El Capitan Golf Course

Final Environmental Impact Report

Technical Appendices

PREPARED FOR:
Helix Water District
7811 University Avenue
La Mesa, CA 91941

Attn: Mr. Larry Campbell

PREPARED BY:
EnviroMINE
3511 Camino Del Rio South, #403
San Diego, CA 92108

NOTICE OF PREPARATION

TO: Attach Label

FROM: Helix Water District
P.O. Box 518
La Mesa, CA 91944

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report

The Helix Water District will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The Project Description, location, and the probable environmental effects are contained in the attached materials. A copy of the Initial Study is attached.

Your response must be sent at the earliest possible date, but not later than 30 days after receipt of this notice.

Please send your response to: Larry Campbell, Right-of-Way Agent, at the address shown above. We will need the name for a contact person in your agency.

PROJECT TITLE: El Monte Golf Course, W.O. 2505

PROJECT LOCATION:

The project site is located in southwestern San Diego County near the community of Lakeside. The project site is aligned along the San Diego River valley and generally follows El Monte Road for a distance of approximately 2 miles, extending across the river valley. The proposed golf course facility would begin approximately one-half mile east of the intersection of Lake Jennings Park Road and El Monte Road.

PROJECT DESCRIPTION:

The project is a proposal to construct two 36-hole golf courses, driving range, club house, and maintenance facilities on an approximate 500-acre site. Construction and operation of the facility would require the construction of access roads, including a two-lane bridge crossing over the San Diego River channel. A number of portable cart bridges would also be required.

PROJECT APPLICANT: El Monte Golf, LLC

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY HAZARDOUS WASTE LIST

N/A

Date: August 19, 1996

Signature: Michael R. Bren

Title: Head of Engineering Services

Telephone: 619-667-6240

Consulting firm retained to prepare draft EIR:

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Address: 3511 Camino Del Rio South, Suite 403
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U.S. Army Corps of Engineers

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Department of Fish & Game
Caltrans, District 11
State Water Resources Control Board,
Division of Clean Water Programs
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City of San Diego, Water Production Division
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Lakeside Community Planning Group
Pacific Bell
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[ ] OTHER ________________

[ ] OTHER ________________

ENVIRONMENTAL CHECKLIST FORM
(To be completed by Lead Agency)

1. **Project Title:** El Monte Golf Course, W.O. 2505

2. **Lead Agency Name and Address:** Helix Water District
P.O. Box 518
La Mesa, CA 91944-0518

3. **Contact Person and Phone Number:** Larry Campbell
(619) 466-0585

4. **Date Checklist Submitted:**

5. **Project Location:** The project is located within the El Monte Valley, San Diego County, Lakeside, California. The project extends along the San Diego River for a distance of approximately two miles between Willow Road on the north, and El Monte Road on the south. Access to the project is proposed from El Monte Road connecting with Lake Jennings Park road approximately 2 miles west of the site (See Figures 1 & 2).

6. **Project Description:** The project is a proposal for 50-year lease of approximately 500 acres of lands owned by Helix Water District followed by construction of two 18-hole golf courses, driving range, and associated facilities. The proposal also includes the construction of an 8,000 square-foot club house facility, 15,000 square foot patio area, parking for 300 vehicles, shop and maintenance facility. Access to the club house will require the construction of an access road connecting to El Monte Road with a bridge crossing the San Diego River. As a final element of the project proposal, five portable cart bridges for river crossings at various areas along the golf course would be provided. With exception of the bridge crossings, no disturbance of the San Diego River Floodway and associated riparian habitat is proposed.

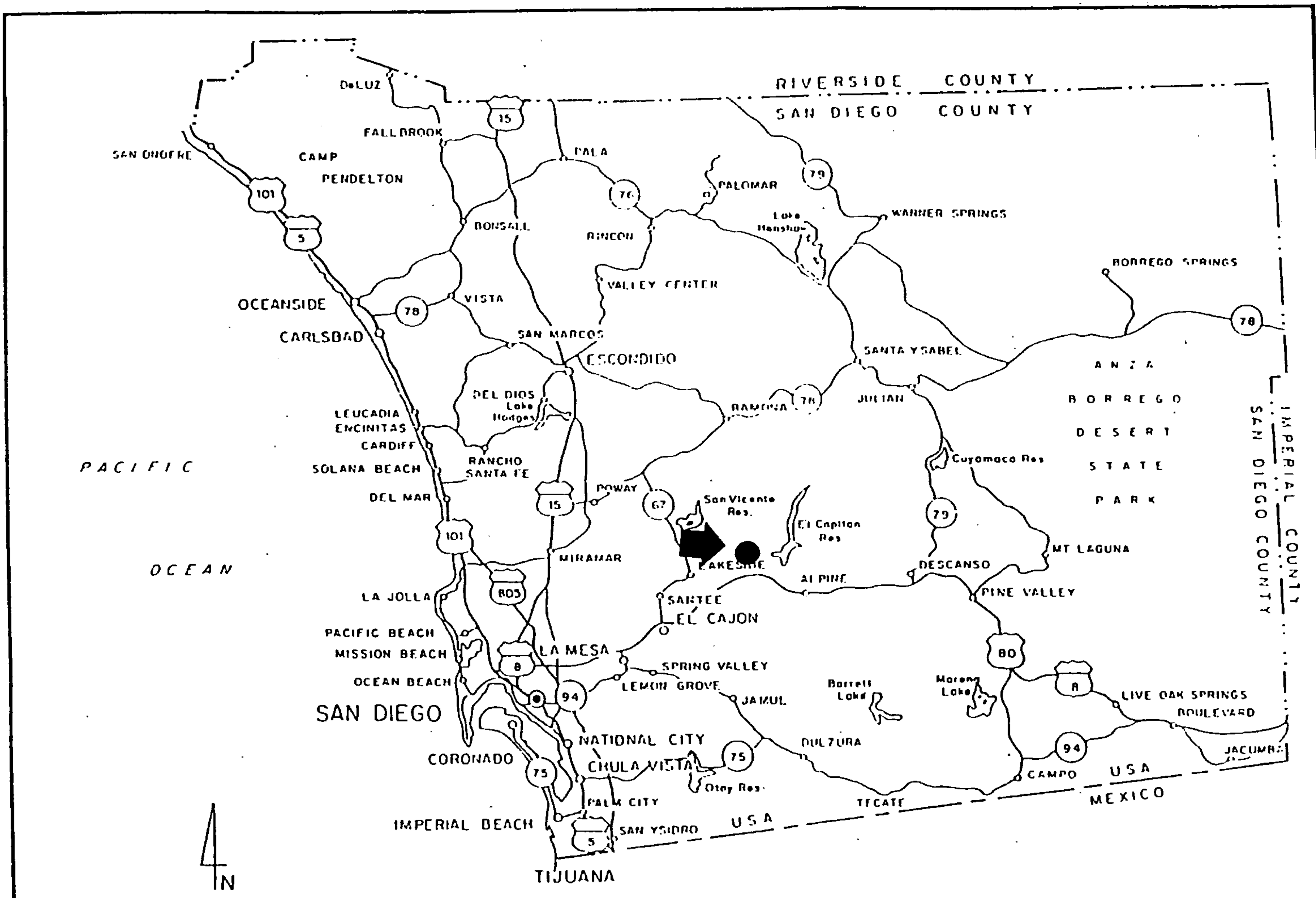
   Grading requirements to construct the project are estimated at 140,000 cubic yards of balanced cut and fill. Four separate water impoundments are proposed at various areas within the golf courses. Vegetation will be watered through the use of groundwater pumped from individual wells located near the central portion of the property. Water wells necessary for water supply purposes would be drilled as part of the project proposal. Irrigation water requirements are estimated at 1,100 to 1,300 acre-feet per year.

   It is estimated that public use of the golf facility will average 1,200 individual automobile trips per day.

7. **Surrounding Land Uses and Setting:** The proposed project is set within the El Monte Valley approximately 2 miles east of Lakeside. Land use in the project vicinity is characterized by rural residential, agricultural, recreation, and open space uses.

   Agricultural uses predominate the project site and surrounding lands. Taiwan Farms leases much of the lands within the valley and is a producer of specialty vegetables for oriental cooking. Other agricultural crops grown on the property include peas, grain crops, and tomatoes. Another important agricultural use which borders the site includes the Van Ommering's Dairy. The dairy is located immediately adjacent to the site on the northeast. As currently planned, the golf course would not impact use of the dairy. Residential uses include scattered rural residential development on large lots. These residential uses are primarily associated with agricultural holdings.

El Monte Golf Course

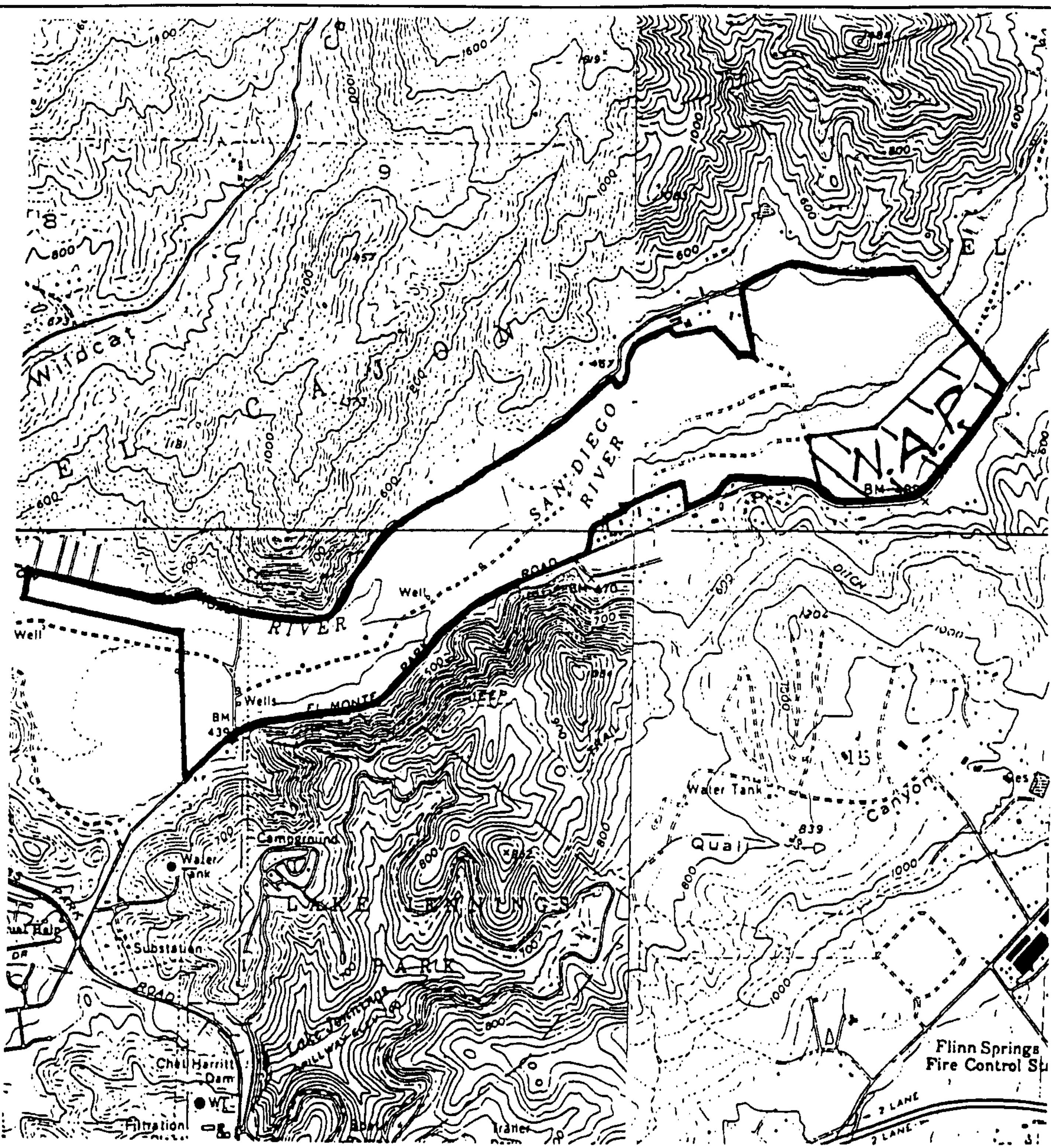


EnviroMINE

Regional Location Map

Figure 1

El Monte Golf Course



SCALE 1:24 000

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NATIONAL GEODETIC VERTICAL DATUM OF 1929

EnviroMINE | Project Location Map | Figure 2

Agricultural and extractive uses have played a major role in modifying the natural vegetation of the project site. Agricultural uses have resulted in the continuous disturbance of the gently sloping lands adjacent to the San Diego River floodway. As such, only minor occurrences of native vegetation are located within areas which would likely be disturbed by the project proposal. Extraction of aggregate resources between 1972 and the early 1980s has resulted in the development of a pronounced floodway. This flood channel will convey all but the largest flood flows through the project site. Vegetation currently found on the project site includes Riparian Scrub (Southern Willow Scrub, Tamarisk Scrub, and Mule Fat Scrub) within the active floodway, Fallow Agricultural Vegetation on upland agricultural lands, and Relict Floodplain Vegetation in isolated pockets outside of the active floodway.

Recreational uses are an important element of the project setting. El Monte County Park is located approximately two miles east of the proposed golf facility. This popular park is host to many company picnics, and other group gatherings. Facilities include parking, play grounds, athletic fields, dance and group activity facilities. Farther to the east approximately three miles is the El Monte Reservoir. El Monte Reservoir is a popular location for boating and fishing. El Monte Road is also a popular Bike Route.

Open space includes the San Diego River riparian zone and steep terrain surrounding the El Monte Valley. El Capitan Mountain, a prominent mountain known for its massive, nearly vertical, granite rock exposure, bounds the valley on the north. Other sloping areas surrounding the valley are largely undeveloped and exhibit an uncluttered appearance.

The San Diego County General Plan designates the project site as (24) Impact Sensitive with a (25) Extractive Overlay. The Impact Sensitive designation is typically applied to areas considered unsuitable for urban development for reasons of public safety or environmental sensitivity. Large-lot residential parcels, agricultural pursuits, limited recreational uses, mineral extraction, or greenbelts connecting permanent open space areas may be compatible with this designation.

The Extractive overlay designation is applied only to areas containing economically or potentially economically extractable mineral resources. This designation promotes extraction as the principal and dominant use, but allows other uses where they would not preclude the future extraction of the mineral resources.

Zoning for the property is S-82 Extractive over approximately 420 acres of the site and A-70 General Agriculture over the remainder.

8. Other Public agencies whose approval is required:

County of San Diego: Major Use Permit
California Department of Fish & Game, Streambed Alteration Agreement.
U.S. Army Corps of Engineers, Nationwide Section 404 Permit.

EVALUATION OF ENVIRONMENTAL IMPACTS

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parenthesis following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved. A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards.

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect is significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, and EIR is required.

4) "Potentially Significant Unless Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The lead agency must describe the mitigation measure, and briefly explain how they reduce the effect to a less than significant level.

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063 (c) (3) (D). Earlier analyses are discussed in Section XVII at the end of the checklist.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts. References to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The following factors checked below would be potentially affected by this project, involving at least one impact that is "Potentially Significant Impact" as indicated by the checklist on the following pages.

✔	Land Use and Planning	✔	Hazards
N/A	Population and Housing	N/A	Noise
N/A	Geological Problems	✔	Mandatory Findings of Significance
✔	Water	N/A	Public Services
N/A	Air Quality	N/A	Utilities & Service Systems
✔	Transportation/Circulation	✔	Aesthetics
✔	Biological Resources	✔	Cultural Resources
✔	Energy & Mineral Resources	✔	Recreation

II. POPULATION & HOUSING.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cumulatively exceed official regional or local population projections?	___	___	___	✔
b) Induce substantial growth in an area either directly or indirectly?	___	___	___	✔
c) Displace existing housing?	___	___	✔	___

Explanation: The project is a proposal to construct a 36-hole golfing complex complete with club house, driving range, and maintenance facilities. Residential development is not part of this proposal. However, the project will provide the existing population with needed recreational and employment opportunities. No direct or indirect population growth would be expected as no housing is proposed and employment opportunities would be limited. However, golfing projects are known to increase area property value and therefore could induce growth in the immediate vicinity. However, any growth which could result from the development of the golfing facility would be required to respect development policies and zoning established for the project vicinity.

The project will result in the removal of three residential dwellings which support existing agricultural uses. No replacement of these dwellings is necessary to support the project. Adequate housing stock is available within the nearby community.

III. GEOLOGICAL PROBLEMS.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Fault rupture?	___	___	___	✔
b) Seismic ground shaking?	___	___	___	✔
c) Seismic ground failure?	___	___	___	✔
d) Seiche, tsunami, or volcanic hazard?	___	___	___	✔
e) Landslides or mudflows?	___	___	___	✔
f) Erosion, changes in topography or unstable soil conditions from excavation, grading, or fill?	___	___	___	✔
g) Subsidence of the land?	___	___	___	✔
h) Expansive soils?	___	___	___	✔
i) Unique geologic or physical features?	___	___	___	✔

Explanation: The project site lies within the Foothills Physiographic province of San Diego County. This is a transitional area between the mountainous areas to the east and the coastal plain. The geologic setting is dominated by the granitic rocks of the Southern California Batholith. This formation is expressed in rock outcroppings and low hills that become more prominent to the east. The San Diego River cuts through the foothills in this area as it descends toward the Pacific Ocean. In this stretch of the river, the channel gradient has been reduced resulting in the deposition of sand sized particles across the historic flood plain. This process has resulted in the formation of a broad, nearly level, alluvial plain overlying the granitic basement rocks.

The El Monte Golf Course is proposed within an area of relative seismic safety. No faults are known to traverse the project site. The Rose Canyon Fault zone is located approximately 18 miles west of the site. Although this fault zone is currently classified as potentially active, recent earthquake activity along faults in the southern extension of the Rose Canyon Fault zone indicates that this zone could be reclassified as active. Other active fault zones in the region that could possibly affect the project site include; the Coronado Banks and San Clemente Fault zones to the west, the Elsinore and San Jacinto Fault zones to the northeast, and the Agua Blance and San Miguel Fault zones to the south.

The most likely geologic hazard to affect the site is ground shaking as a result of movement along one of the major active fault zones mentioned above. The following table shows the relative distance of active fault zones from the project site along with the expected maximum probable earthquake.

Fault Zone	Distance	Maximum Probable Earthquake
Rose Canyon	18 miles	6.5 magnitude
Elsinore	25 miles	7.3 magnitude
Coronado Banks	29 miles	6.5 magnitude
San Jacinto	49 miles	7.8 magnitude
San Clemente	57 miles	7.3 magnitude

Major seismic events are likely to be the result of movement along the Elsinore or San Jacinto Fault zone. Recently there have been several earthquakes of magnitude as high as 4.0 on the Rose Canyon Fault zone and earthquakes of this magnitude or less are common along the Coronado Banks fault zone.

The City of San Diego Water Utilities Department operates and maintains the El Capitan Reservoir and dam. This dam is monitored regularly by the City and California Department of Safety of Dams. In addition, seismic safety studies have been performed to determine the structures stability against the maximum expected seismic event. This study found the dam to be safe for maximum water storage capabilities.

The U. S. Department of Agriculture Soil Conservation Service, San Diego County Soil Survey (Bowman, 1973) identifies that the Tujunga Sand and Visalia sandy loam soil series are represented on the project site. In addition, areas within the San Diego River floodway are distinguished as Riverwash.

Tujunga Sand is a recently formed soil derived from granitic alluvium found on alluvial fans and flood plains with slopes of less than 5 percent. Tujunga Sand exhibits a poorly differentiated horizonation, are low in fertility, and are highly permeable. Typical uses for Tujunga Sands is for avocados, flowers, and truck crops. Other uses common to this soils would include rangelands and golf courses.

The Visalia series consists of moderately well drained, very deep sandy loams derived from granitic alluvium. These soils are on alluvial fans and flood plains and have slopes of 0 to 15 percent. Visalia series may be used for a variety of agricultural uses.

Due to the high permeability of these soils, the erosion hazard is slight. The proposed improvements would result in short term disturbance of the site for grading to build the golfing facilities, however, no significant increases in surface runoff and/or soil erosion should be expected due to the non-intensive nature of the improvements and low soil erosion hazard endemic to the soils.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. WATER.				
a) Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	___	___	✔	___
b) Exposure of people or property to water related hazards such as flooding?	✔	___	___	___
c) Discharge into surface water or other alteration of surface water quality?	✔	___	___	___
d) Changes in the amount of surface water in any water body?	___	___	✔	___
e) Changes in currents, of the course or direction of water movements?	✔	___	___	___
f) Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations or through substantial loss of groundwater recharge capability?	✔	___	___	___
g) Altered direction or rate of flow of groundwater?	___	___	___	✔
h) Impacts to groundwater quality?	✔	___	___	___
i) Substantial reduction in the amount of groundwater otherwise available for public water supplies?	✔	___	___	___

Explanation: The historic floodplain of the San Diego River occupied a wide area within the El Monte Valley. Mineral extraction within the channel has resulted in the development of a broad floodway which would contain all but the largest runoff events. In addition to these channel modifications, the San Diego River is controlled by El Capitan Reservoir approximately three mile east of the proposed project. As a result of these influences, the San Diego River no longer floods the entire valley during periods of high runoff.

The project should be evaluated to determine if changes in the existing drainage pattern of the affected properties would be altered such that off site areas would be negatively impacted by increased surface water flow impacts. This will require the completion of surface hydrology studies to identify existing conditions and determine mitigation measures to eliminate the potential for changes which could negatively impact the dynamics of the floodway.

Golf Course operations will result in irrigation and fertilizing of landscaping and lawn areas. These activities could result in discharges of nutrient laden surface waters into the San Diego River and subsurface water table. Studies should be completed to determine the potential for the project to significantly impact the quantity and quality of surface water flows within the San Diego River.

The project would not be expected to result in significant increases in surface runoff during precipitation events. Only a small area of the site will be developed such that water infiltration would be affected. These areas would include the parking lot, maintenance facilities and club house. All other areas would be maintained as lawns or landscaping. The high permeability of the native topsoils will result in the rapid absorption of precipitation and runoff waters.

Impacts to groundwater could be realized if excessive pumping for irrigation purposes should occur or if excessive fertilizers used in landscape/lawn maintenance were to infiltrate into the water table. Where ever possible, existing data should be used to determine the potential for the project to result in a significant reduction of water availability in the project vicinity. If problems are identified, mitigation measures should be developed to reduce the potential for significant impacts. Existing ground water quality data along with the Helix Water District's water monitoring program should be described. As necessary, management parameters should be developed to insure maintenance of existing groundwater quality characteristics.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
V. AIR QUALITY.				
a) Violate any air quality standard or contribute to an existing or projected air quality violation?	___	___	___	✔
b) Expose sensitive receptors to pollutants?	___	___	___	✔
c) Alter air movement, moisture, or temperature, or cause any change in climate?	___	___	___	✔
d) Create objectionable odors?	___	___	___	✔

Explanation:

a) The project is a proposal to build and operate a 36-hole golf course and associated facilities. During construction operations, fugitive dust emissions should be expected. However, these activities are controlled by adherence to the County Grading Ordinance and their short term nature. The project will result in an increase in vehicular traffic (max 1,200 ADT) which will result in increased vehicle emissions. Emissions factors were calculated to determine if significant increases could be expected by implementation of this project. These calculations assumed that 25% of total vehicle trips originated within 7 miles of the site, 60% originated within 15 miles of the site, with the remaining 15% originating within 20 miles of the site. The following is a listing of expected emissions increases:

	CO	TOG	ROG	NOx	Particulates Tire Ware	Particulates Exhaust
Pounds/Day	270.37	25.22	22.41	80.55	15.2	4.27

These increases would occur over a broad regional area and are not considered to be significant. Emissions from operations equipment (e.g., lawn mowers, service vehicles, etc.) are expected to be minimal.

b) Construction and/or operations of the golfing facility would not be expected to introduce significant air pollutants into the project vicinity. Operation of the facility will likely reduce overall particulate emissions through the elimination of agricultural uses on the project site.

c) No significant changes in air movements, or significant changes in climatic conditions would be expected. No barriers to air movement would result.

d) The creation of objectionable orders would not be expected. However, the location of the golfing facility directly adjacent to an operating dairy would introduce site visitors to livestock odors. This is not seen as a significant adverse impact. The dairy is an existing condition of the environmental setting.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. TRANSPORTATION/CIRCULATION.				
a) Increased vehicle trips or traffic congestion?	✔			
b) Hazards to safety from design features or incompatible uses?	✔			
c) Inadequate emergency access or access to nearby uses?			✔	
d) Insufficient parking capacity on-site or off-site?				✔
e) Hazards or barriers for pedestrians or bicyclists?	✔			
f) Conflicts with adopted policies supporting transportation?			✔	
g) Rail, waterborne, or traffic impacts?				✔

Explanation: Existing roadway conditions find El Monte Road improved to two travel lanes with a 22-foot paved surface. Existing roadway traffic is approximately 1,500 ADT along El Monte Road. However, weekend traffic increases significantly with public use of El Capitan Reservoir and El Monte County Park located east of the proposed project site. The San Diego County Public Works Dept. notes that the El Monte Road/Lake Jennings Park Road intersection currently operates at a moderate level of service (LOS B).

The project would increase roadway traffic in the project vicinity. Roadway traffic is expected to increase by approximately 1,200 Average Daily Trips (ADT), including delivery trucks, to the site. With minor exceptions, this traffic is expected to be passenger car traffic. Although existing traffic flow conditions are good, a traffic study should be completed to determine if significant impacts to public safety, and circulation would result from the project.

VII. BIOLOGICAL RESOURCES.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Endangered, threatened or rare species of their habitats?	✓			
b) Locally designated species?	✓			
c) Locally designated natural communities?	✓			
d) Wetland habitat?	✓			
e) Wildlife dispersal or migration corridors?	✓			

Explanation: Current conditions find the project site fully disturbed by agricultural use and past extractive activities within the San Diego River floodway. These conditions have resulted in the elimination of endemic natural habitats. However, riparian vegetation associated with river channels are important biological corridors. A preliminary biological investigation prepared for the site identified Riparian Scrub, Relict Floodplain Vegetation and Active and Fallow Agricultural Vegetation on the project site. No protected species were identified on the project site during the preliminary biological survey, although their occurrence is possible as habitat for these species exists (i.e., least Bell's Vireo, Southwestern Willow Flycatcher, and Arroyo Southwestern Toad). A focused survey for the least Bell's Vireo was conducted during the early summer of 1994. The target species was not identified during these surveys. In addition, Southwestern Willow Flycatcher, and the Arroyo Southwestern Toad, which are known to occupy similar habitats, were not detected during the biological surveys of the project site. Additional surveys were conducted during the spring of 1996. No listed species were detected on the project site.
Although the project does not propose disturbance to the floodway, the project would introduce an intensive recreational use adjacent to an important biological corridor. This is cause for significant biological concern. As such, biological issues should be addressed in the EIR.

VIII. ENERGY & MINERAL RESOURCES.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with adopted energy conservation plans?				✓
b) Use non-renewable resources in a wasteful and inefficient manner?				✓
c) Result in the loss of availability of known mineral resource that would be of future value to the region and the residents of the state?			✓	

Explanation:

a) The project would not be expected to utilize large quantities of energy resources. In addition no emergency conservation plans are established for the project vicinity.

b) No non-renewable resources would be utilized by the project.

c) The California Department of Mines and Geology Special Report No. 153 (CDMG, No. 153, 1983) identified the alluvial materials on the project site as Regionally Significant in its classification of Western San Diego County aggregate resources. The sand resources on the project site are relatively free of impurities and can be used as a constituent of concrete with only minimal processing. High quality sand sources, such as those on the project site, have been diminished in western San Diego County by past extraction and development, or have become unavailable due to sensitive environmental concerns. Approval of an intensive land use on the project site would limit the potential for future mineral extraction on the project site. However, the low intensity of development proposed for the project site would not preclude future mineral extraction should these activities become important.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HAZARDS.				
a) A risk of accidental explosion or release of hazardous substances?	✓			
b) Possible interference with an emergency response plan or emergency evacuation plan?				✓
c) The creation of any health hazard or potential health hazard?			✓	
d) Exposure of people to existing sources of potential health hazards?				✓
e) Increased fire hazard in areas with flammable brush, grass, or trees?				✓

Explanation:

a) Although the project is currently in the early stages of plan development, it should be assumed that daily operations would result in the use of fertilizers, pesticides, and fuel for power equipment. Storage of these materials on the project site would likely be necessary. However, storage and use of fertilizers, pesticides and fuels would be required to follow storage protocol for public facilities as required by environmental health regulations. Compliance with these regulations would eliminate the potential for significant impacts. However, the use of fertilizers, pesticides and fuels should be evaluated as a component of a groundwater quality study. If significant impacts are identified, mitigation measures should be identified to reduce impacts to below significance thresholds.

b) The project does not interfere with the emergency response plan for the Lakeside area.

c) The project area has been used continuously for agricultural production for many years. Agricultural production areas have been noted for high occurrences of San Joaquin Valley Fever (*Coccidioides immidis*). *Coccidioides immidis* is a soil pathogen which is known to occur in surficial soils with a high fraction of silt in the soil matrix. Disturbance of surficial soils can result in the dispersion of bacterial spores through the air. Where these spores come into contact with persons of low resistance, flu like symptoms can result. These symptoms can be quite severe in persons of low tolerance, and have been reported to cause death in some cases.

The San Diego County Department of Health Services maintains records to track the reported occurrences of Valley Fever by geographical area. Although 59 cases of Valley Fever were reported in 1994, no reports of Valley Fever have been reported in the Lakeside area over the past 5 years. Therefore, it is likely that the soil conditions favorable to the occurrence of *Coccidioides immidis* are not present in the project vicinity.

d) The proposed golf course project is planned adjacent to the San Diego River floodway. High volume flood flows have been known to occur on the river in periods of high precipitation. However, the 100-year magnitude flood would be contained almost entirely within the existing floodway. Because flood flows are infrequent and generally contained by the existing floodway, no significant public safety impacts would be expected.

Other public safety impacts to consider would be the location of El Capitan Reservoir up stream of the project site. Should a dam break occur, large quantities of water could flood the project site. However, the City of San Diego Water Utilities Department reports that Dam Safety Surveys are conducted annually to certify the safety of these structures against the maximum probable seismic event. As such, the potential for dam rupture is not considered to be a significant public safety concern of the project.

e) No increase in fire hazard would be expected. No structures are planned within areas of known fire hazard. Proposed development of an irrigated landscape will limit the potential for wildland fires.

X NOISE.	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Increase in existing noise levels?	___	___	✓	___
b) Exposure of people to sever noise levels?	___	___	___	✓

Explanation:

a) Existing conditions find road way traffic at approximately 1,500 ADT. This traffic level produces noise levels of 57.9 dBA at 50 feet from the center of the roadway. Project induced traffic would increase ADT to 2,700. This increase would result in a 2.3 dBA increase. Increases of less than 3 dBA are not generally perceptible. Therefore, the calculated increase of 2.3 dBA would not be noticeable. Existing plus project noise levels would be below County standards. Therefore, no significant impacts would result.

b) During construction operations, heavy equipment noise will be evident. Heavy equipment noise can be severe. However, required compliance with the County Noise Ordinance limits the duration of construction equipment operations on a daily basis. In addition, these noise sources will not persist over an extended period.

XI. PUBLIC SERVICES.	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Fire protection?			✓	
b) Police protection?			✓	
c) Schools?			✓	
d) Maintenance of public facilities, including roads?			✓	
e) Other governmental services?			✓	

Explanation: The project is a proposal to construct and operate a public golfing facility. Lease agreements call for a private contractor to develop and operate this facility. Public infrastructure would not be required to operate and maintain this facility. Increases in the need for fire and police protection should be expected, however, the increased demands on these services should not be considered significant.

XII. UTILITIES & SERVICE SYSTEMS.	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Power or natural gas?				✓
b) Communications systems?				✓
c) Local or regional water treatment or distribution facilities?				✓
d) Sewer or septic tanks?			✓	
e) Storm water drainage?			✓	
f) Solid waste disposal?			✓	
g) Local or regional water supplies?			✓	

Explanation: The project is a proposal to construct and operate a 36-hole golfing facility on an 500-acre site. Only minimal demands on utilities and service systems would be expected. Adequate capacity is available within the existing operating capabilities of these systems. Septic systems would be used for liquid waste disposal. Groundwater would be used for irrigation water supplies. Potable (domestic) water and water for fire flow will be supplied by the local water district (Padre Dam Municipal Water District).

XIII. AESTHETICS.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Affect a scenic vista or scenic highway?	✔			
b) Have a demonstrable negative aesthetic effect?			✔	
c) Create light or glare?			✔	

Explanation:

a) El Monte Valley is identified as a scenic corridor by the Lakeside Community Plan. Development of a golf course would result in the development of a green belt adjacent to the San Diego River floodway. These improvements would be continuously maintained for recreational activities proposed with use of the site. However, development of the site to golf course uses would change the character of the project vicinity from rural residential and agricultural to a manicured recreational setting. Some viewers may consider these changes to be significant adverse visual impacts. Issues relating to visual impacts should be analyzed in an EIR.

b) See comment XIII a) above.

c) If night time operations were conducted at the driving range, nuisance light and glare conditions could occur. However, these impacts would be localized to a realtively small area of the site. As such, significant light and glare impacts would not be expected.

XIV. CULTURAL RESOURCES.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Disturb paleontological resources?			✔	
b) Disturb archaeological resources?	✔			
c) Affect historical resources?	✔			
d) Have the potential to cause a physical change which would affect unique ethnic cultural values?	✔			
e) Restrict existing religious or sacred uses within the potential impact area?	✔			

Explanation: The project is a proposal to construct and operate a 36-hole golfing facility on an 500-acre site. The project site is located adjacent to a locally prominent natural resource, the San Diego River. This area is known for its prehistoric use by Native Americans. Therefore, an archaeological/historical survey should be conducted for the project site to determine the potential for significant impacts, and where necessary, identify mitigation/avoidance measures.

XV. RECREATION.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Increases the demand for neighborhood or regional parks or other recreational facilities?				✓
b) Affect existing recreational opportunities	✓			

Explanation: The project is a proposal to construct and operate a 36-hole golfing facility on an 500-acre site. The recreational nature of this project would add to the recreational opportunities available to the existing population in San Diego County. Although the project would not result in the direct need for new or additional recreational facilities, portions of the property, including the San Diego River floodway, are used for equestrian trail riding. Development of the property for golfing purposes could eliminate the use of upland areas adjacent to the San Diego River floodway for trail riding purposes. The project's potential to impact these recreational activities should be thoroughly examined to determine the potential for significant impacts to these activities. This analysis should include a thorough review of the Lakeside Community Plan policies regarding the development and maintenance of riding trails.

XVI. MANDATORY FINDINGS OF SIGNIFICANCE.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or plant or animal or eliminate important endangered examples of the major periods of California history or prehistory?	✓			
b) Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals?			✓	
c) Does the project have impacts that are individually limited, but cumulatively considerable?	✓			
d) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	✓			

Explanation: Based on a preliminary of the proposed El Monte Golf Course proposal, it has been determined that the project has the potential to result in significant adverse environmental impacts. An Environmental Impact Report shall be prepared to address the following specific issues as they relate to the project proposal:

1. Land Use
2. Surface and Ground Water
3. Transportation/Circulation
4. Biological Resources
5. Agricultural/Mineral Resources
6. Aesthetics
7. Cultural Resources
8. Recreation

The following mandatory sections should also be addressed in the EIR:

- Effects Not Found to be Significant.
- Alternatives to the Proposed Action.
- Cumulative Impacts to the Proposed Action.
- The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity.
- Any Significant Irreversible Environmental Changes Which Would Be Involved in the Proposed Action Should It Be Implemented.
- The Growth-Inducing Impact of the Proposed Action.
- Organizations and Persons Consulted.

DETERMINATION

_____ On the basis of this initial evaluation:

_____ I find the proposed project **COULD NOT** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

_____ I find that although the proposed project could have as significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described in the environmental checklist, have been added to the project. A **NEGATIVE DECLARATION** will be prepared.

__✓__ I find the proposed project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

_____ I find that the proposed project **MAY** have a significant effect(s) on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described in this checklist, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

_____ I find that although the proposed project could have a significant effect on the environment, there **WILL NOT** be a significant effect in this case because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards and (b) have been avoided or mitigated pursuant that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

______________________	______________________
Signature	**Date**
______________________	Helix Water District
Staff	**For**

El Monte Golf Course

Traffic Impact Analysis

Draft: October 1996

Revised: August 5, 1998

Prepared For:
Helix Water District

Prepared By:

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In Cooperation With:
Environmine

J98430

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Appendices

1.0 Introduction

The purpose of this report is to document the methodologies, assumptions and findings of the traffic impact study conducted for the proposed El Monte Golf Course project. Katz, Okitsu & Associates, in cooperation with Enviromine, Inc., was retained by the Helix Water District to prepare the necessary transportation/traffic engineering documents in support of an Environmental Impact Report being prepared for the project.

This report documents existing conditions in the project vicinity and evaluates future traffic impacts and operational issues that may result from the project.

Project Description

The proposed project consists of two 18-hole golf courses and a 9-hole practice course with an accompanying clubhouse. The project site is located on El Monte Road in the unincorporated area of eastern San Diego County known as the El Monte Valley. Access to the project will be taken from El Monte Road, east of Lake Jennings Park Road, and regional access will be provided from Interstate 8 and State Route 67. Figure 1 shows the project vicinity, and Figure 2 shows the project location. Figure 3 shows the project site plan.

Background

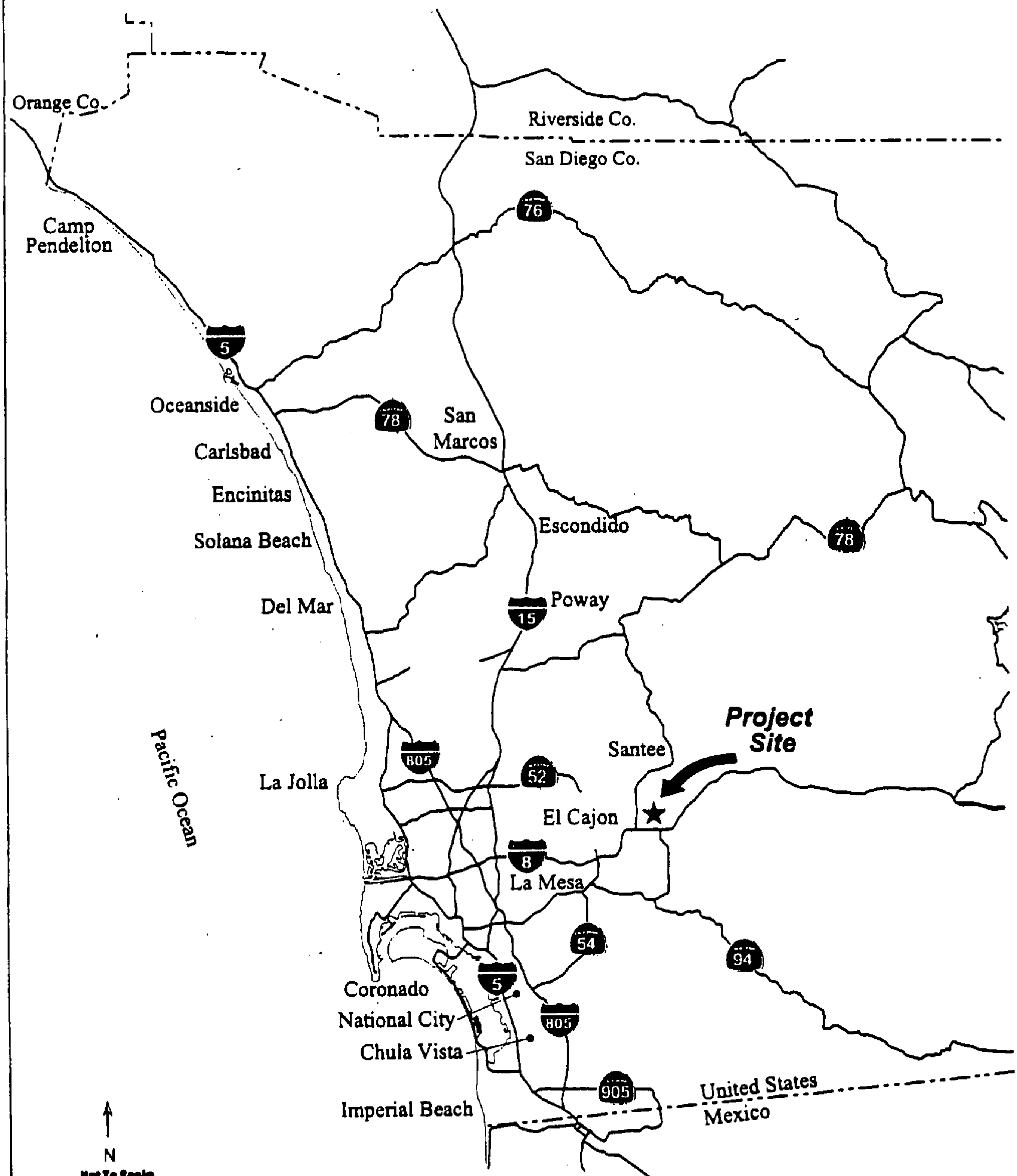
The project site is located in the jurisdiction of the County of San Diego, and the County Department of Planning and Land Use was consulted prior to the preparation of this study. Based on discussions with the County, the key issues to be addressed in this analysis are the impact of the project on the daily and peak hour operations on the nearby circulation system, especially at the interchange of Interstate 8 at Lake Jennings Park Road and at SR-67 at Mapleview Road.

Study Approach

The approach for conducting this analysis is to document existing conditions on the study area circulation network and to determine future project impacts. The following conditions are included in this analysis:

- Existing (Year 1996) Conditions
- Future (Year 1998) Conditions
- Future (Year 1998) Conditions with the Project

The analysis consists of an evaluation of daily roadway segment operations and peak hour intersection operations during morning and evening peak hours.



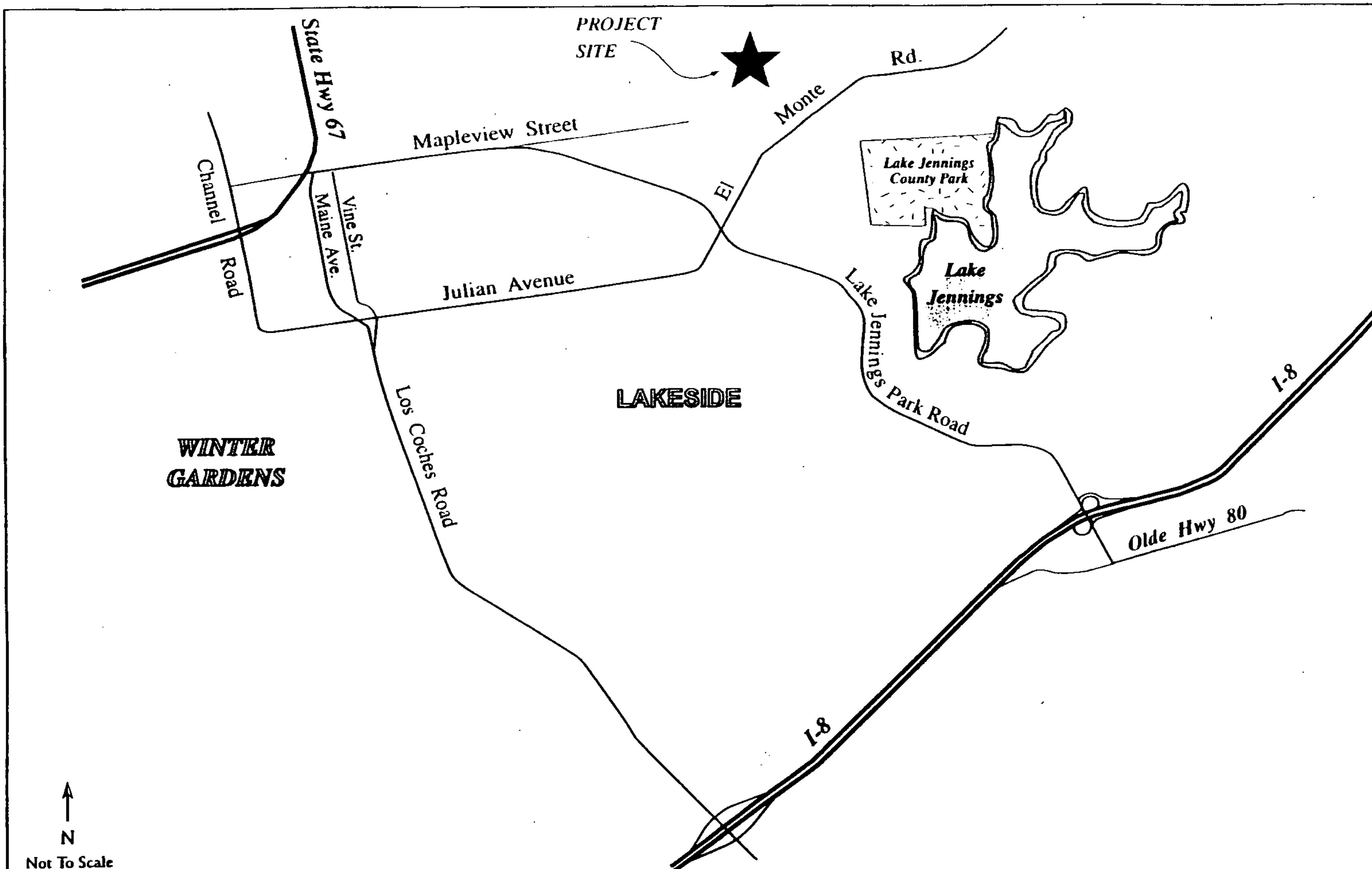
Last Revised: August 5, 1998.

Figure 1

Study Area

Katz, Okitsu & Associates
Traffic Engineers and Transportation Planners

El MonteGolf Course
Traffic Impact Study



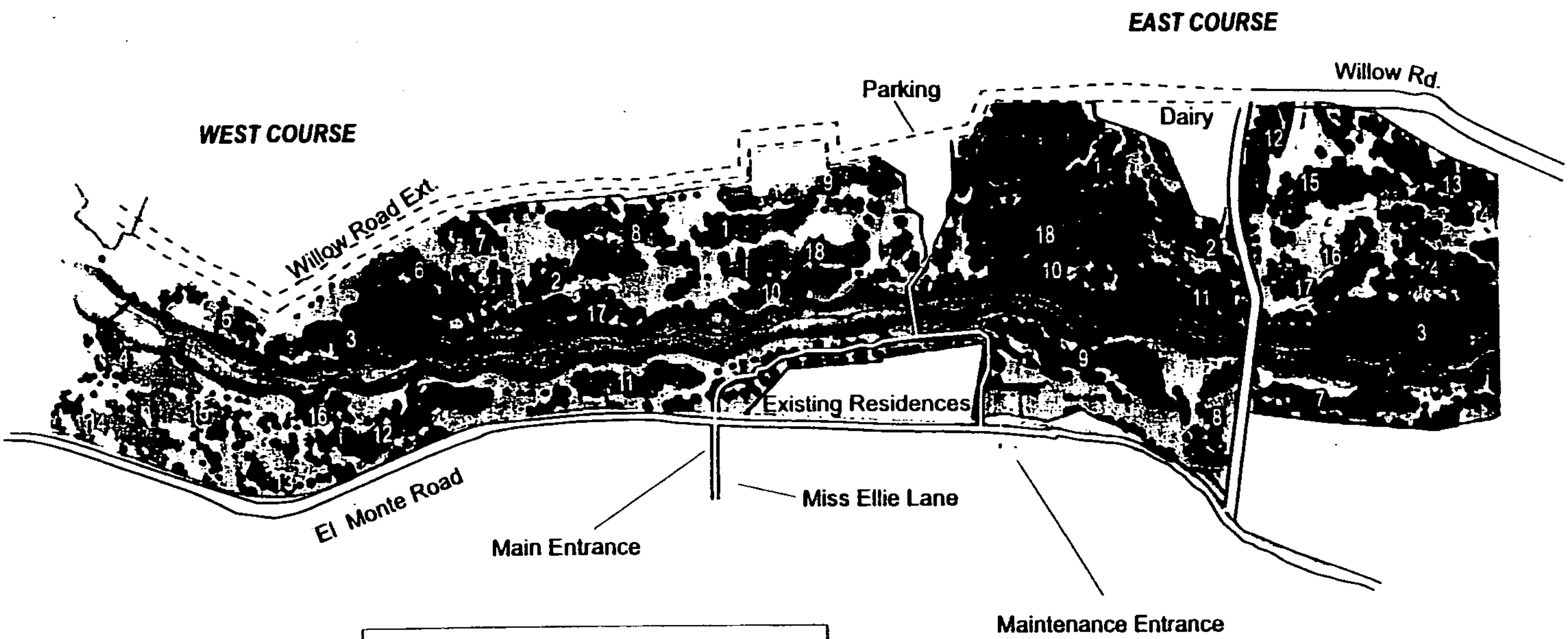
Last Revised: April 15, 1998.

Figure 2

Project Location

Katz, Okitsu & Associates
Traffic Engineers and Transportation Planners

El Monte Golf Course
Traffic Impact Study



LEGEND

Club House Facility	8,000 sq. ft.
Patio Area	15,000 sq. ft.
Parking	300 vehicles
Maintenance Facilities	10,000 sq. ft.
Maintenance Compound	80,000 sq. ft.
- - - - - - - - - - -	Unpaved Road

N
Not To Scale
Source: Golf Properties Design

NORTH
NOT TO SCALE

Last Revised: April 15, 1998.

Figure 3

Project Site Plan

Katz, Okitsu & Associates
Traffic Engineers and Transportation Planners

El Monte Golf Course
Traffic Impact Analysis

2.0 ANALYSIS METHODS

This section details the assumptions, methodologies and standards used to evaluate existing and future conditions in the study area.

TRAFFIC IMPACT STUDY AREA

The SANDAG Congestion Management Plan (CMP) requires a traffic analysis for all large-scale projects that generate at least 2,400 daily trips or 200 or more peak hour trips. Locations must be studied where the project adds more than 50 or more peak hour trips in one direction to a regionally significant arterial (RSA) or more than 150 peak hour trips in one direction to a freeway. If this threshold is met, all intersections on the RSA network where peak hour traffic volume increases may exceed 50 vehicles must be analyzed closely. The proposed project does not meet the trip generation threshold, so a detailed CMP level of analysis is not required.

The County of San Diego was consulted in the definition of the study area for the project. The study must analyze site access and major roadway segments and intersections that would potentially be impacted by the project. The following intersections are expected to meet the above criteria and are studied in this report:

- State Route 67 at Mapleview Street
- Lake Jennings Park Road at El Monte Road/Julian Avenue
- Lake Jennings Park Road at I-8 Westbound Ramps
- Lake Jennings Park Road at I-8 Eastbound Ramps

No other intersections are expected to be significantly impacted by the project.

METHODOLOGIES

All of the traffic analysis methodologies described in this section are based upon the concept of traffic "Level of Service." This concept is fundamental to many forms of traffic analysis. Level of service measures are a method of quantifying the degree of freedom or restriction roadway users experience. Level of service is a report card scale ranging from A to F which describes the varying conditions on a roadway during a specific time interval of study. Brief definitions of level of service are shown in Appendix A, Table A-1

Roadway Segments

Traffic conditions on roadway segments are often defined by comparing the capacity of the roadway to the volume of traffic that the roadway serves on a typical day. Based on a series of thresholds defined by the municipality for various classifications of roadways, daily level of service for particular segments can be defined. Table A-2 summarizes the County of San Diego Roadway Level of Service guidelines.

These thresholds shown above are not intended to serve as an exact descriptor of the actual operating condition on the roadway, as the capacity is subject to a number of factors. These factors include pavement width, access to cross street and driveways, intersection signal timing, spacing, and geometry; and on-street parking. The actual functional capacity of a roadway is based on the ability of arterial intersection to accommodate peak hour volumes. Efficient design of intersections to achieve acceptable levels of service during peak hours of demand could result in higher capacities on the roadway.

Signalized Intersections

Traffic conditions along urban and suburban roadways and highways are most significant during peak hours at signalized intersections. Traffic conditions are normally focused on these intersections during the peak hours of the day.

Traffic conditions are evaluated in the City of San Diego using the methodology and procedures outlined in the *Highway Capacity Manual, 1995 Edition* (HCM), a publication of the Transportation Research Board. Chapter 9 of the HCM is devoted to analysis of signalized intersections. The methodology in this chapter is based upon measurements or forecasts of average vehicle stopped delay for traffic passing through the subject signalized intersection. Table A-3 summarizes the level of service criteria used in HCM operational analysis method for signalized intersections.

Unsignalized Intersections

Chapter 10 of the 1994 Highway Capacity Manual describes the currently accepted methodology for estimating level of service for unsignalized intersections. The method for two-way stop controlled intersections predicts level of service by estimating the average total delay experienced by the stopping drivers. Delay is arrived at by predicting the average amount of time a driver at the stop line must wait to receive an acceptable gap in the conflicting traffic stream; other factors are considered as well. The model assumes random arrival of vehicles at the intersection, which is often not the case if nearby intersections are controlled by traffic signals, but methods are available to correct for such a condition if necessary. Table A-4 shows the criteria for level of service for the two-way stop controlled intersections in the project area.

For all-way stop controlled intersections, the Chapter 10 Highway Capacity Analysis Manual was was used. This method calculates average stop delay for all vehicles entering the intersection. Delay is report per approach as well as the intersection as a whole. Table A-5 summarizes the relationship between approach delay and level of service.

Usually, the potential need for future traffic controls at a stop-controlled intersection is more significant than the peak hour level of service. This analysis is conducted by evaluating the intersection for "warrants" for traffic signals or for all-way stop controls. These warrants are published by the Federal Highway Administration and by Caltrans and are widely used and accepted. The warrants consider many factors related to traffic volume, speed, accident experience, and others, to determine whether additional traffic controls would be a benefit to traffic. These warrant analyses are not based upon level of service, but they do determine the appropriate methodology for determining level of service.

STANDARDS

For roadway segments, the County of San Diego recommends that arterial segments generally achieve LOS C or better. Level of service D is a commonly accepted minimum standard for peak hour intersection conditions in urbanized communities. The County of San Diego has adopted this level of service standard.

TRAFFIC DATA

Existing average daily traffic data was obtained from the County of San Diego Traffic Engineering Division and the San Diego Association of Governments' (SANDAG) *San Diego Region Average Weekday Traffic Volumes 1991-1995*, dated April 1996. Supplemental counts were conducted by Southland Car Counters in August 1996, specifically for this study. Appendix B contains a summary of the 24-hour machine counts taken on Lake Jennings Park Road and El Monte Road.

3.0 EXISTING CONDITIONS

EXISTING CIRCULATION NETWORK

The study area is located to the north of Interstate 8 and east of State Route 67 in the unincorporated area of San Diego County, as shown in Figure 1. The project would take access from El Monte Road. Figure 4 shows the existing study area network and intersection channelization.

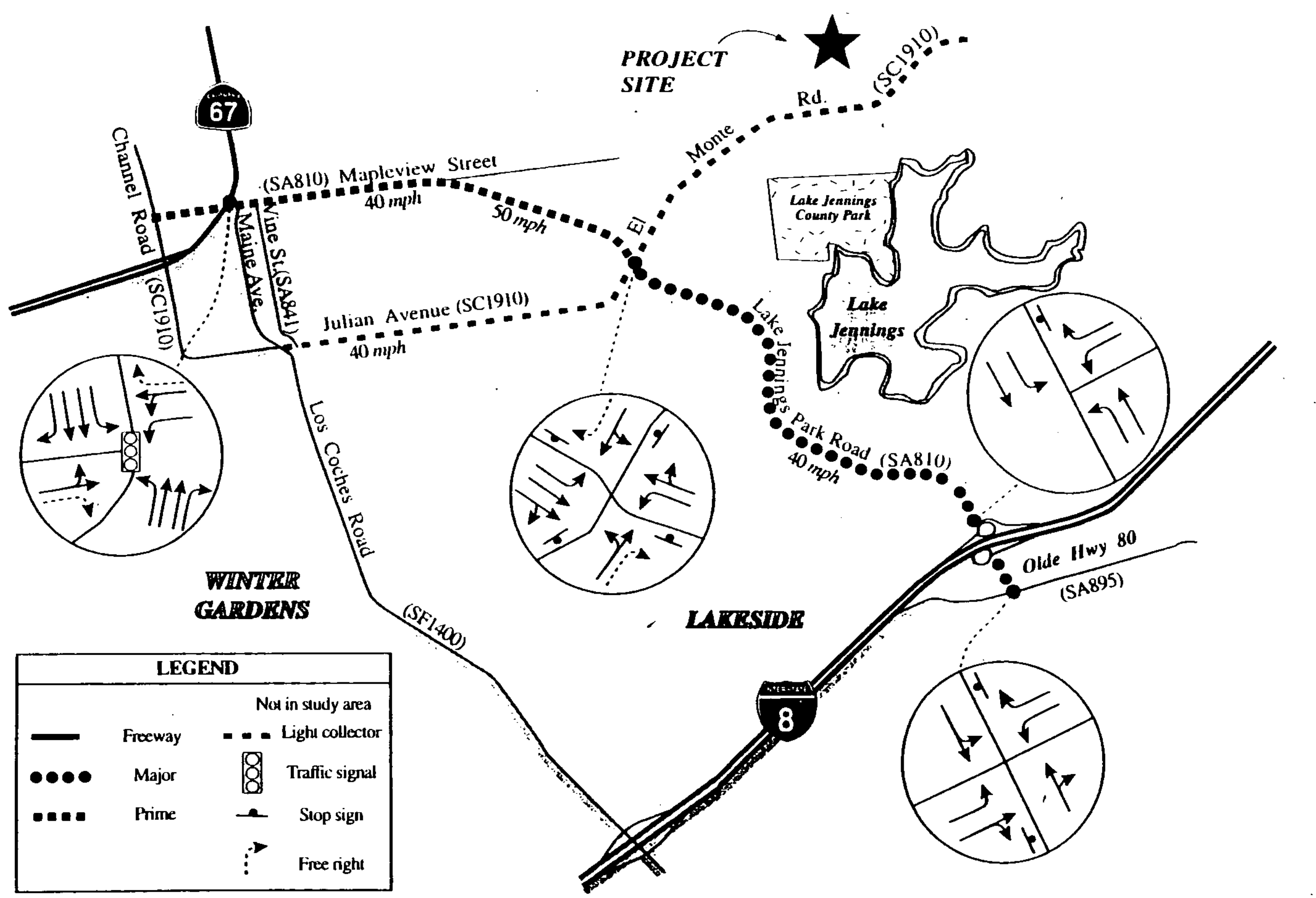
State Route 67 (San Vicente Freeway)
Classified as a freeway on the County of San Diego's Circulation Element, State Route 67 (SR-67) provides north-south access from Interstate 8 (I-8) to the community of Ramona, where it meets State Route 78. Traffic volumes on SR 67 average 24,500 vehicles daily (ADT). At the intersection of Mapleview Street, State Route 67 crosses at grade, with traffic signals controlling each approach.

Mapleview Street/Lake Jennings Park Road (SA810)
Mapleview Street (SA810) runs east-west from Channel Road (SC1910) to its terminus east of Vista Del Capitan. Between Channel Road (SC1910) and SR-67, Mapleview Street (SA810) is classified as a Major arterial and carries approximately 7,000 ADT on two travel lanes separated by a double yellow stripe in most locations. East of SR-67, Mapleview Street (SA810) is classified as a Prime arterial and carries approximately 20,400 ADT. Speed limits on Mapleview Street (SA810) are posted at 40 miles per hour (mph) and no on-street parking is allowed. Mapleview Street (SA810) is striped for a bike lane, and curb, gutter and sidewalk improvements are in place for the majority of the street. East of Pino Drive, Mapleview Street runs eastward as an unclassified residential collector to its terminus just past Vista del Capitan.

The intersection of Mapleview Street (SA810) at State Route 67 is located less than 120 feet east of its intersection with Maine Avenue. The next intersection to the east, Vine Street, is located less than 100 feet from Maine Avenue. Left turns to and from Vine Street are currently prohibited by permanent-type channelizers imbedded in the center of Mapleview Street. The combination of the short left turn storage space for westbound vehicles on Maine Avenue and the long delays for vehicles accessing State Route 67 at grade result in the blockage of Maine Avenue. The County has attempted to ease this congestion by prohibiting left tums in and out from Vine Street.

Lake Jennings Park Road serves as the extension of SA810 where Mapleview Street diverges to the east. Lake Jennings Park Road (SA810) classified as a Prime arterial on the County's Circulation Element between Mapleview Street and El Monte Road (SC1910). Between Mapleview Street and El Monte Road, Lake Jennings Park Road is currently constructed as a four lane Major arterial with a bike lane and is separated by a painted median. Speed limits are posted at 50 mph and on-street parking is not allowed. For the most part, curb, gutter and sidewalk improvements are in place.

From south of El Monte Road (SC1910) to Jack Oak Road, Lake Jennings Park Road is classified as a Major Street and is constructed with two lanes southbound and one lane northbound. Northbound and southbound traffic are separated by a painted double yellow stripe. Existing pavement width on Lake Jennings Park Road (SA810) south of El Monte Road is 64 feet. No curb, gutter, or sidewalk improvements are in place, and on-street parking is not allowed. Speed limits are posted at 40 mph. In the immediate study area, daily traffic volumes on Lake Jennings Park Road (SA810) north and south of Julian Avenue/El Monte Road (SC1910) were found to be 9,900 and 11,150 ADT,



Last Revised: August 5, 1998.

Figure 4

Existing Circulation Network

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respectively. South of Jack Oak Road, Lake Jennings Park Road (SA810) narrows to one lane in each direction, separated by a painted yellow stripe.

Julian Avenue/El Monte Road (SA1910)
Julian Avenue (SA1910) provides east-west connection from Channel Road (SC1910) to El Monte Road. From Lake Jennings Park Road (SA810) to Los Coches Road (SF1400), Julian Avenue is classified as a Light Collector and carries approximately 9,000 ADT on two travel lanes separated by a painted double yellow stripe. Julian Avenue is posted at 40 mph, and no on-street parking is allowed. From the intersection of Julian Avenue at Lake Jennings Park Road to approximately 400 feet west, curb, gutter, and sidewalk improvements are in place. Westward from that point, the roadway is unimproved, except at intersections.

El Monte Road (SA1910) continues eastward from Lake Jennings Park Road and provides access to the El Capitan Reservoir and the project site. El Monte Road (SA1910) is classified as a Light Collector roadway and carries approximately 2,300 ADT. El Monte Road is striped for two lanes of traffic, separated by a double yellow painted stripe. No posted speed limit signs were observed, nor are there existing sidewalk, curb or gutter improvements in place.

Willow Road (SA820)
Willow Road (SA820) runs parallel and to the north of El Monte Road, north of the San Diego River. Classified as a Light Collector facility, Willow Road provides access to SR-67 and continues eastward past Wildcat Canyon Road and the southern portion of the Louis A. Seltzer County Park. East of the park property, the Willow Road Extension is a private unpaved road and runs along the northern edge of the project site. Willow Road crosses the river and connects to El Monte Road through the Van Omerring Dairy. This is also a private road.

ROADWAY SEGMENT CONDITIONS

The County of San Diego General Plan Public Facility Element states that LOS C be the minimum desired level of service for County roads. To determine existing service levels on study area roadway segments, we compared the County of San Diego's adopted ADT thresholds for LOS, the daily capacity of the study area roadway segments, and the existing volumes in the study area. Table 1 and Figure 5 present the results this analysis.

Table 1
Existing Roadway Segment Conditions

Roadway Segment	*Classification/ Lanes*	*Maximum Recommended Volume**	*Existing ADT*	*LOS*
Lake Jennings Park Road SA810)				
North of El Monte Road	Major/4	29,600	9,900	A
South of El Monte Road	Collector/3**	20,600	11,150	A
North of Interstate 8	Lt. Collector/2	7,100	11,800	E
El Monte Road (SC1910)				
East of Lake Jennings Park Road	Lt. Collector/2	7,100	2,300	B
Mapleview Street (SA810)				
East of State Route 67	Collector/4	27,400	20,400	B
Julian Avenue (SC1910)				
West of Lake Jennings Park Road	Lt.Collector/2	7,100	9,000	D

Note: *LOS C capacity
**3-lane Collector capacity estimated based on ¾ of 4-lane Collector capacity.

As shown on Table 1, two roadway segments currently exceed their LOS C capacity. These segments are Julian Avenue, west of Lake Jennings Park Road, and Lake Jennings Park Road north of Interstate 8. The remaining study area roadway segments operate at LOS C or better under existing volumes.

It is important to note that the values shown in Appendix A reflect the County of San Diego's adopted guidelines for various functional classes of roadways. The values shown are not intended to serve as an exact description of the actual operating level of service on a particular roadway segment. The capacity of roadway facilities is affected by a number of factors, including pavement width, access to cross streets and driveways, intersection signal timing and geometry, and on-street parking. The actual functional capacity of urban facilities is based on the ability of arterial intersections to accommodate peak hour volumes. Efficient designs of intersections to achieve acceptable levels of service could result in higher capacities. Thus, volumes higher than those shown in Table 1 and Appendix A may occur on arterial segments and peak hour traffic could still be accommodated at good levels of service. The daily roadway segment analysis is a useful planning guideline to indicate where further analysis is required and provides technical support for the sizing of Circulation Element facilities in general terms. However, peak hour intersection LOS provides the primary source of information on which actual circulation system performance is judged.

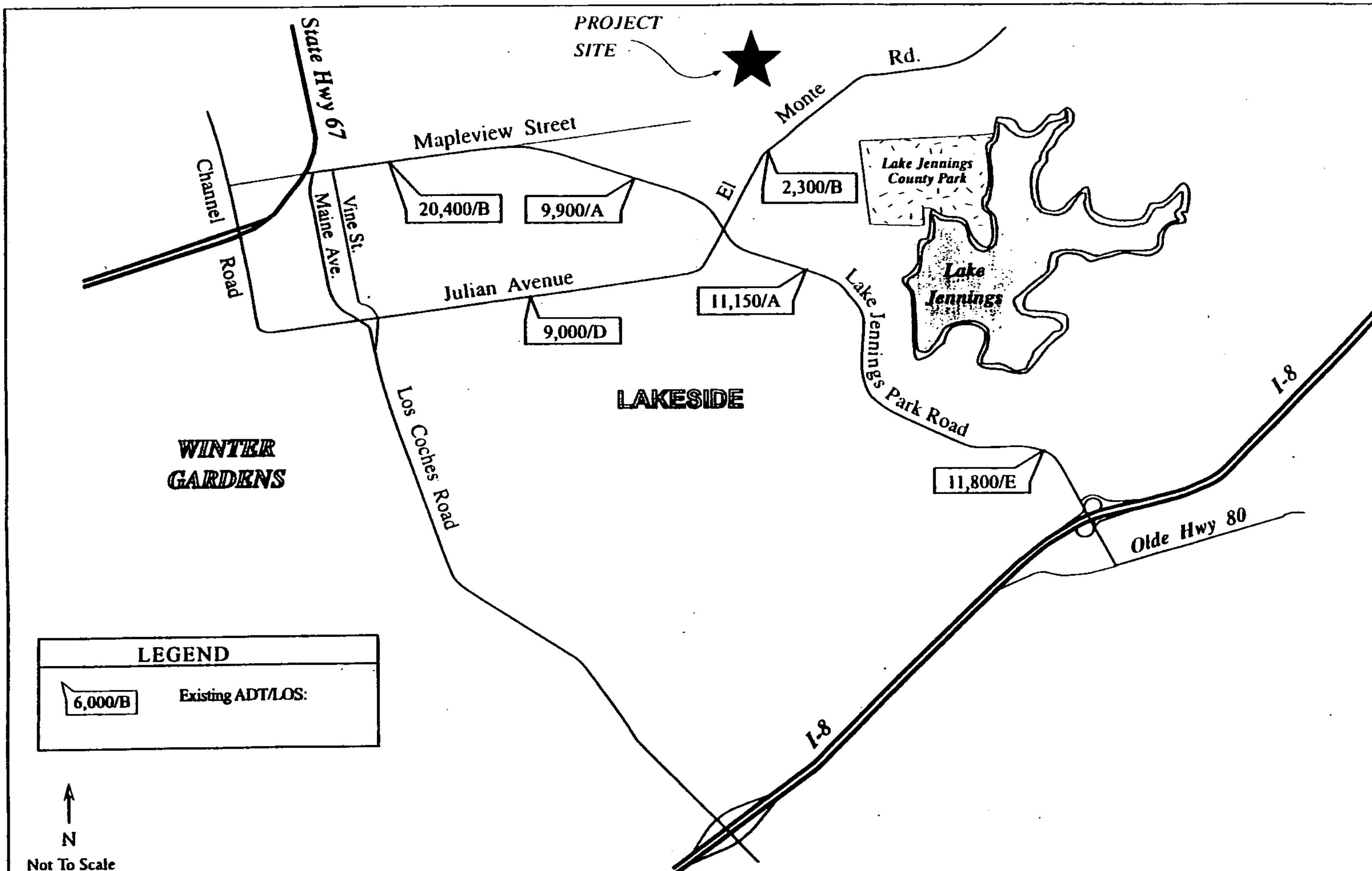

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Figure 5

Existing Roadway Segment Conditions

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4.0 PROJECT DESCRIPTION

As stated in the introduction to this report, the proposed project consists of two 18-hole golf courses, a 9-hole practice course and a clubhouse. Access to the proposed project will be taken from El Monte Road, east of Lake Jennings Park Road at the main entrance at Ashwood Road. In addition, access can be taken from Willow Road, a private dirt road connecting to El Monte Road and running along the northern edge of the project site. The site for the proposed project is currently vacant and necessarily, any development of the site will result in a higher level of traffic activity on the site and increases on streets and driveways leading to the site. Any traffic that can be attributed to the proposed project site is known as project-related traffic.

Project-related traffic consists of trips on the street system which begin or end on the project site as a result of the development of the proposed project. Project related traffic is a function of the extent and type of development proposed for the site. This information is used to establish trip generation for the site.

Project Trip Generation

Trip generation is a measure or forecast of the number of trips which begin or end at the project site. All or part of these trips will result in traffic increases on the streets where they occur. The traffic generated is a function of the extent and type of development proposed for the site.

Vehicular traffic generation characteristics for projects are normally estimated based on rates in the standard trip generation manuals, such as the *Trip Generation, Fifth Edition*, published by the Institute of Transportation Engineers (ITE) or the 1995 San Diego Association of Governments (SANDAG) *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*. These manuals provide standards and recommendations for the probable traffic generation for various land uses based upon nation-wide and local studies of existing developments in comparable settings. Since its traffic generation information is calibrated to better reflect rates in the San Diego region in particular, the golf course rates recommended in the SANDAG *Brief Guide* were used for this study.

The following table summarizes the daily and peak hour trip generating assumptions for golf courses. Appendix D contains excerpts from the SANDAG *Brief Guide* used in this analysis.

Table 3
Trip Generation

		Daily		*AM Peak Hour*				*PM Peak Hour*			
Existing Land Use	*Land Use Intensity*	*Rate**	*Total Trips*	*AM %*	*Total Trips*	*In-bound*	*Out-bound*	*PM %*	*Total Trips*	*In-bound*	*Out-bound*
Golf Course	2 Courses	600	1,200	6%	72	58	14	9%	108	32	76
Practice Course	0.5 Course	300	300	6%	18	14	4	9%	28	8	20
Total			**1500**		**100**	**72**	**18**		**136**	**40**	**96**

*Trip Rate is based on number of 18-hole golf courses.

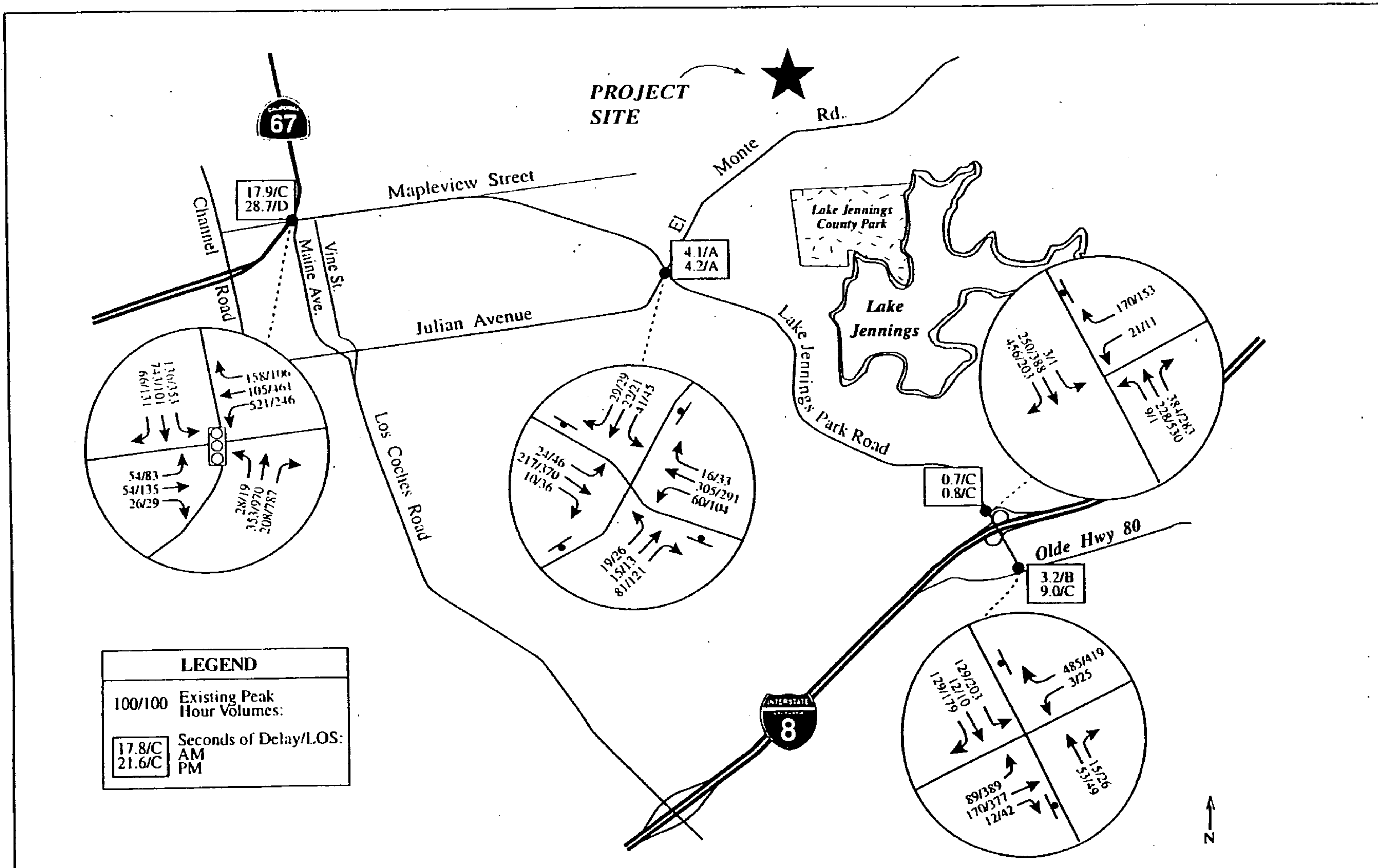

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Figure 6

Peak Hour Intersection Conditions

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PEAK HOUR INTERSECTION CONDITIONS

In order to assess current conditions at the study area intersections, turn movement volumes were collected during morning and evening peak periods on August 20, 1996. Appendix B contains summaries of the peak hour manual turning movement counts at study intersections. The morning and evening peak hours of analysis were selected to coincide with the peak hours of demand on the adjacent study area roadways rather than the peak hour of activities at the future golf course project. In this manner, the "worst-case" condition would be analyzed.

Table 2 indicates the results of the peak hour intersection level of service for existing conditions in the project study area. Figure 6 summarizes graphically the results of this analysis.

Table 2
Existing Peak Hour Intersection Conditions

	AM Peak		*PM Peak*	
Signalized Intersection	***Delay (sec.)***	***LOS***	***Delay (sec.)***	***LOS***
SR-67 at Mapleview Street	17.9	C	28.7	D
All-way Stop Controlled Intersection				
Lake Jennings Park Road at El Monte Road/ Julian Avenue	4.1	A	4.2	A
Minor Street Stop Controlled Intersections				
Lake Jennings Park Road at I-8 WB Ramps	0.7	C	0.8	C
Lake Jennings Park Road at I-8 EB Ramps	3.2	B	9.0	C

For unsignalized intersections, average delay is quoted for all vehicles entering the intersection. Level of service is quoted for the worst-case movement.

Table 9 shows all study intersections in the project study area are currently operating at an acceptable level of service (LOS D or better) during peak hours. Appendix C contains the worksheets used in this analysis.

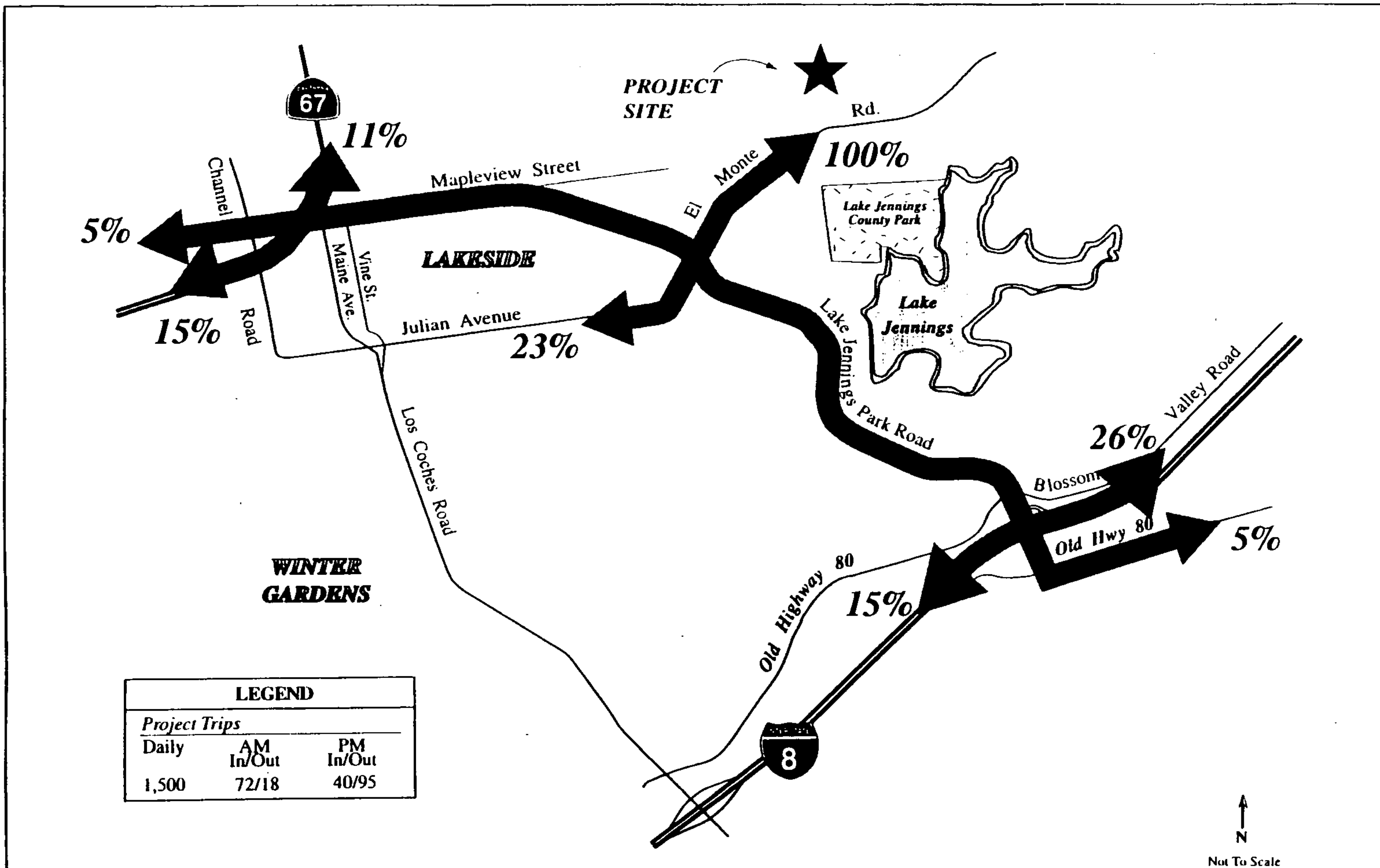
Project Trip Distribution

Trip distribution is the process of identifying the probable destinations, directions, or traffic routes that project related traffic will likely affect. The potential interaction between the proposed development and surrounding residential areas, services, and regional access routes are considered in order to identify the routes where project traffic will distribute.

Trip distribution information can be estimated from observed traffic patterns or experience, and it can also be obtained as output from regional traffic forecasting models developed to analyze future traffic conditions on highways. The estimated traffic shown on Table 3 were assigned to the surrounding circulation network based on a manual assignment prepared by KOA staff. This assignment was based on the knowledge of existing land uses in the project area and the likely routes that patrons of the new golf course would take to access the site.

Figure 7 shows the proportion of inbound and outbound project traffic that will use various street segments, as well as morning and afternoon peak hour turn movements that will be made.

Figure 8 shows the net increase in project related trips for the proposed project. This figure shows the total morning and afternoon peak hour inbound and outbound project traffic that will use various street segments, as well as the turning movements that will be made. In addition, the net increase in traffic that would be added to existing volumes are shown. This is obtained by combining the traffic distribution shown in Figure 7 with the traffic generation presented in Table 3.



LEGEND		
Project Trips		
Daily	AM In/Out	PM In/Out
1,500	72/18	40/95

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Figure 7

Trip Distribution

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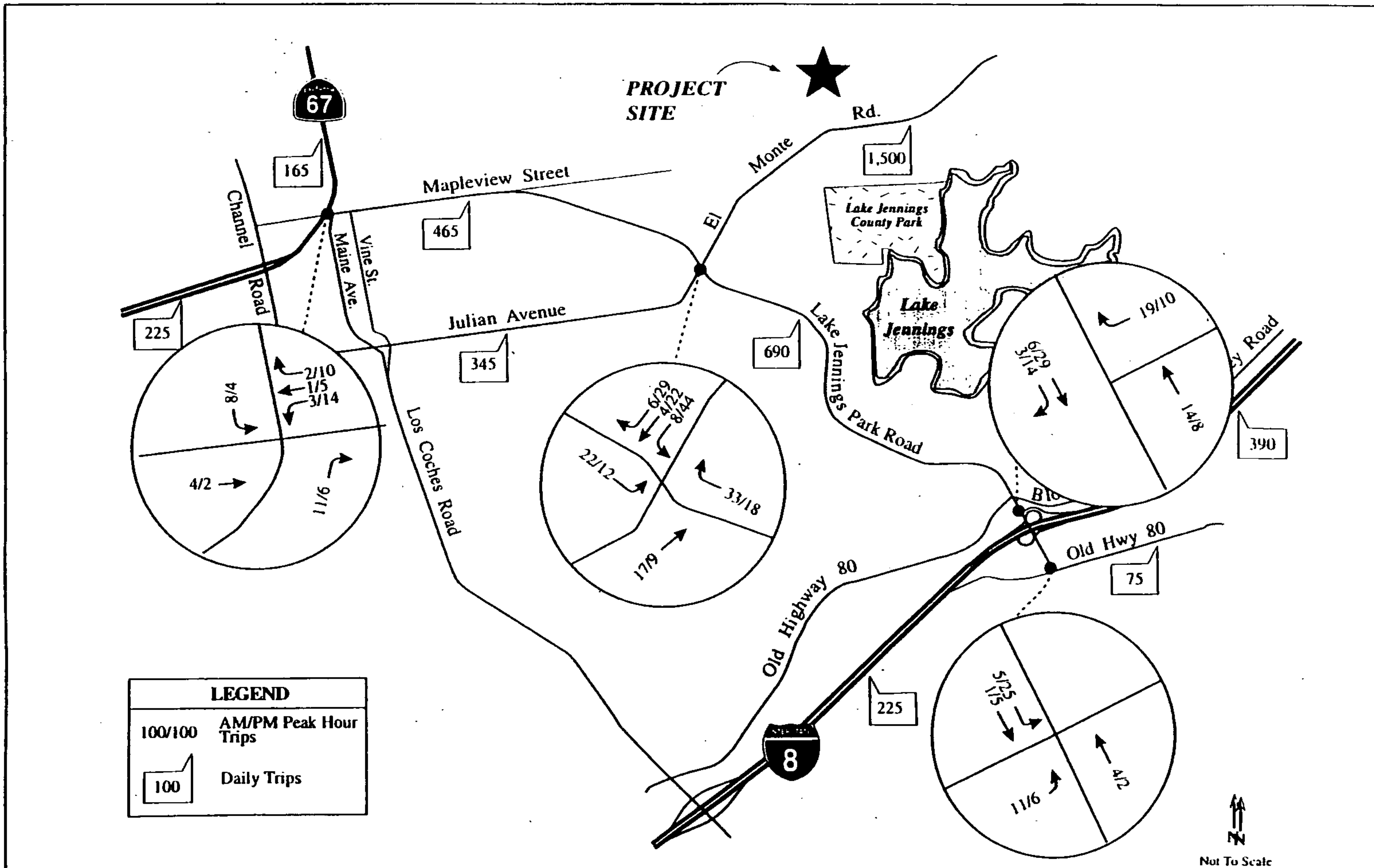

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Figure 8

Trip Assignment

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5.0 FUTURE TRAFFIC CONDITIONS

In order to simulate conditions in the study area in the near-term (1998), a growth factor of two percent was applied for two years. A two percent growth rate is typically applied for near-term forecasts throughout San Diego County due to the relatively slow rate of growth in the region. Kaufman and Broad is developing a 171 lot subdivision (California Sundance TM# 49-01-1) on the south side of Julian Avenue west of Lakeshore Drive. The traffic from this project was also estimated and added to the background volumes.

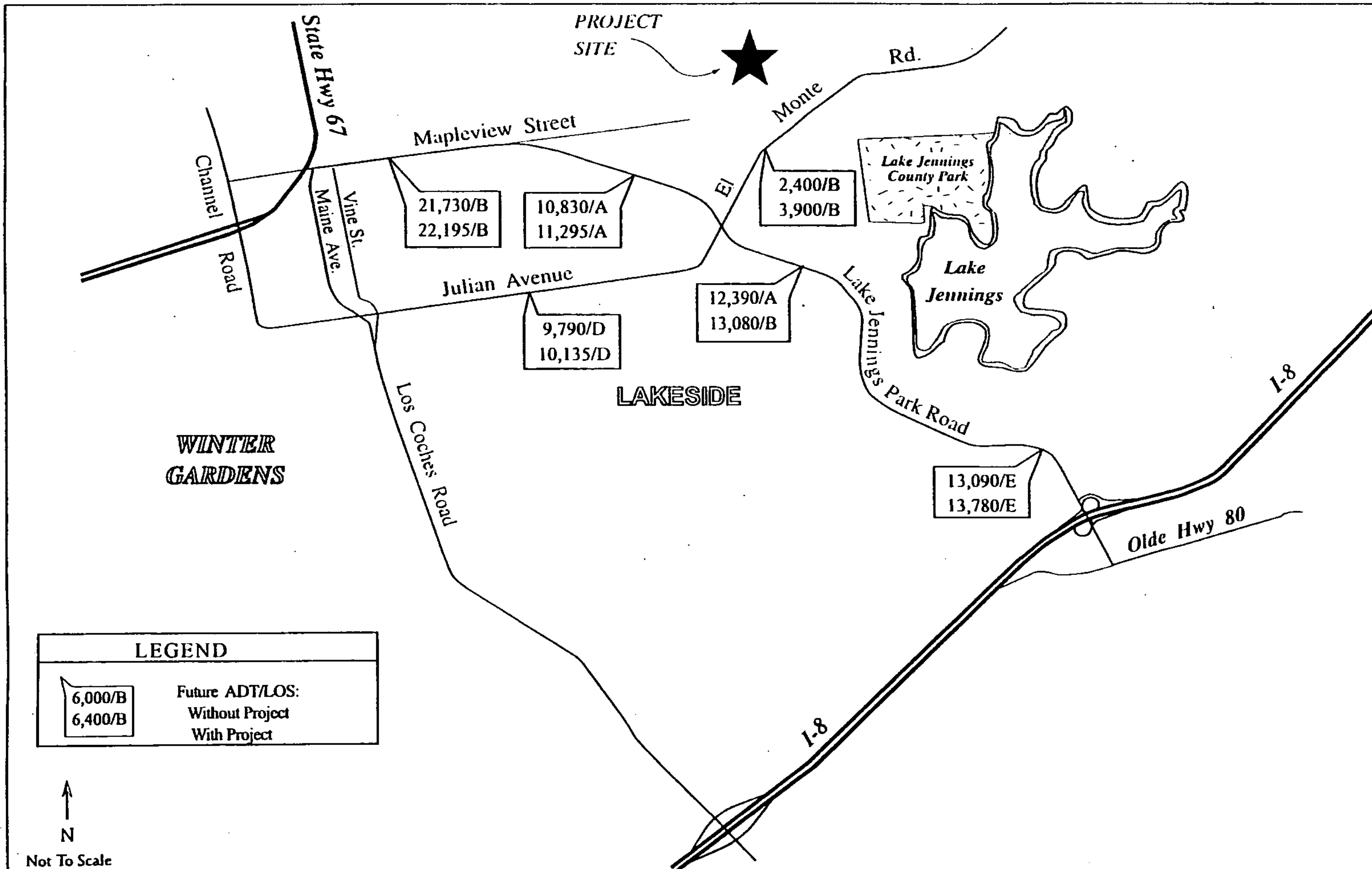
ROADWAY SEGMENT CONDITIONS

Table 4 summarizes the roadway level of service analysis conducted for daily traffic volumes. Figure 9 shows the daily roadway segment level of service for the year 1998 without and with the project traffic added. Appendix E of this report contains the HCM worksheets used in this analysis.

Table 4
Summary of Future Roadway Segment Conditions

Roadway Segment	*Classification/ Lanes*	*Maximum Recommended Volume**	*Existing 1996*		*Forecast 1998 w/o Project*		*Forecast 1998 w/ Project*	
			ADT	*LOS*	*ADT*	*LOS*	*ADT*	*LOS*
Lake Jennings Park Road (SA810)								
North of El Monte Road	Major/4	29,600	9,900	A	10,830	A	11,295	A
South of El Monte Road	Collector/3**	20,600	11,150	A	12,390	A	13,080	B
North of Interstate 8	Light Collector/2	7,100	11,800	**E**	13,090	**E**	13,780	**E**
El Monte Road (SC1910)								
East of Lake Jennings Park Rd.	Light Collector/2	7,100	2,300	B	2,400	B	3,900	B
Mapleview Street (SA810)								
East of State Route 67	Collector/4	27,400	20,400	B	21,730	B	22,195	B
Julian Avenue (SC1910)								
West of Lake Jennings Park Rd.	Light Collector/2	7,100	9,000	**D**	9,790	**D**	10,135	**D**

Notes: *LOS C capacity.
**3-lane Collector capacity estimated based on ¾ of 4-lane capacity.



Last Revised:August 17, 1998.

Figure 9

Future Roadway Segment Conditions

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As shown on Table 4, without any planned improvements, the same two roadway segments found to be deficient under existing traffic volumes are expected to exceed its LOS C capacity in the near-term future without the addition of project trips. These segments are Julian Avenue, west of Lake Jennings Park Road and Lake Jennings Park Road, north of Interstate 8.

Lake Jennings Park Road north of I-8 has a level of service that is somewhat overstated given the actual operating conditions. The use of the County's standards require that we identify the capacity as 7,100 ADT, but a number of County roadways and rural state highways operate adequately at similar or higher volumes. These include Del Dios Highway, Cole Grade Road, El Camino Real, and San Dieguito Road. The reasons that the traffic operation is acceptable involve limited access, few side obstructions, and intersection improvements to handle the peak hour demands. The remaining study area roadway segments operate at LOS C or better under forecast daily volumes.

As shown on Table 4, the addition of project trips slightly increases daily traffic demand on study area roadways, but it does not affect the overall level of service at any roadway segment. As a private road, it is not expected that any significant amount of project traffic would access the site via the Willow Road/Van Omerring Dairy route.

PEAK HOUR INTERSECTION CONDITIONS

Peak hour intersection volumes under near-term conditions were forecast based on existing volumes plus the ambient growth in traffic and the other adjacent projects. To this background base, the project traffic was added. Table 5 summarizes the results of this analysis. Figures 9 and 10 show the peak hour conditions for Near-Term conditions without and with the project.

Table 5
Future Peak Hour Intersection Conditions

Signalized Intersection	*Existing 1996*		*Future 1998 w/o Project*		*Future 1998 w/ Project*	
	Delay (sec.)	*LOS*	*Delay (sec.)*	*LOS*	*Delay (sec.)*	*LOS*
AM Peak Hour						
Signalized Intersection						
SR-67 at Mapleview St.	17.9	C	18.1	C	18.3	C
All-way Stop Controlled Intersection						
Lake Jennings Park Rd. at El Monte Rd./ Julian Ave.	4.1	A	4.4	A	5.4	B
Minor Street Stop Controlled Intersection						
Lake Jennings Park Rd. at I-8 WB Ramps	0.7	C	0.7	C	0.8	C
Lake Jennings Park Rd. at I-8 EB Ramps	3.2	B	3.3	B	3.3	B
PM Peak Hour						
Signalized Intersection						
SR-67 at Mapleview St.	28.7	D	33.4	D	35.7	D
All-way Stop Controlled Intersection						
Lake Jennings Park Rd. at El Monte Rd./ Julian Ave.	4.2	A	4.5	A	5.3	B
Minor Street Stop Controlled Intersection						
Lake Jennings Park Rd. at I-8 WB Ramps	0.8	C	0.8	C	0.8	C
Lake Jennings Park Rd. at I-8 EB Ramps	9.0	C	10.1	C	11.9	D

As shown in this table, all of the study area intersections operate at LOS D or better during peak hours with or without the project traffic. Since the County's minimum standard for peak hour intersections is LOS D, no project impacts are found.

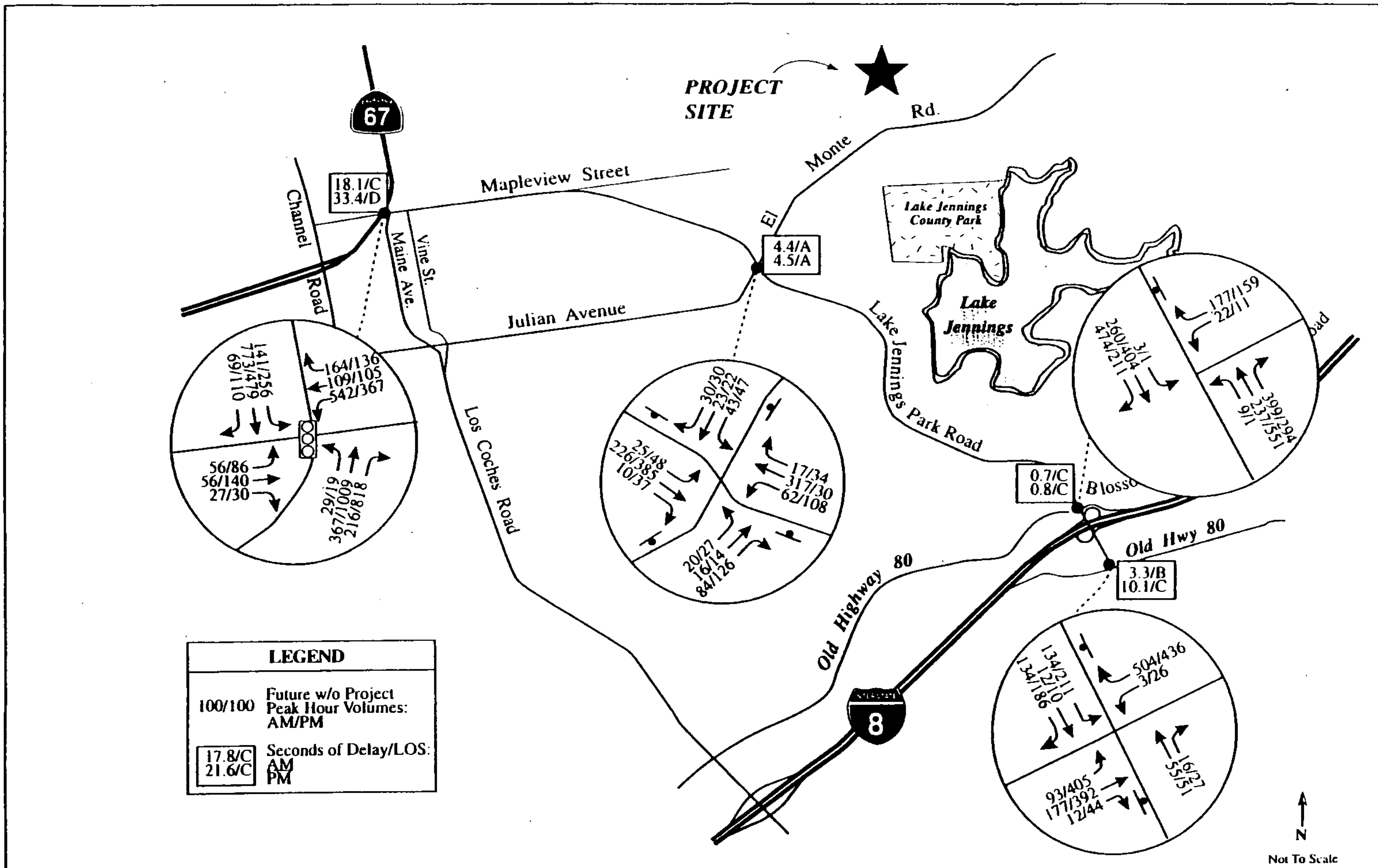

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Figure 10

Future Intersection Conditions without Project

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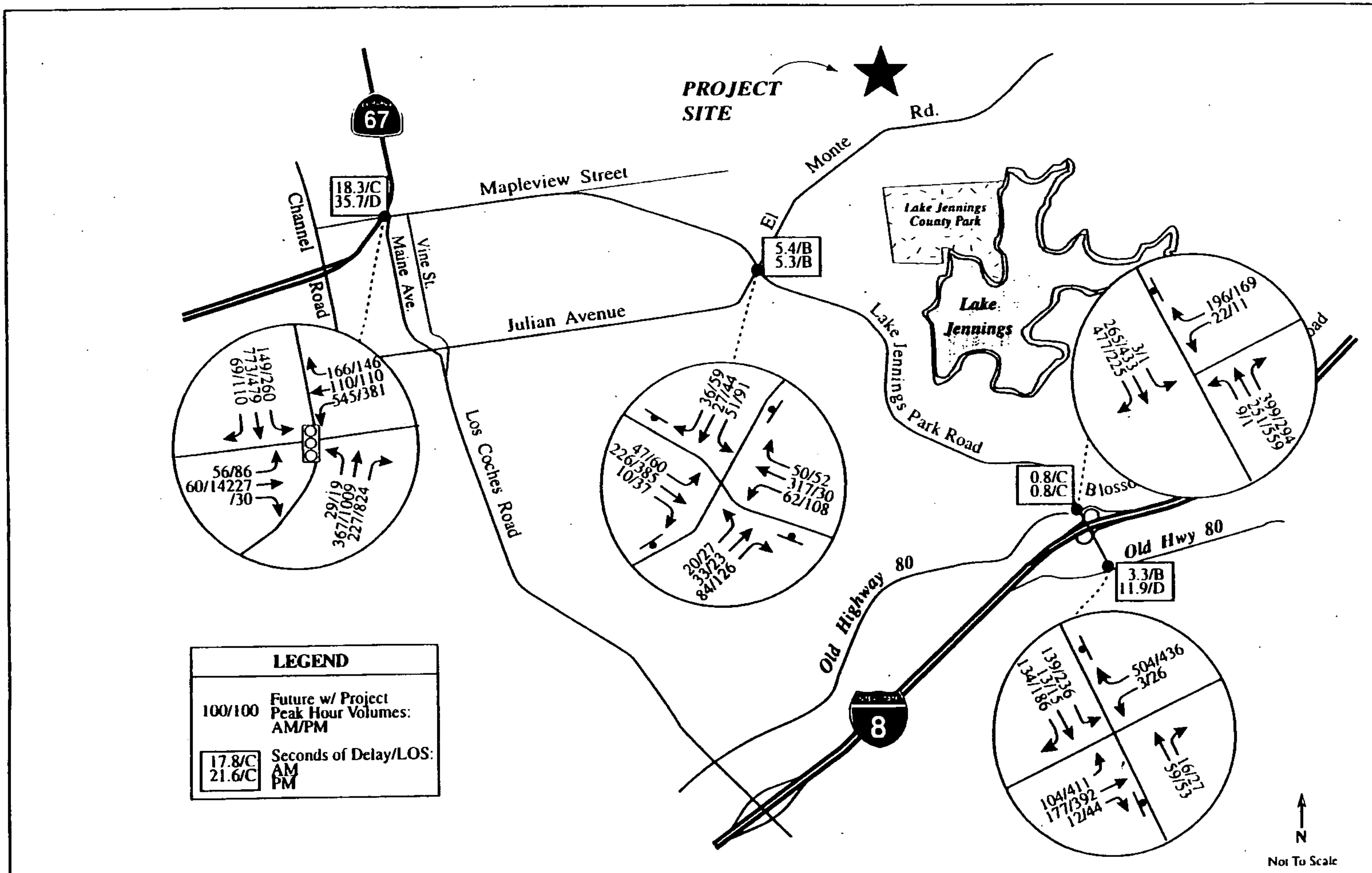

Last Revised: April 15, 1998.

Figure 11

Future Intersection Conditions with Project

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6.0 PROJECT ACCESS

The El Monte Golf Course project would take access from El Monte Road, with one main driveway and one service driveway on the north side of El Monte Road. Given the speeds and curves on El Monte Road, it would be desirable for the main project driveway to align with Miss Ellie Lane on the south side of El Monte Road, and opposing left turn channelization provided.

The provision of a northern leg to this existing intersection at Miss Ellie Lane provides an opportunity to enhance visibility for vehicles entering the roadway from the opposite side. A solid granite bluff exists on the south side of El Monte Road west of Miss Ellie Lane. Therefore, the widening of El Monte Road to provide left turn channelization may require moving the center of the road to the north at this location to achieve adequate sight distance.

The project site can also be accessed by way of Willow Road, which borders the site to the north. Willow Road crosses the river and connects to El Monte Road through the Van Omerring Dairy. This is currently a private road, and it is not expected that any significant amount of project traffic would access the site via this route.

7.0 CONCLUSIONS

The El Monte Golf Course project would add approximately 1,500 additional daily trips to the adjacent street network in the community Lakeside in eastern San Diego County. This project will add approximately 100 trips in the AM peak hour and 136 trips in the PM peak hour. An analysis of existing and future conditions revealed that without the additional traffic demands associated with the project, the following roadway segments operate at less than desirable levels:

- Julian Avenue (SC1910), west of Lake Jennings Park Road (LOS D for Existing and Near-term Future conditions).
- Lake Jennings Park Road (SA810), north of Interstate 8 (LOS E for Existing and Near-term Future conditions). However, as stated earlier, the actual operations are much more favorable on this segment than is suggested by the use of the County's ADT threshold.

In order to achieve acceptable daily operations on this portion of Lake Jennings Park Road (SA810), the roadway would have to be improved to at least four-lane Collector standards. Since the roadway classified in the General Plan as a Major road, this would be an interim improvement.

However,. since a true indication of roadway conditions is determined by peak hour operations at arterial intersections, and since no study area intersection was found to operate below the County of San Diego standard of LOS D under existing and Near-term Future conditions with or without the project, no impacts from the project are indicated.

We recommend the following improvements be made as part of the El Monte Golf Course Project.

- Design project access driveways and channelization to the satisfaction of the County Traffic Engineer.

It has been a pleasure working with Enviromine, the Helix Water District, and the County of San Diego Department of Planning and Land Use staff on this project.

