# INTERSTATE 5 NORTH COAST FLOODPLAIN STUDIES

**PREPARED FOR:**

**Caltrans, District 11 Hydraulics**
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**San Diego, CA 92110**

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**February 2008**

# Book 2 of 3

DOKKEN ENGINEERING
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# SECTION 4

# San Dieguito River Location Hydraulic Study

# SECTION 4: SAN DIEGUITO RIVER LOCATION HYDRAULIC STUDY

## 4.0 PROJECT PURPOSE AND VICINITY MAP:

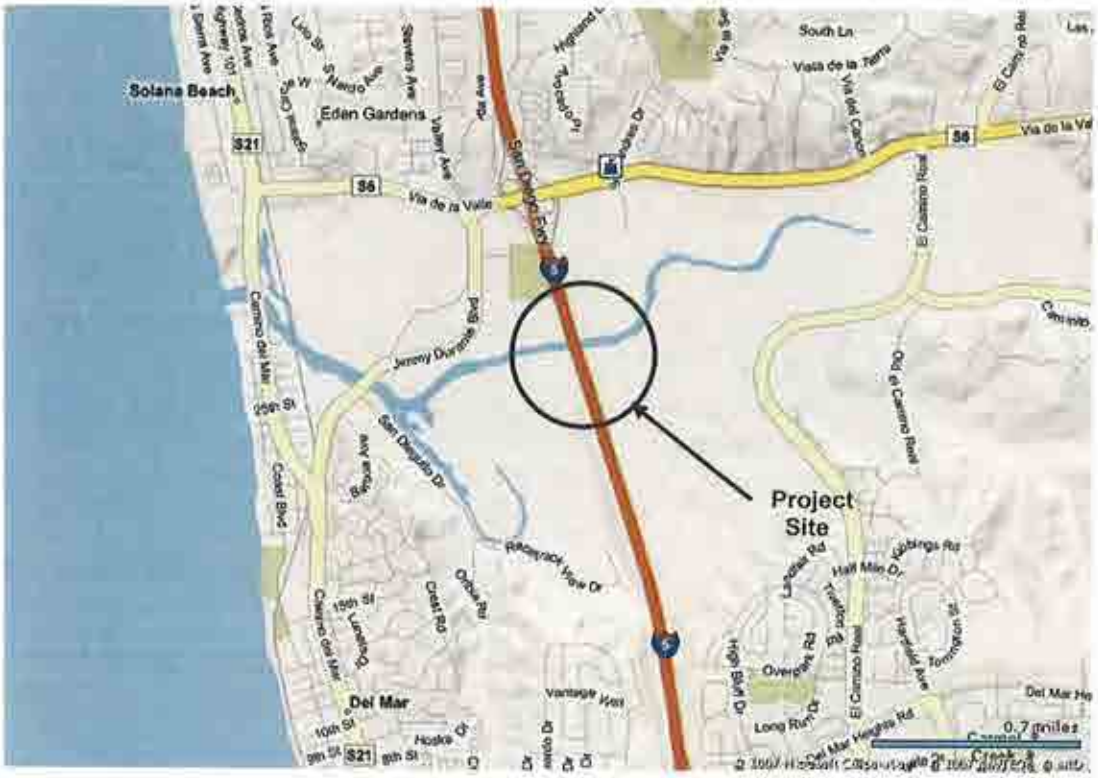



**Figure 1: Project Vicinity Map**

The I-5 Bridge crossing over the San Dieguito River is located in the City of Del Mar in the west-central region of San Diego County. (Thomas Bros. page 1187-H2).

This study was prepared for California Department of Transportation for the purpose of determining impacts to the San Dieguito River base (100-year) flood from the proposed improvements to the Interstate-5 (I-5) freeway.

This study specifically addresses the following:

1.) The San Dieguito River 100-year floodplain as it presently exists,

2.) The San Dieguito River 100-year floodplain after the I-5 Bridge has been replaced,

3.) Performing a risk assessment associated with any possible floodplain encroachment.

The replacement of the existing I-5 Bridge (No. 57-0488) requires that the bridge be widened from 179 feet to 253 feet. The proposed bridge would also be approximately 20 feet longer on each end for a total length of 689 feet. The existing I-5 Bridge is supported by 10 pier walls with widths ranging from 1.5 to 2.5 feet in diameter. The pier walls will be replaced with five rows of piers each 4 feet in diameter for the replacement bridge.

## 4.1 DESCRIPTION OF WATERSHED:

The San Dieguito River basin occupies an area of approximately 346 square miles, including portions of the cities of Del Mar, Escondido, Poway, San Diego, Solana Beach, and unincorporated areas of San Diego County (Figure 2). Starting from Santa Ysabel, the watershed expands northwest to San Pasqual, southwest to Ramona, and west to the cities of Del Mar and Solana Beach with three major water bodies: San Dieguito River, San Dieguito Lagoon, and Lake Hodges. Approximately 88% of the total drainage area is controlled by Hodges Dam.

**Figure 2: Regional Basin Area**

The watershed extends through a diverse array of habitats from its eastern headwaters in the Volcan Mountains to its outlet at the Pacific Ocean. There are several important natural areas within the watershed that sustain a number of threatened and endangered species. Among these are the 55-mile long, 80,000 acre San Dieguito River Park, the 150 acre San Dieguito Lagoon, and water storage reservoirs including Lake Hodges, Lake Sutherland, and Lake Poway.

The San Dieguito Lagoon is currently undergoing extensive re-grading and restoration as mitigation for the San Onofre Nuclear Generation Station. The project began in mid-September 2006 and is slated for completion late 2009.

## 4.2 FLOODPLAIN MODELING METHODOLOGY:

The area of analysis ranges from 6,500 feet upstream to 1,500 feet downstream of the I-5 Bridge. In this region, 42,800 cfs of water passes through the opening beneath the I-5 Bridge from a 5,000 foot wide floodplain. During a 100-year storm event, a broad slow moving river would flow through the floodplain with the I-5 Bridge serving as the only major constriction point. Downstream of the I-5 Bridge, the floodplain opens up to the north and floods the Del Mar Fairgrounds. Within the floodplain study limits, the floodplain bottom elevations range from 9 to -4 feet, using the North American Vertical Datum of 1988 (NAVD 88).

## 4.3 HEC-RAS INPUT

The HEC-RAS River Analysis System v3.1.3 is a graphically based computer program which has been developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center. Input required by the software included channel cross sectional geometry, channel roughness coefficients, starting water surface elevations, and a 100-year storm event discharge.

### 4.3.1 Cross Sectional Geometry:

The majority of the cross sections were placed perpendicular to the river flow path. Several cross sections have been skewed to allow channel reach lengths to accurately model the river. To better define the channel terrain, it was necessary for the cross sections in locations of bridges, depressions, islands or contractions/expansions to be more closely spaced. Ineffective flow areas were used at portions of the river which did not contribute significantly to the conveyance of the flood waters.

The hydraulic model was based on the topography (including hydrographic elevations) obtained from Project Design Consultants, dated November 19, 2003 in the National Geodetic Vertical Datum of 1929 (NGVD 29). Along with this topography, the Grading Plan from the San Dieguito Wetland Project prepared by Southern California Edison Company was used for grading and excavation currently in progress (NGVD 29). Both topographic sheets were combined and scaled accordingly to create a complete topographic map of the floodplain. All results are provided in English units using NAVD 88. At the completion of the San Dieguito Restoration Project, this study may require revising if changes to the grading plan received, August 13, 2007, from Project Design Consultants occur during construction.

#### 4.3.1.1 Bridges

The existing I-5 Bridge is at cross section #7000. The Momentum Equation was used to calculate water surface elevations under the bridge. The primary concern of modeling the possible encroachment of the San Dieguito River from the I-5 Bridge replacement was the removal of the pier walls into the floodplain and construction of new concrete piers. The effective number obstructions will be halved from ten to five. However, the diameter of the bridge supports will increase in diameter from 2.5 feet to 4 feet. The as-builts and the Advanced Planning Study used to model the I-5 Bridge are included in Appendix C. A clogging factor of +25% was added to the bridge piers to account for debris which could catch on the piers and provide additional blockage to the flow of the river.

The proposed I-5 Bridge will be approximately 74 feet wider and approximately 40 feet longer than the existing I-5 Bridge. The existing channel (Figure 3) is proposed to be widened, from its existing location at the northern end of the I-5 Bridge, to the entire length of the widened bridge. The re-grading along with the reduction of bridge pier obstructions will reduce the constriction of the San Dieguito River flow beneath the I-5 Bridge crossing.

**Figure 3: Existing San Dieguito River/ I-5 Bridge crossing.**

#### 4.3.1.2 Ineffective Flow Areas

The cross section exhibits in Appendix A. show the ineffective flow areas for the post project conditions. The constriction and expansion zones upstream and downstream of the I-5 Bridge are modeled as areas of ineffective flow.

#### 4.3.1.3 Flood Insurance Study Cross Sections

A detailed hydraulic analysis has been performed downstream of the I-5 Bridge, as shown on the Flood Insurance Rate Map (FIRM) in Appendix 'A'. The water surface elevation from cross section "E" in the FIRM was used as the furthest downstream cross section of the floodplain analysis, cross section #5333. The project is located in a designated 100-year floodplain, Zone A, where no base flood elevations have been determined. The extents of the floodplain in the project vicinity were determined by FEMA by approximate means.

#### 4.3.1.4 Existing Floodplain Conditions

Several hydraulic models were developed to determine the most accurate methods in which to depict the floodplain of the San Dieguito River. The floodplain in the vicinity of the I-5 Bridge is a Zone A. No backup data is available for the original development of the floodplain, and no base flood elevations have been established by FEMA for Zone A floodplains. An existing HEC-RAS model performed by Chang Consultants, September 1998 was originally used as the existing model. This existing model was updated to show the proposed grading plan for the San Dieguito Lagoon Restoration Plan

as the existing condition, because it is currently under construction and will be completed before the proposed I-5 Bridge would be constructed. This updated existing conditions model was used for comparison with the proposed bridge improvements. This existing model may need to be updated at the completion of the San Dieguito Restoration project.

### 4.3.2 Manning's Roughness Coefficient:

Each cross section contains a left overbank, main channel, and right overbank, which represents the different regions of the waterway in terms of roughness coefficients. The main channel is the base of the river, typically the low flow region of the river. The left and right overbanks represent the more vegetated area on the sides of the river. The north side, or the right overbank, contains mostly light brush with trees (0.05). On the south side or left overbank, there are two different channel types, though they yield the same Manning's value. Downstream of I-5 has similar vegetation to the right over bank while upstream consists of row crops (both 0.05). The main channel consists of wide floodplain with high grass (0.035).

**Figure 4: Floodplain with high grass**

**Figure 5: Light brush and trees**

### 4.3.3 Starting Water Surface Elevation:

The model was analyzed in a subcritical flow regime. A FEMA Zone AE floodplain has been established downstream of the I-5 Bridge. The furthest downstream cross section was placed at this location to connect with FEMA floodplain information. The FIS establishes this elevation at 20.65 feet as the starting water surface elevation from the Floodway Data Table (Appendix A).

### 4.3.4 Discharge:

Based on FIS data, *Table 4 – Summary of Discharge: San Dieguito River – Upstream of U.S. Interstate Highway 5 Bridge*, 42,800 cfs was selected as the 100-year flood discharge (Appendix A).

## 4.4 HEC-RAS OUTPUT

The water surface elevations which are displayed in the appendices and output of this study are based on flooding that would occur during a 100-year storm. Appendix 'B' contains the water surface elevations of each cross section, channel velocities, top widths, Froude numbers, and bottom elevations. Since the I-5 Bridge replacement would reduce the pier obstructions within the floodplain, and open up the floodway underneath the bridge, the water surface elevation would decrease upstream. The San Dieguito River has a flat channel bottom which produces low velocity flows during the 100-year storm event. It is the flatness of the lagoon which produces the small change to flood levels which extends thousands of feet upstream. As shown in Table A, there would be a decrease to the existing 100-year floodplain due to the I-5 Bridge replacement.

**TABLE A: Floodplain Comparison**

| FEMA Cross Section | River Station | River Station Description | Existing W.S. Elevation (ft) | Proposed W.S. Elevation (ft) | Change in Elevation (ft) | Existing Top Width (ft) | Proposed Top Width (ft) | Change in Top Width (ft) |
|---|---|---|---|---|---|---|---|---|
| | 13555 | Furthest Upstream Cross Section | 21.90 | 21.82 | **-0.08** | 1545.94 | 1525.74 | **-20.20** |
| | 11854 | | 21.57 | 21.47 | **-0.10** | 2384.79 | 2381.91 | **-2.88** |
| | 10577 | | 21.43 | 21.33 | **-0.10** | 1983.64 | 1982.94 | **-0.70** |
| | 9777 | | 21.43 | 21.32 | **-0.11** | 2926.93 | 2926.05 | **-0.88** |
| | 9274 | | 21.41 | 21.31 | **-0.10** | 3139.81 | 3136.81 | **-3.00** |
| | 8043 | | 21.39 | 21.28 | **-0.11** | 4324.42 | 4322.85 | **-1.57** |
| | 7554 | | 21.34 | 21.23 | **-0.11** | 5852.95 | 5852.15 | **-0.80** |
| | 7286 | | 20.98 | 20.86 | **-0.12** | 5229.85 | 5227.42 | **-2.43** |
| | 7000 | I-5 Bridge | | | | | | |
| | 6809 | | 20.54 | 20.54 | **0.00** | 4479.15 | 4479.15 | **0.00** |
| | 6661 | | 20.61 | 20.61 | **0.00** | 4474.32 | 4474.32 | **0.00** |
| | 6437 | | 20.65 | 20.65 | **0.00** | 4397.55 | 4397.55 | **0.00** |
| | 5926 | | 20.65 | 20.65 | **0.00** | 4615.28 | 4615.28 | **0.00** |
| E | 5333 | Furthest Downstream Cross Section | 20.65 | 20.65 | **0.00** | 4385.20 | 4385.20 | **0.00** |

### 4.4.1 Warning Messages

Warning messages encountered during the proposed model include the following:

***The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections,*** displayed at cross sections #5916, #6661, #6809, #7286, #7554, #8043, #10577, #11858 and #13555. Portions of the San Dieguito River were relatively uniform and allowed for cross

sections to be placed several hundred feet apart. These changes are appropriate based on the spacing of these sections.

***The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections,*** displayed at cross section #13555. This message is occurring because of the considerable change in floodplain width.

***Divided flow computed for this cross section,*** displayed at cross sections #8043 and #13555. Along these cross sections, divided flow is expected due to the restoration of the lagoon and the flow diversion berm being constructed in the floodplain.

## 4.5 RISK ASSESSMENT:

Within the San Dieguito River, the replacement to the I-5 Bridge would cause a decrease to flood water elevations upstream. The impacts to the floodplain would not be considered a significant or longitudinal encroachment. Since the 100-year flood would still be contained within the floodplain boundaries, there would be no increased risk to life or property associated with the proposed improvements. No additional roadways would flood upstream from the proposed I-5 Bridge replacement. Therefore, no transportation routes will be interrupted or terminated beyond existing conditions. In addition, the County of San Diego Ordinance #9830 (New Series), which states that the increase shall be no more than 2/10 of 1 foot in the floodway of the San Dieguito River is also satisfied.

Additionally, no floodplain values will be adversely impacted without mitigation. Natural and beneficial floodplain values, as defined in Chapter 17 "Definitions" in the Caltrans Standard Environmental Reference (SER), include fish, wildlife, plants, outdoor recreation, aquaculture, forestry, etc., that are found within a designated floodplain. Listed below are the beneficial uses of the San Dieguito Lagoon obtained from the Water Quality Control Plan for the San Diego Basin along with a short description and determination of impacts.

- Contact and non-contact water recreation. Includes the uses of water for recreational activities involving proximity to water and contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, diving, surfing, white water activities, fishing, use of natural hot springs, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities. The I-5 bridge replacement will not have any effect on the lagoon's recreational uses aside from during the construction phase. There is a hiking trail that passes underneath the I-5 Bridge which may be closed periodically during construction.

- Preservation of biological habitats of special significance. Included uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection. The construction areas associated with the bridge replacement may impact a limited amount of biological habitats. Currently, a Natural Environment Study (NES) is being prepared

to support the I-5 North Coast Widening Project. The NES will assess if any biological habitats of special significance may be impacted and what mitigation measures, if any, are needed.

- Estuarine habitat. Includes uses of water that support estuarine ecosystems including, but not limited to, preservations or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). The construction areas associated with the bridge replacement may impact a limited amount of estuarine habitat. Currently, a Natural Environment Study (NES) is being prepared to support the I-5 North Coast Widening Project. The NES will assess if any estuarine habitat may be impacted and what mitigation measures, if any, are needed.

- Wildlife habitat. This includes uses of water that supports terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, or wildlife water and food sources. The NES will assess if any wildlife habitat may be impacted and what mitigation measures, if any, are needed.

- Rare, threatened, or endangered species. Included uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under the state or federal law as rare, threatened or endangered. The NES will assess if any rare, threatened or endangered species may be impacted and what mitigation measures, if any, are needed.

- Marine habitat. Included uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds.) The NES will assess if any marine habitat may be impacted and what mitigation measures, if any, are needed.

- Migration of aquatic organisms. Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish. The NES will assess if any migration of aquatic organisms may be impacted and what mitigation measures, if any, are needed.

- Spawning, reproduction, and/or early development. Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish. The NES will assess if any spawning, reproduction, or early development may be impacted and what mitigation measures, if any, are needed.

The proposed bridge replacement has been designed to minimize disturbance to the floodplain. The bridge design has been through several iterations to select an alternative which is compatible with floodplain development and least harmful to the environment, while maintaining feasibility for improving I-5. Efforts should be made to limit the footprint of the construction site and reduce construction time in order to minimize impacts to natural and beneficial floodplain values, hazards to human life, and property loss.

## 4.6 SUMMARY AND CONCLUSION:

Results provided in this study demonstrate that a minimal decrease to water surface elevations would occur to the existing San Dieguito River 100-year floodplain if the I-5 Bridge was replaced. Hydrological and hydraulic data was obtained from a Flood Insurance Study (FIS), and HEC-RAS v3.1.3 software was used to perform the hydraulic computations. The floodplain can be described as a slow moving water body with relatively no change in water surface elevations during the 100-year storm. The constriction under the I-5 Bridge regulates the majority of the river flow.

The existing and proposed I-5 Bridge and piers were both modeled and analyzed under the 100-year flood conditions. It was determined that the resulting upstream water surface elevation would drop approximately 1.2 inches with the proposed replacement (See Table A: Floodplain Comparison). The proposed I-5 replacement bridge would improve the ability of the San Dieguito River to convey the 100-year storm event.

# APPENDIX 'A'

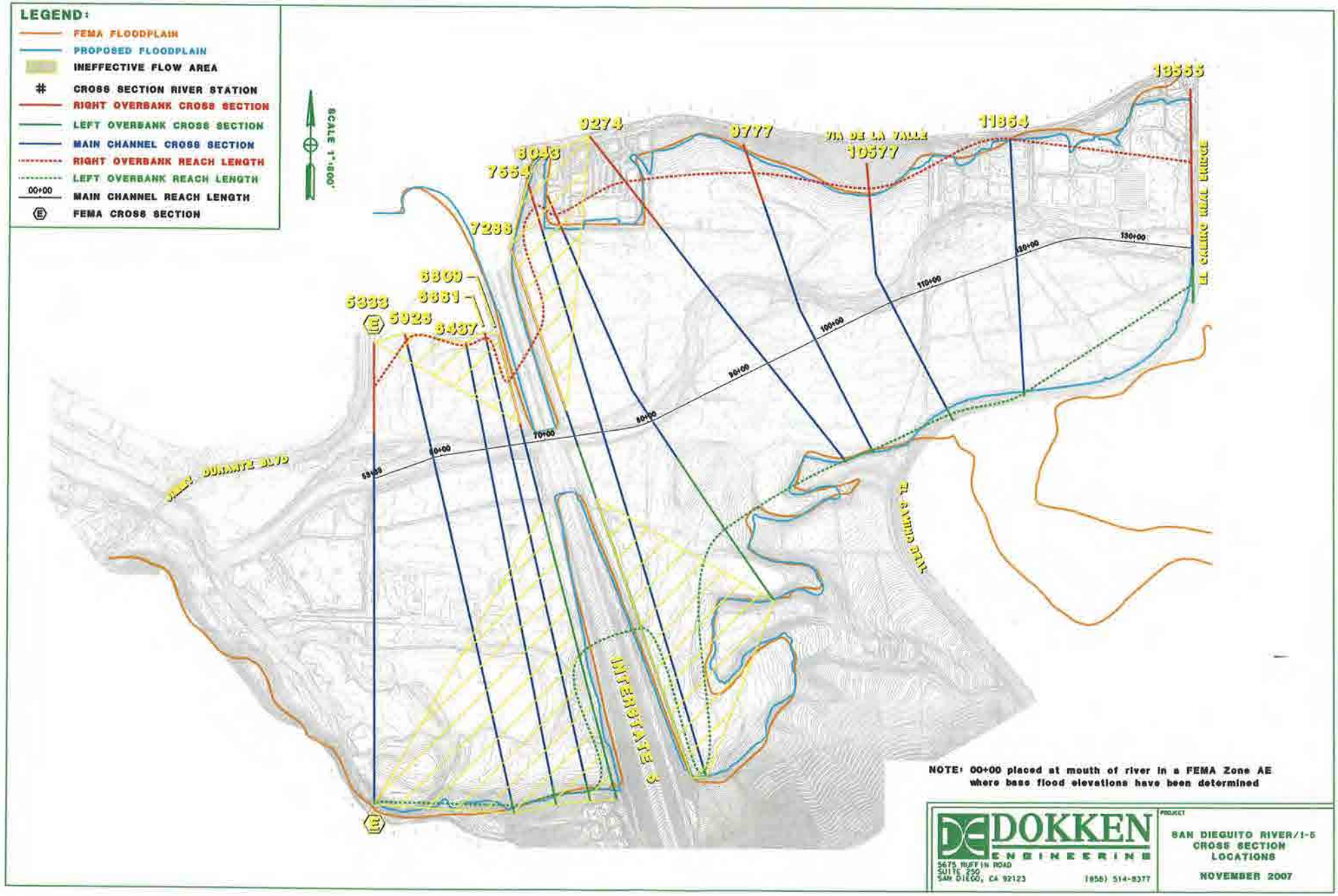
## Cross Section Locations Exhibits

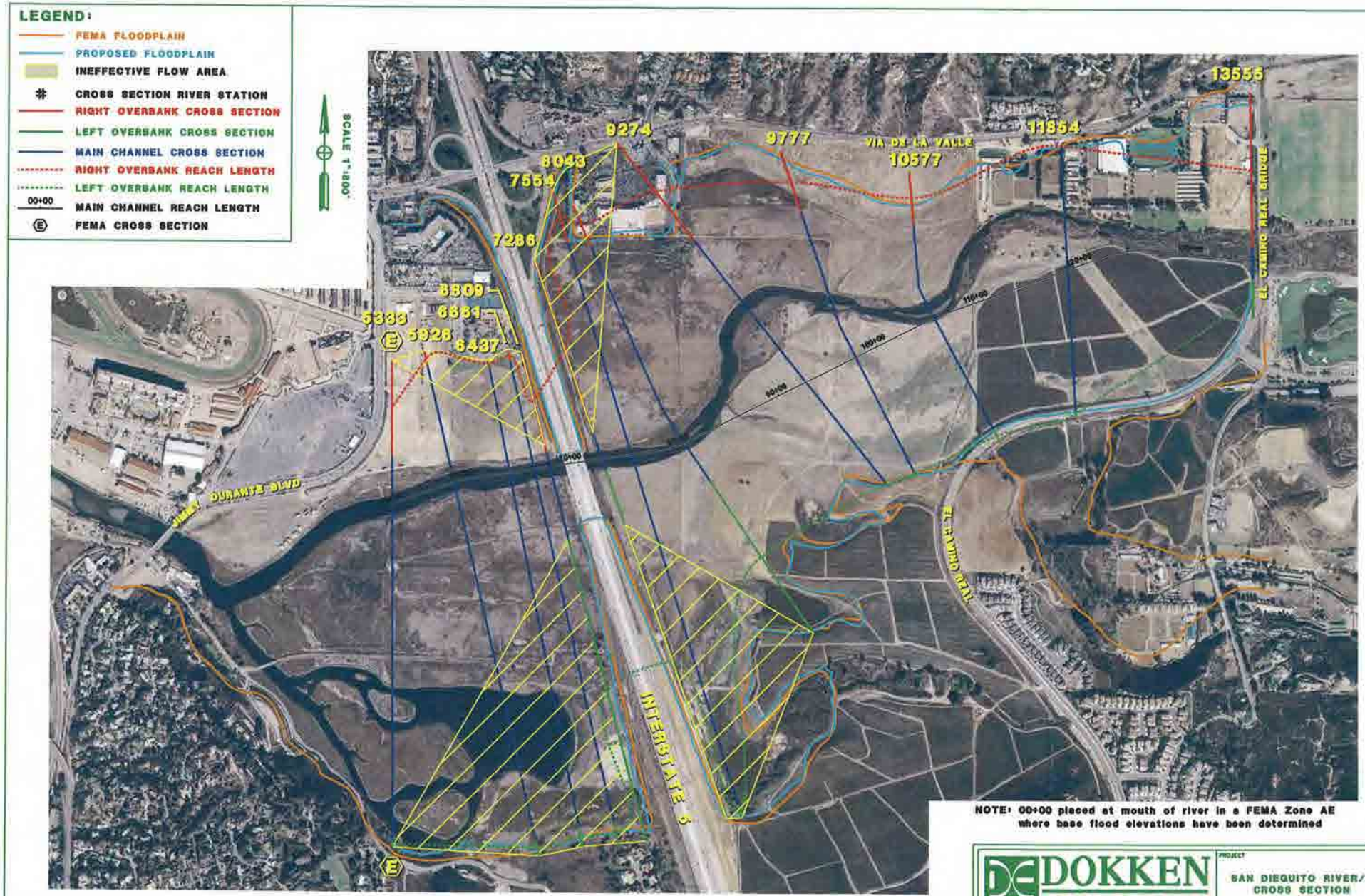
## Grading Plan

## Flood Insurance Rate Maps (FIRM)

## Flood Insurance Study (FIS)

## Summary of Discharges


LEGEND:
FEMA FLOODPLAIN
PROPOSED FLOODPLAIN
INEFFECTIVE FLOW AREA
# CROSS SECTION RIVER STATION
RIGHT OVERBANK CROSS SECTION
LEFT OVERBANK CROSS SECTION
MAIN CHANNEL CROSS SECTION
RIGHT OVERBANK REACH LENGTH
LEFT OVERBANK REACH LENGTH
00+00 MAIN CHANNEL REACH LENGTH
E FEMA CROSS SECTION
SCALE 1"=800'
13555
11864
9777
9274
8048
7554
7288
6809
6661
6437
5928
5833
10577
VIA DE LA VALLE
EL CAMINO REAL BRIDGE
JAMES DURANTE BLVD
INTERSTATE 5
TILE CHUTE
NOTE: 00+00 placed at mouth of river in a FEMA Zone AE where base flood elevations have been determined
DOKKEN ENGINEERING
5675 RUFFIN ROAD
SUITE 250
SAN DIEGO, CA 92123
(858) 514-8377
PROJECT
SAN DIEGUITO RIVER/I-5
CROSS SECTION
LOCATIONS
NOVEMBER 2007




NOTE: 00+00 placed at mouth of river in a FEMA Zone AE where base flood elevations have been determined

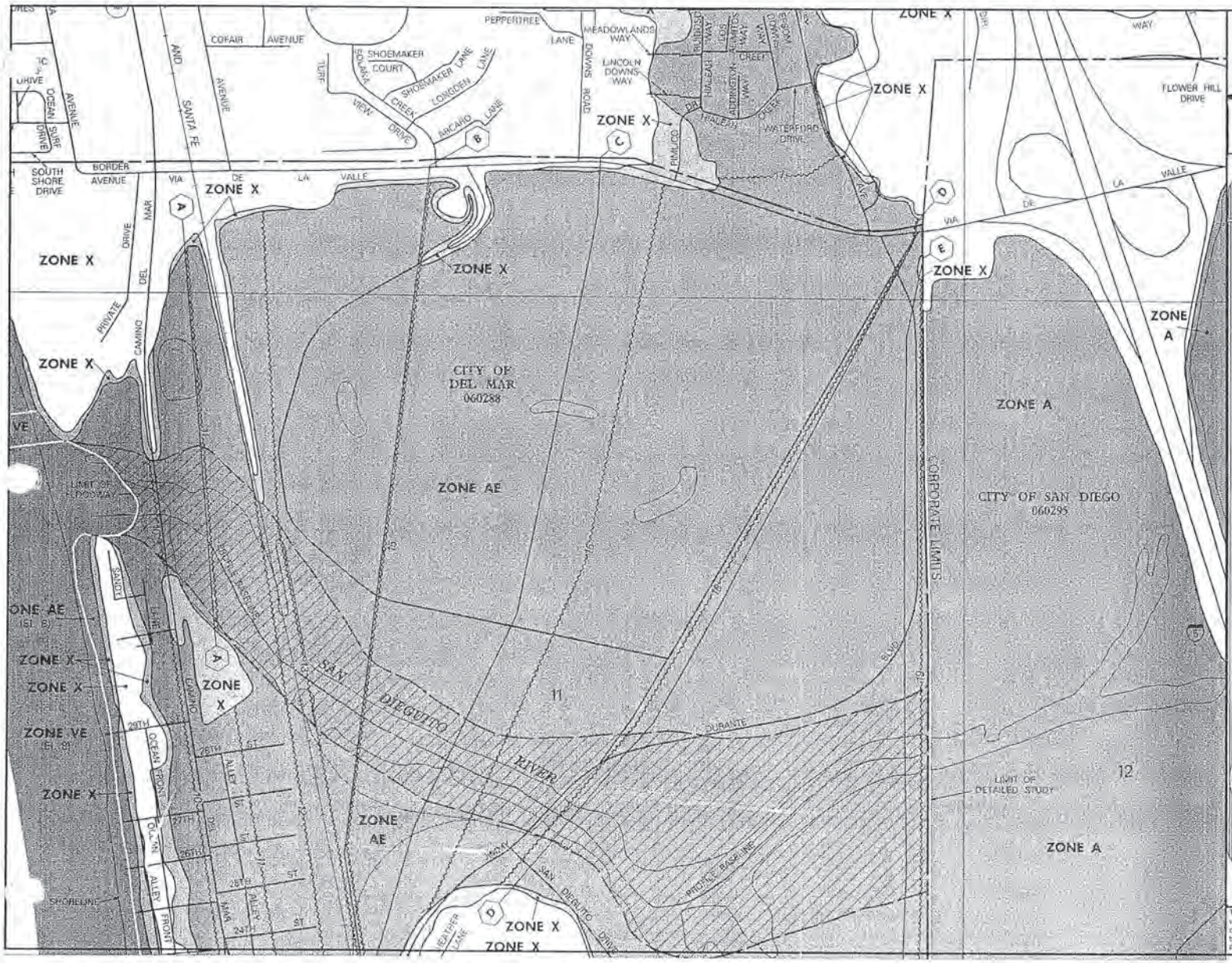
DOKKEN ENGINEERING
5675 RUFFIN ROAD
SUITE 250
SAN DIEGO, CA 92123
(858) 514-8377

PROJECT

SAN DIEGUITO RIVER/I-5
CROSS SECTION
LOCATIONS

NOVEMBER 2007

**Figure 4.2. San Dieguito Wetlands Restoration Project - Grading Plan**




NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

**PANEL 1307 OF 2375**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

| CONTAINS: COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| DEL MAR, CITY OF | 060288 | 1307 | F |
| ENCINITAS, CITY OF | 060726 | 1307 | F |
| SAN DIEGO, CITY OF | 060295 | 1307 | F |
| SOLANA BEACH, CITY OF | 060729 | 1307 | F |

**MAP NUMBER**
**06073C1307 F**

**EFFECTIVE DATE:**
**JUNE 19, 1997**

Federal Emergency Management Agency

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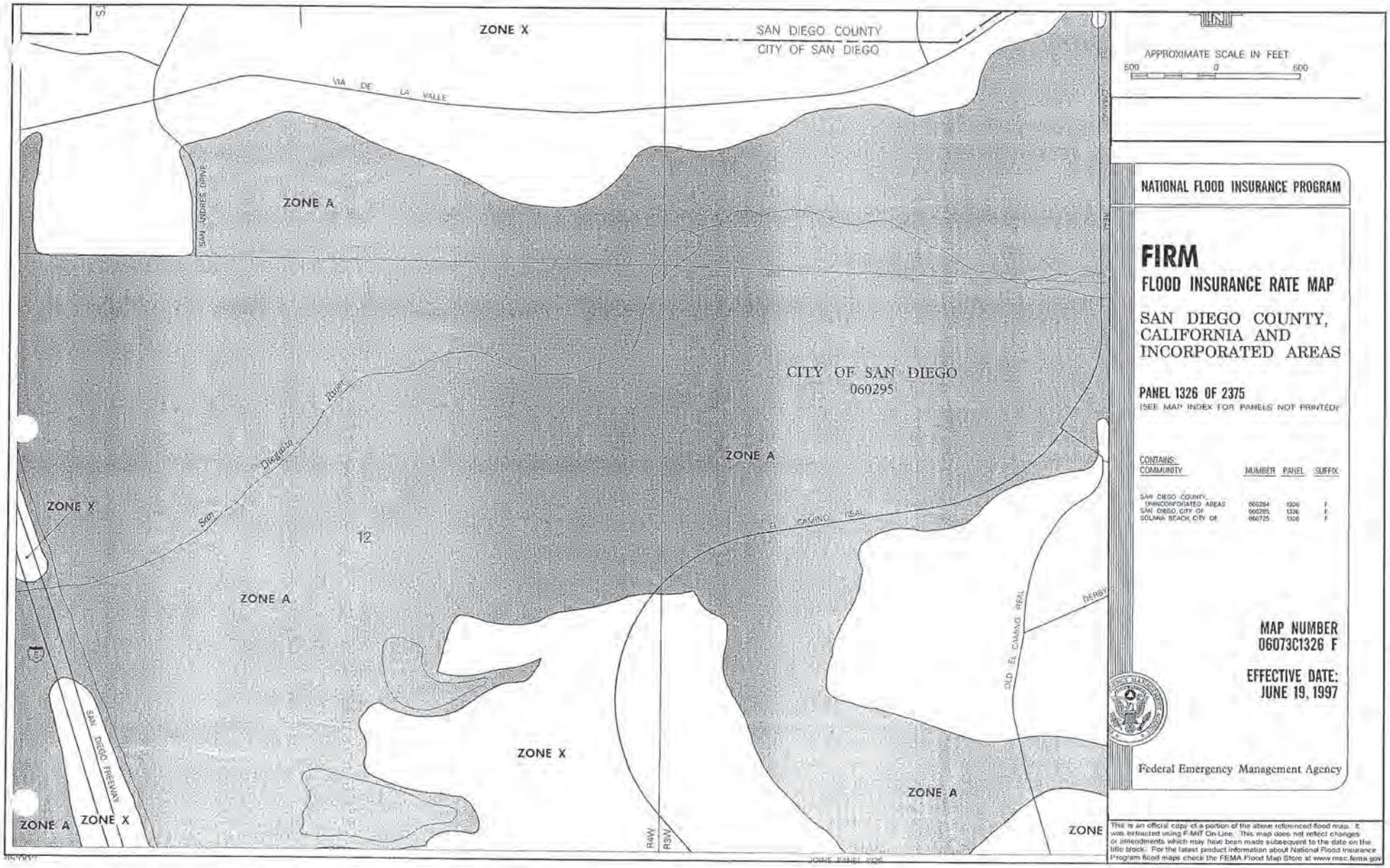
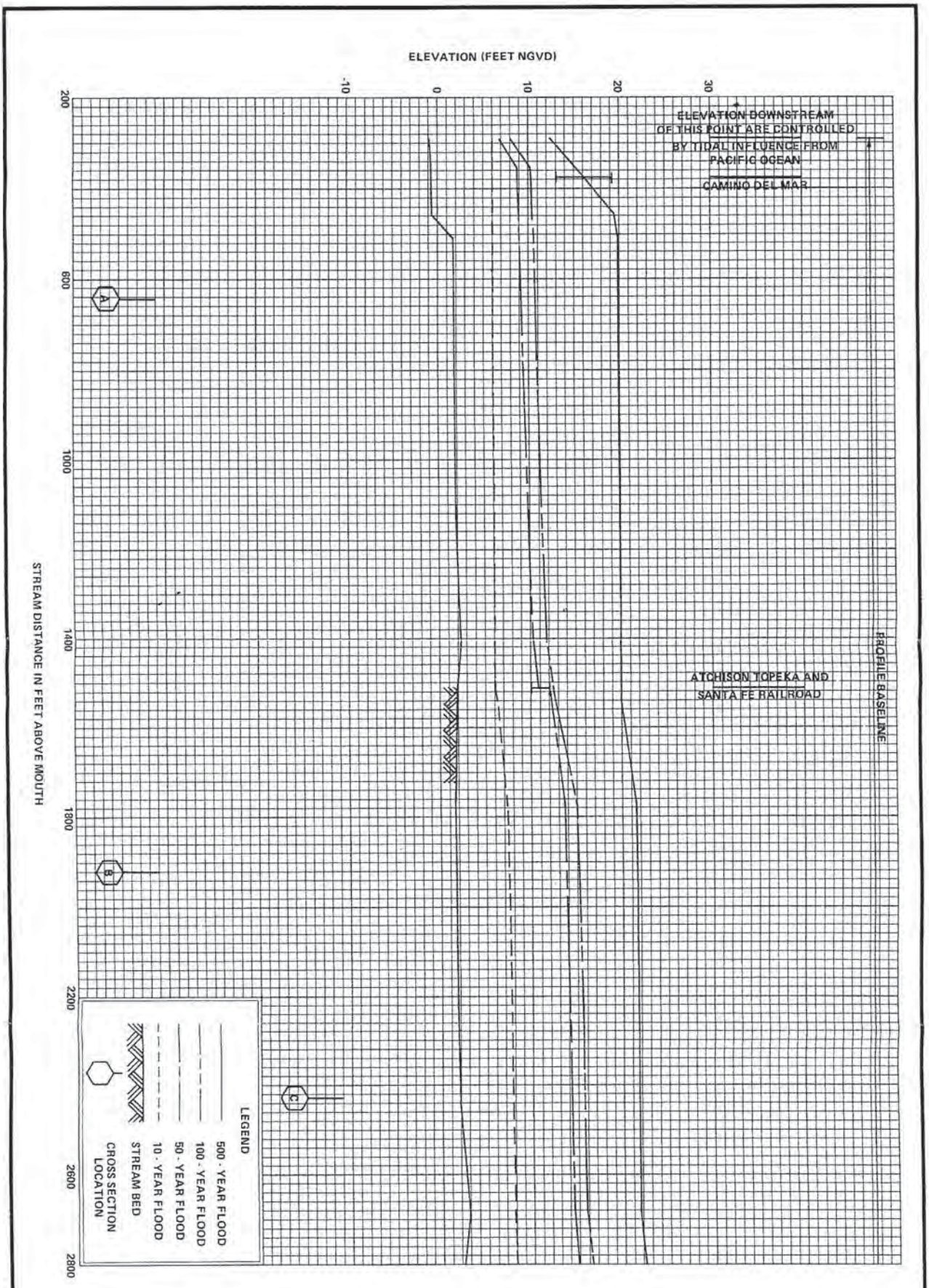

ZONE X
SAN DIEGO COUNTY
CITY OF SAN DIEGO
VIA DE LA VALLE
SAN ANDRES DRIVE
ZONE A
CITY OF SAN DIEGO
060295
ZONE A
ZONE X
San Dieguito
12
ZONE A
EL CAMINO REAL
OLD EL CAMINO REAL
DERBY
ZONE X
ZONE A
ZONE X
ZONE A
ZONE
SAN DIEGO FREEWAY
R4W
R3W
APPROXIMATE SCALE IN FEET
500 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS
PANEL 1326 OF 2375
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
SAN DIEGO, COUNTY OF (UNINCORPORATED AREAS) 060284 1326 F
SAN DIEGO, CITY OF 060295 1326 F
SOLANA BEACH, CITY OF 060725 1326 F
MAP NUMBER
06073C1326 F
EFFECTIVE DATE:
JUNE 19, 1997
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



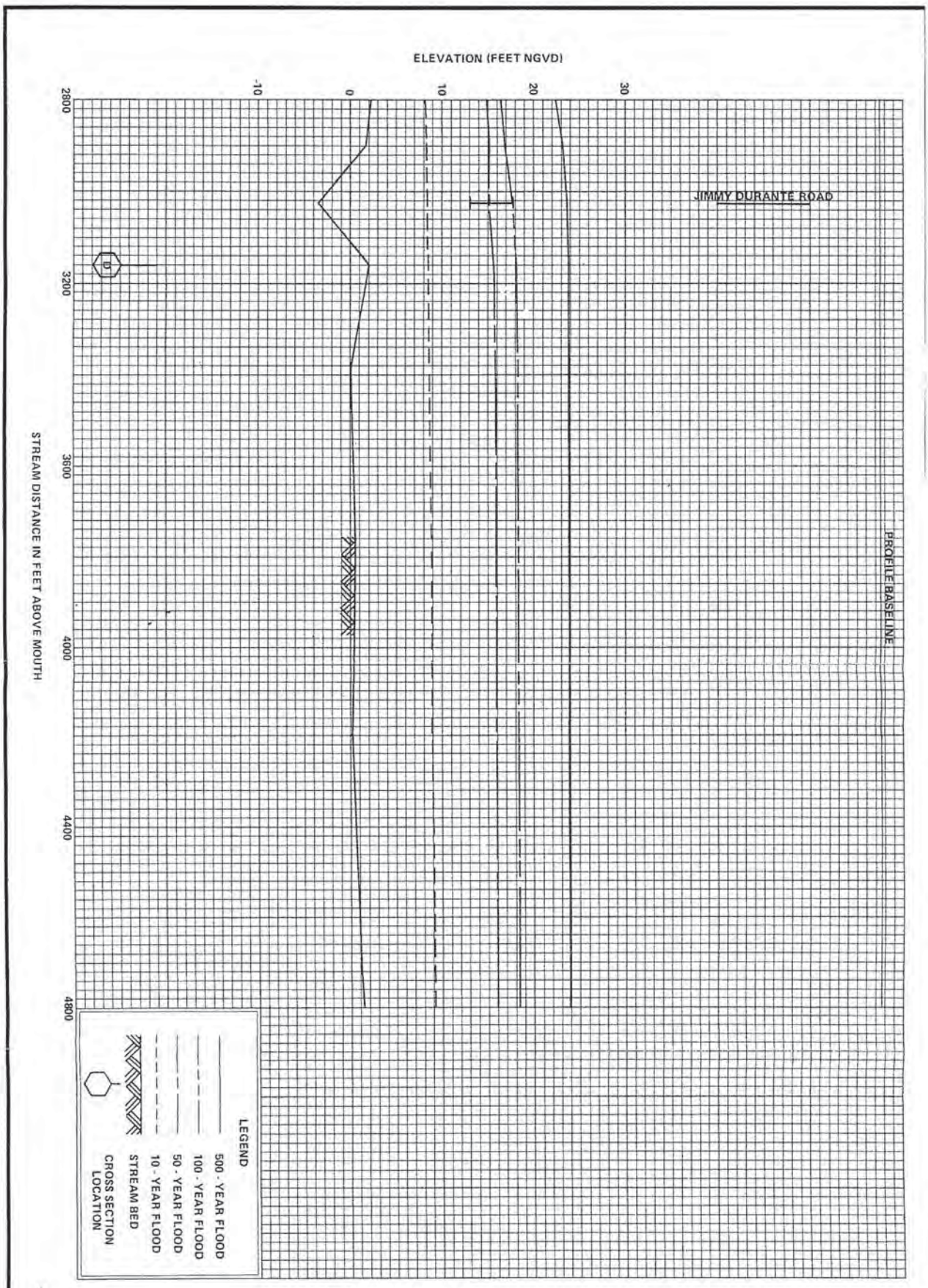



FEDERAL EMERGENCY MANAGEMENT AGENCY

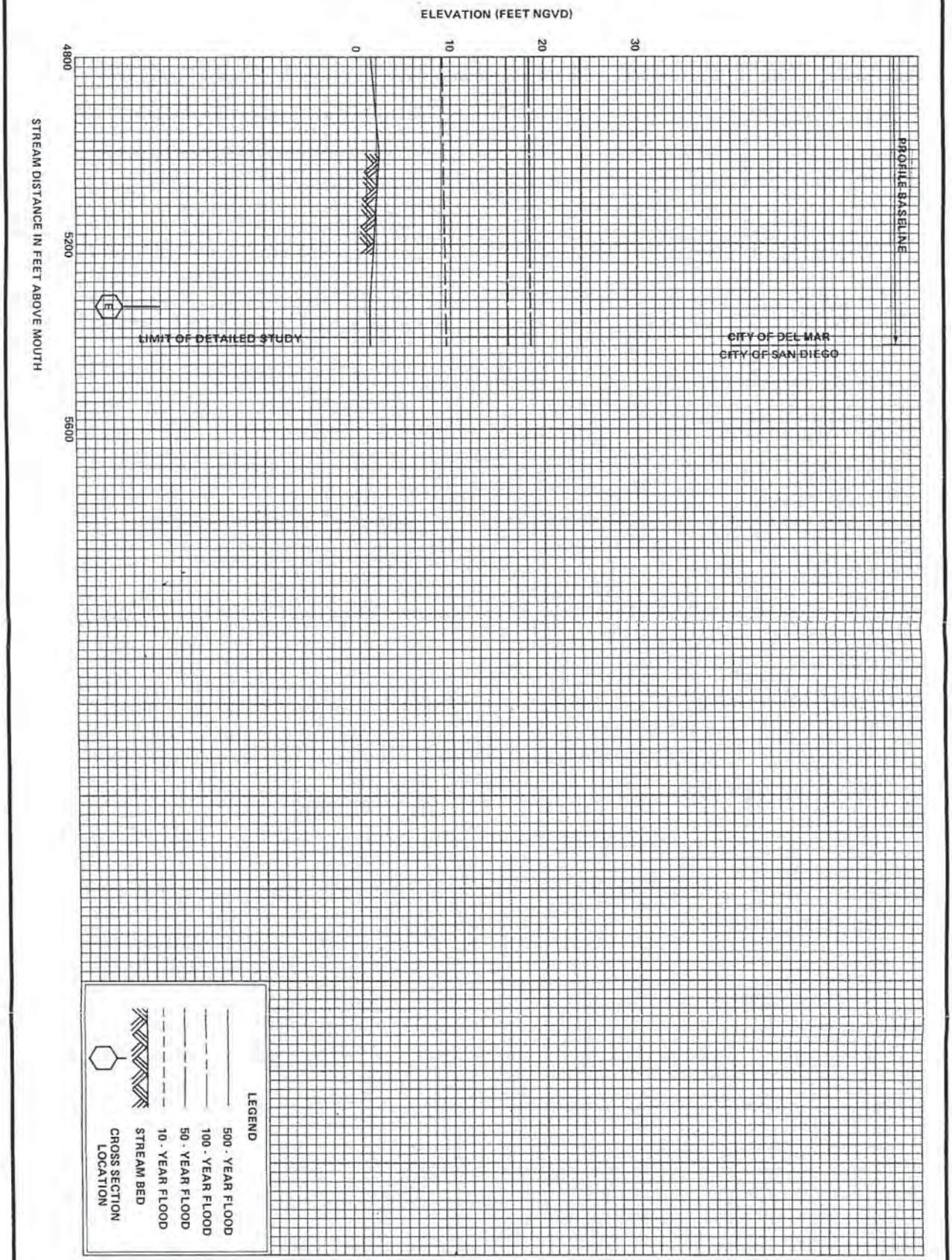
**SAN DIEGO COUNTY, CA AND INCORPORATED AREAS**

**FLOOD PROFILES**

SAN DIEGUITO RIVER




| 308P | FEDERAL EMERGENCY MANAGEMENT AGENCY<br>**SAN DIEGO COUNTY, CA AND INCORPORATED AREAS** | **FLOOD PROFILES**<br>SAN DIEGUITO RIVER |
|---|---|---|


ELEVATION (FEET NGVD)
0
10
20
30
4800
5200
5600
STREAM DISTANCE IN FEET ABOVE MOUTH
PROFILE BASELINE
E
LIMIT OF DETAILED STUDY
CITY OF DEL MAR
CITY OF SAN DIEGO
LEGEND
500 - YEAR FLOOD
100 - YEAR FLOOD
50 - YEAR FLOOD
10 - YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| San Dieguito River | | | | | | | | |
| A | 642 | 920 | 6,206 | 7.1 | 10.7 | 10.7 | 10.7 | 0.0 |
| B | 1,918 | 541 | 5,247 | 9.1 | 15.0 | 15.0 | 15.0 | 0.0 |
| C | 2,428 | 469 | 5,168 | 9.7 | 15.6 | 15.6 | 15.6 | 0.0 |
| D | 3,156 | 772 | 10,328 | 4.5 | 18.1 | 18.1 | 18.7 | 0.6 |
| E | 5,333 | 1,082 | 13,465 | 3.7 | 18.5 | 18.5 | 19.2 | 0.7 |

[1]Feet Above Mouth

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA
AND INCORPORATED AREAS

# FLOODWAY DATA

SAN DIEGUITO RIVER

Table 4. Summary of Discharges (Cont'd)

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (cfs) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Samagutuma Creek | | | | | |
| At Mouth | 6.4 | 900 | 2,600 | 4,000 | 7,000 |
| San Clemente Canyon Creek | | | | | |
| Upstream of Confluence with Rose Canyon Creek | 18.4 | 1,400 | 4,200 | 6,900 | 16,000 |
| Upstream of Genesee Avenue | 15.3 | 1,200 | 3,600 | 5,600 | 12,000 |
| Upstream of Interstate Highway 805 | 12.5 | 1,000 | 3,100 | 4,900 | 11,000 |
| San Diego River | | | | | |
| At Confluence with Murphy Canyon Creek | 420.0 | 3,100 | 17,000 | 36,000 | 112,000 |
| Just Downstream of Confluence of San Vicente Creek | 290.0 | 2,500 | --[1] | 31,000 | --[1] |
| San Dieguito River | | | | | |
| Upstream of Camino Del Mar Bridge | --[1] | 5,700 | 31,400 | 41,800 | 90,000 |
| Upstream of Atchison, Topeka & Santa Fe Railway Bridge | --[1] | 5,700 | 31,400 | 41,800 | 90,000 |
| Upstream of Jimmy Durante Bridge | --[1] | 5,800 | 32,100 | 42,400 | 90,000 |
| Upstream of U.S. Interstate Highway 5 Bridge | --[1] | 5,900 | 32,500 | 42,800 | 90,000 |
| San Elijo Creek | | | | | |
| 0.1 Mile Upstream of El Camino Road | 5.4 | 500 | 1,600 | 2,100 | 5,500 |
| San Luis Rey River | | | | | |
| At Mouth | 560.0 | 6,600 | 31,000 | 51,000 | 120,000 |
| Downstream of Confluence with Moosa Canyon | 355.6 | 6,200 | 30,000 | 48,000 | 110,000 |
| Downstream of Confluence with Keys Canyon | 252.3 | 5,000 | 25,000 | 41,000 | 98,000 |
| Upstream of Confluence with Keys Canyon | 180.4 | 4,000[2] | 20,000 | 33,000 | 85,000 |
| Downstream of Palma | 167.3 | 4,000[2] | 18,000 | 30,000 | 78,000 |
| Downstream of Confluence with Puma Creek | 126.7 | 4,000[2] | 16,800 | 28,000 | 72,800 |
| Upstream of Confluence with Puma Creek | 71.5 | 5,000 | 15,000 | 24,500 | 64,000 |

[1]Data Not Available
[2]Discharge Decreases With Increasing Area Due to Breakouts From the Low Flow Channel

# APPENDIX 'B'

# Results Summary

# HEC-RAS Cross Section Input/Output

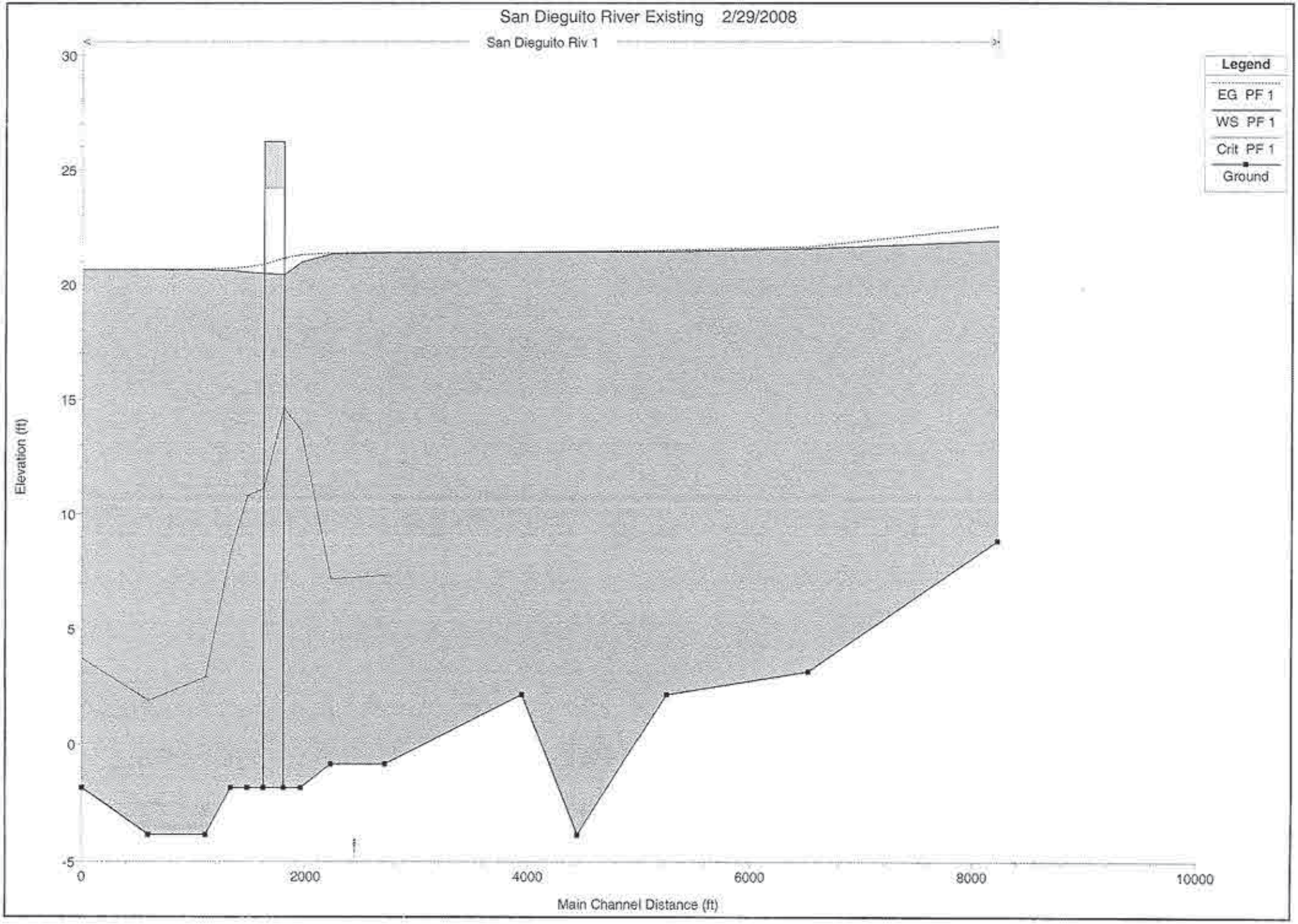
## Existing

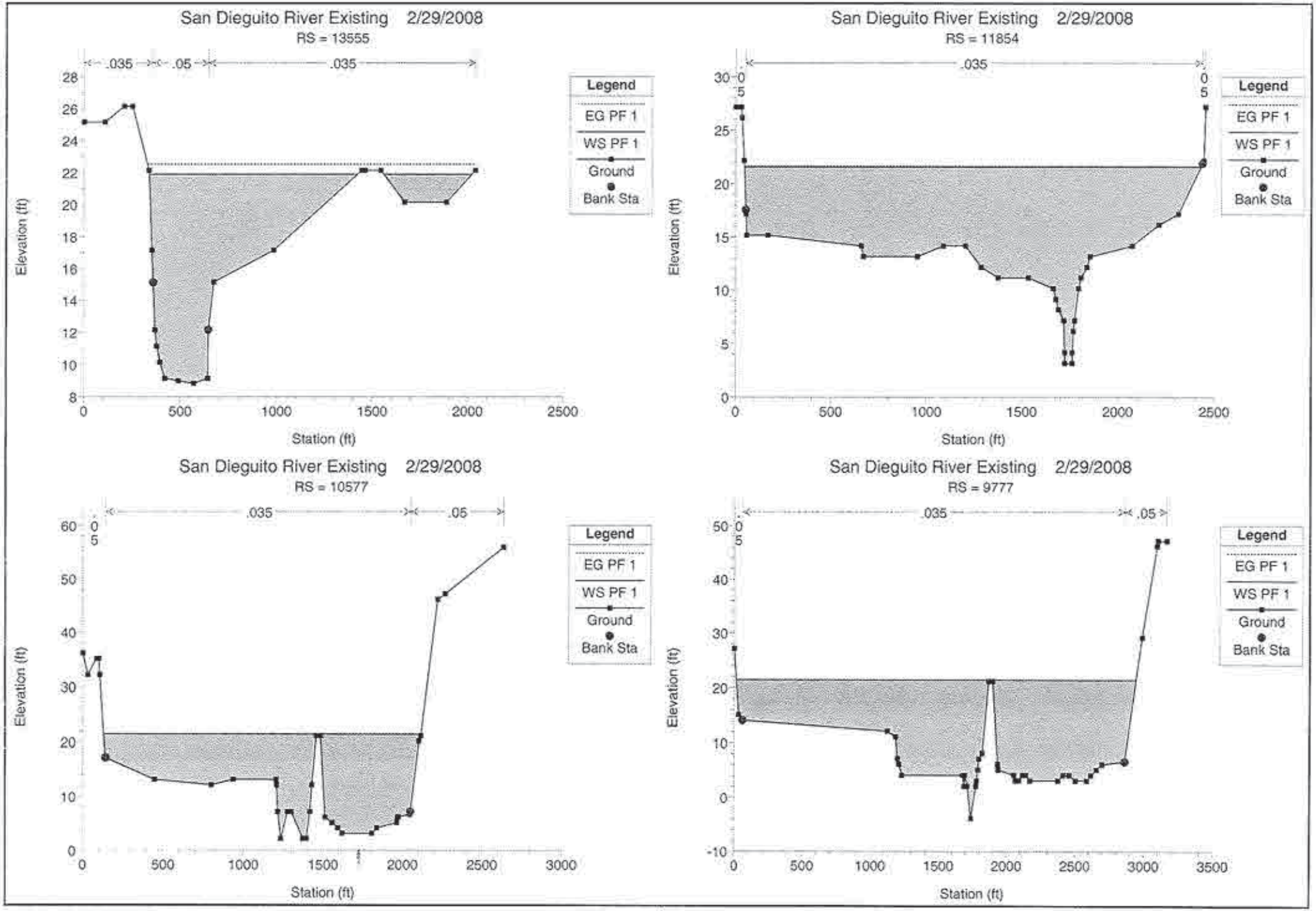
## Proposed

# EXISTING

HEC-RAS Plan: SD_Existing River: San Dieguito Riv Reach: 1 Profile: PF 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 1 | 13555 | PF 1 | 42800.00 | 8.62 | 21.90 | | 22.53 | 0.002097 | 7.30 | 7327.79 | 1545.94 | 0.36 |
| 1 | 11854 | PF 1 | 42800.00 | 3.15 | 21.57 | | 21.65 | 0.000172 | 2.24 | 19146.98 | 2394.79 | 0.14 |
| 1 | 10577 | PF 1 | 42800.00 | 2.15 | 21.43 | | 21.49 | 0.000094 | 1.96 | 22075.41 | 1983.64 | 0.10 |
| 1 | 9777 | PF 1 | 42800.00 | -3.85 | 21.43 | | 21.45 | 0.000023 | 1.14 | 37899.54 | 2926.93 | 0.06 |
| 1 | 9274 | PF 1 | 42800.00 | 2.15 | 21.41 | | 21.44 | 0.000029 | 1.20 | 36388.65 | 3139.81 | 0.06 |
| 1 | 8043 | PF 1 | 42800.00 | -0.85 | 21.39 | 7.34 | 21.41 | 0.000019 | 1.11 | 45839.52 | 4324.42 | 0.05 |
| 1 | 7554 | PF 1 | 42800.00 | -0.85 | 21.34 | 7.18 | 21.38 | 0.000049 | 1.67 | 25614.39 | 5852.95 | 0.08 |
| 1 | 7286 | PF 1 | 42800.00 | -1.85 | 20.98 | 13.65 | 21.31 | 0.000405 | 5.25 | 10598.38 | 5229.85 | 0.24 |
| 1 | 7000 | | Bridge | | | | | | | | | |
| 1 | 6909 | PF 1 | 42800.00 | -1.85 | 20.54 | 10.81 | 20.78 | 0.000287 | 3.96 | 11083.44 | 4479.15 | 0.19 |
| 1 | 6661 | PF 1 | 42800.00 | -1.85 | 20.61 | 8.37 | 20.71 | 0.000106 | 2.55 | 16776.90 | 4474.32 | 0.12 |
| 1 | 6437 | PF 1 | 42800.00 | -3.85 | 20.65 | 2.90 | 20.68 | 0.000031 | 1.54 | 27770.76 | 4397.55 | 0.07 |
| 1 | 5926 | PF 1 | 42800.00 | -3.85 | 20.65 | 1.88 | 20.67 | 0.000015 | 1.04 | 41152.88 | 4615.28 | 0.05 |
| 1 | 5333 | PF 1 | 42800.00 | -1.85 | 20.65 | 3.71 | 20.66 | 0.000007 | 0.73 | 62839.10 | 4385.20 | 0.03 |


San Dieguito River Existing 2/29/2008
San Dieguito Riv 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
30
25
20
15
10
5
0
-5
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)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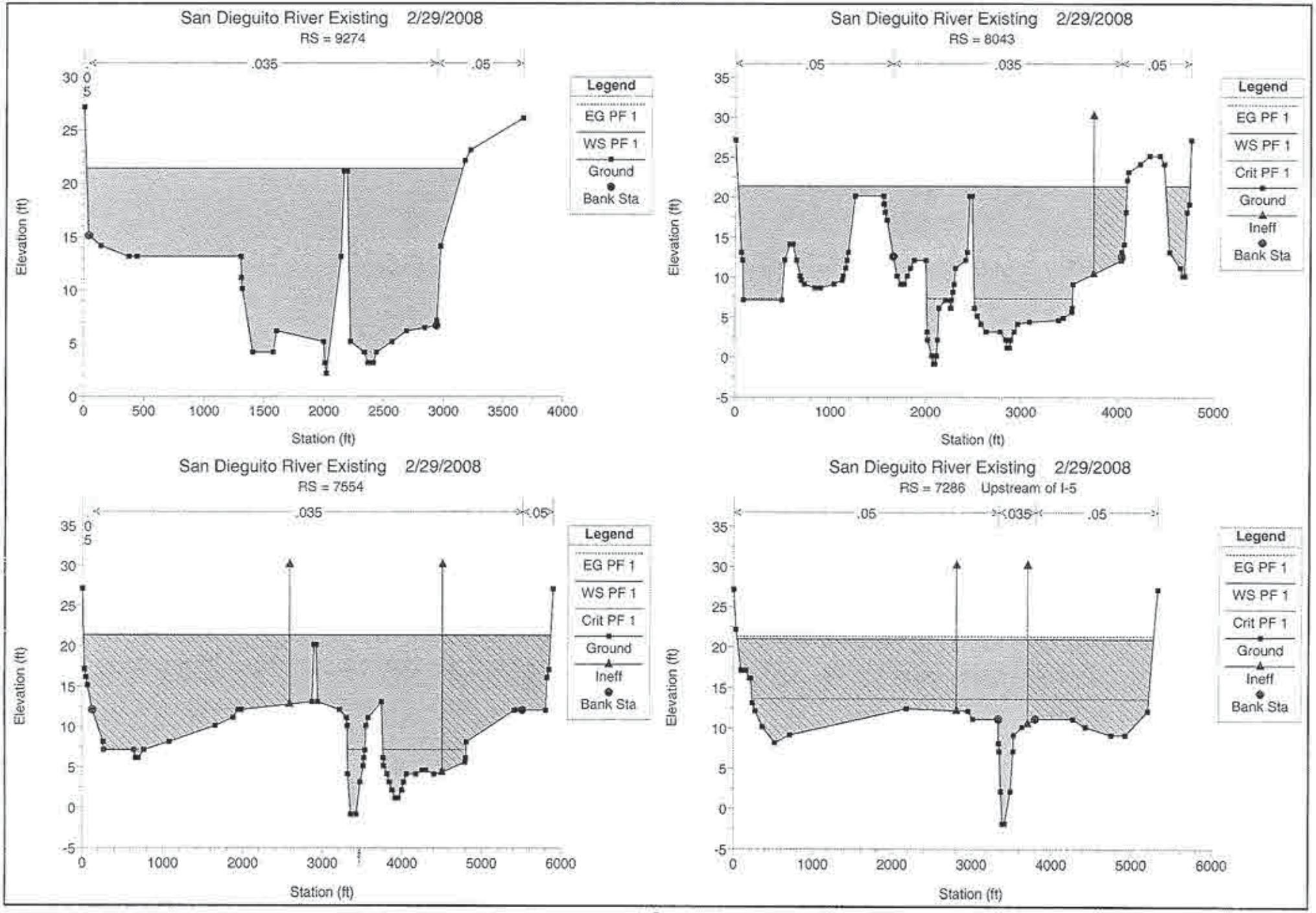
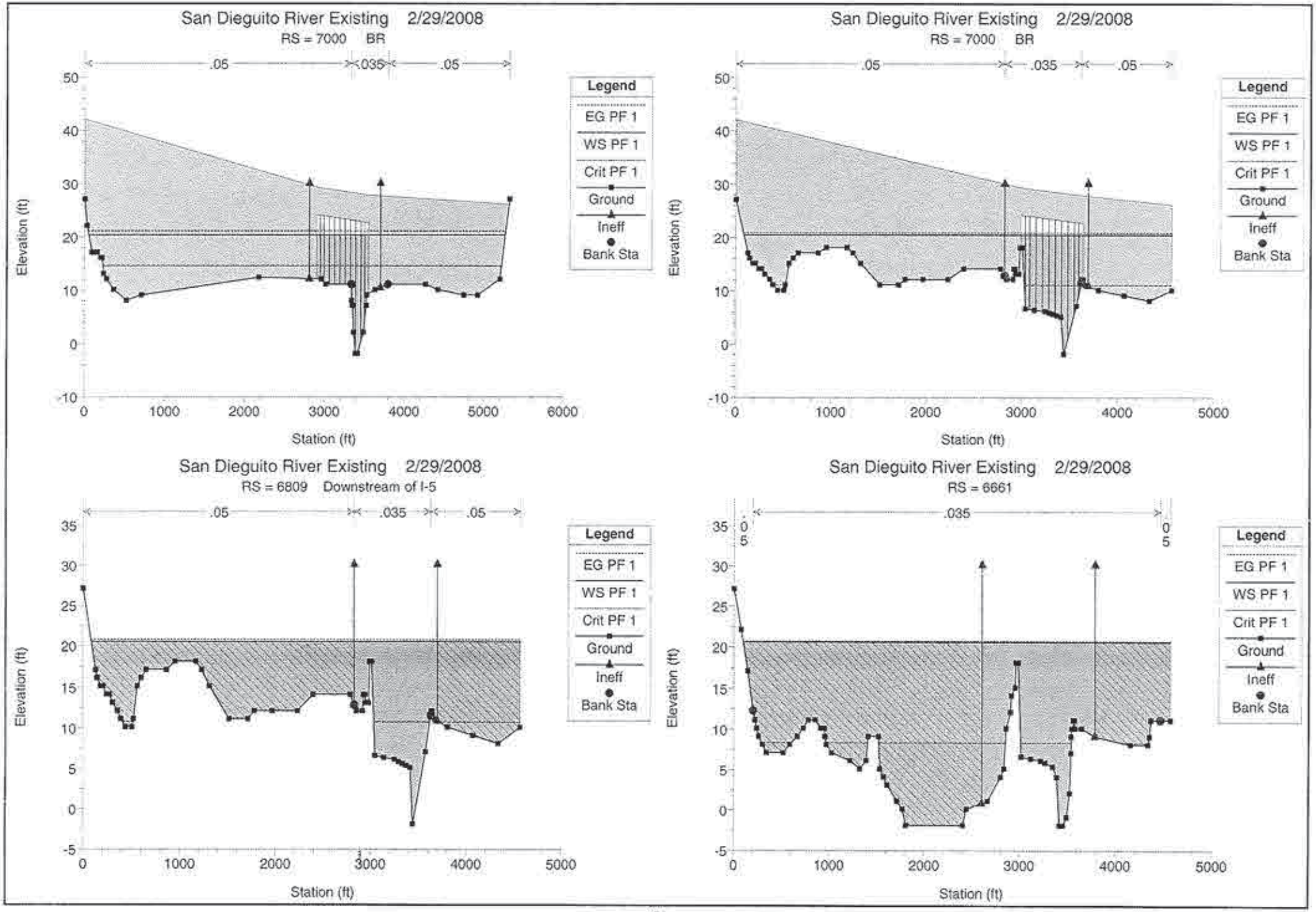
RS = 13555
.035
.05
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 11854
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 10577
.035
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 9777
.035
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


