Agency (U.S. EPA) may take enforcement actions against the Discharger as authorized by the Clean Water Act.

12. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the necessary legal authorities, programs, and controls to ensure that the following incompatible wastes are not introduced to the treatment system, where incompatible wastes are:

a. Wastes which create a fire or explosion hazard in the treatment works;

b. Wastes which will cause corrosive structural damage to treatment works, but in no case wastes with a pH lower than 5.0, unless the works is specially designed to accommodate such wastes;

c. Solid or viscous wastes in amounts which cause obstruction to flow in sewers, or which cause other interference with proper operation or treatment works;

d. Any waste, including oxygen demanding pollutants (BOD, etc.), released in such volume or strength as to cause inhibition or disruption in the treatment works, and subsequent treatment process upset and loss of treatment efficiency;

e. Heat in amounts that inhibit or disrupt biological activity in the treatment works, or that raise influent temperatures above 40°C (104°F), unless the Regional Board approves alternate temperature limits;

f. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems; and

h. Any trucked or hauled pollutants, except at points predesignated by the Discharger.

13. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the legal authorities, programs, and controls necessary to ensure that indirect discharges do not

introduce pollutants into the sewerage system that, either alone or in conjunction with a discharge or discharges from other sources:

a. Flow through the system to the receiving water in quantities or concentrations that cause a violation of this Order, or

b. Inhibit or disrupt treatment processes, treatment system operations, or sludge processes, use, or disposal and either cause a violation of this Order or prevent sludge use or disposal in accordance with this Order.

14. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of, or clearance from the State Water Resources Control Board (Division of Water Rights).

15. Minimum detection levels for monitoring required by this Order shall, unless impracticable, be adequate to demonstrate compliance with permit limitations.

16. In the event the Discharger does not comply with an effluent limitation or receiving water limitation of this Order, the Discharger shall resample for the specific constituent for which the limitation was exceeded. The Discharger shall continue sampling at an increased frequency sufficient to determine the duration and severity of the violation. The frequency for constituents sampled using 24-hour composites on a 7-day a week schedule are exempted. This information shall be compiled in a written notification, which shall state nature, time, duration, and cause of noncompliance, and shall describe the measures being taken to remedy the noncompliance and, prevent recurrence. All permit violations must be reported to the Board by telephone (916) 255-3000 within 24 hours of having knowledge of such noncompliance.

17. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

    To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Regional Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on **6 December 2002.**

THOMAS R. PINKOS, Executive Officer

rke:11/12/02

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM ORDER NO. R5-2002-0210

NPDES NO. CA0078662

FOR
EL DORADO IRRIGATION DISTRICT
DEER CREEK WASTEWATER TREATMENT PLANT
EL DORADO COUNTY

The Discharger shall not implement any changes to this Program unless and until the Regional Board or Executive Officer issues a revised Monitoring and Reporting Program. Specific sample station locations shall be established under direction of the Regional Board's staff, and a description of the stations shall be attached to this Order.

INFLUENT MONITORING

Samples shall be collected at approximately the same time as effluent samples and should be representative of the influent. Influent monitoring shall include at least the following:

Constituent	Sampling Units	Type of Sample	Frequency
20°C BOD_5	mg/l, lbs/day	24 hr. Composite[1]	Twice Weekly
Total Suspended Solids	mg/l, lbs/day	24 hr. Composite[1]	Twice Weekly
Flow	mgd	Meter	Continuous

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[1] 24-hour samples shall be flow proportional.

EFFLUENT MONITORING

Effluent samples shall be collected downstream from the last connection through which wastes can be admitted into the outfall and after dechlorination. Effluent samples should be representative of the volume and quality of the discharge. Time of collection of samples shall be recorded. Effluent monitoring shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency
Chlorine Residual [5,6] (after dechlorination)	mg/l	Meter/Grab	Continuous/Weekly
Sodium Bisulfite [5,6]	*mg/l*	*Meter*	*Continuous/Weekly*
Flow (effluent and reclamation)	*mgd*	*Meter*	*Continuous*
Turbidity	*NTU*	*Meter[7]*	*Continuous*
pH	Number	Grab	Daily
Settleable Solids	ml/l	Grab	Daily
Constituents	*Units*	*Type of Sample*	*Sampling Frequency*

Temperature	°F	Grab	Daily
20°C BOD_5	mg/l, lbs/day	24 hr. Composite[1]	Five days/week
Suspended Solids	mg/l, lbs/day	24 hr. Composite[1]	Five days/week
Total Coliform Organisms	*MPN/100 ml*	*Grab*	*Five days/week*
Ammonia[3]	*mg/l*	*Grab*	*Weekly*
Copper	*µg/l*	*Grab*	*Weekly*
Electrical Conductivity	*µmhos/cm*	*Grab*	*Weekly*
Hardness (as $CaCO_3$)	mg/l	Grab	Weekly
Nitrate (N)	*mg N/l*	*Grab*	*Weekly*
Chloroform	µg/l	Grab	Bi-Monthly
Dichlorobromomethane	*µg/l*	*Grab*	*Bi-Monthly*
Dibromochloromethane	*µg/l*	*Grab*	*Bi-Monthly*
Total Trihalomethanes[8]	µg/l	Grab	Bi-Monthly
Acute Toxicity[2]	% Survival	Grab	Quarterly
EPA Priority Pollutants[4]	µg/l	As appropriate	Bi-Annually

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[1] Composite samples shall be flow proportional.

[2] The bioassay shall be 96-hour acute toxicity tests conducted in accordance with EPA/600/4-90/027F, or later amendment approved by Board staff. The bioassay shall sample undiluted effluent after the dechlorination process and prior to discharge to Deer Creek. Larval stage rainbow trout (Oncorhynchus mykiss) shall be used as the test species. The bioassay shall be started on different days to assure representative sampling of the wastestream. Temperature and pH shall be recorded each day of the test.

[3] Concurrent with bioassay, pH, and temperature monitoring.

[4] EPA priority pollutants shall include NTR and CTR constituents and aluminum.

[5] Use of continuous monitoring instrumentation for chlorine and sodium bisulfite residual in the effluent is an appropriate method of process control, however, the accuracy of the chlorine analyzers are not low enough to meet minimum detection levels. Residual sodium bisulfite in the effluent indicates that chlorine is not present in the effluent, which can validate a zero residual reading on the chlorine analyzer. Reporting of these two constituents, when sodium bisulfite is present and chlorine is zero, sufficiently insures compliance with the chlorine residual limit, as long as the instruments are maintained and calibrated in accordance with the manufactures recommendations. In addition to the continuous recorder, a weekly grab sample of the effluent shall be analyzed by a certified laboratory for chlorine and sodium bisulfite. Readings from the residual analyzers shall be taken at the time of sampling, and reported with the laboratory results to validate the accuracy of the process control instrumentation.

[6] Report magnitude and duration of all non-zero residual events. Non-zero events are defined as a reading of zero for chlorine residual and sodium bisulfite is below the minimum detection limit of the continuous residual monitoring device. If the continuous monitoring device is out of service, then one grab chlorine residual sample shall be collected per day.

[7] The turbidity meter shall be stationed immediately after the filters, prior to chlorination and dechlorination.

[8] Total trihalomethanes is the sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples. Receiving water monitoring shall include at least the following:

Station	Description
R-1	Gaging station upstream of the point of discharge at the first bridge crossing Deer Creek as part of the access road to the WWTP.
R-2	100 feet downstream of the confluence of the secondary channel and the main stem of Deer Creek.

Constituents	Units	Station	Sampling Frequency
Flow	mgd	Meter (R-1)	Continuous
Dissolved Oxygen	mg/l	R-1, R-2	Weekly
Electrical Conductivity	µmhos/cm	R-1, R-2	Weekly
Hardness (as $CaCO_3$)	mg/l	R-1, R-2	Weekly
pH	Number	R-1, R-2	Weekly
Temperature	°F (°C)	R-1, R-2	Weekly
Turbidity	NTU	R-1, R-2	Weekly
Radionuclides	pCi/l	R-1, R-2	Annually

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations R-1 and R-2. Notes on receiving water conditions shall be summarized in the monitoring report. Attention shall be given to the presence or absence of:

a. Floating or suspended matter
b. Discoloration
c. Bottom deposits
d. Aquatic life
e. Visible films, sheens or coatings
f. Fungi, slimes, or objectionable growths
g. Potential nuisance conditions
h. Foam

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing toxicity to Deer Creek. The testing shall be conducted as specified in EPA 600/4-91-002. Chronic toxicity samples shall be collected at the discharge of the wastewater treatment plant prior to its entering Deer Creek. Composite (24-hour) samples shall be representative of the volume and quality of the discharge. The effluent tests must be conducted with concurrent reference toxicant tests. Monthly laboratory reference toxicant tests may be substituted upon approval. Both the reference toxicant and effluent test must meet all test acceptability criteria as specified in the chronic manual. If the test acceptability criteria are not achieved, then the Discharger must re-sample and re-test within 14 days. Chronic toxicity monitoring shall include the following:

Species: *Pimephales promelas, Ceriodaphnia dubia, and Selenastrum capricornutum*
Frequency: Four times per year
Dilution Series:

	Dilutions (%)					Controls	
	100	75	50	25	12.5	Creek Water	Lab Water
% WWTP Effluent	100	75	50	25	12.5	0	0
% Dilution Water[1]	0	25	50	75	87.5	100	0
% Lab Water[2]	0	0	0	0	0	0	100

[1] Dilution water shall be receiving water from Deer Creek taken upstream from the discharge point. The dilution series may be altered upon approval of Board staff.

SLUDGE MONITORING

A composite sample of sludge shall be collected annually in accordance with EPA's *POTW Sludge Sampling and Analysis Guidance Document, August 1989*, and tested for the following metals:

- Cadmium
- Chromium
- Copper
- Lead
- Nickel
- Zinc
- Mercury

Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

REPORTING

Monitoring results shall be submitted to the Regional Board by the **first day** of the second month following sample collection. Quarterly and annual monitoring results shall be submitted by the **first day of the second month following each calendar quarter, semi-annual period, and year,** respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements. The highest daily maximum for the month, monthly and weekly averages, and medians, and removal efficiencies (%) for BOD and Suspended Solids, should be determined and recorded.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **30 January of each year**, the Discharger shall submit a written report to the Executive Officer containing the following:

a. The names, certificate grades, and general responsibilities of all persons employed at the WWTP (Standard Provision A.5).

b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

c. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.6).

d. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

The Discharger may also be requested to submit an annual report to the Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered by: THOMAS R. PINKOS, Executive Officer

6December 2002
(Date)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2002- 0211

REQUIRING THE
EL DORADO IRRIGATION DISTRICT
DEER CREEK WASTEWATER TREATMENT PLANT
TO CEASE AND DESIST
FROM DISCHARGING CONTRARY TO REQUIREMENTS

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds:

1. On 6 December 2002 the Regional Board adopted Waste Discharge Requirements (WDR) Order No. R5-2002- 0210, for the El Dorado Irrigation District, (Discharger) Deer Creek Wastewater Treatment Plant. WDR Order No. R5-2002-0210 regulates the discharge of approximately 2.5 million gallons per day (mgd) of treated domestic wastewater to Deer Creek, which is tributary to the Cosumnes River.

2. WDR Order No. R5-2002-0210 contains Effluent Limitations for total trihaolmethanes, nitrite, and nitrate plus nitrite as contained in B.1 and B.2., which read in part as follows:

Constituents	Units	Monthly Average	Weekly Average	7-day Median	Daily Maximum	1-hour Average
Nitrite (as N)	mg/l	1	---	---	---	---
	lbs/day [3]	21	---	---	---	---
Nitrate + Nitrite (as N)	mg/l	10	---	---	---	---
	lbs/day[3]	208	---	---	---	---
Total Trihalomethanes[7]	µg/l	80[7]	---	---	---	---
	lbs/day[3]	1.66	---	---	---	---

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[3] Based upon a design treatment capacity of 2.5 mgd (x mg/l x 8.345 x 1.12 mgd = y lbs/day).[3]

[7] The monthly average for total trihalomethanes shall not exceed 80µg/l. Total trihalomethanes is the sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane.

3. The use of chlorine as a disinfectant may result in the formation of total trihalomethanes that exceed the Effluent Limitation. Past sampling of the discharge shows total trihalomethanes above 80 µg/l. The discharge threatens to violate the Waste Discharge Requirement Effluent Limitation for total trihalomethanes.

4. The current facility design and operation result in incomplete denitrification of wastewater and increased effluent nitrate and nitrite concentrations. Failure to denitrify the wastewater would result in concentrations of nitrate and nitrite that exceed Effluent Limitations.

5. Based on the above findings, this discharge represents a threatened discharge of waste in violation of WDR Order No. R5-2002- 0210, Effluent Limitations for nitrite, and nitrate plus nitrite.

6. In order to consistently comply with the nitrite and nitrate plus nitrite Effluent Limitations, denitrification of the wastewater is necessary.

7. In accordance with California Water Code (CWC) Section 13385(j)(3), the Regional Board finds that, based upon operational capabilities, the Discharger can no consistently comply with nitrite and nitrate plus nitrite effluent limitations. The nitrite and nitrate plus nitrite limitations are new requirements that become applicable to the permit after the effective date of adoption of the waste discharge requirements for which new or modified control measures are necessary in order to comply with the limitation, and the new or modified control measures cannot be designed, installed, and put into operation within 30 calendar days.

   Since the time schedules for completion of actions necessary to achieve full compliance exceed one year, interim requirements and dates for there achievement are included in this Order. This time schedule does not exceed five years. Treatment actions can be taken to correct the violations that would otherwise be subject to mandatory penalties under California Water Code section 13385(h) and (i), and the Discharger can take reasonable measures to achieve compliance within five (5) years from the date the waste discharge requirements were required to be reviewed pursuant to Section 13380.

Compliance with this Order exempts the Discharger from mandatory minimum penalties for violations of effluent nitrate limitations only, in accordance with California Water Code Section 13385(j)(3).

8. On 6 December 2002, in Sacramento, California, after due notice to the Discharger and all other affected persons, the Regional Board conducted a public hearing at which evidence was received to consider a Cease and Desist Order to establish a time schedule to achieve compliance with waste discharge requirements.

9. Issuance of this Order is exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21000, *et seq.*), in accordance with Section 15321 (a)(2), Title 14, California Code of Regulations.

10. Any person adversely affected by this action of the Regional Board may petition the State Water Resources Control Board (State Board) to review the action. The petition must be received by the State Board Office of the Chief Counsel, P.O. Box 100, Sacramento, CA, 95812-0100, within 30 days of the date on which the action was taken. Copies of the law and regulations applicable to filing petitions will be provided on request.

IT IS HEREBY ORDERED THAT:

1. Cease and Desist Order No. 5-00-003 is hereby rescinded and the El Dorado Irrigation District, Deer Creek Wastewater Treatment Plant, shall cease and desist from discharging and threatening to discharge contrary to Waste Discharge Requirements Order No. R5-2002-0210, Effluent Limitations for total trihalomethanes, nitrite and nitrate plus nitrite.

2. The El Dorado Irrigation District, Deer Creek Wastewater Treatment Plant, shall comply with the following time schedule to assure compliance with the total trihalomethanes, nitrite and nitrate plus nitrite Effluent Limitations B.1. and B.2. contained in Waste Discharge Requirements Order No. R5-2002-0210:

Task	Compliance Date
Submit Workplan and Time Schedule	**6 February 2003**
Identify Scope of Projects	**31 December 2003**
Complete Facility Modifications	**30 September 2006**
Full Compliance	**30 December 2006**

3. Until full compliance with Waste Discharge Requirements Order No. R5-2002-0210, and Effluent Limitations B.1 and B.2 is achieved for nitrite and nitrate plus nitrite, the Discharger shall operate the treatment plant in a denitrification mode to the maximum extent practicable.

4. The El Dorado Irrigation District shall comply with the Receiving Water Limitations for pH, turbidity and temperature contained in Waste Discharge Requirements Order No. R5-2002-0210 **by 1 December 2003.**

5. If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer may apply to the Attorney General for judicial enforcement or issue a complaint for Administrative Civil Liability.

I, THOMAS R. PINKOS, Executive Officer, do herby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 6 December 2002.

THOMAS R. PINKOS, Executive Officer

RKE:rke *11/12/02*

INFORMATION SHEET

ORDER NO. R5-2002-0210
EL DORADO IRRIGATION DISTRICT
DEER CREEK WASTEWATER TREATMENT PLANT
EL DORADO COUNTY
NPDES NO. CA0078662

SCOPE OF PERMIT

This renewed Order regulates the discharge of up to 2.5 million gallons per day (mgd), design average dry weather flow (ADWF), of effluent from the El Dorado Irrigation District (Discharger), Deer Creek Wastewater Treatment Plant (DCWWTP). This Order includes effluent, water supply, sludge, and surface water limitations, monitoring and reporting requirements, additional study requirements, and reopener provisions for effluent constituents.

BACKGROUND INFORMATION

The Discharger owns and operates a wastewater collection, treatment, reclamation and disposal system, and provides sewerage service to the Cameron Park and Mother Lode Service Area. The treatment plant is in Section 16, T9N, R9E, MDB&M, as shown on Attachment A, a part of this Order. Treated municipal wastewater is discharged to Deer Creek, a water of the United States and a tributary to the Cosumnes River. Treated wastewater discharged for reclamation is regulated under separate waste discharge requirements and must meet the requirements of California Code of Regulations, Title 22.

The treatment system main components consists of an influent siphon, headworks, primary clarifier, three aeration basins, an emergency storage basin, three secondary clarifiers, eleven tertiary filters, two chlorine contact chambers, one primary sludge thickener, one waste activated sludge thickener, four aerobic digesters, two belt filter presses, two sludge lime addition stations, and a plant drain sump. Sludge is dewatered by the belt filter presses and disposed off-site on farmland or at the local landfill.

The DCWWTP has been significantly upgraded over the past five years. With the exception of the tertiary treatment system, improvements to the primary, secondary, and ancillary treatment processes have been constructed to accommodate an ADWF of 3.6 mgd. The environmental impact report for the expansion of the DCWWTP for 2.5 to 3.6 mgd states that the capacity of the existing tertiary filtration system is rated at 1.5 mgd. Additional filtration capacity is provided by using the tertiary filtration system that was designed and constructed for use as part of the reclamation treatment system, which can be utilized for discharge to Deer Creek when not being used to produce reclaimed water.

The Discharger has not accurately defined the capacity of the reclamation treatment system. There are occasions during peak wet weather flows when the filter capacity is exceeded. As an interim measure, until additional filter capacity is added, the Discharger modified the flow splitter to the tertiary filters so that flows that could not be handled by the filters are diverted from the secondary treatment system to a 1 million gallon seasonally used storage tank. When flows subside in the plant, the stored secondary treated wastewater is returned to the headworks, via the plant drain, for retreatment.

The Discharger is in the initial stages of the process to add additional tertiary treatment capacity to accommodate an ADWF of 3.6 MGD. In addition, due to the variability of the receiving water dilution capacity, there are times when 20-to-1-dilution capacity is not available during peak wet weather events. Without this amount of dilution the effluent coliform limit of 2.2 MPN/100 ml (7-day median) will be required. Design parameters for the expanded tertiary system will have to take into consideration the peak wet weather events, when 20-to-1 dilutions is not available, and the 2.2 MPN/100 ml (7-day median) is in effect.

A time schedule is included in the permit to allow the Discharger adequate time to construct the necessary facilities to fully expand to 3.6 MGD, and achieve compliance with the coliform limit. Upon completion of the upgrades to the tertiary treatment system, to be capable of treating both an average dry weather flow of 3.6 MGD, and peak wet weather flows, the capacity of the facility will be rated at 3.6 MGD. At that time mass limits will be calculated using 3.6 MGD. Upon completion of the improvements, the expansion of the facility shall be certified, by a Registered Civil Engineer with experience in the design and operation of wastewater treatment plants, that the facility expansion has been completed and the facility was designed and constructed to achieve the limits established in the permit.

RECEIVING WATER BENEFICIAL USES

The DCWWTP discharges treated effluent to Deer Creek, which is tributary to the Cosumnes River. The Basin Plan at page II-2.00 states: "Existing and potential beneficial uses which currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1. The beneficial uses of any specifically identified water body generally apply to its tributary streams." The Basin Plan does not specifically identify beneficial uses for Deer Creek, but the Basin Plan does identify present and potential uses for the Cosumnes River, to which is tributary.

The Basin Plan identifies the following beneficial uses for the Cosumnes River: municipal and domestic supply; agricultural irrigation, agricultural stock watering, body contact water recreation, canoeing and rafting, non-contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, cold spawning habitat, and wildlife habitat. In addition, State Board Resolution No 88-63, incorporated into the Basin Plan pursuant to Regional Board Resolution 89-056, requires the Regional Board to assign the municipal and domestic supply use to water bodies that do not have beneficial uses listed in Table II-1.

The Basin Plan on page II-1.00 states: "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning…" and with respect to disposal of wastewaters states that "...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses."

In reviewing whether the existing and/or potential uses of the Cosumnes River apply to the Deer Creek, the Regional Board has considered the following facts:

a. *Domestic Supply and Agricultural Supply*

The State Water Resources Control Board (SWRCB) Resolution No. 88-63 "Sources of Drinking Water" provides that "All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards…"

The SWRCB has issued water rights to existing water users along Deer Creek and the Cosumnes River downstream of the discharge for domestic and irrigation uses. Since Deer Creek is an ephemeral stream the creek likely provides groundwater recharge *during periods of low flow. The groundwater is a source of drinking water. In addition to the existing water uses, growth in the area, downstream of the discharge is expected to continue, which presents a potential for increased domestic and agricultural uses of the water in Deer Creek.*

b. *Water Contact and Noncontact Recreation and Esthetic Enjoyment*

The Regional Board finds that the discharge flows through residential areas, there is ready public access to Deer Creek, exclusion of the public are unrealistic and contact recreational activities currently exist along Deer Creek and downstream waters and these uses are likely to increase as the population in the area grows. Prior to discharge into the Cosumnes River, Deer Creek flows through areas of general public access, meadows, residential areas and parks, to the Cosumnes River. The Cosumnes River also offers recreational opportunities.

c. *Groundwater Recharge*

In areas where groundwater elevations are below the stream bottom, water from the stream will percolate to groundwater. Since Deer Creek is at times dry, it is reasonable to assume that the stream water is lost by evaporation, flow downstream and percolation to groundwater providing a source of municipal and irrigation water supply.

d. *Freshwater Replenishment*

When water is present in Deer Creek, there is hydraulic continuity between Deer Creek and the Cosumnes River. During periods of hydraulic continuity, Deer Creek adds to the water quantity and may impact the quality of water flowing down stream in the Cosumnes River.

e. *Preservation and Enhancement of Fish, Wildlife and Other Aquatic Resources.*

Deer Creek flows to the Cosumnes River. The California Department of Fish and Game (DFG) has verified that the fish species present in Deer Creek and downstream waters are consistent with both cold and warm water fisheries, that there is a potential for anadromous fish migration necessitating a cold water designation and that trout, a cold water species, have been found both upstream and downstream of the wastewater treatment plant. The Basin Plan (Table II-1) designates the Cosumnes River as being both a cold and warm freshwater habitat. Therefore, pursuant to the Basin Plan (Table II-1, Footnote (2)), the cold designation applies to Deer Creek. The cold-water habitat designation necessitates that the in-stream dissolved oxygen concentration be maintained at, or above, 7.0 mg/l.

Upon review of the flow conditions, habitat values, and beneficial uses of Deer Creek, and the facts described above, the Regional Board finds that the beneficial uses identified in the Basin Plan for the Cosumnes River are applicable to Deer Creek.

The Regional Board also finds that based on the available information and on the Discharger's application, that Deer Creek, absent the discharge, is an ephemeral stream. The ephemeral nature of Deer Creek means that the designated beneficial uses must be protected, but that no credit for receiving water dilution is available. Although the discharge, at times, maintains the aquatic habitat, constituents may not be discharged that may cause harm to aquatic life. At other times, natural flows within Deer Creek help support the aquatic life. Both conditions may exist within a short time span, where Deer Creek would be dry without the discharge and periods when sufficient background flows provide hydraulic continuity with the Cosumnes River. Dry conditions occur primarily in the summer months, but dry conditions may also occur throughout the year, particularly in low rainfall years. The lack of dilution results in more stringent effluent limitations to protect contact recreational uses, drinking water standards, agricultural water quality goals and aquatic life. Significant dilution may occur during and immediately following high rainfall events.

WATER RIGHTS

On 22 June 1995, the State Water Resources Control Board (SWRCB) adopted Water Rights Order No. WR95-9. The Order established that the Discharger is required to maintain specified quantities of discharge to Deer Creek. Terms and conditions of the water rights decisions to allow reclamation of a portion of the discharge from the WWTP are as follows:

"IT IS HEREBY ORDERED THAT treated waste water change petition WW-20 filed by El Dorado Irrigation District on September 14, 1992 pursuant to Water Code sections 1210 and 1211 is approved, subject to the following terms and conditions:

1. *The source of treated wastewater shall be from the Deer Creek Waste Water Treatment Plant located within Section 15, T9N, R9E, MDB&M: California Coordinate System: Zone 2, North 353,200, East 2,290,750.*

2. *Irrigation shall be added as a purpose of use of the treated wastewater. This purpose of use is in addition to the existing purposes of use for habitat and fish and wildlife preservation within Deer Creek.*

3. *The added place of use and point of discharge shall be within the El Dorado Hills Development, north of Highway 50 near Cameron Park, as shown on a map on file with the State Water Resources Control Board. This place of use and point of discharge are in addition to the existing point of discharge to Deer Creek and in addition to the existing place of use of treated wastewater in Deer Creek downstream from the wastewater treatment plant.*

4. *EID shall install continuous recording devices at the outlet to Deer Creek and in the pipe used for delivery to the added place of use from the wastewater treatment plant. Such measuring devices shall be satisfactory to the SWRCB and capable of measuring the flows discharged to Deer Creek and to the added place of use. Said measuring devices shall be installed and operational no later than August 1, 1995, and shall be properly maintained thereafter. The measuring devices shall be monitored on a- weekly basis. A record of the measurements and their sum shall he maintained by EID and made available for inspection by interested parties upon reasonable request. A copy of the records shall be submitted*

annually to the Chief, Division of Water Rights. Construction, operation, and maintenance costs of the measuring devices are the responsibility of EID.

5.a.. Whenever the Deer Creek Waste Water Treatment Plant produces less than a daily average of 2.5 million gallons per day, EID may discharge up to 1.5 million gallons per day of treated waste water through the added point of discharge to the added place of use within the El Dorado Hills Development as described in term 3, provided that EID shall discharge a minimum of 0.5 million gallons per day of treated waste water into Deer Creek as measured at the point of discharge to Deer Creek.

5.b. Whenever the Deer Creek Waste Water Treatment Plant produces more than a daily average of 2.5 million gallons per day, EID shall discharge a minimum of 1.0 million gallons per day of treated waste water to Deer Creek, and may discharge to the added point of discharge and place of use within the El Dorado Hills Development described in term 3 any treated waste water in excess of the 1.0 million gallons per day released to Deer Creek.

5.c. EID shall continue such releases so long as the California Regional Water Quality Control Board, Central Valley Region, permits discharge to the creek.

6. The SWRCB reserves jurisdiction in the public interest to modify the terms and conditions of this order, including imposition of requirements-to alter project facilities or operations and to modify instream flow releases. SWRCB action will be taken only after notice to interested parties and opportunity for hearing."

Water Rights Order No. WR95-9 is a condition of operation of the DCWWTP. The Monitoring and Reporting Program, requires the Discharger to report to the influent, effluent, and reclamation flows on a daily basis in order to validate compliance with the water rights order.

EFFLUENT LIMITATIONS

Chlorine- The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. The Discharger uses chlorine for disinfection of the effluent waste stream. Chlorine can cause toxicity to aquatic organisms. U.S. EPA Ambient Water Quality Criteria for the Protection of Fresh Water Aquatic Life recommends a maximum 1-hour average of 0.019 (0.02) µg/l and 4-day average of 0.011 (0.01) µg/l chlorine. The use of chlorine as a disinfectant presents a reasonable potential that it could be discharged in toxic concentrations. Effluent Limitations for chlorine have been included in this Order to protect the receiving stream aquatic life beneficial uses. The effluent limitations have been established at the ambient water quality criteria for chlorine since Deer Creek is a low-flow stream and at times provides no dilution.

Ammonia and Nitrates - Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. Wastewater treatment plants commonly use nitrification to remove ammonia from the waste stream. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. Nitrate and nitrite are known to cause adverse health effects in humans. The Basin Plan prohibits the discharge of chemical constituents in concentrations that adversely affect beneficial uses. Domestic water supply is a beneficial use of Deer Creek. U.S. EPA has developed Drinking Water Standards for protection of human health for nitrite and nitrate and Ambient Water Quality Criteria for ammonia. The discharge from the DCWWTP has a reasonable potential to cause or contribute to an in-stream excursion above water quality standards for ammonia, nitrite, and nitrate. Effluent limitations for ammonia, nitrate, and nitrite are included in this Order to assure the treatment process adequately nitrifies and denitrifies the waste stream to protect the beneficial uses of the receiving stream and to prevent aquatic toxicity.

Under current operational conditions, due to the variable inflow conditions of wastewater into the treatment plant, nitrification on a consistent basis has been achievable. In addition to nitrification, to achieve ammonia limits, de-nitrification is necessary to meet nitrate and nitrite limits. Upgrades to the facility will be necessary to achieve these limits.

Coliform - The beneficial uses of Deer Creek and the Cosumnes River include contact recreation uses and irrigation. To protect these beneficial uses, the Regional Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The principal infectious agents (pathogens) that may be present in raw sewage may be classified into three broad groups: bacteria, parasites, and viruses. Tertiary treatment, consisting of chemical coagulation, sedimentation, and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream. The wastewater must be treated to tertiary standards (filtered) to protect contact recreational and food crop irrigation uses. The method of treatment is not prescribed by Order No. R5-2002-0210; however, wastewater must be treated to a level equivalent to that specified in Title 22 and in other recommendations by the DHS.

The DHS is consulted by the Regional Board and makes recommendations for protection of the public's health when contacting wastewater effluent. Generally, DHS recommends that it is necessary treat wastewater to a tertiary level or provide a 20-to-1 dilution for secondary treated wastewater, in order to protect the public health for contact recreational activities or the irrigation of food crops. The Discharger has been unable to quantify significant dilution within Deer Creek. The Discharger has, however, requested this Order contain secondary treatment effluent limitations to provide relief under a significant storm event when a 20-to-1 dilution is available. The Discharger will be required to establish an in-stream flow measuring system to accurately determine periods when 20-to-1 dilution exists. During these high flow periods, assimilative capacity has not been quantified for individual pollutants and end-of-pipe limits have been established. The BOD and TSS limits for secondary treatment are 30 mg/l as a monthly average and the total coliform limit is 23 MPN as a 7-day median. When there is less than 20-to-1 dilution full tertiary treatment is required. The tertiary limits for both BOD and TSS are 10 mg/l, and the effluent limit for total coliform organisms is 2.2 MPN/100 ml as a 7-day median. The effluent limits are based on the critical low flow, or zero dilution, and have also resulted in "end-of-pipe" limits.

The DHS has developed reclamation criteria, California Code of Regulations, Title 22, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 m*l* as a 7-day median. Title 22 is not directly applicable to surface waters; however, the Regional Board finds that it is appropriate to apply DHS's reclamation criteria because Deer Creek and the Consumnes River are used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for the irrigation of food crops. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DHS.

The permit contains Effluent Limitations and a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. In accordance with California Water Code, Section 13241, the Board has considered the following:

As stated in the above Findings, the past, present and probable future beneficial uses of the receiving stream include municipal and domestic supply, agricultural irrigation, agricultural stock watering, body contact water recreation, canoeing and rafting, non-contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, cold spawning habitat, and wildlife habitat.

The environmental characteristics of the hydrographic unit including the quality of water available will be improved by the requirement to provide tertiary treatment for this wastewater discharge. Tertiary treatment will allow for the reuse of the undiluted wastewater for food crop irrigation and contact recreation activities which would otherwise be unsafe according to recommendations from the DHS.

Fishable and swimable water quality conditions can be reasonably achieved through the coordinated control of all factors which affect water quality in the area.

The economic impact of requiring an increased level of treatment has been considered. The economic impact of requiring an increased level of treatment has been considered. The current monthly domestic sewer user fee is $42.94, approximately double the California average monthly domestic sewer user fee of $20.46. The Discharger has already expanded the capacity of the treatment facility to 3.6 MGD, except for the tertiary treatment system. In 2001 the District estimated the cost to expand the tertiary treatment capacity to be $4.9 million. The loss of beneficial uses within downstream waters, without the tertiary treatment requirement, include prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, would have a detrimental economic impact. In addition to pathogen removal to protect irrigation and recreation, tertiary treatment may also aid in meeting discharge limitations for other pollutants, such as heavy metals, reducing the need for advanced treatment.

The need to develop housing in the area will be facilitated by improved water quality, which protects the contact recreation and irrigation uses of the receiving water. DHS recommends that, in order to protect the public health, undiluted wastewater effluent must be treated to a tertiary level, for contact recreational and food crop irrigation uses. Without tertiary treatment, the downstream waters could not be safely utilized for contact recreation or the irrigation of food crops.

It is the Regional Board's policy, (Basin Plan, page IV-15.00, Policy 2) to encourage the reuse of wastewater. The Regional Board requires Dischargers to evaluate how reuse or land disposal of wastewater can be optimized. The need to develop and use recycled water is facilitated by providing a tertiary level of wastewater treatment, which will allow for a greater variety of uses in accordance with California Code of Regulations, Title 22.

Turbidity- In addition to coliform testing, a turbidity effluent limitation has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is also capable of reliably meeting a reduced turbidity limitation of 2 NTU as a daily average, 5 NTU at least 95 percent of the time within a day, and 10 NTU at all times. Failure of the filtration system, such that virus removal is impaired, would normally result in increased particles in the effluent and higher effluent turbidity. Turbidity monitoring has a major advantage over coliform monitoring for evaluating filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours to days to identify high coliform concentrations.

Phase II Effluent and Receiving Water Quality Assessment

In accordance with a previous permit, Order No, 97-211, the Discharger performed a study entitled "Phase II Effluent and Receiving Water Quality Assessment for the El Dorado Irrigation District's Deer Creek Wastewater Treatment Plant, dated 12 February 1999. The purpose of this report was to accurately identify contaminant levels in the treated effluent discharged from the DCWWTP into Deer Creek, and to assess the potential for effluent discharges to cause a receiving water exceedance of the water quality standards, including chronic toxicity. The study provided a significant amount of data to determine compliance with the CTR and other applicable water quality objectives. From the study the following constituents were determined to have a reasonable potential to exceed water quality objectives.

a. **Total Trihalomethanes and Chloroform -** Municipal and domestic supply is a beneficial use of the receiving stream. The narrative toxicity objective and this beneficial use designation comprise a water quality standard applicable to pollutants in the receiving stream. The Basin Plan contains the *Policy for Application of Water Quality Objectives*, which provides that narrative objectives may be translated using numerical limits published by other agencies and organizations. The Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA) has published the Toxicity Criteria Database, which contains cancer potency factors for chemicals, including chloroform, that have been used as a basis for regulatory actions by the boards, departments and offices within Cal/EPA. The OEHHA cancer potency value for oral exposure to chloroform is 0.031 milligrams per kilogram body weight per day (mg/kg-day). By applying standard toxicologic assumptions used by OEHHA and USEPA in evaluating health risks via drinking water exposure of 70 kg body weight and 2 liters per day water consumption, this cancer potency factor is equivalent to a concentration in drinking water of 1.1 ug/L (ppb) at the 1-in-a-million cancer risk level. This risk level is consistent with that used by the DHS to set *de minimus* risks from involuntary exposure to carcinogens in drinking water in developing MCLs and Action Levels and by OEHHA to set negligible cancer risks in developing Public Health Goals for drinking water. The one-in-a-million cancer risk level is also mandated by USEPA in applying human health protective criteria contained in the NTR and the CTR to priority toxic pollutants in California surface waters. A recent decision by the State Water Resources Control Board, Order No. WQ2002-0015, found that application of a chloroform limitation for a discharge to an ephemeral stream based on a cancer risk analysis was not appropriate since the U.S. EPA is evaluating the science used to develop the CTR and has reserved application of a water quality standard. This Order establishes an Effluent Limitation at the maximum contaminate level (MCL) for total trihalomethanes, the sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane, based on protection of the municipal beneficial use of 80 μg/l. Based on information included in analytical laboratory results submitted by the Discharger, the discharge was found to have an average concentration of 48 μg/l, with a maximum concentration of 76 μg/l of chloroform. The discharge has a reasonable potential to cause or contribute to an in-stream excursion above the water quality objective for municipal uses by causing exceedance of the primary MCL for trihaolmethanes. Therefore, an Effluent Limitation for total trihalomethanes is included in this Order and is based on the Basin Plan objective for municipal use. If U.S. EPA or the State Board develop a water quality objective for chloroform and/or total trihalomethanes, this Order may be reopened and a new Effluent Limitation established.

b. ***Chlorodibromomethane*** - Based on information included in analytical laboratory results submitted by the Discharger, the discharge had an average concentration of 1.07 µg/l and a maximum concentration of 1.90 µg/l, and has a reasonable potential to cause or contribute to an in-stream excursion above water quality standards for chlorodibromomethane. The CTR establishes numeric water quality standards for chlorodibromomethane. The criterion for waters from which both water and organisms are consumed is 0.41 ug/l. An Effluent Limitation for chlorodibromomethane is included in the permit.

f. ***Dichlorobromomethane*** - Based on information included in analytical laboratory results submitted by the Discharger, the discharge was found to have a average concentration of 9.4 µg/l and a maximum concentration of 12.0 µg/l, and has a reasonable potential to cause or contribute to an in-stream excursion above water quality standards for dichlorobromomethane. The CTR establishes numeric water quality standards for dichlorobromomethane. The criterion for waters from which both water and organisms are consumed is 0.56 ug/l. An Effluent Limitation for dichlorobromomethane is included in the permit.

g. ***Copper***- Based on analytical results of effluent samples collected by the Discharger, the discharge has been measured up to 30.7 µg/l, with an average concentration of 19.4 µg/l, and has a reasonable potential to cause or contribute to an in-stream excursion above the CTR standards for copper; therefore, effluent limitations for copper are included in the Order. At the worst case hardness of 70 mg/l, the criterion continuous concentration and criterion maximum concentration limitations for copper are 6.6 µg/l and 9.6 µg/l, respectively. The CTR standards for metals are presented in dissolved concentrations. U.S. EPA recommends conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for copper in freshwater are 0.960 for both the acute and the chronic criteria. The effluent limitations for copper are presented in total recoverable concentrations, and are based on the CTR.

The Discharger is considering conducting a Water Effect Ration (WER) study for copper, to determine the site-specific toxicity of copper in the effluent and Deer Creek. The default value for the WER, in calculating the copper effluent limits is 1. The reason for performing this study is to determine if the WER ratio for the site-specific conditions in Deer Creek is greater than the default value, and if that value allows for a higher effluent limit for copper. Upon completion of the study, Regional Board Staff will evaluate the results of the study, and may reopen the permit to account for a sites-specific WER for discharge from the DCWWTP.

h. ***Diethyl phthalate and Dimethyl phthalate***- Ten samples were taken monthly and analyzed for Diethyl phthalate and Dimethyl phthalate, all of the samples were non-detect except for the first sample taken. Diethyl phthalate and Dimethyl phthalate were present in the first round of samples at concentrations of 78 µg/l and 17 µg/l, respectively. Diethyl phthalate and Dimethyl phthalate are used in the manufacturing of plastics and polyvinyl chloride (PVC) pipe and tubing. The presence in the first round of sampling may have been due to the use of new sampling equipment that was not properly sanitized before it's first use. The CTR standards for Diethyl phthalate and Dimethyl phthalate are 23 mg/l and 313 mg/l, respectively. There is no reasonable potential to exceed the CTR standard.

Toxicity—The Basin Plan states that "[a]ll waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances." The Basin Plan requires that "[a]s a minimum, compliance with this objective...shall be evaluated with a 96-hour bioassay." Order No. R5-2002-0210 requires both acute and chronic toxicity monitoring to evaluate compliance with this water quality objective.

The low-flow nature of Deer Creek means that the designated beneficial uses must be protected, but that no credit for receiving water dilution is available. The use of a dilution series to evaluate compliance with the narrative toxicity objective contained in the Basin Plan is, therefore, inappropriate.

The Basin Plan further states that "...effluent limits based upon acute biotoxicity tests of effluents will be prescribed...". Effluent limitations for acute toxicity have been included in the Order.

GENERAL EFFLUENT LIMITATION INFORMATION

Selected 40 CFR §122.2 definitions:

'*Average monthly discharge limitation* means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.

Daily discharge means the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonable represents a calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum daily discharge limitation means the highest allowable "daily discharge".'

The SIP contains similar definitions. These definitions were used in the development of Order No. 0210. Alternate limitation period terms were used in the permit for the sake of clarity. Alternates are shown in the following table:

Term Used in Permit	SIP/40 CFR 122.2 Term
Monthly average	Average monthly discharge limitation. 30-day averages may have been converted to monthly averages to conform with 40 CFR §122.45 (see below)
1-Day average	Maximum daily discharge limitation. Since the daily discharge for limitations expressed in concentrations is defined as the average measurement of the pollutant over the day, the term '1-Day Average' was used in the Order.

40 CFR §122.45 states that:

(1) "In the case of POTWs, permit effluent limitations...shall be calculated based on design flow."

(2) "For continuous discharges all permit effluent limitations...shall unless impracticable be stated as...[a]verage weekly and average monthly discharge limitations for POTWs."

(3) "All pollutants limited in permits shall have limitations...expressed in terms of mass except...[f]or pH, temperature, radiation, or other pollutants which cannot appropriately be expressed by mass...Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations."

U.S. EPA recommends a maximum daily limitation rather than an average weekly limitation for water quality based permitting.

RECEIVING WATER LIMITATIONS AND MONITORING

Dissolved Oxygen—By the tributary rule, Deer Creek has been designated as having the beneficial use of cold freshwater aquatic habitat (COLD). For water bodies designated as having COLD as a beneficial use, the Basin Plan includes a water quality objective of maintaining a minimum of 7.0 mg/*l* of dissolved oxygen. Since, by the tributary rule, the beneficial use of COLD does apply to Deer Creek, a receiving water limitation of 7.0 mg/*l* for dissolved oxygen was included in the Order.

For surface water bodies outside of the Delta, the Basin Plan includes the water quality objective that "...the monthly median of the mean daily dissolved oxygen (DO) concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation." This objective was included as a receiving water limitation in the Order.

pH—For all surface water bodies in the Sacramento River and San Joaquin River basins, the Basin Plan includes water quality objectives stating that "[t]he pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses." By the tributary rule, Deer Creek has the beneficial uses of both COLD and WARM (warm freshwater habitat); therefore, the Order includes receiving water limitations for both pH range and pH change.

The Basin Plan allows an appropriate averaging period for pH change in the receiving stream. Since there is no technical information available that indicates that aquatic organisms are adversely affected by shifts in pH within the 6.5 to 8.5 range, an averaging period is considered appropriate and a monthly averaging period for determining compliance with the 0.5 receiving water pH limitation is included in the Order.

Temperature—By the tributary rule, Deer Creek has the beneficial uses of both COLD and WARM. The Basin Plan includes the objective that "[a]t no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F above natural receiving water temperature." The Order includes a receiving water limitation based on this objective.

Turbidity—The Basin Plan includes the following objective: "Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:

- (The 30-day average turbidity to increase) More than 1 Nephelometric Turbidity Units (NTUs) where natural turbidity is between 0 and 5 NTUs.
- Where natural turbidity is between 5 and 10 NTUs, increases shall not exceed 20 percent.
- Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTU.

- Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent."

The Basin Plan states: *"In determining compliance with the above limits, appropriate averaging periods may be applied provided that the beneficial uses will be fully protected."*. Based upon studies performed by the Discharger, in consultation with the Department of Fish and Game, a 30-day averaging period is protective of the beneficial uses for turbidity when the turbidity of the receiving water is between 0 and 5 NTUs.

Narrative Limitations—Receiving Water Limitations 2 (biostimulatory substances), 3 (color), 5 (floating material), 4 (oil and grease), 5 (radioactivity), 6 (settleable material), 7 (tastes and odors), and 8 (toxicity) are based on narrative Basin Plan objectives. The objectives are located in Chapter III: Water Quality Objectives, under the Water Quality Objectives for Inland Surface Waters heading.

BASIN PLAN AMENDMENT PROCESS

Discharge from the DCWWTP can at times dominate the flow in Deer Creek. This condition caused violation of the Basin Plan water quality objectives for inland surface waters for pH, dissolved oxygen, temperature, and turbidity. The Discharger has made significant upgrades to the facility, however during low flow conditions in the creek, receiving water limitations for theses pollutants are not being consistently achieved. The Regional Board issued Cease and Desist Order (CDO) No. 95-255 on 7 December 1995 requiring the Discharger implement corrective actions to comply with these and other permit limitations. Subsequent to the CDO being issued, significant improvements to the facilities were made which brought the facility into compliance with the dissolved oxygen limit, however, pH, turbidity, and temperature remained problematic. When the current WDRs were issued in 1997, a CDO with compliance time schedules was also adopted to allow further time to comply with the Basin Plan objectives for pH, turbidity, and temperature.

The Discharger chose to pursue a Site-Specific Basin Plan Amendment (SSBPA) in lieu of making physical improvements to the treatment plant for compliance with Basin Plan objectives for pH, turbidity, and temperature. Due to the lengthy SSBPA process, the time schedule was modified to reflect the additional time needed to complete the Basin Plan Amendments (BPAs). CDO No. 5-000-033, Amendment 1, requires the Discharger to complete the BPAs by 30 December 2003. On 19 July 2002, the Regional Board adopted the BPAs for pH and turbidity. The State of California Office of Administrative Law (OAL) and U.S. EPA must also approve the BPAs before becoming effective.

The Regional Board has not yet considered the BPA for temperature. Since the existing Basin Plan Objectives for pH, turbidity, and temperature remain in effect, this Order contains limitations based those objectives.

RKE:rke 11/12/02

Temperature- and pH-Dependent Effluent Limits for Ammonia Criterion Continuous Concentration, Maximum Average Monthly Concentration

Ammonia Concentration Limitation (mg N/*l*)										
Temperature, °C (°F)										
pH	**0** (32)	**14** (57)	**16** (61)	**18** (64)	**20** (68)	**22** (72)	**24** (75)	**26** (79)	**28** (82)	**30** (86)
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179

$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) x \; MIN \left(2.85, 1.45 \cdot 10^{0.028(25-T)} \right)$$

Where: CCC = criteria continuous concentration

T = temperature in degrees Celsius (°C)

TABLE B

pH-Dependent Effluent Limits for Ammonia
Criterion Maximum Concentration, Maximum 1-hour Average

pH	Ammonia Concentration Limit (mg N/*l*)
6.5	**32.6**
6.6	**31.3**
6.7	**29.8**
6.8	**28.0**
6.9	**26.2**
7.0	**24.1**
7.1	**21.9**
7.2	**19.7**
7.3	**17.5**
7.4	**15.3**
7.5	**13.3**
7.6	**11.4**
7.7	**9.64**
7.8	**8.11**
7.9	**6.77**
8.0	**5.62**
8.1	**4.64**
8.2	**3.83**
8.3	**3.15**
8.4	**2.59**
8.5	**2.14**
8.6	**1.77**
8.7	**1.47**
8.8	**1.23**
8.9	**1.04**
9.0	**0.885**

$$CMC_{salmonids\ present} = \left(\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}} \right)$$

Where: CMC = criteria maximum concentration

TABLE C

Hardness-Dependent Effluent Limits for Copper

U.S. EPA National Ambient Water Quality Criteria
Recommended To Protect Freshwater Aquatic Life

Copper Concentration Limitations (Expressed as dissolved metal)		
Hardness (mg/l as $CaCO_3$)	Continuous Conc. 4-Day Avg. (µg/l) [1]	Maximum Conc. 1-hour Avg. (µg/l) [2]
<25	Must Calculate	Must Calculate
25	2.7	3.6
30	3.2	4.3
35	3.7	5.0
40	4.1	5.7
45	4.5	6.3
50	5.0	7.0
55	5.4	7.7
60	5.8	8.3
65	6.2	9.0
70	6.6	9.6
75	7.0	10
80	7.4	11
85	7.8	12
90	8.2	12
95	8.6	13
100	9.0	13
110	9.7	15
120	11	16
130	11	17
140	12	19
150	13	20
160	13	21
170	14	22
180	15	23
190	16	25
200	16	26
210	17	27
220	18	28
230	18	30
240	19	31
250	20	32
260	20	33
270	21	34
280	22	36
290	22	37
300	23	38

[1] Criteria Continuous Concentration (4-day Average) =
(e{0.8545[ln(hardness)] - 1.702}) x (0.960)

[2] Criteria Maximum Concentration (1-hour Average =
(e{0.9422[ln(hardness)] - 1.700}) x (0.960)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2003-0151

NPDES NO. CA0079464

WASTE DISCHARGE REQUIREMENTS FOR SAN ANDREAS SANITARY DISTRICT WASTEWATER TREATMENT PLANT CALAVERAS COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds that:

1. The San Andreas Sanitary District, (hereafter Discharger) submitted a Report of Waste Discharge (RWD), dated 27 March 2003, and applied for a permit revision to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the San Andreas Sanitary District Wastewater Treatment Plant (WWTP).

2. The Discharger owns and operates a domestic wastewater collection, treatment, and disposal system, and provides sewerage service to the community of San Andreas, in Calaveras County. The San Andreas Sanitary District was formed as a public agency in the early 1950's. The District includes all of San Andreas as well as some outside areas, encompassing approximately 1,260 acres. The WWTP provides sewer services to approximately 2,700 residents. There are approximately 1140 service connections, of which approximately 1000 are residential users and 140 are commercial users. No industries are connected to the system. San Andreas is the county seat of Calaveras County and experiences a substantial influx in population during the day because of the high school, government centers and tourism.

3. The WWTP components include a grit removal chamber, mechanical screen (for solids removal) Parshall flume, flow metering, storm flow by-pass device for diverting excessive storm inflow to the high flow treatment system and storage reservoir, pre-aeration basin, primary clarifier, re-circulating trickling filter, secondary clarifier, sodium hypochlorite contact chamber, sodium bisulfite dechlorination unit, heated unmixed anaerobic digester, sludge drying beds, three post-secondary effluent polishing ponds, and a 6 million gallon storage reservoir. A diesel power generator is on site and used in the event of electrical power loss. The Plant lay out and wastewater flow diagram is shown in Attachment A, a part of this Order.

4. Disposal of treated wastewater is accomplished exclusively to land from 1 May through 31 October of each year. The Discharger owns approximately 180 acres of land for disposal, known as the Dedicated Land Disposal Area (DLDA). Presently, the Discharger uses about 70 of those acres, as the other 110 acres were recently purchased and are currently unimproved land. The treated wastewater is first held in the effluent storage reservoir, then pumped to on-site evaporation, transpiration and percolation ditches. The disposal ditches have a total length of approximately two miles, and vary in depth from about 1.5 to 3.0 feet and in width from about 2 to 4 feet. Storm water run off, or excess effluent from the trenches is returned to the storage

reservoir via a return ditch. Vegetation control in the DLDA is accomplished through prescribed burns by the local public fire agency.

5. From 1 November through 30 April, secondary treated effluent is discharged to the DLDA to the extent feasible. Treated effluent that cannot be discharged to land is currently discharged to San Andreas Creek, a tributary to Murray Creek, a tributary of the North Fork of the Calaveras River. Using the effluent polishing ponds for storage, the WWTP is capable of discharging up to a maximum of 1.5 mgd of treated effluent depending upon receiving water flows and considering the minimum 20:1 dilution requirement. Discharge to surface waters is prohibited during the period of 1 May through 31 October of each year.

   The discharge to San Andreas Creek is disinfected secondary treated wastewater, which requires that adequate dilution water be available in the creek at the time of discharge. Previous Order No. 5-01-118 required the Discharger to install a stream gauge monitor in Murray Creek to assure that when discharges occur, the stream flows of the creek would provide at least a 20:1 (receiving water:effluent) dilution ratio. The California Department of Health Services (DHS) has recommended that discharges of secondary treated domestic wastewater, when not diluted by receiving water flows of at least 20:1, be treated to a tertiary level to reduce the concentration of human pathogens.

   In previous Order No. 5-01-118, the Discharger proposed moving the point of effluent discharge from San Andreas Creek, to Murray Creek, where it was expected that a larger watershed would provide for higher sustained flows and a consistent minimum 20:1 dilution ratio. After installing a stream gauge monitor on Murray Creek, the Discharger determined that moving the effluent discharge point downstream from San Andreas Creek to Murray Creek might not result in a consistent minimum 20 to 1 dilution of receiving water to effluent recommended by the California DHS. The Discharger subsequently completed studies to evaluate all available effluent disposal options. In the February 2003 Effluent Disposal Options Assessment Report, the Discharger considered reclamation, land disposal, winter only surface water discharge, and year-round surface water discharge options. Results of this report indicate viable reclamation alternatives do not exist, and the complete containment of wastewater on land during typical wet winters is infeasible. Considering these findings, this Report concluded that dry season land disposal, combined with maximizing winter land disposal supplemented with a winter surface water discharge was the superior option with regards to public health, the environment, and economics. For the wet season surface water discharge portion of this option, the Discharger determined that moving the point of effluent discharge downstream in the watershed, to the confluence of Murray Creek and the North Fork of the Calaveras River, would provide a consistent minimum dilution of 20 to 1 throughout the wet season period of discharge. The Discharger has proposed moving the discharge location from San Andreas Creek to the Calaveras River by 1 November 2004. The Discharger has also proposed that the water will enter the Calaveras River via a 'cross river diffuser'.

6. A California Environmental Quality Act (CEQA) Mitigated Negative Declaration was prepared by the Discharger in support of the proposal to move the point of effluent discharge downstream to the Calaveras River. This Mitigated Negative Declaration was approved by the Lead Agency

(the Discharger) on 19 March 2003. The Discharger has filed the Notice of Determination with the County Clerk and Office of Planning and Research. The Regional Board has considered the Mitigated Negative Declaration, and these waste discharge requirements will mitigate or avoid the significant impacts on water quality by: (a) ensuring the discharge does not cause a condition of pollution or nuisance, and, (b) establishing effluent limitations and monitoring requirements for toxic and conventional pollutants with the reasonable potential to cause or contribute to exceedence of a water quality standard.

7. The WWTP, DLDA, and discharge points to San Andreas Creek are in Section 18, T4N, R12E, MDB&M, as shown on Attachment B, a part of this Order. The discharge point to the Calaveras River is in Section 12, T4N, R11E, MDB&M, as shown on Attachment B. Treated wastewater is subsequently discharged from the ponds to San Andreas Creek, a water of the United States, at the point lattitude 38°, 12', 11" and longitude 120°, 41', 18". or to the Calaveras River, a water of the United States, at the point lattitude 38°, 12', 38" and longitude 120°, 42', 17" also as shown in Attachment B.

8. The Report of Waste Discharge describes the existing wastewater flows and influent quality as follows:

Average Dry Weather Influent Flow:	0.3	million gallons per day (mgd)
Design Average Dry Weather Flow:	0.4	mgd
Design Hydraulic Capacity:	1.5	mgd
Average Temperature:	76.7°F Summer; 63.2°F Winter	

Constituent	mg/L	lbs/day[2]
BOD[1]	306	1021
Total Suspended Solids	244	814

[1] 5-day, 20°C biochemical oxygen demand
[2] At design average flow

9. The Report of Waste Discharge describes the existing treated wastewater effluent flows and effluent quality as follows:

Average Effluent Flow:	0.31	mgd
Design Wet Weather Flow to Surface Waters:	1.5	mgd

Constituent	mg/L	lbs/day[2]
BOD[1]	16	41
Total Suspended Solids	13	34

[1] 5-day, 20°C biochemical oxygen demand
[2] At average flow

10. The discharge of treated wastewater was previously regulated by Waste Discharge Requirements (WDR) Order No. 5-01-118, NPDES Permit No. CA0079464, which was adopted by the Regional Board on 11 May 2001. Under this Order, the Discharger was permitted to discharge a

maximum of 1.5 million gallons per day (mgd) of treated wastewater to San Andreas or Murray Creek from 1 November through 30 April.

11. The U.S. Environmental Protection Agency (USEPA) and the Regional Board have classified this discharge as a minor discharge.

12. The Regional Board adopted a *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

13. The existing **beneficial uses** of the **Calveras River**, from its source to New Hogan Reservoir, as identified in Table II-1 of the Basin Plan include: body contact recreation, canoeing and rafting, (REC-1); and other non-body contact recreation (REC-2); warm freshwater aquatic habitat (WARM); cold freshwater aquatic habitat (COLD); migration of aquatic organisms (MIGR) in warm habitat, warm and cold habitat spawning, reproduction, and/or early development (SPWN); and wildlife habitat (WILD). Agricultural supply (AGR) including both irrigation and stock watering, is not identified in Table II-1 of the Basin Plan as an existing beneficial use of the Calaveras River. However, active water rights permits (stockwatering), have been identified downstream of the point of discharge along Murray Creek and the North Fork Calveras River. The Regional Board is required to apply the beneficial uses of municipal and domestic supply to the Calaveras River based on SWRCB Resolution No. 88-63 which was incorporated into the Basin Plan pursuant to Regional Board Resolution 89-056. In addition, State Board Resolution No. 88-63, incorporated into the Basin Plan pursuant to Regional Board Resolution No. 89-056, provides that "*Where a a body of water is not currently designated as MUN* (municipal and domestic supply beneficial use) *but, in the opinion of a Regional Board, is presently or potentially suitable for MUN, the Regional Board shall include MUN in the beneficial use designation.* " Based upon ambient receiving water data collected by the Discharger, the North Fork Calveras River, from its source to New Hogan Reservoir, is suitable for MUN, therefore the MUN use is also designated as a beneficial use of this water body. Also, the State Water Resources Control Board (State Board) maintains an active water rights permit for domestic and irrigation supply use from New Hogan Reservoir, downstream of the discharge.

The Basin Plan on page II-1.00 states: "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning..." and with respect to disposal of wastewaters states that "... disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses."

14. The Basin Plan at page II-2.00 states that: "Existing and potential beneficial uses that currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1. The beneficial uses of any specifically identified water body generally apply to its tributary streams." The Basin Plan does not specifically identify **beneficial uses** for **San Andreas Creek** or Murray Creek, but the Basin Plan does identify existing beneficial uses for the Calaveras River, as noted above, to which they are tributary.

In reviewing what existing beneficial uses that may apply to San Andreas Creek and Murray Creek, the Regional Board has considered the following facts:

a. *Domestic, Municipal, and Agricultural Irrigation Supply*

The Regional Board is required to apply the beneficial uses of municipal and domestic supply to San Andreas Creek and Murray Creek based on SWRCB Resolution No. 88-63 which was incorporated into the Basin Plan pursuant to Regional Board Resolution 89-056. The State Water Resources Control Board (SWRCB) has issued water rights permits to existing water users along Murray Creek and the Calaveras River downstream of the discharge for domestic and irrigation uses. Since San Andreas Creek and Murray Creek are ephemeral streams, the creeks likely provide groundwater recharge during periods of low flow. The groundwater is a source of drinking water. In addition to the existing water uses, growth in the area, downstream of the discharge is expected to continue, which presents a potential for increased domestic and agricultural uses of the water in San Andreas Creek and Murray Creek.

b. *Groundwater Recharge*

In areas where groundwater elevations are below the stream bottoms, water from the streams will percolate to groundwater. Since San Andreas Creek and Murray Creek are at times almost dry, it is reasonable to assume that the stream water is lost by evaporation, flow downstream and percolation to groundwater thereby providing a source of domestic, municipal, and irrigation water supply.

c. *Freshwater Replenishment*

When water is present in San Andreas Creek and Murray Creek, there is hydraulic continuity between San Andreas Creek, Murray Creek and the Calaveras River. During periods of hydraulic continuity, San Andreas and Murray Creeks add to the water quantity and may impact the quality of water flowing downstream in the Calaveras River.

d. *Water Contact and Non-Contact Recreation and Esthetic Enjoyment*

The Regional Board finds that the discharge flows through areas where there is ready public access to San Andreas and Murray Creek. Exclusion of the public is unrealistic and contact recreational activities currently exist along the creeks. These uses are likely to increase as the population in the area grows.

e. *Preservation and Enhancement of Fish, Wildlife and Other Aquatic Resources.*

San Andreas Creek and Murray Creek flow to the Calaveras River. The California Department of Fish and Game (DFG) has verified that the fish species present in San Andreas and Murray Creeks and downstream waters are consistent with both cold and warm water fisheries, and that a cold water species has been found both upstream and downstream of the wastewater treatment plant. The Basin Plan (Table II-1) designates the Calaveras River source to New Hogan Reservoir, as being both a cold and warm freshwater habitat. Therefore, pursuant to the Basin Plan (Table II-1, Footnote (2)), the cold designation applies to San Andreas and Murray Creeks. The cold-water habitat designation necessitates that the in-stream dissolved oxygen concentration be maintained at, or above, 7.0 mg/l. This approach recognizes that, if the naturally occurring in-stream dissolved oxygen concentration is below 7.0 mg/l, the Discharger is not required to improve the naturally occurring level.

Upon review of the flow conditions, habitat values, existing and potential beneficial uses of the Calaveras River, and the facts described above, the Regional Board finds that the beneficial uses identified in the Basin Plan for the Calaveras River, from it's source to New Hogan Reservoir, are applicable to San Andreas Creek and Murray Creek. In addition, beneficial uses not specifically identified in the Basin Plan, as indicated above, exist or potentially exist in San Andreas Creek and Murray Creek and must be protected.

The Board also finds that based on the available information and on the Discharger's application, that San Andreas Creek and Murray Creek, absent the discharge, are at times ephemeral streams. At other times, natural flows within San Andreas Creek and Murray Creek help support the cold-water aquatic life. Both conditions may exist within a short time span, where the Creeks would be dry without the discharge and periods when sufficient background flows provide hydraulic continuity with the Calaveras River. Dry conditions occur primarily in the summer months, but dry conditions, and low flow conditions, may also occur throughout the year, particularly in low rainfall years. The lack of dilution results in more stringent effluent limitations to protect contact recreational uses, drinking water-related uses , agricultural water uses and aquatic life. Significant dilution may occur during and immediately following high rainfall events.

15. USEPA adopted the *National Toxics Rule* (NTR) on 22 December 1992, which was amended on 4 May 1995 and 9 November 1999 and the *California Toxics Rule* (CTR) on 18 May 2000, which was amended on 13 February 2001. These Rules contain water quality standards applicable to this discharge. The State Water Resources Control Board (SWRCB) adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Policy or SIP), which contains guidance on implementation of the NTR and the CTR.

16. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric water quality standard. Beneficial uses, together with their corresponding water quality objectives or promulgated water quality criteria, constitute the water quality standards for waters of the state for purposes of compliance with the CWA.

In determining whether a discharge has the reasonable potential to contribute to an in-stream excursion (reasonable potential analysis), the dilution of the effluent in the receiving water may be considered where areas of dilution are defined. The available dilution may also be used to calculate protective effluent limitations by applying water quality criteria at the edge of the defined mixing zone. These calculations include receiving water pollutant concentrations that are typically based on worst-case conditions for flow and concentration.

If limited or no dilution is available, effluent limitations are set equal to the applicable water quality objective or criteria which are applied at the point of discharge so the discharge will not cause the receiving stream to exceed water quality objectives or promulgated criteria established to protect the beneficial uses. In situations where receiving water flows are substantially greater than effluent flows, dilution may be considered in establishing effluent limitations. However, when a receiving water is impaired by a particular pollutant or stressor, limited or no pollutant assimilative capacity may be available in spite of the available dilution. In these instances, and depending upon the nature of the pollutant, effluent limitations may be set equal to or less than the applicable water quality objectives or criteria that are applied at the point of discharge such that the discharge will not cause or contribute to the receiving stream excursion above water quality objectives or promulgated criteria established to protect the beneficial uses.

17. On 10 September 2001 the Executive Officer of the Regional Board issued a letter pursuant to Section 13267 of the California Water Code (CWC) requiring all NPDES Dischargers to conduct effluent and receiving water monitoring and submit results of this monitoring in accordance with a time schedule provided in the letter. The Discharger conducted a study to determine whether levels of NTR, CTR, or other pollutants in the discharge have the reasonable potential to cause or contribute to an in-stream excursion above a numeric or narrative water quality standard, including Basin Plan numeric or narrative objectives. Results of this study were submitted in March 2003 with the new Report of Waste Discharge (RWD) which proposed moving the point of discharge to the Calaveras River.

18. While the Discharger has proposed moving the point of effluent discharge downstream to the Calaveras River, extension of the pipeline and completion of the project will not be complete until at least November 2004. Until that time, the Discharger will continue to discharge treated effluent during the wet season at the historical location in San Andreas Creek. Only limited information regarding flows in San Andreas Creek or Murray Creek is available, and no information is available regarding critical flow conditions or flow conditions during extended dry periods. Limited flow data from Murray Creek indicates that a consistent 20:1 dilution ratio cannot be maintained during all flow conditions. Considering the limited watershed supporting San Andreas Creek and Murray Creek, it is likely that flows during a dry fall/winter period could be negligible. Considering these conditions, and given the new information on pollutant concentrations in the effluent, the reasonable potential analysis for pollutants in the effluent discharged to San Andreas Creek, and the development of associated effluent limitations, was accomplished considering no credit for dilution. Previous Order No. 5-01-118 included a time schedule requiring tertiary treatment of any effluent discharged that does not receive 20:1 dilution by **1 April 2006**. This Order retains that time schedule.

19. This Order requires a minimum dilution ratio of 20:1 (receiving water to effluent) for the discharge of treated secondary effluent to the Calaveras River. Development and consideration of dilution credits in establishing and determining compliance with water quality-based effluent

limitations for priority pollutants is described in Section 1.4.2. of the SIP. Dilution credit, mixing zones and mixing zone analyses methods are also presented in Section 2 and Section 4 of the USEPA's Technical Support Document For Water Quality-based Toxics Control, 1991 (TSD). Considering minimum dilution ratio of 20:1 required by this Order, a maximum dilution credit of 20 has been used in accomplishing the reasonable potential analysis and developing effluent limitations where appropriate. As the outfall and diffuser configuration and design have not been completed, the Discharger shall be required, prior to commencing the discharge, to conduct a *Dilution/Mixing Zone Study* to verify complete mixing of the discharge and characterize the extent of actual dilution. Points in the receiving water where the applicable criteria/objective shall be met must also be defined in this study. This Order may be reopened if the study indicates the discharge is not completely mixed, or if site specific conditions concerning the discharge and the receiving water indicate that a smaller dilution credit is necessary to protect beneficial uses and meet the conditions of the SIP. This study shall be completed prior to discharge from the new outfall to the Calaveras River.

20. Section 1.4.2.2 of the SIP outlines conditions which must be met in allowing a mixing zone. Considering these conditions, where applicable, maximum daily effluent limitations have been developed for discharge to the Calaveras River considering acute criteria, an acute waste load allocation, and no dilution credit, to prevent acutely toxic conditions at the point of discharge. Also where applicable, average monthly effluent limitations have been developed considering chronic criteria, a chronic wasteload allocation, and available dilution. A mixing zone and dilution credit were not considered for the discharge to San Andreas Creek.

21. Technology-based treatment requirements under section 301(b) of the CWA represent the minimum level of control that must be imposed in a permit issued under section 402 of the CWA. Regulations promulgated at 40 CFR 122.44 (a) require technology-based effluent limitations to be placed in NPDES permits based on national effluent limitations guidelines and standards, best professional judgment (BPJ), or a combination of the two. 40 CFR Part 133 provides information on the level of effluent quality attainable through the application of secondary or equivalent treatment. 40 CFR Part 133.102 describes the minimum level of effluent quality attainable in terms of the parameters for biochemical oxygen demand (BOD), suspended solids (SS), and pH. Results of monitoring indicate the Discharger is capable of meeting these limitations. Effluent limitations for these conventional pollutants using these levels of effluent quality established in 40 CFR Part 133.102 have been retained in the Order.

22. Previous Order No. 5-01-118 included an effluent limitation for total coliform, with a total coliform count not to exceed 23 MPN (Most Probable Number)/100 ml (milliliters) as a monthly median limitation, and 230 MPN/100ml as a daily maximum, with 20:1 dilution. These limitations were established considering recommendations from the California Department of Health Services. Beneficial uses of the Calaveras River, San Andreas Creek, and Murray Creek include body contact recreation (REC-1) and other non-contact recreation (REC-2), and public access is not restricted up or downstream in the vicinity of the discharge. Other beneficial uses include agricultural supply (AGR) and municipal and domestic supply (MUN). The limitations of Order No. 5-01-118 are retained in this new Order. As noted previously, limited flow information from San Andreas Creek and Murray Creek indicate there may be instances where

the dilution ratio falls below 20:1. As noted previously, this Order includes a time schedule requiring tertiary treatment of any effluent discharged that does not receive 20:1 dilution by 1 April 2006. This Order may be reopened to address new information concerning effects on public drinking water supplies.

23. Section 1.3 of the SIP requires a water quality based effluent limitation when the maximum effluent concentration (MEC) or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion. Based upon the study conducted by the Discharger, the MEC's of copper, zinc, dichlorobromomethane, and bis(2-ethylhexyl) phthalate have exceeded applicable pollutant criteria of the CTR/NTR. Therefore, water quality-based effluent limitations for these pollutants are required. When required, Section 1.4 of the SIP provides four methods that may be used to develop effluent limitations. These four methods include: (1) assigning a loading allocation based upon a completed TMDL; (2) use of a steady state model; (3) use of a dynamic model; or, (4) establishing effluent limitations that consider intake water pollutants. Water quality-based effluent limitations have been developed in this Order using the steady state model described in Section 1.4 of the SIP and the TSD. Since the discharge is permitted only under conditions of a minimum of 20:1 dilution, development of these limitations has, where applicable, considered dilution of the receiving water for pollutants with demonstrated assimilative capacity.

24. In studies conducted by the Discharger, the MEC for total **copper** was reported as 35 µg/L (ppb). The minimum hardness of the effluent was reported as 68 mg/L (ppm) hardness as CaCO3. This MEC exceeds the adjusted freshwater aquatic life water quality acute (Criterion Maximum Concentration, CMC) and chronic (Criterion Continuous Concentration, CCC) criteria for copper established in the USEPA's California Toxics Rule (9.7 µg/L (ppb) and 6.7 µg/L (ppb), respectively at 68 mg/L hardness as CaCO3). As noted above, Section 1.3 of the SIP requires water quality-based effluent limitations when the MEC or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion. Effluent limitations for discharge to the **Calaveras River** have been developed for total copper as shown in the Information Sheet, a part of this Order. To prevent acutely toxic conditions at the point of discharge and in the zone of initial dilution, a table in Attachment D, a part of this Order, expresses the maximum daily effluent limitation (MDEL) developed for copper considering the acute aquatic life criterion (CMC) without consideration of dilution. Attachment D also includes a table expressing the average monthly effluent limitation (AMEL) developed considering the chronic aquatic life criterion (CCC) for copper and dilution credit.

For discharge to **San Andreas Creek**, a final AMEL and MDEL have been developed for copper considering the critical ECA, and no dilution credit as shown in the Information Sheet. These final limitations are to be adjusted accordingly with results of corresponding receiving water monitoring for upstream receiving water hardness as shown in Attachment C, a part of this Order.

The Discharger cannot currently meet these limitations, whether discharging to San Andreas Creek, or the Calaveras River. The Discharger has no processes specific for the removal of copper. Section 2.1 of the SIP provides that: "*Based on an existing discharger's request and demonstration that it is infeasible for the discharger to achieve immediate compliance with a CTR criterion, or with an effluent limitation based on a CTR criterion, the RWQCB may establish* *a compliance schedule in an NPDES permit.*" As the average monthly and maximum daily effluent limitations for copper are new requirements in this Order, the Discharger has not been afforded an opportunity to submit the compliance schedule justification required by the SIP (Section 2.1). This Order requires the Discharger to provide this information. Implementation of the new water quality based effluent limitations for copper become effective on **17 December 2003** if a compliance schedule justification is not completed and submitted by the Discharger to the Board. If a compliance schedule justification is completed and submitted by this date, the final water quality based effluent limitations for copper become effective **1 October 2008**, and this Order includes a Provision outlining studies and a time schedule for compliance with the new final effluent limitations for copper. In accordance with the SIP, Sections 2.2.1 and 2.2.2, a numeric interim limitation for copper has been established in this Order as shown in the Information Sheet based upon current facility performance. The Order may be reopened to include a new interim effluent limitation for copper after additional effluent data have been collected.

25. In studies conducted by the Discharger, the MEC for total **zinc** was reported as 170 µg/L (ppb). The minimum hardness of the effluent was reported as 68 mg/L (ppm) hardness as CaCO3. This MEC exceeds the adjusted freshwater aquatic life water quality acute CMC and chronic CCC criteria for zinc established in the USEPA's CTR (86 µg/L (ppb) and 86 µg/L (ppb), respectively at 68 mg/L hardness as CaCO3). As noted above, Section 1.3 of the SIP requires water quality-based effluent limitations when the MEC or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion. Effluent limitations for discharge to the **Calaveras River** have been developed for total zinc as shown in the Information Sheet, a part of this Order. To prevent acutely toxic conditions at the point of discharge and in the zone of initial dilution, a table in Attachment F, a part of this Order, expresses the MDEL developed for zinc considering the acute aquatic life criterion (CMC) without consideration of dilution. Attachment F also includes a table expressing the AMEL developed considering the chronic aquatic life criterion (CCC) for zinc and dilution credit.

For discharge to **San Andreas Creek**, a final AMEL and MDEL have been developed for zinc considering the critical ECA, and no dilution credit as shown in the Information Sheet. These final limitations are to be adjusted accordingly with results of corresponding receiving water monitoring for upstream receiving water hardness as shown in Attachment E, a part of this Order.

The Discharger cannot currently meet these limitations, whether discharging to San Andreas Creek, or the Calaveras River. The Discharger has no processes specific to the removal of zinc. Section 2.1 of the SIP provides that: "*Based on an existing discharger's request and demonstration that it is infeasible for the discharger to achieve immediate compliance with a CTR criterion, or with an effluent limitation based on a CTR criterion, the RWQCB may establish a compliance schedule in an NPDES permit.*" As the average monthly and maximum daily effluent limitations for zinc are new requirements in this Order, the Discharger has not been afforded an opportunity to submit the compliance schedule justification required by the SIP (Section 2.1). This Order requires the Discharger to provide this information. Implementation of the new water quality based effluent limitations for zinc become effective on **17 December 2003** if a compliance schedule justification is not completed and submitted by the Discharger to the Board. If a compliance schedule justification is completed and submitted by this date, the final water quality based effluent limitations for zinc become effective **1 October 2008**, and this Order includes a Provision outlining studies and a time schedule for compliance with the new final effluent limitations for zinc. In accordance with the SIP, Sections 2.2.1 and 2.2.2, a numeric interim limitation for zinc has been established in this Order as shown in the Information Sheet based upon current facility performance. The Order may be reopened to include a new interim effluent limitation for zinc after additional effluent data have been collected

26. As noted previously, the MUN beneficial use applies to San Andreas Creek, Murray Creek, and the Calaveras River. Section 1.1 of the SIP states in part that "*Designated beneficial uses to which human health criteria/objectives would apply include... municipal and domestic supply (MUN) and water contact recreation (REC 1). Human health criteria/objectives are differentiated by whether organisms alone from the water body are consumed compared to whether both organisms and water from the water body are consumed. Where MUN is designated, the latter situation applies.*"

27. A human health criterion for **dichlorobromomethane** of 0.56 µg/L (ppb), for consumption of both water and organisms, was established in the CTR. In studies conducted by the Discharger, the MEC for dichlorobromomethane was reported as 0.7 µg/L (ppb). This MEC exceeds the human health criterion for dichlorobromomethane established in the CTR. Section 1.3 of the SIP requires water quality-based effluent limitations when the MEC or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion.

Water quality-based effluent limitations for discharge to the **Calaveras River** have been developed for dichlorobromomethane as shown in the Information Sheet, a part of this Order. These water quality-based effluent limitations are substantially higher than the reported MEC of 0.7 µg/L (ppb). Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using the calculated AMEL and MDEL. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for dichlorobromomethane is needed prior to establishing a final effluent limitation for the discharge to the Calaveras River. This Order includes a time schedule for the Discharger to collect sufficient information for the calculation of final effluent limitations prior to discharge to the Calaveras River. Pursuant to Section 2.2.1 of the SIP, the water quality to be achieved includes prevention of toxic conditions in the Calaveras River as a result of the discharge, and the maintenance of the highest quality water consistent with the maximum benefit to the people of the State. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for dichlorobromomethane as enforceable limitations.

For discharge to **San Andreas Creek**, an AMEL was developed as shown in the Information Sheet considering the human health criterion for dichlorobromomethane and no dilution credit.

The Discharger cannot currently meet these limitations when discharging to San Andreas Creek. The Discharger has no processes specific to the removal of dichlorobromomethane. Section 2.1

of the SIP provides that: "*Based on an existing discharger's request and demonstration that it is infeasible for the discharger to achieve immediate compliance with a CTR criterion, or with an effluent limitation based on a CTR criterion, the RWQCB may establish a compliance schedule in an NPDES permit.*" As the average monthly and maximum daily effluent limitations for dichlorobromomethane are new requirements in this Order, the Discharger has not been afforded an opportunity to submit the compliance schedule justification required by the SIP (Section 2.1). This Order requires the Discharger to provide this information. Implementation of the new water quality based effluent limitations for dichlorobromomethane become effective on **17 December 2003** if a compliance schedule justification is not completed and submitted by the Discharger to the Board. If a compliance schedule justification is completed and submitted by this date, the final water quality based effluent limitations for dichlorobromomethane become effective **1 October 2008**, and this Order includes a Provision outlining studies and a time schedule for compliance with the new final effluent limitations for dichlorobromomethane. In accordance with the SIP, Sections 2.2.1 and 2.2.2, and as shown in the Information Sheet, a numeric interim limitation for dichlorobromomethane has been established in this Order based upon current facility performance.

28. A human health criterion for **bis(2-ethylhexyl) phthalate** of 1.8 µg/L (ppb), for consumption of both water and organisms, was established in the NTR. In studies conducted by the Discharger, the MEC for bis(2-ethylhexyl) phthalate was reported as 3.6 µg/L (ppb). This MEC exceeds the human health criterion for bis(2-ethylhexyl) phthalate established in the NTR. Section 1.3 of the SIP requires water quality-based effluent limitations when the MEC or observed maximum background concentration of a priority pollutant exceeds an appropriate pollutant criterion. The maximum observed ambient background concentration (B) of bis(2-ethylhexyl) phthalate in the Calaveras River was reported as < 2.0 µg/L (ppb). Considering this result, it is unknown if and how much assimilative capacity exists within the Calaveras River if any. No information is available regarding ambient background concentrations of bis(2-ethylhexyl) phthalate in San Andreas Creek or Murray Creek.

Concerning calculation of final effluent limitations for bis(2-ethylhexyl) phthalate for discharge to the **Calaveras River**, the SIP provides in Section 1.4 that "*If data are insufficient to calculate the effluent limitation, the RWQCB shall establish interim requirements in accordance with Section 2.2.2.*" This Order includes a time schedule for the Discharger to collect sufficient information for the calculation of final effluent limitations prior to discharge to the Calaveras River. Pursuant to Section 2.2.1 of the SIP, the water quality to be achieved includes prevention of toxic conditions in the Calaveras River as a result of the discharge, and the maintenance of the highest quality water consistent with the maximum benefit to the people of the State. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for bis(2-ethylhexyl) phthalate as enforceable limitations. In accordance with the SIP, Sections 2.2.1 and 2.2.2, for discharge to the Calaveras River, a numeric interim limitation for bis(2-ethylhexyl) phthalate has been established in this Order based upon current facility performance, as shown in the Information Sheet.

For discharge to **San Andreas Creek**, an AMEL was developed as shown in the Information Sheet considering the human health criterion for bis(2-ethylhexyl) phthalate and no dilution credit. The Discharger cannot currently meet these limitations when discharging to San Andreas Creek. The Discharger has no processes specific to the removal of bis(2-ethylhexyl) phthalate. Compliance schedules described in Section 2.1 of the SIP exclude NTR pollutants, therefore this Order does not include a schedule of compliance with the final effluent limitation for bis(2-ethylhexyl) phthalate for discharge to San Andreas Creek.

29. At p.III-8.00 the Basin Plan provides that relative to toxicity : "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" At page 1, the TSD provides that "*Where States have not developed chemical specific numeric criteria, States may interpret their narrative standards for specific chemicals by using EPA criteria updated with current quantitative risk values.*" The TSD further states on page 1 "*The integrated approach must include the control of toxics through implementation of the "no toxics" criterion and/or numeric criteria for the parameter of toxicity, the control of individual pollutants for which specific chemical water quality criteria exist in a state's standard, as well as the use of biological criteria. Reliance solely on the chemical specific numeric criteria or the narrative criterion or biological criteria would result in only a partially effective State toxics control program.*"

Under the CWA Section 304(a), USEPA has developed methodologies and specific criteria guidance to protect aquatic life and human health. These methodologies are intended to provide protection for all surface waters on a national basis. The methodologies have been subject to public review, as have the individual criteria guidance documents. Water quality criteria developed under Section 304(a) of the CWA are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects. Section 304(a) criteria do not reflect consideration of economic impacts or the technological feasibility of meeting the chemical concentrations in ambient water. Section 304(a) criteria provide guidance to States in adopting water quality standards that ultimately provide a basis for controlling discharges or releases of pollutants. Staff has used USEPA's ambient water quality criteria as a means of supplementing the integrated approach to toxics control, and in some cases deriving numeric limitations to protect receiving waters from toxicity as required in the Basin Plan's narrative objective of prohibiting toxic constituents in toxic amounts.

30. The Basin Plan does not provide a numeric water quality objective for **aluminum**. However, the USEPA has developed National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life for aluminum. The USEPA has recommended, as a freshwater ambient water quality criteria for aluminum, a chronic, four day average criterion continuous concentration (CCC) of 87 μg/L, and an acute, one-hour average criterion maximum concentration (CMC) of 750 μg/L expressed in terms of total recoverable metal in the water column. In establishing these criteria, USEPA notes that there are three major reasons why the use of a water-effect ratio (WER) may be appropriate in applying the aluminum criteria including the fact that the 87 μg/L CCC was based on a toxicity test with striped bass in water with low pH and low hardness.

Results of monitoring conducted by the Discharger indicate effluent aluminum concentrations ranged from 160 µg/L to 580 µg/L. The minimum pH of the effluent has been reported as 6.8 pH units, and the minimum hardness of the effluent has been reported as 68 mg/L as CaCO3. Results of monitoring of the Calaveras River indicate ambient background concentrations of aluminum ranged from 40 µg/L to 80 µg/L. The minimum pH of the Calaveras River has been reported as 7.8 pH units during the period of discharge (one data point), and the minimum hardness of the Calaveras River has been reported as 60 mg/L as CaCO3. No information is available on aluminum concentrations in San Andreas or Murray Creek. Results of ambient background pH monitoring in San Andreas Creek during the period of discharge from December 2002 through April 2003 have ranged from 6.9 to 7.2 pH units.

Considering results of monitoring indicate periods of relatively low hardness and neutral pH, the MEC for total aluminum is over 6 times greater than the CCC, the maximum ambient background concentration of aluminum in the Calaveras River has been reported as high as 80 µg/L, the aquatic life beneficial use, the narrative toxicity objective of the Basin Plan, and, the USEPA chronic criterion for aluminum, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

For discharge to the **Calaveras River** or **San Andreas Creek**, AMEL's and MDEL's have been developed for aluminum as shown in the Information Sheet. Based upon the results of effluent monitoring, the Discharger cannot currently comply with these new effluent limitations for aluminum. At Page IV-16.00 the Basin Plan states "*In no event shall an NPDES permit include a schedule of compliance that allows more than ten years (from the date of adoption of the objective or criteria) for compliance with water quality objectives, criteria or effluent limitations based on the objectives or criteria. Schedules of compliance are authorized by this provision only for those water quality objectives or criteria adopted after the effective date of this provision [25 September 1995*]." The narrative toxicity objective is not a new objective, therefore a schedule of compliance for aluminum is not included in this Order.

31. In December 1999, the U.S EPA published an Update of Ambient Water Quality Criteria for **Ammonia** (1999 Ammonia Update). The new criteria in the 1999 Ammonia Update reflect recent research and data since 1984, and are a revision of several elements in the 1984 criteria, including the pH and temperature relationship of the acute and chronic criteria and the averaging period of the chronic criterion. As a result of these revisions, the acute criterion for ammonia is now dependent on pH and fish species present, and the chronic criterion is dependent on pH and temperature. At lower temperatures, the chronic criterion is also dependent on the presence or absence of early life stages of fish (ELS). The beneficial uses of the Calaveras River, from its source to New Hogan Reservoir, and San Andreas Creek include warm freshwater aquatic habitat (WARM), cold freshwater aquatic habitat (COLD), migration of aquatic organisms (MIGR) in warm habitat, warm and cold habitat spawning, and reproduction, and/or early development (SPWN). The early life stages of fish are likely present during the permitted period of discharge.

The reported MEC of total ammonia is 16 mg/L (as N), with an average daily concentration of effluent total ammonia reported as 2.2 mg/L (as N). The maximum effluent pH for the period of discharge from November 1999 through April 2003 was reported as 7.8 pH units. Without regard to dilution, the discharge from the effluent has the reasonable potential to exceed the acute ambient water quality ammonia criteria for the protection of fresh water aquatic life at the point of discharge to the Calaveras River or San Andreas Creek. The maximum total ammonia concentration reported in the Calaveras River was reported as 1.1 mg/L (as N), and the maximum pH was reported as 7.8 pH units. Although simple steady state dilution calculations using the limited ambient data available indicate that assimilative capacity for chronic toxicity is available in the Calaveras River, sufficient information is not available to adequately determine mixing zone and dilution characteristics.

The Regional Board considered the level of ammonia in the effluent in light of the narrative toxicity objective in the Basin Plan. For determining whether there is reasonable potential for an excursion above this narrative objective, the Regional Board used the second method prescribed by 40 CFR 122.44(d)(vi) for determining reasonable potential, which relies on USEPA recommended criteria and other information. The Board chose this method because USEPA's recommended ambient water quality criteria for ammonia have been developed using methodologies that are subject to public review, as is the individual recommended criteria guidance document. Results of monitoring submitted by the Discharger indicate the effluent discharged to the Calaveras River has the reasonable potential to cause or contribute to an excursion above the acute ammonia criterion. Considering no dilution in San Andreas Creek, results of effluent monitoring submitted by the Discharger indicate the effluent discharged to San Andreas Creek has the reasonable potential to cause or contribute to an excursion above the acute and chronic ammonia criteria.

Accordingly, to prevent acutely toxic conditions at the point of discharge to the **Calaveras River**, a one hour maximum effluent limitation for total ammonia has been included in this Order based upon the EPA's ambient water quality acute toxicity criterion (Attachment H). Compliance with this limit will require recording of effluent pH at the time that the samples are collected for ammonia, and may require information regarding the presence or absence of salmonids in the Calaveras River. Because a minimum 20 to 1 dilution is required for discharge, acute toxicity is almost certainly the governing toxic criterion. The extent of the chronic toxicity mixing zone will be evaluated in the *Dilution/Mixing Zone Study.* Based upon the results on the *Dilution/Mixing Zone Study*, this Order may be reopened to include delineation of a chronic toxicity mixing zone and additional chronic effluent limitations for ammonia, if warranted.

To prevent chronic and acutely toxic conditions at the point of discharge to **San Andreas Creek**, a one hour and AMEL for total ammonia have been included in this Order based upon the EPA's ambient water quality chronic and acute toxicity criteria (Attachment G and Attachment H). Compliance with these limits will require recording of effluent pH and temperature at the time that the samples are collected for ammonia, and may require information regarding the presence or absence of salmonids in San Andreas Creek.

Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for total ammonia. As noted previously, the narrative toxicity objective is not a new objective, therefore a schedule of compliance for ammonia is not included in this Order.

32. The Discharger uses **chlorine** for the disinfection of treated wastewater. The Basin Plan does not provide a numeric water quality objective for chlorine, but the Basin Plan does contain a narrative toxicity objective. For determining whether there is reasonable potential for an excursion above this narrative objective, the Regional Board used the second method prescribed by 40 CFR 122.44(d)(vi) for determining reasonable potential, which relies on USEPA criteria and other information. The Board chose this method because USEPA's recommended ambient water quality criteria for chlorine have been developed using methodologies that are subject to public review, as is the individual recommended criteria guidance document. USEPA's ambient water quality criteria for protection of aquatic life are 11 µg/L as a 4-day average (chronic) concentration, and 19 µg/L as a 1-hour average (acute) concentration for total residual chlorine. Continuous use of chlorine for the disinfection of the final effluent presents a reasonable potential for the discharge to cause or contribute to an excursion above the acute and chronic chlorine criteria.

For discharge to the Calaveras River and San Andreas Creek, this Order includes new effluent limitations for chlorine based directly upon the USEPA's ambient water quality criteria. Based upon results of monitoring, and installation of the new dechlorination unit, the Discharger is capable of consistently meeting these limitations.

33. For Chemical Constituents at page III-3.00, the Basin Plan states '*At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations…*' Federal regulations at 40 CFR Section 122.44(d)(1)(vi)(A) allow the state to establish effluent limitations using an explicit state policy interpreting its narrative objectives. Use of MCL's is appropriate to implement the chemical constituent objective of the Basin Plan. The Calaveras River, San Andreas Creek, and Murray Creek are designated for use as domestic or municipal supply (MUN).

The Regional Board has considered the factors specified in California Water Code (CWC) Section 13263, including considering the provisions of CWC Section 13241 where appropriate. The Regional Board is not required to consider the factors in CWC Section 13241 in applying existing water quality objectives, including adopting new effluent limitations in this Order.

The Regional Board must implement the CWC consistent with the Clean Water Act (CWA). The CWA precludes the consideration of costs when developing effluent limitations for NPDES permits necessary to implement water quality standards (See Ackels v. EPA (9th Cir. 1993) 7 F.3d 862, 865-66). The Regional Board may consider costs in developing compliance schedules. The Regional Board finds, on balance, that these requirements are necessary to protect the beneficial uses of the Calaveras River, San Andreas Creek, and Murray Creek.

34. The Basin Plan does not include a numeric objective for **nitrate** or **nitrite**. The USEPA has established a primary Maximum Contaminant Level (MCL) for nitrate of 10 mg/L (as nitrogen (N)), and a primary MCL for nitrite of 1 mg/L (as nitrogen (N)). USEPA has also established in the MCL a limit for total nitrate + nitrite of 10 mg/L. Additionally, USEPA's ambient water quality criteria for nitrates, protective of human health for consumption of water and organisms, is expressed also as a concentration of 10 mg/l (as N). In Title 22, Table 64431-A of the California Code of Regulations (CCR) the California DHS has established a primary MCL for nitrate + nitrite (sum as nitrogen) of 10 mg/L, and a primary MCL for nitrite (as nitrogen) of 1.0.

As reported by the Discharger, the MEC for nitrate + nitrite (as N) was 17.2 mg/L. Independently, the MEC for nitrate was reported as 17 mg/L (as N), and the MEC for nitrite was reported as 0.2 mg/L (as N). The average daily effluent concentration for nitrate + nitrite (as N) has been reported as 12.2 mg/L. These nitrate + nitrite effluent concentrations, without regard to dilution, exceed the California DHS primary MCL for nitrate + nitrite (as N). The maximum observed ambient background concentration of nitrate + nitrite (as N) in the Calaveras River was reported as 1.7 mg/L. Independently, the maximum observed ambient background concentration for nitrates was reported as 1.7 mg/L (as N), and the maximum observed ambient background concentration nitrites was reported as less than 0.03 mg/L (as N). Considering these effluent monitoring results, the MUN beneficial use, the chemical constituent objective of the Basin Plan, and the California DHS primary MCL for nitrate + nitrite, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

An AMEL and MDEL for discharge to the **Calaveras River** were considered for nitrate + nitrite (as N) developed using the USEPA recommendations for permitting for human health protection as described in Section 5.4.4 of the TSD and as shown in the Information Sheet. These water quality-based effluent limitations are substantially higher than the reported MEC of 17.2 mg/L (ppm). Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using the calculated AMEL and MDEL. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for nitrate + nitrite is needed prior to establishing a final effluent limitation for the discharge to the Calaveras River. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations for discharge to the Calaveras River at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to reopen this Order and include final water quality-based effluent limitations for nitrate + nitrite as enforceable limitations.

For discharge to **San Andreas Creek**, where dilution credit was not considered, an AMEL was developed considering the USEPA recommendations for permitting for human health protection provided in Section 5.4.4 of the TSD. The AMEL was set equal to the WLA, or in this case, the nitrates + nitirites MCL (10 mg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for nitrates +

nitrites. As the chemical constituent objective is not a new objective, a schedule of compliance for nitrates + nitrites is not included in this Order.

35. In Title 22, Table 64449-A of the CCR, the California DHS has established a secondary MCL for **iron** of 300 μg/L considering consumer acceptance limits. Results of monitoring conducted by the Discharger indicate effluent concentrations of iron ranged from 210 μg/L to 450 μg/L . The MEC, without regard to dilution, exceeds the California DHS secondary MCL for iron. The maximum observed ambient background concentration of iron in the Calaveras River was reported as 130 μg/L. The data indicate that the Calaveras River does have assimilative capacity for iron. Dilution and/or assimilative capacity was not considered for discharge to San Andreas Creek. Considering the MEC, the MUN beneficial use, the chemical constituents objective of the Basin Plan, and the California DHS secondary MCL for iron, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

The criterion used to determine reasonable potential for iron is not related to aquatic toxicity or human health. Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using a calculated AMEL and MDEL based upon a human health WLA. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for iron is needed prior to establishing a final effluent limitation for the discharge to the **Calaveras River**. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for iron as enforceable limitations.

For discharge to **San Andreas Creek**, where dilution credit was not considered, an AMEL was set equal to the WLA, or in this case, the iron secondary MCL (300 μg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for iron. As the chemical constituents objective is not a new objective, a schedule of compliance for iron is not included in this Order.

36. In Title 22, Table 64449-A of the CCR, the California DHS has established a secondary MCL for **manganese** of 50 μg/L considering consumer acceptance limits. Results of monitoring conducted by the Discharger indicate effluent concentrations of manganese ranged from 25 μg/L to 82 μg/L . The MEC, without regard to dilution, exceeds the California DHS secondary MCL for manganese. The maximum observed ambient background concentration of manganese in the Calaveras River was reported as 12 μg/L. The data indicate that the Calaveras River does have assimilative capacity for manganese. Dilution and/or assimilative capacity was not considered for discharge to San Andreas Creek. Considering the MEC, the MUN beneficial use, the chemical constituents objective of the Basin Plan, and the California DHS secondary MCL for manganese, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

The criterion used to determine reasonable potential for manganese is not related to aquatic toxicity or human health. Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using a calculated AMEL and MDEL based upon a human health WLA. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for manganese is needed prior to establishing a final effluent limitation for the discharge to the **Calaveras River**. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for manganese as enforceable limitations.

For discharge to **San Andreas Creek**, where dilution credit was not considered, an AMEL was set equal to the WLA, or in this case, the manganese secondary MCL (50 µg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for manganese. As the chemical constituents objective is not a new objective, a schedule of compliance for manganese is not included in this Order.

37. In Title 22, Table 64449-A of the CCR, the California DHS has established a secondary MCL for **Methylene Blue Active Substances** (MBAS) of 500 µg/L considering consumer acceptance limits. Results of monitoring conducted by the Discharger indicate effluent concentrations of MBAS ranged from 500 µg/L to 2,000 µg/L . The MEC, without regard to dilution, exceeds the California DHS secondary MCL for MBAS. The maximum observed ambient background concentration of MBAS in the Calaveras River was reported as less than 50 µg/L. The data indicate that the Calaveras River does have assimilative capacity for MBAS. Dilution and/or assimilative capacity was not considered for discharge to San Andreas Creek. Considering the MEC, the MUN beneficial use, the chemical constituents objective of the Basin Plan, and the California DHS secondary MCL for MBAS, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

The criterion used to determine reasonable potential for MBAS is not related to aquatic toxicity or human health. Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using a calculated AMEL and MDEL based upon a human health WLA. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for MBAS is needed prior to establishing a final effluent limitation for the discharge to the **Calaveras River**. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for MBAS as enforceable limitations.

For discharge to **San Andreas Creek**, where dilution credit was not considered, an AMEL was set equal to the WLA, or in this case, the MBAS secondary MCL (500 µg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for MBAS. As the chemical constituents objective is not a new objective, a schedule of compliance for MBAS is not included in this Order.

38. **Diazinon** is used for the control of pests in both agricultural and urban settings. For inland surface waters within the Region, there are currently no adopted numeric objectives for diazinon. For diazinon, the USEPA has published a tentative one-hour maximum acute criterion of 0.09 µg/L. The California Department of Fish and Game (DFG) criteria include a one-hour average acute value of 0.08 µg/L and a four-day average chronic value of 0.05 µg/L.

Results of three effluent sampling events indicated one instance where diazinon was detected, at a concentration of 1.6 µg/L. Results of two ambient background monitoring events in the Calaveras River indicate concentrations of diazinon were less than 0.1 µg/L. This information is not sufficient to adequately assess whether the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard in the Calaveras River. This Order contains new monitoring requirements for diazinon, and may be reopened, and effluent limitations established for diazinon if appropriate, based upon additional data collection. Depending upon the nature of collected data, the Discharger may be required to implement a study and develop source control actions, and/or interim or final point of discharge effluent limitations may be established.

Considering the MEC, the aquatic life beneficial uses, the pesticide and narrative toxicity objectives of the Basin Plan, and the California DFG criteria for diazinon, the discharge to **San Andreas Creek** has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

For discharge to San Andreas Creek, an AMEL and MDEL have been developed for diazinon as shown in the Information Sheet. Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for diazinon. Additionally, based upon the use of current analytical methods, routine monitoring may be unable to determine compliance with these limitations. Analytical methods for compliance monitoring purposes will be specified in this Order. As the narrative toxicity and pesticide objectives are not new objectives, a schedule of compliance for diazinon is not included in this Order.

39. **Carbofuran** is a broad spectrum carbamate insecticide with applications for pest control in various food and feed crops. In Title 22, Table 64444-A of the CCR, the California DHS has established a primary MCL for carbofuran of 18 µg/L The California Office of Environmental Health Hazard Assessment (OEHHA) has established a Public Health Goal for carbofuran in drinking water of 1.7 µg/L. In 1992, the California DFG published an interim criterion to protect freshwater aquatic life of 0.5 µg/L as an instantaneous maximum.

Results of three effluent sampling events indicated one instance where carbofuran was reported as greater than the analytical detection method limit, but less than the method reporting limit, at a detected, but not quantified (DNQ) concentration of 2.51 µg/L. Results from the two other rounds of effluent monitoring indicated carbofuran concentrations were less than 1.3 and less than 1.1 µg/L. Results of two ambient background monitoring events in the Calaveras River indicate concentrations of carbofuran were less than 0.5 µg/L and less than 1.1 µg/L. This information is not sufficient to adequately assess whether the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard. This Order contains new monitoring requirements for carbofuran, and may be reopened, and effluent limitations established for carbofuran if appropriate, based upon additional data collection. Depending upon the nature of collected data, the Discharger may be required to implement a study and develop source control actions, and/or interim or final point of discharge effluent limitations may be established.

40. The Basin Plan provides that the **pH** (of surface waters) shall not be depressed below 6.5 nor raised above 8.5 pH Units. The Basin Plan further provides that changes in normal ambient pH levels shall not exceed 0.5 pH units in fresh waters with designated COLD or WARM beneficial uses. Although the discharge will occur under conditions of 20 to 1 dilution, pH can significantly affect the mobility of metals, and toxicity of ammonia, therefore the existing effluent limitation for pH has been retained in this Order. This Order also retains receiving water limitations and monitoring requirements for pH.

41. At Page III-5.00, the Basin Pan provides surface water quality objectives for **dissolved oxygen** (DO), and states, in part: *For surface water bodies outside the legal boundaries of the Delta, the monthly median of the mean daily dissolved oxygen (DO) concentration shall not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration shall not fall below 75 percent of saturation. The dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time:*

Waters designated WARM 5.0 mg/l
Waters designated COLD 7.0 mg/l
Waters designated SPWN 7.0 mg/l

This Order retains the limitation that the discharge shall not cause the DO of the receiving water to fall below 7.0 mg/l, in support of the COLD and SPWN beneficial uses and associated Basin Plan objective.

42. Effluent and receiving water **temperature** affect numerous water quality conditions including ammonia toxicity (increasing with increasing temperature) and oxygen saturation (decreasing with increasing temperature). Additionally, warm waters may cause detrimental conditions of aquatic aversion or attraction. The Basin Plan states that: "*At no time shall the temperature of... WARM intrastate waters be increased more than 5°F above natural receiving water temperature*". Through the use of the pond system, effluent temperatures are buffered, and under conditions of 20:1 dilution, the potential for the discharge to increase the temperature of the Calaveras River or San Andreas Creek appears unlikely. However, this Order contains receiving water limitations inclusive of the Basin Plan objectives.

43. The Basin Plan states that: "*Waters shall be free of changes in* ***turbidity*** *that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:*

- *Where natural turbidity is between 0 and 5 (NTUs), increases shall not exceed 1 NTU*
- *Where natural turbidity is between 5 and 50 NTU's, increases shall not exceed 20 percent*
- *Where natural turbidity is between 50 and 100 NTU's, increases shall not exceed 10 NTU's*
- *Where natural turbidity is greater than 100 NTU's, increases shall not exceed 10 percent"*

This Order includes effluent and receiving water monitoring requirements for turbidity, and retains receiving water limitations and monitoring requirements for turbidity.

44. The Basin Plan states that "*Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.*" This Order includes effluent monitoring requirements for **oil and grease**.

45. The beneficial uses of the underlying ground water are municipal and domestic, industrial service, industrial process and agricultural supply. The WWTP processes include the use of three polishing ponds, the equalization basin, and the DLDA.

SWRCB Resolution 68-16 requires the Regional Board, in regulating the discharge of waste, to maintain high quality waters of the State (i.e. background water quality) until it is demonstrated that any change in quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Regional Board's policies (e.g. quality that exceeds objectives). Some degradation of groundwater beneath the WWTP and associated DLDA is consistent with Resolution 68-16 provided that:

a. the degradation is confined within a specified boundary;

b. The Discharger minimizes degradation by fully implementing, regularly maintaining, and optimally operating best practicable treatment and control (BPTC) measures;

c. The degradation is limited to waste constituents typically encountered in domestic wastewater as specified in the groundwater limitation in this Order; and,

d. The degradation does not result in water quality less than that prescribed in the Basin Plan.

Some degradation of groundwater by some of the typical waste constituents released with the discharge from a municipal wastewater utility, after effective source control, treatment, and control is consistent with the maximum benefit to the people of the State. The technology, energy, and waste management advantages of municipal utility service far exceed any benefits derived from a community otherwise reliant on numerous concentrated individual wastewater systems, and the impact on water quality will be substantially less. Degradation of groundwater by toxic pollutants other than those typically associated with a WWTP, and by pollutants that can be effectively removed by conventional treatment (e.g. total coliform bacteria) is prohibited. When allowed, the degree of degradation permitted depends upon many factors including; background water quality, the pollutant, the beneficial uses of groundwater and most stringent water quality objective, source control measures, and pollutant treatability. Economic prosperity of the local community is of maximum benefit to the people of the State, and therefore sufficient reason exists to accommodate growth and groundwater degradation around the WWTP, provided that the terms of the Basin Plan including SWRCB Resolution 68-16, are met.

As required by previous Order No. 5-01-118, the Discharger is currently installing a series of three wells to assess and monitor the impact of the discharge on groundwater, if any. This Order includes groundwater limitations that allow groundwater to be degraded when compared to background groundwater quality, but not to exceed water quality objectives. If groundwater quality has been degraded by the operation of the WWTP beyond the quality described above, this Order may be reopened, and specific numeric limitations imposed.

46. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and SWRCB Resolution 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on existing water quality will be insignificant.

47. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

48. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Relations Code Section 21000, et. Seq.), in accordance with Section 13389 of the California Water Code.

49. The Regional Board has considered the information in the attached Information Sheet in developing the Findings of this Order. The attached Information Sheet is part of this Order. Attachments A, B, C, D, E, F, G, and H are also a part of this Order.

50. The Regional Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

51. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

52. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect upon the date of hearing, provided EPA has no objections.

53. Any person adversely affected by this action of the Regional Board may petition the SWRCB to review the action. The petition must be received by the State Board Office of the Chief Counsel, P.O. Box 100, Sacramento, CA 95812-0100, within 30 days of the date the action was taken. Copies of the law and regulations applicable to filing petitions will be provided upon request.

IT IS HEREBY ORDERED that Order No. 5-01-118 is rescinded and that the San Andreas Sanitary District, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations, policies, and plans adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of wastewater at a location or in a manner different from that described in Findings No.(s) 2 - 5, and No. 7 is prohibited.

2. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by Standard Provision A.13. [See attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)"].

3. Neither the discharge nor its treatment shall create a nuisance as defined in Section 13050 of the California Water Code.

4. The discharge of effluent to San Andreas Creek or the Calaveras River is prohibited from **1 May through 31 October** of each year.

5. The discharge of secondary treated effluent to San Andreas Creek in quantities which do not receive a minimum of 20:1 dilution as a daily average (receiving water flow : effluent flow) is prohibited as of **1 April 2006**. The discharge of treated secondary effluent to the Calaveras River in quantities which do not receive a minimum of 20:1 dilution as a daily average (receiving water flow : effluent flow) is prohibited.

B. Effluent Limitations:

1. Secondary treated effluent discharged to **San Andreas Creek** shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average[16]	Monthly Median	Daily Maximum[16]
BOD[1]	mg/L (ppm)	30[2]	45[2]	---	60[2]
	lbs/day[3]	375	563	---	751
Total Suspended Solids	mg/L (ppm)	30[2]	45[2]	---	60[2]
	lbs/day[3]	375	563	---	751
Settleable Solids	ml/l	0.1	---	---	0.2
Total Coliform	MPN/100ml	---	---	23	230
Chlorine Residual	µg/L (ppb)	---	11.0[14]	---	19[15]
	lbs/day[3]	---	0.14	---	0.24
Copper (Total)	µg/L (ppb)	[4]	---	---	[4]
	lbs/day[3]	[5]	---	---	[5]
	µg/L (ppb)	105[8]	---	---	---
	lbs/day[3]	1.3[8]	---	---	---
Zinc (Total)	µg/L (ppb)	[6]	---	---	[6]
	lbs/day[3]	[7]	---	---	[7]
	µg/L (ppb)	510[8]	---	---	---
	lbs/day[3]	6.4[8]	---	---	---
Dichlorobromomethane	µg/L (ppb)	0.56[13]	---	---	1.1[13]
	lbs/day[3]	0.007[13]	---	---	0.014[13]
	µg/L (ppb)	2.1[8]	---	---	---
	lbs/day[3]	0.026[8]	---	---	---
Bis(2-ethylhexyl) phthalate	µg/L (ppb)	1.8	---	---	3.6
	lbs/day[3]	0.023	---	---	0.045
Aluminum (Total)	µg/L (ppb)	83	---	---	143
	lbs/day[3]	1.04	---	---	1.8
Ammonia (Total)	mg/L (ppm)	[9]	---	---	[11]
	lbs/day[3]	[10]	---	---	[12]
Nitrate + Nitrite (as Nitrogen)	mg/L (ppm)	10	---	---	---
	lbs/day[3]	125	---	---	---
Iron	µg/L (ppb)	300	---	---	---
	lbs/day[3]	3.8	---	---	---
Manganese	µg/L (ppb)	50	---	---	---
	lbs/day[3]	0.63	---	---	---
MBAS	µg/L (ppb)	500	---	---	---
	lbs/day[3]	6.3	---	---	---
Diazinon	µg/L (ppb)	0.04	---	---	0.08
	lbs/day[3]	0.0005	---	---	0.001

[1] 5-day, 20°C Biochemical Oxygen Demand.

[2] To be ascertained by a 24-hour composite.

[3] Based upon a wet weather design discharge capacity of 1.5 mgd (*x* mg/L x 8.34 x 1.5 mgd = *y* lbs/day).

[4] Calculate limit based upon Attachment C. Final effluent limitation effective 1 October 2008.

[5] Calculate limit based upon Attachment C, where (*x* mg/L x 8.34 x 1.5 mgd = *y* lbs/day). Final effluent limitation effective 1 October 2008.

[6] Calculate limit based upon Attachment E. Final effluent limitation effective 1 October 2008.

[7] Calculate limit based upon Attachment E, where (*x* mg/L x 8.34 x 1.5 mgd = *y* lbs/day). Final effluent limitation effective 1 October 2008.

[8] Interim limits effective until 30 September 2008.

[9] Concentration limits identified in Attachment G.

[10] Calculate limit based upon Attachment G, where (*x* mg/L x 8.34 x 1.5 mgd = *y* lbs/day).

[11] Maximum one hour average concentration limits identified in Attachment H.

[12] Calculate limit based upon Attachment H, where (*x* mg/L x 8.34 x 1.5 mgd = *y* lbs/day).

[13] Final effluent limitation effective 1 October 2008.

[14] Maximum four day average concentration limitation.

[15] Maximum one hour average concentration limitation.

[16] Except as noted.

2. Any effluent discharged to **San Andreas Creek** that does not receive 20:1 dilution as of **1 April 2006**, must then receive tertiary treatment, shall be oxidized, coagulated and filtered, or equivalent treatment provided, and shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average[16]	7-Day Median	Daily Maximum[16]	Daily Average
BOD[1]	mg/L (ppm)	10	15	---	20	---
	lbs/day[3]	125	188	---	250	---
Total Suspended Solids	mg/L (ppm)	10	15	---	20	---
	lbs/day[3]	125	188	---	250	---
Settleable Solids	ml/l	0.1	---	---	0.2	---
Total Coliform	MPN/100ml	---	---	2.2	23	---
Turbidity	NTU's	---	---	---	5	2
Chlorine Residual	µg/L (ppb)	---	11[14]	---	19[15]	---
	lbs/day[3]	---	0.14	---	0.24	---
Copper (Total)	µg/L (ppb)	[4]	---	---	[4]	---
	lbs/day[3]	[5]	---	---	[5]	---
	µg/L (ppb)	105[8]	---	---	---	---
	lbs/day[3]	1.3[8]	---	---	---	---
Zinc (Total)	µg/L (ppb)	[6]	---	---	[6]	---
	lbs/day[3]	[7]	---	---	[7]	---
	µg/L (ppb)	510[8]	---	---	---	---
	lbs/day[3]	6.4[8]	---	---	---	---
Dichlorobromomethane	µg/L (ppb)	0.56[13]	---	---	1.1[13]	---
	lbs/day[3]	0.007[13]	---	---	0.014[13]	---
	µg/L (ppb)	2.1[8]	---	---	---	---
	lbs/day[3]	0.026[8]	---	---	---	---

Constituents	Units	Monthly Average	Weekly Average[16]	7-Day Median	Daily Maximum[16]	Daily Average
Bis(2-ethylhexyl) phthalate	µg/L (ppb)	1.8	---	---	3.6	---
	lbs/day[3]	0.023	---	---	0.045	---
Aluminum (Total)	µg/L (ppb)	83	---	---	143	---
	lbs/day[3]	1.04	---	---	1.8	---
Ammonia (Total)	mg/L (ppm)	[9]	---	---	[11]	---
	lbs/day[3]	[10]	---	---	[12]	---
Nitrate + Nitrite (as Nitrogen)	mg/L (ppm)	10	---	---	---	---
	lbs/day[3]	125	---	---	---	---
Iron	µg/L (ppb)	300	---	---	---	---
	lbs/day[3]	3.8	---	---	---	---
Manganese	µg/L (ppb)	50	---	---	---	---
	lbs/day[3]	0.63	---	---	---	---
MBAS	µg/L (ppb)	500	---	---	---	---
	lbs/day[3]	6.3	---	---	---	---
Diazinon	µg/L (ppb)	0.04	---	---	0.08	---
	lbs/day[3]	0.0005	---	---	0.001	---

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[1] 5-day, 20°C Biochemical Oxygen Demand.
[2] To be ascertained by a 24-hour composite.
[3] Based upon a wet weather design discharge capacity of 1.5 mgd (x mg/L x 8.34 x 1.5 mgd = y lbs/day).
[4] Calculate limit based upon Attachment C. Final effluent limitation effective 1 October 2008.
[5] Calculate limit based upon Attachment C, where (x mg/L x 8.34 x 1.5 mgd = y lbs/day). Final effluent limitation effective 1 October 2008.
[6] Calculate limit based upon Attachment E. Final effluent limitation effective 1 October 2008.
[7] Calculate limit based upon Attachment E, where (x mg/L x 8.34 x 1.5 mgd = y lbs/day). Final effluent limitation effective 1 October 2008.
[8] Interim limits effective until 30 September 2008.
[9] Concentration limits identified in Attachment G.
[10] Calculate limit based upon Attachment G, where (x mg/L x 8.34 x 1.5 mgd = y lbs/day).
[11] Maximum one hour average concentration limits identified in Attachment H.
[12] Calculate limit based upon Attachment H, where (x mg/L x 8.34 x 1.5 mgd = y lbs/day).
[13] Final effluent limitation effective 1 October 2008.
[14] Maximum four day average concentration limitation.
[15] Maximum one hour average concentration limitation.
[16] Except as noted.

3. Effluent discharged to the **Calaveras River** shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average[13]	Monthly Median	Daily Maximum[13]
BOD[1]	mg/L (ppm)	30[2]	45[2]	---	60[2]
	lbs/day[3]	375	563	---	751
Total Suspended Solids	mg/L (ppm)	30[2]	45[2]	---	60[2]
	lbs/day[3]	375	563	---	751
Settleable Solids	ml/L	0.1	---	---	0.2

Constituents	Units	Monthly Average	Weekly Average[13]	Monthly Median	Daily Maximum[13]
Total Coliform	MPN/100ml	---	---	23	230
Chlorine Residual	µg/L (ppb)	---	11[11]	---	19[12]
	lbs/day[3]	---	0.14	---	0.24
Copper (Total)	µg/L (ppb)	[4]	---	---	[4]
	lbs/day[3]	[5]	---	---	[5]
	µg/L (ppb)	105[8]	---	---	---
	lbs/day[3]	1.3[8]	---	---	---
Zinc (Total)	µg/L (ppb)	[6]	---	---	[6]
	lbs/day[3]	[7]	---	---	[7]
	µg/L (ppb)	510[8]	---	---	---
	lbs/day[3]	6.4[8]	---	---	---
Dichlorobromomethane	µg/L (ppb)	2.1[8]	---	---	---
	lbs/day	0.026[8]	---	---	---
Bis(2-ethylhexyl) phthalate	µg/L (ppb)	13.7[8]	---	---	---
	lbs/day	0.17[8]	---	---	---
Aluminum (Total)	µg/L (ppb)	216	---	---	373
	lbs/day	2.7	---	---	4.7
Ammonia (Total)	mg/L (ppm)	---	---	---	[9]
	lbs/day	---	---	---	[10]

[1] 5-day, 20°C Biochemical Oxygen Demand.

[2] To be ascertained by a 24-hour composite.

[3] Based upon a wet weather design discharge capacity of 1.5 mgd (x mg/L x 8.34 x 1.5 mgd = y lbs/day).

[4] Calculate limit based upon Attachment D. Final effluent limitation effective 1 October 2008.

[5] Calculate limit based upon Attachment D, where (x mg/L x 8.34 x 1.5 mgd = y lbs/day). Final effluent limitation effective 1 October 2008.

[6] Calculate limit based upon Attachment F. Final effluent limitation effective 1 October 2008.

[7] Calculate limit based upon Attachment F, where (x mg/L x 8.34 x 1.5 mgd = y lbs/day). Final effluent limitation effective 1 October 2008.

[8] Interim limits effective until 30 September 2008.

[9] Maximum one hour concentration limits identified in Attachment H.

[10] Calculate limit based upon Attachment H, where (x mg/L x 8.34 x 1.5 mgd = y lbs/day).

[11] Maximum four day average concentration limitation.

[12] Maximum one hour average concentration limitation.

[13] Except as noted.

4. The arithmetic mean of 20°C BOD (5-day) and total suspended solids in effluent samples collected over a monthly period shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

5. The discharge shall not have a pH less than 6.5 nor greater than 8.5.

6. The peak wet weather flow through the trickling filter treatment facility shall not exceed 0.9 mgd.

7. The discharge flow to San Andreas Creek or the Calaveras River shall not exceed 1.5 mgd.

8. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

   Minimum for any one bioassay - - - - - - - - - 70%
   Median for any three or more consecutive bioassays - - - - 90%

C. Discharge Specifications, Flow Equalization Basin, Designated Land Disposal Area:

1. Treated wastewater discharged to the Designated Land Disposal Area shall not exceed the following limits:

Constituents	Units	Monthly Average	Monthly Median	Daily Maximum
BOD[1]	mg/L	40[2]		80[2]
Settleable Solids	mL/L	0.2		0.5
Total Coliform	MPN/100mL		23	230

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[1] 5-day, 20°C biochemical oxygen demand (BOD)
[2] To be ascertained by a 24-hour composite

2. Reclaimed wastewater shall meet the criteria contained in Title 22, Division 4, California Code of Regulations (CCR), Section 60301, et seq.

3. The average dry weather flow through the treatment facility shall not exceed 0.4 mgd.

4. The maximum daily discharge to the Designated Land Disposal Area shall not exceed 0.9 million gallons.

5. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the wastewater treatment and disposal areas or property owned by the Discharger.

6. As a means of discerning compliance with Limitation C.5, the dissolved oxygen content in the upper zone (1 foot) of wastewater in ponds shall not be less than 1.0 mg/L.

7. The effluent polishing ponds shall not have a pH less than 6.5 or greater than 8.5 averaged over any 24-hour period. The effluent storage reservoir shall not have a pH less than 6.5 or greater than 9.0 averaged over any 24-hour period.

8. Ponds shall be managed to prevent breeding of mosquitos. In particular,

   a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

   b. Weeds shall be minimized.

   c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

9. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.

10. Ponds and disposal trenches shall have sufficient capacity to accommodate allowable wastewater flow and design seasonal precipitation and ancillary inflow and infiltration during the irrigation season (May through October). Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. Freeboard in the storage ponds shall never be less than two feet (measured vertically to the lowest point of overflow).

11. There shall be no run off or overflow of effluent outside the Designated Land Disposal Area. The trenches and ponds shall be protected from inundation from the one in one hundred year storm event.

D. Sludge Disposal:

1. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner approved by the Executive Officer, and consistent with *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* as set forth in Title 27, CCR, Division 2, Subdivision 1, Section 20005, et seq.

2. Any proposed change in sludge use or disposal practice from a previously approved practice shall be reported to the Executive Officer and EPA Regional Administrator at least **90 days** in advance of the change.

3. Use and disposal of sewage sludge shall comply with existing Federal and State laws and regulations, including permitting requirements and technical standards included in 40 CFR 503.

   If the State Water Resources Control Board and the Regional Water Quality Control Boards are given the authority to implement regulations contained in 40 CFR 503, this Order may be reopened to incorporate appropriate time schedules and technical standards. The Discharger must comply with the standards and time schedules contained in 40 CFR 503 whether or not they have been incorporated into this Order.

E. Receiving Water Limitations- San Andreas Creek and the Calaveras River:

Receiving Water Limitations are based upon water quality objectives contained in the Basin Plan. As such, they are a required part of this permit. The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 7.0 mg/L (ppm). The monthly median of the mean daily dissolved oxygen concentration at this location shall not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration shall not fall below 75 percent of saturation.

2. Any individual pesticide or combination of pesticides to be present in concentrations that adversely affect beneficial uses, and total identifiable persistent chlorinated hydrocarbon pesticides to be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer.

3. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.

4. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

5. Aesthetically undesirable discoloration.

6. Fungi, slimes, or other objectionable growths.

7. The turbidity to increase as follows:

    a. More than 1 Nephelometric Turbidity Units (NTUs) where natural turbidity is between 0 and 5 NTUs.

    b. More than 20 percent where natural turbidity is between 5 and 50 NTUs.

    c. More than 10 NTUs where natural turbidity is between 50 and 100 NTUs.

    d. More than 10 percent where natural turbidity is greater than 100 NTUs.

8. The normal ambient pH to fall below 6.5, exceed 8.5, or change by more than 0.5 pH units.

9. Deposition of material that causes nuisance or adversely affects beneficial uses.

10. The normal ambient temperature to increase more than 5°F.

11. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations, Title 22; that harm human, plant, animal or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

12. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.

13. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

14. Violations of any applicable water quality standard for receiving waters adopted by the Regional Board, the State Water Resources Control Board, or the U.S. Environmental Protection Agency pursuant to the CWA and regulations adopted thereunder.

15. Taste or odor-producing substances to impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

16. The fecal coliform concentration in any 30-day period to exceed a geometric mean of 200 MPN/100 mL or cause more than 10 percent of total samples to exceed 400 MPN/100 mL.

F. **Groundwater Limitations:** The release of waste constituents from any storage, treatment, or disposal component of the WWTP or DLDA shall not, in combination with other sources, cause the following in groundwater:

1. Beneficial uses to be adversely impacted or water quality objectives to be exceeded.

2. Any constituent concentration, when compared with background, to be incrementally increased beyond the current concentration.

3. Total coliform organisms to equal or exceed a most probable number of 2.2/100 mL over any seven-day period.

G. **Provisions:**

1. The Discharger shall comply with Monitoring and Reporting Program No. R5-2003-0151, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

   When requested by USEPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self Monitoring Reports.

2. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

3. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.

4. The Discharger shall report to the Regional Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "Emergency Planning and Community Right to Know Act of 1986.

5. **Copper, Zinc, Dichlorobromomethane Effluent Limitation Time Schedules**: Effluent Limitations B.1., B.2., and B.3. require the Discharger to comply with new monthly average and daily maximum effluent limitations for CTR Pollutants including total copper, total zinc, and dichlorobromomethane. The new final water quality based effluent limitations for these CTR pollutants required by this Order shall become effective on **1 October 2008**. The Discharger shall comply with the following time schedule in order to study and implement measures necessary to comply with these new limitations, or comply with alternative final limitations developed using a methodology prescribed by Section 1.4 of the SIP:

Task	Compliance Date
Submit Compliance Alternatives Study Workplan	**1 March 2004**
Submit Compliance Alternatives Study Report	**1 July 2005**
Select Alternative(s)	**1 October 2005**
Submit Implementation Plan and Time Schedule for Selected Alternative(s)	**1 January 2006**
Achieve Full Compliance	**1 October 2008**

The Discharger shall submit to the Regional Board on or before each compliance report due date, the specified document or, if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is being reported, the reasons for such noncompliance shall be stated, plus an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

As this schedule is greater than one year, the Discharger shall submit semi-annual progress reports on **15 January** and **15 July** each year until the Discharger achieves compliance with the final water quality based effluent limitations for these pollutants.

6. **Dilution/Mixing Zone Study**: The Discharger shall conduct a *Dilution/Mixing Zone Study* to address requirements of SIP Section 1.4.2, including, but not limited to, whether the

discharge to the Calaveras River is completely or incompletely mixed and mixing zone conditions specified by SIP Section 1.4.2.2. This study shall also specifically address dilution and mixing zone issues as they pertain to final effluent limitations for copper, zinc, dichlorobromomethane, bis(2-ethylhexyl) phthalate, aluminum, ammonia, nitrates + nitrites, iron, manganese, MBAS, and diazinon. This Study shall also include recommendations for receiving water monitoring which can be used to determine compliance with final limitations. Within **one (1) month** of adoption of this Order the Discharger shall complete and submit a *Study Workplan*. The final *Dilution/Mixing Zone Study* shall be completed and submitted within **ten (10) months** of adoption of this Order. The results of this *Study*, in combination with the requirements of Provision E.4., shall be sufficient, considering water year classifications, to conduct the determination of effluent limitations required by Section 1.3 of the SIP and to calculate water quality based effluent limitations in accordance with Section 1.4 of the SIP. In some instances, interim performance-based effluent limits shall be in effect until this *Study* is completed and the permit is reopened to incorporate final effluent limits. This Order may be reopened after review of the final *Study*, and findings and limitations incorporated into the Order as appropriate.

7. **Data Collection, Final/Interim Limits:** The Discharger shall submit within **ten (10) months** of adoption of this Order a ***Pollutant Data Collection Report*** summarizing pollutant data collected pursuant to MRP No. R5-2003-XXX, a part of this Order. This report shall include ambient Calaveras River pollutant data and, in combination with the *Dilution/Mixing Zone Study* requirements of Provision G.6. and results of effluent monitoring, shall be sufficient to calculate final water quality based or performance based interim or final effluent limitations for several constituents including dichlorobromomethane, bis(2-ethylhexyl) phthalate, nitrates + nitrites, iron, manganese, MBAS, diazinon, copper, zinc, aluminum and ammonia. This Order may be reopened upon review of additional data collected pursuant to MRP No. R5-2003-XXX or this summary report to include new findings and limitations if appropriate.

8. **Chronic Toxicity Testing:** The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger shall initiate a Toxicity Identification Evaluation (TIE) to identify the causes of toxicity. Upon completion of the TIE, the Discharger shall submit a workplan to conduct a Toxicity Reduction Evaluation (TRE) and, after Regional Board evaluation, conduct the TRE. This Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if a chronic toxicity water quality objective is adopted by the SWRCB, this Order may be reopened and a limitation based on that objective included.

9. **Adoption of new Minimum Level's (ML's):** Where an approved laboratory analytical method and associated ML cannot, at this time, determine whether a CTR constituent is present in the discharge above the applicable criteria, the Discharger shall resample for these constituents if new ML's are adopted by the SWRCB.

10. **Reopeners:** This Order may be reopened and effluent and/or receiving water limitations modified based on new information, including information on copper, zinc, dichlorobromomethane, bis(2-ethylhexyl) phthalate, aluminum, ammonia, nitrates + nitrites, iron, manganese, MBAS, diazinon, and carbofuran, supplied as required by this Order.

11. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provisions."

12. The Discharger shall use the best practicable control to limit mineralization to no more than a reasonable increment.

13. This Order expires on **15 October 2008** and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 180 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.

14. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of or clearance from the SWRCB (Division of Water Rights).

15. In the event of any change in control or ownership of land or waste discharge facilities recently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

16. To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Regional Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 17 October 2003.

THOMAS R. PINKOS, Executive Officer

Amended : JME

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2003-0151

NPDES NO. CA0079464
FOR
SAN ANDREAS SANITARY DISTRICT
WASTEWATER TREATMENT PLANT
CALAVERAS COUNTY

This Monitoring and Reporting Program is issued pursuant to California Water Code Sections 13267 and 13383. For purposes of evaluating compliance with the limitations of Order No. R5-2003-0151, the Discharger shall conduct monitoring and submit reports as specified below. To evaluate compliance with the limitations of this Order, monitoring should occur within a brief enough period to be able to evaluate the effect of the effluent on the ambient water quality. The Discharger shall not implement any changes to this Program unless and until the Regional Board or Executive Officer issues a revised Monitoring and Reporting Program.

Section 13267 of the California Water Code states, in part, "(a) A regional board, in establishing waste discharge requirements may investigate the quality of any waters of the state within its region" and "(b)(1) In conducting an investigation ... , the regional board may require that any person who ... discharges ... waste ... that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires." This Monitoring and Reporting Program to monitor groundwater and surface water required by Order No. R5-2003-0151 is necessary to assure compliance with Order No. R5-2003-0151. The Discharger operates the facility that discharges waste subject to Order No. R5-2003-0151.

INFLUENT MONITORING
(year-round)

When discharging to San Andreas Creek or the Calaveras River, influent samples shall be collected at approximately the same time as effluent samples and should be representative of the influent. Influent monitoring shall be conducted regardless of whether the discharge is to land or surface waters, and shall include at least the following:

Constituent	**Units**	**Type of Sample**	**Sampling Frequency**
Flow	mgd	Meter	Continuous
20° C BOD_5	mg/L, lbs/day	24 hr. Composite	Weekly
Suspended Solids	mg/L, lbs/day	24 hr. Composite	Weekly
Specific Conductivity[1]	µmhos/cm	Grab	Weekly
pH[1]	pH Units	Grab	Weekly
Ammonia (Total, as N)	mg/L	Grab	Monthly
Aluminum	µg/L, lbs/day	Grab	Monthly
Copper (Total)[2]	µg/L, lbs/day	Grab	Monthly
Zinc (Total)[2]	µg/L, lbs/day	Grab	Monthly
Bis(2-ethylhexyl) phthalate[2]	µg/L, lbs/day	Grab	Monthly
Iron	µg/L, lbs/day	Grab	Monthly
Manganese	µg/L, lbs/day	Grab	Monthly
MBAS	µg/L, lbs/day	Grab	Monthly

Constituent	**Units**	**Type of Sample**	**Sampling Frequency**
Diazinon[3]	μg/L, lbs/day	Grab	Twice Yearly

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[1] Field Measurements.

[2] At a minimum the Discharger shall comply with the Monitoring Requirements for these constituents as outlined in Section 2.3 and 2.4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), adopted 2 March 2000 by the State Water Resources Control Board. For each priority pollutant use an analytical method from the SIP, Appendix 4 with a Minimum Level (ML) below all applicable pollutant criteria. In accordance with Section 2.4.2 of the SIP, the Discharger is to instruct the laboratory analyzing samples for priority pollutants to establish calibration standards so that the ML is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. Report all peaks identified by the EPA test methods

[3] Discharger must submit report outlining sample collection, Analytical test methods, and detection limits within 60 days of permit adoption for approval. Report all peaks identified by the EPA test methods.

EFFLUENT MONITORING
DISCHARGE TO SAN ANDREAS CREEK OR CALAVERAS RIVER

(from ponds when discharging to surface waters)

During the period of 1 November through 30 April of each year, effluent samples shall be collected from the outfall when discharging to San Andreas Creek or the Calaveras River. Effluent samples shall be collected downstream from the last connection through which wastes can be admitted into the outfall to San Andreas Creek or the Calaveras River. Time of collection of samples shall be recorded. Samples collected from the outfall having passed through the poliching ponds, shall be considered adequately composited. The Effluent monitoring shall include at least the following:

Constituents	**Units**	**Type of Sample**	**Sampling Frequency**
Flow	mgd	Meter	Continuous
Chlorine Residual	μg/L/, lbs/day	Grab	Daily
Temperature[1]	°F	Meter	Daily
Dissolved Oxygen[1]	mg/L	Meter	Daily
pH[1, 2]	pH Units	Meter	Daily
20° C BOD$_5$	mg/L, lbs/day	24 hr. Composite	Weekly
Total Suspended Solids	mg/L, lbs/day	24 hr. Composite	Weekly
Settleable Solids	ml/L	Grab	Weekly
Electrical Conductivity @ 25° C[1]	μmhos/cm	Grab	Weekly
Ammonia (Total, as N)	mg/L, lbs/day	Grab	Weekly
Total Coliform Organisms	MPN/100 mL	Grab	Weekly
Copper (Total)[4]	μg/L, lb/day	Grab	Twice Monthly
Zinc (Total)[4]	μg/L, lb/day	Grab	Twice Monthly
Dichlorbromomethane[4]	μg/L, lbs/day	Grab	Twice Monthly
Bis(2-ethylhexyl) phthalate[4]	μg/L, lbs/day	Grab	Twice Monthly
Nitrate + Nitrite	mg/L, lbs/day	Grab	Twice Monthly
Aluminum (Total)	μg/L, lbs/day	Grab	Twice Monthly
Iron (Total)	μg/L, lbs/day	Grab	Twice Monthly
Manganese (Total)	μg/L, lbs/day	Grab	Twice Monthly

Constituent	**Units**	**Type of Sample**	**Sampling Frequency**
MBAS	µg/L, lbs/day	Grab	Twice Monthly
Hardness (as CaCO3) [5]	mg/L	Grab	Twice Monthly
Turbidity	NTU	Grab	Monthly
Oil and Grease	mg/L	Grab	Monthly
Diazinon[7]	µg/L	Grab	Monthly
Acute Toxicity[6]	% Survival	Grab	Quarterly
Standard Minerals[8]	mg/L, as appropriate	Grab	Twice Yearly
Priority Pollutants[4]	[4]	Grab	[9]

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[1] Field Measurements.

[2] Concurrent with ammonia monitoring.

[3] Concurrent with ammonia monitoring.

[4] At a minimum the Discharger shall comply with the Monitoring Requirements for these constituents as outlined in Section 2.3 and 2.4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), adopted 2 March 2000 by the State Water Resources Control Board. For each priority pollutant use an analytical method from the SIP, Appendix 4 with a Minimum Level (ML) below all applicable pollutant criteria. In accordance with Section 2.4.2 of the SIP, the Discharger is to instruct the laboratory analyzing samples for priority pollutants to establish calibration standards so that the ML is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. Report all peaks identified by the EPA test methods.

[5] Concurrent with metals monitoring.

[6] The acute bioassays samples shall be analyzed using EPA-821-R-02-012, Fifth Edition, or later amendment with Board staff approval. Temperature and pH shall be recorded at the time of bioassay sample collection. Test species shall be fathead minnows (Pimephales promelas).

[7] Discharger must submit report outlining sample collection, Analytical test methods, and detection limits within 60 days of permit adoption for approval. Report all peaks identified by the EPA test methods.

[8] Standard Minerals shall include pH, hardness, silica, calcium, magnesium, hardness, phosphate, sodium, potassium, bicarbonate alkalinity, carbonate alkalinity, sulfate, and chloride and include verification that the analysis is complete (i.e. cation/anion balance).

[9] Priority Pollutant monitoring to be conducted twice during the life of the permit.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples and be collected only during time of discharge to surface waters. When discharge occurs to San Andreas Creek, the Discharger shall monitor receiving water stations R-1 and R-2. When discharge occurs to the Calaveras River, the Discharger shall monitor receiving water stations R-3 and R-4. Receiving water monitoring shall include:

Station	Description
R-1	100 feet upstream from the point of discharge in San Andreas Creek
R-2	500 feet downstream from the point of discharge in San Andreas Creek
R-3	100 feet upstream from the point of discharge in the Calaveras River
R-4	Downstream from the point of discharge in the Calaveras River, at defined edge of Mixing Zone

Constituents	**Units**	**Station**	**Sampling Frequency**
Flow	cfs or mgd	R-1 or R-3	Daily
Dilution Factor	River Flow/Effluent Flow	R-1 or R-3/Effluent	Daily
Dissolved Oxygen[1]	mg/L	R-1 and R-2 or R-3 and R-4	Weekly
Temperature[1]	°F	R-1 and R-2 or R-3 and R-4	Weekly
Electrical Conductivity @25°C[1]	μmhos/cm	R-1 and R-2 or R-3 and R-4	Weekly
pH[1,2]	pH Units	R-1 and R-2 or R-3 and R-4	Weekly
Turbidity	NTU	R-1 and R-2 or R-3 and R-4	Twice Monthly
Hardness, as CaCO3[5]	mg/L	R-1 or R-3	Twice Monthly
Fecal Coliform Organisms	MPN/100 ml	R-1 and R-2 or R-3 and R-4	Monthly
Ammonia (Total as N)	mg/L	R-1 and R-2 or R-3 and R-4	Monthly
Copper (Total)[4]	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
Zinc (Total)[4]	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
Dichlorbromomethane[4]	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
Bis(2-ethylhexyl) phthalate[4]	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
Nitrate + Nitrite	mg/L	R-1 and R-2 or R-3 and R-4	Monthly
Aluminum (Total)	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
Iron (Total)	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
Manganese (Total)	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
MBAS	μg/L	R-1 and R-2 or R-3 and R-4	Monthly
Diazinon[6]	μg/L	R-1 and R-2 or R-3 and R-4	Monthly

Constituents	**Units**	**Station**	**Sampling Frequency**
Priority Pollutants[4]	[4]	R-1/R-3	[7]

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[1] Field Measurements.
[2] Concurrent with ammonia monitoring.
[3] Concurrent with ammonia monitoring.
[4] At a minimum the Discharger shall comply with the Monitoring Requirements for these constituents as outlined in Section 2.3 and 2.4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), adopted 2 March 2000 by the State Water Resources Control Board. For each priority pollutant use an analytical method from the SIP, Appendix 4 with a Minimum Level (ML) below all applicable pollutant criteria. In accordance with Section 2.4.2 of the SIP, the Discharger is to instruct the laboratory analyzing samples for priority pollutants to establish calibration standards so that the ML is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. Report all peaks identified by the EPA test methods.
[5] Concurrent with metals monitoring.
[6] Discharger must submit report outlining sample collection, Analytical test methods, and detection limits within 60 days of permit adoption for approval. Report all peaks identified by the EPA test methods.
[7] Priority Pollutant monitoring to be conducted twice during the life of the permit.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations R-1 and R-2 when discharging to San Andreas Creek, or R-3 and R-4 when discharging to the Calaveras River. Attention shall be given to the presence of:

a. Floating or suspended matter
b. Discoloration
c. Bottom deposits
d. Aquatic life
e. Visible films, sheens or coatings
f. Fungi, slimes, or objectionable growths
g. Potential nuisance conditions

Notes on receiving water conditions shall be summarized in the monitoring reports.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing toxicity to San Andreas Creek or the Calaveras River. The testing shall be conducted as specified in USEPA Method EPA-821-R-02-013, Fourth Edition, or later amendment. Chronic toxicity samples shall be collected at the outfall prior to its entering either San Andreas Creek or the Calaveras River. Grab samples shall be representative of the volume and quality of the discharge. Time of collection samples shall be recorded. The effluent tests must be conducted with concurrent reference toxicant tests. Both the reference toxicant and effluent test must meet all test acceptability criteria as specified in the chronic manual. If the test acceptability criteria are not achieved, then the Discharger must re-sample and re-test within 14 days. Chronic toxicity monitoring shall include the following:

Species:	*Pimephales promelas, Ceriodaphnia dubia, and Selenastrum capricornutum*
Frequency:	Annually

The Discharger shall conduct the chronic toxicity test using two controls and a minimum of 5 effluent concentrations, using the dilution series listed below:

Dilution Series:	Dilutions (%)					Controls	
	100	50	25	12.5	6.25	Creek or River Water	Lab Water
% Effluent	100	50	25	12.5	6.25	0	0
% Dilution Water*	0	50	75	87.5	93.75	100	0
% Lab Water	0	0	0	0	0	0	100

* Dilution water shall be receiving water from San Andreas Creek or the Calaveras River taken upstream from the discharge point.

DISCHARGE TO LAND

The following shall constitute the minimum monitoring of effluent discharged to the Designated Land Disposal Area.

Constituents	Units	Type of Sample	Sampling Frequency
20°C BOD_5	mg/L	24 hr. Composite	Weekly
Settleable Solids	ml/L	Grab	Weekly
Total Coliform Organisms	MPN/100 mL	Grab	Weekly
Electrical Conductivity @25°C	µmhos/cm	Meter	Weekly
Flow to storage ponds	mgd	Meter	Continuous
Flow to disposal trenches	mgd	Meter	Daily

SLUDGE MONITORING

A composite sample of sludge shall be collected annually in accordance with EPA's POTW Sludge Sampling and Analysis Guidance Document, August 1989, and tested for the following metals:

Cadmium
Chromium
Copper
Lead
Nickel
Zinc

Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

GROUNDWATER MONITORING

The Discharger shall conduct a groundwater-monitoring program to determine whether wastewater treatment and storage units are impacting underlying groundwater. Monitoring of the three groundwater-monitoring wells (1 up gradient and 2 down gradient) shall be initiated by **1 January 2004**, to assess the groundwater quality down gradient from the treatment plant, storage basins and wastewater disposal trenches, and shall include at least the following:

Constituents	**Units**	**Frequency**
Ground water elevation[1]	feet	Quarterly
Electrical conductivity	µmhos/cm	Quarterly
Total Dissolved Solids	mg/L	Semi-annually
pH	pH units	Quarterly
Total coliform organisms	MPN/ 100 ml	Semi-annually
Nitrate (as N)	mg/L	Semi-annually
Standard Minerals[2]	mg/L	Every odd year

[1] The groundwater elevation shall be used to calculate the direction and gradient of ground water flow, which must be reported.

[2] Standard Minerals shall include pH, hardness, silica, calcium, magnesium, hardness, phosphate, sodium, potassium, bicarbonate alkalinity, carbonate alkalinity, sulfate, and chloride and include verification that the analysis is complete (i.e. cation/anion balance).

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Water supply monitoring shall include at least the following:

Constituents	**Units**	**Sampling Frequency**
Standard Minerals[3]	mg/L	Annually[1]
Electrical Conductivity[2] @ 25°C	µmhos/cm	Annually
Total Dissolved Solids	mg/L	Annually

[1] Concurrent with effluent and receiving water samples.

[2] If the water supply is from more than one source, the EC shall be reported as a weighted average and include copies of supporting calculations.

[3] Standard Minerals shall include pH, hardness, silica, calcium, magnesium, hardness, phosphate, sodium, potassium, bicarbonate alkalinity, carbonate alkalinity, sulfate, and chloride and include verification that the analysis is complete (i.e. cation/anion balance).

REPORTING

Monitoring reports shall be submitted to the Regional Board by the **first day** of the second month following sample collection. Annual monitoring results shall be submitted by the **first day of the second month following each calendar year,** respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements. The highest daily maximum for the month, monthly and weekly averages, and medians, and should be determined and recorded.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **1 February** of each year, the Discharger shall submit a written report to the Executive Officer containing the following:

a. The names, certificate grades, and general responsibilities of all persons employed at the WWTP (Standard Provision A.5).

b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

c. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.6).

d. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

The Discharger may also be requested to submit an annual report to the Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of (Standard Provision D.6).

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered By: THOMAS R. PINKOS, Executive Officer

17 October 2003
(Date)

JME

INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2003-0151
SAN ANDREAS SANITARY DISTRICT
SAN ANDREAS WASTEWATER TREATMENT PLANT
CALAVERAS COUNTY

Site Description and Background

The San Andreas Sanitary District Wastewater Treatment Plant (WWTP) is a publicly owned and operated facility located in San Andreas, Calaveras County. The San Andreas Sanitary District was formed as a public agency in the early 1950's. The District includes all of San Andreas as well as some outside areas, encompassing approximately 1,260 acres. The WWTP provides sewer services to approximately 2,700 residents. There are approximately 1140 service connections, of which approximately 1000 are residential users and 140 are commercial users. No industries are connected to the system. San Andreas is the county seat of Calaveras County and experiences a substantial influx in population during the day because of the high school, government centers and tourism.

The District (hereafter Discharger) has made significant improvements to the treatment facilities in 1969 and in 1982, which were paid with public funds (Bonds) that are currently being repaid through monthly user fees and property taxes. Funds provided in a grant from the State Water Resources Control Board (SWRCB) in November 1992 were used for the rehabilitation of the headworks and the primary clarifier, and expansion of the trickling filter. These modifications were completed during the summer and fall of 1994. In 1994, grant funding from the State of California Small Community Grant Program was used to increase the WWTP's wet weather capacity. The Discharger's collection system was experiencing high inflow/infiltration during the wet weather in excess of the treatment plant capacity. State funding was used to construct bypass appurtenances above both the primary clarifier and trickling filter. Peak flows in excess of the treatment capacity of either treatment component may now be bypassed to an irrigation basin which was converted to a wet weather equalization holding basin. Excess wastewater is now stored during high flow events, and is pumped back to the headworks for treatment when excess influent flows subside.

The Discharger's collection system consists of approximately 18 miles of publicly owned sanitary sewer pipe ranging in size from 4 inches to 12 inches. The Discharger also maintains five lift stations. The current average dry weather flow to the treatment plant is approximately 0.3 million gallons per day (mgd). Actual peak influent flows have not exceeded 0.9 mgd since the Discharger completed various inflow/infiltration corrective actions in the 1990's. The Discharger has implemented a continuing sewer line preventative maintenance program, which includes video surveillance of the sewer lines and cleaning and repairs as necessary. The average dry weather flow capacity of the WWTP is currently 0.4 mgd. The design flow capacity of the main WWTP is 0.9 mgd. As currently configured, the design hydraulic capacity of the WWTP is 1.5 mgd (0.9 mgd in the main WWTP treatment train + 0.6 mgd in the peak flow treatment train).

Treatment Plant Description

The WWTP components include a grit removal chamber, mechanical screen (for solids removal) Parshall flume, flow metering, storm flow by-pass device for diverting excessive storm inflow to the high flow treatment system and storage reservoir, pre-aeration basin, primary clarifier, re-circulating trickling filter, secondary clarifier, sodium hypochlorite contact chamber, sodium bisulfite dechlorination unit, heated unmixed anaerobic digester, sludge drying beds, three post-secondary effluent polishing ponds, and a 6 million gallon storage reservoir. A diesel power generator is on site and used in the event of electrical power loss. The Plant lay out and wastewater flow diagram is shown in Attachment A, a part of this Order.

Dry Season Discharge (1 May – 31 October)
Disposal of treated wastewater is accomplished exclusively to land from 1 May through 31 October of each year. The Discharger owns approximately 180 acres of land for disposal, known as the Dedicated Land Disposal Area (DLDA). Presently, the Discharger uses about 70 of those acres, as the other 110 acres were recently purchased and are currently unimproved land. The treated wastewater is first held in the effluent storage reservoir, then pumped to on-site evaporation, transpiration and percolation ditches. The disposal ditches have a total length of approximately two miles, and vary in depth from about 1.5 to 3.0 feet and in width from about 2 to 4 feet. Storm water run off, or excess effluent from the trenches is returned to the storage reservoir via a return ditch. Vegetation control in the DLDA is accomplished through prescribed burns by the local public fire agency.

Wet Season Discharge (1 November – 30 April)
From 1 November through 30 April, secondary treated effluent is discharged to the DLDA to the extent feasible. Treated effluent that cannot be discharged to land is currently discharged to San Andreas Creek, a tributary to Murray Creek, a tributary of the North Fork of the Calaveras River. Using the effluent polishing ponds for storage, the WWTP is capable of discharging up to a maximum of 1.5 mgd of treated effluent depending upon receiving water flows and considering the minimum 20:1 dilution requirement. Discharge to surface waters is prohibited during the period of 1 May through 31 October of each year.

The discharge to San Andreas Creek is disinfected secondary treated wastewater, which requires that adequate dilution water be available in the creek at the time of discharge. Previous Order No. 5-01-118 required the Discharger to install a stream gauge monitor in Murray Creek to assure that when discharges occur, the stream flows of the creek would provide at least a 20:1 (receiving water:effluent) dilution ratio. The Department of Health Services has recommended that discharges of secondary treated domestic wastewater, when not diluted by receiving water flows of at least 20:1, be tertiary treated to reduce the concentration of human pathogens.

In previous Order No. 5-01-118, the Discharger proposed moving the point of effluent discharge from San Andreas Creek, to Murray Creek, where it was expected that a larger watershed would provide for higher sustained flows and a consistent minimum 20:1 dilution ratio. After installing a stream gauge monitor on Murray Creek, the Discharger determined that moving the effluent discharge point downstream from San Andreas Creek to Murray Creek might not result in a consistent minimum 20 to 1 dilution of receiving water to effluent recommended by the California Department of Health Services. The Discharger subsequently completed studies to evaluate all available effluent disposal options. In the February 2003 Effluent Disposal Options Assessment Report, the Discharger considered reclamation, land disposal, winter only surface water discharge, and year-round surface water discharge options. Results of this report indicate viable reclamation alternatives do not exist, and the complete containment of wastewater on land during typical wet winters is infeasible. Considering these findings, and the location of the WWTP in the rolling hills of the Sierra Foothills, this Report concluded that dry season land disposal, combined with maximizing winter land disposal supplemented with a winter surface water discharge was the superior option with regards to public health, the environment, and economics. For the wet season surface water discharge portion of this option, the Discharger determined that moving the point of effluent discharge downstream in the watershed, to the confluence of Murray Creek and the North Fork of the Calaveras River, would provide a consistent minimum dilution of 20 to 1 throughout the wet season period of discharge. The Discharger has proposed moving the discharge location from San Andreas Creek to the Calaveras River 1 November 2004. The Discharger has also proposed that the water will enter the Calaveras River via a 'cross river diffuser'.

A California Environmental Quality Act (CEQA) Mitigated Negative Declaration was prepared by the Discharger in support of the proposal to move the point of effluent discharge downstream to the Calaveras River. This Mitigated Negative Declaration was approved by the Lead Agency (the Discharger) on 19 March 2003. The Discharger has filed the Notice of Determination with the County Clerk and Office of Planning and Research.

Beneficial Uses

Calaveras River
The existing **beneficial uses** of the Calveras River, from its source to New Hogan Reservoir, as identified in Table II-1 of the Basin Plan include; body contact recreation, canoeing and rafting, (REC-1); and other non-body contact recreation (REC-2); warm freshwater aquatic habitat (WARM); cold freshwater aquatic habitat (COLD); migration of aquatic organisms (MIGR) in warm habitat, warm and cold habitat spawning, reproduction, and/or early development (SPWN); and wildlife habitat (WILD). Agricultural supply (AGR) including both irrigation and stock watering, is not identified in Table II-1 of the Basin Plan as an existing beneficial use of the Calaveras River. However, active water rights permits (stockwatering), have been identified downstream of the point of discharge along Murray Creek and the North Fork Calveras River. The Regional Board is required to apply the beneficial uses of municipal and domestic supply to the Calaveras River based on SWRCB Resolution No. 88-63 which was incorporated into the Basin Plan pursuant to Regional Board Resolution 89-056. In addition, State Board Resolution No. 88-63, incorporated into the Basin Plan pursuant to Regional Board Resolution No. 89-056, provides that "*Where a a body of water is not currently designated as MUN* (municipal and domestic supply beneficial use) *but, in the opinion of a Regional Board, is presently or potentially suitable for MUN, the Regional Board shall include MUN in the beneficial use designation.*" Based upon ambient receiving water data collected by the Discharger, the North Fork Calveras River, from its source to New Hogan Reservoir, is suitable for MUN, therefore the MUN use is also designated as a beneficial use of this water body. Also, the State Water Resources Control Board (State Board) maintains an active water rights permit for domestic and irrigation supply use from New Hogan Reservoir, downstream of the discharge.

The Basin Plan on page II-1.00 states: "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning…" and with respect to disposal of wastewaters states that "... disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses."

San Andreas Creek/Murray Creek

The Basin Plan at page II-2.00 states that: "Existing and potential beneficial uses that currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1. The beneficial uses of any specifically identified water body generally apply to its tributary streams." The Basin Plan does not specifically identify beneficial uses for San Andreas or Murray Creek, but the Basin Plan does identify existing beneficial uses for the Calaveras River, as noted above, to which they are tributary.

In reviewing what existing beneficial uses that may apply to San Andreas Creek and Murray Creek, the Regional Board has considered the following facts:

a. *Domestic, Municipal, and Agricultural Irrigation Supply*

The Regional Board is required to apply the beneficial uses of municipal and domestic supply to San Andreas Creek and Murray Creek based on SWRCB Resolution No. 88-63 which was incorporated into the Basin Plan pursuant to Regional Board Resolution 89-056. The State Water Resources Control Board (SWRCB) has issued water rights permits to existing water users along Murray Creek and the Calaveras River downstream of the discharge for domestic and irrigation uses. Since San Andreas Creek and Murray Creek are ephemeral streams, the creeks likely provide groundwater recharge during periods of low flow. The groundwater is a source of drinking water. In addition to the existing water uses, growth in the area, downstream of the discharge is expected to continue, which presents a potential for increased domestic and agricultural uses of the water in San Andreas Creek and Murray Creek.

b. *Groundwater Recharge*

In areas where groundwater elevations are below the stream bottoms, water from the streams will percolate to groundwater. Since San Andreas Creek and Murray Creek are at times almost dry, it is reasonable to assume that the stream water is lost by evaporation, flow downstream and percolation to groundwater thereby providing a source of domestic, municipal, and irrigation water supply.

c. *Freshwater Replenishment*

When water is present in San Andreas Creek and Murray Creek, there is hydraulic continuity between San Andreas Creek, Murray Creek and the Calaveras River. During periods of hydraulic continuity, San Andreas and Murray Creeks add to the water quantity and may impact the quality of water flowing downstream in the Calaveras River.

d. *Water Contact and Non-Contact Recreation and Esthetic Enjoyment*

The Regional Board finds that the discharge flows through areas where there is ready public access to San Andreas and Murray Creek. Exclusion of the public is unrealistic and contact recreational activities currently exist along the creeks. These uses are likely to increase as the population in the area grows.

e. *Preservation and Enhancement of Fish, Wildlife and Other Aquatic Resources.*

San Andreas Creek and Murray Creek flow to the Calaveras River. The California Department of Fish and Game (DFG) has verified that the fish species present in San Andreas and Murray Creeks and downstream waters are consistent with both cold and warm water fisheries, and that a cold water species has been found both upstream and downstream of the wastewater treatment plant. The Basin Plan (Table II-1) designates the Calaveras River source to New Hogan Reservoir, as being both a cold and warm freshwater habitat. Therefore, pursuant to the Basin Plan (Table II-1, Footnote (2)), the cold designation applies to San Andreas and Murray Creeks. The cold-water habitat designation necessitates that the in-stream dissolved oxygen concentration be maintained at, or above, 7.0 mg/l. This approach recognizes that, if the naturally occurring in-stream dissolved oxygen concentration is below 7.0 mg/l, the Discharger is not required to improve the naturally occurring level.

Upon review of the flow conditions, habitat values, existing and potential beneficial uses of the Calaveras River, and the facts described above, the Regional Board finds that the beneficial uses identified in the Basin Plan for the Calaveras River, from it's source to New Hogan Reservoir, are applicable to San Andreas Creek and Murray Creek. In addition, beneficial uses not specifically identified in the Basin Plan, as indicated above, exist or potentially exist in San Andreas Creek and Murray Creek and must be protected.

The Board also finds that based on the available information and on the Discharger's application, that San Andreas Creek and Murray Creek, absent the discharge, are at times ephemeral streams. At other times, natural flows within San Andreas Creek and Murray Creek help support the cold-water aquatic life. Both conditions may exist within a short time span, where the Creeks would be dry without the discharge and periods when sufficient background flows provide hydraulic continuity with the Calaveras River. Dry conditions occur primarily in the summer months, but dry conditions, and low flow conditions, may also occur throughout the year, particularly in low rainfall years. The lack of dilution results in more stringent effluent limitations to protect contact recreational uses, drinking water-related uses, agricultural water uses, and aquatic life. Significant dilution may occur during and immediately following high rainfall events.

New Information- CTR/NTR and Other Pollutants
On 10 September 2001 the Executive Officer of the Regional Board issued a letter pursuant to Section 13267 of the California Water Code (CWC) requiring all NPDES Dischargers to conduct effluent and receiving water monitoring and submit results of this monitoring in accordance with a time schedule provided in the letter. The Discharger conducted a study to determine whether levels of NTR, CTR, or other pollutants in the discharge have the reasonable potential to cause or contribute to an in-stream excursion above a numeric or narrative water quality standard, including Basin Plan numeric or narrative objectives. Results of this study were submitted in March 2003 with the new Report of Waste Discharge (RWD) that proposed moving the point of discharge to the Calaveras River.

Consideration of Effluent and Receiving Water Limitations

Evaluation of Dilution Credit

San Andreas Creek/Murray Creek
While the Discharger has proposed moving the point of effluent discharge downstream to the Calaveras River, extension of the pipeline and completion of the project will not be complete until at least November 2004. Until that time, the Discharger will continue to discharge treated effluent during the wet season at the historical location in San Andreas Creek. Only limited information regarding flows in San Andreas Creek or Murray Creek is available, and no information is available regarding critical flow conditions or flow conditions during extended dry periods. Limited flow data from Murray Creek indicates that a consistent 20:1 dilution ratio cannot be maintained during all flow conditions. Considering the limited watershed supporting San Andreas Creek and Murray Creek, it is likely that flows during a dry fall/winter period could be negligible. Considering these conditions, and given the new information on pollutant concentrations in the effluent, the reasonable potential analysis for pollutants in the effluent discharged to San Andreas Creek, and the development of associated effluent limitations, was accomplished considering no credit for dilution.

Previous Order No. 5-01-118 included a time schedule requiring tertiary treatment of any effluent discharged that does not receive 20:1 dilution by **1 April 2006**. This Order retains that time schedule.

Calaveras River
This Order requires a minimum dilution ratio of 20:1 (receiving water to effluent) for the discharge of treated secondary effluent to the Calaveras River. Development and consideration of dilution credits in establishing and determining compliance with water quality-based effluent limitations for priority pollutants is described in Section 1.4.2. of the SIP. Dilution credit, mixing zones and mixing zone analyses methods are also presented in Section 2 and Section 4 of the TSD. Considering minimum dilution ratio of 20:1 required by this Order, a maximum dilution credit of 20 has been used in accomplishing the reasonable potential analysis and developing effluent limitations where appropriate.

As the outfall and diffuser configuration and design have not been completed, the Discharger shall be required, prior to commencing the discharge, to conduct a *Dilution/Mixing Zone Study* to verify complete mixing of the discharge and characterize the extent of actual dilution. Points in the receiving water where the applicable criteria/objective shall be met must also be defined in this study. This Order may be reopened if the study indicates the discharge is not completely mixed, or if site specific conditions concerning the discharge and the receiving water indicate that a smaller dilution credit is necessary to protect beneficial uses and meet the conditions of the SIP. This study shall be completed prior to discharge from the new outfall to the Calaveras River.

Concerning mixing zones, the SIP provides that a mixing zone shall be as small as practicable, and "*The following conditions shall be met in allowing a mixing zone:*

A. A mixing zone shall not:
  (1) compromise the integrity of the entire waterbody;

(2) cause acutely toxic conditions to aquatic life passing through the mixing zone;
(3) restrict the passage of aquatic life
(4) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;
(5) produce undesirable or nuisance aquatic life;
(6) result in floating debris, oil, or scum;
(7) produce objectionable color, odor, taste, or turbidity;
(8) cause objectionable bottom deposits;
(9) cause nuisance;
(10) dominate the receiving water body or overlap a mixing zone from different outfalls; or
(11) be allowed at or near any drinking water intake.. "

Considering these conditions, where applicable, maximum daily effluent limitations have been developed for discharge to the Calaveras River considering acute criteria, an acute waste load allocation, and no dilution credit, to prevent acutely toxic conditions at the point of discharge. Also where applicable, average monthly effluent limitations have been developed considering chronic criteria, a chronic wasteload allocation, and available dilution.

Consideration of Technology Based Effluent Limitations/Previous Permit Limits

Conventional Pollutants- Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS)
Technology-based treatment requirements under section 301(b) of the CWA represent the minimum level of control that must be imposed in a permit issued under section 402 of the CWA. Regulations promulgated at 40 CFR 122.44 (a) require technology-based effluent limitations to be placed in NPDES permits based on national effluent limitations guidelines and standards, best professional judgment (BPJ), or a combination of the two.

40 CFR Part 133 provides information on the level of effluent quality attainable through the application of secondary of equivalent treatment. 40 CFR Part 133.102 describes the minimum level of effluent quality attainable in terms of the parameters for biochemical oxygen demand (BOD), suspended solids (SS), and pH.

	BOD (mg/l)	**Suspended Solids (mg/l)**
30 Day Average	30	30
7 Day Average	45	45
30 Day Average % Removal	85%	85%

Effluent pH shall be maintained between 6.0 and 9.0

Results of monitoring indicate the Discharger is capable of meeting these limitations. Effluent limitations for these conventional pollutants using these levels of effluent quality established in 40 CFR Part 133.102 have been retained in the Order.

Disinfection
Previous Order No. 5-01-118 included an effluent limitation for total coliform, with a total coliform count not to exceed 23 MPN (Most Probable Number)/100 ml (milliliters) as a monthly median limitation, and 230 MPN/100ml as a daily maximum, with 20:1 dilution. These limitations were established considering recommendations from the California Department of Health Services. Beneficial uses of the Calaveras River, San Andreas Creek, and Murray Creek include body contact recreation (REC-1) and other non-contact recreation (REC-2), and public access is not restricted up or downstream in the vicinity of the discharge. Other beneficial uses include agricultural supply (AGR) and municipal and domestic supply (MUN). The limitations of Order No. 5-01-118 are retained in this new Order. As noted previously, limited flow information from San Andreas Creek and Murray Creek indicate there may be instances where the dilution ratio falls below 20:1. As noted previously, this Order includes a time schedule requiring tertiary treatment of any effluent discharged that does not receive 20:1 dilution by 1 April 2003.

Consideration of Water Quality-Based Effluent Limitations
Federal regulations, 40 CFR Part 122.44 (d)(1)(i), require that NPDES permit effluent limitations must control all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above any State water quality standard, including any narrative criteria for water quality. Beneficial uses, together with their corresponding water quality objectives or promulgated water quality criteria, can be defined per federal regulations as water quality standards.

The Porter Cologne Water Quality Control Act defines water quality objectives as *"...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area"*. Water quality objectives designed to protect beneficial uses and prevent nuisances are found in the Basin Plan, and may be stated in either numerical or narrative form.

In determining whether a discharge has the reasonable potential to contribute to an in-stream excursion, the dilution of the effluent in the receiving water may be considered where areas of dilution are defined. The available dilution may also be used to calculate protective effluent limitations by applying water quality criteria at the edge of the defined mixing zone. These calculations include receiving water pollutant concentrations which are typically based on worst-case conditions for flow and concentration.

If limited or no dilution is available, effluent limitations are set equal to the applicable water quality objective or criteria which are applied at the point of discharge so the discharge will not cause the receiving stream to exceed water quality objectives or promulgated criteria established to protect the beneficial uses. In situations where receiving water flows are substantially greater than effluent flows, as is required for the discharge to the Calaveras River, dilution may be considered in establishing effluent limitations. However, when a receiving water is impaired by a particular pollutant or stressor, limited or no pollutant assimilative capacity may be available in spite of the available dilution. In these instances, and depending upon the nature of the pollutant, effluent limitations may be set equal to or less than the applicable water quality objectives or criteria which are applied at the point of discharge such that the discharge will not cause or contribute to the receiving stream excursion above water quality objectives or promulgated criteria established to protect the beneficial uses. At this time, the characteristics of the effluent and receiving water mixing zone in the Calaveras River have not been fully defined.

Priority Pollutants
Section 1.3 of the SIP requires a water quality based effluent limitation when the maximum effluent concentration (MEC) or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion. Based upon the study conducted by the Discharger, the MEC's of copper, zinc, dichlorobromomethane, and bis(2-ethylhexyl) phthalate have exceeded applicable pollutant criteria of the CTR/NTR. Therefore, water quality-based effluent limitations for these pollutants are required.

When required, Section 1.4 of the SIP provides four methods that may be used to develop effluent limitations. These four methods include: (1) assigning a loading allocation based upon a completed TMDL; (2) use of a steady state model; (3) use of a dynamic model; or, (4) establishing effluent limitations that consider intake water pollutants.

Water quality-based effluent limitations have been developed in this Order using the steady state model described in Section 1.4 of the SIP and the TSD. Since the discharge is permitted only under conditions of a minimum of 20:1 dilution, development of these limitations has, where applicable, considered dilution of the receiving water for pollutants with demonstrated assimilative capacity.

Data Adjustments
In most situations, USEPA's NPDES regulations require that limits for metals in permit's be stated as total recoverable. Since most water quality criteria are expressed in the dissolved form, it is necessary to translate between dissolved metal in ambient waters and total recoverable metal in effluent. USEPA guidance on the use of translators provides three options including, (1) assuming the translator equivalent to the criteria guidance conversion factor, (2) developing a translator directly as the ratio of dissolved to total recoverable metal, and/or, (3) developing a translator through the use of a partioning coefficient. Reasonable potential analysis for this permit was conducted using the first option, applying criteria guidance conversion factors. To assure that metals criteria are appropriate for the chemical conditions under which they are applied, USEPA also provides for adjustment of the criteria through application of the water-effect ratio (WER). The WER approach compares bioavailability and toxicity of a specific pollutant in receiving waters and in laboratory waters. For this permit, reasonable potential analysis was conducted using a WER default value of 1.

Effluent Limitations, CTR/NTR Aquatic Life Criteria

Copper
In studies conducted by the Discharger, the MEC for total copper was reported as 35 μg/L (ppb). The minimum hardness of the effluent was reported as 68 mg/L (ppm) hardness as CaCO3. This MEC exceeds the adjusted freshwater aquatic life water quality acute (Criterion Maximum Concentration, CMC) and chronic (Criterion Continuous Concentration, CCC) criteria for copper established in the USEPA's California Toxics Rule (9.7 μg/L (ppb) and 6.7 μg/L (ppb), respectively at 68 mg/L hardness

as CaCO3). As noted above, Section 1.3 of the SIP requires water quality-based effluent limitations when the maximum effluent concentration (MEC) or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion.

The maximum observed ambient background concentration (B) of total copper in the Calaveras River was reported as 1.8 µg/L (ppb), with a minimum observed ambient background hardness reported as 60 mg/L (as CaCO3). Considering the total copper adjusted freshwater aquatic life acute and chronic criteria at 60 mg/L hardness are 8.7 µg/L (ppb) and 6.0 µg/L (ppb) respectively, the data indicate that the Calaveras River does have assimilative capacity for copper.

To prevent acutely toxic conditions at the point of discharge to the Calaveras River and in the zone of initial dilution, a table expressing the maximum daily effluent limitation (MDEL) has been developed for copper considering the acute aquatic life criterion (CMC) without consideration of dilution. In accordance with Section 1.4 of the SIP, the acute effluent concentration allowance (ECA) shall be set equal to the CMC, adjusted using the observed corresponding effluent hardness. Effluent hardness is used in lieu of the receiving water hardness for the adjustment of the CMC since no credit was provided for dilution. As the number of data points for the calculation is less than 10, a default coefficient of variation (CV) of 0.6 shall be used in the calculation until sufficient data is collected. The MDEL shall be calculated using the CV and the multipliers in Tables 1 and 2 of the SIP as shown below:

WATER QUALITY -BASED MDEL- Calaveras River	
Copper (Total)	
ECA $_{acute}$	CMC @ Observed Effluent Hardness as CaCO3
Coefficient of Variation (Default)	0.6
LTA $_{(acute)}$	(ECA $_{acute}$ *Table 1 Acute Multiplier)
Sampling Frequency (n)	≤ 4
MDEL	(LTA*Table 2 MDEL Multiplier)

Attachment D provides an example of calculated MDEL's for copper based upon a range of effluent hardness values.

The average monthly effluent limitation (AMEL) has been developed considering the chronic aquatic life criterion (CCC) for copper and a dilution credit of 20. In accordance with Section 1.4 of the SIP, the C (priority pollutant criterion) shall be set equal to the CCC, adjusted using the observed ambient background, receiving water hardness. The ECA shall be calculated using the formula ECA = C + D(C – B) where C represents the adjusted chronic copper criterion, D represents the dilution credit, and B represents the maximum observed ambient background concentration. As the number of data points for the calculation is less than 10, a default CV of 0.6 shall be used until sufficient data is collected. The AMEL shall then be calculated using the CV and the multipliers in Tables 1 and 2 of the SIP as shown below:

WATER QUALITY -BASED AMEL- Calaveras River	
Copper (Total)	
C (chronic pollutant criterion)	CCC @ Observed Receiving Water Hardness as CaCO3
D	Dilution Credit = 20
B	Maximum observed background concentration
ECA chronic	C + D(C – B)
Coefficient of Variation (Default)	0.6
LTA (chronic)	(ECA chronic *Table 1 Chronic Multiplier)
Sampling Frequency (n)	≤ 4
AMEL	(LTA*Table 2 AMEL Multiplier)

Attachment D provides an example of calculated AMEL's for copper based upon a range of receiving water hardness values.

For discharge to San Andreas Creek, an AMEL and MDEL have been developed for copper considering the critical ECA, and no dilution credit. Since a site-specific translator has not been developed for copper as described in the SIP Section 1.4.1, the USEPA conversion factor was used in expressing the dissolved copper criterion as total recoverable. Acute and chronic effluent concentration allowance's (ECA's) shall be set equal to the adjusted acute and chronic copper criterion (criterion adjusted based upon observed receiving water hardness), and the most limiting long-term average (LTA) discharge condition for copper determined using Table 1 of the SIP, using a default CV of 0.6. The AMEL and MDEL shall then be calculated using a steady state model (with no dilution credit) this CV and the multipliers in Table 2 of the SIP as shown in the example below which uses an observed receiving water hardness of 60 mg/L (as CaCO3):

WATER QUALITY BASED MDEL and AMEL- San Andreas Creek	
Copper (Total)	
Number of Observations	3
Effluent Maximum	35
Dilution Credit	0
ECA acute (@ 60 mg/L (ppm) hardness as CaCO3)	8.7 µg/L
ECA chronic (@ 60 mg/L (ppm) hardness as CaCO3)	6.0 µg/L
Coefficient of Variation (Default)	0.6
LTA acute	2.8
LTA chronic	3.2
Limiting LTA (acute) = (ECA acute *Table 1 Acute Multiplier)	2.8
Sampling Frequency (n)	≤ 4/mo
AMEL (LTA*Table 2 AMEL Multiplier)	**4.3 µg/L (ppb)**
MDEL (LTA*Table 2 MDEL Multiplier)	**8.7 µg/L (ppb)**

Using these calculations, a final AMEL of 4.3 µg/L (ppb) and MDEL of 8.7 µg/L (ppb) for copper (total) would result at an observed receiving water hardness of 60 mg/L (as CaCO3) in accordance with Sections 1.3 and 1.4 of the SIP using the adjusted copper criteria. The final AMEL and MDEL in this Order are to be adjusted accordingly with results of corresponding receiving water monitoring for upstream receiving water hardness as shown in Attachment C.

The Discharger cannot currently meet these limitations, whether discharging to San Andreas Creek, or the Calaveras River. The Discharger has no processes specific to the removal of copper. Section 2.1 of the SIP provides that: "*Based on an existing discharger's request and demonstration that it is infeasible for the discharger to achieve immediate compliance with a CTR criterion, or with an effluent limitation based on a CTR criterion, the RWQCB may establish a compliance schedule in an NPDES permit.*" As the average monthly and maximum daily effluent limitations for copper are new requirements in this Order, the Discharger has not been afforded an opportunity to submit the compliance schedule justification required by the SIP (Section 2.1). This Order requires the Discharger to provide this information. Implementation of the new water quality based effluent limitations for copper become effective on **17 December 2003** if a compliance schedule justification is not completed and submitted by the Discharger to the Board. If a compliance schedule justification is completed and submitted by this date, the final water quality based effluent limitations for copper become effective **1 October 2008**, and this Order includes a Provision outlining studies and a time schedule for compliance with the new final effluent limitations for copper.

In accordance with the SIP, Sections 2.2.1 and 2.2.2, a numeric interim limitation for copper has been established in this Order based upon current facility performance. As shown below, this interim limitation consists of a projected monthly average effluent total copper concentration of 105 µg/L (ppb) derived using available effluent copper data (three data points), and applying the statistical methodologies for estimating maximum concentrations identified in Chapter 3 of USEPA's Technical Support Document for Water Quality-based Toxics Control (TSD, 1991). Derivation of this interim copper limitation is summarized below:

INTERIM EFFLUENT LIMITATION	
Copper (total)	
Number of Observations	3
Minimum (µg/L, ppb)	17
Observed Maximum (µg/L, ppb)	*35*
Coefficient of Variation (Default)	0.6
Multiplier[1]	3.0
Projected Monthly Average	**105 (µg/L, ppb)**

[1] From TSD Table 3-2

This Order includes new monitoring requirements for copper. The Order may be reopened to include a new interim effluent limitation for copper after additional effluent data have been collected.

Zinc

In studies conducted by the Discharger, the MEC for total zinc was reported as 170 µg/L (ppb). The minimum hardness of the effluent was reported as 68 mg/L (ppm) hardness as CaCO3. This MEC exceeds the adjusted freshwater aquatic life water quality acute CMC and chronic CCC criteria for zinc established in the USEPA's CTR (86 µg/L (ppb) and 86 µg/L (ppb), respectively at 68 mg/L hardness as CaCO3). As noted above, Section 1.3 of the SIP requires water quality-based effluent limitations when the MEC or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion.

The maximum observed ambient background concentration (B) of total zinc in the Calaveras River was reported as < 0.5 µg/L (ppb), with a minimum observed ambient background hardness reported as 60 mg/L (as CaCO3). Considering the total zinc adjusted freshwater aquatic life acute and chronic criteria at 60 mg/L hardness are 78 µg/L (ppb) and 78 µg/L (ppb) respectively, the data indicate that the Calaveras River does have assimilative capacity for zinc.

To prevent acutely toxic conditions at the point of discharge and in the zone of initial dilution, a table expressing the MDEL has been developed for zinc considering the acute aquatic life criterion (CMC) without consideration of dilution. In accordance with Section 1.4 of the SIP, the acute effluent concentration allowance (ECA) shall be set equal to the CMC, adjusted using the observed corresponding effluent hardness. Effluent hardness is used in lieu of the receiving water hardness for the adjustment of the CMC since no credit was provided for dilution. As the number of data points for the calculation is less than 10, a default coefficient of variation (CV) of 0.6 shall be used in the calculation until sufficient data is collected. The MDEL shall be calculated using the CV and the multipliers in Tables 1 and 2 of the SIP as shown below:

WATER QUALITY -BASED MDEL- Calaveras River	
Zinc (Total)	
ECA acute	CMC @ Observed Effluent Hardness as CaCO3
Coefficient of Variation (Default)	0.6
LTA (acute)	(ECA acute *Table 1 Acute Multiplier)
Sampling Frequency (n)	≤ 4
MDEL	(LTA*Table 2 MDEL Multiplier)

Attachment F provides an example of calculated MDEL's for zinc based upon a range of effluent hardness values.

The AMEL has been developed considering the chronic aquatic life criterion (CCC) for zinc and a dilution credit of 20. In accordance with Section 1.4 of the SIP, the C (priority pollutant criterion) shall be set equal to the CCC, adjusted using the observed ambient background, receiving water hardness. The ECA shall be calculated using the formula ECA = C + D(C – B) where C represents the adjusted chronic zinc criterion, D represents the dilution credit, and B represents the maximum observed ambient background concentration. As the number of data points for the calculation is less than 10, a default CV of 0.6 shall be used until sufficient data is collected. The AMEL shall then be calculated using the CV and the multipliers in Tables 1 and 2 of the SIP as shown below:

WATER QUALITY -BASED AMEL- Calaveras River	
Zinc (Total)	
C (chronic pollutant criterion)	CCC @ Observed Receiving Water Hardness as CaCO3
D	Dilution Credit = 20
B	Maximum observed background concentration
ECA chronic	C + D(C – B)
Coefficient of Variation (Default)	0.6
LTA (chronic)	(ECA chronic *Table 1 Chronic Multiplier)
Sampling Frequency (n)	≤ 4
AMEL	(LTA*Table 2 AMEL Multiplier)

Attachment F provides an example of calculated AMEL's for zinc based upon a range of receiving water hardness values.

For discharge to San Andreas Creek, an AMEL and MDEL have been developed for zinc considering the critical ECA, and no dilution credit. Acute and chronic effluent concentration allowance's (ECA's) shall be set equal to the adjusted acute and chronic zinc criterion (criterion adjusted based upon observed receiving water hardness), and the most limiting long-term average (LTA) discharge condition for zinc determined using Table 1 of the SIP, using a default CV of 0.6. The AMEL and MDEL shall then be calculated using a steady state model (with no dilution credit) this CV and the multipliers in Table 2 of the SIP as shown in the example below which uses an observed receiving water hardness of 60 mg/L (as CaCO3):

WATER QUALITY BASED MDEL and AMEL- San Andreas Creek	
Zinc (Total)	
Number of Observations	3
Effluent Maximum	170
Dilution Credit	0
ECA acute (@ 60 mg/L (ppm) hardness as CaCO3)	78 µg/L
ECA chronic (@ 60 mg/L (ppm) hardness as CaCO3)	78 µg/L
Coefficient of Variation (Default)	0.6
LTA acute	25
LTA chronic	41
Limiting LTA (acute) = (ECA acute *Table 1 Acute Multiplier)	25
Sampling Frequency (n)	≤ 4/mo
AMEL (LTA*Table 2 AMEL Multiplier)	**39 µg/L (ppb)**
MDEL (LTA*Table 2 MDEL Multiplier)	**78 µg/L (ppb)**

Using these calculations, a final AMEL of 39 µg/L (ppb) and MDEL of 78 µg/L (ppb) for zinc (total) would result at an observed receiving water hardness of 60 mg/L (as CaCO3) in accordance with Sections 1.3 and 1.4 of the SIP using the adjusted zinc criteria. These final limitations are to be adjusted accordingly with results of corresponding receiving water monitoring for upstream receiving water hardness as shown in Attachment E.

The Discharger cannot currently meet these limitations whether discharging to San Andreas Creek or the Calaveras River. The Discharger has no processes specific to the removal of zinc. Section 2.1 of the SIP provides that: "*Based on an existing discharger's request and demonstration that it is infeasible for the discharger to achieve immediate compliance with a CTR criterion, or with an effluent limitation based on a CTR criterion, the RWQCB may establish a compliance schedule in an NPDES permit.*" As the average monthly and maximum daily effluent limitations for zinc are new requirements in this Order, the Discharger has not been afforded an opportunity to submit the compliance schedule justification required by the SIP (Section 2.1). This Order requires the Discharger to provide this information. Implementation of the new water quality based effluent limitations for zinc become effective on **17 December 2003** if a compliance schedule justification is not completed and submitted by the Discharger to the Board. If a compliance schedule justification is completed and submitted by this date, the final water quality based effluent limitations for zinc become effective **1 October 2008**, and this

Order includes a Provision outlining studies and a time schedule for compliance with the new final effluent limitations for zinc.

In accordance with the SIP, Sections 2.2.1 and 2.2.2, a numeric interim limitation for zinc has been established in this Order based upon current facility performance. As shown below, this interim limitation consists of a projected monthly average effluent total zinc concentration of 510 μg/L (ppb) derived using available effluent zinc data (three data points), and applying the statistical methodologies for estimating maximum concentrations identified in Chapter 3 of USEPA's TSD. Derivation of this interim zinc limitation is summarized below:

INTERIM EFFLUENT LIMITATION	
Zinc (total)	
Number of Observations	3
Minimum (μg/L, ppb)	98
Observed Maximum (μg/L, ppb)	*170*
Coefficient of Variation (Default)	0.6
Multiplier[1]	3.0
Projected Monthly Average	**510 (μg/L, ppb)**

[1] From TSD Table 3-2

This Order includes new monitoring requirements for zinc. The Order may be reopened to include a new interim effluent limitation for zinc after additional effluent data have been collected.

Effluent Limitations, CTR/NTR Human Health Criteria

As noted in the Order findings, the MUN beneficial use applies to San Andreas Creek, Murray Creek, and the Calaveras River. Section 1.1 of the SIP states in part that "*Designated beneficial uses to which human health criteria/objectives would apply include... municipal and domestic supply (MUN) and water contact recreation (REC 1). Human health criteria/objectives are differentiated by whether organisms alone from the water body are consumed compared to whether both organisms and water from the water body are consumed. Where MUN is designated, the latter situation applies.*"

Dichlorobromomethane

A human health criterion for dichlorobromomethane of 0.56 μg/L (ppb), for consumption of both water and organisms, was established in the CTR. In studies conducted by the Discharger, the MEC for dichlorobromomethane was reported as 0.7 μg/L (ppb). This MEC exceeds the human health criterion for dichlorobromomethane established in the CTR. Section 1.3 of the SIP requires water quality-based effluent limitations when the MEC or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion.

The maximum observed ambient background concentration (B) of dichlorobromomethane in the Calaveras River was reported as < 0.46 μg/L (ppb). Considering this result assimilative capacity for dichlorobromomethane exists within the Calaveras River.

For discharge to the Calaveras River, an AMEL was developed considering the human health criterion for dichlorobromomethane and a dilution credit of 20 (minimum dilution ratio for discharge to the

Calaveras River). In accordance with Section 1.4 of the SIP, the C (priority pollutant criterion) was set equal to the human health criterion. The ECA was calculated using the formula ECA = C + D(C – B) where C represents the human health criterion, D represents the dilution credit, and B represents the ambient background arithmetic mean concentration (for pollutant criterion intended to protect human health from carcinogenic effects). Since the discharge to the Calaveras River occurs only under conditions of a minimum of 20 to 1 dilution (receiving water : effluent), a dilution credit of 20 was used in the ECA calculation. Concerning calculation of the arithmetic mean concentration (B), Section 1.4.3.2 of the SIP states: "*If all samples are below the reported detection limits, the ambient background concentration shall be set equal to the lowest of the individual reported detection limits*". Since results of both ambient background samples for dichlorbromomethane were less than detection limits, the lowest individual reported detection limit was used in the calculation (< 0.20 µg/L (ppb). In accordance with Section 1.4 of the SIP, the AMEL for dichlorbromomethane was then set equal to the calculated ECA. The MDEL for dichlorobromomethane was then calculated by multiplying the ECA by the ration of the MDEL multiplier to the AMEL multiplier using a default CV of 0.6, and a sampling frequency (n) of ≤ 4. These AMEL and MDEL calculations are summarized below:

WATER QUALITY -BASED AMEL and MDEL- Calaveras River	
Dichlorobromomethane	
C	Human health criterion (0.56 µg/L)
B	Arithmetic mean background concentration (0.20 µg/L)
D	Dilution Credit = 20
ECA = C + D(C – B)	ECA = 0.56 + 20(0.56 – 0.2) = 7.8 µg/L
AMEL = ECA	**7.8 µg/L**
Coefficient of Variation (Default)	0.6
Sampling Frequency (n)	≤ 4
MDEL = ECA (MDEL/AMEL multiplier)	7.8 (2.01) = **15.5 µg/L**

These water quality-based effluent limitations are substantially higher than the reported MEC of 0.7 µg/L (ppb). Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using the calculated AMEL and MDEL. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for dichlorobromomethane is needed prior to establishing a final effluent limitation for the discharge to the Calaveras River.

Concerning calculation of final effluent limitations for dichlorobromomethane, the SIP provides in Section 1.4 that "*If data are insufficient to calculate the effluent limitation, the RWQCB shall establish interim requirements in accordance with Section 2.2.2.*"

This Order includes a time schedule for the Discharger to collect sufficient information for the calculation of final effluent limitations prior to discharge to the Calaveras River. Pursuant to Section 2.2.1 of the SIP, the water quality to be achieved includes prevention of toxic conditions in the Calaveras River as a result of the discharge, and the maintenance of the highest quality water consistent with the maximum benefit to the people of the State. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for dichlorobromomethane as enforceable limitations.

For discharge to San Andreas Creek, an AMEL was developed considering the human health criterion for dichlorobromomethane and no dilution credit. In accordance with Section 1.4 of the SIP, the ECA was set equal to the C (priority pollutant criterion), and the AMEL was then set equal to the ECA. The MDEL for dichlorobromomethane was calculated by multiplying the ECA by the ration of the MDEL multiplier to the AMEL multiplier using a default CV of 0.6, and a sampling frequency (n) of $\leq$ 4. These AMEL and MDEL calculations are summarized below:

WATER QUALITY -BASED AMEL and MDEL- San Andreas Creek	
Dichlorobromomethane	
C	Human health criterion (0.56 µg/L)
ECA = C	ECA = 0.56 µg/L
AMEL = ECA	**0.56 µg/L**
Coefficient of Variation (Default)	0.6
Sampling Frequency (n)	$\leq$ 4
MDEL = ECA (MDEL/AMEL multiplier)	0.56 (2.01) = **1.1** µg/L

The Discharger cannot currently meet these limitations when discharging to San Andreas Creek. The Discharger has no processes specific to the removal of dichlorobromomethane. Section 2.1 of the SIP provides that: "*Based on an existing discharger's request and demonstration that it is infeasible for the discharger to achieve immediate compliance with a CTR criterion, or with an effluent limitation based on a CTR criterion, the RWQCB may establish a compliance schedule in an NPDES permit.*" As the average monthly and maximum daily effluent limitations for dichlorobromomethane are new requirements in this Order, the Discharger has not been afforded an opportunity to submit the compliance schedule justification required by the SIP (Section 2.1). This Order requires the Discharger to provide this information. Implementation of the new water quality based effluent limitations for dichlorobromomethane become effective on **17 December 2003** if a compliance schedule justification is not completed and submitted by the Discharger to the Board. If a compliance schedule justification is completed and submitted by this date, the final water quality based effluent limitations for dichlorobromomethane become effective **1 October 2008**, and this Order includes a Provision outlining studies and a time schedule for compliance with the new final effluent limitations for dichlorobromomethane.

In accordance with the SIP, Sections 2.2.1 and 2.2.2, a numeric interim limitation for dichlorobromomethane has been established in this Order based upon current facility performance. As shown below, this interim limitation consists of a projected AMEL dichlorobromomethane concentration of 2.1 µg/L (ppb) derived using available effluent dichlorobromomethane data (three data points), and applying the statistical methodologies for estimating maximum concentrations identified in Chapter 3 of USEPA's Technical Support Document for Water Quality-based Toxics Control (TSD, 1991). Derivation of this interim dichlorobromomethane limitation is summarized below:

INTERIM EFFLUENT LIMITATION	
Dichlorobromomethane	
Number of Observations	3
Minimum (µg/L, ppb)	< 0.46
Observed Maximum (µg/L, ppb)	*0.7*
Coefficient of Variation (Default)	0.6
Multiplier[1]	3.0
Projected Monthly Average	**2.1 (µg/L, ppb)**

[1] From TSD Table 3-2

Bis(2-ethylhexyl) phthalate
A human health criterion for bis(2-ethylhexyl) phthalate of 1.8 µg/L (ppb), for consumption of both water and organisms, was established in the NTR. In studies conducted by the Discharger, the MEC for bis(2-ethylhexyl) phthalate was reported as 3.6 µg/L (ppb). This MEC exceeds the human health criterion for bis(2-ethylhexyl) phthalate established in the NTR. Section 1.3 of the SIP requires water quality-based effluent limitations when the MEC or observed maximum background concentration (B) of a priority pollutant exceeds an appropriate pollutant criterion.

The maximum observed ambient background concentration (B) of bis(2-ethylhexyl) phthalate in the Calaveras River was reported as < 2.0 µg/L (ppb). Considering this result, it is unknown if and how much assimilative capacity exists within the Calaveras River if any. No information is available regarding ambient background concentrations of bis(2-ethylhexyl) phthalate in San Andreas Creek or Murray Creek.

Concerning calculation of final effluent limitations for bis(2-ethylhexyl) phthalate for discharge to the Calaveras River, the SIP provides in Section 1.4 that "*If data are insufficient to calculate the effluent limitation, the RWQCB shall establish interim requirements in accordance with Section 2.2.2.*"

This Order includes a time schedule for the Discharger to collect sufficient information for the calculation of final effluent limitations prior to discharge to the Calaveras River. Pursuant to Section 2.2.1 of the SIP, the water quality to be achieved includes prevention of toxic conditions in the Calaveras River as a result of the discharge, and the maintenance of the highest quality water consistent with the maximum benefit to the people of the State. The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for bis(2-ethylhexyl) phthalate as enforceable limitations.

In accordance with the SIP, Sections 2.2.1 and 2.2.2, for discharge to the Calaveras River, a numeric interim limitation for bis(2-ethylhexyl) phthalate has been established in this Order based upon current facility performance. As shown below, this interim limitation consists of a projected AMEL bis(2-ethylhexyl) phthalate concentration of 13.7 µg/L (ppb) derived using available effluent bis(2-ethylhexyl) phthalate data (two data points), and applying the statistical methodologies for estimating maximum concentrations identified in Chapter 3 of USEPA's Technical Support Document for Water Quality-based Toxics Control (TSD, 1991). Derivation of this interim bis(2-ethylhexyl) phthalate limitation is summarized below:

INTERIM EFFLUENT LIMITATION	
Bis(2-ethylhexyl) phthalate	
Number of Observations	2
Minimum (µg/L, ppb)	< 2.0
Observed Maximum (µg/L, ppb)	***3.6***
Coefficient of Variation (Default)	0.6
Multiplier[1]	3.8
Projected Monthly Average	**13.7 (µg/L, ppb)**

[1] From TSD Table 3-2

For discharge to San Andreas Creek, an AMEL was developed considering the human health criterion for bis(2-ethylhexyl) phthalate and no dilution credit. In accordance with Section 1.4 of the SIP, the ECA was set equal to the C (priority pollutant criterion), and the AMEL was then set equal to the ECA. The MDEL for bis(2-ethylhexyl) phthalate was calculated by multiplying the ECA by the ration of the MDEL multiplier to the AMEL multiplier using a default CV of 0.6, and a sampling frequency (n) of ≤ 4. These AMEL and MDEL calculations are summarized below:

WATER QUALITY -BASED AMEL and MDEL- San Andreas Creek	
Bis(2-ethylhexyl) phthalate	
C	Human health criterion (1.8 µg/L)
ECA = C	ECA = 1.8 µg/L
AMEL = ECA	**1.8 µg/L**
Coefficient of Variation (Default)	0.6
Sampling Frequency (n)	≤ 4
MDEL = ECA (MDEL/AMEL multiplier)	1.8 (2.01) = **3.6 µg/L**

The Discharger cannot currently meet these limitations when discharging to San Andreas Creek. The Discharger has no processes specific to the removal of bis(2-ethylhexyl) phthalate. Compliance schedules described in Section 2.1 of the SIP exclude NTR pollutants, therefore this Order does not include a schedule of compliance with the final effluent limitation for bis(2-ethylhexyl) phthalate for discharge to San Andreas Creek.

Other Pollutants/Objectives

Narrative Toxicity

At p.III-8.00 the Basin Plan provides that relative to toxicity : "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" At page 1, the TSD provides that "*Where States have not developed chemical specific numeric criteria, States may interpret their narrative standards for specific chemicals by using EPA criteria updated with current quantitative risk values.*" The TSD further states on page 1 "*The integrated approach must include the control of toxics through implementation of the "no toxics" criterion and/or numeric criteria for the parameter of toxicity, the control of individual pollutants for which specific chemical water quality criteria exist in a state's standard, as well as the use of biological* *criteria. Reliance solely on the chemical specific numeric criteria or the narrative criterion or biological criteria would result in only a partially effective State toxics control program."*

Under the CWA Section 304(a), USEPA has developed methodologies and specific criteria guidance to protect aquatic life and human health. These methodologies are intended to provide protection for all surface waters on a national basis. The methodologies have been subject to public review, as have the individual criteria guidance documents. Water quality criteria developed under Section 304(a) of the CWA are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects. Section 304(a) criteria do not reflect consideration of economic impacts or the technological feasibility of meeting the chemical concentrations in ambient water. Section 304(a) criteria provide guidance to States in adopting water quality standards that ultimately provide a basis for controlling discharges or releases of pollutants. Staff has used USEPA's ambient water quality criteria as a means of supplementing the integrated approach to toxics control, and in some cases deriving numeric limitations to protect receiving waters from toxicity as required in the Basin Plan's narrative objective of prohibiting toxic constituents in toxic amounts.

Aluminum

The Basin Plan does not provide a numeric water quality objective for aluminum. However, the USEPA has developed National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life for aluminum. The USEPA has recommended, as a freshwater ambient water quality criteria for aluminum, a chronic, four day average criterion continuous concentration (CCC) of 87 µg/L, and an acute, one-hour average criterion maximum concentration (CMC) of 750 µg/L expressed in terms of total recoverable metal in the water column. In establishing these criteria, USEPA notes that there are three major reasons why the use of a water-effect ratio (WER) may be appropriate in applying the aluminum criteria including the fact that the 87 µg/L CCC was based on a toxicity test with striped bass in water with low pH and low hardness.

Results of monitoring conducted by the Discharger indicate effluent aluminum concentrations ranged from 160 µg/L to 580 µg/L. The minimum pH of the effluent has been reported as 6.8 pH units, and the minimum hardness of the effluent has been reported as 68 mg/L as $CaCO_3$. Results of monitoring of the Calaveras River indicate ambient background concentrations of aluminum ranged from 40 µg/L to 80 µg/L. The minimum pH of the Calaveras River has been reported as 7.8 pH Units during the period of discharge (one data point), and the minimum hardness of the Calaveras River has been reported as 60 mg/L as $CaCO_3$. No information is available on aluminum concentrations in San Andreas or Murray Creek. Results of ambient background pH monitoring in San Andreas Creek during the period of discharge from December 2002 through April 2003 have ranged from 6.9 to 7.2 pH Units.

Considering results of monitoring indicate periods of relatively low hardness and neutral pH, the MEC for total aluminum is over 6 times greater than the CCC, the maximum ambient background concentration of aluminum in the Calaveras River has been reported as high as 80 µg/L, the aquatic life beneficial use, the narrative toxicity objective of the Basin Plan, and, the USEPA chronic criterion for aluminum, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

An AMEL and MDEL have been developed for aluminum considering the chronic aquatic life criteria, a chronic waste load allocation, and discharge to the Calaveras River and available dilution. A steady state model was used to develop an ECA using the example from the SIP where the ECA or waste load allocation (WLA) = C + D(C – B) where C represents the chronic aluminum criterion, D represents the dilution credit, and B represents the maximum observed ambient background concentration. The AMEL and MDEL were then calculated using procedures in Section 5.4 and Appendix E of the TSD. As the number of data points for the calculation is less than 10, a default CV of 0.6 was used in the development of these limitations shown below:

WATER QUALITY -BASED AMEL and MDEL- Calaveras River	
Total Aluminum	
C	Chronic Aquatic Life Criterion (87 µg/L)
B	Maximum observed background concentration (80 µg/L)
D	Dilution Credit = 20
WLA/ECA (chronic) = C + D(C – B)	WLA/ECA = 87 + 20(87 – 80) = 227 µg/L
Coefficient of Variation (Default)	0.6
LTA (chronic)	= WLA c $* e^{[0.5\sigma_4^2 - z\sigma_4]}$ = 227 * 0.527 = 120
AMEL (95 Percentile, # samples = 2)	= LTA c $* e^{[z\sigma_n - 0.5\sigma_n^2]}$ = 120 * 1.8 = **216 µg/L**
MDEL	= LTA c $* e^{[z\sigma - 0.5\sigma^2]}$ = 120 * 3.11 = **373 µg/L**

For discharge to San Andreas Creek, an AMEL and MDEL have been developed for aluminum considering the chronic aquatic life criteria, a chronic waste load allocation, and no dilution credit. In this instance the WLA was set equal to the chronic aquatic life criterion, WLA = C. The AMEL and MDEL were then calculated using procedures in Section 5.4 and Appendix E of the TSD. As the number of data points for the calculation is less than 10, a default CV of 0.6 was used in the development of these limitations shown below:

WATER QUALITY -BASED AMEL and MDEL- San Andreas Creek	
Total Aluminum	
C	Chronic Aquatic Life Criterion (87 µg/L)
WLA(chronic) = C	WLA = 87 µg/L
Coefficient of Variation (Default)	0.6
LTA (chronic)	= WLA c $* e^{[0.5\sigma_4^2 - z\sigma_4]}$ = 87 * 0.527 = 46
AMEL (95 Percentile, # samples = 2)	= LTA c $* e^{[z\sigma_n - 0.5\sigma_n^2]}$ = 46 * 1.8 = **83 µg/L**
MDEL	= LTA c $* e^{[z\sigma - 0.5\sigma^2]}$ = 46 * 3.11 = **143 µg/L**

Based upon the results of effluent monitoring, the Discharger cannot currently comply with these new effluent limitations for aluminum. At Page IV-16.00 the Basin Plan states "*In no event shall an NPDES permit include a schedule of compliance that allows more than ten years (from the date of adoption of the objective or criteria) for compliance with water quality objectives, criteria or effluent limitations based on the objectives or criteria. Schedules of compliance are authorized by this provision only for those water quality objectives or criteria adopted after the effective date of this provision [25 September 1995*]." The narrative toxicity objective is not a new objective, therefore a schedule of compliance for aluminum is not included in this Order. A separate Cease and Desist Order shall be proposed for compliance with the new aluminum effluent limitations.

Ammonia

In December 1999, the U.S EPA published an Update of Ambient Water Quality Criteria for Ammonia (1999 Ammonia Update). The 1999 Ammonia Update contains EPA's most recent freshwater aquatic life criteria for ammonia, superseding all previous EPA recommended freshwater criteria for ammonia. The new criteria in the 1999 Ammonia Update reflect recent research and data since 1984, and are a revision of several elements in the 1984 criteria, including the pH and temperature relationship of the acute and chronic criteria and the averaging period of the chronic criterion. As a result of these revisions, the acute criterion for ammonia is now dependent on pH and fish species present, and the chronic criterion is dependent on pH and temperature. At lower temperatures, the chronic criterion is also dependent on the presence or absence of early life stages of fish (ELS).

The other significant revision in the 1999 Ammonia Update is EPA's recommendation of 30 days as the averaging period for the ammonia chronic criterion. In addition, EPA recommends that within the 30-day averaging period, no 4-day average concentration should exceed 2.5 times the chronic criterion (Criterion Continuous Concentration (CCC)).

In natural waters ammonia exists in two forms, un-ionized ammonia (NH_3) and the ammonium ion (NH_4), with equilibrium controlled by temperature and pH. Whereas the 1984/1985 criteria were derived based on un-ionized ammonia, which required a relationship with temperature, the criteria used in the 1999 Update are expressed only as total (un-ionized plus ionized) ammonia.

The 1999 Update states in part that the available evidence indicates the toxicity of ammonia can depend on ionic composition, pH, and temperature. The 1999 Update further states that based upon available data for ammonia, evaluated using the procedures described in the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses", that, except possibly where an unusually sensitive species is important at a site, freshwater aquatic life should be protected if **both** of the following conditions are satisfied for the temperature, T, and pH of the waterbody:

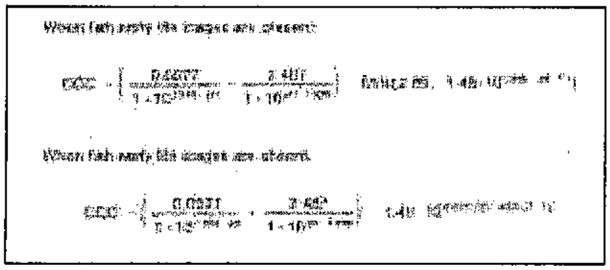
1. The one-hour average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CMC (acute criterion) calculated using the following equations. Where salmonid fish are present:

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

Or where salmonid fish are not present:

$$CMC = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}}$$

2A. The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CCC (chronic criterion) calculated using the following equations.



2B. In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the CCC.

Both the CMC and CCC for ammonia are expressed in milligrams ammonia nitrogen per liter (mg N/L).

The beneficial uses of the Calaveras River, from its source to New Hogan Reservoir, and San Andreas Creek include warm freshwater aquatic habitat (WARM), cold freshwater aquatic habitat (COLD), migration of aquatic organisms (MIGR) in warm habitat, warm and cold habitat spawning, and reproduction, and/or early development (SPWN). The early life stages of fish are likely present during the permitted period of discharge.

The reported MEC of total ammonia is 16 mg/L (as N), with an average daily concentration of effluent total ammonia reported as 2.2 mg/L (as N). The maximum effluent pH for the period of discharge from November 1999 through April 2003 was reported as 7.8 pH Units. Without regard to dilution, the discharge from the effluent has the reasonable potential to exceed the acute ambient water quality ammonia criteria for the protection of fresh water aquatic life at the point of discharge to the Calaveras River or San Andreas or Murray Creeks. The maximum total ammonia concentration reported in the Calaveras River was reported as 1.1 mg/L (as N), and the maximum pH was reported as 7.8 pH Units. Although simple steady state dilution calculations using the limited ambient data available indicate that assimilative capacity for chronic toxicity is available in the Calaveras River, sufficient information is not available to adequately determine mixing zone and dilution characteristics.

The Regional Board considered the level of ammonia in the effluent in light of the narrative toxicity objective in the Basin Plan. For determining whether there is reasonable potential for an excursion above this narrative objective, the Regional Board used the second method prescribed by 40 CFR 122.44(d)(vi) for determining reasonable potential, which relies on USEPA recommended criteria and other information. The Board chose this method because USEPA's recommended ambient water quality criteria for ammonia have been developed using methodologies that are subject to public review, as is the individual recommended criteria guidance document. Results of monitoring submitted by the Discharger indicate the effluent discharged to the Calaveras River has the reasonable potential to cause or contribute to an excursion above the acute ammonia criterion. Considering no dilution in San Andreas Creek, results of effluent monitoring submitted by the Discharger indicate the effluent discharged to San Andreas Creek has the reasonable potential to cause or contribute to an excursion above the acute and chronic ammonia criteria.

Accordingly, to prevent acutely toxic conditions at the point of discharge to the Calaveras River, a one hour maximum effluent limitation for total ammonia has been included in this Order based upon the EPA's ambient water quality acute toxicity criterion (Attachment H). Compliance with this limit will require recording of effluent pH at the time that the samples are collected for ammonia, and may require information regarding the presence or absence of salmonids in the Calaveras River. Because a minimum 20 to 1 dilution is required for discharge, acute toxicity is almost certainly the governing toxic criterion. The extent of the chronic toxicity mixing zone will be evaluated in the *Dilution/Mixing Zone Study.* Based upon the results on the *Dilution/Mixing Zone Study*, this Order may be reopened to include delineation of a chronic toxicity mixing zone and additional chronic effluent limitations for ammonia, if warranted.

To prevent chronic and acutely toxic conditions at the point of discharge to San Andreas Creek, a one hour maximum and AMEL for total ammonia have been included in this Order based upon the EPA's ambient water quality chronic and acute toxicity criteria (Attachment G and Attachment H). Compliance with these limits will require recording of effluent pH and temperature at the time that the samples are collected for ammonia, and may require information regarding the presence or absence of salmonids in San Andreas Creek.

Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for total ammonia. As noted previously, the narrative toxicity objective is not a new objective, therefore a schedule of compliance for ammonia is not included in this Order. A separate Cease and Desist Order shall be proposed for compliance with the new ammonia effluent limitations.

Chlorine

The Discharger uses chlorine for the disinfection of treated wastewater. The Basin Plan does not provide a numeric water quality objective for chlorine, but the Basin Plan does contain a narrative toxicity objective. For determining whether there is reasonable potential for an excursion above this narrative objective, the Regional Board used the second method prescribed by 40 CFR 122.44(d)(vi) for determining reasonable potential, which relies on USEPA criteria and other information. The Board chose this method because USEPA's recommended ambient water quality criteria for chlorine have been developed using methodologies that are subject to public review, as is the individual recommended criteria guidance document. USEPA's ambient water quality criteria for protection of aquatic life are 11 μg/L as a 4-day average (chronic) concentration, and 19 μg/L as a 1-hour average (acute) concentration for total residual chlorine. Continuous use of chlorine for the disinfection of the final effluent presents a reasonable potential for the discharge to cause or contribute to an excursion above the acute and chronic chlorine criteria. This Order includes new effluent limitations for chlorine based directly upon the USEPA's ambient water quality criteria. Based upon results of monitoring, and installation of the new dechlorination unit, the Discharger is capable of consistently meeting these limitations.

Chemical Constituents Objective

For Chemical Constituents at page III-3.00, the Basin Plan states '*At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations…*' Federal regulations at 40 CFR Section 122.44(d)(1)(vi)(A) allow the state to establish effluent limitations using an explicit state policy interpreting its narrative objectives. Use of MCL's is appropriate to implement the chemical constituent objective of the Basin Plan. The Calaveras River, San Andreas Creek, and Murray Creek are designated for use as domestic or municipal supply (MUN).

The Regional Board has considered the factors specified in California Water Code (CWC) Section 13263, including considering the provisions of CWC Section 13241 where appropriate. The Regional Board is not required to consider the factors in CWC Section 13241 in applying existing water quality objectives, including adopting new effluent limitations in this Order.

The Regional Board must implement the CWC consistent with the Clean Water Act (CWA). The CWA precludes the consideration of costs when developing effluent limitations for NPDES permits necessary to implement water quality standards (See Ackels v. EPA (9th Cir. 1993) 7 F.3d 862, 865-66). The Regional Board may consider costs in developing compliance schedules. The Regional Board finds, on balance, that these requirements are necessary to protect the beneficial uses of the Calaveras River, San Andreas Creek, and Murray Creek.

Nitrate/Nitrite

The Basin Plan does not include a numeric objective for nitrate or nitrite. The USEPA has established a primary Maximum Contaminant Level (MCL) for nitrate of 10 mg/L (as nitrogen (N)), and a primary MCL for nitrite of 1 mg/L (as nitrogen (N)). USEPA has also established in the MCL a limit for total nitrate + nitrite of 10 mg/L. Additionally, USEPA's ambient water quality criteria for nitrate, protective of human health for consumption of water and organisms, is expressed also as a concentration of 10 mg/l (as N). In Title 22, Table 64431-A of the California Code of Regulations (CCR) the California DHS has established a primary MCL for nitrate + nitrite (sum as nitrogen) of 10 mg/L, and a primary MCL for nitrite (as nitrogen) of 1.0.

As reported by the Discharger, the MEC for nitrate + nitrite (as N) was 17.2 mg/L. Independently, the MEC for nitrate was reported as 17 mg/L (as N), and the MEC for nitrite was reported as 0.2 mg/L (as N). The average daily effluent concentration for nitrate + nitrite (as N) has been reported as 12.2 mg/L. These nitrate + nitrite effluent concentrations, without regard to dilution, exceed the California DHS primary MCL for nitrate + nitrite (as N). The maximum observed ambient background concentration of nitrate + nitrite (as N) in the Calaveras River was reported as 1.7 mg/L. Independently, the maximum observed ambient background concentration for nitrate was reported as 1.7 mg/L (as N), and the maximum observed ambient background concentration nitrite was reported as less than 0.03 mg/L (as N). The data indicate that the Calaveras River does have assimilative capacity for nitrate and nitrite. Dilution and/or assimilative capacity was not considered for discharge to San Andreas Creek.