Sincerely,

Katz, Okitsu & Associates

J. Arnold Torma, P.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
J. ARNOLD TORMA
1143
exp. 03/00
TRAFFIC
STATE OF CALIFORNIA

And

Pamela A. Barnhart
Senior Transportation Planner

APPENDIX A

Definitions, Standards and Methodologies

Table A-1
Level of Service (LOS) Definitions

The concept of LOS is defined as a qualitative measure describing operational conditions within a traffic stream, and the motorist's and/or passengers' perception of operations. A LOS definition generally describes these conditions in terms of such factors as speed, travel time, freedom to maneuver, comfort, convenience, and safety. Levels of service for freeway segments can generally be categorized as follows:

LOS	*V/C*	*Congestion/Delay*	*Traffic Description*
(Used for surface streets, freeways, expressways and conventional highways)			
"A"	<0.41	None	Free flow.
"B"	0.42-0.62	None	Free to stable flow, light to moderate volumes.
"C"	0.63-0.80	None to minimal	Stable flow, moderate volumes, and freedom to maneuver noticeably restricted.
"D"	0.80-0.92	Minimal to substantial	Approaches unstable flow, heavy volumes, and very limited freedom to maneuver.
"E"	0.93-1.00	Significant	Extremely unstable flow, maneuverability and psychological comfort extremely poor.
(Used for surface streets and conventional highways)			
"F"	<1.00	Considerable	Forced or breakdown flow. Delay measured in average travel speed (MPH). Signalized segments experience delays >60.0 seconds/vehicle.
(Used for freeways and expressways)			
"F(0)"	1.01-1.25	Considerable 0-1 hour delay	Forced flow, heavy congestion, long queues form behind breakdown points, stop and go.
"F(1)"	1.26-1.35	Severe 1-2 hour delay	Very heavy congestion, very long queues.
"F(2)"	1.36-1.45	Very Severe 2-3 hour delay	Extremely heavy congestion, longer queues, more numerous breakdown points, longer stop periods.
"F(3)"	>1.46	Extremely Severe 3+ hours of delay	Gridlock

SOURCE: Caltrans, 1992.

Table A-2
Roadway Classifications, Levels of Service (LOS) and Average Daily Traffic (ADT)

Circulation Element Road Cross Section							Average Daily Traffic (ADT) Level of Service (LOS)				
Class	Median (Feet)	Traveled Way (Feet)	Shoulder (Feet)	Parkway Strip (Feet)	Roadbed (Feet)	Right-of-way (Feet)	"A" Freeflow	"B" Steady Flow	"C" Stable Flow	"D" Approach Unstable	"E" Unstable
Prime – Divided highway, grade separations, access control or extra lanes as required.	18	36	8	10	106	102-106	<22,000	37,000	44,600	50,000	57,000
Major – 4-lane divided road, access and parking controlled as necessary.	18	24	8	10	82	102	<14,800	24,700	29,600	33,400	37,000
Collector – 4-lane divided road.		24	8	10	64	84	<13,700	22,800	27,400	30,800	34,200
Light Coll. – Two lane undivided road, auxiliary lanes and additional right of way at critical sections, low traffic.		12	8	10	40	60	<1,900	4,100	7,100	10,900	16,200
Rural Coll. – Two lane undivided road, less than 5,000 ADT projected, unpaved right-of-way for equestrian and farm vehicle use.		12	8	10	40	60	<1,900	4,100	7,100	10,900	16,200
Rural Light Coll. – Two lane undivided road, auxiliary lanes, and additional right of way at critical sections, increased "curve radii" standards.		12	8	10	40	60	<1,900	4,100	7,100	10,900	16,200
Rural Mtn. – Two-lane divided road approximate only in rural mountain areas, auxiliary lanes and right of way at critical sections.		12	8	30	40	100	<1,900	4,100	7,100	10,900	16,200
Recreational Parkway – Recreational routes for travel pleasure purposes.		12	8	30	40	Min. 100	<1,900	4,100	7,100	10,900	16,200

Notes: Maximum protected corridor width for future right-of-way.
Levels of service are not applied to non-circulation roads since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads
carrying through traffic between major trip generators and attractors.

Table A-3
HCM Average Vehicle Stopped Delay and
Level of Service Criteria for Signalized Intersections

Level of Service	*Average Stopped Delay (Seconds per Vehicle)*	*Traffic Conditions*
A	0-5	Excellent, Light Traffic
B	5.1-15.0	Good, Light to Moderate Traffic
C	15.1-25.0	Moderate Traffic, with Insignificant Delay
D	25.1-40.0	Heavy Traffic, with Significant Delay
E	40.1-60.0	Severe Congestion and Delay
F	Greater Than 60.0	Failed, Indicated Levels Cannot Be Handled

Table A-4
Level of Service Criteria for Stop-controlled Intersections (Two-way and All-way)

Average Total Delay (sec/veh)	Level of Service (LOS) Characteristics
≤5	*LOS A* - Little or no delay
>5 and ≤10	*LOS B* - Short traffic delay
>10 and ≤20	*LOS C* - Average traffic delay
>20 and ≤30	*LOS D* - Long traffic delays
>30 and ≤45	*LOS E* - Very long traffic delays
>45	LOS F - When the demand exceeds the capacity of the lane, extreme delays will be encountered along with queuing, which may cause severe congestion to the intersection and/or a change in the type of traffic control.

APPENDIX B

Traffic Count Summaries

Location:Lake Jennings N – W/o El Monte San Diego Volumes for Tuesday [illegible]

AM Period	EB		WB		
12:00–12:15	10		19		
12:15–12:30	4		6		
12:30–12:45	5		7		
12:45–1:00	7	26	5	37	63
1:00–1:15	5		4		
1:15–1:30	6		3		
1:30–1:45	2		7		
1:45–2:00	4	17	4	18	35
2:00–2:15	2		3		
2:15–2:30	6		5		
2:30–2:45	5		9		
2:45–3:00	7	20	10	27	47
3:00–3:15	4		14		
3:15–3:30	2		22		
3:30–3:45	6		15		
3:45–4:00	10	22	24	75	97
4:00–4:15	13		30		
4:15–4:30	28		44		
4:30–4:45	18		56		
4:45–5:00	23	82	72	202	284
5:00–5:15	47		80		
5:15–5:30	47		84		
5:30–5:45	76		96		
5:45–6:00	61	231	77	337	568
6:00–6:15	69		116		
6:15–6:30	77		127		
6:30–6:45	67		111		
6:45–7:00	60	273	98	452	725
7:00–7:15	69		92		
7:15–7:30	53		93		
7:30–7:45	55		83		
7:45–8:00	69	246	73	341	587
8:00–8:15	60		66		
8:15–8:30	53		67		
8:30–8:45	66		83		
8:45–9:00	51	230	84	300	530
9:00–9:15	62		72		
9:15–9:30	84		82		
9:30–9:45	55		59		
9:45–10:00	51	252	80	293	545
10:00–10:15	45		77		
10:15–10:30	46		62		
10:30–10:45	49		50		
10:45–11:00	45	185	52	241	426
11:00–11:15	81		67		
11:15–11:30	64		63		
11:30–11:45	73		60		
11:45–12:00	64	282	67	257	539
Total Volumes	1866		2580		4446
Daily Totals					

PM Period	EB		WB		
12:00–12:15	69		63		
12:15–12:30	55		91		
12:30–12:45	60		54		
12:45–1:00	67	251	59	267	518
1:00–1:15	72		58		
1:15–1:30	65		57		
1:30–1:45	83		59		
1:45–2:00	62	282	56	230	512
2:00–2:15	96		59		
2:15–2:30	82		63		
2:30–2:45	99		79		
2:45–3:00	85	362	77	278	640
3:00–3:15	104		85		
3:15–3:30	109		77		
3:30–3:45	106		61		
3:45–4:00	114	433	64	287	720
4:00–4:15	109		69		
4:15–4:30	111		85		
4:30–4:45	103		87		
4:45–5:00	124	447	84	325	772
5:00–5:15	102		88		
5:15–5:30	92		72		
5:30–5:45	123		66		
5:45–6:00	100	417	74	300	717
6:00–6:15	76		63		
6:15–6:30	63		44		
6:30–6:45	72		49		
6:45–7:00	69	280	30	186	466
7:00–7:15	48		47		
7:15–7:30	52		40		
7:30–7:45	48		40		
7:45–8:00	34	182	35	162	344
8:00–8:15	33		50		
8:15–8:30	47		25		
8:30–8:45	42		27		
8:45–9:00	28	150	28	130	280
9:00–9:15	35		28		
9:15–9:30	34		32		
9:30–9:45	30		21		
9:45–10:00	30	129	26	107	236
10:00–10:15	17		23		
10:15–10:30	23		18		
10:30–10:45	19		15		
10:45–11:00	14	73	17	73	146
11:00–11:15	17		15		
11:15–11:30	14		10		
11:30–11:45	16		5		
11:45–12:00	10	57	4	34	91
Total Volumes	3063		2379		5442
Daily Totals	4929		4959		$\boxed{9888}$

Location:El Monte N/O Lake Jennings San Diego Volumes for Tuesday 3/21/90 02170002

AM Period	NB		SB		
12:00-12:15	0		1		
12:15-12:30	1		0		
12:30-12:45	1		0		
12:45-1:00	2	4	2	3	7
1:00-1:15	0		0		
1:15-1:30	0		1		
1:30-1:45	1		0		
1:45-2:00	0	1	1	2	3
2:00-2:15	0		1		
2:15-2:30	0		1		
2:30-2:45	1		0		
2:45-3:00	0	1	2	4	5
3:00-3:15	0		2		
3:15-3:30	0		2		
3:30-3:45	1		0		
3:45-4:00	0	1	2	6	7
4:00-4:15	1		4		
4:15-4:30	1		5		
4:30-4:45	3		6		
4:45-5:00	3	8	5	20	28
5:00-5:15	6		11		
5:15-5:30	7		9		
5:30-5:45	9		16		
5:45-6:00	19	41	14	50	91
6:00-6:15	4		27		
6:15-6:30	2		31		
6:30-6:45	12		8		
6:45-7:00	9	27	20	86	113
7:00-7:15	14		13		
7:15-7:30	9		23		
7:30-7:45	8		28		
7:45-8:00	16	47	15	79	126
8:00-8:15	14		12		
8:15-8:30	10		20		
8:30-8:45	20		16		
8:45-9:00	19	63	34	82	145
9:00-9:15	10		33		
9:15-9:30	20		17		
9:30-9:45	19		18		
9:45-10:00	17	66	36	104	170
10:00-10:15	25		19		
10:15-10:30	4		30		
10:30-10:45	9		27		
10:45-11:00	23	61	7	83	144
11:00-11:15	14		27		
11:15-11:30	23		29		
11:30-11:45	17		19		
11:45-12:00	19	73	11	86	159
Total Volumes	393		605		998
Daily Totals					

PM Period	NB		SB		
12:00-12:15	23		26		
12:15-12:30	24		24		
12:30-12:45	14		25		
12:45-1:00	13	74	23	98	172
1:00-1:15	17		21		
1:15-1:30	15		21		
1:30-1:45	3		13		
1:45-2:00	15	50	22	77	127
2:00-2:15	28		16		
2:15-2:30	13		19		
2:30-2:45	16		24		
2:45-3:00	15	72	18	77	149
3:00-3:15	19		14		
3:15-3:30	24		13		
3:30-3:45	26		11		
3:45-4:00	27	96	13	51	147
4:00-4:15	18		23		
4:15-4:30	21		18		
4:30-4:45	25		16		
4:45-5:00	18	82	27	84	166
5:00-5:15	20		18		
5:15-5:30	20		17		
5:30-5:45	17		17		
5:45-6:00	16	73	16	68	141
6:00-6:15	27		10		
6:15-6:30	18		23		
6:30-6:45	21		7		
6:45-7:00	23	89	18	58	147
7:00-7:15	22		19		
7:15-7:30	19		14		
7:30-7:45	14		5		
7:45-8:00	18	73	6	44	117
8:00-8:15	15		3		
8:15-8:30	8		4		
8:30-8:45	5		3		
8:45-9:00	11	39	5	15	54
9:00-9:15	8		6		
9:15-9:30	6		2		
9:30-9:45	9		4		
9:45-10:00	8	31	5	17	48
10:00-10:15	4		4		
10:15-10:30	4		1		
10:30-10:45	2		2		
10:45-11:00	4	14	3	10	24
11:00-11:15	4		0		
11:15-11:30	2		1		
11:30-11:45	1		3		
11:45-12:00	1	8	1	5	13
Total Volumes	701		604		1305
Daily Totals	1094		1209		2303

Location: Lake Jennings E/O El Monte   San Diego   Volumes for Tuesday 3/21/96   02170003

AM Period	EB		WB		
12:00–12:15	12		10		
12:15–12:30	5		13		
12:30–12:45	9		8		
12:45–1:00	3	29	8	39	68
1:00–1:15	6		6		
1:15–1:30	6		4		
1:30–1:45	6		6		
1:45–2:00	5	23	6	22	45
2:00–2:15	4		3		
2:15–2:30	2		1		
2:30–2:45	5		5		
2:45–3:00	7	18	8	17	35
3:00–3:15	9		12		
3:15–3:30	3		14		
3:30–3:45	7		19		
3:45–4:00	10	29	17	62	91
4:00–4:15	12		25		
4:15–4:30	15		39		
4:30–4:45	37		42		
4:45–5:00	37	101	70	176	277
5:00–5:15	36		66		
5:15–5:30	64		82		
5:30–5:45	78		65		
5:45–6:00	69	247	95	308	555
6:00–6:15	90		99		
6:15–6:30	91		111		
6:30–6:45	88		138		
6:45–7:00	72	341	119	467	808
7:00–7:15	86		96		
7:15–7:30	98		91		
7:30–7:45	81		84		
7:45–8:00	72	337	92	363	700
8:00–8:15	65		83		
8:15–8:30	69		93		
8:30–8:45	72		75		
8:45–9:00	66	272	85	336	608
9:00–9:15	64		80		
9:15–9:30	60		72		
9:30–9:45	71		59		
9:45–10:00	52	247	64	275	522
10:00–10:15	59		74		
10:15–10:30	43		59		
10:30–10:45	63		59		
10:45–11:00	49	214	70	262	476
11:00–11:15	68		60		
11:15–11:30	78		73		
11:30–11:45	84		68		
11:45–12:00	80	310	72	273	583
Total Volumes	2168		2600		4768
Daily Totals					

PM Period	EB		WB		
12:00–12:15	72		77		
12:15–12:30	61		86		
12:30–12:45	76		63		
12:45–1:00	82	291	62	288	579
1:00–1:15	76		62		
1:15–1:30	75		65		
1:30–1:45	80		63		
1:45–2:00	71	302	57	247	549
2:00–2:15	77		79		
2:15–2:30	98		67		
2:30–2:45	97		77		
2:45–3:00	103	375	77	300	675
3:00–3:15	134		89		
3:15–3:30	107		91		
3:30–3:45	119		95		
3:45–4:00	131	491	115	390	881
4:00–4:15	130		125		
4:15–4:30	164		108		
4:30–4:45	122		93		
4:45–5:00	139	555	98	424	979
5:00–5:15	112		93		
5:15–5:30	114		99		
5:30–5:45	111		88		
5:45–6:00	125	462	89	369	831
6:00–6:15	110		64		
6:15–6:30	76		72		
6:30–6:45	86		55		
6:45–7:00	84	356	38	229	585
7:00–7:15	63		37		
7:15–7:30	81		50		
7:30–7:45	63		56		
7:45–8:00	47	254	37	180	434
8:00–8:15	40		47		
8:15–8:30	43		53		
8:30–8:45	60		23		
8:45–9:00	38	181	37	160	341
9:00–9:15	35		32		
9:15–9:30	36		27		
9:30–9:45	35		25		
9:45–10:00	31	137	35	119	256
10:00–10:15	21		27		
10:15–10:30	19		22		
10:30–10:45	22		21		
10:45–11:00	16	78	14	84	162
11:00–11:15	18		19		
11:15–11:30	16		15		
11:30–11:45	17		8		
11:45–12:00	12	63	6	48	111
Total Volumes	3545		2838		6383
Daily Totals	5713		5438		11151

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: SR 67 DATE: 8/20/96 CITY: SAN DIEGO

E-W STREET: MAPLEVIEW DAY: TUESDAY PROJECT# 0218001A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	1	2	1	0	1	1	1.5	0.5	1	
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM	2	76	43	21	139	9	13	12	2	130	20	41	508
15 AM	4	76	48	25	195	19	12	12	5	138	21	48	603
30 AM	9	122	67	37	237	15	21	15	11	156	35	38	763
45 AM	7	75	35	35	161	8	13	12	4	110	27	37	524
8:00 AM	8	80	58	39	150	24	8	15	6	117	22	35	562
15 AM	2	82	47	35	165	28	17	15	6	96	23	31	547
30 AM	4	53	43	19	117	11	8	9	3	136	23	32	458
45 AM	7	87	68	32	130	13	14	19	9	84	17	26	506
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES =	43	651	409	243	1294	127	106	109	46	967	188	288	4471

AM Peak Hr Begins at 715 AM

PEAK VOLUMES =	28	353	208	136	743	66	54	54	26	521	105	158	2452

ADDITIONS:SIGNALIZED

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: SR 67 DATE: 8/20/96 CITY: SAN DIEGO

E-W STREET: MAPLEVIEW DAY: TUESDAY PROJECT# 0218001P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	1	2	1	0	1	1	1.5	0.5	1	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	5	179	139	49	118	17	12	22	5	73	22	43	684
15 PM	6	244	195	54	141	19	20	39	8	80	22	36	864
30 PM	6	221	171	70	111	26	22	30	12	87	31	39	826
45 PM	5	243	197	59	112	31	19	38	4	85	21	33	847
5:00 PM	3	191	167	55	90	26	28	30	9	89	24	33	745
15 PM	5	305	226	64	137	23	17	29	5	79	29	31	950
30 PM	5	231	197	68	122	26	19	38	11	100	27	34	878
45 PM	4	176	167	38	97	20	14	29	2	75	17	33	672
6:00 PM													
15 PM													
30 PM													
45 PM													

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES =	39	1790	1459	457	928	188	151	255	56	668	193	282	6466

PM Peak Hr Begins at 445 PM

PEAK VOLUMES =	18	970	787	246	461	106	83	135	29	353	101	131	3420

ADDITIONS:SIGNALIZED

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: EL MONTE/ JULIAN
E-W STREET: LAKE JENNINGS
DATE: 8/20/96
DAY: TUESDAY
CITY: SAN DIEGO
PROJECT# 0218002A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	2	0	0	1	1	0	1	0	
6:00 AM													
15 AM													
30 AM													
45 AM							6	47	4	16	57	3	179
7:00 AM	10	4	17	7	3	5	6	50	3	18	87	2	213
15 AM	5	2	18	14	1	7	5	64	5	12	78	5	226
30 AM	5	3	22	13	8	6	4	56	1	17	89	3	217
45 AM	4	1	23	10	4	5	9	47	1	13	51	6	183
8:00 AM	5	9	18	4	9	11	6	52	1	34	58	1	184
15 AM	4	1	12	9	1	5	6	52	4	16	53	5	179
30 AM	6	6	17	6	2	6	9	45	2	24	69	3	200
45 AM	7	4	18	4	3	12							
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES =	46	30	145	67	31	57	51	413	21	150	542	28	1581

AM Peak Hr Begins at 715 AM

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
PEAK VOLUMES =	19	15	81	41	22	29	24	217	10	60	305	16	839

ADDITIONS: 4-WAY STOP

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: EL MONTE/ JULIAN   DATE: 8/20/96   CITY: SAN DIEGO

E-W STREET: LAKE JENNINGS   DAY: TUESDAY

PROJECT# 0218002P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	1	0	1	0	1	2	0	1	1	0	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	5	5	31	6	7	5	6	87	9	20	69	5	255
15 PM	7	8	28	14	5	4	6	91	7	24	44	5	243
30 PM	6	4	29	9	7	5	10	90	5	22	85	4	276
45 PM	8	3	32	11	5	4	14	79	9	27	72	4	268
5:00 PM	8	0	20	12	7	8	10	89	11	21	65	8	259
15 PM	2	7	38	8	8	9	13	99	5	32	80	10	311
30 PM	8	3	31	14	1	8	9	103	11	24	74	11	297
45 PM	14	8	14	12	3	7	7	76	10	28	51	8	238
6:00 PM													
15 PM													
30 PM													
45 PM													

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES =	58	38	223	86	43	50	75	714	67	198	540	55	2147

PM Peak Hr Begins at 445 PM

PEAK VOLUMES =	26	13	121	45	21	29	46	370	36	104	291	33	1135

ADDITIONS: 4-WAY STOP

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: LAKE JENNINGS DATE: 8/20/96 CITY: SAN DIEGO

E-W STREET: I-8 WEST DAY: TUESDAY PROJECT# 0218003A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:		1	1	1	1	2				1		1	
6:00 AM													
15 AM													
30 AM													
45 AM													333
7:00 AM	0	35	86	1	53	119				1		38	367
15 AM	3	51	91	0	60	115				6		41	421
30 AM	4	56	114	1	69	127				6		44	395
45 AM	0	57	89	2	63	131				4		49	338
8:00 AM	2	64	90	0	58	83				5		36	321
15 AM	0	53	98	0	62	79				2		27	365
30 AM	0	68	91	0	47	88				11		60	330
45 AM	0	48	87	0	63	83				7		42	
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES =	9	432	746	4	475	825	0	0	0	42	0	337	2870

AM Peak Hr Begins at 715 AM

PEAK VOLUMES =	9	228	384	3	250	456	0	0	0	21	0	170	1521

ADDITIONS:1-WAY STOP, WB
NL=ILLGAL LEFT TURN ONTO FWY

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: LAKE JENNINGS DATE: 8/20/96 CITY: SAN DIEGO

E-W STREET: I-8 WEST DAY: TUESDAY PROJECT# 0218003P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:		1	1	1	1	2				1		1	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	1	113	96	0	101	37				7		41	396
15 PM	0	136	71	0	99	46				6		38	396
30 PM	0	138	72	0	84	35				5		43	377
45 PM	0	104	56	1	81	43				2		49	336
5:00 PM	1	143	91	0	104	61				2		33	435
15 PM	0	148	63	0	105	46				2		35	399
30 PM	0	135	73	0	98	53				5		36	400
45 PM	0	94	64	0	84	54				2		35	333
6:00 PM													
15 PM													
30 PM													
45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
VOLUMES =	2	1011	586	1	756	375	0	0	0	31	0	310	3072

PM Peak Hr Begins at 445 PM

PEAK VOLUMES =	1	530	283	1	388	203	0	0	0	11	0	153	1570

ADDITIONS: 1-WAY STOP, WB
NL=ILLEGAL LEFT ONTO FWY

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: LAKE JENNINGS DATE: 8/20/96 CITY: SAN DIEGO

E-W STREET: I-8 EAST DAY: TUESDAY PROJECT# 0218004A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NT	NR	NR2	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	1	0.5	0.5	1	0	1	
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM	9	1	5	39	1	21	18	42	4	0	0	108	248
15 AM	14	8	2	37	2	34	19	33	2	0	0	113	264
30 AM	19	1	4	29	5	33	17	49	4	2	0	139	302
45 AM	9	3	3	33	4	32	27	57	3	1	0	104	276
8:00 AM	11	3	6	30	1	30	26	31	3	0	0	129	270
15 AM	13	2	6	25	2	30	21	42	5	4	0	113	263
30 AM	16	1	3	36	7	16	32	52	5	3	0	115	286
45 AM	12	4	6	32	4	34	21	38	11	4	0	113	279
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													

	NT	NR	NR2	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES =	103	23	35	261	26	230	181	344	37	14	0	934	2188

AM Peak Hr Begins at 715 AM

PEAK VOLUMES =	53	15	15	129	12	129	89	170	12	3	0	485	1112

ADDITIONS: 4-WAY STOP
NR2=ENT TO I-8 EAST RAMP
SR=ON RAMP

SOUTHLAND CAR COUNTERS
VEHICLE AND MANUAL COUNTS

N-S STREET: LAKE JENNINGS DATE: 8/20/96 CITY: SAN DIEGO

E-W STREET: I-8 EAST DAY: TUESDAY PROJECT# 0218004P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NT	NR	NR2	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	1	0.5	0.5	1	0	1	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	22	4	9	51	3	34	67	97	13	2	0	117	419
15 PM	14	4	4	47	1	46	62	99	7	3	0	118	405
30 PM	15	6	6	54	5	58	77	92	9	4	0	110	436
45 PM	14	7	5	46	4	61	96	79	14	3	0	97	426
5:00 PM	11	5	5	50	3	34	88	95	10	8	0	122	431
15 PM	9	8	3	51	1	39	104	100	8	9	0	102	434
30 PM	15	6	3	56	2	45	101	103	10	5	0	98	444
45 PM	12	5	4	38	1	62	80	88	14	7	0	81	392
6:00 PM													
15 PM													
30 PM													
45 PM													
	NT	NR	NR2	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES =	112	45	39	393	20	379	675	753	85	41	0	845	3387

PM Peak Hr Begins at 445 PM

	NT	NR	NR2	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
PEAK VOLUMES =	49	26	16	203	10	179	389	377	42	25	0	419	1735

ADDITIONS: 4-WAY STOP
NR2=ENT TO I-8 EAST
SR=ON RAMP

APPENDIX C

HCS Intersection Analysis Worksheets – Existing Conditions

El Monte Golf Course
Traffic Impact Analysis
Existing AM Peak Hour

Level Of Service Computation Report
1994 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #2 L. Jennings Park Rd./Julian Ave./El Monte Road

Cycle (sec):	1	Critical Vol./Cap. (X):	0.787
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	4.1
Optimal Cycle:	0	Level Of Service:	A

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Ignore			Include		
Lanes:	1 0 0 1 0			1 0 1 1 0			0 1 0 0 1			0 1 0 0 1		
Volume Module:												
Base Vol:	60	305	16	24	217	10	19	15	81	41	22	29
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Initial Bse:	60	305	16	24	217	10	19	15	0	41	22	29
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	60	305	16	24	217	10	19	15	0	41	22	29
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	60	305	16	24	217	10	19	15	0	41	22	29
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1:00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Final Vol.:	60	305	16	24	217	10	19	15	0	41	22	29
Saturation Flow Module:												
Sat/Lane:	408	408	408	350	350	350	158	158	158	235	235	235
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.95	0.05	1.00	1.91	0.09	0.56	0.44	1.00	0.65	0.35	1.00
Final Sat.:	408	388	20	350	669	31	88	70	158	153	82	235
Capacity Analysis Module:												
Vol/Sat:	0.15	0.79	0.79	0.07	0.32	0.32	0.22	0.22	0.00	0.27	0.27	0.12
Crit Moves:		****			****		****				****	
ApproachV/S:		0.47			0.24			0.11			0.20	
Level Of Service Module:												
Delay/Veh:	1.7	19.9	19.9	1.3	3.4	3.4	2.3	2.3	0.0	2.8	2.8	1.6
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.7	19.9	19.9	1.3	3.4	3.4	2.3	2.3	0.0	2.8	2.8	1.6
LOS by Move:	A	C	C	A	A	A	A	A	*	A	A	A
ApproachDel:		5.9			2.5			1.5			2.1	
LOS by Appr:		B			A			A			A	

El Monte Golf Course
Traffic Impact Analysis
Existing AM Peak Hour

Level Of Service Computation Report
1994 HCM Unsignalized Method (Base Volume Alternative)

Intersection #3 L. Jennings Park Rd./I-8 Westbound Ramps

Average Delay (sec/veh):	0.7	Worst Case Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Ignore			Include		
Lanes:	1 0 1 0 1			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	9	228	384	3	706	0	0	0	0	21	0	170
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Initial Bse:	9	228	384	3	706	0	0	0	0	21	0	170
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	9	228	384	3	706	0	0	0	0	21	0	170
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	9	228	384	3	706	0	0	0	0	21	0	170
Adjusted Volume Module:												
Grade:		0%			0%			0%			0%	
% Cycle/Cars:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
% Truck/Comb:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
PCE Adj:	1.10	1.00	1.00	1.10	1.00	1.00	1.10	1.10	1.10	1.10	1.10	1.10
Cycl/Car PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Trck/Cmb PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Adj Vol.:	10	228	384	3	706	0	0	0	0	23	0	187
Critical Gap Module:												
MoveUp Time:	2.1	xxxx	xxxxx	2.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.4	xxxx	2 6
Critical Gp:	5.0	xxxx	xxxxx	5.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.5	xxxx	5.5
Capacity Module:												
Cnflict Vol:	706	xxxx	xxxxx	612	xxxx	xxxxx	xxxx	xxxx	xxxxx	946	xxxx	228
Potent Cap.:	790	xxxx	xxxxx	876	xxxx	xxxxx	xxxx	xxxx	xxxxx	300	xxxx	1061
Adj Cap:	1.00	xxxx	xxxxx	1.00	xxxx	xxxxx	xxxx	xxxx	xxxxx	0 98	xxxx	1.00
Move Cap.:	790	xxxx	xxxxx	876	xxxx	xxxxx	xxxx	xxxx	xxxxx	295	xxxx	1061
Level Of Service Module:												
Stopped Del:	4.6	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	13.1	xxxx	4 0
LOS by Move:	A	*	*	A	*	*	*	*	*	C	*	A
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:		0.1			0.0			0 0			5 0	

```
                       El Monte Golf Course
                     Traffic Impact Analysis
                      Existing AM Peak Hour
-------------------------------------------------------------------------------
                  Level Of Service Computation Report
        1994 HCM Unsignalized Method (Base Volume Alternative)
*******************************************************************************
Intersection #7 L. Jennings Park Road/I-8 Eastbound Ramps
*******************************************************************************
Average Delay (sec/veh):        3.2         Worst Case Level Of Service:      B
*******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Ignore
Lanes:        0  0  0  1  0    0  1  0  0  1    1  0  0  1  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    53    15   129    12   129    89   170    12     3     0   485
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00
Initial Bse:    0    53    15   129    12   129    89   170    12     3     0     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00
PHF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00
PHF Volume:     0    53    15   129    12   129    89   170    12     3     0     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Final Vol.:     0    53    15   129    12   129    89   170    12     3     0     0
------------|---------------||---------------||---------------||---------------|
Adjusted Volume Module:
Grade:            0%               0%               0%               0%
% Cycle/Cars:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
% Truck/Comb:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
PCE Adj:     1.10  1.00  1.00  1.10  1.00  1.00  1.10  1.10  1.10  1.10  1.10  1.10
Cycl/Car PCE:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Trck/Cmb PCE:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Adj Vol.:       0    53    15   142    12   129    98   187    13     3     0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
MoveUp Time:xxxxx  xxxx xxxxx   2.1  xxxx xxxxx   3.4   3.3   2.6   3.4  xxxx xxxxx
Critical Gp:xxxxx  xxxx xxxxx   5.0  xxxx xxxxx   6.5   6.0   5.5   6.5  xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx  xxxx xxxxx    68  xxxx xxxxx   202   209    12   293  xxxx xxxxx
Potent Cap.: xxxx  xxxx xxxxx  1591  xxxx xxxxx   809   847  1365   717  xxxx xxxxx
Adj Cap:     xxxx  xxxx xxxxx  1.00  xxxx xxxxx  0.93  0.90  1.00  0.75  xxxx xxxxx
Move Cap.:   xxxx  xxxx xxxxx  1591  xxxx xxxxx   749   765  1365   535  xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Stopped Del:xxxxx  xxxx xxxxx   2.5  xxxx xxxxx   5.5   6.0   2.7   6.8  xxxx xxxxx
LOS by Move:    *     *     *     A     *     *     B     *     *     B     *     A
Movement:     LT  - LTR  - RT    LT  - LTR  - RT    LT  - LTR  - RT    LT  - LTR  - RT
Shared Cap.: xxxx  xxxx xxxxx  xxxx  xxxx xxxxx  xxxx  xxxx   788  xxxx  xxxx xxxxx
Shrd StpDel:xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx xxxxx  xxxx   5.8 xxxxx  xxxx xxxxx
Shared LOS:     *     *     *     *     *     *     *     *     B     *     *     *
ApproachDel:        0.0              1.2              5.7              6.8
```



```
                       El Monte Golf Course
                     Traffic Impact Analysis
                      Existing AM Peak Hour
-------------------------------------------------------------------------------
                  Level Of Service Computation Report
         1994 HCM Operations Method (Base Volume Alternative)
*******************************************************************************
Intersection #14 SR-67 at Mapleview Street
*******************************************************************************
Cycle (sec):         100             Critical Vol./Cap. (X):         0.510
Loss Time (sec):      10 (Y+R =  4 sec) Average Delay (sec/veh):      17.9
Optimal Cycle:        37             Level Of Service:                   C
*******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected       Split Phase      Split Phase
Rights:          Include          Include          Ignore           Ignore
Min. Green:     0     0     0     0     0     0     0     0     0     0     0     0
Lanes:        1  0  2  0  1    1  0  2  0  1    0  1  0  0  1    1  1  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      28   353   208   136   743    66    54    54    26   521   105   158
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  0.00
Initial Bse:   28   353   208   136   743    66    54    54     0   521   105     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  0.00
PHF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  0.00
PHF Volume:    28   353   208   136   743    66    54    54     0   521   105     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   28   353   208   136   743    66    54    54     0   521   105     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  0.00
MLF Adj:     1.00  1.05  1.00  1.00  1.05  1.00  1.00  1.00  0.00  1.05  1.05  0.00
Final Vol.:    28   371   208   136   780    66    54    54     0   547   110     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  0.95  1.00  0.85  0.95  1.00  0.85  0.98  0.98  1.00  0.96  0.96  1.00
Lanes:       1.00  2.00  1.00  1.00  2.00  1.00  0.50  0.50  1.00  1.67  0.33  1.00
Final Sat.:  1805  3800  1615  1805  3800  1615   931   931  1900  3037   611  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02  0.10  0.13  0.08  0.21  0.04  0.06  0.06  0.00  0.18  0.18  0.00
Crit Moves:  ****                    ****              ****                    ****
Green/Cycle: 0.03  0.27  0.27  0.16  0.40  0.40  0.11  0.11  0.00  0.35  0.35  0.00
Volume/Cap:  0.51  0.36  0.47  0.47  0.51  0.10  0.51  0.51  0.00  0.51  0.51  0.00
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Delay/Veh:   36.8  19.0  20.2  25.6  14.7  12.0  28.6  28.6   0.0  16.8  16.8   0.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  36.8  19.0  20.2  25.6  14.7  12.0  28.6  28.6   0.0  16.8  16.8   0.0
Queue:          1     8     5     4    16     1     2     2     0    12     3     0
*******************************************************************************
```

```
------------------------------------------------------------------------------
                           El Monte Golf Course
                         Traffic Impact Analysis
                          Existing PM Peak Hour
------------------------------------------------------------------------------
                    Level Of Service Computation Report
        1994 HCM 4-Way Stop Method (Base Volume Alternative)
******************************************************************************
Intersection #2 L. Jennings Park Rd./Julian Ave./El Monte Road
******************************************************************************
Cycle (sec):            1                Critical Vol./Cap. (X):        0.611
Loss Time (sec):        0 (Y+R =  4 sec) Average Delay (sec/veh):         4.2
Optimal Cycle:          0                Level Of Service:                  A
******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
-------------|----------------||----------------||----------------||----------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Ignore           Include
Lanes:        1  0  0  1  0   1  0  1  1  0   0  1  0  0  1   0  1  0  0  1
-------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:      104   29    33    46  370    36    26   13   121    45   21    29
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
Initial Bse:   104   29    33    46  370    36    26   13     0    45   21    29
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Volume:    104   29    33    46  370    36    26   13     0    45   21    29
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   104   29    33    46  370    36    26   13     0    45   21    29
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
Final Vol.:    104   29    33    46  370    36    26   13     0    45   21    29
-------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:      365  365   365   332  332   332   170  170   170   250  250   250
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        1.00 0.47  0.53  1.00 1.82  0.18  0.67 0.33  1.00  0.68 0.32  1.00
Final Sat.:    365  171   194   332  605    59   113   57   170   170   80   250
-------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:      0.28 0.17  0.17  0.14 0.61  0.61  0.23 0.23  0.00  0.26 0.26  0.12
Crit Moves:   ****                  ****        ****                   ****
ApproachV/S:       0.23             0.45             0.11             0.19
-------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
Delay/Veh:     3.0  1.9   1.9   1.7 10.2  10.2   2.4  2.4   0.0   2.7  2.7   1.6
Delay Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:    3.0  1.9   1.9   1.7 10.2  10.2   2.4  2.4   0.0   2.7  2.7   1.6
LOS by Move:     A    A     A     A    C     C     A    A     *     A    A     A
ApproachDel:        2.4              5.6              1.5              2.1
LOS by Appr:         A                B                A                A
******************************************************************************
```



```
------------------------------------------------------------------------------
                           El Monte Golf Course
                         Traffic Impact Analysis
                          Existing PM Peak Hour
------------------------------------------------------------------------------
                    Level Of Service Computation Report
         1994 HCM Unsignalized Method (Base Volume Alternative)
******************************************************************************
Intersection #3 L. Jennings Park Rd./I-8 Westbound Ramps
******************************************************************************
Average Delay (sec/veh):       0.8          Worst Case Level Of Service:      C
******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
-------------|----------------||----------------||----------------||----------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Ignore           Include
Lanes:        1  0  1  0  1   1  0  1  0  0   0  0  0  0  0   1  0  0  0  1
-------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:        1  530   283     1  591     0     0    0     0    11    0   153
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
Initial Bse:     1  530   283     1  591     0     0    0     0    11    0   153
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Volume:      1  530   283     1  591     0     0    0     0    11    0   153
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:      1  530   283     1  591     0     0    0     0    11    0   153
-------------|----------------||----------------||----------------||----------------|
Adjusted Volume Module:
Grade:              0%               0%               0%               0%
% Cycle/Cars:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
% Truck/Comb:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
PCE Adj:      1.10 1.00  1.00  1.10 1.00  1.00  1.10 1.10  1.10  1.10 1.10  1.10
Cycl/Car PCE:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
Trck/Cmb PCE:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
Adj Vol.:        1  530   283     1  591     0     0    0     0    12    0   168
-------------|----------------||----------------||----------------||----------------|
Critical Gap Module:
MoveUp Time:   2.1 xxxx xxxxx   2.1 xxxx xxxxx xxxxx xxxx xxxxx   3.4 xxxx   2.6
Critical Gp:   5.0 xxxx xxxxx   5.0 xxxx xxxxx xxxxx xxxx xxxxx   6.5 xxxx   5.5
-------------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:   591 xxxx xxxxx   813 xxxx xxxxx  xxxx xxxx xxxxx  1123 xxxx   530
Potent Cap.:   896 xxxx xxxxx   703 xxxx xxxxx  xxxx xxxx xxxxx   237 xxxx   746
Adj Cap:      1.00 xxxx xxxxx  1.00 xxxx xxxxx  xxxx xxxx xxxxx  1.00 xxxx  1.00
Move Cap.:     896 xxxx xxxxx   703 xxxx xxxxx  xxxx xxxx xxxxx   236 xxxx   746
-------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
Stopped Del:   4.0 xxxx xxxxx   5.1 xxxx xxxxx xxxxx xxxx xxxxx  16.0 xxxx   6.1
LOS by Move:     A    *     *     B    *     *     *    *     *     C    *     B
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:        0.0              0.0              0.0              6.7
```

El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions without Project PM Peak Hour

Level Of Service Computation Report
1994 HCM Unsignalized Method (Future Volume Alternative)

Intersection #7 L. Jennings Park Road/I-8 Eastbound Ramps

Average Delay (sec/veh): 10.1 Worst Case Level Of Service: C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Ignore		
Lanes:	0 0 0 1 0			0 1 0 0 1			1 0 0 1 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	49	26	203	10	179	389	377	42	25	0	419
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00
Initial Bse:	0	51	27	211	10	186	405	392	44	26	0	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	51	27	211	10	186	405	392	44	26	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	51	27	211	10	186	405	392	44	26	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	0	51	27	211	10	186	405	392	44	26	0	0
Adjusted Volume Module:												
Grade:		0%			0%			0%			0%	
% Cycle/Cars:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
% Truck/Comb:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
PCE Adj:	1.10	1.00	1.00	1.10	1.00	1.00	1.10	1.10	1.10	1.10	1.10	1.10
Cycl/Car PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Trck/Cmb PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Adj Vol.:	0	51	27	232	10	186	445	431	48	29	0	0
Critical Gap Module:												
MoveUp Time:	xxxxx	xxxx	xxxxx	2.1	xxxx	xxxxx	3.4	3.3	2.6	3.4	xxxx	xxxxx
Critical Gp:	xxxxx	xxxx	xxxxx	5.0	xxxx	xxxxx	6.5	6.0	5.5	6.5	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	78	xxxx	xxxxx	286	300	10	504	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	1574	xxxx	xxxxx	723	760	1368	541	xxxx	xxxxx
Adj Cap:	xxxx	xxxx	xxxxx	1.00	xxxx	xxxxx	0.87	0.83	1.00	0.39	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	1574	xxxx	xxxxx	630	633	1368	209	xxxx	xxxxx
Level Of Service Module:												
Stopped Del:	xxxxx	xxxx	xxxxx	2.6	xxxx	xxxxx	15.8	14.8	2.7	19.7	xxxx	xxxxx
LOS by Move:	*	*	*	A	*	*	C	*	*	C	*	A
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	669	xxxx	xxxx	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	13.6	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	C	*	*	*
ApproachDel:	0.0			1.4			14.7			19.7		

El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions without Project PM Peak Hour

Level Of Service Computation Report
1994 HCM Operations Method (Future Volume Alternative)

Intersection #14 SR-67 at Mapleview Street

Cycle (sec): 100 Critical Vol./Cap. (X): 1.006
Loss Time (sec): 10 (Y+R = 4 sec) Average Delay (sec/veh): 33.4
Optimal Cycle: 180 Level Of Service: D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Split Phase			Split Phase		
Rights:	Include			Include			Ignore			Ignore		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 2 0 1			1 0 2 0 1			0 1 0 0 1			1 1 0 0 1		
Volume Module:												
Base Vol:	18	970	787	246	461	106	83	135	29	353	101	131
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00	1.04	1.04	0.00
Initial Bse:	19	1009	818	256	479	110	86	140	0	367	105	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	19	1009	818	256	479	110	86	140	0	367	105	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Volume:	19	1009	818	256	479	110	86	140	0	367	105	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	19	1009	818	256	479	110	86	140	0	367	105	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
MLF Adj:	1.00	1.05	1.00	1.00	1.05	1.00	1.00	1.00	0.00	1.05	1.05	0.00
Final Vol.:	19	1059	818	256	503	110	86	140	0	385	110	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	0.85	0.95	1.00	0.85	0.98	0.98	1.00	0.96	0.96	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	0.38	0.62	1.00	1.56	0.44	1.00
Final Sat.:	1805	3800	1615	1805	3800	1615	709	1153	1900	2837	811	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.28	0.51	0.14	0.13	0.07	0.12	0.12	0.00	0.14	0.14	0.00
Crit Moves:			****	****				****			****	
Green/Cycle:	0.05	0.50	0.50	0.14	0.60	0.60	0.12	0.12	0.00	0.13	0.13	0.00
Volume/Cap:	0.22	0.55	1.01	1.01	0.22	0.11	1.01	1.01	0.00	1.01	1.01	0.00
Level Of Service Module:												
Delay/Veh:	29.8	11.3	41.7	72.8	6.1	5.6	76.3	76.3	0.0	60.7	60.7	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.8	11.3	41.7	72.8	6.1	5.6	76.3	76.3	0.0	60.7	60.7	0.0
Queue:	1	20	30	11	6	1	5	7	0	16	6	0

El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions with Project AM Peak Hour

Level Of Service Computation Report
1994 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #2 L. Jennings Park Rd./Julian Ave./El Monte Road

Cycle (sec):	1	Critical Vol./Cap. (X):	0.956
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	5.4
Optimal Cycle:	0	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Ignore			Include		
Lanes:	1 0	0 1	0	1 0	1 1	0	0 1	0 0	1	0 1	0 0	1
Volume Module:												
Base Vol:	60	305	16	24	217	10	19	15	81	41	22	29
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00	1.04	1.04	1.04
Initial Bse:	62	317	17	25	226	10	20	16	0	43	23	30
Added Vol:	0	0	33	22	0	0	0	17	0	8	4	6
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	62	317	50	47	226	10	20	33	0	51	27	36
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	62	317	50	47	226	10	20	33	0	51	27	36
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	62	317	50	47	226	10	20	33	0	51	27	36
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Final Vol.:	62	317	50	47	226	10	20	33	0	51	27	36
Saturation Flow Module:												
Sat/Lane:	384	384	384	349	349	349	167	167	167	238	238	238
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.86	0.14	1.00	1.92	0.08	0.38	0.62	1.00	0.65	0.35	1.00
Final Sat.:	384	332	52	349	668	30	63	104	167	156	82	238
Capacity Analysis Module:												
Vol/Sat:	0.16	0.96	0.96	0.13	0.34	0.34	0.32	0.32	0.00	0.33	0.33	0.15
Crit Moves:		****				****		****			****	
ApproachV/S:		0.56			0.27			0.16			0.24	
Level Of Service Module:												
Delay/Veh:	1.8	37.8	37.8	1.7	3.6	3.6	3.3	3.3	0.0	3.5	3.5	1.8
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.8	37.8	37.8	1.7	3.6	3.6	3.3	3.3	0.0	3.5	3.5	1.8
LOS by Move:	A	E	E	A	A	A	A	A	*	A	A	A
ApproachDel:		8.4			2.8			1.8			2.5	
LOS by Appr:		B			A			A			A	

El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions with Project AM Peak Hour

Level Of Service Computation Report
1994 HCM Unsignalized Method (Future Volume Alternative)

Intersection #3 L. Jennings Park Rd./I-8 Westbound Ramps

Average Delay (sec/veh): 0.8 Worst Case Level Of Service: C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Ignore			Include		
Lanes:	1 0	1 0	1	1 0	0 1	0	0 0	0 0	0	1 0	0 0	1
Volume Module:												
Base Vol:	9	228	384	3	706	0	0	0	0	21	0	170
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00	1.04	1.04	1.04
Initial Bse:	9	237	399	3	734	0	0	0	0	22	0	177
Added Vol:	0	14	0	0	8	0	0	0	0	0	0	19
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	9	251	399	3	742	0	0	0	0	22	0	196
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	9	251	399	3	742	0	0	0	0	22	0	196
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	9	251	399	3	742	0	0	0	0	22	0	196
Adjusted Volume Module:												
Grade:		0%			0%			0%			0%	
% Cycle/Cars:		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx
% Truck/Comb:		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx
PCE Adj:	1.10	1.00	1.00	1.10	1.00	1.00	1.10	1.10	1.10	1.10	1.10	1.10
Cycl/Car PCE:		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx
Trck/Cmb PCE:		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx
Adj Vol.:	10	251	399	3	742	0	0	0	0	24	0	215
Critical Gap Module:												
MoveUp Time:	2.1	xxxx	xxxxx	2.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.4	xxxx	2.6
Critical Gp:	5.0	xxxx	xxxxx	5.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.5	xxxx	5.5
Capacity Module:												
Cnflict Vol:	742	xxxx	xxxxx	650	xxxx	xxxxx	xxxx	xxxx	xxxxx	1006	xxxx	251
Potent Cap.:	759	xxxx	xxxxx	840	xxxx	xxxxx	xxxx	xxxx	xxxxx	277	xxxx	1033
Adj Cap:	1.00	xxxx	xxxxx	1.00	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.98	xxxx	1.00
Move Cap.:	759	xxxx	xxxxx	840	xxxx	xxxxx	xxxx	xxxx	xxxxx	272	xxxx	1033
Level Of Service Module:												
Stopped Del:	4.8	xxxx	xxxxx	4.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	14.4	xxxx	4.3
LOS by Move:	A	*	*	A	*	*	*	*	*	C	*	A
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:		0.1			0.0			0.0			5.3	

El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions with Project AM Peak Hour

Level Of Service Computation Report
1994 HCM Unsignalized Method (Future Volume Alternative)

Intersection #7 L. Jennings Park Road/I-8 Eastbound Ramps

Average Delay (sec/veh): 3.3   Worst Case Level Of Service: B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Ignore		
Lanes:	0 0 0 1 0			0 1 0 0 1			1 0 0 1 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	53	15	129	12	129	89	170	12	3	0	485
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00
Initial Bse:	0	55	16	134	12	134	93	177	12	3	0	0
Added Vol:	0	4	0	5	1	0	11	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	59	16	139	13	134	104	177	12	3	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	59	16	139	13	134	104	177	12	3	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	0	59	16	139	13	134	104	177	12	3	0	0
Adjusted Volume Module:												
Grade:	0%			0%			0%			0%		
% Cycle/Cars:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
% Truck/Comb:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
PCE Adj:	1.10	1.00	1.00	1.10	1.00	1.00	1.10	1.10	1.10	1.10	1.10	1.10
Cycl/Car PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Trck/Cmb PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Adj Vol.:	0	59	16	153	13	134	114	194	14	3	0	0
Critical Gap Module:												
MoveUp Time:	xxxxx	xxxx	xxxxx	2.1	xxxx	xxxxx	3.4	3.3	2.6	3.4	xxxx	xxxxx
Critical Gp:	xxxxx	xxxx	xxxxx	5.0	xxxx	xxxxx	6.5	6.0	5.5	6.5	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	75	xxxx	xxxxx	220	227	13	314	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	1579	xxxx	xxxxx	790	829	1363	696	xxxx	xxxxx
Adj Cap:	xxxx	xxxx	xxxxx	1.00	xxxx	xxxxx	0.92	0.89	1.00	0.73	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	1579	xxxx	xxxxx	726	741	1363	507	xxxx	xxxxx
Level Of Service Module:												
Stopped Del:	xxxxx	xxxx	xxxxx	2.5	xxxx	xxxxx	5.8	6.4	2.7	7.1	xxxx	xxxxx
LOS by Move:	*	*	*	A	*	*	B	*	*	B	*	A
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	764	xxxx	xxxx	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	6.1	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	B	*	*	*
ApproachDel:	0.0			1.3			6.0			7.1		

El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions with Project AM Peak Hour

Level Of Service Computation Report
1994 HCM Operations Method (Future Volume Alternative)

Intersection #14 SR-67 at Mapleview Street

Cycle (sec): 100   Critical Vol./Cap. (X): 0.534
Loss Time (sec): 10 (Y+R = 4 sec)   Average Delay (sec/veh): 18.3
Optimal Cycle: 38   Level Of Service: C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Split Phase			Split Phase		
Rights:	Include			Include			Ignore			Ignore		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 2 0 1			1 0 2 0 1			0 1 0 0 1			1 1 0 0 1		
Volume Module:												
Base Vol:	28	353	208	136	743	66	54	54	26	521	105	158
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00	1.04	1.04	0.00
Initial Bse:	29	367	216	141	773	69	56	56	0	542	109	0
Added Vol:	0	0	11	8	0	0	0	4	0	3	1	2
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	29	367	227	149	773	69	56	60	0	545	110	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Volume:	29	367	227	149	773	69	56	60	0	545	110	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	29	367	227	149	773	69	56	60	0	545	110	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
MLF Adj:	1.00	1.05	1.00	1.00	1.05	1.00	1.00	1.00	0.00	1.05	1.05	0.00
Final Vol.:	29	385	227	149	811	69	56	60	0	572	116	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	0.85	0.95	1.00	0.85	0.98	0.98	1.00	0.96	0.96	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	0.48	0.52	1.00	1.66	0.34	1.00
Final Sat.:	1805	3800	1615	1805	3800	1615	899	963	1900	3033	615	1900
Capacity Analysis Module:												
Vol/Sat:	0.02	0.10	0.14	0.08	0.21	0.04	0.06	0.06	0.00	0.19	0.19	0.00
Crit Moves:	****				****			****			****	
Green/Cycle:	0.03	0.27	0.27	0.16	0.40	0.40	0.12	0.12	0.00	0.35	0.35	0.00
Volume/Cap:	0.53	0.37	0.52	0.52	0.53	0.11	0.53	0.53	0.00	0.53	0.53	0.00
Level Of Service Module:												
Delay/Veh:	38.1	19.2	20.9	26.3	15.1	12.2	28.9	28.9	0.0	17.0	17.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	38.1	19.2	20.9	26.3	15.1	12.2	28.9	28.9	0.0	17.0	17.0	0.0
Queue:	1	9	5	4	17	1	2	2	0	13	3	0

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PPM.CMD                Wed Aug 5, 1998 15:19:51                Page 1-1
------------------------------------------------------------------------------
                            El Monte Golf Course
                          Traffic Impact Analysis
              Future 1998 Conditions with Project PM Peak Hour
------------------------------------------------------------------------------
                      Level Of Service Computation Report
           1994 HCM 4-Way Stop Method (Future Volume Alternative)
******************************************************************************
Intersection #2 L. Jennings Park Rd./Julian Ave./El Monte Road
******************************************************************************
Cycle (sec):          1              Critical Vol./Cap. (X):         0.683
Loss Time (sec):      0 (Y+R =  4 sec) Average Delay (sec/veh):        5.3
Optimal Cycle:        0              Level Of Service:                 B
******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Ignore           Include
Lanes:         1  0  0  1  0    1  0  1  1  0    0  1  0  0  1    0  1  0  0  1
------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:     104    29    33    46   370    36    26    13   121    45    21    29
Growth Adj:  1.04  1.04  1.04  1.04  1.04  1.04  1.04  1.04  0.00  1.04  1.04  1.04
Initial Bse:  108    30    34    48   385    37    27    14     0    47    22    30
Added Vol:      0     0    18    12     0     0     0     9     0    44    22    29
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  108    30    52    60   385    37    27    23     0    91    44    59
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00
PHF Volume:   108    30    52    60   385    37    27    23     0    91    44    59
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  108    30    52    60   385    37    27    23     0    91    44    59
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00
Final Vol.:   108    30    52    60   385    37    27    23     0    91    44    59
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:     318   318   318   309   309   309   193   193   193   284   284   284
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  0.37  0.63  1.00  1.82  0.18  0.54  0.46  1.00  0.67  0.33  1.00
Final Sat.:   318   116   202   309   564    54   104    89   193   191    93   284
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:     0.34  0.26  0.26  0.19  0.68  0.68  0.26  0.26  0.00  0.48  0.48  0.21
Crit Moves:  ****                          ****        ****                    ****
ApproachV/S:     0.30              0.52              0.13              0.34
------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
Delay/Veh:    3.6   2.7   2.7   2.1  13.4  13.4   2.7   2.7   0.0   6.1   6.1   2.2
Delay Adj:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   3.6   2.7   2.7   2.1  13.4  13.4   2.7   2.7   0.0   6.1   6.1   2.2
LOS by Move:    A     A     A     A     C     C     A     A     *     B     B     A
ApproachDel:      3.1               7.2               1.6               3.7
LOS by Appr:       A                 B                 A                 A
******************************************************************************

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------------------------------------------------------------------------------
                            El Monte Golf Course
                          Traffic Impact Analysis
              Future 1998 Conditions with Project PM Peak Hour
------------------------------------------------------------------------------
                      Level Of Service Computation Report
           1994 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #3 L. Jennings Park Rd./I-8 Westbound Ramps
******************************************************************************
Average Delay (sec/veh):       0.8        Worst Case Level Of Service:     C
******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Ignore           Include
Lanes:         1  0  1  0  1    1  0  0  1  0    0  0  0  0  0    1  0  0  0  1
------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:       1   530   283     1   591     0     0     0     0    11     0   153
Growth Adj:  1.04  1.04  1.04  1.04  1.04  1.04  1.04  1.04  0.00  1.04  1.04  1.04
Initial Bse:    1   551   294     1   615     0     0     0     0    11     0   159
Added Vol:      0     8     0     0    44     0     0     0     0     0     0    10
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    1   559   294     1   659     0     0     0     0    11     0   169
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00
PHF Volume:     1   559   294     1   659     0     0     0     0    11     0   169
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Final Vol.:     1   559   294     1   659     0     0     0     0    11     0   169
Adjusted Volume Module:
Grade:             0%               0%               0%               0%
% Cycle/Cars:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
% Truck/Comb:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
PCE Adj:     1.10  1.00  1.00  1.10  1.00  1.00  1.10  1.10  1.10  1.10  1.10  1.10
Cycl/Car PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Trck/Cmb PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Adj Vol.:       1   559   294     1   659     0     0     0     0    13     0   186
Critical Gap Module:
MoveUp Time:  2.1 xxxx xxxxx   2.1 xxxx xxxxx xxxxx xxxx xxxxx   3.4 xxxx   2.6
Critical Gp:  5.0 xxxx xxxxx   5.0 xxxx xxxxx xxxxx xxxx xxxxx   6.5 xxxx   5.5
------------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:  659 xxxx xxxxx   854 xxxx xxxxx  xxxx xxxx xxxxx  1220 xxxx   559
Potent Cap.:  832 xxxx xxxxx   672 xxxx xxxxx  xxxx xxxx xxxxx   208 xxxx   721
Adj Cap:     1.00 xxxx xxxxx  1.00 xxxx xxxxx  xxxx xxxx xxxxx  1.00 xxxx  1.00
Move Cap.:    832 xxxx xxxxx   672 xxxx xxxxx  xxxx xxxx xxxxx   208 xxxx   721
------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
Stopped Del:  4.3 xxxx xxxxx   5.4 xxxx xxxxx xxxxx xxxx xxxxx  18.4 xxxx   6.5
LOS by Move:    A     *     *     B     *     *     *     *     *     C     *     B
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *     *     *     *     *     *     *     *     *     *     *     *
ApproachDel:      0.0               0.0               0.0               7.3

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El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions with Project PM Peak Hour

Level Of Service Computation Report
1994 HCM Unsignalized Method (Future Volume Alternative)

Intersection #7 L. Jennings Park Road/I-8 Eastbound Ramps

Average Delay (sec/veh): 11.9 Worst Case Level Of Service: D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Ignore		
Lanes:	0 0 0 1 0			0 1 0 0 1			1 0 0 1 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	49	26	203	10	179	389	377	42	25	0	419
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00
Initial Bse:	0	51	27	211	10	186	405	392	44	26	0	0
Added Vol:	0	2	0	25	5	0	6	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	53	27	236	15	186	411	392	44	26	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	53	27	236	15	186	411	392	44	26	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	0	53	27	236	15	186	411	392	44	26	0	0
Adjusted Volume Module:												
Grade:	0%			0%			0%			0%		
% Cycle/Cars:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
% Truck/Comb:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
PCE Adj:	1.10	1.00	1.00	1.10	1.00	1.00	1.10	1.10	1.10	1.10	1.10	1.10
Cycl/Car PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Trck/Cmb PCE:	xxxx	xxxx		xxxx	xxxx		xxxx	xxxx		xxxx	xxxx	
Adj Vol.:	0	53	27	260	15	186	452	431	48	29	0	0
Critical Gap Module:												
MoveUp Time:	xxxxx	xxxx	xxxxx	2.1	xxxx	xxxxx	3.4	3.3	2.6	3.4	xxxx	xxxxx
Critical Gp:	xxxxx	xxxx	xxxxx	5.0	xxxx	xxxxx	6.5	6.0	5.5	6.5	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	80	xxxx	xxxxx	318	332	15	536	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	1570	xxxx	xxxxx	693	731	1360	518	xxxx	xxxxx
Adj Cap:	xxxx	xxxx	xxxxx	1.00	xxxx	xxxxx	0.86	0.81	1.00	0.35	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	1570	xxxx	xxxxx	593	594	1360	179	xxxx	xxxxx
Level Of Service Module:												
Stopped Del:	xxxxx	xxxx	xxxxx	2.7	xxxx	xxxxx	19.4	17.6	2.7	23.5	xxxx	xxxxx
LOS by Move:	*	*	*	A	*	*	C	*	*	D	*	A
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	629	xxxx	xxxx	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	16.1	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	C	*	*	*
ApproachDel:		0.0			1.5			17.7			23.5	

El Monte Golf Course
Traffic Impact Analysis
Future 1998 Conditions with Project PM Peak Hour

Level Of Service Computation Report
1994 HCM Operations Method (Future Volume Alternative)

Intersection #14 SR-67 at Mapleview Street

Cycle (sec): 100 Critical Vol./Cap. (X): 1.020
Loss Time (sec): 10 (Y+R = 4 sec) Average Delay (sec/veh): 35.7
Optimal Cycle: 180 Level Of Service: D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Split Phase			Split Phase		
Rights:	Include			Include			Ignore			Ignore		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 2 0 1			1 0 2 0 1			0 1 0 0 1			1 1 0 0 1		
Volume Module:												
Base Vol:	18	970	787	246	461	106	83	135	29	353	101	131
Growth Adj:	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00	1.04	1.04	0.00
Initial Bse:	19	1009	818	256	479	110	86	140	0	367	105	0
Added Vol:	0	0	6	4	0	0	0	2	0	14	5	10
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	19	1009	824	260	479	110	86	142	0	381	110	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Volume:	19	1009	824	260	479	110	86	142	0	381	110	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	19	1009	824	260	479	110	86	142	0	381	110	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
MLF Adj:	1.00	1.05	1.00	1.00	1.05	1.00	1.00	1.00	0.00	1.05	1.05	0.00
Final Vol.:	19	1059	824	260	503	110	86	142	0	400	116	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	0.85	0.95	1.00	0.85	0.98	0.98	1.00	0.96	0.96	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	0.38	0.62	1.00	1.55	0.45	1.00
Final Sat.:	1805	3800	1615	1805	3800	1615	702	1160	1900	2828	820	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.28	0.51	0.14	0.13	0.07	0.12	0.12	0.00	0.14	0.14	0.00
Crit Moves:			****	****			****				****	
Green/Cycle:	0.05	0.50	0.50	0.14	0.59	0.59	0.12	0.12	0.00	0.14	0.14	0.00
Volume/Cap:	0.22	0.56	1.02	1.02	0.22	0.11	1.02	1.02	0.00	1.02	1.02	0.00
Level Of Service Module:												
Delay/Veh:	29.9	11.5	45.6	77.1	6.1	5.7	80.8	80.8	0.0	64.0	64.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.9	11.5	45.6	77.1	6.1	5.7	80.8	80.8	0.0	64.0	64.0	0.0
Queue:	1	21	32	12	7	1	5	7	0	17	6	0

Darnell & ASSOCIATES, INC.

TRANSPORTATION PLANNING & TRAFFIC ENGINEERING

December 7, 1998

Mr. Russ Hunt
Mooney & Associates
9903-B Business Park Avenue
San Diego, CA 92131

D&A Ref. No: 981103

Subject: El Capitan Golf Course Levels of Service

Dear Mr. Hunt:

In response to the letter of comment from the County of San Diego Department of Public Works, dated November 16, 1998, Darnell &Associates has followed the recommendation of the department and prepared a supplemental analysis of the level of service on the segment of Lake Jennings Park Road north of Interstate 8. This two lane segment was reanalyzed using the PM Peak hour traffic volumes, as presented in the Technical Appendices of the Draft EIR Report, and the Highway Capacity Manual methodology. The segment was examined under two scenarios: Existing Conditions and Existing Plus Project Conditions. The result of the analysis found that the actual operational level of service during the period of highest hourly volumes is D, not E, as would be indicated by the application of the County Public Road Standards Level of Service Table. The analysis worksheets are attached.

We hope this analysis is sufficient documentation and conclusive evidence that the level of service for this segment of Lake Jennings Park Road will operate at an acceptable level of service under both scenarios.

If you have any questions concerning the analysis or the findings please call Steve Denny at (619) 233-9373.

Sincerely,

DARNELL & ASSOCIATES, INC.

Steve Denny
Senior Transportation Planner

SD/bm
1103capi.ltr/98-12

1202 KETTNER BLVD • SUITE 6200 • SAN DIEGO, CA 92101
PHONE: 619-233-9373 • FAX: 619-233-4034

12345X

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... Lake Jennings Park N. of I-8
ANALYST.............. S. Denny
TIME OF ANALYSIS..... Pm Peak Hour
DATE OF ANALYSIS..... 11-11-1998
OTHER INFORMATION.... Existing Conditions

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS........................	2
PERCENTAGE OF BUSES.........................	0
PERCENTAGE OF RECREATIONAL VEHICLES.........	2
DESIGN SPEED (MPH)..........................	50
PEAK HOUR FACTOR............................	.95
DIRECTIONAL DISTRIBUTION (UP/DOWN)..........	57 / 43
LANE WIDTH (FT).............................	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	6
PERCENT NO PASSING ZONES....................	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	1	.96	.96
B	2.2	2	2.5	1	.96	.95
C	2.2	2	2.5	1	.96	.95
D	2	1.6	1.6	1	.96	.97
E	2	1.6	1.6	1	.96	.97

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1037
ACTUAL FLOW RATE: 1092

LOS	SERVICE FLOW RATE	V/C
A	103	.04
B	407	.16
C	814	.32
D	1482	.57
E	2599	1

LOS FOR GIVEN CONDITIONS: D

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... Lake Jennings Park N. of I-8
ANALYST.............. S Denny
TIME OF ANALYSIS..... PM Peak Hour
DATE OF ANALYSIS..... 11-11-1998
OTHER INFORMATION.... Existing Plus Project

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS........................	2
PERCENTAGE OF BUSES.........................	0
PERCENTAGE OF RECREATIONAL VEHICLES.........	2
DESIGN SPEED (MPH)..........................	50
PEAK HOUR FACTOR............................	.95
DIRECTIONAL DISTRIBUTION (UP/DOWN)..........	57 / 43
LANE WIDTH (FT).............................	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	6
PERCENT NO PASSING ZONES....................	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	1	.96	.96
B	2.2	2	2.5	1	.96	.95
C	2.2	2	2.5	1	.96	.95
D	2	1.6	1.6	1	.96	.97
E	2	1.6	1.6	1	.96	.97

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1098
ACTUAL FLOW RATE: 1156

LOS	SERVICE FLOW RATE	V/C
A	103	.04
B	407	.16
C	814	.32
D	1482	.57
E	2599	1

LOS FOR GIVEN CONDITIONS: D

Appendix C

Biological Resource Reports

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

5510 Morehouse Dr.
San Diego, CA 92121
619 458 9044
Fax 619 458 0943

98-162-3151
March 27, 1998

Mr. Rick Carpenter
EnviroMINE
3511 Camino Del Rio South
Suite 403
San Diego, California 92108

Subject: El Monte Golf Course Project -- Biological Update and Assessment of the March 1998 Proposed Golf Course Design

Dear Mr. Carpenter:

Ogden Environmental and Energy Services Co., Inc. (Ogden) submits this biological update for the El Monte Golf Course project area and provides an assessment of projected impacts and mitigation associated with the March 1998 proposed golf course design.

INTRODUCTION AND PURPOSE

The biological study area based on topographic maps provided by Steen and Associates encompasses approximately 460 acres and is located in southwestern San Diego County, California immediately east of the community of Lakeside (Figure 1). Additional agricultural land occurs within the northwest portion of the project site boundaries, although no development is proposed in this area and it was not part of the biological study area. The project site is aligned along both sides of the San Diego River, beginning approximately one-half mile east of the intersection of Lake Jennings Park Road and El Monte Road (Figure 2). The property is owned by the Helix Water District and the project proposes a lease arrangement for the purpose of constructing two 18-hole golf courses plus associated facilities (e.g., club house and maintenance facility). Additional information on components of the golf course design (e.g., golf holes, lakes, and planting zones) is included in the Projected Impacts and Habitat Conversions Section.

This report updates and references where appropriate previous biological survey results for the project site. Previous project biological reports include *El Monte Golf Course Preliminary Reconnaissance Biological Report (Marquez & Associates 1996), A Biological Resources Survey Report For the El Monte Canyon Golf Course Project Site (Scheidt 1996),* and *El Monte Golf Course Wetland Delineation Report (Ogden 1997).* The purpose of this report is to provide updated biological survey information from February 1998 surveys and more specific impact analyses based on the latest proposed golf course plan prepared by Golf Properties Design in March 1998.

Survey Methodology

Ogden biologist Jim Prine conducted vegetation surveys at the project site on February 24 and 27, 1998. All areas were surveyed by foot. Limits of vegetation canopies were doublechecked by use of an aerial photograph taken in April 1997. Vegetation mapping was compiled on topographic maps (May 1997; scale 1 inch [in] = 200 feet [ft]) with 2-foot contours. An inventory of individual native (e.g., oak) and non-native trees outside the river corridor was also conducted. Although focused plant and wildlife surveys were not performed during these February surveys (other than the tree inventory), all plant and wildlife species encountered were recorded. On February 24, Jim Prine met Mr. David Fleming of Golf Properties Design onsite to assess potential impacts from the five proposed river crossings (i.e., one entry bridge and four cart paths) which had been surveyed and marked through the river channel with lath stakes and flagging. Scientific nomenclature used throughout this report conforms to Skinner and Pavik (1994) and Jepson (1996) for plants, Holland (1986) for vegetation communities, Unit (1984) for birds, and Jameson and Peeters (1988) for mammals. A summary of previous biological surveys is provided below.

- Biologist Viviane Marquez conducted a general reconnaissance survey on April 3, 1996.

- Biologist Vincent N. Scheidt (with assistance from biologist John Holts) conducted a total of 10 surveys between September 9, 1993 and October 17, 1996. The surveys were conducted to provide a complete inventory of biological resources (i.e., individual plants, vegetation communities, and wildlife species) that could be detected within this timeframe. A major component of the second through eighth field survey efforts was the focused search for Least Bell's vireo (*Vireo bellii pusillus*), willow flycatcher (*Empidonax traillii*), and other riparian associated rare birds. Specific survey dates and additional survey information is included the associated Survey Report (Scheidt 1996).

- Ogden biologists Jim Prine, Bonnie Hendricks and Leslie Hickson conducted wetland delineation surveys on June 12, 16, and 20, 1997 in accordance with the ACOE unified Federal Method (WTI 1991).

EXISTING CONDITIONS

Plants and Vegetation Communities

Plants

One hundred and fifty-three species of native and non-native plants have been identified during the various project surveys. A complete list is provided in Scheidt (1996). Most of the species detected are locally-common species. No rare, endangered, or otherwise sensitive species have been detected during project surveys other than coast live oak (*Quercus agrifolia*) which is considered sensitive by the County of San Diego. Scheidt (1996) lists 18 sensitive species known to occur in the general vicinity of the project site. In addition, a United States Fish and Wildlife Service (USFWS) project comment letter dated December 11, 1997 indicates the site (i.e., river terraces) may provide suitable habitat for San Diego ambrosia (*Ambrosia pumila*).

The mature tree inventory conducted during the February 1998 surveys outside the river channel revealed there are 34 mature coast live oak trees scattered onsite with diameters at breast height (DBH) ranging from approximately 16 to 44 inches. These oaks have remained healthy over time in spite of agricultural activities such as discing that have occurred adjacent to and under their driplines (i.e., canopy edge). In addition, there are 17 mature Western sycamore (*Platanus racemosa*) trees scattered onsite with DBH's ranging from approximately 10 to 40 inches. The locations of these trees are depicted on the Existing Biological Resources and Proposed Development figures (Figures 3 and 4). Four of the 30 coast live oak mapped locations have two trees (Figure 4). Other scattered trees outside the river channel onsite include Fremont cottonwood (*Populus fremontii*), blue elderberry (*Sambucus mexicana*), and a wide variety of ornamental species.

Vegetation Communities

Based on the updated February 1998 surveys, there are five vegetation communities onsite including: agricultural vegetation, coastal sage scrub, tamarisk scrub, disturbed riparian scrub, and riparian woodland. In addition, defined drainage channels onsite outside the San Diego River are designated as waters of the U.S. Table 1 provides a summary of existing habitat acreages onsite.

Agricultural Vegetation. The majority of the upland areas onsite outside the river channel are characterized as agricultural vegetation which either support active agricultural activities, crops, or fallow fields. Many of the fields are disced annually. Some of the agricultural crops have included melons, squash, wheat, and bamboo. The fallow fields support mostly ruderal, weedy herbs and grassess including tumbleweeds (*Amaranthus* sp.), perennial mustard (*Brassica geniculata*), fiddleneck (*Amsinckia intermedia*), wild oat (*Avena* sp.), and brome grass (*Bromus* sp.). Scattered within the agricultural land are 34 mature coast live oak and 17 Western sycamore trees, in addition to other scattered native and non-native shrubs and trees. This habitat totals 364.7 acres within the study area (Table 1).

Coastal Sage Scrub. Regenerated coastal sage scrub habitat occurs in four locations onsite that have not been subject to recent agricultural activities/impacts. Three of these areas occur on the north side of the river, and one area occurs on the south side of the river adjacent to tamarisk scrub habitat (Figures 3 and 4). The primary species include flat-top buckwheat (*Eriogonum fasciculatum* ssp. *fasciculatum*), California sagebrush (*Artemisia californica*), and broom baccharis (*Baccharis sarothroides*). Other species in this habitat include California croton (*Croton californicus*), deerweed (*Lotus scoparius*), brickellbush (*Brickellia californica*) and our lord's candle (*Yucca whipplei*). Native cover in this habitat ranges from approximately 30 to 90 percent, and the habitat is generally in good condition. This habitat totals 1.9 acres within the study area (Table 1). This habitat is considered sensitive by the County of San Diego and USFWS.

Tamarisk Scrub. Tamarisk scrub occurs in a contiguous area south of the river (Figures 3 and 4). Mature and semi-mature tamarisk (*Tamarix gallica*) specimens ranging from approximately 10 to 20 feet high dominate this non-native habitat and account for approximately 95 percent of the overall cover within this vegetation community. Additional mid-story and understory species include mule fat (*Baccharis salicifolia*), blue elderberry, flat-top buckwheat, tree tobacco (*Nicotiana glauca*), stinking gourd (*Cucurbita foetidissima*), and primrose (*Camissonia* sp.). Scheidt (1996) referred to this general area as relict floodplain. This area probably did receive floodwaters periodically before the El Captain Dam/Reservoir was constructed in 1935. This area was examined during the June 1997 wetland delineation surveys and was determined to be non-wetland. This habitat totals 8.4 acres within the study area (Table 1).

Disturbed Riparian Scrub. The disturbed riparian scrub within the San Diego River channel consists of mid-story plant species and younger tree species that are generally under 20 feet in height. Riparian scrub onsite is a fairly generalized plant community that can be more specifically described as consisting of overlapping areas of tamarisk scrub, mule fat scrub, and southern willow scrub depending on the nature and species composition of the plant mix. The riparian scrub onsite is described as disturbed because over half of the plant cover is comprised of non-native species, primarily tamarisk and cottonwood) without directly impacting the trees. Construction monitoring would be necessary to determine actual impacts to riparian woodland. Since this is a sensitive habitat, all the projected permanent and temporary impacts are significant.

Waters of U.S. The proposed project will permanently impact the five waters of the U.S. drainages totaling 0.3 acre. According to the *El Monte Golf Course Environmental Development Program Draft (Golf Properties Design 1997)*, "turf drainage corridors" will replace the existing drainage channels outside the river (although not necessarily in the same locations). These turf drainage corridors will act as catchment zones to capture potential contaminants and prevent adverse affects to ground water quality. A series of topographic lows will capture and extract solids (desiltation) from the runoff waters. The waters overflow will pass to aquatic plant filtration basins, and finally on to water percolation swales as clean water. The system is designed to capture normal rainfall events while passing extreme event overflow through into the river. Although the proposed turf drainage corridors may reduce erosion and improve water quality as compared to the existing drainages, the worst-case analysis is that 0.3 acre of waters of the U.S. will be permanently impacted. Since this is a sensitive resource, the projected impact is significant.

Wildlife and Wildlife Habitat

Creation of the golf course is expected to remove about 1.9 acres of existing coastal sage scrub habitat, which is distributed in several small, isolated patches near the river channel. It will also create over 20 acres of relatively contiguous and strategically located sage scrub habitat in the wildlife movement corridor. Thus, the proposed project will result in a net increase of about 18 acres of coastal sage scrub habitat. This will represent a net increase in habitat value and presumably of coastal sage scrub wildlife species expected to persist on the site.

As discussed above (Vegetation Communities), the project is expected also to affect about 4.0 acres of riparian woodland with selective grading beneath canopies of riparian trees at the top edge of the river channel slope. This may remove some understory that is used as habitat by wildlife, but is not expected to remove or destroy mature trees, which are primarily rooted in the channel bottom.

Wildlife Corridors

The existing east-west corridor along the river channel is likely to become further constrained by construction of golf facilities and by the expected increase in human activity on both sides of the river. In particular, the following golf facilities are expected to negatively affect movement by wildlife along the San Diego River channel:

- The four cart crossings, the one entry bridge crossing, and the equestrian trail crossing will collectively and permanently remove about 0.69 acres of natural vegetation in the river channel (Table 2) and may disrupt natural movement of some species along the river. The bridge, and to a lesser degree the cart and equestrian crossings, may also be perceived as barriers by some species, especially large mammals. Increased human presence in the river channel due to the crossings could further constrain the functionality of the movement corridor, although movements by many species occurs mostly at night when humans will be absent. In addition, construction of these crossings will temporarily remove about 0.90 acres of natural vegetation (Table 2).

- The close proximity of golf holes along either side of the river channel may result in increased noise levels and increased perception of human presence by species using the channel. This may indirectly reduce use of the movement corridor by some species, at least during daylight hours.

On the other hand, removing the existing, unofficial equestrian uses from the river channel should have a positive effect on the movement corridor by allowing recovery of mature vegetation and reducing human intrusion and disturbance in the river channel. This is expected to at least partially offset the project's negative impacts on wildlife use of the river corridor. In total, the net effect of the proposed project is still expected to result in a significant impact to the existing east-west corridor.

The potential north-south movement corridor across the valley will be improved by the proposed golf course design. Current agricultural fields and disturbed areas will be replaced by a contiguous coastal sage scrub habitat area connecting the river channel to existing coastal sage scrub habitats on either side of the valley. However, the two cart path crossings and one equestrian trail located within the wildlife movement corridor will reduce habitat value in the area somewhat, due to increased human presence within the corridor area.

RECOMMENDED MITIGATION

A number of existing project design features will minimize, enhance, and mitigate potential biological impacts. Some of these existing features include a 50-foot wide biological buffer and a 100-foot wide planning buffer that shall be established on both sides of the river banks. The 50-foot wide biological buffer shall have invasive exotics (e.g., tamarisk, giant wild reed etc...) removed and be revegetated with strictly native, indigenous shrubs and herbs, thereby establishing a vegetation barrier on both sides of the river that will prevent encroachment and habitat degradation. The 100-foot planning buffer will be established at the outer edge of the biological buffer and shall preclude the establishment of structures or other improvements (except a bridge and designated paths), but shall permit golf play. Implementation of these buffers should reduce any potential indirect impacts to the riparian habitat (i.e., from noise, light and human intrusion) to below a level of significance. In addition, the project's Environmental Development Plan (Golf Properties Design 1997) has been designed to protect biological values onsite through proper management of, for example, runoff, pesticides, and groundwater.

The following mitigation measures for projected significant impacts should be implemented in addition to those measures which are already part of project design and those discussed by Scheidt (1996). Implementation of these measures should reduce impacts to below a level of significance.

Plants and Vegetation Communities

Plants

- For the 34 coast live oak trees with a DBH of 4 inches or greater that are projected to be indirectly impacted by proposed grading adjacent to their driplines, it is recommended that they be mitigated at a 5:1 ratio utilizing five-gallon container stock. According to the County of San Diego Department of Planning and Land Use Guidelines for Implementation of CEQA (1991), the 10:1 ratio may be reduced with larger specimen replacement trees, providing survivability rates will warrant their installation. Replacement trees are expected to be protected and maintained such that five healthy saplings (vigorously growing trees of two inches or greater diameter) survive for each tree impacted. Based on the recommended replacement ratio of 5:1 (utilizing five-gallon container stock), a total of 170 trees should be planted onsite to mitigate for the 34 trees that will be indirectly impacted. It is recommended that most or all of these replacement trees be installed in the 50-foot wide biological buffer that is proposed on both sides of the river.

- In response to the USFWS project comment letter dated December 11, 1997, a focused survey for San Diego ambrosia along the river terraces should be conducted after May (i.e., this species typically blooms between June and September). [This survey should also be used as an opportunity to re-check for sensitive plant species that are known for the general vicinity, but that have not been detected onsite during past surveys].

- Although an isolated Western sycamore is not a sensitive species, it is recommended that isolated specimens of this species be protected to the extent feasible. Specimens that may be directly or indirectly impacted should be replaced in-kind.

Vegetation Communities

- Coastal Sage Scrub. The impact to 1.9 acres shall be adequately mitigated by the proposed creation of 21.1 acres of coastal sage scrub as part of the wildlife corridor/preserve area. Creation of this habitat onsite will result in over an 11:1 replacement ratio. A detailed coastal sage scrub restoration plan should be prepared by a qualified biologist that details issues such as site preparation, installation specifications, maintenance, monitoring and reporting. To ensure the created habitat is adequately established, maintenance and monitoring typically occurs for three to five years after installation; or until specified success standards are achieved (e.g., cover of desirable native shrubs, and elimination of particular invasive weed species).

- Disturbed Riparian Scrub, Riparian Woodland and Waters of the U.S. The projected permanent and temporary impacts to these three wetland resources shall be mitigated by an onsite habitat restoration program including wetland creation and enhancement. It is recommended that permanent impacts to disturbed riparian scrub and riparian woodland be mitigated at a 3:1 ratio, while permanent impacts to waters of the U.S. be mitigated at a 1:1 ratio. To satisfy typical ACOE and CDFG permitting requirements, temporary impacts to vegetated wetlands should be mitigated at a 2:1 ratio. Assuming the projected impact to 4.0 acres of riparian woodland (CDFG jurisdictional habitat) can be avoided (see mitigation measure below), then the combined permanent vegetated wetland impacts would total 0.69 acre and temporary impacts would total 0.9 acre. Recommended mitigation ratios and acreages are listed below:

  - Permanent impacts to disturbed riparian scrub and riparian woodland total 0.69 acre -- multiplied by a 3:1 ratio equals 2.07 acres.

  - Permanent impacts to waters of the U.S. total 0.3 acre -- multiplied by a 1:1 ratio equals 0.3 acre.

  - Temporary impacts to disturbed riparian scrub and riparian woodland total 0.9 acre -- multiplied by a 2:1 ratio equals 1.8 acres.

Therefore, the recommended wetland mitigation restoration program (excluding mitigation for projected impacts to riparian woodland along the river banks) would total 4.17 acres. A detailed wetland restoration plan should be prepared by a qualified biologist that details issues such as site preparation, installation specifications, maintenance, monitoring and reporting. To ensure the created habitat is adequately established, maintenance and monitoring for wetland programs typically occurs for five years after installation, or until specified success standards are achieved (e.g., cover of desirable native overstory and understory plants, and elimination of particular invasive weed species). As a guideline, ACOE and CDFG typically require that at least 1:1 replacement of all impacts be accomplished by wetland habitat creation (i.e., converting upland into wetland). Based on the projected impacts referenced above, approximately 1.9 acres of the recommended 4.17 acres should involve wetland habitat creation. The remaining 2.47 acres of mitigation could be accomplished through wetland enhancement measures.

The project is currently in the process of identifying the most ecologically appropriate onsite location adjacent to the river to accomplish 1.9 acres of wetland creation. The remainder of the mitigation (i.e., 2.27 acres) is proposed to be accomplished by enhancing the existing riparian habitat in the river within and partially upstream and downstream of the proposed wildlife corridor. Since ACOE and CDFG typically provide 1/2 credit for enhancement mitigation, at least 4.5 to 5.0 acres should be included in this enhancement effort. Enhancement in this situation would involve removal and control of particular invasive weed species (e.g., tamarisk, pampas grass etc...) and possible planting of native species where weed species are removed. Because there is a high volume of invasive weed species upstream of this proposed enhancement location, removal of target weed species would need to occur throughout the life of the golf course project to be effective.

- <u>Avoidance of Projected Riparian Woodland Impacts.</u> Necessary cart path crossings and the entry bridge crossing of the river to complete golf course circulation cannot be avoided, although most or all of the projected impacts from the golf course footprint to riparian woodland that overhangs the channel banks on either side of the river can be avoided. The overlay of the existing habitat and golf course footprint indicate up to 4.0 acres of this edge habitat could be impacted. Most of the riparian tree (e.g., willow and cottonwood) stems that provide canopy overhang on the river banks grow out of the river bottom, such that most of the grading that is proposed on the banks will actually impact scattered native and non-native upland understory species without directly impacting the tree stems. To ensure potential impacts to riparian woodland species do not occur, measures such as protective construction fencing to prevent intrusion and erosion, construction monitoring, and/or project redesign could be implemented. If the projected worst-case impacts do occur to 4.0 acres of riparian woodland, then up to 12 acres of additional mitigation would be required based on a 3:1 replacement ratio.

- <u>Recommendations to Shift Proposed Crossings of the River</u>. During the February 24, 1998 survey, the five proposed river crossings (i.e., one entry bridge and four cart paths) were examined. Golf Properties Design indicated in regard to the cart path crossings, that field adjustments could be made during construction to avoid trees and align the paths between vegetation openings to minimize impacts. Part of the February 1998 field surveys involved determining how potential shifting of the alignments (e.g., east or west) might result in impacts to lesser quality wetland habitat. The first through fourth cart path crossings of the river listed below occur in sequence from west to east. Provided below are the alignment shifting recommendations:

- Cart Path #1. The existing design alignment will traverse through disturbed riparian scrub with approximately 85 percent cover. Shifting this alignment approximately 20 feet west to an open area within the river could result is avoiding vegetation impacts within the channel.

- Cart Path #2. The existing design alignment will traverse through disturbed riparian scrub with approximately 80 percent cover and riparian woodland along the north side of the channel. Shifting this alignment approximately 35 feet east could avoid impacts to riparian woodland.

- Cart Path #3. The existing design alignment will traverse through disturbed riparian scrub with approximately 90 percent cover (dominated by pampas grass and tamarisk) and riparian woodland along the north and south sides of the channel. The alignment is already proposed through low-quality riparian scrub and shifting it in this general area will not avoid riparian woodland habitat. However, for this alignment and the other cart paths, most or all of the tree trunks can be avoided during construction.

- Cart Path #4. The existing design alignment will traverse through disturbed riparian scrub with less than 30 percent cover. Alignment shifting cannot avoid this habtiat type altogether, although due to the sparse cover and space between shrubs, most of the potential shrub impacts can be avoided by marking the final alignment in the field.

- Entry Road Bridge. The existing design alignment will traverse through disturbed riparian scrub with approximately 40 percent cover (i.e., evenly distributed between native and non-native species) and riparian woodland along the north side of the channel. Shifting this alignment approximately 200 feet west could avoid impacts to riparian woodland and would result in impacts to lower quality riparian scrub (i.e., dominated by non-natives such as pampas grass).

Wildlife and Wildlife Habitat

The following mitigation measures should be implemented in addition to those discussed in Scheidt (1996).

The wildlife movement corridor was specifically designed to mitigate for impacts to coastal sage scrub and associated species in the study area, as well as potential impacts to wildlife movement corridors. The approximately 21 acres of coastal sage scrub habitat to be created in the corridor zone should compensate for any adverse effects on these biological resources, subject to the following conditions:

- A habitat restoration plan shall be prepared and implemented for the wildlife corridor/habitat creation area. The goal of the restoration plan shall be to create at least 20 contiguous acres of potential breeding habitat for California gnatcatchers in the river valley. The created habitat shall be configured to accommodate north-south wildlife movement from existing coastal sage scrub habitat, on the north and south valley slopes, to the existing river channel. This corridor area shall have a minimum width of 400 feet and an average width of at least 500 feet across the valley.

- Success of the restoration plan shall be measured by a biological monitoring program to last a minimum of 3 years, or until all success criteria are achieved. The monitoring program will track the success of habitat creation by recording appropriate success criteria for (1) individual plant species (e.g., growth and reproduction by species), (2) appropriate vegetation community characteristics (e.g., species composition, percent canopy closure) and (3) use of the area by gnatcatchers and other wildlife. Specific success criteria shall be defined in the restoration plan.

In addition to habitat creation within the wildlife corridor/habitat creation area, approximately 44 additional acres of the golf course will be landscaped using the Zone 1 (19.2 acres) and Zone 2 (24.9 acres) planting palettes. As discussed above, the Zone 1 palette consists of native coastal sage scrub species and the Zone 2 palette consists of native California shrub species. Areas planted using these palettes are expected to provide some additional habitat value to native wildlife species; however, no specific mitigation credit is expected for these areas, because they are not designed specifically to re-create naturally occurring, native vegetation communities, and because they are primarily small and non-contiguous areas scattered throughout the golf course. However, some of the zone 1 plantings are positioned adjacent to native coastal sage scrub habitat along the project boundaries, and may enhance or expand habitat values in these areas.

Wildlife Corridors

The wildlife corridor/habitat creation area was specifically designed to mitigate for potential impacts to wildlife movement corridors by the project. In addition to the above conditions and mitigation measures discussed in Scheidt (1996), the following condition shall be implemented as part of the biological monitoring program:

- Fencing shall be incorporated along either side of the cart paths and equestrian path wherever they enter or cross the river channel, wildlife corridor/habitat creation area, or other areas specifically designated as biological open space by the golf course design or the Helix Water District Subarea Plan. The fencing shall be designed to prevent golfers, equestrians, or other humans from casual entry into biological resource areas.

- Signage shall be erected at appropriate locations along cart paths and equestrian trails to educate users about the biological resources and prohibited uses in the biological open space areas.

SUMMARY

In summary, from an environmental perspective, the March 1998 golf course design provides significant improvements as compared to past designs. The project has been designed in an attempt to minimize biological impacts and to be compatible with the local landscape and environment. The project also provides some positive biological net benefits over and above existing conditions (e.g., conversion of agricultural land to coastal sage scrub). Unavoidable significant biological impacts resulting from the project can be mitigated to below a level of significance with measures included in this letter and proposed by Scheidt (1996). If you have questions concerning information provided in this letter, please contact Jim Prine or Dr. Wayne Spencer at (619) 458-9044.

Sincerely,

James D. Prine

James D. Prine
Biologist

Wayne Spencer

Dr. Wayne Spencer
Wildlife Biologist

JDP/alo

Enclosures

cc: Contract #3-1899-1000-1003

References:

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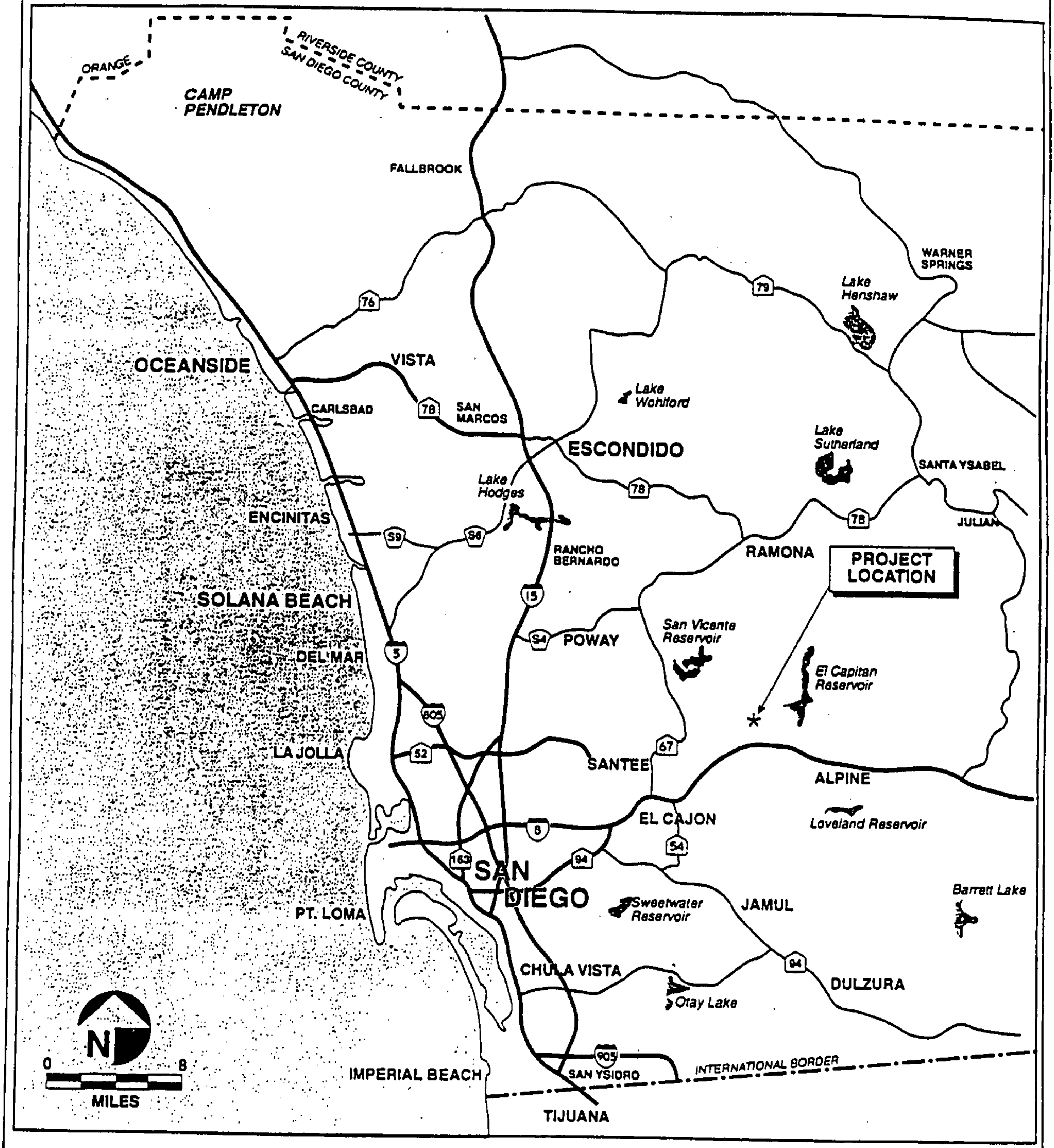
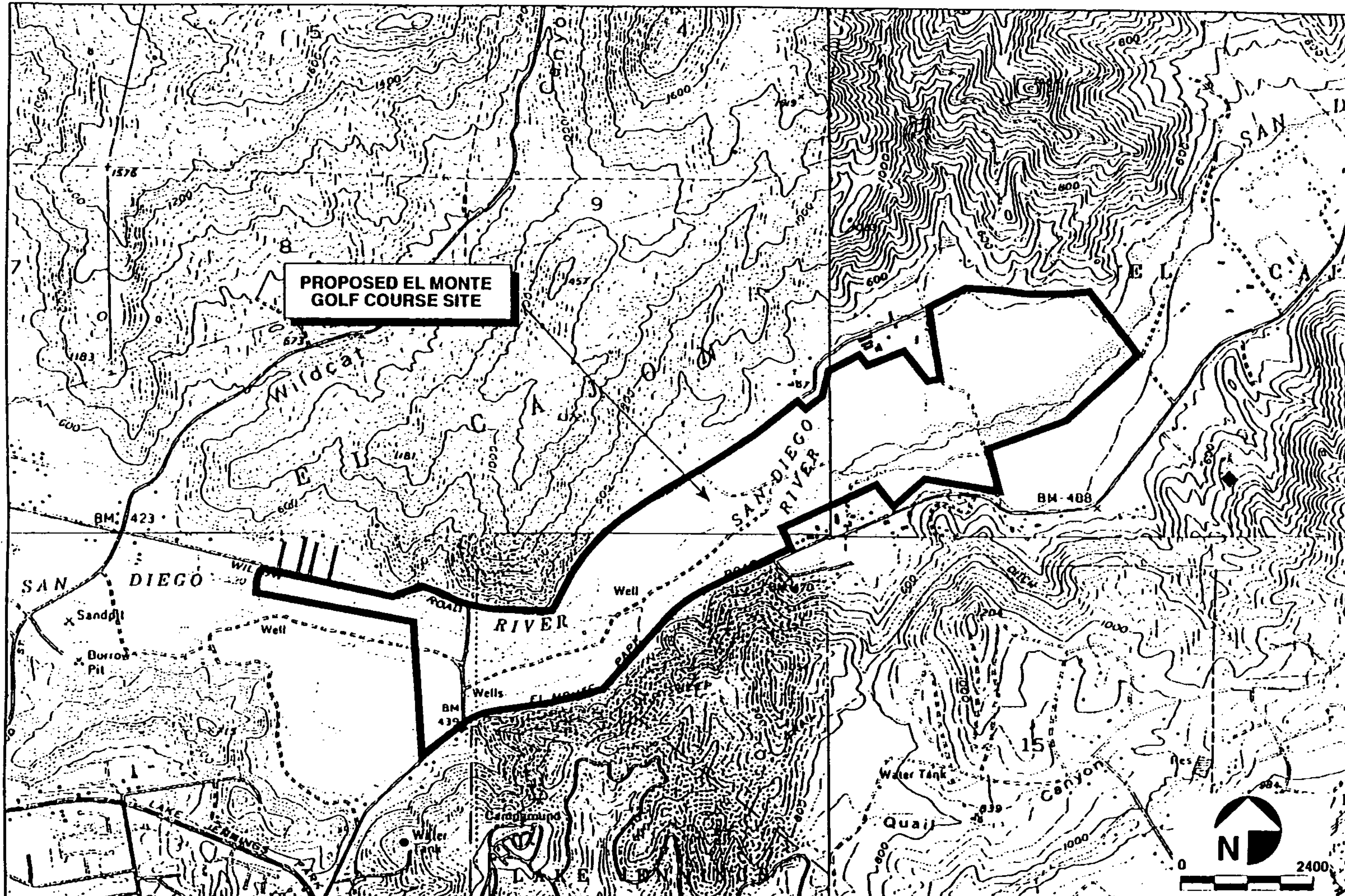


OGDEN

Regional Location Map

FIGURE 1



SOURCE: U.S.G.S. 7.5 Min. Quadrangle Maps of Alpine, El Cajon, El Cajon Mtn ,and San Vicente Res., California

OGDEN

Vicinity Map of El Monte Golf Course Site

FIGURE

2

Table 1

EL MONTE GOLF COURSE PROJECT
EXISTING HABITATS AND PROJECTED PERMANENT IMPACTS (in acres)
MARCH 1998

Habitats	Existing	Projected Impacts					Total Impacts	Remaining Open Space
		Golf Course and Facilities[1]	Created Lakes	Wildlife Corridor[2] (CSS)	Natural Plantings Zones[3] 1/2	Equestrian Trail		
Agriculture	364.7	279.0	19.3	20.7	19.2/24.1	1.5	363.8	0.9
Tamarisk Scrub	8.4	7.55	--	0.35	--/0.5	--	8.4	0.0
Coastal Sage Scrub	1.9	1.7	--	--	--/0.2	--	1.9	0.0[4]
Disturbed Riparian Scrub	59.8	0.52	--	--	--/--	0.04	0.56	59.24
Riparian Woodland (ACOE/CDFG)	21.2	0.08	--	--	--/--	0.01	0.09	21.11
Riparian Woodland (CDFG only)	4.1	3.90[5]	--	--	--/0.1[5]	0.004	4.0	0.1
Waters of the U.S.	0.3	0.3	--	--	--/--	--	0.3[6]	0.0
Totals	**460.4**	**293.05**	**19.3**	**21.1**	**19.2/24.9**	**1.55**	**379.1**	**81.4**

1. Golf course and facilities includes all golf turfed areas (i.e., holes and practice areas), entry roads, cart paths and associated facilities and buildings (e.g., club house and maintenance building).
2. Wildlife corridor is the coastal sage scrub (CSS) habitat creation/preserve area that is proposed for the north and south sides of the river.
3. Natural planting Zone 1 includes a pure native coastal sage scrub palette (also used for the wildlife corridor). Zone 1 includes the designated areas outside the wildlife corridor/preserve area. Zone 2 is a native California shrub palette with species from within and outside the region.
4. The 0.0 acres under Remaining Open Space denotes the existing 1.9 acres will be completely impacted by the project, although the project design proposes the creation of 21.1 acres of coastal sage scrub in the wildlife corridor/preserve (plus an additional 19.2 acres of Zone 1 CSS planting) that will be preserved in open space.
5. Based on a worst-case analysis, 4.0 acres of riparian woodland (CDFG jurisdictional) may be impacted by the project. Of this total, only 0.04 would be permanently impacted by the river crossings (i.e., cart paths, entry bridge and equestrian trail) listed in Table 2. The remaining impact is projected from the golf course footprint/grading and associated planting zones. Most of the tree stems that provide canopy overhang on the river banks grow out of the river bottom, such that the majority of grading that will occur on these banks will actually impact native and non-native upland understory species under the riparian woodland trees (e.g., willow and cottonwood).
6. The five waters of the U.S. drainages will be replaced with turfed drainage corridors.

Table 2

EL MONTE GOLF COURSE PROJECT
EXISTING WETLAND HABITATS AND PROJECTED PERMANENT AND TEMPORARY MPAC FROM CART PATHS, ENTRY BRIDGE AND EQUESTRIAN TRAIL (in square feet and acres)
MARCH 1998

Habitats	**Existing**	**Impacts**[1,2]					
Habitats		First Cart Path Perm./Temp.	Second Cart Path Perm./Temp.	Third Cart Path Perm./Temp.	Fourth Cart Path Perm./Temp.	Entry Bridge Perm./Temp.	Equestrian Trail Perm./Temp.
Disturbed Riparian Scrub	59.8 ac.	2,800/2,800 sq. ft./sq. ft.	2,200/2,200 sq. ft./sq. ft.	2,900/2,900 sq. ft./sq. ft.	3,500/3,500 sq. ft./sq. ft.	11,400/18,600 sq. ft./sq. ft.	1,760/2,200 sq. ft./sq. ft.
Riparian Woodland (ACOE/CDFG)	21.2 ac.		600/600 sq. ft./sq. ft.	1,200/1,200 sq. ft./sq. ft.		1,520/2,480 sq. ft./sq. ft.	480/600 sq. ft./sq. ft.
Riparian Woodland (CDFG only)	4.1 ac.		200/200 sq. ft./sq. ft.	600/600 sq. ft./sq. ft.		760/760 sq. ft./sq. ft.	160/200 sq. ft./sq. ft.
Waters of the U.S.	0.3 ac.						
Totals		**2,800/2,800 sq. ft./sq. ft.**	**3,000/3,000 sq.ft./sq. ft.**	**4,700/4,700 sq. ft./sq. ft.**	**3,500/3,500 sq. ft./sq. ft.**	**13,680/22,320 sq. ft./sq. ft.**	**2,400/3,000 sq. ft./sq. ft.**
	85.4 ac.	**0.065/0.065 ac./ac.**	**0.07/0.07 ac./ac.**	**0.11/0.11 ac./ac/**	**0.08/0.08 ac./ac/**	**0.31/0.51 ac./ac/**	**0.05/0.07 ac./ac/**

1 The first through fourth proposed cart path crossing of the river occur in sequence from west to east.
2 Additional wetland impacts to waters of the U.S. and riparian woodland (CDFG jurisdictional habitat) resulting from the golf course (e.g., turfed areas and associ are included in habitat impact summary totals in Table 1.

Zone 1—Native plants—Animal linkage corridor

N— Native
CN— Nativ
O— Orname
C— Hortic

Shrubs—-coastal sage scrubs

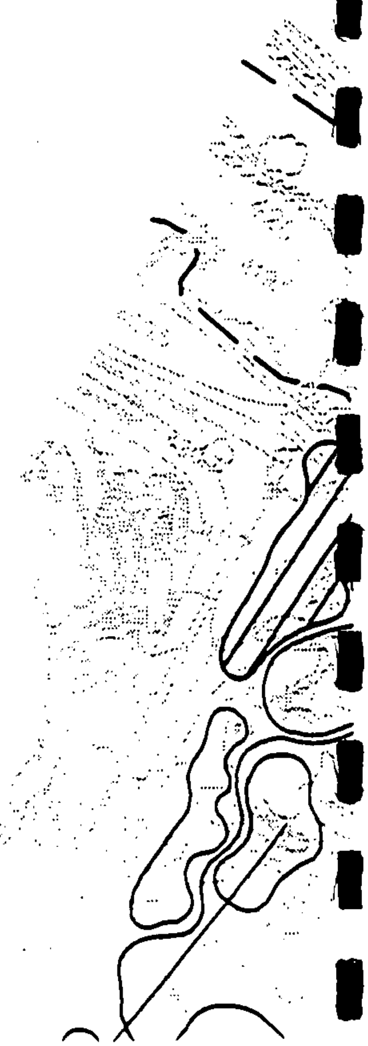
N	Artemisia californica	California sagebrush
N	Baccharis pilularis	coyote bush
N	Brickella califonica	California brickellbush
N	Encelia californica	California encelia
N	Eriogonum fasciculatum	flat—top buckwheat
N	Isocoma venetus	coastal goldenbrush
N	lotus scoparius	deerweed
N	Ribes speciosum	fushia—flower gooseberry
N	Salvia apiana	white sage
N	Salvia mellifera	black sage
N	Viguiera lacinata	San Diego sunflower

Large Shrubs & Trees

N	Heteromeles arbutifolia	toyon
N	Rhus laurina	laurel sumac
N	Platanus racemosa	California sycamore
N	Populus fremontii	western poplar
N	Quercus agrifolia	coast live oak
N	Sambucus mexicana	blue elderberry

Zone 2—California adaptable natives—Low shrubs
golf & passive animal linkage

N	Sambucus mexicana	California sagebrush
N	Encelia californica	California encelia
N	Eriogonum fasciculatum	flat—top buckwheat
N	Penstemon centranthifolius	Scarlet bugler
N	Ribes speciosum	fushia—flower gooseberry
N	Salvia apiana	white sage
N	Salvia mellifera	black sage
N	Viguiera lacinata	San Diego sunflower
N	Rosa californica	wild rose
CN	Arctostaphylos edmundsii	little sur manzanita
N	Arctostaphylos glaucal	big berried manzanita
CN	Arctostaphylos densiflora	Howard McMinn manzanita
CN	Ceanothus griseus "Yankee pt"	Yankee point ceanothus
N	Ceanothus crassifolius	heavy leaf ceanothus
N	Mimulus puniceus	red monkey flower
N	Rhamnus californica	coffee berry
N	Rhamnus crocea	red berry



A BIOLOGICAL RESOURCES SURVEY REPORT FOR
THE EL MONTE CANYON GOLF COURSE PROJECT SITE
W.O. #2502
LAKESIDE PLANNING AREA
COUNTY OF SAN DIEGO.