San Dieguito River Existing 2/29/2008
RS = 9274
.035
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 8043
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 7554
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 7286 Upstream of I-5
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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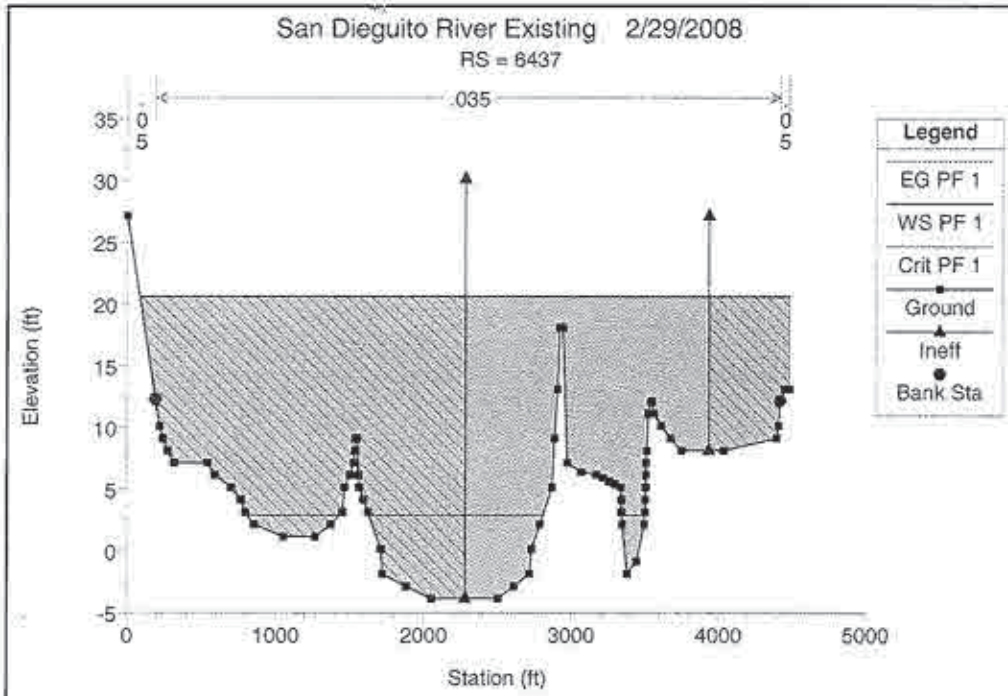
RS = 7000 BR
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 7000 BR
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 6809 Downstream of I-5
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Existing 2/29/2008
RS = 6661
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


San Dieguito River Existing 2/29/2008
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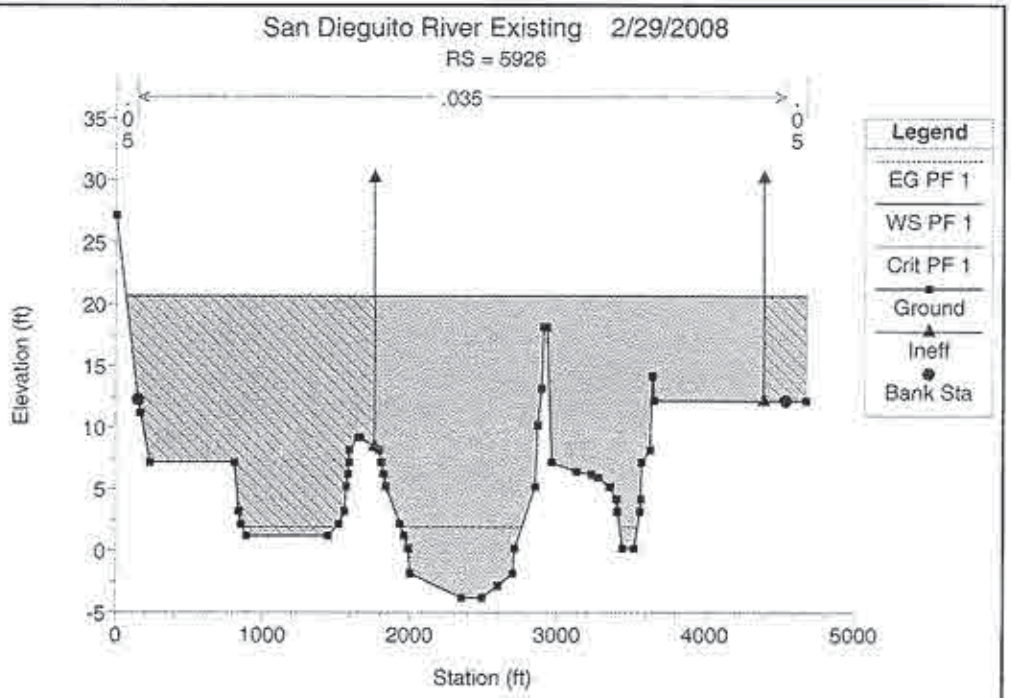
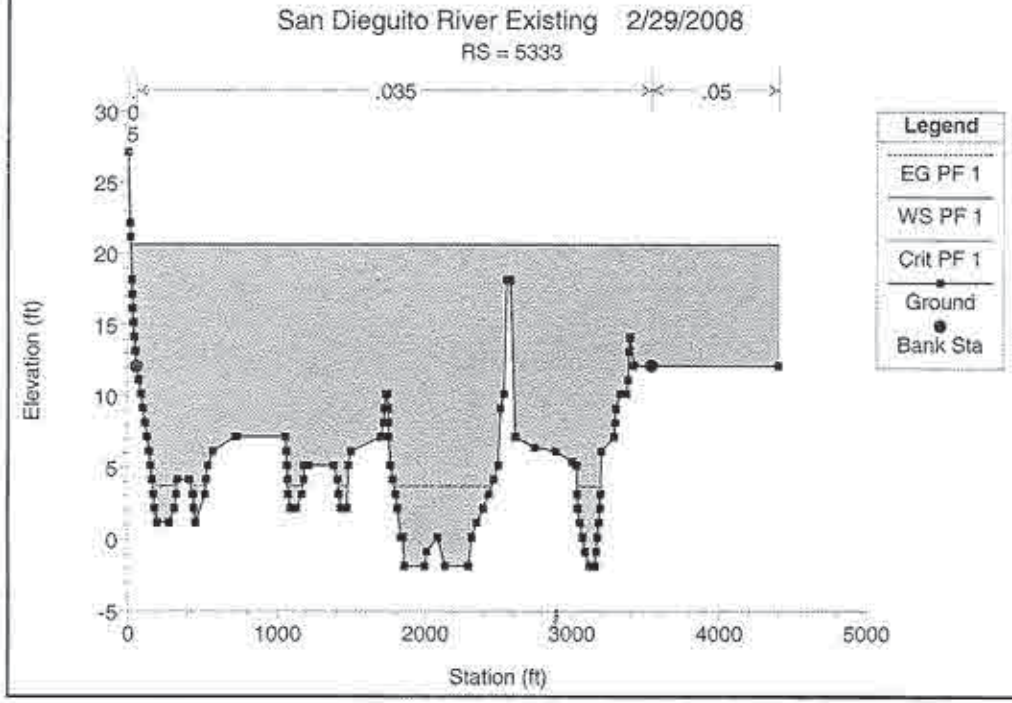
.035
.05
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
35
30
25
20
15
10
5
0
-5
0
1000
2000
3000
4000
5000


San Dieguito River Existing 2/29/2008
RS = 5926
.035
.035
.05
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
35
30
25
20
15
10
5
0
-5
0
1000
2000
3000
4000
5000


San Dieguito River Existing 2/29/2008
RS = 5333
.035
.05
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
30
25
20
15
10
5
0
-5
0
1000
2000
3000
4000
5000

SDR_Exist.rep

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X        X           X   X     X    X    X
XXXXXXX  XXXX     X      XXX  XXXX      XXXXXX    XXXX
X     X  X        X           X  X      X     X       X
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X     X  XXXXXX    XXXX       X    X    X     X  XXXXX
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PROJECT DATA
Project Title: SanDieguitoRiver_Existing
Project File : SDR_Exist.prj
Run Date and Time: 2/29/2008 4:24:43 PM

Project in English units

Project Description:
San Diego River Existing Conditions Model

PLAN DATA

Plan Title: San Dieguito River Existing
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Existing\SDR_Exist.p01

Geometry Title: San Dieguito Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Existing\SDR_Exist.g02

Flow Title : 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Existing\SDR_Exist.f01

Plan Summary Information:

| | | | | | |
|---|---|---|---|---|---|
| Number of: Cross Sections | = 13 | Multiple Openings | = 0 |
| Culverts | = 0 | Inline Structures | = 0 |
| Bridges | = 1 | Lateral Structures | = 0 |

Computational Information

| | |
|---|---|
| Water surface calculation tolerance | = 0.01 |
| Critical depth calculation tolerance | = 0.01 |
| Maximum number of iterations | = 20 |
| Maximum difference tolerance | = 0.3 |
| Flow tolerance factor | = 0.001 |

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Existing\SDR_Exist.f01

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| San Dieguito Riv | 1 | 13555 | 42800 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| San Dieguito Riv | 1 | PF 1 | Normal S = 0.003491 | Known WS = 20.65 |

GEOMETRY DATA

Geometry Title: San Dieguito Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Existing\SDR_Exist.g02

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 13555

INPUT
Description:
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 25.15 | 107.46 | 25.15 | 206.93 | 26.15 | 250.4 | 26.15 | 335.53 | 22.15 |
| 351.26 | 17.15 | 358.1 | 15.12 | 368.13 | 12.15 | 378.5 | 11.15 | 394.04 | 10.15 |
| 420.06 | 9.15 | 490.28 | 8.99 | 570.6 | 8.82 | 643.38 | 9.15 | 646.03 | 12.15 |
| 646.14 | 12.16 | 673.89 | 15.15 | 985.5 | 17.15 | 1443.3 | 22.15 | 1460.3 | 22.15 |
| 1542.76 | 22.15 | 1668.5 | 20.15 | 1886.9 | 20.15 | 2038.21 | 22.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 358.1 | .05 | 646.14 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 358.1 | 646.14 | 1909.77 1701.26 | 1796 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| E.G. Elev (ft) | 22.53 | Element | Left OB | Channel |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Right OB | | | | |
| Vel Head (ft) | 0.63 | Wt. n-Val. | 0.035 | 0.050 |
| 0.035 | | | | |
| W.S. Elev (ft) | 21.90 | Reach Len. (ft) | 1909.77 | 1701.26 |
| 1796.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 75.02 | 3599.55 |
| 3653.22 | | | | |
| E.G. Slope (ft/ft) | 0.002097 | Area (sq ft) | 75.02 | 3599.55 |
| 3653.22 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 322.36 | 26264.62 |
| 16213.02 | | | | |
| Top Width (ft) | 1545.94 | Top Width (ft) | 21.80 | 288.04 |
| 1236.10 | | | | |
| Vel Total (ft/s) | 5.84 | Avg. Vel. (ft/s) | 4.30 | 7.30 |
| 4.44 | | | | |
| Max Chl Dpth (ft) | 13.08 | Hydr. Depth (ft) | 3.44 | 12.50 |
| 2.96 | | | | |
| Conv. Total (cfs) | 934661.5 | Conv. (cfs) | 7039.6 | 573563.8 |
| 354058.1 | | | | |
| Length Wtd. (ft) | 1720.01 | Wetted Per. (ft) | 22.83 | 289.92 |
| 1236.32 | | | | |
| Min Ch El (ft) | 8.82 | Shear (lb/sq ft) | 0.43 | 1.63 |
| 0.39 | | | | |
| Alpha | 1.18 | Stream Power (lb/ft s) | 1.85 | 11.86 |
| 1.72 | | | | |
| Frctn Loss (ft) | 0.72 | Cum Volume (acre-ft) | 1588.27 | 5973.66 |
| 580.01 | | | | |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 188.14 | 467.01 |
| 81.46 | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 11854

INPUT
Description:
Station Elevation Data num= 36

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 28.1 | 27.15 | 32.14 | 26.15 | 42.95 | 22.15 | 51.82 | 17.53 |
| 52.56 | 17.15 | 55.9 | 15.15 | 168.07 | 15.15 | 658.24 | 14.15 | 669.88 | 13.15 |
| 952.46 | 13.15 | 1088.3 | 14.15 | 1203.7 | 14.15 | 1286.3 | 12.15 | 1375.8 | 11.15 |
| 1534.6 | 11.15 | 1662.7 | 10.15 | 1676.7 | 9.15 | 1690.7 | 8.15 | 1718.1 | 7.15 |
| 1722.5 | 4.15 | 1722.9 | 3.15 | 1762.7 | 3.15 | 1763.3 | 4.15 | 1768.6 | 6.15 |
| 1775.5 | 7.15 | 1795.9 | 10.15 | 1808.6 | 11.15 | 1840.3 | 12.15 | 1854.8 | 13.15 |
| 2072.8 | 14.15 | 2211.7 | 16.15 | 2312 | 17.15 | 2437.3 | 21.89 | 2444.1 | 22.15 |
| 2453.2 | 27.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 51.82 | .035 | 2437.3 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 51.82 | 2437.3 | 743.4 | 1277.32 1429.64 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.65 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.08 | Wt. n-Val. | 0.050 | 0.035 |
| W.S. Elev (ft) | 21.57 | Reach Len. (ft) | 743.40 | 1277.32 |
| 1429.64 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 15.67 | 19131.31 |
| E.G. Slope (ft/ft) | 0.000172 | Area (sq ft) | 15.67 | 19131.31 |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 9.02 | 42790.98 |
| Top Width (ft) | 2384.79 | Top Width (ft) | 7.76 | 2377.03 |
| Vel Total (ft/s) | 2.24 | Avg. Vel. (ft/s) | 0.58 | 2.24 |
| Max Chl Dpth (ft) | 18.42 | Hydr. Depth (ft) | 2.02 | 8.05 |
| Conv. Total (cfs) | 3259139.0 | Conv. (cfs) | 687.1 | 3258452.0 |
| Length Wtd. (ft) | 1277.90 | Wetted Per. (ft) | 8.75 | 2380.87 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | 0.02 | 0.09 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.01 | 0.19 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 1586.28 | 5529.78 |
| 504.70 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 187.49 | 414.96 |
| 55.98 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 10577

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 36.15 | 31.06 | 32.15 | 85.1 | 35.15 | 99.31 | 35.15 | 105.25 | 32.15 |
| 140.4 | 17.15 | 141.3 | 17.14 | 447.3 | 13.15 | 801.3 | 12.15 | 937.27 | 13.15 |
| 1204.85 | 13.15 | 1206.5 | 12.15 | 1214.63 | 7.15 | 1234.32 | 2.15 | 1276.78 | 7.15 |
| 1299.53 | 7.15 | 1373.48 | 2.15 | 1395.61 | 2.15 | 1416.5 | 7.15 | 1429.3 | 12.15 |
| 1456.45 | 21.15 | 1481.4 | 21.15 | 1511.6 | 6.15 | 1557.57 | 5.15 | 1593.2 | 4.15 |
| 1620.1 | 3.15 | 1805.7 | 3.15 | 1838.5 | 4.15 | 1963.8 | 5.15 | 1968.5 | 6.15 |
| 1974.81 | 6.19 | 2046.4 | 6.65 | 2048.6 | 7.15 | 2102.2 | 20.15 | 2112.8 | 21.15 |
| 2218.1 | 46.15 | 2265.5 | 47.15 | 2631.9 | 55.9 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 141.3 | .035 | 2048.6 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 141.3 | 2048.6 | 809.4 | 800.27 1102.6 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.49 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.06 | Wt. n-Val. | 0.050 | 0.035 0.050 |
| W.S. Elev (ft) | 21.43 | Reach Len. (ft) | 809.40 | 800.27 1102.60 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 25.37 | 21624.33 425.71 |
| E.G. Slope (ft/ft) | 0.000084 | Area (sq ft) | 25.37 | 21624.33 425.71 |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 11.52 | 42390.20 398.29 |
| Top Width (ft) | 1983.64 | Top Width (ft) | 10.94 | 1907.30 65.40 |
| Vel Total (ft/s) | 1.94 | Avg. Vel. (ft/s) | 0.45 | 1.96 0.94 |
| Max Chl Dpth (ft) | 19.28 | Hydr. Depth (ft) | 2.32 | 11.34 6.51 |
| Conv. Total (cfs) | 4662501.0 | Conv. (cfs) | 1254.5 | 4617858.0 43388.1 |
| Length Wtd. (ft) | 802.86 | Wetted Per. (ft) | 11.82 | 1916.84 67.03 |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 | 0.06 0.03 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.01 | 0.12 0.03 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 1585.93 | 4932.24 497.71 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 187.33 | 352.15 54.91 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 9777

INPUT
Description:
Station Elevation Data num= 42

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 30.95 | 15.15 | 54.91 | 14.15 | 58.3 | 14.14 | 1123.5 | 12.15 |
| 1184.5 | 11.15 | 1197.24 | 7.15 | 1209.17 | 6.15 | 1231.8 | 4.15 | 1677.1 | 4.15 |
| 1688 | 2.15 | 1692.1 | 4.15 | 1710.9 | 2.15 | 1737.4 | -3.85 | 1774.96 | 2.15 |
| 1781 | 3.15 | 1789.4 | 5.15 | 1794.75 | 7.15 | 1820.72 | 8.15 | 1866.86 | 21.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1895.9 | 21.15 | 1933.7 | 6.15 | 1936.23 | 5.15 | 2050.3 | 4.15 | 2063.4 | 3.15 |
| 2089.7 | 3.15 | 2115.8 | 4.15 | 2138.5 | 4.15 | 2170.15 | 3.15 | 2373.15 | 3.15 |
| 2412.9 | 4.15 | 2454.8 | 4.15 | 2499.7 | 3.15 | 2583.1 | 3.15 | 2613.6 | 4.15 |
| 2653.2 | 5.15 | 2694.5 | 6.15 | 2858.2 | 6.65 | 2985.3 | 29.15 | 3093.6 | 46.15 |
| 3099.4 | 47.15 | 3162.5 | 47.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 58.3 | .035 | 2858.2 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 58.3 | 2858.2 | 275.06 | 502.66 1232.3 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.45 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 21.43 | Reach Len. (ft) | 275.06 | 502.66 | 1232.30 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 237.98 | 37044.61 | 616.95 |
| E.G. Slope (ft/ft) | 0.000023 | Area (sq ft) | 237.98 | 37044.61 | 616.95 |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 103.98 | 42363.84 | 332.18 |
| Top Width (ft) | 2926.93 | Top Width (ft) | 43.55 | 2799.90 | 83.49 |
| Vel Total (ft/s) | 1.13 | Avg. Vel. (ft/s) | 0.44 | 1.14 | 0.54 |
| Max Chl Dpth (ft) | 25.28 | Hydr. Depth (ft) | 5.47 | 13.23 | 7.39 |
| Conv. Total (cfs) | 8870754.0 | Conv. (cfs) | 21550.1 | 8780356.0 | 68847.9 |
| Length Wtd. (ft) | 509.12 | Wetted Per. (ft) | 44.74 | 2808.25 | 84.79 |
| Min Ch El (ft) | -3.85 | Shear (lb/sq ft) | 0.01 | 0.02 | 0.01 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.02 | 0.01 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 1583.48 | 4393.31 | 484.51 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 186.83 | 308.91 | 53.02 |

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 9274

INPUT
Description:
Station Elevation Data num= 32

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 35.56 | 15.15 | 39.41 | 15.11 | 140.5 | 14.15 | 371.23 | 13.15 |
| 439.61 | 13.15 | 1303.78 | 13.15 | 1308.9 | 11.15 | 1315.5 | 10.15 | 1404.87 | 4.15 |
| 1576.24 | 4.15 | 1603.44 | 6.15 | 1995.8 | 5.15 | 2007.7 | 3.15 | 2020.86 | 2.15 |
| 2139.86 | 13.15 | 2163.86 | 21.15 | 2187.6 | 21.15 | 2221.67 | 5.15 | 2336.54 | 4.15 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2367.4 | 3.15 | 2413.2 | 3.15 | 2439.73 | 4.15 | 2569.23 | 5.15 | 2690.41 | 6.15 |
| 2842.6 | 6.45 | 2941.04 | 6.65 | 2943.34 | 7.15 | 2975.22 | 14.15 | 3175.2 | 22.15 |
| 3221.3 | 23.15 | 3667.16 | 26.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 39.41 | .035 | 2941.04 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 39.41 | 2941.04 | 1312.7 | 1232.14 731.7 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.44 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.050 | 0.035 |
| 0.050 | | | | |
| W.S. Elev (ft) | 21.41 | Reach Len. (ft) | 1312.70 | 1232.14 |
| 731.70 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 82.33 | 35270.25 |
| 1036.07 | | | | |
| E.G. Slope (ft/ft) | 0.000029 | Area (sq ft) | 82.33 | 35270.25 |
| 1036.07 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 30.26 | 42302.13 |
| 467.62 | | | | |
| Top Width (ft) | 3139.81 | Top Width (ft) | 22.41 | 2901.63 |
| 215.77 | | | | |
| Vel Total (ft/s) | 1.18 | Avg. Vel. (ft/s) | 0.37 | 1.20 |
| 0.45 | | | | |
| Max Chl Dpth (ft) | 19.26 | Hydr. Depth (ft) | 3.67 | 12.16 |
| 4.80 | | | | |
| Conv. Total (cfs) | 7997617.0 | Conv. (cfs) | 5653.7 | 7904584.0 |
| 87378.7 | | | | |
| Length Wtd. (ft) | 1237.72 | Wetted Per. (ft) | 23.44 | 2907.99 |
| 216.72 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.00 | 0.03 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 1582.47 | 3976.08 |
| 461.13 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 186.62 | 276.01 |
| 48.79 | | | | |

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 8043

INPUT
Description:
Station Elevation Data num= 88

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 62.22 | 13.15 | 74.73 | 12.15 | 85.25 | 7.15 | 487.65 | 7.15 |
| 518.99 | 12.15 | 569.67 | 14.15 | 603.2 | 14.15 | 641.2 | 12.15 | 680.13 | 10.15 |
| 694.2 | 9.65 | 723.27 | 9.15 | 835.32 | 8.65 | 895.2 | 8.65 | 1035.07 | 9.15 |
| 1122.48 | 9.65 | 1133.08 | 10.15 | 1157.48 | 11.15 | 1173.42 | 12.15 | 1186.2 | 13.15 |
| 1258.6 | 20.15 | 1554.5 | 20.15 | 1558.15 | 19.15 | 1569.75 | 18.15 | 1589.55 | 17.15 |
| 1658.12 | 12.61 | 1695.25 | 10.15 | 1737.04 | 9.15 | 1773.32 | 9.15 | 1804.64 | 10.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1837.5 | 11.15 | 1874.73 | 12.15 | 1999 | 12.15 | 2013.6 | 3.15 | 2018.66 | 2.15 |
| 2064.02 | .15 | 2081.34 | -.85 | 2095.44 | -.85 | 2114 | .15 | 2124.8 | 2.15 |
| 2135.93 | 6.15 | 2201.8 | 7.15 | 2254.16 | 7.15 | 2257.7 | 6.15 | 2261.5 | 6.15 |
| 2269.6 | 7.15 | 2283.66 | 8.15 | 2297.74 | 9.15 | 2306.7 | 11.15 | 2416.28 | 12.15 |
| 2433.2 | 13.15 | 2454.9 | 20.15 | 2479.9 | 20.15 | 2508.7 | 6.15 | 2536.9 | 5.15 |
| 2577.1 | 4.15 | 2631.8 | 3.15 | 2778.9 | 3.15 | 2838.7 | 2.15 | 2851.6 | 1.15 |
| 2876.3 | 1.15 | 2892 | 2.15 | 2925.8 | 3.15 | 2963 | 4.15 | 3082.9 | 4.4 |
| 3390.5 | 4.65 | 3438.4 | 4.9 | 3525.7 | 5.65 | 3527.9 | 6.15 | 3536.9 | 9.15 |
| 4040.3 | 12.15 | 4041.93 | 12.52 | 4044.7 | 13.15 | 4070.5 | 14.15 | 4089 | 18.15 |
| 4099.1 | 22.15 | 4113.6 | 23.15 | 4233 | 24.15 | 4329.3 | 25.15 | 4440.4 | 25.15 |
| 4482.8 | 24.15 | 4540.3 | 13.15 | 4654.9 | 11.15 | 4679.5 | 10.15 | 4698.2 | 10.15 |
| 4720 | 18.15 | 4744.7 | 19.15 | 4763.9 | 27.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 1658.12 | .035 | 4041.93 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1658.12 | 4041.93 | 2307.4 488.53 | 209.2 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 3751.6 | 4763.9 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.41 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.050 | 0.035 |
| W.S. Elev (ft) | 21.39 | Reach Len. (ft) | 2307.40 | 488.53 |
| 209.20 | | | | |
| Crit W.S. (ft) | 7.34 | Flow Area (sq ft) | 15240.09 | 30599.43 |
| E.G. Slope (ft/ft) | 0.000019 | Area (sq ft) | 15240.09 | 33529.96 |
| 2275.70 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 8803.81 | 33996.20 |
| Top Width (ft) | 4324.42 | Top Width (ft) | 1632.52 | 2383.81 |
| 308.09 | | | | |
| Vel Total (ft/s) | 0.93 | Avg. Vel. (ft/s) | 0.58 | 1.11 |
| Max Chl Dpth (ft) | 22.24 | Hydr. Depth (ft) | 9.34 | 14.62 |
| Conv. Total (cfs) | 9748341.0 | Conv. (cfs) | 2005199.0 | 7743143.0 |
| Length Wtd. (ft) | 675.60 | Wetted Per. (ft) | 1635.95 | 2102.80 |
| Min Ch El (ft) | -0.85 | Shear (lb/sq ft) | 0.01 | 0.02 |
| Alpha | 1.20 | Stream Power (lb/ft s) | 0.01 | 0.02 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 1351.60 | 3003.03 |
| 433.32 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 161.68 | 201.26 |
| 44.39 | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross

sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 7554

INPUT
Description:
Station Elevation Data num= 59

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 24.6 | 17.15 | 43.18 | 16.15 | 61.65 | 15.15 | 123.29 | 12.15 |
| 124.7 | 12.11 | 260.4 | 8.15 | 267.1 | 7.15 | 643.5 | 7.15 | 664.43 | 6.15 |
| 700.15 | 6.15 | 770.57 | 7.15 | 1082.9 | 8.15 | 1658.3 | 10.15 | 1883.38 | 11.15 |
| 1941.3 | 12.15 | 1982.75 | 12.15 | 2869.01 | 13.15 | 2890.66 | 20.15 | 2916.55 | 20.15 |
| 2937.5 | 13.15 | 3213.55 | 12.15 | 3298.6 | 11.15 | 3309.46 | 10.15 | 3316.15 | 4.15 |
| 3351.45 | -.85 | 3422.24 | -.85 | 3475.66 | 3.15 | 3512.81 | 5.15 | 3522.14 | 6.15 |
| 3533.5 | 7.15 | 3543.4 | 10.15 | 3572.5 | 11.15 | 3740.1 | 13.15 | 3761.82 | 6.15 |
| 3768.26 | 5.15 | 3810.92 | 4.15 | 3839.42 | 3.15 | 3875.07 | 2.15 | 3912.65 | 1.15 |
| 3951.15 | 1.15 | 3998.98 | 2.15 | 4020.72 | 3.15 | 4055.98 | 4.15 | 4175.53 | 4.15 |
| 4251.33 | 4.65 | 4298.37 | 4.65 | 4402.94 | 4.15 | 4505.84 | 4.4 | 4792.97 | 5.65 |
| 4801.01 | 6.15 | 4807.62 | 8.15 | 5412.03 | 12.15 | 5422.07 | 12.15 | 5510.17 | 12.15 |
| 5806.56 | 12.15 | 5820.13 | 16.15 | 5846.91 | 17.15 | 5895.44 | 27.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 124.7 | .035 | 5510.17 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 124.7 | 5510.17 | 1488 | 268.5 1186.87 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2585.15 | 30.15 | F |
| 4501.6 | 5895.44 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.38 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.04 | Wt. n-Val. | | 0.035 |
| W.S. Elev (ft) | 21.34 | Reach Len. (ft) | 1488.00 | 268.50 |
| 1186.87 | | | | |
| Crit W.S. (ft) | 7.18 | Flow Area (sq ft) | | 25614.39 |
| E.G. Slope (ft/ft) | 0.000049 | Area (sq ft) | 700.82 | 67061.90 |
| 2989.58 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | | 42800.00 |
| Top Width (ft) | 5852.95 | Top Width (ft) | 110.41 | 5385.47 |
| 357.07 | | | | |
| Vel Total (ft/s) | 1.67 | Avg. Vel. (ft/s) | | 1.67 |
| Max Chl Dpth (ft) | 22.19 | Hydr. Depth (ft) | | 13.37 |
| Conv. Total (cfs) | 6109598.0 | Conv. (cfs) | | 6109598.0 |
| Length Wtd. (ft) | 458.96 | Wetted Per. (ft) | | 1923.45 |

| | | | | |
|---|---|---|---|---|
| Min Ch El (ft) | -0.85 | Shear (lb/sq ft) | | 0.04 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.07 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 929.39 | 2438.96 |
| 420.67 | | | | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 115.52 | 157.69 |
| 42.79 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 7286

INPUT
Description: Upstream of I-5
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 28.7 | 22.15 | 90.97 | 17.15 | 151.8 | 17.15 | 200.45 | 16.15 |
| 214.97 | 16.15 | 235.46 | 13.15 | 272.24 | 12.15 | 362.6 | 10.15 | 520.8 | 8.15 |
| 709.55 | 9.15 | 2176.6 | 12.46 | 2950.71 | 12.15 | 3013.37 | 11.15 | 3332.23 | 11.15 |
| 3336.33 | 8.15 | 3346.62 | 7.15 | 3365.89 | 2.15 | 3387.5 | -1.85 | 3415.73 | -1.85 |
| 3487.71 | 2.15 | 3521.96 | 7.15 | 3527.4 | 9.15 | 3632.52 | 10.15 | 3792.9 | 11.15 |
| 4264.36 | 11.15 | 4420.07 | 10.15 | 4747.1 | 9.15 | 4922.14 | 9.15 | 5200.71 | 12.15 |
| 5323.83 | 27.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 3332.23 | .035 | 3792.9 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 3332.23 | 3792.9 | 640.24 | 476.55 | 543.46 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2806.4 | 30.15 | F |
| 3698.4 | 5323.83 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.31 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.33 | Wt. n-Val. | 0.050 | 0.035 |
| W.S. Elev (ft) | 20.98 | Reach Len. (ft) | 154.00 | 154.00 |
| 154.00 | | | | |
| Crit W.S. (ft) | 13.65 | Flow Area (sq ft) | 4987.31 | 5611.08 |
| E.G. Slope (ft/ft) | 0.000405 | Area (sq ft) | 31478.65 | 6567.53 |
| 15211.47 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 13368.68 | 29431.32 |

| | | | | |
|---|---|---|---|---|
| Top Width (ft) | 5229.85 | Top Width (ft) | 3288.92 | 460.67 1480.26 |
| Vel Total (ft/s) | 4.04 | Avg. Vel. (ft/s) | 2.68 | 5.25 |
| Max Chl Dpth (ft) | 22.83 | Hydr. Depth (ft) | 9.48 | 15.32 |
| Conv. Total (cfs) | 2126126.0 | Conv. (cfs) | 664100.6 | 1462025.0 |
| Length Wtd. (ft) | 154.00 | Wetted Per. (ft) | 525.84 | 369.04 |
| Min Ch El (ft) | -1.85 | Shear (lb/sq ft) | 0.24 | 0.38 |
| Alpha | 1.30 | Stream Power (lb/ft s) | 0.64 | 2.02 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 379.77 | 2212.04 172.71 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 57.46 | 139.68 17.76 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE

RIVER: San Dieguito Riv
REACH: 1 RS: 7000

INPUT
Description:
Distance from Upstream XS = 154
Deck/Roadway Width = 178.75
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 42.15 | 2.15 | 2896.7 | 29.45 | 2.15 | 2896.7 | 29.45 | 24.2 |
| 3546.2 | 27.95 | 22.7 | 3546.2 | 27.95 | 2.15 | 5400 | 26.15 | 2.15 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 28.7 | 22.15 | 90.97 | 17.15 | 151.8 | 17.15 | 200.45 | 16.15 |
| 214.97 | 16.15 | 235.46 | 13.15 | 272.24 | 12.15 | 362.6 | 10.15 | 520.8 | 8.15 |
| 709.55 | 9.15 | 2176.6 | 12.46 | 2950.71 | 12.15 | 3013.37 | 11.15 | 3332.23 | 11.15 |
| 3336.33 | 8.15 | 3346.62 | 7.15 | 3365.89 | 2.15 | 3387.5 | -1.85 | 3415.73 | -1.85 |
| 3487.71 | 2.15 | 3521.96 | 7.15 | 3527.4 | 9.15 | 3632.52 | 10.15 | 3792.9 | 11.15 |
| 4264.36 | 11.15 | 4420.07 | 10.15 | 4747.1 | 9.15 | 4922.14 | 9.15 | 5200.71 | 12.15 |
| 5323.83 | 27.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 3332.23 | .035 | 3792.9 | .05 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|

3332.23 3792.9 .1 .3

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2806.4 | 30.15 | F |
| 3698.4 | 5323.83 | 30.15 | F |

Downstream Deck/Roadway Coordinates num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 42.15 | 2.15 | 2990 | 29.45 | 2.15 | 2990 | 29.45 | 24.2 |
| 3639.5 | 27.95 | 22.7 | 3639.5 | 27.95 | 2.15 | 4600 | 26.15 | 2.15 |

Downstream Bridge Cross Section Data

Station Elevation Data num= 55

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 126.5 | 17.15 | 145.53 | 16.15 | 180.9 | 15.15 | 205.46 | 15.15 |
| 241.63 | 14.15 | 273.24 | 14.15 | 305.7 | 13.15 | 357.1 | 12.15 | 390.3 | 11.15 |
| 439.76 | 10.15 | 507.5 | 10.15 | 523.23 | 11.15 | 561.6 | 15.15 | 602.98 | 16.15 |
| 655.56 | 17.15 | 866.67 | 17.15 | 953.91 | 18.15 | 1168.1 | 18.15 | 1230.35 | 17.15 |
| 1311.71 | 15.15 | 1513.9 | 11.15 | 1711.72 | 11.15 | 1778 | 12.15 | 1965.24 | 12.15 |
| 2228.14 | 12.15 | 2391.4 | 14.15 | 2778.55 | 14.15 | 2820.77 | 12.86 | 2843.9 | 12.15 |
| 2909 | 12.15 | 2917.53 | 14.15 | 2933.6 | 14.15 | 2937.23 | 13.15 | 2972.3 | 13.15 |
| 2982 | 18.15 | 3004.52 | 18.15 | 3039.74 | 6.65 | 3134 | 6.4 | 3243.49 | 6.15 |
| 3287 | 5.9 | 3327.81 | 5.65 | 3367.54 | 5.4 | 3409.64 | 5.15 | 3439.04 | -1.85 |
| 3441.87 | -1.85 | 3571.57 | 7.15 | 3623.2 | 11.58 | 3629.85 | 12.15 | 3641.07 | 12.15 |
| 3664.4 | 11.15 | 3801.73 | 10.15 | 4069.7 | 9.15 | 4333 | 8.15 | 4562.74 | 10.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 2820.77 | .035 | 3623.2 | .05 |

Bank Sta: Left Right Coeff Contr. Expan.
2820.77 3623.2 .1 .3

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2819.9 | 30.15 | F |
| 3693.2 | 4562.74 | 30.15 | F |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 28.15
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 10

Pier Data
Pier Station Upstream= 2942.7 Downstream= 3036
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -7.85 | 5 | 25.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -7.85 | 5 | 25.15 |

Pier Data
Pier Station Upstream= 2988.7 Downstream= 3082
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -7.85 | 5 | 25.15 |

Downstream num= 2

```
    Width    Elev     Width    Elev
       5   -7.85         5   25.15

Pier Data
Pier Station      Upstream=  3055.2     Downstream=  3148.5
Upstream       num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15
Downstream     num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15

Pier Data
Pier Station      Upstream=  3121.7     Downstream=    3215
Upstream       num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15
Downstream     num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15

Pier Data
Pier Station      Upstream=  3188.2     Downstream=  3281.5
Upstream       num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15
Downstream     num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15

Pier Data
Pier Station      Upstream=  3254.7     Downstream=    3348
Upstream       num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15
Downstream     num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15

Pier Data
Pier Station      Upstream=  3321.2     Downstream=  3414.5
Upstream       num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15
Downstream     num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15

Pier Data
Pier Station      Upstream=  3387.7     Downstream=    3481
Upstream       num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15
Downstream     num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15

Pier Data
Pier Station      Upstream=  3454.2     Downstream=  3547.5
Upstream       num=         2
    Width    Elev     Width    Elev
       5   -7.85         5   25.15
Downstream     num=         2
```

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -7.85 | 5 | 25.15 |

Pier Data
Pier Station  Upstream=  3500.2  Downstream=  3593.5
Upstream  num=  2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -7.85 | 5 | 25.15 |

Downstream  num=  2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -7.85 | 5 | 25.15 |

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 21.31 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 20.98 | E.G. Elev (ft) | 21.16 |
| 20.89 | | | |
| Q Total (cfs) | 42800.00 | W.S. Elev (ft) | 20.43 |
| 20.50 | | | |
| Q Bridge (cfs) | 42800.00 | Crit W.S. (ft) | 14.61 |
| 11.11 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 22.28 |
| 22.35 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 5.97 |
| 4.99 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 7169.34 |
| 8568.91 | | | |
| Weir Submerg | | Froude # Chl | 0.30 |
| 0.23 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 58106.97 |
| 72012.66 | | | |
| Min El Weir Flow (ft) | 28.15 | Hydr Depth (ft) | 11.96 |
| 14.29 | | | |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 846.76 |
| 896.56 | | | |
| Delta EG (ft) | 0.52 | Conv. Total (cfs) | 1137647.0 |
| 1631328.0 | | | |
| Delta WS (ft) | 0.43 | Top Width (ft) | 599.50 |
| 599.50 | | | |
| BR Open Area (sq ft) | 8978.97 | Frctn Loss (ft) | 0.17 |
| 0.06 | | | |
| BR Open Vel (ft/s) | 5.97 | C & E Loss (ft) | 0.10 |
| 0.05 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.75 |
| 0.41 | | | |

Br Sel Method Energy only Power Total (lb/ft s) 4.47
2.05

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 6809

INPUT
Description: Downstream of I-5
Station Elevation Data num= 55

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 126.5 | 17.15 | 145.53 | 16.15 | 180.9 | 15.15 | 205.46 | 15.15 |
| 241.63 | 14.15 | 273.24 | 14.15 | 305.7 | 13.15 | 357.1 | 12.15 | 390.3 | 11.15 |
| 439.76 | 10.15 | 507.5 | 10.15 | 523.23 | 11.15 | 561.6 | 15.15 | 602.98 | 16.15 |
| 655.56 | 17.15 | 866.67 | 17.15 | 953.91 | 18.15 | 1168.1 | 18.15 | 1230.35 | 17.15 |
| 1311.71 | 15.15 | 1513.9 | 11.15 | 1711.72 | 11.15 | 1778 | 12.15 | 1965.24 | 12.15 |
| 2228.14 | 12.15 | 2391.4 | 14.15 | 2778.55 | 14.15 | 2820.77 | 12.86 | 2843.9 | 12.15 |
| 2909 | 12.15 | 2917.53 | 14.15 | 2933.6 | 14.15 | 2937.23 | 13.15 | 2972.3 | 13.15 |
| 2982 | 18.15 | 3004.52 | 18.15 | 3039.74 | 6.65 | 3134 | 6.4 | 3243.49 | 6.15 |
| 3287 | 5.9 | 3327.81 | 5.65 | 3367.54 | 5.4 | 3409.64 | 5.15 | 3439.04 | -1.85 |
| 3441.87 | -1.85 | 3571.57 | 7.15 | 3623.2 | 11.58 | 3629.85 | 12.15 | 3641.07 | 12.15 |
| 3664.4 | 11.15 | 3801.73 | 10.15 | 4069.7 | 9.15 | 4333 | 8.15 | 4562.74 | 10.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 2820.77 | .035 | 3623.2 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 2820.77 | 3623.2 | 1290.06 | 147.74 | 464.74 | .1 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2819.9 | 30.15 | F |
| 3693.2 | 4562.74 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.78 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.24 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 20.54 | Reach Len. (ft) | 1290.06 | 147.74 | 464.74 |
| Crit W.S. (ft) | 10.81 | Flow Area (sq ft) | 6.67 | 10443.93 | |

| | | | | |
|---|---|---|---|---|
| 632.84 | | | | |
| E.G. Slope (ft/ft) | 0.000287 | Area (sq ft) | 17548.25 | 10443.93 |
| 10385.07 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 13.06 | 41404.71 |
| 1382.23 | | | | |
| Top Width (ft) | 4479.15 | Top Width (ft) | 2737.18 | 802.43 |
| 939.54 | | | | |
| Vel Total (ft/s) | 3.86 | Avg. Vel. (ft/s) | 1.96 | 3.96 |
| 2.18 | | | | |
| Max Chl Dpth (ft) | 22.39 | Hydr. Depth (ft) | 7.67 | 13.02 |
| 9.04 | | | | |
| Conv. Total (cfs) | 2526088.0 | Conv. (cfs) | 770.9 | 2443737.0 |
| 81580.2 | | | | |
| Length Wtd. (ft) | 153.03 | Wetted Per. (ft) | 0.87 | 807.18 |
| 70.05 | | | | |
| Min Ch El (ft) | -1.85 | Shear (lb/sq ft) | 0.14 | 0.23 |
| 0.16 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.27 | 0.92 |
| 0.35 | | | | |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 281.27 | 2138.49 |
| 128.17 | | | | |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 45.60 | 134.62 |
| 13.53 | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 6661

INPUT
Description:
Station Elevation Data num= 68

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 73.26 | 22.15 | 142.34 | 17.15 | 198.2 | 12.33 | 200.3 | 12.15 |
| 217.16 | 11.15 | 237.34 | 10.15 | 256.86 | 9.15 | 298.5 | 8.15 | 342.19 | 7.15 |
| 519.66 | 7.15 | 587.23 | 8.15 | 666.14 | 9.15 | 727.86 | 10.15 | 782.23 | 11.15 |
| 854.16 | 11.15 | 910.44 | 10.15 | 948.9 | 10.15 | 956.1 | 9.15 | 970.03 | 8.15 |
| 1025.92 | 7.15 | 1219.7 | 6.15 | 1323.3 | 5.15 | 1392.11 | 6.15 | 1411.7 | 9.15 |
| 1519.6 | 9.15 | 1532.02 | 5.15 | 1571.5 | 4.15 | 1609.72 | 3.15 | 1713.8 | 1.15 |
| 1769.85 | .15 | 1807.76 | -1.85 | 2408.16 | -1.85 | 2440.8 | .15 | 2663.86 | 1.15 |
| 2799.43 | 4.15 | 2835.33 | 5.15 | 2856.62 | 10.15 | 2901.3 | 12.15 | 2911.1 | 14.15 |
| 2950.5 | 15.15 | 2956.5 | 18.15 | 2979.06 | 18.15 | 3013.35 | 6.65 | 3114.64 | 6.4 |
| 3217.61 | 6.15 | 3261.71 | 5.9 | 3341.87 | 5.4 | 3386.06 | 4.15 | 3416.07 | -1.85 |
| 3454.32 | -1.85 | 3491.1 | -.85 | 3522.46 | 2.15 | 3535.54 | 7.15 | 3537.58 | 9.15 |
| 3542.05 | 10.15 | 3557.3 | 10.15 | 3559.85 | 11.15 | 3567.6 | 11.15 | 3573.34 | 10.15 |
| 3642.5 | 10.15 | 3782.9 | 9.15 | 4150.47 | 8.15 | 4334.46 | 8.15 | 4352.2 | 9.15 |
| 4366.54 | 11.15 | 4463.3 | 11.15 | 4568.81 | 11.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

```
      0     .05   198.2     .035  4463.3     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        198.2  4463.3              321.4  224.95  198.11          .1         .3
Ineffective Flow     num=       2
   Sta L   Sta R     Elev  Permanent
       0  2600.8    30.15        F
  3781.1 4568.81    30.15        F

CROSS SECTION OUTPUT  Profile #PF 1

  E.G. Elev (ft)              20.71    Element                 Left OB    Channel
Right OB
  Vel Head (ft)                0.10    Wt. n-Val.                         0.035
  W.S. Elev (ft)              20.61    Reach Len. (ft)         321.40     224.95
198.11
  Crit W.S. (ft)               8.37    Flow Area (sq ft)                  16776.90
  E.G. Slope (ft/ft)       0.000106    Area (sq ft)            410.95     63936.86
998.48
  Q Total (cfs)            42800.00    Flow (cfs)                         42800.00
  Top Width (ft)            4474.32    Top Width (ft)          103.71     4265.10
105.51
  Vel Total (ft/s)             2.55    Avg. Vel. (ft/s)                     2.55
  Max Chl Dpth (ft)           22.46    Hydr. Depth (ft)                    14.21
  Conv. Total (cfs)        4164467.0     Conv. (cfs)                        4164467.0
  Length Wtd. (ft)           224.95    Wetted Per. (ft)                    1186.67
  Min Ch El (ft)              -1.85    Shear (lb/sq ft)                     0.09
  Alpha                        1.00    Stream Power (lb/ft s)               0.24
  Frctn Loss (ft)              0.01    Cum Volume (acre-ft)    15.33      2012.35
67.45
  C & E Loss (ft)              0.02    Cum SA (acres)           3.53      126.03
   7.96


Warning: The cross-section end points had to be extended vertically for the computed
water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.
Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid,
         water surface was used.

CROSS SECTION


RIVER: San Dieguito Riv
REACH: 1                    RS: 6437

INPUT
Description:
```

Station Elevation Data num= 74

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 187.11 | 12.37 | 189.89 | 12.15 | 216.55 | 10.15 | 238.46 | 9.15 |
| 270.9 | 8.15 | 315.41 | 7.15 | 539.57 | 7.15 | 587.06 | 6.15 | 700.85 | 5.15 |
| 764.94 | 4.15 | 796.11 | 3.15 | 852.9 | 2.15 | 1052.61 | 1.15 | 1267.8 | 1.15 |
| 1374.3 | 2.15 | 1452.16 | 3.15 | 1464.83 | 5.15 | 1502.5 | 6.15 | 1527.05 | 7.15 |
| 1534.75 | 8.15 | 1536.88 | 9.15 | 1549.3 | 9.15 | 1558.97 | 6.15 | 1563.23 | 5.15 |
| 1593.09 | 4.15 | 1622.57 | 3.15 | 1710.81 | .15 | 1723.2 | -1.85 | 1882.87 | -2.85 |
| 2052.23 | -3.85 | 2504.34 | -3.85 | 2609.73 | -2.85 | 2719.26 | -1.85 | 2731.25 | .15 |
| 2786.37 | 2.15 | 2868.96 | 5.15 | 2883.54 | 9.15 | 2905.7 | 13.15 | 2916.5 | 18.15 |
| 2938.43 | 18.15 | 2971.43 | 7.15 | 3066.53 | 6.4 | 3169.5 | 6.15 | 3213.73 | 5.9 |
| 3254.05 | 5.65 | 3293.22 | 5.4 | 3333.3 | 5.15 | 3337.5 | 4.15 | 3338.3 | 3.15 |
| 3341.82 | 2.15 | 3378.75 | -1.85 | 3442.34 | -.85 | 3495.5 | 2.15 | 3500.85 | 3.15 |
| 3502.14 | 4.15 | 3504.38 | 5.15 | 3506.07 | 6.15 | 3507.55 | 7.15 | 3511 | 8.15 |
| 3521.75 | 11.15 | 3539.68 | 12.15 | 3544.12 | 12.15 | 3556.04 | 11.15 | 3605.61 | 10.15 |
| 3671.64 | 9.15 | 3747.43 | 8.15 | 4032.7 | 8.15 | 4392.9 | 9.15 | 4405.25 | 10.15 |
| 4414.57 | 12.15 | 4415.52 | 12.18 | 4446.25 | 13.15 | 4479.88 | 13.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 187.11 | .035 | 4415.52 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 187.11 | 4415.52 | 407.84 | 510.16 | 564.9 | .1 .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2279.4 | 30.15 | F |
| 3929.86 | 4479.88 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.04 | Wt. n-Val. | | 0.035 |
| W.S. Elev (ft) | 20.65 | Reach Len. (ft) | 407.84 | 510.16 |
| 564.90 | | | | |
| Crit W.S. (ft) | 2.90 | Flow Area (sq ft) | | 27770.76 |
| E.G. Slope (ft/ft) | 0.000031 | Area (sq ft) | 433.61 | 72279.49 |
| 497.39 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | | 42800.00 |
| Top Width (ft) | 4397.55 | Top Width (ft) | 104.78 | 4228.41 |
| 64.36 | | | | |
| Vel Total (ft/s) | 1.54 | Avg. Vel. (ft/s) | | 1.54 |
| Max Chl Dpth (ft) | 24.50 | Hydr. Depth (ft) | | 16.83 |
| Conv. Total (cfs) | 7719970.0 | Conv. (cfs) | | 7719970.0 |
| Length Wtd. (ft) | 510.16 | Wetted Per. (ft) | | 1657.44 |
| Min Ch El (ft) | -3.85 | Shear (lb/sq ft) | | 0.03 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.05 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 12.21 | 1660.63 |
| 64.05 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 2.76 | 104.09 |
| 7.57 | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 5926

INPUT
Description:
Station Elevation Data num= 54

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 149.15 | 12.23 | 149.9 | 12.15 | 166.22 | 11.15 | 230.5 | 7.15 |
| 807.3 | 7.15 | 836.52 | 3.15 | 853.84 | 2.15 | 890.9 | 1.15 | 1444.82 | 1.15 |
| 1519.4 | 2.15 | 1557.1 | 3.15 | 1569.84 | 5.15 | 1582.3 | 6.15 | 1588.77 | 7.15 |
| 1591.2 | 8.15 | 1649.7 | 9.15 | 1664.55 | 9.15 | 1791.1 | 8.15 | 1807.1 | 7.15 |
| 1821.5 | 6.15 | 1836.7 | 5.15 | 1933.9 | 2.15 | 1962.2 | 1.15 | 1989.6 | .15 |
| 2002.2 | -1.85 | 2354.9 | -3.85 | 2493.3 | -3.85 | 2598.6 | -2.85 | 2701 | -1.85 |
| 2713.5 | .15 | 2852.92 | 5.15 | 2870 | 10.15 | 2896.14 | 13.15 | 2906.6 | 18.15 |
| 2928.7 | 18.15 | 2962.1 | 7.15 | 3129.9 | 6.4 | 3232.55 | 6.15 | 3277.77 | 5.9 |
| 3356.66 | 5.15 | 3401.44 | 4.15 | 3408.4 | 3.15 | 3441.6 | .15 | 3522 | .15 |
| 3560.44 | 3.15 | 3567.4 | 4.15 | 3571 | 7.15 | 3630.7 | 8.15 | 3642 | 14.15 |
| 3644.9 | 14.15 | 3653.65 | 12.15 | 4540.9 | 12.15 | 4680.26 | 12.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 149.15 | .035 | 4540.9 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
149.15 4540.9 1306.04 593.43 542.48 .1 .3

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1758.1 | 30.15 | F |
| 4392.9 | 4680.26 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.67 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | | 0.035 |
| W.S. Elev (ft) | 20.65 | Reach Len. (ft) | 1306.04 | 593.43 |
| 542.48 | | | | |
| Crit W.S. (ft) | 1.88 | Flow Area (sq ft) | | 41152.88 |
| E.G. Slope (ft/ft) | 0.000015 | Area (sq ft) | 354.35 | 67958.23 |
| 1184.54 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | | 42800.00 |
| Top Width (ft) | 4615.28 | Top Width (ft) | 84.17 | 4391.75 |
| 139.36 | | | | |
| Vel Total (ft/s) | 1.04 | Avg. Vel. (ft/s) | | 1.04 |
| Max Chl Dpth (ft) | 24.50 | Hydr. Depth (ft) | | 15.62 |
| Conv. Total (cfs) | 10895820.0 | Conv. (cfs) | | |

10895820.0

| | | | | |
|---|---|---|---|---|
| Length Wtd. (ft) | 592.39 | Wetted Per. (ft) | | 2642.42 |
| Min Ch El (ft) | -3.85 | Shear (lb/sq ft) | | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.02 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 8.52 | 839.42 |
| 53.14 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 1.88 | 53.62 |
| 6.25 | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 5333

INPUT
Description:
Station Elevation Data num= 113

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 12.23 | 22.15 | 14.59 | 21.15 | 23.42 | 18.15 | 26.93 | 17.15 |
| 30.68 | 16.15 | 34.49 | 15.15 | 41.48 | 14.15 | 48.41 | 13.15 | 56.22 | 12.15 |
| 57.11 | 12.08 | 69.03 | 11.15 | 87.66 | 10.15 | 101.96 | 9.15 | 115.82 | 8.15 |
| 129.67 | 7.15 | 141.97 | 6.15 | 151.79 | 5.15 | 161.54 | 4.15 | 170.25 | 3.15 |
| 178.96 | 2.15 | 198.59 | 1.15 | 278.77 | 1.15 | 312.94 | 2.15 | 326.16 | 3.15 |
| 333.36 | 4.15 | 412.15 | 4.15 | 438.65 | 3.15 | 443.36 | 2.15 | 456.16 | 1.15 |
| 521.64 | 3.15 | 526.95 | 4.15 | 539.2 | 5.15 | 573.21 | 6.15 | 724.42 | 7.15 |
| 734.29 | 7.15 | 1059.37 | 7.15 | 1066 | 6.15 | 1068.73 | 5.15 | 1071.38 | 4.15 |
| 1076.82 | 3.15 | 1091.51 | 2.15 | 1132.22 | 2.15 | 1169 | 3.15 | 1182.6 | 4.15 |
| 1186.4 | 5.15 | 1214 | 5.15 | 1383.6 | 5.15 | 1408 | 4.15 | 1415.4 | 3.15 |
| 1430.8 | 2.15 | 1470.9 | 2.15 | 1485.5 | 5.15 | 1500.75 | 6.15 | 1702.7 | 7.15 |
| 1724 | 8.15 | 1729.26 | 9.15 | 1736.2 | 10.15 | 1745.14 | 10.15 | 1749.15 | 9.15 |
| 1752.7 | 8.15 | 1755.34 | 7.15 | 1765.93 | 5.15 | 1781.5 | 4.15 | 1799.94 | 3.15 |
| 1812.53 | 2.15 | 1833.88 | .15 | 1850.12 | .15 | 1858.45 | -1.85 | 1997.5 | -1.85 |
| 2012.7 | -.85 | 2083.7 | .15 | 2135.8 | -1.85 | 2295.3 | -1.85 | 2315.42 | .15 |
| 2349.9 | 1.15 | 2397.2 | 2.15 | 2433.17 | 3.15 | 2466.5 | 4.15 | 2497.88 | 5.15 |
| 2513.2 | 9.15 | 2536.14 | 10.15 | 2553 | 18.15 | 2577 | 18.15 | 2611.6 | 7.15 |
| 2745 | 6.4 | 2888.3 | 6.15 | 3001.2 | 5.4 | 3029.3 | 5.15 | 3033.5 | 3.15 |
| 3039 | 2.15 | 3052.25 | 1.15 | 3070 | .15 | 3088.8 | -.85 | 3117.6 | -1.85 |
| 3155.9 | -1.85 | 3164.9 | -.85 | 3173.7 | .15 | 3183.5 | 1.15 | 3192.4 | 2.15 |
| 3194.4 | 3.15 | 3200.1 | 6.15 | 3286.9 | 7.15 | 3292 | 8.15 | 3297.1 | 9.15 |
| 3327.6 | 10.15 | 3369.3 | 10.15 | 3380.1 | 11.15 | 3385.8 | 13.15 | 3389.76 | 14.15 |
| 3418.9 | 12.15 | 3536.6 | 12.15 | 4401.26 | 12.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 57.11 | .035 | 3536.6 | .05 |

Bank Sta: Left Right Coeff Contr. Expan.

57.11 3536.6 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.66 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.050 | 0.035 |
| 0.050 | | | | |
| W.S. Elev (ft) | 20.65 | Reach Len. (ft) | | |
| Crit W.S. (ft) | 3.71 | Flow Area (sq ft) | 214.30 | 55275.19 |
| 7349.61 | | | | |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 214.30 | 55275.19 |
| 7349.61 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 51.32 | 40288.46 |
| 2460.22 | | | | |
| Top Width (ft) | 4385.20 | Top Width (ft) | 41.05 | 3479.49 |
| 864.66 | | | | |
| Vel Total (ft/s) | 0.68 | Avg. Vel. (ft/s) | 0.24 | 0.73 |
| 0.33 | | | | |
| Max Chl Dpth (ft) | 22.50 | Hydr. Depth (ft) | 5.22 | 15.89 |
| 8.50 | | | | |
| Conv. Total (cfs) | 15723180.0 | Conv. (cfs) | 18854.9 | |
| 14800530.0 903794.3 | | | | |
| Length Wtd. (ft) | | Wetted Per. (ft) | 42.07 | 3489.80 |
| 873.16 | | | | |
| Min Ch El (ft) | -1.85 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.00 | | | | |
| Alpha | 1.09 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | |
| C & E Loss (ft) | | Cum SA (acres) | | |

SUMMARY OF MANNING'S N VALUES

River:San Dieguito Riv

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| 1 | 13555 | .035 | .05 | .035 |
| 1 | 11854 | .05 | .035 | .05 |
| 1 | 10577 | .05 | .035 | .05 |
| 1 | 9777 | .05 | .035 | .05 |
| 1 | 9274 | .05 | .035 | .05 |
| 1 | 8043 | .05 | .035 | .05 |
| 1 | 7554 | .05 | .035 | .05 |
| 1 | 7286 | .05 | .035 | .05 |
| 1 | 7000 | Bridge | | |
| 1 | 6809 | .05 | .035 | .05 |
| 1 | 6661 | .05 | .035 | .05 |
| 1 | 6437 | .05 | .035 | .05 |
| 1 | 5926 | .05 | .035 | .05 |
| 1 | 5333 | .05 | .035 | .05 |

SUMMARY OF REACH LENGTHS

River: San Dieguito Riv

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| 1 | 13555 | 1909.77 | 1701.26 | 1796 |
| 1 | 11854 | 743.4 | 1277.32 | 1429.64 |
| 1 | 10577 | 809.4 | 800.27 | 1102.6 |
| 1 | 9777 | 275.06 | 502.66 | 1232.3 |
| 1 | 9274 | 1312.7 | 1232.14 | 731.7 |
| 1 | 8043 | 2307.4 | 488.53 | 209.2 |
| 1 | 7554 | 1488 | 268.5 | 1186.87 |
| 1 | 7286 | 640.24 | 476.55 | 543.46 |
| 1 | 7000 | Bridge | | |
| 1 | 6809 | 1290.06 | 147.74 | 464.74 |
| 1 | 6661 | 321.4 | 224.95 | 198.11 |
| 1 | 6437 | 407.84 | 510.16 | 564.9 |
| 1 | 5926 | 1306.04 | 593.43 | 542.48 |
| 1 | 5333 | | | |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: San Dieguito Riv

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| 1 | 13555 | .1 | .3 |
| 1 | 11854 | .1 | .3 |
| 1 | 10577 | .1 | .3 |
| 1 | 9777 | .1 | .3 |
| 1 | 9274 | .1 | .3 |
| 1 | 8043 | .1 | .3 |
| 1 | 7554 | .1 | .3 |
| 1 | 7286 | .1 | .3 |
| 1 | 7000 | Bridge | |
| 1 | 6809 | .1 | .3 |
| 1 | 6661 | .1 | .3 |
| 1 | 6437 | .1 | .3 |
| 1 | 5926 | .1 | .3 |
| 1 | 5333 | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl (ft) | (ft) |
| 1 | 13555 | PF 1 | 42800.00 | 8.82 | 21.90 | |
| 22.53 | 0.002097 | 7.30 | 7327.79 | 1545.94 | 0.36 | |
| 1 | 11854 | PF 1 | 42800.00 | 3.15 | 21.57 | |
| 21.65 | 0.000172 | 2.24 | 19146.98 | 2384.79 | 0.14 | |
| 1 | 10577 | PF 1 | 42800.00 | 2.15 | 21.43 | |
| 21.49 | 0.000084 | 1.96 | 22075.41 | 1983.64 | 0.10 | |
| 1 | 9777 | PF 1 | 42800.00 | -3.85 | 21.43 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 21.45 | 0.000023 | 1.14 | 37899.54 | 2926.93 | 0.06 | |
| 1 | | 9274 | PF 1 | 42800.00 | 2.15 | 21.41 | |
| | 21.44 | 0.000029 | 1.20 | 36388.65 | 3139.81 | 0.06 | |
| 1 | | 8043 | PF 1 | 42800.00 | -0.85 | 21.39 | 7.34 |
| | 21.41 | 0.000019 | 1.11 | 45839.52 | 4324.42 | 0.05 | |
| 1 | | 7554 | PF 1 | 42800.00 | -0.85 | 21.34 | 7.18 |
| | 21.38 | 0.000049 | 1.67 | 25614.39 | 5852.95 | 0.08 | |
| 1 | | 7286 | PF 1 | 42800.00 | -1.85 | 20.98 | 13.65 |
| | 21.31 | 0.000405 | 5.25 | 10598.38 | 5229.85 | 0.24 | |
| 1 | | 7000 | | Bridge | | | |
| 1 | | 6809 | PF 1 | 42800.00 | -1.85 | 20.54 | 10.81 |
| | 20.78 | 0.000287 | 3.96 | 11083.44 | 4479.15 | 0.19 | |
| 1 | | 6661 | PF 1 | 42800.00 | -1.85 | 20.61 | 8.37 |
| | 20.71 | 0.000106 | 2.55 | 16776.90 | 4474.32 | 0.12 | |
| 1 | | 6437 | PF 1 | 42800.00 | -3.85 | 20.65 | 2.90 |
| | 20.68 | 0.000031 | 1.54 | 27770.76 | 4397.55 | 0.07 | |
| 1 | | 5926 | PF 1 | 42800.00 | -3.85 | 20.65 | 1.88 |
| | 20.67 | 0.000015 | 1.04 | 41152.88 | 4615.28 | 0.05 | |
| 1 | | 5333 | PF 1 | 42800.00 | -1.85 | 20.65 | 3.71 |
| | 20.66 | 0.000007 | 0.73 | 62839.10 | 4385.20 | 0.03 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : SD_Existing

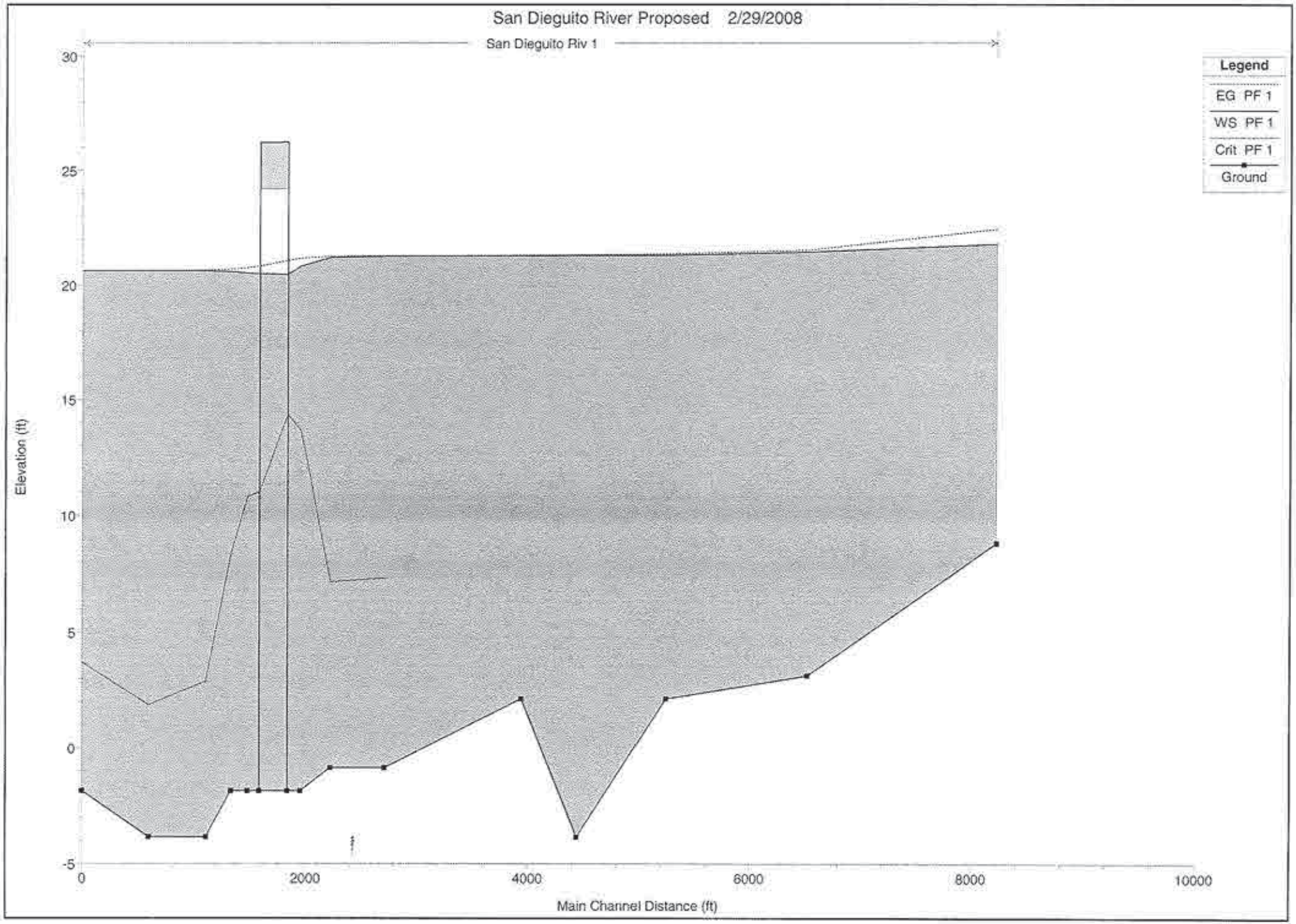
River: San Dieguito Riv Reach: 1 RS: 13555 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Dieguito Riv Reach: 1 RS: 11854 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Dieguito Riv Reach: 1 RS: 10577 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Dieguito Riv Reach: 1 RS: 8043 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 7554 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 7286 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 7000 Profile: PF 1 Upstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 7000 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 6809 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 6661 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 6437 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 5926 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.