Considering these effluent monitoring results, the MUN beneficial use, the chemical constituent objective of the Basin Plan, and the California DHS primary MCL for nitrate + nitrite, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

An AMEL and MDEL for discharge to the Calaveras River were considered for nitrate + nitrite (as N) developed using the USEPA recommendations for permitting for human health protection as described in Section 5.4.4 of the TSD. A steady state model was used to develop an ECA/WLA using the example from the SIP where the ECA or WLA = C + D(C – B) where C represents the nitrate + nitrite criterion, D represents the dilution credit, and B represents the arithmetic mean of the observed ambient background concentration. The AMEL was then set equal to the WLA. The MDEL was calculated using the multipliers in Table 5-3 of the TSD considering a default CV of 0.6 and the number of samples per month. Development of these limitations is shown below:

WATER QUALITY -BASED AMEL and MDEL- Calaveras River	
Nitrate + Nitrite	
C	Primary MCL (10 mg/L)
B	Arithmetic mean background concentration (1.0 mg/L)
D	Dilution Credit = 20
WLA/ECA (chronic) = C + D(C – B)	WLA/ECA = 10 + 20(10 – 1) = 190 mg/L
Coefficient of Variation (Default)	0.6
n (# of samples per month)	2
AMEL	**190 mg/L**
MDEL/AMEL ratio	Using 99th percentile multiplier From TSD Table 5.3 = 1.31
MDEL	190 (1.31) = **249 mg/L**

These water quality-based effluent limitations are substantially higher than the reported MEC of 17.2 mg/L (ppm). Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using the calculated AMEL and MDEL. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for nitrate + nitrite is needed prior to establishing a final effluent limitation for the discharge to the Calaveras River.

The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations for discharge to the Calaveras River at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to reopen this Order and include final water quality-based effluent limitations for nitrate + nitrite as enforceable limitations.

For discharge to San Andreas Creek, where dilution credit was not considered, an AMEL was developed considering the USEPA recommendations for permitting for human health protection provided in Section 5.4.4 of the TSD. The AMEL was set equal to the WLA, or in this case, the nitrate + nitirite MCL (10 mg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for nitrate + nitrite. As the chemical constituent objective is not a new objective, a schedule of compliance for nitrate + nitrite is not included in this Order. A separate Cease and Desist Order shall be proposed for compliance with the new AMEL.

Iron

In Title 22, Table 64449-A of the CCR, the California DHS has established a secondary MCL for iron of 300 µg/L considering consumer acceptance limits.

Results of monitoring conducted by the Discharger indicate effluent concentrations of iron ranged from 210 µg/L to 450 µg/L . The MEC, without regard to dilution, exceeds California DHS secondary MCL for iron. The maximum observed ambient background concentration of iron in the Calaveras River was reported as 130 µg/L. The data indicate that the Calaveras River does have assimilative capacity for iron. Dilution and/or assimilative capacity was not considered for discharge to San Andreas Creek.

Considering the MEC, the MUN beneficial use, the chemical constituents objective of the Basin Plan, and the California DHS secondary MCL for iron, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

The criterion used to determine reasonable potential for iron is not related to aquatic toxicity or human health. Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using a calculated AMEL and MDEL based upon a human health WLA. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for iron is needed prior to establishing a final effluent limitation for the discharge to the Calaveras River.

The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for iron as enforceable limitations.

For discharge to San Andreas Creek, where dilution credit was not considered, an AMEL was set equal to the WLA, or in this case, the iron secondary MCL (300 µg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for iron. As the chemical constituents objective is not a new objective, a schedule of compliance for iron is not included in this Order. A separate Cease and Desist Order shall be proposed for compliance with the new AMEL.

Manganese

In Title 22, Table 64449-A of the CCR, the California DHS has established a secondary MCL for manganese of 50 µg/L considering consumer acceptance limits.

Results of monitoring conducted by the Discharger indicate effluent concentrations of manganese ranged from 25 µg/L to 82 µg/L. The MEC, without regard to dilution, exceeds California DHS secondary MCL's for manganese. The maximum observed ambient background concentration of manganese in the Calaveras River was reported as 12 µg/L. The data indicate that the Calaveras River does have assimilative capacity for manganese. Dilution and/or assimilative capacity was not considered for discharge to San Andreas Creek.

Considering the MEC, the MUN beneficial use, the chemical constituents objective of the Basin Plan, and the California DHS secondary MCL for manganese, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

The criterion used to determine reasonable potential for manganese is not related to aquatic toxicity or human health. Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using a calculated AMEL and MDEL based upon a human health WLA. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for manganese is needed prior to establishing a final effluent limitation for the discharge to the Calaveras River.

The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for manganese as enforceable limitations.

For discharge to San Andreas Creek, where dilution credit was not considered, an AMEL was set equal to the WLA, or in this case, the manganese secondary MCL (50 µg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for manganese. As the chemical constituent objective is not a new objective, a schedule of compliance for manganese is not included in this Order. A separate Cease and Desist Order shall be proposed for compliance with the new AMEL.

Methylene Blue Active Substances (MBAS)
In Title 22, Table 64449-A of the CCR, the California DHS has established a secondary MCL for MBAS of 500 µg/L considering consumer acceptance limits.

Results of monitoring conducted by the Discharger indicate effluent concentrations of MBAS ranged from 2,000 µg/L to 500 µg/L . The MEC, without regard to dilution, exceeds California DHS secondary MCL for MBAS. The maximum observed ambient background concentration of MBAS in the Calaveras River was reported as less than 50 µg/L. The data indicate that the Calaveras River does have assimilative capacity for MBAS. Dilution and/or assimilative capacity was not considered for discharge to San Andreas Creek.

Considering the MEC, the MUN beneficial use, the chemical constituents objective of the Basin Plan, and the California DHS secondary MCL for MBAS, the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

The criterion used to determine reasonable potential for MBAS is not related to aquatic toxicity or human health. Considering the existing performance of the plant, and SWRCB Resolution No. 68-16, a final limit based upon statistics and the MEC would be more appropriate than using a calculated AMEL and MDEL based upon a human health WLA. However, since only three effluent data points, and two receiving water data points are currently available, collection and evaluation of additional effluent and receiving water data for MBAS is needed prior to establishing a final effluent limitation for the discharge to the Calaveras River.

The reason that final water quality-based effluent limitations are not being incorporated into the permit as enforceable limitations at this time is because insufficient effluent and receiving water data exists for proper calculation of final limitations. When sufficient data are collected, it is the intent of the Regional Board to include final water quality-based effluent limitations for MBAS as enforceable limitations.

For discharge to San Andreas Creek, where dilution credit was not considered, an AMEL was set equal to the WLA, or in this case, the MBAS secondary MCL (500 µg/L). Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for MBAS. As the chemical constituents objective is not a new objective, a schedule of compliance for MBAS is not included in this Order. A separate Cease and Desist Order shall be proposed for compliance with the new AMEL.

Pesticides
The Basin Plan includes an objective for Pesticides, stating in part;

- *No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses*
- *Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses*
- *Pesticide concentrations shall not exceed those allowable by applicable antidegradation policies*
- *Pesticide concentrations shall not exceed the lowest levels technically and economically achievable*

As noted previously, the Basin Plan also includes a narrative toxicity objective which states, in part, that: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*"

Diazinon
Diazinon is used for the control of pests in both agricultural and urban settings. For inland surface waters within the Region, there are currently no adopted numeric objectives for diazinon.
For diazinon, the USEPA has published a tentative one-hour maximum acute criterion of 0.09 µg/L. The California Department of Fish and Game (DFG) criteria published in March 2000 include a one-hour average acute value of 0.08 µg/L and a four-day average chronic value of 0.05 µg/L.

Results of three effluent sampling events indicated one instance where diazinon was detected, at a concentration of 1.6 µg/L. Results of two ambient background monitoring events in the Calaveras River indicate concentrations of diazinon were less than 0.1 µg/L. This information is not sufficient to adequately assess whether the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard in the Calaveras River. This Order contains new monitoring requirements for diazinon, and may be reopened, and effluent limitations established for diazinon if appropriate, based upon additional data collection. Depending upon the nature of collected data, the Discharger may be required to implement a study and develop source control actions, and/or interim or final point of discharge effluent limitations may be established.

Considering the MEC, the aquatic life beneficial uses, the pesticide and narrative toxicity objectives of the Basin Plan, and the California DFG criteria for diazinon, the discharge to San Andreas Creek has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard.

An AMEL and MDEL have been developed for diazinon considering the most restrictive of a chronic or acute WLA. Since the limiting LTA is derived from consideration of a chronic WLA, the AMEL and MDEL have been developed for diazinon considering the chronic aquatic life criteria, a chronic waste load allocation, and no dilution credit. The AMEL and MDEL were then calculated using procedures in Section 5.4 and Appendix E of the TSD. A default CV of 0.6 was used in the development of these limitations shown below:

WATER QUALITY -BASED AMEL and MDEL- San Andreas Creek	
Diazinon	
WLA c = Cc	Chronic Aquatic Life Criterion (0.05 μg/L)
WLA a = Ca	Acute Aquatic Life Criterion (0.08 μg/L)
LTA c (99th Percentile)	= WLA c ∗ (.527) = 0.0263 μg/L
LTA a (99th Percentile)	= WLA a ∗ (.321) = 0.0257 μg/L
LTA min	= 0.0263 μg/L
Coefficient of Variation (Default)	0.6
MDEL (99th Percentile)	= LTA min (0.0263) ∗ (3.11) = 0.08 μg/L
AMEL (95 Percentile, # samples = 4)	= LTA min (0.0263) ∗ (1.55) = 0.04 μg/L

Based upon the results of effluent monitoring, the Discharger may not be able to consistently comply with these new limitations for diazinon. Additionally, based upon the use of current analytical methods, routine monitoring may be unable to determine compliance with these limitations. Analytical methods for compliance monitoring purposes will be specified in this Order. As the narrative toxicity and pesticide objectives are not new objectives, a schedule of compliance for diazinon is not included in this Order. A separate Cease and Desist Order shall be proposed for compliance with the new MDEL and AMEL.

Carbofuran

Carbofuran is a broad spectrum carbamate insecticide with applications for pest control in various food and feed crops. In Title 22, Table 64444-A of the CCR, the California DHS has established a primary MCL for carbofuran of 18 μg/L. The California Office of Environmental Health Hazard Assessment (OEHHA) has established a Public Health Goal for carbofuran in drinking water of 1.7 μg/L. In 1992, the California DFG published an interim criterion to protect freshwater aquatic life of 0.5 μg/L as an instantaneous maximum.

Results of three effluent sampling events indicated one instance where carbofuran was reported as greater than the analytical detection method limit, but less than the method reporting limit, at a detected, but not quantified (DNQ) concentration of 2.51 µg/L. Results from the two other rounds of effluent monitoring indicated carbofuran concentrations were less than 1.3 and less than 1.1 µg/L. Results of two ambient background monitoring events in the Calaveras River indicate concentrations of carbofuran were less than 0.5 µg/L and less than 1.1 µg/L. This information is not sufficient to adequately assess whether the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a State water quality standard. This Order contains new monitoring requirements for carbofuran, and may be reopened, and effluent limitations established for carbofuran if appropriate, based upon additional data collection. Depending upon the nature of collected data, the Discharger may be required to implement a study and develop source control actions, and/or interim or final point of discharge effluent limitations may be established.

pH
The Basin Plan provides that the pH (of surface waters) shall not be depressed below 6.5 nor raised above 8.5 pH Units. The Basin Plan further provides that changes in normal ambient pH levels shall not exceed 0.5 pH Units in fresh waters with designated COLD or WARM beneficial uses. Although the discharge will occur under conditions of 20 to 1 dilution, pH can significantly affect the mobility of metals, and toxicity of ammonia, therefore the existing effluent limitation for pH has been retained in this Order. This Order also retains receiving water limitations and monitoring requirements for pH.

Dissolved Oxygen
At Page III-5.00, the Basin Pan provides surface water quality objectives for dissolved oxygen (DO), and states, in part: *For surface water bodies outside the legal boundaries of the Delta, the monthly median of the mean daily dissolved oxygen (DO) concentration shall not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration shall not fall below 75 percent of saturation. The dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time:*

Waters designated WARM 5.0 mg/l
Waters designated COLD 7.0 mg/l
Waters designated SPWN 7.0 mg/l

This Order retains the limitation that the discharge shall not cause the DO of the receiving water to fall below 7.0 mg/l, in support of the COLD and SPWN beneficial uses and associated Basin Plan objective.

Temperature
Effluent and receiving water temperature affect numerous water quality conditions including ammonia toxicity (increasing with increasing temperature) and oxygen saturation (decreasing with increasing temperature). Additionally, warm waters may cause detrimental conditions of aquatic aversion or attraction. The Basin Plan states that: "*At no time shall the temperature of... WARM intrastate waters be increased more than 5°F above natural receiving water temperature*". Through the use of the pond system, effluent temperatures are buffered, and under conditions of 20:1 dilution, the potential for the

discharge to increase the temperature of the Calaveras River or San Andreas Creek appears unlikely. However, this Order contains receiving water limitations inclusive of the Basin Plan objectives.

Turbidity
Basin Plan states that: "*Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:*

- *Where natural turbidity is between 0 and 5 (NTUs), increases shall not exceed 1 NTU*
- *Where natural turbidity is between 5 and 50 NTU's, increases shall not exceed 20 percent*
- *Where natural turbidity is between 50 and 100 NTU's, increases shall not exceed 10 NTU's*
- *Where natural turbidity is greater than 100 NTU's, increases shall not exceed 10 percent"*

This Order includes effluent and receiving water monitoring requirements for turbidity, and retains receiving water limitations and monitoring requirements for turbidity.

Oil and Grease
The Basin Plan states that "*Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.*" This Order includes effluent monitoring requirements for Oil and Grease.

Treatment and Storage Ponds, Groundwater
The beneficial uses of the underlying ground water are municipal and domestic, industrial service, industrial process and agricultural supply. The WWTP processes include the use of three polishing ponds, the equalization basin, and the DLDA.

SWRCB Resolution 68-16 requires the Regional Board, in regulating the discharge of waste, to maintain high quality waters of the State (i.e. background water quality) until it is demonstrated that any change in quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality les than that described in the Regional Board's policies (e.g. quality that exceeds objectives). Some degradation of groundwater beneath the WWTP and associated DLDA is consistent with Resolution 68-16 provided that:

a. the degradation is confined within a specified boundary;

b. The Discharger minimizes degradation by fully implementing, regularly maintaining, and optimally operating best practicable treatment and control (BPTC) measures;

c. The degradation is limited to waste constituents typically encountered in domestic wastewater as specified in the groundwater limitation in this Order; and,

d. The degradation does not result in water quality less than that prescribed in the Basin Plan.

Some degradation of groundwater by some of the typical waste constituents released with the discharge from a municipal wastewater utility, after effective source control, treatment, and control is consistent with the maximum benefit to the people of the State. The technology, energy, and waste management advantages of municipal utility service far exceed any benefits derived from a community otherwise reliant on numerous concentrated individual wastewater systems, and the impact on water quality will be substantially less. Degradation of groundwater by toxic pollutants other than those typically associated with a WWTP, and by pollutants that can be effectively removed by conventional treatment (e.g. total coliform bacteria) is prohibited. When allowed, the degree of degradation permitted depends upon many factors including; background water quality, the pollutant, the beneficial uses of groundwater and most stringent water quality objective, source control measures, and pollutant treatability. Economic prosperity of the local community is of maximum benefit to the people of the State, and therefore sufficient reason exists to accommodate growth and groundwater degradation around the WWTP, provided that the terms of the Basin Plan including SWRCB Resolution 68-16, are met.

As required by previous Order No. 5-01-118, the Discharger is currently installing a series of three wells to assess and monitor the impact of the discharge on groundwater, if any. This Order includes groundwater limitations that allow groundwater to be degraded when compared to background groundwater quality, but not to exceed water quality objectives. If groundwater quality has been degraded by the operation of the WWTP beyond the quality described above, this Order may be reopened, and specific numeric limitations imposed.

Sludge Disposal

The Discharger treats all primary and secondary sludge in a heated unmixed anaerobic digester. Drying of digested sludge is accomplished by using sand-drying beds. Dried sludge is then stored on site, characterized, then disposed of at the Calaveras County Landfill.

JME

APPENDIX J

Cultural Resources Reports (Bound Under Separate Cover)

Cultural resources reports contain potentially sensitive information about the location and nature of cultural resources. The reports are therefore contained at the offices of the BIA under separate cover.

APPENDIX K

Site Grading and Storm Drainage Study

SITE GRADING AND STORM DRAINAGE

Proposed Gaming Facility
North Fork Rancheria of Mono Indians
Madera County, California

SITES I AND II

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CIVIL ENGINEERS

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Rev. August 2006
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TABLE OF CONTENTS

SECTION I

SITE I

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS

SECTION II

SITE II

LIST OF TABLES

LIST OF FIGURES

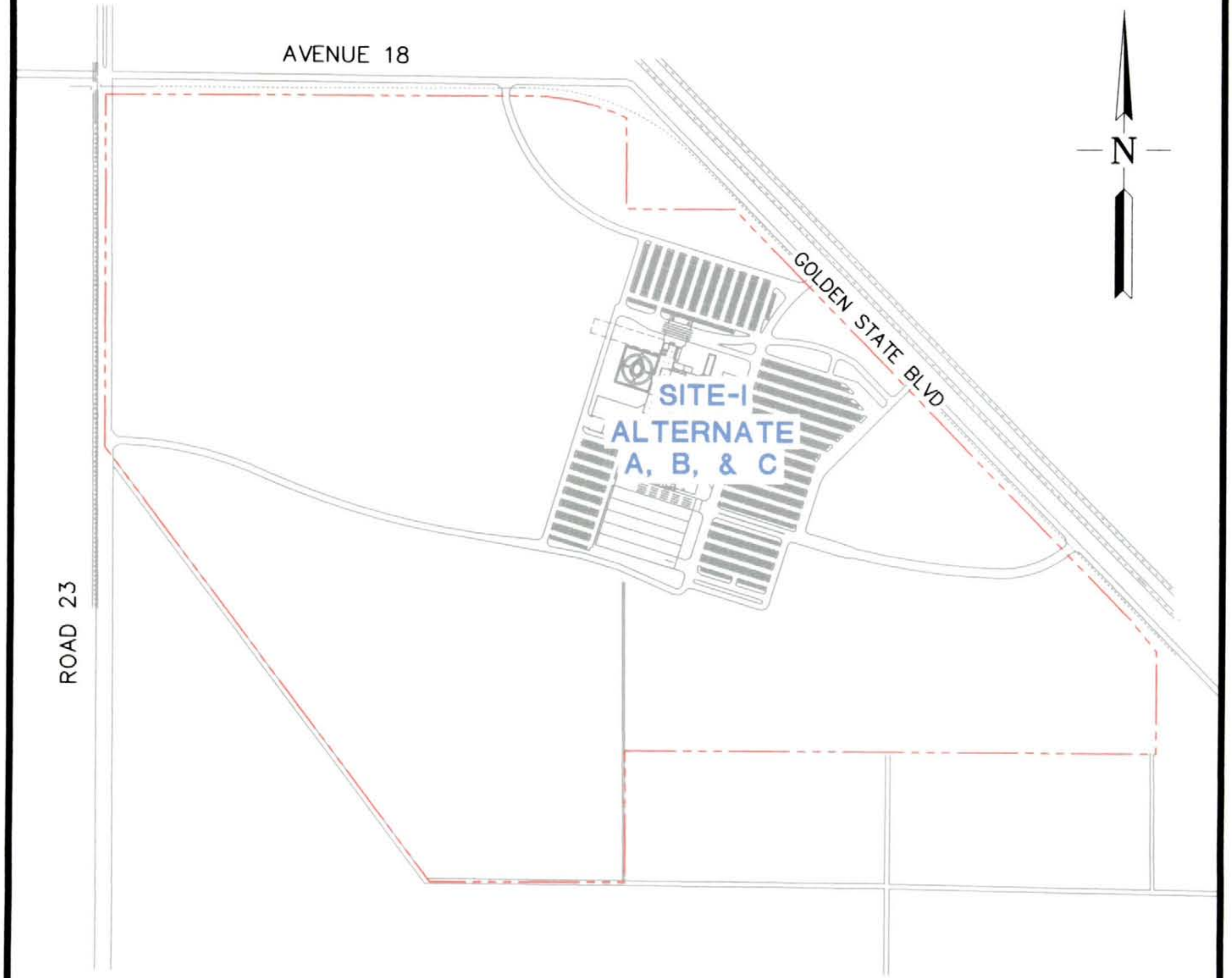
APPENDICES

A – Site I- Project Floodplain Study

B – Site II- Project Floodplain Study

C – Sample Best Management Practices

SECTION-I
Site I
Alternate Layouts A, B, & C



SITE GRADING AND
STORM DRAINAGE (SITE I)
PROPOSED GAMING FACILITY
NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

INTRODUCTION

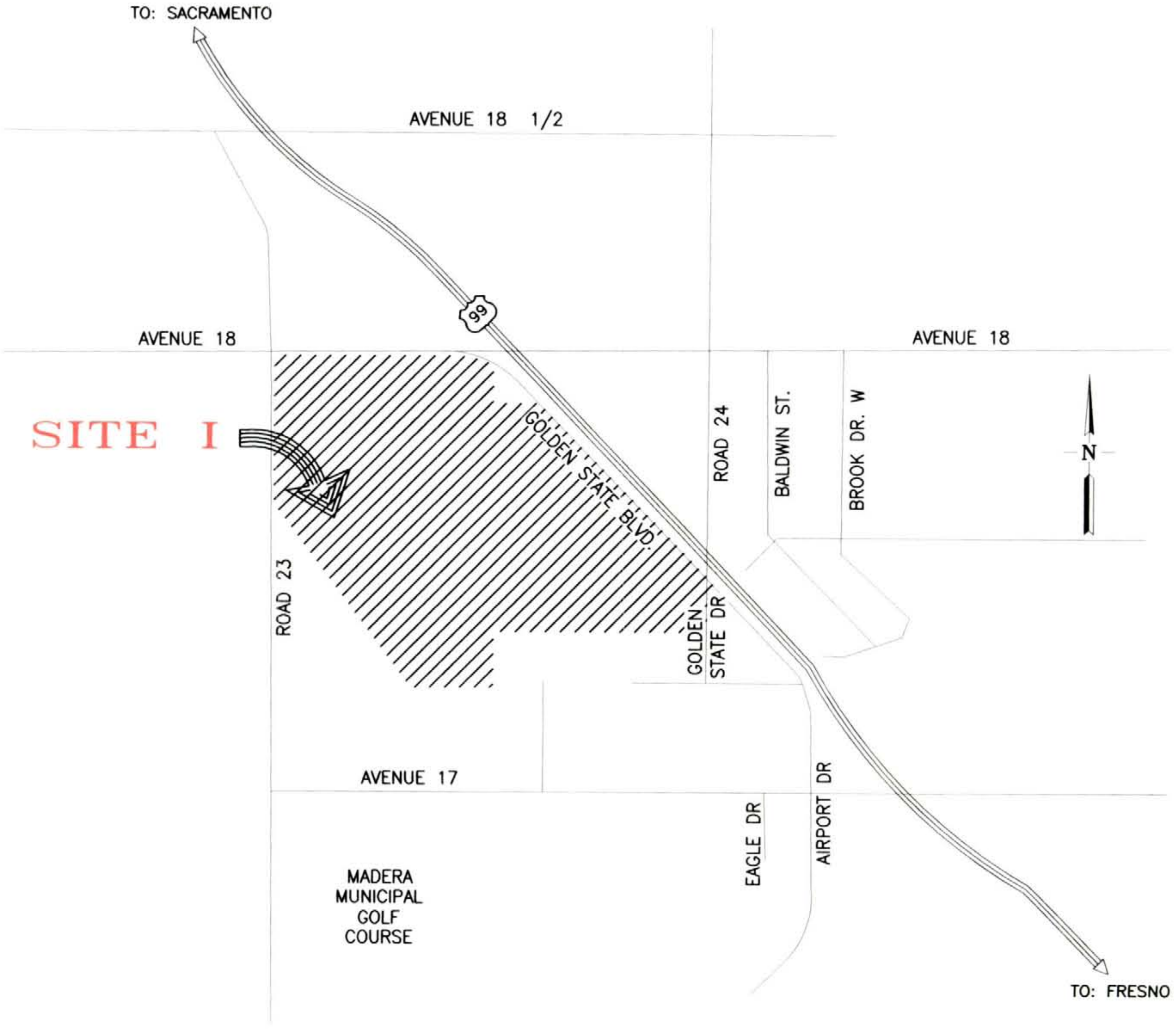
This report presents preliminary site grading and storm drainage plans for the proposed Gaming Facility in Madera County located on the west side of State Highway 99, South of Avenue 18, and East of County Road 23 in Madera County, California (See Figure 1).

The plans were based upon preliminary architectural layouts options A-1, Reduced Intensity & B-1 within the proposed project boundaries. Architectural layouts A-1 and Reduced Intensity are alternate layouts for the Casino and hotel and Layout B-1 is for Retail and Restaurants. This report and associated plans were intended to provide information for the environmental analysis of the project. The final architectural design and site development plan for the project may require revisions to the plans presented in this report.

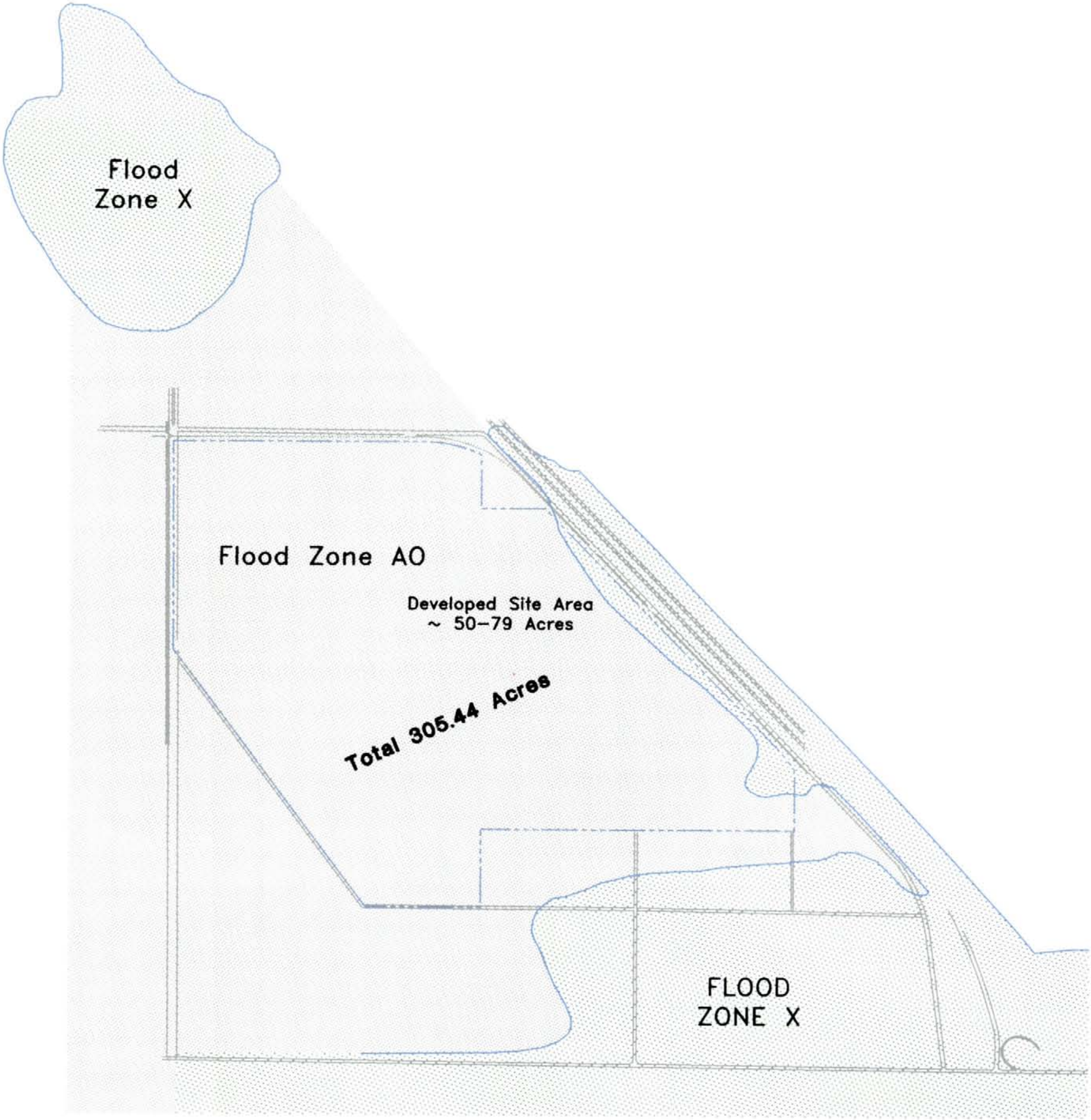
The Flood Insurance Rate Map entitled "Madera County, California (Unincorporated Areas) Community Panel Number 060170 0600B and 060170 0605 B" designates a portion of the project as located within the 100 year flood zone A0 of Schmidt Creek (See Figure 2).

The grading and drainage plan incorporates fill to elevate the proposed Gaming Facility above the 100-year flood plain and creates a series of stormwater detention ponds to attenuate the increase in peak flow of the storm runoff created by the development of the project. The increase in peak flow is created by fill in the flood plain and increasing the impervious area by constructing the project.

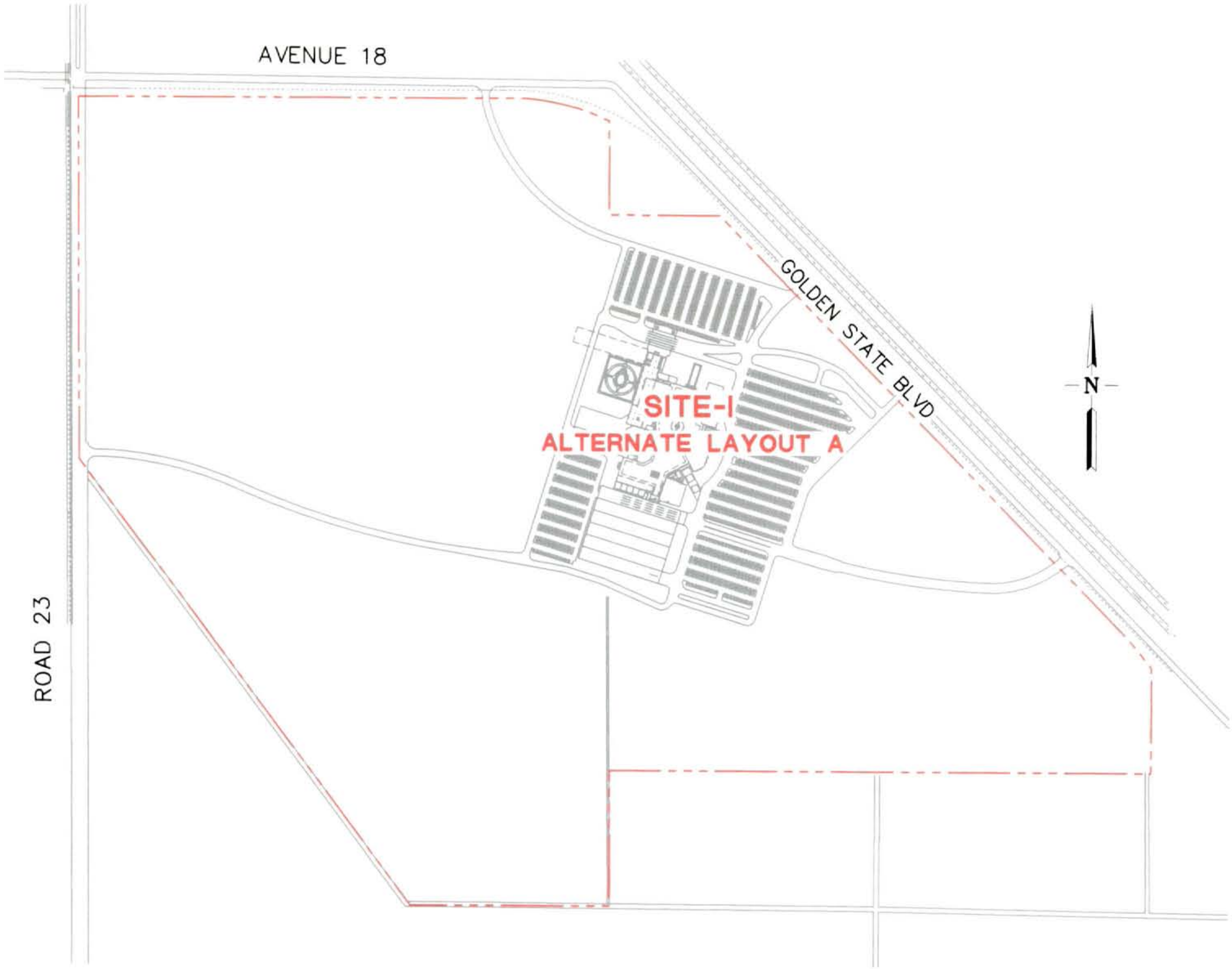
The project has been analyzed with three alternate layouts on the site location. All three layouts are depicted on Figures 3a, 3b, & 3c.



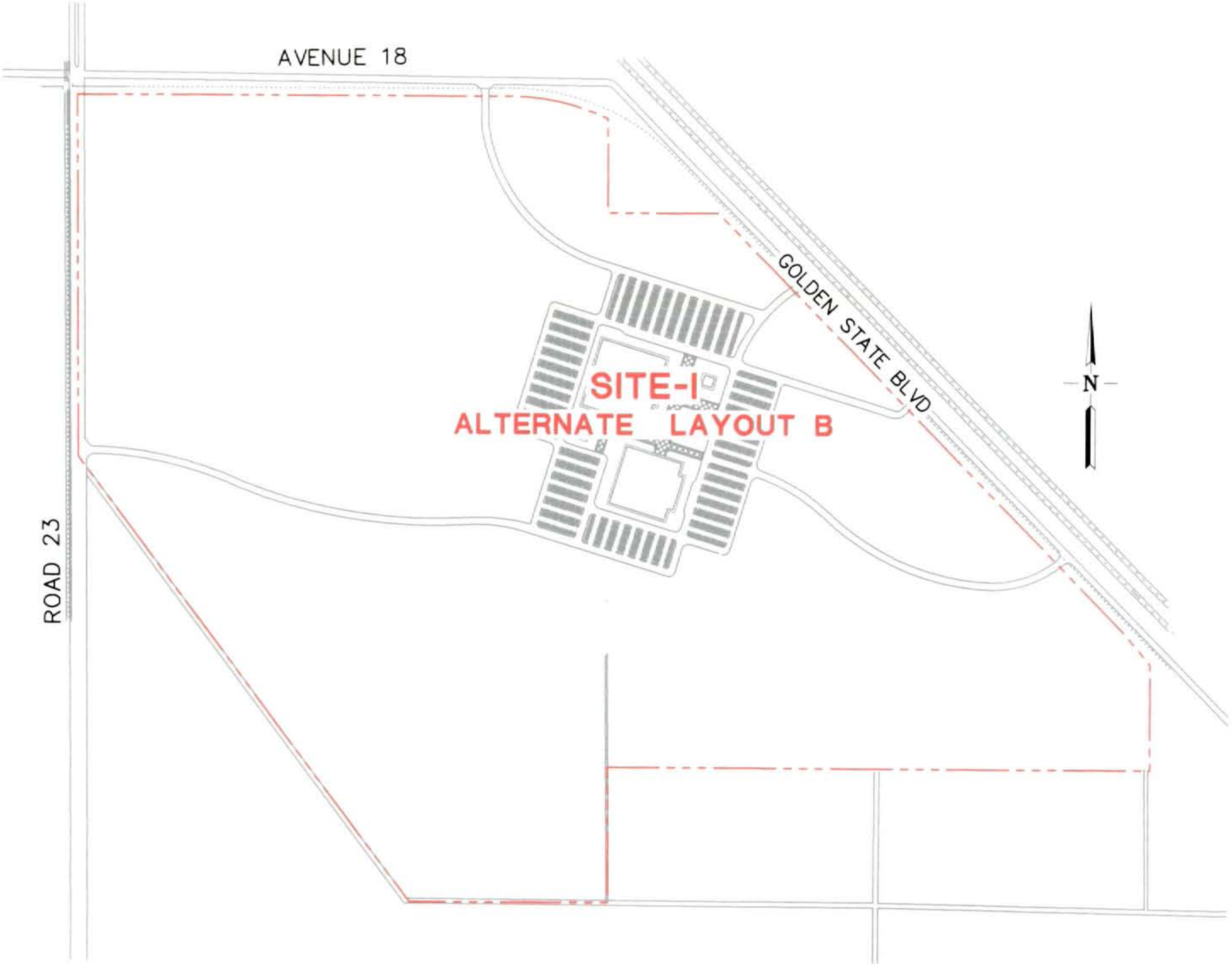
PROJECT BOUNDARY
FIGURE I



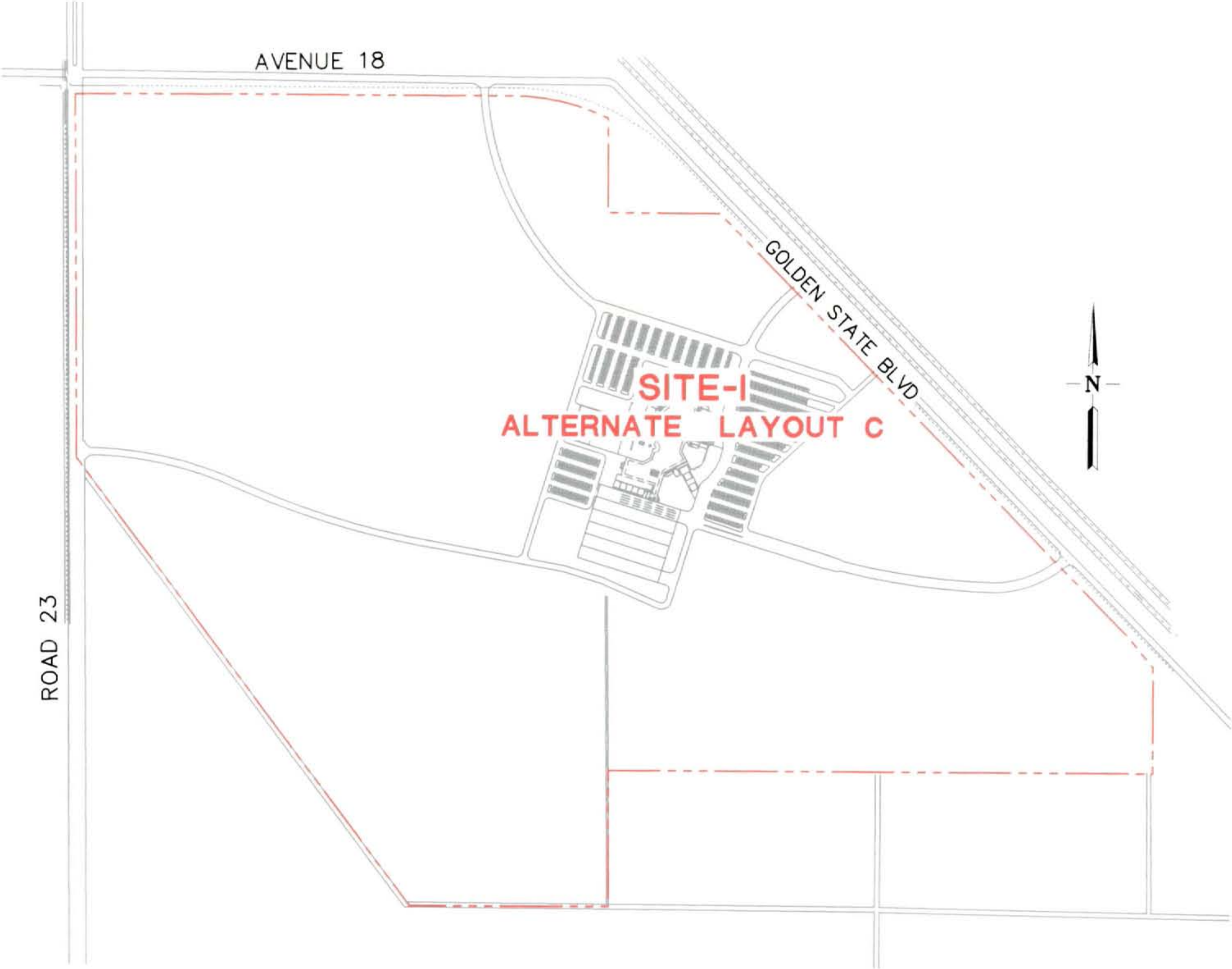
FLOOD PLAIN BOUNDARY
Site I
FIGURE 2



SITE-I LOCATION
LAYOUT A
FIGURE 3a



SITE-I LOCATION
LAYOUT B
FIGURE 3b



SITE-I LOCATION
LAYOUT C
FIGURE 3c

EXISTING SITE DESCRIPTION

The site consists of approximately 305 acres of grazing and pastureland. The site is bounded by Avenue 18 on the north, Road 23 on the west, State Highway-99 on the east, and undeveloped property on the south.

The existing topography is relatively flat. The site slopes from its easterly boundary to Road 23 passing through the property at an average slope of 0.1 %.

Schmidt Creek flows westerly through the site from State Highway-99 to Road-23 and into Dry Creek. Existing storm runoff from the site sheet flows to Schmidt Creek.

PROJECT FLOODPLAIN STUDY

The floodplain evaluation for this project requires the assessment of two (2) aspects to managing floodwaters in proximity to the proposed project site. These two aspects are: a) management of project-induced excess rainfall runoff volumes including mitigation for floodplain storage lost as a result of the project improvements, and b) potential impacts to the hydraulic grade line or water surface for with-project conditions.

For the purposes of this investigation, evaluation of the 10-year and 100-year events will be reviewed to quantify the site characteristics and response to excess rainfall runoff volumes in the vicinity of the proposed project. The investigation will consider the existing conditions versus improved conditions with respect to total rainfall versus net excess rainfall contributing to runoff after accommodating infiltration and surface interception losses.

With respect to the hydraulic grade line evaluation, only the 100-year will be considered. It is assumed that local drainage channels, ditches, etc. can accommodate the bulk of the 10-year runoff with nominal, temporary overbank or floodplain storage.

The Floodplain Study is included with this report as appendix A-site I. Project Floodplain Study.

STORMWATER DETENTION ANALYSIS

To mitigate the project induced stormwater impacts identified in the project Floodplain Study it is proposed to construct a series of storm water detention basins. The Floodplain study was conducted using Layout A. Layout A is the most intense development and creates the greatest impact. Layouts B & C have a lesser impact and therefore the proposed mitigations will be valid for them as well.

The project creates an impact to the Floodplain in three different ways:

1. The loss of floodplain storage created by the encroachment of the facility, parking lots, treatment plant and wastewater storage basin into the floodplain.
2. The increase in storm runoff created by the new impervious surfaces.
3. The loss of floodplain storage created by the encroachment of the new storm water detention basin into the floodplain.

The proposed detention basins will incorporate approximately 105 Acre Feet of storage to mitigate the impacts stated above. The detention basins encompass a surface area of approximately 39 Acres. The 100 year storm runoff is expected to pond to a depth of approximately 3 feet within the detention basin.

The increase in volumes due to development and storage volumes for the site are shown in Table 1.

Although the proposed development of the project increases runoff and peak flow rates, the detention basins temporarily stores the runoff to limit the peak designed metering structures to pre-project levels. A preliminary plan showing the location of the detention basins is included as Figure 4.

TABLE 1 – Increased Volumes & Storage Volumes

INCREASED RUN-OFF

INCREASE DUE TO PROJECT FLOODPLAIN ENCROACHMENT = 53.5AcFt

INCREASE DUE TO IMPERVIOUS AREA = 9.9AcFt

INCREASE DUE TO DETENTION BASIN ENCROACHMENT = 39.0AcFt

TOTAL STORAGE REQUIRED = 102.4 ACFT

STORAGE VOLUMES

TOTAL STORAGE PROVIDED = 105 ACFT

DRAINAGE IMPROVEMENTS

The development of the project will include several storm drainage improvements. The following sections describe the recommended improvements.

Overland Drainage Release

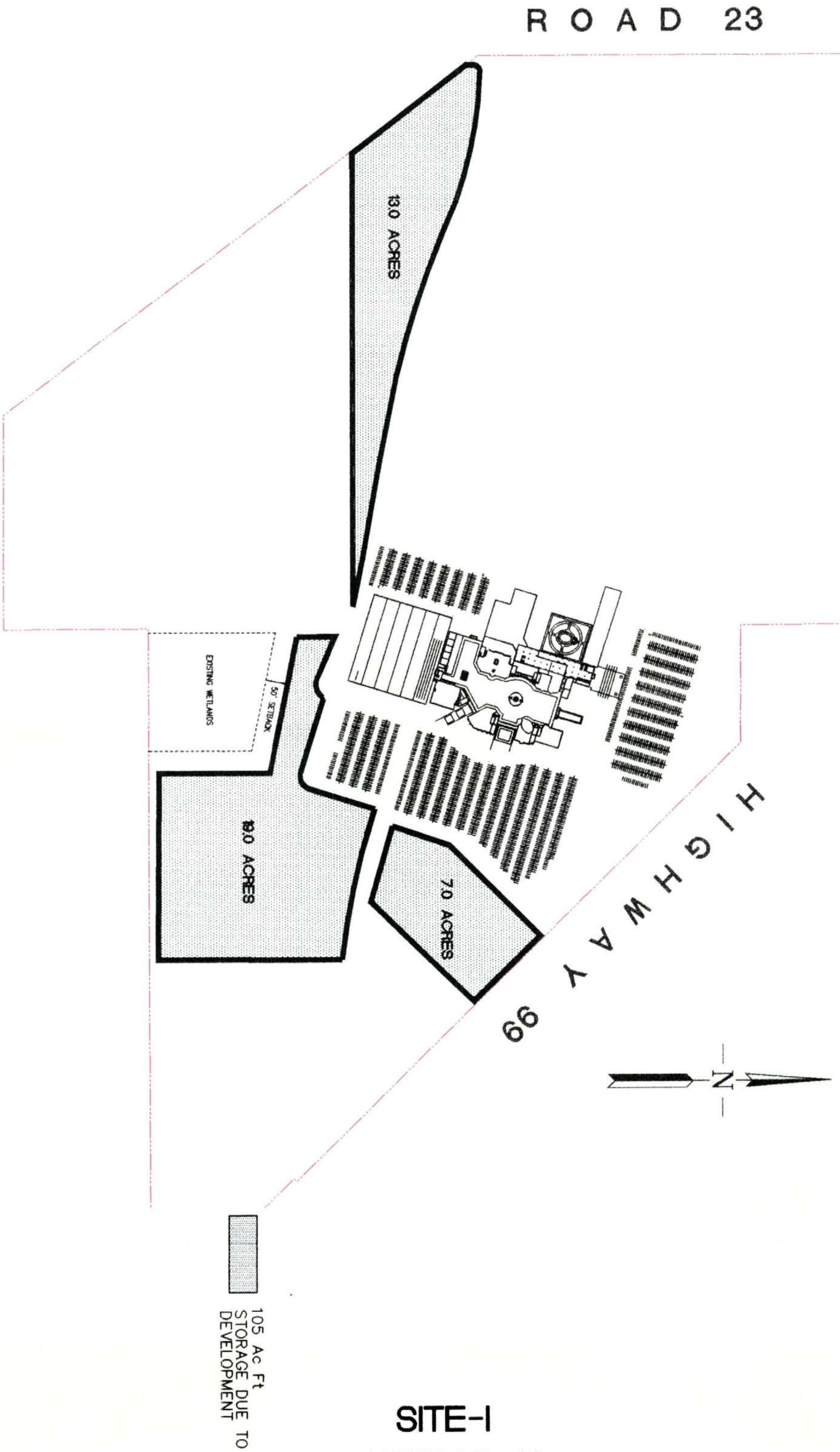
As the project is developed, an overland drainage will be created to allow property to drain under overflow conditions. The overland drainage release will be around the perimeter of the sites and is shown on Figures 5, 6 and 7.

Detention Basin Grading

Figure 4 shows the proposed locations and volumes for the detention basins. A preliminary grading plan is included as Figure 8 that provides a more detailed grading analysis.

Future Development Impacts

A review of the proposed Madera Town Center project and other city facilities has been performed to determine its impact on this project. The Madera Town Center project proposes to limit the post-project storm runoff to be equal to the pre-project level by providing stormwater detention. If the Town Center project is approved with adequate detention neither the Gaming Facility or the Town Center project will have a significant impact to stormwater runoff in the Schmidt Creek Basin.



SITE-I

LAYOUTS A, B and C

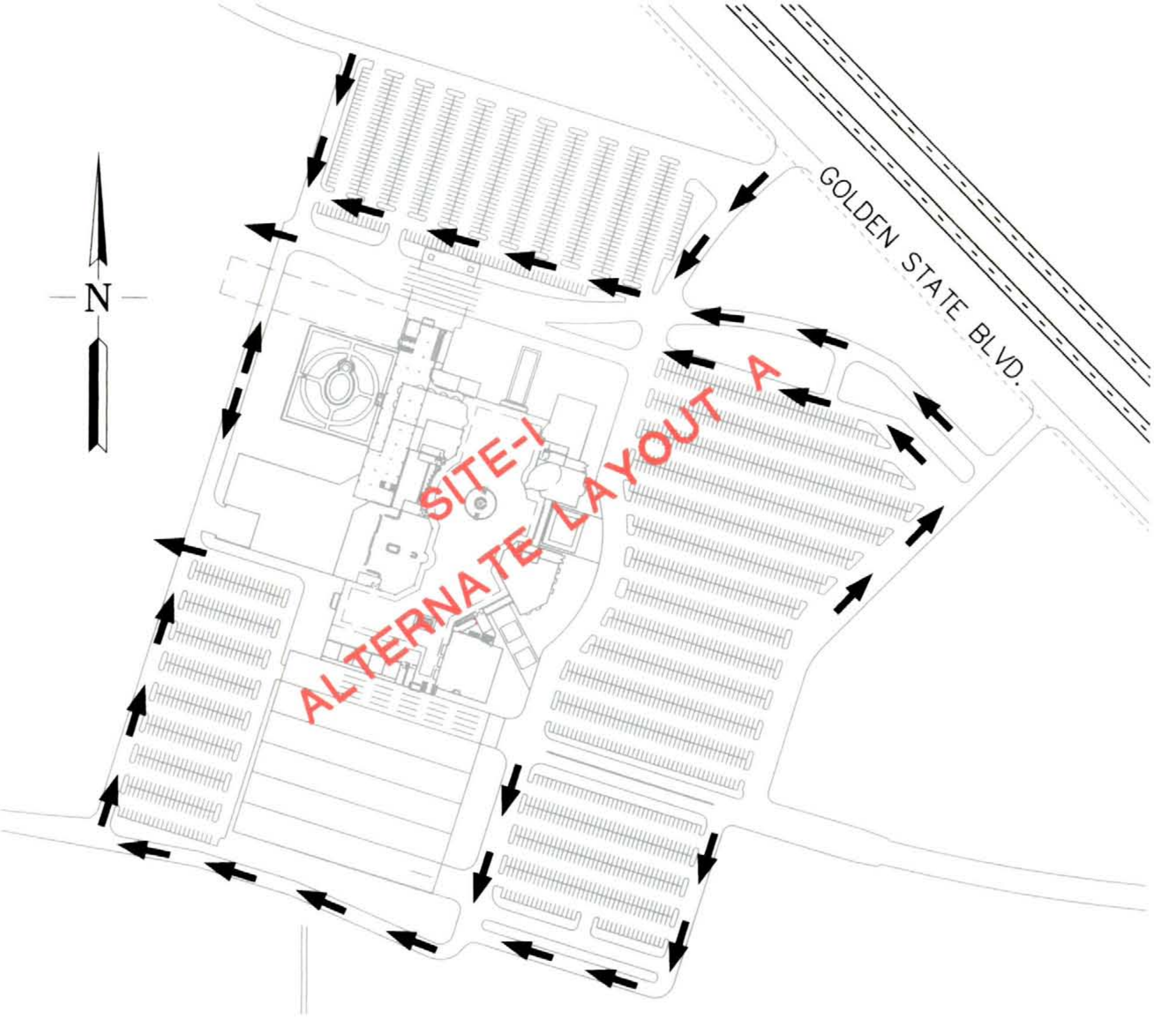
STORM DRAIN

NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

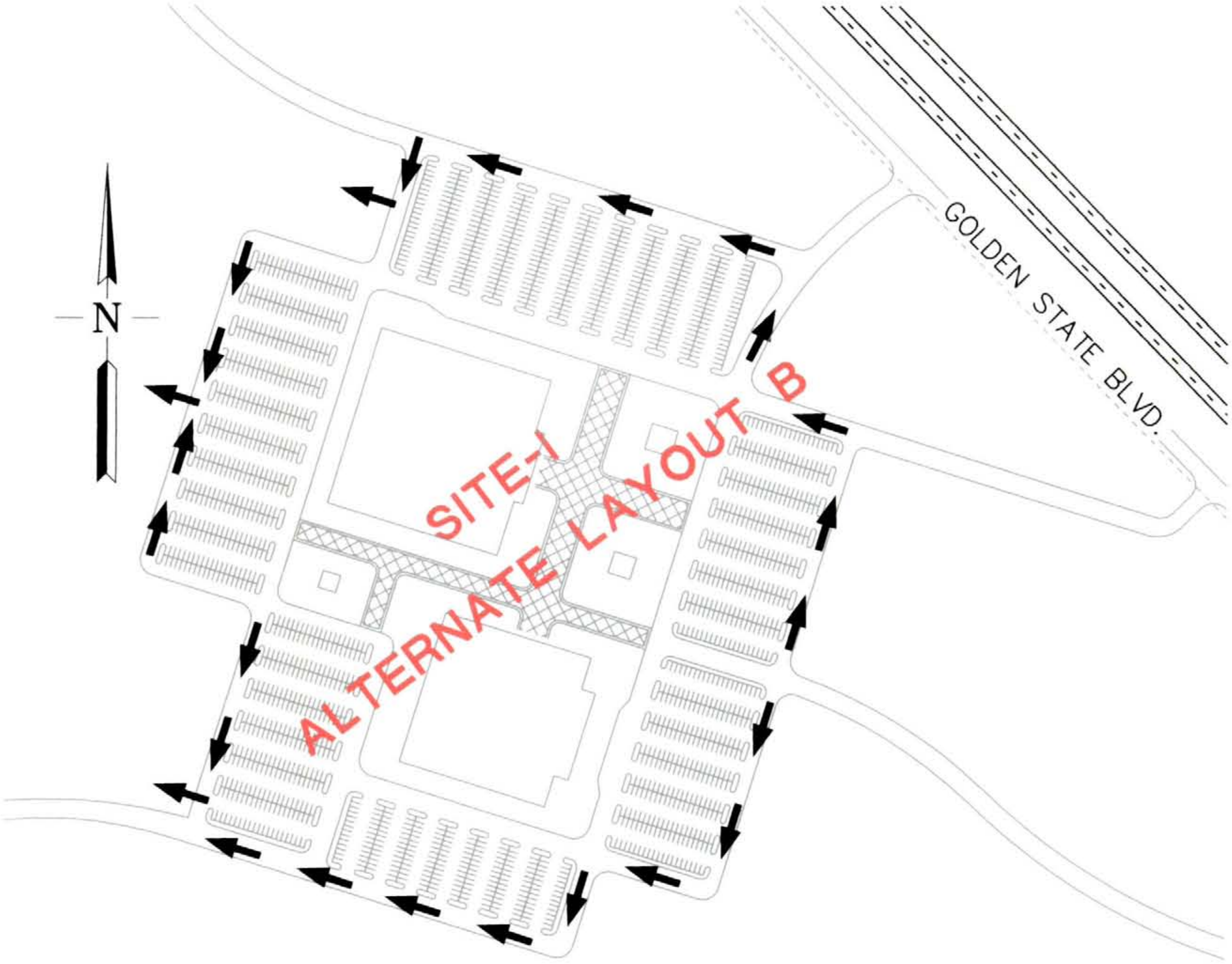
RAK ROBERT A. KARN & ASSOCIATES, INC.

1

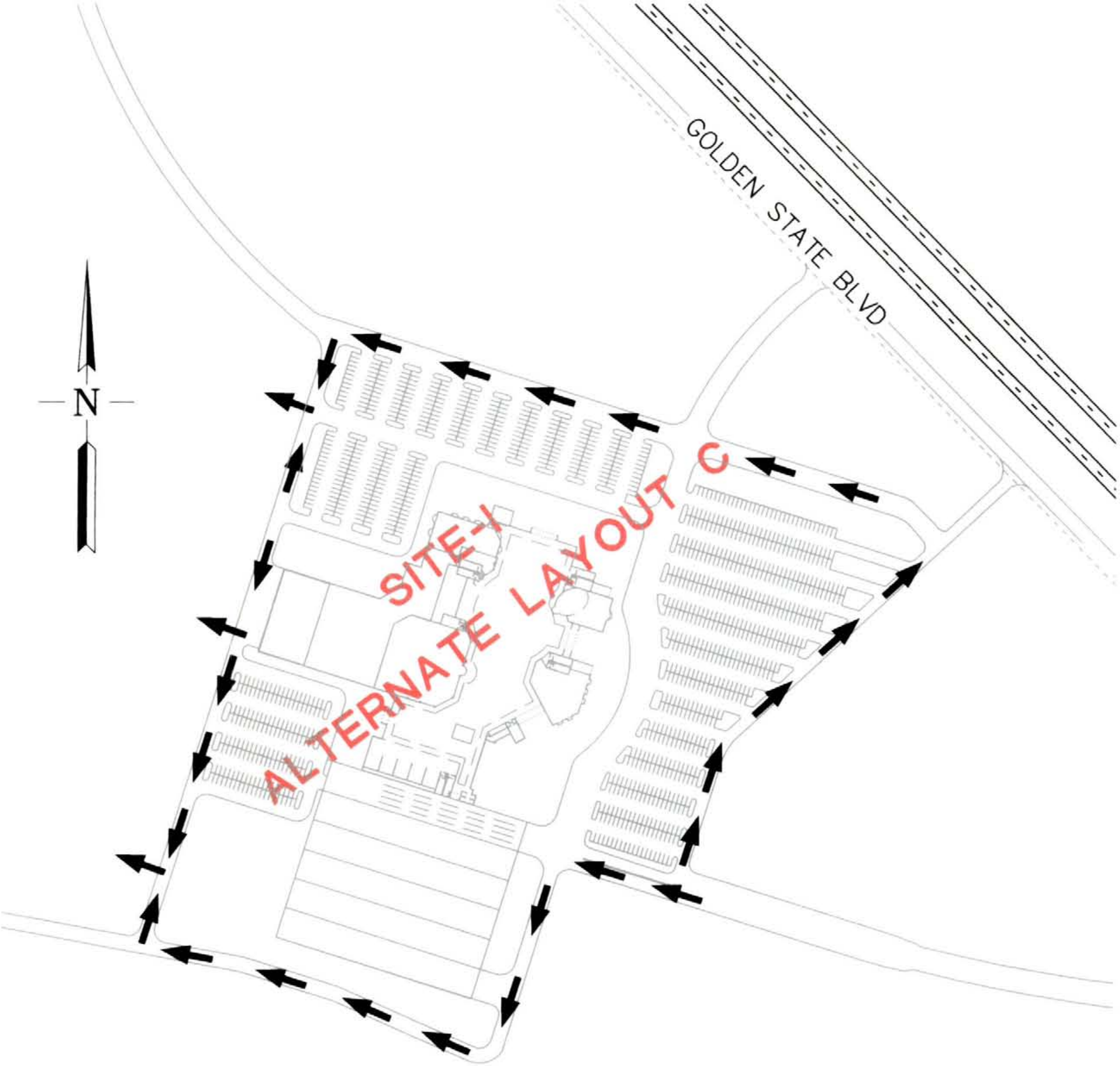
FIGURE 4



SITE-I
OVERLAND DRAINAGE RELEASE
FIGURE 5



SITE-I
OVERLAND DRAINAGE RELEASE
FIGURE 6



SITE-I
OVERLAND DRAINAGE RELEASE
FIGURE 7

Building and Parking Lot Grading and Drainage

The finished floor of the building will be elevated above the FEMA 100 year flood plain elevations by incorporating fill from the detention basin excavation. It is estimated that 200,000 cubic yards of earthwork will be required for Site IA, 170,000 cubic yards for Site IB, and 150,000 cubic yards for Site IC. It is anticipated that the onsite grading will balance based upon the detention basin excavation and additional onsite borrowing if necessary.

Onsite drainage systems will consist of an underground piped drainage system. Inlets will be placed at appropriate intervals to capture runoff and convey to the grassy swales that surround the site. The grassy swales will convey the storm water to the detention basins.

Roof leaders should be connected directly to the pipe system and parking lots should be constructed with a 1% minimum slope and 5% maximum slope toward the inlets.

Preliminary Grading Plans for the 3 alternate land use plans are includes as Figures 9, 10, & 11.

EROSION CONTROL

An erosion control plan will be developed with the primary intent to decrease pollutants entering the water columns, with a secondary intent of trapping pollutants before they exit the site.

A Storm Water Pollution Prevention Plan should be prepared as part of the project to provide a level of protection equivalent to full compliance with the Statewide General Construction Activities Storm Water Permit adopted by the Storm Water Resources Control Board.

A partial list of Best Management Practices (BMP's) from the California Stormwater BMP Handbook is included as Appendix C.

The construction of the grassy swales, silt oil traps and the large shallow detention basins will function as a major component of the post construction BMP's.

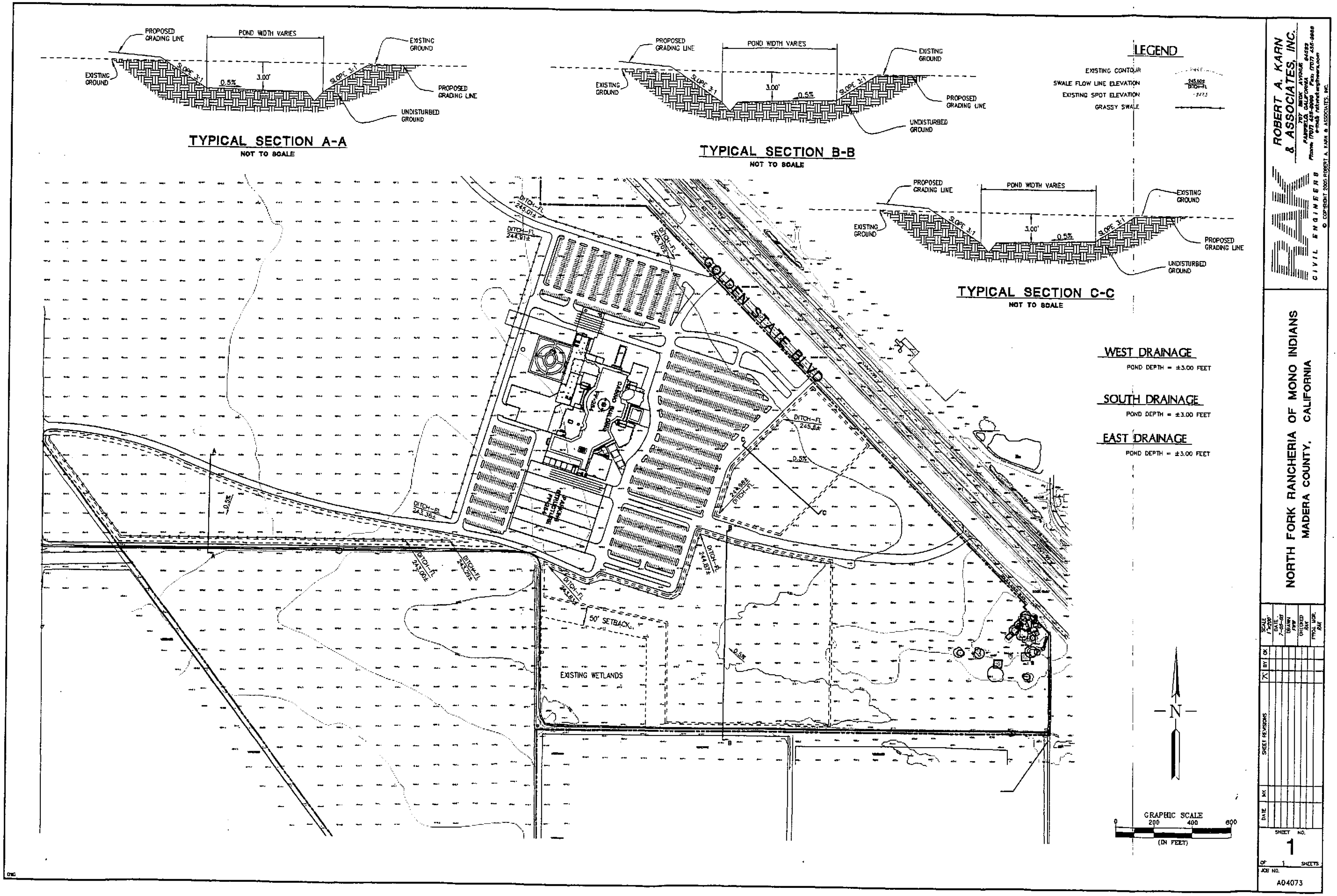

PROPOSED GRADING LINE
POND WIDTH VARIES
EXISTING GROUND
SLOPE 3:1
0.5%
3.00'
UNDISTURBED GROUND
TYPICAL SECTION A-A
NOT TO SCALE
TYPICAL SECTION B-B
NOT TO SCALE
TYPICAL SECTION C-C
NOT TO SCALE
LEGEND
EXISTING CONTOUR
SWALE FLOW LINE ELEVATION
EXISTING SPOT ELEVATION
GRASSY SWALE
245.50±
DITCH-FL
DITCH-FL 245.01±
DITCH-FL 244.81±
DITCH-FL 245.70±
DITCH-FL 245.8±
DITCH-FL 244.98±
DITCH-FL 243.36±
DITCH-FL 243.00±
DITCH-FL 243.29±
DITCH-FL 243.81±
DITCH-FL 244.87±
GOLDEN STATE BLVD
CASINO BUILDING
FF=264
PARKING STRUCTURE FF=264
50' SETBACK
EXISTING WETLANDS
A
B
C
WEST DRAINAGE
POND DEPTH = ±3.00 FEET
SOUTH DRAINAGE
POND DEPTH = ±3.00 FEET
EAST DRAINAGE
POND DEPTH = ±3.00 FEET
N
GRAPHIC SCALE
0
200
400
600
(IN FEET)
DATE
MK
SHEET REVISIONS
BY
CK
SCALE 1"=200'
DATE 7-05-05
DRAWN FWW
CHECKED RAK
PROJ. MGR. RAK
SHEET NO.
1
OF 1 SHEETS
JOB NO.
A04073
NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA
RAK
CIVIL ENGINEERS
ROBERT A. KARN & ASSOCIATES, INC.
707 BECK AVENUE
FAIRFIELD, CALIFORNIA 94533
Phone (707) 435-9999 Fax (707) 435-9988
e-mail: rakwest engineers.com
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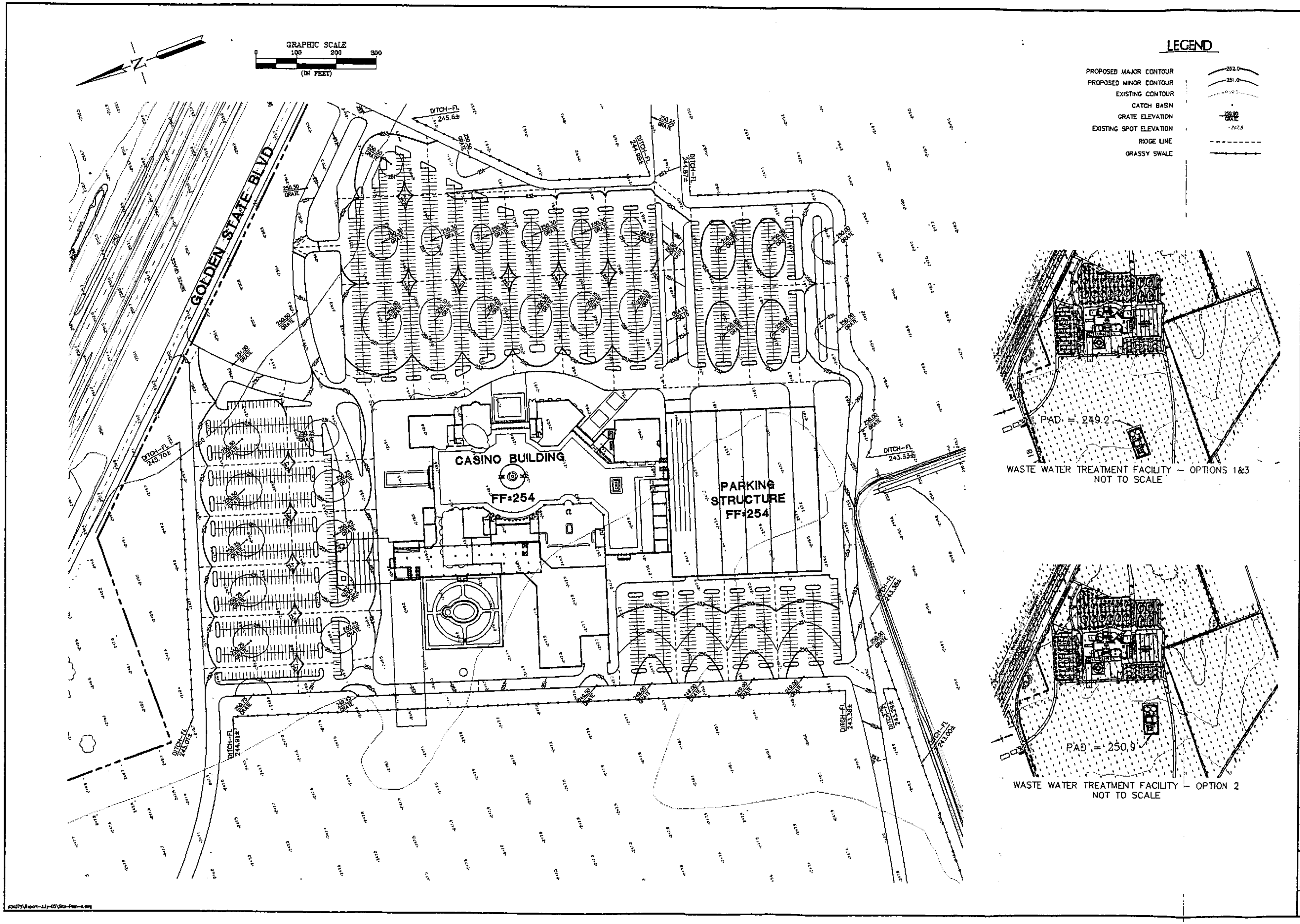
FIGURE 8



PRELIMINARY GRADING PLAN (SITE-A)
NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

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DATE 7-05-05
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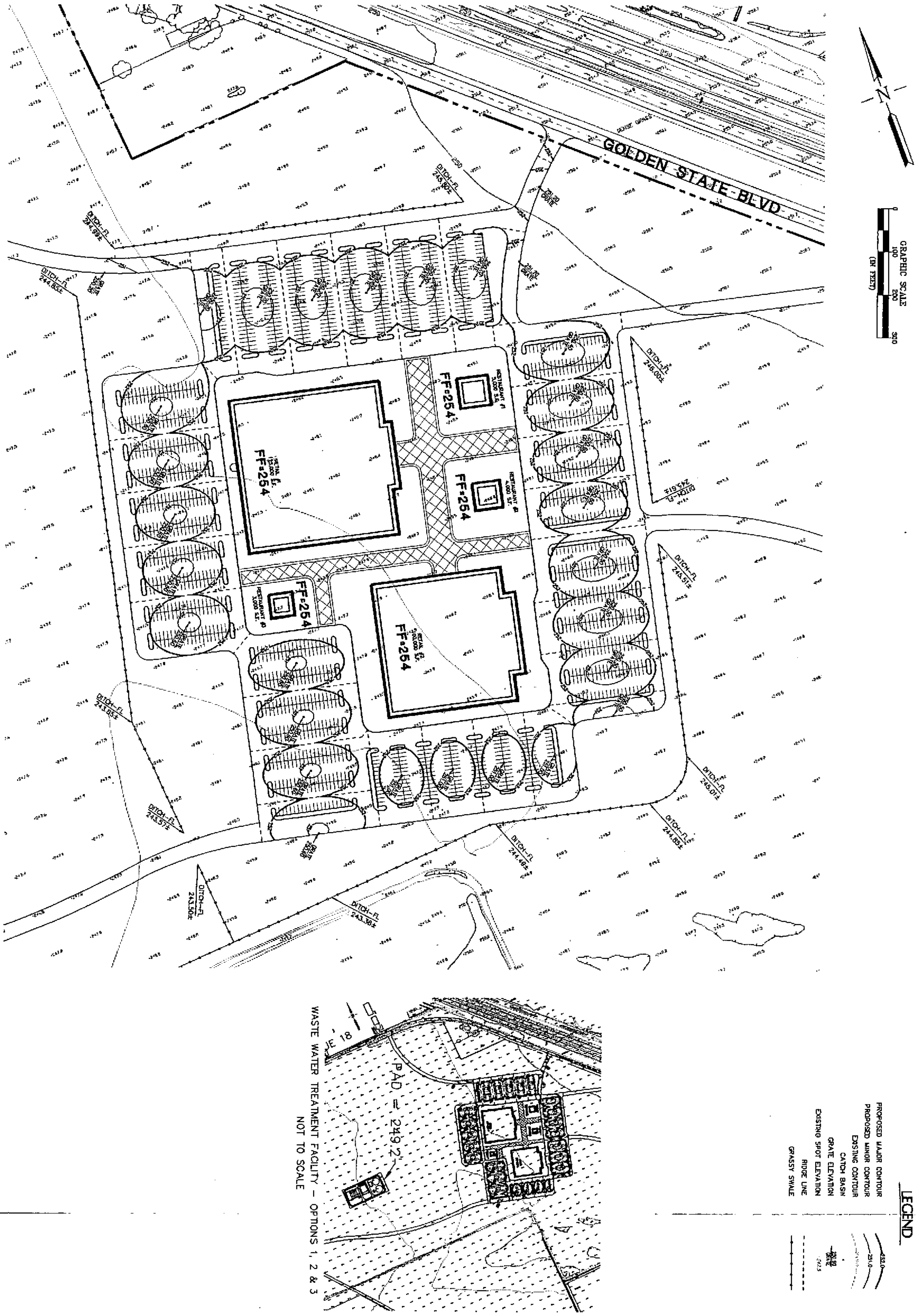
FIGURE 9



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DATE 7-05-05
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PROJ MGR. RAK

PRELIMINARY GRADING PLAN (SITE-B)
NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

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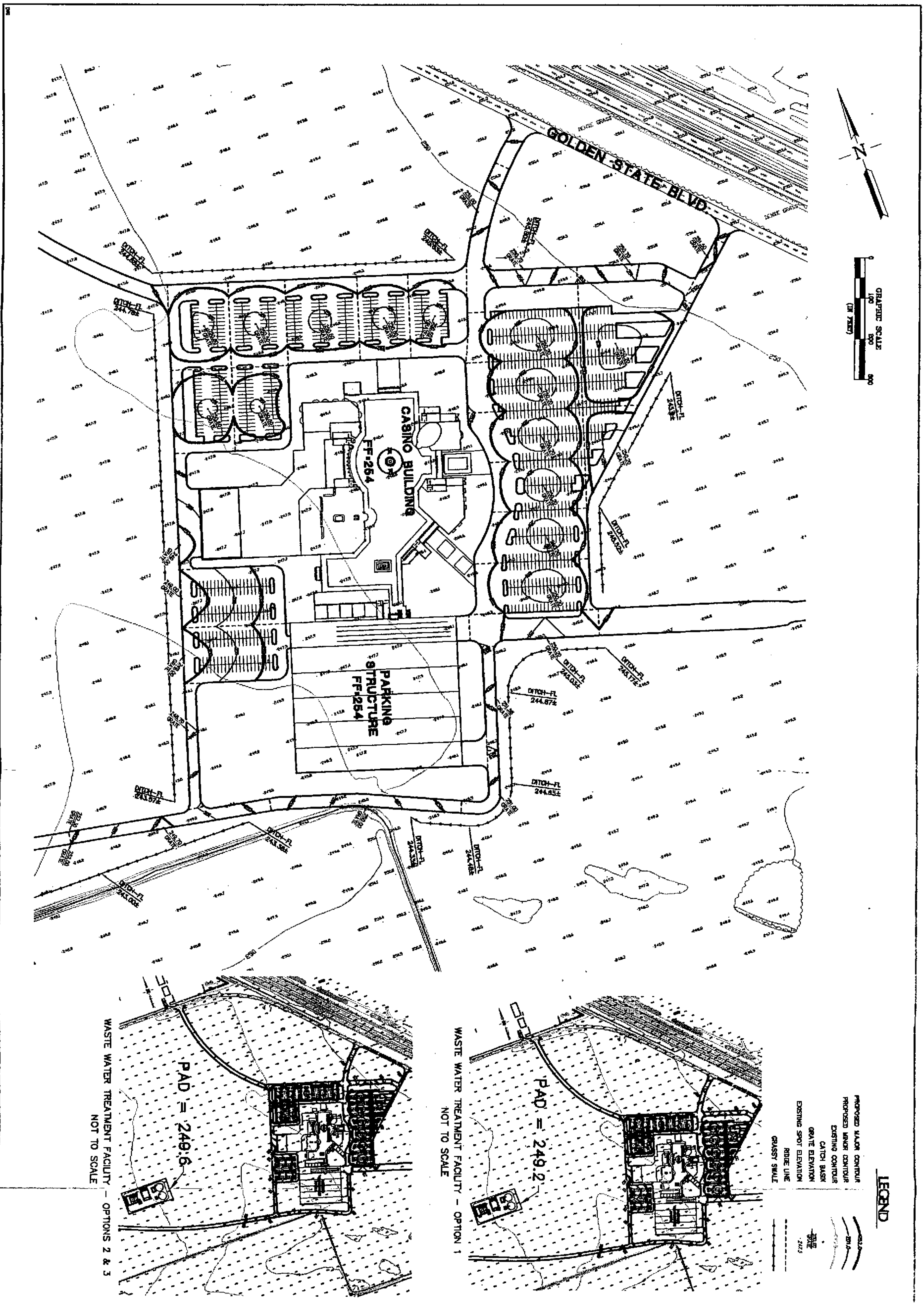
Phone (707) 435-9999 Fax (707) 435-9968
e-mail rak@rakengineers.com

FIGURE 10



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OF 1 SHEETS

JOB NO. A04073

PRELIMINARY GRADING PLAN (SITE-C RED. INTENSITY)
NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

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e-mail: rakarakengineers.com

FIGURE 11

SUMMARY

The impacts associated with floodplain encroachment, increase in storm runoff as a result of development can be mitigated through the creation of detention basins on the site. Alternate layouts would require a maximum of 105 acre feet of storage due to encroachment in the flood plain and additional storage due to development.

The excavation associated with the detention ponds would create adequate fill material to raise the finish floor of either Layout approximately 5 feet above the 100-year flood plain elevation. In addition, an overland drainage release for property can be maintained around the perimeter of the developed site.

SECTION-II

Alternate Site II

SITE GRADING AND
STORM DRAINAGE (SITE-II)
PROPOSED GAMING FACILITY
NORTHFORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

INTRODUCTION

This report presents a preliminary site grading and storm drainage plan for the proposed Gaming Facility in Madera County on Mission Drive in Madera County, California. (See Figure 12)

The plan was based upon preliminary architectural layout D for the Site-II location within the proposed project boundaries. This report and associated plans were intended to provide information for the environmental analysis of the project. The final architectural design and site development plan for the project may require revisions to the plans presented in this report.

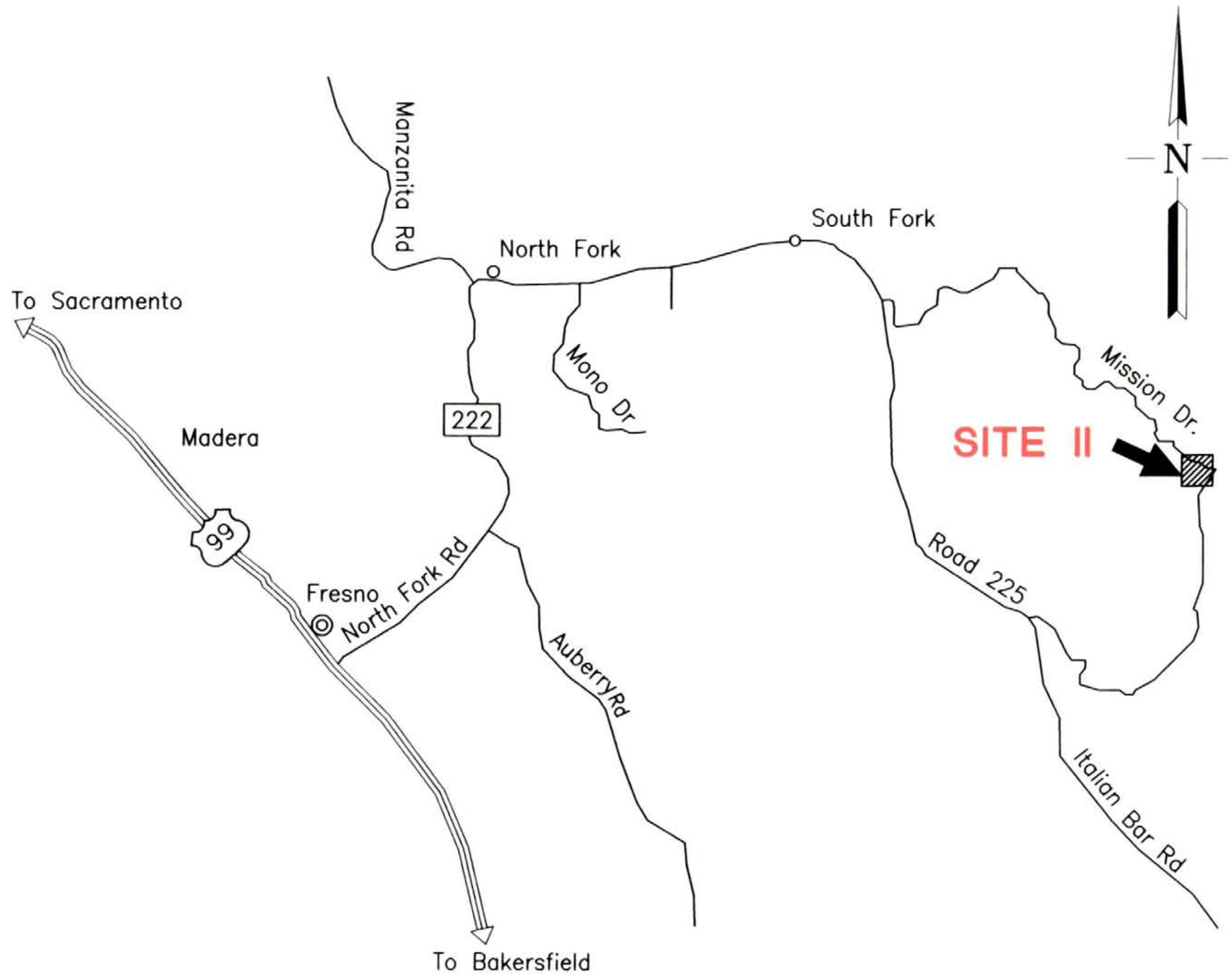
The grading and drainage plan incorporates a stormwater detention basin to attenuate the increase in peak flow of the storm runoff created by the development of the project. The increase in peak flow is created by the additional runoff created by the expanded impervious area.

EXISTING SITE DESCRIPTION

The site consists of approximately 4.7 acres of mountain land located on the west side of Mission Drive.

The existing topography is steep with an average slope of 25% from the eastern portion of the project to the western portion of the project.

The site accepts runoff from the property east of Mission Drive and runoff sheet flows to the westerly property line.



PROJECT BOUNDARY & LOCATION MAP

NO SCALE

FIGURE 12

STORMWATER HYDROLOGY

A hydrologic investigation was performed to estimate the 100-year storm runoff for the pre and post development of the site.

The Haestad Pond Pack Software was utilized to develop Soil Conservation Service (SCS) unit hydrographs. The hydrographs were analyzed to determine the volume of storm drainage detention required.

Watershed area was calculated for the site based upon the preliminary architectural site plan.

The SCS Unit Hydrographs and the associated calculations are included with this report as Appendix B.

The Flood insurance Rate Map entitled "Madera County, California (Unincorporated Areas) Community Panel Number 060170 0375B" designates this property as being located within the Sierra National Forest as a "Zone D-Areas in which flood hazards are undetermined" and therefore is not located within a regulated flood hazard area.

In addition, based upon a review of the site topography and the above referenced map it was determined that flood hazards will not affect the site. The existing site topography slopes from east to west at approximately 25%. The preliminary grading plan cuts a pad out in the middle of the site. The edges of the site where the existing drainage swales are located will not be disturbed. All drainage will continue to flow southwesterly through the southern portion of the site at a slope of approximately 40% eliminating any flooding concern.

STORMWATER DETENTION ANALYSIS

To mitigate offsite impacts, the stormwater drainage system for the proposed project is designed to limit the peak flow from the developed site to predevelopment peak flows.

To accomplish this, stormwater detention has been incorporated into the southern portion of the project site. The storage pond size takes into account the increase in runoff created by increased impervious surfaces.

The stormwater detention basin has been sized to allow for 1 Acre foot of storm runoff with a depth of approximately 3 feet.

The increase in volumes due to development and storage volumes for the site are shown in Table 2.

Although the proposed development of the project increases runoff and peak flow rates, the detention basins temporarily stores the runoff to limit the peak flow. The peak flow from the detention basin will be metered to pre-project levels. A preliminary grading plan for the detention basin is included as Figure 13.

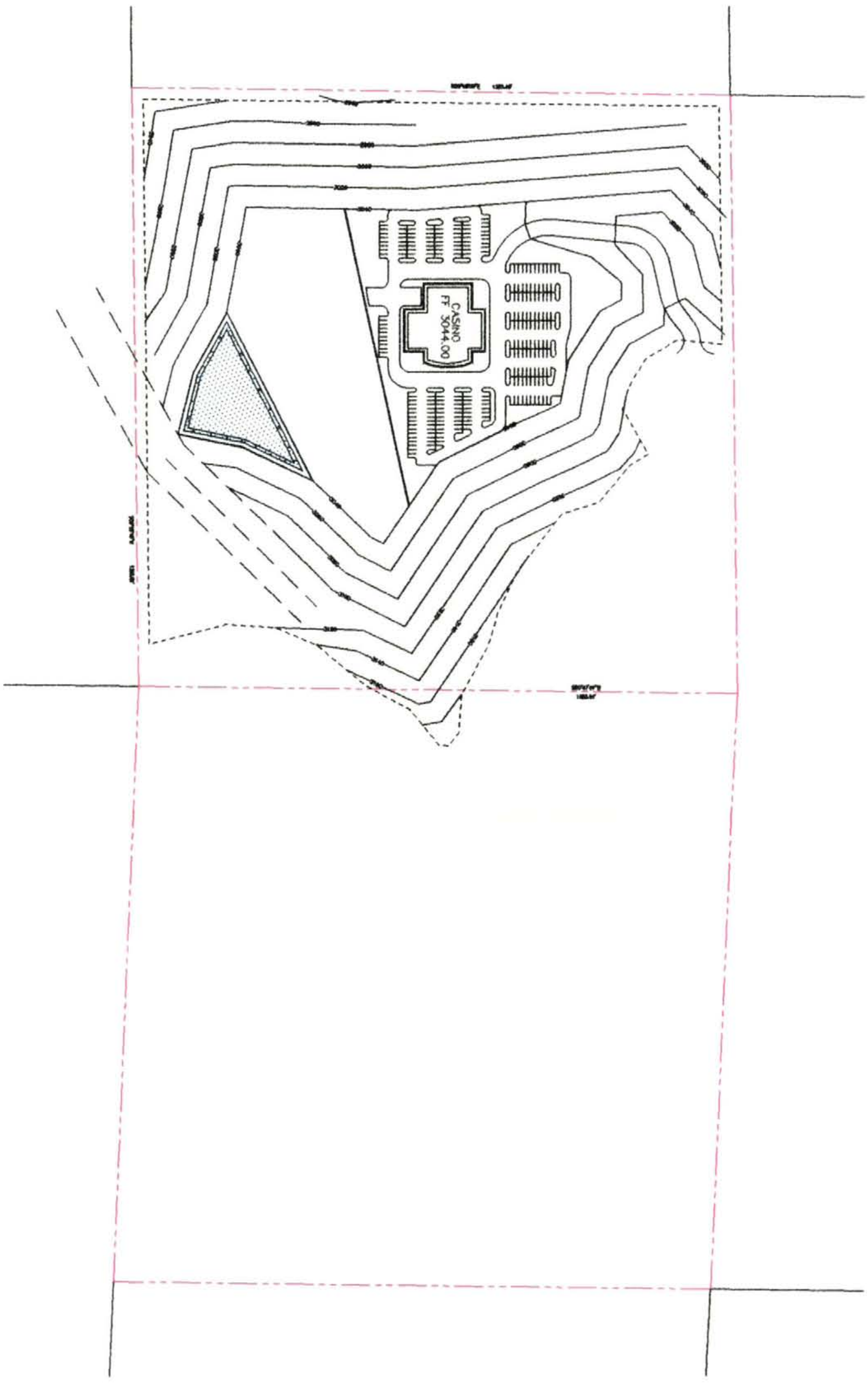
TABLE 2 – Increased Volumes & Storage Volumes

INCREASED RUN-OFF

TOTAL STORAGE REQUIRED = 0.55 AcFt

STORAGE VOLUMES

TOTAL STORAGE PROVIDED = 1.0 ACFT



▨ 1 Ac Ft
STORM WATER
DETENTION POND
DEPTH=4'±
SIDE SLOPES=2:1

SITE-II

LAYOUT D

STORM DRAIN

NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

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FIGURE 13

DRAINAGE IMPROVEMENTS

The development of the project will include several storm drainage improvements. The following sections describe the recommended improvements.

Overland Drainage Release

An overland drainage release has been incorporated into the project design to enable the property east of Mission Drive to continue to drain through the project site. The overland drainage release also allows the building to be protected during peak storm runoff events. The overland drainage release is shown on Figure 14.

Building and Parking Lot Grading and Drainage

The total volume of earthwork is estimated to be 600,000 CYD to develop the site. Onsite drainage systems will consist of an underground piped drainage system. Inlets will be placed at appropriate intervals to capture runoff and convey to the detention basins.

Roof leaders should be connected directly to the pipe system and parking lots should be constructed with a 1% minimum slope and 5% maximum slope toward the inlets.

A Preliminary Grading Plan has been prepared and is included as Figure 15.

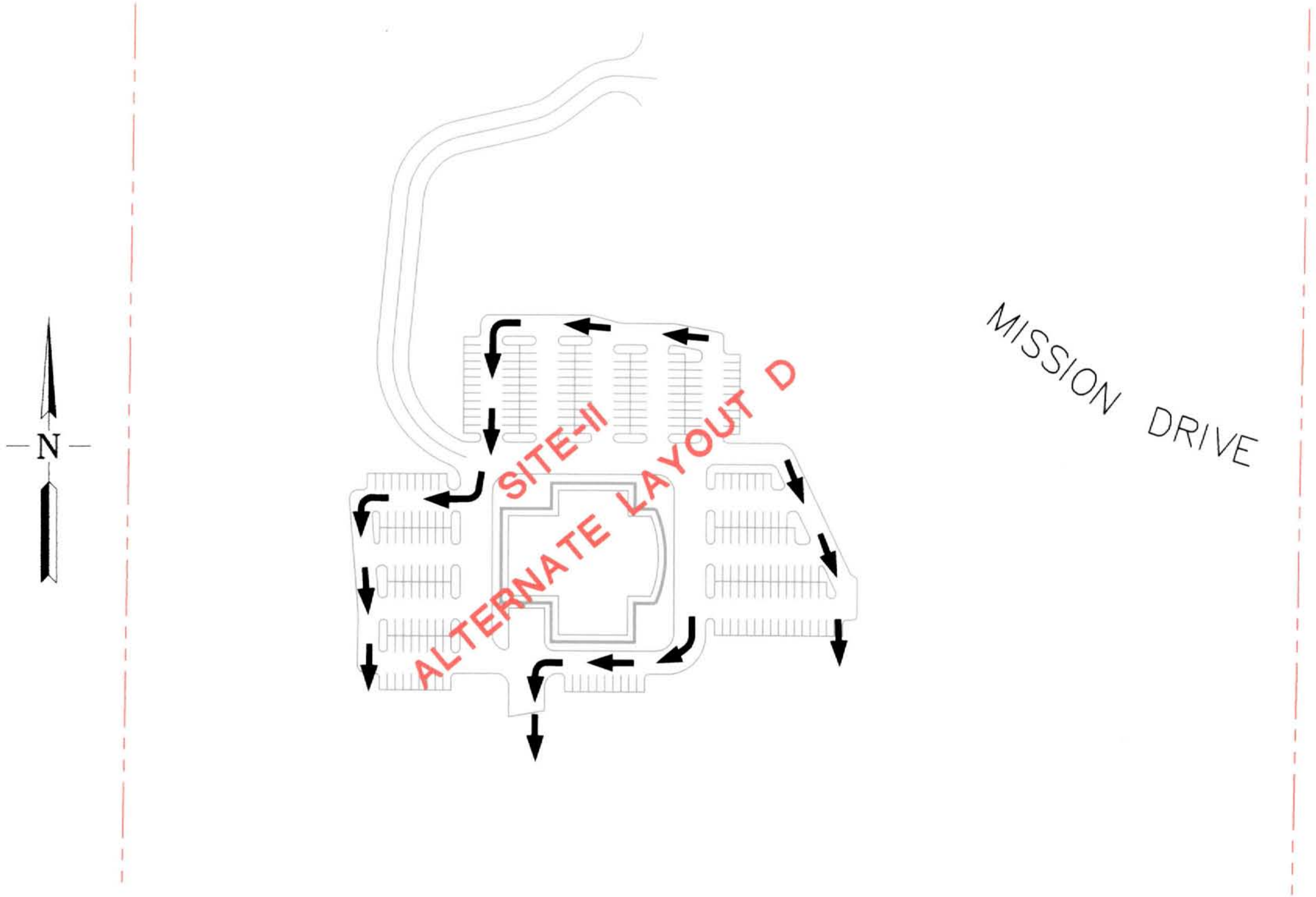
EROSION CONTROL

An erosion control plan will be developed with the primary intent to decrease pollutants entering the water columns, with a secondary intent of trapping pollutants before they exit the site.

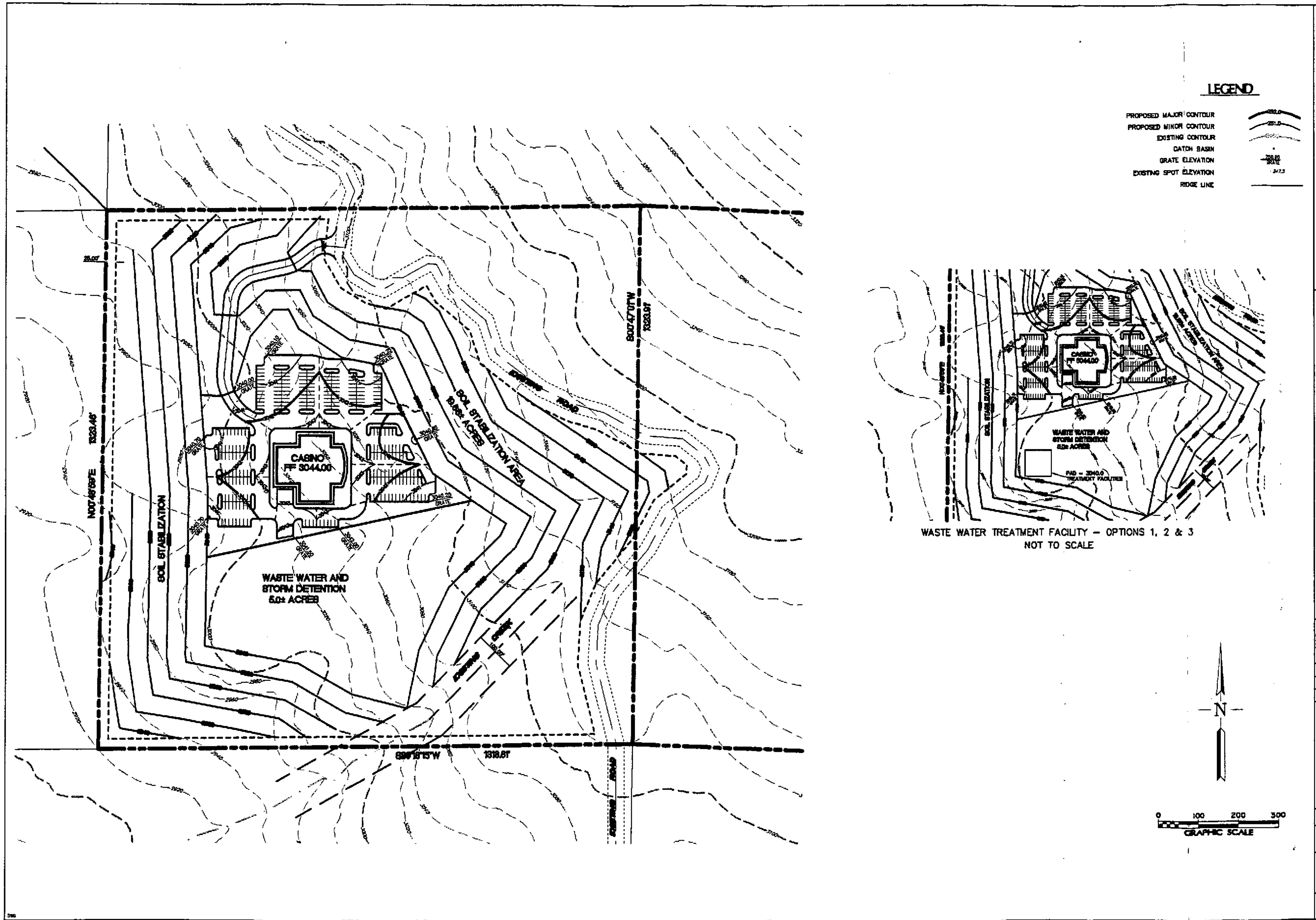
A Storm Water Pollution Prevention Plan should be prepared as part of the project to provide a level of protection equivalent to full compliance with the Statewide General Construction Activities Storm Water Permit adopted by the Storm Water Resources Control Board.

A partial list of Best Management Practices (BMP's) from the California Stormwater BMP Handbook is included as Appendix C.

The major components of the Post Construction BMP's will be the stormwater detention basin and silt oil traps.



SITE II
LAYOUT D
OVERLAND DRAINAGE RELEASE
FIGURE 14



WASTE WATER TREATMENT FACILITY – OPTIONS 1, 2 & 3
NOT TO SCALE

PRELIMINARY GRADING PLAN (SITE-D)
NORTHFORK RANCHERIA OF MONO INDIANS
NEAR MADERA, CALIFORNIA

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FIGURE 15

SUMMARY

The impacts associated with an increase in storm runoff as a result of development can be mitigated through the creation of the stormwater detention basin.

The onsite excavation associated with the project will generate a balanced site. In addition, an overland drainage release has been designed to handle storm runoff from the eastern side of the site.

The site consists of 2:1 slopes, which will be stable with proper compaction, hydroseeding, straw fiber rolls and a geotechnical review.

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APPENDIX A

SITE I

Project Floodplain Study

Project Floodplain Study

North Fork Rancheria of Mono Indians
Madera County, California

August 2006

Prepared by

RAK
CIVIL ENGINEERS

ROBERT A. KARN & ASSOCIATES
707 BECK AVENUE
FAIRFIELD, CALIFORNIA 94533

TABLE OF CONTENTS

LIST OF FIGURES

Section 1

Introduction and Background

The floodplain evaluation for this project requires the assessment of two (2) aspects to managing floodwaters in proximity to the proposed project site. These two aspects are: a) management of project-induced excess rainfall runoff volumes including mitigation for floodplain storage lost as a result of the project improvements, and b) potential impacts to the hydraulic grade line or water surface for with-project conditions.

For the purposes of this investigation, evaluation of the 10-year and 100-year events will be reviewed to quantify the site characteristics and response to excess rainfall runoff volumes in the vicinity of the proposed project. The investigation will consider the existing conditions versus improved conditions with respect to total rainfall versus net excess rainfall contributing to runoff after accommodating infiltration and surface interception losses.

With respect to the hydraulic grade line evaluation, only the 100-year will be considered. It is assumed that local drainage channels, ditches, etc. can accommodate the bulk of the 10-year runoff with nominal, temporary overbank or floodplain storage.

Floodplain Volume Evaluation

This evaluation is divided into floodplain characterization, precipitation and site response, and rainfall runoff production for both existing and improved conditions.

Floodplain Characterization

The proposed project site is currently situated within the boundaries of a delineated special flood hazard inundation zone as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps [1] (FIRM). The specific inundation zone is "Zone A0", which represents an area with

> "*... flood depths of 1 to 3 feet (usually sheet flow on sloping terrain);...*"

In this instance, the FIRM indicates a depth of 1.0 foot of inundation in the vicinity of the project site. Figure 1 depicts the delineated 100-year floodplain boundary in relationship to the project property. Floodwaters progress from east to west (right to left in Figure 1) as a result of excess runoff associated with Dry Creek and Schmidt Creek. A review of Figure 1 reveals that an average floodplain width in proximity to the project site is about 11,100 feet (2+ mi.), and the overall terrain slope is mild from east to west (right to left in Figure 1).

Precipitation and Site Response

A review of the total storm precipitation was made for the 10- and 100-year return period storms for the proposed site. The results are based on data published in the NOAA Atlas 2 [2], and depicted in isopluvial (spatially varying rainfall depth) maps covering the project vicinity. The 24-hour storm duration was chosen as it most represents an expected extreme storm event in the San Joaquin valley, and produces more rainfall volume than the 6-hour storm event. This also produces a conservative approximation of potential rainfall runoff response for the subject project area.

---

[1] Project site is depicted on two (2) FIRMs: Madera County, California Panel 600 of 775, Community Panel No. 060170 0600B (Aug 4, 1987), and Madera County, California Panel 605 of 775, Community Panel No. 060170 0605B (Aug 4, 1987).

[2] U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Precipitation-Frequency Atlas of the Western United States, Region IX – California, 1973.

According to NOAA Atlas 2, the total precipitation for the 10- and 100-year 24-hour events is estimated at:

☐ 10-Yr, 24-Hr Event:	1.81 inches
☐ 100-Yr, 24-Hr Event:	2.45 inches

Figure 2 shows portions of NOAA Atlas 2 Figures 40 and 43 in the vicinity of the project site. The location of Madera California was used as the reference point in Figure 2 to ascertain the rainfall totals.

Determination of an expected site response to rainfall requires a comparison of pre-project and post-project conditions to ascertain project-induced rainfall effects. Under the pre-project conditions, interception of rainfall and infiltration and wetting of the top layer of soil occurs until that point at which the soils can no longer capture and retain rainfall. Rainfall above and beyond this point is considered excess or net rainfall that produces runoff from the site. Under with-project conditions, increased impervious surfaces associated with site improvements reduce the interception and infiltration potential, and result in increased net rainfall that produces more runoff than under pre-project conditions.

Interception/infiltration loss rates are customarily characterized by an initial loss rate, followed by a constant loss rate. The initial loss rate is greater, and accommodates rainfall lost to adhesion to soils, wetting of the top layer of soil, and attraction to plants or other surfaces. The constant loss rate represents that residual loss potential as rainfall permeates the soil layer and infiltrates into the near surface ground mass. Generally, it is assumed that runoff from excess rainfall does not occur until both the initial and constant loss rate has been accommodated.

At the time of this evaluation, no empirical data on initial or constant loss rates for the project vicinity were readily available. Therefore, assumptions of initial and constant loss rates were made for the basis of this assessment.

Rainfall Runoff Production

Under existing (pre-project) conditions, rainfall runoff production will be estimated in terms of depth (inches) of total rainfall. These values can then be compared to with-project conditions to quantify the induced runoff volume associated with proposed improvements. (For the purposes of this evaluation, it is assumed that a single storm event occurs [i.e. no storm nesting] since multi-storm precipitation data for the project site was not readily available at the time of this evaluation.)

The following pre-project, site-specific losses were assumed:

- ☐ 0.24 inches/hr (for the first hour)[3]
- ☐ 0.10 inches/hr (subsequent hours)[4]

It was further assumed that the storm characteristics for the San Joaquin valley result in a majority of the rainfall occurring over a six-hour period nested within the 24-hour total storm period. (This is commonly observed in the Sacramento/San Joaquin valleys for wet-season storms whereby the bulk of the rainfall occurs in a shorter, nested timeframe within the larger general rain period for a given storm.) This 6-hour precipitation period can be represented by percent of rainfall per hour. The percentage breakdown over the 6-hour period used for this evaluation is: 10%, 11%, 14%, 37%, 13%, and 10%[5]. An estimation of rainfall runoff for pre-project conditions is shown below:

10-Year Event Excess Rainfall Runoff Estimate: Pre-project Conditions
(Total Rainfall: 1.81 in.)

Time Period	% of Total	Rainfall (in/hr)	Loss (in/hr)	Net Rainfall Runoff (in)
Hr 1:	10%	0.18	0.24	0.00
Hr 2:	11%	0.20	0.06* + 0.10	0.04
Hr 3:	14%	0.25	0.10	0.15
Hr 4:	37%	0.67	0.10	0.57
Hr 5:	13%	0.24	0.10	0.14
Hr 6:	10%	0.18	0.10	0.08
> 6 Hrs:	5%	0.09	0.10	0.00
Totals:	100%	1.81 in.	0.84 in.	0.97 in.

- Residual loss carryover from previous hour; only count 0.18 in. of loss in first hour for totals.

---

[3] EM 1110-2-1417 suggests that initial losses can range from 10-20% of the total rainfall for forested areas, and around 0.1-0.2 inches for urban areas. For the agricultural area around the project site, 10% of the total rainfall was chosen.

[4] Table 5-1. SCS soil groups and infiltration loss rates (SCS, 1986); assumed soil group C, clay loams, shallow sandy loam, soils low in organic content, and soils usually high in clay; loss rate range of 0.05-0.15 in/hr.

[5] Percentage distribution concept of the 6-hr rainfall period based on EM1110-2-1411; percentages modified to produce 95% of rainfall in the 6-hour period, with the remaining 5% to occur over the remaining 18 hrs for the 24-hour event.

100-Year Event Excess Rainfall Runoff Estimate: Pre-project Conditions
(Total Rainfall: 2.45 in.)

Time Period	% of Total	Rainfall (in/hr)	Loss (in/hr)	Net Rainfall Runoff (in)
Hr 1:	10%	0.25	0.24	0.01
Hr 2:	11%	0.27	0.10	0.17
Hr 3:	14%	0.34	0.10	0.24
Hr 4:	37%	0.91	0.10	0.81
Hr 5:	13%	0.32	0.10	0.22
Hr 6:	10%	0.25	0.10	0.15
> 6 Hrs:	5%	0.11	0.10	0.01
Totals:	100%	2.45 in.	0.84 in.	1.61 in.

* Residual loss carryover from previous hour; only count 0.18 in. of loss in first hour for totals.

In summary, net rainfall producing runoff volume for the project site is estimated at 0.97 inches and 1.61 inches for the 10-year, and 100-year events, respectively.

Under with-project conditions, site improvements will increase runoff as a result of increased imperviousness for a portion of the project property. For the purposes of this evaluation, it is assumed that depression storage and wetting of hardened, paved, or other impervious (improved) surfaces will capture 5% of the total event, with 95% of the total rainfall resulting in runoff. The following impervious surfaces were estimated from Improvement Plan A, Spray Field treatment (See Figure 3):

❑ Treatment Plant	2.43 Ac.
❑ Buildings, Parking, Streets	42.83 Ac.
	45.26 Ac.

With 95% of the total rainfall producing runoff, the total precipitation for the 100-year event generating runoff volume from impervious surfaces is 2.33 inches. This represents a project induced runoff volume of 8.8 ac.ft. from impervious surfaces associated with project improvements.

With respect to landscaped areas, it was assumed that net rainfall producing runoff was equivalent to the pre-project net rainfall amount of 1.61 inches. An estimate of the amount of landscaping around the new buildings and parking lot associated with project improvements is:

☐ Landscaping	8.5 Ac.

This represents a project induced runoff volume of 1.1 ac.ft. from improved, landscaped areas.

Therefore, the total estimated with-project induced runoff volume attributed to site improvements is approximately 9.90 ac.ft.

Additionally, the project improvements are required to exist a minimum of 1.0 feet above the estimated floodplain. Thus, in addition to induced runoff volume, the project must mitigate for flood volume displaced as a result of project improvements within the delineated 100-year flood boundary. For this evaluation, preliminary estimates were made on areas of improvements to be removed from the floodplain. A review of the preliminary site plan design indicates an allowance for some nominal storage of floodwaters in and around drainage inlets. However, for this estimation, this nominal storage is disallowed, although landscaped areas were not excluded from temporary floodplain storage in the event of a rare, infrequent event such as a 100-year storm event. The estimated improved areas excluded from floodplain storage include:

☐ Treatment Plant	2.4 Ac.
☐ Facility and Parking Lots	42.8 Ac.
☐ Wastewater Storage Basin	8.3 Ac.
	53.5 Ac.

Utilizing the FIRM estimated depth of flooding in the vicinity of the project site of 1.0 feet results in a displaced flood volume of 53.5 ac.ft.

Therefore, project-induced flood volume storage demand associated with increased runoff and displaced floodplain is estimated at 63.4 ac.ft. If the project designates a portion of land dedicated to flood storage, this property would also need to displace floodplain storage, and thus its surface acreage times 1-foot of depth would need to be added to the storage volume.

Development or set-aside of a portion of the project property dedicated solely for flood storage was not part of this evaluation. In the context of a 2-mile wide, 1-foot depth floodplain running for 5-8 miles upstream and downstream of the project site, the project-induced flood volume is minimal in comparison to that of the floodplain.

Section 3

Potential Impacts to Hydraulic Gradeline

The purpose of this section is to evaluate, at a preliminary level, the potential for impacts to the water surface profile in the vicinity of the project as a result of site improvements.

For this evaluation, normal depth calculations only will be performed. A detailed hydraulic study of the subject floodplain will not be performed. There have been more detailed hydraulic studies performed upstream of the project on each of the creeks contributing runoff to the project property. However, the downstream limits of these detailed studies terminate significantly upstream from the subject property. Relevant hydraulic information representing peak discharges will be utilized for this evaluation.

For normal depth calculations, peak flowrates, average invert slope, average roughness ("n" values), and representative geometry is used to calculate a normal depth and estimated water surface elevation. To make normal depth calculations reasonable, it is assumed that features or topography exist in proximity to FEMA's floodplain boundaries sufficient to contain the floodplain. (In the event that this is not the case, then the computed water surface elevation is conservative, and actually higher than the real floodplain elevation would be for a commensurate storm used in the calculations. Also, calculations will only be performed for the 100-year event so as to relate the results back to the approximated FEMA floodplain conditions depicted on the FIRMs.

Peak Discharge Estimation

A peak discharge rate for this evaluation is based on combining the 100-year peak flows from Schmidt and Dry Creeks, and then adding some additional amount to represent that added flow associated with contributions to runoff between the upstream detailed studies and the project site. It was assumed, for purposes of this study, that the peak flows in the two creeks were concurrent; i.e. – they are in phase and peak at the same time when flows reach the vicinity of the proposed project. The estimated peak discharge for this evaluation is:

- Schmidt Creek .... 1,270 cfs (FEMA detailed study)
- Dry Creek .... 2,830 cfs (FEMA detailed study)

- ☐ Additional Contribution [6] .... 900 cfs (20%+)

Normal Depth Peak Discharge: .... 5,000 cfs

Invert Slope Estimation

An average invert slope of the floodplain was estimated from three (3) slopes representing the floodplain characteristics near the project site. These are labeled S1, S2 and S3 on Figure 1. Thus, the average slope is:

$$S = 0.0021 \text{ ft./ft.}$$

Typical Geometry and Roughness Estimation

To perform the normal depth calculations, three (3) cross-sections were developed to represent the floodplain hydraulic regime in proximity to the proposed project site. For each of these, an average Manning's roughness value ("n") was estimated based on review of the USGS quad mapping and aerial photography. The three cross-sections are shown in Figure 1 as: XS 4.0, XS 4.5, and XS 5.0. Note that XS 4.0 passes directly through the proposed project site. This cross section geometry will be modified to depict exclusion attributable to project improvements (with-project conditions) and its water surface elevation will be computed for comparison against the pre-project results to identify whether the project produces a hydraulic impact as a result of site improvements.

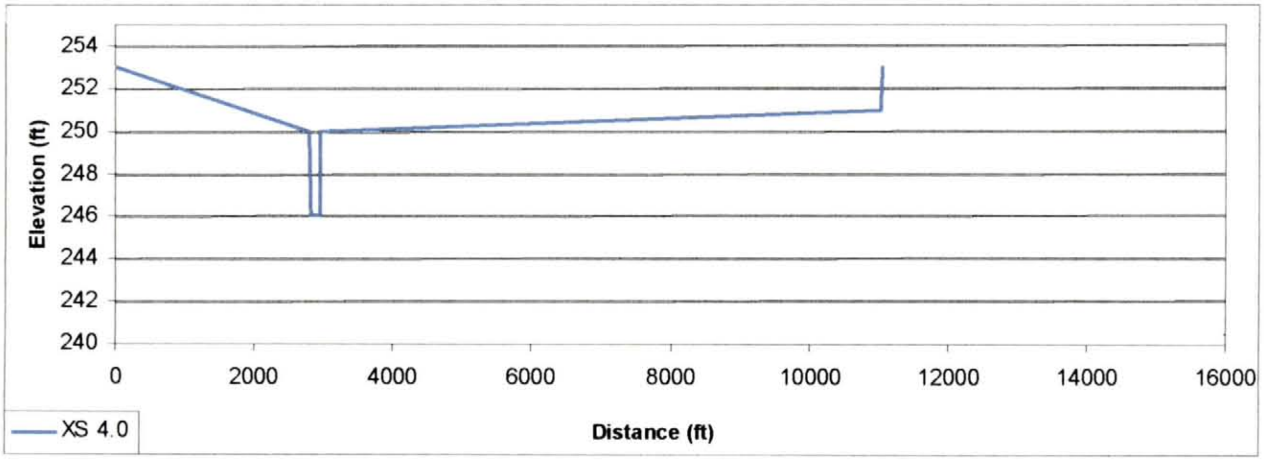
Average roughness values for each cross-section were computed as:

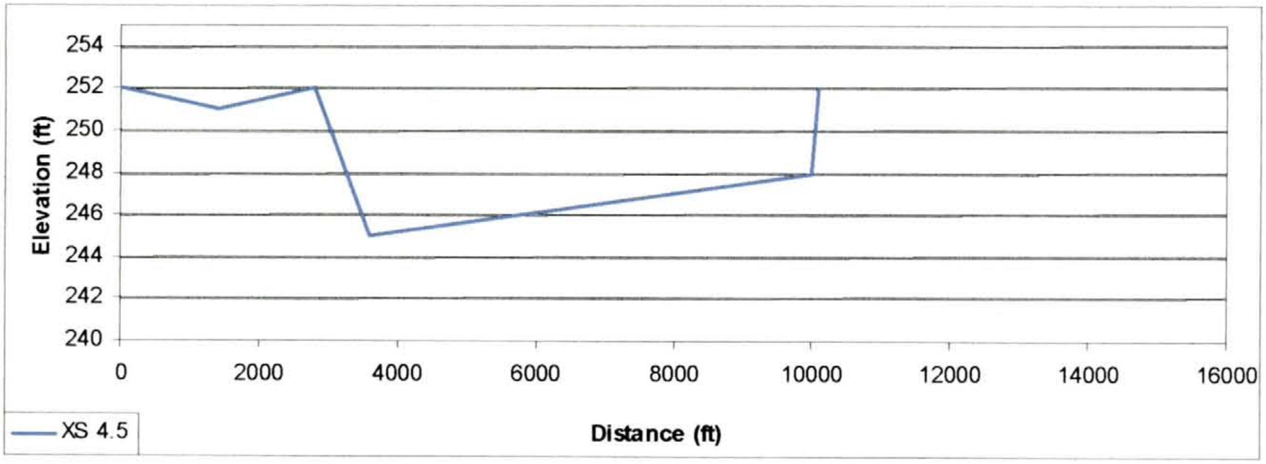
☐ XS 4.0	0.041
☐ XS 4.5	0.043
☐ XS 5.0	0.043

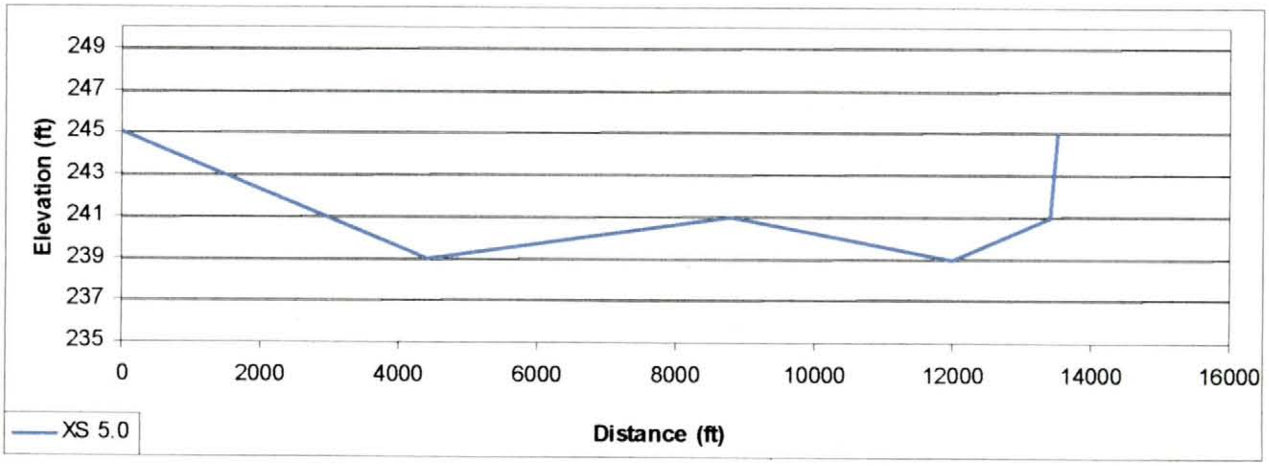
Pre-project cross-sections are shown in the following graphics (cross section orientation is facing downstream {east to west}):

---

[6] Estimated contribution associated with additional runoff between the detailed studies and the project site.







A simple normal depth computation application, Hydrocalc, was used to evaluate the hydraulic performance of the above cross sections. The results are tabulated below:

```
***********************************
HydroCalc ASCII Output  XS 4.0
***********************************

Input Parameters:
-----------------

Channel type: GENERAL
Flow =                   5000.000 cfs
Manning n =               0.04100
Bottom slope =            0.00210
Energy coeff =              1.000

Computed Results:
------------------

Normal depth =            250.922 ft
Normal velocity =           1.098 ft/s
Froude number =             0.264
Critical depth =          249.375 ft
Critical velocity =        10.271 ft/s
Flow area =              4553.596 sq ft
Wetted perimeter =       8472.320 ft
Top width =              8469.513 ft
Hydraulic radius =          0.537 ft
Hydraulic depth =           0.538 ft
```

```
***********************************
HydroCalc ASCII Output  XS 4.5
***********************************

Input Parameters:
-----------------

Channel type: GENERAL
Flow =                   5000.000 cfs
Manning n =               0.04300
Bottom slope =            0.00210
Energy coeff =              1.000

Computed Results:
------------------

Normal depth =            246.751 ft
Normal velocity =           1.449 ft/s
Froude number =             0.273
Critical depth =          246.042 ft
Critical velocity =         4.098 ft/s
Flow area =              3445.601 sq ft
Wetted perimeter =       3935.589 ft
Top width =              3935.581 ft
Hydraulic radius =          0.875 ft
Hydraulic depth =           0.876 ft
```

```
***********************************
HydroCalc ASCII Output  XS 5.0
***********************************

Input Parameters:
-----------------

Channel type: GENERAL
Flow =                   5000.000 cfs
Manning n =               0.04300
Bottom slope =            0.00210
Energy coeff =              1.000

Computed Results:
------------------

Normal depth =            240.276 ft
Normal velocity =           1.174 ft/s
Froude number =             0.259
Critical depth =          239.744 ft
Critical velocity =         3.469 ft/s
Flow area =              4260.394 sq ft
Wetted perimeter =       6677.736 ft
Top width =              6677.733 ft
Hydraulic radius =          0.638 ft
Hydraulic depth =           0.638 ft
```

In summary, the normal depth calculations indicate a range of average flow velocities from approximately 1 – 1.5 feet-per-second on the floodplain, and an average depth of between 0.5 – 1.0 foot deep. These results are consistent with the FIRM definition for a Zone A0 designation.

To evaluate the effects of the project improvements, the conveyance area for XS 4.0 (see Figure 1) is now modified to exclude a portion of the cross-section representing project improvements within the floodplain. A review of Figure 3 indicates that improvements produce approximately an 1,800-ft wide impediment to flows moving from east to west with roughly two-thirds of the width blocked by structures. The remaining one-third of the width encompassing parking spaces, curbs and landscaping are still susceptible to being submerged by shallow, passing flood flows. Thus, XS 4.0 was modified to exclude 1,200 linear feet from the cross-section, representing a loss in conveyance area commensurate to the typical project improvements. The normal depth calculations are made for this condition, and the results are shown in the table below:

```
***************************************
HydroCalc ASCII Output  XS 4.0 Modified
***************************************

Input Parameters:
-----------------
Channel type: GENERAL
Flow =               5000.000 cfs
Manning n =           0.04100
Bottom slope =        0.00210
Energy coeff =          1.000

Computed Results:
------------------
Normal depth =         251.017 ft
Normal velocity =        1.102 ft/s
Froude number =          0.264
Critical depth =       250.568 ft
Critical velocity =      3.217 ft/s
Flow area =           4528.472 sq ft
Wetted perimeter =    8349.824 ft
Top width =           8349.625 ft
Hydraulic radius =       0.542 ft
Hydraulic depth =        0.542 ft
```

A review of the results indicates a negligible impact to the hydraulic grade line as a result of the project improvements.

- Change in water surface elevation ....+ 0.095 ft (~ 1.1 inches)
- Change in average velocity ....+ 0.004 ft/sec.
- Change in average hydraulic depth ....+ 0.004 ft.
- Change in flow area ....- 25± sq.ft.

Summary

The following summarizes the results of the floodplain evaluation of potential impacts associated with proposed project improvements in the Madera County area.

Floodplain Storage Impacts

Implementation of the project improvements within the 100-year floodplain will require some temporary runoff volume storage to mitigate increased runoff and floodplain storage exclusion attributable to the project. An estimate of local storage needed is approximately 64 acre-feet plus that floodplain volume excluded in order to construct a temporary storage facility. This can be easily be accommodated within the remaining project boundary be shaping a shallow terminal basin. This terminal basin's invert should not be less than the nearby drainage infrastructure (agricultural ditches) if the basin is to drain by gravity. The terminal basin can also provide storm water quality benefits to the project by capturing and treating runoff from parking areas and improved lands about the proposed project.

Hydraulic Grade Line Impacts

Implementation of the project improvements within the 100-year floodplain will have negligible effects on the hydraulic conveyance and flow regime in proximity to the proposed project and downstream, possibly increasing the water surface of the 11,000+ foot-wide floodplain by nominal amount, not likely perceptible to properties in the floodplain. The level of accuracy of the delineated FEMA floodplains (likely determined by approximate mapping methods) is probably less than that level of accuracy in the empirical results normal depth computations. In addition, normal depth computations do not take into account downstream hydraulic backwater conditions. Thus, the near imperceptible change in the water surface may be negated by downstream flow regime conditions. Natural phenomena and/or manmade changes, irrespective of the project improvements, such as wind-wave setup, sediment transport, cropping patterns, County road maintenance (such as resurfacing, etc.), ditch maintenance, changes in upstream land use resulting in accelerated runoff or increased storage conditions, will likely have greater impacts on the floodplain than the empirical amount computed within this assessment.

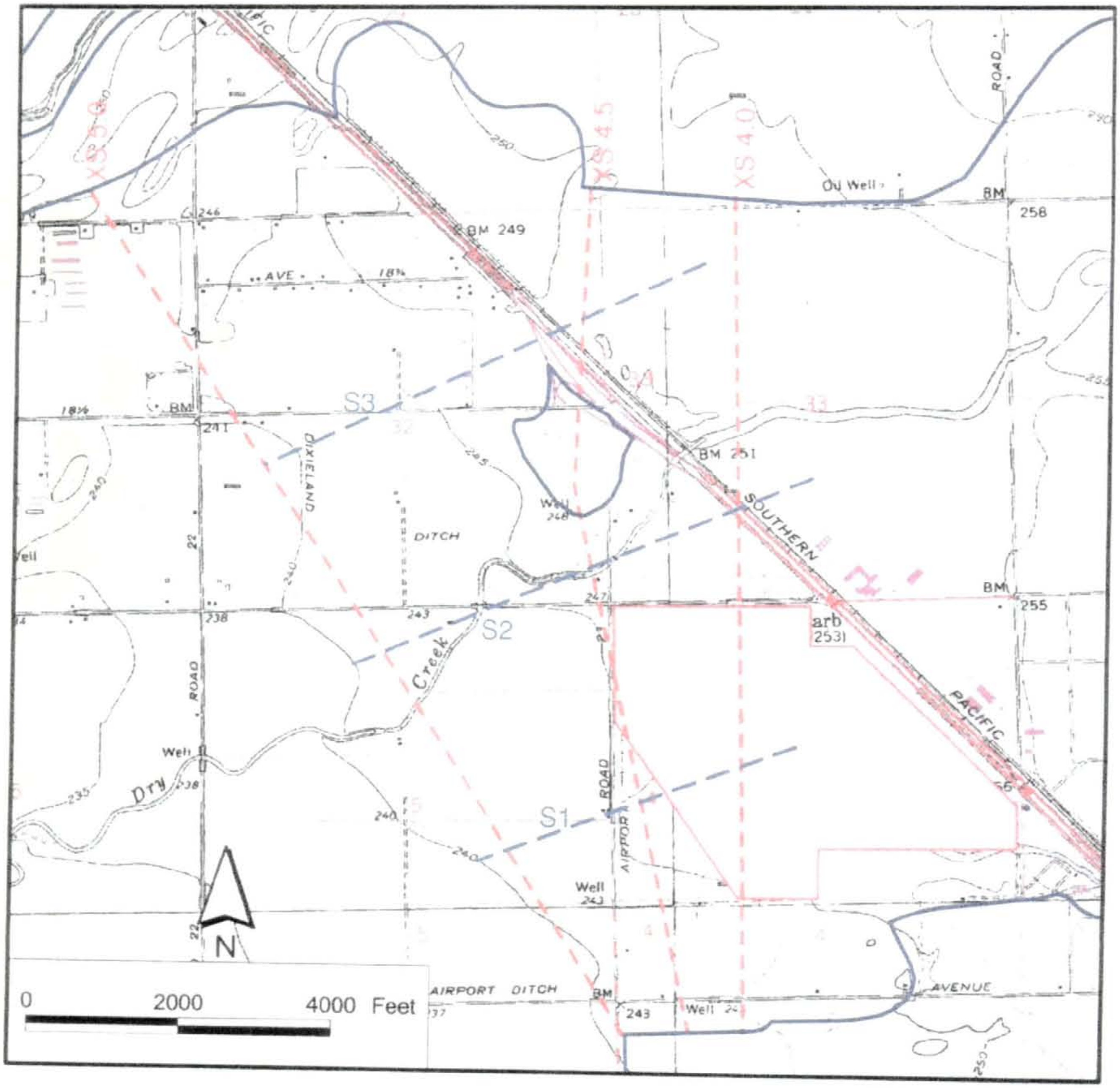
Conclusion

The purpose of this investigation was to ascertain the impacts, if any, to both the floodplain storage as well as the hydraulic conveyance through the floodplain as a result of project improvements implemented within the 100-year floodplain. This investigation has made with conservative assumptions erring on the safe side of hydraulic analyses in order to determine any mitigation requirements as a result of the project. It is the conclusion of this investigation that the project improvements have a inconsequential, nominal impact on the existing 100-year floodplain, and is likely imperceptible. It is reasonable to accept that the degree of accuracy in the approximate floodplain mapping is less than the minimal deviation derived by normal depth computations, which doesn't take into account downstream hydraulic conditions that likely dominate the miniscule value.

It is, therefore, the opinion of the undersigned that the project improvements will not have a detrimental impact to the surrounding area and its associated floodplain, and any changes as a result of the project would likely be imperceptible to those in the floodplain surrounding the project vicinity.

This evaluation was performed using prudent and reasonable judgment commensurate with the level of detail and accuracy of readily available information provided by the project design engineer.

PREPARED UNDER THE DIRECTION OF:
Robert A. Kam, PE
Robert A. Kam & Associates, Inc.



LEGEND:

▭ Approx. 100-Yr Floodplain
╱ Average Floodplain Slope
╱ Approx. XSEC Location
▭ Project Property

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FLOODPLAIN ENVIRONMENT NEAR PROJECT

NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

FIGURE 1

Clips taken from NOAA Atlas 2, Region IX – California, 1973.

Figure 40

ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION FOR SOUTHERN HALF OF CALIFORNIA IN TENTHS OF AN INCH

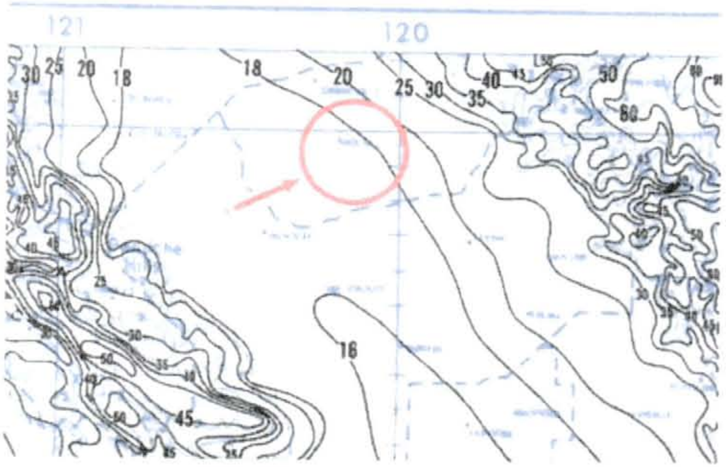
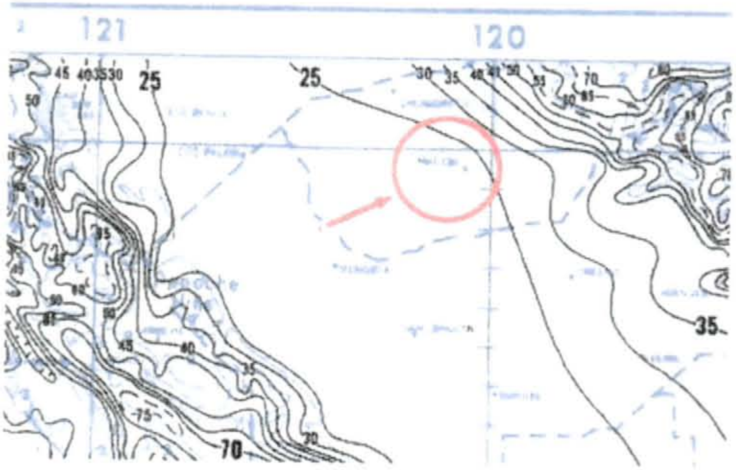


Figure 43

ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION FOR SOUTHERN HALF OF CALIFORNIA IN TENTHS OF AN INCH



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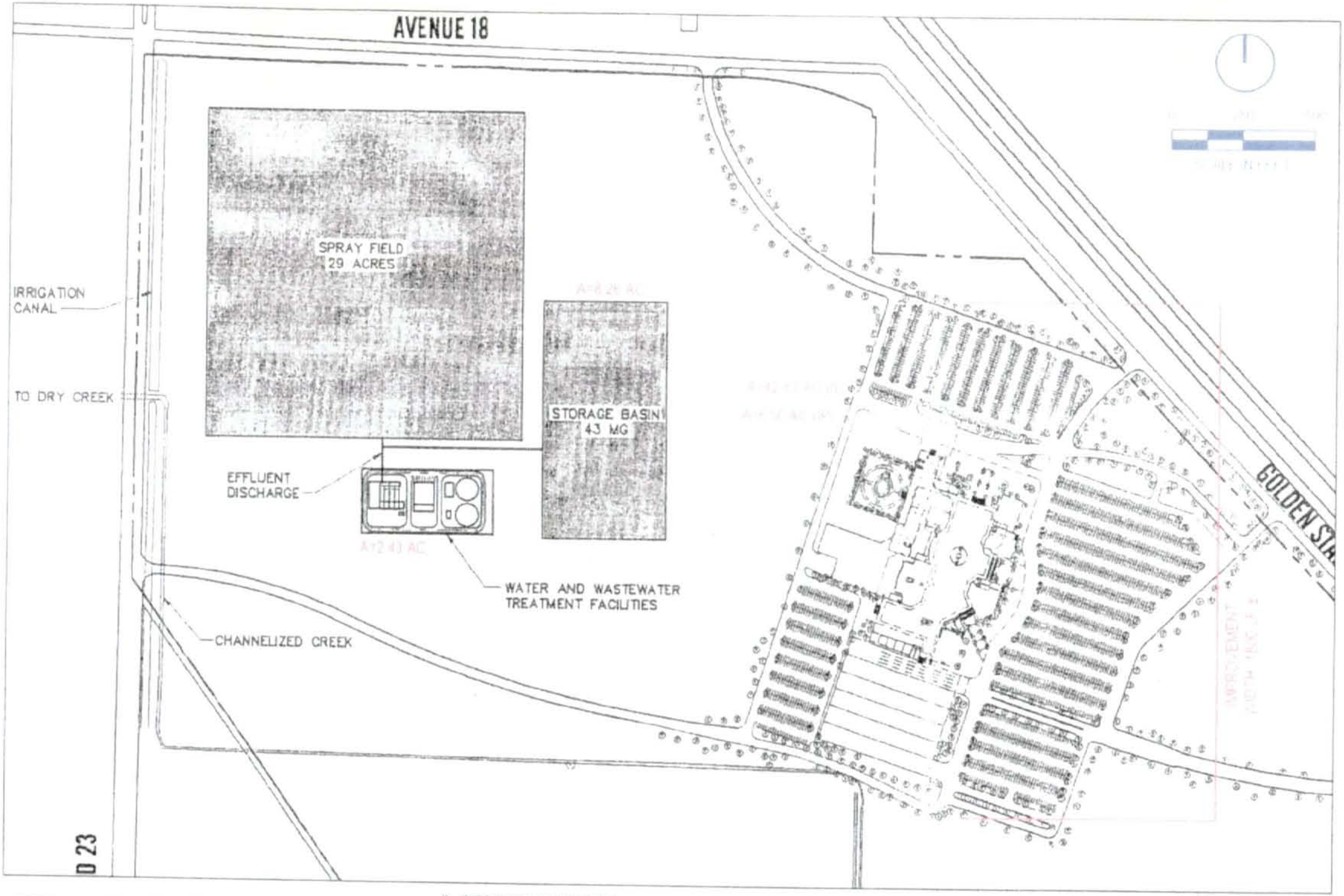
NOAA ATLAS 2 PRECIPITATION-FREQUENCY ESTIMATES
10- AND 100-YEAR 24-HOUR PRECIPITATION

NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

FIGURE 2



II - IMPROVED, IMPERVIOUS
IP - IMPROVED, PERVIOUS

RAK
CIVIL ENGINEERS
707 BECK AVENUE
FAIRFIELD, CALIFORNIA 94533
916-435-9999

ESTIMATED TYPICAL HYDRAULICS IMPEDIMENTS

NORTH FORK RANCHERIA OF MONO INDIANS
MADERA COUNTY, CALIFORNIA

FIGURE 3

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707 Beck Avenue, Fairfield, California 94533 Phone: (707) 435-9999 Fax: (707) 435-9988

APPENDIX B

SITE II

Project Floodplain Study

JOB TITLE

Project Date: 8/30/2005
Project Engineer: KUMUDVATHI
Project Title: NORTH FORK CASINO PROJECT
Project Comments:

********************** MASTER SUMMARY **********************

*************** NETWORK SUMMARIES (DETAILED) ***************

****************** DESIGN STORMS SUMMARY *******************

********************** RAINFALL DATA **********************

********************** TC CALCULATIONS ********************

*********************** HYG ADDITION **********************

*********************** TIME VS.ELEV ***********************

*********************** POND VOLUMES ***********************

*********************** POND ROUTING ***********************

****************** RATIONAL METHOD CALCS ******************

```
********************************************************************
********************************************************************
*                                                                  *
*                                                                  *
*                     MODIFIED RATIONAL METHOD                     *
*         ---- Grand Summary For All Storm Frequencies ----        *
*                                                                  *
*                                                                  *
********************************************************************
********************************************************************


     Q = CiA * Units Conversion;  Where Conversion = 43560 / (12 * 3600)

                  Area = 5.340 acres                  Tc = .5000 hrs
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                             VOLUMES
Freq.  Adjusted  Duration      I       Qpeak   Allowable|  Inflow    Storage
years    'C'       hrs       in/hr      cfs       cfs    |  ac-ft      ac-ft
---------------------------------------------------------|--------------------
   100  .900     4.6333     .5084      2.46      1.85    |    .943       .550
```

```
                       MASTER DESIGN STORM SUMMARY

  Default Network Design Storm File, ID              MYSTORM

                         Rainfall
     Return Event          Type          IDF ID
     ------------    ---------------    ----------------
       100           I-D-F Curve        IDF-100


                        MASTER NETWORK SUMMARY
                    Modified Rational Method Network

                     (*Node=Outfall; +Node=Diversion;)
         (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

                                                                          Max
                        Return    HYG Vol           Qpeak     Qpeak   Max WSEL  Pond Storage
 Node ID           Type Event      ac-ft    Trun     hrs       cfs       ft        ac-ft
 ----------------- ---- ------ ---------- --  ---------  --------- --------- ------------
 DEVELOPED         AREA   100       .943            .5000      2.46

*OUT 10            JCT    100       .943            .5000      2.46

 POND 10       IN  POND   100       .943            .5000      2.46

 POND 10      OUT  POND   100       .943            .5000      2.46
```

```
                         NETWORK SUMMARY -- NODES
          (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

     DEFAULT Design Storm File,ID =


     Storm Tag Name       =
     -------------------------------------------------------------------
     Data Type, File, ID =
     Total Rainfall Depth=  .0000 in
     Duration Multiplier =  0
     Resulting Duration  = .0000 hrs
     Resulting Start Time= .0000 hrs  Step= .0000 hrs  End= .0000 hrs

                                    HYG Vol        Qpeak       Qpeak     Max WSEL
       Node ID               Type    ac-ft  Trun.  hrs          cfs         ft
      -----------------      ----  ---------- -- ---------    --------  ---------
       DEVELOPED             AREA       .943        .5000        2.46
Outfall OUT 10               JCT        .943        .5000        2.46
       POND 10       IN      POND       .943        .5000        2.46
       POND 10       OUT     POND       .943        .5000        2.46
```

```
                        NETWORK SUMMARY -- LINKS
       (UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
       (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

    DEFAULT Design Storm File,ID =


    Storm Tag Name       =
    ----------------------------------------------------------------------
    Data Type, File, ID =
    Total Rainfall Depth=  .0000 in
    Duration Multiplier =  0
    Resulting Duration  = .0000 hrs
    Resulting Start Time= .0000 hrs  Step= .0000 hrs  End= .0000 hrs

                                   HYG Vol      Peak Time  Peak Q
Link ID          Type              ac-ft  Trun.   hrs       cfs     End Points
---------------- ----              ----------- --- -------  -------- ----------------
ADDLINK 10       ADD     UN          .943         .5000      2.46   DEVELOPED
                         DL          .943         .5000      2.46
                         DN          .943         .5000      2.46   POND 10       IN

ROUTE 10         PONDrt  UN          .943         .5000      2.46   POND 10       IN
ROUTE 10                             .943         .5000      2.46   POND 10       OUT
                         DL          .943         .5000      2.46
                         DN          .943         .5000      2.46   OUT 10
```

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
Mod.Rat DEVELOPED	Subarea DEVELOPED	Add Hyd DEVELOPED

```
                         NETWORK ROUTING SEQUENCE

==========================================================================
 Link Operation           UPstream Node               DNstream Node
==========================================================================
 Add Hyd ADDLINK 10       Subarea DEVELOPED          Pond     POND 10      IN

 POND ROUTE TOTAL OUTFLOW...
 Total Pond Outflow       Pond     POND 10      IN   Outflow POND 10      OUT

 SET POND ROUTING LINK TO TOTAL POND OUTFLOW...
 Outlet  ROUTE 10         Outflow POND 10      OUT   Jct      OUT 10
```

```
Title... Project Date: 8/30/2005
         Project Engineer: KUMUDVATHI
         Project Title: NORTH FORK CASINO PROJECT
         Project Comments:

                 I-D-F DESIGN STORM SUMMARY

 Storm Queue File,ID =                  MYSTORM

 Storm Tag Name      =     100
 ---------------------------------------------------------------------------
 File: Type, ID = : I-D-F Storm... IDF-100
 Storm Frequ.  = 100 yr
```

```
                    Rainfall-Intensity-Duration Curve

                     Time, hrs    Intens., in/hr
                    -----------   -----------
                         .0833         4.8000
                         .1667         3.1800
                         .2500         2.5600
                         .5000         1.7200
                        1.0000         1.1500
                        2.0000          .7800
                        3.0000          .6200
                        6.0000          .4150
                       12.0000          .2800
                       24.0000          .1800
```

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

------------------------------------------------------------------------

Segment #1:  Tc: User Defined

                                      Segment #1 Time:      .5000 hrs
------------------------------------------------------------------------

                                              =========================
                                               Total Tc:      .5000 hrs
                                              =========================
```

```
------------------------------------------------------------------------
Tc Equations used...
------------------------------------------------------------------------

==== User Defined ======================================================

    Tc = Value entered by user

    Where:  Tc = Time of concentration
```

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::


------------------------------------------------------------------------

Segment #1:  Tc: User Defined

                                        Segment #1 Time:      .5000 hrs
------------------------------------------------------------------------

                                                  =========================
                                                  Total Tc:       .5000 hrs
                                                  =========================
```

```
----------------------------------------------------------------------------
Tc Equations used...
----------------------------------------------------------------------------

==== User Defined ==========================================================

     Tc = Value entered by user

     Where:  Tc = Time of concentration
```

```
                    SUMMARY FOR HYDROGRAPH ADDITION
                    at Node: OUT 10

 HYG Directory: S:\A04073\hydro\casino\

 ========================================================================
 Upstream Link ID  Upstream Node ID  HYG file      HYG ID         HYG tag
 ------------------------------------------------------------------------
 ROUTE 10          POND 10     IN    work_pad.hyg  ROUTE 10           100
 ========================================================================

 INFLOWS TO:  OUT 10
 -------------------------------------- Volume    Peak Time   Peak Flow
 HYG file     HYG ID            HYG tag   ac-ft       hrs         cfs
 ------------------------------------------------------------------------
 work_pad.hyg ROUTE 10            100        .943      .5000        2.46

 TOTAL FLOW INTO:  OUT 10
 -------------------------------------- Volume    Peak Time   Peak Flow
 HYG file     HYG ID            HYG tag   ac-ft       hrs         cfs
 ------------------------------------------------------------------------
 work_pad.hyg OUT 10              100        .943      .5000        2.46
```

```
           TOTAL NODE INFLOW...
           HYG file = S:\A04073\hydro\casino\work_pad.hyg
           HYG ID    = OUT 10
           HYG Tag  =     100
           -----------------------------------
           Peak Discharge =         2.46 cfs
           Time to Peak   =        .5000 hrs
           HYG Volume     =         .943 ac-ft
           -----------------------------------

                         HYDROGRAPH ORDINATES (cfs)
   Time   |              Output Time increment = .0500 hrs
   hrs    |    Time on left represents time for first value in each row.
----------|---------------------------------------------------------------
    .0000 |         .00         .25         .49         .74         .99
    .2500 |        1.23        1.48        1.72        1.97        2.22
    .5000 |        2.46        2.46        2.46        2.46        2.46
    .7500 |        2.46        2.46        2.46        2.46        2.46
   1.0000 |        2.46        2.46        2.46        2.46        2.46
   1.2500 |        2.46        2.46        2.46        2.46        2.46
   1.5000 |        2.46        2.46        2.46        2.46        2.46
   1.7500 |        2.46        2.46        2.46        2.46        2.46
   2.0000 |        2.46        2.46        2.46        2.46        2.46
   2.2500 |        2.46        2.46        2.46        2.46        2.46
   2.5000 |        2.46        2.46        2.46        2.46        2.46
   2.7500 |        2.46        2.46        2.46        2.46        2.46
   3.0000 |        2.46        2.46        2.46        2.46        2.46
   3.2500 |        2.46        2.46        2.46        2.46        2.46
   3.5000 |        2.46        2.46        2.46        2.46        2.46
   3.7500 |        2.46        2.46        2.46        2.46        2.46
   4.0000 |        2.46        2.46        2.46        2.46        2.46
   4.2500 |        2.46        2.46        2.46        2.46        2.46
   4.5000 |        2.46        2.46        2.46        2.38        2.14
   4.7500 |        1.89        1.64        1.40        1.15         .90
   5.0000 |         .66         .41         .16         .00
```

```
Type.... Node: Addition Summary                              Page 6.02
Name.... OUT 10                                           Event: 100 yr
File.... S:\A04073\hydro\casino\SITE-D.ppw
Storm... IDF-100   Tag:     100
```

```
♀
Type.... Time-Elev                                           Page 7.01
Name.... POND 10       OUT   Tag:     100                 Event: 100 yr
File.... S:\A04073\hydro\casino\SITE-D.PPW
Storm... IDF-100   Tag:     100

                         TIME vs. ELEVATION (ft)

   Time   |              Output Time increment = .0500 hrs
   hrs    |   Time on left represents time for first value in each row.
----------|-----------------------------------------------------------
    .0000 |        .00         .00         .00         .00         .00
    .2500 |        .00         .00         .00         .00         .00
    .5000 |        .00         .00         .00         .00         .00
    .7500 |        .00         .00         .00         .00         .00
   1.0000 |        .00         .00         .00         .00         .00
   1.2500 |        .00         .00         .00         .00         .00
   1.5000 |        .00         .00         .00         .00         .00
   1.7500 |        .00         .00         .00         .00         .00
   2.0000 |        .00         .00         .00         .00         .00
   2.2500 |        .00         .00         .00         .00         .00
   2.5000 |        .00         .00         .00         .00         .00
   2.7500 |        .00         .00         .00         .00         .00
   3.0000 |        .00         .00         .00         .00         .00
   3.2500 |        .00         .00         .00         .00         .00
   3.5000 |        .00         .00         .00         .00         .00
   3.7500 |        .00         .00         .00         .00         .00
   4.0000 |        .00         .00         .00         .00         .00
   4.2500 |        .00         .00         .00         .00         .00
   4.5000 |        .00         .00         .00         .00         .00
   4.7500 |        .00         .00         .00         .00         .00
   5.0000 |        .00         .00         .00         .00
```

```
Type.... Vol: Elev-Area
Name.... POND 10

File.... S:\A04073\hydro\casino\SITE-D.ppw
```

```
 Elevation   Planimeter   Area   A1+A2+sqr(A1*A2)  Volume    Volume Sum
   (ft)       (sq.in)    (acres)     (acres)       (ac-ft)     (ac-ft)
-----------------------------------------------------------------------
  3035.00      -----      .1902       .0000          .000        .000
  3039.00      -----      .2540       .6640          .885        .885
  3040.00      -----      .2714       .7881          .263       1.148
```

```
                       POND VOLUME EQUATIONS

 * Incremental volume computed by the Conic Method for Reservoir Volumes.

   Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

   where: EL1, EL2      = Lower and upper elevations of the increment
          Area1,Area2   = Areas computed for EL1, EL2, respectively
          Volume        = Incremental volume between EL1 and EL2
```

```
                    SUMMARY FOR HYDROGRAPH ADDITION
                    at Node: POND 10      IN

 HYG Directory: S:\A04073\hydro\casino\

 ==========================================================================
 Upstream Link ID  Upstream Node ID  HYG file     HYG ID           HYG tag
 --------------------------------------------------------------------------
 ADDLINK 10        DEVELOPED         work_pad.hyg DEVELOPED            100
 ==========================================================================


 INFLOWS TO:   POND 10       IN
 ---------------------------------------- Volume    Peak Time   Peak Flow
 HYG file     HYG ID           HYG tag    ac-ft       hrs          cfs
 --------------------------------------------------------------------------
 work_pad.hyg DEVELOPED          100        .943      .5000        2.46

 TOTAL FLOW INTO:   POND 10       IN
 ---------------------------------------- Volume    Peak Time   Peak Flow
 HYG file     HYG ID           HYG tag    ac-ft       hrs          cfs
 --------------------------------------------------------------------------
 work_pad.hyg POND 10       IN   100        .943      .5000        2.46
```

```
Type.... Node: Pond Inflow Summary                          Page 9.02
Name.... POND 10      IN                                 Event: 100 yr
File.... S:\A04073\hydro\casino\SITE-D.ppw
Storm... IDF-100   Tag:    100
```

```
            TOTAL NODE INFLOW...
            HYG file = S:\A04073\hydro\casino\work_pad.hyg
            HYG ID   = POND 10       IN
            HYG Tag  =    100
            ----------------------------------
            Peak Discharge =        2.46 cfs
            Time to Peak   =       .5000 hrs
            HYG Volume     =        .943 ac-ft
            ----------------------------------

                            HYDROGRAPH ORDINATES (cfs)
  Time   |                  Output Time increment = .0500 hrs
  hrs    |     Time on left represents time for first value in each row.
---------|-----------------------------------------------------------------
   .0000 |          .00          .25          .49          .74          .99
   .2500 |         1.23         1.48         1.72         1.97         2.22
   .5000 |         2.46         2.46         2.46         2.46         2.46
   .7500 |         2.46         2.46         2.46         2.46         2.46
  1.0000 |         2.46         2.46         2.46         2.46         2.46
  1.2500 |         2.46         2.46         2.46         2.46         2.46
  1.5000 |         2.46         2.46         2.46         2.46         2.46
  1.7500 |         2.46         2.46         2.46         2.46         2.46
  2.0000 |         2.46         2.46         2.46         2.46         2.46
  2.2500 |         2.46         2.46         2.46         2.46         2.46
  2.5000 |         2.46         2.46         2.46         2.46         2.46
  2.7500 |         2.46         2.46         2.46         2.46         2.46
  3.0000 |         2.46         2.46         2.46         2.46         2.46
  3.2500 |         2.46         2.46         2.46         2.46         2.46
  3.5000 |         2.46         2.46         2.46         2.46         2.46
  3.7500 |         2.46         2.46         2.46         2.46         2.46
  4.0000 |         2.46         2.46         2.46         2.46         2.46
  4.2500 |         2.46         2.46         2.46         2.46         2.46
  4.5000 |         2.46         2.46         2.46         2.38         2.14
  4.7500 |         1.89         1.64         1.40         1.15          .90
  5.0000 |          .66          .41          .16          .00
```

```
                 POND ROUTED TOTAL OUTFLOW HYG...
                 HYG file = S:\A04073\hydro\casino\work_pad.hyg
                 HYG ID   = POND 10       OUT
                 HYG Tag  =     100
                 -----------------------------------
                 Peak Discharge =        2.46 cfs
                 Time to Peak   =       .5000 hrs
                 HYG Volume     =        .943 ac-ft
                 -----------------------------------

                             HYDROGRAPH ORDINATES (cfs)
   Time   |                  Output Time increment = .0500 hrs
   hrs    |    Time on left represents time for first value in each row.
 ---------|-------------------------------------------------------------
   .0000  |       .00        .25        .49        .74        .99
   .2500  |      1.23       1.48       1.72       1.97       2.22
   .5000  |      2.46       2.46       2.46       2.46       2.46
   .7500  |      2.46       2.46       2.46       2.46       2.46
  1.0000  |      2.46       2.46       2.46       2.46       2.46
  1.2500  |      2.46       2.46       2.46       2.46       2.46
  1.5000  |      2.46       2.46       2.46       2.46       2.46
  1.7500  |      2.46       2.46       2.46       2.46       2.46
  2.0000  |      2.46       2.46       2.46       2.46       2.46
  2.2500  |      2.46       2.46       2.46       2.46       2.46
  2.5000  |      2.46       2.46       2.46       2.46       2.46
  2.7500  |      2.46       2.46       2.46       2.46       2.46
  3.0000  |      2.46       2.46       2.46       2.46       2.46
  3.2500  |      2.46       2.46       2.46       2.46       2.46
  3.5000  |      2.46       2.46       2.46       2.46       2.46
  3.7500  |      2.46       2.46       2.46       2.46       2.46
  4.0000  |      2.46       2.46       2.46       2.46       2.46
  4.2500  |      2.46       2.46       2.46       2.46       2.46
  4.5000  |      2.46       2.46       2.46       2.38       2.14
  4.7500  |      1.89       1.64       1.40       1.15        .90
  5.0000  |       .66        .41        .16        .00
```

```
                DIVERTED HYDROGRAPH...
                HYG file = S:\A04073\hydro\casino\work_pad.hyg
                HYG ID    = ROUTE 10
                HYG Tag   =     100
                ----------------------------------
                Peak Discharge =        2.46 cfs
                Time to Peak   =       .5000 hrs
                HYG Volume     =        .943 ac-ft
                ----------------------------------

                          HYDROGRAPH ORDINATES (cfs)
   Time    |              Output Time increment = .0500 hrs
   hrs     |     Time on left represents time for first value in each row.
 ---------|-----------------------------------------------------------------
    .0000  |        .00        .25        .49        .74        .99
    .2500  |       1.23       1.48       1.72       1.97       2.22
    .5000  |       2.46       2.46       2.46       2.46       2.46
    .7500  |       2.46       2.46       2.46       2.46       2.46
   1.0000  |       2.46       2.46       2.46       2.46       2.46
   1.2500  |       2.46       2.46       2.46       2.46       2.46
   1.5000  |       2.46       2.46       2.46       2.46       2.46
   1.7500  |       2.46       2.46       2.46       2.46       2.46
   2.0000  |       2.46       2.46       2.46       2.46       2.46
   2.2500  |       2.46       2.46       2.46       2.46       2.46
   2.5000  |       2.46       2.46       2.46       2.46       2.46
   2.7500  |       2.46       2.46       2.46       2.46       2.46
   3.0000  |       2.46       2.46       2.46       2.46       2.46
   3.2500  |       2.46       2.46       2.46       2.46       2.46
   3.5000  |       2.46       2.46       2.46       2.46       2.46
   3.7500  |       2.46       2.46       2.46       2.46       2.46
   4.0000  |       2.46       2.46       2.46       2.46       2.46
   4.2500  |       2.46       2.46       2.46       2.46       2.46
   4.5000  |       2.46       2.46       2.46       2.38       2.14
   4.7500  |       1.89       1.64       1.40       1.15        .90
   5.0000  |        .66        .41        .16        .00
```

```
                 SUMMARY OF RATIONAL METHOD PEAK DISCHARGES
                     --- PREDEVELOPED CONDITIONS ---

   Q = CiA * Units Conversion;  Where Conversion = 43560 / (12 * 3600)


Tag     Freq     File           IDF Curve
-----   ------   ------------   ----------------
100     100                     IDF-100

                                        Tc = .5000 hrs
                                 .------------------------------.
Tag     Freq      C     C adj   |   C       I        Area    |    Peak Q
        (years)         factor  |  final   in/hr     acres   |     cfs
-----   ------  -----  ------   |------------------------------|  ----------
100     100     .200   1.000    |  .200    1.7200    5.340   |     1.85
                                 ------------------------------
```

```
Type.... Rational Predev. Peak Q                          Page 10.01
Name.... DEVELOPED                                       Event: 100 yr
File.... S:\A04073\hydro\casino\SITE-D.ppw
Storm... IDF-100   Tag:    100
```

```
Type.... Mod. Rational Graph                              Page 10.02
Name.... DEVELOPED          Tag:    100                  Event: 100 yr
File.... S:\A04073\hydro\casino\SITE-D.PPW
Storm... IDF-100   Tag:    100

                        MODIFIED RATIONAL METHOD
           ---- Graphical Summary for Maximum Required Storage ----
                               Method I


   Q = CiA * Units Conversion;  Where Conversion = 43560 / (12 * 3600)

  **********************************************************************
  *  RETURN FREQUENCY: 100 yr    | Allowable Outflow: 1.85 cfs        *
  *  'C' Adjustment: 1.000       | Required Storage: .550 ac-ft       *
  *--------------------------------------------------------------------*
  *  Peak Inflow: 2.46 cfs                                             *
  * .HYG File:   100                                                   *
  **********************************************************************


Q |              Td = 4.6333 hrs               |  Return Freq: 100 yr
 /------- Approx. Duration for Max. Storage ------/  C adj.factor:1.000
 |                                             |
 |                                             |
 |               Tc= .5000 hrs                 |
 |               I = 1.7200 in/hr              |  Area = 5.340 acres
 |             . Q = 8.34 cfs                  |  Weighted C = .900
 |            .|.                              |  Adjusted C = .900
 |           . | .                             |
 |          .  |  .           Required Storage |
 |         .      .      .-- .550 ac-ft        |  Td= 4.6333 hrs
 |        .    |  .      |                     |  I = .5084 in/hr
 |       .     x x x x x x x|x x x x x x x x x x  Q = 2.46 cfs
 |      .                |
 |     .    x                                   x
 |    .                                           o   Q = 1.85 cfs
 |   .  x                        o                |x  (Allow.Outflow)
 |  . x               .     o                     |
 |  . x            o    .    NOT TO SCALE         |   x
 | . x      o           .    ============         |
 | o                    .                         |      x
 -------------------------------------------------|-----------
                                              4.7574 hrs     T
```

```
                       MODIFIED RATIONAL METHOD
              ---- Summary for Single Storm Frequency ----


     Q = CiA * Units Conversion;  Where Conversion = 43560 / (12 * 3600)

RETURN FREQUENCY: 100 yr  `C' Adjustment =  1.000Allowable Q = 1.85 cfs
-------------------------------------------------------------------------

Hydrograph Storm Duration, Td = 4.6333 hrs      Tc = .5000 hrs
Hydrograph File:   100
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                          VOLUMES
 Wtd.  Adjusted  Duration  Intens.     Area      Qpeak |  Inflow     Storage
 `C'     'C'       hrs      in/hr      acres      cfs  |   ac-ft      ac-ft
-------------------------------------------------------|---------------------
 .900    .900     .5000    1.7200     5.340      8.34 |     .344       .268
 .900    .900     .6667    1.5300     5.340      7.41 |     .409       .319
 .900    .900     .8333    1.3400     5.340      6.49 |     .447       .345
 .900    .900    1.0000    1.1500     5.340      5.57 |     .461       .346
 .900    .900    2.0000     .7800     5.340      3.78 |     .625       .433
 .900    .900    3.0000     .6200     5.340      3.00 |     .745       .477
 .900    .900    4.0000     .5517     5.340      2.67 |     .884       .539

********************************************************* Storage Maximum
 .900    .900    4.6333     .5084     5.340      2.46 |     .943       .550
************************************************************************

 .900    .900    5.0000     .4833     5.340      2.34 |     .968       .547
 .900    .900    6.0000     .4150     5.340      2.01 |     .997       .500
 .900    .900    7.0000     .3925     5.340      1.90 |    1.100       .526
 .900    .900    8.0000     .3700     5.340      1.79 |    Qpeak < Qallow
```

```
                MODIFIED RATIONAL METHOD HYDROGRAPH

     Q = CiA * Units Conversion;  Where Conversion = 43560 / (12 * 3600)


Tag     Freq    File            IDF Curve
-----   ------  ------------    ----------------
100     100                     IDF-100

                                        Td = 4.6333 hrs
                                 .------------------------------.
Tag     Freq     C     C adj    |   C        I        Area    |    Peak Q
        (years)        factor   |  final   in/hr     acres    |     cfs
-----   ------  -----  ------   |------------------------------|  ----------
100      100    .900   1.000    |  .900    .5084     5.340    |    2.46
                                 ------------------------------


            HYG file = S:\A04073\hydro\casino\work_pad.hyg
            HYG ID   = DEVELOPED
            HYG Tag  =    100
            -------------------------------------
            Peak Discharge =         2.46 cfs
            Time to Peak   =        .5000 hrs
            HYG Volume     =         .943 ac-ft
            =====================================

                        HYDROGRAPH ORDINATES (cfs)
  Time  |               Output Time increment = .0500 hrs
  hrs   |     Time on left represents time for first value in each row.
--------|-------------------------------------------------------------
  .0000 |        .00         .25         .49         .74         .99
  .2500 |       1.23        1.48        1.72        1.97        2.22
  .5000 |       2.46        2.46        2.46        2.46        2.46
  .7500 |       2.46        2.46        2.46        2.46        2.46
 1.0000 |       2.46        2.46        2.46        2.46        2.46
 1.2500 |       2.46        2.46        2.46        2.46        2.46
 1.5000 |       2.46        2.46        2.46        2.46        2.46
 1.7500 |       2.46        2.46        2.46        2.46        2.46
 2.0000 |       2.46        2.46        2.46        2.46        2.46
 2.2500 |       2.46        2.46        2.46        2.46        2.46
 2.5000 |       2.46        2.46        2.46        2.46        2.46
 2.7500 |       2.46        2.46        2.46        2.46        2.46
 3.0000 |       2.46        2.46        2.46        2.46        2.46
```

```
                         HYDROGRAPH ORDINATES (cfs)
  Time  |                Output Time increment = .0500 hrs
  hrs   |     Time on left represents time for first value in each row.
--------|--------------------------------------------------------------
 3.2500 |        2.46        2.46        2.46        2.46        2.46
 3.5000 |        2.46        2.46        2.46        2.46        2.46
 3.7500 |        2.46        2.46        2.46        2.46        2.46
 4.0000 |        2.46        2.46        2.46        2.46        2.46
 4.2500 |        2.46        2.46        2.46        2.46        2.46
 4.5000 |        2.46        2.46        2.46        2.38        2.14
 4.7500 |        1.89        1.64        1.40        1.15         .90
 5.0000 |         .66         .41         .16         .00
```

```
RATIONAL C COEFFICIENT DATA
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

--------------------------------------------------------------------------


                                                    Area          C x Area
Soil/Surface Description                 C         acres           acres
--------------------------------      --------   ----------     ----------
Pre Developed CA                        .2000       5.340           1.068

WEIGHTED C & TOTAL AREA --->            .2000       5.340           1.068
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
```

```
RATIONAL C COEFFICIENT DATA
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

------------------------------------------------------------------------

                                                  Area          C x Area
Soil/Surface Description             C            acres          acres
------------------------------    --------     ----------     ----------
Pre Developed CA                   .9000         5.340          4.806

WEIGHTED C & TOTAL AREA --->       .9000         5.340          4.806
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
```

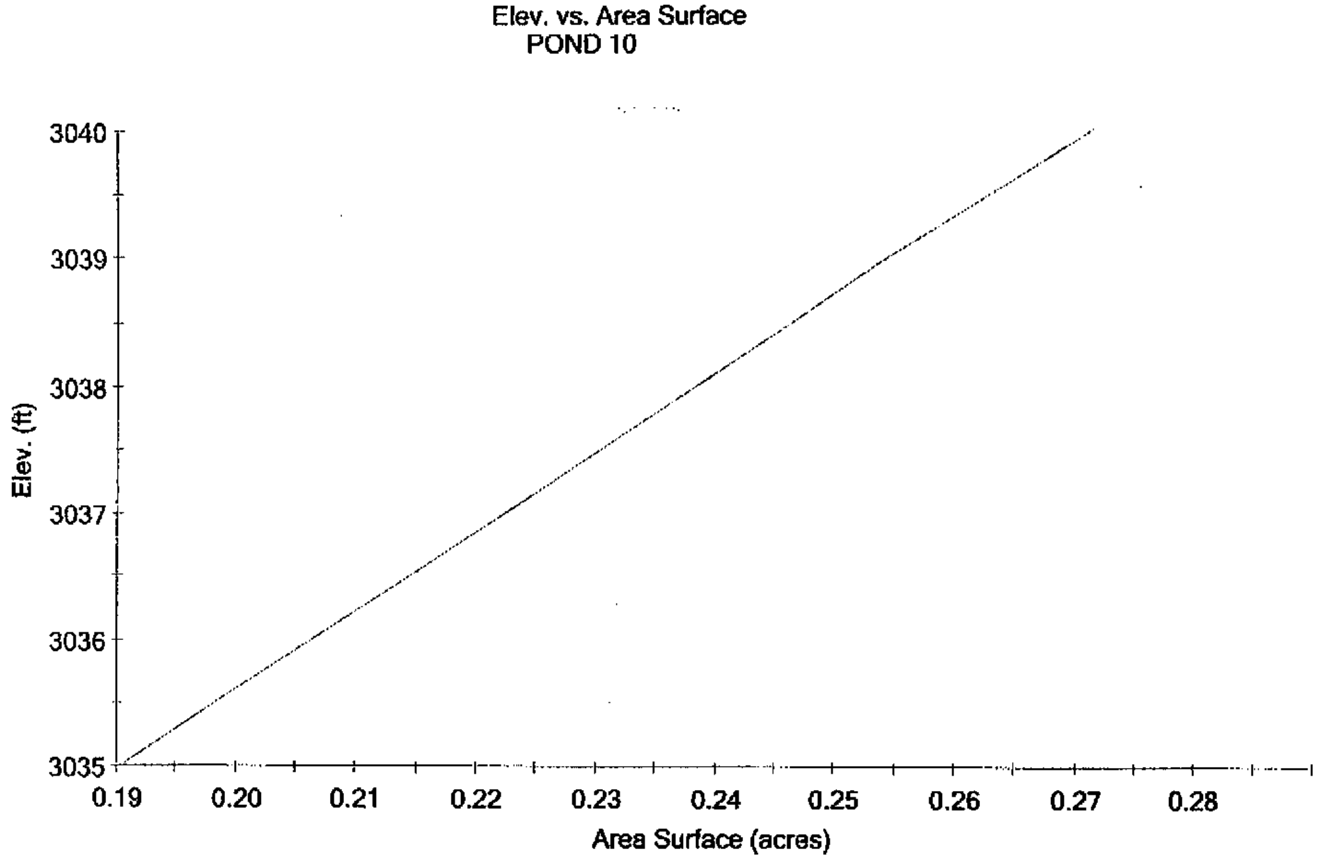
Appendix A

A-1

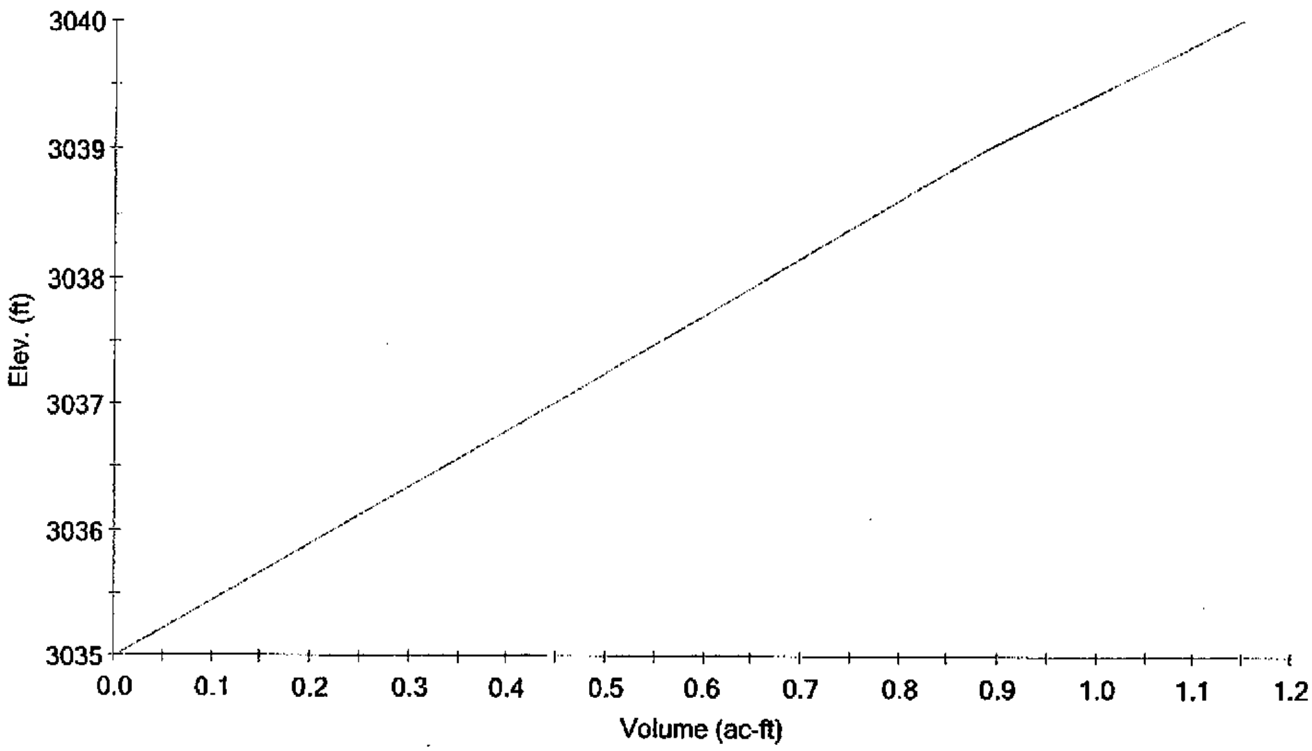
Index of Starting Page Numbers for ID Names

PondMaker Design Wizard

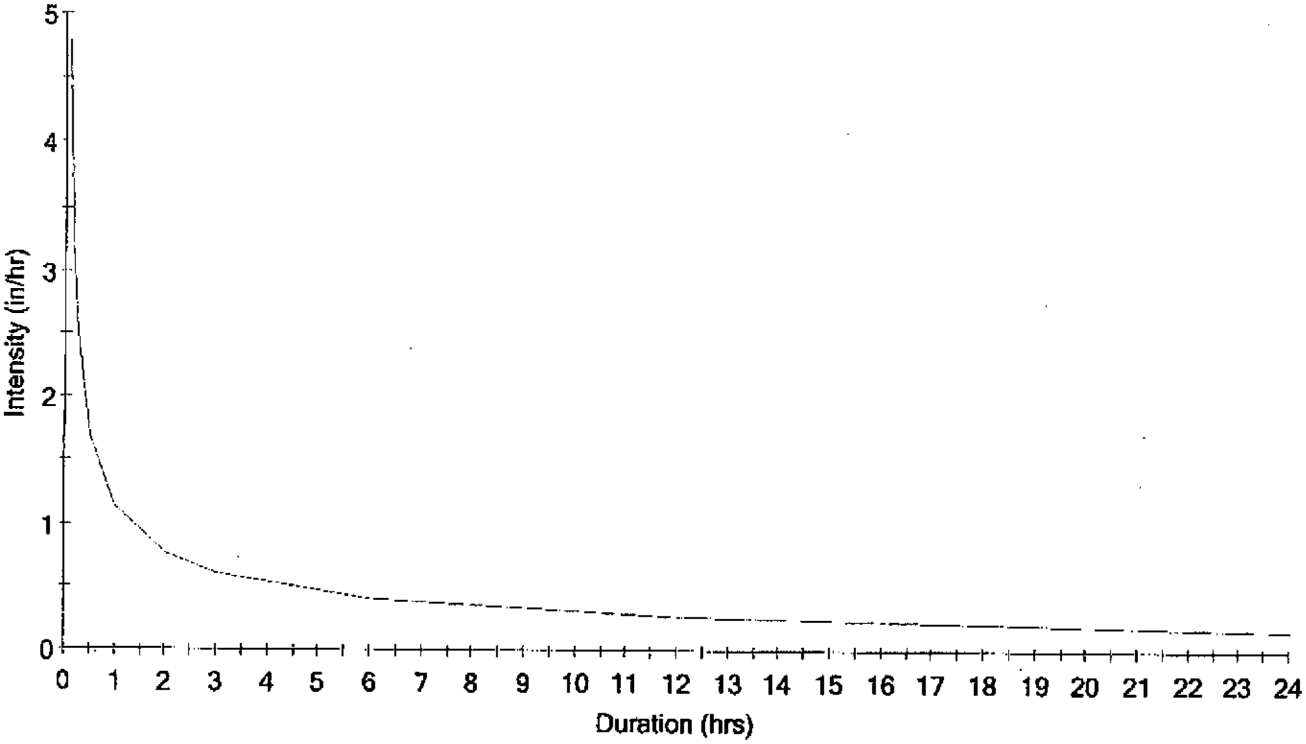
Return Event	Pre Dev Peak (cfs)	Pre Dev Volume (ac-ft)	Post Dev Peak (cfs)	Post Total Volume (ac-ft)	Estimated Storage (ac-ft)	Interp. W.S. Elev. (ft)	Freeboard Depth (ft)
100	1.8523	0.00000	2.4637	0.94339	0.88534	3039.0000	PASS


Elev. vs. Area Surface
POND 10
3040
3039
3038
3037
3036
3035
Elev. (ft)
0.19
0.20
0.21
0.22
0.23
0.24
0.25
0.26
0.27
0.28
Area Surface (acres)

Elev. vs. Volume
POND 10



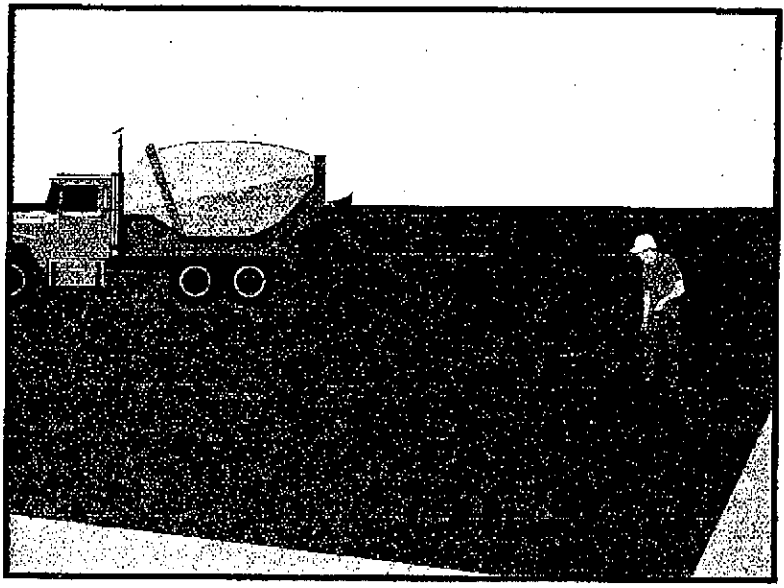
Intensity-Duration-Frequency
IDF-100 100



APPENDIX C

Sample Best Management Practices

Paving and Grinding Operations NS-3



Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather.

Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is in the forecast.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runon (see WM-1, Material Delivery and Storage).

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	✓
WM	Waste Management and Materials Pollution Control	✓

Legend:

✓ **Primary Objective**

✓ **Secondary Objective**

Targeted Constituents

Sediment	✓
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	✓
Organics	

Potential Alternatives

None

CASQA
California Stormwater Quality Association

- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.

- If paving involves an onsite mixing plant, follow the stormwater permitting requirements for industrial activities.

- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses, These materials should be stored consistent with WM-3, Stockpile Management.

- Disposal of PCC and AC waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.

- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:

    - AC grindings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any storm drains or watercourses. Install silt fence until structure is stabilized or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; or SE-5, Fiber Rolls.

    - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt must be recycled or disposed.

    - Any AC chunks and pieces used in embankments must be placed above the water table and covered by at least 1 ft of material.

- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.

- Dig out activities should not be conducted in the rain.

- Collect dig out material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If dig out material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:

  - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.

  - Old asphalt must be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect and return to aggregate base stockpile or dispose of properly.

- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if allowed by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized.

- Drainage inlet structures and manholes should be covered with filter fabric during application of seal coat, tack coat, slurry seal, and fog seal.

- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials rather than burying. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.

- Substances used to coat asphalt transport trucks, and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.

- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.

- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.

- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

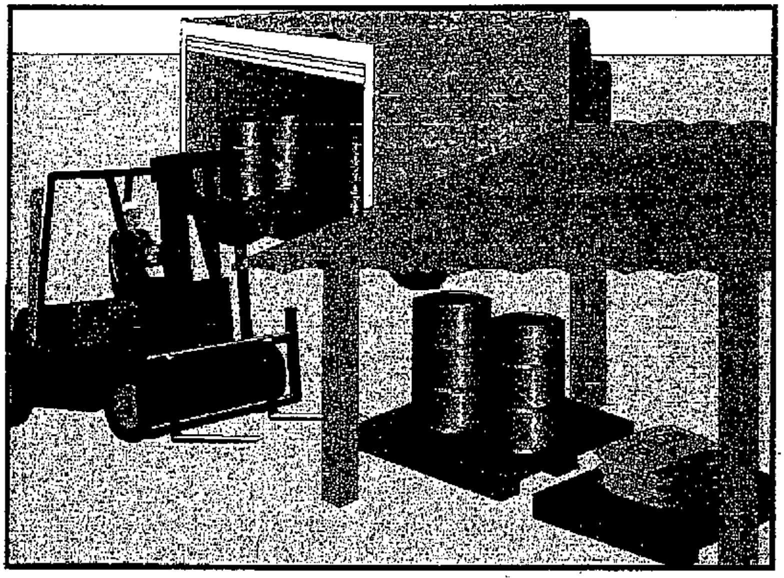
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Material Delivery and Storage WM-1



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	✓

Legend:

✓ Primary Objective

✓ Secondary Objective

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Potential Alternatives

None

CASQA
California Stormwater Quality Association

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components

- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located near the construction entrances, away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area which will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.
- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the rainy season, consider storing materials in a covered area. Store materials in secondary containments such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, in secondary containment.

- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Chemicals should be kept in their original labeled containers.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, each temporary containment facility should be covered during non-working days, prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous materials.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep an ample supply of spill cleanup materials near the storage area.
- Keep storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

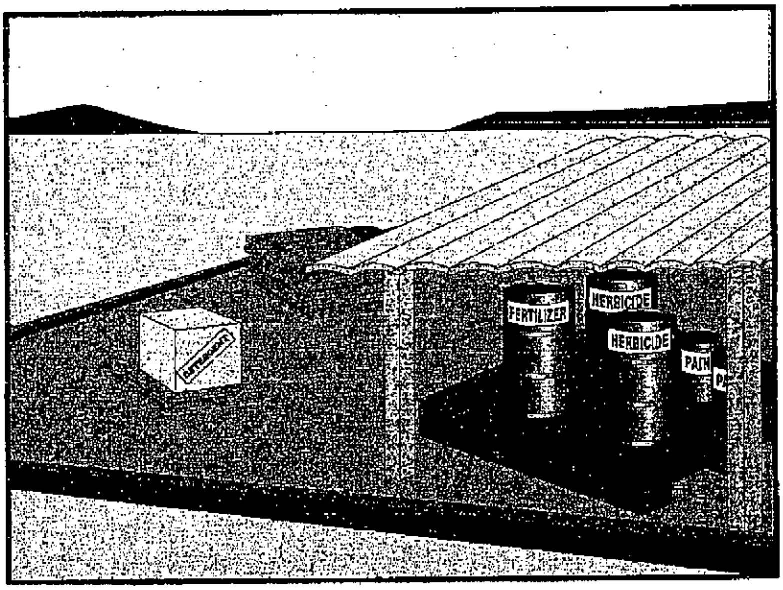
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use

WM-2



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	✓

Legend:

✓ **Primary Objective**

✓ **Secondary Objective**

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Potential Alternatives

None

CASQA
California Stormwater Quality Association

Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydro seeding. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.

- Require contractors to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two–week intervals in the non-rainy season to verify continued BMP implementation.
- Maintenance of this best management practice is minimal.
- Spot check employees and subcontractors throughout the job to ensure appropriate practices are being employed.

References

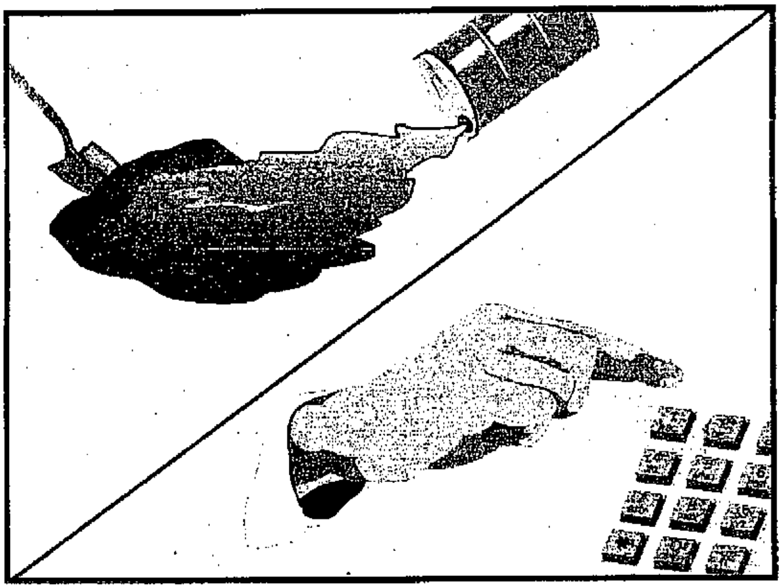
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Spill Prevention and Control WM-4



Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	✓

Legend:

✓ **Primary Objective**

✓ **Secondary Objective**

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Potential Alternatives

None

CASQA
California Stormwater Quality Association

- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.

- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.

- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

- Use absorbent materials on small spills rather than hosing down or burying the spill.

- Absorbent materials should be promptly removed and disposed of properly.

- Follow the practice below for a minor spill:

    - Contain the spread of the spill.

    - Recover spilled materials.

    - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

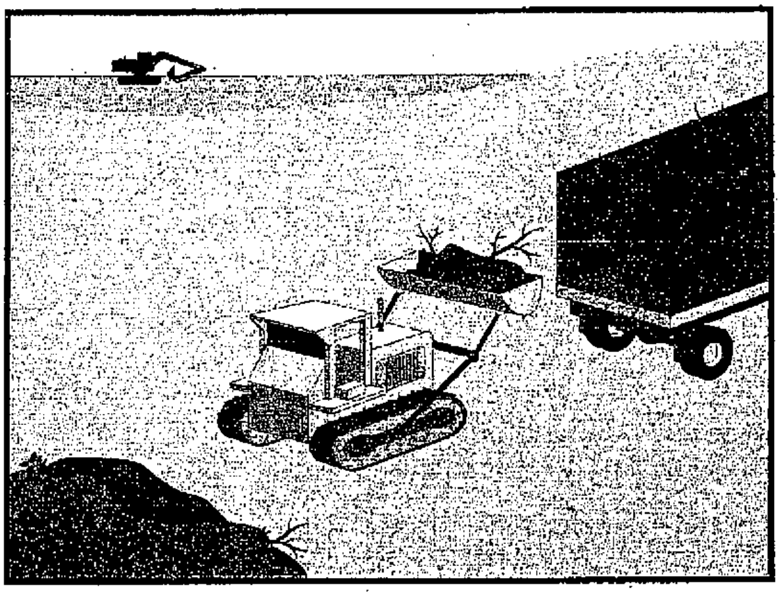
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	✓

Legend:

✓ **Primary Objective**

✓ **Secondary Objective**

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Potential Alternatives

None

CASQA
California
Stormwater
Quality
Association

- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity--based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

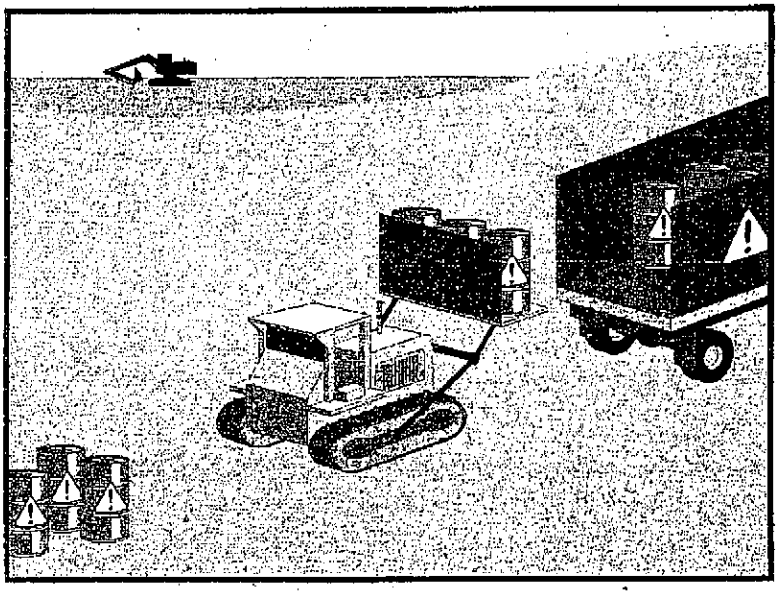
References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Hazardous Waste Management WM-6



Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Concrete Curing Compounds
- Palliatives
- Septic Wastes
- Stains
- Wood Preservatives
- Asphalt Products
- Pesticides
- Acids
- Paints
- Solvents
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	✓

Legend:

✓ **Primary Objective**

✓ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Potential Alternatives

None

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In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
  - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
  - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
  - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
  - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

  - Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.

  - Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.

- Drums should not be overfilled and wastes should not be mixed.

- Unless watertight, containers of dry waste should be stored on pallets.

- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.

- Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.

- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.

- The following actions should be taken with respect to temporary contaminant:

  - Ensure that adequate hazardous waste storage volume is available.

  - Ensure that hazardous waste collection containers are conveniently located.

  - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

  - Minimize production or generation of hazardous materials and hazardous waste on the job site.

  - Use containment berms in fueling and maintenance areas and where the potential for spills is high.

  - Segregate potentially hazardous waste from non-hazardous construction site debris.

  - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.
- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.

- A copy of the hazardous waste manifests should be provided.

References

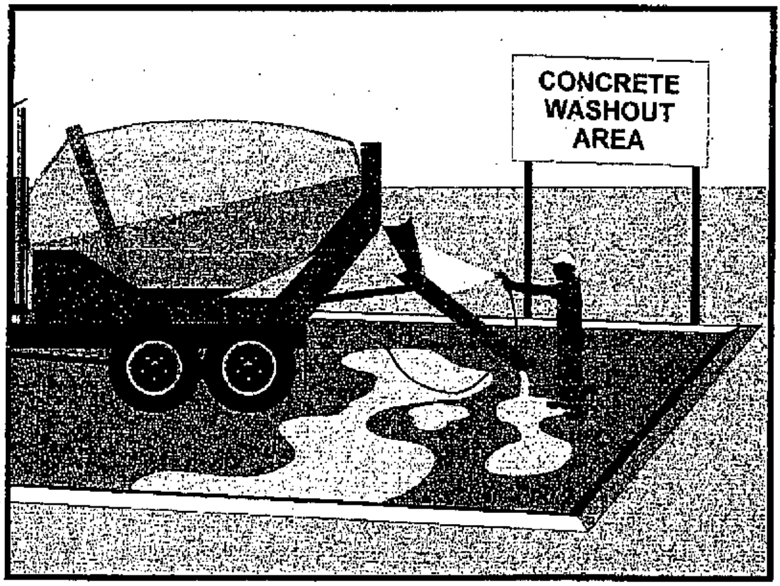
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Waste Management WM-8



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	✓

Legend:
- ✓ **Primary Objective**
- ✓ **Secondary Objective**

Targeted Constituents

Sediment	✓
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, performing onsite washout in a designated area, and training employee and subcontractors.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result form demolition activities
- Slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition
- Concrete trucks and other concrete-coated equipment are washed onsite
- Mortar-mixing stations exist
- See also NS-8, Vehicle and Equipment Cleaning

Limitations

- Offsite washout of concrete wastes may not always be possible.

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Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.
- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas.
- Avoid mixing excess amounts of fresh concrete.
- Perform washout of concrete trucks offsite or in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - Locate washout area at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Wash out wastes into the temporary pit where the concrete can set, be broken up, and then disposed properly.
- Avoid creating runoff by draining water to a bermed or level area when washing concrete to remove fine particles and expose the aggregate.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility.
- A sign should be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.

- Below grade concrete washout facilities are typical. Above grade facilities are used if excavation is not practical.
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut PCC slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Slurry residue should be vacuumed and disposed in a temporary pit (as described in OnSite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and

minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.

  - Straw bales, wood stakes, and sandbag materials should conform to the provisions in SE-9, Straw Bale Barrier.
  - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- Temporary Concrete Washout Facility (Type Below Grade)
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and disposed of. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and disposed of.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures.

Inspection and Maintenance

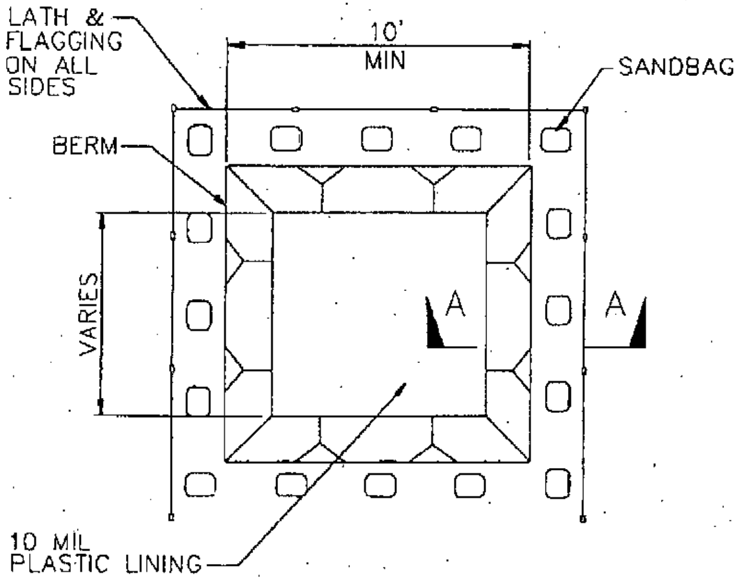
- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and disposed of.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

References

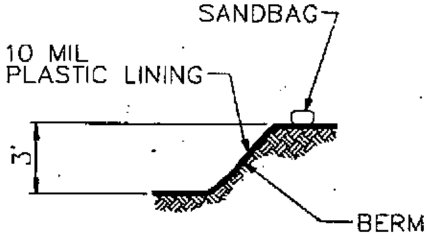
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

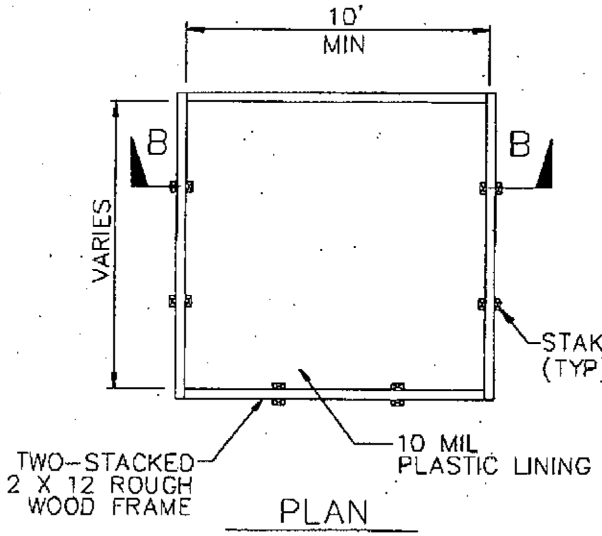
Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



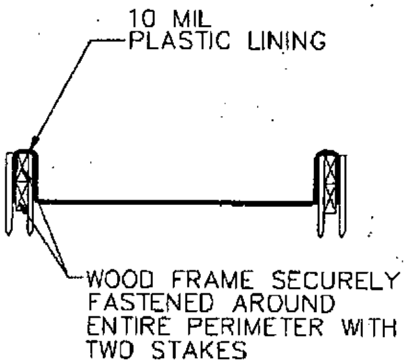
PLAN
NOT TO SCALE
TYPE "BELOW GRADE"



SECTION A–A
NOT TO SCALE



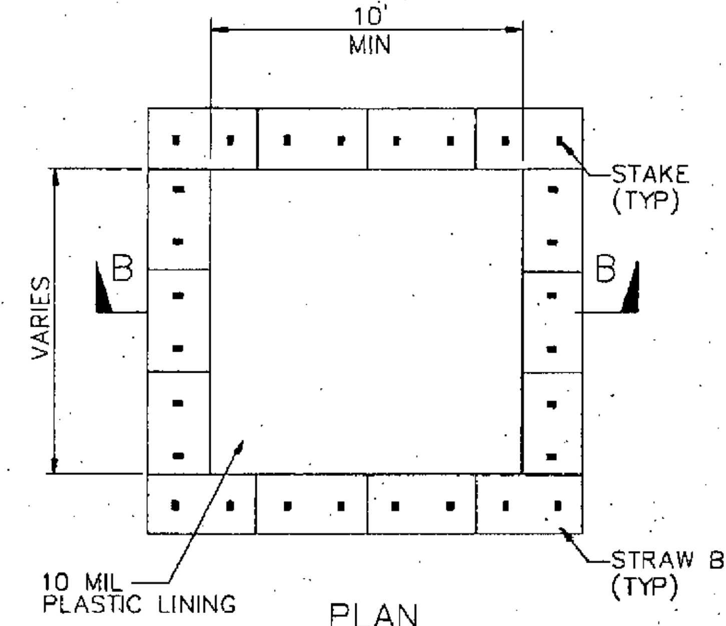
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



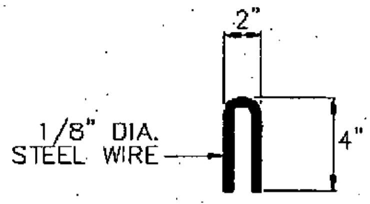
SECTION B–B
NOT TO SCALE

NOTES

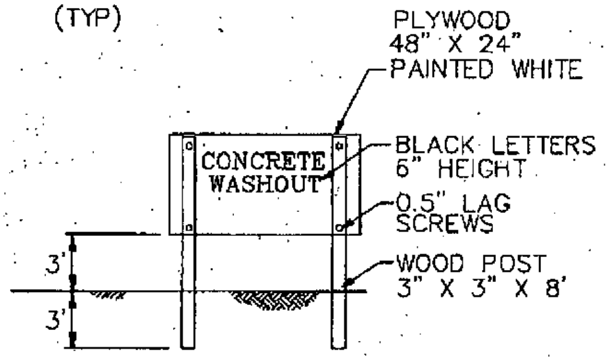
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



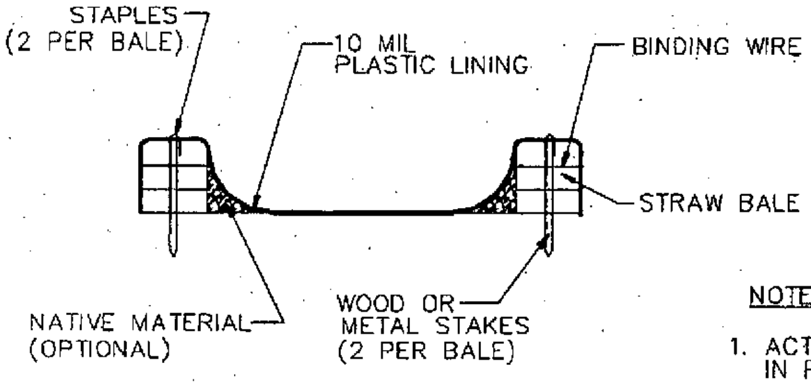
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

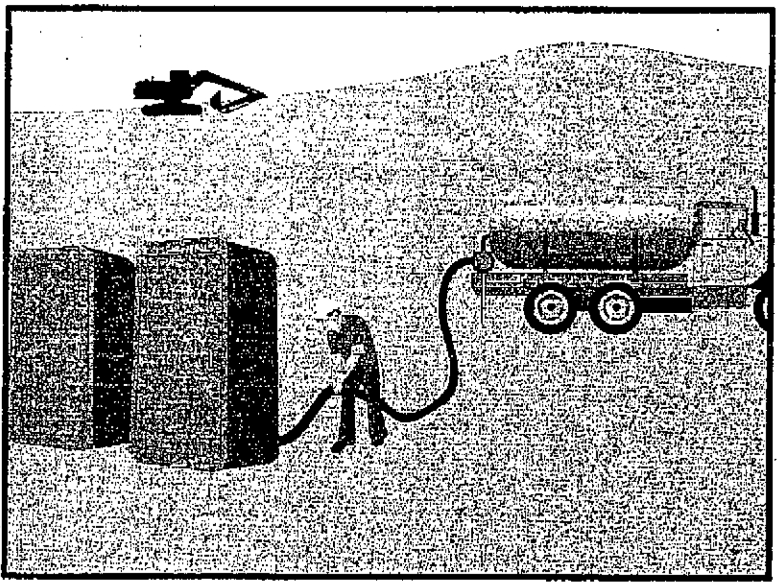


SECTION B–B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Sanitary/Septic Waste Management WM-9



Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.
- Wastewater should not be discharged or buried within the project site.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	✓

Legend:

✓ Primary Objective

✓ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	✓
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	✓

Potential Alternatives

None

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- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Untreated raw wastewater should never be discharged or buried.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

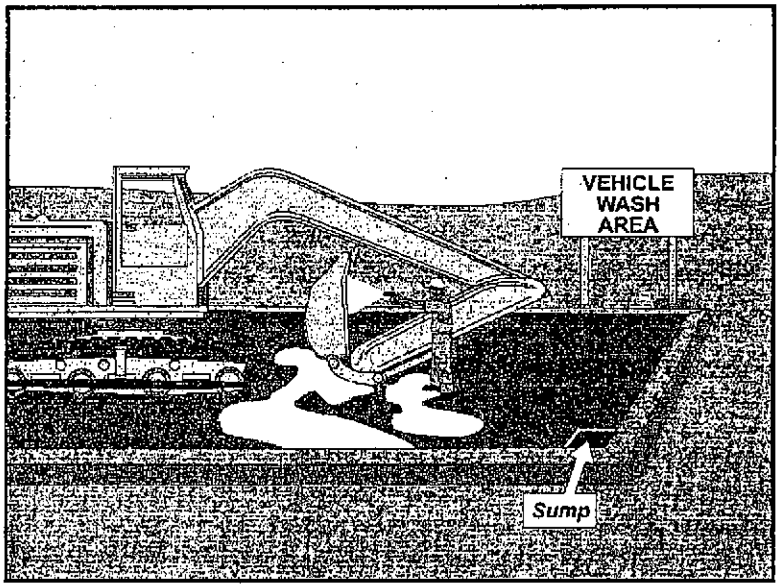
- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning NS-8



Description and Purpose

Vehicle and equipment cleaning procedures and practices prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning by using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

Use an offsite commercial washing business as much as possible. These businesses are better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	✓
WM	Waste Management and Materials Pollution Control	

Legend:

✓ Primary Objective

✓ Secondary Objective

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	
Bacteria	
Oil and Grease	✓
Organics	✓

Potential Alternatives

None

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- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.

- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.

- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.

- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - No discharge of wash waters to storm drains or watercourses
  - Used only when necessary

- When cleaning vehicles and equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
  - Use positive shutoff valve to minimize water usage
  - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and should not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

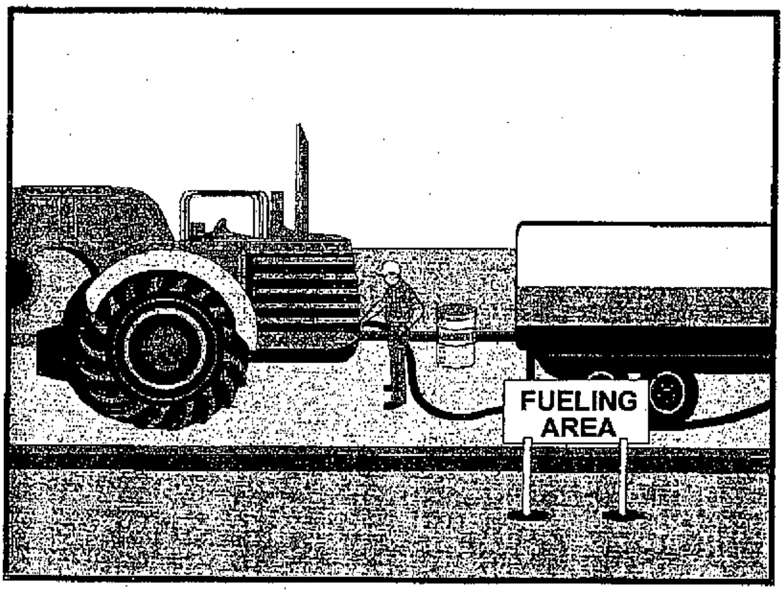
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

Vehicle and Equipment Fueling NS-9



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	✓
WM	Waste Management and Materials Pollution Control	

Legend:

✓ **Primary Objective**

✓ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	✓
Organics	

Potential Alternatives

None

Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.

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- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

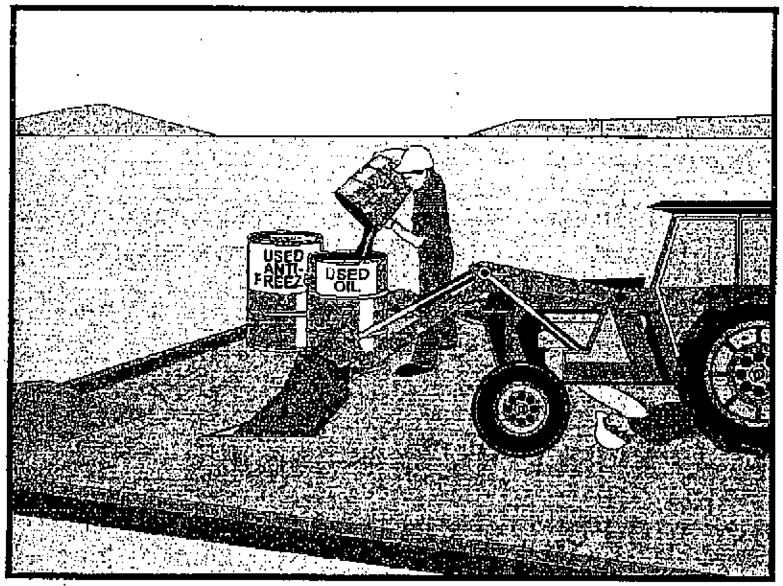
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	✓
WM	Waste Management and Materials Pollution Control	

Legend:
- ✓ **Primary Objective**
- ✓ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	✓
Trash	✓
Metals	
Bacteria	
Oil and Grease	✓
Organics	✓

Potential Alternatives

None

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

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NS-10 Vehicle & Equipment Maintenance

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.
- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,- trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Keep ample supplies of spill cleanup materials onsite.

- Maintain waste fluid containers in leak proof condition.

- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.

- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

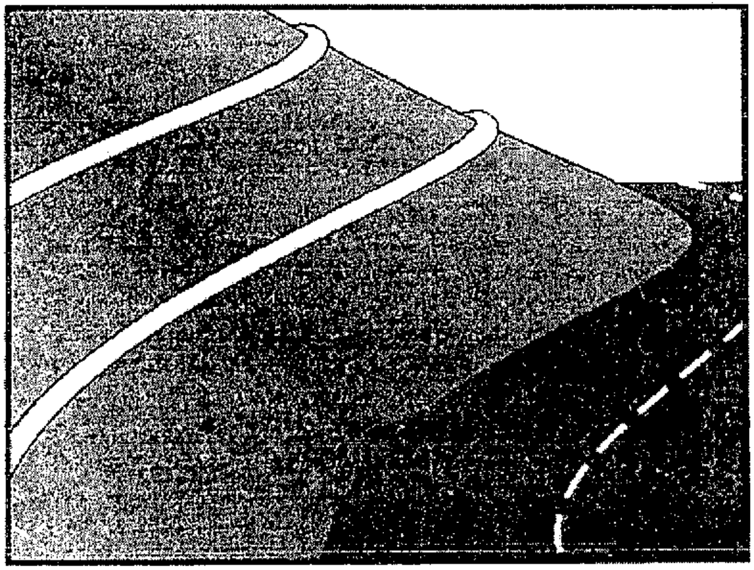
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Fiber Rolls SE-5



Description and Purpose

A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations

- Fiber rolls are not effective unless trenched

Objectives

EC	Erosion Control	✓
SE	Sediment Control	✔
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

✔ Primary Objective

✓ Secondary Objective

Targeted Constituents

Sediment	✔
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

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- Fiber rolls at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20 in. diameter or installations achieving the same protection (i.e. stacked smaller diameter fiber rolls, etc.).

- Difficult to move once saturated.

- If not properly staked and trenched in, fiber rolls could be transported by high flows.

- Fiber rolls have a very limited sediment capture zone.

- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

Implementation

Fiber Roll Materials

- Fiber rolls should be either prefabricated rolls or rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.

- Bind roll at each end and every 4 ft along length of roll with jute-type twine.

Installation

- Locate fiber rolls on level contours spaced as follows:

    - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

    - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

    - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.

- Stake fiber rolls into a 2 to 4 in. deep trench with a width equal to the diameter of the fiber roll.

    - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.

    - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.

- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Removal

- Fiber rolls are typically left in place.

- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Costs

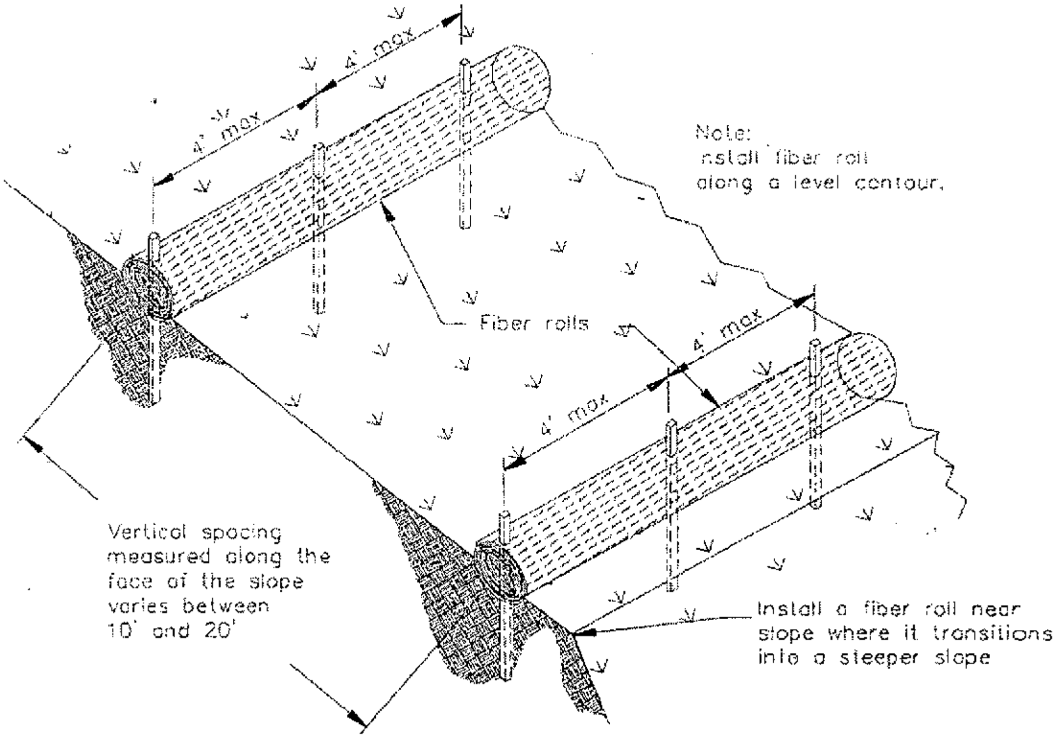
Material costs for fiber rolls range from $20 - $30 per 25 ft roll.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site of disposed at an appropriate location.
- If fiber rolls are used for erosion control, such as in a mini check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

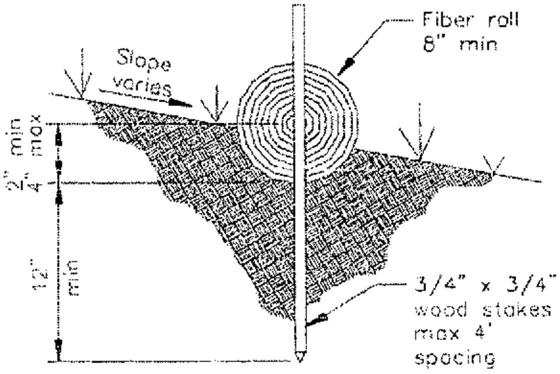
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



TYPICAL FIBER ROLL INSTALLATION

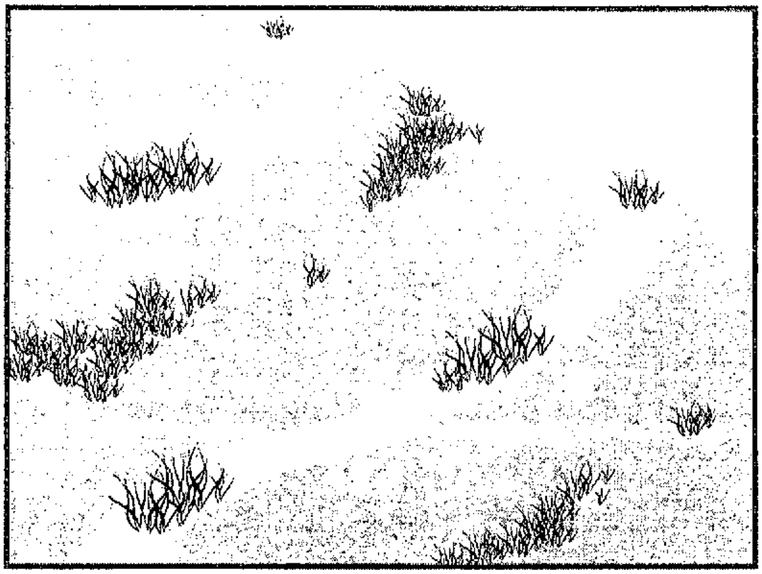
N.T.S.



ENTRENCHMENT DETAIL

N.T.S.

Hydroseeding EC-4



Description and Purpose

Hydroseeding typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, to temporarily protect exposed soils from erosion by water and wind.

Suitable Applications

Hydroseeding is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydroseeding must be used in conjunction with mulching (i.e., straw mulch).
- Steep slopes are difficult to protect with temporary seeding.
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation is not appropriate for short term inactivity.

Objectives

EC	Erosion Control	✓
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	✓
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
✓ **Primary Objective**
✓ **Secondary Objective**

Targeted Constituents

Sediment	✓
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch
EC-5 Soil Binders
EC-6 Straw Mulch
EC-7 Geotextiles and Mats
EC-8 Wood Mulching

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Implementation

In order to select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

- Soil conditions
- Site topography
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is an excellent source of information on appropriate seed mixes.

The following steps shall be followed for implementation:

- Avoid use of hydroseeding in areas where the BMP would be incompatible with future earthwork activities and would have to be removed.
- Hydroseeding can be accomplished using a multiple step or one step process. The multiple step process ensures maximum direct contact of the seeds to soil. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.
- Prior to application, roughen the area to be seeded with the furrows trending along the contours.
- Apply a straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code. Fertilizer shall be pelleted or granular form.
- Follow up applications shall be made as needed to cover weak spots and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average cost for installation and maintenance may vary from as low as $300 per acre for flat slopes and stable soils, to $1600 per acre for moderate to steep slopes and/or erosive soils.

Hydroseeding		Installed Cost per Acre
High Density	Ornamentals	$400 - $1600
	Turf Species	$350
	Bunch Grasses	$300 - $1300
Fast Growing	Annual	$350 - $650
	Perennial	$300 - $800
Non-Competing	Native	$300 - $1600
	Non-Native	$400 - $500
Sterile	Cereal Grain	$500

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems shall be inspected for complete coverage and adjusted as needed to maintain complete coverage.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

APPENDIX L

Revised Groundwater Study

WorleyParsons
resources & energy

ANALYTICAL ENVIRONMENTAL SERVICES

GROUNDWATER STUDY: PROPOSED NORTH FORK CASINO

MADERA COUNTY, CALIFORNIA

Prepared for:

Analytical Environmental Services

1801 7th Street, Suite 100

Sacramento, California 95811

Prepared by:

WorleyParsons

2330 East Bidwell Street, Suite 150

October 2008

ANALYTICAL ENVIRONMENTAL SERVICES
GROUNDWATER STUDY: PROPOSED NORTH FORK CASINO
MADERA COUNTY, CALIFORNIA

Michael Tietze, a California Professional Geologist and Certified Hydrogeologist, as an employee of WorleyParsons, with expertise in hydrogeology, has reviewed the report with the title Groundwater Study: Proposed North Fork Casino. His signature and stamp appears below.

MICHAEL TIETZE
No. HG 63

Michael Tietze
Certified Hydrogeologist HG 63
October 2008

ANALYTICAL ENVIRONMENTAL SERVICES
GROUNDWATER STUDY: PROPOSED NORTH FORK CASINO
MADERA COUNTY, CALIFORNIA

Executive Summary

The North Fork Rancheria of Mono Indians has proposed to establish a casino and hotel development to the northwest of the City of Madera in Madera County, California ("the Madera Site"; **Figures 1, 2, and 3**). An alternative site near the town of North Fork in the same county is also being considered ("the North Fork Site"; **Figures 1 and 4**).

Four development alternatives are being considered, as follows:

A Development of the casino and hotel on the Madera Site;

B Reduced intensity casino development on the Madera Site;

C Alternative retail use for the Madera Site; and

D Development of a casino and hotel on the North Fork Site.

WorleyParsons was contracted to undertake a study relating to the proposed use of groundwater to supply each of the proposed development alternatives. The objective of the study was to assess how this use of groundwater would affect local groundwater levels and wells. Water demand parameters for each development alternative were supplied by HydroScience, Inc.

The Madera Site comprises about 305 acres of land located northwest of the City of Madera. It lies at an elevation of approximately 250 feet above mean sea level and is currently used for growing non-irrigated crops. A residence and associated buildings are present in the southeastern corner. Seven disused agricultural wells were observed on the Site during a visit conducted on 14 April 2005.

The Madera Site lies within the Madera subbasin of the San Joaquin Valley Groundwater Basin (**Figure 1**). The most important aquifer in the area is the Older Alluvium, comprising intercalated lenses of clay, silt, sand, and some gravel. An important regional aquitard, the E-clay or Corcoran Clay, is not thought to be present beneath the Madera Site. Borehole logs for wells drilled near to the Madera Site indicate alternating "sandy" and "clayey" layers to at least 700 feet below ground surface (bgs), with the sandier horizons generally accounting for between 25% and 40% of the total thickness.

Groundwater elevation data were not available for the Madera Site, but DWR interpretations based on records for nearby wells exhibit an overall decline in groundwater levels of approximately 115 feet between 1958 and 2006, with the current groundwater level interpolated to be about 195 feet bgs. The dominant influence on groundwater flow direction in the area over the last 15 years appears to be a pumping depression located north of the City of Madera (**Figure 5**). Comparison of local well hydrographs, precipitation records and reservoir storage data shows short-term correlations between rainfall amount / storage and groundwater levels, but also a long-term decline in groundwater levels that is independent of climatic factors and related to an ongoing overdraft condition (**Figures 6, 7, and 8**).

ANALYTICAL ENVIRONMENTAL SERVICES
GROUNDWATER STUDY: PROPOSED NORTH FORK CASINO
MADERA COUNTY, CALIFORNIA

The North Fork Site is located about 38 miles east-northeast of the City Of Madera and approximately 2 miles east-southeast of the town of North Fork. The Site occupies wooded, south-facing slopes of the Sierra foothills, ranging in elevation from approximately 2,920 feet amsl in the southeast, to approximately 3,480 feet amsl in the northeast. Two residences currently occupy the Site. The North Fork Site overlies granitic basement rocks, within which groundwater is present in fractures. There is little available information on groundwater occurrence, levels, flow, or storage, and even when available, such properties are usually site-specific and highly variable from one location to another. However, groundwater is widely used for domestic supply in the area. Todd Engineers obtained records for approximately 4,600 wells in eastern Madera County and reported a median yield of 8.5 gallons per minute (gpm) and an average yield of 22 gpm (Todd, 2002). Wells in the vicinity of the Site reportedly achieve yields ranging from less than 10 to 240 gpm (**Section 5.5**).

An analytical model was constructed to examine the effects of the three proposed development alternatives for the Madera Site on off-Site groundwater levels and wells. The average groundwater pumping rates with and without water recycling for Development Alternatives A, B, and C, as determined by HydroScience (2006), were used in the model. These rates were as follows:

- Alternative A – 273,000 gallons per day (gpd) (190 gpm) with recycling and 400,000 gpd (278 gpm) without recycling;
- Alternative B – 166,000 gpd (115 gpm) with recycling and 251,000 gpd (174 gpm) without recycling; and
- Alternative C – 11,000 gpd (8 gpm) with recycling and 23,000 gpd (16 gpm) without recycling.

Based on the pumping well location provided by HydroScience, the model showed that at the property boundary, the predicted drawdown would be as follows:

- Alternative A: 6.4 feet with recycling and 9.3 feet without recycling;
- Alternative B: 3.8 feet with recycling and 5.8 feet without recycling; and
- Alternative C: 0.3 feet with recycling and 0.5 feet without recycling.

The predicted drawdown decreases to approximately 1.5 feet at a distance of 2 miles for Alternative A without recycling (the worst case) and about 1 foot for Alternative A with recycling and Alternative B without recycling. Drawdown of less than 1.5 feet is probably not significant relative to seasonal or short term water level changes in this area.

Records for 259 water production wells within 2 miles of the Site were obtained from the California Department of Water Resources (DWR). All of these wells are expected to experience some amount of interference drawdown from the project, as follows:

- Alternative A: 1.0 to 4.9 feet with recycling and 1.5 to 7.2 feet without recycling;

- Alternative B: 0.5 to 3.0 feet with recycling and 0.9 to 4.5 feet without recycling; and
- Alternative C: less than 0.3 feet with recycling and less than 0.5 feet without recycling.

A combination of interference drawdown from the project and the documented regional declining groundwater levels may result in four different potential impacts to nearby wells. These are:

1. The well going dry;
2. The water level in the well falling so low that the well is no longer usable;
3. Impacts 1 or 2 occur, but the well pump intake can be lowered to extend the life of the well; and/or
4. Increased operational costs.

Impacts 1 and 2 were evaluated in terms of projects impact on the usable lifetime of nearby wells. Given long term groundwater level trends, there are 68 wells less than 250 feet deep that are either dry or at risk for going dry or becoming unusable in the next 36 years without development of the project. Because actual future water level trends cannot be accurately predicted, the usable lifetime of these wells may be shorter or longer. Based on the observed long term trends and the predicted interference drawdown associated with project pumping, the project will shorten the remaining usable lifetimes of these wells by 1 to 3 years. The actual contribution of project pumping to the shortening of usable lifespans of nearby wells will be determined based on a groundwater monitoring program to be implemented as part of the project's mitigation program

Impact 3 must be evaluated based on well-specific information that is not generally available at this time. We recommend that this impact be evaluated on case-by-case basis during the mitigation phase of the project.

A reasonable range for increased operational costs (Impact 4) was evaluated by simulating several different well, pump, water level and interference drawdown configurations. In general, it was found that increased costs for residential well operators are not expected to be significant. Increased costs for agricultural, industrial or municipal well owners with annual pumping requirements in the range of hundreds to several thousand dollars may be expected to range from several hundred to several thousand dollars. (For the pumps modeled, the maximum cost increase represents an approximately 2 percent increase in the user's overall pumping costs.) The only City of Madera well that may be impacted by project pumping (Well No. 26) is designated for use as a standby well and for fire suppression. As such, significant increases in the electrical cost to operate this well are not anticipated.

On a regional basis, the project will contribute slightly (approximately 0.02 to 0.5 percent) to an existing imbalance between groundwater pumping and recharge (overdraft). Significant ground subsidence is not anticipated as a result of the project.

Implementation of a drawdown monitoring program is recommended to document actual drawdown from the project as well as regional water level trends and interference drawdown from other nearby groundwater pumping. Data from the program can be used to establish baseline conditions, evaluate the effectiveness of measures designed to mitigate drawdown, and to assess appropriate mitigation for nearby impacted well owners.

Drawdown and overdraft impacts can be mitigated to some extent by implementation of Best Management Practices (BMPs) in the proposed construction and infiltration from on-Site land application of treated wastewater from the development. The effectiveness of this mitigation measure was estimated for Alternative A to be a reduction in predicted drawdown of between 7 and 49 percent, depending on the extent to which spray field or leach field application is used for disposal. Based on the information provided, slightly greater mitigation efficiencies may be expected for Alternatives B and C and if groundwater recycling is not incorporated, because the relatively more treated wastewater is discharged compared to the projected groundwater extraction rates for those alternatives. In addition to the above, the tribe has executed a Memorandum of Understanding (MOU) with the Madera Irrigation District (MID) to contribute to its recharge efforts to help address overdraft in the groundwater basin in which the project is located. The tribe's contribution covers recharge of 450 acre-feet per year of water to the groundwater basin, which is equal to the project water demand of Alternative A without recycling.

All the wells in the area will experience impacts from the prevailing regional decline in groundwater levels. The following alternatives for mitigation of significant project-related interference drawdown impacts are being considered, to the extent the impact is attributable to project pumping as distinguished from the regional trend:

- Impacts 1 and 2 : Reimbursement for well replacement, rehabilitation or deepening;
- Impact 3: Reimbursement for pump replacement or re-setting;
- Impact 4: Compensation for increased cost; and
- At the tribe's discretion, providing a connection to a local public or private water system, for any and/or all potential significant impacts.

The average daily groundwater pumping rate for the North Fork Alternative (Development Alternative D) would be about 27,000 gpd (19 gpm) without water recycling and 14,000 gpd (10 gpm) if recycling is incorporated. The proposed pumping rate of 9 to 17 gpm is comparable to or lower than the reported yields of existing wells in the area of the North Fork Site for which information was obtained (**Section 5.5**), but exceeds the median well yield reported for wells drilled in eastern Madera County (Todd, 2002). Therefore, it appears likely that the aquifer could produce water at the proposed rate if one or more wells were installed, as needed. However, the drawdown resulting from this pumping cannot be predicted at this time, due to the lack of available data on groundwater levels or aquifer parameters in the North Fork area. In addition, due to the nature of fractured granitic aquifers, such properties are usually site-specific and highly variable from one location to another.

CONTENTS

List of Figures

List of Appendices

List of Acronyms and Abbreviations

amsl	above mean sea level
AES	Analytical Environmental Services
AF	acre-feet
AFY	acre-feet per year
bgs	below ground surface
DWR	California Department of Water Resources
EIS	Environmental Impact Statement
gpd	gallons per day
gpd/ft	gallons per day per foot
gpm	gallons per minute
HydroScience	HydroScience Engineers, Inc.
mg/L	milligrams per liter
MAF	million acre feet
MID	Madera Irrigation District
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
WRCC	Western Regional Climate Center

ANALYTICAL ENVIRONMENTAL SERVICES
GROUNDWATER STUDY: PROPOSED NORTH FORK CASINO
MADERA COUNTY, CALIFORNIA

1. INTRODUCTION

1.1 Project Background

The North Fork Rancheria of Mono Indians has proposed to establish a casino and hotel development on a 305-acre area of land to the northwest of the City of Madera in Madera County, California ("the Madera Site"; **Figures 1, 2 and 3**). An alternative site near the town of North Fork in the same county is also being considered ("the North Fork Site"; **Figures 1 and 4**). An Environmental Impact Statement (EIS) is to be prepared by Analytical Environmental Services (AES) as required by the National Environmental Policy Act.

The EIS will evaluate four development alternatives, as follows:

A. Development of the casino and hotel on the Madera Site;

B. Reduced intensity casino development on the Madera Site;

C. Alternative retail use for the Madera Site; and

D. Development of a casino and hotel on the North Fork Site.

HydroScience Engineers, Inc. (HydroScience) performed a *Water and Wastewater Feasibility Study* for the proposed casino and hotel development (HydroScience, 2006). In the case of the Madera Site, the study considers two alternative strategies for water supply to the proposed development: an off-Site groundwater supply from the City of Madera; and an on-Site groundwater supply using two proposed wells. The North Fork Site development alternative would be supplied by on-Site groundwater wells (HydroScience, 2006).

1.2 Project Scope

WorleyParsons was contracted by AES to undertake a study relating to the proposed use of groundwater from on-Site wells to supply the proposed development alternatives described above. Consideration of the alternative water supply from the City of Madera was not part of the project scope. The objective of the study was to assess how the use of groundwater to supply the new development alternatives, as recommended in the *Water and Wastewater Feasibility Study*, would affect local groundwater levels and wells, the groundwater basin in which the Site is located, and the potential for ground subsidence to occur. Our assessment was performed using existing data and limited field observation. This report includes revisions made in response to comments received from the City of Madera, Madera Irrigation District, and the U.S. Environmental Protection Agency. Subsurface investigation and hydrogeologic testing were not included in our scope of services.

1.3 Report Organization

This report is subdivided as follows:

Section 1: Introduction.

Section 2: Regional Hydrogeologic Setting. An overview of the topography, drainage, climate, geology and hydrogeology of the Madera County region.

Section 3: Previous Groundwater Use Studies. A review of relevant groundwater studies undertaken between the late 1950's and 2004, with particular emphasis on measured groundwater elevations and trends.

Section 4: Madera Site Evaluation. A summary of geologic and hydrogeologic conditions pertaining to the Madera Site, with discussion of historical groundwater levels.

Section 5: North Fork Site Evaluation. A summary of geologic and hydrogeologic conditions pertaining to the North Fork Site, with discussion of groundwater use in the vicinity.

Section 6: Potential Impacts of Using Groundwater as a Water Supply for the Madera Site Development Alternatives. An evaluation of the effects of the three proposed development alternatives of the Madera Site on groundwater levels and wells in the vicinity, the groundwater basin in which the Site is located, and on ground subsidence.

Section 7: Potential Impacts of Using Groundwater as a Water Supply for the North Fork Site Development Alternative. Discussion of the effects of the North Fork Site development alternative on groundwater levels and wells in the vicinity.

Section 8: Conclusions.

Section 9: Closure/Limitations.

Section 10: References.

2. REGIONAL HYDROGEOLOGIC SETTING

2.1 Topography and Land Use

Ground surface elevations in Madera County range from less than 300 feet above mean sea level (amsl) in the west to over 13,000 feet amsl in the east. The western third of the county is occupied by part of the San Joaquin Valley; the eastern area by the foothills and mountains of the Sierra Nevada.

The San Joaquin Valley is a structural trough up to 200 miles long and 70 miles wide, bounded to the west by the Coast Ranges, to the south by the San Emigdio and Tehachapi Mountains, to the east by the Sierra Nevada, and to the north by the Sacramento-San Joaquin Delta and the Sacramento Valley.

The San Joaquin Valley provides flat to gently rolling farmland. The foothills region is used mainly for grazing, irrigated pasture, and animal husbandry. The predominant land uses in the mountain region (above about 3,500 feet amsl) are tourism, recreation, and forestry (Todd Engineers, 2002).

2.2 Climate

The San Joaquin Valley has an arid to semi-arid climate characterized by hot summers and mild winters. Mean annual precipitation on the valley floor ranges from less than 5 inches in the south to 15 inches in the north. Average annual precipitation in the Sierra Nevada ranges from 20 inches in the lower foothills to more than 80 inches at some high altitude sites (Gronberg *et al.*, 1998).

2.3 Drainage

More than 90% of surface runoff from Madera County is ultimately discharged via the San Joaquin River, which forms the western and most of the southern county boundary (Todd Engineers, 2002). The Fresno and Chowchilla Rivers, both tributary to the San Joaquin River, are the other major drainage courses in the county.

The area also contains thousands of miles of canals and ditches, originally built for agricultural irrigation or for gold mining operations. In the late 1940's, the Federal government became involved with irrigation, and was responsible for the construction of substantial storage, pumping and conveyance facilities (Gronberg *et al.*, 1998). The major rivers and several of the minor courses are dammed within the county: major reservoirs in the foothill area include Millerton Lake (formed by Friant Dam) on the San Joaquin River, Hensley Lake on the Fresno River, and Eastman Reservoir on the Chowchilla River. The Madera and Friant-Kern Canals were constructed to divert water respectively north and south from below Friant Dam (Gronberg *et al.*, 1998).

2.4 Geology and Hydrogeology

The San Joaquin Valley structural trough is infilled with up to 32,000 feet of marine sediments (deposited during periodic inundation by the Pacific Ocean) and continental sediments (formed by erosion of the surrounding mountains) (California Department of Water Resources [DWR], 2004). The foothills and mountains of the Sierra Nevada to the east are made up of pre-Tertiary igneous and metamorphic basement rocks. The Madera Site lies in the San Joaquin Valley, whereas the North Fork Site lies in the foothills to the east. Therefore, the two Sites are characterized by very different geologic and hydrogeologic conditions (see **Sections 4 and 5**).

The following are brief descriptions of the main geologic and hydrostratigraphic units present in Madera County, from youngest to oldest.

Flood Basin Deposits: these Holocene age deposits underlie recently flooded areas in a narrow band parallel to the San Joaquin River. Their maximum thickness is about 50 feet (Mitten *et al.*, 1970).

Younger Alluvium: this is a thin (0 to 50 feet thick) deposit of interbedded clay, silt, and sand, that underlies the channels, flood plains and parts of the alluvial fans of the Chowchilla, Fresno, and San Joaquin Rivers (Mitten *et al.*, 1970).

Older Alluvium: this is the most important aquifer in the area (DWR, 2004). It consists mainly of intercalated lenses of clay, silt, sand, and some gravel. It includes lacustrine and marsh deposits, which contain the E-clay or Corcoran Clay (equivalent to the Diatomaceous Clay of Davis *et al.*, 1959), a regionally important hydrogeologic confining layer. The Older Alluvium is of Pleistocene and Holocene age, ranges in thickness from 0 to about 1,000 feet, and dips gently towards the southwest (Mitten *et al.*, 1970).

Tertiary and Quaternary Continental Deposits: these include interbedded, poorly sorted sand, silt, clay and conglomerate with layers of hardpan and traces of volcanic glass and tuff (Mitten *et al.*, 1970). DWR (2004) includes the Ione Formation in this category, although Mitten *et al.* (1970) group the Ione conglomerates and sandstones with the underlying consolidated strata. The Tertiary and Quaternary Continental Deposits are between 1,000 and 2,200 feet thick in the Madera area (Mitten *et al.*, 1970).

Pre-Tertiary and Tertiary undifferentiated marine and continental sedimentary rocks: these sandstone, siltstone, claystone and shale rocks overlie the basement complex unconformably (Mitten *et al.*, 1970).

Basement complex: granitic and schistose basement rocks underlie the valley infill deposits, and outcrop in the foothills and mountains of eastern Madera County. The basement comprises sedimentary and volcanic strata that were folded, faulted, metamorphosed, and intruded by granitic batholiths during the Nevadan Orogeny, which began about 200 million years ago and resulted in the formation of the Sierra Nevada mountains (Todd Engineers, 2002).

2.5 Groundwater Occurrence and Flow

In the San Joaquin Valley of western Madera County, potable groundwater occurs mainly in the unconsolidated alluvial deposits of Pleistocene and Holocene age (DWR, 2004). In the foothills to the east, groundwater occurs predominantly in fractured bedrock (Todd Engineers, 2002) but also in gravel- and silt-filled stream courses and meadows (Madera County, 1995).

Overall, groundwater flow in Madera County is from the upland areas of the east towards the San Joaquin Valley in the west.

3. PREVIOUS GROUNDWATER USE STUDIES

This Section briefly summarizes important historical groundwater use studies that are relevant to the Madera and North Fork Sites.

3.1 Early Studies

The first report on groundwater occurrences in the San Joaquin valley was authored by W. C. Mendenhall and published by the United States Geological Survey (USGS) in 1916, and was based on fieldwork carried out between 1905 and 1910 (Davis *et al.*, 1959). At the time, groundwater supplied only a small proportion of the agricultural water demand in the San Joaquin Valley, on the order of about a quarter of a million acre-feet per year (AFY).

In 1934, the California Division of Water Resources (now the Department of Water Resources) published reports on the state water plan that included the San Joaquin Valley. In 1939, Piper and others described hydrogeologic conditions in the Mokelumne area (Mitten *et al.*, 1970).

By 1955, approximately 9 million AFY of groundwater were being pumped to supply just over half of the irrigated area in the San Joaquin Valley (Davis *et al.*, 1959).

3.2 USGS Water-Supply Paper 1469, 1959

The study undertaken by Davis *et al.* (1959) and published as Water-Supply Paper 1469 was the first on groundwater conditions in the San Joaquin Valley since Mendenhall's publication of 1916. The study was designed to provide a reconnaissance appraisal of groundwater conditions and quality.

For the purposes of the study, the San Joaquin Valley was divided into several smaller units. The Madera Site is located within the San Joaquin River unit. In this unit, groundwater recharge occurs chiefly along the San Joaquin and Fresno Rivers, the Berenda Slough, and several lesser streams. Flow in these streams is augmented by deliveries from the Madera Canal to the Madera Irrigation District (MID), which in 1951 totaled 37,727 acre-feet (AF).

Irrigation in the unit was largely accomplished by groundwater extraction. Thus, well hydrographs commonly showed a general rise of water levels in late autumn and winter, when groundwater pumping was small and recharge comparatively large, and a decline in late spring and summer, when pumping increased and recharge was smaller.

3.3 DWR Bulletin 135, 1966

DWR Bulletin 135 (DWR, 1966) was intended to provide a comprehensive report on water resources in Madera County and the drainage basins of the Chowchilla and Fresno Rivers. The study was undertaken at the request of the Madera County Water Commission, which had been tasked with addressing water "problems" in the county.

The report concluded that existing and authorized water supply projects were insufficient to meet the projected demands in the area. The report highlighted proposed projects that could meet the anticipated demand, both in the valley area and in the foothills of the eastern county. Off the valley floor, the report noted that water was supplied almost entirely from limited groundwater resources which were "... inadequate to cope with increasing requirements."

3.4 USGS Open File Report 70-228, 1970

The USGS, in cooperation with DWR, began studying areas within the San Joaquin Valley in 1948. In 1970, their report on the Madera area (including the area of the Madera Site) was published (Mitten *et al.*, 1970). The purposes of the study were to detail the geology and hydrogeology of the area, to describe groundwater storage, and to relate conditions to those in adjacent areas. The work was carried out between 1964 and 1968.

The report gives a detailed account of geology, hydrogeology, and water quality in the area. It describes the three groundwater bodies present: the confined water body (which underlies the E-clay in the western area); the unconfined water body (which overlies the E-clay, where present, and supplies most of the groundwater pumped in the area); and the shallow water body (which is only locally present).

Analysis of hydrographs revealed a general long-term decline of the groundwater surface in the unconfined water body in the area. Between 1906 and 1965, water levels declined between 40 and 55 feet in some areas.

The potentiometric surface of the confined water body also showed a long-term declining trend due to increased pumping. In the western part of the area, the potentiometric surface was above ground level in 1905; in 1965 it was between 60 and 100 feet below ground surface (bgs). This was mainly attributed to pumping to the west of the Madera area.

Most of the fresh groundwater in the area is a bicarbonate type that generally contains less than 500 milligrams per liter (mg/L) dissolved solids, although this increases to in excess of 2,000 mg/L below 800 feet depth.

3.5 USGS Professional Paper 1401, 1984-1991

This study, published in four parts between 1984 and 1991, sought to describe major aspects of the geology, hydrology, and geochemistry of the Central Valley aquifer system (Bertoldi *et al.*, 1991).

The report notes the difference between the "traditional" view of the San Joaquin Valley as containing two aquifers (unconfined and confined) separated by a regional confining unit (the Corcoran or E-clay), and a more recent interpretation which envisages a single heterogeneous aquifer containing many isolated lenses of sand, silt, and clay. Under the latter interpretation, although the Corcoran Clay is present as a distinct, comparatively thick, low permeability layer, its significance in controlling vertical groundwater flow is less than that of the combined effect of the many other fine-grained lenses present in the stratigraphic sequence.

The report notes that groundwater flow in the Central Valley has been greatly altered by large-scale groundwater development and very large diversions and redistribution of surface water. Heavy pumping from wells, averaging 11.5 million AF annually during the 1960's and 1970's (peaking at 15 million AF in the drought year of 1977), combined with increased recharge due to irrigation, caused changes in groundwater levels throughout the area. Groundwater flow was now primarily towards pumping centers rather than towards pre-existing natural discharge areas.

Increased pumping of groundwater has also caused land surface subsidence over a large area.

3.6 DWR San Joaquin District Study, 1992

DWR (1992) provided an analysis of groundwater level trends between 1970 and 1991 in the San Joaquin Valley. The report notes that other DWR publications describe the Valley's groundwater basin as being in overdraft, based on long-term average conditions. As defined by DWR, overdraft is a long-term deficiency in water supplies – and specifically the portion of water demand that exceeds long-term supplies. This overdraft was estimated as about 10% of the Valley's average, long-term, sustainable supply.

Groundwater levels beneath the San Joaquin Valley were described as "high" in 1970. Decreasing precipitation, culminating in the 1976-77 drought, led to increased groundwater pumping and declining groundwater surface levels. However, by the early 1980's increased precipitation had allowed groundwater levels to rebound to or exceed 1970 elevations. After 1987, another downward trend began.

Annual changes in groundwater storage were computed for each county in the study area for the years 1970 to 1991. For Madera County, the cumulative change in storage was calculated as a decrease of 2,091,600 AF. This was reflected in an average groundwater level decline of 38.8 feet, which represented a larger decline than observed in many other counties; this was attributed to the "inadequacy of surface water supplies" to supplement groundwater in Madera County.

3.7 Madera County General Plan, 1995

The background report to Madera County's General Plan (Madera County, 1995) lists the four irrigation districts that manage surface water delivery in the county, and states that groundwater wells for municipal use are managed by local governments. There are eleven large and about 44 small community water systems in operation in the county, the vast majority of which use groundwater as the primary source.

Groundwater resources in western Madera County are described as adequate, with residential wells generally pumping from between 150 and 300 feet deep, and commercial and agricultural wells being deeper. However, the report states that "the average amount of [annual] groundwater recharge is far less than the average annual use. The result of this trend is increasing depth to groundwater".

In the eastern mountainous area of the county, reliable sources of groundwater are more difficult to find, with fracture systems, gravel- and silt-filled stream courses, and meadows presenting the best opportunities for water supply development.

The report draws attention to the Central Valley Project Improvement Act, signed into law by Congress in 1992, which, according to the report, could result in increased costs and reduced supplies of surface water to agricultural users in Madera County, and in turn could increase pressure on groundwater supplies. The report considers that this act alone has the potential to drastically affect the agricultural community, and that its combined effect with existing legislation that reserves more water for environmental purposes and future droughts could have "even greater severity."

The following extract from the report summarizes concerns over water supply in the county:

> "Madera County faces two key issues in regard to groundwater supply. First, continued agricultural production will continue to lower the water table. Reduced surface supplies during dry years and the potential ability to sell water outside the county will exacerbate this situation. Secondly, groundwater in the foothills and mountains is very limited, and is not adequate to serve significant future growth. Water supply is therefore one of the most critical issues facing Madera County."

3.8 Madera Irrigation District Groundwater Management Plan, 1999

In 1999, MID described its intention to produce a groundwater management plan, designed to define its role in managing local groundwater resources in order to maximize supply and protect quality (Boyle Engineering, 1999). The Madera Site lies within the MID service area.

MID measures spring and fall depths to groundwater in wells throughout its service area. These measurements have recorded an average groundwater level decline of about 1.25 feet per year. In an effort to replenish the groundwater supply, MID operates eight recharge basins and unlined canals that contribute to recharge. These recharge basins and canals are all located in the Madera subbasin. The Madera subbasin is defined as lands overlying the alluvium in Madera County (DWR, 2004). The location of the Madera subbasin and the recharge basins are shown on **Figure 1**.

The report compares hydrographs of wells in and near the City of Madera with those of wells near the Fresno and San Joaquin Rivers. The hydrographs show that water levels are generally in decline near the City of Madera, whereas near the rivers they vary with annual precipitation. The report concludes that "it is apparent that the basin underlying the city [of Madera] is in a much more serious state of overdraft."

This is a primary concern for the MID, because groundwater is the primary source of water for municipal and agricultural users in the basin.

3.9 Madera County AB3030 Groundwater Management Plan, 2001

A groundwater management plan for the groundwater basins in the western third of Madera County was prepared by Todd Engineers (2001). Included were parts of the Madera, Chowchilla, and Delta-Mendota subbasins that were not already subject to existing management plans prepared by others. The Madera Site is covered by the MID's groundwater management plan (**Section 3.8**) because it is located in the MID service area. Madera County's groundwater management plan is limited to portions of Madera County that are not covered by existing groundwater management plans and, therefore, does not strictly apply to the Madera Site. However, the information contained within Madera County's plan is relevant to the general Madera Site area.

The plan notes that DWR classified the Madera and Chowchilla subbasins as being in a state of "critical overdraft" in 1980, although this terminology is no longer used by DWR. A long-term declining trend in groundwater elevations was observed from well hydrographs. Overall declines ranged from less than 10 feet in wells located near the San Joaquin River, to more than 150 feet in northwestern Madera County.

A correlation between precipitation, availability of surface water deliveries, and water elevations was noted, with water levels rising during wet periods and falling during periods of drought. However, following a drought in the mid- to late-1980's, groundwater levels did not recover significantly, despite the drought being followed by several of the wettest years on record. This was attributed to increased pumping over time, and possibly also the effect of decreasing specific yields in deeper saturated sediments.

Todd Engineers (2001) estimated the change in groundwater storage from the drought conditions of the early 1990's to the wet conditions of the late 1990's as -68,338 AFY on average. This corresponded to an average annual decline in groundwater levels of 1.5 feet. Todd Engineers noted that three separate calculations of change in groundwater storage (two by DWR and one by Todd Engineers) resulted in similar quantification of overdraft conditions in the Madera County groundwater subbasins from 1952 to 1998. Todd Engineers made the following comments:

> "These data indicate that no measures to date have arrested the overdraft condition of the groundwater basin, despite recent record wet years. Without mitigation, water levels are expected to continue to decline into the future with the rate of decline controlled by precipitation and pumping patterns. As water levels reach all-time lows, damage to the groundwater basin may be occurring."

Four strategies to address the declining water levels and achieve a sustainable water supply were discussed:

1. Maximize groundwater recharge. Maximizing natural streamflow recharge could partially mitigate groundwater overdraft. The purchase of additional water could also be considered.
2. Preclude export of water out of the County.
3. Agricultural land conversion. Agricultural pumping is estimated to account for more than 95% of groundwater pumping in the County. Conversion of the land to urban usage could reduce groundwater use. However, if agricultural land currently irrigated with surface water is converted to urban use – with total reliance on groundwater for potable uses – then groundwater demand would increase and surface water return flows would be lost.
4. Develop standards for urban development. Regional overdraft conditions and water balance should be taken into consideration when demonstrating a sufficient water supply for any new development.

3.10 Todd Engineers Report – Eastern Madera County, 2002

Madera County contracted Todd Engineers to undertake a study of groundwater conditions in the eastern part of the county, in the foothill and mountain regions not covered by the AB3030 plan (See **Section 3.9**). The North Fork Site lies within this area. The objectives of the study were to compile, summarize, and analyze existing data on groundwater conditions, and to provide recommendations for further work and on groundwater management issues.

Data were generally not available on groundwater occurrence, levels, flow, or storage. However, groundwater is the main source of water supply in eastern Madera County, with surface water from streams and reservoirs supplementing in some areas. Approximately 45 county- and community-operated water systems, and 69 non-community water systems are active in the area, and there are records for about 4,500 private wells.

Todd Engineers carried out a preliminary watershed water balance for the foothill region. The total groundwater recharge was estimated at 107,000 AFY, compared to an annual water demand of 5,803 AFY. Thus, water demand was estimated to be only about 5% of recharge. However, it was cautioned that most groundwater recharge occurs in portions of the county where groundwater is not used. In developed areas, the water demand is likely a much higher percentage of the local recharge.

The study concluded that on a regional basis, sufficient groundwater is available to meet demand. However, development is typically concentrated (*e.g.*, in small towns), which causes water demand to be a significant proportion of local recharge. Well yields are typically less than 50 gallons per minute (gpm), with a median reported yield of 8.5 gpm and an average reported yield of 22 gpm. In some cases, it may be necessary to drill several wells until one with sufficient yield is found.

Note that the conclusions of this study are seemingly in contradiction to the conclusions of the study performed in support of the Madera County General Plan (**Section 3.7**), which stated that "groundwater in the foothills and mountains is very limited, and is not adequate to serve significant future growth".

3.11 Millerton Area Watershed Assessment, 2003

The Millerton Area watershed lies west of the town of North Fork and, although the area covered by the Millerton Area Watershed Assessment does not include the North Fork Site, the assessment provides insights into water supply issues in the foothills of Madera County.

Because of a general lack of information on groundwater resources (the most extensive study undertaken had been the Todd Engineers project – see **Section 3.10**), discussions were undertaken with local well drillers and geologists. Details of these discussions are included in Appendix 3 to the draft watershed assessment (Millerton Area Watershed Coalition, 2003). Some of the comments made include the following:

- Typical domestic water well production is in the 5 to 7 gpm range.
- Well depths are generally between 400 and 700 feet bgs. The deepest wells are about 1,500 feet deep. Deep fractures remain open because they contain weathered rock particles.
- Water levels are falling in some areas. Current well "re-drills" due to declining groundwater levels are generally in excess of 700 feet bgs, with most around 900 feet bgs.
- DWR does not keep records of well water levels in the foothill area.
- "You don't really know [if sufficient groundwater is present] until you drill a well and test what you have."

3.12 DWR Bulletin 118 Update, 2003-2004

DWR maintains online descriptions of California's groundwater basins, including the Madera subbasin of the San Joaquin Valley Groundwater Basin (DWR, 2004).

The Madera subbasin is defined as lands overlying the alluvium in Madera County. The subbasin is bounded to the south by the San Joaquin River, to the west by the eastern boundary of the Columbia Canal service area, to the north by the southern boundary of the Chowchilla subbasin, and to the east by the crystalline bedrock of the Sierra Nevada foothills.

On average, water levels in the subbasin declined nearly 40 feet from 1970 through 2000:

- Approximately 30 feet of decline occurred from 1970 to 1978;
- Stabilization and rebound of about 25 feet occurred from 1978 to 1987;

- Steep declines to about 45 feet below the 1970 level occurred from 1987 to 1996; and,
- A rise of about 8 feet occurred from 1996 to 2000.

The estimated average specific yield of the Madera subbasin is 10.4%. The storage capacity of the subbasin above a depth of 300 feet bgs was estimated to be 18,500,000 AF, and the storage capacity to the base of fresh groundwater was estimated to be 40,900,000 AF. DWR (2004) gives two estimates of the actual groundwater stored:

- 24,000,000 AF to a depth of about 1,000 feet bgs in 1961; and,
- 12,600,000 AF to a depth of 300 feet bgs in 1995.

DWR (2004) reported a partially complete groundwater budget for the Madera subbasin in 1990 as follows:

- Applied water recharge: 404,000 AF;
- Natural recharge: 21,000 AF;
- Agricultural extraction: 551,000 AF; and,
- Urban extraction: 15,000 AF.

Artificial recharge, subsurface inflow and outflow, and the change in groundwater storage were not determined. The net effect of these undetermined components is equivalent to a groundwater inflow of 141,000 AF. WorleyParsons anticipates that the undetermined inflow consists mainly of groundwater withdrawn from storage in the aquifer, because the other three undetermined components are expected to be relatively small in comparison to withdrawal from storage.

3.13 DRAFT EIR FOR THE MADERA IRRIGATION DISTRICT WATER SUPPLY ENHANCEMENT PROJECT, 2005

As an outgrowth of its AB 3030 Groundwater Management Plan, MID proposed the Water Supply Enhancement Project to increase its storage capacity and supply reliability for its customers. The project consists of aquifer storage of surface water entitlements that typically cannot be delivered to MID customers due to the timing and/or duration of their availability. As conceived, up to 55,000 AFY will be diverted to the Madera Ranch, located approximately 8 miles southwest of the Site in the Madera subbasin (**Figure 1**), where it will be infiltrated by applying it to swale recharge areas and recharge basins. The infiltrated water will be stored in the aquifer for future extraction. The total storage capacity of the project is estimated to be 250,000 AF. The water will be extracted by pumping it from up to 15 existing and 49 proposed new wells and pumped back into MID and surrounding areas for agricultural use when needed. Only up to 90 percent of the water that is infiltrated will be recovered, leaving the remaining 10% to help offset the current overdraft condition in the basin. Exportation of water outside of

Madera County will not be permitted. Shallow groundwater levels will be monitored around the perimeter of the recharge area, and recharge will be managed such that groundwater levels do not rise higher than 20 feet bgs.

Under current conditions, MID diverts an average of 3,080 AFY of surface water to the eight recharge basins located within its jurisdiction in the Madera subbasin (**Figure 1**). The amount of water sent to the basins has varied since measurements began in 1993. Water was diverted to these basins during 10 of the 12 years from 1993 through 2004, and during three of the years, less than 1,000 AF was sent to the basins. The maximum amount of water sent to the basins was 8,091 AF in 2000.

The Draft Environmental Impact Report (DEIR) for the project states that the Madera Subbasin is in overdraft by an estimated average of 100,000 AFY. As a result, groundwater levels declined an average of 67 feet since 1945 and 30 feet since 1980. The amount of groundwater pumped varies from year to year, depending upon the availability of surface water, precipitation and temperature. Groundwater pumping during critically dry years can be more than twice as high as pumping during wet years.

3.14 KDSA Report on Groundwater Conditions in the North Fork Area, 2007

In 2007, Kenneth D. Schmidt and Associates (KDSA) conducted a hydrogeologic evaluation of the North Fork area in the mountainous area of Madera county. The North Fork site lies within this study area. This report presents the groundwater condition of the North Fork area through 2007.

According to the report, both Madera County Maintenance District water supply systems and private water supply systems are present in the North Fork area; however, private wells outside of these systems provide most of the water pumped in the area. A total of 66 individual wells in the North Fork-Willow Creek subarea (the subarea of North Fork in which the project site is located) were air tested for yields. About 30 percent of the individual wells had air test yields of less than 5 gpm, which is considered moderately low. About 10 percent of the wells had air test yields exceeding 50 gpm, which is considered excellent. The remaining 60 percent of the wells had air test yields between 5 and 50 gpm.

From July 2006 through October 2007, water levels were measured in a number of wells in the North Fork area as part of the investigation conducted by KDSA. According to the findings, precipitation in the North Fork Area was low in winter 2006 through October 2007, compared to historical values. Despite this, water levels in almost all wells rose following the February 2007 precipitation. Overall, water levels in wells in the North Fork area were relatively stable compared to those in wells in the Oakhurst and Chukchansi Casino areas. This was attributed as most likely being due to the overall predominance of private domestic wells and lack of large-capacity water system wells.

According to the report, the County Maintenance District water systems in the North Fork area pumped a total of 240 acre-feet in 2006. KDSA estimated the annual pumpage from individual wells (including springs) to be approximately 400 acre-feet per year, thus the total annual groundwater pumpage in the North Fork area was estimated to be 640 acre-feet in 2006.

KDSA determined that groundwater recharge generally appears to be adequate compared to groundwater demand in the North Fork area, due to the relatively high precipitation and low to moderate pumpage.

In terms of water quality, KDSA noted that iron is present in water from some wells, but this is not uncommon in the hardrock. Arsenic concentrations were found to slightly exceed the MCL in a relatively small area at and near North Fork. Gross alpha radiation (an indicator of uranium) exceeded the MCL in wells present over a fairly large area northwest of North Fork and south of Bass Lake. Otherwise, the chemical quality of well water in the North Fork area was found to be generally excellent.

The following recommendations were made in the report by KDSA:

1. Continue groundwater level and groundwater quality monitoring of wells for which permission can be obtained.
2. Develop a program to notify owners of property where new individual wells are to be constructed of where gross alpha radiation is expected to exceed the MCL.
3. Require laboratory analyses of water from new wells for selected constituents. Madera County Environmental Health would recommend not drinking the water if gross alpha radiation is confirmed to exceed the MCL.
4. Require hydrogeologic evaluations of the groundwater supply for new subdivisions, as recommended in the Oakhurst study area (KDSA, 2005).

3.15 KDSA – Proposed Groundwater Monitoring Program for Madera County, 2008

On behalf of the Resources Management Agency of the County of Madera, KDSA prepared a report describing the existing groundwater monitoring program for the foothills, mountain and valley floor areas of Madera County, and identified data gaps in the monitoring programs in these areas. A groundwater monitoring program was then proposed to address these gaps and to supplement the existing monitoring.

Data gaps were identified by KDSA in the groundwater monitoring program for the foothill and mountain regions in the following areas:

1. Accessibility of well completion reports,
2. Streamflow data,
3. Water levels, and

4. Groundwater quality data.

Data gaps were identified by KDSA in the groundwater monitoring program for the valley floor in the following areas:

1. Canal flow (spills – flows leaving the district are not generally measured);
2. Pumpage (pumpage for most private irrigation, domestic, and industrial wells is not measured);
3. Water levels;
4. Land subsidence; and
5. Groundwater quality data.

Based on the data gaps observed, KDSA recommended additional monitoring for the foothills, mountains and valley floor. The following is the additional monitoring activities were recommended for the foothills and mountains:

1. Reactivate or replace the stream gage on Miami Creek in the Oakhurst Basin to measure base flow accurately and provide amounts of total streamflow each year.
2. Continue monitoring the water-level networks developed in the Oakhurst, North Fork, Coarsegold and Raymond-Hensley Lake areas. Conduct continuous water level measurements in some wells in areas of concentrated pumping. Prepare spring and fall water level elevations and direction of groundwater flow maps annually, as well as water level hydrographs.
3. Sample and analyze new domestic water wells for constituents of concern. Sample water from a number of private wells that were sampled as part of the detailed studies at least every three years. Develop a database to access this information in the future. Update groundwater quality problem area maps on a biennial basis based on the results of this sampling and results of analyses of water from water system wells.

The following is the additional monitoring activities were recommended for the valley floor:

1. Measure the pumpage from each well in the valley floor area that produces more than 100 gpm so that pumpage in the valley floor area can be determined more precisely on an annual basis. Start efforts to have flowmeters installed on as many large-capacity wells as possible, on a volunteer basis.
2. Conduct annual or more frequent crop surveys for the entire valley floor area to compute the crop consumptive use of applied water. Determine consumptive use in urban and rural residential areas.

3. Subdivide the existing monitoring network for the valley floor into at least two depth zones: a shallow and deep zone. Monitor the zones by the wells whose screened intervals intercept each zone. The goal of this program would be to prepare spring and fall water level elevation maps for both the shallow and deep groundwater on an annual basis, including the direction of groundwater flow. This would provide a better understanding of the shallow aquifer based on the monitoring well data from gasoline leak sites, dairies, and other sites, which would provide data showing depth to the shallowest groundwater. Prepare periodic water level hydrographs for wells in both zones. Evaluate water level trends and water budgets at least every three years to estimate groundwater overdraft in the valley floor area.
4. Measure land surface elevations every several years to determine the area and rate of land subsidence within certain areas in the County. Prepare maps of land subsidence correlated to groundwater pumping in Madera County and surrounding areas every three years.
5. Sample new domestic water wells for constituents of concern. Update maps of groundwater quality problem areas every several years with this information as well as data from municipal and other water systems. Sample problem area wells on a routine basis (at least annually) with owner's approval in order to determine time trends. Prepare maps and update every few years showing the vertical trends in groundwater quality from the data obtained by the City of Madera at Madera Ranchos, Madera Community College, Rolling Hills, Valley Children's Hospital, and at a number of schools. These maps should show where this information has been obtained and the results should be interpreted and presented in reports on groundwater quality problem areas.

3.16 Madera County Integrated Regional Water Management Plan, April 2008

An Integrated Regional Water Management Plan (IRWMP) was produced by five Advisory Committees in Madera County (including over 80 individuals representing community organizations, municipalities, irrigation and water districts, and nondistricted areas) to document the collective approach of the County and its stakeholders to water management, and to deal with water supply, water quality, and flood management through 2030.

Total water use in the County in 2006 was noted to be approximately 1.2 million acre-feet (MAF), with agricultural water demand comprising approximately 97 percent of the total water use. By the year 2030, it was estimated based on the DWR's 2005 California Water Plan Update that agricultural water use in the county will level off and be approximately 1.2 MAF per year and urban and rural water use in the County will be approximately 91,100 AF per year, making the total water demand in 2030 approximately 1.3 MAF per year. This is approximately 8 percent greater than the existing water demand.

The IRWMP indicates that water supply within the County is provided mainly by groundwater pumping, which accounts for approximately 75 percent of the total agricultural water use in the valley floor area. In addition, almost the entire urban and rural water demand in the county is provided by groundwater. The remaining water demand is met by surface water. Water level decline throughout the valley floor ranges from 1 to 5 feet per year and is greatest in the Madera area and the eastern part of Chowchilla Water District, which rely almost entirely on groundwater. Average annual surface water deliveries for the period from 1996 to 2006 are estimated at about 300,000 AF per year. Despite the surface water supply, the valley floor groundwater overdraft is reported to be approximately 100,000 AF per year. Based on the water demand and supply analysis for 2030, it is anticipated that the overdraft in the Valley Floor will grow to about 155,000 AF per year if no mitigation action is taken. According to the IRWMP, this would potentially result in higher pumping costs, poorer water quality, land subsidence, and potential adjudication of the basin. The IRWMP states that continued overdraft of the valley floor groundwater basins in the County is not sustainable.

The IRWMP indicates that groundwater in the Foothills and Mountains is drawn from wells and springs in weathered materials and fractures in hard rock. In areas of higher precipitation, groundwater recharge is adequate for existing uses. However, some problems have been encountered in parts of these areas due to well interference and groundwater quality issues. In areas of lower precipitation, groundwater recharge is more limited, possibly requiring additional water supply from other sources to support future development. Additional information regarding groundwater supply in the foothill area near North Fork is provided in the report on Groundwater Conditions in the North Fork area, which was prepared to support the IRWMP and is discussed above in **Section 3.14**.

According to the IRWMP, most of the groundwater in the valley floor, foothills and Mountains is of suitable quality for irrigation. Groundwater for public consumption is found of suitable quality at specific depths within the valley floor. The IRWMP notes that the valley floor's most critical water resources issues include groundwater overdraft and stormwater flooding. The IRWMP also notes that recent evaluations of groundwater supply availability in the foothills and mountains indicate that groundwater conditions are not as dire as predicted when previous surface water studies were performed; however, some surface water supply investigations are warranted to determine the best manner to augment groundwater in some areas of the foothills and mountains with surface water supply. Water quality improvements and other water management measures were also recommended to be initiated.

The following recommendations for water management in the foothills and mountains of Madera County were proposed by the IRWMP.

1. Conduct water supply evaluations and pump testing for new public supply wells.
2. Conduct hydrologic evaluation prior to use of groundwater to meet the water demand of large developments.
3. Apply well and septic system spacing criteria to prevent well interference problems and induced groundwater contamination.

4. Develop a program to identify and protect the groundwater recharge areas on the golf course and surrounding landscaped areas.
5. The Oakhurst WWTP should proceed with plans to construct a pipeline crossing of the Fresno River to enable the development of additional sprayfields on the north side of the river and to eventually take water to the Sierra Meadows golf course area for irrigation use.
6. County Ordinance 17.48.020 allows for individual septic tanks on each lot of a subdivision on land above the 500-foot elevation. The County should review this ordinance, specifically the size and number of lots allowed to have individual septic systems in a subdivision with the goal of protecting groundwater quality.
7. There are several un-sewered areas in the County. To limit the impact of failing septic systems, it was recommended that a feasibility study be conducted for sewering these areas. It was also recommended that new developments install centralized treatment and disposal systems instead of private septic tanks, where technically and economically feasible;
8. The hydrogeologic investigations of the lower Coarsegold and Raymond-Hensley Lake areas concluded that the recharge in these areas is very limited and that further large-scale dense development may require a supplemental water supply to augment the available groundwater. It was recommended that studies be performed to evaluate the feasibility of developing surface water supplies for domestic use in these areas.
9. Prior to implementation of specific vegetation management projects designed to increase water supply within Madera County, it was recommended that legal issues associated with water rights be evaluated. If it were determined that there is a legal mechanism for acquiring the rights to water produced by a project, it was recommended that feasibility studies, including pilot tests, are needed.

The major water supply issue identified in the IRWMP in the valley floor is the continuing overdraft of the groundwater basins. The following recommendations proposed by the IRWMP are intended to help alleviate this problem through the reduction of groundwater pumping or by increasing available water supplies.

1. As a Central Valley Project (CVP) contractor, the County must engage in the process and support the other CVP contractor's efforts to protect CVP allocations from further reduction due to San Joaquin River restoration efforts.
2. The County should evaluate participation in water banking as a potential means of augmenting water supply within the County.
3. The County should pursue permission to receive Section 215 water (water released from Friant Dam for flood control purposes) and should develop agreements with Madera Irrigation District

(MID), Chowchilla Water District (CWD) and the U.S. Bureau of Reclamation (USBR) to use the Madera Canal to convey Section 215 water to County facilities or joint use facilities that may be developed as part of a multiagency project.

4. It was recommended that CWD pursue development and implementation of a water conveyance system previously evaluated by the CWD, and the County cooperate with and assist CWD in expediting this project.
5. It was recommended that Madera County and a CVP contractor evaluate the benefits and costs of water supply from the Temperance Flat Dam and Reservoir (previously investigated by the USBR), determine how this water source would integrate with the other surface and groundwater sources available to the County, and develop a well-founded plan to acquire a portion of this new water supply to help relieve overdraft and provide high-quality water for use within the County.
6. MID is currently seeking authorization from the USACE and will have to seek funding for the Madera Canal/Hidden Dam Pump Storage Project, which has the potential to provide up to 6,000 AF per year (average) of additional water supply for use by MID. There are potential partnering opportunities for the County and/or other water agencies in the County that should be pursued.
7. The Madera Lake Area Groundwater Storage Study indicated that the recharge potential of Madera Lake is approximately 10,000 AFY. The study also indicated that the area south of the Fresno River adjacent to Madera Lake is favorable for the construction of additional recharge basins. This project, in conjunction with the acquisition of surface water supplies by the County and the development of the Madera Water Bank, may create opportunities to store, transfer, and exchange water with MID that would allow for delivery of other surface waters in the County at locations where it is needed for future development. The County and City of Madera should discuss with MID the possibilities of participating in the development of this project.
8. The Madera Canal was identified as the key facility for conveying San Joaquin River water into the County for current use. Its use would be required for many of the water augmentation projects identified above. This canal was also identified as the primary facility that allows water purchased or brought in from outside the County to be conveyed into the County through transfers and exchanges. Increasing the canal capacity may be required in the future and would have countywide benefits, including in the foothills and mountains. It was recommended that a feasibility study for increasing the capacity of the canal be conducted and that funding for the study be obtained from all future beneficiaries.
9. As part of the City of Madera Wastewater Treatment Plant Expansion project, the City proposes that a system of extraction wells be constructed in the area of the percolation ponds to pump groundwater from under the ponds to prevent mounding and elevated concentrations of nitrates and other contaminants in the underlying groundwater. The City has entered into an agreement

with MID to pump up to 9,600 AFY of the groundwater into the MID distribution system for irrigation use. The City should discuss with MID the possibility of exchanging this groundwater for surface water delivered upgradient of the City for use in recharging the groundwater basin.

10. The type of project discussed in Item 9 represents an opportunity for the City of Madera, MID and possibly the County to participate in developing joint use recharge facilities. This and other opportunities should be pursued by the County and other water agencies in the County. The County should take the lead in initiating a multiagency-funded feasibility study of potential joint use recharge facilities throughout the County. In addition, the study would evaluate the opportunities for these basins to also serve as flood control basins.
11. The major water systems in the valley floor do not meter and charge for water on a volumetric basis. These systems include the cities of Madera and Chowchilla and the County Service Areas and Maintenance Districts. Data shows that water use is reduced by 15 to 25 percent when meters are installed and water is billed on a volumetric basis. Potential water savings and reduction in groundwater pumping could range from 6,000 to 9,000 AFY. It is recommended that a jointly funded study be initiated that would determine the cost, recommend a process for meter installation, evaluate alternative water rate schedules, and identify potential funding sources.
12. The County should develop a program to identify and properly abandon wells no longer in use to prevent the cross-contamination of aquifers. The County's well standards (Title 13, Section 13.52) should outline the criteria for determining whether a well should be abandoned and the process for abandonment.
13. The County should investigate the following policies as to legal and institutional feasibility and for possible adoption. The size of development to which any new policy would apply would be established during the development and adoption process for the policy.
    a) Setting limitations on new agricultural development if water supply is not sufficient to meet demand and/or requiring annexation into a water or irrigation district as a prerequisite. Limitations could be in the form of limiting groundwater pumping on a per-acre limit and could be applied only to areas with severe overdraft problems as defined in the policy or ordinance.
    b) Metering of water produced by groundwater wells.
    c) Groundwater pump tax or land-based assessment to fund water supply projects. Funds raised through these mechanisms should not go into the general fund and should be reserved for implementation of engineered projects and not further studies. A tax or assessment may be subject to the constraints of Propositions 13 and 218.

d) Requiring all new large development to provide the approving agency a detailed plan to balance the development's water supply and not to rely on mining or overdraft of the basin to meet its demands.

e) Requiring new large development to include facilities for the reuse of wastewater, including dual plumbing (nonpotable/recycled and potable water).

14. It was estimated by County staff that it would cost approximately $90 million to complete repairs and make required improvements on all County-operated water and sewer systems. It was recommended that funds be sought from all available sources to repair and improve these systems to improve water supply reliability and quality for the special district customers. It was also recommended that rate structures be implemented that will collect adequate funds to make the districts self-sufficient. The County should also look at combining districts where possible.

15. It was recommended that the County implement the proposed countywide groundwater monitoring program discussed in greater detail in **Section 3.15**. The program is designed to continue the data collection started as part of this project and to fill in the gaps where sufficient data is not currently collected. This program was considered vital to monitoring groundwater conditions throughout the County and to provide data for future decisions regarding development and protection of the County's water resources.

4. MADERA SITE EVALUATION

4.1 Site Location and Description

The Madera Site comprises about 305 acres of land located northwest of the City of Madera. It is bounded by Golden State Boulevard and Highway 99 to the northeast, Avenue 18 to the north, Road 23 to the west, and residential and agricultural land to the south (**Figures 2** and **3**).

The Madera Site is currently used for growing non-irrigated crops. A residence and associated buildings are present in the southeastern corner. Seven agricultural wells were observed on the Site during a visit conducted on 14 April 2005 (**Figure 3**). These wells appear to have been disused for some time.

4.2 Topography, Climate and Drainage

The Madera Site lies at an elevation of approximately 250 feet amsl and occupies essentially flat-lying agricultural land.

The following references for average annual rainfall in the vicinity of the Madera Site were found during WorleyParsons's literature review:

- 11 inches in the majority of the Madera subbasin (DWR, 2004);
- 10.3 inches in the MID area (Boyle Engineering, 1999); and,
- 11.22 inches at Madera station (period of record 1 July 1948 to 31 December 2004; Western Regional Climate Center [WRCC], 2005a).

In the Madera area, only 1 to 2% of the precipitation falls in summer, and 70 to 75% falls in winter (Mitten *et al.*, 1970).

The Madera Site lies approximately 2.25 miles north of the Fresno River, and less than 0.25 mile south of Dry Creek. The USGS topographic map (**Figure 3**) shows Schmidt Creek, an ephemeral stream, flowing onto the Site along its eastern boundary. This stream is now channelized across the Site as indicated in Figure 1-2 of HydroScience (2005). Airport Ditch, a canal operated by MID (AES, 2004), runs along the western Site boundary.

4.3 Geology and Hydrogeology

The Madera Site lies within the Madera subbasin of the San Joaquin Valley Groundwater Basin. Water-bearing units in the Madera subbasin comprise unconsolidated deposits of Pleistocene and Holocene age (DWR, 2004).

The most important aquifer in the area is the Older Alluvium, comprising intercalated lenses of clay, silt, sand, and some gravel (see **Section 2.4**). The E-clay or Corcoran Clay is not thought to be present beneath the Madera Site; its eastern boundary lies about 4 miles to the southwest (Figure 5 of Mitten *et al.*, 1970; see **Figure 2**).

Borehole logs for wells drilled near to the Madera Site, obtained from DWR, are consistent with the above description of the Older Alluvium. The geologic descriptions on the logs are generally very basic (often limited to one word, *e.g.*, "sand" or "clay"), but the logs do serve to give a qualitative indication of geologic conditions. The logs indicate alternating "sandy" and "clayey" layers to at least 700 feet bgs in the vicinity of the Madera Site, with the sandier horizons generally accounting for between 25% and 40% of the total thickness.

4.4 Groundwater Levels

4.4.1 Site-Specific Measurements

WorleyParsons attempted to measure the depth to groundwater in the on-Site agricultural wells during a Site visit carried out on 14 April 2005. Efforts were made to lower a measuring tape into the wells, but on each occasion an obstruction was met before groundwater was reached. No measurements of depth to groundwater could therefore be obtained from the on-Site wells.

4.4.2 DWR Interpretations of Historical Groundwater Levels

Maps produced by DWR show lines of equal groundwater elevation in the Madera subbasin (DWR, 2008), as interpreted from spring measurements in designated wells. These maps are included as **Appendix A**. The following table provides the approximate groundwater elevation beneath the Madera Site for each mapped year, together with the general horizontal groundwater flow direction as interpreted from the maps. Note that due to the map scale, the interpolated elevations must be regarded as very approximate; the figures serve to illustrate the general change in groundwater elevations over time. The depth to groundwater given is based on an approximate Site elevation of 250 feet amsl.

Year	Approximate Groundwater Elevation (feet amsl)	Approximate Depth to Groundwater (feet bgs)	Groundwater Flow Direction
1958	180	70	West
1962	170	80	West
1969	165	85	West

Year	Approximate Groundwater Elevation (feet amsl)	Approximate Depth to Groundwater (feet bgs)	Groundwater Flow Direction
1970	170	80	West
1976	165	85	West
1984	170	80	West
1989	135	115	Northwest
1990	135	115	West to Northwest
1991	120	130	Northwest
1992	115	135	Northwest
1993	115	135	Northwest
1994	110	140	North
1995	110	140	West-northwest
1996	115	135	West to Northwest
1997	115	135	Northwest
1998	115	135	West-northwest
1999	110	140	Northwest
2000	110	140	West-northwest
2001	110	140	West-northwest
2002	105	145	West-northwest
2003	100	150	Northwest
2004	105	145	Northwest
2005	70	180	North-northwest
2006	55	195	North-northwest

The final, 2006 entry in the above table is based on DWR's interpretation of groundwater contours in the San Joaquin Valley in Spring 2006 (DWR, 2008), as shown on **Figure 5**. The maps in **Appendix A** indicate an approximate decline in the groundwater surface of 115 feet between 1958 and 2006 in the vicinity of the Madera Site. Notably, from the DWR's groundwater elevation contour maps, it is interpreted that the water table at the Site dropped by approximately 50 feet between the spring 2004 and the spring 2006 measurement dates. The 2006 map represents the most current data contour data available form the DWR website as of the writing of this report.

The sequence of groundwater elevation contour maps shows the development of an apparent pumping depression northwest of the Madera Site, beneath an area approximately half way between the Cities of Madera and Chowchilla. The beginnings of this depression are evident on the earliest map (1958), and the later maps show the depression continuing to deepen, causing the initial westerly groundwater flow direction in the Madera Site vicinity to change towards the northwest, and eventually the north-northwest. By 1991 this depression had effectively merged with a second depression that had initially developed west of Chowchilla. According to the DWR interpretation, this depression has been the dominant influence on groundwater flow direction in the vicinity of the Madera Site for the last 17 to 22 years.

Beginning in 1969, there has also been a groundwater table depression southwest of the Madera Site, between it and the San Joaquin River. The 2006 map shows this depression in the groundwater surface as being as much as 80 feet lower than the groundwater elevation near the River.

4.4.3 Site Vicinity Hydrographs

Groundwater elevation data for wells located on the Madera Site were not available from the sources reviewed. The DWR's online database was reviewed (DWR, 2005c), and three wells which are located in the vicinity of the Madera Site and have relatively complete records over a long time period, were selected for analysis. These key wells are designated as State Wells 10S/17E-34A2, 11S/17E-6J1, and 11S/17E-4R1. The key well locations are indicated on **Figure 2**, and hydrographs showing spring groundwater elevations for the three wells are plotted on **Figure 6**. Well 11S/17E-4R1 is the nearest of the three wells to the Madera Site.

The well-documented declining groundwater elevation trend in the area (see **Section 3** and **Section 4.4.2**) is clearly evident in the three hydrographs. Overall, the trends shown by the wells are roughly parallel before 1984. After 1984, the groundwater elevations in wells 10S/17E-34A2 and 11S/17E-6J1 began to decline at a faster rate. Between the 2004 and 2006, the rate of decline of well 10S/17E-34A2 increased, with a total decline of 35.6 feet during that period. The trend of the other well, 11S/17E-4R1, is a more consistent decline over the entire period of record from 1961 to 2003; however, it does show a steeper decline during 1985 through 1991.

Before 1984, groundwater elevations in well 10S/17E-34A2 were higher than in the other two wells, reflecting the westerly groundwater flow direction that prevailed at the time. In 1985, the groundwater elevation in well 10S/17E-34A2 dropped below that in well 11S/17E-4R1, and then in 1992 it dropped below that in well 11S/17E-6J1. This reflected the change to a more northwesterly flow direction (see **Section 4.4.2**).

Precipitation records were examined to determine whether groundwater levels and precipitation amount can be correlated. Because the precipitation record for the nearest measuring station at Madera is incomplete, data from the Fresno station were used (WRCC, 2008). The average annual (water year) precipitation for the period 1954 through 2005 was calculated, and for each water year the departure from that average (positive or negative) was computed. The cumulative departure from average precipitation, and the prevailing climate (wet or dry), are shown on **Figure 7**. Hydrographs for the three wells described above are shown for comparison. All three hydrographs show short-term correlations with annual precipitation:

- The years 1970 through 1977 were marked by below-average precipitation (except 1973) and the hydrographs show a generally declining groundwater surface.
- Between 1978 and 1983, rainfall was above-average, and groundwater elevations stabilized or rose slightly. The wettest year in the period of record was 1983.
- 1984 to 1991 were below-average rainfall years (except 1986), and were marked by declining groundwater levels. The cumulative departure from average precipitation during this period declined at a similar rate as was seen during 1970 to 1977, but groundwater elevations declined much faster than they had during 1970 to 1977. This is likely a consequence of increasing groundwater pumping in the area.
- From 1992 to 2000, rainfall was markedly above-average with occasional below-average years (1994 and 1999). In two of the wells, groundwater elevations still declined overall, but at a slower rate than during 1984 to 1992. However, the groundwater elevation in well 10S/17E-34A2 continued to decline at a similar rate to the previous period.
- From 2001 through 2003, rainfall was below average and groundwater levels in the three wells showed an overall decline at about the same rate as in the previous period (note: water level data were not available for 2002).
- From 2003 through 2005, rainfall was generally below average. Precipitation data was not available after 2005. Water levels in well 11S/17E-4R1 from 2005 through 2007 and in well 11S/17E-6J1 from 2004 through 2005 dropped abruptly (note: water level data for well 11S/17E-4R1 is not available after 2004).

Groundwater levels can be expected to decline during dry periods, and this is clearly demonstrated in **Figure 7**. However, data for the wet period of 1992 through 2000 demonstrate there is a long-term declining trend in groundwater levels that is influenced by factors other than climate. The most likely cause of this decline is groundwater pumping leading to overdraft conditions. There has been a recent significant drop in groundwater levels in some nearby wells that may be related to a local increase in pumping.

An additional, short-term influence on groundwater levels is produced by Hensley Reservoir. Hensley Reservoir is located on the Fresno River, about 14 miles upstream of the Madera Site (**Figure 1**). The reservoir stores runoff during the wet season and releases stored water during the dry season. Reservoir storage in May (*i.e.*, at the end of the wet season) is plotted along with the hydrographs for the three wells near to the Madera Site in **Figure 8** (United States Bureau of Reclamation [USBR], 2008).

Following a period of two or more dry years, storage in the reservoir is typically depleted. Runoff from the next wet year is then used to refill the reservoir and is held in storage. As a result, the groundwater system does not receive the amount of recharge that would be expected during that wet year. This in turn produces a steeper decline in groundwater levels during that wet year than would otherwise be expected. **Figure 8** shows that sharp declines in groundwater levels occurred in the wet years 1978, 1982, 1986, 1993, 2004 and 2005, when reservoir storage increased sharply.

The opposite phenomenon can occur following a period of two or more wet years, when the reservoir is typically near-full. During the next dry year, stored water is released in relatively large volumes. As a result, the groundwater system receives more recharge than would be expected during that dry year. This produces a rise in groundwater levels, or less of a decline than would otherwise be expected. **Figure 8** shows that groundwater-levels rose during the dry years 1984 and 1987, when reservoir storage decreased sharply.

In summary, the groundwater elevation in well 11S/17E-4R1, nearest to the Site, declined 57 feet between 1968 and 2004. Between 1968 and 2007, the elevation in well 11S/17E-6J1 declined 101 feet, and the elevation in 10S/17E-34A2 declined 165 feet. The larger decline in 10S/17E-34A2, which is located just over 1.5 miles northeast of the Madera Site, could reflect influence of the pumping depression that appears to exist between the cities of Madera and Chowchilla (see **Section 4.4.2**). Similarly, the 101 feet decline in well 11S/17E-6J1, located about 1.25 miles west of the Madera Site, could be related to the depression that formed west of the Madera Site, between it and the San Joaquin River. Well 11S/17E-4R1, located about 1/4 mile southeast of the Site, appears less influenced by these pumping centers.

5. NORTH FORK SITE EVALUATION

5.1 Site Location and Description

The North Fork Site is located about 38 miles east-northeast of the City Of Madera and approximately 2 miles east-southeast of the town of North Fork (**Figures 1 and 4**). The Site occupies wooded, south-facing slopes of the Sierra foothills. Two residences are currently present on the property.

5.2 Topography, Climate and Drainage

The North Fork Site ranges in elevation from approximately 2,920 feet amsl in the southeast, to approximately 3,480 feet amsl in the northeast (**Figure 4**).

At the nearby town of North Fork, average annual precipitation is 33.2 inches, with more than 87% falling between November and April (Todd Engineers, 2002).

A tributary stream to Whisky Creek flows across the eastern part of the North Fork Site. Another stream, tributary to Willow Creek, originates near the southwestern corner of the Site.

5.3 Geology and Hydrogeology

The North Fork Site lies on an outcrop of the early Cretaceous Bass Lake Tonalite, described as an equigranular, typically medium gray, medium-grained, hornblende-biotite tonalite (Bateman, 1992). This is part of the granitic basement complex described generally in Section **2.4.**

Groundwater in the North Fork area is available primarily from fractures within the bedrock. Fractures and joints are likely to be more extensive and interconnected within the upper few hundred feet bgs, and tend to decrease in number and size with depth. The depth of weathering and decomposition of granitic rocks varies from none to approximately 100 feet bgs (Todd Engineers, 2002). Each fracture intercepted by a pumping well is usually connected only to a limited number of additional fractures. This effect tends to limit the area from which the well can receive recharge, thus limiting the well's potential yield.

5.4 Groundwater Levels

From July 2006 through October 2007, water levels were measured in a number of wells in the North Fork area as part of the investigation conducted by KDSA. According to the findings, precipitation in the North Fork Area was low in winter 2006 through October 2007, compared to historical values. Despite this, water levels in almost all wells rose following the February 2007 precipitation. Overall, water levels in wells in the North Fork area were relatively stable compared to those in wells in the Oakhurst and Chukchansi Casino areas. This is most likely due to the overall predominance of private domestic wells and lack of large-capacity water system wells.

The DWR website does not include information on groundwater levels in the North Fork area. In their study of groundwater conditions in eastern Madera County, Todd Engineers reported that data were generally not available on groundwater occurrence, levels, flow, or storage. However, it was noted that groundwater is the main source of water supply in the area. Groundwater was measured at a depth of 60 feet bgs in a domestic well located on the North Fork Site during a Site visit on 13 April 2005 (see below). HydroScience (2006) reports the depth to water (presumably at the time of well installation) in 43 wells installed in the North Fork Site vicinity between 1959 and 2002 as ranging from 18 to 575 feet.

5.5 Groundwater Pumping

Groundwater is widely used for domestic supply in the area. Todd Engineers obtained records for approximately 4,600 wells in eastern Madera County and reported a median yield of 8.5 gallons per minute (gpm) and an average yield of 22 gpm (Todd, 2002). KDSA (2007) indicates a total of 66 individual wells in the North Fork-Willow Creek subarea (the subarea in which the North Fork site is located) were air tested for yields. About 30 percent of the individual wells had air test yields of less than 5 gpm, which is considered moderately low. About 10 percent of the wells had air test yields exceeding 50 gpm, which is considered excellent. The remaining 60 percent of the wells had air test yields between 5 and 50 gpm. Based on information from Todd Engineers (2002), wells in the vicinity of the North Fork Site reportedly achieve yields ranging from less than 10 to 240 gpm, as summarized in greater detail below.

North Fork Maintenance District supplies water to the town of North Fork, about 5 miles west of the North Fork Site. It has one, 520-feet deep groundwater well, with a pumping capacity of 240 gpm (Todd Engineers, 2002). An additional well operated by the district is currently inactive but available for future use (HydroScience, 2006). At the time of Todd Engineers' report (2002), water shortages had not been an issue for this district.

Cascadel Water Company supplies a community located about 4,000 feet northeast of the North Fork Site. Water has been supplied from a spring and three wells. Wells 1 (500 feet deep) and 1A produce 57 gpm combined, and Well 2 (550 feet deep) produces 25 gpm (Todd Engineers, 2002).

According KDSA (2007), the County Maintenance District water systems in the North Fork area pumped a total of 240 acre-feet in 2006. KDSA estimated the annual pumpage from individual wells (including springs) to be approximately 400 acre-feet per year, thus the total annual groundwater pumpage in the North Fork area was estimated to be 640 acre-feet in 2006.

KDSA determined that groundwater recharge generally appears to be adequate compared to groundwater demand in the North Fork area, due to the relatively high precipitation and low to moderate pumpage.

HydroScience obtained well completion records for 43 wells installed in the North Fork Site vicinity between 1959 and 2002. The locations of 33 of these wells and the well completion details for all of the wells are summarized in **Appendix B**. The depths of the wells reportedly range from 60 to 1,075 feet bgs and the reported well yields range from 1 to 171 gpm. Several of the plotted wells are located on the land allotments northwest of the North Fork Site, but no wells were identified on the Site itself. The records indicate that several of the wells have been deepened over time.

The two residences located on the North Fork Site have wells for domestic water supply. The water level in one of these wells was measured at approximately 60 feet bgs on 13 April 2005. The depth of the well was not determined. The yield of the well was estimated to be less than 10 gpm. The well serving the other residence was not easily accessible at the time of the Site visit; however, the residents reported that the well was tested to yield approximately 55 gpm. Several springs were reportedly located near this residence and had historically been developed for water supply. The capacities of these springs are not known.

Anecdotal evidence from current North Fork Site occupants and other local residents indicates there are a number of springs and wells on land allotments adjacent to the North Fork Site. One of these wells was reportedly drilled to 400 feet bgs, and yielded 55 gpm at the time of installation. Another well reportedly tested at 100 gpm, with little or no measurable drawdown. Other wells are reported to have been drilled to at least 700 feet bgs.

Mr. Galen Lee (one of the residents living on the land allotments) indicated that approximately 10 domestic wells are currently in use on the land allotments (personal communication, February 2006). Of these, seven wells were installed between 1974 and 1976. These wells had to be deepened in 1982/83 because the original installations were too shallow and water levels declined during the drought of the late 1970s. New wells installed on the land allotments in subsequent years were drilled to greater depths. Mr. Lee indicated that the well on his property has experienced decreased yield over the last 10 years, which he attributed to development of the community water supply at Cascadel and a productive domestic well installed south of the North Fork Site.

6. POTENTIAL IMPACTS OF USING GROUNDWATER TO SUPPLY THE MADERA SITE DEVELOPMENT ALTERNATIVES

6.1 Madera Site Development Alternatives and Water Supply Requirements

AES has provided details of three development alternatives for the Madera Site:

Alternative A – Development of a casino and hotel;

Alternative B – Reduced intensity casino development; and

Alternative C – Alternative retail use.

HydroScience produced a *Water and Wastewater Feasibility Study* for the development alternatives, including recommendations for the number, depth, and capacities of new on-Site wells needed for water supply (HydroScience, 2006).

The proposed casino and hotel development at the Madera Site (Development Alternative A) has a projected average water demand of 400,000 gallons per day (gpd). Assuming recommended water recycling is undertaken, the recommended groundwater pumping capacity for the wells is 320 gpm (HydroScience, 2006). Note that the recommended pumping capacity is designed to allow the water supply system to handle peak demand with an appropriate safety factor, and average pumping rates are expected to be lower. The average projected water demand and long term pumping rate for each alternative, with and without water recycling, may be summarized as follows (HydroScience, 2006):

Alternative A – 273,000 gpd (190 gpm) with recycling and 400,000 gpd (278 gpm) without recycling;

Alternative B – 166,000 gpd (115 gpm) with recycling and 251,000 gpd (174 gpm) without recycling; and

Alternative C – 11,000 gpd (8 gpm) with recycling and 23,000 gpd (16 gpm) without recycling.

HydroScience recommends that groundwater be supplied by two new production wells drilled to at least 600 feet bgs (HydroScience, 2006). (WorleyParsons anticipates that Development Alternative C could be supplied by a single well.) The proposed wells would likely be drilled near the water treatment plant for the proposed development, in the approximate Site area shown on **Figures 9 and 10**.

6.2 Development of Drawdown Model

An analytical drawdown model was developed for predicting water-level impacts due to proposed pumping at the Madera Site. The purpose of the model is to assess potential impacts from the proposed pumping associated with each of the three development alternatives on groundwater levels and wells in the Site vicinity. Existing or future impacts due to groundwater pumping from off-Site wells in the area are not predicted by the analytical model, but are included in our discussion of cumulative impacts in **Section 6.7**.

The analytical model uses the Theis non-equilibrium equation (Driscoll, 1986) for describing drawdown from a pumping well. Parameters for the analytical model were derived from a historical pumping test carried out in the vicinity and data obtained from other sources cited in this report (see **Section 6.2.1**).

Although HydroScience has recommended that groundwater be supplied by two new production wells (HydroScience, 2006), the analytical model described in this Section simulates the project's average pumping rates assuming a single pumping well. Simulating a single well to represent two closely spaced wells with the same total pumping rate generally gives a small overestimate in the predicted off-Site drawdown. Other conservative assumptions intended to compensate for uncertainties in the model data and assumptions are described in **Sections 6.2.1 through 6.2.3**.

6.2.1 Hydrogeologic Data Used in Model Development

The average specific yield of the strata between 10 and 200 feet deep in the San Joaquin River unit, within which the Madera Site lies, was estimated to be 11.9% by Davis *et al.* (1959). Estimates were given for each township subunit; for Township 11S, Range 17E, in which the Madera Site is situated, the average estimated specific yield was 11.6%. More recently, DWR (2004) estimated the average specific yield of the Madera subbasin to be 10.4%.

Mitten *et al.* (1970) reported six estimates of transmissivity obtained from a total of four aquifer tests in the Madera area. Well 10S/16E-24H1 is the nearest of the four tested wells to the Madera Site and is located about 3 miles to the northwest (**Figure 2**). Well 10S/16E-24H1 is screened in the Older Alluvium between 136 and 172 feet bgs. The aquifer test on this well resulted in a transmissivity estimate of 18,000 gallons per day per foot, measured from a 240 feet-deep observation well (10S/16E-24J1). The estimate of 18,000 gallons per day per foot was the lowest of the six transmissivity estimates derived from well tests in the area; the highest was 99,000 gallons per day per foot (Mitten *et al.*, 1970).

The following caveats apply to the transmissivity value obtained from the aquifer test at well 10S/16E-24H1:

a) Well 10S/16E-24H1 is 183 feet deep (and is screened from 136 to 172 feet bgs), whereas the proposed wells at the Site would be 600 feet deep (HydroScience, 2006). However, the E-clay is not present in the area of this test well or the proposed wells at the Site, so they would produce water from the same aquifer. WorleyParsons assumes that the proposed supply wells will intercept a greater saturated thickness of aquifer than the test well because the proposed wells are deeper (600 feet versus 180 feet). The smaller aquifer thickness of the test well as compared to the proposed supply wells implies that the transmissivity estimated from the aquifer test is conservative (smaller) with respect to the proposed wells. The smaller transmissivity of the test well will cause the drawdown of the proposed wells to be overestimated.

b) The observation well used for the aquifer test (10S/16E-24J1) is 240 feet deep as compared to 183 feet for the pumping well (10S/16E-24H1). Due to this difference in depth, the screened interval of the observation well potentially may not overlap the screened interval of the pumping well. This condition may have caused over-estimation of aquifer transmissivity during interpretation of the test data. However, since the E-clay is not present in the area of these wells, both wells are likely screened in the same aquifer, thus minimizing the amount of overestimation due to this effect. In addition, the transmissivity at 10S/16E-24H1 is the lowest of the six values reported by Mitten *et al.* (1970).

An aquifer test could be performed with the proposed pumping well(s) to confirm that the aquifer parameters (transmissivity and storativity) used in the model are applicable to the proposed wells, and that the model is not overly conservative. An existing inactive well near the test well should be used as an observation well for the test. If a suitable existing well is not available, then a monitoring well should to drilled near the test well to the same depth as the test well.

The aquifer parameters used in the analytical model are summarized in the table below.

Aquifer Parameter	**Parameter Value**	**Units**	**Source**
Transmissivity	18,000	gpd/ft	Mitten *et al.* (1970)
Storativity	0.104	NA	DWR (2004)
Pumping Rate⁺ Alternative A	278 (190 with recycling)	gpm	HydroScience (2006)
Pumping Rate⁺ Alternative B	174 (115 with recycling)	gpm	HydroScience (2006)
Pumping Rate⁺ Alternative C	16 (8 with recycling)	gpm	HydroScience (2006)
Pumping Time⁺⁺	10	years	WorleyParsons

⁺ Rate is time-constant in the model and represents the Average Day Flow with recycling operations.

⁺⁺ Methodology for selecting pumping time is described in **Section 6.3**.

gpd/ft = gallons per day per foot

6.2.2 Model Assumptions

The Theis non-equilibrium well equation incorporates the following standard assumptions:

1. The aquifer being pumped is homogeneous and isotropic.
2. The aquifer is uniform in thickness and infinite in areal extent.
3. The aquifer receives no recharge, thus all flow produced from the pumping well comes from aquifer storage.
4. The pumping well is screened in, and receives water from, the full thickness of the aquifer.
5. Water is released from aquifer storage instantaneously when the water level is lowered.
6. The pumping well is 100 percent efficient.
7. Laminar flow exists throughout the well and aquifer.
8. The water table or potentiometric surface has no slope.

The drawdown predictions developed for this report assume that water levels near the Madera Site will adjust to the proposed pumping, and that a period of about ten years can be used to compute drawdown representative of long-term conditions, as described in **Section 6.3**.

The model assumes that the proposed wells will pump at a constant rate (*i.e.*, without seasonal or weekly variations). This assumption is suitable for making long-term predictions of drawdown, such as the drawdown after ten years.

6.2.3 Model Limitations

The analytical model used for this report was developed to predict drawdown using available hydrogeologic data as input. Thus the lack of Site-specific data for transmissivity, storativity, and pumping time has been compensated by using data from surrounding areas (*e.g.*, well 10S/16E-24H1) to make reasonable to conservative estimates of Site conditions. The Theis equation is based on the eight assumptions listed above in **Section 6.2.2**. The Theis equation is accurate when each of these assumptions is met. Most of the assumptions are considered reasonable for the Madera subbasin aquifer. To the extent that these assumptions are realistic, the analytical model remains accurate.

6.3 Groundwater-Level Impacts in Site Vicinity From Proposed Pumping Well(s)

The analytical drawdown model was used to predict drawdown impacts in the vicinity of the Madera Site, from pumping the proposed 600 feet-deep wells. The Theis equation assumes that the aquifer is infinite, and as a result, the predicted drawdown (water-level decline in feet) increases roughly in proportion to the logarithm of the pumping time. For example, the increase in drawdown during the time period from 10 days to 100 days after the start of pumping would be about the same as the increase in drawdown from 100 days to 1,000 days after the start of pumping. Thus drawdown increases very slowly after long periods of pumping, giving the impression that drawdown has stopped increasing. In practice, a finite time period must be used to predict drawdown with the Theis equation. Although the selection of this time period may seem arbitrary, the use of a long time period ensures that drawdown would be increasing very slowly at the end of the selected period. For purposes of this report, a time period of 10 years was selected for predicting drawdown effects from the proposed pumping wells, based on the considerations described above. In addition, the limitations of the available data (**Section 6.2.1**) suggest that the analytical model should not be used to make predictions over exceedingly long periods of time (*e.g.*, greater than 10 years).

Figure 11 is a distance-drawdown graph showing the model's predicted drawdown for Development Alternatives A, B and C with and without water recycling. (Note that the effects of mitigation measures discussed in **Section 6.7** are not reflected in the drawdown predictions shown on **Figure 11**.) **Figure 11** indicates the predicted drawdown as a function of distance between the proposed pumping well and the point of drawdown measurement. For example, the distance could represent the interval between the proposed pumping well and an off-Site well. **Figure 11** can be applied to any potential pumping well location on the Site.

A vertical, blue, dashed line on **Figure 11** indicates the approximate distance from the center of the area for siting the production well(s) to the nearest point on the Site boundary (see **Figures 9** and **10**). This distance is approximately 1,000 feet. Drawdown occurring beyond the Site boundary (*i.e.*, to the right of the 1,000-foot line) can potentially impact existing off-Site water levels and wells. **Figure 11** shows the following predicted drawdown at the property boundary:

Alternative A: 6.4 feet with recycling and 9.3 feet without recycling;

Alternative B: 3.8 feet with recycling and 5.8 feet without recycling; and

Alternative C: 0.3 feet with recycling and 0.5 feet without recycling.

Figure 11 illustrates that the magnitude of drawdown decreases with distance from the pumping well and extends for a finite distance from the Site. That is, the greatest amount of drawdown occurs near the Site and the amount of drawdown decreases rapidly with increasing distance. Farther from the Site, the magnitude of drawdown is smaller and the rate at which the drawdown decreases with distance is also less. As a result, the difference in drawdown effects between the various alternatives also decreases with distance At a distance of approximately 2 miles, the estimated drawdown for Alternative A without recycling (the worst case in terms of drawdown) is 1.5 feet, which is only 0.5 foot more than the estimated drawdown for Alternative A with recycling and Alternative B without recycling (both about 1 foot). Based upon examination of the hydrographs for wells in the Site vicinity, drawdowns of this magnitude are probably insignificant in relation to seasonal and short term natural variations in groundwater levels, and the difference in drawdown between the alternatives also appears insignificant.

6.4 Interference Drawdown Impacts in Off-Site Wells

6.4.1 Types of Impacts and Evaluation Approach

The project-related drawdown at any affected well (interference drawdown) will result in a decreased saturated thickness available to be pumped at that well. In the most extreme case, this could result in drawdown of the water level in a well to a depth below the screen of the well (*i.e.*, the affected well goes dry as a result of project pumping). At the other extreme, the effect of project pumping may be so small that the project-related drawdown is insignificant relative to short term or seasonal fluctuations, or the drawdown could represent an insignificant impact to the well user. The following possible significant impacts could occur:

1. The interference drawdown results in the water level in the aquifer being drawn down below the screen of the well (*i.e.*, the well goes dry as discussed above).
2. The interference drawdown results in the water level in the aquifer being drawn down to a point where the remaining saturated thickness is too small for the affected well to provide an adequate water supply for the intended use, or the pumping water level is too close the intake level of the pump, exposing it to potential damage.
3. The interference drawdown results in the water level in the well during pumping (the well's pumping water level) being drawn near the intake of the pump, requiring lowering of the pump intake in order for the well to remain operational. This is essentially a variation of case 2, but there is space below the pump allowing an adequate flow rate to be restored by lowering the pump. Energy costs would be expected to increase after the pump is lowered.
4. The interference drawdown results in a decrease in saturated thickness such that the well and pump can continue to operate and produce the required amount of water, but pumping must occur at either greater frequency/duration and must lift water for a greater height, using more energy, therefore resulting in greater operational and maintenance costs. This is a condition that can develop prior to the onset of case 1, 2 or 3.

The hydrogeologic factors that dictate which of the above impacts will occur are the saturated thickness of the well before interference drawdown and the amount of interference drawdown that is applied (which varies with the distance of the impacted well from the project well). The impact from interference drawdown has the potential to be more severe if it represents a higher percentage of the well's initial saturated thickness prior to the onset of interference drawdown. For example, a 10-foot drop in water level has a greater potential to cause Impacts 1 or 2 in a shallower well; whereas, the same drop in water level in a deeper well might result in less serious, but potentially still significant, impacts such as 3 or 4. In general, small variations in saturated thickness are not considered significant when assessing transmissivity values from the interpretation of aquifer test drawdown data (Jacob, 1950). However, in assessing the impacts of interference drawdown to neighboring pumping wells, a small change in saturated thickness (*e.g.*, 2 feet or more) could still cause a significant increase in electrical costs or could shorten the life of a well. These cases are discussed in additional detail in the subsequent sections.

The impacts resulting from interference drawdown are also dependant on several factors that may vary from well to well, even if the wells have the same saturated thickness and applied interference drawdown. These well-specific factors include the following:

- Local variations in the transmissivity of the saturated sediments in which the well is completed (*i.e.*, their ability to yield water to the well with a given amount of drawdown in the aquifer);
- The condition and efficiency of the well (*i.e.*, the water level in the well bore compared to the water level in the aquifer just outside the well, which can be significantly lower if the well is in poor condition or poorly designed);
- The well's pump specifications, including its rating curve, the depth at which the pump intake is set, and the resulting pumping water level in the well during operation;
- The well's screened interval, which usually, but not always, extends to the bottom of a well; and
- The minimum required water production rate of the well.

The factors listed above affect the amount of water a well can produce, the amount of drawdown in the aquifer needed to produce that water, and the pumping water level inside the well while it is operating, which may be lower than the water level in the aquifer. As such, information regarding these factors is important when assessing impacts to individual wells; however, it is not readily available for the Site. For this reason, our present evaluation uses saturated thickness and interference drawdown, which can be determined by applying our analytical drawdown model to available information regarding nearby wells, to assess the range of potential impacts that may reasonably be expected. Well-specific impacts are more appropriately evaluated and addressed during the mitigation phase of the project (**Section 6.7**).

Our evaluation of interference drawdown related impacts to nearby wells will be based on the following specific data:

- The distance from the proposed pumping wells to the off-Site well in question;
- The predicted drawdown in the aquifer at the location of the off-Site well;
- The depth of the off-Site well; and
- The static depth to groundwater in the off-Site well.

For the purposes of this analysis, Impacts 1 and 2 may be grouped together since they both result in a well's being rendered unusable. In addition, the concept of a "usable well lifetime" is a useful and appropriate approach to evaluating these impacts as further discussed in **Section 6.4.3**. As stated above, Impact 3 is best evaluated on a case by case basis during the mitigation phase (**Section 6.7**), but a limited discussion is included in **Section 6.4.4**. Impact 4 can occur in shallow or deeper wells that may or may not be at risk of the first three impacts. It is further discussed in **Section 6.4.4**.

6.4.2 Predicted Interference Drawdown in Wells Within a 2-mile Radius

Data regarding potential wells which might be affected by the project was obtained for wells within a 2-mile radius of the Site. As stated above, drawdown impacts at greater distance from the Site are probably insignificant compared to seasonal and short term natural fluctuations in groundwater levels that all wells experience. Information regarding the location, construction and use of 259 wells within approximately 2 miles of the area proposed for installation of the project well(s) was obtained by WorleyParsons from the DWR. (Note that our records search identified only one of the seven disused existing wells observed on the Madera Site. This raises the possibility that there could be other wells in the Site vicinity, used or disused, for which DWR has no records. In addition, it was not possible to correlate several wells for which hydrograph information is available on the DWR website with the wells for which construction records were provided.) Because shallow wells are more susceptible to the more potentially serious impacts, data are summarized separately for "Shallow" wells (i.e., wells that are less than 250 feet deep) and "Deeper" wells (i.e., wells that are 250 feet or deeper) in **Tables 1** and **2**, respectively. (The 250-foot depth cutoff was selected to correspond with an approximate usable well life of 50 years if groundwater levels in the area continue to drop at their present rate, as further discussed in **Section 6.4.3**.) The locations of the Shallow and Deeper wells are shown on **Figures 9** and **10**, respectively.

Tables 1 and **2** also present the existing saturated thickness of the wells and the predicted drawdowns for Alternatives A and B with and without recycling. The predicted drawdowns for Alternative C were not included because they are less than 0.4 foot for each well, which is not considered significant. The cumulative frequency distribution for interference drawdown for Alternatives A and B with and without recycling is also shown graphically in **Figure 12**. The predicted interference drawdown to nearby wells resulting from Development Alternatives A and B may be summarized as follows. (Note that the effects of mitigation measures discussed in **Section 6.7** are not reflected in these drawdown predictions.)

> Alternative A (without recycling) – The predicted drawdown in nearby wells ranges from 1.5 to 7.2 feet. 100 wells are predicted to experience interference drawdown equal or greater than approximately 2.5 feet, and 10 wells are predicted to experience interference drawdown equal to or greater than approximately 5.5 feet.

Alternative A (with recycling) – The predicted drawdown in nearby wells ranges from 1.0 to 4.9 feet. 100 wells are predicted to experience interference drawdown equal or greater than approximately 1.7 feet, and 10 wells are predicted to experience interference drawdown equal to or greater than approximately 3.8 feet.

Alternative B (without recycling) – The predicted drawdown in nearby wells ranges from 0.9 to 4.5 feet. 100 wells are predicted to experience interference drawdown equal or greater than approximately 1.5 feet, and 10 wells are predicted to experience interference drawdown equal to or greater than approximately 3.4 feet.

Alternative B (with recycling) – The predicted drawdown in nearby wells ranges from 0.6 to 3.0 feet. 100 wells are predicted to experience interference drawdown equal or greater than approximately 1.0 foot, and 10 wells are predicted to experience interference drawdown equal to or greater than approximately 2.3 feet.

6.4.3 Impacts on "Usable Lifetimes" of Nearby Shallow Wells (Impacts 1 and 2)

The total interference drawdown experienced by existing wells near the Madera Site will be the sum of drawdown caused by pumping at the Madera Site and drawdown caused by pumping other wells in the Madera subbasin. Thus, interference drawdown caused by pumping at the Madera Site would be superimposed on the well-documented, historical, and apparently continuing regional decline in groundwater elevations. DWR (1992) reported an average decline in the groundwater surface in Madera County of 38.8 feet between 1970 and 1991 (**Section 3.6**). This equates to an annual average decline of about 1.85 feet. Water levels in well 11S/17E-R4, located approximately ¼ mile southwest of the Site, declined by 62.5 feet between 1970 and 2004, which equates to an average long term rate of decline of 1.84 feet per year (**Figure 6**). Based on groundwater level data from 1970 to 2006, the Madera County IRWMP (Madera County, 2008) reports that the average annual groundwater level decline in the Madera Site area is between 1 and 3 feet per year. More recent drops in groundwater elevations in well 11S/17E-04R1, as well as in wells 10S/17E-34A2 and 11S/17E-6J1, located further to the north, have exceeded this average rate of decline, sometimes significantly so. It is impossible to tell if these increases in water level decline will be sustained or are related to shorter term effects. For the purposes of this analysis, we have assumed a long term rate of water level decline of 1.85 feet per year as explained in greater detail below; however, the actual rate of decline experienced in the area may be smaller or greater than this amount. Drawdown effects from the proposed pumping wells would be added to this regional decline.

The relationship between the regional water level trend and the types of impacts that may be expected to nearby wells from pumping at the Site is illustrated in **Figure 13**, which shows the three well hydrographs discussed in **Section 4.4.3**, representing the effects of regional declining groundwater level trends, and the well depth ranges in which the different kinds of well impacts may occur. The hydrographs and color bands shown on **Figure 13** indicate that wells less than 250 feet deep are threatened with going dry or being rendered otherwise unusable if regional groundwater level declines continue. The impact of pumping at the Site would be to accelerate this effect. These wells are represented by the uppermost color band. The shallowest well in the Site vicinity, represented by the upper edge of the uppermost color band, is 120 feet deep. This well is denoted number 71 in **Table 1**. As can be seen, this well is shallower than recent groundwater levels in the Madera Site vicinity, as indicated by the three hydrographs. Therefore, this well is almost certainly already dry. Wells 1, 2, 16, 21, 56, 64, 71, 83, 137, 223, 338, 341, and 345 (**Table 1** and **Figure 9**) are also probably already dry. Wells 12, 47, 82, 107, 177, 216, 217, 220, 229, 235, 251, 252, 334, 342, 343, 344, and 354 are somewhat deeper and appear to extend below the projected depth of the water table, but have saturated intervals less than 10 feet. With such small saturated intervals, it is questionable whether these wells can currently yield enough water to serve their intended use.

A typical well that may be at risk of going dry or being rendered unusable in the future is well number 81 (**Table 1**). This well is 228 feet deep and located approximately 4,100 feet north of the center of the proposed area for siting the project production wells (**Figure 9**). The current groundwater elevation at this location is expected to be about 47 feet amsl (**Figure 5**), which equates to a depth to groundwater of about 203 feet bgs. The well is 228 feet deep, but its screened interval extends to only 224 feet bgs. The effective saturated thickness of the well is therefore likely to be around 11 feet (the distance from the water table to the bottom of the screened interval less a minimum water depth of 10 feet assumed to be needed to sustain domestic well use), and the expected usable lifetime of the well is 6 years. From **Table 1**, it can also be seen that the predicted drawdown for this well under Development Alternative A without water recycling (the "worst case" alternative in terms of drawdown) would be about 4.4 feet. This predicted drawdown is equivalent to almost 2.4 years of regional groundwater level decline at the 1.85 feet-per-year rate reported by DWR (1992). In other words, this well would go dry or be rendered unusable in approximately 4 years, about 2 years sooner, due to the combined effects of regional water level decline and Development Alternative A.

Table 1 shows representative well-life predictions undertaken for Shallow wells within 2 miles of the proposed project well location. This table indicates that the remaining lifetime of the Shallow wells may be reduced by approximately 1 to 3 years under the worst case drawdown predictions for the project as proposed (Alternative A with water recycling). A smaller reduction in the remaining lifetime of these wells would be expected under the other development scenarios.

It should be noted that the concept of a reduction in usable well life as presented in Table 1 is for perspective only, to help gauge the range of impacts that may reasonably be expected, and is not intended to be predictive of actual outcomes, since future groundwater level trends cannot be predicted with accuracy and may vary with climatic conditions or changes in water demand or management. For example, as indicated in **Section 3.13**, regional groundwater pumping during critically dry years can be more than twice as high as the average rate, resulting in a more rapid decline in groundwater levels. In the recent past, this appears to have occurred during a dry period between 1987 and 1990, when water levels in the key wells monitored by DWR near the Site declined at a rate of 5.8 to 9.4 feet/year, or three to five times the long-term average rate for the area (**Figure 7**). During such an extended dry period, wells with small remaining saturated thicknesses (less than about 30 to 50 feet) are vulnerable to going dry or being rendered unusable. Wells with longer remaining saturated thicknesses would likely outlive the dry period and experience long-term water level declines at the regional average rate. As discussed previously, other more recent increases in the long term rate of water decline are also evident and may not be climatically induced, but would have a similar effect on well life.

Interference drawdown resulting from the project would remain the same whether it occurs during wet or dry periods; however, during dry periods or times of increased regional water level decline, it could contribute to the early demise of a well with a small remaining saturated interval. The actual contribution of the project to the demise of the well is dependant on the actual regional water level trend between the time that project pumping starts and the well becomes unusable. The actual contribution of the project to the well's demise may or may not be significant. For the purposes of mitigation, it will be necessary to use actual water level measurements and trends to establish the effect of project pumping on the usable life of a well, as discussed further in **Sections 6.8.1 and 6.8.4**. Additionally, it should be cautioned that the potential threat of a specific off-Site well going dry cannot be gauged solely from the well's depth, but is influenced by the well-specific factors discussed in **Section 6.4.1**.

As the saturated thickness of a well increases, the effect of project pumping becomes less significant compared to the regional groundwater decline. In addition, the assumption that historical groundwater level trends can be projected into the future becomes increasingly uncertain over longer periods of time, and is probably not meaningful beyond several decades. For these reasons, wells deeper than 250 feet are not evaluated for usable well life in **Table 1**, but are included in **Table 2** alongside predictions of interference drawdown. Nevertheless, depending on actual long term water level trends, these wells could experience a reduction in their usable life.

6.4.4 Impacts Requiring Pump Intakes to be Reset to Greater Depth (Impact 3)

A reduction in the saturated thickness above the well's pump intake can result in a decrease in the amount of water the well can produce. In extreme cases, the pumping water level inside the well can fall below the pump intake, potentially damaging the pump if the pump controls are not equipped to sense this condition and shut the pump down. In cases where the pump intake is set near the bottom of a well and cannot be lowered, this impact is essentially synonymous with Impacts 1 or 2, discussed in **Section 6.4.3**. In other cases, it may be possible to lower the pump intake and continue use of the well.

Because interference drawdown from project pumping is superimposed on a regional declining groundwater level trend, the concept of usable well life can also be applied to Impact 3. In this instance, the usable well lifetime would be the number of years until the regional water level decline plus the project-induced interference drawdown cause the impacted well to become unusable through decreased yield or the pump to be in danger of damage. At that point, the pump intake would need to be lowered to extend the well's usable lifetime.

In shallow or domestic wells, the pump intake is often set near the bottom of the well and evaluation of this impact is synonymous with Impacts 1 and 2, as noted above. Pump intakes for deeper wells and high capacity wells (e.g., municipal wells) are commonly set above the bottom of the well.

The City of Madera provided information regarding the completion and operation of the wells within their municipal water system, including Well No. 26, located approximately 6,200 feet south of the proposed project well location. This well is designated well number 142 in **Table 2** and is 600 feet deep. Information provided by the City of Madera in 2006 indicates that as of that time, it was used for standby and fire water only. The information provided indicates the well's pump intake level (bowl) was set at 220 feet bgs, and that the pumping water level was 201 feet bgs, or 19 feet above the pump intake. The well was capable of producing water at a rate of 1,374 gpm. Under these conditions, we expect that the City would want to lower the pump intake in this well in the relatively near future, but certainly by the time the pumping water level is 5 feet above the pump intake (a reasonable minimum factor of safety). The remaining time, in the absence of the casino development, before the pump intake must be lowered can be estimated by dividing the saturated thickness (14 feet) by the rate of regional water level decline (1.85 feet/year). The remaining time before it would become necessary to lower the pump intake is therefore approximately 8 years. The predicted worst case interference drawdown from the project wells is 3.1 feet (Alternative A without recycling, see **Table 2**), and would therefore decrease the time before the pump intake needs to be lowered by 2 years, from 8 years to 6 years. Under the other development alternatives, the time would be decreased by closer to 1 year, from 8 years to 7 years.

6.4.5 Impacts on Operating Cost of Nearby Shallow and Deeper Wells (Impact 4)

Interference drawdown changes the operational characteristics of the pump operating within an existing water well. The additional interference drawdown effectively results in an increase in pump head (the distance the pump must lift the water), which in turn decreases the pump discharge rate, and changes the pump power requirements. The well will have to be pumped for a longer time each day as a result. Thus, more power will be required to pump the same total volume of water. The extent to which a well might be impacted by increased electrical costs may be dependant upon several factors, including the following:

- Distance from the proposed pumping wells to the off-site well of concern (*i.e.*, the amount of interference drawdown;
- Aquifer characteristics;
- Depth of the off-site well;
- Pumping water level in the well prior to the onset of interference drawdown;

- Pump specifications;
- Well condition and efficiency; and

Nature of pumping (rate and duration/frequency).

Because information regarding the well-specific factors above (except well depth) is not readily available for wells near the Site, several operational scenarios and their associated changes in pumping power requirements were examined in order to add perspective on the range of impacts that might be anticipated. These included:

- A range of interference drawdown to represent varying distance between the pumping wells at the Site and the off-site well;
- Three pumping rates (15, 500, and 1,500 gpm) to generally represent well uses for residential, irrigation and municipal/industrial purposes;
- A range of well depths (pump depths) to represent typical well depths in the area; and
- A range of pumping water levels based on conditions at the Madera Site and the addition of potential interference drawdown.
- The assumption of appropriate pumps installed in the wells to produce the designated flow rates under the assumed conditions;

For each scenario, our engineer selected a pump that would be appropriate to supply water at the approximate rate specified given the well depth and water level. Thus, for purposes of this analysis, wells with different pumping water levels were assumed to contain different pumps, in order to maintain a reasonable match in each case between the well's pump, water level, and flow rate. The changes in electrical consumption to pump 1 AF of water were then evaluated for that pump when the different levels of interference drawdown were applied. Additional details regarding our methodology are presented in **Appendix C**.

By attempting to model a range of conditions, we hoped to bracket the real world pumps and ensure that their operating conditions lie within the feasible space of this analysis. While this analysis is not exact and may not be representative of all actual installed pump types and conditions, it does offer some insight as to how much additional power might be required to pump 1 acre-foot of water if additional water table drawdown occurs. If site-specific information regarding water wells and pumps becomes available in the future, this analysis could be adapted to examine power requirement impacts for those specific pumps during the mitigation phase of the project.

Twelve distinct evaluations, representing six different well and pump configurations under two different interference drawdown conditions, were made based upon the following ranges of values and boundary conditions:

- Three pumping rates: 15 gpm, 500 gpm, and 1,500 gpm;
- For the 15 gpm pumping rates: two different pump configurations with intake depths at 200 and 400 feet bgs, and two associated pumping water levels, 160 and 300 feet bgs, respectively;
- For the 500 and 1,500 gpm pumping rates: two different pump configurations with intake depths at 350[1] and 500 feet bgs, and two associated pumping water levels, 200 and 400 feet bgs, respectively;

Two interference drawdown depths: 2.0 feet, and 6.0 feet.

The 12 evaluations were combined to produce the following matrix with 12 cells for which the additional incremental power (in kilowatt-hours [kW-hours]) required to pump 1 AF of water was evaluated per the procedures outlined in **Appendix C**.

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[1] Note that the pump intake depth of City of Madera Well No. 26, the closest municipal supply well to the Site, is reportedly 220 feet bgs; however, the average pump intake depth of municipal supply wells in Madera is 300 feet bgs, and pump intake depths range from 220 to 400 feet bgs. In addition, Well No. 26 is used for standby and fire water only. Pump intake depths of 300 and 500 feet bgs were therefore selected to evaluate larger capacity wells.

Additional Power Consumption Caused by Interference Drawdown Under Representative Well Configurations for the Madera Site Vicinity

Pump Discharge Rate (gpm)		**15**	
Pump Installation Depth (feet bgs)		**200**	**400**
Pumping Water Level (feet bgs)		**160**	**300**
	Interference Drawdown (feet)	**Additional Power Consumption (kW-hours/acre-foot)**	
	2.0	**0.4**	**4.8**
	6.0	**29.4**	**33.5**
Pump Discharge Rate (gpm)		**500**	
Pump Installation Depth (feet bgs)		**350**	**500**
Pumping Water Level (feet bgs)		**200**	**400**
	Interference Drawdown (feet)	**Additional Power Consumption (kW-hours/acre-foot)**	
	2.0	**0.1**	**1.9**
	6.0	**4.6**	**7.9**
Pump Discharge Rate (gpm)		**1,500**	
Pump Installation Depth (feet bgs)		**350**	**500**
Pumping Water Level (feet bgs)		**200**	**400**
	Interference Drawdown (feet)	**Additional Power Consumption (kW-hours/acre-foot)**	
	2.0	**2.0**	**5.5**
	6.0	**5.0**	**20.1**

The results of our evaluation are discussed below. Additional details are presented in the graphs and charts included in **Appendix C**.

For the pumping case of 15 gpm, and 2.0 feet of interference drawdown, the additional power required varied from a low of approximately 0.4 kW-hours to a high of approximately 4.8 kW-hours per acre-foot of water. For 6.0 feet of interference drawdown, the additional power required varied from a low of approximately 29.4 kW-hours to a high of approximately 33.5 kW-hours per acre-foot of water. The average additional power required was 2.6 kW-hours and 31.5 kW-hours, for 2.0 feet and 6.0 feet of interference drawdown, respectively.

For the pumping case of 500 gpm, and 2.0 feet of interference drawdown, the additional power required varied from a low of approximately 0.1 kW-hours to a high of approximately 1.9 kW-hours per acre-foot of water. For 6.0 feet of interference drawdown, the additional power required varied from a low of approximately 4.6 kW-hours to a high of approximately 7.9 kW-hours per acre-foot of water. The average additional power required was 1.0 kW-hours and 6.3 kW-hours, for 2.0 feet and 6.0 feet of interference drawdown, respectively.

For the pumping case of 1,500 gpm, and 2.0 feet of additional drawdown, the additional power required varied from a low of approximately 2.0 kW-hours to a high of approximately 5.5 kW-hours per acre-foot of water. For 6.0 feet of interference drawdown, the additional power required varied from a low of approximately 5.0 kW-hours to a high of approximately 20.1 kW-hours per acre-foot of water. The average additional power required was 3.8 kW-hours and 12.6 kW-hours, for 2.0 feet and 6.0 feet of interference drawdown, respectively.

Considering all pumping rates, for 2.0 feet of interference drawdown, the additional power requirements ranged between a low of approximately 0.1 kW-hours to a high of approximately 5.5 kW-hours per acre foot. For 6.0 feet of interference drawdown, the additional power requirements ranged between a low of approximately 4.6 kW-hours to a high of approximately 33.5 kW-hours.

The following conclusions may be drawn from the above results:

- As interference drawdown increases, the additional power required to pump 1 AF of water also increases.
- As the depth to the pumping water level increases, the additional power required to pump 1 AF of water when interference drawdown is applied also increases.
- Wells operated at lower flow rates (15 gpm) may experience a greater increase in the power required to pump an acre-foot of water than higher capacity wells when interference drawdown increases from 2 feet to 6 feet. Conversely, at higher flow rates (500 and 1,500 gpm), interference drawdown causes less of an increase in power to pump 1 AF of water than for the 15 gpm flow rate.
- Notwithstanding the increase in unit power consumption rates, the actual cost increase resulting from interference drawdown will be greater for higher capacity wells (500 and 1,500 gpm) than for lower capacity wells (15 gpm). This is because lower capacity wells are typically associated with residential use, and the annual water volume pumped by a residential user is comparatively small. According to the American Water Works Association (AWWA), the average household in the United Stated uses approximately 1/3 AF of water per year, so the net cost increase to a domestic user will probably not be significant (*i.e.*, only a few dollars per year). Conversely, water wells pumping at higher rates are typically associated with agricultural, industrial or municipal users, with water requirements in the hundreds or thousands of acre feet per year. Even though

less additional power is generally required per acre-foot of water when interference drawdown occurs in higher capacity wells, the need to pump many acre-feet of water per year results in a larger overall annual cost increase. For perspective, if a municipal water user pumps a well with a capacity of 1,500 gpm to produce 1,900 AF of water in a year, the additional annual power requirement with 6 feet of interference drawdown will be approximately 24,000 kW-hours of electricity. At $0.15 per kW-hour, the additional cost impact to that user would be approximately $3,600 per year. (It should be noted that for the pump modeled, this represents an approximately 2 percent increase in the user's overall pumping cost.) Similarly, the additional annual cost resulting from 2 feet of interference drawdown would be about $1,100.

- The difference between the upper and lower bound power consumption increase for a 1,500 gpm pump subject to 6 feet of interference drawdown is relatively high, especially when considering the potential cost differential to a higher capacity water user. This illustrates the importance of using well- and pump-specific information in assessing impacts to wells during the mitigation phase of the project.

6.4.6 Impacts on City of Madera Municipal wells

The closest well to the Site in the City of Madera's water supply system is Well No. 142, located approximately 6,200 feet from the proposed pumping well location south of the Site at the municipal airport. This well is used for standby and fire protection purposes. Other wells in the City of Madera's water supply system are located more than 2 miles from the Site and are not expected to experience significant drawdown-related impacts. City Well No. 26 is estimated to experience drawdowns of up to approximately 1.9 to 3.1 feet, depending upon the development alternative, and could be subject to increased electrical costs during operation. However, based on the analysis presented in Section 6.4.5 and the current status of the well, it is unlikely that the additional costs would amount to more than $100 per year and, as such, these impacts may be considered insignificant. This well is not likely to experience other interference drawdown-related impacts.

Based on discussions with the City of Madera (Mr. Marvin Ward and Mr. David Merchen, personal communication), we understand that there are presently no plans to expand the City's water supply system by installing additional wells near the Site or reinstating Well No. 26 for ongoing production.

6.5 Potential for Drawdown-Induced Ground Subsidence

Ground subsidence can occur as a result of water level decline in aquifer systems. When the fluid pressure in an aquifer is reduced as a result of changes in the groundwater level, a shift in the balance of support for the overlying materials causes the "skeleton" of the aquifer system to deform slightly (Galloway, et al., 1999). Reversible deformation occurs in all aquifer systems as a result of the cyclical rise and fall of groundwater levels associated with short and longer term climatic cycles. Permanent ground subsidence can occur when pore water pressures in the aquifer fall below their lowest historical point, and the particles in the aquifer skeleton are permanently rearranged and compressed. This type of deformation is most prevalent when confined alluvial aquifer systems are overdrafted. Confined aquifer systems ("pressure aquifer systems") undergo much larger changes in porewater pressure during groundwater withdrawal than unconfined systems ("water table aquifer systems"). In addition, alluvial aquifer systems often include aquitards with a high clay content. When water pressures in the confined aquifer fall, water drains from the aquitards and the relatively open and weak pore structure in the clay strata undergoes a permanent collapse and compression.

In the San Joaquin Valley, an area of approximately 5,200 square miles has experienced ground subsidence in excess of 1 foot (Ireland, 1986). The greatest amount of subsidence, over 29 feet, occurred in the western part of the valley southwest of the town of Mendota. Most of the subsidence occurred during periods of increasing groundwater demand and decreasing groundwater levels (pressures) in the confined aquifer system from the 1920s to the 1970s. In the western portion of the San Joaquin Valley, where the greatest subsidence was recorded, groundwater levels in the deep confined aquifer system dropped by over 400 feet during this period, and were declining at a rate of about 10 feet per year in some areas as of 1960 (Galloway, et al., 1999). Since the 1970s, ground subsidence has continued at a much slower rate in some locations, but has generally stopped due to increased surface water deliveries and recovering groundwater levels. Most of the area in which subsidence occurred is underlain by the Corcoran Clay, which is the major regional aquitard that separates the San Joaquin Valley's confined and unconfined aquifer systems (**Sections 2.4** and **3.4**).

Ground subsidence of up to approximately 1 foot has been documented west of the City of Madera, in the vicinity of Madera Ranch, despite the fact that the area has been subject to extensive groundwater pumping from both above and below the Corcoran Clay over the last 100 years (Jones & Stokes, 2005). Jones & Stokes therefore concluded that significant ground subsidence was not likely to be associated with MID's Water Supply Enhancement Project (**Section 3.13**). The eastern boundary of the subsidence-affected area coincides approximately with the eastern extent of the Corcoran Clay (Ireland, 1986) and does not extend beneath the Site, despite the fact that significant groundwater pumping has also occurred in the Site vicinity. In conclusion, significant ground subsidence is not expected to be associated with the proposed casino project because subsidence has not been a significant problem in the Madera area despite significant historical pumping, the area that has been impacted does not extend beneath the Site, and the Site is underlain by an unconfined aquifer system, which is less susceptible to pumping induced subsidence.

6.6 Potential for Surface Water Impacts

According to the Spring 2006 groundwater contour map provided by the DWR (2008) and presented as **Figure 5**, groundwater occurs at a depth 195 feet below the ground surface near the Site and the surrounding area is generally level. There is no known hydrologic connection between groundwater and surface water in this area and impacts to surface water resources are not likely to occur as a result of project groundwater pumping.

6.7 Cumulative Impacts

Future trends in groundwater levels near the Site would be determined by a combination of the drawdown effects caused by pumping at the Site, the existing regional declining trend in groundwater elevations, interference drawdown from other groundwater pumpers (e.g., the City of Madera), and changes in water levels due to other causes (*e.g.*, artificial groundwater recharge, changes in groundwater management practices, or climatic trends). A regional declining trend has been documented at approximately 1 to 3 feet per year in the Madera subbasin in the vicinity of the Site. This trend appears to be corroborated near the Site by long-term well hydrographs (**Figures 6, 7 and 8**). However, these hydrographs also show periods of lower and most recently significantly greater rates of water level decline. The effect of groundwater pumping at the Site will be a small amount of additional drawdown in a finite area around the Site.

The Madera subbasin has been determined to be in a state of overdraft (**Sections 3.6, 3.7. 3.8, 3.9** and **3.13**); that is, the groundwater removed by pumping exceeds recharge, and as a result basin storage and groundwater levels are both declining with undesirable side effects. The basin overdraft has been estimated to be approximately 100,000 AFY (Jones & Stokes, 2005). Based on the water demand and supply analysis for 2030, it is anticipated that the overdraft in the valley floor area will grow to about 155,000 AF per year if no mitigation action is taken (KDSA, 2008). The project pumping of approximately 8 to 278 gpm (18 to 450 AFY) would cause a very small increase in the current basin overdraft of approximately 0.02 to 0.5 percent. Note that this estimate does not consider any of the mitigation measures described in the following section.

Two recent Federal court decisions have resulted in the allocation of significant surface water resources to the protection of endangered fish in the San Joaquin River and the Sacramento-San Joaquin Delta. A Federal Court ruling in 2005 found that contracted irrigation diversions form the San Joaquin River at Friant Dam violated the Federal Endangered Species Act because they jeopardized endangered salmon in the San Joaquin River drainage. Subsequent rulings required the release of water from the dam to maintain minimum flows protective of fish. This has resulted in partial curtailment of irrigation diversions by the CVP to the Friant-Kern Canal and the Madera Canal. In addition, a September 2007 Federal court decision imposed rules to protect delta smelt, and put significant restrictions on the diversion of water from the Sacramento-San Joaquin Delta to the SWP and CVP, resulting in further curtailment of contracted deliveries via those water supply systems.

Reductions in water supply deliveries via the SWP and CVP may be expected to continue at least over the next several years, while both local and regional solutions are sought to the complex water supply issues raised by these curtailments. The Draft State Water Project Delivery Reliability Report (DWR,

2007) represents the state of water affairs if no actions for improvement are taken. It shows a continued eroding of SWP water delivery reliability under the current method of moving water through the delta. The analysis shows that annual SWP deliveries would decrease virtually every year in the future (93% of future years). These reductions would amount to a 20% reduction from current levels about one-fourth of the time, and greater than 30% in one-sixth of future years.

The Madera County IRWMP (KDSA, 2008) discusses several efforts being pursued in the county which are intended to conjunctively address both surface water supply and groundwater overdraft issues. Other efforts are being pursued on a regional basis. The reduction in available surface water deliveries could result in increased reliance on groundwater as a water supply, the impact of the Delta Smelt and Friant Dam decisions is dependant on a complex series of factors, and cannot be reliably predicted in the context of this study.

6.8 Potential Mitigation Measures

6.8.1 Groundwater Level Monitoring

The actual drawdown impacts from using groundwater to supply the proposed projects, and actual regional water level trends on which these drawdown impacts are overprinted, can only be accurately assessed with the implementation of a properly designed monitoring program. Such a program would allow documentation of the actual distance-drawdown relationship in the vicinity of the Site, local ambient groundwater level trends and the potential influence of interference drawdown from other water users in the area. This information in turn can be used to evaluate the effectiveness of the hydrogeological mitigation measures that are being considered as part of the project, and can form the basis for assessment of impacts to well owners in the Site Vicinity.

A groundwater level monitoring program could include existing wells and/or new wells installed for the project. We recommend that a monitoring program be designed based on an evaluation of completion data and lithologic logs for existing wells that may be available for that purpose. The monitoring program should include at least two wells completed at depths shallower than 250 feet and two wells completed at depths between 300 and 600 feet. Ideally, one shallow and one deep monitoring well should be located within ½ mile of the proposed project pumping well(s) to evaluate near-Site drawdown associated with the project. The other shallow and deep monitoring wells should be located between 1 and 2 miles from the pumping well(s), near the estimated lateral limit of significant drawdown associated with the project. If existing wells are used, they should not be used for water production within one month of being measured. Also, the monitoring wells should not be located near wells that are being actively pumped. We recommend that water level measurements begin at least one year prior to project development to develop sufficient baseline data, and that both spring and fall measurements be taken.

Data from groundwater level monitoring that is conducted by DWR can be used to assess the ongoing regional groundwater level trend in the Madera subbasin and establish a regional baseline.

6.8.2 On-Site Hydrogeologic Mitigation Measures Considered as Part of Site Development

Several mitigation measures are included as part of the proposed project, which will reduce the drawdown impact of on-Site pumping for water supply. Key measures that are planned include Best Management Practices (BMPs) that promote infiltration of storm water runoff from developed portions of the Site, and on-Site disposal of treated wastewater. BMPs for enhancing infiltration of storm water runoff have the potential to increase the rate of natural recharge at the Site, while on-Site disposal of treated wastewater will return groundwater originating from the casino wells back to the aquifer. As discussed below, the effectiveness of these measures to reduce drawdown impacts is directly proportional to the rate of new recharge compared with the pumping rate.

Since buildings and pavements are relatively impermeable to storm water, such "hardscape" development increases runoff and decreases recharge to groundwater relative to pre-development conditions. The primary function of storm water BMPs is usually to decrease the amount or rate of runoff entering waterways from impermeable hardscape development. However, an important secondary function is to recapture as recharge some of the storm water that would otherwise flow from the Site as runoff. Storm water BMPs that are planned for the project include routing of storm water runoff to landscaped areas where feasible, conveying storm water via vegetated swales instead of concrete-lined V-ditches, and constructing a storm water detention basin to retain a portion of the storm water at the Site, where it will evaporate or percolate into the subsurface while detained in the basin. The effectiveness of these BMPs in promoting recharge depends on soil and climatic conditions, available space, Site layout and BMP design. Typically, site or development constraints are such that only some of the pre-development recharge is recovered, but if enough space is available and soil conditions are favorable, a storm water detention basin can be designed to percolate several times the amount of pre-development recharge.

To add perspective on the potential effectiveness of storm water BMPs to mitigate drawdown from the development of on on-Site groundwater supply, we have compared the potential rate of recharge from implementation of these BMPs to the projected rate of groundwater pumping. (The effect on drawdown will be proportionally the same as the rate of additional recharge divided by the pumping rate.) The area of the Site that will be developed with buildings and pavements encompasses approximately 40 acres. Given that the annual precipitation in the Site area is just under 12 inches and that a reasonable pre-development percolation rate from precipitation in a semi-arid environment is about 12 percent, the annual pre-development recharge in portions of the Site proposed for hardscape development (approximately 40 acres) is approximately 1.6 million gallons. This recharge rate is equivalent to approximately 3 gpm, or about 1.6 percent of the projected groundwater pumping rate at the Site under Alternative A with recycling (190 gpm). Thus, if the recharge in developed area were increased by an additional 3 gpm (or 100 percent over pre-development conditions, a reasonable gain if BMPs are constructed in a way that promotes infiltration), the projected drawdown would be decreased by only 1.6

percent. In conclusion, the planned BMPs are expected to be effective in reducing or controlling runoff, but are likely to have only a limited benefit in terms of reducing the drawdown impacts of pumping.

Recharge from on-Site disposal of treated wastewater is likely to have a more significant mitigating effect because the recharge rate is much greater than that generated by implementation of storm water BMPs. Wastewater from the casino development will be treated in an on-Site wastewater treatment plant to a level meeting or exceeding tertiary treatment standards. The treated wastewater will then be either: (1) disposed at the Site in a leach field, (2) disposed at the Site in a spray field, (3) a combination of these two on-Site disposal alternatives, (4) disposed off-Site via surface water discharge or (5) discharge to the local sewer system. If wastewater recycling is implemented, the demand for pumped groundwater will be reduced and a portion of the recycled water will be used for landscape irrigation. Wastewater recycling will be conducted unless the Site is connected to the local sewer system. **Figure 14** presents a diagram showing the anticipated water and wastewater balance for Alternative A with water recycling using information provided in the *Water and Wastewater Feasibility Study* report by HydroScience (HydroScience, 2006).

As shown on **Figure 14**, under Alternative A with water recycling, approximately 270,000 gallons per day of wastewater will be treated by the wastewater treatment plant. Approximately 107,000 gpd of this amount will be reused by the development in recycled water applications. Of the remaining 163,000 gpd, approximately 20,000 gpd will be applied to landscaped areas as irrigation water and 143,000 will be disposed via land application using a spray field, a leach field, or a combination of the two. Reasonable percolation rates were estimated for each of these treated wastewater streams using professional judgment.

Figure 14 shows estimated recharge rates for disposal of 143,000 gpd of treated wastewater assuming either spray disposal (resulting in an estimated recharge rate of 10 gpm) or leach field disposal (resulting in an estimated recharge rate of 89 gpm). The spray and leach field disposal alternatives shown on **Figure 14** are assumed to be combined with landscape irrigation disposal of 20,000 gpd (for which the estimated recharge rate is 3.5 gpm). Based on this analysis, we estimate that the range of recharge that may be expected from the on-Site application and disposal of treated wastewater (under Alternative A with water recycling) will range from approximately 13.5 to 92.5 gpm. This rate of additional recharge will reduce the drawdown impact from using an on-Site groundwater source by an amount proportional to the groundwater pumping rate, or between approximately 7 to 49 percent under Alternative A.

The additional recharge that may be induced by on-Site disposal of wastewater and implementation of storm water BMPs under Alternatives A, B and C with wastewater recycling is summarized in the table below.

Development Alternative	Pumping Rate	Additional Recharge Rate (gpm)[1]				
		Leachfield Disposal	Sprayfield Disposal	Irrigation	Stormwater BMPs	Total Range (% of Pumping Rate)
A + Recycling	190 gpm	89	10	3.5	3	9% to 50%
B + Recycling	110 gpm	59	7	3.5	2	11% to 64%
C + Recycling	12 gpm	6	1	1	1	25% to 67%

Notes:
1. For the purposes of this analysis, we have assumed that no groundwater recharge would be derived if treated wastewater is discharged to off-Site surface water; however, some water of the discharged water would be expected to percolate through off-Site stream beds.

As shown above, the percent reduction in drawdown impact would be slightly greater under Alternatives B and C with water recycling, because the wastewater disposal rate is greater relative to the rate at which groundwater is extracted. Under each alternative, if treated wastewater is disposed via a leach field, the recharge rate is expected to be in the upper end of the range; whereas, if the treated wastewater is disposed in a spray field, the recharge rate is expected to be in the lower end of the range. In actual practice, a combination between landscape, spray field and leach field application for wastewater disposal may be selected.

6.8.3 Off-Site Hydrogeologic Mitigation Measures Considered as Part of the Project

The tribe has executed a Memorandum of Understanding (MOU) with the Madera Irrigation District (MID) to contribute to its recharge efforts to help address overdraft in the groundwater basin in which the project is located. The tribe's contribution covers recharge of 450 acre-feet per year of water to the groundwater basin, which is equal to the project water demand of Alternative A without recycling.

6.8.4 Potential Mitigation Measures for Impacts to Nearby Wells

Impacts to nearby wells will result from a combination of the documented regional declining trend in groundwater levels and the added affect of interference drawdown from groundwater pumping associated with the proposed project. The amount of project-related interference drawdown that may be expected has been predicted as a function of distance (**Figure 11**) and at the known off-Site well locations (**Tables 1 and 2**). The actual amount of interference drawdown associated with the project and the future rate of regional groundwater level decline will be determined from the proposed groundwater level monitoring program (**Section 6.7.1**). We recommend that these data from the monitoring program be used in the proposed mitigation program to distinguish the portion of impacts to nearby wells that is project related vs. the portion that is attributable to regional declining groundwater level trend. At least one year of baseline data and one year of data after project pumping begins should be collected prior to implementation of the mitigation/cost reimbursement program outlined below.

The following mitigation measures for impacts to nearby wells are proposed:

- Reduction in usable well life (Impacts 1 and 2) –The tribe would reimburse the owners of wells that become unusable within 30 years of the onset of project pumping for a portion of the prevailing, customary cost for well replacement or deepening. The percentage of the cost reimbursed by the tribe would depend upon the degree to which the well's usable life is shortened as determined from data gathered during the groundwater level monitoring program and water level data gathered by others. Specifically, the following approach will be used:
    - Regional groundwater monitoring data for the period between the time that pumping for the project begins and the well becomes unusable will be analyzed using a best-fit line approach to determine the regional rate of groundwater level decline in feet per year;
    - Groundwater monitoring data for the project will be used to assess the amount of drawdown in feet experienced by the affected well for which the project is responsible;
    - The number of years by which the well's life is shortened due to the project will be calculated by dividing the amount of drawdown induced by the project by the calculated annual rate of regional water level decline; and
    - The tribe will reimburse the well owner for the cost of replacing or deepening the unusable well at a rate of 10 % of the customary and prevailing cost for each year that the well life is shortened due to the project.[2]
- Groundwater level falling near or below pump intake (Impact 3) – The concept of usable well life can also be applied to this impact, except that the well's usable life is extended by lowering the pump intake. The time period until a pump intake requires lowering depends on a number of well-specific factors that are not known at this time and can be less than or greater than the range of remaining well lifetimes listed in **Table 1.** However, the impact of project pumping on shortening this time period would be similar to the impact on shortening well life, and will be determined using the same approach.
    - The tribe would reimburse the owners of wells with pumps that require lowering within 30 years of the onset of project pumping for a portion of the prevailing, customary cost for

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[2] Reimbursement at a rate of 10 % of costs per year of well life lost assumes that the reasonable minimum expected service life of a well would be at least 10 years beyond the time of installation. Thus, the time-value of well use is conservatively estimated to be 10 % of the value of the well per year.

this service. Specifically, the number of years the project has shortened the usable life of the well with the pump at the original depth will be calculated using the approach outlined above. Reimbursement will occur at a rate of 10 % of the cost of lowering the pump or pump intake for each year that the well's life with the pump at its original position is shortened.

  - In order to be eligible, the well owner would need to provide the tribe with documentation of the well location and completion data, including pump intake depth, and that the well was constructed and usable before project pumping was initiated. The tribe must be made aware of the cost reimbursement claim prior to lowering of the pump intake, so that the need for possible well deepening, replacement or rehabilitation can be assessed. At the tribe's discretion, compensation may be paid toward well deepening, replacement or rehabilitation in lieu of lowering the pump intake.

- Increased Electrical and Maintenance Cost (Impact 4) – Based on our analysis, operators of wells utilized for domestic purposes and limited agricultural or industrial pumpers are not expected to experience significant increases in their electrical costs as a result of groundwater pumping for the proposed project. The tribe would reimburse well owners pumping more than 100 AF/year for their additional annual electrical costs at the prevailing electrical rate based on the following formula[3]:

$$\text{KWhr/year} = \frac{\text{(gallons Pumped/year) x (feet of interference drawdown)}}{1621629}$$

- In order to qualify for reimbursement, the well owner must provide proof of the actual annual volume of water pumped. As an alternative to annual payments, a one-time lump sum payment of a mutually agreeable amount could be made.

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[3] This formula is derived from combining the following two formulas:

KW input = ([Pump brake horsepower] x 0.7457) / (motor efficiency)

Pump brake horsepower = ([gpm] x [feet of water] x [specific gravity]) / (3960 x [pump efficiency])

Where:

specific gravity = 1;

typical motor efficiency = 85%; and

typical pump efficiency = 60%

- No reimbursement would be made available for wells installed after operation of the project wells commences.
- For any of the above impacts, the tribe may choose at its discretion to provide the well owner with a connection to a local public or private water supply system in lieu of the above mitigation measures, at reduced cost in proportion to the extent the impact was caused by project pumping.

The known owners of identified wells within 2 miles of the proposed project pumping well would be notified of the mitigation program outlined above before project pumping begins. We recommend that the tribe contract with a third party such as the County of Madera to oversee this mitigation program.

7. POTENTIAL IMPACTS OF THE NORTH FORK SITE DEVELOPMENT ALTERNATIVE ON OFF-SITE GROUNDWATER LEVELS AND WELLS

The average daily groundwater pumping rate for the North Fork Alternative (Development Alternative D) would be about 27,000 gpd (17 gpm) without water recycling and 14,000 gpd (10 gpm) with water recycling (HydroScience, 2006). We understand that Alternative D would be supplied by installing one or two new pumping wells near the center of the North Fork Site, drilled to at least 500 feet bgs, or by using the existing water supply well currently at that location (Chad Broussard, AES, personal communication, February 2006).

The proposed pumping rate of 10 to 19 gpm is comparable to or lower than the reported yields of existing wells in the area of the North Fork Site for which information was obtained (**Section 5.5**), but exceeds the median well yield reported for wells drilled in eastern Madera County (Todd, 2002). Therefore, it appears likely that the aquifer could produce water at the proposed rate if one or more wells were installed, as needed. However, the drawdown resulting from this pumping cannot be predicted at this time, due to the lack of available data on groundwater levels or aquifer parameters in the North Fork area. In addition, due to the nature of fractured granitic aquifers, such properties are usually site-specific and highly variable from one location to another.

Possible effects on nearby wells could range from no impact at all to a well going dry or its pumping capacity being significantly reduced. A new pumping well could also cause a similar range of effects on existing springs. Drawdown effects from the new well could be felt at a considerable distance if the well is screened in a long fracture system. Mitigation measures similar to those described in **Section 6.7** would be available to counter impacts from the proposed pumping.

8. CONCLUSIONS

8.1 The Madera Site

- The Madera Site lies within the San Joaquin Valley and is underlain by at least 700 feet of unconsolidated Pleistocene and Holocene age deposits, including groundwater-bearing sands, gravels and silts. The E-clay or Corcoran Clay, generally regarded as a significant aquitard, is not believed to be present beneath the Madera Site.
- Groundwater elevation data were not available for the Madera Site, but DWR interpretations based on records for nearby wells exhibit an overall decline in groundwater levels of approximately 115 feet between 1958 and 2006, with the current groundwater level interpolated as being about 195 feet bgs. The dominant influence on groundwater flow in the area over the last 15 years appears to be a pumping depression located between the cities of Madera and Chowchilla.
- Comparison of local well hydrographs and precipitation records shows short-term correlations between rainfall amount and groundwater levels, but also a long-term decline in groundwater levels that is independent of climatic factors.
- An analytical model was prepared to examine the effects on off-Site groundwater levels and wells of the three proposed Development Alternatives with and without water recycling incorporated. The average groundwater pumping rates considered are as follows:

  Alternative A – 273,000 gallons per day (gpd) (190 gpm) with recycling and 400,000 gpd (278 gpm) without recycling;

  Alternative B – 166,000 gpd (115 gpm) with recycling and 251,000 gpd (174 gpm) without recycling; and

  Alternative C – 11,000 gpd (8 gpm) with recycling and 23,000 gpd (16 gpm) without recycling.

- Based on the model, the predicted drawdown at the Madera Site boundary would be as follows:

  Alternative A: 6.4 feet with recycling and 9.3 feet without recycling;

  Alternative B: 3.8 feet with recycling and 5.8 feet without recycling; and

  Alternative C: 0.3 feet with recycling and 0.5 feet without recycling.

  The predicted drawdown decreases to approximately 1.5 feet at a distance of 2 miles for Alternative A without recycling (the worst case) and about 1 foot for Alternative A with recycling and Alternative B without recycling. Drawdown of less than 1.5 feet is probably not significant relative to seasonal or short term water level changes in this area.

- Records for 259 water production wells within 2 miles of the Site were obtained from the California Department of Water Resources (DWR). All of these wells are expected to experience some amount of interference drawdown from the project, as follows:

  Alternative A: 1.0 to 4.9 feet with recycling and 1.5 to 7.2 feet without recycling;

  Alternative B: 0.5 to 3.0 feet with recycling and 0.9 to 4.5 feet without recycling; and

  Alternative C: less than 0.3 feet with recycling and less than 0.5 feet without recycling.

- A combination of interference drawdown from the project and the documented regional declining groundwater level of 1.85 feet per year may result in four different potential impacts to nearby wells. These are:

  1. The well going dry;
  2. The water level in the well falling so low that the well is no longer usable;
  3. Impacts 1 or 2 occur, but the well pump intake can be lowered to extend the life of the well; and/or
  4. Increased operational costs.

- Impacts 1 and 2 were evaluated in terms of projects impact on the usable lifetime of nearby wells. Given long term groundwater level trends, there are 68 wells less than 250 feet deep that are either dry or at risk for going dry or becoming unusable in the next 36 years without development of the project. Because actual future water level trends cannot be accurately predicted, the usable lifetime of these wells may be shorter or longer. Based on the observed long term trends and the predicted interference drawdown associated with project pumping, the project will shorten the remaining usable lifetimes of these wells by 1 to 3 years. The actual contribution of project pumping to the shortening of usable lifespans of nearby wells will be determined based on a groundwater monitoring program to be implemented as part of the project's mitigation program.

- Impact 3 can only be evaluated based on well-specific information that is not generally available at this time. We recommend that this impact be evaluated on case-by-case basis during the mitigation phase of the project.

- A reasonable range for increased operational costs (Impact 4) was evaluated by simulating several different well, pump, water level and interference drawdown configurations. In general, it was found that increased costs for residential well operators are not expected to be significant. Increased costs for agricultural, industrial or municipal well owners with annual pumping requirements in the range of hundreds to several thousand dollars may be expected to range from several hundred to several thousand dollars. (For the pumps modeled, the maximum cost increase represents an approximately 2 percent increase in the user's overall pumping costs.) The only City of Madera well close enough to the site to experience these types of impacts is currently used only for standby and fire suppression purposes, so significant cost impacts are not expected.

- On a regional basis, the project will contribute slightly (approximately 0.02 to 0.5 percent) to an existing imbalance between groundwater pumping and recharge (overdraft). Significant ground subsidence is not anticipated as a result of the project.
- Implementation of a drawdown monitoring program is recommended to document actual drawdown from the project as well as regional water level trends and interference drawdown from other nearby groundwater pumping. Data from the program can be used to establish baseline conditions, evaluate the effectiveness of measures designed to mitigate drawdown, and to assess appropriate mitigation for nearby impacted well owners.
- Drawdown and overdraft impacts can be mitigated to some extent by implementation of Best Management Practices (BMPs) in the proposed construction and infiltration from on-Site land application of treated wastewater from the development. The effectiveness of these mitigation measures was estimated to be 9 to 50 percent for Alternative A, 11 to 64 percent for Alternative B, and 25 to 67 percent for Alternative C, depending on the extent to which spray field or leach field application is used for disposal. In addition to the above, the tribe has executed a Memorandum of Understanding (MOU) with the Madera Irrigation District (MID) to contribute to its recharge efforts to help address overdraft in the groundwater basin in which the project is located. The tribe's contribution covers recharge of 450 acre-feet per year of water to the groundwater basin, which is equal to the project water demand of Alternative A without recycling.
- All the wells in the area will experience impacts from the prevailing regional decline in groundwater levels. The following alternatives for mitigation of significant project-related interference drawdown impacts are being considered, to the extent the impact is attributable to project pumping as distinguished from the regional trend:

  Impacts 1 and 2 : Reimbursement for well replacement, rehabilitation or deepening;

  Impact 3: Reimbursement for pump replacement or re-setting;

  Impact 4: Compensation for increased cost;

  At the tribe's discretion, providing a connection to a local public or private water system, for any and/or all potential significant impacts.

8.2 The North Fork Site

- The North Fork Site overlies granitic basement rocks, within which groundwater is present in fractures. There is little available information on groundwater occurrence, levels, flow, or storage, and such information is usually very Site-specific in such a setting. However, groundwater is widely used for domestic supply in the area, with wells reportedly achieving yields of between 10 and 240 gpm.
- The average day groundwater pumping rate for the North Fork Alternative (Development Alternative D) would be about 27,000 gpd (19 gpm) without water recycling and 14,000 gpd (10 gpm) if recycling is incorporated. We understand that Alternative D would be supplied by installing one or two new pumping wells near the center of the North Fork Site, drilled to at least 500 feet bgs, or by using the existing water supply well currently at that location.
- The proposed pumping rate of 10 to 19 gpm is comparable to the reported yields of existing wells in the area of the North Fork Site for which information was obtained (**Section 5.5**), but exceeds the median well yield reported for wells drilled in eastern Madera County (Todd, 2002). Therefore, it appears likely that the aquifer could produce water at the proposed rate if one or more wells were installed, as needed. However, the drawdown resulting from this pumping cannot be predicted at this time, due to the lack of available data on groundwater levels or aquifer parameters in the North Fork area, and the general uncertainty in estimating aquifer parameters in fractured granitic aquifers without site-specific data.

9. CLOSURE/LIMITATIONS

This report has been prepared for the exclusive use of Analytical Environmental Services, Inc. as it pertains to the assessment of the effects of the use of groundwater to supply the proposed North Fork Casino development near Madera and North Fork, Madera County, California. Our services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable, qualified environmental consultants practicing in this or similar locations. No other warranty, either express or implied, is made as to the professional advice included in this report. These services were performed consistent with our agreement with our client.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We do not warrant the accuracy of information supplied by others or the use of segregated portions of this report.

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TABLES

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Table 1 - Construction Details, Predicted Drawdown and Estimated Well Life for Shallow Wells Within Two Miles of the Site

CLIENT: AES
PROJECT No.: N0492
LOCATION: Madera
PROJECT DESCRIPTION: Proposed North Fork Casino

DATE: 1-Aug-08
BY: Ryan Farrell
REVISION: Mike Tietze

							Predicted Drawdown (feet)[6]				Estimated Well Life Remaining (years)[7]				
Well Reference No.[1]	Year Installed	Well Type	Depth (feet bgs)[2]	Screened Interval (feet bgs)[3]	Distance to Site Pumping Center (feet)[4]	Saturated Thickness (feet)[5]	Option A (with recycling)	Option A (without recycling)	Option B (with recycling)	Option B (without recycling)	Without Casino	Option A (with recycling)	Option A (without recycling)	Option B (with recycling)	Option B (without recycling)
107	1969	domestic	202	unknown	670	7	7.3	10.7	4.5	6.7	0	0	0	0	0
115	1966	domestic	240	228-236	2,300	45	4.4	6.4	2.7	4.0	19	17	15	17	17
112	unknown	unknown	216	unknown	2,500	24	4.2	6.1	2.6	3.8	8	5	4	6	5
71	1977	other	120	unknown	2,900	0	3.8	5.5	2.3	3.5	0	0	0	0	0
137	1956	irrigation	160	90-152	3,000	0	3.8	5.5	2.3	3.4	0	0	0	0	0
81	1975	domestic	228	216-224	4,100	21	3.0	4.4	1.8	2.8	6	4	4	5	4
64	1973	irrigation	202	172-188	4,600	0	2.7	4.0	1.7	2.5	0	0	0	0	0
355	1988	domestic	240	200-240	4,700	45	2.7	3.9	1.7	2.5	19	17	17	18	18
406	1960	industrial	220	unknown	5,000	30	2.6	3.7	1.6	2.3	11	9	9	10	10
67	1946	unknown	212	unknown	5,200	13	2.5	3.6	1.5	2.3	2	0	0	1	0
379	1991	domestic	220	140-220	5,200	27	2.5	3.6	1.5	2.3	9	8	7	8	8
116	1966	domestic	244	232-240	5,200	43	2.5	3.6	1.5	2.3	18	17	16	17	17
345	1985	domestic	185	145-185	5,800	0	2.3	3.3	1.4	2.1	0	0	0	0	0
352	1987	domestic	240	200-240	5,900	47	2.2	3.2	1.4	2.0	20	19	18	19	19
353	1988	domestic	240	200-240	6,100	46	2.1	3.1	1.3	1.9	19	18	18	19	18
103	1985	domestic	210	170-210	6,300	26	2.1	3.0	1.3	1.9	9	8	7	8	8
104	1979	domestic	205	145-205	6,300	18	2.1	3.0	1.3	1.9	4	3	3	4	3
339	1979	domestic	205	145-205	6,300	18	2.1	3.0	1.3	1.9	4	3	3	4	3
217	1980	domestic	198	118-198	6,800	9	1.9	2.8	1.1	1.7	0	0	0	0	0
346	1985	domestic	228	none	6,900	39	1.8	2.7	1.1	1.7	16	15	14	15	15
229	1986	domestic	200	160-200	7,000	9	1.8	2.7	1.1	1.7	0	0	0	0	0
82	1980	domestic	200	140-200	7,000	3	1.8	2.7	1.1	1.7	0	0	0	0	0
343	1987	domestic	200	160-200	7,100	1	1.8	2.6	1.1	1.6	0	0	0	0	0
348	1987	domestic	240	180-240	7,100	43	1.8	2.6	1.1	1.6	18	17	16	17	17
342	1987	domestic	200	170-200	7,200	1	1.8	2.6	1.1	1.6	0	0	0	0	0
338	1981	domestic	195	110-195	7,200	0	1.8	2.6	1.1	1.6	0	0	0	0	0
366	1992	domestic	240	160-240	7,700	45	1.6	2.4	1.0	1.5	19	18	18	18	18
340	1985	domestic	205	165-205	7,800	12	1.6	2.3	1.0	1.5	1	0	0	1	0
65	1973	domestic	216	196-212	7,800	15	1.6	2.3	1.0	1.5	3	2	1	2	2
351	1987	domestic	240	200-240	7,900	43	1.6	2.3	1.0	1.4	18	17	17	17	17
56	1968	irrigation	153	86-149	7,900	0	1.6	2.3	1.0	1.4	0	0	0	0	0
349	1988	domestic	240	200-240	8,000	50	1.5	2.3	0.9	1.4	22	21	20	21	21
344	1987	domestic	200	180-200	8,100	2	1.5	2.2	0.9	1.4	0	0	0	0	0
126[8]	1955	irrigation	252	212-248	8,100	58	1.5	2.2	0.9	1.4	26	25	25	25	25
136	1990	domestic	240	unknown	8,300	64	1.5	2.2	0.9	1.4	29	28	28	29	28
347	1988	domestic	240	200-240	8,300	49	1.5	2.2	0.9	1.4	21	20	20	21	20
220	1979	domestic	200	140-200	8,600	10	1.4	2.1	0.8	1.3	0	0	0	0	0
354	1988	domestic	200	160-200	8,600	8	1.4	2.1	0.8	1.3	0	0	0	0	0
16	1964	domestic	200	148-198	8,700	0	1.4	2.0	0.8	1.3	0	0	0	0	0
341	1985	domestic	180	140-180	8,800	0	1.4	2.0	0.8	1.3	0	0	0	0	0

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Table 1 - Construction Details, Predicted Drawdown and Estimated Well Life for Shallow Wells Within Two Miles of the Site

CLIENT: AES
PROJECT No.: N0492
LOCATION: Madera
PROJECT DESCRIPTION: Proposed North Fork Casino

DATE: 1-Aug-08
BY: Rvan Farrell
REVISION: Mike Tietze

Well Reference No.[1]	Year Installed	Well Type	Depth (feet bgs)[2]	Screened Interval (feet bgs)[3]	Distance to Site Pumping Center (feet)[4]	Saturated Thickness (feet)[5]	Predicted Drawdown (feet)[6]				Estimated Well Life Remaining (years)[7]				
							Option A (with recycling)	Option A (without recycling)	Option B (with recycling)	Option B (without recycling)	Without Casino	Option A (with recycling)	Option A (without recycling)	Option B (with recycling)	Option B (without recycling)
2	1980	domestic	200	150-200	8,900	0	1.4	2.0	0.8	1.2	0	0	0	0	0
1	1980	domestic	200	140-200	8,900	0	1.4	2.0	0.8	1.2	0	0	0	0	0
251	1979	domestic	200	unknown	9,100	9	1.3	1.9	0.8	1.2	0	0	0	0	0
235	1987	domestic	200	160-200	9,200	7	1.3	1.9	0.7	1.2	0	0	0	0	0
160	1976	domestic	244	224-244	9,200	76	1.3	1.9	0.7	1.2	36	35	35	35	35
47	1965	dom/irr	202	unknown	9,400	2	1.3	1.9	0.7	1.2	0	0	0	0	0
285	1979	domestic	200	120-200	9,400	13	1.3	1.9	0.7	1.2	2	1	1	1	1
252	1979	domestic	200	unknown	9,500	10	1.2	1.8	0.7	1.1	0	0	0	0	0
221	unknown	domestic	200	120-200	9,600	13	1.2	1.8	0.7	1.1	2	1	1	1	1
222	1980	domestic	236	none	9,600	45	1.2	1.8	0.7	1.1	19	18	18	19	18
163	1951	irrigation	206	135-203	9,600	35	1.2	1.8	0.7	1.1	14	13	13	13	13
234	1987	domestic	220	120-220	9,800	32	1.2	1.8	0.7	1.1	12	11	11	12	11
334	1974	domestic	180	160-176	9,800	1	1.2	1.8	0.7	1.1	0	0	0	0	0
188	1988	domestic	240	200-240	9,900	40	1.2	1.7	0.6	1.1	16	16	15	16	16
86	1988	domestic	240	200-240	9,900	40	1.2	1.7	0.6	1.1	16	16	15	16	16
223	unknown	domestic	184	unknown	9,900	0	1.2	1.7	0.6	1.1	0	0	0	0	0
231	1983	domestic	236	220-232	9,900	43	1.2	1.7	0.7	1.1	18	17	17	17	17
286	1980	domestic	220	180-220	10,000	42	1.2	1.7	0.6	1.1	17	17	16	17	17
146	1986	domestic	246	none	10,000	72	1.2	1.7	0.6	1.1	34	33	33	33	33
177	1986	domestic	203	173-203	10,100	6	1.2	1.7	0.6	1.1	0	0	0	0	0
186	1987	domestic	220	180-220	10,100	20	1.1	1.7	0.6	1.0	5	5	4	5	5
216	1979	domestic	195	135-195	10,300	10	1.1	1.6	0.6	1.0	0	0	0	0	0
84	unknown	domestic	220	180-220	10,300	20	1.1	1.6	0.6	1.0	5	5	5	5	5
227	1987	domestic	245	205-245	10,500	63	1.1	1.6	0.6	1.0	29	28	28	28	28
83	1984	domestic	185	145-185	10,600	0	1.1	1.6	0.6	1.0	0	0	0	0	0
176	1984	domestic	220	180-220	10,900	24	1.0	1.5	0.5	0.9	8	7	7	7	7
190	1991	domestic	220	140-220	11,000	20	1.0	1.5	0.5	0.9	5	5	5	5	5
21	1971	dom/irr	200	168-196	11,000	0	1.0	1.5	0.5	0.9	0	0	0	0	0
12	1959	domestic	146	122-142	11,100	2	1.0	1.5	0.5	0.9	0	0	0	0	0

Notes:
1. Approximate locations of wells are plotted on **Figure 9**. Locations were plotted based on sketched maps available from DWR or addresses and were not field verified.
2. bgs = below ground surface.
3. Range represents the top and bottom of the reported screened intervals and may include multiple screened intervals. None means the well has an open bottom.
4. Approximate distance from center of the area designated for installaton of project water supply well(s) (see **Figure 9**) rounded to the nearest 100 feet.
5. Estimated difference between the bottom of the well and the reported groundwater level at the well location in Spring 2006 (**Figure 6**). In case the bottom of the reported screened interval does not extend to the bottom of the well, the bottom of the screened interval is used.
6. Predicted drawdown based on analytical model (**Figure 11**), rounded to the nearest 0.1 foot.
7. Estimated remaining usable life of the well. See text for explanation.
8. This well is reported to be deeper than 250 feet bgs; however, the screened interval is reported to be above 250 feet bgs, and it is therefore assumed to function as a Shallow well.

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Table 2 - Construction Details and Predicted Drawdown for Deeper Wells Within Two Miles of the Site

CLIENT: AES
PROJECT No.: N0492
LOCATION: North Fork
PROJECT DESCRIPTION: Proposed North Fork Casino

DATE: 1-Aug-08
BY: Ryan Farrell
REVISION: Mike Tietze

Well Reference No.[1]	Year Installed	Well Type	Depth (feet bgs)[2]	Screened Interval (feet bgs)[3]	Distance to Site Pumping Center (feet)[4]	Saturated Thickness (feet)[5]	Predicted Drawdown (feet)[6] Option A (with recycling)	Option A (without recycling)	Option B (with recycling)	Option B (without recycling)
108	1995	irrigation	600	300-600	1,800	408	4.9	7.2	3.0	4.5
109	1973	irrigation	295	199-291	1,900	98	4.8	7.0	2.9	4.4
119	1998	irrigation	700	265-696	2,100	499	4.5	6.6	2.8	4.2
114	1970	irrigation	300	205-296	2,500	101	4.2	6.1	2.6	3.8
105	1965	dom/irr	312	182-310	2,700	116	4.0	5.8	2.4	3.7
139	1995	irrigation	510	220-510	2,900	321	3.8	5.5	2.3	3.5
69	1990	industrial	400	unknown	3,200	199	3.6	5.3	2.2	3.3
68	1980	domestic	436	295-420	3,200	219	3.6	5.2	2.2	3.3
121	1998	irrigation	716	264-708	3,300	508	3.5	5.1	2.1	3.2
364	1990	domestic	319	none	3,600	120	3.3	4.8	2.0	3.0
358	1988	domestic	260	220-260	3,800	68	3.2	4.6	1.9	2.9
430	2003	domestic	360	300-360	3,800	165	3.2	4.6	1.9	2.9
111	2002	domestic	280	264-276	4,000	84	3.1	4.5	1.9	2.8
387	1997	domestic	328	268-328	4,000	128	3.1	4.5	1.9	2.8
357	1988	dom/ind	292	none	4,100	92	3.0	4.4	1.8	2.7
432	2003	domestic	300	240-300	4,200	102	2.9	4.3	1.8	2.7
422	2001	domestic	300	240-300	4,300	104	2.9	4.2	1.8	2.6
78	2002	domestic	304	288-300	4,300	101	2.9	4.2	1.8	2.6
365	1991	domestic	275	160-260	4,300	67	2.9	4.2	1.8	2.6
390	1997	domestic	351	291-351	4,500	151	2.8	4.1	1.7	2.6
421	2001	domestic	360	300-360	4,600	160	2.7	4.0	1.7	2.5
429	2003	domestic	360	300-360	4,600	160	2.7	4.0	1.7	2.5
388	1997	domestic	317	257-317	4,800	124	2.6	3.9	1.6	2.4
400	1993	domestic	320	260-320	4,800	121	2.6	3.8	1.6	2.4
66	2002	domestic	326	306-322	4,900	125	2.6	3.8	1.6	2.4
118	1978	irrigation	536	214-532	4,900	339	2.6	3.8	1.6	2.4
120	1971	irrigation	500	273-386	4,900	191	2.6	3.8	1.6	2.4
117	1978	irrigation	588	210-584	5,000	387	2.6	3.8	1.6	2.4
371	1993	domestic	329	unknown	5,000	130	2.6	3.8	1.6	2.4
414	1999	domestic	300	240-300	5,000	104	2.6	3.7	1.6	2.3
405		unknown	330	270-330	5,100	131	2.5	3.7	1.5	2.3
373	1993	domestic	335	275-335	5,200	136	2.5	3.6	1.5	2.3
122	2001	unknown	400	200-400	5,300	204	2.4	3.6	1.5	2.2
409	1998	domestic	340	300-340	5,400	147	2.4	3.5	1.5	2.2
44	2002	domestic	300	240-300	5,400	104	2.4	3.5	1.4	2.2
269	1994	domestic	312	252-312	5,500	119	2.4	3.4	1.4	2.2
369	93	domestic	360	300-360	5,500	161	2.3	3.4	1.4	2.1
413	1999	domestic	340	280-340	5,600	148	2.3	3.4	1.4	2.1
431	2003	domestic	360	300-360	5,900	161	2.2	3.2	1.3	2.0
380	1992	domestic	295	0-295	6,000	95	2.2	3.2	1.3	2.0
433	2004	domestic	300	237-300	6,000	108	2.2	3.1	1.3	2.0
80	1972	irrigation	396	228-393	6,100	187	2.1	3.1	1.3	2.0
419	1998	domestic	340	280-340	6,200	147	2.1	3.1	1.3	1.9
142	1978	municipal	600	240-600	6,200	422	2.1	3.1	1.3	1.9
417	2001	domestic	340	280-340	6,200	147	2.1	3.1	1.3	1.9
356	1988	domestic	255	215-255	6,200	57	2.1	3.0	1.3	1.9
106	1979	industrial	277	197-273	6,300	88	2.1	3.0	1.3	1.9
73	1978	irrigation	307	200-300	6,300	97	2.0	3.0	1.2	1.9
425	1998	domestic	340	280-340	6,300	142	2.0	3.0	1.2	1.9
100	1998	dom/irr	370	unknown	6,500	170	2.0	2.9	1.2	1.8
399	1993	domestic	315	265-315	6,500	121	2.0	2.9	1.2	1.8
313	1997	domestic	272	243-272	6,500	88	2.0	2.9	1.2	1.8
270	1993	domestic	315	255-315	6,600	125	1.9	2.8	1.2	1.8
426	2002	domestic	320	260-320	6,700	122	1.9	2.8	1.2	1.8
415	2000	domestic	360	300-360	6,700	170	1.9	2.8	1.2	1.8
55	1989	domestic	280	240-280	6,800	80	1.9	2.8	1.1	1.7
401	1993	domestic	340	280-340	6,800	148	1.9	2.7	1.1	1.7
98	1975	irrigation	516	200-512	6,900	312	1.9	2.7	1.1	1.7
376	1995	domestic	336	276-336	6,900	143	1.9	2.7	1.1	1.7
385	1996	domestic	300	240-300	6,900	107	1.8	2.7	1.1	1.7
239	1989	domestic	275	215-275	6,900	82	1.8	2.7	1.1	1.7
392	1997	domestic	356	296-356	7,000	161	1.8	2.7	1.1	1.7
428	2003	domestic	360	297-360	7,000	164	1.8	2.7	1.1	1.7
386	1996	domestic	345	275-345	7,100	155	1.8	2.6	1.1	1.6
393	1993	domestic	315	255-315	7,100	118	1.8	2.6	1.1	1.6
60	1993	industrial	540	240-340	7,200	139	1.8	2.6	1.1	1.6
408	2000	domestic	340	300-340	7,200	141	1.8	2.6	1.1	1.6
391	1998	domestic	355	295-355	7,200	158	1.8	2.6	1.1	1.6

Table 2 - Construction Details and Predicted Drawdown for Deeper Wells Within Two Miles of the Site

CLIENT: AES
PROJECT No.: N0492
LOCATION: North Fork
PROJECT DESCRIPTION: Proposed North Fork Casino
DATE: 1-Aug-08
BY: Ryan Farrell
REVISION: Mike Tietze

Well Reference No.[1]	Year Installed	Well Type	Depth (feet bgs)[2]	Screened Interval (feet bgs)[3]	Distance to Site Pumping Center (feet)[4]	Saturated Thickness (feet)[5]	Predicted Drawdown (feet)[6]			
							Option A (with recycling)	Option A (without recycling)	Option B (with recycling)	Option B (without recycling)
404	1994	domestic	325	265-325	7,200	133	1.8	2.6	1.1	1.6
325	2001	domestic	340	280-340	7,300	151	1.7	2.5	1.1	1.6
26	1994	domestic	315	255-315	7,400	117	1.7	2.5	1.0	1.6
367	unknown	unknown	340	280-340	7,400	147	1.7	2.5	1.0	1.6
403	1994	domestic	310	250-310	7,500	116	1.7	2.5	1.0	1.5
383	1994	domestic	315	255-315	7,500	120	1.7	2.5	1.0	1.5
420	2001	domestic	360	300-360	7,500	161	1.7	2.4	1.0	1.5
62	1972	irrigation	308	185-304	7,500	104	1.7	2.4	1.0	1.5
423	2001	domestic	300	240-300	7,500	110	1.7	2.4	1.0	1.5
377	1995	domestic	340	280-340	7,600	148	1.7	2.4	1.0	1.5
233	1987	domestic	260	200-260	7,600	63	1.6	2.4	1.0	1.5
53	1988	domestic	274	unknown	7,600	74	1.6	2.4	1.0	1.5
416	2000	domestic	300	240-300	7,600	110	1.6	2.4	1.0	1.5
389	1997	domestic	375	315-375	7,700	178	1.6	2.4	1.0	1.5
128	1978	irrigation	525	182-525	7,700	334	1.6	2.4	1.0	1.5
411	1999	domestic	340	280-340	7,700	145	1.6	2.4	1.0	1.5
427	1974	irrigation	330	190-326	7,700	140	1.6	2.3	1.0	1.5
326	2001	domestic	340	280-340	7,800	150	1.6	2.3	1.0	1.5
382	1992	domestic	300	240-300	7,900	110	1.6	2.3	1.0	1.4
39	1992	domestic	380	300-380	7,900	190	1.6	2.3	0.9	1.4
394	1994	domestic	336	unknown	8,000	143	1.5	2.3	0.9	1.4
48	1985	irrigation	316	180-312	8,000	115	1.5	2.3	0.9	1.4
77	1970	irrigation	501	192-489	8,000	281	1.5	2.2	0.9	1.4
412	2000	domestic	340	280-340	8,000	147	1.5	2.2	0.9	1.4
410	1998	domestic	340	300-340	8,000	142	1.5	2.2	0.9	1.4
135	1980	industrial	252	none	8,100	79	1.5	2.2	0.9	1.4
51	1983	domestic	284	268-280	8,200	79	1.5	2.2	0.9	1.4
395	1995	domestic	300	240-300	8,200	110	1.5	2.2	0.9	1.4
418	1998	domestic	340	280-340	8,300	147	1.5	2.2	0.9	1.4
89	1993	domestic	341	unknown	8,300	143	1.5	2.2	0.9	1.3
260	1997	domestic	336	276-336	8,400	140	1.5	2.1	0.9	1.3
378	1994	domestic	340	280-340	8,500	147	1.4	2.1	0.9	1.3
134	1978	irrigation	525	170-525	8,600	346	1.4	2.1	0.9	1.3
407	1994	domestic	300	240-300	8,600	107	1.4	2.1	0.9	1.3
424	2001	domestic	340	280-340	8,700	145	1.4	2.0	0.9	1.3
63	1999	domestic	400	220-400	8,700	200	1.4	2.0	0.8	1.3
93	1992	domestic	300	220-300	8,800	99	1.4	2.0	0.8	1.3
99	2000	domestic	300	240-300	8,900	99	1.4	2.0	0.8	1.3
54	1989	dom/irr	337	none	8,900	137	1.4	2.0	0.8	1.2
250	1993	domestic	338	273-333	9,000	143	1.3	2.0	0.8	1.2
238	1989	domestic	250	210-250	9,000	56	1.3	2.0	0.8	1.2
264	1993	domestic	313	253-313	9,000	121	1.3	2.0	0.8	1.2
57	1990	private	315	275-315	9,100	115	1.3	1.9	0.8	1.2
152	2001	domestic	300	240-300	9,100	124	1.3	1.9	0.8	1.2
372	1994	domestic	365	305-365	9,100	173	1.3	1.9	0.8	1.2
25	1998	irrigation	836	294-836	9,100	633	1.3	1.9	0.8	1.2
207	1985	domestic	330	270-300	9,100	133	1.3	1.9	0.8	1.2
263	1998	domestic	340	280-340	9,100	146	1.3	1.9	0.8	1.2
259	1997	domestic	353	293-353	9,200	160	1.3	1.9	0.8	1.2
283	2002	domestic	320	260-320	9,200	127	1.3	1.9	0.8	1.2
308	1995	domestic	359	299-359	9,200	174	1.3	1.9	0.8	1.2
95	1998	domestic	335	275-335	9,200	135	1.3	1.9	0.8	1.2
307	1992	domestic	320	240-320	9,200	135	1.3	1.9	0.8	1.2
15	1979	irrigation	630	250-630	9,300	420	1.3	1.9	0.8	1.2
282	2000	domestic	360	300-360	9,300	163	1.3	1.9	0.8	1.2
274	1999	domestic	320	260-320	9,300	135	1.3	1.9	0.8	1.2
5	1978	irrigation	456	210-450	9,400	240	1.3	1.9	0.8	1.2
258	1997	domestic	352	292-352	9,400	163	1.3	1.9	0.8	1.2
277	2000	domestic	360	300-360	9,400	162	1.3	1.9	0.8	1.2
29	2002	domestic	282	266-278	9,400	78	1.3	1.9	0.8	1.2
151	2001	domestic	300	240-300	9,400	119	1.3	1.9	0.8	1.2
201	1995	domestic	331	271-331	9,400	131	1.3	1.9	0.8	1.2
149	1994	domestic	330	270-330	9,500	150	1.3	1.8	0.8	1.2
309	1995	domestic	300	240-300	9,500	119	1.3	1.8	0.8	1.2
18	1991	domestic	302	290-298	9,600	87	1.2	1.8	0.8	1.1
245	1993	domestic	340	280-340	9,600	155	1.2	1.8	0.8	1.1
94	1998	domestic	356	296-356	9,600	156	1.2	1.8	0.8	1.1
87	1988	domestic	280	240-280	9,600	79	1.2	1.8	0.7	1.1

Table 2 - Construction Details and Predicted Drawdown for Deeper Wells Within Two Miles of the Site

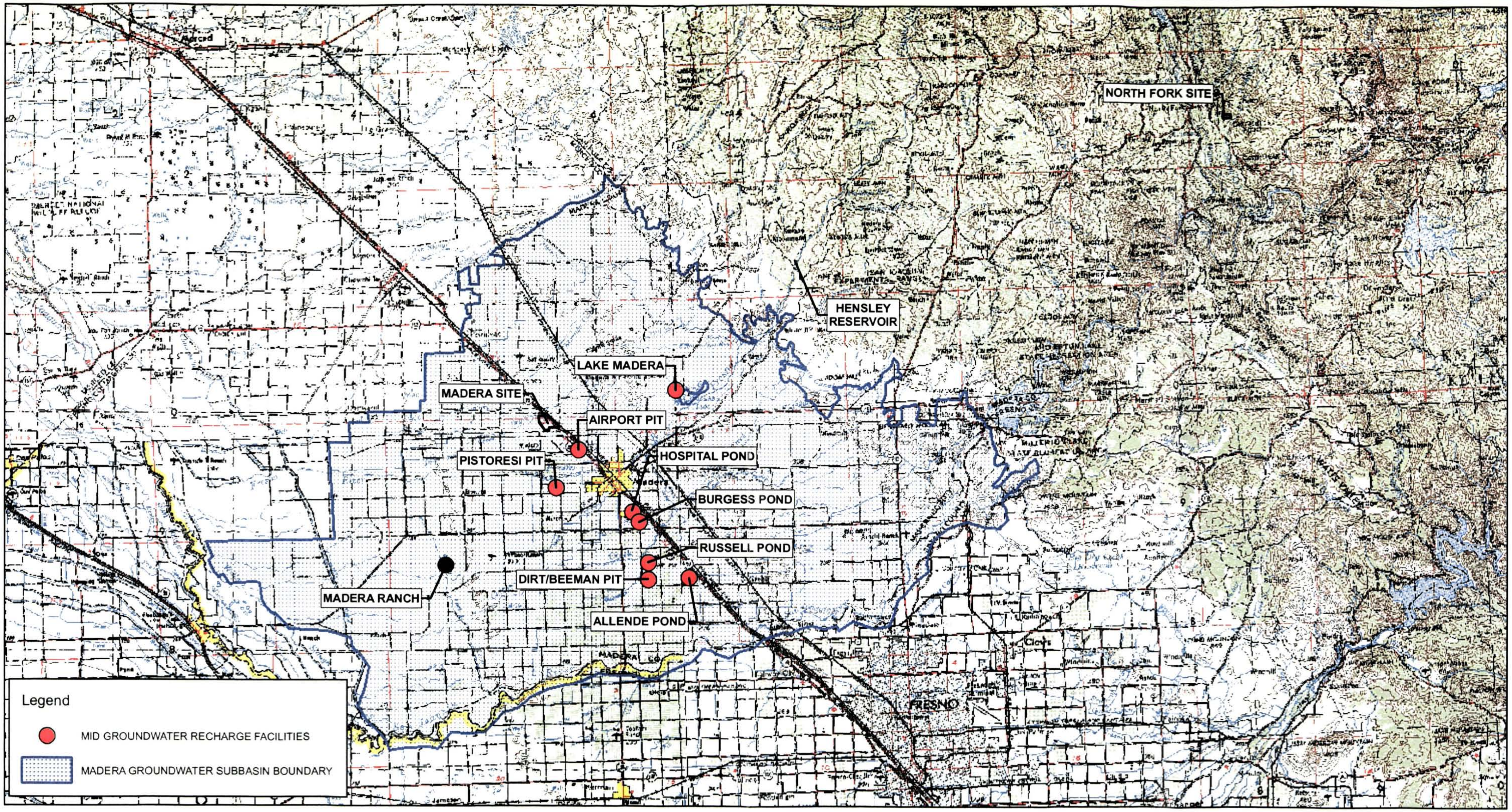
CLIENT: AES
PROJECT No.: N0492
LOCATION: North Fork
PROJECT DESCRIPTION: Proposed North Fork Casino
DATE: 1-Aug-08
BY: Ryan Farrell
REVISION: Mike Tietze

Well Reference No.[1]	Year Installed	Well Type	Depth (feet bgs)[2]	Screened Interval (feet bgs)[3]	Distance to Site Pumping Center (feet)[4]	Saturated Thickness (feet)[5]	Predicted Drawdown (feet)[6]			
							Option A (with recycling)	Option A (without recycling)	Option B (with recycling)	Option B (without recycling)
4	1978	irrigation	470	210-450	9,600	239	1.2	1.8	0.7	1.1
88	1990	domestic	280	200-280	9,600	80	1.2	1.8	0.7	1.1
248	1995	domestic	340	280-340	9,700	151	1.2	1.8	0.7	1.1
33	1982	irrigation	370	274-366	9,700	182	1.2	1.8	0.7	1.1
9	1998	domestic	460	0-460	9,700	252	1.2	1.8	0.7	1.1
61	1994	domestic	316	300-312	9,700	113	1.2	1.8	0.7	1.1
262	1998	domestic	355	295-355	9,700	164	1.2	1.8	0.7	1.1
42/43	2003	irrigation	600	296-592	9,700	399	1.2	1.8	0.7	1.1
37	1991	domestic	328	310-318	9,700	123	1.2	1.8	0.7	1.1
273	1999	domestic	340	280-340	9,800	145	1.2	1.8	0.7	1.1
255	1992	domestic	300	220-300	9,800	108	1.2	1.8	0.7	1.1
92	1995	domestic	333	273-333	9,800	132	1.2	1.8	0.7	1.1
279	2000	domestic	340	280-340	9,800	146	1.2	1.8	0.7	1.1
148	1990	private	290	250-290	9,800	110	1.2	1.8	0.7	1.1
253	1992	domestic	320	260-320	9,900	131	1.2	1.7	0.7	1.1
197	1995	domestic	340	280-340	9,900	149	1.2	1.7	0.7	1.1
266	1993	domestic	315	255-315	9,900	130	1.2	1.7	0.7	1.1
6	1984	domestic	295	none	9,900	84	1.2	1.7	0.7	1.1
45	1974	irrigation	292	170-290	9,900	108	1.2	1.7	0.7	1.1
314	1997	domestic	300	240-300	9,900	120	1.2	1.7	0.7	1.1
267	1993	domestic	340	280-340	10,000	149	1.2	1.7	0.7	1.1
49	1987	dom/irr	278	264-276	10,000	79	1.2	1.7	0.7	1.1
212	2001	domestic	340	280-340	10,000	139	1.2	1.7	0.7	1.1
276	2001	domestic	340	280-340	10,000	152	1.2	1.7	0.7	1.1
261	1997	domestic	355	295-355	10,100	163	1.2	1.7	0.7	1.1
97	1994	domestic	315	255-315	10,100	118	1.2	1.7	0.7	1.1
241	1990	domestic	260	220-260	10,100	68	1.1	1.7	0.7	1.1
150	1999	domestic	360	300-360	10,200	185	1.1	1.7	0.7	1.0
284	2002	domestic	360	300-360	10,200	177	1.1	1.7	0.7	1.0
350	1988	domestic	260	200-260	10,200	69	1.1	1.7	0.7	1.0
38	1992	irrigation	436	unknown	10,200	256	1.1	1.7	0.7	1.0
324	2000	domestic	340	280-340	10,200	149	1.1	1.7	0.7	1.0
361	1989	domestic	280	200-280	10,300	89	1.1	1.7	0.7	1.0
275	1999	domestic	320	260-320	10,300	134	1.1	1.6	0.7	1.0
337	2003	domestic	360	300-360	10,300	180	1.1	1.6	0.7	1.0
200	1995	domestic	361	301-361	10,300	163	1.1	1.6	0.7	1.0
271	1994	domestic	330	270-330	10,400	143	1.1	1.6	0.7	1.0
249	1995	domestic	320	265-320	10,400	137	1.1	1.6	0.7	1.0
74	1989	domestic	300	unknown	10,400	89	1.1	1.6	0.7	1.0
321	2000	domestic	340	280-340	10,400	158	1.1	1.6	0.7	1.0
215	1999	unknown	320	260-320	10,400	120	1.1	1.6	0.7	1.0
96	1993	domestic	312	252-312	10,500	113	1.1	1.6	0.7	1.0
198	1995	domestic	340	280-340	10,500	138	1.1	1.6	0.7	1.0
281	2000	domestic	350	290-350	10,600	150	1.1	1.6	0.7	1.0
363	1990	domestic	260	220-260	10,600	78	1.1	1.6	0.7	1.0
402	1993	domestic	350	290-350	10,600	165	1.1	1.6	0.7	1.0
22	2003	irrigation	420	unknown	10,600	208	1.1	1.6	0.7	1.0
278	2000	domestic	350	290-350	10,700	165	1.1	1.6	0.6	1.0
23	1976	domestic	264	190-260	10,800	48	1.0	1.5	0.6	1.0
203	1995	domestic	350	290-350	10,900	153	1.0	1.5	0.6	0.9
85	1988	domestic	260	200-260	11,000	61	1.0	1.5	0.6	0.9
19	1992	irrigation	350	338-346	11,000	134	1.0	1.5	0.6	0.9
3	1966	unknown	428	210-420	11,000	208	1.0	1.5	0.6	0.9
10	1994	domestic	335	unknown	11,000	123	1.0	1.5	0.6	0.9

Notes:

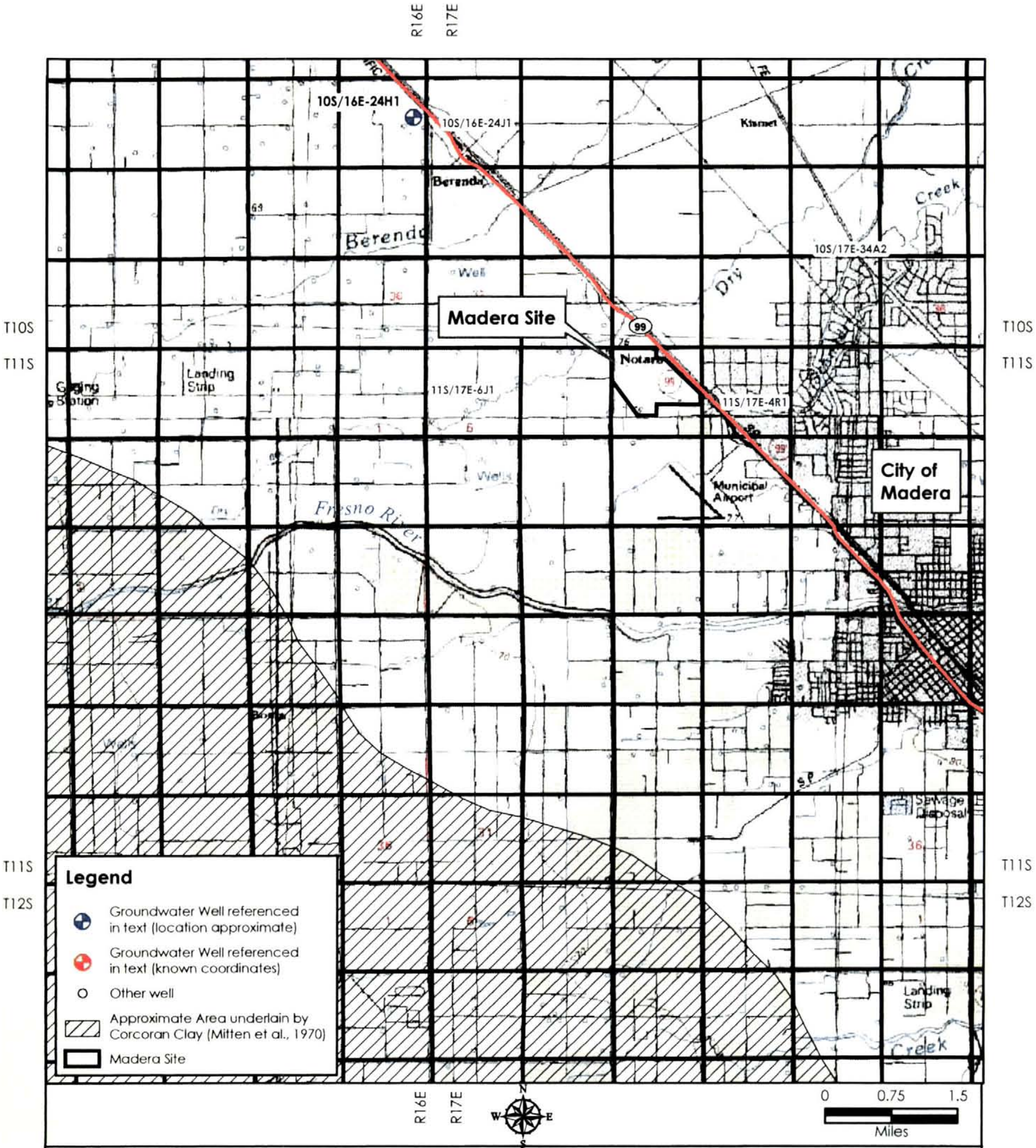
1. Approximate locations of wells are plotted on **Figure 10**. Locations were plotted based on sketched maps available from DWR or addresses and were not field ver
2. bgs = below ground surface.
3. Range represents the top and bottom of the reported screened intervals and may include multiple screened intervals. None means the well has an open bottom.
4. Approximate distance from center of the area designated for installaton of project water supply well(s) (see **Figure 10**) rounded to the nearest 100 feet.
5. Estimated difference between the bottom of the well and the reported groundwater level at the well location in 2006 (Figure 5). In case the bottom of the reported s interval does not extend to the bottom of the well, the bottom of the screened interval is used.
6. Predicted drawdown based on analytical model (**Figure 11**), rounded to the nearest 0.1 foot.

FIGURES



NOTE; Groundwater recharge facilities approximated from "Groundwater Recharge Facilities" Figure 1-1 BOYLE ENGINEERING CORP.
All locations approximate

PROPOSED NORTH FORK CASINO	WorleyParsons resources & energy		
REGIONAL MAP	SWL	MT	11/2006
	N0492		1



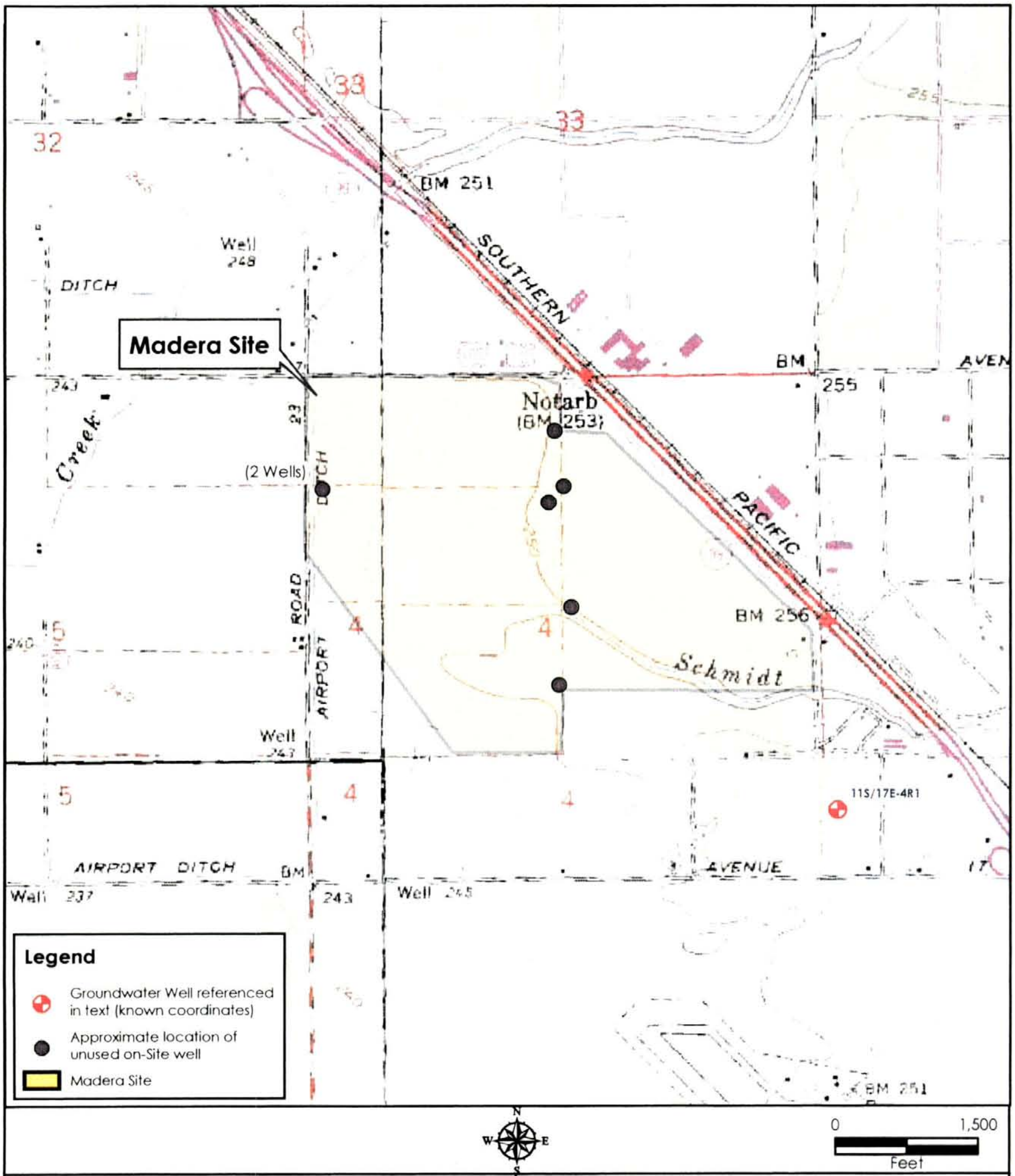
PROPOSED NORTH FORK CASINO

WorleyParsons

resources & energy

MADERA SITE VICINITY

SWL	MT	05/2005
N0492	**2**	



PROPOSED NORTH FORK CASINO

WorleyParsons
resources & energy

MADERA SITE VICINITY

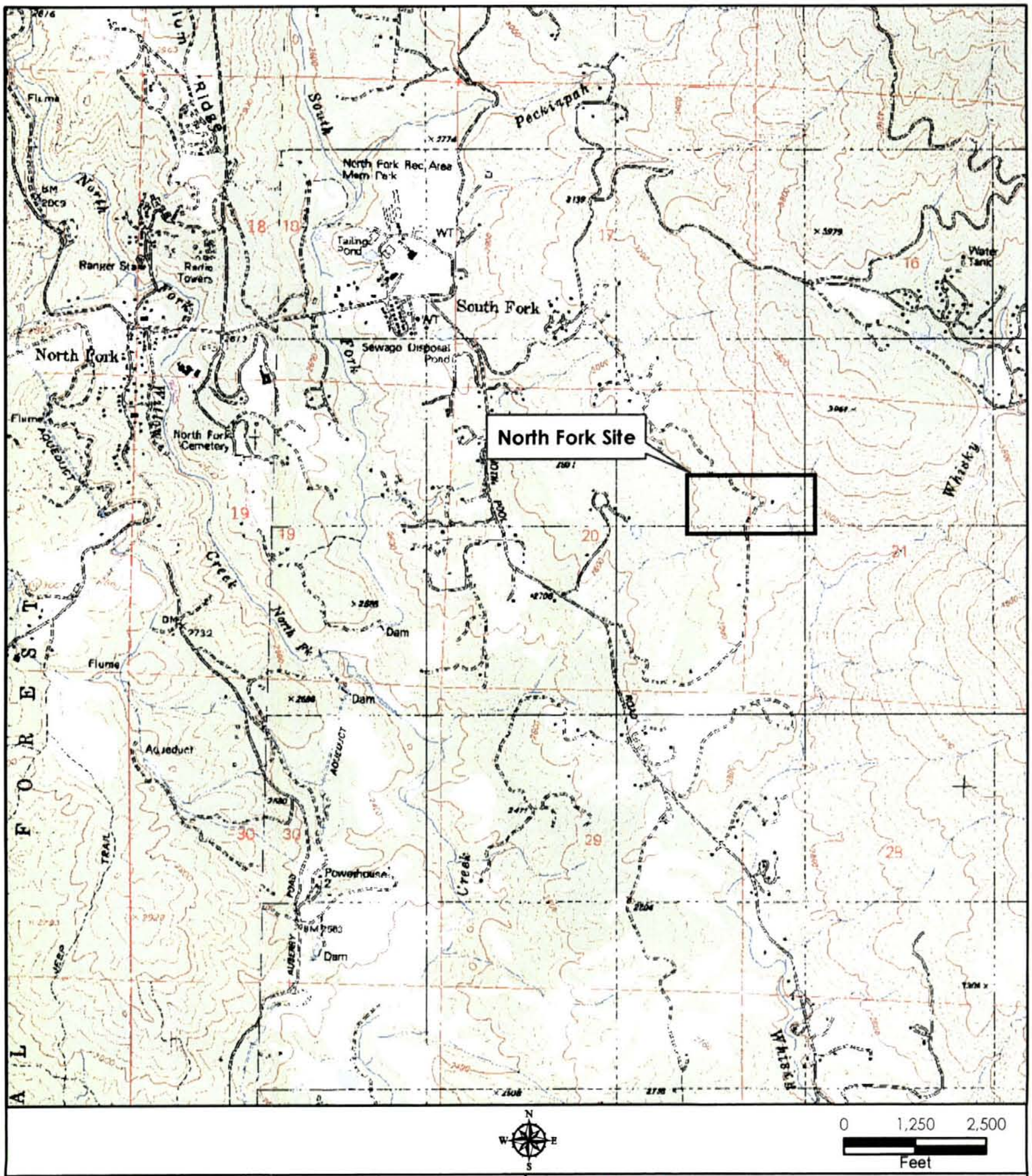
SWL

MT

05/2005

N0492

3



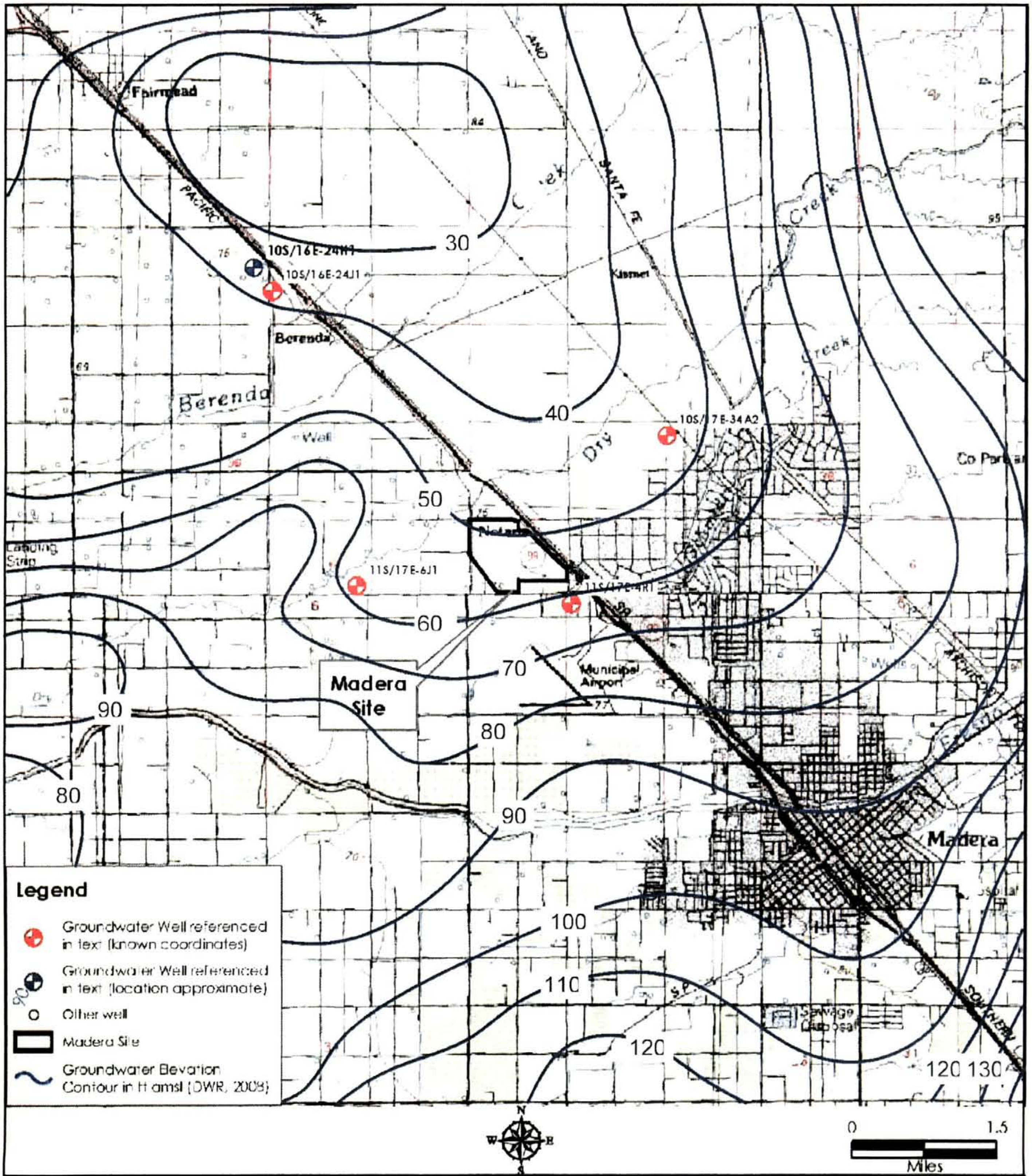
PROPOSED NORTH FORK CASINO

WorleyParsons

resources & energy

NORTH FORK SITE

SWL	MT	05/2005
N0492	4	

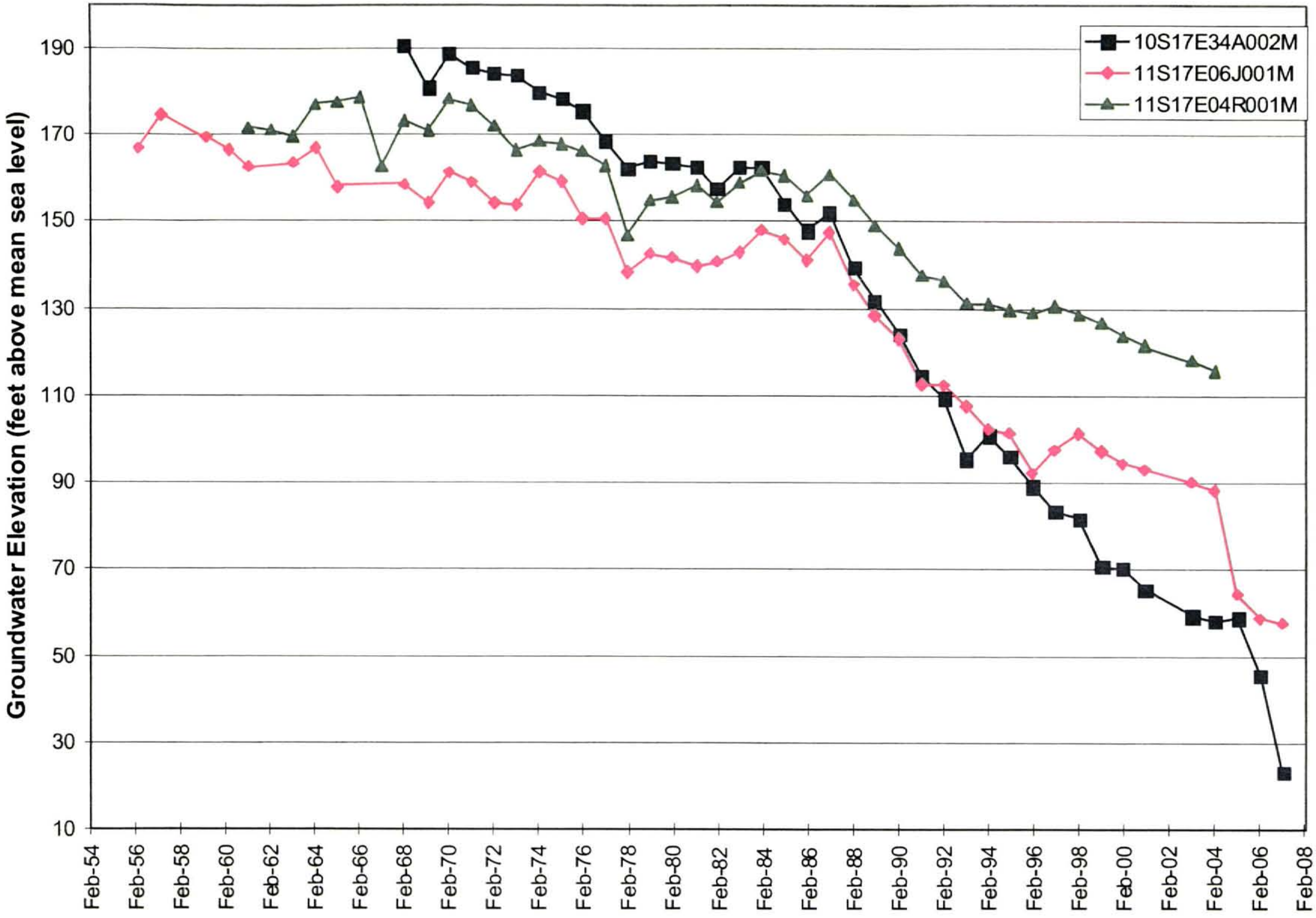


Proposed North Fork Casino

WorleyParsons
resources & energy

SPRING 2006 GROUNDWATER ELEVATIONS IN THE MADERA VICINITY

RDF	MT	7/2008
6N0492		5

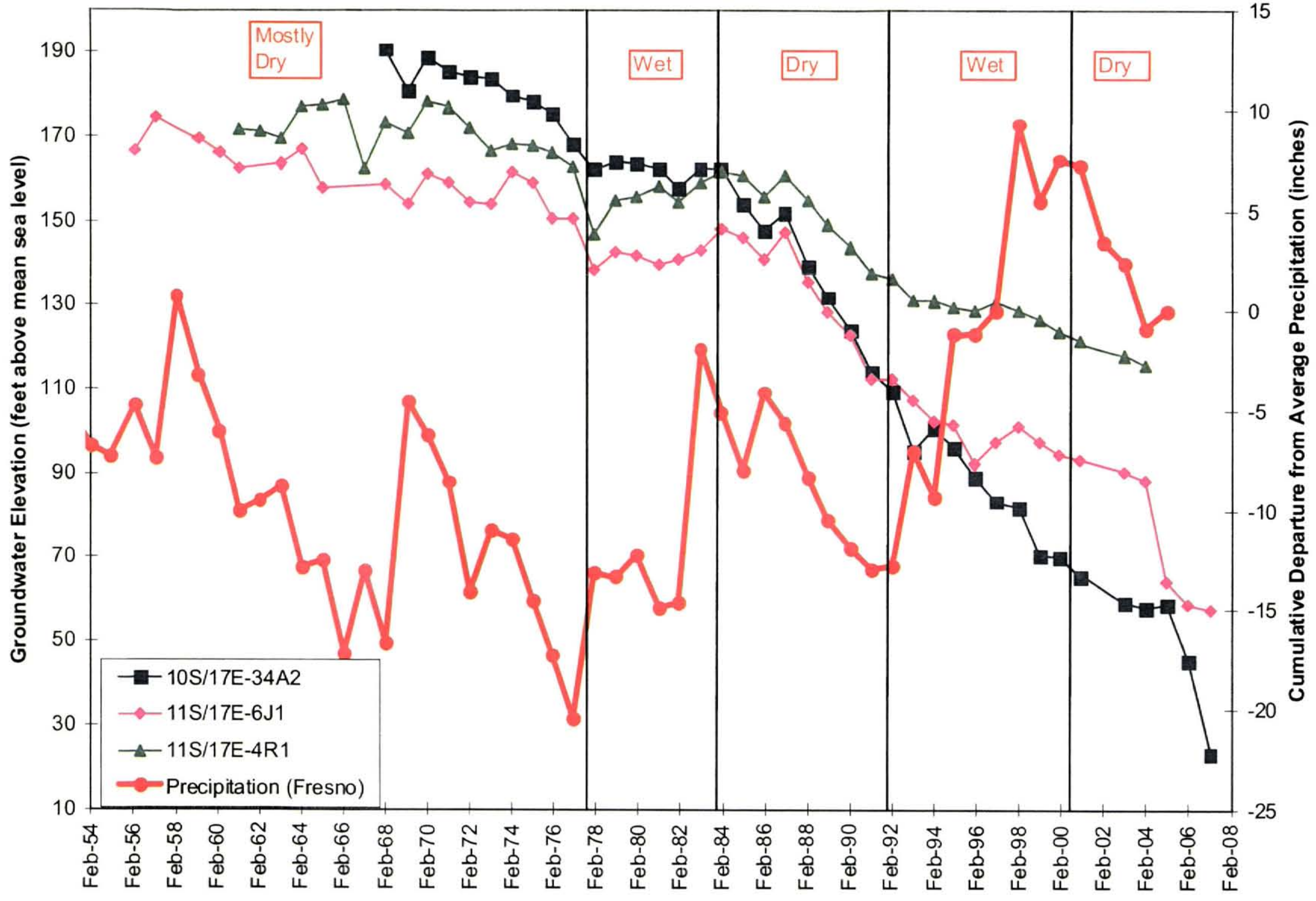


PROPOSED NORTH FORK CASINO

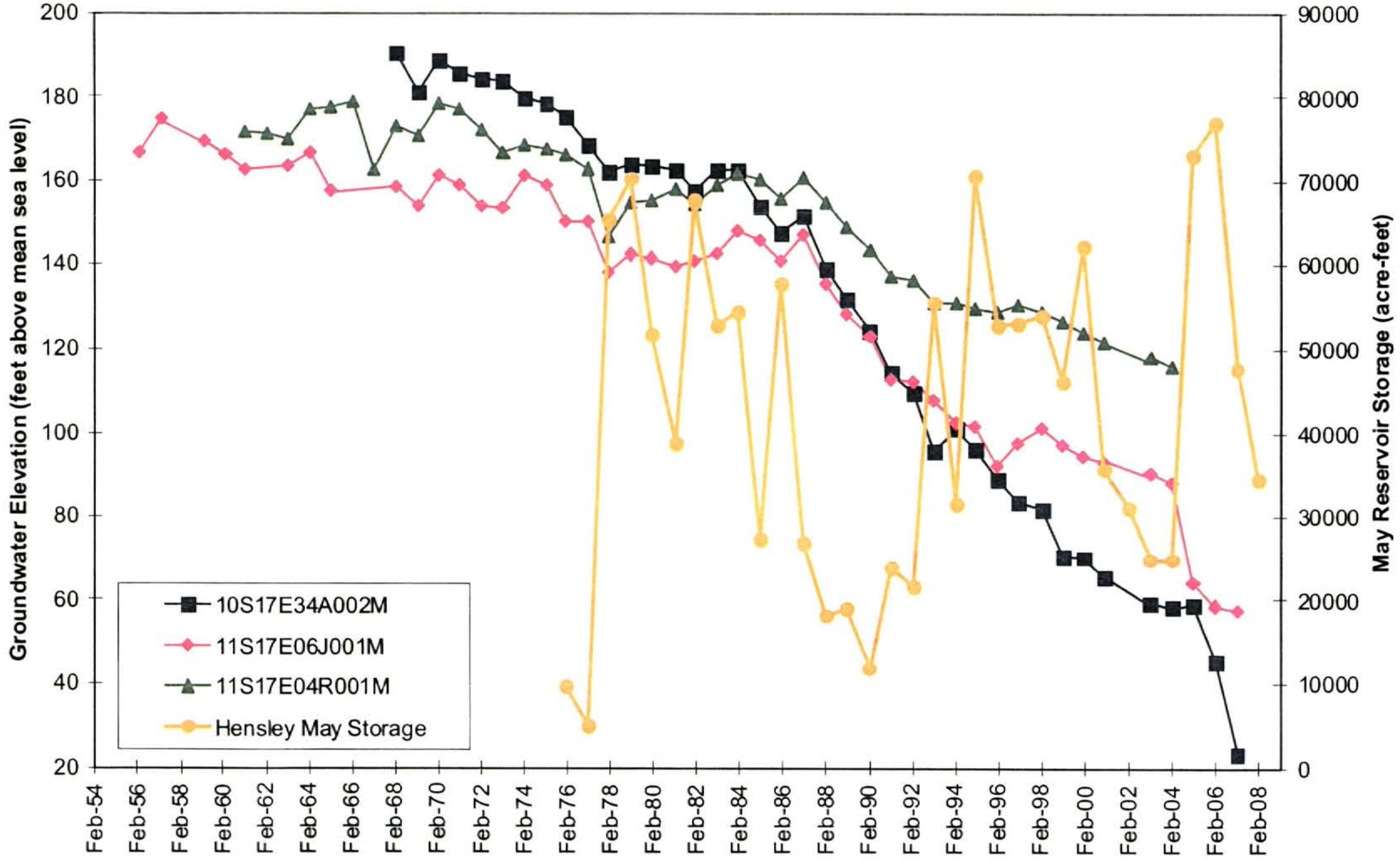
WorleyParsons
resources & energy

MADERA SITE VICINITY WELL HYDROGRAPHS

RDF
MT
10/2008
6N0492A
6



PROPOSED NORTH FORK CASINO		WorleyParsons resources & energy		
MADERA SITE VICINITY WELL HYDROGRAPHS COMPARED TO CUMULATIVE DEPARTURE FROM AVERAGE PRECIPITATION	RDF	MT	10/2008	
	6N0492A	7		

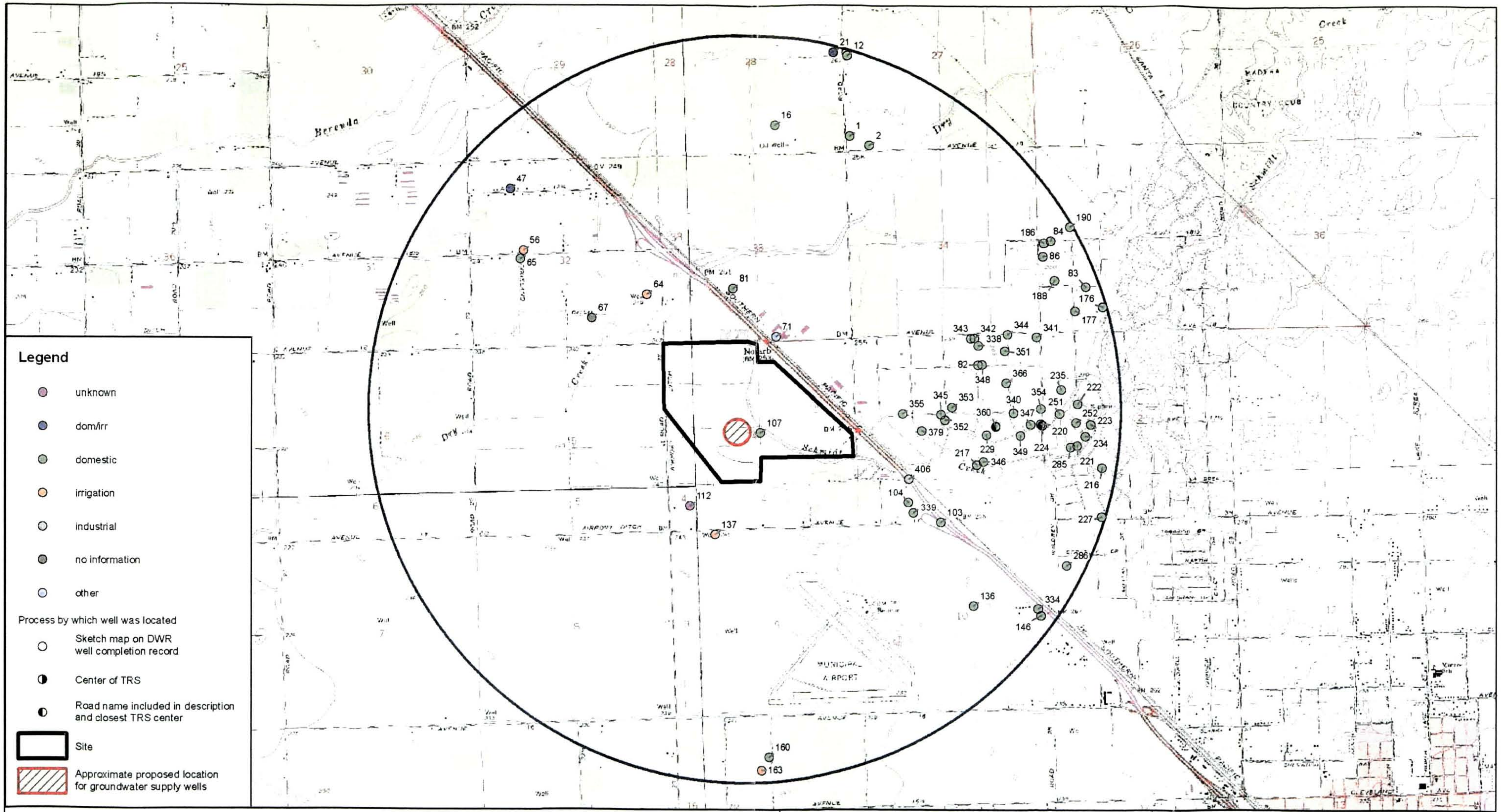


PROPOSED NORTH FORK CASINO

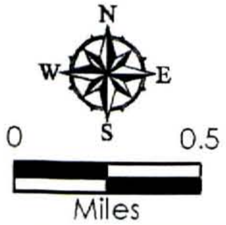
WorleyParsons
resources & energy

MADERA SITE VICINITY WELL HYDROGRAPHS COMPARED TO STORAGE IN HENSLEY RESERVOIR

RDF | MT | 10/2008
6N0492A | 8



All well locations are approximate,
based on the methods used and
were not field verified.
Locations of monitoring wells and
test wells were not plotted.
See Table 1 for well completion details.
TRS = Township-Range-Section

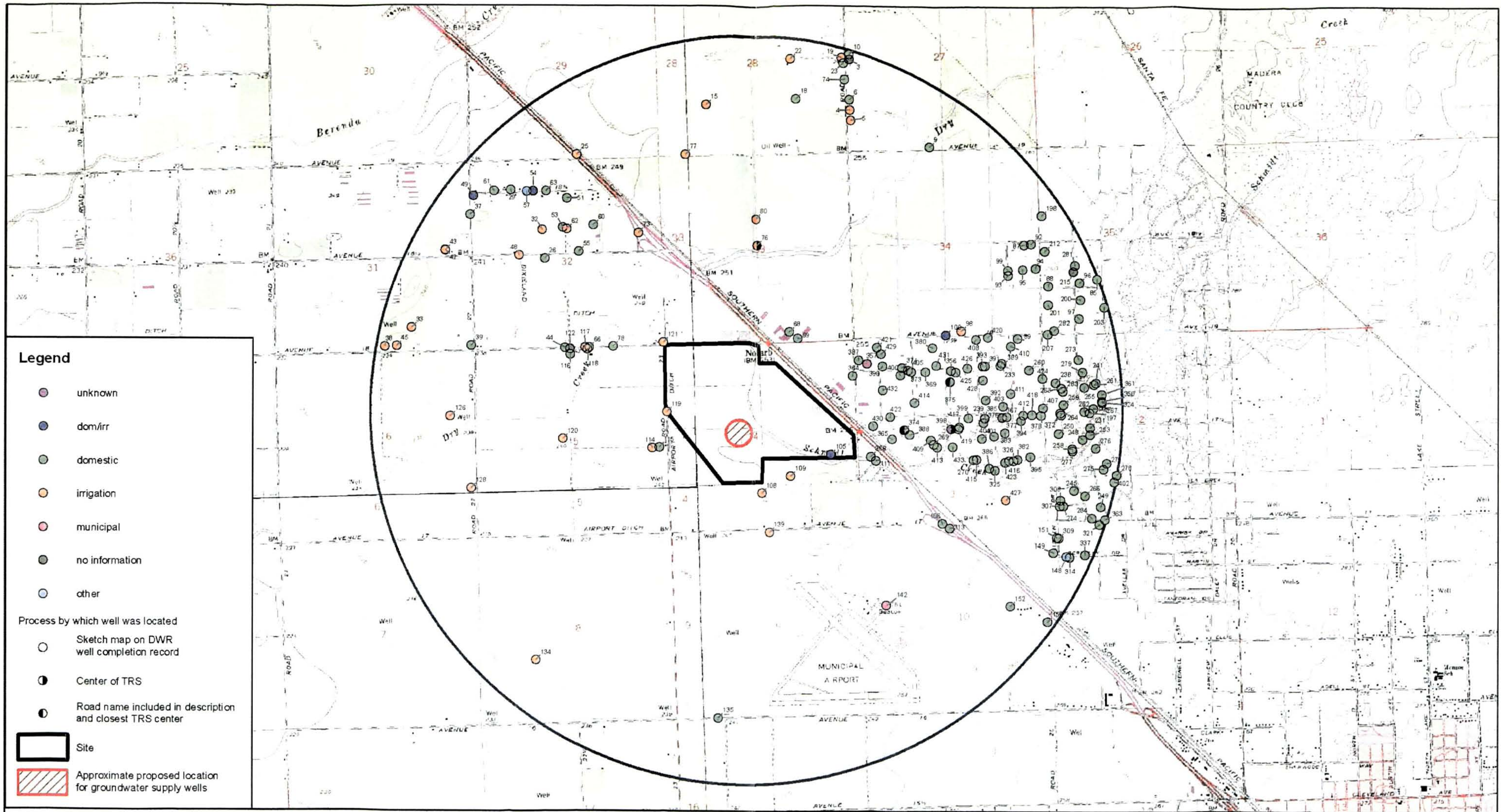


PROPOSED NORTHFORK CASINO

WorleyParsons
resources & energy

APPROXIMATE LOCATION OF SHALLOW WELLS

RDF	MT	07/2008
N0492		9



Legend

- ● unknown
- ● dom/irr
- ● domestic
- ● irrigation
- ● municipal
- ● no information
- ● other

Process by which well was located

- ○ Sketch map on DWR well completion record
- ◑ Center of TRS
- ◐ Road name included in description and closest TRS center
- ▭ Site
- ▨ Approximate proposed location for groundwater supply wells

All well locations are approximate, based on the methods used and were not field verified.
Locations of monitoring wells and test wells were not plotted.
See Table 1 for well completion details.
TRS = Township-Range-Section

N
W E
S
0 0.5
Miles

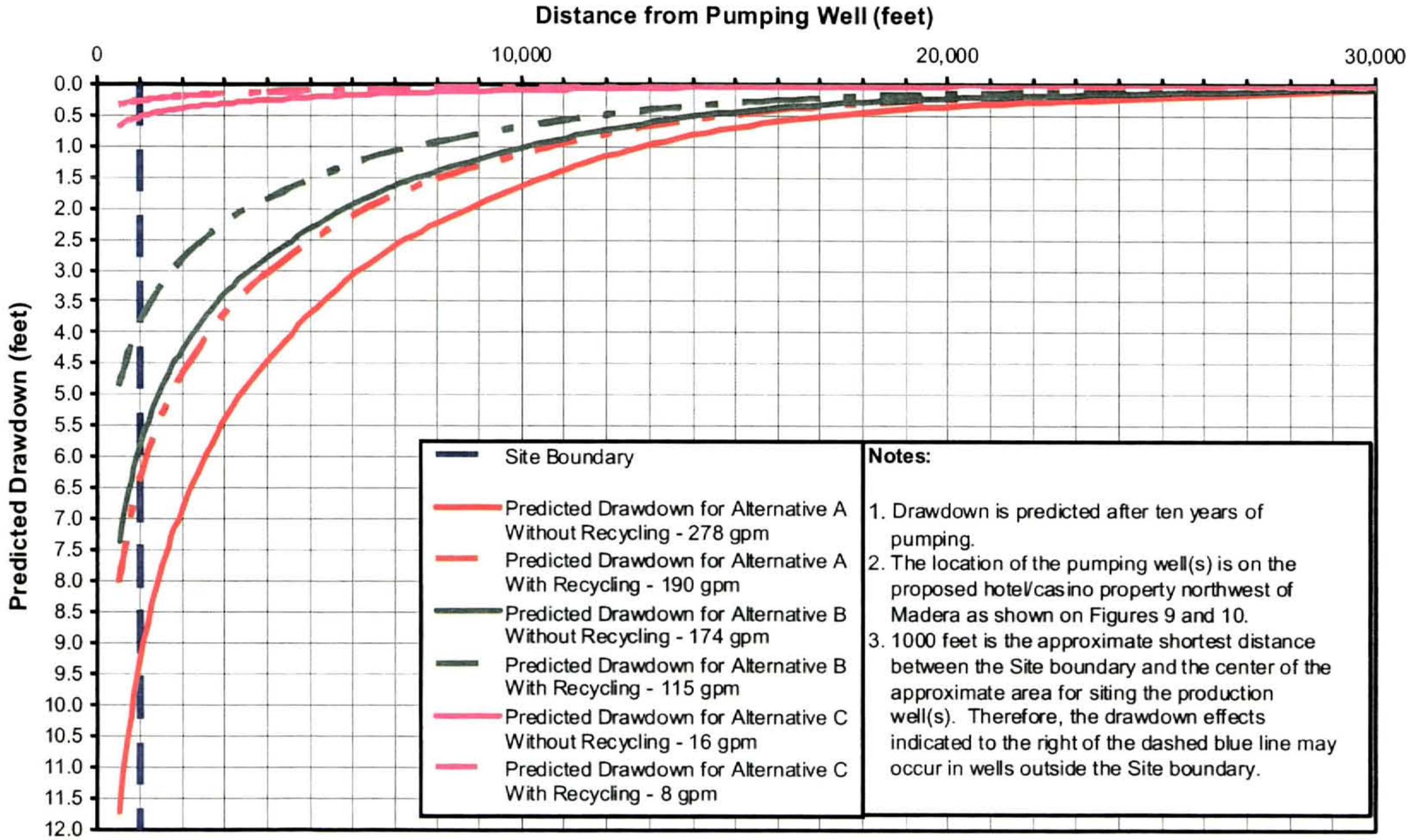
PROPOSED NORTHFORK CASINO

WorleyParsons
resources & energy

APPROXIMATE LOCATION OF DEEP WELLS

RDF	MT	07/2008
N0492	10	

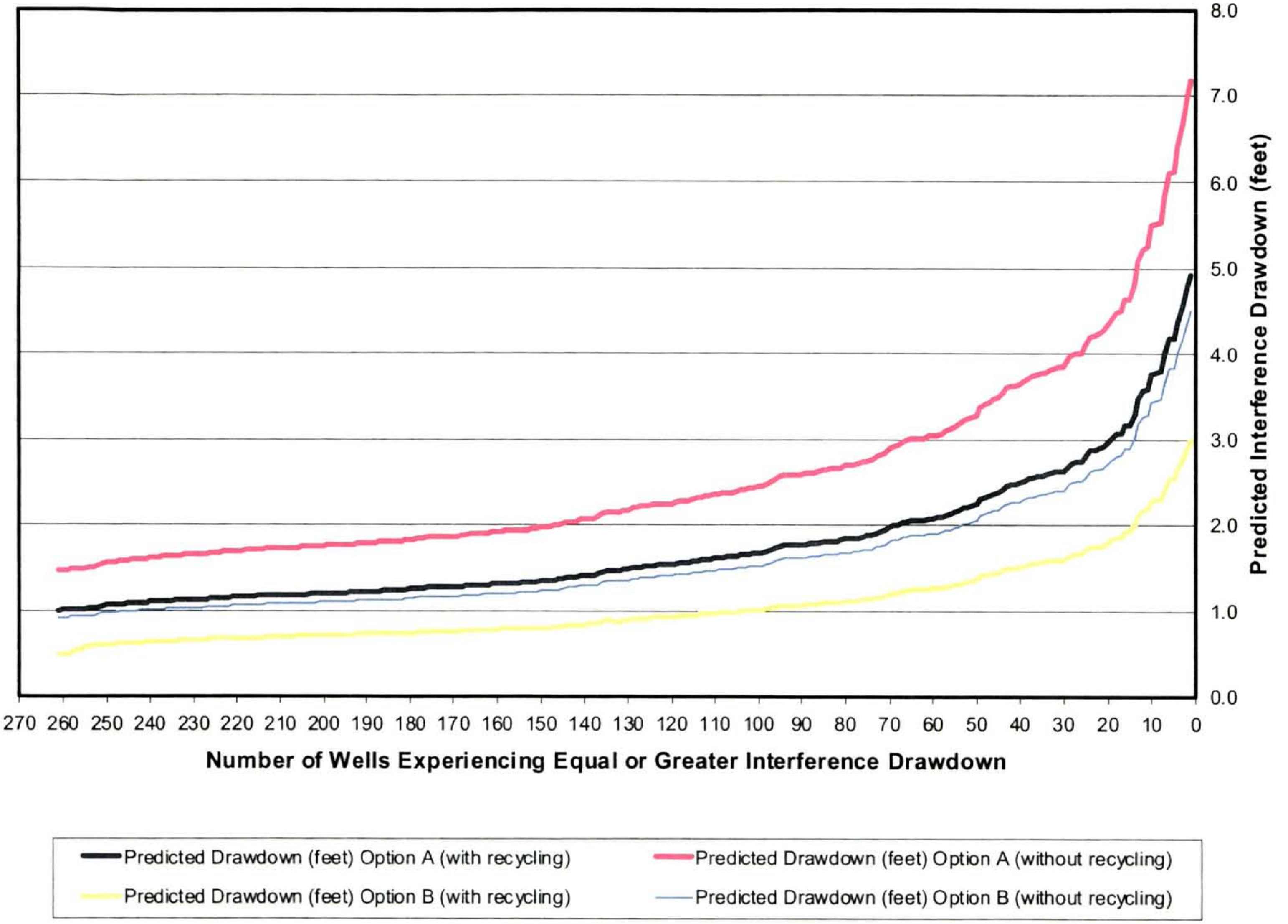
Figure 11 - Distance-Drawdown Prediction for the Proposed Pumping Well(s)



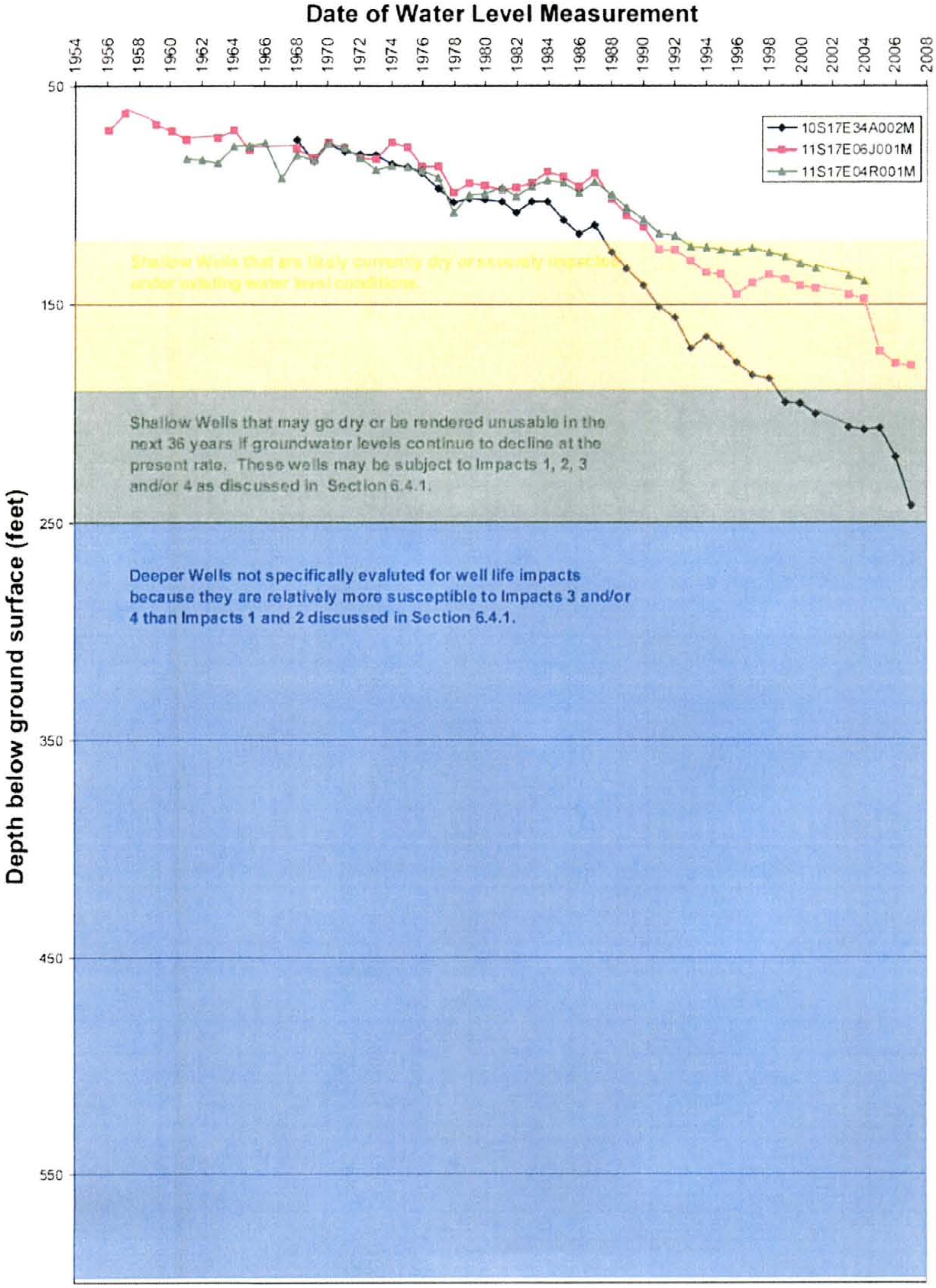
Notes:

1. Drawdown is predicted after ten years of pumping.
2. The location of the pumping well(s) is on the proposed hotel/casino property northwest of Madera as shown on Figures 9 and 10.
3. 1000 feet is the approximate shortest distance between the Site boundary and the center of the approximate area for siting the production well(s). Therefore, the drawdown effects indicated to the right of the dashed blue line may occur in wells outside the Site boundary.