Prepared for

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January 1995
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SUMMARY

The approximately 500-acre El Monte Canyon Golf Course project site (W.O. #2502) east of Lakeside in unincorporated San Diego County was surveyed for sensitive biological resources in the spring and summer of 1994, spring of 1996 (by Viviane Marquez), and fall of 1996. Three major plant associations were identified during the survey; Riparian Scrub (including Southern Willow Scrub, Tamarisk Scrub, Mule Fat Scrub, and small patches of Freshwater Marsh), Active and Fallow Agricultural Vegetation, and Relict Floodplain Vegetation in a few areas isolated from the active floodway but not subject to recent agricultural conversion. In addition, limited areas of disturbed vegetation and ornamental plantings are located on and at the fringe of the San Diego River floodplain. Riparian Scrub habitats are considered sensitive biological resources in San Diego County. One hundred and fifty-three species of plants and sixty-eight species of animals were identified onsite. Fourteen of the animals are considered sensitive species. These are Orange-throated Whiptail, Coastal Whiptail, Cooper's Hawk, Prairie Falcon, American Kestrel, Turkey Vulture, Red-shouldered Hawk, Great Horned Owl, Barn Owl, Great Blue Heron, Yellow-breasted Chat, Western Bluebird, Bewick's Wren, and Greater Roadrunner. Both direct and indirect project-related impacts associated with this project are discussed in detail. Comprehensive mitigation measures are presented, including riparian corridor buffering, oak and sycamore management, revegetation, and other measures.

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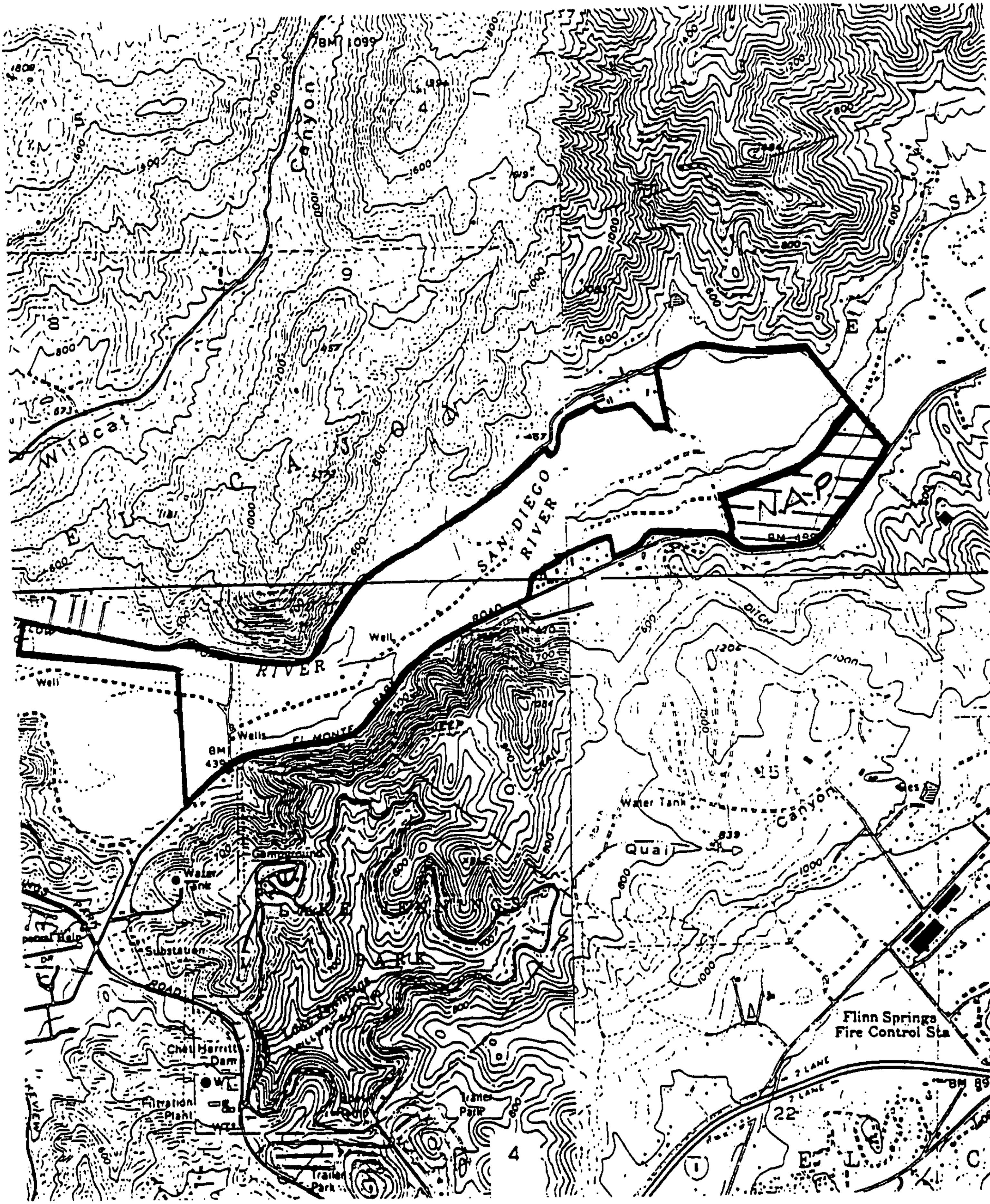

INTRODUCTION

This report presents the findings of a series of biological resources field surveys of the approximately 500-acre El Monte Canyon Golf Course project property located off El Monte Road in the Lakeside Planning Area of the County of San Diego (Figure 1). The subject property, wholely within the historical floodplain of the San Diego River, is owned and managed by the Helix Water District (formerly known as the Helix Irrigation District). The District is acting as Lead Agency in this project application, with the County of San Diego, California Department of Fish and Game, and U.S. Army Corps of Engineers functioning as Responsible Agencies. Development of this site as proposed would result in conversion of areas currently supporting mostly active and fallow agriculture to public golf course lands, with associated amenities, including fairways, parking lots, a club house, driving range, etc. The floodway of the San Diego River, currently contained within an open, unimproved, flood-control channel, will not be significantly disturbed during site development and long-term (50-year) site use, although six bridge crossing of the river are anticipated. Anticipated impacts to biological resources present on this site could or would be the direct or indirect result of grading for site improvement, the removal of mature oak or sycamore trees, roadway, bridge, and golf cart path construction, clearing of vegetation for ornamental landscaping, and other alterations of the existing character of the property.

The purpose of this report is (1) to assess the local and regional significance of biological resources present on and adjacent to the project site, (2) identify all project-specific direct and indirect impacts, and (3) propose the implementation of specific mitigation measures, as required under provisions of the California Environmental Quality Act (CEQA), the Resource Protection Ordinance (RPO), the Endangered Species Acts (FESA, CESA), and other environmental regulations. To this end, an inventory of the site's biota has been prepared, and a directed search for signs of rare, endangered, or otherwise sensitive plant communities (habitats) and species has been conducted. All sensitive plants, animals, and habitats known from the general vicinity of this property were researched prior to initiation of the field survey.

SITE DESCRIPTION AND PRESENT LAND USE

The El Monte Canyon Golf Course project site consists of an irregularly-shaped, 500-acre parcel of mostly vacant agricultural land located immediately north of and abutting El Monte Road to the south, and abutting Willow Road on the north. East of the site are contiguous agricultural areas within the historical floodplain of the San Diego River. To the west is the Nelson & Sloan Company's relatively large sand-extraction site. The project site may be characterized physiographically as a portion of the broad, historical floodplain of the upper San Diego River within the El Monte Canyon, approximately midway between the community of Lakeside and the El Capitan Reservoir. The slopes of the surrounding hillsides to the north and south support mostly Diegan Coastal Sage Scrub and Southern Oak Woodland plant communities. Most of the site is relatively flat, although a few moderately sloping areas are present at the margins of the river floodway and at the edges of the historical floodplain. The San Diego River, forming a narrow and highly modified riparian corridor, bisects the property within a man-made, unimproved, trapezoidal channel into disjunct northern and southern sections. The vast majority of the site supports agricultural vegetation or fallow fields. Several graded dirt roads provide access to various areas of the site along the southern property line from El Monte Road. Small clusters of residential homes are present in the immediate vicinity of the site to the north and south. The vegetation on this site is typical of that found in the project's general vicinity. Soil types onsite include Riverwash (Rm) within the floodway of the San Diego River, Tujunga Sand (TuB) on slopes between 0 and 5 percent, Visalia Sandy Loams (VaA, VaB) on slopes between 0 and 2 percent. and 2 and 5 percent, respectively, and Greenfield Sandy Loams (GrC) on slopes between 5 and 9 percent. These substrates are not recognized as types which support large numbers of sensitive plant species. Signs of human use of the site are numerous, and include agricultural site uses, dumping and stockpiling of materials in several areas, fences and equestrian trails through the riparian area and in other locations, and many others. Very few areas of the project site could be considered to be in a "natural" state, i.e.; supporting high-quality, indigenous, native vegetation. However, the long-term agricultural use of the property has permitted a diverse assemblage of native plants and animals to persist, albeit in diminished numbers, on this site.

SURVEY METHODS AND LIMITATIONS

Biological field surveying of the El Monte Canyon Golf Course project site was performed in 1993 and 1994 by Vincent N. Scheidt (VNS), a San Diego County-certified Biological Consultant and the author of this report. Assisting in the field on occasion was John Holts (JH), Associate Field Biologist. All field reconnaissance surveys were conducted on foot, following an irregular route, and all areas of the site were visited and inventoried several times for biotic components. Each identified habitat-type was visited and thoroughly examined several times during the survey period. Additional time was spent in areas of biological diversity, such as along the margin of the floodway, in the vicinity of debris piles, adjacent to edges of the roadways, etc.

Viviane Marquez (VM) of Marquez and Associates provided a follow-up survey in April of 1996. This resulted in the production of a separate technical report, *"El Monte Golf Course Preliminary Reconnaissance Biological Report"*, dated 11 April 1996. A copy of that report is attached (Attachment A).

Most recently, additional field surveying was conducted by the author in September and October 1996 with the intent of revisiting and mapping habitats, mapping mature oak and sycamore trees, and verifying site conditions as they exist at this time.

Field surveys of the El Monte Canyon Golf Course project site were conducted on the following days and under the following conditions:

Date	Hours	Personnel	Conditions
9 September 1993	08:00-9:30	VNS	Clear, mild, 60's to low 70's no breeze
27 May 1994	08:00-12:00	VNS	Overcast to partially-clear, mild, upper 50's to to low 70's no breeze

3 June 1994	07:30-11:30	VNS	Hazy sun upper 60's to low 80's no breeze
9 June 1994	07:00-11:00	VNS	Sunny, mild light "Santa Ana" conditions mid 60's to upper 80's no breeze
20 June 1994	08:00-11:45	VNS	Clear, mild high 60's to upper 80's light breeze
27 June 1994	07:00-11:00	VNS, JH	Clear, mild mid-70's to high 80's no breeze
5 July 1994	08:00-11:30	VNS, JH	Sunny, mild mid-70's to mid-80's light breeze
15 July 1994	07:30-11:00	VNS	Hazy sun, mild high 60's to mid-70's no breeze
22 July 1994	07:00-10:45	VNS	Sunny, mild low 60's to low 70's light breeze
3 April 1996	11:00-15:05	VM	Sunny, 70 to 85 degrees winds 0-4 mph
12 September 1996	10:00-13:00	VNS	Sunny, mild low to mid 70's light breeze
8 October 1996	7:00-9:00	VNS	Hazy sun mid 60's no breeze
17 October 1996	12:00-15:00	VNS	Sunny, mild mid 70's to mid 80's light westerly breeze

Animals encountered onsite were identified with the aid of 10 x 25, 7 x 35, and 10 x 40 power binoculars as needed. Some species were detected on the basis of characteristic scats, tracks, dens, and/or calls observed. No trapping was conducted, thus limiting the completeness of the fauna inventory to a degree. Most nocturnal mammals would have been missed because trapping was not conducted. Further limitations to the completeness of the fauna survey were imposed by temporal, weather-related, and seasonal factors. A major component of the second through eighth field survey efforts was the focused search for Least Bell's Vireo *(Vireo bellii pusillus)*, Willow Flycatcher *(Empidonax traillii)*, and other riparian-associated rare birds. This was done in conjunction with ongoing site inventorying and habitat analysis. Species-specific surveying protocols, including an eight-week breeding bird survey, were utilized during all field surveys for these sensitive bird species. The April 3 field survey, as mentioned before, was conducted by Viviane Marquez with the intent of providing a preliminary field study.

Plants observed were identified *in situ*, or on the basis of characteristic samples collected and returned for later laboratory identification. Limitations to the completeness of the floral survey and inventory were also imposed by seasonal factors. Surveying during other times of the year would probably increase the total site flora by up to 10 percent. However, the extensive amount of time spent in the field over a relatively long period of time maximized the detectability of most perennial species and many persistent annuals. Most resident species of plants were likely detected at one time or another during the field surveying.

Nomenclatural sources used in this report are standard field guides and monographs. These include Munz (1974) (*flora*), Unitt (1984) (*birds*), Stebbins (1985) (*herpetofauna*), Jameson and Peeters (1988) (*mammals*), and Holland (1986) (*vegetation*).

RESULTS OF THE SURVEY - FLORA/VEGETATION

One hundred and fifty-three species of native and non-native plants were identified during the field surveys of the El Monte Canyon Golf Course project site. These are listed alphabetically in Table 1.

FIGURE 2. BIOLOGICAL RESOURCES - THE EL MONTE CANYON GOLF COURSE PROPERTY.

(See map pocket, Attachment B, at back of report)

Most of the plants detected are locally-common species, abundant in the site's vicinity. No rare, endangered, or otherwise sensitive plants were detected during the course of the field investigations. However, a number of sensitive plant species are known to occur in the general vicinity of this property, and several probably occur on the scrub-covered hillsides to the north and south of the project site. Sensitive plants are listed and discussed in Table 3. A number of weedy plants, as indicated in Table 1, were observed onsite. Most of these were directly associated with disturbed areas adjacent to El Monte Road or Willow Road, or in areas within active agriculture, although others were invasive in the native habitat. One of these (*Tamarix* or Salt Cedar) appears to be a significant threat to the integrity of the native wetland vegetation on this property. Permanent eradication of this noxious pest from active riparian areas is effectively impossible, however.

Three overlapping plant associations were identified on the El Monte Canyon Golf Course project site. These are Riparian Scrub (including Southern Willow Scrub, Tamarisk Scrub, Mule Fat Scrub, and very small patches of Freshwater Marsh) within the floodway of the San Diego River, Active and Fallow Agricultural Vegetation in upland areas of the floodplain, and Relict Floodplain Vegetation in a few areas isolated from the active floodway but not subject to recent agricultural conversion. In addition, limited areas of disturbed vegetation are present onsite adjacent to the shoulder of El Monte Road, and ornamental plantings surround several homes on and at the fringe of the floodplain. Riparian habitats are considered sensitive plant communities in San Diego County. The distribution of plant communities observed on this site is illustrated in Figure 2.

Riparian Scrub

A relatively narrow strip of Riparian Scrub vegetation is present within the immediate floodway of the San Diego River. The vegetation within this "generalized" plant community may be further characterized as Southern Willow Scrub, Mule Fat Scrub, or Tamarisk Scrub, depending on the nature and species composition of the plant mix, extent and duration of inundation and hydration, degree of disturbance, and other factors. Also present are very small patches of Freshwater Marsh vegetation infused into the scrub. Southern Willow Scrub is a dense wetland plant association dominated by various species of willow, including Southwestern Willow *(Salix gooddingii)*, Arroyo Willow *(Salix lasiolepis)*, Shining Willow *(Salix lucida* ssp. *lasiandra)*, and Sandbar Willow *(Salix hindsiana)*, with Western Cottonwood *(Populus fremontii)*, and other mesophilous trees, shrubs, and herbaceous elements. Mule Fat Scrub similarly supports various willows, although Mule Fat *(Baccharis glutinosa)* is a dominant species within the assemblage, and the vegetative height is lower overall. Tamarisk Scrub supports Salt Cedar *(Tamarix gallica)* along with other native and non-native wetland species, including willows and Mule Fat. This weedy, non-native species commonly devastates indigenous, native wetland habitats by removing much groundwater from available aquifers and by crowding out and competing with less aggressive native plants.

Significant changes to the hydrology of the upper San Diego River have taken place over the last several decades. For one, the impoundment of runoff waters behind El Capitan Dam has severely reduced the amount of flowage through this section of the river, hence significantly altering the natural vegetation in the historical floodplain. Agricultural conversion of floodplain areas currently above the limits of the existing floodway (above the current 100-year flood line) have further impacted native vegetation in this area. Other changes reflect an infusion of non-native weedy elements and the degrading effects of these non-indigenous plants and animals. Finally, human encroachment through river channelization, and equestrian and residential usage of the river valley have significantly impacted the nature of the riparian wetland vegetation formerly and currently on this site.

Agricultural Vegetation

Effectively all upland area within the floodplain, with the exception of residential areas and relict floodplain areas (see below) support active agriculture or fallow fields. Crops such as melons, squash, wheat, bamboo, and others were evident in active areas; fallow areas support mostly ruderal, weedy herbs and grasses, including tumbleweeds *(Amaranthus* spp.*)*, Perennial Mustard *(Brassica geniculata)*, wild oat *(Avena* spp.*)*, and many others. Most of the areas within active agriculture are disced at least annually. It is also assumed that areas not currently in active planting are rotated with crops as market conditions dictate. A few narrow strips along fence lines, at the edge of the floodway and the floodplain, etc. support a mixture of native and non-native plants, including Flat-top

Buckwheat *(Eriogonum fasciculatum)* and California Sagebrush *(Artemisia californía)*. These areas retain a degree of natural habitat value, although they do not constitute a discrete habitat, *per se*.

Relict Floodplain Vegetation

A number of very small areas on the subject site support Relict Floodplain Vegetation plant assemblages. These spots are highly fragmentary, and located at the edges of the agricultural areas, usually in somewhat protected locations such as adjacent to slopes, along fence lines, or in other areas protected from ongoing tillage and planting. The largest area of relict floodplain, illustrated in Figure 2, is found along the southern edge of the property in an area adjacent to El Monte Road between a bamboo plantation on the west, a small residential area on the east, and the San Diego River on the north. Indicator species found in this location include a number of native and non-native species, such as buckwheat *(Eriogonum)* and primrose *(Camissonia)*, together with large specimens of Salt Cedar *(Tamarix gallica)* and an open ground-cover of Red-stem Stork's-bill *(Erodium cicutarium)* and others which suggest that this area has not been subject to agricultural conversion within at least a generation prior to the field survey. Light grazing could very well have occurred in this area in the relatively recent past. Prior to river channelization, these relict floodplain habitat areas were probably subject to regular, periodic natural flooding. Although within the historical floodplain, the Relict Floodplain Vegetation on this site does not constitute a jurisdictional wetland.

RESULTS OF THE SURVEY - FAUNA

Sixty-eight species of vertebrates were observed or detected as occurring on the El Monte Canyon Golf Course project site during the course of the field surveys. These are listed alphabetically by Class in Table 2. Most are common Lakeside-area residents or locally common migratory species. Two of the reptiles and twelve of the birds observed are considered sensitive species in the San Diego County area. These are Orange-throated Whiptail, Coastal Whiptail, Cooper's Hawk, Prairie Falcon, American Kestrel, Turkey Vulture, Red-shouldered Hawk, Great Horned Owl, Barn Owl, Great Blue Heron, Yellow-breasted Chat, Western Bluebird, Bewick's Wren, and Greater Roadrunner.

Sensitive animals observed on this site or known from the site's vicinity are discussed in detail in sections which follow.

Fish

Fish were neither observed nor anticipated due to a lack of persistent surface water. Non-native species such as Mosquito Fish *(Gambusia affinis)* or others could persist here on a temporary basis as wash-downs from vector control areas upstream of the site during rainy winter months.

Amphibians

One species of common amphibian was detected during the course of the field survey. This is Western Toad *(Bufo boreas)*, a well-known local species. Western Toad is represented on this property by the sighting of a single road-killed specimen found along the shoulder of El Monte Road. This species is undoubtedly common on the subject site, especially in mesic areas. Three or four additional species of amphibians very likely occur on this site. These are species known to occur in habitat similar to that present found here. Anticipated other species include Garden Slender Salamander, Pacific Treefrog, Monterey Salamander, Arboreal Salamander, and possibly others. One sensitive amphibian which historically occurred on this site is the Arroyo Toad *(Bufo microscaphus californicus)*, a federally-listed Endangered Species. This species is discussed subsequently.

Reptiles

Six species of cismontane reptiles were observed during the survey. These are Orange-throated Whiptail *(Cnemidophorus hyperythrus)*, Coastal Whiptail *(Cnemidophorus tigris)*, Western Fence Lizard *(Sceloporus occidentalis)*, Side-blotched Lizard *(Uta stansburiana)*, Common Kingsnake *(Lampropeltis getulus)*, and Red Racer *(Masticophis flagellum)*. Orange-throated Whiptails and Coastal Whiptails are represented onsite by sightings in various less-disturbed areas of the property. Orange-throated Whiptails occur primarily on the transitional upland fringe of the floodway and in other upland areas. Coastal Whiptails occur at the margins of the floodway proper. Both of these latter species are considered sensitive in San Diego County. Western Fence Lizards were relatively common in various areas of both the floodway and upper ruderal areas of the site, especially in the vicinity of debris, down trees, etc. Side-blotched Lizards were also seen in fair numbers, especially in the more open, flattish areas along the fringes of the floodplain. A single Common Kingsnake was seen dead on El Monte Road. This species is known to be relatively common in the vicinity of this site. Likewise, a single Red Racer, a fast-moving and very active diurnal serpent, was seen moving through the brush at the edge of the floodway. A substantial number of other reptiles likely occur on this property, but were not detected. This was principally a function of the cryptic nature of most reptiles and the season of the field surveys. Additional reptile species which could be expected to occur onsite include Common Gopher Snake, Coastal Glossy Snake, Western Longnose Snake, Red Diamond Rattlesnake, Southern Pacific Rattlesnake, Two-striped Garter Snake, Striped Racer, San Diego Ringneck Snake, Southwestern Black-headed Snake, San Diego Alligator Lizard, San Diego Night Snake, Western Skink, and possibly others.

Mammals

Ten species of generally common mammals were detected or observed on the property. These are Coyote *(Canis latrans)*, Opossum *(Didelphis marsupialis)*, Pacific Kangaroo Rat *(Dipodomys agilis)*, Pocket Mouse *(Perognathus* sp.*)*, Desert Cottontail *(Sylvilagus audubonii)*, Valley Pocket Gopher *(Thomomys bottae)*, California Ground Squirrel *(Spermophilus beecheyi)*, Striped Skunk *(Mephitis mephitis)*, feral Cat *(Felis catus)*, and Gray Fox *(Urocyon cinereoargenteus)*. Coyote and Gray Fox were detected on the basis of characteristic scats seen. Pacific Kangaroo Rat and Pocket Mouse were identified on the basis of characteristic dust "baths" and burrows seen in several places. Valley Pocket Gopher burrows were seen on the slopes leading down to the floodway. Several Desert Cottontails were observed moving about the property during early morning hours. California Ground Squirrels were also seen moving about in the vicinity of lumber piles and near the bases of mature trees. The carcass of a Striped Skunk, Opossum, and a feral Cat were observed in various areas of the site. Numerous additional mammals utilize the site on at least an occasional basis. These include Racoon, various species of native mice, California Vole, many species of bats, and possibly others. These species are known to utilize habitat similar to that found onsite. Nocturnal field surveying and/or trapping would be required to adequately assess the mammal fauna of the subject property.

Birds

Forty-eight species of birds were observed on the El Monte Canyon Golf Course project site. Please refer to Table 2 at the end of this report for complete listing. Most of the birds observed are common occupants of this area, although twelve species - Cooper' Hawk, Prairie Falcon, American Kestrel, Turkey Vulture, Red-shouldered Hawk, Great Horned Owl, Barn Owl, Great Blue Heron, Yellow-breasted Chat, Western Bluebird, Bewick's Wren, and Greater Roadrunner - are considered sensitive. These species are discussed in detail subsequently. Representative birds observed within the riparian strip include species such as Song Sparrow *(Melospiza melodia)*, Northern Oriole *(Icterus galbula)*, Phainopepla *(Phainopepla nitens)*, and Lesser Goldfinch *(Carduelis psaltria)*. Commonly observed birds in more upland areas include House Finch *(Carpodacus mexicanus)*, Brown-headed Cowbird *(Molothrus ater)*, Western Bluebird *(Sialia mexicana)*, and three species of hummingbirds *(Archilochus)*. A number of additional avian species may be expected to occur on or in the vicinity of the site. These include various other wide-ranging raptors, songbirds, and others known from habitat similar to that found here. Because of the relatively heterogeneity of the vegetation on this site, the variety of birds anticipated to occur here could be extensive.

RESULTS OF THE SURVEY - SENSITIVE RESOURCES

Sensitive Habitats

Riparian Scrub

Wetland habitats of all types are on the decline throughout the west as a result of land development, grazing, woodcutting, understory clearing, and other human-associated uses of these areas. The Riparian Scrub on this site forms a biological resource of varying habitat value and significance. Areas of Southern Willow Scrub, Mule Fat Scrub, and Freshwater Marsh, particularly dense areas, are of much greater value than areas of Tamarisk Scrub, although all riparian areas are of importance to area wildlife. The riparian area on this site not only functions by providing a rich and heterogeneous diversity of native plants, including numerous facultative and obligate wetland indicators, but it also forms a natural linkage corridor for birds and other vertebrates traversing the property in an easterly-westerly direction. Many vertebrates depend directly on riparian corridor areas such as these for foraging, nesting, roosting, den construction, etc. Preservation of all remaining riparian areas in Southern California, especially those along major riverine systems, is an important priority to land-use managers. Most important are those areas that support a diversity of plants and animals, including sensitive species such as Yellow-breasted Chat and others. The riparian area on this site is of significant local importance, and thus it should be retained a valuable resource in connection with any future land-use changes.

Sensitive Plants

No sensitive plants were observed on the El Monte Canyon Golf Course project site during the course of the field survey. For purposes of this report, sensitive plants are those listed as rare, endangered, threatened, or otherwise noteworthy by the California Department of Fish and Game, the U.S. Fish and Wildlife Service, the California Native Plant Society (CNPS), or other conservation agencies, organizations, or local authorities. Those sensitive plants known to occur in the vicinity of this project site are listed in annotated fashion in Table 3 at the end of this report. A few of uncommon plants could occur onsite, although most are found on substrates or within habitats not present on this property. However, at least some sensitive species occur on the steep hillsides to the immediate north and south of the property within oak and sage scrub vegetation.

Sensitive Animals

Fourteen sensitive animals were detected on the El Monte Canyon Golf Course project site; two reptiles and twelve birds. These are Orange-throated Whiptail, Coastal Whiptail, Cooper's Hawk, Prairie Falcon, American Kestrel, Turkey Vulture, Red-shouldered Hawk, Great Horned Owl, Barn Owl, Great Blue Heron, Yellow-breasted Chat, Western Bluebird, Bewick's Wren, and Greater Roadrunner. For purposes of this report, sensitive animals are those listed as rare, endangered, threatened, or otherwise noteworthy by the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), the National Audubon Society (NAS), or other conservation agencies, organizations, or local authorities. Each of these sensitive animal species is discussed below:

***Cnemidophorus hyperythrus* / Orange-throated Whiptail**
"Threatened" (San Diego Herpetological Society, 1980).
"Fully Protected" (CDFG, 1993).
Former Fed. Endangered Species Candidate - Category C2.

The Orange-throated Whiptail is an alert and active diurnal ground lizard found primarily in areas of relatively intact native vegetation where soils are sufficiently friable to allow burrowing and foraging. The United States distribution of this sensitive species is restricted to extreme southwestern California, where it ranges from Orange and Riverside Counties south into northern Baja California. Orange-throated Whiptails are relatively abundant where they still remain, although major portions of the species' former range have been lost to urbanization and agricultural land conversions, particularly in the coastal lowland.

Cnemidophorus hyperythrus is considered "threatened" by the San Diego Herpetological Society. In addition, it is fully protected by the California Department of Fish and Game, and was until recently a Federal Endangered Species Candidate, level "C2". Level "C2" indicated a "taxon for which substantial biological information to support a proposed rule is lacking". This suggests that the species is too widespread and/or common to warrant formal federal listing as an Endangered or Threatened Species at present. Category C2 was eliminated in February 1996. This species remains on the County of San Diego's "Sensitive Reptiles" list, however. Approximately 65 to 75% of the documented historical distribution of this species within the United States has been replaced by urban and agricultural developments.

At least ten specimens of this cryptic lizard species were observed during the course of the surveys. Several additional sightings were recorded, however these probably represent repeat sightings of the same individuals over several weeks. This is a relatively low number of specimens for the amount of apparently suitable habitat present here. The heavy agricultural use of the majority of the site prevents substantially larger numbers from occurring here. However, at least several dozen specimens would be expected to be present on this property. Specimens were observed mostly along the fringes of the agriculture, within relict strips of less disturbed vegetation at the edges of fields and related areas. Prior to agricultural conversion, Orange-throated Whiptail was undoubtedly a very common resident of the subject property.

***Cnemidophorus tigris multiscutatus* / Coastal Whiptail**
Former Fed. Endangered Species Candidate - Category C2.

Coastal Whiptail is an alert ground lizard similar in many respects to the related but smaller Orange-throated Whiptail. This robust species is less restricted with regards to areas of soils friability and hence is more widely distributed in the Southern California area. The United States distribution of Coastal Whiptail is restricted to western California, where it ranges from the Mexican Border to near central California. As with the Orange-throated Whiptail, this species is relatively abundant where it still remains, although major portions of its former range have been lost to urban and agricultural land conversions. Coastal Whiptail had been recently added to the Federal Endangered Species candidate list at a level "C2". A level "C2" indicated a "taxon for which substantial biological information to support a proposed rule is lacking". This suggests that the species is "too widespread and/or common to warrant federal listing at the present time". Category C2 was eliminated in February 1996. This species remains on the County of San Diego's "Sensitive Reptiles" list, however.

Four Coastal Whiptails were observed during the course of the survey. These were mostly distributed along the fringes of the floodway, at lower elevations than the related *C. hyperythrus*. One specimen was observed at the shoulder of El Monte Road. At least several dozen specimens would be expected on the subject site, mostly in less disturbed areas not already occupied by *C. hyperythrus*.

***Accipiter cooperii* / Cooper's Hawk**
"Species of Local Concern" (Tate, 1986).
"California Species of Special Concern" (CDFG, 1993).
Federal status: none.

Cooper's Hawk is a crow-sized raptor with a small head, short wings, a long tail and barred breast. It nests in open woodlands, and has declined as a result of shooting, egg collecting, and habitat loss. *A. cooperii* is listed as a "Species of Local Concern" by the National Audubon Society (Tate, 1986), although it is not endangered or threatened in the San Diego County area. Like most raptors, Cooper's Hawk is fully protected from "take", and is considered a "California Species of Special Concern" by the Department of Fish and Game.

Cooper's Hawks is reported from this property by Marquez (Attachment A). The prior and subsequent field surveys failed to located any specimens of this species onsite, although Cooper's Hawk could certainly occur here as a resident raptor. Specimens would be expected to occur in the more densely vegetated riparian areas.

***Falco mexicanus* / Prairie Falcon**
"Declining" (Unitt, 1984).
"California Species of Special Concern" (CDFG, 1993).
Federal status: none.

Prairie Falcon is a smallish, sandy-colored raptor with pointed wings, a narrow tail, and an indistinct "mustache" of dark facial striping. Prairie Falcons are very rare but widely distributed in San Diego County, occurring in open grasslands, agricultural fields, and desert scrublands. As a nesting bird, probably less than 30 pairs remain in San Diego County, and the California Department of Fish and Game has designated this species a "California Species of Special Concern". The local breeding population of Prairie Falcon is also of concern to local falconers.

A single specimen was seen roosting on a dead tree near the eastern end of on the El Monte Canyon Golf Course project site. When approached, this specimen flew quickly offsite on characteristic rapid wing beats. It is certain that this specimen does not nest on the subject property, although it forages in the vicinity and probably nests on nearby mountain cliff slopes to the northeast.

***Falco sparverius* / American Kestrel**
"Blue-list" (Tate, 1986).
Federal status: none.

American Kestrels, often called Sparrow Hawks, are small, jay-sized raptors with a rufous back and tail, distinctive eye and head markings, and a generally stout appearance. Kestrels forage in open areas, and occur over most of North and South America. "Blue-list" status is an indication that the species is experiencing non-cyclic population declines throughout its range in the United States, as documented by the National Audubon Society. National survey respondents have indicated that this species is on the decline everywhere it occurs. This is likely the result of the gradual shift from an agriculturally-based society to an industrial/urban society at a national level. Although on the decline over much of its range, American Kestrels are relatively common as a resident species in San Diego County, and are not considered locally endangered.

Several American Kestrels were seen during the course of the survey roosting near and flying about the eastern end of the property. Nesting habitat is present on and nearby this site, and the specimens observed undoubtedly nest on or near the property. Because of its relative abundance in San Diego County, American Kestrel is not considered a significant biological resource in association with the project site.

***Buteo lineatus* / Red-shouldered Hawk**
"Blue List" (1986).
"Fully Protected" (CDFG, 1993).
Federal status: none.

Red-shouldered Hawks are attractive, medium-sized raptors which nest and roost in a variety of woodland habitats. The California Department of Fish and Game fully protects Red-shouldered Hawks from harassment or "take".

"Blue-list" status is an indication that this species is experiencing non-cyclic population declines throughout its range in the United States, as documented by the National Audubon Society. National survey respondents have indicated that this species is on the decline everywhere it occurs. In San Diego County, Red-shouldered Hawks are typically found in riparian or oak woodlands, in eucalyptus stands, and even in larger parks, such as Balboa Park. Population numbers of this species in Southern California seem to have changed little over the last century, although other areas within the species' range have experienced significant population declines.

A single specimen was seen on the El Monte Canyon Golf Course project site, flying above and roosting in the oak and cottonwood trees near the eastern edge of the property. It is unlikely that this specimen nests on the property although it probably nests on adjacent sites to the east where the floodplain is more heavily wooded.

***Bubo virginianus* / Great Horned Owl**
"Blue-list" (Tate, 1986).
"Fully Protected" (CDFG, 1993).
Federal status: none.

Great Horned Owls are large and distinctive nocturnal raptors with characteristic ear tufts or "horns" and a heavily barred breast. The California Department of Fish and Game fully protects Great Horned Owls from harassment or other forms of "take". "Blue-list" status is an indication that the species is experiencing non-cyclic population declines throughout its range in the United States, as documented by the National Audubon Society. In San Diego County, this species occurs over large areas, nesting and roosting wherever there are dense stands of tall trees, including eucalyptus and sycamores. Population numbers in Southern California seem to be relatively stable, although this species is declining in other areas of its range.

A single specimen was observed on the El Monte Canyon Golf Course project site during the survey period, roosting in the oak trees near the eastern edge of the property. It is unlikely that this specimen nests on the property although it probably nests on adjacent sites to the east where the floodplain is more heavily wooded.

***Tyto alba* / Barn Owl**
"Blue-list" (Tate, 1986).
Federal status: none.

Barn Owl is a unique predatory bird characterized by a distinctive, white, heart-shaped face, dark eyes, and a lack of ear tufts. "Blue-list" status is an indication that the species is experiencing non-cyclic population declines throughout its range in the United States, as documented by the National Audubon Society. In Southern California, Barn Owls range and forage widely, nesting in many types of open cavities. Specimens roost in areas of thick vegetation or in buildings (hence the common name). Population numbers in Southern California seem to be relatively stable, although this species is declining in other areas of its range.

Several feathers characteristic of this species were found in various areas of the site, mostly in association with the understory of trees and in open areas. Although specimens were not observed, it is likely that at least several barn owls occupy the vicinity of this property, and forage within the open agricultural fields which constitute most of the project site.

***Cathartes aura* / Turkey Vulture**
"Blue-list" (Tate, 1986).
"Fully Protected" (CDFG, 1993).
"Declining" (Unitt, 1984).

Turkey Vultures are unmistakable, large, soaring scavengers which forage over undeveloped land and agricultural areas. In San Diego County, this species has declined significantly in numbers, principally as a result of urbanization, accidental poisoning, and increased use of pesticides, which has resulted in a decrease in shell thickness, and hence, fecundity. Turkey Vultures can still be seen in fair abundance in some areas, although not in near the numbers of a century ago (Unitt, 1984). "Blue-list" status is an indication that the species is experiencing non-cyclic population declines throughout its range in the United States, as documented by the National Audubon Society.

Several Turkey Vultures were seen flying above the project site during the survey period. The species is not uncommon in the site's general vicinity, and nesting habitat is present in the region, although not on the subject property. This species' numbers and distribution is tied to the presence of dead animals, and it remains very common in southern Baja California, where food is relatively abundant.

***Ardea herodias* / Great Blue Heron**
"Species of Special Concern" (NAS, 1986).

Great Blue Heron is a large, majestic, and unmistakable wading bird which occurs in a variety of marshy habitats throughout the United States. Numbers of this species have declined significantly over the entirety of its range since the last century, as wetland habitats were drained and developed. Great Blue Heron is considered a "Species of Special Concern" by the National Audubon

Society. This is a result of national population declines. However, this species was probably never very abundant in San Diego County, as appropriate wetland habitats have always been scarce in the dry southwest.

A single specimen was observed flying across the project site during the course of the survey. This specimen was undoubtedly in route to offsite wetland areas to the west. It is clear that this specimen does not nests on the subject property.

***Icteria virens* / Yellow-breasted Chat**
"California Species of Special Concern" (CDFG, 1993).

Yellow-breasted Chat is a large and very distinctive wood warbler with white "spectacle" markings, a bright yellow throat, an olive green dorsum, and a white belly. This species occurs from southern Canada to central Mexico breeding in willow-dominated drainages and canyons. Because of breeding success problems within the riparian areas of California, the Department of Fish and Game has listed this species along with other obligate riparian songbirds as a "California Species of Special Concern".

Two Yellow-breasted Chats were observed during the course of the field surveys moving about within the willows near the middle of the river floodway. These individuals likely breed on or nearby the project site within the thicker areas of riparian scrub.

***Sialia mexicana* / Western Bluebird**
"Blue List" (Tate, 1986).

Western Bluebird is an attractive, blue and reddish-brown songbird which inhabits open areas, especially at the edges of woodlands or in the vicinity of farms, etc. This species occurs throughout the western United States, although it has declined in portions of its range as nesting habitat (holes in trees, nest boxes, etc.) are consumed by competing species, particularly Starling *(Sturnus vulgaris)*. "Blue-list" status is an indication that this species is experiencing non-cyclic population declines throughout its range in the United States, as documented by the National Audubon Society.

Western Bluebird was found to be common on the subject site during the field survey. The open, rural character of the property suits this species well, and bluebirds likely nest on or nearby this property. At least twenty-five specimens were observed, generally flocking together in various areas of the site, during the course of the field surveys.

***Geococcyx californianus* / Greater Roadrunner**
"Declining" (Unitt, 1984).

Greater Roadrunners are unmistakable, ground-dwelling birds with long tails, a ragged crest, and a streaked breast pattern. This unique species occurs over a large area of the southwest, from Louisiana and Oklahoma west to California and south to central Mexico. Roadrunners prefer to hunt prey and elude predators by running along the ground rather than flying, although they are capable of short flights when necessary. This behavior restricts roadrunners to open country, dominated by scattered shrubs and cactus.

Greater Roadrunner populations in western San Diego County are being seriously threatened by a loss of habitat, primarily as a result of land development. This characteristic bird of the coastal lowland is certainly not "common" as once they were considered by local ornithologists (Unitt, 1984).

Several specimens were observed near the eastern end of the site on both survey days. Several instances of interaction between mature and immature specimens were observed, suggesting that reproduction is occurring onsite. This species probably nests on or very near the subject property.

***Thryomanes bewickii* / Bewick's Wren**
"Blue List" (Tate, 1986).

Bewick's (pronounced "Buick's") Wrens are small, aggressive birds which occupy a wide variety of habitats in San Diego County from the coast into the desert. "Blue-list" status is an indication that this species is experiencing non-cyclic population declines throughout its range in the United States, as documented by the National Audubon Society. Numbers of this species appear to be relatively stable in San Diego County, although the species is on the decline in other parts of the country.

Several specimens were seen in association with denser areas of riparian scrub vegetation within the San Diego River floodway. Numerous others are probably present, and nesting habitat is available onsite. Bewick's Wren is not considered a significant resource of the site.

No other sensitive animals were observed on the El Monte Canyon Golf Course project site during the course of the field survey. A number of other sensitive vertebrates are likely to utilize resources provided by this site, at least on an occasional basis. Other sensitive animals known from the vicinity of the property are listed and discussed in Table 3.

POTENTIAL IMPACTS OF THE PROPOSED PROJECT

The proposed development of a public golf course and related improvements within the confines of El Monte Canyon will result in certain measurable losses of biological resource values associated with the subject property. Because the vast majority of the site supports open and actively-maintained agricultural land, most project-related impacts will be the indirect result of the conversion of this acreage to recreational use. Riparian wetland resources within the floodway of the San Diego River will be impacted by six relatively significant crossings, although the majority of the floodway will be buffered to the extent possible given the nature of the current project design. A certain amount of encroachment into and loss of sensitive wetland habitat areas is expected; this can be measured and compensated for. Other impacts are less direct, and involve less readily measurable effects, including losses of raptor foraging habitat, losses of wildlife corridor use along the San Diego River floodway, and losses associated with an increased human presence in this portion of El Monte Canyon.

The California Environmental Quality Act (CEQA) requires a "worst-case" analysis in determining potential development-related impacts. Thus, an assumption must be made that all areas within the ownership and not within an area proposed for the preservation of biological resource values will be impacted by site development. Impacts are assessed at a level which is either **"significant"** or **"less than significant"** under provisions of CEQA. Also, an assessment is made as to whether or not project-related impacts are fully mitigable. In this instance, all direct and indirect impacts anticipated are considered mitigable within the context of the project application, assuming the adoption of specific mitigation measures detailed in later in this report.

Several project-related impacts to biological resource values found on and in the vicinity of the El Monte Canyon Golf Course project site have been identified as a result of the analysis of the current project design and three years of accumulated field data. These include the following:

(1) Measurable losses of Riparian Scrub vegetation are anticipated as a result of improvement of six crossings over the San Diego River. Five of these bridges will measure approximately 300 linear feet by 10 feet, and one will measure 300 feet by 30 feet. A portion of the area impacted will be affected by bridge construction (pilings), although the bulk will be impacted by the "shadow effect" created by placing a solid structure directly over the floodway. Impacted will thus be approximately 0.4 acres of jurisdictional wetlands. All impacts to wetlands habitat values are considered **significant,** as defined by CEQA.

(2) The construction of six relatively significant concrete bridges over the San Diego River in this section of El Monte Canyon has a potential to affect the viability of wildlife corridor movement through this reach of the river. Quantifying this impact would require information not available at the time of report preparation. Depending on the final configuration of any improved crossings, impacts can be measured as either **significant** or **less than significant**. In any case, disruption of wildlife corridor use of this portion of the San Diego River is considered a **significant** impact.

(3) Bridge or river crossing construction across the San Diego River could also impact Arroyo Toad, a federally-listed Endangered Species. Should this species be resident onsite, impacts associated with these currently proposed improvements would be considered **significant.**

(4) Losses of open raptor foraging areas associated with fallow and active agricultural areas is expected. The conversion of approximately 400 acres of open foraging area to public golf course use will undoubtedly displace certain less tolerant raptors from the property, possibly including Cooper's Hawk, Prairie Falcon, Great Horned Owl, and perhaps others. While displacement of these sensitive resident raptors is not certain, the likelihood of it occurring is at least moderate. Currently, most upland areas of the site are in active agriculture. However, large areas appear to be either seasonally inactive, or lying fallow. These areas are available to resident raptors. Golf course conversion will result in continuous use of upland areas for golf course activities and related course maintenance. The removal or manicuring of mature trees, including snags, would result in a loss of numerous roost sites.

Any substantial nighttime lighting would be disruptive to the foraging habitats of raptors that typically forage at night (e.g. owls). In addition, early morning or evening overhead spray irrigation would be disruptive to raptors that would otherwise forage during this time on the project site. Displacement of the resident raptor fauna due to loss of roost sites, lighting, irrigation practices, etc. from this large foraging area is considered **significant**.

(5) Certain other losses associated with a greater human presence in the El Monte Canyon area are expected. These would include degradation of the wetland area through direct or indirect encroachment, and impacts associated with higher traffic levels along Willow Road and El Monte Road. Any degradation of wetland habitat areas would be considered **significant**. Cumulative impacts to area wildlife associated with traffic and direct human presence on the property (golfers and maintenance personnel) is considered **less than significant.**

PROPOSED MITIGATION

In order to reduce all project-related impacts to a level which is considered **less than significant**, as defined by CEQA, the following mitigation measures shall be required as a part of the project application:

(1) Development of the El Monte Canyon Golf Course project site, as presently proposed, shall require the preparation, approval, and implementation of a **Biological Resource Management Plan** following preliminary project approval, but prior to the approval of any grading or improvement plans. The intent of this plan shall be to provide a methodology to reduce all **significant**, project-related impacts to wildlife habitat values to a level which is **less than significant**. These significant impacts are listed and discussed on the previous pages. The primary focus of the management plan shall be to adequately manage the existing and improved biological resources associated with this large property, including both wetland and upland resource values, for the duration of the proposed site-use. The implementation of, or mechanism to implement all recommendations contained within such a document shall also be made a condition of project approval. Conceptually,

this plan shall contain, at a minimum:

- A comprehensive revegetation/habitat enhancement component to compensate for direct losses of wetland values associated with river crossing improvements. This plan shall define the specific, final, improvement-related impacts (the specific area of wetland potentially lost, measuring approximately 0.4 acres), establish replanting ratios (10-1 for any isolated riparian trees impacted and 3-1 for impacted wetland acreage), define specific areas to be used for replanting, specify biological monitoring periods (bimonthly to annually for five years), required maintenance, removal of exotics such as *Tamarix* and *Arundo*, construction monitoring, etc and other items as defined by the plan preparer. This plan shall be prepared by a County-certified and qualified biologist experienced in riparian wetland restoration and enhancement planning.

- A management strategy for enhancing and protecting the various biological and planning buffer set-backs required to protect existing riparian vegetation and relict floodplain vegetation within and abutting the floodway of the San Diego River. Biological buffer areas shall be established a minimum 50 feet in width on both sides of the floodway. Additional 100 feet of planning buffer shall be established at the outer edge of the biological buffer. The biological buffer areas have a potential to form critical, open sandy habitats to permit the continued survival of Orange-throated Whiptail, Coastal Whiptail, and other native vertebrates which are presently found onsite in greatly diminished numbers. If successfully managed, these areas will permit the substantial enhancement of wildlife values in this expanded and protected upland buffer adjacent to the floodway. The biological buffer area shall be revegetated with strictly native, indigenous, alluvially-dependent shrubs and herbs and shall be "permanently" fenced to prevent ongoing encroachment and habitat degradation for the life of the proposed use. The planning buffer shall preclude the establishment of structures or other improvements (except bridge crossings) and shall permit play as a "rough".

- Mechanisms to protect *in situ* all mature Coast Live Oaks, California Sycamores, and Western Cottonwood trees. Examples of effective mechanisms may include avoidance through project design features, consultation with qualified arborist prior to disturbing any trees (to insure their continued vigor), and like-kind and like-size replacement for any trees unavoidably lost. These mature trees are not only an aesthetic feature of the subject site, but they provide critical roosting and potential nesting habitat for many of the raptors found within El Monte Canyon. Larger trees of the same genetic stock shall be used in the proposed plant palette when preparing the final project landscape plans. All landscape plans and plant pallets shall be reviewed for wetlands compatibility as a function of the Biological Resource Management Plan.

- A mechanism to effectively eliminate ongoing equestrian and (to a lesser extent) ORV usage of the highly sensitive riparian area running through the center of the property within the San Diego River floodway. This activity has a potential to greatly affect avian breeding success and could cause local extirpation of the resident populations of Orange-throated Whiptail and Coastal Whiptail residing on this site through trampling, etc. Direct access to the riparian corridor must be controlled as a feature of long-term site management. The project proposes moving the existing unauthorized horse trail from the floodway to the north side of El Monte Road. This is a beneficial element of the project. Examples of effective mechanisms may include barrier fencing and signage, as determined appropriate. Signage would not only warn potential trespassers to avoid entering the sensitive floodway, but also direct them to use the proposed trail that would be constructed along the southern border of the golf course.

- A mechanism to control lighting, watering, and any other factors which might result in the displacement of raptors or other fauna currently utilizing this property. Examples of effective mechanisms may include prohibitions against lighting of the golf course and driving range at or near dusk, and a variable irrigation schedule that would be less disruptive to morning foraging habitats by onsite raptors.

(2) As previously mentioned, any crossing of the San Diego River could result in significant impacts to wildlife corridor movement. Design of the proposed bridges crossings, however, can mitigate this concern, and reduce impacts to corridor disruption to less than significant. All crossings shall be a minimum of 15 to 20 feet above grade, with all openings at least twice as wide as the width of the bridge structure. These values are based on local studies of wildlife movement patterns under similar circumstances.

(3) Because Arroyo Toad is known to occur in the upper San Diego River watershed, it will be necessary to conduct directed field surveys for this federally-listed Endangered Species. If found onsite, specific mitigation shall be developed, including seasonal control and/or modification of any at-grade or above grade river crossings, modification of upland planning and biological buffers for toad utilization, etc. A Section 7 consultation between the U.S. Army Corps of Engineers and the USFWS will also be necessary, should Arroyo Toad be found. These agencies would function in a permitting capacity with respect to the "take" of this listed species, and they may have additional mitigation requirements. If determined necessary, the USFWS may also require that the applicant obtain a Section 10(a) Endangered Species Permit from the Department of the Interior. The Corps of Engineers would also require an individual Section 404 Permit if toads are found residing onsite.

Implementation of the above mitigation measures will reduce all project-related impacts to biological resources associated with this project to a level below significance, as defined by CEQA.

Table 1. **Floral Checklist - the El Monte Canyon Golf Course Project Site.**

Scientific Name	Common Name	Habitat
Amaranthus albus *	White Tumbleweed	A
Amaranthus palmeri	Palmer's Pigweed	A
Ambrosia psilostachya	Western Ragweed	R
Ambrosia confertiflora	Ragweed	A
Amsinckia intermedia	Fiddleneck	A
Anagallis arvensis *	Scarlet Pimpernel	R
Antirrhinum nuttallianum	Nuttall's Snapdragon	F
Artemisia douglasiana	Douglas Sagewort	R
Artemisia californica	California Sagebrush	F
Arundo donax *	Giant Wild Reed	R
Avena fatua *	Wild Oat	A
Avena sativa *	Cultivated Oat	A
Avena barbata *	Slender Wild Oat	A
Baccharis glutinosa	Mule Fat	R
Baccharis sarothroides	Broom Baccharis	F
Brassica geniculata *	Perennial Mustard	A
Brickellia californica	California Brickellbush	R
Bromus rubens *	Foxtail Brome	A
Bromus diandrus *	Ripgut Brome	A
Calystegia macrostegia	Morning Glory	A
Camissonia bistorta	Southern Sun Cup	F
Camissonia strigulosa	Evening Primrose	F
Castilleja stenantha	Calif Thread-torch	F

Table 1. Floral Checklist - the El Monte Canyon Golf Course Site (page 2).

Scientific Name	Common Name	Habitat
Carex spissa	San Diego Sedge	R
Cenchrus incertus	Coast Sandbur	A
Centaurea melitensis *	Tocalote	A
Centaurium venustum	Canchalagua	F
Cerastium glomeratum *	Mouse-ear Chickweed	A
Chaenactis glabriuscula	Yellow Pincushion	F
Chamaesyce polycarpa	Small-seed Sand Mat	F
Chenopodium murale *	Goosefoot	A
Claytonia perfoliata	Miner's Lettuce	R
Clematis sp.	Clematis	F
Cnicus benedictus	Blessed Thistle	A
Conyza bonariensis *	Horseweed	A
Conyza canadensis *	Common Horseweed	A
Cortaderia selloana *	Pampas Grass	R
Croton californicus	California Croton	F
Cryptantha sp.	Cryptantha	?
Cucurbita foetidissima	Stinking Gourd	F
Cynodon dactylon *	Bermuda Grass	A
Cyperus esculentus *	Yellow Sedge	R
Cyperus sp.	Sedge	R
Datisca glomerata	Datisca	R
Datura meteloides	Jimsonweed	A
Descurainia pinnata	Tansy Mustard	A

Table 1. Floral Checklist - the El Monte Canyon Golf Course Site (page 3).

Scientific Name	Common Name	Habitat
Distichlis spicata	Desert Salt Grass	R
Eleocharis acicularis	Perennial Spikerush	R
Epilobium sp.	Fireweed	R
Eremocarpus setigerus	Dove Weed	A
Eriogonum gracile	Slender Buckwheat	F
Eriogonum fasciculatum	Flat-top Buckwheat	F
Erodium botrys *	Long-beaked Stork's-bill	A
Erodium cicutarium *	Red-stem Stork's-bill	F
Euphorbia peplus *	Petty Spurge	R
Filago californica	California Filago	F
Filago gallica *	Narrow-leaf Filago	A
Foeniculum vulgare *	Wild Anise	A
Galium aparine *	Common Bedstraw	A
Gnaphalium beneolens	Cudweed	R
Gnaphalium palustre	Cudweed	R
Gnaphalium californicum	California Cudweed	F
Gnaphalium bicolor	Bicolor Cudweed	F
Haplopappus venetus	Isocoma	F
Helianthus annuus *	Common Sunflower	A
Heliotropium curvassavicum	Wild Heliotrope	A
Hemizonia fasciculata	Common Tarweed	F
Heterotheca grandiflora *	Telegraph Weed	A
Hordeum murinum *	Wild Barley	A

Table 1. Floral Checklist - the El Monte Canyon Golf Course Site (page 4).

Scientific Name	Common Name	Habitat
Hypochoeris glabra *	Smooth Cat's-tongue	F
Juncus mexicanus	Mexican Rush	R
Juncus dubius	Doubtful Rush	R
Juncus sp.	Wire Rush	R
Juncus rugulosus	Wrinkled Rush	R
Lactuca serriola *	Wild Lettuce	A
Lamarckia aura *	Goldentop	A
Lastarriaea coriacea	Lastarriaea	F
Lepidium nitidum	Shining Peppergrass	F
Leptochloa sp.	Sprangle Top	R
Lupinus concinnus	Arroyo Lupine	F
Lotus scoparius	Deerweed	F
Lotus sp.	Lotus	A
Lotus hamatus	Grab Lotus	A
Lotus purshianus	Spanish Clover	A
Lupinus truncatus	Collar Lupine	F
Lupinus bicolor	Bicolor Lupine	F
Lupinus hirsutissimus	Stinging Lupine	?
Lupinus sp.	Lupine	F
Malacothamnus fasciculatus	Bush Mallow	R
Malosma laurina	Laurel Sumac	F
Malva parviflora *	Cheeseweed	A
Marah macrocarpa	Man Root	F

Table 1. Floral Checklist - the El Monte Canyon Golf Course Site (page 5).

Scientific Name	Common Name	Habitat
Marrubium vulgare *	Horehound	A
Medicago sativa *	Alfalfa	A
Melilotus indicus *	Indian Sweet Clover	A
Melilotus albus *	White Sweet Clover	A
Mesembryanthemum chrystallinum *	Ice Plant	A
Mesembryanthemum edule *	Hottentot Fig	A
Mesembryanthemum nodiflorum	Nodding Ice Plant	A
Microseris lindleyi	Silver Puffs	F
Microsteris gracilis	Slender Phlox	F
Mimulus guttatus	Monkeyflower	R
Mimulus cardinalis	Monkeyflower	R
Nicotiana glauca *	Tree Tobacco	A
Oenthera hookeri	Marsh Primrose	R
Opuntia littoralis	Prickly Pear	F
Opuntia ficus-indica *	Indian Fig	A
Palafoxia aridus var. *lineatus*	Spanish Needles	F
Panicum capillare	Western Witch Grass	R
Pectocarya linearis ssp. *ferocula*	Slender Pectocarya	F
Phacelia cicutaria hispida	Caterpillar Phacelia	F
Phalaris sp. *	Canary Grass	A
Platanus racemosa	California Sycamore	F
Pluchea sericea	Arrowweed	R
Poa annua *	Annual Bluegrass	R

Table 1. Floral Checklist - the El Monte Canyon Golf Course Site (page 6).

Scientific Name	Common Name	Habitat
Pennisetum setaceum *	African Fountain Grass	A
Polygonum arenastrum *	Yard Knotweed	R
Polypogon monspeliensis *	Rabbitfoot Grass	R
Populus fremontii	Western Cottonwood	R
Portulaca oleracea	Common Purslane	R
Quercus agrifolia	Coast Live Oak	A
Rafinesquia californica	California Chicory	F
Raphanus sativus *	Wild Radish	A
Ricinus communis *	Castor Bean	R
Rosa californica	California Rose	R
Rumex salicifolius	California Dock	R
Salix exigua	Sandbar Willow	R
Salix gooddingii	Southwestern Willow	R
Salix lasiolepis	Arroyo Willow	R
Salix lucida ssp. *lasiandra*	Shining Willow	R
Salix hindsiana	Sandbar Willow	R
Salsola iberica *	Russian Thistle	A
Salvia apiana	White Sage	F
Sambucus mexicanus	Elderberry	R
Schinus molle *	Peruvian Peppertree	A
Scirpus acutus	Bulrush	R
Silene gallica *	Common Catchfly	A
Silybum marianum *	Milk Thistle	A

Table 1. Floral Checklist - the El Monte Canyon Golf Course Site (page 7).

Scientific Name	Common Name	Habitat
Sisymbrium altissimum *	Tumble Mustard	A
Solanum nodiflorum *	White-flowered Nightshade	A
Sonchus oleraceus *	Sow Thistle	A
Sorghum halepense *	Johnson Grass	R
Stachys rigida	Stachys	R
Stephanomeria virgata	Stephanomeria	F
Tamarix gallica *	Salt Cedar	R
Tribulus terrestris *	Puncture Vine	A
Typha domingensis	Cattails	R
Typha latifolia	Cattails	R
Urtica urens *	Dwarf Nettle	A
Veronica peregrina	Purslane Speedwell	R
Xanthium strumarium *	Cocklebur	R
Yucca whipplei	Our Lord's Candle	F
Zauschneria californica	California Fuschia	R

Total = 153 plant species observed. * = non=native or non-indigenous taxon.

Principal habitat codes: **A** = Agricultural areas (active and fallow)

R = Riparian Scrub habitat

F = Relict Floodplain vegetation

? = reported by Marquez (1996), habitat not defined.

Table 2. Fauna Checklist - the El Monte Canyon Golf Course Project site.

Scientific Name	Common Name	Habitat	Numbers
Birds			
Accipiter cooperii	Cooper's Hawk	?	?
Anas platyrhynchos	Mallard	o	3
Aphelecoma coerulescens	Scrub Jay	R	15+
Archilochus alexandri	Black-chinned Hummingbird	F	10+
Archilochus anna	Anna's Hummingbird	F	25+
Archilochus costae	Costa's Hummingbird	F	10+
Ardea herodias	Great Blue Heron	o	1
Bubo virginianus	Great Horned Owl	R	1
Buteo lineatus	Red-shouldered Hawk	R	2
Buteo jamaicensis	Red-tailed Hawk	o	4+
Callipepla californica	California Quail	F	15+
Carduelis psaltria	Lesser Goldfinch	R	50+
Carpodacus mexicanus	Housefinch	R	50+
Cathartes aura	Turkey Vulture	o	5+
Chamaea fasciata	Wrentit	R	5+
Chondestes grammacus	Lark Sparrow	A	10+
Colaptes auratus	Common Flicker	R	5+
Columbia livia	Rock Dove	o	5+
Corvus brachyrhynchos	Common Crow	o	10+
Corvus corvax	Common Raven	o	10+
Dendrocopos nuttallii	Nuttall's Woodpecker	R	5+
Dendroica coronata	Audubon's Warbler	?	?

Table 2. **Fauna Checklist - the El Monte Canyon Golf Course Project site (page 2).**

Scientific Name	Common Name	Habitat	Numbers
ds (cont)			
Falco sparverius	American Kestrel	A	5+
Falco mexicanus	Prairie Falcon	A	1
Geococcyx californicus	Greater Roadrunner	A	5+
Geothlypis trichas	Common Yellowthroat	?	?
Hirundo pyrrhonota	Cliff Swallow	?	?
Icteria virens	Yellow-breasted Chat	R	2
Icterus galbula	Northern Oriole	R	15+
Melospiza melodia	Song Sparrow	R	50+
Mimus polyglottos	Mockingbird	A	15+
Molothrus ater	Brown-headed Cowbird	A	50+
Myiarchus cinerascens	Ash-throated Flycatcher	A	10+
Passerina caerulea	Blue-headed Grosbeak	R	3
Passerina melanocephalus	Black-headed Grosbeak	R	2
Passerina cyanea	Indigo Bunting	R	1
Phainopepla nitens	Phainopepla	R	15+
Pipilo crissalis	California Towhee	F	10+
Pipilo erythrophthalmus	Rufous-sided Towhee	R	5+
Psaltriparus minimus	Bushtit	R	25+
Salpinctes obsoletus	Rock Wren	F	2
Sayomis nigricans	Black Phoebe	A	10+
Selasphorus rufus	Rufous Hummingbird	F	2
Sialia mexicana	Western Bluebird	A	25+

Table 2. Fauna Checklist - the El Monte Canyon Golf Course Project site (page 3).

Scientific Name	Common Name	Habitat	Numbers
Birds (cont)			
Stelgidopteryx ruficollis	Rough-winged Swallow	o	5+
Sturnus vulgaris	Starling	R	25+
Tachycineta thalassina	Violet-green Swallow	o	12
Thryomanes bewickii	Bewick's Wren	R	5+
Tyrannus verticalis	Western Kingbird	A	3
Tyto alba	Barn Owl	A	1+
Zenaida macroura	Mourning Dove	A	15+
Mammals			
Canis latrans	Coyote	F	scats
Didelphis marsupialis	Opossum	A	dead
Dipodomys agilis	Pacific Kangaroo Rat	F	baths
Felis catus	Cat (feral)	A	dead
Mephitis mephitis	Striped Skunk	A	dead
Perognathus sp.	Pocket Mouse	F	holes
Spermophilus beecheyi	California Ground Squirrel	A	15+
Sylvilagus auduboni	Desert Cottontail	A	10+
Thomomys bottae	Valley Pocket Gopher	R	holes
Urocyon cinereoargenteus	Gray Fox	F	scats
Amphibians			
Bufo boreas	Western Toad	A	dead

Table 2. Fauna Checklist - the El Monte Canyon Golf Course Project site (page 4).

Scientific Name	Common Name	Habitat	Numbers
ptiles			
Cnemidophorus tigris	Tiger Whiptail	R	4
Cnemidophorus hyperythrus	Orange-throated Whiptail	F	10+
Lampropeltis getulus	Common Kingsnake	A	shed
Sceloporus occidentalis	Western Fence Lizard	A	25+
Masticophis flagellum	Red Racer	R	1+
Uta stansburiana	Side-blotched Lizard	F	5+

Total = 68 species of vertebrates detected.

51 species of birds;

10 species of mammals;

1 species of amphibian;

6 species of reptiles.

Habitat codes as in Table 1; o = flying over site. ? = reported by Marquez (1996), habitat not defined.

TABLE 3. SENSITIVE SPECIES KNOWN FROM THE VICINITY OF THE EL MONTE CANYON GOLF COURSE PROJECT SITE.

Plants

Acanthomintha ilicifolia **/ San Diego Thorn Mint**
CNPS RED code: 2-3-2, List 1B.
Federal Endangered Species Candidate - Category C1 (USFWS, 1993).
STATE-LISTED ENDANGERED SPECIES.
This annual herb occurs in heavy clay soils. Suitable habitat is not present on this site. Not expected, based on habitat considerations.

Achnantherum diegoensis **/ San Diego County Needle Grass**
CNPS RED code: 1-2-1, List 4.
State/Fed. status: none.
This perennial species occurs in seasonal drainages in chaparral and sage scrub habitats. Suitable habitat is not present on this site. Not expected, based on habitat considerations.

Ambrosia pumila **/ San Diego Ambrosia**
CNPS RED code: 3-3-2, List 1B.
Former Fed. Endangered Species Candidate - Category C2 (USFWS, 1993).
State status: none.
This small herb occurs in a variety of habitats, primarily on clay soils. Suitable habitat is not present on this site. Not expected, based on habitat considerations. Two related but common species of *Ambrosia (A. psilostachya, A. confertiflora)* were positively identified on the subject site.

Artemisia palmeri **/ San Diego Sagewort**
CNPS RED code: 2-2-1, List 2.
Federal/State status: none.
San Diego Sagewort is a distinctive perennial sub-shrub associated with riparian drainages and mesic chaparral. Appropriate habitat is present on this site. No signs of occurrence were detected, in spite of a careful search. If present, this species would occur in very limited numbers within the Riparian Scrub habitat.

Astragalus deanei **/ Dean's Milk-vetch**
CNPS RED code: 3-3-3.
Former Fed. Endangered Species Candidate - Category C2 (USFWS, 1993).
State status: none.
This distinctive species of short-lived perennial "locoweed" occurs in dry chaparral and sage scrub within a narrow range of elevations (250-350 meters MSL). Suitable habitat is not present on this site. Not expected, based on habitat considerations.

Calochortus dunnii **/ Dunn's Mariposa**
CNPS RED code: 2-2-2, list 1B.
STATE-LISTED RARE SPECIES.
Former Fed. Endangered Species Candidate - Category C2 (USFWS, 1993).
This attractive lily occurs on mountain slopes above 1000 meters in elevation. Suitable habitat is not present on this site. Not expected, based on habitat considerations.

TABLE 3. SENSITIVE SPECIES KNOWN FROM THE VICINITY OF THE EL MONTE CANYON GOLF COURSE PROJECT SITE (PG 2).

***Ceanothus cyaneus* / Lakeside Ceanothus**
CNPS RED code: 3-2-2. List 1B.
Former Fed. Endangered Species Candidate; Category C2 (USFWS, 1993).
State status: none.
This species is a distinctive perennial which occurs in dense to open chaparral vegetation. Suitable habitat is not present on this site. Not expected, based on habitat considerations.

***Chorizanthe procumbens* / Prostrate Spineflower**
CNPS RED code: 1-2-2, List 4.
State/Federal Status: none.
Prostrate Spineflower is a delicate species which occurs in open chaparral and sage scrub habitats; appropriate habitat is not present on this site. Not expected, based on habitat considerations. The related and somewhat similar *Lastarriaea coriacea* was positively identified on this property.

***Dudleya variegata* / Variegated Dudleya**
CNPS RED code: 2-2-2, List 1B.
Former Fed. Endangered Species Candidate - Category C2 (USFWS, 1993).
State Status: none.
This seasonally-detectable perennial succulent occurs in rocky areas within chaparral, sage scrub, and grassland habitats. Appropriate habitat is not present on this site. Not expected, based on habitat considerations.

***Ericameria palmeri* / Palmer's Ericameria**
CNPS RED code: 2-2-1.
Former Fed. Endangered Species Candidate - Category C2 (USFWS, 1993).
State Status: none.
Palmer's Ericameria is a distinctive, shrubby species which occurs in open, xeric coastal sage scrub habitat. Appropriate habitat is not present on this site. Not expected, based on habitat considerations.

***Ferocactus viridescens* / San Diego Barrel Cactus**
CNPS RED code 1-3-1, List 2.
Federal category C2.
State Status: none.
This unmistakable succulent occurs in heavy soils associated with sage scrub and chaparral vegetation. Suitable habitat is not present on this site. Not expected, based on habitat considerations.

***Githopsis diffusa* ssp. *filicaulis* / Mission Canyon Bluecup**
CNPS RED code 3-3-2, List 1B.
Former Fed. category C2.
State Status: none.
This species occurs in mesic chaparral and adjacent habitats. Suitable habitat is not present on this site. Not expected, based on habitat considerations.

Certification, or a waiver of certification, from the State Water Resources Control Board verifying that the project complies with Section 401 of the Federal Clean Water Act will be required.

It is likely that mitigation of Southern Willow Scrub will be required as a permitting condition. However, exact mitigation requirements will be addressed through the permitting process with the various resource agencies.

Marquez & Associates Biological Consultants conducted a preliminary reconnaissance survey of the proposed El Monte Golf Course site. This survey's purpose was to evaluate potential environmental constraints associated with the El Monte Golf Course Development project and this site.

Project Description

The proposed project is a 36 hole golf course and driving range with a full service club house, maintenance buildings, and 5 golf cart/pedestrian river crossings and 1 vehicle all-weather road crossings at the San Diego River. The project will utilize approximately 500 acres of an estimated 1,000 acres of land owned by the Helix Water District of La Mesa. The 500 acres will be leased from the Helix Water District by the project applicants.

Environmental Setting

The proposed El Monte Golf Course site is located north of Interstate 8, east of Ashwood Street, between El Monte Road to the south and Willow Road to the north, in Lakeside, California. Adjacent land uses are a sand mining operation (Nelson Sloan) to the west, low density residential with numerous cattle and horse enclosures to the north and south and undeveloped land, including El Monte County Park to the east. U.S. Geologic Survey (1967) maps indicate hills reach 1700 feet elevation south of the project site and 1500 feet elevation to the north. The project site is a valley, essentially level, at approximately 500 feet elevation

Land use on the project site is predominately agricultural and is bisected by the San Diego River. The river is approximately 300 feet (91.5 meters) wide along most of the subject property. A narrow equestrian trail, approximately 5 feet (1.5 meters) wide, borders the San Diego River to the north and agricultural access roads, approximately 8 feet (2.4

meters) wide, border portions of the river to the south within the project site.

Soil types on the project site include Riverwash, Tujunga Sand (0-5% slope) and Visalia Sandy Loam (0-5% slope) (U. S. Department of Agriculture 1973).

Methods

A preliminary reconnaissance survey of the Proposed El Monte Golf Course site was conducted by Viviane Marquez, Principal Biologist for Marquez & Associates Biological Consultants between 1100 and 1505 hours on 3 April 1996. Weather conditions were sunny, temperatures between 70°- 85° F and winds from 0 - 4 m.p.h. The survey included slowly driving the perimeter of the project site on El Monte Road, Willow Road, Hazy Meadows Lane and Van Omering Dairy Road. Agricultural access roads were also driven; periodically stopping to survey the river area with the aid of binoculars. A 3 hour on-foot survey was conducted in areas of natural vegetation, north of the San Diego River, where access allowed. Plant and animal species were identified by direct observation, observation through Bausch & Lomb 10 X 40 binoculars, vocalization, scat or tracks. Habitat type and vegetation composition were noted. A plant and animal species list was compiled on-site. It should be noted that this survey and species lists were preliminary in nature and did not cover all areas of the project site. Scientific nomenclature used follows Hickman (1993), plant community designation conform to Holland (1986) and Sawyer and Keeler-Wolf (1995) (in parentheses) and bird nomenclature follow the American Ornithologists' Union (1983).

Results

The preliminary survey indicated that over 90% of the project site is currently in agricultural/pastoral use. The extent of natural habitat observed on the project site is limited to the San Diego River and a narrow band (< 15 feet or 4.5 meters) on either side of the river. The riverbed supports highly disturbed Southern Willow Scrub and Freshwater Marsh (Holland 1986), (Mixed Willow Series and Cattail series - Sawyer and Keeler-Wolf 1995). These habitats are wetland communities. The existing riverbed was dredged to its 300 feet (91.5 meters) width in 1975 (Mr. Robert Clark *personal communication*). The water flow in the riverbed is sporadic within the project site. On the survey date, numerous areas of ponded water were evident and several narrow streams within the riverbed were observed. The riverbed is approximately 10 feet (3 meters) below the adjacent narrow band of natural vegetation and agricultural lands bordering the river. The natural vegetation adjacent to the river appears to be remnants of coastal sage scrub vegetation as evidenced by the patchy presence of Flat-topped Buckwheat (*Eriogonum fasciculatum*) and California Sagebrush (*Artemisia californica*) shrubs as well as numerous annuals representative of the coastal sage scrub community.

Wetland Communities

Wetland communities are found along streambeds throughout California where moisture is at or near the surface year round. Wetland communities within the study area include Southern Willow Scrub, and Freshwater Marsh.

Southern Willow Scrub

Southern Willow Scrub is a tall, open, broad leafed, winter deciduous association dominated by several willow species (*Salix* sp.), with scattered Fremont's Cottonwoods (*Populus fremontii*), Western Sycamores (*Platanus racemosa*) and generally with only a few understory species. Southern Willow Scrub is considered a sensitive plant community because: 1) it provides breeding habitat for the Least Bell's Vireo (*Vireo bellii pusillus*), the Southwestern Willow Flycatcher (*Empidonax traillii extimus*), and other state and federal endangered species, 2) it grows along drainages regulated under state and federal policies protecting streambed resources and 3) it is a valuable, naturally limited and declining habitat. Southern Willow Scrub within the project site is dominated by the non-native invasive plant species Tamarisk (*Tamarix parviflora*) and Pampas grass (*Cortaderia selloana*). However, the native species; Western Sycamore, Fremont's Cottonwood, Sandbar Willow (*Salix exigua*), will not negatively affect implementation of the MSCP and 3) that it is consistent with the MSCP and the San Diego River HCP.

The project is designed to have a minimum 50 foot buffer zone in most of the area adjacent to the San Diego River. The exceptions to this are where river crossings will be constructed. By maintaining this buffer zone the majority of direct biological impacts will be avoided.

The impacts to the riverbed and wetland communities associated with the river crossings will require numerous biological surveys, and permits. The following minimum requirements will likely be necessary.

- A wetland delineation and a thorough biological survey and report including directed surveys for the following endangered animal species: Least Bell's Vireo, Southwestern Willow Flycatcher, Southwestern Pond Turtle (*Clemmys marmorata pallida*), Spadefoot Toad (*Scaphiopus hammondii*) and Arroyo Southwestern Toad (*Bufo microscaphus californicus*) will be necessary. Indirect impacts (noise, lighting, etc.) to these species, of the proposed project will also need to be evaluated.
- If any federal and state endangered species are found to occupy the area. consultation with the U.S. Fish and Wildlife Service and a 10 (a) Endangered Species Act permit will be required. The permit may be conditioned by the Service with mitigation, impact reduction or avoidance measures.
- A 1601 stream bed alteration agreement application with the California Department of Fish and Game will need to be submitted along with permit fees and relevant documents (including biological report, and wetland delineation). The agreement may be conditioned by the Department with mitigation, impact reduction or avoidance measures.
- The U.S. Army Corps of Engineers (ACOE) has jurisdiction over waters of the U. S. and wetlands under Section 404 of the Federal Clean Water Act. It is expected that impacts to jurisdictional wetlands will be less than 1 acre in size and may qualify for a Nationwide Permit, in which case only notification to the Corps is necessary. However, verification must be made that all required conditions of a Nationwide Permit are met and a letter of notification and relevant documents including copies of the 1601 agreement application, 401 water quality

certification application (see below), biological report and the wetland delineation, should be submitted to the ACOE, requesting concurrence that the project is covered under a Nationwide Permit. If all Nationwide Permit requirements are not met, a standard individual permit application form and relevant documents will need to be submitted to the ACOE for an individual 404 Permit.

- Certification, or a waiver of certification, from the State Water Resources Control Board verifying that the project c mplies with Section 401 of the Federal Clean Water Act will be required. The Regional Water Quality Control Board has up to a year to respond to the application and can issue a waiver of certification, certification, conditional acceptance, or a rejection of the permit.

The Least Bell's Vireo and the Southwestern Willow Flycatcher are only present as breeders in San Diego between March 15 and September 30. If grading and construction associated with this project occur outside the breeding season, impacts from roads are confined to the most disturbed areas of the riverbed with minimal native vegetation disturbed, and revegetation with native Southern Willow Scrub species occurs in areas temporarily impacted by the project, most impacts to these species and their potential habitat can be kept to a minimum.

It is likely that creation or enhancement (removal of invasive, exotic, wetland species) of on-site Southern Willow Scrub will be required as a permitting condition. However, exact mitigation requirements will be addressed through the permitting process with the various resource agencies.

Viviane J. Marquez
Marquez & Associates Biological Consultants
314 Second Avenue
Chula Vista, California 91910
619-476-1040

11 April 1996

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Individuals Contacted:
Mr. Robert Clark, President of El Monte Golf. *personal communication*.

Appendix A

Plant Species

Ambrosia psilostachya	Western Ragweed
Amsinckia intermedia	Common Fiddleneck
Artemisia californica	California Sagebrush
Arundo donax **	Giant Reed
Avena barbata **	Slender Wild Oat
Baccharis salicifolia	Seep Willow, Mule Fat
Bromus madritensis **	Compact Chess
Calystegia macrostegia	Wild Morning Glory
Cammisonia sp.	Primrose
*Cortaderia selloana***	Pampas Grass
Cryptantha sp.	Popcorn Flower
*Datura wrightii***	Jimson Weed
Eriogonum fasciculatum	Flat-topped Buckwheat
*Foeniculum vulgare***	Fennel
Gnaphalium sp.	Gnaphalium
Heterotheca grandiflora	Telegraph Weed
Lepidium nitidum	Shining Peppergrass
Lotus scoparius	Deerweed
Lupinus hirsutissimus	Stinging Lupine
Lupinus sp.	Lupine
Marrubium vulgare **	Horehound
*Nicotiana glauca***	Tree Tobacco
Opuntia littoralis	Coastal Prickly Pear
Platanus racemosa	Western Sycamore
Populis fremontii	Fremont's Cottonwood

Quercus agrifolia	Coast Live Oak
Ricinus communis **	Castor Bean
Salix exigua	Sandbar Willow
Salix gooddingii	Goodding's Black Willow
Salix lasiolepis	Arroyo Willow
Sambucus mexicana	Elderberry
Schinus molle **	Peruvian Pepper Tree
Tamarix parviflora **	Tamarisk
Xanthium spinosum	Spiny Cocklebur
Typha latifolia	Cattail

** represents non-native species

Appendix B

Animal Species

Anna's Hummingbird	*Calypte anna*
Audubon's Warbler	*Dendroica coronata*
Bewick's Wren	*Thryomanes bewikii*
Black Phoebe	*Sayornis nigricans*
Bushtit	*Psaltriparus minimus*
California Quail	*Callipepla californica*
Cliff Swallow	*Hirundo pyrrhonata*
Common Raven	*Corvus corax*
Common Yellowthroat	*Geothlypis trichas*
Coopers Hawk	*Accipiter cooperii*
House Finch	*Carpodacus mexicanus*
Lark Sparrow	*Chondestes grammacus*
Lesser Goldfinch	*Carduelis psaltria*
Mourning Dove	*Zenaida macroura*
Red-shouldered Hawk	*Buteo lineatus*
Red-winged Blackbird	*Corvus brachyrhynchos*
Turkey Vulture	*Cathartes aura*
Wrentit	*Chamaea fasciata*
Audubon's Cottontail	*Sylvillagus audubonii*

Appendix D
Archaeological Resource Report

A • S • M

affiliates

October 28, 1996

Mr. Warren Coalson
EnviroMINE
3511 Camino Del Rio South, Suite 403
San Diego, California 92108

Re: Cultural Resource Survey and Evaluation of the Proposed El Monte Golf Course Project

Dear Mr. Coalson:

This report presents the results of a cultural resources study conducted by ASM Affiliates for the proposed El Monte Golf Course project located near Lakeside, California (Figure 1). The study was performed to determine the presence or absence of potentially significant prehistoric and historic resources within the project property. This study included the review of all site records and reports on file with the San Diego Museum of Man and the South Coastal Information Center at San Diego State University, followed by an intensive pedestrian survey of the project. In addition, limited testing was conducted at one archaeological site, CA-SDI-13,652, a portion of which extends into the project. Subsurface testing conducted at the site indicates the presence of a substantial subsurface deposit within the project property that qualifies as significant pursuant to CEQA. No other cultural resources were discovered during the investigation. The study methods, findings, and recommendations are presented below.

Existing Conditions

The proposed 520-acre El Monte Golf Course is located along San Diego River several miles east of Lakeside, California. It is situated within the flood plain on both sides of the river. Willow Road, winding along the base of the El Cajon Mountains, forms the northern boundary of the project; the southern boundary is bounded by El Monte Road and adjacent steep hills. Land use in the general vicinity primarily consists of agriculture, diary farming, and gravel quarrying activities. Residential use of the surrounding area is largely rural ranch style housing with several areas of higher density housing including trailer parks. The majority of the property area is currently being used for agriculture or diary farming. A gravel quarry is situated on the western end of the project, while other portions contain horse stables. All of these activities have greatly modified the original landscape. The gravel quarrying on the west side of the project area has excavated and disturbed a substantial amount of acreage. Flood control activities have also disturbed portions of the central part of the project area and farming has greatly impacted the remaining parts.

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Cultural Background

Archaeological, ethnographic and historic information indicate that the San Diego County region has been occupied by Native Americans for nearly 10,000 years. The earliest evidence is that which archaeologists have named the San Dieguito Complex, a generalized hunter-gather band level society documented at sites throughout the region. By roughly 8,500 B.P., Early Archaic groups displaced the San Dieguito, intensively occupying the immediate coastal areas of southern California, including San Diego County where they are referred to as the La Jolla. Evidence of Kumeyaay and Luiseño culture groups, first found in the archaeological record around 1500 years ago in the southern and northern areas of the county respectively, represent the final major, indigenous culture historic horizon. Known regionally as the Late Prehistoric, this period ended with the arrival of the first Europeans.

At the time of initial European contact, the study area was occupied by the Kumeyaay Native American group. The Kumeyaay, also known as the Diegueño, inhabited the southern region of San Diego County, west and central Imperial County, and northern Baja California, and are the direct descendants of the early Late Prehistoric hunter-gathers. Kumeyaay territory encompassed a large and diverse environment that included marine, foothill, mountain, and desert resource zones. A number of Kumeyaay reservations are located near the project area including those of the Barona, Capitan Grande, Viejas, and Sycuan bands of Kumeyaay Indians.

Study Methods

The methods used to determine the existence of cultural resources in the project area included record searches, a field reconnaissance survey, and a limited testing program of one site. The record searches, conducted for a mile radius of the project area, were obtained from the South Coastal Information Center at San Diego State University and the San Diego Museum of Man (see attachment). The on-foot examination of the project was conducted by a four-person crew supervised by John Cook, S.O.P.A., and Ken Victorino on August 28th and 29th, 1996. The entire project area was surveyed by transects at 20m intervals with all prehistoric and historic resources being noted. Ground visibility ranged from excellent along dirt roads and newly plowed fields to poor in fields where crops were growing. In general, ground visibility was sufficient for the detection of any archaeological resources and no problems were encountered accessing and surveying all portions of the project area.

Results

A review of site records disclosed that no archaeological sites or resources had been recorded within the project area (Attachment A). The project area had been previously surveyed in 1975, by Sue Ann Cupples and no sites were found at that time, although 24 sites are recorded within a 1-mile radius of the project. Many of these are small temporary camp sites situated on the hills to the north and south of the project area. These sites often contain milling, small scatters of lithics and pottery, groundstone, and other artifacts. Very few sites are recorded in the river bottom and presumably they have been destroyed by flooding or modern farming.

Previously Recorded Sites: Six sites are recorded as being located directly adjacent the project area:

CA-SDI-4517: Recorded by Mooney and May in 1975, this site is located 200m northeast of the project area on the southeast face of a knoll. It consists of a bedrock milling station, and an associated midden above a rock outcrop including ceramics, lithics, and groundstone. This site may be George Carter's "El Monte Site" that Malcolm Rogers recorded in the 1920s (see Rogers notes W-231 in site record).

CA-SDI-13,652: This extensive site is located on the northwest edge of the project area, with the majority of the site situated on the north side of Willow Road. It consists of bedrock milling features, a rockshelter, midden, pottery, shell, bone, fire-affected rock, groundstone, and other items. There are three loci covering a 250 by 125m area. It is considered a Late Prehistoric habitation site and was recorded by Ogden in 1993. Most of the site and it's features such as the milling and rockshelter are located on the north side of Willow Road. A small portion of the site extends across the road into the project property.

CA-SDI-13,610: Located 100m south of the project area on the south side of El Monte Road, this site was recorded by Ogden in 1993 as consisting of several loci with milling features on large granite boulders and a small number of artifacts including a ceramic sherd and a mano.

CA-SDI-13,609: This site is located 75m east of CA-SDI-13,610, on the south side of El Monte Road approximately 100m south of the project. It is described as a single milling slick on a granite boulder.

CA-SDI-13,608/H: Located near a bend in El Monte Road, this site is 300m southeast of the project area on the north side of the road. It consists of two components: a prehistoric scatter of artifacts and an historic concrete silo and associated historic debris in a 305 x 50m area. The historic and prehistoric artifacts are scattered together in a plowed field. Prehistoric items include a mano fragment and a possible hammerstone, while the historic artifacts include some aqua glass fragments and a piece of embossed purple glass.

CA-SDI-13,607: Situated several hundred meters southeast of the project area on both sides of El Monte Road, this site consists of a scatter of artifacts including groundstone, hammerstones, lithics, and ceramics; no features were recorded. There are two loci: Locus A on the north side of El Monte Road on a hillside, and Locus B on the south side of the road in a disked field and road cut. The site covers a 200 by 175m area.

Survey Results

The on-foot survey of the project area revealed that the project area is heavily disturbed by agricultural and past sand extraction activities. There has been considerable alteration to the original landscape particularly in areas where flood control work has been conducted. With the exception of one previously recorded site, CA-SDI-13,652, no other sites or artifacts were found in the project area.

Evaluation of CA-SDI-13,652

CA-SDI-13,652 is situated in the northwest portion of the project area adjacent to Willow Road (an unmaintained dirt road) which bisects the site in an east-west direction (Figure 2 & 3). The portion of the site south of Willow Road is located within an agricultural field and has been impacted by extensive plowing and now lies fallow. Most of the site is located outside the project area among the bedrock outcrops on the slope of the hills on the north side of the road. The site is a large habitation site with milling features, a rockshelter, midden, shell, bone, fire-affected rock, groundstone and other items. Most of these features including the bedrock milling and rockshelter are located on the hill side on the north side of the road.

Originally recorded by Ogden Environmental in 1993 as a large, Late Prehistoric occupation site, SDI-13,652 consists of three loci covering an area 250 by 125m. Bedrock milling features (mortars, basins, and slicks), Tizon Brownware ceramics, shell, bone, fire-affected rock, groundstone, debitage, a rockshelter, and a Desert Side Notch projectile point were documented.

During the current study, the presence of cultural materials within the portion of the site south of Willow Road was confirmed by a low density scatter of flaked lithics, ceramics, some groundstone, and fire-affected rock. The testing program at CA-SDI-13,652 was limited to the south side of Willow Road, in the portion of site within the project boundaries. A total of 38 shovel test pits (STPs) and one 1.0 x 0.5m unit were excavated to determine the horizontal and vertical extent of the archaeological deposit within that portion of the site. Over 400 artifacts were recovered including 274 flaked lithics, 128 pieces of ceramics, and two groundstone fragments (Tables 1 and 2). Faunal material (burnt and unburnt) including bone and marine shell were also recovered, as was charcoal and fire-affected rock. With the exception of the fire-affected rock, all recovered artifacts were transported to ASM's laboratory facilities for cataloguing and analysis where they will be retained until a permanent repository is available for curation.

Conducted in lines running parallel to Willow Road spaced 20m intervals, 38 STPs were excavated in 10cm levels to a maximum depth of 85cm (Table 1). The STPs revealed 15-20cm of heavily disturbed plow-zone underlain by gray silt of varying degrees of compactness, with a cultural deposit to a depth of at least 85cm. Of the 38 STPs excavated, 19 produced prehistoric cultural material including lithics, pottery, and groundstone. The lithics consisted of one metavolcanic biface fragment and one quartz biface fragment along with 62 metavolcanic, 87 quartz, and 21 obsidian flakes. Sixty-one pieces of Tizon Brownware, including two rim sherds, and one pestle fragment were also recovered. The STPs yielded 356 pieces of small mammal bone, some burned, and 18 fragments of shell. Charcoal and fire-affected rock were observed in 13 of the STPs.

The 1.0 x 0.5m unit was placed in the area of heaviest artifact concentration as determined by the STPs and excavated in 10cm levels to a depth of 80cm (Table 2). A total of 51 metavolcanic, 47 quartz, and one obsidian flake were recovered from the unit. Two quartz biface fragments and one triangular quartz biface were also found. The unit yielded 218 pieces of small and large mammal bone (some burned), three pieces of weathered shell (unidentified bivalve), and 73 pieces of Tizon Brownware (including one rim sherd). One mano fragment was recovered from the 40-50cm level. Charcoal and/or fire-affected rock was seen in all but three levels, with the density drastically increasing below 60cm.

Based on testing results, that portion of the site south of Willow Road has a subsurface cultural deposit to a depth of at least 85cm, with the highest density of artifacts appearing below 30cm. The tested portion of the site covers an area approximately 220 by 75m and revealed prehistoric cultural material consisting of lithics, bone, shell, pottery, and groundstone.

Management Recommendations

The cultural resource study conducted by ASM Affiliates, Inc. for the proposed El Monte Golf Course included a cultural resource literature review, site records search, intensive pedestrian survey and evaluation. Record search information and survey results indicated that a portion of one archaeological site, CA-SDI-13,652, extends into the project property. The survey of the project area discovered no new cultural resources. CA-SDI-13,652 was relocated during the current study, and a limited testing program was implemented to evaluate the significance of that portion of the site contained within the project boundaries. The results of the evaluation indicate the presence of a substantial subsurface deposit that qualifies as significant pursuant to CEQA. Preservation of the site via site capping is the preferred mitigation to any adverse impacts that might result from construction of the proposed project. This will involve the placement of 6 inches of clean sand followed by 2 to 4 feet of clean, sterile fill soil over the entire site and buffer area. All work should be performed under the direct supervision of a qualified archaeologist. The boundaries of the site area should be appropriately delineated on all project maps with prohibitions against future excavation and/or disturbance. Irrigation, other utilities and improvements must not penetrate the sand stratum demarcating the top of the site. In addition, because of the possibility of buried deposits within the project boundaries, it is recommended that a qualified archaeological monitor be present during any extensive grading and subsurface excavation during construction of the golf course. Indirect impacts to that portion of CA-SDI-13,652 north of the project should be mitigated by fencing and signage restricting access.

Should you have any questions regarding this study, please do not hesitate to call me.

Sincerely,

John R. Cook S.O.P.A.
Principal

Attachments: Figure 2 - Map showing location of CA-SDI-13,652
Figure 3 - CA-SDI-13,652 site map showing test locations
Tables 1 & 2
Confidential Records Search

Appendix E
Hydrology Study

El Monte Golf Course River Hydrology Study

Prepared for

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I. INTRODUCTION

This report was prepared by Howard H. Chang Consultants for EnviroMINE to present a hydrology study for the proposed El Monte Golf Course along the Upper San Diego River in El Monte Valley near Lakeside. The drainage basin of the San Diego River is shown in Fig. 1, with the project location in El Monte Valley shown in Fig. 2. EnvironMINE was selected by the Helix Water District to prepare an Environmental Impact Report (EIR) for the project pursuant to the California Environmental Quality Act. Howard H. Chang Consultants is a subcontractor for the project responsible for the hydrology analysis of the EIR. The hydrology study covers the following discussions for the EIR:

(1) Description of the existing conditions in the study area as they pertain to surface water hydrology,

(2) Identification of impacts to the existing surface water hydrology conditions in the study area which could result from implementation of the proposed project,

(3) Identification of mitigation measures which could be incorporated into the project design to reduce the significance of impacts, and

(4) Determination of significance following the implementation of prescribed mitigation.

II. ENVIRONMENTAL SETTING

El Monte Valley (see Fig. 2) is within the drainage basin of the San Diego River (see Fig. 1) which originates from the Cuyamaca Mountains and flows southwesterly to the Pacific Ocean through Mission Bay. The drainage basin of the San Diego River is 433 square miles; it is a pear-shaped basin elongated in the northeast to southwest direction with an approximate length of 41 miles. The basin has a width that varies from about 7 miles at the mouth to about 14 miles in the mountains. The upstream reaches of the main channel above the major dams have steep slopes, as do the tributaries. The main channel below the major dams generally have mild slopes, except for the reach through Mission Gorge which has a steep local slope within the rocky hill slopes. The dominant material of the streambed is alluvial sand, except that bedrock surfaces through the steep Mission Gorge reach. A major physical feature of the alluvial bed is the numerous ponds created by sand mining. The sand pits are scattered in the river bed from Mission Valley to the El Capitan and San Vicente dams. The history of sand mining is described in a later section.

The San Diego River basin has a mild climate, with fairly mild differences between summer and winter. More than 70 % of the annual precipitation occurs in the period from December to March. The distribution of mean annual precipitation of the basin is uneven; it varies from about 10 inches per year at the river mouth to about 35 inches at Cuyamaca Mountains. Precipitation records from the various rain gages are kept by the National Weather Services and the County of San Diego.

Control Structures for the San Diego River - Major controls structures for the San Diego River include the El Capitan Dam, the San Vicente Dam and Cuyamaca Dam. These control structures are described below.

The Lake Cuyamaca Dam is located on the headwaters of the San Diego River within the drainage basin of El Capitan Reservoir. Lake Cuyamaca Reservoir has a storage capacity of 11,600 acre-feet at the spillway crest elevation of 4,635.6 feet. Its dam crest elevation is 4,641 feet. However, the Division of Dam Safety restricted the maximum impound level to be four feet below the spillway crest for the sake of dam safety. The spillway has the capacity of 4,540 cfs.

The El Capitan Dam is located on the San Diego River approximately seven miles east of Lakeside; it is a hydraulic fill rock embankment with an impervious clay core. The dam has a total height of 242 feet and with the spillway crest at elevation 750 feet above the USGS datum. El Capitan Reservoir has a drainage basin area of 190 square miles including the small basin area for Lake Cuyamaca. The reservoir has a surface area of 1562 acres and a capacity of 112,800 acre-feet at the spillway crest.

The San Vicente Dam is a concrete gravity dam, located on San Vicente Creek, a tributary of the San Diego River below the project site. The reservoir has a drainage basin area of about 75 square miles. The dam has a total height of 199 feet above the streambed; its crest elevation is 659 feet with spillway crest elevation of 650 feet. At the crest elevation, the reservoir has a surface area of 1,069 acres and a storage capacity of 90,230 acre-feet.

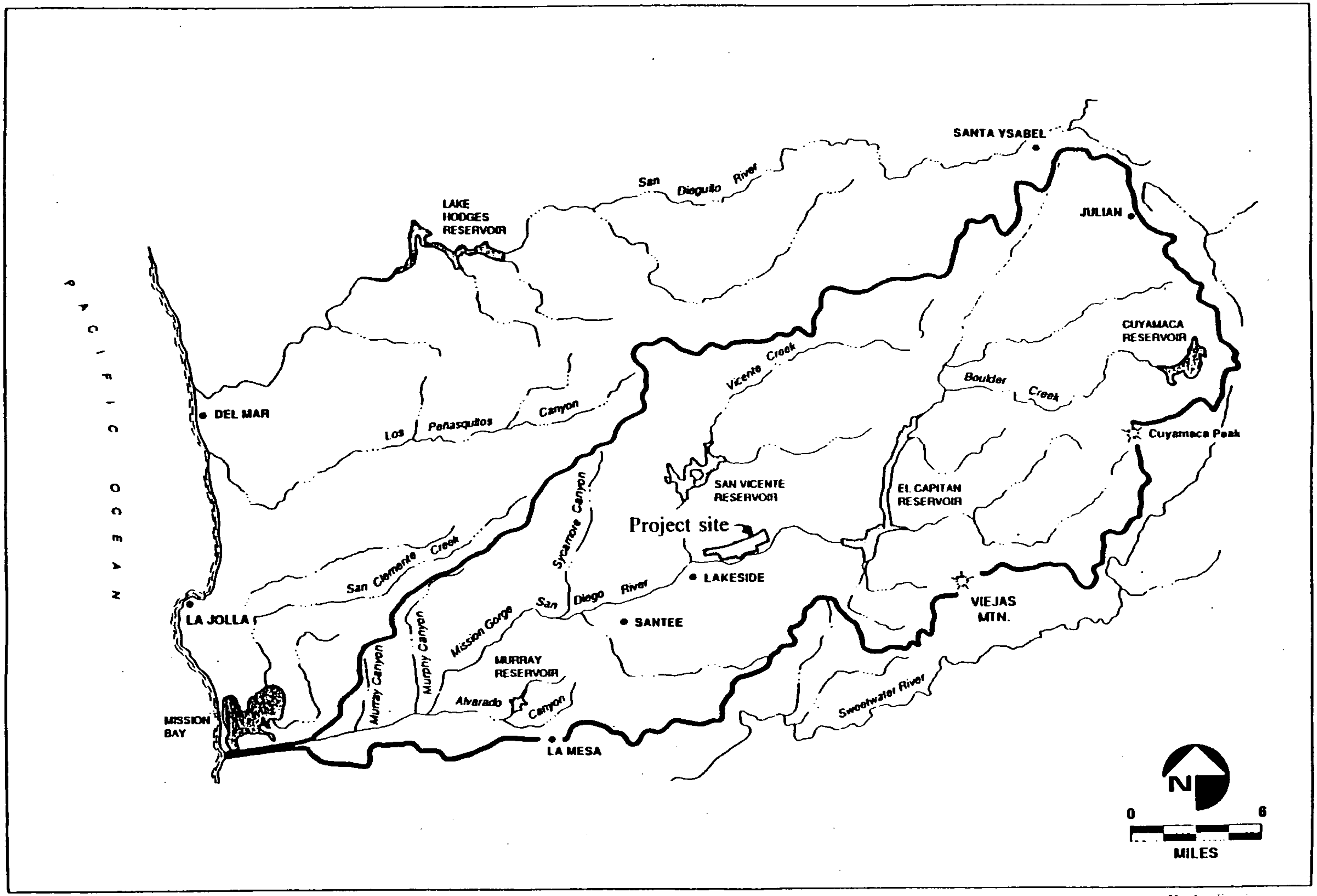

Fig. 1. Drainage basin of the San Diego River

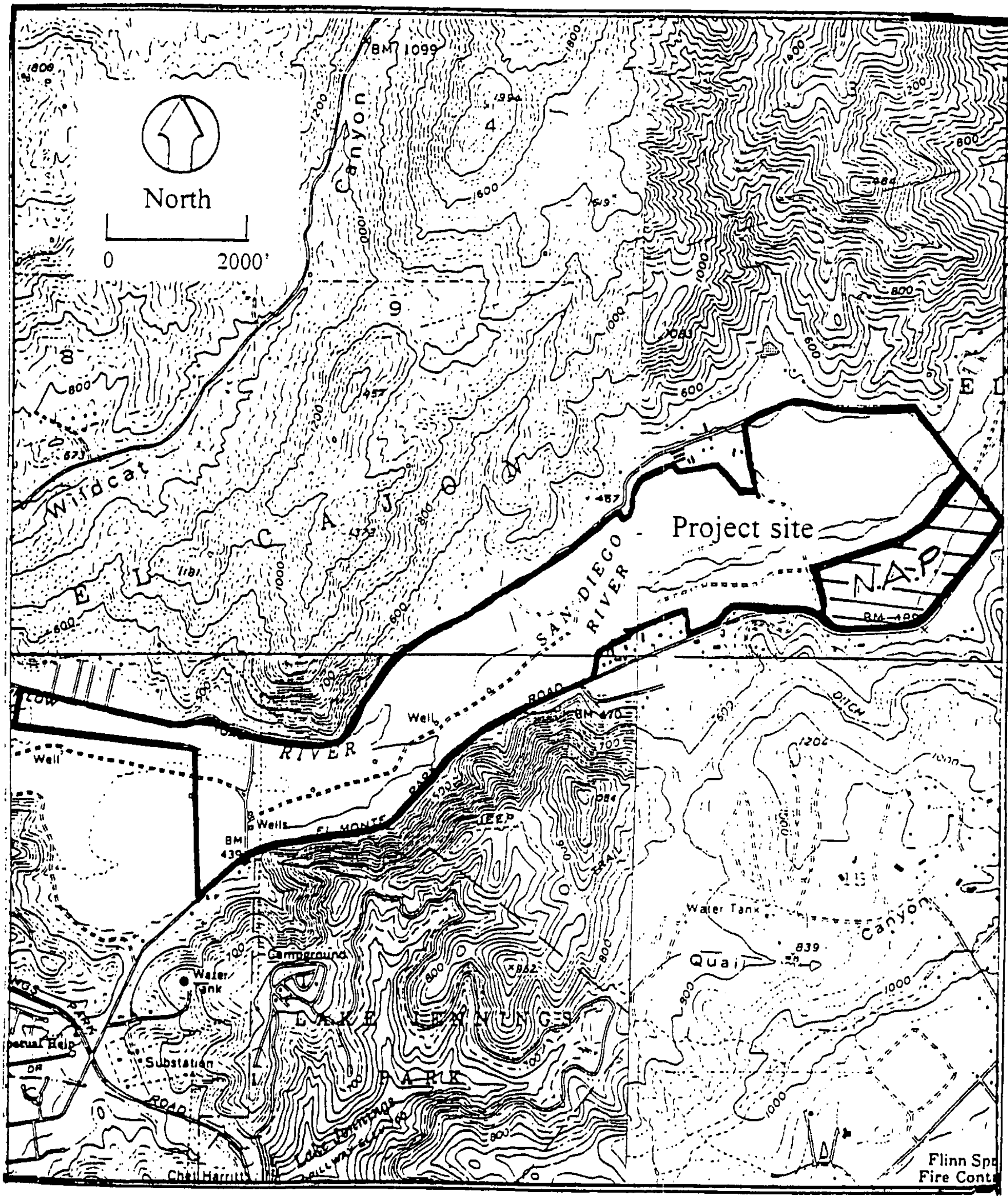

Fig. 2. Project site along of the Upper San Diego River in El Monte Valley

The completion of the El Capitan Dam in 1935 and San Vicente Dam in 1943 has changed the character of flood flow in the San Diego River. The greatest flood since the completion of the dams occurred on February 21, 1980. The inflow to El Capitan Reservoir was estimated to be 40,000 cfs (County, 1980) and the San Vicente inflow was 11,500 cfs. Because of the reservoirs, the outflow was only 1,080 at El Capitan spillway and 6,000 cfs at San Vicente spillway. In other words, San Vicente Dam reduced the peak flow in San Vicente Creek by nearly one half, while El Capitan Dam received more than the 100-yr inflow without spilling, except minor amounts at a later time.

The 1980 flood was the first spill for El Capitan since 1941 and the first ever for Lower Otay and Sutherland Reservoirs. The 40,000 cfs inflow to El Capitan was worth about $ 6,000 per minute, but some of the water had to be discharged in the interest of dam safety. The 1980 flood was the largest spill ever recorded at San Vicente.

El Capitan Dam and San Vicente Dam are owned and operated by the City of San Diego for municipal use and irrigation. These reservoirs have had a marked effect on runoff to the ocean. The storage capacity of El Capitan Reservoir is more than six times the mean annual runoff of the river. These two reservoirs are water storage reservoirs; and most of the water in San Vicente Reservoir are imported. With exception of high storm flows, water releases from the reservoirs are generally to the water supply system of the region. As such, they do not affect the runoff of the river channel. Each dam has an uncontrolled spillway, and spillage occurs when the water level exceeds the spillway crest. Since the completion, spillage of the El Capitan reservoir has occurred rarely in: 1938, 1939, 1941, and 1980. For the San Vicente Reservoir, spillage has occurred in 1978, 1980, and 1983.