**PROSPOSED**

HEC-RAS Plan: SDR_Prop River: San Dieguito Riv Reach: 1 Profile: PF 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 1 | 13555 | PF 1 | 42800.00 | 8.82 | 21.82 | | 22.47 | 0.002186 | 7.41 | 7194.81 | 1525.74 | 0.37 |
| 1 | 11854 | PF 1 | 42800.00 | 3.15 | 21.47 | | 21.55 | 0.000160 | 2.27 | 18904.49 | 2381.91 | 0.14 |
| 1 | 10577 | PF 1 | 42800.00 | 2.15 | 21.33 | | 21.39 | 0.000087 | 1.98 | 21864.14 | 1982.94 | 0.10 |
| 1 | 9777 | PF 1 | 42800.00 | -3.85 | 21.32 | | 21.34 | 0.000024 | 1.15 | 37586.72 | 2926.05 | 0.06 |
| 1 | 9274 | PF 1 | 42800.00 | 2.15 | 21.31 | | 21.33 | 0.000030 | 1.21 | 36051.75 | 3136.81 | 0.06 |
| 1 | 8043 | PF 1 | 42800.00 | -0.85 | 21.28 | 7.34 | 21.30 | 0.000020 | 1.12 | 45436.72 | 4322.85 | 0.05 |
| 1 | 7554 | PF 1 | 42800.00 | -0.85 | 21.23 | 7.18 | 21.27 | 0.000050 | 1.66 | 25405.33 | 5852.15 | 0.08 |
| 1 | 7286 | PF 1 | 42800.00 | -1.85 | 20.86 | 13.65 | 21.19 | 0.000418 | 5.30 | 10493.68 | 5227.42 | 0.24 |
| 1 | 7000 | | Bridge | | | | | | | | | |
| 1 | 6809 | PF 1 | 42800.00 | -1.85 | 20.54 | 10.81 | 20.78 | 0.000287 | 3.96 | 11083.44 | 4479.15 | 0.19 |
| 1 | 6661 | PF 1 | 42800.00 | -1.85 | 20.61 | 8.37 | 20.71 | 0.000106 | 2.55 | 16776.90 | 4474.32 | 0.12 |
| 1 | 6437 | PF 1 | 42800.00 | -3.85 | 20.65 | 2.90 | 20.68 | 0.000031 | 1.54 | 27770.76 | 4397.55 | 0.07 |
| 1 | 5926 | PF 1 | 42800.00 | -3.85 | 20.65 | 1.68 | 20.67 | 0.000015 | 1.04 | 41152.88 | 4615.28 | 0.05 |
| 1 | 5333 | PF 1 | 42800.00 | -1.85 | 20.65 | 3.71 | 20.66 | 0.000007 | 0.73 | 62839.10 | 4385.20 | 0.03 |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San Dieguito Riv 1
Legend
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WS PF 1
Crit PF 1
Ground
Elevation (ft)
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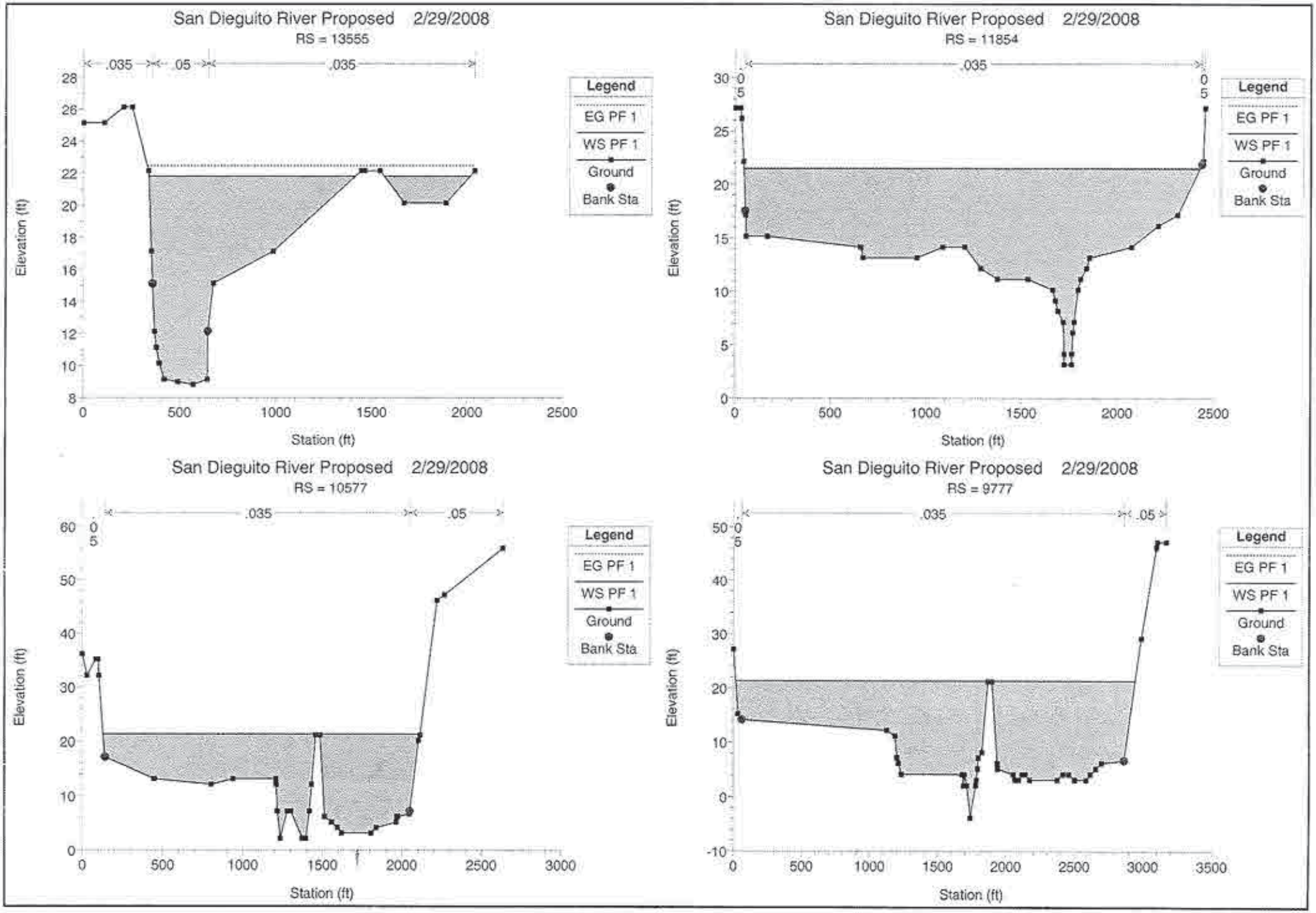
25
20
15
10
5
0
-5
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)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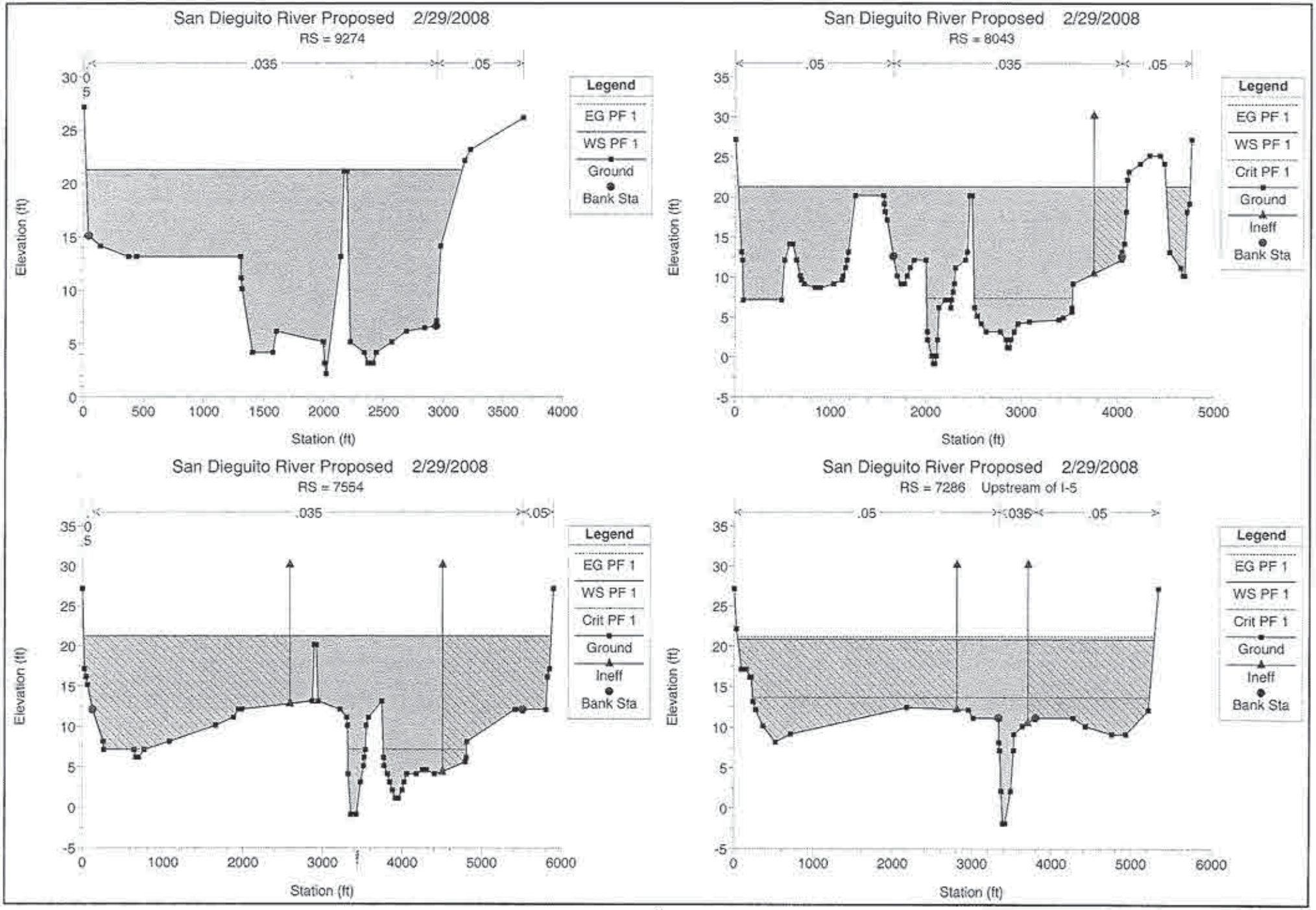
.05
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 11854
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 10577
.035
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 9777
.035
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 8043
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 7554
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 7286 Upstream of I-5
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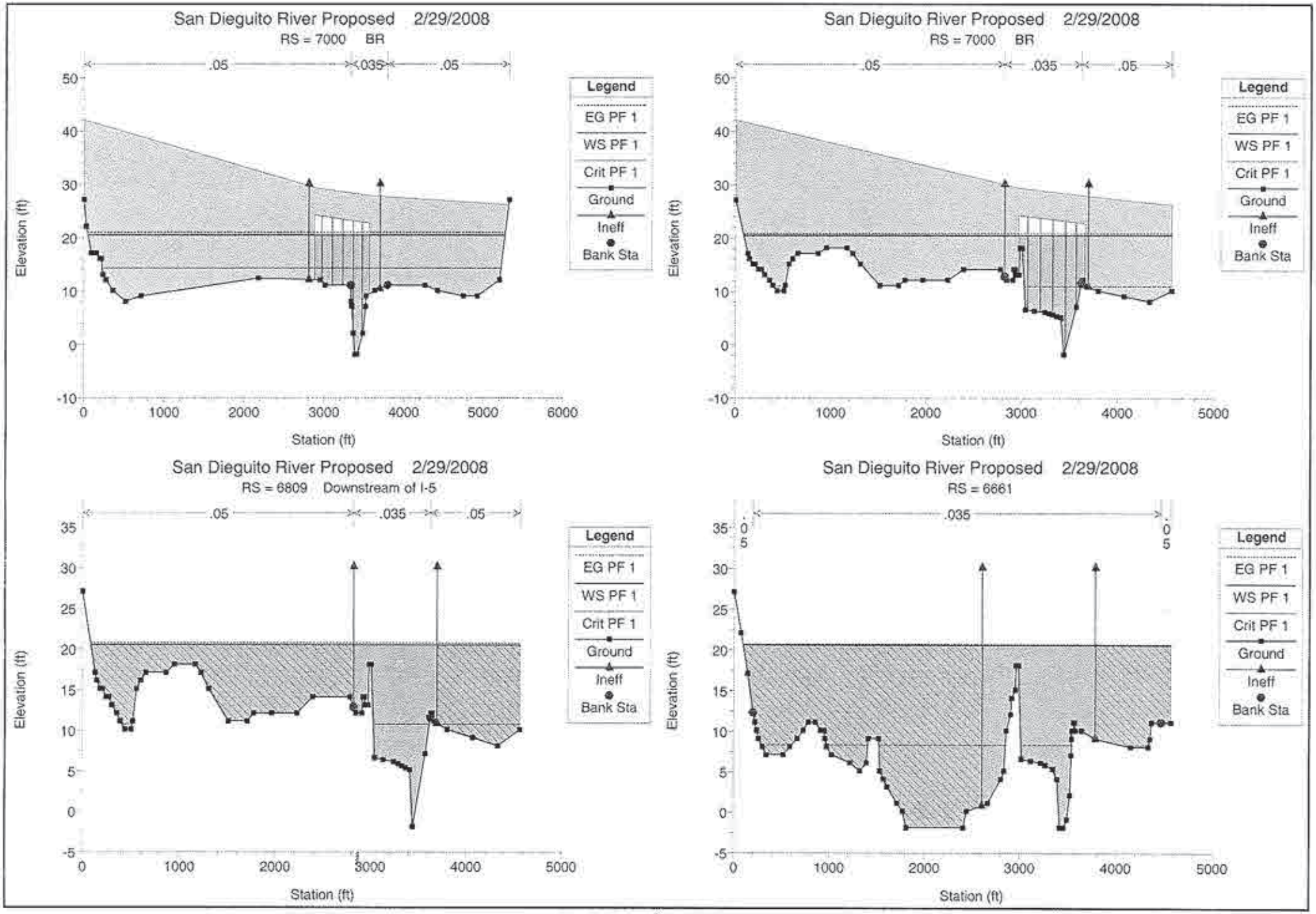
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 7000 BR
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
RS = 6809 Downstream of I-5
.05
.035
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Dieguito River Proposed 2/29/2008
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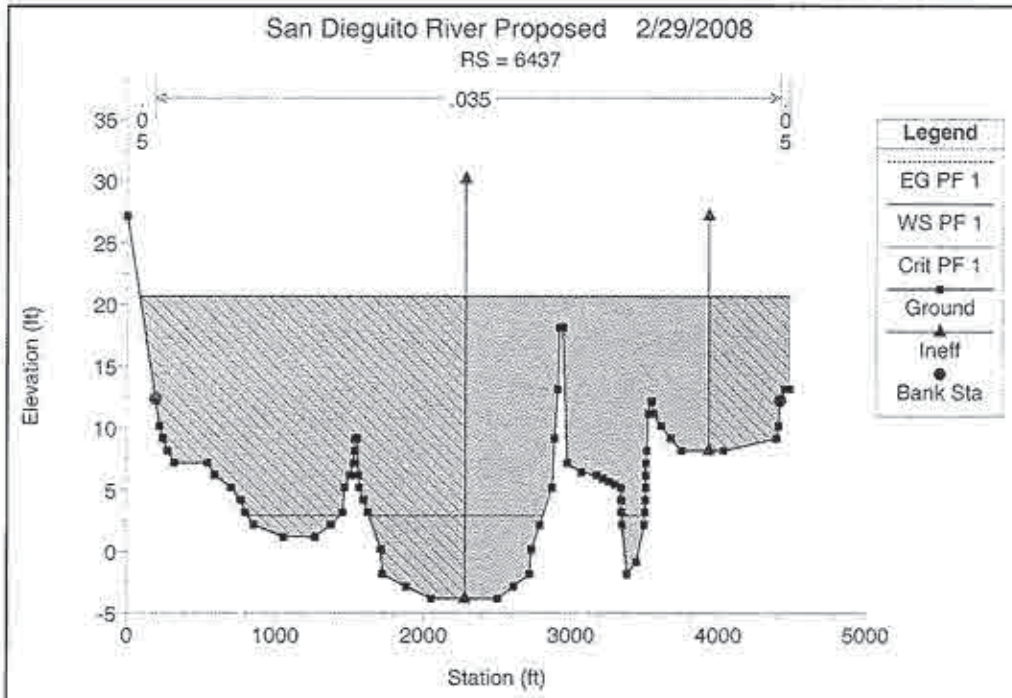
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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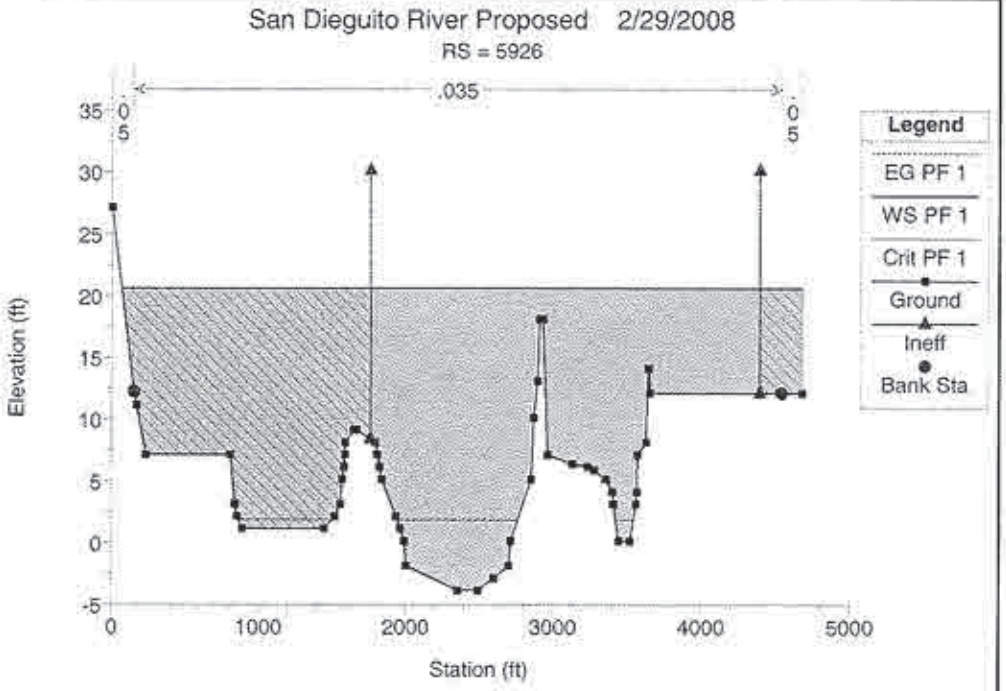
.035
0
5
0
5
Elevation (ft)
35
30
25
20
15
10
5
0
-5
0
1000
2000
3000
4000
5000
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta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.035
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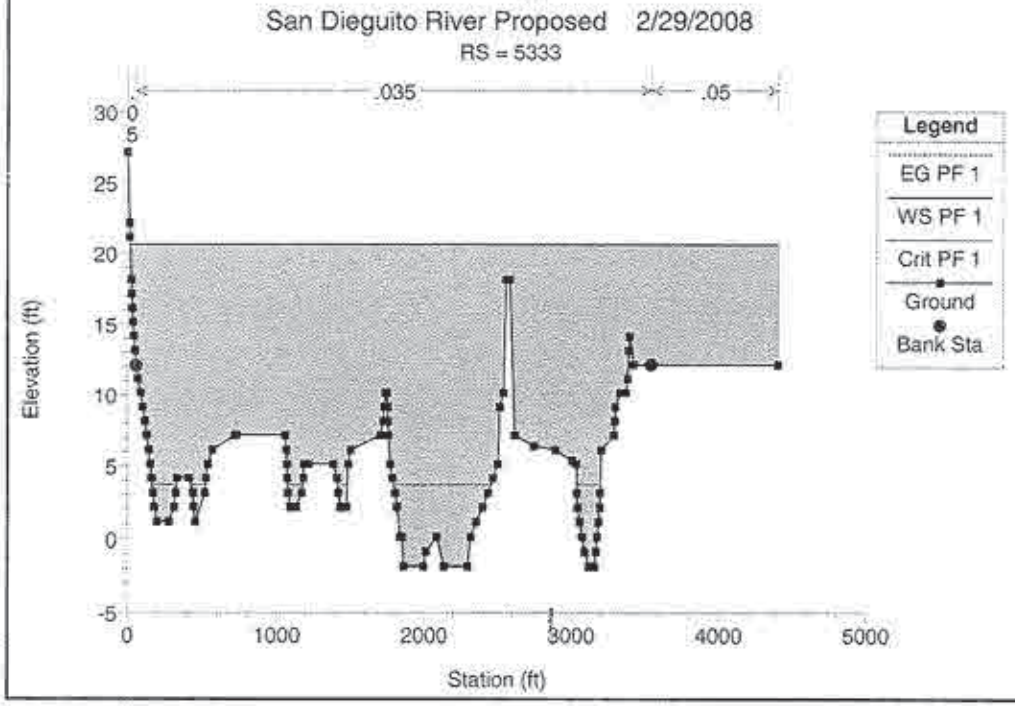
5
0
5
Elevation (ft)
35
30
25
20
15
10
5
0
-5
0
1000
2000
3000
4000
5000
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta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RS = 5333
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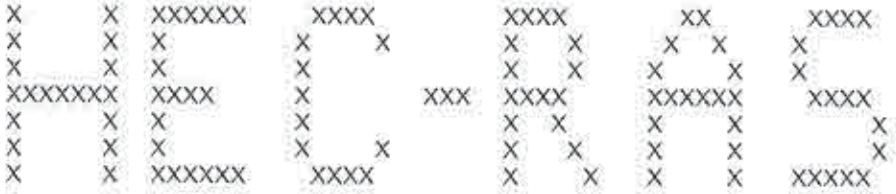
.05
0
5
Elevation (ft)
30
25
20
15
10
5
0
-5
0
1000
2000
3000
4000
5000
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California



PROJECT DATA
Project Title: SanDieguitoRiver_Proposed
Project File : SDR_Prop.prj
Run Date and Time: 2/29/2008 4:33:56 PM

Project in English units

PLAN DATA

Plan Title: San Dieguito River Proposed
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Proposed\SDR_Prop.p01

Geometry Title: San Dieguito River Proposed Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Proposed\SDR_Prop.g02

Flow Title : 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Proposed\SDR_Prop.f02

Plan Summary Information:

| | | | | | |
|---|---|---|---|---|---|
| Number of: Cross Sections | = | 13 | Multiple Openings | = | 0 |
| Culverts | = | 0 | Inline Structures | = | 0 |
| Bridges | = | 1 | Lateral Structures | = | 0 |

Computational Information

| | | |
|---|---|---|
| Water surface calculation tolerance | = | 0.01 |
| Critical depth calculation tolerance | = | 0.01 |
| Maximum number of iterations | = | 20 |
| Maximum difference tolerance | = | 0.3 |
| Flow tolerance factor | = | 0.001 |

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Proposed\SDR_Prop.f02

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| San Dieguito Riv | 1 | 13555 | 42800 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| San Dieguito Riv | 1 | PF 1 | Normal S = 0.003491 | Known WS = 20.65 |

GEOMETRY DATA

Geometry Title: San Dieguito River Proposed Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Dieguito\HEC-RAS\Final\Proposed\SDR_Prop.g02

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 13555

INPUT
Description:
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 25.15 | 107.46 | 25.15 | 206.93 | 26.15 | 250.4 | 26.15 | 335.53 | 22.15 |
| 351.26 | 17.15 | 358.1 | 15.12 | 368.13 | 12.15 | 378.5 | 11.15 | 394.04 | 10.15 |
| 420.06 | 9.15 | 490.28 | 8.99 | 570.6 | 8.82 | 643.38 | 9.15 | 646.03 | 12.15 |
| 646.14 | 12.16 | 673.89 | 15.15 | 985.5 | 17.15 | 1443.3 | 22.15 | 1460.3 | 22.15 |
| 1542.76 | 22.15 | 1668.5 | 20.15 | 1886.9 | 20.15 | 2038.21 | 22.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 358.1 | .05 | 646.14 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 358.1 | 646.14 | 1909.77 1701.26 | 1796 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 22.47 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.65 | Wt. n-Val. | 0.035 | 0.050 |
| 0.035 | | | | |
| W.S. Elev (ft) | 21.82 | Reach Len. (ft) | 1909.77 | 1701.26 |

| | | | | |
|---|---|---|---|---|
| 1796.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 73.14 | 3574.61 |
| 3547.06 | | | | |
| E.G. Slope (ft/ft) | 0.002186 | Area (sq ft) | 73.14 | 3574.61 |
| 3547.06 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 318.17 | 26505.31 |
| 15976.52 | | | | |
| Top Width (ft) | 1525.74 | Top Width (ft) | 21.52 | 288.04 |
| 1216.18 | | | | |
| Vel Total (ft/s) | 5.95 | Avg. Vel. (ft/s) | 4.35 | 7.41 |
| 4.50 | | | | |
| Max Chl Dpth (ft) | 13.00 | Hydr. Depth (ft) | 3.40 | 12.41 |
| 2.92 | | | | |
| Conv. Total (cfs) | 915503.5 | Conv. (cfs) | 6805.7 | 566955.8 |
| 341742.0 | | | | |
| Length Wtd. (ft) | 1719.74 | Wetted Per. (ft) | 22.54 | 289.92 |
| 1216.40 | | | | |
| Min Ch El (ft) | 8.82 | Shear (lb/sq ft) | 0.44 | 1.68 |
| 0.40 | | | | |
| Alpha | 1.18 | Stream Power (lb/ft s) | 1.93 | 12.47 |
| 1.79 | | | | |
| Frctn Loss (ft) | 0.75 | Cum Volume (acre-ft) | 1555.40 | 5940.05 |
| 563.16 | | | | |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 185.83 | 467.00 |
| 79.99 | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 11854

INPUT
Description:
Station Elevation Data num= 36

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 28.1 | 27.15 | 32.14 | 26.15 | 42.95 | 22.15 | 51.82 | 17.53 |
| 52.56 | 17.15 | 55.9 | 15.15 | 168.07 | 15.15 | 658.24 | 14.15 | 669.88 | 13.15 |
| 952.46 | 13.15 | 1088.3 | 14.15 | 1203.7 | 14.15 | 1286.3 | 12.15 | 1375.8 | 11.15 |
| 1534.6 | 11.15 | 1662.7 | 10.15 | 1676.7 | 9.15 | 1690.7 | 8.15 | 1718.1 | 7.15 |
| 1722.5 | 4.15 | 1722.9 | 3.15 | 1762.7 | 3.15 | 1763.3 | 4.15 | 1768.6 | 6.15 |
| 1775.5 | 7.15 | 1795.9 | 10.15 | 1808.6 | 11.15 | 1840.3 | 12.15 | 1854.8 | 13.15 |
| 2072.8 | 14.15 | 2211.7 | 16.15 | 2312 | 17.15 | 2437.3 | 21.89 | 2444.1 | 22.15 |
| 2453.2 | 27.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 51.82 | .035 | 2437.3 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 51.82 | 2437.3 | 743.4 | 1277.32 1429.64 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.55 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.08 | Wt. n-Val. | 0.050 | 0.035 |
| W.S. Elev (ft) | 21.47 | Reach Len. (ft) | 743.40 | 1277.32 |
| 1429.64 Crit W.S. (ft) | | Flow Area (sq ft) | 14.89 | 18889.60 |
| E.G. Slope (ft/ft) | 0.000180 | Area (sq ft) | 14.89 | 18889.60 |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 8.60 | 42791.39 |
| Top Width (ft) | 2381.91 | Top Width (ft) | 7.56 | 2374.34 |
| Vel Total (ft/s) | 2.26 | Avg. Vel. (ft/s) | 0.58 | 2.27 |
| Max Chl Dpth (ft) | 18.32 | Hydr. Depth (ft) | 1.97 | 7.96 |
| Conv. Total (cfs) | 3193175.0 | Conv. (cfs) | 641.9 | 3192533.0 |
| Length Wtd. (ft) | 1277.90 | Wetted Per. (ft) | 8.53 | 2378.18 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | 0.02 | 0.09 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.01 | 0.20 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 1553.47 | 5501.38 |
| 490.04 C & E Loss (ft) | 0.01 | Cum SA (acres) | 185.19 | 415.01 |
| 54.91 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 10577

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 36.15 | 31.06 | 32.15 | 85.1 | 35.15 | 99.31 | 35.15 | 105.25 | 32.15 |
| 140.4 | 17.15 | 141.3 | 17.14 | 447.3 | 13.15 | 801.3 | 12.15 | 937.27 | 13.15 |
| 1204.85 | 13.15 | 1206.5 | 12.15 | 1214.63 | 7.15 | 1234.32 | 2.15 | 1276.78 | 7.15 |
| 1299.53 | 7.15 | 1373.48 | 2.15 | 1395.61 | 2.15 | 1416.5 | 7.15 | 1429.3 | 12.15 |
| 1456.45 | 21.15 | 1481.4 | 21.15 | 1511.6 | 6.15 | 1557.57 | 5.15 | 1593.2 | 4.15 |
| 1620.1 | 3.15 | 1805.7 | 3.15 | 1838.5 | 4.15 | 1963.8 | 5.15 | 1968.5 | 6.15 |
| 1974.81 | 6.19 | 2046.4 | 6.65 | 2048.6 | 7.15 | 2102.2 | 20.15 | 2112.8 | 21.15 |
| 2218.1 | 46.15 | 2265.5 | 47.15 | 2631.9 | 55.9 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 141.3 | .035 | 2048.6 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 141.3 | 2048.6 | 809.4 | 800.27 1102.6 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.39 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.06 | Wt. n-Val. | 0.050 | 0.035 |
| 0.050 | | | | |
| W.S. Elev (ft) | 21.33 | Reach Len. (ft) | 809.40 | 800.27 |
| 1102.60 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 24.21 | 21421.16 |
| 418.77 | | | | |
| E.G. Slope (ft/ft) | 0.000087 | Area (sq ft) | 24.21 | 21421.16 |
| 418.77 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 11.00 | 42393.49 |
| 395.51 | | | | |
| Top Width (ft) | 1982.94 | Top Width (ft) | 10.69 | 1907.30 |
| 64.95 | | | | |
| Vel Total (ft/s) | 1.96 | Avg. Vel. (ft/s) | 0.45 | 1.98 |
| 0.94 | | | | |
| Max Chl Dpth (ft) | 19.18 | Hydr. Depth (ft) | 2.27 | 11.23 |
| 6.45 | | | | |
| Conv. Total (cfs) | 4589363.0 | Conv. (cfs) | 1179.1 | 4545774.0 |
| 42410.0 | | | | |
| Length Wtd. (ft) | 802.85 | Wetted Per. (ft) | 11.54 | 1916.84 |
| 66.57 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 | 0.06 |
| 0.03 | | | | |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.01 | 0.12 |
| 0.03 | | | | |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 1553.13 | 4910.36 |
| 483.17 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 185.04 | 352.23 |
| 53.85 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 9777

INPUT
Description:
Station Elevation Data num= 42

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 30.95 | 15.15 | 54.91 | 14.15 | 58.3 | 14.14 | 1123.5 | 12.15 |
| 1184.5 | 11.15 | 1197.24 | 7.15 | 1209.17 | 6.15 | 1231.8 | 4.15 | 1677.1 | 4.15 |
| 1688 | 2.15 | 1692.1 | 4.15 | 1710.9 | 2.15 | 1737.4 | -3.85 | 1774.96 | 2.15 |
| 1781 | 3.15 | 1789.4 | 5.15 | 1794.75 | 7.15 | 1820.72 | 8.15 | 1866.86 | 21.15 |
| 1895.9 | 21.15 | 1933.7 | 6.15 | 1936.23 | 5.15 | 2050.3 | 4.15 | 2063.4 | 3.15 |
| 2089.7 | 3.15 | 2115.8 | 4.15 | 2138.5 | 4.15 | 2170.15 | 3.15 | 2373.15 | 3.15 |
| 2412.9 | 4.15 | 2454.8 | 4.15 | 2499.7 | 3.15 | 2583.1 | 3.15 | 2613.6 | 4.15 |
| 2653.2 | 5.15 | 2694.5 | 6.15 | 2858.2 | 6.65 | 2985.3 | 29.15 | 3093.6 | 46.15 |

3099.4 47.15 3162.5 47.15

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 58.3 | .035 | 2858.2 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 58.3 | 2858.2 | 275.06 | 502.66 1232.3 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.34 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.050 | 0.035 |
| 0.050 | | | | |
| W.S. Elev (ft) | 21.32 | Reach Len. (ft) | 275.06 | 502.66 |
| 1232.30 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 233.34 | 36745.33 |
| 608.06 | | | | |
| E.G. Slope (ft/ft) | 0.000024 | Area (sq ft) | 233.34 | 36745.33 |
| 608.06 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 102.45 | 42367.28 |
| 330.27 | | | | |
| Top Width (ft) | 2926.05 | Top Width (ft) | 43.27 | 2799.90 |
| 82.88 | | | | |
| Vel Total (ft/s) | 1.14 | Avg. Vel. (ft/s) | 0.44 | 1.15 |
| 0.54 | | | | |
| Max Chl Dpth (ft) | 25.17 | Hydr. Depth (ft) | 5.39 | 13.12 |
| 7.34 | | | | |
| Conv. Total (cfs) | 8750922.0 | Conv. (cfs) | 20946.8 | 8662447.0 |
| 67528.0 | | | | |
| Length Wtd. (ft) | 509.05 | Wetted Per. (ft) | 44.45 | 2808.25 |
| 84.17 | | | | |
| Min Ch El (ft) | -3.85 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.02 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 1550.74 | 4376.05 |
| 470.17 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 184.54 | 308.99 |
| 51.98 | | | | |

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 9274

INPUT
Description:
Station Elevation Data num= 32

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 35.56 | 15.15 | 39.41 | 15.11 | 140.5 | 14.15 | 371.23 | 13.15 |
| 439.61 | 13.15 | 1303.78 | 13.15 | 1308.9 | 11.15 | 1315.5 | 10.15 | 1404.87 | 4.15 |
| 1576.24 | 4.15 | 1603.44 | 6.15 | 1995.8 | 5.15 | 2007.7 | 3.15 | 2020.86 | 2.15 |
| 2139.86 | 13.15 | 2163.86 | 21.15 | 2187.6 | 21.15 | 2221.67 | 5.15 | 2336.54 | 4.15 |
| 2367.4 | 3.15 | 2413.2 | 3.15 | 2439.73 | 4.15 | 2569.23 | 5.15 | 2690.41 | 6.15 |
| 2842.6 | 6.45 | 2941.04 | 6.65 | 2943.34 | 7.15 | 2975.22 | 14.15 | 3175.2 | 22.15 |
| 3221.3 | 23.15 | 3667.16 | 26.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 39.41 | .035 | 2941.04 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 39.41 | 2941.04 | 1312.7 | 1232.14 731.7 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.33 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.050 | 0.035 0.050 |
| W.S. Elev (ft) | 21.31 | Reach Len. (ft) | 1312.70 | 1232.14 731.70 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 79.94 | 34958.75 1013.06 |
| E.G. Slope (ft/ft) | 0.000030 | Area (sq ft) | 79.94 | 34958.75 1013.06 |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 29.52 | 42309.44 461.03 |
| Top Width (ft) | 3136.81 | Top Width (ft) | 22.09 | 2901.63 213.08 |
| Vel Total (ft/s) | 1.19 | Avg. Vel. (ft/s) | 0.37 | 1.21 0.46 |
| Max Chl Dpth (ft) | 19.16 | Hydr. Depth (ft) | 3.62 | 12.05 4.75 |
| Conv. Total (cfs) | 7878881.0 | Conv. (cfs) | 5435.0 | 7788576.0 84869.8 |
| Length Wtd. (ft) | 1237.71 | Wetted Per. (ft) | 23.11 | 2907.99 214.04 |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 | 0.02 0.01 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.00 | 0.03 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 1549.75 | 3962.34 447.24 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 184.33 | 276.10 47.79 |

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 8043

INPUT
Description:
Station Elevation Data num= 88

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 62.22 | 13.15 | 74.73 | 12.15 | 85.25 | 7.15 | 487.65 | 7.15 |
| 518.99 | 12.15 | 569.67 | 14.15 | 603.2 | 14.15 | 641.2 | 12.15 | 680.13 | 10.15 |
| 694.2 | 9.65 | 723.27 | 9.15 | 835.32 | 8.65 | 895.2 | 8.65 | 1035.07 | 9.15 |
| 1122.48 | 9.65 | 1133.08 | 10.15 | 1157.48 | 11.15 | 1173.42 | 12.15 | 1186.2 | 13.15 |
| 1258.6 | 20.15 | 1554.5 | 20.15 | 1558.15 | 19.15 | 1569.75 | 18.15 | 1589.55 | 17.15 |
| 1658.12 | 12.61 | 1695.25 | 10.15 | 1737.04 | 9.15 | 1773.32 | 9.15 | 1804.64 | 10.15 |
| 1837.5 | 11.15 | 1874.73 | 12.15 | 1999 | 12.15 | 2013.6 | 3.15 | 2018.66 | 2.15 |
| 2064.02 | .15 | 2081.34 | -.85 | 2095.44 | -.85 | 2114 | .15 | 2124.8 | 2.15 |
| 2135.93 | 6.15 | 2201.8 | 7.15 | 2254.16 | 7.15 | 2257.7 | 6.15 | 2261.5 | 6.15 |
| 2269.6 | 7.15 | 2283.66 | 8.15 | 2297.74 | 9.15 | 2306.7 | 11.15 | 2416.28 | 12.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2433.2 | 13.15 | 2454.9 | 20.15 | 2479.9 | 20.15 | 2508.7 | 6.15 | 2536.9 | 5.15 |
| 2577.1 | 4.15 | 2631.8 | 3.15 | 2778.9 | 3.15 | 2838.7 | 2.15 | 2851.6 | 1.15 |
| 2876.3 | 1.15 | 2892 | 2.15 | 2925.8 | 3.15 | 2963 | 4.15 | 3082.9 | 4.4 |
| 3390.5 | 4.65 | 3438.4 | 4.9 | 3525.7 | 5.65 | 3527.9 | 6.15 | 3536.9 | 9.15 |
| 4040.3 | 12.15 | 4041.93 | 12.52 | 4044.7 | 13.15 | 4070.5 | 14.15 | 4089 | 18.15 |
| 4099.1 | 22.15 | 4113.6 | 23.15 | 4233 | 24.15 | 4329.3 | 25.15 | 4440.4 | 25.15 |
| 4482.8 | 24.15 | 4540.3 | 13.15 | 4654.9 | 11.15 | 4679.5 | 10.15 | 4698.2 | 10.15 |
| 4720 | 18.15 | 4744.7 | 19.15 | 4763.9 | 27.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 1658.12 | .035 | 4041.93 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1658.12 | 4041.93 | 2307.4 488.53 | 209.2 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 3751.6 | 4763.9 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.30 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.02 | Wt. n-Val. | 0.050 | 0.035 |
| W.S. Elev (ft) | 21.28 | Reach Len. (ft) | 2307.40 | 488.53 |
| 209.20 Crit W.S. (ft) | 7.34 | Flow Area (sq ft) | 15063.62 | 30373.10 |
| E.G. Slope (ft/ft) | 0.000020 | Area (sq ft) | 15063.62 | 33272.25 |
| 2242.45 Q Total (cfs) | 42800.00 | Flow (cfs) | 8756.09 | 34043.91 |
| Top Width (ft) | 4322.85 | Top Width (ft) | 1632.04 | 2383.81 |
| 307.00 Vel Total (ft/s) | 0.94 | Avg. Vel. (ft/s) | 0.58 | 1.12 |
| Max Chl Dpth (ft) | 22.13 | Hydr. Depth (ft) | 9.23 | 14.51 |
| Conv. Total (cfs) | 9614968.0 | Conv. (cfs) | 1967045.0 | 7647924.0 |
| Length Wtd. (ft) | 674.58 | Wetted Per. (ft) | 1635.46 | 2102.80 |
| Min Ch El (ft) | -0.85 | Shear (lb/sq ft) | 0.01 | 0.02 |
| Alpha | 1.20 | Stream Power (lb/ft s) | 0.01 | 0.02 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 1321.57 | 2997.34 |
| 419.90 C & E Loss (ft) 43.42 | 0.00 | Cum SA (acres) | 159.41 | 201.35 |

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 7554

INPUT
Description:
Station Elevation Data num= 59

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 24.6 | 17.15 | 43.18 | 16.15 | 61.65 | 15.15 | 123.29 | 12.15 |
| 124.7 | 12.11 | 260.4 | 8.15 | 267.1 | 7.15 | 643.5 | 7.15 | 664.43 | 6.15 |
| 700.15 | 6.15 | 770.57 | 7.15 | 1082.9 | 8.15 | 1658.3 | 10.15 | 1883.38 | 11.15 |
| 1941.3 | 12.15 | 1982.75 | 12.15 | 2869.01 | 13.15 | 2890.66 | 20.15 | 2916.55 | 20.15 |
| 2937.5 | 13.15 | 3213.55 | 12.15 | 3298.6 | 11.15 | 3309.46 | 10.15 | 3316.15 | 4.15 |
| 3351.45 | -.85 | 3422.24 | -.85 | 3475.66 | 3.15 | 3512.81 | 5.15 | 3522.14 | 6.15 |
| 3533.5 | 7.15 | 3543.4 | 10.15 | 3572.5 | 11.15 | 3740.1 | 13.15 | 3761.82 | 6.15 |
| 3768.26 | 5.15 | 3810.92 | 4.15 | 3839.42 | 3.15 | 3875.07 | 2.15 | 3912.65 | 1.15 |
| 3951.15 | 1.15 | 3998.98 | 2.15 | 4020.72 | 3.15 | 4055.98 | 4.15 | 4175.53 | 4.15 |
| 4251.33 | 4.65 | 4298.37 | 4.65 | 4402.94 | 4.15 | 4505.84 | 4.4 | 4792.97 | 5.65 |
| 4801.01 | 6.15 | 4807.62 | 8.15 | 5412.03 | 12.15 | 5422.07 | 12.15 | 5510.17 | 12.15 |
| 5806.56 | 12.15 | 5820.13 | 16.15 | 5846.91 | 17.15 | 5895.44 | 27.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 124.7 | .035 | 5510.17 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
124.7 5510.17 1488 268.5 1186.87 .1 .3

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2585.15 | 30.15 | F |
| 4501.6 | 5895.44 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.04 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 21.23 | Reach Len. (ft) | 1488.00 | 268.50 | 1186.87 |
| Crit W.S. (ft) | 7.18 | Flow Area (sq ft) | | 25405.33 | |
| E.G. Slope (ft/ft) | 0.000050 | Area (sq ft) | 688.79 | 66474.41 | 2950.66 |
| Q Total (cfs) | 42800.00 | Flow (cfs) | | 42800.00 | |
| Top Width (ft) | 5852.15 | Top Width (ft) | 110.14 | 5385.47 | 356.54 |
| Vel Total (ft/s) | 1.68 | Avg. Vel. (ft/s) | | 1.68 | |
| Max Chl Dpth (ft) | 22.08 | Hydr. Depth (ft) | | 13.26 | |
| Conv. Total (cfs) | 6026716.0 | Conv. (cfs) | | 6026716.0 | |
| Length Wtd. (ft) | 457.92 | Wetted Per. (ft) | | 1923.45 | |
| Min Ch El (ft) | -0.85 | Shear (lb/sq ft) | | 0.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.07 | |

| | | | | |
|---|---|---|---|---|
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 904.36 | 2438.01 |
| 407.43 | | | | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 113.26 | 157.78 |
| 41.83 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 7286

INPUT
Description: Upstream of I-5
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 28.7 | 22.15 | 90.97 | 17.15 | 151.8 | 17.15 | 200.45 | 16.15 |
| 214.97 | 16.15 | 235.46 | 13.15 | 272.24 | 12.15 | 362.6 | 10.15 | 520.8 | 8.15 |
| 709.55 | 9.15 | 2176.6 | 12.46 | 2950.71 | 12.15 | 3013.37 | 11.15 | 3332.23 | 11.15 |
| 3336.33 | 8.15 | 3346.62 | 7.15 | 3365.89 | 2.15 | 3387.5 | -1.85 | 3415.73 | -1.85 |
| 3487.71 | 2.15 | 3521.96 | 7.15 | 3527.4 | 9.15 | 3632.52 | 10.15 | 3792.9 | 11.15 |
| 4264.36 | 11.15 | 4420.07 | 10.15 | 4747.1 | 9.15 | 4922.14 | 9.15 | 5200.71 | 12.15 |
| 5323.83 | 27.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 3332.23 | .035 | 3792.9 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 3332.23 | 3792.9 | 640.24 | 476.55 | 543.46 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2806.4 | 30.15 | F |
| 3698.4 | 5323.83 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 21.19 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.34 | Wt. n-Val. | 0.050 | 0.035 |
| W.S. Elev (ft) | 20.86 | Reach Len. (ft) | 116.95 | 116.95 |
| 116.95 | | | | |
| Crit W.S. (ft) | 13.65 | Flow Area (sq ft) | 4925.58 | 5568.09 |
| E.G. Slope (ft/ft) | 0.000418 | Area (sq ft) | 31092.68 | 6513.46 |
| 15037.78 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 13295.81 | 29504.19 |
| Top Width (ft) | 5227.42 | Top Width (ft) | 3287.46 | 460.67 |
| 1479.30 | | | | |
| Vel Total (ft/s) | 4.08 | Avg. Vel. (ft/s) | 2.70 | 5.30 |

| | | | | |
|---|---|---|---|---|
| Max Chl Dpth (ft) | 22.71 | Hydr. Depth (ft) | 9.37 | 15.21 |
| Conv. Total (cfs) | 2093867.0 | Conv. (cfs) | 650459.3 | 1443408.0 |
| Length Wtd. (ft) | 116.95 | Wetted Per. (ft) | 525.84 | 369.04 |
| Min Ch El (ft) | -1.85 | Shear (lb/sq ft) | 0.24 | 0.39 |
| Alpha | 1.30 | Stream Power (lb/ft s) | 0.66 | 2.09 |
| Frctn Loss (ft) | 0.07 | Cum Volume (acre-ft) | 361.54 | 2213.06 |
| 162.37 | | | | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 55.23 | 139.76 |
| 16.82 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE

RIVER: San Dieguito Riv
REACH: 1 RS: 7000

INPUT
Description:
Distance from Upstream XS = 116.95
Deck/Roadway Width = 252.85
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 42.15 | 2.15 | 2876.95 | 29.45 | 2.15 | 2876.95 | 29.45 | 24.2 |
| 3565.95 | 27.95 | 22.7 | 3565.95 | 27.95 | 2.15 | 5400 | 26.15 | 2.15 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 28.7 | 22.15 | 90.97 | 17.15 | 151.8 | 17.15 | 200.45 | 16.15 |
| 214.97 | 16.15 | 235.46 | 13.15 | 272.24 | 12.15 | 362.6 | 10.15 | 520.8 | 8.15 |
| 709.55 | 9.15 | 2176.6 | 12.46 | 2950.71 | 12.15 | 3013.37 | 11.15 | 3332.23 | 11.15 |
| 3336.33 | 8.15 | 3346.62 | 7.15 | 3365.89 | 2.15 | 3387.5 | -1.85 | 3415.73 | -1.85 |
| 3487.71 | 2.15 | 3521.96 | 7.15 | 3527.4 | 9.15 | 3632.52 | 10.15 | 3792.9 | 11.15 |
| 4264.36 | 11.15 | 4420.07 | 10.15 | 4747.1 | 9.15 | 4922.14 | 9.15 | 5200.71 | 12.15 |
| 5323.83 | 27.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 3332.23 | .035 | 3792.9 | .05 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 3332.23 | 3792.9 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2806.4 | 30.15 | F |

```
 3698.4 5323.83   30.15       F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   42.15    2.15 2970.25   29.45    2.15 2970.25   29.45    24.2
 3659.25   27.95    22.7 3659.25   27.95    2.15    4600   26.15    2.15

Downstream Bridge Cross Section Data
Station Elevation Data    num=      55
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0    27.15    126.5    17.15   145.53    16.15    180.9    15.15   205.46    15.15
  241.63    14.15   273.24    14.15    305.7    13.15    357.1    12.15    390.3    11.15
  439.76    10.15    507.5    10.15   523.23    11.15    561.6    15.15   602.98    16.15
  655.56    17.15   866.67    17.15   953.91    18.15   1168.1    18.15  1230.35    17.15
 1311.71    15.15   1513.9    11.15  1711.72    11.15     1778    12.15  1965.24    12.15
 2228.14    12.15   2391.4    14.15  2778.55    14.15  2820.77    12.86   2843.9    12.15
    2909    12.15  2917.53    14.15   2933.6    14.15  2937.23    13.15   2972.3    13.15
    2982    18.15  3004.52    18.15  3039.74     6.65     3134      6.4  3243.49     6.15
    3287      5.9  3327.81     5.65  3367.54      5.4  3409.64     5.15  3439.04    -1.85
 3441.87    -1.85  3571.57     7.15   3623.2    11.58  3629.85    12.15  3641.07    12.15
  3664.4    11.15  3801.73    10.15   4069.7     9.15     4333     8.15  4562.74    10.15

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
       0     .05  2820.77    .035   3623.2     .05

Bank Sta: Left   Right     Coeff Contr.    Expan.
       2820.77  3623.2            .1         .3
Ineffective Flow     num=       2
   Sta L   Sta R     Elev   Permanent
       0  2819.9    30.15         F
  3693.2 4562.74    30.15         F

Upstream Embankment side slope                  =       0 horiz. to 1.0 vertical
Downstream Embankment side slope                =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow     =     .95
Elevation at which weir flow begins             =   28.15
Energy head used in spillway design             =
Spillway height used in design                  =
Weir crest shape                                = Broad Crested

Number of Piers =  5

Pier Data
Pier Station     Upstream=  2968.8    Downstream=  3062.1
Upstream     num=       2
    Width    Elev     Width    Elev
        5   -2.85         5   25.15
Downstream     num=       2
    Width    Elev     Width    Elev
        5   -2.85         5   25.15

Pier Data
Pier Station     Upstream= 3100.05    Downstream= 3193.35
Upstream     num=       2
    Width    Elev     Width    Elev
        5   -2.85         5   25.15
Downstream     num=       2
    Width    Elev     Width    Elev
        5   -2.85         5   25.15

Pier Data
```

```
Pier Station     Upstream=  3231.3    Downstream=  3324.6
Upstream     num=        2
    Width   Elev    Width   Elev
        5   -2.85       5   25.15
Downstream     num=        2
    Width   Elev    Width   Elev
        5   -2.85       5   25.15

Pier Data
Pier Station     Upstream=  3362.5    Downstream=  3455.8
Upstream     num=        2
    Width   Elev    Width   Elev
        5   -2.85       5   25.15
Downstream     num=        2
    Width   Elev    Width   Elev
        5   -2.85       5   25.15

Pier Data
Pier Station     Upstream= 3474.06    Downstream=  3567.4
Upstream     num=        2
    Width   Elev    Width   Elev
        5   -2.85       5   25.15
Downstream     num=        2
    Width   Elev    Width   Elev
        5   -2.85       5   25.15

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)                21.19    Element                Inside BR US
Inside BR DS
  W.S. US. (ft)                20.86    E.G. Elev (ft)               21.10
20.85
  Q Total (cfs)             42800.00    W.S. Elev (ft)               20.50
20.51
  Q Bridge (cfs)            42800.00    Crit W.S. (ft)               14.35
10.99
  Q Weir (cfs)                          Max Chl Dpth (ft)            22.35
22.36
  Weir Sta Lft (ft)                     Vel Total (ft/s)              5.43
 4.66
  Weir Sta Rgt (ft)                     Flow Area (sq ft)          7886.66
9174.90
  Weir Submerg                          Froude # Chl                 0.28
 0.22
  Weir Max Depth (ft)                   Specif Force (cu ft)      61777.25
75024.45
```

| | | | |
|---|---|---|---|
| Min El Weir Flow (ft) | 28.15 | Hydr Depth (ft) | 11.88 |
| 13.82 | | | |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 794.50 |
| 824.47 | | | |
| Delta EG (ft) | 0.41 | Conv. Total (cfs) | 1387853.0 |
| 1927575.0 | | | |
| Delta WS (ft) | 0.32 | Top Width (ft) | 664.00 |
| 664.00 | | | |
| BR Open Area (sq ft) | 9848.38 | Frctn Loss (ft) | 0.17 |
| 0.04 | | | |
| BR Open Vel (ft/s) | 5.43 | C & E Loss (ft) | 0.08 |
| 0.03 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.59 |
| 0.34 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 3.20 |
| 1.60 | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 6809

INPUT
Description: Downstream of I-5
Station Elevation Data num= 55

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 126.5 | 17.15 | 145.53 | 16.15 | 180.9 | 15.15 | 205.46 | 15.15 |
| 241.63 | 14.15 | 273.24 | 14.15 | 305.7 | 13.15 | 357.1 | 12.15 | 390.3 | 11.15 |
| 439.76 | 10.15 | 507.5 | 10.15 | 523.23 | 11.15 | 561.6 | 15.15 | 602.98 | 16.15 |
| 655.56 | 17.15 | 866.67 | 17.15 | 953.91 | 18.15 | 1168.1 | 18.15 | 1230.35 | 17.15 |
| 1311.71 | 15.15 | 1513.9 | 11.15 | 1711.72 | 11.15 | 1778 | 12.15 | 1965.24 | 12.15 |
| 2228.14 | 12.15 | 2391.4 | 14.15 | 2778.55 | 14.15 | 2820.77 | 12.86 | 2843.9 | 12.15 |
| 2909 | 12.15 | 2917.53 | 14.15 | 2933.6 | 14.15 | 2937.23 | 13.15 | 2972.3 | 13.15 |
| 2982 | 18.15 | 3004.52 | 18.15 | 3039.74 | 6.65 | 3134 | 6.4 | 3243.49 | 6.15 |
| 3287 | 5.9 | 3327.81 | 5.65 | 3367.54 | 5.4 | 3409.64 | 5.15 | 3439.04 | -1.85 |
| 3441.87 | -1.85 | 3571.57 | 7.15 | 3623.2 | 11.58 | 3629.85 | 12.15 | 3641.07 | 12.15 |
| 3664.4 | 11.15 | 3801.73 | 10.15 | 4069.7 | 9.15 | 4333 | 8.15 | 4562.74 | 10.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 2820.77 | .035 | 3623.2 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 2820.77 | 3623.2 | 1290.06 | 147.74 | 464.74 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2819.9 | 30.15 | F |
| 3693.2 | 4562.74 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.78 | Element | Left OB | Channel |

| | | | | |
|---|---|---|---|---|
| Right OB | | | | |
| Vel Head (ft) | 0.24 | Wt. n-Val. | 0.050 | 0.035 |
| 0.050 | | | | |
| W.S. Elev (ft) | 20.54 | Reach Len. (ft) | 1290.06 | 147.74 |
| 464.74 | | | | |
| Crit W.S. (ft) | 10.81 | Flow Area (sq ft) | 6.67 | 10443.93 |
| 632.84 | | | | |
| E.G. Slope (ft/ft) | 0.000287 | Area (sq ft) | 17548.25 | 10443.93 |
| 10385.07 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 13.06 | 41404.71 |
| 1382.23 | | | | |
| Top Width (ft) | 4479.15 | Top Width (ft) | 2737.18 | 802.43 |
| 939.54 | | | | |
| Vel Total (ft/s) | 3.86 | Avg. Vel. (ft/s) | 1.96 | 3.96 |
| 2.18 | | | | |
| Max Chl Dpth (ft) | 22.39 | Hydr. Depth (ft) | 7.67 | 13.02 |
| 9.04 | | | | |
| Conv. Total (cfs) | 2526088.0 | Conv. (cfs) | 770.9 | 2443737.0 |
| 81580.2 | | | | |
| Length Wtd. (ft) | 153.03 | Wetted Per. (ft) | 0.87 | 807.18 |
| 70.05 | | | | |
| Min Ch El (ft) | -1.85 | Shear (lb/sq ft) | 0.14 | 0.23 |
| 0.16 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.27 | 0.92 |
| 0.35 | | | | |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 281.27 | 2138.49 |
| 128.17 | | | | |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 45.60 | 134.62 |
| 13.53 | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 6661

INPUT
Description:
Station Elevation Data num= 68

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 73.26 | 22.15 | 142.34 | 17.15 | 198.2 | 12.33 | 200.3 | 12.15 |
| 217.16 | 11.15 | 237.34 | 10.15 | 256.86 | 9.15 | 298.5 | 8.15 | 342.19 | 7.15 |
| 519.66 | 7.15 | 587.23 | 8.15 | 666.14 | 9.15 | 727.86 | 10.15 | 782.23 | 11.15 |
| 854.16 | 11.15 | 910.44 | 10.15 | 948.9 | 10.15 | 956.1 | 9.15 | 970.03 | 8.15 |
| 1025.92 | 7.15 | 1219.7 | 6.15 | 1323.3 | 5.15 | 1392.11 | 6.15 | 1411.7 | 9.15 |
| 1519.6 | 9.15 | 1532.02 | 5.15 | 1571.5 | 4.15 | 1609.72 | 3.15 | 1713.8 | 1.15 |
| 1769.85 | .15 | 1807.76 | -1.85 | 2408.16 | -1.85 | 2440.8 | .15 | 2663.86 | 1.15 |
| 2799.43 | 4.15 | 2835.33 | 5.15 | 2856.62 | 10.15 | 2901.3 | 12.15 | 2911.1 | 14.15 |
| 2950.5 | 15.15 | 2956.5 | 18.15 | 2979.06 | 18.15 | 3013.35 | 6.65 | 3114.64 | 6.4 |
| 3217.61 | 6.15 | 3261.71 | 5.9 | 3341.87 | 5.4 | 3386.06 | 4.15 | 3416.07 | -1.85 |
| 3454.32 | -1.85 | 3491.1 | -.85 | 3522.46 | 2.15 | 3535.54 | 7.15 | 3537.58 | 9.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3542.05 | 10.15 | 3557.3 | 10.15 | 3559.85 | 11.15 | 3567.6 | 11.15 | 3573.34 | 10.15 |
| 3642.5 | 10.15 | 3782.9 | 9.15 | 4150.47 | 8.15 | 4334.46 | 8.15 | 4352.2 | 9.15 |
| 4366.54 | 11.15 | 4463.3 | 11.15 | 4568.81 | 11.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 198.2 | .035 | 4463.3 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 198.2 | 4463.3 | 321.4 | 224.95 198.11 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2600.8 | 30.15 | F |
| 3781.1 | 4568.81 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.71 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.10 | Wt. n-Val. | | 0.035 |
| W.S. Elev (ft) | 20.61 | Reach Len. (ft) | 321.40 | 224.95 |
| 198.11 Crit W.S. (ft) | 8.37 | Flow Area (sq ft) | | 16776.90 |
| E.G. Slope (ft/ft) | 0.000106 | Area (sq ft) | 410.95 | 63936.86 |
| 998.48 Q Total (cfs) | 42800.00 | Flow (cfs) | | 42800.00 |
| Top Width (ft) | 4474.32 | Top Width (ft) | 103.71 | 4265.10 |
| 105.51 Vel Total (ft/s) | 2.55 | Avg. Vel. (ft/s) | | 2.55 |
| Max Chl Dpth (ft) | 22.46 | Hydr. Depth (ft) | | 14.21 |
| Conv. Total (cfs) | 4164467.0 | Conv. (cfs) | | 4164467.0 |
| Length Wtd. (ft) | 224.95 | Wetted Per. (ft) | | 1186.67 |
| Min Ch El (ft) | -1.85 | Shear (lb/sq ft) | | 0.09 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.24 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 15.33 | 2012.35 |
| 67.45 C & E Loss (ft) | 0.02 | Cum SA (acres) | 3.53 | 126.03 |
| 7.96 | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 6437

INPUT
Description:
Station Elevation Data num= 74

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 187.11 | 12.37 | 189.89 | 12.15 | 216.55 | 10.15 | 238.46 | 9.15 |
| 270.9 | 8.15 | 315.41 | 7.15 | 539.57 | 7.15 | 587.06 | 6.15 | 700.85 | 5.15 |
| 764.94 | 4.15 | 796.11 | 3.15 | 852.9 | 2.15 | 1052.61 | 1.15 | 1267.8 | 1.15 |
| 1374.3 | 2.15 | 1452.16 | 3.15 | 1464.83 | 5.15 | 1502.5 | 6.15 | 1527.05 | 7.15 |
| 1534.75 | 8.15 | 1536.88 | 9.15 | 1549.3 | 9.15 | 1558.97 | 6.15 | 1563.23 | 5.15 |
| 1593.09 | 4.15 | 1622.57 | 3.15 | 1710.81 | .15 | 1723.2 | -1.85 | 1882.87 | -2.85 |
| 2052.23 | -3.85 | 2504.34 | -3.85 | 2609.73 | -2.85 | 2719.26 | -1.85 | 2731.25 | .15 |
| 2786.37 | 2.15 | 2868.96 | 5.15 | 2883.54 | 9.15 | 2905.7 | 13.15 | 2916.5 | 18.15 |
| 2938.43 | 18.15 | 2971.43 | 7.15 | 3066.53 | 6.4 | 3169.5 | 6.15 | 3213.73 | 5.9 |
| 3254.05 | 5.65 | 3293.22 | 5.4 | 3333.3 | 5.15 | 3337.5 | 4.15 | 3338.3 | 3.15 |
| 3341.82 | 2.15 | 3378.75 | -1.85 | 3442.34 | -.85 | 3495.5 | 2.15 | 3500.85 | 3.15 |
| 3502.14 | 4.15 | 3504.38 | 5.15 | 3506.07 | 6.15 | 3507.55 | 7.15 | 3511 | 8.15 |
| 3521.75 | 11.15 | 3539.68 | 12.15 | 3544.12 | 12.15 | 3556.04 | 11.15 | 3605.61 | 10.15 |
| 3671.64 | 9.15 | 3747.43 | 8.15 | 4032.7 | 8.15 | 4392.9 | 9.15 | 4405.25 | 10.15 |
| 4414.57 | 12.15 | 4415.52 | 12.18 | 4446.25 | 13.15 | 4479.88 | 13.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 187.11 | .035 | 4415.52 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 187.11 | 4415.52 | 407.84 | 510.16 | 564.9 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2279.4 | 30.15 | F |
| 3929.86 | 4479.88 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.04 | Wt. n-Val. | | 0.035 |
| W.S. Elev (ft) | 20.65 | Reach Len. (ft) | 407.84 | 510.16 |
| 564.90 | | | | |
| Crit W.S. (ft) | 2.90 | Flow Area (sq ft) | | 27770.76 |
| E.G. Slope (ft/ft) | 0.000031 | Area (sq ft) | 433.61 | 72279.49 |
| 497.39 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | | 42800.00 |
| Top Width (ft) | 4397.55 | Top Width (ft) | 104.78 | 4228.41 |
| 64.36 | | | | |
| Vel Total (ft/s) | 1.54 | Avg. Vel. (ft/s) | | 1.54 |
| Max Chl Dpth (ft) | 24.50 | Hydr. Depth (ft) | | 16.83 |
| Conv. Total (cfs) | 7719970.0 | Conv. (cfs) | | 7719970.0 |
| Length Wtd. (ft) | 510.16 | Wetted Per. (ft) | | 1657.44 |
| Min Ch El (ft) | -3.85 | Shear (lb/sq ft) | | 0.03 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.05 |

| | | | | |
|---|---|---|---|---|
| Frctn Loss (ft) 64.05 | 0.01 | Cum Volume (acre-ft) | 12.21 | 1660.63 |
| C & E Loss (ft) 7.57 | 0.01 | Cum SA (acres) | 2.76 | 104.09 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 5926

INPUT
Description:
Station Elevation Data num= 54

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 149.15 | 12.23 | 149.9 | 12.15 | 166.22 | 11.15 | 230.5 | 7.15 |
| 807.3 | 7.15 | 836.52 | 3.15 | 853.84 | 2.15 | 890.9 | 1.15 | 1444.82 | 1.15 |
| 1519.4 | 2.15 | 1557.1 | 3.15 | 1569.84 | 5.15 | 1582.3 | 6.15 | 1588.77 | 7.15 |
| 1591.2 | 8.15 | 1649.7 | 9.15 | 1664.55 | 9.15 | 1791.1 | 8.15 | 1807.1 | 7.15 |
| 1821.5 | 6.15 | 1836.7 | 5.15 | 1933.9 | 2.15 | 1962.2 | 1.15 | 1989.6 | .15 |
| 2002.2 | -1.85 | 2354.9 | -3.85 | 2493.3 | -3.85 | 2598.6 | -2.85 | 2701 | -1.85 |
| 2713.5 | .15 | 2852.92 | 5.15 | 2870 | 10.15 | 2896.14 | 13.15 | 2906.6 | 18.15 |
| 2928.7 | 18.15 | 2962.1 | 7.15 | 3129.9 | 6.4 | 3232.55 | 6.15 | 3277.77 | 5.9 |
| 3356.66 | 5.15 | 3401.44 | 4.15 | 3408.4 | 3.15 | 3441.6 | .15 | 3522 | .15 |
| 3560.44 | 3.15 | 3567.4 | 4.15 | 3571 | 7.15 | 3630.7 | 8.15 | 3642 | 14.15 |
| 3644.9 | 14.15 | 3653.65 | 12.15 | 4540.9 | 12.15 | 4680.26 | 12.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 149.15 | .035 | 4540.9 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 149.15 | 4540.9 | 1306.04 | 593.43 | 542.48 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1758.1 | 30.15 | F |
| 4392.9 | 4680.26 | 30.15 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.67 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.02 | Wt. n-Val. | | 0.035 |
| W.S. Elev (ft) | 20.65 | Reach Len. (ft) | 1306.04 | 593.43 |
| 542.48 Crit W.S. (ft) | 1.88 | Flow Area (sq ft) | | 41152.88 |
| E.G. Slope (ft/ft) | 0.000015 | Area (sq ft) | 354.35 | 67958.23 |
| 1184.54 Q Total (cfs) | 42800.00 | Flow (cfs) | | 42800.00 |
| Top Width (ft) | 4615.28 | Top Width (ft) | 84.17 | 4391.75 |

| | | | | | |
|---|---|---|---|---|---|
| 139.36 | | | | | |
| Vel Total (ft/s) | 1.04 | Avg. Vel. (ft/s) | | | 1.04 |
| Max Chl Dpth (ft) | 24.50 | Hydr. Depth (ft) | | | 15.62 |
| Conv. Total (cfs) | 10895820.0 | Conv. (cfs) | | | |
| 10895820.0 | | | | | |
| Length Wtd. (ft) | 592.39 | Wetted Per. (ft) | | | 2642.42 |
| Min Ch El (ft) | -3.85 | Shear (lb/sq ft) | | | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | | 0.02 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | | 8.52 | 839.42 |
| 53.14 | | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 1.88 | 53.62 |
| 6.25 | | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Dieguito Riv
REACH: 1 RS: 5333

INPUT
Description:
Station Elevation Data num= 113

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 12.23 | 22.15 | 14.59 | 21.15 | 23.42 | 18.15 | 26.93 | 17.15 |
| 30.68 | 16.15 | 34.49 | 15.15 | 41.48 | 14.15 | 48.41 | 13.15 | 56.22 | 12.15 |
| 57.11 | 12.08 | 69.03 | 11.15 | 87.66 | 10.15 | 101.96 | 9.15 | 115.82 | 8.15 |
| 129.67 | 7.15 | 141.97 | 6.15 | 151.79 | 5.15 | 161.54 | 4.15 | 170.25 | 3.15 |
| 178.96 | 2.15 | 198.59 | 1.15 | 278.77 | 1.15 | 312.94 | 2.15 | 326.16 | 3.15 |
| 333.36 | 4.15 | 412.15 | 4.15 | 438.65 | 3.15 | 443.36 | 2.15 | 456.16 | 1.15 |
| 521.64 | 3.15 | 526.95 | 4.15 | 539.2 | 5.15 | 573.21 | 6.15 | 724.42 | 7.15 |
| 734.29 | 7.15 | 1059.37 | 7.15 | 1066 | 6.15 | 1068.73 | 5.15 | 1071.38 | 4.15 |
| 1076.82 | 3.15 | 1091.51 | 2.15 | 1132.22 | 2.15 | 1169 | 3.15 | 1182.6 | 4.15 |
| 1186.4 | 5.15 | 1214 | 5.15 | 1383.6 | 5.15 | 1408 | 4.15 | 1415.4 | 3.15 |
| 1430.8 | 2.15 | 1470.9 | 2.15 | 1485.5 | 5.15 | 1500.75 | 6.15 | 1702.7 | 7.15 |
| 1724 | 8.15 | 1729.26 | 9.15 | 1736.2 | 10.15 | 1745.14 | 10.15 | 1749.15 | 9.15 |
| 1752.7 | 8.15 | 1755.34 | 7.15 | 1765.93 | 5.15 | 1781.5 | 4.15 | 1799.94 | 3.15 |
| 1812.53 | 2.15 | 1833.88 | .15 | 1850.12 | .15 | 1858.45 | -1.85 | 1997.5 | -1.85 |
| 2012.7 | -.85 | 2083.7 | .15 | 2135.8 | -1.85 | 2295.3 | -1.85 | 2315.42 | .15 |
| 2349.9 | 1.15 | 2397.2 | 2.15 | 2433.17 | 3.15 | 2466.5 | 4.15 | 2497.88 | 5.15 |
| 2513.2 | 9.15 | 2536.14 | 10.15 | 2553 | 18.15 | 2577 | 18.15 | 2611.6 | 7.15 |
| 2745 | 6.4 | 2888.3 | 6.15 | 3001.2 | 5.4 | 3029.3 | 5.15 | 3033.5 | 3.15 |
| 3039 | 2.15 | 3052.25 | 1.15 | 3070 | .15 | 3088.8 | -.85 | 3117.6 | -1.85 |
| 3155.9 | -1.85 | 3164.9 | -.85 | 3173.7 | .15 | 3183.5 | 1.15 | 3192.4 | 2.15 |
| 3194.4 | 3.15 | 3200.1 | 6.15 | 3286.9 | 7.15 | 3292 | 8.15 | 3297.1 | 9.15 |
| 3327.6 | 10.15 | 3369.3 | 10.15 | 3380.1 | 11.15 | 3385.8 | 13.15 | 3389.76 | 14.15 |
| 3418.9 | 12.15 | 3536.6 | 12.15 | 4401.26 | 12.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 57.11 | .035 | 3536.6 | .05 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 57.11 | 3536.6 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 20.66 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.050 | 0.035 |
| 0.050 | | | | |
| W.S. Elev (ft) | 20.65 | Reach Len. (ft) | | |
| Crit W.S. (ft) | 3.71 | Flow Area (sq ft) | 214.30 | 55275.19 |
| 7349.61 | | | | |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 214.30 | 55275.19 |
| 7349.61 | | | | |
| Q Total (cfs) | 42800.00 | Flow (cfs) | 51.32 | 40288.46 |
| 2460.22 | | | | |
| Top Width (ft) | 4385.20 | Top Width (ft) | 41.05 | 3479.49 |
| 864.66 | | | | |
| Vel Total (ft/s) | 0.68 | Avg. Vel. (ft/s) | 0.24 | 0.73 |
| 0.33 | | | | |
| Max Chl Dpth (ft) | 22.50 | Hydr. Depth (ft) | 5.22 | 15.89 |
| 8.50 | | | | |
| Conv. Total (cfs) | 15723180.0 | Conv. (cfs) | 18854.9 | |
| 14800530.0 903794.3 | | | | |
| Length Wtd. (ft) | | Wetted Per. (ft) | 42.07 | 3489.80 |
| 873.16 | | | | |
| Min Ch El (ft) | -1.85 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.00 | | | | |
| Alpha | 1.09 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | |
| C & E Loss (ft) | | Cum SA (acres) | | |

SUMMARY OF MANNING'S N VALUES

River:San Dieguito Riv

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| 1 | 13555 | .035 | .05 | .035 |
| 1 | 11854 | .05 | .035 | .05 |
| 1 | 10577 | .05 | .035 | .05 |
| 1 | 9777 | .05 | .035 | .05 |
| 1 | 9274 | .05 | .035 | .05 |
| 1 | 8043 | .05 | .035 | .05 |
| 1 | 7554 | .05 | .035 | .05 |
| 1 | 7286 | .05 | .035 | .05 |
| 1 | 7000 | Bridge | | |
| 1 | 6809 | .05 | .035 | .05 |
| 1 | 6661 | .05 | .035 | .05 |

| | | | | |
|---|---|---|---|---|
| 1 | 6437 | .05 | .035 | .05 |
| 1 | 5926 | .05 | .035 | .05 |
| 1 | 5333 | .05 | .035 | .05 |

SUMMARY OF REACH LENGTHS

River: San Dieguito Riv

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| 1 | 13555 | 1909.77 | 1701.26 | 1796 |
| 1 | 11854 | 743.4 | 1277.32 | 1429.64 |
| 1 | 10577 | 809.4 | 800.27 | 1102.6 |
| 1 | 9777 | 275.06 | 502.66 | 1232.3 |
| 1 | 9274 | 1312.7 | 1232.14 | 731.7 |
| 1 | 8043 | 2307.4 | 488.53 | 209.2 |
| 1 | 7554 | 1488 | 268.5 | 1186.87 |
| 1 | 7286 | 640.24 | 476.55 | 543.46 |
| 1 | 7000 | Bridge | | |
| 1 | 6809 | 1290.06 | 147.74 | 464.74 |
| 1 | 6661 | 321.4 | 224.95 | 198.11 |
| 1 | 6437 | 407.84 | 510.16 | 564.9 |
| 1 | 5926 | 1306.04 | 593.43 | 542.48 |
| 1 | 5333 | | | |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: San Dieguito Riv

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| 1 | 13555 | .1 | .3 |
| 1 | 11854 | .1 | .3 |
| 1 | 10577 | .1 | .3 |
| 1 | 9777 | .1 | .3 |
| 1 | 9274 | .1 | .3 |
| 1 | 8043 | .1 | .3 |
| 1 | 7554 | .1 | .3 |
| 1 | 7286 | .1 | .3 |
| 1 | 7000 | Bridge | |
| 1 | 6809 | .1 | .3 |
| 1 | 6661 | .1 | .3 |
| 1 | 6437 | .1 | .3 |
| 1 | 5926 | .1 | .3 |
| 1 | 5333 | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | |
| | | | (cfs) | (ft) | (ft) | (ft) |
| (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | |
| 1 | 13555 | PF 1 | 42800.00 | 8.82 | 21.82 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 22.47 | 0.002186 | 7.41 | 7194.81 | 1525.74 | 0.37 | |
| 1 | | 11854 | PF 1 | 42800.00 | 3.15 | 21.47 | |
| | 21.55 | 0.000180 | 2.27 | 18904.49 | 2381.91 | 0.14 | |
| 1 | | 10577 | PF 1 | 42800.00 | 2.15 | 21.33 | |
| | 21.39 | 0.000087 | 1.98 | 21864.14 | 1982.94 | 0.10 | |
| 1 | | 9777 | PF 1 | 42800.00 | -3.85 | 21.32 | |
| | 21.34 | 0.000024 | 1.15 | 37586.72 | 2926.05 | 0.06 | |
| 1 | | 9274 | PF 1 | 42800.00 | 2.15 | 21.31 | |
| | 21.33 | 0.000030 | 1.21 | 36051.75 | 3136.81 | 0.06 | |
| 1 | | 8043 | PF 1 | 42800.00 | -0.85 | 21.28 | 7.34 |
| | 21.30 | 0.000020 | 1.12 | 45436.72 | 4322.85 | 0.05 | |
| 1 | | 7554 | PF 1 | 42800.00 | -0.85 | 21.23 | 7.18 |
| | 21.27 | 0.000050 | 1.68 | 25405.33 | 5852.15 | 0.08 | |
| 1 | | 7286 | PF 1 | 42800.00 | -1.85 | 20.86 | 13.65 |
| | 21.19 | 0.000418 | 5.30 | 10493.68 | 5227.42 | 0.24 | |
| 1 | | 7000 | | Bridge | | | |
| 1 | | 6809 | PF 1 | 42800.00 | -1.85 | 20.54 | 10.81 |
| | 20.78 | 0.000287 | 3.96 | 11083.44 | 4479.15 | 0.19 | |
| 1 | | 6661 | PF 1 | 42800.00 | -1.85 | 20.61 | 8.37 |
| | 20.71 | 0.000106 | 2.55 | 16776.90 | 4474.32 | 0.12 | |
| 1 | | 6437 | PF 1 | 42800.00 | -3.85 | 20.65 | 2.90 |
| | 20.68 | 0.000031 | 1.54 | 27770.76 | 4397.55 | 0.07 | |
| 1 | | 5926 | PF 1 | 42800.00 | -3.85 | 20.65 | 1.88 |
| | 20.67 | 0.000015 | 1.04 | 41152.88 | 4615.28 | 0.05 | |
| 1 | | 5333 | PF 1 | 42800.00 | -1.85 | 20.65 | 3.71 |
| | 20.66 | 0.000007 | 0.73 | 62839.10 | 4385.20 | 0.03 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : SDR_Prop

River: San Dieguito Riv Reach: 1 RS: 13555 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Dieguito Riv Reach: 1 RS: 11854 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Dieguito Riv Reach: 1 RS: 10577 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Dieguito Riv Reach: 1 RS: 8043 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 7554 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical

depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 7286 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 7000 Profile: PF 1 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 7000 Profile: PF 1 Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 6809 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Dieguito Riv Reach: 1 RS: 6661 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 6437 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Dieguito Riv Reach: 1 RS: 5926 Profile: PF 1
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.