PROPOSED NORTH FORK CASINO	WorleyParsons resources & energy		
DISTANCE - DRAWDOWN PREDICTION FOR THE PROPOSED PUMPING WELL(S)	RDF	MT	10/2008
	6N0492A	11	



PROPOSED NORTH FORK CASINO	WorleyParsons resources & energy		
PREDICTED INTERFERENCE DRAWDOWN IMPACTS ON OFF-SITE WELLS WITHIN 2 MILES OF THE PROPOSED PROJECT WELL(S)	RDF	MT	10/2008
	6N0492A		12



PROPOSED NORTH FORK CASINO	**WorleyParsons** resources & energy			
KEY WELL HYDROGRAPHS AND POTENTIAL IMPACTS TO NEARBY WELLS	RDF	MT	10/200	
	6N0492A	13		

Appendix A

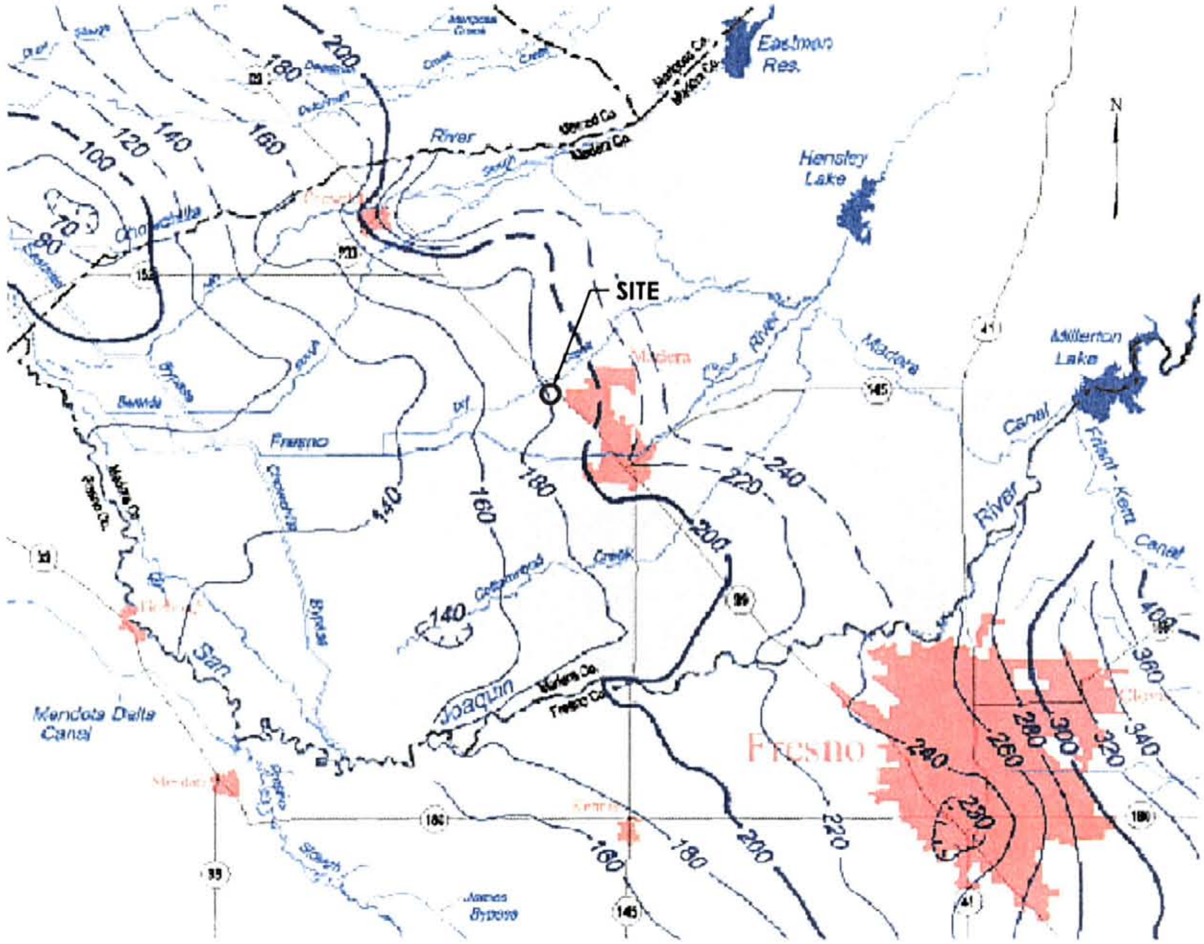
DWR interpretations of groundwater elevation in the Madera subbasin

Madera Groundwater Basin

Spring 1958, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles
2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10, 20 and 40 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

KOMEX

PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

PROPOSED NORTH FORK CASINO

CT 05/2005
AB N0492A

GROUNDWATER ELEVATION CONTOURS, SPRING 1958

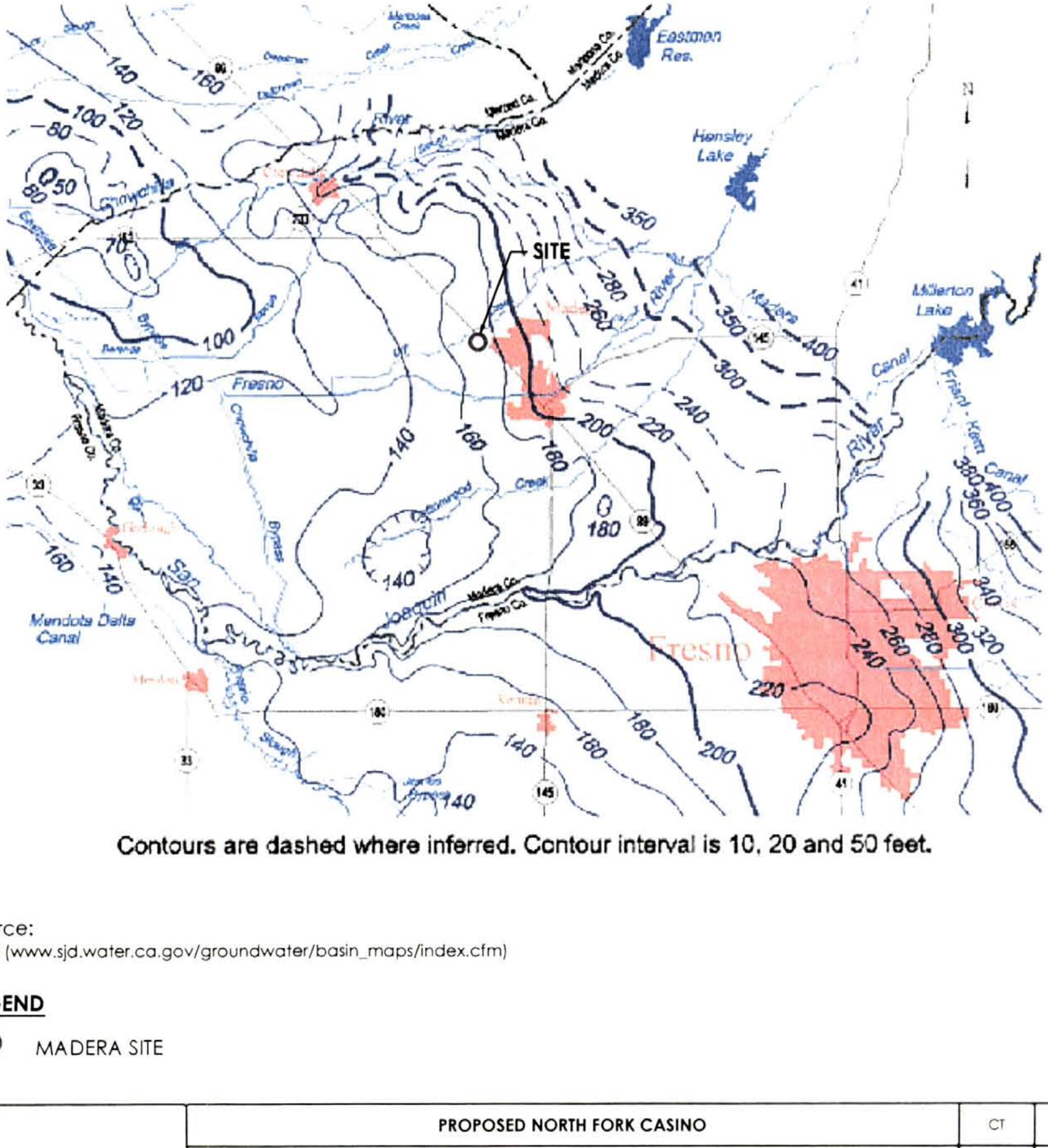
A

Madera Groundwater Basin

Spring 1962, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles
2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

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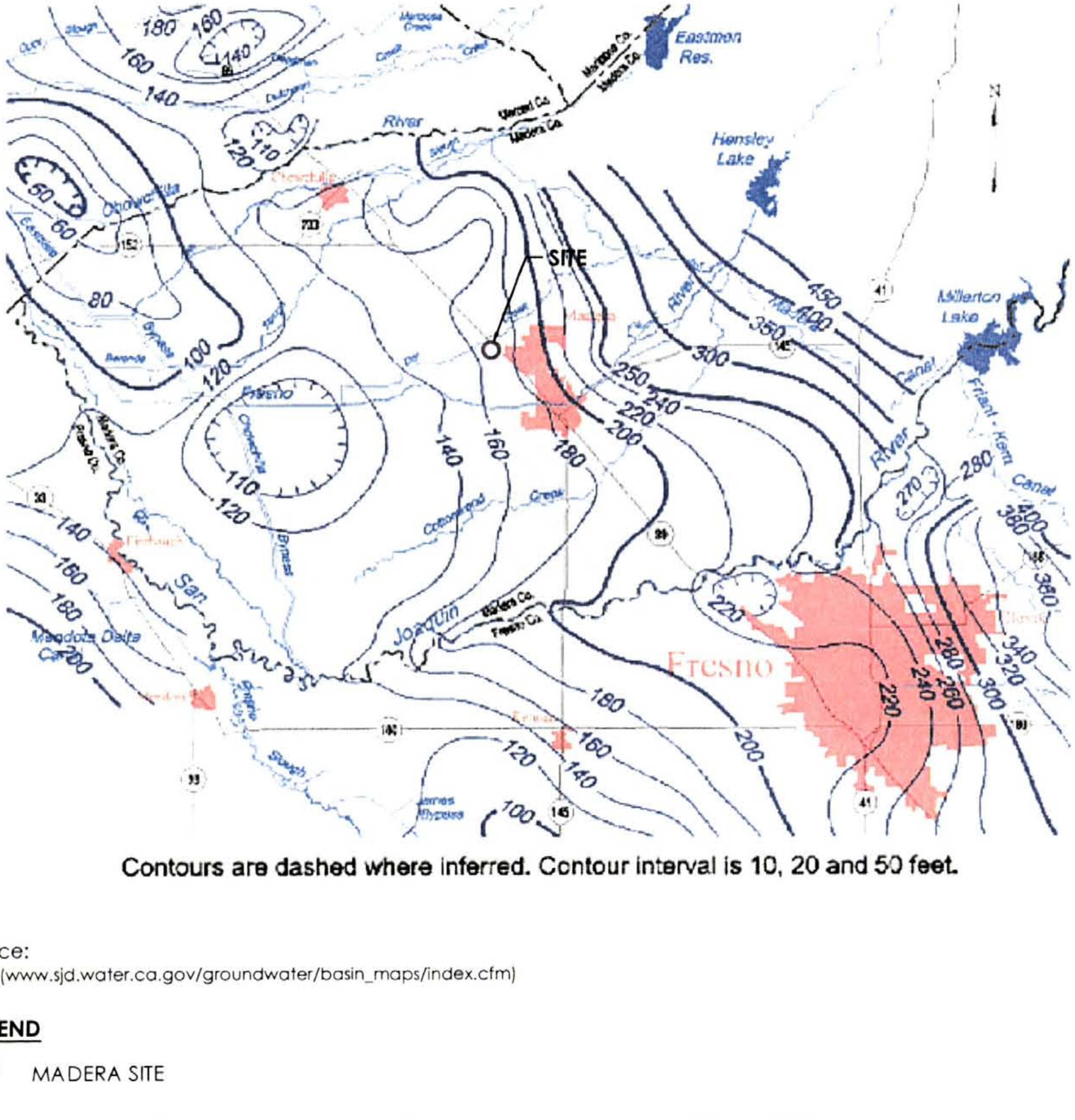
PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1962	A	

Madera Groundwater Basin

Spring 1969, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles
2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

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PROPOSED NORTH FORK CASINO

GROUNDWATER ELEVATION CONTOURS, SPRING 1969

CT	05/2005
AB	N0492A

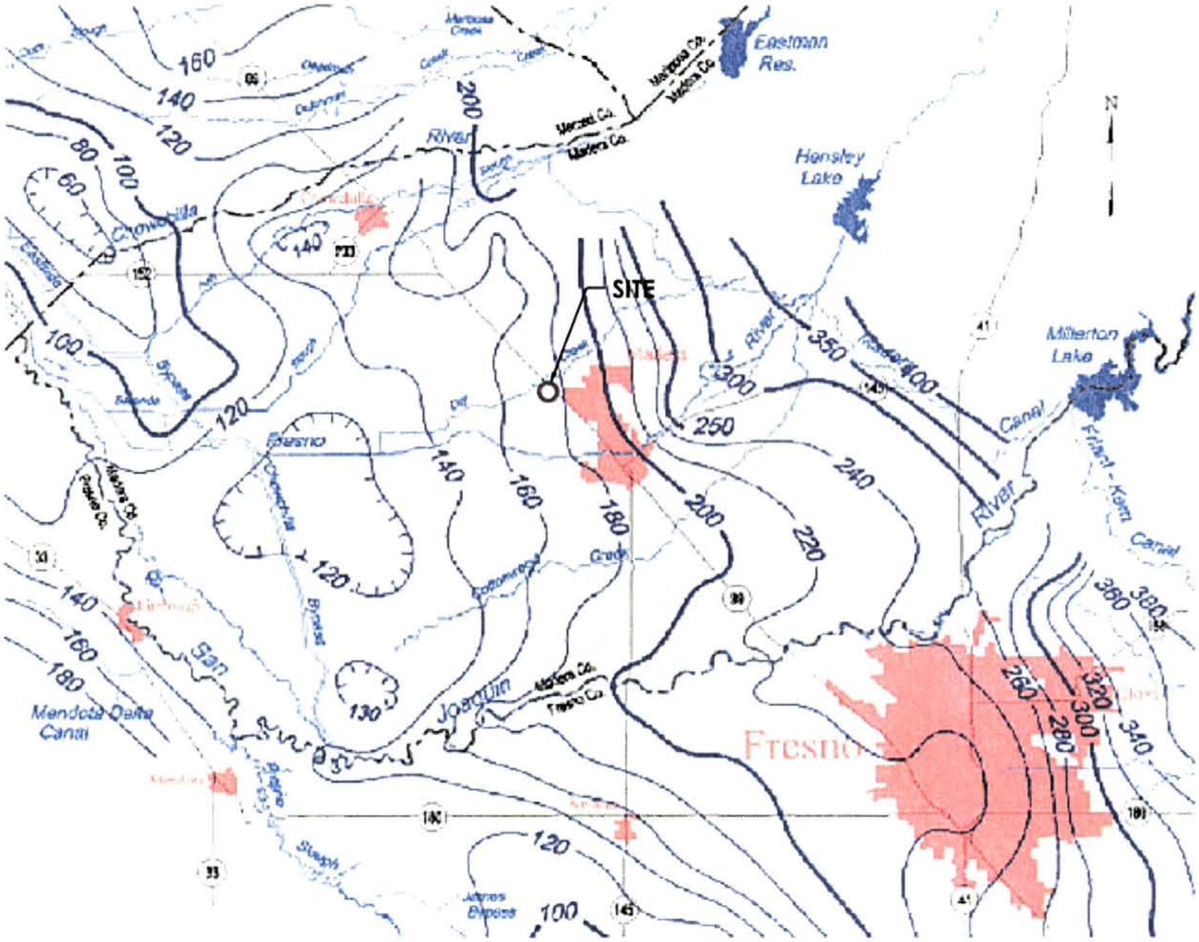
A

Madera Groundwater Basin

Spring 1970, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles
2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

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PROPOSED NORTH FORK CASINO

GROUNDWATER ELEVATION CONTOURS, SPRING 1970

CT 05/2005
AB N0492A

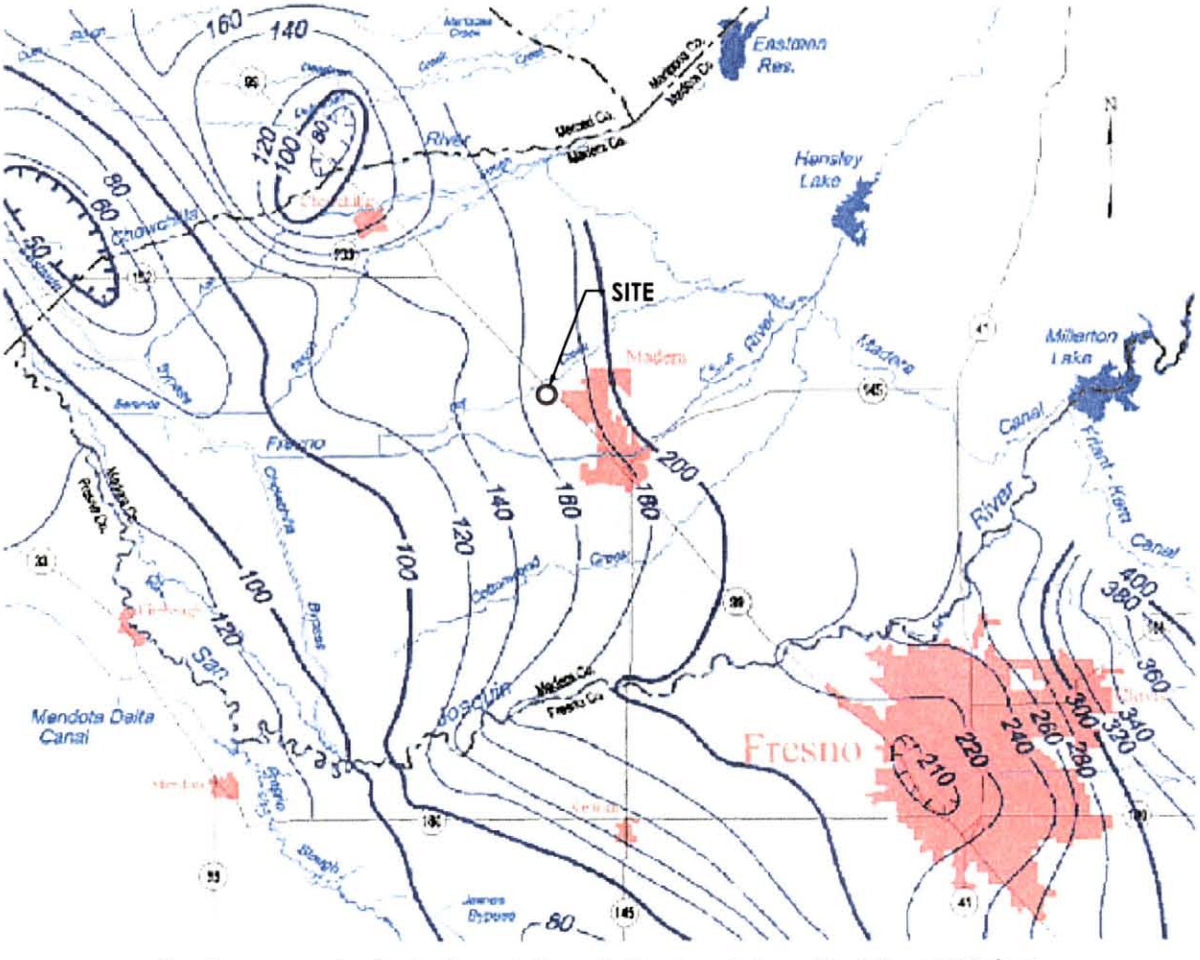
A

Madera Groundwater Basin

Spring 1976, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles
2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

KOMEX

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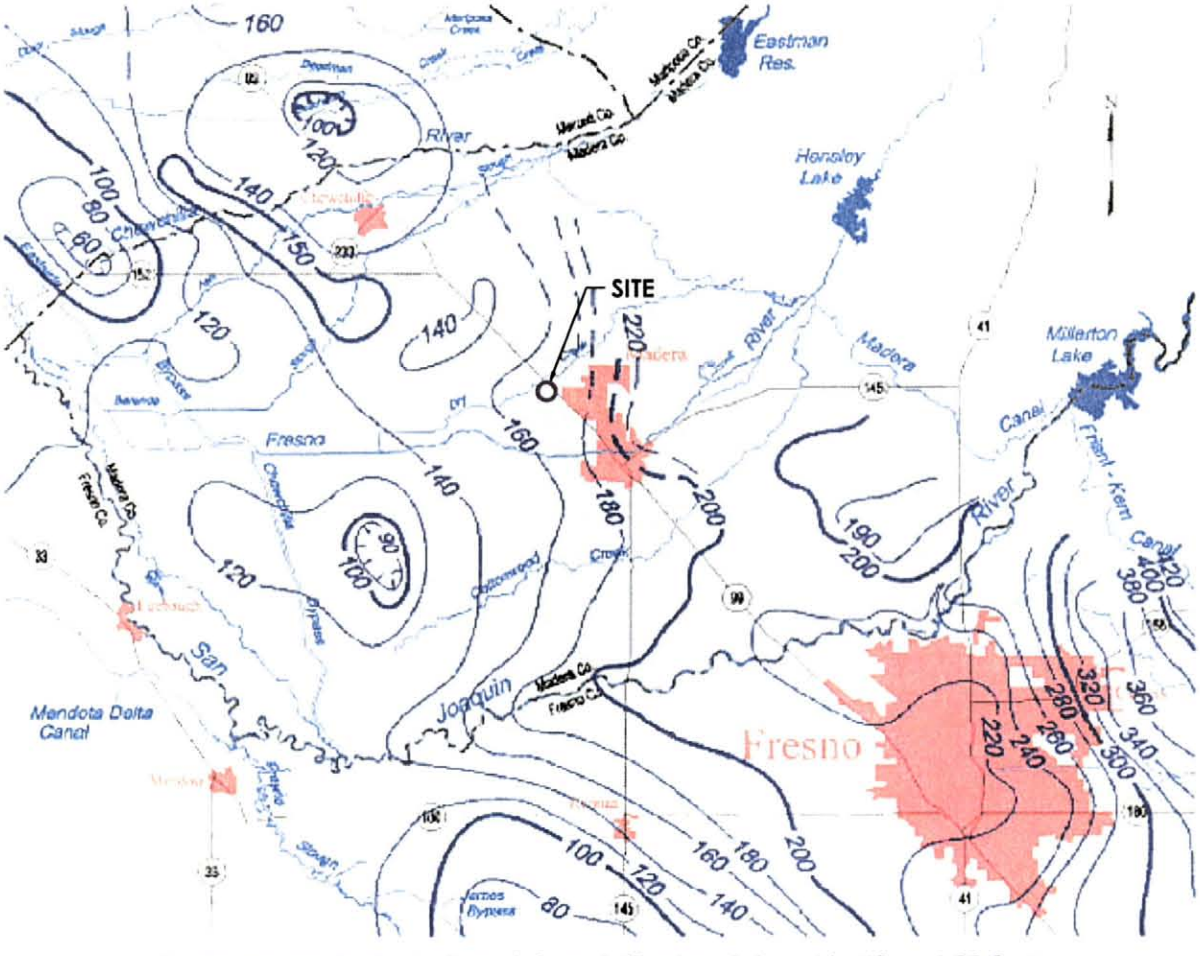
PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1976	**A**	

Madera Groundwater Basin

Spring 1984, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles
2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

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PROPOSED NORTH FORK CASINO

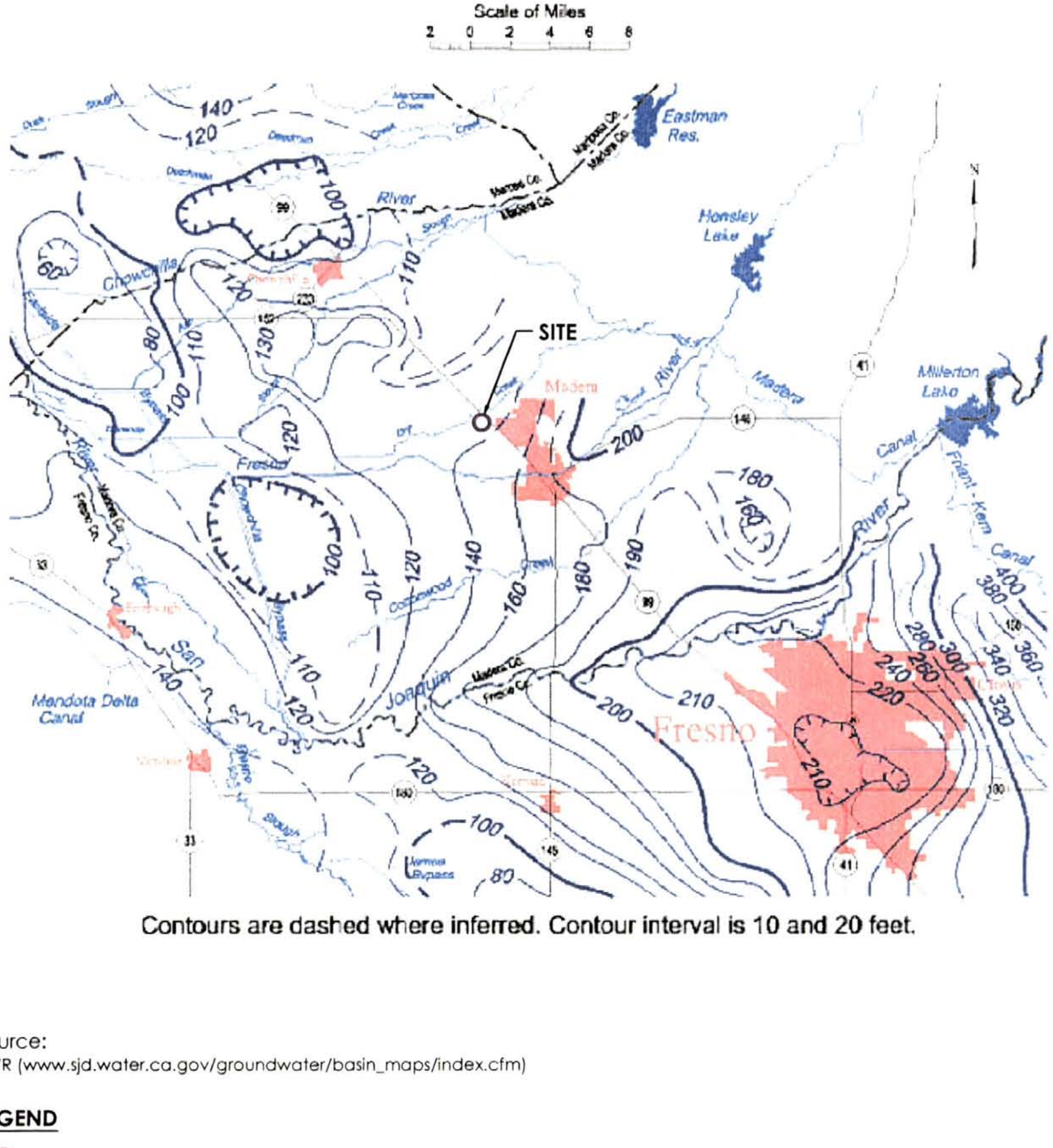
GROUNDWATER ELEVATION CONTOURS, SPRING 1984

CT	05/2005
AB	N0492A

A

Madera Groundwater Basin

Spring 1989, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO

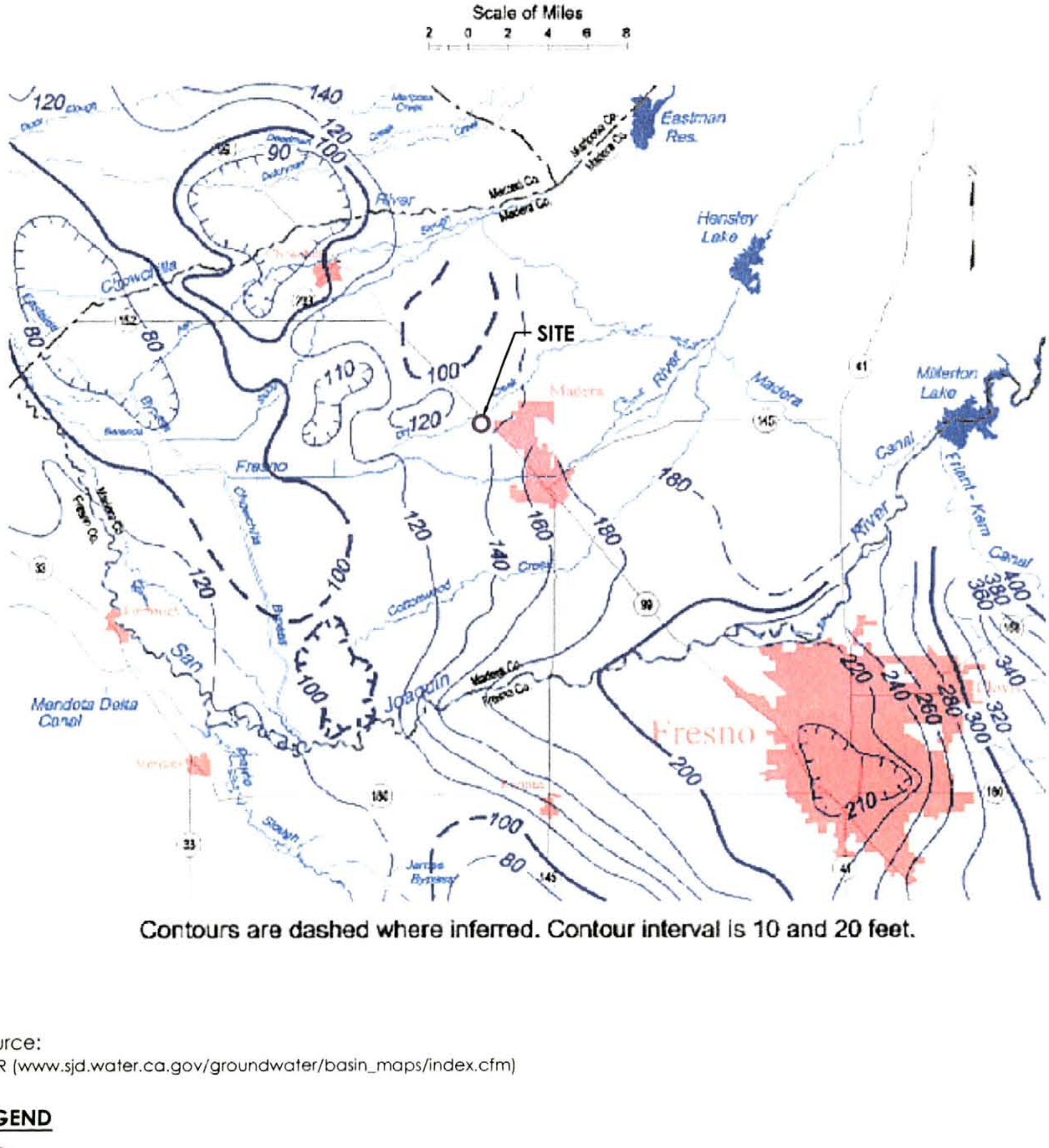
GROUNDWATER ELEVATION CONTOURS, SPRING 1989

CT	05/2005
AB	N0492A

A

Madera Groundwater Basin

Spring 1990, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

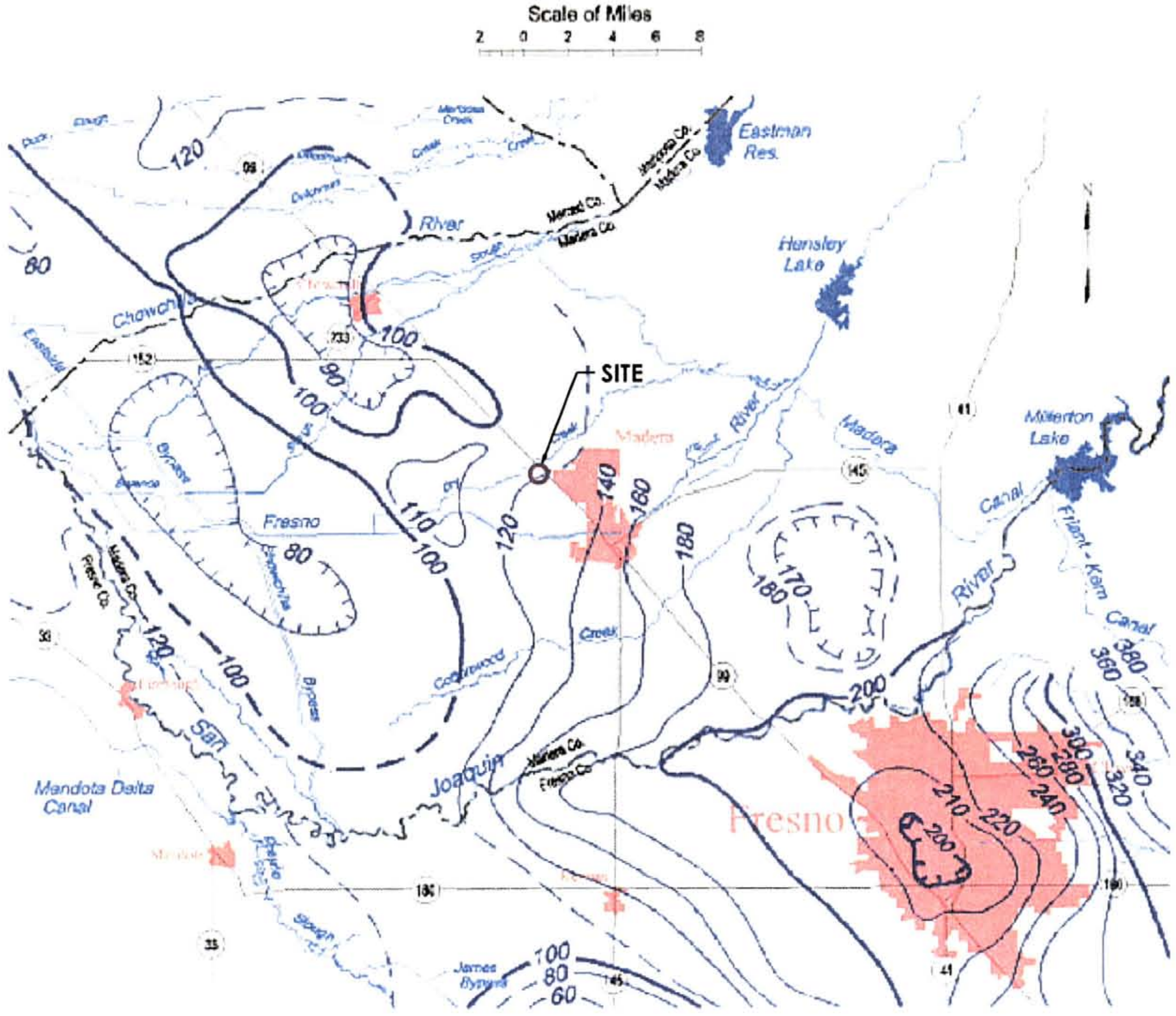
KOMEX

PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1990	**A**	

Madera Groundwater Basin

Spring 1991, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

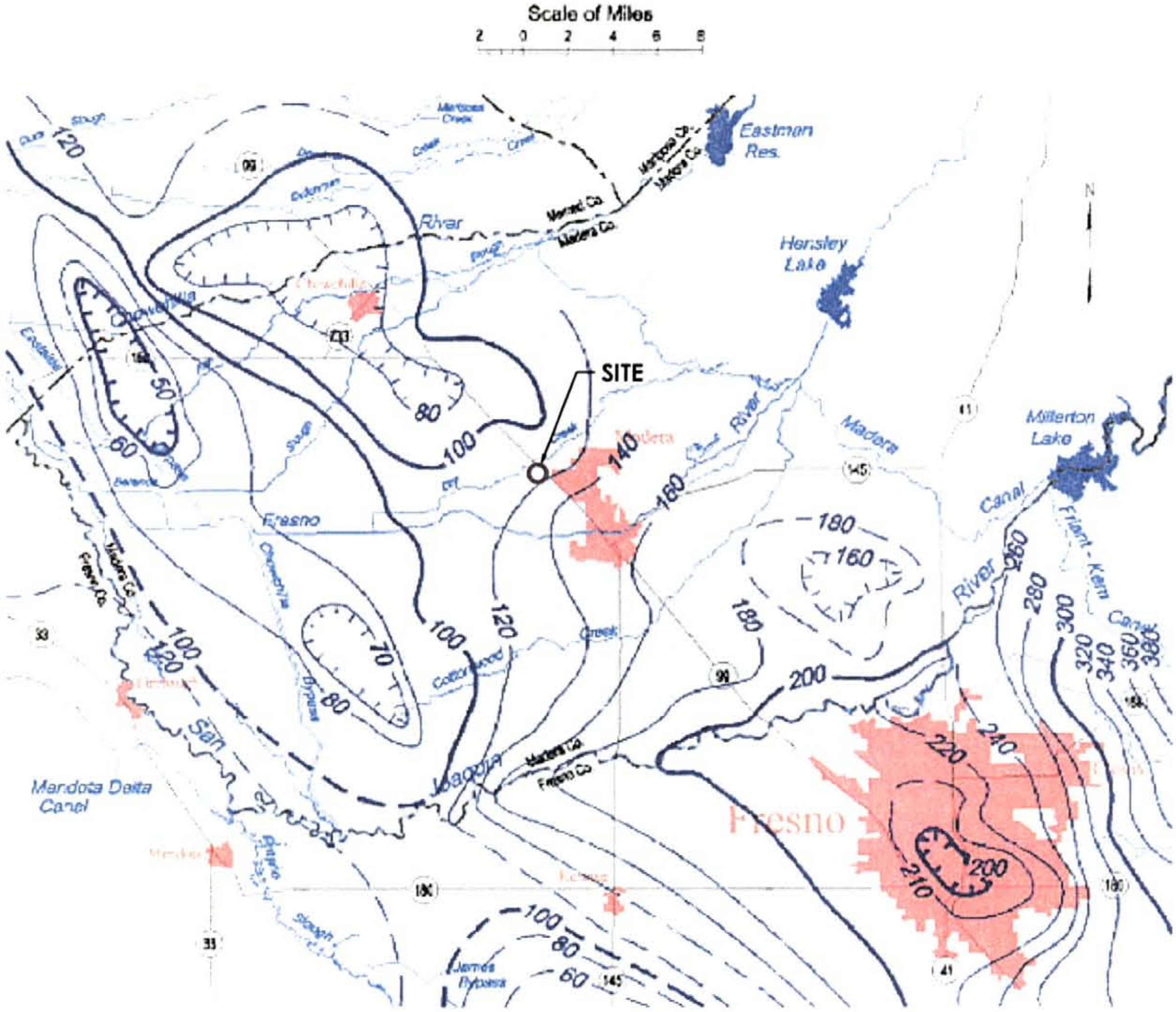
○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO	CT	05/2005
GROUNDWATER ELEVATION CONTOURS, SPRING 1991	AB	N0492A
	A	

Madera Groundwater Basin

Spring 1992, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

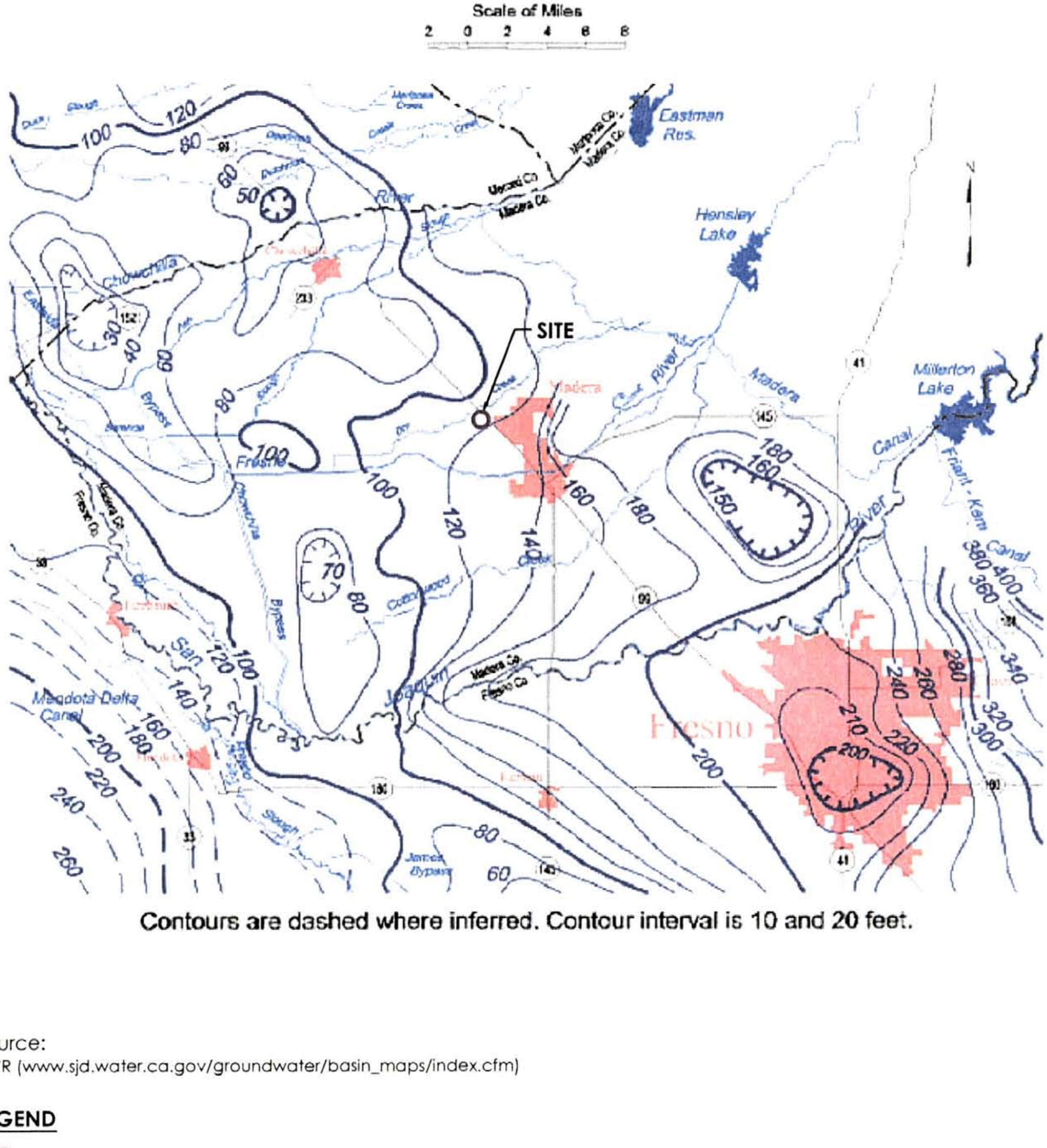
○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1992	**A**	

Madera Groundwater Basin

Spring 1993, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

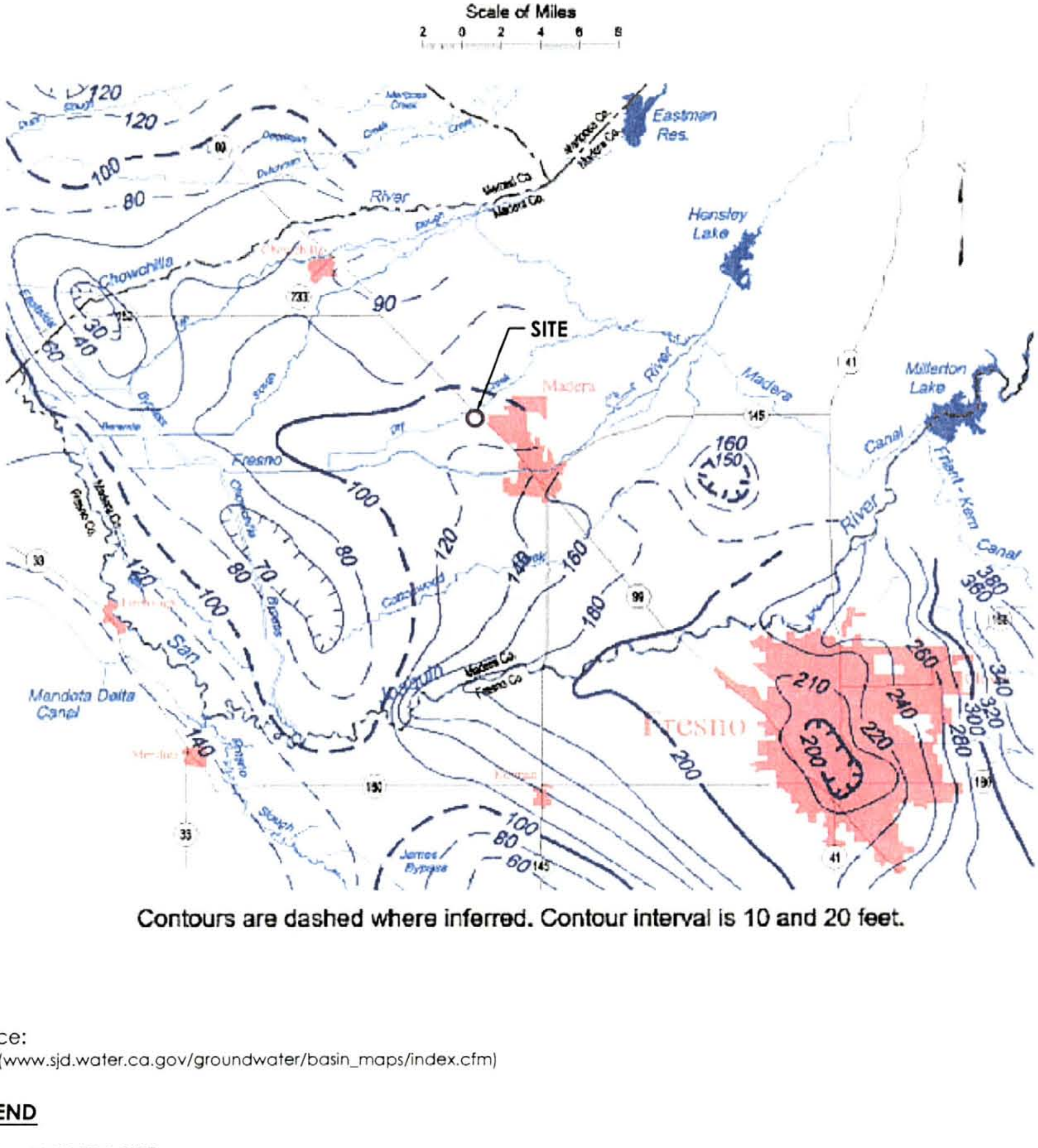
KOMEX

PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1993	**A**	

Madera Groundwater Basin

Spring 1994, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

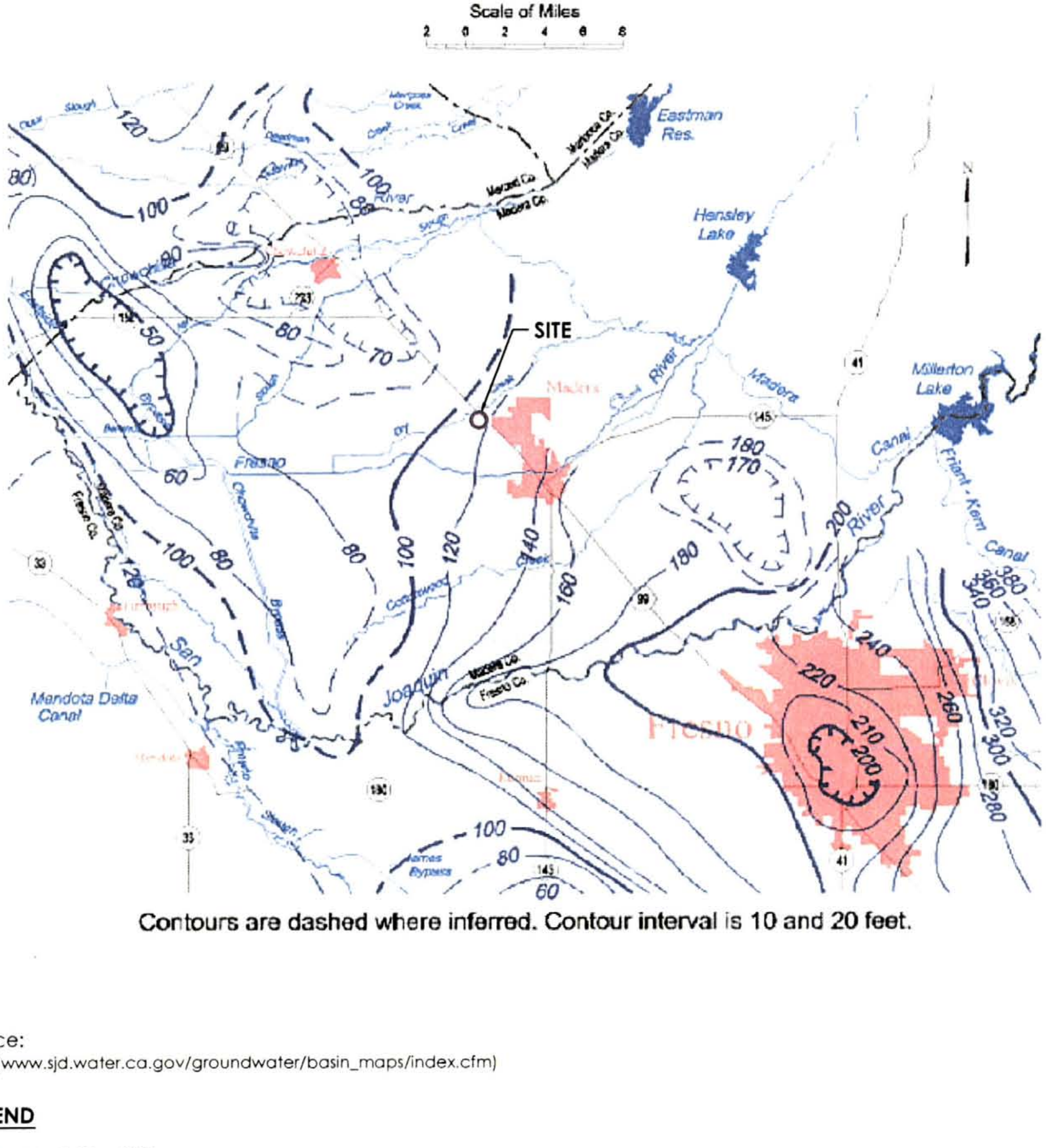
○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1994	A	

Madera Groundwater Basin

Spring 1995, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

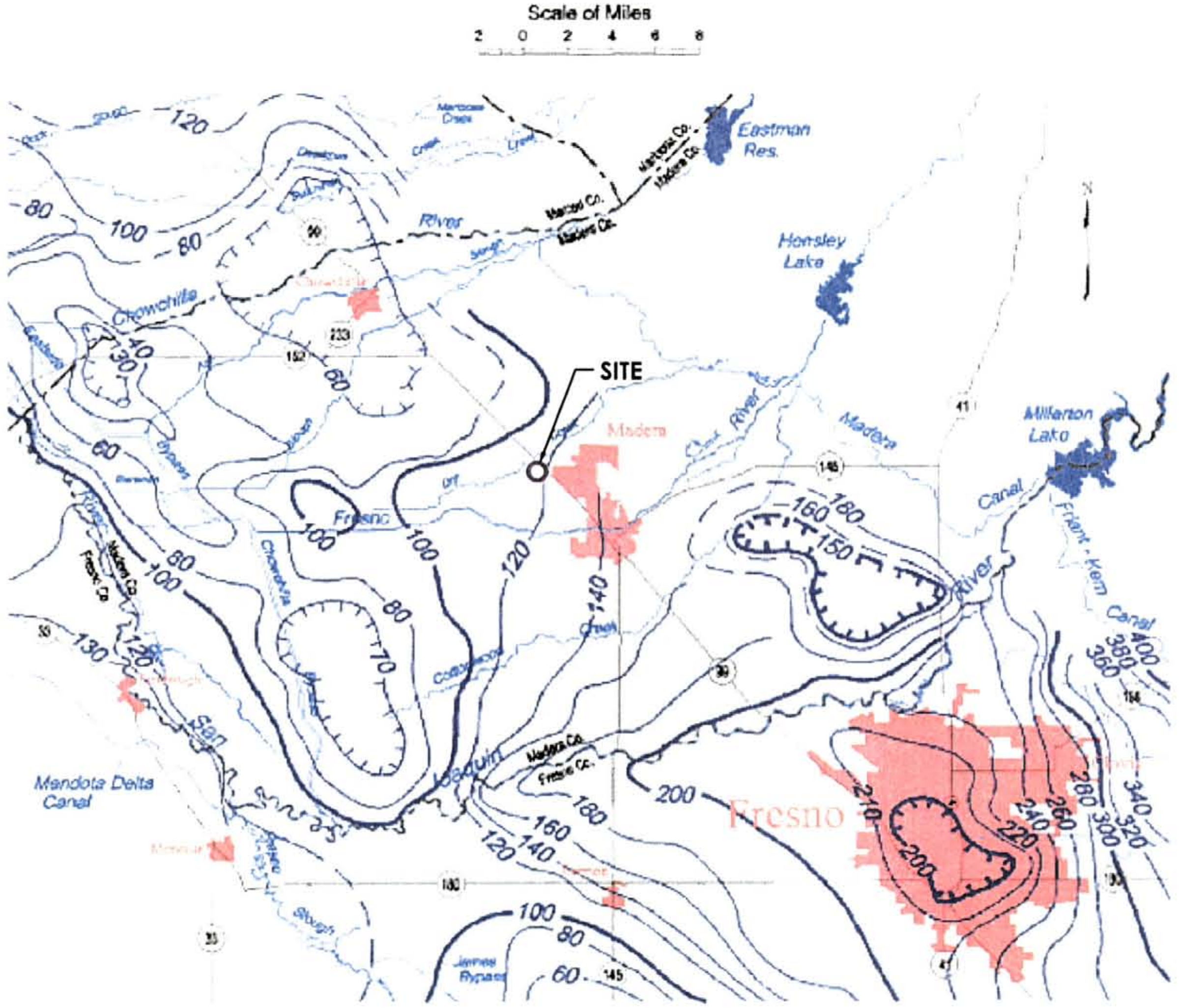
○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1995	A	

Madera Groundwater Basin

Spring 1996, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO

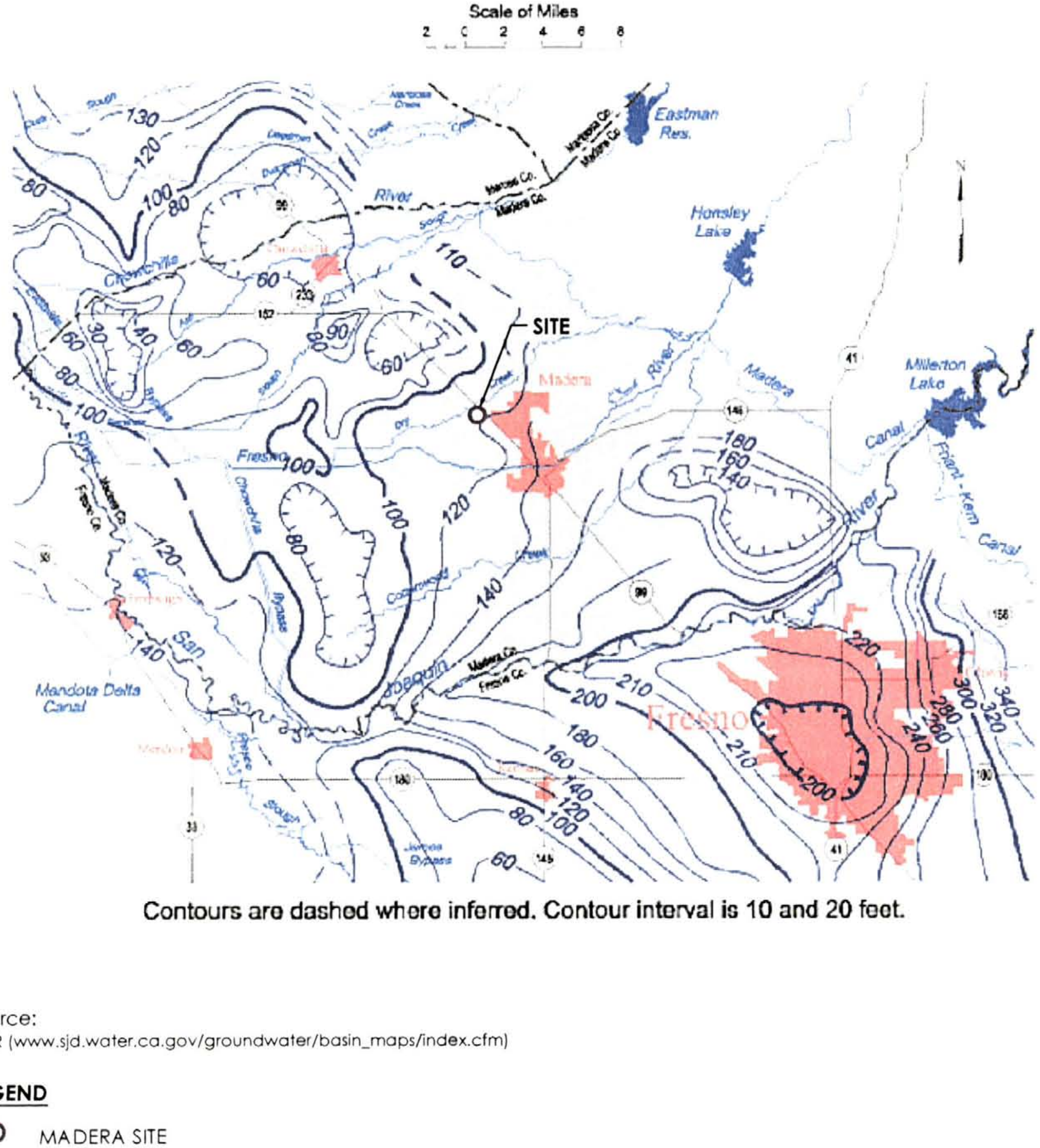
CT	05/2005
AB	N0492A

GROUNDWATER ELEVATION CONTOURS, SPRING 1996

A

Madera Groundwater Basin

Spring 1997, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

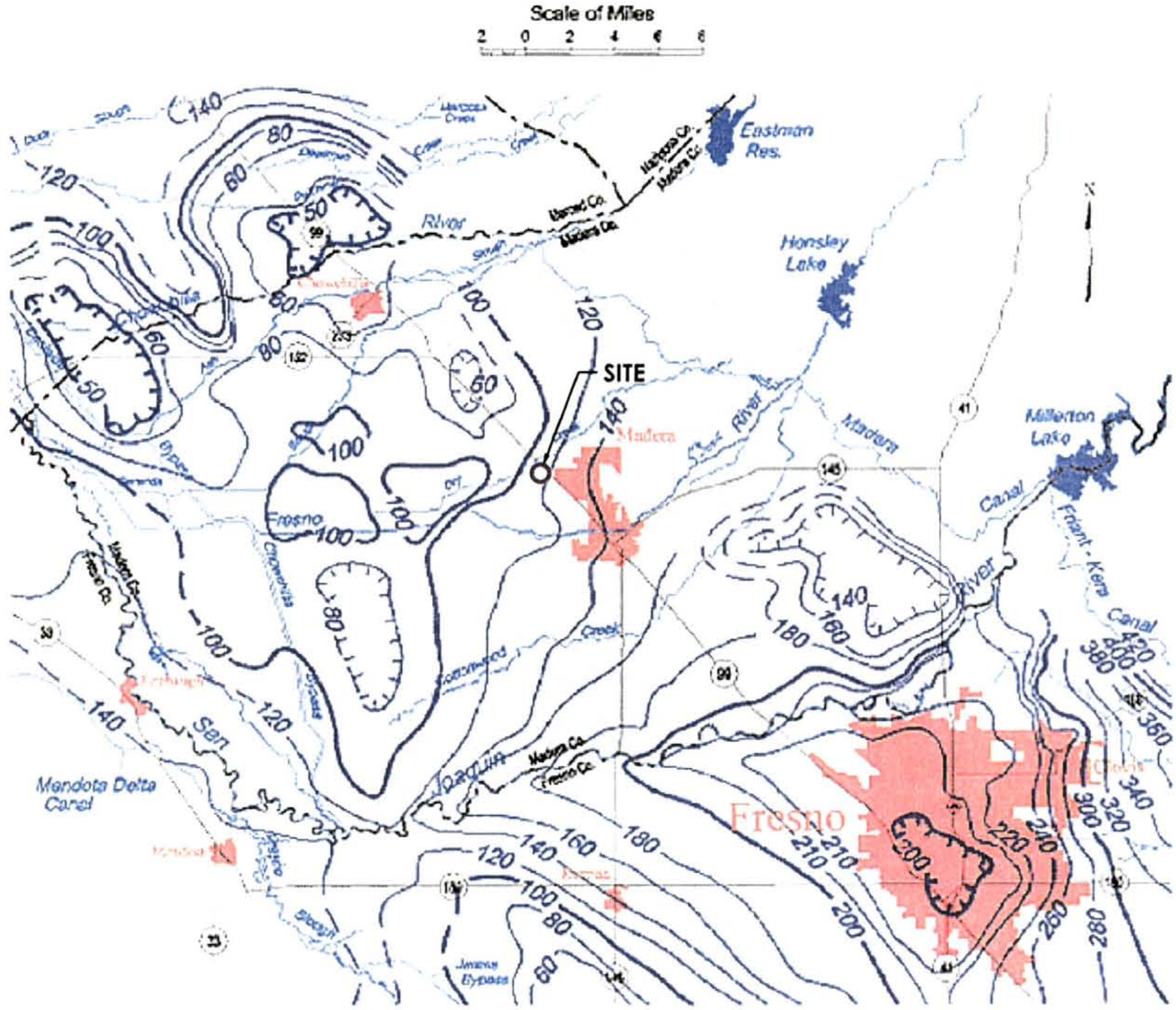
○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO	CT	05/2005
	AB	N0492A
GROUNDWATER ELEVATION CONTOURS, SPRING 1997	A	

Madera Groundwater Basin

Spring 1998, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO

CT 05/2005

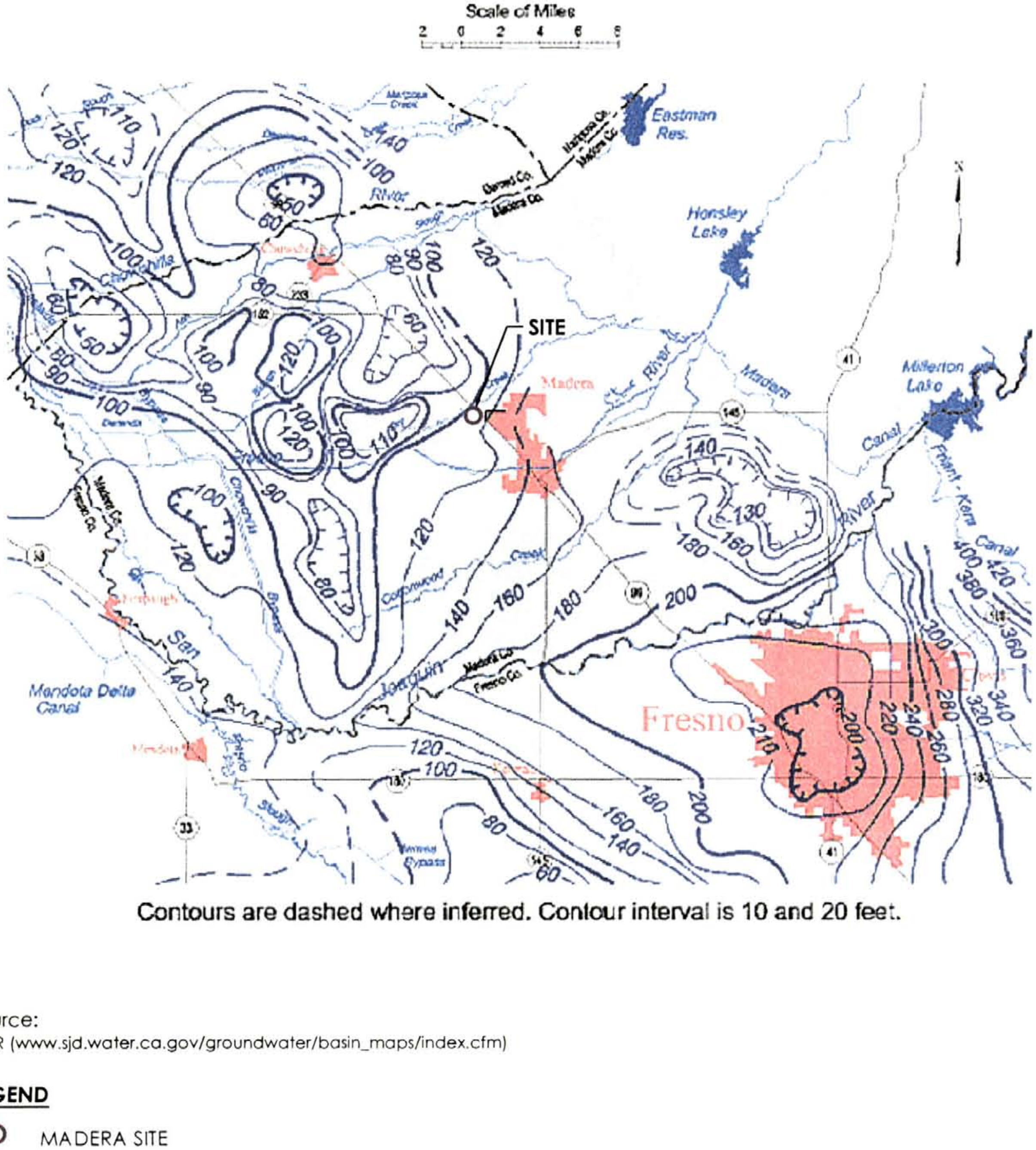
AB N0492A

GROUNDWATER ELEVATION CONTOURS, SPRING 1998

A

Madera Groundwater Basin

Spring 1999, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

○ MADERA SITE

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PROPOSED NORTH FORK CASINO

CT 05/2005

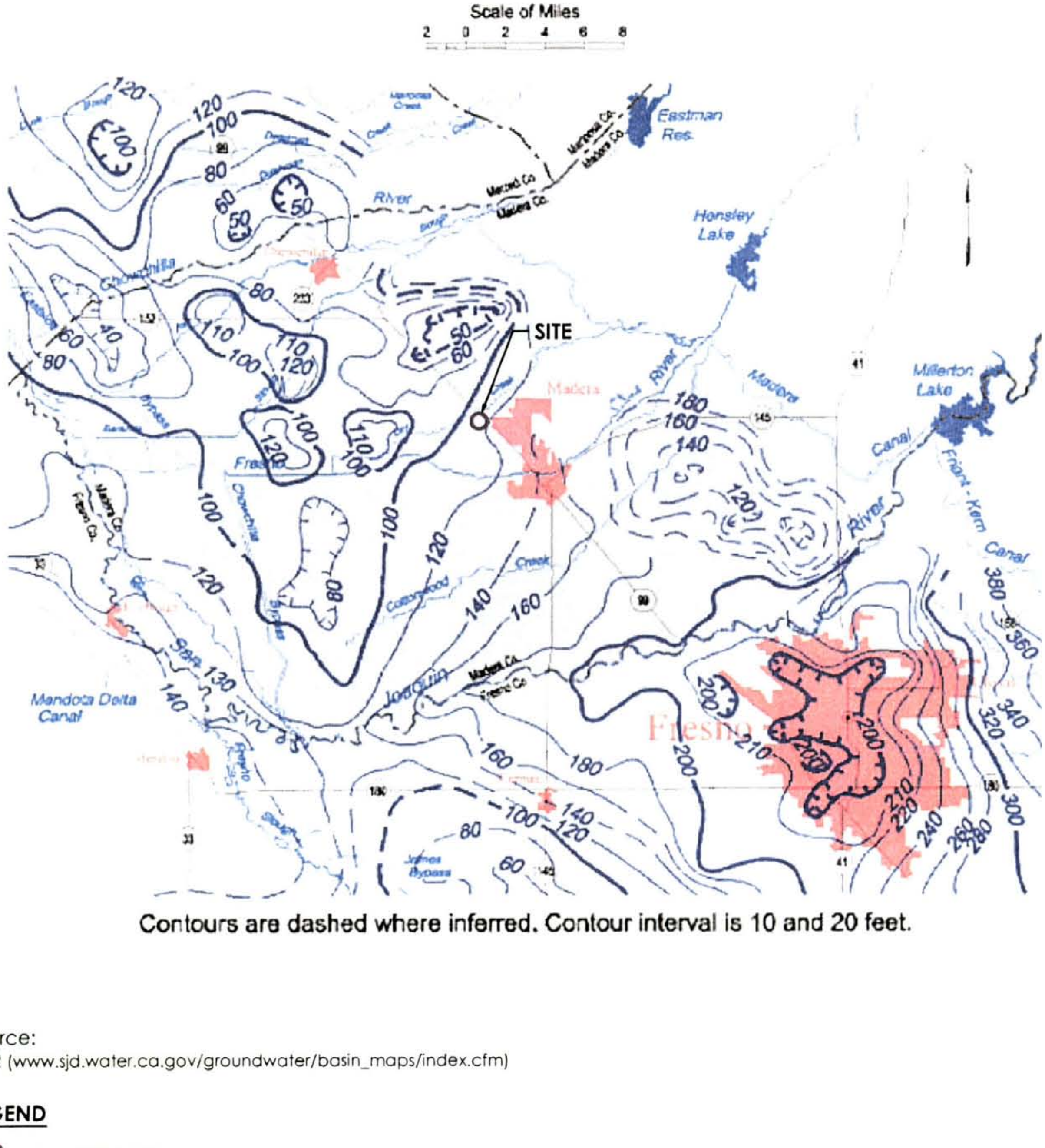
AB N0492A

GROUNDWATER ELEVATION CONTOURS, SPRING 1999

A

Madera Groundwater Basin

Spring 2000, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

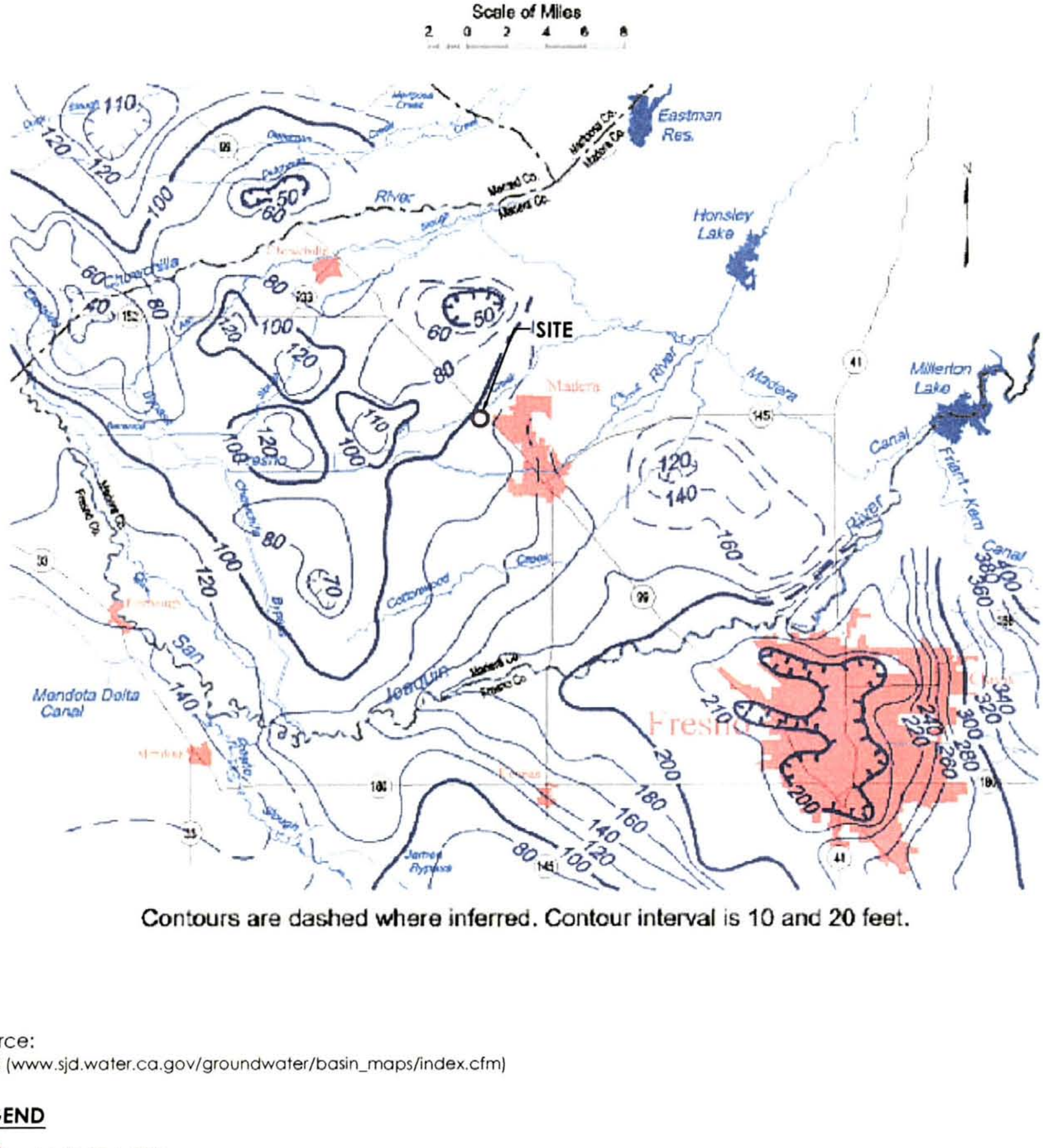
○ MADERA SITE

KOMEX

	PROPOSED NORTH FORK CASINO	CT	05/2005
		AB	N0492A
	GROUNDWATER ELEVATION CONTOURS, SPRING 2000	A	

Madera Groundwater Basin

Spring 2001, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

LEGEND

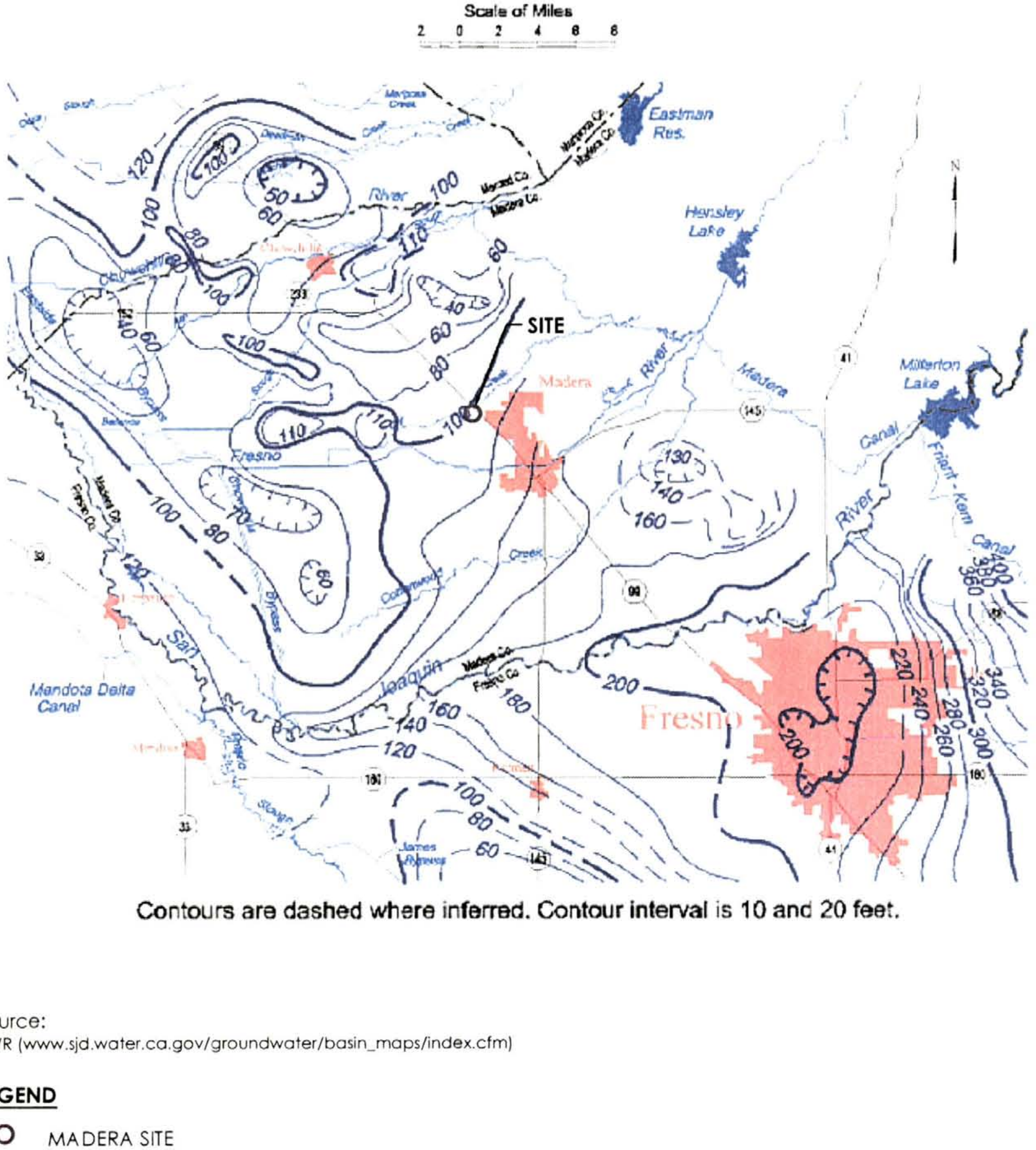
○ MADERA SITE

KOMEX

PROPOSED NORTH FORK CASINO	CT	05/2005
GROUNDWATER ELEVATION CONTOURS, SPRING 2001	AB	N0492A
		A

Madera Groundwater Basin

Spring 2002, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

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PROPOSED NORTH FORK CASINO

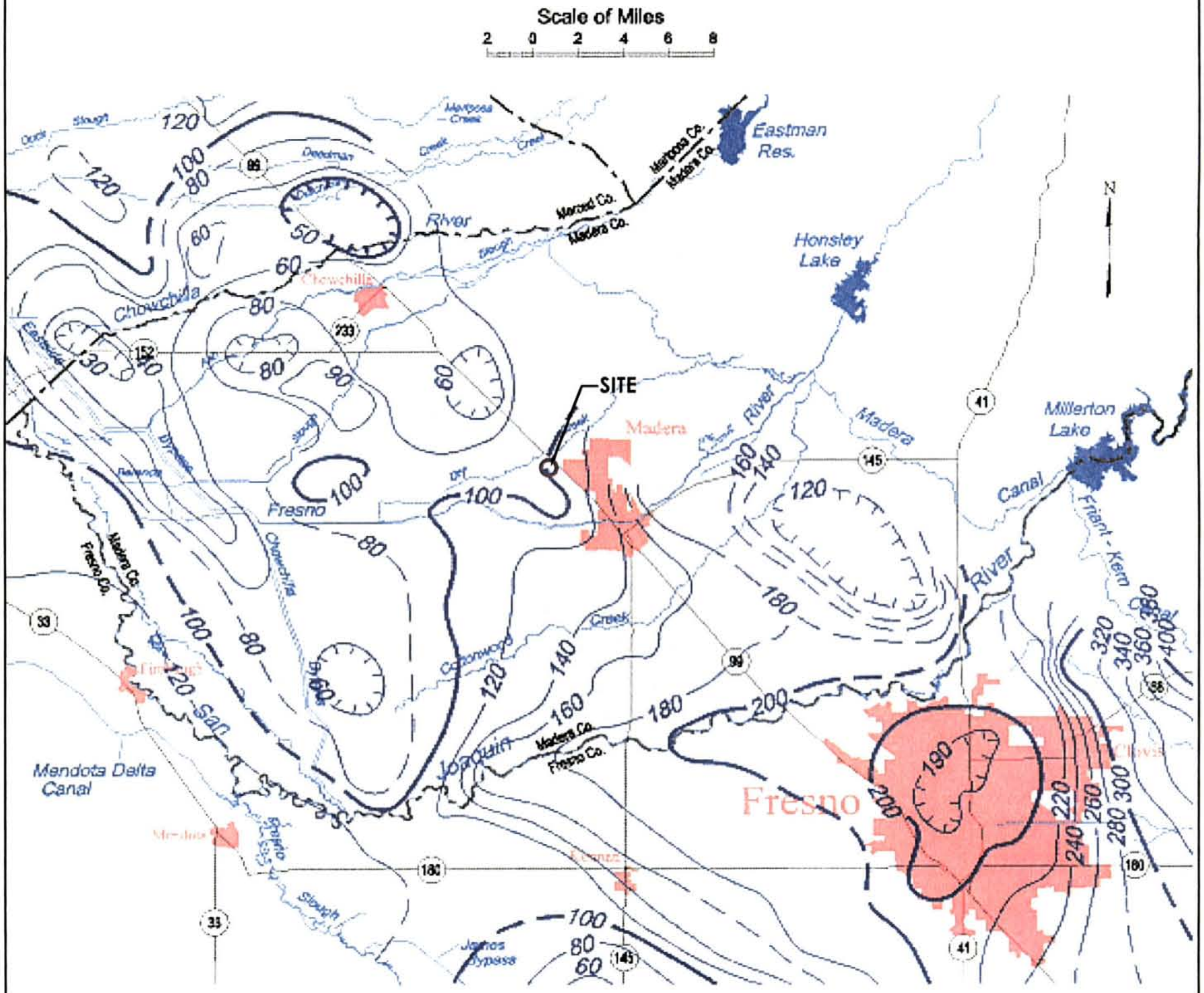
GROUNDWATER ELEVATION CONTOURS, SPRING 2002

CT	05/2005
AB	N0492A

A

Madera Groundwater Basin

Spring 2003, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

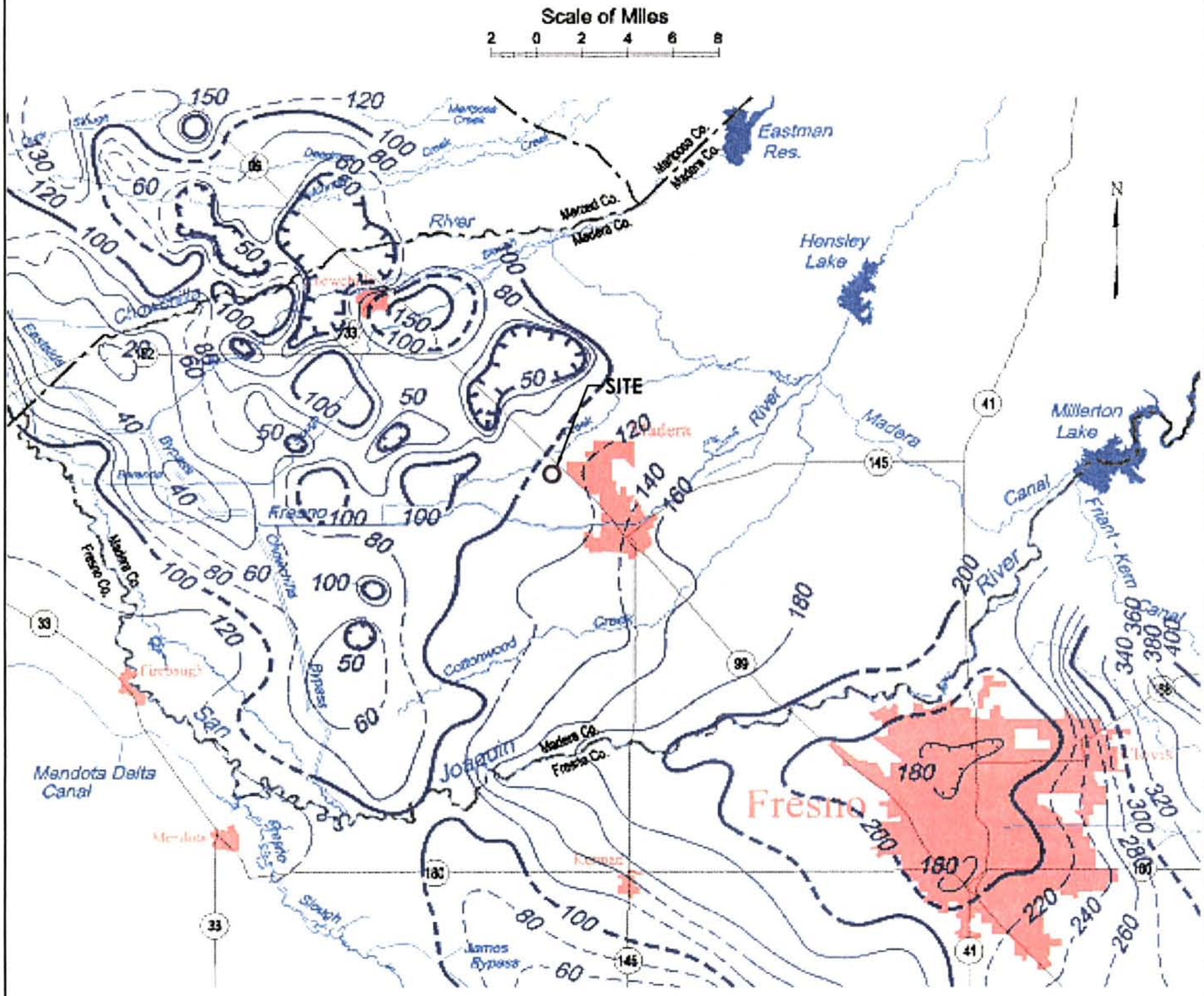
LEGEND

○ MADERA SITE

WorleyParsons resources & energy	PROPOSED NORTH FORK CASINO	MT	06/2008
		RF	N0492A
	GROUNDWATER ELEVATION CONTOURS, SPRING 2003	**A**	

Madera Groundwater Basin

Spring 2004, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

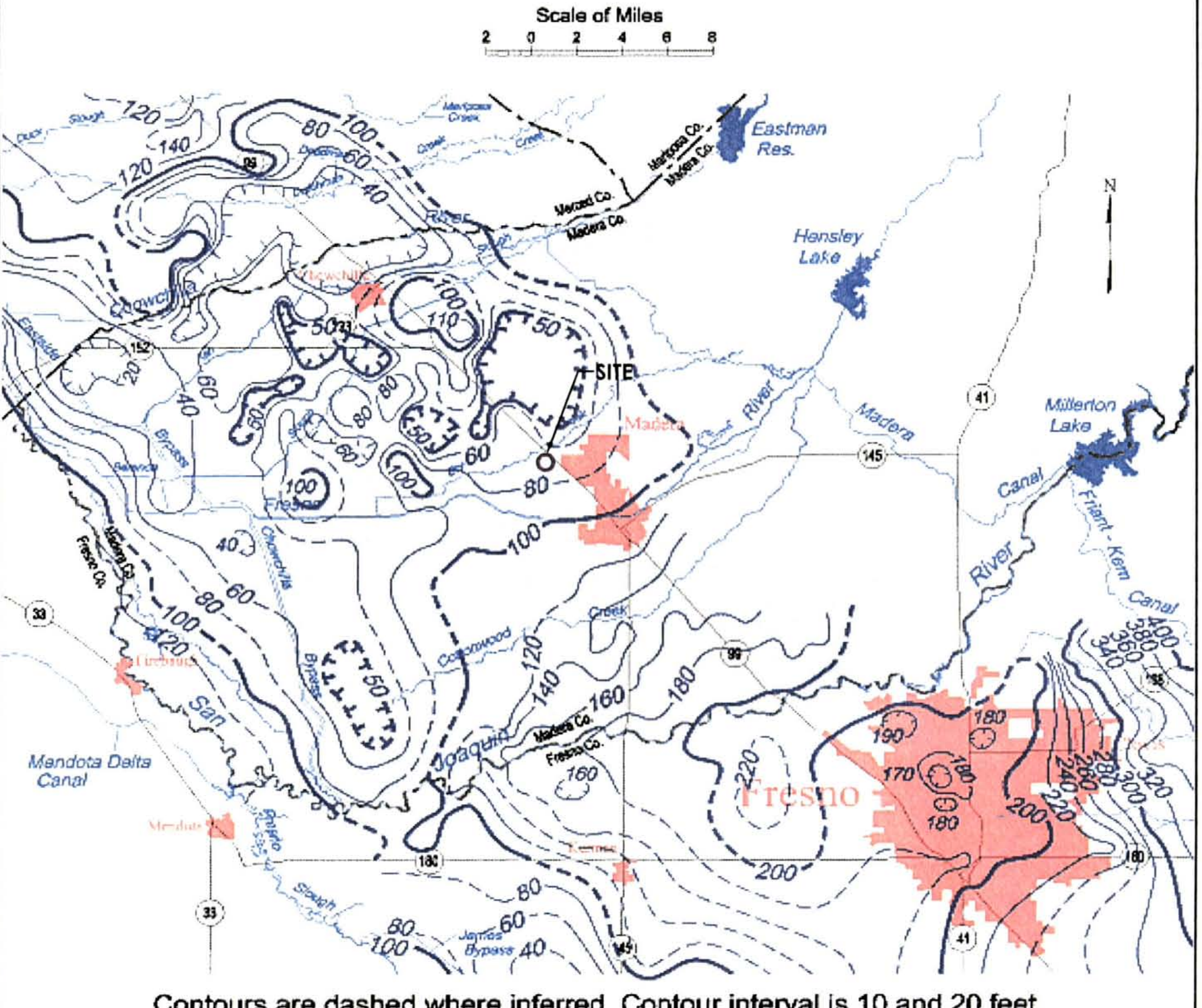
LEGEND

○ MADERA SITE

WorleyParsons resources & energy	PROPOSED NORTH FORK CASINO	MT	06/2008
		RF	N0492A
	GROUNDWATER ELEVATION CONTOURS, SPRING 2004	**A**	

Madera Groundwater Basin

Spring 2005, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

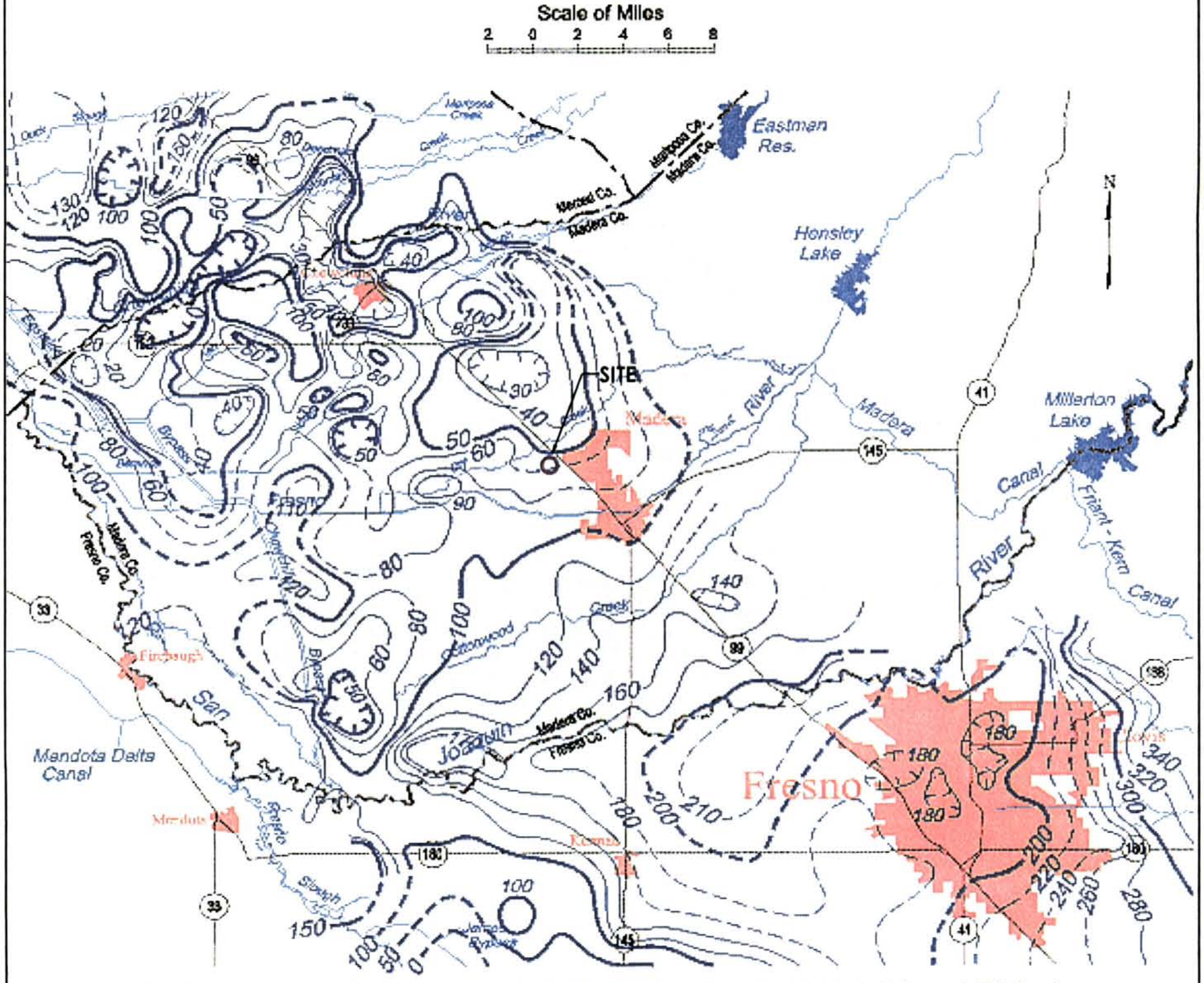
LEGEND

○ MADERA SITE

WorleyParsons resources & energy	**PROPOSED NORTH FORK CASINO**	MT	06/2008
	GROUNDWATER ELEVATION CONTOURS, SPRING 2005	RF	N0492A
		A	

Madera Groundwater Basin

Spring 2006, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

Source:
DWR (www.sjd.water.ca.gov/groundwater/basin_maps/index.cfm)

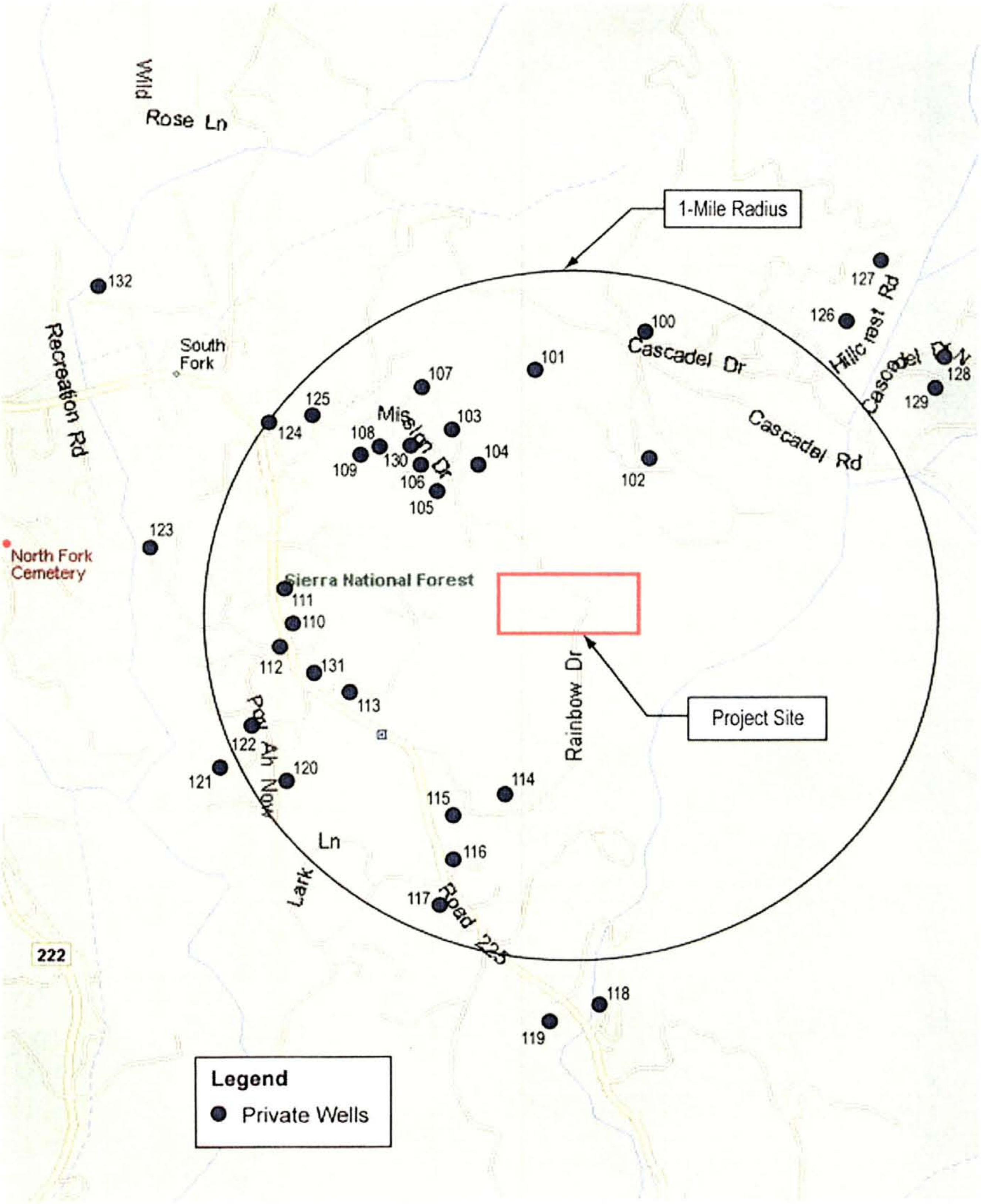
LEGEND

○ MADERA SITE

WorleyParsons resources & energy	PROPOSED NORTH FORK CASINO	MT	06/2008
		RF	N0492A
	GROUNDWATER ELEVATION CONTOURS, SPRING 2006	A	

Appendix B

Data regarding wells near the North fork site



s:\common\project\North Fork Rancheria\Figures\Fig 4-3.pdf

HydroScience Engineers, Inc.

Map Source: Streets & Trips, 2004
Well Source: Department of Water Resources

DRAFT

Figure 4-3
North Fork
Water and Wastewater Feasibility Study
Groundwater Wells in the Vicinity of the North Fork Site

Table 4-2: Existing Groundwater Wells at the North Fork Site

	Screen Depth						
Well Number	From (ft)	To (ft)	Diameter (inches)	Total Depth (ft)	Depth to Groundwater (ft)	Discharge Rate (gpm)	Year of Well Installation
100	-	-	6 1/4	700	355	4	1993
101	-	-	6	100	38	25	1979
102	-	-	-	1075	440	5	1991
103	-	-	6 1/8	450	385	100	1995
104	-	-	6 5/8	275	220	15	1995
105	-	-	6	525	100	25	1995
106	-	-	6 1/8	375	300	15	1995
107	-	-	6	525	495	18	1996
108	-	-	6 1/2	275	85	5	1985
109	-	-	6 1/2	300	145	3	1985
110	-	-	6 5/8	120	-	30	1976
111	-	-	6 1/4	300	90	9	2002
112	-	-	8	460	107	2.5	1994
113	-	-	6 5/8	300	46	2	1972
114	-	-	6	450	-	1	1980
115	-	-	6 1/2	280	185	20	1987
116	-	-	6 5/8	675	-	15	1976
117	-	-	7	150	39	20	1980
118	-	-	6 1/2	475	120	6	1991
119	-	-	6 1/4	500	390	12	1994
120	-	-	-	350	-	1.5	1978
121	-	-	6 1/4	100	64	15	1994
122	-	-	6 1/4	150	90	30	2002
123	-	-	6 5/8	280	-	4	1976
124	-	-	6 5/8	550	81	25	1991
125	-	-	6 1/4	660	-	5	1991
126	-	-	-	600	-	40	1991
127	-	-	6 1/4	1000	-	4	1991
128	-	-	-	800	575	3	2002[a]
129	-	-	6 5/8	105	8	100	1988
130	-	-	6	400	65	10	1995
131	-	-	7	325	111	2	1981
132	-	-	8 5/8	891	66	171	1987
200[b]	-	-	6	155	-	-	1980
201[b]	-	-	6	355	65	3.5	1981
202[b]	-	-	6	300	31	1.5	1983
203[b]	-	-	-	74	33	5	1959
204[b]	-	-	7	220	21	1.5	1971
205[b]	-	-	7	170	27	6	1973[c]
206[b]	-	-	7	230	160	2	1973[c]
207[b]	-	-	7	200	18	1.5	1973[c]
208[b]	-	-	6 5/8	60	-	30	1972
209[b]	-	-	6	300	172	4	1983[d]

Source: Department of Water Resources

[a] Well was deepened.

[b] Not included on figure because location information on well log was incomplete.

[c] Well log indicated well was located within South Fork Indian Reservation.

[d] Well log indicated well was located within Indian Mission off Coscodel Road.

Note: Well locations shown in Figure 4-3 are approximate.

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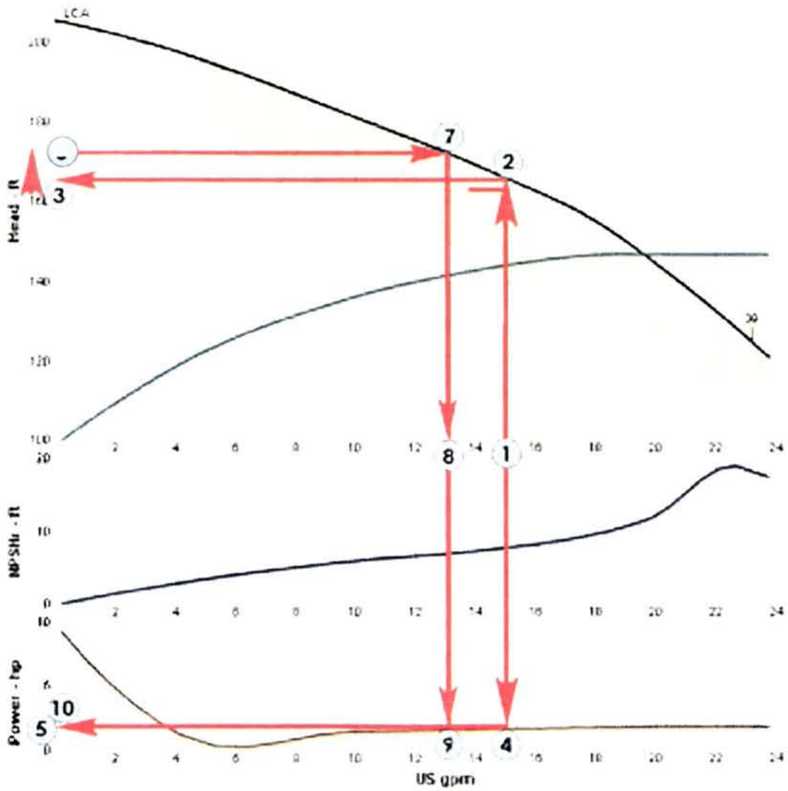
Appendix C

Evaluation of well pump electrical consumption

GOULDS PUMPS



Methodology Summary

Once a suitable pump has been found that satisfies the discharge and head requirements for a particular case, the discharge (Q), head (H), and power (P) analysis starts at Point #1 shown on the figure.

From Point #1 at the required Q, a vertical line is drawn upward to intersect the pump curve at Point #2.

From Point #2, a horizontal line is drawn to the left (to Point #3) and the H associated with that particular Q is determined.

From Point #1, a vertical line is drawn downward to intersect the power curve at Point #4.

From Point #4, a horizontal line is drawn to the left (to Point #5) and the P associated with that particular Q is determined.

The Q, H, and P determined by the steps shown above represent the baseline conditions for a particular case.

Additional drawdown is then imposed, and the incremental effects on the Q, H, and P are then determined. This change in value of the parameters Q, H, and P are used later to estimate the impact to the power requirements to pump one acre-foot of water.

Additional drawdown is the equivalent of moving higher up the pump curve (higher head).

From Point #3, a vertical line is drawn upwards to Point #6. The length of this line is the imposed drawdown and will either be 2.0 feet or 6.0 feet.

From Point #6, a horizontal line is drawn to the right to intersect the pump curve at Point #7.

From Point #7, a vertical line is drawn downwards to Point #8. Where this line intersects the Q axis determines what the new Q for the pump will be given the additional head (imposed drawdown) for that case. For monotonically decreasing pump curves, as H increases, Q decreases, and conversely, as H decreases, Q increases.

From Point #8, a vertical line is drawn downwards to intersect the power curve at Point #9.

From Point #9, a horizontal line is drawn to the left (to Point #10) and the new P associated with the new Q is determined.

Example

Baseline
Q = 15.0 gpm, H = 166.3 feet, P = 1.73 h.p. (Point #1, #3, and #5, respectively).

Impose an additional drawdown of 6.0 feet (Point #3 to #6).

New
Q = 13.1 gpm, H = 172.3 feet, P = 1.61 h.p. (Point #8, #6, and #10, respectively).

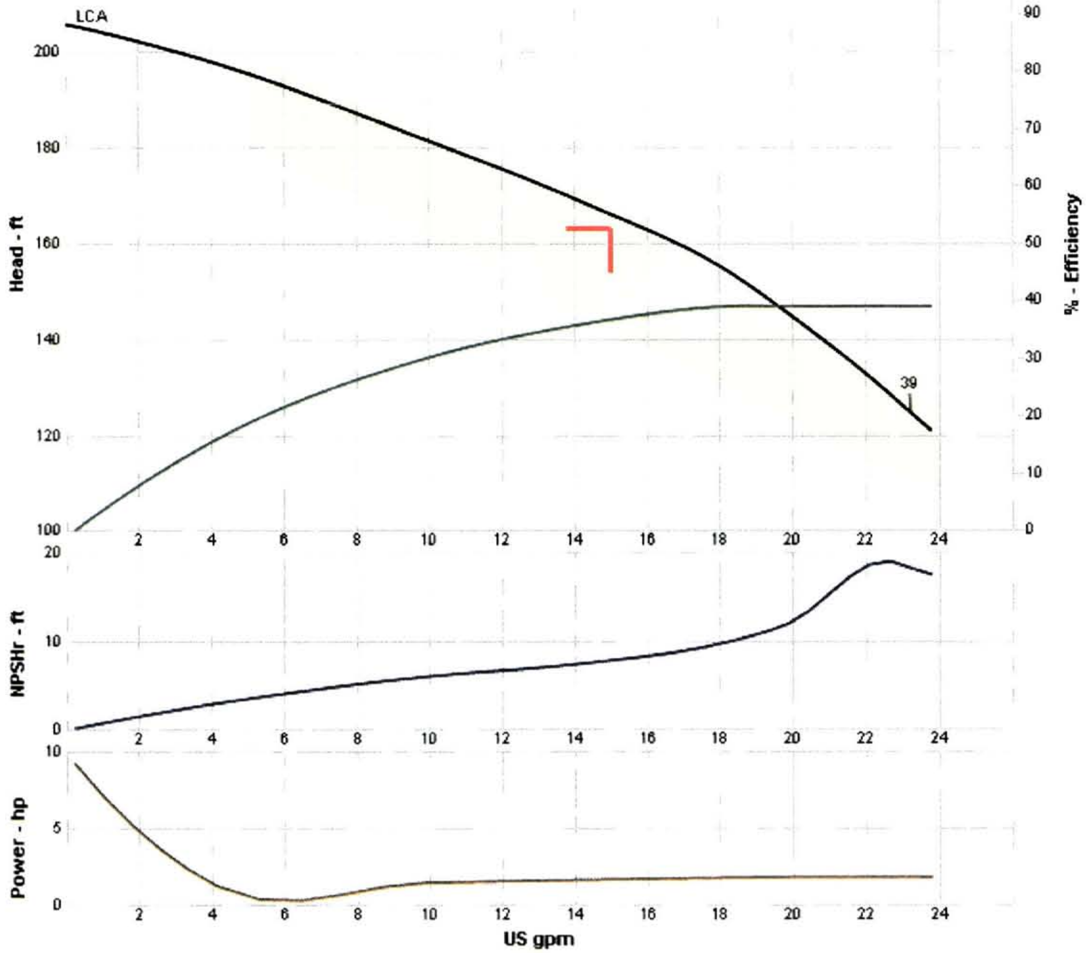
Incremental Difference
Q = -1.9 gpm, H = +6.0 feet, P = -0.12 h.p.

WorleyParsons Komex
resources & energy

DRAWN BY:	EDITED BY:	DATE:
-----	-----	--/----

APPROVED:

GOULDS PUMPS



CLEAR LIQUID ONLY in multistage pumps.

Request for Quote

Submit your selection to Goulds Pumps.

Pump

Type	MULTISTAGE
Size	LCA
Curve	Goulds LC
Speed	3550 rpm
Line	LCA

Redraw Reset

Display Options ?

● Manufacturer settings
○ Custom

Multiple Pumps

Number of pumps 1

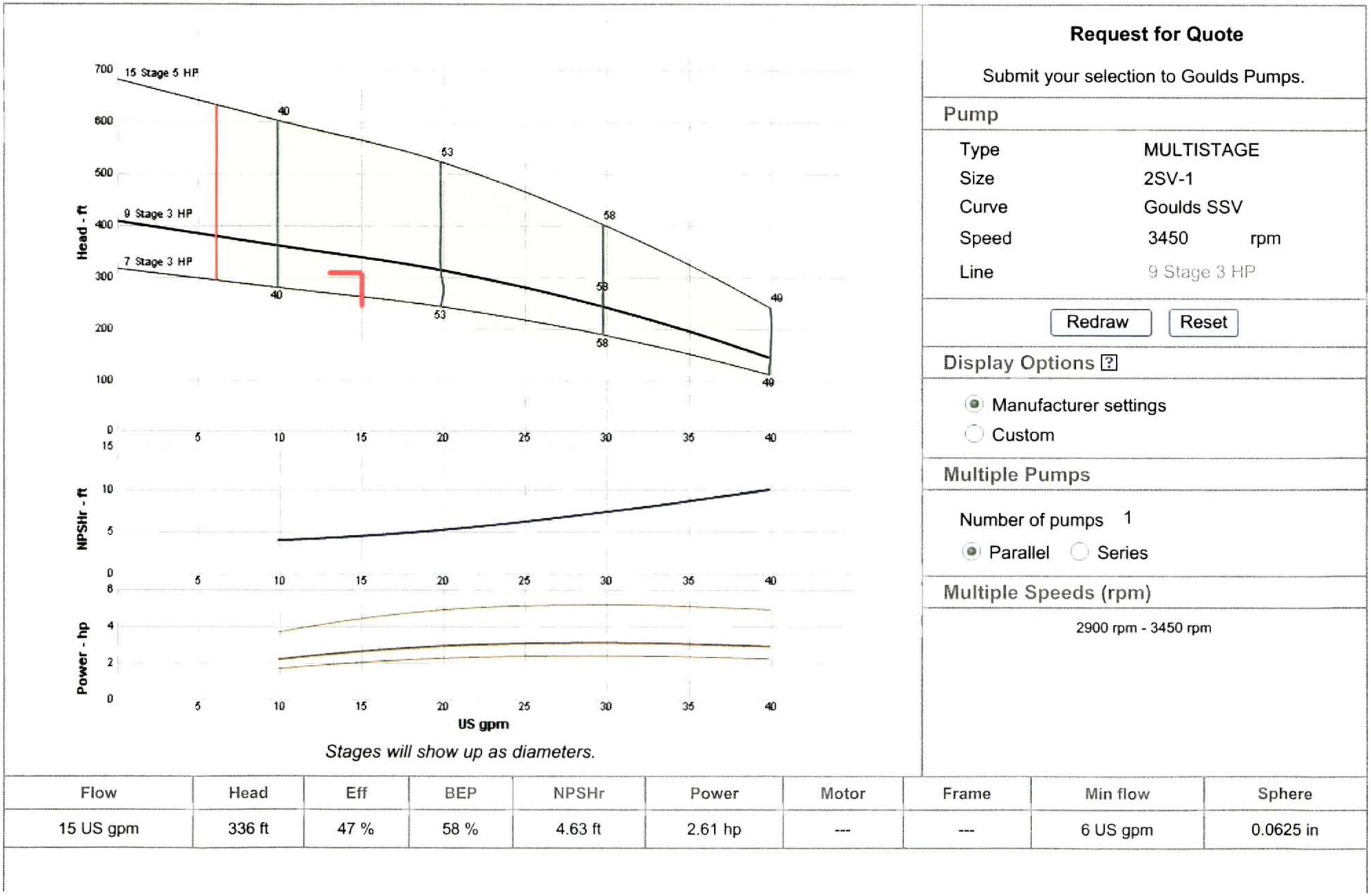
● Parallel ○ Series

Multiple Speeds (rpm)

1180 rpm - 3550 rpm

Flow	Head	Eff	BEP	NPSHr	Power	Motor	Frame	Min flow	Sphere
15 US gpm	166 ft	37 %	39 %	7.97 ft	1.71 hp	---	---	5 US gpm	---

GOULDS PUMPS



Stages will show up as diameters.

Request for Quote

Submit your selection to Goulds Pumps.

Pump

Type	MULTISTAGE
Size	2SV-1
Curve	Goulds SSV
Speed	3450 rpm
Line	9 Stage 3 HP

Display Options

● Manufacturer settings
○ Custom

Multiple Pumps

Number of pumps 1

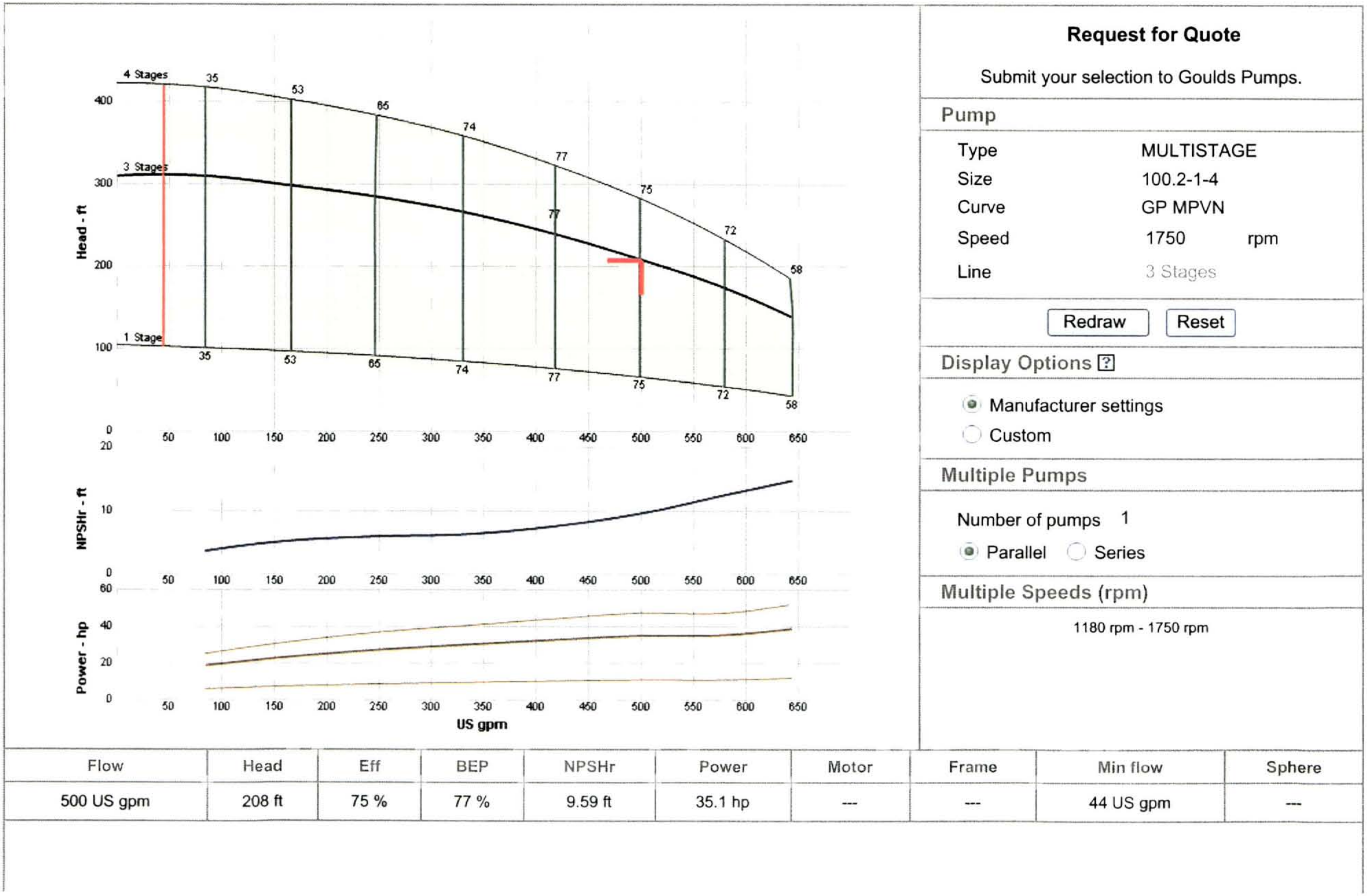
● Parallel ○ Series

Multiple Speeds (rpm)

2900 rpm - 3450 rpm

Flow	Head	Eff	BEP	NPSHr	Power	Motor	Frame	Min flow	Sphere
15 US gpm	336 ft	47 %	58 %	4.63 ft	2.61 hp	---	---	6 US gpm	0.0625 in

GOULDS PUMPS



Request for Quote

Submit your selection to Goulds Pumps.

Pump

Type	MULTISTAGE	
Size	100.2-1-4	
Curve	GP MPVN	
Speed	1750	rpm
Line	3 Stages	

Redraw Reset

Display Options ?

● Manufacturer settings
○ Custom

Multiple Pumps

Number of pumps 1

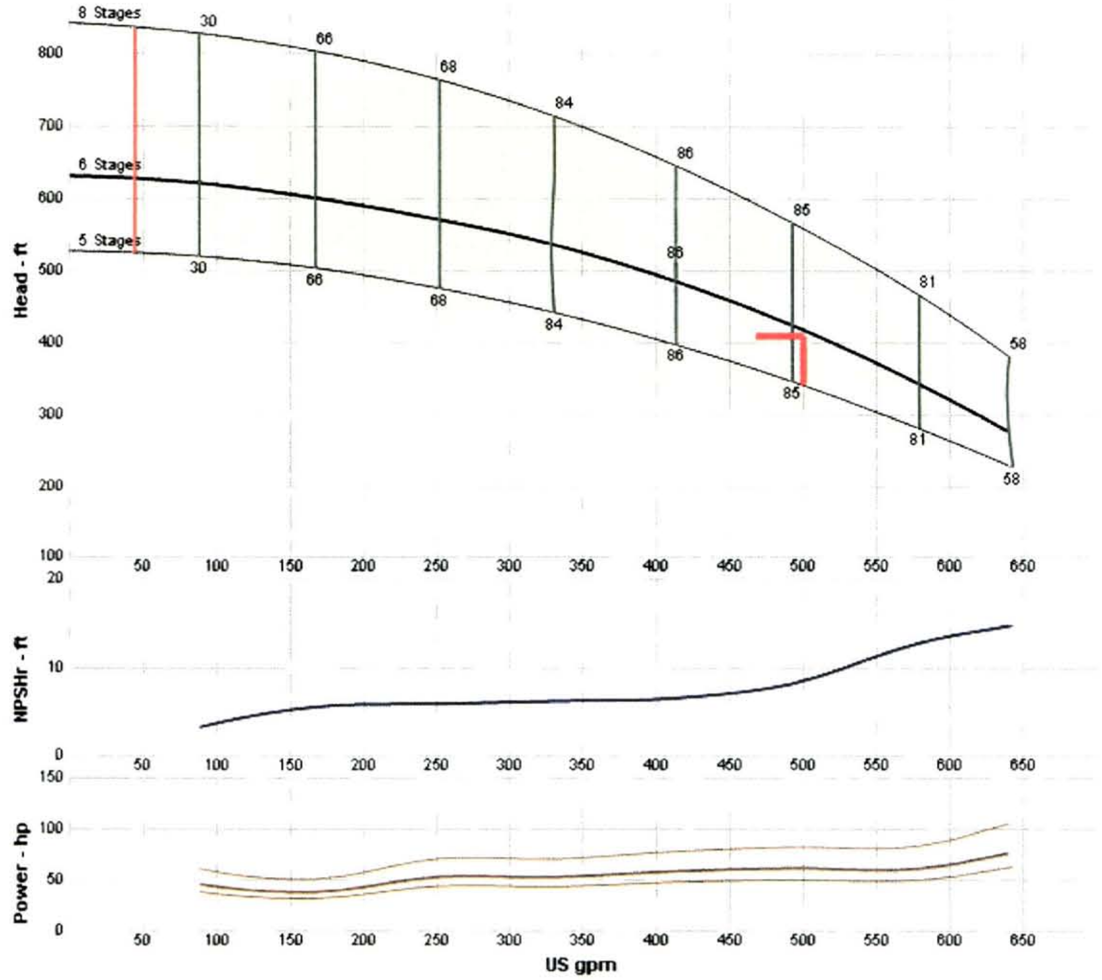
● Parallel ○ Series

Multiple Speeds (rpm)

1180 rpm - 1750 rpm

Flow	Head	Eff	BEP	NPSHr	Power	Motor	Frame	Min flow	Sphere
500 US gpm	208 ft	75 %	77 %	9.59 ft	35.1 hp	---	---	44 US gpm	---

GOULDS PUMPS



Request for Quote

Submit your selection to Goulds Pumps.

Pump

Type	MULTISTAGE
Size	100.2-5-8
Curve	GP MPVN
Speed	1750 rpm
Line	6 Stages

Redraw Reset

Display Options ?

● Manufacturer settings
○ Custom

Multiple Pumps

Number of pumps 1

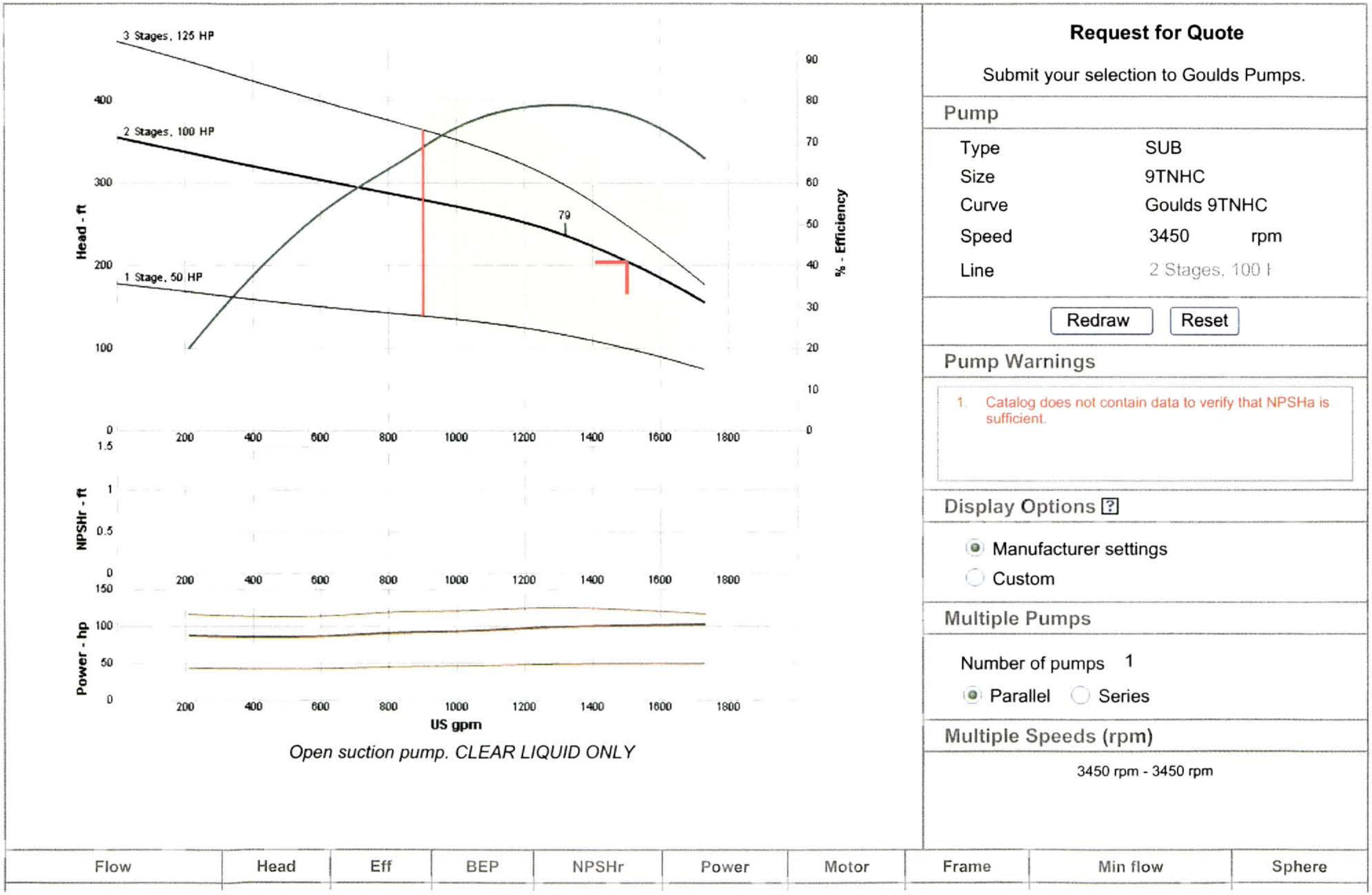
● Parallel ○ Series

Multiple Speeds (rpm)

1180 rpm - 1750 rpm

Flow	Head	Eff	BEP	NPSHr	Power	Motor	Frame	Min flow	Sphere
500 US gpm	416 ft	85 %	86 %	8.62 ft	61.9 hp	---	---	44 US gpm	---

GOULDS PUMPS



Open suction pump. CLEAR LIQUID ONLY

Request for Quote

Submit your selection to Goulds Pumps.

Pump

Type	SUB
Size	9TNHC
Curve	Goulds 9TNHC
Speed	3450 rpm
Line	2 Stages, 100 I

Pump Warnings

1. Catalog does not contain data to verify that NPSHa is sufficient.

Display Options

● Manufacturer settings
○ Custom

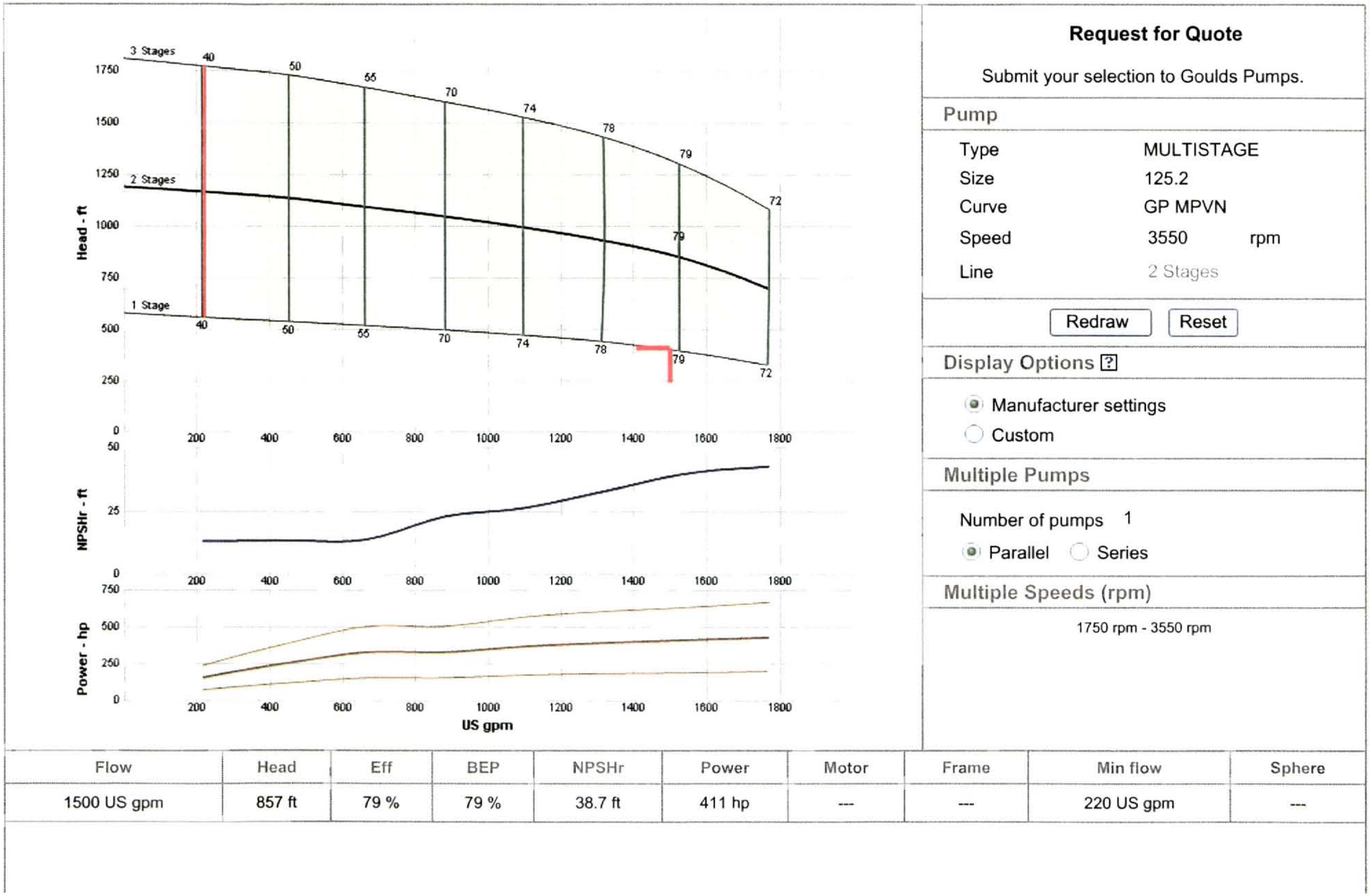
Multiple Pumps

Number of pumps 1

● Parallel ○ Series

Multiple Speeds (rpm)

3450 rpm - 3450 rpm



Request for Quote

Submit your selection to Goulds Pumps.

Pump

Type	MULTISTAGE
Size	125.2
Curve	GP MPVN
Speed	3550 rpm
Line	2 Stages

Redraw Reset

Display Options ?

● Manufacturer settings
○ Custom

Multiple Pumps

Number of pumps 1

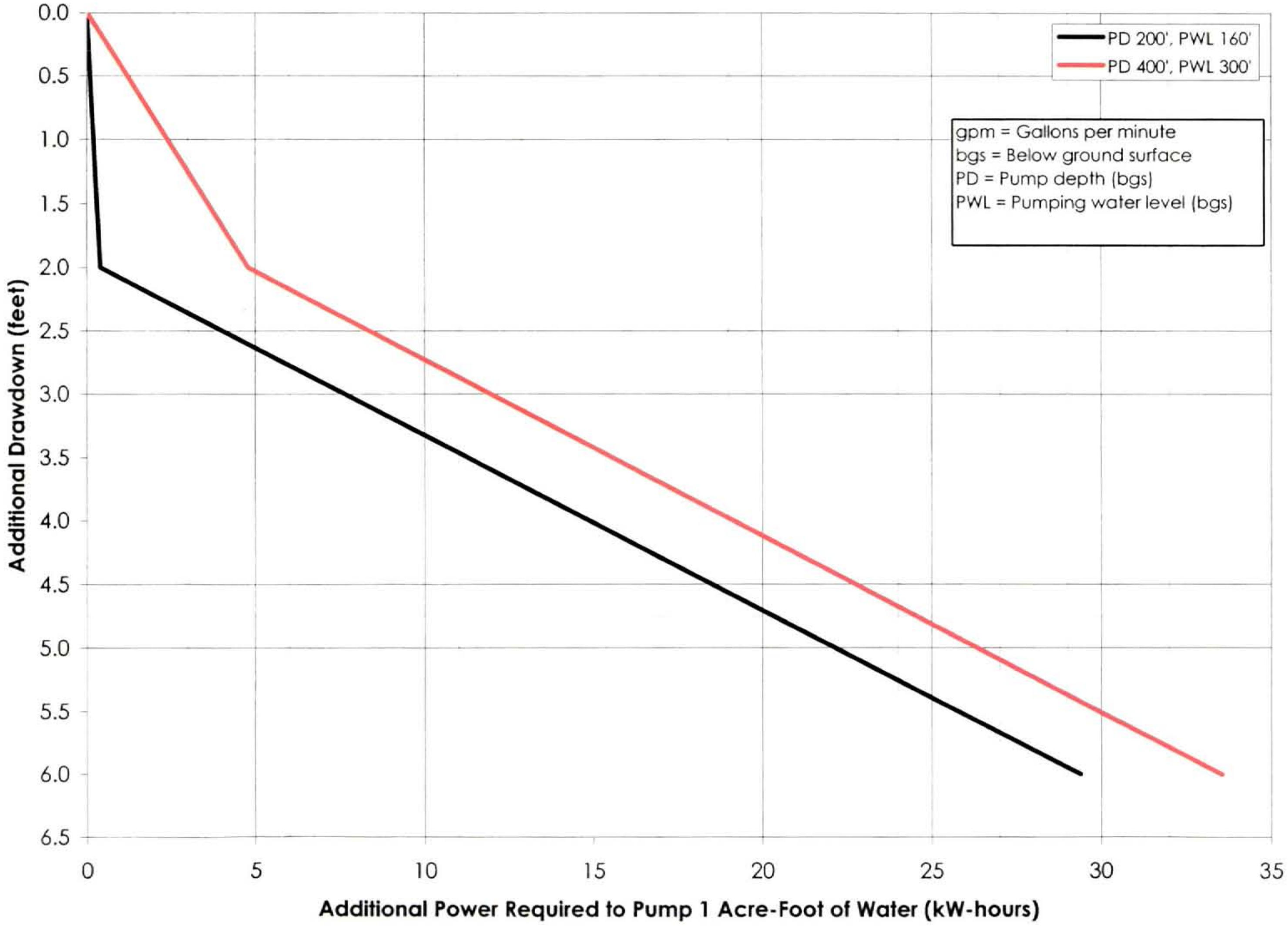
● Parallel ○ Series

Multiple Speeds (rpm)

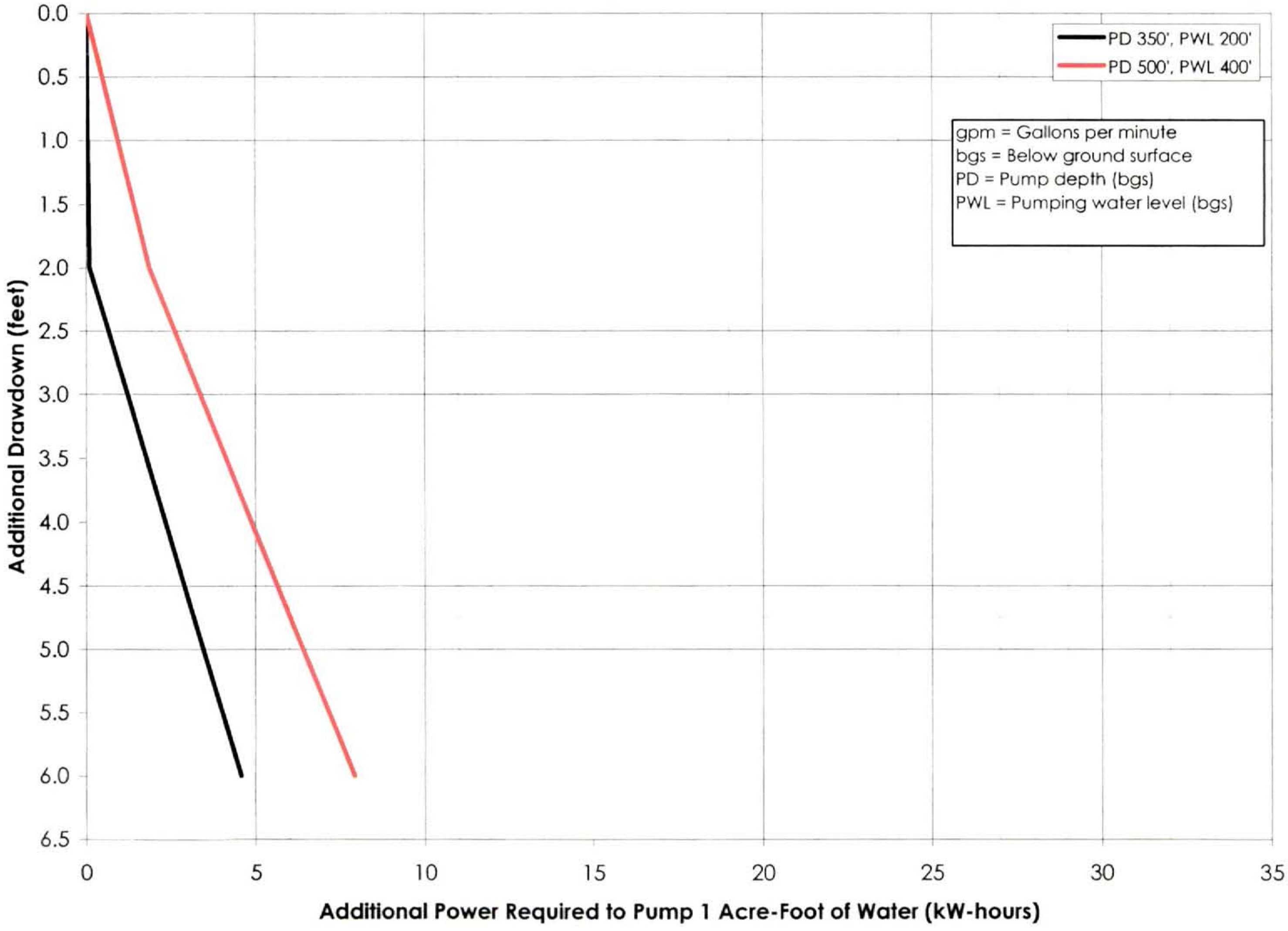
1750 rpm - 3550 rpm

Flow	Head	Eff	BEP	NPSHr	Power	Motor	Frame	Min flow	Sphere
1500 US gpm	857 ft	79 %	79 %	38.7 ft	411 hp	---	---	220 US gpm	---

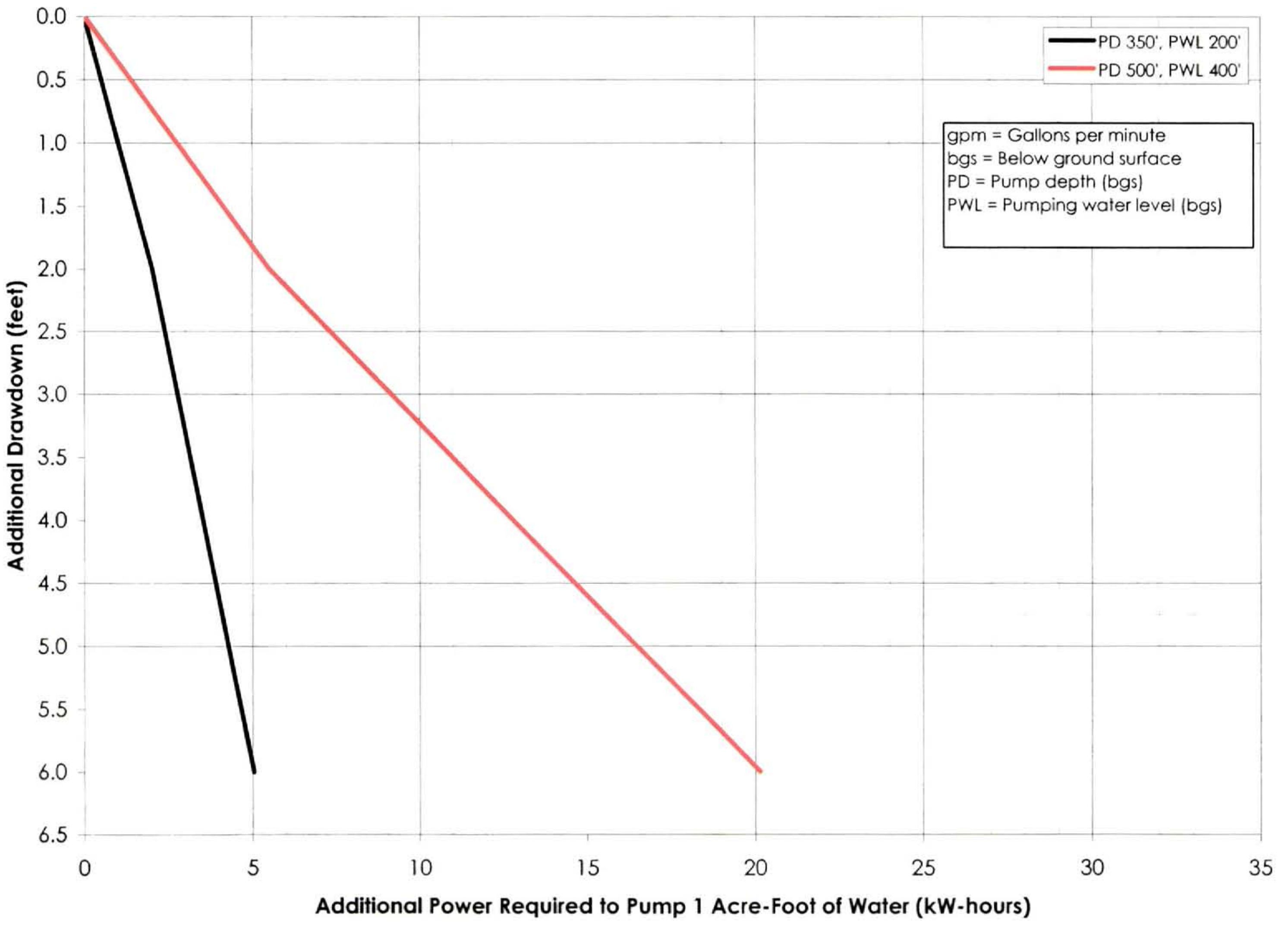
15 gpm Baseline Pumping Rate
Additional Power Required to Pump 1 Acre-Foot of Water as a Function of Additional Drawdown



500 gpm Baseline Pumping Rate
Additional Power Required to Pump 1 Acre-Foot of Water as a Function of Additional Drawdown



1,500 gpm Baseline Pumping Rate
Additional Power Required to Pump 1 Acre-Foot of Water as a Function of Additional Drawdown



APPENDIX M

Updated Traffic Impact Study

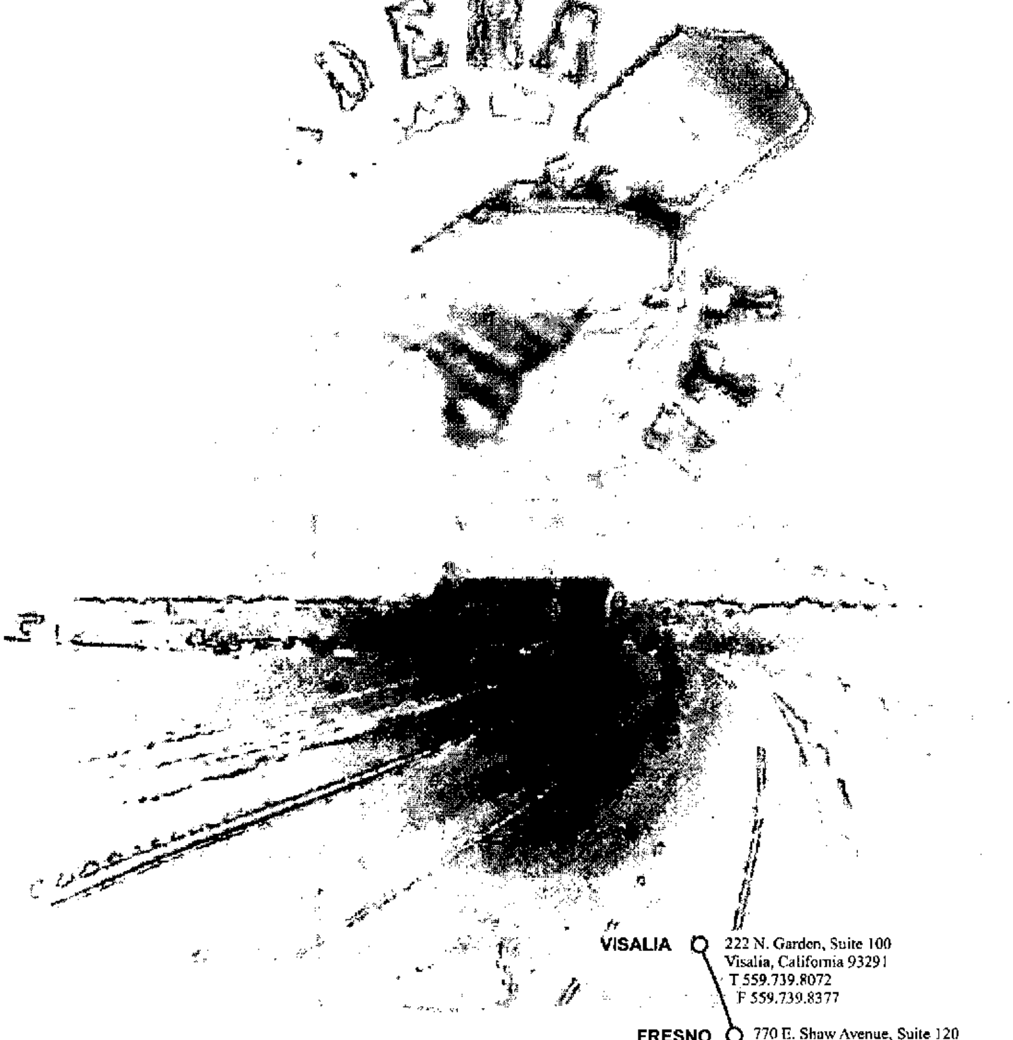
04-837.2

OCTOBER 2008
FINAL

TRAFFIC IMPACT STUDY

North Fork Casino

Madera County



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F 805.547.9596

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F 303.797.0987

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TRAFFIC IMPACT STUDY

FOR THE

NORTH FORK CASINO

Madera County, California

Final: October 2008
2nd Draft: October 2006
1st Draft: October 2005

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Robert Jones, Technician
Jason Quick, Technician

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TRAFFIC IMPACT STUDY

FOR THE

NORTH FORK CASINO

I. EXECUTIVE SUMMARY

This Traffic Impact Study (TIS) was prepared to assess the traffic impacts due to the development of the North Fork Casino (Project) and will be used in the preparation of a Project Environmental Impact Statement (EIS). The five (5) alternatives evaluated for the TIS include:

- Alternative A: Proposed Project Alternative located on the Madera Site
- Alternative B: Reduced Intensity Alternative located on the Madera Site
- Alternative C: Commercial Land Use Alternative located on the Madera Site
- Alternative D: Off-Site Alternative located on the North Fork Site
- Alternative E: No Project Alternative

The following sections provide a summary of identified impacts and recommended improvements for each alternative land use and location along with proportionate share information for the recommended improvements.

Alternative A, Proposed Project Alternative (Madera Site)

Alternative A, which is the Proposed Project Alternative, would consist of the following land uses:

- 268,480 square foot (sf) casino including a gift shop, lounge (entertainment), and restaurants
- 200 room (224,530 sf) hotel

The Alternative A total square footage would be 493,010 sf and the Project would be constructed and operational by 2010. Alternative A would be located on the approximately 305 acre Madera Site, which is located to the west of Golden State Boulevard, east of Road 23, north of Avenue 17, and south of Avenue 18 in Madera County.

Table 1 shows the Alternative A levels of service summary for the various scenarios for the County segments, freeway segments, and intersections surrounding the Madera Site. County segments, freeway segments, or intersections operating or projected to operate below the adopted level of service are shown bolded in Table 1. The signalized and all-way stopped-controlled (AWSC) intersection levels of service shown in Table 1 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized and AWSC level of service or delay shown in Table 1. The signalized levels of service or delay shown in Table 1 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

Table 2 shows the results of the Alternative A peak hour volume signal warrant analyses for the various scenarios for the study intersections surrounding the Madera Site. If a study intersection met the peak hour volume signal warrant then a "Yes" is shown in the appropriate scenario column. If the intersection did not meet the peak hour volume signal warrant then a "No" is shown in the appropriate scenario column. Intersections by scenario that met the peak hour volume signal warrant are shown bolded Table 2.

Table 3 shows the Alternative A projected 95th-percentile queue lengths for the various scenarios for the various study locations surrounding the Madera Site. Movements with queue lengths that exceed or are projected to exceed their available storage lengths are shown bolded in Table 3. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column.

TABLE 1:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE / MADERA SITE)

	Existing		2010 No Project		2010 Project		Mitigated 2010 Project		2030 No Project		2030 Project		Mitigated 2030 Project	
County Segment	**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**	
Avenue 18 ½ – Road 24 to Road 23	A/A		A/A		A/A		A/A		A/B		A/B		A/B	
Road 23 – Avenue 18 ½ to Avenue 17	A/A		B/B		B/B		B/B		D/D		D/D		D/D	
Avenue 17 – Road 23 to SR 99	A/A		A/A		A/D		A/D		**F/F**		F/F		A/C	
Avenue 17 – SR 99 to Road 27	A/A		B/E		C/F		A/B		**E/F**		F/F		A/B	
Golden State Blvd Avenue 17 to Road 23	A/A		A/A		A/A		A/A		A/A		A/D		A/D	
Freeway Segment	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**
SR 99 north of Avenue 18 ½														
• **NB**	C/C	22.6/22.1	C/C	23.9/24.2	C/C	24.3/25.2	C/C	24.3/25.2	**D/D**	**26.5/33.2**	**D/D**	**26.6/33.6**	C/C	19.3/22.7
• **SB**	**C/D**	18.4/**28.1**	**C/D**	19.6/**31.1**	**C/D**	20.0/**32.5**	B/C	13.3/19.7	**C/E**	23.9/**41.4**	**C/E**	24.1/**42.2**	B/C	17.8/25.7
SR 99 between Avenue 18 ½ and Avenue 17														
• **NB**	C/C	23.6/23.0	C/C	24.9/25.5	**C/D**	25.3/**27.0**	B/B	16.5/17.4	**D/D**	**26.4/31.4**	**D/D**	**26.4/31.4**	C/C	19.2/21.7
• **SB**	**C/D**	19.1/**29.7**	**C/D**	20.4/**33.6**	C/E	21.0/**36.1**	B/C	14.0/20.8	**C/E**	23.5/**40.5**	C/E	23.5/**40.5**	B/C	17.5/25.2
SR 99 south of Avenue 17														
• **NB**	C/C	25.1/24.5	**D/D**	**28.7/31.0**	**D/E**	**31.5/38.7**	C/C	19.3/21.6	**E/F**	**39.0/—**	**E/F**	**42.6/—**	C/E	25.9/41.8
• **SB**	**C/D**	20.2/**32.4**	C/E	22.8/44.4	C/F	24.7/—	B/C	16.2/25.8	**D/F**	**29.2/—**	**D/F**	**30.1/—**	C/F	21.1/—
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Avenue 18 ½ at SR 99 NB ramps							B/B	13.4/13.4			B/B	14.7/13.2	**B/B**	**13.5/12.8**
• EB Left	A/A	8.2/7.9	A/A	6.4/5.6	A/A	8.4/8.1			A/B	7.5/10.1				
• **NB Approach**	C/B	16.3/14.8	C/C	21.3/21.4	C/D	22.7/**26.4**			**F/F**	**337.7/7523.8**				
Avenue 18 ½ at SR 99 SB ramps/Road 23							**A/B**	**9.1/11.3**			**B/E**	17.8/58.6	A/B	9.6/14.2
• WB Left-Through	A/A	0.6/1.2	A/A	0.8/1.5	A/A	0.8/1.4								
• **NB Approach**	B/C	13.9/17.2	**C/E**	18.5/**36.5**	C/F	20.8/**63.1**								
• **SB Approach**	B/C	13.5/17.2	C/D	16.5/**28.5**	**C/E**	17.2/**36.5**			**F/F**	**52.0/332.3**				
Avenue 18 ½ at Pistachio Drive														
• EB Left-Through	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.7/2.2	A/A	0.7/2.5	A/A	0.7/2.6
• **SB Approach**	B/B	12.7/13.8	B/C	14.3/17.3	B/C	15.0/20.3	B/C	15.0/20.3	**C/F**	24.8/**187.5**	**D/F**	27.8/**309.6**	B/C	14.2/17.9
Avenue 18 ½ at Golden State Boulevard													B/B	12.6/17.4
• EB Left-Through	A/A	0.4/0.1	A/A	0.3/0.1	A/A	0.3/0.1	A/A	0.3/0.1						
• SB Approach	B/B	10.9/10.9	B/B	11.8/12.2	B/B	12.1/12.9	B/B	12.1/12.9						
• EB Left-Through-Right									A/A	1.0/0.9	A/A	1.0/0.9		
• WB Left-Through									A/A	6.6/7.5	A/A	6.9/7.9		
• **NB Approach**									**C/F**	19.2/137.3	**C/F**	23.7/**360.3**		
• **SB Approach**									**F/F**	**429.1/9379.8**	**F/F**	**685.3/—**		
Avenue 18 at Road 23													A/A	5.1/7.4
• NB Left-Through-Right	A/A	0.1/0.5	A/A	0.1/0.2	A/A	0.1/0.2	A/A	0.1/0.2	A/A	0.0/0.2	A/A	0.0/0.2		
• SB Left-Through-Right	A/A	0.4/0.6	A/A	1.4/1.4	A/A	1.7/1.7	A/A	1.7/1.7	A/A	0.8/1.0	A/A	2.3/2.7		
• WB Approach	A/A	9.4/9.8	A/B	9.7/10.2	A/B	9.6/10.1	A/B	9.6/10.1	B/C	14.5/17.9	C/C	15.3/21.2		
• EB Approach	A/B	9.9/10.1	B/B	10.7/11.9	B/B	10.8/12.1	B/B	10.8/12.1	C/C	16.4/24.8	C/D	18.8/31.5		

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *— = exceeds software parameters* *n/a = not applicable*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 1:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE / MADERA SITE)

	Existing		**2010 No Project**		**2010 Project**		**Mitigated 2010 Project**		**2030 No Project**		**2030 Project**		**Mitigated 2030 Project**	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Avenue 17 at SR 99 NB ramps							B/B	13.0/18.1			**E/F**	**75.1/268.4**	C/F	22.2/96.0
• **EB Left**	A/A	9.0/8.0	B/B	10.0/10.2	B/B	11.0/13.9			**D/F**	**27.7/617.2**				
• **NB Approach**	B/B	11.9/13.3	**F/F**	**114.6/371.0**	**F/F**	**6015.5/4113.0**			**F/F**	**6790.7/—**				
Avenue 17 at SR 99 SB off-ramp							A/A	2.7/5.5			C/F	24.4/336.6	A/B	5.1/13.6
• **SB Approach**	B/B	10.2/11.1	C/F	16.6/**174.5**	**E/F**	**37.6/6974.5**			**F/F**	**7445.5/—**				
Avenue 17 at Golden State Boulevard							B/C	18.8/21.5			**E/F**	**65.1/416.9**	C/F	23.3/133.2
• EB Left	A/A	0.0/0.0	A/A	8.2/8.7	A/B	9.2/10.7			B/D	12.5/29.4				
• **WB Left**	A/A	7.6/7.5	A/A	8.5/8.9	A/B	9.2/10.8			**F/F**	**71.5/275.4**				
• **NB Approach**	A/A	9.7/9.3	C/D	22.2/32.4	**F/F**	**250.4/—**			**F/F**	—/—				
• **SB Approach**	B/B	12.2/11.9	**F/F**	**113.9/—**	**F/F**	—/—			**F/F**	—/—				
Avenue 17 at Road 23							A/A	7.6/9.7			**E/F**	**58.6/256.4**	B/B	13.3/16.4
• NB Left-Through-Right	A/A	0.1/0.4	A/A	0.7/1.4	A/A	0.7/1.7			A/A	3.2/3.3				
• SB Left-Through-Right	A/A	1.1/0.7	A/A	0.7/0.6	A/A	0.7/0.6			A/A	0.8/0.3				
• **WB Approach**	B/B	10.5/10.6	B/C	13.9/18.9	C/E	15.5/**39.0**			**F/F**	—/—				
• **EB Approach**	B/B	10.3/10.4	B/B	12.3/14.9	B/C	13.1/19.2			**F/F**	—/—				
Ellis Street at Road 26	A/A	4.8/5.5	A/A	6.6/9.5	A/B	7.6/13.3	A/B	7.6/13.3	B/C	10.1/22.2	A/B	9.9/19.8	A/B	9.9/19.8
Gateway/Avenue 16 at SR 99 NB ramps														
• SB Approach	B/B	10.3/11.0	B/B	10.6/11.4	B/B	10.7/11.5	B/B	10.7/11.5						
Avenue 16/Avenue 16 connector at SR 99 NB ramps														
• EB Left	A/B	9.7/10.6	B/B	10.1/11.4	B/B	10.3/11.9	B/B	10.3/11.9						
Avenue 16 at SR 99 NB ramp connector														
• EB Left-Through	A/A	4.7/4.8	A/A	5.0/5.4	A/A	5.2/5.8	A/A	5.2/5.8						
• SB Approach	A/A	9.0/9.6	A/A	9.1/9.9	A/A	9.2/9.9	A/A	9.2/9.9						
Avenue 16/Ellis Overcrossing at SR 99 NB ramps									B/B	11.7/13.9	B/B	11.7/13.8	B/B	11.7/13.8
Avenue 16 at SR 99 SB ramps			A/A	9.3/10.0	A/B	9.2/10.1	A/B	9.2/10.1	A/B	7.3/10.6	A/B	7.4/10.9	A/B	7.4/10.9
• EB Left	A/A	7.7/7.9												
• SB Approach	B/B	11.0/13.0												
Avenue 16 at Schnoor Avenue/Golden State	A/B	8.4/10.9												
Avenue 16/Ellis Overcrossing at Aviation Drive			B/C	18.1/21.2	B/C	18.5/25.9	B/C	18.5/25.9	**F/F**	**115.7/399.6**	**F/F**	**126.3/415.2**	C/D	22.7/53.8
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B/B	12.1/15.1	B/C	14.3/22.7	**B/D**	14.9/**36.4**	B/C	12.1/24.4	C/F	**26.8/199.2**	B/F	16.8/**93.9**	B/C	12.5/29.2
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B/B	14.2/12.2	B/B	15.2/14.2	B/B	15.4/18.6	B/B	10.1/14.0	C/F	**31.4/133.0**	C/E	27.5/**80.3**	B/C	18.3/27.9
Avenue 15 ½ at Road 23													A/A	5.4/7.4
• NB Left-Through-Right	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0		
• SB Left-Through-Right	A/A	1.0/1.7	A/A	1.0/1.8	A/A	1.1/2.0	A/A	1.1/2.0	A/A	1.1/1.7	A/A	1.1/1.7		
• **WB Approach**	B/B	10.1/10.7	B/B	10.8/12.0	B/B	11.0/12.7	B/B	11.0/12.7	C/D	16.9/34.4	C/E	17.5/**38.1**		
• EB Approach	A/B	0.0/10.2	A/B	0.0/11.1	A/B	0.0/11.6	A/B	0.0/11.6	A/C	0.0/19.0	A/C	0.0/19.8		
SR 145/Madera Avenue at SR 99 NB ramps	A/B	9.1/13.1	A/A	5.6/6.6	A/B	5.6/10.7	A/A	6.4/7.3	**D/F**	**37.0/242.9**	**D/F**	**51.2/264.3**	B/C	16.6/30.7
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C/C	22.1/31.2	C/C	21.1/33.3	C/D	22.2/**38.7**	B/B	10.6/13.1	**E/F**	**70.9/238.7**	C/F	24.4/**99.2**	B/C	15.3/25.1
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B/B	10.6/11.0	B/B	13.1/14.1	B/B	13.9/17.0	B/B	11.1/10.4	C/F	29.7/**163.2**	B/C	16.2/24.4	B/B	12.7/16.6

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters* *n/a = not applicable*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 1:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE / MADERA SITE)

	Existing		2010 No Project		2010 Project		Mitigated 2010 Project		2030 No Project		2030 Project		Mitigated 2030 Project	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Avenue 14 at Road 23	A/A	8.4/8.4	A/A	8.8/9.3	A/A	9.0/9.8	A/A	9.0/9.8	B/C	11.6/16.6	B/C	11.8/17.8	A/A	7.0/6.9
Avenue 12/Golden State Boulevard at SR 99 SB ramps							B/B	14.1/13.1			C/C	21.7/24.1	C/B	20.6/17.8
• SB Left-Through	A/A	4.6/3.4	A/A	6.1/3.7	A/A	6.1/3.7			A/A	9.1/7.5				
• **WB Approach**	C/C	15.3/16.8	**E/D**	**43.3/30.0**	**F/E**	**50.7/44.3**			**F/F**	**9323.4/9051.8**				
Avenue 12 at Golden State Boulevard	**D/F**	51.0/**90.1**	D/D	54.0/52.0	D/E	54.3/**58.4**	D/D	39.8/41.2	**F/F**	**205.2/328.4**	**E/F**	**75.6/155.1**	C/D	34.4/39.5
Avenue 12 at SR 99 NB ramps			B/C	17.9/21.7	B/C	19.1/21.9	B/B	12.9/12.8	C/E	21.5/**57.9**	C/E	22.9/**63.8**	B/B	16.5/18.0
• EB Left-Through	A/A	2.3/4.1												
• **NB Approach**	**F/F**	**119.1/182.2**												

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters* *n/a = not applicable*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 2:
SIGNAL WARRANT ANALYSIS
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE / MADERA SITE)

Intersection	**Existing**	**2010 No Project**	**2010 Project**	**2030 No Project**	**2030 Project**
Avenue 18 ½ at SR 99 SB ramps/Road 23	No	No	No	**Yes**	**Yes**
Avenue 18 ½ at SR 99 NB ramps	No	No	No	**Yes**	**Yes**
Avenue 17 at SR 99 SB off-ramp	No	**Yes**	**Yes**	**Yes**	---
Avenue 17 at SR 99 NB ramps	**Yes**	**Yes**	**Yes**	**Yes**	---
Avenue 12/Golden State Boulevard at SR 99 SB ramps	No	**Yes**	**Yes**	**Yes**	---
Avenue 12 at Golden State Boulevard	---	---	---	---	---
Avenue 12 at SR 99 NB ramps	**Yes**	---	---	---	---
Avenue 18 at Road 23	No	No	No	No	**Yes**
Avenue 17 at Road 23	No	No	**Yes**	**Yes**	---
Avenue 17 at Golden State Boulevard	No	**Yes**	**Yes**	**Yes**	---
Ellis Street at Road 26	---	---	---	---	---
Avenue 15 ½ at Road 23	No	No	No	**Yes**	**Yes**
Avenue 14 at Road 23	No	No	No	**Yes**	**Yes**
Avenue 16 at Schnoor Avenue	**Yes**	---	---	---	---
Avenue 16 at Aviation Drive	---	---	---	---	---
Avenue 16 at SR 99 SB ramps	No	---	---	---	---
Avenue 16/Avenue 16 connector at SR 99 NB ramps	No	No	No	---	---
Avenue 16 at SR 99 NB ramp connector	No	No	No	---	---
Gateway/Avenue 16 at SR 99 NB ramps	No	No	No	---	---
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	---	---	---	---	---
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	---	---	---	---	---
SR 99 NB ramps at SR 145/Madera Avenue	---	---	---	---	---
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	---	---	---	---	---
Olive Avenue/Avenue 14/ SR 99 SB on-ramp at SR 145	---	---	---	---	---
Avenue 18 ½ at Pistachio Drive	No	No	No	**Yes**	**Yes**
Avenue 18 ½ at Golden State Boulevard	No	No	No	**Yes**	**Yes**

SR = State Route *Yes = meets urban/rural peak hour volume signal warrant*
No = does not meet urban/rural peak hour volume signal warrant *--- = signalized intersection/no warrant prepared*
Bolded Text = intersection meets the peak hour signal warrant

TABLE 3:
95TH-PERCENTILE QUEUE LENGTH SUMMARY
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE / MADERA SITE)

		95th Percentile Queue Length (ft) (AM/PM)						
Intersection	**Existing Queue Storage Length (ft)**	**Existing**	**2010 No Project**	**2010 Project**	**Mitigated 2010 Project^4**	**2030 No Project**	**2030 Project**	**Mitigated 2030 Project^4**
SR 99 NB off-ramp at Avenue 18 ½	1,204^1 (770^2)							
- NB Left		43/38	69/80	77/114	110/131	461/---	#164/#181	148/188
- NB Through-Right		4/4	4/4	4/5	19/0	8/9	26/0	25/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256^1 (822^2)							
- **SB Left-Through-Right**		22/47	35/95	37/118	63/97	246/**860**		
- SB Left								82/124
- SB Left-Right							#209/#357	
- SB Right								61/#119
SR 99 SB off-ramp at Avenue 17	1,341^1 (907^2)							
- **SB Left**	589^3	4/13	15/259	62/---	56/163	---/---	#358/**#657**	110/#308
- **SB Right**	589^3	1/1	8/11	20/44	35/38	239/---	106/**192**	46/122
SR 99 NB off-ramp at Avenue 17	1,060^1 (626^2)							
- **NB Left**	45^3				128/160		**#766/#1,383**	275/**#838**
- **NB Left-Through**		17/8	322/**623**	---/---	129/161	---/---	**#773/#1,406**	
- **NB Through-Right**								49/**#664**
- **NB Right**	45^3	12/66	27/**588**	**49/1,557**	26/214	**403/---**	**53/#901**	29/**#541**
SR 99 NB off-ramp at Avenue 16 *[Avenue 16/Ellis Avenue Overcrossing]*	1,150^1 (716^2)							
- SE Through-Right		0/0	0/0	0/0	0/0			
- *[NB Left]*	*[150^3]*					55/89	55/89	55/89
- *[NB Through-Right]*	*[150^1]*					29/48	29/48	29/48
SR 99 SB off-ramp at Avenue 16 *[Avenue 16/Ellis Avenue Overcrossing]*	1,020^1 (586^2)							
- SB Left	*[225^3]*	9/18	33/49	34/50	34/50	34/56	34/56	34/56
- SB Right	*[225^3]*	15/29	40/51	42/54	42/54	24/123	24/127	24/127
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881^1 (447^2)							
- **NB Left**	353^3	83/103	110/192	137/292	110/#318	141/**205**	142/**186**	137/**231**
- **NB Left-Through**	353^3	82/103	110/194	137/293	110/#321	141/**209**	142/190	137/235
- **NB Right**	353^3	39/129	41/208	42/254	37/#269	232/**#828**	#239/**#766**	74/**#383**

95th percentile queue length - is minimum amount of storage needed for each movement *SR = State Route* *ft = feet* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[xx] = 2030 conditions ^{1} *= Total ramp length* ^{2} *= Calculated storage distance* ^{3} *= Distance of ramp striped as 2-lanes (existing)*
--- = not calculated for unsignalized intersections *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *m = volume for 95th percentile queue is metered by upstream signal*
Bolded Text = 95th percentile queues exceed the available storage capacity *4 = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

TABLE 3:
95TH-PERCENTILE QUEUE LENGTH SUMMARY
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE / MADERA SITE)

		95th Percentile Queue Length (ft) (AM/PM)						
Intersection	**Existing Queue Storage Length (ft)**	**Existing**	**2010 No Project**	**2010 Project**	**Mitigated 2010 Project[4]**	**2030 No Project**	**2030 Project**	**Mitigated 2030 Project[4]**
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])							
• **SB Left**	65[3]							137/**#360**
• **SB Left-Through**		76/123	95/155	108/179	78/148	**#407/#813**	**#407/#781**	
• **SB Through – Right**								103/**#334**
• **SB Right**	65[3]	30/25	38/65	42/145	33/124	**114/241**	**115/221**	
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])							
• WB Left	90[3]	116/103	117/108	117/108	109/85	#459/#575	#395/#575	104/115
• WB Through-Right	90[3]	0/30	0/31	0/31	0/26	0/62	0/62	0/45
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])							
• **SB Left**	65[3]	143/143	171/210	187/266	92/109	454/#1,062	197/389	
• **SB Left-Right**								154/248
• **SB Right**	65[3]	43/37	41/33	40/30	47/35	174/**244**	185/303	137/242
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])							
• **WB Left**		70/81	239/190	273/277	60/64	—/—	431/532	359/445
• **WB Right**		7/7	7/8	7/8	14/14	7/15	28/73	23/32
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])							
• **NB Left**								187/182
• **NB Left-Through**	49[3]	259/300	216/224	236/#240	173/163	#501/**#581**	#512/**#593**	
• **NB Through-Right**								101/182
• **NB Right**	49[3]	18/21	49/58	52/59	42/47	234/**#501**	236/**#511**	102/180
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481							
• **WB Left (at Golden State Boulevard)**		6/3	10/10	13/21	#131/#170	437/—	**m#634/m#499**	#270/**m#431**
• **WB Through (at Golden State Boulevard)**					74/132		**m133/m310**	
• **WB Through-Right** (at Golden State Boulevard)		0/0	0/0	0/0		0/0		262/**#1,084**
• **WB Right (at Golden State Boulevard)**					15/28		**m17/m12**	
• EB Through (at SR 99 SB off-ramp)		0/0	0/0	0/0	3/52	0/0	m77/m109	90/m213

95th percentile queue length - is minimum amount of storage needed for each movement *SR = State Route* *ft = feet* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[xx] = 2030 conditions [1] *= Total ramp length* [2] *= Calculated storage distance* [3] *= Distance of ramp striped as 2-lanes (existing)*
--- = not calculated for unsignalized intersections *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *m = volume for 95th percentile queue is metered by upstream signal*
***Bolded Text** = 95th percentile queues exceed the available storage capacity* [4] *= Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

Table 4 shows the Alternative A ramp widening/auxiliary lane thresholds for the various scenarios for the various State Route (SR) 99 off-ramps. Locations that are projected to meet the thresholds are shown bolded in Table 4.

Table 5 shows the Alternative A calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet left-turn channelization warrants, or require dual left-turn lanes or separate right-turn lanes for the various Project scenarios for the various study locations surrounding the Madera Site. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 4:
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
ALTERNATIVE A (PROPOSED PROJECT / MADERA SITE)

	Existing			2010 No Project			2010 Project			2030 No Project			2030 Project		
Intersection	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	248/231	N/N	N/N	282/302	N/N	N/N	292/347	N/N *(N)*	N/N *(N)*	378/406	N/N	N/N	378/406	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 18 ½	155/248	N/N	N/N	189/289	N/N	N/N	190/290	N/N *(N)*	N/N *(N)*	504/737	N/N	N/N	548/793	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 17	55/111	N/N	N/N	109/222	N/N	N/N	164/320	N/N *(N)*	N/N *(N)*	497/745	N/N	N/N	497/745	N/N *(N)*	N/N *(N)*
SR 99 NB off-ramp at Avenue 17	204/428	N/N	N/N	424/822	N/N	N/N	617/**1186**	**N/Y** *(N)*	N/N *(N)*	**1650/3347**	N/N	**Y/Y**	**1863/3603**	N/N *(N)*	**Y/Y** *(Y)*
SR 99 NB off-ramp at Avenue 16	60/104	N/N	N/N	69/115	N/N	N/N	69/115	N/N *(N)*	N/N *(N)*	314/430	N/N	N/N	314/430	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 16	185/269	N/N	N/N	248/385	N/N	N/N	282/464	N/N *(N)*	N/N *(N)*	630/**950**	**N/Y**	N/N	637/**964**	**N/Y** *(N)*	N/N *(N)*
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	328/552	N/N	N/N	451/846	N/N	N/N	540/**1100**	**N/Y** *(N)*	N/N *(N)*	753/**1298**	**N/Y**	N/N	753/**1298**	**N/Y** *(N)*	**N/Y** *(N)*
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	129/181	N/N	N/N	192/303	N/N	N/N	242/408	N/N *(N)*	N/N *(N)*	707/**1134**	**N/Y**	N/N	736/**1196**	**N/Y** *(N)*	N/N *(N)*
SR 99 NB off-ramp at SR 145/Madera Avenue	217/186	N/N	N/N	223/193	N/N	N/N	223/193	N/N *(N)*	N/N *(N)*	496/534	N/N	N/N	496/534	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 14/Olive Avenue	361/317	N/N	N/N	439/504	N/N	N/N	487/657	N/N *(N)*	N/N *(N)*	**958/1400**	**Y/Y**	N/N	**975/1438**	**Y/Y** *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	369/372	N/N	N/N	470/490	N/N	N/N	490/550	N/N *(N)*	N/N *(N)*	**1176/1567**	**Y/N**	**N/Y**	**1185/1590**	**Y/N** *(N)*	**N/Y** *(Y)*
SR 99 NB off-ramp at Avenue 12	313/294	N/N	N/N	355/343	N/N	N/N	355/343	N/N *(N)*	N/N *(N)*	745/805	N/N	N/N	745/805	N/N *(N)*	N/N *(N)*

PCE = Passenger Car Equivalent *SR = State Route* *Y = Threshold Met* *N = Threshold Not Met* *NB = northbound* *SB – southbound* *(Y) = Mitigations Included in Analyses & Cost Estimates*
(N) = Mitigations Not Included in Analyses & Cost Estimates *Bolded Text = ramps meet at least one of the volume thresholds*

TABLE 5:
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE A (PROPOSED PROJECT/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	100	n/a
	NBR	25	100	n/a
	WBL	---	n/a	n/a
	SBL	---	n/a	200
	SBR	---	n/a	500
Avenue 18 ½ at SR 99 NB ramps	EBL	150	150	300[1]
Avenue 17 at SR 99 NB ramps	WBR	---	250	n/a
	EBL	300	100	300[1]
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	350	900
	SBL	---	200	500
Avenue 12 at Golden State Boulevard	NBL	200	100	100
	WBL	---	100	100
	WBR	---	n/a	700
	SBL	400	350[1]	750[4]
	SBR	200	100	n/a
	EBL	350	300	400
	EBR	425	100	n/a
Avenue 12 at SR 99 NB ramps	WBR	---	600	1,800
	EBL	---	250	300[1]
Avenue 17 at Road 23	NBL	---	n/a	150
	WBL	---	n/a	100
	SBR	---	n/a	300
	EBR	---	n/a	300
Avenue 17 at Golden State Boulevard	NBL	50	150	300
	NBR	---	n/a	650[3]
	WBL	---	200	600[1]
	WBR	---	350	n/a
	SBL	---	200[1]	600[1]
	EBL	---		100[1]
Ellis Street at Road 26	NBL	---	100	100
	WBR	---	250	150
	SBL	---	200	200
	EBR		100	100

ft = feet *SR = State Route* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

TABLE 5:
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE A (PROPOSED PROJECT/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 16/Ellis Street at Aviation Drive	NBL	75	100	400
	NBR	75	n/a	1,100[3]
	WBL	200	400	850[1]
	SBL	---	100	400[1]
	SBR	---	100	n/a
	EBL	---	100	150
	EBR		n/a	350
Avenue 16 at SR 99 SB ramps	WBR	---	100	n/a
	EBL	---	150	n/a
Avenue 16 at SR 99 NB ramps	EBL	---	n/a	n/a
	EBR	---	n/a	n/a
Avenue 16/Ellis Street at SR 99 NB ramps	NBL	---	n/a	150[1]
	NBTR	---	n/a	150
	WBR	---	n/a	200
	EBL	300	n/a	400[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	200	1,050
	EBL	100	250	200[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	250	450
	EBR	125	700	900
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	250[1]	600[1]
	SBR	---	n/a	350
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	100[1]	200[1]
	SBL	100	n/a	250
	SBR	25	250	550
	EBL	175	250	300[1]
	EBR	175	500	1,150
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	n/a	100
	NBR	---	n/a	500
	WBL	---	n/a	350[1]
	WBR	---	175	n/a
	SBL	---	n/a	150
Avenue 18 at Pistachio Drive	WBR		250	250

ft = feet SR = State Route NB = northbound SB = southbound
WB = westbound EB = eastbound n/a = not applicable --- =no existing lane
[1] = dual lefts required, length of each left-turn lane [2] = exceeds available distance to nearest intersection
[3] = dual rights required, length of each right-turn lane [4] = triple lefts required, length of each left-turn lane

In order to mitigate the County segments, freeway segments, and intersections projected to operate below the level of service standard as identified in Table 1, meet the peak hour volume signal warrant as identified in Table 2, exceed the 95th percentile queue storage lengths as identified in Table 3, meet the ramp widening/auxiliary lane thresholds as identified in Table 4, and/or exceed the available storage length, meet the left-turn channelization warrant, require dual left-turn lanes, or separate right-turn lanes as identified in Table 5, the following improvements by scenario are proposed for Alternative A at the Madera Site:

Opening Day (2010) Improvements for Alternative A

County Segments

- Avenue 17 – SR 99 to Road 27
    - Restripe/widen from two (2) lanes to four (4) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 between Avenue 18 ½ to Avenue 17
    - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 south of Avenue 17
    - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

Intersections

- Avenue 18 ½ at SR 99 NB ramps
    - Signalize the intersection

- Avenue 18 ½ at SR 99 SB ramps/Road 23
    - Signalize the intersection

- Avenue 17 at SR 99 NB ramps
    - Signalize the intersection
    - Restripe/widen the NB approach, south leg, from one (1) shared left-through lane and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane and two (2) right-turn lanes
    - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane to one (1) left-turn lane and two (2) through lanes
    - Restripe/widen the WB approach from one (1) through lane and one (1) right-turn lane to two (2) through lanes and one (1) right-turn lane

- Avenue 17 at SR 99 SB ramps
    - Signalize the intersection
    - Restripe/widen the EB approach, west leg, from one (1) through lane to two (2) through lanes
    - Restripe/widen the WB approach, east leg, from one (1) through lane to two (2) through lanes

- Avenue 17 at Golden State Boulevard
    - Signalize the intersection
    - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to two (2) left-turn lanes and one (1) shared through-right lane

  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane

- Avenue 17 at Road 23
  - Signalize the intersection

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) right-turn lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane to one (1) left-turn lane and one (1) through lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) right-turn lane to dual (2) left-turn lanes and one (1) right-turn lane

- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane

- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the WB approach, east leg, from a shared through-right lane to one (1) through lane and one (1) right-turn lane

<u>2030 Improvements for Alternative A</u>

<u>County Segments</u>

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from four (4) lanes to six (6) lanes

- Avenue 17 – Road 23 to SR 99
  - Restripe/widen from two (2) lanes to six (6) lanes

<u>Freeway Segments</u>

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

- SR 99 between Avenue 18 ½ to Avenue 17

  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

Intersections

- Avenue 18 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane, to dual (2) left-turn lanes and one (1) through lane

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Restripe/widen the SB approach, north leg, from a shared left-right lane to one (1) left-turn lane and one (1) right-turn lane

- Avenue 18 ½ at Pistachio Drive
  - Although the Avenue 18 ½ at Pistachio Drive intersection is projected to meet the urban peak hour volume signal warrant, it will not be signalized due to its proximity to the SR 99 SB off-ramp. The intersection will be restricted to right-in/right-out/left-in access, which reduces the need for a signal and allows the intersection to operate at an acceptable level of service without a signal.

- Avenue 18 ½ at Golden State Boulevard / Road 23
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1)-through-right lane, to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through lane and one (1) right-turn lane, to dual (2) left-turn lanes and one (1) shared through-right lane

- Avenue 18 at Road 23
  - Signalize the intersection

- Avenue 17 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes to three (3) left-turn lanes, one (1) shared through-right lane, and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane to two (2) through lanes and one (1) shared through-right lane
  - Widen the NB off-ramp to two (2) lanes with a NB auxiliary lane on SR 99

- Avenue 17 at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and two (2) right-turn lanes

  - Restripe/widen the EB approach, west leg, from two (2) through lanes to four (4) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes to three (3) through lanes

- Avenue 17 at Golden State Boulevard
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane

- Avenue 17 at Road 23
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to one (1) shared left-through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane to one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) through lane, and one (1) shared through-right lane

- Avenue 16/Ellis Street at Aviation Drive/Kennedy
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane, and one (1) through-right lane

- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and two (2) through lanes
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes

- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps

  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) shared through-right lane

- Avenue 15 ½ at Road 23
  - Signalize the intersection

- SR 145/Madera Avenue at SR 99 NB ramps
  - Restripe/widen the SB approach, north leg, from one (1) through lane and one (1) shared through-right lane to two (2) through lanes and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to two (2) left-turn lanes and one (1) shared through-right lane

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the NB approach, south leg, from two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane, to dual (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane, to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane, to dual (2) left-turn lanes, one (1) through lane, one (1) shared through-right lane and one (1) right-turn lane

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-right-turn lane, an one (1) right-turn lane

- Avenue 14 at Road 23
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Widen the SB off-ramp to two (2) lanes with a SB auxiliary lane on SR 99

- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane, to three (3) left-turn lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane, to one (1) left-turn lane, three (3) through lanes, and one (1) right-turn lane

- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg from a shared left-through lane and a separate right-turn lane, to dual (2) left-turn lanes, a shared through-right lane, and one (1) right-turn lane

- Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lane, to dual (2) left-turn lanes and three (3) through lanes
- Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane, to two (2) through lanes, one (1) shared through-right lane and one (1) right-turn lane

With the proposed Alternative A/Madera Site improvements detailed previously, two (2) freeway segments and two (2) intersections are still projected to operate below the adopted level of service standard even with the recommended improvements. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E" and "F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. The Avenue 17 at SR 99 NB ramps and Avenue 17 at Golden State Boulevard intersections are both still projected to operate at a LOS "F" in the PM peak hour. Per discussions with Caltrans staff, widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative A mitigations, these four (4) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density and intersection delay). Therefore these four (4) locations should be viewed as mitigated as appropriate by the Project.

Alternative B, Reduced Intensity Alternative (Madera Site)

Alternative B, which is the Reduced Intensity Alternative, would consist of a 198,990 sf casino including a gift shop, lounge (entertainment), and restaurants, and would be constructed and operational by 2010. Alternative B would be located on the approximately 305 acre Madera Site, which is located to the west of Golden State Boulevard, east of Road 23, north of Avenue 17, and south of Avenue 18 in Madera County.