The San Diego County Water Authority has initiated a new study to increase the storage capacity of these two reservoirs. As a result of this study, there is a high likelihood that San Vicente Dam may be raised, but changes for El Capitan Dam are not likely. The new project, if implemented, will further modify the flow characteristics of downstream areas.

Gaging Stations and Flood Records - There are six stream gaging stations located within the San Diego River basin, namely: (1) San Diego River at El Capitan Dam, (2) San Vicente Creek at San Vicente Dam, (3) Los Coches Creek near Lakeside, (4) Forester Creek at El Cajon, (5) San Diego River near Santee, and (6) San Diego River at Fashion Valley

The USGS stream gage at El Capitan Dam (No. 11020600) is located on the left bank of the reservoir 100 feet upstream from El Capitan Dam. The station covers a drainage basin area of 190 square miles, with records kept since September, 1970. The maximum discharge recorded by this station occurred on February 24, 1980 with flow of 1,080 cfs.

The San Vicente Creek gage at San Vicente Dam (No. 11022100) is located at the outlet tower in the reservoir. This station has a drainage basin area of 74.2 square miles, with records kept since October, 1970. The maximum recorded discharge occurred on February 21, 1980, with the value of 6,000 cfs.

The USGS stream gage on the San Diego River near Santee (No. 11022500) is at Mission Gorge Dam. It is located 20.4 km upstream from the mouth and has a drainage basin of 377 square miles, representing 87.3 % of the total drainage area of the basin. This gage was moved in 1982 to a new location at Mast Boulevard (New No. 11022480) and the drainage basin is reduced to 368 square miles. This station is of greatest importance because it has been recording river flows since May 1912, the longest for San Diego County. This station has recorded an average discharge of 25 cfs and an average annual runoff of 18,100 acre-feet. Because of the large variation in discharge, the stream stays dry for a good part of the year. Maximum discharges recorded at this station include the January, 1916 flood (peak discharge 70,200 cfs) and the December, 1921 flood (peak discharge 16,700 cfs). These record floods occurred before the completion of the El Capitan and San Vicente dams. The maximum discharge since the completion of these dams was 9,590 cfs recorded on March 1, 1983.

Reservoir Releases - The reservoirs in the San Diego River basin are water storage reservoirs. San Vicente Reservoir is supplied by imported water via the San Diego Aqueduct. The water releases from the reservoirs are generally to the water supply system of the region under normal conditions; they do not affect the runoff of the river channel. However, water may also be released for the sake of flood control. Spillage of the reservoirs have also occurred after successive storms. Such water releases and spillage do affect the downstream runoff.

El Capitan and San Vicente Reservoirs are operated by the Water Utility Department of the City of San Diego. Reservoir spillage occurs when the storage level exceeds the spillway. Under normal conditions, water is released from the reservoirs to the water supply system. The reservoirs are connected to the water supply system through a series of pipes. The maximum draw down from either reservoir is about 70 mgd (109 cfs). Since these two reservoirs are connected by a pipeline, water may also be directed from one to the other by gravity flow. Water may also be directed from these two reservoirs to Lake Murray.

Water utilization policy for the reservoirs requires the use of local runoff first before imported water, thus saving the cost for water import. The City's primary objective for the operation of these reservoirs is to maximize the capture and utilization of local runoff water. For this reason, San Diego City Council policy No. 400-4 states that the reservoirs shall have 60 % of the annual water requirement as active available storage in San Vicente, El Capitan and Murray reservoirs. This policy sets the lower level of storage in these reservoirs. It is a normal practice to maintain a minimum water storage in these reservoirs each fall just before the winter rainy season. This operation policy has reduced the chances for water releases and spillage.

El Capitan Dam is a hydraulic fill dam which was considered to have a stability problem in the event the dam is saturated during an earthquake. The State dam safety requirement was for the upper 30 feet of the reservoir pool level to be lowered as rapidly as possible. However, the water-release requirement was reviewed and waiver of water releases for dam safety was granted. The San Vicente Dam, a concrete gravity dam, may not be governed by the requirement for water releases for dam safety.

Water releases from the reservoirs may be made for the purpose of flood control. To avoid excessive flood discharge due to spillage and to provide drawdown for dam safety, water may be released from the reservoir. Water releases are through the blow-off valve. The 1980 water releases from the El Capitan Dam produced a moderate flow rate which lasted for a few days.

A review of the spillage records for El Capitan Dam finds that the dam has spilled due to flooding in 5 years (1938, 1939, 1941, 1980, and 1993) since completion in 1935. More detailed information on the spillages of 1980 and 1993 are available. The 1980 spillage was from February

23 to April 26, 1980. The total volume of spillage was 68,306 acre-feet. This volume also includes water release for reservoir level drawdown below the spillway crest for dam safety regulations at the time. The 1993 spillage was from March 13 to April 18, 1983 for a total volume of 12,402 acre-feet. There was no artificial reservoir level draw down for this case.

In addition to the flood spillages, water was also released in 1981, 1983 and 1984 for dam safety regulations at the time. Such releases and the respective volumes are as follows:

1981: 31,795 acre-feet

1983: 28,006 acre-feet

1984: 15,879 acre-feet

Sand Mining History - The San Diego River has a sand mining history concurrent with the regional growth. River sand is the largest mineral resource in the County of San Diego; it is used as a construction material, as the major composition of concrete. Most of the concrete sand is produced from instream sand mining. Earlier mining operations were generally small in quantity and they were not regulated. With accelerated growth in the region and increasing quantities of sand mining, such activities have been regulated through the permitting process in the last three decades. The Lower San Diego River bed was mined earlier as this is in the proximity of construction activities, with major activities in the 1950's and 1960's, The major mining activities were gradually extended to the Middle San Diego River and the Upper San Diego River. At the present, all mining activities in the lower and middle reaches of the San Diego River have stopped, primarily because economically viable resources have been mostly depleted. The remaining active mining operations are in the Upper San Diego River above Cottonwood Avenue by RCP Company and in El Monte Valley by Nelson and Sloan.

The San Diego River has undergone one of the most extensive sand mining histories among all rivers in urban areas. The river bed is dotted with sand pits from I-163 all the way to El Capitan Dam and San Vicente Dam. The depth of excavation varies from 10 to 80 feet, with the average in the order of 25 feet. Sand pits cover over 50 % of the channel length within the mining reach. Channel changes have been induced by sand mining, however, it will take many large flood events to reestablish a new smooth equilibrium bed profile. At the present time, the stream bed profile is saw-blade shaped. The dips in the profile usually correspond to the sand pits.

Sand Mining in El Monte Valley - Sand mining operations in El Monte Valley include the previous operation by Woodward Sand and Materials Company and the on-going operation by Nelson and Sloan. The Woodward Sand operation started in the early 1970's and it stopped around 1982. This operation created the present main channel of the river that is about 300 feet wide, 10 feet deep, and 2.7 miles long extending along the channel throughout the Helix Water District's property.

The sand mining operation by the Nelson and Sloan Company is located on the south bank of the main channel (see Fig. 3) and it is separated from the main channel by a haul road embankment. The operation started in the early 1970's and its bottom elevation is well below the water table so that it has become a deep water pond.

In order to avoid impacts of the water pond on the river channel, Nelson and Sloan is required to provide a partition between the river channel and the extraction site. This requirement is from the County Flood Control which also enforces such a requirement. It is assumed in this study that the Nelson/Sloan pond is properly separated from the river channel to the 100-yr flood level so that it does not impact the river channel.

River Crossings in El Monte Valley - At this time, there are no bridges on this river reach in El Monte Valley as all crossings are dip crossings. Most of these dip crossings do not have low flow culverts under the road. The crossings and their locations are listed below:

Ashwood Street: This dip crossing with asphalt road surface pavement and culverts under the roadway is located at Section 320 as shown in Fig. 3.

Pipeline crossing: The 36-inch water pipeline belongs to the Helix Water District; its crossing is at Section 333. The top of pipe is at elevation 409.9 feet. The minimum soil cover over the pipeline in the main channel is now less than 2 feet.

Road crossing at El Monte Rancho boundary: This dip crossing is located at Section 350.

Road crossing at Circle V Dairy: This dip crossing is at Section 380.

Hazy Meadow Lane: This dip crossing is at Section 410.

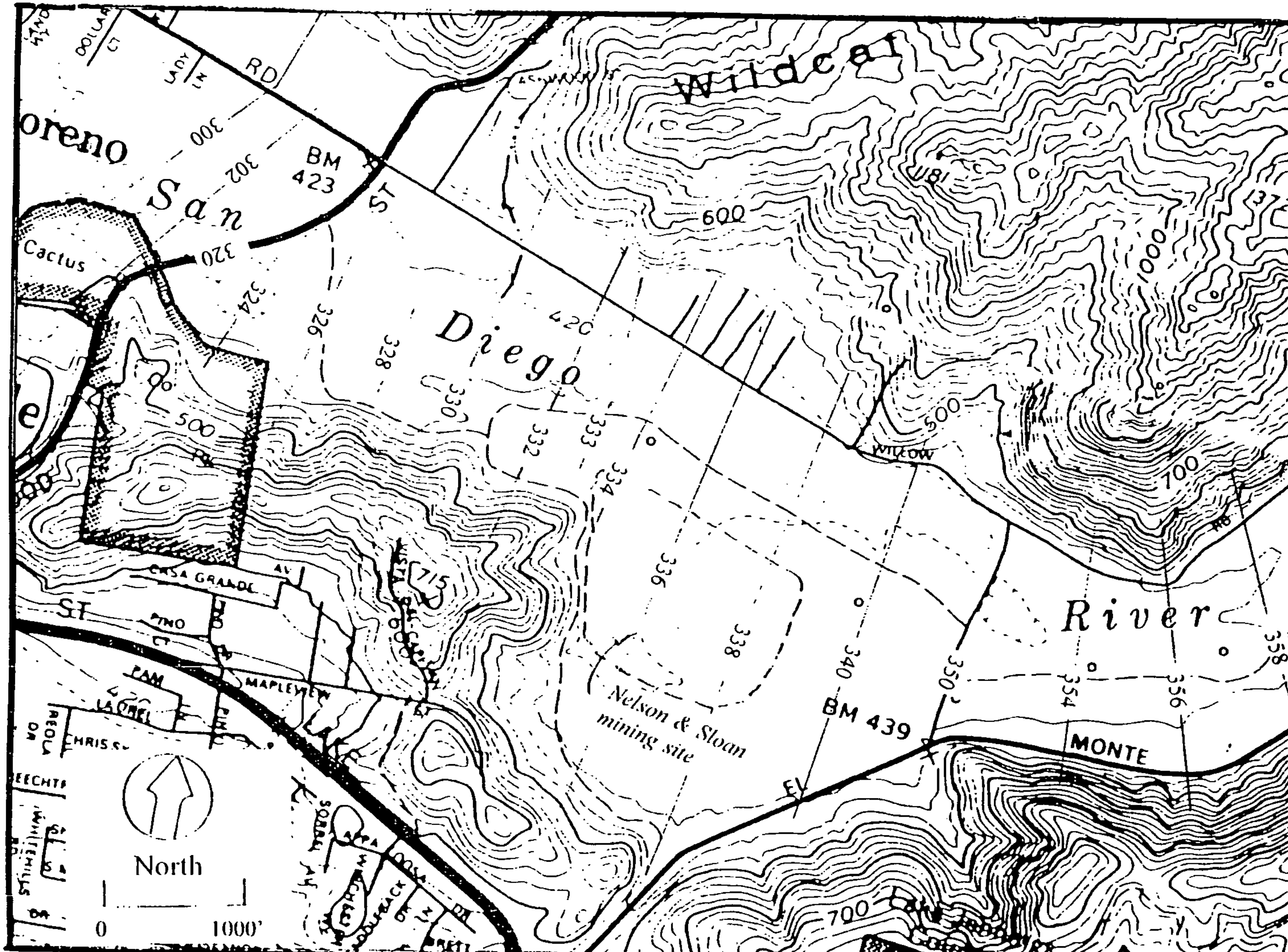

Fig. 3. Upper San Diego River in El Monte Valley with cross section locations

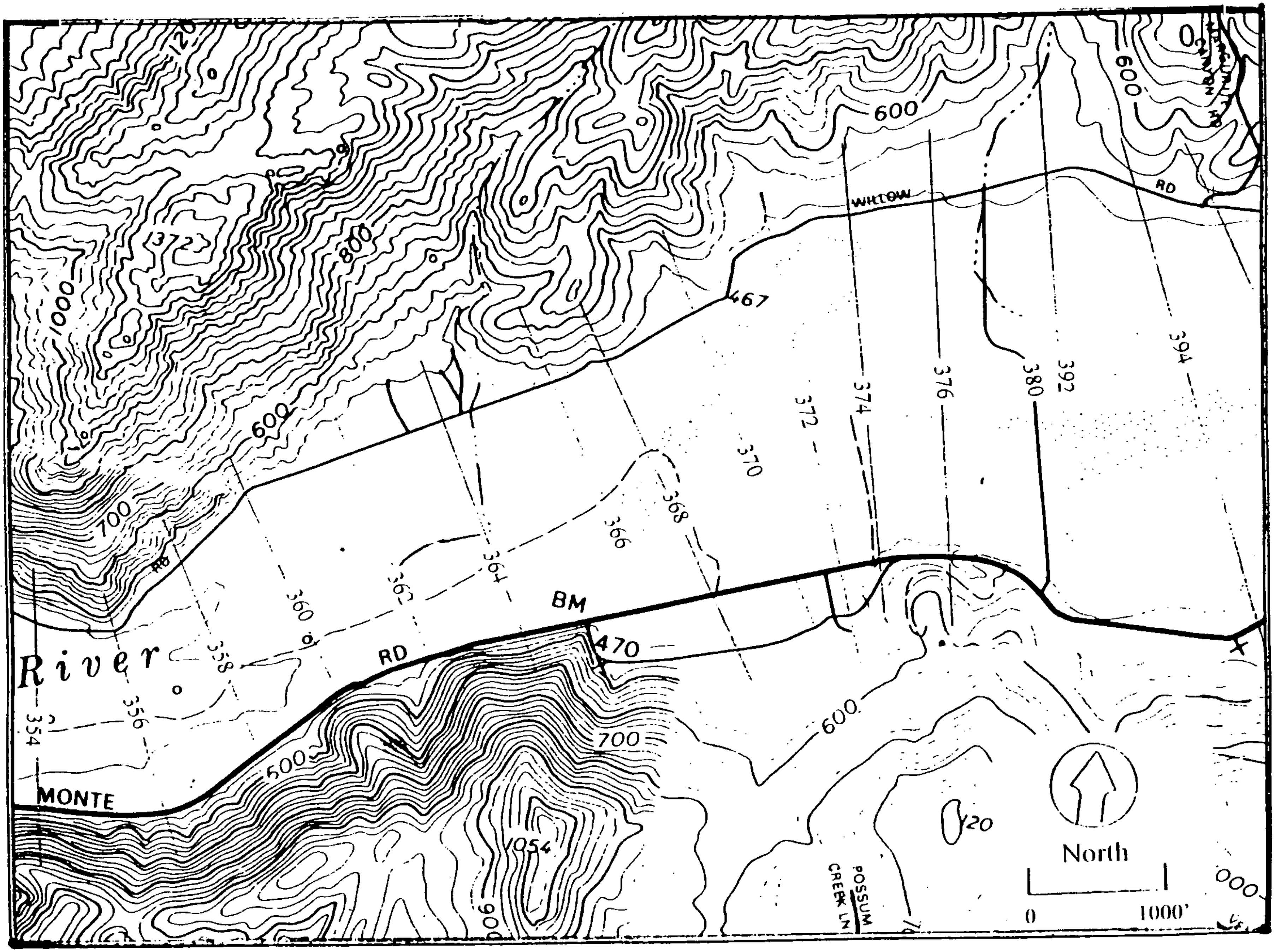

Fig. 3 (continued). Upper San Diego River in El Monte Valley
with cross section locations

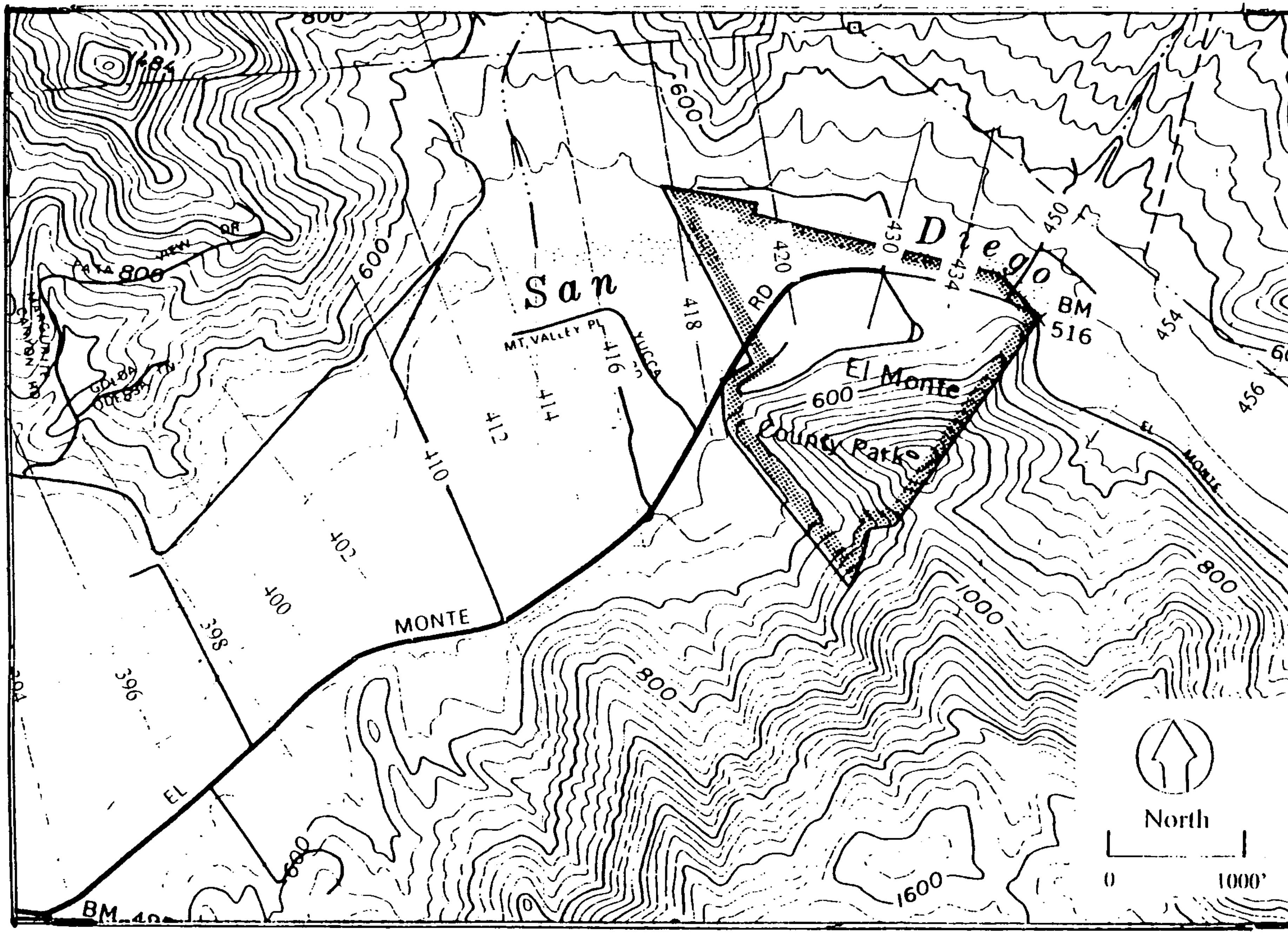

Fig. 3 (continued). Upper San Diego River in El Monte Valley
with cross section locations

III. FLOOD HYDROLOGY FOR EL MONTE VALLEY

The flood discharge of the Upper San Diego River in El Monte Valley is affected by the operation rule of the El Capitan Reservoir. This reservoir was assumed to be three quarters full for the 100-yr flood in previous studies by the County of San Diego (1973), California Department of Water Resources (DWR, 1976), and the Corps of Engineers. At three quarters of the capacity, i.e., 84,750 acre-feet, the pool elevation is 729 feet. The 100-yr flood peak discharges obtained by these agencies as summarized by the County (1973) are tabulated below, together with the adopted discharges.

Table 1. Summary of peak flows for 100-yr flood in cfs

Location	DWR	County	Corps	Adopted
San Diego River 2 miles below El Monte Park	14,000	21,000	22,000	19,000

These agencies obtained different discharges for the same channel reach. The adopted discharge represents the value agreed upon by the agencies. It should be noted that different approaches were followed by these agencies. The regression analysis was used by the DWR; the frequency analysis was used by the Corps, and the County employed the rainfall-runoff method.

A hydrology study of the river basin was completed in 1975 by the U. S. Army Corps of Engineers. Flood discharges obtained in this Corps study as listed in Table 2 are considerably higher than those listed in Table 1. The 1975 Corps discharges were used by Nolte and Associates in FIS-86 study for FEMA. These discharges shall be termed FEMA-adopted discharges.

Table 2. FEMA-adopted flood discharges for the study river reach

Location	Discharge, cfs		
	100-yr flood	50-yr flood	10-yr flood
Downstream limit of study (Sec. 300)	31,000	12,500	2,500
Upstream limit of study (Sec. 456)	29,400	11,300	500

In the future, El Capitan Reservoir may be kept at storage levels higher than three-quarters full. This practice would result in higher flood discharges. In view of this, the FEMA-adopted discharges are used in his study as a conservative measure for hydrology.

The 100-yr flood hydrographs for the river reach are shown in Fig. 4. The shape of the hydrograph is based on information provided by the California Department of Water Resources (DWR, 1976). The flood has a short duration with rapidly rising and falling discharges as are characteristic of arid regions.

IV. PROPOSED GOLF COURSE PROJECT

The proposed golf course involves grading in order to create the desired land features. The grading plan for this project was prepared by *Golf Properties Design* located in El Cajon (phone number 442-8100). A copy of the grading plan is attached to this report. Special features of the grading plan are described below.

(1) There is no net import or export of materials from the project site.

(2) There is no grading in the existing main channel.

(3) Several lakes will be created in the overbank areas of the main channel as shown in the grading plan. These lakes maintain a minimum separation of about 200 feet from the main channel. Each lake has surrounding berms that are higher than the 100-yr flood level to prevent river flow from entering into the lake.

(4) There are four river crossings for golf carts within the project area. Such crossings are dip crossings following the existing channel bed profile. Small culverts will be installed at each crossing just to pass the nuisance flow. Bank protection, whether riprap or concrete, shall be designed by a registered civil engineer.

(5) There is a proposed bridge located at Section 370 near the club house. The bridge plan as shown in Fig. 5 for Section 370 has a span of 350 feet and six sets of piers. The bridge low chord stays above the computed 100-yr flood level.

For the purpose of river hydraulic analysis, cross sections are used to define the channel geometry. The cross sections used in the original Nolte study are also used in this study. Sample cross-sectional profiles for the existing and proposed conditions are shown in Fig. 5.

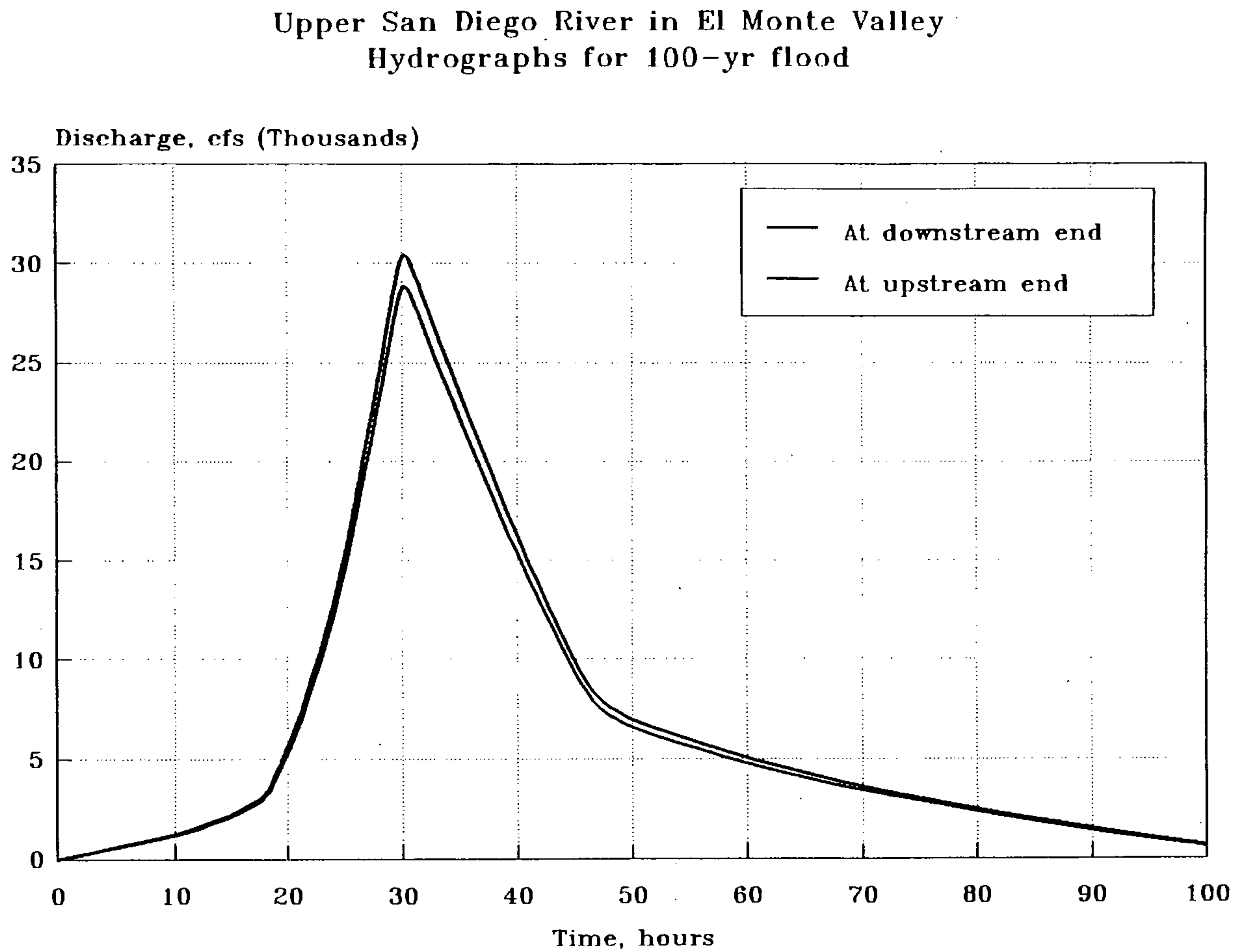

Fig. 4. Hydrographs of the 100-yr flood adopted by FEMA

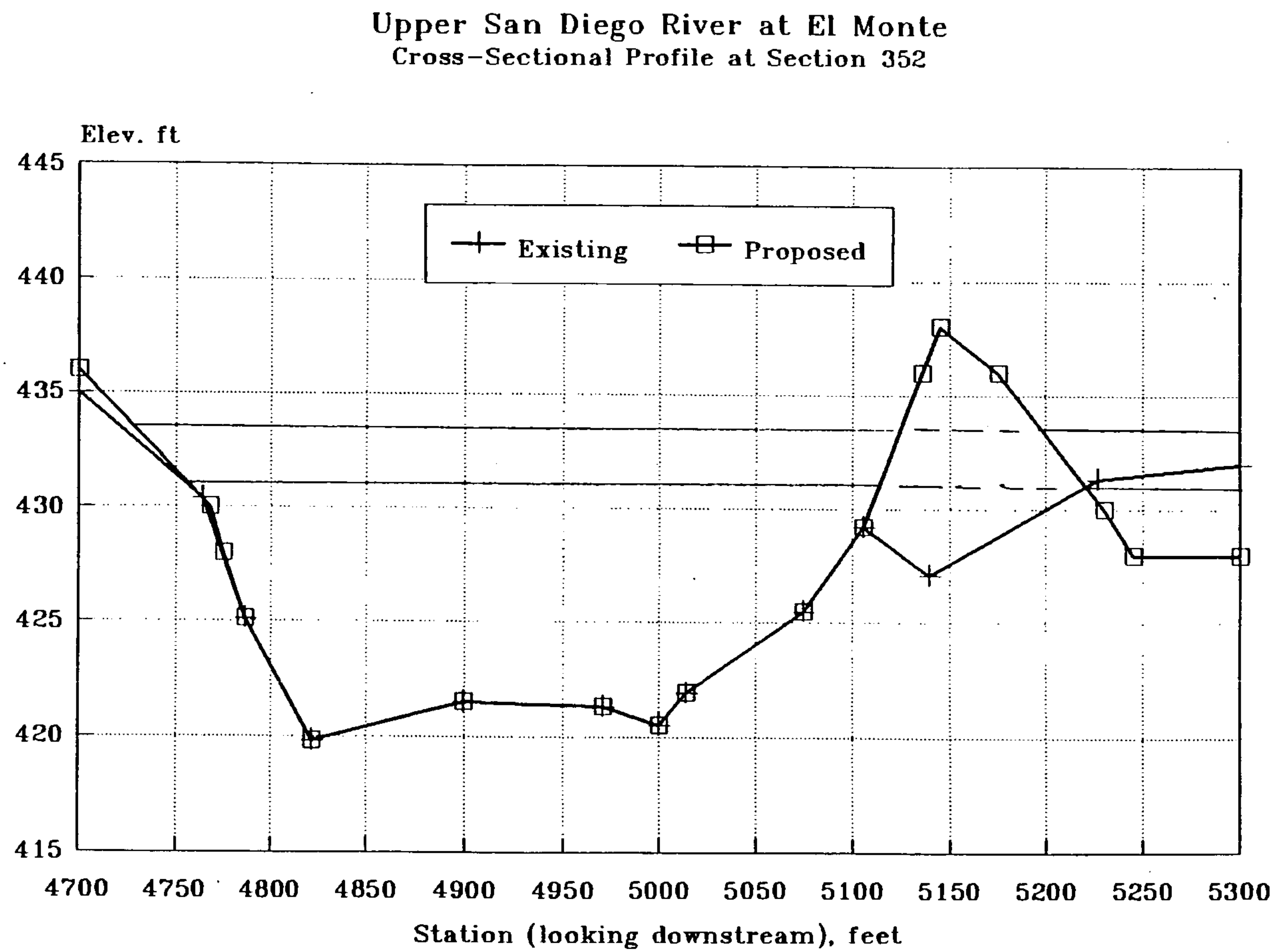

Fig. 5. Sample cross-sectional profiles with 100-yr flood levels

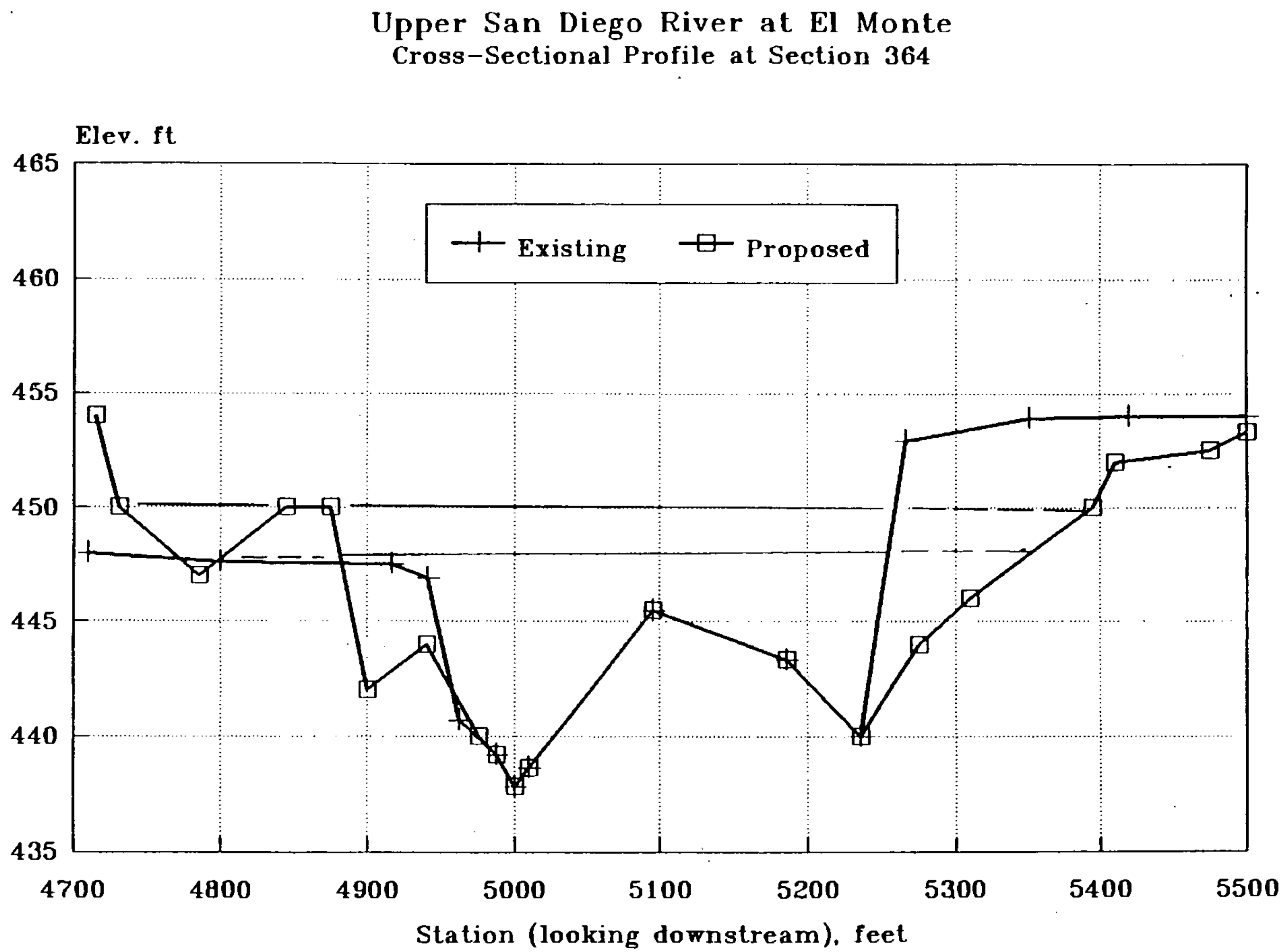

Fig. 5 (continued). Sample cross-sectional profiles with 100-yr flood levels

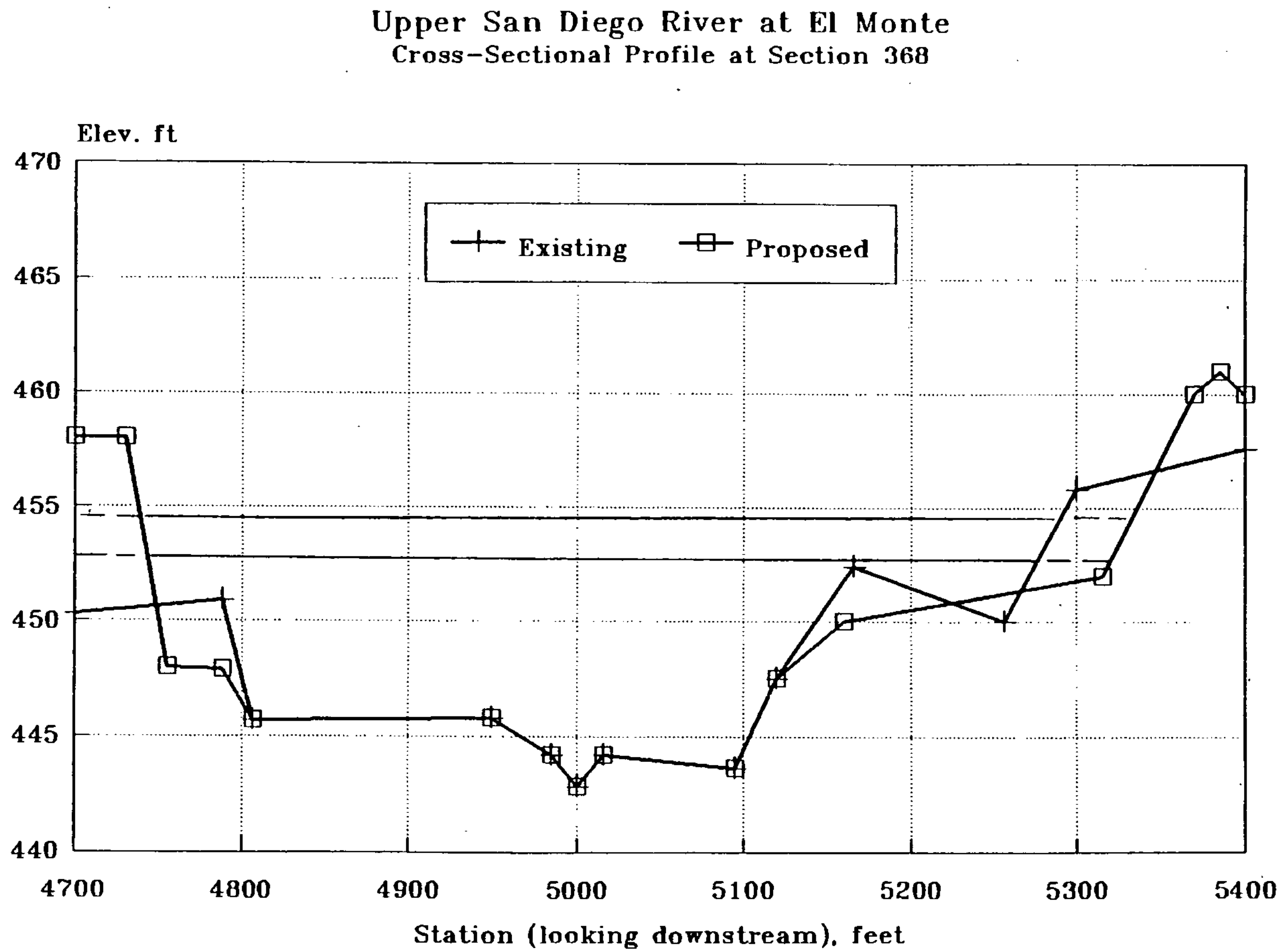

Fig. 5 (continued). Sample cross-sectional profiles with 100-yr flood levels

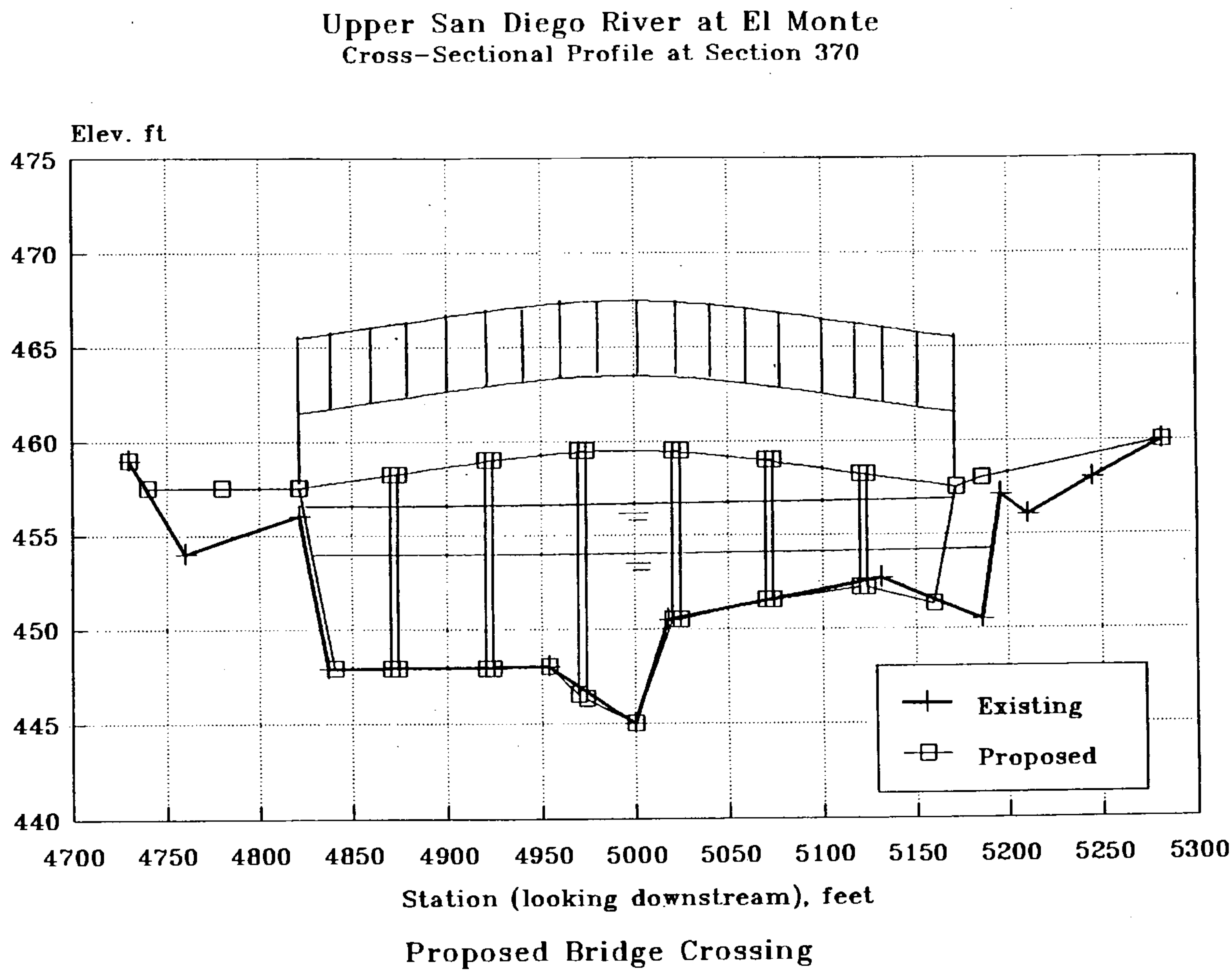

Fig. 5 (continued). Sample cross-sectional profiles with 100-yr flood levels

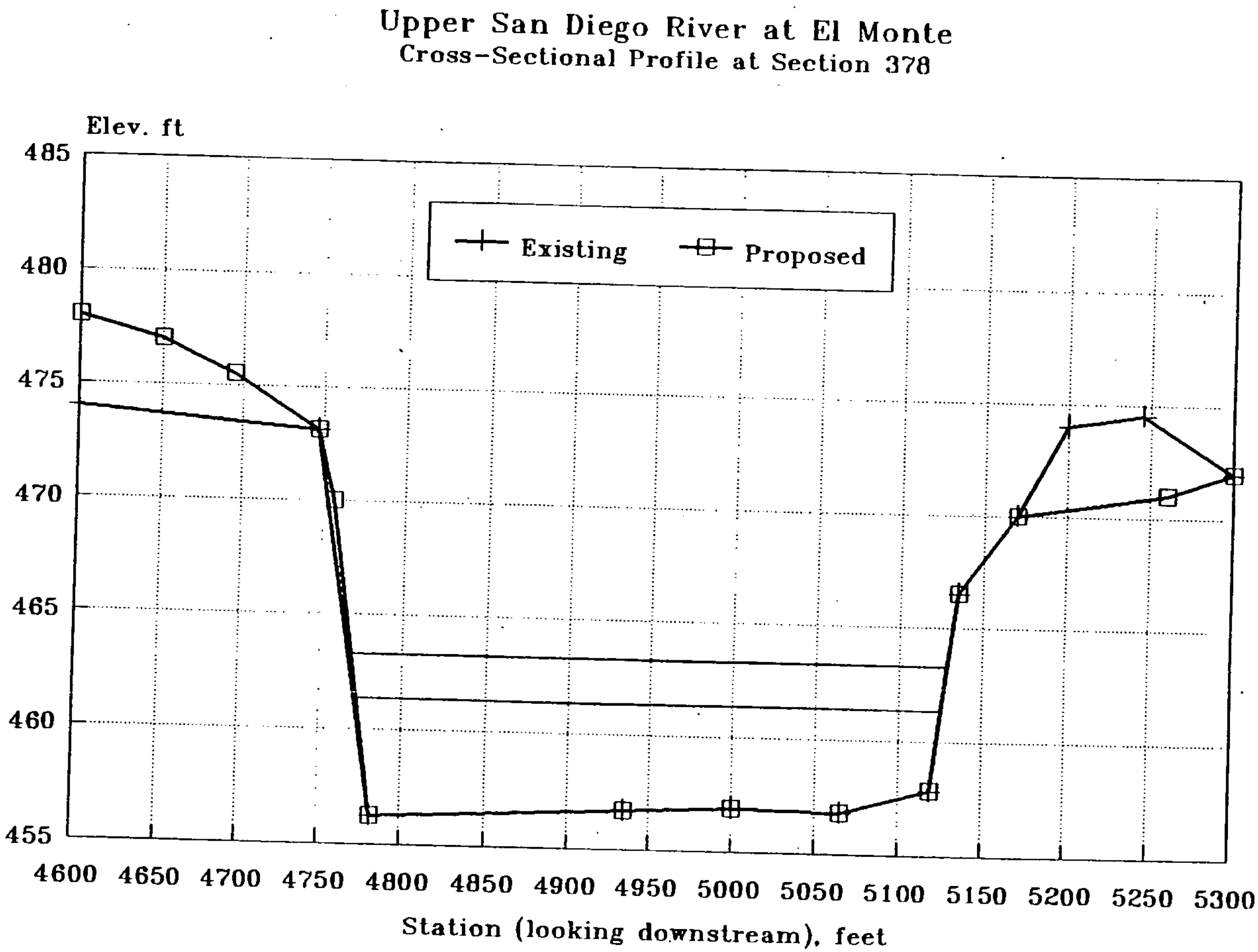

Fig. 5 (continued). Sample cross-sectional profiles with 100-yr flood levels

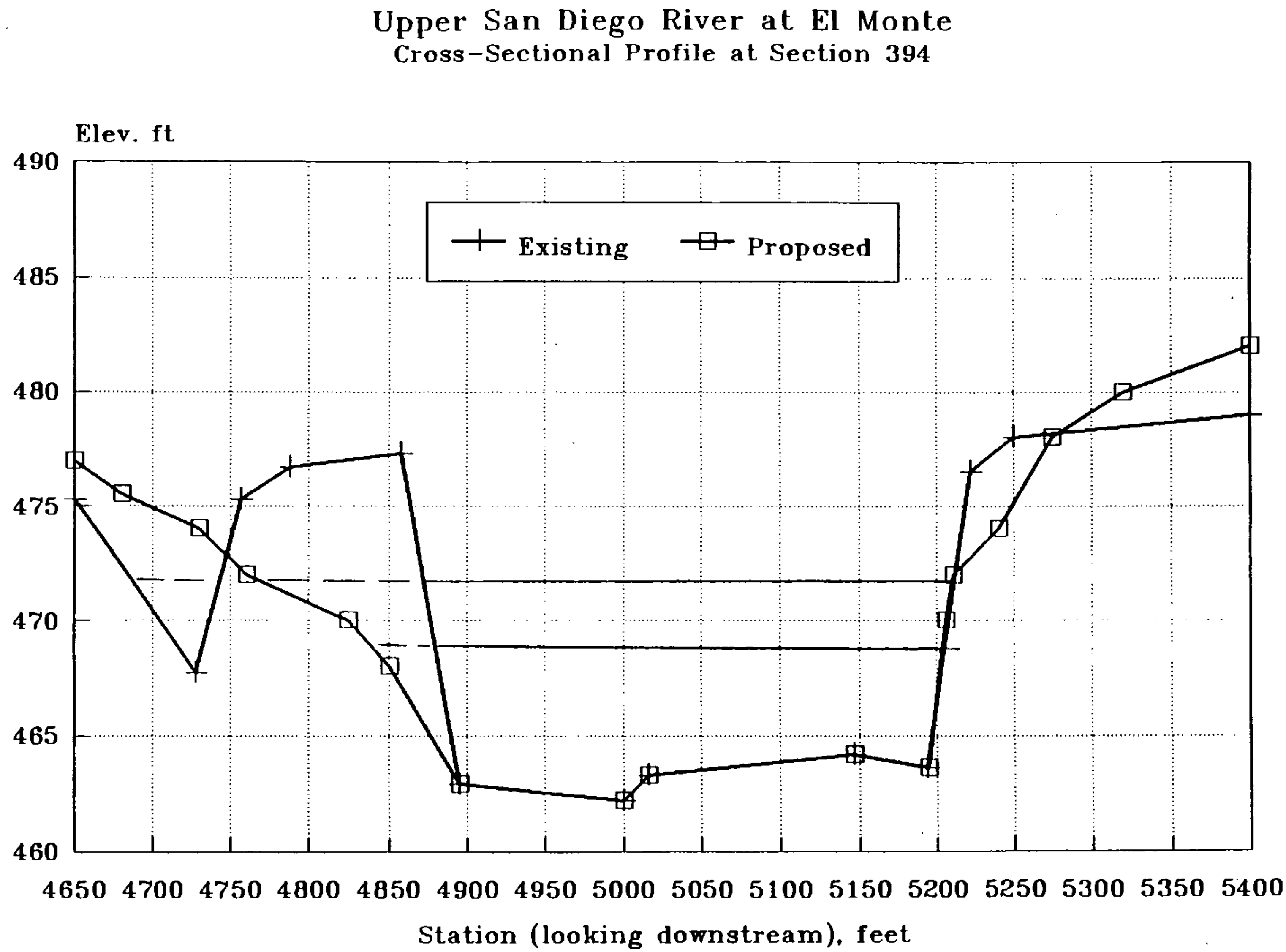

Fig. 5 (continued). Sample cross-sectional profiles with 100-yr flood levels

V. FLOW CHARACTERISTICS OF UPPER SAN DIEGO RIVER IN EL MONTE VALLEY

The river channel of the Upper San Diego River in El Monte Valley, under its existing conditions, was shaped by sand and gravel mining before 1982. The channel has a width of about 300 feet and a depth of about 10 feet. A series of grade-control structures were placed in the channel at the time of mining. These structures were outflanked during subsequent flows. Without any restoration, these structures are considered ineffective.

The hydraulics of flow for the river channel was computed using the HEC-2 computer program developed by the U. S. Army Corps of Engineers. The channel geometry is defined by cross sections whose locations are shown in Fig. 3. These cross sections were taken from the Flood Insurance Study 1986 (FIS-86) performed by Nolte and Associates for the Federal Emergency Management Agency. A list of these sections and their respective river miles and minimum bed elevations are given in Table 3. These cross sections were generated based on aerial survey after the 1983 reservoir release. Since then, changes in channel geometry have been minor because of the limited durations and discharges of reservoir releases that occurred only in 1984 and 1993.

Table 3. List of cross sections and their respective river miles and minimum bed elevations

SECNO	RIVER MILE	ELMIN	POINT OF INTEREST
300	0.000	389.4	Downstream limit of study
302	0.091	392.6	
304	0.114	393.6	
306	0.120	397.2	
308	0.120	397.2	Ashwood Street
310	0.135	397.3	
312	0.135	397.3	
314	0.139	397.7	
315	0.146	397.8	
316	0.153	397.9	
317	0.153	397.9	
318	0.157	397.9	
319	0.157	398.0	
320	0.166	397.8	
322	0.191	399.4	
324	0.275	401.7	
326	0.348	402.1	
328	0.449	403.6	

SECNO	RIVER MILE	ELMIN	POINT OF INTEREST
330	0.555	405.5	
332	0.697	408.1	Downstream boundary of Helix property
333	0.768	411.2	36-inch pipeline, top elevation 409.9 feet
334	0.821	411.2	
336	0.922	412.7	
338	1.040	415.0	
340	1.164	416.0	
342	1.296	418.8	
344	1.310	418.8	
350	1.336	420.2	Road crossing at El Monte Rancho boundary
352	1.350	419.8	
354	1.455	422.6	
356	1.587	424.8	
358	1.763	429.4	
360	1.886	433.2	
362	2.017	434.1	
364	2.165	437.8	
366	2.313	442.1	
368	2.385	442.8	
370	2.487	445.0	
372	2.592	448.0	
374	2.695	449.4	
376	2.792	453.1	
378	2.922	456.2	
380	2.944	457.0	Dip crossing
390	2.962	457.0	
392	2.992	458.1	
394	3.160	462.2	
396	3.307	464.6	
398	3.438	465.3	Upstream boundary of Helix property
400	3.523	467.1	
402	3.642	469.1	
404	3.755	472.3	
406	3.872	473.8	
408	3.956	475.1	
408.5	3.966	477.4	
409	3.966	477.4	Road crossing
410	3.969	477.4	
411	3.969	477.4	
411.5	3.978	477.4	
412	4.015	477.7	
414	4.108	477.0	
416	4.224	481.7	
418	4.345	485.3	
420	4.479	486.3	

SECNO	RIVER MILE	ELMIN	POINT OF INTEREST
422	4.611	490.5	
424	4.628	490.3	
430	4.641	490.8	Road crossing
432	4.660	491.6	
434	4.729	492.4	
436	4.794	494.0	
438	4.807	494.0	
440	4.823	494.5	Road crossing
442	4.835	494.7	
444	4.916	495.9	
446	5.014	497.1	
448	5.032	496.7	
448.5	5.041	497.5	
449	5.041	497.5	Road crossing
450	5.045	497.5	
451	5.045	497.5	
452	5.061	497.8	
454	5.176	500.1	
456	5.317	502.8	
458	5.433	505.0	Upstream limit of study

Existing floodplain zoning for the river reach was published in the Flood Insurance Rate Map, or FIRM map, shown in Fig. 6, by the Federal Emergency Management Agency. This map has the effective date of June 19, 1997 which is after the completion of the HEC-2 study made for FIS-86 by Nolte and Associates. Two flood zones are designated on the FIRM map; namely, Zone A and Zone X. They are described below.

Zone A: Areas of 100-yr flood; base flood (100-yr flood) elevations and flood hazard factors not determined.

Zone X: Areas determined to be outside 500-yr floodplain.

From the definitions given above, the Zone A boundaries shown on the FIRM map are only approximate boundaries of inundation by the 100-yr flood. It appears that the Nolte study was either not used for the FIRM maps or the results from the Nolte study were only considered to be approximate.

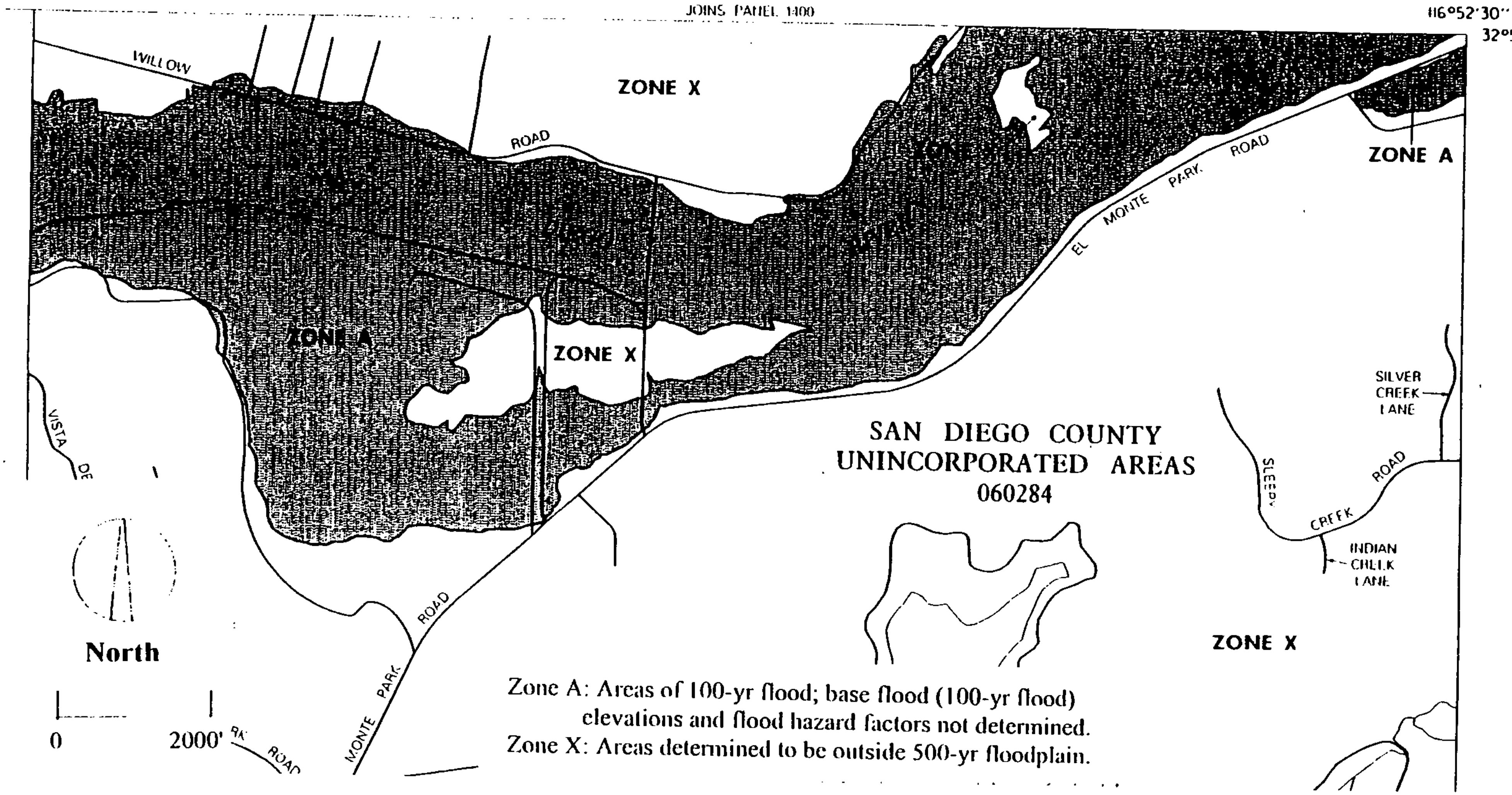

Fig. 6. The Flood Insurance Rate Map for the area

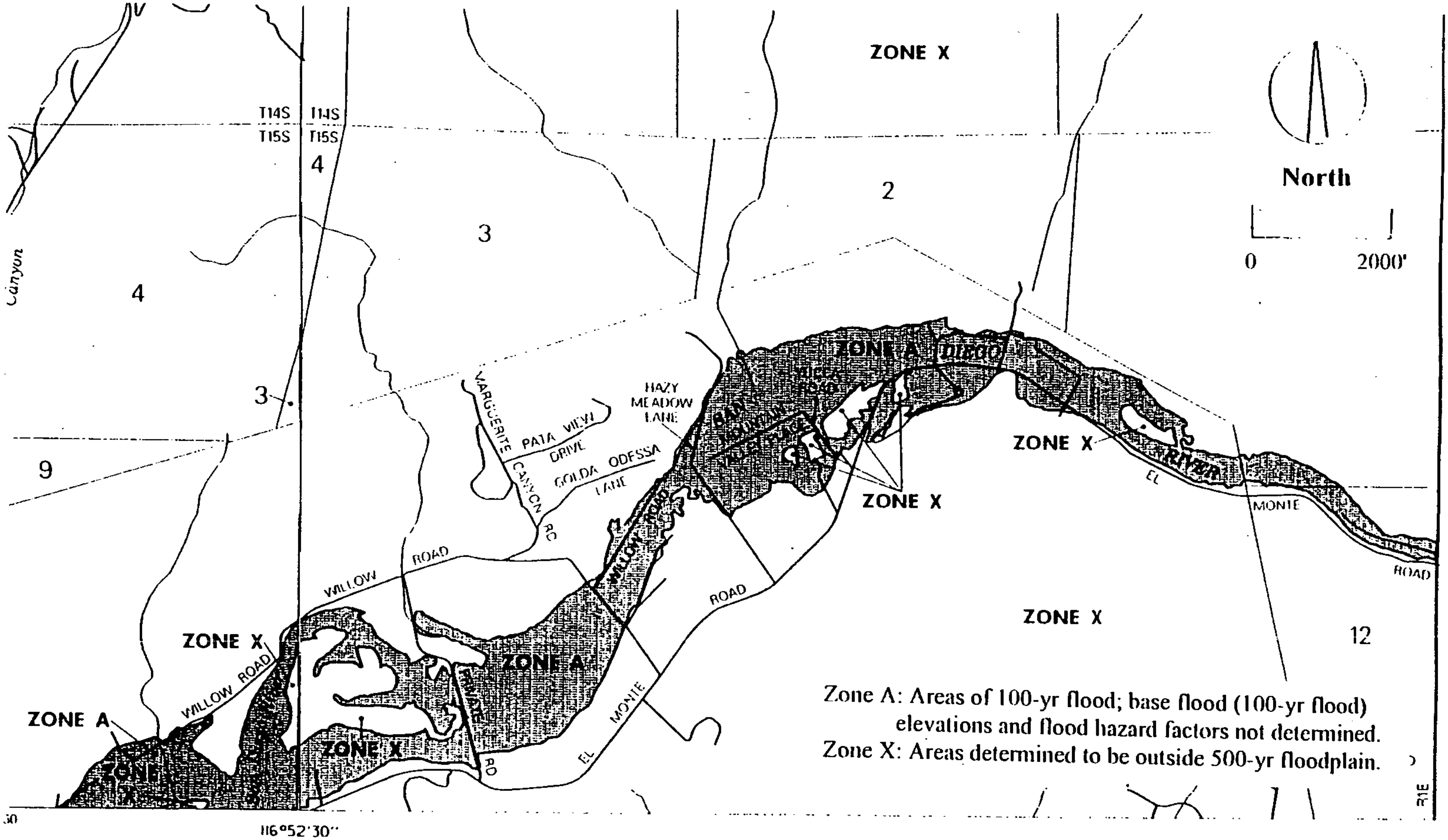

Fig. 6 (continued). The Flood Insurance Rate Map for the area

Since the completion of mining by Woodward Sand in 1982, there have been certain changes in the main channel that are described below:

(1) There has been extensive growth of vegetation in the channel. The trees, shrubs, and other plants are nourished by the steady groundwater seepage through the alluvium underlying the channel bed. The dense vegetation growth indicates a higher degree of roughness for the channel, a higher flood level, and a lower velocity.
(2) The channel has experienced bank erosion resulting from meandering development of the river flow. Bank erosion has so far been minor because of limited flow durations. Such development is expected to continue in the future.
(3) Siltation of the channel has occurred near the upstream entrance.
(4) Erosion has occurred along channels both upstream and downstream of the Woodward Sand mining reach.

Such changes in the post mining channel has altered conclusions of the Nolte study. The original HEC-2 computations by Nolte were updated to reflect the changes in channel roughness. Results of the new HEC-2 computations are shown in Figs. 7 through 11 for the existing and proposed conditions. Figs. 7 through 10 show the computed water-surface profiles for the channel reach and Fig. 11 shows the computed velocities under the existing conditions of the river channel. The numerical values for these quantities are given in the HEC-2 input/output listings in Appendix A of this report. These results pertain to two flood discharges, i.e., the County 100-yr flood and the FEMA-adopted 100-yr flood. Because of the increased channel roughness due to vegetation growth, the computed water-surface elevations are slightly higher than those obtained in the previous FIS-86 study.

It is important to point out that the HEC-2 model is a fixed boundary model in that the channel boundary is assumed to be unchanged during a flood. Since the potential channel boundary changes during a flood are not considered by the HEC-2 model, the computed velocities as shown in Fig. 11 may be unrealistic. The rather large spatial variations in velocity may not occur during the flood because of channel's adjustment in geometry. A new set of results for the velocity will also be computed using an erodible-boundary model, to be presented in the next section. However, the computed velocities as shown in Fig. 11 can be used to assess the stability of the road crossings.

At the Ashwood Street crossing for example, the computed velocity of 14.5 feet per second exceeds the permissible velocity for asphalt road surface; therefore, this road crossing is subject to erosion during the 100-yr flood. At other unlined dip crossings, the computed velocities are higher than the permissible velocity for the bed material; therefore, all the unlined dip crossings are subject to erosional damages.

The computed water-surface elevations are also plotted at sample cross sections as shown in Fig 5. It can be seen from the figure that the County's 100-yr flood is generally contained within the main channel while the FEMA-adopted 100 flood generally extends above the banks of the main channel. While the floodwater spreads out to the overbank areas under the FEMA-adopted flood discharge, most of the discharge is still conveyed through the main channel because of the shallow flooding of the overbank areas.

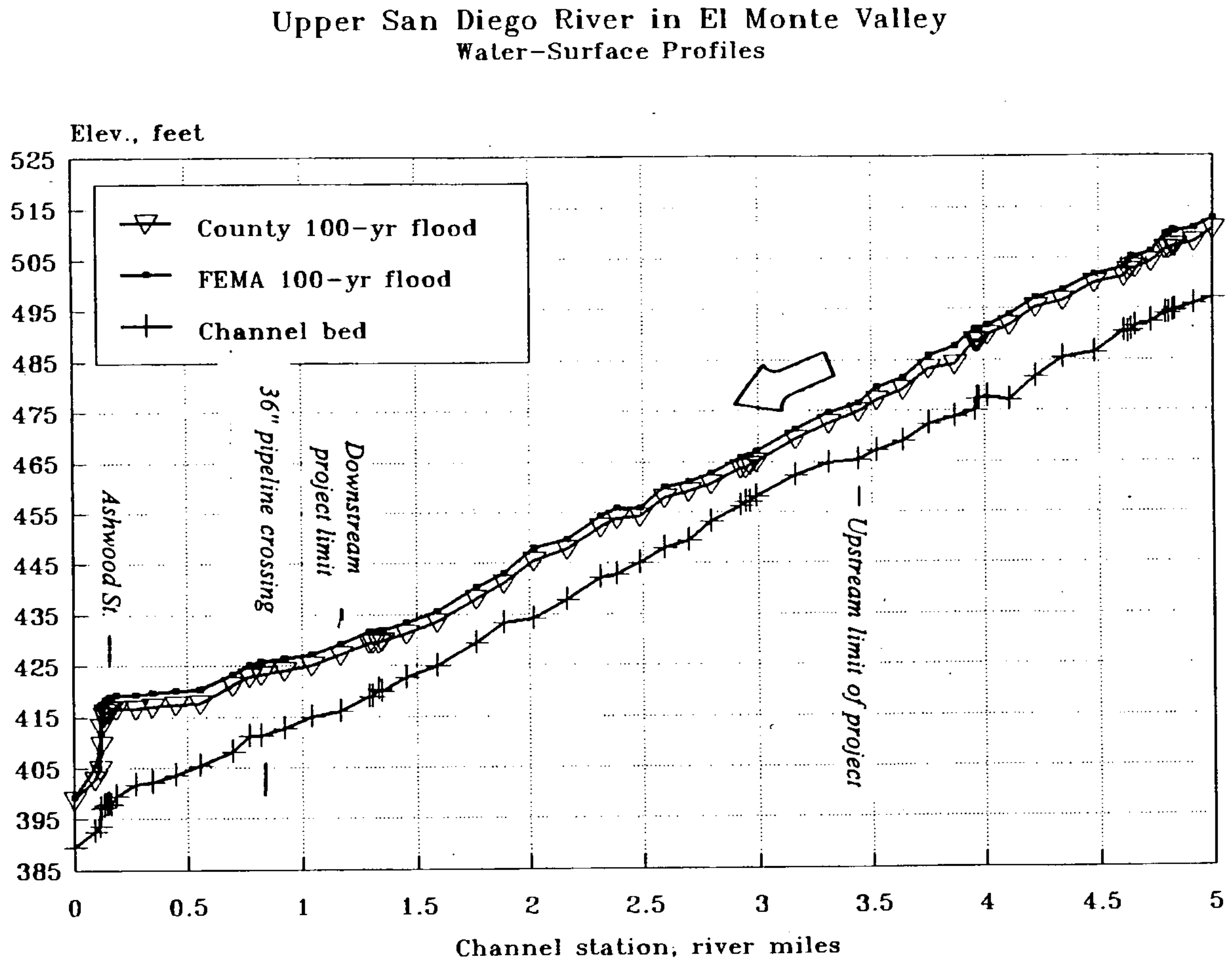

Fig. 7. Water-surface profiles based on HEC-2 analysis for existing conditions

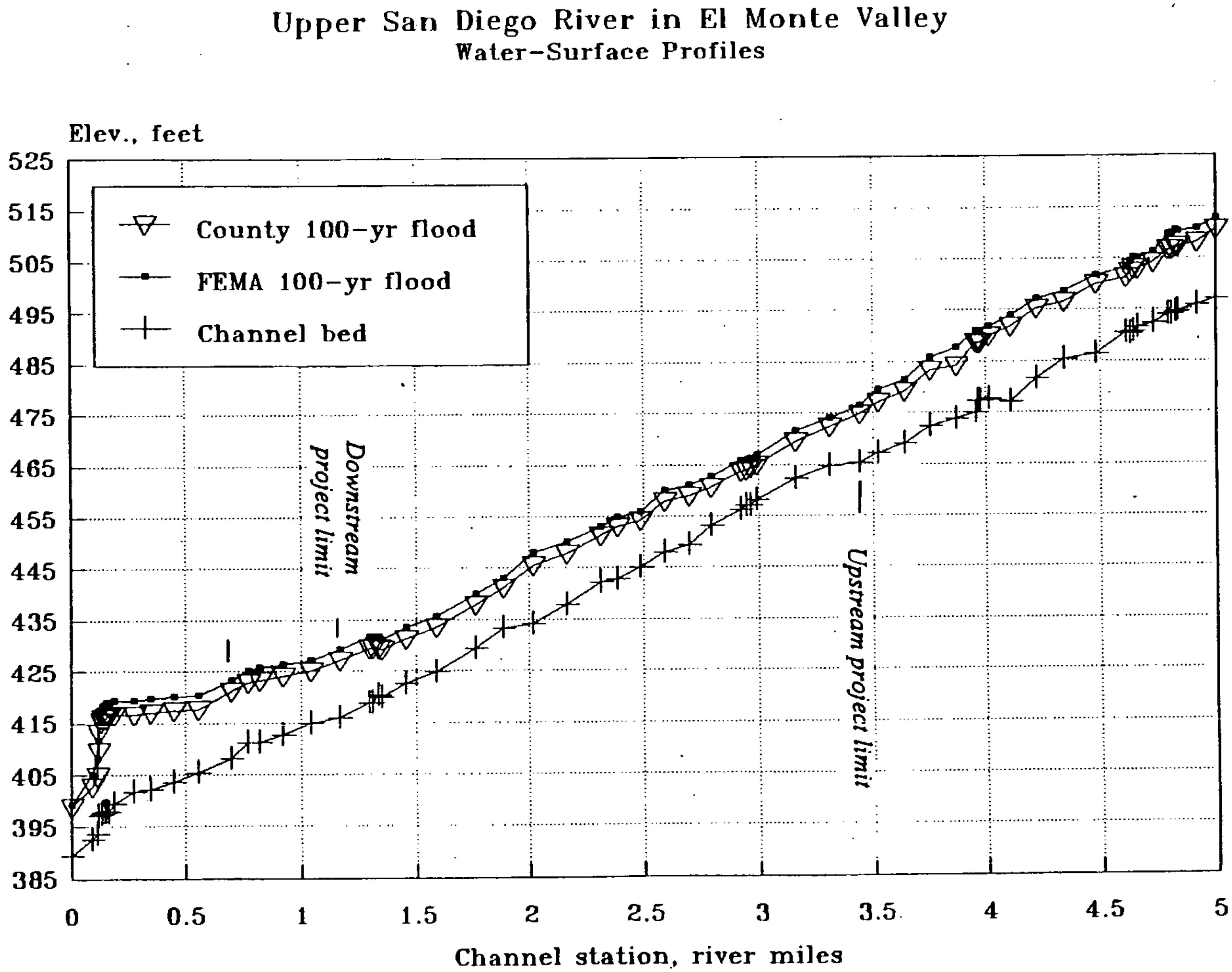

Fig. 8. Water-surface profiles based on HEC-2 analysis for proposed conditions

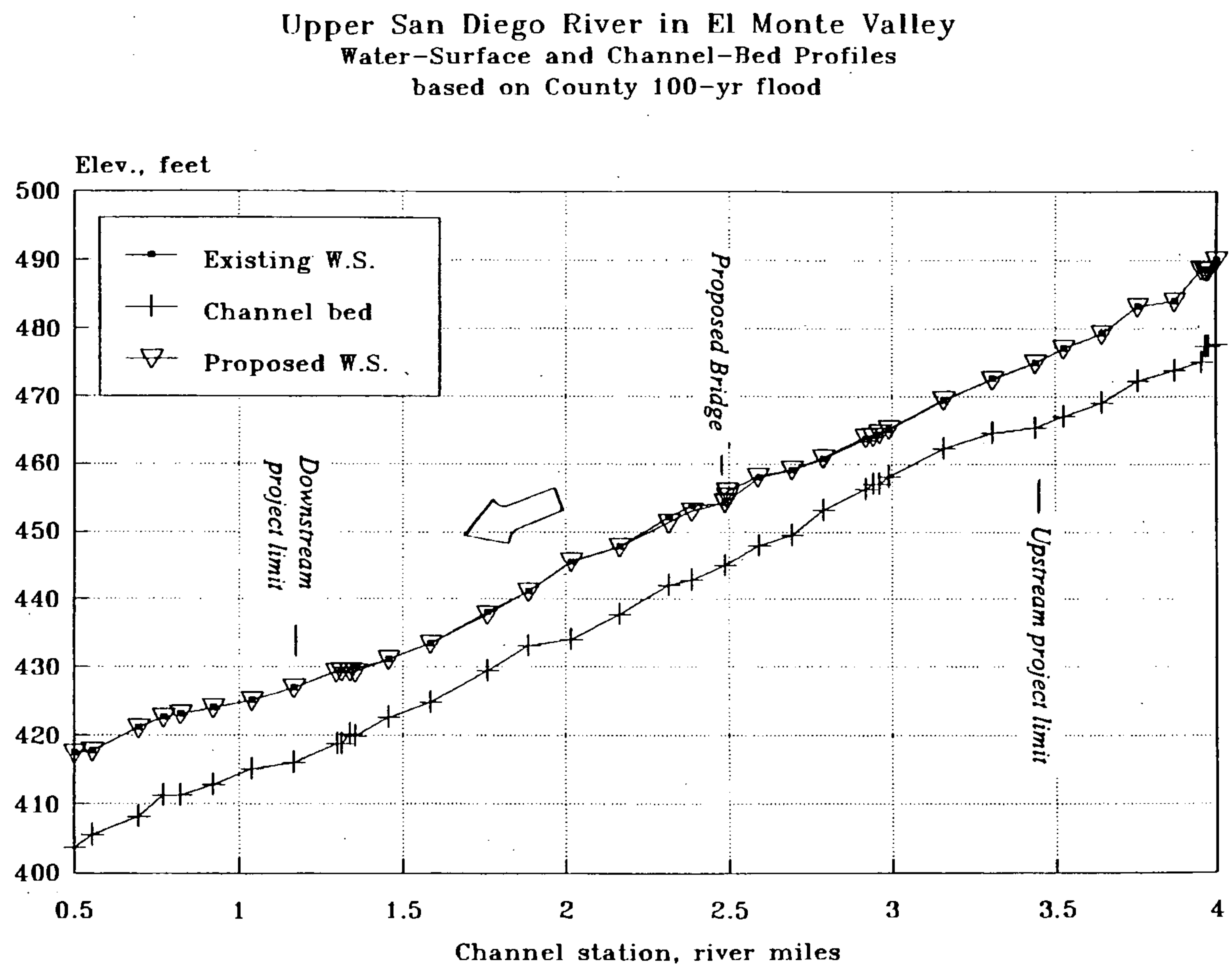

Fig. 9. Comparison of water-surface profiles based on County 100-yr flood

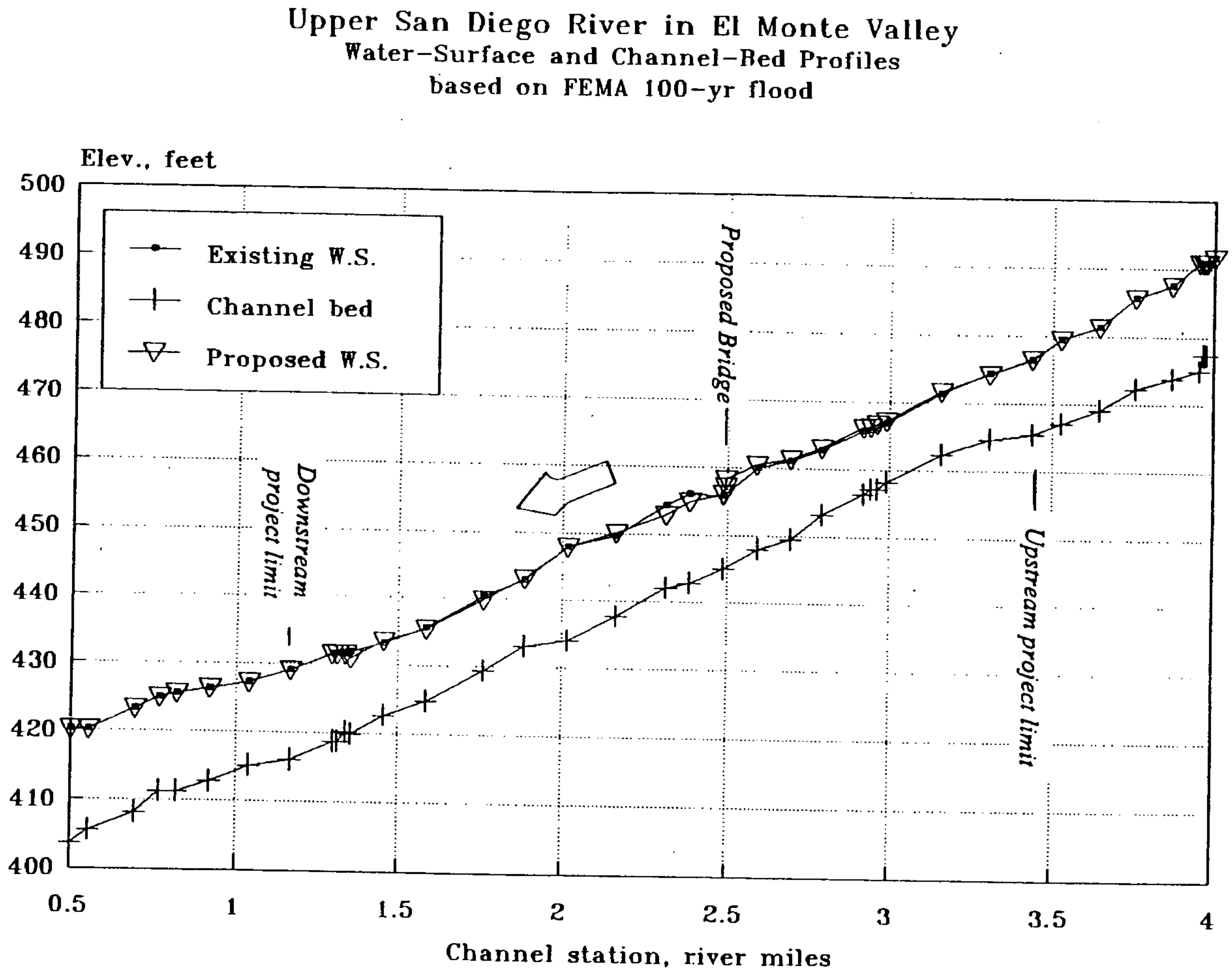

Fig. 10. Comparison of water-surface profiles based on FEMA 100-yr flood

Upper San Diego River in El Monte Valley
Spatial Variations of Velocity
at Peak Discharge of 100-yr Flood

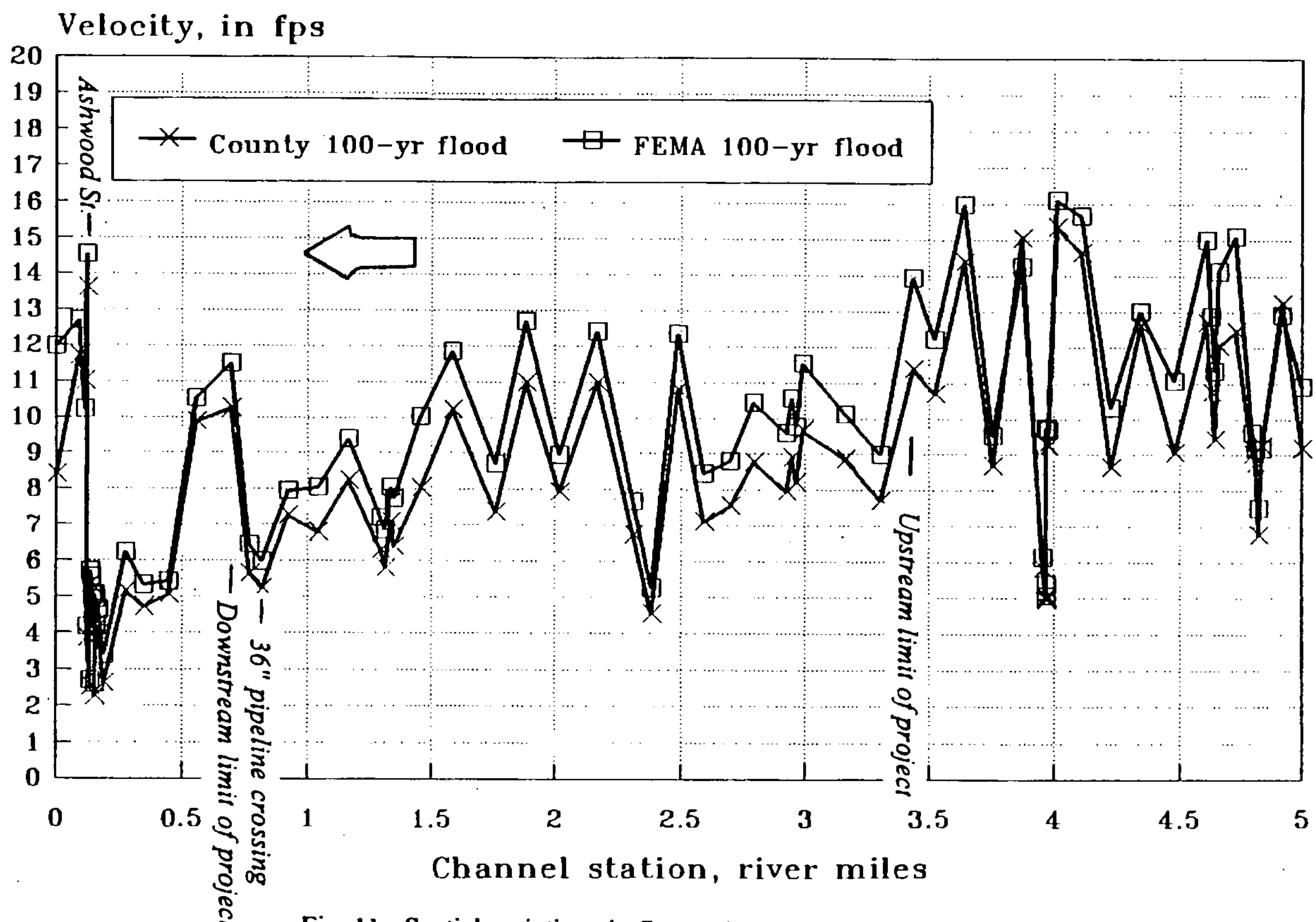

Fig. 11. Spatial variations in flow velocity based on HEC-2 analysis

VI. EXISTING EROSION TREND FOR THE RIVER CHANNEL

A river is the author of its own geometry. In the long term, the characteristics of a river as described by its width, depth, slope, meandering pattern, etc., are delicately adjusted to provide a balance between its ability to transport the water and sediment loads supplied from the watershed. The Upper San Diego River is a disturbed stream, primarily due to El Capitan Dam and sand mining operations. Because of these human activities, the natural equilibrium of the river channel has been altered. This river channel is expected to undergo changes in order to establish a new equilibrium. The dominant material of the streambed is alluvial sand which is highly erodible during floods.

A natural river in dynamic equilibrium has a sand flow that is in approximate balance with the sand supply from the watershed. In the case of this river reach, the sand supply has been cut off by El Capitan Dam; the flood discharge is also reduced. In the future, bed sediment will continue to be removed by the flow without replenishment from upstream; therefore, the river channel is expected to undergo erosion as a general trend.

The potential river channel changes are simulated using the FLUVIAL-12 model (Chang, 1988) using the FEMA-adopted 100-yr flood. The FLUVIAL-12 model has been formulated and developed for water and sediment routing in natural and man-made channels and reservoirs since 1972. The combined effects of flow hydraulics, sediment transport and river channel changes are simulated for a given period of flow. River channel changes simulated by FLUVIAL-12 include channel-bed scour and fill (and/or aggradation and degradation), width variation, and changes in bed elevation induced by the curvature effect. These inter-related changes are coupled in the model for each time step. Hydrographs for floods are used in mathematical model. While this model is for erodible channels, physical constraints, such as bank protection, grade-control structures and bedrock outcroppings may also be specified. Applications of this model include evaluations of general scour at bridge crossings, sediment delivery, channels responses to aggregate mining, channelization, and other factors.

Simulation of Sediment Delivery - Sediment delivery is defined as the accumulated amount of sediment that has passed a certain channel section for a specified period of time, that is,

$$Y = \int_T Q_s\, DT \qquad (1)$$

where Y is sediment delivery (yield); Q_s is sediment discharge; t is time; and T is the duration. The sediment discharge Q_s pertains only to bed-material load of sand, gravel and cobble. Fine sediment of clay and silt constitute the wash load may not be computed by a sediment transport formula. Sediment delivery is widely employed by hydrologists for watershed management; it is used herein to keep track of sediment supply and removal along the channel reach.

Stream channel changes are generally associated with sediment storage and depletion, which are manifested in the variation of sediment delivery along the channel. The spatial variation of sediment delivery depicts erosion and deposition along a stream reach. A decreasing delivery in the downstream direction, i.e. negative gradient for the delivery-distance curve, signifies that sediment load is partially stored in the channel to result in a net deposition. On the other hand, an increasing delivery in the downstream direction (positive gradient for the delivery-distance curve) indicates sediment removal from the channel boundary or net scour. A uniform sediment delivery along the channel (horizontal curve) indicates sediment balance, i.e., zero storage or depletion. From the engineering viewpoint, it is best to achieve a uniform delivery, the non-silt and non-scour condition, for dynamic equilibrium.

Simulated results pertaining to sediment delivery by the 100-yr flood are shown in Fig. 12. As expected, the figure depicts a general trend of erosion for the channel reach with some local exceptions under the existing conditions of the river channel. This general trend is related to the deficit in sediment supply. The greatest erosion is simulated to occur just upstream of the Ashwood Street crossing. Channel-bed erosion occurs at this location once the crossing is removed by scour.

Simulated Changes in Channel Geometry - Simulated changes in channel geometry during the 100-yr flood under the existing conditions are illustrated by the changes in longitudinal channel-bed profiles in Fig. 13 and changes in cross-sectional profiles exemplified in Fig. 14. By reviewing these simulated changes, it is clear that the changes in channel geometry are characterized by channel-bed scour and fill, bank erosion, and erosion of the overbank areas. In other words, the existing main channel is not stable. Potential changes in channel width tends to be more pronounced than changes in bed elevation.

Potential Changes at 36-Inch Pipeline Crossing - Simulated cross-sectional changes for Section 333 shown in Fig. 14 pertain to the river crossing of the 36-inch pipeline. This channel crossing is simulated to undergo erosion which manifests in scour of the channel bed and overbank areas. Channel-bed scour is also shown to expose the top of the pipeline at elevation 409.9 feet. Once the pipeline is exposed, the pipeline itself becomes an obstruction to flow which causes additional local scour around the pipeline. For this reason, the pipeline is not safe from the viewpoint of potential scour during floods.

It is a common practice to place buried pipes a few feet below the maximum potential channel-bed scour. In other words, a soil cover with a thickness of a few feet is required as a safety margin. The present soil cover over the 36-inch pipeline is less than 2 feet. This thickness is inadequate as a safety margin.

Simulated Spatial Variations in Velocity - The spatial variations in velocity shown in Fig. 11 were obtained using the HEC-2 model which assumes rigid channel boundary. The large changes in velocity from one section to the next are not supported by field observations during floods. In fact, the channel boundary will undergo changes during floods to result in more uniform distribution of the velocity along the channel.

The simulated spatial variation in velocity using the FLUVIAL-12 model is shown in Fig. 15. Since channel changes are considered, the spatial variation in velocity is much less pronounced.

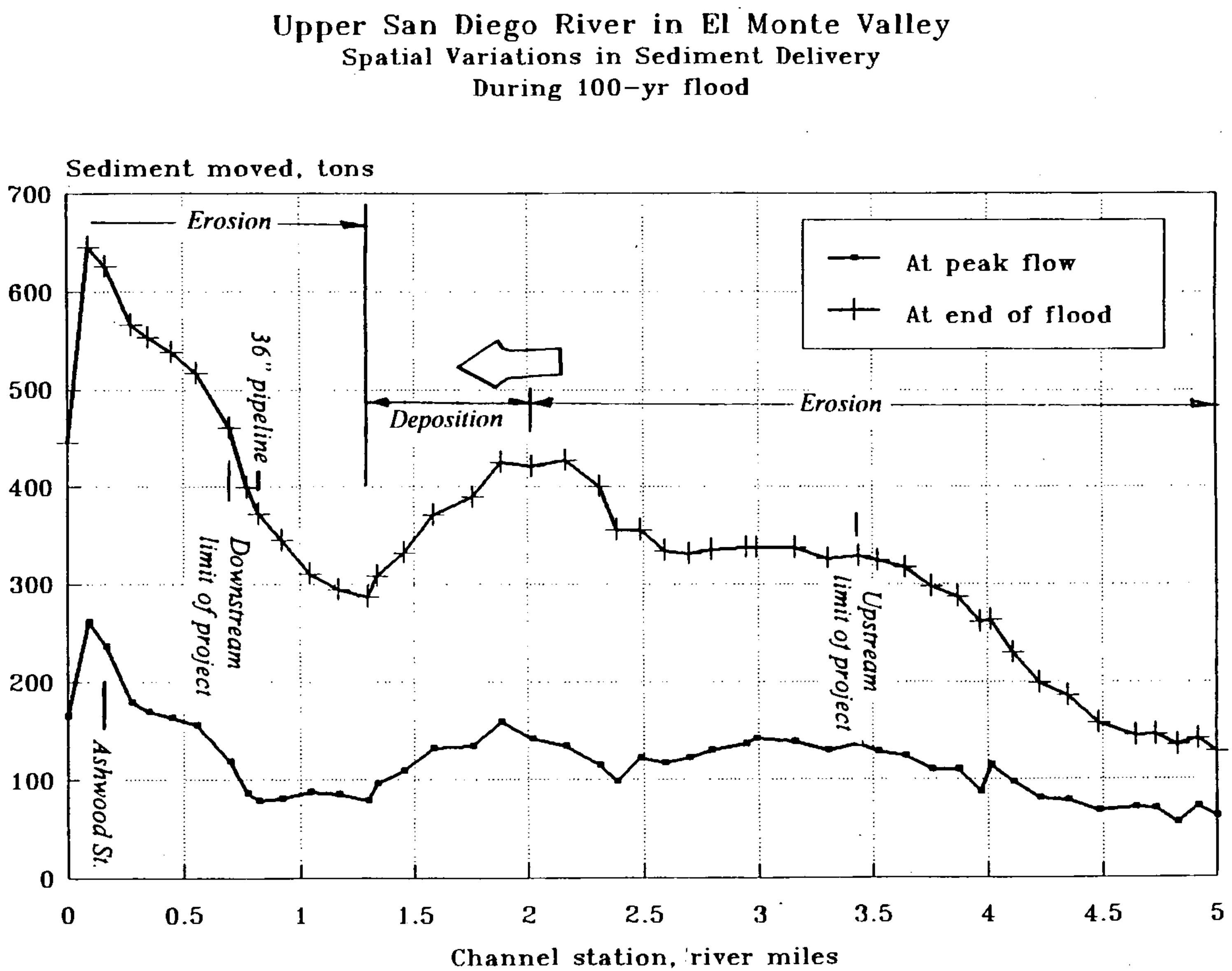

Fig. 12. Spatial variations in sediment delivery along the river reach

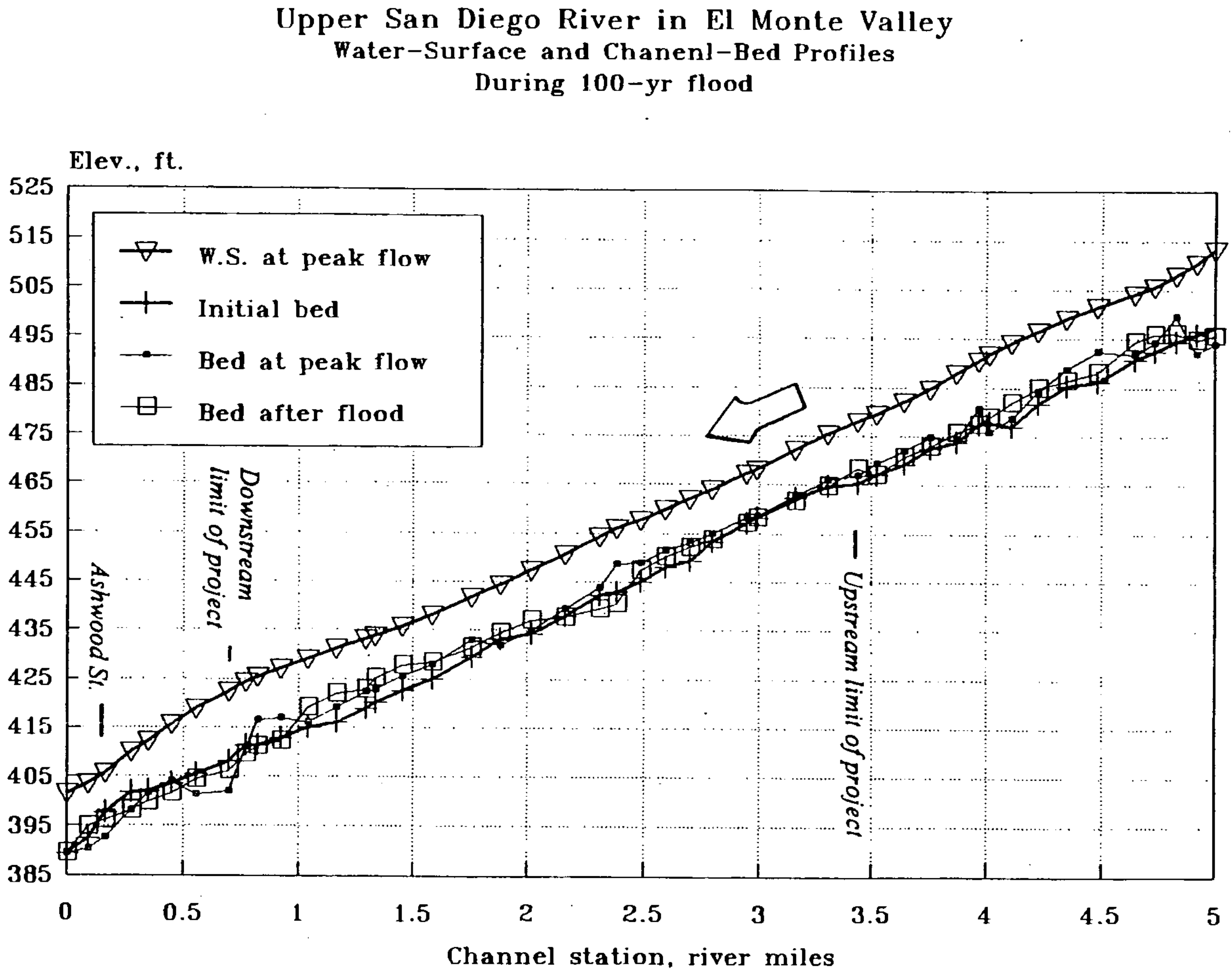

Fig. 13. Water-surface and channel-bed profile changes based on FLUVIAL-12 analysis

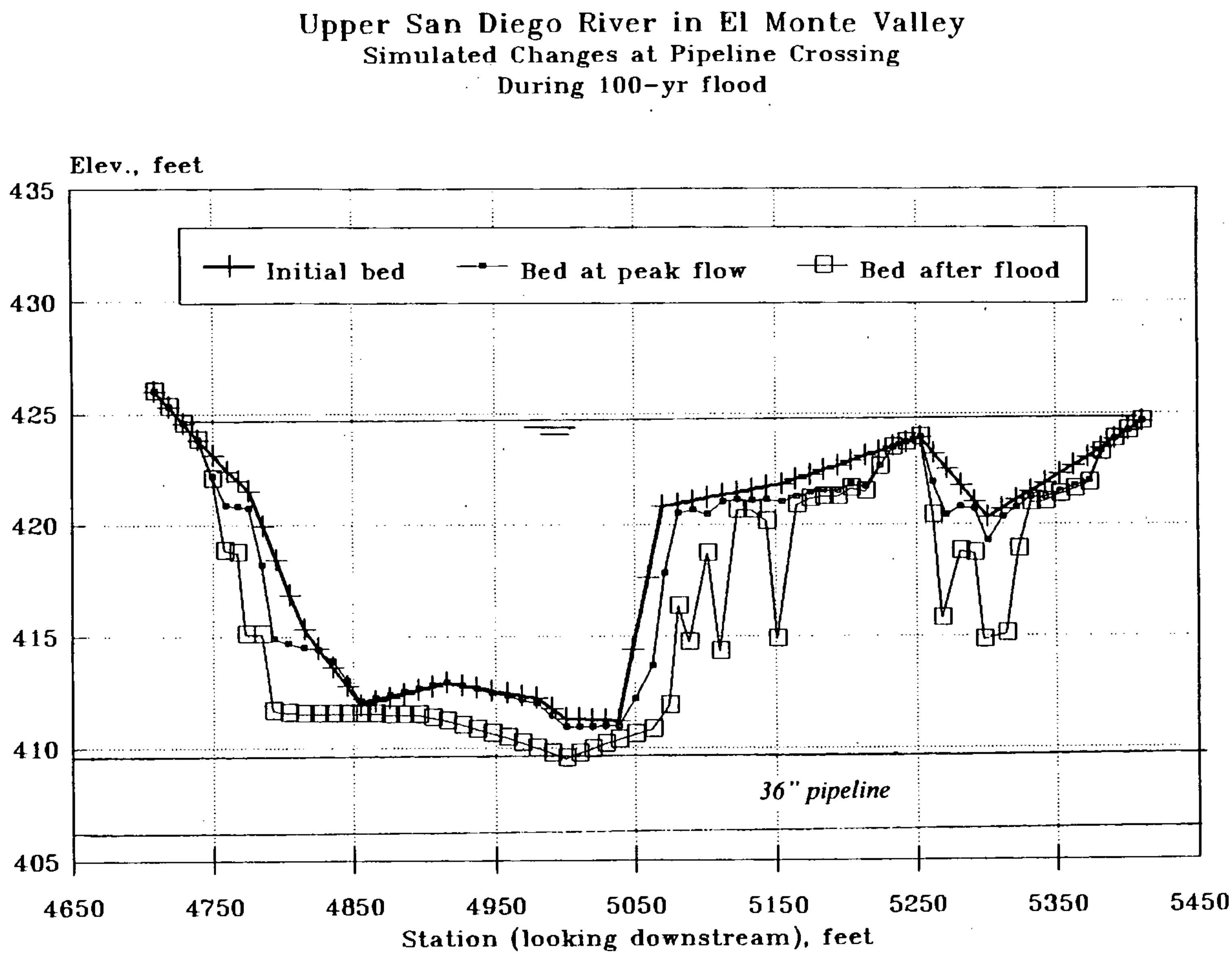

Fig. 14. Simulated cross-sectional changes during 100-yr flood

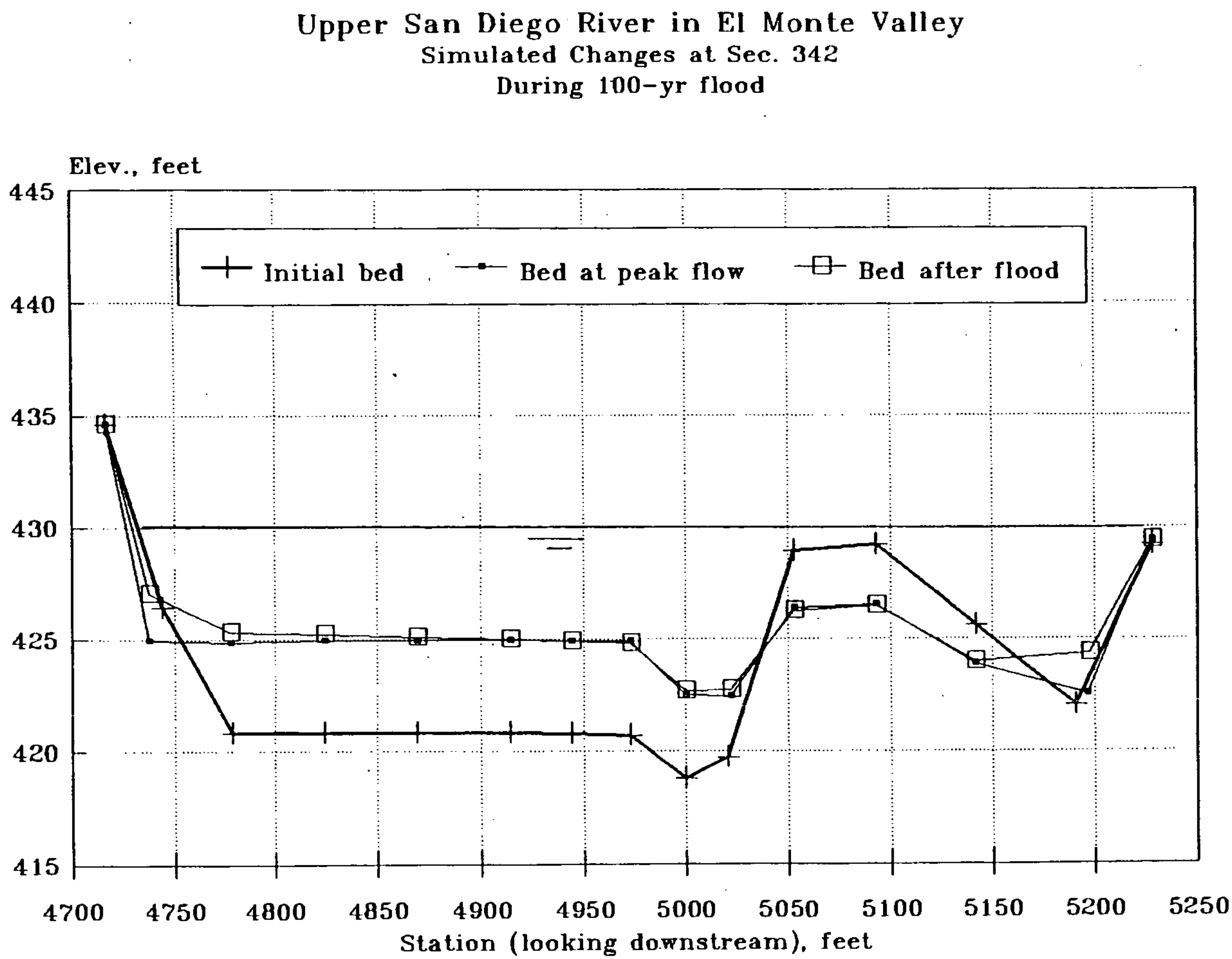

Fig. 14 (continued). Simulated cross-sectional changes

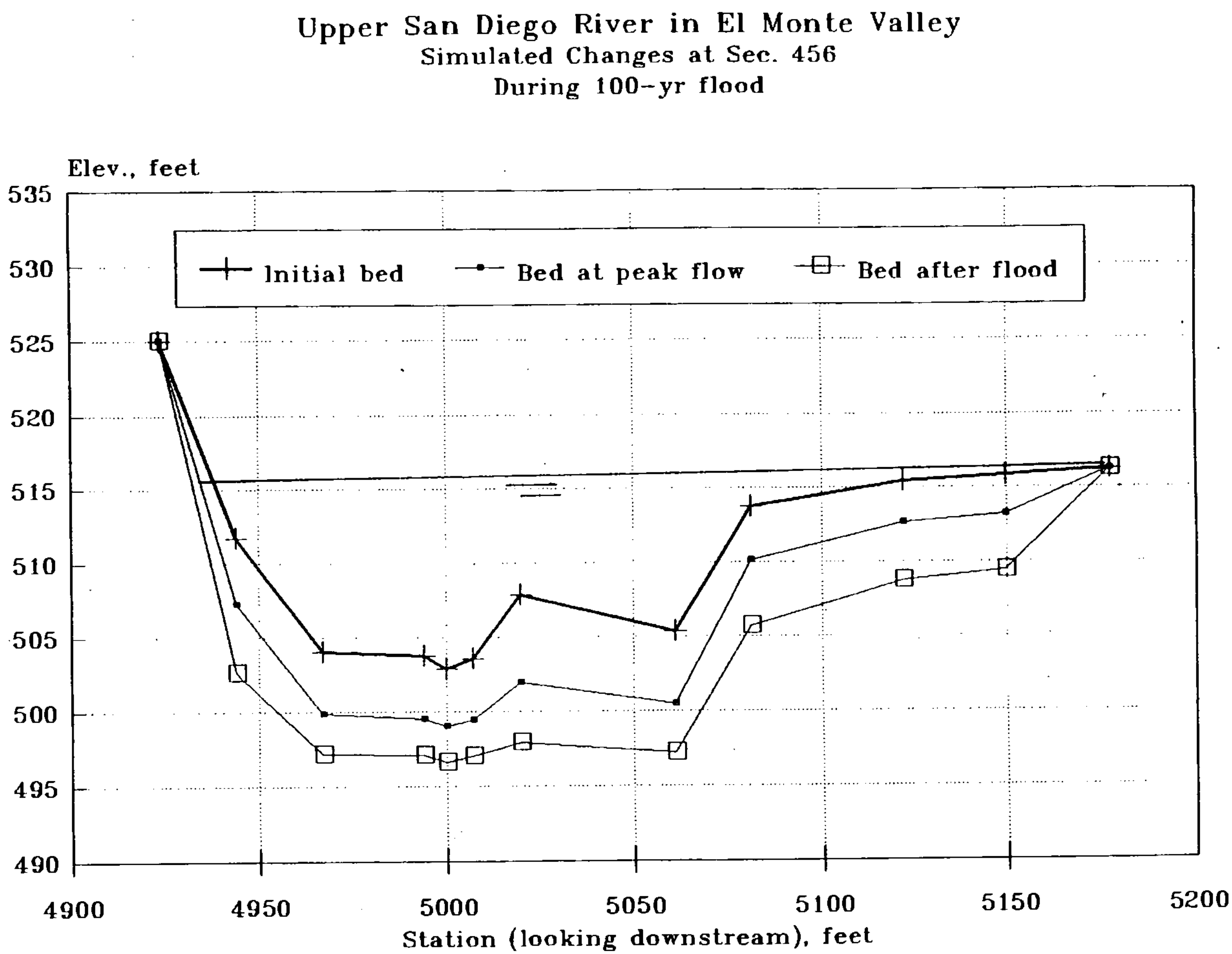

Fig. 14 (continued). Simulated cross-sectional changes

Upper San Diego River in El Monte Valley
Spatial Variations of Velocity
at Peak Discharge of 100-yr Flood

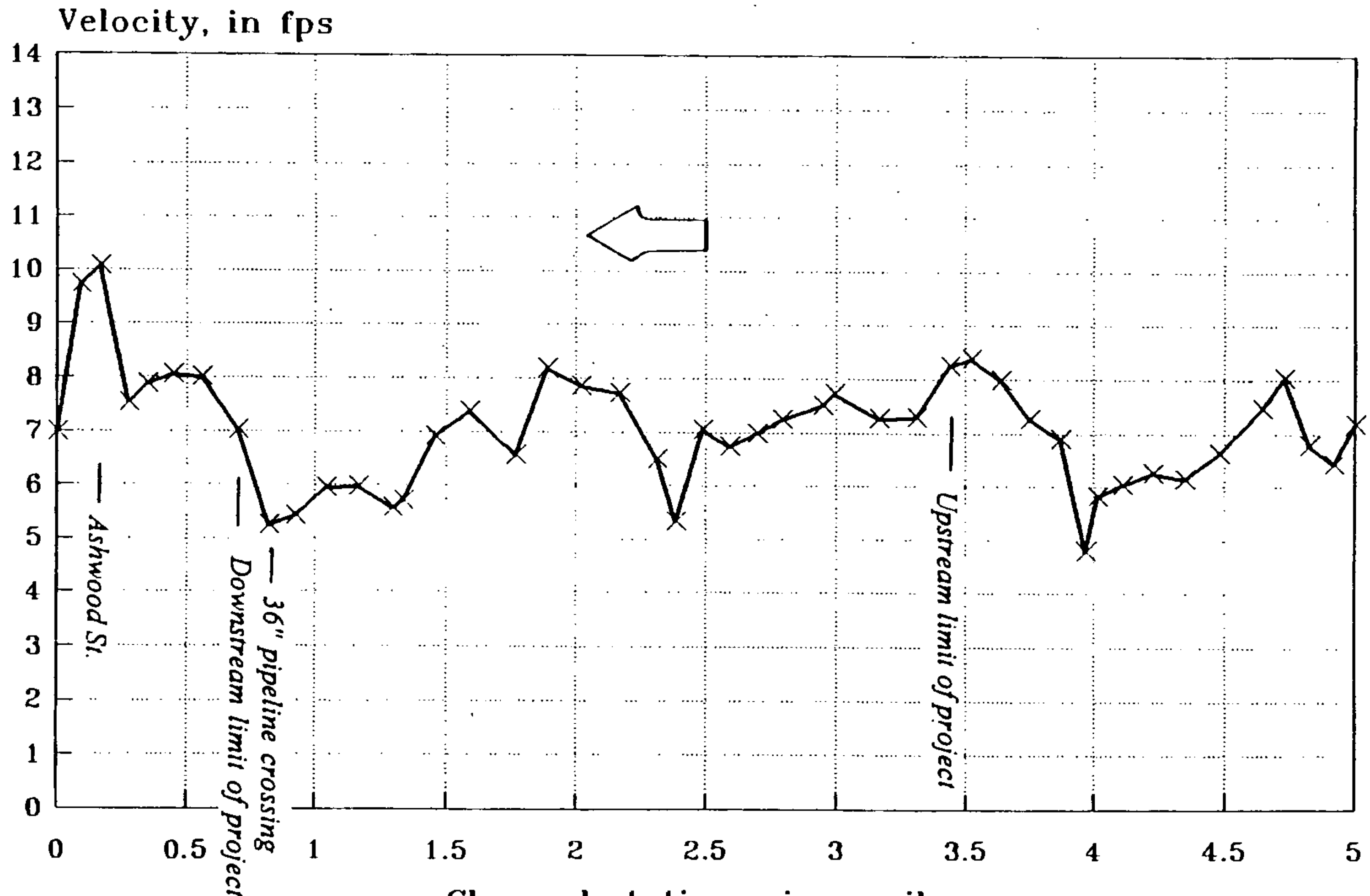

Fig 15. Spatial variations in flow velocity based on FLUVIAL-12 analysis

VII. POTENTIAL IMPACTS DUE TO PROPOSED PROJECT

A part of the proposed golf course project is within the floodplain boundaries of the river. For this reason, it may have impacts on the hydraulics of flow and erosion and sedimentation of the river channel. The potential impacts are analyzed below in terms of the project impacts on the flood level, floodplain boundaries, flow velocities, and erosion and sedimentation.