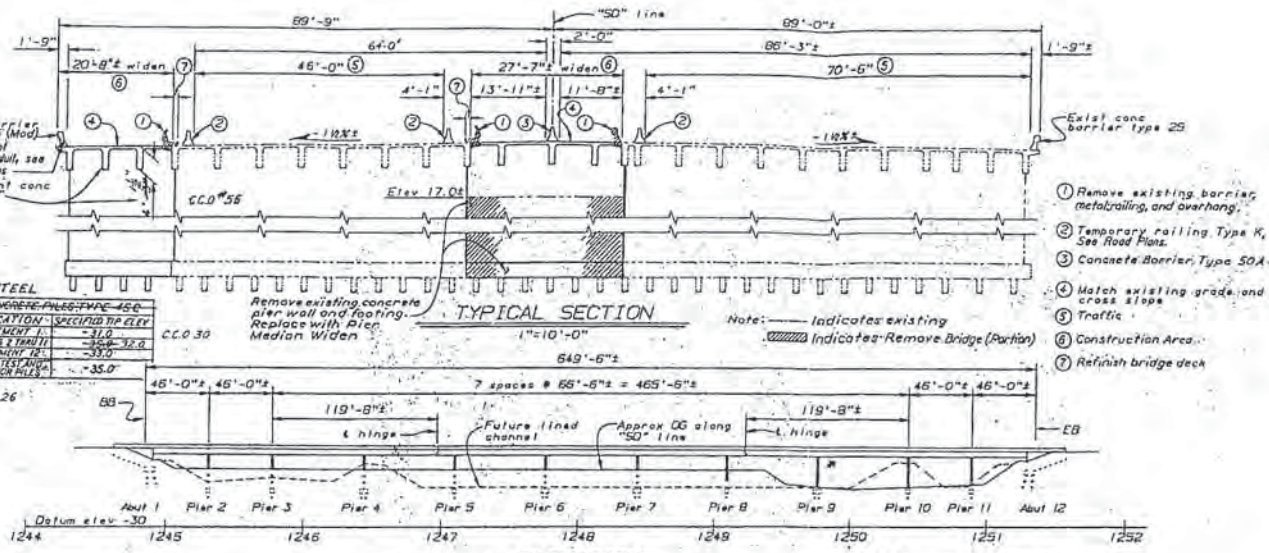
# APPENDIX 'C'

## Location Hydraulic Study Form

## Floodplain Encroachment Form

## As-builts

## Backup Data




TYPICAL SECTION

1"=10'-0"

Note: —— Indicates existing

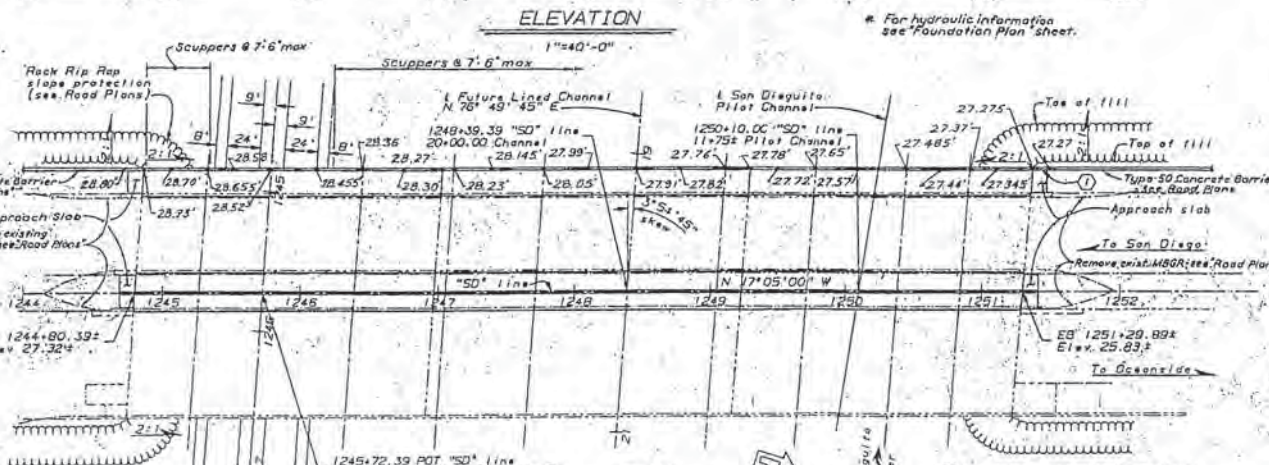
▨ Indicates Remove Bridge (Portion)

① Remove existing barrier, metal railing, and overhang.
② Temporary railing Type K, See Road Plans.
③ Concrete Barrier, Type 50A
④ Match existing grade and cross slope
⑤ Traffic
⑥ Construction Area
⑦ Refinish bridge deck

STEEL

| ~~CONCRETE PILES TYPE 45 C~~ | |
|---|---|
| LOCATION | SPECIFIED TIP ELEV |
| ABUTMENT 1 | -31.0 |
| PIERS 2 THRU 11 | ~~-45.0~~ -32.0 |
| ABUTMENT 12 | -33.0 |
| LOAD TEST PILE & ANCHOR PILES | -35.0 |

Remove existing concrete pier wall and footing. Replace with Pier Median Widen




ELEVATION

1"=40'-0"

PLAN

1"=40'-0"

* For hydraulic information see "Foundation Plan" sheet.

① Paint "San Dieguito River Br." and "Br No 57-488L"

For General Notes see "Typical Section" sheet.

| DIST. | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | 5 | R33.6/R36.2 | 186 | 209 |

Alex Shamma
REGISTERED ENGINEER - CIVIL
Alex Shamma
No. 12226
Exp. 3-31-93
CIVIL
STATE OF CALIFORNIA

10-13-92
PLANS APPROVAL DATE

APPROXIMATE QUANTITIES

| | LUMP SUM |
|---|---|
| BRIDGE REMOVAL (PORTION), LOCATION A | LUMP SUM |
| FURNISH PILING (CLASS 45C) | 9,156 LF |
| DRIVE PILE (CLASS 45C) | 393 EA |
| DRILL AND BOND DOWEL | 720 LF |
| REFINISH BRIDGE DECK | 1,047 SQFT |
| WATERSTOP | 93 LF |
| 32" NEOPRENE STRIP | 93 LF |
| JOINT SEAL (no 1/2") | 86 LF |
| JOINT SEAL (TYPE 2-no 1 1/2") | 84 LF |

FINAL PAY QUANTITIES

| | |
|---|---|
| STRUCTURE EXCAVATION (ABUTMENT) | 130 CY |
| STRUCTURE EXCAVATION (TYPE D) | 2,660 CY |
| STRUCTURE BACKFILL (BRIDGE) | 48 CY |
| STRUCTURAL CONCRETE, BRIDGE FOOTING | 703 CY |
| STRUCTURAL CONCRETE, BRIDGE | 2,424 CY |
| STRUCTURAL CONCRETE, APPROACH SLAB (TYPE SD) | 23 CY |
| BAR REINFORCING STEEL (BRIDGE) | 260,420 LB |
| MISCELLANEOUS METAL | 2,615 LB |
| EARTHQUAKE RESTRAINER - CABLE TYPE I | 700 LB |
| MISCELLANEOUS METAL (BRIDGE) | 400 LF |
| CONCRETE BARRIER (TYPE 25) | 450 LF |
| CONCRETE BARRIER (TYPE 50A) | |

AS BUILT A.A.L.

CORRECTIONS BY P.A. Bizzegotta

CONTRACT NO. 11-189154

DATE 12-6-94

Standard Plan Sheet No.

Detail No.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INDEX TO PLANS

| SHEET NO. | TITLE |
|---|---|
| 1 | GENERAL PLAN |
| 2 | FOUNDATION PLAN |
| 3 | ABUTMENT DETAILS NO. 1 |
| 4 | ABUTMENT DETAILS NO. 2 |
| 5 | PIERS |
| 6 | TYPICAL SECTION |
| 7 | GIRDER LAYOUT - LEFT WIDEN |
| 8 | GIRDER LAYOUT - MEDIAN WIDEN |
| 9 | REINFORCEMENT - LEFT WIDEN |
| 10 | REINFORCEMENT - MEDIAN WIDEN |
| 11 | T-BEAM HINGE DETAILS - ELASTOMERIC |
| 12 | EARTHQUAKE RESTRAINERS |
| 13 | LOAD TEST PILES (1) |
| 14 | LOAD TEST PILES (2) |
| 15 | STRUCTURE APPROACH TYPE SD (10) |
| 16 | CONCRETE BARRIER TYPE 25 (MOD) |
| 17 | LOG OF TEST BORINGS 1 OF 3 |
| 18 | LOG OF TEST BORINGS 2 OF 3 |
| 19 | LOG OF TEST BORINGS 3 OF 3 |

STANDARD PLANS DATED JANUARY 1988

| | |
|---|---|
| A12-C | EXCAVATION AND BACKFILL BRIDGE - LIMITS OF PAYMENT |
| A75-A | CONCRETE BARRIER TYPE 50 |
| 80-1 | BRIDGE DETAILS |
| 80-3 | BRIDGE DETAILS |
| 80-5 | BRIDGE DETAILS |
| 80-13 | BRIDGE DETAILS |
| 82-6 | PILE DETAILS - CLASS 45C AND 70C |
| 82-9 | LOAD TEST ANCHOR PILE DETAIL |
| 84-1 | T-BEAM DETAILS |
| 84-21 | JOINT SEAL DETAILS |
| 814-30 | TEMPORARY RAILING |

| | | | | | |
|---|---|---|---|---|---|
| DESIGN | BY A. Shamma | CHECKED Ed Mauro | LOAD FACTOR DESIGN | LIVE LOADING HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD | |
| DETAILS | BY Andy Onodera 6-91 | CHECKED Jack Martin | LAYOUT | BY A. Shamma | CHECKED Ed Mauro |
| QUANTITIES | BY Mike Wu | CHECKED Gary Gurney | SPECIFICATIONS | BY D. Blakesley 5/92 | PLANS AND WEB CHECKED BB 5/92 |

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DESIGN ENGINEER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 10

CU 11
EA 189151

BRIDGE NO. 57-488R/L
POST MILE 35.66

SAN DIEGUITO RIVER BRIDGE (WIDEN)
GENERAL PLAN

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 1 OF 19

| DIST | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | 5 | R33.6/R36.2 | 187 | 209 |

REGISTERED ENGINEER-CIVIL — Alex Strakowski, No. 17229, Exp. 9-31-93, CIVIL, STATE OF CALIFORNIA

10-13-92
PLANS APPROVAL DATE

## HYDROLOGIC SUMMARY

DRAINAGE AREA : 347 square miles

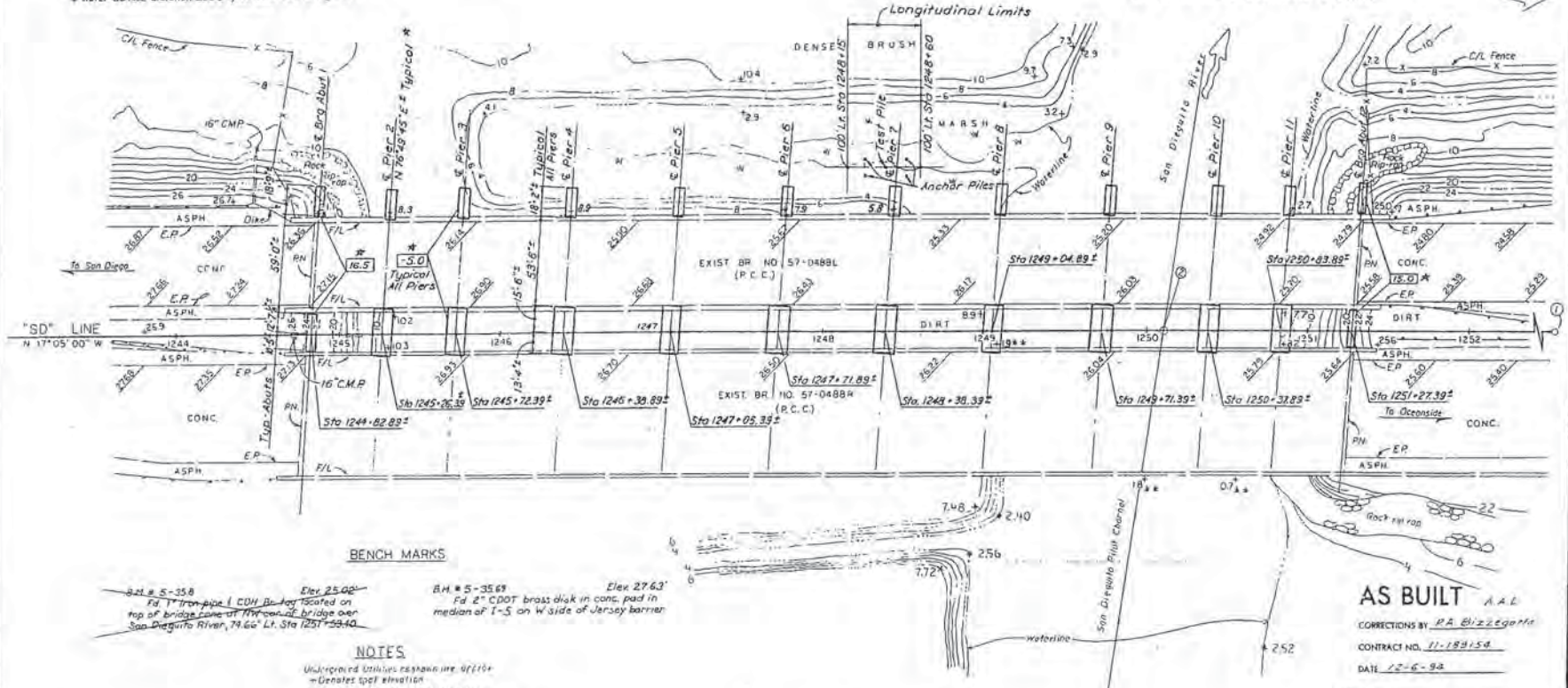
| | DESIGN FLOOD | BASE FLOOD |
|---|---|---|
| FREQUENCY (Years) | | 100 |
| DISCHARGE (Cubic feet per second) | 80,000 | 41,000 |
| WATER SURFACE (Elevation ~~at bridge~~) | 17.5'* | 14.0'* |

Flood plain data are based upon information available when the plans were prepared and are shown to meet Federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.

* Water Surface Elevation 200'± upstream from bridge ℄.

① 1285+37.79 P.O.T. "SD" Line | 298138.204 | 1692409.154
② 1250+10.00 P.O.T. "SD" Line
11+75± ℄ San Dieguito Pilot Channel

NOTE:
Piles for Pile Load Test shall be located within the Longitudinal Limits Shown. See "Load Test Pile Details" for additional details.




## BENCH MARKS

B.M. # 5-35.8 Elev. 25.90'
Fd. 1" Iron pipe | CDH Brass Tag located on top of bridge curb at NW corner of bridge over San Dieguito River, 79.66' Lt. Sta 1251+59.40

B.M. # 5-35.69 Elev. 27.63'
Fd 2" CDOT brass disk in conc. pad in median of I-5 on W side of Jersey barrier

## NOTES

Underground Utilities response line, dig to ±
→Denotes spot elevation
*Denotes bottom of footing elev.
*Denotes to be filled with 1000 cu. yd. sand
☆ Match existing
Indicates bottom of footing elev.

AS BUILT A.A.L.
CORRECTIONS BY P.A. Bizzegotto
CONTRACT NO. 11-189154
DATE 12-6-93

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

| PRELIMINARY INVESTIGATION SECTION | | | | | | | |
|---|---|---|---|---|---|---|---|
| SCALE 1" = 30' | DATUM USGS 1929 / ADJ 1950 SURVEY | PHOTOGRAMMETRY AS OF: | | DRAWN | M. Henning 6-25-91 | DESIGN | A. Strakowski |
| | | SURVEYED | | TRACED | | DETAILS | Frank Segura 3/92 |
| ALIGNMENT TIES | | FIELD CHECKED | M. Jue 5-14-91 | CHECKED | M. Jue 7-17-91 | QUANTITIES | P.A. Bizzegotto |

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

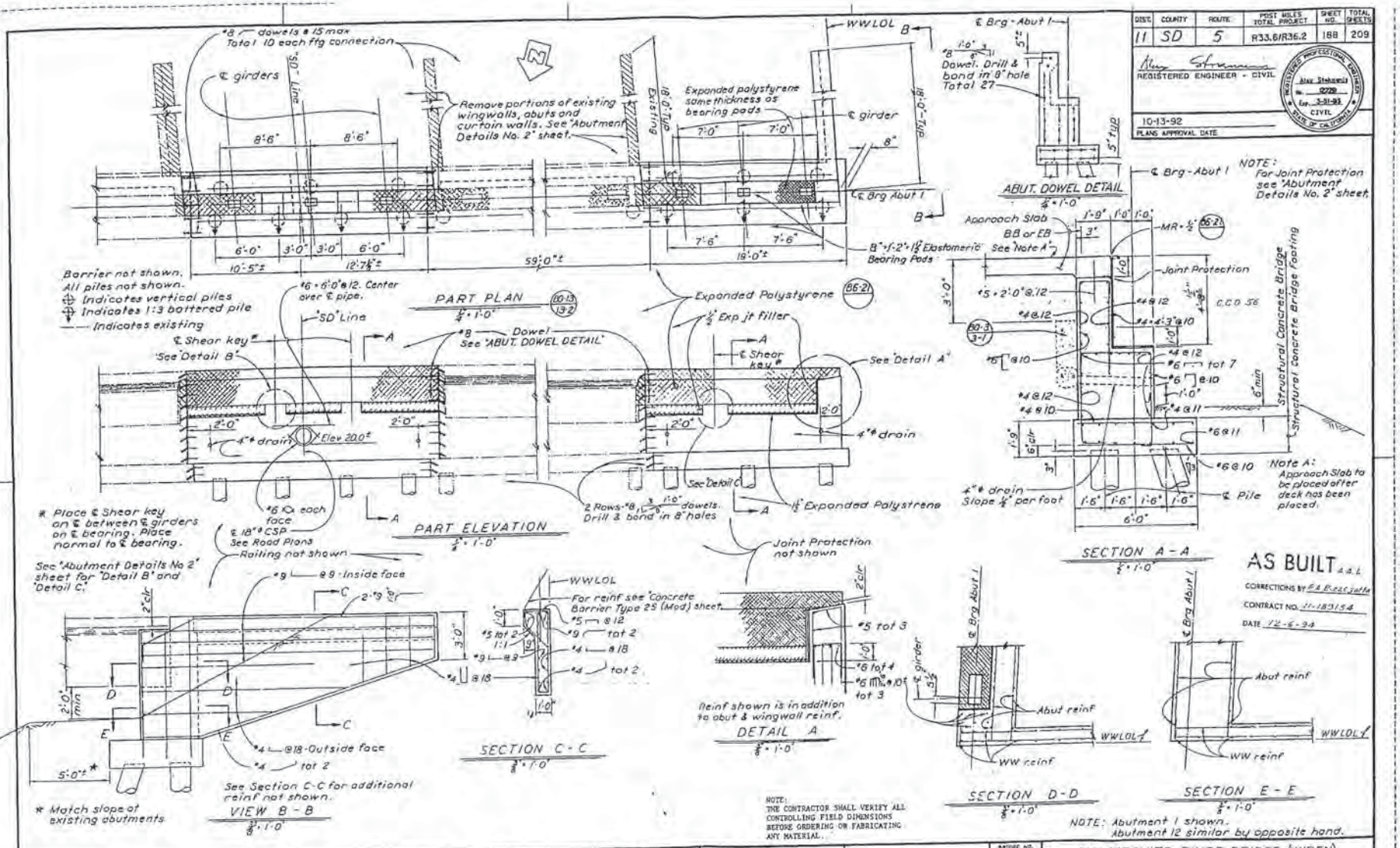
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURE DESIGN 10
CU 11
EA 189151

| BRIDGE NO. | SAN DIEGUITO RIVER BRIDGE (WIDEN) |
|---|---|
| 57-488R/L | FOUNDATION PLAN |
| POST MILE 35.66 | |

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 2 OF 19

DS 050 2145 (4/89)




| DIST. | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | 5 | R33.6/R36.2 | 188 | 209 |

REGISTERED ENGINEER - CIVIL

10-13-92
PLANS APPROVAL DATE

AS BUILT

CORRECTIONS BY

CONTRACT NO.

DATE

| DESIGN | DETAILS | QUANTITIES |
|---|---|---|
| Frank Segura 3/92 | | |

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 10

CU 11
EA 189151

BRIDGE NO. 57-488 R/L
POST MILE 35.66

SAN DIEGUITO RIVER BRIDGE (WIDEN)

ABUTMENT DETAILS NO. 1

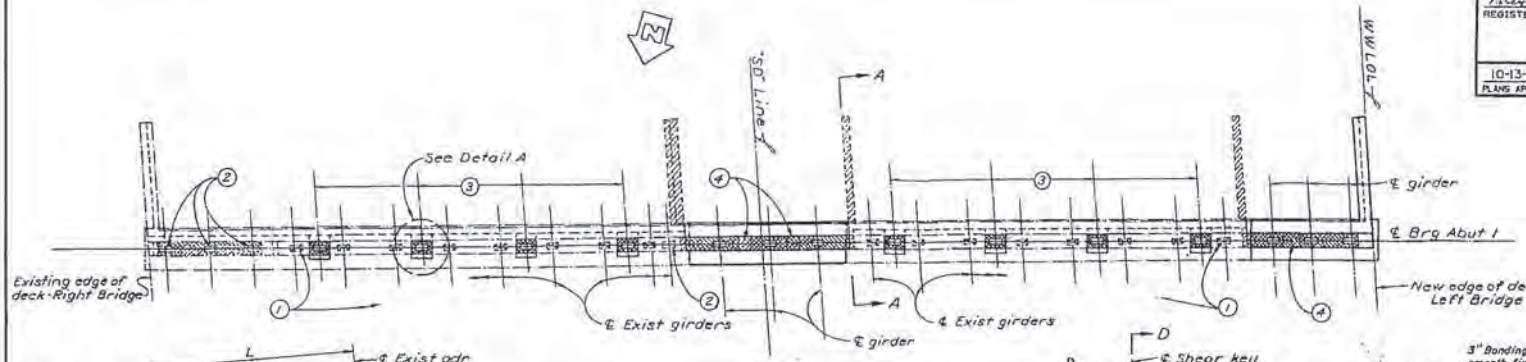
SHEET 3 OF 19

| DIST. | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | 5 | R33.6/R36.2 | 189 | 209 |

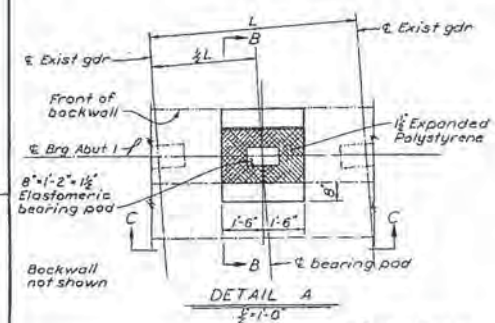
Alex Stamoulis
REGISTERED ENGINEER – CIVIL
No. 12228
Exp. 3-31-93
CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

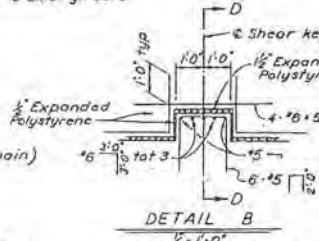
10-13-92
PLANS APPROVAL DATE

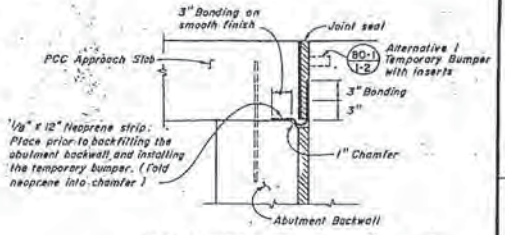
**AS BUILT** A.A.L.
CORRECTIONS BY P.A. Bizzegotto
CONTRACT NO. 11-163154
DATE 12-6-94




NOTE:
- Indicates existing
- Indicates Remove Concrete
- Indicates Expanded Polystyrene
- (1) Existing Exp Brg Assemblies (to remain)
- (2) Existing Elastomeric Pads
- (3) ℄ New Elastomeric Brg Pads
- (4) Shear key

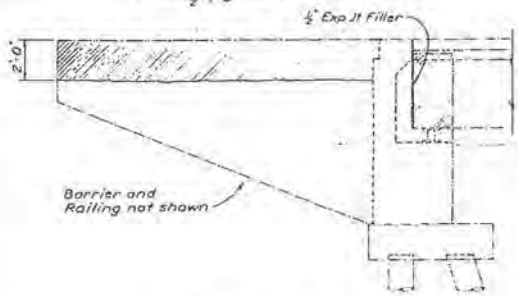


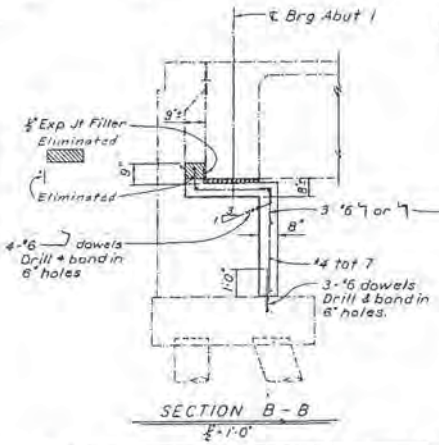



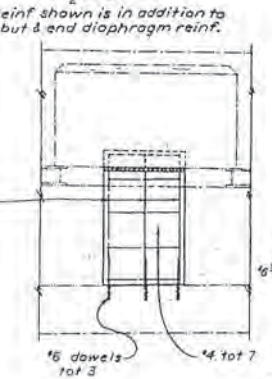



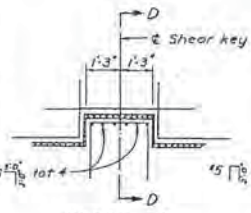

'/8" x 12" Neoprene strip: Place prior to backfilling the abutment backwall, and installing the temporary bumper. (Fold neoprene into chamfer.)

JOINT PROTECTION DETAIL *
No Scale
* For new abutments



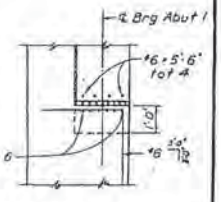




Detail C is similar to Detail B except as noted.

NOTE:
Abutment 1 shown. Abutment 12 similar by opposite hand.




NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

| | | | |
|---|---|---|---|
| DESIGN | A Stamoulis | CHECKED | |
| DETAILS | Frank Segura 3/92 | CHECKED | |
| QUANTITIES | | CHECKED | |

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 10

CU 11
EA 189151

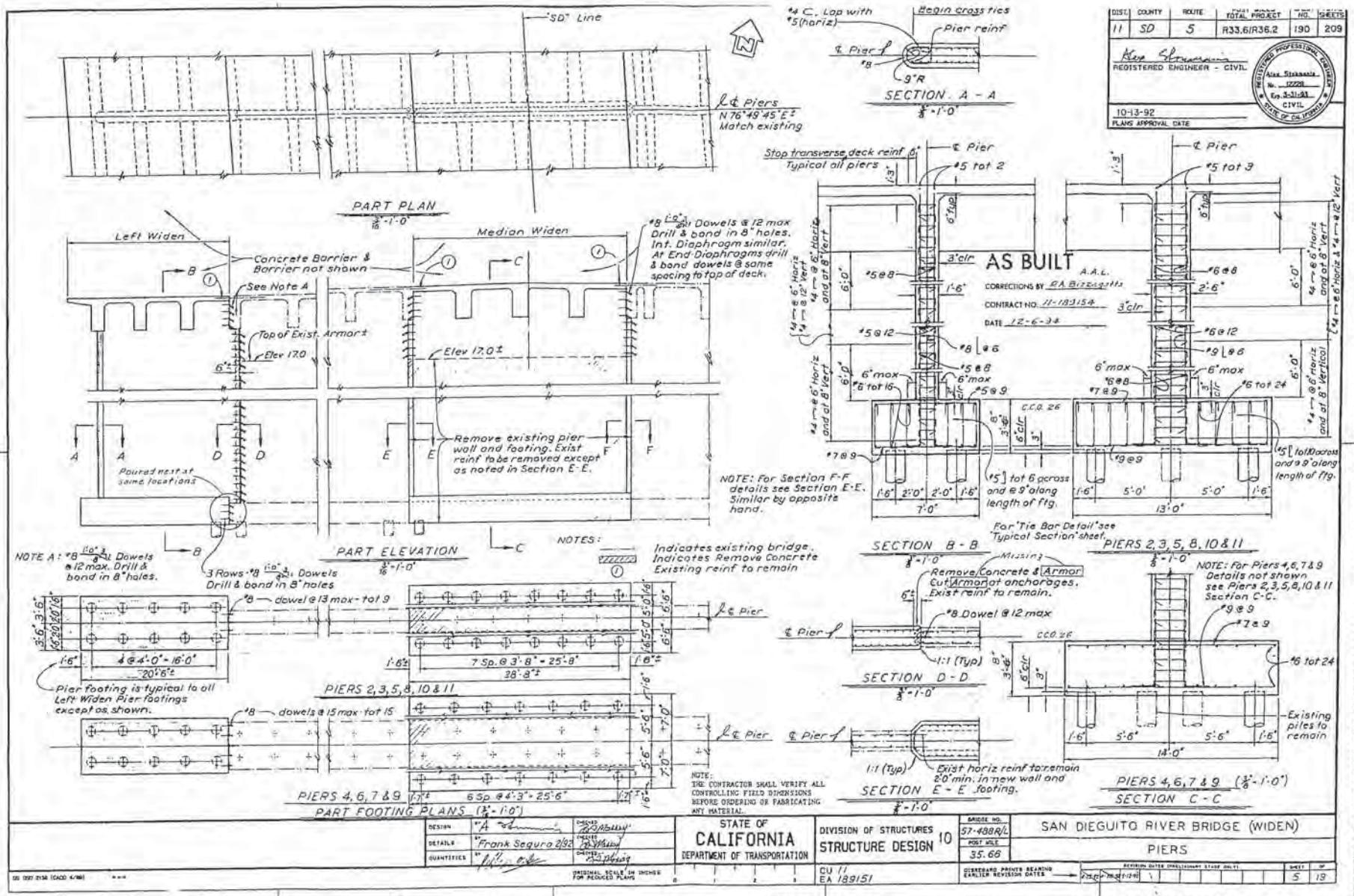
| BRIDGE NO. | 57-488R/L |
|---|---|
| POST MILE | 35.66 |

STANDARD PRINTS BEARING EARLIER REVISION DATES: 7-13-93

# SAN DIEGUITO RIVER BRIDGE (WIDEN)
## ABUTMENT DETAILS NO. 2

REVISION DATES (PRELIMINARY GRADE ONLY)

SHEET 4 OF 19




| DIST. | COUNTY | ROUTE | TOTAL PROJECT | NO. | SHEETS |
|---|---|---|---|---|---|
| 11 | SD | 5 | R33.6/R36.2 | 190 | 209 |

Kiss Stavrianis
REGISTERED ENGINEER - CIVIL
Kiss Stavrianis No. 17229 Exp. 3-31-93 CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

10-13-92
PLANS APPROVAL DATE

| | | |
|---|---|---|
| DESIGN | "A" | CHECKED |
| DETAILS | "Frank Segura 2/92" | CHECKED |
| QUANTITIES | "" | CHECKED |

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 10

| BRIDGE NO. | 57-488R/L |
|---|---|
| POST MILE | 35.66 |

CU 11
EA 189151

SAN DIEGUITO RIVER BRIDGE (WIDEN)
PIERS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

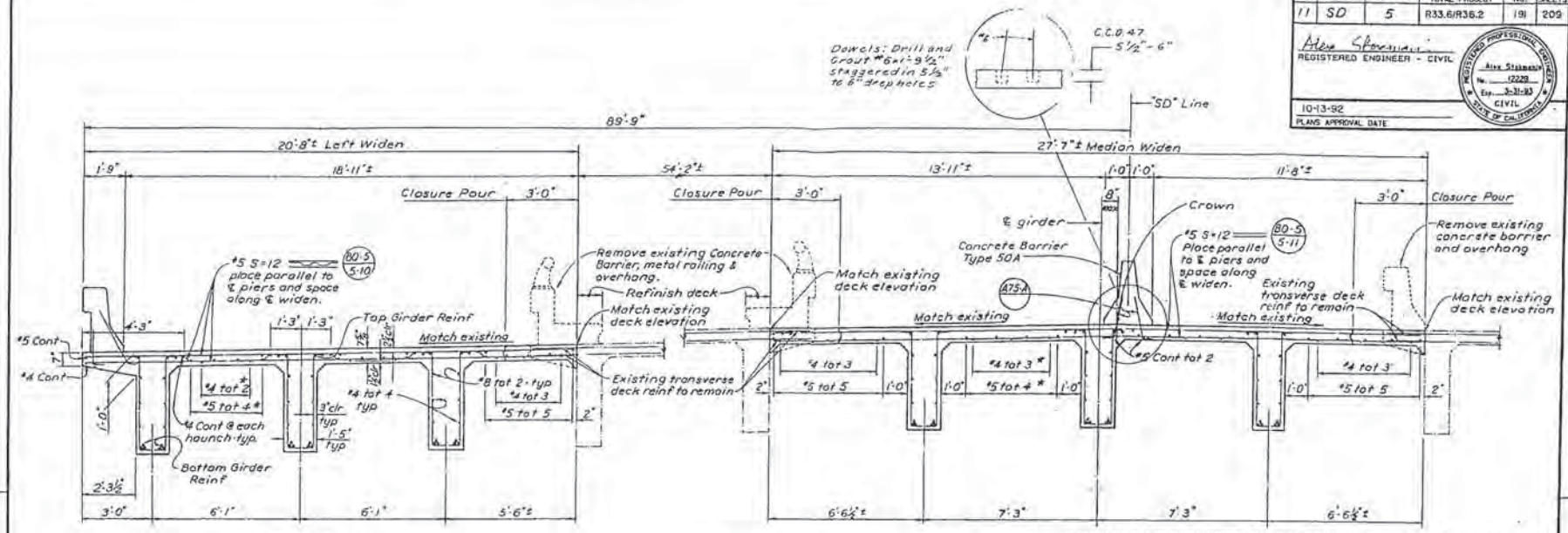
REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 5 OF 19

| DIST. | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | 5 | R33.6/R36.2 | 191 | 209 |

Alex Stamatis
REGISTERED ENGINEER - CIVIL
Alex Stamatis No. 12229 Exp. 3-31-93 CIVIL STATE OF CALIFORNIA

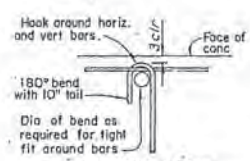
10-13-92
PLANS APPROVAL DATE



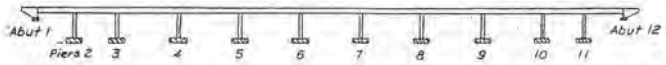

TYPICAL SECTION ½"=1'-0" (80-5 86-1)

NOTE: For Median Widen details not shown see Left Widen.
★ Typical per bay except as noted.
—— Indicates existing

AS BUILT A.A.L.
CORRECTIONS BY P.A. Bizzingarro
CONTRACT NO. 11-1J315-1
DATE 12-3-92

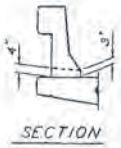



TIE BAR DETAIL
Scale: None

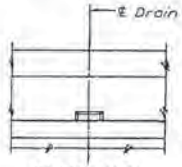



CONCRETE STRENGTH AND TYPE LIMITS
No Scale

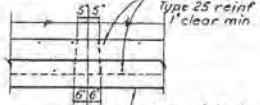
Structural Concrete, Bridge
Structural Concrete, Bridge Footing




SECTION




ELEVATION




PLAN

SCUPPER DRAIN DETAIL ½"=1'-0"

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

## GENERAL NOTES
## LOAD FACTOR DESIGN

DESIGN: BRIDGE DESIGN SPECIFICATIONS (1983 AASHTO with Interims and Revisions by CALTRANS)

DEAD LOAD: Includes 35 psf for future wearing surface.

LIVE LOADING: HS20-44 and alternative and permit design load.

SEISMIC LOADING: Peak Rock Acceleration = 0.5 g
Depth of Alluvium = 0 to 150 ft.

REINFORCED CONCRETE:
$f_y$ = 60,000 psi
$f'_c$ = 3,250 psi
n = 9

Transverse Deck Slabs (Working Stress Design)
$f_s$ = 20,000 psi
$f_c$ = 1,200 psi
n = 10

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| DESIGN | BY A. Stamatis | CHECKED B.J.Mitchell | STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION | DIVISION OF STRUCTURES STRUCTURE DESIGN 10 | BRIDGE NO. 57-488 R/L | SAN DIEGUITO RIVER BRIDGE (WIDEN) | |
| DETAILS | BY Frank Segura 2/92 | CHECKED C.E. Mauney | | | POST MILE 35.66 | TYPICAL SECTION | |
| QUANTITIES | BY Felix Mejia | CHECKED E.J. Pfeiffer | | | | | |
| ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 | | | | CU 11 EA 189151 | DISREGARD PRINTS BEARING EARLIER REVISION DATES | REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 6 OF 19 |

## LOCATION HYDRAULIC STUDY FORM

Dist. *11* Co. *SD* Rte. *005* K.P. *R54.9/R75.7*
EA Bridge No. *57-0488*
Floodplain Description:
***Meandering fresh water River with areas of shallow water, salt marshes, large ponds, and small islands. Location of interest: I-5 /San Dieguito River***

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

***This project includes an improvement to the I-5 Bridge over the San Dieguito River with 10+4+buffer alternative. The alternative requires the existing I-5 right bridge to be replaced and would not have significant impacts to the existing floodplain.***

2. ADT: Current *272,000* Projected *364,000 (year 2030)*
***(Current ADT values taken from SANDAG: Transportation Forecast Information Center)***

3. Hydraulic Data: Base Flood $Q_{100}$= *42800* $ft^3 / s$

$WSE_{100}$= *20.86 ft (Upstream face of I-5 Bridge)*
The flood of record, if greater than $Q_{100}$:
Q= *N/A* $m^3 / s$ WSE= *N/A*
Overtopping flood Q=***(no increase from existing condition)*** $m^3 / s$
WSE=***(no increase from existing condition)***

Are NFIP maps and studies available? YES **X** NO_____

4. Is the highway location alternative within a regulatory floodway ?
YES_____ NO *X*

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain. ***(See Appendix 'A')***

Potential $Q_{100}$ backwater damages:

A. Residences? NO *X* YES
B. Other Bldgs? NO *X* YES
C. Crops? NO___YES ***(no increase from existing condition)***
D. Natural and beneficial

FLOODPLAIN VALUES? NO **X** YES_____

6. Type of Traffic:

A. Emergency supply or evacuation route? NO_____YES **X**

B. Emergency vehicle access? NO_____YES__X____
C. Practicable detour available? NO_____YES__X____
D. School bus or mail route? NO_____YES__X____

7. Estimated duration of traffic interruption for 100-year event hours: **I-5 Crossing is above the Floodplain, therefore, no traffic interruptions are anticipated.**

8. Estimated value of $Q_{100}$ flood damages (if any) – moderate risk level.

A. Roadway $ ***(no increase from existing condition)***
B Property $ ***(no increase from existing condition)***
Total $ ***(no increase from existing condition)***

9. Assessment of Level of Risk Low__X____
Moderate____
High_____

For High Risk projects, during design phase, additional Design Study Risk Analysis May be necessary to determine design alternative.

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible
Floodplain development? NO___*X*___YES

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

Signature – Hydraulic/Project Engineer_____Date_____

## FLOODPLAIN ENCROACHMENT REPORT SUMMARY

Dist. *11* Co. *SD* Rte. *005* K.P. *R54.9/R75.7*
Bridge No. *57-0488*
Limits: ***I-5 / San Dieguito River***

Floodplain Description: ***Meandering fresh water River with areas of shallow water, salt marshes, large ponds, and small islands. Location of interest: I-5 /San Dieguito River.***

| | | No | Yes |
|---|---|---|---|
| 1. | Is the proposed action a longitudinal encroachment of the base floodplain? | *X* | |
| 2. | Are the risks associated with the implementation of the proposed action significant? | *X* | ___ |
| 3. | Will the proposed action support probable incompatible floodplain development? | *X* | ___ |
| 4. | Are there any significant impacts on natural and beneficial floodplain values? | *X* | ___ |
| 5. | Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain. | *X* | ___ |
| 6. | Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q). | *X* | ___ |
| 7. | Are Location Hydraulic Studies that document the above answers on file? If not explain. | ___ | *X* |

PREPARED BY:

_____ _____
Signature – Dist. Hydraulic Engineer Date

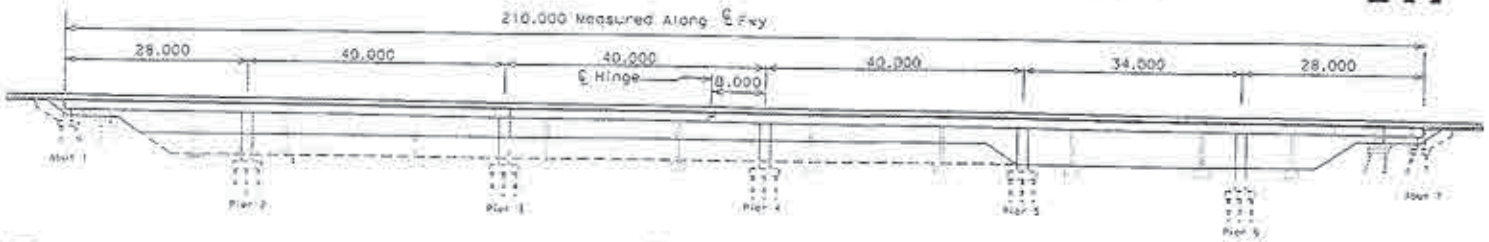
_____ _____
Signature – Dist. Environmental Branch Chief Date

_____ _____
Signature – Dist. Project Engineer Date

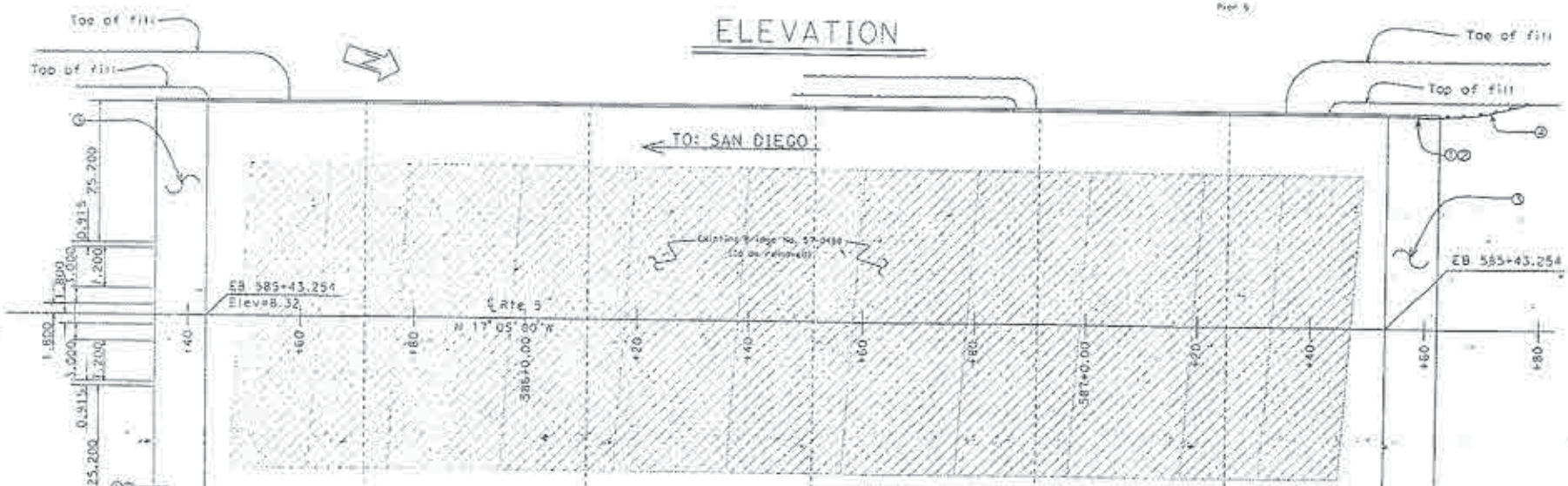
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST. | COUNTY | ROUTE | KILOMETER POST/TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |

LEGEND:
Denotes existing structure
Denotes new construction




## ELEVATION




## PLAN

NOTES:

① Point "SAN DIEGUITO RIVER BRIDGE"
② Point "BR NO. 57-0488"
③ Approach Slab Type N(9S)
④ Metal Beam Guard Rail See " Road Plans"

ASSUMPTIONS:

1 2 Stage construction
2 Abutments: Class 625C (Alt "V") Driven Piles
3 Piers: 1.22 m dia. columns on Class 625C (Alt "V") Driven Piles
4 Bridge profile is raised .600 m to accomodate existing clearances

| | |
|---|---|
| Date of Estimate | 12-28-04 PGA |
| Structure Depth | 1.600 M |
| Length | 210.000 M |
| Width | 77.070 M |
| Area | 16184 Sq M |
| Bridge Removal | 10786 Sq M |
| Cost/SM Including 10% Mobilization & 25% Contingencies | $ 1550 |
| Total Cost | $ 24,564,100 |

(1 OF 2)

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| | | | |
|---|---|---|---|
| DESIGNED BY | GARY HIGHT | DATE | 10/04 |
| DRAWN BY | GARY HIGHT | DATE | 10/04 |
| CHECKED BY | | DATE | |
| APPROVED | | DATE | |

STRUCTURE DESIGN SECTION 18

**PLANNING STUDY**

SAN DIEGUITO RIVER BR (REPLACE)

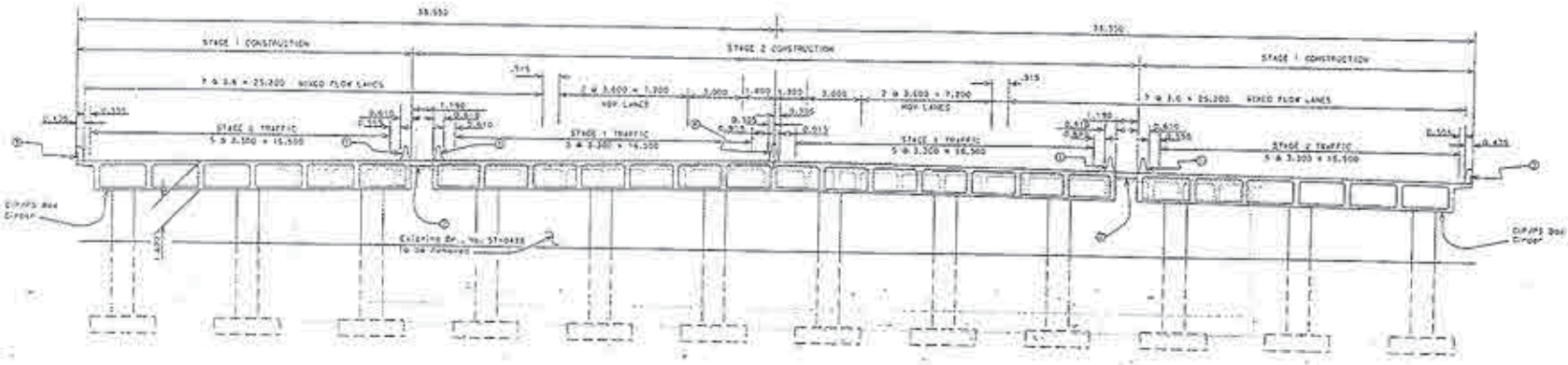
| | |
|---|---|
| BRIDGE NO. 57-0488 | 11 |
| SCALE: No Scale | EA 235800 |

FILE => San Dieguito.dgn

DATE PLOTTED => 05-JAN-2005 TIME PLOTTED => 12:19

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST. | COUNTY | ROUTE | KILOMETER POST/TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |




# TYPICAL SECTION

LEGEND

Denotes existing structure
Denotes new construction

NOTES

1. Temporary Rail (Type K) See "Road Plans"
2. Closure Pour
3. Concrete Barrier Type 732
4. Concrete Barrier Type 60G

(2 OF 2)

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| | | | |
|---|---|---|---|
| DESIGNED BY: GARY HIGHT | DATE: 10/04 | STRUCTURE DESIGN SECTION 18 | PLANNING STUDY |
| DRAWN BY: GARY HIGHT | DATE: 10/04 | | SAN DIEGUITO RIVER BR (REPLACE) |
| CHECKED BY: | DATE: | | BRIDGE NO. 57-0488 \| dv 11 |
| APPROVED: | DATE: | | SCALE: No Scale \| ck 235800 |

FILE => san dieguito.dgn

DATE PLOTTED => 05-JAN-2005 TIME PLOTTED => 13:00

**I-5 North Coast Widening Floodplain Studies**
Caltrans
DE Project 1683

# RECORD OF CONVERSATION

**DATE:** 09/21/07 **TIME:** 8:30 AM **DE FILE No.** 1683-300

**RECORDED BY:** Glen Parker

**SPOKE WITH:** Ray Martinez

**TELEPHONE No.** 703-317-6251

**NATURE OF CALL:** ☐ Incoming ☒ Outgoing ☐ Meeting

**DISTRIBUTION:** Ray Martinez (Michael Baker), Glen Parker (Dokken Engineering), Tim Brownson (Caltrans), Wen Cheng (Michael Baker), Mike Skowronek (Michael Baker)

**SUBJECT OF CONVERSATION: Acceptable FEMA floodplain modeling procedures**

ITEMS DISCUSSED:

**Available Backup Data to generate previously approved floodplain models:** Glen explained that a formal request has been submitted for backup floodplain information for lagoons and creeks along I-5 with Zone AE floodplains between San Diego and Oceanside. In some cases the HEC-2 data provided by Michael Baker Corporation was limited and did not have enough information to recreate previously generated floodplain models with reasonable accuracy. Glen said in these cases, Dokken Engineering would prefer to create HEC-RAS models which tie in with FEMA cross sections to use as a basis for existing conditions. Ray said Dokken Engineering must use their expertise to decide whether the existing FEMA data can be reused and to document efforts in a Technical Studies Data Notebook (TSDN). There have been past situations which required an existing model to be recreated and it is acceptable to FEMA as long as the appropriate documentation supports the procedure. Glen agreed to document the scenarios where existing models could not be used with accuracy.

**Coordination with FEMA and Caltrans:** Glen said that Caltrans is in the planning phase for the I-5 North Coast Widening, which will widen I-5 from San Diego to Oceanside. At this point in time, a preferred alternative has not been identified and therefore no coordination has occurred between Caltrans and FEMA to begin processing LOMRs. Glen said the final design of this project would likely occur in different phases several years in the future. It would be beneficial to coordinate with FEMA when needed during the process. Glen asked who the appropriate FEMA contacts may be to continue coordination when needed throughout the process. Ray said to coordinate with Wen Chen and Michael Skowronek, who work at the RMC for FEMA Region IX and can act as Outreach Coordinators on behalf of FEMA, when appropriate depending on the development of the project.

# SECTION 5

# San Elijo Lagoon Location Hydraulic Study

# SECTION 5: SAN ELIJO LAGOON LOCATION HYDRAULIC STUDY

## 5.0 PROJECT PURPOSE AND VICINITY MAP:

**The San Elijo Lagoon is located in a coastal wetland between the cities of Encinitas and Solana Beach, approximately 20 miles north of the City of San Diego (Thomas Bros. page 1167; F-5).**
**Figure 1: Project Vicinity Map**

This study was prepared for Caltrans for the purpose of determining impacts to the San Elijo Lagoon base (100-year) flood from the proposed improvements to the Interstate-5 freeway.

This study specifically addresses the following:

1.) The San Elijo Lagoon 100-year floodplain as it presently exists,

2.) The San Elijo Lagoon 100-year floodplain after the I-5 Bridge has been widened,

3.) Performing a risk assessment associated with any possible floodplain encroachment.

The proposed improvements to the I-5 Bridge over the San Elijo Lagoon would require that the bridge be replaced. The proposed structure would be between 283 feet to 327.5 feet wide, and a total length of 360 feet long. The bottom width of the channel beneath the bridge would also be widened from 130 feet to 215 feet. The existing I-5 Bridge consists of two bridges spaced 21.5 feet apart. Both the left bridge and right bridge contain three bents consisting of six piers each. To accommodate the widening, seven additional piers would be added to each row of piers. This portion of the San Elijo Lagoon is designated as a 100-year Zone A floodplain where no base flood elevations have been determined.

Results are provided in this study, which demonstrate that the bridge replacement would cause a decrease of the 100-yr floodplain water surface elevations (WSE) upstream of the proposed I-5 Bridge.

## 5.1 DESCRIPTION OF WATERSHED:

**Figure 2: Carlsbad Watershed**

The existing watershed of the San Elijo Lagoon is composed of 77 square miles and is fed by two main water sources listed in the project location: Escondido Creek and San Elijo Creek, also know as the Orilla Creek. It has been determined that these creeks generate a 100-year discharge of 23,255 cfs. In the late 1870s, the San Elijo Lagoon was a low-lying marshy plain. Fresh and salt water exchanges took place regularly which enabled a stable wetland environment capable of supporting unique plant and animal life. In more recent years, numerous manmade structures have significantly decreased the amount of tidal flow exchange the lagoon experiences. Dikes, railroads, and highways have all been built within the wetlands that have altered the environmental characteristics and capabilities of the lagoon to the point where it can no longer support consistent tidal exchanges.

## 5.2 FLOODPLAIN MODELING METHODOLOGY:

The area of analysis ranges from where the San Elijo and Escondido Creeks merge, to the mouth of the lagoon at the Pacific Ocean. The upstream reaches of the lagoon is a wide floodplain, with narrow, shallow channels during normal flow. In a 100-year storm event, the top width of the flow ranges from one quarter to a half a mile wide until it is channeled underneath the existing I-5 Bridges. Moving westward toward the ocean, the lagoon flow would then expand into a large

basin before contracting again to flow beneath the NCTD Railroad Trestle Bridge tracks. The majority of the storm flow would pass under the North County Transit District (NCTD) Railroad and South Coast Highway Bridges, whereas higher flood waters would stay under the bridges, yet overtop the berm to the south. Finally, the water discharges into the ocean.

Along its path to the ocean, the 100-year storm flow would frequently flood Manchester Avenue, including the undercrossing at I-5 (see Appendix 'A'). Elevations on Manchester Avenue are as low as 12 feet and approximately 16.0 feet at the undercrossing.

## 5.3 HEC-RAS INPUT

### 5.3.1 Cross Sectional Geometry:

The geometry for each cross section was derived from contours from a combination of three sources. Topographic surveys provided by the County of San Diego, October 25, 1985 (5 feet contours, NGVD 29), digital topography created by Towill, Inc., October 3, 1990 (1 foot contours, NGVD 29), and digital topography provided by Caltrans (0.5 meter contours, NAVD 88) were used. Both of the English topography based on the National Geodetic Vertical Datum of 1929 (NGVD 29) were converted to North American Vertical Datum of 1988 (NAVD 88) for this study. Each cross section extends perpendicular from contours and meets an approximate flow line.

Some cross sections contain unique features. Cross section #8618 models an earthen dike which serves as a footpath connecting the north and south sides of the lagoon and also to prevent tidal flows from penetrating further east in efforts to preserve a freshwater pond (Coastal Environments and Exponent, INC, 2004).

**Figure 3: South Coast Highway development.**

A small commercial area exists along the South Coast Highway. There are buildings which were modeled within cross sections located in this area. These are seen in cross section #334

of the model. Due to the contraction at the bridges, the channel has limited effectiveness for conveying flow. Ineffective flow areas, low flow regions with velocities close or equal to zero, were added to the model near the contraction points to accurately replicate the lagoon.

#### 5.3.1.1 Bridges

Three bridges within the project area affect the WSE of the San Elijo lagoon. They include the South Coast Highway Bridge, the NCTD Railroad Trestle Bridge, and the northbound and southbound I-5 Bridges.

The bridges are modeled at the following cross sections:

- Cross section #500 – South Coast Highway Bridge
- Cross section #1900 – NCTD Railroad Trestle Bridge
- Cross section #7100 – I-5 Bridge(s)

Contraction and expansion coefficients (0.1 and 0.3) are utilized throughout the model to represent energy losses due to gradual transitions in the geometry of the lagoon. The coefficients were adjusted to represent the more significant contractions and expansions as the lagoon narrows at each of the three bridge crossings. The bridges have abrupt transitions and 0.3 and 0.5 were used for the bounding cross sections of the bridges.

The existing I-5 Bridges and the South Coast Highway Bridge were modeled from as-builts, included in Appendix C. There were no as-built records available for the railroad trestle bridge, and it was modeled based on measurements gathered during field investigations. The proposed widened I-5 Bridge was modeled based on the optimal length alternative determined in the report, *Location Hydraulic Study San Elijo Lagoon,* dated March 2007, by Dokken Engineering. In addition, the smaller bridge piers were modeled as twice their diameters and the larger diameter piers were increased by 25%. This approach was used to account for debris which could catch on bridge piers and provide additional blockage to the flow.

**Figure 4: South Coast Highway Bridge.**

The existing South Coast Highway Bridge (Figure 4) is the furthest downstream, at the outfall to the Pacific Ocean. The bridge consists of five rows of 1.5 foot diameter piers. The bridge was modeled with 3 foot piers, after applying the clogging factor. The bridge deck would come in contact with the floodwaters during a 100-yr storm, however it is unlikely that the bridge will overtop. The South Coast Highway will overtop throughout the commercially developed area, south of the bridge, by up to 3 feet.

**Figure 5: NCTD Railroad Trestle Bridge.**

The next upstream structure is the NCTD Railroad Trestle Bridge (Figure 5). This bridge is the next major constriction point to the floodplain's flow. The bridge is supported by nineteen 1.5 foot trestle bents. The bridge piers were modeled as 3 foot piers, after applying the clogging factor. The tracks will flood approximately 1500 feet south of the trestle bridge by over 2 feet during a 100-yr storm event.

Two existing I-5 Bridges, southbound and northbound, cross over the San Elijo Lagoon and Manchester Avenue (Figure 6). The bridge decks remain entirely above the 100-yr floodplain and only the piers of the bridge will cause any effect on the floodplain. In the bridge analysis portion of HEC-RAS, the energy equation (Standard Step Method) was used. This method provided the highest energy loss through the bridge. For the geometry of the bridges, three rows of 4 foot diameter piers continue through the entire width of the bridge. The proposed bridge was modeled with a total length of 360 feet, supported by three rows of piers spaced 90 feet apart. The channel beneath the I-5 Bridge was also widened to 215 feet. The bridge piers were modeled as 5 foot diameters, after applying the clogging factor. The final design of the proposed bridge will be based upon the alternative that is chosen in the City of Encinitas, San Elijo Lagoon Enhancement Plan Project Report, currently under development.

**Figure 6: I-5 Bridges spanning Manchester Avenue and the San Elijo Lagoon.**

#### 5.3.1.2 Ineffective Flow Areas

The cross sections in Appendix A show the ineffective flow areas for the post project conditions. The contraction and expansion areas upstream and downstream of the bridges within the project vicinity are modeled as ineffective flow.

#### 5.3.1.3 Flood Insurance Study Cross Sections

No detailed hydraulic analyses have been performed in this area, and a base floodplain elevation has not been determined as shown in the Flood Insurance Rate Map (FIRM) in Appendix 'A'. Two detailed analyses have been performed upstream near cross section 50 for the San Elijo Creek and Escondido Creek (shown in FIS). These analyses have not accounted for possible backwater effects due to channel constrictions near I-5 and therefore the models in this study cannot tie into FEMA calculated water surface elevations or cross sections.

#### 5.3.1.4 Existing Floodplain Conditions

The project site is within a Zone A floodplain, without established floodplain water surface elevations determined and required a new existing model to be created. A previous report titled, *Location Hydraulic Study San Elijo Lagoon,* dated March 2007, by Dokken Engineering for Caltrans, was used to develop the existing model. This previous report studied the effect of replacing the three bridges within the lagoon to improve the tidal flushing of the lagoon and reduce the flooding of Manchester Avenue, beneath the I-5 Bridges. For this study, the current bridge configurations of the three crossings were modeled as the existing condition. This existing conditions model was used for comparison with the effects of the proposed I-5 Bridge improvements.

### 5.3.2 Manning's Roughness Coefficient

Each cross section is divided into three segments: left overbank, main channel, and right overbank. These segments represent the different regions of the waterway in terms of roughness coefficients. The main channel is the base of the lagoon and the left and right overbanks make up the sides. For the left and right overbanks, a roughness value of 0.04 was used to simulate high grass pastures, scattered brush and heavy weeds. Manchester Avenue passes through the right overbank, to account for the asphalt roadway a roughness value of 0.013 was assigned The main channel is a waterway with top width greater than 100 feet and contains high grass. For this segment a roughness coefficient of 0.035 was used.