Table 6 shows the Alternative B levels of service summary for the various scenarios for the County segments, freeway segments, and intersections surrounding the Madera Site. County segments, freeway segments, or intersections operating or projected to operate below the adopted level of service are shown bolded in Table 6. The signalized and AWSC intersection levels of service shown in Table 6 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized and AWSC level of service or delay shown in Table 6. The signalized levels of service or delay shown in Table 6 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

TABLE 6:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE / MADERA SITE)

	Existing		2010 No Project		2010 Project		Mitigated 2010 Project		2030 No Project		2030 Project		Mitigated 2030 Project	
County Segment	**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**	
Avenue 18 ½ Road 24 to Road 23	A/A		A/A		A/A		A/A		A/B		A/B		A/B	
Road 23 – Avenue 18 ½ to Avenue 17	A/A		B/B		B/B		B/B		D/D		D/D		D/D	
Avenue 17 – Road 23 to SR 99	A/A		A/A		A/**D**		A/**D**		**F/F**		**F/F**		A/C	
Avenue 17 – SR 99 to Road 27	A/A		B/**E**		C/**F**		A/B		**E/F**		**F/F**		A/B	
Golden State Blvd – Avenue 17 to Road 23	A/A		A/A		A/A		A/A		A/A		A/C		A/C	
Freeway Segment	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**
SR 99 north of Avenue 18 ½														
• **NB**	C/C	22.6/22.1	C/C	23.9/24.2	C/C	24.2/25.2	C/C	24.2/25.2	**D/D**	**26.5/33.2**	**D/D**	**26.6/34.3**	C/C	19.4/23.0
• **SB**	C/**D**	18.4/**28.1**	C/**D**	19.6/**31.1**	C/**D**	20.0/**32.5**	B/C	13.3/19.7	C/**E**	23.9/**41.4**	C/**E**	24.1/**43.0**	B/C	17.8/26.0
SR 99 between Avenue 18 ½ and Avenue 17														
• **NB**	C/C	23.6/23.0	C/C	24.9/25.5	C/**D**	25.3/**27.0**	B/B	16.5/17.4	**D/D**	**26.4/31.4**	**D/D**	**26.5/32.5**	C/C	19.3/22.2
• **SB**	C/**D**	19.1/**29.7**	C/**D**	20.4/**33.6**	C/**E**	21.0/**36.1**	B/C	14.0/20.8	C/**E**	23.5/**40.5**	C/**E**	23.7/**42.1**	B/C	17.6/25.7
SR 99 south of Avenue 17														
• **NB**	C/C	25.1/24.5	**D/D**	**28.7/31.0**	**D/E**	**31.5/38.6**	C/C	19.3/21.5	**E/F**	**39.0/---**	**E/F**	**41.5/---**	C/E	25.5/40.9
• **SB**	C/**D**	20.2/**32.4**	C/**E**	22.8/**44.4**	C/**F**	24.7/---	B/C	16.2/25.8	**D/F**	**29.2/---**	**D/F**	**29.8/---**	C/F	21.0/---
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Avenue 18 ½ at SR 99 NB ramps							B/B	13.3/13.4			B/B	14.5/12.8	B/B	12.9/11.3
• EB Left	A/A	8.2/7.9	A/A	6.4/5.6	A/A	8.4/8.1			A/B	7.5/10.1				
• **NB Approach**	C/B	16.3/14.8	C/C	21.3/21.4	C/**D**	22.7/**26.4**			**F/F**	**337.7/7523.8**				
Avenue 18 ½ at SR 99 SB ramps/Road 23							**A/B**	**8.9/11.3**			B/**D**	17.3/**54.9**	A/B	9.7/14.7
• WB Left-Through	A/A	0.6/1.2	A/A	0.8/1.5	A/A	0.8/1.4								
• **NB Approach**	B/C	13.9/17.2	C/**E**	18.5/**36.5**	C/**F**	20.8/**63.1**								
• **SB Approach**	B/C	13.5/17.2	C/**D**	16.5/**28.5**	C/**E**	17.2/**36.5**			**F/F**	**52.0/332.3**				
Avenue 18 ½ at Pistachio Drive														
• EB Left-Through	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.7/2.2	A/A	0.7/2.6	A/A	0.7/2.5
• **SB Approach**	B/B	12.7/13.8	B/C	14.3/17.3	B/C	15.0/20.3	B/C	15.0/20.3	C/**F**	24.8/**187.5**	D/**F**	26.7/**277.0**	B/C	14.0/17.4
Avenue 18 ½ at Golden State Boulevard													B/B	14.6/16.3
• EB Left-Through	A/A	0.4/0.1	A/A	0.3/0.1	A/A	0.3/0.1	A/A	0.3/0.1						
• SB Approach	B/B	10.9/10.9	B/B	11.8/12.2	B/B	12.1/12.9	B/B	12.1/12.9						
• EB Left-Through-Right									A/A	1.0/0.9	A/A	1.0/0.9		
• WB Left-Through									A/A	6.6/7.5	A/A	7.3/8.7		
• **NB Approach**									C/**F**	19.2/**137.3**	D/**F**	31.1/---		
• **SB Approach**									**F/F**	**429.1/9379.8**	F/F	593.0/---		
Avenue 18 at Road 23													A/A	4.8/7.1
• NB Left-Through-Right	A/A	0.1/0.5	A/A	0.1/0.2	A/A	0.1/0.2	A/A	0.1/0.2	A/A	0.0/0.2	A/A	0.0/0.2		
• SB Left-Through-Right	A/A	0.4/0.6	A/A	1.4/1.4	A/A	1.7/1.7	A/A	1.7/1.7	A/A	0.8/1.0	A/A	1.9/2.2		
• WB Approach	A/A	9.4/9.8	A/B	9.7/10.2	A/B	9.6/10.1	A/B	9.6/10.1	B/C	14.5/17.9	B/C	14.9/20.3		
• EB Approach	A/B	9.9/10.1	B/B	10.7/11.9	B/B	10.8/12.1	B/B	10.8/12.1	C/C	16.4/24.8	C/D	18.0/29.3		

SR = State Route *[1] Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 6:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE / MADERA SITE)

	Existing		**2010 No Project**		**2010 Project**		**Mitigated 2010 Project**		**2030 No Project**		**2030 Project**		**Mitigated 2030 Project**	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Avenue 17 at SR 99 NB ramps							B/B	13.0/18.1			**E/F**	**69.3/260.2**	C/F	21.5/91.1
• **EB Left**	A/A	9.0/8.0	B/B	10.0/10.2	B/B	11.0/13.9			**D/F**	**27.7/617.2**				
• **NB Approach**	B/B	11.9/13.3	**F/F**	**114.6/371.0**	**F/F**	**6001.8/4093.9**			**F/F**	**6790.7/—**				
Avenue 17 at SR 99 SB off-ramp							A/A	2.7/5.5			B/F	17.1/**277.5**	A/B	5.1/11.8
• **SB Approach**	B/B	10.2/11.1	C/F	16.6/174.5	**E/F**	**37.6/6974.5**			**F/F**	**7445.5/—**				
Avenue 17 at Golden State Boulevard							B/C	18.9/21.5			**E/F**	**62.5/409.1**	C/F	22.4/**118.6**
• EB Left	A/a	0.0/0.0	A/A	8.2/8.7	A/B	9.2/10.7			B/D	12.5/29.4				
• **WB Left**	A/A	7.6/7.5	A/A	8.5/8.9	A/B	9.2/10.8			**F/F**	**71.5/275.4**				
• **NB Approach**	A/A	9.7/9.3	C/D	22.2/32.4	**F/F**	**250.4/—**			**F/F**	**—/—**				
• **SB Approach**	B/B	12.2/11.9	**F/F**	**113.9/—**	**F/F**	**—/—**			**F/F**	**—/—**				
Avenue 17 at Road 23							A/A	7.4/9.5			E/F	**56.3/248.6**	B/B	13.2/16.0
• NB Left-Through-Right	A/A	0.1/0.4	A/A	0.7/1.4	A/A	0.7/1.7			A/A	3.2/3.3				
• SB Left-Through-Right	A/A	1.1/0.7	A/A	0.7/0.6	A/A	0.7/0.6			A/A	0.8/0.3				
• **WB Approach**	B/B	10.5/10.6	B/C	13.9/18.9	C/**E**	15.5/**39.2**			**F/F**	**—/—**				
• **EB Approach**	B/B	10.3/10.4	B/B	12.3/14.9	B/C	13.1/19.1			**F/F**	**—/—**				
Ellis Street at Road 26	A/A	4.8/5.5	A/A	6.6/9.5	A/B	7.6/13.2	A/B	7.6/13.2	B/C	10.1/22.2	A/B	9.9/19.7	A/B	9.9/19.7
Gateway/Avenue 16 at SR 99 NB ramps														
• SB Approach	B/B	10.3/11.0	B/B	10.6/11.4	B/B	10.7/11.5	B/B	10.7/11.5						
Avenue 16/Avenue 16 connector at SR 99 NB ramps														
• EB Left	A/B	9.7/10.6	B/B	10.1/11.4	B/B	10.3/11.9	B/B	10.3/11.9						
Avenue 16 at SR 99 NB ramp connector														
• EB Left-Through	A/A	4.7/4.8	A/A	5.0/5.4	A/A	5.2/5.9	A/A	5.2/5.9						
• SB Approach	A/A	9.0/9.6	A/A	9.1/9.9	A/A	9.2/9.9	A/A	9.2/9.9						
Avenue 16/Ellis Overcrossing at SR 99 NB ramps									B/B	11.7/13.9	B/B	11.7/13.9	B/B	11.7/13.9
Avenue 16 at SR 99 SB ramps			A/A	9.3/10.0	A/B	9.2/10.1	A/B	9.2/10.1	A/B	7.3/10.6	A/B	7.4/10.8	A/B	7.4/10.8
• EB Left	A/A	7.7/7.9												
• SB Approach	B/B	11.0/13.0												
Avenue 16 at Schnoor Avenue/Golden State	A/B	8.4/10.9												
Avenue 16/Ellis Overcrossing at Aviation Drive			B/C	18.1/21.2	B/C	18.5/25.9	B/C	18.5/25.9	**F/F**	**115.7/399.6**	**F/F**	**123.5/409.2**	C/D	22.4/52.4
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B/B	12.1/15.1	B/C	14.3/22.7	B/D	14.9/36.8	B/C	12.1/24.9	C/F	26.8/**199.2**	B/F	16.9/**91.7**	B/C	12.4/28.9
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B/B	14.2/12.2	B/B	15.2/14.2	B/B	15.4/18.6	B/B	10.1/14.1	C/F	31.4/**133.0**	C/E	27.0/**78.2**	B/C	18.2/27.2
Avenue 15 ½ at Road 23													A/A	5.4/7.1
• NB Left-Through-Right	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0
• SB Left-Through-Right	A/A	1.0/1.7	A/A	1.0/1.8	A/A	1.1/2.0	A/A	1.1/2.0	A/A	1.1/1.7	A/A	1.1/1.7		
• **WB Approach**	B/B	10.1/10.7	B/B	10.8/12.0	B/B	11.0/12.7	B/B	11.0/12.7	C/D	16.9/34.4	C/E	17.3/37.1		
• EB Approach	A/B	0.0/10.2	A/B	0.0/11.1	A/B	0.0/11.6	A/B	0.0/11.6	A/C	0.0/19.0	A/C	0.0/19.6		
SR 145/Madera Avenue at SR 99 NB ramps	A/B	9.1/13.1	A/A	5.6/6.6	A/B	5.6/10.2	A/A	6.3/7.6	**D/F**	**37.0/242.9**	**D/F**	**48.5/257.0**	B/C	15.2/23.3
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C/C	22.1/31.2	C/C	21.1/33.3	C/D	22.0/**38.7**	B/B	10.5/13.5	**E/F**	**70.9/238.7**	C/F	**24.4/98.0**	B/C	15.8/28.6

SR = State Route *[1] Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB – westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 6:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE / MADERA SITE)

	Existing		2010 No Project		2010 Project		Mitigated 2010 Project		2030 No Project		2030 Project		Mitigated 2030 Project	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B/B	10.6/11.0	B/B	13.1/14.1	B/B	13.9/17.0	B/B	11.2/12.1	C/**F**	29.7/**163.2**	B/C	16.2/24.3	B/B	12.7/19.0
Avenue 14 at Road 23	A/A	8.4/8.4	A/A	8.8/9.3	A/A	9.0/9.8	A/A	9.0/9.8	B/C	11.6/16.6	B/C	11.7/17.5	A/A	7.0/7.0
Avenue 12/Golden State Boulevard at SR 99 SB ramps							B/B	18.1/14.8			C/C	21.7/24.0	B/B	17.1/17.1
▪ SB Left-Through	A/A	4.6/3.4	A/A	6.1/3.7	A/A	6.1/3.7			A/A	9.1/7.5				
• **WB Approach**	C/C	15.3/16.8	**E/D**	**43.3/30.0**	**F/E**	**50.7/44.3**			**F/F**	**9323.4/9051.8**				
Avenue 12 at Golden State Boulevard	D/**F**	51.0/**90.1**	D/D	54.0/52.0	D/**E**	54.3/**58.4**	C/D	33.5/41.6	**F/F**	**205.2/328.4**	**E/F**	**75.2/154.2**	C/D	27.3/39.9
Avenue 12 at SR 99 NB ramps			B/C	17.9/21.7	B/C	19.1/21.9	B/B	12.9/13.8	C/**E**	21.5/**57.9**	C/E	22.8/**62.8**	B/B	11.5/15.0
• EB Left-Through	A/A	2.3/4.1												
• **NB Approach**	**F/F**	**119.1/182.2**												

SR = State Route   [1] *Delay per vehicle*   *secs = seconds*   *NB = northbound*   *SB = southbound*   *WB = westbound*   *EB = eastbound*   *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

Table 7 shows the results of the Alternative B peak hour volume signal warrant analyses for the various scenarios for the study intersections surrounding the Madera Site. If a study intersection met the peak hour volume signal warrant then a "Yes" is shown in the appropriate scenario column. If the intersection did not meet the peak hour volume signal warrant then a "No" is shown in the appropriate scenario column. Intersections by scenario that met the peak hour volume signal warrant are shown bolded Table 7.

TABLE 7:
SIGNAL WARRANT ANALYSIS
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE / MADERA SITE)

Intersection	**Existing**	**2010 No Project**	**2010 Project**	**2030 No Project**	**2030 Project**
Avenue 18 ½ at SR 99 SB ramps/Road 23	No	No	No	**Yes**	**Yes**
Avenue 18 ½ at SR 99 NB ramps	No	No	No	**Yes**	**Yes**
Avenue 17 at SR 99 SB off-ramp	No	**Yes**	**Yes**	**Yes**	---
Avenue 17 at SR 99 NB ramps	**Yes**	**Yes**	**Yes**	**Yes**	---
Avenue 12/Golden State Boulevard at SR 99 SB ramps	No	**Yes**	**Yes**	**Yes**	---
Avenue 12 at Golden State Boulevard	---	---	---	---	---
Avenue 12 at SR 99 NB ramps	**Yes**	---	---	---	---
Avenue 18 at Road 23	No	No	No	No	**Yes**
Avenue 17 at Road 23	No	No	**Yes**	**Yes**	---
Avenue 17 at Golden State Boulevard	No	**Yes**	**Yes**	**Yes**	---
Ellis Street at Road 26	---	---	---	---	---
Avenue 15 ½ at Road 23	No	No	No	**Yes**	**Yes**
Avenue 14 at Road 23	No	No	No	**Yes**	**Yes**
Avenue 16 at Schnoor Avenue	**Yes**	---	---	---	---
Avenue 16 at Aviation Drive	---	---	---	---	---
Avenue 16 at SR 99 SB ramps	No	---	---	---	---
Avenue 16/Avenue 16 connector at SR 99 NB ramps	No	No	No	---	---
Avenue 16 at SR 99 NB ramp connector	No	No	No	---	---
Gateway/Avenue 16 at SR 99 NB ramps	No	No	No	---	---
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	---	---	---	---	---
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	---	---	---	---	---
SR 99 NB ramps at SR 145/Madera Avenue	---	---	---	---	---
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	---	---	---	---	---
Olive Avenue/Avenue 14/ SR 99 SB on-ramp at SR 145	---	---	---	---	---
Avenue 18 ½ at Pistachio Drive	No	No	No	**Yes**	**Yes**
Avenue 18 ½ at Golden State Boulevard	No	No	No	**Yes**	**Yes**

SR = State Route *Yes = meets urban/rural peak hour volume signal warrant*
No = does not meet urban/rural peak hour volume signal warrant *--- = signalized intersection/no warrant prepared*
Bolded Text = intersection meets the peak hour signal warrant

Table 8 shows the Alternative B projected 95th-percentile queue lengths for the various scenarios for the various study locations surrounding the Madera Site. Movements with queue lengths that exceed or are projected to exceed their available storage lengths are shown bolded in Table 8. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column.

Table 9 shows the Alternative B ramp widening/auxiliary lane thresholds for the various scenarios for the various SR 99 off-ramps. Locations that are projected to meet the thresholds are shown bolded in Table 9.

TABLE 8:
95TH-PERCENTILE QUEUE LENGTH SUMMARY
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE / MADERA SITE)

		95th Percentile Queue Length (ft) (AM/PM)						
Intersection	**Existing Queue Storage Length (ft)**	**Existing**	**2010 No Project**	**2010 Project**	**Mitigated 2010 Project**	**2030 No Project**	**2030 Project**	**Mitigated 2030 Project**
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])							
• NB Left		43/38	69/80	77/114	110/131	**#671/#813**	#164/#181	148/162
• NB Through-Right		4/4	4/4	4/5	19/0		26/0	25/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256[1] (822[2])					**0/241**		
• SB Left-Through-Right		22/47	35/95	37/118	61/97			
• SB Left						209/221		84/109
• SB Left-Right						35/64	#199/#351	
• SB Right								61/#107
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])					**#425/#819**		
• SB Left	589[3]	4/13	15/259	62/—	56/163		#348/#657	110/#297
• SB Right	589[3]	1/1	8/11	20/44	35/38	132/**202**	103/192	46/122
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])							
• NB Left	45[3]				127/157	—/—	**#727/#1,332**	264/**#810**
• NB Left-Through	45[3]	17/8	322/**623**	—/—	128/158	**7/15**	**#736/#1,355**	
• NB Through-Right								50/**#664**
• NB Right	45[3]	12/66	27/**588**	49/**1,571**	26/216		48/**#896**	29/**#541**
SR 99 NB off-ramp at Avenue 16 *[Avenue 16/Ellis Avenue Overcrossing]*	1,150[1] (716[2])					**#501/#581**		
• SB Through-Right		0/0	0/0	0/0	0/0			
• *[NB Left]*	*[150[3]]*					234/**#501**	55/89	55/89
• *[NB Through-Right]*	*[150[3]]*						29/48	29/48
SR 99 SB off-ramp at Avenue 16 ***[Avenue 16/Ellis Avenue Overcrossing]***	1,020[1] (586[2])					437/—		
• SB Left	*[225[3]]*	9/18	33/49	34/50	34/50		34/56	34/56
• SB Right	*[225[3]]*	15/29	40/51	42/54	42/54	0/0	24/126	24/126
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])							
• NB Left	353[3]	83/103	110/192	137/292	110/#349	0/0	142/186	137/210
• **NB Left-Through**		82/103	110/194	137/293	1108#350	**#671/#813**	142/190	137/215
• **NB Right**	353[3]	39/129	41/208	42/244	37/#275	**0/241**	#238/#766	73/#352

95th percentile queue length - is minimum amount of storage needed for each movement *SR = State Route* *ft = feet* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[xx] = 2030 conditions *[1] = Total ramp length* *[2] = Calculated storage distance* *[3] = Distance of ramp striped as 2-lanes (existing)*
--- = not calculated for unsignalized intersections *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *m = volume for 95th percentile queue is metered by upstream signal*
***Bolded Text** = 95th percentile queues exceed the available storage capacity* *[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

TABLE 8:
95TH-PERCENTILE QUEUE LENGTH SUMMARY
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE / MADERA SITE)

		95th Percentile Queue Length (ft) (AM/PM)						
Intersection	**Existing Queue Storage Length (ft)**	**Existing**	**2010 No Project**	**2010 Project**	**Mitigated 2010 Project**	**2030 No Project**	**2030 Project**	**Mitigated 2030 Project**
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])							
• **SB Left**	65[3]							135/#327
• **SB Left-Through**		76/123	95/155	108/179	78/173	**#407/#813**	**#401/#765**	
• **SB Through-Right**								102/#309
• **SB Right**	65[3]	30/25	38/65	42/145	33/139	**114/241**	**115/2119**	
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])							
• WB Left	90[3]	116/103	117/108	117/108	109/99	#459/#575	#395/#575	104/156
• WB Through-Right		0/30	0/31	0/31	0/29	0/62	0/62	0/54
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])							
• **SB Left**	65[3]	143/143	171/210	187/266	92/131	454/#1,062	**197/#387**	
• **SB Left-Right**								153/298
• **SB Right**	65[3]	43/37	41/33	40/30	47/40	**174/244**	**184/300**	136/281
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])							
• **WB Left**		70/81	239/190	273/277	158/75	---/---	431/531	309/458
• **WB Right**		7/7	7/8	7/8	12/38	7/15	28/72	26/54
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])							
• **NB Left**								157/178
• **NB Left-Through**	49[3]	259/300	216/224	236/#240	173/181	**#501/#581**	**#512/#593**	
• **NB Through-Right**								83/173
• **NB Right**	49[3]	18/21	49/58	52/59	42/50	234/**#501**	236/**#511**	83/171
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481							
• WB Left (at Golden State Boulevard)		6/3	10/10	13/21	#130/#170	437/—	**m#684/m#522**	#271/**m#431**
• **WB Through (at Golden State Boulevard)**					75/132		**m122/m362**	
• WB Through-Right (at Golden State Boulevard)		0/0	0/0	0/0		0/0		224/**#634**
• WB Right (at Golden State Boulevard)					15/58		**m16/m28**	
• EB Through (at SR 99 SB off-ramp)		0/0	0/0	0/0	3/52	0/0	m72/m70	83/m228

95th percentile queue length - is minimum amount of storage needed for each movement *SR = State Route* *ft = feet* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
{xx} = 2030 conditions *[1] = Total ramp length* *[2] = Calculated storage distance* *[3] = Distance of ramp striped as 2-lanes (existing)*
--- = not calculated for unsignalized intersections *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *m = volume for 95th percentile queue is metered by upstream signal*
***Bolded Text** = 95th percentile queues exceed the available storage capacity* *[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

TABLE 9:
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE / MADERA SITE)

Intersection	Existing			2010 No Project			2010 Project			2030 No Project			2030 Project		
	PCE (AM/PM)	900 to 1,499 PCE Threshold (AM/PM) (Y/N)	1,500 PCE Threshold (AM/PM) (Y/N)	PCE (AM/PM)	900 to 1,499 PCE Threshold (AM/PM) (Y/N)	1,500 PCE Threshold (AM/PM) (Y/N)	PCE (AM/PM)	900 to 1,499 PCE Threshold (AM/PM) (Y/N)	1,500 PCE Threshold (AM/PM) (Y/N)	PCE (AM/PM)	900 to 1,499 PCE Threshold (AM/PM) (Y/N)	1,500 PCE Threshold (AM/PM) (Y/N)	PCE (AM/PM)	900 to 1,499 PCE Threshold (AM/PM) (Y/N)	1,500 PCE Threshold (AM/PM) (Y/N)
SR 99 NB off-ramp at Avenue 18 ½	248/231	N/N	N/N	282/302	N/N	N/N	292/347	N/N *(N)*	N/N *(N)*	378/406	N/N	N/N	378/406	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 18 ½	155/248	N/N	N/N	189/289	N/N	N/N	190/290	N/N *(N)*	N/N *(N)*	504/737	N/N	N/N	536/776	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 17	55/111	N/N	N/N	109/222	N/N	N/N	164/320	N/N *(N)*	N/N *(N)*	497/745	N/N	N/N	497/746	N/N *(N)*	N/N *(N)*
SR 99 NB off-ramp at Avenue 17	204/428	N/N	. N/N	424/822	N/N	N/N	615/**1183**	N/Y *(N)*	N/N *(N)*	**1650/3347**	N/N	Y/Y	**1800/3537**	N/N *(N)*	Y/Y *(Y)*
SR 99 NB off-ramp at Avenue 16	60/104	N/N	N/N	69/115	N/N	N/N	69/115	N/N *(N)*	N/N *(N)*	314/430	N/N	N/N	314/430	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 16	185/269	N/N	N/N	248/385	N/N	N/N	282/464	N/N *(N)*	N/N *(N)*	630/**950**	N/Y	N/N	635/**960**	N/Y *(N)*	N/N *(N)*
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	328/552	N/N	N/N	451/846	N/N	N/N	540/**1090**	N/Y *(N)*	N/N *(N)*	753/**1298**	N/Y	N/N	753/**1299**	N/Y *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	129/181	N/N	N/N	192/303	N/N	N/N	242/408	N/N *(N)*	N/N *(N)*	707/**1134**	N/Y	N/N	728/**1178**	N/Y *(N)*	N/N *(N)*
SR 99 NB off-ramp at SR 145/Madera Avenue	217/186	N/N	N/N	223/193	N/N	N/N	223/193	N/N *(N)*	N/N *(N)*	496/534	N/N	N/N	496/534	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 14/Olive Avenue	361/317	N/N	N/N	439/504	N/N	N/N	487/657	N/N *(N)*	N/N *(N)*	**958/1400**	Y/Y	N/N	**968/1427**	Y/Y *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	369/372	N/N	N/N	470/490	N/N	N/N	490/550	N/N *(N)*	N/N *(N)*	**1176/1567**	Y/N	N/Y	**1182/1585**	Y/N *(N)*	N/Y *(Y)*
SR 99 NB off-ramp at Avenue 12	313/294	N/N	N/N	355/343	N/N	N/N	355/343	N/N *(N)*	N/N *(N)*	745/805	N/N	N/N	745/805	N/N *(N)*	N/N *(N)*

PCE = Passenger Car Equivalent *SR – State Route* *Y = Threshold Met* *N = Threshold Not Met* *NB = northbound* *SB = southbound* *(Y) = Mitigations Included in Analyses & Cost Estimates*
(N) = Mitigations Not Included in Analyses & Cost Estimates *Bolded Text = ramps meet at least one of the volume thresholds*

Table 10 shows the Alternative B calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet left-turn channelization warrants, or require dual left-turn lanes or separate right-turn lanes for the various Project scenarios for the various study locations surrounding the Madera Site. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 10:
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE B (REDUCED INTENSITY/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	100	n/a
	NBR	25	100	n/a
	WBL	---	n/a	n/a
	SBL			150
	SBR			450
Avenue 18 ½ at SR 99 NB ramps	EBL	150	150	250[1]
Avenue 17 at SR 99 NB ramps	WBR		200	n/a
	EBL	300	100	300[1]
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	400	850
	SBL	---	200	500
Avenue 12 at Golden State Boulevard	NBL	200	100	100
	WBL	---	100	100
	WBR		n/a	650
	SBL	400	350[1]	700[4]
	SBR	200	100	n/a
	EBL	350	300	350
	EBR	425	100	n/a
Avenue 12 at SR 99 NB ramps	WBR	---	650	1,650
	EBL	---	250	300[1]
Avenue 17 at Road 23	NBL	---	n/a	150
	WBL	---	n/a	100
	SBR	---	n/a	250
	EBR		n/a	300
Avenue 17 at Golden State Boulevard	NBL	50	150	300
	NBR	---	n/a	650[3]
	WBL	---	200	600[1]
	WBR	---	300	n/a
	SBL	---	200[1]	550[1]
	EBL	---		100[1]

ft = feet *SR = State Route* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

TABLE 10:
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE B (REDUCED INTENSITY/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)	2030 Project Storage Length (ft)
Ellis Street at Road 26	NBL	---	100	100
	WBR	---	250	150
	SBL	---	200	200
	EBR		100	100
Avenue 16/Ellis Street at Aviation Drive	NBL	75	100	400
	NBR	75	n/a	1,100[3]
	WBL	200	400	850[1]
	SBL		100	400[1]
	SBR		100	n/a
	EBL	---	100	150
	EBR		n/a	350
Avenue 16 at SR 99 SB ramps	WBR		100	n/a
	EBL		150	n/a
Avenue 16/Ellis Street at SR 99 NB ramps	NBL		n/a	150[1]
	NBTR		n/a	150
	WBR	---	n/a	200
	EBL	300	n/a	400[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	250	950
	EBL	100	250	200[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	300	450
	EBR	125	800	800
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	300[1]	800[1]
	SBR	---	n/a	450
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	100[1]	250[1]
	SBL	100	n/a	300
	SBR	25	250	700
	EBL	175	250	350[1]
	EBR	175	600	1,450
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	n/a	100
	NBR	---	n/a	450
	WBL	---	n/a	350[1]
	WBR		175	n/a
	SBL	---	n/a	150
Avenue 18 at Pistachio Drive	WBR		250	250

ft = feet *SR = State Route* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

In order to mitigate the County segments, freeway segments, and intersections projected to operate below the level of service standard as identified in Table 6, meet the peak hour volume signal warrant as identified in Table 7, exceed the 95th percentile queue storage lengths as identified in Table 8, meet the ramp widening/auxiliary lane thresholds as identified in Table 9, and/or exceed the available storage length, meet the left-turn channelization warrant, require dual left-turn lanes, or separate right-turn lanes as identified in Table 10, the following improvements by scenario are proposed for Alternative B at the Madera Site:

Opening Day (2010) Improvements for Alternative B

County Segments

- Avenue 17 – SR 99 to Road 27
    - Restripe/widen from two (2) lanes to four (4) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 between Avenue 18 ½ to Avenue 17
    - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 south of Avenue 17
    - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

Intersections

- Avenue 18 ½ at SR 99 NB ramps
    - Signalize the intersection

- Avenue 18 ½ at SR 99 SB ramps/Road 23
    - Signalize the intersection

- Avenue 17 at SR 99 NB ramps
    - Signalize the intersection
    - Restripe/widen the NB approach, south leg, from one (1) shared left-through lane and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane and two (2) right-turn lanes
    - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane to one (1) left-turn lane and two (2) through lanes
    - Restripe/widen the WB approach from one (1) through lane and one (1) right-turn lane to two (2) through lanes and one (1) right-turn lane

- Avenue 17 at SR 99 SB ramps
    - Signalize the intersection
    - Restripe/widen the EB approach, west leg, from one (1) through lane to two (2) through lanes
    - Restripe/widen the WB approach, east leg, from one (1) through lane to two (2) through lanes

- Avenue 17 at Golden State Boulevard
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to two (2) left-turn lanes and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane

- Avenue 17 at Road 23
  - Signalize the intersection

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) right-turn lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane to one (1) left-turn lane and one (1) through lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) right-turn lane to dual (2) left-turn lanes and one (1) right-turn lane

- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane

- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the WB approach, east leg, from a shared through-right lane to one (1) through lane and one (1) right-turn lane

2030 Improvements for Alternative B

County Segments

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from four (4) lanes to six (6) lanes

- Avenue 17 – Road 23 to SR 99
  - Restripe/widen from two (2) lanes to six (6) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2

  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

<u>*Intersections*</u>

- Avenue 18 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane, to dual (2) left-turn lanes and one (1) through lane

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Restripe/widen the SB approach, north leg, from a shared left-right lane to one (1) left-turn lane and one (1) right-turn lane

- Avenue 18 ½ at Pistachio Drive
  - Although the Avenue 18 ½ at Pistachio Drive intersection is projected to meet the urban peak hour volume signal warrant, it will not be signalized due to its proximity to the SR 99 SB off-ramp. The intersection will be restricted to right-in/right-out/left-in access, which reduces the need for a signal and allows the intersection to operate at an acceptable level of service without a signal.

- Avenue 18 ½ at Golden State Boulevard / Road 23
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1)-through-right lane, to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through lane and one (1) right-turn lane, to dual (2) left-turn lanes and one (1) shared through-right lane

- Avenue 18 at Road 23
  - Signalize the intersection

- Avenue 17 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes to three (3) left-turn lanes, one (1) shared through-right lane, and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane to two (2) through lanes and one (1) shared through-right lane
  - Widen the NB off-ramp to two (2) lanes with a NB auxiliary lane on SR 99

- Avenue 17 at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from two (2) through lanes to four (4) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes to three (3) through lanes

- Avenue 17 at Golden State Boulevard
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane

- Avenue 17 at Road 23
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to one (1) shared left-through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane to one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) through lane, and one (1) shared through-right lane

- Avenue 16/Ellis Street at Aviation Drive/Kennedy
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane, and one (1) through-right lane

- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and two (2) through lanes

  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes

- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) shared through-right lane

- Avenue 15 ½ at Road 23
  - Signalize the intersection

- SR 145/Madera Avenue at SR 99 NB ramps
  - Restripe/widen the SB approach, north leg, from one (1) through lane and one (1) shared through-right lane to two (2) through lanes and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to two (2) left-turn lanes and one (1) shared through-right lane

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the NB approach, south leg, from two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane, to dual (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane, to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane, to dual (2) left-turn lanes, one (1) through lane, one (1) shared through-right lane and one (1) right-turn lane

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-right-turn lane, an one (1) right-turn lane

- Avenue 14 at Road 23
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Widen the SB off-ramp to two (2) lanes with a SB auxiliary lane on SR 99

- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane, to three (3) left-turn lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane, to one (1) left-turn lane, three (3) through lanes, and one (1) right-turn lane

- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg from a shared left-through lane and a separate right-turn lane, to dual (2) left-turn lanes, a shared through-right lane, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lane, to dual (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane, to two (2) through lanes, one (1) shared through-right lane and one (1) right-turn lane

With the proposed Alternative B/Madera Site improvements detailed previously, two (2) freeway segments and two (2) intersections are still projected to operate below the adopted level of service standard even with the recommended improvements. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E" and "F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. The Avenue 17 at SR 99 NB ramps and Avenue 17 at Golden State Boulevard intersections are both still projected to operate at a LOS "F" in the PM peak hour. Per discussions with Caltrans staff, widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative B mitigations, these four (4) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density and intersection delay). Therefore these four (4) locations should be viewed as mitigated as appropriate by the Project.

Alternative C, Commercial Land Use Alternative (Madera Site)

Alternative C, which is the Commercial Land Use Alternative, would consist of the following land uses:

- 125,000 sf Free Standing Discount Superstore
- 100,000 sf Discount Club
- 3,000 sf Fast Food Restaurant with Drive-Through
- 4,000 sf High-Turnover Sit-Down Restaurant
- 5,000 sf High-Turnover Sit-Down Restaurant

The Alternative C total square footage would be 237,000 sf and the Project would be constructed and operational by 2010. Alternative C would be located on the approximately 305 acre Madera Site, which is located to the west of Golden State Boulevard, east of Road 23, north of Avenue 17, and south of Avenue 18 in Madera County.

Table 11 shows the Alternative C levels of service summary for the various scenarios for the County segments, freeway segments, and intersections surrounding the Madera Site. County segments, freeway segments, or intersections operating or projected to operate below the adopted level of service are shown bolded in Table 11. The signalized and AWSC intersection levels of service shown in Table 11 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized and AWSC level of service or delay shown in Table 11. The signalized levels of service or delay shown in Table 11 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

Table 12 shows the results of the Alternative C peak hour volume signal warrant analyses for the various scenarios for the study intersections surrounding the Madera Site. If a study intersection met the peak hour volume signal warrant then a "Yes" is shown in the appropriate scenario column. If the intersection did not meet the peak hour volume signal warrant then a "No" is shown in the appropriate scenario column. Intersections by scenario that met the peak hour volume signal warrant are shown bolded Table 12.

Table 13 shows the Alternative C projected 95th-percentile queue lengths for the various scenarios for the various study locations surrounding the Madera Site. Movements with queue lengths that exceed or are projected to exceed their available storage lengths are shown bolded in Table 13. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column.

Table 14 shows the Alternative C ramp widening/auxiliary lane thresholds for the various scenarios for the various SR 99 off-ramps. Locations that are projected to meet the thresholds are shown bolded in Table 14.

Table 15 shows the Alternative C calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet left-turn channelization warrants, or require dual left-turn lanes or separate right-turn lanes for the various Project scenarios for the various study locations surrounding the Madera Site. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 11:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE / MADERA SITE)

	Existing		**2010 No Project**		**2010 Project**		**Mitigated 2010 Project**		**2030 No Project**		**2030 Project**		**Mitigated 2030 Project**	
County Segment	**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**		**LOS AM/PM**	
Avenue 18 ½ – Road 24 to Road 23	A/A		A/A		A/A		A/A		A/B		A/B		A/B	
Road 23 – Avenue 18 ½ to Avenue 17	A/A		B/B		B/B		B/B		D/D		D/E		A/A	
Avenue 17 – Road 23 to SR 99	A/A		A/A		A/D		A/D		F/F		**F/F**		A/C	
Avenue 17 – SR 99 to Road 27	A/A		B/E		C/F		A/B		E/F		**F/F**		A/B	
Golden State Blvd – Avenue 17 to Road 23	A/A		A/A		A/A		A/A		A/A		A/C		A/C	
Freeway Segment	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**	**LOS AM/PM**	**Density (pc/mi/ln) AM/PM**
SR 99 north of Avenue 18 ½														
• **NB**	C/C	22.6/22.1	C/C	23.9/24.2	C/C	24.2/25.1	C/C	24.2/25.1	**D/D**	**26.5/33.2**	**D/D**	**26.6/34.3**	C/C	19.4/23.0
• **SB**	C/**D**	18.4/**28.1**	C/**D**	19.6/31.1	C/**D**	19.9/**32.5**	B/C	13.3/19.7	C/E	23.9/41.4	C/E	24.1/43.0	B/C	17.8/26.0
SR 99 between Avenue 18 ½ and Avenue 17														
• **NB**	C/C	23.6/23.0	C/C	24.9/25.5	C/**D**	25.3/**27.0**	B/B	16.5/17.4	**D/D**	**26.4/31.4**	**D/D**	**26.5/32.5**	C/C	19.3/22.2
• **SB**	C/**D**	19.1/**29.7**	C/**D**	20.4/33.6	C/E	21.0/**36.1**	B/C	14.0/20.8	C/E	23.5/40.5	C/E	23.7/**40.6**	B/C	17.6/25.2
SR 99 south of Avenue 17														
• **NB**	C/C	25.1/24.5	**D/D**	**28.7/31.0**	**D/E**	**31.6/38.8**	C/C	19.3/21.6	**E/F**	**39.0/—**	**E/F**	**41.2/---**	C/E	25.4/41.9
• **SB**	C/**D**	20.2/**32.4**	C/E	22.8/**44.4**	C/F	24.8/---	B/C	16.2/25.9	**D/F**	**29.2/---**	**D/F**	**30.3/---**	C/F	21.2/---
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Avenue 18 ½ at SR 99 NB ramps							B/B	13.3/13.4			B/B	14.9/13.5	B/B	12.9/12.8
• EB Left	A/A	8.2/7.9	A/A	6.4/5.6	A/A	8.4/8.1			A/B	7.5/10.1				
• **NB Approach**	C/B	16.3/14.8	C/C	21.3/21.4	C/**D**	22.7/**26.4**			**F/F**	**337.7/7523.8**				
Avenue 18 ½ at SR 99 SB ramps/Road 23							**A/B**	**8.9/11.3**			B/**E**	18.2/**64.4**	A/B	9.8/14.1
• WB Left-Through	A/A	0.6/1.2	A/A	0.8/1.5	A/A	0.8/1.4								
• **NB Approach**	B/C	13.9/17.2	C/**E**	18.5/**36.5**	C/**F**	20.8/**60.2**								
• **SB Approach**	B/C	13.5/17.2	C/**D**	16.5/**28.5**	C/E	17.2/**36.3**			**F/F**	**52.0/332.3**				
Avenue 18 ½ at Pistachio Drive														
• EB Left-Through	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.0/0.4	A/A	0.7/2.2	A/A	0.7/2.5	A/A	0.7/2.6
• SB Approach	B/B	12.7/13.8	B/C	14.3/17.3	B/C	15.0/20.2	B/C	15.0/20.2	C/F	24.8/**187.5**	D/F	26.9/**314.1**	B/C	14.0/17.9
Avenue 18 ½ at Golden State Boulevard													B/B	14.7/17.4
• EB Left-Through	A/A	0.4/0.1	A/A	0.3/0.1	A/A	0.3/0.1	A/A	0.3/0.1						
• SB Approach	B/B	10.9/10.9	B/B	11.8/12.2	B/B	12.1/12.9	B/B	12.1/12.9						
• EB Left-Through-Right									A/A	1.0/0.9	A/A	1.0/0.9		
• WB Left-Through									A/A	6.6/7.5	A/A	6.8/7.9		
• **NB Approach**									C/F	19.2/137.3	C/F	23.0/**1155.7**		
• **SB Approach**									**F/F**	**429.1/9379.8**	**F/F**	**633.7/—**		
Avenue 18 at Road 23													A/A	5.2/7.9
• NB Left-Through-Right	A/A	0.1/0.5	A/A	0.1/0.2	A/A	0.1/0.2	A/A	0.1/0.2	A/A	0.0/0.2	A/A	0.0/0.2		
• SB Left-Through-Right	A/A	0.4/0.6	A/A	1.4/1.4	A/A	1.7/1.6	A/A	1.7/1.6	A/A	0.8/1.0	A/A	1.7/2.7		
• WB Approach	A/A	9.4/9.8	A/B	9.7/10.2	A/B	9.6/10.1	A/B	9.6/10.1	B/C	14.5/17.9	B/C	14.7/22.0		
• EB Approach	A/B	9.9/10.1	B/B	10.7/11.9	B/B	10.8/12.0	B/B	10.8/12.0	C/C	16.4/24.8	C/D	17.8/31.9		

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 11:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE / MADERA SITE)

	Existing		**2010 No Project**		**2010 Project**		**Mitigated 2010 Project**		**2030 No Project**		**2030 Project**		**Mitigated 2030 Project**	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Avenue 17 at SR 99 NB ramps							B/B	13.1/17.8			**E/F**	**67.9/267.6**	C/F	21.3/**95.8**
• **EB Left**	A/A	9.0/8.0	B/B	10.0/10.2	B/B	11.0/13.9			**D/F**	**27.7/617.2**				
• **NB Approach**	B/B	11.9/13.3	**F/F**	**114.6/371.0**	**F/F**	**6029.1/4161.6**			**F/F**	**6790.7/—**				
Avenue 17 at SR 99 SB off-ramp							A/A	2.7/5.6			C/F	20.1/**341.9**	A/B	5.1/14.4
• **SB Approach**	B/B	10.2/11.1	C/F	16.6/**174.5**	**E/F**	**38.2/6994.7**			**F/F**	**7445.5/—**				
Avenue 17 at Golden State Boulevard							B/C	18.9/21.6			**E/F**	**70.3/417.6**	C/F	24.0/**140.6**
• EB Left	A/A	0.0/0.0	A/A	8.2/8.7	A/B	9.2/10.8			B/D	12.5/29.4				
• **WB Left**	A/A	7.6/7.5	A/A	8.5/8.9	A/B	9.2/10.8			**F/F**	**71.5/275.4**				
• **NB Approach**	A/A	9.7/9.3	C/D	22.2/32.4	**F/F**	**247.8/—**			**F/F**	**—/—**				
• **SB Approach**	B/B	12.2/11.9	**F/F**	**113.9/—**	**F/F**	**—/—**			**F/F**	**—/—**				
Avenue 17 at Road 23							A/A	7.5/9.6			**E/F**	**56.7/258.1**	B/B	13.2/16.5
• NB Left-Through-Right	A/A	0.1/0.4	A/A	0.7/1.4	A/A	0.7/1.9			A/A	3.2/3.3				
• SB Left-Through-Right	A/A	1.1/0.7	A/A	0.7/0.6	A/A	0.7/0.6			A/A	0.8/0.3				
• **WB Approach**	B/B	10.5/10.6	B/C	13.9/18.9	C/**E**	15.4/**35.8**			**F/F**	**—/—**				
• **EB Approach**	B/B	10.3/10.4	B/B	12.3/14.9	B/C	13.1/19.6			**F/F**	**—/—**				
Ellis Street at Road 26	A/A	4.8/5.5	A/A	6.6/9.5	A/B	7.6/13.2	A/B	7.6/13.2	B/C	10.1/22.2	A/B	10.0/19.5	A/B	10.0/19.5
Gateway/Avenue 16 at SR 99 NB ramps														
• SB Approach	B/B	10.3/11.0	B/B	10.6/11.4	B/B	10.7/11.6	B/B	10.7/11.6						
Avenue 16/Avenue 16 connector at SR 99 NB ramps														
• EB Left	A/B	9.7/10.6	B/B	10.1/11.4	B/B	10.3/11.9	B/B	10.3/11.9						
Avenue 16 at SR 99 NB ramp connector														
• EB Left-Through	A/A	4.7/4.8	A/A	5.0/5.4	A/A	5.2/5.8	A/A	5.2/5.8						
• SB Approach	A/A	9.0/9.6	A/A	9.1/9.9	A/A	9.2/9.9	A/A	9.2/9.9						
Avenue 16/Ellis Overcrossing at SR 99 NB ramps									B/B	11.7/13.9	B/B	11.7/13.8	B/B	11.7/13.8
Avenue 16 at SR 99 SB ramps			A/A	9.3/10.0	A/B	9.2/10.2	A/B	9.2/10.2	A/B	7.3/10.6	A/B	7.4/10.9	A/B	7.4/10.9
• EB Left	A/A	7.7/7.9												
• SB Approach	B/B	11.0/13.0												
Avenue 16 at Schnoor Avenue/Golden State	A/B	8.4/10.9												
Avenue 16/Ellis Overcrossing at Aviation Drive			B/C	18.1/21.2	B/C	18.5/26.0	B/C	18.5/26.0	**F/F**	**115.7/399.6**	**F/F**	**122.4/419.0**	C/D	22.1/54.1
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B/B	12.1/15.1	B/C	14.3/22.7	B/**D**	14.9/**38.2**	B/C	12.1/24.5	C/F	26.8/**199.2**	B/F	16.8/**96.2**	B/C	12.5/29.4
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B/B	14.2/12.2	B/B	15.2/14.2	B/B	15.4/18.9	B/B	10.1/14.5	C/F	31.4/**133.0**	C/F	28.0/**86.0**	B/C	18.3/28.0
Avenue 15 ½ at Road 23													A/A	5.4/7.4
• NB Left-Through-Right	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0	A/A	0.0/0.0
• SB Left-Through-Right	A/A	1.0/1.7	A/A	1.0/1.8	A/A	1.1/1.8	A/A	1.1/1.8	A/A	1.1/1.7	A/A	1.1/1.7		
• **WB Approach**	B/B	10.1/10.7	B/B	10.8/12.0	B/B	11.0/12.5	B/B	11.0/12.5	C/D	16.9/34.4	C/**E**	17.4/**38.8**		
• EB Approach	A/B	0.0/10.2	A/B	0.0/11.1	A/B	0.0/11.5	A/B	0.0/11.5	A/C	0.0/19.0	A/C	0.0/20.0		
SR 145/Madera Avenue at SR 99 NB ramps	A/B	9.1/13.1	A/A	5.6/6.6	A/B	5.6/10.1	A/A	6.3/7.1	**D/F**	**37.0/242.9**	**D/F**	**47.6/262.6**	B/C	15.1/25.6
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C/C	22.1/31.2	C/C	21.1/33.3	C/**D**	22.0/**39.1**	B/B	10.5/12.8	**E/F**	**70.9/238.7**	C/**F**	24.4/**99.8**	B/C	15.8/24.4

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *— = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 11:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE COUNTY SEGMENTS, FREEWAY SEGMENTS, AND INTERSECTIONS
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE / MADERA SITE)

	Existing		**2010 No Project**		**2010 Project**		**Mitigated 2010 Project**		**2030 No Project**		**2030 Project**		**Mitigated 2030 Project**	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B/B	10.6/11.0	B/B	13.1/14.1	B/B	13.9/16.5	B/B	11.2/12.1	C/**F**	29.7/**163.2**	B/C	16.2/24.5	B/B	12.8/17.7
Avenue 14 at Road 23	A/A	8.4/8.4	A/A	8.8/9.3	A/A	9.0/9.7	A/A	9.0/9.7	B/C	11.6/16.6	B/C	11.8/18.0	A/A	7.0/7.0
Avenue 12/Golden State Boulevard at SR 99 SB ramps							B/B	14.6/13.1			C/C	22.0/24.0	B/B	16.3/17.1
• SB Left-Through	A/A	4.6/3.4	A/A	6.1/3.7	A/A	6.1/3.7			A/A	9.1/7.5				
• **WB Approach**	C/C	15.3/16.8	**E/D**	**43.3/30.0**	**F/E**	**50.7/47.9**			**F/F**	**9323.4/9051.8**				
Avenue 12 at Golden State Boulevard	D/**F**	51.0/**90.1**	D/D	54.0/52.0	D/E	54.3/60.0	D/D	40.8/40.4	**F/F**	**205.2/328.4**	**E/F**	**75.9/154.5**	C/D	30.2/40.2
Avenue 12 at SR 99 NB ramps			B/C	17.9/21.7	B/C	19.1/21.9	B/B	13.0/12.9	C/E	21.5/**57.9**	C/E	23.3/**66.3**	B/B	10.4/15.2
• EB Left-Through	A/A	2.3/4.1												
• **NB Approach**	**F/F**	**119.1/182.2**												

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

Table 12:
Signal Warrant Analysis
Alternative C (Commercial Land Use Alternative / Madera Site)

Intersection	Existing	2010 No Project	2010 Project	2030 No Project	2030 Project
Avenue 18 ½ at SR 99 SB ramps/Road 23	No	No	No	**Yes**	**Yes**
Avenue 18 ½ at SR 99 NB ramps	No	No	No	**Yes**	**Yes**
Avenue 17 at SR 99 SB off-ramp	No	**Yes**	**Yes**	**Yes**	---
Avenue 17 at SR 99 NB ramps	**Yes**	**Yes**	**Yes**	**Yes**	---
Avenue 12/Golden State Boulevard at SR 99 SB ramps	No	**Yes**	**Yes**	**Yes**	---
Avenue 12 at Golden State Boulevard	---	---	---	---	---
Avenue 12 at SR 99 NB ramps	**Yes**	---	---	---	---
Avenue 18 at Road 23	No	No	No	No	**Yes**
Avenue 17 at Road 23	No	No	**Yes**	**Yes**	---
Avenue 17 at Golden State Boulevard	No	**Yes**	**Yes**	**Yes**	---
Ellis Street at Road 26	---	---	---	---	---
Avenue 15 ½ at Road 23	No	No	No	**Yes**	**Yes**
Avenue 14 at Road 23	No	No	No	**Yes**	**Yes**
Avenue 16 at Schnoor Avenue	**Yes**	---	---	---	---
Avenue 16 at Aviation Drive	---	---	---	---	---
Avenue 16 at SR 99 SB ramps	No	---	---	---	---
Avenue 16/Avenue 16 connector at SR 99 NB ramps	No	No	No	---	---
Avenue 16 at SR 99 NB ramp connector	No	No	No	---	---
Gateway/Avenue 16 at SR 99 NB ramps	No	No	No	---	---
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	---	---	---	---	---
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	---	---	---	---	---
SR 99 NB ramps at SR 145/Madera Avenue	---	---	---	---	---
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	---	---	---	---	---
Olive Avenue/Avenue 14/ SR 99 SB on-ramp at SR 145	---	---	---	---	---
Avenue 18 ½ at Pistachio Drive	No	No	No	**Yes**	**Yes**
Avenue 18 ½ at Golden State Boulevard	No	No	No	**Yes**	**Yes**

SR = State Route *Yes = meets urban/rural peak hour volume signal warrant*
No = does not meet urban/rural peak hour volume signal warrant *--- = signalized intersection/no warrant prepared*
Bolded Text = intersection meets the peak hour signal warrant

TABLE 13:
95TH-PERCENTILE QUEUE LENGTH SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE / MADERA SITE)

		95th Percentile Queue Length (ft) (AM/PM)						
Intersection	**Existing Queue Storage Length (ft)**	**Existing**	**2010 No Project**	**2010 Project**	**Mitigated 2010 Project**	**2030 No Project**	**2030 Project**	**Mitigated 2030 Project**
SR 99 NB off-ramp at Avenue 18 ½	1,204^{1} (770^{2})							
• NB Left		43/38	69/80	77/114	110/131	**#671/#813**	#164/#181	148/188
• NB Through-Right		4/4	4/4	4/5	19/0		26/0	25/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256^{1} (822^{2})					**0/241**		
• SB Left-Through-Right		22/47	35/95	37/118	61/97			
• SB Left						209/221		84/124
• SB Left-Right						35/64	#210/#360	
• SB Right								60/#119
SR 99 SB off-ramp at Avenue 17	1,341^{1} (907^{2})					#425/**#819**		
• SB Left	589^{3}	4/13	15/259	62/—	56/164		#348/#657	110/#308
• SB Right	589^{3}	1/1	8/11	20/45	35/39	132/**202**	102/194	45/124
SR 99 NB off-ramp at Avenue 17	1,060^{1} (626^{2})							
• NB Left	45^{3}				129/162	—/—	**#730/#1,381**	260/#838
• NB Left-Through	45^{3}	17/8	322/**623**	—/—	129/163	**7/15**	**#736/#1,406**	
• NB Through-Right								50/#665
• NB Right	45^{3}	12/66	**27/588**	**49/1,555**	26/214		**51/#901**	29/#542
SR 99 NB off-ramp at Avenue 16 ***[Avenue 16/Ellis Avenue Overcrossing]***	1,150^{1} (716^{2})					#501/**#581**		
• SE Through-Right		0/0	0/0	0/0	0/0			
• ***[NB Left]***	*[150^{3}]*					234/**#501**	55/88	55/88
• *[NB Through-Right]*	*[150^{3}]*						29/48	29/48

95th percentile queue length - is minimum amount of storage needed for each movement *SR = State Route* *ft = feet* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[xx] = 2030 conditions ^{1} *= Total ramp length* ^{2} *= Calculated storage distance* ^{3} *= Distance of ramp striped as 2-lanes (existing)*
--- = not calculated for unsignalized intersections *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *m = volume for 95th percentile queue is metered by upstream signal*
Bolded Text = 95th percentile queues exceed the available storage capacity *4 = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

TABLE 13:
95TH-PERCENTILE QUEUE LENGTH SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE / MADERA SITE)

		95th Percentile Queue Length (ft) (AM/PM)						
Intersection	**Existing Queue Storage Length (ft)**	**Existing**	**2010 No Project**	**2010 Project**	**Mitigated 2010 Project**	**2030 No Project**	**2030 Project**	**Mitigated 2030 Project**
SR 99 SB off-ramp at Avenue 16	1,020[1]					437/—		
[Avenue 16/Ellis Avenue Overcrossing]	(586[2])							
- SB Left	*[225[3]]*	9/18	33/49	34/56	34/56		34/57	34/57
- SB Right	*[225[3]]*	15/29	40/51	43/55	43/55	0/0	24/127	24/127
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])							
- **NB Left**	353[3]	83/103	110/192	137/**286**	110/#321	0/0	142/**200**	137/230
- **NB Left-Through**		82/103	110/194	137/**286**	110/#322	**#671/#813**	142/204	137/235
- **NB Right**	353[3]	39/129	41/208	42/**247**	37/#268	**0/241**	#241/#833	75/#383
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])							
- **SB Left**	65[3]							139/**#364**
- **SB Left-Through**		76/123	95/155	108/184	78/152	**#407/#813**	**#413/#860**	
- **SB Through-Right**								105/**#334**
- **SB Right**	65[3]	30/25	38/65	42/145	33/124	**114/241**	**117/239**	
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])							
- WB Left	90[3]	116/103	117/108	117/108	109/99	#459/#575	#395/#575	104/136
- WB Right	90[3]	0/30	0/31	0/31	0/29	0/62	0/62	0/50
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])							
- **SB Left**	65[3]	143/143	171/210	187/263	92/130	454/#1,062	198/389	
- **SB Left-Right**								154/278
- **SB Right**	65[3]	43/37	41/33	40/30	47/140	174/**244**	185/304	139/267
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])							
- **WB Left**		70/81	239/190		59/70	—/—	443/533	290/459
- **WB Right**		7/7	7/8		13/14	**7/15**	28/72	25/54
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])							
- NB Left								144/178
- **NB Left-Through**	49[3]	259/300	216/224	236/#240	173/163	#501/**#581**	#512/**#593**	
- **NB Through-Right**								76/171
- **NB Right**	49[3]	18/21	49/58	52/59	42/47	234/**#501**	#236/**#508**	76/170

95th percentile queue length - is minimum amount of storage needed for each movement *SR = State Route* *ft = feet* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[xx] = 2030 conditions [1] *= Total ramp length* [2] *= Calculated storage distance* [3] *= Distance of ramp striped as 2-lanes (existing)*
--- = not calculated for unsignalized intersections *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *m = volume for 95th percentile queue is metered by upstream signal*
***Bolded Text** = 95th percentile queues exceed the available storage capacity* *4 = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

TABLE 13:
95TH-PERCENTILE QUEUE LENGTH SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE / MADERA SITE)

		95th Percentile Queue Length (ft) (AM/PM)						
Intersection	**Existing Queue Storage Length (ft)**	**Existing**	**2010 No Project**	**2010 Project**	**Mitigated 2010 Project**	**2030 No Project**	**2030 Project**	**Mitigated 2030 Project**
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481							
• WB Left (at Golden State Boulevard)		6/3	10/10	13/21	#130/#169	437/—	**m#701/m#498**	#272/**m#431**
• **WB Through (at Golden State Boulevard)**					74/135		**m150/m311**	
• WB Through-Right (at Golden State Boulevard)		0/0	0/0	0/0		0/0		241/**#1098**
• WB Right (at Golden State Boulevard)					15/36		**m21/m12**	
• EB Through (at SR 99 SB off-ramp)		0/0	0/0	0/0	3/52	0/0	m77/m106	m97/m212

95th percentile queue length - is minimum amount of storage needed for each movement *SR = State Route* *ft = feet* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[xx] = 2030 conditions *[1] = Total ramp length* *[2] = Calculated storage distance* *[3] = Distance of ramp striped as 2-lanes (existing)*
--- = not calculated for unsignalized intersections *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *m = volume for 95th percentile queue is metered by upstream signal*
***Bolded Text** = 95th percentile queues exceed the available storage capacity* *[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

TABLE 14:
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE / MADERA SITE)

	Existing			2010 No Project			2010 Project			2030 No Project			2030 Project		
Intersection	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	248/231	N/N	N/N	282/302	N/N	N/N	292/347	N/N *(N)*	N/N *(N)*	378/406	N/N	N/N	378/406	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 18 ½	155/248	N/N	N/N	189/289	N/N	N/N	190/290	N/N *(N)*	N/N *(N)*	504/737	N/N	N/N	532/793	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 17	55/111	N/N	N/N	109/222	N/N	N/N	164/322	N/N *(N)*	N/N *(N)*	497/745	N/N	N/N	496/748	N/N *(N)*	N/N *(N)*
SR 99 NB off-ramp at Avenue 17	204/428	N/N	N/N	424/822	N/N	N/N	619/**1192**	N/**Y** *(N)*	N/N *(N)*	**1650/3347**	N/N	**Y/Y**	**1787/3600**	N/N *(N)*	**Y/Y** *(Y)*
SR 99 NB off-ramp at Avenue 16	60/104	N/N	N/N	69/115	N/N	N/N	69/115	N/N *(N)*	N/N *(N)*	314/430	N/N	N/N	314/428	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 16	185/269	N/N	N/N	248/385	N/N	N/N	284/482	N/N *(N)*	N/N *(N)*	630/**950**	N/**Y**	N/N	639/**969**	N/**Y** *(N)*	N/N *(N)*
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	328/552	N/N	N/N	451/846	N/N	N/N	540/**1075**	N/**Y** *(N)*	N/N *(N)*	753/**1298**	N/**Y**	N/N	753/**1297**	N/**Y** *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	129/181	N/N	N/N	192/303	N/N	N/N	242/412	N/N *(N)*	N/N *(N)*	707/**1134**	N/**Y**	N/N	746/**1202**	N/**Y** *(N)*	N/N *(N)*
SR 99 NB off-ramp at SR 145/Madera Avenue	217/186	N/N	N/N	223/193	N/N	N/N	223/193	N/N *(N)*	N/N *(N)*	496/534	N/N	N/N	496/534	N/N *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 14/Olive Avenue	361/317	N/N	N/N	439/504	N/N	N/N	487/650	N/N *(N)*	N/N *(N)*	**958/1400**	**Y/Y**	N/N	**977/1439**	**Y/Y** *(N)*	N/N *(N)*
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	369/372	N/N	N/N	470/490	N/N	N/N	490/561	N/N *(N)*	N/N *(N)*	**1176/1567**	**Y**/N	N/**Y**	**1188/1587**	**Y**/N *(N)*	N/**Y** *(Y)*
SR 99 NB off-ramp at Avenue 12	313/294	N/N	N/N	355/343	N/N	N/N	355/343	N/N *(N)*	N/N *(N)*	745/805	N/N	N/N	745/805	N/**Y** *(N)*	N/N *(N)*

PCE = Passenger Car Equivalent *SR = State Route* *Y = Threshold Met* *N = Threshold Not Met* *NB = northbound* *SB = southbound* *(Y) = Mitigations Included in Analyses & Cost Estimates*
(N) = Mitigations Not Included in Analyses & Cost Estimates *Bolded Text = ramps meet at least one of the volume thresholds*

TABLE 15:
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE/MADERA SITE)

Intersection	**Movement**	**Existing Storage Length (ft)**	**2010 Project Storage Length (ft)**	**2030 Project Storage Length (ft)**
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	100	n/a
	NBR	25	100	n/a
	WBL	---	n/a	n/a
	SBL		n/a	200
	SBR		n/a	500
Avenue 18 ½ at SR 99 NB ramps	EBL	150	150	300[1]
Avenue 17 at SR 99 NB ramps	WBR		250	n/a
	EBL	300	100	300[1]
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	350	900
	SBL	---	200	500
Avenue 12 at Golden State Boulevard	NBL	200	100	100
	WBL	---	100	100
	WBR		n/a	700
	SBL	400	350[1]	700[4]
	SBR	200	100	n/a
	EBL	350	300	350
	EBR	425	100	n/a
Avenue 12 at SR 99 NB ramps	WBR	---	600	1,650
	EBL	---	250	300[1]
Avenue 17 at Road 23	NBL	---	n/a	150
	WBL	---	n/a	100
	SBR	---	n/a	300
	EBR		n/a	300
Avenue 17 at Golden State Boulevard	NBL	50	150	300
	NBR	---	n/a	650[3]
	WBL	---	200	600[1]
	WBR	---	350	n/a
	SBL	---	200[1]	650[1]
	EBL	---		100[1]
Ellis Street at Road 26	NBL	---	100	100
	WBR	---	250	150
	SBL	---	200	200
	EBR		100	100

ft = feet SR = State Route NB = northbound SB = southbound WB = westbound
EB = eastbound n/a = not applicable --- =no existing lane

[1] *= dual lefts required, length of each left-turn lane*

[2] *= exceeds available distance to nearest intersection*

[3] *= dual rights required, length of each right-turn lane*

[4] *= triple lefts required, length of each left-turn lane*

TABLE 15:
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 16/Ellis Street at Aviation Drive	NBL	75	100	350
	NBR	75	n/a	1,000[3]
	WBL	200	400	800[1]
	SBL		100	400[1]
	SBR		100	n/a
	EBL	---	100	150
	EBR		n/a	350
Avenue 16 at SR 99 SB ramps	WBR		100	n/a
	EBL		150	n/a
Avenue 16/Ellis Street at SR 99 NB ramps	NBL		n/a	150[1]
	NBTR		n/a	150
	WBR	---	n/a	200
	EBL	300	n/a	400[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	250	1,050
	EBL	100	250	200[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	300	450
	EBR	125	800	900
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	300[1]	700[1]
	SBR	---	n/a	450
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	100[1]	200[1]
	SBL	100	n/a	250
	SBR	25	250	600
	EBL	175	250	350[1]
	EBR	175	600	1,150
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	n/a	100
	NBR	---	n/a	500
	WBL	---	n/a	350[1]
	WBR		175	n/a
	SBL	---	n/a	150
Avenue 18 at Pistachio Drive	WBR		250	250

ft = feet *SR = State Route* *NB = northbound* *SB = southbound* *WB = westbound*
EB = eastbound *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

In order to mitigate the County segments, freeway segments, and intersections projected to operate below the level of service standard as identified in Table 11, meet the peak hour volume signal warrant as identified in Table 12, exceed the 95th percentile queue storage lengths as identified in Table 13, meet the ramp widening/auxiliary lane thresholds as identified in Table 14, and/or exceed the available storage length, meet the left-turn channelization warrant, require dual left-turn lanes, or separate right-turn lanes as identified in Table 15, the following improvements by scenario are proposed for Alternative C at the Madera Site:

Opening Day (2010) Improvements for Alternative C

County Segments

- Avenue 17 – SR 99 to Road 27
    - Restripe/widen from two (2) lanes to four (4) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 between Avenue 18 ½ to Avenue 17
    - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 south of Avenue 17
    - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
    - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

Intersections

- Avenue 18 ½ at SR 99 NB ramps
    - Signalize the intersection

- Avenue 18 ½ at SR 99 SB ramps/Road 23
    - Signalize the intersection

- Avenue 17 at SR 99 NB ramps
    - Signalize the intersection
    - Restripe/widen the NB approach, south leg, from one (1) shared left-through lane and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane and two (2) right-turn lanes
    - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane to one (1) left-turn lane and two (2) through lanes
    - Restripe/widen the WB approach from one (1) through lane and one (1) right-turn lane to two (2) through lanes and one (1) right-turn lane

- Avenue 17 at SR 99 SB ramps
    - Signalize the intersection
    - Restripe/widen the EB approach, west leg, from one (1) through lane to two (2) through lanes
    - Restripe/widen the WB approach, east leg, from one (1) through lane to two (2) through lanes

- Avenue 17 at Golden State Boulevard
    - Signalize the intersection
    - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to two (2) left-turn lanes and one (1) shared through-right lane

  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane

- Avenue 17 at Road 23
  - Signalize the intersection

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) right-turn lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane to one (1) left-turn lane and one (1) through lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) right-turn lane to dual (2) left-turn lanes and one (1) right-turn lane

- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane

- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the WB approach, east leg, from a shared through-right lane to one (1) through lane and one (1) right-turn lane

2030 Improvements for Alternative C

County Segments

- Road 23 – Avenue 18 ½ to Avenue 17
  - Restripe/widen from two (2) lanes to four (4) lanes (Alternative C only)

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from four (4) lanes to six (6) lanes

- Avenue 17 – Road 23 to SR 99
  - Restripe/widen from two (2) lanes to six (6) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

Intersections

- Avenue 18 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane, to dual (2) left-turn lanes and one (1) through lane

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Restripe/widen the SB approach, north leg, from a shared left-right lane to one (1) left-turn lane and one (1) right-turn lane

- Avenue 18 ½ at Pistachio Drive
  - Although the Avenue 18 ½ at Pistachio Drive intersection is projected to meet the urban peak hour volume signal warrant, it will not be signalized due to its proximity to the SR 99 SB off-ramp. The intersection will be restricted to right-in/right-out/left-in access, which reduces the need for a signal and allows the intersection to operate at an acceptable level of service without a signal.

- Avenue 18 ½ at Golden State Boulevard / Road 23
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1)-through-right lane, to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through lane and one (1) right-turn lane, to dual (2) left-turn lanes and one (1) shared through-right lane

- Avenue 18 at Road 23
  - Signalize the intersection

- Avenue 17 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes to three (3) left-turn lanes, one (1) shared through-right lane, and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane to two (2) through lanes and one (1) shared through-right lane
  - Widen the NB off-ramp to two (2) lanes with a NB auxiliary lane on SR 99

- Avenue 17 at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from two (2) through lanes to four (4) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes to three (3) through lanes

- Avenue 17 at Golden State Boulevard
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane

- Avenue 17 at Road 23
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to one (1) shared left-through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane to one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) through lane, and one (1) shared through-right lane

- Avenue 16/Ellis Street at Aviation Drive/Kennedy
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane, and one (1) through-right lane

- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and two (2) through lanes
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes

- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) shared through-right lane

- Avenue 15 ½ at Road 23
  - Signalize the intersection

- SR 145/Madera Avenue at SR 99 NB ramps
  - Restripe/widen the SB approach, north leg, from one (1) through lane and one (1) shared through-right lane to two (2) through lanes and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to two (2) left-turn lanes and one (1) shared through-right lane

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the NB approach, south leg, from two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane, to dual (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane, to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane, to dual (2) left-turn lanes, one (1) through lane, one (1) shared through-right lane and one (1) right-turn lane

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-right-turn lane, an one (1) right-turn lane

- Avenue 14 at Road 23
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Widen the SB off-ramp to two (2) lanes with a SB auxiliary lane on SR 99

- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane, to three (3) left-turn lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane, to one (1) left-turn lane, three (3) through lanes, and one (1) right-turn lane

- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg from a shared left-through lane and a separate right-turn lane, to dual (2) left-turn lanes, a shared through-right lane, and one (1) right-turn lane

- Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lane, to dual (2) left-turn lanes and three (3) through lanes
- Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane, to two (2) through lanes, one (1) shared through-right lane and one (1) right-turn lane

With the proposed Alternative C/Madera Site improvements detailed previously, two (2) freeway segments and two (2) intersections are still projected to operate below the adopted level of service standard even with the recommended improvements. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E" and "F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. The Avenue 17 at SR 99 NB ramps and Avenue 17 at Golden State Boulevard intersections are both still projected to operate at a LOS "F" in the PM peak hour. Per discussions with Caltrans staff, widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative C mitigations, these four (4) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density and intersection delay). Therefore these four (4) locations should be viewed as mitigated as appropriate by the Project.

Alternative D, Off-Site Alternative (North Fork Site)

Alternative D, which is the Off-Site Alternative, would consist of a 26,001 sf casino including a restaurant and would be constructed and operational by 2010. Alternative D would be located on the North Fork Site, which is located to the west of Mission Drive/Federal Road 209, east of road 225, and south of Cascadel Road in Madera County.

Table 16 shows the Alternative D levels of service summary for the study intersections for the various scenarios surrounding the North Fork Site. Intersections operating or projected to operate below the adopted level of service are shown bolded in Table 16. The signalized and AWSC intersection levels of service shown in Table 16 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized and AWSC level of service or delay shown in Table 16.

Table 17 shows the Alternative D peak hour volume signal warrant analyses for the various scenarios for the study intersections surrounding the North Fork Site. If a study intersection met the peak hour volume signal warrant then a Yes is shown in the appropriate scenario column. If the intersection did not meet the peak hour volume signal warrant then a No is shown in the appropriate scenario column. Intersections by scenario that met the peak hour volume signal warrant are shown bolded Table 17.

TABLE 16:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE STUDY INTERSECTIONS
ALTERNATIVE D (OFF-SITE ALTERNATIVE/NORTH FORK SITE)

	Existing		**2010 No Project**		**2010 Project**		**2030 No Project**		**2030 Project**		**Mitigated 2030 Project**	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
SR 145 at SR 41	B/C	14.0/21.6	B/C	15.4/22.8	B/C	15.4/22.9	**C/D**	39.6/**40.6**	**C/D**	29.6/**40.7**	CC	20.7/30.1
SR 41 at Road 200	A/A	8.1/5.7	A/A	8.2/5.7	A/A	8.2/5.8	A/A	9.3/7.7	A/A	9.3/8.5	A/A	9.3/8.5
SR 41 at Road 420 (Thornberry Road)											A/A	6.1/6.5
• SB Left	A/A	8.7/8.9	A/A	8.8/9.0	A/A	8.8/9.0	A/B	9.7/10.2	A/B	9.7/10.2		
• **WB Approach**	B/B	12.9/14.3	B/B	13.3/14.9	B/B	13.3/14.9	**C/D**	20.2/**27.5**	**C/D**	20.2/**27.5**		
SR 41 at SR 49	A/B	9.9/11.9	B/B	10.0/12.1	B/B	10.1/12.1	B/B	11.4/14.7	B/B	11.1/14.7	B/B	11.1/14.7
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	A/A	7.0/7.3	A/A	7.1/7.4	A/A	7.3/7.7	A/A	7.9/8.7	A/A	8.2/9.2	A/A	8.2/9.2
Road 225 (Mammoth Pool Rd) at Cascadel Road												
• SB Left	A/A	7.4/7.3	A/A	7.4/7.3	A/A	7.5/7.4	A/A	7.5/7.4	A/A	7.5/7.5	A/A	7.5/7.5
• WB Approach	A/A	8.6/8.6	A/A	8.7/8.7	A/A	8.7/8.8	A/A	9.1/9.7	A/A	9.3/9.6	A/A	9.3/9.6
Cascadel Road at Mission Drive												
• SB Left-Through	-/A	-/1.1	-/A	-/1.1	A/A	5.3/6.7	-/A	-/1.2	A/A	4.3/6.3	A/A	4.3/6.3
• WB Approach	A/A	8.6/8.6	A/A	8.7/8.6	A/A	8.8/8.9	A/A	8.8/8.8	A/A	8.9/9.1	A/A	8.9/9.1
North Fork Road at Auberry Road												
• EB Left-Through	-/-	-/-	A/A	0.2/0.2	A/A	0.1/1.0	A/A	1.1/1.2	A/A	1.6/1.6	A/A	1.6/1.6
• WB Left	A/A	7.4/7.5	A/A	7.4/7.5	A/A	7.5/7.5	A/A	7.6/7.6	A/A	7.6/7.6	A/A	76/7.6
• NB Approach	A/A	9.1/9.1	A/B	9.2/10.6	A/A	9.4/9.4	B/B	10.7/11.1	B/B	10.9/11.4	B/B	10.9/11.4
• SB Approach	B/A	10.1/8.8	A/A	9.9/9.8	A/A	9.7/9.7	B/B	12.2/13.1	B/B	12.5/13.4	B/B	12.5/13.4
North Fork Road at Crane Valley Road												
• EB Left-Through	A/A	1.3/2.6	A/A	1.3/2.7	A/A	1.3/2.6	A/A	1.7/3.3	A/A	1.6/3.3	A/A	1.6/3.3
• SB Approach	A/A	9.3/9.9	A/B	9.3/10.0	A/A	9.4/10.1	B/B	10.1/11.7	B/B	10.1/11.8	B/B	10.1/11.8

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
Bolded Text – intersection/movement operates below the appropriate level of service standard

TABLE 17:
SIGNAL WARRANT ANALYSIS
ALTERNATIVE D (OFF-SITE ALTERNATIVE/NORTH FORK SITE)

Intersection	**Existing**	**2010 No Project**	**2010 Project**	**2030 No Project**	**2030 Project**
SR 41 at SR 145	---	---	---	---	---
SR 41 at Road 200	---	---	---	---	---
SR 41 at Road 420 (Thornberry)	No	No	No	**Yes**	**Yes**
SR 41 at SR 49	---	---	---	---	---
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	No	No	No	No	No
Road 225 (Mammoth Pool Rd) at Cascadel Road	No	No	No	No	No
Cascadel Rd at Mission Dr	No	No	No	No	No
North Fork Rd at Auberry Rd	No	No	No	No	No
North Fork Rd at Crane Valley Rd	No	No	No	No	No

SR = State Route *Yes = meets urban/rural peak hour volume signal warrant*
No = does not meet urban/rural peak hour volume signal warrant *--- = signalized intersection/no warrant prepared*
Bolded Text = intersection meets the peak hour signal warrant

Table 18 shows the Alternative D calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet left-turn channelization warrants, or require dual left-turn lanes or separate right-turn lanes for the various Project scenarios for the various study locations surrounding the North Fork Site. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 18:
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE D (OFF-SITE ALTERNATIVE/NORTH FORK SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)	2030 Project Storage Length (ft)
SR 145 at SR 41	NBL	500	100	100
	WBL	175	100	100
	SBL	425	100	100
	EBL	200	200	200
	EBR	200	100	100
SR 41 at Road 200	NBR	475	100	100
	WBL	200	100	100
	WBR	200	100	100
	SBL	500	100	100
SR 41 at Road 420 (Thornberry Road)	SBL	425	100	100
SR 41 at SR 49	NBL	125	100	100
	SBR	150	350	400
	EBL	225	200	250
	EBR	225	100	150
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	WBR	---	100	100
	EBR	---	100	100
Road 225 (Mammoth Pool Rd) at Cascadel Road	SBL	150	100	100
North Fork Rd at Auberry Rd	NBR	---	100	100
	WBL	125	100	100
	EBR	---	100	100

ft = feet *SR = State Route* *NB = northbound* *SB = southbound* *WB = westbound*
EB = eastbound *--- =no existing lane* *[1] = dual lefts required, length of each left-turn lane*
[2] = exceeds available distance to nearest intersection *[3] = dual rights required, length of each right-turn lane*
[4] = triple lefts required, length of each left-turn lane

In order to mitigate the intersections projected to operate below the level of service standard as identified in Table 16, meet the peak hour volume signal warrant as identified in Table 17, and/or meet the left-turn channelization warrant as identified in Table 18, the following improvements by scenario are proposed for Alternative D at the North Fork Site:

2030 Improvements for Alternative D

- SR 145 at SR 41
    - Optimize the signal cycle length

- SR 41 at Road 420 (Thornberry Road)
    - Signalize the intersection

Proportionate Share Percentages

Table 19 shows the Proportionate Share Percentages recommended for the proposed improvements detailed previously and other roadway improvements as defined in the 2007 Regional Transportation Plan (RTP) and by the various reviewing agencies. The traffic growth that is projected for each of these study locations is due not only to this Project but to all planned and pending projects.

The Proportionate Share Percentages were calculated by taking the Project trips and dividing by the total 2030 Project volumes – the Existing volumes for the given study location. The formula used in calculating the Proportionate Share Percentages is:

Proportionate Share Percentage = Project only trips / (2030 Project volume – Existing Volume)

TABLE 19:
PROJECT PROPORTIONATE SHARE PERCENTAGES

	Proportionate Share Percentage (%)		
	County of Madera[1]	City of Madera[1]	Caltrans[1]
	Alternative A/B/C	Alternative A/B/C	Alternative A/B/C
Madera Site			
County Segment			
Road 23 – Avenue 18 ½ to Avenue 17	---/---/8.21	---	---
Avenue 17 – Road 23 to SR 99	9.91/7.02/8.21		
Avenue 17 – SR 99 to Road 27	6.18/4.64/5.77	---	---
Freeway Segment			
SR 99 north of Avenue 18 ½	---	---	1.39/3.20/3.22
SR 99 between Avenue 18 ½ and Avenue 17	---	---	0.00[2]/3.92/2.27
SR 99 south of Avenue 17	---	---	5.57/3.94/5.31
Intersection			
Avenue 18 ½ at SR 99 NB ramps	5.78/4.23/6.40	---	5.78/4.23/6.40
Avenue 18 ½ at SR 99 SB ramps/Road 23	8.80/6.42/9.19	---	8.80/6.42/9.19
Avenue 18 ½ at Pistachio Drive	7.29/5.30/7.69	---	7.29/5.30/7.69
Avenue 18 ½ at Golden State Blvd/Road 23	8.04/5.91/8.50	---	8.04/5.91/8.50
Avenue 18 at Road 23	11.02/8.25/11.66	---	11.02/8.25/11.66
Avenue 17 at SR 99 NB ramps	8.69/6.24/6.27	---	8.69/6.24/6.27
Avenue 17 at SR 99 SB ramps	9.47/6.78/8.83	---	9.47/6.78/8.83
Avenue 17 at Golden State Boulevard	11.95/8.61/10.75	---	11.95/8.61/10.75
Avenue 17 at Road 23	3.04/2.18/3.33	---	3.04/2.18/3.33

SR = State Route *1 = Proportionate Share Percentages are based on the controlling jurisdiction*

2 = All Project trips to/from the south are projected to use Avenue 17 and all trips to/from the north are projected to use Avenue 18 ½ to access the site

TABLE 19:
PROJECT PROPORTIONATE SHARE PERCENTAGES

	Proportionate Share Percentage (%)		
	County of Madera[1]	**City of Madera[1]**	**Caltrans[1]**
	Alternative A/B/C	**Alternative A/B/C**	**Alternative A/B/C**
Intersection			
Ellis Street at Road 26	2.91/2.01/2.61	---	2.91/2.01/2.61
Ellis Street/Avenue 16 at SR 99 NB ramps	---	1.55/1.07/1.31	1.55/1.07/1.31
Ellis Street/Avenue 16 at SR 99 SB ramps	---	1.29/0.95/1.18	1.29/0.95/1.18
Avenue 16/Ellis Overcrossing at Aviation Drive	---	2.56/1.79/2.90	---
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	---	3.97/2.80/3.91	3.97/2.80/3.91
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	---	2.45/1.75/2.76	2.45/1.75/2.76
Avenue 15 ½ at Road 23	---	4.76/3.53/5.18	---
SR 145/Madera Avenue at SR 99 NB ramps	---	2.92/2.03/2.43	2.92/2.03/2.43
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	---	1.31/1.25/1.96	1.31/1.25/1.96
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	---	2.22/1.57/2.56	2.22/1.57/2.56
Avenue 14 at Road 23	---	4.59/3.32/5.05	---
Avenue 12/Golden State Boulevard at SR 99 SB ramps	1.27/0.92/1.27	---	1.27/0.92/1.27
Avenue 12 at Golden State Boulevard	1.04/0.76/1.04	---	1.04/0.76/1.04
Avenue 12 at SR 99 NB ramps	1.63/1.17/1.54	---	1.63/1.17/1.54
North Fork Site			
	Alternative D	**Alternative D**	**Alternative D**
Intersection			
SR 41 at Road 420 (Thornberry Road)	---	---	0.00

SR = State Route [1] *= Proportionate Share Percentages are based on the controlling jurisdiction*

[2] *= All Project trips to/from the south are projected to use Avenue 17 and all trips to/from the north are projected to use Avenue 18 ½ to access the site*

II. TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF WORKSHEETS

III. INTRODUCTION

This TIS was prepared to assess the traffic impacts due to the development of the North Fork Casino (Project) and will be used in the preparation of a Project EIS. The five (5) alternatives evaluated for the TIS include:

- Alternative A: Proposed Project located on the Madera Site
- Alternative B: Reduced Intensity Alternative located on the Madera Site
- Alternative C: Commercial Land Use located on the Madera Site
- Alternative D: Off-Site Alternative located the North Fork Site
- Alternative E: No Project Alternative

The following sections provide information on the various project alternative descriptions, locations of the various alternatives, current land use and zoning, alternative phasing, project sponsor/contact person and reference sources.

A. PROJECT DESCRIPTION

Alternative A (Madera Site)

Alternative A, which is the Proposed Project, will consist of the following land uses:

- 268,480 square foot (sf) casino including a gift shop, lounge (entertainment), and restaurants
- 200 room (224,530 sf) hotel

Total Alternative A square footage would be 493,010 sf.

Alternative B (Madera Site)

Alternative B, which is the Reduced Intensity Alternative, will consist of a 198,990 sf casino including a gift shop, lounge (entertainment), and restaurants.

Alternative C (Madera Site)

Alternative C, which is the Commercial Land Use Alternative, will consist of the following land uses:

- 125,000 sf Free Standing Discount Superstore
- 100,000 sf Discount Club
- 3,000 sf Fast Food Restaurant with Drive-Through
- 4,000 sf High-Turnover Sit-Down Restaurant
- 5,000 sf High-Turnover Sit-Down Restaurant

Total Alternative C square footage would be 237,000 sf.

Alternative D (North Fork Site)

Alternative D, which is the Off-Site Alternative, will consist of a 26,001 sf casino including a restaurant.

Alternative E (Madera or North Fork Site)

Alternative E, which is the No Project Alternative, assumes that both sites will remain vacant. Other development in the study areas would continue to occur.

B. PROJECT LOCATION

Madera Site (Alternative A, B, C)

The Madera Site is located to the west of Golden State Boulevard, east of Road 23, north of Avenue 17, and south of Avenue 18 in Madera County. Figure 1 shows the Madera Site in relation to the surrounding street system.

North Fork Site (Alternative D)

The North Fork Site is located to the west of Mission Drive/Federal Road 209, east of Road 225, and south of Cascadel Road in Madera County. Figure 2 shows the North Fork Site in relation to the surrounding street system.

C. SITE PLAN

Alternative A (Madera Site)

Figure 3 shows the Alternative A, Proposed Project, site plan.

Alternative B (Madera Site)

Figure 4 shows the Alternative B, Reduced Intensity Alternative, site plan.

Alternative C (Madera Site)

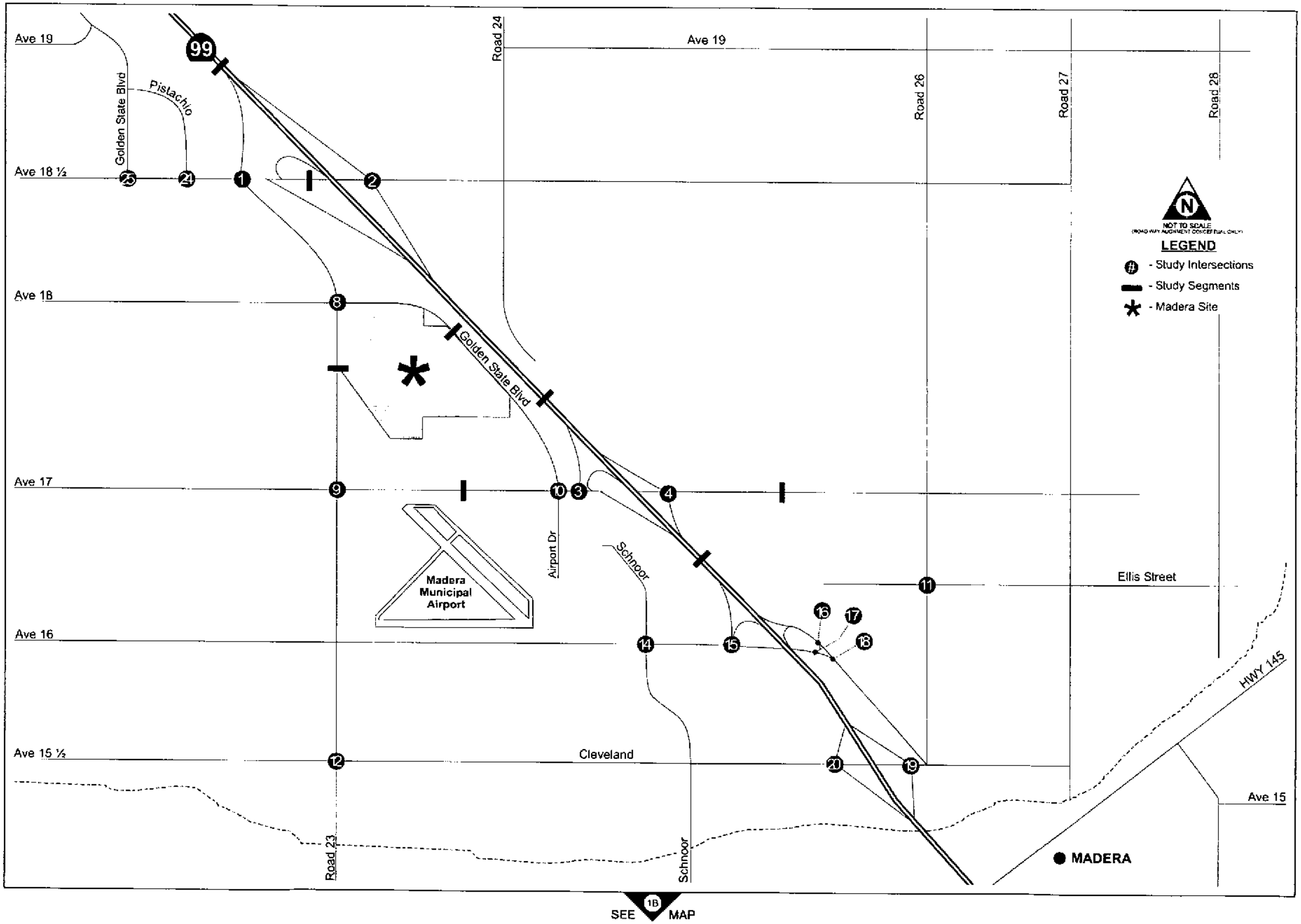
Figure 5 shows the Alternative C, Commercial Land Use Alternative, site plan.

Alternative D (North Fork Site)

Figure 6 shows the Alternative D, Off-Site Alternative, site plan.

Alternative E (Madera or North Fork Site)

There is no site plan for Alternative E since both the Madera and North Fork Sites would remain vacant.



VICINITY MAP

Madera Site
(Alternative A, B, C)

North Fork Casino
Madera County

Figure 1

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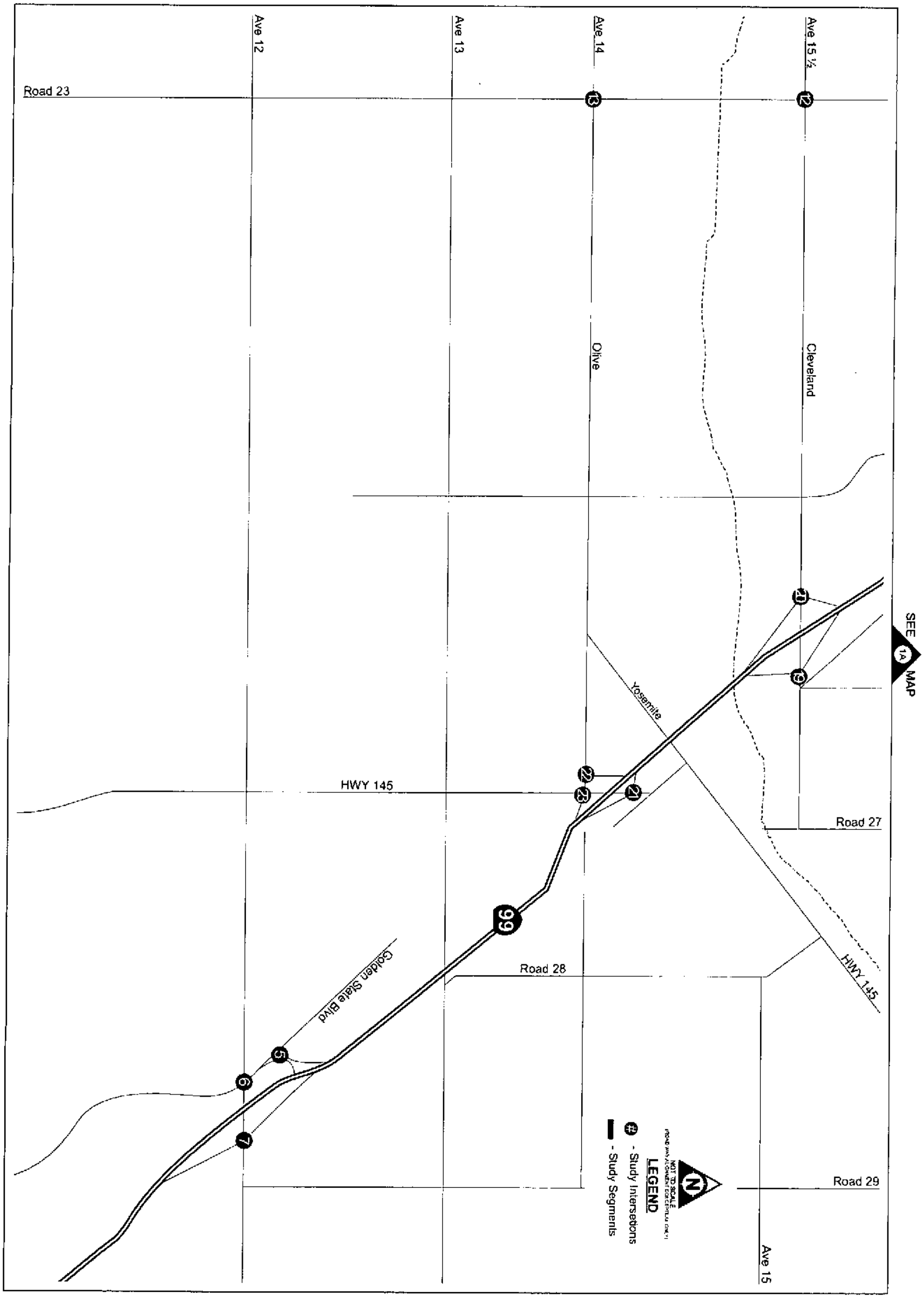

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VICINITY MAP
Madera Site
(Alternative A,B,C)

North Fork Casino
Madera County

Figure 1

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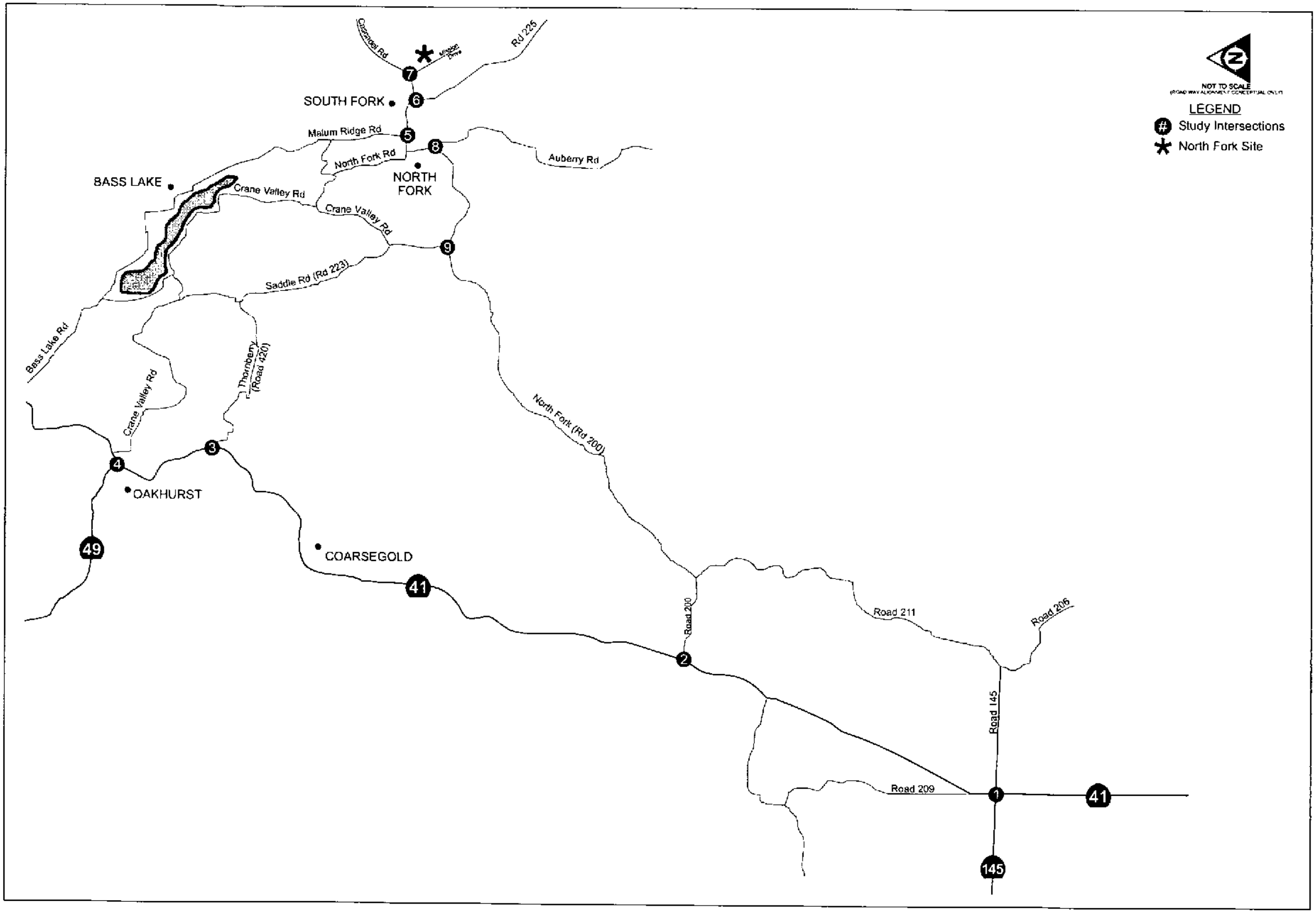

VICINITY MAP
North Fork Site
(Alternative D)

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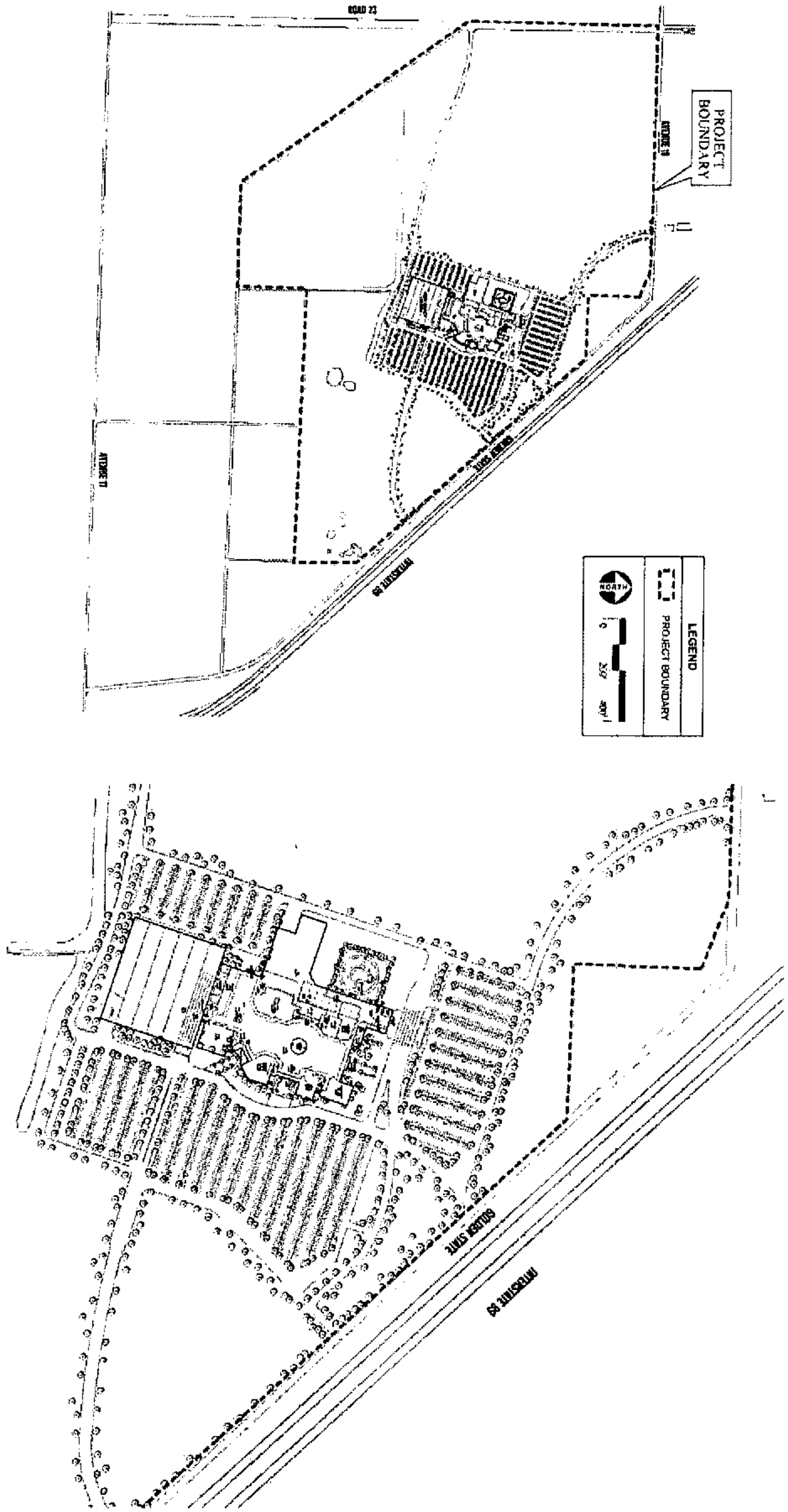
North Fork Casino
Madera County

Figure 2

04-837.2



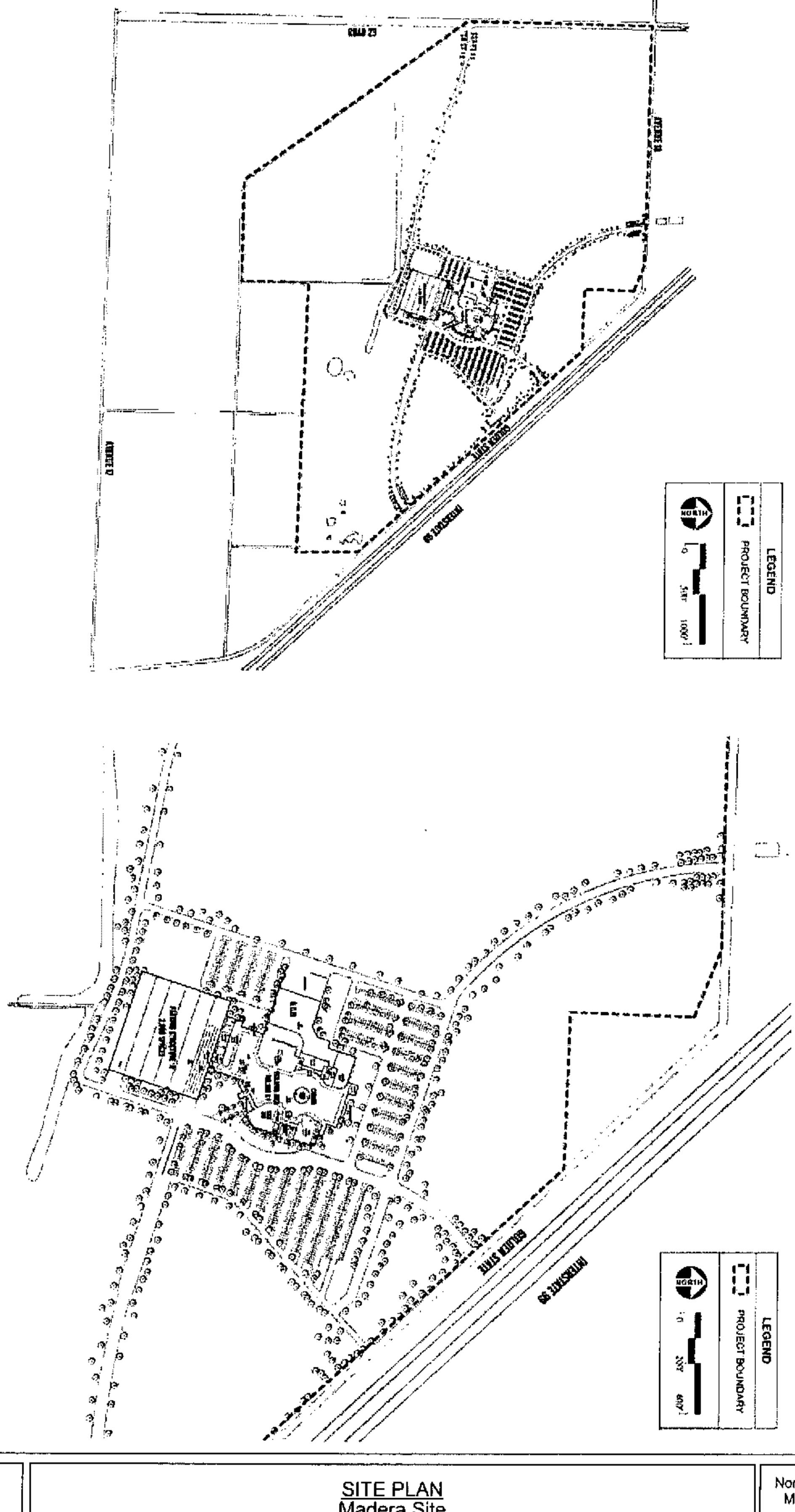
TPG Consulting

SITE PLAN
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 3

04-537.2



SITE PLAN
Madera Site
(Alternative B)

North Fork Casino
Madera County

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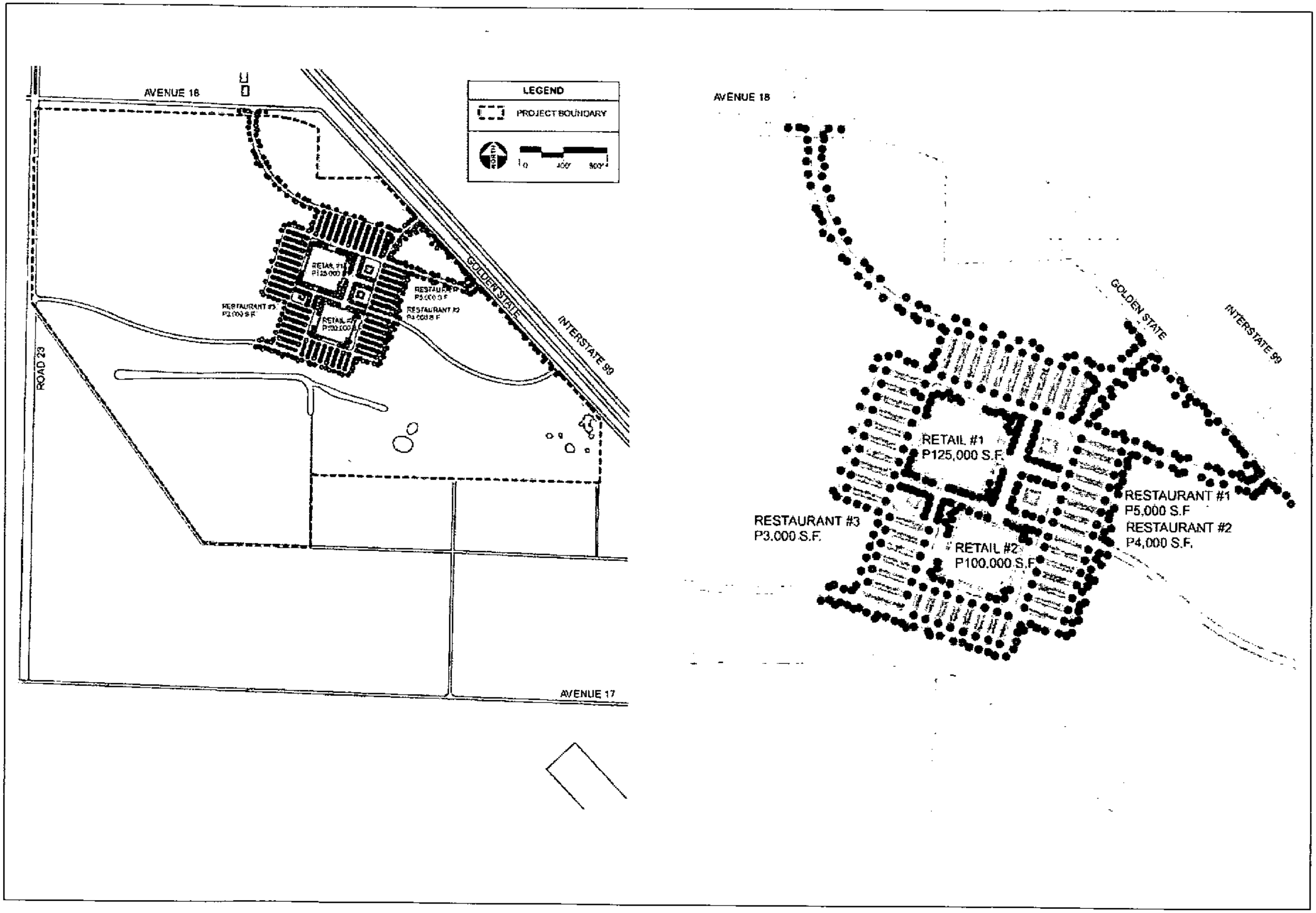
Figure 4



SITE PLAN
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 5

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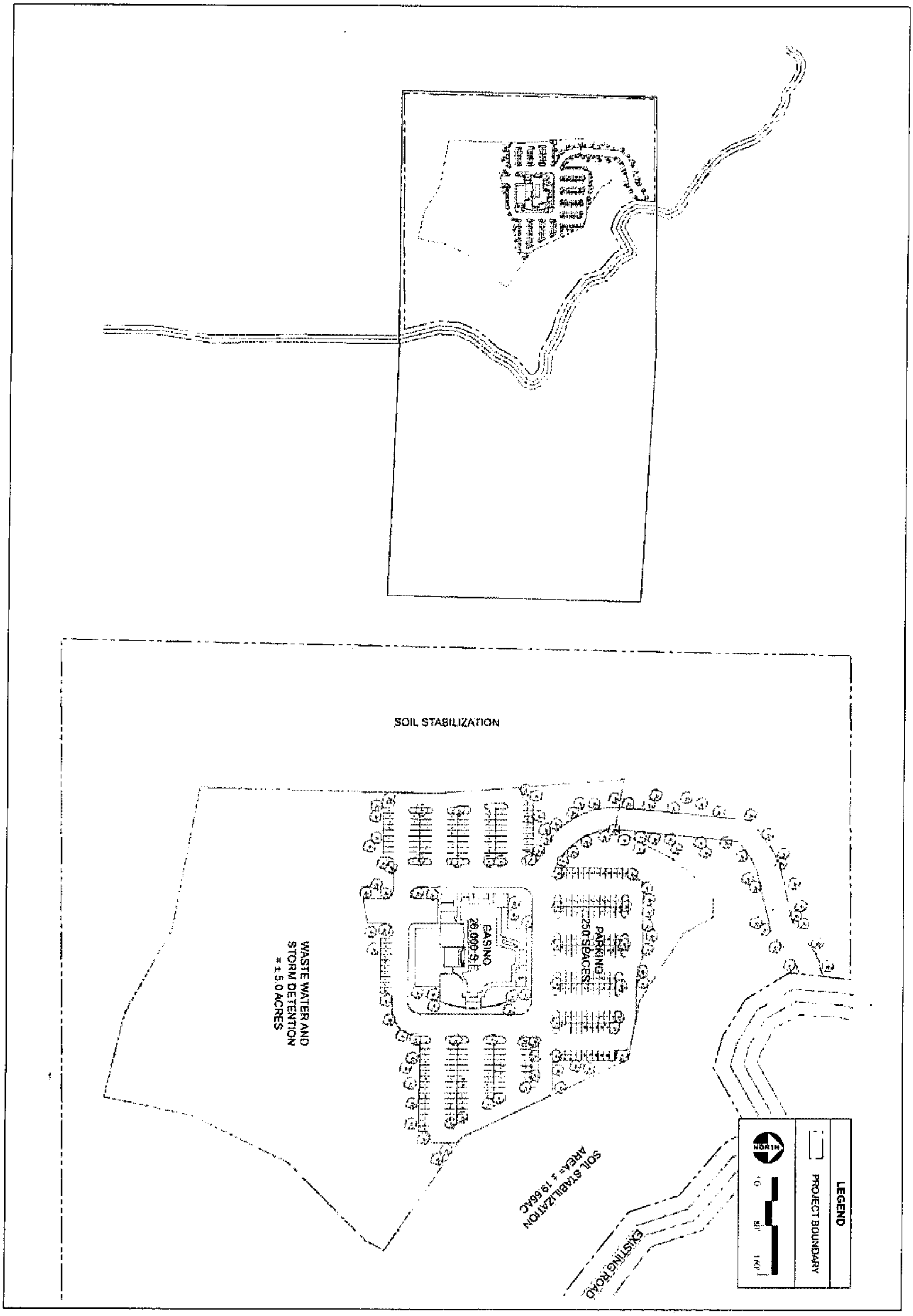
TPG CONSULTING



SITE PLAN
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 6

04-837.2

D. CIRCULATION NETWORK

Madera Site (Alternative A, B, C)

Figure 1 shows the Madera Site (Alternatives A, B, C) and its relation to the surrounding roadway system. The following sections describe the Existing (2008) transit, bike and roadway systems in the vicinity of the Madera Site.

Transit

Madera Dial-A-Ride service is offered in the City of Madera and its surrounding environs. Dial-A-Ride is a combined general public/demand-response service offered by the City of Madera with cooperative funding by Madera County. Service area is within approximately five miles of Downtown. Hours of operation are 7:00 AM to 6:30 PM Monday through Friday, 9:00 AM to 4:00 PM Saturday, and 8:30 AM to 2:30 PM Sunday. Reservations are required two hours in advance for service Monday through Saturday. Sunday reservations are required by 3:00 PM Saturday. County fares are $1.00 for rides beginning or ending within the City limits (Ellis to the north, Avenue 13 to the south, Road 24 ½ to the west and Road 29 to the east) and $2.00 for rides beginning or ending outside of the City limits but within the area bounded by Avenue 19 to the north, Avenue 12 to the south, Road 23 to the west and Road 29 ½ and Road 30 ½ to the east. Tickets may be purchased at the Intermodal Center and Save Mart Pharmacy.

Greyhound offers inter-community bus service several times a day with stops in the City of Madera. They operate seven days a week from the City of Madera's Downtown Intermodal Center.

Madera County also has one private taxi operator that provides service seven days per week, 24 hours per day.

Bike

There are no bike paths, lanes, and routes located in the study area surrounding the Madera Site currently. Bike paths provide for bicycle travel on a right-of-way completely separated from any street or highway. Bike lanes provide for a striped lane for one-way travel on a street or highway. Bike routes provide for shared use with pedestrian or motor vehicle traffic. According to the *Madera County 2004 Regional Bicycle Transportation Plan*, bike facilities are planned for the study area surrounding the Madera Site and are projected to be constructed within 10 years.

Roadways

Table 20 describes the Existing (2008) street system in the study area surrounding the Madera Site including the street classification, number of lanes, and the posted speed limits.

TABLE 20:
DESCRIPTION OF EXISTING (2008) STREET SYSTEM
MADERA PROJECT SITE (ALTERNATIVE A, B, C)

Street	Classification	No. of Lanes (2-dir)	Posted Speed Limit (mph)
Avenue 18 ½	County Road	2	35
Avenue 18	Arterial	2	NPS
Avenue 17	Arterial	2	45
Avenue 16	Arterial	2	35-40
Avenue 15 ½	Arterial	2	NPS
Avenue 14	Arterial	2	NPS
Avenue 12	Arterial	2	35
Road 23	County Road	2	45
Road 26	County Road	4	NPS
Golden State Blvd/Airport Road	Arterial	2	35
Golden State Boulevard	Arterial	2	NPS
Schnoor Avenue	Arterial	2	40
Cleveland Avenue	Arterial	4	35
Olive Avenue	Arterial	2-3	30
Ellis Street	Arterial	2	NPS
SR 99	Freeway	4	65
SR 145	Highway	2	35

SR = State Route *NPS = no posted speed limit*

Table 21 lists the Existing (2008) Madera Site study intersections and their associated intersection control.

TABLE 21:
EXISTING (2008) INTERSECTION CONTROL
MADERA PROJECT SITE (ALTERNATIVE A, B, C)

Intersection	**Signalized/Unsignalized**	**Type**
Avenue 18 ½ at SR 99 southbound off-ramp/Road 23	Unsignalized	TWSC
Avenue 18 ½ at SR 99 northbound ramps	Unsignalized	TWSC
Avenue 17 at SR 99 southbound off-ramp	Unsignalized	TWSC
Avenue 17 at SR 99 northbound ramps	Unsignalized	TWSC
Avenue 12/Golden State Boulevard at SR 99 SB ramps	Unsignalized	TWSC
Avenue 12 at Golden State Boulevard	Signalized	AU
Avenue 12 at SR 99 NB ramps	Unsignalized	TWSC
Avenue 18 ½ at Pistachio	Unsignalized	TWSC
Avenue 18 ½ at Golden State	Unsignalized	TWSC
Avenue 18 at Road 23	Unsignalized	TWSC
Avenue 17 at Road 23	Unsignalized	TWSC
Avenue 17 at Golden State Boulevard/Airport Road	Unsignalized	TWSC
Ellis Street at Road 26	Signalized	AU
Avenue 15 ½ at Road 23	Unsignalized	TWSC
Avenue 14 at Road 23	Unsignalized	AWSC
Avenue 16 at Schnoor Avenue	Unsignalized	AWSC
Avenue 16 at SR 99 SB ramps	Unsignalized	TWSC
Avenue 16 at SR 99 NB ramps	Unsignalized	TWSC
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	Signalized	AC
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	Signalized	AC
SR 145/Madera Avenue at SR 99 NB ramps	Signalized	AC
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	Signalized	AC
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	Signalized	AC

TWSC = two-way stop controlled *AWSC = all-way stop-control*
AC = actuated coordinated *AU = actuated uncoordinated* *SR = State Route*
NB = northbound *SB = southbound*

North Fork Site (Alternative D)

Figure 2 shows the North Fork Site (Alternative D) and its relation to the surrounding roadway system. The following sections describe the Existing (2008) transit, bike and roadway systems in the vicinity of the North Fork Site.

Transit

Madera County has one private taxi operator that provides service seven days per week, 24 hours per day.

Bike

There are no bike paths, lanes, and routes located in the study area surrounding the North Fork Site currently. Bike paths provide for bicycle travel on a right-of-way completely separated from any street or highway. Bike lanes provide for a striped lane for one-way travel on a street or highway. Bike routes provide for shared use with pedestrian or motor vehicle traffic.

Roadways

Table 22 describes the Existing (2008) street system in the study area surrounding the North Fork Site including the street classification, number of lanes, and the posted speed limits.

TABLE 22:
DESCRIPTION OF EXISTING (2008) STREET SYSTEM
NORTH FORK SITE (ALTERNATIVE D)

Street	Classification	No. of Lanes (2-dir)	Posted Speed Limit (mph)
SR 145	Highway/County Road	2	55
SR 41	Highway	4	45-55
SR 49	Highway	2	35
Road 200	County Road	2	55
Road 420 (Thornberry Road)	County Road	2	NPS
Road 274 (Malum Ridge Road)	County Road	2	55
Road 225 (Mammoth Pool Road)	County Road	2	35
Cascadel Road	County Road	2	35
Mission Drive	County Road	2	NPS
North Fork Road	County Road	2	55
Auberry Road	County Road	2	NPS
Crane Valley Road	County Road	2	55

NPS = no posted speed limit *SR = State Route*

Table 23 lists the Existing (2008) North Fork Site study intersections and their associated intersection control.

TABLE 23:
EXISTING (2008) INTERSECTION CONTROL
NORTH FORK SITE (ALTERNATIVE D)

Intersection	Signalized/Unsignalized	Type
SR 145 at SR 41	Signalized	AU
SR 41 at Road 200	Signalized	AU
SR 41 at Road 420 (Thornberry Road)	Unsignalized	TWSC
SR 41 at SR 49	Signalized	AU
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	Unsignalized	AWSC
Road 225 (Mammoth Pool Road) at Cascadel Road	Unsignalized	TWSC
Cascadel Road at Mission Drive	Unsignalized	TWSC
North Fork Road at Auberry Road	Unsignalized	TWSC
North Fork Road at Crane Valley Road	Unsignalized	TWSC

TWSC = two-way stop controlled *AWSC = all-way stop-control* *AU – actuated-coordinated*
SR = State Route

E. LAND USE AND ZONING

Madera Site (Alternative A, B, C)

The approximately 305 acre Madera Site is currently vacant and zoned ARE-40 (agricultural, rural, exclusive, forty acre district). If the Madera Site is chosen, the land will be taken into Federal trust and land use zoning classifications will no longer apply.

North Fork Site (Alternative D)

Three (3) single family residences are currently located on the approximately 80 acre North Fork Site, which is in Federal trust. Since the land is in Federal trust no land use zoning classifications apply. Should Alternative D be developed, the one (1) house located on the west side of Mission Drive would be removed and the remaining two (2) houses on the east side of Mission Drive would remain.

F. PHASING PLAN

Alternative A, B, C (Madera Site)

Alternative A, B, or C would be constructed and occupied in a single phase and would be operational in 2010.

Alternative D (North Fork Site)

Alternative D would be constructed and occupied in a single phase and would be operational in 2010.

G. PROJECT SPONSOR AND CONTACT PERSON

The Project Sponsor for all four (4) build alternatives is the North Fork Rancheria of Mono Indians of California. The Project Contact is Ms. Elaine Bethel Fink, Tribal Chairperson.

H. REFERENCES

This report was prepared using information taken from the following sources:

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IV. TRAFFIC ANALYSIS

The following sections provide information on the existing and projected segment and intersection traffic volumes, facility geometry and traffic controls; trip generation data for the various alternatives; trip distribution data for the various alternatives, and resulting levels of service for all alternatives for all scenarios.

A. STUDY ASSUMPTIONS

Information on all study methodologies and study assumptions used in this traffic evaluation can be found in the Appendices section VI – B.

B. TRAFFIC VOLUMES, FACILITY GEOMETRY, AND TRAFFIC CONTROLS

The lane configurations, associated intersection control, and peak hour volumes shown in the following figures were used in the various analyses as appropriate. The resulting levels of service are also shown in the following figures.

Madera Site (Alternative A, B, C, E)

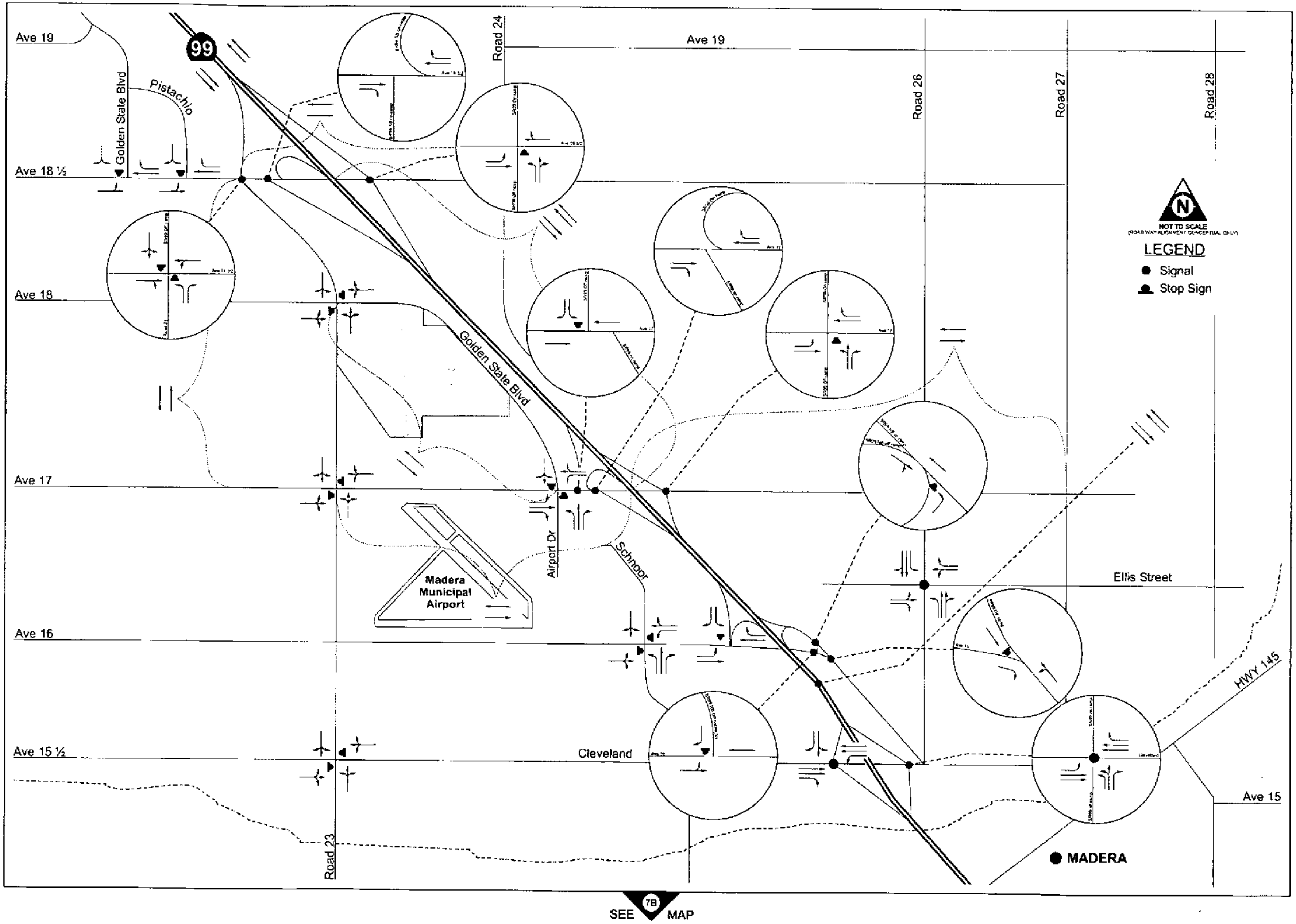
Existing (2008) Conditions

Figures 7, 8, and 9 show the Existing (2008) lane configurations and intersection control, AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting Existing (2008) levels of service for the Madera Site. The two-way stop-controlled (TWSC) levels of service shown on Figure 9 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 9 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 9.

Opening Day (2010) No Project Conditions

Alternative E (No Project Alternative)

Figures 10, 11, and 12 show the Opening Day (2010) No Project Alternative E lane configurations and intersection control, AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting Opening Day (2010) No Project Alternative E levels of service for the Madera Site. The Opening Day (2010) No Project Alternative E lane configurations and intersection control are also used in the Opening Day (2010) Project analyses. The TWSC levels of service shown on Figure 12 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 12 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 12. The signalized intersection levels of service or delay shown in Figure 12 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.



LANE CONFIGURATION AND INTERSECTION CONTROL

Existing
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 7

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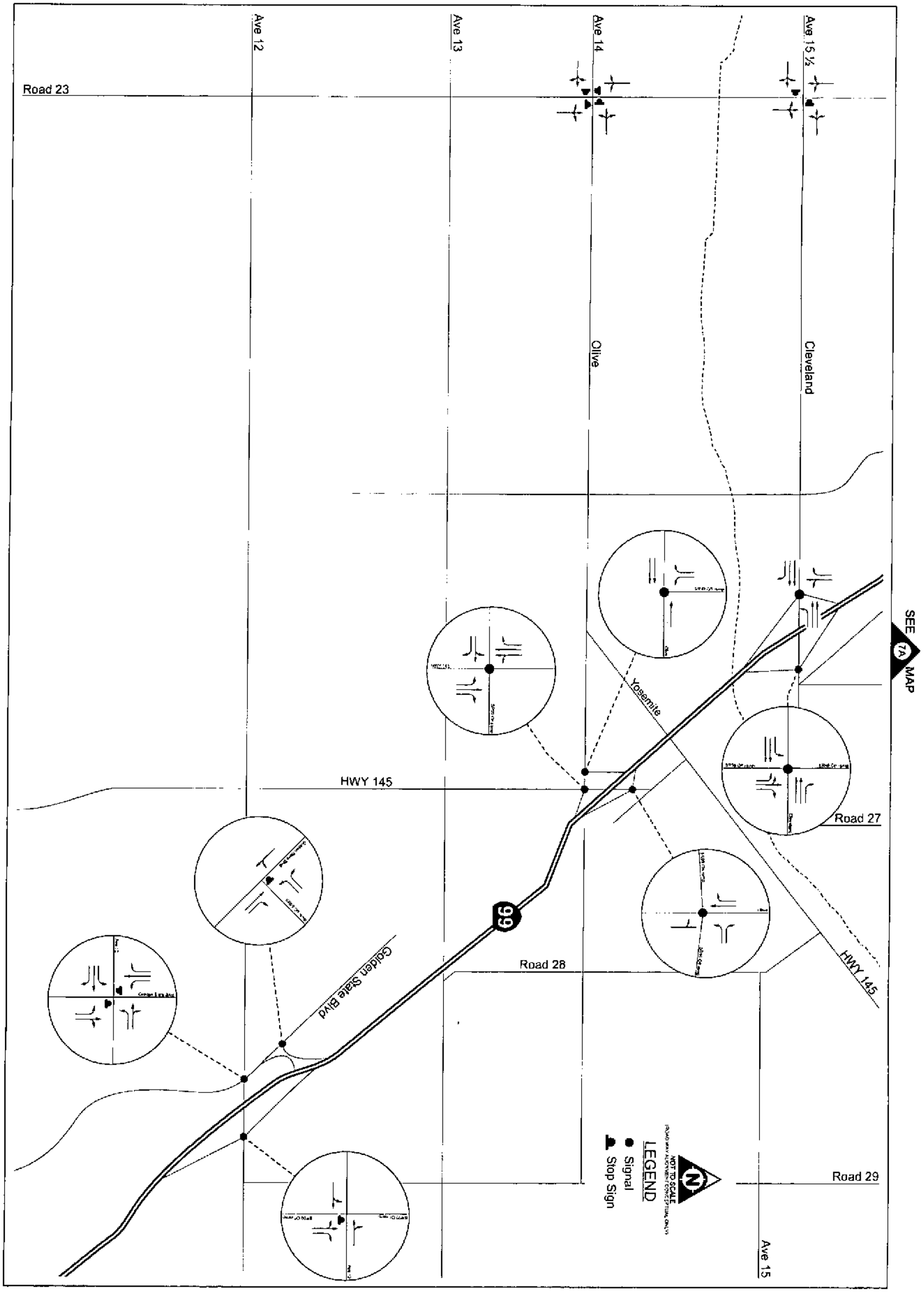

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LANE CONFIGURATION AND INTERSECTION CONTROL

Existing
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 7

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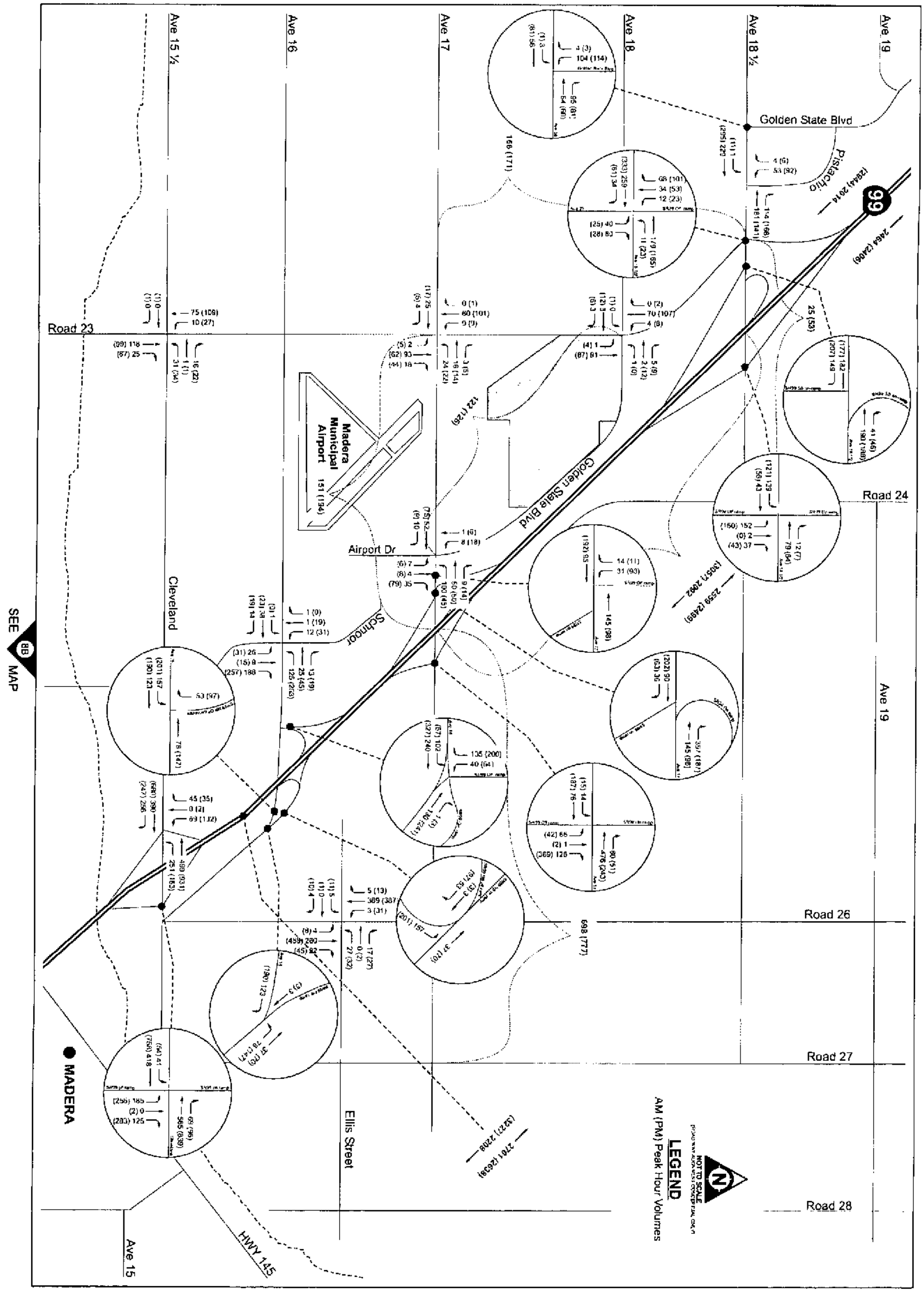
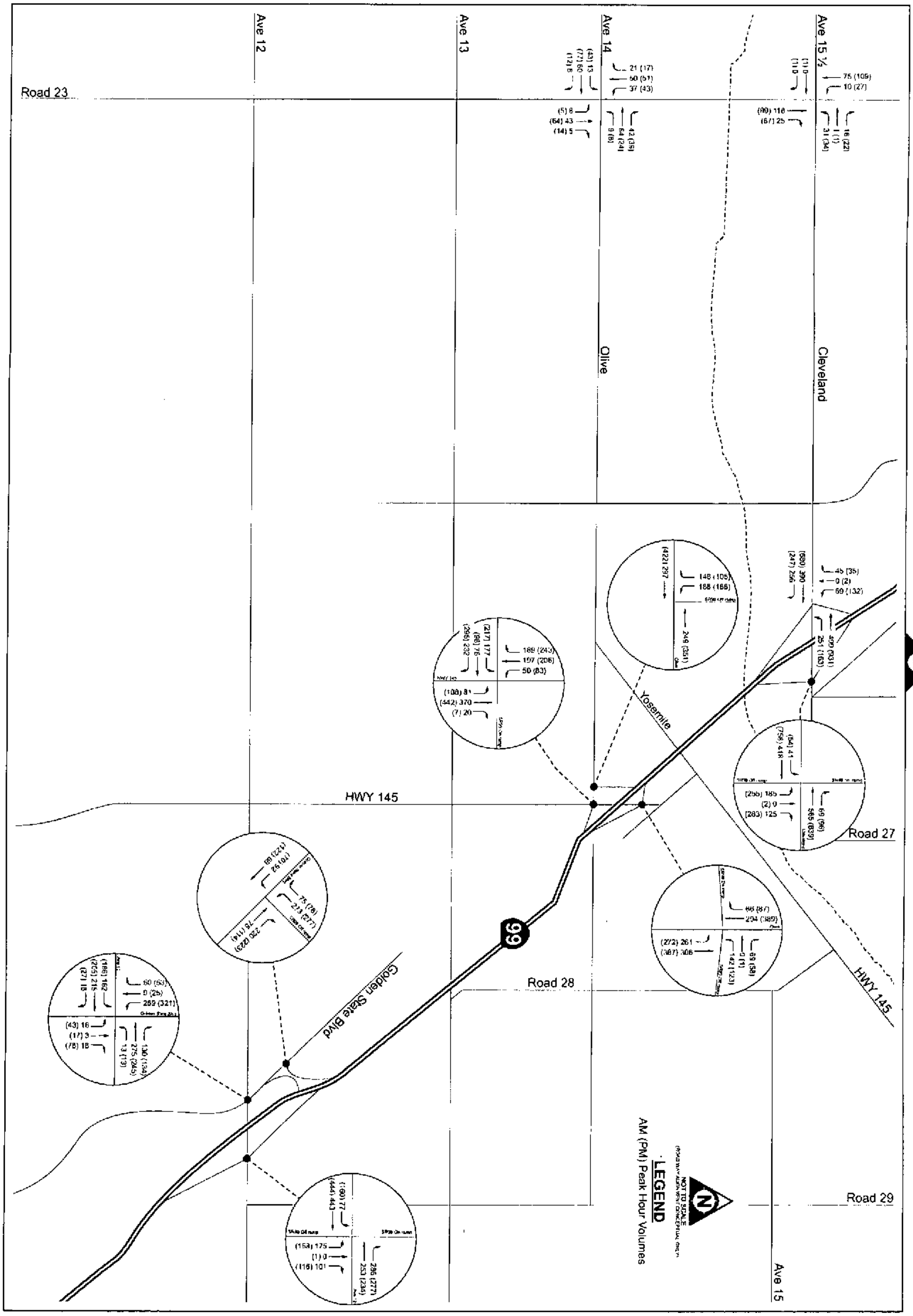


PEAK HOUR TRAFFIC VOLUMES
Existing
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 8

04-837.2



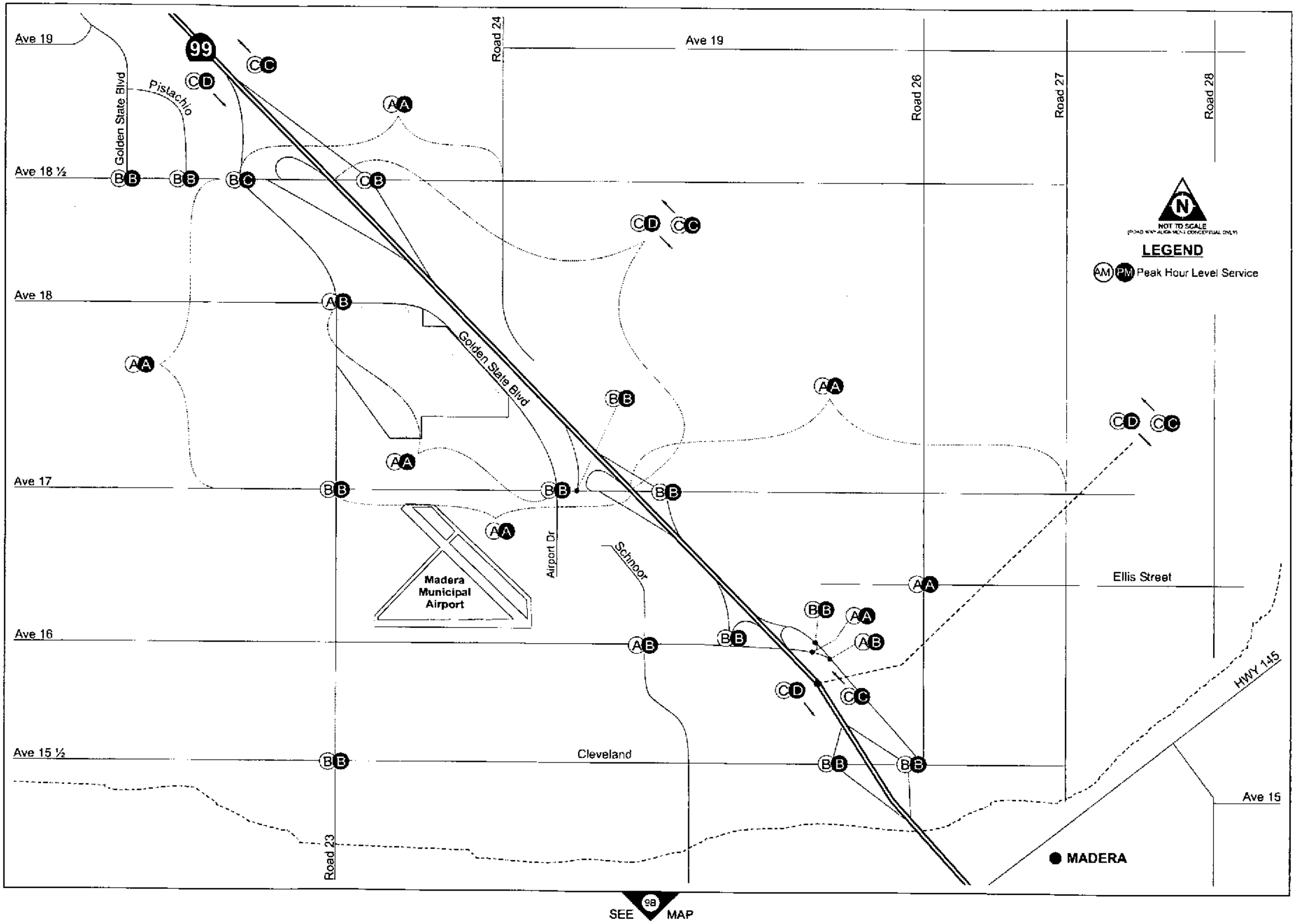
PEAK HOUR TRAFFIC VOLUMES

Existing
Madera Site

North Fork Casino
Madera County

Figure 8

04-837.2



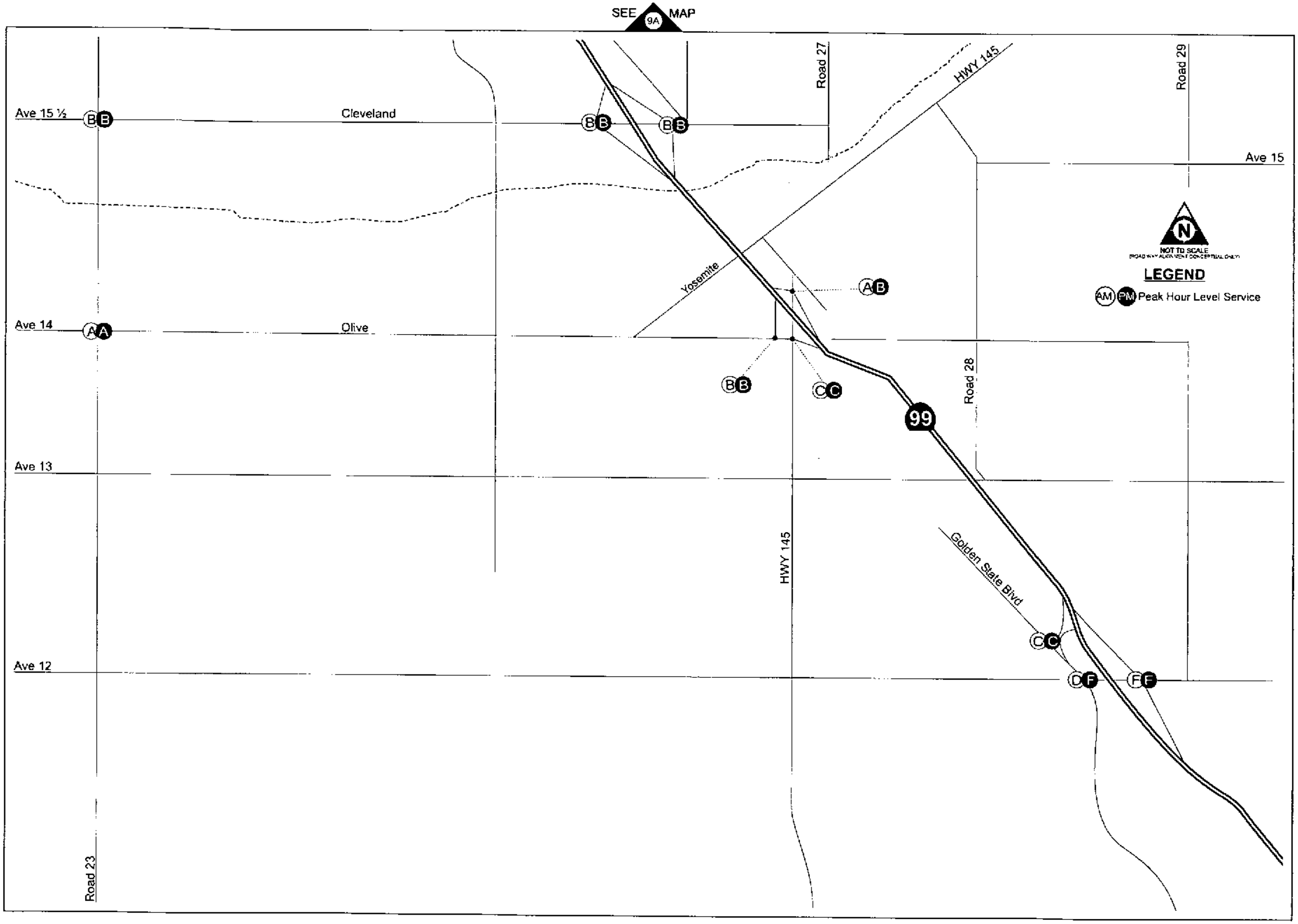
LEVELS OF SERVICE
Existing
Madera Site
(Alternative E)

North Fork Casino
Madera County

04-837.2

Figure 9

TPG Consulting



LEVELS OF SERVICE

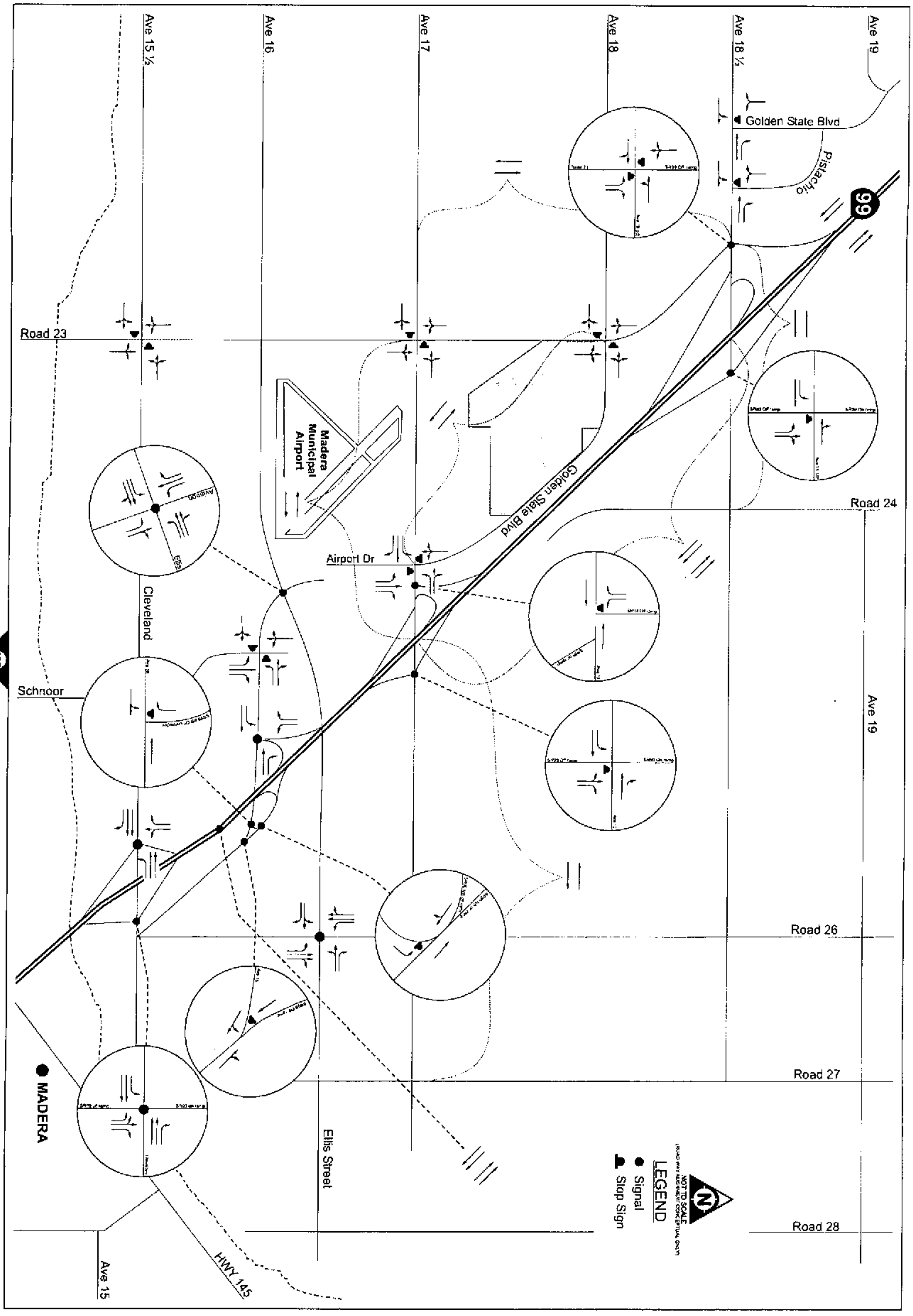
Existing
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 9

04-837.2

TPG Consulting



IPG Consulting

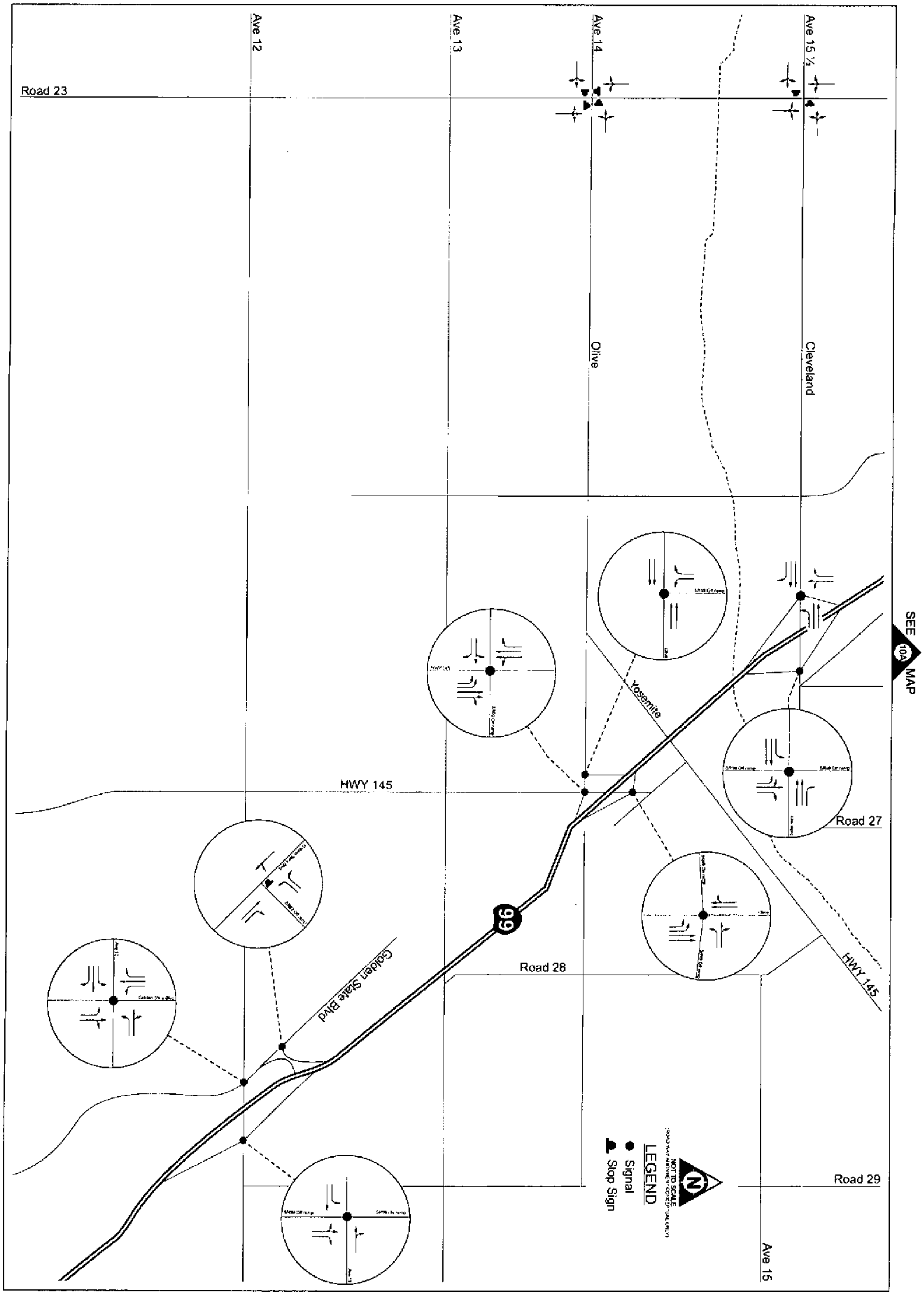
LANE CONFIGURATION AND INTERSECTION CONTROL

2010 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

04-637.2

Figure 10



IPG Consulting

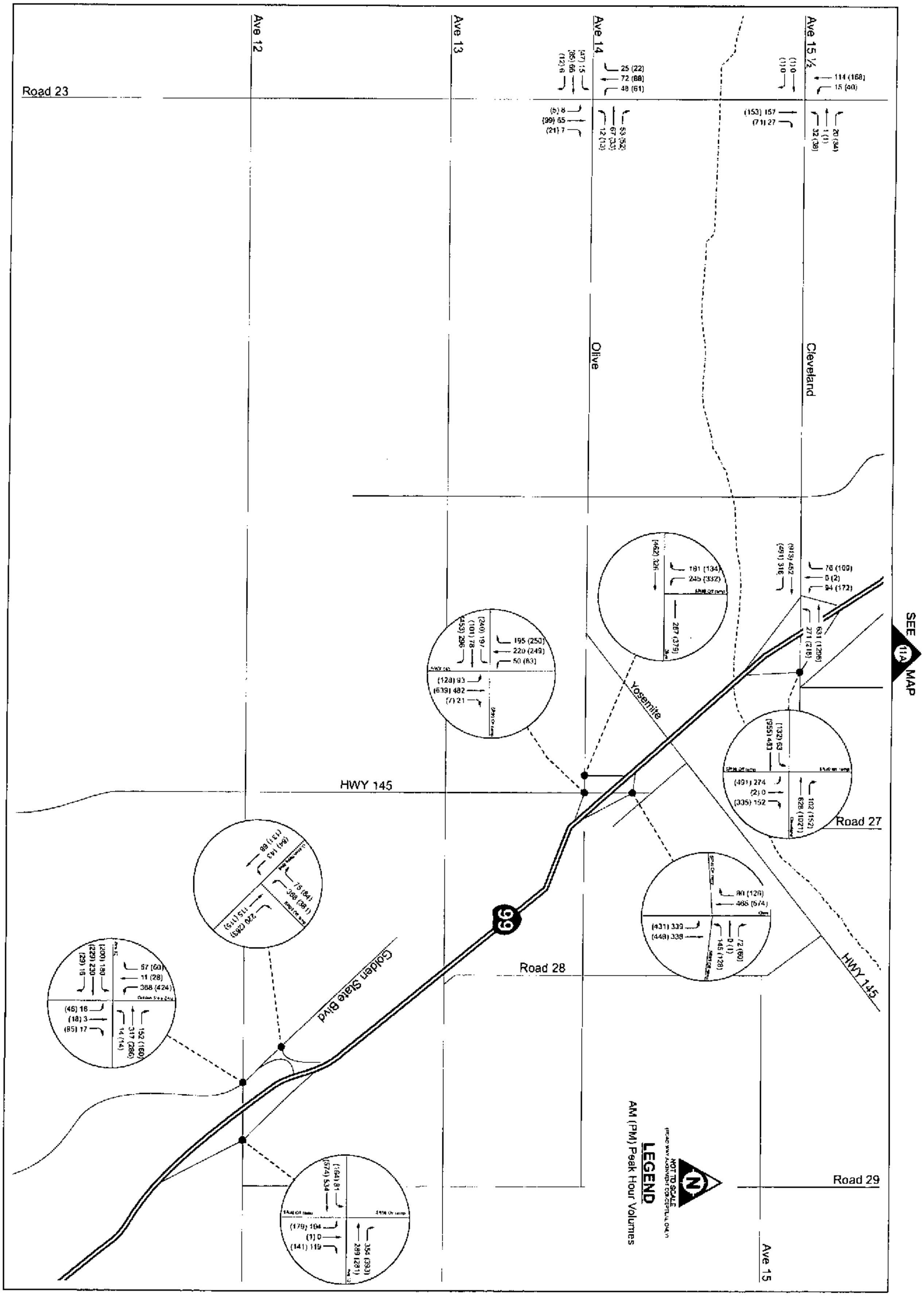
LANE CONFIGURATION AND INTERSECTION CONTROL

2010 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

04-837.2

Figure 10



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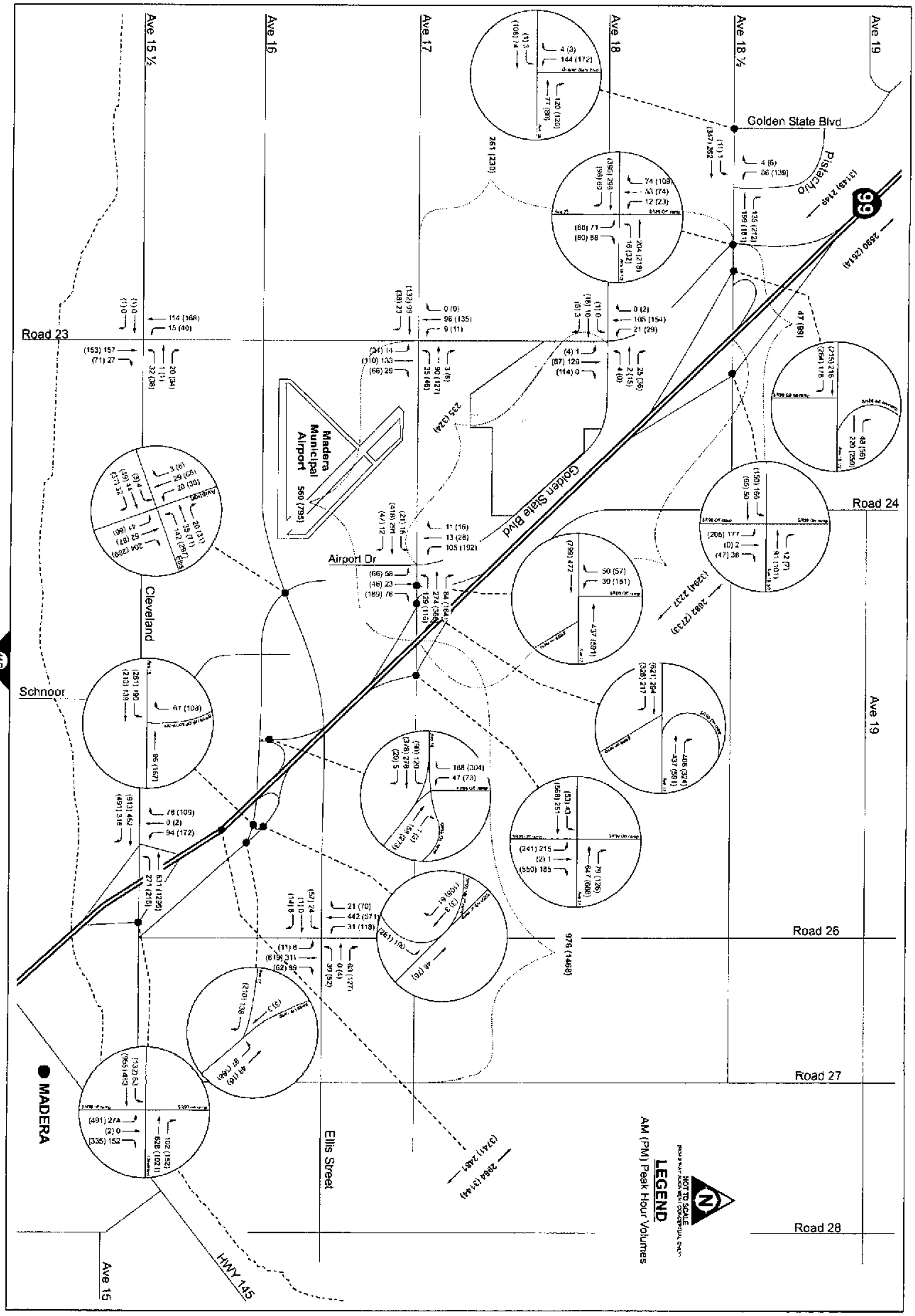
PEAK HOUR TRAFFIC VOLUMES

2010 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 11

04-837.2



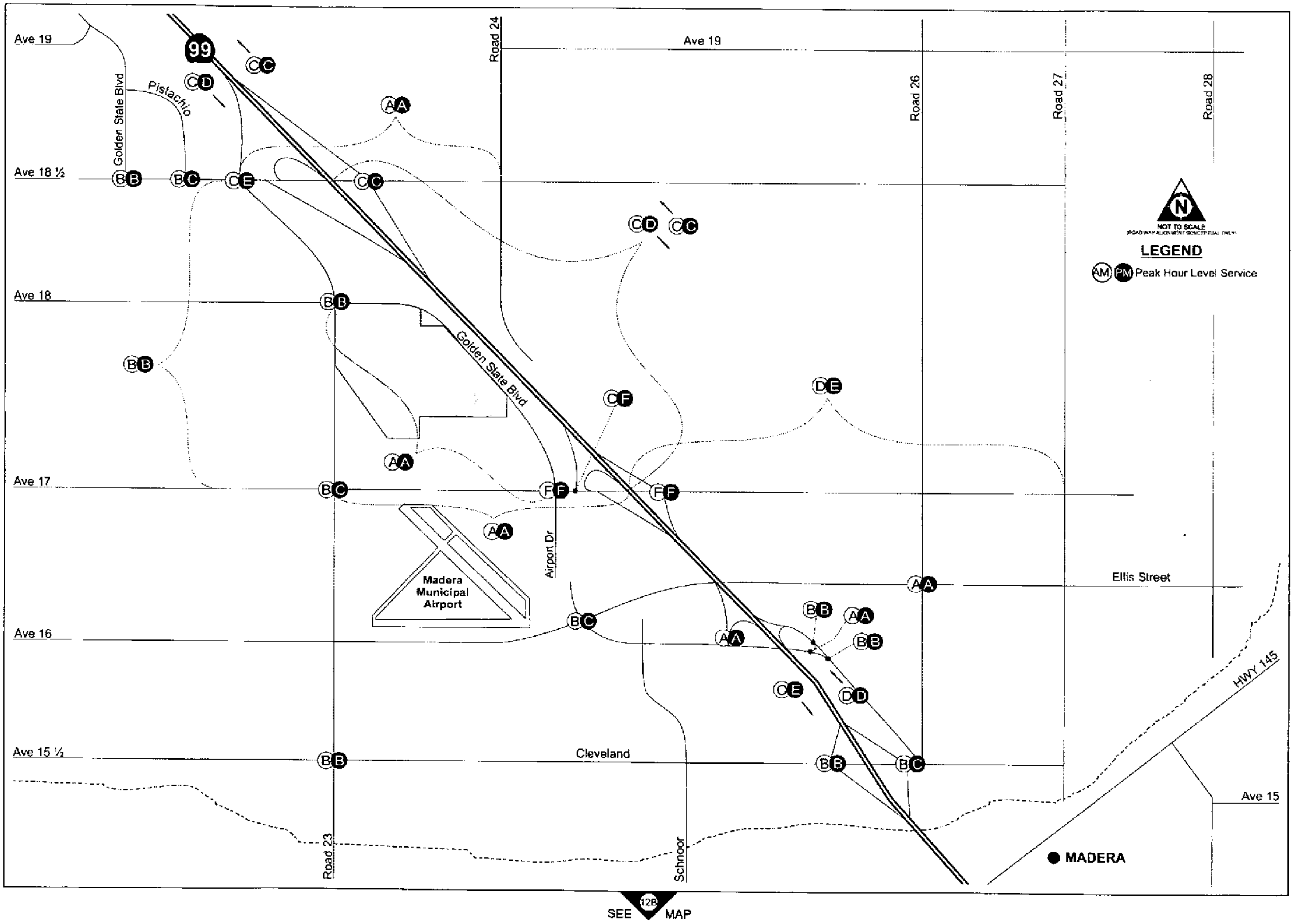
PEAK HOUR TRAFFIC VOLUMES

2010 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 11

04-837.2



LEVELS OF SERVICE

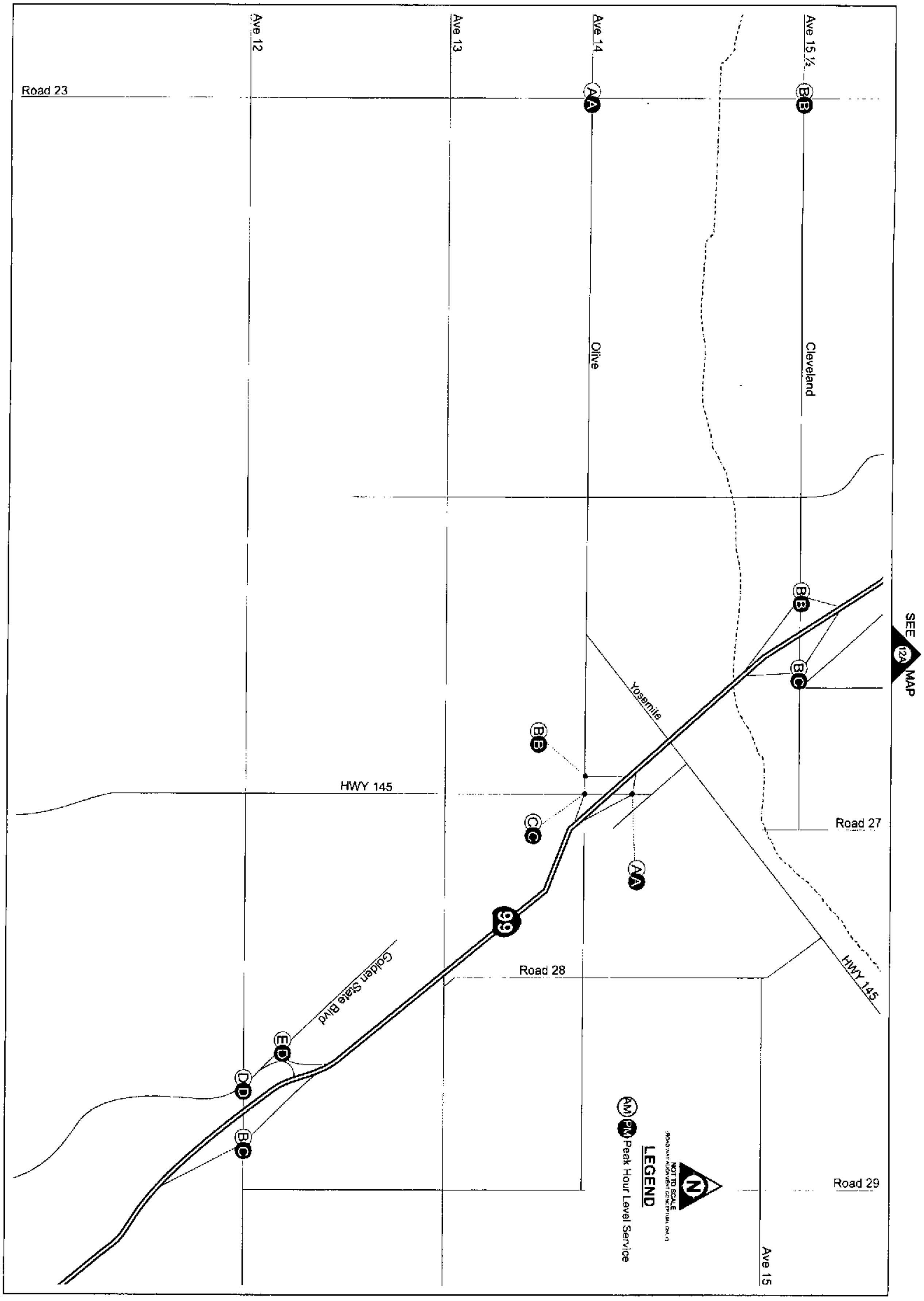
2010 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 12

04-837.2

TPG Consulting



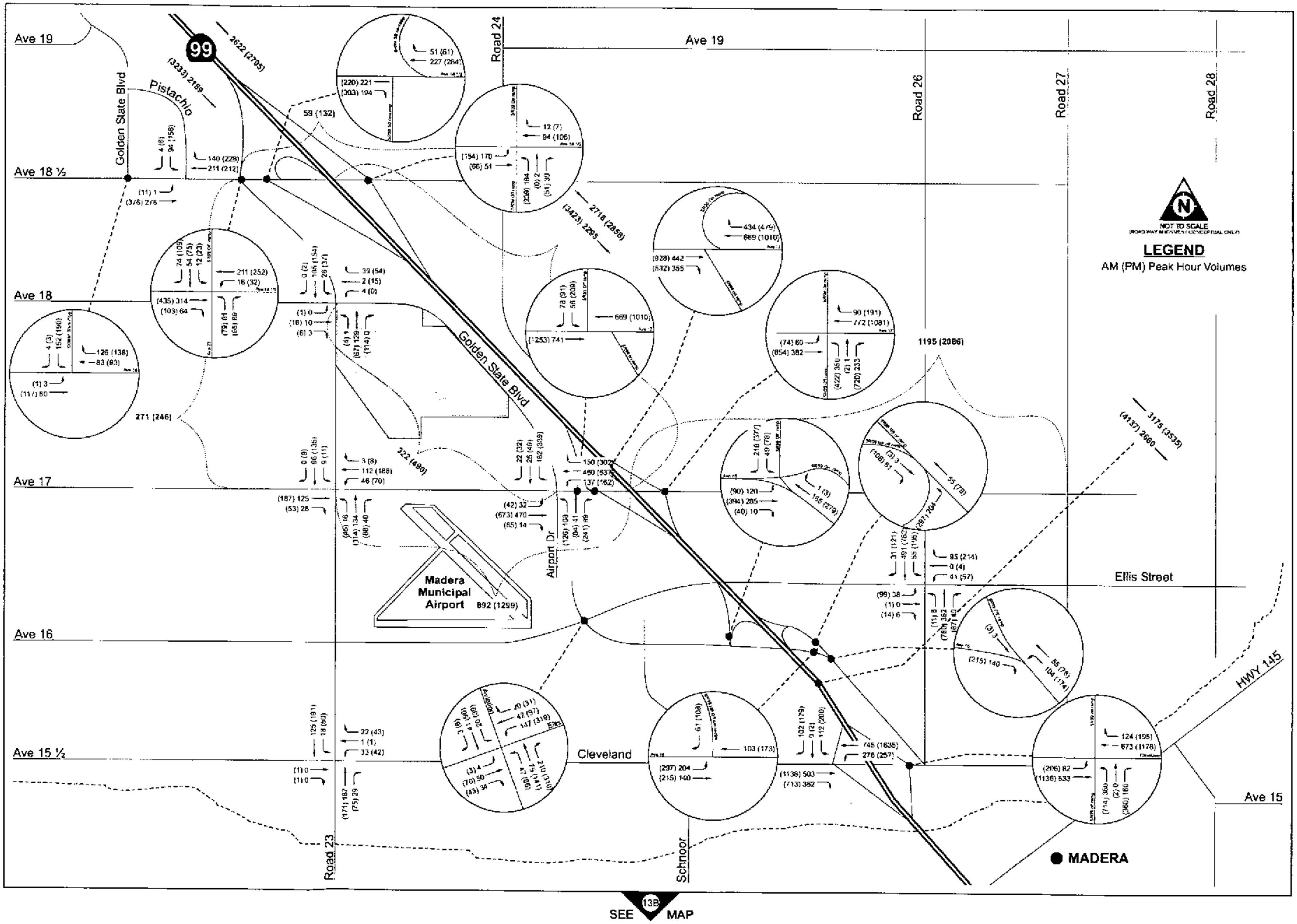
TPG Consulting

LEVELS OF SERVICE
2010 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 12

04-837.2



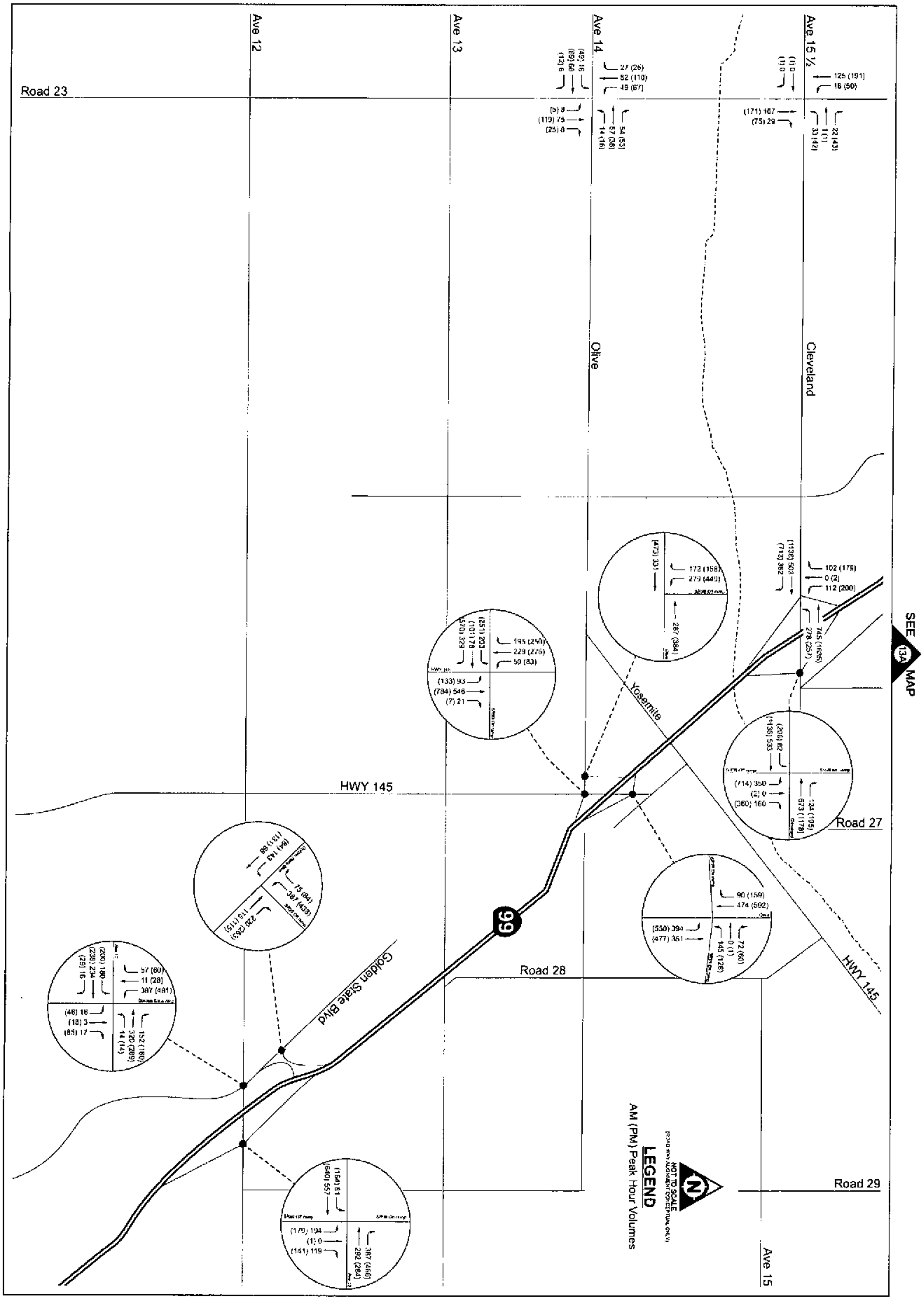
PEAK HOUR TRAFFIC VOLUMES

2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 13

04-837.2



PEAK HOUR TRAFFIC VOLUMES
2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

04-837.2

Figure 13

Opening Day (2010) Project Conditions

Alternative A (Proposed Project Alternative)

Figures 13 and 14 show the Opening Day (2010) Project Alternative A AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting Opening Day (2010) Project Alternative A levels of service for the Madera Site. The TWSC levels of service shown on Figure 14 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 14 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 14. The signalized intersection levels of service or delay shown in Figure 14 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

Alternative B (Reduced Intensity Alternative)

Figures 15 and 16 show the Opening Day (2010) Project Alternative B AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting Opening Day (2010) Project Alternative B levels of service for the Madera Site. The TWSC levels of service shown on Figure 16 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 16 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 16. The signalized intersection levels of service or delay shown in Figure 16 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

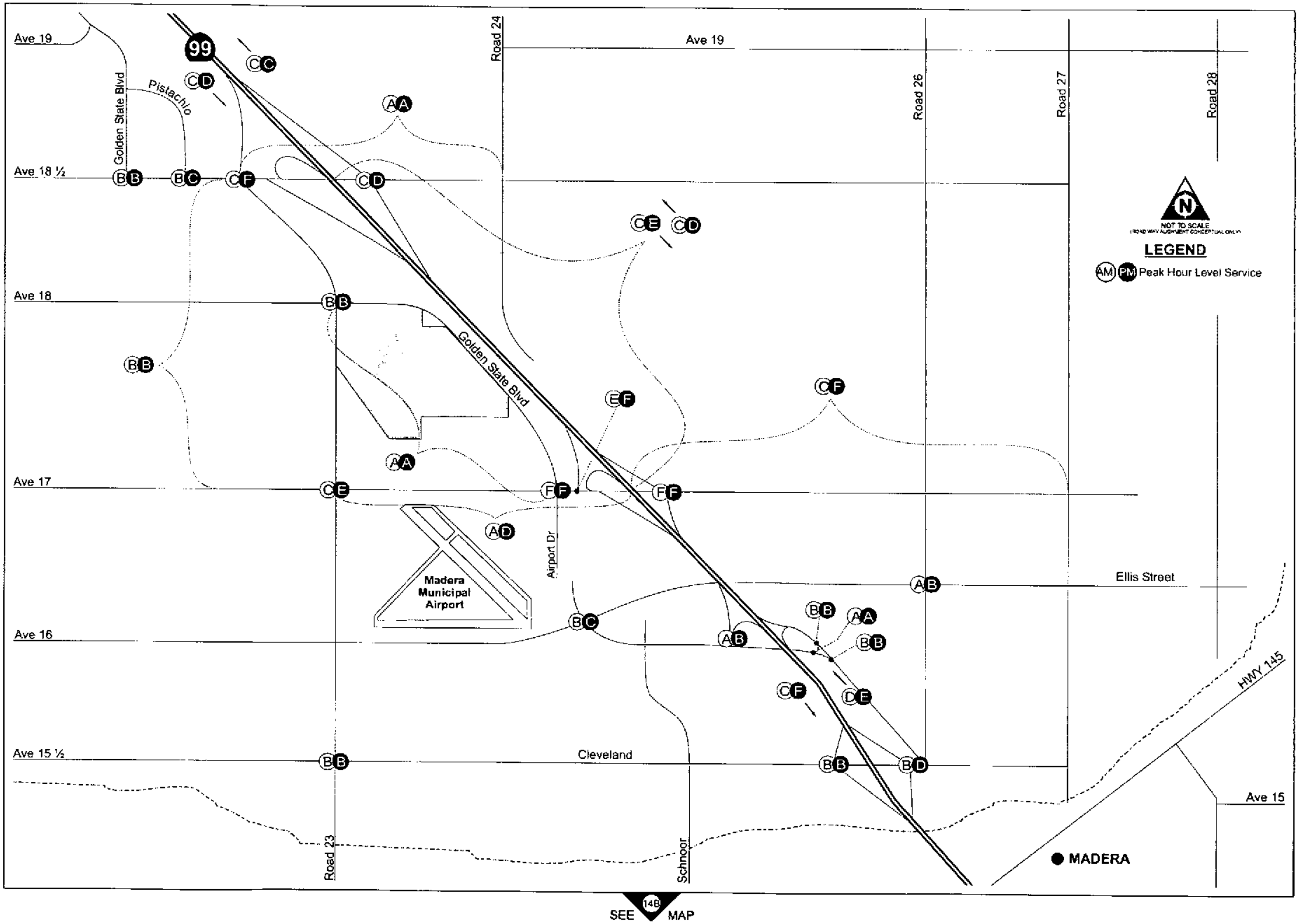
Alternative C (Commercial Land Use Alternative)

Figures 17 and 18 show the Opening Day (2010) Project Alternative C AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting Opening Day (2010) Project Alternative C levels of service for the Madera Site. The TWSC levels of service shown on Figure 18 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 18 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 18. The signalized intersection levels of service or delay shown in Figure 18 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

Mitigated Opening Day (2010) Project Conditions

Alternative A (Proposed Project Alternative)

Figures 19 and 20 show the Mitigated Opening Day (2010) Project Alternative A lane configurations and intersection control, and resulting Mitigated Opening Day (2010) Project Alternative A levels of service for the Madera Site. The TWSC levels of service shown on Figure 20 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 20 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized and AWSC level of service or delay shown on Figure 20. The signalized intersection levels of service or delay shown in Figure 20 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.



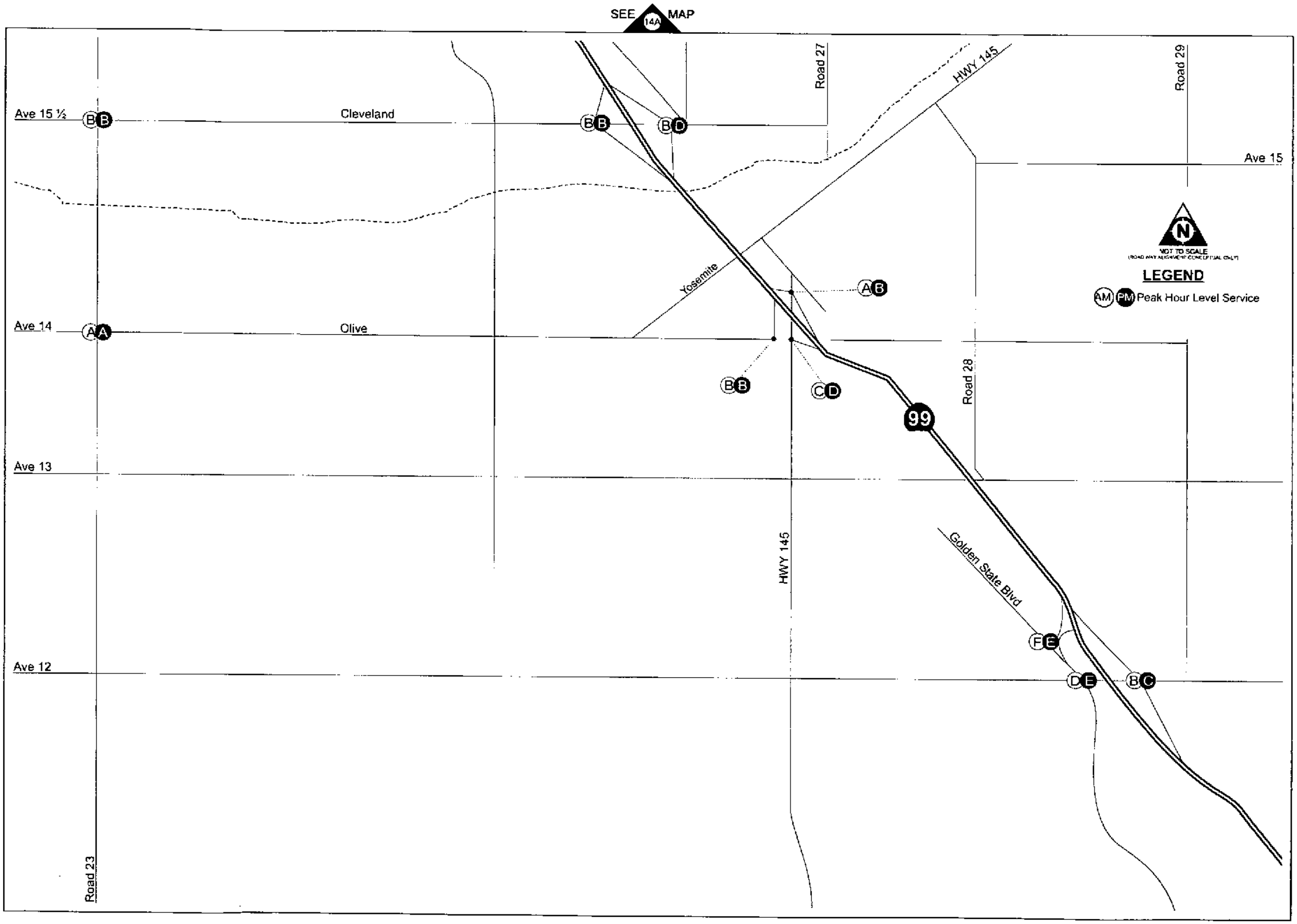
LEVELS OF SERVICE

2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 14

04-837.2



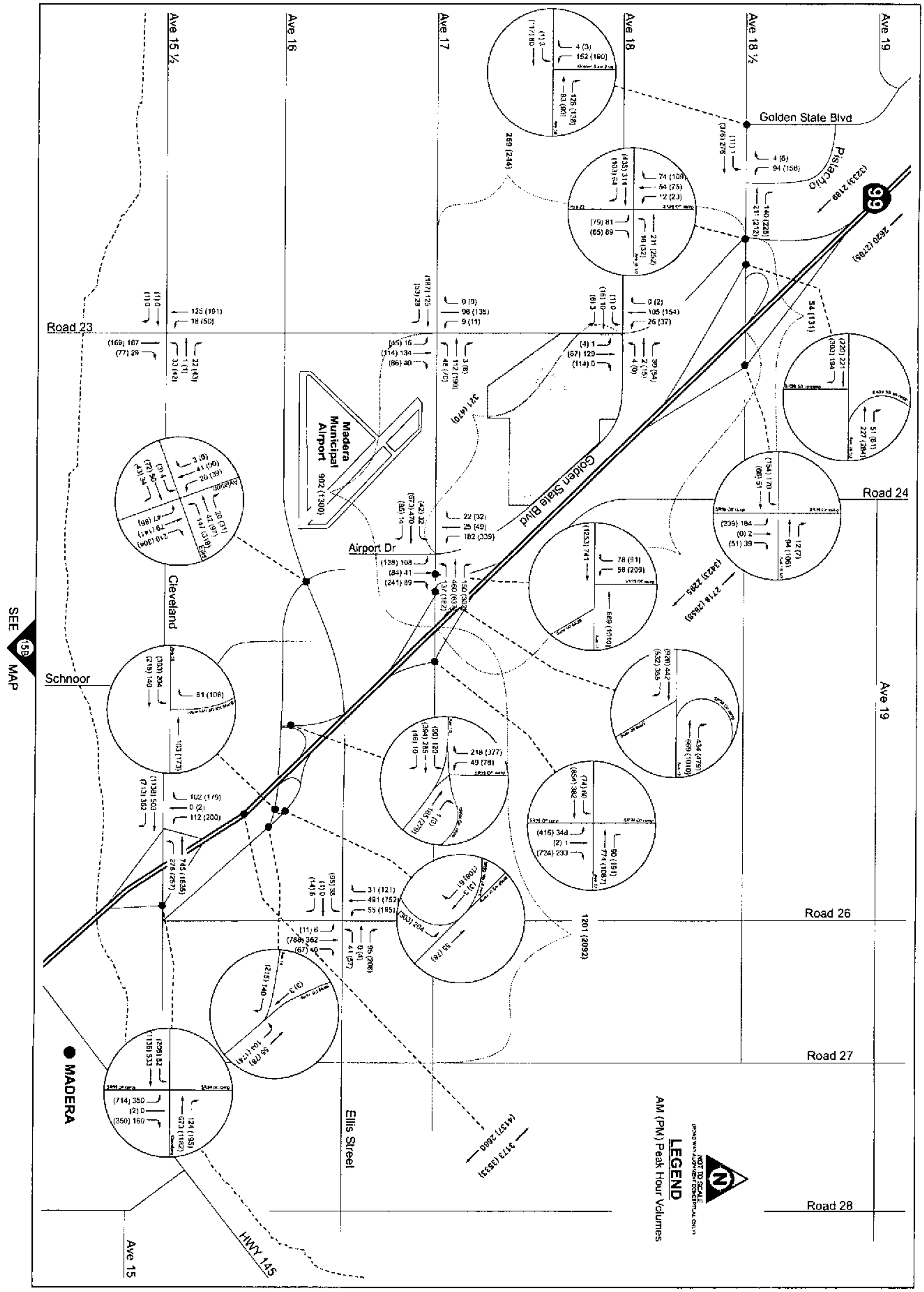
LEVELS OF SERVICE

2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

04-837.2

Figure 14



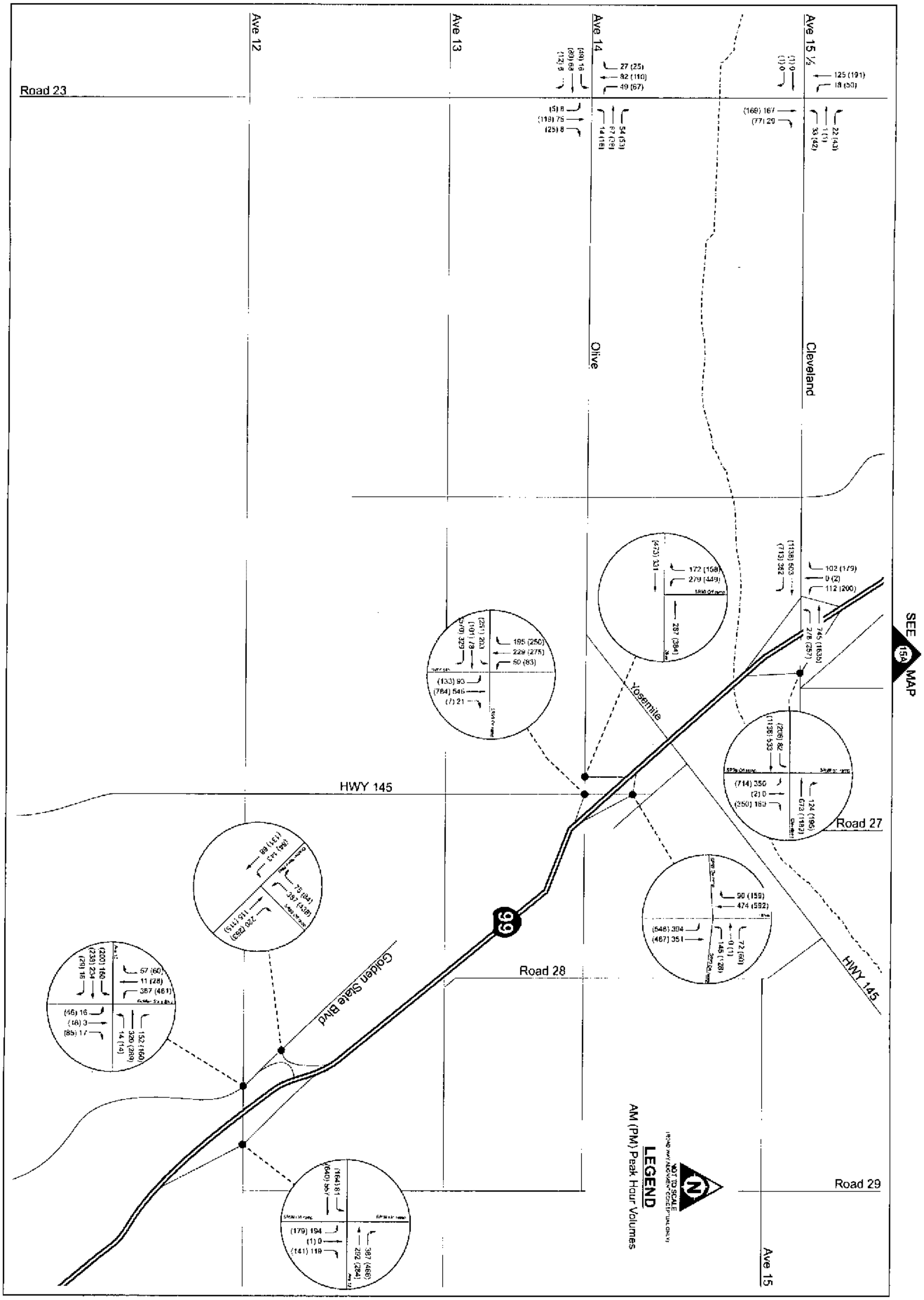
PEAK HOUR TRAFFIC VOLUMES

2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 15

04-83.1.2



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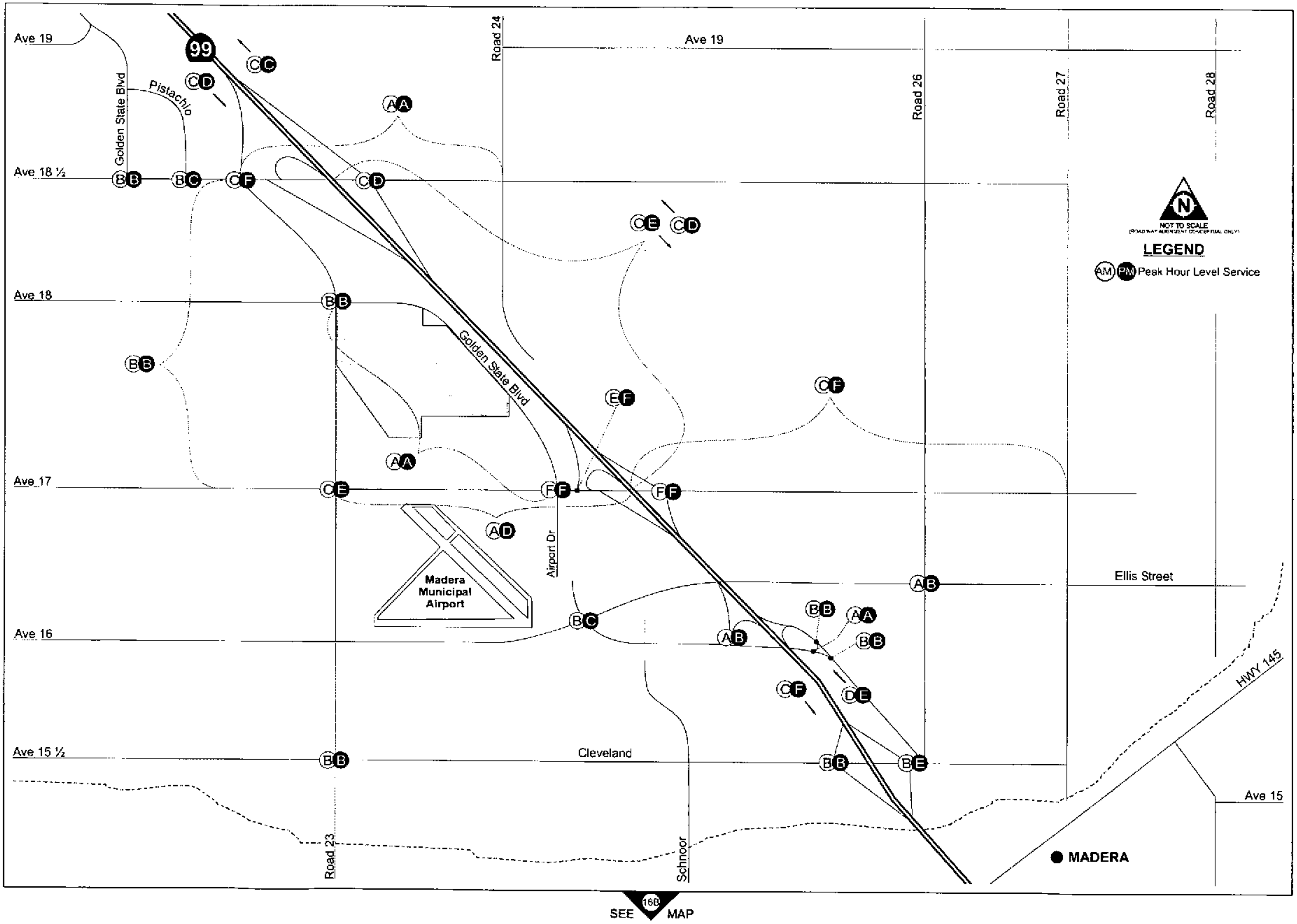
PEAK HOUR TRAFFIC VOLUMES
2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 15

04-837.2



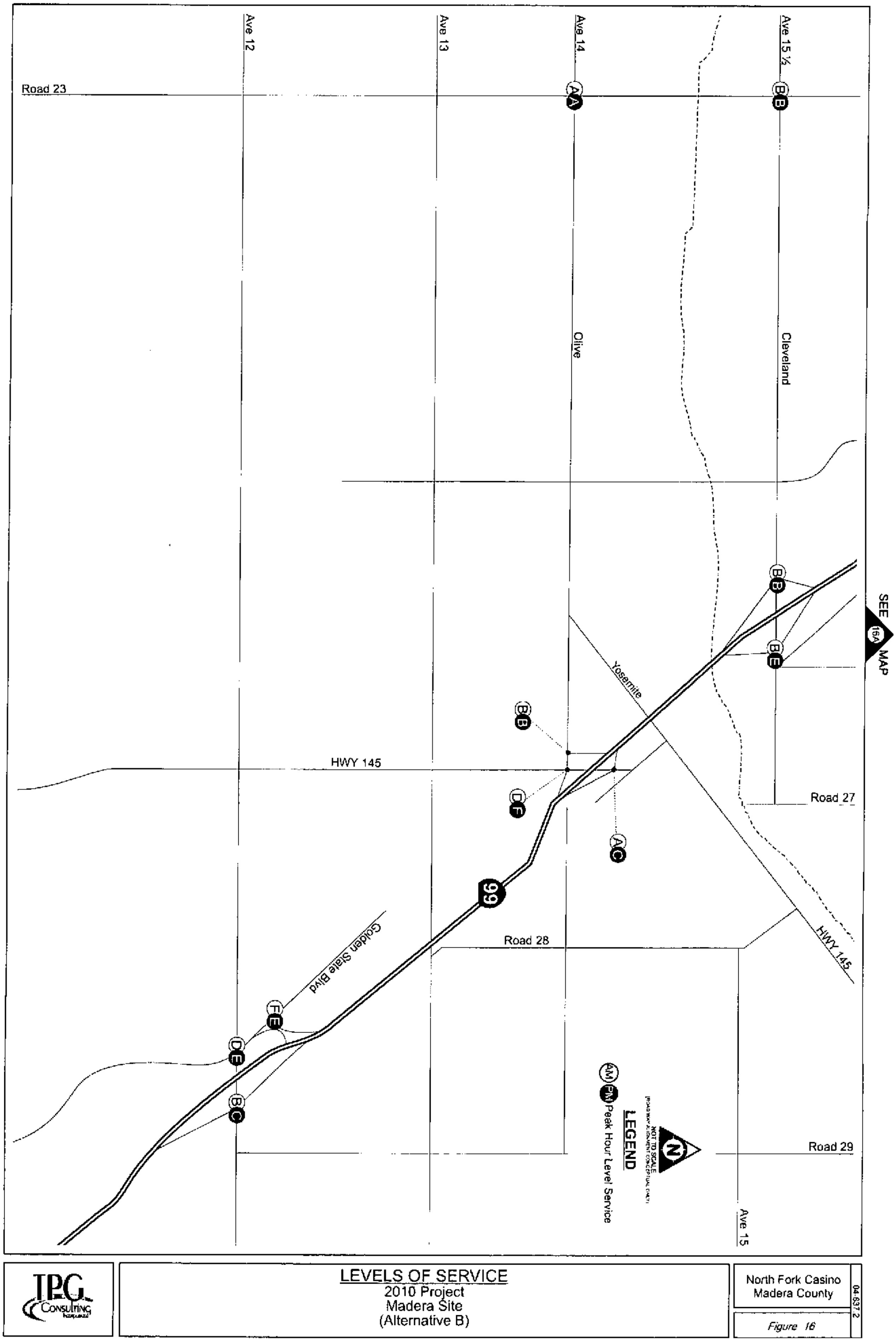
LEVELS OF SERVICE

2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 16

04-837.2

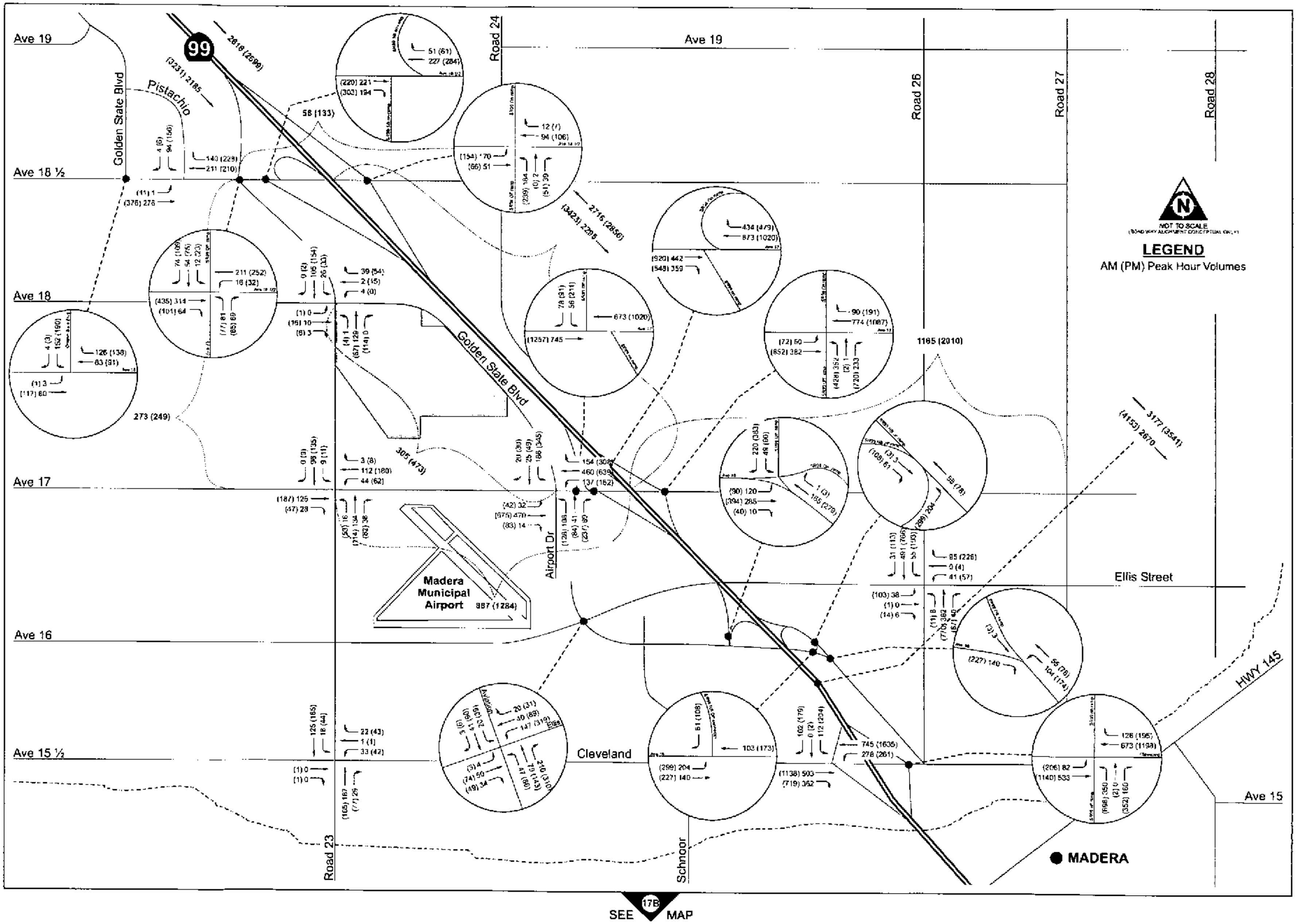


LEVELS OF SERVICE
2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 16

04.637.2



SEE 17B MAP

PEAK HOUR TRAFFIC VOLUMES

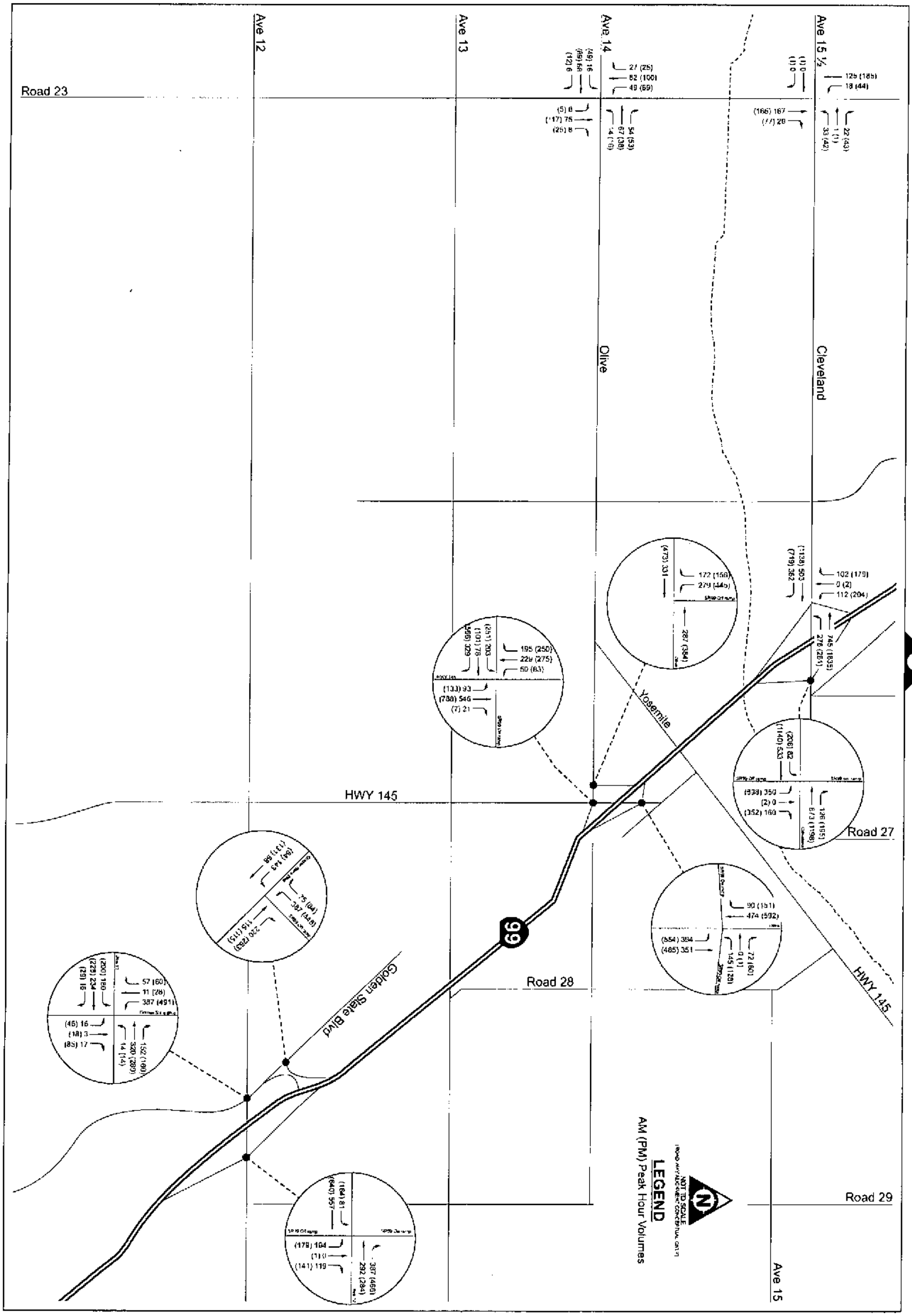
2010 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

04-837.2

Figure 17

TPG Consulting



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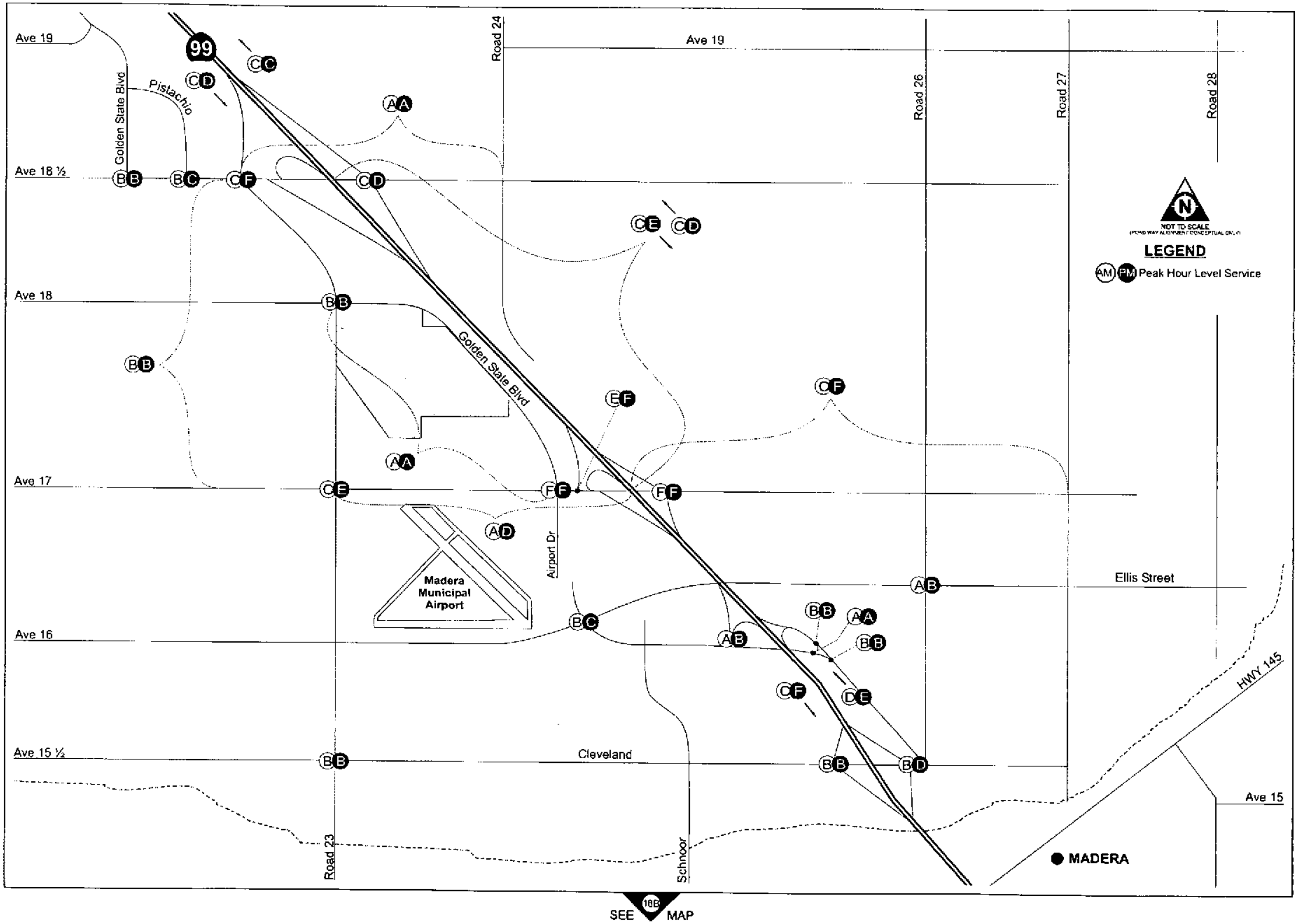
PEAK HOUR TRAFFIC VOLUMES

2010 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 17

04-837.2



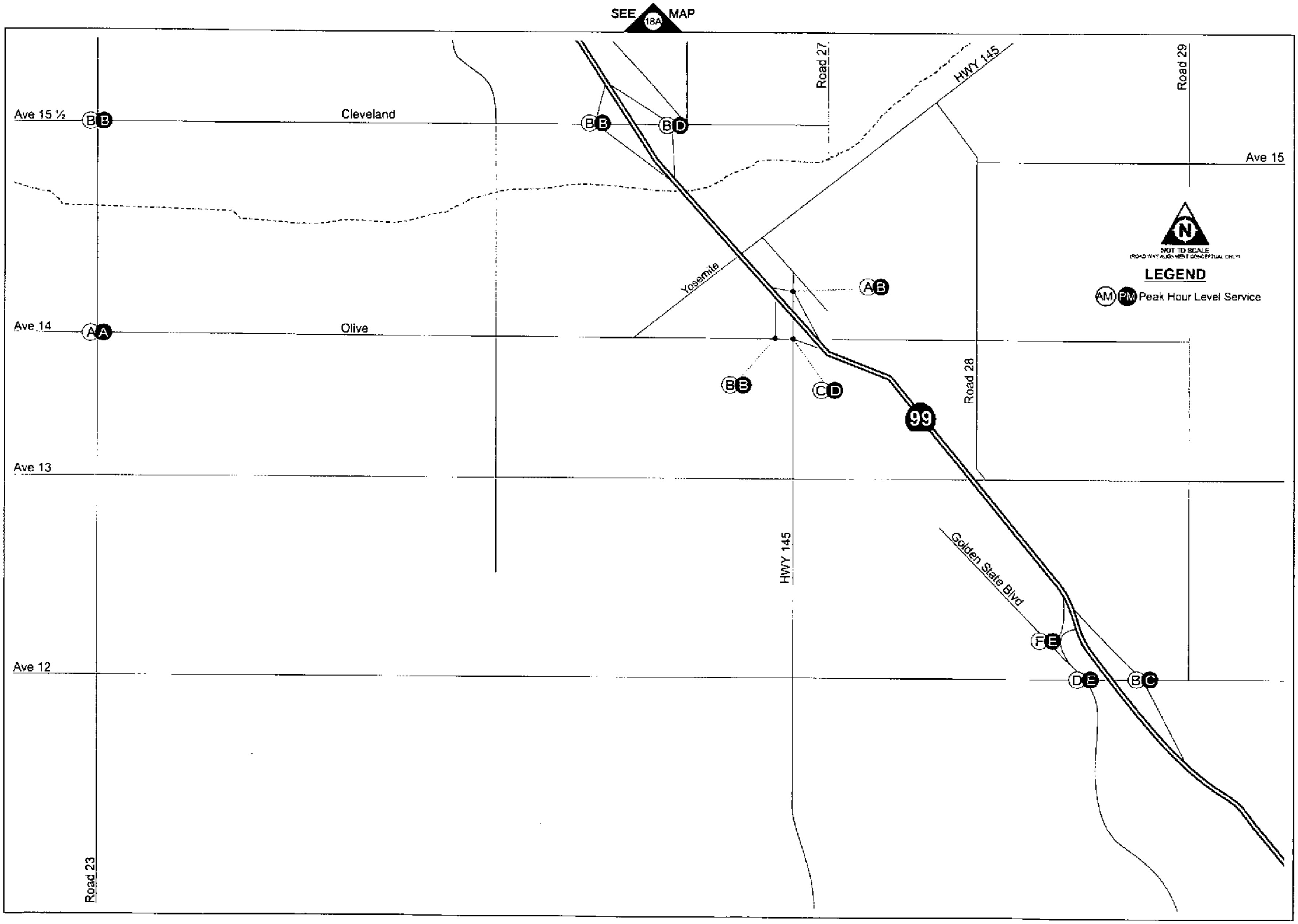
LEVELS OF SERVICE
2010 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 18

04-637.2

IPG Consulting



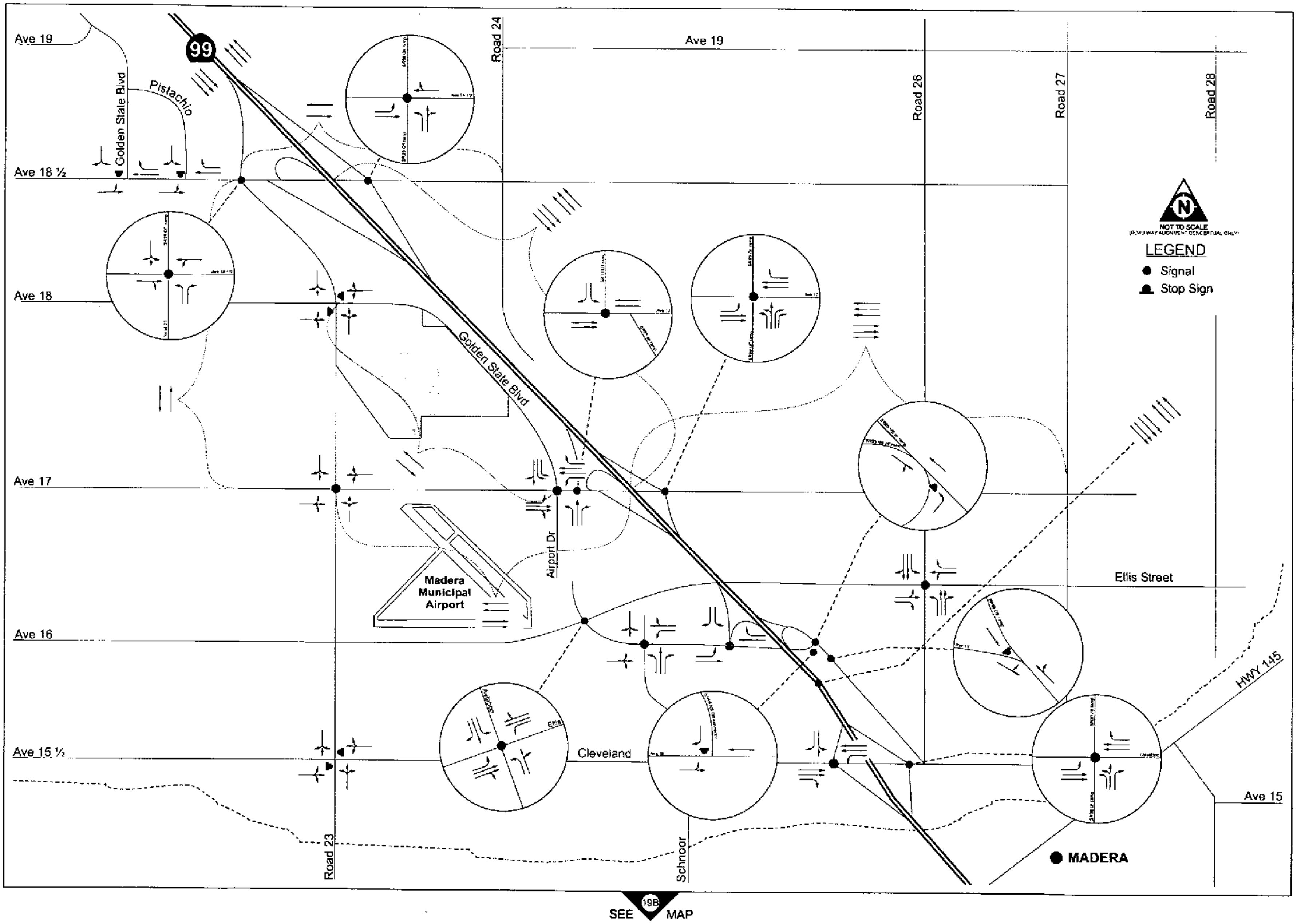
North Fork Casino
Madera County

04-837.2

Figure 18

LEVELS OF SERVICE
2010 Project
Madera Site
(Alternative C)

TPG CONSULTING



LANE CONFIGURATION AND INTERSECTION CONTROL

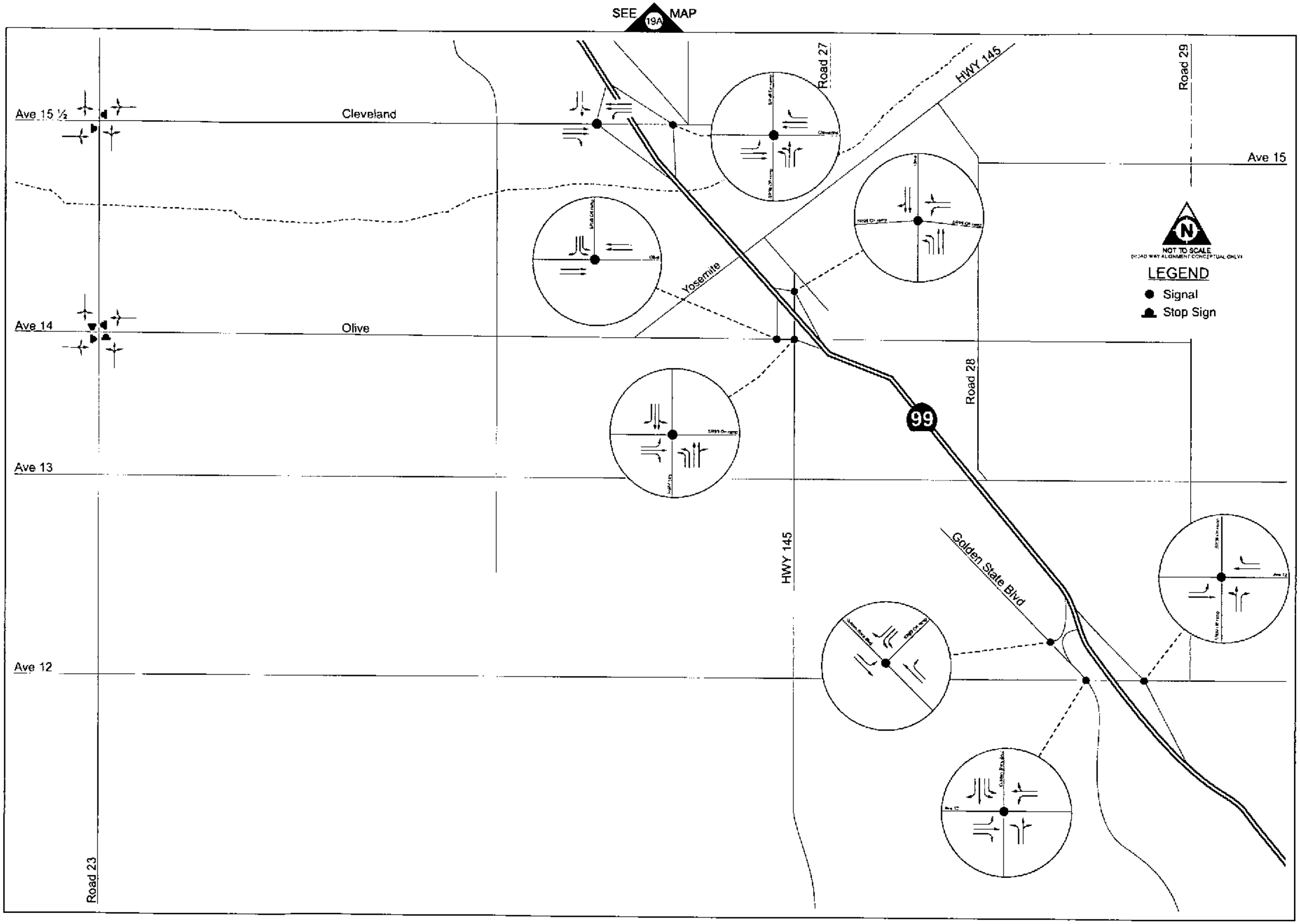
Mitigated 2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 19

04-837.2

IPG Consulting



LANE CONFIGURATION AND INTERSECTION CONTROL

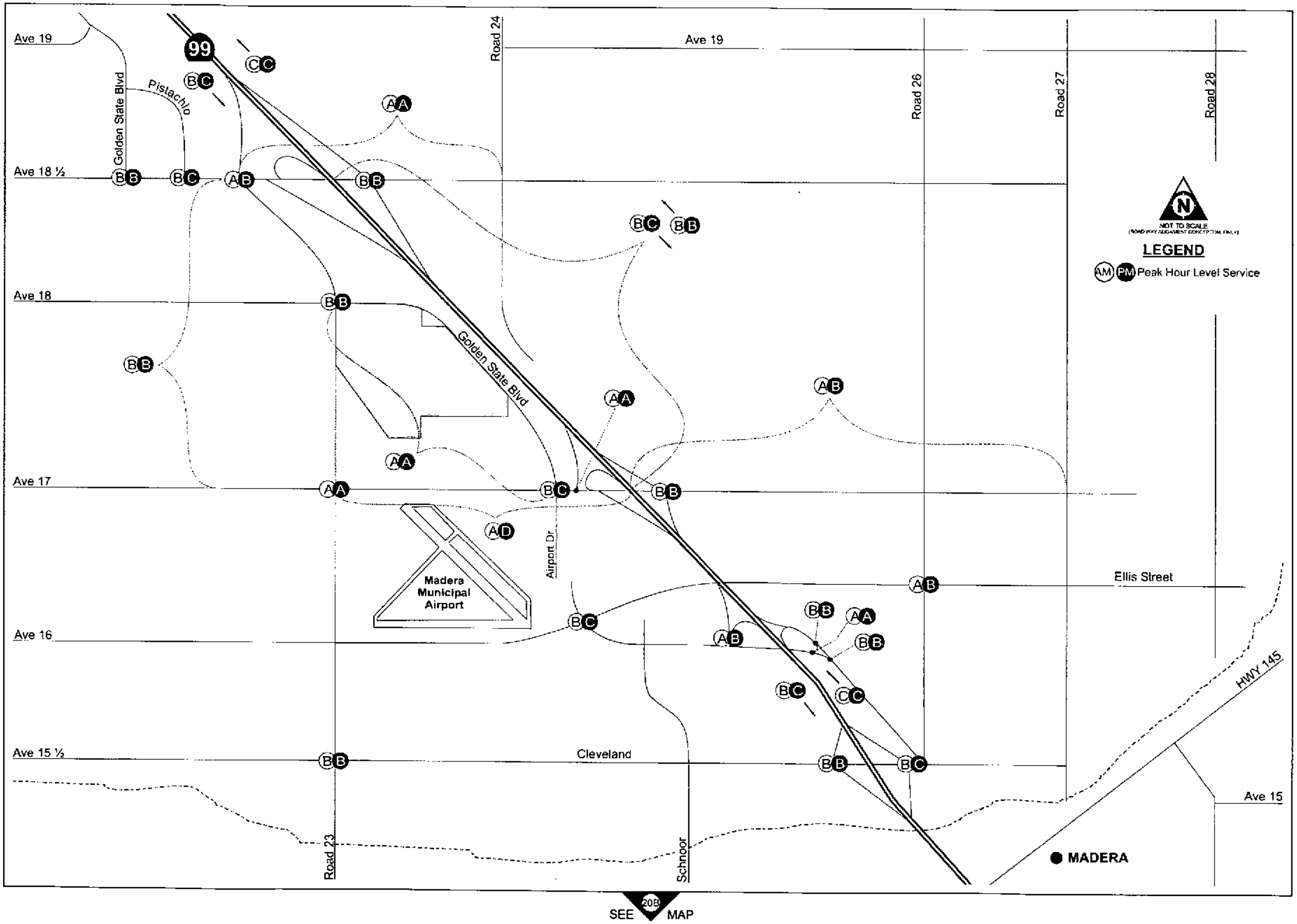
Mitigated 2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 19

04-837.2

IPG Consulting



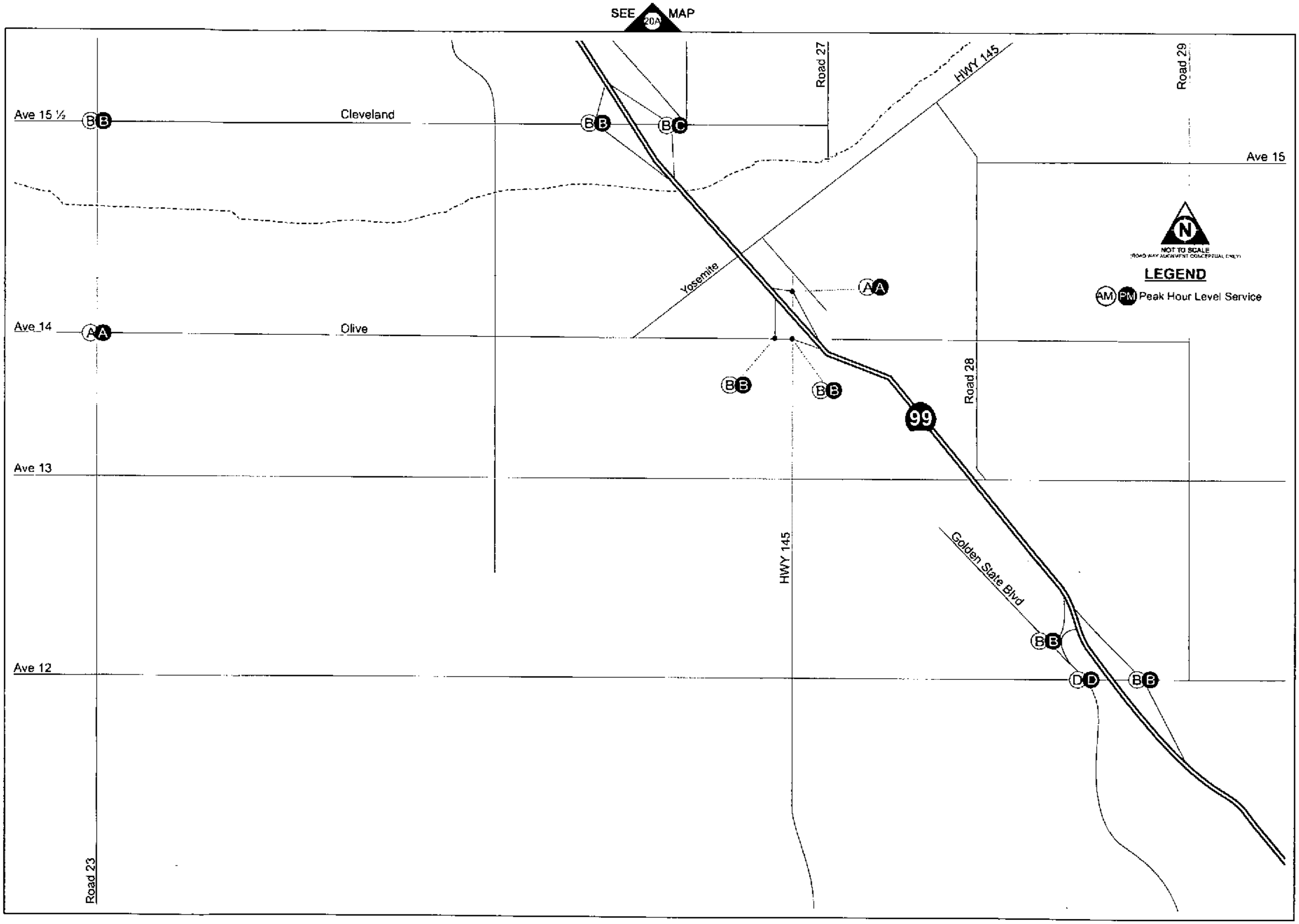
LEVELS OF SERVICE

Mitigated 2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 20

04-837.2



North Fork Casino
Madera County

04-837.2

Figure 20

LEVELS OF SERVICE
Mitigated 2010 Project
Madera Site
(Alternative A)

TPG Consulting Incorporated

Alternative B (Reduced Intensity Alternative)

Figures 21 and 22 show the Mitigated Opening Day (2010) Project Alternative B lane configurations and intersection control, and resulting Mitigated Opening Day (2010) Project Alternative B levels of service for the Madera Site. The TWSC levels of service shown on Figure 22 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 22 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized and AWSC level of service or delay shown on Figure 22. The signalized intersection levels of service or delay shown in Figure 22 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

Alternative C (Commercial Land Use Alternative)

Figures 23 and 24 show the Mitigated Opening Day (2010) Project Alternative C lane configurations and intersection control, and resulting Mitigated Opening Day (2010) Project Alternative C levels of service for the Madera Site. The TWSC levels of service shown on Figure 24 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 24 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized and AWSC level of service or delay shown on Figure 24. The signalized intersection levels of service or delay shown in Figure 24 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

2030 No Project Conditions

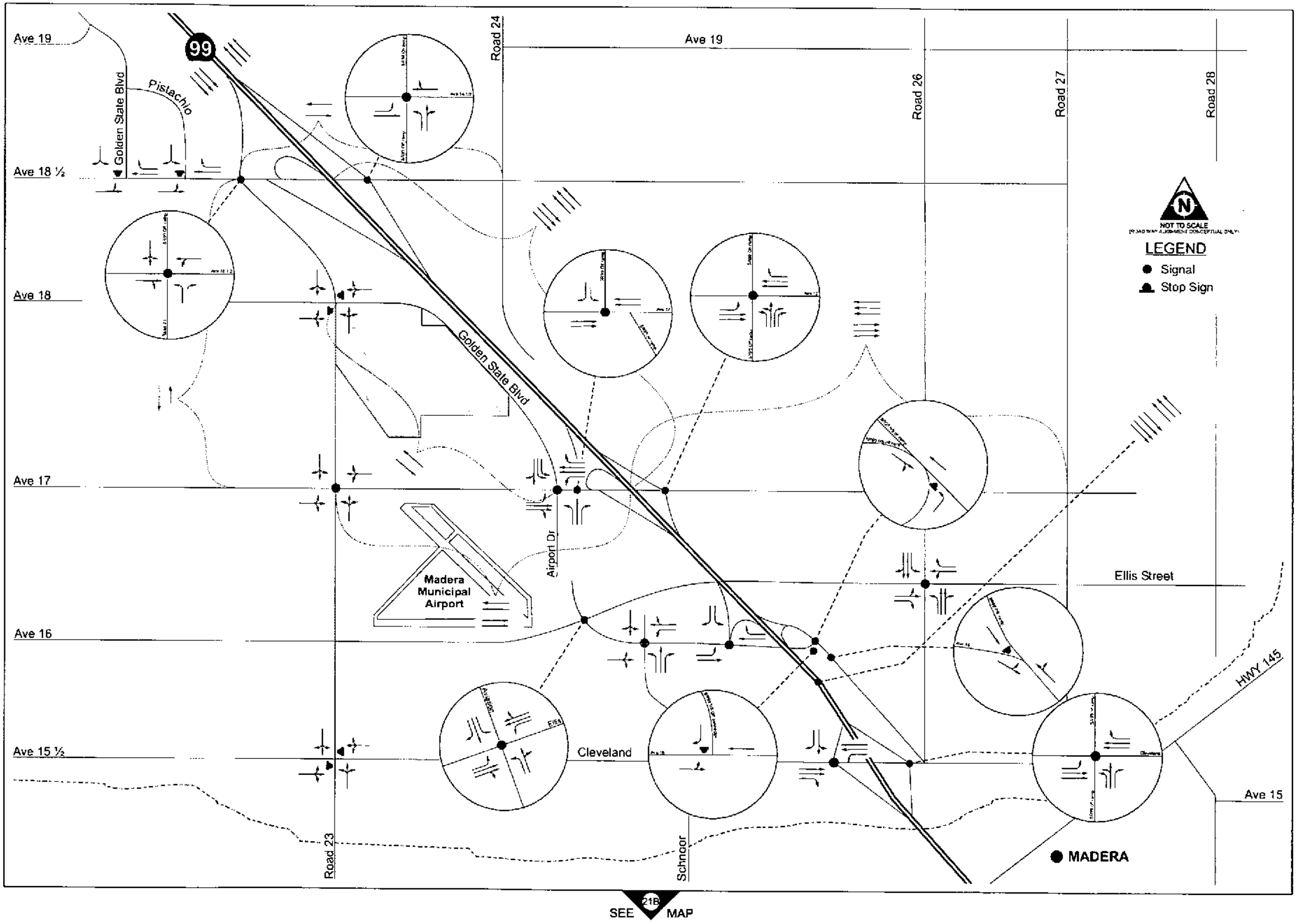
Alternative E (No Project Alternative)

Figures 25, 26, and 27 show the 2030 No Project Alternative E lane configurations and intersection control, AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting 2030 No Project Alternative E levels of service for the Madera Site. The TWSC levels of service shown on Figure 27 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 27 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 27. The signalized intersection levels of service or delay shown in Figure 27 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

2030 Project Conditions

Alternative A (Proposed Project Alternative)

Figures 28, 29, and 30 show the 2030 Project Alternative A lane configurations and intersection control, Alternative A AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting 2030 Project Alternative A levels of service for the Madera Site. The TWSC levels of service shown on Figure 30 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 30 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 30. The signalized intersection levels of service or delay shown in Figure 30 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.