Impacts on Flood Level due to Golf Course Grading - The floodplain of the Upper San Diego River at the project site includes the main channel and overbank areas. Sample cross-sectional profiles are shown in Fig. 5, together with the computed water-surface elevations based on two flood discharges. Values of the computed water-surface elevations are given in Appendix A of the report. The main channel of a cross section is typically 300 feet in width and 10 feet in average depth. Since the overbank areas have very shallow flow depths and very low velocities, most of the flow is conveyed through the main channel. In river hydraulics, the main channel is considered to be the *effective flow area* and the overbank areas are considered as *ineffective flow areas*.

Under the proposed project, no grading would occur within the main channel. Grading, however, would occur in the overbank areas to create land features characteristic of a golf course. A very small amount of flood flow occurs in the ineffective flow areas, and therefore, no significant impacts on flood level would occur. In order to confirm this assessment, the computed water-surface elevations for the existing and proposed conditions are compared as shown in Figs. 9 and 10; they are also summarized in Table 4 for numerical comparison. Except for those sections in the upstream vicinity of the proposed bridge at Section 370, the listed values in the table indicate the following points:

(1) The project would cause no rises in water-surface elevation.

(2) There would be some very small drops in water-surface elevation.

Impacts on Flood Level due to Proposed Crossings - The proposed project has four golf cart crossings. These crossings are dip crossings as they span the main river channel following the existing channel bed profile. Small culverts will be installed at each dip crossing just to pass the nuisance flow. For these reasons, such crossings would have no significant impacts on the flood level.

Impacts on Flood Level due to Proposed Bridge - The proposed bridge is located at Section 370 near the club house. The hydraulic design is subject to the requirements, regulations and policy by the Federal Emergency Management Agency (FEMA), including:

(1) conveyance of the base (100-yr) flood, and

(2) backwater caused by the bridge and embankment and all other obstructions to be within one foot above the surface of the base flood.

Water-surface profiles and flow velocities for the proposed bridge were computed using the HEC-2 program The computed water-surface elevations are included in Table 4 under the proposed conditions. By comparing the water-surface elevations for the proposed conditions with the corresponding values for the existing conditions, it can be seen that the proposed bridge will result in very small rises in water-surface elevation in the upstream vicinity. However, all such rises are ithin the 1 foot limit.

Table 4. Comparison of computed water-surface elevations for the existing and proposed conditions

Section number	Water surface based on County 100-yr discharge, feet		Water surface based on FEMA 100-yr discharge, feet	
	Existing	Proposed	Existing	Proposed
340	427.0	427.0	429.2	429.2
342	429.4	429.3	431.6	431.6
344	429.4	429.4	431.5	431.7
350	429.5	429.4	431.7	431.6
352	429.8	429.2	431.9	431.0
354	431.2	431.2	433.3	433.5
356	433.5	433.4	435.5	435.5
358	438.0	437.8	440.3	439.9
360	441.1	441.1	443.0	443.1
362	445.5	445.6	447.9	447.9
364	447.8	447.8	449.7	450.1
366	452.2	451.3	454.3	452.9
368	453.7	453.0	455.9	454.9
370	454.2	454.2	455.8	455.9
372	457.9	458.1	460.0	460.4
374	459.0	459.2	461.1	461.4
376	460.7	461.0	462.7	463.1
378	463.6	464.0	465.7	466.2
380	463.8	464.2	465.8	466.3
390	464.2	464.6	466.2	466.7
392	465.0	465.3	466.9	467.2
394	469.4	469.6	471.4	471.7
396	472.6	472.4	476.5	474.2
398	474.9	475.0	476.5	476.7
400	477.2	477.1	479.6	479.5

Impacts on Floodplain Boundaries - Existing floodplain boundaries are published in the Flood Insurance Rate Map, or FIRM map, shown in Fig. 6, by the Federal Emergency Management Agency. The floodplain boundaries were established based on an approximate method before the completion of HEC-2 computations made for FIS-86 by Nolte and Associates.

A portion of the proposed golf course is within the floodplain boundaries of the river, with the majority of the existing ground elevation very close to the 100-yr flood level. Grading of the golf course would change the ground surface features through cuts and fills of local areas. Some areas would be cut to establish new elevations below the 100-yr flood level while other areas would be filled to establish elevations above the 100-yr flood level. As such, the area subject to inundation would be changed by grading for golf course construction. By definition, an area subject to inundation by the 100-yr flood is within the floodplain boundaries.

In conclusion, the proposed grading would change the floodplain boundaries since certain areas would be raised above or lowered below the 100-yr flood level. Since the grading is on the golf course and not on adjacent areas outside the golf course, changes in floodplain boundaries due to golf course grading would only be expected to impact the golf course itself and not adjacent properties.

The proposed bridge at Section 370 will cause small rises in the flood level in its upstream vicinity. Such rises are within the 1 foot limit permitted by FEMA. The rises in the flood level are associated with small changes in floodplain boundaries.

The changes in floodplain boundaries can be determined based on the grading plan for the golf course and the computed water-surface elevations listed in Appendix A of the report. As a first step, the local ground elevation of an area is compared with the computed water-surface elevation, or flood level. If the local elevation is above the flood level, then the area is outside the floodplain boundaries. If the local elevation is below the water-surface elevation, then the area is within the floodplain boundaries. The floodplain boundary changes due to grading may then be determined based on the change in ground elevation.

Impacts on Flow Velocities - As described previously, the main channel is the effective flow area of the Upper San Diego River and the overbank areas are the ineffective flow areas. The proposed golf course involves no grading within the main channel of the Upper San Diego River. As long as the effective flow area of the river channel is not affected by grading, the proposed project has insignificant impact on the flow velocities of the river.

The proposed project, however, would impact the flow velocities in the overbank areas of the main channel. Grading for the creation of land features for the golf course would change the flow pattern in the overbank areas. Under the existing conditions, the limited discharge of overbank flow is distributed as overland flow and in small streams. With the creation of land features, the overbank flow tends to be more concentrated in lower areas. Such changes in flow pattern may also change the pattern of erosion and sedimentation in the overbank areas. Because project grading is limited to the golf course itself, the associated changes in overbank flow pattern should be limited to the project area. In order to assure that neighboring properties would not be significantly impacted by changes in flow velocities on overbank areas, a 50-foot setback is applied along all portions of the golf course boundary within the 100-yr floodplain (see Appendix A for 100-yr flood level). No grading within the setback lowers the ground elevation to be below the 100-yr flood level. With the setback, the project impacts on adjacent properties are considered insignificant.

Impacts on Erosion and Sedimentation - Under the existing conditions, a general trend of erosion occurs along the flood channel with local exceptions as described previously. The erosion includes scouring and widening of the main channel and erosion of overbank areas. The general trend of erosion is primarily attributed to El Capitan Reservoir which detains the bed sediment thereby causing a deficit in sediment supply for the channel reach downstream, as illustrated in Fig. 12. The 36-inch pipeline is located in a channel reach subject to scour under the existing conditions. The pipeline is not safe from the viewpoint of potential scour during floods.

As clear water flows down the spillway of El Capitan Dam, it picks up sediment from the main channel and overbank areas. In other words, the source of sediment transport in the future is the bed material now present in the river valley. The proposed project would have no significant impacts on the existing pattern of erosion and sedimentation because the sediment source is not affected as explained below.

(1) Separation of lakes from the river channel: Under the proposed plan, several deep-water lakes will

be created in the overbank areas along the main channel. If flood waters should enter into the lakes, large quantities of sand would then settle in the lakes. Under this scenario, these lakes would be sand traps. Trapping of river sand by a lake would result in sediment deficit for the river channel. This deficit would further aggravate the existing pattern of channel erosion. Under the proposed plan, these lakes are separated from the main channel for a distance of at least 200 feet. The ground elevation in the zone of separation is also above the 100-yr flood level. These measures would prevent river flow from entering the lakes.

(2) No net import or export of material for golf course construction: The creation of the golf course will involve grading. Generally speaking, a net import of soil tends to increase the sediment supply to the river system and it thus tends to reduce potential downstream erosion. On the other hand, a net export of soil will do the opposite. Of course, the effects also depends on the distribution of the imported or exported soil. For the proposed golf course, the grading will require no net import or export of material from the project site.

(3) The grading plan: While the main channel would not be affected by project grading, the overbank areas would be graded to create golf course land features. Major changes in topography in the overbank areas may affect the flow pattern and potential erosion and sedimentation. For example, a large depression created in the overbank area may become a sediment trap and result in sediment deficit for the downstream river channel. In contrast, a large mound extending above the flood level may keep some soil away from the river transport system. Under the proposed grading plan for the golf course, grading would create gently rolling land features without major depressions nor prominent mounds.

Based on the above analyses, it may be concluded that the proposed golf course project would have insignificant impacts on potential erosion and sedimentation of the river channel.

Impacts on Erosion at Road Crossings - There exist several road crossings of the river as listed in Section II of the report. The road surface for Ashwood Street is asphalt paved. Other road crossings have unpaved dirt roads. From the computed velocities shown in Fig. 11, the Ashwood Street crossing is subject to very high flow velocities. These flow velocities exceed the permissible velocity of the asphalt pavement. This crossing is therefore subject to erosional damages during floods. Other dirt crossings are also subject to erosional changes during floods.

The project impacts on the road crossings are now analyzed. It has been discussed that the proposed project would not impact the velocity in the main channel. For this reason, the project would have insignificant impacts on the threshold for erosion at the road crossings. The project would not impact the sediment supply to the river system as described previously and therefore it would not cause greater erosional impacts at the road crossings.

VIII. SUMMARY OF IMPACTS AND MITIGATION RECOMMENDATIONS

The project impacts are classified into four categories: unavoidable significant impacts (Class I), significant effects that will be mitigated or avoided (Class II), effects found not to be significant (Class III), and beneficial impacts (Class IV). The findings on impacts and mitigation measures are summarized below into these four categories .

Unavoidable Significant Impacts (Class I) - Impacts that can not be avoided including the potential erosional damages at the river crossings and at the 36-inch pipeline crossing are found to be significant and unavoidable as described below. These impacts are existing and they will not be aggravated by the proposed project as long as the planned mitigation measures for erosion are implemented.

Erosion potential at temporary crossings in the river channel - Temporary crossings, including the asphalt-paved dip at Ashwood Street and other dirt crossings, are subject to erosion and wash-out under the existing conditions. Existing and future erosion impacts on these crossings are significant and unavoidable. The proposed project does not affect the flow velocity nor erosion in the channel; therefore, it will not cause additional impacts at the temporary crossings.

Erosion potential at the 36-inch water pipeline crossing - The pipeline is subject to exposure by potential river channel scour. Once the pipeline is exposed by river flow, the pipeline itself becomes an obstruction to flow which causes additional local scour around the pipe. The pipeline is considered unsafe under existing conditions. Without protective measures, existing and future erosion impacts on the pipeline are significant and unavoidable. Since the proposed project would not affect the erosion in the channel, the project would not cause additional impacts at the pipeline crossing.

Significant Effects That Have Been Mitigated or Avoided (Class II) - Impacts of this category including the flood level, overbank velocities, and potential for increased erosion are described below.

Impacts on flood level due to proposed crossings - The proposed project has four golf cart crossings. These crossings are dip crossings as they span the main river channel following the existing channel bed profile. Small culverts will be installed at each dip crossing just to pass the nuisance flow. For these reasons, such crossings would have no significant impacts on the flood level.

Impacts on Flood Level due to Proposed Bridge - The proposed bridge is located at Section 370 near the club house. The hydraulic design for the bridge is subject to the requirements, regulations and policy by the Federal Emergency Management Agency (FEMA), including:
(1) conveyance of the base (100-yr) flood, and
(2) backwater caused by the bridge and embankment and all other obstructions to be within one foot above the surface of the base flood.

Water-surface profiles and flow velocities for the proposed bridge were computed using the HEC-2 program The computed water-surface elevations are included in Table 4 under the proposed conditions. By comparing the water-surface elevations of the proposed conditions with the corresponding values for the existing conditions, it can be seen that the proposed bridge will result in very small rises in water-surface elevation in the upstream vicinity. However, all such rises are within the 1 foot limit.

Impacts on overbank flow velocities at adjacent properties - Because of grading, the proposed golf course may impact the flow velocities in the overbank areas of the main channel. In order to assure that neighboring properties would not be significantly impacted by changes in flow velocities on overbank areas, a 50-foot setback is applied along all portions of the golf course boundary within the 100-yr floodplain. No grading within the setback lowers the ground elevation to be below the

100-yr flood level. With the setback, the project impacts on adjacent properties are considered insignificant.

Erosion potential due to sediment supply to the channel - Because of sediment detention by El Capitan Reservoir, the source of sediment for the river channel is the bed material in the river valley. The proposed lakes and golf course grading can impact the sediment source. A reduction of the sediment source can aggravate the existing erosion condition for the river channel. Such potential impacts will be mitigated to the level of insignificance because of the following mitigation measures.
(1) A berm surrounding each lake is used to keep floodwater from entering into the lake. Each berm has a top elevation that is at least two feet above the 100-yr flood level. It shall also have a clay core to prevent seepage since seepage may destabilize the berm.
(2) Each lake has a minimum setback of 200 feet from the main channel.
(3) There is no net export of material from the project site. Materials dredged from the lakes are not a part of this accounting.
(4) Proposed grading for the golf course follows the natural topography without creating major depressions nor prominent mounds.

The sand mining operation by Nelson and Sloan is a part of the existing conditions. In order to avoid impacts of the existing sand mining pit on the river channel, Nelson and Sloan is required to provide a partition between the river channel and the extraction site. This requirement is from the County Flood Control which also enforces such a requirement. It is assumed in this study that the Nelson/Sloan pond is properly separated from the river channel to the 100-yr flood level so that it does not impact the river channel.

Implementation of Mitigation Measures for Class II Impacts - The recommendations for the implementation of the mitigation measures are given below.

(1) The applicant shall submit the grading plan of the golf course to the County of San Diego for review and approval. The grading plan shall include the existing and proposed topographies of the golf course, and net export and import of soil for the project.
(2) The applicant shall submit the design and grading plan of the lakes to the County of San Diego for review and approval. The design for berms shall be prepared by a registered civil engineer

specialized in geotechnical engineering.

(3) Each lake shall be constructed and completed during the dry period of the year; namely, from March 15 to October 30.

(5) All phases of construction shall be inspected by the County.

(6) The applicant is responsible for the maintenance of the lakes, golf cart crossings and the bridge throughout the life of the project. Inspection monitoring by the County shall occur bi-annually. If adverse impacts occur that are beyond those identified in the original hydrology study, the applicant would be required to mitigate the problem(s) to the satisfaction of the County of San Diego.

Effects Found Not to be Significant (Class III) - Certain effects that will not be significantly impacted by the proposed project are summarized below.

Impacts on flood level due to golf course grading - The floodplain of the Upper San Diego River at the project site includes a main channel and overbank areas. The main channel is typically 300 feet in width and 10 feet in average depth. Hydraulic computations show that the overbank areas have very shallow flow depths and very low velocities and that most of the flow is conveyed through the main channel. In river hydraulics, the main channel is considered to be the *effective flow area* and the overbank areas are considered as *ineffective flow areas*. Under the proposed project, no grading would occur within the main channel. Grading, however, would occur in the overbank areas to create land features characteristic of a golf course. Since the grading would be limited to the ineffective flow areas and no grading would be within the effective flow area, the proposed project would have no significant impacts on the flood level of the Upper San Diego River.

Impacts on flow velocities - The proposed golf course involves no grading within the main channel of the Upper San Diego River. As long as the effective flow area of the river channel is not affected by grading, the proposed project would not result in significant impacts on the flow velocities of the main channel. The proposed project, however, would impact the flow velocities in the overbank areas of the main channel. The grading for the creation of land features for the golf course may change the flow pattern in the overbank areas. Under the existing conditions, the limited discharge of overbank flow is distributed as overland flow and in small streams. With the creation of land features, the overbank flow tends to be more concentrated in lower areas. Because the project grading is limited to the golf course itself, the associated changes in overbank flow pattern are also limited to the project area. Since the overbank velocities are generally very low, and the overbank grading is also under the requirements for erosion mitigation, the impacts due to grading on flow velocities are found to be insignificant.

Impacts on floodplain boundaries - Existing floodplain boundaries are published in the Flood Insurance Rate Map, or FIRM map, shown in Fig. 6, by the Federal Emergency Management Agency. The floodplain boundaries were established based on an approximate method before the completion of HEC-2 computations made for FIS-86 by Nolte and Associates.

A portion of the proposed golf course is within the floodplain boundaries of the river, with another portion outside of its boundaries. The proposed grading for the golf course includes cuts and fills in creating the land features. The existing ground elevations for the golf course area are generally very close to the 100-yr flood level. Under the proposed grading, certain cut areas will become below the 100-yr flood level and certain fill areas will become above the flood level. In other words, the area subject to inundation will be changed by the proposed grading. An area subject to inundation by the 100-yr flood, by definition, is within the floodplain boundaries. In summary, the proposed grading will change the floodplain boundaries if certain areas are raised above or lowered below the 100-yr flood level. Under the proposed grading plan, the floodplain boundaries may extend beyond the main channel into the overbank areas. Since the grading is only on the golf course and not on adjacent areas outside the golf course, changes in floodplain boundaries due to golf course grading will only impact the golf course itself but not the adjacent properties. The impacts are insignificant.

The proposed bridge at Section 370 will cause small rises in the flood level in its upstream vicinity. Such rises are within the 1 foot limit permitted by FEMA. The rises in the flood level are associated with small changes in floodplain boundaries. The changes in floodplain boundaries due to the bridge backwater are considered insignificant since they meet the FEMA guidelines.

Recommended Task for Class III Impacts - While the impacts of the Class III category are insignificant, the project will change the existing floodplain boundaries which is under the jurisdiction of FEMA. It is recommended that a Conditional Letter of Map Revision, or CLOMR, be obtained from FEMA. The CLOMR will be followed by the Letter of Map Revision, or LOMR, and the final revised floodplain map. This will require the preparation of several items required by FEMA for processing. Preparation of the packages for CLOMR and LOMR should be completed by a registered civil engineer specialized in hydraulic engineering.

The changes in floodplain boundaries due to golf course grading can be determined based on the grading plan for the golf course and the computed water-surface elevations listed in Appendix A of the report. As a first step, the local ground elevation of an area should be compared with the computed water-surface elevation, or flood level. If the local elevation is above the flood level, then the area is outside the floodplain boundaries. If the local elevation is below the water-surface elevation, then the area is within the floodplain boundaries. The floodplain boundary changes due to grading may then be determined based on the changes in ground elevation.

Beneficial Impacts (Class IV) - The project includes a club house, four lakes and ground cover for the golf course. The project area is barren or used for farming under the existing conditions. The lakes are greater in area than the club house; they would reduce the surface water runoff, thereby reducing the flood discharge of the river by a small amount.

REFERENCES

1. Brownlie, W. R. and Taylor, B. D., "Sediment Management for Southern California Mountains, coastal Plains and Shoreline. Part C. Coastal Sediment Delivery by Major Rivers in southern California", EQL Rept. No. 17-C, Calif. Inst. of Technology, Feb. 1981

2. California Department of Water Resources, "Upper San Diego Flood Control Investigation", Bulletin No. 182, February 1976.

3. Chang, H. H., *Fluvial Processes in River Engineering,* John Wiley & Sons, New York, 1988, 432pp.

4. Corps of Engineers, Los Angeles District, "Hydrology: San Diego River", July, 1975.

5. County of San Diego, 1980 storm report.

APPENDIX A - INPUT/OUTPUT LISTINGS OF HEC-2 RUNS

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1*********************************************          ****************************************
*  HEC-2 WATER SURFACE PROFILES               *          *  U.S. ARMY CORPS OF ENGINEERS        *
*                                             *          *  HYDROLOGIC ENGINEERING CENTER       *
*  Version    4.6.2;  May 1991                *          *  609 SECOND STREET, SUITE D          *
*                                             *          *  DAVIS, CALIFORNIA 95616-4687        *
*                                             *          *                                      *
*  RUN DATE    21AUG96    TIME    14:11:36    *          *          (916) 756-1104              *
*                                             *          *                                      *
*********************************************          ****************************************


                     X     X  XXXXXXX   XXXXX            XXXXX
                     X     X  X        X     X          X     X
                     X     X  X        X                      X
                     XXXXXXX  XXXX     X         XXXXX   XXXXX
                     X     X  X        X                X
                     X     X  X        X     X          X
                     X     X  XXXXXXX   XXXXX           XXXXXXX

                                                      THIS RUN EXECUTED 21AUG96    14:11:36

     ************************************
     HEC-2 WATER SURFACE PROFILES

     Version   4.6.2;  May 1991
     ************************************


T1       CDOVES COUNTY OF SAN DIEGO
T2       HOWARD H. CHANG
T3       UPPER SAN DIEGO RIVER 100-YR FLOOD BY COUNTY

J1  ICHECK     INQ      NINV      IDIR      STRT      METRIC     HVINS     Q        WSEL       FQ

               2.                           .0067                                   393.8

J2  NPROF      IPLOT    PRFVS     XSECV     XSECH     FN        ALLDC      IBW      CHNIM      ITRACE

     1.          0       -1


QT   5.        20000.    31000.    12500.    2500.     31000.
NC   .03       .035      .050      .15       .3
ET             9.1       9.1       9.1       7.1       9.1       4886.1    5068.8    4627.2    5085.8
        UPPER SAN DIEGO RIVER AT THE CONFLUENCE OF SAN VINCENTE CREEK
X1   300.0     41.0      4886.1    5068.8
GR   404.5     3393.8    406.8     3536.0    407.8     3702.8    408.2     3791.8    413.4     3835.1
GR   407.2     3878.5    410.2     4103.8    411.4     4246.1    410.1     4420.1    408.0     4513.8
GR   397.3     4544.8    394.8     4627.2    395.6     4677.1    392.8     4716.8    395.7     4811.1
GR   395.6     4886.1    390.8     4977.2    389.4     5000.0    391.0     5037.9    401.7     5068.8
GR   410.5     5085.8    411.5     5129.1    412.1     5309.8    413.6     5489.4    413.4     5634.2
GR   413.5     5841.2    414.5     6048.3    414.1     6191.7    415.2     6311.6    413.9     6395.6
GR   413.8     6535.5    417.1     6734.4    420.0     6812.3    427.0     6899.1    433.4     6966.7
GR   443.1     6970.2    442.8     7002.1    431.7     7005.8    436.7     7035.8    444.7     7119.7
GR   457.4     7164.1

ET             9.1       9.1       9.1       7.1       9.1       4956.4    5053.     4798.2    5066.6
X1   302.0     13.0      4956.4    5053.     550.      295.      480.9
GR   600.      4798.1    405.2     4798.2    402.0     4831.0    396.0     4877.1    395.4     4926.4
GR   397.8     4956.4    395.1     4987.3    392.6     5000.0    393.4     5036.6    400.5     5053.0
GR   406.8     5066.6    600.      5066.7    600.      5151.9

NC   .03       .035      .050      .3        .5
ET             9.1       9.1       9.1                 9.1                           4880.     5237.7
X1   304.0     15.0      4987.4    5075.6    59.       75.       120.7
GR   600.      4661.5    600.      4780.9    600.      4879.9    408.6     4880.0    400.1     4916.2
GR   397.3     4960.2    396.4     4987.4    393.6     5000.0    394.8     5034.6    395.5     5075.6
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GR  400.8     5107.1    404.5     5168.8    405.4     5237.7    600.      5237.8    600.      5401.6

ET            9.1       9.1       9.1                 9.1                           4908.5    5270.9

      ASHWOOD NORMAL BRIDGE X-SEC. 1 FOOT D/S OF BRIDGE.
X1  306.      17.       4988.5    5011.4    30.       25.       30.
GR  600.      4691.2    600.      4785.4    600.      4908.4    408.9     4908.5    408.9     4908.6
GR  397.4     4988.5    397.2     4988.6    397.2     5000.     397.2     5011.4    397.4     5011.5
GR  407.0     5097.2    408.4     5112.8    408.5     5112.9    409.6     5176.0    410.4     5270.9
GR  600.      5271.     600.      5521.5

NC  .025      .025      .050      .3        .5
ET            9.11      9.11      9.11                9.11                          4908.5    5270.9
      ASHWOOD NORMAL BRIDGE X-SEC. INSIDE BRIDGE.
X1  308.      23.       4988.5    5011.4    2.        2.        2.
X2                                399.4     406.2
BT  23.       4175.7    600.      600.      4252.4    600.      600.      4355.     600.      600.
BT  4469.7    600.      600.      4585.4    600.      600.      4691.2    600.      600.      4785.4
BT  600.      600.      4908.4    600.      600.      4908.5    408.9     408.9     4908.6    408.9
BT  408.9     4988.5    408.2     408.2     4988.6    407.2     399.4     5000.     406.2     399.4
BT  5011.4    406.3     399.4     5011.5    406.7     406.7     5097.2    407.0     407.      5112.8
BT  408.4     408.4     5112.9    408.5     408.5     5176.0    409.6     409.6     5270.9    410.4
BT  410.4     5271.     600.      600.      5521.5    600.      600.      5694.1    600.      600.
GR  600.0     4175.7    600.0     4252.4    600.      4355.0    600.      4469.7    600.0     4585.4
GR  600.      4691.2    600.      4785.4    600.      4908.4    408.9     4908.5    408.9     4908.6
GR  408.2     4988.5    397.2     4988.6    397.2     5000.     397.2     5011.4    406.7     5011.5
GR  407.0     5097.2    408.4     5112.8    408.5     5112.9    409.6     5176.0    410.4     5270.9
GR  600.      5271.     600.      5521.5    600.      5694.1

ET            9.11      9.11      9.11                9.11                          4864.8    5270.9
      ASHWOOD BRIDGE MODELED WITH RECTANGULAR EFFECTIVE FLOW AREA
X1  310.0     23.0      4988.5    5011.4    78.       56.       78.                 .1
X2                                399.4     406.2
BT  23.       4175.7    600.      600.      4252.4    600.      600.      4355.     600.      600.
BT  4469.7    600.      600.      4585.4    600.      600.      4691.2    600.      600.      4864.7
BT  600.      600.      4864.8    410.4     410.4     4908.5    408.9     408.9     4908.6    408.9
BT  408.9     4988.5    408.2     408.2     4988.6    407.2     399.4     5000.     406.2     399.4
BT  5011.4    406.3     399.4     5011.5    406.7     406.7     5097.2    407.0     407.      5112.8
BT  408.4     408.4     5112.9    408.5     408.5     5176.0    409.6     409.6     5270.9    410.4
BT  410.4     5271.     600.      600.      5521.5    600.      600.      5694.1    600.      600.
GR  600.0     4175.7    600.0     4252.4    600.      4355.0    600.      4469.7    600.      4585.4
GR  600.      4691.2    600.      4864.7    410.4     4864.8    408.9     4908.5    408.9     4908.6
GR  408.2     4988.5    397.2     4988.6    397.2     5000.     397.2     5011.4    406.7     5011.5
GR  407.0     5097.2    408.4     5112.8    408.5     5112.9    409.6     5176.0    410.4     5270.9
GR  600.      5271.     600.      5521.5    600.      5694.1

ET            9.1       9.1       9.1                 9.1                           4864.8    5270.9
      ASHWOOD NORMAL BRIDGE X-SEC OUTSIDE BRIDGE
X1  312.                                    2.        2.        2.

NC  .03       .03       .050      .3        .5
ET            9.1       9.1       9.1                 1.4                           4869.4    5270.9
X1  314.      20.       4962.7    5037.3    26.7      25.       20.7                .2
GR  600.      4644.     600.      4733.8    600.      4869.3    407.6     4869.4    408.2     4898.2
GR  401.4     4923.6    400.8     4954.5    397.6     4962.7    397.5     4962.8    397.5     5000.
GR  397.5     5037.2    397.6     5037.3    402.4     5054.1    407.9     5088.     408.8     5110.1
GR  408.6     5112.9    409.6     5176.     410.4     5270.9    600.      5271.     600.      5521.5

ET            9.1       9.1    9  .1                  3.4                           4817.9    5270.9
X1  315.      20.       4962.7    5037.3    225.      15.       39.                 .3
GR  600.      4644.     600.      4817.8    408.3     4817.9    407.6     4869.4    408.2     4898.2
GR  401.4     4923.6    400.8     4954.5    397.6     4962.7    397.5     4962.8    397.5     5000.
GR  397.5     5037.2    397.6     5037.3    402.4     5054.1    407.9     5088.     408.8     5110.1
GR  408.6     5112.9    409.6     5176.     410.4     5270.9    600.      5271.     600.      5521.5

ET            9.1       9.1       9.1       7.1                 4962.7    5037.3    4817.9    5270.9
      COUNTY NORMAL BRIDGE.  1 FOOT D/S OF BRIDGE.
X1  316.      20.       4962.7    5037.3    34.       34.       34.                 .4
GR  600.      4644.     600.      4817.8    408.3     4817.9    407.6     4869.4    408.2     4898.2
GR  401.4     4923.6    400.8     4954.5    397.6     4962.7    397.5     4962.8    397.5     5000.
GR  397.5     5037.2    397.6     5037.3    402.4     5054.1    407.9     5088.     408.8     5110.1
GR  408.6     5112.9    409.6     5176.     410.4     5270.9    600.      5271.     600.      5521.5
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ET           9.11     9.11     9.11     7.11     3.41     4962.7   5037.3   4817.9   5270.9
       COUNTY NORMAL BRIDGE.  INSIDE BRIDGE.
X1  317.     25.      4962.7   5037.3   2.       2.       2.                .4
X2                             407.     410.5
BT  25.      4290.7   600.     600.     4400.5   600.     600.     4460.8   600.     600.
BT  4528.7   600.     600.     4609.2   600.     600.     4644.    600.     600.     4817.8
BT  600.     600.     4817.9   408.3    408.3    4869.4   407.6    407.6    4898.2   408.2
BT  408.2    4923.6   401.4    401.4    4954.5   400.8    400.8    4962.7   410.5    410.5
BT  4962.8   410.5    407.     5000.    410.5    407.     5037.2   410.5    407.     5037.3
BT  410.5    410.5    5054.1   402.4    402.4    5088.    407.9    407.9    5110.1   408.8
BT  408.8    5112.9   408.6    408.6    5176.    409.6    409.6    5270.9   410.4    410.4
BT  5271.    600.     600.     5521.5   600.     600.
GR  600.     4290.7   600.     4400.5   600.     4460.8   600.     4528.7   600.     4609.2
GR  600.     4644.    600.     4817.8   408.3    4817.9   407.6    4869.4   408.2    4898.2
GR  401.4    4923.6   400.8    4954.5   410.5    4962.7   397.5    4962.8   397.5    5000.
GR  397.5    5037.2   410.5    5037.3   402.4    5054.1   407.9    5088.    408.8    5110.1
GR  408.6    5112.9   409.6    5176.    410.4    5270.9   600.     5271.    600.     5521.5

ET           9.11     9.11     9.11     7.11     3.41     4962.7   5037.3   4817.9   5270.9
       COUNTY BRIDGE INSIDE BRIDGE U/S
X1  318.                                25.      30.      18.
X2                             407.     410.5             1.

ET           9.1      9.1      9.1      7.1      3.4      4962.7   5037.3   4817.9   5270.9
       COUNTY NORMAL BRIDGE.  1 FOOT U/S OF BRIDGE.
X1  319.     20.      4962.7   5037.3   2.       2.       2.                .5
GR  600.     4644.    600.     4817.8   408.3    4817.9   407.6    4869.4   408.2    4898.2
GR  401.4    4923.6   400.8    4954.5   397.6    4962.7   397.5    4962.8   397.5    5000.
GR  397.5    5037.2   397.6    5037.3   402.4    5054.1   407.9    5088.    408.8    5110.1
GR  408.6    5112.9   409.6    5176.    410.4    5270.9   600.     5271.    600.     5521.5

ET           9.1      9.1      9.1                                          4780.    5270.9
X1  320.0    20.0     4954.5   5054.1   50.      30.      45.               .5
GR  600.     4460.8   600.     4528.7   600.     4609.2   600.     4779.9   407.7    4780.
GR  408.3    4817.9   407.6    4869.4   408.2    4898.2   401.4    4923.6   400.8    4954.5
GR  397.5    5000.0   397.3    5021.5   402.4    5054.1   407.9    5088.0   408.8    5110.1
GR  408.6    5112.9   409.6    5176.    410.4    5270.9   600.     5271.    600.     5521.5

NC  .3       .03      .050     .15      .3
ET           9.1      9.1      9.1                                          4634.3   5241.1
X1  322.0    11.0     4718.6   5197.6   165.     130.     132.6
GR  600.     4634.2   408.0    4634.3   407.4    4718.6   400.5    4794.3   399.6    4921.3
GR  399.4    5000.0   399.5    5055.2   401.5    5126.5   406.4    5197.6   413.8    5241.1
GR  600.     5241.2

ET           9.1      9.1      9.1               6.4                        4540.6   5240.8
X1  324.0    15.0     4815.7   5065.1   465.     70.      445.3
GR  600.     4411.4   600.     4540.5   407.0    4540.6   404.3    4683.8   404.0    4815.7
GR  402.0    4919.6   401.7    5000.0   402.3    5025.4   402.3    5047.1   415.3    5065.1
GR  416.2    5122.4   416.2    5240.8   600.     5240.9   600.     5475.5   600.     5520.1

ET           9.1      9.1      9.1      7.1      4.4      4809.4   5115.3   4628.1   5378.4
X1  326.0    20.0     4809.4   5115.3   407.     280.     385.6
GR  600.     4415.8   600.     4628.    418.8    4628.1   417.1    4647.7   410.5    4672.3
GR  405.7    4718.6   404.9    4768.2   413.5    4809.4   404.7    4852.6   404.3    4931.9
GR  402.8    4967.7   402.1    5000.0   402.5    5043.6   402.9    5093.7   410.6    5115.3
GR  415.8    5142.5   415.3    5174.3   414.9    5252.6   416.4    5378.4   600.     5378.5

NC  .028     .028     .050     .15      .3
ET           9.1      9.1      9.1               1.4                        4689.8   5297.1
X1  328.0    20.0     4843.9   5093.1   587.8    485.     535.4
GR  600.     4242.7   600.     4269.9   600.     4324.1   600.     4467.6   600.     4689.7
GR  416.6    4689.8   415.8    4721.9   412.0    4765.0   410.8    4843.9   405.9    4875.4
GR  405.0    4932.0   405.7    4972.2   403.8    5000.0   403.6    5031.5   407.0    5093.1
GR  415.7    5125.0   416.3    5194.9   416.2    5297.1   600.     5297.2   600.     5549.1

QT  5.       19000.   31000.   12500.   2500.    31000.
ET           9.1      9.1      9.1               9.1                        4730.5   5174.4
X1  330.0    20.0     4950.    5080.4   610.     560.     555.2
GR  600.     4179.8   600.     4281.3   600.     4330.8   600.     4491.8   600.     4730.4
GR  419.7    4730.5   414.4    4767.5   418.1    4862.6   415.8    4922.9   410.0    4950.0
GR  405.5    4973.7   405.7    5000.0   405.9    5021.4   409.3    5080.4   409.7    5098.2
GR  419.1    5121.3   418.7    5174.4   600.     5174.5   600.     5421.3   600.     5587.0
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ET		9.1	9.1	9.1		7.1	4912.	5232.	4864.5	5279.1
NC			0.045							
X1	332.0	13.0	4937.8	5064.4	700.	850.	752.9			
GR	600.	4864.4	421.2	4864.5	419.3	4911.8	412.6	4937.8	409.9	4976.6
GR	408.1	5000.0	409.3	5015.7	412.7	5064.4	420.2	5108.3	420.0	5163.8
GR	417.3	5232.4	421.6	5279.1	600.	5279.2				
ET		9.1	9.1	9.1		3.4			4708.4	5411.7
X1	333.0	18.0	4916.4	5070.5	377.	377.	377.0			
GR	600.	4708.3	426.0	4708.4	422.4	4760.1	421.5	4776.0	415.3	4815.5
GR	411.9	4855.4	412.9	4916.4	412.2	4979.3	411.3	5000.0	411.2	5038.2
GR	420.8	5070.5	421.8	5154.1	423.9	5253.3	420.3	5302.1	423.0	5373.0
GR	424.6	5411.7	600.	5411.8	600.	5497.2				
ET		9.1	9.1	9.1		3.4			4708.4	5411.7
X1	334.0	18.0	4916.4	5070.5	278.	278.	278.0			
GR	600.	4708.3	426.0	4708.4	422.4	4760.1	421.5	4776.0	415.3	4815.5
GR	411.9	4855.4	412.9	4916.4	412.2	4979.3	411.3	5000.0	411.2	5038.2
GR	420.8	5070.5	421.8	5154.1	423.9	5253.3	420.3	5302.1	423.0	5373.0
GR	424.6	5411.7	600.	5411.8	600.	5497.2				
ET		9.1	9.1	9.1		7.1	4796.	5279.	4680.7	5368.7
X1	336.0	20.0	4850.4	5047.7	583.	550.	530.8			
GR	600.	3584.6	600.	3632.4	600.	3738.9	600.	4598.1	600.	4680.6
GR	430.4	4680.7	428.1	4766.8	421.0	4796.3	415.1	4850.4	414.0	4948.2
GR	412.7	5000.0	414.1	5017.0	414.7	5047.7	421.9	5071.0	421.7	5149.9
GR	424.0	5259.1	423.0	5331.7	426.1	5368.7	600.	5368.8	600.	5687.7
ET		9.1	9.1	9.1		7.1	4848.	5175.	4694.4	5332.3
X1	338.0	18.0	4960.7	5044.4	615.	640.	625.5			
GR	600.	4547.8	600.	4694.3	432.4	4694.4	429.4	4722.3	429.8	4787.4
GR	429.7	4822.7	423.2	4848.0	415.8	4869.8	416.8	4960.7	415.0	5000.0
GR	416.6	5044.4	416.5	5081.1	424.6	5121.9	425.3	5169.3	425.1	5259.8
GR	424.9	5332.3	600.	5332.4	600.	5468.2				
QT	5.	19000.	30600.	12200.	2000.	30600.				
ET		9.1	9.1	9.1		1.4			4797.8	5304.6
X1	340.0	15.0	4906.3	5061.3	781.3	670.	654.6			
GR	600.0	4639.8	600.	4719.1	600.	4797.7	429.2	4797.8	422.7	4829.7
GR	418.5	4906.3	417.8	4965.8	416.0	5000.0	418.3	5007.5	418.2	5061.3
GR	421.9	5082.2	426.3	5097.4	428.4	5161.3	425.6	5304.6	600.	5304.7
ET		9.1	9.1	9.1		7.1	4744.	5182.	4717.2	5228.7
X1	342.0	15.0	4779.5	5021.2	630.1	666.	694.2			
GR	600.	4477.2	600.	4606.0	600.	4717.1	434.6	4717.2	426.4	4744.1
GR	420.8	4779.5	420.8	4914.0	420.7	4973.5	418.8	5000.0	419.7	5021.2
GR	428.9	5053.2	429.2	5093.0	422.0	5191.7	429.2	5228.7	600.	5228.8
ET		9.1	9.1	9.1		7.1	4750.	5182.	4719.3	5214.5
X1	344.0	15.0	4939.	5031.4	180.	95.	75.5			
GR	600.	4608.6	600.	4719.2	432.1	4719.3	422.4	4757.3	420.9	4811.2
GR	421.2	4939.0	420.8	4975.2	418.8	5000.0	421.3	5031.4	429.1	5066.4
GR	429.8	5174.4	427.0	5214.5	600.	5214,6	600.	5445.	600.	5505.0
ET		9.1	9.1	9.1		7.1	4767.	5219.	4738.9	5323.6
X1	350.0	15.0	4920.8	5069.2	85.	105.	138.0			
GR	600.	4477.0	600.	4738.8	432.4	4738.9	430.0	4772.6	429.9	4772.7
GR	421.1	4827.1	423.0	4920.8	420.2	5000.0	420.4	5047.5	421.3	5069.2
GR	428.1	5103.5	428.2	5103.6	429.8	5219.2	432.2	5323.6	600.	5323.7
ET		9.1	9.1	9.1		7.1	4784.	5200.	4763.8	5226.6
X1	352.0	15.0	4899.5	5075.1	127.	80.	73.8			
NC			0.04							
GR	600.	4634.1	600.	4763.7	430.4	4763.8	425.1	4786.6	419.8	4821.9
GR	421.5	4899.5	421.3	4970.2	420.5	5000.0	421.9	5014.5	425.5	5075.1
GR	429.2	5105.9	427.1	5139.9	431.3	5226.6	600.	5226.7	600.	5442.8
ET		9.1	9.1	9.1		1.4			4753.8	5104.4
X1	354.0	13.0	4773.6	5080.5	600.	529.	555.4			
GR	600.	4542.8	600.	4660.7	600.	4753.7	436.2	4753.8	423.9	4773.6
GR	422.9	4890.9	422.9	4958.7	422.6	5000.0	425.2	5028.3	426.0	5080.5
GR	437.3	5104.4	600.	5104.5	600.	5254.2				

ET		9.1	9.1	9.1		7.1	4960.	5266.	4935.2	5277.2
X1	356.0	13.0	4960.1	5141.2	780.	550.	695.2			
GR	600.	4664.2	600.	4753.0	600.	4935.1	437.7	4935.2	431.2	4960.1
GR	426.1	4975.1	424.8	5000.0	426.8	5011.5	427.4	5141.2	429.7	5254.6
GR	439.6	5277.2	600.	5277.3	600.	5500.7				
ET		9.1	9.1	9.1		7.1	4812.	5172.	4712.4	5189.2
X1	358.0	15.0	4816.9	5051.4	952.	820.	930.			
GR	600.	4350.2	600.	4375.6	600.	4415.1	600.	4560.2	600.	4712.3
GR	440.4	4712.4	439.0	4793.0	431.8	4816.9	430.3	4953.1	429.4	5000.0
GR	432.4	5051.4	430.5	5132.2	442.8	5189.2	600.	5189.3	600.	5391.2
ET		9.1	9.1	9.1		9.1			4786.3	5186.9
X1	360.0	14.0	4963.6	5093.3	750.	657.	651.4			
GR	600.	4786.2	443.5	4786.3	443.3	4832.6	435.6	4854.3	435.8	4963.6
GR	434.6	4986.9	433.2	5000.0	434.8	5022.1	437.4	5093.3	438.1	5135.1
GR	447.0	5149.1	447.3	5186.9	600.	5187.	600.	5528.4		
ET		9.1	9.1	9.1		7.1	4814.	5146.	4792.6	5224.9
X1	362.0	20.0	4944.	5037.3	681.2	712.	686.5			
GR	600.	4513.9	600.	4546.1	600.	4581.5	600.	4646.9	600.	4792.5
GR	446.4	4792.6	446.7	4814.4	438.3	4839.0	437.6	4944.0	435.1	4986.8
GR	434.1	5000.0	435.5	5009.6	438.7	5037.3	441.6	5108.5	440.6	5130.6
GR	445.8	5145.6	446.4	5224.9	600.	5225.	600.	5523.5	600.	5669.9
ET		9.1	9.1	9.1	7.1	9.1	4961.7	5095.7	4916.8	5351.6
X1	364.0	14.0	4961.7	5095.7	770.	754.	785.3			
GR	600.	4916.7	447.5	4916.8	446.9	4941.1	440.7	4961.7	439.2	4987.5
GR	437.8	5000.0	438.6	5010.0	445.5	5095.7	443.3	5186.1	440.0	5235.7
GR	452.9	5266.2	453.9	5351.6	600.	5351.7	600.	5599.5		
ET		9.1	9.1	9.1		7.1	4837.	5265.	4811.2	5333.5
X1	366.0	15.0	4959.8	5009.3	773.	848.	781.8			
GR	600.	4811.1	452.1	4811.2	451.8	4837.3	445.4	4847.0	448.2	4959.8
GR	447.2	4984.4	442.1	5000.0	446.3	5009.3	445.1	5148.2	447.4	5179.2
GR	453.4	5209.9	451.5	5295.2	456.7	5333.5	600.	5333.6	600.	5615.8
ET		9.1	9.1	9.1	7.1	5.4	4788.	5165.5	4649.4	5299.6
X1	368.0	19.0	4949.5	5015.7	419.0	353.	376.6			
GR	600.	4302.6	600.	4337.4	600.	4468.7	600.	4531.5	600.	4649.3
GR	450.3	4649.6	450.9	4788.0	445.7	4806.6	445.8	4949.5	444.2	4984.5
GR	442.8	5000.0	444.2	5015.7	443.6	5094.9	447.5	5119.8	452.4	5165.5
GR	450.0	5255.9	455.8	5299.6	600.	5299.7	600.	5465.6		
QT	5.	19000.	30200.	11900.	1500.	30200.				
ET		9.1	9.1	9.1	7.1	9.1	4821.5	5131.5	4821.5	5196.1
X1	370.0	14.0	4953.6	5017.7	461.7	627.	538.0			
GR	600.	4481.2	600.	4596.1	600.	4719.5	600.	4821.4	456.0	4821.5
GR	447.9	4837.4	448.0	4953.6	445.0	5000.0	450.5	5017.7	452.7	5131.5
GR	450.5	5185.9	457.1	5196.1	600.	5196.2	600.	5422.7		
ET		9.1	9.1	9.1		9.1			4854.5	5270.9
X1	372.0	12.0	4879.2	5183.1	463.6	680.	554.7			
GR	600.	4675.6	600.	4854.4	458.5	4854.5	450.9	4879.2	448.7	4964.5
GR	448.0	5000.0	449.8	5063.7	453.5	5183.1	454.3	5254.0	461.7	5270.9
GR	600.	5271.	600.	5345.						
ET		9.1	9.1	9.1		9.1			4863.	5260.2
X1	374.0	13.0	4886.6	5021.	562.	530.	548.5			
GR	600.	4605.3	600.	4719.3	600.	4862.9	461.7	4863.0	453.5	4886.6
GR	450.0	4972.7	449.4	5000.0	452.0	5021.0	452.6	5138.1	455.5	5214.8
GR	462.3	5260.2	600.	5260.3	600.	5450.2				
ET		9.1	9.1	9.1		9.1			4843.9	5225.3
X1	376.0	15.0	4868.6	5154.9	520.	530.	508.3			
GR	600.	4408.9	600.	4456.2	600.	4578.7	600.	4633.2	600.	4843.8
GR	470.8	4843.9	455.0	4868.6	453.1	4956.0	453.6	5000.0	454.0	5019.6
GR	455.0	5154.9	455.5	5190.3	464.9	5225.3	600.	5225.4	600.	5473.6
ET		9.1	9.1	9.1		9.1			4746.2	5134.9
X1	378.0	10.0	4781.5	5118.6	665.2	353.	686.1			
GR	600.	4746.1	473.1	4746.2	456.2	4781.5	456.7	4934.5	456.9	5000.0

GR	456.8	5064.9	457.8	5118.6	466.5	5134.9	600.	5135.	600.	5277.4
ET		9.1	9.1	9.1		9.1			4739.4	5109.6
X1	380.0	10.0	4769.7	5044.4	145.2	110.	115.5			
GR	600.	4548.0	600.	4739.3	472.0	4739.4	459.0	4769.7	457.1	4905.4
GR	457.0	5000.0	457.8	5044.4	457.3	5087.8	468.8	5109.6	600.	5109.7
ET		9.1	9.1	9.1		9.1			4788.8	5140.
X1	390.0	13.0	4915.8	5029.1	80.	190.	97.8			
GR	600.	4788.7	473.5	4788.8	473.4	4788.9	458.7	4815.8	457.9	4915.8
GR	457.0	4969.9	457.0	5000.0	458.6	5029.1	457.6	5115.7	468.6	5139.9
GR	468.7	5140.0	600.	5140.1	600.	5304.8				
ET		9.1	9.1	9.1		9.1			4851.1	5188.
X1	392.0	14.0	4948.7	5165.6	159.	370.	156.0			
GR	600.	4548.7	600.	4602.9	600.	4673.8	600.	4791.4	600.	4851.
GR	472.2	4851.1	459.3	4875.0	459.8	4948.7	458.9	5000.0	458.1	5066.8
GR	458.3	5165.6	471.0	5188.0	600.	5188.1	600.	5379.9		
ET		9.1	9.1	9.1		9.1			4643.4	5221.8
X1	394.0	15.0	4895.	5015.8	1037.	736.	890.9			
GR	600.	4344.5	600.	4643.3	475.3	4643.4	467.7	4728.2	475.3	4756.9
GR	476.7	4788.4	477.3	4857.6	462.9	4895.0	462.2	5000.0	463.3	5015.8
GR	464.2	5146.7	463.6	5193.5	476.5	5221.8	600.	5221.9	600.	5490.8
ET		9.1	9.1	9.1		9.1			4766.6	5161.5
X1	396.0	13.0	4954.3	5071.7	927.7	610.	771.8			
GR	600.	4551.4	600.	4659.4	600.	4766.5	474.4	4766.6	467.7	4791.4
GR	467.1	4891.5	466.0	4954.3	464.6	5000.0	466.3	5071.7	466.5	5132.8
GR	479.	5161.5	600.	5161.6	600.	5360.2				
NC	.03	.03	.04	.15	.3					
ET		9.1	9.1	9.1		7.1	4796.	5059.	4771.1	5078.8
X1	398.0	15.0	4971.6	5038.1	783.7	660.	694.9			
GR	600.	4643.8	600.	4694.4	600.	4722.1	600.	4771.	482.6	4771.1
GR	476.2	4795.7	469.4	4824.0	469.0	4900.7	467.1	4971.6	465.3	5000.0
GR	466.6	5038.1	474.5	5058.7	481.6	5078.8	600.	5078.9	600.	5262.5
QT	5.	19000.	29800.	11600.	1000.	29800.				
NC			0.035							
ET		9.1	9.1	9.1	7.1	7.1	4966.4	5222.	4957.1	5225.5
X1	400.0	13.0	4966.4	5020.2	550.	368.	448.0			
GR	600.	4850.6	600.	4891.2	600.	4957.	480.9	4957.1	471.1	4966.4
GR	467.1	4983.1	467.2	5000.0	468.4	5020.2	471.2	5107.8	469.9	5203.2
GR	481.6	5225.5	600.	5225.6	600.	5386.4				
ET						7.1	4915.	5217.		
X1	402.	20.	4970.7	5046.7	630.	630.	630.6			
GR	600.	4263.	600.	4431.3	600.	4626.6	600.	4770.1	600.	4914.8
GR	481.5	4914.9	473.1	4927.1	473.4	4970.7	469.4	4989.9	469.1	5000.0
GR	469.3	5015.1	473.3	5046.7	473.8	5119.4	480.0	5151.7	480.5	5205.0
GR	481.5	5217.3	600.	5217.4	600.	5561.8	600.	5690.6	600.	5791.2
ET		9.1	9.1	9.1		1.4			4825.4	5214.4
X1	404.0	15.0	4970.3	5038.6	582.	567.	592.3			
GR	600.	4446.1	600.	4628.1	600.	4825.3	486.4	4825.4	475.7	4848.9
GR	474.5	4932.1	478.7	4970.3	472.5	4989.6	472.3	5000.0	472.3	5010.2
GR	477.5	5038.6	479.2	5109.8	478.7	5182.9	485.9	5214.4	600.	5214.5
ET		9.1	9.1	9.1		7.1	4573.	5051.	4515.1	5062.1
X1	406.0	18.0	4946.7	5037.4	258.	595.	617.7			
GR	600.	3889.5	600.	4012.7	600.	4125.9	600.	4230.3	600.	4515.
GR	485.2	4515.1	487.3	4631.9	486.5	4770.3	486.4	4834.1	478.5	4853.5
GR	477.9	4946.7	474.4	4989.2	473.8	5000.0	474.9	5008.2	480.4	5037.4
GR	493.9	5062.1	600.	5062.2	600.	5106.1				
NC	.035	.035	.035	.3	.5					
ET		9.1	9.1	9.1		7.1	4420.	5022.	4152.8	5040.2
X1	408.0	22.0	4977.8	5016.1	350.	616.	445.3			
GR	600.	3673.8	600.	3766.5	600.	3825.5	600.	4152.7	485.6	4152.8
GR	487.6	4289.5	486.2	4364.7	487.3	4452.5	485.9	4488.0	479.8	4520.7
GR	481.0	4570.9	481.4	4673.5	481.9	4818.3	481.2	4890.1	480.6	4950.1
GR	475.2	4977.8	475.1	5000.0	476.6	5016.1	481.6	5026.6	494.8	5040.2

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GR   600.      5040.3      600.        5224.8

     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IOC        ICONT      CORAR      TOPWID     ENDST

*PROF 1

CCHV=      .150 CEHV=       .300
*SECNO 300.000

3470 ENCROACHMENT STATIONS=      4627.2     5085.8  TYPE=       1  TARGET=       458.600
        UPPER SAN DIEGO RIVER AT THE CONFLUENCE OF SAN VINCENTE CREEK
   300.000       9.41     398.81        .00        .00     400.19       1.38        .00        .00     395.60
   20000.0    10569.0     9431.0         .0     1031.3     1124.8         .0         .0         .0     401.70
       .00      10.25       8.38        .00       .030       .050       .000       .000     389.40    4627.20
   .006704         0.         0.         0.          0          0          7        .00     433.27    5060.47


*SECNO 302.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4798.2     5066.6  TYPE=       1  TARGET=       268.400
   302.000      10.03     402.63     402.63        .00     405.86       3.23       4.27        .56     397.80
   20000.0    11244.0     8735.4       20.6      691.4      747.7        4.9       21.2        4.0     400.50
       .01      16.26      11.68       4.22       .030       .050       .035       .000     392.60    4824.58
   .010348       550.       481.       295.          2          8          0        .00     233.01    5057.59


CCHV=      .300 CEHV=       .500
*SECNO 304.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      4880.0     5237.7  TYPE=       1  TARGET=       357.700
   304.000      11.14     404.74        .00        .00     406.90       2.15        .71        .32     396.40
   20000.0     7159.8     9674.2     3165.9      525.8      880.2      338.2       24.6        4.5     395.50
       .01      13.62      10.99       9.36       .030       .050       .035       .000     393.60    4896.46
   .006397        59.       121.        75.          7          0          0        .00     290.34    5186.80


*SECNO 306.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4908.5     5270.9  TYPE=       1  TARGET=       362.400
        ASHWOOD NORMAL BRIDGE X-SEC. 1 FOOT D/S OF BRIDGE.
   306.000      12.30     409.50     409.50        .00     412.39       2.89        .20        .37     397.40
   20000.0     7370.0     3827.2     8802.8      507.4      281.6      683.6       25.7        4.7     397.20
       .01      14.53      13.59      12.88       .030       .050       .035       .000     397.20    4908.50
   .007415        30.        30.        25.         20          8          0        .00     261.74    5170.24


CCHV=      .300 CEHV=       .500
*SECNO 308.000
BTCARD, BRIDGE STENCL=      4908.50    STENCR=      5270.90

3301 HV CHANGED MORE THAN HVINS


3370 NORMAL BRIDGE, NRD=  23 MIN ELTRD=    406.20 MAX ELLC=    399.40
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3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4908.5    5270.9  TYPE=      1  TARGET=      362.400
        ASHWOOD NORMAL BRIDGE X-SEC. INSIDE BRIDGE.
   308.000     15.87    413.07    413.07       .00    415.45      2.39       .01       .15    408.20
   20000.0    4425.1     774.5   14800.4     361.4     201.1    1162.5      25.7       4.7    397.20
       .01     12.24      3.85     12.73      .025      .050      .025      .000    397.20   4908.50
   .005683        2.        2.        2.        20        22         0   -162.04    362.40   5270.90


*SECNO 310.000
BTCARD, BRIDGE STENCL=    4864.80   STENCR=    5270.90

3301 HV CHANGED MORE THAN HVINS

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.90


3370 NORMAL BRIDGE, NRD=  23 MIN ELTRD=   406.20 MAX ELLC=   399.40


3470 ENCROACHMENT STATIONS=     4864.8    5270.9  TYPE=      1  TARGET=      406.100

4677 BRIDGE DECK DEFINITION ERROR AT STATIONS    5011.40   5011.50
        ASHWOOD BRIDGE MODELED WITH RECTANGULAR EFFECTIVE FLOW AREA
   310.000     17.75    415.05       .00       .00    416.04       .99       .17       .42    408.30
   20000.0    5815.3     609.8   13574.9     743.6     244.6    1651.4      28.9       5.2    397.30
       .02      7.82      2.49      8.22      .025      .050      .025      .000    397.30   4864.80
   .001570       78.       78.       56.        14         0         0   -161.31    406.10   5270.90


*SECNO 312.000

3470 ENCROACHMENT STATIONS=     4864.8    5270.9  TYPE=      1  TARGET=      406.100
        ASHWOOD NORMAL BRIDGE X-SEC OUTSIDE BRIDGE
   312.000     18.08    415.38       .00       .00    416.12       .74       .00       .08    408.30
   20000.0    5293.7    2195.2   12511.1     785.2     413.6    1738.5      29.1       5.2    397.30
       .02      6.74      5.31      7.20      .025      .050      .025      .000    397.30   4864.80
   .001131        2.        2.        2.         2         0         0       .00    406.10   5270.90


CCHV=     .300 CEHV=     .500
*SECNO 314.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.53


3470 ENCROACHMENT STATIONS=     4869.4    5270.9  TYPE=      1  TARGET=      401.500
   314.000     18.19    415.89       .00       .00    416.25       .36       .02       .11    397.80
   20000.0    6107.6    6135.2    7757.2    1086.7    1356.7    1757.8      31.0       5.5    397.80
       .02      5.62      4.52      4.41      .030      .050      .030      .000    397.70   4869.40
   .000485       27.       21.       25.         2         0         0       .00    401.50   5270.90


*SECNO 315.000

3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=      1  TARGET=      453.000

   315.000     18.21    416.01       .00       .00    416.31       .30       .04       .02    397.90
   20000.0    7195.9    5645.6    7158.6    1488.9    1358.7    1763.8      39.5       6.2    397.90
       .02      4.83      4.16      4.06      .030      .050      .030      .000    397.80   4817.90
   .000408      225.       39.       15.         2         0         0       .00    453.00   5270.90


*SECNO 316.000
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3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=       1  TARGET=       453.000
        COUNTY NORMAL BRIDGE.  1 FOOT D/S OF BRIDGE.
   316.000      18.12     416.02       .00        .00     416.33        .30        .01        .00     398.00
   20000.0     7197.2     5674.8    7128.0     1476.6     1352.3     1744.0       43.1        6.6     398.00
       .02       4.87       4.20      4.09       .030       .050       .030       .000     397.90    4817.90
   .000419        34.        34.       34.          0          0          0        .00     453.00    5270.90

*SECNO 317.000
BTCARD, BRIDGE STENCL=    4817.90   STENCR=     5270.90

3370 NORMAL BRIDGE, NRD=  25 MIN ELTRD=   410.50 MAX ELLC=   407.00

3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=       1  TARGET=       453.000

4677 BRIDGE DECK DEFINITION ERROR AT STATIONS    5037.20   5037.30
        COUNTY NORMAL BRIDGE.  INSIDE BRIDGE.
   317.000      18.03     415.93       .00        .00     416.42        .49        .00        .09     410.90
   20000.0     9238.2     2432.0    8329.9     1410.5     1083.8     1614.3       43.3        6.6     410.90
       .02       6.55       2.24      5.16       .030       .050       .030       .000     397.90    4817.90
   .000803         2.         2.        2.          7          0          0    -260.40     453.00    5270.90

*SECNO 318.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .56

3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=   410.50 MAX ELLC=   407.00

3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=       1  TARGET=       453.000
        COUNTY BRIDGE INSIDE BRIDGE U/S
   318.000      18.01     415.91       .00        .00     416.51        .60        .03        .05     410.90
   20000.0     6473.1     4318.5    9208.4     1018.3     1081.4     1331.4       45.5        6.9     410.90
       .03       6.36       3.99      6.92       .030       .050       .030       .000     397.90    4817.90
   .002596        25.        18.       30.          2          0          0    -926.83     453.00    5270.90

    SECNO      DEPTH      CWSEL     CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH       QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH       VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH      XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

*SECNO 319.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.56

3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=       1  TARGET=       453.000
        COUNTY NORMAL BRIDGE.  1 FOOT U/S OF BRIDGE.
   319.000      18.31     416.31       .00        .00     416.60        .29        .00        .09     398.10
   20000.0     7194.2     5611.6    7194.2     1503.5     1366.2     1787.3       45.7        6.9     398.10
       .03       4.79       4.11      4.03       .030       .050       .030       .000     398.00    4817.90
   .000396         2.         2.        2.          2          0          0        .00     453.00    5270.90

*SECNO 320.000

3470 ENCROACHMENT STATIONS=     4780.0    5270.9  TYPE=       1  TARGET=       490.900
   320.000      18.56     416.36       .00        .00     416.63        .27        .02        .01     401.30
   20000.0     7672.5     6598.3    5729.2     1673.0     1680.0     1533.6       50.2        7.3     402.90
       .03       4.59       3.93      3.74       .030       .050       .030       .000     397.80    4780.00
   .000406        50.        45.       30.          1          0          0        .00     490.90    5270.90

CCHV=     .150 CEHV=      .300
*SECNO 322.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.43
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3470 ENCROACHMENT STATIONS=     4634.3    5241.1  TYPE=       1  TARGET=       606.800
   322.000       17.19     416.59        .00        .00     416.69       .10        .04        .02     407.40
   20000.0       209.9    19139.8      650.3      749.4     7394.0     282.3       71.3        9.1     406.40
       .04         .28       2.59       2.30       .300       .050      .030       .000     399.40    4634.30
   .000198        165.       133.       130.          2          0         0        .00     606.80    5241.10


*SECNO 324.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .46


3470 ENCROACHMENT STATIONS=     4540.6    5240.8  TYPE=       1  TARGET=       700.200
   324.000       14.87     416.57        .00        .00     416.93       .36        .16        .08     404.00
   20000.0      2436.1    17466.9       97.1     3203.0     3414.0      91.5      147.9       14.9     415.30
       .07         .76       5.12       1.06       .300       .050      .030       .000     401.70    4540.60
   .000925        465.       445.        70.          2          0         0        .00     700.20    5240.80

*SECNO 326.000

3470 ENCROACHMENT STATIONS=     4628.1    5378.4  TYPE=       1  TARGET=       750.300
   326.000       14.87     416.97        .00        .00     417.28       .31        .34        .01     413.50
   20000.0       889.6    18063.5     1046.8     1387.0     3852.4     459.2      203.3       20.8     410.60
       .09         .64       4.69       2.28       .300       .050      .030       .000     402.10    4648.20
   .000858        407.       386.       280.          2          0         0        .00     730.20    5378.40


CCHV=     .150 CEHV=      .300
*SECNO 328.000

3470 ENCROACHMENT STATIONS=     4689.8    5297.1  TYPE=       1  TARGET=       607.300
   328.000       13.83     417.43        .00        .00     417.81       .38        .51        .02     410.80
   20000.0      3407.0    15051.5     1541.5      668.2     2983.3     415.6      264.1       29.0     407.00
       .13        5.10       5.05       3.71       .028       .050      .028       .000     403.60    4689.80
   .001055        588.       535.       485.          1          0         0        .00     607.30    5297.10


*SECNO 330.000

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .45


3470 ENCROACHMENT STATIONS=     4730.5    5174.4  TYPE=       1  TARGET=       443.900
   330.000       12.18     417.68        .00        .00     419.23      1.55       1.07        .35     410.00
   19000.0      2364.3    13815.9     2819.8      353.1     1403.0     224.1      303.3       35.3     409.30
       .14        6.70       9.85      12.58       .028       .050      .028       .000     405.50    4744.55
   .004646        610.       555.       560.          2          0         0        .00     351.86    5117.83


*SECNO 332.000

3470 ENCROACHMENT STATIONS=     4864.5    5279.1  TYPE=       1  TARGET=       414.600
   332.000       13.05     421.15        .00        .00     422.57      1.42       3.32        .02     412.60
   19000.0      1480.3    13889.0     3630.7      177.7     1358.0     516.2      338.6       42.0     412.70
       .16        8.33      10.23       7.03       .028       .045      .028       .000     408.10    4865.79
   .004068        700.       753.       850.          3          0         0        .00     408.40    5274.19

       SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
       Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
       TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
       SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 333.000

3265 DIVIDED FLOW
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3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.71

3470 ENCROACHMENT STATIONS=			4708.4	5411.7 TYPE=	1	TARGET=	703.300		
333.000	11.50	422.70	.00	.00	423.50	.80	.83	.09	412.90
19000.0	9898.9	8535.4	565.7	1173.4	1518.5	250.2	360.2	46.1	420.80
.18	8.44	5.62	2.26	.028	.045	.028	.000	411.20	4755.83
.001388	377.	377.	377.	2	0	0	.00	536.09	5365.05

*SECNO 334.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=			4708.4	5411.7 TYPE=	1	TARGET=	703.300		
334.000	11.98	423.18	.00	.00	423.86	.68	.35	.02	412.90
19000.0	9784.7	8337.9	877.4	1253.3	1593.5	368.3	379.9	49.7	420.80
.19	7.81	5.23	2.38	.028	.045	.028	.000	411.20	4748.84
.001128	278.	278.	278.	2	0	0	.00	585.10	5377.45

*SECNO 336.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=			4680.7	5368.7 TYPE=	1	TARGET=	688.000		
336.000	11.26	423.96	.00	.00	424.75	.79	.86	.03	415.10
19000.0	2709.4	14135.1	2155.5	338.0	1943.0	462.7	417.3	56.9	414.70
.21	8.02	7.27	4.66	.028	.045	.028	.000	412.70	4784.00
.002300	583.	531.	550.	2	0	0	.00	554.44	5343.17

*SECNO 338.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=			4694.4	5332.3 TYPE=	1	TARGET=	637.900		
338.000	10.04	425.04	.00	.00	426.30	1.26	1.41	.14	416.80
19000.0	9313.3	5227.6	4459.1	921.2	769.0	504.1	452.8	63.5	416.60
.23	10.11	6.80	8.85	.028	.045	.028	.000	415.00	4840.86
.002204	615.	626.	640.	0	0	0	.00	359.36	5332.30

*SECNO 340.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=			4797.8	5304.6 TYPE=	1	TARGET=	506.800		
340.000	11.00	427.00	.00	.00	428.19	1.19	1.88	.01	418.50
19000.0	5347.7	11669.6	1982.7	535.6	1416.6	246.9	488.1	69.4	418.20
.25	9.98	8.24	8.03	.028	.045	.028	.000	416.00	4808.60
.003267	781.	655.	670.	3	0	0	.00	381.74	5304.60

*SECNO 342.000

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=			4717.2	5228.7 TYPE=	1	TARGET=	511.500		
342.000	10.56	429.36	.00	.00	429.97	.61	1.70	.09	420.80
19000.0	1580.6	13401.7	4017.7	218.4	2133.1	684.9	528.9	76.2	419.70
.28	7.24	6.28	5.87	.028	.045	.028	.000	418.80	4734.38
.001985	630.	694.	666.	2	0	0	.00	494.32	5228.70

*SECNO 344.000

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3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=     4719.3     5214.5  TYPE=       1   TARGET=       495.200
   344.000      10.56     429.36        .00        .00     430.28        .93        .21        .09     421.20
   19000.0    13302.3     4808.2      889.5     1571.8      831.8      190.4      536.1       77.3     421.30
       .29       8.46       5.78       4.67       .028       .045       .028       .000     418.80    4730.05
   .001640       180.        76.        95.          2          0          0        .00     409.76    5214.50

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 350.000

3470 ENCROACHMENT STATIONS=     4738.9     5323.6  TYPE=       1   TARGET=       584.700
   350.000       9.27     429.47        .00        .00     430.54       1.08        .22        .05     423.00
   19000.0     8811.7     8810.7     1377.6      911.5     1245.7      221.8      542.3       78.3     421.30
       .29       9.67       7.07       6.21       .028       .045       .028       .000     420.20    4775.37
   .002691        85.       138.       105.          2          0          0        .00     419.86    5195.23


*SECNO 352.000

3470 ENCROACHMENT STATIONS=     4763.8     5226.6  TYPE=       1   TARGET=       462.800
   352.000       9.96     429.76        .00        .00     430.78       1.02        .23        .01     421.50
   19000.0     9700.3     8604.6      695.0     1011.5     1346.1      201.8      547.7       79.3     425.50
       .30       9.59       6.39       3.44       .028       .040       .028       .000     419.80    4766.56
   .001961       127.        74.        80.          2          0          0        .00     428.22    5194.78


*SECNO 354.000

3470 ENCROACHMENT STATIONS=     4753.8     5104.4  TYPE=       1   TARGET=       350.600
   354.000       8.59     431.19        .00        .00     432.17        .99       1.38        .01     423.90
   19000.0      269.4    18581.7      149.0       42.7     2321.3       28.4      579.8       84.1     426.00
       .32       6.30       8.00       5.24       .028       .040       .028       .000     422.60    4761.87
   .003128       600.       555.       529.          2          0          0        .00     329.60    5091.47


*SECNO 356.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     4935.2     5277.2  TYPE=       1   TARGET=       342.000
   356.000       8.66     433.46        .00        .00     435.29       1.83       2.87        .25     431.20
   19000.0       43.8    12112.3     6843.9        9.8     1185.8      573.7      612.0       89.0     427.40
       .33       4.45      10.21      11.93       .028       .040       .028       .000     424.80    4951.42
   .006219       780.       695.       550.          2          0          0        .00     311.78    5263.20


*SECNO 358.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.49

3470 ENCROACHMENT STATIONS=     4712.4     5189.2  TYPE=       1   TARGET=       476.800
   358.000       8.62     438.02        .00        .00     439.01        .99       3.59        .13     431.80
   19000.0      373.3    12514.0     6112.7       64.1     1697.0      661.2      655.2       96.0     432.40
       .36       5.83       7.37       9.25       .028       .040       .028       .000     429.40    4796.27
   .002816       952.       930.       820.          2          0          0        .00     370.75    5167.02


*SECNO 360.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
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3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4786.3    5186.9  TYPE=       1  TARGET=       400.600
  360.000       7.90     441.10     441.10        .00     443.67       2.57      3.07        .47     435.80
  19000.0     9269.4     8158.2     1572.4      632.9      744.8      147.1     685.6      101.2     437.40
      .38      14.65      10.95      10.69       .028       .040       .028      .000     433.20    4838.80
  .008471       750.       651.       657.         20         11          0       .00     301.02    5139.82

*SECNO 362.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.91

3470 ENCROACHMENT STATIONS=      4792.6    5224.9  TYPE=       1  TARGET=       432.300
  362.000      11.41     445.51        .00        .00     446.65       1.14      2.76        .21     437.60
  19000.0     8270.2     6913.5     3816.3      869.6      871.6      513.6     715.5      106.2     438.70
      .40       9.51       7.93       7.43       .028       .040       .028      .000     434.10    4817.89
  .002330       681.       687.       712.          3          0          0       .00     326.86    5144.76

*SECNO 364.000

   SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
   Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
   TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
   SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .58

3470 ENCROACHMENT STATIONS=      4916.8    5351.6  TYPE=       1  TARGET=       434.800
  364.000       9.97     447.77        .00        .00     449.78       2.01      2.87        .26     440.70
  19000.0      915.4     9893.8     8190.9       95.4      903.0      678.9     750.3      112.1     445.50
      .42       9.59      10.96      12.06       .028       .040       .028      .000     437.80    4916.80
  .006863       770.       785.       754.          3          0          0       .00     337.26    5254.06

*SECNO 366.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.49

3470 ENCROACHMENT STATIONS=      4811.2    5333.5  TYPE=       1  TARGET=       522.300
  366.000      10.07     452.17        .00        .00     453.49       1.33      3.61        .10     448.20
  19000.0     5689.1     2026.6    11284.3      644.6      300.9     1149.8     785.5      119.2     446.30
      .44       8.83       6.74       9.81       .028       .040       .028      .000     442.10    4811.20
  .003102       773.       782.       848.          2          0          0       .00     426.83    5300.06

*SECNO 368.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.03
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3470 ENCROACHMENT STATIONS=     4649.4     5299.6  TYPE=       1  TARGET=        650.200
    368.000      10.94    453.74       .00       .00    454.15       .40       .51       .14    445.80
    19000.0     8413.6    2839.9    7746.5    1678.3     625.5    1439.4     811.2     123.9    444.20
        .46       5.01      4.54      5.38      .028      .040      .028      .000    442.80   4649.59
    .000750       419.      377.      353.         2         0         0       .00    634.50   5284.10

*SECNO 370.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4821.5     5196.1  TYPE=       1  TARGET=        374.600
    370.000       9.21    454.21    454.21       .00    456.45      2.24       .86       .55    448.00
    19000.0    10452.8    5082.4    3464.8     765.9     471.8     448.8     844.5     130.1    450.50
        .48      13.65     10.77      7.72      .028      .040      .028      .000    445.00   4825.02
    .005987       462.      538.      627.        20        15         0       .00    366.60   5191.63


*SECNO 372.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.58


3470 ENCROACHMENT STATIONS=     4854.5     5270.9  TYPE=       1  TARGET=        416.400
    372.000       9.88    457.88       .00       .00    458.64       .76      1.97       .22    450.90
    19000.0      459.2   16647.3    1893.5      79.0    2341.6     296.4     872.7     135.2    453.50
        .50       5.81      7.11      6.39      .028      .040      .028      .000    448.00   4856.53
    .002407       464.      555.      680.         2         0         0       .00    405.63   5262.16


*SECNO 374.000

3470 ENCROACHMENT STATIONS=     4863.0     5260.2  TYPE=       1  TARGET=        397.200
    374.000       9.62    459.02       .00       .00    460.10      1.08      1.37       .10    453.50
    19000.0      226.4    7945.2   10828.5      43.8    1055.0    1209.2     904.0     140.1    452.00
        .52       5.17      7.53      8.95      .028      .040      .028      .000    449.40   4870.72
    .002640       562.      549.      530.         2         0         0       .00    367.58   5238.29


*SECNO 376.000

3470 ENCROACHMENT STATIONS=     4843.9     5225.3  TYPE=       1  TARGET=        381.400
    376.000       7.57    460.67       .00       .00    461.91      1.24      1.76       .05    455.00
    19000.0      160.8   16390.4    2448.9      25.1    1869.4     241.5     930.3     144.3    455.00
        .53       6.40      8.77     10.14      .028      .040      .028      .000    453.10   4859.74
    .004564       520.      508.      530.         2         0         0       .00    349.80   5209.54

       SECNO      DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
       Q          QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
       TIME       VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
       SLOPE      XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 378.000

3470 ENCROACHMENT STATIONS=     4746.2     5134.9  TYPE=       1  TARGET=        388.700
    378.000       7.41    463.61       .00       .00    464.58       .97      2.63       .04    456.20
    19000.0      401.9   18412.4     185.7      57.4    2319.3      31.6     965.1     149.7    457.80
        .56       7.01      7.94      5.87      .028      .040      .028      .000    456.20   4766.02
    .003489       665.      686.      353.         3         0         0       .00    363.46   5129.49