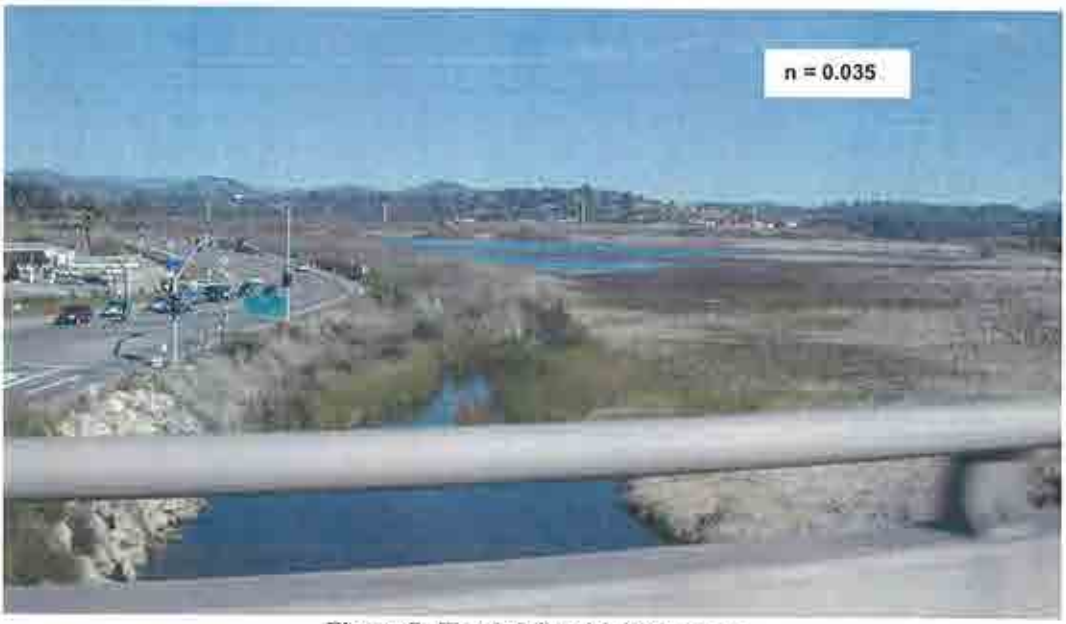



**Figure 7: Floodplain with high grass**

**Figure 8: Scattered brush**

**Figure 9: Asphalt**

### 5.3.3 Starting Water Elevation

The model was run in a mixed flow regime. The large width and minor slope of the San Elijo Lagoon would produce a broad, slow moving body of water in subcritical flow for a 100-year storm, with a hydraulic jump occurring just downstream of the South Coast Highway crossing. At the mouth of the San Elijo Lagoon lies a FEMA designated Zone AE floodplain, where the lagoon flows into Pacific Ocean. The downstream starting water surface elevation was input as 9.15 ft (NAVD 88). Normal depth was used for the upstream boundary condition in HEC-RAS. The slope of the channel was used for an approximate friction slope (0.0046).

### 5.3.4 Discharge

For the purposes of the floodplain analysis, 23,255 cfs was identified as the peak 100-year storm discharge. The model begins at the joining of the Escondido Creek and San Elijo Creek; therefore a sum of the two storm flows was used. By multiplying the cross sectional area by velocity for section 'A' in both of the Flood Insurance Studies in Appendix 'D', the 100-year discharges for both creeks were combined to achieve a total flow entering the San Elijo Lagoon.

## 5.4 HEC-RAS OUTPUT

The water surface elevations, which are displayed in the appendices and output of this study, are based on flooding that would occur during a 100-year storm. Appendix 'B' contains water surface elevations of each cross section, as well as other hydraulic results for comparison. Water surface elevations decreased immediately after the I-5 Bridge due to the sudden contraction and expansion formed in the lagoon by the existing I-5 Bridge. Since San Elijo Lagoon is a fairly flat waterway, the water surface elevations remain fairly uniform upstream and downstream of the bridge. In effect, the lagoon's flat bottom lacks the change in elevation to achieve higher flow velocities and thus produces an extremely level water surface profile until the flow passes the South Coast Highway. As shown in Table A on the next page, no significant increase to the existing 100-year floodplain would occur from the I-5 bridge widening.

**Table A: Floodplain Comparison**

| River Station | Q Total | Existing W.S. Elev | Proposed W.S. Elev | Change in Elevation | Existing Top Width | Proposed Top Width | Change in Width |
|---|---|---|---|---|---|---|---|
| | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) |
| 10436 | 23255 | 19.74 | 18.57 | -1.17 | 2507.96 | 2457.12 | -50.84 |
| 9816 | 23255 | 19.74 | 18.56 | -1.18 | 3132.25 | 3089.81 | -42.44 |
| 9213 | 23255 | 19.73 | 18.55 | -1.18 | 2724.41 | 2697.25 | -27.16 |
| 8949 | 23255 | 19.73 | 18.55 | -1.18 | 2475.66 | 2454.49 | -21.17 |
| 8793 | 23255 | 19.72 | 18.54 | -1.18 | 2155.29 | 2117.39 | -37.9 |
| 8618 | 23255 | 19.7 | 18.5 | -1.20 | 2007.88 | 1972.79 | -35.09 |
| 8569 | 23255 | 19.71 | 18.52 | -1.19 | 2047.46 | 2005.32 | -42.14 |
| 8167 | 23255 | 19.67 | 18.47 | -1.20 | 1766.95 | 1719.68 | -47.27 |
| 7761 | 23255 | 19.61 | 18.38 | -1.23 | 1722.2 | 1679.28 | -42.92 |
| 7461 | 23255 | 19.47 | 18.25 | -1.22 | 1732.99 | 1684.35 | -48.64 |
| 7100 | 23255 | Interstate 5 San Elijo Lagoon Bridge | | | | | |
| 6881 | 23255 | 17.42 | 17.44 | 0.02 | 1871.2 | 1871.74 | 0.54 |
| 6682 | 23255 | 17.49 | 17.49 | 0.00 | 1530.95 | 1530.95 | 0 |
| 6416 | 23255 | 17.5 | 17.5 | 0.00 | 1664.74 | 1664.74 | 0 |
| 5921 | 23255 | 17.49 | 17.49 | 0.00 | 1762.22 | 1762.22 | 0 |
| 5355 | 23255 | 17.49 | 17.49 | 0.00 | 2530.94 | 2530.94 | 0 |
| 4621 | 23255 | 17.49 | 17.49 | 0.00 | 3415.51 | 3415.51 | 0 |
| 3735 | 23255 | 17.49 | 17.49 | 0.00 | 4089.17 | 4089.17 | 0 |
| 2499 | 23255 | 17.48 | 17.48 | 0.00 | 3642.92 | 3642.92 | 0 |
| 2020 | 23255 | 17.36 | 17.36 | 0.00 | 4170.24 | 4170.24 | 0 |
| 1923 | 23255 | 17.28 | 17.28 | 0.00 | 4018.76 | 4018.76 | 0 |
| 1900 | 23255 | NCTD Railroad Bridge | | | | | |
| 1872 | 23255 | 16.99 | 16.99 | 0.00 | 4087.33 | 4087.33 | 0 |
| 1276 | 23255 | 17 | 17 | 0.00 | 5311.94 | 5311.94 | 0 |
| 569 | 23255 | 16.83 | 16.83 | 0.00 | 4666.4 | 4666.4 | 0 |
| 500 | 23255 | South Coast Highway 101 Bridge | | | | | |
| 448 | 23255 | 10.17 | 10.17 | 0.00 | 1261.01 | 1261.01 | 0 |
| 114 | 23255 | 9.15 | 9.15 | 0.00 | 4927.7 | 4927.7 | 0 |
| 1 | 23255 | 9.15 | 9.15 | 0.00 | 4675.42 | 4675.42 | 0 |

### 5.4.1 Warning Messages

Warning messages encountered during the proposed model include the following:

***The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections,*** was displayed at cross sections #114, #500, #569, #1276, #1872, #1900, #1923, #2020, #2499, #3735, #5355, #5921, #6881, #7100, #7461, #8569, #8618, #8793, and #10436. Portions of the San Elijo Lagoon were relatively uniform and allowed for cross sections to be placed several hundred feet apart. These changes are appropriate based on the spacing of the sections.

***Divided flow computed for this cross section,*** was displayed at cross sections #448 and #569. This occurred due to water flowing under the South Coast Highway as well as overtopping a portion of the crossing.

***The velocity head has changed by more than 0.5 ft (0.15m). This may indicate the need for additional cross sections,*** displayed at cross section #448, #500, #7100, and #7461. This message is common at constrictions such as bridges and additional cross sections are not normally added. This warning message was acceptable.

***The energy loss was greater than 1.0 ft between the current and previous cross section. This may indicate the need for additional cross sections;*** was displayed at cross section #500. This message occurred because of the changes and spacing of consecutive cross sections. This message was acceptable.

***For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible; the momentum answer has been disregarded,*** displayed at cross section #7461. The Energy (standard step) method was used for this cross section.

***The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations,*** displayed at cross section #500. To address this warning message, the model was run in a mixed flow regime instead of subcritical flow. This warning occurs in transitional flow between subcritical and supercritical flow. Since the model was run in a mixed flow regime, these cross sections are considered valid.

***During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.*** This warning displayed at cross section #500. A critical depth at this point in the channel is reasonable. Since the model was run in a mixed flow regime, this cross section is considered valid.

## 5.5 RISK ASSESSMENT

Within the San Elijo Lagoon, the widening to I-5 would cause a decrease to flood water elevations upstream. The impacts to the floodplain would not be considered a significant or longitudinal encroachment. The 100-year flood does currently cause property flooding, but there would be no increased risk to life or property associated with the proposed improvements. No additional roadways would flood upstream of I-5, therefore no transportation routes will be interrupted or terminated, beyond existing conditions, due to the I-5 Bridge widening.

Additionally, no floodplain values will be adversely impacted without mitigation. Natural and beneficial floodplain values, as defined in Chapter 17 "Definitions" in the Caltrans Standard Environmental Reference (SER), include fish, wildlife, plants, outdoor recreation, aquaculture, forestry, etc., that are found within a designated floodplain. Listed below are the beneficial uses of the San Elijo Lagoon obtained from the Water Quality Control Plan for the San Diego Basin along with a short description and determination of impacts.

- Contact and non-contact water recreation. Includes the uses of water for recreational activities involving proximity to water and contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, diving, surfing, white water activities, fishing, use of natural hot springs, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities. The I-5 bridge widening will not have any effect on the lagoon's recreational uses aside from during the construction stage. There is a hiking trail that passes underneath the I-5 Bridge which may be closed periodically during the bridge widening.

- Preservation of biological habitats of special significance. Included uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection. The construction areas associated with the bridge widening may impact a limited amount of biological habitats. Currently, a Natural Environment Study (NES) is being prepared to support the I-5 North Coast Widening Project. The NES will assess if any biological habitats of special significance may be impacted and what mitigation measures, if any, are needed.

- Estuarine habitat. Includes uses of water that support estuarine ecosystems including, but not limited to, preservations or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). The NES will assess if any estuarine habitat may be impacted and what mitigation measures, if any, are needed.

- Wildlife habitat. This includes uses of water that supports terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, or wildlife water and food sources. The NES will assess if any wildlife habitat may be impacted and what mitigation measures, if any, are needed.

- Rare, threatened, or endangered species. Included uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under the state or federal law as rare, threatened or endangered. The NES will assess if any rare, threatened or endangered species may be impacted and what mitigation measures, if any, are needed.

- Marine habitat. Included uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds). The NES will assess if any marine habitat may be impacted and what mitigation measures, if any, are needed.

- Migration of aquatic organisms. Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish. The NES will assess if any migration of aquatic organisms may be impacted and what mitigation measures, if any, are needed.

- Spawning, reproduction, and/or early development. Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish. The NES will assess if any spawning, reproduction, or early development may be impacted and what mitigation measures, if any, are needed.

The proposed bridge widening has been designed to minimize disturbance to the floodplain. The bridge design has been through several iterations to select an alternative which is compatible with floodplain development and least harmful to the environment, while maintaining feasibility for improving I-5. Efforts should be made to limit the footprint of the construction site and reduce construction time in order to minimize impacts to natural and beneficial floodplain values, hazards to human life, and property loss.

## 5.6 SUMMARY AND CONCLUSION:

Several hydraulic models were developed to determine the most accurate methods in which to depict the floodplain of the San Elijo Lagoon. Careful consideration was given to the placement of cross sections which fully modeled the true constriction of the lagoon by the I-5 Bridge, as well as the I-5 Bridge itself. Throughout a 100-year storm event, a water body flowing in subcritical flow with a hydraulic jump after the South Coast Highway crossing has been anticipated. From the water surface profiles generated by the HEC-RAS model, it was determined that only a slight change in water surface elevation upstream of the I-5 Bridge occurred during the 100-year storm event. Due to the flatness of the San Elijo Lagoon geometry, a small increase in water surface elevation would require a significant distance upstream to taper back into the existing floodplain. Since the change is slight and the proposed floodplain remains within the floodplain boundaries, impacts to the existing floodplain are considered negligible.

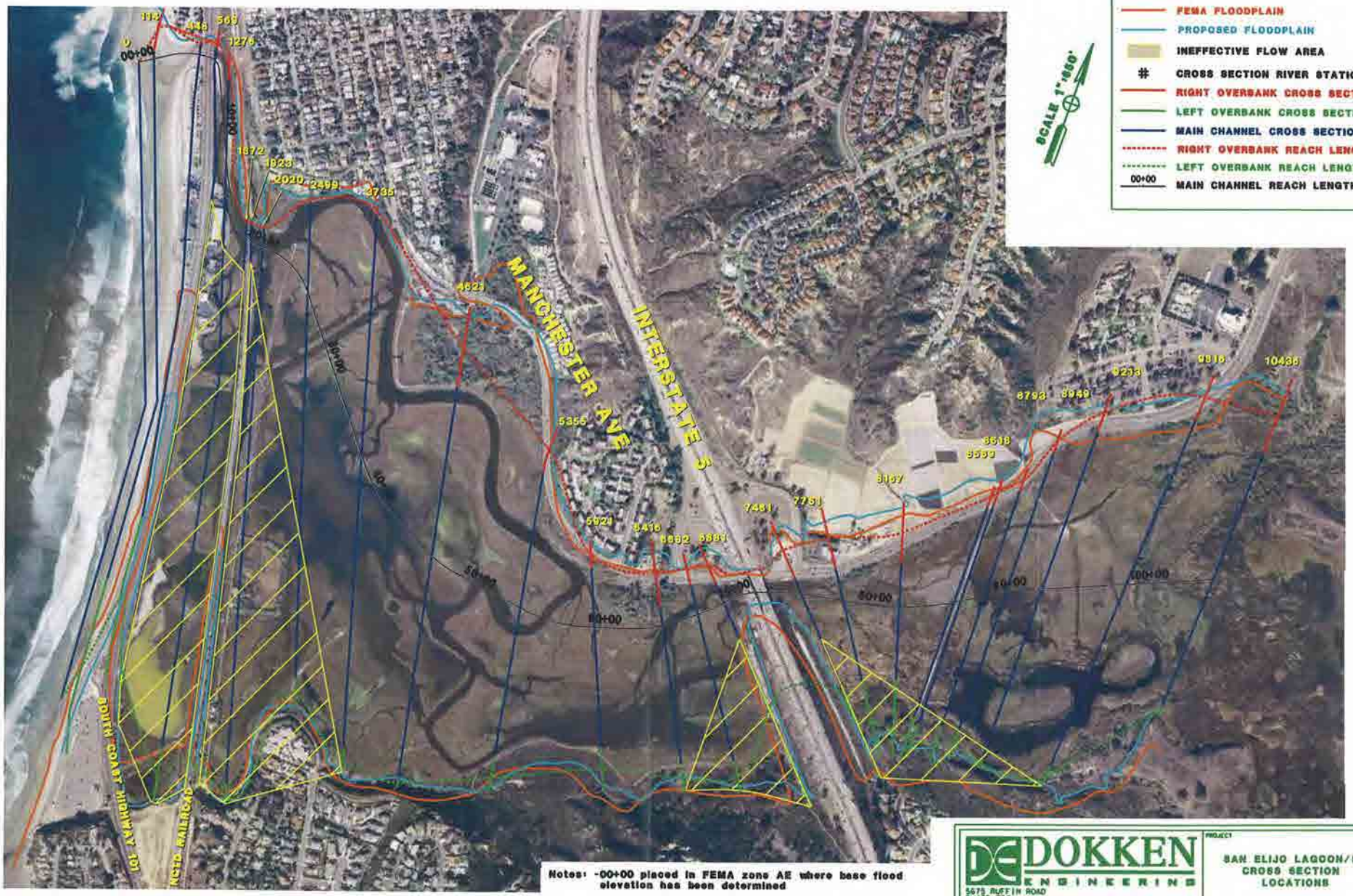
# Appendix A

# Cross Section Location Exhibits

# Flood Insurance Rate Map (FIRM)

# FEMA Floodway Data

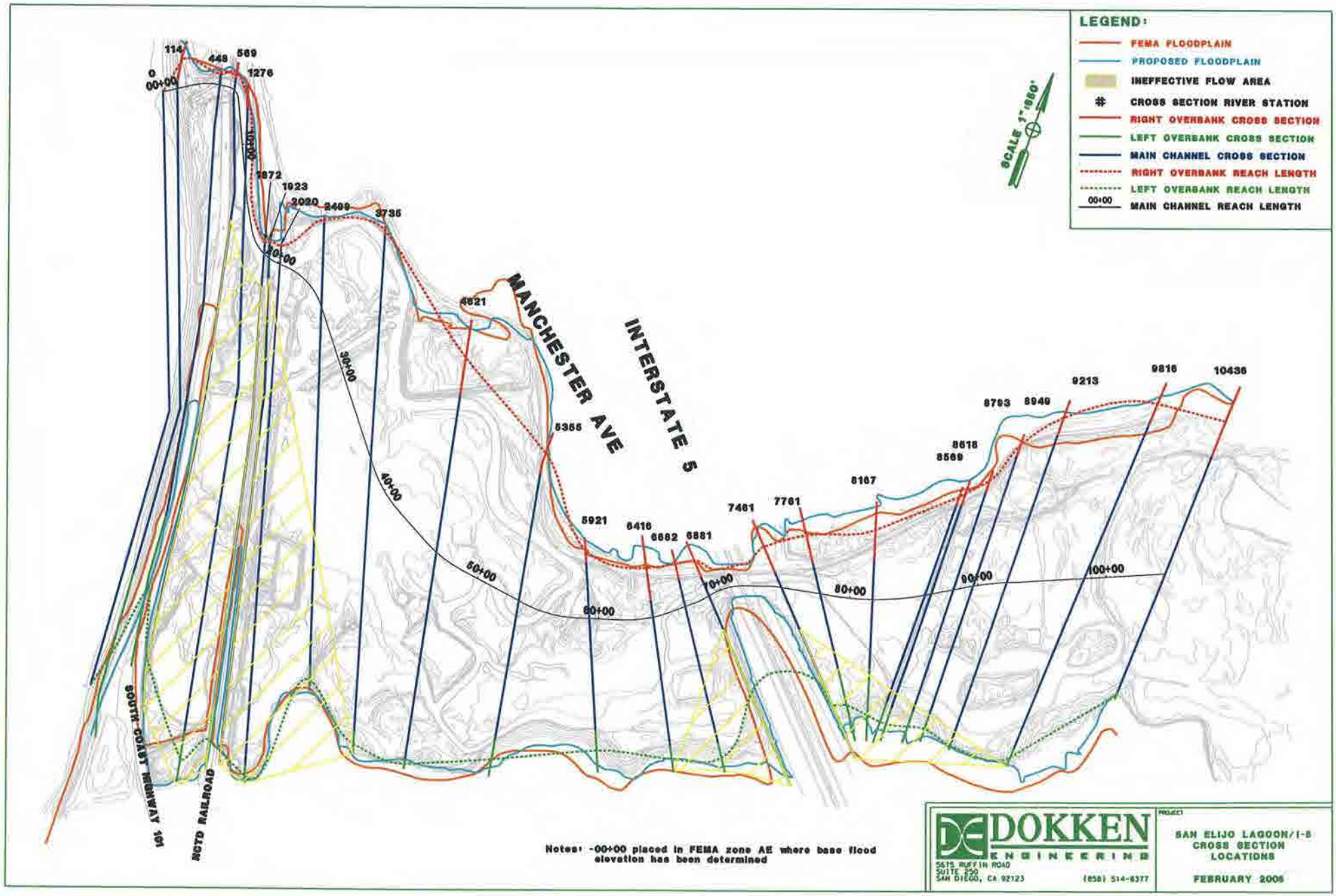
## Floodway Data Sheet

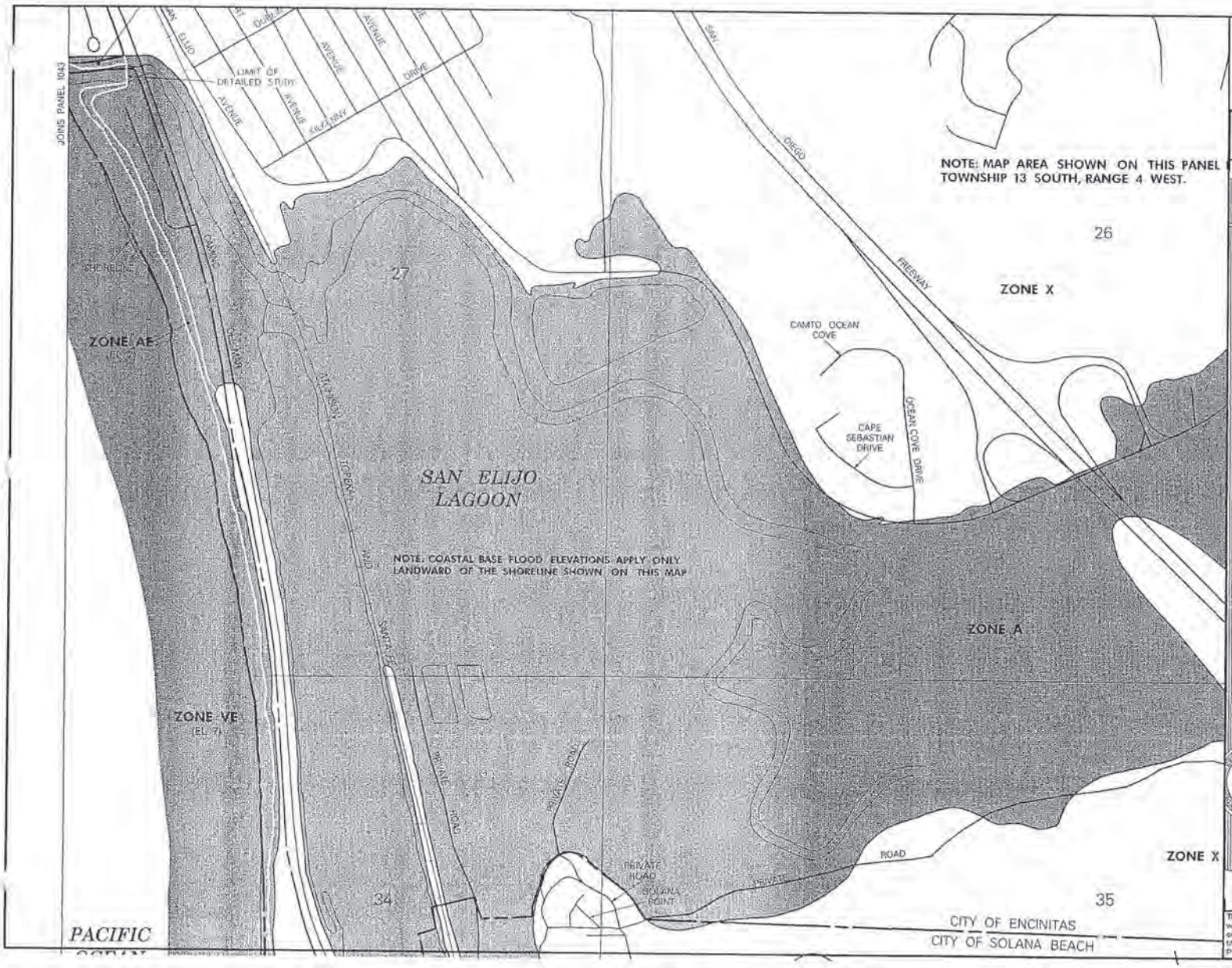



DOKKEN ENGINEERING
5675 RUFFIN ROAD
SUITE 250
SAN DIEGO, CA 92123
(858) 514-0377

PROJECT
SAN ELIJO LAGOON/I-5
CROSS SECTION
LOCATIONS

FEBRUARY 2008


LEGEND:
FEMA FLOODPLAIN
PROPOSED FLOODPLAIN
INEFFECTIVE FLOW AREA
# CROSS SECTION RIVER STATION
RIGHT OVERBANK CROSS SECTION
LEFT OVERBANK CROSS SECTION
MAIN CHANNEL CROSS SECTION
RIGHT OVERBANK REACH LENGTH
LEFT OVERBANK REACH LENGTH
00+00 MAIN CHANNEL REACH LENGTH
SCALE 1"=650'
0
00+00
114
448
569
1276
1872
1923
2020
2469
3735
10+00
4821
MANCHESTER AVE
INTERSTATE 5
5355
5921
6416
6682
6881
7461
7761
8167
8569
8618
8793
8949
9213
9816
10436
20+00
30+00
40+00
50+00
60+00
70+00
80+00
90+00
100+00
SOUTH COAST HIGHWAY 101
NCTD RAILROAD
Notes: -00+00 placed in FEMA zone AE where base flood elevation has been determined
DOKKEN ENGINEERING
5615 KUFFIN ROAD
SUITE 320
SAN DIEGO, CA 92123
(858) 514-6377
PROJECT
SAN ELIJO LAGOON/I-5
CROSS SECTION
LOCATIONS
FEBRUARY 2006




APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

**PANEL 1044 OF 2375**
(SEE MAP INDEX FOR PANELS NOT PRINTED)

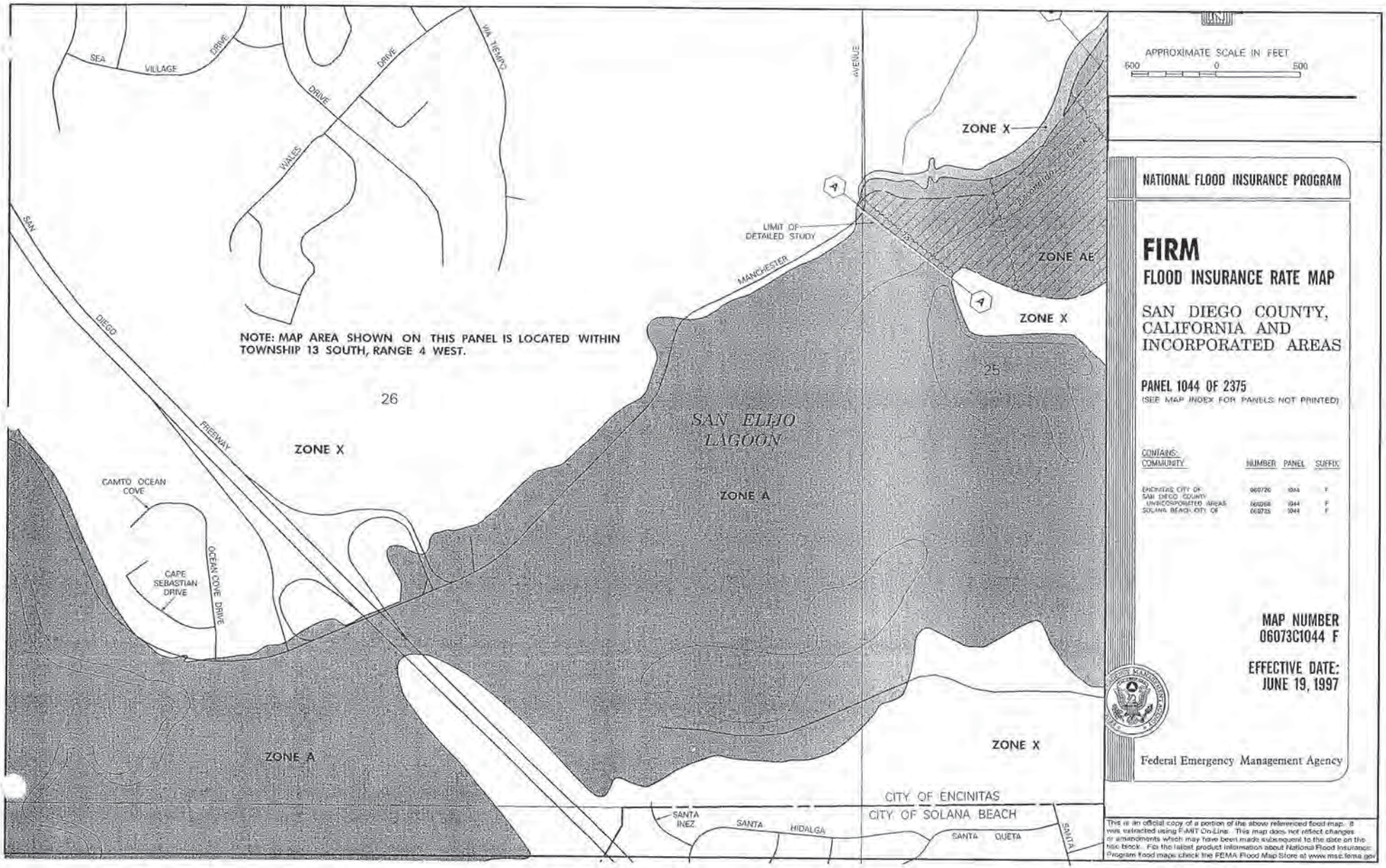
| CONTAINS COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| ENCINITAS, CITY OF | 060725 | 1044 | F |
| SAN DIEGO COUNTY, UNINCORPORATED AREAS | 060284 | 1044 | F |
| SOLANA BEACH, CITY OF | 060726 | 1044 | F |

**MAP NUMBER**
**06073C1044 F**

**EFFECTIVE DATE:**
**JUNE 19, 1997**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov




NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

**PANEL 1044 OF 2375**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

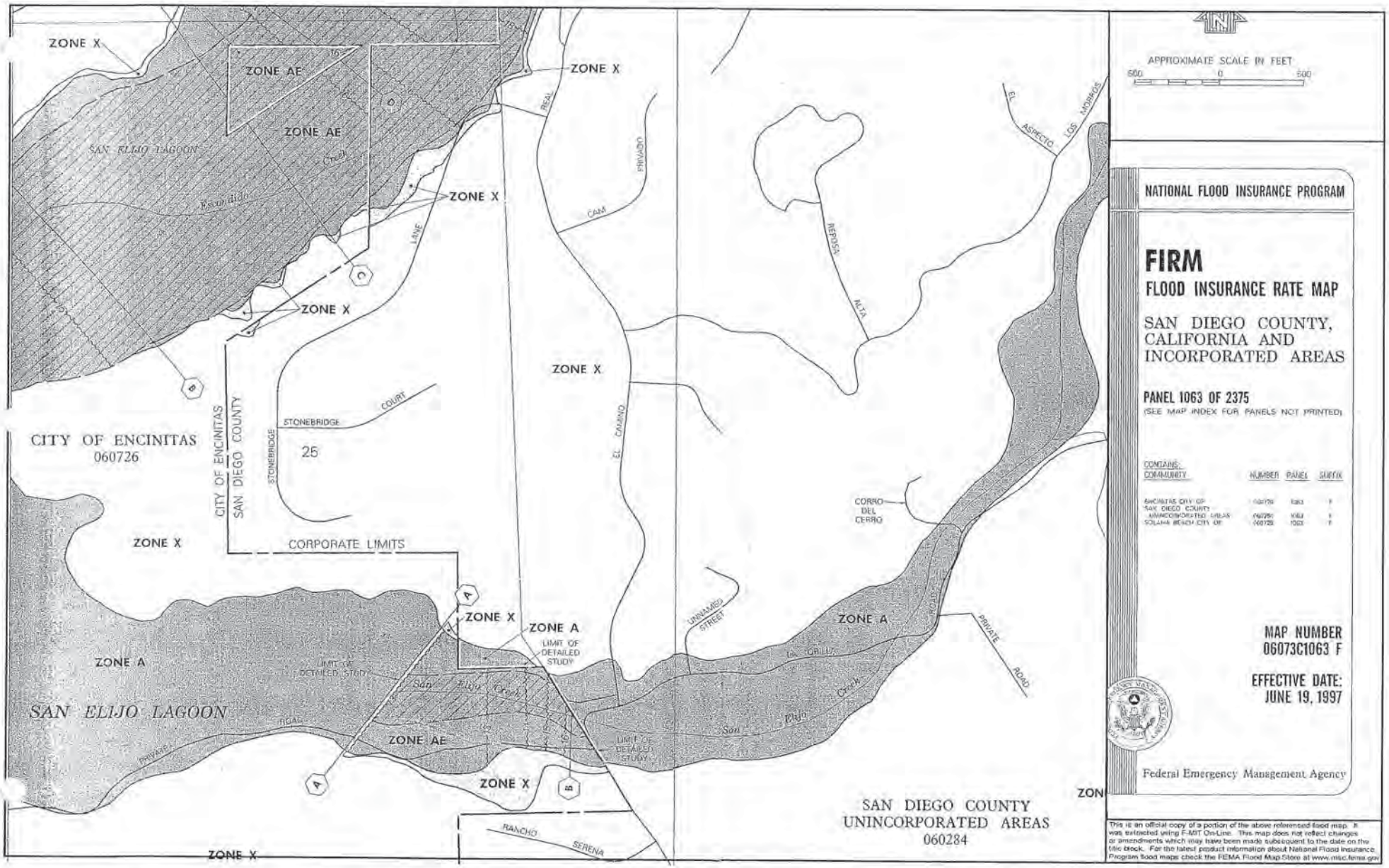
| CONTAINS: COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| ENCINITAS, CITY OF | 060726 | 1044 | F |
| SAN DIEGO COUNTY, UNINCORPORATED AREAS | 060284 | 1044 | F |
| SOLANA BEACH, CITY OF | 060735 | 1044 | F |

**MAP NUMBER 06073C1044 F**

**EFFECTIVE DATE: JUNE 19, 1997**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


ZONE X
ZONE AE
ZONE AE
SAN ELIJO LAGOON
Escondido Creek
ZONE X
ZONE X
ZONE X
REAL
CAM
PRIVADO
LANE
EL ASPECTO
LOS MONROS
REPOSA
ALTA
CITY OF ENCINITAS
060726
CITY OF ENCINITAS
SAN DIEGO COUNTY
STONEBRIDGE
COURT
STONEBRIDGE
25
ZONE X
EL CAMINO
CORRO DEL CERRO
ZONE X
CORPORATE LIMITS
ZONE A
ZONE X
ZONE A
LIMIT OF DETAILED STUDY
UNNAMED STREET
ZONE A
ROAD
PRIVATE ROAD
ZONE A
LIMIT OF DETAILED STUDY
San Elijo Creek
SAN ELIJO LAGOON
ROAD
PRIVATE
ZONE AE
LIMIT OF DETAILED STUDY
San Elijo Creek
ZONE X
RANCHO SERENA
ZONE X
SAN DIEGO COUNTY
UNINCORPORATED AREAS
060284
ZON
APPROXIMATE SCALE IN FEET
500 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS
PANEL 1063 OF 2375
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
ENCINITAS, CITY OF 060726 1063 F
SAN DIEGO, COUNTY OF UNINCORPORATED AREAS 060284 1063 F
SOLANA BEACH, CITY OF 060729 1063 F
MAP NUMBER
06073C1063 F
EFFECTIVE DATE:
JUNE 19, 1997
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Escondido Creek (Below Lake Wohlford) | | | | | | | | |
| A | 11,025 | 668 | 3,065 | 6.9 | 13.2 | 13.2 | 13.2 | 0.0 |
| B | 12,569 | 1,290 | 8,331 | 2.5 | 15.1 | 15.1 | 15.1 | 0.0 |
| C | 14,054 | 1,230 | 6,299 | 3.3 | 15.6 | 15.6 | 15.6 | 0.0 |
| D | 14,887 | 1,202 | 4,902 | 4.3 | 16.1 | 16.1 | 16.2 | 0.1 |
| E | 16,040 | 1,065 | 2,664 | 7.9 | 18.6 | 18.6 | 18.7 | 0.1 |
| F | 17,729 | 312 | 1,750 | 12.0 | 28.5 | 28.5 | 28.5 | 0.0 |
| G | 18,534 | 1,255 | 11,848 | 1.8 | 31.4 | 31.4 | 31.6 | 0.2 |
| H | 19,459 | 1,120 | 7,418 | 2.8 | 31.5 | 31.5 | 31.7 | 0.2 |
| I | 20,678 | 792 | 3,487 | 6.0 | 32.5 | 32.5 | 32.7 | 0.2 |
| J | 20,835 | 708 | 2,783 | 7.5 | 32.9 | 32.9 | 33.0 | 0.1 |
| K | 21,927 | 795 | 4,445 | 4.7 | 37.0 | 37.0 | 37.2 | 0.2 |
| L | 23,639 | 548 | 3,203 | 6.6 | 40.6 | 40.6 | 40.8 | 0.2 |
| M | 25,313 | 600 | 3,608 | 5.8 | 45.3 | 45.3 | 45.5 | 0.2 |
| N | 25,771 | 550 | 2,393 | 8.8 | 45.8 | 45.8 | 46.1 | 0.3 |
| O | 26,606 | 977 | 2,069 | 10.2 | 51.5 | 51.5 | 51.5 | 0.0 |
| P | 27,378 | 1,005 | 5,392 | 3.9 | 55.7 | 55.7 | 55.8 | 0.1 |
| Q | 28,116 | 1,163 | 4,861 | 4.3 | 56.5 | 56.5 | 56.6 | 0.1 |
| R | 28,780 | 858 | 3,536 | 5.9 | 57.7 | 57.7 | 57.8 | 0.1 |
| S | 29,578 | 795 | 3,347 | 6.3 | 60.5 | 60.5 | 60.6 | 0.1 |
| T | 30,905 | 254 | 1,835 | 11.4 | 65.3 | 65.3 | 65.3 | 0.0 |
| U | 55,660 | 180 | 1,796 | 10.6 | 367.3 | 367.3 | 367.3 | 0.0 |
| V | 58,990 | 395 | 1,956 | 9.7 | 399.1 | 399.1 | 399.1 | 0.0 |
| W | 61,330 | 152 | 1,324 | 14.4 | 432.2 | 432.2 | 432.2 | 0.0 |
| X | 63,130 | 198 | 1,420 | 13.4 | 464.1 | 464.1 | 464.1 | 0.0 |
| Y | 64,805 | 234 | 1,527 | 12.4 | 503.9 | 503.9 | 503.9 | 0.0 |
| Z | 67,980 | 194 | 1,685 | 11.3 | 544.7 | 544.7 | 544.7 | 0.0 |

[1]Feet Above Pacific Ocean

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

**SAN DIEGO COUNTY, CA**
**AND INCORPORATED AREAS**

**FLOODWAY DATA**

**ESCONDIDO CREEK (BELOW LAKE WOHLFORD)**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| San Elijo Creek | | | | | | | | |
| A | 0 | 335 | 916 | 2.3 | 12.6 | 9.4[2] | 10.4[2] | 1.0 |
| B | 1,105 | 227 | 498 | 4.2 | 16.4 | 16.4 | 16.8 | 0.4 |

[1]Feet Above San Elijo Lagoon
[2]Elevation Computed Without Consideration of Backwater Effects From San Elijo Lagoon

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA
AND INCORPORATED AREAS

# FLOODWAY DATA

SAN ELIJO CREEK

Table 4. Summary of Discharges (Cont'd)

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (cfs) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Coyote Creek | | | | | |
| At Apex of Alluvial Fan | 132.0 | 5,200 | 16,000 | 24,000 | 35,200 |
| Culp-Tubb Canyon | | | | | |
| At Apex of Alluvial Fan | 13.0 | 2,400 | 6,000 | 8,500 | 12,500 |
| Deer Springs Creek | | | | | |
| At Mouth | 1.8 | --[1] | --[1] | 1,550 | --[1] |
| Descanso Creek | | | | | |
| At Mouth | 5.6 | 1,300 | 3,800 | 6,000 | 10,400 |
| Dry Canyon | | | | | |
| At Apex of Alluvial Fan | 1.9 | 450 | 1,150 | 1,700 | 2,650 |
| Encanto Branch | | | | | |
| Above Confluence with South Las Chollas Creek | 6.0 | 1,200 | 2,700 | 3,500 | 6,600 |
| Above Confluence with Radio Drive Tributary | 4.8 | 1,100 | 2,600 | 3,400 | 6,500 |
| At 64th Street | 4.2 | 950 | 2,300 | 3,000 | 6,100 |
| Above Confluence with Jamacha Branch | 2.4 | 640 | 1,400 | 1,700 | 3,200 |
| Escondido Creek | | | | | |
| At Interstate Highway 5 | 77.7 | 3,400 | 15,500 | 22,000 | 41,000 |
| Upstream of Lake Val Sereno | 68.0 | 3,200 | 14,500 | 21,000 | 38,400 |
| Upstream of Elfin Forest Lake | 55.7 | 2,800 | 13,000 | 19,000 | 35,000 |
| At Harmony Grove Road | 48.3 | 2,600 | 12,000 | 18,000 | 32,000 |
| Approximately 11,200 feet Upstream of Wohlford Dam | 2.2 | --[1] | --[1] | 2,700 | --[1] |
| Eucalyptus Hills East Branch | | | | | |
| At Riverside Drive | 1.5 | --[1] | --[1] | 860 | --[1] |

[1]Data Not Available

Table 4. Summary of Discharges (Cont'd)

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (cfs) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Samagutuma Creek | | | | | |
| At Mouth | 6.4 | 900 | 2,600 | 4,000 | 7,000 |
| San Clemente Canyon Creek | | | | | |
| Upstream of Confluence with Rose Canyon Creek | 18.4 | 1,400 | 4,200 | 6,900 | 16,000 |
| Upstream of Genesee Avenue | 15.3 | 1,200 | 3,600 | 5,600 | 12,000 |
| Upstream of Interstate Highway 805 | 12.5 | 1,000 | 3,100 | 4,900 | 11,000 |
| San Diego River | | | | | |
| At Confluence with Murphy Canyon Creek | 420.0 | 3,100 | 17,000 | 36,000 | 112,000 |
| Just Downstream of Confluence of San Vicente Creek | 290.0 | 2,500 | --[1] | 31,000 | --[1] |
| San Dieguito River | | | | | |
| Upstream of Camino Del Mar Bridge | --[1] | 5,700 | 31,400 | 41,800 | 90,000 |
| Upstream of Atchison, Topeka & Santa Fe Railway Bridge | --[1] | 5,700 | 31,400 | 41,800 | 90,000 |
| Upstream of Jimmy Durante Bridge | --[1] | 5,800 | 32,100 | 42,400 | 90,000 |
| Upstream of U.S. Interstate Highway 5 Bridge | --[1] | 5,900 | 32,500 | 42,800 | 90,000 |
| San Elijo Creek | | | | | |
| 0.1 Mile Upstream of El Camino Road | 5.4 | 500 | 1,600 | 2,100 | 5,500 |
| San Luis Rey River | | | | | |
| At Mouth | 560.0 | 6,600 | 31,000 | 51,000 | 120,000 |
| Downstream of Confluence with Moosa Canyon | 355.6 | 6,200 | 30,000 | 48,000 | 110,000 |
| Downstream of Confluence with Keys Canyon | 252.3 | 5,000 | 25,000 | 41,000 | 98,000 |
| Upstream of Confluence with Keys Canyon | 180.4 | 4,000[2] | 20,000 | 33,000 | 85,000 |
| Downstream of Palma | 167.3 | 4,000[2] | 18,000 | 30,000 | 78,000 |
| Downstream of Confluence with Puma Creek | 126.7 | 4,000[2] | 16,800 | 28,000 | 72,800 |
| Upstream of Confluence with Puma Creek | 71.5 | 5,000 | 15,000 | 24,500 | 64,000 |

[1]Data Not Available
[2]Discharge Decreases With Increasing Area Due to Breakouts From the Low Flow Channel

# Appendix B

# Results Summary

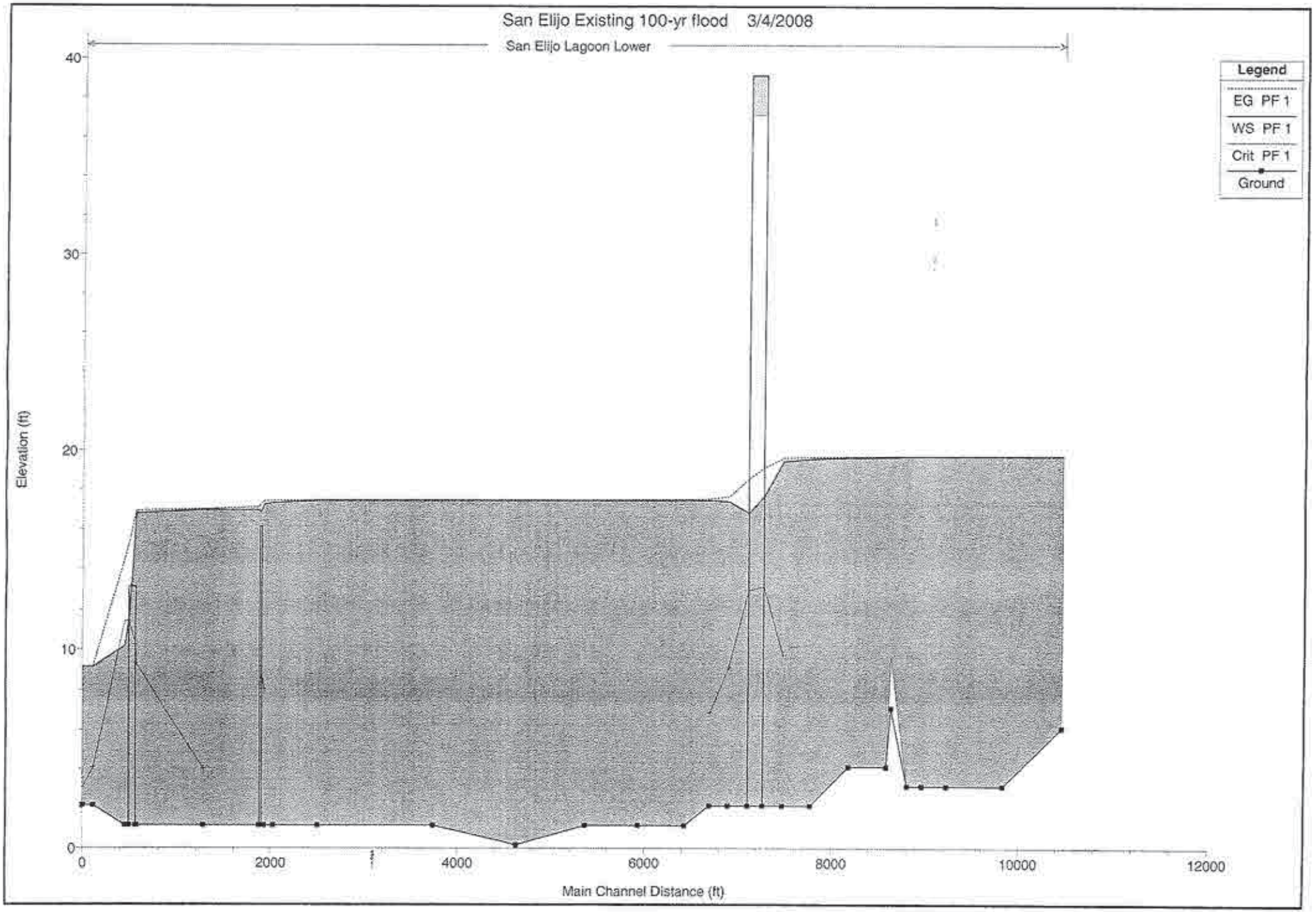
# HEC-RAS Cross Section Input/Output

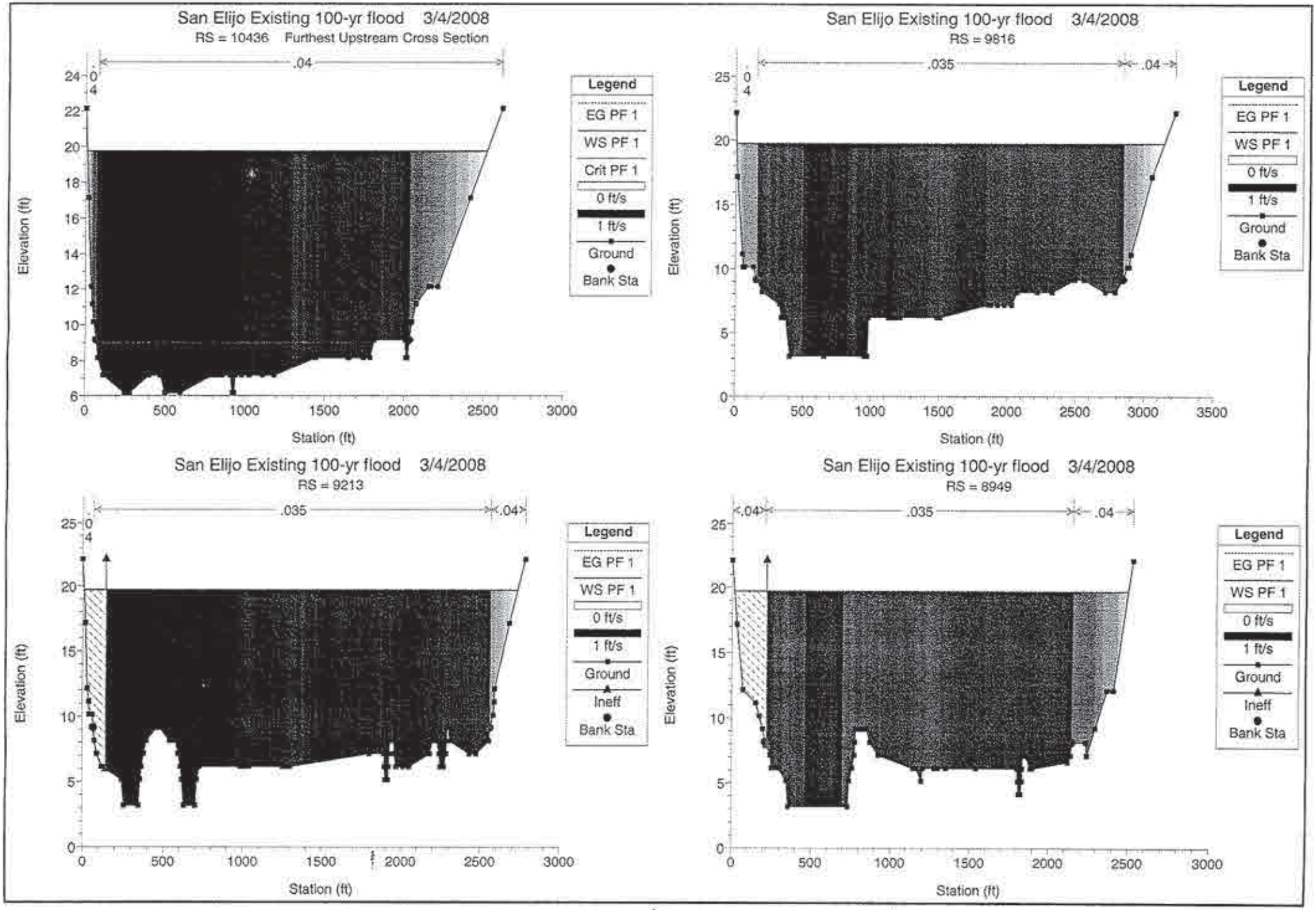
## Existing
## Proposed

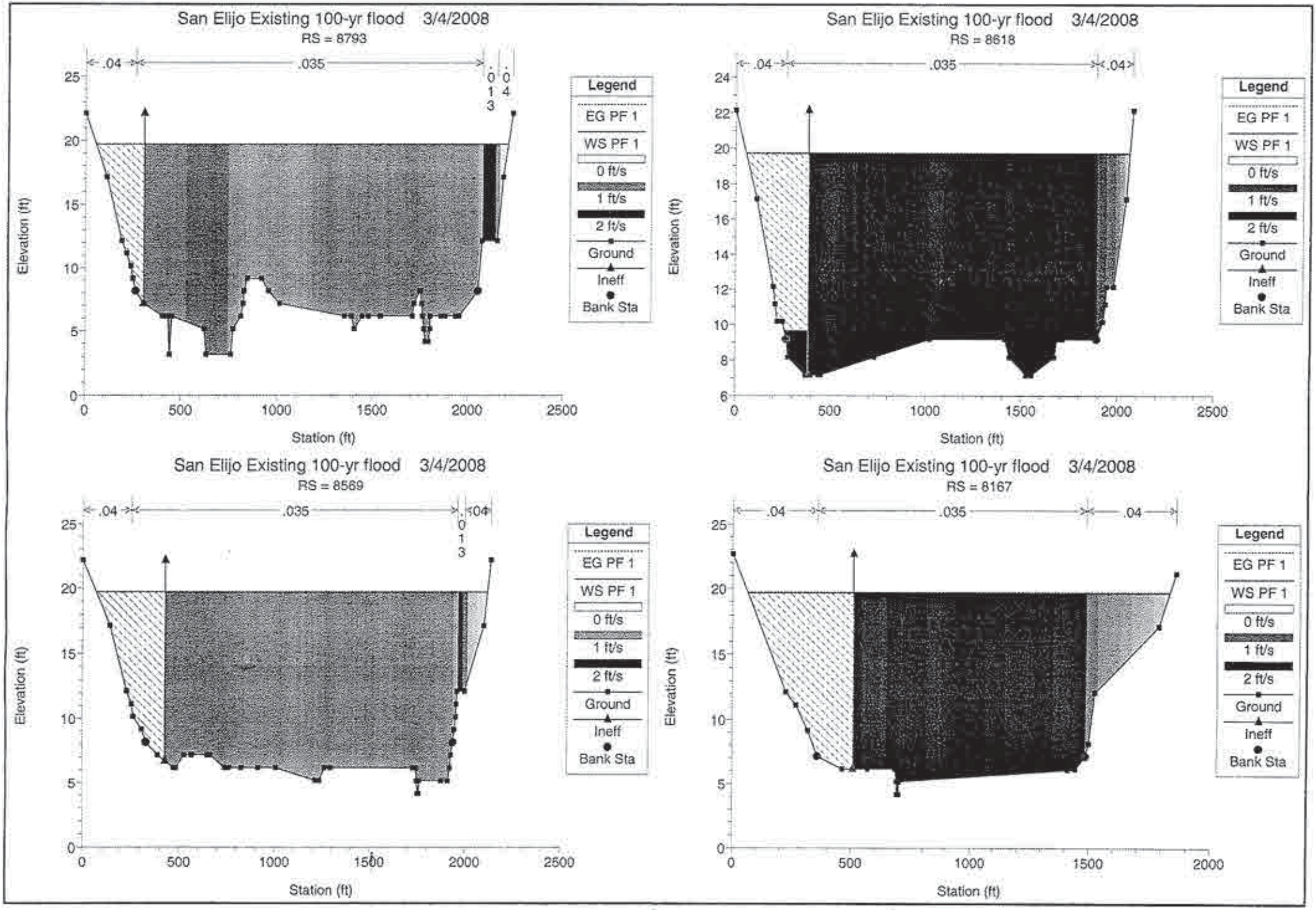
# EXISTING

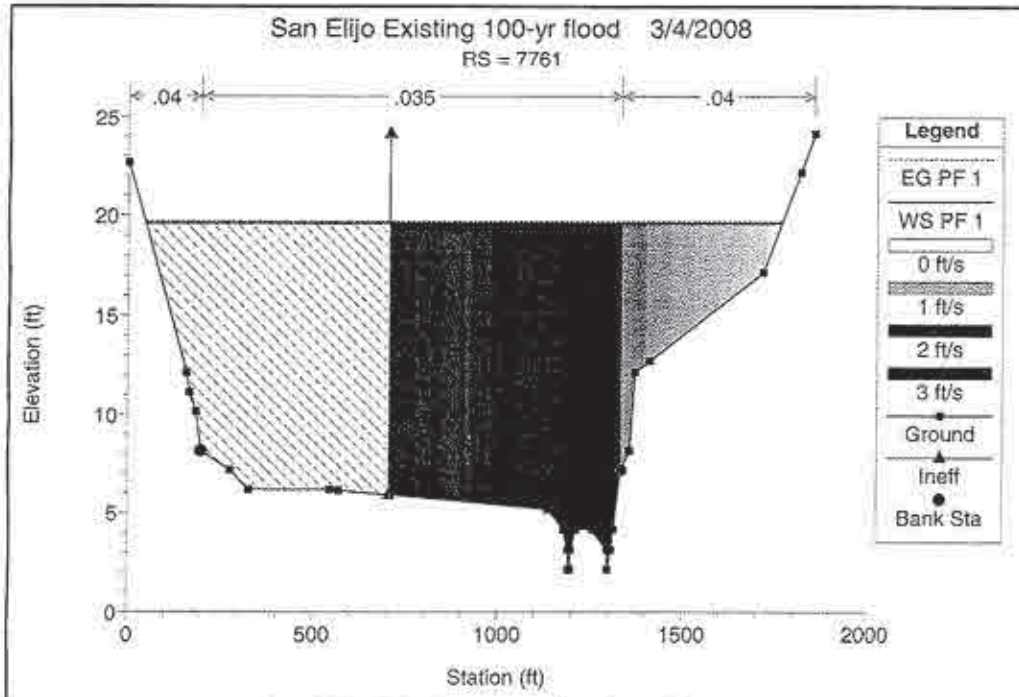
HEC-RAS Plan: SE_Exist River: San Elijo Lagoon Reach: Lower Profile: PF 1

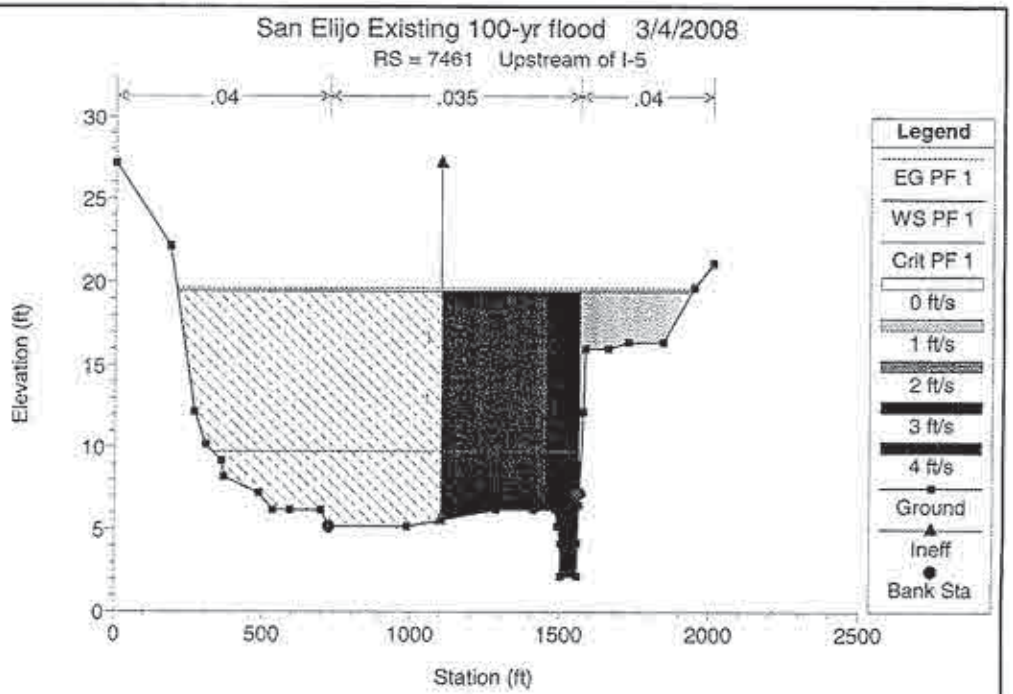
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Lower | 10436 | PF 1 | 23255.00 | 6.15 | 19.74 | 9.00 | 19.75 | 0.000020 | 0.90 | 27209.78 | 2507.96 | 0.04 |
| Lower | 9816 | PF 1 | 23255.00 | 3.15 | 19.74 | | 19.75 | 0.000007 | 0.62 | 38534.08 | 3132.25 | 0.03 |
| Lower | 9213 | PF 1 | 23255.00 | 3.15 | 19.73 | | 19.74 | 0.000009 | 0.72 | 32776.79 | 2724.41 | 0.03 |
| Lower | 8949 | PF 1 | 23255.00 | 3.15 | 19.73 | | 19.74 | 0.000011 | 0.81 | 29774.77 | 2475.66 | 0.04 |
| Lower | 8793 | PF 1 | 23255.00 | 3.15 | 19.72 | | 19.74 | 0.000015 | 0.93 | 24530.39 | 2155.29 | 0.04 |
| Lower | 8618 | PF 1 | 23255.00 | 9.65 | 19.70 | | 19.73 | 0.000055 | 1.46 | 16277.41 | 2007.88 | 0.08 |
| Lower | 8569 | PF 1 | 23255.00 | 4.15 | 19.71 | | 19.72 | 0.000020 | 1.08 | 21565.70 | 2047.46 | 0.05 |
| Lower | 8167 | PF 1 | 23255.00 | 4.15 | 19.67 | | 19.71 | 0.000043 | 1.62 | 15353.04 | 1766.95 | 0.08 |
| Lower | 7761 | PF 1 | 23255.00 | 2.15 | 19.61 | | 19.68 | 0.000083 | 2.30 | 11347.86 | 1722.20 | 0.11 |
| Lower | 7461 | PF 1 | 23255.00 | 2.15 | 19.47 | 9.75 | 19.64 | 0.000189 | 3.37 | 7670.51 | 1732.99 | 0.16 |
| Lower | 7100 | | Bridge | | | | | | | | | |
| Lower | 6881 | PF 1 | 23255.00 | 2.15 | 17.42 | 9.15 | 17.68 | 0.000313 | 4.06 | 5931.32 | 1871.20 | 0.20 |
| Lower | 6682 | PF 1 | 23255.00 | 2.15 | 17.49 | 6.93 | 17.55 | 0.000074 | 2.04 | 11468.62 | 1530.95 | 0.10 |
| Lower | 6416 | PF 1 | 23255.00 | 1.15 | 17.50 | | 17.53 | 0.000037 | 1.42 | 17550.50 | 1664.74 | 0.07 |
| Lower | 5921 | PF 1 | 23255.00 | 1.15 | 17.49 | | 17.51 | 0.000027 | 1.23 | 19994.61 | 1762.22 | 0.06 |
| Lower | 5355 | PF 1 | 23255.00 | 1.15 | 17.49 | | 17.50 | 0.000012 | 0.80 | 30115.85 | 2530.94 | 0.04 |
| Lower | 4621 | PF 1 | 23255.00 | 0.15 | 17.49 | | 17.49 | 0.000005 | 0.56 | 43109.66 | 3415.51 | 0.03 |
| Lower | 3735 | PF 1 | 23255.00 | 1.15 | 17.49 | | 17.49 | 0.000003 | 0.41 | 56811.49 | 4089.17 | 0.02 |
| Lower | 2499 | PF 1 | 23255.00 | 1.15 | 17.48 | | 17.48 | 0.000007 | 0.65 | 35947.57 | 3642.92 | 0.03 |
| Lower | 2020 | PF 1 | 23255.00 | 1.15 | 17.36 | | 17.47 | 0.000095 | 2.55 | 9183.42 | 4170.24 | 0.11 |
| Lower | 1923 | PF 1 | 23255.00 | 1.15 | 17.28 | 8.04 | 17.44 | 0.000402 | 3.28 | 7117.03 | 4018.76 | 0.28 |
| Lower | 1900 | | Bridge | | | | | | | | | |
| Lower | 1872 | PF 1 | 23255.00 | 1.15 | 16.99 | | 17.14 | 0.000384 | 3.09 | 7564.93 | 4087.33 | 0.27 |
| Lower | 1276 | PF 1 | 23255.00 | 1.15 | 17.00 | 4.04 | 17.03 | 0.000032 | 1.38 | 16933.58 | 5311.94 | 0.07 |
| Lower | 569 | PF 1 | 23255.00 | 1.15 | 16.83 | 9.32 | 16.96 | 0.000791 | 2.95 | 7930.51 | 4666.40 | 0.28 |
| Lower | 500 | | Bridge | | | | | | | | | |
| Lower | 448 | PF 1 | 23255.00 | 1.15 | 10.17 | 11.41 | 14.64 | 0.011978 | 16.98 | 1377.46 | 1261.01 | 2.86 |
| Lower | 114 | PF 1 | 23255.00 | 2.15 | 9.15 | 4.09 | 9.16 | 0.000056 | 0.99 | 24514.53 | 4927.70 | 0.07 |
| Lower | 1 | PF 1 | 23255.00 | 2.15 | 9.15 | 3.07 | 9.16 | 0.000021 | 0.71 | 32722.97 | 4675.42 | 0.05 |

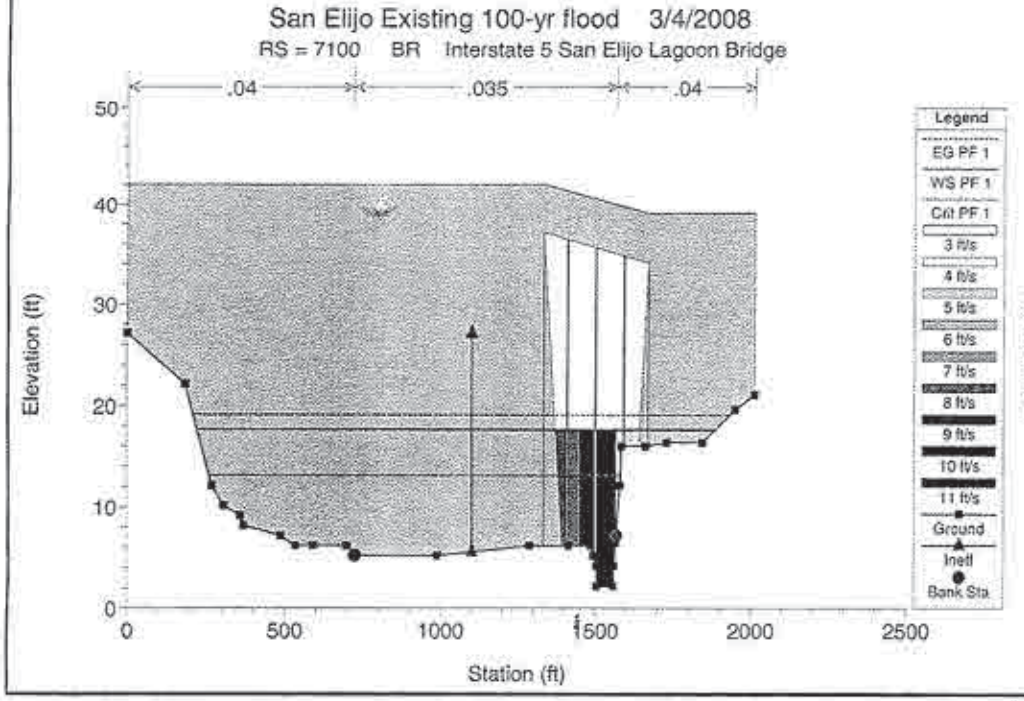

San Elijo Existing 100-yr flood 3/4/2008
San Elijo Lagoon Lower
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
40
30
20
10
0
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)

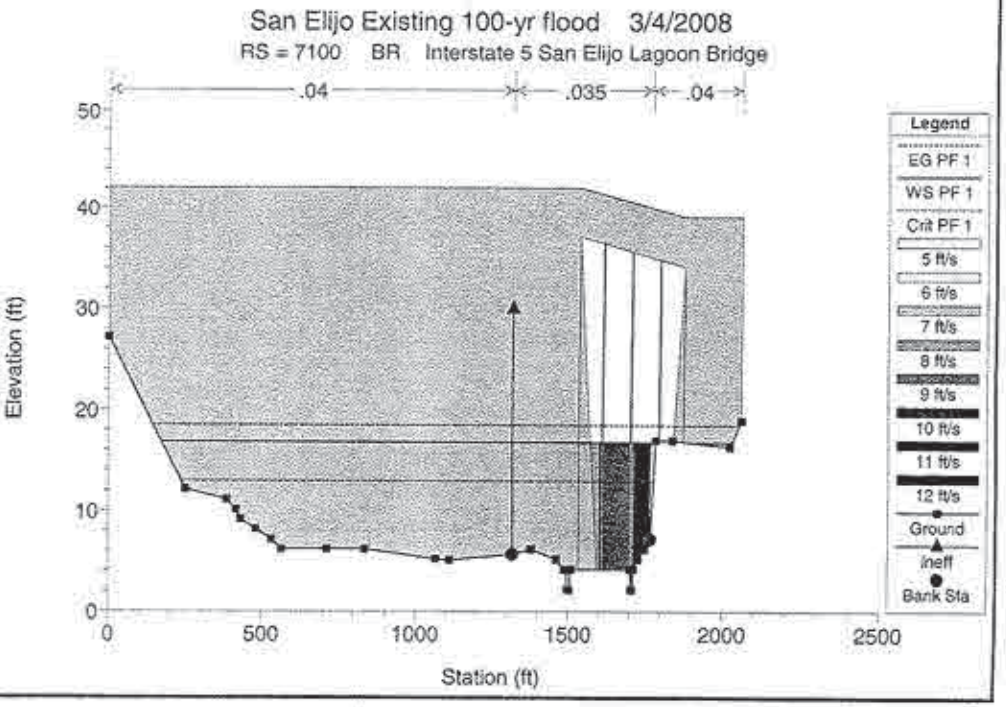

San Elijo Existing 100-yr flood 3/4/2008
RS = 10436 Furthest Upstream Cross Section
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 9816
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 9213
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 8949
.04
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