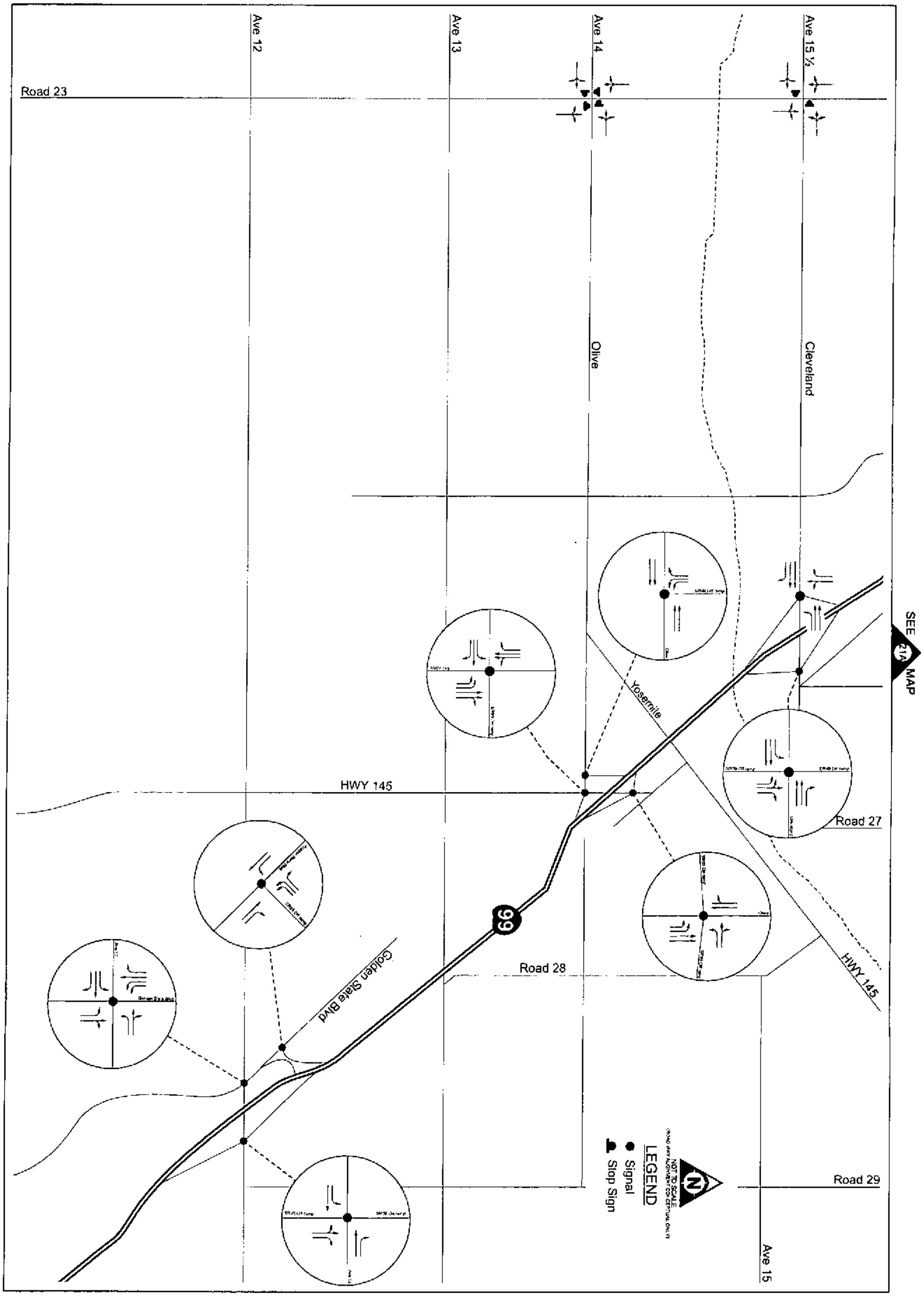
LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2008 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 21

04-837.2



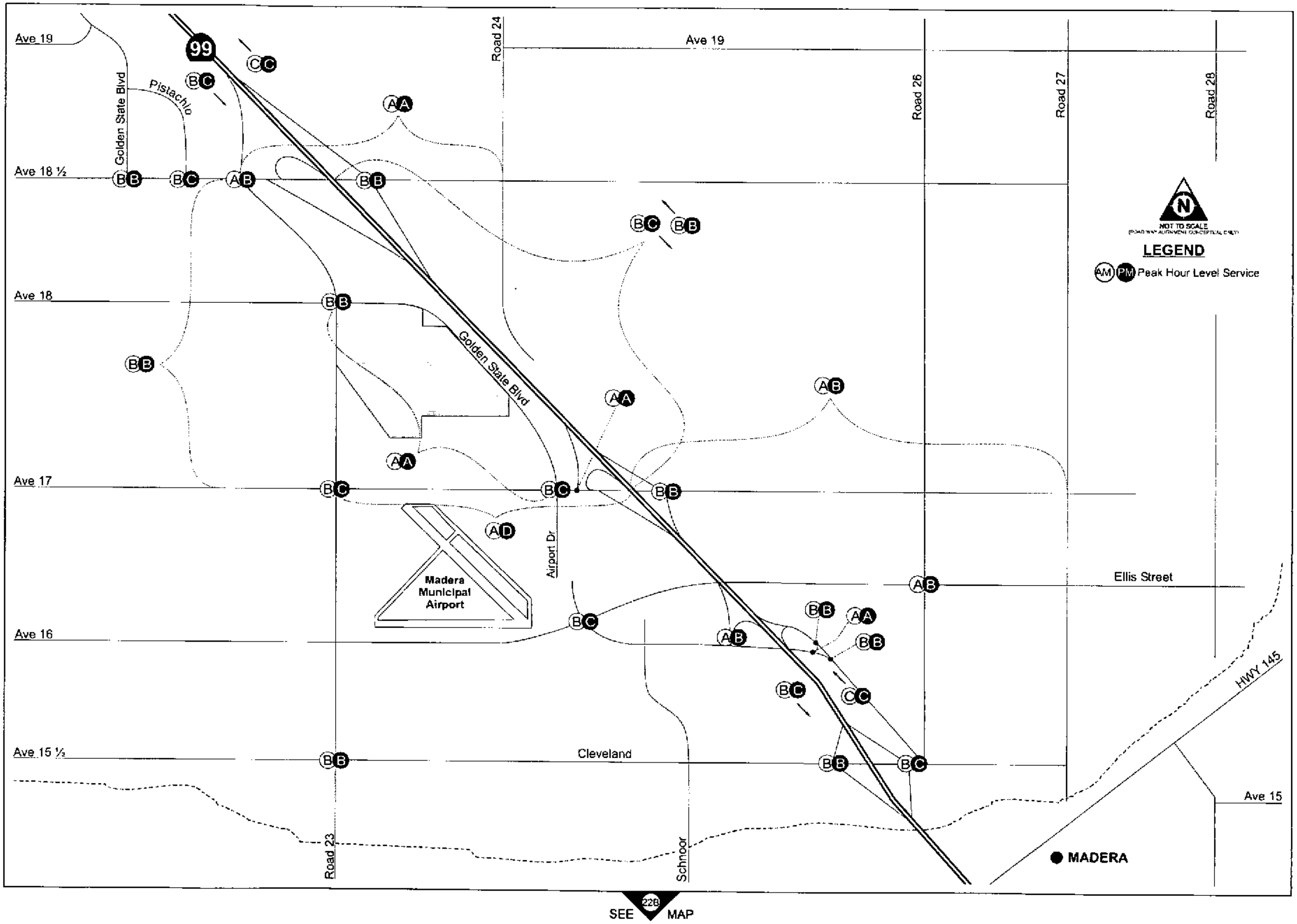
LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2008 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 21

04-837.2

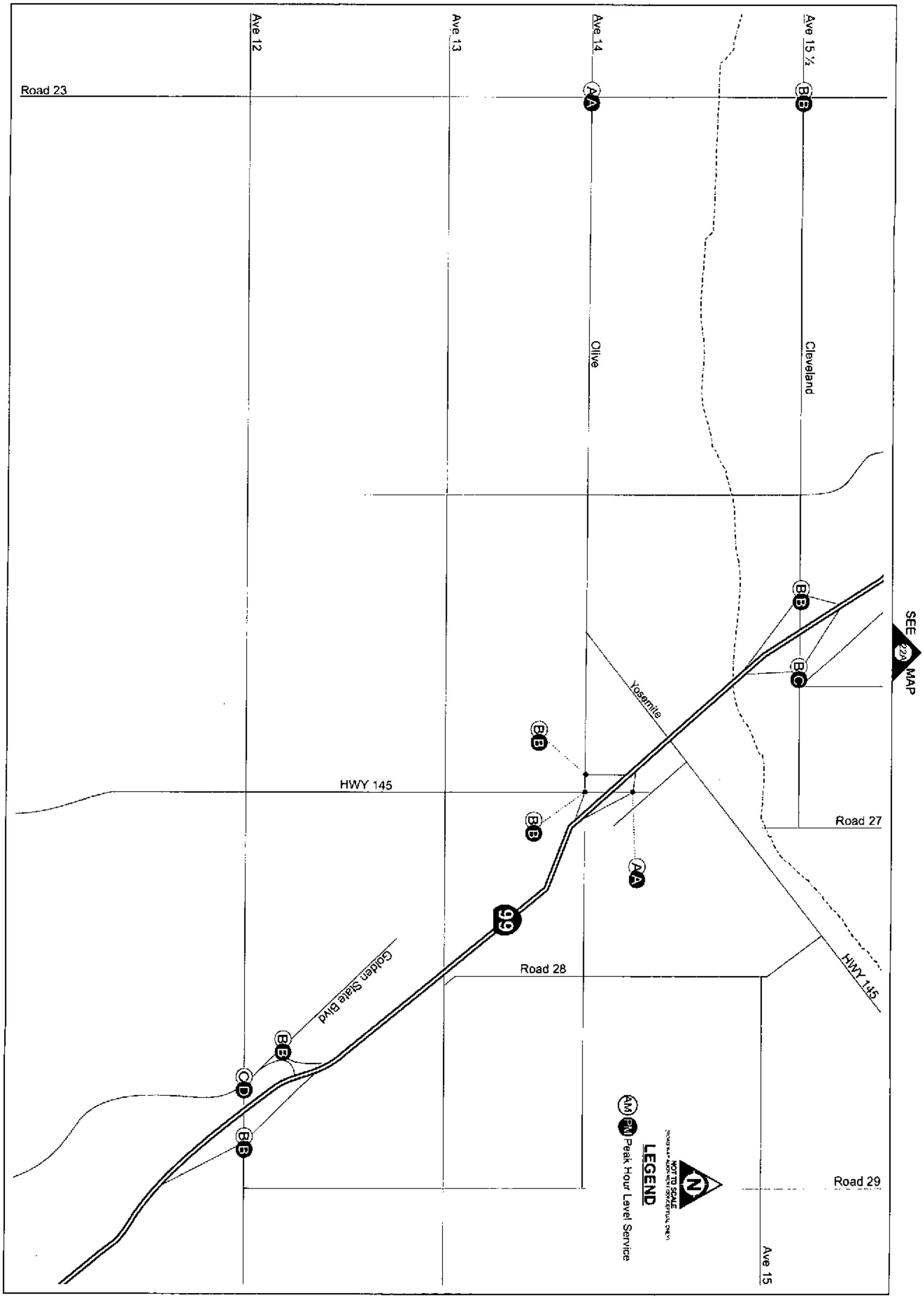


LEVELS OF SERVICE
Mitigated 2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 22

04-837.2



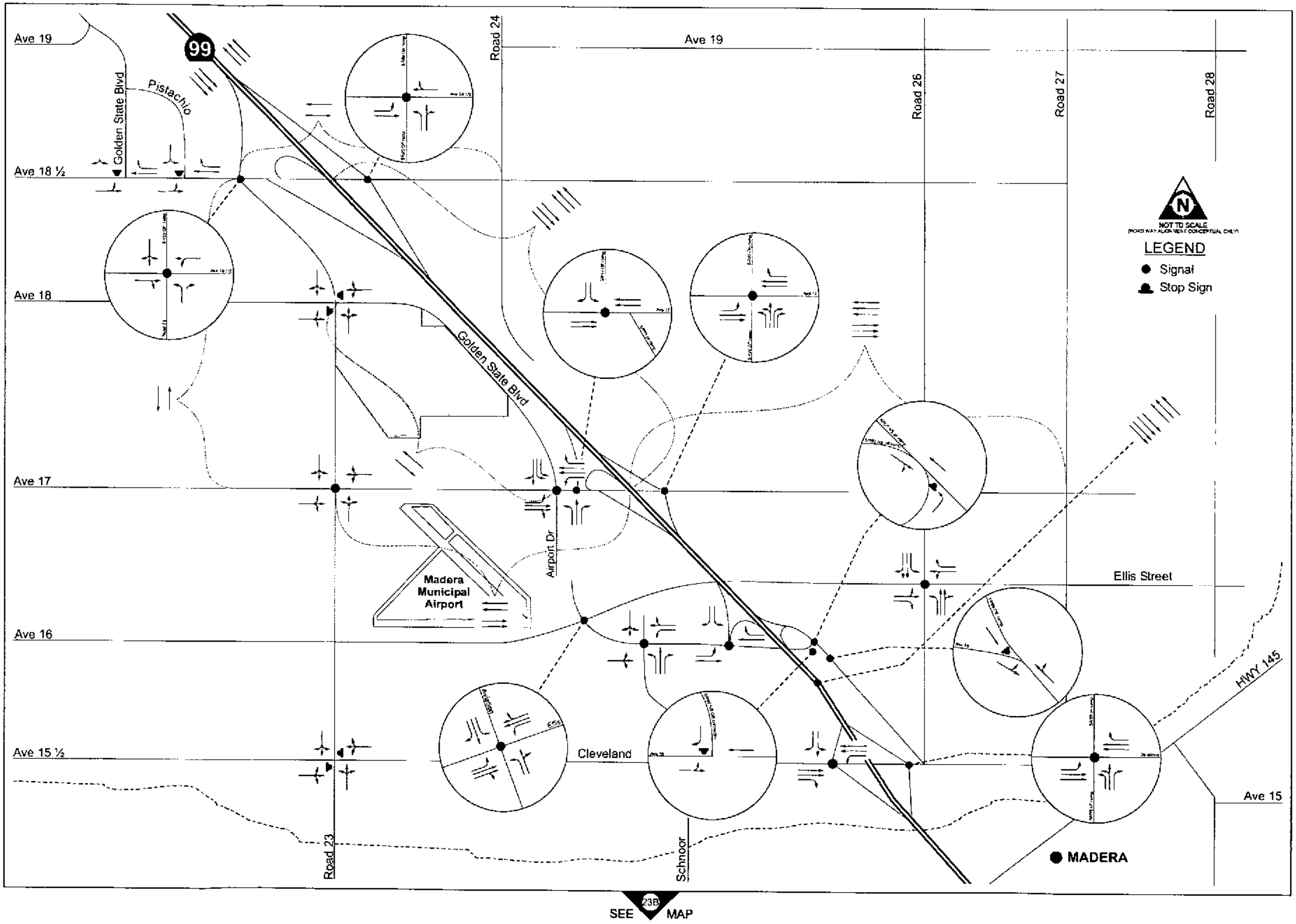
LEVELS OF SERVICE

Mitigated 2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

04-837.2

Figure 22



LANE CONFIGURATION AND INTERSECTION CONTROL

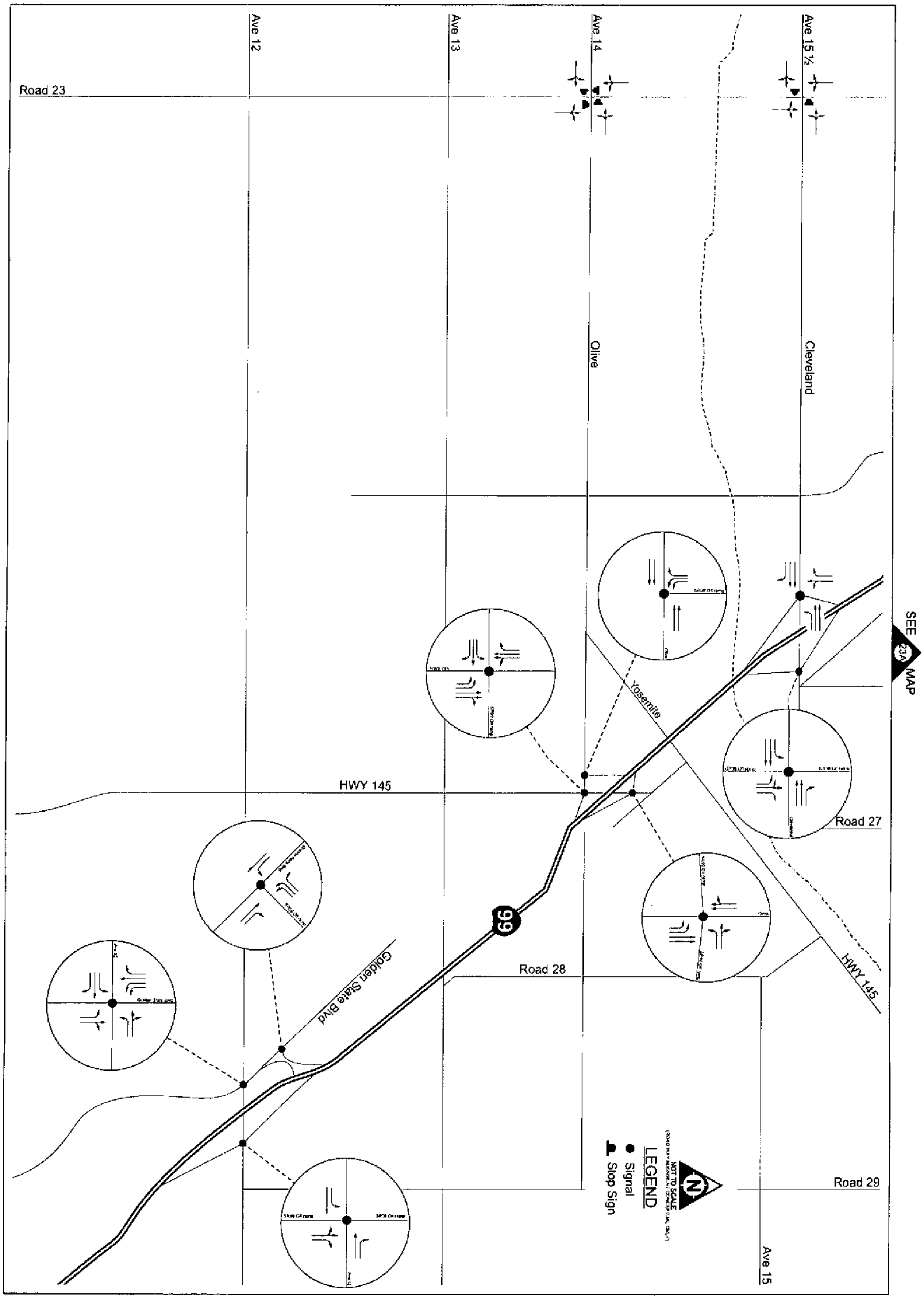
Mitigated 2008 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 23

04-837.2

TPG Consulting



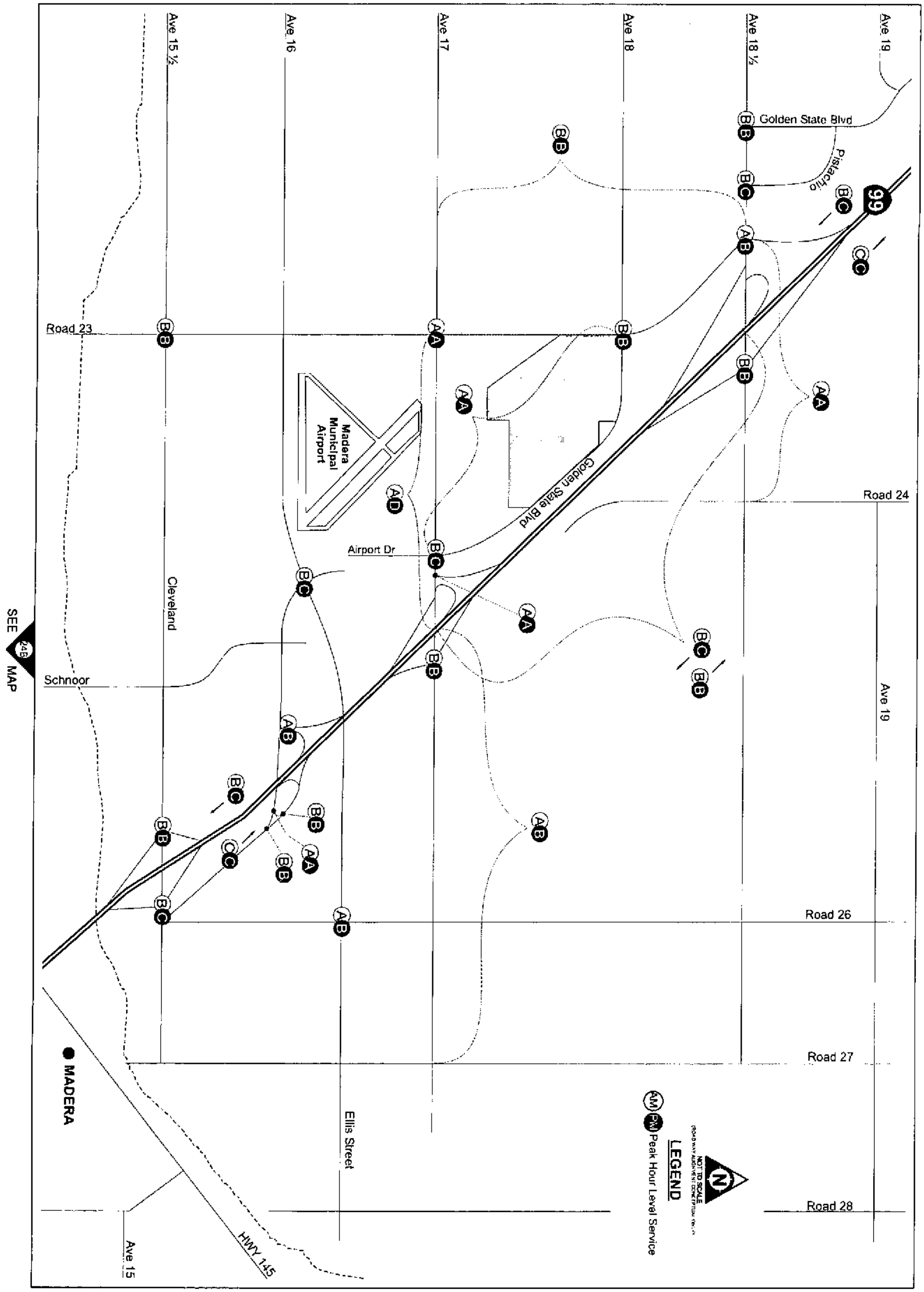
LANE CONFIGURATION AND INTERSECTION CONTROL
Mitigated 2008 Project
Madera Site
(Alternative C)

IPG Consulting

North Fork Casino
Madera County

04-837.2

Figure 23



Ave 15 ½
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Ave 17
Ave 18
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Golden State Blvd
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Road 23
Road 24
Road 26
Road 27
Road 28
Madera Municipal Airport
Golden State Blvd
Airport Dr
Cleveland
Schnoor
SEE 24B MAP
Ave 19
Ellis Street
MADERA
HWY 145
Ave 15
LEGEND
NOT TO SCALE
ROADWAY ALIGNMENT DESCRIPTION ONLY
AM PM Peak Hour Level Service
BB
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AB
BC
CC
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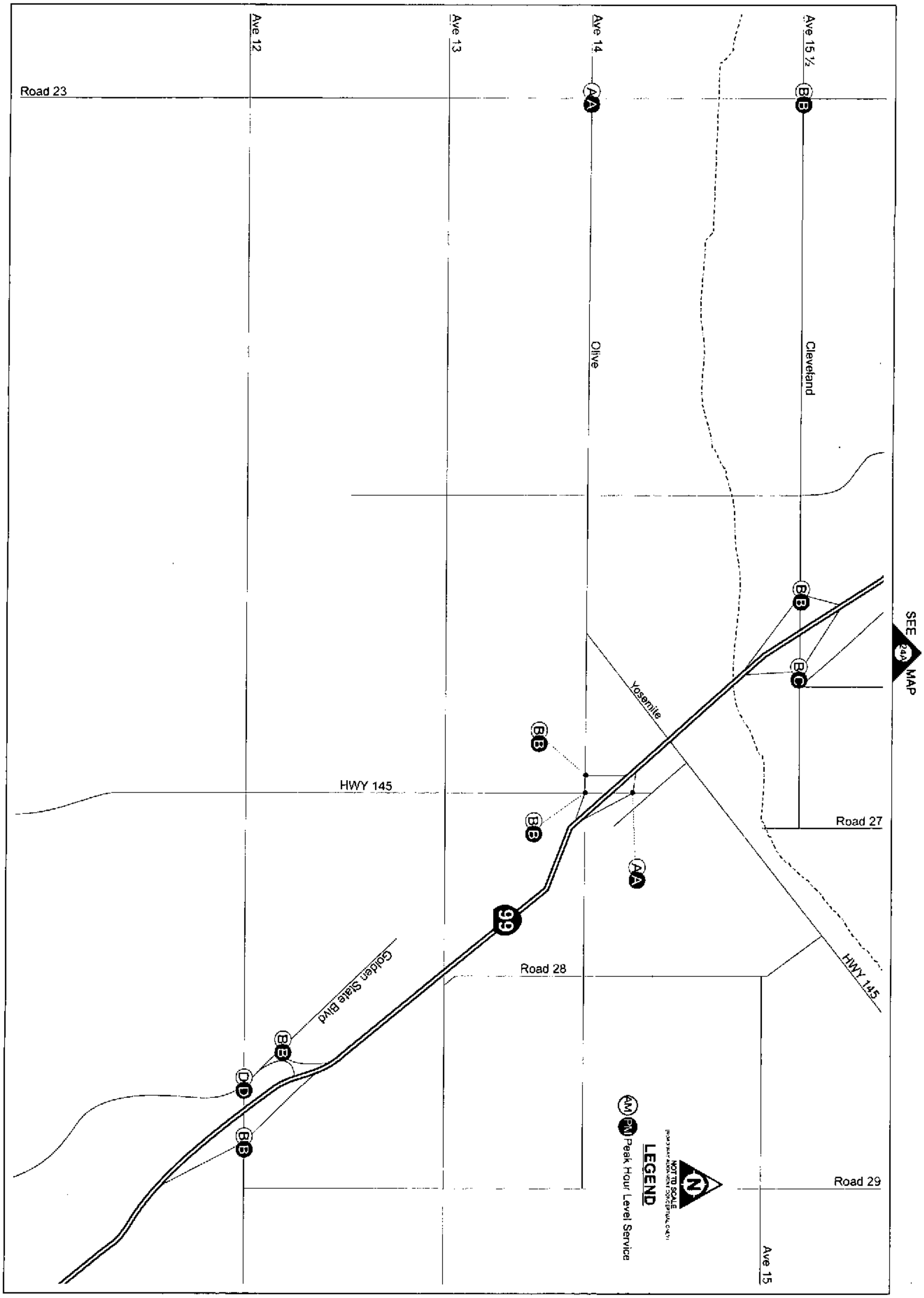

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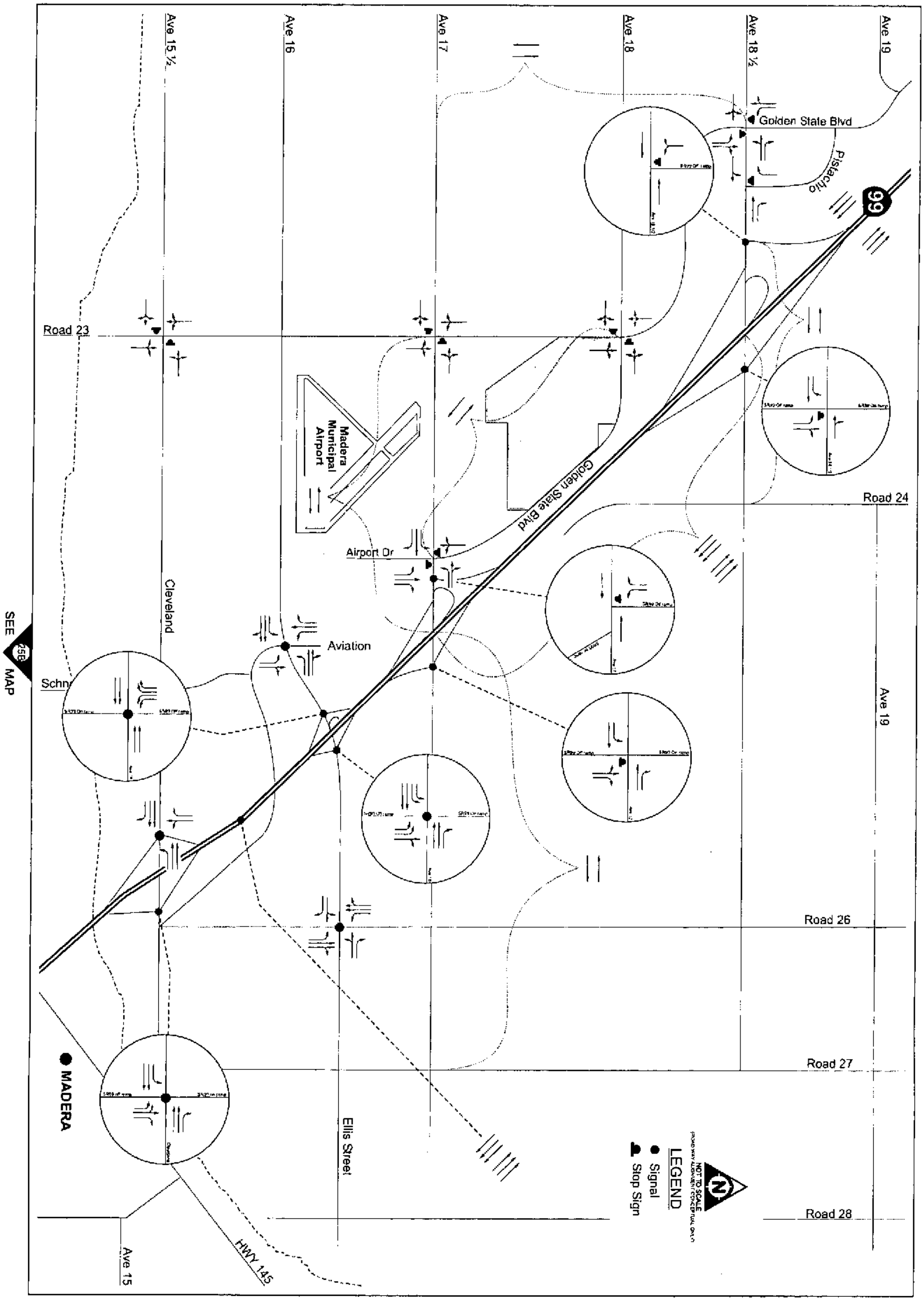
LEVELS OF SERVICE

Mitigated 2010 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 24

04-637.2

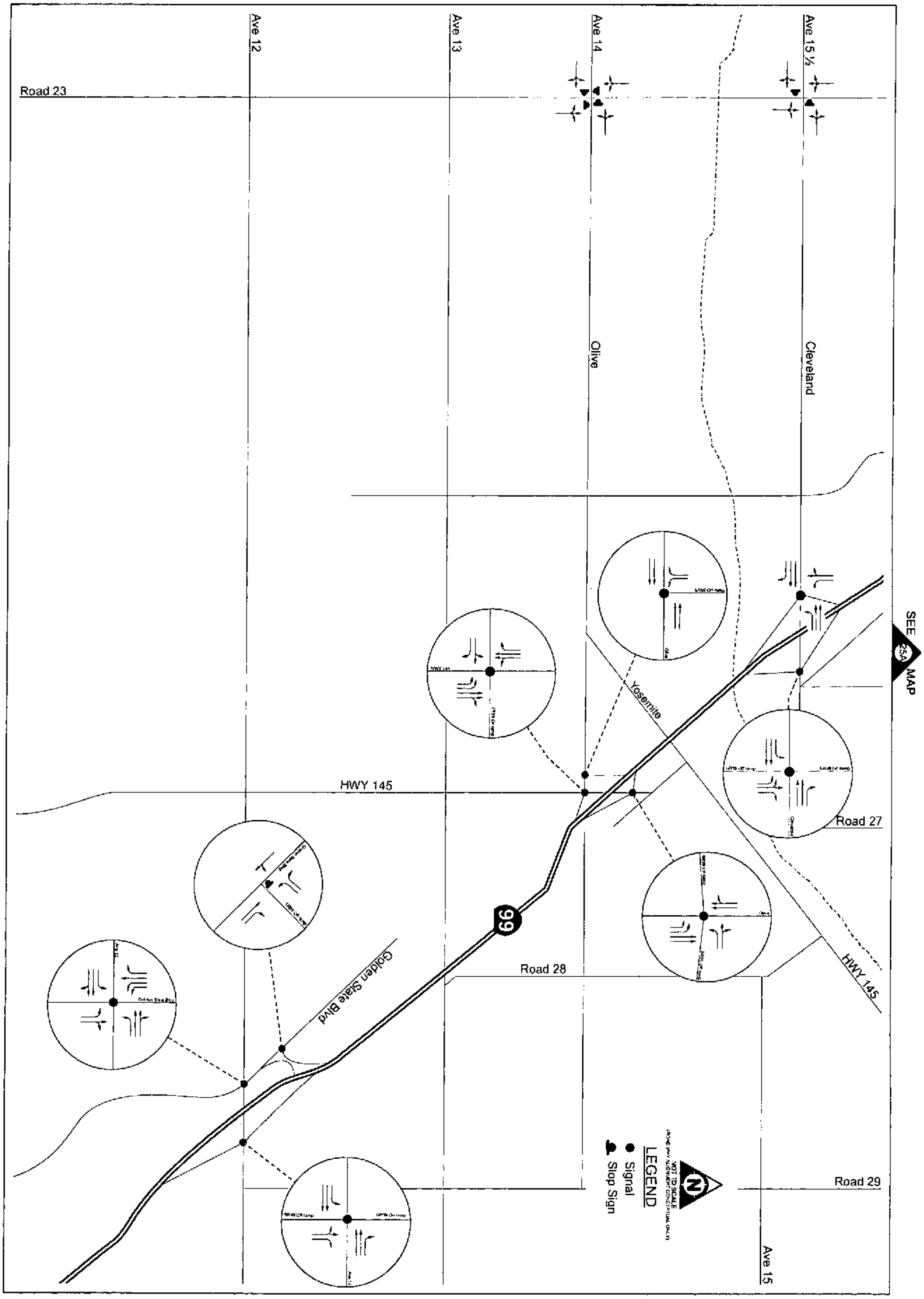


LANE CONFIGURATION AND INTERSECTION CONTROL
2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

04-837.2

Figure 25



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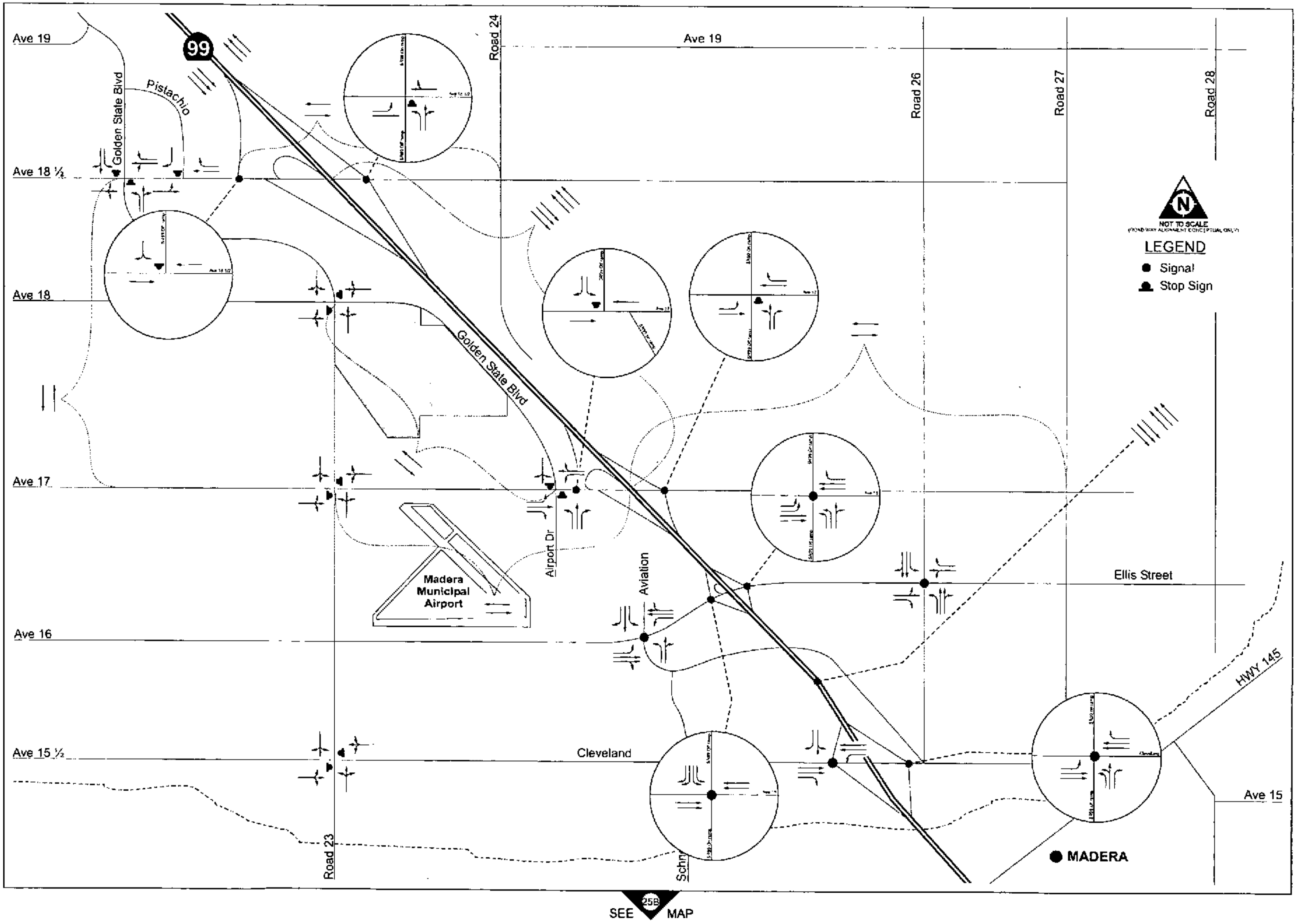
LANE CONFIGURATION AND INTERSECTION CONTROL

2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

04-837.2

Figure 25



LANE CONFIGURATION AND INTERSECTION CONTROL

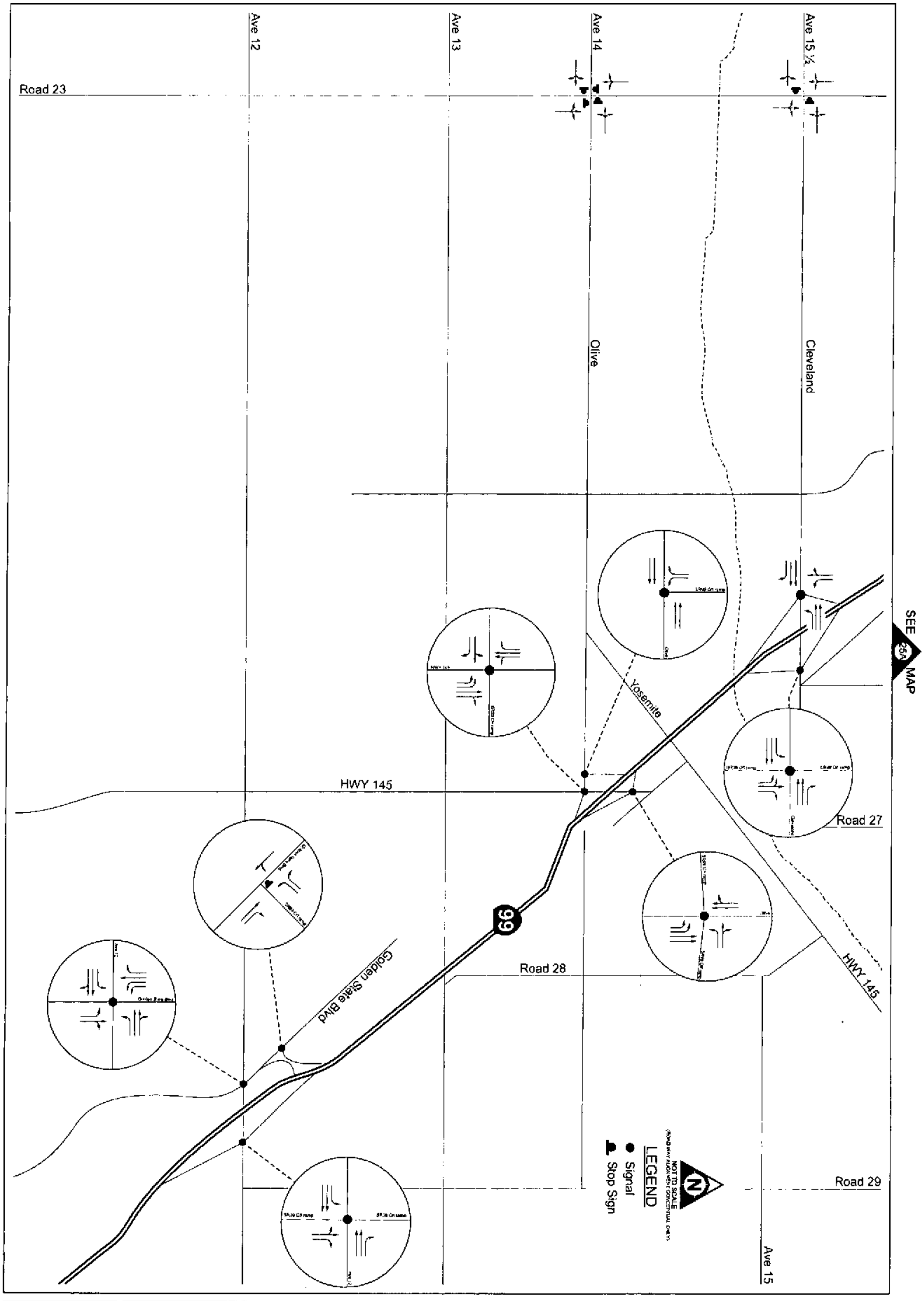
2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

04-837.2

Figure 25

TPG Consulting Incorporated



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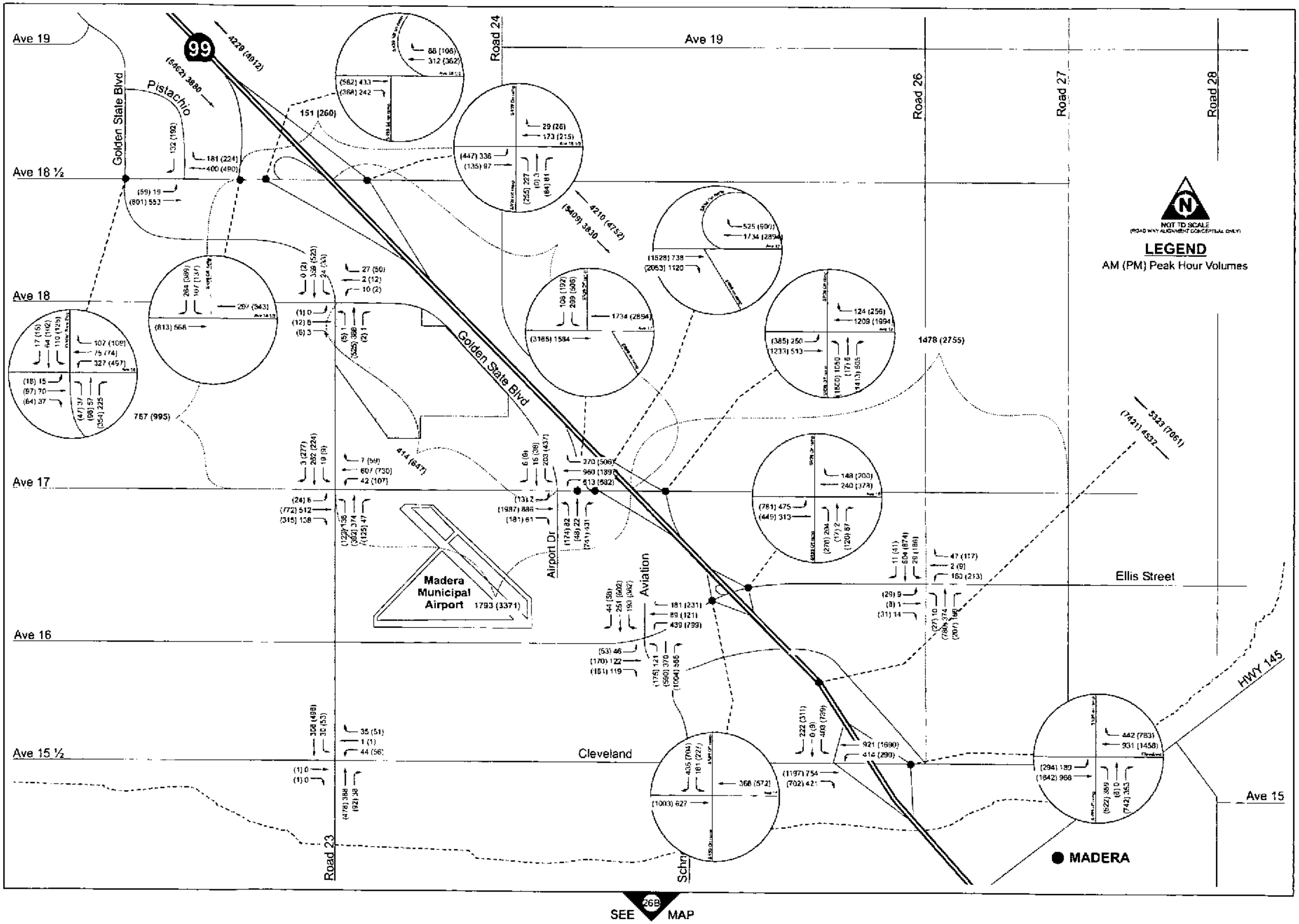
LANE CONFIGURATION AND INTERSECTION CONTROL

2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

04-837.2

Figure 25



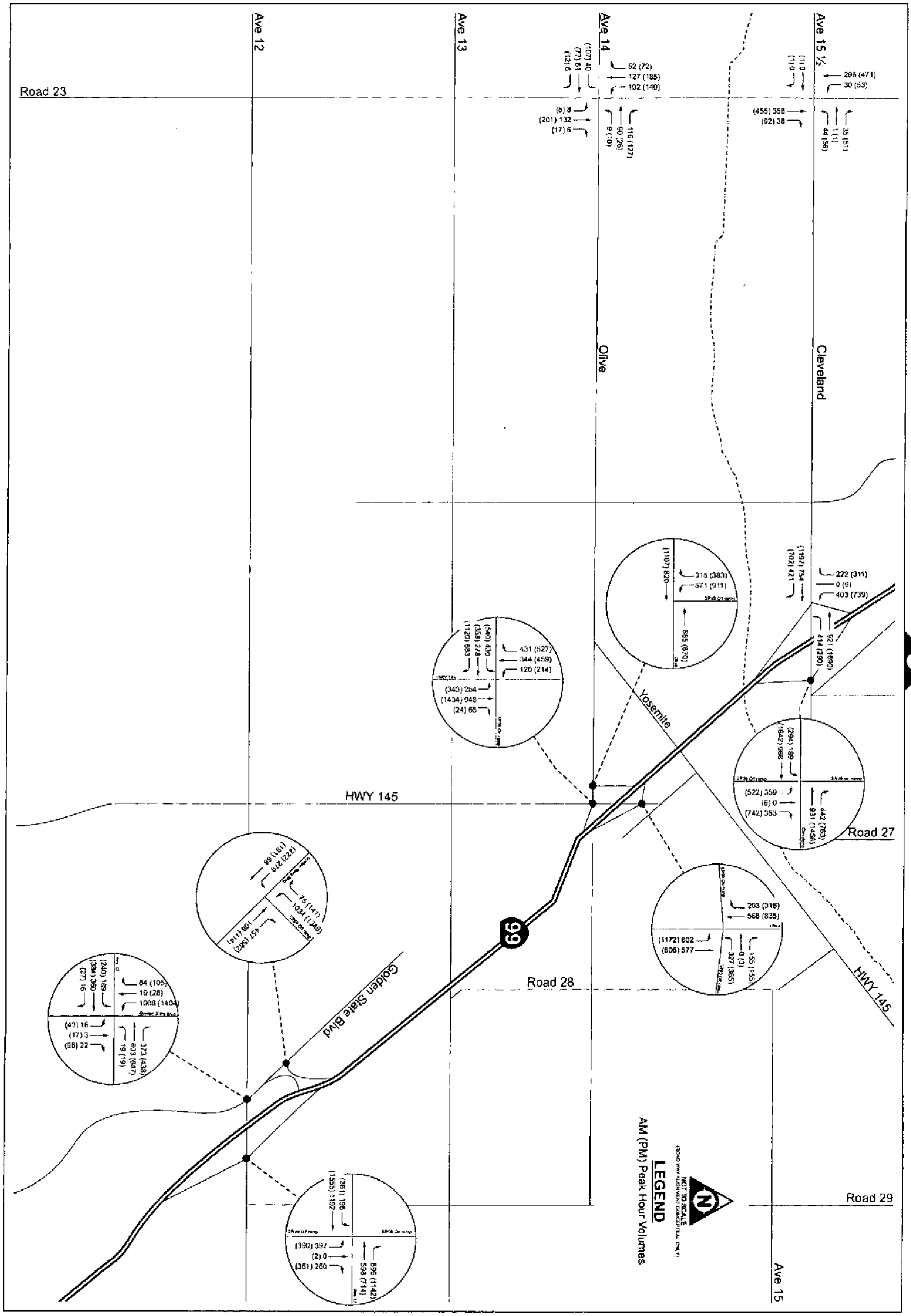
PEAK HOUR TRAFFIC VOLUMES

2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 26

04-637.2

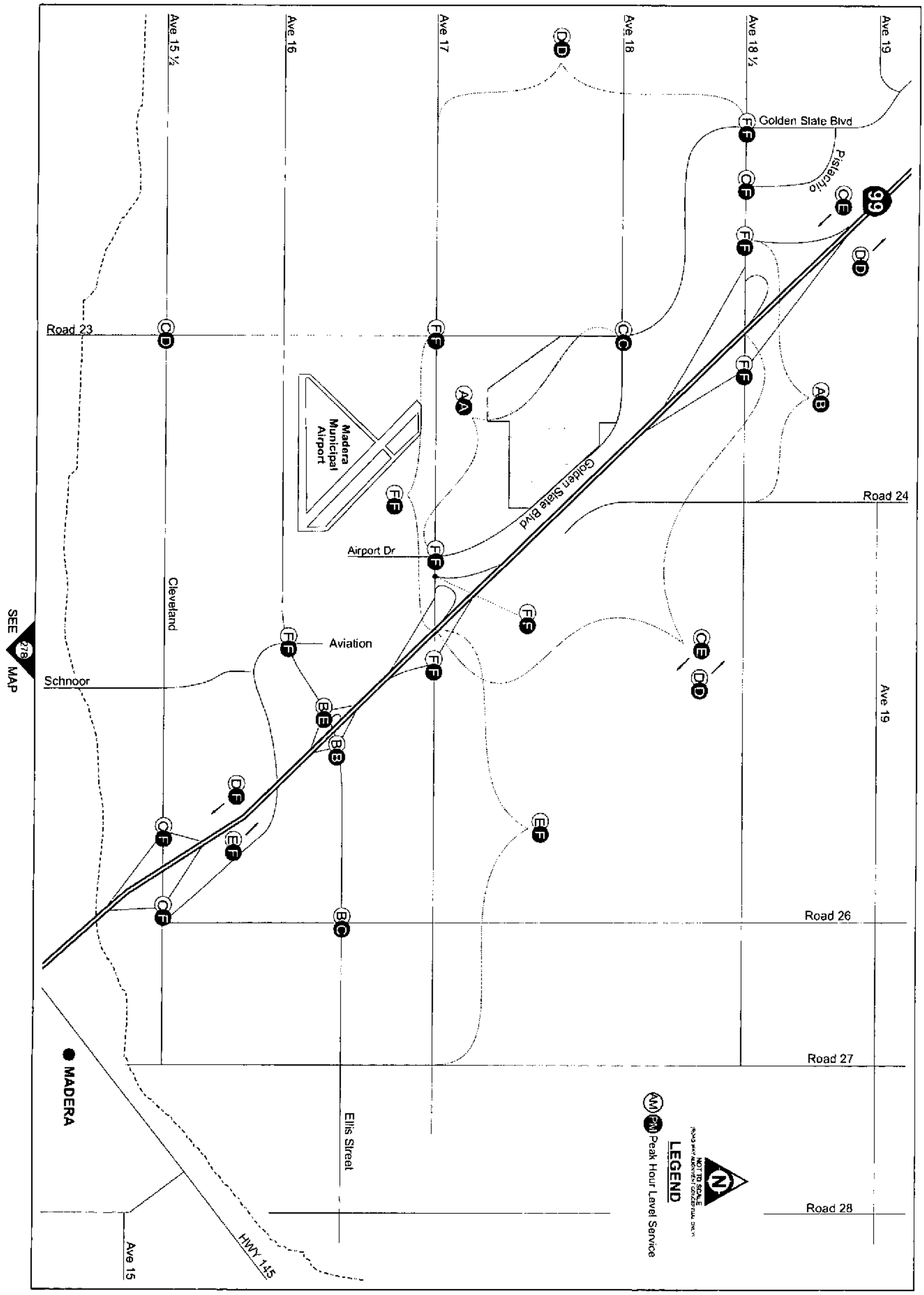


PEAK HOUR TRAFFIC VOLUMES
2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 26

04-837.2



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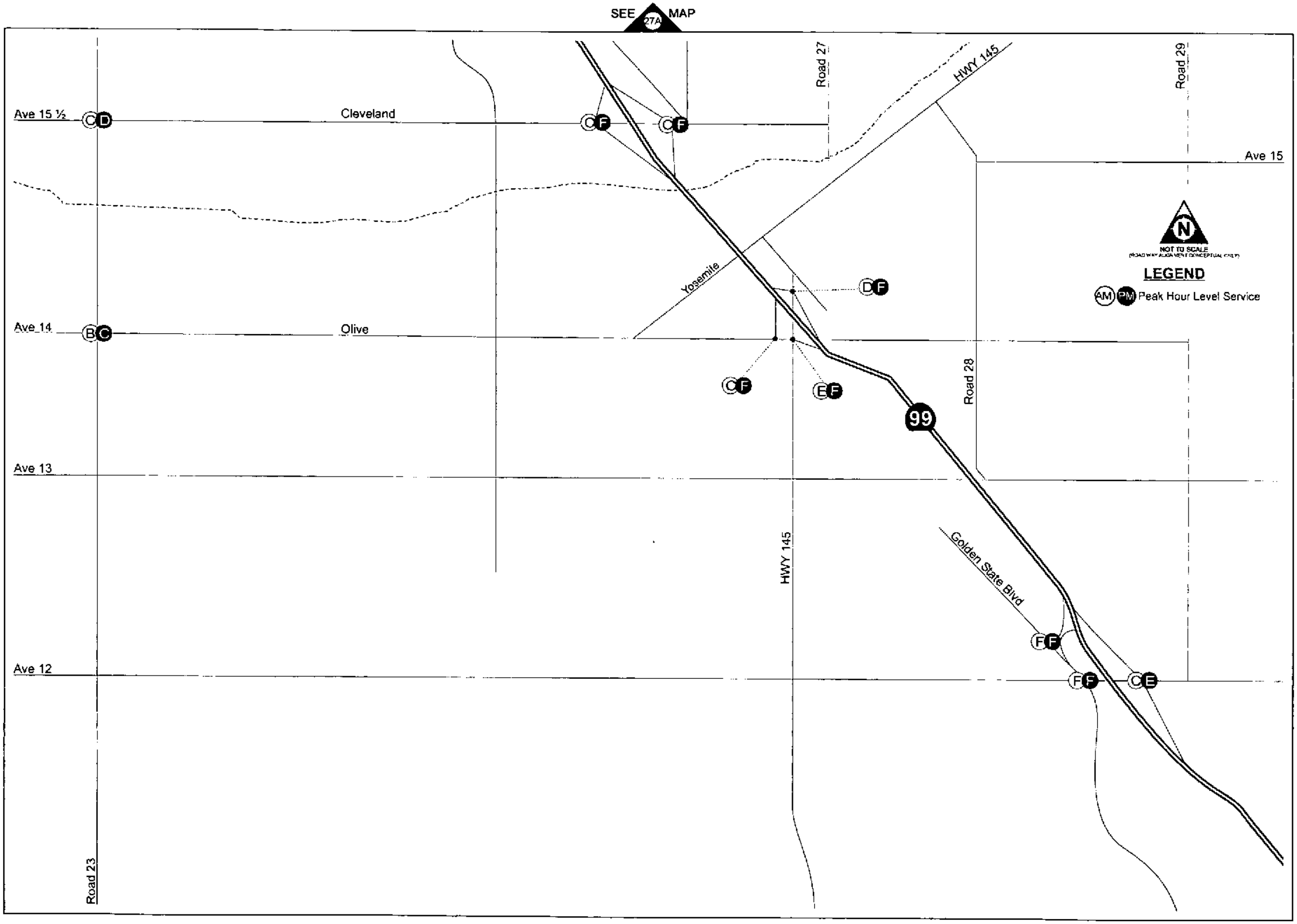
LEVELS OF SERVICE
2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County
Figure 27
04-637.2



LEVELS OF SERVICE

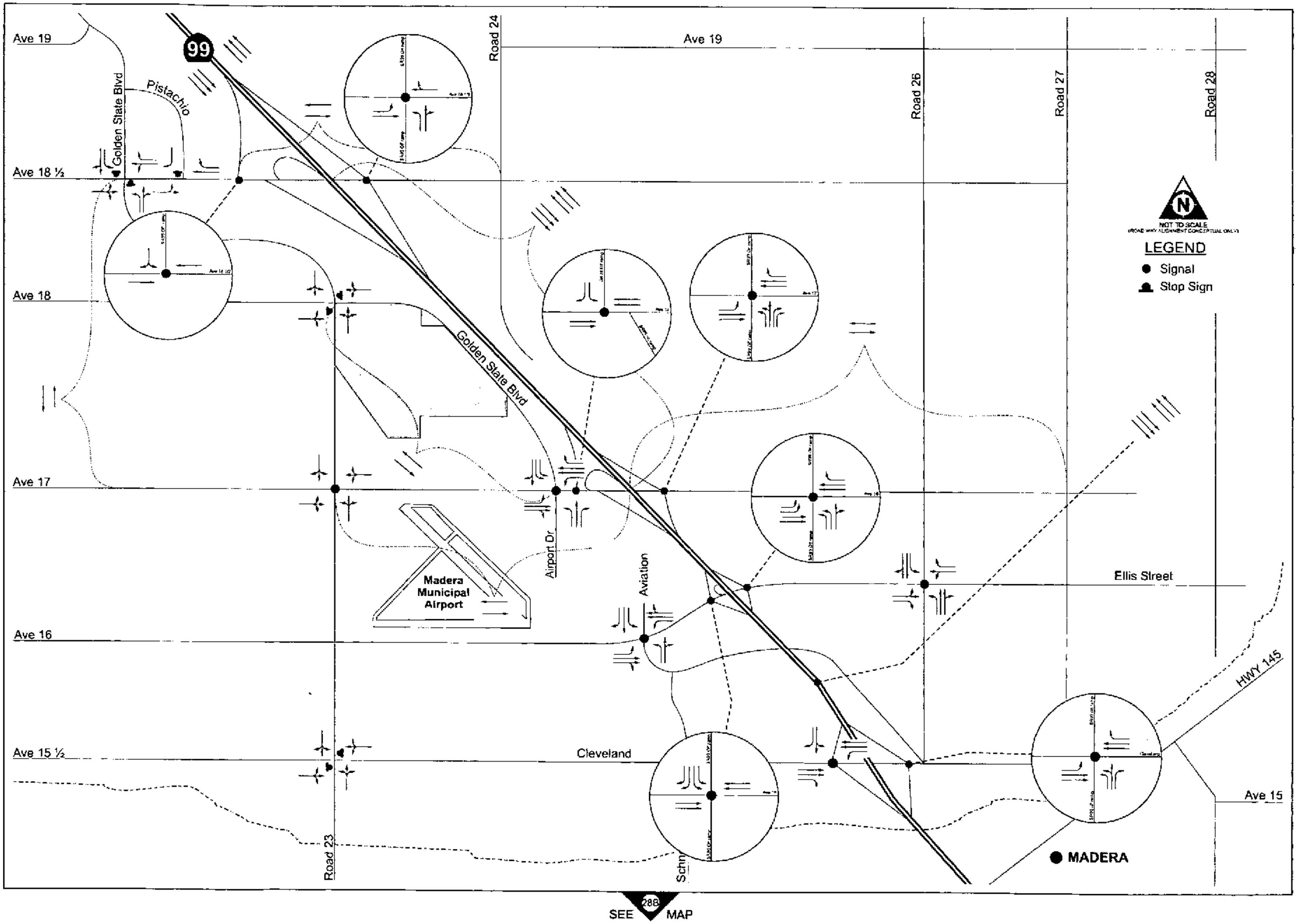
2030 No Project
Madera Site
(Alternative E)

North Fork Casino
Madera County

Figure 27

04-837.2

TPG Consulting



LANE CONFIGURATION AND INTERSECTION CONTROL

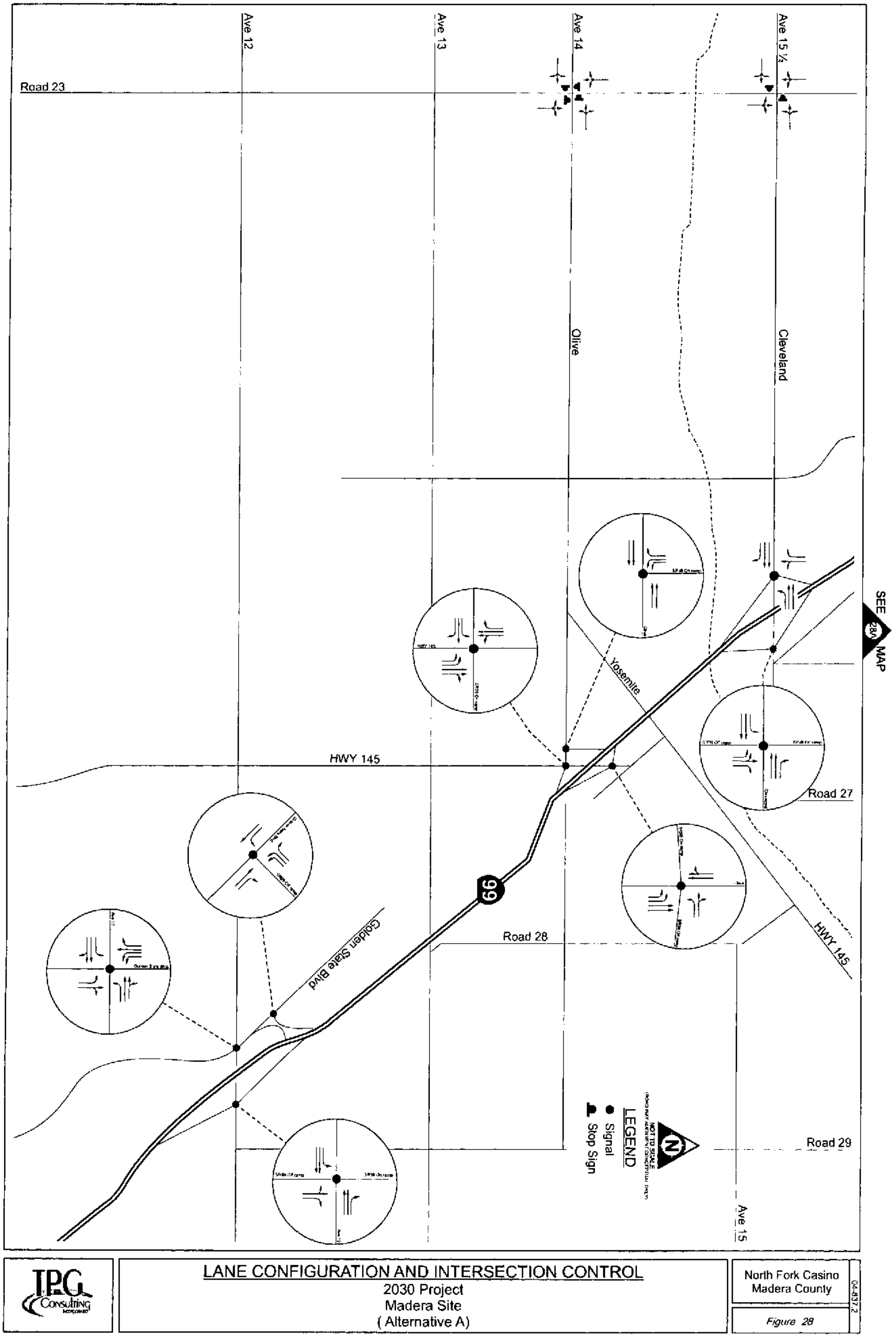
2030 Project
Madera Site
(Alternative A)

04-637.2

North Fork Casino
Madera County

Figure 28

TPG Consulting



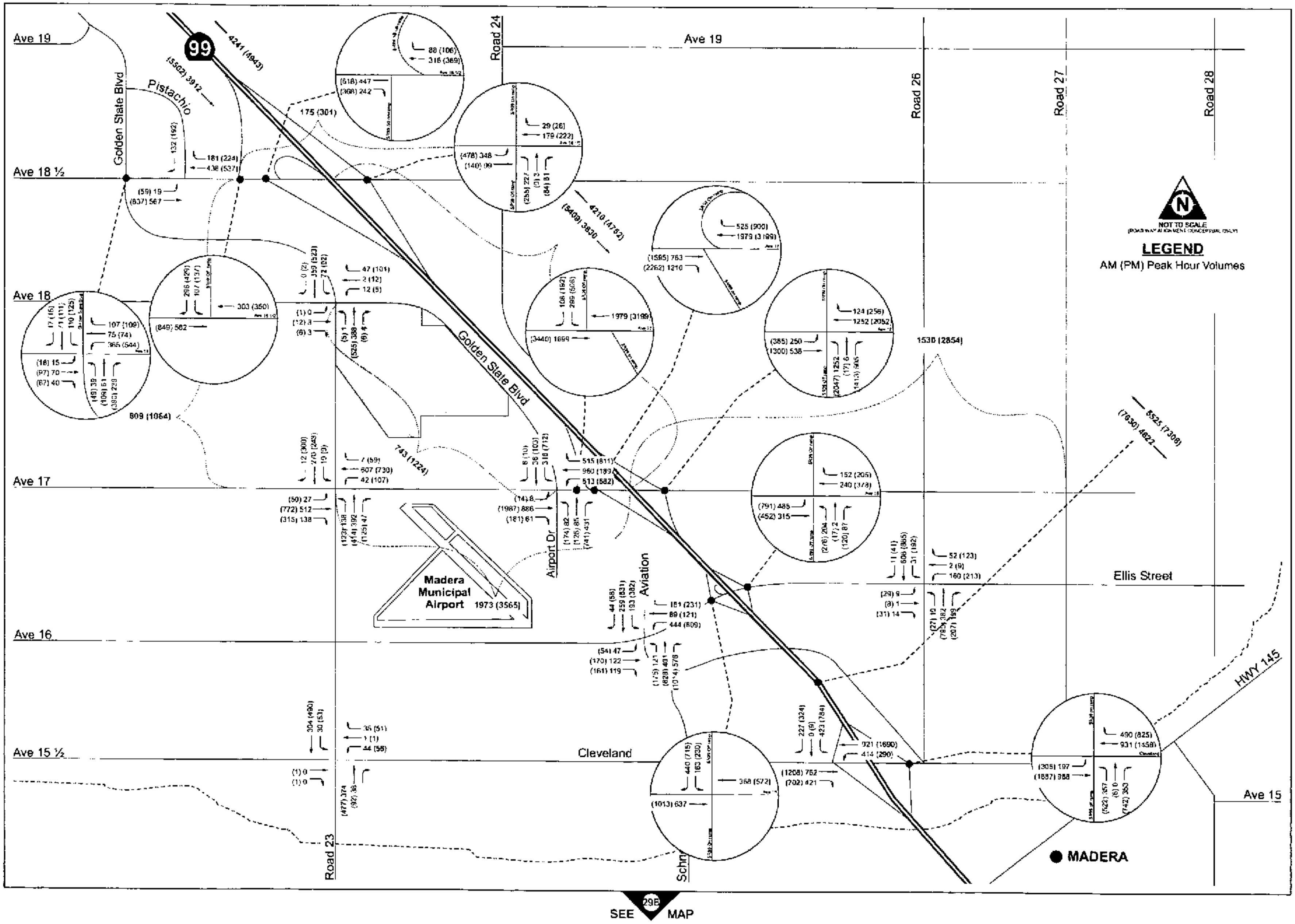
LANE CONFIGURATION AND INTERSECTION CONTROL

2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 28

04-837.2

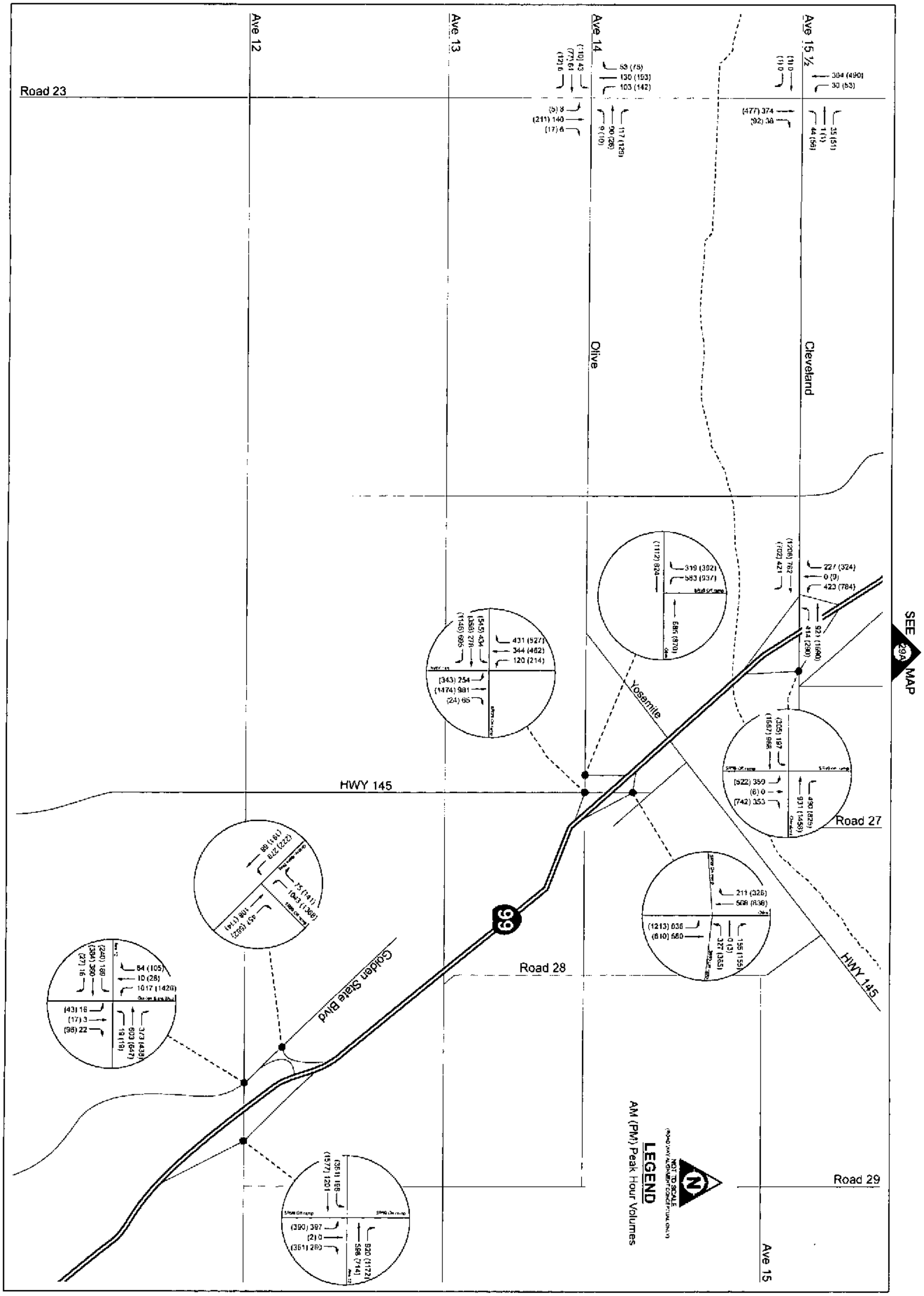


PEAK HOUR TRAFFIC VOLUMES
2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 29

04-837.2



TPG Consulting

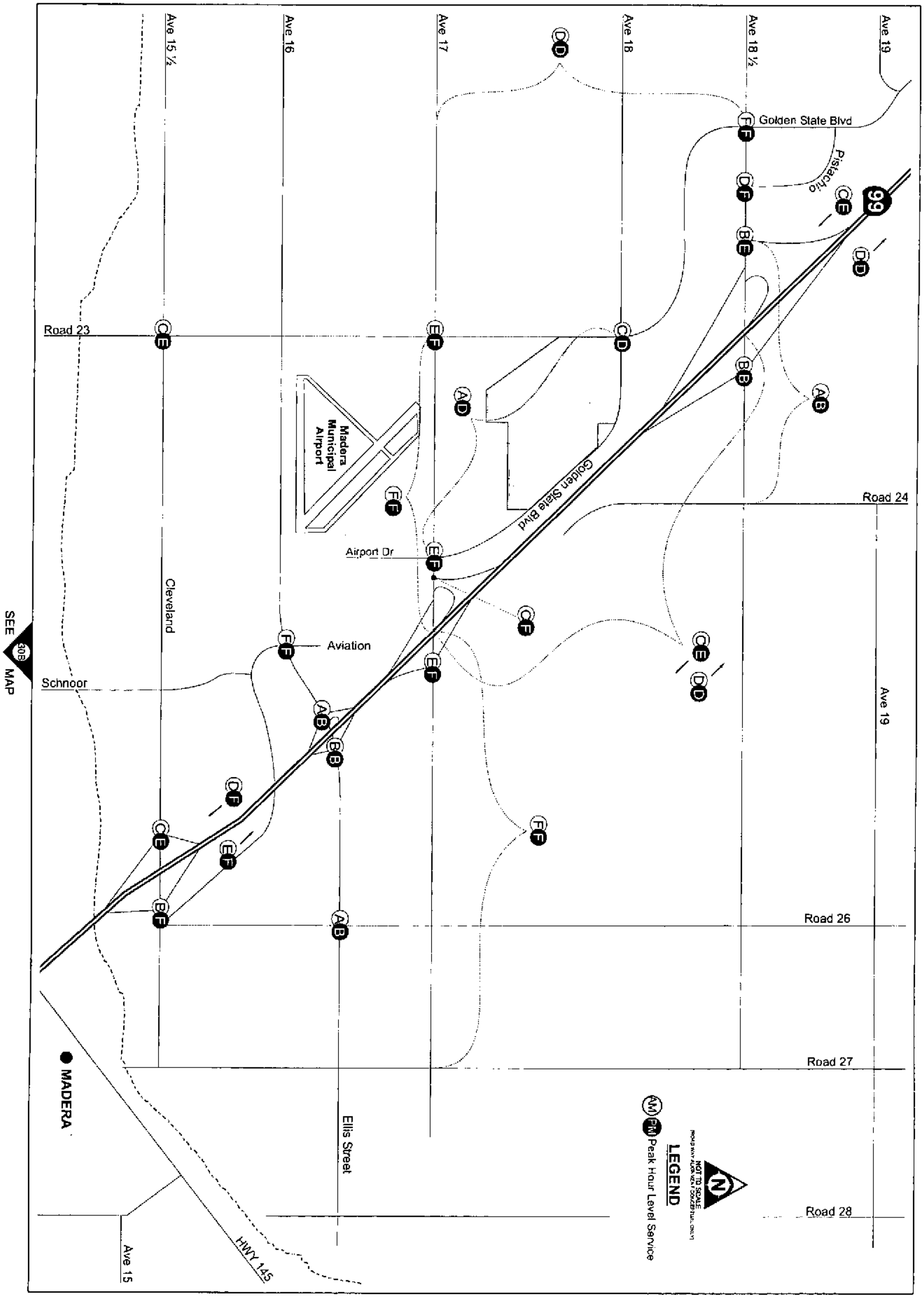
PEAK HOUR TRAFFIC VOLUMES

2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 29

04-637.2

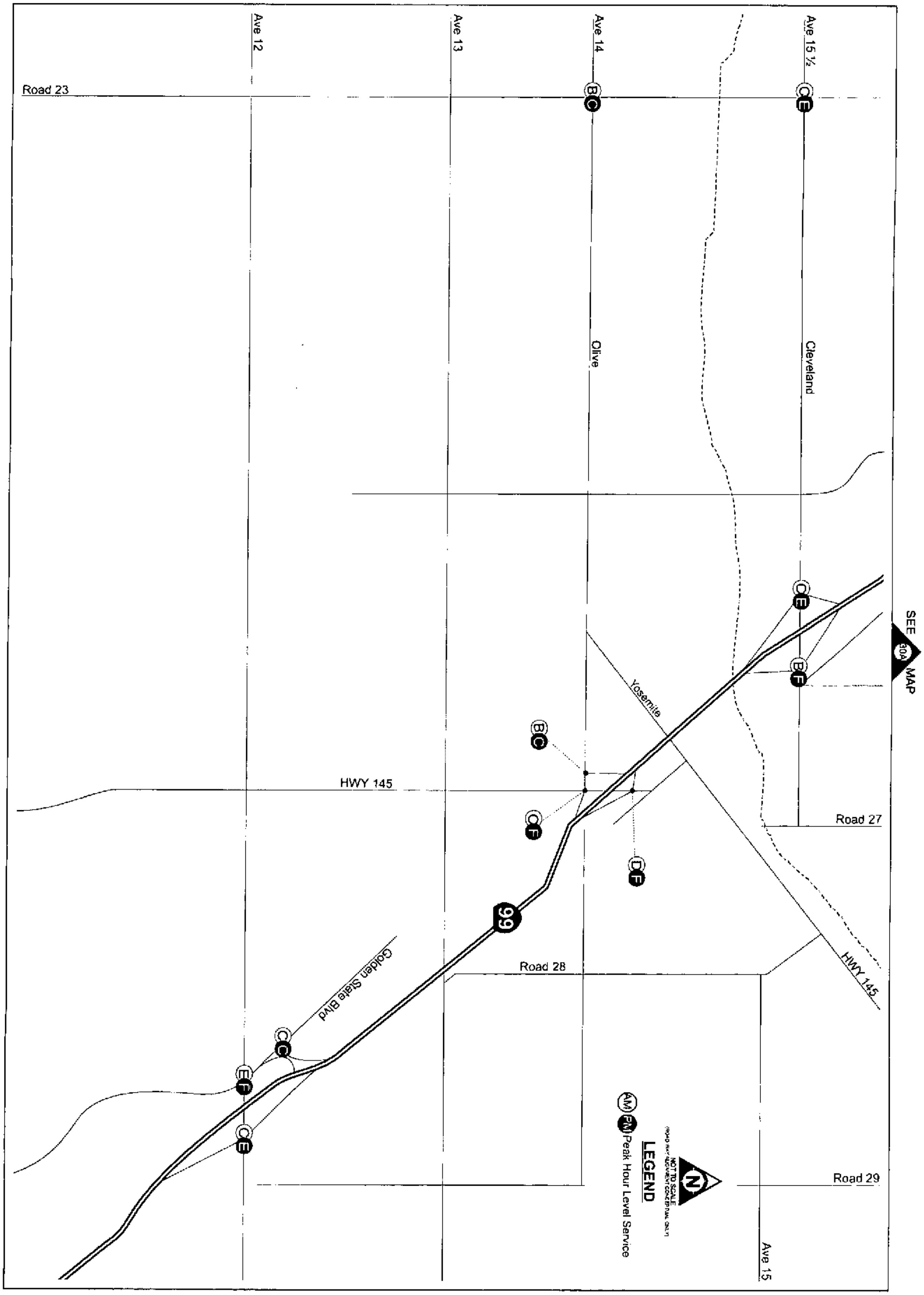


LEVELS OF SERVICE
2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 30

04-837.2



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LEVELS OF SERVICE
2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 30

04-837.2

Alternative B (Reduced Intensity Alternative)

Figures 31, 32, and 33 show the 2030 Project Alternative B lane configurations and intersection control, Alternative B AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting 2030 Project Alternative B levels of service for the Madera Site. The TWSC levels of service shown on Figure 33 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 33 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 33. The signalized intersection levels of service or delay shown in Figure 33 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

Alternative C (Alternative Land Use Alternative)

Figures 34, 35, and 36 show the 2030 Project Alternative C lane configurations and intersection control, Alternative C AM and PM peak hour traffic volumes (segment, freeway, and intersection), and resulting 2030 Project Alternative C levels of service for the Madera Site. The TWSC levels of service shown on Figure 36 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 36 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 36. The signalized intersection levels of service or delay shown in Figure 36 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

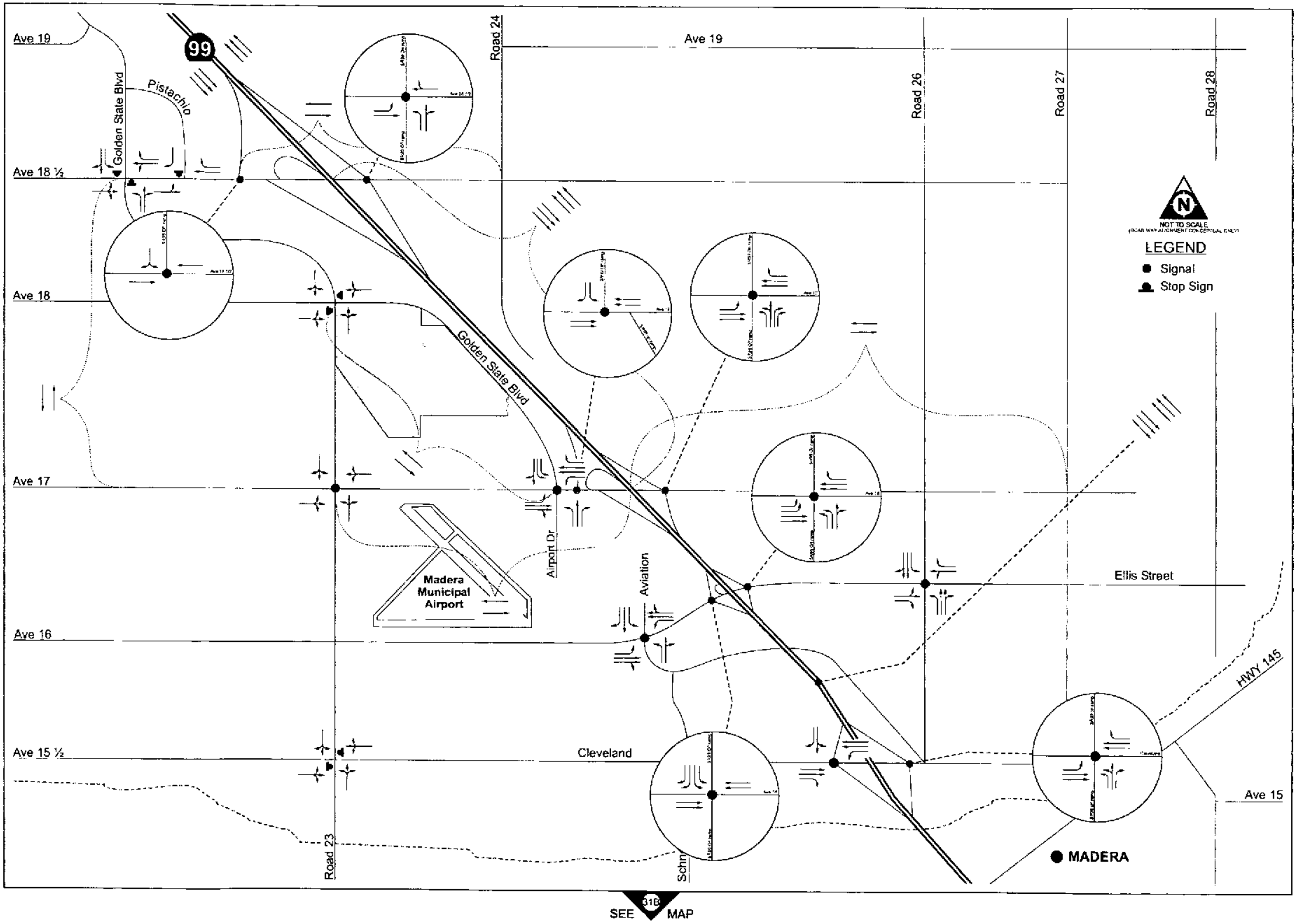
Mitigated 2030 Project Conditions

Alternative A (Proposed Project Alternative)

Figures 37 and 38 show the Mitigated 2030 Project Alternative A lane configurations and intersection control, and resulting Mitigated 2030 Project Alternative A levels of service for the Madera Site. The TWSC levels of service shown on Figure 38 are the levels of service for the worst operating movement at that intersection. The signalized intersection levels of service shown on Figure 38 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Figure 38. The signalized intersection levels of service or delay shown in Figure 38 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

Alternative B (Reduced Intensity Alternative)

Figures 39 and 40 show the Mitigated 2030 Project Alternative B lane configurations and intersection control, and resulting Mitigated 2030 Project Alternative B levels of service for the Madera Site. The TWSC levels of service shown on Figure 40 are the levels of service for the worst operating movement at that intersection. The signalized intersection levels of service shown on Figure 40 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Figure 40. The signalized intersection levels of service or delay shown in Figure 40 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.



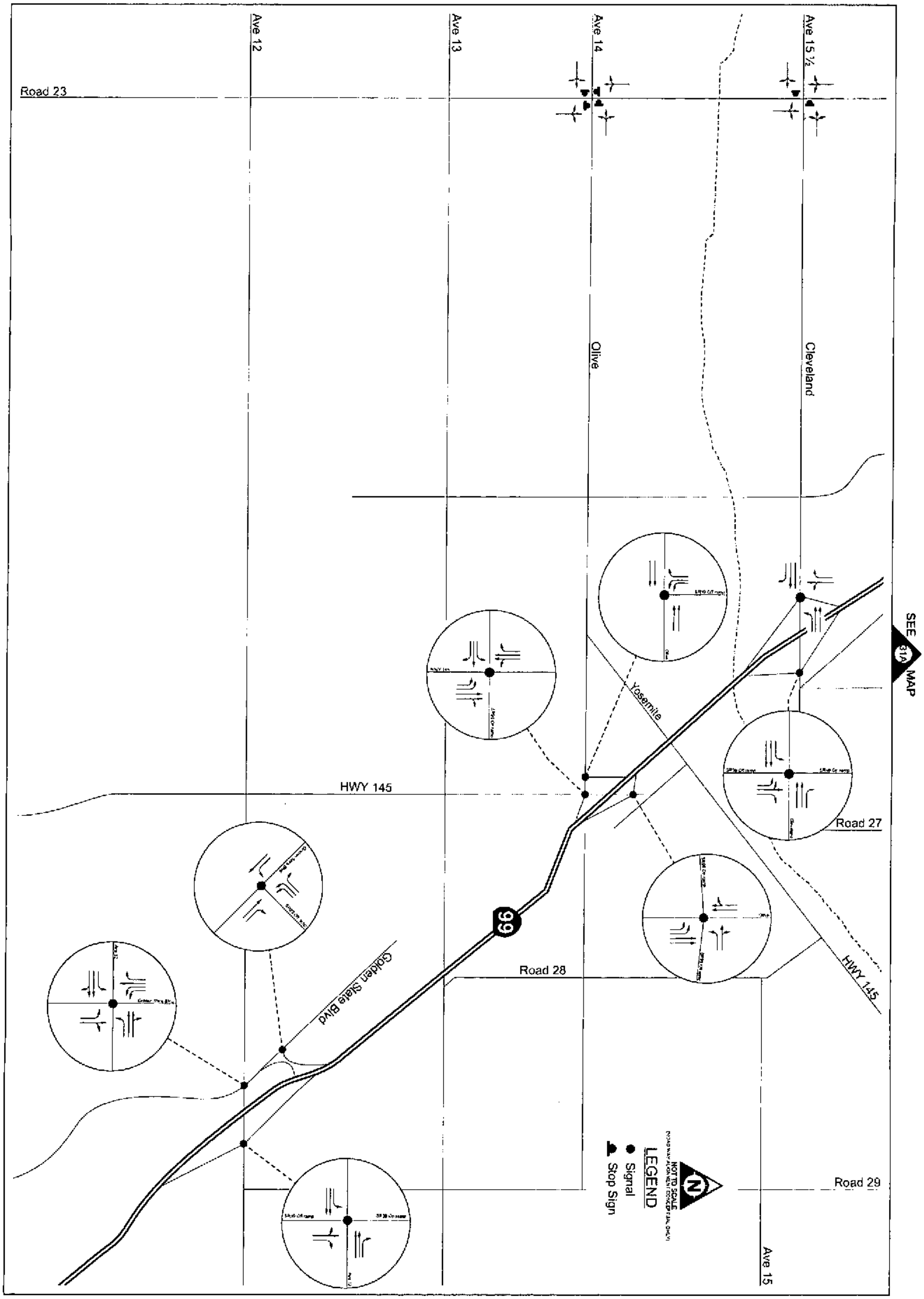
LANE CONFIGURATION AND INTERSECTION CONTROL

2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 31

04-837.2



LPG CONSULTING

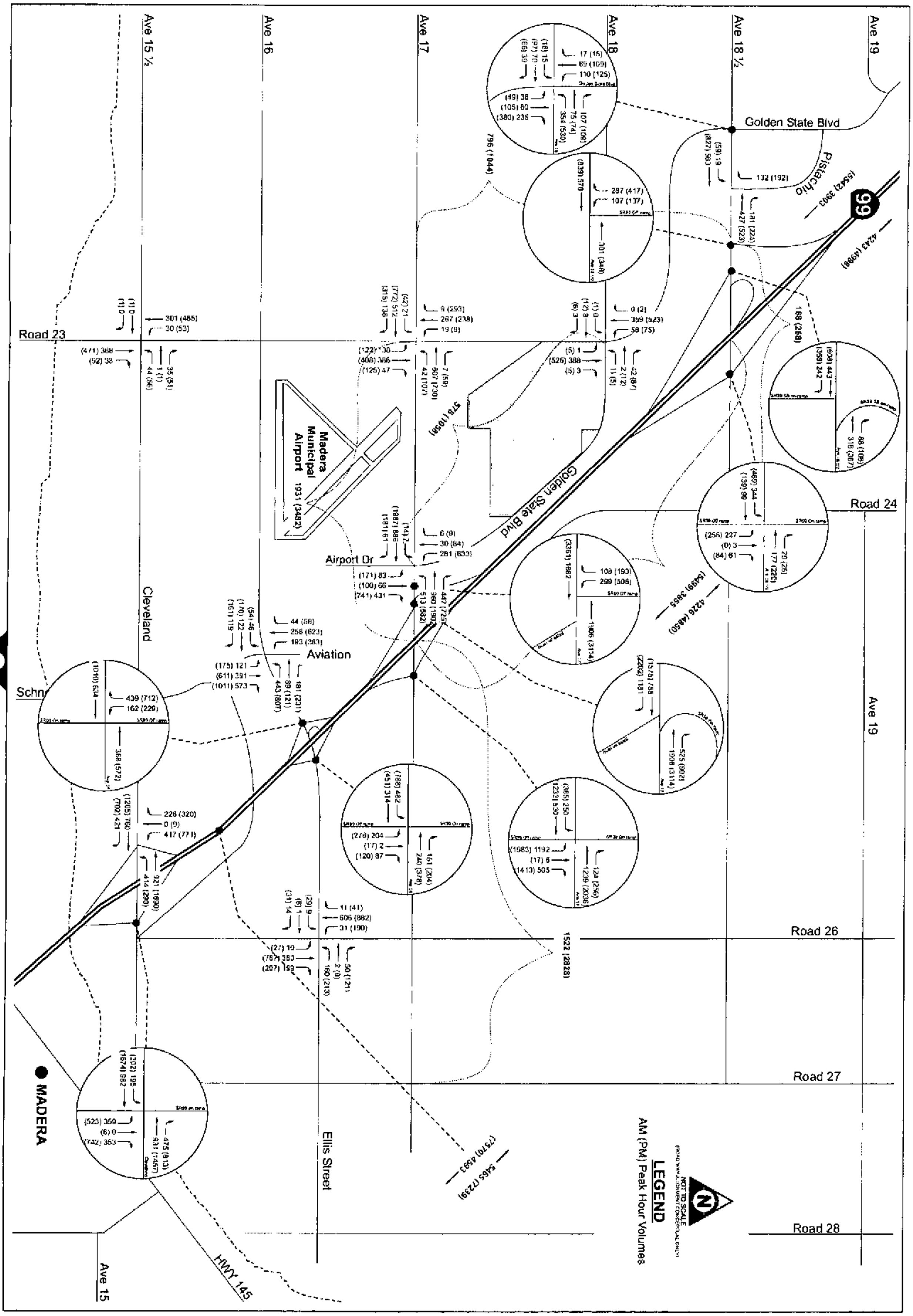
LANE CONFIGURATION AND INTERSECTION CONTROL

2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 31

04-837.2



TPG Consulting

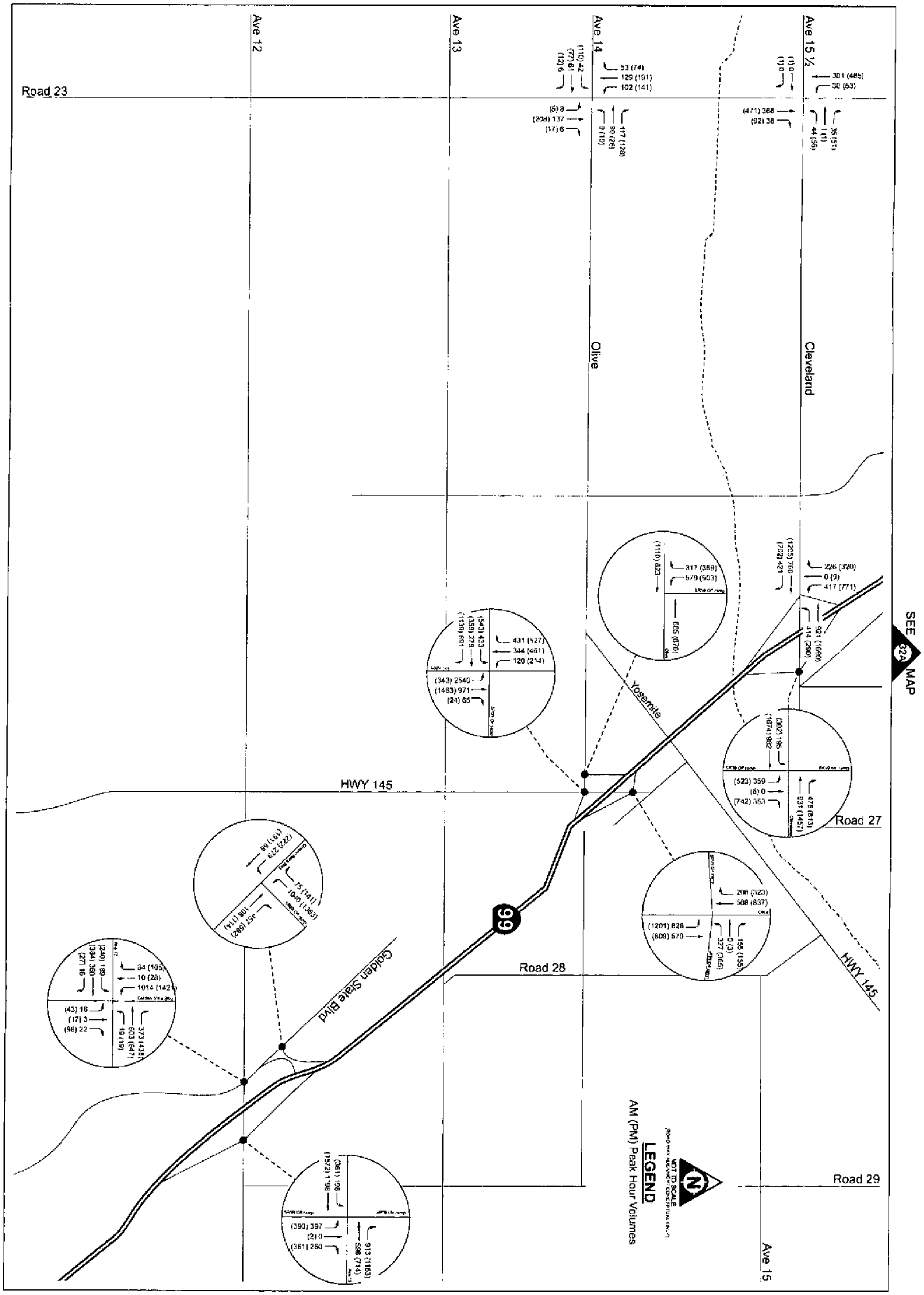
PEAK HOUR TRAFFIC VOLUMES

2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 32

04-837.2



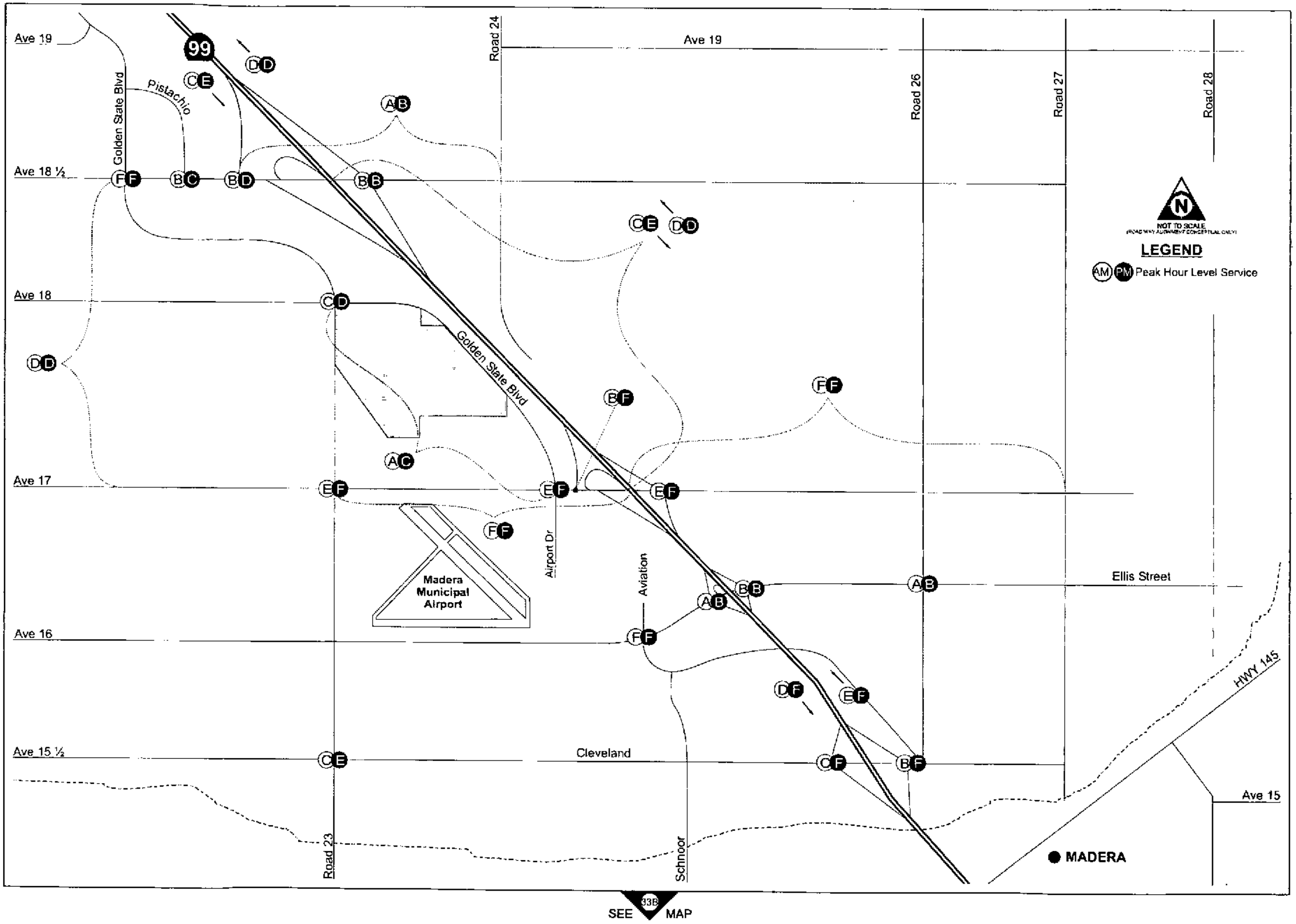
TPG Consulting

PEAK HOUR TRAFFIC VOLUMES
2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 32

04-837.2

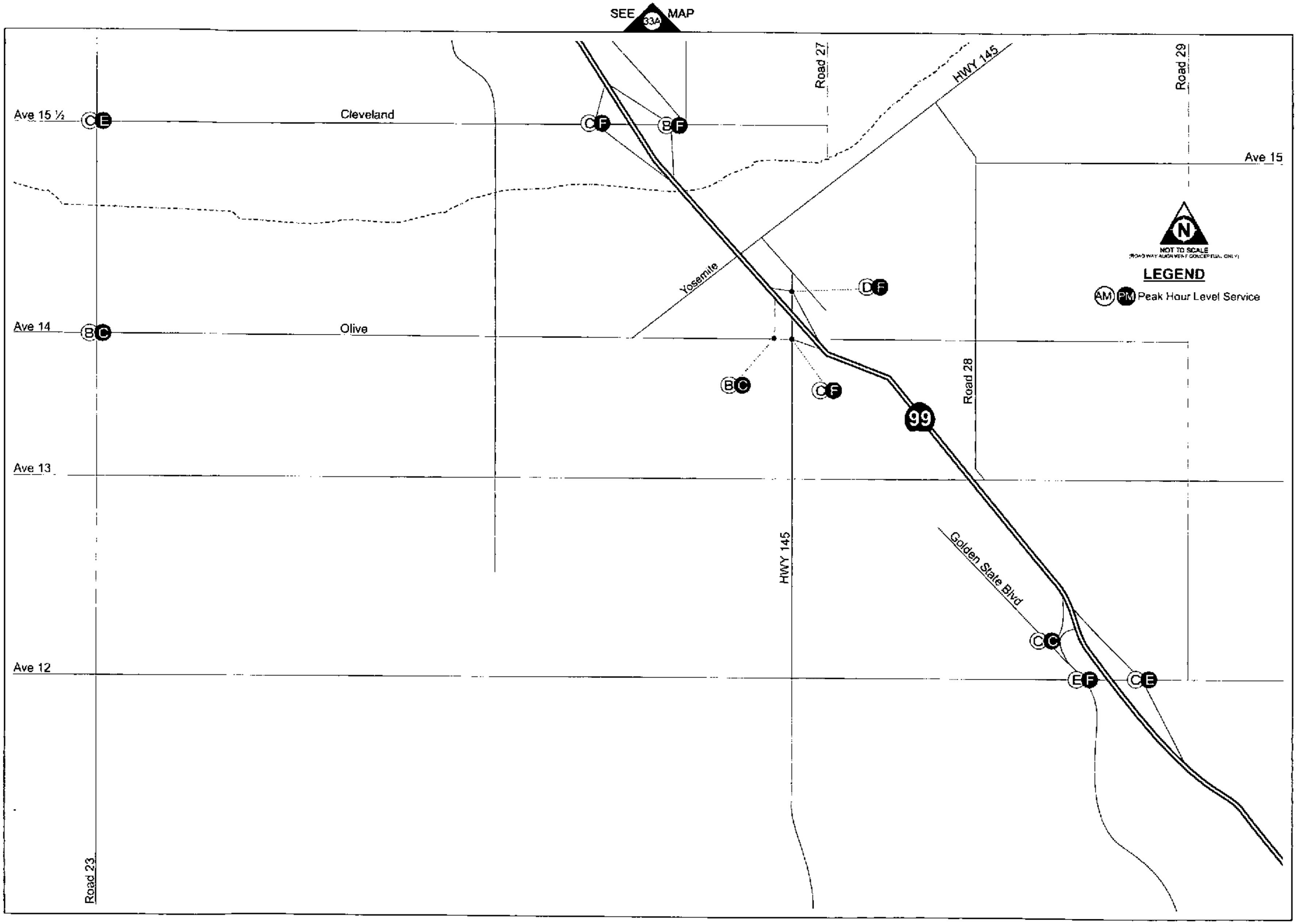


LEVELS OF SERVICE
2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 33

04-837.2



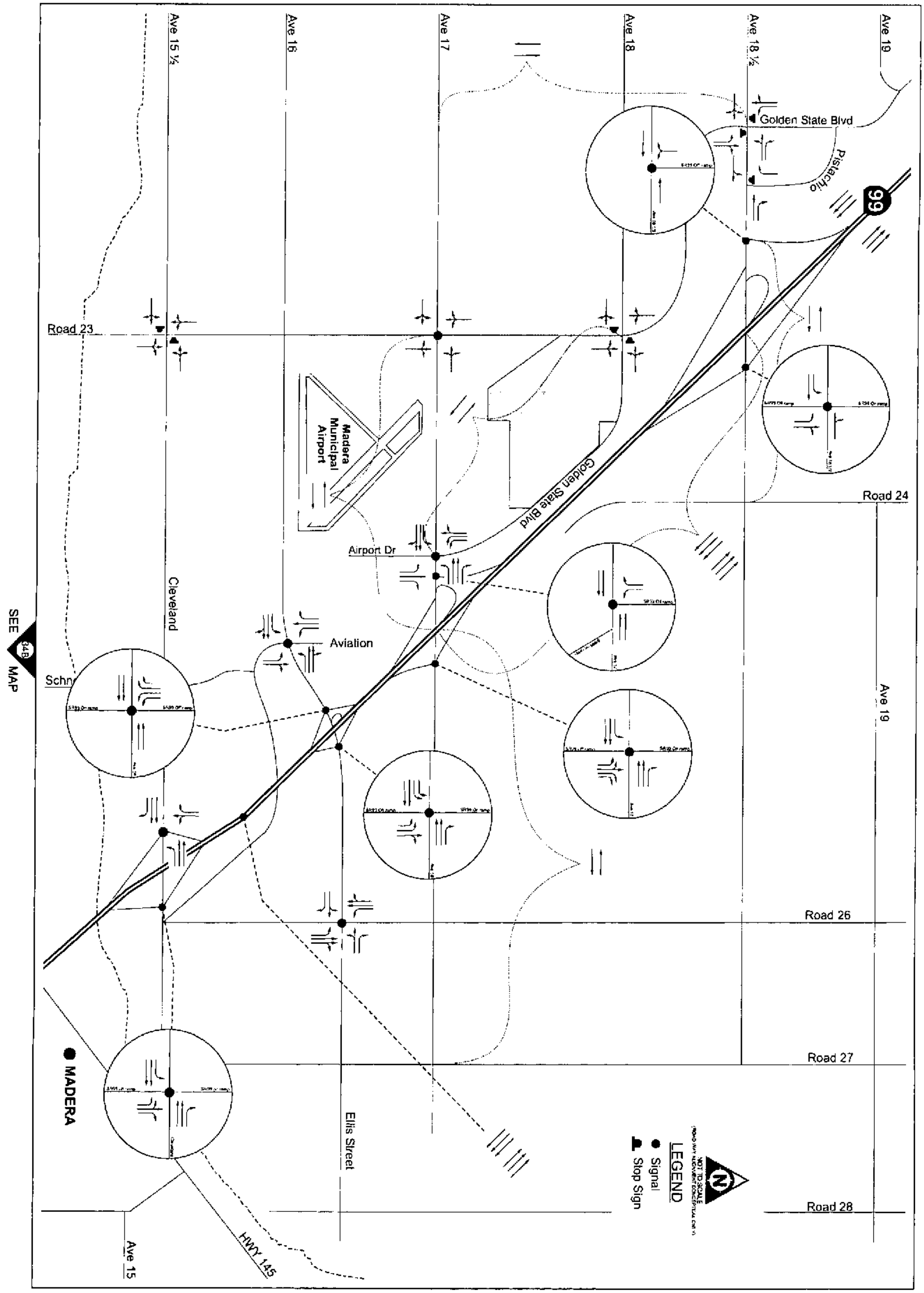
LEVELS OF SERVICE

2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 33

04-837.2

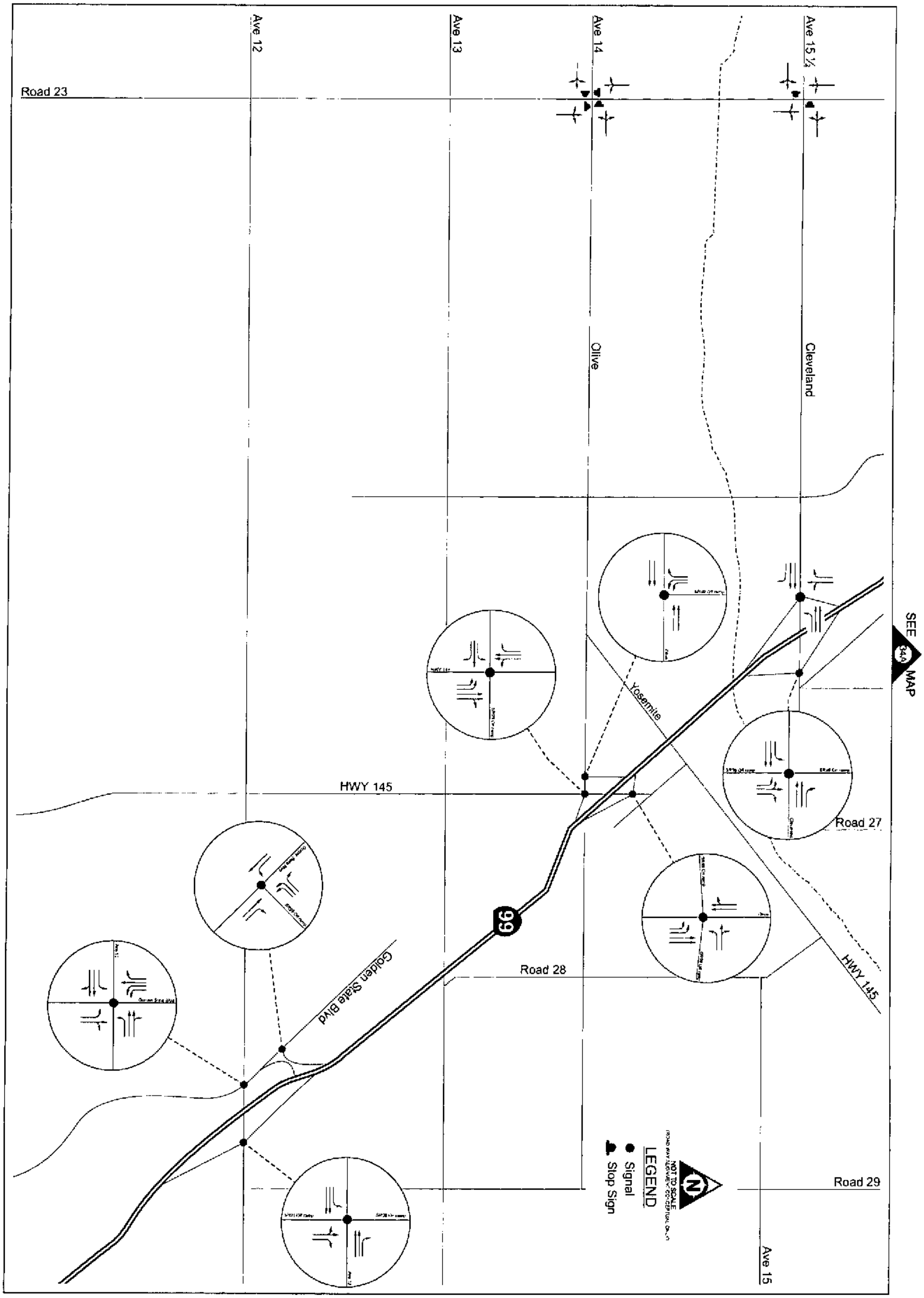


LANE CONFIGURATION AND INTERSECTION CONTROL
2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 34

04-837.2



TPG Consulting

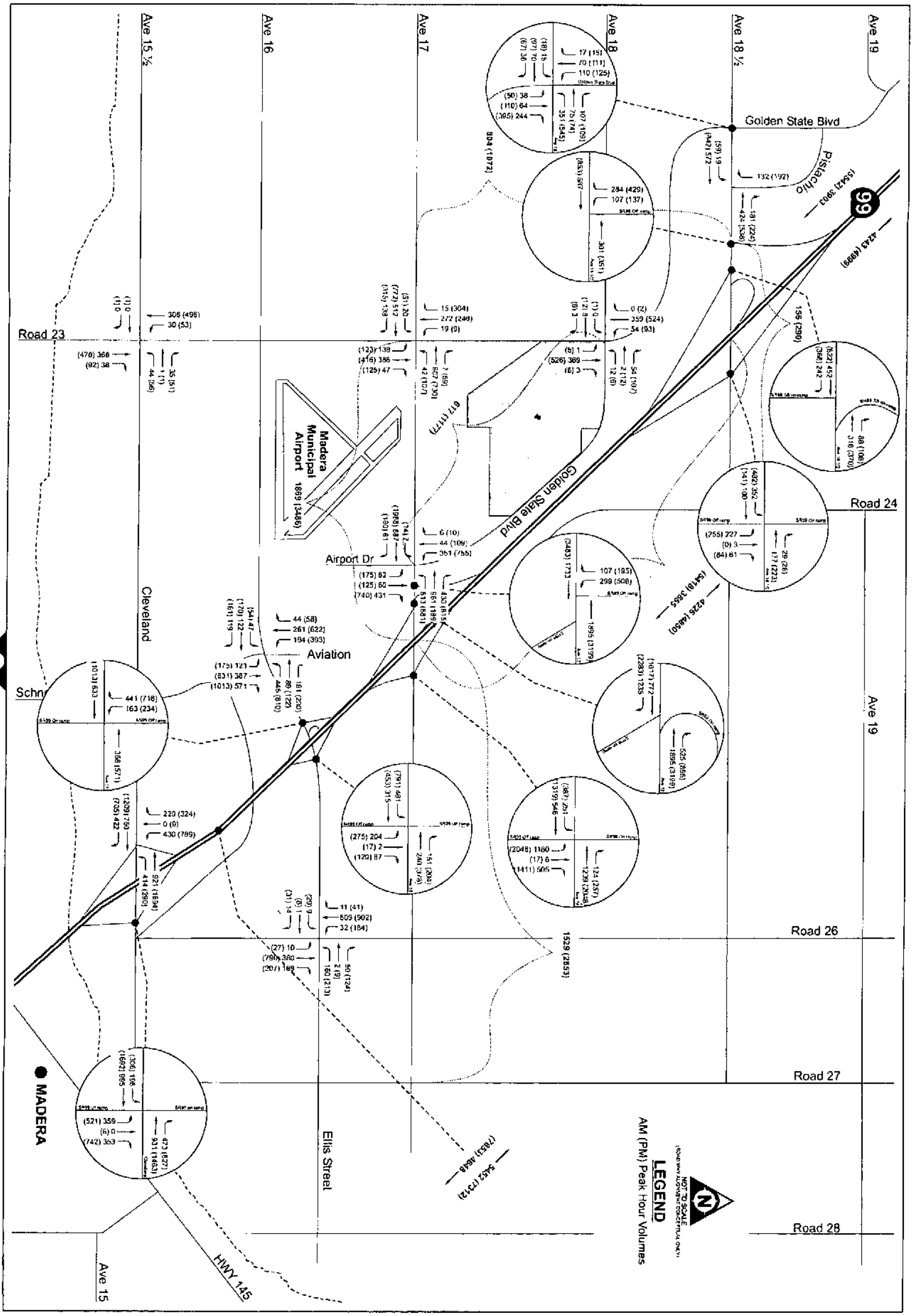
LANE CONFIGURATION AND INTERSECTION CONTROL

2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 34

04-837.2



TPG Consulting

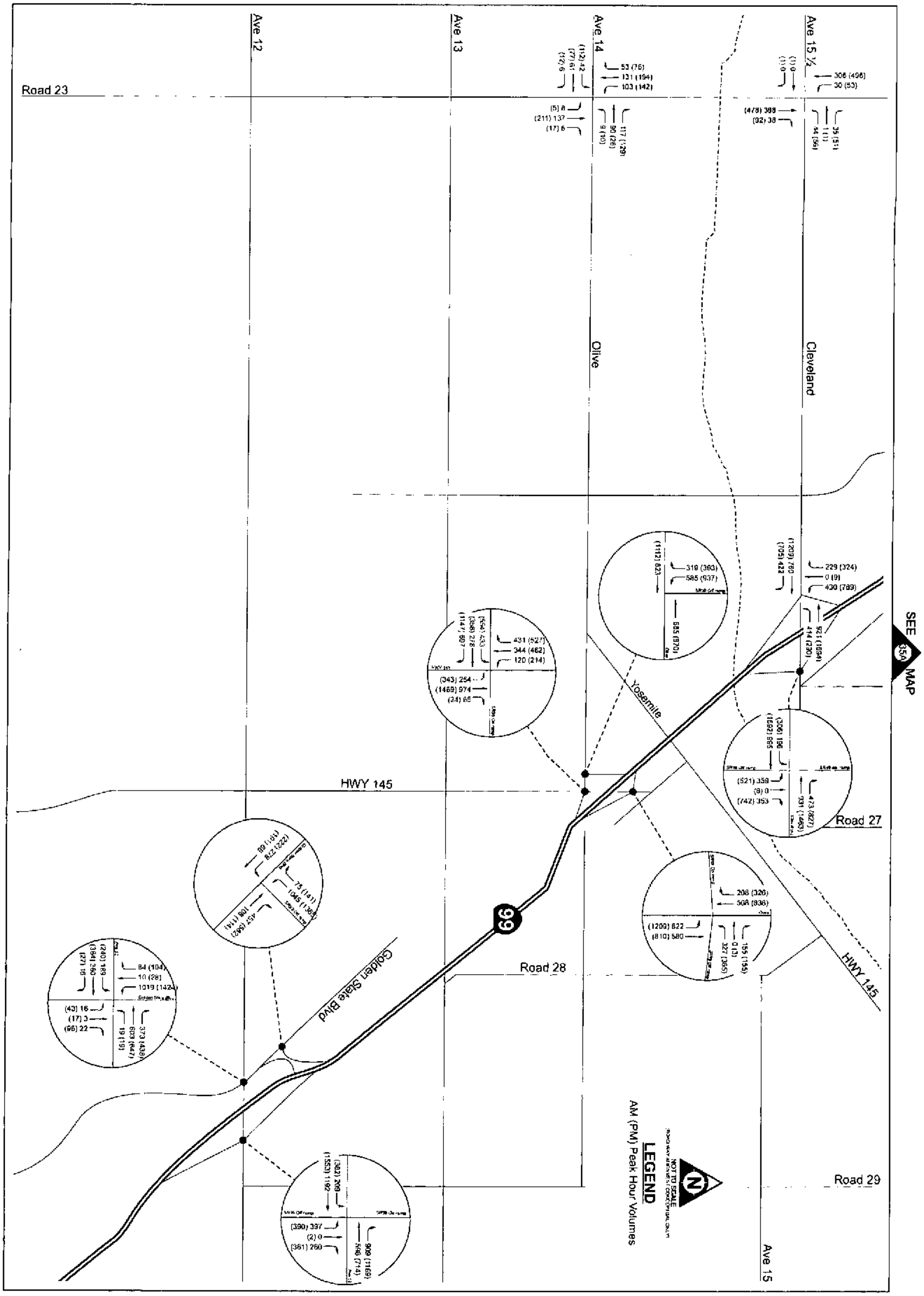
PEAK HOUR TRAFFIC VOLUMES

2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 35

04-837.2



TPG CONSULTING

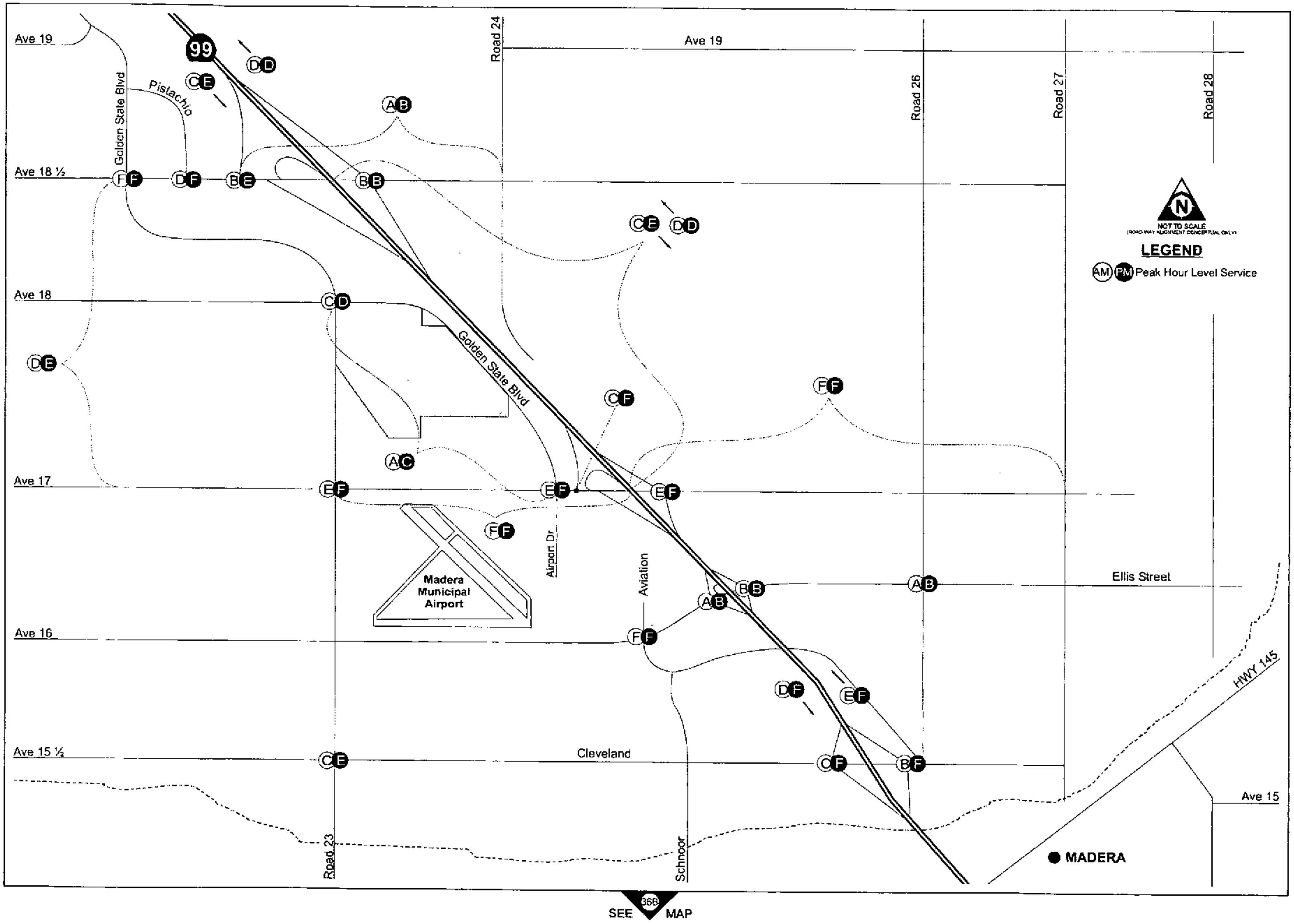
PEAK HOUR TRAFFIC VOLUMES

2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

04-837.2

Figure 35

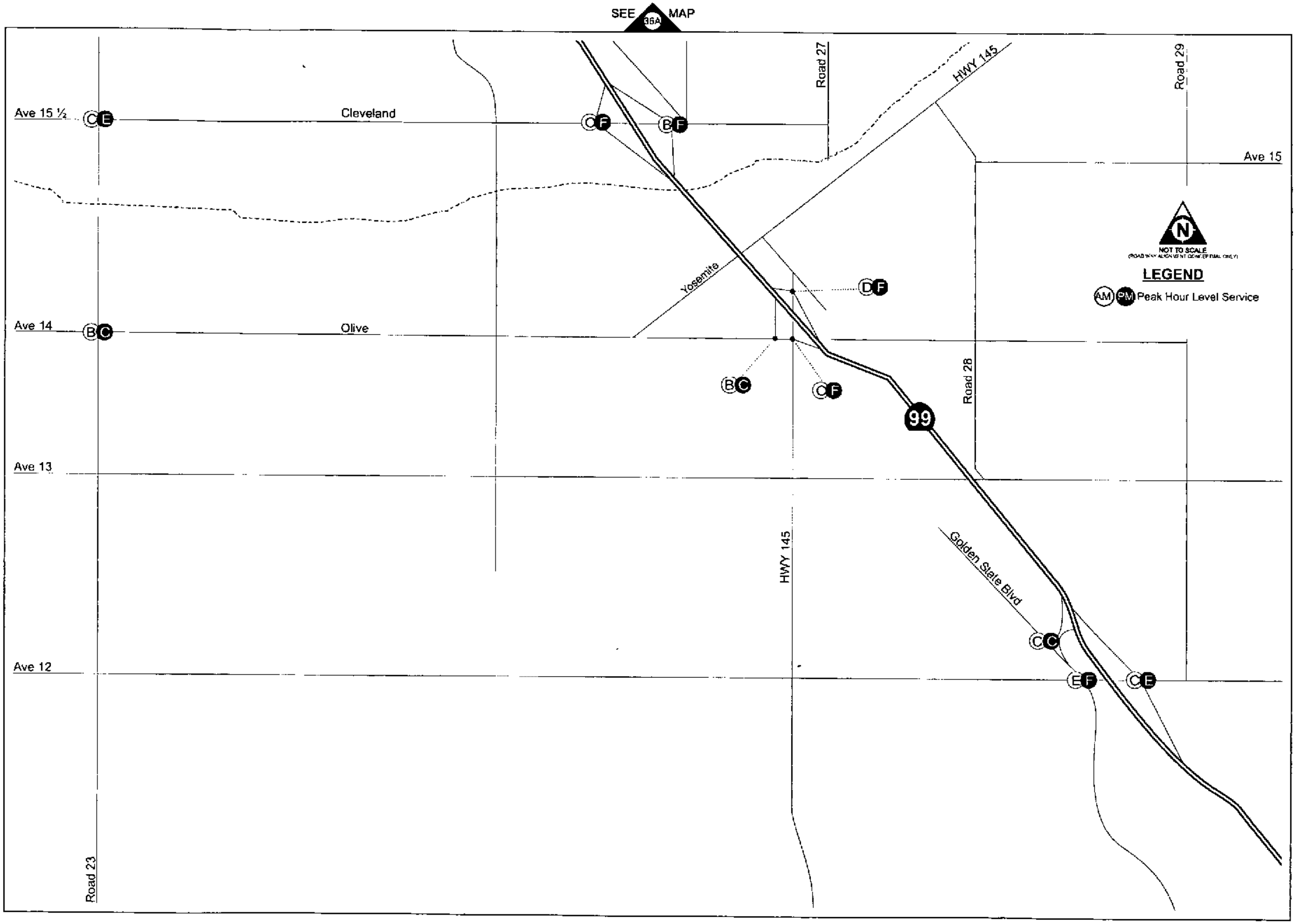


LEVELS OF SERVICE
2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 36

04-637.2



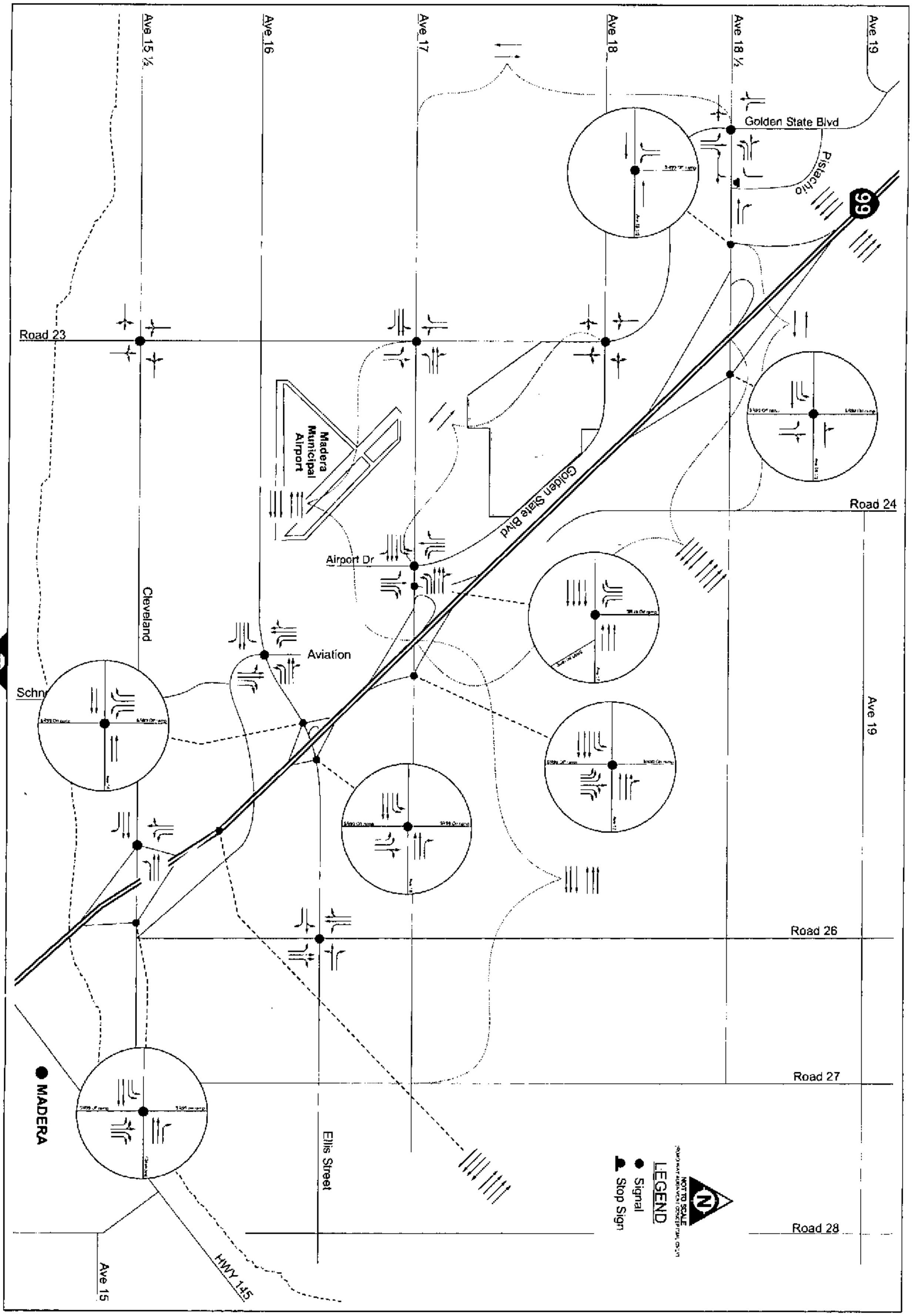
LEVELS OF SERVICE
2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 36

04-837.2

TPG Consulting



TPG CONSULTING

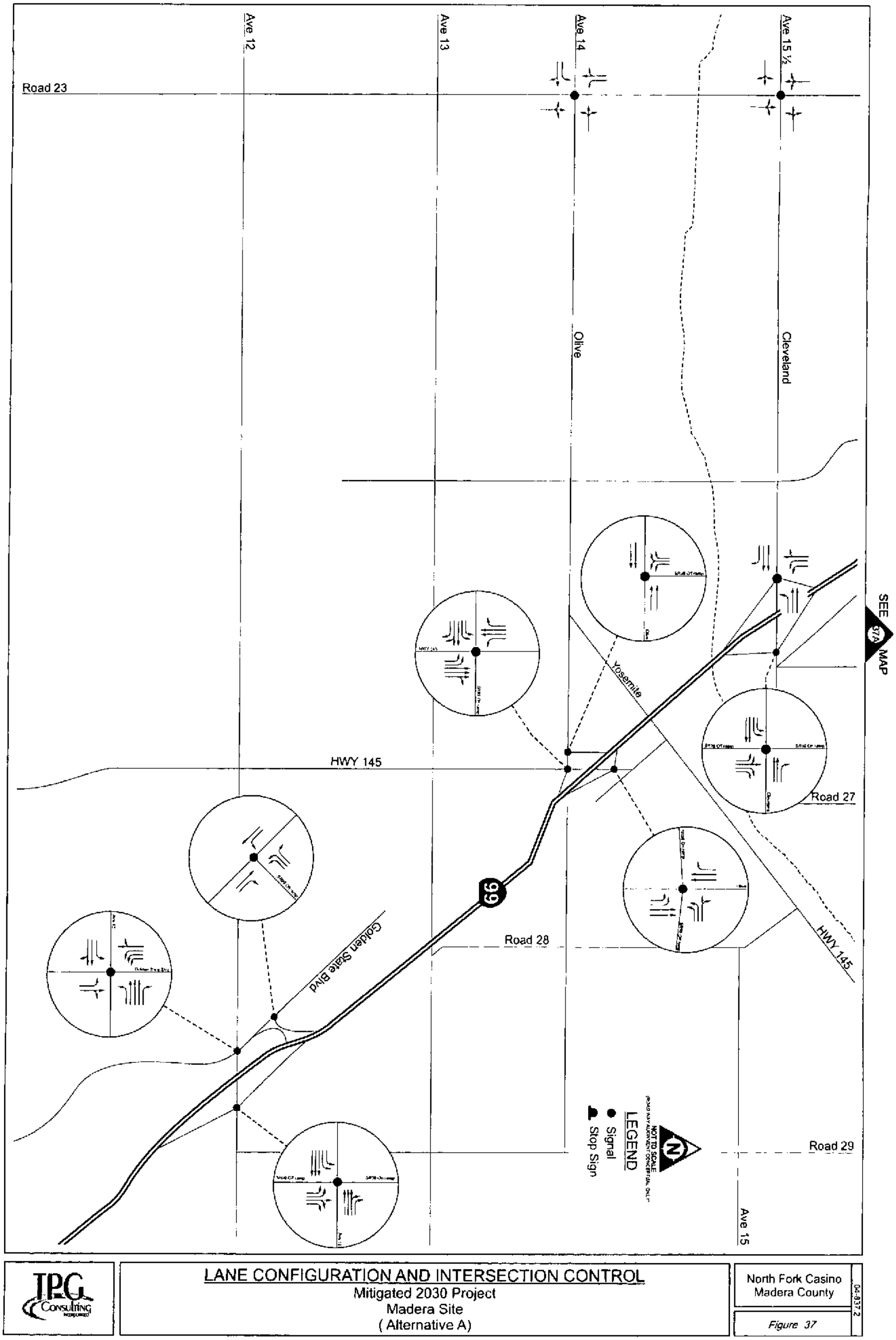
LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 37

04-837.2



TPG Consulting Incorporated

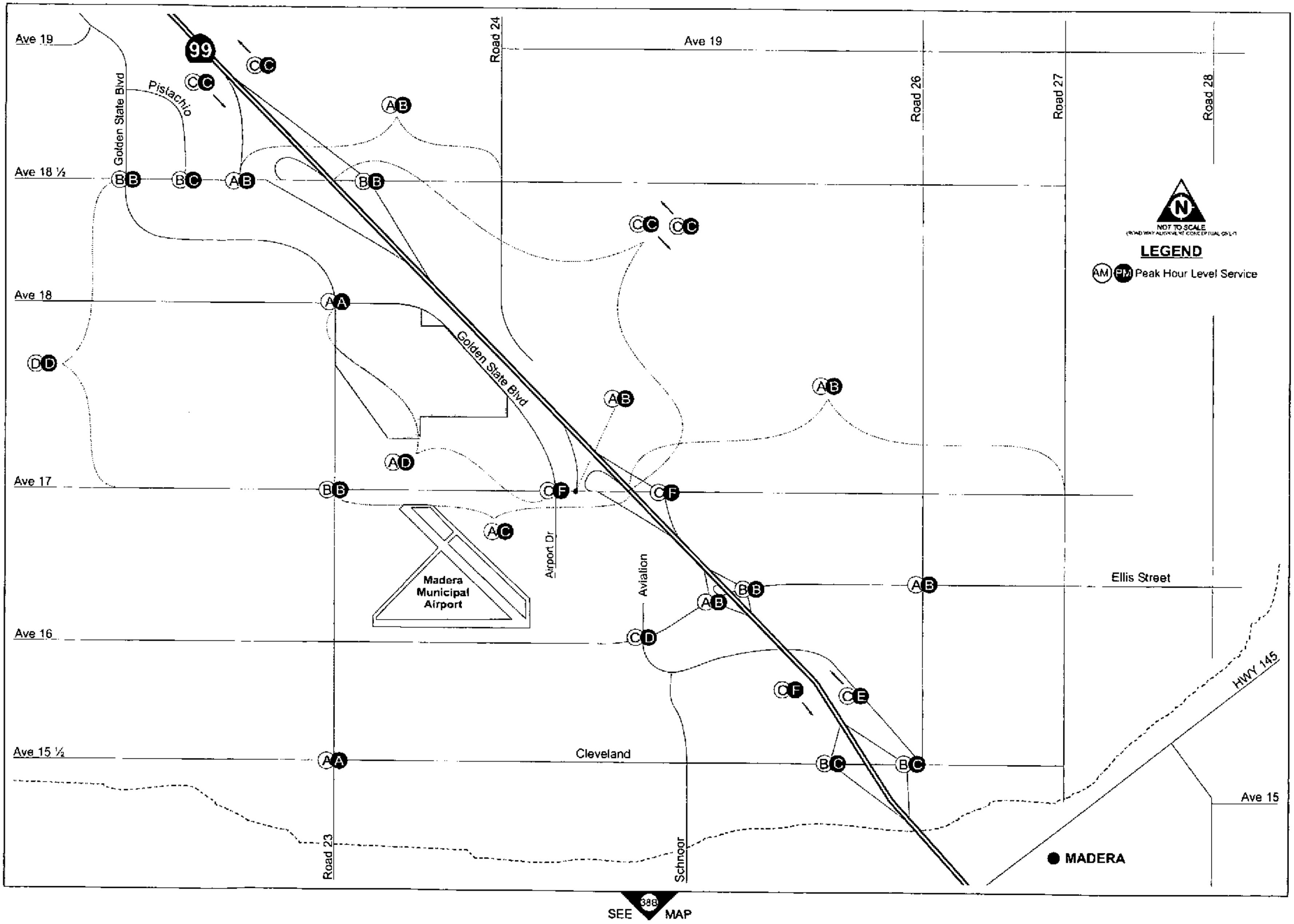
LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 37

04-837.2



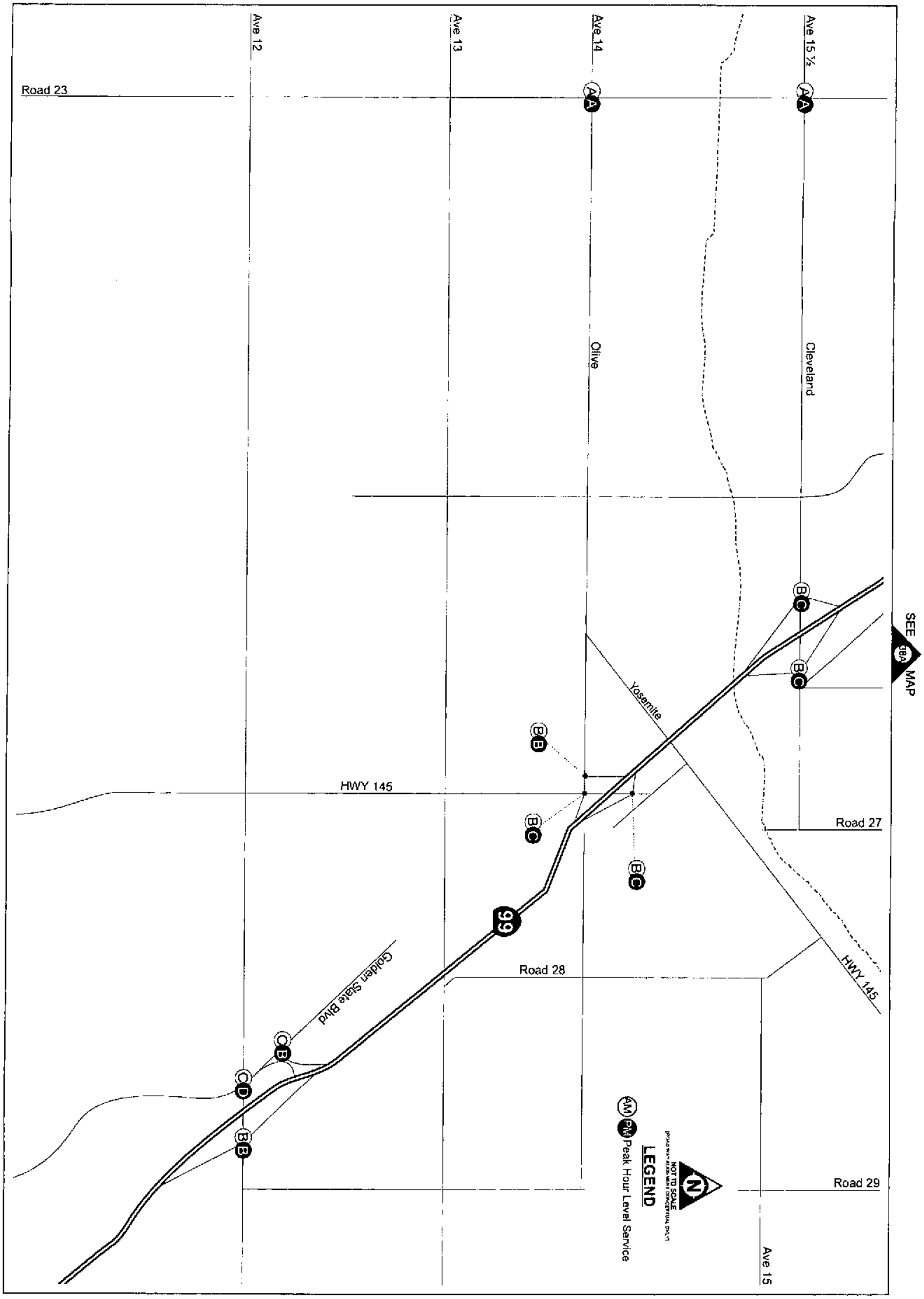
LEVELS OF SERVICE
Mitigated 2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

04-837.2

Figure 38

IPG Consulting



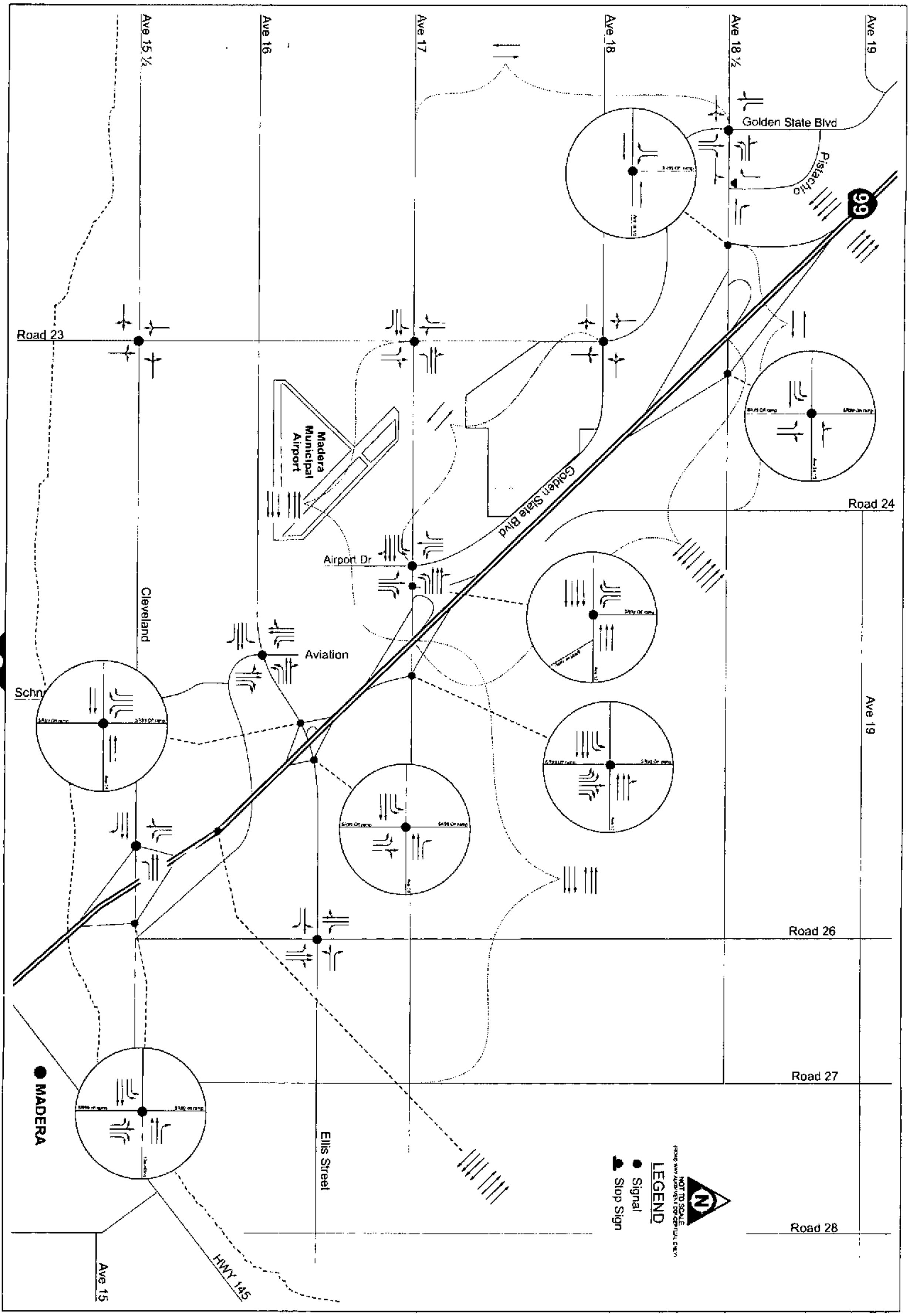
LEVELS OF SERVICE

Mitigated 2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 38

04-837.2

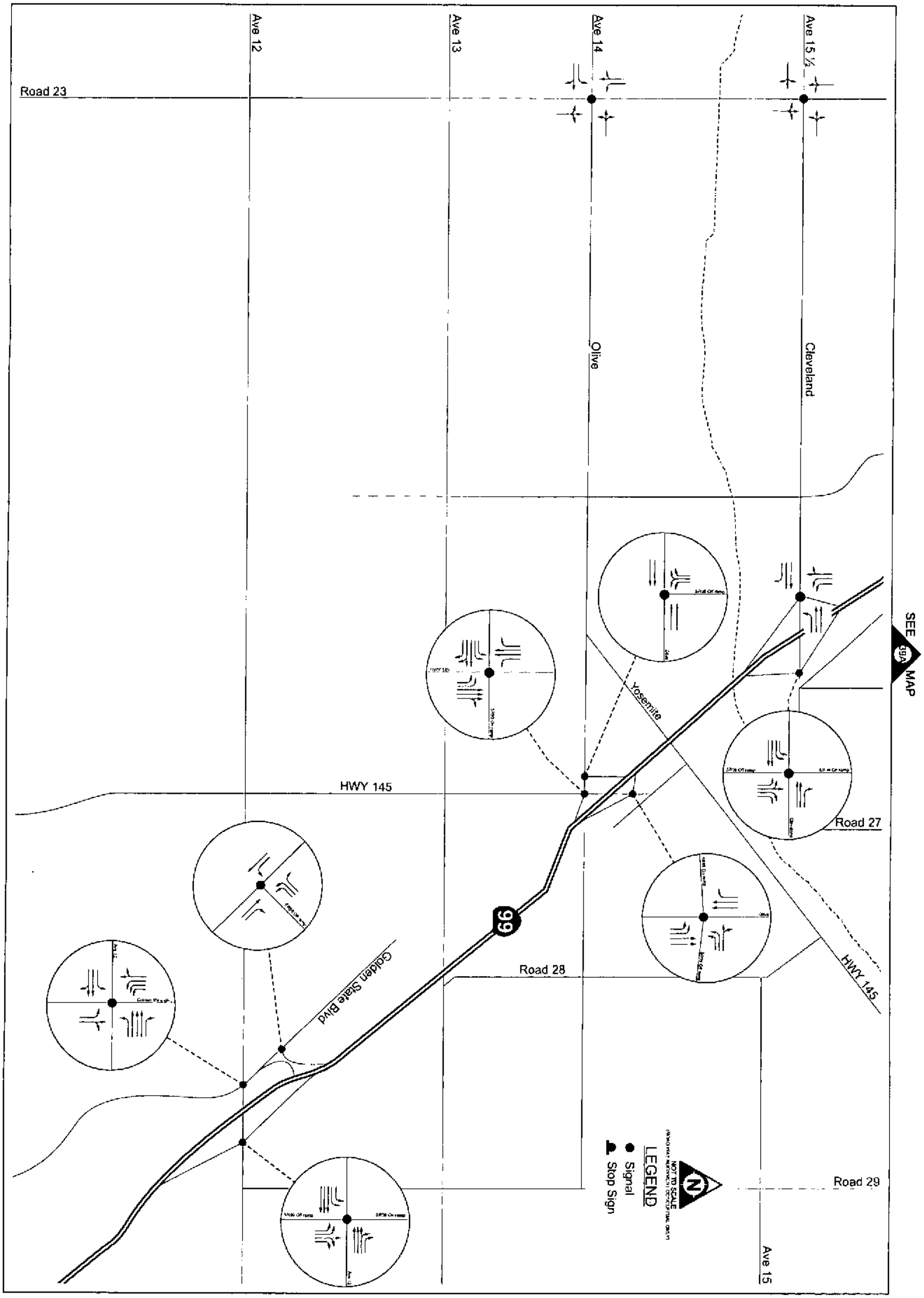


LANE CONFIGURATION AND INTERSECTION CONTROL
Mitigated 2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 39

04-837.2



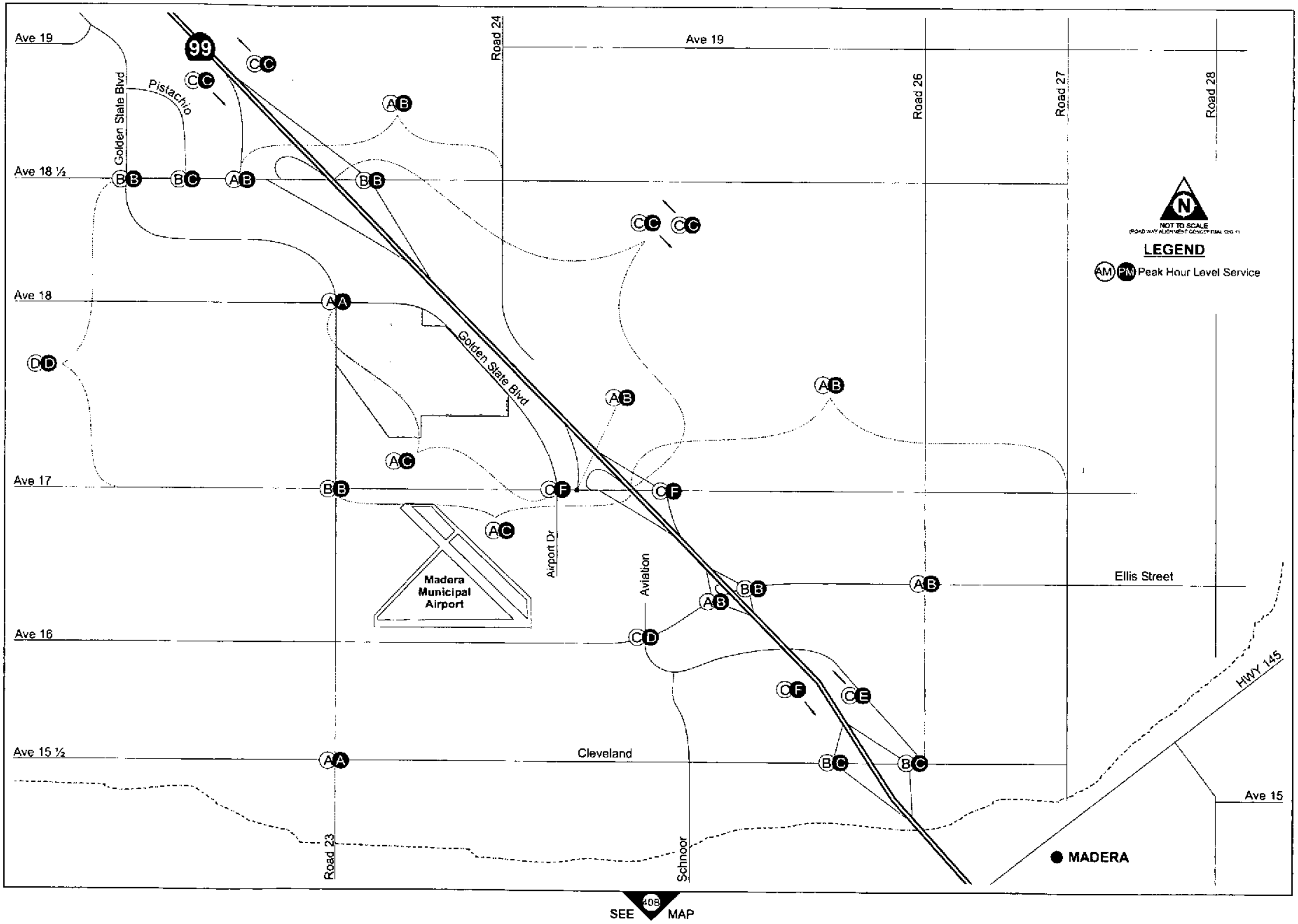
LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 39

04-837.2

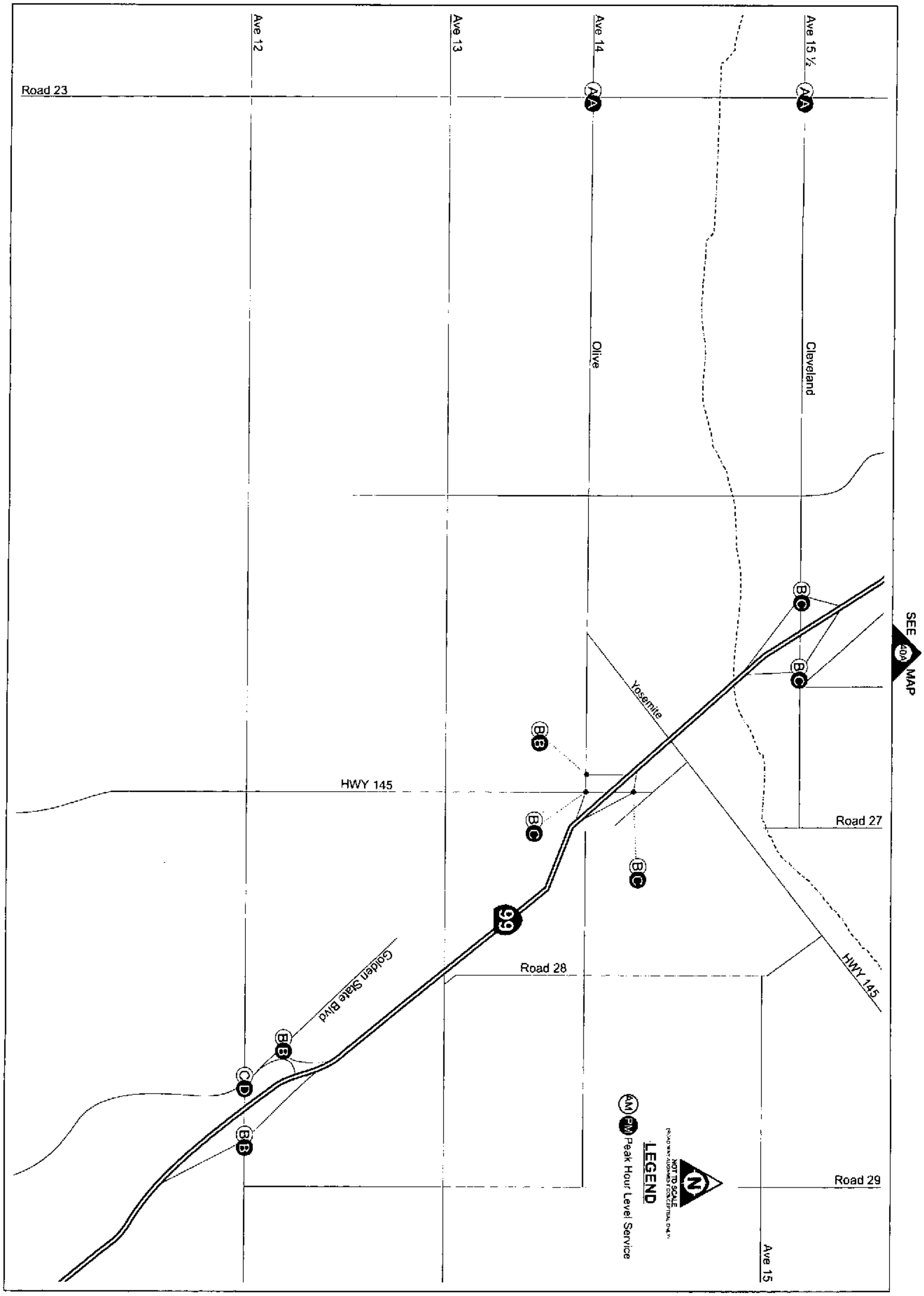


LEVELS OF SERVICE
Mitigated 2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 40

04-837.2



LEVELS OF SERVICE
Mitigated 2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 40

04-837.2

Alternative C (Alternative Land Use Alternative)

Figures 41 and 42 show the Mitigated 2030 Project Alternative C lane configurations and intersection control, and resulting Mitigated 2030 Project Alternative C levels of service for the Madera Site The TWSC levels of service shown on Figure 42 are the levels of service for the worst operating movement at that intersection. The signalized intersection levels of service shown on Figure 42 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Figure 42. The signalized intersection levels of service or delay shown in Figure 42 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement.

North Forth Site (Alternative D, E)

Existing (2008) Conditions

Figures 43, 44, and 45 show the Existing (2008) lane configurations and intersection control, AM and PM peak hour intersection traffic volumes, and resulting Existing (2008) levels of service for the North Fork Site. The Existing (2008) lane configurations and intersection control are also used in the following analysis scenarios:

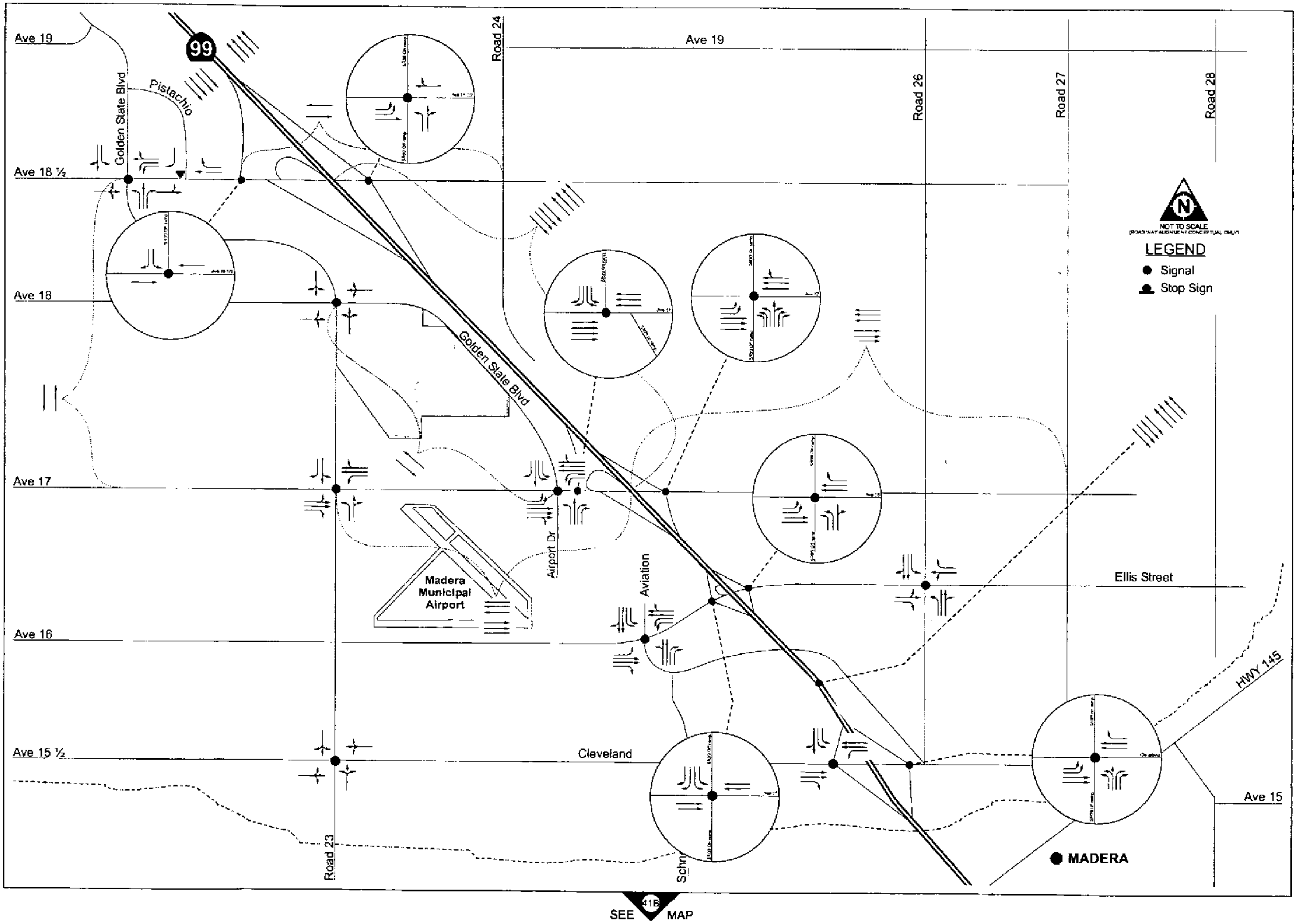
- Opening Day (2010) No Project
- Opening Day (2010) Project
- 2030 No Project
- 2030 Project

The TWSC levels of service shown on Figure 45 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 45 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 45.

Opening Day (2010) No Project Conditions

Alternative E (No Project Alternative)

Figures 46 and 47 show the Opening Day (2010) No Project Alternative E AM and PM peak hour intersection traffic volumes, and resulting Opening Day (2010) No Project Alternative E levels of service for the North Fork Site. The TWSC levels of service shown on Figure 47 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 47 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 47.



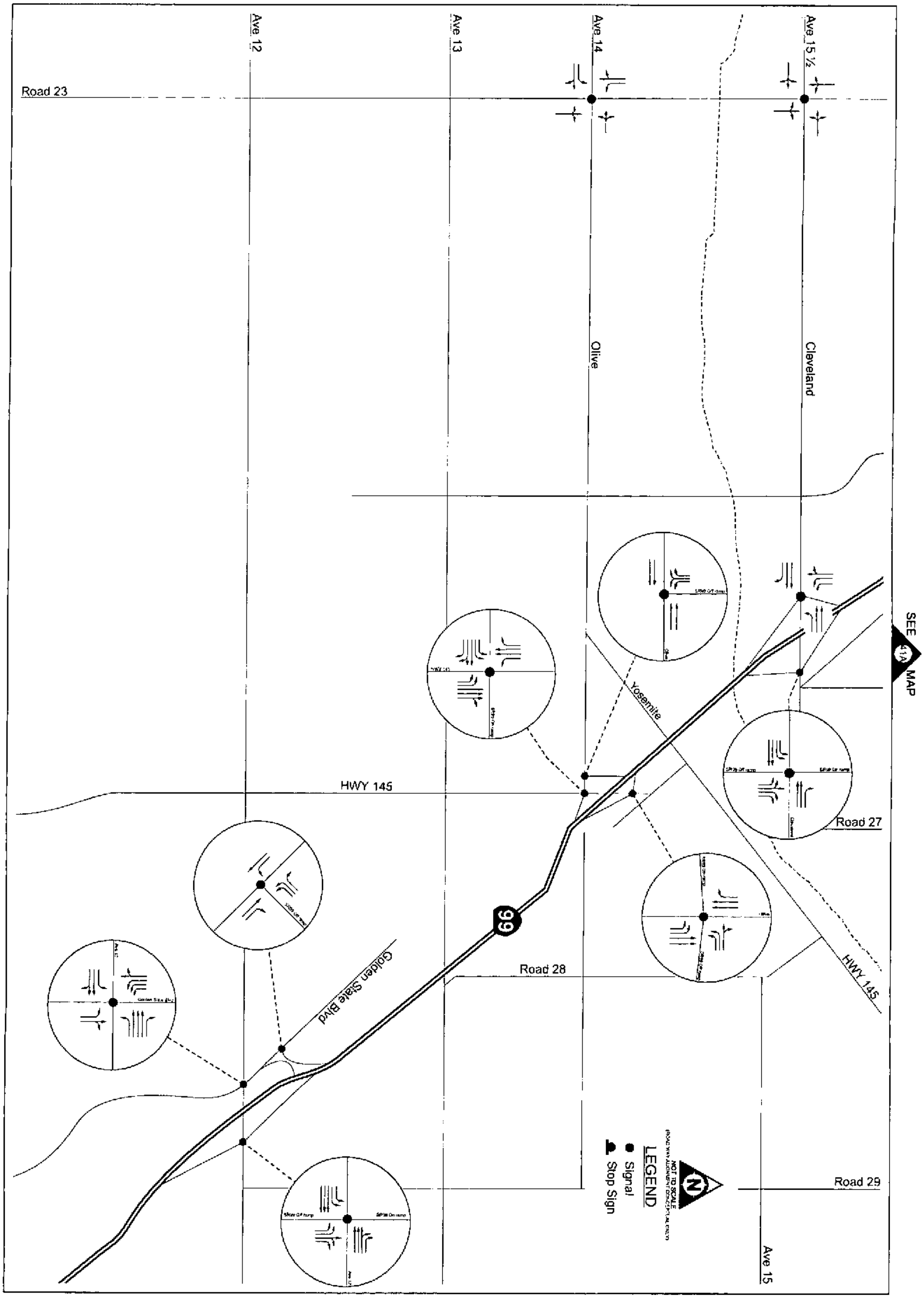
LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 41

04-837.2



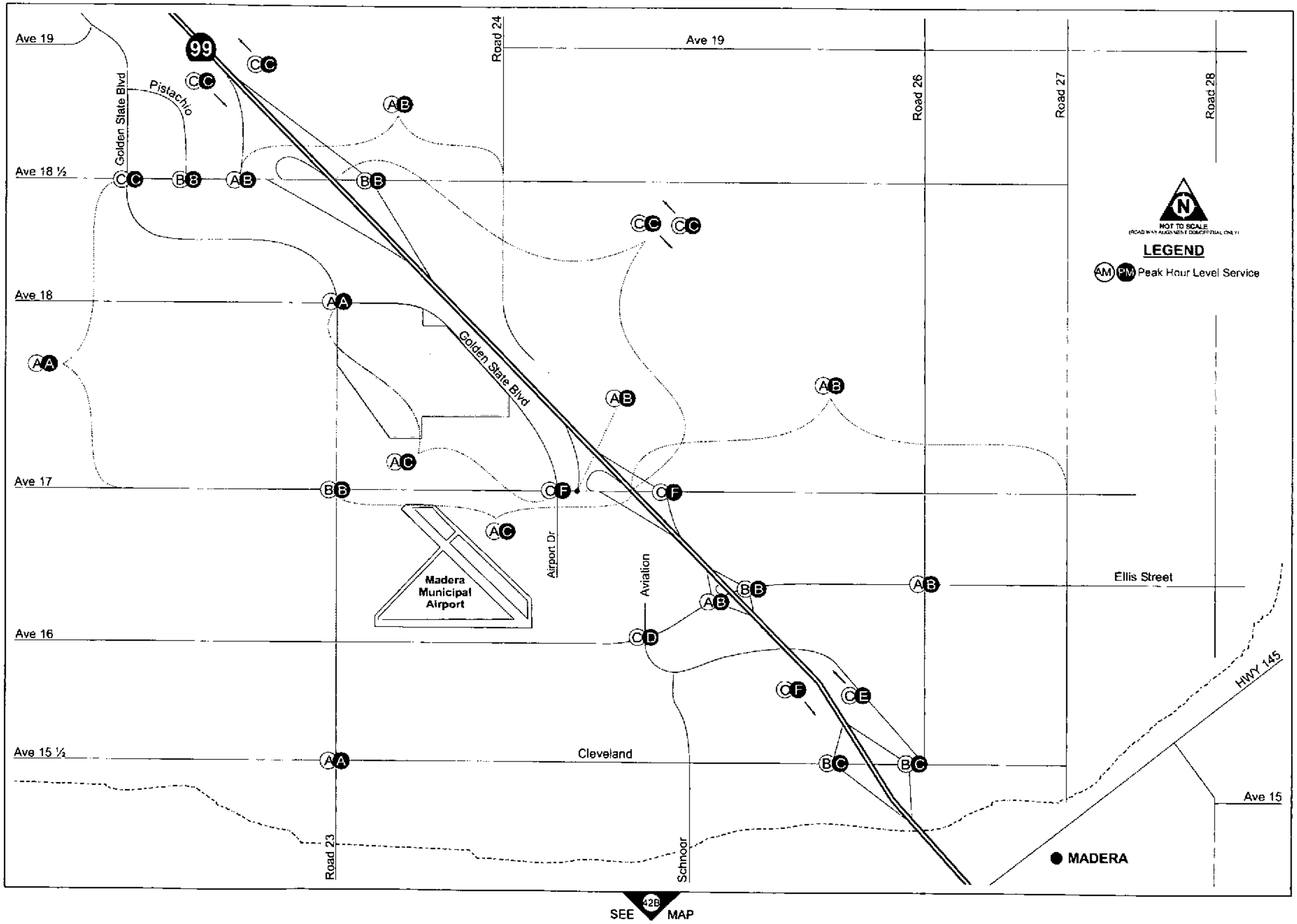
LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

04-637.2

Figure 41



LEVELS OF SERVICE

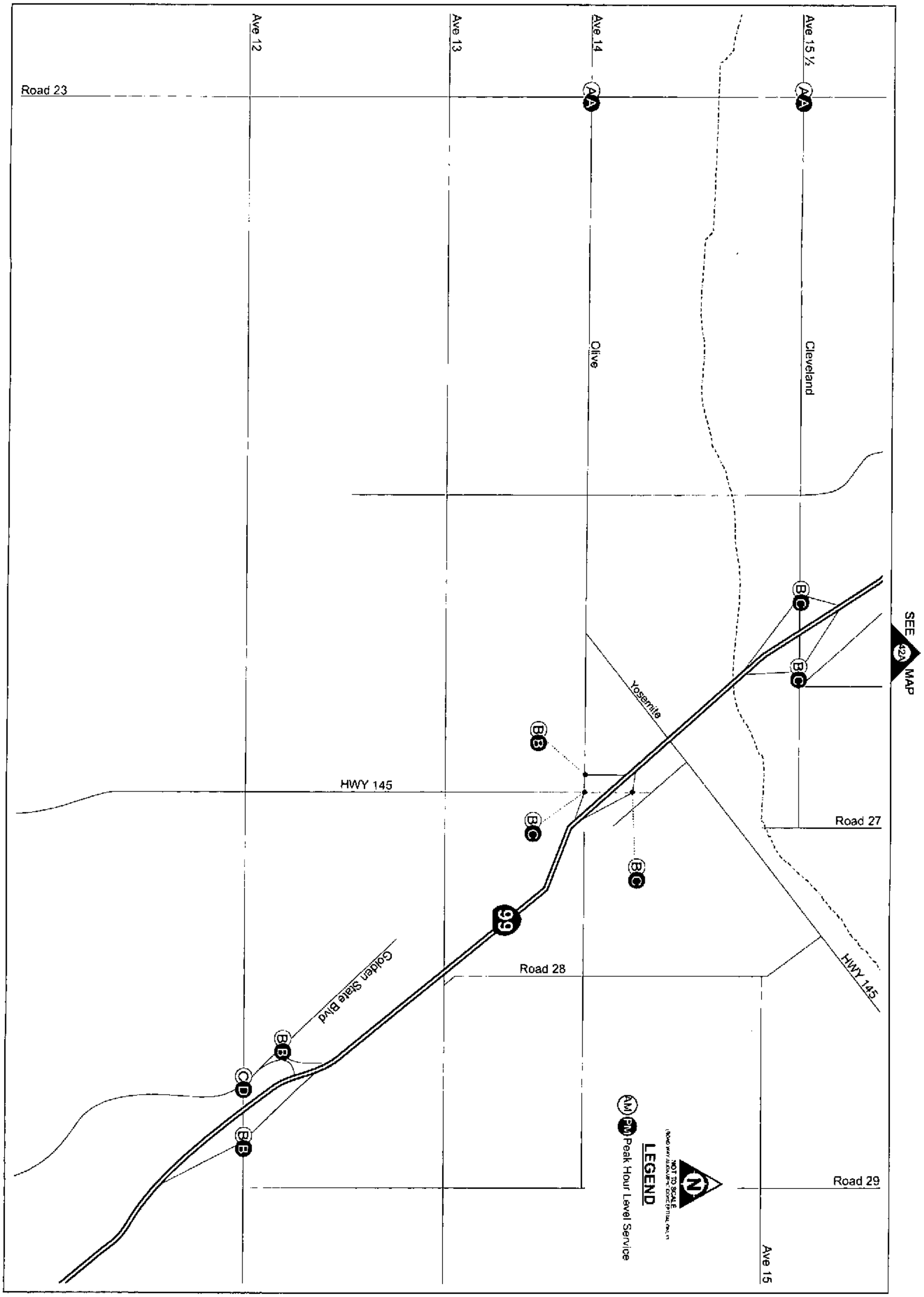
Mitigated 2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 42

04-637.2

IPG Consulting



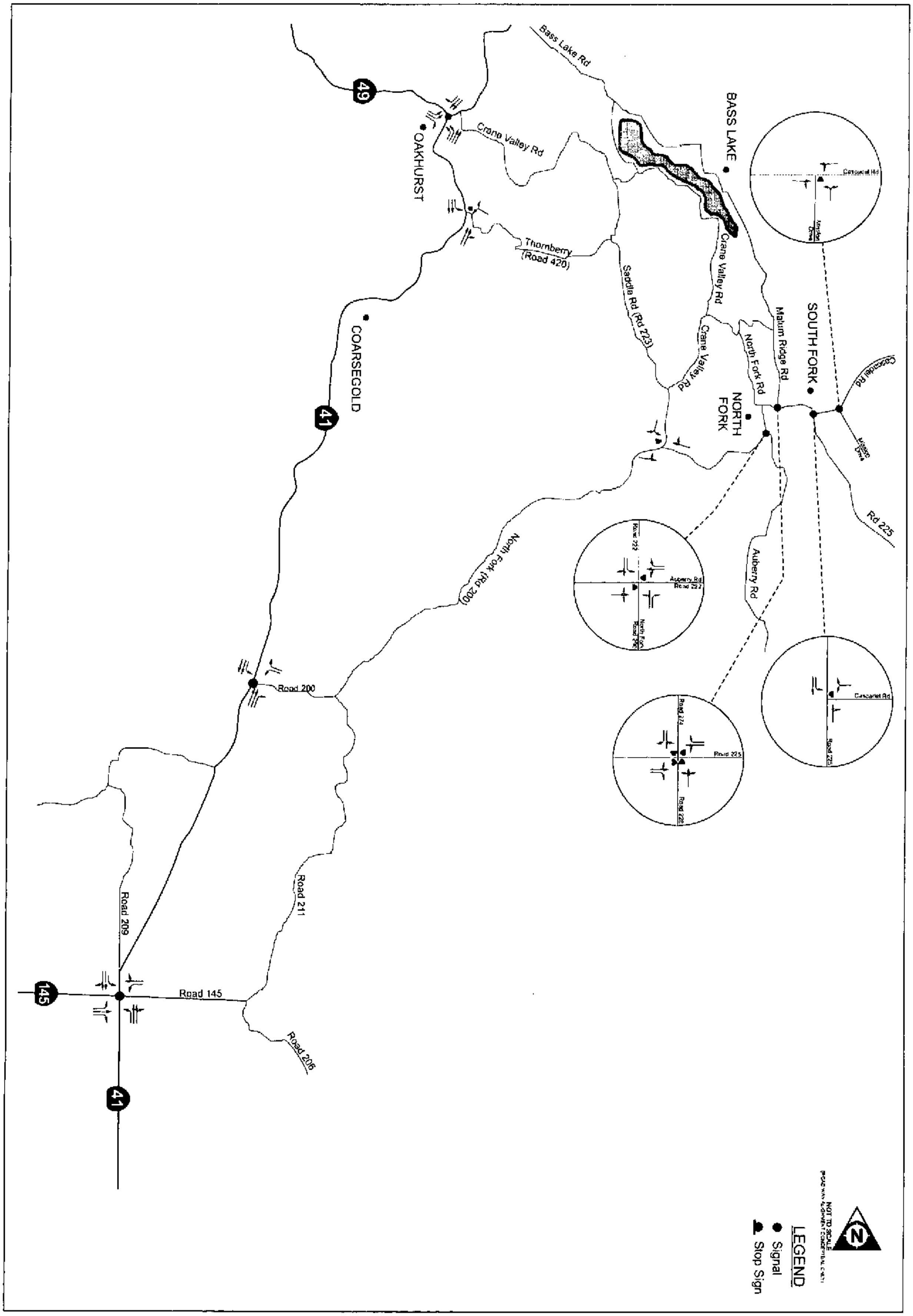
LEVELS OF SERVICE

Mitigated 2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

04-837.2

Figure 42



TPG Consulting

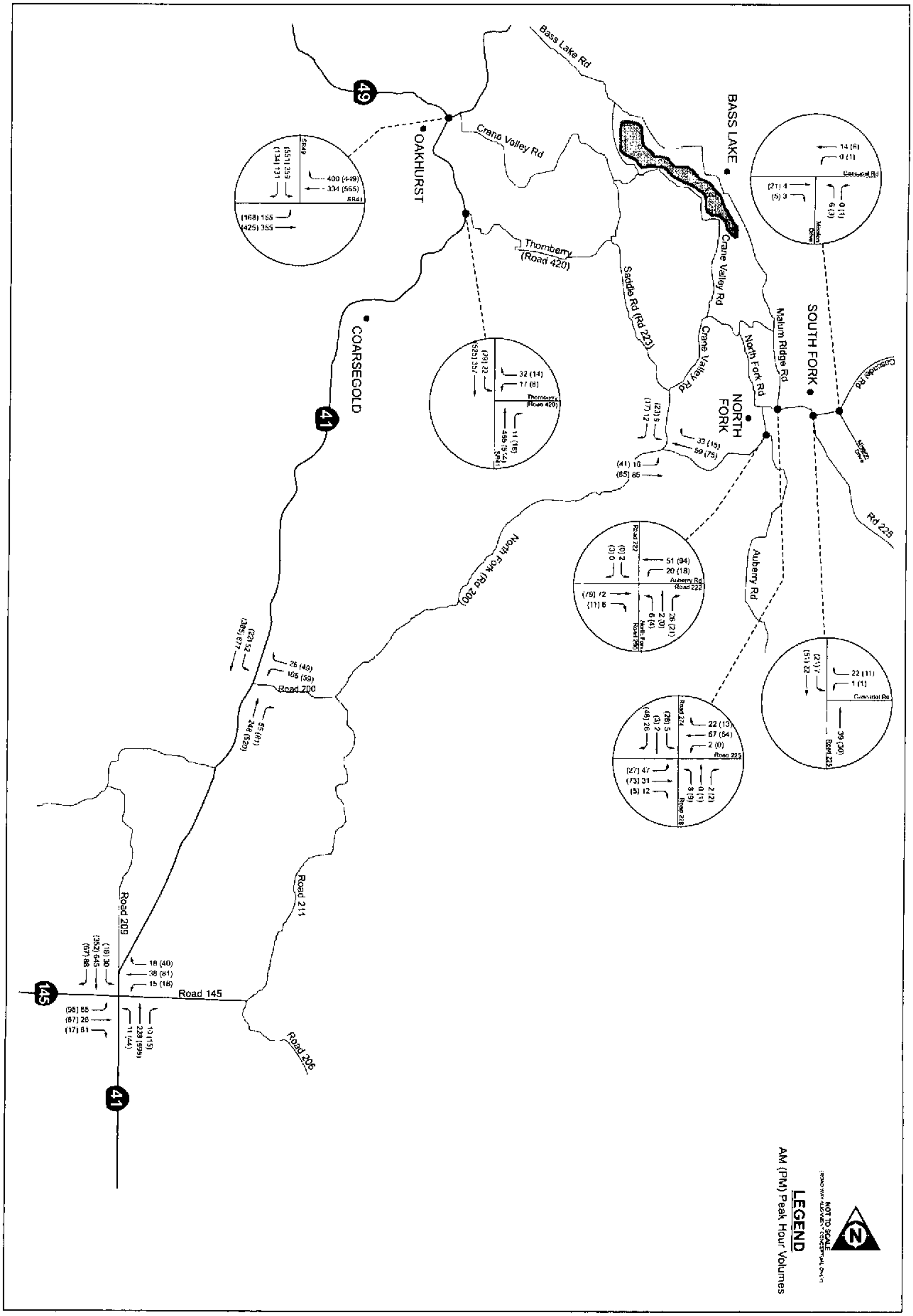
LANE CONFIGURATION AND INTERSECTION CONTROL

Existing
North Fork Site
(Alternative D)

North Fork Casino
Madera County

04-637.2

Figure 43



TPG Consulting

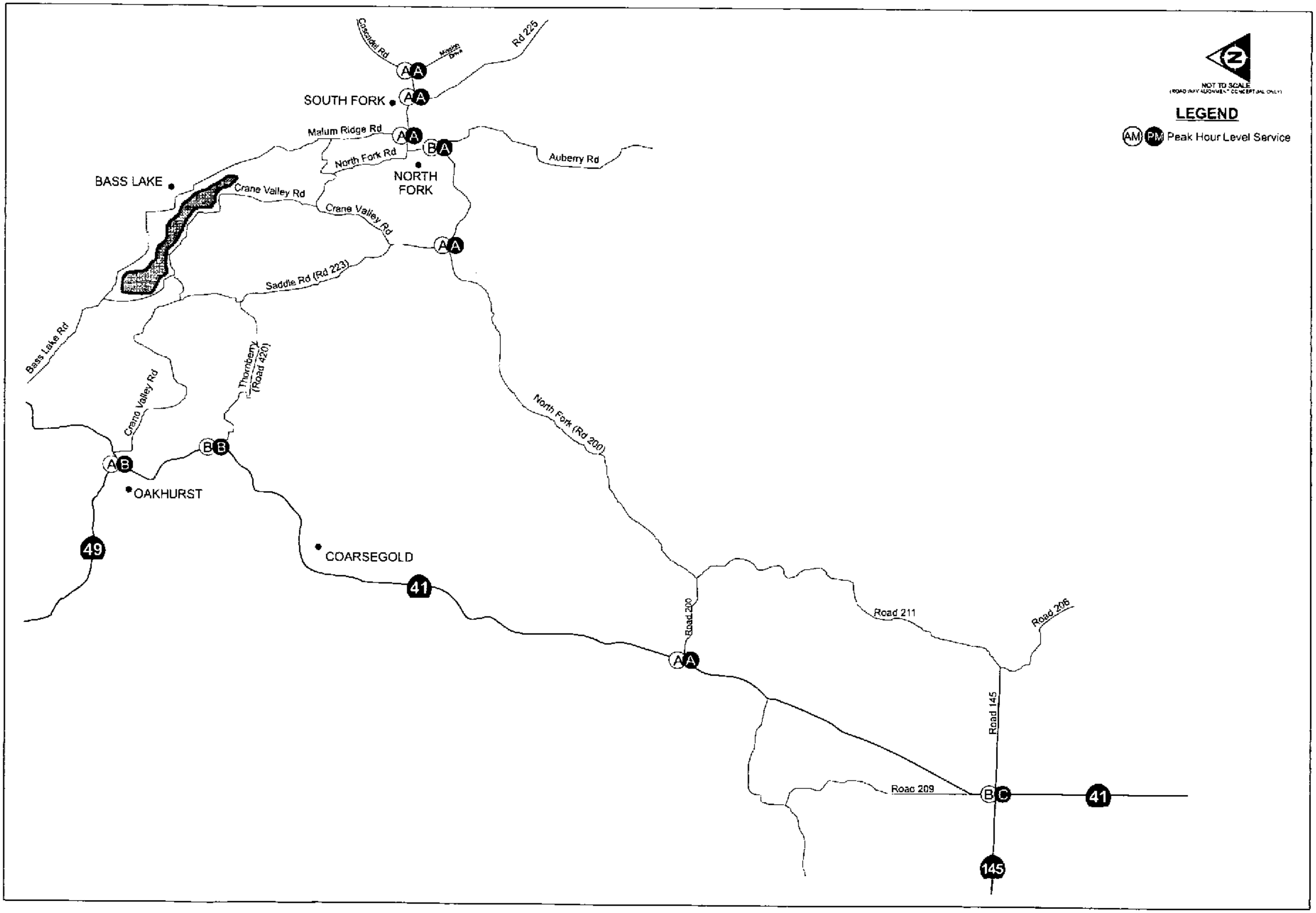
PEAK HOUR TRAFFIC VOLUMES

Existing
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 44

04-837.2



LEVEL OF SERVICE

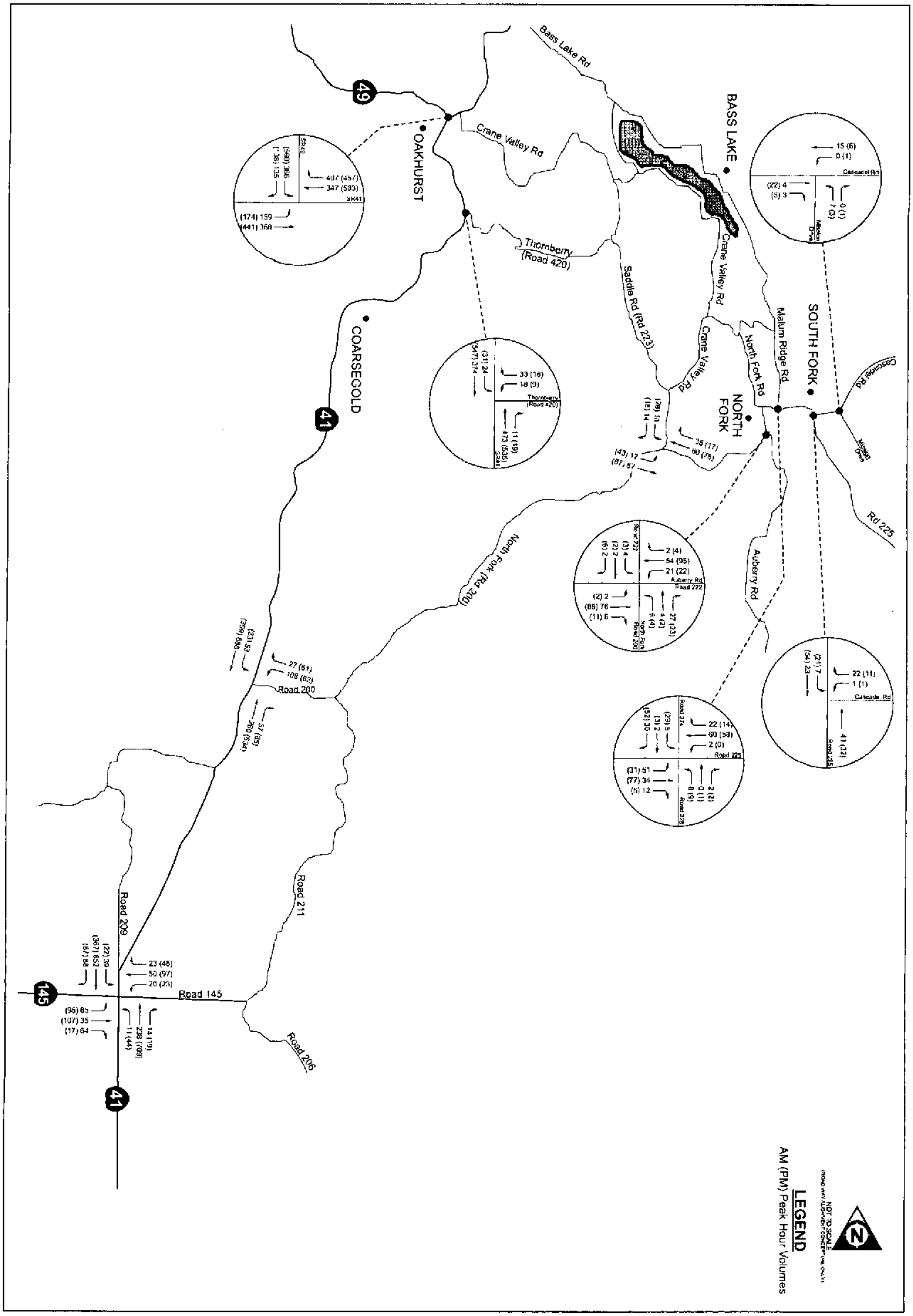
Existing
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 45

04-837.2

IPG CONSULTING



IPG CONSULTING

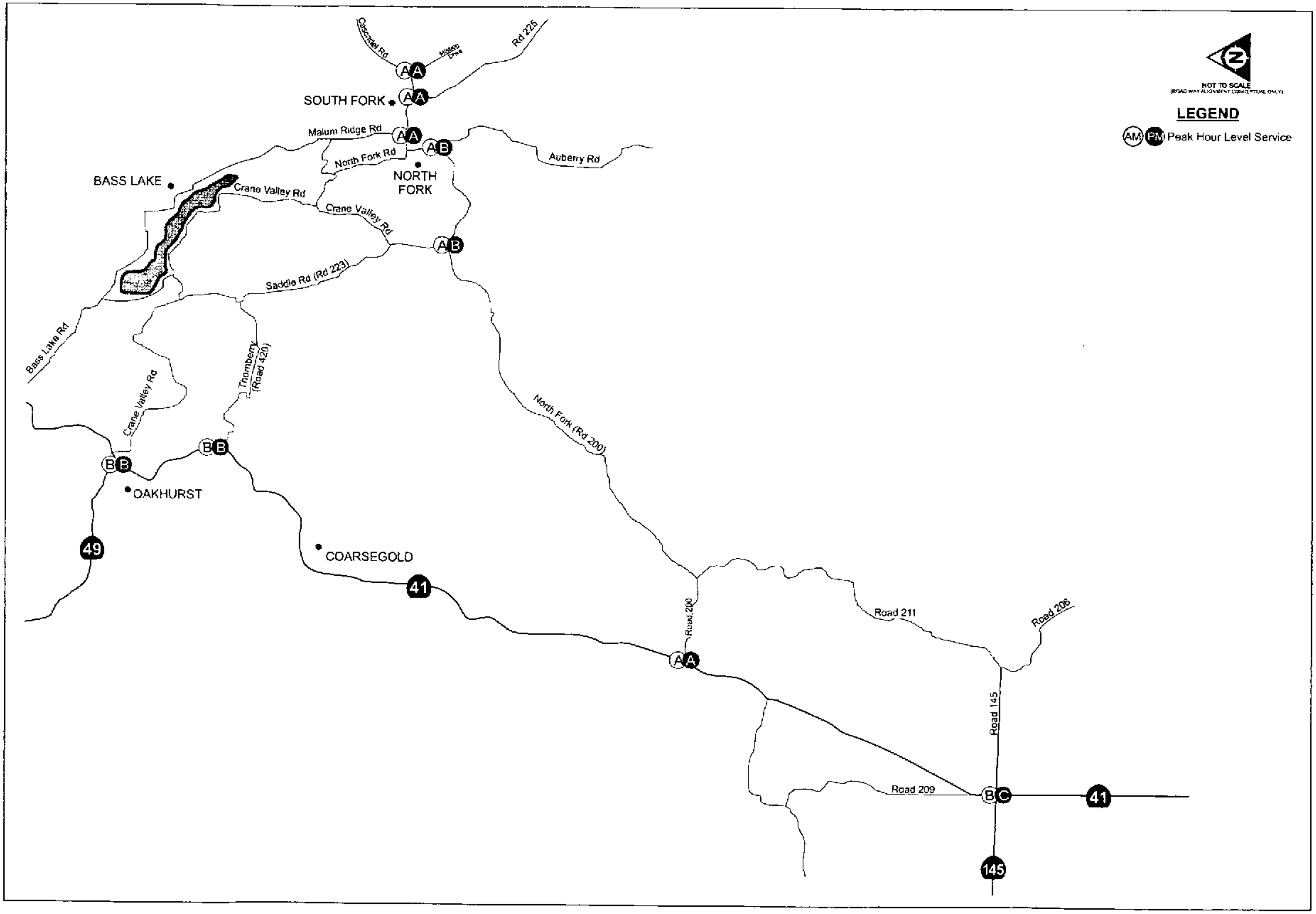
PEAK HOUR TRAFFIC VOLUMES

2010 No Project
North Fork Site
(Alternative E)

North Fork Casino
Madera County

04-837.2

Figure 46



LEVEL OF SERVICE

2010 No Project
North Fork Site
(Alternative E)

North Fork Casino
Madera County

Figure 47

04-837.2

Opening Day (2010) Project Conditions

Alternative D (Off-site Alternative)

Figures 48 and 49 show the Opening Day (2010) Project Alternative D AM and PM peak hour intersection traffic volumes, and resulting Opening Day (2010) Project Alternative D levels of service for the North Fork Site. The TWSC levels of service shown on Figure 49 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 49 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 49.