*SECNO 380.000

3470 ENCROACHMENT STATIONS=     4739.4     5109.6  TYPE=       1  TARGET=        370.200
    380.000       6.77    463.77       .00       .00    465.20      1.43       .48       .14    459.00
```

19000.0	169.2	15078.6	3752.2	26.6	1695.6	309.8	971.0	150.6	457.80
.56	6.37	8.89	12.11	.028	.040	.028	.000	457.00	4758.57
.005060	145.	116.	110.	2	0	0	.00	341.50	5100.07

*SECNO 390.000

3470 ENCROACHMENT STATIONS= 4788.8 5140.0 TYPE= 1 TARGET= 351.200

390.000	7.24	464.24	.00	.00	465.74	1.50	.52	.02	457.90
19000.0	6517.1	6339.8	6143.1	621.9	772.5	580.1	976.3	151.5	458.60
.56	10.48	8.21	10.59	.028	.040	.028	.000	457.00	4805.66
.003776	80.	98.	190.	2	0	0	.00	324.64	5130.31

*SECNO 392.000

3470 ENCROACHMENT STATIONS= 4851.1 5188.0 TYPE= 1 TARGET= 336.900

392.000	6.91	465.01	.00	.00	466.66	1.65	.88	.05	459.80
19000.0	5188.6	13488.6	322.8	432.9	1398.8	39.7	984.7	152.9	458.30
.57	11.99	9.64	8.12	.028	.040	.028	.000	458.10	4864.42
.005613	159.	156.	370.	2	0	0	.00	313.02	5177.44

*SECNO 394.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 4643.4 5221.8 TYPE= 1 TARGET= 578.400

394.000	7.18	469.38	.00	.00	470.96	1.58	4.29	.01	462.90
19000.0	466.6	7271.4	11262.0	75.5	821.6	1029.6	1022.5	159.6	463.30
.59	6.18	8.85	10.94	.028	.040	.028	.000	462.20	4709.48
.004405	1037.	891.	736.	2	0	0	.00	353.05	5206.17

*SECNO 396.000

3470 ENCROACHMENT STATIONS= 4766.6 5161.5 TYPE= 1 TARGET= 394.900

396.000	7.97	472.57	.00	.00	473.75	1.18	2.73	.06	466.00
19000.0	8506.8	6494.0	3999.2	938.7	842.3	419.0	1058.2	165.9	466.30
.62	9.06	7.71	9.55	.028	.040	.028	.000	464.60	4773.39
.003114	928.	772.	610.	2	0	0	.00	373.34	5146.73

CCHV= .150 CEHV= .300
*SECNO 398.000

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS= 4771.1 5078.8 TYPE= 1 TARGET= 307.700

398.000	9.57	474.87	.00	.00	476.93	2.06	2.91	.26	467.10
19000.0	11529.4	6668.4	802.2	980.2	585.9	89.1	1090.7	171.3	466.60
.63	11.76	11.38	9.00	.030	.040	.030	.000	465.30	4801.25
.005166	784.	695.	660.	2	0	0	.00	258.49	5059.74

*SECNO 400.000

3470 ENCROACHMENT STATIONS= 4957.1 5225.5 TYPE= 1 TARGET= 268.400

400.000	10.05	477.15	.00	.00	478.83	1.68	1.84	.06	471.10
19000.0	81.4	5263.5	13655.1	17.4	492.7	1325.0	1108.5	173.9	468.40
.65	4.68	10.68	10.31	.030	.035	.030	.000	467.10	4960.65
.003346	550.	448.	368.	2	0	0	.00	256.38	5217.03

*SECNO 402.000

3301 HV CHANGED MORE THAN HVINS

402.000	10.16	479.26	.00	.00	482.02	2.77	2.87	.33	473.40
19000.0	3675.3	9412.1	5912.6	289.5	655.3	492.6	1132.2	177.5	473.30
.66	12.70	14.36	12.00	.030	.035	.030	.000	469.10	4918.16

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 .006548      630.      631.      630.        3         0         0       .00    229.68   5147.83


*SECNO 404.000

   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.69


3470 ENCROACHMENT STATIONS=      4825.4    5214.4  TYPE=       1  TARGET=      389.000
   404.000     10.99    483.29       .00       .00    484.38      1.09      2.11       .25    478.70
   19000.0    9072.6    5304.4    4622.9    1001.1     612.5     716.1    1157.3     181.4    477.50
       .68      9.06      8.66      6.46      .030      .035      .030      .000    472.30   4832.22
   .002296      582.      592.      567.         2         0         0       .00    370.79   5203.01


*SECNO 406.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4515.1    5062.1  TYPE=       1  TARGET=      547.000
   406.000     10.26    484.06    484.06       .00    487.38      3.32      1.77       .67    477.90
   19000.0    8248.4   10676.7      74.9     583.6     710.1      12.2    1176.3     184.5    480.40
       .69     14.13     15.03      6.13      .030      .035      .030      .000    473.80   4839.86
   .008153      258.      618.      595.        20         9         0       .00    204.23   5044.09


CCHV=     .300 CEHV=     .500
*SECNO 408.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.67


3470 ENCROACHMENT STATIONS=      4152.8    5040.2  TYPE=       1  TARGET=      887.400
   408.000     13.52    488.62       .00       .00    488.88       .26       .58       .92    475.20
   19000.0   15581.5    2932.2     486.3    4278.3     504.5     125.3    1203.0     189.0    476.60
       .71      3.64      5.81      3.88      .035      .035      .035      .000    475.10   4152.80
   .000604      350.      445.      616.         2         0         0       .00    881.03   5033.83

   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST
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T1      COUNTY OF SAN DIEGO ZONE 2 - FEMA 100-YR FLOOD
T2
T3

J1  ICHECK    INQ      NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

          3.                                                                      394.4

J2  NPROF     IPLOT    PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

 15.                    -1

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*PROF 2
0

CCHV=     .150 CEHV=     .300
*SECNO 300.000
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4627.2     5085.8  TYPE=       1  TARGET=      458.600
       UPPER SAN DIEGO RIVER AT THE CONFLUENCE OF SAN VINCENTE CREEK
   300.000      9.77    399.17    399.17    398.81    402.07      2.90       .00       .00    395.60
   31000.0   16799.7   14200.3        .0    1123.9    1187.4        .0        .0        .0    401.70
       .00     14.95     11.96       .00      .030      .050      .000      .000    389.40   4627.20
   .012796        0.        0.        0.         0        19         0       .00    434.30   5061.50

*SECNO 302.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4798.2     5066.6  TYPE=       1  TARGET=      268.400
   302.000     12.40    405.00    405.00    402.63    408.96      3.96      5.38       .32    397.80
   31000.0   18468.0   12394.3     137.7    1032.4     976.5      21.8      25.6       4.2    400.50
       .01     17.89     12.69      6.32      .030      .050      .035      .000    392.60   4800.30
   .008555      550.      481.      295.         2        11         0       .00    262.40   5062.70

CCHV=     .300 CEHV=     .500
*SECNO 304.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.51


3470 ENCROACHMENT STATIONS=     4880.0     5237.7  TYPE=       1  TARGET=      357.700
   304.000     14.53    408.13       .00    404.74    410.04      1.91       .46       .62    396.40
   31000.0   11296.7   12040.5    7662.8     858.6    1179.3     871.0      30.7       4.7    395.50
       .01     13.16     10.21      8.80      .030      .050      .035      .000    393.60   4882.02
   .003737       59.      121.       75.         6         0         0       .00    355.68   5237.70

*SECNO 306.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4908.5     5270.9  TYPE=       1  TARGET=      362.400
       ASHWOOD NORMAL BRIDGE X-SEC. 1 FOOT D/S OF BRIDGE.
   306.000     14.38    411.58    411.58    409.50    414.90      3.32       .14       .71    397.40
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   31000.0   11383.5    4783.4   14833.1     673.6     329.2    1175.1      32.3       5.0    397.20
       .01     16.90     14.53     12.62      .030      .050      .035      .000    397.20   4908.50
   .006884       30.       30.       25.        20         5         0       .00    362.40   5270.90


CCHV=      .300 CEHV=      .500
*SECNO 308.000
BTCARD, BRIDGE STENCL=     4908.50   STENCR=     5270.90

3370 NORMAL BRIDGE, NRD=  23 MIN ELTRD=   406.20 MAX ELLC=   399.40

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4908.5     5270.9  TYPE=       1  TARGET=       362.400
        ASHWOOD NORMAL BRIDGE X-SEC. INSIDE BRIDGE.
   308.000     17.44    414.64    414.64    413.07    417.85      3.21       .01       .03    408.20
   31000.0    7023.1     983.1   22993.8     487.3     237.2    1570.8      32.4       5.0    397.20
       .01     14.41      4.15     14.64      .025      .050      .025      .000    397.20   4908.50
   .005286        2.        2.        2.        20        21         0   -162.04    362.40   5270.90


*SECNO 310.000
BTCARD, BRIDGE STENCL=     4864.80   STENCR=     5270.90

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.92

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3370 NORMAL BRIDGE, NRD=  23 MIN ELTRD=   406.20 MAX ELLC=   399.40


3470 ENCROACHMENT STATIONS=     4864.8     5270.9  TYPE=       1  TARGET=       406.100

4677 BRIDGE DECK DEFINITION ERROR AT STATIONS     5011.40   5011.50
        ASHWOOD BRIDGE MODELED WITH RECTANGULAR EFFECTIVE FLOW AREA
   310.000     19.95    417.25       .00    415.05    418.57      1.32       .15       .57    408.30
   31000.0    9304.7     794.4   20900.9    1015.5     295.0    2221.8      36.7       5.5    397.30
       .01      9.16      2.69      9.41      .025      .050      .025      .000    397.30   4864.80
   .001428       78.       78.       56.        14         0         0   -161.31    406.10   5270.90


*SECNO 312.000

3470 ENCROACHMENT STATIONS=     4864.8     5270.9  TYPE=       1  TARGET=       406.100
        ASHWOOD NORMAL BRIDGE X-SEC OUTSIDE BRIDGE
   312.000     20.31    417.61       .00    415.38    418.65      1.05       .00       .08    408.30
   31000.0    8583.3    2647.9   19768.9    1060.4     464.6    2316.0      36.8       5.6    397.30
       .01      8.09      5.70      8.54      .025      .050      .025      .000    397.30   4864.80
   .001117        2.        2.        2.         2         0         0       .00    406.10   5270.90


CCHV=      .300 CEHV=      .500
*SECNO 314.000

3470 ENCROACHMENT STATIONS=     4869.4     5270.9  TYPE=       1  TARGET=       401.500
   314.000     20.53    418.23       .00    415.89    418.81       .58       .02       .14    397.80
   31000.0    9170.9    8485.4   13343.7    1305.9    1532.0    2306.5      39.4       5.8    397.80
       .01      7.02      5.54      5.79      .030      .050      .030      .000    397.70   4869.40
   .000618       27.       21.       25.         2         0         0       .00    401.50   5270.90


*SECNO 315.000

3470 ENCROACHMENT STATIONS=     4817.9     5270.9  TYPE=       1  TARGET=       453.000
   315.000     20.63    418.43       .00    416.01    418.90       .47       .05       .03    397.90
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   31000.0   11079.1    7708.8   12212.0    1839.1    1539.1    2328.8     49.7       6.5    397.90
       .02      6.02      5.01      5.24      .030      .050      .030     .000    397.80   4817.90
   .000503      225.       39.       15.         2         0         0      .00    453.00   5270.90

*SECNO 316.000

3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=      1  TARGET=      453.000
        COUNTY NORMAL BRIDGE.  1 FOOT D/S OF BRIDGE.
   316.000     20.55    418.45       .00    416.02    418.92       .47      .02       .00    398.00
   31000.0   11081.8    7737.3   12180.9    1827.4    1533.0    2309.9     54.1       6.9    398.00
       .02      6.06      5.05      5.27      .030      .050      .030     .000    397.90   4817.90
   .000513       34.       34.       34.         0         0         0      .00    453.00   5270.90


*SECNO 317.000
BTCARD, BRIDGE STENCL=     4817.90   STENCR=     5270.90

3370 NORMAL BRIDGE, NRD=  25 MIN ELTRD=   410.50 MAX ELLC=   407.00


3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=      1  TARGET=      453.000

4677 BRIDGE DECK DEFINITION ERROR AT STATIONS    5037.20   5037.30
        COUNTY NORMAL BRIDGE.  INSIDE BRIDGE.
   317.000     20.42    418.32       .00    415.93    419.04       .72      .00       .12    410.90
   31000.0   13716.5    3276.3   14007.2    1756.2    1261.9    2172.0     54.3       6.9    410.90
       .02      7.81      2.60      6.45      .030      .050      .030     .000    397.90   4817.90
   .000878        2.        2.        2.         7         0         0  -260.40    453.00   5270.90


*SECNO 318.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .61


3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=   410.50 MAX ELLC=   407.00


3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=      1  TARGET=      453.000
        COUNTY BRIDGE INSIDE BRIDGE U/S
   318.000     20.39    418.29       .00    415.91    419.15       .86      .04       .07    410.90
   31000.0   10076.6    5241.1   15682.3    1362.1    1258.6    1886.1     57.2       7.2    410.90
       .02      7.40      4.16      8.31      .030      .050      .030     .000    397.90   4817.90
   .002364       25.       18.       30.         2         0         0  -926.83    453.00   5270.90

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 319.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.22


3470 ENCROACHMENT STATIONS=     4817.9    5270.9  TYPE=      1  TARGET=      453.000
        COUNTY NORMAL BRIDGE.  1 FOOT U/S OF BRIDGE.
   319.000     20.82    418.82       .00    416.31    419.28       .45      .00       .12    398.10
   31000.0   11072.6    7641.8   12285.6    1867.4    1553.6    2374.4     57.4       7.2    398.10
       .02      5.93      4.92      5.17      .030      .050      .030     .000    398.00   4817.90
   .000479        2.        2.        2.         2         0         0      .00    453.00   5270.90


*SECNO 320.000

3470 ENCROACHMENT STATIONS=     4780.0    5270.9  TYPE=      1  TARGET=      490.900
   320.000     21.10    418.90       .00    416.36    419.31       .41      .02       .01    401.30
   31000.0   11952.7    8970.3   10077.0    2115.5    1932.6    2083.4     63.0       7.6    402.90
       .02      5.65      4.64      4.84      .030      .050      .030     .000    397.80   4780.00
   .000471       50.       45.       30.         2         0         0      .00    490.90   5270.90


CCHV=      .150 CEHV=      .300
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*SECNO 322.000

3470 ENCROACHMENT STATIONS=     4634.3     5241.1  TYPE=       1  TARGET=        606.800
   322.000      19.82     419.22        .00     416.59     419.39        .18        .05        .03     407.40
   31000.0      374.0    29323.0     1303.0      971.0     8653.4      396.6       88.7        9.4     406.40
       .04        .39       3.39       3.29       .300       .050       .030       .000     399.40    4634.30
   .000275       165.       133.       130.          2          0          0        .00     606.80    5241.10


*SECNO 324.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .50


3470 ENCROACHMENT STATIONS=     4540.6     5240.8  TYPE=       1  TARGET=        700.200
   324.000      17.49     419.19        .00     416.57     419.70        .51        .21        .10     404.00
   31000.0     3685.9    25393.8     1920.3     3923.5     4067.2      551.6      180.6       15.2     415.30
       .06        .94       6.24       3.48       .300       .050       .030       .000     401.70    4540.60
   .001091       465.       445.        70.          2          0          0        .00     700.20    5240.80


    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 326.000

3470 ENCROACHMENT STATIONS=     4628.1     5378.4  TYPE=       1  TARGET=        750.300
   326.000      17.59     419.69        .00     416.97     420.08        .39        .36        .02     413.50
   31000.0     1377.1    24982.0     4640.8     1861.4     4685.4     1175.6      251.9       21.2     410.60
       .08        .74       5.33       3.95       .300       .050       .030       .000     402.10    4628.10
   .000854       407.       386.       280.          2          0          0        .00     750.30    5378.40


CCHV=      .150 CEHV=      .300
*SECNO 328.000

3470 ENCROACHMENT STATIONS=     4689.8     5297.1  TYPE=       1  TARGET=        607.300
   328.000      16.51     420.11        .00     417.43     420.58        .47        .48        .02     410.80
   31000.0     6636.1    19762.8     4601.1     1080.7     3650.2      961.6      334.9       29.5     407.00
       .11       6.14       5.41       4.78       .028       .050       .028       .000     403.60    4689.80
   .000929       588.       535.       485.          2          0          0        .00     607.30    5297.10


*SECNO 330.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .48


3470 ENCROACHMENT STATIONS=     4730.5     5174.4  TYPE=       1  TARGET=        443.900
   330.000      14.73     420.23        .00     417.68     421.90       1.68        .96        .36     410.00
   31000.0     7973.2    18237.9     4788.9      893.4     1735.0      396.6      391.7       36.4     409.30
       .12       8.92      10.51      12.07       .028       .050       .028       .000     405.50    4730.50
   .003988       610.       555.       560.          2          0          0        .00     443.90    5174.40


*SECNO 332.000

3470 ENCROACHMENT STATIONS=     4864.5     5279.1  TYPE=       1  TARGET=        414.600
   332.000      15.11     423.21        .00     421.15     425.02       1.81       3.08        .04     412.60
   31000.0     3293.3    18596.2     9110.5      329.0     1619.4      958.5      443.8       44.0     412.70
       .14      10.01      11.48       9.51       .028       .045       .028       .000     408.10    4864.50
   .004055       700.       753.       850.          3          0          0        .00     414.60    5279.10

*SECNO 333.000

3301 HV CHANGED MORE THAN HVINS
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3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.71

3470 ENCROACHMENT STATIONS=      4708.4     5411.7  TYPE=        1  TARGET=        703.300
   333.000      13.83      425.03        .00     422.70     425.98        .95        .83        .13     412.90
   31000.0    14922.2     12128.2     3949.6     1587.8     1878.6      959.7      475.5       48.8     420.80
       .16       9.40        6.46       4.12       .028       .045       .028       .000     411.20    4722.27
   .001379       377.        377.       377.          2          0          0        .00     689.43    5411.70


*SECNO 334.000

3470 ENCROACHMENT STATIONS=      4708.4     5411.7  TYPE=        1  TARGET=        703.300
   334.000      14.35      425.55        .00     423.18     426.35        .80        .35        .02     412.90
   31000.0    14624.9     11725.0     4650.0     1689.5     1957.8     1135.2      504.9       53.2     420.80
       .17       8.66        5.99       4.10       .028       .045       .028       .000     411.20    4714.89
   .001123       278.        278.       278.          2          0          0        .00     696.81    5411.70


*SECNO 336.000

3470 ENCROACHMENT STATIONS=      4680.7     5368.7  TYPE=        1  TARGET=        688.000
   336.000      13.57      426.27        .00     423.96     427.21        .94        .82        .04     415.10
   31000.0     4626.6     19091.6     7281.8      502.2     2398.2     1175.9      560.7       61.4     414.70
       .19       9.21        7.96       6.19       .028       .045       .028       .000     412.70    4774.41
   .002080       583.        531.       550.          2          0          0        .00     594.29    5368.70


*SECNO 338.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      4694.4     5332.3  TYPE=        1  TARGET=        637.900
   338.000      12.20      427.20        .00     425.04     428.78       1.57       1.38        .19     416.80
   31000.0    14207.8      7640.9     9151.4     1190.1      950.4     1110.0      613.5       69.3     416.60
       .20      11.94        8.04       8.24       .028       .045       .028       .000     415.00    4832.42
   .002324       615.        626.       640.          2          0          0        .00     499.88    5332.30

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

*SECNO 340.000

3470 ENCROACHMENT STATIONS=      4797.8     5304.6  TYPE=        1  TARGET=        506.800
   340.000      13.19      429.19        .00     427.00     430.69       1.50       1.91        .01     418.50
   30600.0     8916.2     16465.3     5218.5      760.8     1755.4      698.7      665.2       77.3     418.20
       .22      11.72        9.38       7.47       .028       .045       .028       .000     416.00    4797.87
   .003183       781.        655.       670.          3          0          0        .00     506.73    5304.60


*SECNO 342.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      4717.2     5228.7  TYPE=        1  TARGET=        511.500
   342.000      12.78      431.58        .00     429.36     432.44        .85       1.65        .10     420.80
   30600.0     2801.1     19222.4     8576.5      326.8     2670.4     1146.2      722.4       85.1     419.70
       .25       8.57        7.20       7.48       .028       .045       .028       .000     418.80    4727.09
   .001932       630.        694.       666.          2          0          0        .00     501.61    5228.70


*SECNO 344.000

3470 ENCROACHMENT STATIONS=      4719.3     5214.5  TYPE=        1  TARGET=        495.200
   344.000      12.71      431.51        .00     429.36     432.78       1.28        .22        .13     421.20
   30600.0    20533.2      7079.6     2987.2     2030.7     1030.7      568.0      732.4       86.4     421.30
       .25      10.11        6.87       5.26       .028       .045       .028       .000     418.80    4721.61
   .001740       180.         76.        95.          2          0          0        .00     492.89    5214.50
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*SECNO 350.000

3470 ENCROACHMENT STATIONS=     4738.9     5323.6  TYPE=       1  TARGET=       584.700
    350.000     11.46     431.66       .00     429.47     433.03      1.37       .22       .03    423.00
    30600.0   13922.9    12606.7    4070.4     1254.8     1570.7     621.5     741.2      87.6    421.30
        .26     11.10       8.03      6.55       .028       .045      .028      .000    420.20   4749.31
    .002543       85.       138.      105.          2          0         0       .00    550.74   5300.05

*SECNO 352.000

3470 ENCROACHMENT STATIONS=     4763.8     5226.6  TYPE=       1  TARGET=       462.800
    352.000     12.07     431.87       .00     429.76     433.26      1.39       .23       .01    421.50
    30600.0   14633.6    13254.5    2711.9     1296.5     1716.2     496.5     748.7      88.7    425.50
        .26     11.29       7.72      5.46       .028       .040      .028      .000    419.80   4763.80
    .002071      127.        74.       80.          1          0         0       .00    462.80   5226.60

     SECNO      DEPTH      CWSEL     CRIWS      WSELK      EG         HV        HL        OLOSS     L-BANK ELEV
     Q          QLOB       QCH       QROB       ALOB       ACH        AROB      VOL       TWA       R-BANK ELEV
     TIME       VLOB       VCH       VROB       XNL        XNCH       XNR       WTN       ELMIN     SSTA
     SLOPE      XLOBL      XLCH      XLOBR      ITRIAL     IDC        ICONT     CORAR     TOPWID    ENDST

*SECNO 354.000

3470 ENCROACHMENT STATIONS=     4753.8     5104.4  TYPE=       1  TARGET=       350.600
    354.000     10.67     433.27       .00     431.19     434.81      1.54      1.50       .04    423.90
    30600.0     560.5    29649.2     390.3       70.7     2961.7      55.9     791.3      93.8    426.00
        .27      7.93      10.01      6.98       .028       .040      .028      .000    422.60   4758.51
    .003536      600.       555.      529.          2          0         0       .00    337.37   5095.88

*SECNO 356.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     4935.2     5277.2  TYPE=       1  TARGET=       342.000
    356.000     10.72     435.52       .00     433.46     438.09      2.57      2.97       .31    431.20
    30600.0     236.3    18415.4   11948.4       35.8     1558.2     829.4     833.9      98.9    427.40
        .29      6.60      11.82     14.41       .028       .040      .028      .000    424.80   4943.54
    .005784      780.       695.      550.          2          0         0       .00    324.35   5267.89

*SECNO 358.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.46


3470 ENCROACHMENT STATIONS=     4712.4     5189.2  TYPE=       1  TARGET=       476.800
    358.000     10.90     440.30       .00     438.02     441.67      1.37      3.41       .18    431.80
    30600.0    1006.1    19397.1   10196.8      165.3     2232.1     937.1     893.2     107.0    432.40
        .32      6.09       8.69     10.88       .028       .040      .028      .000    429.40   4718.40
    .002714      952.       930.      820.          2          0         0       .00    459.20   5177.59

*SECNO 360.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4786.3     5186.9  TYPE=       1  TARGET=       400.600
    360.000      9.78     442.98    442.98     441.10     446.48      3.50      2.91       .64    435.80
    30600.0   14829.1    12542.1    3228.8      872.9      989.0     237.5     935.1     113.0    437.40
        .33     16.99      12.68     13.59       .028       .040      .028      .000    433.20   4833.49
    .007781      750.       651.      657.         20          8         0       .00    309.29   5142.78
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3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.72


3470 ENCROACHMENT STATIONS=      4825.4     5214.4  TYPE=       1  TARGET=        389.000
    404.000      13.42     485.72        .00     483.29     487.07       1.35       1.87        .31     478.70
    29800.0    13517.5     7394.4     8888.1     1342.0      777.9     1127.1     1578.6      199.5     477.50
        .59      10.07       9.51       7.89       .030       .035       .030       .000     472.30    4826.90
    .002011       582.       592.       567.          3          0          0        .00     386.71    5213.60


*SECNO 406.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4515.1     5062.1  TYPE=       1  TARGET=        547.000
    406.000      13.75     487.55     487.55     484.06     490.14       2.59       1.28        .37     477.90
    29800.0    14819.1    14648.4      332.5     1282.3     1027.1       46.8     1607.2      203.6     480.40
        .60      11.56      14.26       7.11       .030       .035       .030       .000     473.80    4515.10
    .004486       258.       618.       595.         20          8          0        .00     535.38    5050.48


CCHV=     .300 CEHV=      .500
*SECNO 408.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.88


3470 ENCROACHMENT STATIONS=      4152.8     5040.2  TYPE=       1  TARGET=        887.400
    408.000      15.89     490.99        .00     488.62     491.29        .30        .46        .69     475.20
    29800.0    25448.6     3651.8      699.6     6236.6      595.4      170.3     1647.2      209.6     476.60
        .62       4.08       6.13       4.11       .035       .035       .035       .000     475.10    4152.80
    .000539       350.       445.       616.          2          0          0        .00     883.47    5036.27
                                                                                 THIS RUN EXECUTED 21AUG96    14:11:39
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 HEC-2 WATER SURFACE PROFILES

 Version    4.6.2;  May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST


UPPER SAN DIEGO RIVER 10

SUMMARY PRINTOUT TABLE  150
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	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.0
	300.000	.00	.00	.00	389.40	20000.00	398.81	.00	400.19	67.04	8.38	2156.16	2442.7
*	300.000	.00	.00	.00	389.40	31000.00	399.17	399.17	402.07	127.96	11.96	2311.24	2740.
*	302.000	480.90	.00	.00	392.60	20000.00	402.63	402.63	405.86	103.48	11.68	1444.01	1966.
*	302.000	480.90	.00	.00	392.60	31000.00	405.00	405.00	408.96	85.55	12.69	2030.79	3351.6
	304.000	120.70	.00	.00	393.60	20000.00	404.74	.00	406.90	63.97	10.99	1744.13	2500
*	304.000	120.70	.00	.00	393.60	31000.00	408.13	.00	410.04	37.37	10.21	2908.87	5070
*	306.000	30.00	.00	.00	397.20	20000.00	409.50	409.50	412.39	74.15	13.59	1472.65	2322.5
*	306.000	30.00	.00	.00	397.20	31000.00	411.58	411.58	414.90	68.84	14.53	2177.95	3736.

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*SECNO 362.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.89


3470 ENCROACHMENT STATIONS=      4792.6     5224.9  TYPE=      1  TARGET=       432.300
   362.000      13.81     447.91        .00     445.51     449.36       1.45       2.57        .31     437.60
   30600.0    13082.7     9809.1     7708.2     1208.2     1095.5      916.8      977.2      118.9     438.70
       .35      10.83       8.95       8.41       .028       .040       .028       .000     434.10    4792.60
   .002188       681.       687.       712.          2          0          0        .00     432.30    5224.90


*SECNO 364.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .59


3470 ENCROACHMENT STATIONS=      4916.8     5351.6  TYPE=      1  TARGET=       434.800
   364.000      11.89     449.69        .00     447.77     452.41       2.73       2.67        .38     440.70
   30600.0     2063.2    14413.9    14122.8      181.9     1161.1      988.4     1026.3      125.7     445.50
       .36      11.34      12.41      14.29       .028       .040       .028       .000     437.80    4916.80
   .006300       770.       785.       754.          3          0          0        .00     341.82    5258.62


*SECNO 366.000

3301 HV CHANGED MORE THAN HVINS

     SECNO      DEPTH      CWSEL      CRIWS      WSELK         EG         HV         HL      OLOSS  L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA    R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN      ELMIN    SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR    TOPWID   ENDST

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.53

3470 ENCROACHMENT STATIONS=      4811.2     5333.5  TYPE=      1  TARGET=       522.300
   366.000      12.15     454.25        .00     452.17     455.80       1.55       3.21        .18     448.20
   30600.0     9547.4     3097.0    17955.6      955.8      404.6     1736.4     1077.0      133.7     446.30
       .39       9.99       7.66      10.34       .028       .040       .028       .000     442.10    4811.20
   .002701       773.       782.       848.          3          0          0        .00     504.28    5315.48


*SECNO 368.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.87


3470 ENCROACHMENT STATIONS=      4649.4     5299.6  TYPE=      1  TARGET=       650.200
   368.000      13.09     455.89        .00     453.74     456.45        .56        .50        .15     445.80
   30600.0    13978.2     4050.2    12571.6     2323.6      768.0     2034.3     1113.1      138.7     444.20
       .41       6.02       5.27       6.18       .028       .040       .028       .000     442.80    4649.59
   .000770       419.       377.       353.          2          0          0        .00     650.01    5299.60


*SECNO 370.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4821.5     5196.1  TYPE=      1  TARGET=       374.600
   370.000      10.79     455.79     455.79     454.21     458.78       2.99        .88        .73     448.00
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   30200.0   15420.6    7068.9    7710.5     972.3     573.4     726.6    1158.7     145.1    450.50
       .42     15.86     12.33     10.61      .028      .040      .028      .000    445.00   4821.91
   .006043      462.      538.      627.        20        15         0       .00    372.17   5194.08


*SECNO 372.000

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.57

3470 ENCROACHMENT STATIONS=      4854.5     5270.9  TYPE=        1  TARGET=       416.400
   372.000     12.00    460.00       .00    457.88    461.10      1.10      2.03       .28    450.90
   30200.0     977.8   25241.0    3981.3     130.8    2986.5     469.3    1196.6     150.3    453.50
       .43      7.47      8.45      8.48      .028      .040      .028      .000    448.00   4854.50
   .002460      464.      555.      680.         2         0         0       .00    412.51   5267.01


*SECNO 374.000

3470 ENCROACHMENT STATIONS=      4863.0     5260.2  TYPE=        1  TARGET=       397.200
   374.000     11.68    461.08       .00    459.02    462.61      1.54      1.38       .13    453.50
   30200.0     529.2   11743.8   17927.0      82.8    1332.5    1672.2    1238.2     155.3    452.00
       .45      6.39      8.81     10.72      .028      .040      .028      .000    449.40   4864.77
   .002648      562.      549.      530.         2         0         0       .00    387.31   5252.08


*SECNO 376.000

3470 ENCROACHMENT STATIONS=      4843.9     5225.3  TYPE=        1  TARGET=       381.400
   376.000      9.57    462.67       .00    460.67    464.44      1.77      1.76       .07    455.00
   30200.0     359.0   25490.6    4350.4      46.0    2443.5     358.6    1273.3     159.7    455.00
       .46      7.80     10.43     12.13      .028      .040      .028      .000    453.10   4856.60
   .004521      520.      508.      530.         2         0         0       .00    360.40   5217.01


*SECNO 378.000

3470 ENCROACHMENT STATIONS=      4746.2     5134.9  TYPE=        1  TARGET=       388.700
   378.000      9.52    465.72       .00    463.61    467.12      1.40      2.63       .05    456.20
   30200.0     789.8   28982.9     427.3      94.6    3029.1      58.7    1319.2     165.2    457.80
       .48      8.35      9.57      7.28      .028      .040      .028      .000    456.20   4761.62
   .003551      665.      686.      353.         2         0         0       .00    371.81   5133.43


*SECNO 380.000

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=      4739.4     5109.6  TYPE=        1  TARGET=       370.200
   380.000      8.79    465.79       .00    463.77    467.78      1.99       .48       .18    459.00
   30200.0     425.9   23746.5    6027.6      53.8    2250.1     426.0    1327.1     166.2    457.80
       .48      7.92     10.55     14.15      .028      .040      .028      .000    457.00   4753.87
   .004887      145.      116.      110.         2         0         0       .00    350.03   5103.90


*SECNO 390.000

3470 ENCROACHMENT STATIONS=      4788.8     5140.0  TYPE=        1  TARGET=       351.200
   390.000      9.18    466.18       .00    464.24    468.34      2.17       .51       .05    457.90
   30200.0   10610.3    9685.3    9904.4     838.9     992.1     780.4    1334.1     167.1    458.60
       .49     12.65      9.76     12.69      .028      .040      .028      .000    457.00   4802.12
   .003827       80.       98.      190.         2         0         0       .00    332.45   5134.57
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*SECNO 392.000

3470 ENCROACHMENT STATIONS= 4851.1 5188.0 TYPE= 1 TARGET= 336.900

392.000	8.80	466.90	.00	465.01	469.32	2.41	.90	.07	459.80
30200.0	8697.0	20872.0	631.0	595.8	1809.6	65.3	1345.4	168.5	458.30
.49	14.60	11.53	9.66	.028	.040	.028	.000	458.10	4860.91
.005696	159.	156.	370.	2	0	0	.00	319.88	5180.78

*SECNO 394.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 4643.4 5221.8 TYPE= 1 TARGET= 578.400

394.000	9.17	471.37	.00	469.38	473.51	2.13	4.15	.04	462.90
30200.0	1298.6	10744.5	18156.9	194.0	1062.7	1413.9	1396.6	175.7	463.30
.51	6.69	10.11	12.84	.028	.040	.028	.000	462.20	4687.21
.004080	1037.	891.	736.	2	0	0	.00	392.42	5210.55

*SECNO 396.000

3470 ENCROACHMENT STATIONS= 4766.6 5161.5 TYPE= 1 TARGET= 394.900

396.000	9.92	474.52	.00	472.57	476.20	1.68	2.62	.07	466.00
30200.0	14175.4	9621.5	6403.2	1299.1	1071.5	569.9	1445.3	182.6	466.30
.53	10.91	8.98	11.24	.028	.040	.028	.000	464.60	4766.60
.003064	928.	772.	610.	2	0	0	.00	384.61	5151.21

CCHV= .150 CEHV= .300
*SECNO 398.000

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS= 4771.1 5078.8 TYPE= 1 TARGET= 307.700

398.000	11.23	476.53	.00	474.87	479.78	3.25	3.11	.47	467.10
30200.0	18951.6	9716.7	1531.7	1270.8	697.1	129.3	1487.9	188.1	466.60
.55	14.91	13.94	11.85	.030	.040	.030	.000	465.30	4794.40
.006146	784.	695.	660.	2	0	0	.00	270.08	5064.47

*SECNO 400.000

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS= 4957.1 5225.5 TYPE= 1 TARGET= 268.400

400.000	12.46	479.56	.00	477.15	481.86	2.30	1.94	.14	471.10
29800.0	194.0	7588.1	22017.9	34.0	622.0	1803.6	1511.0	190.9	468.40
.56	5.71	12.20	12.21	.030	.035	.030	.000	467.10	4958.37
.003197	550.	448.	368.	3	0	0	.00	263.24	5221.61

*SECNO 402.000

3301 HV CHANGED MORE THAN HVINS

402.000	12.37	481.47	481.41	479.26	484.89	3.42	2.69	.34	473.40
29800.0	6037.0	13161.1	10601.9	409.3	823.5	794.4	1543.5	195.0	473.30
.57	14.75	15.98	13.35	.030	.035	.030	.000	469.10	4914.94
.005978	630.	631.	630.	6	5	0	.00	302.01	5216.95
SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 404.000

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*SECNO 352.000

3265 DIVIDED FLOW

3280 CROSS SECTION    352.00 EXTENDED      3.03 FEET

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     4763.8    5226.6  TYPE=       1  TARGET=       462.800
   352.000     11.23    431.03       .00    429.20    433.04      2.00       .23       .35    421.50
   30600.0   15673.7   14100.7     825.6    1178.5    1569.9     122.8      96.5      13.8    425.50
       .04     13.30      8.98      6.72      .028      .040      .028      .000    419.80   4763.80
   .003154      127.       74.       80.         3         0         0       .00    356.25   5226.60

*SECNO 354.000

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     4753.8    5104.4  TYPE=       1  TARGET=       350.600
   354.000     10.92    433.52       .00    431.19    434.90      1.38      1.77       .09    423.90
   30600.0     892.2   28869.4     838.4     107.5    3036.2     109.7     136.1      18.3    426.00
       .06      8.30      9.51      7.64      .028      .040      .028      .000    422.60   4753.80
   .003086      600.      555.      529.         3         0         0       .00    350.60   5104.40

*SECNO 356.000

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     4900.0    5277.2  TYPE=       1  TARGET=       377.200
   356.000     10.70    435.50       .00    433.41    437.91      2.41      2.70       .31    431.20
   30600.0     679.8   17975.7   11944.5      93.8    1554.0     859.3     180.7      23.8    427.40
       .07      7.25     11.57     13.90      .028      .040      .028      .000    424.80   4912.75
   .005560      780.      695.      550.         2         0         0       .00    364.45   5277.20

*SECNO 358.000
1
   18FEB98     16:28:25                                                                   23

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.72

3470 ENCROACHMENT STATIONS=     4690.0    5270.0  TYPE=       1  TARGET=       580.000
   358.000     10.53    439.93       .00    437.78    440.82       .89      2.68       .23    431.80
   30600.0    5841.9   15067.3    9690.8     763.4    2144.7    1170.9     248.6      33.2    432.40
       .11      7.65      7.03      8.28      .028      .040      .028      .000    429.40   4690.00
   .001870      952.      930.      820.         2         0         0       .00    549.87   5239.87

*SECNO 360.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS
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*	308.000	2.00	406.20	399.40	397.20	20000.00	413.07	413.07	415.45	56.83	3.85	1724.98	2653.1
*	308.000	2.00	406.20	399.40	397.20	31000.00	414.64	414.64	417.85	52.86	4.15	2295.21	4263.9
*	310.000	78.00	406.20	399.40	397.30	20000.00	415.05	.00	416.04	15.70	2.49	2639.65	5047.1
*	310.000	78.00	406.20	399.40	397.30	31000.00	417.25	.00	418.57	14.28	2.69	3532.27	8202.5
	312.000	2.00	.00	.00	397.30	20000.00	415.38	.00	416.12	11.31	5.31	2937.32	5948.0
	312.000	2.00	.00	.00	397.30	31000.00	417.61	.00	418.65	11.17	5.70	3841.00	9276.3
*	314.000	20.70	.00	.00	397.70	20000.00	415.89	.00	416.25	4.85	4.52	4201.19	9084.3
	314.000	20.70	.00	.00	397.70	31000.00	418.23	.00	418.81	6.18	5.54	5144.39	12465.84
	315.000	39.00	.00	.00	397.80	20000.00	416.01	.00	416.31	4.08	4.16	4611.37	9895.7
	315.000	39.00	.00	.00	397.80	31000.00	418.43	.00	418.90	5.03	5.01	5707.00	13827.8
	316.000	34.00	.00	.00	397.90	20000.00	416.02	.00	416.33	4.19	4.20	4572.91	9768.3
	316.000	34.00	.00	.00	397.90	31000.00	418.45	.00	418.92	5.13	5.05	5670.29	13686.91
*	317.000	2.00	410.50	407.00	397.90	20000.00	415.93	.00	416.42	8.03	2.24	4108.70	7058.5
*	317.000	2.00	410.50	407.00	397.90	31000.00	418.32	.00	419.04	8.78	2.60	5190.13	10464.9
*	318.000	18.00	410.50	407.00	397.90	20000.00	415.91	.00	416.51	25.96	3.99	3431.03	3925.0
*	318.000	18.00	410.50	407.00	397.90	31000.00	418.29	.00	419.15	23.64	4.16	4506.75	6375.2
*	319.000	2.00	.00	.00	398.00	20000.00	416.31	.00	416.60	3.96	4.11	4656.89	10047.3
*	319.000	2.00	.00	.00	398.00	31000.00	418.82	.00	419.28	4.79	4.92	5795.38	14169.6
	320.000	45.00	.00	.00	397.80	20000.00	416.36	.00	416.63	4.06	3.93	4886.64	9920.3
	320.000	45.00	.00	.00	397.80	31000.00	418.90	.00	419.31	4.71	4.64	6131.46	14284.3
*	322.000	132.60	.00	.00	399.40	20000.00	416.59	.00	416.69	1.98	2.59	8425.64	14227.0
	322.000	132.60	.00	.00	399.40	31000.00	419.22	.00	419.39	2.75	3.39	10021.05	18707.7
*	324.000	445.30	.00	.00	401.70	20000.00	416.57	.00	416.93	9.25	5.12	6708.48	6574.6
*	324.000	445.30	.00	.00	401.70	31000.00	419.19	.00	419.70	10.91	6.24	8542.32	9384.4
	326.000	385.60	.00	.00	402.10	20000.00	416.97	.00	417.28	8.58	4.69	5698.64	6828.8
	326.000	385.60	.00	.00	402.10	31000.00	419.69	.00	420.08	8.54	5.33	7722.48	10605.9
	328.000	535.40	.00	.00	403.60	20000.00	417.43	.00	417.81	10.55	5.05	4067.18	6156.8
	328.000	535.40	.00	.00	403.60	31000.00	420.11	.00	420.58	9.29	5.41	5692.49	10173.3
*	330.000	555.20	.00	.00	405.50	19000.00	417.68	.00	419.23	46.46	9.85	1980.17	2787.3
*	330.000	555.20	.00	.00	405.50	31000.00	420.23	.00	421.90	39.88	10.51	3025.06	4908.6
	332.000	752.90	.00	.00	408.10	19000.00	421.15	.00	422.57	40.68	10.23	2051.87	2978.7
	332.000	752.90	.00	.00	408.10	31000.00	423.21	.00	425.02	40.55	11.48	2906.94	4867.94
*	333.000	377.00	.00	.00	411.20	19000.00	422.70	.00	423.50	13.88	5.62	2942.05	5099.45
*	333.000	377.00	.00	.00	411.20	31000.00	425.03	.00	425.98	13.79	6.46	4426.16	8348.45
	334.000	278.00	.00	.00	411.20	19000.00	423.18	.00	423.86	11.28	5.23	3215.11	5657.22
	334.000	278.00	.00	.00	411.20	31000.00	425.55	.00	426.35	11.23	5.99	4782.58	9251.1
	336.000	530.80	.00	.00	412.70	19000.00	423.96	.00	424.75	23.00	7.27	2743.71	3961.7
	336.000	530.80	.00	.00	412.70	31000.00	426.27	.00	427.21	20.80	7.96	4076.35	6796.7
	338.000	625.50	.00	.00	415.00	19000.00	425.04	.00	426.30	22.04	6.80	2194.30	4046.9
	338.000	625.50	.00	.00	415.00	31000.00	427.20	.00	428.78	23.24	8.04	3250.56	6430.0
	340.000	654.60	.00	.00	416.00	19000.00	427.00	.00	428.19	32.67	8.24	2199.11	3323.9
	340.000	654.60	.00	.00	416.00	30600.00	429.19	.00	430.69	31.83	9.38	3214.87	5423.8
	342.000	694.20	.00	.00	418.80	19000.00	429.36	.00	429.97	19.85	6.28	3036.33	4264.0
	342.000	694.20	.00	.00	418.80	30600.00	431.58	.00	432.44	19.32	7.20	4143.44	6962.6
	344.000	75.50	.00	.00	418.80	19000.00	429.36	.00	430.28	16.40	5.78	2593.99	4691.0
	344.000	75.50	.00	.00	418.80	30600.00	431.51	.00	432.78	17.40	6.87	3629.43	7335.2
	350.000	138.00	.00	.00	420.20	19000.00	429.47	.00	430.54	26.91	7.07	2378.99	3662.9
	350.000	138.00	.00	.00	420.20	30600.00	431.66	.00	433.03	25.43	8.03	3447.04	6067.8
	352.000	73.80	.00	.00	419.80	19000.00	429.76	.00	430.78	19.61	6.39	2559.42	4290.5

	352.000	73.80	.00	.00	419.80	30600.00	431.87	.00	433.26	20.71	7.72	3509.18	6723.95
	354.000	555.40	.00	.00	422.60	19000.00	431.19	.00	432.17	31.28	8.00	2392.50	3397.01
	354.000	555.40	.00	.00	422.60	30600.00	433.27	.00	434.81	35.36	10.01	3088.36	5146.17
	356.000	695.20	.00	.00	424.80	19000.00	433.46	.00	435.29	62.19	10.21	1769.38	2409.40
	356.000	695.20	.00	.00	424.80	30600.00	435.52	.00	438.09	57.84	11.82	2423.41	4023.53
*	358.000	930.00	.00	.00	429.40	19000.00	438.02	.00	439.01	28.16	7.37	2422.29	3580.4
*	358.000	930.00	.00	.00	429.40	30600.00	440.30	.00	441.67	27.14	8.69	3334.56	5874.2
*	360.000	651.40	.00	.00	433.20	19000.00	441.10	441.10	443.67	84.71	10.95	1524.88	2064.32
*	360.000	651.40	.00	.00	433.20	30600.00	442.98	442.98	446.48	77.81	12.68	2099.33	3468.9
*	362.000	686.50	.00	.00	434.10	19000.00	445.51	.00	446.65	23.30	7.93	2254.67	3936.07
*	362.000	686.50	.00	.00	434.10	30600.00	447.91	.00	449.36	21.88	8.95	3220.55	6541.23
*	364.000	785.30	.00	.00	437.80	19000.00	447.77	.00	449.78	68.63	10.96	1677.33	2293.5
*	364.000	785.30	.00	.00	437.80	30600.00	449.69	.00	452.41	63.00	12.41	2331.41	3855.2
*	366.000	781.80	.00	.00	442.10	19000.00	452.17	.00	453.49	31.02	6.74	2095.27	3411.31
*	366.000	781.80	.00	.00	442.10	30600.00	454.25	.00	455.80	27.01	7.66	3096.73	5888.3
*	368.000	376.60	.00	.00	442.80	19000.00	453.74	.00	454.15	7.50	4.54	3743.21	6938.3
*	368.000	376.60	.00	.00	442.80	30600.00	455.89	.00	456.45	7.70	5.27	5125.86	11029.29
*	370.000	538.00	.00	.00	445.00	19000.00	454.21	454.21	456.45	59.87	10.77	1686.51	2455.6
*	370.000	538.00	.00	.00	445.00	30200.00	455.79	455.79	458.78	60.43	12.33	2272.25	3884.7
*	372.000	554.70	.00	.00	448.00	19000.00	457.88	.00	458.64	24.07	7.11	2717.04	3872.60
*	372.000	554.70	.00	.00	448.00	30200.00	460.00	.00	461.10	24.60	8.45	3586.62	6089.3
	374.000	548.50	.00	.00	449.40	19000.00	459.02	.00	460.10	26.40	7.53	2308.02	3697.6
	374.000	548.50	.00	.00	449.40	30200.00	461.08	.00	462.61	26.48	8.81	3087.43	5868.37
	376.000	508.30	.00	.00	453.10	19000.00	460.67	.00	461.91	45.64	8.77	2135.97	2812.3
	376.000	508.30	.00	.00	453.10	30200.00	462.67	.00	464.44	45.21	10.43	2848.11	4491.6
	378.000	686.10	.00	.00	456.20	19000.00	463.61	.00	464.58	34.89	7.94	2408.33	3216.56
	378.000	686.10	.00	.00	456.20	30200.00	465.72	.00	467.12	35.51	9.57	3182.33	5068.2
	380.000	115.50	.00	.00	457.00	19000.00	463.77	.00	465.20	50.60	8.89	2031.97	2670.9
	380.000	115.50	.00	.00	457.00	30200.00	465.79	.00	467.78	48.87	10.55	2729.91	4319.94
	390.000	97.80	.00	.00	457.00	19000.00	464.24	.00	465.74	37.76	8.21	1974.52	3091.8
	390.000	97.80	.00	.00	457.00	30200.00	466.18	.00	468.34	38.27	9.76	2611.41	4881.5
	392.000	156.00	.00	.00	458.10	19000.00	465.01	.00	466.66	56.13	9.64	1871.37	2536.01
	392.000	156.00	.00	.00	458.10	30200.00	466.90	.00	469.32	56.96	11.53	2470.75	4001.3
	394.000	890.90	.00	.00	462.20	19000.00	469.38	.00	470.96	44.05	8.85	1926.79	2862.6
	394.000	890.90	.00	.00	462.20	30200.00	471.37	.00	473.51	40.80	10.11	2670.56	4727.97
	396.000	771.80	.00	.00	464.60	19000.00	472.57	.00	473.75	31.14	7.71	2199.98	3404.
	396.000	771.80	.00	.00	464.60	30200.00	474.52	.00	476.20	30.64	8.98	2940.45	5456.
	398.000	694.90	.00	.00	465.30	19000.00	474.87	.00	476.93	51.66	11.38	1655.23	2643.59
	398.000	694.90	.00	.00	465.30	30200.00	476.53	.00	479.78	61.46	13.94	2097.13	3852.
	400.000	448.00	.00	.00	467.10	19000.00	477.15	.00	478.83	33.46	10.68	1835.09	3284.
	400.000	448.00	.00	.00	467.10	29800.00	479.56	.00	481.86	31.97	12.20	2459.62	5270.16
	402.000	630.60	.00	.00	469.10	19000.00	479.26	.00	482.02	65.48	14.36	1437.34	2347.
	402.000	630.60	.00	.00	469.10	29800.00	481.47	481.41	484.89	59.78	15.98	2027.30	3854.
*	404.000	592.30	.00	.00	472.30	19000.00	483.29	.00	484.38	22.96	8.66	2329.74	3965.08
*	404.000	592.30	.00	.00	472.30	29800.00	485.72	.00	487.07	20.11	9.51	3246.95	6644.
*	406.000	617.70	.00	.00	473.80	19000.00	484.06	484.06	487.38	81.53	15.03	1305.99	2104.
*	406.000	617.70	.00	.00	473.80	29800.00	487.55	487.55	490.14	44.86	14.26	2356.10	4449.32
*	408.000	445.30	.00	.00	475.10	19000.00	488.62	.00	488.88	6.04	5.81	4908.08	7732.
*	408.000	445.30	.00	.00	475.10	29800.00	490.99	.00	491.29	5.39	6.13	7002.33	12835.

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	300.000	20000.00	398.81	.00	.00	.00	433.27	.00
*	300.000	31000.00	399.17	.36	.00	.36	434.30	.00
*	302.000	20000.00	402.63	.00	3.81	.00	233.01	480.90
*	302.000	31000.00	405.00	2.37	5.82	2.37	262.40	480.90
	304.000	20000.00	404.74	.00	2.12	.00	290.34	120.70
*	304.000	31000.00	408.13	3.39	3.14	3.39	355.68	120.70
*	306.000	20000.00	409.50	.00	4.76	.00	261.74	30.00
*	306.000	31000.00	411.58	2.08	3.45	2.08	362.40	30.00
*	308.000	20000.00	413.07	.00	3.57	.00	362.40	2.00
*	308.000	31000.00	414.64	1.57	3.06	1.57	362.40	2.00
*	310.000	20000.00	415.05	.00	1.98	.00	406.10	78.00
*	310.000	31000.00	417.25	2.20	2.61	2.20	406.10	78.00
	312.000	20000.00	415.38	.00	.33	.00	406.10	2.00
	312.000	31000.00	417.61	2.23	.36	2.23	406.10	2.00
*	314.000	20000.00	415.89	.00	.50	.00	401.50	20.70
	314.000	31000.00	418.23	2.35	.63	2.35	401.50	20.70
	315.000	20000.00	416.01	.00	.13	.00	453.00	39.00
	315.000	31000.00	418.43	2.42	.20	2.42	453.00	39.00
	316.000	20000.00	416.02	.00	.01	.00	453.00	34.00
	316.000	31000.00	418.45	2.42	.01	2.42	453.00	34.00
*	317.000	20000.00	415.93	.00	-.09	.00	453.00	2.00
*	317.000	31000.00	418.32	2.39	-.12	2.39	453.00	2.00
*	318.000	20000.00	415.91	.00	-.02	.00	453.00	18.00
*	318.000	31000.00	418.29	2.37	-.04	2.37	453.00	18.00
*	319.000	20000.00	416.31	.00	.40	.00	453.00	2.00
*	319.000	31000.00	418.82	2.51	.54	2.51	453.00	2.00
	320.000	20000.00	416.36	.00	.05	.00	490.90	45.00
	320.000	31000.00	418.90	2.54	.08	2.54	490.90	45.00
*	322.000	20000.00	416.59	.00	.23	.00	606.80	132.60
	322.000	31000.00	419.22	2.63	.31	2.63	606.80	132.60
*	324.000	20000.00	416.57	.00	-.02	.00	700.20	445.30
*	324.000	31000.00	419.19	2.62	-.03	2.62	700.20	445.30
	326.000	20000.00	416.97	.00	.39	.00	730.20	385.60
	326.000	31000.00	419.69	2.72	.50	2.72	750.30	385.60
	328.000	20000.00	417.43	.00	.46	.00	607.30	535.40
	328.000	31000.00	420.11	2.68	.42	2.68	607.30	535.40
*	330.000	19000.00	417.68	.00	.26	.00	351.86	555.20
*	330.000	31000.00	420.23	2.54	.12	2.54	443.90	555.20
	332.000	19000.00	421.15	.00	3.47	.00	408.40	752.90
	332.000	31000.00	423.21	2.06	2.99	2.06	414.60	752.90
*	333.000	19000.00	422.70	.00	1.55	.00	536.09	377.00
*	333.000	31000.00	425.03	2.33	1.82	2.33	689.43	377.00
	334.000	19000.00	423.18	.00	.49	.00	585.10	278.00
	334.000	31000.00	425.55	2.36	.52	2.36	696.81	278.00
	336.000	19000.00	423.96	.00	.78	.00	554.44	530.80
	336.000	31000.00	426.27	2.31	.72	2.31	594.29	530.80

	338.000	19000.00	425.04	.00	1.08	.00	359.36	625.50
	338.000	31000.00	427.20	2.16	.93	2.16	499.88	625.50
	340.000	19000.00	427.00	.00	1.96	.00	381.74	654.60
	340.000	30600.00	429.19	2.19	1.98	2.19	506.73	654.60
	342.000	19000.00	429.36	.00	2.36	.00	494.32	694.20
	342.000	30600.00	431.58	2.22	2.40	2.22	501.61	694.20
	344.000	19000.00	429.36	.00	.00	.00	409.76	75.50
	344.000	30600.00	431.51	2.15	-.08	2.15	492.89	75.50
	350.000	19000.00	429.47	.00	.11	.00	419.86	138.00
	350.000	30600.00	431.66	2.19	.15	2.19	550.74	138.00
	352.000	19000.00	429.76	.00	.29	.00	428.22	73.80
	352.000	30600.00	431.87	2.12	.21	2.12	462.80	73.80
	354.000	19000.00	431.19	.00	1.43	.00	329.60	555.40
	354.000	30600.00	433.27	2.09	1.40	2.09	337.37	555.40
	356.000	19000.00	433.46	.00	2.28	.00	311.78	695.20
	356.000	30600.00	435.52	2.06	2.25	2.06	324.35	695.20
*	358.000	19000.00	438.02	.00	4.55	.00	370.75	930.00
*	358.000	30600.00	440.30	2.28	4.78	2.28	459.20	930.00
*	360.000	19000.00	441.10	.00	3.09	.00	301.02	651.40
*	360.000	30600.00	442.98	1.88	2.68	1.88	309.29	651.40
*	362.000	19000.00	445.51	.00	4.41	.00	326.86	686.50
*	362.000	30600.00	447.91	2.40	4.93	2.40	432.30	686.50
*	364.000	19000.00	447.77	.00	2.26	.00	337.26	785.30
*	364.000	30600.00	449.69	1.92	1.78	1.92	341.82	785.30
*	366.000	19000.00	452.17	.00	4.40	.00	426.83	781.80
*	366.000	30600.00	454.25	2.08	4.57	2.08	504.28	781.80
*	368.000	19000.00	453.74	.00	1.57	.00	634.50	376.60
*	368.000	30600.00	455.89	2.15	1.64	2.15	650.01	376.60
*	370.000	19000.00	454.21	.00	.46	.00	366.60	538.00
*	370.000	30200.00	455.79	1.59	-.10	1.59	372.17	538.00
*	372.000	19000.00	457.88	.00	3.67	.00	405.63	554.70
*	372.000	30200.00	460.00	2.12	4.21	2.12	412.51	554.70
	374.000	19000.00	459.02	.00	1.14	.00	367.58	548.50
	374.000	30200.00	461.08	2.06	1.08	2.06	387.31	548.50
	376.000	19000.00	460.67	.00	1.65	.00	349.80	508.30
	376.000	30200.00	462.67	2.01	1.60	2.01	360.40	508.30
	378.000	19000.00	463.61	.00	2.94	.00	363.46	686.10
	378.000	30200.00	465.72	2.11	3.05	2.11	371.81	686.10
	380.000	19000.00	463.77	.00	.16	.00	341.50	115.50
	380.000	30200.00	465.79	2.02	.07	2.02	350.03	115.50
	390.000	19000.00	464.24	.00	.47	.00	324.64	97.80
	390.000	30200.00	466.18	1.94	.39	1.94	332.45	97.80
	392.000	19000.00	465.01	.00	.77	.00	313.02	156.00
	392.000	30200.00	466.90	1.89	.73	1.89	319.88	156.00
	394.000	19000.00	469.38	.00	4.37	.00	353.05	890.90
	394.000	30200.00	471.37	1.99	4.47	1.99	392.42	890.90
	396.000	19000.00	472.57	.00	3.19	.00	373.34	771.80
	396.000	30200.00	474.52	1.95	3.14	1.95	384.61	771.80

	398.000	19000.00	474.87	.00	2.30	.00	258.49	694.90
	398.000	30200.00	476.53	1.67	2.02	1.67	270.08	694.90
	400.000	19000.00	477.15	.00	2.29	.00	256.38	448.00
	400.000	29800.00	479.56	2.41	3.03	2.41	263.24	448.00
	402.000	19000.00	479.26	.00	2.11	.00	229.68	630.60
	402.000	29800.00	481.47	2.21	1.91	2.21	302.01	630.60
*	404.000	19000.00	483.29	.00	4.04	.00	370.79	592.30
*	404.000	29800.00	485.72	2.43	4.25	2.43	386.71	592.30
*	406.000	19000.00	484.06	.00	.76	.00	204.23	617.70
*	406.000	29800.00	487.55	3.49	1.83	3.49	535.38	617.70
*	408.000	19000.00	488.62	.00	4.56	.00	881.03	445.30
*	408.000	29800.00	490.99	2.37	3.44	2.37	883.47	445.30

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 300.000 PROFILE= 2 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 302.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 302.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 302.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 302.000 PROFILE= 2 MINIMUM SPECIFIC ENERGY

WARNING SECNO= 304.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 306.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 306.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 306.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO= 306.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 306.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 306.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 308.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 308.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 308.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO= 308.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 308.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 308.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO= 310.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 310.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 314.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 318.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 318.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 319.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 319.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 322.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 324.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 324.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 330.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 330.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 333.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 333.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 358.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 358.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 360.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 360.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 360.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO= 360.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 360.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY

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CAUTION SECNO=    360.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=    362.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    362.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    364.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    364.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    366.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    366.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    368.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    368.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    370.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    370.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    370.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    370.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    370.000  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    370.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=    372.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    372.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    404.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    404.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    406.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    406.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    406.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    406.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    406.000  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    406.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=    408.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    408.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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 *  HEC-2 WATER SURFACE PROFILES                *                                                  *  U.S. ARMY CORPS OF
ENGINEERS        *
 *                                              *                                                  *  HYDROLOGIC
ENGINEERING CENTER      *
 *  Version   4.6.2;  May 1991                  *                                                  *  609 SECOND STREET,
SUITE D          *
 *                                              *                                                  *  DAVIS, CALIFORNIA
95616-4687       *
 *  RUN DATE    18FEB98    TIME   16:28:25      *                                                  *          (916)
756-1104           *
 ********************************************
*************************************


                                         X     X  XXXXXXX   XXXXX              XXXXX
                                         X     X  X        X     X            X     X
                                         X     X  X        X                        X
                                         XXXXXXX  XXXX     X          XXXXX    XXXXX
                                         X     X  X        X                  X
                                         X     X  X        X     X            X
                                         X     X  XXXXXXX   XXXXX             XXXXXXX
1
    18FEB98      16:28:25                                                                              1


                                                        EXECUTED 18FEB98    16:28:25
 ************************************
  HEC-2 WATER SURFACE PROFILES

  Version   4.6.2;  May 1991
 ************************************


T1      CDOVES COUNTY OF SAN DIEGO      0150-83-22
T2      PROPOSED CONDITIONS FOR EL MONTE GOLF COURSE, SEC. 340 TO 396
T3      UPPER SAN DIEGO RIVER 100-YR

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

          2.                                                                         427.00

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

  1.          0         -1


NC  0.028     0.028     0.045     0.15      0.3
QT  5.        19000.    30600.    12200.    2000.     30600.
ET            9.1       9.1       9.1                 1.4                                     4797.8    5304.6
X1  340.0     15.0      4906.3    5061.3    781.3     670.      654.6
GR  600.0     4639.8    600.      4719.1    600.      4797.7    429.2     4797.8    422.7     4829.7
GR  418.5     4906.3    417.8     4965.8    416.0     5000.0    418.3     5007.5    418.2     5061.3
GR  421.9     5082.2    426.3     5097.4    428.4     5161.3    425.6     5304.6    600.      5304.7

ET            9.1       9.1       9.1                 7.1       4744.     5182.     4550.     5228.7
X1  342.0     28.0      4779.5    5021.2    630.1     666.      694.2
GR  434.      3865.     432.      4005.     430.      4050.     432.      4065.     432.      4125.
GR  430.      4145.     428.      4200.     430.      4280.     430.      4370.     428.      4420.
GR  426.      4540.     426.      4632.     428.      4645.     430.      4655.     430.      4725.
GR  426.4     4744.1    420.8     4779.5    420.8     4914.0    420.7     4973.5    418.8     5000.0
GR  419.7     5021.2    423.9     5025.2    425.0     5093.0    424.0     5170.     426.      5182.
GR  428.      5275.     430.      5365.     436.      5400.
```

ET		9.1	9.1	9.1		7.1	4750.	5182.	4550.	5214.5
X1	344.0	25.0	4939.	5031.4	180.	95.	75.5			
GR	436.	3920.	434.	3955.	429.5	4100.	430.	4145.	428.	4270.
GR	430.	4420.	428.	4460.	427.5	4510.	428.	4570.	428.	4650.
GR	430.	4660.	430.	4735.	422.4	4757.3	420.9	4811.2	421.2	4939.0
GR	420.8	4975.2	418.8	5000.0	421.3	5031.4	424.	5044.	424.	5075.
GR	424.	5175.	426.	5190.	428.	5285.	432.	5400.	436.	5420.
ET		9.1	9.1	9.1		7.1	4767.	5219.	4600.	5323.6
X1	350.0	18.0	4920.8	5069.2	85.	105.	138.0			
GR	436.	4340.	432.	4400.	432.	4550.	430.	4580.	428.	4660.
GR	426.	4680.	425.	4738.9	425.0	4772.6	424.9	4802.7	421.1	4827.1
GR	423.0	4920.8	420.2	5000.0	420.4	5047.5	421.3	5069.2	426.	5080.
GR	428.1	5130.	430.	5230.	436.	5390.				

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ET		9.1	9.1	9.1		7.1	4784.	5200.	4763.8	5226.6
X1	352.0	17.0	4899.5	5075.1	127.	80.	73.8			
NC			0.04							
GR	436.	4700.	430.	4768.	428.	4775.	425.1	4786.6	419.8	4821.9
GR	421.5	4899.5	421.3	4970.2	420.5	5000.0	421.9	5014.5	425.5	5075.1
GR	429.2	5105.9	436.	5135.9	438.	5145.	436.	5175.	430.	5230.
GR	428.	5245.	428.	5300.						
ET		9.1	9.1	9.1		1.4			4753.8	5104.4
X1	354.0	17.0	4773.6	5080.5	600.	529.	555.4			
GR	440.	4625.	432.	4680.	431.	4710.	432.	4725.	436.	4745.
GR	423.9	4773.6	422.9	4890.9	422.9	4958.7	422.6	5000.0	425.2	5028.3
GR	426.0	5080.5	432.	5105.	436.	5125.	434.	5142.	433.	5210.
GR	434.	5250.	440.	5300.						
ET		9.1	9.1	9.1		7.1	4960.	5266.	4900.	5277.2
X1	356.0	15.0	4960.1	5141.2	780.	550.	695.2			
GR	440.	4860.	438.	4880.	436.	4906.	434.	4933.	431.2	4960.1
GR	426.1	4975.1	424.8	5000.0	426.8	5011.5	427.4	5141.2	429.7	5254.6
GR	438.	5290.	436.	5300.	436.	5400.	438.	5445.	440.	5470.
ET		9.1	9.1	9.1		7.1	4812.	5172.	4690.	5270.
X1	358.0	21.0	4816.9	5051.4	952.	820.	930.			
GR	442.	4570.	440.	4650.	440.	4680.	432.	4715.	432.	4745.
GR	437.	4780.	436.	4785.	431.8	4816.9	430.3	4953.1	429.4	5000.0
GR	432.4	5051.4	430.5	5132.2	438.	5185.	436.	5200.	436.	5233.
GR	440.	5240.	441.	5265.	440.	5290.	438.	5360.	440.	5405.
GR	442.	5448.								
ET		9.1	9.1	9.1		9.1			4830.	5186.9
X1	360.0	17.0	4963.6	5093.3	750.	657.	651.4			
GR	446.	4640.	442.	4665.	440.	4745.	439.	4780.	440.	4810.
GR	444.	4838.	435.6	4854.3	435.8	4963.6	434.6	4986.9	433.2	5000.0
GR	434.8	5022.1	437.4	5093.3	438.1	5135.1	447.0	5149.1	447.3	5186.9
GR	448.	5205.	450.	5240.						
ET		9.1	9.1	9.1		7.1	4814.	5146.	4792.6	5224.9
X1	362.0	15.0	4944.	5037.3	681.2	712.	686.5			
GR	456.	4780.	448.	4814.	438.3	4839.0	437.6	4944.	435.1	4986.8
GR	434.1	5000.0	435.5	5009.6	438.7	5037.3	441.6	5108.5	440.6	5130.6
GR	445.8	5145.6	450.	5154.	452.	5165.	450.	5180.	452.	5190.
ET		9.1	9.1	9.1	7.1	9.1	4961.7	5095.7	4916.8	5351.6
X1	364.0	20.0	4940.0	5095.7	770.	754.	785.3			
GR	454.	4715.	450.	4730.	447.	4785.	450.	4845.	450.	4875.
GR	442.	4900.	444.	4940.	440.	4975.	439.2	4987.5	437.8	5000.0
GR	438.6	5010.0	445.5	5095.7	443.3	5186.1	440.0	5235.7	444.	5275.
GR	446.	5310.	450.	5395.	452.	5410.	452.5	5475.	453.3	5500.

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ET		9.1	9.1	9.1		7.1	4837.	5265.	4811.2	5333.5
X1	366.0	16.0	4959.8	5009.3	773.	848.	781.8			
GR	456.	4700.	456.	4745.	453.	4760.	452.8	4837.3	445.4	4847.
GR	448.2	4959.8	447.2	4984.4	442.1	5000.0	446.3	5009.3	445.1	5148.2
GR	447.4	5179.2	448.	5245.	450.	5260.	452.	5365.	456.	5405.
GR	460.	5420.								
ET		9.1	9.1	9.1	7.1	5.4	4788.	5165.5	4649.4	5299.6
X1	368.0	16.0	4949.5	5015.7	419.0	353.	376.6			
GR	458.	4700.	458.	4730.	448.	4755.	447.9	4788.0	445.7	4806.6
GR	445.8	4949.5	444.2	4984.5	442.8	5000.0	444.2	5015.7	443.6	5094.9
GR	447.5	5119.8	450.	5160.	452.	5315.	460.	5370.	461.	5385.
GR	460.	5400.								
QT	5.	19000.	30200.	11900.	1500.	30200.				
ET		9.1	9.1	9.1	7.1	9.1	4821.5	5172	4821.5	5172
X1	370	18	4953.6	5020	461.7	627	538			
GR	459	4730	457.5	4740	457.5	4780	457.5	4821.4	457.5	4821.5
GR	447.9	4840.7	447.9	4870	447.9	4920	448	4953.6	445	5000
GR	450.5	5020	451.5	5070	452.2	5120	451.3	5160	457.5	5172
GR	457.5	5172.1	458	5185.9	460	5282				
ET		9.1	9.1	9.1	7.1	9.1	4821.5	5172	4821.5	5172
X1	370.1	37	4953.6	5020	2	2	2			
X2				459.5	457.5					
BT	-37	4730	459	0	4740	457.5	0	4780	457.5	0
BT		4821.4	457.5	0	4821.5	465.5	457.5	4840.7	465.8	457.8
BT		4870	466.2	458.2	4870	466.2	458.2	4874	466.2	458.2
BT		4874	466.2	458.2	4920	467	459	4920	467	459
BT		4924	467	459	4924	467	459	4953.6	467.3	459.3
BT		4970	467.5	459.5	4970	467.5	459.5	4974	467.5	459.5
BT		4974	467.5	459.5	5000	467.5	459.5	5020	467.5	459.5
BT		5020	467.5	459.5	5024	467.5	459.4	5024	467.5	459.5
BT		5070	467	459	5070	467	459	5074	467	459
BT		5074	467	459	5120	466.2	458.2	5120	466.2	458.2
BT		5124	466.2	458.2	5124	466.2	458.2	5160	466	458
BT		5172	465.5	457.5	5172.1	457.5	0	5185.9	458	0
BT		5282	460	0						
GR	459	4730	457.5	4740	457.5	4780	457.5	4821.4	457.5	4821.5
GR	447.9	4840.7	447.9	4870	458.2	4870	458.2	4874	447.9	4874
GR	447.9	4920	459	4920	459	4924	447.9	4924	448	4953.6
GR	446.5	4970	459.5	4970	459.5	4974	446.3	4974	445	5000
GR	450.5	5020	459.5	5020	459.5	5024	450.5	5024	451.5	5070
GR	459	5070	459	5074	451.5	5074	452.2	5120	458.2	5120
GR	458.2	5124	452.2	5124	451.3	5160	457.5	5172	457.5	5172.1
GR	458	5185.9	460	5282						
ET		9.1	9.1	9.1	7.1	9.1	4821.5	5172	4821.5	5172
X1	370.2	37	4953.6	5020	38	38	38		0.3	
X2				459.5	457.5		1			
GR	459	4730	457.5	4740	457.5	4780	457.5	4821.4	457.5	4821.5
GR	447.9	4840.7	447.9	4870	458.2	4870	458.2	4874	447.9	4874
GR	447.9	4920	459	4920	459	4924	447.9	4924	448	4953.6

GR	446.5	4970	459.5	4970	459.5	4974	446.3	4974	445	5000
GR	450.5	5020	459.5	5020	459.5	5024	450.5	5024	451.5	5070
GR	459	5070	459	5074	451.5	5074	452.2	5120	458.2	5120
GR	458.2	5124	452.2	5124	451.3	5160	457.5	5172	457.5	5172.1
GR	458	5185.9	460	5282						
ET		9.1	9.1	9.1	7.1	9.1	4821.5	5172	4821.5	5172
X1	370.3	18	4953.6	5020	2	2	2		0.3	
GR	459	4730	457.5	4740	457.5	4780	457.5	4821.4	457.5	4821.5
GR	447.9	4840.7	447.9	4870	447.9	4920	448	4953.6	445	5000
GR	450.5	5020	451.5	5070	452.2	5120	451.3	5160	457.5	5172
GR	457.5	5172.1	458	5185.9	460	5282				
NC	0.028	0.028	0.045	0.15	0.3					
ET		9.1	9.1	9.1		9.1			4854.5	5270.9

X1	372.0	14.0	4879.2	5183.1	421.6	638.	512.7			
GR	462.	4800.	458.	4808.	456.	4855.	454.	4862.	450.9	4879.2
GR	448.7	4964.5	448.0	5000.0	449.8	5063.7	453.5	5183.1	454.3	5254.0
GR	461.7	5270.9	459.	5340.	460.	5380.	464.	5390.		
ET		9.1	9.1	9.1		9.1			4863.	5260.2
X1	374.0	13.0	4886.6	5021.	562.	530.	548.5			
GR	464.	4770.	462.	4822.	460.	4875.	453.5	4886.6	450.0	4972.
GR	449.4	5000.0	452.0	5021.0	452.6	5138.1	455.5	5215.	462.3	5260.
GR	466.	5272.	470.	5284.	468.	5370.				
ET		9.1	9.1	9.1		9.1			4843.9	5225.3
X1	376.0	11.0	4868.6	5154.9	520.	530.	508.3			
GR	470.8	4843.9	455.0	4868.6	453.1	4956.0	453.6	5000.0	454.0	5019.6
GR	455.0	5154.9	455.5	5190.3	464.	5225.3	464.	5280.	466.	5355.
GR	468.	5370.								
ET		9.1	9.1	9.1		9.1			4746.2	5134.9
X1	378.0	14.0	4781.5	5118.6	665.2	353.	686.1			
GR	478.	4600.	477.	4650.	475.5	4695.	473.1	4746.2	470.	4757.
GR	456.2	4781.5	456.7	4934.5	456.9	5000.0	456.8	5064.9	457.8	5118.6
GR	466.5	5134.9	470.	5170.	471.	5260.	472.	5300.		
ET		9.1	9.1	9.1		9.1			4739.4	5109.6
X1	380.0	9.0	4769.7	5044.4	145.2	110.	115.5			
GR	470.	4710.	468.0	4739.4	459.0	4769.7	457.1	4905.4	457.0	5000.0
GR	457.8	5044.4	457.3	5087.8	468.8	5109.6	470.	5220.7		
ET		9.1	9.1	9.1		9.1			4788.8	5140.
X1	390.0	10.0	4915.8	5029.1	80.	190.	97.8			
GR	473.5	4788.8	473.4	4788.9	458.7	4815.8	457.9	4915.8	457.0	4969.9
GR	457.0	5000.0	458.6	5029.1	457.6	5115.7	464.	5135.	470.	5155.
ET		9.1	9.1	9.1		9.1			4851.1	5188.
X1	392.0	8.0	4961.1	5165.6	159.	370.	156.0			
GR	472.2	4861.1	459.3	4875.0	459.8	4948.7	458.9	5000.0	458.1	5066.8
GR	458.3	5165.6	471.0	5188.0	472.	5230.				

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ET		9.1	9.1	9.1		9.1			4750.	5221.8
X1	394.0	15.0	4895.	5015.8	1037.	736.	890.9			
GR	474.	4730.	472.	4760.	470.	4825.	468.	4850.	462.9	4895.0
GR	462.2	5000.0	463.3	5015.8	464.2	5146.7	463.6	5194.	470.	5206.
GR	472.	5211.	474.	5240.	478.	5275.	480.	5320.	482.	5400.
ET		9.1	9.1	9.1		9.1			4766.6	5161.5
X1	396.0	12.0	4954.3	5071.7	927.7	610.	771.8			
GR	480.	4675.	478.	4700.	476.	4755.	474.	4780.	467.7	4791.4
GR	467.1	4891.5	466.0	4954.3	464.6	5000.0	466.3	5071.7	466.5	5132.8
GR	476.	5181.5	480.	5206.						
NC	.03	.03	.04	.15	.3					
ET		9.1	9.1	9.1		7.1	4796.	5059.	4771.1	5078.8
X1	398.0	15.0	4971.6	5038.1	783.7	660.	694.9			
GR	600.	4643.8	600.	4694.4	600.	4722.1	600.	4771.	482.6	4771.1
GR	476.2	4795.7	469.4	4824.0	469.0	4900.7	467.1	4971.6	465.3	5000.0
GR	466.6	5038.1	474.5	5058.7	481.6	5078.8	600.	5078.9	600.	5262.5
QT	5.	19000.	29800.	11600.	1000.	29800.				
NC			0.035							
ET		9.1	9.1	9.1	7.1	7.1	4966.4	5222.	4957.1	5225.5
X1	400.0	13.0	4966.4	5020.2	550.	368.	448.0			
GR	600.	4850.6	600.	4891.2	600.	4957.	480.9	4957.1	471.1	4966.4
GR	467.1	4983.1	467.2	5000.0	468.4	5020.2	471.2	5107.8	469.9	5203.2
GR	481.6	5225.5	600.	5225.6	600.	5386.4				
ET						7.1	4915.	5217.		
X1	402.	20.	4970.7	5046.7	630.	630.	630.6			
GR	600.	4263.	600.	4431.3	600.	4626.6	600.	4770.1	600.	4914.8

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GR   481.5    4914.9   473.1    4927.1   473.4    4970.7   469.4    4989.9   469.1    5000.0
GR   469.3    5015.1   473.3    5046.7   473.8    5119.4   480.0    5151.7   480.5    5205.0
GR   481.5    5217.3   600.     5217.4   600.     5561.8   600.     5690.6   600.     5791.2

ET            9.1      9.1      9.1               1.4                        4825.4   5214.4
X1   404.0    15.0     4970.3   5038.6   582.     567.     592.3
GR   600.     4446.1   600.     4628.1   600.     4825.3   486.4    4825.4   475.7    4848.9
GR   474.5    4932.1   478.7    4970.3   472.5    4989.6   472.3    5000.0   472.3    5010.2
GR   477.5    5038.6   479.2    5109.8   478.7    5182.9   485.9    5214.4   600.     5214.5

ET            9.1      9.1      9.1               7.1      4573.    5051.    4515.1   5062.1
X1   406.0    18.0     4946.7   5037.4   258.     595.     617.7
GR   600.     3889.5   600.     4012.7   600.     4125.9   600.     4230.3   600.     4515.
GR   485.2    4515.1   487.3    4631.9   486.5    4770.3   486.4    4834.1   478.5    4853.5
GR   477.9    4946.7   474.4    4989.2   473.8    5000.0   474.9    5008.2   480.4    5037.4
GR   493.9    5062.1   600.     5062.2   600.     5106.1

NC   .035     .035     .035     .3       .5
ET            9.1      9.1      9.1               7.1      4420.    5022.    4152.8   5040.2
1
  18FEB98     16:28:25                                                       6

X1   408.0    22.0     4977.8   5016.1   350.     616.     445.3
GR   600.     3673.8   600.     3766.5   600.     3825.5   600.     4152.7   485.6    4152.8
GR   487.6    4289.5   486.2    4364.7   487.3    4452.5   485.9    4488.0   479.8    4520.7
GR   481.0    4570.9   481.4    4673.5   481.9    4818.3   481.2    4890.1   480.6    4950.1
GR   475.2    4977.8   475.1    5000.0   476.6    5016.1   481.6    5026.6   494.8    5040.2
GR   600.     5040.3   600.     5224.8

ET            9.1      9.1      9.1      7.1      7.1      4420.    5022.    4134.9   5016.7
X1   408.5    18.      4983.2   5016.8   25.      120.     51.
GR   600.     4134.8   486.4    4134.9   489.0    4266.8   489.3    4304.7   489.0    4421.0
GR   487.2    4495.2   479.3    4575.4   480.6    4715.1   481.1    4846.0   482.9    4900.0
GR   482.8    4900.1   482.8    4983.2   477.4    4983.3   477.4    5000.    477.4    5016.7
GR   489.1    5016.8   600.     5016.9   600.     5180.6

NC   .035     .035     .017     .3       .5
ET            9.11     9.11     9.11              7.11     4420.    5022.    4134.9   5016.7
        STALLION RANCH BRIDGE MODELED AS NORMAL BRIDGE.  D/S FACE
X1   409.0    23.0     4983.2   5016.8   2.       2.       2.
X2   .                          479.9    483.3
BT   23.      3223.8   600.     600.     3380.8   600.     600.     3535.6   600.      600.
BT   3607.5   600.     600.     3818.4   600.     600.     4134.8   600.     600.     4134.9
BT   486.5    486.5    4266.8   489.0    489.0    4304.7   489.3    489.3    4421.0   489.0
BT   489.0    4495.2   487.2    487.2    4575.4   479.3    479.3    4715.1   480.6    480.6
BT   4846.0   481.1    481.1    4900.0   482.9    482.9    4900.1   482.8    482.8    4983.2
BT   481.1    481.1    4983.3   482.1    479.9    5000.0   483.3    479.9    5016.7   484.9
BT   479.9    5016.8   600.     600.     5180.5   600.     600.     5180.6   600.     600.
GR   600.     3223.8   600.     3380.8   600.     3535.6   600.     3607.5   600.     3818.4
GR   600.     4134.8   486.4    4134.9   489.0    4266.8   489.3    4304.7   489.0    4421.0
GR   487.2    4495.2   479.3    4575.4   480.6    4715.1   481.1    4846.0   482.9    4900.0
GR   482.8    4900.1   482.8    4983.2   477.4    4983.3   477.4    5000.    477.4    5016.7
GR   600.     5016.8   600.     5180.5   600.     5180.6

ET            9.11     9.11     9.11              7.11     4425.    5022.    4134.9   5016.7
        STALLION RANCH BRIDGE MODELED AS NORMAL BRIDGE.  U/S FACE
X1   410.0    23.0     4983.2   5016.8   14.      14.      14.
X2   .                          479.9    483.3
BT   23.      3223.8   600.     600.     3380.8   600.     600.     3535.6   600.     600.
BT   3607.5   600.     600.     3818.4   600.     600.     4134.8   600.     600.     4134.9
BT   486.5    486.5    4266.8   489.0    489.0    4304.7   489.3    489.3    4421.0   489.0
BT   489.0    4495.2   487.2    487.2    4575.4   479.3    479.3    4715.1   480.6    480.6
BT   4846.0   481.1    481.1    4900.0   482.9    482.9    4900.1   482.8    482.8    4983.2
BT   481.1    481.1    4983.3   482.1    479.9    5000.0   483.3    479.9    5016.7   484.9
BT   479.9    5016.8   600.     600.     5180.5   600.     600.     5180.6   600.     600.
GR   600.     3223.8   600.     3380.8   600.     3535.6   600.     3607.5   600.     3818.4
GR   600.     4134.8   486.4    4134.9   489.0    4266.8   489.3    4304.7   489.0    4421.0
GR   487.2    4495.2   479.3    4575.4   480.6    4715.1   481.1    4846.0   482.9    4900.0
GR   482.8    4900.1   482.8    4983.2   477.4    4983.3   477.4    5000.    477.4    5016.7
GR   600.     5016.8   600.     5180.5   600.     5180.6
1
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ET		9.1	9.1	9.1		7.1	4425.	5022.	4134.9	5016.7
X1	411.				2.0	2.0	2.0			
ET		9.1	9.1	9.1		7.1	4435.	5022.	4134.9	5016.7
X1	411.5				20.	80.	50.			
NC			0.035							
ET		9.1	9.1	9.1		7.1	4491.9	5170.1	4180.	5251.4
X1	412.	20.	4990.1	5009.9	160.	280.	193.8			
GR	600.	3888.8	600.	4179.9	489.7	4180.	490.4	4219.8	492.0	4353.5
GR	491.0	4511.9	491.0	4695.3	488.9	4807.1	489.8	4901.2	488.5	4954.1
GR	481.3	4971.1	478.7	4990.1	477.7	5000.0	478.2	5009.9	485.1	5076.7
GR	484.6	5138.9	483.9	5172.7	489.3	5191.8	489.8	5251.4	600.	5251.5
QT	5.	19000.	29400.	11300.	500.	29400.				
ET			9.1			7.1	4465.	5136.	4452.5	5136.
X1	414.0	17.	4982.8	5014.7	478.7	375.	488.3			
GR	600.	3941.6	600.	4107.5	600.	4239.5	600.	4452.4	489.8	4452.5
GR	490.7	4596.1	493.4	4690.2	494.0	4800.1	492.2	4901.6	490.0	4966.2
GR	482.4	4982.8	477.0	5000.0	481.0	5014.7	484.3	5110.2	488.8	5136.0
GR	600.	5136.1	600.	5304.9						
ET			9.1			9.1			4643.5	5146.1
X1	416.0	20.	4951.7	5032.5	565.	664.	615.			
GR	600.	4497.9	600.	4525.	600.	4570.9	600.	4587.	600.	4643.4
GR	495.4	4643.5	495.2	4701.9	495.9	4789.9	493.7	4846.0	485.3	4876.7
GR	487.2	4951.7	484.0	4977.5	482.1	4988.9	481.7	5000.0	484.0	5020.8
GR	489.1	5032.5	486.0	5117.3	494.0	5146.1	600.	5216.2	600.	5299.2
ET			9.1			9.1			4575.7	5101.5
X1	418.0	20.	4974.5	5016.8	620.	625.	640.			
GR	600.	4135.1	600.	4145.2	600.	4299.6	600.	4381.5	600.	4575.6
GR	495.1	4575.7	496.5	4665.5	494.4	4720.5	491.1	4756.8	490.2	4826.1
GR	499.0	4856.8	494.3	4936.3	488.6	4975.4	485.3	4984.5	485.4	5000.0
GR	487.5	5016.8	489.6	5032.9	490.6	5069.7	499.1	5101.5	600.	5101.6
ET			9.1			9.1			4722.8	5129.8
X1	420.0	20.0	4980.3	5040.4	761.	690.	705.7			
GR	600.	4267.	600.	4408.4	600.	4533.	600.	4595.6	600.	4722.7
GR	499.8	4722.8	499.9	4765.6	493.0	4787.7	492.4	4853.7	496.1	4887.0
GR	492.3	4912.7	493.5	4980.3	487.9	4990.8	486.3	5000.0	488.2	5015.3
GR	493.6	5040.4	492.8	5108.0	498.3	5129.8	600.	5129.9	600.	5311.9

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1
0

CCHV= .150 CEHV= .300
*SECNO 340.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 4797.8 5304.6 TYPE= 1 TARGET= 506.800

340.000	11.00	427.00	.00	.00	428.19	1.19	.00	.00	418.50
19000.0	5347.7	11669.5	1982.8	535.6	1416.6	246.9	.0	.0	418.20
.00	9.98	8.24	8.03	.028	.045	.028	.000	416.00	4808.60
.003267	781.	655.	670.	0	0	0	.00	381.75	5304.60

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*SECNO 342.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1 49

3470 ENCROACHMENT STATIONS=     4550.0     5228.7  TYPE=      1  TARGET=       678.700
   342.000      10.48     429.28       .00       .00    429.72       .45      1.43       .11     420.80
   19000.0     2637.0    11369.5    4993.5     525.3    2112.6     905.9      44.6       7.5     419.70
       .03       5.02       5.38      5.51      .028      .045      .028      .000    418.80    4550.00
   .001476       630.       694.      666.         2         0         0       .00    601.25    5228.70

*SECNO 344.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=     4550.0     5214.5  TYPE=      1  TARGET=       664.500
   344.000      10.58     429.38       .00       .00    429.88       .49       .14       .01     421.20
   19000.0    10588.3     3751.6    4660.1    1698.7     834.4     932.7      53.8       9.2     421.30
       .04       6.23       4.50      5.00      .028      .045      .028      .000    418.80    4550.00
   .000988       180.        76.       95.         2         0         0       .00    584.62    5214.50

1
    18FEB98      16:28:25                                                                         9

     SECNO      DEPTH      CWSEL     CRIWS     WSELK      EG        HV        HL       OLOSS    L-BANK ELEV
     Q          QLOB       QCH       QROB      ALOB       ACH       AROB      VOL      TWA      R-BANK ELEV
     TIME       VLOB       VCH       VROB      XNL        XNCH      XNR       WTN      ELMIN    SSTA
     SLOPE      XLOBL      XLCH      XLOBR     ITRIAL     IDC       ICONT     CORAR    TOPWID   ENDST

*SECNO 350.000

3470 ENCROACHMENT STATIONS=     4600.0     5323.6  TYPE=      1  TARGET=       723.600
   350.000       9.17     429.37       .00       .00    430.08       .71       .14       .07     423.00
   19000.0    10653.4     7358.3     988.4    1435.4    1231.5     220.6      61.5      10.6     421.30
       .05       7.42       5.97      4.48      .028      .045      .028      .000    420.20    4605.08
   .001949        85.       138.      105.         2         0         0       .00    591.91    5196.99

*SECNO 352.000
3280 CROSS SECTION    352.00 EXTENDED       1.20 FEET

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     4763.8     5226.6  TYPE=      1  TARGET=       462.800
   352.000       9.40     429.20       .00       .00    430.49      1.29       .23       .17     421.50
   19000.0     9996.0     8771.7     232.3     935.1    1248.2      57.0      67.3      11.6     425.50
       .05      10.69       7.03      4.08      .028      .040      .028      .000    419.80    4770.80
   .002622       127.        74.       80.         2         0         0       .00    335.10    5105.90

*SECNO 354.000

3470 ENCROACHMENT STATIONS=     4753.8     5104.4  TYPE=      1  TARGET=       350.600
   354.000       8.59     431.19       .00       .00    432.13       .95      1.59       .05     423.90
   19000.0      411.4    18290.8     297.8      62.9    2324.0      55.1      97.6      16.0     426.00
       .07       6.54       7.87      5.40      .028      .040      .028      .000    422.60    4756.36
   .003020       600.       555.      529.         2         0         0       .00    345.35    5101.71
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*SECNO 356.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .69

3470 ENCROACHMENT STATIONS=      4900.0     5277.2  TYPE=       1  TARGET=       377.200
   356.000      8.61    433.41       .00       .00    435.22      1.82      2.83       .26    431.20
   19000.0     106.0   12038.9    6855.1      23.6    1175.0     580.1     130.3      21.2    427.40
       .09      4.49     10.25     11.82      .028      .040      .028      .000    424.80   4938.74
   .006333      780.      695.      550.         2         0         0       .00    331.67   5270.41


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   18FEB98      16:28:25                                                                        10


    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 358.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.72

3470 ENCROACHMENT STATIONS=      4690.0     5270.0  TYPE=       1  TARGET=       580.000
   358.000      8.38    437.78       .00       .00    438.45       .67      3.06       .17    431.80
   19000.0    3103.0   10297.3    5599.7     491.1    1641.5     770.9     178.7      30.2    432.40
       .12      6.32      6.27      7.26      .028      .040      .028      .000    429.40   4690.00
   .002130      952.      930.      820.         2         0         0       .00    542.87   5236.11

*SECNO 360.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4830.0     5186.9  TYPE=       1  TARGET=       356.900
   360.000      7.92    441.12    441.12       .00    443.72      2.60      2.59       .58    435.80
   19000.0    9199.9    8210.7    1589.4     622.1     747.4     148.1     213.1      36.8    437.40
       .14     14.79     10.99     10.73      .028      .040      .028      .000    433.20   4843.59
   .008481      750.      651.      657.        20        11         0       .00    296.27   5139.85

*SECNO 362.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.92

3470 ENCROACHMENT STATIONS=      4792.6     5224.9  TYPE=       1  TARGET=       432.300
   362.000     11.45    445.55       .00       .00    446.68      1.14      2.74       .22    437.60
   19000.0    8237.0    6920.0    3843.0     865.3     875.2     517.8     243.0      41.7    438.70
       .16      9.52      7.91      7.42      .028      .040      .028      .000    434.10   4820.32
   .002302      681.      687.      712.         3         0         0       .00    324.54   5144.87
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   18FEB98       16:28:25                                                                          11


     SECNO       DEPTH       CWSEL       CRIWS       WSELK       EG          HV          HL          OLOSS       L-BANK ELEV
     Q           QLOB        QCH         QROB        ALOB        ACH         AROB        VOL         TWA         R-BANK ELEV
     TIME        VLOB        VCH         VROB        XNL         XNCH        XNR         WTN         ELMIN       SSTA
     SLOPE       XLOBL       XLCH        XLOBR       ITRIAL      IDC         ICONT       CORAR       TOPWID      ENDST


 *SECNO 364.000

 3470 ENCROACHMENT STATIONS=       4916.8      5351.6  TYPE=       1  TARGET=        434.800
    364.000       10.02      447.82         .00         .00      449.11        1.29        2.38         .05      444.00
    19000.0       845.9      8671.7      9482.4       102.1      1014.0       978.5       281.5        48.4      445.50
        .18        8.28        8.55        9.69        .028        .040        .028        .000      437.80     4916.80
    .004380        770.        785.        754.           3           0           0         .00      431.93     5348.73


 *SECNO 366.000

 3470 ENCROACHMENT STATIONS=       4811.2      5333.5  TYPE=       1  TARGET=        522.300
    366.000        9.19      451.29         .00         .00      452.68        1.39        3.54         .03      448.20
    19000.0      4900.5      1832.0     12267.5       528.3       257.5      1244.6       320.1        57.0      446.30
        .21        9.28        7.12        9.86        .028        .040        .028        .000      442.10     4839.29
    .004261        773.        782.        848.           2           0           0         .00      488.06     5327.35


 *SECNO 368.000

 3301 HV CHANGED MORE THAN HVINS


 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.05


 3470 ENCROACHMENT STATIONS=       4649.4      5299.6  TYPE=       1  TARGET=        650.200
    368.000       10.18      452.98         .00         .00      453.50         .53         .69         .13      445.80
    19000.0      8103.0      2873.3      8023.7      1344.9       575.0      1364.2       343.3        61.6      444.20
        .23        6.03        5.00        5.88        .028        .040        .028        .000      442.80     4742.55
    .001016        419.        377.        353.           2           0           0         .00      557.05     5299.60


 *SECNO 370.000

 3301 HV CHANGED MORE THAN HVINS

 3685 20 TRIALS ATTEMPTED WSEL,CWSEL
 3693 PROBABLE MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED

 3470 ENCROACHMENT STATIONS=       4821.5      5172.0  TYPE=       1  TARGET=        350.500
    370.000        9.22      454.22      454.22         .00      456.59        2.37        1.09         .55      448.00
    19000.0     10501.4      5351.6      3146.9       751.8       487.6       386.6       373.6        67.2      450.50
        .24       13.97       10.98        8.14        .028        .040        .028        .000      445.00     4828.06
    .006217        462.        538.        627.          20          15           0         .00      337.59     5165.65


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   18FEB98       16:28:25                                                                          12


     SECNO       DEPTH       CWSEL       CRIWS       WSELK       EG          HV          HL          OLOSS       L-BANK ELEV
     Q           QLOB        QCH         QROB        ALOB        ACH         AROB        VOL         TWA         R-BANK ELEV
     TIME        VLOB        VCH         VROB        XNL         XNCH        XNR         WTN         ELMIN       SSTA
     SLOPE       XLOBL       XLCH        XLOBR       ITRIAL      IDC         ICONT       CORAR       TOPWID      ENDST


 *SECNO 370.100

 3265 DIVIDED FLOW
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3370 NORMAL BRIDGE, NRD=  37 MIN ELTRD=   457.50 MAX ELLC=   459.50

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      4821.5     5172.0  TYPE=       1  TARGET=        350.500
   370.100       9.39     454.39     454.39        .00     456.87       2.48        .01        .03     448.00
   19000.0    10334.1     5213.1     3452.8      721.2      477.0      376.8      373.7       67.2     459.50
       .24      14.33      10.93       9.16       .028       .040       .028       .000     445.00    4827.72
   .008420         2.         2.         2.         20         20          0        .00     314.25    5165.98


*SECNO 370.200

3265 DIVIDED FLOW


3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=   457.50 MAX ELLC=   459.50


3470 ENCROACHMENT STATIONS=      4821.5     5172.0  TYPE=       1  TARGET=        350.500
   370.200       9.88     455.18        .00        .00     457.21       2.03        .28        .07     448.30
   19000.0    10126.4     4988.8     3884.9      780.1      508.1      443.7      375.1       67.5     459.80
       .24      12.98       9.82       8.76       .028       .040       .028       .000     445.30    4826.73
   .006399        38.        38.        38.          8          0          0        .00     316.21    5166.94


*SECNO 370.300

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.52


3470 ENCROACHMENT STATIONS=      4821.5     5172.0  TYPE=       1  TARGET=        350.500
   370.300      10.66     455.96        .00        .00     457.32       1.36        .01        .10     448.30
   19000.0     9927.7     4805.2     4267.1      934.3      583.1      597.9      375.2       67.5     450.80
       .24      10.63       8.24       7.14       .028       .040       .028       .000     445.30    4825.19
   .002762         2.         2.         2.          4          0          0        .00     343.25    5168.43


1
   18FEB98     16:28:25                                                                                  13


     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


CCHV=      .150 CEHV=       .300
*SECNO 372.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      4854.5     5270.9  TYPE=       1  TARGET=        416.400
   372.000      10.07     458.07        .00        .00     458.77        .70       1.35        .10     450.90
   19000.0      934.0    15942.1     2123.9      119.2     2401.5      312.0      404.5       72.1     453.50
       .26       7.83       6.64       6.81       .028       .045       .028       .000     448.00    4854.50
   .002569       422.       513.       638.          2          0          0        .00     408.11    5262.61


*SECNO 374.000

3470 ENCROACHMENT STATIONS=      4863.0     5260.2  TYPE=       1  TARGET=        397.200
   374.000       9.83     459.23        .00        .00     460.29       1.07       1.41        .11     453.50
   19000.0      147.0     7377.5    11475.5       29.3     1083.0     1255.3      437.0       76.9     452.00
       .28       5.02       6.81       9.14       .028       .045       .028       .000     449.40    4876.38
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 .002640      562.      549.      530.         2        0        0       .00    363.29   5239.67

*SECNO 376.000

3470 ENCROACHMENT STATIONS=     4843.9    5225.3  TYPE=      1  TARGET=      381.400
 376.000      7.86    460.96       .00       .00    462.11      1.14      1.79       .02    455.00
 19000.0     188.1   16014.1    2797.8      27.8    1954.9     263.9     464.3      81.2    455.00
     .30      6.76      8.19     10.60      .028      .045      .028      .000    453.10   4859.27
 .004751      520.      508.      530.         2         0         0       .00    353.53   5212.81

*SECNO 378.000

3470 ENCROACHMENT STATIONS=     4746.2    5134.9  TYPE=      1  TARGET=      388.700
 378.000      7.82    464.02       .00       .00    464.88       .87      2.73       .04    456.20
 19000.0     392.4   18381.2     226.5      54.1    2452.5      36.1     500.8      86.5    457.80
     .32      7.25      7.49      6.28      .028      .045      .028      .000    456.20   4767.64
 .003654      665.      686.      353.         2         0         0       .00    362.58   5130.23

*SECNO 380.000

3470 ENCROACHMENT STATIONS=     4739.4    5109.6  TYPE=      1  TARGET=      370.200
1
 18FEB98      16:28:25                                                                          14

  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 380.000      7.20    464.20       .00       .00    465.49      1.29       .48       .13    459.00
 19000.0     308.0   14590.6    4101.4      45.6    1814.1     334.0     507.1      87.5    457.80
     .32      6.75      8.04     12.28      .028      .045      .028      .000    457.00   4752.18
 .004788      145.      116.      110.         2         0         0       .00    348.71   5100.89

*SECNO 390.000

3470 ENCROACHMENT STATIONS=     4788.8    5140.0  TYPE=      1  TARGET=      351.200
 390.000      7.63    464.63       .00       .00    465.98      1.35       .47       .02    457.90
 19000.0    6744.0    5743.0    6513.0     665.1     816.7     640.0     512.8      88.4    458.60
     .33     10.14      7.03     10.18      .028      .045      .028      .000    457.00   4804.95
 .003258       80.       98.      190.         2         0         0       .00    332.15   5137.10

*SECNO 392.000

3470 ENCROACHMENT STATIONS=     4851.1    5188.0  TYPE=      1  TARGET=      336.900
 392.000      7.18    465.28       .00       .00    466.89      1.61       .83       .08    459.80
 19000.0    5597.3   13038.5     364.2     441.8    1457.2      43.0     521.8      89.9    458.30
     .33     12.67      8.95      8.47      .028      .045      .028      .000    458.10   4868.55
 .005792      159.      156.      370.         2         0         0       .00    309.36   5177.92

*SECNO 394.000

3470 ENCROACHMENT STATIONS=     4750.0    5221.8  TYPE=      1  TARGET=      471.800
 394.000      7.40    469.60       .00       .00    470.95      1.34      4.02       .04    462.90
 19000.0    1607.6    6296.4   11096.0     202.9     848.8    1069.7     562.5      96.7    463.30
     .36      7.92      7.42     10.37      .028      .045      .028      .000    462.20   4829.96
 .003750     1037.      891.      736.         2         0         0       .00    375.29   5205.26

*SECNO 396.000

3470 ENCROACHMENT STATIONS=     4766.6    5161.5  TYPE=      1  TARGET=      394.900
 396.000      7.84    472.44       .00       .00    473.68      1.24      2.72       .01    466.00
 19000.0    8579.4    5966.1    4454.5     893.8     826.9     458.7     599.7     103.3    466.30
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       .38        9.60       7.22       9.71       .028       .045       .028       .000     464.60    4782.83
   .003538        928.       772.       610.          2          0          0        .00     378.67    5161.50


1
    18FEB98       16:28:25                                                                                   15


     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


 CCHV=     .150 CEHV=     .300
 *SECNO 398.000

 3301 HV CHANGED MORE THAN HVINS


 3470 ENCROACHMENT STATIONS=     4771.1     5078.8  TYPE=       1  TARGET=      307.700
    398.000       9.66     474.96        .00        .00     476.97       2.00       3.06        .23     467.10
    19000.0    11557.0     6630.3      812.7      996.6      592.3       91.2      632.2      108.7     466.60
        .40      11.60      11.19       8.91       .030       .040       .030       .000     465.30    4800.85
    .004925       784.       695.       660.          2          0          0        .00     259.16    5060.01


 *SECNO 400.000

 3470 ENCROACHMENT STATIONS=     4957.1     5225.5  TYPE=       1  TARGET=      268.400
    400.000      10.04     477.14        .00        .00     478.82       1.69       1.81        .05     471.10
    19000.0       81.1     5267.2    13651.7       17.3      491.8     1321.9      650.1      111.4     468.40
        .41       4.68      10.71      10.33       .030       .035       .030       .000     467.10    4960.67
    .003370       550.       448.       368.          2          0          0        .00     256.33    5217.00


 *SECNO 402.000

 3301 HV CHANGED MORE THAN HVINS

    402.000      10.16     479.26        .00        .00     482.02       2.76       2.87        .32     473.40
    19000.0     3677.0     9405.6     5917.4      290.1      656.3      493.8      673.8      114.9     473.30
        .43      12.67      14.33      11.98       .030       .035       .030       .000     469.10    4918.14
    .006507       630.       631.       630.          2          0          0        .00     229.76    5147.90


 *SECNO 404.000

 3301 HV CHANGED MORE THAN HVINS


 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.68


 3470 ENCROACHMENT STATIONS=     4825.4     5214.4  TYPE=       1  TARGET=      389.000
    404.000      10.98     483.28        .00        .00     484.38       1.10       2.11        .25     478.70
    19000.0     9075.1     5307.7     4617.2      999.7      611.8      714.5      698.9      118.9     477.50
        .45       9.08       8.68       6.46       .030       .035       .030       .000     472.30    4832.24
    .002308       582.       592.       567.          2          0          0        .00     370.73    5202.96


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    18FEB98       16:28:25                                                                                   16


     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


 *SECNO 406.000
```

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 4515.1 5062.1 TYPE= 1 TARGET= 547.000

406.000	10.25	484.05	484.05	.00	487.38	3.32	1.77	.67	477.90
19000.0	8247.6	10677.5	74.8	583.4	709.9	12.2	717.9	121.9	480.40
.45	14.14	15.04	6.13	.030	.035	.030	.000	473.80	4839.86
.008163	258.	618.	595.	20	9	0	.00	204.22	5044.08

CCHV= .300 CEHV= .500
*SECNO 408.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.68

3470 ENCROACHMENT STATIONS= 4152.8 5040.2 TYPE= 1 TARGET= 887.400

408.000	13.52	488.62	.00	.00	488.88	.26	.58	.92	475.20
19000.0	15581.8	2931.9	486.3	4279.0	504.5	125.3	744.6	126.5	476.60
.48	3.64	5.81	3.88	.035	.035	.035	.000	475.10	4152.80
.000603	350.	445.	616.	2	0	0	.00	881.03	5033.83

*SECNO 408.500

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 4134.9 5016.7 TYPE= 1 TARGET= 881.800

408.500	11.20	488.60	.00	.00	488.94	.35	.02	.05	482.80
19000.0	17153.3	1846.7	.0	3652.5	374.8	.0	747.6	127.0	100000.00
.48	4.70	4.93	.00	.035	.035	.000	.000	477.40	4134.90
.000918	25.	51.	120.	2	0	0	.00	690.60	5016.70

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500
*SECNO 409.000
BTCARD, BRIDGE STENCL= 4134.90 STENCR= 5016.70

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 23 MIN ELTRD= 483.30 MAX ELLC= 479.90

3470 ENCROACHMENT STATIONS= 4134.9 5016.7 TYPE= 1 TARGET= 881.800

4677 BRIDGE DECK DEFINITION ERROR AT STATIONS 4983.20 4983.30
STALLION RANCH BRIDGE MODELED AS NORMAL BRIDGE. D/S FACE

409.000	11.19	488.59	.00	.00	488.95	.36	.00	.01	482.80
19000.0	17490.4	1509.6	.0	3648.2	299.5	.0	747.8	127.0	100000.00
.48	4.79	5.04	.00	.035	.017	.000	.000	477.40	4134.90
.000957	2.	2.	2.	9	0	0	-75.15	689.99	5016.70

*SECNO 410.000

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BTCARD, BRIDGE STENCL=    4134.90   STENCR=    5016.70

3265 DIVIDED FLOW


3370 NORMAL BRIDGE, NRD=  23 MIN ELTRD=   483.30 MAX ELLC=   479.90


3470 ENCROACHMENT STATIONS=     4134.9    5016.7  TYPE=      1  TARGET=       881.800

4677 BRIDGE DECK DEFINITION ERROR AT STATIONS    4983.20   4983.30
        STALLION RANCH BRIDGE MODELED AS NORMAL BRIDGE.  U/S FACE
   410.000     11.21     488.61       .00       .00    488.97       .36       .01       .00    482.80
   19000.0   17492.7     1507.3        .0    3665.8     300.4        .0     749.1     127.2 100000.00
       .48      4.77       5.02       .00      .035      .017      .000      .000    477.40   4134.90
   .000945       14.        14.       14.        11         0         0    -75.15    692.45   5016.70


*SECNO 411.000

3265 DIVIDED FLOW

1
   18FEB98      16:28:25                                                                         18


     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST



3470 ENCROACHMENT STATIONS=     4134.9    5016.7  TYPE=      1  TARGET=       881.800
   411.000     11.15     488.55       .00       .00    489.03       .48       .00       .06    482.80
   19000.0   15538.8     3461.2        .0    3622.1     373.3        .0     749.2     127.2 100000.00
       .48      4.29       9.27       .00      .035      .017      .000      .000    477.40   4134.90
   .000770        2.         2.        2.         2         0         0       .00    686.32   5016.70


*SECNO 411.500

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=     4134.9    5016.7  TYPE=      1  TARGET=       881.800
   411.500     11.18     488.58       .00       .00    489.05       .47       .02       .00    482.80
   19000.0   15549.6     3450.4        .0    3645.6     374.5        .0     751.3     127.6 100000.00
       .49      4.27       9.21       .00      .035      .017      .000      .000    477.40   4134.90
   .000758       20.        50.       80.         1         0         0       .00    689.63   5016.70


*SECNO 412.000

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4180.0    5251.4  TYPE=      1  TARGET=      1071.400
   412.000     12.27     489.97    489.97       .00    491.89      1.92       .32       .72    478.70
   19000.0    3587.9     3615.6   11796.4     411.1     235.6    1158.1     763.9     130.2    478.20
       .49      8.73      15.35     10.19      .035      .035      .035      .000    477.70   4180.00
   .004828      160.       194.      280.        20         9         0       .00    517.13   5251.40


*SECNO 414.000
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3265 DIVIDED FLOW

   414.000      14.70     491.70     491.30        .00     494.02       2.32       1.92        .20     482.40
   19000.0     1638.8     5750.3    11610.9      359.9      393.2      997.4      780.9      134.8     481.00
       .50       4.55      14.63      11.64       .035       .035       .035       .000     477.00    4452.50
   .004407       479.       488.       375.          4         11          0        .00     398.31    5136.00

1
   18FEB98      16:28:25                                                                                   19

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

*SECNO 416.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.60

   416.000      13.49     495.19        .00        .00     496.08        .89       1.64        .43     487.20
   19000.0     6098.0     7695.4     5206.6      873.6      891.2      797.9      811.7      139.9     489.10
       .52       6.98       8.64       6.53       .035       .035       .035       .000     481.70    4807.98
   .001728       565.       615.       664.          2          0          0        .00     338.90    5146.89

*SECNO 418.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .55

   418.000      11.24     496.54        .00        .00     498.37       1.83       1.82        .47     494.30
   19000.0     6365.0     7914.5     4720.6      784.6      629.2      431.6      843.4      145.6     487.50
       .54       8.11      12.58      10.94       .035       .035       .035       .000     485.30    4575.70
   .005763       620.       640.       625.          3          0          0        .00     466.02    5091.92

*SECNO 420.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.69

   420.000      13.79     500.09        .00        .00     500.96        .87       2.31        .29     493.50
   19000.0     9466.2     5838.8     3694.9     1410.9      645.4      564.9      880.8      153.0     493.60
       .57       6.71       9.05       6.54       .035       .035       .035       .000     486.30    4722.80
   .002012       761.       706.       690.          3          0          0        .00     407.00    5129.80

1
   18FEB98      16:28:25                                                                                   20

T1      CDOVES - COUNTY OF SAN DIEGO ZONE 2 - FEMA 100-YR FLOOD
T2      GEORGE S. NOLTE AND ASSOCIATES
T3      SAN DIEGO RIVER DECK 3

J1  ICHECK    INQ        NINV       IDIR       STRT       METRIC     HVINS      Q          WSEL       FQ

            3.                                                                            429.19
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J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15.		-1							

1
18FEB98 16:28:25 21

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 2
0

CCHV= .150 CEHV= .300
*SECNO 340.000

3470 ENCROACHMENT STATIONS= 4797.8 5304.6 TYPE= 1 TARGET= 506.800

340.000	13.19	429.19	.00	427.00	430.69	1.50	.00	.00	418.50
30600.0	8915.9	16460.0	5224.1	761.3	1756.1	699.8	.0	.0	418.20
.00	11.71	9.37	7.47	.028	.045	.028	.000	416.00	4797.85
.003177	781.	655.	670.	0	0	0	.00	506.75	5304.60

*SECNO 342.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.56

3470 ENCROACHMENT STATIONS= 4550.0 5228.7 TYPE= 1 TARGET= 678.700

342.000	12.75	431.55	.00	429.28	432.13	.58	1.30	.14	420.80
30600.0	5680.8	15672.5	9246.6	993.1	2661.3	1377.0	63.8	9.1	419.70
.03	5.72	5.89	6.71	.028	.045	.028	.000	418.80	4550.00
.001299	630.	694.	666.	2	0	0	.00	678.70	5228.70

*SECNO 344.000

3470 ENCROACHMENT STATIONS= 4550.0 5214.5 TYPE= 1 TARGET= 664.500

344.000	12.85	431.65	.00	429.38	432.27	.62	.13	.01	421.20
30600.0	17030.6	5306.2	8263.3	2533.8	1044.0	1348.2	77.2	11.0	421.30
.04	6.72	5.08	6.13	.028	.045	.028	.000	418.80	4550.00
.000937	180.	76.	95.	2	0	0	.00	664.50	5214.50

*SECNO 350.000

3470 ENCROACHMENT STATIONS= 4600.0 5323.6 TYPE= 1 TARGET= 723.600

350.000	11.43	431.63	.00	429.37	432.46	.83	.12	.06	423.00
30600.0	17505.5	9967.3	3127.2	2158.4	1566.1	608.1	88.3	12.6	421.30
.04	8.11	6.36	5.14	.028	.045	.028	.000	420.20	4600.00
.001605	85.	138.	105.	2	0	0	.00	673.40	5273.40

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

```
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4830.0    5186.9  TYPE=      1  TARGET=      356.900
   360.000       9.89     443.09     443.09     441.12     446.57       3.48       2.29        .78     435.80
   30600.0    14678.3    12631.9     3289.9      862.4     1002.8      242.8      296.8       39.9     437.40
       .12      17.02      12.60      13.55       .028       .040       .028       .000     433.20    4830.00
   .007534       750.       651.       657.         20         11          0        .00     304.82    5142.95


*SECNO 362.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.80


3470 ENCROACHMENT STATIONS=     4792.6    5224.9  TYPE=      1  TARGET=      432.300
   362.000      13.77     447.87        .00     445.55     449.50       1.63       2.65        .28     437.60
   30600.0    13153.1    10078.1     7368.8     1159.5     1091.9      773.5      337.5       45.0     438.70
       .14      11.34       9.23       9.53       .028       .040       .028       .000     434.10    4814.34
   .002336       681.       687.       712.          2          0          0        .00     335.40    5149.74


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   18FEB98      16:28:25                                                                                24


   SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
   Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
   TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
   SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 364.000

3470 ENCROACHMENT STATIONS=     4916.8    5351.6  TYPE=      1  TARGET=      434.800
   364.000      12.29     450.09        .00     447.82     451.65       1.56       2.14        .01     444.00
   30600.0     1404.3    12479.1    16716.6      154.7     1366.7     1557.8      391.4       51.8     445.50
       .16       9.08       9.13      10.73       .028       .040       .028       .000     437.80    4916.80
   .003354       770.       785.       754.          3          0          0        .00     434.80    5351.60


*SECNO 366.000

3470 ENCROACHMENT STATIONS=     4811.2    5333.5  TYPE=      1  TARGET=      522.300
   366.000      10.79     452.89        .00     451.29     454.75       1.86       3.01        .09     448.20
   30600.0     7981.0     2792.1    19826.9      725.5      337.1     1766.1      446.9       60.8     446.30
       .18      11.00       8.28      11.23       .028       .040       .028       .000     442.10    4811.20
   .004030       773.       782.       848.          2          0          0        .00     522.30    5333.50


*SECNO 368.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.88


3470 ENCROACHMENT STATIONS=     4649.4    5299.6  TYPE=      1  TARGET=      650.200
   368.000      12.06     454.86        .00     452.98     455.64        .78        .74        .16     445.80
   30600.0    12965.1     4219.7    13415.2     1738.9      699.6     1898.6      478.0       65.5     444.20
       .20       7.46       6.03       7.07       .028       .040       .028       .000     442.80    4737.85
   .001140       419.       377.       353.          2          0          0        .00     561.75    5299.60


*SECNO 370.000

3301 HV CHANGED MORE THAN HVINS
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3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    4821.5    5172.0  TYPE=     1  TARGET=     350.500
   370.000     10.91    455.91    455.91    454.22    459.07      3.16      1.18       .71    448.00
   30200.0   15648.5    7517.1    7034.4     967.2     600.0     635.9     518.6      71.2    450.50
       .21     16.18     12.53     11.06      .028      .040      .028      .000    445.00   4824.67
   .006144      462.      538.      627.        20        15         0       .00    344.25   5168.93
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   18FEB98      16:28:25                                                                        25

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 370.100

3265 DIVIDED FLOW


3370 NORMAL BRIDGE, NRD=  37 MIN ELTRD=   457.50 MAX ELLC=   459.50

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    4821.5    5172.0  TYPE=     1  TARGET=     350.500
   370.100     11.15    456.15    456.15    454.39    459.47      3.32       .01       .05    448.00
   30200.0   15424.1    7223.3    7552.6     931.6     586.8     615.4     518.7      71.2    459.50
       .21     16.56     12.31     12.27      .028      .040      .028      .000    445.00   4824.21
   .008799        2.        2.        2.        20        12         0       .00    321.17   5169.38

*SECNO 370.200

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS


3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=   457.50 MAX ELLC=   459.50


3470 ENCROACHMENT STATIONS=    4821.5    5172.0  TYPE=     1  TARGET=     350.500
   370.200     11.82    457.12       .00    455.18    459.85      2.73       .29       .09    448.30
   30200.0   15146.9    6934.3    8118.8    1012.8     628.3     707.2     520.7      71.5    459.80
       .21     14.96     11.04     11.48      .028      .040      .028      .000    445.30   4822.88
   .006653       38.       38.       38.         6         0         0       .00    323.79   5170.67

*SECNO 370.300

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.61
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   18FEB98      16:28:25                                                                        26

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST
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3470 ENCROACHMENT STATIONS=     4821.5     5172.0  TYPE=       1  TARGET=       350.500
   370.300     12.91    458.21       .00    455.96    460.00      1.78       .01       .14    448.30
   30200.0   14851.4    6791.9    8556.7    1228.2     732.5     936.7     520.8      71.5    450.80
       .21     12.09      9.27      9.14      .028      .040      .028      .000    445.30   4821.50
   .002579        2.        2.        2.         4         0         0       .00    350.50   5172.00


CCHV=      .150 CEHV=      .300
*SECNO 372.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     4854.5     5270.9  TYPE=       1  TARGET=       416.400
   372.000     12.41    460.41       .00    458.07    461.41      1.00      1.30       .12    450.90
   30200.0    1723.4   24020.1    4456.6     177.0    3112.6     504.3     560.8      76.2    453.50
       .22      9.74      7.72      8.84      .028      .045      .028      .000    448.00   4854.50
   .002456      422.      513.      638.         2         0         0       .00    413.46   5267.96


*SECNO 374.000

3470 ENCROACHMENT STATIONS=     4863.0     5260.2  TYPE=       1  TARGET=       397.200
   374.000     12.02    461.42       .00    459.23    462.91      1.49      1.36       .15    453.50
   30200.0     413.0   10855.6   18931.4      68.6    1378.4    1751.9     604.4      81.2    452.00
       .24      6.02      7.88     10.81      .028      .045      .028      .000    449.40   4863.00
   .002558      562.      549.      530.         2         0         0       .00    391.21   5254.21


*SECNO 376.000

3470 ENCROACHMENT STATIONS=     4843.9     5225.3  TYPE=       1  TARGET=       381.400
   376.000      9.98    463.08       .00    460.96    464.70      1.62      1.74       .04    455.00
   30200.0     417.5   24811.0    4971.5      51.0    2560.3     395.5     641.1      85.7    455.00
       .25      8.18      9.69     12.57      .028      .045      .028      .000    453.10   4855.97
   .004640      520.      508.      530.         2         0         0       .00    365.54   5221.51


*SECNO 378.000

3470 ENCROACHMENT STATIONS=     4746.2     5134.9  TYPE=       1  TARGET=       388.700
   378.000     10.01    466.21       .00    464.02    467.47      1.26      2.72       .05    456.20
   30200.0     770.6   28914.1     515.3      88.9    3194.7      66.2     689.4      91.2    457.80
       .27      8.67      9.05      7.78      .028      .045      .028      .000    456.20   4763.73
   .003745      665.      686.      353.         2         0         0       .00    370.62   5134.35


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   18FEB98       16:28:25                                                                      27


     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 380.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     4739.4     5109.6  TYPE=       1  TARGET=       370.200
   380.000      9.32    466.32       .00    464.20    468.11      1.79       .48       .16    459.00
   30200.0     755.0   22877.0    6568.0      90.3    2395.9     457.9     697.8      92.2    457.80
       .28      8.36      9.55     14.34      .028      .045      .028      .000    457.00   4745.05
   .004657      145.      116.      110.         2         0         0       .00    359.86   5104.90


*SECNO 390.000
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 3470 ENCROACHMENT STATIONS=     4788.8     5140.0  TYPE=        1   TARGET=       351.200
   390.000        9.68      466.68         .00      464.63      468.63       1.95        .47         .05      457.90
   30200.0     10897.7      8732.1     10570.2       895.9      1048.8      865.8      705.4        93.1      458.60
       .28       12.16        8.33       12.21        .028        .045       .028       .000      457.00     4801.20
   .003272         80.         98.        190.           2           0          0        .00      338.80     5140.00

*SECNO 392.000

 3470 ENCROACHMENT STATIONS=     4851.1     5188.0  TYPE=        1   TARGET=       336.900
   392.000        9.12      467.22         .00      465.28      469.61       2.39        .85         .13      459.80
   30200.0      9297.8     20191.5       710.7       599.5      1878.6       70.3      717.4        94.6      458.30
       .29       15.51       10.75       10.12        .028        .045       .028       .000      458.10     4866.46
   .005956        159.        156.        370.           2           0          0        .00      314.88     5181.34

*SECNO 394.000

3301 HV CHANGED MORE THAN HVINS


 3470 ENCROACHMENT STATIONS=     4750.0     5221.8  TYPE=        1   TARGET=       471.800
   394.000        9.54      471.74         .00      469.60      473.48       1.73       3.77         .10      462.90
   30200.0      3454.8      9143.5     17601.7       401.0      1107.2     1480.2      772.9       102.3      463.30
       .31        8.62        8.26       11.89        .028        .045       .028       .000      462.20     4768.38
   .003261       1037.        891.        736.           2           0          0        .00      441.97     5210.35

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    18FEB98       16:28:25
                                                                                                          28

    SECNO       DEPTH       CWSEL       CRIWS       WSELK       EG          HV          HL          OLOSS       L-BANK ELEV
    Q           QLOB        QCH         QROB        ALOB        ACH         AROB        VOL         TWA         R-BANK ELEV
    TIME        VLOB        VCH         VROB        XNL         XNCH        XNR         WTN         ELMIN       SSTA
    SLOPE       XLOBL       XLCH        XLOBR       ITRIAL      IDC         ICONT       CORAR       TOPWID      ENDST

*SECNO 396.000

 3470 ENCROACHMENT STATIONS=     4766.6     5161.5  TYPE=        1   TARGET=       394.900
   396.000        9.64      474.24         .00      472.44      476.07       1.83       2.57         .03      466.00
   30200.0     14122.5      8813.0      7264.5      1208.1      1039.8      621.6      823.8       109.6      466.30
       .33       11.69        8.48       11.69        .028        .045       .028       .000      464.60     4776.90
   .003596        928.        772.        610.           3           0          0        .00      384.60     5161.50

CCHV=      .150 CEHV=       .300
*SECNO 398.000

3301 HV CHANGED MORE THAN HVINS


 3470 ENCROACHMENT STATIONS=     4771.1     5078.8  TYPE=        1   TARGET=       307.700
   398.000       11.36      476.66         .00      474.96      479.81       3.15       3.34         .40      467.10
   30200.0     18988.8      9663.8      1547.4      1291.8       704.9      132.4      865.9       115.2      466.60
       .34       14.70       13.71       11.69        .030        .040       .030       .000      465.30     4793.94
   .005856        784.        695.        660.           2           0          0        .00      270.86     5064.81

*SECNO 400.000

3301 HV CHANGED MORE THAN HVINS


 3470 ENCROACHMENT STATIONS=     4957.1     5225.5  TYPE=        1   TARGET=       268.400
   400.000       12.43      479.53         .00      477.14      481.85       2.32       1.91         .13      471.10
   29800.0       193.2      7594.4     22012.4        33.7       620.4     1797.7      889.3       117.9      468.40
       .35        5.73       12.24       12.24        .030        .035       .030       .000      467.10     4958.40
   .003230        550.        448.        368.           3           0          0        .00      263.16     5221.56
```

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*SECNO 402.000

3301 HV CHANGED MORE THAN HVINS

   402.000      12.36     481.46    481.42    479.26    484.89      3.43      2.71       .33    473.40
   29800.0     6036.8    13165.4   10597.8     409.0     823.0     793.4     921.6     122.0    473.30
       .36      14.76      16.00     13.36      .030      .035      .030      .000    469.10   4914.95
   .005993       630.       631.      630.         6         5         0       .00    301.92   5216.87
```



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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 404.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.73


3470 ENCROACHMENT STATIONS=     4825.4     5214.4  TYPE=       1  TARGET=       389.000
   404.000      13.42     485.72       .00    483.28    487.07      1.35      1.87       .31    478.70
   29800.0    13516.7     7393.4    8889.8    1342.4     778.1    1127.7     956.7     126.6    477.50
       .38      10.07       9.50      7.88      .030      .035      .030      .000    472.30   4826.89
   .002009       582.       592.      567.         3         0         0       .00    386.73   5213.62


*SECNO 406.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     4515.1     5062.1  TYPE=       1  TARGET=       547.000
   406.000      13.75     487.55    487.55    484.05    490.14      2.59      1.28       .37    477.90
   29800.0    14819.1    14648.4     332.5    1282.3    1027.1      46.8     985.3     130.7    480.40
       .39      11.56      14.26      7.11      .030      .035      .030      .000    473.80   4515.10
   .004486       258.       618.      595.        20         8         0       .00    535.38   5050.48


CCHV=      .300 CEHV=      .500
*SECNO 408.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.88


3470 ENCROACHMENT STATIONS=     4152.8     5040.2  TYPE=       1  TARGET=       887.400
   408.000      15.89     490.99       .00    488.62    491.29       .30       .46       .69    475.20
   29800.0    25448.6     3651.8     699.6    6236.6     595.4     170.3    1025.4     136.6    476.60
       .42       4.08       6.13      4.11      .035      .035      .035      .000    475.10   4152.80
   .000539       350.       445.      616.         2         0         0       .00    883.47   5036.27
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
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     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 *SECNO 408.500

 3470 ENCROACHMENT STATIONS=     4134.9     5016.7  TYPE=      1  TARGET=        881.800
    408.500     13.57    490.97       .00    488.60    491.35       .38       .02       .04    482.80
    29800.0   27492.1    2307.9        .0    5569.7     454.2        .0    1029.6     137.2 100000.00
        .42      4.94      5.08       .00      .035      .035      .000      .000    477.40   4134.90
    .000804       25.       51.      120.         2         0         0       .00    881.80   5016.70

 CCHV=     .300 CEHV=      .500
 *SECNO 409.000
 BTCARD, BRIDGE STENCL=    4134.90   STENCR=     5016.70

 3370 NORMAL BRIDGE, NRD=  23 MIN ELTRD=   483.30 MAX ELLC=   479.90

 3470 ENCROACHMENT STATIONS=     4134.9     5016.7  TYPE=      1  TARGET=        881.800

 4677 BRIDGE DECK DEFINITION ERROR AT STATIONS     4983.20   4983.30
        STALLION RANCH BRIDGE MODELED AS NORMAL BRIDGE.  D/S FACE
    409.000     13.56    490.96       .00    488.59    491.35       .39       .00       .01    482.80
    29800.0   27759.6    2040.4        .0    5565.4     378.9        .0    1029.9     137.2 100000.00
        .42      4.99      5.39       .00      .035      .017      .000      .000    477.40   4134.90
    .000819        2.        2.        2.         8         0         0    -75.15    881.80   5016.70

 *SECNO 410.000
 BTCARD, BRIDGE STENCL=    4134.90   STENCR=     5016.70

 3370 NORMAL BRIDGE, NRD=  23 MIN ELTRD=   483.30 MAX ELLC=   479.90

 3470 ENCROACHMENT STATIONS=     4134.9     5016.7  TYPE=      1  TARGET=        881.800

 4677 BRIDGE DECK DEFINITION ERROR AT STATIONS     4983.20   4983.30
        STALLION RANCH BRIDGE MODELED AS NORMAL BRIDGE.  U/S FACE
    410.000     13.58    490.98       .00    488.61    491.37       .39       .01       .00    482.80
    29800.0   27761.5    2038.5        .0    5578.5     379.4        .0    1031.8     137.5 100000.00
        .42      4.98      5.37       .00      .035      .017      .000      .000    477.40   4134.90
    .000814       14.       14.       14.        11         0         0    -75.15    881.80   5016.70

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   18FEB98       16:28:25
                                                                                                 31