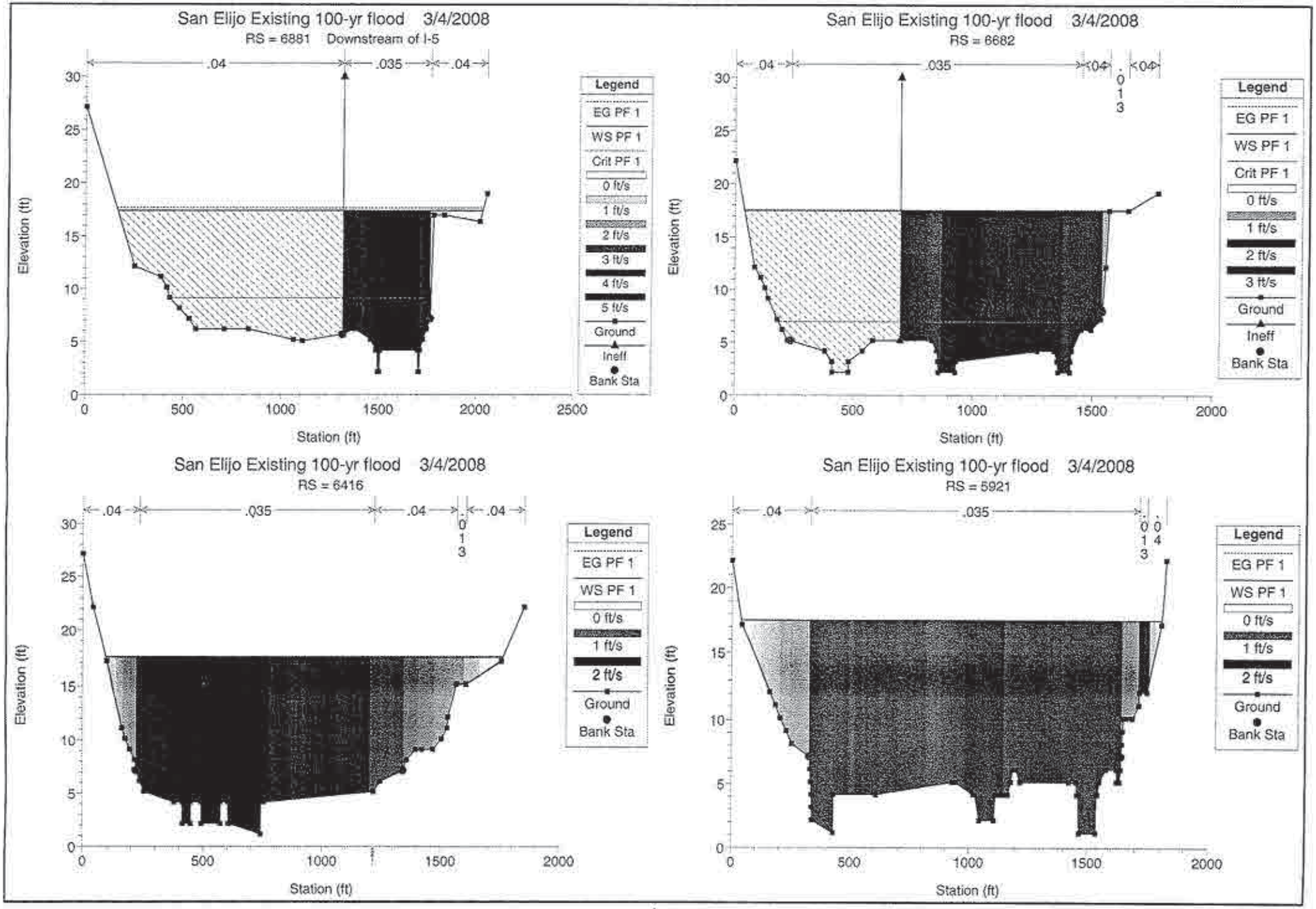

San Elijo Existing 100-yr flood 3/4/2008
RS = 8793
.04
.035
.013
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 8618
.04
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 8569
.04
.035
.013
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 8167
.04
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

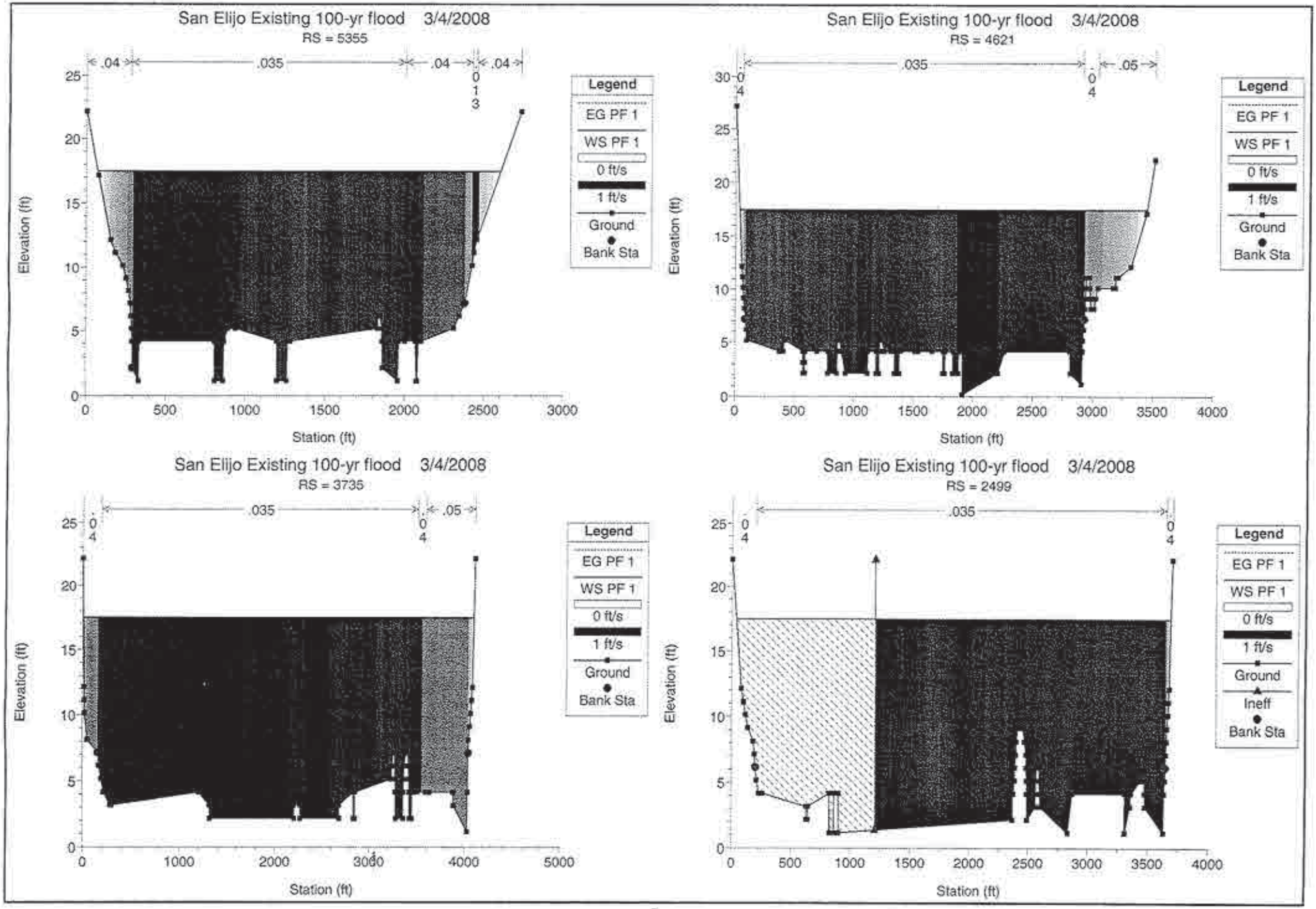

San Elijo Existing 100-yr flood 3/4/2008
RS = 7761
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
Ground
Ineff
Bank Sta

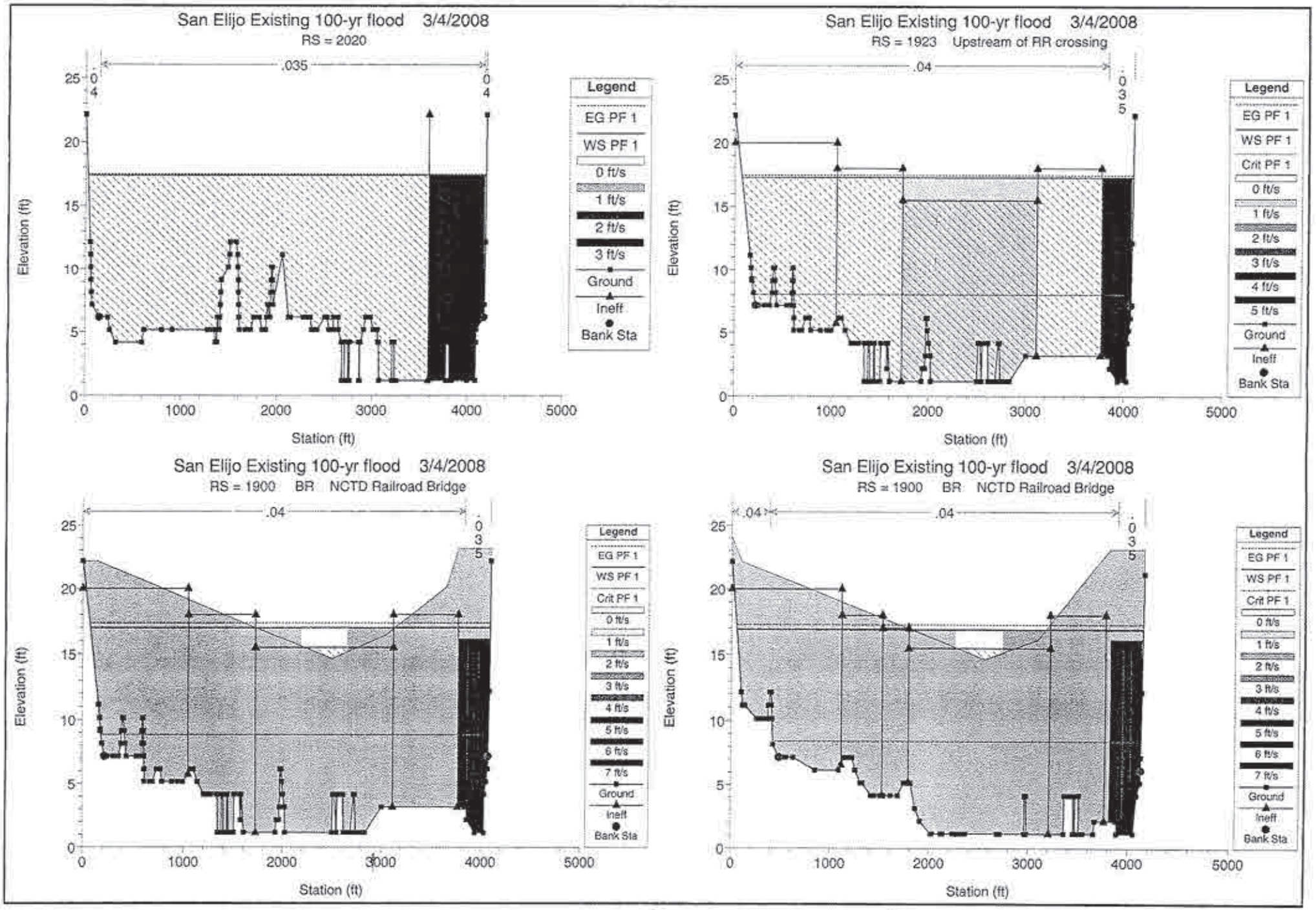

San Elijo Existing 100-yr flood 3/4/2008
RS = 7461 Upstream of I-5
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

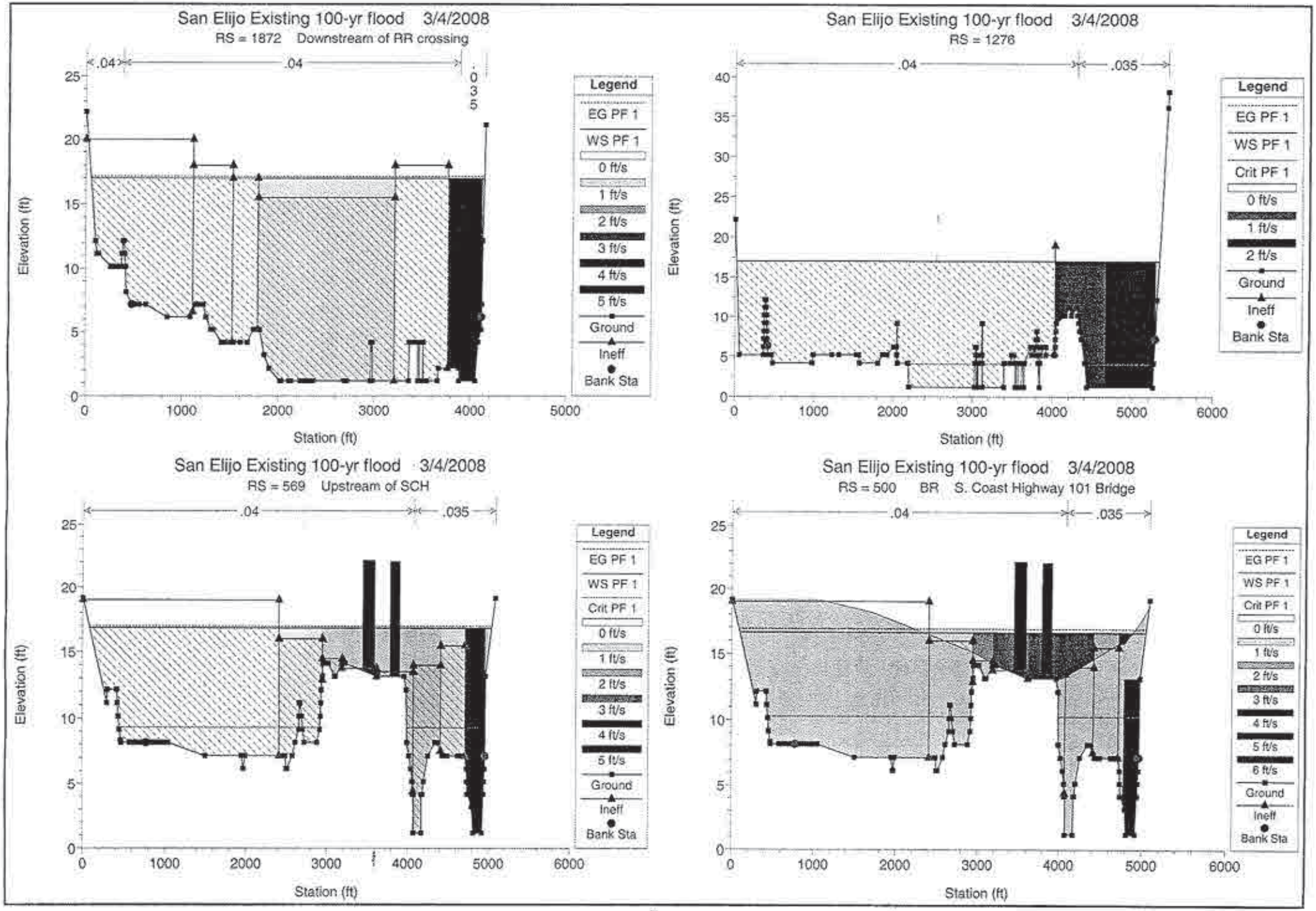

San Elijo Existing 100-yr flood 3/4/2008
RS = 7100 BR Interstate 5 San Elijo Lagoon Bridge
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Ineff
Bank Sta

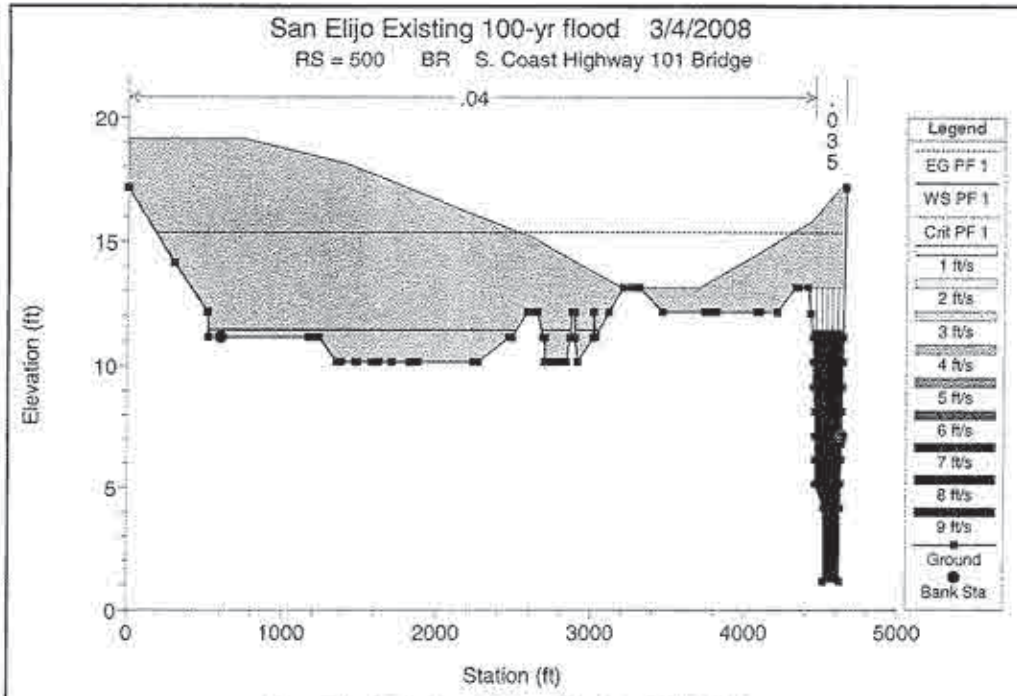

San Elijo Existing 100-yr flood 3/4/2008
RS = 7100 BR Interstate 5 San Elijo Lagoon Bridge
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Ineff
Bank Sta

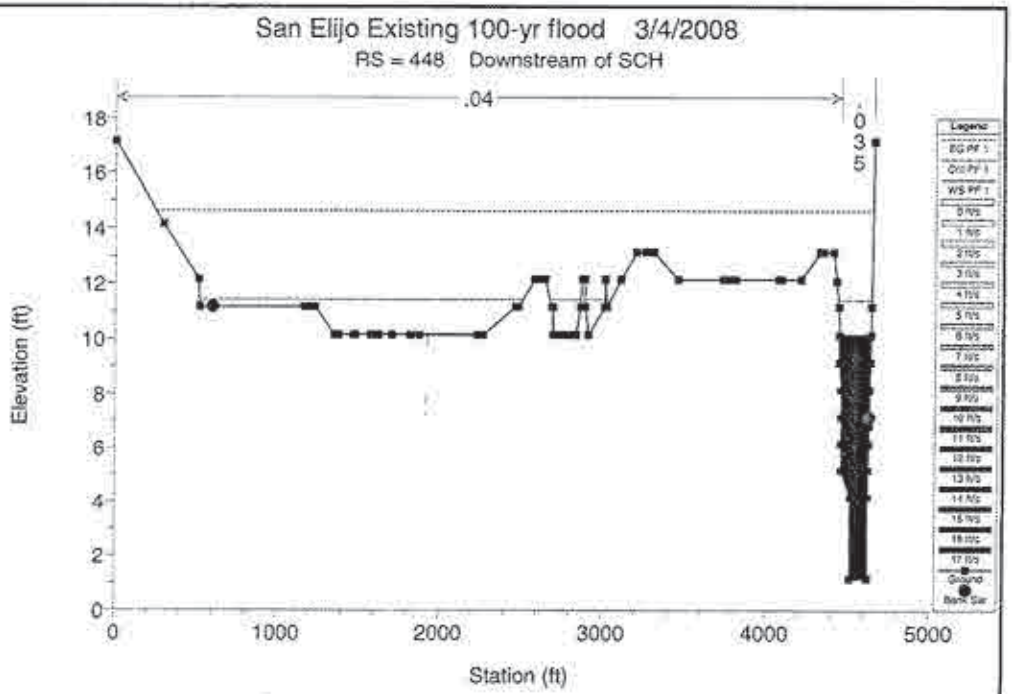

San Elijo Existing 100-yr flood 3/4/2008
RS = 6881 Downstream of I-5
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 6682
.04
.035
.04
.04
.013
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 6416
.04
.035
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 5921
.04
.035
.013
.014
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Bank Sta

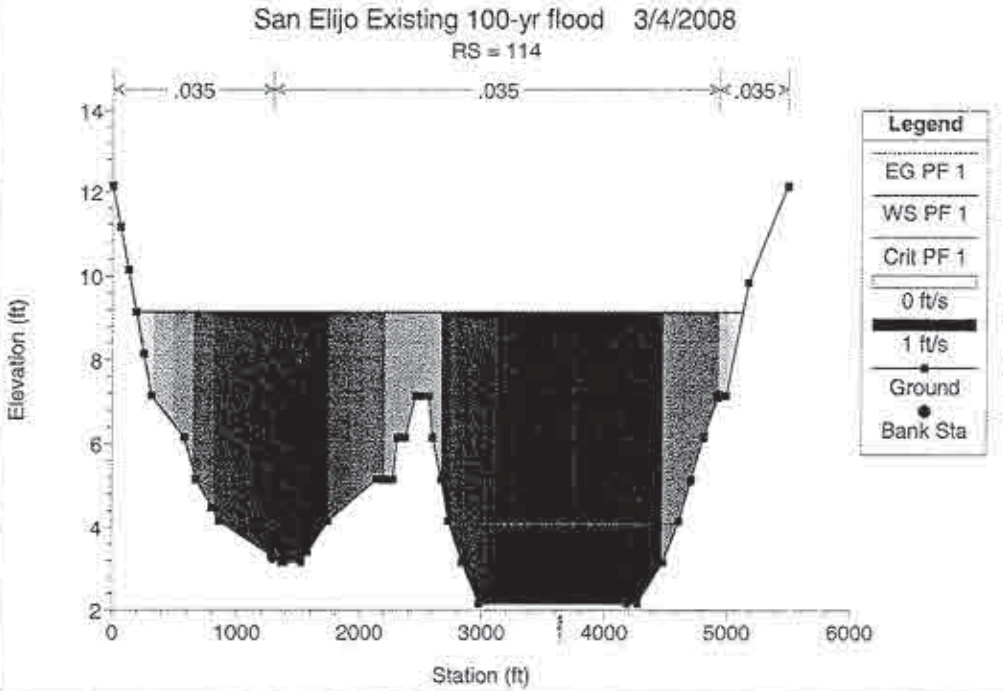

San Elijo Existing 100-yr flood 3/4/2008
RS = 5355
.04
.035
.04
.04
0
1
3
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 4621
.035
.05
0
4
0
4
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 3735
.035
.05
0
4
0
4
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
San Elijo Existing 100-yr flood 3/4/2008
RS = 2499
.035
0
4
0
4
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

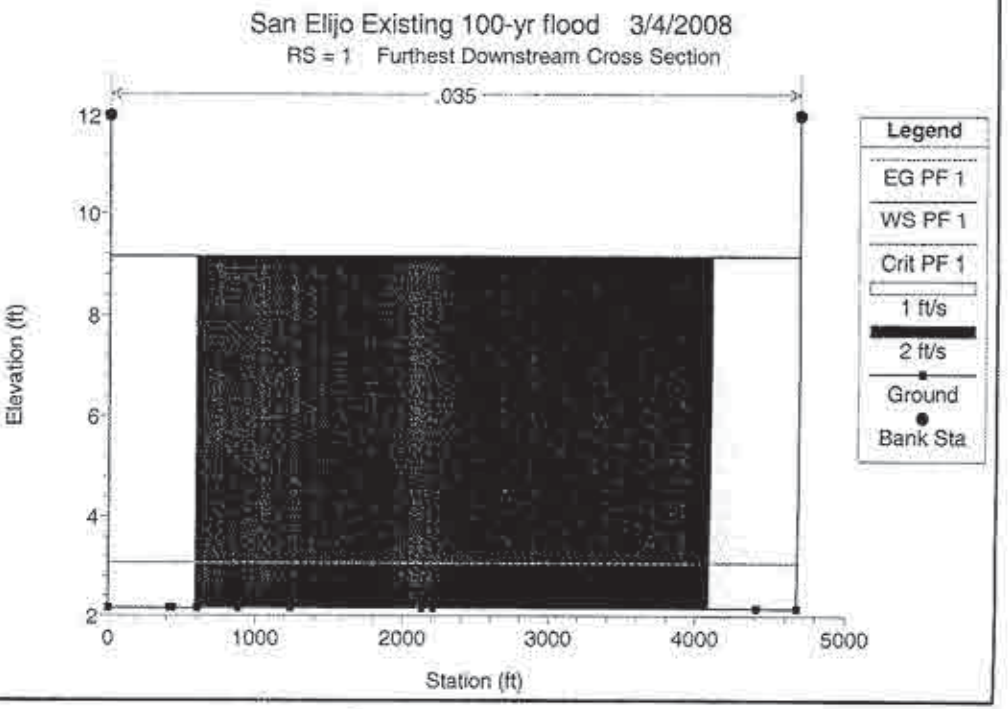

San Elijo Existing 100-yr flood 3/4/2008
RS = 2020
.035
0.4
0.4
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 1923 Upstream of RR crossing
.04
0.35
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 1900 BR NCTD Railroad Bridge
.04
0.35
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 1900 BR NCTD Railroad Bridge
.04
.04
0.35
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta


San Elijo Existing 100-yr flood 3/4/2008
RS = 1872 Downstream of RR crossing
.04
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 1276
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 569 Upstream of SCH
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta
San Elijo Existing 100-yr flood 3/4/2008
RS = 500 BR S. Coast Highway 101 Bridge
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta


San Elijo Existing 100-yr flood 3/4/2008
RS = 500 BR S. Coast Highway 101 Bridge
.04
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


San Elijo Existing 100-yr flood 3/4/2008
RS = 448 Downstream of SCH
.04
.035
Elevation (ft)
Station (ft)


San Elijo Existing 100-yr flood 3/4/2008
RS = 114
.035
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


San Elijo Existing 100-yr flood 3/4/2008
RS = 1 Furthest Downstream Cross Section
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
1 ft/s
2 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

SE_Exist.rep

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X        X           X   X     X    X    X
XXXXXXX  XXXX     X      XXX  XXXX      XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
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PROJECT DATA
Project Title: San Elijo Existing
Project File : SE_Exist.prj
Run Date and Time: 3/4/2008 8:01:13 PM

Project in English units

Project Description:
San Elijo Lagoon 100-yr Existing Floodplain Model

San Elijo Lagoon

PLAN DATA

Plan Title: San Elijo Existing 100-yr flood
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Existing\SE_Exist.p01

Geometry Title: Basic Geometry for high flood analysis
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Existing\SE_Exist.g01

Flow Title : 100 yr flood
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Existing\SE_Exist.f01

Plan Summary Information:

| | | | | | |
|---|---|---|---|---|---|
| Number of: Cross Sections | = 26 | Multiple Openings | = | 0 |
| Culverts | = 0 | Inline Structures | = | 0 |
| Bridges | = 3 | Lateral Structures | = | 0 |

Computational Information

| | |
|---|---|
| Water surface calculation tolerance | = 0.01 |
| Critical depth calculation tolerance | = 0.01 |
| Maximum number of iterations | = 20 |
| Maximum difference tolerance | = 0.3 |
| Flow tolerance factor | = 0.001 |

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only

Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: 100 yr flood
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Existing\SE_Exist.f01

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| RIVER-1 | Reach-1 | 10436 | 23255 |
| San Elijo Lagoon | Lower | 10436 | 23255 |

Boundary Conditions

| River | Reach | Profile | Upstream |
|---|---|---|---|
| San Elijo Lagoon | Lower | PF 1 | Normal S = 0.0046 |

Known WS = 9.15

Changes in WS and EG

| River | Reach | RS | Profile | Type | Value |
|---|---|---|---|---|---|
| San Elijo Lagoon | Lower | 1 | PF 1 Known WS | | 0 |

GEOMETRY DATA

Geometry Title: Basic Geometry for high flood analysis
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Existing\SE_Exist.g01

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 10436

INPUT
Description: Furthest Upstream Cross Section
Station Elevation Data num= 42

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 15 | 17.15 | 35 | 12.15 | 42 | 11.15 | 50 | 10.15 |
| 69 | 9.15 | 81 | 8.15 | 115 | 7.15 | 247 | 6.15 | 280 | 6.15 |
| 401 | 7.15 | 472 | 7.15 | 499 | 6.15 | 596 | 6.15 | 799 | 7.15 |
| 833 | 7.15 | 860 | 7.15 | 910 | 7.15 | 923 | 6.15 | 933 | 6.15 |
| 941 | 7.15 | 982 | 7.15 | 1030 | 7.15 | 1112 | 7.15 | 1186 | 7.15 |
| 1446 | 8.15 | 1648 | 8.15 | 1655 | 8.15 | 1746 | 8.15 | 1786 | 8.15 |
| 1813 | 9.15 | 2007 | 9.15 | 2012 | 8.15 | 2020 | 8.15 | 2033 | 9.15 |
| 2048 | 10.15 | 2074 | 11.15 | 2152 | 12.15 | 2168 | 12.15 | 2211 | 12.15 |
| 2411 | 17.15 | 2611.9 | 22.15 | | | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 81 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 69 | 2033 | 950.3 | 621.4 545.2 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 19.75 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.040 | 0.040 0.040 |
| W.S. Elev (ft) | 19.74 | Reach Len. (ft) | 950.30 | 621.40 545.20 |
| Crit W.S. (ft) | 9.00 | Flow Area (sq ft) | 433.10 | 24155.98 2620.69 |
| E.G. Slope (ft/ft) | 0.000020 | Area (sq ft) | 433.10 | 24155.98 2620.69 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 263.25 | 21630.47 1361.28 |
| Top Width (ft) | 2507.96 | Top Width (ft) | 61.78 | 1964.00 482.18 |
| Vel Total (ft/s) | 0.85 | Avg. Vel. (ft/s) | 0.61 | 0.90 0.52 |
| Max Chl Dpth (ft) | 13.59 | Hydr. Depth (ft) | 7.01 | 12.30 5.44 |
| Conv. Total (cfs) | 5140007.0 | Conv. (cfs) | 58184.7 | 4780942.0 300880.8 |
| Length Wtd. (ft) | 623.85 | Wetted Per. (ft) | 62.97 | 1964.34 482.34 |
| Min Ch El (ft) | 6.15 | Shear (lb/sq ft) | 0.01 | 0.02 0.01 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.01 | 0.01 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 426.87 | 7872.65 294.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 60.53 | 608.71 56.42 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 8.63 | 0.02 | 0.33 | 1.48 |
| 0.00 | 0.23 | 0.05 | | | | |
| 2 | LOB | 8.63 | 17.25 | 3.59 | 16.22 | 9.04 |
| 0.02 | 1.88 | 0.22 | | | | |
| 3 | LOB | 17.25 | 25.88 | 14.05 | 36.51 | 8.89 |
| 0.06 | 4.23 | 0.38 | | | | |
| 4 | LOB | 25.88 | 34.50 | 27.90 | 55.11 | 8.89 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.12 | 6.39 | 0.51 | | | | | |
| 5 | LOB | 34.50 | 43.13 | 42.26 | 70.16 | 8.72 | |
| 0.18 | 8.13 | 0.60 | | | | | |
| 6 | LOB | 43.13 | 51.75 | 52.60 | 79.87 | 8.68 | |
| 0.23 | 9.26 | 0.66 | | | | | |
| 7 | LOB | 51.75 | 60.38 | 59.12 | 85.49 | 8.64 | |
| 0.25 | 9.91 | 0.69 | | | | | |
| 8 | LOB | 60.38 | 69.00 | 63.70 | 89.41 | 8.64 | |
| 0.27 | 10.37 | 0.71 | | | | | |
| 9 | Chan | 69.00 | 314.50 | 2948.28 | 3185.14 | 245.56 | |
| 12.68 | 12.97 | 0.93 | | | | | |
| 10 | Chan | 314.50 | 560.00 | 2966.88 | 3196.98 | 245.52 | |
| 12.76 | 13.02 | 0.93 | | | | | |
| 11 | Chan | 560.00 | 805.50 | 3016.83 | 3229.06 | 245.50 | |
| 12.97 | 13.15 | 0.93 | | | | | |
| 12 | Chan | 805.50 | 1051.00 | 2836.10 | 3112.06 | 245.60 | |
| 12.20 | 12.68 | 0.91 | | | | | |
| 13 | Chan | 1051.00 | 1296.50 | 2770.36 | 3068.08 | 245.50 | |
| 11.91 | 12.50 | 0.90 | | | | | |
| 14 | Chan | 1296.50 | 1542.00 | 2506.19 | 2889.04 | 245.50 | |
| 10.78 | 11.77 | 0.87 | | | | | |
| 15 | Chan | 1542.00 | 1787.50 | 2444.30 | 2846.02 | 245.50 | |
| 10.51 | 11.59 | 0.86 | | | | | |
| 16 | Chan | 1787.50 | 2033.00 | 2141.54 | 2629.60 | 245.65 | |
| 9.21 | 10.71 | 0.81 | | | | | |
| 17 | ROB | 2033.00 | 2105.36 | 411.23 | 651.00 | 72.42 | |
| 1.77 | 9.00 | 0.63 | | | | | |
| 18 | ROB | 2105.36 | 2177.73 | 323.34 | 563.39 | 72.37 | |
| 1.39 | 7.79 | 0.57 | | | | | |
| 19 | ROB | 2177.73 | 2250.09 | 292.34 | 530.34 | 72.37 | |
| 1.26 | 7.33 | 0.55 | | | | | |
| 20 | ROB | 2250.09 | 2322.45 | 192.89 | 413.28 | 72.39 | |
| 0.83 | 5.71 | 0.47 | | | | | |
| 21 | ROB | 2322.45 | 2394.81 | 102.24 | 282.37 | 72.39 | |
| 0.44 | 3.90 | 0.36 | | | | | |
| 22 | ROB | 2394.81 | 2467.18 | 36.27 | 151.64 | 72.38 | |
| 0.16 | 2.10 | 0.24 | | | | | |
| 23 | ROB | 2467.18 | 2539.54 | 2.97 | 28.68 | 48.02 | |
| 0.01 | 0.60 | 0.10 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 9816

INPUT
Description:
Station Elevation Data num= 42

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 10 | 17.15 | 50 | 11.15 | 56 | 10.15 | 66 | 10.15 |
| 130 | 10.15 | 156 | 9.15 | 198 | 8.15 | 326 | 7.15 | 339 | 6.15 |
| 354 | 6.15 | 371 | 6.15 | 403 | 3.15 | 655 | 3.15 | 658 | 3.15 |
| 951 | 3.15 | 974 | 3.15 | 981 | 6.15 | 1128 | 6.15 | 1163 | 6.15 |
| 1181 | 6.15 | 1214 | 6.15 | 1484 | 6.15 | 1510 | 6.15 | 1859 | 7.15 |
| 1881 | 7.15 | 1928 | 7.15 | 1977 | 7.15 | 2032 | 7.15 | 2070 | 8.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2216 | 8.15 | 2327 | 8.15 | 2491 | 9.15 | 2557 | 9.15 | 2713 | 8.15 |
| 2785 | 8.15 | 2843 | 9.15 | 2872 | 10.15 | 2886 | 10.15 | 2899 | 11.15 |
| 3049 | 17.15 | 3219 | 22.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 156 | .035 | 2843 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 156 | 2843 | 477.18 | 604.7 728.2 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.040 | 0.035 | 0.040 |
| W.S. Elev (ft) | 19.74 | Reach Len. (ft) | 477.18 | 604.70 | 728.20 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1256.89 | 35779.54 | 1497.66 |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 1256.89 | 35779.54 | 1497.66 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 498.85 | 22325.43 | 430.72 |
| Top Width (ft) | 3132.25 | Top Width (ft) | 151.18 | 2687.00 | 294.07 |
| Vel Total (ft/s) | 0.60 | Avg. Vel. (ft/s) | 0.40 | 0.62 | 0.29 |
| Max Chl Dpth (ft) | 16.59 | Hydr. Depth (ft) | 8.31 | 13.32 | 5.09 |
| Conv. Total (cfs) | 8887220.0 | Conv. (cfs) | 190641.4 | 8531973.0 | 164605.8 |
| Length Wtd. (ft) | 605.15 | Wetted Per. (ft) | 152.34 | 2687.84 | 294.28 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 408.44 | 7445.15 | 268.24 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 58.20 | 575.54 | 51.56 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Velocity (ft/s) | Left Sta (ft) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 19.50 | 6.44 | 38.09 | 15.40 | |
| 0.03 | 2.59 | 0.17 | | | | | |
| 2 | LOB | 19.50 | 39.00 | 30.48 | 106.82 | 19.72 | |
| 0.13 | 5.48 | 0.29 | | | | | |
| 3 | LOB | 39.00 | 58.50 | 62.27 | 163.94 | 19.71 | |
| 0.27 | 8.41 | 0.38 | | | | | |
| 4 | LOB | 58.50 | 78.00 | 78.10 | 187.01 | 19.50 | |
| 0.34 | 9.59 | 0.42 | | | | | |
| 5 | LOB | 78.00 | 97.50 | 78.10 | 187.01 | 19.50 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.34 | 9.59 | 0.42 | | | | | |
| 6 | LOB | 97.50 | 117.00 | 78.10 | 187.01 | 19.50 | |
| 0.34 | 9.59 | 0.42 | | | | | |
| 7 | LOB | 117.00 | 136.50 | 78.65 | 187.82 | 19.50 | |
| 0.34 | 9.63 | 0.42 | | | | | |
| 8 | LOB | 136.50 | 156.00 | 86.72 | 199.20 | 19.51 | |
| 0.37 | 10.22 | 0.44 | | | | | |
| 9 | Chan | 156.00 | 491.88 | 2872.15 | 4575.75 | 336.07 | |
| 12.35 | 13.62 | 0.63 | | | | | |
| 10 | Chan | 491.88 | 827.75 | 3990.14 | 5572.25 | 335.88 | |
| 17.16 | 16.59 | 0.72 | | | | | |
| 11 | Chan | 827.75 | 1163.63 | 3342.18 | 5013.88 | 336.49 | |
| 14.37 | 14.93 | 0.67 | | | | | |
| 12 | Chan | 1163.63 | 1499.50 | 2861.62 | 4564.63 | 335.88 | |
| 12.31 | 13.59 | 0.63 | | | | | |
| 13 | Chan | 1499.50 | 1835.38 | 2704.90 | 4412.96 | 335.88 | |
| 11.63 | 13.14 | 0.61 | | | | | |
| 14 | Chan | 1835.38 | 2171.25 | 2401.81 | 4109.30 | 335.89 | |
| 10.33 | 12.23 | 0.58 | | | | | |
| 15 | Chan | 2171.25 | 2507.13 | 2103.33 | 3794.76 | 335.88 | |
| 9.04 | 11.30 | 0.55 | | | | | |
| 16 | Chan | 2507.13 | 2843.00 | 2049.30 | 3736.01 | 335.89 | |
| 8.81 | 11.12 | 0.55 | | | | | |
| 17 | ROB | 2843.00 | 2890.00 | 170.43 | 464.63 | 47.03 | |
| 0.73 | 9.89 | 0.37 | | | | | |
| 18 | ROB | 2890.00 | 2937.00 | 120.78 | 377.98 | 47.06 | |
| 0.52 | 8.04 | 0.32 | | | | | |
| 19 | ROB | 2937.00 | 2984.00 | 76.85 | 288.12 | 47.04 | |
| 0.33 | 6.13 | 0.27 | | | | | |
| 20 | ROB | 2984.00 | 3031.00 | 41.74 | 199.76 | 47.04 | |
| 0.18 | 4.25 | 0.21 | | | | | |
| 21 | ROB | 3031.00 | 3078.00 | 16.84 | 115.85 | 47.03 | |
| 0.07 | 2.46 | 0.15 | | | | | |
| 22 | ROB | 3078.00 | 3125.00 | 4.04 | 49.17 | 47.02 | |
| 0.02 | 1.05 | 0.08 | | | | | |
| 23 | ROB | 3125.00 | 3172.00 | 0.05 | 2.14 | 12.07 | |
| 0.00 | 0.18 | 0.03 | | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 9213

INPUT
Description:
Station Elevation Data num= 70

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 15 | 17.15 | 30 | 12.15 | 40 | 11.15 | 43 | 10.15 |
| 50 | 10.15 | 63 | 10.15 | 68 | 9.15 | 75 | 8.15 | 90 | 7.15 |
| 121 | 6.15 | 244 | 5.15 | 259 | 3.15 | 349 | 3.15 | 360 | 5.15 |
| 370 | 6.15 | 383 | 7.15 | 400 | 8.15 | 465 | 9.15 | 481 | 9.15 |
| 544 | 8.15 | 564 | 8.15 | 579 | 8.15 | 596 | 7.15 | 611 | 6.15 |
| 619 | 5.15 | 630 | 3.15 | 703 | 3.15 | 713 | 5.15 | 730 | 6.15 |
| 984 | 6.15 | 1016 | 6.15 | 1041 | 6.15 | 1250 | 6.15 | 1283 | 6.15 |
| 1299 | 6.15 | 1799 | 7.15 | 1891 | 7.15 | 1896 | 6.15 | 1900 | 5.15 |
| 1917 | 5.15 | 1921 | 6.15 | 1924 | 7.15 | 1929 | 8.15 | 1954 | 8.15 |
| 1958 | 7.15 | 1967 | 6.15 | 1970 | 6.15 | 2012 | 6.15 | 2050 | 6.15 |
| 2180 | 7.15 | 2195 | 8.15 | 2226 | 8.15 | 2239 | 7.15 | 2247 | 6.15 |
| 2269 | 6.15 | 2284 | 7.15 | 2286 | 8.15 | 2291 | 9.15 | 2299 | 9.15 |
| 2305 | 8.15 | 2429 | 7.15 | 2472 | 7.15 | 2554 | 8.15 | 2561 | 9.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2581 | 10.15 | 2586 | 11.15 | 2589 | 12.15 | 2680 | 17.15 | 2780 | 22.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 68 | .035 | 2561 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 68 | 2561 | 236.4 | 264.5 | 398.2 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 145 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 | 0.040 |
| W.S. Elev (ft) | 19.73 | Reach Len. (ft) | 236.40 | 264.50 | 398.20 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 31976.16 | 800.63 |
| E.G. Slope (ft/ft) | 0.000009 | Area (sq ft) | 436.42 | 32968.91 | 800.63 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23002.90 | 252.10 |
| Top Width (ft) | 2724.41 | Top Width (ft) | 60.75 | 2493.00 | 170.66 |
| Vel Total (ft/s) | 0.71 | Avg. Vel. (ft/s) | | 0.72 | 0.31 |
| Max Chl Dpth (ft) | 16.58 | Hydr. Depth (ft) | | 13.24 | 4.69 |
| Conv. Total (cfs) | 7673874.0 | Conv. (cfs) | | 7590685.0 | 83189.2 |
| Length Wtd. (ft) | 269.62 | Wetted Per. (ft) | | 2418.44 | 171.15 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | | 0.01 | 0.00 |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 399.16 | 6967.96 | 249.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 57.04 | 539.58 | 47.68 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 8.50 | 0.00 | 0.26 | 1.32 |
| 0.00 | 0.21 | 0.00 | | | | |
| 2 | LOB | 8.50 | 17.00 | 0.00 | 15.58 | 8.96 |
| 0.00 | 1.83 | 0.00 | | | | |
| 3 | LOB | 17.00 | 25.50 | 0.00 | 39.67 | 8.96 |
| 0.00 | 4.67 | 0.00 | | | | |
| 4 | LOB | 25.50 | 34.00 | 0.00 | 61.88 | 8.76 |
| 0.00 | 7.28 | 0.00 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | LOB | 34.00 | 42.50 | 0.00 | 72.20 | 8.67 | |
| 0.00 | 8.49 | 0.00 | | | | | |
| 6 | LOB | 42.50 | 51.00 | 0.00 | 81.42 | 8.53 | |
| 0.00 | 9.58 | 0.00 | | | | | |
| 7 | LOB | 51.00 | 59.50 | 0.00 | 81.46 | 8.50 | |
| 0.00 | 9.58 | 0.00 | | | | | |
| 8 | LOB | 59.50 | 68.00 | 0.00 | 83.96 | 8.60 | |
| 0.00 | 9.88 | 0.00 | | | | | |
| 9 | Chan | 68.00 | 145.00 | 0.00 | 992.75 | 77.12 | |
| 0.00 | 12.89 | 0.00 | | | | | |
| 10 | Chan | 145.00 | 447.00 | 3299.90 | 4345.29 | 302.44 | |
| 14.19 | 14.39 | 0.76 | | | | | |
| 11 | Chan | 447.00 | 749.00 | 2892.62 | 4015.62 | 302.54 | |
| 12.44 | 13.30 | 0.72 | | | | | |
| 12 | Chan | 749.00 | 1051.00 | 3000.81 | 4102.13 | 302.00 | |
| 12.90 | 13.58 | 0.73 | | | | | |
| 13 | Chan | 1051.00 | 1353.00 | 2997.25 | 4099.21 | 302.00 | |
| 12.89 | 13.57 | 0.73 | | | | | |
| 14 | Chan | 1353.00 | 1655.00 | 2851.37 | 3978.31 | 302.00 | |
| 12.26 | 13.17 | 0.72 | | | | | |
| 15 | Chan | 1655.00 | 1957.00 | 2685.67 | 3841.49 | 302.70 | |
| 11.55 | 12.72 | 0.70 | | | | | |
| 16 | Chan | 1957.00 | 2259.00 | 2784.83 | 3923.50 | 302.22 | |
| 11.98 | 12.99 | 0.71 | | | | | |
| 17 | Chan | 2259.00 | 2561.00 | 2490.46 | 3670.63 | 302.53 | |
| 10.71 | 12.15 | 0.68 | | | | | |
| 18 | ROB | 2561.00 | 2588.38 | 111.19 | 266.52 | 27.63 | |
| 0.48 | 9.74 | 0.42 | | | | | |
| 19 | ROB | 2588.38 | 2615.75 | 62.42 | 188.00 | 27.45 | |
| 0.27 | 6.87 | 0.33 | | | | | |
| 20 | ROB | 2615.75 | 2643.13 | 41.35 | 146.77 | 27.42 | |
| 0.18 | 5.36 | 0.28 | | | | | |
| 21 | ROB | 2643.13 | 2670.50 | 23.88 | 105.59 | 27.42 | |
| 0.10 | 3.86 | 0.23 | | | | | |
| 22 | ROB | 2670.50 | 2697.88 | 10.70 | 65.21 | 27.41 | |
| 0.05 | 2.38 | 0.16 | | | | | |
| 23 | ROB | 2697.88 | 2725.25 | 2.54 | 27.51 | 27.41 | |
| 0.01 | 1.01 | 0.09 | | | | | |
| 24 | ROB | 2725.25 | 2752.63 | 0.03 | 1.03 | 6.42 | |
| 0.00 | 0.16 | 0.03 | | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8949

INPUT
Description:
Station Elevation Data num= 51

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 30 | 17.15 | 70 | 12.15 | 150 | 11.15 | 172 | 10.15 |
| 196 | 9.15 | 210 | 8.15 | 242 | 7.15 | 251 | 6.15 | 270 | 6.15 |
| 291 | 6.15 | 344 | 5.15 | 357 | 3.15 | 732 | 3.15 | 742 | 5.15 |
| 760 | 6.15 | 774 | 7.15 | 778 | 8.15 | 782 | 9.15 | 798 | 9.15 |
| 822 | 9.15 | 850 | 9.15 | 871 | 8.15 | 925 | 7.15 | 1144 | 6.15 |
| 1163 | 6.15 | 1195 | 5.15 | 1205 | 6.15 | 1274 | 6.15 | 1300 | 6.15 |
| 1348 | 6.15 | 1541 | 6.15 | 1801 | 6.15 | 1806 | 5.15 | 1812 | 4.15 |
| 1824 | 4.15 | 1833 | 5.15 | 1834 | 6.15 | 1837 | 7.15 | 1852 | 7.15 |
| 1886 | 6.15 | 1898 | 6.15 | 2119 | 6.65 | 2138 | 7.15 | 2143 | 8.15 |
| 2232 | 8.15 | 2239 | 7.15 | 2290 | 9.27 | 2359 | 12.15 | 2400 | 12.15 |

2519 22.15

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 210 | .035 | 2143 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 210 | 2143 | 130.434 | 155.9 373.34 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 218 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 19.74 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 0.040 |
| W.S. Elev (ft) | 19.73 | Reach Len. (ft) | 130.43 | 155.90 373.34 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 26797.58 2977.20 |
| E.G. Slope (ft/ft) | 0.000011 | Area (sq ft) | 1466.07 | 26891.20 2977.20 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 21726.43 1528.57 |
| Top Width (ft) | 2475.66 | Top Width (ft) | 195.47 | 1933.00 347.18 |
| Vel Total (ft/s) | 0.78 | Avg. Vel. (ft/s) | | 0.81 0.51 |
| Max Chl Dpth (ft) | 16.58 | Hydr. Depth (ft) | | 13.92 8.58 |
| Conv. Total (cfs) | 7042509.0 | Conv. (cfs) | | 6579598.0 462911.1 |
| Length Wtd. (ft) | 168.84 | Wetted Per. (ft) | | 1926.77 347.68 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | | 0.01 0.01 |
| Alpha | 1.04 | Stream Power (lb/ft s) | | 0.01 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 394.00 | 6786.22 231.76 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 56.35 | 526.15 45.31 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 26.25 | 0.00 | 11.45 | 11.88 |
| 0.00 | 0.98 | 0.00 | | | | |
| 2 | LOB | 26.25 | 52.50 | 0.00 | 98.15 | 26.48 |
| 0.00 | 3.74 | 0.00 | | | | |
| 3 | LOB | 52.50 | 78.75 | 0.00 | 180.27 | 26.39 |
| 0.00 | 6.87 | 0.00 | | | | |
| 4 | LOB | 78.75 | 105.00 | 0.00 | 206.11 | 26.25 |
| 0.00 | 7.85 | 0.00 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | LOB | 105.00 | 131.25 | 0.00 | 214.73 | 26.25 | |
| 0.00 | 8.18 | 0.00 | | | | | |
| 6 | LOB | 131.25 | 157.50 | 0.00 | 224.27 | 26.26 | |
| 0.00 | 8.54 | 0.00 | | | | | |
| 7 | LOB | 157.50 | 183.75 | 0.00 | 249.53 | 26.28 | |
| 0.00 | 9.51 | 0.00 | | | | | |
| 8 | LOB | 183.75 | 210.00 | 0.00 | 281.56 | 26.30 | |
| 0.00 | 10.73 | 0.00 | | | | | |
| 9 | Chan | 210.00 | 218.00 | 0.00 | 93.63 | 8.00 | |
| 0.00 | 11.70 | 0.00 | | | | | |
| 10 | Chan | 218.00 | 458.63 | 3032.10 | 3587.20 | 240.85 | |
| 13.04 | 14.91 | 0.85 | | | | | |
| 11 | Chan | 458.63 | 699.25 | 3621.63 | 3989.20 | 240.63 | |
| 15.57 | 16.58 | 0.91 | | | | | |
| 12 | Chan | 699.25 | 939.88 | 2273.62 | 3019.70 | 241.17 | |
| 9.78 | 12.55 | 0.75 | | | | | |
| 13 | Chan | 939.88 | 1180.50 | 2478.02 | 3176.98 | 240.64 | |
| 10.66 | 13.20 | 0.78 | | | | | |
| 14 | Chan | 1180.50 | 1421.13 | 2617.76 | 3283.54 | 240.68 | |
| 11.26 | 13.65 | 0.80 | | | | | |
| 15 | Chan | 1421.13 | 1661.75 | 2596.66 | 3267.32 | 240.63 | |
| 11.17 | 13.58 | 0.79 | | | | | |
| 16 | Chan | 1661.75 | 1902.38 | 2611.87 | 3283.30 | 241.45 | |
| 11.23 | 13.64 | 0.80 | | | | | |
| 17 | Chan | 1902.38 | 2143.00 | 2494.76 | 3190.34 | 240.73 | |
| 10.73 | 13.26 | 0.78 | | | | | |
| 18 | ROB | 2143.00 | 2190.00 | 313.79 | 544.19 | 47.00 | |
| 1.35 | 11.58 | 0.58 | | | | | |
| 19 | ROB | 2190.00 | 2237.00 | 315.28 | 545.97 | 47.05 | |
| 1.36 | 11.62 | 0.58 | | | | | |
| 20 | ROB | 2237.00 | 2284.00 | 317.98 | 548.81 | 47.06 | |
| 1.37 | 11.68 | 0.58 | | | | | |
| 21 | ROB | 2284.00 | 2331.00 | 234.61 | 457.22 | 47.04 | |
| 1.01 | 9.73 | 0.51 | | | | | |
| 22 | ROB | 2331.00 | 2378.00 | 166.81 | 372.55 | 47.02 | |
| 0.72 | 7.93 | 0.45 | | | | | |
| 23 | ROB | 2378.00 | 2425.00 | 136.11 | 329.93 | 47.09 | |
| 0.59 | 7.02 | 0.41 | | | | | |
| 24 | ROB | 2425.00 | 2472.00 | 42.68 | 164.63 | 47.17 | |
| 0.18 | 3.50 | 0.26 | | | | | |
| 25 | ROB | 2472.00 | 2519.00 | 1.31 | 13.89 | 18.25 | |
| 0.01 | 0.76 | 0.09 | | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8793

INPUT
Description:
Station Elevation Data num= 51

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 110 | 17.15 | 190 | 12.15 | 215 | 11.15 | 238 | 10.15 |
| 249 | 9.15 | 262 | 8.15 | 305 | 7.15 | 404 | 6.15 | 431 | 6.15 |
| 441 | 3.15 | 442 | 3.15 | 453 | 6.15 | 621 | 5.15 | 632 | 3.15 |
| 762 | 3.15 | 773 | 5.15 | 812 | 6.15 | 825 | 7.15 | 829 | 8.15 |
| 846 | 9.15 | 919 | 9.15 | 955 | 8.15 | 1013 | 7.15 | 1354 | 6.15 |
| 1389 | 6.15 | 1406 | 5.15 | 1448 | 6.15 | 1480 | 6.15 | 1541 | 6.15 |
| 1544 | 6.15 | 1709 | 6.15 | 1718 | 7.15 | 1747 | 8.15 | 1751 | 8.15 |
| 1758 | 7.15 | 1762 | 6.15 | 1770 | 5.15 | 1778 | 4.15 | 1794 | 4.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1802 | 5.15 | 1804 | 6.15 | 1860 | 6.15 | 1881 | 6.15 | 1936 | 6.15 |
| 1955 | 6.15 | 2053 | 8.15 | 2073 | 12.15 | 2153 | 12.15 | 2183 | 17.15 |
| 2233 | 22.15 | | | | | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 262 | .035 | 2073 | .013 | 2153 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 262 | 2053 | 164.68 | 175.6 204.18 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 305 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 | 0.017 |
| W.S. Elev (ft) | 19.72 | Reach Len. (ft) | 164.68 | 175.60 | 204.18 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 23548.03 | 982.36 |
| E.G. Slope (ft/ft) | 0.000015 | Area (sq ft) | 1143.61 | 24067.11 | 982.36 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22015.71 | 1239.29 |
| Top Width (ft) | 2155.29 | Top Width (ft) | 208.57 | 1791.00 | 155.72 |
| Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | | 0.93 | 1.26 |
| Max Chl Dpth (ft) | 16.57 | Hydr. Depth (ft) | | 13.47 | 6.31 |
| Conv. Total (cfs) | 5973722.0 | Conv. (cfs) | | 5655374.0 | 318348.8 |
| Length Wtd. (ft) | 177.01 | Wetted Per. (ft) | | 1750.19 | 156.65 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | | 0.01 | 0.01 |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.01 | 0.01 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 390.09 | 6695.04 | 214.79 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 55.74 | 519.48 | 43.15 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 32.75 | 65.50 | 0.00 | 3.31 | 12.09 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.27 | 0.00 | | | | | |
| 2 | LOB | 65.50 | 98.25 | 0.00 | 42.35 | 32.78 | |
| 0.00 | 1.29 | 0.00 | | | | | |
| 3 | LOB | 98.25 | 131.00 | 0.00 | 94.86 | 32.80 | |
| 0.00 | 2.90 | 0.00 | | | | | |
| 4 | LOB | 131.00 | 163.75 | 0.00 | 160.72 | 32.81 | |
| 0.00 | 4.91 | 0.00 | | | | | |
| 5 | LOB | 163.75 | 196.50 | 0.00 | 227.28 | 32.81 | |
| 0.00 | 6.94 | 0.00 | | | | | |
| 6 | LOB | 196.50 | 229.25 | 0.00 | 278.29 | 32.78 | |
| 0.00 | 8.50 | 0.00 | | | | | |
| 7 | LOB | 229.25 | 262.00 | 0.00 | 336.80 | 32.84 | |
| 0.00 | 10.28 | 0.00 | | | | | |
| 8 | Chan | 262.00 | 305.00 | 0.00 | 519.08 | 43.01 | |
| 0.00 | 12.07 | 0.00 | | | | | |
| 9 | Chan | 305.00 | 523.50 | 2774.29 | 2965.17 | 219.35 | |
| 11.93 | 13.57 | 0.94 | | | | | |
| 10 | Chan | 523.50 | 742.00 | 3469.13 | 3386.59 | 218.68 | |
| 14.92 | 15.50 | 1.02 | | | | | |
| 11 | Chan | 742.00 | 960.50 | 2364.97 | 2692.14 | 218.90 | |
| 10.17 | 12.32 | 0.88 | | | | | |
| 12 | Chan | 960.50 | 1179.00 | 2473.35 | 2763.52 | 218.51 | |
| 10.64 | 12.65 | 0.89 | | | | | |
| 13 | Chan | 1179.00 | 1397.50 | 2715.10 | 2922.60 | 218.52 | |
| 11.68 | 13.38 | 0.93 | | | | | |
| 14 | Chan | 1397.50 | 1616.00 | 2824.50 | 2992.75 | 218.53 | |
| 12.15 | 13.70 | 0.94 | | | | | |
| 15 | Chan | 1616.00 | 1834.50 | 2764.27 | 2957.88 | 219.19 | |
| 11.89 | 13.54 | 0.93 | | | | | |
| 16 | Chan | 1834.50 | 2053.00 | 2630.10 | 2867.38 | 218.52 | |
| 11.31 | 13.12 | 0.92 | | | | | |
| 17 | ROB | 2053.00 | 2075.50 | 171.49 | 210.36 | 22.90 | |
| 0.74 | 9.35 | 0.82 | | | | | |
| 18 | ROB | 2075.50 | 2098.00 | 289.33 | 170.36 | 22.50 | |
| 1.24 | 7.57 | 1.70 | | | | | |
| 19 | ROB | 2098.00 | 2120.50 | 289.33 | 170.36 | 22.50 | |
| 1.24 | 7.57 | 1.70 | | | | | |
| 20 | ROB | 2120.50 | 2143.00 | 289.33 | 170.36 | 22.50 | |
| 1.24 | 7.57 | 1.70 | | | | | |
| 21 | ROB | 2143.00 | 2165.50 | 169.04 | 157.34 | 22.67 | |
| 0.73 | 6.99 | 1.07 | | | | | |
| 22 | ROB | 2165.50 | 2188.00 | 27.65 | 82.13 | 22.77 | |
| 0.12 | 3.65 | 0.34 | | | | | |
| 23 | ROB | 2188.00 | 2210.50 | 3.13 | 21.46 | 20.82 | |
| 0.01 | 1.04 | 0.15 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8618

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 110 | 17.15 | 200 | 12.15 | 210 | 11.15 | 221 | 10.15 |
| 248 | 10.15 | 268 | 9.15 | 278 | 8.15 | 370 | 7.15 | 397 | 7.15 |
| 436 | 7.15 | 450 | 7.15 | 730 | 8.15 | 1023 | 9.15 | 1414 | 9.15 |
| 1438 | 8.15 | 1526 | 7.15 | 1555 | 7.15 | 1672 | 8.15 | 1688 | 9.15 |
| 1716 | 9.15 | 1893 | 9.15 | 1925 | 10.15 | 1938 | 11.15 | 1943 | 12.15 |
| 1980 | 12.15 | 2043 | 17.15 | 2080 | 22.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 268 | .035 | 1893 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 268 | 1893 | 50 | 48.8 58.102 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 382 | | F |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 0 | 1910 | 9.65 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 19.73 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 19.70 | Reach Len. (ft) | 50.00 | 48.80 |
| 58.10 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 15180.88 |
| 1096.54 | | | | |
| E.G. Slope (ft/ft) | 0.000055 | Area (sq ft) | 1161.77 | 16326.22 |
| 1096.54 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22207.81 |
| 1047.19 | | | | |
| Top Width (ft) | 2007.88 | Top Width (ft) | 214.03 | 1625.00 |
| 168.85 | | | | |
| Vel Total (ft/s) | 1.43 | Avg. Vel. (ft/s) | | 1.46 |
| 0.95 | | | | |
| Max Chl Dpth (ft) | 10.05 | Hydr. Depth (ft) | | 10.05 |
| 6.49 | | | | |
| Conv. Total (cfs) | 3142361.0 | Conv. (cfs) | | 3000859.0 |
| 141502.3 | | | | |
| Length Wtd. (ft) | 49.21 | Wetted Per. (ft) | | 1511.00 |
| 169.36 | | | | |
| Min Ch El (ft) | 9.65 | Shear (lb/sq ft) | | 0.03 |
| 0.02 | | | | |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.05 |
| 0.02 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 385.74 | 6613.62 |
| 209.92 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 54.94 | 512.60 |
| 42.39 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 33.50 | 67.00 | 0.00 | 3.86 | 13.05 |
| 0.00 | 0.30 | 0.00 | | | | |
| 2 | LOB | 67.00 | 100.50 | 0.00 | 45.35 | 33.53 |
| 0.00 | 1.35 | 0.00 | | | | |
| 3 | LOB | 100.50 | 134.00 | 0.00 | 99.27 | 33.55 |
| 0.00 | 2.96 | 0.00 | | | | |
| 4 | LOB | 134.00 | 167.50 | 0.00 | 161.16 | 33.55 |
| 0.00 | 4.81 | 0.00 | | | | |
| 5 | LOB | 167.50 | 201.00 | 0.00 | 223.53 | 33.56 |
| 0.00 | 6.67 | 0.00 | | | | |
| 6 | LOB | 201.00 | 234.50 | 0.00 | 301.27 | 33.59 |
| 0.00 | 8.99 | 0.00 | | | | |
| 7 | LOB | 234.50 | 268.00 | 0.00 | 327.32 | 33.51 |
| 0.00 | 9.77 | 0.00 | | | | |
| 8 | Chan | 268.00 | 382.00 | 0.00 | 1145.35 | 114.00 |
| 0.00 | 10.05 | 0.00 | | | | |
| 9 | Chan | 382.00 | 597.86 | 3172.54 | 2168.70 | 215.86 |
| 13.64 | 10.05 | 1.46 | | | | |
| 10 | Chan | 597.86 | 813.71 | 3172.55 | 2168.70 | 215.86 |
| 13.64 | 10.05 | 1.46 | | | | |
| 11 | Chan | 813.71 | 1029.57 | 3172.55 | 2168.70 | 215.86 |
| 13.64 | 10.05 | 1.46 | | | | |
| 12 | Chan | 1029.57 | 1245.43 | 3172.55 | 2168.70 | 215.86 |
| 13.64 | 10.05 | 1.46 | | | | |
| 13 | Chan | 1245.43 | 1461.29 | 3172.55 | 2168.70 | 215.86 |
| 13.64 | 10.05 | 1.46 | | | | |
| 14 | Chan | 1461.29 | 1677.14 | 3172.54 | 2168.70 | 215.86 |
| 13.64 | 10.05 | 1.46 | | | | |
| 15 | Chan | 1677.14 | 1893.00 | 3172.55 | 2168.70 | 215.86 |
| 13.64 | 10.05 | 1.46 | | | | |
| 16 | ROB | 1893.00 | 1916.38 | 270.51 | 234.00 | 23.38 |
| 1.16 | 10.01 | 1.16 | | | | |
| 17 | ROB | 1916.38 | 1939.75 | 235.80 | 215.77 | 23.45 |
| 1.01 | 9.23 | 1.09 | | | | |
| 18 | ROB | 1939.75 | 1963.13 | 170.32 | 177.47 | 23.44 |
| 0.73 | 7.59 | 0.96 | | | | |
| 19 | ROB | 1963.13 | 1986.50 | 166.18 | 174.73 | 23.40 |
| 0.71 | 7.48 | 0.95 | | | | |
| 20 | ROB | 1986.50 | 2009.88 | 118.35 | 142.67 | 23.45 |
| 0.51 | 6.10 | 0.83 | | | | |
| 21 | ROB | 2009.88 | 2033.25 | 64.70 | 99.30 | 23.45 |
| 0.28 | 4.25 | 0.65 | | | | |
| 22 | ROB | 2033.25 | 2056.63 | 21.10 | 50.76 | 23.53 |
| 0.09 | 2.17 | 0.42 | | | | |
| 23 | ROB | 2056.63 | 2080.00 | 0.23 | 1.84 | 5.27 |
| 0.00 | 0.35 | 0.12 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon

REACH: Lower RS: 8569

INPUT
Description:
Station Elevation Data num= 41

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 140 | 17.15 | 230 | 12.15 | 255 | 11.15 | 264 | 10.15 |
| 308 | 9.15 | 331 | 8.15 | 391 | 7.15 | 473 | 6.15 | 487 | 6.15 |
| 529 | 7.15 | 568 | 7.15 | 651 | 7.15 | 666 | 7.15 | 740 | 6.15 |
| 763 | 6.15 | 827 | 6.15 | 916 | 6.15 | 1007 | 6.15 | 1215 | 5.15 |
| 1237 | 5.15 | 1264 | 6.15 | 1294 | 6.15 | 1726 | 6.15 | 1743 | 6.15 |
| 1746 | 5.15 | 1751 | 4.15 | 1757 | 4.15 | 1761 | 5.15 | 1874 | 5.15 |
| 1909 | 5.15 | 1921 | 6.15 | 1926 | 7.15 | 1936 | 8.15 | 1944 | 9.15 |
| 1951 | 10.15 | 1953 | 11.15 | 1958 | 12.15 | 1997 | 12.15 | 2097 | 17.15 |
| 2134 | 22.15 | | | | | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 255 | .035 | 1958 | .013 | 1997 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 331 | 1936 | 167 | 403 | 694.2 .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 429 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 19.72 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | | 0.035 |
| 0.023 | | | | |
| W.S. Elev (ft) | 19.71 | Reach Len. (ft) | 167.00 | 403.00 |
| 694.20 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 20524.13 |
| 1041.57 | | | | |
| E.G. Slope (ft/ft) | 0.000020 | Area (sq ft) | 1525.99 | 21733.36 |
| 1041.57 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22248.62 |
| 1006.38 | | | | |
| Top Width (ft) | 2047.46 | Top Width (ft) | 262.55 | 1605.00 |
| 179.91 | | | | |
| Vel Total (ft/s) | 1.08 | Avg. Vel. (ft/s) | | 1.08 |
| 0.97 | | | | |
| Max Chl Dpth (ft) | 15.56 | Hydr. Depth (ft) | | 13.62 |
| 5.79 | | | | |
| Conv. Total (cfs) | 5192631.0 | Conv. (cfs) | | 4967916.0 |
| 224715.7 | | | | |
| Length Wtd. (ft) | 417.32 | Wetted Per. (ft) | | 1507.62 |
| 180.67 | | | | |
| Min Ch El (ft) | 4.15 | Shear (lb/sq ft) | | 0.02 |
| 0.01 | | | | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.02 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 384.19 | 6592.30 |
| 208.49 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 54.67 | 510.79 |
| 42.16 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr | Left Sta Velocity (ft) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| | Depth(ft) | (ft/s) | | | | |
| 1 | LOB | 41.38 | 82.75 | 0.00 | 3.65 | 14.31 |
| 0.00 | 0.26 | 0.00 | | | | |
| 2 | LOB | 82.75 | 124.13 | 0.00 | 51.70 | 41.40 |
| 0.00 | 1.25 | 0.00 | | | | |
| 3 | LOB | 124.13 | 165.50 | 0.00 | 119.29 | 41.42 |
| 0.00 | 2.88 | 0.00 | | | | |
| 4 | LOB | 165.50 | 206.88 | 0.00 | 211.90 | 41.44 |
| 0.00 | 5.12 | 0.00 | | | | |
| 5 | LOB | 206.88 | 248.25 | 0.00 | 304.41 | 41.43 |
| 0.00 | 7.36 | 0.00 | | | | |
| 6 | LOB | 248.25 | 289.63 | 0.00 | 390.65 | 41.44 |
| 0.00 | 9.44 | 0.00 | | | | |
| 7 | LOB | 289.63 | 331.00 | 0.00 | 444.39 | 41.40 |
| 0.00 | 10.74 | 0.00 | | | | |
| 8 | Chan | 331.00 | 429.00 | 0.00 | 1209.23 | 98.01 |
| 0.00 | 12.34 | 0.00 | | | | |
| 9 | Chan | 429.00 | 617.38 | 2543.69 | 2432.31 | 188.39 |
| 10.94 | 12.91 | 1.05 | | | | |
| 10 | Chan | 617.38 | 805.75 | 2606.04 | 2467.87 | 188.38 |
| 11.21 | 13.10 | 1.06 | | | | |
| 11 | Chan | 805.75 | 994.13 | 2758.55 | 2553.49 | 188.38 |
| 11.86 | 13.56 | 1.08 | | | | |
| 12 | Chan | 994.13 | 1182.50 | 2893.12 | 2627.53 | 188.38 |
| 12.44 | 13.95 | 1.10 | | | | |
| 13 | Chan | 1182.50 | 1370.88 | 2877.22 | 2618.95 | 188.39 |
| 12.37 | 13.90 | 1.10 | | | | |
| 14 | Chan | 1370.88 | 1559.25 | 2758.55 | 2553.49 | 188.38 |
| 11.86 | 13.56 | 1.08 | | | | |
| 15 | Chan | 1559.25 | 1747.63 | 2762.75 | 2556.88 | 188.57 |
| 11.88 | 13.57 | 1.08 | | | | |
| 16 | Chan | 1747.63 | 1936.00 | 3048.71 | 2713.60 | 188.76 |
| 13.11 | 14.41 | 1.12 | | | | |
| 17 | ROB | 1936.00 | 1960.75 | 222.89 | 238.00 | 25.22 |
| 0.96 | 9.62 | 0.94 | | | | |
| 18 | ROB | 1960.75 | 1985.50 | 359.70 | 187.00 | 24.75 |
| 1.55 | 7.56 | 1.92 | | | | |
| 19 | ROB | 1985.50 | 2010.25 | 225.16 | 182.61 | 24.77 |
| 0.97 | 7.38 | 1.23 | | | | |
| 20 | ROB | 2010.25 | 2035.00 | 85.70 | 155.28 | 24.78 |
| 0.37 | 6.27 | 0.55 | | | | |
| 21 | ROB | 2035.00 | 2059.75 | 59.42 | 124.66 | 24.78 |
| 0.26 | 5.04 | 0.48 | | | | |
| 22 | ROB | 2059.75 | 2084.50 | 37.14 | 94.03 | 24.78 |
| 0.16 | 3.80 | 0.39 | | | | |
| 23 | ROB | 2084.50 | 2109.25 | 16.09 | 57.01 | 24.88 |
| 0.07 | 2.30 | 0.28 | | | | |
| 24 | ROB | 2109.25 | 2134.00 | 0.28 | 3.00 | 6.72 |
| 0.00 | 0.45 | 0.09 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8167