2030 No Project Conditions

Alternative E (No Project Alternative)

Figures 50 and 51 show the 2030 No Project Alternative E AM and PM peak hour intersection traffic volumes, and resulting 2030 No Project Alternative E levels of service for the North Fork Site. The TWSC levels of service shown on Figure 51 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 51 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 51.

2030 Project Conditions

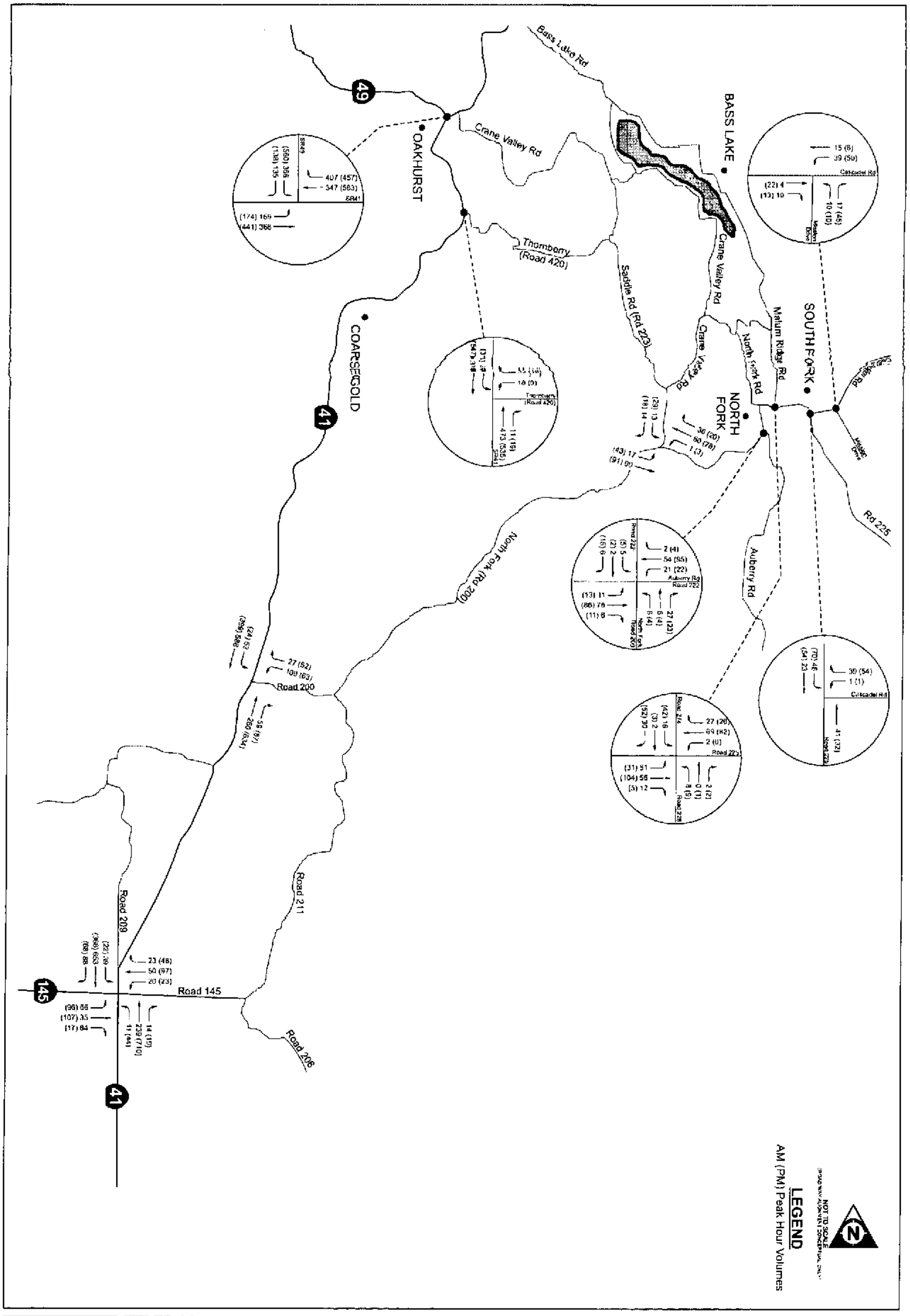
Alternative D (Off-site Alternative)

Figures 52 and 53 show the 2030 Project Alternative D AM and PM peak hour intersection traffic volumes and resulting 2030 Project Alternative D levels of service for the North Fork Site. The TWSC levels of service shown on Figure 53 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 53 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 53.

Mitigated 2030 Project Conditions

Alternative D (Off-site Alternative)

Figures 54 and 55 show the Mitigated 2030 Project Alternative D lane configurations and intersection control, and resulting Mitigated 2030 Project Alternative D levels of service for the North Fork Site. The TWSC levels of service shown on Figure 55 are the levels of service for the worst operating movement at that intersection. The signalized and AWSC intersection levels of service shown on Figure 55 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Figure 55.



PEAK HOUR TRAFFIC VOLUMES

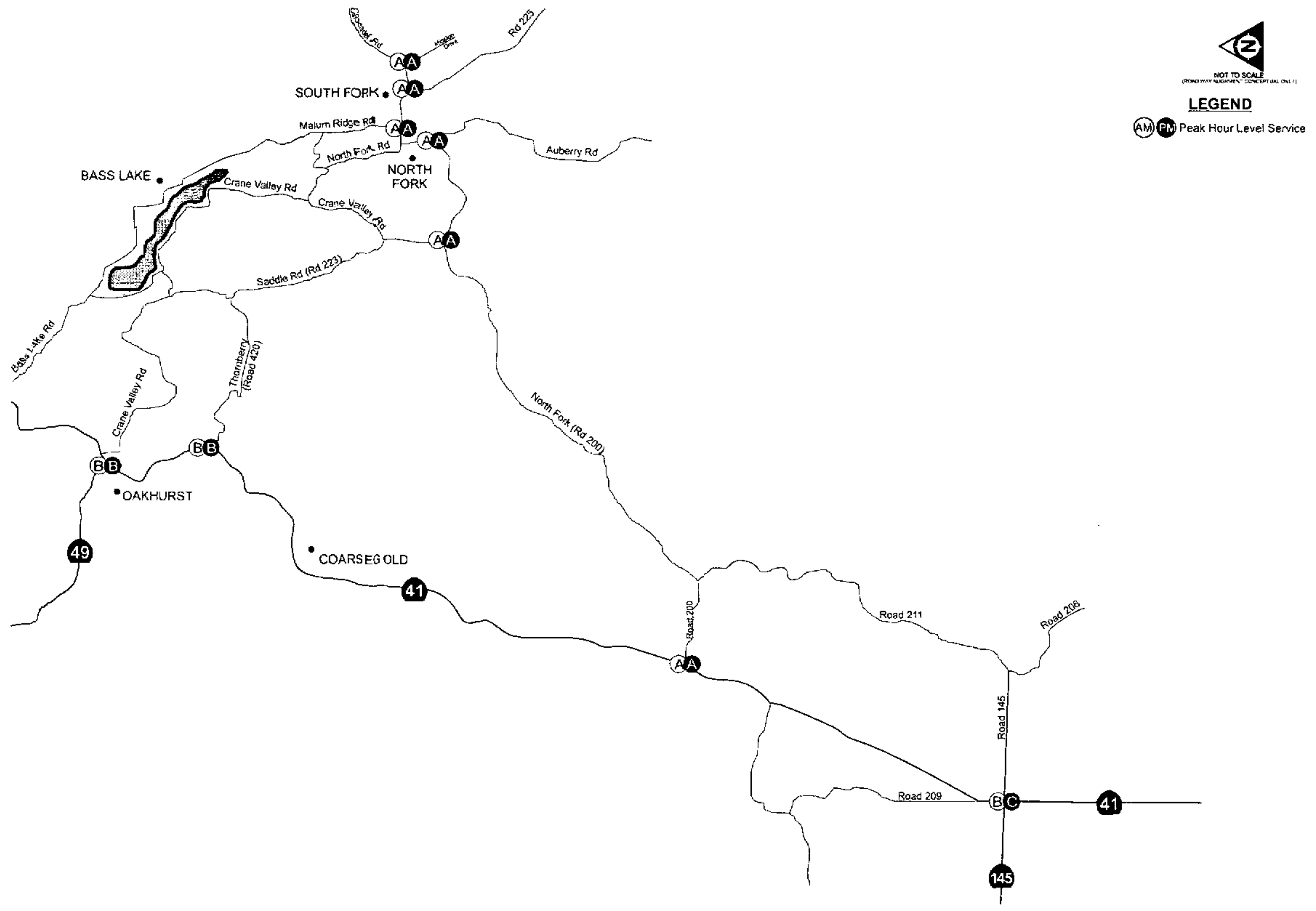
2010 Project
North Fork Site
(Alternative D)

IPG Consulting

North Fork Casino
Madera County

Figure 48

04-837.2

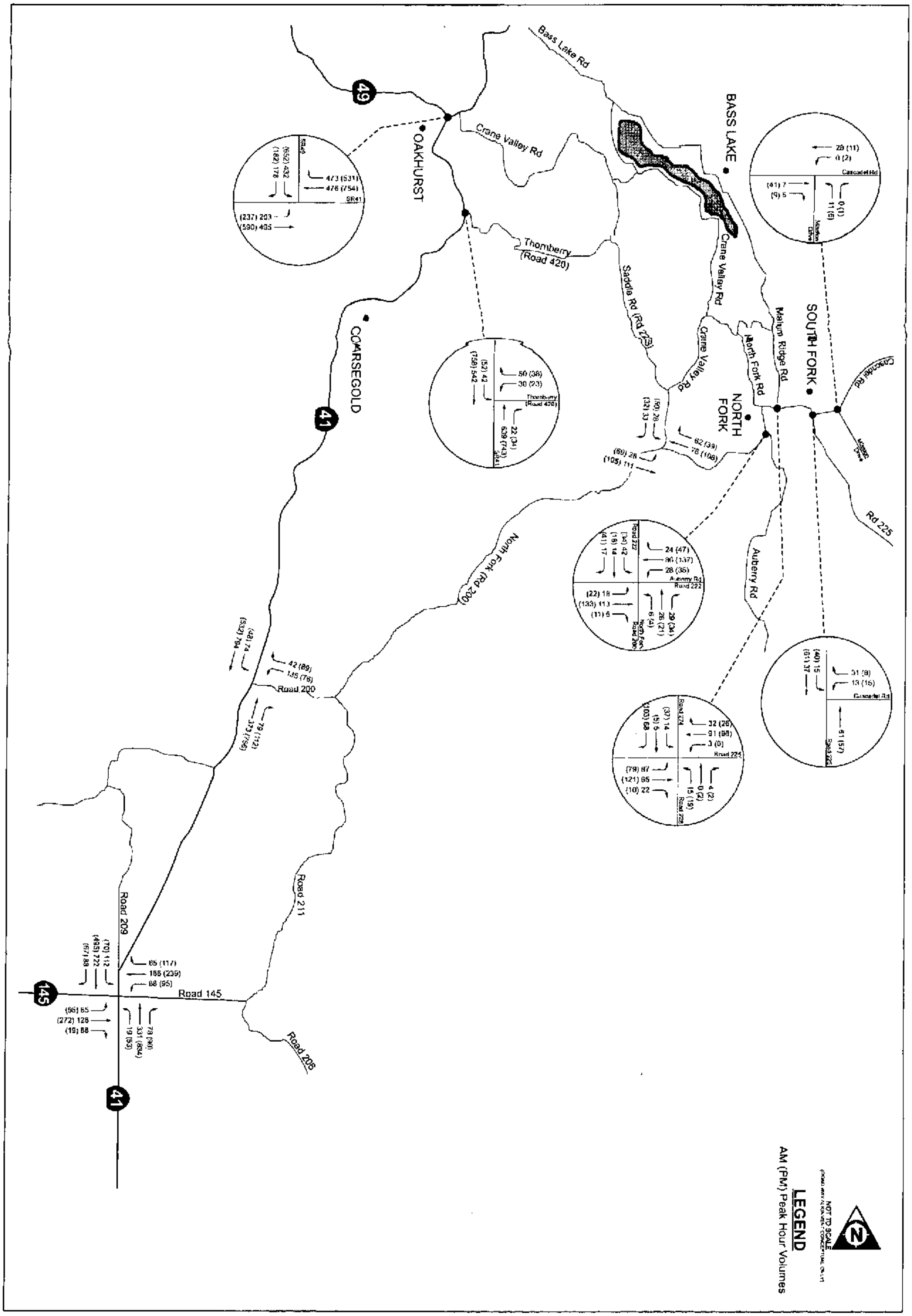


LEVEL OF SERVICE
2010 Project
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 49

04-837.2



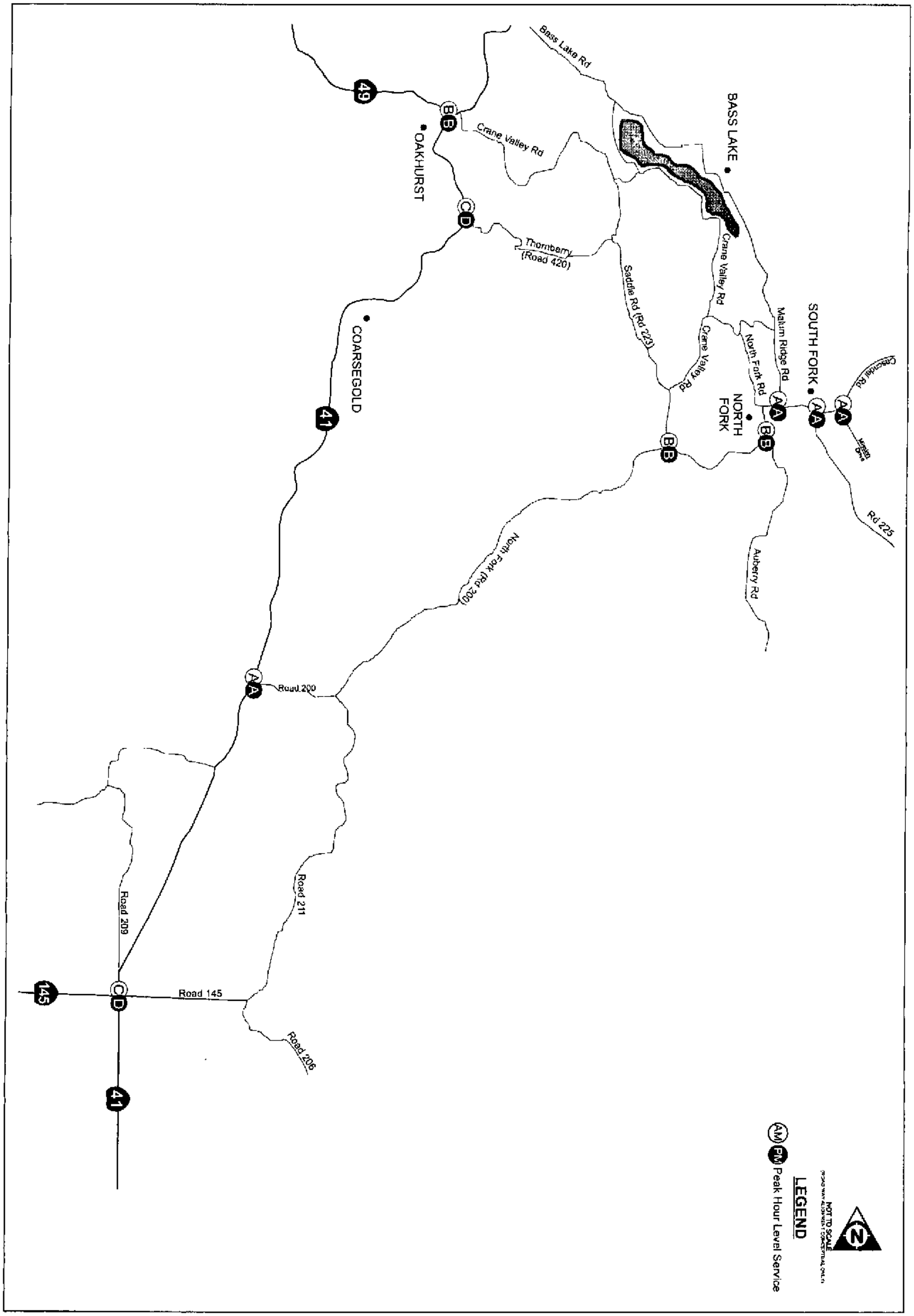
TPG CONSULTING

PEAK HOUR TRAFFIC VOLUMES
2030 No Project
North Fork Site
(Alternative E)

North Fork Casino
Madera County

04-637.2

Figure 50



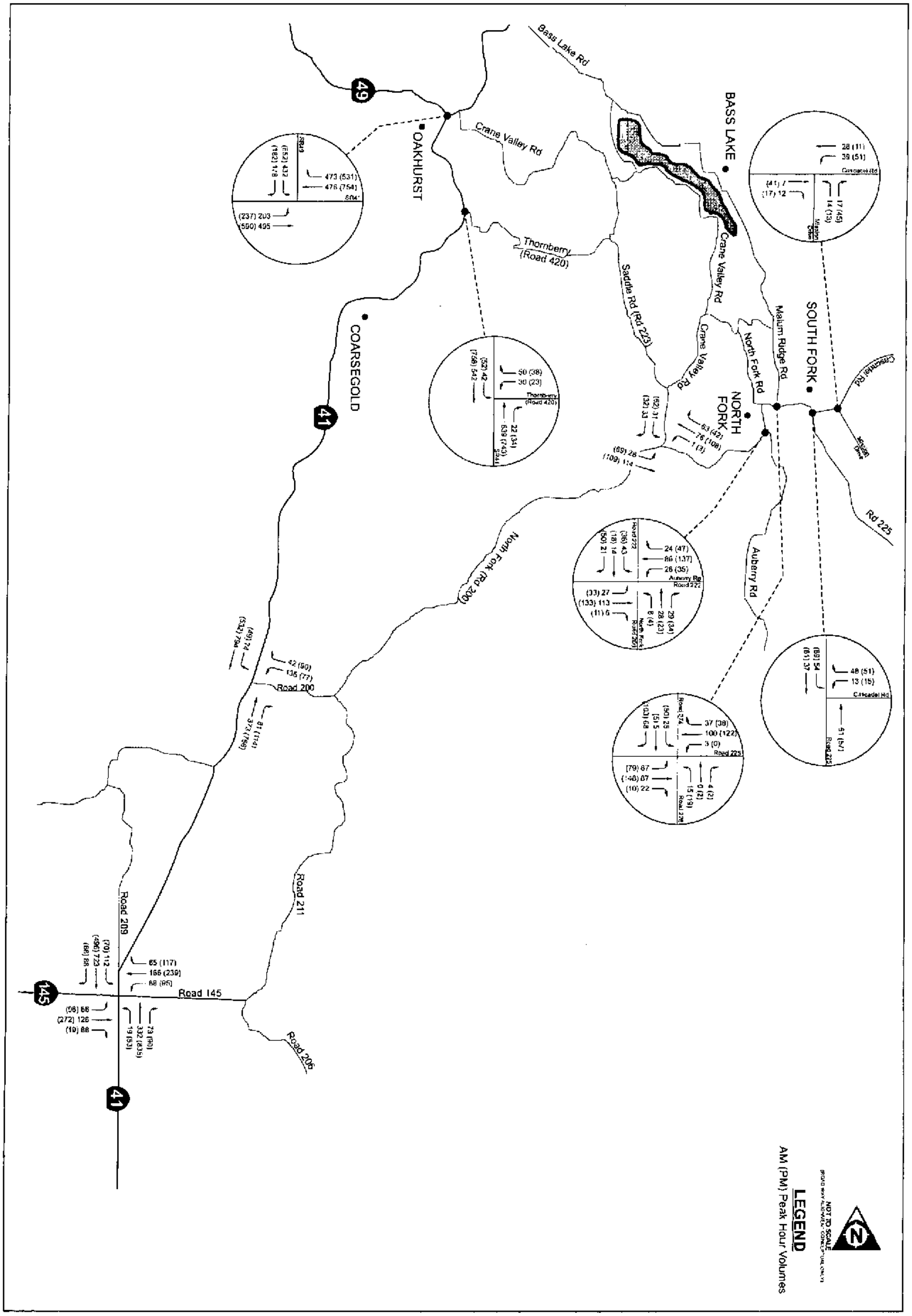
IPG Consulting

LEVEL OF SERVICE
2030 No Project
North Fork Site
(Alternative E)

North Fork Casino
Madera County

Figure 51

04-837.2



TPG CONSULTING

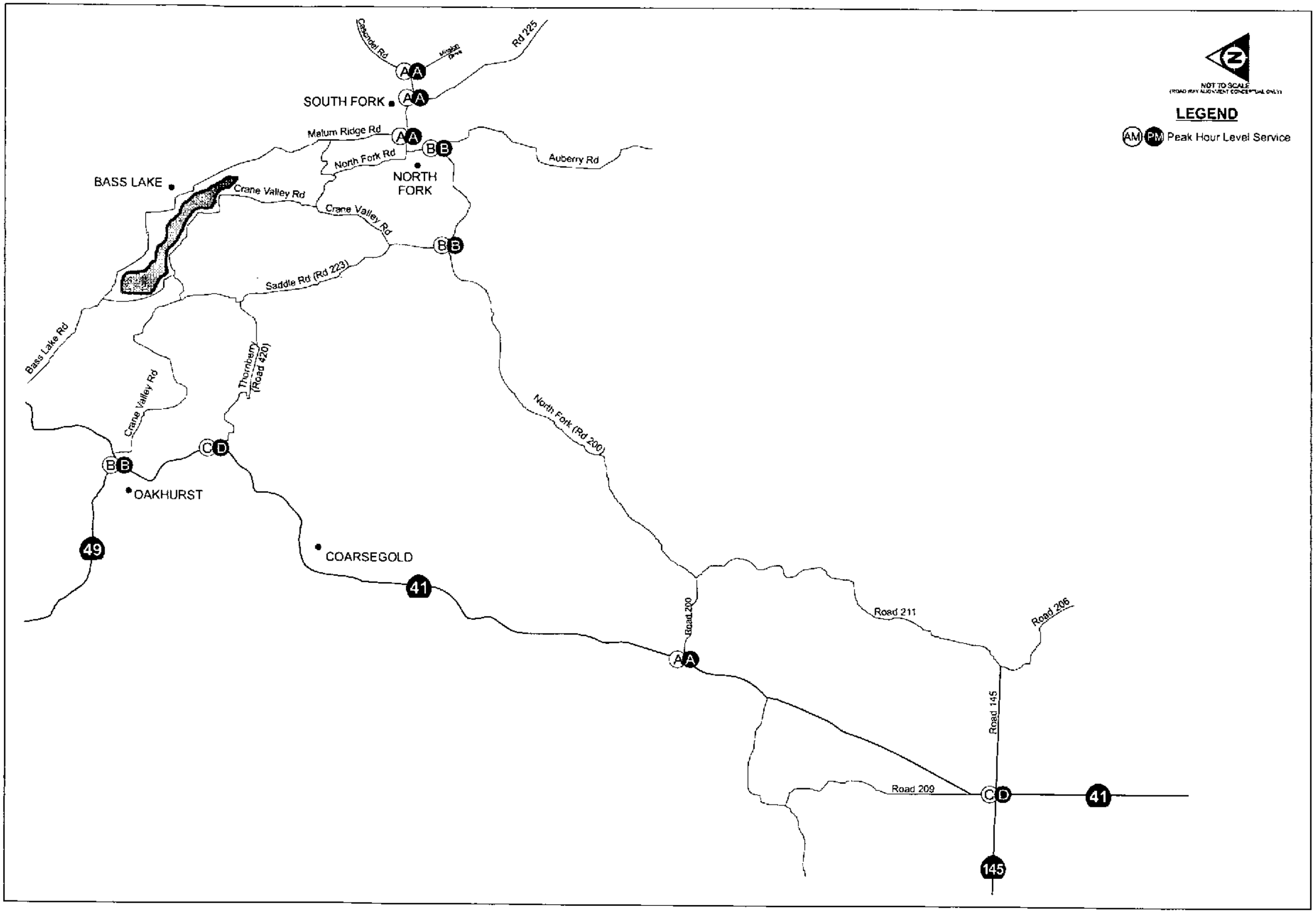
PEAK HOUR TRAFFIC VOLUMES

2030 Project
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 52

04-837.2



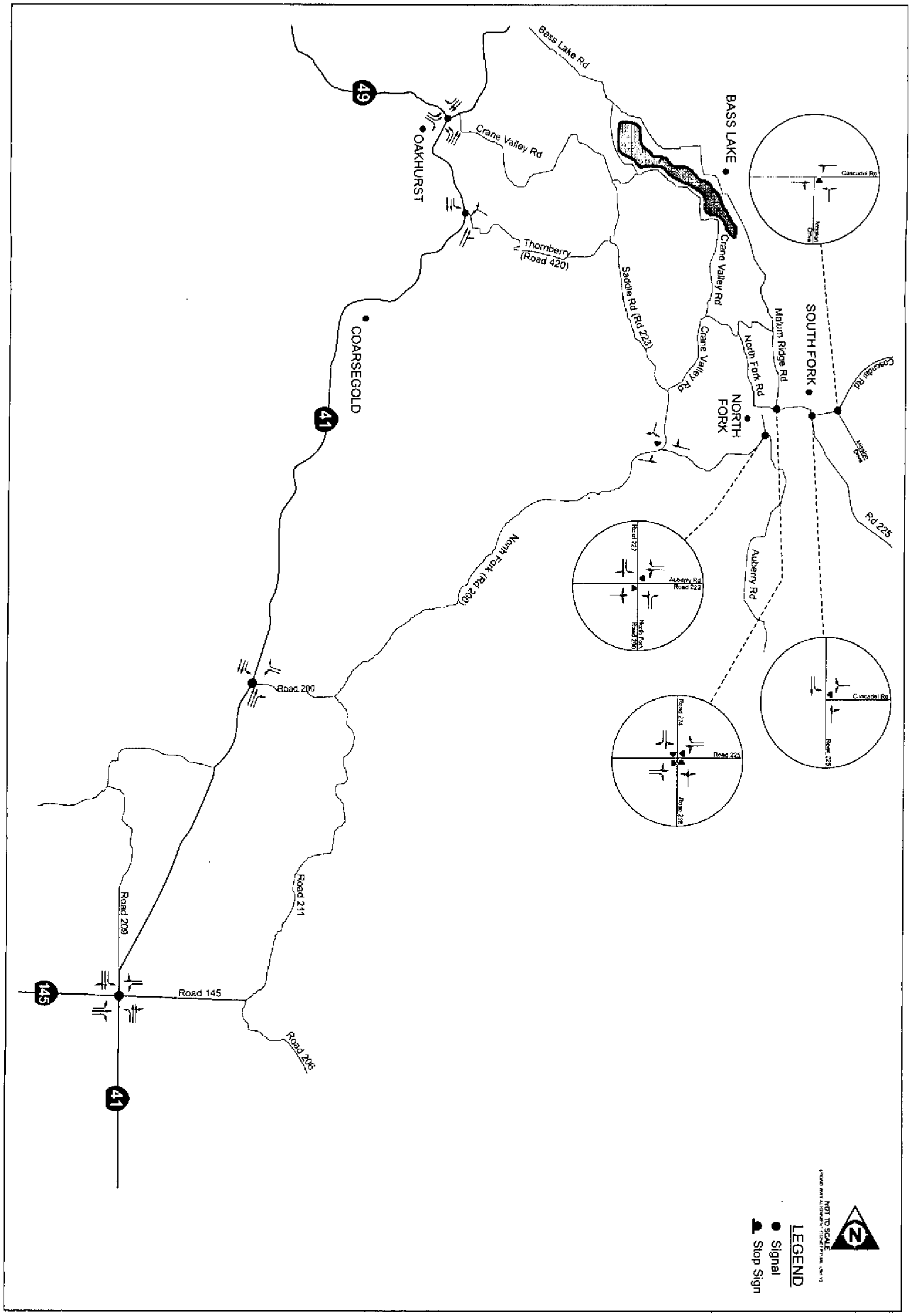
LEVEL OF SERVICE
2030 Project
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 53

04-837.2

IPG Consulting



LANE CONFIGURATION AND INTERSECTION CONTROL

Mitigated 2030 Project
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 54

04-837.2

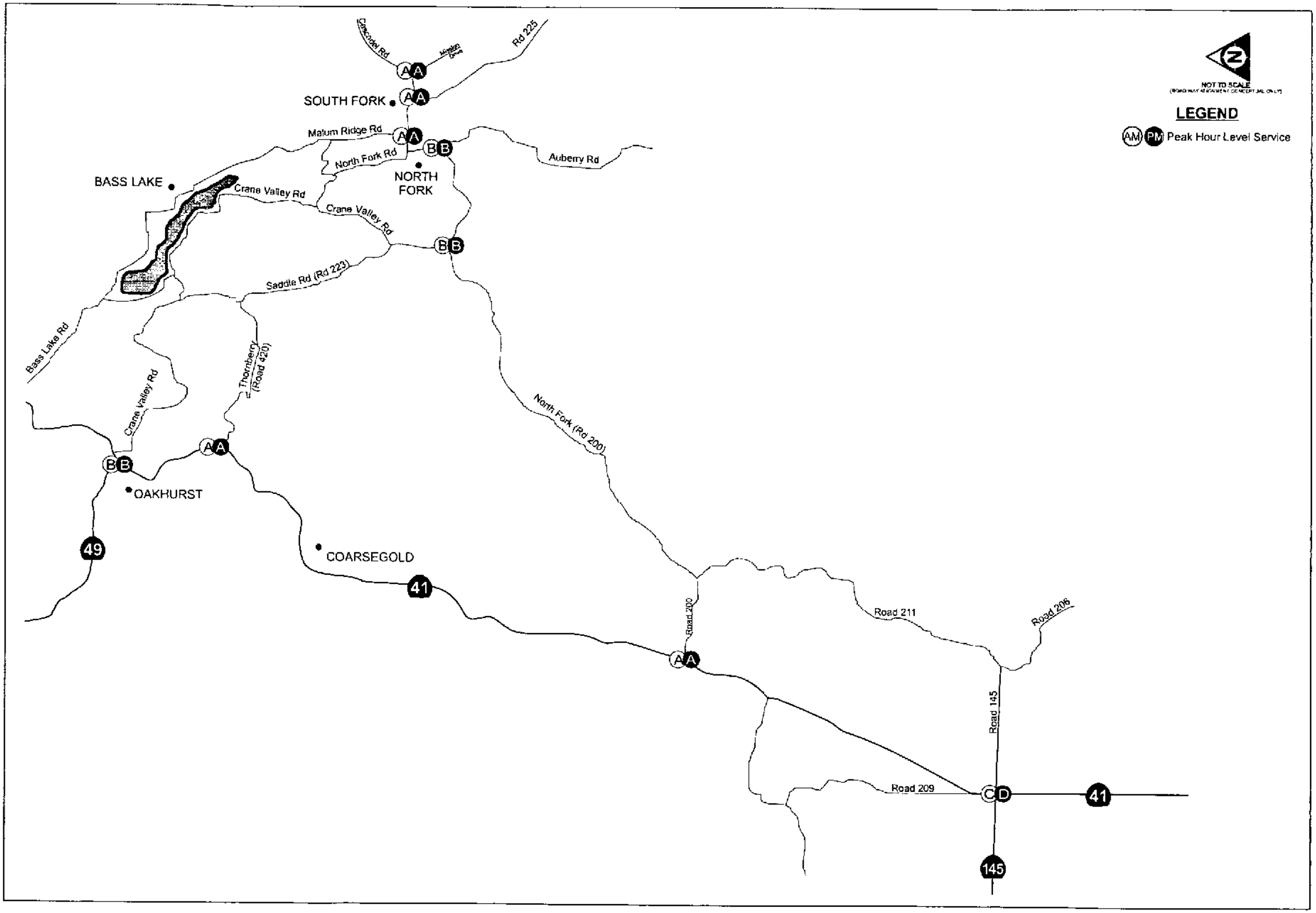
LEVEL OF SERVICE

Mitigated 2030 Project
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 55

04-837.2



C. PROJECT TRIP GENERATION

Trip Rates and Resulting Trips by Component

Alternative A, B, D

Casino Gaming Facility/Hotel Trip Rate Data Sources

Per the County of Madera scoping letter, "Project trip generation should be based upon those standards contained within the ITE periodicals, relevant publications by other entities such as the San Diego Area Association of Governments (SANDAG), or actual counts at local casinos." AES, National Environmental Policy Act (NEPA) preparer for this Project, provided copies of two (2) recent casino-hotel traffic studies, which were to be used to develop appropriate trip generation information for use in this study. The Shingle Springs Rancheria Interchange Project Transportation/Circulation Technical Study and the Enterprise Rancheria Casino-Hotel Traffic Impact Study have both received approval from the Bureau of Indian Affairs (BIA). Both documents have extensive discussions on the research performed to determine an appropriate trip generation rate for Indian gaming facilities and on the trip rates developed for weekday daily, AM and PM peak of the street as well as Saturday peak hour of the generator conditions.

The trip generation rates used in the Shingle Springs Rancheria Interchange Project Transportation/Circulation Technical Study[1] was based on data from five (5) northern California Indian gaming casinos ranging in size from 17,300 sf to 78,000 sf. Inbound and outbound traffic data was collected for a weekday AM peak of the street, a weekday PM peak of the street, and a Saturday peak hour of the generator. The resulting traffic data was then converted to trip generation data for use in the Shingle Springs document using a weighted average rate methodology[2].

The trip generation rates used in the Enterprise Rancheria Casino-Hotel Traffic Impact Study[3] included the data from the Shingle Springs document and additional information from the following sources:

- San Diego County Casino Study
- Mystic Lake Casino Survey
- Barona Indian Gaming Casino Survey
- Sycuan Indian Gaming Casino Survey
- Gaming Casino Traffic Article from Institute of Transportation Engineers (ITE) Journal, March 1998
- Mississippi Gulf Coast Casino Study

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[1] The Shingle Springs Rancheria Project consisted of a 238,500 sf casino complex, a 250 room hotel and a 37,400 sf convention/event center.

[2] Weighted Average Trip Generation Rate – This rate is defined as the number of weighted trip ends per unit of the independent variable. The rate simply assumes a linear relationship between trip ends and the independent variable, having a slope equal to the rate and with the straight line passing through the origin (i.e. with a value of zero for the independent variable, the number of trips generated is zero). The average rates are typically weighted by the units of the independent variable. – Institute of Transportation Engineers (ITE) Trip Generation Handbook, page 7, March 2001.

[3] The Enterprise Casino-Hotel Project consisted of a 207,760 sf casino complex and a 170 room hotel.

The San Diego County Casino Study was developed based on surveys of numerous southern California Indian gaming casinos. This study found that Indian gaming casinos typically generate 100 trips per 1,000 sf of gaming floor area on an average day. Please note that gaming floor area is a subset of a typically much larger casino floor area. Casino floor area usually consists of not only the gaming floor area but also includes restrooms, administration areas, entryways, and food/beverage areas. This report also determined that when a hotel is part of a casino-hotel establishment, that the daily trip rate for the hotel was 3.0 trips per room rather than the typical 8.23 trips per room rate found in the *Trip Generation* manual.

Trip rates for the Mystic Lake Casino, a large stand-alone Indian gaming casino-hotel facility located in southwestern Minnesota, were based on surveys of existing weekday PM peak hour and Saturday peak hour trips.

Weeklong driveway count data collected for the Barona Indian Gaming Casino, a 120,000 sf Indian gaming casino located in San Diego County, showed that on average, average weekday peak hour traffic volumes are approximately 7% of average weekday daily volumes.

The Sycuan Indian Gaming Casino Survey showed that on average Saturday volumes are 27% higher than volumes on an average weekday. This data was based on weeklong driveway counts.

The March 1998 ITE Journal article summarized the results of year long traffic counts at two (2) St. Louis, Missouri area casinos. This article provides conversion factors that can be used to convert trip generation rates for one time period to other time periods. This article also showed that on average, average weekday peak hour traffic volumes are approximately 7% of average weekday daily volumes.

The Mississippi Gulf Coast Casino Study surveyed traffic volumes at eight casinos on a Saturday along the Mississippi coast. This study included four (4) casinos with hotel facilities and four (4) casinos without hotel facilities, and provided an opportunity to see how the presence of a hotel effects trip generation.

Casino Gaming Facility Trip Rates

Alternative A (Proposed Project Alternative)

To develop the casino trip generation information used in this study for Alternative A, TPG utilized the data sources and survey data described in the *Casino Gaming Facility/Hotel Trip Rate* data sources discussed previously. Table 24 shows the resulting average weekday daily and peak of street trip rates derived from the data sources and used in this study for the casino portion of the Project.

TABLE 24:
CASINO GAMING FACILITY TRIP GENERATION DATA
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE)
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

Land Use	Period	Average Rate[1]	Directional Distribution (%) Enter	Directional Distribution (%) Exit
Casino (per ksf casino floor area)	Daily	45.30	50	50
	AM Peak of Street	2.36	70	30
	PM Peak of Street	3.93	53	47

[1] *Trips per 1,000 square feet* *ksf = 1,000 square feet*

The data shown in Table 24 consists of the following:

- Type of land use – casino
- Time period – average weekday daily or average weekday AM/PM peak hour of street
- Average trip generation rate – the number of trips generated per time period per 1,000 sf of casino floor area
- Directional distribution percentage – enter and exit

As shown in Table 24, the 268,480 sf Alternative A casino is projected to generate 45.30 trips for every 1,000 sf of casino floor area in a 24-hour average weekday period. The 43.50 trips per 1,000 sf of casino floor area was derived based on the San Diego Casino Study survey data that showed Indian gaming casinos typically generated 100 trips per 1,000 sf of gaming floor area on a typical weekday, The Alternative A casino gaming floor area will consist of 121,630 sf, which equates to approximately 12,163 average weekday trips. Converting the trips per 1,000 sf of gaming floor area to trips per 1,000 sf of casino floor area results in a trip rate of 45.30 per 1,000 sf of casino floor area on an average weekday. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period.

Pass-by trips are vehicular trips that are attracted to Project land uses from the existing traffic stream on roadways adjacent to the Project site that have direct access to the Project site. Diverted link trips are similar to pass-by trips, except that they are attracted from nearby roadways that do no have direct access to the Project site. Per the Caltrans *Guide for the Preparation of Traffic Impact Studies*, a 15% pass-by/diverted link rate was applied to the Project casino and hotel uses that would likely show a reduction due to pass-by trips traveling along SR 99 (diverted link) and Road 23 (pass-by).

The Enterprise study PM peak hour trip rate estimate was based in part on the Shingle Springs document but expanded the weighted average rate to include the data from the Barona and Mystic Lake Casinos. Both the Barona and Mystic Lake casinos are larger in size and more closely resemble the Enterprise Casino and the proposed Alternative A Project. The final PM peak of the street trip generation rate used in the Enterprise document was established by averaging together the following two trip rates: (1) the trip rate of 3.48 trips per 1,000 square feet of casino floor area established by plotting the trip rates for seven (7) casinos ranging in size from 17,000 sf to the 447,600 sf with a best fit curve; and (2) the trip rate of 4.37 established from a straight line interpolation of 4.56 trips per 1,000 sf of casino floor area for the Barona casino and 3.87 trips per 1,000 sf of casino floor area for the Mystic Lake casino.

As shown in both the Shingle Springs and the Enterprise documents, the smaller the casino size the greater the number of peak hour trips per 1,000 square feet of casino floor area. Conversely the larger the casino, the small the number of peak hour trips per 1,000 square feet of casino floor area. Both the Shingle Springs Project (238,500 sf) and the Enterprise Casino-Hotel Project (207,760 sf) consisted of smaller casino facilities than will the proposed North Fork Casino Project (268,480 sf). As such, using the Enterprise Project AM/PM peak hour trip generation rates for the North Fork Project should provide a conservative estimate of weekday AM and PM peak hour trips. Therefore, the PM peak hour trip rate of 3.93 trips per 1,000 sf of casino floor area developed in the Enterprise document was also utilized in this study for Alternative A and is shown in Table 24. Per the Barona Indian Gaming Casino Survey and the March 1998 ITE Journal article, average weekday peak hour traffic volumes are approximately 7% of the average weekday daily volumes. Dividing the average weekday PM peak hour trip rate of 3.93 trips per 1,000 sf of casino floor area by the average weekday daily trip rate of 43.50 trips per 1,000 sf of casino floor area shows that the average weekday PM peak hour trip rate is approximately 9% of the average weekday daily rate. Therefore the use of the average weekday PM peak hour trip rate of 3.93 trips per 1,000 sf of casino floor area should be considered a conservative number. Conversion of the 3.93 trips per 1,000 sf of casino floor area to trips per 1,000 sf of gaming floor area results in a PM peak hour trip rate of 8.674 trips per 1,000 sf of gaming floor area.

The Shingle Springs document also collected AM peak of the street data for one of the five (5) northern California casinos. As stated in the Shingles document, very few casino trips are generated in the AM peak of the street time period with the majority of the Project trips occurring during the PM peak of the street time period or in some cases even later evening, such as 7:00 to 9:00 PM. Since the PM peak is considered the worst case, it was considered sufficient for study purposes to collect AM data at only one Casino location. The AM peak of the street casino trips was found to be 60% of the PM peak of the street casino trips. Therefore the AM peak of the street trip generation rate used in the North Fork study for Alternative A is 2.36 trips (3.93*0.6) per 1,000 sf of casino floor area and is shown in Table 24.

Peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and are rarely a 50/50 split. In the case of the casino traffic previous survey data has shown that for an average weekday AM peak of the street condition, the direction percentage is typically 70% entering and 30% exiting, while for the PM peak hour of the street condition, the directional percentage is typically 53% entering and 47% exiting.

Comparison to Chukchansi Casino Trip Rates

To verify that this study was using a conservative set of data assumptions for the development of the Alternative A casino trip generation information, a comparison of trip rates was made between the Alternative A, Proposed Project Alternative, and the Chukchansi Casino. The Chukchansi Casino, which is located in Madera County near the intersection of SR 41 and Lucky Lane, is estimated to consist of the following uses:

- Casino Floor Area – 176,000 sf (52,000 sf of gaming floor area)
- Hotel – 120,000 sf (204 rooms)

Per Caltrans April 11, 2006 letter commenting on the North Fork Casino first draft, the latest PM peak hour counts at the SR 41 and Lucky Lane intersection showed that 358 two directional trips were being generated by the Chukchansi Casino. If a worst case assessment was used, which assumes that the entire 358 PM peak hour trips were generated by the casino as opposed to the 358 PM peak hour trips being generated by a combination of the casino and hotel, the resulting trip rate would be

6.88 trips per 1,000 sf of gaming floor area (358 trips/52 ksf gaming floor area), and 2.034 trips per 1,000 sf of casino floor area (358 trips/176 ksf casino floor area). As shown in the discussion on the development of the Alternative A casino trip rates, this document utilizes an 8.674 trip rate per 1,000 sf of gaming floor area and a 3.93 trip rate per 1,000 sf of casino floor area. Since the proposed Alternative A casino trip rates for either the gaming or casino floor area are greater than those being currently generated by the Chukchansi Casino this analysis should be considered a worst case assessment. Again it should also be noted that typically the smaller the casino size the greater the number of peak hour trips per 1,000 square feet of casino floor area. Conversely the larger the casino size the lower the number of peak hour trips per 1,000 square feet of casino floor area. Therefore since the proposed Alternative A Casino is larger than the current Chukchansi Casino the use of trip generation rates greater than the known rates generated by the Chukchansi Casino should be considered a worst case assessment.

Alternative B (Reduced Intensity Alternative)

To develop the casino trip generation information used in this study for Alternative B, TPG utilized the data sources and survey data described in the *Casino Gaming Facility/Hotel Trip Rate* data sources discussed previously. Table 25 shows the resulting average weekday daily and peak of street trip rates derived from the data sources and used in this study for the casino portion of the Project.

TABLE 25:
CASINO GAMING FACILITY TRIP GENERATION DATA
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE)
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

Land Use	Period	Average Rate[1]	Directional Distribution (%)	
			Enter	Exit
Casino (per ksf casino floor area)	Daily	45.36	50	50
	AM Peak of Street	2.36	70	30
	PM Peak of Street	3.93	53	47

[1] *Trips per 1,000 square feet* *ksf = 1,000 square feet*

The data shown in Table 25 consists of the following:

- Type of land use – casino
- Time period – average weekday daily or average weekday AM/PM peak hour of street
- Average trip generation rate – the number of trips generated per time period per 1,000 sf of casino floor area
- Directional distribution percentage – enter and exit

As shown in Table 25, the 198,990 sf Alternative B casino is projected to generate 45.36 trips for every 1,000 sf of casino floor area in a 24-hour average weekday period. The 43.56 trips per 1,000 sf of casino floor area was derived based on the San Diego Casino Study survey data that showed Indian gaming casinos typically generated 100 trips per 1,000 sf of gaming floor area on a typical weekday, The Alternative B casino gaming floor area will consist of 90,255 sf, which equates to approximately 9,026 average weekday trips. Converting the trips per 1,000 sf of gaming floor area to trips per 1,000 sf of casino floor area results in a trip rate of 45.36 per 1,000 sf of casino floor area on an average weekday. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period.

Pass-by trips are vehicular trips that are attracted to Project land uses from the existing traffic stream on roadways adjacent to the Project site that have direct access to the Project site. Diverted link trips are similar to pass-by trips, except that they are attracted from nearby roadways that do no have direct access to the Project site. Per the Caltrans *Guide for the Preparation of Traffic Impact Studies*, a 15% pass-by/diverted link rate was applied to the Project casino use that would likely show a reduction due to pass-by trips traveling along SR 99 (diverted link) and Road 23 (pass-by).

As stated previously, the Enterprise study PM peak hour trip rate estimate was based in part on the Shingle Springs document but expanded the weighted average rate to include the data from the Barona and Mystic Lake Casinos. Both the Barona and Mystic Lake casinos are larger in size and more closely resemble the Enterprise Casino and the proposed Alternative B Project. The final PM peak of the street trip generation rate used in the Enterprise document was established by averaging together the following two trip rates: (1) the trip rate of 3.48 trips per 1,000 square feet of casino floor area established by plotting the trip rates for seven (7) casinos ranging in size from 17,000 sf to the 447,600 sf with a best fit curve; and (2) the trip rate of 4.37 established from a straight line interpolation of 4.56 trips per 1,000 sf of casino floor area for the Barona casino and 3.87 trips per 1,000 sf of casino floor area for the Mystic Lake casino.

The PM peak hour trip rate of 3.93 trips per 1,000 sf of casino floor area developed in the Enterprise document was also utilized in this study for Alternative B and is shown in Table 25. Per the Barona Indian Gaming Casino Survey and the March 1998 ITE Journal article, average weekday PM peak hour traffic volumes are approximately 7% of the average weekday daily volumes. Dividing the average weekday PM peak hour trip rate of 3.93 trips per 1,000 sf of casino floor area by the average weekday daily trip rate of 43.50 trips per 1,000 sf of casino floor area shows that the average weekday PM peak hour trip rate is approximately 9% of the average weekday daily rate. Therefore the use of the average weekday PM peak hour trip rate of 3.93 trips per 1,000 sf of casino floor area should be considered a conservative number.

The Shingle Springs document also collected AM peak of the street data for one of the five (5) northern California casinos. As stated in the Shingles document, very few casino trips are generated in the AM peak of the street time period with the majority of the Project trips occurring during the PM peak of the street time period or in some cases even later evening, such as 7:00 to 9:00 PM. Since the PM peak is considered the worst case, it was considered sufficient for study purposes to collect AM data at only one Casino location. The AM peak of the street casino trips was found to be 60% of the PM peak of the street casino trips. Therefore the AM peak of the street trip generation rate used in the North Fork study for Alternative B is 2.36 trips (3.93*0.6) per 1,000 sf of casino floor area and is shown in Table 25.

Peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and are rarely a 50/50 split. In the case of the casino traffic previous survey data has shown that for an average weekday AM peak of the street condition, the direction percentage is typically 70% entering and 30% exiting, while for the PM peak hour of the street condition, the directional percentage is typically 53% entering and 47% exiting.

Alternative D (Off-Site Alternative)

To develop the casino trip generation information used in this study for Alternative D, TPG utilized the data sources and survey data described in the *Casino Gaming Facility/Hotel Trip Rate* data sources discussed previously. Table 26 shows the resulting average weekday daily and peak of street trip rates derived from the data sources and used in this study for the casino portion of the Project.

TABLE 26:
CASINO GAMING FACILITY TRIP GENERATION DATA
ALTERNATIVE D (OFF-SITE ALTERNATIVE)
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

Land Use	Period	Average Rate[1]	Directional Distribution (%)	
			Enter	Exit
Casino (per ksf casino floor area)	Daily	59.42	50	50
	AM Peak of Street	2.50	70	30
	PM Peak of Street	4.16	53	47

[1] *Trips per 1,000 square feet* *ksf = 1,000 square feet*

The data shown in Table 26 consists of the following:

- Type of land use – casino
- Time period – average weekday daily or average weekday AM/PM peak hour of street
- Average trip generation rate – the number of trips generated per time period per 1,000 sf of casino floor area
- Directional distribution percentage – enter and exit

As shown in Table 26, the 26,001 sf Alternative D casino is projected to generate 59.42 trips for every 1,000 sf of casino floor area in a 24-hour average weekday period. The 59.42 trips per 1,000 sf of casino floor area was derived based on the San Diego Casino Study survey data that showed Indian gaming casinos typically generated 100 trips per 1,000 sf of gaming floor area on a typical weekday, The Alternative D casino gaming floor area will consist of 15,451 sf, which equates to 1,545 average weekday trips. Converting the trips per 1,000 sf of gaming floor area to trips per 1,000 sf of casino floor area results in a trip rate of 59.42 per 1,000 sf of casino floor area on an average weekday. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period.

Pass-by and/or diverted link trips were not accounted for the Alternative D due to the remote location.

Per the Barona Indian Gaming Casino Survey and the March 1998 ITE Journal article, average weekday PM peak hour traffic volumes are approximately 7% of the average weekday daily volumes. Multiplying the average weekday daily trip rate of 59.42 trips per 1,000 sf of casino floor area by 7% results in an average weekday PM peak hour trip rate of 4.16 trips per 1,000 sf of casino floor area. The average weekday PM peak hour trip rate of 4.16 was used in this study for Alternative D.

The Shingle Springs document also collected AM peak of the street data for one of the five (5) northern California casinos. As stated in the Shingles document, very few casino trips are generated in the AM peak of the street time period with the majority of the Project trips occurring during the PM peak of the street time period or in some cases even later evening, such as 7:00 to 9:00 PM. Since the PM peak is considered the worst case, it was considered sufficient for study purposes to collect AM data at only one Casino location. The AM peak of the street casino trips was found to be 60% of the PM peak of the street casino trips. Therefore the AM peak of the street trip generation rate used in the North Fork study is 2.50 trips (4.16*0.6) per 1,000 sf of casino floor area and is shown in Table 26.

Peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and are rarely a 50/50 split. In the case of the casino traffic previous survey data has shown that for an average weekday AM peak of the street condition, the direction percentage is typically 70% entering and 30% exiting, while for the PM peak hour of the street condition, the directional percentage is typically 53% entering and 47% exiting.

Casino Gaming Facility Trips

Alternative A (Proposed Project Alternative)

Table 27 shows the resulting primary (new), pass-by/diverted link, and total casino gaming facility trips used in this analysis for Alternative A. As shown in Table 27 using the rates shown in Table 24, the 268,480 sf Alternative A casino is projected to generate a total of 12,163 daily two directional trips. The Alternative A casino is also projected to generate a total of 633 two directional AM peak of the street trips with 443 entering and 190 trips exiting, and a total of 1,055 two directional PM peak of the street trips with 559 entering and 496 trips exiting.

TABLE 27:
CASINO GAMING FACILITY TRIP GENERATION DATA
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE)
WEEKDAY DAILY AND PEAK HOUR OF STREET TRIPS

			AM Peak		PM Peak	
Uses	**Size**	**Daily (trips)**	**Enter (trips)**	**Exit (trips)**	**Enter (trips)**	**Exit (trips)**
Primary (New) Project Trips	268,480 sf	10,339	377	161	475	422
Pass-By/Diverted Link	268,480 sf	1,824	66	29	84	74
Total	**268,480 sf**	**12,163**	**443**	**190**	**559**	**496**

ksf = 1,000 square feet *sf = square feet* *trips are calculated per ksf*

Alternative B (Reduced Intensity Alternative)

Table 28 shows the resulting primary (new), pass-by/diverted link, and total casino gaming facility trips used in this analysis for Alternative B. As shown in Table 28 using the rates shown in Table 25, the 198,990 sf Alternative B casino is projected to generate a total of 9,026 daily two directional trips. The Alternative B casino is also projected to generate a total of 469 two directional AM peak of the street trips with 328 entering and 141 trips exiting, and a total of 782 two directional PM peak of the street trips with 414 entering and 368 trips exiting.

TABLE 28:
CASINO GAMING FACILITY TRIP GENERATION DATA
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE)
WEEKDAY DAILY AND PEAK HOUR OF STREET TRIPS

			AM Peak		PM Peak	
Uses	**Size**	**Daily (trips)**	**Enter (trips)**	**Exit (trips)**	**Enter (trips)**	**Exit (trips)**
Primary (New) Project Trips	198,990 sf	7,672	279	120	352	313
Pass-By/Diverted Link	198,990 sf	1,354	49	21	62	55
Total	**198,990 sf**	**9,026**	**328**	**141**	**414**	**368**

ksf = 1,000 square feet *sf = square feet* *trips are calculated per ksf*

Alternative D (Off-Site Alternative)

Table 29 shows the resulting casino gaming facility trips used in this analysis for Alternative D. As shown in Table 29 using the rates shown in Table 26, the 26,001 sf Alternative D casino is projected to generate a total of 1,545 daily two directional trips. The Alternative D casino is also projected to generate a total of 66 two directional AM peak of the street trips with 46 entering and 20 trips exiting, and a total of 108 two directional PM peak of the street trips with 57 entering and 51 trips exiting.

TABLE 29:
CASINO GAMING FACILITY TRIP GENERATION DATA
ALTERNATIVE D (OFF-SITE ALTERNATIVE)
WEEKDAY DAILY AND PEAK HOUR OF STREET TRIPS

			AM Peak		PM Peak	
Uses	**Size**	**Daily (trips)**	**Enter (trips)**	**Exit (trips)**	**Enter (trips)**	**Exit (trips)**
Casino	26,001 sf	1,545	46	20	57	51

ksf = 1,000 square feet *sf = square feet* *trips are calculated per ksf*

Hotel Trip Rates

The Hotel component base trip generation information was developed from the number of rooms provided by the applicant using the Institute of Transportation Engineers (ITE) Trip Generation manual and the corresponding software[4]. Table 30 lists the corresponding land use codes and page numbers as provided for in the Trip Generation manual that were looked at in developing the Project trip generation Hotel component information.

TABLE 30:
ITE TRIP GENERATION DATA
MANUAL REFERENCE INFORMATION

Land Use	Land Use Code	Page Number
Hotel	310	541 - 568

Table 31 lists the daily, AM peak of the street, and PM peak of the street average rates and the directional distribution as provided in the Trip Generation manual.

TABLE 31:
ITE TRIP GENERATION DATA
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

			Directional Distribution (%)	
Land Use	**Period**	**Average[1] Rate**	**Enter**	**Exit**
Hotel (per room)	Daily	8.17	50	50
	AM Peak of Street	0.56	61	39
	PM Peak of Street	0.59	53	47

[1] *Trips per room*

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[4] Trip Generation (software), Version 5, Microtrans, 2003.

As discussed previously, the San Diego County Department of Public Works prepared a casino trip generation study that contained surveys of numerous southern California Indian gaming casinos. As stated previously, this report determined that when a hotel is part of a casino-hotel establishment, the daily trip rate for the hotel was 3.0 trips per room rather than the typical 8.17 trips per room rate found in the Trip Generation manual. This is a 63.5% reduction in number of daily trips likely to be generated by a hotel when the hotel is combined with a casino. This reduction in number of trips likely to be generated by a hotel when it is a part of a casino project is due to the "capturing" of trips by the casino, i.e. guests staying at Indian casino hotels are there for the express purpose of gaming at the adjacent casino and are not using the hotel as typical lodging. This reduction in number of trips also applies to both the AM and PM peak of the street hotel rates. Table 32 shows the resulting average weekday daily and AM/PM peak hour of street hotel rates used in this study.

TABLE 32:
HOTEL TRIP GENERATION DATA
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

Land Use	Period	Average Rate[1]	Directional Distribution (%) Enter	Directional Distribution (%) Exit
Hotel (per room)	Daily	3.00	50	50
	AM Peak of Street	0.21	61	39
	PM Peak of Street	0.22	53	47

[1] *Trips per room*

The data shown in Table 32 consists of the following:

- Type of land use – hotel
- Time period – average weekday daily or average weekday AM/PM peak hour of street
- Average trip generation rate – the number of trips generated per time period per room
- Directional distribution percentage – enter and exit

As shown in Table 32, the 224,530 sf (200 room) hotel is projected to generate 3.00 trips for every room in an average weekday 24-hour period. The hotel is also projected to generate 0.21 trips for every room during the average weekday AM peak hour of the street and 0.22 trips for every room during the average weekday PM peak hour of the street. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period. As stated previously peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and is rarely a 50/50 split. In the case of the hotel traffic ITE survey data has shown that for an average weekday AM peak hour of the street condition, the directional percentage is typically 61% entering and 39% exiting, while for the average weekday PM peak hour of the street condition, the directional percentage is typically 53% entering and 47% exiting.

<u>*Hotel Trips*</u>

Alternative A (Proposed Project Alternative)

Table 33 shows the resulting primary (new), pass-by/diverted link, and total hotel trips used in this analysis. As shown in Table 33 using the rates shown in Table 32, the 224,530 sf (200 room) Alternative A hotel is projected to generate a total of 600 daily two directional trips. The Alternative A hotel is also projected to generate a total of 41 two directional AM peak of the street trips with 25 entering and 16 trips exiting, and a total of 44 two directional PM peak of the street trips with 23 entering and 21 trips exiting.

TABLE 33:
HOTEL TRIP GENERATION DATA
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE)
WEEKDAY DAILY AND PEAK HOUR OF GENERATOR TRIPS

			AM Peak		PM Peak	
Uses	**Size**	**Daily (trips)**	**Enter (trips)**	**Exit (trips)**	**Enter (trips)**	**Exit (trips)**
Primary (New) Project Trips	224,530 sf / 200 rooms	510	21	14	20	18
Pass-By/Diverted Link	224,530 sf / 200 rooms	90	4	2	3	3
Total	**224,530 sf / 200 rooms**	**600**	**25**	**16**	**23**	**21**

sf = square feet *trips are calculated per room*

Alternative C

Trip Generation

The Alternative C trip generation information was developed based on information provided by AES and using the Institute of Transportation Engineers (ITE) Trip Generation manual and the corresponding software[5]. Table 34 lists the corresponding land use codes and page numbers as provided for in the Trip Generation manual.

TABLE 34:
ITE TRIP GENERATION DATA
MANUAL REFERENCE INFORMATION

Land Use	**Land Use Code**	**Page Number**
Free Standing Discount Superstore	813	1,327 – 1,336
Discount Club	861	1,579 – 1,597
Fast Food Restaurant with Drive Through	934	1,749 – 1,770
High Turnover (sit-down) Restaurant	932	1,722 – 1,740

According to the ITE Trip Generation manual[6], the uses analyzed in this report are defined as follows:

- "Free-standing discount superstores are similar to the free-standing discount stores described in Land Use 815, with the exception that they also contain a full service grocery department under the same roof that shares entrances and exits with the discount store area. The stores usually offer a variety of customer services, centralized cashiering and a wide range of products. They typically maintain long store hours 7 days a week. The stores included in this land use are often the only ones on the site, but they can also be found in mutual operation with a related or unrelated garden center and/or service station. They also are sometimes found as separate parcels within a retail complex with their own dedicated parking area."

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[5] *Trip Generation* (software), Version 5, Microtrans, 2003.
[6] *Trip Generation*, 7th edition, Volume 3, ITE, 2003, pages 1173,1675.

- "A discount club is a discount store or warehouse where shoppers pay a membership fee in order to take advantage of discounted prices on a wide variety of items such as food, clothing, tires and appliances; many items are sold in large quantities or bulk."
- "Fast-food restaurant with drive-through window is characterized by a large carryout clientele; long hours of services (some are open for breakfast, all are open for lunch and dinner, some are open late at night or 24 hours); and high turnover rates for eat-in customers. These limited-service eating establishments do not provide table service. Patrons generally order at a cash register and pay before they eat."
- "High-turnover (sit-down) restaurants consist of sit-down, full-service eating establishments with turnover rates of approximately one hour or less. This type of restaurant is usually moderately priced and frequently belongs to a restaurant chain. Generally, these restaurants serve lunch and dinner; they may also be open for breakfast and are sometimes open 24 hours per day. These restaurants typically do not take reservations. Some facilities contained within this land use may also contain a bar area for serving food and alcoholic drinks."

Table 35 lists the daily, and AM and PM peak of the street average rates and the directional distribution used in this Project assessment. Project trips were actually calculated using the Trip Generation software and therefore there may be some rounding differences in the data used in the analysis and data prepared using the rates shown in Table 35. It should be noted that the trip generation information prepared from the use of the manual or software is raw data to be used as a basis for further evaluation by the traffic impact study preparer.

TABLE 35:
ITE TRIP GENERATION DATA
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

Land Use	Period	Average Rate[1]	Directional Distribution (%)	
			Enter	Exit
Free Standing Discount Superstore	Daily	49.21	50	50
	AM Peak of Street	1.84	51	49
	PM Peak of Street	3.87	49	51
Discount Club	Daily	41.80	50	50
	AM Peak of Street	0.56	71	29
	PM Peak of Street	4.24	50	50
Fast Food Restaurant w/ drive-thru	Daily	496.12	50	50
	AM Peak of Street	53.11	51	49
	PM Peak of Street	34.64	52	48
High Turnover (sit-down) Restaurant	Daily	127.15	50	50
	AM Peak of Street	11.52	52	48
	PM Peak of Street	10.92	61	39

[1] *Trip Ends Per Thousand Square Feet*

The data shown in Table 35 consists of the following:

- Type of land use – Free Standing Discount Superstore, Discount Club, and Fast Food Restaurant w/ drive-thru, High Turnover (sit-down) Restaurant
- Time period – average weekday daily or average weekday AM/PM peak hour of street
- Average trip generation rate – the number of trips generated per time period per room
- Directional distribution percentage – enter and exit

As shown in Table 35, the 125,000 sf Free Standing Discount Superstore is projected to generate 49.21 trips for every 1,000 sf in an average weekday 24-hour period. The Free Standing Discount Superstore is also projected to generate 1.84 trips for every 1,000 sf during the average weekday AM peak hour of the street and 3.87 trips for every 1,000 sf during the average weekday PM peak hour of the street. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period. As stated previously peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and is rarely a 50/50 split. In the case of the Free Standing Discount Superstore traffic ITE survey data has shown that for an average weekday AM peak hour of the street condition, the directional percentage is typically 51% entering and 49% exiting, while for the average weekday PM peak hour of the street condition, the directional percentage is typically 49% entering and 51% exiting.

The 100,000 sf Discount Club is projected to generate 41.80 trips for every 1,000 sf in an average weekday 24-hour period. The Discount Club is also projected to generate 0.56 trips for every 1,000 sf during the average weekday AM peak hour of the street and 4.24 trips for every 1,000 sf during the average weekday PM peak hour of the street. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period. As stated previously peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and is rarely a 50/50 split. In the case of the Discount Club traffic ITE survey data has shown that for an average weekday AM peak hour of the street condition, the directional percentage is typically 71% entering and 29% exiting, while for the average weekday PM peak hour of the street condition, the directional percentage is typically 50% entering and 50% exiting.

The 3,000 sf Fast Food Restaurant w/ drive-thru is projected to generate 496.12 trips for every 1,000 sf in an average weekday 24-hour period. The Fast Food Restaurant w/ drive-thru is also projected to generate 53.11 trips for every 1,000 sf during the average weekday AM peak hour of the street and 34.64 trips for every 1,000 sf during the average weekday PM peak hour of the street. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period. As stated previously peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and is rarely a 50/50 split. In the case of the Fast Food Restaurant w/ drive-thru traffic ITE survey data has shown that for an average weekday AM peak hour of the street condition, the directional percentage is typically 51% entering and 49% exiting, while for the average weekday PM peak hour of the street condition, the directional percentage is typically 52% entering and 48% exiting.

The 4,000 and 5,000 sf High Turnover (sit-down) Restaurants are projected to generate 127.15 trips for every 1,000 sf in an average weekday 24-hour period. The High Turnover (sit-down) Restaurants are also projected to generate 11.52 trips for every 1,000 sf during the average weekday AM peak hour of the street and 10.92 trips for every 1,000 sf during the average weekday PM peak hour of the street. Daily trips are typically assumed to be 50 percent entering and 50 percent exiting within a 24-hour period. As stated previously peak hour of the street conditions typically show a heavier entering or exiting volume depending on the use and is rarely a 50/50 split. In the case of the High Turnover (sit-down) Restaurants traffic ITE survey data has shown that for an average weekday AM peak hour of the street condition, the directional percentage is typically 52% entering and 48% exiting, while for the average weekday PM peak hour of the street condition, the directional percentage is typically 61% entering and 39% exiting.

Captured Project Trips

Captured trips are trips between two or more uses that stay internal, or do not exit, a mixed-use or multi-use site. Traffic Impact Analysis states:

> "There can be a sharing of trips within a mixed-use center, which is defined as a development with several types of land uses that is served by one access system connected to the public roadway. Typical mixed-use centers are shopping centers that have additional land uses on the perimeter of the site: banks, restaurants, photo processing stands, auto centers, theaters, etc. An assumption is made that some trips to the site likely will stop at one or more of these peripheral land uses in addition to stopping at the shopping center. Although no major documentation exists, some analysts use 10 percent or more (to account for this sharing of trips), depending on the project and local area characteristics."[7]

According to the ITE Trip Generation Handbook (ITE Handbook), which is widely considered one of the industry standards for the preparation of traffic evaluations, a "multi-use development is typically a single real-estate project that consists of two or more ITE land use classifications between which trips can be made without using the off-site road system"[8]. The proposed "Free-Standing Discount Superstore", "Discount Club", "Fast-Food Restaurant w/ Drive-Thru", and "High Turnover (sit-down) Restaurant" are all ITE land use classifications and could capture some trips on-site as opposed to all vehicular trips entering/exiting the site as primary (new) or pass-by trips. The methodology shown in the ITE Handbook for determining captured trips was used in this study to develop captured trips for the proposed "Free-Standing Discount Superstore", "Discount Club", "Fast-Food Restaurant w/ Drive-Thru", and "High Turnover (sit-down) Restaurant" as appropriate. The capture rates used in this study were 5% for both the AM and PM peak hours. This 5% capture rate is consistent with the Caltrans *Guide for the Preparation of Traffic Impact Studies*. For further information on the application of the captured trip methodology, please refer to the ITE Handbook[9]. Captured trips were calculated between all Project components.

Pass-By/Diverted Link Project Trips

Pass-by trips are vehicular trips that are attracted to Project land uses from the existing traffic stream on roadways adjacent to the Project site that have direct access to the Project site. Diverted link trips are similar to pass-by trips, except that they are attracted from nearby roadways that do no have direct access to the Project site. Per the Caltrans *Guide for the Preparation of Traffic Impact Studies*, a 15% pass-by/diverted link rate was applied to the Project restaurant uses that would likely show a reduction due to pass-by trips traveling along SR 99 (diverted link) and Road 23 (pass-by).

Total Project Trips

Alternative A (Proposed Project Alternative)

Table 36 shows the projected number of daily, AM and PM peak hour trips that would be generated by the Alternative A, Proposed Project Alternative, land use components based on the average rate and distributional data shown in Table 24. Table 36 also shows the primary (new) and pass-by/diverted link Project trips for Alternative A, Proposed Project Alternative.

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[7] *Traffic Impact Analysis*, American Planning Association (APA) Report # 387, Froda Greenberg and Jim Hecimovich, 1984, page 6.

[8] *Trip Generation Handbook*, A Recommended Practice, ITE, March 2001, page 79.

[9] *Trip Generation Handbook*, A Recommended Practice, ITE, March 2001, page 79.

TABLE 36:
PROJECT TRIP GENERATION DATA
ALTERNATIVE A (PROPOSED PROJECT ALTERNATIVE)

			AM Peak		PM Peak	
Uses	**Size**	**Daily (trips)**	**Enter (trips)**	**Exit (trips)**	**Enter (trips)**	**Exit (trips)**
Primary (New) Project Trips						
Casino	268,480 sf	10,339	377	161	475	422
Hotel	224,530 sf/200 Rooms	510	21	14	20	18
Pass-By/Diverted Link Trips						
Casino	268,480 sf	1,824	66	29	84	74
Hotel	224,530 sf/200 Rooms	90	4	2	3	3
Total Project Trips						
Total	**493,010 sf/200 Rooms**	**12,763**	**468**	**206**	**582**	**517**

sf = square feet

Alternative B (Reduced Intensity Alternative)

Table 37 shows the projected number of daily, AM and PM peak hour trips that would be generated by the Alternative B, Reduced Intensity Alternative, land use components based on the average rate and distributional data shown in Table 25.

TABLE 37:
PROJECT TRIP GENERATION DATA
ALTERNATIVE B (REDUCED INTENSITY ALTERNATIVE)

			AM Peak		PM Peak	
Uses	**Size**	**Daily (trips)**	**Enter (trips)**	**Exit (trips)**	**Enter (trips)**	**Exit (trips)**
Primary (New) Project Trips	198,990 sf	7,672	279	120	352	313
Pass-By/Diverted Link	198,990 sf	1,354	49	21	62	55
Total	**198,990 sf**	**9,026**	**328**	**141**	**414**	**368**

sf = square feet

Alternative C (Commercial Land Use Alternative)

Table 38 shows the projected number of daily, AM and PM peak hour trips that would be generated by the Alternative C, Commercial Land Use Alternative, land use components based on the average rate and distributional data shown in Table 35. Table 38 also shows the base, primary (new), capture, and pass-by/diverted link Project trips for Alternative C, Commercial Land Use Alternative.

TABLE 38:
PROJECT TRIP GENERATION DATA
ALTERNATIVE C (COMMERCIAL LAND USE ALTERNATIVE)

Land Use	**Size**	**Daily (trips)**	**AM Peak Enter (trips)**	**AM Peak Exit (trips)**	**PM Peak Enter (trips)**	**PM Peak Exit (trips)**
Primary (New) Project Trips						
Free Standing Discount Superstore	125,000 sf	6,151	111	105	223	229
Discount Club	100,000 sf	4,180	36	14	197	195
Restaurants[1]	12,000 sf	2,238	109	110	87	68
Captured Trips						
Free Standing Discount Superstore	125,000 sf	---	7	8	15	17
Discount Club	100,000 sf	---	4	2	15	17
Restaurants[1]	12,000 sf	---	7	8	12	8
Pass-By/Diverted Link Trips						
Free Standing Discount Superstore	125,000 sf	0	0	0	0	0
Discount Club	100,000 sf	0	0	0	0	0
Restaurants[1]	12,000 sf	395	19	20	15	12
Total Project Trips						
Total	**237,000 sf**	**12,964**	**293**	**267**	**564**	**546**

[1] *Includes all restaurant uses – (1) High Turnover Restaurant and (2) Fast-Food Restaurants w/ Drive-Thru*
sf = square feet

A copy of the Alternative C trip generation data software printout is included in Appendices section Attachment VI – C - 1.

Alternative D (Off-Site Alternative)

Table 39 shows the projected number of daily, AM and PM peak hour trips that would be generated by the Alternative D, Off-Site Alternative, land use components based on the average rate and distributional data shown in Table 26.

TABLE 39:
PROJECT TRIP GENERATION DATA
ALTERNATIVE D (OFF-SITE ALTERNATIVE)

Uses	**Size**	**Daily (trips)**	**AM Peak Enter (trips)**	**AM Peak Exit (trips)**	**PM Peak Enter (trips)**	**PM Peak Exit (trips)**
Casino	26,001 sf	1,545	46	20	57	51

sf = square feet

It should be noted that no captured or pass-by trip reductions were utilized in this evaluation. As such the Alternative D, Off-Site Alternative, project primary (new) trips should be considered worst case.

D. PROJECT TRIP DISTIRBUTION AND ASSIGNMENT

Trip distribution for the Project primary (new) trips for the various alternatives was based on Traffic Model generated trip distribution data.[10] Basically the Traffic Model determines the locations of workers or consumers likely to access the Project site. The Model then estimates the roadways that these workers or consumers would likely use to travel to the site, and calculates the number of Model generated vehicle trips projected to occur on each roadway. This roadway trip data is then converted to match the primary (new) trip generation data developed for the Project alternatives. Per Traffic Access and Impact Studies for Site Development, use of a Traffic Model is one of the most commonly accepted methods for estimating trip distribution[11]. As stated previously, the Project primary (new) trip distribution data for the various alternatives was prepared using the 2025 Model.

Alternative A (Proposed Project/Madera Site)

Figure 56 shows the Alternative A, Proposed Project, primary (new) trip distribution percentages for both 2010 and 2030. Figures 57 and 58 show the Alternative A primary (new) trip assignment for 2010 and 2030 respectively for the various study intersections.

Alternative B (Reduced Intensity Alternative/Madera Site)

Figure 59 shows the Alternative B, Reduced Intensity Alternative, primary (new) trip distribution percentages for both 2010 and 2030. Figures 60 and 61 show the Alternative B primary (new) trip assignments for 2010 and 2030 respectively for the various study intersections.

Alternative C (Commercial Land Use Alternative/Madera Site)

Figure 62 shows the Alternative C, Commercial Land Use Alternative, primary (new) trip distribution percentages for both 2010 and 2030. Figures 63 and 64 show the Alternative C primary (new) trip assignments for 2010 and 2030 respectively for the various study intersections.

Alternative D (Off-Site Alternative/North Fork Site)

Figures 65 and 66 shows the Alternative D, Off-Site Alternative, primary (new) trip distribution percentages and the Alternative D primary (new) trip assignment respectively for the various study intersections.

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[10] Project primary (new) trip distribution was based on a MCTC Model select zone analysis utilizing the 2025 network.

[11] *Traffic Access and Impact Studies for Site Development*, A Recommended Practice, ITE, Transportation Planners Council Task Force on Traffic Access/Impact Studies, 1991, page 27.

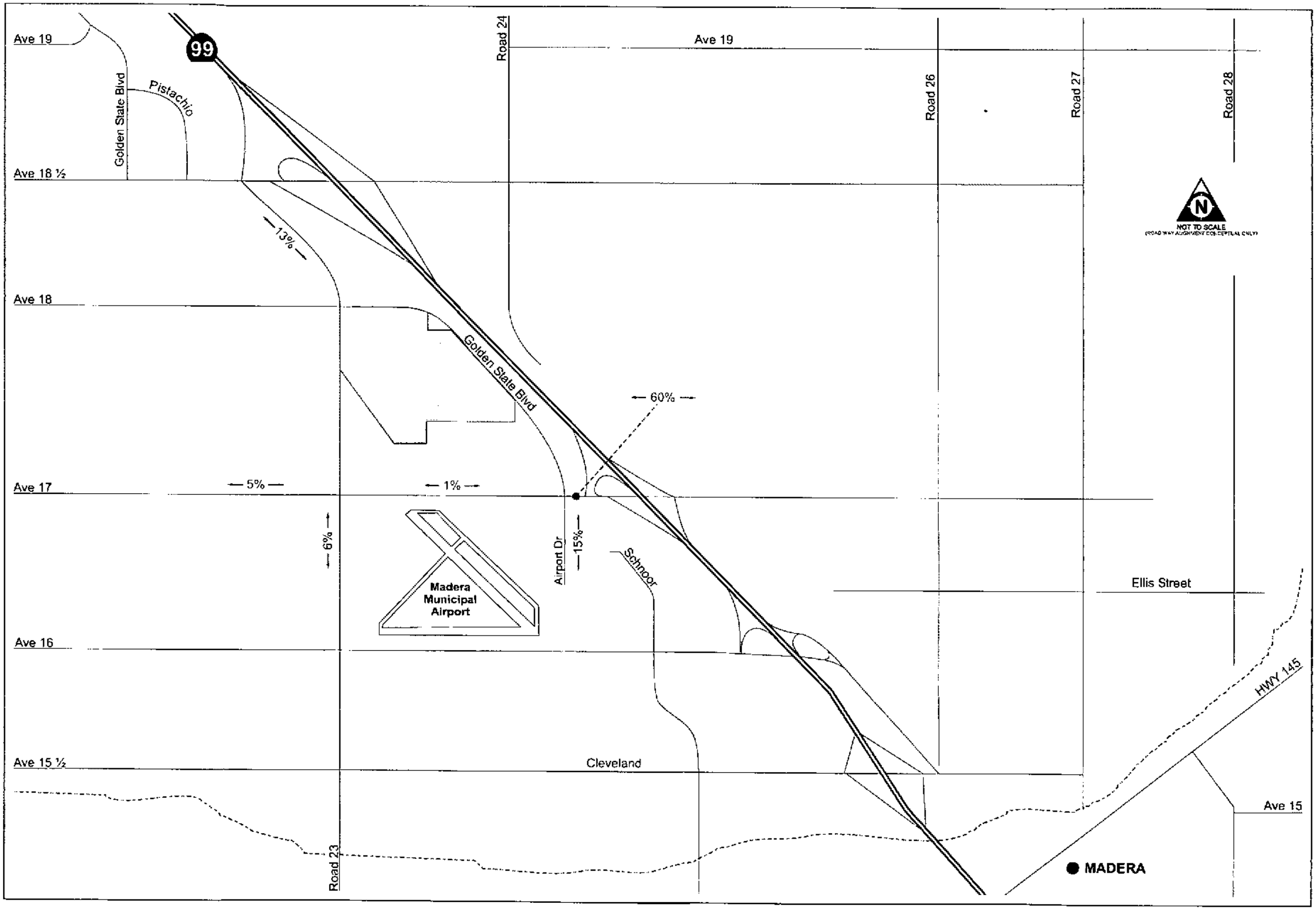
TRIP DISTRIBUTION PERCENTAGES

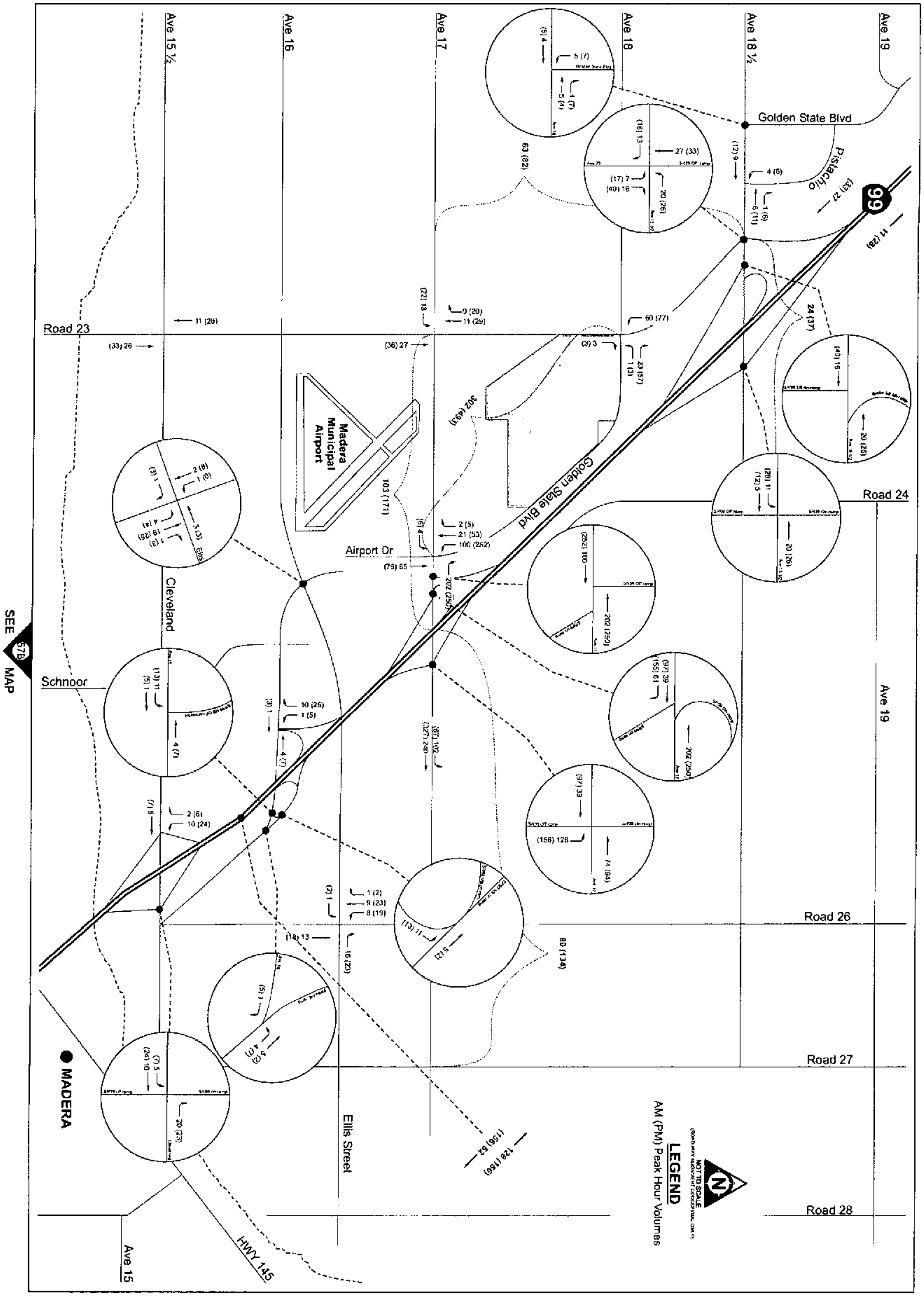
Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

04-837.2

Figure 56





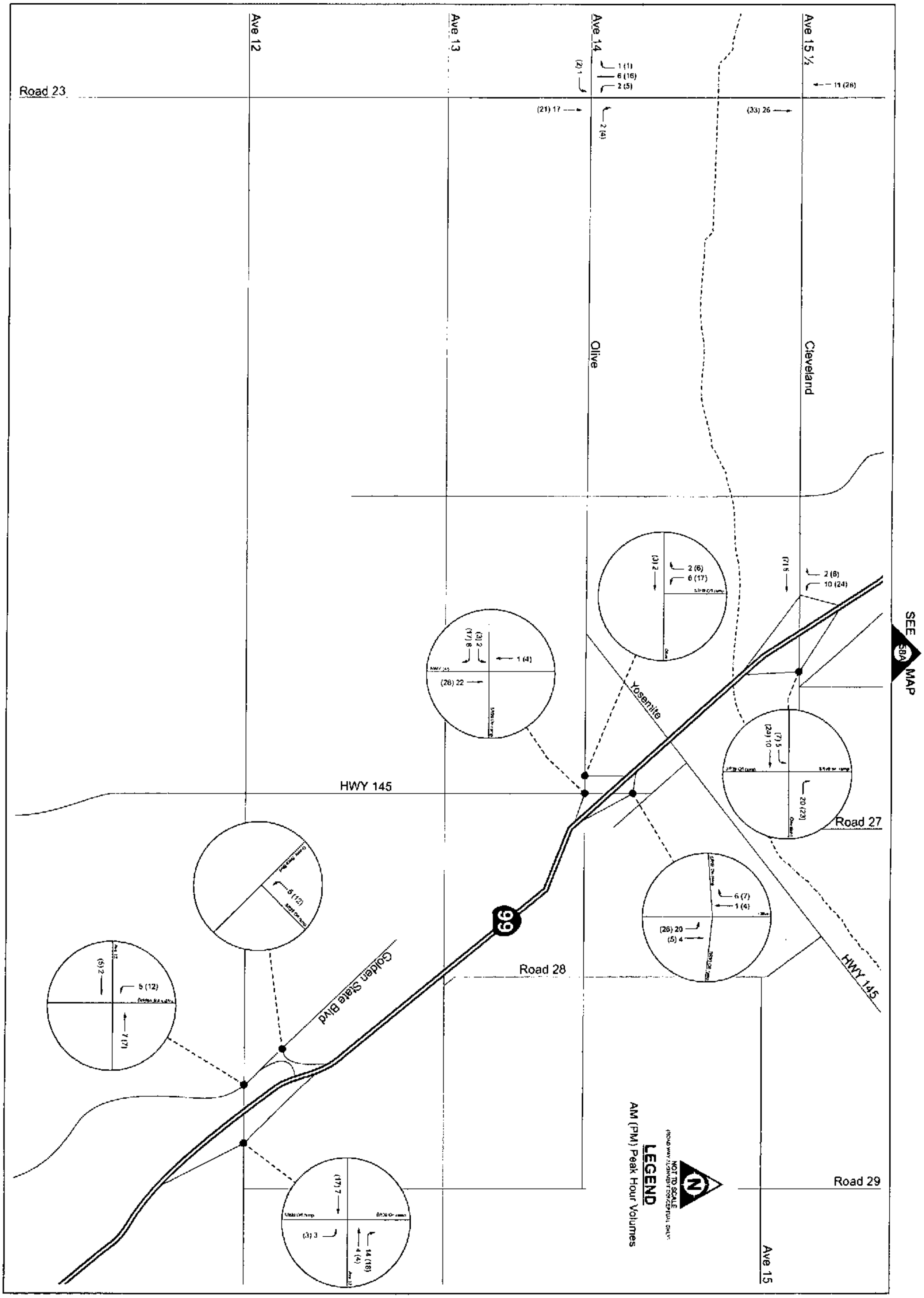
INTERSECTION TRIP ASSIGNMENT

2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

Figure 57

04-837.2



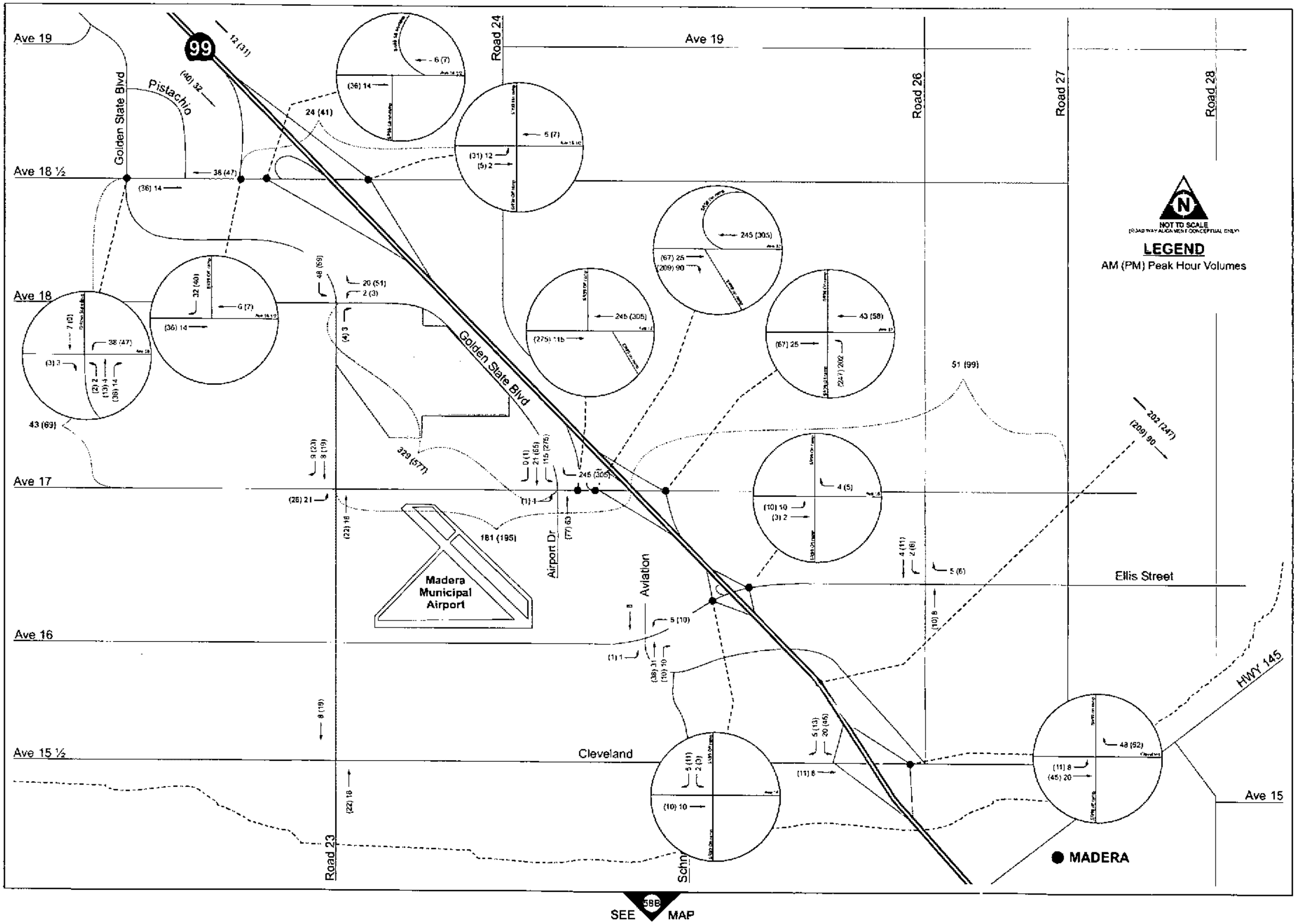
INTERSECTION TRIP ASSIGNMENT

2010 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

04-837.2

Figure 57



INTERSECTION TRIP ASSIGNMENT

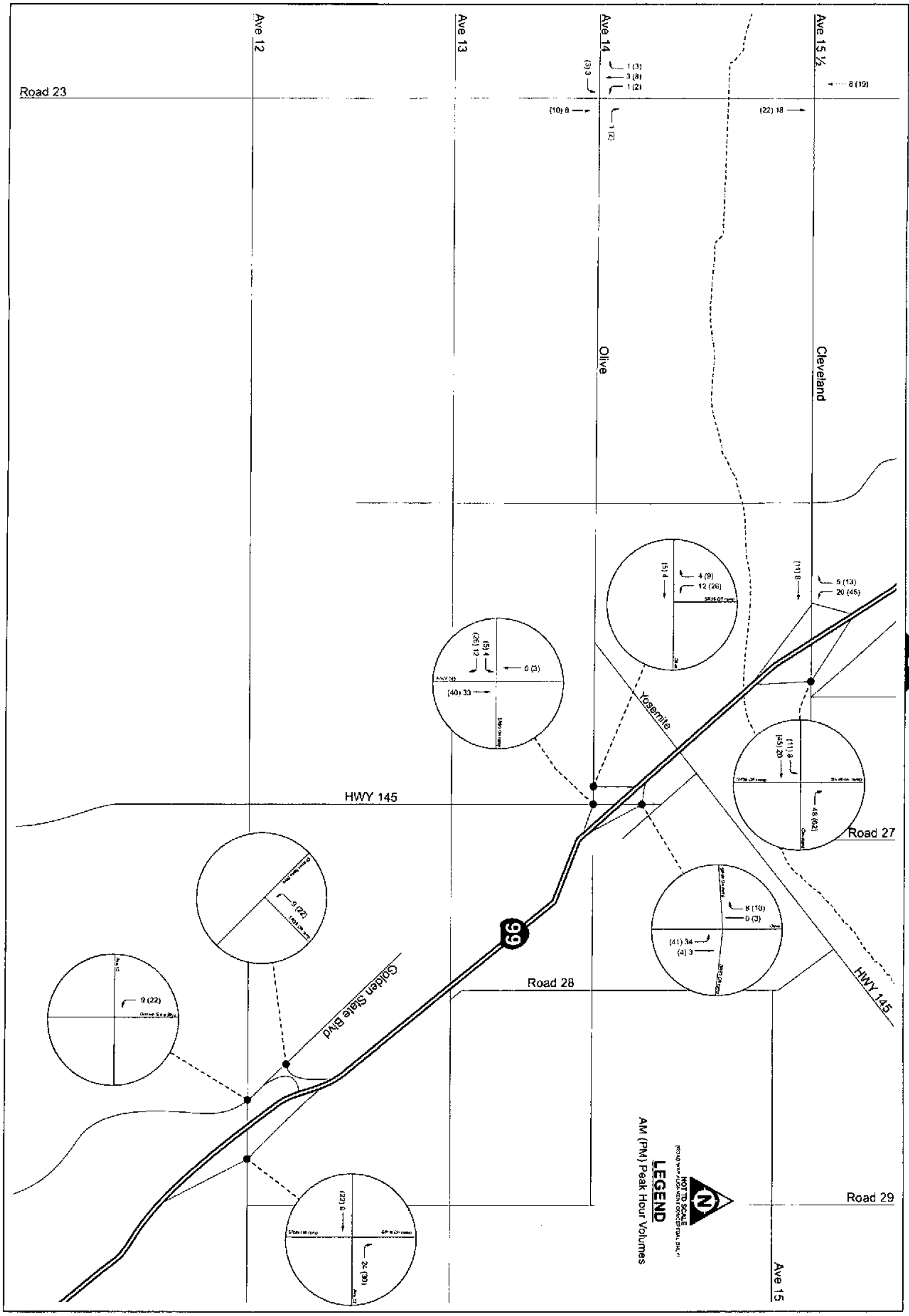
2030 Project
Madera Site
(Alternative A)

TPG Consulting

04-837.2

North Fork Casino
Madera County

Figure 58



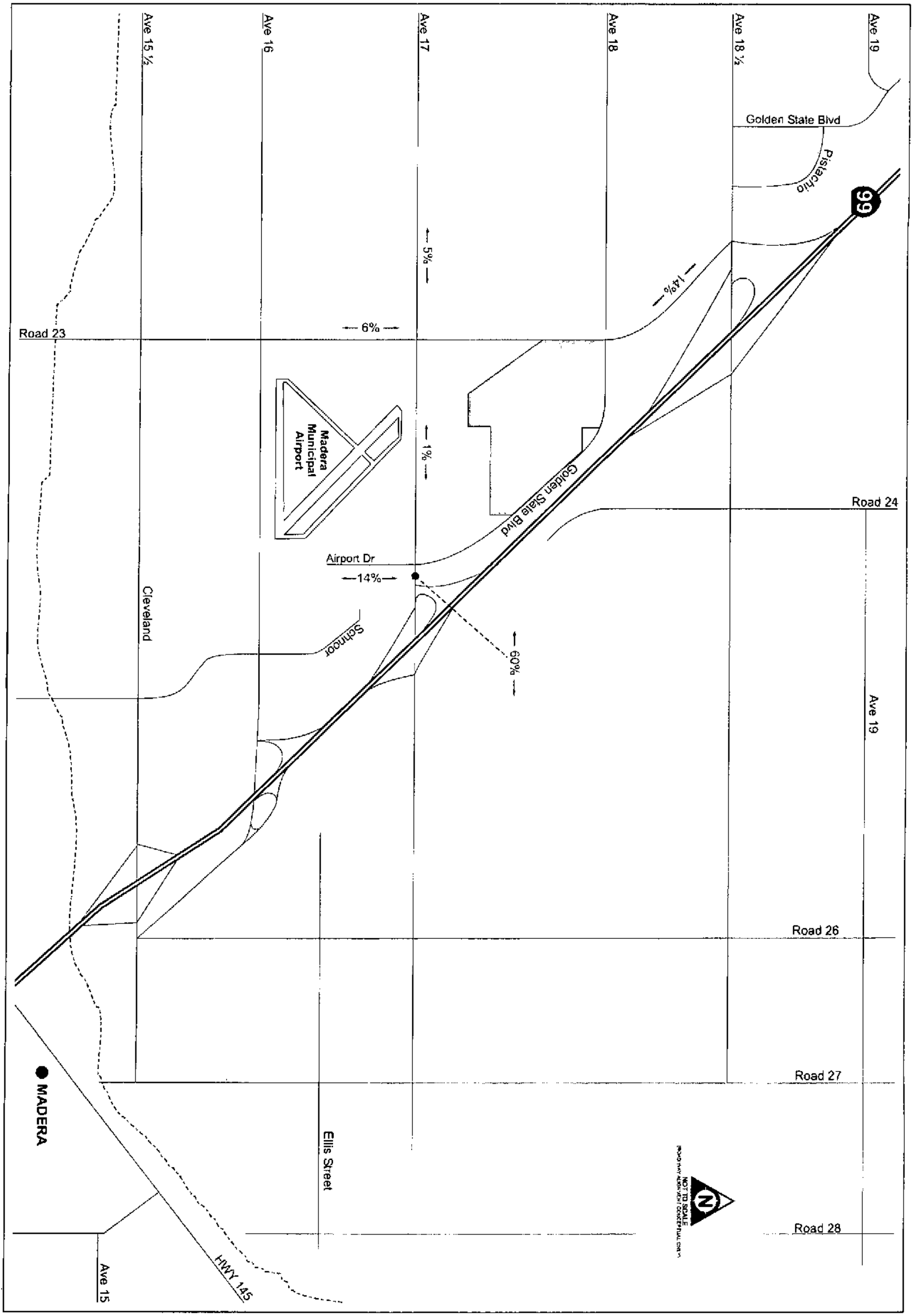
INTERSECTION TRIP ASSIGNMENT

2030 Project
Madera Site
(Alternative A)

North Fork Casino
Madera County

04-837.2

Figure 58



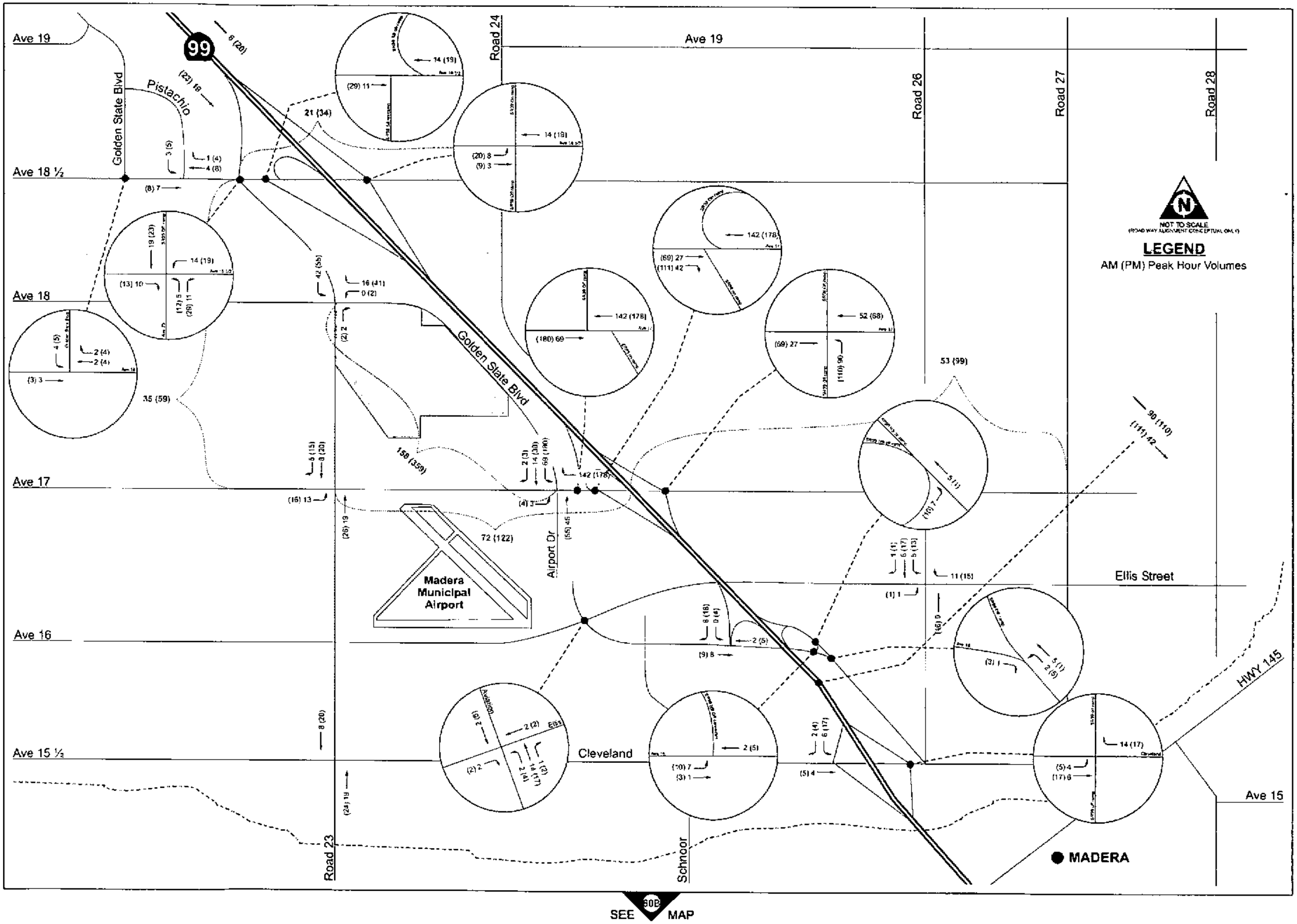
TRIP DISTRIBUTION PERCENTAGES

Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

04 837.2

Figure 59



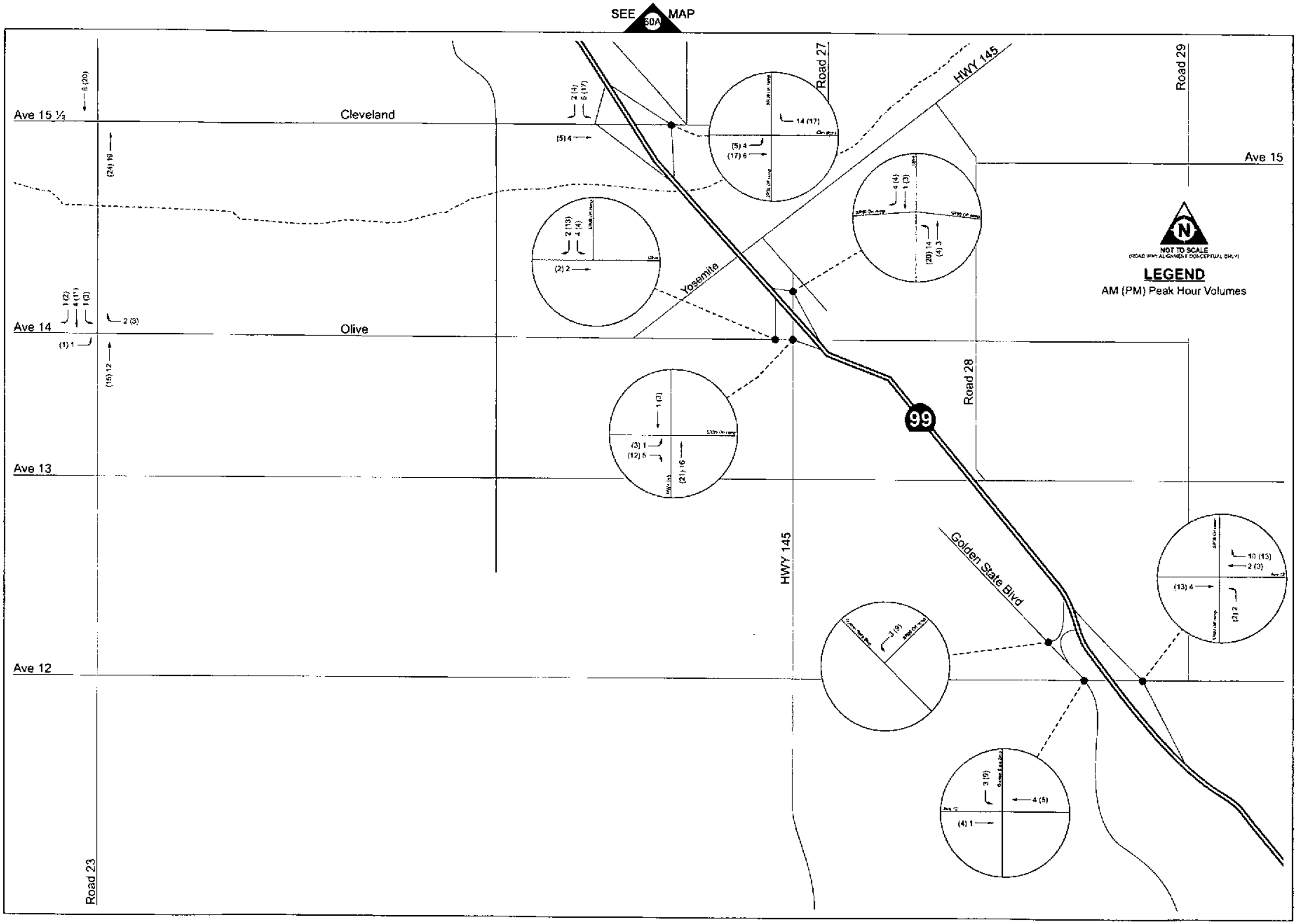
INTERSECTION TRIP ASSIGNMENT
2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 60

04-837.2

TPG Consulting



INTERSECTION TRIP ASSIGNMENT

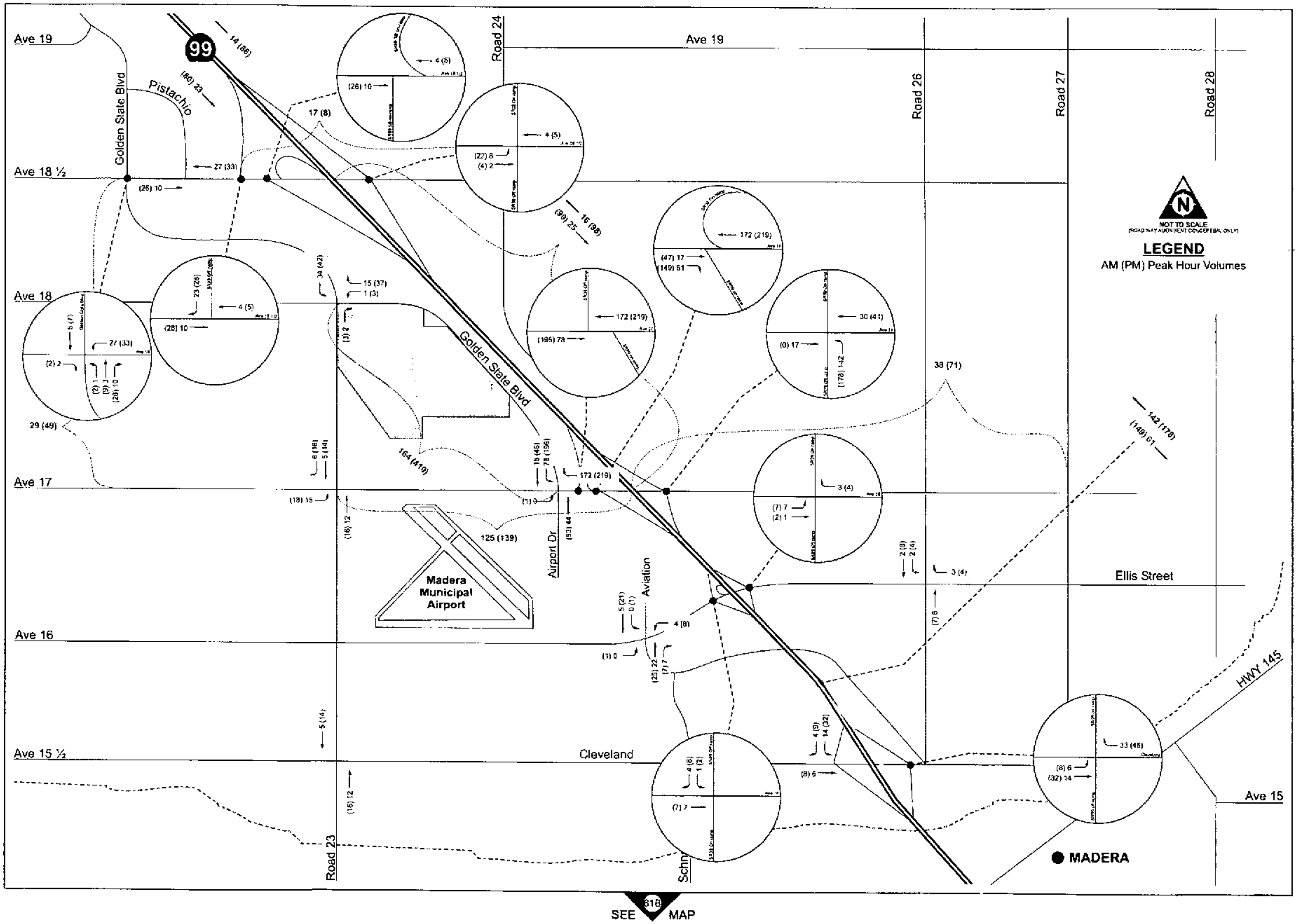
2010 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 60

04-837.2

TPG Consulting



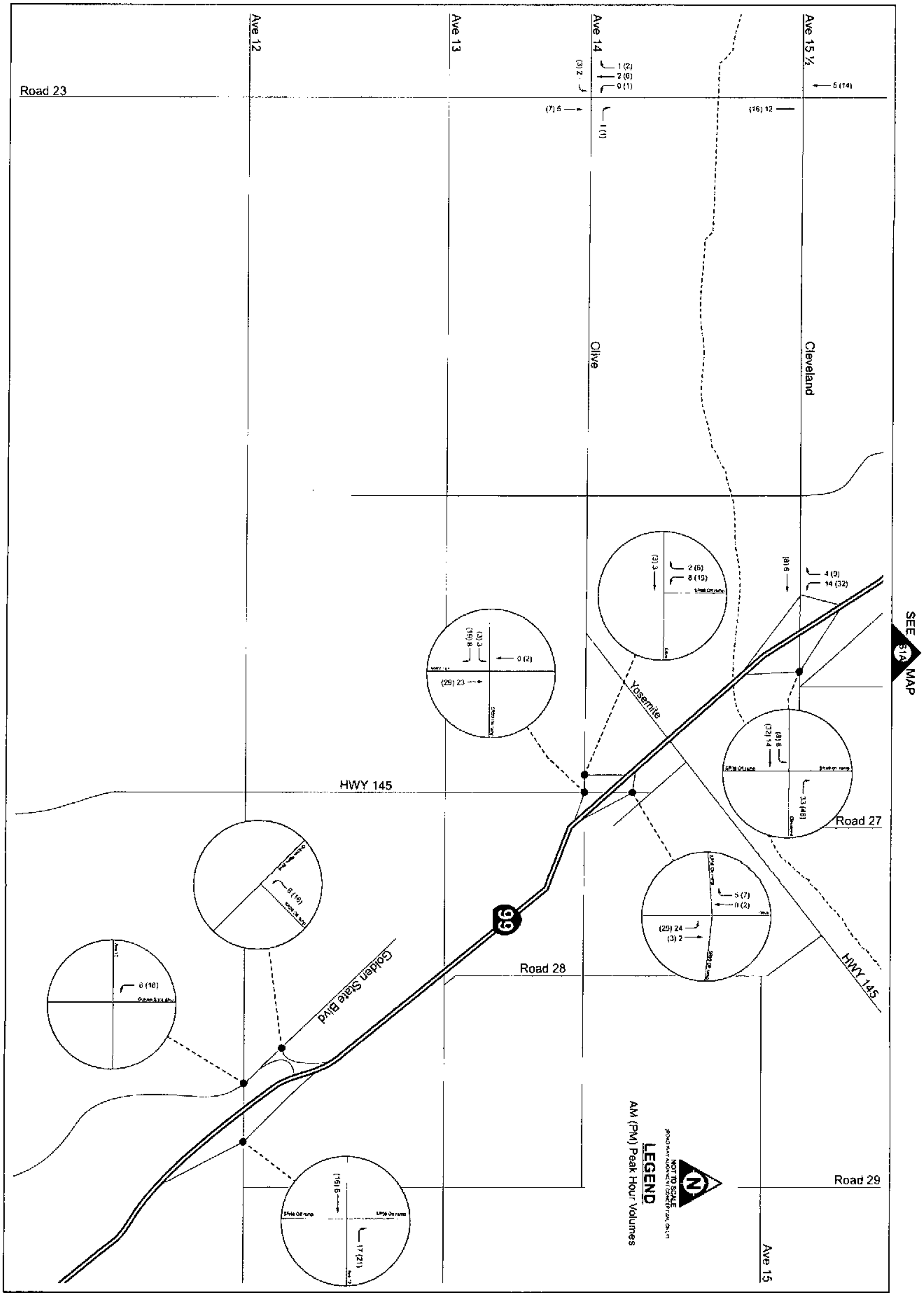
INTERSECTION TRIP ASSIGNMENT
2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

Figure 61

04-837.2

TPG Consulting



IPG Consulting

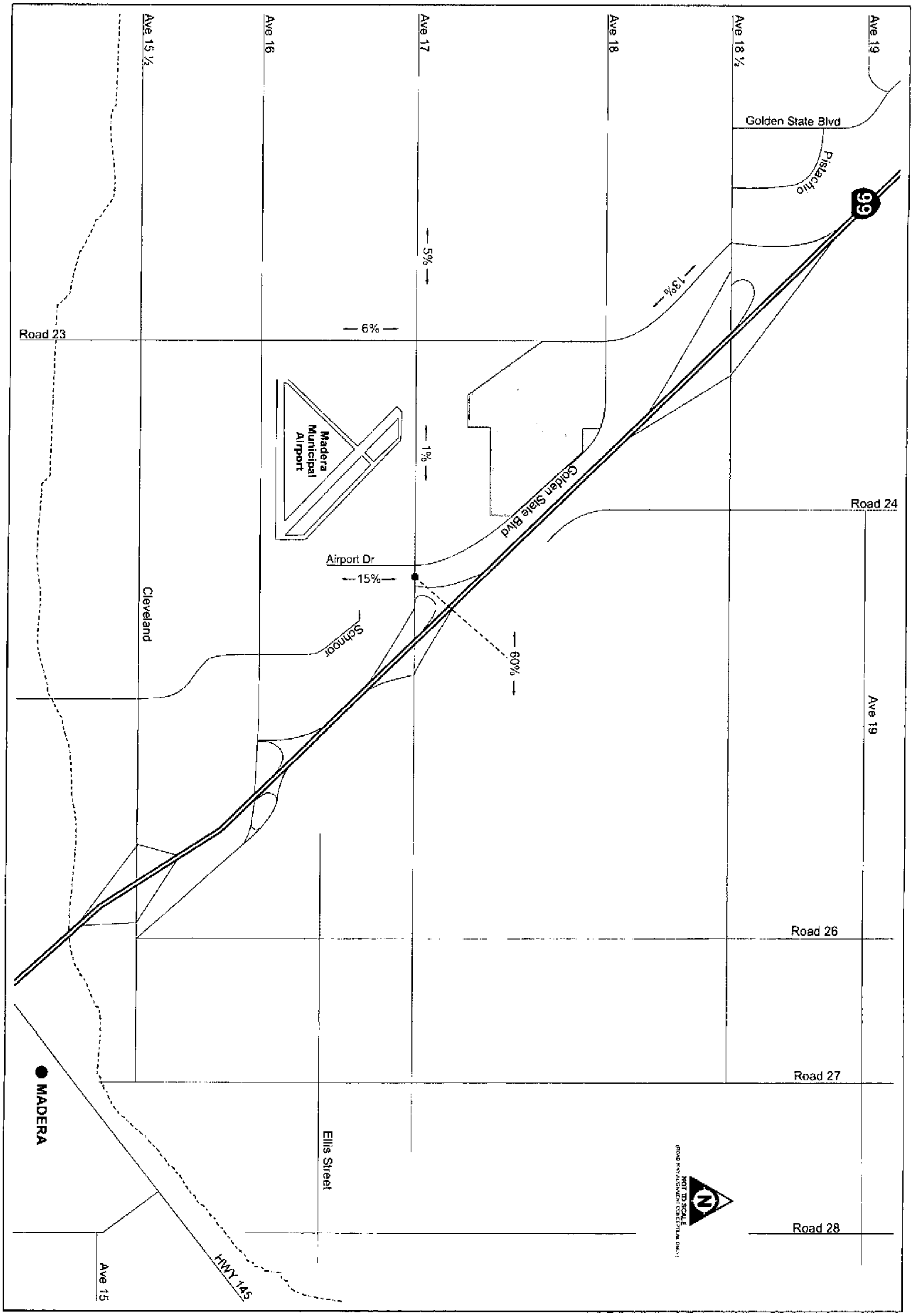
INTERSECTION TRIP ASSIGNMENT

2030 Project
Madera Site
(Alternative B)

North Fork Casino
Madera County

04-837.2

Figure 61



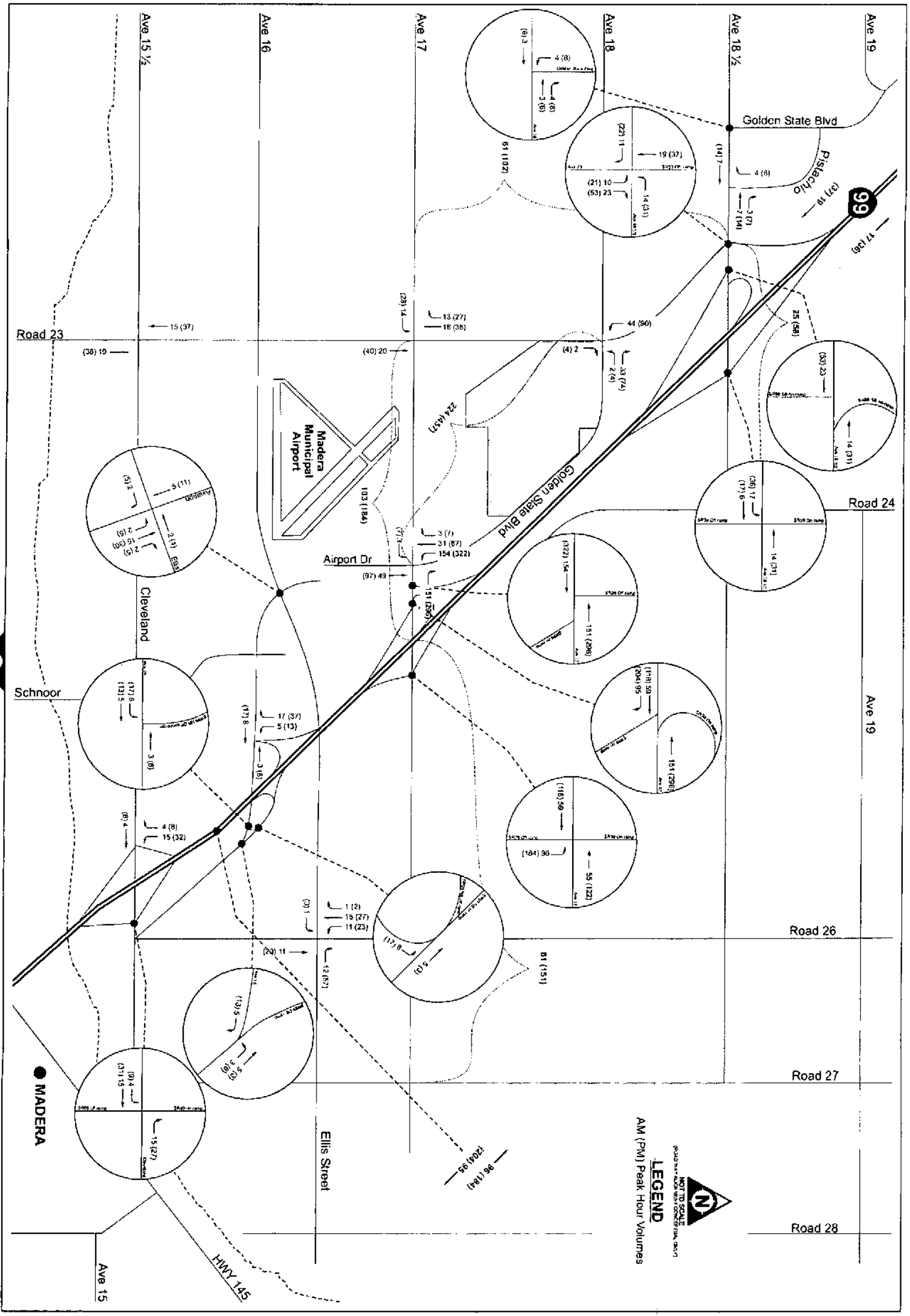
TRIP DISTRIBUTION PERCENTAGES

Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 62

04-837.2



INTERSECTION TRIP ASSIGNMENT

2010 Project

Madera Site

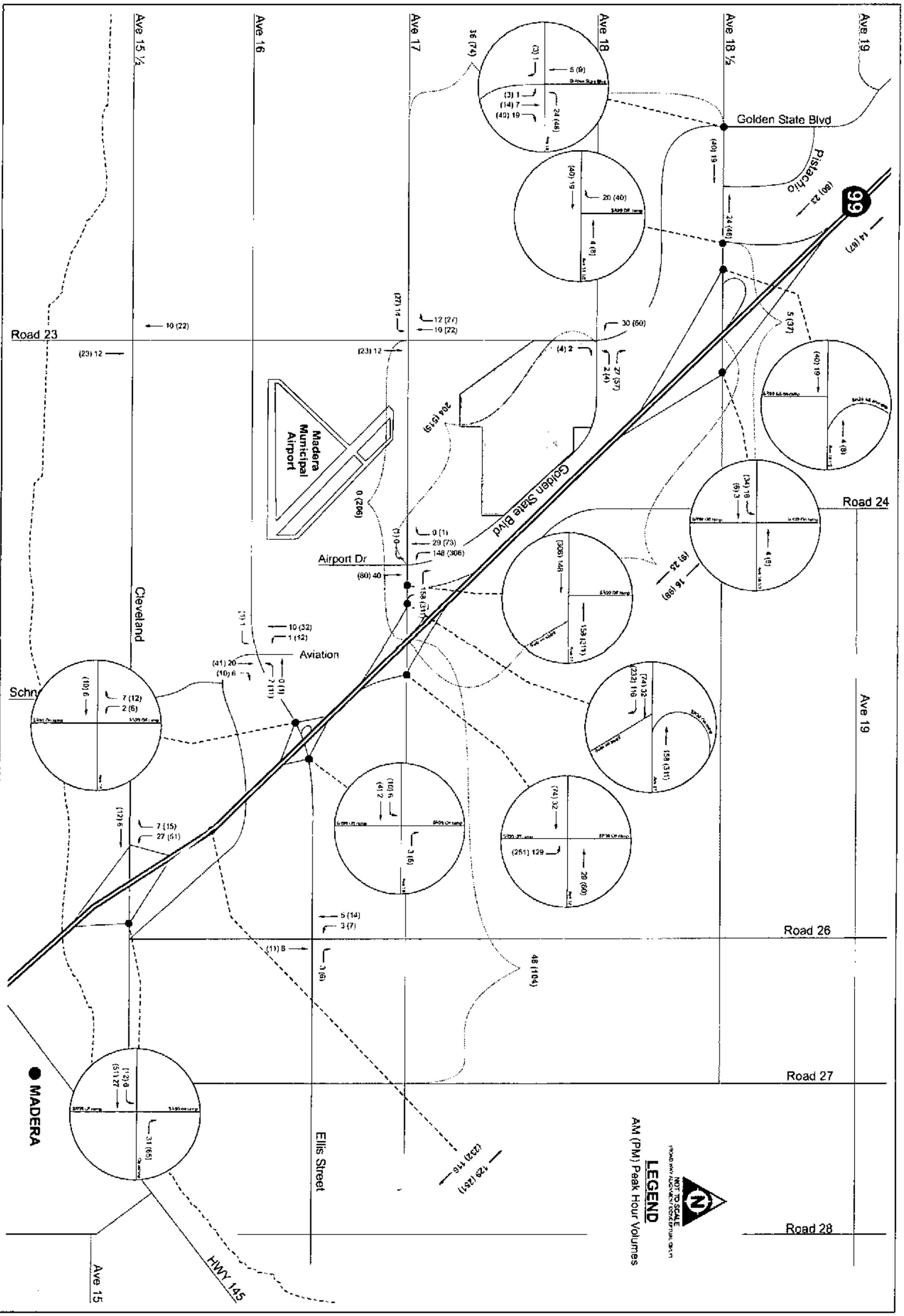
(Alternative C)

North Fork Casino

Madera County

Figure 63

04-837.2



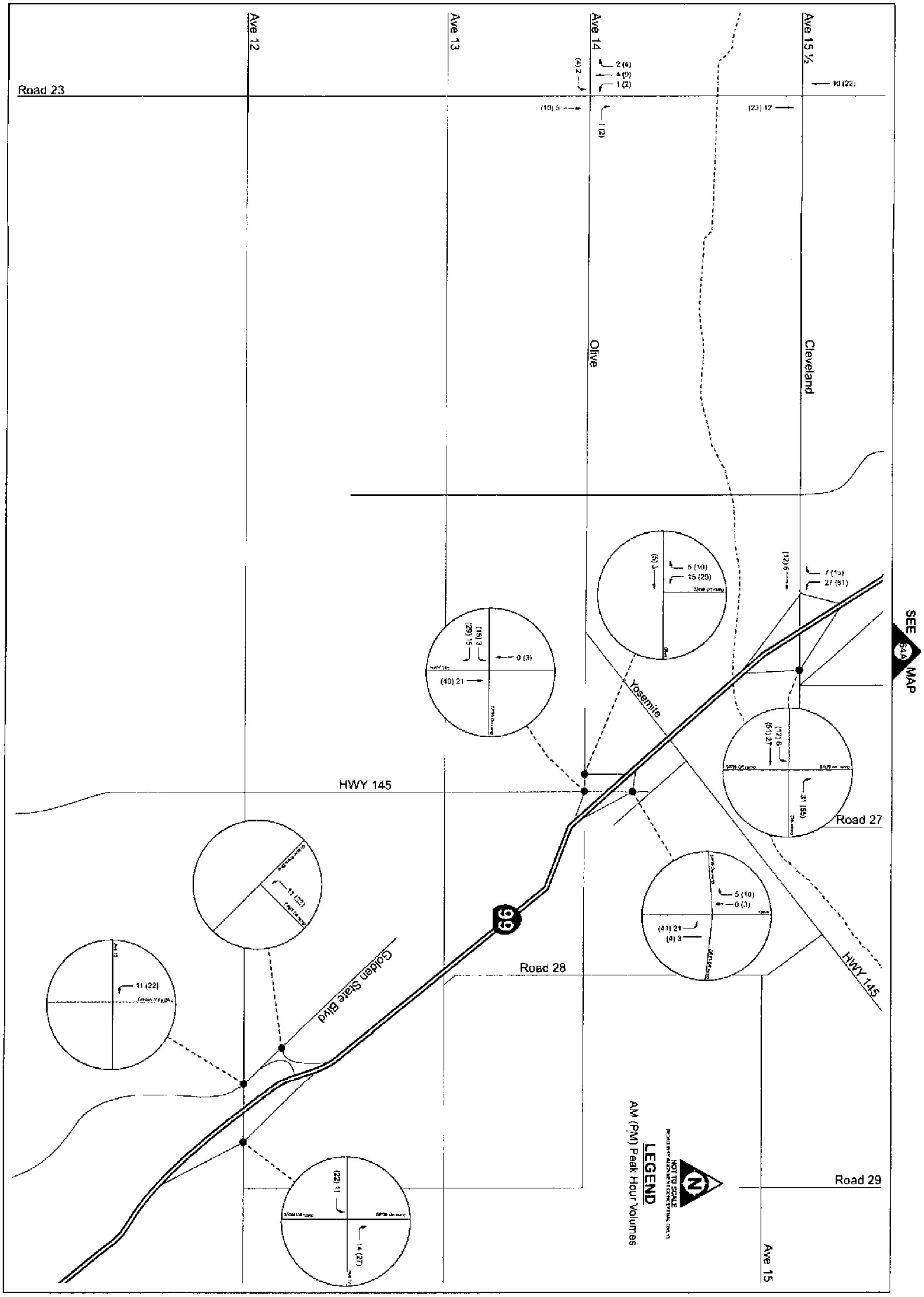
INTERSECTION TRIP ASSIGNMENT

2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

Figure 64

04-837.2



TPG Consulting

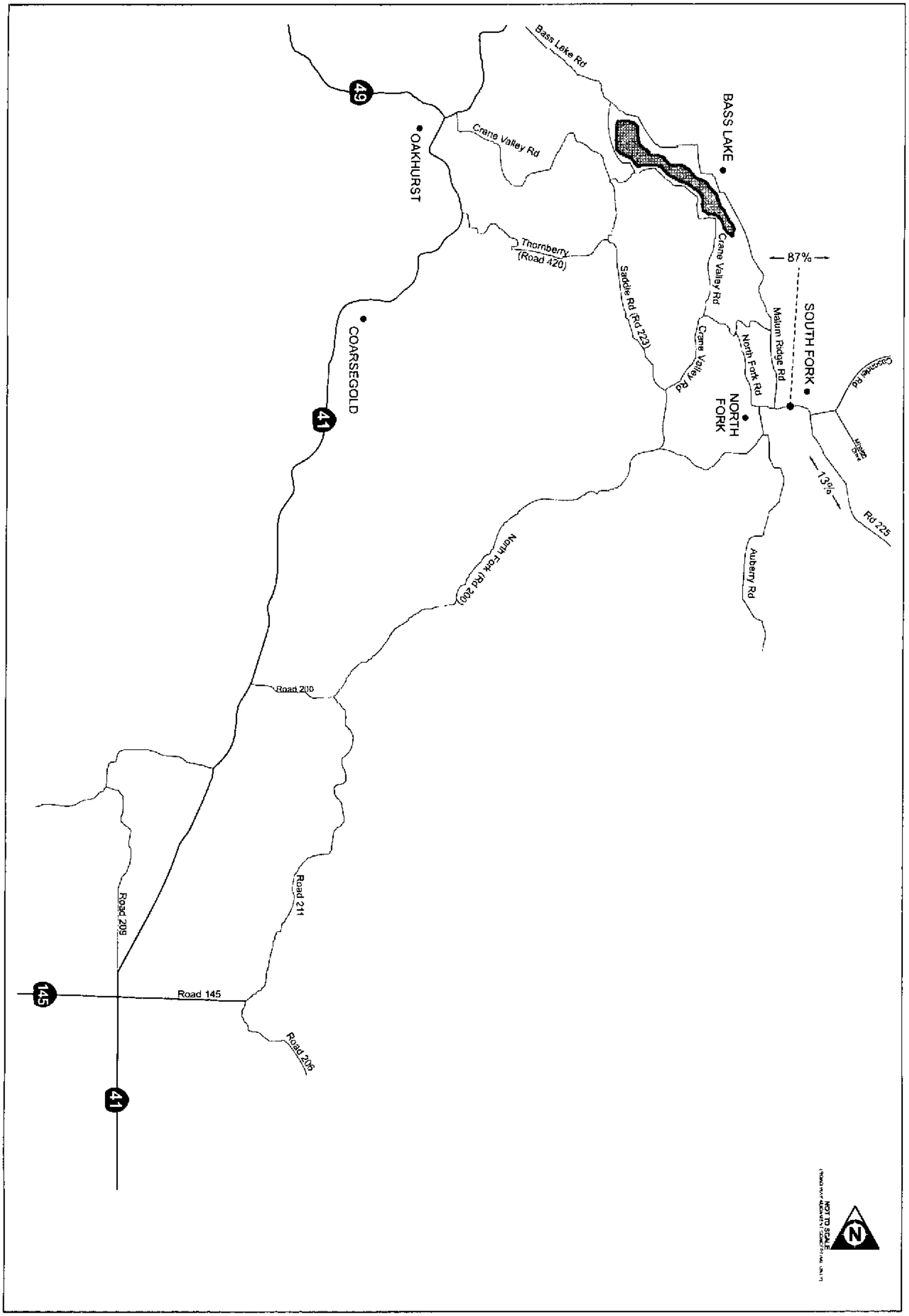
INTERSECTION TRIP ASSIGNMENT

2030 Project
Madera Site
(Alternative C)

North Fork Casino
Madera County

04-837.2

Figure 64



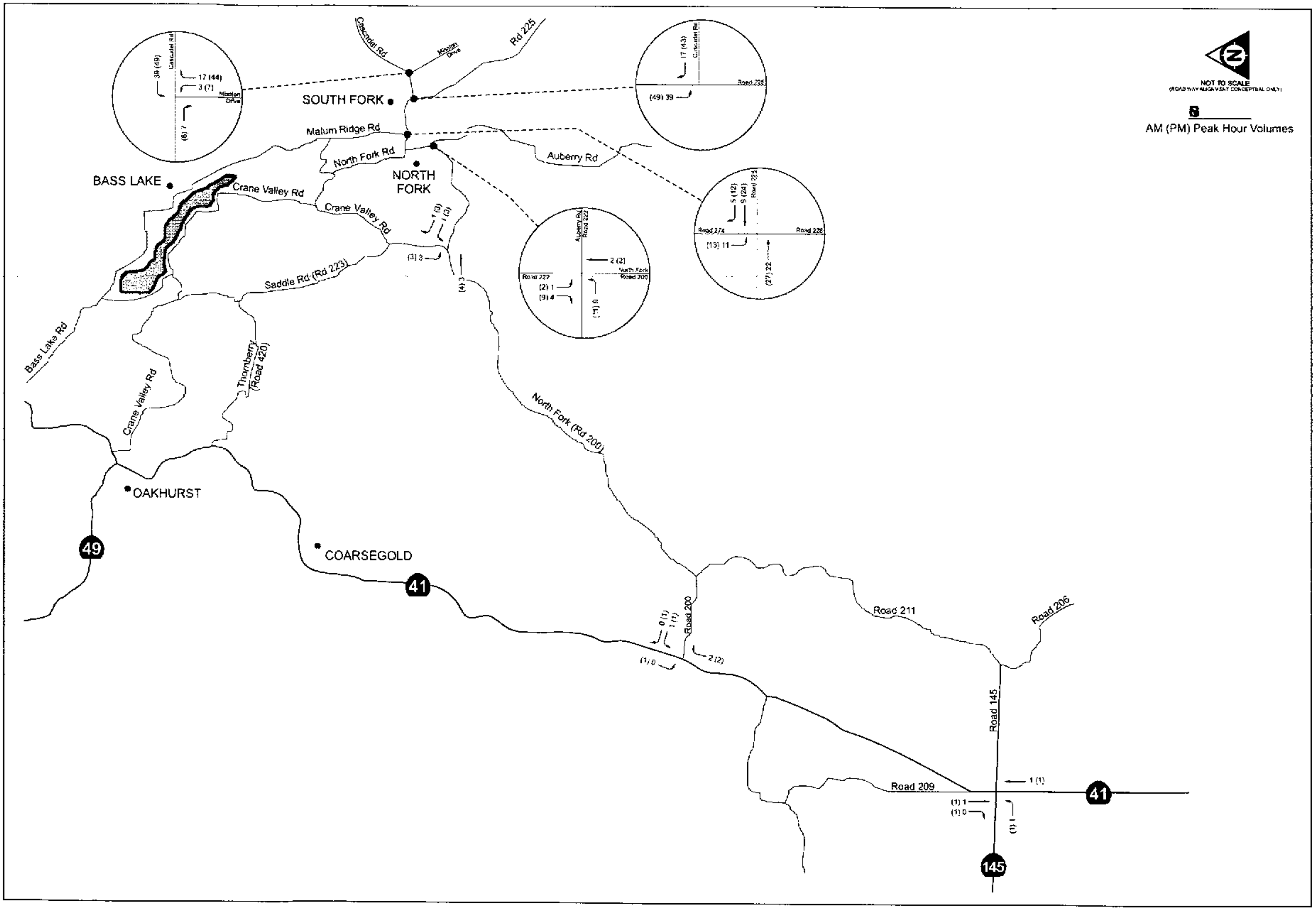
IPG Consulting Incorporated

TRIP DISTRIBUTION PERCENTAGES
Project
North Fork Site
(Alternative D)

North Fork Casino
Madera County

Figure 65

04-837.2



INTERSECTION TRIP ASSIGNMENT

Project
North Fork Site
(Alternative D)

North Fork Casino
Madera County

04-837.2

Figure 66

TPG CONSULTING INCORPORATED

E. LEVELS OF SERVICE AND WARRANT ANALYSES

Madera Site (Alternative A, B, C)

Existing (2008) Conditions

Roadway Levels of Service

Table 40 shows the Existing (2008) levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 7 (lane configurations) and 8 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 40 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 40. The signalized levels of service or delay shown in Table 40 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Existing (2008) freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 2 and Attachment VI – C – 3 respectively. Figure 9 provides a graphical representation of the resulting Existing (2008) levels of service.

TABLE 40:
EXISTING (2008) CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE

County Segment	AM Peak Hour LOS	PM Peak Hour LOS
Avenue 18 ½ - Road 24 to Road 23	A	A
Road 23 – Avenue 18 ½ to Avenue 17	A	A
Avenue 17 – Road 23 to SR 99	A	A
Avenue 17 – SR 99 to Road 27	A	A
Golden State Boulevard – Avenue 17 to Road 23	A	A

Freeway Segment	AM Peak Hour LOS	AM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS	PM Peak Hour Density (pc/mi/ln)
SR 99 north of Avenue 18 ½				
• NB	C	22.6	C	22.1
• SB	C	18.4	**D**	**28.1**
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	C	23.6	C	23.0
• SB	C	19.1	**D**	**29.7**
SR 99 south of Avenue 17				
• NB	C	25.1	C	24.5
• SB	C	20.2	**D**	**32.4**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 40:
EXISTING (2008) CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE

Intersection	**AM Peak Hour**		**PM Peak Hour**	
	LOS	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps				
• EB Left	A	8.2	A	7.9
• NB Approach	C	16.3	B	14.8
Avenue 18 ½ at SR 99 SB ramps/Road 23				
• WB Left-Through	A	0.6	A	1.2
• NB Approach	B	13.9	C	17.2
• SB Approach	B	13.5	C	17.2
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	12.7	B	13.8
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.4	A	0.1
• SB Approach	B	10.9	B	10.9
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.5
• SB Left-Through-Right	A	0.4	A	0.6
• WB Approach	A	9.4	A	9.8
• EB Approach	A	9.9	B	10.1
Avenue 17 at SR 99 NB ramps				
• EB Left	A	9.0	A	8.0
• NB Approach	B	11.9	B	13.3
Avenue 17 at SR 99 SB ramps				
• SB Approach	B	10.2	B	11.1
Avenue 17 at Golden State Boulevard				
• EB Left-Through-Right	A	0.0	A	0.0
• WB Left-Through-Right	A	7.6	A	7.5
• NB Approach	A	9.7	A	9.3
• SB Approach	B	12.2	B	11.9
Avenue 17 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.4
• SB Left-Through-Right	A	1.1	A	0.7
• WB Approach	B	10.5	B	10.6
• EB Approach	B	10.3	B	10.4
Ellis Street at Road 26	A	4.8	A	5.5
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.3	B	11.0

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 40:
EXISTING (2008) CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE

Intersection	**AM Peak Hour**		**PM Peak Hour**	
	LOS	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	A	9.7	B	10.6
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	4.7	A	4.8
• SB Approach	A	9.0	A	9.6
Avenue 16 at SR 99 SB ramps				
• EB Left	A	7.7	A	7.9
• SB Approach	B	11.0	B	13.0
Avenue 16 at Schnoor Avenue	A	8.4	B	10.9
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	12.1	B	15.1
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	14.2	B	12.2
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.0	A	1.7
• WB Approach	B	10.1	B	10.7
• EB Approach	A	0.0	B	10.2
SR 145/Madera Avenue at SR 99 NB ramps	A	9.1	B	13.1
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	22.1	C	31.2
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	10.6	B	11.0
Avenue 14 at Road 23	A	8.4	A	8.4
Avenue 12/Golden State Boulevard at SR 99 SB ramps				
• SB Left-Through	A	4.6	A	3.4
• WB Approach	C	15.3	C	16.8
Avenue 12 at Golden State Boulevard	D	51.0	**F**	**90.1**
Avenue 12 at SR 99 NB ramps				
• EB Left-Through	A	2.3	A	4.1
• **NB Approach**	F	**119.1**	F	**182.2**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

Count segments, freeway segments and intersections within the study area that are currently operating below the adopted level of service standard are shown bolded in Table 40. As shown in Table 40 and Figure 9, the following freeway segments (3) and intersections (2) are currently operating or have movements currently operating below the adopted level of service standards in the Existing (2008) scenario:

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17

  - SB – PM peak hour – LOS "D"

- SR 99 south of Avenue 17
  - SB – PM peak hour – LOS "D"

Intersections

- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "F"
- Avenue 12 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"/"F"

The remaining County segments, freeway segments, and intersections are currently operating at or above the adopted standards in the Existing (2008) scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following nineteen (19) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps/Road 23 - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 -Rural
- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Ellis Street at Road 26 - Urban
- Avenue 16 at Schnoor Avenue - Rural
- Avenue 16 at SR 99 SB ramps - Urban
- Avenue 16/Avenue 16 connector at SR 99 NB ramps - Urban
- Avenue 16 at SR 99 NB ramp connector - Urban
- Gateway/Avenue 16 at SR 99 NB ramps - Urban
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban
- Avenue 12 at SR 99 NB ramps - Urban

Based on the rural and urban peak hour volume signal warrant, the signal warrant is currently met at the following three (3) locations potentially indicating the need for a traffic signal:

- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 16 at Schnoor Avenue - Rural
- Avenue 12 at SR 99 NB ramps - Urban

The signal warrant is not met at the remaining sixteen (16) study intersections in the Existing (2008) scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in the Appendices section Attachment VI – C - 4.

Queue Lengths

Table 41 shows the estimated Existing (2008) conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 41:
EXISTING (2008) CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204^1 (770^2)	
• NB Left		43/38
• NB Left-Through-Right		4/4
SR 99 SB off-ramp at Avenue 18 ½	1,256^1 (822^2)	
• SB Left-Through-Right		22/47
SR 99 SB off-ramp at Avenue 17	1,341^1 (907^2)	
• SB Left	589^3	4/13
• SB Right	589^3	1/1
SR 99 NB off-ramp at Avenue 17	1,060^1 (626^2)	
• NB Left-Through	45^3	17/8
• NB Right	45^3	12/66
SR 99 NB off-ramp at Avenue 16	1,150^1 (716^2)	
• SE Through-Right		0/0
SR 99 SB off-ramp at Avenue 16	1,020^1 (586^2)	
• SB Left		9/18
• SB Right		15/29
SR 99 NB off-ramp at Avenue 15 1/2 /Cleveland Avenue	881^1 (447^2)	
• NB Left	353^3	83/103
• NB Left-Through	353^3	82/103
• NB Right	353^3	39/129

SR = State Route *ft = feet*
95th percentile queue length - is minimum amount of storage needed for each movement
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
^{1} = Total ramp length *^{2} = Calculated storage distance*
^{3} = Distance of ramp striped as 2-lanes *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles

TABLE 41:
EXISTING (2008) CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 15 1/2/Cleveland Avenue	1,000[1] (566[2])	
• SB Left-Through	65[3]	76/130
• SB Right	65[3]	30/25
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	106/103
• WB Through-Right	90[3]	0/30
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	143/143
• SB Right	65[3]	43/37
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		70/81
• WB Right		7/7
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left-Through	49[3]	259/300
• NB Right	49[3]	18/21
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Blvd)		6/3
• WB Through-Right (at Golden State Blvd)		0/0
• EB Through (at SR 99 SB off-ramp)		0/0

SR = State Route ft = feet
95th percentile queue length - is minimum amount of storage needed for each movement
NB = northbound SB = southbound WB = westbound EB = eastbound
[1] = Total ramp length [2] = Calculated storage distance
[3] = Distance of ramp striped as 2-lanes --- not calculated for unsignalized intersections
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles

As shown, in Table 41, no analyzed queue lengths are estimated to currently exceed the allowable storage length in the 95th percentile condition in the Existing (2008) scenario for the Madera Site location.

Ramp Widening/Auxiliary Lane Threshold

Table 42 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 42:
EXISTING (2008) CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE

Scenario	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**≥ 1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	248/231	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	155/248	N/N	N/N
SR 99 SB off-ramp at Avenue 17	55/111	N/N	N/N
SR 99 NB off-ramp at Avenue 17	204/428	N/N	N/N
SR 99 NB off-ramp at Avenue 16	60/104	N/N	N/N
SR 99 SB off-ramp at Avenue 16	185/269	N/N	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	328/552	N/N	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	129/181	N/N	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	217/186	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	361/317	N/N	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	369/372	N/N	N/N
SR 99 NB off-ramp at Avenue 12	313/294	N/N	N/N

SR = State Route *PCE = Passenger Car Equivalent* *Y = Threshold Met*
N = Threshold Not Met *NB = northbound* *SB = southbound*

As shown in Table 42, none of the study off-ramps are projected to meet the 900 to 1,499 PCE or the >1,500 PCE threshold in the Existing (2008) scenario for the Madera Site.

Opening Day (2010) No Project Conditions

Alternative E (No Project Alternative)

Roadway Levels of Service

The 2010 No Project lane configurations and intersection control incorporated the proposed improvements identified by Caltrans including the following:

- Avenue 16 at SR 99 SB ramps
  - Signalize the intersection
- SR 145/Madera Avenue at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg, from a shared through-left lane, to dual (2) left-turn lanes and two (2) through lanes
  - Restripe/widen the SB approach, north leg, from one (1) through lane and a separate right-turn lane, to one (1) through lane and a shared through-right lane

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the NB approach, south leg, from a separate left-turn lane, one (1) through lane, and a separate right-turn lane, to dual (2) left-turn lanes, one (1) through lane, and a shared through-right lane
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the WB approach, east leg, from one (1) through lane to two (2) through lanes
  - Restripe/widen the WB departure, west leg, from a separate left-turn lane and one (1) through lane, to a separate left-turn lane and two (2) through lanes
- Avenue 12 at SR 99 NB ramps
  - Signalize the intersection
  - Restripe/widen the EB approach, west leg, from a shared left-through, to a separate left-turn lane and one (1) through lane

A new overcrossing will be built at Ellis Street over SR 99. Ellis Street will cross SR 99 from the east and merge with Avenue 16 west of SR 99. The overcrossing will not change the Avenue 16 at SR 99 interchange until the 2030 No Project scenario.

Table 43 shows the Opening Day (2010) No Project levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 10 (lane configurations) and 11 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 43 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 43. The signalized levels of service or delay shown in Table 43 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Opening Day (2010) No Project freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 5 and Attachment VI – C – 6 respectively. Figure 12 provides a graphical representation of the resulting Opening Day (2010) No Project levels of service.

TABLE 43:
OPENING DAY (2010) NO PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

	AM Peak Hour	**PM Peak Hour**
County Segment	**LOS**	**LOS**
Avenue 18 ½ - Road 24 to Road 23	A	A
Road 23 – Avenue 18 ½ to Avenue 17	B	B
Avenue 17 – Road 23 to SR 99	A	A
Avenue 17 – SR 99 to Road 27	B	**E**
Golden State Boulevard – Avenue 17 to Road 23	A	A

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 43:
OPENING DAY (2010) NO PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• NB	C	23.9	C	24.2
• **SB**	C	19.6	**D**	**31.1**
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	C	24.9	C	25.5
• **SB**	C	20.4	**D**	**33.6**
SR 99 south of Avenue 17				
• **NB**	**D**	**28.7**	**D**	**31.0**
• **SB**	C	22.8	**E**	**44.4**

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps				
• EB Left	A	6.4	A	5.6
• NB Approach	C	21.3	C	21.4
Avenue 18 ½ at SR 99 SB ramps/Road 23				
• WB Left-Through	A	0.8	A	1.5
• **NB Approach**	C	18.5	**E**	**36.5**
• **SB Approach**	C	16.5	**D**	**28.5**
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	14.3	C	17.3
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.3	A	0.1
• SB Approach	B	11.8	B	12.2
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.2
• SB Left-Through-Right	A	1.4	A	1.4
• WB Approach	B	9.7	B	10.2
• EB Approach	B	10.7	B	11.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 43:
OPENING DAY (2010) NO PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay^1 (secs)**	**LOS**	**Delay^1 (secs)**
Avenue 17 at SR 99 NB ramps				
• EB Left	B	10.0	B	10.2
• **NB Approach**	**F**	**114.6**	**F**	**371.0**
Avenue 17 at SR 99 SB ramps				
• **SB Approach**	C	16.6	**F**	**174.5**
Avenue 17 at Golden State Boulevard				
• EB Left-Through-Right	A	8.2	A	7.4
• WB Left-Through-Right	A	8.5	A	8.9
• NB Approach	C	22.2	D	32.4
• **SB Approach**	**F**	**113.9**	**F**	**---**
Avenue 17 at Road 23				
• NB Left-Through-Right	A	0.7	A	1.4
• SB Left-Through-Right	A	0.7	A	0.6
• WB Approach	B	13.9	C	18.9
• EB Approach	B	12.3	B	14.9
Ellis Street at Road 26	A	6.6	A	9.5
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.6	B	11.4
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	B	10.1	B	11.4
Avenue 16 at SR 99 SB ramps	A	9.3	A	10.0
Avenue 16 at Aviation Drive	B	18.1	C	21.2
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	14.3	C	22.7
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	15.2	B	14.2
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	5.0	A	5.4
• SB Approach	A	9.1	A	9.9
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.0	A	1.8
• WB Approach	B	10.8	B	12.0
• EB Approach	A	0.0	B	11.1
SR 145/Madera Avenue at SR 99 NB ramps	A	5.6	A	6.6
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	21.15	C	33.3
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	13.1	B	14.1
Avenue 14 at Road 23	A	8.8	A	9.3

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 43:
OPENING DAY (2010) NO PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

Intersection	AM Peak Hour LOS	AM Peak Hour Delay[1] (secs)	PM Peak Hour LOS	PM Peak Hour Delay[1] (secs)
Avenue 12/Golden State Boulevard at SR 99 SB ramps				
• SB Left-Through	A	6.1	A	3.7
• **WB Approach**	**E**	**43.3**	**D**	**30.0**
Avenue 12 at Golden State Boulevard	D	54.0	D	52.0
Avenue 12 at SR 99 NB ramps	B	17.9	C	21.7

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standard are shown bolded in Table 43. As shown in Table 43 and Figure 12, the following County segment (1), freeway segments (4), and intersections (5) are projected to operate or have movements projected to operate below the adopted level of service standards in the Opening Day (2010) No Project Alternative E scenario:

County Segments

- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hours – LOS "E"

Intersections

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "E"
  - SB Approach – PM peak hour – LOS "D"
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "E"/"D"

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the Opening Day (2010) No Project Alternative E scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following fifteen (15) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps/Road 23 - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 16/Avenue 16 connector at SR 99 NB ramps - Urban
- Gateway/Avenue 16 at SR 99 NB ramps - Urban
- Avenue 16 at SR 99 NB ramp connector - Urban
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following four (4) locations potentially indicating the need for a traffic signal:

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

The signal warrant is not met at the remaining eleven (11) study intersections in the Opening Day (2010) No Project Alternative E scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 7.

Queue Lengths

Table 44 shows the estimated Opening Day (2010) No Project Alternative E conditions queue lengths developed from the level of service analyses.

TABLE 44:
OPENING DAY (2010) NO PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE E)

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204^{1}	
	(770^{2})	
- NB Left		69/80
- NB Through-Right		4/4
SR 99 SB off-ramp at Avenue 18 ½	1,256^{1}	
	(822^{2})	
- SB Left-Through-Right		35/95
SR 99 SB off-ramp at Avenue 17	1,341^{1}	
	(907^{2})	
- SB Left	589^{3}	15/259
- SB Right	589^{3}	8/11
SR 99 NB off-ramp at Avenue 17	1,060^{1}	
	(626^{2})	
- **NB Left-Through**	45^{3}	322/**623**
- **NB Right**	45^{3}	27/**588**
SR 99 NB off-ramp at Avenue 16	1,150^{1}	
	(716^{2})	
- SE Through-Right		0/0
SR 99 SB off-ramp at Avenue 16	1,020^{1}	
	(586^{2})	
- SB Left		33/49
- SB Right		40/51
SR 99 NB off-ramp at Avenue 15 1/2 /Cleveland Avenue	881^{1}	
- NB Left	(447^{2})	110/192
- NB Left-Through	353^{3}	110/194
- NB Right	353^{3}	41/208
SR 99 SB off-ramp at Avenue 15 1/2/Cleveland Avenue	1,000^{1}	
	(566^{2})	
- SB Left-Through	65^{3}	95/155
- SB Right	65^{3}	38/65

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *^{1} = Total ramp length* *^{2} = Calculated storage distance*
^{3} = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 44:
OPENING DAY (2010) NO PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE E)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	117/108
• WB Through-Right	90[3]	0/31
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	171/210
• SB Right	65[3]	41/33
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		239/190
• WB Right		7/8
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left	49[3]	216/224
• NB Right	49[3]	49/58
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Boulevard)		10/10
• WB Through-Right (at Golden State Boulevard)		0/0
• EB Through (at SR 99 SB off-ramp)		0/0

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 44. As shown in Table 44, the following location by time period are projected to exceed the allowable storage length in the Opening Day (2010) No Project Alternative E scenario with 95th percentile traffic conditions:

- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Opening Day (2010) No Project Alternative E scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 45 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 45:
OPENING DAY (2010) NO PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE E)

Scenario	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**≥ 1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	282/302	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	189/289	N/N	N/N
SR 99 SB off-ramp at Avenue 17	109/222	N/N	N/N
SR 99 NB off-ramp at Avenue 17	424/822	N/N	N/N
SR 99 NB off-ramp at Avenue 16	69/115	N/N	N/N
SR 99 SB off-ramp at Avenue 16	248/385	N/N	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	451/846	N/N	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	192/303	N/N	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	223/193	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	439/504	N/N	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	470/490	N/N	N/N
SR 99 NB off-ramp at Avenue 12	355/343	N/N	N/N

PCE = Passenger Car Equivalent *Y = Threshold Met* *N = Threshold Not Met*
SR = State Route *NB = northbound* *SB = southbound*
Bolded Text = ramps meet at least one of the volume thresholds

As shown in Table 45, none of the study off-ramps are projected to meet the 900 to 1,499 PCE or >1,500 PCE threshold in the Opening Day (2010) No Project Alternative E scenario.

Opening Day (2010) with Project Conditions

Alternative A (Proposed Project Alternative)

Roadway Levels of Service

Table 46 show the Opening Day (2010) with Project Alternative A levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 10 (lane configurations) and 13 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 46 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 46. The signalized levels of service or delay shown in Table 46 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Opening Day (2010) with Project Alternative A freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 8 and Attachment VI – C – 9 respectively. Figure 14 provides a graphical representation of the resulting Opening Day (2010) with Project Alternative A levels of service.

TABLE 46:
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour	**PM Peak Hour**
County Segment	**LOS**	**LOS**
Avenue 18 ½ - Road 24 to Road 23	A	A
Road 23 – Avenue 18 ½ to Avenue 17	B	B
Avenue 17 – Road 23 to SR 99	A	D
Avenue 17 – SR 99 to Road 27	C	**F**
Golden State Boulevard – Avenue 17 to Road 23	A	A

	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• **NB**	C	24.3	C	25.2
• **SB**	C	20.3	**D**	**32.5**
SR 99 between Avenue 18 ½ and Avenue 17				
• **NB**	C	25.3	**D**	**27.0**
• **SB**	C	21.0	**E**	**36.1**
SR 99 south of Avenue 17				
• **NB**	**D**	**31.5**	**E**	**38.7**
• **SB**	C	24.1	**F**	---

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps				
• EB Left	A	8.4	A	8.1
• **NB Approach**	C	22.7	**D**	**26.4**
Avenue 18 ½ at SR 99 SB ramps/Road 23				
• WB Left-Through	A	0.8	A	1.4
• **NB Approach**	C	20.8	**F**	**63.1**
• **SB Approach**	C	17.2	**E**	**36.5**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = NO LOS/delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 46:
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	15.0	C	20.3
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.3	A	0.1
• SB Approach	B	12.1	B	12.9
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.2
• SB Left-Through-Right	A	1.7	A	1.7
• WB Approach	A	9.6	B	10.1
• EB Approach	B	10.8	B	12.1
Avenue 17 at SR 99 NB ramps				
• EB Left	B	11.0	B	13.9
• **NB Approach**	**F**	**6015.5**	**F**	**4113.0**
Avenue 17 at SR 99 SB ramps				
• **SB Approach**	**E**	**37.6**	**F**	**6974.5**
Avenue 17 at Golden State Boulevard				
• EB Left-Through-Right	A	9.2	B	10.7
• WB Left-Through-Right	A	9.2	B	10.8
• **NB Approach**	**F**	**250.4**	**F**	**---**
• **SB Approach**	**F**	**---**	**F**	**---**
Avenue 17 at Road 23				
• NB Left-Through-Right	A	0.7	A	1.7
• SB Left-Through-Right	A	0.7	A	0.6
• **WB Approach**	C	15.5	**E**	**39.0**
• EB Approach	B	13.1	C	19.2
Ellis Street at Road 26	A	7.6	B	13.3
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.7	B	11.5
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	B	10.3	B	11.9
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	5.2	A	5.8
• SB Approach	A	9.2	A	9.9
Avenue 16 at SR 99 SB ramps	A	9.2	B	10.1

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = NO LOS/delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 46:
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 16 at Aviation Drive	B	18.5	C	25.9
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	14.9	**D**	**36.4**
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	15.4	B	18.6
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	***	***	***	***
• SB Left-Through-Right	A	1.1	A	2.0
• WB Approach	B	11.0	B	12.7
• EB Approach	A	0.0	B	11.6
SR 145/Madera Avenue at SR 99 NB ramps	A	5.6	B	10.7
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	22.0	**D**	**38.7**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	13.9	B	17.0
Avenue 14 at Road 23	A	9.0	A	9.8
Avenue 12/Golden State Boulevard at SR 99 SB ramps				
• SB Left-Through	A	6.1	A	3.7
• **WB Approach**	**F**	**50.7**	**E**	**44.3**
Avenue 12 at Golden State Boulevard	D	54.3	**E**	**58.4**
Avenue 12 at SR 99 NB ramps	B	19.1	C	21.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = NO LOS/delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standard are shown bolded in Table 46. As shown in Table 46 and Figure 14, the following County segment (1), freeway segments (5), and intersections (10) are projected to operate or have movements projected to operate below the adopted level of service standards in the Opening Day (2010) with Project Alternative A scenario:

County Segments

- Avenue 17 – SR 99 to Road 27 – PM peak hour - LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
    - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
    - NB – PM peak hour – LOS "D"
    - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
    - NB – AM/PM peak hours – LOS "D"/"E"

  - SB – PM peak hour – LOS "F"

Intersections

- Avenue 18 at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS "D"
- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – PM peak hour – LOS "E"
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "D"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"/"E"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "E"

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standard in the Opening Day (2010) Project Alternative A scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following fifteen (15) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps/Road 23 - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 16/Avenue 16 connector at SR 99 NB ramps - Urban
- Gateway/Avenue 16 at SR 99 NB ramps - Urban
- Avenue 16 at SR 99 NB ramp connector - Urban
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following five (5) locations potentially indicating the need for a traffic signal:

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

The signal warrant is not met at the remaining ten (10) study intersections in the Opening Day (2010) Project Alternative A scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 10.

Queue Lengths

Table 47 shows the estimated Opening Day (2010) Project Alternative A conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 47:
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 18 ½	1,2041 (770[2])	
• NB Left		77/114
• NB Through-Right		4/5
SR 99 SB off-ramp at Avenue 18 ½	1,256[1] (822[2])	
• SB Left-Through-Right		37/118
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• SB Left	589[3]	62/---
• SB Right	589[3]	20/44
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• **NB Left-Through**	45[3]	---/---
• **NB Right**	45[3]	49/**1,557**

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 47:
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 16	1,150[1] (716[2])	
• SE Through-Right		0/0
SR 99 SB off-ramp at Avenue 16	1,020[1] (586[2])	
• SB Left		34/50
• SB Right		42/54
SR 99 NB off-ramp at Avenue 15 1/2 /Cleveland Avenue	881[1] (447[2])	
• NB Left	353[3]	137/292
• NB Left-Through	353[3]	137/293
• NB Right	353[3]	42/254
SR 99 SB off-ramp at Avenue 15 1/2/Cleveland Avenue	1,000[1] (566[2])	
• SB Left-Through	65[3]	108/179
• SB Right	65[3]	42/145
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	117/108
• WB Through-Right	90[3]	0/31
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	187/266
• SB Right	65[3]	40/30
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		273/277
• WB Right		7/8
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left	49[3]	236/#240
• NB Right	49[3]	52/59

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 47:
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Boulevard)		13/21
• WB Through-Right (at Golden State Boulevard)		0/0
• EB Through (at SR 99 SB off-ramp)		0/0

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *1 = Total ramp length* *2 = Calculated storage distance*
3 = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
Bolded Text *= 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 47. As shown in Table 47, the following locations by time period are projected to exceed the allowable storage length in the Opening Day (2010) with Project Alternative A scenario with 95th percentile traffic conditions:

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Opening Day (2010) Project Alternative A scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 48 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 48:
OPENING DAY (2010) WITH PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Scenario	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**≥ 1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	292/347	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	190/290	N/N	N/N
SR 99 SB off-ramp at Avenue 17	164/320	N/N	N/N
SR 99 NB off-ramp at Avenue 17	617/**1186**	N/**Y**	N/N
SR 99 NB off-ramp at Avenue 16	69/115	N/N	N/N
SR 99 SB off-ramp at Avenue 16	282/464	N/N	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	540/**1100**	N/**Y**	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	242/408	N/N	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	223/193	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	487/657	N/N	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	490/550	N/N	N/N
SR 99 NB off-ramp at Avenue 12	355/343	N/N	N/N

PCE = Passenger Car Equivalent Y = Threshold Met N = Threshold Not Met
SR = State Route NB = northbound SB = southbound
Bolded Text = ramps meet at least one of the volume thresholds

Off-ramps projected to meet one or both thresholds are shown in bold in Table 48. As shown in Table 48, the following off-ramps, by time period, are projected to meet the 900 to 1,499 PCE threshold in the Opening Day (2010) with Project Alternative A scenario:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB off-ramp – PM peak hour

When ramp volumes are between 900 to 1,499 PCE, provisions <u>should</u> be made for the future widening of a one-lane ramp to two-lanes and for the future construction of an associated 1,333 ft (minimum) auxiliary lane prior to the widened ramp. When ramp volumes are equal to or exceed 1,500 PCE, a two-lane ramp and associated 1,333 ft (minimum) auxiliary lane <u>should</u> be constructed.

Left-Turn Warrants

Left-turn lane channelization warrants were prepared to determine the need for separate left-turn lanes at six (6) County of Madera intersections that are currently unchannelized. The following intersection movements were analyzed to determine if separate left-turn lanes were warranted:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - WB left-turn

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - SB left-turn
- Avenue 18 at Road 23
    - NB left-turn
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Avenue 17 at Road 23
    - NB left-turn
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Avenue 17 at Golden State Boulevard
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Ellis Street at Road 26
    - NB left-turn
    - SB left-turn
    - EB left-turn
    - WB left-turn

The locations that met the left-turn warrant for the Opening Day (2010) with Project Alternative A are as follows:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
    - WB left-turn
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - SB left-turn
- Avenue 18 at Road 23
    - SB left-turn
- Avenue 17 at Road 23
    - SB left-turn
    - WB left-turn
- Avenue 17 at Golden State Boulevard
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Ellis Street at Road 26
    - NB left-turn
    - SB left-turn

Standard state of the practice dictates that dual left-turn lanes are recommended for left-turning volumes greater than 300 vehicles per hour and that separate right-turn lanes are recommended for right-turning volumes greater than 300 vehicles per hour. Based on this standard of practice, the following locations and movements should be considered for either dual left-turn lanes or a separate right-turn lane:

- Avenue 17 at SR 99 NB ramps

  - Dual NB left-turn lanes
  - Separate NB right-turn lane
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate WB right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Dual SB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16 at Schnoor Avenue
  - Dual WB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 16 at SR 99 SB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Separate EB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Dual WB left-turn lanes
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Dual SB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual EB left-turn lanes
  - Separate EB right-turn lane

Turn Lane Storage Calculations

Table 49 shows the calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet the left-turn channelization warrant, or require dual left-turn lanes or separate right-turn lanes. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 49:
OPENING DAY (2010) WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE A (PROPOSED PROJECT/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 with Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	100
	NBR	25	100
	WBL	---	n/a
Avenue 18 ½ at SR 99 NB ramps	EBL	150	150
Avenue 17 at SR 99 NB ramps	WBR		250
	EBL	300	100
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	350
	SBL	---	200
Avenue 12 at Golden State Boulevard	NBL	200	100
	WBL	---	100
	WBR		n/a
	SBL	400	350[1]
	SBR	200	100
	EBL	350	300
	EBR	425	100
Avenue 12 at SR 99 NB ramps	WBR	---	600
	EBL	---	250
Avenue 17 at Road 23	NBL	---	n/a
	WBL	---	n/a
	SBR	---	n/a
	EBR		n/a
Avenue 17 at Golden State Boulevard	NBL	50	150
	NBR	---	n/a
	WBL	---	200
	WBR	---	350
	SBL	---	200[1]
	EBL	---	
Ellis Street at Road 26	NBL	---	100
	WBR	---	250
	SBL	---	200
	EBR		100

ft = feet *NB = northbound* *SB = southbound* *WB = westbound*
EB = eastbound *n/a = not applicable* *--- =no existing lane*
SR = State Route *[1] = dual lefts required, length of each left-turn lane*
[2] = exceeds available distance to nearest intersection
[3] = dual rights required, length of each right-turn lane

TABLE 49:
OPENING DAY (2010) WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE A (PROPOSED PROJECT/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 with Project Storage Length (ft)
Avenue 16/Ellis Street at Aviation Drive	NBL	75	100
	NBR	75	n/a
	WBL	200	400
	SBL		100
	SBR		100
	EBL	---	100
	EBR		n/a
Avenue 16 at SR 99 SB ramps	WBR		100
	EBL		150
Avenue 16/Ellis Street at SR 99 NB ramps	WBR	---	n/a
	EBL	300	n/a
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	200
	EBL	100	250
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	250
	EBR	125	700
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	250[1]
	SBR	---	n/a
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	100[1]
	SBL	100	n/a
	SBR	25	250
	EBL	175	250
	EBR	175	500
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	n/a
	NBR	---	n/a
	WBL	---	n/a
	WBR		175
	SBL	---	n/a
Avenue 18 at Pistachio Drive	WBR		250

ft = feet *NB = northbound* *SB = southbound* *WB = westbound*
EB = eastbound *n/a = not applicable* *--- =no existing lane*
SR = State Route *[1] = dual lefts required, length of each left-turn lane*
[2] = exceeds available distance to nearest intersection
[3] = dual rights required, length of each right-turn lane

Alternative B (Reduced Intensity Alternative)

Roadway Levels of Service

Table 50 shows the Opening Day (2010) with Project Alternative B levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 10 (lane configurations) and 15 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 50 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 50. The signalized levels of service or delay shown in Table 50 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Opening Day (2010) with Project Alternative B freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 11 and Attachment VI – C - 12. Figure 16 provides a graphical representation of the resulting Opening Day (2010) with Project Alternative B levels of service.

TABLE 50:
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
County Segment	**LOS**		**LOS**	
Avenue 18 ½ - Road 24 to Road 23	A		A	
Road 23 – Avenue 18 ½ to Avenue 17	B		B	
Avenue 17 – Road 23 to SR 99	A		D	
Avenue 17 – SR 99 to Road 27	C		**F**	
Golden State Boulevard – Avenue 17 to Road 23	A		A	
	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• NB	C	24.2	C	25.2
• **SB**	C	20.0	**D**	**32.5**
SR 99 between Avenue 18 ½ and Avenue 17				
• **NB**	C	25.3	**D**	**27.0**
• **SB**	C	21.0	**E**	**36.1**
SR 99 south of Avenue 17				
• **NB**	**D**	31.5	**E**	**38.6**
• **SB**	C	24.7	**F**	---
	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps				
• EB Left	A	8.4	A	8.1
• **NB Approach**	C	22.7	**D**	**26.4**
Avenue 18 ½ at SR 99 SB ramps/Road 23				
• WB Left-Through	A	0.8	A	1.4
• **NB Approach**	C	20.8	**F**	**63.1**
• **SB Approach**	C	17.2	**E**	**36.5**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 50:
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	15.0	C	20.3
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.3	A	0.1
• SB Approach	B	12.1	B	12.9
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.2
• SB Left-Through-Right	A	1.7	A	1.7
• WB Approach	A	9.6	B	10.1
• EB Approach	B	10.8	B	12.1
Avenue 17 at SR 99 NB ramps				
• EB Left	B	11.0	B	13.9
• **NB Approach**	**F**	**6001.8**	**F**	**4093.9**
Avenue 17 at SR 99 SB ramps				
• **SB Approach**	**E**	**37.6**	**F**	**6974.5**
Avenue 17 at Golden State Boulevard				
• EB Left-Through-Right	A	9.2	B	10.7
• WB Left-Through-Right	A	9.2	B	10.8
• **NB Approach**	**F**	**250.4**	**F**	**---**
• **SB Approach**	**F**	**---**	**F**	**---**
Avenue 17 at Road 23				
• NB Left-Through-Right	A	0.7	A	1.7
• SB Left-Through-Right	A	0.7	A	0.6
• **WB Approach**	C	15.5	**E**	**39.2**
• EB Approach	B	13.1	C	19.1
Ellis Street at Road 26	A	7.6	B	13.2
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.7	B	11.5
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	B	10.3	B	11.9
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	5.2	A	5.9
• SB Approach	A	9.2	A	9.9
Avenue 16 at SR 99 SB ramps	A	9.2	B	10.1

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 50:
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection	AM Peak Hour LOS	AM Peak Hour Delay[1] (secs)	PM Peak Hour LOS	PM Peak Hour Delay[1] (secs)
Avenue 16 at Aviation Drive	B	18.5	C	25.9
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	14.9	**D**	**36.8**
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	15.4	B	18.6
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	***	***	***	***
• SB Left-Through-Right	A	1.1	A	2.0
• WB Approach	B	11.0	B	12.7
• EB Approach	A	0.0	B	11.6
SR 145/Madera Avenue at SR 99 NB ramps	A	5.6	B	10.2
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	22.0	**D**	**38.7**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	13.9	B	17.0
Avenue 14 at Road 23	A	9.0	A	9.8
Avenue 12/Golden State Boulevard at SR 99 SB ramps				
• SB Left-Through	A	6.1	A	3.7
• WB Approach	**F**	**50.7**	**E**	**44.3**
Avenue 12 at Golden State Boulevard	D	54.3	**E**	**58.4**
Avenue 12 at SR 99 NB ramps	B	19.1	C	21.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standards are shown bolded in Table 50. As shown in Table 50 and Figure 16, the following County segment (1), freeway segments (5), and intersections (10) are projected to operate or have movements projected to operate below the adopted level of service standards in the Opening Day (2010) Project Alternative B scenario:

<u>County Segments</u>

- Avenue 17 – SR 99 to Road 27 – PM peak hour - LOS "F"

<u>Freeway Segments</u>

- SR 99 north of Avenue 18 ½
    - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
    - NB – PM peak hour – LOS "D"

  - SB – PM peak hour – LOS “E”
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS “D”/”E”
  - SB – PM peak hour – LOS “F”

Intersections

- Avenue 18 at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS “D”
- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS “F”
  - SB Approach – PM peak hour – LOS “E”
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS “F”
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS “E”/“F”
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM/PM peak hours – LOS “F”
  - SB Approach – AM/PM peak hours – LOS “F”
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS “E”
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS “D”
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS “D”
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS “F”/”E”
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS “E”

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standard in the Opening Day (2010) Project Alternative B scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following fifteen (15) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps/Road 23 - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 16/Avenue 16 connector at SR 99 NB ramps - Urban
- Gateway/Avenue 16 at SR 99 NB ramps - Urban
- Avenue 16 at SR 99 NB ramp connector - Urban
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following five (5) locations potentially indicating the need for a traffic signal:

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

The signal warrant is not met at the remaining ten (10) study intersections in the Opening Day (2010) with Project Alternative B scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 13.

Queue Lengths

Table 51 shows the estimated Opening Day (2010) with Project Alternative B conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 51
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
• NB Left		77/114
• NB Through-Right		4/5
SR 99 SB off-ramp at Avenue 18 ½	1,256[1] (822[2])	
• SB Left-Through-Right		37/118
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• **SB Left**	589[3]	62/---
• **SB Right**	589[3]	20/44

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route [1] *= Total ramp length* [2] *= Calculated storage distance*
[3] *= Distance of ramp striped as 2-lanes or more* *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 51
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• **NB Left-Through**	45[3]	---/---
• **NB Right**	45[3]	49/**1,571**
SR 99 NB off-ramp at Avenue 16	1,150[1] (716[2])	
• WB Left		0/0
SR 99 SB off-ramp at Avenue 16	1,020[1] (586[2])	
• SB Left		30/50
• SB Right		42/54
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])	
• NB Left	353[3]	137/292
• NB Left-Through	353[3]	137/293
• NB Right	353[3]	42/244
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
• SB Left-Through	65[3]	108/179
• SB Right	65[3]	42/145
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	117/108
• WB Through-Right	90[3]	0/31
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	187/266
• SB Right	65[3]	40/30
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		273/277
• WB Right		7/8

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 51
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left-Through	49[3]	236/#240
• NB Right	49[3]	52/59
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Blvd)		13/21
• WB Through-Right (at Golden State Blvd)		0/0
• EB Through (at SR 99 SB off-ramp)		0/0

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
Bolded Text *= 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 51. As shown in Table 51, the following locations by time period are projected to exceed the allowable storage length in the Opening Day (2010) Project Alternative B scenario with 95th percentile traffic conditions:

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Opening Day (2010) Project Alternative B scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 52 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 52:
OPENING DAY (2010) PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Scenario	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**≥ 1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	292/347	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	190/290	N/N	N/N
SR 99 SB off-ramp at Avenue 17	164/320	N/N	N/N
SR 99 NB off-ramp at Avenue 17	615/**1183**	N/Y	N/N
SR 99 NB off-ramp at Avenue 16	69/115	N/N	N/N
SR 99 SB off-ramp at Avenue 16	282/464	N/N	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	540/**1090**	N/Y	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	242/408	N/N	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	223/193	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	487/657	N/N	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	490/550	N/N	N/N
SR 99 NB off-ramp at Avenue 12	355/343	N/N	N/N

PCE = Passenger Car Equivalent *Y = Threshold Met* *N = Threshold Not Met*
SR = State Route *NB = northbound* *SB = southbound*
Bolded Text = ramps meet at least one of the volume thresholds

Off-ramps projected to meet one or both thresholds are shown in bold in Table 52. As shown in Table 52, the following off-ramps, by time period, are projected to meet the 900 to 1,499 PCE threshold in the Opening Day (2010) Project Alternative B scenario:

- Avenue 17 at SR 99 NB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB off-ramp – PM peak hour

When ramp volumes are between 900 to 1,499 PCE, provisions <u>should</u> be made for the future widening of a one-lane ramp to two-lanes and for the future construction of an associated 1,333 ft (minimum) auxiliary lane prior to the widened ramp. When ramp volumes are equal to or exceed 1,500 PCE, a two-lane ramp and associated 1,333 ft (minimum) auxiliary lane <u>should</u> be constructed.

Left-Turn Warrants

Left-turn lane channelization warrants were prepared to determine the need for separate left-turn lanes at six (6) County of Madera intersections that are currently unchannelized. The following intersection movements were analyzed to determine if separate left-turn lanes were warranted:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
    - WB left-turn

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn

The locations that met the left-turn warrant for the Opening Day (2010) with Project Alternative B are as follows:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - WB left-turn
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - SB left-turn
- Avenue 17 at Road 23
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn

Standard state of the practice dictates that dual left-turn lanes are recommended for left-turning volumes greater than 300 vehicles per hour and that separate right-turn lanes are recommended for right-turning volumes greater than 300 vehicles per hour. Based on this standard of practice, the following locations and movements should be considered for either dual left-turn lanes or a separate right-turn lane:

- Avenue 17 at SR 99 NB ramps

  - Dual NB left-turn lanes
  - Separate NB right-turn lane
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate WB right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Dual SB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16 at Schnoor Avenue
  - Dual WB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 16 at SR 99 SB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Separate EB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Dual WB left-turn lanes
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Dual SB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual EB left-turn lanes
  - Separate EB right-turn lane

Turn Lane Storage Calculations

Table 53 shows the calculated left-turn storage lengths for movements which have existing separate left or right-turn lanes, meet the left-turn channelization warrant, or require dual left-turn lanes or separate right-turn lanes. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 53:
OPENING DAY (2010) WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE B (REDUCED INTENSITY/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	100
	NBR	25	100
	WBL	---	n/a
Avenue 18 ½ at SR 99 NB ramps	EBL	150	150
Avenue 17 at SR 99 NB ramps	WBR		200
	EBL	300	100
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	400
	SBL	---	200
Avenue 12 at Golden State Boulevard	NBL	200	100
	WBL	---	100
	WBR		n/a
	SBL	400	350[1]
	SBR	200	100
	EBL	350	300
	EBR	425	100
Avenue 12 at SR 99 NB ramps	WBR	---	650
	EBL	---	250
Avenue 17 at Road 23	NBL	---	n/a
	WBL	---	n/a
	SBR	---	n/a
	EBR		n/a
Avenue 17 at Golden State Boulevard	NBL	50	150
	NBR	---	n/a
	WBL	---	200
	WBR	---	300
	SBL	---	200[1]
	EBL	---	
Ellis Street at Road 26	NBL	---	100
	WBR	---	250
	SBL	---	200
	EBR		100

ft = feet SR = State Route NB = northbound SB = southbound
WB = westbound EB = eastbound n/a = not applicable --- =no existing lane
[1] = dual lefts required, length of each left-turn lane
[2] = exceeds available distance to nearest intersection
[3] = dual rights required, length of each right-turn lane

TABLE 53:
OPENING DAY (2010) WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE B (REDUCED INTENSITY/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)
Avenue 16/Ellis Street at Aviation Drive	NBL	75	100
	NBR	75	n/a
	WBL	200	400
	SBL		100
	SBR		100
	EBL	---	100
	EBR		n/a
Avenue 16 at SR 99 SB ramps	WBR		100
	EBL		150
Avenue 16/Ellis Street at SR 99 NB ramps	WBR	---	n/a
	EBL	300	n/a
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	250
	EBL	100	250
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	300
	EBR	125	800
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	300[1]
	SBR	---	n/a
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	100[1]
	SBL	100	n/a
	SBR	25	250
	EBL	175	250
	EBR	175	600
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	n/a
	NBR	---	n/a
	WBL	---	n/a
	WBR		175
	SBL	---	n/a
Avenue 18 at Pistachio Drive	WBR		250

ft = feet *SR = State Route* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] *= dual lefts required, length of each left-turn lane*
[2] *= exceeds available distance to nearest intersection*
[3] *= dual rights required, length of each right-turn lane*

<u>Alternative C (Commercial Land Use Alternative)</u>

Roadway Levels of Service

Table 54 shows the Opening Day (2010) with Project Alternative C levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 10 (lane configurations) and 17 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 54 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 54. The signalized levels of service or delay shown in Table 54 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Opening Day (2010) with Project Alternative C freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 14 and Attachment VI – C – 15 respectively. Figure 18 provides a graphical representation of the resulting Opening Day (2010) with Project Alternative C levels of service.

TABLE 54
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

County Segment	**AM Peak Hour LOS**	**PM Peak Hour LOS**
Avenue 18 ½ - Road 24 to Road 23	A	A
Road 23 – Avenue 18 ½ to Avenue 17	B	B
Avenue 17 – Road 23 to SR 99	A	D
Avenue 17 – SR 99 to Road 27	C	**F**
Golden State Boulevard – Avenue 17 to Road 23	A	A

	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• NB	C	24.2	C	25.1
• **SB**	C	19.9	**D**	**32.5**
SR 99 between Avenue 18 ½ and Avenue 17				
• **NB**	C	25.3	**D**	**27.0**
• **SB**	C	21.0	**E**	**36.1**
SR 99 south of Avenue 17				
• **NB**	**D**	**31.6**	**E**	**38.8**
• **SB**	C	24.8	**F**	**---**
Avenue 18 ½ at SR 99 NB ramps				
• EB Left	A	8.4	A	8.1
• **NB Approach**	C	22.7	**D**	**26.4**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 54
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 SB ramps/Road 23				
• WB Left-Through	A	0.8	A	1.4
• **NB Approach**	C	20.8	**F**	**60.2**
• **SB Approach**	C	17.2	**E**	**36.3**
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	15.0	C	20.2
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.3	A	0.1
• SB Approach	B	12.1	B	12.9
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.2
• SB Left-Through-Right	A	1.7	A	1.6
• WB Approach	A	9.6	B	10.1
• EB Approach	B	10.8	B	12.0
Avenue 17 at SR 99 NB ramps				
• EB Left	B	11.0	B	13.9
• **NB Approach**	**F**	**6029.1**	**F**	**4161.6**
Avenue 17 at SR 99 SB ramps				
• **SB Approach**	**E**	**38.2**	**F**	**6994.7**
Avenue 17 at Golden State Boulevard				
• EB Left-Through-Right	A	9.2	B	10.8
• WB Left-Through-Right	A	9.2	B	10.8
• **NB Approach**	**F**	**247.8**	**F**	---
• **SB Approach**	**F**	**---**	**F**	**---**
Avenue 17 at Road 23				
• NB Left-Through-Right	A	0.7	A	1.9
• SB Left-Through-Right	A	0.7	A	0.6
• **WB Approach**	C	15.4	**E**	**35.8**
• EB Approach	B	13.1	C	19.6
Ellis Street at Road 26	A	7.6	B	13.2
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.7	B	11.6
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	B	10.3	B	11.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 54
OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	5.2	A	5.8
• SB Approach	A	9.2	A	9.9
Avenue 16 at SR 99 SB ramps	A	9.2	B	10.2
Avenue 16 at Aviation Drive	B	18.5	C	26.0
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	14.9	**D**	**38.2**
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	15.4	B	18.9
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	1.8
• WB Approach	B	11.0	B	12.5
• EB Approach	A	0.0	B	11.5
SR 145/Madera Avenue at SR 99 NB ramps	A	5.6	B	10.1
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	22.0	**D**	**39.1**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	13.9	B	16.5
Avenue 14 at Road 23	A	9.0	A	9.7
Avenue 12/Golden State Boulevard at SR 99 SB ramps				
• SB Left-Through	A	6.1	A	3.7
• **WB Approach**	**F**	**50.7**	**E**	**47.9**
Avenue 12 at Golden State Boulevard	D	54.3	**E**	**60.0**
Avenue 12 at SR 99 NB ramps	B	19.1	C	21.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments and intersections within the study area that are projected to operate below the adopted level of service standard are shown bolded in Table 54. As shown in Table 54 and in Figure 18, the following County segment (1), freeway segments (5), and intersections (10) are projected to operate or have movements projected to operate below the adopted level of service standards in the Opening Day (2010) with Project Alternative C scenario:

County Segments

- Avenue 17 – SR 99 to Road 27 – PM peak hour - LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – PM peak hour – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "D"/"E"
  - SB – PM peak hour – LOS "F"

Intersections

- Avenue 18 at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS "D"
- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – PM peak hour – LOS "E"
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "D"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"/"E"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "E"

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the Opening Day (2010) Project Alternative C scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following fifteen (15) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps/Road 23 - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural

- Avenue 17 at Road 23 - Rural
- Avenue 16/Avenue 16 connector at SR 99 NB ramps - Urban
- Gateway/Avenue 16 at SR 99 NB ramps - Urban
- Avenue 16 at SR 99 NB ramp connector - Urban
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following five (5) locations potentially indicating the need for a traffic signal:

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

The signal warrant is not met at the remaining ten (10) study intersections in the Opening Day (2010) Project Alternative C scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 16.

Queue Lengths

Table 55 shows the estimated Opening Day (2010) Project Alternative C conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 55:
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, ALTERNATIVE LAND USE ALTERNATIVE)

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
• NB Left		77/114
• NB Through-Right		4/5
SR 99 SB off-ramp at Avenue 18 ½	1,256[1] (822[2])	
• SB Left-Through-Right		37/118

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 55:
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, ALTERNATIVE LAND USE ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
- **SB Left**	589[3]	62/---
- SB Right	589[3]	20/45
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
- **NB Left-Through**	45[3]	---/---
- **NB Right**	45[3]	49/**1,555**
SR 99 NB off-ramp at Avenue 16	1,150[1] (716[2])	
- WB Left		0/0
SR 99 SB off-ramp at Avenue 16	1,020[1] (586[2])	
- SB Left		34/56
- SB Right		43/55
SR 99 NB off-ramp at Avenue 15 1/2 /Cleveland Avenue	881[1] (447[2])	
- NB Left	353[3]	137/286
- NB Left-Through	353[3]	137/286
- NB Right	353[3]	42/247
SR 99 SB off-ramp at Avenue 15 1/2/Cleveland Avenue	1,000[1] (566[2])	
- SB Left-Through	65[3]	108/184
- SB Right	65[3]	42/145
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
- WB Left	90[3]	117/108
- WB Right	90[3]	0/31
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
- SB Left	65[3]	187/263
- SB Right	65[3]	40/30

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 55:
OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, ALTERNATIVE LAND USE ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		273/295
• WB Right		7/8
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left	49[3]	236/#240
• NB Right	49[3]	52/59
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Blvd)		13/21
• WB Through-Right (at Golden State Blvd)		0/0
• EB Through (at SR 99 SB off-ramp)		0/0

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more *--- not calculated for unsignalized intersections*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 55. As shown in Table 55, the following locations by time period are projected to exceed the allowable storage length in the Opening Day (2010) Project Alternative C scenario with 95th percentile traffic conditions:

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Opening Day (2010) with Project Alternative C scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 56 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 56:
OPENING DAY (2010) WITH PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

Scenario	PCE (AM/PM)	900 to 1,499 PCE Threshold (AM/PM) (Y/N)	≥ 1,500 PCE Threshold (AM/PM) (Y/N)
SR 99 NB off-ramp at Avenue 18 ½	292/347	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	190/290	N/N	N/N
SR 99 SB off-ramp at Avenue 17	164/322	N/N	N/N
SR 99 NB off-ramp at Avenue 17	619/**1192**	N/**Y**	N/N
SR 99 NB off-ramp at Avenue 16	69/115	N/N	N/N
SR 99 SB off-ramp at Avenue 16	284/482	N/N	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	540/**1075**	N/**Y**	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	242/412	N/N	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	223/193	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	487/650	N/N	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	490/561	N/N	N/N
SR 99 NB off-ramp at Avenue 12	355/343	N/N	N/N

PCE = Passenger Car Equivalent *Y = Threshold Met* *N = Threshold Not Met*
SR = State Route *NB = northbound* *SB = southbound*
Bolded Text = ramps meet at least one of the volume thresholds

Off-ramps projected to meet one or both thresholds are shown in bold in Table 56. As shown in Table 56, the following off-ramps, by time period, are projected to meet the 900 to 1,499 PCE threshold in the Opening Day (2010) Project Alternative C scenario:

- Avenue 17 at SR 99 NB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB off-ramp – PM peak hour

When ramp volumes are between 900 to 1,499 PCE, provisions should be made for the future widening of a one-lane ramp to two-lanes and for the future construction of an associated 1,333 ft (minimum) auxiliary lane prior to the widened ramp. When ramp volumes are equal to or exceed 1,500 PCE, a two-lane ramp and associated 1,333 ft (minimum) auxiliary lane should be constructed.

Left-Turn Warrants

Left-turn lane channelization warrants were prepared to determine the need for separate left-turn lanes at six (6) County of Madera intersections that are currently unchannelized. The following intersection movements were analyzed to determine if separate left-turn lanes were warranted:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - WB left-turn
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn

The locations that met the left-turn warrant for the Opening Day (2010) with Project Alternative C are as follows:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - WB left-turn
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - SB left-turn
- Avenue 17 at Road 23
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn

Standard state of the practice dictates that dual left-turn lanes are recommended for left-turning volumes greater than 300 vehicles per hour and that separate right-turn lanes are recommended for right-turning volumes greater than 300 vehicles per hour. Based on this standard of practice, the following locations and movements should be considered for either dual left-turn lanes or a separate right-turn lane:

- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate WB right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Dual SB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16 at Schnoor Avenue
  - Dual WB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 16 at SR 99 SB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Separate EB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Dual WB left-turn lanes
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Dual SB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual EB left-turn lanes
  - Separate EB right-turn lane

Turn Lane Storage Calculations

Table 57 shows the calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet the left-turn channelization warrant, or require dual left-turn lanes or separate right-turn lanes. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 57:
OPENING DAY (2010) WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE C (ALTERNATIVE LAND USE/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	100
	NBR	25	100
	WBL	---	n/a
Avenue 18 ½ at SR 99 NB ramps	EBL	150	150
Avenue 17 at SR 99 NB ramps	WBR		250
	EBL	300	100
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	350
	SBL	---	200
Avenue 12 at Golden State Boulevard	NBL	200	100
	WBL	---	100
	WBR		n/a
	SBL	400	350[1]
	SBR	200	100
	EBL	350	300
	EBR	425	100
Avenue 12 at SR 99 NB ramps	WBR	---	600
	EBL	---	250
Avenue 17 at Road 23	NBL	---	n/a
	WBL	---	n/a
	SBR	---	n/a
	EBR		n/a
Avenue 17 at Golden State Boulevard	NBL	50	150
	NBR	---	n/a
	WBL	---	200
	WBR	---	350
	SBL	---	200[1]
	EBL	---	

ft = feet SR = State Route NB = northbound SB = southbound
WB = westbound EB = eastbound n/a = not applicable --- =no existing lane
[1] = dual lefts required, length of each left-turn lane [2] = exceeds available distance to nearest intersection
[3] = dual rights required, length of each right-turn lane

TABLE 57:
OPENING DAY (2010) WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE C (ALTERNATIVE LAND USE/MADERA SITE)

Intersection	**Movement**	**Existing Storage Length (ft)**	**2010 Project Storage Length (ft)**
Ellis Street at Road 26	NBL	---	100
	WBR	---	250
	SBL	---	200
	EBR		100
Avenue 16/Ellis Street at Aviation Drive	NBL	75	100
	NBR	75	n/a
	WBL	200	400
	SBL		100
	SBR		100
	EBL	---	100
	EBR		n/a
Avenue 16 at SR 99 SB ramps	WBR		100
	EBL		150
Avenue 16/Ellis Street at SR 99 NB ramps	NBL		n/a
	NBTR		n/a
	WBR	---	n/a
	EBL	300	n/a
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	200
	EBL	100	250
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	300
	EBR	125	700
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	300[1]
	SBR	---	n/a
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	100[1]
	SBL	100	n/a
	SBR	25	250
	EBL	175	250
	EBR	175	600
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	n/a
	NBR	---	n/a
	WBL	---	n/a
	WBR		175
	SBL	---	n/a
Avenue 18 at Pistachio Drive	WBR		250

ft = feet *SR = State Route* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] *= dual lefts required, length of each left-turn lane* [2] *= exceeds available distance to nearest intersection*
[3] *= dual rights required, length of each right-turn lane*

The calculated storage lengths shown in Table 57 are for one lane only. All turn lanes requiring two (2) or more lanes, the length shown must be divided by the number of lanes to determine the storage per lane.

Mitigated Opening Day (2010) with Project Conditions

Alternative A (Proposed Project)

Roadway Levels of Service

Based on the information provided in the previous sections, the following locations, by scenario, are currently or are projected to operate below the adopted level of service standards:

Existing (2008)

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - SB – PM peak hour – LOS "D"

Intersections

- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "F"
- Avenue 12 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"/"F"

Opening Day (2010) No Project - Alternative E

County Segments

- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hours – LOS "E"

Intersections

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "E"
  - SB Approach – PM peak hour – LOS "D"
- Avenue 17 at SR 99 NB ramps

  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "E"/"D"

Opening Day (2010) with Alternative A Project

County Segments

- Avenue 17 – SR 99 to Road 27 – PM peak hour - LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – PM peak hour – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "D"/"E"
  - SB – PM peak hour – LOS "F"

Intersections

- Avenue 18 at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS "D"
- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – PM peak hour – LOS "E"
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "D"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"/"E"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "E"

The following locations, by scenario are also projected to meet either the rural or urban peak hour volume warrant:

Existing (2008)

- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Schnoor Avenue - Rural
- Avenue 12 at SR 99 NB ramps - Urban

Opening Day (2010) No Project – Alternative E

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

Opening Day (2010) with Alternative A Project

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

The following locations, by scenario, are also projected to exceed the available queue storage lengths with 95th percentile traffic conditions:

Opening Day (2010) No Project – Alternative E

- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour

Opening Day (2010) with Alternative A Project

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – PM peak hour

The locations that met the left-turn warrant for the Opening Day (2010) with Project Alternative A scenario are as follows:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - WB left-turn
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - SB left-turn
- Avenue 17 at Road 23
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard

  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn

In addition the following locations are projected to need dual (2) left-turn lanes and/or separate right-turn lanes:

- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate WB right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Dual SB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16 at Schnoor Avenue
  - Dual WB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 16 at SR 99 SB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Separate EB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Dual WB left-turn lanes
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Dual SB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual EB left-turn lanes
  - Separate EB right-turn lane

To mitigate the County segments, freeway segments, or intersections projected to operate below the appropriate adopted level of service standard, meet either the rural or urban peak hour volume warrant, meet the ramp widening/auxiliary lane threshold, exceed the available storage lengths, or require left-turn or right-turn channelization the following improvements are recommended:

Opening Day (2010) with Alternative A Project

County Segments

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from two (2) lanes to four (4) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- Avenue 18 ½ at SR 99 NB ramps
  - Signalize the intersection – Did not meet the warrant in 2010 but was shown as signalized since the SB ramp intersection was signalized as a mitigation in 2010; did meet the warrant in 2030 NP

Intersections

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Signalize the intersection – Did not meet the warrant in 2010 but was used as a mitigation in 2010; did meet the warrant in 2030 NP
- Avenue 17 at SR 99 NB ramps
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through lane and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane to one (1) left-turn lane and two (2) through lanes
  - Restripe/widen the WB approach from one (1) through lane and one (1) right-turn lane to two (2) through lanes and one (1) right-turn lane
- Avenue 17 at SR 99 SB ramps
  - Signalize the intersection
  - Restripe/widen the EB approach, west leg, from one (1) through lane to two (2) through lanes
  - Restripe/widen the WB approach, east leg, from one (1) through lane to two (2) through lanes
- Avenue 17 at Golden State Boulevard
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to two (2) left-turn lanes and one (1) shared through-right lane

  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
- Avenue 17 at Road 23
  - Signalize the intersection
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) right-turn lane
- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane to one (1) left-turn lane and one (1) through lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) right-turn lane to dual (2) left-turn lanes and one (1) right-turn lane
- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the WB approach, east leg, from a shared through-right lane to one (1) through lane and one (1) right-turn lane

Table 58 shows the Mitigated Opening Day (2010) with Project Alternative A levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 19 (lane configurations) and 13 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 58 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 58. The signalized levels of service or delay shown in Table 58 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Mitigated Opening Day (2010) Project Alternative A freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 17 and Attachment VI – C – 18 respectively. Figure 20 provides a graphical representation of the resulting Mitigated Opening Day (2010) Project Alternative A levels of service.