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 *SECNO 411.000

 3470 ENCROACHMENT STATIONS=     4134.9     5016.7  TYPE=      1  TARGET=        881.800
    411.000     13.52    490.92       .00    488.55    491.42       .50       .00       .05    482.80
    29800.0   25393.2    4406.9        .0    5533.9     452.8        .0    1032.1     137.6 100000.00
        .42      4.59      9.73       .00      .035      .017      .000      .000    477.40   4134.90
    .000698        2.        2.        2.         2         0         0       .00    881.80   5016.70

 *SECNO 411.500

 3470 ENCROACHMENT STATIONS=     4134.9     5016.7  TYPE=      1  TARGET=        881.800
    411.500     13.55    490.95       .00    488.58    491.44       .49       .02       .00    482.80
    29800.0   25404.6    4395.4        .0    5560.4     453.8        .0    1035.1     138.0 100000.00
        .42      4.57      9.68       .00      .035      .017      .000      .000    477.40   4134.90
    .000689       20.       50.       80.         1         0         0       .00    881.80   5016.70
```

*SECNO 412.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 4180.0 5251.4 TYPE= 1 TARGET= 1071.400

412.000	14.07	491.77	491.77	489.97	493.63	1.85	.28	.68	478.70
29800.0	7970.1	4363.5	17466.3	1247.3	271.2	1592.3	1054.4	141.8	478.20
.43	6.39	16.09	10.97	.035	.035	.035	.000	477.70	4180.00
.004399	160.	194.	280.	20	8	0	.00	1016.39	5251.40

*SECNO 414.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

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18FEB98 16:28:25 32

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 4452.5 5136.0 TYPE= 1 TARGET= 683.500

414.000	16.79	493.79	493.79	491.70	496.23	2.44	1.79	.29	482.40
29400.0	6124.5	7193.1	16082.4	1057.1	459.8	1250.7	1083.3	150.5	481.00
.43	5.79	15.65	12.86	.035	.035	.035	.000	477.00	4452.50
.004093	479.	488.	375.	3	11	0	.00	633.21	5136.00

*SECNO 416.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.44

3470 ENCROACHMENT STATIONS= 4643.5 5146.1 TYPE= 1 TARGET= 502.600

416.000	15.45	497.15	.00	495.19	498.32	1.18	1.71	.38	487.20
29400.0	10356.0	10798.5	8245.5	1431.9	1049.2	1019.6	1127.4	158.2	489.10
.46	7.23	10.29	8.09	.035	.035	.035	.000	481.70	4643.50
.001975	565.	615.	664.	3	0	0	.00	502.60	5146.10

*SECNO 418.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .66

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3470 ENCROACHMENT STATIONS=      4575.7     5101.5  TYPE=       1  TARGET=        525.800
   418.000      13.32     498.62        .00     496.54     500.44       1.83       1.79        .33     494.30
   29400.0    12347.8    10350.1     6702.1     1474.3      796.6      595.9     1173.3      165.5     487.50
       .47       8.38      12.99      11.25       .035       .035       .035       .000     485.30    4575.70
   .004489       620.       640.     . 625.          2          0          0        .00     516.24    5099.70
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1
   18FEB98       16:28:25                                                                              33
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST
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*SECNO 420.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      4722.8     5129.8  TYPE=       1  TARGET=        407.000
   420.000      15.37     501.67        .00     500.09     502.99       1.32     .  2.39        .15     493.50
   29400.0    15298.3     8193.0     5908.7     1818.8      740.5      706.5     1224.8      173.3     493.60
       .49       8.41      11.06       8.36       .035       .035       .035       .000     486.30    4722.80
   .002504       761.       706.       690.          2          0          0        .00     407.00    5129.80
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1
   18FEB98       16:28:25                                                                              34
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                                                      EXECUTED 18FEB98    16:28:27
************************************
 HEC-2 WATER SURFACE PROFILES

 Version    4.6.2;  May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

UPPER SAN DIEGO RIVER 10

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.0
	340.000	.00	.00	.00	416.00	19000.00	427.00	.00	428.19	32.67	8.24	2199.18	3324.
	340.000	.00	.00	.00	416.00	30600.00	429.19	.00	430.69	31.77	9.37	3217.22	5429.2
*	342.000	694.20	.00	.00	418.80	19000.00	429.28	.00	429.72	14.76	5.38	3543.83	4945.
*	342.000	694.20	.00	.00	418.80	30600.00	431.55	.00	432.13	12.99	5.89	5031.39	8491.
	344.000	75.50	.00	.00	418.80	19000.00	429.38	.00	429.88	9.88	4.50	3465.83	6043.6
	344.000	75.50	.00	.00	418.80	30600.00	431.65	.00	432.27	9.37	5.08	4926.06	9999.1
	350.000	138.00	.00	.00	420.20	19000.00	429.37	.00	430.08	19.49	5.97	2887.53	4303.
	350.000	138.00	.00	.00	420.20	30600.00	431.63	.00	432.46	16.05	6.36	4332.64	7637.
	352.000	73.80	.00	.00	419.80	19000.00	429.20	.00	430.49	26.22	7.03	2240.22	3710.7
	352.000	73.80	.00	.00	419.80	30600.00	431.03	.00	433.04	31.54	8.98	2871.25	5448.
	354.000	555.40	.00	.00	422.60	19000.00	431.19	.00	432.13	30.20	7.87	2441.96	3457.
	354.000	555.40	.00	.00	422.60	30600.00	433.52	.00	434.90	30.86	9.51	3253.37	5508.6
*	356.000	695.20	.00	.00	424.80	19000.00	433.41	.00	435.22	63.33	10.25	1778.75	2387.
	356.000	695.20	.00	.00	424.80	30600.00	435.50	.00	437.91	55.60	11.57	2507.17	4103.

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CAUTION SECNO=    370.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    370.100  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    370.100  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    370.100  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    370.100  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    370.100  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    370.100  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=    370.300  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    370.300  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    404.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    404.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    406.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    406.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    406.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    406.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    406.000  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    406.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=    408.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    408.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
1
   18FEB98      16:28:25                                                          41

CAUTION SECNO=    409.000  PROFILE=  1  BRIDGE DECK DEFINITION ERROR
CAUTION SECNO=    409.000  PROFILE=  2  BRIDGE DECK DEFINITION ERROR

CAUTION SECNO=    410.000  PROFILE=  1  BRIDGE DECK DEFINITION ERROR
CAUTION SECNO=    410.000  PROFILE=  2  BRIDGE DECK DEFINITION ERROR

CAUTION SECNO=    412.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    412.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    412.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    412.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    412.000  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    412.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    414.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    414.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    416.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    416.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    418.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    418.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    420.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	358.000	930.00	.00	.00	429.40	19000.00	437.78	.00	438.45	21.30	6.27	2903.56	4116.69
*	358.000	930.00	.00	.00	429.40	30600.00	439.93	.00	440.82	18.70	7.03	4079.09	7075.30
*	360.000	651.40	.00	.00	433.20	19000.00	441.12	441.12	443.72	84.81	10.99	1517.59	2063.17
*	360.000	651.40	.00	.00	433.20	30600.00	443.09	443.09	446.57	75.34	12.60	2108.03	3525.30
*	362.000	686.50	.00	.00	434.10	19000.00	445.55	.00	446.68	23.02	7.91	2258.31	3959.99
*	362.000	686.50	.00	.00	434.10	30600.00	447.87	.00	449.50	23.36	9.23	3024.89	6331.47
	364.000	785.30	.00	.00	437.80	19000.00	447.82	.00	449.11	43.80	8.55	2094.66	2870.88
	364.000	785.30	.00	.00	437.80	30600.00	450.09	.00	451.65	33.54	9.13	3079.15	5283.37

1
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	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	366.000	781.80	.00	.00	442.10	19000.00	451.29	.00	452.68	42.61	7.12	2030.46	2910.56
	366.000	781.80	.00	.00	442.10	30600.00	452.89	.00	454.75	40.30	8.28	2828.72	4820.35
*	368.000	376.60	.00	.00	442.80	19000.00	452.98	.00	453.50	10.16	5.00	3284.06	5959.41
*	368.000	376.60	.00	.00	442.80	30600.00	454.86	.00	455.64	11.40	6.03	4337.04	9062.73
*	370.000	538.00	.00	.00	445.00	19000.00	454.22	454.22	456.59	62.17	10.98	1625.98	2409.72
*	370.000	538.00	.00	.00	445.00	30200.00	455.91	455.91	459.07	61.44	12.53	2203.01	3852.87
*	370.100	2.00	457.50	459.50	445.00	19000.00	454.39	454.39	456.87	84.20	10.93	1575.01	2070.59
*	370.100	2.00	457.50	459.50	445.00	30200.00	456.15	456.15	459.47	87.99	12.31	2133.87	3219.52
	370.200	38.00	457.50	459.50	445.30	19000.00	455.18	.00	457.21	63.99	9.82	1731.93	2375.24
	370.200	38.00	457.50	459.50	445.30	30200.00	457.12	.00	459.85	66.53	11.04	2348.23	3702.57
*	370.300	2.00	.00	.00	445.30	19000.00	455.96	.00	457.32	27.62	8.24	2115.32	3615.27
*	370.300	2.00	.00	.00	445.30	30200.00	458.21	.00	460.00	25.79	9.27	2897.30	5946.23
	372.000	512.70	.00	.00	448.00	19000.00	458.07	.00	458.77	25.69	6.64	2832.62	3748.89
	372.000	512.70	.00	.00	448.00	30200.00	460.41	.00	461.41	24.56	7.72	3793.94	6093.82
	374.000	548.50	.00	.00	449.40	19000.00	459.23	.00	460.29	26.40	6.81	2367.54	3697.69
	374.000	548.50	.00	.00	449.40	30200.00	461.42	.00	462.91	25.58	7.88	3198.88	5970.68
	376.000	508.30	.00	.00	453.10	19000.00	460.96	.00	462.11	47.51	8.19	2246.55	2756.58
	376.000	508.30	.00	.00	453.10	30200.00	463.08	.00	464.70	46.40	9.69	3006.80	4433.64
	378.000	686.10	.00	.00	456.20	19000.00	464.02	.00	464.88	36.54	7.49	2542.65	3143.25
	378.000	686.10	.00	.00	456.20	30200.00	466.21	.00	467.47	37.45	9.05	3349.83	4934.86
	380.000	115.50	.00	.00	457.00	19000.00	464.20	.00	465.49	47.88	8.04	2193.70	2745.97
	380.000	115.50	.00	.00	457.00	30200.00	466.32	.00	468.11	46.57	9.55	2944.07	4425.61
	390.000	97.80	.00	.00	457.00	19000.00	464.63	.00	465.98	32.58	7.03	2121.80	3328.98
	390.000	97.80	.00	.00	457.00	30200.00	466.68	.00	468.63	32.72	8.33	2810.48	5279.25
	392.000	156.00	.00	.00	458.10	19000.00	465.28	.00	466.89	57.92	8.95	1941.92	2496.60
	392.000	156.00	.00	.00	458.10	30200.00	467.22	.00	469.61	59.56	10.75	2548.34	3913.22
	394.000	890.90	.00	.00	462.20	19000.00	469.60	.00	470.95	37.50	7.42	2121.46	3102.58
	394.000	890.90	.00	.00	462.20	30200.00	471.74	.00	473.48	32.61	8.26	2988.43	5288.42
	396.000	771.80	.00	.00	464.60	19000.00	472.44	.00	473.68	35.38	7.22	2179.36	3194.46
	396.000	771.80	.00	.00	464.60	30200.00	474.24	.00	476.07	35.96	8.48	2869.43	5035.84
	398.000	694.90	.00	.00	465.30	19000.00	474.96	.00	476.97	49.25	11.19	1680.11	2707.31
	398.000	694.90	.00	.00	465.30	30200.00	476.66	.00	479.81	58.56	13.71	2129.07	3946.33
	400.000	448.00	.00	.00	467.10	19000.00	477.14	.00	478.82	33.70	10.71	1831.08	3273.16
	400.000	448.00	.00	.00	467.10	29800.00	479.53	.00	481.85	32.30	12.24	2451.84	5243.38

1
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	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	402.000	630.60	.00	.00	469.10	19000.00	479.26	.00	482.02	65.07	14.33	1440.23	2355.3
	402.000	630.60	.00	.00	469.10	29800.00	481.46	481.42	484.89	59.93	16.00	2025.39	3849.3
*	404.000	592.30	.00	.00	472.30	19000.00	483.28	.00	484.38	23.08	8.68	2325.96	3955.1
*	404.000	592.30	.00	.00	472.30	29800.00	485.72	.00	487.07	20.09	9.50	3248.23	6648.9

•	406.000	617.70	.00	.00	473.80	19000.00	484.05	484.05	487.38	81.63	15.04	1305.53	2103.00
•	406.000	617.70	.00	.00	473.80	29800.00	487.55	487.55	490.14	44.86	14.26	2356.10	4449.32
•	408.000	445.30	.00	.00	475.10	19000.00	488.62	.00	488.88	6.03	5.81	4908.84	7734.40
•	408.000	445.30	.00	.00	475.10	29800.00	490.99	.00	491.29	5.39	6.13	7002.33	12835.57
	408.500	51.00	.00	.00	477.40	19000.00	488.60	.00	488.94	9.18	4.93	4027.33	6272.61
	408.500	51.00	.00	.00	477.40	29800.00	490.97	.00	491.35	8.04	5.08	6023.89	10512.49
•	409.000	2.00	483.30	479.90	477.40	19000.00	488.59	.00	488.95	9.57	5.04	3947.65	6142.70
•	409.000	2.00	483.30	479.90	477.40	29800.00	490.96	.00	491.35	8.19	5.39	5944.33	10409.8
•	410.000	14.00	483.30	479.90	477.40	19000.00	488.61	.00	488.97	9.45	5.02	3966.13	6181.70
•	410.000	14.00	483.30	479.90	477.40	29800.00	490.98	.00	491.37	8.14	5.37	5957.95	10442.63
	411.000	2.00	.00	.00	477.40	19000.00	488.55	.00	489.03	7.70	9.27	3995.33	6846.8
	411.000	2.00	.00	.00	477.40	29800.00	490.92	.00	491.42	6.98	9.73	5986.68	11281.9
	411.500	50.00	.00	.00	477.40	19000.00	488.58	.00	489.05	7.58	9.21	4020.09	6901.99
	411.500	50.00	.00	.00	477.40	29800.00	490.95	.00	491.44	6.89	9.68	6014.23	11350.4
•	412.000	193.80	.00	.00	477.70	19000.00	489.97	489.97	491.89	48.28	15.35	1804.80	2734.34
•	412.000	193.80	.00	.00	477.70	29800.00	491.77	491.77	493.63	43.99	16.09	3110.79	4492.81
	414.000	488.30	.00	.00	477.00	19000.00	491.70	491.30	494.02	44.07	14.63	1750.46	2862.1
•	414.000	488.30	.00	.00	477.00	29400.00	493.79	493.79	496.23	40.93	15.65	2767.52	4595.6
•	416.000	615.00	.00	.00	481.70	19000.00	495.19	.00	496.08	17.28	8.64	2562.69	4570.77
•	416.000	615.00	.00	.00	481.70	29400.00	497.15	.00	498.32	19.75	10.29	3500.67	6616.04
•	418.000	640.00	.00	.00	485.30	19000.00	496.54	.00	498.37	57.63	12.58	1845.42	2502.8
•	418.000	640.00	.00	.00	485.30	29400.00	498.62	.00	500.44	44.89	12.99	2866.87	4388.0
•	420.000	705.70	.00	.00	486.30	19000.00	500.09	.00	500.96	20.12	9.05	2621.25	4236.01
	420.000	705.70	.00	.00	486.30	29400.00	501.67	.00	502.99	25.04	11.06	3265.82	5875.07

UPPER SAN DIEGO RIVER 10

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	340.000	19000.00	427.00	.00	.00	.00	381.75	.00
	340.000	30600.00	429.19	2.19	.00	2.19	506.75	.00
•	342.000	19000.00	429.28	.00	2.28	.00	601.25	694.20
•	342.000	30600.00	431.55	2.27	2.36	2.27	678.70	694.20
	344.000	19000.00	429.38	.00	.11	.00	584.62	75.50
	344.000	30600.00	431.65	2.27	.11	2.27	664.50	75.50
	350.000	19000.00	429.37	.00	-.01	.00	591.91	138.00
	350.000	30600.00	431.63	2.25	-.03	2.25	673.40	138.00
	352.000	19000.00	429.20	.00	-.17	.00	335.10	73.80
	352.000	30600.00	431.03	1.83	-.59	1.83	356.25	73.80
	354.000	19000.00	431.19	.00	1.99	.00	345.35	555.40
	354.000	30600.00	433.52	2.33	2.48	2.33	350.60	555.40
•	356.000	19000.00	433.41	.00	2.22	.00	331.67	695.20
	356.000	30600.00	435.50	2.09	1.98	2.09	364.45	695.20
•	358.000	19000.00	437.78	.00	4.37	.00	542.87	930.00
•	358.000	30600.00	439.93	2.15	4.43	2.15	549.87	930.00
•	360.000	19000.00	441.12	.00	3.34	.00	296.27	651.40
•	360.000	30600.00	443.09	1.97	3.16	1.97	304.82	651.40
•	362.000	19000.00	445.55	.00	4.42	.00	324.54	686.50
•	362.000	30600.00	447.87	2.32	4.78	2.32	335.40	686.50

	364.000	19000.00	447.82	.00	2.28	.00	431.93	785.30
	364.000	30600.00	450.09	2.27	2.22	2.27	434.80	785.30
	366.000	19000.00	451.29	.00	3.46	.00	488.06	781.80
	366.000	30600.00	452.89	1.60	2.80	1.60	522.30	781.80
*	368.000	19000.00	452.98	.00	1.69	.00	557.05	376.60
*	368.000	30600.00	454.86	1.88	1.97	1.88	561.75	376.60
*	370.000	19000.00	454.22	.00	1.24	.00	337.59	538.00
*	370.000	30200.00	455.91	1.69	1.05	1.69	344.25	538.00
*	370.100	19000.00	454.39	.00	.17	.00	314.25	2.00
*	370.100	30200.00	456.15	1.76	.23	1.76	321.17	2.00
	370.200	19000.00	455.18	.00	.79	.00	316.21	38.00
	370.200	30200.00	457.12	1.94	.97	1.94	323.79	38.00

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	370.300	19000.00	455.96	.00	.78	.00	343.25	2.00
*	370.300	30200.00	458.21	2.25	1.09	2.25	350.50	2.00
	372.000	19000.00	458.07	.00	2.11	.00	408.11	512.70
	372.000	30200.00	460.41	2.34	2.20	2.34	413.46	512.70
	374.000	19000.00	459.23	.00	1.16	.00	363.29	548.50
	374.000	30200.00	461.42	2.20	1.01	2.20	391.21	548.50
	376.000	19000.00	460.96	.00	1.74	.00	353.53	508.30
	376.000	30200.00	463.08	2.11	1.65	2.11	365.54	508.30
	378.000	19000.00	464.02	.00	3.05	.00	362.58	686.10
	378.000	30200.00	466.21	2.19	3.13	2.19	370.62	686.10
	380.000	19000.00	464.20	.00	.19	.00	348.71	115.50
	380.000	30200.00	466.32	2.12	.11	2.12	359.86	115.50
	390.000	19000.00	464.63	.00	.43	.00	332.15	97.80
	390.000	30200.00	466.68	2.05	.36	2.05	338.80	97.80
	392.000	19000.00	465.28	.00	.65	.00	309.36	156.00
	392.000	30200.00	467.22	1.94	.55	1.94	314.88	156.00
	394.000	19000.00	469.60	.00	4.32	.00	375.29	890.90
	394.000	30200.00	471.74	2.14	4.52	2.14	441.97	890.90
	396.000	19000.00	472.44	.00	2.83	.00	378.67	771.80
	396.000	30200.00	474.24	1.81	2.50	1.81	384.60	771.80
	398.000	19000.00	474.96	.00	2.52	.00	259.16	694.90
	398.000	30200.00	476.66	1.69	2.41	1.69	270.86	694.90
	400.000	19000.00	477.14	.00	2.18	.00	256.33	448.00
	400.000	29800.00	479.53	2.39	2.87	2.39	263.16	448.00
	402.000	19000.00	479.26	.00	2.12	.00	229.76	630.60
	402.000	29800.00	481.46	2.20	1.93	2.20	301.92	630.60
*	404.000	19000.00	483.28	.00	4.02	.00	370.73	592.30
*	404.000	29800.00	485.72	2.44	4.26	2.44	386.73	592.30
*	406.000	19000.00	484.05	.00	.77	.00	204.22	617.70
*	406.000	29800.00	487.55	3.50	1.83	3.50	535.38	617.70
*	408.000	19000.00	488.62	.00	4.57	.00	881.03	445.30
*	408.000	29800.00	490.99	2.37	3.44	2.37	883.47	445.30

408.500	19000.00	488.60	.00	-.02	.00	690.60	51.00
408.500	29800.00	490.97	2.37	-.02	2.37	881.80	51.00

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SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
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* 409.000	29800.00	490.96	2.37	.00	2.37	881.80	2.00
* 410.000	19000.00	488.61	.00	.02	.00	692.45	14.00
* 410.000	29800.00	490.98	2.37	.01	2.37	881.80	14.00
411.000	19000.00	488.55	.00	-.06	.00	686.32	2.00
411.000	29800.00	490.92	2.37	-.05	2.37	881.80	2.00
411.500	19000.00	488.58	.00	.03	.00	689.63	50.00
411.500	29800.00	490.95	2.37	.02	2.37	881.80	50.00
* 412.000	19000.00	489.97	.00	1.40	.00	517.13	193.80
* 412.000	29800.00	491.77	1.80	.82	1.80	1016.39	193.80
414.000	19000.00	491.70	.00	1.72	.00	398.31	488.30
* 414.000	29400.00	493.79	2.09	2.02	2.09	633.21	488.30
* 416.000	19000.00	495.19	.00	3.49	.00	338.90	615.00
* 416.000	29400.00	497.15	1.96	3.36	1.96	502.60	615.00
* 418.000	19000.00	496.54	.00	1.35	.00	466.02	640.00
* 418.000	29400.00	498.62	2.08	1.47	2.08	516.24	640.00
* 420.000	19000.00	500.09	.00	3.55	.00	407.00	705.70
420.000	29400.00	501.67	1.57	3.05	1.57	407.00	705.70

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SUMMARY OF ERRORS AND SPECIAL NOTES

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Appendix F
Groundwater Study

9675 Business Park Avenue San Diego California
Telephone 619 536 5610
Facsimile 619 536 5620

GROUNDWATER RESOURCE EVALUATION

FOR THE

EL MONTE GOLF COURSE PROJECT

LAKESIDE, CALIFORNIA

Prepared for:

EnviroMine
3511 Camino Del Rio South, Suite 403
San Diego, California 92108

Prepared by:

Earth Tech
9675 Business Park Avenue
San Diego, CA 92129

Job Number: 24396.01

September 9, 1998

EARTH TECH

a tyco INTERNATIONAL LTD. COMPANY

[illegible] Business Park Avenue, San Diego, California [illegible]

Telephone
[illegible]
Facsimile
619.536.5620

September 9, 1998

Mr. Warren Coalson
EnviroMine
3511 Camino Del Rio South, Suite 403
San Diego, CA 92108

Subject: **Groundwater Resource Evaluation**
for the Proposed El Monte Golf Course Project
Lakeside, California

Dear Warren:

In accordance with your authorization, Earth Tech has performed a groundwater resource evaluation for the proposed El Monte Golf Course project in Lakeside, California. The field work cited herein was largely taken from a report by Ninyo & Moore, dated February 10, 1997 (Ninyo & Moore, 1997). Our services included a review and re-examination of that previous work, installation of a groundwater monitoring network, and development of a groundwater monitoring and management plan. This report provides a discussion of Ninyo & Moore's field activities, and presents our findings and conclusions.

We appreciate the opportunity to be of service to you on this project. If you have any questions, please feel free to call me.

Sincerely,

Earth Tech, Inc.

Douglas F. Roff

Douglas F. Roff, CEG 1480, CHG 293
Environmental Group Manager

DFR:sd

24396.01

Distribution: (3) Addressee

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APPENDICES

FIGURES

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EXECUTIVE SUMMARY

A groundwater resource evaluation was performed for the proposed El Monte Golf Course project, located in Lakeside, California. The purpose of this study was to evaluate the groundwater resources in the area, evaluate groundwater quality, evaluate potential impacts to groundwater from proposed golf course operations, and discuss mitigation measures to reduce impacts to the aquifer to an insignificant level. Ninyo & Moore (1997) conducted: a) pump testing to evaluate the aquifer characteristics in the project area; b) review of aerial photographs and literature relating to the hydrogeologic conditions of the project site and general golf course maintenance practices; c) drilling and installation of an exploratory well; and d) sampling groundwater from selected wells for chemical analysis. Earth Tech reviewed and evaluated this information. In addition, Earth Tech installed a groundwater monitoring network and established a groundwater monitoring and management plan.

Current basin groundwater demand is estimated to be about 1,140 acre-feet per year (afy). Basin groundwater demand subsequent to construction of the proposed golf course and future residential buildout will be approximately 1,760 afy. Total and recoverable groundwater in storage are estimated at 18,900 and 9,450 acre-feet (af), respectively. The proposed Groundwater Monitoring and Management Plan (Appendix C) should ensure adequate groundwater supplies for other groundwater users. Water demands in excess of the limits identified in the Groundwater Monitoring and Management Plan will come from other sources (i.e., Helix Water District).

The City of San Diego claims pueblo rights to all groundwater in this basin. Pueblo rights date from before the 1848 Treaty of Guadeloupe Hidalgo and have been recognized by California courts. These rights originated in Spanish and Mexican law, and gave cities paramount rights to use water naturally occurring within the city limits, for the benefit of its inhabitants. Only two cities in California (Los Angeles and San Diego) have been recognized as benefiting from these rights (Dunning, 1982). Because of this right, all groundwater use within this basin is subject to termination at the discretion of the City of San Diego.

The groundwater quality should be adequate to meet the project requirements. Best Management Practices (BMPs) should be instituted to minimize impacts to water quality.

1. PROJECT DESCRIPTION AND OBJECTIVES

In accordance with your direction, Earth Tech has performed a groundwater resource evaluation for the site of the proposed 460-acre El Monte Golf Course, which is located north of El Monte Road in Lakeside, California (Figure 1). It is our understanding that the proposed development will include two 18-hole championship golf courses, a 9-hole golf training course, a driving range, and clubhouse facilities. This will include 264 acres of irrigated turf and 19.5 acres of lakes. An additional 48.4 acres will be planted with low-water use native plants in a wildlife linkage corridor and non-play fringe areas (Golf Properties Design, 1997). Based on information provided to us by the golf course designer, the estimated water requirement will be approximately 1,172 afy. In order to make the project profitable, the proponents need to supply the majority of water needs from groundwater. Any remaining irrigation water needs would come from Helix Water District. Potable water supply will come via an out-of-district service from Padre Dam Municipal Water District.

To evaluate groundwater production capacity and water quality, Ninyo & Moore (1997) performed the following tasks: 1) pump testing to evaluate the aquifer characteristics in the project area; 2) review of aerial photographs and literature relating to the hydrogeologic conditions of the project site and general golf course maintenance practices; 3) drilling and installation of an exploratory well; and 4) collecting groundwater samples from selected wells for chemical analysis. Earth Tech evaluated these data, installed a groundwater monitoring network, and established a groundwater monitoring and management plan.

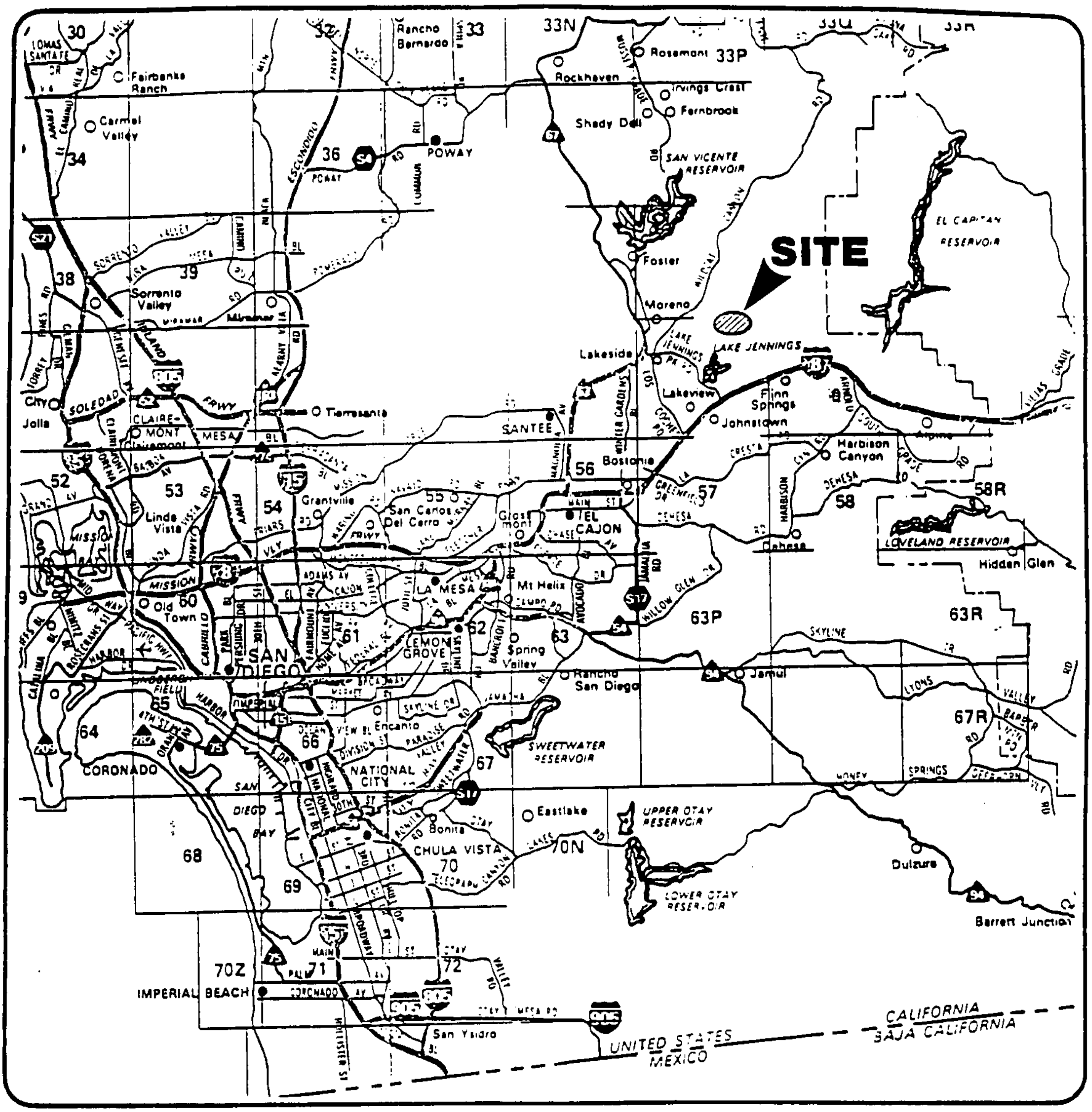
2. SITE DESCRIPTION AND HYDROGEOLOGIC CONDITIONS

The proposed El Monte Golf Course acreage is located in an east-west trending, alluvium-filled valley approximately 3 miles east of the unincorporated community of Lakeside in San Diego County, California. The proposed project lies within the drainage of the San Diego River and is bounded largely by El Monte Road to the south and Willow Road to the north. The El Capitan Reservoir is located about 3 miles from the east end of the site, while the western portion of the site opens into the Santee Groundwater Basin. Current basin land uses within the project area include residential, commercial, agricultural and open space. The property is owned and managed by the Helix Water District. Agricultural uses have been prominent in the recent past. The site vicinity and well locations are shown on Figure 2. The limits of the El Monte Basins are shown on Figure 3.

Steep mountains bound the north and south sides of the alluvial valley. The alluvial valley gently slopes from east to west. Elevations range from approximately 3,600 feet above mean sea level (msl) in the local mountains to approximately 460 msl feet on the alluvial plain.

According to the California Regional Water Quality Control Board (RWQCB), the site is located in the El Monte Hydrologic Subunit of the San Diego Hydrologic Unit. The existing beneficial uses for groundwater in the El Monte Hydrologic Subunit include municipal, agricultural and industrial service supply. A potential beneficial use for groundwater in this subunit is for industrial process supply (RWQCB, 1994).

The primary groundwater production in the area originates from the alluvium overlying residuum (weathered bedrock) and fractured bedrock. The hills surrounding the alluvial valley are primarily composed of Cretaceous-age granitic rock (CDMG, 1975). Review of the geologic literature and the drilling logs indicates that the alluvium consists mainly of silts and sands with interbedded clay, gravels and cobbles. The California Department of Mines and Geology reports that the average thickness of suitable aggregate is 155 feet within the upper San Diego River between the upper end of Mission Gorge to within a mile of El Capitan Dam (CDMG, 1983). A well log prepared by Woodward-Clyde Consultants indicates that Helix Water District's Well No. 101 encountered alluvium to a depth of 220 feet bgs. Ninyo & Moore drilled production well (PW-1) in the eastern portion of the site near the centerline of the drainage. That well encountered weathered granitic rock at a depth of 80 feet. The average alluvial thickness along the centerline of the basin in the project area is thought to be on the order of 100 feet. Drilling performed during the site geotechnical studies appears to confirm this (Fleming, 1998). The alluvial thickness tapers to nothing at the valley margins.



REFERENCE: Thomas Bros. Maps, San Diego Foldout Map

0 4.5 9.0

Approximate Scale in

NORTH

Ninyo & Moore

SITE LOCATION MAP

PROPOSED EL MONTE GOLF COURSE
LAKESIDE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
103248-01	12/96	1

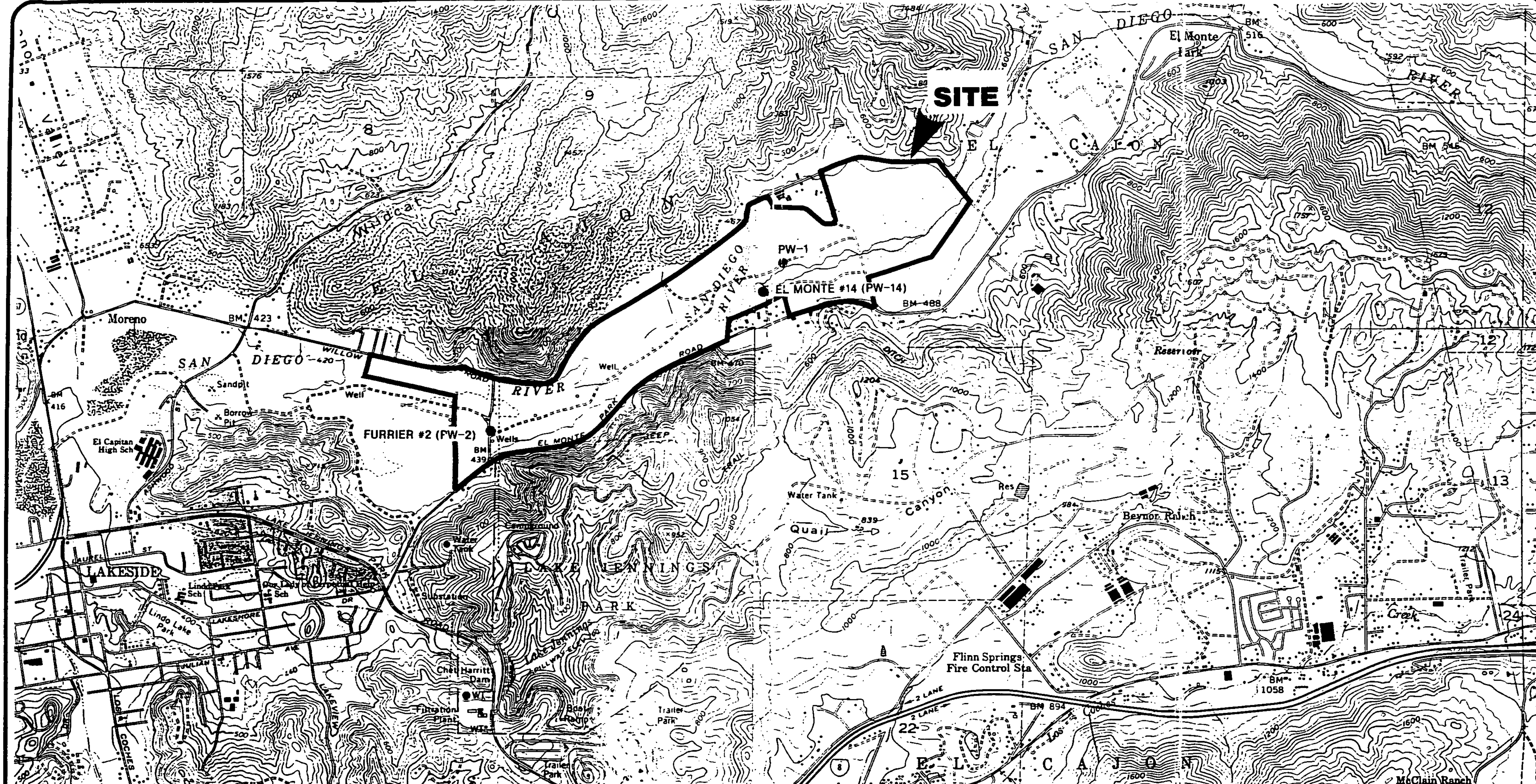
2.1 Groundwater Recharge

Groundwater in storage in the basin varies with time. Inputs to the groundwater system come in the form of overland rainfall recharge, streambed infiltration, septic tank recharge, irrigation recharge, groundwater inflow, and leakage through and under El Capitan Dam. The most significant source of water in this basin is thought to be overland rainfall recharge. Losses to the groundwater system result from phreatophytes, groundwater extraction, baseflow, evaporation off the water surface from the sand mining operation, and groundwater outflow.

The groundwater flow direction is generally toward the west and along the valley. The El Monte Watershed extends from the El Capitan Dam on the east to the eastern boundary of the Santee Groundwater Basin on the west and is approximately 8,400 acres in area. The groundwater gradient was approximately 0.003 on May 11, 1998.

2.2 Rainfall

According to the County of San Diego Groundwater Limitations Map (County of San Diego, 1991), this reach of the basin receives an average of 15 to 18 inches of rainfall per year. Based on records kept by the County of San Diego at El Capitan Reservoir from 1935 to 1997, annual rainfall (July 1 to June 30) has ranged from a high of 33.84 inches in 1940/1941 to a low of 6.73 inches in 1960/1961. The average during this period was approximately 16.1 inches per year. Most of this rainfall occurs between November and April.



LEGEND

● Approximate groundwater well location

2000 0 2000 4000
scale feet

REFERENCE: U.S.G.S. TOPOGRAPHIC MAPS FOR: SAN VINCENTE RESERVOIR QUADRANGLE, DATED 1955, REVISED 1971, EL CAJON QUADRANGLE, DATED 1967, REVISED 1975, ALPINE QUADRANGLE, DATED 1955, REVISED 1982, AND EL CAJON MTN. QUADRANGLE, DATED 1955, REVISED 1988.

Ninyo & Moore

VICINITY AND WELL LOCATION MAP

PROPOSED EL MONTE GOLF COURSE

LAKESIDE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
103248-01	12/96	2

2.3 Evapotranspiration

Potential evaporation rates (pE) were available from a Class A pan the El Capitan Reservoir (CDWR, 1979). These data were corrected by a coefficient of 0.7 to estimate potential evapotranspiration (pET). These data, averaged over the interval 1935 to 1979, are given in Table 1 below:

Table 1. Potential Evaporation and Evapotranspiration, El Monte Watershed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
pE (inches)	2.9	3.2	4.1	5.7	7.6	9.3	10.9	10.3	9.0	6.9	4.6	3.2	77.6
pET (inches)	2.0	2.2	2.9	4.0	5.3	6.5	7.6	7.2	6.3	4.9	3.2	2.2	54.3

As would be expected, the highest evaporation and evapotranspiration potential occur in the summer and fall months. During these periods, potential evaporation and evapotranspiration exceed rainfall. Therefore, the only significant recharge typically occurs in the winter and early spring months. As is typical of most places in San Diego, it is not uncommon to go many years with little to no recharge. During those periods, extracted groundwater must come from storage, resulting in basinwide water level declines. The majority of the recharge often occurs during a few very wet years. During these wet periods, storage is replenished and water levels rise. During some especially wet years, available recharge may exceed the basin's capacity to store it, resulting in rejected recharge in the form of runoff.

It is generally assumed that one-tenth to one-third of applied irrigation and 90 percent of septic system effluent percolates into the groundwater system. Leakage from the El Capital Reservoir occurs through fractures within the granitic basement rock in which the dam is constructed and through the dam core. The City of San Diego monitors water leakage through the dam embankment at a trapezoidal weir near the toe of the dam. The leakage estimates are used to determine refunds for reservoir water loss to the various water districts which own portions of the reservoir water storage.

3. DRILLING AND WELL INSTALLATION

A boring was drilled by Tri-County Drilling Company from October 1 through 3, 1996, using a mud-rotary drilling rig under the observation and direction of Ninyo & Moore. A pilot hole was drilled to a depth of 50 feet below ground surface (bgs), using an 18-inch bit. A 50-foot-long, 18-inch-diameter, steel surface casing was grouted in-place and allowed to set for 24 hours. A 12-inch-diameter boring was continued through the center of the casing, to a total depth of 150 feet bgs. An 8-inch-diameter steel well screen was installed from the surface to 150 feet bgs and pea gravel was placed in the boring annulus between 50 and 150 feet bgs. The well was completed with a locking, steel surface cap. This well was designated PW-1. Two 2-inch piezometers were installed in the vicinity of the well so that hydraulic conductivity and specific yield of the surrounding aquifer could be calculated. The approximate well and piezometer locations are shown on Figure 2. The boring log for the pumping well is presented in Appendix A.

4. PUMP TESTING

Two inactive water supply wells were pump tested to evaluate the condition of the wells, collect a representative groundwater sample, and evaluate the aquifer characteristics in the well vicinity. No nearby observation wells were monitored during pump testing.

An attempt was made to pump PW-2 (Furrier No. 2) on September 23, 1996. A 30-horsepower submersible pump was installed at a depth of approximately 130 feet bgs. The total well depth was measured to be 146 feet bgs. The depth to groundwater was 14.8 feet bgs prior to pumping. The well was pumped at approximately 95 to 100 gallons per minute (gpm), for 2.5 hours, at which time the drawdown was measured at 6.5 feet. Soon after the yield dropped sharply (from over 100 gpm to less than 30 gpm), the discharge became very turbid and the pump testing was terminated. The pump was removed and, after remeasuring the total depth of the well, it was found that it had caved to approximately 130 feet bgs. No further pump testing was attempted on this well.

On September 25, 1996, a limited step-drawdown pump test was performed on PW-14 (El Monte No. 14). The total depth of the well was measured to be 145 feet bgs and the pump was placed at approximately 130 feet bgs. A static water level of 8.2 feet bgs was measured prior to pumping. A 9-hour pump test was performed. A total drawdown of 17.2 feet was recorded at the completion of pumping, at an average pumping rate of 290 gpm.

Based on the age of well PW-14 (constructed in 1948), a down-hole video survey was performed to ascertain the condition of the well casing, and to evaluate whether it could be used as a water supply well for the proposed golf course project. The video tape revealed that the casing was in poor condition, that some portions were encrusted with iron oxide, and other portions had deteriorated completely.

Between October 9 and 10, 1996, a pump test was performed on the newly constructed well (PW-1). A 30-horsepower submersible pump was installed at approximately 140 feet bgs. The static groundwater level prior to pumping was 17.5 feet bgs. A step-drawdown test was performed for a period of approximately 24 hours. The final pumping rate averaged approximately 270 gpm and the total drawdown at the termination of the pump test was 35.9 feet. Piezometers P-1, P-2 and well PW-14, which are located approximately 83, 215.6 and 643 feet, respectively, from PW-1, were used as observation wells during the pump testing. The total recorded drawdowns in the observation wells was 0.81, 0.69 and 0.23 feet, respectively.

5. PUMP TEST DATA ANALYSIS

The data from the first two pumping tests were not analyzed. The pump test data from well PW-1 were analyzed by Ninyo & Moore to evaluate aquifer characteristics at the proposed golf course site. The test results were analyzed using time-drawdown and distance-drawdown methods. Results of the test were analyzed using the Jacob's method. The step-drawdown data were corrected as described by Birsoy and Summers (1980), to obtain adjusted times for each step. Based on the analysis of measurements made in the observation wells, the hydraulic conductivity of the alluvial sediments in the well vicinity was estimated to be 380 and 520 feet per day (ft/day) for P-1 and P-2, respectively. Ninyo & Moore calculated the specific yield (ratio of the volume of water that can be drained from the aquifer under gravity, to the total saturated volume) to be 0.007 and 0.0045 for P-1 and P-2, respectively. However, these low values likely are the result of delayed gravity yield effects. Therefore, these data generally appear to reflect the elastic components of aquifer response to pumping (i.e., storativity), whereas specific yield may not be adequately calculated unless a longer constant rate test was performed. A more realistic range of values of specific yield for sandy alluvium would be on the order of 0.1 to 0.3.

The water level rose during the last 400 minutes of the pump test of PW-1. This phenomenon may be due to one or more factors, such as a constant-head boundary condition resulting from the San Diego River channel, enhanced well development caused by additional removal of fines during pumping, and/or effects of other groundwater supply wells in the vicinity being shut down during the pump test.

6. AQUIFER CHARACTERISTICS

The aquifer characteristics and hydrogeologic conditions of the proposed project site and vicinity have been the subject of several previous studies. The following summary is based on Ninyo & Moore's review of the available hydrogeologic documentation and reports.

Groundwater wells completed within the alluvium of the basin have reported sustainable yields ranging from 165 gpm to 390 gpm (CDWR, 1984). Helix Well No. 100, which is located in the western portion of the site, was reportedly pumped at a rate of 486 gpm for 80 minutes in 1977. At that time, the initial water level in the well was 51 feet bgs and the maximum drawdown observed was approximately 90 feet. A monitoring well, located about 100 feet from the pump well, had a maximum measured drawdown of 0.4 feet at the completion of the test. Based on the data from this pump test, the hydraulic conductivity was calculated to be 34 feet/day (Black & Veatch, 1994).

6.1 Groundwater in Storage

Several other studies have estimated the aquifer specific yields of wells drilled in the vicinity of the proposed project. The estimated specific yield of the aquifer at the Helix Well #100 is approximately 0.15 (Black & Veatch, 1994). The average specific yield of the aquifer on the eastern portion of the project site was estimated by CDWR (1984) to be approximately 0.24.

Groundwater in storage within the basin is important since groundwater recharge occurs sporadically. Many years of little to no recharge are often punctuated by years with very high rates of recharge. During prolonged dry spells, extracted groundwater must be drawn from storage. The amount of available groundwater stored within the El Monte Basin aquifer was estimated using the assumptions shown in Table 2:

Table 2. Groundwater in Storage Estimates

Aquifer	Area (acres)	Average Saturated Thickness (feet)	Specific Yield	Groundwater in Storage (af)
Alluvium	1,100	60	0.2	13,200
Residuum				
- hillsides	7,300	5	0.04	1,460
- lowlands	1,100	15	0.04	660
Fractured Rock				
- hillsides	7,300	400	0.001	2,920
- lowlands	1,100	600	0.001	660
			Total	18,900

To comply with the County of San Diego Groundwater Ordinance, this amount must be multiplied by one-half to estimate recoverable groundwater in storage. Therefore, for calculation purposes the recoverable groundwater stored within the El Monte Basin is assumed to be 9,450 af.

7. CURRENT AND FUTURE GROUNDWATER USES

7.1 Current Water Needs

Available information regarding the current water budget for the basin is limited. The majority of groundwater is currently used for agricultural and domestic purposes, and the bulk of the water is obtained from private supply wells. Generally, these wells are not metered and the information is confidential in accordance with state law; therefore groundwater extraction can only be estimated. Several published reports have presented estimates of the volume of groundwater extracted from the basin, based on information gathered from local residents, well drillers and local water district officials. In 1990, Montgomery documented that there were 102 wells completed in the El Monte Basin alluvial aquifer and estimated that 579 afy of groundwater was extracted from the aquifer.

Agricultural groundwater demands include livestock needs. These uses include the Van Ommerring Dairy and the horse ranches located throughout the valley. Although no specific groundwater consumption data were available for the dairy or the horse ranches, groundwater demand for livestock was estimated to be approximately 100 gallons per day (gpd) per animal for dairy cattle and 15 gpd per horse. Assuming a total of 500 head of cattle and 500 horses within the valley (personal communication with Warren Coalson, EnviroMine, 1998), it is estimated that livestock usage of groundwater is approximately 64 afy.

A total of 171 residences are located within the watershed. Of this total, 156 homes are located in the lower portions of the valley. The remainder (15 homes) are located along the southern rim of the watershed within the Quail Canyon Estates subdivision. Water supplies for these homes are provided by Padre Dam Municipal Water District. Water for residential uses within the valley are provided by a combination of groundwater wells and imported sources provided by the Lakeside Water District. The Lakeside Water District serves 16 residences from an 8-inch water main located within El Monte and Willow Roads. This water line terminates near the southwestern boundary of the property. This leaves a total of 140 residential units which use groundwater for domestic uses. At 0.5 afy per residence, this would equate to 70 afy of residential water demand within the basin.

Groundwater is also lost through evapotranspiration. Evapotranspiration is dependent on groundwater availability and the type of vegetation. Evapotranspiration losses are not as high for native plant species as for crops and the phreatophytes which have been established near the toe of the El Capitan Reservoir embankment. A portion of the proposed project property is currently used to cultivate non-native crops. Helix Water District (Ninyo & Moore, 1997) has estimated that water usage within the basin attributed to vegetation ranges from 1.0 to 2.5 afy per crop. Bamboo, guava, pummelo and palm tree crops cover approximately 40 acres and utilize approximately 2.5 afy and all other crops (three crops produced annually) cover approximately 160 acres and utilize approximately 1.0 afy per crop. These figures combined equate to a total of 580 afy for agricultural usage. Other non-native (phreatophytic) plant species, which include Tamarisk, Giant Reed (Arundo), Wild Tobacco and Pampas Grass, cover approximately 22 acres and have been estimated to utilize approximately 124 afy.

The current groundwater needs for the El Monte Basin are summarized in Table 3.

Table 3. Current Groundwater Needs in El Monte Basin

Use Type	Units	Water Demand (afy)	Total Use (afy)	Total Use Per Category (afy)
Residential				
Total Residential Usage	171			
Padre Dam Water District	-15			
Lakeside Water District	-16			
Total Dependent on Wells	140	0.5	70.0	
Net Residential Use				**70.0**
Agricultural Use				
On-Site				
Row Crop 3/year @ 1 af/crop	120	3.0	360.0	
Nursery	2	2.5	5.0	
Off-Site Lands				
Row Crop 3/year @ 1 af/crop	40	3.0	120.0	
Pumelo	40	2.5	100.0	
Livestock				
Cattle	500	0.11	56.0	
Horses	500	0.017	8.4	
Total Agricultural Use				**649.4**
Other Uses				
Helix Well No. 101		300.0	300.0	300.0
Phreatophytes	22	5.6	123.2	123.2
Total Other Uses				**423.2**
Total Groundwater Utilization Before Project				**1,143**
Note: Livestock figures assume 15 gpd per head for 500 horses and 100 gpd per head for 500 cattle.				

Other water districts currently withdraw groundwater from the Santee Basin, which lies west of the El Monte Basin and downgradient of the proposed project site. The Lakeside Water District currently extracts about 750 to 1,000 afy from a well located approximately 1.5 miles west (downgradient) of the project site. The Riverview Water District reportedly extracts 350 afy from a well located approximately 2 miles west of the proposed site. The Padre Dam Municipal Water District also operates one extraction well, located approximately four miles west of the project site, which is used to replenish the Santee Lakes when reclaimed water is not sufficient. All three of these districts have expressed an interest in further developing groundwater resources downgradient of the project (SCWA, 1997).

Groundwater extraction by these districts is not likely to have a direct impact on groundwater availability within the El Monte Basin since the wells are not only located downgradient of the basin, but they are also recharged by additional watershed area. Groundwater recharge to the Santee Basin originates from many sources besides the El Monte Basin. These include: subsurface inflow from the Los Coches Creek, subsurface inflow from the Moreno Valley Basin (which includes inflow from Slaughterhouse Canyon and leakage from the San Vicente Reservoir) and precipitation infiltration over a larger watershed area.

7.2 Future Water Needs

Although only 171 residential units are located within the approximate 8,400-acre groundwater basin, future development could result in an addition of approximately 125 residential units. This estimate takes into consideration the predominance of steeply sloping, and largely inaccessible lands, and lands that are otherwise constrained from development within the watershed. Because the majority of the lands within the basin are designated (18) Multiple Rural Use and (24) Impact Sensitive, with maximum lot size determined by slope conditions, it is assumed that, in most cases, new development would be limited to large size lots (20+ acres). In addition, approximately half of the undeveloped slope areas are within established open-space preserves (i.e., Cleveland National Forest, El Capitan Open Space Preserve, and Louis A. Stelzer County Park). The availability of imported water supplies in the project groundwater use by residential development and may in fact result in a reduction in residential use in the future. As a result of these conditions, total anticipated groundwater-dependent residential development is estimated at 160 units (i.e., 80 afy). This value may decline as existing well users convert to better quality imported water. As the basin becomes more developed, it is anticipated that the number of cattle will decline as horses increase. Furthermore, we have assumed a 25 percent reduction in row crop acreage.

The Helix Water District has recently redeveloped its well No. 101 and will utilize it to augment their imported water supplies. Currently the District withdraws approximately 300 afy from this well. Although this well is located west and downgradient of the proposed golf course site, adjacent to the Nelson & Sloan sand extraction pit, because of its proximity to the site and the large extractions, it is included in the future basin uses.

Anticipated future water needs for El Monte Basin are summarized in Table 4.

Table 4. Future Groundwater Needs in El Monte Basin

Use Type	Units	Water Demand (afy)	Total Use (afy)	Total Use Per Category
Residential Use				
Existing Residential on Groundwater	140	0.5	70	
Future Residential on Groundwater	24	0.5	12	
Total Residential Use				82
Agricultural Use (off-site) - 80 acres				
Row Crop 3/year @ 1 af/crop	30	3.0	90	
Pumelo (2.5 af/acre)	40	2.5	100	
Horses	750	0.017	12.8	
Total Agricultural Use				**203**
Helix Well No. 101		300.0	300	300
Golf Course				1,172
Total Groundwater Utilization Before Project				**1,757**
Note: Livestock figures assume no cattle and 15 gpd per head for 750 horses.				

7.3 Groundwater Rights

The City of San Diego claims pueblo rights to the surface and groundwater within the El Monte Basin. Therefore, all water use by others within the basin is at the discretion of the City of San Diego. Currently, the City of San Diego allows extraction for use on lands within the basin, however, this use must terminate at the request of the City.

8. GROUNDWATER QUALITY

Ninyo & Moore collected groundwater samples from wells PW-1 and PW-2, PW-14 subsequent to pump testing each of the wells. The samples were analyzed for volatile organics (EPA method 8240), semivolatile organics (EPA method 8270) and general minerals. Volatile and semivolatile organic constituents were not detected above their individual detection limits.

Based on the general mineral analytical data from the three wells tested, the RWQCB groundwater quality objectives for the El Monte Basin have been exceeded in samples collected from well PW-2 for manganese, sodium, iron and total dissolved solids (TDS). The water samples collected from wells PW-1 and PW-14 exceeded the groundwater quality objectives for manganese and iron. This is not uncommon in San Diego County. The water quality data and a comparison with the water quality objectives are summarized in Appendix B.

9. PROPOSED PROJECT IMPACT

The construction and maintenance of a golf course facility can impact the quality and condition of the groundwater beneath the site. Without careful management of the golf course maintenance practices, the groundwater quality could be impacted by fertilizers (e.g., nitrates), herbicides and pesticides. Also, the amount of groundwater withdrawn from the aquifer could affect other groundwater users in the El Monte Basin by lowering the groundwater table. However, a proper groundwater monitoring and management plan can reduce these impacts to a level of insignificance.

The 460-acre site will include 264 acres of irrigated turf and 19.5 acres of lakes. Additional acreage will be planted in drought-tolerant native plants. After construction and grow-in, annual golf course water demand is estimated at about 1,170 afy (Golf Properties Design, 1997).

Groundwater extraction has the potential to impact the overall depth of the water table. There will likely be an overall drop in the water table. However, it is difficult to quantify the amount the water table will be lowered, since there are many factors which influence this process (i.e., recharge, pumping rates and well density)

Historical records indicate that maximum groundwater fluctuations in the basin have been on the order of 115 feet (see Table 5). More typical fluctuations from the drought of the mid-1970s to the wet period in the early 1980's and 1990's were on the order of 50 to 65 feet. It is believed that some of these measurements may have been made in pumping wells during pumping. Therefore, the maximum changes noted herein may overstate basinwide changes.

Table 5. Historic Water Depths, Provided by Helix Water District

Well	Shallowest (feet bgs)	Date	Deepest (feet bgs)	Date	Maximum Change
Melville	16.2	May 1983	65.9	June 1974	49.7
Allen[a]	4.9	Nov. 1963	47.0	June 1972	42.1
Furrier No. 1	14.3	May 1983	63.8	May 1974	49.5
Denlinger No. 1	12.8	Mar. 1983	67.9	May 1976	55.1
2	15.1	May 1983	65.9	Oct. 1974	50.8
Furrier No. 2[ab]	12.1	May 1983	68.0	Mar. 1970	55.9
Denlinger No. 2	13.4	Mar. 1983	68.0	Feb. 1977	54.6
7	51.4	July 1978	66.0	Jan. 1960	14.6
8[a]	46.0	Apr. 1959	63.0	Jan. 1960	17.0
9[a]	50.2	Sept. 1979	65.9	April 1974	15.7
10	52.0	May 1959	69.0	Aug. 1977	17.0
11	43.9	Jan. 1957	69.5	Dec. 1975	25.6
13	38.0	Jan. 1957	68.4	Jan. 1978	30.4
14	4.9	Aug. 1995	69.7	Sept. 1977	64.8
100[a]	12.0	May 1995	126.4	Oct. 1989	114.4

a Data taken from pumping wells. May overestimate basinwide fluctuations.
b Also known as PW-2 and MW-7.

Since much of the recharge happens during a few very wet years and much of the potential recharge is rejected because the basin may be "full" at those times, increased groundwater production can allow enhanced recharge of this high-quality rainwater by leaving more storage capacity in the aquifer going into the wet season.

Several mitigation measures can be incorporated into general golf course design and management plans which can help prevent or lessen the impact to groundwater levels. These measures include the following:

- Use of drought-tolerant grass species for construction of the golf course.

- Pumping several wells at a lower pumping rate, rather than fewer wells at a higher pumping rate, to reduce the localized impact to the aquifer by spreading the water table depression effect over a larger area.
- Institution of a groundwater monitoring and management plan.

If proper golf course management practices are not utilized, soil and turf amendments (i.e., fertilizers, pesticides and herbicides) could significantly affect the quality of groundwater in the basin. Fertilizers, for instance, can increase the nitrate and TDS concentrations, as well as alter the pH of the groundwater. Typically, these amendments are relatively water soluble and, therefore, can potentially migrate to shallow groundwater. Measures to protect groundwater quality are described in the Environmental Development Program prepared for this project (Golf Properties Design, 1997).

Data provided to us from the Singing Hills Country Club, located south of El Monte Basin in the middle Sweetwater River drainage, indicates very little, if any, impact to groundwater quality after 30 years of golf course pumping and irrigation. According to laboratory reports of groundwater samples collected from four wells on that site, there was no evidence of pesticides or chlorinated herbicides (by EPA Methods 608 and 615) in 1996 (Truesdail Laboratories, 1996). Testing performed on one well and two piezometers in 1993 indicated no evidence of pesticides or chlorinated herbicides (Quality Assurance Laboratory, 1993). Samples collected from two production wells and two piezometers in 1989 also indicated no evidence of pesticides or chlorinated herbicides. They further reported nitrate concentrations of 0.08 to 0.66 mg/l as nitrogen (Applied Consultants, 1989). Two production wells and one peizometer were sampled and tested for general minerals in April 1996 (Environmental Engineering laboratory, 1996). The lab reported TDS concentrations of 372, 398 and 404 mg/l and nitrate concentrations of <0.04, 0.31 and 0.58 mg/l as nitrogen. Taken together, these results indicate that a golf course similarly situated in an alluvial-filled granitic valley can be operated in such a way as to have minimal impact on water quality.

10. FINDINGS AND CONCLUSIONS

Based on our resource evaluation as described herein, the following findings and conclusions are presented regarding the availability and suitability of groundwater at the subject site.

- Current sources of groundwater recharge to the basin are precipitation, streambed infiltration, septic system (including recharge of imported water), agricultural irrigation returns, groundwater inflow, and leakage from El Capitan Reservoir. Precipitation recharge is thought to be the biggest component.
- Current basin groundwater extraction is estimated to be about 1,140 afy.
- Golf course demand is expected to be about 1,170 afy.
- Future basin groundwater demand is estimated to be about 1,760 afy.
- Total and recoverable storage are estimated at 18,900 and 9,450 af, respectively.
- Wells completed in alluvium are expected to be able to produce several hundred gpm each. Wells completed in fractured rock typically produce in the range of 5 to 20 gpm.
- Historic water levels have fluctuated 15 to 65 feet (in unpumped wells). This occurred while the land was under cultivation. The attached Groundwater Monitoring and Management Plan (Appendix C) should significantly reduce the potential for such large changes in the future.
- Groundwater quality should be acceptable for irrigation purposes.
- Properly managing the golf course can have minimal negative and possibly some positive impacts on groundwater quality.

11. RECOMMENDATIONS

Based on our understanding of the project objectives and the hydrogeologic conditions in the El Monte Basin, the following recommendations are made:

- Best Management Practices (BMPs) should be established and followed to minimize impacts.
- The attached Groundwater Monitoring and Management Plan (Appendix C) should be instituted to mitigate impacts to other groundwater users.

12. LIMITATIONS

The environmental services outlined in this document are generally consistent with current practice exercised by hydrogeologic consultants performing similar work in this region. No other warranty, expressed or implied, is made regarding the professional services described in this report.

Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

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GROUNDWATER MONITORING AND MANAGEMENT PLAN

Background

The project proposes to extract groundwater from the extensive alluvial aquifer underlying the basin for irrigation demands on the golf course. Irrigation demands which cannot be supplied by groundwater will be supplied from other sources. Potable water for the clubhouse will be provided as an out-of-district service by the Padre Dam Municipal Water District. In order to mitigate impacts on neighboring water levels, the following monitoring and management plan will be implemented. The monitoring will be managed by a California-Certified Hydrogeologist or a Registered Engineer with experience in groundwater management.

In order to evaluate potential impacts, questionnaires were mailed to all of the properties surrounding the site. Included in the information request, was the depth of the wells on each property. The results of this survey are shown on Table 1. The property locations are shown on Figure 1. Four properties are known to have wells which are less than 90 feet deep. As a mitigation for potential impacts from groundwater extraction, the project will provide funds to deepen these wells to 100 feet below ground surface (bgs) or connect the homes to the nearest potable water line.

Monitoring Program

Instantaneous and cumulative flowmeters will be installed on all production wells on the site. The flowmeters will be read twice per month. Monitoring reports will be provided to the Helix Water District and County of San Diego semi-annually. The reports will be due to the District and County no later than July 31 and January 31 of each year, for the periods of January 1 through June 30 and July 1 through December 31, respectively. The reports will summarize the flowmeter and water level data. The reports will be signed by a Certified Hydrogeologist or Registered Engineer with experience in groundwater management.

Permanent monitoring devices (such as pressure transducers) with data loggers will be installed in seven unpumped wells on site. Figure 1 shows the approximate locations of the observation wells and the proposed production wells. Well depths, geology, and groundwater depths from the observation wells are presented on Table 2. The monitoring devices will record depth to water every 12 hours. The monitoring devices will be connected telemetrically to a device capable of contacting the golf course operator and hydrogeologist within 24 hours in the event that water levels decline below pre-set depths.

Table 1. Reported Well Depths

Well Designation	Well Depth (feet bgs)
A	230
B	unknown
C	120
D	120+
E	170
F	100
G	700
H	540
I	850
J	110
K	unknown
L	unknown
M	700
N	625
O	250
P	600
Q	250
R	150
S	300
T	280
U	484
V	200
W	80
X	100
Y	90
Z	80
AA	125
BB	100
CC	150
DD	60

Table 2. Groundwater Monitoring Wells

Well	Total Depth (feet bgs)	Refusal Depth (feet bgs)	Alluvium Depth (feet bgs)	Screen Depth (feet bgs)	Depth to Groundwater 5/11/98 (feet bgs)	Depth to Groundwater 7/20/98 (feet bgs)
MW-1	75	--	70	8 - 75	15.2	16.0
MW-2	65	65	50	5 - 65	19.0	19.5
MW-3	75	--	>75	10 - 75	44.2	44.8
MW-4	75	--	>75	10 - 75	20.6	19.0
MW-5	75	~75	50	10 - 75	13.4	13.5
MW-6	75	~75	68	10 - 75	10.5	10.0
MW-7*	146	Unknown	Unknown	Unknown	17.5	Not Measured

* Also known as PW-2 and Furrier No. 2.

Based on our review of available data, and assuming minimum pump intake depths of 95 feet bgs in the surrounding area, we propose the following:

a. A maximum of 1,172 af of groundwater shall be extracted during any one-year (January 1 to December 31) period. This rate of extraction shall be maintained while groundwater levels measured in the seven monitoring wells remain at 65 feet bgs (100 feet bgs for well MW-3) or shallower.

b. If the groundwater levels measured in any of the seven monitoring wells drop lower than 65 feet bgs (100 feet bgs for well MW-3), groundwater extraction from the nearest production well shall be stopped until the groundwater depth returns to a level of less than 65 feet bgs (100 feet bgs for well MW-3) for at least 7 days. Once groundwater depth remains above 65 feet bgs (100 feet bgs for well MW-3) for seven days, extraction from nearest production well may resume

c. If the groundwater levels measured in any of the seven monitoring wells drop lower than 75 feet bgs (110 feet bgs for well MW-3), groundwater extraction shall be stopped in all production wells.

d. If groundwater extraction is not sufficient to meet project irrigation demands, the golf course operator shall implement irrigation conservation procedures and/or utilize an alternate water source. Such alternative source shall be a non-potable water source provided by Helix Water District or other approved water purveyor.

Currently, five extraction wells are planned. The actual number of operating wells and the production from each well will be modified in order to minimize drawdowns in the observation wells. The wells will be spaced no closer than 500 feet apart to minimize localized drawdown.

The current on-site and surrounding agricultural uses (e.g., dairy and row crops), as well as the domestic septic systems, all result in groundwater quality degradation. This occurs because the return flows are concentrated in salts and organic compounds, relative to the background water quality. Animal and human wastes, and fertilizer, herbicide and pesticide usage all contribute to water degradation. Most of the water used for irrigation is lost to evaporation and evapotranspiration. Since the salts do not evaporate, the water left over which recharges the groundwater system is concentrated with respect to these salts. For example, if the applied water had a TDS concentration of 500 mg/l, and two-thirds of this water was lost to evaporation and evapotranspiration, the remaining water would have a TDS concentration of 1,500 mg/l. The addition of salts and organic compounds exacerbates this situation. A slow increase in TDS concentrations to some asymptotic value, typically occurs concomitant with basin buildout. The proposed golf course may likewise contribute to basinwide water degradation. Best management practices will be employed to minimize impacts. These include judicious use of fertilizers and degradable herbicides and minimizing evaporative losses by irrigating in the cool part of the day. In order to monitor water quality changes, water samples will be collected from two of the seven wells and analyzed as shown on Table 4. This information will be used to optimize groundwater extraction, irrigation practices and herbicide usage.

Table 4. Water Quality Analyses

Analysis	Method	Sample Frequency
Nitrate	SM 4500 - NO_3	Quarterly
TDS	SM 2540	Quarterly
Acid and base/neutral extractable organics	SW846 8270	Annually
Carbamate pesticides	DW 531	Annually
Chlorinated herbicides	SW846 8150	Annually
Glyphosate	DW 547	Annually
Organochlorine pesticides	SW846 8080	Annually
Organophosphorus pesticides	SW846 8140	Annually
Volatile Organics	SW846 8260	Annually

SM - Standard Methods for the Examination of Water and Wastewater, 23rd Edition; SW846 - Test Methods for Evaluating Solid Waste; Physical/Chemical Methods, Update III; DW - EPA 500 Series, Methods for the Determination of Organic Compounds in Drinking Water, including Supplements I and II.

The results of this water quality monitoring will be forwarded to the Helix Water District on an annual basis.

APPENDIX A

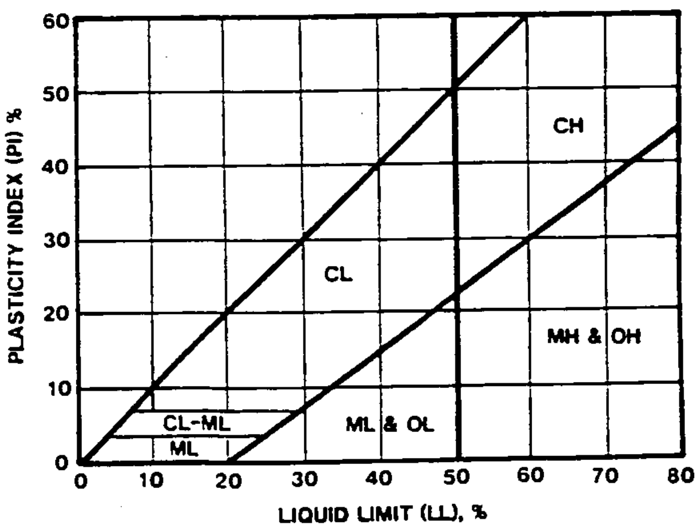
BORING LOGS

MAJOR DIVISIONS		SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS (More than 1/2 of soil > No. 200 sieve size)	GRAVELS (More than 1/2 of coarse fraction > No. 4 sieve size)	GW	Well graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 1/2 of coarse fraction < No. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (More than 1/2 of soil < No. 200 sieve size)	SILTS & CLAYS Liquid Limit < 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS Liquid Limit > 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils

CLASSIFICATION CHART (Unified Soil Classification System)

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL Coarse Fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND Coarse Medium Fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

GRAIN SIZE CHART



PLASTICITY CHART

Ninyo & Moore | U.S.C.S. METHOD OF SOIL CLASSIFICATION

DATE DRILLED		BORING NO.	SAMPLE
GROUND ELEVATION		SHEET 1 OF 1	
METHOD OF DRILLING			
DRIVE WEIGHT		DROP	
SAMPLED BY	LOGGED BY	REVIEWED BY	

DEPTH (feet)	SAMPLES Bulk / Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							Auger (A)
							Solid line denotes formation change.
							Modified split-barrel drive sampler (C)
							No recovery with modified Split-Barrel Drive Sampler (B)
							Dutch cone test (D)
5							Seepage
							Rock Cores (E)
							Groundwater
							Piston (I)
							Dashed line denotes lithologic change
10							Standard Penetration Test (P)
							No recovery with a standard penetration test (T)
							Shelby tube sample (R)
		XX/ XX					Distance pushed in inches/Length of sample recovered in inches.
							No recovery with Shelby tube sampler (X)
15							Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Sheared Bedding Surface
							The total depth line is a solid line that is drawn at the level of the last entry.
20							

Ninyo & Moore

BORING LOG

EXPLANATION OF BORING LOG

PROJECT NO.	DATE	FIGURE
SAMPLE	Rev.9/94	

DATE DRILLED	10/02/96	BORING NO.	PW-1
GROUND ELEVATION	≈470' ± MSL	SHEET	1 OF 8
METHOD OF DRILLING	Canterra (Mud Rotary)		
DRIVE WEIGHT		DROP	
SAMPLED BY	YRG	LOGGED BY / REVIEWED BY	YRG / SB

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	ALLUVIUM: Gray, dry to damp, loose to medium dense, silty fine SAND; some coarse sand and gravel.
							SW	Gray, damp to moist, medium dense, fine to coarse SAND; some silt, micaceous.
5								
10								@ 10': Layer of coarse sand approximately 2 inches thick.
15								
								@ 16': Becomes very moist, less silt and coarse sand.
				▽				@ 19': Groundwater encountered during drilling.
20								

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-1

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 10/02/96 BORING NO. PW-1 GROUND ELEVATION ≈470' + MSL SHEET 2 OF 8 METHOD OF DRILLING Canterra (Mud Rotary) DRIVE WEIGHT ______ DROP ______ SAMPLED BY YRG LOGGED BY YRG REVIEWED BY SB DESCRIPTION/INTERPRETATION
20							SW	ALLUVIUM: Gray, saturated, medium dense, fine to medium SAND; some silt and gravel.
25								@ 25': Less coarse sand.
								@ 28': Becomes medium sand; some silt.
30								
35								
								@ 37': Abundant gravel and cobbles.
40								

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-2

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40							SM	ALLUVIUM (Continued): Gray, saturated, medium dense, silty medium SAND; some clay.
45								
								@ 48': More coarse sand and gravel.
50								
								@ 54': Interlayers of silt and clay.
55								
								@ 57': More fine sand.
60								

DATE DRILLED 10/02/96 BORING NO. PW-1

GROUND ELEVATION ≈470' ± MSL SHEET 3 OF 8

METHOD OF DRILLING Canterra (Mud Rotary)

DRIVE WEIGHT DROP

SAMPLED BY YRG LOGGED BY YRG REVIEWED BY SB

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-3

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION

DATE DRILLED 10/02/96 BORING NO. PW-1

GROUND ELEVATION ≈470' ± MSL SHEET 4 OF 8

METHOD OF DRILLING Canterra (Mud Rotary)

DRIVE WEIGHT DROP

SAMPLED BY YRG LOGGED BY YRG REVIEWED BY SB

Depth (feet)	Classification U.S.C.S.	Description/Interpretation
60	SW-SM	ALLUVIUM (Continued): Gray, saturated, dense, silty, fine to medium SAND; some gravel.
65		
		@ 66': More coarse sand and gravel.
70		
		@ 71': Interlayers of silt and clay.
75		@ 75': Large cobbles and boulders.
80		

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-4

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
80								<u>DECOMPOSED GRANITIC ROCK</u>: Gray to yellowish brown, hard, granodioritic rock; some iron oxide staining.
85								
90								@ 91': Becomes very hard; abundant iron oxide staining.
95								<u>GRANITIC ROCK</u>: Gray, hard, granodioritic rock; slightly weathered.
100								

DATE DRILLED 10/02/96 BORING NO. PW-1

GROUND ELEVATION ≈470' ± MSL SHEET 5 OF 8

METHOD OF DRILLING Canterra (Mud Rotary)

DRIVE WEIGHT DROP

SAMPLED BY YRG LOGGED BY YRG REVIEWED BY SB

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-5

DATE DRILLED	10/02/96	BORING NO.	PW-1
GROUND ELEVATION	≈470' ± MSL	SHEET	6 OF 8
METHOD OF DRILLING	Canterra (Mud Rotary)		
DRIVE WEIGHT		DROP	
SAMPLED BY	YRG	LOGGED BY	YRG
REVIEWED BY	SB		

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
100								GRANITIC ROCK (Continued): Gray, hard, granodioritic rock; some fractures and iron oxide staining.
105								
								@ 108': Fracture zone; some clay.
110								
								@ 112': Iron oxide staining.
115								
120								

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-6

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 10/02/96 BORING NO. PW-1 GROUND ELEVATION ≈470' ± MSL SHEET 7 OF 8 METHOD OF DRILLING Canterra (Mud Rotary) DRIVE WEIGHT ______ DROP ______ SAMPLED BY YRG LOGGED BY YRG REVIEWED BY SB DESCRIPTION/INTERPRETATION
120								GRANITIC ROCK (Continued): Gray, hard, granodioritic rock; some fractures, slightly weathered.
125								
130								@ 132': Some iron oxide staining.
135								
140								

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-7

DEPTH (feet)	SAMPLES Bulk / Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 10/02/96 BORING NO. PW-1 GROUND ELEVATION ≈470' ± MSL SHEET 8 OF 8 METHOD OF DRILLING Canterra (Mud Rotary) DRIVE WEIGHT ___ DROP ___ SAMPLED BY YRG LOGGED BY YRG REVIEWED BY SB DESCRIPTION/INTERPRETATION
140							GRANITIC ROCK (Continued): Gray, hard, granodioritic rock; some iron oxide staining and fractures.
145							
150							Total Depth = 150'. Groundwater encountered during drilling at approximately 19'. No caving. Groundwater well installed on 10/3/96.
155							
160							

Ninyo & Moore

BORING LOG

El Monte Golf Course
El Monte, California

PROJECT NO.	DATE	FIGURE
103248-01	11/96	A-8

APPENDIX B

WATER QUALITY DATA

Pacific Treatment
Analytical Services, Inc.
4340 Viewridge Avenue, Suite A • San Diego, CA 92123
(619) 560-7717 • Fax (619) 560-7763
Analytical Chemistry Laboratory

October 18, 1996

Ninyo & Moore
Attn: York R. Gorzolla
10225 Barnes Canyon Road
San Diego, California 92121

Project Name/No.: None
Laboratory Log No.: 1415-96
Date Received: 10/10/96
Sample Matrix: One water sample
PO No.: 103248-01

Please find the following enclosures for the above referenced project identified:

1) Analytical Report
2) QA/QC Report
3) Cooler Receipt Form
4) Chain of Custody Form

.... **Certificate of Analysis** ....

Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. Date of extraction, date of analysis, detection limits and dilution factor are reported for each compound analyzed.

A Cooler Receipt Form is utilized upon receipt of sample(s) at PTAS. This helps ensure sample integrity from start to finish.

A minimum of 90% of the data for each analytical method is associated with acceptable quality control criteria. Determinations of completion were made by assessing the following QA/QC functions, as applicable to methodology:

- Surrogate Percent Recovery,
  Laboratory Control Sample (LCS) percent recoveries for all analyses.
- Matrix Spike Recovery/Matrix Spike Duplicate Recovery (MSR & MSDR) and Relative Percent Difference (RPD from MSR & MSDR).

I certify that this data report is in compliance both technically and for completeness. Release of the data contained in this hardcopy data report has been authorized by the following signature.

Janis Columbo
Vice President/Laboratory Director

ANALYSIS RESULTS

CLIENT: NINYO & MOORE	DATE SAMPLED: 10/10/96
	DATE RECEIVED: 10/10/96
PROJECT NAME/No.: NONE	DATE DIGESTED: 10/14/96*
PTAS LOG #: 1415-96-1	DATE ANALYZED: 10/11-18/96
SAMPLE ID: PW-1	MATRIX: WATER

ANALYTE	PREP./ANALYSIS METHODS	DETECTION LIMIT	DF	RESULTS	UNITS
MBAS	SMEWW 5540 C	1	1	ND	MG/L
pH	EPA 150.1	0.1	1	7.1	pH UNITS
NITRATE AS N	SMEWW 4500 NO3 E	0.05	1	1.11	MG/L
CHLORIDE	SMEWW 4500 Cl C	0.05	1	66.0	MG/L
TDS	SMEWW 2540 C	1	1	310	MG/L
CONDUCTIVITY	SMEWW 2510 B	1	1	500	UMHOS/CM
SULFATE	SMEWW 4500 SO4 E	5	1	66	MG/L
ALKALINITY	SMEWW 2320 B	5	1	130	MG CaCO3/L
CALCIUM	EPA 3010/6010	2	1	37	MG/L
COPPER	EPA 3010/6010	0.05	1	ND	MG/L
IRON	EPA 3010/6010	0.1	1	0.4	MG/L
MAGNESIUM	EPA 3010/6010	1	1	17	MG/L
MANGANESE	EPA 3010/6010	0.03	1	0.10	MG/L
SODIUM	EPA 3010/6010	5	1	35	MG/L
ZINC	EPA 3010/6010	0.05	1	0.05	MG/L
TOTAL HARDNESS	SMEWW 2340 B	10	1	160	MG CaCO3/L

DF = DILUTION FACTOR

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT

DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

* NOTE: APPLIES TO METALS ONLY.

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: METHOD BLANK
SAMPLE ID: N/A
DILUTION FACTOR: 1

DATE SAMPLED: N/A
DATE RECEIVED: N/A
DATE EXTRACTED: 10/14/96
DATE ANALYZED: 10/16/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
1-Naphthylamine	5	ND
1,2,4,5-Tetrachlorobenzene	5	ND
1,2,4-Trichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,3-Dinitrobenzene	5	ND
1,3,5-Trinitrobenzene	5	ND
1,4-Dichlorobenzene	5	ND
1,4-Naphthoquinone	5	ND
2-Acetylaminofluorene	5	ND
2,3,4,6-Tetrachlorophenol	5	ND
2,4,5-Trichlorophenol	5	ND
2,4,6-Trichlorophenol	5	ND
2,4-Dichlorophenol	5	ND
2,4-Dimethylphenol	5	ND
2,4-Dinitrophenol	15	ND
2,4-Dinitrotoluene	5	ND
2,6-Dichlorophenol	5	ND
2,6-Dinitrotoluene	5	ND
2-Chloronaphthalene	5	ND
2-Chlorophenol	5	ND
2-Methylnaphthalene	5	ND
2-Methylphenol	5	ND
2-Naphthylamine	5	ND
2-Nitroaniline	5	ND
2-Nitrophenol	5	ND
2-Picoline	5	ND
3,3-Dichlorobenzidine	5	ND
3,3-Dimethylbenzidine	5	ND
3-Methylcholanthrene	5	ND
3-Methylphenol	5	ND
3-Nitroaniline	5	ND
4,6-Dinitro-2-methylphenol	10	ND
4-Aminobiphenyl	5	ND
4-Bromophenyl-phenylether	5	ND
4-Chloro-3-methylphenol	5	ND
4-Chloroaniline	5	ND
4-Chlorophenyl-phenylether	5	ND
4-Methylphenol	5	ND
4-Nitroaniline	5	ND
4-Nitrophenol	5	ND
5-Nitro-o-toluidine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: METHOD BLANK
SAMPLE ID: N/A
DILUTION FACTOR: 1

DATE SAMPLED: N/A
DATE RECEIVED: N/A
DATE EXTRACTED: 10/14/96
DATE ANALYZED: 10/16/96
MATRIX: WATER
SAMPLE VOL /WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
7,12 Dimethylbenzanthracene	5	ND
a'a Dimethylphenethylamine	5	ND
Acenaphthene	5	ND
Acenaphthylene	5	ND
Acetophenone	5	ND
Aniline	5	ND
Anthracene	5	ND
Benzidine	20	ND
Benzo(a)anthracene	5	ND
Benzo(a)pyrene	5	ND
Benzo(b)fluoranthene	5	ND
Benzo(g,h,i)perylene	5	ND
Benzo(k)fluoranthene	5	ND
Benzoic Acid	5	ND
Benzyl alcohol	5	ND
Bis(2-Chloroethoxy)methane	5	ND
Bis(2-Chloroethyl)ether	5	ND
Bis(2-Chloroisopropyl)ether	5	ND
Bis(2-Ethylhexyl)phthalate	5	ND
Butylbenzylphthalate	5	ND
Chrysene	5	ND
Di-n-butylphthalate	5	ND
Di-n-octylphthalate	5	ND
Dibenz(a,h)anthracene	5	ND
Dibenzofuran	5	ND
Diethylphthalate	5	ND
Dimethylphthalate	5	ND
Diphenylamine	5	ND
Ethyl methanesulfonate	5	ND
Fluoranthene	5	ND
Fluorene	5	ND
Hexachlorobenzene	5	ND
Hexachlorobutadiene	5	ND
Hexachlorocyclopentadiene	5	ND
Hexachloroethane	5	ND
Indeno(1,2,3-cd)pyrene	5	ND
Isophorone	5	ND
Methyl methanesulfonate	5	ND
N-Nitroso-di-n-butylamine	5	ND
N-Nitroso-di-n-propylamine	5	ND
N-Nitroso-dimethylamine	5	ND
N-Nitrosodiphenylamine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE		DATE SAMPLED:	N/A
		DATE RECEIVED:	N/A
PROJECT NAME/No.: NONE		DATE EXTRACTED:	10/14/96
PTAS LOG #: METHOD BLANK		DATE ANALYZED:	10/16/96
SAMPLE ID: N/A		MATRIX:	WATER
DILUTION FACTOR: 1		SAMPLE VOL./WT.:	1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
N-Nitrosopiperidine	5	ND
Naphthalene	5	ND
Nitrobenzene	5	ND
o-Toluidine	5	ND
Pentachlorobenzene	5	ND
Pentachloronitrobenzene	5	ND
Pentachlorophenol	5	ND
Phenacetin	5	ND
Phenanthrene	5	ND
Phenol	5	ND
Pronamide	5	ND
Pyrene	5	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
2-FLUOROPHENOL	21-100	83
PHENOL-d6	10-94	88
NITROBENZENE-d5	35-114	72
2-FLUOROBIPHENYL	43-116	72
2,4,6-TRIBROMOPHENOL	10-123	79
4-TERPHENYL-d14	33-141	63

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1415-96-1
SAMPLE ID: PW-1
DILUTION FACTOR: 1

DATE SAMPLED: 10/10/96
DATE RECEIVED: 10/10/96
DATE EXTRACTED: 10/14/96
DATE ANALYZED: 10/16/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
1-Naphthylamine	5	ND
1,2,4,5-Tetrachlorobenzene	5	ND
1,2,4-Trichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,3-Dinitrobenzene	5	ND
1,3,5-Trinitrobenzene	5	ND
1,4-Dichlorobenzene	5	ND
1,4-Naphthoquinone	5	ND
2-Acetylaminofluorene	5	ND
2,3,4,6-Tetrachlorophenol	5	ND
2,4,5-Trichlorophenol	5	ND
2,4,6-Trichlorophenol	5	ND
2,4-Dichlorophenol	5	ND
2,4-Dimethylphenol	5	ND
2,4-Dinitrophenol	15	ND
2,4-Dinitrotoluene	5	ND
2,6-Dichlorophenol	5	ND
2,6-Dinitrotoluene	5	ND
2-Chloronaphthalene	5	ND
2-Chlorophenol	5	ND
2-Methylnaphthalene	5	ND
2-Methylphenol	5	ND
2-Naphthylamine	5	ND
2-Nitroaniline	5	ND
2-Nitrophenol	5	ND
2-Picoline	5	ND
3,3-Dichlorobenzidine	5	ND
3,3-Dimethylbenzidine	5	ND
3-Methylcholanthrene	5	ND
3-Methylphenol	5	ND
3-Nitroaniline	5	ND
4,6-Dinitro-2-methylphenol	10	ND
4-Aminobiphenyl	5	ND
4-Bromophenyl-phenylether	5	ND
4-Chloro-3-methylphenol	5	ND
4-Chloroaniline	5	ND
4-Chlorophenyl-phenylether	5	ND
4-Methylphenol	5	ND
4-Nitroaniline	5	ND
4-Nitrophenol	5	ND
5-Nitro-o-toluidine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1415-96-1
SAMPLE ID: PW-1
DILUTION FACTOR: 1

DATE SAMPLED: 10/10/96
DATE RECEIVED: 10/10/96
DATE EXTRACTED: 10/14/96
DATE ANALYZED: 10/16/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
7,12 Dimethylbenzanthracene	5	ND
a'a Dimethylphenethylamine	5	ND
Acenaphthene	5	ND
Acenaphthylene	5	ND
Acetophenone	5	ND
Aniline	5	ND
Anthracene	5	ND
Benzidine	20	ND
Benzo(a)anthracene	5	ND
Benzo(a)pyrene	5	ND
Benzo(b)fluoranthene	5	ND
Benzo(g,h,i)perylene	5	ND
Benzo(k)fluoranthene	5	ND
Benzoic Acid	5	ND
Benzyl alcohol	5	ND
Bis(2-Chloroethoxy)methane	5	ND
Bis(2-Chloroethyl)ether	5	ND
Bis(2-Chloroisopropyl)ether	5	ND
Bis(2-Ethylhexyl)phthalate	5	ND
Butylbenzylphthalate	5	ND
Chrysene	5	ND
Di-n-butylphthalate	5	ND
Di-n-octylphthalate	5	ND
Dibenz(a,h)anthracene	5	ND
Dibenzofuran	5	ND
Diethylphthalate	5	ND
Dimethylphthalate	5	ND
Diphenylamine	5	ND
Ethyl methanesulfonate	5	ND
Fluoranthene	5	ND
Fluorene	5	ND
Hexachlorobenzene	5	ND
Hexachlorobutadiene	5	ND
Hexachlorocyclopentadiene	5	ND
Hexachloroethane	5	ND
Indeno(1,2,3-cd)pyrene	5	ND
Isophorone	5	ND
Methyl methanesulfonate	5	ND
N-Nitroso-di-n-butylamine	5	ND
N-Nitroso-di-n-propylamine	5	ND
N-Nitroso-dimethylamine	5	ND
N-Nitrosodiphenylamine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1415-96-1
SAMPLE ID: PW-1
DILUTION FACTOR: 1

DATE SAMPLED: 10/10/96
DATE RECEIVED: 10/10/96
DATE EXTRACTED: 10/14/96
DATE ANALYZED: 10/16/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
N-Nitrosopiperidine	5	ND
Naphthalene	5	ND
Nitrobenzene	5	ND
o-Toluidine	5	ND
Pentachlorobenzene	5	ND
Pentachloronitrobenzene	5	ND
Pentachlorophenol	5	ND
Phenacetin	5	ND
Phenanthrene	5	ND
Phenol	5	ND
Pronamide	5	ND
Pyrene	5	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
2-FLUOROPHENOL	21-100	90
PHENOL-d6	10-94	94
NITROBENZENE-d5	35-114	84
2-FLUOROBIPHENYL	43-116	82
2,4,6-TRIBROMOPHENOL	10-123	97
4-TERPHENYL-d14	33-141	63

ANALYSIS RESULTS - EPA 8240
VOLATILE ORGANIC ANALYTES

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: METHOD BLANK
SAMPLE ID: N/A
DILUTION FACTOR: 1

DATE SAMPLED: N/A
DATE RECEIVED: N/A
DATE ANALYZED: 10/17/96
MATRIX: WATER
SAMPLE VOL/WT: 10 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
ACETONE	100	ND
BENZENE	5	ND
BROMODICHLOROMETHANE	5	ND
BROMOFORM	5	ND
BROMOMETHANE	10	ND
2-BUTANONE (MEK)	100	ND
CARBON DISULFIDE	5	ND
CARBON TETRACHLORIDE	5	ND
CHLOROBENZENE	5	ND
CHLOROETHANE	10	ND
2-CHLOROETHYLVINYL ETHER	10	ND
CHLOROFORM	5	ND
CHLOROMETHANE	10	ND
DIBROMOCHLOROMETHANE	5	ND
1,2-DICHLOROBENZENE	5	ND
1,3-DICHLOROBENZENE	5	ND
1,4-DICHLOROBENZENE	5	ND
DICHLORODIFLUORMETHANE	10	ND
1,1-DICHLOROETHANE	5	ND
1,2-DICHLOROETHANE	5	ND
1,1-DICHLOROETHENE	5	ND
CIS-1,2-DICHLOROETHENE	5	ND
TRANS-1,2-DICHLOROETHENE	5	ND
1,2-DICHLOROPROPANE	5	ND
CIS-1,3-DICHLOROPROPENE	5	ND
TRANS-1,3-DICHLOROPROPENE	5	ND
ETHYLBENZENE	5	ND
2-HEXANONE	50	ND
METHYLENE CHLORIDE	5	ND
4-METHYL-2-PENTANONE (MIBK)	50	ND
STYRENE	5	ND
1,1,1,2-TETRACHLOROETHANE	5	ND
1,1,2,2-TETRACHLOROETHANE	5	ND
TETRACHLOROETHENE	5	ND
TOLUENE	5	ND
TOTAL XYLENES	5	ND
1,1,1-TRICHLOROETHANE	5	ND
1,1,2-TRICHLOROETHANE	5	ND
TRICHLOROETHENE	5	ND
TRICHLOROFLUOROMETHANE	10	ND
1,2,3-TRICHLOROPROPANE	5	ND
VINYL ACETATE	50	ND
VINYL CHLORIDE	10	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
1,2-DICHLOROETHANE-D4	76-114	89
TOLUENE-D8	88-110	94
4-BROMOFLUOROBENZENE	86-115	91

ANALYSIS RESULTS - EPA 8240
VOLATILE ORGANIC ANALYTES

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1415-96-1
SAMPLE ID: PW-1
DILUTION FACTOR: 1

DATE SAMPLED: 10/10/96
DATE RECEIVED: 10/10/96
DATE ANALYZED: 10/17/96
MATRIX: WATER
SAMPLE VOL./WT: 10 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
ACETONE	100	ND
BENZENE	5	ND
BROMODICHLOROMETHANE	5	ND
BROMOFORM	5	ND
BROMOMETHANE	10	ND
2-BUTANONE (MEK)	100	ND
CARBON DISULFIDE	5	ND
CARBON TETRACHLORIDE	5	ND
CHLOROBENZENE	5	ND
CHLOROETHANE	10	ND
2-CHLOROETHYLVINYL ETHER	10	ND
CHLOROFORM	5	ND
CHLOROMETHANE	10	ND
DIBROMOCHLOROMETHANE	5	ND
1,2-DICHLOROBENZENE	5	ND
1,3-DICHLOROBENZENE	5	ND
1,4-DICHLOROBENZENE	5	ND
DICHLORODIFLUORMETHANE	10	ND
1,1-DICHLOROETHANE	5	ND
1,2-DICHLOROETHANE	5	ND
1,1-DICHLOROETHENE	5	ND
CIS-1,2-DICHLOROETHENE	5	ND
TRANS-1,2-DICHLOROETHENE	5	ND
1,2-DICHLOROPROPANE	5	ND
CIS-1,3-DICHLOROPROPENE	5	ND
TRANS-1,3-DICHLOROPROPENE	5	ND
ETHYLBENZENE	5	ND
2-HEXANONE	50	ND
METHYLENE CHLORIDE	5	ND
4-METHYL-2-PENTANONE (MIBK)	50	ND
STYRENE	5	ND
1,1,1,2-TETRACHLOROETHANE	5	ND
1,1,2,2-TETRACHLOROETHANE	5	ND
TETRACHLOROETHENE	5	ND
TOLUENE	5	ND
TOTAL XYLENES	5	ND
1,1,1-TRICHLOROETHANE	5	ND
1,1,2-TRICHLOROETHANE	5	ND
TRICHLOROETHENE	5	ND
TRICHLOROFLUOROMETHANE	10	ND
1,2,3-TRICHLOROPROPANE	5	ND
VINYL ACETATE	50	ND
VINYL CHLORIDE	10	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
1,2-DICHLOROETHANE-D4	76-114	88
TOLUENE-D8	88-110	94
4-BROMOFLUOROBENZENE	86-115	90

QA/QC REPORT

ERA ANALYSIS: 9973
DATE ANALYZED: 10/11/96

SPIKED ANALYTE	TV	DV	AR
pH	9.13	9.02	8.93 - 9.33

QA/QC REPORT

ERA ANALYSIS: 9973
DATE ANALYZED: 10/11-16/96

SPIKED ANALYTE	TV	DV	%R
TDS	642	585	91
CONDUCTIVITY	740	720	97
ALKALINITY	159	159	100

QA/QC REPORT

DATE ANALYZED: 10/11-18/96

SPIKED ANALYTE	LCS % R	MS % R	MSD % R	RPD	ACCEPTABLE LCS,MS/MSD CRITERIA %	ACCEPTABLE RPD CRITERIA %
MBAS	97	102	102	0	80-120	< 20
NITRATE AS N	97	90	92	2	80-120	< 20
CHLORIDE	99	95	98	3	80-120	< 20
SULFATE	100	112	116	4	80-120	< 20
CALCIUM	95	101	94	7	75-125	< 20
COPPER	88	89	85	5	75-125	< 20
IRON	93	94	90	4	75-125	< 20
MAGNESIUM	94	95	88	8	75-125	< 20
MANGANESE	90	92	88	4	75-125	< 20
SODIUM	91	94	88	7	75-125	< 20
ZINC	96	95	93	2	75-125	< 20

TV = TRUE VALUE
DV = DETERMINED VALUE
AR = ACCEPTABLE RANGE
% R = PERCENT RECOVERY
LCS % R = LABORATORY CONTROL SAMPLE PERCENT RECOVERY
MS % R = MATRIX SPIKE PERCENT RECOVERY
MSD % R = MATRIX SPIKE DUPLICATE PERCENT RECOVERY
RPD = RELATIVE PERCENT DIFFERENCE

QA/QC REPORT					
METHOD: EPA 8270-WATER **DATE ANALYZED:** 10/16/96 **PTAS LOG#:** 1415-96 BLANK				**ACCEPTABLE LCS/LCSD CRITERIA**	**ACCEPTABLE RPD CRITERIA**
SPIKED ANALYTE	**LCS % R**	**LCSD % R**	**RPD**	**%**	**%**
ACENAPHTHENE	91	84	8	47-145	<30
DI-N-BUTYL PHTHALATE	51	47	8	1-118	<30
1,4-DICHLOROBENZENE	87	89	2	20-124	<30
2,4-DINITROTOLUENE	89	96	8	39-139	<30
N-NITROSO-DI-N-PROPYLAMINE	93	86	8	D-230	<30
PYRENE	67	71	6	52-115	<30
1,2,4-TRICHLOROBENZENE	94	91	3	44-142	<30
4-CHLORO-3-METHYLPHENOL	95	85	11	22-147	<30
2-CHLOROPHENOL	62	64	3	23-134	<30
4-NITROPHENOL	92	99	7	D-132	<30
PENTACHLOROPHENOL	46	48	9	14-176	<30
PHENOL	73	74	1	5-112	<30

LCS % R = LABORATORY CONTROL SAMPLE PERCENT RECOVERY

LCSD % R = LABORATORY CONTROL SAMPLE DUPLICATE PERCENT RECOVERY

RPD = RELATIVE PERCENT DIFFERENCE

QA/QC REPORT						
METHOD:	**EPA 8240-LIQUID**				**ACCEPTABLE LCS, MS/MSD CRITERIA**	**ACCEPTABLE RPD CRITERIA**
DATE ANALYZED:	10/17/96					
PTAS LOG#:	1407-96-2					
SPIKED ANALYTE	**LCS % R**	**MS % R**	**MSD % R**	**RPD**	%	%
1,1-DICHLOROETHENE	85	87	94	8	61-145	<30
TRICHLOROETHENE	102	94	100	6	71-120	<30
CHLOROBENZENE	113	106	112	6	75-130	<30
TOLUENE	112	104	111	7	76-125	<30
BENZENE	116	110	116	5	76-127	<30

LCS % R = LABORATORY CONTROL SAMPLE PERCENT RECOVERY
MS % R = MATRIX SPIKE PERCENT RECOVERY
MSD % R = MATRIX SPIKE DUPLICATE PERCENT RECOVERY
RPD = RELATIVE PERCENT DIFFERENCE

Pacific Treatment Analytical Services, Inc. 4340 Viewridge Avenue, Suite A; San Diego, CA 92123; (619) 560-7717 Fax (619) 560-7763

CHAIN-OF-CUSTODY RECORD

PTAS LAB ID

DATE/TIME STAMP

Client:

Address:

Attn: Phone:

Sampled by: Fax:

Billing Address:

Project: PO #:

REQUESTED ANALYSIS

Client Sample ID	Sample Date	Sample Time	Sample Matrix	Container(s) #	Type*	PTAS ID #	418.1 (TRPH)	TPH (DOHS GC/FID)	602 / 8020 (Full List)	602 / 8020 (BTXE only)	601 / 8010 (Purgeable Halocarbons)	608 / 8080 (Pesticides & PCBs)	608 / 8080 (PCBs only)	624 / 8240 (Volatile Organics)	625 / 8270 (Semi-Volatile Organics)	TTLC Metals (CAC Title 22)	STLC Metals (CAC Title 22)	TCLP Metals (RCRA EPA 1311)	TCLP Organics (RCRA EPA 1311)	Cd Cr Cu Pb Ni Ag Zn
						1														
						2														
						3														
						4														
						5														
						6														
						7														
						8														
						9														
						10														

*Container Types: B - Brass Tube; V - VOA; G - Glass; P - Plastic; O - Other (list)

Seals Intact: Yes No N/A Correct Containers: Yes No

Sample Temperature: Cold Ambient Warm

Sample Preservation: Yes No N/A

Disposal: N/A Pickup PTAS (additional fee) Archive (additional fee)

Turnaround Time: 24 hr 48 hr 3 day 5 day Normal

Comments:

RELINQUISHED BY

Signature

Print Company

Date Time

Signature

Print Company

Date Time

Signature

Print Company

Date Time

RECEIVED BY

Signature

Print Company

Date Time

Signature

Print Company

Date Time

Signature

Print Company

Date Time

[redacted]

Pacific Treatment Analytical Services, Inc.
4340 Viewridge Avenue, Suite A • San Diego, CA 92123 (619) 560-7717 FAX: (619) 560-7763

Cooler Receipt Form

Client: [illegible]

Project Name: ______________________ / Not Given

Log Numbers: 1415-96 TO ______________

Samples Received in: Cooler(s) Box(es) None Other: ______________

Number of Coolers: [illegible] Log-In Date: [illegible] Time: [illegible]

Logged in By: [illegible] Signature: [illegible]

1. Were samples sufficiently chilled? If included, report temperature of temperature blank	Yes	No	N/A ___°C
2. Were chain-of-custody forms filled out properly (ink, signed, etc.) If NO, explain below.	Yes	No	
3. Did all bottles arrive unbroken with labels in good condition? If NO, explain below.	Yes	No	
4. Were correct containers used for the analyses requested? If NO, explain below.	Yes	No	
5. Were samples correctly preserved? If NO, explain below.	Yes	No	N/A
6. Was sufficient sample sent for analyses requested? If NO, explain below.	Yes	No	
7. Were air bubbles absent from VOA samples? If NO, list by PTAS log number on the back of this form.	Yes	No	N/A

Additional Notes:

Pacific Treatment
Analytical Services, Inc.

4340 Viewridge Avenue, Suite A • San Diego, CA 921[illegible]
(619) 5[illegible]0-7717 • Fax (619) 5[illegible]0-77[illegible]
Analytical Chemistry Laboratory

October 9, 1996

Ninyo & Moore
Attn: York R. Gorzolla
6150 Lusk Blvd., Suite 200
San Diego, California 92121

Project Name/No.: None
Laboratory Log No.: 1345-96
Date Received: 09/25/96
Sample Matrix: Two water samples
PO No.: None

Please find the following enclosures for the above referenced project identified:

1) Analytical Report
2) QA/QC Report
3) Cooler Receipt Form
4) Chain of Custody Form

....................*Certificate of Analysis*....................

Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. Date of extraction, date of analysis, detection limits and dilution factor are reported for each compound analyzed. All samples were analyzed within the method required holding time from sample collection.

A Cooler Receipt Form is utilized upon receipt of sample(s) at PTAS. This helps ensure sample integrity from start to finish.

A minimum of 90% of the data for each analytical method is associated with acceptable quality control criteria. Determinations of completion were made by assessing the following QA/QC functions, as applicable to methodology:

- Surrogate Percent Recovery,
  Laboratory Control Sample (LCS) percent recoveries for all analyses,
- Matrix Spike Recovery/Matrix Spike Duplicate Recovery (MSR & MSDR) and Relative Percent Difference (RPD from MSR & MSDR).

I certify that this data report is in compliance both technically and for completeness. Release of the data contained in this hardcopy data report has been authorized by the following signature.

Jolumbo

Janis Columbo
Vice President/Laboratory Director

ANALYSIS RESULTS

CLIENT: NINYO & MOORE		DATE SAMPLED:	09/25/96
		DATE RECEIVED:	09/25/96
PROJECT NAME/No.:	NONE	DATE DIGESTED:	09/27/96*
PTAS LOG #:	1345-96-1	DATE ANALYZED:	09/25-10/01/96
SAMPLE ID:	PW-#2	MATRIX:	WATER

ANALYTE	PREP./ANALYSIS METHODS	DETECTION LIMIT	DF	RESULTS	UNITS
pH	EPA 150.1	0.1	1	7.3	pH UNITS
TDS	SMEWW 2540 C	1	1	686	MG/L
CONDUCTIVITY	SMEWW 2510 B	1	1	990	UMHOS/CM
CHLORIDE	SMEWW 4500 Cl C	0.05	1	115	MG/L
MBAS	SMEWW 5540 C	1	1	ND	MG/L
ALKALINITY	SMEWW 2320 B	5	1	183	MG CaCO3/L
SULFATE	SMEWW 4500 SO4 E	25	5	180	MG/L
COPPER	EPA 3010/6010	0.05	1	ND	MG/L
ZINC	EPA 3010/6010	0.05	1	ND	MG/L
IRON	EPA 3010/6010	0.1	1	2.7	MG/L
MANGANESE	EPA 3010/6010	0.03	1	0.82	MG/L
SODIUM	EPA 3010/6010	5	1	65	MG/L
CALCIUM	EPA 3010/6010	2	1	65	MG/L
MAGNESIUM	EPA 3010/6010	1	1	42	MG/L
TOTAL HARDNESS	SMEWW 2340 B	10	1	340	MG CaCO3/L

DF = DILUTION FACTOR

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.

DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

* NOTE: APPLIES TO METALS ONLY.

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ANALYSIS RESULTS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1345-96-2
SAMPLE ID: PW-#14 (PUMP WELL)

DATE SAMPLED: 09/25/96
DATE RECEIVED: 09/25/96
DATE DIGESTED: 09/27/96*
DATE ANALYZED: 09/25-10/01/96
MATRIX: WATER

ANALYTE	PREP./ANALYSIS METHODS	DETECTION LIMIT	DF	RESULTS	UNITS
pH	EPA 150.1	0.1	1	6.7	pH UNITS
TDS	SMEWW 2540 C	1	1	490	MG/L
CONDUCTIVITY	SMEWW 2510 B	1	1	740	UMHOS/CM
CHLORIDE	SMEWW 4500 Cl C	0.05	1	77	MG/L
MBAS	SMEWW 5540 C	1	1	ND	MG/L
ALKALINITY	SMEWW 2320 B	5	1	151	MG CaCO3/L
SULFATE	SMEWW 4500 SO4 E	25	5	105	MG/L
COPPER	EPA 3010/6010	0.05	1	ND	MG/L
ZINC	EPA 3010/6010	0.05	1	0.10	MG/L
IRON	EPA 3010/6010	0.1	1	2.0	MG/L
MANGANESE	EPA 3010/6010	0.03	1	0.08	MG/L
SODIUM	EPA 3010/6010	5	1	52	MG/L
CALCIUM	EPA 3010/6010	2	1	51	MG/L
MAGNESIUM	EPA 3010/6010	1	1	26	MG/L
TOTAL HARDNESS	SMEWW 2340 B	10	1	240	MG CaCO3/L

DF = DILUTION FACTOR
ND = NON DETECT ABOVE INDICATED DETECTION LIMIT
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

* NOTE: APPLIES TO METALS ONLY.

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: METHOD BLANK
SAMPLE ID: N/A
DILUTION FACTOR: 1

DATE SAMPLED: N/A
DATE RECEIVED: N/A
DATE EXTRACTED: 09/30/96
DATE ANALYZED: 10/03/96
MATRIX: LIQUID
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
1-Naphthylamine	5	ND
1,2,4,5-Tetrachlorobenzene	5	ND
1,2,4-Trichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,3-Dinitrobenzene	5	ND
1,3,5-Trinitrobenzene	5	ND
1,4-Dichlorobenzene	5	ND
1,4-Naphthoquinone	5	ND
2-Acetylaminofluorene	5	ND
2,3,4,6-Tetrachlorophenol	5	ND
2,4,5-Trichlorophenol	5	ND
2,4,6-Trichlorophenol	5	ND
2,4-Dichlorophenol	5	ND
2,4-Dimethylphenol	5	ND
2,4-Dinitrophenol	15	ND
2,4-Dinitrotoluene	5	ND
2,6-Dichlorophenol	5	ND
2,6-Dinitrotoluene	5	ND
2-Chloronaphthalene	5	ND
2-Chlorophenol	5	ND
2-Methylnaphthalene	5	ND
2-Methylphenol	5	ND
2-Naphthylamine	5	ND
2-Nitroaniline	5	ND
2-Nitrophenol	5	ND
2-Picoline	5	ND
3,3-Dichlorobenzidine	5	ND
3,3-Dimethylbenzidine	5	ND
3-Methylcholanthrene	5	ND
3-Methylphenol	5	ND
3-Nitroaniline	5	ND
4,6-Dinitro-2-methylphenol	10	ND
4-Aminobiphenyl	5	ND
4-Bromophenyl-phenylether	5	ND
4-Chloro-3-methylphenol	5	ND
4-Chloroaniline	5	ND
4-Chlorophenyl-phenylether	5	ND
4-Methylphenol	5	ND
4-Nitroaniline	5	ND
4-Nitrophenol	5	ND
5-Nitro-o-toluidine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: METHOD BLANK
SAMPLE ID: N/A
DILUTION FACTOR: 1

DATE SAMPLED: N/A
DATE RECEIVED: N/A
DATE EXTRACTED: 09/30/96
DATE ANALYZED: 10/03/96
MATRIX: LIQUID
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
7,12 Dimethylbenzanthracene	5	ND
a'a Dimethylphenethylamine	5	ND
Acenaphthene	5	ND
Acenaphthylene	5	ND
Acetophenone	5	ND
Aniline	5	ND
Anthracene	5	ND
Benzidine	20	ND
Benzo(a)anthracene	5	ND
Benzo(a)pyrene	5	ND
Benzo(b)fluoranthene	5	ND
Benzo(g,h,i)perylene	5	ND
Benzo(k)fluoranthene	5	ND
Benzoic Acid	5	ND
Benzyl alcohol	5	ND
Bis(2-Chloroethoxy)methane	5	ND
Bis(2-Chloroethyl)ether	5	ND
Bis(2-Chloroisopropyl)ether	5	ND
Bis(2-Ethylhexyl)phthalate	5	ND
Butylbenzylphthalate	5	ND
Chrysene	5	ND
Di-n-butylphthalate	5	ND
Di-n-octylphthalate	5	ND
Dibenz(a,h)anthracene	5	ND
Dibenzofuran	5	ND
Diethylphthalate	5	ND
Dimethylphthalate	5	ND
Diphenylamine	5	ND
Ethyl methanesulfonate	5	ND
Fluoranthene	5	ND
Fluorene	5	ND
Hexachlorobenzene	5	ND
Hexachlorobutadiene	5	ND
Hexachlorocyclopentadiene	5	ND
Hexachloroethane	5	ND
Indeno(1,2,3-cd)pyrene	5	ND
Isophorone	5	ND
Methyl methanesulfonate	5	ND
N-Nitroso-di-n-butylamine	5	ND
N-Nitroso-di-n-propylamine	5	ND
N-Nitroso-dimethylamine	5	ND
N-Nitrosodiphenylamine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: METHOD BLANK
SAMPLE ID: N/A
DILUTION FACTOR: 1

DATE SAMPLED: N/A
DATE RECEIVED: N/A
DATE EXTRACTED: 09/30/96
DATE ANALYZED: 10/03/96
MATRIX: LIQUID
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
N-Nitrosopiperidine	5	ND
Naphthalene	5	ND
Nitrobenzene	5	ND
o-Toluidine	5	ND
Pentachlorobenzene	5	ND
Pentachloronitrobenzene	5	ND
Pentachlorophenol	5	ND
Phenacetin	5	ND
Phenanthrene	5	ND
Phenol	5	ND
Pronamide	5	ND
Pyrene	5	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
2-FLUOROPHENOL	21-100	52
PHENOL-d6	10-94	66
NITROBENZENE-d5	35-114	47
2-FLUOROBIPHENYL	43-116	57
2,4,6-TRIBROMOPHENOL	10-123	66
4-TERPHENYL-d14	33-141	45

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1345-96-1
SAMPLE ID: PW-#2
DILUTION FACTOR: 1

DATE SAMPLED: 09/25/96
DATE RECEIVED: 09/25/96
DATE EXTRACTED: 09/30/96
DATE ANALYZED: 10/07/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
1-Naphthylamine	5	ND
1,2,4,5-Tetrachlorobenzene	5	ND
1,2,4-Trichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,3-Dinitrobenzene	5	ND
1,3,5-Trinitrobenzene	5	ND
1,4-Dichlorobenzene	5	ND
1,4-Naphthoquinone	5	ND
2-Acetylaminofluorene	5	ND
2,3,4,6-Tetrachlorophenol	5	ND
2,4,5-Trichlorophenol	5	ND
2,4,6-Trichlorophenol	5	ND
2,4-Dichlorophenol	5	ND
2,4-Dimethylphenol	5	ND
2,4-Dinitrophenol	15	ND
2,4-Dinitrotoluene	5	ND
2,6-Dichlorophenol	5	ND
2,6-Dinitrotoluene	5	ND
2-Chloronaphthalene	5	ND
2-Chlorophenol	5	ND
2-Methylnaphthalene	5	ND
2-Methylphenol	5	ND
2-Naphthylamine	5	ND
2-Nitroaniline	5	ND
2-Nitrophenol	5	ND
2-Picoline	5	ND
3,3-Dichlorobenzidine	5	ND
3,3-Dimethylbenzidine	5	ND
3-Methylcholanthrene	5	ND
3-Methylphenol	5	ND
3-Nitroaniline	5	ND
4,6-Dinitro-2-methylphenol	10	ND
4-Aminobiphenyl	5	ND
4-Bromophenyl-phenylether	5	ND
4-Chloro-3-methylphenol	5	ND
4-Chloroaniline	5	ND
4-Chlorophenyl-phenylether	5	ND
4-Methylphenol	5	ND
4-Nitroaniline	5	ND
4-Nitrophenol	5	ND
5-Nitro-o-toluidine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1345-96-1
SAMPLE ID: PW-#2
DILUTION FACTOR: 1

DATE SAMPLED: 09/25/96
DATE RECEIVED: 09/25/96
DATE EXTRACTED: 09/30/96
DATE ANALYZED: 10/07/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
7.12 Dimethylbenzanthracene	5	ND
a'a Dimethylphenethylamine	5	ND
Acenaphthene	5	ND
Acenaphthylene	5	ND
Acetophenone	5	ND
Aniline	5	ND
Anthracene	5	ND
Benzidine	20	ND
Benzo(a)anthracene	5	ND
Benzo(a)pyrene	5	ND
Benzo(b)fluoranthene	5	ND
Benzo(g.h.i)perylene	5	ND
Benzo(k)fluoranthene	5	ND
Benzoic Acid	5	ND
Benzyl alcohol	5	ND
Bis(2-Chloroethoxy)methane	5	ND
Bis(2-Chloroethyl)ether	5	ND
Bis(2-Chloroisopropyl)ether	5	ND
Bis(2-Ethylhexyl)phthalate	5	ND
Butylbenzylphthalate	5	ND
Chrysene	5	ND
Di-n-butylphthalate	5	ND
Di-n-octylphthalate	5	ND
Dibenz(a.h)anthracene	5	ND
Dibenzofuran	5	ND
Diethylphthalate	5	ND
Dimethylphthalate	5	ND
Diphenylamine	5	ND
Ethyl methanesulfonate	5	ND
Fluoranthene	5	ND
Fluorene	5	ND
Hexachlorobenzene	5	ND
Hexachlorobutadiene	5	ND
Hexachlorocyclopentadiene	5	ND
Hexachloroethane	5	ND
Indeno(1.2.3-cd)pyrene	5	ND
Isophorone	5	ND
Methyl methanesulfonate	5	ND
N-Nitroso-di-n-butylamine	5	ND
N-Nitroso-di-n-propylamine	5	ND
N-Nitroso-dimethylamine	5	ND
N-Nitrosodiphenylamine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE	DATE SAMPLED: 09/25/96
	DATE RECEIVED: 09/25/96
PROJECT NAME/No.: NONE	DATE EXTRACTED: 09/30/96
PTAS LOG #: 1345-96-1	DATE ANALYZED: 10/07/96
SAMPLE ID: PW-#2	MATRIX: WATER
DILUTION FACTOR: 1	SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
N-Nitrosopiperidine	5	ND
Naphthalene	5	ND
Nitrobenzene	5	ND
o-Toluidine	5	ND
Pentachlorobenzene	5	ND
Pentachloronitrobenzene	5	ND
Pentachlorophenol	5	ND
Phenacetin	5	ND
Phenanthrene	5	ND
Phenol	5	ND
Pronamide	5	ND
Pyrene	5	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
2-FLUOROPHENOL	21-100	31
PHENOL-d6	10-94	42
NITROBENZENE-d5	35-114	37
2-FLUOROBIPHENYL	43-116	44
2,4,6-TRIBROMOPHENOL	10-123	53
4-TERPHENYL-d14	33-141	33

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1345-96-2
SAMPLE ID: PW-#14 (PUMP WELL)
DILUTION FACTOR: 1

DATE SAMPLED: 09/25/96