INPUT
Description:
Station Elevation Data num= 19

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.65 | 224.7 | 12.15 | 266.8 | 11.15 | 316.8 | 9.15 | 357.3 | 7.15 |
| 462.5 | 6.15 | 569.5 | 6.15 | 682.6 | 6.15 | 690.5 | 5.15 | 692.1 | 4.15 |
| 699.2 | 4.15 | 700.7 | 5.15 | 1411.2 | 6.11 | 1443.4 | 6.15 | 1484.3 | 7.15 |
| 1496.9 | 8.15 | 1521.3 | 12.15 | 1785.4 | 17.15 | 1857.3 | 21.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 357.3 | .035 | 1484.3 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 357.3 | 1484.3 | 164.3 | 406.6 | 536.4 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 507 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 19.71 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.04 | Wt. n-Val. | | 0.035 0.040 |
| W.S. Elev (ft) | 19.67 | Reach Len. (ft) | 164.30 | 406.60 536.40 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 13586.21 1766.83 |
| E.G. Slope (ft/ft) | 0.000043 | Area (sq ft) | 1885.49 | 15557.66 1766.83 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 21974.14 1280.86 |
| Top Width (ft) | 1766.95 | Top Width (ft) | 293.54 | 1127.00 346.41 |
| Vel Total (ft/s) | 1.51 | Avg. Vel. (ft/s) | | 1.62 0.72 |
| Max Chl Dpth (ft) | 15.52 | Hydr. Depth (ft) | | 13.90 5.10 |
| Conv. Total (cfs) | 3527603.0 | Conv. (cfs) | | 3333307.0 194295.9 |
| Length Wtd. (ft) | 416.29 | Wetted Per. (ft) | | 977.97 346.89 |
| Min Ch El (ft) | 4.15 | Shear (lb/sq ft) | | 0.04 0.01 |
| Alpha | 1.09 | Stream Power (lb/ft s) | | 0.06 0.01 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 377.65 | 6419.80 186.11 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 53.60 | 498.15 37.97 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 44.66 | 89.33 | 0.00 | 15.27 | 25.60 |
| 0.00 | 0.60 | 0.00 | | | | |
| 2 | LOB | 89.33 | 133.99 | 0.00 | 99.97 | 44.71 |
| 0.00 | 2.24 | 0.00 | | | | |
| 3 | LOB | 133.99 | 178.65 | 0.00 | 193.18 | 44.71 |
| 0.00 | 4.33 | 0.00 | | | | |
| 4 | LOB | 178.65 | 223.31 | 0.00 | 286.39 | 44.71 |
| 0.00 | 6.41 | 0.00 | | | | |
| 5 | LOB | 223.31 | 267.98 | 0.00 | 358.10 | 44.68 |
| 0.00 | 8.02 | 0.00 | | | | |
| 6 | LOB | 267.98 | 312.64 | 0.00 | 422.55 | 44.70 |
| 0.00 | 9.46 | 0.00 | | | | |
| 7 | LOB | 312.64 | 357.30 | 0.00 | 510.03 | 44.72 |
| 0.00 | 11.42 | 0.00 | | | | |
| 8 | Chan | 357.30 | 507.00 | 0.00 | 1971.45 | 149.70 |
| 0.00 | 13.17 | 0.00 | | | | |
| 9 | Chan | 507.00 | 646.61 | 2997.54 | 1887.68 | 139.61 |
| 12.89 | 13.52 | 1.59 | | | | |
| 10 | Chan | 646.61 | 786.23 | 3265.95 | 1991.07 | 140.27 |
| 14.04 | 14.26 | 1.64 | | | | |
| 11 | Chan | 786.23 | 925.84 | 3295.14 | 1997.99 | 139.61 |
| 14.17 | 14.31 | 1.65 | | | | |
| 12 | Chan | 925.84 | 1065.46 | 3223.06 | 1971.65 | 139.61 |
| 13.86 | 14.12 | 1.63 | | | | |
| 13 | Chan | 1065.46 | 1205.07 | 3151.63 | 1945.32 | 139.61 |
| 13.55 | 13.93 | 1.62 | | | | |
| 14 | Chan | 1205.07 | 1344.69 | 3080.84 | 1918.98 | 139.61 |
| 13.25 | 13.74 | 1.61 | | | | |
| 15 | Chan | 1344.69 | 1484.30 | 2959.99 | 1873.52 | 139.63 |
| 12.73 | 13.42 | 1.58 | | | | |
| 16 | ROB | 1484.30 | 1530.93 | 446.87 | 455.27 | 46.99 |
| 1.92 | 9.76 | 0.98 | | | | |
| 17 | ROB | 1530.93 | 1577.55 | 251.63 | 321.58 | 46.63 |
| 1.08 | 6.90 | 0.78 | | | | |
| 18 | ROB | 1577.55 | 1624.18 | 200.28 | 280.42 | 46.63 |
| 0.86 | 6.01 | 0.71 | | | | |
| 19 | ROB | 1624.18 | 1670.80 | 153.72 | 239.26 | 46.63 |
| 0.66 | 5.13 | 0.64 | | | | |
| 20 | ROB | 1670.80 | 1717.43 | 112.23 | 198.11 | 46.63 |
| 0.48 | 4.25 | 0.57 | | | | |
| 21 | ROB | 1717.43 | 1764.05 | 76.13 | 156.95 | 46.63 |
| 0.33 | 3.37 | 0.49 | | | | |
| 22 | ROB | 1764.05 | 1810.68 | 38.37 | 104.07 | 46.67 |
| 0.16 | 2.23 | 0.37 | | | | |
| 23 | ROB | 1810.68 | 1857.30 | 1.63 | 11.16 | 20.07 |
| 0.01 | 0.56 | 0.15 | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 7761

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.65 | 157.8 | 12.15 | 166.2 | 11.15 | 184.5 | 10.15 | 197.2 | 8.15 |
| 276.6 | 7.15 | 326.8 | 6.15 | 545 | 6.15 | 569.5 | 6.11 | 1134.6 | 5.15 |
| 1178.9 | 4.15 | 1191 | 3.15 | 1193 | 2.15 | 1197.2 | 2.15 | 1199.2 | 3.15 |
| 1213.8 | 4.15 | 1254.5 | 4.15 | 1297.2 | 3.15 | 1298.2 | 2.15 | 1308.7 | 3.15 |
| 1314.5 | 4.15 | 1333.6 | 7.15 | 1356.7 | 8.15 | 1371.8 | 12.15 | 1411.2 | 12.72 |
| 1718.6 | 17.15 | 1819.1 | 22.15 | 1857.3 | 24.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 197.2 | .035 | 1333.6 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 197.2 | 1333.6 | 113.2 | 300.3 | 337 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 704.8 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 19.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.08 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 19.61 | Reach Len. (ft) | 113.20 | 300.30 |
| 337.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 9150.12 |
| 2197.75 | | | | |
| E.G. Slope (ft/ft) | 0.000083 | Area (sq ft) | 781.16 | 15857.34 |
| 2197.75 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 21064.91 |
| 2190.09 | | | | |
| Top Width (ft) | 1722.20 | Top Width (ft) | 151.44 | 1136.40 |
| 434.35 | | | | |
| Vel Total (ft/s) | 2.05 | Avg. Vel. (ft/s) | | 2.30 |
| 1.00 | | | | |
| Max Chl Dpth (ft) | 17.46 | Hydr. Depth (ft) | | 14.55 |
| 5.06 | | | | |
| Conv. Total (cfs) | 2552491.0 | Conv. (cfs) | | 2312105.0 |
| 240386.0 | | | | |
| Length Wtd. (ft) | 302.98 | Wetted Per. (ft) | | 630.15 |
| 434.99 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.08 |
| 0.03 | | | | |
| Alpha | 1.17 | Stream Power (lb/ft s) | | 0.17 |
| 0.03 | | | | |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 372.63 | 6273.18 |
| 161.70 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 52.77 | 487.59 |
| 33.16 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr | Left Sta Velocity (ft) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| | Depth(ft) | (ft/s) | | | | |
| 1 | LOB | 24.65 | 49.30 | 0.00 | 0.42 | 3.55 |
| 0.00 | 0.12 | 0.00 | | | | |
| 2 | LOB | 49.30 | 73.95 | 0.00 | 26.03 | 24.70 |
| 0.00 | 1.06 | 0.00 | | | | |
| 3 | LOB | 73.95 | 98.60 | 0.00 | 66.46 | 24.70 |
| 0.00 | 2.70 | 0.00 | | | | |
| 4 | LOB | 98.60 | 123.25 | 0.00 | 106.89 | 24.70 |
| 0.00 | 4.34 | 0.00 | | | | |
| 5 | LOB | 123.25 | 147.90 | 0.00 | 147.32 | 24.70 |
| 0.00 | 5.98 | 0.00 | | | | |
| 6 | LOB | 147.90 | 172.55 | 0.00 | 192.17 | 24.74 |
| 0.00 | 7.80 | 0.00 | | | | |
| 7 | LOB | 172.55 | 197.20 | 0.00 | 241.87 | 24.82 |
| 0.00 | 9.81 | 0.00 | | | | |
| 8 | Chan | 197.20 | 324.10 | 0.00 | 1563.37 | 126.92 |
| 0.00 | 12.32 | 0.00 | | | | |
| 9 | Chan | 324.10 | 451.00 | 0.00 | 1707.42 | 126.90 |
| 0.00 | 13.45 | 0.00 | | | | |
| 10 | Chan | 451.00 | 577.90 | 0.00 | 1708.38 | 126.90 |
| 0.00 | 13.46 | 0.00 | | | | |
| 11 | Chan | 577.90 | 704.80 | 0.00 | 1728.06 | 126.90 |
| 0.00 | 13.62 | 0.00 | | | | |
| 12 | Chan | 704.80 | 862.00 | 4856.43 | 2178.61 | 157.20 |
| 20.88 | 13.86 | 2.23 | | | | |
| 13 | Chan | 862.00 | 1019.20 | 5013.40 | 2220.59 | 157.20 |
| 21.56 | 14.13 | 2.26 | | | | |
| 14 | Chan | 1019.20 | 1176.40 | 5241.79 | 2280.80 | 157.21 |
| 22.54 | 14.51 | 2.30 | | | | |
| 15 | Chan | 1176.40 | 1333.60 | 5953.30 | 2470.12 | 158.54 |
| 25.60 | 15.71 | 2.41 | | | | |
| 16 | ROB | 1333.60 | 1399.06 | 822.11 | 616.83 | 66.01 |
| 3.54 | 9.42 | 1.33 | | | | |
| 17 | ROB | 1399.06 | 1464.53 | 455.36 | 431.31 | 65.47 |
| 1.96 | 6.59 | 1.06 | | | | |
| 18 | ROB | 1464.53 | 1529.99 | 351.96 | 369.55 | 65.47 |
| 1.51 | 5.65 | 0.95 | | | | |
| 19 | ROB | 1529.99 | 1595.45 | 259.50 | 307.80 | 65.47 |
| 1.12 | 4.70 | 0.84 | | | | |
| 20 | ROB | 1595.45 | 1660.91 | 178.66 | 246.04 | 65.47 |
| 0.77 | 3.76 | 0.73 | | | | |
| 21 | ROB | 1660.91 | 1726.38 | 109.29 | 183.21 | 65.48 |
| 0.47 | 2.80 | 0.60 | | | | |
| 22 | ROB | 1726.38 | 1791.84 | 13.20 | 43.01 | 41.63 |
| 0.06 | 1.03 | 0.31 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon

REACH: Lower RS: 7461

INPUT
Description: Upstream of I-5
Station Elevation Data num= 29

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 185 | 22.15 | 268.6 | 12.15 | 306.5 | 10.15 | 359.1 | 9.15 |
| 368.5 | 8.15 | 486 | 7.15 | 533.1 | 6.15 | 590.7 | 6.15 | 696.6 | 6.15 |
| 722.74 | 5.15 | 986.5 | 5.15 | 1286.5 | 6.15 | 1412.4 | 6.15 | 1483.7 | 6.15 |
| 1492 | 5.15 | 1502.5 | 4.15 | 1503.6 | 2.15 | 1557.6 | 2.15 | 1558.7 | 4.15 |
| 1564.5 | 6.44 | 1566.3 | 7.15 | 1577.8 | 12.15 | 1583.3 | 16 | 1660 | 16 |
| 1727 | 16.4 | 1843 | 16.4 | 1947.8 | 19.7 | 2010.6 | 21.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 722.74 | .035 | 1566.3 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 722.74 | 1566.3 | 578.1 | 581.2 | 546.8 | .3 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1098.3 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 19.64 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.17 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 19.47 | Reach Len. (ft) | 209.00 | 209.00 |
| 209.00 | | | | |
| Crit W.S. (ft) | 9.75 | Flow Area (sq ft) | | 6537.87 |
| 1132.64 | | | | |
| E.G. Slope (ft/ft) | 0.000189 | Area (sq ft) | 5687.94 | 11894.08 |
| 1132.64 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22048.81 |
| 1206.19 | | | | |
| Top Width (ft) | 1732.99 | Top Width (ft) | 515.31 | 843.56 |
| 374.11 | | | | |
| Vel Total (ft/s) | 3.03 | Avg. Vel. (ft/s) | | 3.37 |
| 1.06 | | | | |
| Max Chl Dpth (ft) | 17.32 | Hydr. Depth (ft) | | 13.97 |
| 3.03 | | | | |
| Conv. Total (cfs) | 1690742.0 | Conv. (cfs) | | 1603047.0 |
| 87695.4 | | | | |
| Length Wtd. (ft) | 209.00 | Wetted Per. (ft) | | 471.04 |
| 376.42 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.16 |
| 0.04 | | | | |
| Alpha | 1.18 | Stream Power (lb/ft s) | | 0.55 |
| 0.04 | | | | |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 364.22 | 6177.52 |
| 148.82 | | | | |
| C & E Loss (ft) | 0.39 | Cum SA (acres) | 51.90 | 480.76 |
| 30.03 | | | | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) | Percent |
|---|---|---|---|---|---|---|---|
| 1 | LOB | 180.69 | 271.03 | 0.00 | 241.73 | 64.04 | |
| 0.00 | 3.80 | 0.00 | | | | | |
| 2 | LOB | 271.03 | 361.37 | 0.00 | 837.40 | 90.41 | |
| 0.00 | 9.27 | 0.00 | | | | | |
| 3 | LOB | 361.37 | 451.71 | 0.00 | 1049.20 | 90.39 | |
| 0.00 | 11.61 | 0.00 | | | | | |
| 4 | LOB | 451.71 | 542.06 | 0.00 | 1140.29 | 90.35 | |
| 0.00 | 12.62 | 0.00 | | | | | |
| 5 | LOB | 542.06 | 632.40 | 0.00 | 1203.13 | 90.34 | |
| 0.00 | 13.32 | 0.00 | | | | | |
| 6 | LOB | 632.40 | 722.74 | 0.00 | 1216.20 | 90.36 | |
| 0.00 | 13.46 | 0.00 | | | | | |
| 7 | Chan | 722.74 | 816.63 | 0.00 | 1344.26 | 93.89 | |
| 0.00 | 14.32 | 0.00 | | | | | |
| 8 | Chan | 816.63 | 910.52 | 0.00 | 1344.26 | 93.89 | |
| 0.00 | 14.32 | 0.00 | | | | | |
| 9 | Chan | 910.52 | 1004.41 | 0.00 | 1343.73 | 93.89 | |
| 0.00 | 14.31 | 0.00 | | | | | |
| 10 | Chan | 1004.41 | 1098.30 | 0.00 | 1323.96 | 93.89 | |
| 0.00 | 14.10 | 0.00 | | | | | |
| 11 | Chan | 1098.30 | 1215.30 | 5384.04 | 1608.72 | 117.00 | |
| 23.15 | 13.75 | 3.35 | | | | | |
| 12 | Chan | 1215.30 | 1332.30 | 5151.09 | 1566.58 | 117.00 | |
| 22.15 | 13.39 | 3.29 | | | | | |
| 13 | Chan | 1332.30 | 1449.30 | 5104.88 | 1558.14 | 117.00 | |
| 21.95 | 13.32 | 3.28 | | | | | |
| 14 | Chan | 1449.30 | 1566.30 | 6408.80 | 1804.43 | 120.04 | |
| 27.56 | 15.42 | 3.55 | | | | | |
| 15 | ROB | 1566.30 | 1621.84 | 371.13 | 276.18 | 57.79 | |
| 1.60 | 4.97 | 1.34 | | | | | |
| 16 | ROB | 1621.84 | 1677.38 | 207.32 | 191.67 | 55.54 | |
| 0.89 | 3.45 | 1.08 | | | | | |
| 17 | ROB | 1677.38 | 1732.91 | 182.76 | 177.71 | 55.54 | |
| 0.79 | 3.20 | 1.03 | | | | | |
| 18 | ROB | 1732.91 | 1788.45 | 170.34 | 170.36 | 55.54 | |
| 0.73 | 3.07 | 1.00 | | | | | |
| 19 | ROB | 1788.45 | 1843.99 | 170.31 | 170.34 | 55.54 | |
| 0.73 | 3.07 | 1.00 | | | | | |
| 20 | ROB | 1843.99 | 1899.53 | 95.05 | 120.07 | 55.57 | |
| 0.41 | 2.16 | 0.79 | | | | | |
| 21 | ROB | 1899.53 | 1955.06 | 9.29 | 26.32 | 40.91 | |
| 0.04 | 0.64 | 0.35 | | | | | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: San Elijo Lagoon
REACH: Lower RS: 7100

INPUT
Description: Interstate 5 San Elijo Lagoon Bridge
Distance from Upstream XS = 209
Deck/Roadway Width = 162
Weir Coefficient = 2.61
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 42.15 | 0 | 1331 | 42.15 | 0 | 1331 | 42.15 | 37.15 |
| 1667 | 39.15 | 34.15 | 1667 | 39.15 | 0 | 2011 | 39.15 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 185 | 22.15 | 268.6 | 12.15 | 306.5 | 10.15 | 359.1 | 9.15 |
| 368.5 | 8.15 | 486 | 7.15 | 533.1 | 6.15 | 590.7 | 6.15 | 696.6 | 6.15 |
| 722.74 | 5.15 | 986.5 | 5.15 | 1286.5 | 6.15 | 1412.4 | 6.15 | 1483.7 | 6.15 |
| 1492 | 5.15 | 1502.5 | 4.15 | 1503.6 | 2.15 | 1557.6 | 2.15 | 1558.7 | 4.15 |
| 1564.5 | 6.44 | 1566.3 | 7.15 | 1577.8 | 12.15 | 1583.3 | 16 | 1660 | 16 |
| 1727 | 16.4 | 1843 | 16.4 | 1947.8 | 19.7 | 2010.6 | 21.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 722.74 | .035 | 1566.3 | .04 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 722.74 | 1566.3 | .3 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1098.3 | | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 42.15 | 0 | 1533 | 42.15 | 0 | 1533 | 42.15 | 37.15 |
| 1869 | 39.15 | 34.15 | 1869 | 39.15 | 0 | 2500 | 39.15 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 249.7 | 12.15 | 383.5 | 11.15 | 414.1 | 10.15 | 429.6 | 9.15 |
| 478.8 | 8.15 | 529.3 | 7.15 | 564.2 | 6.15 | 710.7 | 6.15 | 834 | 6.15 |
| 1064.8 | 5.15 | 1109.9 | 5.05 | 1315.8 | 5.65 | 1378.7 | 6.15 | 1460 | 5.15 |
| 1486.3 | 4.15 | 1493.4 | 4.15 | 1495.9 | 2.15 | 1504.2 | 2.15 | 1509.3 | 4.15 |
| 1701 | 4.15 | 1705 | 2.15 | 1708 | 2.15 | 1713.4 | 4.15 | 1727.8 | 5.15 |
| 1748.4 | 6.15 | 1766.4 | 7.15 | 1780.8 | 17 | 1835.1 | 17 | 2019 | 16.4 |
| 2055 | 19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 1315.8 | .035 | 1766.4 | .04 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 1315.8 | 1766.4 | .3 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|

```
       0  1315.8       30        F

Upstream Embankment side slope                 =       0 horiz. to 1.0 vertical
Downstream Embankment side slope               =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =      .95
Elevation at which weir flow begins            =
Energy head used in spillway design            =
Spillway height used in design                 =
Weir crest shape                               = Broad Crested

Number of Abutments =  2

Abutment Data
Upstream      num=        2
     Sta     Elev      Sta     Elev
    1331    37.15     1391     6.15
Downstream      num=         2
     Sta     Elev      Sta     Elev
    1533    37.15     1593     4.15

Abutment Data
Upstream      num=        2
     Sta     Elev      Sta     Elev
    1637      16      1667    34.15
Downstream      num=         2
     Sta     Elev      Sta     Elev
    1837      17      1869    34.15

Number of Piers =  3

Pier Data
Pier Station      Upstream=     1408     Downstream=     1610
Upstream      num=        2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15
Downstream      num=         2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15

Pier Data
Pier Station      Upstream=     1499     Downstream=     1701
Upstream      num=        2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15
Downstream      num=         2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15

Pier Data
Pier Station      Upstream=     1590     Downstream=     1792
Upstream      num=        2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15
Downstream      num=         2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd    =     1.2
Selected Low Flow Methods = Highest Energy Answer
```

```
High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
```

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 19.64 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 19.47 | E.G. Elev (ft) | 19.15 |
| 18.57 | | | |
| Q Total (cfs) | 23255.00 | W.S. Elev (ft) | 17.69 |
| 16.83 | | | |
| Q Bridge (cfs) | 23255.00 | Crit W.S. (ft) | 13.15 |
| 12.98 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 15.54 |
| 14.68 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.41 |
| 10.48 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 2470.47 |
| 2218.04 | | | |
| Weir Submerg | | Froude # Chl | 0.50 |
| 0.55 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 22154.09 |
| 20826.67 | | | |
| Min El Weir Flow (ft) | 39.16 | Hydr Depth (ft) | 9.65 |
| 11.06 | | | |
| Min El Prs (ft) | 37.15 | W.P. Total (ft) | 317.52 |
| 259.48 | | | |
| Delta EG (ft) | 1.96 | Conv. Total (cfs) | 445110.9 |
| 397451.3 | | | |
| Delta WS (ft) | 2.05 | Top Width (ft) | 256.12 |
| 200.62 | | | |
| BR Open Area (sq ft) | 7594.70 | Frctn Loss (ft) | 0.49 |
| 0.16 | | | |
| BR Open Vel (ft/s) | 10.48 | C & E Loss (ft) | 0.08 |
| 0.74 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 1.33 |
| 1.83 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 12.48 |
| 19.15 | | | |

```
Warning: For the final momentum answer at the bridge, the upstream energy was
computed lower than
         the downstream energy.  This is not physically possible, the momentum
answer has been
         disregarded.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may
indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
```

is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 6881

INPUT
Description: Downstream of I-5
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 249.7 | 12.15 | 383.5 | 11.15 | 414.1 | 10.15 | 429.6 | 9.15 |
| 478.8 | 8.15 | 529.3 | 7.15 | 564.2 | 6.15 | 710.7 | 6.15 | 834 | 6.15 |
| 1064.8 | 5.15 | 1109.9 | 5.05 | 1315.8 | 5.65 | 1378.7 | 6.15 | 1460 | 5.15 |
| 1486.3 | 4.15 | 1493.4 | 4.15 | 1495.9 | 2.15 | 1504.2 | 2.15 | 1509.3 | 4.15 |
| 1701 | 4.15 | 1705 | 2.15 | 1708 | 2.15 | 1713.4 | 4.15 | 1727.8 | 5.15 |
| 1748.4 | 6.15 | 1766.4 | 7.15 | 1780.8 | 17 | 1835.1 | 17 | 2019 | 16.4 |
| 2055 | 19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 1315.8 | .035 | 1766.4 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1315.8 | 1766.4 | 419.4 | 199.3 | 204.6 | .3 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1315.8 | 30 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.25 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 17.42 | Reach Len. (ft) | 419.40 | 199.30 |
| 204.60 | | | | |
| Crit W.S. (ft) | 9.15 | Flow Area (sq ft) | | 5691.51 |
| 239.81 | | | | |
| E.G. Slope (ft/ft) | 0.000313 | Area (sq ft) | 11431.39 | 5691.51 |
| 239.81 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23109.35 |
| 145.65 | | | | |
| Top Width (ft) | 1871.20 | Top Width (ft) | 1153.86 | 450.60 |
| 266.75 | | | | |
| Vel Total (ft/s) | 3.92 | Avg. Vel. (ft/s) | | 4.06 |
| 0.61 | | | | |
| Max Chl Dpth (ft) | 15.27 | Hydr. Depth (ft) | | 12.63 |
| 0.90 | | | | |
| Conv. Total (cfs) | 1314851.0 | Conv. (cfs) | | 1306616.0 |
| 8235.0 | | | | |
| Length Wtd. (ft) | 199.33 | Wetted Per. (ft) | | 452.62 |
| 269.83 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.25 |
| 0.02 | | | | |
| Alpha | 1.07 | Stream Power (lb/ft s) | | 1.00 |

| | | | | | |
|---|---|---|---|---|---|
| 0.01 | | | | | |
| Frctn Loss (ft) | | 0.03 | Cum Volume (acre-ft) | 322.99 | 6116.39 |
| 144.40 | | | | | |
| C & E Loss (ft) | | 0.09 | Cum SA (acres) | 47.88 | 476.06 |
| 28.14 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

Profile #PF 1

| Percent Conv | Pos Hydr | Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|
| 1 | LOB | | 0.00 | 164.48 | 0.00 | 0.19 | 2.53 |
| 0.00 | 0.08 | | 0.00 | | | | |
| 2 | LOB | | 164.48 | 328.95 | 0.00 | 672.36 | 164.63 |
| 0.00 | 4.09 | | 0.00 | | | | |
| 3 | LOB | | 328.95 | 493.43 | 0.00 | 1227.95 | 164.54 |
| 0.00 | 7.47 | | 0.00 | | | | |
| 4 | LOB | | 493.43 | 657.90 | 0.00 | 1787.83 | 164.50 |
| 0.00 | 10.87 | | 0.00 | | | | |
| 5 | LOB | | 657.90 | 822.38 | 0.00 | 1853.90 | 164.48 |
| 0.00 | 11.27 | | 0.00 | | | | |
| 6 | LOB | | 822.38 | 986.85 | 0.00 | 1904.51 | 164.48 |
| 0.00 | 11.58 | | 0.00 | | | | |
| 7 | LOB | | 986.85 | 1151.33 | 0.00 | 2009.11 | 164.48 |
| 0.00 | 12.22 | | 0.00 | | | | |
| 8 | LOB | | 1151.33 | 1315.80 | 0.00 | 1975.55 | 164.48 |
| 0.00 | 12.01 | | 0.00 | | | | |
| 9 | Chan | | 1315.80 | 1372.13 | 2489.44 | 650.43 | 56.33 |
| 10.70 | 11.55 | | 3.83 | | | | |
| 10 | Chan | | 1372.13 | 1428.45 | 2488.37 | 650.27 | 56.33 |
| 10.70 | 11.54 | | 3.83 | | | | |
| 11 | Chan | | 1428.45 | 1484.78 | 2791.26 | 696.75 | 56.35 |
| 12.00 | 12.37 | | 4.01 | | | | |
| 12 | Chan | | 1484.78 | 1541.10 | 3268.44 | 771.68 | 57.41 |
| 14.05 | 13.70 | | 4.24 | | | | |
| 13 | Chan | | 1541.10 | 1597.43 | 3139.22 | 747.52 | 56.32 |
| 13.50 | 13.27 | | 4.20 | | | | |
| 14 | Chan | | 1597.43 | 1653.75 | 3139.22 | 747.52 | 56.32 |
| 13.50 | 13.27 | | 4.20 | | | | |
| 15 | Chan | | 1653.75 | 1710.08 | 3210.11 | 760.88 | 56.93 |
| 13.80 | 13.51 | | 4.22 | | | | |
| 16 | Chan | | 1710.08 | 1766.40 | 2583.29 | 666.47 | 56.63 |
| 11.11 | 11.83 | | 3.88 | | | | |
| 17 | ROB | | 1766.40 | 1802.48 | 79.17 | 86.13 | 39.12 |
| 0.34 | 2.39 | | 0.92 | | | | |
| 18 | ROB | | 1802.48 | 1838.55 | 4.65 | 15.23 | 36.08 |
| 0.02 | 0.42 | | 0.31 | | | | |
| 19 | ROB | | 1838.55 | 1874.63 | 6.00 | 17.74 | 36.08 |
| 0.03 | 0.49 | | 0.34 | | | | |
| 20 | ROB | | 1874.63 | 1910.70 | 8.58 | 21.98 | 36.08 |
| 0.04 | 0.61 | | 0.39 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21 | ROB | 1910.70 | 1946.78 | 11.52 | 26.23 | 36.08 |
| 0.05 | 0.73 | 0.44 | | | | |
| 22 | ROB | 1946.78 | 1982.85 | 14.79 | 30.48 | 36.08 |
| 0.06 | 0.84 | 0.49 | | | | |
| 23 | ROB | 1982.85 | 2018.93 | 18.39 | 34.72 | 36.08 |
| 0.08 | 0.96 | 0.53 | | | | |
| 24 | ROB | 2018.93 | 2055.00 | 2.54 | 7.30 | 14.26 |
| 0.01 | 0.51 | 0.35 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 6682

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 81.8 | 12.15 | 108 | 11.15 | 126.6 | 10.15 | 139.9 | 9.15 |
| 178.7 | 7.15 | 199.8 | 6.15 | 222.7 | 5.15 | 235.3 | 5.15 | 379.1 | 4.15 |
| 409.3 | 3.15 | 410.4 | 2.15 | 479 | 2.15 | 480.3 | 3.15 | 537.9 | 4.15 |
| 581.1 | 5.15 | 828.3 | 5.15 | 849.6 | 4.15 | 855 | 3.15 | 856.1 | 2.15 |
| 926.2 | 2.15 | 931.6 | 3.15 | 1269.4 | 4.15 | 1341.6 | 4.15 | 1353.1 | 3.15 |
| 1357.5 | 2.15 | 1406.8 | 2.15 | 1407.8 | 3.15 | 1413.4 | 4.15 | 1453.9 | 6.15 |
| 1494.1 | 6.15 | 1535.2 | 7.15 | 1540.2 | 7.91 | 1541.8 | 8.15 | 1555.1 | 12.15 |
| 1569.1 | 17.5 | 1648.1 | 17.5 | 1771.1 | 19.15 | | | | |

Manning's n Values num= 5

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|---|---|
| 0 | .04 | 235.3 | .035 | 1453.9 | .04 | 1569.1 | .013 | 1648.1 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 235.3 | 1540.2 | 389.6 | 265.9 | 226 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 695.7 | 30 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.55 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.06 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 389.60 | 265.90 |
| 226.00 | | | | |
| Crit W.S. (ft) | 6.93 | Flow Area (sq ft) | | 11318.55 |
| 150.07 | | | | |
| E.G. Slope (ft/ft) | 0.000074 | Area (sq ft) | 1518.85 | 17436.84 |
| 150.07 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23116.26 |
| 138.74 | | | | |

| | | | | |
|---|---|---|---|---|
| Top Width (ft) | 1530.95 | Top Width (ft) | 197.18 | 1304.90 |
| 28.87 | | | | |
| Vel Total (ft/s) | 2.03 | Avg. Vel. (ft/s) | | 2.04 |
| 0.92 | | | | |
| Max Chl Dpth (ft) | 15.34 | Hydr. Depth (ft) | | 13.40 |
| 5.20 | | | | |
| Conv. Total (cfs) | 2704984.0 | Conv. (cfs) | | 2688845.0 |
| 16138.6 | | | | |
| Length Wtd. (ft) | 265.65 | Wetted Per. (ft) | | 845.87 |
| 30.47 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.06 |
| 0.02 | | | | |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.13 |
| 0.02 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 260.65 | 6063.48 |
| 143.48 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 41.38 | 472.04 |
| 27.45 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 29.41 | 58.83 | 0.00 | 26.21 | 20.86 |
| 0.00 | 1.27 | 0.00 | | | | |
| 2 | LOB | 58.83 | 88.24 | 0.00 | 125.59 | 29.59 |
| 0.00 | 4.27 | 0.00 | | | | |
| 3 | LOB | 88.24 | 117.65 | 0.00 | 181.52 | 29.44 |
| 0.00 | 6.17 | 0.00 | | | | |
| 4 | LOB | 117.65 | 147.06 | 0.00 | 228.87 | 29.47 |
| 0.00 | 7.78 | 0.00 | | | | |
| 5 | LOB | 147.06 | 176.48 | 0.00 | 278.45 | 29.45 |
| 0.00 | 9.47 | 0.00 | | | | |
| 6 | LOB | 176.48 | 205.89 | 0.00 | 321.44 | 29.44 |
| 0.00 | 10.93 | 0.00 | | | | |
| 7 | LOB | 205.89 | 235.30 | 0.00 | 356.78 | 29.43 |
| 0.00 | 12.13 | 0.00 | | | | |
| 8 | Chan | 235.30 | 388.77 | 0.00 | 1976.88 | 153.48 |
| 0.00 | 12.88 | 0.00 | | | | |
| 9 | Chan | 388.77 | 542.23 | 0.00 | 2230.17 | 154.21 |
| 0.00 | 14.53 | 0.00 | | | | |
| 10 | Chan | 542.23 | 695.70 | 0.00 | 1911.25 | 153.48 |
| 0.00 | 12.45 | 0.00 | | | | |
| 11 | Chan | 695.70 | 864.60 | 4202.18 | 2131.21 | 169.40 |
| 18.07 | 12.62 | 1.97 | | | | |
| 12 | Chan | 864.60 | 1033.50 | 5385.62 | 2470.94 | 168.99 |
| 23.16 | 14.63 | 2.18 | | | | |
| 13 | Chan | 1033.50 | 1202.40 | 4881.13 | 2328.84 | 168.90 |
| 20.99 | 13.79 | 2.10 | | | | |
| 14 | Chan | 1202.40 | 1371.30 | 4776.86 | 2299.70 | 169.06 |
| 20.54 | 13.62 | 2.08 | | | | |
| 15 | Chan | 1371.30 | 1540.20 | 3870.47 | 2087.86 | 169.52 |
| 16.64 | 12.36 | 1.85 | | | | |
| 16 | ROB | 1540.20 | 1569.06 | 138.74 | 150.07 | 30.45 |

0.60 5.20 0.92

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 6416

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 43 | 22.15 | 100 | 17.15 | 164 | 11.15 | 177 | 10.15 |
| 197 | 9.15 | 217 | 8.15 | 222 | 7.15 | 238 | 6.15 | 255 | 5.15 |
| 379 | 4.15 | 413 | 4.15 | 414 | 2.15 | 448 | 2.15 | 449 | 4.15 |
| 492 | 4.15 | 493 | 2.15 | 571 | 2.15 | 572 | 4.15 | 602 | 4.15 |
| 605 | 2.15 | 740 | 1.15 | 742 | 4.15 | 754 | 4.15 | 1218 | 5.15 |
| 1247 | 6.15 | 1341 | 7.15 | 1356 | 8.15 | 1394 | 9.15 | 1420 | 9.15 |
| 1467 | 9.15 | 1503 | 10.15 | 1527 | 11.15 | 1530 | 12.15 | 1565 | 15.15 |
| 1605 | 15.15 | 1754 | 17.15 | 1850 | 22.15 | | | | |

Manning's n Values num= 5

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|---|---|
| 0 | .04 | 238 | .035 | 1218 | .04 | 1565 | .013 | 1605 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 222 | 1341 | 587 495.5 | 490.8 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.53 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.040 | 0.035 |
| 0.038 | | | | |
| W.S. Elev (ft) | 17.50 | Reach Len. (ft) | 587.00 | 495.50 |
| 490.80 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 687.53 | 14873.31 |
| 1989.66 | | | | |
| E.G. Slope (ft/ft) | 0.000037 | Area (sq ft) | 687.53 | 14873.31 |
| 1989.66 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 477.70 | 21144.14 |
| 1633.16 | | | | |
| Top Width (ft) | 1664.74 | Top Width (ft) | 126.00 | 1119.00 |
| 419.74 | | | | |
| Vel Total (ft/s) | 1.33 | Avg. Vel. (ft/s) | 0.69 | 1.42 |
| 0.82 | | | | |
| Max Chl Dpth (ft) | 16.35 | Hydr. Depth (ft) | 5.46 | 13.29 |
| 4.74 | | | | |
| Conv. Total (cfs) | 3843772.0 | Conv. (cfs) | 78957.5 | 3494872.0 |
| 269942.1 | | | | |
| Length Wtd. (ft) | 498.38 | Wetted Per. (ft) | 126.49 | 1126.25 |
| 420.13 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.01 | 0.03 |
| 0.01 | | | | |
| Alpha | 1.08 | Stream Power (lb/ft s) | 0.01 | 0.04 |
| 0.01 | | | | |

| | | | | |
|---|---|---|---|---|
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 250.78 | 5964.87 |
| 137.93 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 39.93 | 464.64 |
| 26.28 | | | | |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 83.25 | 111.00 | 1.54 | 10.24 | 15.07 |
| 0.01 | 0.68 | 0.15 | | | | |
| 2 | LOB | 111.00 | 138.75 | 27.86 | 74.46 | 27.87 |
| 0.12 | 2.68 | 0.37 | | | | |
| 3 | LOB | 138.75 | 166.50 | 86.19 | 146.60 | 27.87 |
| 0.37 | 5.28 | 0.59 | | | | |
| 4 | LOB | 166.50 | 194.25 | 153.66 | 207.19 | 27.80 |
| 0.66 | 7.47 | 0.74 | | | | |
| 5 | LOB | 194.25 | 222.00 | 208.44 | 249.05 | 27.88 |
| 0.90 | 8.97 | 0.84 | | | | |
| 6 | Chan | 222.00 | 361.88 | 2371.15 | 1741.16 | 139.94 |
| 10.20 | 12.45 | 1.36 | | | | |
| 7 | Chan | 361.88 | 501.75 | 2855.69 | 1954.79 | 143.58 |
| 12.28 | 13.98 | 1.46 | | | | |
| 8 | Chan | 501.75 | 641.63 | 3215.75 | 2088.19 | 141.72 |
| 13.83 | 14.93 | 1.54 | | | | |
| 9 | Chan | 641.63 | 781.50 | 3324.68 | 2128.94 | 141.48 |
| 14.30 | 15.22 | 1.56 | | | | |
| 10 | Chan | 781.50 | 921.38 | 2622.62 | 1838.10 | 139.88 |
| 11.28 | 13.14 | 1.43 | | | | |
| 11 | Chan | 921.38 | 1061.25 | 2523.12 | 1795.94 | 139.88 |
| 10.85 | 12.84 | 1.40 | | | | |
| 12 | Chan | 1061.25 | 1201.13 | 2425.16 | 1753.77 | 139.88 |
| 10.43 | 12.54 | 1.38 | | | | |
| 13 | Chan | 1201.13 | 1341.00 | 1805.95 | 1572.41 | 139.90 |
| 7.77 | 11.24 | 1.15 | | | | |
| 14 | ROB | 1341.00 | 1404.63 | 540.47 | 572.83 | 63.67 |
| 2.32 | 9.00 | 0.94 | | | | |
| 15 | ROB | 1404.63 | 1468.25 | 476.99 | 531.31 | 63.63 |
| 2.05 | 8.35 | 0.90 | | | | |
| 16 | ROB | 1468.25 | 1531.88 | 379.89 | 464.08 | 63.83 |
| 1.63 | 7.29 | 0.82 | | | | |
| 17 | ROB | 1531.88 | 1595.50 | 150.93 | 196.61 | 63.75 |
| 0.65 | 3.09 | 0.77 | | | | |
| 18 | ROB | 1595.50 | 1659.13 | 63.60 | 129.92 | 63.63 |
| 0.27 | 2.04 | 0.49 | | | | |
| 19 | ROB | 1659.13 | 1722.75 | 18.74 | 76.19 | 63.63 |
| 0.08 | 1.20 | 0.25 | | | | |
| 20 | ROB | 1722.75 | 1786.38 | 2.54 | 18.71 | 38.00 |
| 0.01 | 0.49 | 0.14 | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 5921

INPUT
Description:
Station Elevation Data num= 58

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 42 | 17.15 | 160 | 12.15 | 184 | 11.15 | 205 | 10.15 |
| 230 | 9.15 | 253 | 8.15 | 326.3 | 7.15 | 331 | 6.15 | 334 | 5.15 |
| 337 | 4.15 | 338 | 3.15 | 339 | 2.15 | 429 | 1.15 | 430 | 4.15 |
| 608 | 4.15 | 929 | 5.15 | 944 | 5.15 | 1019 | 4.15 | 1025 | 4.15 |
| 1044 | 2.15 | 1106 | 2.15 | 1112 | 4.15 | 1132 | 4.15 | 1135 | 4.15 |
| 1153 | 4.15 | 1158 | 4.15 | 1165 | 4.15 | 1177 | 5.15 | 1185 | 6.15 |
| 1199 | 6.15 | 1216 | 5.15 | 1420 | 5.15 | 1450 | 5.15 | 1456 | 4.15 |
| 1461 | 4.15 | 1465 | 1.15 | 1535 | 1.15 | 1537 | 4.15 | 1541 | 4.15 |
| 1548 | 5.15 | 1574 | 6.15 | 1619 | 6.15 | 1620 | 5.15 | 1632 | 5.15 |
| 1635 | 6.15 | 1637 | 7.15 | 1639 | 8.15 | 1642 | 9.15 | 1646 | 10.15 |
| 1656 | 10.15 | 1680 | 10.15 | 1682 | 10.15 | 1708 | 11.15 | 1710 | 12.15 |
| 1742 | 12.15 | 1800 | 17.15 | 1820 | 22.15 | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 331 | .035 | 1710 | .013 | 1742 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 326.3 | 1637 | 813.7 | 567.6 | 810.3 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.51 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.040 | 0.035 |
| 0.027 | | | | |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 813.70 | 567.60 |
| 810.30 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1740.16 | 17387.21 |
| 867.24 | | | | |
| E.G. Slope (ft/ft) | 0.000027 | Area (sq ft) | 1740.16 | 17387.21 |
| 867.24 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 1112.50 | 21334.92 |
| 807.58 | | | | |
| Top Width (ft) | 1762.22 | Top Width (ft) | 287.16 | 1310.70 |
| 164.36 | | | | |
| Vel Total (ft/s) | 1.16 | Avg. Vel. (ft/s) | 0.64 | 1.23 |
| 0.93 | | | | |
| Max Chl Dpth (ft) | 16.34 | Hydr. Depth (ft) | 6.06 | 13.27 |
| 5.28 | | | | |
| Conv. Total (cfs) | 4489123.0 | Conv. (cfs) | 214755.7 | 4118473.0 |
| 155895.0 | | | | |
| Length Wtd. (ft) | 583.62 | Wetted Per. (ft) | 287.38 | 1318.29 |
| 165.40 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.01 | 0.03 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 234.43 | 5781.38 |
| 121.83 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 37.15 | 450.82 |
| 22.99 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross

sections.
Note: Manning's n values were composited to a single value in the main channel.

Profile #PF 1

| Conv | Pos Hydr | Left Sta (ft) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) | Percent |
|---|---|---|---|---|---|---|---|
| | Depth(ft) | Velocity (ft/s) | | | | | |
| 1 | LOB | 0.00 | 40.79 | 0.01 | 0.16 | 1.66 | 0.00 |
| | 0.10 | 0.04 | | | | | |
| 2 | LOB | 40.79 | 81.58 | 8.59 | 46.98 | 40.83 | 0.04 |
| | 1.15 | 0.18 | | | | | |
| 3 | LOB | 81.58 | 122.36 | 39.61 | 117.53 | 40.82 | 0.17 |
| | 2.88 | 0.34 | | | | | |
| 4 | LOB | 122.36 | 163.15 | 86.68 | 188.02 | 40.82 | 0.37 |
| | 4.61 | 0.46 | | | | | |
| 5 | LOB | 163.15 | 203.94 | 147.83 | 259.02 | 40.83 | 0.64 |
| | 6.35 | 0.57 | | | | | |
| 6 | LOB | 203.94 | 244.73 | 222.83 | 331.31 | 40.82 | 0.96 |
| | 8.12 | 0.67 | | | | | |
| 7 | LOB | 244.73 | 285.51 | 288.42 | 386.70 | 40.80 | 1.24 |
| | 9.48 | 0.75 | | | | | |
| 8 | LOB | 285.51 | 326.30 | 318.54 | 410.42 | 40.79 | 1.37 |
| | 10.06 | 0.78 | | | | | |
| 9 | Chan | 326.30 | 490.14 | 3099.76 | 2396.43 | 167.26 | 13.33 |
| | 14.63 | 1.29 | | | | | |
| 10 | Chan | 490.14 | 653.98 | 2691.82 | 2182.39 | 163.84 | 11.58 |
| | 13.32 | 1.23 | | | | | |
| 11 | Chan | 653.98 | 817.81 | 2565.60 | 2120.41 | 163.84 | 11.03 |
| | 12.94 | 1.21 | | | | | |
| 12 | Chan | 817.81 | 981.65 | 2426.25 | 2050.55 | 163.84 | 10.43 |
| | 12.52 | 1.18 | | | | | |
| 13 | Chan | 981.65 | 1145.49 | 2986.89 | 2325.38 | 164.27 | 12.84 |
| | 14.19 | 1.28 | | | | | |
| 14 | Chan | 1145.49 | 1309.33 | 2366.73 | 2020.86 | 163.97 | 10.18 |
| | 12.33 | 1.17 | | | | | |
| 15 | Chan | 1309.33 | 1473.16 | 2458.90 | 2072.50 | 164.92 | 10.57 |
| | 12.65 | 1.19 | | | | | |
| 16 | Chan | 1473.16 | 1637.00 | 2738.98 | 2218.70 | 166.35 | 11.78 |
| | 13.54 | 1.23 | | | | | |
| 17 | ROB | 1637.00 | 1659.88 | 151.57 | 179.42 | 23.40 | 0.65 |
| | 7.84 | 0.84 | | | | | |
| 18 | ROB | 1659.88 | 1682.75 | 137.76 | 167.90 | 22.88 | 0.59 |
| | 7.34 | 0.82 | | | | | |
| 19 | ROB | 1682.75 | 1705.63 | 123.37 | 157.19 | 22.89 | 0.53 |
| | 6.87 | 0.78 | | | | | |
| 20 | ROB | 1705.63 | 1728.50 | 195.43 | 125.65 | 23.11 | 0.84 |
| | 5.49 | 1.56 | | | | | |
| 21 | ROB | 1728.50 | 1751.38 | 154.28 | 118.38 | 22.91 | 0.66 |
| | 5.17 | 1.30 | | | | | |
| 22 | ROB | 1751.38 | 1774.25 | 35.77 | 81.12 | 22.96 | 0.15 |
| | 3.55 | 0.44 | | | | | |
| 23 | ROB | 1774.25 | 1797.13 | 9.24 | 36.01 | 22.96 | 0.04 |
| | 1.57 | 0.26 | | | | | |
| 24 | ROB | 1797.13 | 1820.00 | 0.15 | 1.57 | 4.29 | 0.00 |
| | 0.37 | 0.10 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than

0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 5355

INPUT
Description:
Station Elevation Data num= 47

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 75 | 17.15 | 153 | 12.15 | 182 | 11.15 | 230 | 10.15 |
| 249 | 9.15 | 266 | 8.15 | 275 | 7.15 | 280 | 6.15 | 286 | 5.15 |
| 289 | 4.15 | 291 | 4.15 | 292 | 2.15 | 330 | 1.15 | 334 | 4.15 |
| 805 | 4.15 | 808 | 1.15 | 861 | 1.15 | 865 | 4.15 | 889 | 5.15 |
| 936 | 5.15 | 1195 | 4.15 | 1198 | 1.15 | 1259 | 1.15 | 1264 | 4.15 |
| 1282 | 4.15 | 1828 | 5.15 | 1831 | 6.15 | 1844 | 6.15 | 1855 | 5.15 |
| 1857 | 4.15 | 1861 | 2.15 | 1958 | 1.15 | 1963 | 4.15 | 2000 | 4.15 |
| 2066 | 4.15 | 2075 | 1.15 | 2078 | 1.15 | 2087 | 4.15 | 2105 | 4.15 |
| 2309 | 5.15 | 2344 | 6.15 | 2376 | 7.15 | 2423 | 10.15 | 2433 | 11.15 |
| 2452 | 12.15 | 2730.76 | 22.15 | | | | | | |

Manning's n Values num= 5

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|---|---|
| 0 | .04 | 280 | .035 | 2000 | .04 | 2423 | .013 | 2452 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 292 | 2376 | 666.9 735.2 | 962.5 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.50 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.039 | 0.036 |
| 0.029 | | | | |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 666.90 | 735.20 |
| 962.50 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1312.55 | 27811.11 |
| 992.19 | | | | |
| E.G. Slope (ft/ft) | 0.000012 | Area (sq ft) | 1312.55 | 27811.11 |
| 992.19 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 568.86 | 22129.31 |
| 556.83 | | | | |
| Top Width (ft) | 2530.94 | Top Width (ft) | 222.09 | 2084.00 |
| 224.85 | | | | |
| Vel Total (ft/s) | 0.77 | Avg. Vel. (ft/s) | 0.43 | 0.80 |
| 0.56 | | | | |
| Max Chl Dpth (ft) | 16.34 | Hydr. Depth (ft) | 5.91 | 13.35 |
| 4.41 | | | | |
| Conv. Total (cfs) | 6817244.0 | Conv. (cfs) | 166762.7 | 6487246.0 |
| 163235.5 | | | | |
| Length Wtd. (ft) | 740.73 | Wetted Per. (ft) | 223.98 | 2092.11 |
| 225.11 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.00 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 205.91 | 5486.91 |
| 104.54 | | | | |

| | | | | |
|---|---|---|---|---|
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 32.39 | 428.71 |
| 19.37 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 36.50 | 73.00 | 0.01 | 0.32 | 3.10 |
| 0.00 | 0.10 | 0.03 | | | | |
| 2 | LOB | 73.00 | 109.50 | 7.14 | 50.41 | 36.58 |
| 0.03 | 1.38 | 0.14 | | | | |
| 3 | LOB | 109.50 | 146.00 | 37.22 | 135.81 | 36.57 |
| 0.16 | 3.72 | 0.27 | | | | |
| 4 | LOB | 146.00 | 182.50 | 76.00 | 208.33 | 36.53 |
| 0.33 | 5.71 | 0.36 | | | | |
| 5 | LOB | 182.50 | 219.00 | 100.06 | 245.65 | 36.51 |
| 0.43 | 6.73 | 0.41 | | | | |
| 6 | LOB | 219.00 | 255.50 | 127.27 | 283.88 | 36.54 |
| 0.55 | 7.78 | 0.45 | | | | |
| 7 | LOB | 255.50 | 292.00 | 221.17 | 388.15 | 38.15 |
| 0.95 | 10.63 | 0.57 | | | | |
| 8 | Chan | 292.00 | 552.50 | 2957.81 | 3575.95 | 261.51 |
| 12.72 | 13.73 | 0.83 | | | | |
| 9 | Chan | 552.50 | 813.00 | 2844.65 | 3494.45 | 261.74 |
| 12.23 | 13.41 | 0.81 | | | | |
| 10 | Chan | 813.00 | 1073.50 | 2806.32 | 3464.95 | 261.52 |
| 12.07 | 13.30 | 0.81 | | | | |
| 11 | Chan | 1073.50 | 1334.00 | 3036.99 | 3638.98 | 262.57 |
| 13.06 | 13.97 | 0.83 | | | | |
| 12 | Chan | 1334.00 | 1594.50 | 2710.28 | 3388.00 | 260.50 |
| 11.65 | 13.01 | 0.80 | | | | |
| 13 | Chan | 1594.50 | 1855.00 | 2520.17 | 3244.38 | 260.71 |
| 10.84 | 12.45 | 0.78 | | | | |
| 14 | Chan | 1855.00 | 2115.50 | 3051.09 | 3763.68 | 263.02 |
| 13.12 | 14.45 | 0.81 | | | | |
| 15 | Chan | 2115.50 | 2376.00 | 2202.00 | 3240.72 | 260.53 |
| 9.47 | 12.44 | 0.68 | | | | |
| 16 | ROB | 2376.00 | 2420.35 | 209.07 | 395.75 | 44.44 |
| 0.90 | 8.92 | 0.53 | | | | |
| 17 | ROB | 2420.35 | 2464.69 | 261.07 | 263.93 | 44.43 |
| 1.12 | 5.95 | 0.99 | | | | |
| 18 | ROB | 2464.69 | 2509.04 | 56.98 | 181.32 | 44.37 |
| 0.25 | 4.09 | 0.31 | | | | |
| 19 | ROB | 2509.04 | 2553.38 | 25.07 | 110.78 | 44.37 |
| 0.11 | 2.50 | 0.23 | | | | |
| 20 | ROB | 2553.38 | 2597.73 | 4.63 | 40.24 | 44.37 |
| 0.02 | 0.91 | 0.12 | | | | |
| 21 | ROB | 2597.73 | 2642.07 | 0.00 | 0.17 | 3.12 |
| 0.00 | 0.06 | 0.02 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 4621

INPUT
Description:
Station Elevation Data num= 86

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 50 | 12.15 | 57 | 11.15 | 63 | 10.15 | 68 | 9.15 |
| 74 | 8.15 | 81 | 7.15 | 92 | 6.15 | 95 | 5.15 | 370 | 4.15 |
| 404 | 4.15 | 418 | 5.15 | 419 | 5.15 | 569 | 4.15 | 571 | 3.15 |
| 572 | 2.15 | 587 | 2.15 | 588 | 3.15 | 589 | 4.15 | 688 | 4.15 |
| 778 | 4.15 | 780 | 2.15 | 855 | 2.15 | 861 | 4.15 | 864 | 5.15 |
| 879 | 5.15 | 891 | 4.15 | 929 | 2.15 | 1114 | 2.15 | 1119 | 4.15 |
| 1187 | 4.15 | 1188 | 2.15 | 1211 | 2.15 | 1212 | 4.15 | 1214 | 4.15 |
| 1219 | 5.15 | 1229 | 5.15 | 1257 | 4.15 | 1309 | 4.15 | 1336 | 4.15 |
| 1341 | 4.15 | 1342 | 2.15 | 1381 | 2.15 | 1382 | 4.15 | 1389 | 4.15 |
| 1512 | 4.15 | 1538 | 4.15 | 1655 | 4.15 | 1747 | 4.15 | 1748 | 2.15 |
| 1764 | 2.15 | 1766 | 4.15 | 1830 | 4.15 | 1831 | 2.15 | 1878 | 2.15 |
| 1880 | 4.15 | 1909 | 4.15 | 1911 | .15 | 2210 | 2.15 | 2265 | 4.15 |
| 2808 | 4.15 | 2815 | 2.15 | 2908 | 1.15 | 2913 | 4.15 | 2915 | 5.15 |
| 2923 | 6.15 | 2928 | 7.15 | 2933 | 8.15 | 2937 | 9.15 | 2942 | 10.15 |
| 2946 | 11.15 | 2968 | 11.15 | 2971 | 10.15 | 2976 | 9.15 | 2981 | 8.15 |
| 3007 | 8.15 | 3022 | 9.15 | 3040 | 10.15 | 3171 | 10.15 | 3184 | 10.15 |
| 3193 | 11.15 | 3206 | 11.15 | 3208 | 11.15 | 3313 | 12.15 | 3443 | 17.15 |
| 3513 | 22.15 | | | | | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 63 | .035 | 2915 | .04 | 3040 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 81 | 2928 | 427 | 888 1159.6 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.49 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.036 | 0.035 |
| 0.046 | | | | |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 427.00 | 888.00 |
| 1159.60 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 290.43 | 39712.73 |
| 3106.50 | | | | |
| E.G. Slope (ft/ft) | 0.000005 | Area (sq ft) | 290.43 | 39712.73 |
| 3106.50 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 95.41 | 22385.21 |
| 774.38 | | | | |
| Top Width (ft) | 3415.51 | Top Width (ft) | 48.79 | 2847.00 |
| 519.72 | | | | |
| Vel Total (ft/s) | 0.54 | Avg. Vel. (ft/s) | 0.33 | 0.56 |
| 0.25 | | | | |
| Max Chl Dpth (ft) | 17.34 | Hydr. Depth (ft) | 5.95 | 13.95 |
| 5.98 | | | | |
| Conv. Total (cfs) | 10106570.0 | Conv. (cfs) | 41465.9 | 9728561.0 |
| 336544.9 | | | | |

| | | | | |
|---|---|---|---|---|
| Length Wtd. (ft) | 888.22 | Wetted Per. (ft) | 49.98 | 2863.74 |
| 520.76 | | | | |
| Min Ch El (ft) | 0.15 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 193.64 | 4917.08 |
| 59.26 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 30.32 | 387.09 |
| 11.14 | | | | |

Profile #PF 1

| Percent Conv | Pos Hydr | Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|
| 1 | LOB | | 30.38 | 40.50 | 0.95 | 10.31 | 8.66 |
| 0.00 | 1.24 | | 0.09 | | | | |
| 2 | LOB | | 40.50 | 50.63 | 8.12 | 40.53 | 10.55 |
| 0.03 | 4.00 | | 0.20 | | | | |
| 3 | LOB | | 50.63 | 60.75 | 17.02 | 62.43 | 10.24 |
| 0.07 | 6.17 | | 0.27 | | | | |
| 4 | LOB | | 60.75 | 70.88 | 28.61 | 79.93 | 10.29 |
| 0.12 | 7.89 | | 0.36 | | | | |
| 5 | LOB | | 70.88 | 81.00 | 40.71 | 97.23 | 10.24 |
| 0.18 | 9.60 | | 0.42 | | | | |
| 6 | Chan | | 81.00 | 436.88 | 2425.10 | 4552.09 | 356.12 |
| 10.43 | 12.79 | | 0.53 | | | | |
| 7 | Chan | | 436.88 | 792.75 | 2593.54 | 4750.21 | 358.19 |
| 11.15 | 13.35 | | 0.55 | | | | |
| 8 | Chan | | 792.75 | 1148.63 | 3088.78 | 5267.40 | 356.84 |
| 13.28 | 14.80 | | 0.59 | | | | |
| 9 | Chan | | 1148.63 | 1504.50 | 2669.39 | 4847.90 | 360.94 |
| 11.48 | 13.62 | | 0.55 | | | | |
| 10 | Chan | | 1504.50 | 1860.38 | 2671.90 | 4841.15 | 359.18 |
| 11.49 | 13.60 | | 0.55 | | | | |
| 11 | Chan | | 1860.38 | 2216.25 | 3504.04 | 5696.44 | 359.19 |
| 15.07 | 16.01 | | 0.62 | | | | |
| 12 | Chan | | 2216.25 | 2572.13 | 2640.70 | 4789.62 | 355.91 |
| 11.36 | 13.46 | | 0.55 | | | | |
| 13 | Chan | | 2572.13 | 2928.00 | 2791.76 | 4967.90 | 357.39 |
| 12.00 | 13.96 | | 0.56 | | | | |
| 14 | ROB | | 2928.00 | 3001.13 | 187.26 | 582.29 | 73.93 |
| 0.81 | 7.96 | | 0.32 | | | | |
| 15 | ROB | | 3001.13 | 3074.25 | 172.26 | 579.79 | 73.19 |
| 0.74 | 7.93 | | 0.30 | | | | |
| 16 | ROB | | 3074.25 | 3147.38 | 131.66 | 536.54 | 73.13 |
| 0.57 | 7.34 | | 0.25 | | | | |
| 17 | ROB | | 3147.38 | 3220.50 | 118.49 | 503.79 | 73.18 |
| 0.51 | 6.89 | | 0.24 | | | | |
| 18 | ROB | | 3220.50 | 3293.63 | 90.77 | 429.25 | 73.13 |
| 0.39 | 5.87 | | 0.21 | | | | |
| 19 | ROB | | 3293.63 | 3366.75 | 60.49 | 336.52 | 73.17 |
| 0.26 | 4.60 | | 0.18 | | | | |
| 20 | ROB | | 3366.75 | 3439.88 | 13.41 | 136.28 | 73.18 |
| 0.06 | 1.86 | | 0.10 | | | | |
| 21 | ROB | | 3439.88 | 3513.00 | 0.05 | 2.04 | 7.86 |
| 0.00 | 0.26 | | 0.03 | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 3735

INPUT
Description:
Station Elevation Data num= 68

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 12 | 12.15 | 17 | 11.15 | 20 | 10.15 | 47 | 8.15 |
| 157 | 7.15 | 167 | 6.15 | 193 | 5.15 | 215 | 4.15 | 285 | 3.15 |
| 301 | 3.15 | 1203 | 4.15 | 1318 | 3.15 | 1320 | 2.15 | 2205 | 2.15 |
| 2207 | 3.15 | 2269 | 3.15 | 2271 | 2.15 | 2681 | 2.15 | 2682 | 3.15 |
| 2830.5 | 4.15 | 2831.5 | 4.15 | 2832.5 | 2.15 | 2846.5 | 2.15 | 2847.5 | 4.15 |
| 2849.5 | 4.15 | 3228.5 | 5.15 | 3238.5 | 6.15 | 3252.5 | 7.15 | 3262.5 | 7.15 |
| 3266.5 | 6.15 | 3269.5 | 5.15 | 3271.5 | 4.15 | 3274.5 | 4.15 | 3276.5 | 2.15 |
| 3352.5 | 2.15 | 3353.5 | 4.15 | 3355.5 | 4.15 | 3358.5 | 5.15 | 3363.5 | 6.15 |
| 3386.5 | 7.15 | 3402.5 | 7.15 | 3410.5 | 6.15 | 3413.5 | 5.15 | 3416.5 | 4.15 |
| 3418.5 | 4.15 | 3419.5 | 2.15 | 3444.5 | 2.15 | 3445.5 | 4.15 | 3449.5 | 4.15 |
| 3502.5 | 4.15 | 3588.5 | 4.15 | 3596.5 | 4.15 | 3618.5 | 4.15 | 3630.5 | 4.15 |
| 3875.5 | 4.15 | 3878.5 | 4.15 | 3880.5 | 3.15 | 4026.5 | 1.15 | 4028.5 | 4.15 |
| 4029.5 | 4.15 | 4035.5 | 7.15 | 4039.5 | 8.15 | 4054.5 | 9.15 | 4064.5 | 10.15 |
| 4073.5 | 11.15 | 4082.5 | 12.15 | 4105.5 | 22.15 | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 193 | .035 | 3502.5 | .04 | 3588.5 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 157 | 4035.5 | 598 1236.9 | 488.7 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.49 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.036 |
| 0.050 | | | | |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 598.00 | 1236.90 |
| 488.70 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1373.70 | 55040.79 |
| 397.00 | | | | |
| E.G. Slope (ft/ft) | 0.000003 | Area (sq ft) | 1373.70 | 55040.79 |
| 397.00 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 380.66 | 22802.88 |
| 71.46 | | | | |
| Top Width (ft) | 4089.17 | Top Width (ft) | 151.40 | 3878.50 |
| 59.27 | | | | |
| Vel Total (ft/s) | 0.41 | Avg. Vel. (ft/s) | 0.28 | 0.41 |
| 0.18 | | | | |
| Max Chl Dpth (ft) | 16.34 | Hydr. Depth (ft) | 9.07 | 14.19 |
| 6.70 | | | | |
| Conv. Total (cfs) | 13427730.0 | Conv. (cfs) | 219797.1 | |
| 13166670.0 41262.1 | | | | |
| Length Wtd. (ft) | 1229.18 | Wetted Per. (ft) | 153.67 | 3890.58 |
| 60.70 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |

| | | | | |
|---|---|---|---|---|
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 185.49 | 3951.27 |
| 12.62 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 29.33 | 318.54 |
| 3.44 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 19.63 | 10.05 | 64.03 | 16.20 |
| 0.04 | 4.56 | 0.16 | | | | |
| 2 | LOB | 19.63 | 39.25 | 39.60 | 157.66 | 19.70 |
| 0.17 | 8.03 | 0.25 | | | | |
| 3 | LOB | 39.25 | 58.88 | 50.22 | 181.62 | 19.65 |
| 0.22 | 9.25 | 0.28 | | | | |
| 4 | LOB | 58.88 | 78.50 | 52.80 | 187.07 | 19.63 |
| 0.23 | 9.53 | 0.28 | | | | |
| 5 | LOB | 78.50 | 98.13 | 54.46 | 190.58 | 19.63 |
| 0.23 | 9.71 | 0.29 | | | | |
| 6 | LOB | 98.13 | 117.75 | 56.14 | 194.08 | 19.63 |
| 0.24 | 9.89 | 0.29 | | | | |
| 7 | LOB | 117.75 | 137.38 | 57.83 | 197.58 | 19.63 |
| 0.25 | 10.07 | 0.29 | | | | |
| 8 | LOB | 137.38 | 157.00 | 59.55 | 201.08 | 19.63 |
| 0.26 | 10.25 | 0.30 | | | | |
| 9 | Chan | 157.00 | 641.81 | 2828.25 | 6717.56 | 484.91 |
| 12.16 | 13.86 | 0.42 | | | | |
| 10 | Chan | 641.81 | 1126.63 | 2787.51 | 6636.47 | 484.81 |
| 11.99 | 13.69 | 0.42 | | | | |
| 11 | Chan | 1126.63 | 1611.44 | 3127.07 | 7111.74 | 485.05 |
| 13.45 | 14.67 | 0.44 | | | | |
| 12 | Chan | 1611.44 | 2096.25 | 3368.47 | 7434.75 | 484.81 |
| 14.48 | 15.34 | 0.45 | | | | |
| 13 | Chan | 2096.25 | 2581.06 | 3318.13 | 7370.75 | 485.28 |
| 14.27 | 15.20 | 0.45 | | | | |
| 14 | Chan | 2581.06 | 3065.88 | 2827.24 | 6708.99 | 487.70 |
| 12.16 | 13.84 | 0.42 | | | | |
| 15 | Chan | 3065.88 | 3550.69 | 2508.43 | 6308.40 | 490.63 |
| 10.79 | 13.01 | 0.40 | | | | |
| 16 | Chan | 3550.69 | 4035.50 | 2037.77 | 6752.13 | 487.38 |
| 8.76 | 13.93 | 0.30 | | | | |
| 17 | ROB | 4035.50 | 4044.25 | 17.44 | 82.93 | 8.88 |
| 0.07 | 9.48 | 0.21 | | | | |
| 18 | ROB | 4044.25 | 4053.00 | 15.33 | 76.36 | 8.77 |
| 0.07 | 8.73 | 0.20 | | | | |
| 19 | ROB | 4053.00 | 4061.75 | 13.36 | 70.38 | 8.79 |
| 0.06 | 8.04 | 0.19 | | | | |
| 20 | ROB | 4061.75 | 4070.50 | 10.97 | 62.56 | 8.80 |
| 0.05 | 7.15 | 0.18 | | | | |
| 21 | ROB | 4070.50 | 4079.25 | 8.61 | 54.10 | 8.80 |
| 0.04 | 6.18 | 0.16 | | | | |
| 22 | ROB | 4079.25 | 4088.00 | 5.18 | 40.69 | 9.27 |
| 0.02 | 4.65 | 0.13 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 23 | ROB | 4088.00 | 4096.75 | 0.58 | 9.97 | 7.38 |
| 0.00 | 1.47 | 0.06 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 2499