TABLE 58:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

County Segment	AM Peak Hour LOS	PM Peak Hour LOS
Avenue 18 ½ - Road 24 to Road 23	A	A
Road 23 – Avenue 18 ½ to Avenue 17	B	B
Avenue 17 – Road 23 to SR 99	A	D
Avenue 17 – SR 99 to Road 27	A	B
Golden State Boulevard – Avenue 17 to Road 23	A	A

	AM Peak Hour		PM Peak Hour	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• NB	C	24.3	C	25.2
• SB	B	13.3	C	19.7
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	B	16.5	B	17.4
• SB	B	14.0	C	20.8
SR 99 south of Avenue 17				
• NB	C	19.3	C	21.6
• SB	B	16.2	C	25.8

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps	B	13.4	B	13.4
Avenue 18 ½ at SR 99 SB ramps/Road 23	A	9.1	B	11.3
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	15.0	C	20.3
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.3	A	0.1
• SB Approach	B	12.1	B	12.9
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.2
• SB Left-Through-Right	A	1.7	A	1.7
• WB Approach	A	9.6	B	10.1
• EB Approach	B	10.8	B	12.1
Avenue 17 at SR 99 NB ramps	B	13.0	B	18.1
Avenue 17 at SR 99 SB ramps	A	2.7	A	5.5
Avenue 17 at Golden State Boulevard	B	18.8	C	21.5
Avenue 17 at Road 23	A	7.6	A	9.7

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*

TABLE 58:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Ellis Street at Road 26	A	7.6	B	13.3
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.7	B	11.5
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	B	10.3	B	11.9
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	5.2	A	5.8
• SB Approach	A	9.2	A	9.9
Avenue 16 at SR 99 SB ramps	A	9.2	B	10.1
Avenue 16 at Aviation Drive	B	18.5	C	25.9
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	12.1	C	24.4
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	10.1	B	14.0
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	2.0
• WB Approach	B	11.0	B	12.7
• EB Approach	A	0.0	B	11.6
SR 145/Madera Avenue at SR 99 NB ramps	A	6.4	A	7.3
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	B	10.5	B	13.1
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	11.1	B	10.4
Avenue 14 at Road 23	A	9.0	A	9.8
Avenue 12/Golden State Boulevard at SR 99 SB ramps	B	14.1	B	13.1
Avenue 12 at Golden State Boulevard	D	39.8	D	41.2
Avenue 12 at SR 99 NB ramps	B	12.9	B	12.8

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*

As shown in Table 58 and Figure 20, all of the County segments, freeway segments, and intersections are projected to operate at or above the appropriate level of service standard in the Mitigated Opening Day (2010) Project Alternative A scenario.

Queue Lengths

Table 59 shows the estimated Mitigated Opening Day (2010) with Project Alternative A conditions queue lengths developed from the level of service analyses for the Madera Site study locations. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column.

TABLE 59:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
• NB Left		110/131
• NB Through-Right		19/0
SR 99 SB off-ramp at Avenue 18 ½	1,256[1] (822[2])	
• SB Left-Through-Right		63/97
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• SB Left	589[3]	56/163
• SB Right	589[3]	35/38
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• NB Left		128/160
• NB Left-Through		129/161
• NB Right		26/214
SR 99 NB off-ramp at Avenue 16	1,150[1] (716[2])	
• SE Through-Right		0/0
SR 99 SB off-ramp at Avenue 16	1,020[1] (586[2])	
• SB Left		34/50
• SB Right		42/54
SR 99 NB off-ramp at Avenue 15 1/2 /Cleveland Avenue	881[1] (447[2])	
• NB Left	353[3]	110/#318
• NB Left-Through	353[3]	110/#321
• NB Right	353[3]	37/#269
SR 99 SB off-ramp at Avenue 15 1/2/Cleveland Avenue	1,000[1] (566[2])	
• SB Left-Through	65[2]	78/148
• SB Right	65[2]	33/124

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

TABLE 59:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	109/85
• WB Through-Right	90[3]	0/26
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	92/109
• SB Right	65[3]	47/35
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		60/64
• WB Right		14/14
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left-Through	49[3]	173/163
• NB Right	49[3]	42/47
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Blvd)		#131/#170
• WB Through (at Golden State Boulevard)		74/132
• WB Right (at Golden State Boulevard)		15/28
• EB Through (at SR 99 SB off-ramp)		3/52

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

As shown in Table 59, all study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Mitigated Opening Day (2010) Project Alternative A scenario.

Alternative B (Reduced Intensity Alternative)

Roadway Levels of Service

Based on the information provided in the previous sections, the following locations, by scenario, are currently or are projected to operate below the adopted level of service standards:

Existing (2008)

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - SB – PM peak hour – LOS "D"

Intersections

- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "F"
- Avenue 12 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"/"F"

Opening Day (2010) No Project - Alternative E

County Segments

- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hours – LOS "E"

Intersections

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "E"
  - SB Approach – PM peak hour – LOS "D"
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "E"/"D"

Opening Day (2010) with Alternative B Project

County Segments

- Avenue 17 – SR 99 to Road 27 – PM peak hour - LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – PM peak hour – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "D"/"E"
  - SB – PM peak hour – LOS "F"

Intersections

- Avenue 18 at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS "D"
- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – PM peak hour – LOS "E"
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "D"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"/"E"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "E"

The following locations, by scenario are also projected to meet either the rural or urban peak hour volume warrant:

Existing (2008)

- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Schnoor Avenue - Rural
- Avenue 12 at SR 99 NB ramps - Urban

Opening Day (2010) No Project – Alternative E

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

Opening Day (2010) with Alternative B Project

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

The following locations, by scenario, are also projected to exceed the available queue storage lengths with 95th percentile traffic conditions:

Opening Day (2010) No Project – Alternative E

- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour

Opening Day (2010) with Alternative B Project

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – PM peak hour

The locations that met the left-turn warrant for the Opening Day (2010) Project Alternative B are as follows:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - WB left-turn
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - SB left-turn
- Avenue 17 at Road 23
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn

In addition the following locations are projected to need dual (2) left-turn lanes and/or separate right-turn lanes:

- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate WB right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Dual SB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16 at Schnoor Avenue
  - Dual WB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 16 at SR 99 SB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Separate EB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Dual WB left-turn lanes
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Dual SB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual EB left-turn lanes
  - Separate EB right-turn lane

To mitigate the County segments, freeway segments, or intersections projected to operate below the appropriate adopted level of service standard, meet either the rural or urban peak hour volume warrant, meet the ramp widening/auxiliary lane threshold, exceed the available storage lengths, or require left-turn or right-turn channelization the following improvements are recommended:

Opening Day (2010) with Alternative B Project

County Segments

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from two (2) lanes to four (4) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes

- Avenue 18 ½ at SR 99 NB ramps
  - Signalize the intersection – Did not meet the warrant in 2010 but was shown as signalized since the SB ramp intersection was signalized as a mitigation in 2010; did meet the warrant in 2030 NP

<u>Intersections</u>

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Signalize the intersection – Did not meet the warrant in 2010 but was used as a mitigation in 2010; did meet the warrant in 2030 NP
- Avenue 17 at SR 99 NB ramps
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through lane and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane to one (1) left-turn lane and two (2) through lanes
  - Restripe/widen the WB approach from one (1) through lane and one (1) right-turn lane to two (2) through lanes and one (1) right-turn lane
- Avenue 17 at SR 99 SB ramps
  - Signalize the intersection
  - Restripe/widen the EB approach, west leg, from one (1) through lane to two (2) through lanes
  - Restripe/widen the WB approach, east leg, from one (1) through lane to two (2) through lanes
- Avenue 17 at Golden State Boulevard
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to two (2) left-turn lanes and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
- Avenue 17 at Road 23
  - Signalize the intersection
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) right-turn lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane to one (1) left-turn lane and one (1) through lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) right-turn lane to dual (2) left-turn lanes and one (1) right-turn lane
- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the WB approach, east leg, from a shared through-right lane to one (1) through lane and one (1) right-turn lane

Table 60 shows the Mitigated Opening Day (2010) with Project Alternative B levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 21 (lane configurations) and 15 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 60 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 60. The signalized levels of service or delay shown in Table 60 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Mitigated Opening Day (2010) with Project Alternative B freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 19 and Attachment VI – C – 20 respectively. Figure 22 provides a graphical representation of the resulting Mitigated Opening Day (2010) with Project Alternative B levels of service.

TABLE 60:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

County Segment	AM Peak Hour LOS	PM Peak Hour LOS
Avenue 18 ½ - Road 24 to Road 23	A	A
Road 23 – Avenue 18 ½ to Avenue 17	B	B
Avenue 17 – Road 23 to SR 99	A	D
Avenue 17 – SR 99 to Road 27	A	B
Golden State Boulevard – Avenue 17 to Road 23	A	A

Freeway Segment	AM Peak Hour LOS	AM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS	PM Peak Hour Density (pc/mi/ln)
SR 99 north of Avenue 18 ½				
• NB	C	24.2	C	25.2
• SB	B	13.3	C	19.7
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	C	16.5	C	17.4
• SB	B	14.0	C	20.8
SR 99 south of Avenue 17				
• NB	C	19.3	C	21.5
• SB	B	16.2	C	25.8
Avenue 18 ½ at SR 99 NB ramps	B	13.3	B	13.4
Avenue 18 ½ at SR 99 SB ramps/Road 23	A	8.9	B	11.3
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	15.0	C	20.3
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.3	A	0.1
• SB Approach	B	12.1	B	12.9
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.2
• SB Left-Through-Right	A	1.7	A	1.7
• WB Approach	A	9.6	B	10.1
• EB Approach	B	10.8	B	12.1
Avenue 17 at SR 99 NB ramps	B	13.0	B	18.1
Avenue 17 at SR 99 SB ramps	A	2.7	A	5.5
Avenue 17 at Golden State Boulevard	B	18.9	C	21.5
Avenue 17 at Road 23	A	7.4	A	9.5
Ellis Street at Road 26	A	7.6	B	13.2
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.7	B	11.5

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** =no LOS/Delay reported*

TABLE 60:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	B	10.3	B	11.9
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	5.2	A	5.9
• SB Approach	A	9.2	A	9.9
Avenue 16 at SR 99 SB ramps	A	9.2	B	10.1
Avenue 16 at Aviation Drive	B	18.5	C	25.9
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	12.1	C	24.9
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	10.1	B	14.1
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	2.0
• WB Approach	B	11.0	B	12.7
• EB Approach	A	0.0	B	11.6
SR 145/Madera Avenue at SR 99 NB ramps	A	6.3	A	7.6
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	B	10.5	B	13.5
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	11.2	B	12.1
Avenue 14 at Road 23	A	9.0	A	9.8
Avenue 12/Golden State Boulevard at SR 99 SB ramps	B	18.1	B	14.8
Avenue 12 at Golden State Boulevard	C	33.5	D	41.6
Avenue 12 at SR 99 NB ramps	B	12.9	B	13.8

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** =no LOS/Delay reported*

As shown in Table 60 and Figure 22, all of the County segments, freeway segments, and intersections are projected to operate at or above the appropriate level of service standard in the Mitigated Opening Day (2010) Project Alternative B scenario.

Queue Lengths

Table 61 shows the estimated Mitigated Opening Day (2010) with Project Alternative B conditions queue lengths developed from the level of service analyses for the Madera Site study locations. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column.

TABLE 61:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
- NB Left		110/131
- NB Through-Right		19/0
SR 99 SB off-ramp at Avenue 18 ½	1,256[1] (822[2])	
- SB Left-Through-Right		61/97
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
- SB Left	589[3]	56/163
- SB Right	589[3]	35/38
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
- NB Left		127/157
- NB Left-Through		128/158
- NB Right		26/216
SR 99 NB off-ramp at Avenue 16	1,150[1] (716[2])	
- SB Through-Right		0/0
SR 99 SB off-ramp at Avenue 16	1,020[1] (586[2])	
- SB Left		34/50
- SB Through		
- SB Right		42/54
SR 99 NB off-ramp at Avenue 15 1/2 /Cleveland Avenue	881[1]	
- NB Left	(447[2])	110/#349
- NB Left-Through	353[3]	110/#350
- NB Right	353[3]	37/#275

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

TABLE 61:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 SB off-ramp at Avenue 15 1/2/Cleveland Avenue	1,000[1] (566[2])	
• SB Left	65[2]	
• SB Left-Through		78/173
• SB Right	65[2]	33/139
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	109/99
• WB Through-Right	90[3]	0/29
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	92/131
• SB Right	65[3]	47/40
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1]	
• WB Left	(997[2])	158/75
• WB Right		12/38
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left-Through	49[3]	173/181
• NB Right	49[3]	42/50
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Blvd)		#130/#170
• WB Through (at Golden State Blvd)		75/132
• WB Right (at Golden State Blvd)		15/27
• EB Through (at SR 99 SB off-ramp)		3/52

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

As shown in Table 61, all study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Mitigated Opening Day (2010) Project Alternative B scenario.

Alternative C (Commercial Land Use Alternative)

Roadway Levels of Service

Based on the information provided in the previous sections, the following locations, by scenario, are currently or are projected to operate below the adopted level of service standards:

Existing (2008)

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - SB – PM peak hour – LOS "D"

Intersections

- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "F"
- Avenue 12 at SR 99 NB ramps
  - NB Approach – AM/PM peak hour – LOS "F"/"F"

Opening Day (2010) No Project - Alternative E

County Segments

- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hours – LOS "E"

Intersections

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "E"
  - SB Approach – PM peak hour – LOS "D"
- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard
  - SB Approach – AM/PM peak hours – LOS "F"

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - WB Approach – AM/PM peak hours – LOS "E"/"D"

Opening Day (2010) with Alternative C Project

County Segments

- Avenue 17 – SR 99 to Road 27 – PM peak hour - LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
    - SB – PM peak hour – LOS "D"
- SR 99 between Avenue 18 ½ and Avenue 17
    - NB – PM peak hour – LOS "D"
    - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
    - NB – AM/PM peak hours – LOS "D"/"E"
    - SB – PM peak hour – LOS "F"

Intersections

- Avenue 18 at SR 99 NB ramps
    - NB Approach – PM peak hour – LOS "D"
- Avenue 18 ½ at SR 99 SB ramps/Road 23
    - NB Approach – PM peak hour – LOS "F"
    - SB Approach – PM peak hour – LOS "E"
- Avenue 17 at SR 99 NB ramps
    - NB Approach – AM/PM peak hour – LOS "F"
- Avenue 17 at SR 99 SB ramps
    - SB Approach – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Golden State Boulevard
    - NB Approach – AM/PM peak hours – LOS "F"
    - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
    - WB Approach – PM peak hour – LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "D"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - WB Approach – AM/PM peak hours – LOS "F"/"E"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "E"

The following locations, by scenario are also projected to meet either the rural or urban peak hour volume warrant:

Existing (2008)

- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Schnoor Avenue - Rural
- Avenue 12 at SR 99 NB ramps - Urban

Opening Day (2010) No Project – Alternative E

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

Opening Day (2010) with Alternative C Project

- Avenue 17 at SR 99 SB ramps - Rural
- Avenue 17 at SR 99 NB ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 12/Golden State Boulevard at SR 99 SB ramps - Urban

The following locations, by scenario, are also projected to exceed the available queue storage lengths with 95th percentile traffic conditions:

Opening Day (2010) No Project – Alternative E

- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour

Opening Day (2010) with Alternative C Project

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – PM peak hour

The locations that met the left-turn warrant for the Opening Day (2010) with Project Alternative C are as follows:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - WB left-turn
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - SB left-turn
- Avenue 17 at Road 23
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn

In addition the following locations are projected to need dual (2) left-turn lanes and/or separate right-turn lanes:

- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate WB right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Dual SB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16 at Schnoor Avenue
  - Dual WB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 16 at SR 99 SB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Separate EB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
  - Dual WB left-turn lanes
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Dual SB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual EB left-turn lanes
  - Separate EB right-turn lane

To mitigate the County segments, freeway segments, or intersections projected to operate below the appropriate adopted level of service standard, meet either the rural or urban peak hour volume warrant, meet the ramp widening/auxiliary lane threshold, exceed the available storage lengths, or require left-turn or right-turn channelization the following improvements are recommended:

Opening Day (2010) with Alternative C Project

County Segments

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from two (2) lanes to four (4) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes
- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes
- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from two (2) lanes to three (3) lanes
  - Restripe/widen the SB leg from two (2) lanes to three (3) lanes
- Avenue 18 ½ at SR 99 NB ramps
  - Signalize the intersection – Did not meet the warrant in 2010 but was shown as signalized since the SB ramp intersection was signalized as a mitigation in 2010; did meet the warrant in 2030 NP

Intersections

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Signalize the intersection – Did not meet the warrant in 2010 but was used as a mitigation in 2010; did meet the warrant in 2030 NP
- Avenue 17 at SR 99 NB ramps
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through lane and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane to one (1) left-turn lane and two (2) through lanes
  - Restripe/widen the WB approach from one (1) through lane and one (1) right-turn lane to two (2) through lanes and one (1) right-turn lane
- Avenue 17 at SR 99 SB ramps
  - Signalize the intersection
  - Restripe/widen the EB approach, west leg, from one (1) through lane to two (2) through lanes
  - Restripe/widen the WB approach, east leg, from one (1) through lane to two (2) through lanes
- Avenue 17 at Golden State Boulevard
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to two (2) left-turn lanes and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane

- Avenue 17 at Road 23
  - Signalize the intersection
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) right-turn lane
- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane to one (1) left-turn lane and one (1) through lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) right-turn lane to dual (2) left-turn lanes and one (1) right-turn lane
- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the WB approach, east leg, from a shared through-right lane to one (1) through lane and one (1) right-turn lane

Table 62 shows the Mitigated Opening Day (2010) with Project Alternative C levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 23 (lane configurations) and 17 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 62 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 62. The signalized levels of service or delay shown in Table 62 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Mitigated Opening Day (2010) with Project Alternative C freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 21 and Attachment VI – C – 22 respectively. Figure 24 provides a graphical representation of the resulting Mitigated Opening Day (2010) with Project Alternative C levels of service.

TABLE 62:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

County Segment	AM Peak Hour LOS	PM Peak Hour LOS
Avenue 18 ½ - Road 24 to Road 23	A	A
Road 23 – Avenue 18 ½ to Avenue 17	B	B
Avenue 17 – Road 23 to SR 99	A	D
Avenue 17 – SR 99 to Road 27	A	B
Golden State Boulevard – Avenue 17 to Road 23	A	A

Freeway Segment	AM Peak Hour LOS	AM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS	PM Peak Hour Density (pc/mi/ln)
SR 99 north of Avenue 18 ½				
• NB	C	24.2	C	25.1
• SB	B	13.3	C	19.7
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	B	16.5	B	17.4
• SB	B	14.0	C	20.8
SR 99 south of Avenue 17				
• NB	C	19.3	C	21.6
• SB	B	16.2	C	25.9

Intersection	AM Peak Hour LOS	AM Peak Hour Delay[1] (secs)	PM Peak Hour LOS	PM Peak Hour Delay[1] (secs)
Avenue 18 ½ at SR 99 NB ramps	B	13.3	B	13.4
Avenue 18 ½ at SR 99 SB ramps/Road 23	A	8.9	B	11.3
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.0	A	0.4
• SB Approach	B	15.0	C	20.2
Avenue 18 ½ at Golden State Boulevard				
• EB Approach	A	0.3	A	0.1
• SB Approach	B	12.1	B	12.9
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.1	A	0.2
• SB Left-Through-Right	A	1.7	A	1.6
• WB Approach	A	9.6	B	10.1
• EB Approach	B	10.8	B	12.0
Avenue 17 at SR 99 NB ramps	B	13.1	B	17.8
Avenue 17 at SR 99 SB ramps	A	2.7	A	5.6
Avenue 17 at Golden State Boulevard	B	18.9	C	21.6
Avenue 17 at Road 23	A	7.5	A	9.6
Ellis Street at Road 26	A	7.6	B	13.2

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/Delay reported*

TABLE 62:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

Intersection	AM Peak Hour LOS	AM Peak Hour Delay[1] (secs)	PM Peak Hour LOS	PM Peak Hour Delay[1] (secs)
Gateway/Avenue 16 at SR 99 NB ramps				
• SB Approach	B	10.7	B	11.6
Avenue 16/Avenue 16 connector at SR 99 NB ramps				
• EB Left	B	10.3	B	11.9
Avenue 16 at SR 99 NB ramp connector				
• EB Left-Through	A	5.2	A	5.8
• SB Approach	A	9.2	A	9.9
Avenue 16 at SR 99 SB ramps	A	9.2	B	10.2
Avenue 16 at Aviation Drive	B	18.5	C	26.0
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	12.1	C	24.5
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	10.1	B	14.5
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	1.8
• WB Approach	B	11.0	B	12.5
• EB Approach	A	0.0	B	11.5
SR 145/Madera Avenue at SR 99 NB ramps	A	6.3	A	7.1
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	B	10.5	B	12.8
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	11.2	B	12.1
Avenue 14 at Road 23	A	9.0	A	9.7
Avenue 12/Golden State Boulevard at SR 99 SB ramps	B	14.7	B	13.1
Avenue 12 at Golden State Boulevard	D	41.1	D	40.6
Avenue 12 at SR 99 NB ramps	B	13.0	B	12.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/Delay reported*

As shown in Table 62 and Figure 24, all of the County segments, freeway segments, and intersections are projected to operate at or above the appropriate level of service standard in the Mitigated Opening Day (2010) Project Alternative C scenario.

Queue Lengths

Table 63 shows the estimated Mitigated Opening Day (2010) with Project Alternative C conditions queue lengths developed from the level of service analyses for the Madera Site study locations. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column.

TABLE 63:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
• NB Left		110/131
• NB Through-Right		19/0
SR 99 SB off-ramp at Avenue 18 ½	1,256[1] (822[2])	
• SB Left-Through-Right		61/97
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• SB Left	589[3]	56/164
• SB Right	589[3]	35/39
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• NB Left		129/162
• NB Left-Through		129/163
• NB Right		26/214
SR 99 NB off-ramp at Avenue 16	1,150[1] (716[2])	
• SB Through-Right		0/0
SR 99 SB off-ramp at Avenue 16	1,020[1] (586[2])	
• SB Left		34/56
• SB Through		
• SB Right		43/55
SR 99 NB off-ramp at Avenue 15 1/2 /Cleveland Avenue	881[1] (447[2])	
• NB Left	353[3]	110/#321
• NB Left-Through	353[3]	110/#322
• NB Right	353[3]	37/#268

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route [1] *= Total ramp length* [2] *= Calculated storage distance*
[3] *= Distance of ramp striped as 2-lanes or more*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*
[4] *= Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column*

TABLE 63:
MITIGATED OPENING DAY (2010) WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 15 1/2/Cleveland Avenue	1,000[1] (566[2])	
• SB Left-Through	65[2]	78/#152
• SB Right	65[2]	33/124
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	109/99
• WB Right	90[3]	0/29
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	92/130
• SB Right	65[3]	47/40
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		59/70
• WB Right		13/14
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left-Through	49[3]	173/163
• NB Right	49[3]	42/47
Avenue 17 between the SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Blvd)		#130/#169
• WB Through (at Golden State Blvd)		74/135
• WB Right (at Golden State Blvd)		15/36
• EB Through (at SR 99 SB off-ramp)		3/52

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

As shown in Table 63, all study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Mitigated Opening Day (2010) with Project Alternative C scenario.

2030 No Project Conditions

Alternative E, No Project Alternative

Roadway Levels of Service

The 2030 No Project lane configurations and intersection control incorporated the proposed improvements identified by Caltrans and included in the Madera County 2007 RTP including the following:

- SR 99 from Avenue 16 to Avenue 21
  - Restripe/widen from four (4) lanes to six (6) lanes
- Airport from Avenue 17 to Yeager
  - Restripe/widen from two (2) lanes to four (4) lanes
- Avenue 18 ½ at SR 99 SB off-ramp
  - Remove NB approach, south leg
  - Restripe the SB approach, north leg, from a shared left-through-right lane, to a shared left-right lane
  - Restripe the EB approach, west leg, from a shared through-right lane, to one (1) through lane
  - Restripe the WB approach, east leg, from a shared left-through lane, to one (1) through lane
- Avenue 18 ½ at Pistachio Drive
  - Restripe the SB approach, north leg, from a shared left-right lane, to a separate right-turn lane
- Avenue 18 ½ at Golden State Boulevard
  - Realign Road 23 from current northern terminus at the intersection of Avenue 18 ½ at SR 99 SB ramps to the NB approach, south leg, of Avenue 18 ½ at Golden State Boulevard
- Avenue 12 at Golden State Boulevard
  - Restripe/widen the EB approach, west leg, from a separate left-turn lane, one (1) through lane, and a separate right-turn lane, to separate left-turn lane, one (1) through lane, and a shared through-right lane
  - Restripe/widen the WB approach, east leg, from a separate left-turn lane and a shared through-right lane, to separate left-turn lane, one (1) through lane, and a shared through-right lane
- Avenue 12 at SR 99 NB Ramps
  - Restripe/widen the EB approach, west leg, from a separate left-turn lane and one (1) through lane, to a separate left-turn lane and two (2) through lanes
  - Restripe/widen the WB approach, east leg, from a shared through-right lane to two (2) through lanes and a separate right-turn lane

A new interchange will be built at Ellis Street at SR 99. Ellis Street will cross SR 99 from the east and merge with Avenue 16 west of SR 99. The Avenue 16 at SR 99 interchange ramps will be removed and converted to an overpass. The new Ellis Street/Avenue 16 at SR 99 interchange is based on the *Avenue 16 at SR 99 Project Study Report* (PSR) prepared by Caltrans in March 2004. With the new interchange, the Avenue 16 at Schnoor Avenue intersection analysis will be replaced by the intersection of Avenue 16/Ellis Street at Golden State Boulevard.

Table 64 shows the 2030 No Project levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 25 (lane configurations) and 26 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 64 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 64. The signalized levels of service or delay shown in Table 64 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Opening 2030 No Project freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 23 and Attachment VI – C – 24 respectively. Figure 27 provides a graphical representation of the resulting 2030 No Project levels of service.

TABLE 64:
2030 NO PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
County Segment	**LOS**		**LOS**	
Avenue 18 ½ - Road 24 to Road 23	A		B	
Road 23 – Avenue 18 ½ to Avenue 17	D		D	
Avenue 17 – Road 23 to SR 99	**F**		**F**	
Avenue 17 – SR 99 to Road 27	**E**		**F**	
Golden State Boulevard – Avenue 17 to Road 23	A		A	
	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• **NB**	**D**	**26.5**	**D**	**33.2**
• **SB**	C	23.9	**E**	**41.4**
SR 99 between Avenue 18 ½ and Avenue 17				
• **NB**	**D**	**26.4**	**D**	**31.4**
• **SB**	C	23.5	**E**	**40.5**
SR 99 south of Avenue 17				
• **NB**	**E**	**39.0**	**F**	---
• **SB**	**D**	**29.2**	**F**	**---**
	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps				
• EB Left	A	7.5	B	10.1
• **NB Approach**	**F**	**337.7**	**F**	**7523.8**
Avenue 18 ½ at SR 99 SB ramps/Road 23				
• WB Left-Through	A	0.0	A	0.0
• NB Approach	A	1.0	A	0.0
• **SB Approach**	**F**	**52.0**	**F**	**332.3**
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.7	A	2.2
• **SB Approach**	C	24.8	**F**	**187.5**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 64:
2030 NO PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

Intersection	AM Peak Hour LOS	AM Peak Hour Delay[1] (secs)	PM Peak Hour LOS	PM Peak Hour Delay[1] (secs)
Avenue 18 ½ at Golden State Boulevard				
• EB Left-Through-Right	A	1.0	A	0.9
• WB Left-Through	A	6.6	A	7.5
• **NB Approach**	C	19.2	**F**	**137.3**
• **SB Approach**	**F**	**429.1**	**F**	**9379.8**
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.0	A	0.2
• SB Left-Through-Right	A	0.8	A	1.0
• WB Approach	B	14.5	C	17.9
• EB Approach	C	16.4	C	24.8
Avenue 17 at SR 99 NB ramps				
• **EB Left**	**D**	**27.7**	**F**	**617.2**
• **NB Approach**	**F**	**6790.7**	**F**	---
Avenue 17 at SR 99 SB ramps				
• **SB Approach**	**F**	**7445.5**	**F**	---
Avenue 17 at Golden State Boulevard				
• EB Left	B	12.5	D	29.4
• **WB Left**	**F**	**71.5**	**F**	**275.4**
• **NB Approach**	**F**	---	**F**	---
• **SB Approach**	**F**	---	**F**	---
Avenue 17 at Road 23				
• NB Left-Through-Right	A	3.2	A	3.3
• SB Left-Through-Right	A	0.8	A	0.3
• **WB Approach**	**F**	---	**F**	---
• **EB Approach**	**F**	---	**F**	---
Ellis Street at Road 26	B	10.1	C	22.2
Avenue 16/Ellis Street at SR NB ramps	B	11.7	B	13.9
Avenue 16/Ellis Street at SR 99 SB ramps	A	7.3	B	10.6
Avenue 16/Ellis Street at Aviation Drive	**F**	**115.7**	**F**	**399.6**
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	C	26.8	**F**	**199.2**
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	C	31.4	**F**	**133.0**
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	1.7
• WB Approach	C	16.9	D	34.4
• EB Approach	A	0.0	C	19.0

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 64:
2030 NO PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
SR 145/Madera Avenue at SR 99 NB ramps	**D**	**37.0**	**F**	**242.9**
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	**E**	**70.9**	**F**	**238.7**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	C	29.7	**F**	**163.2**
Avenue 14 at Road 23	B	11.6	C	16.6
Avenue 12/Golden State Boulevard at SR 99 SB ramps				
• SB Left-Through	A	9.1	A	7.5
• **WB Approach**	**F**	**9323.4**	**F**	**9051.8**
Avenue 12 at Golden State Boulevard	**F**	**205.2**	**F**	**328.4**
Avenue 12 at SR 99 NB ramps	C	21.5	**E**	**57.9**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standard in 2030 are shown bolded in Table 64. As shown in Table 64 and Figure 27, the following County segments (2), freeway segments (6), and intersections (17) are projected to operate or have movements projected to operate below the adopted level of service standards in the 2030 No Project Alternative E scenario:

<u>County Segments</u>

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"/"F"

<u>Freeway Segments</u>

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

<u>Intersections</u>

- Avenue 18 ½ at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"

- Avenue 18 ½ at SR 99 SB Ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps
  - EB Left – AM/PM peak hours – LOS "D"/"F"
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Golden State Boulevard
  - WB Left – AM/PM peak hours – LOS "F"
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – AM/PM peak hours – LOS "F"
  - EB Approach – AM/PM peak hours – LOS "F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – AM/PM peak hours – LOS "E"/"F"
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp – PM peak hour – LOS "F"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standard in the 2030 No Project Alternative E scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following eleven (11) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 17 at SR 99 SB Ramps - Rural
- Avenue 17 at SR 99 NB Ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural

- Avenue 14 at Road 23 – Rural

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following ten (10) locations potentially indicating the need for a traffic signal:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 17 at SR 99 SB Ramps - Rural
- Avenue 17 at SR 99 NB Ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

The signal warrant is not met at the remaining study intersection in the 2030 No Project Alternative E scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. The warrant is not met at the remaining unsignalized intersection. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 25.

Queue Lengths
Table 65 shows the estimated 2030 No Project Alternative E conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 65:
2030 NO PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
- **NB Left**		461/**---**
- NB Through-Right		8/9
SR 99 SB off-ramp at Avenue 18 ½	1,256[1] (822[2])	
- **SB Left-Through-Right**		246/**860**

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 65:
2030 NO PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• **SB Left**	589[3]	---/---
• **SB Right**	589[3]	239/---
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• **NB Left-Through**	45[3]	---/---
• **NB Right**	45[3]	**403/---**
SR 99 NB off-ramp at Avenue 16/Ellis Avenue	1,150[1] (716[2])	
• NB Left	150[3]	55/89
• NB Through-Right	150[3]	29/48
SR 99 SB off-ramp at Avenue 16/Ellis Avenue	1,020[1] (586[2])	
• SB Left	225[3]	34/56
• SB Right	225[3]	24/123
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])	
• NB Left	353[3]	141/205
• NB Left-Through	353[3]	141/209
• **NB Right**	353[3]	232/**#828**
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
• **SB Left-Through**	65[3]	#407/**#813**
• **SB Right**	65[3]	114/**241**
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	#459/#575
• WB Right	90[3]	0/62
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• **SB Left**	65[3]	454/**#1,062**
• **SB Right**	65[3]	174/**244**

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 65:
2030 NO PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• **WB Left**		---/---
• WB Right		7/15
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• **NB Left-Through**	49[3]	#501/**#581**
• **NB Right**	49[3]	234/**#501**
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481	
• **WB Left (at Golden State Boulevard)**		437/---
• WB Through-Right		0/0
• EB Through (at SR 99 SB off-ramp)		0/0

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes or more
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 65. As shown in Table 65, the following locations by time period are projected to exceed the allowable storage length with 95th percentile traffic conditions:

- Avenue 18 ½ at SR 99 NB off-ramp
  - NB Left – PM peak hour
- Avenue 18 ½ at SR 99 SB off-ramp
  - SB Left-Through-Right – PM peak hour
- Avenue 17 at SR 99 SB off-ramp
  - SB Left – AM/PM peak hours
  - SB Right – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 14/Olive Avenue at SR 99 SB off-ramp
  - SB Left – PM peak hour

  - SB Right – PM peak hour
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp
  - WB Left – AM/PM peak hours
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. The queue exceedances on Avenue 17 indicate that at some point during either the PM peak hour, spillback from vehicles in the through or turn lanes is expected to block the adjacent intersection. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the 2030 No Project Alternative E scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 66 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 66:
2030 NO PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE E, NO PROJECT ALTERNATIVE)

Scenario	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**≥ 1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	378/406	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	504/737	N/N	N/N
SR 99 SB off-ramp at Avenue 17	497/745	N/N	N/N
SR 99 NB off-ramp at Avenue 17	**1650/3347**	N/N	**Y/Y**
SR 99 NB off-ramp at Avenue 16	314/430	N/N	N/N
SR 99 SB off-ramp at Avenue 16	630/**950**	N/**Y**	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	753/**1298**	N/**Y**	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	707/**1134**	N/**Y**	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	496/534	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	**958/1400**	**Y/Y**	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	**1176/1567**	**Y**/N	N/**Y**
SR 99 NB off-ramp at Avenue 12	745/805	N/N	N/N

PCE = Passenger Car Equivalent *Y = Threshold Met* *N = Threshold Not Met*
SR = State Route *NB = northbound* *SB = southbound*
Bolded Text = ramps meet at least one of the volume thresholds

Off-ramps projected to meet one or both thresholds are shown in bold in Table 66. As shown in Table 66, the following off-ramps, by time period, are projected to meet the 900 to 1,499 PCE threshold in the 2030 No Project Alternative E scenario:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 16 at SR 99 SB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB off-ramp – PM peak hour
- Avenue 14/Olive Avenue at SR 99 SB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – AM/PM peak hours

The following off-ramps are projected to meet the 1,500 PCE threshold:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours

When ramp volumes are between 900 to 1,499 PCE, provisions should be made for the future widening of a one-lane ramp to two-lanes and for the future construction of an associated 1,333 ft (minimum) auxiliary lane prior to the widened ramp. When ramp volumes are equal to or exceed 1,500 PCE, a two-lane ramp and associated 1,333 ft (minimum) auxiliary lane should be constructed.

2030 with Project Conditions

Alternative A, Proposed Project Alternative

Roadway Levels of Service

The 2030 with Project Alternative A scenario lane configurations and intersection control incorporated the recommended improvements identified in the Mitigated Opening Day (2010) Alternative A scenario and the proposed improvements identified by Caltrans and included in the Madera County 2007 RTP as shown in the 2030 No Project scenario.

Table 67 shows the 2030 Project Alternative A levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 28 (lane configurations) and 29 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 67 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 67. The signalized levels of service or delay shown in Table 67 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The 2030 Project Alternative A freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 26 and Attachment VI – C – 27 respectively. Figure 30 provides a graphical representation of the resulting 2030 Project Alternative A levels of service.

TABLE 67:
2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour	PM Peak Hour
County Segment	**LOS**	**LOS**
Avenue 18 ½ - Road 24 to Road 23	A	B
Road 23 – Avenue 18 ½ to Avenue 17	D	D
Avenue 17 – Road 23 to SR 99	**F**	**F**
Avenue 17 – SR 99 to Road 27	**F**	**F**
Golden State Boulevard – Avenue 17 to Road 23	A	D

	AM Peak Hour		PM Peak Hour	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• **NB**	**D**	**26.6**	**D**	**33.6**
• **SB**	C	24.1	**E**	**42.2**
SR 99 between Avenue 18 ½ and Avenue 17				
• **NB**	**D**	**26.4**	**D**	**31.4**
• **SB**	C	23.5	**E**	**40.5**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/Delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 67:
2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 south of Avenue 17				
• **NB**	**E**	**42.6**	**F**	**---**
• **SB**	**D**	**30.1**	**F**	**---**
	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps	B	14.7	B	13.2
Avenue 18 ½ at SR 99 SB ramps/Road 23	B	17.8	**E**	58.6
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.7	A	2.5
• **SB Right**	D	27.8	**F**	**309.6**
Avenue 18 ½ at Golden State Boulevard				
• NB Left-Through-Right	A	1.0	A	0.9
• SB Left-Through-Right	A	6.9	A	7.9
• **EB Approach**	C	23.7	**F**	**360.3**
• **WB Approach**	**F**	**685.3**	**F**	**---**
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.0	A	0.2
• SB Left-Through-Right	A	2.3	A	2.7
• WB Approach	C	15.3	C	21.2
• EB Approach	C	18.8	D	31.5
Avenue 17 at SR 99 NB ramps	**E**	**75.1**	**F**	**268.4**
Avenue 17 at SR 99 SB ramps	C	24.4	**F**	**336.6**
Avenue 17 at Golden State Boulevard	**E**	**65.1**	**F**	**416.9**
Avenue 17 at Road 23	**E**	**58.6**	**F**	**256.4**
Ellis Street at Road 26	A	9.9	B	19.8
Avenue 16/Ellis Street at SR NB ramps	B	11.7	B	13.8
Avenue 16/Ellis Street at SR 99 SB ramps	A	7.4	B	10.9
Avenue 16/Ellis Street at Aviation Drive	**F**	**126.3**	**F**	**415.2**
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	16.8	**F**	**93.9**
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	C	27.5	**E**	**80.3**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/Delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 67:
2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection	**AM Peak Hour**		**PM Peak Hour**	
	LOS	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	1.7
• **WB Approach**	C	17.5	**E**	**38.1**
• EB Approach	A	0.0	C	19.8
SR 145/Madera Avenue at SR 99 NB ramps	D	51.2	**F**	**264.3**
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	24.4	**F**	**99.2**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	16.2	C	24.4
Avenue 14 at Road 23	B	11.8	C	17.8
Avenue 12/Golden State Boulevard at SR 99 SB ramps	C	21.7	C	24.1
Avenue 12 at Golden State Boulevard	**E**	**75.6**	**F**	**155.1**
Avenue 12 at SR 99 NB ramps	C	22.9	**E**	**63.8**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* **** = no LOS/Delay reported*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standards are shown bolded in Table 67. As shown in Table 67 and Figure 30, the following County segments (2), freeways segments (6), and intersections (15) are projected to operate or have movements projected to operate below the adopted level of service standards in the 2030 with Project Alternative A scenario:

County Segments

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 SB ramps – PM peak hour – LOS "E"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at SR 99 SB ramps – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Road 23 – AM/PM peak hours – LOS "E"/"F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "E"
- Avenue 15 ½ at Road 23
  - WB Approach – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the 2030 with Project Alternative A scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following seven (7) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following seven (7) locations potentially indicating the need for a traffic signal:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 28.

Queue Lengths

Table 68 shows the estimated 2030 with Project Alternative A conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 68:
2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
• NB Left		#164/#181
• NB Through-Right		26/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256[1] (822[2])	
• SB Left-Right		#209/#357
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• SB Left	589[3]	#358/#657
• SB Right	589[3]	106/192
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• **NB Left**	45[3]	**#766/#1,383**
• **NB Left-Through**	45[3]	**#773/#1,406**
• **NB Right**	45[3]	**53/#901**
SR 99 NB off-ramp at Avenue 16/Ellis Avenue	1,150[1] (716[2])	
• NB Left	150[3]	55/89
• NB Through-Right	150[3]	29/48

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 68:
2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 16/Ellis Avenue	1,020[1] (586[2])	
• SB Left	225[3]	34/56
• SB Right	225[3]	24/127
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])	
• NB Left	353[3]	142/186
• NB Left-Through	353[3]	142/190
• **NB Right**	353[3]	#239/**#766**
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
• **SB Left-Through**	65[3]	#409/**#781**
• **SB Right**	65[3]	115/**221**
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	#395/#575
• WB Through-Right	90[3]	0/62
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	197/389
• SB Right	65[3]	185/303
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		431/532
• WB Right		28/73
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• **NB Left-Through**	49[3]	#512/**#593**
• **NB Right**	49[3]	236/**#511**
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481	
• **WB Left (at Golden State Boulevard)**		**m#634/m#499**
• WB Through		m133/m310
• WB Right (at Golden State Boulevard)		m17/m12
• EB Through (at SR 99 SB off-ramp)		m77/m109

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 68. As shown in Table 68, the following locations by time period are projected to exceed the allowable storage length with 95th percentile traffic conditions:

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – AM/PM peak hours
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – AM/PM peak hours

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. The queue exceedances on Avenue 17 indicate that at some point during either the AM or PM peak hours, spillback from vehicles in the through or turn lanes is expected to block the adjacent intersection. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the 2030 with Project Alternative A scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 69 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 69:
2030 WITH PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

Scenario	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**≥ 1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	378/406	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	548/793	N/N	N/N
SR 99 SB off-ramp at Avenue 17	497/745	N/N	N/N
SR 99 NB off-ramp at Avenue 17	**1863/3603**	N/N	**Y/Y**
SR 99 NB off-ramp at Avenue 16	314/430	N/N	N/N
SR 99 SB off-ramp at Avenue 16	637/**964**	N/**Y**	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	753/**1298**	N/**Y**	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	736/**1196**	N/**Y**	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	496/534	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	**975/1438**	**Y/Y**	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	**1185/1590**	**Y**/N	N/**Y**
SR 99 NB off-ramp at Avenue 12	745/805	N/N	N/N

PCE = Passenger Car Equivalent Y = Threshold Met N = Threshold Not Met
SR = State Route NB = northbound SB = southbound
Bolded Text = ramps meet at least one of the volume thresholds

Off-ramps projected to meet one or both thresholds are shown in bold in Table 69. As shown in Table 69, the following off-ramps, by time period, are projected to meet the 900 to 1,499 PCE threshold in the 2030 with Project Alternative A scenario:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 16 at SR 99 SB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB off-ramp – PM peak hour
- Avenue 14/Olive Avenue at SR 99 SB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – AM/PM peak hours

The following off-ramps are projected to meet the 1,500 PCE threshold:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – PM peak hour

When ramp volumes are between 900 to 1,499 PCE, provisions should be made for the future widening of a one-lane ramp to two-lanes and for the future construction of an associated 1,333 ft (minimum) auxiliary lane prior to the widened ramp. When ramp volumes are equal to or exceed 1,500 PCE, a two-lane ramp and associated 1,333 ft (minimum) auxiliary lane should be constructed.

Left-Turn Warrants

Left-turn lane channelization warrants were prepared to determine the need for separate left-turn lanes at six (6) County of Madera intersections that are currently unchannelized. The following intersection movements were analyzed to determine if separate left-turn lanes were warranted:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - SB left-turn
- Avenue 18 at Road 23
    - NB left-turn
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Avenue 17 at Road 23
    - NB left-turn
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Avenue 17 at Golden State Boulevard
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Ellis Street at Road 26
    - NB left-turn
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
    - EB left-turn
    - WB left-turn

The locations that met the left-turn warrant for the 2030 with Project Alternative A are as follows:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - SB left-turn
- Avenue 18 at Road 23
    - NB left-turn
    - SB left-turn
- Avenue 17 at Road 23
    - NB left-turn
    - SB left-turn
    - WB left-turn
- Avenue 17 at Golden State Boulevard
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Ellis Street at Road 26
    - NB left-turn
    - SB left-turn

  - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - EB left-turn
  - WB left-turn

Standard state of the practice dictates that dual left-turn lanes are recommended for left-turning volumes greater than 300 vehicles per hour and that separate right-turn lanes are recommended for right-turning volumes greater than 300 vehicles per hour. Based on this standard of practice, the following locations and movements should be considered for either dual left-turn lanes or a separate right-turn lane:

- Avenue 18 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
- Avenue 12 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Ellis Street at Road 26
  - Separate SB right-turn lane
- Avenue 16/Ellis Street at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16/Ellis Street at SR 99 NB ramps
  - Separate WB right-turn lane
  - Dual EB left-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual NB left-turn lanes

  - Separate NB right-turn lane
  - Dual EB left-turn lanes
  - Separate EB right-turn lane
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - Separate NB right-turn lane
  - Dual WB left-turn lanes

Turn Lane Storage Calculations

Table 70 shows the calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet the left-turn channelization warrant, or require dual left-turn lanes or separate right-turn lanes. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 70:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE A (PROPOSED PROJECT/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	n/a
	NBR	25	n/a
	WBL	---	n/a
Avenue 18 ½ at SR 99 NB ramps	EBL	150	300[1]
Avenue 17 at SR 99 NB ramps	WBR		n/a
	EBL	300	300[1]
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	900
	SBL	---	500
Avenue 12 at Golden State Boulevard	NBL	200	100
	WBL	---	100
	WBR		700
	SBL	400	750[2]
	SBR	200	n/a
	EBL	350	400
	EBR	425	n/a
Avenue 12 at SR 99 NB ramps	WBR	---	1,800
	EBL	---	300[1]

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

TABLE 70:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE A (PROPOSED PROJECT/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 17 at Road 23	NBL	---	150
	WBL	---	100
	SBR	---	300
	EBR		300
Avenue 17 at Golden State Boulevard	NBL	50	300
	NBR	---	650[1]
	WBL	---	600[1]
	WBR	---	n/a
	SBL	---	600[1]
	EBL	---	100[1]
Ellis Street at Road 26	NBL	---	100
	WBR	---	150
	SBL	---	200
	EBR		100
Avenue 16/Ellis Street at Aviation Drive	NBL	75	400
	NBR	75	1,100[1]
	WBL	200	850[1]
	SBL		400[1]
	SBR		n/a
	EBL	---	150
	EBR		350
Avenue 16 at SR 99 SB ramps	WBR		n/a
	EBL		n/a
	EBR	---	n/a
Avenue 16/Ellis Street at SR 99 NB ramps	WBR	---	200
	EBL	300	400[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	1,050
	EBL	100	200[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	450
	EBR	125	900
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	600[1]
	SBR	---	350

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

TABLE 70:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE A (PROPOSED PROJECT/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	200[1]
	SBL	100	250
	SBR	25	550
	EBL	175	300[1]
	EBR	175	1,150
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	100
	NBR	---	450
	WBL	---	350[1]
	WBR		n/a
	SBL	---	150
Avenue 18 at Pistachio Drive	WBR		250

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

Alternative B (Reduced Intensity Alternative)

Roadway Levels of Service

The 2030 with Project Alternative B scenario lane configurations and intersection control incorporated the recommended improvements identified in the Mitigated Opening Day (2010) with Alternative B scenario and the proposed improvements identified by Caltrans and included in the Madera County 2007 RTP as shown in the 2030 No Project scenario.

Table 71 shows the 2030 with Project Alternative B levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 31 (lane configurations) and 32 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 71 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 71. The signalized levels of service or delay shown in Table 71 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The 2030 Project Alternative B freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 29 and Attachment VI – C – 30 respectively. Figure 33 provides a graphical representation of the resulting 2030 Project Alternative B levels of service.

TABLE 71:
2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour	**PM Peak Hour**
County Segment	**LOS**	**LOS**
Avenue 18 ½ - Road 24 to Road 23	A	B
Road 23 – Avenue 18 ½ to Avenue 17	D	D
Avenue 17 – Road 23 to SR 99	F	**F**
Avenue 17 – SR 99 to Road 27	F	F
Golden State Boulevard – Avenue 17 to Road 23	A	C

	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• **NB**	C	26.6	**D**	**34.3**
• **SB**	C	24.1	**E**	**43.0**
SR 99 between Avenue 18 ½ and Avenue 17				
• **NB**	**D**	**26.5**	**D**	**32.5**
• **SB**	C	23.7	**E**	**42.1**
SR 99 south of Avenue 17				
• **NB**	**E**	**41.5**	**F**	---
• **SB**	D	29.8	**F**	---

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps	B	14.5	B	12.8
Avenue 18 ½ at SR 99 SB ramps	B	17.3	**D**	54.9
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.7	A	2.4
• **SB Right**	D	26.7	**F**	**277.0**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 71:
2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection	**AM Peak Hour**		**PM Peak Hour**	
	LOS	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at Golden State Boulevard				
• NB Left-Through-Right	A	1.0	A	0.9
• SB Left-Through-Right	A	6.8	A	7.8
• **EB Approach**	C	22.2	**F**	**268.4**
• **WB Approach**	**F**	**602.1**	**F**	**9397.2**
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.0	A	0.2
• SB Left-Through-Right	A	1.9	A	2.2
• WB Approach	B	14.9	C	20.3
• EB Approach	C	18.0	D	29.3
Avenue 17 at SR 99 NB ramps	**E**	**69.3**	**F**	**260.2**
Avenue 17 at SR 99 SB ramps	B	17.1	**F**	**277.5**
Avenue 17 at Golden State Boulevard	**E**	**62.5**	**F**	**409.1**
Avenue 17 at Road 23	**E**	**56.3**	**F**	**248.6**
Ellis Street at Road 26	A	9.9	B	19.7
Avenue 16/Ellis Street at SR NB ramps	B	11.7	B	13.9
Avenue 16/Ellis Street at SR 99 SB ramps	A	7.4	B	10.8
Avenue 16/Ellis Street at Aviation Drive	**F**	**123.5**	**F**	**409.2**
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	16.9	**F**	**91.7**
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	C	27.0	**E**	**78.2**
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	1.7
• **WB Approach**	C	17.3	**E**	**37.1**
• EB Approach	A	0.0	C	19.6
SR 145/Madera Avenue at SR 99 NB ramps	**D**	**48.5**	**F**	**257.0**
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	24.4	**F**	**98.0**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	16.2	C	24.3
Avenue 14 at Road 23	B	11.7	C	17.5
Avenue 12/Golden State Boulevard at SR 99 SB ramps	C	21.7	C	24.0
Avenue 12 at Golden State Boulevard	**E**	**75.2**	**F**	**154.2**
Avenue 12 at SR 99 NB ramps	C	22.8	**E**	**62.8**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standards are shown bolded in Table 71. As shown in Table 71 and Figure 33, the following County segments (2), freeways segments (6), and intersections (15) are projected to operate or have movements projected to operate below the adopted level of service standards in the 2030 with Project Alternative B scenario:

County Segments

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 SB ramps – PM peak hour – LOS "D"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at SR 99 SB ramps – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Road 23 – AM/PM peak hours – LOS "E"/"F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "E"
- Avenue 15 ½ at Road 23
  - WB Approach – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the 2030 with Project Alternative B scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following seven (7) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following seven (7) locations potentially indicating the need for a traffic signal:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C – 31.

Queue Lengths

Table 72 shows the estimated 2030 with Project Alternative B conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 72:
2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
- NB Left		#164/#181
- NB Right		26/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256[1] (822[2])	
- SB Left-Right		#199/#351
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
- SB Left	589[3]	#348/#657
- SB Right	589[3]	103/192
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
- **NB Left**	45[3]	**#727/#1,332**
- **NB Left-Through**	45[3]	**#736/#1,355**
- **NB Right**	45[3]	**48/#896**
SR 99 NB off-ramp at Avenue 16/Ellis Avenue	1,150[1] (716[2])	
- NB Left	150[3]	55/89
- NB Through-Right	150[3]	29/48
SR 99 SB off-ramp at Avenue 16/Ellis Avenue	1,020[1] (586[2])	
- SB Left	225[3]	34/56
- SB Right	225[3]	24/126
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])	
- NB Left	353[3]	142/186
- NB Left-Through	353[3]	142/190
- **NB Through-Right**	353[3]	#238/**#766**

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 72:
2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
• **SB Left-Through**	65[3]	#401/**#765**
• **SB Right**	65[3]	115/**219**
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	#395/#575
• WB Through-Right	90[3]	0/62
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	197/387
• SB Right	65[3]	184/300
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		431/531
• WB Right		28/72
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• **NB Left-Through**	49[3]	#512/**#593**
• **NB Right**	49[3]	236/**#511**
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481	
• **WB Left (at Golden State Boulevard)**		**m#684/m#522**
• WB Through (at Golden State Boulevard)		m122/m362
• WB Right (at Golden State Boulevard)		m16/m28
• EB Through (at SR 99 SB off-ramp)		m72/m70

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 72. As shown in Table 72, the following locations by time period are projected to exceed the allowable storage length with 95th percentile traffic conditions:

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – AM/PM peak hours
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours

- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – AM/PM peak hours

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. The queue exceedances on Avenue 17 indicate that at some point during either the AM or PM peak hours, spillback from vehicles in the through or turn lanes is expected to block the adjacent intersection. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the 2030 Project Alternative B scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 73 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 73:
2030 WITH PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Scenario	**PCE (AM/PM)**	**900 to 1,499 PCE Threshold (AM/PM) (Y/N)**	**≥ 1,500 PCE Threshold (AM/PM) (Y/N)**
SR 99 NB off-ramp at Avenue 18 ½	378/406	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	536/776	N/N	N/N
SR 99 SB off-ramp at Avenue 17	497/746	N/N	N/N
SR 99 NB off-ramp at Avenue 17	**1800/3537**	N/N	**Y/Y**
SR 99 NB off-ramp at Avenue 16	314/430	N/N	N/N
SR 99 SB off-ramp at Avenue 16	635/**960**	N/**Y**	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	753/**1299**	N/**Y**	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	728/**1178**	N/**Y**	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	496/534	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	**968/1427**	**Y/Y**	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	**1182/1585**	**Y**/N	N/**Y**
SR 99 NB off-ramp at Avenue 12	745/805	N/N	N/N

PCE = Passenger Car Equivalent *Y = Threshold Met* *N = Threshold Not Met*
SR = State Route *NB = northbound* *SB = southbound*
Bolded Text = ramps meet at least one of the volume thresholds

Off-ramps projected to meet one or both thresholds are shown in bold in Table 73. As shown in Table 73, the following off-ramps, by time period, are projected to meet the 900 to 1,499 PCE threshold in the 2030 Project Alternative B scenario:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 16 at SR 99 SB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB off-ramp – PM peak hour
- Avenue 14/Olive Avenue at SR 99 SB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – AM/PM peak hours

The following off-ramps are projected to meet the 1,500 PCE threshold:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – PM peak hour

When ramp volumes are between 900 to 1,499 PCE, provisions should be made for the future widening of a one-lane ramp to two-lanes and for the future construction of an associated 1,333 ft (minimum) auxiliary lane prior to the widened ramp. When ramp volumes are equal to or exceed 1,500 PCE, a two-lane ramp and associated 1,333 ft (minimum) auxiliary lane should be constructed.

Left-Turn Warrants

Left-turn lane channelization warrants were prepared to determine the need for separate left-turn lanes at six (6) County of Madera intersections that are currently unchannelized. The following intersection movements were analyzed to determine if separate left-turn lanes were warranted:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - EB left-turn
  - WB left-turn

The locations that met the left-turn warrant for the 2030 with Project Alternative B are as follows:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn

  - SB left-turn
  - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - EB left-turn
  - WB left-turn

Standard state of the practice dictates that dual left-turn lanes are recommended for left-turning volumes greater than 300 vehicles per hour and that separate right-turn lanes are recommended for right-turning volumes greater than 300 vehicles per hour. Based on this standard of practice, the following locations and movements should be considered for either dual left-turn lanes or a separate right-turn lane:

- Avenue 18 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
- Avenue 12 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Ellis Street at Road 26
  - Separate SB right-turn lane
- Avenue 16/Ellis Street at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16/Ellis Street at SR 99 NB ramps
  - Separate WB right-turn lane
  - Dual EB left-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Dual EB left-turn lanes
  - Separate EB right-turn lane
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - Separate NB right-turn lane
  - Dual WB left-turn lanes

Turn Lane Storage Calculations

Table 74 shows the calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet the left-turn channelization warrant, or require dual left-turn lanes or separate right-turn lanes. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 74:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE B (REDUCED INTENSITY/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	n/a
	NBR	25	n/a
	WBL	---	n/a
Avenue 18 ½ at SR 99 NB ramps	EBL	150	250[1]
Avenue 17 at SR 99 NB ramps	WBR		n/a
	EBL	300	300[1]
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	850
	SBL	---	500
Avenue 12 at Golden State Boulevard	NBL	200	100
	WBL	---	100
	WBR		650
	SBL	400	700[4]
	SBR	200	n/a
	EBL	350	350
	EBR	425	n/a
Avenue 12 at SR 99 NB ramps	WBR	---	1,650
	EBL	---	300[1]

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

TABLE 74:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE B (REDUCED INTENSITY/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 17 at Road 23	NBL	---	150
	WBL	---	100
	SBR	---	250
	EBR		300
Avenue 17 at Golden State Boulevard	NBL	50	300
	NBR	---	650[3]
	WBL	---	600[1]
	WBR	---	n/a
	SBL	---	550[1]
	EBL	---	100[1]
Ellis Street at Road 26	NBL	---	100
	WBR	---	150
	SBL	---	200
	EBR		100
Avenue 16/Ellis Street at Aviation Drive	NBL	75	400
	NBR	75	1,100[3]
	WBL	200	850[1]
	SBL		400[1]
	SBR		n/a
	EBL	---	150
	EBR		350
Avenue 16 at SR 99 SB ramps	WBR		n/a
	EBL		n/a
Avenue 16/Ellis Street at SR 99 NB ramps	WBR	---	200
	EBL	300	400[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	950
	EBL	100	200[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	450
	EBR	125	800
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	800[1]
	SBR	---	450

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

TABLE 74:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE B (REDUCED INTENSITY/MADERA SITE)

Intersection	**Movement**	**Existing Storage Length (ft)**	**2030 Project Storage Length (ft)**
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	250[1]
	SBL	100	300
	SBR	25	700
	EBL	175	350[1]
	EBR	175	1,450
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	100
	NBR	---	400
	WBL	---	300[1]
	WBR		n/a
	SBL	---	150
Avenue 18 at Pistachio Drive	WBR		250

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

Alternative C (Commercial Land Use Alternative)

Roadway Levels of Service

The 2030 with Project Alternative C scenario lane configurations and intersection control incorporated the recommended improvements identified in the Mitigated Opening Day (2010) Alternative C scenario and the proposed improvements identified by Caltrans and included in the Madera County 2007 RTP as shown in the 2030 No Project scenario.

Table 75 shows the 2030 with Project Alternative C levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 34 (lane configurations) and 35 (peak hour volumes) shown previously. The signalized and AWSC intersection levels of service shown on Table 75 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized or AWSC level of service or delay shown on Table 75. The signalized levels of service or delay shown in Table 75 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The 2030 Project Alternative C freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 32 and Attachment VI – C – 33 respectively. Figure 36 provides a graphical representation of the resulting 2030 with Project Alternative C levels of service.

TABLE 75:
2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
County Segment	**LOS**		**LOS**	
Avenue 18 ½ - Road 24 to Road 23	A		B	
Road 23 – Avenue 18 ½ to Avenue 17	D		**E**	
Avenue 17 – Road 23 to SR 99	**F**		**F**	
Avenue 17 – SR 99 to Road 27	**F**		**F**	
Golden State Boulevard – Avenue 17 to Road 23	A		C	
	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• **NB**	D	26.6	**D**	**34.3**
• **SB**	C	24.1	**E**	**43.0**
SR 99 between Avenue 18 ½ and Avenue 17				
• **NB**	**D**	**26.5**	**D**	**32.5**
• **SB**	C	23.7	**E**	**40.6**
SR 99 south of Avenue 17				
• **NB**	**E**	**41.2**	**F**	---
• **SB**	**D**	**30.3**	**F**	---
	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps	B	14.9	B	13.5
Avenue 18 ½ at SR 99 SB ramps/Road 23	B	18.2	**E**	**64.4**
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.7	A	2.5
• **SB Right**	D	26.9	**F**	**314.1**
Avenue 18 ½ at Golden State Boulevard				
• NB Left-Through-Right	A	1.0	A	0.9
• SB Left-Through-Right	A	6.8	A	7.9
• **EB Approach**	C	23.0	**F**	**1155.7**
• **WB Approach**	**F**	**633.7**	**F**	---

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 75:
2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 at Road 23				
• NB Left-Through-Right	A	0.0	A	0.2
• SB Left-Through-Right	A	1.7	A	2.7
• WB Approach	B	14.7	C	22.0
• EB Approach	C	17.8	D	31.9
Avenue 17 at SR 99 NB ramps	**E**	**67.9**	**F**	**267.6**
Avenue 17 at SR 99 SB ramps	C	20.1	**F**	**341.9**
Avenue 17 at Golden State Boulevard	**E**	**70.3**	**F**	**417.6**
Avenue 17 at Road 23	**E**	**56.7**	**F**	**258.1**
Ellis Street at Road 26	A	10.0	B	19.5
Avenue 16/Ellis Street at SR NB ramps	B	11.7	B	13.8
Avenue 16/Ellis Street at SR 99 SB ramps	A	7.4	B	10.9
Avenue 16/Ellis Street at Aviation Drive	**F**	**122.4**	**F**	**419.0**
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	16.8	**F**	**96.2**
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	C	28.0	**F**	**86.0**
Avenue 15 ½ at Road 23				
• NB Left-Through-Right	A	0.0	A	0.0
• SB Left-Through-Right	A	1.1	A	1.7
• **WB Approach**	C	17.4	**E**	**38.8**
• EB Approach	A	0.0	C	20.0
SR 145/Madera Avenue at SR 99 NB ramps	**D**	**47.6**	**F**	**262.6**
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	24.4	**F**	**99.8**
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	16.2	C	24.5
Avenue 14 at Road 23	B	11.8	C	18.0
Avenue 12/Golden State Boulevard at SR 99 SB ramps	C	22.0	C	24.0
Avenue 12 at Golden State Boulevard	**E**	**75.9**	**F**	**154.5**
Avenue 12 at SR 99 NB ramps	C	23.3	**E**	**66.3**

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
--- = beyond software limitations
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standards are shown bolded in Table 75. As shown in Table 75 and Figure 36, the following County segments (3), freeways segments (6), and intersections (15) are projected to operate or have movements projected to operate below the adopted level of service standards in the 2030 with Project Alternative C scenario:

<u>County Segments</u>

- Road 23 – Avenue 18 ½ to Avenue 17 – PM peak hour – LOS "E"

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 SB ramps – PM peak hour – LOS "D"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at SR 99 SB ramps – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Road 23 – AM/PM peak hours – LOS "E"/"F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F
- Avenue 15 ½ at Road 23
  - WB Approach – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the 2030 Project Alternative B scenario.

Signal Warrants

Rural and urban peak hour volume signal warrants were prepared for the following seven (7) unsignalized intersections:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural

- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

Based on the rural and urban peak hour volume warrant, the signal warrant is met at the following seven (7) locations potentially indicating the need for a traffic signal:

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 34.

Queue Lengths

Table 76 shows the estimated 2030 with Project Alternative C conditions queue lengths developed from the level of service analyses for the Madera Site study locations.

TABLE 76:
2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

Intersection	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
- NB Left		#164/#181
- NB Through-Right		26/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256[1] (822[2])	
- SB Left-Right		#210/#360
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
- SB Left	589[3]	#348/#657
- SB Right	589[3]	102/194
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
- **NB Left**	45[3]	**#730/#1,381**
- **NB Left-Through**	45[3]	**#736/#1,406**
- **NB Right**	45[3]	**51/#901**
SR 99 NB off-ramp at Avenue 16/Ellis Avenue	1,150[1] (716[2])	
- NB Left	150[3]	55/88
- NB Through-Right	150[3]	29/48
SR 99 SB off-ramp at Avenue 16/Ellis Avenue	1,020[1] (586[2])	
- SB Left	225[3]	34/57
- SB Right	225[3]	24/127
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])	
- NB Left	353[3]	142/200
- NB Left-Through	353[3]	142/204
- **NB Right**	353[3]	#241/**#833**
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
- **SB Left-Through**	65[3]	#413/**#860**
- **SB Right**	65[3]	117/**239**

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

TABLE 76:
2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	#395/#575
• WB Right	90[3]	0/62
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left	65[3]	198/389
• SB Right	65[3]	185/304
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		443/533
• WB Right		28/72
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• **NB Left-Through**	49[3]	#512/**#593**
• **NB Right**	49[3]	236/**#508**
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481	
• **WB Left (at Golden State Boulevard)**		**m#701/m#498**
• WB Through		m150/m311
• WB Right		m21/m12
• EB Through (at SR 99 SB off-ramp)		m77/m106

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 76. As shown in Table 76, the following locations by time period are projected to exceed the allowable storage length with 95th percentile traffic conditions:

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – AM/PM peak hours
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour

  - SB Right – PM peak hour
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – AM/PM peak hours

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. The queue exceedances on Avenue 17 indicate that at some point during either the AM or PM peak hours, spillback from vehicles in the through or turn lanes is expected to block the adjacent intersection. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the 2030 Project Alternative C scenario.

Ramp Widening/Auxiliary Lane Threshold

Table 77 shows the SR 99 off-ramp volumes and whether the PCE volumes by time period meet or exceed one or both of these two thresholds.

TABLE 77:
2030 WITH PROJECT CONDITIONS
RAMP WIDENING/AUXILIARY LANE THRESHOLD SUMMARY
MADERA SITE (ALTERNATIVE C, COMMERCIAL LAND USE ALTERNATIVE)

Scenario	PCE (AM/PM)	900 to 1,499 PCE Threshold (AM/PM) (Y/N)	≥ 1,500 PCE Threshold (AM/PM) (Y/N)
SR 99 NB off-ramp at Avenue 18 ½	378/406	N/N	N/N
SR 99 SB off-ramp at Avenue 18 ½	532/793	N/N	N/N
SR 99 SB off-ramp at Avenue 17	496/748	N/N	N/N
SR 99 NB off-ramp at Avenue 17	**1787/3600**	N/N	**Y/Y**
SR 99 NB off-ramp at Avenue 16	314/428	N/N	N/N
SR 99 SB off-ramp at Avenue 16	639/**969**	N/**Y**	N/N
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	753/**1297**	N/**Y**	N/N
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	746/**1202**	N/**Y**	N/N
SR 99 NB off-ramp at SR 145/Madera Avenue	496/534	N/N	N/N
SR 99 SB off-ramp at Avenue 14/Olive Avenue	**977/1439**	**Y/Y**	N/N
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	**1188/1587**	**Y**/N	N/**Y**
SR 99 NB off-ramp at Avenue 12	745/805	N/N	N/N

PCE = Passenger Car Equivalent *Y = Threshold Met* *N = Threshold Not Met*

SR = State Route *NB = northbound* *SB = southbound*
Bolded Text = ramps meet at least one of the volume thresholds

Off-ramps projected to meet one or both thresholds are shown in bold in Table 77. As shown in Table 77, the following off-ramps, by time period, are projected to meet the 900 to 1,499 PCE threshold in the 2030 Project Alternative C scenario:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 16 at SR 99 SB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB off-ramp – PM peak hour
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB off-ramp – PM peak hour
- Avenue 14/Olive Avenue at SR 99 SB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – AM/PM peak hours

The following off-ramps are projected to meet the 1,500 PCE threshold:

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – PM peak hour

When ramp volumes are between 900 to 1,499 PCE, provisions <u>should</u> be made for the future widening of a one-lane ramp to two-lanes and for the future construction of an associated 1,333 ft (minimum) auxiliary lane prior to the widened ramp. When ramp volumes are equal to or exceed 1,500 PCE, a two-lane ramp and associated 1,333 ft (minimum) auxiliary lane <u>should</u> be constructed.

Left-Turn Warrants

Left-turn lane channelization warrants were prepared to determine the need for separate left-turn lanes at six (6) County of Madera intersections that are currently unchannelized. The following intersection movements were analyzed to determine if separate left-turn lanes were warranted:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn
  - EB left-turn

  - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - EB left-turn
  - WB left-turn

The locations that met the left-turn warrant for the 2030 Project Alternative C are as follows:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn
  - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - EB left-turn
  - WB left-turn

Standard state of the practice dictates that dual left-turn lanes are recommended for left-turning volumes greater than 300 vehicles per hour and that separate right-turn lanes are recommended for right-turning volumes greater than 300 vehicles per hour. Based on this standard of practice, the following locations and movements should be considered for either dual left-turn lanes or a separate right-turn lane:

- Avenue 18 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
- Avenue 12 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard

  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Ellis Street at Road 26
  - Separate SB right-turn lane
- Avenue 16/Ellis Street at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16/Ellis Street at SR 99 NB ramps
  - Separate WB right-turn lane
  - Dual EB left-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Dual EB left-turn lanes
  - Separate EB right-turn lane
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - Separate NB right-turn lane
  - Dual WB left-turn lanes

Turn Lane Storage Calculations

Table 78 shows the calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes, meet the left-turn channelization warrant, or require dual left-turn lanes or separate right-turn lanes. SR 99 off-ramp approaches and movements included in the queue length analysis are not included in the storage length calculations. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 78:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 18 ½ at SR 99 SB ramps/Road 23	NBL	25	n/a
	NBR	25	n/a
	WBL	---	n/a
Avenue 18 ½ at SR 99 NB ramps	EBL	150	300[1]
Avenue 17 at SR 99 NB ramps	WBR		n/a
	EBL	300	300[1]
Avenue 12/Golden State Boulevard at SR 99 SB ramps	NBR	---	900
	SBL	---	500
Avenue 12 at Golden State Boulevard	NBL	200	100
	WBL	---	100
	WBR		700
	SBL	400	700[4]
	SBR	200	n/a
	EBL	350	350
	EBR	425	n/a
Avenue 12 at SR 99 NB ramps	WBR	---	1,650
	EBL	---	300[1]
Avenue 17 at Road 23	NBL	---	150
	WBL	---	100
	SBR	---	300
	EBR		300
Avenue 17 at Golden State Boulevard	NBL	50	300
	NBR	---	650[3]
	WBL	---	600[1]
	WBR	---	n/a
	SBL	---	650[1]
	EBL	---	100[1]
Ellis Street at Road 26	NBL	---	100
	WBR	---	150
	SBL	---	200
	EBR		100

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

TABLE 78:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE C (COMMERCIAL LAND USE/MADERA SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
Avenue 16/Ellis Street at Aviation Drive	NBL	75	350
	NBR	75	1,000[3]
	WBL	200	800[1]
	SBL		400[1]
	SBR		n/a
	EBL	---	150
	EBR		350
Avenue 16 at SR 99 SB ramps	WBR		n/a
	EBL		n/a
Avenue 16/Ellis Street at SR 99 NB ramps	WBR	---	200
	EBL	300	400[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	WBR	50	1,050
	EBL	100	200[1]
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	WBL	125	450
	EBR	125	900
SR 145/Madera Avenue at SR 99 NB ramps	NBL	---	700[1]
	SBR	---	450
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	NBL	125	200[1]
	SBL	100	250
	SBR	25	600
	EBL	175	350[1]
	EBR	175	1,150
Avenue 18 ½ at Golden State Boulevard/ Road 23	NBL	---	100
	NBR	---	450
	WBL	---	350[1]
	WBR		n/a
	SBL	---	150
Avenue 18 at Pistachio Drive	WBR		250

SR = State Route *ft = feet* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] *= dual lefts required, length of each left-turn lane* [2] *= exceeds available distance to nearest intersection*
[3] *= dual rights required, length of each right-turn lane* [4] *= triple lefts required, length of each left-turn lane*

Mitigated 2030 Project Conditions

Alternative A (Proposed Project Alternative)

Roadway Levels of Service

Based on the information provided in the previous sections, the following locations, by scenario, are projected to operate below the adopted level of service standards:

2030 No Project

County Segments

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"/"F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 18 ½ at SR 99 SB Ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps
  - EB Left – AM/PM peak hours – LOS "D"/"F"
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Golden State Boulevard
  - WB Left – AM/PM peak hours – LOS "F"
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – AM/PM peak hours – LOS "F"

  - EB Approach – AM/PM peak hours – LOS "F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – AM/PM peak hours – LOS "E"/"F"
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp – PM peak hour – LOS "F"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

2030 with Alternative A Project

County Segments

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 SB ramps – PM peak hour – LOS "E"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at SR 99 SB ramps – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Road 23 – AM/PM peak hours – LOS "E"/"F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "E"
- Avenue 15 ½ at Road 23
  - WB Approach – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

The following locations, by scenario are also projected to meet either the rural or urban peak hour volume warrant:

2030 No Project

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 17 at SR 99 SB Ramps - Rural
- Avenue 17 at SR 99 NB Ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

2030 with Alternative A Project

- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

The following locations, by scenario, are also projected to exceed the available queue storage lengths with 95th percentile traffic conditions:

2030 No Project

- Avenue 18 ½ at SR 99 NB off-ramp
  - NB Left – PM peak hour
- Avenue 18 ½ at SR 99 SB off-ramp
  - SB Left-Through-Right – PM peak hour
- Avenue 17 at SR 99 SB off-ramp
  - SB Left – AM/PM peak hours
  - SB Right – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour

- Avenue 14/Olive Avenue at SR 99 SB off-ramp
  - SB Left – PM peak hour
  - SB Right – PM peak hour
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp
  - WB Left – AM/PM peak hours
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – PM peak hour

2030 with Alternative A Project

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – AM/PM peak hours
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – AM/PM peak hours

The following locations, by scenario, are also projected to meet the ramp widening/auxiliary lane threshold:

2030 No Project

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours

2030 with Alternative A Project

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – PM peak hour

The following locations met the left-turn warrant for the 2030 Project Alternative A scenario:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn

  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn
  - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - EB left-turn
  - WB left-turn

The following locations and movements will require either dual left-turn lanes or a separate right-turn lane:

- Avenue 18 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
- Avenue 12 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Ellis Street at Road 26
  - Separate SB right-turn lane
- Avenue 16/Ellis Street at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16/Ellis Street at SR 99 NB ramps
  - Separate WB right-turn lane
  - Dual EB left-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual WB left-turn lanes

  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Dual EB left-turn lanes
  - Separate EB right-turn lane
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - Separate NB right-turn lane
  - Dual WB left-turn lanes

To mitigate the County segments, freeway segments, or intersections projected to operate below the appropriate adopted level of service standard, meet either the rural or urban peak hour volume warrant, meet the ramp widening/auxiliary lane threshold, or exceed the available storage lengths the following improvements, by scenario, are recommended:

2030 with Alternative A Project

County Segments

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from four (4) lanes to six (6) lanes
- Avenue 17 – Road 23 to SR 99
  - Restripe/widen from two (2) lanes to six (6) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes
- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes
- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

Intersections

- Avenue 18 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane, to dual (2) left-turn lanes and one (1) through lane
- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Restripe/widen the SB approach, north leg, from a shared left-right lane to one (1) left-turn lane and one (1) right-turn lane
- Avenue 18 ½ at Pistachio Drive
  - Although the Avenue 18 ½ at Pistachio Drive intersection is projected to meet the urban peak hour volume signal warrant, it will not be signalized due to its proximity to the SR 99 SB off-

ramp. The intersection will be restricted to right-in/right-out/left-in access, which reduces the need for a signal and allows the intersection to operate at an acceptable level of service without a signal.

- Avenue 18 ½ at Golden State Boulevard / Road 23
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1)-through-right lane, to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through lane and one (1) right-turn lane, to dual (2) left-turn lanes and one (1) shared through-right lane
- Avenue 18 at Road 23
  - Signalize the intersection
- Avenue 17 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes to three (3) left-turn lanes, one (1) shared through-right lane, and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane to two (2) through lanes and one (1) shared through-right lane
  - Widen the NB off-ramp to two (2) lanes with a NB auxiliary lane on SR 99
- Avenue 17 at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from two (2) through lanes to four (4) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes to three (3) through lanes
- Avenue 17 at Golden State Boulevard
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
- Avenue 17 at Road 23
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to one (1) shared left-through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane to one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane

  - Restripe/widen the WB approach, east leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) through lane, and one (1) shared through-right lane
- Avenue 16/Ellis Street at Aviation Drive/Kennedy
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane, and one (1) through-right lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and two (2) through lanes
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) shared through-right lane
- Avenue 15 ½ at Road 23
  - Signalize the intersection
- SR 145/Madera Avenue at SR 99 NB ramps
  - Restripe/widen the SB approach, north leg, from one (1) through lane and one (1) shared through-right lane to two (2) through lanes and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to two (2) left-turn lanes and one (1) shared through-right lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the NB approach, south leg, from two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane, to dual (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane, to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane, to dual (2) left-turn lanes, one (1) through lane, one (1) shared through-right lane and one (1) right-turn lane
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-right-turn lane, an one (1) right-turn lane
- Avenue 14 at Road 23
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane

- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Widen the SB off-ramp to two (2) lanes with a SB auxiliary lane on SR 99
- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane, to three (3) left-turn lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane, to one (1) left-turn lane, three (3) through lanes, and one (1) right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg from a shared left-through lane and a separate right-turn lane, to dual (2) left-turn lanes, a shared through-right lane, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lane, to dual (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane, to two (2) through lanes, one (1) shared through-right lane and one (1) right-turn lane

Table 79 shows the Mitigated 2030 with Project Alternative A levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 37 (lane configurations) and 29 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 79 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 79. The signalized levels of service or delay shown in Table 79 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Mitigated 2030 Project Alternative A freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 35 and Attachment VI – C – 36 respectively. Figure 38 provides a graphical representation of the resulting Mitigated 2030 with Project Alternative A levels of service.

TABLE 79:
MITIGATED 2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT)

County Segment	**AM Peak Hour LOS**	**PM Peak Hour LOS**
Avenue 18 ½ - Road 24 to Road 23	A	B
Road 23 – Avenue 18 ½ to Avenue 17	D	D
Avenue 17 – Road 23 to SR 99	A	C
Avenue 17 – SR 99 to Road 27	A	B
Golden State Boulevard – Avenue 17 to Road 23	A	D

	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• NB	C	19.3	C	22.7
• SB	B	17.8	C	25.7
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	C	19.2	C	21.7
• SB	B	17.5	C	25.2
SR 99 south of Avenue 17				
• **NB**	C	25.9	**E**	**41.8**
• **SB**	C	21.1	**F**	**---**

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps	B	13.5	B	12.8
Avenue 18 ½ at SR 99 SB ramps/Road 23	A	9.6	B	14.2
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.7	A	2.6
• SB Right	B	14.2	C	17.9
Avenue 18 ½ at Golden State Boulevard	B	12.6	B	17.4
Avenue 18 at Road 23	A	5.1	A	7.4
Avenue 17 at SR 99 NB ramps	C	22.2	**F**	**96.0**
Avenue 17 at SR 99 SB ramps	A	5.1	B	13.6
Avenue 17 at Golden State Boulevard	C	23.3	**F**	**133.2**
Avenue 17 at Road 23	B	13.3	B	16.4
Ellis Street at Road 26	A	9.9	B	19.8
Avenue 16/Ellis Street at SR NB ramps	B	11.7	B	13.8
Avenue 16/Ellis Street at SR 99 SB ramps	A	7.4	B	10.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* *--- = beyond software limitations*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 79:
MITIGATED 2030 WITH PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT)

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 16/Ellis Street at Aviation Drive	C	22.7	D	53.8
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	12.5	C	29.2
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	18.3	C	27.9
Avenue 15 ½ at Road 23	A	5.4	A	7.4
SR 145/Madera Avenue at SR 99 NB ramps	B	16.6	C	30.7
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	B	15.3	C	25.1
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	12.7	B	16.6
Avenue 14 at Road 23	A	7.0	A	6.9
Avenue 12/Golden State Boulevard at SR 99 SB ramps	C	20.6	B	17.8
Avenue 12 at Golden State Boulevard	C	34.4	D	39.5
Avenue 12 at SR 99 NB ramps	B	16.5	B	18.0

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound* *--- = beyond software limitations*
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standards are shown bolded in Table 79. As shown in Table 79 and Figure 38, two (2) freeway segments and two (2) intersections are still projected to operate below the adopted level of service standard even with the recommended improvements. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E" and "F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. The Avenue 17 at SR 99 NB ramps and Avenue 17 at Golden State Boulevard intersections are still projected to operate at a LOS "F" in the PM peak hour. Per discussions with Caltrans staff, widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative A mitigations, these four (4) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density and intersection delay). Therefore these four (4) locations should be viewed as mitigated as appropriate by the Project. The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the Mitigated 2030 with Project Alternative A scenario.

Queue Lengths

Table 80 shows the estimated Mitigated 2030 with Project Alternative A conditions queue lengths developed from the level of service analyses for the Madera Site study locations. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column. Existing ramp queue storage lengths were used since final ramp lengths for future improvements are not known.

TABLE 80:
MITIGATED 2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
• NB Left		148/188
• NB Through-Right		25/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256[1] (822[2])	
• SB Left		82/124
• SB Right		61/#119
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• SB Left	589[3]	#110/#308
• SB Right	589[3]	46/122
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• **NB Left**	45[3]	275/**#838**
• **NB Through-Right**	45[3]	49/**#664**
• **NB Right**	45[3]	29/**#541**
SR 99 NB off-ramp at Avenue 16/Ellis Avenue	1,150[1] (716[2])	
• NB Left	150[3]	55/89
• NB Through-Right	150[3]	29/48
SR 99 SB off-ramp at Avenue 16/Ellis Avenue	1,020[1] (586[2])	
• SB Left	225[3]	34/56
• SB Right	225[3]	24/127
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])	
• NB Left	353[3]	137/231
• NB Left-Through	353[3]	137/235
• NB Right	353[3]	74/#383

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

TABLE 80:
MITIGATED 2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT)

Intersection	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
- SB Left	65[3]	137/#360
- SB Through-Right	65[3]	103/#334
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
- WB Left	90[3]	104/115
- WB Through-Right	90[3]	0/45
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
- SB Left-Right	65[3]	154/248
- SB Right	65[3]	137/242
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
- WB Left		359/445
- WB Right		23/32
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
- NB Left	49[3]	187/182
- NB Through-Right	49[3]	101/182
- NB Right	49[3]	102/180
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481	
- WB Left (at Golden State Boulevard)		#270/m#431
- **WB Through-Right**		262/**#1,084**
- WB Right		
- EB Through (at SR 99 SB off-ramp)		90/m213

ft = feet   *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound   *SB = southbound*   *WB = westbound*   *EB = eastbound*
SR = State Route   *[1] = Total ramp length*   *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 80. As shown in Table 80, the following locations by time period are projected to exceed the allowable storage length with 95th percentile traffic conditions:

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – PM peak hour
  - NB Left-Through – PM peak hour

  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Through – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. The queue exceedances on Avenue 17 indicate that at some point during either the AM or PM peak hours, spillback from vehicles in the through or turn lanes is expected to block the adjacent intersection. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Mitigated 2030 Project Alternative A scenario.

Alternative B (Reduced Intensity Alternative)

Roadway Levels of Service

Based on the information provided in the previous sections, the following locations, by scenario, are projected to operate below the adopted level of service standards:

2030 No Project

County Segments

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"/"F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 18 ½ at SR 99 SB Ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"

  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps
  - EB Left – AM/PM peak hours – LOS "D"/"F"
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Golden State Boulevard
  - WB Left – AM/PM peak hours – LOS "F"
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – AM/PM peak hours – LOS "F"
  - EB Approach – AM/PM peak hours – LOS "F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – AM/PM peak hours – LOS "E"/"F"
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp – PM peak hour – LOS "F"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

2030 with Alternative B Project

County Segments

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 SB ramps – PM peak hour – LOS "D"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23

  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at SR 99 SB ramps – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Road 23 – AM/PM peak hours – LOS "E"/"F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "E"
- Avenue 15 ½ at Road 23
  - WB Approach – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

The following locations, by scenario are also projected to meet either the rural or urban peak hour volume warrant:

2030 No Project

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 17 at SR 99 SB Ramps - Rural
- Avenue 17 at SR 99 NB Ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

2030 with Alternative B Project

- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

The following locations, by scenario, are also projected to exceed the available queue storage lengths with 95th percentile traffic conditions:

2030 No Project

- Avenue 18 ½ at SR 99 NB off-ramp
  - NB Left – PM peak hour
- Avenue 18 ½ at SR 99 SB off-ramp
  - SB Left-Through-Right – PM peak hour

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – AM/PM peak hours
  - SB Right – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 14/Olive Avenue at SR 99 SB off-ramp
  - SB Left – PM peak hour
  - SB Right – PM peak hour
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp
  - WB Left – AM/PM peak hours
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – PM peak hour

2030 with Alternative B Project

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – AM/PM peak hours
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – AM/PM peak hours

The following locations, by scenario, are also projected to meet the ramp widening/auxiliary lane threshold:

2030 No Project

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours

2030 with Alternative B Project

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – PM peak hour

The following locations met the left-turn warrant for the 2030 with Project Alternative B scenario:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - SB left-turn
- Avenue 18 at Road 23
  - NB left-turn
  - SB left-turn
- Avenue 17 at Road 23
  - NB left-turn
  - SB left-turn
  - WB left-turn
- Avenue 17 at Golden State Boulevard
  - SB left-turn
  - EB left-turn
  - WB left-turn
- Ellis Street at Road 26
  - NB left-turn
  - SB left-turn
  - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - EB left-turn
  - WB left-turn

The following locations and movements will require either dual left-turn lanes or a separate right-turn lane:

- Avenue 18 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
- Avenue 17 at SR 99 NB ramps
  - Dual NB left-turn lanes
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
- Avenue 12 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual EB left-turn lanes
- Avenue 12 at SR 99 NB ramps
  - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual SB left-turn lanes
  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Ellis Street at Road 26
  - Separate SB right-turn lane
- Avenue 16/Ellis Street at Golden State Boulevard
  - Separate NB right-turn lane
  - Dual WB left-turn lanes

  - Separate WB right-turn lane
- Avenue 16/Ellis Street at SR 99 NB ramps
  - Separate WB right-turn lane
  - Dual EB left-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Dual EB left-turn lanes
  - Separate EB right-turn lane
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - Separate NB right-turn lane
  - Dual WB left-turn lanes

To mitigate the County segments, freeway segments, or intersections projected to operate below the appropriate adopted level of service standard, meet either the rural or urban peak hour volume warrant, meet the ramp widening/auxiliary lane threshold, or exceed the available storage lengths the following improvements, by scenario, are recommended:

2030 with Alternative B Project

<u>County Segments</u>

- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from four (4) lanes to six (6) lanes
- Avenue 17 – Road 23 to SR 99
  - Restripe/widen from two (2) lanes to six (6) lanes

<u>Freeway Segments</u>

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes
- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes
- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes

<u>Intersections</u>

- Avenue 18 ½ at SR 99 NB ramps
    - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane, to dual (2) left-turn lanes and one (1) through lane
- Avenue 18 ½ at SR 99 SB ramps/Road 23
    - Restripe/widen the SB approach, north leg, from a shared left-right lane to one (1) left-turn lane and one (1) right-turn lane
- Avenue 18 ½ at Pistachio Drive
    - Although the Avenue 18 ½ at Pistachio Drive intersection is projected to meet the urban peak hour volume signal warrant, it will not be signalized due to its proximity to the SR 99 SB off-ramp. The intersection will be restricted to right-in/right-out/left-in access, which reduces the need for a signal and allows the intersection to operate at an acceptable level of service without a signal.
- Avenue 18 ½ at Golden State Boulevard / Road 23
    - Signalize the intersection
    - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1)-through-right lane, to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
    - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) through-right lane
    - Restripe/widen the WB approach, east leg, from one (1) shared left-through lane and one (1) right-turn lane, to dual (2) left-turn lanes and one (1) shared through-right lane
- Avenue 18 at Road 23
    - Signalize the intersection
- Avenue 17 at SR 99 NB ramps
    - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes to three (3) left-turn lanes, one (1) shared through-right lane, and two (2) right-turn lanes
    - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and three (3) through lanes
    - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane to two (2) through lanes and one (1) shared through-right lane
    - Widen the NB off-ramp to two (2) lanes with a NB auxiliary lane on SR 99
- Avenue 17 at SR 99 SB ramps
    - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and two (2) right-turn lanes
    - Restripe/widen the EB approach, west leg, from two (2) through lanes to four (4) through lanes
    - Restripe/widen the WB approach, east leg, from two (2) through lanes to three (3) through lanes
- Avenue 17 at Golden State Boulevard
    - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
    - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane
    - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane

  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
- Avenue 17 at Road 23
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to one (1) shared left-through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane to one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) through lane, and one (1) shared through-right lane
- Avenue 16/Ellis Street at Aviation Drive/Kennedy
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane, and one (1) through-right lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and two (2) through lanes
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) shared through-right lane
- Avenue 15 ½ at Road 23
  - Signalize the intersection
- SR 145/Madera Avenue at SR 99 NB ramps
  - Restripe/widen the SB approach, north leg, from one (1) through lane and one (1) shared through-right lane to two (2) through lanes and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to two (2) left-turn lanes and one (1) shared through-right lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the NB approach, south leg, from two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane, to dual (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane, to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane

- Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane, to dual (2) left-turn lanes, one (1) through lane, one (1) shared through-right lane and one (1) right-turn lane

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-right-turn lane, an one (1) right-turn lane
- Avenue 14 at Road 23
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Widen the SB off-ramp to two (2) lanes with a SB auxiliary lane on SR 99
- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane, to three (3) left-turn lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane, to one (1) left-turn lane, three (3) through lanes, and one (1) right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg from a shared left-through lane and a separate right-turn lane, to dual (2) left-turn lanes, a shared through-right lane, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lane, to dual (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane, to two (2) through lanes, one (1) shared through-right lane and one (1) right-turn lane

Table 81 shows the Mitigated 2030 with Project Alternative B levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 39 (lane configurations) and 32 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 81 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 81. The signalized levels of service or delay shown in Table 81 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Mitigated 2030 Project Alternative B freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 37 and Attachment VI – C – 38 respectively. Figure 40 provides a graphical representation of the resulting Mitigated 2030 with Project Alternative B levels of service.

TABLE 81:
MITIGATED WITH 2030 PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

County Segment	**AM Peak Hour LOS**	**PM Peak Hour LOS**
Avenue 18 ½ - Road 24 to Road 23	A	B
Road 23 – Avenue 18 ½ to Avenue 17	D	D
Avenue 17 – Road 23 to SR 99	A	C
Avenue 17 – SR 99 to Road 27	A	B
Golden State Boulevard – Avenue 17 to Road 23	A	C

Freeway Segment	**AM Peak Hour**		**PM Peak Hour**	
	LOS	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• NB	C	19.4	C	23.0
• SB	B	17.8	C	26.0
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	C	19.3	C	22.2
• SB	B	17.6	C	25.7
SR 99 south of Avenue 17				
• **NB**	C	25.5	**E**	**40.9**
• **SB**	C	21.0	**F**	---

Intersection	**AM Peak Hour**		**PM Peak Hour**	
	LOS	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps	B	12.9	B	11.3
Avenue 18 ½ at SR 99 SB ramps/Road 23	A	9.7	B	14.7
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.7	A	2.5
• SB Right	B	14.0	C	17.4
Avenue 18 ½ at Golden State Boulevard	B	14.6	B	16.3
Avenue 18 at Road 23	A	4.8	A	7.1
Avenue 17 at SR 99 NB ramps	C	21.5	**F**	**91.1**
Avenue 17 at SR 99 SB ramps	A	5.1	B	11.8
Avenue 17 at Golden State Boulevard	C	22.4	**F**	**118.6**
Avenue 17 at Road 23	B	13.2	B	16.0

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 81:
MITIGATED WITH 2030 PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection	**AM Peak Hour**		**PM Peak Hour**	
	LOS	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Ellis Street at Road 26	A	9.9	B	19.7
Avenue 16/Ellis Street at SR NB ramps	B	11.7	B	13.9
Avenue 16/Ellis Street at SR 99 SB ramps	A	7.4	B	10.8
Avenue 16/Ellis Street at Aviation Drive	C	22.4	D	52.4
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	12.4	C	28.9
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	18.2	C	27.2
Avenue 15 ½ at Road 23	A	5.4	A	7.1
SR 145/Madera Avenue at SR 99 NB ramps	B	15.2	C	23.3
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	B	15.8	C	28.6
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	12.7	B	19.0
Avenue 14 at Road 23	A	7.0	A	7.0
Avenue 12/Golden State Boulevard at SR 99 SB ramps	B	17.1	B	17.1
Avenue 12 at Golden State Boulevard	C	27.3	D	39.9
Avenue 12 at SR 99 NB ramps	B	11.5	B	15.0

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standards are shown bolded in Table 81. As shown in Table 81 and Figure 40, two (2) freeway segments and two (2) intersections are still projected to operate below the adopted level of service standard even with the recommended improvements. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E" and "F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. The Avenue 17 at SR 99 NB ramps and Avenue 17 at Golden State Boulevard intersections are still projected to operate at a LOS "F" in the PM peak hour. Per discussions with Caltrans staff, widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative B mitigations, these four (4) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density and intersection delay). Therefore these four (4) locations should be viewed as mitigated as appropriate by the Project. The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the Mitigated 2030 with Project Alternative B scenario.

Queue Lengths

Table 82 shows the estimated Mitigated 2030 with Project Alternative B conditions queue lengths developed from the level of service analyses for the Madera Site study locations. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column. Existing ramp queue storage lengths were used since final ramp lengths for future improvements are not known.

TABLE 82:
MITIGATED 2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95^{th} Percentile Queue Length (ft) (AM/PM)**
SR 99 NB off-ramp at Avenue 18 ½	$1,204^1$ (770^2)	
• NB Left		148/162
• NB Through-Right		25/0
SR 99 SB off-ramp at Avenue 18 1/2	$1,256^1$ (822^2)	
• SB Left		84/109
• SB Right		61/#107
SR 99 SB off-ramp at Avenue 17	$1,341^1$ (907^2)	
• SB Left	589^3	110/#297
• SB Right	589^3	46/122
SR 99 NB off-ramp at Avenue 17	$1,060^1$ (626^2)	
• **NB Left**	45^3	**264/#810**
• **NB Through-Right**	45^3	**50/#664**
• **NB Right**	45^3	**29/#541**
SR 99 NB off-ramp at Avenue 16/Ellis Avenue	$1,150^1$ (716^2)	
• NB Left	150^3	55/89
• NB Through-Right	150^3	29/48
SR 99 SB off-ramp at Avenue 16/Ellis Avenue	$1,020^1$ (586^2)	
• SB Left	225^3	34/56
• SB Right	225^3	24/126
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881^1 (447^2)	
• NB Left	353^3	137/210
• NB Left-Through	353^3	137/215
• NB Right	353^3	73/#215

ft = feet *95^{th} percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *^{1} = Total ramp length* *^{2} = Calculated storage distance*
^{3} = Distance of ramp striped as 2-lanes
 # = 95^{th} percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95^{th} percentile queue is metered by upstream signal
^{4} = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

TABLE 82:
MITIGATED 2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

Intersection	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
• SB Left	65[3]	135/#327
• SB Through-Right	65[3]	102/#309
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
• WB Left	90[3]	104/156
• WB Through-Right	90[3]	0/54
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
• SB Left-Right	65[3]	153/298
• SB Right	65[3]	136/281
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
• WB Left		309/458
• WB Right		26/54
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
• NB Left	49[3]	157/178
• NB Through-Right	49[3]	83/173
• NB Right	49[3]	83/171
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481	
• WB Left (at Golden State Boulevard)		#271/m#431
• **WB Through-Right**		224/**#634**
• EB Through (at SR 99 SB off-ramp)		83/m228

ft = feet 95th percentile queue length - is minimum amount of storage needed for each movement
NB = northbound SB = southbound WB = westbound EB = eastbound
SR = State Route [1] = Total ramp length [2] = Calculated storage distance
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 82. As shown in Table 82, the following locations by time period are projected to exceed the allowable storage length with 95th percentile traffic conditions:

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – PM peak hour
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour

- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Through – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. The queue exceedances on Avenue 17 indicate that at some point during either the AM or PM peak hours, spillback from vehicles in the through or turn lanes is expected to block the adjacent intersection. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Mitigated 2030 Project Alternative B scenario.

Alternative C (Commercial Land Use Alternative)

Roadway Levels of Service

Based on the information provided in the previous sections, the following locations, by scenario, are projected to operate below the adopted level of service standards:

2030 No Project

County Segments

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "E"/"F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 18 ½ at SR 99 SB Ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"

- Avenue 17 at SR 99 NB ramps
  - EB Left – AM/PM peak hours – LOS "D"/"F"
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Golden State Boulevard
  - WB Left – AM/PM peak hours – LOS "F"
  - NB Approach – AM/PM peak hours – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at Road 23
  - WB Approach – AM/PM peak hours – LOS "F"
  - EB Approach – AM/PM peak hours – LOS "F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – AM/PM peak hours – LOS "E"/"F"
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp – PM peak hour – LOS "F"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM/PM peak hours – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

2030 with Alternative C Project

County Segments

- Road 23 – Avenue 18 ½ to Avenue 17 – PM peak hour – LOS "E"
- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"
- Avenue 17 – SR 99 to Road 27 – AM/PM peak hours – LOS "F"

Freeway Segments

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM/PM peak hours – LOS "E"/"F"
  - SB – AM/PM peak hours – LOS "D"/"F"

Intersections

- Avenue 18 ½ at SR 99 SB ramps – PM peak hour – LOS "D"
- Avenue 18 ½ at Pistachio Drive
  - SB Approach – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23

  - NB Approach – PM peak hour – LOS "F"
  - SB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 NB ramps – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at SR 99 SB ramps – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 17 at Road 23 – AM/PM peak hours – LOS "E"/"F"
- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F
- Avenue 15 ½ at Road 23
  - WB Approach – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps – AM/PM peak hours – LOS "D"/"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F"
- Avenue 12 at Golden State Boulevard – AM/PM peak hours – LOS "E"/"F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"

The following locations, by scenario are also projected to meet either the rural or urban peak hour volume warrant:

2030 No Project

- Avenue 18 ½ at SR 99 SB ramps - Urban
- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 17 at SR 99 SB Ramps - Rural
- Avenue 17 at SR 99 NB Ramps - Rural
- Avenue 17 at Golden State Boulevard - Rural
- Avenue 17 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

2030 with Alternative C Project

- Avenue 18 ½ at SR 99 NB ramps - Urban
- Avenue 18 ½ at Pistachio Drive - Urban
- Avenue 18 ½ at Golden State Boulevard/Road 23 - Urban
- Avenue 18 at Road 23 - Rural
- Avenue 15 ½ at Road 23 - Rural
- Avenue 14 at Road 23 - Rural

The following locations, by scenario, are also projected to exceed the available queue storage lengths with 95th percentile traffic conditions:

2030 No Project

- Avenue 18 ½ at SR 99 NB off-ramp
  - NB Left – PM peak hour
- Avenue 18 ½ at SR 99 SB off-ramp
  - SB Left-Through-Right – PM peak hour

- Avenue 17 at SR 99 SB off-ramp
  - SB Left – AM/PM peak hours
  - SB Right – PM peak hour
- Avenue 17 at SR 99 NB off-ramp
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 14/Olive Avenue at SR 99 SB off-ramp
  - SB Left – PM peak hour
  - SB Right – PM peak hour
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp
  - WB Left – AM/PM peak hours
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – PM peak hour

2030 with Alternative Project

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – AM/PM peak hours
  - NB Left-Through – AM/PM peak hours
  - NB Right – AM/PM peak hours
- Avenue 15 ½/Cleveland Avenue at SR 99 NB off-ramp
  - NB Right – PM peak hour
- Avenue 15 ½/Cleveland Avenue at SR 99 SB off-ramp
  - SB Left-Through – PM peak hour
  - SB Right – PM peak hour
- Avenue 12 at SR 99 NB off-ramp
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Left – AM/PM peak hours

The following locations, by scenario, are also projected to meet the ramp widening/auxiliary lane threshold:

2030 No Project

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours

2030 with Alternative C Project

- Avenue 17 at SR 99 NB off-ramp – AM/PM peak hours
- Avenue 12/Golden State Boulevard at SR 99 SB off-ramp – PM peak hour

The following locations met the left-turn warrant for the 2030 with Project Alternative C scenario:

- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - SB left-turn
- Avenue 18 at Road 23
    - NB left-turn
    - SB left-turn
- Avenue 17 at Road 23
    - NB left-turn
    - SB left-turn
    - WB left-turn
- Avenue 17 at Golden State Boulevard
    - SB left-turn
    - EB left-turn
    - WB left-turn
- Ellis Street at Road 26
    - NB left-turn
    - SB left-turn
    - WB left-turn
- Avenue 18 ½ at Golden State Boulevard/Road 23
    - EB left-turn
    - WB left-turn

The following locations and movements will require either dual left-turn lanes or a separate right-turn lane:

- Avenue 18 ½ at SR 99 NB ramps
    - Dual EB left-turn lanes
- Avenue 17 at SR 99 NB ramps
    - Dual NB left-turn lanes
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
    - Separate NB right-turn lane
    - Dual SB left-turn lanes
- Avenue 12 at Golden State Boulevard
    - Separate NB right-turn lane
    - Dual SB left-turn lanes
    - Dual EB left-turn lanes
- Avenue 12 at SR 99 NB ramps
    - Separate WB right-turn lane
- Avenue 17 at Golden State Boulevard
    - Separate NB right-turn lane
    - Dual SB left-turn lanes
    - Dual WB left-turn lanes
    - Separate WB right-turn lane
- Ellis Street at Road 26
    - Separate SB right-turn lane
- Avenue 16/Ellis Street at Golden State Boulevard
    - Separate NB right-turn lane

  - Dual WB left-turn lanes
  - Separate WB right-turn lane
- Avenue 16/Ellis Street at SR 99 NB ramps
  - Separate WB right-turn lane
  - Dual EB left-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Dual EB left-turn lanes
  - Separate WB right-turn lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Dual WB left-turn lanes
  - Separate EB right-turn lane
- SR 145/Madera Avenue at SR 99 NB ramps
  - Dual NB left-turn lanes
  - Separate SB right-turn lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Dual NB left-turn lanes
  - Separate NB right-turn lane
  - Dual EB left-turn lanes
  - Separate EB right-turn lane
- Avenue 18 ½ at Golden State Boulevard/Road 23
  - Separate NB right-turn lane
  - Dual WB left-turn lanes

To mitigate the County segments, freeway segments, or intersections projected to operate below the appropriate adopted level of service standard, meet either the rural or urban peak hour volume warrant, meet the ramp widening/auxiliary lane threshold, or exceed the available storage lengths the following improvements, by scenario, are recommended:

2030 with Alternative C Project

County Segments

- Road 23 – Avenue 18 ½ to Avenue 17
  - Restripe/widen from two (2) lanes to four (4) lanes (Alternative C only)
- Avenue 17 – SR 99 to Road 27
  - Restripe/widen from four (4) lanes to six (6) lanes
- Avenue 17 – Road 23 to SR 99
  - Restripe/widen from two (2) lanes to six (6) lanes

Freeway Segments

- SR 99 north of Avenue 18 1/2
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes
- SR 99 between Avenue 18 ½ to Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes
  - Restripe/widen the SB leg from three (3) lanes to four (4) lanes
- SR 99 south of Avenue 17
  - Restripe/widen the NB leg from three (3) lanes to four (4) lanes

- Restripe/widen the SB leg from three (3) lanes to four (4) lanes

Intersections

- Avenue 18 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and one (1) through lane, to dual (2) left-turn lanes and one (1) through lane
- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - Restripe/widen the SB approach, north leg, from a shared left-right lane to one (1) left-turn lane and one (1) right-turn lane
- Avenue 18 ½ at Pistachio Drive
  - Although the Avenue 18 ½ at Pistachio Drive intersection is projected to meet the urban peak hour volume signal warrant, it will not be signalized due to its proximity to the SR 99 SB off-ramp. The intersection will be restricted to right-in/right-out/left-in access, which reduces the need for a signal and allows the intersection to operate at an acceptable level of service without a signal.
- Avenue 18 ½ at Golden State Boulevard / Road 23
  - Signalize the intersection
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1)-through-right lane, to one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through lane and one (1) right-turn lane, to dual (2) left-turn lanes and one (1) shared through-right lane
- Avenue 18 at Road 23
  - Signalize the intersection
- Avenue 17 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes to three (3) left-turn lanes, one (1) shared through-right lane, and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane to two (2) through lanes and one (1) shared through-right lane
  - Widen the NB off-ramp to two (2) lanes with a NB auxiliary lane on SR 99
- Avenue 17 at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane and one (1) right-turn lane to two (2) left-turn lanes and two (2) right-turn lanes
  - Restripe/widen the EB approach, west leg, from two (2) through lanes to four (4) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes to three (3) through lanes
- Avenue 17 at Golden State Boulevard
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane

  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane to two (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane
- Avenue 17 at Road 23
  - Restripe/widen the NB approach, south leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane to one (1) shared left-through lane and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane to one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) shared left-through-right lane to one (1) left-turn lane and one (1) through lane, and one (1) shared through-right lane
- Avenue 16/Ellis Street at Aviation Drive/Kennedy
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane and one (1) shared through-right lane to one (1) left-turn lane, one (1) through lane, and two (2) right-turn lanes
  - Restripe/widen the SB approach, north leg, from one (1) left-turn lane, one (1) through lane, and one (1) right-turn lane to two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) shared through-right lane to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane to two (2) left-turn lanes, one (1) through lane, and one (1) through-right lane
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lanes to two (2) left-turn lanes and two (2) through lanes
  - Restripe/widen the NB approach, south leg, from one (1) left-turn lane, one (1) shared left-through lane, and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-through lane, and two (2) right-turn lanes
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane and one (1) right-turn lane to two (2) left-turn lanes and one (1) shared through-right lane
- Avenue 15 ½ at Road 23
  - Signalize the intersection
- SR 145/Madera Avenue at SR 99 NB ramps
  - Restripe/widen the SB approach, north leg, from one (1) through lane and one (1) shared through-right lane to two (2) through lanes and one (1) right-turn lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane and one (1) shared through-right lane to two (2) left-turn lanes and one (1) shared through-right lane
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145
  - Restripe/widen the NB approach, south leg, from two (2) left-turn lanes, one (1) through lane, and one (1) shared through-right lane, to dual (2) left-turn lanes, two (2) through lanes, and one (1) shared through-right lane

  - Restripe/widen the SB approach, north leg, from one (1) shared left-through lane, one (1) through lane, and one (1) right-turn lane, to one (1) left-turn lane, two (2) through lanes, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane, one (1) through lane and one (1) right-turn lane, to dual (2) left-turn lanes, one (1) through lane, one (1) shared through-right lane and one (1) right-turn lane
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp
  - Restripe/widen the SB approach, north leg, from two (2) left-turn lanes and one (1) right-turn lane to one (1) left-turn lane, one (1) shared left-right-turn lane, an one (1) right-turn lane
- Avenue 14 at Road 23
  - Signalize the intersection
  - Restripe/widen the SB approach, north leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
  - Restripe/widen the EB approach, west leg, from one (1) shared left-through-right lane, to one (1) left-turn lane and one (1) shared through-right lane
- Avenue 12/Golden State Boulevard at SR 99 SB off ramps
  - Widen the SB off-ramp to two (2) lanes with a SB auxiliary lane on SR 99
- Avenue 12 at Golden State Boulevard
  - Restripe/widen the SB approach, north leg, from to dual (2) left-turn lanes, one (1) through lane and one (1) right-turn lane, to three (3) left-turn lanes, and one (1) shared through-right lane
  - Restripe/widen the WB approach, east leg, from one (1) left-turn lane, one (1) through lane, and one (1) shared through-right lane, to one (1) left-turn lane, three (3) through lanes, and one (1) right-turn lane
- Avenue 12 at SR 99 NB ramps
  - Restripe/widen the NB approach, south leg from a shared left-through lane and a separate right-turn lane, to dual (2) left-turn lanes, a shared through-right lane, and one (1) right-turn lane
  - Restripe/widen the EB approach, west leg, from one (1) left-turn lane and two (2) through lane, to dual (2) left-turn lanes and three (3) through lanes
  - Restripe/widen the WB approach, east leg, from two (2) through lanes and one (1) right-turn lane, to two (2) through lanes, one (1) shared through-right lane and one (1) right-turn lane

Table 83 shows the Mitigated 2030 with Project Alternative C levels of service for the County segments, freeway segments, and intersections for the Madera Site utilizing Figures 41 (lane configurations) and 35 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 83 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 83. The signalized levels of service or delay shown in Table 83 may not reflect the effects of 95th percentile queues that exceed the capacity for their movement. The Mitigated 2030 with Project Alternative C freeway segment and intersection levels of service calculations for the Madera Site are included in the Appendices section Attachment VI – C – 39 and Attachment VI – C – 40 respectively. Figure 42 provides a graphical representation of the resulting Mitigated 2030 with Project Alternative C levels of service.

TABLE 83:
MITIGATED WITH 2030 PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

	AM Peak Hour	**PM Peak Hour**
County Segment	**LOS**	**LOS**
Avenue 18 ½ - Road 24 to Road 23	A	B
Road 23 – Avenue 18 ½ to Avenue 17	A	A
Avenue 17 – Road 23 to SR 99	A	C
Avenue 17 – SR 99 to Road 27	A	B
Golden State Boulevard – Avenue 17 to Road 23	A	C

	AM Peak Hour		**PM Peak Hour**	
Freeway Segment	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
SR 99 north of Avenue 18 ½				
• NB	C	19.4	C	23.0
• SB	B	17.8	C	26.0
SR 99 between Avenue 18 ½ and Avenue 17				
• NB	C	19.3	C	22.2
• SB	B	17.6	C	25.2
SR 99 south of Avenue 17				
• **NB**	C	25.4	**E**	**41.9**
• **SB**	C	21.2	**F**	**---**

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Avenue 18 ½ at SR 99 NB ramps	**B**	**12.9**	**B**	**12.8**
Avenue 18 ½ at SR 99 SB ramps/Road 23	A	9.8	B	14.1
Avenue 18 ½ at Pistachio Drive				
• EB Approach	A	0.7	A	2.6
• SB Right	B	14.0	C	17.9
Avenue 18 ½ at Golden State Boulevard	B	14.7	B	17.4
Avenue 18 at Road 23	A	5.2	A	7.9
Avenue 17 at SR 99 NB ramps	C	21.3	**F**	**95.8**
Avenue 17 at SR 99 SB ramps	A	5.1	B	14.4
Avenue 17 at Golden State Boulevard	C	24.0	**F**	**140.6**
Avenue 17 at Road 23	B	13.2	B	16.5
Ellis Street at Road 26	A	10.0	B	19.5
Avenue 16/Ellis Street at SR NB ramps	B	11.7	B	13.8
Avenue 16/Ellis Street at SR 99 SB ramps	A	7.4	B	10.9
Avenue 16/Ellis Street at Aviation Drive	C	22.1	D	54.1
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	12.5	C	29.4
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	B	18.3	C	28.0
Avenue 15 ½ at Road 23	A	5.4	A	7.4

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 83:
MITIGATED WITH 2030 PROJECT CONDITIONS
COUNTY SEGMENT, FREEWAY SEGMENT, AND INTERSECTION WEEKDAY LEVEL OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**		**LOS**
SR 145/Madera Avenue at SR 99 NB ramps	B	15.1	C	25.6
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	B	15.8	C	24.4
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	B	12.8	B	17.7
Avenue 14 at Road 23	A	7.0	A	7.0
Avenue 12/Golden State Boulevard at SR 99 SB ramps	B	16.3	B	17.1
Avenue 12 at Golden State Boulevard	C	30.2	D	40.2
Avenue 12 at SR 99 NB ramps	B	10.4	B	15.2

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

County segments, freeway segments, and intersections within the study area that are projected to operate below the adopted level of service standards are shown bolded in Table 83. As shown in Table 83 and Figure 42, two (2) freeway segments and two (2) intersections are still projected to operate below the adopted level of service standard even with the recommended improvements. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E" and "F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. The Avenue 17 at SR 99 NB ramps and Avenue 17 at Golden State Boulevard intersections are still projected to operate at a LOS "F" in the PM peak hour. Per discussions with Caltrans staff, widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative C mitigations, these four (4) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density and intersection delay). Therefore these four (4) locations should be viewed as mitigated as appropriate by the Project. The remaining County segments, freeway segments, and intersections are projected to operate at or above the adopted level of service standards in the Mitigated 2030 with Project Alternative C scenario.

Queue Lengths

Table 84 shows the estimated Mitigated 2030 Project Alternative C conditions queue lengths developed from the level of service analyses for the Madera Site study locations. Please note that storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column. Existing ramp queue storage lengths were used since final ramp lengths for future improvements are not known.

TABLE 84
MITIGATED 2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

Intersection	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 NB off-ramp at Avenue 18 ½	1,204[1] (770[2])	
• NB Left		148/188
• NB Through-Right		25/0
SR 99 SB off-ramp at Avenue 18 1/2	1,256[1] (822[2])	
• SB Left		84/124
• SB Right		60/#119
SR 99 SB off-ramp at Avenue 17	1,341[1] (907[2])	
• SB Left	589[3]	110/#308
• SB Right	589[3]	45/124
SR 99 NB off-ramp at Avenue 17	1,060[1] (626[2])	
• **NB Left**	45[3]	260/**#838**
• **NB Through-Right**	45[3]	50/**#665**
• **NB Right**	45[3]	29/**#542**
SR 99 NB off-ramp at Avenue 16/Ellis Avenue	1,150[1] (716[2])	
• NB Left	150[3]	55/88
• NB Through-Right	150[3]	29/48

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *1 = Total ramp length* *2 = Calculated storage distance*
3 = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*
4 = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

TABLE 84
MITIGATED 2030 WITH PROJECT CONDITIONS
WEEKDAY 95TH PERCENTILE QUEUE LENGTH
MADERA SITE (ALTERNATIVE C, ALTERNATE LAND USE ALTERNATIVE)

Intersection	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
SR 99 SB off-ramp at Avenue 16/Ellis Avenue	1,020[1] (586[2])	
- SB Left	225[3]	34/57
- SB Right	225[3]	24/127
SR 99 NB off-ramp at Avenue 15 ½ /Cleveland Avenue	881[1] (447[2])	
- NB Left	353[3]	137/230
- NB Left-Through	353[3]	137/235
- NB Right	353[3]	75/#383
SR 99 SB off-ramp at Avenue 15 ½ /Cleveland Avenue	1,000[1] (566[2])	
- SB Left	65[3]	139/#364
- SB Through-Right	65[3]	105/#334
SR 99 NB off-ramp at SR 145/Madera Avenue	1,310[1] (876[2])	
- WB Left	90[3]	104/136
- WB Right	90[3]	0/50
SR 99 SB off-ramp at Avenue 14/Olive Avenue	1,254[1] (820[2])	
- SB Left	65[3]	154/278
- SB Right	65[3]	139/267
SR 99 SB off-ramp at Avenue 12/Golden State Boulevard	1,431[1] (997[2])	
- WB Left		290/459
- WB Right		25/54
SR 99 NB off-ramp at Avenue 12	1,223[1] (789[2])	
- NB Left	49[3]	144/178
- NB Left-Through	49[3]	76/171
- NB Right	49[3]	76/170
Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard	481	
- WB Left (at Golden State Boulevard)		#272/m#431
- **WB Through-Right**		241/**#1098**
- EB Through (at SR 99 SB off-ramp)		m97/m212

ft = feet *95th percentile queue length - is minimum amount of storage needed for each movement*
NB = northbound *SB = southbound* *WB = westbound* *EB = eastbound*
SR = State Route *[1] = Total ramp length* *[2] = Calculated storage distance*
[3] = Distance of ramp striped as 2-lanes
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
***Bolded Text** = 95th percentile queues exceed the available storage capacity*

[4] = Storage lengths for mitigated scenarios may be different than those shown in the Existing Queue Storage Length column

Movements with queue lengths that are projected to exceed their available storage lengths are shown bolded in Table 84. As shown in Table 84, the following locations by time period are projected to exceed the allowable storage length with 95th percentile traffic conditions:

- Avenue 17 at SR 99 NB off-ramp
  - NB Left – PM peak hour
  - NB Left-Through – PM peak hour
  - NB Right – PM peak hour
- Avenue 17 between SR 99 SB off-ramp and Golden State Boulevard
  - WB Through – PM peak hour

These queue exceedances indicate that it is likely that at some point during either the AM or PM peak hour, deceleration for vehicles utilizing these various ramps would likely occur on the mainline. The queue exceedances on Avenue 17 indicate that at some point during either the AM or PM peak hours, spillback from vehicles in the through or turn lanes is expected to block the adjacent intersection. It should be noted that these queue exceedances are estimated based on the level of service analysis and are provided for information only. They are to be used in the design process and are not intended for use as a significance criteria.

All remaining study queue lengths are not projected to exceed the allowable storage lengths in the 95th percentile condition in the Mitigated 2030 Project Alternative C scenario.

North Forth Site (Alternative D)

Existing (2008) Conditions

Roadway Levels of Service

Table 85 show the Existing (2008) levels of service for the study intersections for the North Fork Site utilizing Figures 43 (lane configurations) and 44 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 85 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 85. The Existing (2008) intersection levels of service calculations for the North Fork Site are included in the Appendix section Attachment VI – C - 41. Figure 45 provides a graphical representation of the resulting Existing (2008) levels of service.

TABLE 85:
EXISTING (2008) CONDITIONS
INTERSECTION WEEKDAY LEVEL OF SERVICE
NORTH FORK SITE (ALTERNATIVE D OFF SITE ALTERNATIVE)

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
SR 145 at SR 41	B	14.0	C	21.6
SR 41 at Road 200	A	8.1	A	5.7
SR 41 at Road 420 (Thornberry Road)				
• SB Left	A	8.7	A	8.9
• WB Approach	B	12.9	B	14.3
SR 41 at SR 49	A	9.9	B	11.9
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	A	7.0	A	7.3
Road 225 (Mammoth Pool Rd) at Cascadel Road				
• SB Left	A	7.4	A	7.3
• WB Approach	A	8.6	A	8.6
Cascadel Road at Mission Drive				
• SB Left-Through	-	-	A	1.1
• WB Approach	A	8.6	A	8.6
North Fork Road at Auberry Road				
• EB Left-Through	-	-	-	-
• WB Left	A	7.4	A	7.5
• NB Approach	A	9.1	A	9.1
• SB Approach	B	10.1	A	8.8
North Fork Road at Crane Valley Road				
• EB Left-Through	A	1.3	A	2.6
• SB Approach	A	9.3	A	9.9

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

As shown in Table 85 and in figure 45, none of the study intersections are currently operating below the adopted level of service standard.

Signal Warrants

Rural peak hour volume signal warrants were prepared for the following six (6) unsignalized intersections:

- SR 41 at Road 420 (Thornberry Road)
- Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)
- Road 225 (Mammoth Pool Rd) at Cascadel Road
- Cascadel Road at Mission Drive
- North Fork Road at Auberry Road
- North Fork Road at Crane Valley Road

Based on the rural peak hour volume warrant, the signal warrant is not met at any of the six (6) study intersections in the Existing (2008) scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 42.

Opening Day (2010) No Project Conditions

Alternative D, No Project Alternative

Roadway Levels of Service

Table 86 show the Opening Day (2010) No Project Alternative D levels of service for the study intersections for the North Fork Site utilizing Figures 43 (lane configurations) and 46 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 86 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 86. The Opening Day (2010) No Project intersection levels of service calculations for the North Fork Site are included in the Appendix section Attachment VI – C - 43. Figure 47 provides a graphical representation of the resulting Opening Day (2010) No Project levels of service.

TABLE 86:
OPENING DAY (2010) NO PROJECT CONDITIONS
INTERSECTION WEEKDAY LEVEL OF SERVICE
NORTH FORK SITE (ALTERNATIVE D, OFF SITE ALTERNATIVE)

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
SR 145 at SR 41	B	C	15.4	22.8
SR 41 at Road 200	A	A	8.2	5.7
SR 41 at Road 420 (Thornberry Road)				
• SB Left	A	A	8.8	9.0
• WB Approach	B	B	13.3	14.9
SR 41 at SR 49	B	B	10.0	12.1
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	A	A	7.1	7.4
Road 225 (Mammoth Pool Rd) at Cascadel Road				
• SB Left	A	A	7.4	7.3
• WB Approach	A	A	8.7	8.7
Cascadel Road at Mission Drive				
• SB Left-Through	-	A	-	1.1
• WB Approach	A	A	8.7	8.6

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 86:
OPENING DAY (2010) NO PROJECT CONDITIONS
INTERSECTION WEEKDAY LEVEL OF SERVICE
NORTH FORK SITE (ALTERNATIVE D, OFF SITE ALTERNATIVE)

North Fork Road at Auberry Road				
• EB Left-Through	A	A	0.2	0.2
• WB Left	A	A	7.4	7.5
• NB Approach	A	B	9.2	10.6
• SB Approach	A	A	9.9	9.8
North Fork Road at Crane Valley Road				
• EB Left-Through	A	A	1.3	2.7
• SB Approach	A	B	9.3	10.0

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

As shown in Table 86 and Figure 47, none of the study intersections are projected to operate below the adopted level of service standard.

Signal Warrants

Rural peak hour volume signal warrants were prepared for the following six (6) unsignalized intersections:

- SR 41 at Road 420 (Thornberry Road)
- Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)
- Road 225 (Mammoth Pool Rd) at Cascadel Road
- Cascadel Road at Mission Drive
- North Fork Road at Auberry Road
- North Fork Road at Crane Valley Road

Based on the rural peak hour volume warrant, the signal warrant is not met at any of the six (6) study intersections in the Opening Day (2010) No Project scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 44.

Opening Day (2010) with Project Conditions

Roadway Levels of Service

Table 87 shows the Opening Day (2010) Project Alternative D levels of service for the study intersections for the North Fork Site utilizing Figures 43 (lane configurations) and 48 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 87 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 87. The Opening Day (2010) Project Alternative D intersection levels of service calculations for the North Fork Site are included in the Appendix section Attachment VI – C - 45. Figure 49 provides a graphical representation of the resulting Opening Day (2010) Project Alternative D levels of service.

TABLE 87:
OPENING DAY (2010) WITH PROJECT CONDITIONS
INTERSECTION WEEKDAY LEVEL OF SERVICE
NORTH FORK SITE (ALTERNATIVE D, OFF-SITE ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
SR 145 at SR 41	B	15.4	C	22.9
SR 41 at Road 200	A	8.2	A	5.8
SR 41 at Road 420 (Thornberry Road)				
• SB Left	A	8.8	A	9.0
• WB Approach	B	13.3	B	14.9
SR 41 at SR 49	B	10.1	B	12.1
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	A	7.3	A	7.7
Road 225 (Mammoth Pool Rd) at Cascadel Road				
• SB Left	A	7.5	A	7.4
• WB Approach	A	8.7	A	8.8
Cascadel Road at Mission Drive				
• WB Left-Through	A	5.3	A	6.7
• NB Approach	A	8.8	A	8.9
North Fork Road at Auberry Road				
• NB Left-Through-Right	A	0.1	A	1.0
• SB Left-Through-Right	A	7.5	A	7.5
• WB Approach	A	9.4	A	9.4
• EB Approach	A	9.7	A	9.7
North Fork Road at Crane Valley Road				
• EB Left-Through	A	1.3	A	2.6
• SB Approach	A	9.4	A	10.1

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

As shown in Table 87 and in Figure 49, none of the study intersections are projected to operate below the adopted level of service standard.

Signal Warrants

Rural peak hour volume signal warrants were prepared for the following six (6) unsignalized intersections:

- SR 41 at Road 420 (Thornberry Road)
- Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)
- Road 225 (Mammoth Pool Rd) at Cascadel Road
- Cascadel Road at Mission Drive
- North Fork Road at Auberry Road
- North Fork Road at Crane Valley Road

Based on the rural peak hour volume warrant, the signal warrant is not met at any of the six (6) study intersections in the Opening Day (2010) Project Alternative D scenario. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 46.

Turn Lane Storage Calculations

Table 88 shows the calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes. No additional locations are projected to meet the warrant or separate left-turn or right-turn lanes. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 88:
OPENING DAY (2010) WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE D (OFF-SITE ALTERNATIVE/NORTH FORK SITE)

Intersection	Movement	Existing Storage Length (ft)	2010 Project Storage Length (ft)
SR 145 at SR 41	NBL	500	100
	WBL	175	100
	SBL	425	100
	EBL	200	200
	EBR	200	100
SR 41 at Road 200	NBR	475	100
	WBL	200	100
	WBR	200	100
	SBL	500	100
SR 41 at Road 420 (Thornberry Road)	SBL	425	100
SR 41 at SR 49	NBL	125	100
	SBR	150	350
	EBL	225	200
	EBR	225	100
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	WBR	---	100
	EBR	---	100
Road 225 (Mammoth Pool Rd) at Cascadel Road	SBL	150	100
North Fork Rd at Auberry Rd	NBR	---	100
	WBL	125	100
	EBR	---	100

ft = feet *SR = State Route* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] *= dual lefts required, length of each left-turn lane* [2] *= exceeds available distance to nearest intersection*
[3] *= dual rights required, length of each right-turn lane* [4] *= triple lefts required, length of each left-turn lane*

2030 No Project Conditions

Alternative E, No Project Alternative

Roadway Levels of Service

Table 89 show the 2030 No Project levels of service for the study intersections for the North Fork Site utilizing Figures 43 (lane configurations) and 50 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 88 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 89. The 2030 No Project intersection levels of service calculations for the North Fork Site are included in the Appendix section Attachment VI – C - 48. Figure 51 provides a graphical representation of the resulting 2030 No Project levels of service.

TABLE 89:
2030 NO PROJECT CONDITIONS
INTERSECTION WEEKDAY LEVEL OF SERVICE
NORTH FORK SITE (ALTERNATIVE D, OFF SITE ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
SR 145 at SR 41	C	D	39.6	40.6
SR 41 at Road 200	A	A	9.3	7.7
SR 41 at Road 420 (Thornberry Road)				
• SB Left	A	B	9.7	10.2
• WB Approach	C	D	20.2	27.5
SR 41 at SR 49	B	B	11.4	14.7
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	A	A	7.9	8.7
Road 225 (Mammoth Pool Rd) at Cascadel Road				
• SB Left	A	A	7.5	7.4
• WB Approach	A	A	9.1	9.7
Cascadel Road at Mission Drive				
• SB Left-Through	-	A	-	1.2
• WB Approach	A	A	8.8	8.8
North Fork Road at Auberry Road				
• EB Left-Through	A	A	1.1	1.2
• WB Left	A	A	7.6	7.6
• NB Approach	B	B	10.7	11.1
• SB Approach	B	B	12.2	13.1
North Fork Road at Crane Valley Road				
• EB Left-Through	A	A	1.7	3.3
• SB Approach	B	B	10.1	11.7

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

As shown in Table 89 and Figure 51, none of the study intersections are projected to operate below the adopted level of service standard.

Signal Warrants

Rural peak hour volume signal warrants were prepared for the following six (6) unsignalized intersections:

- SR 41 at Road 420 (Thornberry Road)
- Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)
- Road 225 (Mammoth Pool Rd) at Cascadel Road
- Cascadel Road at Mission Drive
- North Fork Road at Auberry Road
- North Fork Road at Crane Valley Road

Based on the rural peak hour volume warrant, the signal warrant is met at SR 41 at Road 420 (Thornberry Road) intersection in the 2030 No Project Alternative D conditions scenario. The warrant is not met at the remaining five (5) study intersections. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 49.

2030 with Project Conditions

Roadway Levels of Service

Table 90 shows the 2030 with Project Alternative D levels of service for the study intersections for the North Fork Site utilizing Figures 43 (lane configurations) and 52 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 90 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 90. The 2030 with Project Alternative D intersection levels of service calculations for the North Fork Site are included in the Appendix section Attachment VI – C - 50. Figure 53 provides a graphical representation of the resulting 2030 with Project Alternative D levels of service.

TABLE 90:
2030 WITH PROJECT CONDITIONS
INTERSECTION WEEKDAY LEVEL OF SERVICE
NORTH FORK SITE (ALTERNATIVE D, OFF-SITE ALTERNATIVE)

Intersection	**AM Peak Hour** **LOS**	**AM Peak Hour** **Delay[1] (secs)**	**PM Peak Hour** **LOS**	**PM Peak Hour** **Delay[1] (secs)**
SR 145 at SR 41	C	29.6	D	40.7
SR 41 at Road 200	A	9.3	A	8.5
SR 41 at Road 420 (Thornberry Road)				
• SB Left	A	9.7	B	10.2
• **WB Approach**	C	20.2	**D**	**27.5**
SR 41 at SR 49	B	11.1	B	14.7
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	A	8.2	A	9.2
Road 225 (Mammoth Pool Rd) at Cascadel Road				
• SB Left	A	7.5	A	7.5
• WB Approach	A/A	9.3	A	9.6
Cascadel Road at Mission Drive				
• WB Left-Through	A	4.3	A	6.3
• NB Approach	A	8.9	A	9.1
North Fork Road at Auberry Road				
• NB Left-Through-Right	A	1.6	A	1.6
• SB Left-Through-Right	A	7.6	A	7.6
• WB Approach	B	10.9	B	11.4
• EB Approach	B	12.5	B	13.4
North Fork Road at Crane Valley Road				
• EB Left-Through	A	1.6	A	3.3
• SB Approach	B	10.1	B	11.8

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*
Bolded Text = intersection/movement operates below the appropriate level of service standard

Intersections within the study area that are currently operating below the adopted level of service standard are shown bolded in Table 90. As shown in Table 90 and Figure 53, the following intersection is projected to operate below the adopted level of service standard:

- SR 41 at Road 420 (Thornberry Road)
    - WB Approach – PM peak hour – LOS "D"

Signal Warrants

Rural peak hour volume signal warrants were prepared for the following six (6) unsignalized intersections:

- SR 41 at Road 420 (Thornberry Road)
- Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)
- Road 225 (Mammoth Pool Rd) at Cascadel Road

- Cascadel Road at Mission Drive
- North Fork Road at Auberry Road
- North Fork Road at Crane Valley Road

Based on the rural peak hour volume warrant, the signal warrant is met at SR 41 at Road 420 (Thornberry Road) intersection in the 2030 Project Alternative D conditions scenario. The warrant is not met at the remaining five (5) study intersections. This warrant analysis is limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendices section Attachment VI – C - 51.

Turn Lane Storage Calculations

Table 91 shows the calculated left-turn storage lengths for movements which have existing separate left-turn or right-turn lanes. No additional locations are projected to meet the warrant or separate left-turn or right-turn lanes. It should be noted that the calculated left-turn storage length increases are not solely due to Project only trips but are also due to increases in background traffic.

TABLE 91:
2030 WITH PROJECT CONDITIONS
TURN LANE STORAGE CALCULATIONS SUMMARY
ALTERNATIVE D (OFF-SITE ALTERNATIVE/NORTH FORK SITE)

Intersection	Movement	Existing Storage Length (ft)	2030 Project Storage Length (ft)
SR 145 at SR 41	NBL	500	100
	WBL	175	100
	SBL	425	100
	EBL	200	200
	EBR	200	100
SR 41 at Road 200	NBR	475	100
	WBL	200	100
	WBR	200	100
	SBL	500	100
SR 41 at Road 420 (Thornberry Road)	SBL	425	100
SR 41 at SR 49	NBL	125	100
	SBR	150	400
	EBL	225	250
	EBR	225	150
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	WBR	---	100
	EBR	---	100
Road 225 (Mammoth Pool Rd) at Cascadel Road	SBL	150	100
North Fork Rd at Auberry Rd	NBR	---	100
	WBL	125	100
	EBR	---	100

ft = feet *SR = State Route* *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *n/a = not applicable* *--- =no existing lane*
[1] = dual lefts required, length of each left-turn lane *[2] = exceeds available distance to nearest intersection*
[3] = dual rights required, length of each right-turn lane *[4] = triple lefts required, length of each left-turn lane*

Mitigated 2030 with Project Conditions

Roadway Levels of Service

Based on the information provided in the previous sections, the following locations, by scenario, are currently or projected to operate below the adopted level of service standard:

2030 No Project

- SR 145 at SR 41 – PM peak hour – LOS "D"

2030 with Alternative D Project

- SR 145 at SR 41 – PM peak hour – LOS "D"
- SR 41 at Road 420 (Thornberry Road)
    - WB Approach – PM peak hour – LOS "D"

The following locations, by scenario are also projected to meet the rural peak hour volume warrant:

2030 with Alternative D Project

- SR 41 at Road 420 (Thornberry Road)

To mitigate the intersections projected to operate below the appropriate adopted level of service standard, meet either the rural or urban peak hour volume warrant or require left-turn or right-turn channelization the following improvements are recommended:

- SR 145 at SR 41
    - Reoptimize the signal cycle length
- SR 41 at Road 420 (Thornberry Road)
    - Signalize the intersection

Table 92 shows the Mitigated 2030 with Project Alternative D levels of service for the study intersections for the North Fork Site utilizing Figures 54 (lane configurations) and 52 (peak hour volumes) shown previously. The signalized intersection levels of service shown on Table 92 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Table 92. The Mitigated 2030 with Project Alternative D intersection levels of service calculations for the North Fork Site are included in the Appendix section Attachment VI – C - 52. Figure 55 provides a graphical representation of the resulting levels of service.

TABLE 92:
MITIGATED 2030 WITH PROJECT CONDITIONS
INTERSECTION WEEKDAY LEVEL OF SERVICE
NORTH FORK SITE (ALTERNATIVE D, OFF-SITE ALTERNATIVE)

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
SR 145 at SR 41	C	20.7	C	30.1
SR 41 at Road 200	A	9.3	A	8.5
SR 41 at Road 420 (Thornberry Road)	A	6.1	A	6.5
SR 41 at SR 49	B	11.1	B	14.7
Road 274 (Malum Ridge Rd) at Road 225 (Mammoth Pool Rd)	A	8.2	A	9.2
Road 225 (Mammoth Pool Rd) at Cascadel Road				
• SB Left	A	7.5	A	7.5
• WB Approach	A	9.3	A	9.6
Cascadel Road at Mission Drive				
• WB Left-Through	A	4.3	A	6.3
• NB Approach	A	8.9	A	9.1
North Fork Road at Auberry Road				
• NB Left-Through-Right	A	1.6	A	1.6
• SB Left-Through-Right	A	76	A	7.6
• WB Approach	B	10.9	B	11.4
• EB Approach	B	12.5	B	13.4
North Fork Road at Crane Valley Road				
• SB Left-Through	A	1.6	A	3.3
• WB Approach	B	10.1	B	11.8

SR = State Route *[1] Delay per vehicle* *secs = seconds* *WB = westbound*
NB = northbound *SB = southbound* *EB = eastbound*

As shown in Table 92 and Figure 55, all of the study intersections are projected to operate at or above the appropriate level of service standard in the Mitigated 2030 Project Alternative D scenario.

V. CONCLUSIONS AND RECOMMENDATIONS

The following sections provide No Project/Project/Mitigated Project levels of service and measures of effectiveness comparison information for the various alternatives, a mitigations phasing plan (future insertion), implementation responsibilities (future insertion), cost estimates for the recommended mitigation measures, and associated financing plan (future insertion).

A. NO PROJECT/PROJECT COMPARISON

Alternative A (Madera Site)

Tables 93 and 94 compare the Alternative A, Proposed Project, Opening Day (2010) No Project, Opening Day (2010) Project, and Mitigated Opening Day (2010) Project, and the 2030 No Project, 2030 Project, and Mitigated 2030 Project level of service results for County segments, freeway segments and intersections projected to operate below the adopted level of service standards, respectively.

Comparison of Opening Day (2010) No Project, Opening Day (2010) Project, and Mitigated Opening Day (2010) Project Scenarios

County Segments

County segments exceeding the appropriate level of service standard are shown in bold print in Table 93. As can be seen in Table 93, one (1) County segment is projected to operate at a LOS "E" in the Opening Day (2010) No Project scenario is projected to operate at a LOS "F" in the Opening Day (2010) Project scenario. The County segment is:

- Avenue 17 – SR 99 to Road 27 – PM peak hour – LOS "E" to LOS "F"

The remaining County segments are projected to operate at acceptable levels of service with or without the Alternative A, Proposed Project, in the Opening Day (2010) scenarios.

As shown in Table 93, the County segment projected to operate below acceptable levels of service in Opening Day (2010) Project scenario is projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project scenario.

Freeway Segments

Freeway segments exceeding the appropriate level of service standard are shown in bold print in Table 93. As can be seen in Table 93, implementation of the Project is projected to cause one (1) new freeway segment operational failure when compared to the Opening Day (2010) No Project scenario. The freeway segment is:

- SR 99 between Avenue 18 ½ and Avenue 17
    - NB – PM peak hour – LOS "C" to LOS "D"

Two (2) freeway segments that are projected to operate at a LOS "D" in the Opening Day (2010) No Project scenario is projected to continue to operate at a LOS "D" in the Opening Day (2010) Project scenario but are projected to show an increased density. These freeway segments are:

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - NB – AM peak hour – LOS "D"

Two (2) freeway segments that are projected to operate at a LOS "D" in the Opening Day (2010) No Project scenario are projected to operate at a LOS "E" in the Opening Day (2010) Project scenario. These freeway segments are:

- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D" to LOS "E"
- SR 99 south of Avenue 17
  - NB – PM peak hour – LOS "D" to LOS "E"

One (1) freeway segment that is projected to operate at a LOS "E" in the Opening Day (2010) No Project scenario is projected to operate at a LOS "F" in the Opening Day (2010) Project scenario. The freeway segment is:

- SR 99 south of Avenue 17
  - SB – PM peak hour – LOS "E" to LOS "F"

The remaining freeway segments by time period are projected to operate at acceptable levels of service with or without the Alternative A, Proposed Project, in the Opening Day (2010) scenarios.

As shown in Table 93, all freeway segments projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project scenario.

Intersections

Intersections exceeding the appropriate level of service standard are shown in bold print in Table 93. As can be seen in Table 93, implementation of the Project is projected to cause seven (7) new intersection operational impacts when compared to the Opening Day (2010) No Project scenario. These seven (7) intersections are:

- Avenue 18 ½ at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS "C" to LOS "D"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM peak hour – LOS "C" to LOS "E"
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM peak hour – LOS "C" to LOS "F"
  - NB Approach – PM peak hour – LOS "D" to LOS "F"
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS "C" to LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "C" to LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "C" to LOS "D"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "D" to LOS "E"

TABLE 93:
COMPARISON OF 2010 NO PROJECT, 2010 PROJECT, AND MITIGATED 2010 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	No Project		Project		Mitigated Project		No Project		Project		Mitigated Project	
County Segment	LOS		LOS		LOS		LOS		LOS		LOS	
Avenue 17 – SR 99 to Road 27	B		C		A		E		F		B	
	LOS			Density (pc/mi/ln)			LOS			Density (pc/mi/ln)		
Freeway Segment	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
SR 99 north of Avenue 18 ½												
• NB	C	C	B	23.9	24.3	16.5	C	C	C	25.7	25.2	17.4
• **SB**	C	C	B	19.6	20.3	13.3	**D**	**D**	C	**33.6**	**32.5**	19.7
SR 99 between Avenue 18 ½ and Avenue 17												
• **NB**	C	C	B	24.9	25.3	19.3	C	**D**	C	28.2	**27.0**	21.6
• **SB**	C	C	B	20.4	21.0	14.0	**D**	**E**	C	**39.1**	**36.1**	20.8
SR 99 south of Avenue 17												
• **NB**	**D**	**D**	C	**28.7**	**31.5**	20.6	**D**	**E**	C	—	**38.7**	25.4
• **SB**	C	C	B	22.8	24.1	16.2	**E**	**F**	C	—	—	25.8
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
Avenue 18 ½ at SR 99 NB ramps			B			13.4			B			13.4
• EB Left	A	A		6.4	8.4		A	A		5.6	8.1	
• **NB Approach**	C	C		21.3	22.7		C	**D**		21.4	**26.4**	
Avenue 18 ½ at SR 99 SB ramps/Road 23			A			9.1			B			11.3
• WB Left-Through	A	A		0.8	0.8		A	A		1.5	1.4	
• **NB Approach**	C	C		18.5	20.8		**E**	**F**		**36.5**	**63.1**	
• **SB Approach**	C	C		16.5	17.2		**D**	**E**		**28.5**	**36.5**	
Avenue 17 at SR 99 NB ramps			B			13.0			B			18.1
• **EB Left**	B	B		10.0	11.0		B	B		10.2	13.9	
• **NB Approach**	**F**	**F**		**114.6**	**6015.5**		**F**	**F**		**371.0**	**4113.0**	
Avenue 17 at SR 99 SB off-ramp			A			2.7			A			5.5
• **SB Approach**	C	**E**		16.6	**37.6**		**F**	**F**		**174.5**	**6974.5**	
Avenue 17 at Golden State Boulevard			B			18.8			C			21.5
• EB Left	A	A		8.2	9.2		A	B		8.7	10.7	
• **WB Left**	A	A		8.5	9.2		A	B		8.9	10.8	
• **NB Approach**	C	**F**		22.2	**250.4**		**D**	**F**		32.4	—	
• **SB Approach**	**F**	**F**		**113.9**	—		**F**	**F**		—	—	

SR = State Route | [1] *Delay per vehicle* | *secs = seconds* | *NB = northbound* | *SB = southbound* | *WB = westbound* | *EB = eastbound* | *-- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 93:
COMPARISON OF 2010 NO PROJECT, 2010 PROJECT, AND MITIGATED 2010 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
Avenue 17 at Road 23			A			7.6			A			9.7
• NB Left-Through-Right	A	A		0.7	0.7		A	A		1.4	1.7	
• SB Left-Through-Right	A	A		0.7	0.7		A	A		0.6	0.6	
• **WB Approach**	B	C		13.9	15.5		C	**E**		18.9	**39.0**	
• **EB Approach**	B	B		12.3	13.1		B	C		14.9	19.2	
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	B	B	14.3	14.9	12.1	C	**D**	C	22.7	**36.4**	24.4
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	C	B	21.1	22.2	10.6	C	**D**	B	33.3	**38.7**	13.1
Avenue 12/Golden State Boulevard at SR 99 SB ramps			B			14.1			B			13.1
• SB Left-Through	A	A		6.1	6.1		A	A		3.7	3.7	
• **WB Approach**	**E**	**F**		**43.3**	**50.7**		**D**	**E**		**30.0**	**44.3**	
Avenue 12 at Golden State Boulevard	D	D	D	54.0	54.3	39.8	D	**E**	D	52.0	**58.4**	41.2

SR = State Route *[1] Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 94:
COMPARISON OF 2030 NO PROJECT, 2030 PROJECT, AND MITIGATED 2030 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	No Project		Project		Mitigated Project		No Project		Project		Mitigated Project	
County Segment	LOS		LOS		LOS		LOS		LOS		LOS	
Avenue 17 – Road 23 to SR 99	F		F		A		F		F		C	
Avenue 17 – SR 99 to Road 27	E		F		A		F		F		B	
	LOS			Density (pc/mi/ln)			LOS			Density (pc/mi/ln)		
Freeway Segment	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
SR 99 north of Avenue 18 ½												
• NB	**D**	**D**	C	**26.5**	**26.6**	19.3	**D**	**D**	C	**33.2**	**33.6**	22.7
• SB	C	C	C	23.9	24.1	24.1	**E**	**E**	C	**41.4**	**42.2**	25.7
SR 99 between Avenue 18 ½ and Avenue 17												
• NB	**D**	**D**	C	**26.4**	**26.4**	19.2	**D**	**D**	C	**31.4**	**31.4**	21.7
• SB	C	C	C	23.5	23.5	23.5	**E**	**E**	C	**40.5**	**40.5**	25.2
SR 99 south of Avenue 17												
• NB	**E**	**E**	C	**39.0**	**42.6**	25.9	**F**	**F**	**E**	—	—	**41.8**
• SB	**F**	**D**	C	—	**30.1**	21.1	**D**	**F**	**F**	**29.2**	**29.2**	—
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
Avenue 18 ½ at SR 99 NB ramps		B	B		14.7	13.5		B	B		13.2	12.8
• EB Left	A			7.5			B			10.1		
• **NB Approach**	**F**			**337.7**			**F**			**7523.8**		
Avenue 18 ½ at SR 99 SB ramps/Road 23		B	A		17.8	9.6		E	B		58.6	14.2
• **SB Approach**	**F**			**52.0**			**F**			**332.3**		
Avenue 18 ½ at Pistachio Drive												
• EB Left-Through	A	A	A	0.7/	0.7	0.7	A	A	A	2.2	2.5	2.6
• **SB Approach**	C	D	B	24.8	27.8	14.2	**F**	**F**	C	**187.5**	**309.6**	17.9
Avenue 18 ½ at Golden State Boulevard			B			12.6			B			17.4
• EB Left-Through-Right	A	A		1.0	1.0		A	A		0.9	0.9	
• WB Left-Through	A	A		6.6	6.9		A	A		7.5	7.9	
• **NB Approach**	C	C		19.2	23.7		**F**	**F**		137.3	**360.3**	
• **SB Approach**	**F**	**F**		**429.1**	**685.3**		**F**	**F**		**9379.8**	—	
Avenue 18 at Road 23			A			5.1			A			7.4
• NB Left-Through-Right	A	A		0.0	0.0		A	A		0.2	0.2	
• SB Left-Through-Right	A	A		0.8	2.3		A	A		1.0	2.7	
• WB Approach	B	C		14.5	15.3		C	C		17.9	21.2	
• EB Approach	C	C		16.4	18.8		C	D		24.8	31.5	

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 94:
COMPARISON OF 2030 NO PROJECT, 2030 PROJECT, AND MITIGATED 2030 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE A, PROPOSED PROJECT ALTERNATIVE)

	AM Peak Hour						**PM Peak Hour**					
	LOS			**Delay (sec)**			**LOS**			**Delay (sec)**		
Intersection	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
Avenue 17 at SR 99 NB ramps		E	C		**75.1**	22.2		**F**	**F**		**268.4**	**96.0**
• **EB Left**	**D**			**27.7**			**F**			**617.2**		
• **NB Approach**	**F**			**6790.7**			**F**			—		
Avenue 17 at SR 99 SB off-ramp		C	A		24.4	5.1		**F**	B		336.6	13.6
• **SB Approach**	**F**			**7445.5**			**F**			—		
Avenue 17 at Golden State Boulevard		E	C		**65.1**	23.3		**F**	**F**		**416.9**	**133.2**
• EB Left	B			12.5			D			29.4		
• **WB Left**	**F**			**71.5**			**F**			**275.4**		
• **NB Approach**	**F**			—			**F**			—		
• **SB Approach**	**F**			—			**F**			—		
Avenue 17 at Road 23		E	B		**58.6**	13.3		**F**	B		**256.4**	16.4
• NB Left-Through-Right	A			3.2			A					
• SB Left-Through-Right	A			0.8			A			0.3		
• **WB Approach**	**F**			—			**F**			—		
• **EB Approach**	**F**			—			**F**			—		
Avenue 16/Ellis Overcrossing at Aviation Drive	**F**	**F**	C	**115.7**	**126.3**	22.7	**F**	**F**	D	**399.6**	**415.2**	53.8
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	C	B	B	26.8	16.8	12.5	**F**	**F**	C	**199.2**	**93.9**	29.2
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	C	C	B	31.4	27.5	18.3	**F**	**E**	C	**133.0**	**80.3**	27.9
Avenue 15 ½ at Road 23			A			5.4			A			7.4
• NB Left-Through-Right	A	A		0.0	0.0		A	A		0.0	0.0	
• SB Left-Through-Right	A	A		1.1	1.1		A	A		1.7	1.7	
• **WB Approach**	C	C		16.9	17.5		D	**E**		34.4	**38.1**	
• EB Approach	A	A		0.0	0.0		C	C		19.0	19.8	
SR 145/Madera Avenue at SR 99 NB ramps	**D**	**D**	B	**37.0**	**51.2**	16.6	**F**	**F**	C	**242.9**	**264.3**	30.7
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	**E**	C	B	**70.9**	24.4	15.3	**F**	**F**	C	**238.7**	**99.2**	25.1
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	C	B	B	29.7	16.2	12.7	**F**	C	B	**163.2**	24.4	16.6
Avenue 12/Golden State Boulevard at SR 99 SB ramps		C	C		21.7	20.6		C	B		24.1	17.8
• SB Left-Through	A			9.1			A			7.5		
• **WB Approach**	**F**			**9323.4**			**F**			**9051.8**		
Avenue 12 at Golden State Boulevard	**F**	**E**	C	**205.2**	**75.6**	34.4	**F**	**F**	D	**328.4**	**155.1**	39.5
Avenue 12 at SR 99 NB ramps	C	C	B	21.5	22.9	16.5	**E**	**E**	B	**57.9**	**63.8**	18.0

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *— = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

Three (3) intersections that are projected to operate at a LOS "F" in the Opening Day (2010) No Project scenario are projected to continue to operate at a LOS "F" in the Opening Day (2010) Project scenario but are projected to show an increased intersection stopped delay. These three (3) intersections are:

- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard
  - SB Approach – AM/PM peak hours – LOS "F"

Two (2) intersections that are projected to operate at a LOS "D" or "E" in the Opening Day (2010) No Project scenario are projected to show an increase in level of service and associated stopped delay in the Opening Day (2010) Project scenario. These two (2) intersections are:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "E" to LOS "F"
  - SB Approach – PM peak hour – LOS "D" to LOS "E"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM peak hour – LOS "E" to LOS "F"
  - WB Approach – PM peak hour – LOS "D" to LOS "E"

The remaining intersections by time period are projected to operate at acceptable levels of service with or without the Alternative A, Proposed Project, in the Opening Day (2010) scenarios.

As shown in Table 93, all intersections projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project scenario.

Comparison of 2030 No Project, 2030 Project, and Mitigated 2030 Project Scenarios

County Segments

County segments exceeding the appropriate level of service standard are shown in bold print in Table 94. As can be seen in Table 94, one (1) County segment is projected to operate at a LOS "F" in the 2030 No Project scenario is projected to continue to operate at a LOS "F" in the 2030 Project scenario. This one (1) segment is:

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"

Because the mitigations identified in the 2010 Project scenario were used in the 2030 Project scenario, level of service and measures of effectiveness comparisons of some county segments between the 2030 No Project scenario and the 2030 Project scenario could not be made due to additional lanes. The County segment analyzed with a different number of lanes in the 2030 No Project and 2030 Project scenarios is:

- Avenue 17 – SR 99 to Road 27

This County segment is projected to operate at a LOS "E/F" in the 2030 No Project scenario AM/PM peak hour respectively, and is projected to operate at a LOS "A/E" in the 2030 Project scenario AM/PM peak hour respectively.

The remaining County segments are projected to operate at acceptable levels of service with or without the Alternative A, Proposed Project, in the 2030 scenarios.

As shown in Table 94, all County segments projected to operate below acceptable levels of service in the 2030 No Project and 2030 Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated 2030 Project scenario.

Freeway Segments

Freeway segments exceeding the appropriate level of service standard are shown in bold print in Table 94. As can be seen in Table 94, five (5) freeway segments that are projected to operate at a LOS "D", "E" or "F" in the 2030 No Project scenario are projected to continue to operate at a LOS "D", "E" or "F" in the 2030 Project scenario but are projected to show an increased density. These five (5) freeway segments are:

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
- SR 99 south of Avenue 17
  - NB – AM peak hour – LOS "E"
  - NB – PM peak hour – LOS "F"
  - SB – AM peak hour – LOS "D"
  - SB – PM peak hour – LOS "F"

One (1) freeway segment that is projected to operate at a LOS "E" in the 2030 No Project scenario is projected to continue to operate at a LOS "E" in the 2030 Project scenario but is projected to show no increase in density. This one (1) freeway segment is:

- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "E"

The remaining freeway segments by time period are projected to operate at acceptable levels of service with or without the Alternative A, Proposed Project, in the 2030 scenarios.

As shown in Table 94, two (2) freeway segments are projected to operate below acceptable levels of service in the Mitigated 2030 Project scenario. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E/F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. All remaining freeway segments are projected to operate at or above the level of service standards in the Mitigated 2030 Project, Alternative A, scenario. However with the proposed Alternative A mitigations, these two (2) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density). Therefore these two (2) locations should be viewed as mitigated as appropriate by the Project.

Intersections

Intersections exceeding the appropriate level of service standard are shown in bold print in Table 94. As can be seen in Table 94 implementation of the Project is projected to cause one (1) new intersection operational failures when compared to the 2030 No Project scenario. This intersection is:

- Avenue 15 ½ at Road 23 – WB Approach – PM peak hour – LOS "D" to LOS "E"

Five (5) intersections that are projected to operate at a LOS "D", "E", or "F" in the 2030 No Project scenario are projected to continue to operate at a LOS "D", "E", or "F" in the 2030 Project scenario but are projected to show an increased intersection stopped delay. These five (5) intersections are:

- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps
    - AM peak hour – LOS "D"
    - PM peak hour – LOS "F"
- Avenue 18 ½ at Pistachio Drive – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
    - NB Approach – PM peak hour – LOS "F"
    - SB Approach – AM/PM peak hours – LOS "F"

Because the mitigations identified in the 2010 Project scenario were used in the 2030 Project scenario, level of service and measures of effectiveness comparisons of some intersections between the 2030 No Project scenario and the 2030 Project scenario could not be made due to either signalization or reconfiguring of the intersections. Intersections analyzed with different lane configurations and intersection control in the 2030 No Project and 2030 Project scenarios are as follows:

- Avenue 18 ½ at SR 99 NB ramps
- Avenue 18 ½ at SR 99 SB ramps
- Avenue 17 at SR 99 NB ramps
- Avenue 17 at SR 99 SB ramps
- Avenue 17 at Golden State Boulevard
- Avenue 17 at Road 23
- Avenue 12/Golden State Boulevard at SR 99 SB ramps

Three (3) intersections are projected to operate at a LOS "F" in the 2030 No Project scenario and are projected to continue to operate at a LOS "F" in the 2030 Project scenario but are projected to show a decreased intersection stopped delay. These three (3) intersections are:

- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LO S"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "F"

Because of changing traffic conditions and optimization of coordinated signals, some intersections are projected to show a decrease in delay from the 2030 No Project scenario to the 2030 Project scenario. Two (2) intersections that are projected to operate at a LOS "D", "E", or "F" in the 2030 No Project scenario are projected to continue to operate at a LOS "D", "E", or "F" in the 2030 Project scenario but are projected to show a decreased intersection stopped delay. These two (2) intersections are:

- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F" to LOS "E"
- Avenue 12 at Golden State Boulevard – AM peak hour – LOS "F" to LOS "E"

Two (2) intersections that are projected to operate at a LOS "E" or "F" in the 2030 No Project scenario are projected to operate at an acceptable level of service in the 2030 Project scenario. These two (2) locations are:

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 - AM peak hour – LOS "E" to LOS "C"

- Olive Avenue/Avenue 14 at SR 99 SB off-ramp – PM peak hour – LOS "F" to LOS "C"

The remaining intersections by time period are projected to operate at acceptable levels of service with or without the Alternative A, Proposed Project, in the 2030 scenarios.

As shown in Table 94, two (2) intersections are projected to operate below acceptable levels of service in the Mitigated 2030 Project scenario. The Avenue 17 at SR 99 NB ramps intersection and the Avenue 17 at Golden State Boulevard intersection are both is projected to operate at a LOS "F" in the PM peak hour. Per the Avenue 17 PSR, Avenue 17 will be widened to a maximum of six (6) through lanes between the ramps and seven (7) through lanes between the SB ramps and Golden State Boulevard. This maximum six (6) to seven (7) lane cross-section is consistent with prior discussions with Caltrans staff, which said that widening Avenue 17 to eight (8) lanes is not recommended. All remaining intersections are projected to operate at or above the level of service thresholds in the Mitigated 2030 Project, Alternative A, scenario. However with the proposed Alternative A mitigations, these two (2) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (intersection delay). Therefore these two (2) locations should be viewed as mitigated as appropriate by the Project.

Alternative B (Madera Site)

Tables 95 and 96 compare the Alternative B, Reduced Intensity Alternative, Opening Day (2010) No Project, Opening Day (2010) Project, and Mitigated Opening Day (2010) Project, and the 2030 No Project, 2030 Project, and Mitigated 2030 Project level of service results for County segments, freeway segments and intersections projected to operate below the adopted level of service standards, respectively.

Comparison of Opening Day (2010) No Project, Opening Day (2010) Project, and Mitigated Opening Day (2010) Project Scenarios

County Segments

County segments exceeding the appropriate level of service standard are shown in bold print in Table 95. As can be seen in Table 95, one (1) County segment is projected to operate at a LOS "E" in the Opening Day (2010) No Project scenario and is projected to operate at a LOS "F" in the Opening Day (2010) Project scenario. The County segment is:

- Avenue 17 – SR 99 to Road 27 – PM peak hour – LOS "E" to LOS "F"

The remaining County segments are projected to operate at acceptable levels of service with or without the Alternative B, Reduced Intensity Alternative, in the Opening Day (2010) scenarios.

As shown in Table 95, all County segments projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project scenario.

Freeway Segments

Freeway segments exceeding the appropriate level of service standard are shown in bold print in Table 95. As can be seen in Table 95, implementation of the Project is projected to cause one (1) new freeway segment operational failure when compared to the Opening Day (2010) No Project scenario. The freeway segment is:

- SR 99 between Avenue 18 ½ and Avenue 17

- NB – PM peak hour – LOS “C” to LOS “D”

TABLE 95:
COMPARISON OF 2010 NO PROJECT, 2010 PROJECT, AND MITIGATED 2010 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	No Project		Project		Mitigated Project		No Project		Project		Mitigated Project	
County Segment	LOS		LOS		LOS		LOS		LOS		LOS	
Avenue 17 – SR 99 to Road 27	B		C		A		E		F		B	
	LOS			Density (pc/mi/ln)			LOS			Density (pc/mi/ln)		
Freeway Segment	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
SR 99 north of Avenue 18 ½												
• NB	C	C	B	23.9	24.2	16.5	C	**C**	B	25.7	**25.2**	17.4
• **SB**	C	C	B	19.6	20.0	13.3	**D**	**D**	C	**33.6**	**32.5**	19.7
SR 99 between Avenue 18 ½ and Avenue 17												
• **NB**	C	C	C	24.9	**25.3**	19.3	C	**D**	C	28.2	**27.0**	21.5
• **SB**	C	C	B	20.4	21.0	14.0	**D**	**E**	C	**39.1**	**36.1**	20.8
SR 99 south of Avenue 17												
• **NB**	**D**	**D**	C	**28.7**	**31.5**	19.3	**D**	**E**	C	**---**	**38.6**	21.5
• **SB**	C	C	B	22.8	24.7	16.2	**E**	**F**	C	**---**	**---**	25.8
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
Avenue 18 ½ at SR 99 NB ramps			B			13.3			B			13.4
• EB Left	A	A		6.4	8.4		A	A		5.6	8.1	
• **NB Approach**	C	C		21.3	22.7		C	**D**		21.4	**26.4**	
Avenue 18 ½ at SR 99 SB ramps/Road 23			A			8.9			B			11.3
• WB Left-Through	A	A		0.8	0.8		A	A		1.5	1.4	
• **NB Approach**	C	C		18.5	20.8		**E**	**F**		**36.5**	**63.1**	
• **SB Approach**	C	C		16.5	17.2		**D**	**E**		**28.5**	**36.5**	
Avenue 17 at SR 99 NB ramps			B			13.0			B			18.1
• **EB Left**	B	B		10.0	11.0		B	B		10.2	13.9	
• **NB Approach**	**F**	**F**		**114.6**	**6001.8**		**F**	**F**		**371.0**	**4093.9**	
Avenue 17 at SR 99 SB off-ramp			A			2.7			A			5.5
• **SB Approach**	C	**E**		16.6	**37.6**		**F**	**F**		**174.5**	**6974.5**	
Avenue 17 at Golden State Boulevard			B			18.9			C			21.5
• EB Left	A	A		8.2	9.2		A	B		8.7	10.7	
• **WB Left**	A	A		8.5	9.2		A	B		8.9	10.8	
• **NB Approach**	C	**F**		22.2	**250.4**		D	**F**		32.4	—	
• **SB Approach**	**F**	**F**		**113.9**	**---**		**F**	**F**		---	---	
Avenue 17 at Road 23			A			7.4			A			9.5
• NB Left-Through-Right	A	A		0.7	0.7		A	A		1.4	1.7	
• SB Left-Through-Right	A	A		0.7	0.7		A	A		0.6	0.6	
• **WB Approach**	B	C		13.9	15.5		C	**E**		18.9	**39.2**	
• **EB Approach**		B			B						12.3	

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 95:
COMPARISON OF 2010 NO PROJECT, 2010 PROJECT, AND MITIGATED 2010 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	B	B	B	14.3	14.9	12.1	C	**D**	C	22.7	**36.8**	24.9
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	C	B	21.1	22.0	10.5	C	**D**	B	33.3	**38.7**	13.5
Avenue 12/Golden State Boulevard at SR 99 SB ramps			B			18.1			B			14.8
• SB Left-Through	A	A		6.1	6.1		A	A		3.7	3.7	
• **WB Approach**	**E**	**F**		**43.3**	**50.7**		**D**	**E**		**30.0**	**44.3**	
Avenue 12 at Golden State Boulevard	D	D	C	54.0	54.3	33.5	D	**E**	D	**52.0**	**58.4**	41.6

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 96:
COMPARISON OF 2030 NO PROJECT, 2030 PROJECT, AND MITIGATED 2030 PROJECT LEVELS OF SERVICE MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	No Project		Project		Mitigated Project		No Project		Project		Mitigated Project	
County Segment	LOS		LOS		LOS		LOS		LOS		LOS	
Avenue 17 – Road 23 to SR 99	F		F		A		F		F		C	
Avenue 17 – SR 99 to Road 27	E		F		A		F		F		B	
	LOS			Density (pc/mi/ln)			LOS			Density (pc/mi/ln)		
Freeway Segment	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
SR 99 north of Avenue 18 ½												
• **NB**	**D**	**D**	C	**26.5**	**26.6**	19.4	**D**	**D**	C	**33.2**	**34.3**	23.0
• **SB**	C	C	C	23.9	24.1	24.1	**E**	**E**	C	**41.4**	**43.0**	26.0
SR 99 between Avenue 18 ½ and Avenue 17												
• **NB**	**D**	**D**	C	**26.4**	**26.5**	19.3	**D**	**D**	C	**31.4**	**32.5**	22.2
• **SB**	C	C	C	23.5	23.7	23.7	**E**	**E**	C	**40.5**	**42.1**	25.7
SR 99 south of Avenue 17												
• **NB**	**E**	**E**	C	39.0	**41.5**	23.5	**F**	**F**	E	—	—	**40.9**
• **SB**	**F**	**D**	C	---	**29.8**	21.0	**D**	**F**	**F**	**29.2**	—	—
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
Avenue 18 ½ at SR 99 NB ramps		B	B		14.5	**12.9**		B	B		12.8	**11.3**
• **EB Left**	A			7.5			B			10.1		
• **NB Approach**	**F**			**337.7**			**F**			**7523.8**		
Avenue 18 ½ at SR 99 SB ramps/Road 23		B	A		17.3	9.7		**D**	B		**54.9**	14.7
Avenue 18 ½ at Pistachio Drive												
• EB Left-Through	A	A	A	0.7	0.7	0.7	A	A	A	2.2	2.6	2.5
• **SB Approach**	C	D	B	24.8	26.7	14.0	**F**	**F**	C	**187.5**	**227.0**	17.4
Avenue 18 ½ at Golden State Boulevard			B			14.6			B			16.3
• EB Left-Through-Right	A	A		1.0	1.0		A	A		0.9	0.9	
• WB Left-Through	A	A		6.6	7.3		A	A		7.5	8.7	
• **NB Approach**	C	C		19.2	31.1		**F**	**F**		137.3	—	
• **SB Approach**	**F**	**F**		**429.1**	**593.0**		**F**	**F**		**9379.8**	—	
Avenue 18 at Road 23			A			4.8			A			7.1
• NB Left-Through-Right	A	A		0.0	0.0		A	A		0.2	0.2	
• SB Left-Through-Right	A	A		0.8	1.9		A	A		1.0	2.2	
• WB Approach	B	B		14.5	14.9		C	C		17.9	20.3	
• EB Approach	C	C		16.4	18.0		C	D		24.8	29.3	
Avenue 17 at SR 99 NB ramps		**E**	C		**69.3**	21.5		**F**	**F**		**260.2**	**91.1**
• **EB Left**	**D**			**27.7**			**F**			**617.2**		
• **NB Approach**	**F**			**6790.7**			**F**			—		

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 96:
COMPARISON OF 2030 NO PROJECT, 2030 PROJECT, AND MITIGATED 2030 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE B, REDUCED INTENSITY ALTERNATIVE)

	AM Peak Hour						**PM Peak Hour**					
	LOS			**Delay (sec)**			**LOS**			**Delay (sec)**		
Intersection	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
Avenue 17 at SR 99 SB off-ramp		B	A		17.1	5.1		F	B		**277.5**	11.8
• **SB Approach**	**F**			**7445.5**			**F**			—		
Avenue 17 at Golden State Boulevard		**E**	C		**62.5**	22.4		**F**	**F**		**409.1**	**118.6**
• EB Left	B			12.5			D			29.4		
• **WB Left**	**F**			**71.5**			**F**			**275.4**		
• **NB Approach**	**F**			—			**F**			—		
• **SB Approach**	**F**			—			**F**			—		
Avenue 17 at Road 23		**E**	B		**56.3**	13.2		**F**	B		**248.6**	16.0
• NB Left-Through-Right	A			3.2			A					
• SB Left-Through-Right	A			0.8			A			0.3		
• **WB Approach**	**F**			—			**F**			—		
• **EB Approach**	**F**			—			**F**			—		
Avenue 16/Ellis Overcrossing at Aviation Drive	**F**	**F**	C	**115.7**	**123.5**	22.4	**F**	**F**	D	**399.6**	**409.2**	52.4
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	C	B	B	26.8	16.9	12.4	**F**	**F**	C	**199.2**	**91.7**	28.9
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	C	C	B	31.4	27.0	18.2	**F**	**E**	C	**133.0**	**78.2**	27.2
Avenue 15 ½ at Road 23			A			5.4			A			7.1
• NB Left-Through-Right	A	A		0.0	0.0	0.0	A	A		0.0	0.0	0.0
• SB Left-Through-Right	A	A		1.1	1.1		A	A		1.7	1.7	
• **WB Approach**	C	C		16.9	17.3		D	**E**		34.4	37.1	
• EB Approach	A	A		0.0	0.0		C	C		19.0	19.6	
SR 145/Madera Avenue at SR 99 NB ramps	**D**	**D**	B	**37.0**	**48.5**	15.2	**F**	**F**	C	**242.9**	**257.0**	23.3
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	**E**	C	B	**70.9**	24.4	15.8	**F**	**F**	C	**238.7**	**98.0**	28.6
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	C	B	B	29.7	16.2	12.7	**F**	C	B	**163.2**	24.3	19.0
Avenue 12/Golden State Boulevard at SR 99 SB ramps		C	B		21.7	17.1		C	B		24.0	17.1
• SB Left-Through	A			9.1			A			7.5		
• **WB Approach**	**F**			**9323.4**			**F**			**9051.8**		
Avenue 12 at Golden State Boulevard	**F**	**E**	C	**205.2**	**75.2**	27.3	**F**	**F**	D	**328.4**	**154.2**	39.9
Avenue 12 at SR 99 NB ramps	C	C	B	21.5	22.8	11.5	**E**	**E**	B	**57.9**	**62.8**	15.0

SR = State Route *¹ Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *— = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

Two (2) freeway segments that are projected to operate at a LOS "D" in the Opening Day (2010) No Project scenario are projected to continue to operate at a LOS "D" in the Opening Day (2010) Project scenario but are projected to show an increased density. The freeway segments are:

- SR 99 north of Avenue 18 ½
  - SB – PM peak hour – LOS "D"
- SR 99 south of Avenue 17
  - NB – AM peak hour – LOS "D"

Two (2) freeway segments that are projected to operate at a LOS "D" in the Opening Day (2010) No Project scenario are projected to operate at a LOS "E" in the Opening Day (2010) Project scenario. These freeway segments are:

- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D" to LOS "E"
- SR 99 south of Avenue 17
  - NB – PM peak hour – LOS "D" to LOS "E"

One (1) freeway segment that is projected to operate at a LOS "E" in the Opening Day (2010) No Project scenario is projected to operate at a LOS "F" in the Opening Day (2010) Project scenario. The freeway segment is:

- SR 99 south of Avenue 17
  - SB – PM peak hour – LOS "E" to LOS "F"

The remaining freeway segments by time period are projected to operate at acceptable levels of service with or without the Alternative B, Reduced Intensity Alternative, in the Opening Day (2010) scenarios.

As shown in Table 95, all freeway segments projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project scenario.

Intersections

Intersections exceeding the appropriate level of service standard are shown in bold print in Table 95. As can be seen in Table 95, implementation of the Project is projected to cause seven (7) new intersection operational impacts when compared to the Opening Day (2010) No Project scenario. These seven (7) intersections are:

- Avenue 18 ½ at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS "C" to LOS "D"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM peak hour – LOS "C" to LOS "E"
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM peak hour – LOS "C" to LOS "F"
  - NB Approach – PM peak hour – LOS "D" to LOS "F"
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS "C" to LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "C" to LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "C" to LOS "D"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "D" to LOS "E"

Three (3) intersections that are projected to operate at a LOS "F" in the Opening Day (2010) No Project scenario are projected to continue to operate at a LOS "F" in the Opening Day (2010) Project scenario but are projected to show an increased intersection stopped delay. These three (3) intersections are:

- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard
  - SB Approach – AM/PM peak hours – LOS "F"

Two (2) intersections that are projected to operate at a LOS "D" or "E" in the Opening Day (2010) No Project scenario are projected to show an increase in level of service and associated stopped delay in the Opening Day (2010) Project scenario. These two (2) intersections are:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "E" to LOS "F"
  - SB Approach – PM peak hour – LOS "D" to LOS "E"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM peak hour – LOS "E" to LOS "F"
  - WB Approach – PM peak hour – LOS "D" to LOS "E"

The remaining intersections by time period are projected to operate at acceptable levels of service with or without the Alternative B, Reduced Intensity Alternative, in the Opening Day (2010) scenarios.

As shown in Table 95, all intersections projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project scenario.

Comparison of 2030 No Project, 2030 Project, and Mitigated 2030 Project Scenarios

County Segments

County segments exceeding the appropriate level of service standard are shown in bold print in Table 96. As can be seen in Table 96, one (1) County segment is projected to operate at a LOS "F" in the 2030 No Project scenario is projected to continue to operate at a LOS "F" in the 2030 Project scenario. This one (1) segment is:

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"

Because the mitigations identified in the 2010 Project scenario were used in the 2030 Project scenario, level of service and measures of effectiveness comparisons of some county segments between the 2030 No Project scenario and the 2030 Project scenario could not be made due to additional lanes. The County segment analyzed with a different number of lanes in the 2030 No Project and 2030 Project scenarios is:

- Avenue 17 – SR 99 to Road 27

This County segment is projected to operate at a LOS "E/F" in the 2030 No Project scenario AM/PM peak hour respectively, and is projected to operate at a LOS "A/E" in the 2030 Project scenario AM/PM peak hour respectively.

The remaining County segments are projected to operate at acceptable levels of service with or without the Alternative B, Reduced Intensity Alternative, in the 2030 scenario.

As shown in Table 96, all County segments projected to operate below acceptable levels of service in the 2030 No Project and 2030 Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated 2030 Project scenario.

Freeway Segments

Freeway segments exceeding the appropriate level of service standard are shown in bold print in Table 96. As can be seen in Table 96, six (6) freeway segments that are projected to operate at a LOS "D", "E" or "F" in the 2030 No Project scenario are projected to continue to operate at a LOS "D", "E" or "F" in the 2030 Project scenario but are projected to show an increased density. These six (6) freeway segments are:

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hour – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM peak hour – LOS "E"
  - NB – PM peak hour – LOS "F"
  - SB – AM peak hour – LOS "D"
  - SB – PM peak hour – LOS "F"

The remaining freeway segments by time period are projected to operate at acceptable levels of service with or without the Alternative B, Reduced Intensity Alternative, in the 2030 scenarios.

As shown in Table 96, two (2) freeway segments are projected to operate below acceptable levels of service in the Mitigated 2030 Project scenario. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E/F" respectively in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. All remaining freeways segments are projected to operate at or above the adopted level of service standard in the Mitigated 2030 Project, Alternative B, scenario. However with the proposed Alternative B mitigations, these two (2) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density). Therefore these two (2) locations should be viewed as mitigated as appropriate by the Project.

Intersections

Intersections exceeding the appropriate level of service standard are shown in bold print in Table 96. As can be seen in Table 96 implementation of the Project is projected to cause one (1) new intersection operational failures when compared to the 2030 No Project scenario. This intersection is:

- Avenue 15 ½ at Road 23 – WB Approach – PM peak hour – LOS "D" to LOS "E"

Five (5) intersections that are projected to operate at a LOS "D", "E", or "F" in the 2030 No Project scenario are projected to continue to operate at a LOS "D", "E", or "F" in the 2030 Project scenario but are projected to show an increased intersection stopped delay. These five (5) intersections are:

- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS “F”
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS “E”
- SR 145/Madera Avenue at SR 99 NB ramps
    - AM peak hour – LOS “D”
    - PM peak hour – LOS “F”
- Avenue 18 ½ at Pistachio Drive – PM peak hour – LOS “F”
- Avenue 18 ½ at Golden State Boulevard/Road 23
    - NB Approach – PM peak hour – LOS “F”
    - SB Approach – AM/PM peak hours – LOS “F”

Because the mitigations identified in the 2010 Project scenario were used in the 2030 Project scenario, level of service and measures of effectiveness comparisons of some intersections between the 2030 No Project scenario and the 2030 Project scenario could not be made due to either signalization or reconfiguring of the intersections. Intersections analyzed with different lane configurations and intersection control in the 2030 No Project and 2030 Project scenarios are as follows:

- Avenue 18 ½ at SR 99 NB ramps
- Avenue 18 ½ at SR 99 SB ramps
- Avenue 17 at SR 99 NB ramps
- Avenue 17 at SR 99 SB ramps
- Avenue 17 at Golden State Boulevard
- Avenue 17 at Road 23
- Avenue 12/Golden State Boulevard at SR 99 SB ramps

Three (3) intersections are projected to operate at a LOS “F” in the 2030 No Project scenario and are projected to continue to operate at a LOS “F” in the 2030 Project scenario but are projected to show a decreased intersection stopped delay. These three (3) intersections are:

- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LO S”F”
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS “F
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS “F”

Because of changing traffic conditions and optimization of coordinated signals, some intersections are projected to show a decrease in delay from the 2030 No Project scenario to the 2030 Project scenario. Two (2) intersections that are projected to operate at a LOS “D”, “E”, or “F” in the 2030 No Project scenario are projected to continue to operate at a LOS “D”, “E”, or “F” in the 2030 Project scenario but are projected to show a decreased intersection stopped delay. These two (2) intersections are:

- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS “F” to LOS “E”
- Avenue 12 at Golden State Boulevard – AM peak hour – LOS “F” to LOS “E”

Two (2) intersections that are projected to operate at a LOS “E” or “F” in the 2030 No Project scenario are projected to operate at an acceptable level of service in the 2030 Project scenario. These two (2) locations are:

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 - AM peak hour – LOS “E” to LOS “C”
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp – PM peak hour – LOS “F” to LOS “C”

The remaining intersections by time period are projected to operate at acceptable levels of service with or without the Alternative B, Reduced Intensity Alternative, in the 2030 scenarios.

As shown in Table 96, two (2) intersections are projected to operate below acceptable levels of service in the Mitigated 2030 Project scenario. The Avenue 17 at SR 99 NB ramps intersection and the Avenue 17 at Golden State Boulevard intersection are both is projected to operate at a LOS "F" in the PM peak hour. Per the Avenue 17 PSR, Avenue 17 will be widened to a maximum of six (6) through lanes between the ramps and seven (7) through lanes between the SB ramps and Golden State Boulevard. This maximum six (6) to seven (7) lane cross-section is consistent with prior discussions with Caltrans staff, which said that widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative B mitigations, these two (2) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (intersection delay). Therefore these two (2) locations should be viewed as mitigated as appropriate by the Project. All remaining intersections are projected to operate at or above the adopted level of service thresholds in the Mitigated 2030 Project, Alternative B, scenario.

Alternative C (Madera Site)

Tables 97 and 98 compare the Alternative C, Alternative Land Use Alternative, Opening Day (2010) No Project, Opening Day (2010) Project, and Mitigated Opening Day (2010) Project, and the 2030 No Project, 2030 Project, and Mitigated 2030 Project level of service results for County segments, freeway segments and intersections projected to operate below the adopted level of service standards, respectively.

Comparison of Opening Day (2010) No Project, Opening Day (2010) Project, and Mitigated Opening Day (2010) Project Scenarios

County Segments

County segments exceeding the appropriate level of service standard are shown in bold print in Table 97. As can be seen in Table 97, one (1) County segment is projected to operate at a LOS "E" in the Opening Day (2010) No Project scenario and are projected to operate at a LOS "F" in the Opening Day (2010) Project scenario. The County segment is:

- Avenue 17 – SR 99 to Road 27 – PM peak hour – LOS "E" to LOS "F"

The remaining County segments are projected to operate at acceptable levels of service with or without the Alternative C, Alternate Land Use Alternative, in the Opening Day (2010) scenarios.

As shown in Table 97, all County segments projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project, Alternative C, scenario.

Freeway Segments

Freeway segments exceeding the appropriate level of service standard are shown in bold print in Table 97. As can be seen in Table 97, implementation of the Project is projected to cause one (1) new freeway segment operational failure when compared to the Opening Day (2010) No Project scenario. The freeway segment is:

- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – PM peak hour – LOS "C" to LOS "D"

TABLE 97:
COMPARISON OF 2010 NO PROJECT, 2010 PROJECT, AND MITIGATED 2010 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATIVE LAND USE ALTERNATIVE)

	AM Peak Hour						**PM Peak Hour**					
	No Project		**Project**		**Mitigated Project**		**No Project**		**Project**		**Mitigated Project**	
County Segment	**LOS**		**LOS**		**LOS**		**LOS**		**LOS**		**LOS**	
Avenue 17 – SR 99 to Road 27	B		C		A		E		F		B	
	LOS			**Density (pc/mi/ln)**			**LOS**			**Density (pc/mi/ln)**		
Freeway Segment	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
SR 99 north of Avenue 18 ½												
• NB	C	C	B	23.9	24.0	16.5	C	C	B	25.7	25.1	17.4
• **SB**	C	C	B	19.6	19.9	13.3	**D**	**D**	C	**33.6**	**32.5**	19.7
SR 99 between Avenue 18 ½ and Avenue 17												
• **NB**	C	C	B	24.9	25.3	17.3	C	**D**	B	28.2	**27.0**	17.9
• **SB**	C	C	B	20.4	21.0	14.0	**D**	**E**	C	**39.1**	**36.1**	20.8
SR 99 south of Avenue 17												
• **NB**	**D**	**D**	C	**28.7**	31.6	19.3	**D**	**E**	C	—	**38.8**	21.6
• **SB**	C	C	B	22.8	24.8	16.2	**E**	**F**	C	—	—	25.9
	LOS			**Delay (sec)**			**LOS**			**Delay (sec)**		
Intersection	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
Avenue 18 ½ at SR 99 NB ramps			B			13.3			B			13.4
EB Left	A	A		6.4	8.4		A	A		5.6	8.1	
• **NB Approach**	C	C		21.3	22.7		C	**D**		21.4	**26.4**	
Avenue 18 ½ at SR 99 SB ramps/Road 23			A			8.9			B			11.3
• WB Left-Through	A	A		0.8	0.8		A	A		1.5	1.4	
• **NB Approach**	C	C		18.5	20.82		**E**	**F**		**36.5**	**60.2**	
• **SB Approach**	C	C		16.5	17.2		**D**	**E**		**28.5**	**36.3**	
• EB Approach	B	B	B	10.7	10.8	10.8	B	B	B	11.9	12.0	12.0
Avenue 17 at SR 99 NB ramps			B			13.1			B			17.8
• **EB Left**	B	B		10.0	11.0		B	B		10.2	13.9	
• **NB Approach**	F	**F**		**114.6**	**6029.1**		**F**	**F**		**371.0**	**4161.6**	
Avenue 17 at SR 99 SB off-ramp			A			2.7			A			5.6
• **SB Approach**	C	**E**		16.6	**38.2**		**F**	**F**		**174.5**	**6994.7**	
Avenue 17 at Golden State Boulevard			B			18.9			C			21.6
• EB Left	A	A		8.2	9.2		A	B		8.7	10.8	
• **WB Left**	A	A		8.5	9.2		A	B		8.9	10.8	
• **NB Approach**	C	**F**		22.2	**247.8**		D	**F**		32.4	—	
• **SB Approach**	**F**	**F**		**113.9**	—		**F**	**F**		—	—	

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *— = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 97:
COMPARISON OF 2010 NO PROJECT, 2010 PROJECT, AND MITIGATED 2010 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATIVE LAND USE ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
Avenue 17 at Road 23			A			7.5			A			9.6
• NB Left-Through-Right	A	A		0.7	0.7		A	A		1.4	1.9	
• SB Left-Through-Right	A	A		0.7	0.7		A	A		0.6	0.6	
• **WB Approach**	B	C		13.9	15.4		C	**E**		18.9	**35.8**	
• **EB Approach**	B	B		12.3	13.1		B	C		14.9	19.6	
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	C	C	B	21.1	22.0	10.5	C	**D**	B	33.3	**39.1**	12.8
Avenue 12/Golden State Boulevard at SR 99 SB ramps			B			14.6			B			13.1
• SB Left-Through	A	A		6.1	6.1		A	A		3.7	3.7	
▪ **WB Approach**	E	**F**		**43.3**	**50.7**		**D**	**E**		**30.0**	**47.9**	
Avenue 12 at Golden State Boulevard	D	D	D	54.0	54.3	40.8	D	**E**	D	52.0	60.0	40.4

SR = State Route *[1] Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *--- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 98:
COMPARISON OF 2030 NO PROJECT, 2030 PROJECT, AND MITIGATED 2030 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATIVE LAND USE ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	No Project		Project		Mitigated Project		No Project		Project		Mitigated Project	
County Segment	LOS		LOS		LOS		LOS		LOS		LOS	
Road 23 – Avenue 18 ½ to Avenue 17	D		D		A		D		**E**		A	
Avenue 17 – Road 23 to SR 99	**F**		**F**		A		**F**		**F**		C	
Avenue 17 – SR 99 to Road 27	**F**		**F**		A		**E**		**F**		B	
	LOS			Density (pc/mi/ln)			LOS			Density (pc/mi/ln)		
Freeway Segment	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
SR 99 north of Avenue 18 ½												
• **NB**	**D**	**D**	C	**26.5**	**26.6**	19.4	**D**	**D**	C	**33.2**	**34.3**	23.0
• **SB**	C	C	C	23.9	24.1	24.1	**E**	**E**	C	**41.4**	**43.0**	26.0
SR 99 between Avenue 18 ½ and Avenue 17												
• **NB**	**D**	**D**	C	**26.4**	**26.5**	19.3	**D**	**D**	C	**31.4**	**32.5**	22.2
• **SB**	C	C	C	23.5	23.7	23.7	**E**	**E**	C	**40.5**	**40.6**	25.2
SR 99 south of Avenue 17												
• **NB**	**E**	**E**	C	**39.0**	**41.2**	25.4	**F**	**F**	E	—	—	**41.9**
• **SB**	**F**	**D**	C	—	**30.3**	21.2	**D**	**F**	F	**29.2**	—	—
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project	No Project	Project	Mitigated Project
Avenue 18 ½ at SR 99 NB ramps		B	B		14.9	12.9		B	B		13.5	12.8
• EB Left	A			7.5			B			10.1		
• **NB Approach**	**F**			**337.7**			**F**			**7523.8**		
Avenue 18 ½ at SR 99 SB ramps/Road 23		B	A		18.2	9.8		**E**	B		**64.4**	14.1
• WB Left-Through												
• **NB Approach**												
• **SB Approach**	**F**			**52.0**			**F**			**332.3**		
Avenue 18 ½ at Pistachio Drive												
• EB Left-Through	A	A	A	0.7	0.7	0.7	A	A	A	2.2	2.5	2.6
• **SB Approach**	C	D	B	24.8	26.9	14.0	**F**	**F**	C	**187.5**	**314.1**	17.9
Avenue 18 ½ at Golden State Boulevard			B			14.7			B			17.4
• EB Left-Through-Right	A	A		1.0	1.0		A	A		0.9	0.9	
• WB Left-Through	A	A		6.6	6.8		A	A		7.5	7.9	
• **NB Approach**	C	C		19.2	23.0		**F**	**F**		**137.3**	**1155.7**	
• **SB Approach**	**F**	**F**		**429.1**	**633.7**		**F**	**F**		**9379.8**	—	

SR = State Route *¹ Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *-- = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

TABLE 98:
COMPARISON OF 2030 NO PROJECT, 2030 PROJECT, AND MITIGATED 2030 PROJECT LEVELS OF SERVICE
MADERA SITE (ALTERNATIVE C, ALTERNATIVE LAND USE ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
Avenue 18 at Road 23			A			5.2			A			7.9
• NB Left-Through-Right	A	A		0.0	0.0		A	A		0.2	0.2	
• SB Left-Through-Right	A	A		0.8	1.7		A	A		1.0	2.7	
• WB Approach	B	C		14.5	14.7		C	C		17.9	22.0	
• EB Approach	C	C		16.4	17.8		C	D		24.8	31.9	
Avenue 17 at SR 99 NB ramps		**E**	C		67.9	21.3		**F**	**F**		**267.6**	**95.8**
• **EB Left**	**D**			**27.7**			**F**			**617.2**		
• **NB Approach**	**F**			**6790.7**			**F**			—		
Avenue 17 at SR 99 SB off-ramp		C	A		20.1	5.1		**F**	B		**341.9**	14.4
• **SB Approach**	**F**			**7445.5**			**F**			—		
Avenue 17 at Golden State Boulevard		**E**	C		**70.3**	24.0		**F**	**F**		**417.6**	**140.6**
• EB Left	B			12.5			D			29.4		
• **WB Left**	**F**			**71.5**			**F**			**275.4**		
• **NB Approach**	**F**			—			**F**			—		
• **SB Approach**	**F**			—			**F**			—		
Avenue 17 at Road 23		**E**	B		**56.7**	13.2		**F**	B		**258.1**	16.5
• NB Left-Through-Right	A			3.2			A					
• SB Left-Through-Right	A			0.8			A			0.3		
• **WB Approach**	**F**			—			**F**			—		
• **EB Approach**	**F**			—			**F**			—		
Avenue 16/Ellis Overcrossing at Aviation Drive	**F**	**F**	C	**115.7**	**122.4**	22.1	**F**	**F**	D	**399.6**	**419.0**	54.1
Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps	C	B	B	26.8	16.8	12.5	**F**	**F**	C	**199.2**	**96.2**	29.4
Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps	C	C	B	31.4	28.0	18.3	**F**	**E**	C	**133.0**	**86.0**	28.0
Avenue 15 ½ at Road 23			A			5.4			A			7.4
• NB Left-Through-Right	A	A		0.0	0.0	0.0	A	A		0.0	0.0	0.0
• SB Left-Through-Right	A	A		1.1	1.1		A	A		1.7	1.7	
• **WB Approach**	C	C		16.9	17.4		D	**E**		34.4	**38.8**	
• EB Approach	A	A		0.0/	0.0		C	C		19.0	20.0	
SR 145/Madera Avenue at SR 99 NB ramps	**D**	**D**	B	**37.0**	**47.6**	15.1	**F**	**F**	C	**242.9**	**262.6**	25.6
Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145	**E**	C	B	**70.9**	24.4	15.8	**F**	**F**	C	**238.7**	**99.8**	24.4
Olive Avenue/Avenue 14 at SR 99 SB off-ramp	C	B	B	29.7	16.2	12.8	**F**	C	B	**163.2**	24.5	17.7
Avenue 14 at Road 23	B	B	A	11.6	11.8	7.0	C	C	A	16.6	18.0	7.0
Avenue 12/Golden State Boulevard at SR 99 SB ramps		C	C		22.0	16.3		C	B		24.0	17.1
• SB Left-Through	A			9.1			A			7.5		
• **WB Approach**	**F**			**9323.4**			**F**			**9051.8**		
Avenue 12 at Golden State Boulevard	**F**	**E**	C	**205.2**	75.9	30.2	**F**	**F**	D	**328.4**	**154.5**	40.2
Avenue 12 at SR 99 NB ramps	C	C	B	21.5	23.3	10.4	**E**	**E**	B	**57.9**	**66.3**	15.2

SR = State Route [1] *Delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound* *— = exceeds software parameters*
Bolded Text = intersection/movement operates below the appropriate level of service standard

Two (2) freeway segments that are projected to operate at a LOS "D" in the Opening Day (2010) No Project scenario are projected to operate at a LOS "E" in the Opening Day (2010) Project scenario. These freeway segments are:

- SR 99 between Avenue 18 ½ and Avenue 17
  - SB – PM peak hour – LOS "D" to LOS "E"
- SR 99 south of Avenue 17
  - NB – PM peak hour – LOS "D" to LOS "E"

One (1) freeway segment that is projected to operate at a LOS "E" in the Opening Day (2010) No Project scenario is projected to operate at a LOS "F" in the Opening Day (2010) Project scenario. The freeway segment is:

- SR 99 south of Avenue 17
  - SB – PM peak hour – LOS "E" to LOS "F"

The remaining freeway segments by time period are projected to operate at acceptable levels of service with or without the Alternative C, Alternate Land Use Alternative, in the Opening Day (2010) scenarios.

As shown in Table 97, all freeway segments projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project, Alternative C, scenario.

Intersections

Intersections exceeding the appropriate level of service standard are shown in bold print in Table 97. As can be seen in Table 97, implementation of the Project is projected to cause seven (7) new intersection operational impacts when compared to the Opening Day (2010) No Project scenario. These seven (7) intersections are:

- Avenue 18 ½ at SR 99 NB ramps
  - NB Approach – PM peak hour – LOS "C" to LOS "D"
- Avenue 17 at SR 99 SB ramps
  - SB Approach – AM peak hour – LOS "C" to LOS "E"
- Avenue 17 at Golden State Boulevard
  - NB Approach – AM peak hour – LOS "C" to LOS "F"
  - NB Approach – PM peak hour – LOS "D" to LOS "F"
- Avenue 17 at Road 23
  - WB Approach – PM peak hour – LOS "C" to LOS "E"
- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LOS "C" to LOS "D"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "C" to LOS "D"
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "D" to LOS "E"

Three (3) intersections that are projected to operate at a LOS "F" in the Opening Day (2010) No Project scenario are projected to continue to operate at a LOS "F" in the Opening Day (2010) Project scenario but are projected to show an increased intersection stopped delay. These three (3) intersections are:

- Avenue 17 at SR 99 NB ramps
  - NB Approach – AM/PM peak hours – LOS "F"

- Avenue 17 at SR 99 SB ramps
  - SB Approach – PM peak hour – LOS "F"
- Avenue 17 at Golden State Boulevard
  - SB Approach – AM/PM peak hours – LOS "F"

Two (2) intersections that are projected to operate at a LOS "D" or "E" in the Opening Day (2010) No Project scenario are projected to show an increase in level of service and associated stopped delay in the Opening Day (2010) Project scenario. These two (2) intersections are:

- Avenue 18 ½ at SR 99 SB ramps/Road 23
  - NB Approach – PM peak hour – LOS "E" to LOS "F"
  - SB Approach – PM peak hour – LOS "D" to LOS "E"
- Avenue 12/Golden State Boulevard at SR 99 SB ramps
  - WB Approach – AM peak hour – LOS "E" to LOS "F"
  - WB Approach – PM peak hour – LOS "D" to LOS "E"

The remaining intersections by time period are projected to operate at acceptable levels of service with or without the Alternative C, Alternate Land Use Alternative, in the Opening Day (2010) scenarios.

As shown in Table 97, all intersections projected to operate below acceptable levels of service in the Opening Day (2010) No Project and Opening Day (2010) Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated Opening Day (2010) Project, Alternative C, scenario.

Comparison of 2030 No Project, 2030 Project, and Mitigated 2030 Project Scenarios

County Segments

County segments exceeding the appropriate level of service standard are shown in bold print in Table 98. As can be seen in Table 98, one (1) County segment is projected to operate at a LOS "F" in the 2030 No Project scenario is projected to continue to operate at a LOS "F" in the 2030 Project scenario. This one (1) segment is:

- Avenue 17 – Road 23 to SR 99 – AM/PM peak hours – LOS "F"

One (1) County segment is projected to operate at a LOS "D" in the 2030 No Project scenario and is projected to operate at a LOS "E" in the 2030 Project scenario. This one (1) segment is:

- Road 23 – Avenue 18 1/2 to Avenue 17 – PM peak hours – LOS "D" to LOS "E"

Because the mitigations identified in the 2010 Project scenario were used in the 2030 Project scenario, level of service and measures of effectiveness comparisons of some county segments between the 2030 No Project scenario and the 2030 Project scenario could not be made due to additional lanes. The County segment analyzed with a different number of lanes in the 2030 No Project and 2030 Project scenarios is:

- Avenue 17 – SR 99 to Road 27

This County segment is projected to operate at a LOS "E/F" in the 2030 No Project scenario AM/PM peak hour respectively, and is projected to operate at a LOS "A/E" in the 2030 Project scenario AM/PM peak hour respectively.

The remaining County segments are projected to operate at acceptable levels of service with or without the Alternative C, Alternate Land Use Alternative, in the 2030 scenarios.

As shown in Table 98, all County segments projected to operate below acceptable levels of service in the 2030 No Project and 2030 Project scenarios are projected to operate at or above the acceptable levels of service in the Mitigated 2030 Project, Alternative C, scenario.

Freeway Segments

Freeway segments exceeding the appropriate level of service standard are shown in bold print in Table 98. As can be seen in Table 98, six (6) freeway segments that are projected to operate at a LOS "D", "E" or "F" in the 2030 No Project scenario are projected to continue to operate at a LOS "D", "E" or "F" in the 2030 Project scenario but are projected to show an increased density. These six (6) freeway segments are:

- SR 99 north of Avenue 18 ½
  - NB – AM/PM peak hour – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 between Avenue 18 ½ and Avenue 17
  - NB – AM/PM peak hours – LOS "D"
  - SB – PM peak hour – LOS "E"
- SR 99 south of Avenue 17
  - NB – AM peak hour – LOS "E"
  - NB – PM peak hour – LOS "F"
  - SB – AM peak hour – LOS "D"
  - SB – PM peak hour – LOS "F"

The remaining freeway segments by time period are projected to operate at acceptable levels of service with or without the Alternative C, Alternate Land Use Alternative, in the 2030 scenarios.

As shown in Table 98, two (2) freeway segments are projected to operate below acceptable levels of service in the Mitigated 2030 Project scenario. The NB and SB SR 99 south of Avenue 17 freeway segments are projected to operate at LOS "E/F" in the PM peak hour. Per discussions with Caltrans staff, SR 99 is only programmed for eight (8) lanes for this segment. However with the proposed Alternative C mitigations, these two (2) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (freeway density). Therefore these two (2) locations should be viewed as mitigated as appropriate by the Project. All remaining freeway segments are projected to operate at or above the adopted level of service threshold in the Mitigated 2030 Project, Alternative C, scenario.

Intersections

Intersections exceeding the appropriate level of service standard are shown in bold print in Table 98. As can be seen in Table 98 implementation of the Project is projected to cause one (1) new intersection operational failure when compared to the 2030 No Project scenario. The one (1) intersection is:

- Avenue 15 ½ at Road 23 – WB Approach – PM peak hour – LOS "D" to LOS "E"

Five (5) intersections that are projected to operate at a LOS "D", "E", or "F" in the 2030 No Project scenario are projected to continue to operate at a LOS "D", "E", or "F" in the 2030 Project scenario but are projected to show an increased intersection stopped delay. These five (5) intersections are:

- Avenue 16/Ellis Overcrossing at Aviation Drive – AM/PM peak hours – LOS "F"
- Avenue 12 at SR 99 NB ramps – PM peak hour – LOS "E"
- SR 145/Madera Avenue at SR 99 NB ramps
    - AM peak hour – LOS "D"
    - PM peak hour – LOS "F"
- Avenue 18 ½ at Pistachio Drive – PM peak hour – LOS "F"
- Avenue 18 ½ at Golden State Boulevard/Road 23
    - NB Approach – PM peak hour – LOS "F"
    - SB Approach – AM/PM peak hours – LOS "F"

Because the mitigations identified in the 2010 Project scenario were used in the 2030 Project scenario, level of service and measures of effectiveness comparisons of some intersections between the 2030 No Project scenario and the 2030 Project scenario could not be made due to either signalization or reconfiguring of the intersections. Intersections analyzed with different lane configurations and intersection control in the 2030 No Project and 2030 Project scenarios are as follows:

- Avenue 18 ½ at SR 99 NB ramps
- Avenue 18 ½ at SR 99 SB ramps
- Avenue 17 at SR 99 NB ramps
- Avenue 17 at SR 99 SB ramps
- Avenue 17 at Golden State Boulevard
- Avenue 17 at Road 23
- Avenue 12/Golden State Boulevard at SR 99 SB ramps

Four (4) intersections are projected to operate at a LOS "F" in the 2030 No Project scenario and are projected to continue to operate at a LOS "F" in the 2030 Project scenario but are projected to show a decreased intersection stopped delay. These four (4) intersections are:

- Cleveland Avenue/Avenue 15 ½ at SR 99 NB ramps – PM peak hour – LO S"F"
- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 – PM peak hour – LOS "F
- Avenue 12 at Golden State Boulevard – PM peak hour – LOS "F"
- Cleveland Avenue/Avenue 15 ½ at SR 99 SB ramps – PM peak hour – LOS "F"

Because of changing traffic conditions and optimization of coordinated signals, some intersections are projected to show a decrease in delay from the 2030 No Project scenario to the 2030 Project scenario. One (1) intersection that is projected to operate at a LOS "D", "E", or "F" in the 2030 No Project scenario is projected to continue to operate at a LOS "D", "E", or "F" in the 2030 Project scenario but is projected to show a decreased intersection stopped delay. This intersection is:

- Avenue 12 at Golden State Boulevard – AM peak hour – LOS "F" to LOS "E"

Two (2) intersections that are projected to operate at a LOS "E" or "F" in the 2030 No Project scenario are projected to operate at an acceptable level of service in the 2030 Project scenario. These two (2) locations are:

- Olive Avenue/Avenue 14/SR 99 SB on-ramp at SR 145 - AM peak hour – LOS "E" to LOS "C"
- Olive Avenue/Avenue 14 at SR 99 SB off-ramp – PM peak hour – LOS "F" to LOS "C"

The remaining intersections by time period are projected to operate at acceptable levels of service with or without the Alternative C, Alternative Land Use Alternative, in the 2030 scenarios.

As shown in Table 98, two (2) intersections are projected to operate below acceptable levels of service in the Mitigated 2030 Project scenario. The Avenue 17 at SR 99 NB ramps intersection and the Avenue 17 at Golden State Boulevard intersection are both is projected to operate at a LOS "F" in the PM peak hour. Per the Avenue 17 PSR, Avenue 17 will be widened to a maximum of six (6) through lanes between the ramps and seven (7) through lanes between the SB ramps and Golden State Boulevard. This maximum six (6) to seven (7) lane cross-section is consistent with prior discussions with Caltrans staff, which said that widening Avenue 17 to eight (8) lanes is not recommended. However with the proposed Alternative C mitigations, these two (2) locations in the 2030 Project scenario are projected to operate above the 2030 No Project measures of effectiveness (intersection delay). Therefore these two (2) locations should be viewed as mitigated as appropriate by the Project. All remaining intersections are projected to operate at or above the adopted level of service thresholds in the Mitigated 2030 Project, Alternative C, scenario.

Alternative D (North Fork Site)

In the Opening Day (2010) scenarios, all intersections are projected to operate at acceptable levels of service with or without the Alternative D, Off-Site Alternative. Table 99 compares the Alternative D, Off-Site Alternative, 2030 No Project, 2030 Project, and Mitigated 2030 Project level of service results for intersections projected to operate below the adopted level of service standards, respectively.

Comparison of 2030 No Project, 2030 Project, and Mitigated 2030 Project Scenarios

Intersection movements exceeding the appropriate level of service standard are shown in bold print in Table 99. One (1) intersection is projected to operate below the appropriate level of service standard in the 2030 No Project scenario and is projected to continue to fail in the 2030 Project scenario but is projected to show an increased intersection stopped delay. This intersection is:

- SR 145 at SR 41 – PM peak hour – LOS "D"

The SR 41 at Road 420 (Thornberry) intersection, WB approach, in the PM peak hour is projected to operate at a LOS "D" with or without the Project but with no increase or decrease in the intersection stopped delay.

The remaining intersections by time period are projected to operate at acceptable levels of service with or without the Alternative D, Off-Site Alternative, in the 2030 scenarios.

As shown in Table 99, all intersections are projected to operate at or above acceptable levels of service in the Mitigated 2030 Project, Alternative D, scenario.

TABLE 99:
COMPARISON OF 2030 NO PROJECT, 2030 PROJECT, AND MITIGATED 2030 PROJECT LEVELS OF SERVICE
NORTH FORK SITE (ALTERNATIVE D, OFF-SITE ALTERNATIVE)

	AM Peak Hour						PM Peak Hour					
	LOS			Delay (sec)			LOS			Delay (sec)		
Intersection	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**	**No Project**	**Project**	**Mitigated Project**
SR 145 at SR 41	C	C	C	39.6	29.6	20.7	**D**	**D**	C	**40.6**	**40.7**	30.1
SR 41 at Road 420 (Thornberry Rd)			A			6.1			A			6.5
• SB Left	A	A		9.7	9.7		B	B		10.2	10.2	
• **WB Approach**	C	C		20.2	20.2		**D**	**D**		**27.5**	**27.5**	

SR = State Route [1] *Delay per vehicle* *secs = seconds* *SB = southbound* *WB = westbound*
--- = exceeds software parameters *Bolded Text = intersection/movement operates below the appropriate level of service standard*

B. MITIGATION PHASING PLAN

To Be Determined

C. IMPLEMENTATION RESPONSIBILITIES

To Be Determined

D. COST ESTIMATES AND FINANCING PLAN FOR MITIGATION MEASURES

Cost Estimates

Table 100 shows the estimated costs for the improvements recommended in this TIS.

TABLE 100:
OPINION OF PROBABLE CONSTRUCTION COSTS FOR RECOMMENDED IMPROVEMENTS

	Cost Estimates ($)	
	2010 Project	**2030 Project**
Madera Site (*Alternatives A, B, & C*)[1]		
County Segments		
Avenue 17 – Road 23 to SR 99	**---**	**$9,342,000**
Avenue 17 – SR 99 to Road 27	**$12,153,000**	
Freeway Segments		
SR 99 north of Avenue 18 ½	**$1,646,000**	**$3,117,000**
SR 99 between Ave 18 ½ and Ave 17	**$9,311,000**	**$9,308,000**
SR 99 south of Avenue 17	**$3,097,000**	**$3,096,000**
Intersections		
Avenue 18 ½ at SR 99 SB ramps/Road 23	**$235,000**	**$1,107,000**
Avenue 18 ½ at SR 99 NB ramps	**$235,000**	**$11,904,000**
Avenue 18 ½ at Golden State/Road 23	**---**	**$3,916,000**
Avenue 17 at SR 99 SB ramps	**$235,000**	**$802,000**
Avenue 17 at SR 99 NB ramps	**$1,877,000**	**$2,099,000**
Ave 12/Golden State at SR 99 SB ramps	**$586,000**	**$1,734,000**
Avenue 12 at Golden State Blvd	**$356,000**	**$442,000**
Avenue 12 at SR 99 NB ramps	**$343,000**	**$17,031,000**
Avenue 18 at Road 23		**$235,000**
Avenue 17 at Road 23	**$235,000**	**$994,000**
Avenue 17 at Golden State Boulevard	**$811,000**	**$698,000**
Avenue 15 ½ at Road 23	**---**	**$235,000**
Avenue 14 at Road 23	**---**	**$651,000**
Ellis St/Ave 16 at Golden State Boulevard	**---**	**$822,000**
Cleveland/Ave 15 ½ at SR 99 NB ramps	**---**	**$5,736,000**
Cleveland/Ave 15 ½ at SR 99 SB ramps	**---**	**$2,744,000**
SR 145/Madera Ave at SR 99 NB ramps	**---**	**$2,788,000**
Olive/Avenue 14 at SR 99 SB off-ramp	**$435,000**	**$200,000**
Olive/Ave 14/SR 99 SB on-ramp at SR 145	**$2,933,000**	**$6,654,000**
Subtotal Construction Cost	***$34,488,000***	***$85,655,000***

TABLE 100:
OPINION OF PROBABLE CONSTRUCTION COSTS FOR RECOMMENDED IMPROVEMENTS

	Cost Estimates ($)	
	2010 Project	**2030 Project**
Traffic Control/Construc. Staging (15%)	**$5,173,000**	**$12,847,000**
Miscellaneous (3%)	**$1,035,000**	**$2,569,000**
Contingencies (35%)	**$12,070,000**	**$29,977,000**
Construction Engineering (5%)	**$1,724,000**	**$4,282,000**
Plans, Spec's, and Engineering (10%)	**$3,449,000**	**$8,565,000**
Project Study Report (PSR)	**$1,250,000**	**$1,750,000**
Environmental Impact Report (EIR)	**$1,500,000**	**$2,250,000**
Total Cost	$60,689,000	$147,895,000
Madera Site (*applies to Alternative C only*)		
County Segment		
Road 23 - Avenue 18 ½ to Ave 17		**$3,163,000**
Traffic Control/Construc. Staging (15%)		**$475,000**
Miscellaneous (3%)		**$95,000**
Contingencies (35%)		**$1,107,000**
Construction Engineering (5%)		**$158,000**
Plans, Spec's, and Engineering (10%)		**$316,000**
Project Study Report (PSR)		**---**
Environmental Impact Report (EIR)		**$250,000**
Total Cost	$ -0 -	$5,564,000
North Fork Site (*applies to Alternative D only*)		
Intersection		
SR 41 at Road 420 (Thornberry Road)	**---**	**$235,000**
Subtotal Construction Cost	**---**	***$235,000***
Traffic Control/Construc. Staging (15%)	**---**	**$35,000**
Miscellaneous (3%)	**---**	
Contingencies (20%)	**---**	
Construction Engineering (5%)	**---**	**$12,000**
Plans, Spec's, and Engineering (10%)	**---**	**$24,000**
Total Construction Cost	**---**	
Project Study Report (PSR)	**---**	**---**
Environmental Impact Report (EIR)	**---**	**---**
Total Cost	$ -0 -	$306,000

SR = State Route *1 = Improvement costs are the same for Alternatives A, B, and C*

Financing Plan

To Be Determined