DATE RECEIVED: 09/25/96
DATE EXTRACTED: 09/30/96
DATE ANALYZED: 10/07/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
1-Naphthylamine	5	ND
1,2,4,5-Tetrachlorobenzene	5	ND
1,2,4-Trichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,3-Dinitrobenzene	5	ND
1,3,5-Trinitrobenzene	5	ND
1,4-Dichlorobenzene	5	ND
1,4-Naphthoquinone	5	ND
2-Acetylaminofluorene	5	ND
2,3,4,6-Tetrachlorophenol	5	ND
2,4,5-Trichlorophenol	5	ND
2,4,6-Trichlorophenol	5	ND
2,4-Dichlorophenol	5	ND
2,4-Dimethylphenol	5	ND
2,4-Dinitrophenol	15	ND
2,4-Dinitrotoluene	5	ND
2,6-Dichlorophenol	5	ND
2,6-Dinitrotoluene	5	ND
2-Chloronaphthalene	5	ND
2-Chlorophenol	5	ND
2-Methylnaphthalene	5	ND
2-Methylphenol	5	ND
2-Naphthylamine	5	ND
2-Nitroaniline	5	ND
2-Nitrophenol	5	ND
2-Picoline	5	ND
3,3-Dichlorobenzidine	5	ND
3,3-Dimethylbenzidine	5	ND
3-Methylcholanthrene	5	ND
3-Methylphenol	5	ND
3-Nitroaniline	5	ND
4,6-Dinitro-2-methylphenol	10	ND
4-Aminobiphenyl	5	ND
4-Bromophenyl-phenylether	5	ND
4-Chloro-3-methylphenol	5	ND
4-Chloroaniline	5	ND
4-Chlorophenyl-phenylether	5	ND
4-Methylphenol	5	ND
4-Nitroaniline	5	ND
4-Nitrophenol	5	ND
5-Nitro-o-toluidine	5	ND

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1345-96-2
SAMPLE ID: PW-#14 (PUMP WELL)
DILUTION FACTOR: 1

DATE SAMPLED: 09/25/96
DATE RECEIVED: 09/25/96
DATE EXTRACTED: 09/30/96
DATE ANALYZED: 10/07/96
MATRIX: WATER
SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
7,12 Dimethylbenzanthracene	5	ND
a'a Dimethylphenethylamine	5	ND
Acenaphthene	5	ND
Acenaphthylene	5	ND
Acetophenone	5	ND
Aniline	5	ND
Anthracene	5	ND
Benzidine	20	ND
Benzo(a)anthracene	5	ND
Benzo(a)pyrene	5	ND
Benzo(b)fluoranthene	5	ND
Benzo(g,h,i)perylene	5	ND
Benzo(k)fluoranthene	5	ND
Benzoic Acid	5	ND
Benzyl alcohol	5	ND
Bis(2-Chloroethoxy)methane	5	ND
Bis(2-Chloroethyl)ether	5	ND
Bis(2-Chloroisopropyl)ether	5	ND
Bis(2-Ethylhexyl)phthalate	5	ND
Butylbenzylphthalate	5	ND
Chrysene	5	ND
Di-n-butylphthalate	5	ND
Di-n-octylphthalate	5	ND
Dibenz(a,h)anthracene	5	ND
Dibenzofuran	5	ND
Diethylphthalate	5	ND
Dimethylphthalate	5	ND
Diphenylamine	5	ND
Ethyl methanesulfonate	5	ND
Fluoranthene	5	ND
Fluorene	5	ND
Hexachlorobenzene	5	ND
Hexachlorobutadiene	5	ND
Hexachlorocyclopentadiene	5	ND
Hexachloroethane	5	ND
Indeno(1,2,3-cd)pyrene	5	ND
Isophorone	5	ND
Methyl methanesulfonate	5	ND
N-Nitroso-di-n-butylamine	5	ND
N-Nitroso-di-n-propylamine	5	ND
N-Nitroso-dimethylamine	5	ND
N-Nitrosodiphenylamine	5	ND

ANALYSIS RESULTS - EPA 8240
VOLATILE ORGANIC ANALYTES

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: 1345-96-1
SAMPLE ID: PW-#2
DILUTION FACTOR: 1

DATE SAMPLED: 09/25/96
DATE RECEIVED: 09/25/96
DATE ANALYZED: 10/07/96
MATRIX: WATER
SAMPLE VOL. WT.: 10 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
ACETONE	100	ND
BENZENE	5	ND
BROMODICHLOROMETHANE	5	ND
BROMOFORM	5	ND
BROMOMETHANE	10	ND
2-BUTANONE (MEK)	100	ND
CARBON DISULFIDE	5	ND
CARBON TETRACHLORIDE	5	ND
CHLOROBENZENE	5	ND
CHLOROETHANE	10	ND
2-CHLOROETHYLVINYL ETHER	10	ND
CHLOROFORM	5	ND
CHLOROMETHANE	10	ND
DIBROMOCHLOROMETHANE	5	ND
1,2-DICHLOROBENZENE	5	ND
1,3-DICHLOROBENZENE	5	ND
1,4-DICHLOROBENZENE	5	ND
DICHLORODIFLUORMETHANE	10	ND
1,1-DICHLOROETHANE	5	ND
1,2-DICHLOROETHANE	5	ND
1,1-DICHLOROETHENE	5	ND
CIS-1,2-DICHLOROETHENE	5	ND
TRANS-1,2-DICHLOROETHENE	5	ND
1,2-DICHLOROPROPANE	5	ND
CIS-1,3-DICHLOROPROPENE	5	ND
TRANS-1,3-DICHLOROPROPENE	5	ND
ETHYLBENZENE	5	ND
2-HEXANONE	50	ND
METHYLENE CHLORIDE	5	ND
4-METHYL-2-PENTANONE (MIBK)	50	ND
STYRENE	5	ND
1,1,1,2-TETRACHLOROETHANE	5	ND
1,1,2,2-TETRACHLOROETHANE	5	ND
TETRACHLOROETHENE	5	ND
TOLUENE	5	46
TOTAL XYLENES	5	ND
1,1,1-TRICHLOROETHANE	5	ND
1,1,2-TRICHLOROETHANE	5	ND
TRICHLOROETHENE	5	ND
TRICHLOROFLUOROMETHANE	10	ND
1,2,3-TRICHLOROPROPANE	5	ND
VINYL ACETATE	50	ND
VINYL CHLORIDE	10	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
1,2-DICHLOROETHANE-D4	76-114	95
TOLUENE-D8	88-110	93
4-BROMOFLUOROBENZENE	86-115	90

ANALYSIS RESULTS - EPA 8240
VOLATILE ORGANIC ANALYTES

CLIENT: NINYO & MOORE

DATE SAMPLED:	09/25/96
DATE RECEIVED:	09/25/96
DATE ANALYZED:	10/07/96
MATRIX:	WATER
SAMPLE VOL. WT.:	10 ML

PROJECT NAME/No.: NONE
PTAS LOG #: 1345-96-2
SAMPLE ID: PW-#14 (PUMP WELL)
DILUTION FACTOR: 1

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
ACETONE	100	ND
BENZENE	5	ND
BROMODICHLOROMETHANE	5	ND
BROMOFORM	5	ND
BROMOMETHANE	10	ND
2-BUTANONE (MEK)	100	ND
CARBON DISULFIDE	5	ND
CARBON TETRACHLORIDE	5	ND
CHLOROBENZENE	5	ND
CHLOROETHANE	10	ND
2-CHLOROETHYLVINYL ETHER	10	ND
CHLOROFORM	5	ND
CHLOROMETHANE	10	ND
DIBROMOCHLOROMETHANE	5	ND
1,2-DICHLOROBENZENE	5	ND
1,3-DICHLOROBENZENE	5	ND
1,4-DICHLOROBENZENE	5	ND
DICHLORODIFLUORMETHANE	10	ND
1,1-DICHLOROETHANE	5	ND
1,2-DICHLOROETHANE	5	ND
1,1-DICHLOROETHENE	5	ND
CIS-1,2-DICHLOROETHENE	5	ND
TRANS-1,2-DICHLOROETHENE	5	ND
1,2-DICHLOROPROPANE	5	ND
CIS-1,3-DICHLOROPROPENE	5	ND
TRANS-1,3-DICHLOROPROPENE	5	ND
ETHYLBENZENE	5	ND
2-HEXANONE	50	ND
METHYLENE CHLORIDE	5	ND
4-METHYL-2-PENTANONE (MIBK)	50	ND
STYRENE	5	ND
1,1,1,2-TETRACHLOROETHANE	5	ND
1,1,2,2-TETRACHLOROETHANE	5	ND
TETRACHLOROETHENE	5	ND
TOLUENE	5	ND
TOTAL XYLENES	5	ND
1,1,1-TRICHLOROETHANE	5	ND
1,1,2-TRICHLOROETHANE	5	ND
TRICHLOROETHENE	5	ND
TRICHLOROFLUOROMETHANE	10	ND
1,2,3-TRICHLOROPROPANE	5	ND
VINYL ACETATE	50	ND
VINYL CHLORIDE	10	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
1,2-DICHLOROETHANE-D4	76-114	98
TOLUENE-D8	88-110	92
4-BROMOFLUOROBENZENE	86-115	89

QA/QC REPORT

ERA ANALYSIS: 9973
DATE ANALYZED: 09/25/96

SPIKED ANALYTE	TV	DV	AR
pH	9.13	9.02	8.85 - 9.25

QA/QC REPORT

ERA ANALYSIS: 9973, 9971
DATE ANALYZED: 09/27-30/96

SPIKED ANALYTE	TV	DV	%R
TDS	642	670	104
CONDUCTIVITY	1210	1160	96
ALKALINITY	156	159	98

QA/QC REPORT

DATE ANALYZED: 09/27-10/01/96

SPIKED ANALYTE	LCS % R	MS % R	MSD % R	RPD	ACCEPTABLE LCS,MS/MSD CRITERIA %	ACCEPTABLE RPD CRITERIA %
CHLORIDE	97	96	93	3	80-120	< 20
MBAS	97	92	98	6	80-120	< 20
SULFATE	112	112	108	4	80-120	< 20
COPPER	92	89	88	1	75-125	< 20
ZINC	89	86	87	1	75-125	< 20
IRON	91	92	92	0	75-125	< 20
MANGANESE	91	88	89	1	75-125	< 20
SODIUM	91	112	105	6	75-125	< 20
CALCIUM	96	91	94	3	75-125	< 20
MAGNESIUM	93	88	91	3	75-125	< 20

TV = TRUE VALUE
DV = DETERMINED VALUE
AR = ACCEPTABLE RANGE
% R = PERCENT RECOVERY
LCS % R = LABORATORY CONTROL SAMPLE PERCENT RECOVERY
MS % R = MATRIX SPIKE PERCENT RECOVERY
MSD % R = MATRIX SPIKE DUPLICATE PERCENT RECOVERY
RPD = RELATIVE PERCENT DIFFERENCE

QA/QC REPORT

METHOD: EPA 8270-WATER DATE ANALYZED: 10/03/96 PTAS LOG#: 1345-96 BLANK				ACCEPTABLE LCS/LCSD CRITERIA	ACCEPTABLE RPD CRITERIA
SPIKED ANALYTE	LCS % R	LCSD % R	RPD	%	%
ACENAPHTHENE	70	65	7	47-145	<30
DI-N-BUTYL PHTHALATE	61	58	5	1-118	<30
1,4-DICHLOROBENZENE	76	74	7	20-124	<30
2,4-DINITROTOLUENE	71	70	1	39-139	<30
N-NITROSO-DI-N-PROPYLAMINE	48	44	9	D-230	<30
PYRENE	57	58	2	52-115	<30
1,2,4-TRICHLOROBENZENE	74	72	3	44-142	<30
4-CHLORO-3-METHYLPHENOL	65	66	2	22-147	<30
2-CHLOROPHENOL	76	73	4	23-134	<30
4-NITROPHENOL	73	71	3	D-132	<30
PENTACHLOROPHENOL	57	57	0	14-176	<30
PHENOL	63	65	3	5-112	<30

LCS % R = LABORATORY CONTROL SAMPLE PERCENT RECOVERY
LCSD % R = LABORATORY CONTROL SAMPLE DUPLICATE PERCENT RECOVERY
RPD = RELATIVE PERCENT DIFFERENCE

ANALYSIS RESULTS - EPA 8270
SEMIVOLATILE ORGANIC COMPOUNDS

CLIENT: NINYO & MOORE	DATE SAMPLED: 09/25/96
	DATE RECEIVED: 09/25/96
PROJECT NAME/No.: NONE	DATE EXTRACTED: 09/30/96
PTAS LOG #: 1345-96-2	DATE ANALYZED: 10/07/96
SAMPLE ID: PW-#14 (PUMP WELL)	MATRIX: WATER
DILUTION FACTOR: 1	SAMPLE VOL./WT.: 1000 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
N-Nitrosopiperidine	5	ND
Naphthalene	5	ND
Nitrobenzene	5	ND
o-Toluidine	5	ND
Pentachlorobenzene	5	ND
Pentachloronitrobenzene	5	ND
Pentachlorophenol	5	ND
Phenacetin	5	ND
Phenanthrene	5	ND
Phenol	5	ND
Pronamide	5	ND
Pyrene	5	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
2-FLUOROPHENOL	21-100	30
PHENOL-d6	10-94	40
NITROBENZENE-d5	35-114	37
2-FLUOROBIPHENYL	43-116	43
2,4,6-TRIBROMOPHENOL	10-123	52
4-TERPHENYL-d14	33-141	35

ANALYSIS RESULTS - EPA 8240
VOLATILE ORGANIC ANALYTES

CLIENT: NINYO & MOORE

PROJECT NAME/No.: NONE
PTAS LOG #: METHOD BLANK
SAMPLE ID: N/A
DILUTION FACTOR: 1

DATE SAMPLED: N/A
DATE RECEIVED: N/A
DATE ANALYZED: 10/07/96
MATRIX: WATER
SAMPLE VOL./WT.: 10 ML

ANALYTE	DETECTION LIMIT PPB (UG/L)	RESULTS PPB (UG/L)
ACETONE	100	ND
BENZENE	5	ND
BROMODICHLOROMETHANE	5	ND
BROMOFORM	5	ND
BROMOMETHANE	10	ND
2-BUTANONE (MEK)	100	ND
CARBON DISULFIDE	5	ND
CARBON TETRACHLORIDE	5	ND
CHLOROBENZENE	5	ND
CHLOROETHANE	10	ND
2-CHLOROETHYLVINYL ETHER	10	ND
CHLOROFORM	5	ND
CHLOROMETHANE	10	ND
DIBROMOCHLOROMETHANE	5	ND
1,2-DICHLOROBENZENE	5	ND
1,3-DICHLOROBENZENE	5	ND
1,4-DICHLOROBENZENE	5	ND
DICHLORODIFLUORMETHANE	10	ND
1,1-DICHLOROETHANE	5	ND
1,2-DICHLOROETHANE	5	ND
1,1-DICHLOROETHENE	5	ND
CIS-1,2-DICHLOROETHENE	5	ND
TRANS-1,2-DICHLOROETHENE	5	ND
1,2-DICHLOROPROPANE	5	ND
CIS-1,3-DICHLOROPROPENE	5	ND
TRANS-1,3-DICHLOROPROPENE	5	ND
ETHYLBENZENE	5	ND
2-HEXANONE	50	ND
METHYLENE CHLORIDE	5	ND
4-METHYL-2-PENTANONE (MIBK)	50	ND
STYRENE	5	ND
1,1,1,2-TETRACHLOROETHANE	5	ND
1,1,2,2-TETRACHLOROETHANE	5	ND
TETRACHLOROETHENE	5	ND
TOLUENE	5	ND
TOTAL XYLENES	5	ND
1,1,1-TRICHLOROETHANE	5	ND
1,1,2-TRICHLOROETHANE	5	ND
TRICHLOROETHENE	5	ND
TRICHLOROFLUOROMETHANE	10	ND
1,2,3-TRICHLOROPROPANE	5	ND
VINYL ACETATE	50	ND
VINYL CHLORIDE	10	ND

ND = NON DETECT ABOVE INDICATED DETECTION LIMIT.
DETECTION LIMITS AND RESULTS HAVE BEEN ADJUSTED ACCORDINGLY TO ACCOUNT FOR DILUTION FACTOR.

SURROGATE SPIKE DATA	ACCEPTABLE CRITERIA	% RECOVERY
1,2-DICHLOROETHANE-D4	76-114	98
TOLUENE-D8	88-110	93
4-BROMOFLUOROBENZENE	86-115	92

QA/QC REPORT						
METHOD:	EPA 8240-WATER				ACCEPTABLE LCS, MS/MSD CRITERIA	ACCEPTABLE RPD CRITERIA
DATE ANALYZED:	10/07/96					
PTAS LOG#:	1359-96-1					
SPIKED ANALYTE	LCS % R	MS % R	MSD % R	RPD	%	%
1,1-DICHLOROETHENE	98	100	100	0	61-145	<30
TRICHLOROETHENE	104	111	113	2	71-120	<30
CHLOROBENZENE	103	107	111	4	75-130	<30
TOLUENE	94	100	103	3	76-125	<30
BENZENE	103	108	112	4	76-127	<30

LCS % R = LABORATORY CONTROL SAMPLE PERCENT RECOVERY
MS % R = MATRIX SPIKE PERCENT RECOVERY
MSD % R = MATRIX SPIKE DUPLICATE PERCENT RECOVERY
RPD = RELATIVE PERCENT DIFFERENCE

Pacific Treatment Analytical Services, Inc.

4340 Viewridge Avenue, Suite A; San Diego, CA 92123; (619) 560-7717 Fax (619) 560-7763

CHAIN-OF-CUSTODY RECORD

PTAS LAB ID

DATE/TIME STAMP 1:28

Client:

Address:

Attn: Phone:

Sampled by: Fax:

Billing Address:

Project: PO #:

Client Sample ID	Sample Date	Sample Time	Sample Matrix	Container(s) #	Type*	PTAS ID #	418.1 (TRPH)	TPH (DOHS GC/FID)	602 / 8020 (Full List)	602 / 8020 (BTXE only)	601 / 8010 (Purgeable Halocarbons)	608 / 8080 (Pesticides & PCBs)	608 / 8080 (PCBs only)	624 / 8240 (Volatile Organics)	625 / 8270 (Semi-Volatile Organics)	TTLC Metals (CAC Title 22)	STLC Metals (CAC Title 22)	TCLP Metals (RCRA EPA 1311)	TCLP Organics (RCRA EPA 1311)	Cd Cr Cu Pb Ni Ag Zn
						1														
						2								X	X					
						3														
						4														
						5														
						6														
						7														
						8														
						9														
						10														

*Container Types: B=Brass Tube; V=VOA; G=Glass; P=Plastic; O=Other (list)

Seals Intact: Yes No N/A Correct Containers: Yes No

Sample Temperature: Cold Ambient Warm

Sample Preservation: Yes No N/A

Disposal: N/C Pickup PTAS (additional fee) Archive (additional fee)

Turnaround Time: 24 hr 48 hr 3 day 5 day Normal

Comments:

RELINQUISHED BY		RECEIVED BY	
Signature		Signature	
Print	Company	Print	Company
Date	Time 31	Date	Time
Signature		Signature	
Print	Company	Print	Company
Date	Time	Date	Time
Signature		Signature	
Print	Company	Print	Company
Date	Time	Date	Time

Pacific Treatment Analytical Services, Inc.
4340 Viewridge Avenue Suite A • San Diego CA 92123 (619) 560-7717 FAX (619) 560-7763

Cooler Receipt Form

Client: NINYO & MOORE

Project Name: ______________________ / Not Given

Log Numbers: 1345-96 TO

Samples Received in: Cooler(s) Box(es) None Other: ________

Number of Coolers: 1 Log-in Date: 9/25/96 Time: 1335

Logged in By: K HUTCHINSON Signature: K Hutch

1. Were samples sufficiently chilled? Yes No N/A
If included, report temperature of temperature blank ___°C

2. Were chain-of-custody forms filled out properly (ink, signed, etc.) Yes No
If NO, explain below.

3. Did all bottles arrive unbroken with labels in good condition? Yes No
If NO, explain below.

4. Were correct containers used for the analyses requested? Yes No
If NO, explain below.

5. Were samples correctly preserved? Yes No N/A
If NO, explain below.

6. Was sufficient sample sent for analyses requested? Yes No
If NO, explain below.

7. Were air bubbles absent from VOA samples? Yes No N/A
If NO, list by PTAS log number on the back of this form.

Additional Notes:

APPENDIX C

GROUNDWATER MONITORING AND MANAGEMENT PLAN

Appendix G
Environmental Management Plan

THE EL CAPITAN GOLF COURSE

LAKESIDE, CALIFORNIA

ENVIRONMENTAL DEVELOPMENT PROGRAM

GOLF COURSE DESIGN -- ENVIRONMENTAL CONSIDERATIONS
CONSTRUCTION AND GROW-IN
ENVIRONMENTAL TURF MANAGEMENT PROGRAM & PRACTICES
MANAGING PERSONNEL

PREPARED BY

GOLF PROPERTIES DESIGN

OCTOBER 1997

3369 DEHESA ROAD EL CAJON, CALIFORNIA 92019 PHONE 619-442-8100, FAX 619-444-5438

EL CAPITAN GOLF COURSE
LAKESIDE, CALIFORNIA

Prepared by: **DAVID N. FLEMING**
Golf Course Architect

Date: October 1997

EXECUTIVE SUMMARY OF THE ENVIRONMENTAL DEVELOPMENT PROGRAM

INTRODUCTION

PROJECT DESCRIPTION:

The El Capitan Golf Resort is located in southwestern San Diego County, California immediately east of the community of Lakeside. The golf course will lay at the foot of El Capitan Mountain. The project site is generally aligned along both sides of the San Diego River, beginning approximately one-half mile east of the intersection of Lake Jennings Park Road and El Monte Road and extending for a distance of approximately two miles to the east. The proposed golf course would occupy low land (i.e., flood plain) areas within the river valley.

The site is accessed from Interstate 8 (I-8) by exiting the freeway at Lake Jennings Park Road, then turning north on Lake Jennings Park Road for a distance of approximately 1.75 miles to its intersection with El Monte Road. At this point the traveler would turn east and travel approximately one-half mile to the project site.

The project is a proposal to lease an approximate 474-acre site for the purpose of constructing two 18 hole golf courses, a golf clinic/9 hole golf training course, a driving range, club house, and maintenance facilities. The proposed lease would run for 50 years from the date of issuance and would require construction and maintenance of the golfing facility as described in the lease document. Also included in the proposal is the construction of access roads, a roadway bridge across the San Diego River channel, and construction of approximately 4 Arizona style at grade crossings to connect to various playing areas on the golf course. The project would involve construction of two 18-hole golf courses, and a 9-hole training course. One of the 18-hole courses would be located towards the west, and one towards the east of the clubhouse.

Construction of the golf courses would require alteration of the natural ground surface for the development of fairways, greens, sand traps, and ponds. Tentative estimates identify that approximately 1,155,000 cubic yards of total grading will be required to construct the golfing facilities. This would be balanced cut and fill (i.e., importing or exporting graded materials on/off the project site is not anticipated.

Water supplies for maintenance of the golf course playing areas and landscaping would be primarily drawn from the groundwater resources located beneath the project site. The proposed lease allows for upwards of 1,200 acre-feet of water extraction per year for use in meeting project irrigation needs. Ground water would be drawn from a number of water supply wells to be drilled in various areas throughout the site. The irrigation requirements for golfing facilities are variable depending on a variety of physical and climatic factors. In addition, the area available for the golf courses totals approximately 362 acres (474 acres minus 112 acres of river channel), not all of these areas would be dedicated to turf propagation. Other, less water consumptive, vegetation would likely be planted over portions of the project site. Much of this vegetation would be comprised of native species.

Groundwater extracted from the alluvial aquifer would be placed within the ponds proposed as part of the project and later used for irrigation of play areas, driving range, and landscaping. Although the lease allows for upwards of 1,200 afy of groundwater extraction, a conservative estimate of water requirements for the proposed golf course finds total requirements of approximately 938 afy (Personal Communication, David Fleming, Golf Properties Design). Should the project require more irrigation water than is available from on-site wells, other water supplies would be used to supplement local groundwater supplies.

The proposed Club House facility would be approximately 15,000 square feet in size and would feature a Pro Shop, Restaurant, and Lounge. Parking facilities would be placed adjacent to the Club House and would accommodate approximately 400 automobiles.

The proposed driving range would provide practice facilities for golfing patrons and is planned for location immediately north of the club house area. Driving range facilities would provide upwards of 35 practice positions.

The access road proposed for the facility would require construction of a two-lane road between El Monte Road (on the south side of the river) to the Club House facility (on the north side of the river). This will require construction of approximately .70 miles of access roads and a two-lane bridge crossing the San Diego River. The access road would also connect the Club House with the maintenance facilities located immediately north of El Monte Road near the eastern portion of the project site.

In addition to automobile traffic, four foot/cart at grade crossings would be placed at various locations along the river. The foot/cart crossings would be approximately 10 feet wide and would span the entire floodway. This would allow patrons to cross the river between the various playing areas on the project site without increasing the human presence within wetland areas.

Maintenance facilities will be necessary to maintain equipment, and to store maintenance supplies and equipment. The maintenance area of the facility would be located on an approximate two-acre site at the southern portion of the property. These facilities would include a large maintenance yard for the storage of irrigation supplies, mulch, sand, fuel, fertilizers, pesticides, and landscaping supplies. Fuel storage would include two 1,000 gallon above ground storage tanks for diesel and gasoline fuels. In addition, a 10,000 to 15,000 sq. ft. work shop/garage would be constructed for the purpose of equipment repair and housing, and storage of spare parts. The entire maintenance compound would be approximately 80,000 square feet in size.

Daily operations would require the services of approximately 50 to 60 full-time equivalent positions (25 to 30 golf course maintenance staff and 20 to 30 golf shop and restaurant staff). Hours of operations would vary depending on season. Summer hours would be the most intensive(5:00 AM to 10:00 PM).
The project site is located on lands owned by the Helix Water District, and used by this agency for watershed. Until recently, these lands have been utilized for agricultural production and floodway. Development of the golfing facility on these lands will require the issuance of a long-term lease (50 years).

PURPOSE OF THE REPORT

The objective of this report is to demonstrate the ability to develop the golf course project so that it can provide a sustainable coexistence with the environment. That through research and knowledgeable planning, the project proponents propose to design, construct, grow in, and maintain an environmentally sound project. This report will describe the golf course maintenance program and show how it relates to the golf course design principles, and construction methodology to protect and enhance the environmental conditions of the site. The project will be supported by University turfgrass research that will document the impacts of golf course development on the environment. These research programs were initiated in the 1980's as a result of many concerned people over the potential loss, contamination, and degradation of native lands.

Through the environmental awareness of the 1980's, a great deal has been learned about how to design, construct, and operate golf courses with safe ecological systems. Most old pesticide chemistry has been eliminated from the market place making many pesticides unavailable for use and potential pollution. The loss of pesticides sales has meanwhile generated research by the industry to develop biologically safe pest controls. The list of biological controls now include microorganisms which are incubated daily and injected into the irrigation systems for distribution and the control of specific turfgrass diseases. Available in today's management programs are alternatives to chemical insect pest control. Insects are being treated with environmentally safe fatty acids, soaps, and natural insect predators. Juvenile growth hormones when applied to the larvae or nymph stages of insects prevent the insect from maturing to the damaging adult stages.

These biological controls are substituted for the hard chemical controls used in the past. The direction of the pest management program is first to select improved turfgrass varieties that are resistant to diseases and insects, then manage for strong healthy turfgrass that will resist fungus infection and weed invasion. When pesticides are required the biological remedies will be the first line of defense, and only in extreme economic conditions will chemical pesticides be applied. This report will offer a detailed explanation of these issues, and how these principals have been built into the project design and/or how they will be applied to management of the golf course.

GOALS OF THE REPORT

1. Present a report that shows how the design criteria will be supported from a technical standpoint to develop a golf course that is "ENVIRONMENTALLY FRIENDLY";

2. Show that we understand the potential environmental problems and have considered viable environmental alternatives. That we will, with safe, proven methodology, hold safe the environment, the wildlife, the ground water, and the people in the community;

3. Remedy one of the main problems in golf course development, the PERCEPTIONS of the general public that: a) golf courses in general are abusers of the use of pesticides and water, and, b) golf courses by their nature will pollute the environment. This report will document the conservative and safe management of both;

4. Train both the construction and maintenance personnel to respect and protect the environment. The key point to our Integrated Pest Management, (IPM), program is knowing the problems and applying the Best Management Practices, (BMP), as the remedies;

5. DEDICATED PRESERVE LAND, retain wildlife habitat, and protect it from alternative development, hunting, wild fires, and habitat destruction;

6. Show that the golf course can increase the WILDLIFE VIABILITY AND DIVERSITY in the area by creating an edge effect (or transitional buffer) between the canopy of native trees/shrubs, and turfgrass. The coexistence of the two may increase the wildlife population;

7. Show that the NUTRIENT PROGRAM, is non polluting and safe to the environment. It is based on slow release fertilizers, natural organics, and nitrogen fixing microorganisms;

8. Show that the disease and insect control will be by BIOLOGICAL REMEDIES as the first line of defense, and only in extreme economic conditions will chemical pesticides be applied; and

9. Describe the configuration of drainage structures to control, clean, and retain storm waters with de siltation basins and living plant nutrient filters. Clean waters will be impounded allowing them to percolate into the ground for storage and later extraction.

GOLF PROPERTIES DESIGN, through the design process, has built in systems to protect the environment, water quality, wildlife, and mankind, while providing clean recreation and employment for many people. The positive approach of environmental protection is designed into the project through the selection of new generation turfgrass varieties that are resistant to diseases and insects, less dependent on pesticides, and require less applied fertilizer and water. They are building on today's technologies to assure ecological integrity, project quality, and business economics. Golf Properties Design is utilizing Best Management Practices which are based on the most current research to enable the coexistence of ecological resources and golf course development.

ENVIRONMENTAL CONSIDERATIONS of the GOLF COURSE DESIGN

SUMMARY of GOLF COURSE FEATURES

The El Capitan Golf Resort development plans include a 36-hole golf course, a golf course clinic/9 hole golf training course, and a practice driving range. These facilities have been designed by Golf Course Architect DAVID N. FLEMING, President of GOLF PROPERTIES DESIGN. The themes for these designs have been developed to enhance the natural conditions while not compromising environmental integrity. The golf course architectural plans call for the courses to have approximately 264 acres of irrigated turf and 19.5 acres of lakes on the 45 holes of golf. An additional 64.4 acres will be planted to low water use native vegetation in a wildlife linkage corridor and non play fringe areas. The golf courses are designed with a transitional buffer zone connecting the native habitat to the golf course fairways and roughs in an effort to enhance wildlife utilization.

The planting plan includes a pallet of valley-indigenous plants to support the threatened California gnatcatcher and other local wildlife Which depends upon this type of vegetation community. This is emphasized by the inclusion of a wildlife linkage corridor which seeks to connect natural open space on the north and south slopes of the valley. This corridor allows unobstructed passage of wildlife in an area that was previously intensively managed for agricultural production. The planting plan has been developed to provide refuge, habitat, and feed for migratory birds and other wildlife species.

Turf grasses have been selected from the new generation of disease and insect resistant varieties. These varieties have the ability to perform to the high standard of a functional golf course with minimum applications of nutrients and pesticides. Turf grasses develop a rich organic layer that acts as a filter to remove any contaminants and pollutants from storm waters as they pass over the turf. In addition, turf grasses tend to hold rain waters on site. The organic layer acts like a sponge, releasing water through time for percolation into the water table.

The El Capitan Golf Resort has also been designed to retain storm waters, removing suspended sediment and potential contaminants and allowing these waters to slowly percolate into the water table. This feature is designed to improve groundwater recharge.

In summary, the El Capitan Golf Resort has been designed to improve the sites function as a habitat for wildlife, to reduce the potential for nutrient pollution, and to enhance groundwater recharge. Each of these issues will be discussed in detail, with management standards identified for implementation following construction of the facility.

DRAINAGE DESIGN AND SURFACE WATER RUNOFF

The golf course design interrupts the surface runoff with turf drainage corridors. These corridors act as catchment zones to capture potential contaminants and prevent adverse affects to ground water quality. A series of topographic lows will capture and extract solids (desiltation) from the runoff waters. The waters overflow from low to low passing waters to aquatic plant filtration bays, and finally on to water percolation swales as clean water. The system is designed to capture normal rainfall events while passing extreme event overflow through into the river.

The main concerns with surface water movement are the transport of sediments, nutrients, and pesticides from more intensively maintained turf areas which could impact surface water quality. Surface runoff is created by a complex series of processes in response to rainfall. Soil, vegetative cover, and slope are factors which interact to determine the amount of runoff which will occur under a given set of conditions.

A runoff coefficient can be calculated for surface areas based on a ratio of the peak runoff rate to the rainfall intensity. Runoff coefficients for areas with turf grasses frequently are evaluated at between 0.18 and 0.28 depending on soil texture. A similar evaluation for a street would be 0.83 (Jarrett, 1985). Studies at Pennsylvania State University (Watschke and Mumma, 1989) and the University of Maryland (Gross et al., 1990; Welterlen et al., 1989) have shown that for significant runoff to occur on areas that have a dense actively growing turf cover even on a 14 percent slope that rainfall or simulated rainfall had to exceed 3 inches/hour. When these conditions exist so that runoff does occur, turf areas are extremely effective in reducing soil losses compared to other cropping.

In a comparison of soil loss from conventional agriculture with soil loss from turf, measured soil loss from tobacco production (4210 lbs/acre) were 842 times higher than from turf areas (5 lbs/acre) even with a slope of 16 percent on a silt loam soil (Gross et al., 1987; Gross et al., 1990). Where polluted runoff from agricultural areas has occurred, establishment of turf buffer strips of 15 feet have been shown to improve water quality (Doyle et al., 1977). (Wauchope, 1978) noted that in cases where water quality has declined due to agricultural practices leading to loss of nutrients and erosion, grass buffer strips placed between treated fields and surface waters have significantly reduced the problem. This is related to the structure of the turf canopy and the fibrous nature of the turf root system.

Turf density, leaf texture and canopy height are physical factors which restrain soil erosion and sediment loss by dissipating impact energy from rain and irrigation water droplets, and providing a resistance to surface movement of water over turf. Turf grasses have an extensive fibrous root system with 80 percent of the root mass found in the upper 2 inches of the soil profile (Welterlen et al., 1989). It is a combination of the turf canopy and root mass which have a strong soil stabilizing effect. Therefore, it is anticipated that the introduction of turf grass to the project site would reduce the runoff conditions.

GOLF COURSE IMPACT AREA

The net impact from the development of the golf complex in areas of turf maintenance include approximately 264 acres. The majority of this area will not require pesticides due to the adaptability and resistance strains of turf grasses. The percent total area which would receive moderate chemical application is a relatively small (greens and ornamental plantings) area, approximately 550,000 square feet (12.63 acres) or 5 percent of the total golf course. The golf course area (264 acres represents only 56 percent of the total project (474 acres) with the greens being 3 percent of the total area.

The major concern regarding contamination of surface waters from runoff focuses on nutrients and pesticides. From turf areas, the major concern regarding contamination of surface waters from runoff containing nutrients is for nitrates and phosphates. Phosphorus is unlikely to create problems except under very specialized conditions. Even though the granular phosphorus fertilizer carriers are greater than 88 percent water soluble and water soluble forms exist for liquid application, the phosphorus becomes rapidly fixed within the soil profile and vertical movement in most soils is only 0.3 to 1.2 inches/year (Young et al., 1985). Research work at Pennsylvania State University by (Watschke and Mumma, 1989) found no sediment loss associated with runoff from turfed plots and observed phosphate losses which averaged only 0.5 lbs./acre when runoff did occur. Their study was conducted on slopes ranging from 9 to 14 percent under intense precipitation simulations. Total phosphorus loss in surface runoff for the entire growing season from a tall fescue/Kentucky bluegrass turf was only 0.0178 lbs/acre (Gross et al., 1990). The largest potential loss of phosphorus would result from rain causing surface runoff immediately following fertilization. This occurrence can be completely avoided by 1) not fertilizing when rain is predicted; and 2) making certain that fertilizer is irrigated to remove the material from the leaves into the soil immediately following application.

Nitrate movement as surface runoff can also be minimized by management decisions. Research has shown that the total nitrogen loss from a fertilizer application can be reduced from 9.5 percent of the total amount applied using urea as the nitrogen carrier to 0.26 percent by changing to a slowly available carrier such as sulfur coated urea (Dunigan a al., 1976). In research tests by (Gross et al., 1990) four applications (3-4 months apart) of granulated urea were applied at the rate of 49 kg. N/ha. in sandy loam soil. The concentration of nitrate found in subsurface water ranged from 0.1-0.7 mg./L. This is well below the Environmental Protection Agency's allowable level of nitrates (10 mg. /L.) for drinking water standards.

In the work conducted at Pennsylvania State University (Watschke et al. 1989; Watschke and Mumma, 1989), potential pollution problems from concentrated runoff under intense irrigation events was studied. Rainfall simulation of 6 inches/hour was necessary for runoff to occur. Their initial work found that a 3-inch per hour rainfall simulation produced no runoff on turfgrass plots where proper site preparation planting and optimum turf establishment had occurred, and these results were documented despite there being a slope ranging from 9 to 14 percent. At the 6 inch/hour rate undiluted research plot runoff water quality remained high, having nitrates below the 10 part per million (ppm) drinking water standard on 28 out of 29 sample dates after runoff rainfall simulation. (Meisinger and Randall, 1991) noted that nitrogen losses in surface runoff are usually small and depend on degree of soil cover, source of nitrogen applied, rainfall intensity immediately after application and soil properties. They also noted that the largest losses will occur when a soluble nitrogen source is applied to a bare soil and a significant runoff event occurs within one day of application, all of which can be avoided by Best Management Practices.

PESTICIDE MIGRATION

Movement of pesticides into surface water during runoff would depend on the chemical nature of the material, length of time between application and rainfall, and the volume and intensity of rainfall following application. Watschke and Mumma (1989) reported on the potential for surface movement of selected pesticides in undiluted runoff on research plots under an extremely high irrigation rate of 6 inches/hour. They monitored for pendimethalin (a commonly used preemergence herbicide); 2,4-D, 2,4-DP, and dicamba (commonly used post emergence herbicides); and Chlorpyrifos (an insecticide).

For pendimethalin and Chlorpyrifos, no chemical was detected in any of the runoff on all 24 sample dates. These materials based on their chemistry become fixed in the soil after application and do not move. For 2,4-D and dicamba, the amounts in the concentrated runoff exceeded federal water standards on only 4 and 1 sample date out of 24, respectively, despite these materials being more water soluble and made as foliar applications. However, these levels were only found when runoff occurred within 2 days after application. They noted that under natural storm water runoff conditions and subsequent dilution that outfall concentrations would be considerably less. Similar findings with 2,4-D applications were noted by (Thompson et at. 1984). Under field conditions the greatest dislodgeable leaf residues of 2,4-D on Kentucky bluegrass were less than 4.5 percent of the total applied at time 0, immediately after application, indicating very rapid adsorption to the leaf surface and a strong affinity for adsorption. No dislodgeable residues were detected at 3 days after application. Hurto (1991) noted that the dissipation rate of foliarly applied pesticides depends on volatilization, plant absorption and photo decomposition. He summarized that research has found that less than 10 percent of the applied rate amount can be found as foliar residue the day after application and that within 1 to 3 days after application levels drop to between 1 and 3 percent. Careful attention to application timing with respect to rainfall and irrigation management can minimize removal of materials which could become non point pollutants. Watschke and Mumma (1989) concluded that nutrient and/or pesticide concentrations in storm water and the impact on surface water would be considerably less than other urban pollutants not associated with well managed turfgrass areas.

The proper management of nutrient and pesticide applications and the relationship to irrigation and rainfall events tend to eliminate problems associated with surface movement of materials and provide the optimum sensitivity for protecting water quality.

The above mentioned pesticides have typical characteristics of chemicals used on golf courses and they demonstrate the low probability of runoff contamination. They are not necessarily pesticides that would be used in the El Monte management program.

SOIL SPECIFICATIONS AND MODIFICATION

Putting Greens are constructed with surface and internal drainage systems. Properly designed drainage systems maximize the golf course playability even after heavy rainfall or irrigation. In the construction of the playing surface for the project, techniques and material will be utilized to ensure good drainage, and resistance to wear and compaction. For this reason, the greens will be constructed based on a United States Golf Association, USGA, method as detailed in "Specifications for a Method of Putting Green Construction."

This method of construction is based on the principle of a perched water table. This unique system takes advantage of the particle size differential within the soil profiles which disrupts internal drainage until saturated conditions occur. By using a four inch layer of specified pea gravel, overlaid with 12 inches of approved root zone mixture, water will be retained in the soil profile. The turfgrass roots will utilize this water without immediate drainage until saturated conditions occur. Materials which may have a propensity to move in the soil solution are held for maximum attenuation times and, if trace amounts are transported under saturated flow conditions, maximum dilution within the soil profile will occur.

The entire putting green is underdrained by a series of perforated drainage lines installed in the subgrade. These are spaced at no more than 20 feet on centers and have outflow with leachate catchment basins to enable monitoring of the leachates for nutrient, pesticides, and salt concentrations. This type of system affords the best approach to irrigation management and monitoring discharges for rainfall from the more intensively managed areas of the golf course. Successful construction of a USGA green requires these specifications to be rigidly followed for five basic values which are used as criteria for recommending the root zone mixture. These are: 1) percentages of capillary micro-pore space which adds aeration porosity, 2) water retention, 3) bulk, 4) density, and 5) water permeability. In addition, particle size analysis and mechanical analysis are usually run as the percentage of sand, silt and clay as well as the different percentage of the sand fractions. These will determine how fast the soil will drain and its potential to resist compaction from traffic and wear. To meet the requirements, samples of materials to be used in construction will be sent to a qualified physical soils testing laboratory to determine the proper ratio for mixing of these materials to meet the standards listed in Table 1. Subsequent recommendations for pH adjustment of the root zone mixture and addition of fertilizers will depend on the final ratio of materials used and will be made based on chemical analysis of the mixture.

Table 1.
PARTICLE SIZE DISTRIBUTION OF USGA ROOT ZONE MIX

Name	Particle Diameter	Specification	
Fine Gravel	2.0 - 3.4 mm	Not more than 10% of the total particles in this range, include a maximum of 3%	
Very Coarse Sand	1.0 - 2.0 mm	fine gravel (preferably none)	
Coarse Sand	0.5 - 1.0 mm	At least 60% of the particles must fall in this range	
Medium Sand	0.25 - 0.50 mm		
Fine Sand	0.15 - 0.25 mm	Not more than 20% of the particles may fall within this range	
Very Fine Sand	0.05 - 0.15 mm	Not more than 5%	Total particles in this range should not exceed 10%
Silt	0.002 - 0.05 mm	Not more than 5%	
Clay	Less than 0.002 mm	Not more than 3%	

Note: Sand for Tee and Green construction shall be washed and conform to current USGA specifications.

PHYSICAL PROPERTIES OF THE ROOT ZONE MIX

Physical Property	**Recommended Ranges**
Total Porosity	35% - 55%
Air-filled Porosity (at 40 cm tension)	15% - 30%
Saturated Conductivity	12 - 24 inches/hr (30-60 cm/hr)
Organic Matter Content	1% - 5% (ideally 2-4%) by weight

TEES

Tees are one of the most trafficked areas on the golf course. A soil mixture identical to the root zone mixture used for the putting green will be used to resist wear and compaction, but no gravel layer will be installed. The installation of perforated drain lines in trenches with gravel will be use on the tee base for the rapid removal of storm waters. Soil pH adjustment and fertilization will be handled the same as with the putting greens. The higher height of cut on the tee surface provides a much deeper root system in the soil profile and imparts considerably better wear tolerance. The tees are managed similar as the greens in nutrient application. Due to the turf selection of hybrid Bermuda the use of pesticides is anticipated to be negligible. The tees will be constructed using the Table 1 standards for physical parameters to meet the specifications for putting green construction with the USGA Green Section method.

FAIRWAYS AND ROUGHS

Soil modification of fairways and roughs is not practical since this encompasses a significant portion of the golf course acreage. The typical soil throughout the project is a well drained sandy loam soil and will serve very well as growing medium. Soil samples will be analyzed from several locations on the property. Chemical analysis from these samples will be the basis on which the recommendations for soil preparation will be made. The preplant fertilizer program will consisted of an composed fertilizer to inoculated the soils with a natural slow release fertilizer. It will act as a stimulant to soil microorganisms which is the basis of the organic system of nutrient and pesticide management. University of California fertility requirements for Bermuda grass will be used as reference points for the fertilizer program.

NATIVE PLANT ZONES

These planting zones include the wildlife animal linkage corridor and the fringe non-play areas of the golf course. The land forms in these areas will be capped with silts and clays on an as availability basis. While in the grading process, as these fine soils are discovered, they will be transported and used as cap soil in the native zone. The fine soils have the ability to retain water and will be best suited to sustain plant growth in marginal or non-irrigated areas. Water application will be supplementary at the time of establishment.

WETLANDS

Aquatic plant bays are constructed by design along the shorelines of the lakes. The construction of barrier stem walls will contain the plants from aggressively invading the lakes and choking the waterways. The average depth of the plant bays is between ground zero and two feet. The stem walls average height is two feet with its top terminating two to six inches below the lakes operating level. The plant bays will appear to have one continuous water surface. They will be supplied with a continuous supply of pumped lake water which filters through the aquatic plant roots, over the stem walls, and returning cleansed to the lake system. The Aquatic plants selected have a high affinity for the absorption of nutrients an pollutants. In effect, they act as water filters by removing nitrates, phosphates, other nutrients and pollutants.

Waterfalls in the lake system create a positive flow of water throughout the lake. The aeration of water created by the waterfalls and wave action maintains a live lake system in a healthy condition. It is integral to supporting fish life, migratory waterfowl, and wildlife with habitat and forage.

WATER CONSERVATION AND WATER QUALITY

The water conservation plan was developed to capture storm waters that formerly would sheet off the land carrying eroded soils through the river to the ocean. Research has documented that in storm events, once they have reached field capacity, farm lands will allow surface runoff carrying top soils down stream. Whereas turf grass has a better ability to hold considerably more rain waters in place, allowing the water to percolate into the groundwater table. With its extensive surface roots, turf can be a great deterrent to the loss of topsoil. Waters captured on turf, in the golf course drainage systems, and in the storm waters corridors, will be cleaned and returned to the groundwater table.

Desiltation basins constructed in the drainage corridors are designed to intercept storm waters and extract the soils and heavy solids carried in the waters. Overflow waters will pass through aquatic plant beds designed to extract nutrients and pollutants. The cleaned exit waters will pass on to infiltration bays. Golf course drainage waters and storm waters will be returned to the ground to be extracted later at a point downstream.

TURFGRASS

Criteria for turfgrass selection:

1. Turf grass varieties well adapted to the micro climates existing in El Monte Valley;

2. Turf grasses that are of high quality and appropriate for each golf course use (greens, tees, fairways, and roughs);

3. Turf that is adaptable to low water use while maintaining high quality appearance:

4. Turf grasses selections with the highest disease and insect resistance:

5. Turf grasses that have low maintenance characteristics and high quality appearance.

GENERAL INFORMATION

Over the past several years, the development of many new improved varieties of turf grasses have been achieved for the compatible coexistence with the environment. The extensive turfgrass breeding programs and research have resulted from the UNITED STATES GOLF ASSOCIATION (USGA) program, and direction to develop turf grasses that would be suitable for use on golf courses that would use 50% less water use and would require 50% less maintenance [reduced dependence on pesticides and less mowing frequency].

Turfgrass varieties that have been developed are well-suited for use on the golf course, and they require significantly less applied nutrients and pesticides. These cultivars have been specifically selected for use on the EL CAPITAN GOLF RESORT. They are drought tolerant and low in susceptibility to insects, disease and weed infestation. By their genetic make, up they will naturally reduce dependency on pesticides compared to older varieties of turfgrass.

In addition, the natural characteristics of these turf grasses limits the movement of pesticides and fertilizers into underlying soils and ground water. Thatch produced by the turf acts as an organic filter to chemically binds pesticides that might otherwise enter the local surface and ground waters. By producing a healthy turf, which is needed for a golf course, added benefits of immobilization and microbial degradation of pesticides retained in the thatch layer are produced. The turfgrass root systems are quite extensive and fibrous, and are able to adsorb and absorb applied pesticides that might penetrate the turf canopy and thatch layer to reach the roots. Warm season grasses will be used on the golf course with the exception of the greens. The tees, fairways, and roughs will be planted in improved seeded hybrid Bermuda grass, and improved Bent grasses planted on the greens.

TURFGRASS SELECTIONS

Warm-Season Grasses: Mirage/Pyramid 50/50 blend of improved seeded Bermuda grasses grow best when days are long and the average daily temperatures are above 75 degrees Fahrenheit, with the optimum growth temperature range being 95 to 100 degrees Fahrenheit. The improved cultivators have an erect growth habit which is excellent for playability. They have improved cold tolerance for early spring green up, and are dark green in color with a medium to fine texture. This blend has excellent drought tolerance and rapid recovery from wear. They consume 68% less water than cool season grasses. The Mirage/Pyramid 50/50 blend has a low susceptibility to diseases making them suitable for limited water and pesticide use.

Greens: Cool-Season Grasses, Dominance Plus blend, (SR 1020/SR1019/SR1119 Bentgrass), for greens grow best in the cool months of the year when the average daily temperatures are between 65 to 85 degrees Fahrenheit, with the optimum growth temperature range being 70 to 85 degrees Fahrenheit.

Greens collars and Bunker Edges: Tifdwarf Bermuda grass will be planted. This variety is dark green, very fine textured and has soft leaf blades with very high shoot density. In addition, it has a low growth habit and short internode extension making a good barrier turf. Its selection for use on bunker edges was for its slow rate of encroachment, and the reduction in trimming frequency and maintenance costs.

Fairways: Mirage/Pyramid Bermuda grass, a new and improved seeded Bermuda grass, will be used on all tees, fairways, and roughs playing surfaces. This grass also has improved dark green color, density, and cold tolerance with medium to fine textured with stiff leaf blades. The nutrient requirements for Mirage/Pyramid are less than older varieties of hybrid Bermudas. As a Best Management Practice, the nutrient that is not applied is the best solution against potential leaching.

THE IRRIGATION SYSTEM

Irrigation design and operational strategy are designed to fulfill environmental requirements for conservation of groundwater on the golf courses and support landscape areas. The irrigation system is designed to meet the supplemental water requirements of the turf beyond natural rainfall. The low water holding capacity of the soils and the shallow rooting of turf grass result in the need for supplemental irrigation to produce a healthy turf. While supplemental irrigation will be needed each month, based on long term climatic records (See Table 2), it appears that the maximum amount should be needed in the months of March through September.

The irrigation system will incorporate computerized controllers utilizing a weather station that calculates meteorological information on a daily basis. A computerized calculation of daily Evapotranspiration, (ET), (the measurement of the total amount of water used by the plant during that specific day), plus a management factor based on the crop coefficient for each plant species will be use to determine the water replacement factor. With this information, only the water used from the previous day will be reapplied to the turf, thus utilizing the minimum amount of supplemental water and lessening the impact on the ground water supply. This solid state control system has the ability to "cycle on" water and "cycle off" soak time to match the water application rate with the soil infiltration rate. This ability eliminates or minimizes the possibility of water run-off. By keeping the applied water on the intended areas in the proper amounts determined by ET, the possibility of nutrient or pesticide migration is minimized or eliminated. The system features individual head and zone control to match the requirement of each different soil type and micro-climate. With this system supplemental moisture can be applied in the right amounts, at the right time and only to areas as needed.

Greens and tees will have individual head control, and the greens will have a double head system to accommodate the different turf management requirements of the greens surrounds, soil types and gradation of the greens and bunker areas.

The native plant zones of the Wildlife Linkage Corridor and the non play fringe golf areas will have an establishment and occasional use water system. Once established, these plants will receive water only in the amounts required to maintain their survival.

GROUND WATER MONITORING WELLS

Ground water monitoring wells will be installed for the purpose of extracting water samples, and testing for potential pollution from fertilizers and pesticides. Tests will start prior to the construction of the golf course and the use of fertilizers and pesticides to establish a base line before the development of the golf course. Tests will be taken every six months following the start of golf course maintenance until stabilized reading occurs. From that point, an annual test will be performed. These tests become part of the management program of monitoring for nutrient and pesticide movement. In the unlikely event that pollutants appear in the ground water, they can be dealt with in the early stages. An adjustment in the management programs could rectify a potential problem. The water tests will be performed by a qualified testing laboratory, and the results will be part of the course's permanent records.

These wells also serve to monitor the ground water reserves. As a conservation program in the dry season, ground water extraction would be rationed back to extend the useful and continuous supply of water to the golf course. By managing the water resource, we avoid plant loss and damage in years of extended drought.

Table 2.
Turfgrass Irrigation Requirements for the El Capitan Golf Resort

Irrigation water use projections with total season requirements and peak flows.

Area Description	Total Landscape Area (S.F.)	Percent Irrigated	Total Irrigation Area	Total Season Req.	Peak Daily Demand	Peak Flow Season
	(Sq. Feet)		(Acres)	(Acre Feet)	(Gallons)	(Gal./Mi)
Total All Areas						
Turf Grass	11,499,840.0	100%	264.0	782.0	998,965.0	2,775
Native Vegetation	2,090,880.0	100%	48.0	54.0	75,679.0	210
Lakes	849,420.0	100%	19.5	59.0	81,858.0	227
Totals	14,440,140.0		331.5	896	1,156,501.0	3,213

Evapotranspiration (ET) monthly factors, monthly water requirements in acre feet for turfgrass, native plants and lakes.

Months	ET by Month	ET Adjusted to Mgt. Factors	Monthly Turf Requirements	Monthly Xeriscape Plantings	Monthly Lakes Requirements	Total Requirements
	Inches/Month	Inches/Month	(Acre Feet)	(Acre Feet)	(Acre Feet)	(Acre Feet)
Jan	2.00	0.38	14.44	0.21	1.64	16
Feb	2.20	0.43	16.09	0.28	1.82	18
Mar	2.90	1.58	38.12	0.91	4.32	42
Apr	4.00	3.27	70.37	1.89	7.97	78
May	5.30	5.14	106.67	3.46	12.08	119
Jun	6.50	6.46	133.40	4.35	15.11	149
Jul	7.60	7.57	156.17	5.51	17.69	183
Aug	7.20	7.13	147.26	5.16	16.68	173
Sept	6.30	6.18	127.87	4.64	14.48	150
Oct	6.90	6.56	136.62	4.03	15.47	160
Nov	3.20	2.57	55.52	2.17	6.29	62
Dec	2.20	0.62	19.22	1.03	2.18	21
Totals	56.30	47.85	1,022.00	33.64	116.00	1,172

Note: Potable water for the club house and other domestic uses would utilize imported water supplies

CONSTRUCTION AND GROW-IN

Soil erosion is most likely to occur during the construction and grow-in phases of golf course development. The major pathway for phosphorus loss is soil erosion. Therefore, any technique effective in reducing soil erosion will also reduce phosphorus losses.

Stabilizing slopes with turfing of waterways, berms, steep slopes, and the construction of gabions and silt screens are examples of structural techniques for erosion control that will be used during construction and grow-in. Areas where erosion is likely to occur may need to be sodded to give immediate stabilization. Other areas would be sprigged or seeded at rates to insure quick establishment. Final preplant preparation should be done with equipment to insure surfaces that are reasonably free of large clods, roots and other debris that would interfere with sodding, sprigging, seeding, and subsequent maintenance operations. Agricultural gypsum and an organic starter fertilizer, based on soil test recommendations, will be applied prior to planting. Lastly, the plantbed should be floated with a drag to be sure it is smooth and firm for planting. Once the course has been planted, the future of the project will depend on how it is grown-in and maintained.

The objective of the grow-in program is the rapid establishment of a high quality turf cover to minimize water erosion and weed infestation. The judicious use of water and fertilizer is essential for a quality turf cover. Sprigged and seeded areas must be kept continuously moist, but not excessively wet, until the two leaf stag growth appears and turf become established. Mulching may be necessary on some slopes for soil erosion control. The golf course superintendent and irrigation technician should be on site when the installation of the irrigation system begins. Since efficient water use and conservation of irrigation water are the responsibility of the superintendent and technician, they will need to become acquainted with the capabilities and underground locations of the irrigation system. In addition, they will be in charge of the growing-in program discussed below.

GROW-IN PROGRAM

IRRIGATION

Planted areas should be kept continuously moist for a period of three weeks. This means frequent, light watering (4 to 6 times per day) rather than soaking the soil when it becomes dry. Water will not be allowed to puddle or run off the surfaces. After three weeks, each area should be irrigated at least twice per day until the grass has completely covered.

FERTILIZATION

The entire course should be fertilized prior to planting with the following:

Organic fertilizer--composted poultry 6-2-4, 80% poultry, 20% gypsum at 1,000 lbs. per acre, or Gro power 3-12-12, at the rate of 8.5 lbs. per 1,000 S.F.

50% incorporated into the soil prior to planting. This preplant fertilizer shall be applied uniformly to the planting area incorporated to a depth of 6 inches. Care shall be taken so as not to redistribute or concentrate the fertilizer while tilling into the soil. 50% applied at the second leaf stag.

Two weeks following planting, start a program of fertilizing each week until the grass has covered. An application of a nitrogen fertilizer at the rate of 0.5 to 0.75 pounds of nitrogen per 1,000 square feet should be made each week for the following six weeks.

NUTRIENT TESTING

Soil testing and a computerized tissue analysis laboratory will be utilized to monitor the nutrient program. Once the turf begins to produce vegetative growth, samples will be harvested, dried and analyzed for nutrient content and deficits. This system enables the golf course superintendent to apply only the nutrient that the turf needs. It eliminates the guess work or random approach to turfgrass fertilization. It also controls the application of excessive nutrient that is subject to migration into the ground water. This is a Best Management System that allows the optimum turf growth for healthy turf. Healthy well managed turf has been documented as the most resistant to diseases and insects, and is the best protection against weed invasion with the least dependency on pesticides.

MOWING

To help control weeds and promote lateral growth, mowing of the Bermuda grass should begin before the grass is approximately 3/4 inch high. On the bentgrass greens, the mowers should be set to cut at 1/4 inch. The height of cut should be gradually lowered until 5/32 inch is reached. On tees and fairways the height of cut will start at 3/4 inch and be gradually reduced to 1/2 inch. The roughs will start at 3/4 inch and will be gradually increased to 1 1/4 inches. The height of cut should not be lowered too soon and mowing should be frequent enough so that no more than one-third of the top growth is removed at any one clipping.

ROLLING

To provide a smooth, firm surface for future operation of mowing equipment and golf carts, all areas will need to be rolled a few times at the discretion of the golf course superintendent. The first rolling should begin when the grass is approximately 45 to 50 percent covered.

DEVELOPING TEE AND PUTTING SURFACES

During the growing-in period, tees and greens will need vertical mowing, topdressing, aerifying and rolling a number of times to produce smooth, true and firm surfaces. The frequency of vertical mowing will be determined by the rate of growth of the turf. It should never be more frequent than full recovery and return of surface growth. The management programs should be at the discretion of the golf course superintendent.

PEST CONTROL

The course should be inspected daily for pests. When control is necessary, biological controls should be the first option, then chemicals from the list of environmentally safe chemicals should be applied following label directions and precautions. During the grow-in and maturation of the golf course, the consultants periodically will inspect the course and monitor the prescribed programs to ensure that they are being conducted in a timely and effective manner. Spot treatment for insects, diseases, and weeds is critical in this stage of turf development, as the open turf is an easy condition for pests to establish themselves and contaminate the balance of the course. Once the course has matured, the objective of the turf management program is to promote slower growth with good color, density and playability. This differs from the grow-in program of rapid establishment. A maintenance program is to encourage growth at a rate sufficient to repair the damage of golf play and traffic.

ENVIRONMENTAL TURF MANAGEMENT PROGRAM

ANNUAL FERTILIZER AND PESTICIDE APPLICATION PROGRAM

FERTILIZER REQUIREMENTS

Greens--Turf type--Dominance Plus Blend (SR 1020 /SR 1019/SR 1119 Bentgrass).

Description	Quantity greens	Ave. Area (S.F.)	Total Area (S.F.)
Championship Golf Courses	36	9,000	324,000
Golf Clinic Greens	9	6,000	54,000
Practice Putting Greens	3	15,000	45,000
Total Area In Greens	48		423,000

Annual fertilizer requirements: pounds per 1,000 SQ FT

Nutrient	Nitrogen	Phosphorus	Potassium
Range	8-10 lbs/1000 sf	3-4 lbs/1000 sf	8-10 lbs/1000 sf
Total Applied	3384 - 4230 lbs/yr	1269 - 1692 lbs/yr	3384 - 4230 lbs/yr

Fertilizer Application calendar:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
F-F	F-F	F-F								F-F	F-F
SR	SR	SR	SR-B	SR-B	SR-B	SR-B	SR-B	SR-B	SR-B	SR	SR

SR Slow release fertilizers such as, Isobutylidene diurea (IBDU), Urea formaldehyde (UF), Sulfur coated urea (SCU), and natural organics

Rate of application 1.5 lbs. of 22-7-12 per 1000 S.F./ month(Nov. to Mar.)

Rate of application 2 lbs. of 25-7-12 per 1000 S.F./ month(Apr. to Oct.)

B Biological plant growth enhancement with the application of Azospirillum which provides nitrogen fixation in the soils and plant growth regulators

F Foliar sprayed greens fertilizer:
Eco K, 1-0-23 at 4 oz/ 1000 S.F.
Eco N, 24-0-0 at 2 oz/ 1000 S.F.
Eco Fe, 2-0-0 at 3 oz/ 1000 S.F.

Application frequency no closer than 2 weeks apart.

Note: The final ratio of nutrients in the applied fertilizers will be determined by the regular testing of the soil and tissue analysis. In the discretion of the Golf Course Superintendent only those deficient nutrients will be applied.

TEES, DRIVING RANGE, FAIRWAYS, AND GOLF CLINIC AREA

Turf type: MIRAGE/ PYRAMID, 50/50 blend of improved seeded Bermuda grass.

Description	Quantity	Ave. Area (sf)	Total Area (sf)
Championship Golf Tees	36 x 5	8,000	288,000
Driving Range	1	296,208	297,208
Championship Fairways	36	108,160	3,893,760
Golf Clinic Area	1	1,106,424	1,106,424
Total Area in Turf			**5,584,392**

Annual fertilizer requirements in pounds per 1,000 SQ FT

Nutrient	Nitrogen	Phosphorus	Potassium
Range	12 lbs/1000 sf	4 lbs/1000 sf	8 lbs/1000 sf
Total Applied	67,008 lbs/yr	22,335 lbs/yr	44,672 lbs/yr

Fertilizer application calendar:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WF	WF	WF		SR			SR			WF	WF
			OF-B	B	OF-B	OF-B	B	0F-B	0F-B		

SR Slow release fertilizers such as, Isobutylidene diurea (IBDU), Urea formaldehyde (UF), Sulfur coated urea (SCU)

Rate 1.0 lbs. Nitrogen per 1000 S.F. -- with no one application to exceed this rate.

OF Organic fertilizer, Poultry compost, (6-2-4 80% poultry, 20% gypsum) applied at the rate of 1000 lbs per acre (1.4 lbs. Nitrogen per 1000 S.F.)

WF Winter blend Fertilizer, 21-7-14 Turf Royale, applied at the rate of 2.5 lbs per 1000 S.F. (0.53 lbs. Nitrogen per 1000 S.F.)

Note: The final ratio of nutrients in the applied fertilizers will be determined by the regular testing of the soil and tissue analysis. Only those deficient nutrients will be applied.

ROUGHS-- Turf type: MIRAGE/PYRAMID, 50/50 blend of improved seeded Bermuda grass.

Description	Quantity	Ave. Area (sf)	Total Area (sf)
Championship golf Roughs	36	152,460	5,488,560
Total Applied	49,396 lbs/yr.	16,465 lbs/yr.	32,9931 lbs/yr.

Annual fertilizer requirements in pounds per 1,000 SQ FT

Nutrient	Nitrogen	Phosphorus	Potassium
Range	9 lbs/1000 sf	3 lbs/1000 sf	6 lbs/1000 sf
Total Applied	49,396 lbs/yr	16,465 lbs/yr	32,931 lbs/yr

Fertilizer application calendar:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WF	WF	WF								WF	WF
			OF-B	B	OF-B	B	OF-B	B	OF-B		

OF Organic fertilizer, Poultry compost, (6-2-4 80% poultry, 20% gypsum) applied at the rate of 1000 lbs per acre (1.4 lbs. Nitrogen per 1000 S.F.)

WF Winter blend Fertilizer, 21-7-14 Turf Royale, applied at the rate of 2.5 lbs per 1000 S.F. (0.53 lbs. Nitrogen per 1000 S.F.)

Note: The final ratio of nutrients in the applied fertilizers will be determined by the regular testing of the soil and tissue analysis. Only those deficient nutrients will be applied.

Table 3.
Forecast of the approximate total amount of nutrient to be applied annually to the golf course turf.

Area	Nutrient		
	Nitrogen lbs/yr	Phosphorus lbs/yr	Potassium lbs/yr
Greens	4,230	1,692	4,230
Tees, Fairways, Dr., Clinic	67,008	22,336	44,672
Roughs	49,396	16,465	32,931
Total Nutrients Applied	**120,634**	**40,493**	**120,643**

AGRONOMIC CONSIDERATION REQUIRING PESTICIDE USE
RECOMMENDED PESTICIDES, RATES, AND ANNUAL CONSUMPTION

POTENTIAL INSECT PESTS

Black turfgrass Ataenius Beetle--Ataenius spretulus
Frit Fly--Oscinella frit
Grass web worm--Herpetogramma licarsisalis

INSECTICIDES

Environmental impact assessment of water solubility, soil persistence, and mobility in soil of compounds used in turf management.

Name of Pesticide	Soil Half Life	Persistence	Potential Leacher
1-Bacillus thuringiensis-Dipel (Biological)	NA		Nonleacher
2-Steinernema spp. (Biological Nematode)	NA		Nonleacher
3-Chlorpyrifos - Dursban	6-139 days	1-4	Nonleacher
4-Imidacloprid - Merit 75 WSP	NA	NA	NA

Chemical application calendar indicated by the above reference number

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1-2				1-2				1-2			
						3					
			4								

INSECTICIDES

Frequencies, rate of applications, area treated, total quantity of chemical applied.

Pesticide Name	#App	Rate of Application	Area Treated	Total Pesticide
1-B. Thuringiensis	2	2-4 quarts/acre	90,000 sf spot treat	5 gals/year
2-Steinernema Spp.	2			
3-Chlorpyrifos	1	2 quarts/acre	435,600 sf	5 gals/year
4-Imidacloprid	1	6.4 oz/acre	435,600 sf	65 oz/year

NOTE: The golf course site is in a virgin area free of most turf insects at this time. Through good sanitation procedures eliminating importation of contaminated nursery materials and sod, and through attentive inspections and spot treatments there should be a limited amount of pesticide dependence. The turf varieties selected are normally resistant to insect damage and have the ability to recover from ordinary insect damage. When spraying is required, the spraying will be limited to areas that are showing damage greater than the ability for the turf to recover. These areas are identified by field inspection and sampling. If suspicious spots are noted in the turf, a sampling with a soap solution or pyrethrum solution is used to drive the insects to the surface.

If a count of 5 to 10 larvae per square yard are found, treatment is warranted. Biological controls with predator insects and juvenile growth hormones are showing good results even further limiting the use of chemical pesticides. The turf management program will continue to upgrade the insect management to use these biologicals as they become available.

POSSIBLE TURF DISEASES

Summer patch--Magnaporthe poae
Fusarium Patch or Pink Snow Mold--Microdochium nivale
Pythium Blight--Pythium aphanidermatum
Brown patch--Rhizoctonis solani, and R. zeae
Dollar spot--Sclerotinia homeocarpa

FUNGICIDES

Name of Pesticide	Soil Half Life	Persistence	Potential Leacher
1-Pseudomonas--TX-1 (Soil Microorganism)	2-7 days	5	Nonleacher
2-Chlorothalin--Daconil	6-139 days	1-4	Nonleacher
3-Iprodione--Chipco 26019	7-30 days	3-4	Nonleacher
4-Fosetyl--Aliette	1 day	5	Nonleacher
5-Triadimefon--Bayleton	6-28 days	3-4	Intermediate
6-Propiconazole--Banner	109-123 days	1-4	Intermediate
7-Metalaxyl--Subdue	7-106 days	1-4	Leacher
8-Heritage	NA	NA	NA

Environmental impact assessment of chemical half life, soil persistence, and mobility in soil of compounds used in turf management.

* Persistence classes:

1-highly persistent,
2-moderately persistent,
3 moderately short-lived,
4 Short-lived,
5-Very short-lived

NOTE: The Pseudomonas, brand name TX-1, is a naturally occurring soil microorganism that will suppress many forms of turf disease because they out compete pathogenic organisms for minerals and nutrients. This Pseudomonas organism has demonstrated the ability to antagonize and suppress the activities of dollar spot, Pythium, pink patch, summer patch, superficial fairy ring, Anthracnose, and Bermudagrass decline, just to mention a few. The selection of disease resistant turfgrass varieties is the first line of defense against damage due to disease infestation. Secondly, the use of the Pseudomonas microorganisms will likely maintain the turf in a healthy condition.

The area of the greens are the principal area to be treated for fungal disease (423,000 S.F). Healthy turf resists diseases through good turf management, adequate air circulation, good thatch control, regular vertical mowing and topdressing, and the avoidance of lush growth from over fertilization and over watering.

In the rare situations of intense disease pressure, the above chemical list allows for an additional control option. The list of chemicals allows alternating pesticides to prevent resistance to a particular chemical. When chemicals are required, certain areas will tend to be more susceptible to disease infection and they will be treated preventatively, while most areas will require only spot treatment.

Chemical application calendar indicated by the above reference number

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	1	1	1	1	1	1	1	1	1	1
						2-3					
				4/5/6			4/5/6				
					8	8	8				

FUNGICIDES

The use of chemical fungicides is a worst case scenario of disease control, and is offered for the evaluation of the quality, safety and quantities of chemicals required for normal turfgrass maintenance.
Frequencies, rate of applications, area treated, total quantity of chemical applied .

Pesticide Name	#App	Rate of Application	Area Treated	Total Pesticide
1-Pseudomonas	Daily	5-10,000 Ct/ml	423,000 sf	NA
2-Chlorothalin	1	6 oz/1000 sf	423,000 sf	160 lbs/yr
3-Iprodione	1	4 oz/1000 sf	423,000 sf	Alternate yrs.1&2
4-Fosetyl	2@2wks	4 oz/1000 sf	423,000 sf	212 lbs/yr
5-Triadimefon	2	2-4 oz/1000 sf	423,000 sf	Alternate yrs 4,5&6
6-Propiconazole	2	2-4 oz/1000 sf	423,000 sf	Alternate yrs 4,5&6
7-Metalaxyl	1	2 oz/1000 sf	423,000 sf	6.6 gals./yr
8-Heritage	3	0.2-0.4 oz/1000 sf	423,000 sf	32 lbs/yr

POTENTIAL PROBLEM WEEDS

Weeds anticipated and their respective herbicide control:

Weed Name	Herbicide Name
Common Bermuda grass--Cynodon dactylon	Round-up (Glyphosate) Fusalaide--(Fluazifop-P)
Goose grass--Eleusine indica	Dimension--(Dithiopyr) Barricade--(Prodiamine)
Crab grass--Digitaria species	Ronstar--(Oxadation) Barricade--(Prodiamine)
Broadleaf weeds general	MCPP--(Mecoprop salts) Gallery--(Isoxaben) Dimension--(Dithiopyr)

HERBICIDES

Environmental impact assessment of water solubility, soil persistence, and mobility in soil of compounds used in turf management.

Name of Pesticide	Soil Half Life	Persistence	Potential Leacher
1 - Round-Up (Glyphosate)	30 days	2-3	Non Leacher
2 - Fusalaide Fluazifop-P-Butyl	7-21 days		Intermediate
3 - Dimension (Dithiopyr)			Intermediate
4 - Barricade (Prodiamine)			Non Leacher
5 - Ronstar (Oxadation)	30-180 days	1-3	Slight
6 - MCCP (Mecoprop Salts)	14-21 days	3	Leacher
7 - Gallery (Isoxaben)			

Chemical application calendar indicated by the above reference number

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4										
					1-2	1-2	1-2				
		6		6			4/5/6				
	7				8	8	8				

HERBICIDES

Frequencies, rate of applications, area treated, total quantity of chemical applied .

Pesticide Name	# App.	Rate of Application	Area Treated (S.F.)	Total Pesticide App.
1 - Round-Up	Vari	2 oz per 1000 sf	Spot Treat 40,000	5 gal per year
2 - Fusalaide	Vari	2-3 Pts per acre	Spot Treat 90,000	2 gal per year
3 - **Dimension	Backup	2-3 oz per 1000 sf	244 acres	Alternate Product
4 - *Barricade	1	2.3 lbs per acre	244 acres	560 lbs per year
5 - ****Ronstar	Backup	2.5 lbs/1000 sf - 2%	48 acres	350 lbs per year
6 - MCPP	Backup	3.3 oz/1000 sf	Spot Treat 100,000	5 gal per year
7 - *** Gallery	1	1/2 oz per 1000 sf	244 acres	40 gal per year

TERMS

vari.-- variable treatment applications to be determined by weed infestation
Alternate product-- Pesticides to be applied in alternate years to be determined by the weed species and infestation pressure.

* Denotes the primary preemergent herbicide for control of goosegrass, crabgrass and other noxious weeds. They will be applied in alternate years as required. The total annual chemical impact should calculate only one herbicides. (#4 Barricade)

** Denotes the secondary preemergent herbicide for control of goosegrass, crabgrass and other noxious weeds. They will be applied in alternate years as required. (#3 dimension)

*** Denotes primary preemergent herbicide for broadleaf weed control. The determination to use this herbicide will be made on field surveys of the weed infestation. The use of this chemical is projected for the first year of operations only. Following the initial control of native weeds, the turf cover will compete effectively against weeds preventing their invasion. (#7 Gallery)

**** Denotes herbicides that are designated for preemergent weed control within the ornamental planting beds and native plant zones. (# 3 Ronstar)

Note: The quantities of herbicide are a worst case scenario based on conditions as if the site was infested with a large volume of native weeds. In the case of El Capitan Golf Resort we expect a low weed count base on the sanitary procedures used in the construction of the golf course. The first priority of weed control will be hand picking at the time of emergence, and thus the control of the seed production of these weed species. The chemical list is offered as the most effective tools for the suppression of weeds, and with the management system of field inspection and spot treatment of weeds, the total volume of herbicide should be an extreme reduction from the above volumes.

RODENT CONTROL

It is anticipated that Ground squirrels, moles, and California pocket gophers will cause turf damage and require control measures.

Control options: These pests are extremely difficult to control because of their subterranean habits.

Option 1: Cultural control--Use Killing traps--Several traps are available which spear or choke the rodents.

Option 2: Chemical Control--Use Fumigants--Several gas producing canisters are available for placement in the tunnel systems.

Option 3: Chemical Control--Use of Poison baits which are placed in the tunnel system out of reach of non target animals or in Agricultural Dept approved bait stations. The mode of action kills the animals in their tunnels limiting secondary poisoning. Daily inspections of baited sites for proper bait disribution and to remove any carcasses.

ENVIRONMENTAL TURF MANAGEMENT PRACTICES

Based on the concepts of Best Management Practices, (BMP), and Integrated Pest Management, (IPM).

BMP can effectively reduce the risk of pollutants reaching environmentally sensitive areas when good turfgrass management and cultural practices have been employed with IPM strategies. Integrated Pest Management is the use of information about turfgrass pest problems including environmental conditions which may precipitate these problems, and integrating cultural practices and pest control measures to prevent or control unacceptable levels of pest damage (Ferrentino, 1990). It is a preventive approach incorporating a number of objectives including the following:

1. Development of a healthy turf that can withstand pest pressure.
2. Judicious and efficient use of chemicals.
3. Enhance the populations of beneficial organisms.
4. Effective timing of handling pest problems at their most vulnerable stage, often resulting in reduction of pesticide usage.

It is an ecologically based system that uses biological and chemical approaches to control. Like BMPs, IPM strategies have been incorporated into every aspect of this plan. Incorporated into this approach are the following:

1. Selection of the best adapted turfgrass species and cultivars for this area.
2. Use of proven cultural practices such as aerification, vertical mowing, topdressing, soil and tissue analysis for maintaining correct nutrient levels, sound irrigation management and proper mowing techniques to produce a high quality playing surface.
3. A sound pesticide management program to control those pests that exceed a tolerance level for acceptable turf growth.
4. Monitoring of the turf and environmental conditions which may precede pest problems and for population changes in pest and beneficial organism populations.

Experience and training are important requisites to an IPM approach which focuses on six basic components as follows:

1. Monitoring of potential pest populations and their environment.
2. Determining pest injury levels and establishing treatment thresholds
3. Decision making, developing and integrating all biological, cultural, and chemical control strategies.
4. Educating personnel on all biological and chemical control strategies.
5. Timing and spot treatment utilizing either the biological, cultural or chemical methods.
6. Evaluating the results of treatment.

One of the most critical components to IPM programs is monitoring. This approach coupled with compiling a site specific history, and consulting with other superintendents in the area and with specialists in turfgrass management make it a workable program. There are economic advantages of IPM programs along with the sociological and environmental consequences of judicious use of chemical pesticide.

GOLF COURSE CULTURAL PRACTICES

The primary cultural practices that produce and sustain a healthy turf are mowing, irrigation and fertilization. These three operations, alone or in combination, often cause changes in the rooting and canopy micro environment which can have either a positive or negative result. Thus, it is essential that these practices are executed in a proper and timely manner to insure turfgrass quality and playability. The best deterrent to weed, insect and disease infestation is a healthy turf. Thus, maintaining healthy grasses will minimize the need to apply fertilizers and pesticides.

MOWING

Mowing is the most basic maintenance operation on a golf course. Without regular mowing at the appropriate heights of cut, the course would become unplayable. With good mowing practices, density, texture, color, root development, wear tolerance and other aspects of turf quality are enhanced.

Proper mowing practices also can reduce the amount of irrigation needed. Taller grass can have a significantly higher evapotranspiration rate and thus a greater need for water. Mowing grass too short stresses the turf which not only produces a need for more water, but can cause the weakened turf to be more susceptible to weed, insect and disease infestation.

Grass variety and turf use has the greatest influence on mowing height. Each use area and turfgrass has a mowing tolerance range within which it can be expected to provide high quality turf. The best approach is to use the highest mowing height acceptable for the various playing surfaces. However, if faster greens are required for tournament play, mowing can be lowered below recommended minimums for a short period of time. On the other hand, another possibility is to continue mowing at an increased height and then roll the greens daily prior to tournament play. frequently this operation will produce the same green speed as the lower cut. In addition, during the summer months when stress is likely to occur, if the golfers are not satisfied with the green speed, the height of cut will not be lowered, but the greens will be rolled once or twice weekly.

Mowing height and growth rate have the most influence on mowing frequency. As a rule of thumb, mowing should be done often enough so that no more that one-third of the leaf is removed at any cutting. Frequent mowing is best because it minimizes the affect on photosynthesis and helps maintain a high percentage of green leaf surface which is necessary for healthy turf development.

If mowing is scheduled at appropriate intervals and the grass clippings are dispersed uniformly, leaving the clippings on the fairways and roughs should cause no problem. Research has indicated that returning clippings to the surface does not greatly increase thatch buildup on turf that is properly managed otherwise. Clippings decompose rapidly thus returning some fertilizer and organic matter into the nutrient cycles within the soils, and they also help conserve moisture and insulate the soil.

Clippings are always removed from greens and tees to prevent interference with the play. Collected clippings can be dispersed in rough and fringe play areas. However, care should be taken not to spread clippings near water sources and wetlands in case they many contain residue of fertilizers or pesticides. Clippings also can be combined with a high carbon source (such as leaves) and composted. Compost can be returned as a soil amendment for renovation of landscape areas.

MOWING HEIGHTS

	Greens	Tees	Fairways	Roughs
Height in inches	1/8-5/32	3/8 - 1/2	1/2 - 3/4	1 1/4 - 2
Clippings Remove	Remove	Remove	return/remove*	Return

* Depends upon equipment and overall management objectives.

BASIC ANNUAL MAINTENANCE GUIDE

Remarks: It should be noted that this basic maintenance program may need to be adjusted from time to time due to weather, seasonal changes, and other unforeseen situations.

1. Soil and tissue analysis--Representative samples from the greens, tees, fairways and roughs are tested for benchmark comparison and current recommendations. The primary purpose of soil testing is to insure a sound fertilizer program based on nutrient availability and balance for good growth of the grass. Soil testing should be on a twice annual schedule until stabilization is obtained. The testing should be completed at a minimum of once annually.

2. Water testing. A series of ground water wells shall be installed and located from the high point of the property to the exit point, as the river flows. The ground water monitoring wells shall be tested every six months by a licensed hydrologist and the results shall be a part of the permanent records.

3. Calibration of Equipment. All spreaders and sprayers must be kept in good condition, repaired, and calibrated for proper distribution of fertilizers and pesticides.

4. Mowing. After irrigation, mowing is the most important and most time consuming maintenance operation on a golf course. Without regular mowing at the appropriate cutting heights the course would become unplayable. With good mowing practices, density, texture, color, root development, wear tolerance and other aspects of turf quality are enhanced.

5. Fertilizing. The fertilizer program will be based on soil test results for pH, calcium, magnesium, phosphorus and potassium. Nitrogen fertilization will be determined by tissue analysis and plant growth rate. The primary fertilizer program is built around organic fertilizers and Azospirillum soil microorganisms for slow controlled nutrient release. Slow release fertilizers better match the turf utilization rate and prevent free nutrients from leaching.

6. Irrigation Program. A computer controlled irrigation system will be driven by ET factors from an on site weather station. Water application rates are matched to soil infiltration rates to avoid water runoff thus minimizing water use.

7. Vertical Mowing. During the growing season, this operation is done on a regular basis. The frequency of vertical mowing is determined by the rate of growth and the Superintendents judgment. It will control grain and thatch buildup on greens, and provide a smoother, faster putting surface.

8. Aerifying. Aerifying surfaces relieves compaction, increases soil and surface air exchange. It improves fertilizer and water movement into the soil and controls the build up of thatch.

9. Topdressing. In addition to following aerification, topdressing should be applied on a regular basis at light application rates. The frequency is determined by the rate of growth and the superintendents judgment. This practice not only helps control thatch, but also helps provide a smooth, true surface for mowing and accurate ball roll.

10. Wetting Agent Applications. Wetting agents are helpful on localized dry spots for uniform turf appearance and health.

11. Over Seeding. Use of perennial ryegrasses will be planted each fall to maintain the healthy turf required to resist compaction from winter play. These ryegrass selections will be enhanced with Endophyte, a naturally occurring fungus. Endophyte is toxic to cutworms, sod web worms and other insects that feed on the stems and crowns of turfgrass. They eliminate the need for pesticides to control these insects.

12. Vertical Mowing/Scalping. This operation sets the crowns of the Bermudagrass closer to the soil surface, which improves the health of the grass and provides a more playable, attractive turf. Heavy in Spring. This procedure is done prior to over seeding to open the turf for better soil contact and seed germination.

13. Raking and Edging Bunkers. Bunkers need to be raked daily and edged on a frequency of 3 to 4 week intervals. The elongation and horizontal encroachment of the surrounding turf will be the determining factor. Tifdwarf hybrid Bermuda will be planted in a banding fashion around the bunkers because of its short internodes and slow horizontal growth.

14. Weed Control. Weed control starts with sanitary construction methods and monitoring to prevent the spread of weed populations. Monitoring and spot

treatment will control the maturation of weed populations and control the source and spread of weed seeds.

15. Insect Control. Monitor for insect pests during the spring and summer months when their presence is most likely. If hot spots can be determined treatment can be confined to isolated areas. The use of Endophyte enhanced ryegrass will likely nullify the need for any pesticide application.

16. Disease Control. The selection of adaptable turfgrass varieties and their disease resistant characteristics will likely nullify the need for any pesticide application. Daily applications of Pseudomonas soil organism will suffice for disease control.

BASIC DAILY MAINTENANCE ACTIVITIES

The establishment of a maintenance schedule which will meet every possible situation is impossible, due to unforeseen conditions such as weather, pests, budget, equipment breakdown, absenteeism, etc.

Activity	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Greens Mow	XX	XX	XX	XX	XX	XX	XX
Tees and Collars Mow	XX		XX		XX		XX
Fairway Mow	XX	XX	XX	XX	XX		
Rough & Utility Mowing	XX	XX		XX	XX		
Cups & Tees Changed	XX	XX	XX	XX	XX	XX	XX
Bunkers Raked - Hand Rake Tracks	XX	XX	XX	XX	XX	XX	XX
Bunkers Raked - Power Machine Raked		XX		XX		XX	XX
Detail Course & Trash Removal	XX	XX	XX	XX	XX	XX	XX
Lake Maintenance	XX		XX		XX		
Landscape Gardening	XX	XX	XX	XX	XX		
Project Work	XX	XX	XX	XX	XX		
Turf Mgt-Aerif, Topdress, Verticut	Varies						
Turf Mgt-Fert, Spray, Trees	Varies						
Parking Lot & Clubhouse Grounds	XX	XX	XX	XX	XX	XX	XX
Irrigation Maintenance	XX	XX	XX	XX	XX		
Turf Equipment Maintenance	XX	XX	XX	XX	XX		
Safety Meetings	XX						
Driving Range Service	XX	XX	XX	XX	XX	XX	XX

MANAGING PERSONNEL

The El Capitan Golf Resort is located on an important animal habitat corridor, and on an important watershed which supplies domestic water. Therefore, sound management and stewardship of the land is critical. The success of this golf course's environmental management plan depends, to a large extent, on the selection of competent personnel. The golf courses will need highly qualified people to see that daily operations are carried out properly and in a timely manner.

The Superintendent's qualifications, because turfgrass management has become more scientific and business oriented, will have to meet strict criteria. The Superintendent should be Certified by the Golf Course Superintendents of America, be licensed as a

Pest Control Advisor and have at least a Bachelor of Science degree in turfgrass management, agronomy, horticulture, plant or soil sciences. He must have a minimum of 5 years experience in golf course maintenance supervision and experience in all phases of golf course management. He should have a thorough knowledge of Best Management Practices, and should have an aptitude for environmental project management. He should have a practical knowledge of the game of golf and its rules so that he can train and effectively supervise the golf course maintenance staff.

Since the project will have two golf courses, and a golf clinic area , it is desirable to have two Assistants Superintendents. They should have a minimum of a Bachelor of Science degree in turfgrass management, agronomy, horticulture, plant or soil sciences. They should have a minimum of two years experience working on the golf course crew, and have a working knowledge of the management of the irrigation system. They must have a Qualified Applicators license, and be working towards obtaining there Pest Controller Advisors license. They should have the ability to schedule and supervise work to achieve the most efficient utilization of the employees and equipment.

The Irrigation Technicians position should be a training position towards becoming an assistant superintendent, and therefore have the same education requirements. Because of the highly sophisticated irrigation system to be used on the courses and the importance of proper monitoring and scheduling of the irrigation cycle, this person should be capable of upward movement in management. This person must have a working knowledge of computerized control systems as well as basic electricity, hydraulics, valves, pumps, sprinkler heads, etc. Since efficient water use and conservation of irrigation water are the responsibility of the system operator, a knowledge of turfgrass water requirements and the capabilities of the irrigation system will also be needed.

The Mechanic is responsible for the repair and maintenance of the fleet of golf course equipment. He must have training in small and large engine maintenance, hydraulics, mower sharpening and service, welding and inventory control and record keeping. This is a critical position to the success of all cultural practices dependent on equipment for execution. This position normally requires some formal education in the maintenance of equipment, record keeping, safety training, and turfgrass requirements. The mechanic is responsible for the safe conditions of the service area and the legal handling of hazardous materials such as fuels, oil, drain oil paints, solvents and the likes. He will participate in the training of new personnel in the safe operations of turf equipment.

The Pesticide Applicator must meet the minimum standard of a licensed Qualified Applicator. The safe and appropriate use of pesticides depends on his ability test and train for his position. The proper equipment maintenance, calibration and application techniques are his responsibility. He must train and supervise those assisting him with his duties. Accurate record keeping and continuing education is a part of his job description.

PESTICIDE STORAGE AND WASH WATER SYSTEMS

PESTICIDE STORAGE BUILDING

Pesticides will be stored in a separate building designated for the agricultural chemicals. The building will be located away from water sources (wells, lakes & river). The rooms will be kept locked and posted as required by law. Material Safety Data Sheets, MSDS information, emergency medical information, and local fire phone numbers will be posted.

The Agricultural storage building will be built in accordance with the regulation of the California Department of Agriculture. These and all conditions required by law are enforced by the California State Department of Agriculture. These regulations are for all users of agricultural products and are for the safe protection of mankind and the environment. All Pesticides will be stored in their original containers. Proper absorbent materials and activated charcoal will be on hand in the event of a spill. Fire extinguishers, protective clothing, agricultural chemical respirators, emergency wash for eyes and overhead full body showers will be provided in a ready condition.

The building floor will be protected with a leak proof flooring. A one piece 40 mil PVC liner will be installed beneath the concrete floor. The floor will be an engineered continuous poured slab with red label concrete sealant incorporated. The building floor will be constructed with a 6 inch containment curb. The curb will be monolithic pour without physical joints. The curbing (stem wall) acts as a containment for spills and has the capacity to hold sufficient water should someone attempt to put out a fire. The fire department will as a policy let a chemical fire burn as water added to the fire could carry chemicals into the atmosphere.

WASH DOWN AND RINSATE CONTAINMENT SYSTEM

There will be a self contained wash down system for the cleaning of the pesticide application equipment and the turf maintenance equipment. The wash rack will be constructed with a rain out roof to prevent excess rain waters from over loading the clean waters reservoir. The wash rack floors will be inverted to collect and direct rinse water to the recovery system. The system filters and removes petrochemicals, grease, oil, fuel, agricultural chemicals, soil, grass clippings from the wash down water and recycles the water in a closed loop system for reuse. The filters are serviced and replaced as required.

WELL HEAD PROTECTION

Water extraction wells and groundwater monitoring wells will be protected from surface runoff waters. The well head will be installed and graded on localized high grounds. A minimum of 5% grade will fall away from the well head to prevent surface runoff waters from accumulating or entering the well. The well head will be sealed in accordance with the County of San Diego Health Services requirements for water well development.

GOLF COURSE DESIGNER:

GOLF PROPERTIES DESIGN

DAVID N. FLEMING, Golf Course Architect
Certified Golf Course Superintendent
Licensed Pest Control Adviser
Licensed Pest Applicator

EXPERIENCE: Golf Course Superintendent--25 years.
Certified Golf Course Superintendent--15 years.
Golf Course Architect--17 years
Golf Construction Manager--25 years.

EDUCATION: CalPoly University, Pomona, California
B.S. Ornamental Horticulture
Pesticide licensing & Certified Golf Course.
Certified Superintendent continuing education.
U.C.L.A. Park and Turf Management
GCSAA Educational Seminars

LICENSE HELD: Certified Golf Course Superintendent- CGCS 5979
Pest Control Advisor - PCA 3668
Certified Commercial Applicator - 14006

SPEAKER: Ecological golf course management--Golf Development Conference, 1994, Acapulco, Mexico

PGA Golf Course Design and Const. Seminars 1987,1989 & 1990

NGF, NGF FAR EAST, LPGA, GCSAA Seminars, International Irrigation Assn. Technical Conference.

Michigan State Turf School, San Diego Golf Course Water Conservation Group, Xeriscape Conference San Diego and Arizona.

Touring Lecture Group on Turf Management in Japan.

Ecological Turf Conference, Maui, Hawaii

AFFILIATIONS: Golf Course Superintendents Assn. of America--30 years
California Golf Course Superintendents Association, Past President
San Diego Golf Course Superintendents Association, Past President
San Diego Water Conservation Group Board Member
California Association of Pest Control Advisors
Audubon Society & Sierra Club
United States Golf Association & National Golf Foundation

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Appendix H

Stephens' Kangaroo Rat Survey

Report of a Survey for the Stephens' Kangaroo Rat over the El Capitan Golf Course Site San Diego County, California

Prepared For:

EnviroMine
3511 Camino Del Rio South
Suite 403
San Diego, California 92108

Prepared By:

RBRiggan and Associates
11228 Zapata Avenue
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619-233-5454

27 August 1998
Revised 16 September 1998
RBR Job Number 1704.21A

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