INPUT
Description:
Station Elevation Data num= 72

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 80 | 12.15 | 99 | 11.15 | 100 | 11.09 | 116 | 10.15 |
| 136 | 9.15 | 181 | 8.15 | 192 | 7.15 | 200 | 6.15 | 208 | 5.15 |
| 229 | 4.15 | 235 | 4.15 | 259 | 4.15 | 628 | 3.15 | 629 | 2.15 |
| 640 | 2.15 | 641 | 2.15 | 643 | 3.15 | 820 | 4.15 | 825 | 1.15 |
| 860 | 1.15 | 864 | 4.15 | 899 | 4.15 | 901 | 1.15 | 2367 | 2.15 |
| 2368 | 4.15 | 2373 | 4.15 | 2383 | 5.15 | 2385 | 6.15 | 2394 | 7.15 |
| 2398 | 8.15 | 2409 | 9.15 | 2454 | 9.15 | 2465 | 8.15 | 2481 | 7.15 |
| 2483 | 6.15 | 2486 | 5.15 | 2487 | 4.15 | 2489 | 4.15 | 2490 | 2.15 |
| 2559 | 3.15 | 2560 | 4.15 | 2562 | 4.15 | 2564 | 5.15 | 2570 | 6.15 |
| 2589 | 6.15 | 2592 | 5.15 | 2595 | 4.15 | 2597 | 4.15 | 2598 | 3.15 |
| 2833 | 1.15 | 2870 | 4.15 | 3305 | 4.15 | 3309 | 1.15 | 3351 | 3.15 |
| 3352 | 4.15 | 3357 | 4.15 | 3432 | 5.15 | 3465 | 5.15 | 3468 | 4.15 |
| 3473 | 3.15 | 3627 | 1.15 | 3628 | 4.15 | 3636 | 5.15 | 3639 | 6.15 |
| 3643 | 7.15 | 3647 | 8.15 | 3651 | 9.15 | 3657 | 10.15 | 3661 | 11.15 |
| 3667 | 12.15 | 3692 | 22.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 200 | .035 | 3639 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 200 | 3639 | 897 | 479.6 391.4 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1205 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.48 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 17.48 | Reach Len. (ft) | 897.00 | 479.60 |
| 391.40 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 35684.99 |
| 262.58 | | | | |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 1088.56 | 50358.38 |
| 262.58 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23171.57 |
| 83.43 | | | | |
| Top Width (ft) | 3642.92 | Top Width (ft) | 162.61 | 3439.00 |
| 41.31 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Vel Total (ft/s) 0.32 | 0.65 | Avg. Vel. (ft/s) | | | 0.65 |
| Max Chl Dpth (ft) 6.36 | 16.33 | Hydr. Depth (ft) | | | 14.66 |
| Conv. Total (cfs) 32588.5 | 9083974.0 | Conv. (cfs) | | | 9051386.0 |
| Length Wtd. (ft) 43.00 | 479.06 | Wetted Per. (ft) | | | 2443.61 |
| Min Ch El (ft) 0.00 | 1.15 | Shear (lb/sq ft) | | | 0.01 |
| Alpha 0.00 | 1.00 | Stream Power (lb/ft s) | | | 0.00 |
| Frctn Loss (ft) 8.93 | 0.01 | Cum Volume (acre-ft) | 168.59 | | 2454.85 |
| C & E Loss (ft) 2.87 | 0.01 | Cum SA (acres) | 27.18 | | 214.65 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 25.00 | 50.00 | 0.00 | 9.93 | 12.70 |
| 0.00 | 0.79 | 0.00 | | | | |
| 2 | LOB | 50.00 | 75.00 | 0.00 | 78.46 | 25.19 |
| 0.00 | 3.14 | 0.00 | | | | |
| 3 | LOB | 75.00 | 100.00 | 0.00 | 142.11 | 25.07 |
| 0.00 | 5.68 | 0.00 | | | | |
| 4 | LOB | 100.00 | 125.00 | 0.00 | 177.65 | 25.04 |
| 0.00 | 7.11 | 0.00 | | | | |
| 5 | LOB | 125.00 | 150.00 | 0.00 | 207.30 | 25.02 |
| 0.00 | 8.29 | 0.00 | | | | |
| 6 | LOB | 150.00 | 175.00 | 0.00 | 222.87 | 25.01 |
| 0.00 | 8.91 | 0.00 | | | | |
| 7 | LOB | 175.00 | 200.00 | 0.00 | 250.24 | 25.11 |
| 0.00 | 10.01 | 0.00 | | | | |
| 8 | Chan | 200.00 | 702.50 | 0.00 | 6936.21 | 503.24 |
| 0.00 | 13.80 | 0.00 | | | | |
| 9 | Chan | 702.50 | 1205.00 | 0.00 | 7737.19 | 505.94 |
| 0.00 | 15.40 | 0.00 | | | | |
| 10 | Chan | 1205.00 | 1610.67 | 4459.47 | 6482.58 | 405.67 |
| 19.18 | 15.98 | 0.69 | | | | |
| 11 | Chan | 1610.67 | 2016.33 | 4331.52 | 6370.33 | 405.67 |
| 18.63 | 15.70 | 0.68 | | | | |
| 12 | Chan | 2016.33 | 2422.00 | 3899.17 | 5991.10 | 407.41 |
| 16.77 | 14.77 | 0.65 | | | | |
| 13 | Chan | 2422.00 | 2827.67 | 3510.88 | 5635.95 | 409.28 |
| 15.10 | 13.89 | 0.62 | | | | |
| 14 | Chan | 2827.67 | 3233.33 | 3366.79 | 5477.21 | 405.79 |
| 14.48 | 13.50 | 0.61 | | | | |
| 15 | Chan | 3233.33 | 3639.00 | 3603.75 | 5727.83 | 409.80 |
| 15.50 | 14.12 | 0.63 | | | | |
| 16 | ROB | 3639.00 | 3645.63 | 27.33 | 69.55 | 6.83 |
| 0.12 | 10.50 | 0.39 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17 | ROB | 3645.63 | 3652.25 | 20.61 | 58.64 | 6.81 |
| 0.09 | 8.85 | 0.35 | | | | |
| 18 | ROB | 3652.25 | 3658.88 | 15.88 | 49.97 | 6.75 |
| 0.07 | 7.54 | 0.32 | | | | |
| 19 | ROB | 3658.88 | 3665.50 | 11.31 | 40.79 | 6.75 |
| 0.05 | 6.16 | 0.28 | | | | |
| 20 | ROB | 3665.50 | 3672.13 | 6.67 | 30.22 | 7.04 |
| 0.03 | 4.56 | 0.22 | | | | |
| 21 | ROB | 3672.13 | 3678.75 | 1.61 | 12.92 | 7.14 |
| 0.01 | 1.95 | 0.12 | | | | |
| 22 | ROB | 3678.75 | 3685.38 | 0.02 | 0.49 | 1.68 |
| 0.00 | 0.31 | 0.04 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 2020

INPUT
Description:
Station Elevation Data num= 137

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 50 | 12.15 | 53 | 11.15 | 55 | 10.15 | 58 | 9.15 |
| 62 | 8.15 | 71 | 7.15 | 148 | 6.15 | 158 | 6.15 | 236 | 6.15 |
| 256 | 5.15 | 320 | 4.15 | 591 | 4.15 | 615 | 5.15 | 799 | 5.15 |
| 910 | 5.15 | 1282 | 5.15 | 1340 | 5.15 | 1351 | 5.15 | 1361 | 4.15 |
| 1376 | 4.15 | 1379 | 5.15 | 1382 | 6.15 | 1389 | 6.15 | 1390 | 5.15 |
| 1391 | 5.15 | 1405 | 5.15 | 1408 | 6.15 | 1414 | 7.15 | 1417 | 8.15 |
| 1420 | 9.15 | 1494 | 10.15 | 1509 | 11.15 | 1513 | 12.15 | 1572 | 12.15 |
| 1590 | 11.15 | 1593 | 10.15 | 1596 | 9.15 | 1598 | 8.15 | 1601 | 7.15 |
| 1606 | 6.15 | 1611 | 5.15 | 1672 | 5.15 | 1674 | 5.15 | 1730 | 5.15 |
| 1762 | 6.15 | 1780 | 6.15 | 1802 | 6.15 | 1821 | 6.15 | 1849 | 5.15 |
| 1853 | 5.15 | 1866 | 5.15 | 1888 | 5.15 | 1897 | 6.15 | 1905 | 7.15 |
| 1913 | 7.15 | 1921 | 6.15 | 1932 | 6.15 | 1934 | 7.15 | 1937 | 8.15 |
| 1941 | 9.15 | 1944 | 10.15 | 1954 | 10.15 | 1956 | 9.15 | 1958 | 8.15 |
| 1963 | 7.15 | 2058 | 11.15 | 2125 | 6.15 | 2145 | 6.15 | 2279 | 6.15 |
| 2307 | 6.15 | 2353 | 6.15 | 2368 | 5.15 | 2425 | 5.15 | 2506 | 6.15 |
| 2533 | 6.15 | 2548 | 5.15 | 2556 | 5.15 | 2566 | 5.15 | 2592 | 5.15 |
| 2597 | 6.15 | 2644 | 6.15 | 2647 | 5.15 | 2680 | 4.15 | 2684 | 4.15 |
| 2685 | 1.15 | 2713 | 1.15 | 2714 | 4.15 | 2716 | 4.15 | 2744 | 4.15 |
| 2749 | 4.15 | 2750 | 1.15 | 2765 | 1.15 | 2766 | 4.15 | 2769 | 4.15 |
| 2866 | 4.15 | 2867 | 4.15 | 2868 | 1.15 | 2873 | 1.15 | 2874 | 4.15 |
| 2878 | 4.15 | 2912 | 5.15 | 2934 | 6.15 | 2940 | 6.15 | 2950 | 6.15 |
| 2956 | 6.15 | 2972 | 6.15 | 2985 | 6.15 | 3014 | 5.15 | 3025 | 5.15 |
| 3056 | 5.15 | 3061 | 4.15 | 3069 | 4.15 | 3074 | 1.15 | 3210 | 1.15 |
| 3213 | 4.15 | 3224 | 4.15 | 3230 | 4.15 | 3235 | 4.15 | 3236 | 1.15 |
| 3251 | 1.15 | 3258 | 1.15 | 3774 | 1.15 | 3780 | 4.15 | 3809 | 4.15 |
| 3814 | 1.15 | 3827 | 1.15 | 3841 | 1.15 | 4000 | 1.15 | 4089 | 1.15 |
| 4090 | 4.15 | 4093 | 4.15 | 4095 | 5.15 | 4174 | 6.15 | 4182 | 7.15 |
| 4190 | 12.15 | 4198 | 22.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 148 | .035 | 4174 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 148 | 4174 | 257 97.3 | 97 | .1 | .3 |

| Ineffective Flow Sta L | Sta R | num= Elev | 1 Permanent |
|---|---|---|---|
| 0 | 3588 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.47 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.10 | Wt. n-Val. | | 0.035 0.040 |
| W.S. Elev (ft) | 17.36 | Reach Len. (ft) | 257.00 | 97.30 97.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 9025.11 158.31 |
| E.G. Slope (ft/ft) | 0.000095 | Area (sq ft) | 1068.98 | 51295.48 158.31 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23054.03 200.97 |
| Top Width (ft) | 4170.24 | Top Width (ft) | 124.07 | 4026.00 20.17 |
| Vel Total (ft/s) | 2.53 | Avg. Vel. (ft/s) | | 2.55 1.27 |
| Max Chl Dpth (ft) | 16.21 | Hydr. Depth (ft) | | 15.40 7.85 |
| Conv. Total (cfs) | 2381829.0 | Conv. (cfs) | | 2361245.0 20584.2 |
| Length Wtd. (ft) | 97.30 | Wetted Per. (ft) | | 589.94 24.17 |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.09 0.04 |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.23 0.05 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 146.37 | 1895.24 7.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 24.23 | 173.55 2.60 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 18.50 | 37.00 | 0.00 | 17.09 | 13.33 |
| 0.00 | 1.31 | 0.00 | | | | |
| 2 | LOB | 37.00 | 55.50 | 0.00 | 85.11 | 19.18 |
| 0.00 | 4.60 | 0.00 | | | | |
| 3 | LOB | 55.50 | 74.00 | 0.00 | 172.48 | 18.81 |
| 0.00 | 9.32 | 0.00 | | | | |
| 4 | LOB | 74.00 | 92.50 | 0.00 | 191.91 | 18.50 |
| 0.00 | 10.37 | 0.00 | | | | |
| 5 | LOB | 92.50 | 111.00 | 0.00 | 196.35 | 18.50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.00 | 10.61 | 0.00 | | | | | |
| 6 | LOB | 111.00 | 129.50 | 0.00 | 200.80 | 18.50 | |
| 0.00 | 10.85 | 0.00 | | | | | |
| 7 | LOB | 129.50 | 148.00 | 0.00 | 205.24 | 18.50 | |
| 0.00 | 11.09 | 0.00 | | | | | |
| 8 | Chan | 148.00 | 639.43 | 0.00 | 6219.48 | 491.48 | |
| 0.00 | 12.66 | 0.00 | | | | | |
| 9 | Chan | 639.43 | 1130.86 | 0.00 | 6002.48 | 491.43 | |
| 0.00 | 12.21 | 0.00 | | | | | |
| 10 | Chan | 1130.86 | 1622.29 | 0.00 | 4960.48 | 493.90 | |
| 0.00 | 10.09 | 0.00 | | | | | |
| 11 | Chan | 1622.29 | 2113.71 | 0.00 | 5143.02 | 493.14 | |
| 0.00 | 10.47 | 0.00 | | | | | |
| 12 | Chan | 2113.71 | 2605.14 | 0.00 | 5665.30 | 491.63 | |
| 0.00 | 11.53 | 0.00 | | | | | |
| 13 | Chan | 2605.14 | 3096.57 | 0.00 | 6383.41 | 505.56 | |
| 0.00 | 12.99 | 0.00 | | | | | |
| 14 | Chan | 3096.57 | 3588.00 | 0.00 | 7896.20 | 494.83 | |
| 0.00 | 16.07 | 0.00 | | | | | |
| 15 | Chan | 3588.00 | 4174.00 | 23054.03 | 9025.11 | 589.94 | |
| 99.14 | 15.40 | 2.55 | | | | | |
| 16 | ROB | 4174.00 | 4177.00 | 50.48 | 33.08 | 3.02 | |
| 0.22 | 11.03 | 1.53 | | | | | |
| 17 | ROB | 4177.00 | 4180.00 | 47.65 | 31.96 | 3.02 | |
| 0.20 | 10.65 | 1.49 | | | | | |
| 18 | ROB | 4180.00 | 4183.00 | 42.68 | 30.58 | 3.19 | |
| 0.18 | 10.19 | 1.40 | | | | | |
| 19 | ROB | 4183.00 | 4186.00 | 30.34 | 25.96 | 3.54 | |
| 0.13 | 8.65 | 1.17 | | | | | |
| 20 | ROB | 4186.00 | 4189.00 | 20.20 | 20.33 | 3.54 | |
| 0.09 | 6.78 | 0.99 | | | | | |
| 21 | ROB | 4189.00 | 4192.00 | 8.80 | 13.46 | 4.38 | |
| 0.04 | 4.49 | 0.65 | | | | | |
| 22 | ROB | 4192.00 | 4195.00 | 0.82 | 2.95 | 3.48 | |
| 0.00 | 1.36 | 0.28 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1923

INPUT
Description: Upstream of RR crossing
Station Elevation Data num= 110

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 160 | 11.15 | 171 | 10.15 | 178 | 9.28 | 179 | 9.15 |
| 195 | 8.15 | 220 | 7.15 | 250 | 7.15 | 308 | 7.15 | 349 | 7.15 |
| 363 | 7.15 | 388 | 8.15 | 391 | 9.15 | 401 | 10.15 | 412 | 10.15 |
| 418 | 9.15 | 426 | 8.15 | 438 | 7.15 | 541 | 7.15 | 569 | 7.15 |
| 592 | 7.15 | 594 | 8.15 | 596 | 9.15 | 600 | 10.15 | 605 | 10.15 |
| 608 | 9.15 | 610 | 8.15 | 612 | 7.15 | 615 | 6.15 | 616 | 5.15 |
| 674 | 5.15 | 686 | 5.15 | 697 | 5.15 | 739 | 6.15 | 774 | 6.15 |
| 792 | 5.15 | 892 | 5.15 | 953 | 5.15 | 1000 | 5.15 | 1085 | 6.15 |
| 1105 | 6.15 | 1144 | 5.15 | 1207 | 4.15 | 1258 | 4.15 | 1281 | 4.15 |
| 1342 | 4.15 | 1345 | 1.15 | 1382 | 1.15 | 1385 | 4.15 | 1400 | 4.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1403 | 1.15 | 1418 | 1.15 | 1426 | 1.15 | 1439 | 1.15 | 1443 | 4.15 |
| 1447 | 4.15 | 1452 | 1.15 | 1507 | 1.15 | 1512 | 4.15 | 1569 | 4.15 |
| 1576 | 2.15 | 1584 | 4.15 | 1607 | 1.15 | 1928 | 1.15 | 1942 | 2.15 |
| 1966 | 2.15 | 1971 | 3.15 | 1974 | 6.15 | 1986 | 6.15 | 1991 | 5.15 |
| 2003 | 4.15 | 2022 | 3.15 | 2026 | 1.15 | 2501 | 1.15 | 2511 | 4.15 |
| 2532 | 4.15 | 2544 | 1.15 | 2548 | 1.15 | 2556 | 4.15 | 2610 | 4.15 |
| 2617 | 1.15 | 2641 | 1.15 | 2659 | 1.15 | 2668 | 1.15 | 2688 | 1.15 |
| 2721 | 4.15 | 2728 | 4.15 | 2737 | 1.15 | 2741 | 1.15 | 2749 | 1.15 |
| 2756 | 1.15 | 2771 | 1.15 | 2780 | 1.15 | 2787 | 1.15 | 2836 | 1.15 |
| 3003 | 3.15 | 3835 | 3.15 | 3841 | 3.15 | 3848 | 3.15 | 3856 | 3.15 |
| 3857 | 2.15 | 3940 | 1.15 | 4030 | 1.15 | 4033 | 4.15 | 4036 | 4.15 |
| 4053 | 5.15 | 4068 | 6.15 | 4070 | 7.15 | 4083 | 12.15 | 4096 | 22.15 |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 3835 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 220 | 4070 | 125 | 51.9 | 36.1 | .3 | .5 |

Ineffective Flow num= 4

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1051 | 20 | T |
| 1051 | 1725 | 18 | T |
| 1725 | 3110 | 15.5 | T |
| 3110 | 3765 | 18 | T |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.44 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.17 | Wt. n-Val. | | 0.036 |
| 0.035 | | | | |
| W.S. Elev (ft) | 17.28 | Reach Len. (ft) | 25.00 | 25.00 |
| 25.00 | | | | |
| Crit W.S. (ft) | 8.04 | Flow Area (sq ft) | | 7000.82 |
| 116.21 | | | | |
| E.G. Slope (ft/ft) | 0.000402 | Area (sq ft) | 785.39 | 53693.13 |
| 116.21 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22957.82 |
| 297.18 | | | | |
| Top Width (ft) | 4018.76 | Top Width (ft) | 149.10 | 3850.00 |
| 19.66 | | | | |
| Vel Total (ft/s) | 3.27 | Avg. Vel. (ft/s) | | 3.28 |
| 2.56 | | | | |
| Max Chl Dpth (ft) | 16.13 | Hydr. Depth (ft) | | 4.14 |
| 5.91 | | | | |
| Conv. Total (cfs) | 1159186.0 | Conv. (cfs) | | 1144372.0 |
| 14813.6 | | | | |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | | 1696.58 |
| 22.33 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.10 |
| 0.13 | | | | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.34 |
| 0.33 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 140.90 | 1777.99 |
| 6.73 | | | | |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 23.42 | 164.76 |
| 2.55 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr | Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|
| 1 | LOB | | 55.00 | 82.50 | 0.00 | 4.62 | 11.63 |
| 0.00 | | 0.40 | 0.00 | | | | |
| 2 | LOB | | 82.50 | 110.00 | 0.00 | 47.92 | 27.56 |
| 0.00 | | 1.74 | 0.00 | | | | |
| 3 | LOB | | 110.00 | 137.50 | 0.00 | 99.92 | 27.56 |
| 0.00 | | 3.63 | 0.00 | | | | |
| 4 | LOB | | 137.50 | 165.00 | 0.00 | 152.18 | 27.57 |
| 0.00 | | 5.53 | 0.00 | | | | |
| 5 | LOB | | 165.00 | 192.50 | 0.00 | 217.49 | 27.61 |
| 0.00 | | 7.91 | 0.00 | | | | |
| 6 | LOB | | 192.50 | 220.00 | 0.00 | 263.26 | 27.52 |
| 0.00 | | 9.57 | 0.00 | | | | |
| 7 | Chan | | 220.00 | 635.50 | 0.00 | 4100.64 | 417.72 |
| 0.00 | | 9.87 | 0.00 | | | | |
| 8 | Chan | | 635.50 | 1051.00 | 0.00 | 4957.84 | 415.54 |
| 0.00 | | 11.93 | 0.00 | | | | |
| 9 | Chan | | 1051.00 | 1725.00 | 0.00 | 9477.38 | 681.13 |
| 0.00 | | 14.06 | 0.00 | | | | |
| 10 | Chan | | 1725.00 | 2186.67 | 807.62 | 819.68 | 463.68 |
| 3.47 | | 1.78 | 0.99 | | | | |
| 11 | Chan | | 2186.67 | 2648.33 | 807.67 | 819.68 | 463.64 |
| 3.47 | | 1.78 | 0.99 | | | | |
| 12 | Chan | | 2648.33 | 3110.00 | 809.22 | 819.68 | 462.30 |
| 3.48 | | 1.78 | 0.99 | | | | |
| 13 | Chan | | 3110.00 | 3765.00 | 0.00 | 9252.19 | 655.00 |
| 0.00 | | 14.13 | 0.00 | | | | |
| 14 | Chan | | 3765.00 | 4070.00 | 20533.31 | 4541.77 | 306.96 |
| 88.30 | | 14.89 | 4.52 | | | | |
| 15 | ROB | | 4070.00 | 4073.25 | 97.06 | 30.88 | 3.48 |
| 0.42 | | 9.50 | 3.14 | | | | |
| 16 | ROB | | 4073.25 | 4076.50 | 76.73 | 26.81 | 3.48 |
| 0.33 | | 8.25 | 2.86 | | | | |
| 17 | ROB | | 4076.50 | 4079.75 | 58.35 | 22.75 | 3.48 |
| 0.25 | | 7.00 | 2.56 | | | | |
| 18 | ROB | | 4079.75 | 4083.00 | 42.04 | 18.69 | 3.48 |
| 0.18 | | 5.75 | 2.25 | | | | |
| 19 | ROB | | 4083.00 | 4086.25 | 19.53 | 12.60 | 4.10 |
| 0.08 | | 3.88 | 1.55 | | | | |
| 20 | ROB | | 4086.25 | 4089.50 | 3.47 | 4.47 | 4.10 |
| 0.01 | | 1.38 | 0.78 | | | | |
| 21 | ROB | | 4089.50 | 4092.75 | 0.00 | 0.01 | 0.21 |
| 0.00 | | 0.06 | 0.10 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: San Elijo Lagoon
REACH: Lower RS: 1900

INPUT
Description: NCTD Railroad Bridge
Distance from Upstream XS = 25
Deck/Roadway Width = 22.001
Weir Coefficient = 2.61
Upstream Deck/Roadway Coordinates
num= 10

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | .15 | 146 | 22.15 | .15 | 1673 | 17.15 | .15 |
| 2010 | 16.15 | .15 | 2493.1 | 14.65 | .15 | 3042.2 | 16.5 | .15 |
| 3648.9 | 20.15 | .15 | 3765.6 | 23.15 | .15 | 3765.6 | 23.15 | 16.15 |
| 4096 | 23.15 | 16.15 | | | | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 110

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 160 | 11.15 | 171 | 10.15 | 178 | 9.28 | 179 | 9.15 |
| 195 | 8.15 | 220 | 7.15 | 250 | 7.15 | 308 | 7.15 | 349 | 7.15 |
| 363 | 7.15 | 388 | 8.15 | 391 | 9.15 | 401 | 10.15 | 412 | 10.15 |
| 418 | 9.15 | 426 | 8.15 | 438 | 7.15 | 541 | 7.15 | 569 | 7.15 |
| 592 | 7.15 | 594 | 8.15 | 596 | 9.15 | 600 | 10.15 | 605 | 10.15 |
| 608 | 9.15 | 610 | 8.15 | 612 | 7.15 | 615 | 6.15 | 616 | 5.15 |
| 674 | 5.15 | 686 | 5.15 | 697 | 5.15 | 739 | 6.15 | 774 | 6.15 |
| 792 | 5.15 | 892 | 5.15 | 953 | 5.15 | 1000 | 5.15 | 1085 | 6.15 |
| 1105 | 6.15 | 1144 | 5.15 | 1207 | 4.15 | 1258 | 4.15 | 1281 | 4.15 |
| 1342 | 4.15 | 1345 | 1.15 | 1382 | 1.15 | 1385 | 4.15 | 1400 | 4.15 |
| 1403 | 1.15 | 1418 | 1.15 | 1426 | 1.15 | 1439 | 1.15 | 1443 | 4.15 |
| 1447 | 4.15 | 1452 | 1.15 | 1507 | 1.15 | 1512 | 4.15 | 1569 | 4.15 |
| 1576 | 2.15 | 1584 | 4.15 | 1607 | 1.15 | 1928 | 1.15 | 1942 | 2.15 |
| 1966 | 2.15 | 1971 | 3.15 | 1974 | 6.15 | 1986 | 6.15 | 1991 | 5.15 |
| 2003 | 4.15 | 2022 | 3.15 | 2026 | 1.15 | 2501 | 1.15 | 2511 | 4.15 |
| 2532 | 4.15 | 2544 | 1.15 | 2548 | 1.15 | 2556 | 4.15 | 2610 | 4.15 |
| 2617 | 1.15 | 2641 | 1.15 | 2659 | 1.15 | 2668 | 1.15 | 2688 | 1.15 |
| 2721 | 4.15 | 2728 | 4.15 | 2737 | 1.15 | 2741 | 1.15 | 2749 | 1.15 |
| 2756 | 1.15 | 2771 | 1.15 | 2780 | 1.15 | 2787 | 1.15 | 2836 | 1.15 |
| 3003 | 3.15 | 3835 | 3.15 | 3841 | 3.15 | 3848 | 3.15 | 3856 | 3.15 |
| 3857 | 2.15 | 3940 | 1.15 | 4030 | 1.15 | 4033 | 4.15 | 4036 | 4.15 |
| 4053 | 5.15 | 4068 | 6.15 | 4070 | 7.15 | 4083 | 12.15 | 4096 | 22.15 |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 3835 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
220 4070 .3 .5
Ineffective Flow num= 4

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1051 | 20 | T |
| 1051 | 1725 | 18 | T |
| 1725 | 3110 | 15.5 | T |
| 3110 | 3765 | 18 | T |

Downstream Deck/Roadway Coordinates
num= 9

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 24.15 | .15 | 100 | 22.15 | .15 | 1725.1 | 17.15 | .15 |
| 2070.1 | 16.15 | .15 | 2550 | 14.65 | .15 | 3085.6 | 16.15 | .15 |
| 3808.67 | 23.15 | .15 | 3808.67 | 23.15 | 16.15 | 4150 | 23.15 | 16.15 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 89

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 100 | 12.15 | 113 | 11.15 | 127 | 11.15 | 135 | 11.15 |
| 257 | 10.15 | 282 | 10.15 | 308 | 10.15 | 311 | 10.15 | 360 | 10.15 |
| 369 | 10.15 | 373 | 11.15 | 375 | 11.15 | 382 | 11.15 | 386 | 12.15 |
| 400 | 12.15 | 403 | 11.15 | 411 | 10.15 | 419 | 8.15 | 480 | 7.15 |
| 541 | 7.15 | 555 | 7.15 | 624 | 7.15 | 845 | 6.15 | 1084 | 6.15 |
| 1141 | 7.15 | 1191 | 7.15 | 1219 | 7.15 | 1249 | 6.15 | 1301 | 5.15 |
| 1311 | 5.15 | 1324 | 5.15 | 1409 | 4.15 | 1436 | 4.15 | 1444 | 4.15 |
| 1502 | 4.15 | 1536 | 4.15 | 1607 | 4.15 | 1680 | 4.15 | 1740 | 5.15 |
| 1781 | 5.15 | 1801 | 5.15 | 1805 | 5.15 | 1855 | 3.15 | 1905 | 2.15 |
| 2014 | 1.15 | 2027 | 1.15 | 2116 | 1.15 | 2134 | 1.15 | 2232 | 1.15 |
| 2255 | 1.15 | 2291 | 1.15 | 2310 | 1.15 | 2349 | 1.15 | 2363 | 1.15 |
| 2684 | 1.15 | 2714 | 1.15 | 2961 | 1.15 | 2964 | 4.15 | 2969 | 4.15 |
| 2970 | 4.15 | 2978 | 4.15 | 2980 | 1.15 | 3361 | 1.15 | 3362 | 4.15 |
| 3389 | 4.15 | 3428 | 4.15 | 3454 | 4.15 | 3456 | 1.15 | 3472 | 1.15 |
| 3473 | 4.15 | 3477 | 4.15 | 3505 | 4.15 | 3508 | 4.15 | 3509 | 1.15 |
| 3549 | 1.15 | 3659 | 1.15 | 3670 | 2.15 | 3877 | 2.15 | 3880 | 2.15 |
| 3884 | 2.15 | 3887 | 1.15 | 4051 | 1.15 | 4080 | 4.15 | 4114 | 5.15 |
| 4116 | 6.15 | 4119 | 7.15 | 4126 | 12.15 | 4150 | 21.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 386 | .04 | 3887 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
480 4116 .3 .5

Ineffective Flow num= 5

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1109 | 20 | T |
| 1109 | 1521 | 18 | T |
| 1521 | 1784 | 17 | T |
| 1784 | 3207 | 15.5 | T |
| 3207 | 3761 | 18 | T |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 1

Abutment Data
Upstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 13765.6 | 12.15 | 13800 | 2.15 |

Downstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 13808.67 | 12.15 | 13843.07 | 2.15 |

Number of Piers = 19

Pier Data
Pier Station Upstream= 3781.6 Downstream= 3824.67
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|

```
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  3797.6    Downstream= 3840.67
Upstream      num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15
Downstream    num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  3813.6    Downstream= 3856.67
Upstream      num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15
Downstream    num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  3829.6    Downstream= 3872.67
Upstream      num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15
Downstream    num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  3845.6    Downstream= 3888.67
Upstream      num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15
Downstream    num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  3861.6    Downstream= 3904.67
Upstream      num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15
Downstream    num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  3877.6    Downstream= 3920.67
Upstream      num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15
Downstream    num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  3893.6    Downstream= 3936.67
Upstream      num=         2
    Width   Elev     Width   Elev
       3    1.15        3   16.15
Downstream    num=         2
    Width   Elev     Width   Elev
```

| | | | |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3909.6 Downstream= 3952.67

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3925.6 Downstream= 3968.67

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3941.6 Downstream= 3984.67

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3957.6 Downstream= 4000.67

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3973.6 Downstream= 4016.67

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3989.6 Downstream= 4032.67

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 4005.6 Downstream= 4048.67

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |

```
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  4021.6    Downstream= 4064.67
Upstream      num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15
Downstream    num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  4037.6    Downstream= 4080.67
Upstream      num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15
Downstream    num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  4053.6    Downstream= 4096.67
Upstream      num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15
Downstream    num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15

Pier Data
Pier Station     Upstream=  4069.6    Downstream= 4112.67
Upstream      num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15
Downstream    num=        2
    Width   Elev    Width   Elev
       3    1.15        3   16.15

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)                17.44    Element                Inside BR US
Inside BR DS
  W.S. US. (ft)                17.28    E.G. Elev (ft)              17.36
17.25
  Q Total (cfs)             23255.00    W.S. Elev (ft)              16.98
16.89
```

| | | | |
|---|---|---|---|
| Q Bridge (cfs) | 20546.32 | Crit W.S. (ft) | 8.86 |
| 8.42 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 15.83 |
| 15.74 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.91 |
| 4.79 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 4740.71 |
| 4856.83 | | | |
| Weir Submerg | | Froude # Chl | 0.23 |
| 0.22 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 31155.79 |
| 32511.56 | | | |
| Min El Weir Flow (ft) | 15.51 | Hydr Depth (ft) | 3.43 |
| 3.60 | | | |
| Min El Prs (ft) | 16.15 | W.P. Total (ft) | 2447.03 |
| 2445.46 | | | |
| Delta EG (ft) | 0.30 | Conv. Total (cfs) | 346128.6 |
| 349885.2 | | | |
| Delta WS (ft) | 0.28 | Top Width (ft) | 1392.46 |
| 1348.23 | | | |
| BR Open Area (sq ft) | 3507.72 | Frctn Loss (ft) | 0.10 |
| 0.00 | | | |
| BR Open Vel (ft/s) | 5.86 | C & E Loss (ft) | 0.01 |
| 0.10 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.55 |
| 0.55 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 2.68 |
| 2.62 | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1872

INPUT
Description: Downstream of RR crossing
Station Elevation Data num= 89

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 100 | 12.15 | 113 | 11.15 | 127 | 11.15 | 135 | 11.15 |
| 257 | 10.15 | 282 | 10.15 | 308 | 10.15 | 311 | 10.15 | 360 | 10.15 |
| 369 | 10.15 | 373 | 11.15 | 375 | 11.15 | 382 | 11.15 | 386 | 12.15 |
| 400 | 12.15 | 403 | 11.15 | 411 | 10.15 | 419 | 8.15 | 480 | 7.15 |
| 541 | 7.15 | 555 | 7.15 | 624 | 7.15 | 845 | 6.15 | 1084 | 6.15 |
| 1141 | 7.15 | 1191 | 7.15 | 1219 | 7.15 | 1249 | 6.15 | 1301 | 5.15 |
| 1311 | 5.15 | 1324 | 5.15 | 1409 | 4.15 | 1436 | 4.15 | 1444 | 4.15 |
| 1502 | 4.15 | 1536 | 4.15 | 1607 | 4.15 | 1680 | 4.15 | 1740 | 5.15 |
| 1781 | 5.15 | 1801 | 5.15 | 1805 | 5.15 | 1855 | 3.15 | 1905 | 2.15 |
| 2014 | 1.15 | 2027 | 1.15 | 2116 | 1.15 | 2134 | 1.15 | 2232 | 1.15 |
| 2255 | 1.15 | 2291 | 1.15 | 2310 | 1.15 | 2349 | 1.15 | 2363 | 1.15 |
| 2684 | 1.15 | 2714 | 1.15 | 2961 | 1.15 | 2964 | 4.15 | 2969 | 4.15 |
| 2970 | 4.15 | 2978 | 4.15 | 2980 | 1.15 | 3361 | 1.15 | 3362 | 4.15 |
| 3389 | 4.15 | 3428 | 4.15 | 3454 | 4.15 | 3456 | 1.15 | 3472 | 1.15 |
| 3473 | 4.15 | 3477 | 4.15 | 3505 | 4.15 | 3508 | 4.15 | 3509 | 1.15 |
| 3549 | 1.15 | 3659 | 1.15 | 3670 | 2.15 | 3877 | 2.15 | 3880 | 2.15 |
| 3884 | 2.15 | 3887 | 1.15 | 4051 | 1.15 | 4080 | 4.15 | 4114 | 5.15 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4116 | 6.15 | 4119 | 7.15 | 4126 | 12.15 | 4150 | 21.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 386 | .04 | 3887 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 480 | 4116 | 267 | 596.2 1122.6 | .3 | .5 |

Ineffective Flow num= 5

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1109 | 20 | T |
| 1109 | 1521 | 18 | T |
| 1521 | 1784 | 17 | T |
| 1784 | 3207 | 15.5 | T |
| 3207 | 3761 | 18 | T |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.14 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.15 | Wt. n-Val. | | 0.036 | 0.035 |
| W.S. Elev (ft) | 16.99 | Reach Len. (ft) | 267.00 | 596.20 | 1122.60 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 7451.25 | 113.68 |
| E.G. Slope (ft/ft) | 0.000384 | Area (sq ft) | 2721.74 | 50364.47 | 113.68 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22999.22 | 255.78 |
| Top Width (ft) | 4087.33 | Top Width (ft) | 428.42 | 3636.00 | 22.91 |
| Vel Total (ft/s) | 3.07 | Avg. Vel. (ft/s) | | 3.09 | 2.25 |
| Max Chl Dpth (ft) | 15.84 | Hydr. Depth (ft) | | 4.19 | 4.96 |
| Conv. Total (cfs) | 1186909.0 | Conv. (cfs) | | 1173854.0 | 13054.8 |
| Length Wtd. (ft) | 600.44 | Wetted Per. (ft) | | 1781.47 | 25.55 |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.10 | 0.11 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.31 | 0.24 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 140.52 | 1755.39 | 6.61 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 23.36 | 162.28 | 2.55 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent | Pos Hydr | Left Sta Velocity (ft) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|

| Conv | Depth(ft) | (ft/s) | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 60.00 | 0.00 | 3.55 | 8.46 | |
| 0.00 | 0.42 | 0.00 | | | | | |
| 2 | LOB | 60.00 | 120.00 | 0.00 | 224.03 | 60.24 | |
| 0.00 | 3.73 | 0.00 | | | | | |
| 3 | LOB | 120.00 | 180.00 | 0.00 | 358.83 | 60.00 | |
| 0.00 | 5.98 | 0.00 | | | | | |
| 4 | LOB | 180.00 | 240.00 | 0.00 | 387.41 | 60.00 | |
| 0.00 | 6.46 | 0.00 | | | | | |
| 5 | LOB | 240.00 | 300.00 | 0.00 | 409.34 | 60.00 | |
| 0.00 | 6.82 | 0.00 | | | | | |
| 6 | LOB | 300.00 | 360.00 | 0.00 | 410.53 | 60.00 | |
| 0.00 | 6.84 | 0.00 | | | | | |
| 7 | LOB | 360.00 | 420.00 | 0.00 | 367.04 | 60.72 | |
| 0.00 | 6.12 | 0.00 | | | | | |
| 8 | LOB | 420.00 | 480.00 | 0.00 | 561.02 | 60.01 | |
| 0.00 | 9.35 | 0.00 | | | | | |
| 9 | Chan | 480.00 | 1109.00 | 0.00 | 6559.72 | 629.01 | |
| 0.00 | 10.43 | 0.00 | | | | | |
| 10 | Chan | 1109.00 | 1521.00 | 0.00 | 4751.44 | 412.04 | |
| 0.00 | 11.53 | 0.00 | | | | | |
| 11 | Chan | 1521.00 | 1784.00 | 0.00 | 3303.48 | 263.01 | |
| 0.00 | 12.56 | 0.00 | | | | | |
| 12 | Chan | 1784.00 | 2258.33 | 556.90 | 707.77 | 474.39 | |
| 2.39 | 1.49 | 0.79 | | | | | |
| 13 | Chan | 2258.33 | 2732.67 | 556.94 | 707.77 | 474.33 | |
| 2.39 | 1.49 | 0.79 | | | | | |
| 14 | Chan | 2732.67 | 3207.00 | 554.72 | 707.77 | 477.18 | |
| 2.39 | 1.49 | 0.78 | | | | | |
| 15 | Chan | 3207.00 | 3761.00 | 0.00 | 8291.54 | 562.14 | |
| 0.00 | 14.97 | 0.00 | | | | | |
| 16 | Chan | 3761.00 | 4116.00 | 21330.66 | 5327.96 | 355.57 | |
| 91.73 | 15.01 | 4.00 | | | | | |
| 17 | ROB | 4116.00 | 4120.25 | 126.79 | 42.77 | 4.70 | |
| 0.55 | 10.06 | 2.96 | | | | | |
| 18 | ROB | 4120.25 | 4124.50 | 71.28 | 31.58 | 5.22 | |
| 0.31 | 7.43 | 2.26 | | | | | |
| 19 | ROB | 4124.50 | 4128.75 | 35.20 | 19.96 | 4.78 | |
| 0.15 | 4.70 | 1.76 | | | | | |
| 20 | ROB | 4128.75 | 4133.00 | 17.39 | 12.81 | 4.54 | |
| 0.07 | 3.01 | 1.36 | | | | | |
| 21 | ROB | 4133.00 | 4137.25 | 4.96 | 6.04 | 4.54 | |
| 0.02 | 1.42 | 0.82 | | | | | |
| 22 | ROB | 4137.25 | 4141.50 | 0.16 | 0.52 | 1.78 | |
| 0.00 | 0.31 | 0.30 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1276

INPUT
Description:
Station Elevation Data num= 135

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 60 | 5.15 | 360 | 5.15 | 363 | 6.15 | 366 | 7.15 |
| 368 | 8.15 | 370 | 9.15 | 372 | 10.15 | 375 | 11.15 | 377 | 12.15 |
| 392 | 12.15 | 398 | 11.15 | 401 | 10.15 | 403 | 9.15 | 405 | 8.15 |
| 408 | 7.15 | 412 | 6.35 | 413 | 6.15 | 416 | 5.15 | 424 | 5.15 |
| 458 | 5.15 | 466 | 5.15 | 476 | 4.15 | 479 | 4.15 | 974 | 4.15 |
| 983 | 4.15 | 988 | 5.15 | 996 | 5.15 | 1227 | 5.15 | 1317 | 5.15 |
| 1537 | 5.15 | 1564 | 5.15 | 1574 | 4.15 | 1807 | 4.15 | 1868 | 5.15 |
| 1925 | 5.15 | 2002 | 6.15 | 2040 | 6.15 | 2044 | 5.15 | 2047 | 9.15 |
| 2050 | 4.15 | 2182 | 4.15 | 2188 | 4.15 | 2201 | 1.15 | 3027 | 1.15 |
| 3028 | 4.15 | 3033 | 4.15 | 3036 | 6.15 | 3040 | 5.15 | 3045 | 5.15 |
| 3047 | 4.15 | 3047 | 6.15 | 3051 | 4.15 | 3052 | 1.15 | 3070 | 1.15 |
| 3071 | 4.15 | 3085 | 4.15 | 3089 | 5.15 | 3098 | 5.15 | 3108 | 5.15 |
| 3114 | 9.15 | 3118 | 5.15 | 3121 | 9.15 | 3121 | 4.15 | 3123 | 4.15 |
| 3124 | 1.15 | 3393 | 1.15 | 3395 | 4.15 | 3406 | 4.15 | 3476 | 4.15 |
| 3483 | 4.15 | 3489 | 5.15 | 3519 | 5.15 | 3521 | 4.15 | 3534 | 4.15 |
| 3536 | 1.15 | 3545 | 1.15 | 3547 | 4.15 | 3568 | 4.15 | 3570 | 1.15 |
| 3616 | 1.15 | 3619 | 4.15 | 3627 | 4.15 | 3642 | 4.15 | 3644 | 4.15 |
| 3645 | 1.15 | 3648 | 4.15 | 3652 | 4.15 | 3724 | 6.15 | 3738 | 5.15 |
| 3775 | 6.15 | 3775 | 5.15 | 3789 | 5.15 | 3790 | 5.15 | 3791 | 6.15 |
| 3794 | 7.15 | 3800 | 8.15 | 3805 | 8.15 | 3811 | 7.15 | 3813 | 6.15 |
| 3817 | 5.15 | 3818 | 5.15 | 3820 | 4.15 | 3822 | 4.15 | 3841 | 1.15 |
| 3842 | 4.15 | 3846 | 4.15 | 3847 | 6.15 | 3848 | 5.15 | 3895 | 6.15 |
| 3910 | 6.15 | 3913 | 6.15 | 3917 | 6.15 | 3919 | 5.15 | 4026 | 5.15 |
| 4034 | 6.15 | 4037 | 7.15 | 4043 | 8.15 | 4046 | 9.15 | 4153 | 10.15 |
| 4205 | 11.15 | 4238 | 10.15 | 4303 | 11.15 | 4311 | 10.15 | 4324 | 9.15 |
| 4336 | 8.15 | 4359 | 7.15 | 4406 | 4.15 | 4432 | 1.15 | 5255 | 1.15 |
| 5268 | 4.15 | 5287 | 7.15 | 5304 | 12.15 | 5433 | 36.15 | 5443 | 38.15 |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4303 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 412 | 5287 | 797.8 706.8 | 209 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 4027.5 | 19 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.03 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | | 0.035 |
| 0.035 | | | | |
| W.S. Elev (ft) | 17.00 | Reach Len. (ft) | 797.80 | 706.80 |
| 209.00 | | | | |
| Crit W.S. (ft) | 4.04 | Flow Area (sq ft) | | 16745.21 |
| 188.37 | | | | |
| E.G. Slope (ft/ft) | 0.000032 | Area (sq ft) | 4173.98 | 65267.85 |
| 188.37 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23136.36 |
| 118.64 | | | | |
| Top Width (ft) | 5311.94 | Top Width (ft) | 393.84 | 4875.00 |
| 43.09 | | | | |
| Vel Total (ft/s) | 1.37 | Avg. Vel. (ft/s) | | 1.38 |
| 0.63 | | | | |
| Max Chl Dpth (ft) | 15.85 | Hydr. Depth (ft) | | 13.30 |
| 4.37 | | | | |
| Conv. Total (cfs) | 4116557.0 | Conv. (cfs) | | 4095555.0 |
| 21002.3 | | | | |
| Length Wtd. (ft) | 702.09 | Wetted Per. (ft) | | 1261.00 |
| 44.26 | | | | |

| | | | | |
|---|---|---|---|---|
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.03 |
| 0.01 | | | | |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.04 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 119.39 | 964.07 |
| 2.72 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 20.84 | 104.04 |
| 1.70 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

Profile #PF 1

| Percent Conv | Pos Hydr | Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|
| 1 | LOB | | 0.00 | 51.50 | 0.00 | 157.47 | 34.65 |
| 0.00 | 4.72 | | 0.00 | | | | |
| 2 | LOB | | 51.50 | 103.00 | 0.00 | 600.28 | 51.83 |
| 0.00 | 11.66 | | 0.00 | | | | |
| 3 | LOB | | 103.00 | 154.50 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | | 0.00 | | | | |
| 4 | LOB | | 154.50 | 206.00 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | | 0.00 | | | | |
| 5 | LOB | | 206.00 | 257.50 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | | 0.00 | | | | |
| 6 | LOB | | 257.50 | 309.00 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | | 0.00 | | | | |
| 7 | LOB | | 309.00 | 360.50 | 0.00 | 610.48 | 51.53 |
| 0.00 | 11.85 | | 0.00 | | | | |
| 8 | LOB | | 360.50 | 412.00 | 0.00 | 363.66 | 53.86 |
| 0.00 | 7.06 | | 0.00 | | | | |
| 9 | Chan | | 412.00 | 1014.58 | 0.00 | 7655.38 | 602.91 |
| 0.00 | 12.70 | | 0.00 | | | | |
| 10 | Chan | | 1014.58 | 1617.17 | 0.00 | 7191.65 | 602.63 |
| 0.00 | 11.93 | | 0.00 | | | | |
| 11 | Chan | | 1617.17 | 2219.75 | 0.00 | 7520.31 | 607.89 |
| 0.00 | 12.48 | | 0.00 | | | | |
| 12 | Chan | | 2219.75 | 2822.33 | 0.00 | 9553.81 | 602.58 |
| 0.00 | 15.85 | | 0.00 | | | | |
| 13 | Chan | | 2822.33 | 3424.92 | 0.00 | 9151.06 | 626.27 |
| 0.00 | 15.19 | | 0.00 | | | | |
| 14 | Chan | | 3424.92 | 4027.50 | 0.00 | 7450.42 | 619.09 |
| 0.00 | 12.36 | | 0.00 | | | | |
| 15 | Chan | | 4027.50 | 4657.25 | 8320.61 | 6865.68 | 630.68 |
| 35.78 | 10.90 | | 1.21 | | | | |
| 16 | Chan | | 4657.25 | 5287.00 | 14815.74 | 9879.53 | 630.33 |
| 63.71 | 15.69 | | 1.50 | | | | |
| 17 | ROB | | 5287.00 | 5306.50 | 99.44 | 136.59 | 20.26 |
| 0.43 | 7.00 | | 0.73 | | | | |
| 18 | ROB | | 5306.50 | 5326.00 | 19.04 | 50.23 | 19.83 |
| 0.08 | 2.58 | | 0.38 | | | | |
| 19 | ROB | | 5326.00 | 5345.50 | 0.17 | 1.56 | 4.16 |

0.00 0.38 0.11

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 569

INPUT
Description: Upstream of SCH
Station Elevation Data num= 92

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | 300 | 11.15 | 305 | 12.15 | 421 | 12.15 | 427 | 11.15 |
| 440 | 10.15 | 451 | 9.15 | 470.71 | 8.33 | 475 | 8.15 | 578 | 8.15 |
| 584 | 8.15 | 647 | 8.15 | 692 | 8.15 | 744 | 8.15 | 775 | 8.15 |
| 779 | 8.15 | 815 | 8.15 | 825 | 8.15 | 879 | 8.15 | 890 | 8.15 |
| 955 | 8.15 | 975 | 8.15 | 985 | 8.15 | 1017 | 8.15 | 1045 | 8.15 |
| 1500 | 7.15 | 1945 | 7.15 | 1966 | 6.15 | 1970 | 6.15 | 1989 | 7.15 |
| 2467 | 7.15 | 2482 | 7.15 | 2497 | 6.15 | 2508 | 6.15 | 2574 | 7.15 |
| 2606 | 8.15 | 2650 | 9.15 | 2653 | 10.15 | 2656 | 11.15 | 2665 | 11.15 |
| 2682 | 10.15 | 2695 | 9.15 | 2719 | 8.15 | 2875 | 8.15 | 2909 | 9.15 |
| 2917 | 10.15 | 2921 | 11.15 | 2926 | 12.15 | 2942 | 13.15 | 2946 | 14.15 |
| 3010 | 14.15 | 3088 | 13.15 | 3098 | 13.15 | 3101 | 13.15 | 3183 | 14.15 |
| 3217 | 14.15 | 3607 | 13.15 | 3947 | 13.15 | 3975 | 12.15 | 3985 | 8.15 |
| 4012 | 7.15 | 4039 | 6.15 | 4054 | 5.15 | 4062 | 4.15 | 4069 | 4.15 |
| 4072 | 1.15 | 4169 | 1.15 | 4171 | 4.15 | 4182 | 4.15 | 4195 | 5.15 |
| 4245 | 7.15 | 4334 | 8.15 | 4364 | 8.15 | 4423 | 7.15 | 4484 | 7.15 |
| 4616 | 7.15 | 4662 | 7.15 | 4701 | 7.15 | 4722 | 6.15 | 4728 | 5.15 |
| 4732 | 4.15 | 4743 | 4.15 | 4790 | 3.15 | 4810 | 1.15 | 4915 | 1.15 |
| 4934 | 4.15 | 4937 | 4.15 | 4940 | 5.15 | 4947 | 6.15 | 4953 | 7.15 |
| 4958 | 13.15 | 5075 | 19.15 | | | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4069 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 779 | 4953 | 543.2 121.7 | 125 | .3 | .5 |

Ineffective Flow num= 7

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2405 | 19 | T |
| 2405 | 2938 | 16 | T |
| 2938 | 3183 | 14.5 | T |
| 3183 | 3607 | 13.75 | T |
| 3607 | 4060 | 13.5 | T |
| 4060 | 4400 | 14 | T |
| 4400 | 4700 | 15.5 | T |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 3434.16 | 3586.35 | 22.17 | 3772.38 | 3896.39 | 22.07 |

CROSS SECTION OUTPUT Profile #PF 1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.96 | | | | |
| Vel Head (ft) | 0.13 | Wt. n-Val. | | 0.036 | 0.035 |
| W.S. Elev (ft) | 16.83 | Reach Len. (ft) | 10.00 | 10.00 | 10.00 |
| Crit W.S. (ft) | 9.32 | Flow Area (sq ft) | | 7765.29 | 165.22 |
| E.G. Slope (ft/ft) | 0.000791 | Area (sq ft) | 4197.18 | 33544.22 | 165.22 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22934.04 | 320.96 |
| Top Width (ft) | 4666.40 | Top Width (ft) | 691.89 | 3897.80 | 76.71 |
| Vel Total (ft/s) | 2.93 | Avg. Vel. (ft/s) | | 2.95 | 1.94 |
| Max Chl Dpth (ft) | 15.68 | Hydr. Depth (ft) | | 3.42 | 2.15 |
| Conv. Total (cfs) | 826923.5 | Conv. (cfs) | | 815510.4 | 11413.1 |
| Length Wtd. (ft) | 10.00 | Wetted Per. (ft) | | 2291.71 | 79.61 |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.17 | 0.10 |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.49 | 0.20 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 42.73 | 162.41 | 1.87 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 10.89 | 32.86 | 1.41 |

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 97.38 | 0.00 | 1.41 | 10.27 |
| 0.00 | 0.14 | 0.00 | | | | |
| 2 | LOB | 97.38 | 194.75 | 0.00 | 153.09 | 97.41 |
| 0.00 | 1.57 | 0.00 | | | | |
| 3 | LOB | 194.75 | 292.13 | 0.00 | 405.94 | 97.41 |
| 0.00 | 4.17 | 0.00 | | | | |
| 4 | LOB | 292.13 | 389.50 | 0.00 | 464.99 | 97.48 |
| 0.00 | 4.78 | 0.00 | | | | |
| 5 | LOB | 389.50 | 486.88 | 0.00 | 636.93 | 97.56 |
| 0.00 | 6.54 | 0.00 | | | | |
| 6 | LOB | 486.88 | 584.25 | 0.00 | 844.94 | 97.38 |
| 0.00 | 8.68 | 0.00 | | | | |
| 7 | LOB | 584.25 | 681.63 | 0.00 | 844.94 | 97.38 |
| 0.00 | 8.68 | 0.00 | | | | |
| 8 | LOB | 681.63 | 779.00 | 0.00 | 844.94 | 97.38 |
| 0.00 | 8.68 | 0.00 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | Chan | 779.00 | 1321.00 | 0.00 | 4786.75 | 542.00 |
| 0.00 | 8.83 | 0.00 | | | | |
| 10 | Chan | 1321.00 | 1863.00 | 0.00 | 5209.83 | 542.00 |
| 0.00 | 9.61 | 0.00 | | | | |
| 11 | Chan | 1863.00 | 2405.00 | 0.00 | 5269.04 | 542.05 |
| 0.00 | 9.72 | 0.00 | | | | |
| 12 | Chan | 2405.00 | 2938.00 | 284.50 | 440.89 | 533.80 |
| 1.22 | 0.83 | 0.65 | | | | |
| 13 | Chan | 2938.00 | 3183.00 | 733.66 | 570.16 | 245.14 |
| 3.15 | 2.33 | 1.29 | | | | |
| 14 | Chan | 3183.00 | 3607.00 | 1134.05 | 779.38 | 278.67 |
| 4.88 | 2.87 | 1.46 | | | | |
| 15 | Chan | 3607.00 | 4060.00 | 1758.91 | 1094.61 | 337.25 |
| 7.56 | 3.33 | 1.61 | | | | |
| 16 | Chan | 4060.00 | 4400.00 | 1595.48 | 961.25 | 342.95 |
| 6.86 | 2.83 | 1.66 | | | | |
| 17 | Chan | 4400.00 | 4700.00 | 402.82 | 398.16 | 300.00 |
| 1.73 | 1.33 | 1.01 | | | | |
| 18 | Chan | 4700.00 | 4953.00 | 17024.63 | 3520.83 | 253.89 |
| 73.21 | 13.92 | 4.84 | | | | |
| 19 | ROB | 4953.00 | 4968.25 | 166.35 | 68.38 | 18.07 |
| 0.72 | 4.48 | 2.43 | | | | |
| 20 | ROB | 4968.25 | 4983.50 | 82.92 | 42.10 | 15.27 |
| 0.36 | 2.76 | 1.97 | | | | |
| 21 | ROB | 4983.50 | 4998.75 | 47.60 | 30.17 | 15.27 |
| 0.20 | 1.98 | 1.58 | | | | |
| 22 | ROB | 4998.75 | 5014.00 | 20.58 | 18.25 | 15.27 |
| 0.09 | 1.20 | 1.13 | | | | |
| 23 | ROB | 5014.00 | 5029.25 | 3.52 | 6.32 | 15.27 |
| 0.02 | 0.41 | 0.56 | | | | |
| 24 | ROB | 5029.25 | 5044.50 | 0.00 | 0.01 | 0.46 |
| 0.00 | 0.01 | 0.05 | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: San Elijo Lagoon
REACH: Lower RS: 500

INPUT
Description: S. Coast Highway 101 Bridge
Distance from Upstream XS = 10
Deck/Roadway Width = 70
Weir Coefficient = 2.61
Upstream Deck/Roadway Coordinates
num= 13

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | .15 | 318.36 | 19.15 | .15 | 1068.36 | 19.15 | .15 |
| 1718.36 | 18.15 | .15 | 2938.36 | 15.15 | .15 | 3518.36 | 13.15 | .15 |
| 4018.36 | 13.15 | .15 | 4701.36 | 15.81 | .15 | 4711.36 | 15.81 | 1.15 |
| 4764.6 | 15.81 | 1.15 | 4764.6 | 15.81 | 13.15 | 4947 | 17.32 | 13.15 |
| 5188.36 | 19.92 | | | | | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 92

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | 300 | 11.15 | 305 | 12.15 | 421 | 12.15 | 427 | 11.15 |
| 440 | 10.15 | 451 | 9.15 | 470.71 | 8.33 | 475 | 8.15 | 578 | 8.15 |
| 584 | 8.15 | 647 | 8.15 | 692 | 8.15 | 744 | 8.15 | 775 | 8.15 |
| 779 | 8.15 | 815 | 8.15 | 825 | 8.15 | 879 | 8.15 | 890 | 8.15 |
| 955 | 8.15 | 975 | 8.15 | 985 | 8.15 | 1017 | 8.15 | 1045 | 8.15 |
| 1500 | 7.15 | 1945 | 7.15 | 1966 | 6.15 | 1970 | 6.15 | 1989 | 7.15 |
| 2467 | 7.15 | 2482 | 7.15 | 2497 | 6.15 | 2508 | 6.15 | 2574 | 7.15 |
| 2606 | 8.15 | 2650 | 9.15 | 2653 | 10.15 | 2656 | 11.15 | 2665 | 11.15 |
| 2682 | 10.15 | 2695 | 9.15 | 2719 | 8.15 | 2875 | 8.15 | 2909 | 9.15 |
| 2917 | 10.15 | 2921 | 11.15 | 2926 | 12.15 | 2942 | 13.15 | 2946 | 14.15 |
| 3010 | 14.15 | 3088 | 13.15 | 3098 | 13.15 | 3101 | 13.15 | 3183 | 14.15 |
| 3217 | 14.15 | 3607 | 13.15 | 3947 | 13.15 | 3975 | 12.15 | 3985 | 8.15 |
| 4012 | 7.15 | 4039 | 6.15 | 4054 | 5.15 | 4062 | 4.15 | 4069 | 4.15 |
| 4072 | 1.15 | 4169 | 1.15 | 4171 | 4.15 | 4182 | 4.15 | 4195 | 5.15 |
| 4245 | 7.15 | 4334 | 8.15 | 4364 | 8.15 | 4423 | 7.15 | 4484 | 7.15 |
| 4616 | 7.15 | 4662 | 7.15 | 4701 | 7.15 | 4722 | 6.15 | 4728 | 5.15 |
| 4732 | 4.15 | 4743 | 4.15 | 4790 | 3.15 | 4810 | 1.15 | 4915 | 1.15 |
| 4934 | 4.15 | 4937 | 4.15 | 4940 | 5.15 | 4947 | 6.15 | 4953 | 7.15 |
| 4958 | 13.15 | 5075 | 19.15 | | | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4069 | .035 |

Bank Sta: Left 779 Right 4953 Coeff Contr. .3 Expan. .5

Ineffective Flow num= 7

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2405 | 19 | T |
| 2405 | 2938 | 16 | T |
| 2938 | 3183 | 14.5 | T |
| 3183 | 3607 | 13.75 | T |
| 3607 | 4060 | 13.5 | T |
| 4060 | 4400 | 14 | T |
| 4400 | 4700 | 15.5 | T |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 3434.16 | 3586.35 | 22.17 | 3772.38 | 3896.39 | 22.07 |

Downstream Deck/Roadway Coordinates num= 10

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | .15 | 750 | 19.15 | .15 | 1400 | 18.15 | .15 |
| 2620 | 15.15 | .15 | 3200 | 13.15 | .15 | 3700 | 13.15 | .15 |
| 4427.11 | 15.81 | 1.15 | 4427.11 | 15.81 | 13.15 | 4642 | 17.32 | 13.15 |
| 4657 | 17.15 | 13.15 | | | | | | |

Downstream Bridge Cross Section Data

Station Elevation Data num= 88

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 17.15 | 297 | 14.15 | 514 | 12.15 | 520 | 11.15 | 599.6 | 11.15 |
| 1163 | 11.15 | 1184 | 11.15 | 1215 | 11.15 | 1226 | 11.15 | 1231 | 11.15 |
| 1350 | 10.15 | 1363 | 10.15 | 1376 | 10.15 | 1468 | 10.15 | 1479 | 10.15 |
| 1576 | 10.15 | 1620 | 10.15 | 1704 | 10.15 | 1819 | 10.15 | 1872 | 10.15 |
| 2230 | 10.15 | 2264 | 10.15 | 2464 | 11.15 | 2471 | 11.15 | 2484 | 11.15 |
| 2583 | 12.15 | 2591 | 12.15 | 2613 | 12.15 | 2645 | 12.15 | 2646 | 12.15 |
| 2647 | 12.15 | 2686 | 11.15 | 2696 | 11.15 | 2697 | 10.15 | 2719 | 10.15 |
| 2771 | 10.15 | 2783 | 10.15 | 2798 | 10.15 | 2828 | 10.15 | 2838 | 10.15 |
| 2863 | 11.15 | 2875 | 12.15 | 2891 | 12.15 | 2892 | 11.15 | 2912 | 10.15 |
| 3012 | 11.15 | 3014 | 12.15 | 3025 | 11.15 | 3112 | 12.15 | 3206 | 13.15 |
| 3262 | 13.15 | 3265 | 13.15 | 3275 | 13.15 | 3311 | 13.15 | 3461 | 12.15 |
| 3737 | 12.15 | 3745 | 12.15 | 3788 | 12.15 | 3812 | 12.15 | 4075 | 12.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4097 | 12.15 | 4210 | 12.15 | 4327 | 13.15 | 4347 | 13.15 | 4408 | 13.15 |
| 4409 | 13.15 | 4427.11 | 12.09 | 4443 | 11.15 | 4445 | 10.15 | 4446 | 9.15 |
| 4457 | 8.15 | 4458 | 7.15 | 4459 | 6.15 | 4460 | 5.15 | 4515 | 4.15 |
| 4516 | 1.15 | 4621 | 1.15 | 4622 | 4.15 | 4624 | 4.15 | 4626 | 5.15 |
| 4629 | 6.15 | 4631 | 6.82 | 4632 | 7.15 | 4634 | 8.15 | 4637 | 9.15 |
| 4640 | 10.15 | 4642 | 11.15 | 4657 | 17.15 | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4457 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
599.6 4632 .3 .5

Ineffective Flow num= 0

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 4821.2 Downstream= 4463.8
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Pier Data
Pier Station Upstream= 4866.81 Downstream= 4607.2
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Pier Data
Pier Station Upstream= 4912.4 Downstream= 4535.5
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Pier Data
Pier Station Upstream= 4952.5 Downstream= 4500
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Pier Data

Pier Station Upstream= 4953.7 Downstream= 4571.33

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -27.85 | 3 | 13.15 |

| Downstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -27.85 | 3 | 13.15 |

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 16.96 | Element | Inside BR US |
| Inside BR DS W.S. US. (ft) | 16.83 | E.G. Elev (ft) | 16.90 |
| 15.36 Q Total (cfs) | 23255.00 | W.S. Elev (ft) | 16.63 |
| 11.46 Q Bridge (cfs) | 12675.34 | Crit W.S. (ft) | 10.27 |
| 11.46 Q Weir (cfs) | | Max Chl Dpth (ft) | 15.48 |
| 10.31 Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.22 |
| 15.77 Weir Sta Rgt (ft) | | Flow Area (sq ft) | 5504.94 |
| 1474.41 Weir Submerg | | Froude # Chl | 0.20 |
| 0.98 Weir Max Depth (ft) | | Specif Force (cu ft) | 24706.63 |
| 18055.11 Min El Weir Flow (ft) | 13.51 | Hydr Depth (ft) | 2.52 |
| 7.76 Min El Prs (ft) | 13.15 | W.P. Total (ft) | 2632.87 |
| 286.38 Delta EG (ft) | 2.32 | Conv. Total (cfs) | 382144.6 |
| 192081.8 Delta WS (ft) | 6.65 | Top Width (ft) | 2249.29 |
| 190.00 BR Open Area (sq ft) | 1813.92 | Frctn Loss (ft) | 0.46 |
| 0.32 BR Open Vel (ft/s) | 8.60 | C & E Loss (ft) | 1.09 |
| 1.60 Coef of Q | | Shear Total (lb/sq ft) | 0.48 |
| 4.71 Br Sel Method | Energy only | Power Total (lb/ft s) | 2.04 |
| 74.31 | | | |

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 448

INPUT
Description: Downstream of SCH
Station Elevation Data num= 88

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 17.15 | 297 | 14.15 | 514 | 12.15 | 520 | 11.15 | 599.6 | 11.15 |
| 1163 | 11.15 | 1184 | 11.15 | 1215 | 11.15 | 1226 | 11.15 | 1231 | 11.15 |
| 1350 | 10.15 | 1363 | 10.15 | 1376 | 10.15 | 1468 | 10.15 | 1479 | 10.15 |
| 1576 | 10.15 | 1620 | 10.15 | 1704 | 10.15 | 1819 | 10.15 | 1872 | 10.15 |
| 2230 | 10.15 | 2264 | 10.15 | 2464 | 11.15 | 2471 | 11.15 | 2484 | 11.15 |
| 2583 | 12.15 | 2591 | 12.15 | 2613 | 12.15 | 2645 | 12.15 | 2646 | 12.15 |
| 2647 | 12.15 | 2686 | 11.15 | 2696 | 11.15 | 2697 | 10.15 | 2719 | 10.15 |
| 2771 | 10.15 | 2783 | 10.15 | 2798 | 10.15 | 2828 | 10.15 | 2838 | 10.15 |
| 2863 | 11.15 | 2875 | 12.15 | 2891 | 12.15 | 2892 | 11.15 | 2912 | 10.15 |
| 3012 | 11.15 | 3014 | 12.15 | 3025 | 11.15 | 3112 | 12.15 | 3206 | 13.15 |
| 3262 | 13.15 | 3265 | 13.15 | 3275 | 13.15 | 3311 | 13.15 | 3461 | 12.15 |
| 3737 | 12.15 | 3745 | 12.15 | 3788 | 12.15 | 3812 | 12.15 | 4075 | 12.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4097 | 12.15 | 4210 | 12.15 | 4327 | 13.15 | 4347 | 13.15 | 4408 | 13.15 |
| 4409 | 13.15 | 4427.11 | 12.09 | 4443 | 11.15 | 4445 | 10.15 | 4446 | 9.15 |
| 4457 | 8.15 | 4458 | 7.15 | 4459 | 6.15 | 4460 | 5.15 | 4515 | 4.15 |
| 4516 | 1.15 | 4621 | 1.15 | 4622 | 4.15 | 4624 | 4.15 | 4626 | 5.15 |
| 4629 | 6.15 | 4631 | 6.82 | 4632 | 7.15 | 4634 | 8.15 | 4637 | 9.15 |
| 4640 | 10.15 | 4642 | 11.15 | 4657 | 17.15 | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4457 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 599.6 | 4632 | 578.3 | 333.4 325 | .3 | .5 |

Ineffective Flow num= 0

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 14.64 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 4.46 | Wt. n-Val. | | 0.035 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.17 | Reach Len. (ft) | 578.30 | 333.40 |
| 325.00 | | | | |
| Crit W.S. (ft) | 11.41 | Flow Area (sq ft) | | 1366.27 |
| 11.19 | | | | |
| E.G. Slope (ft/ft) | 0.011978 | Area (sq ft) | | 1366.27 |
| 11.19 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23193.11 |
| 61.89 | | | | |
| Top Width (ft) | 1261.01 | Top Width (ft) | | 1252.96 |
| 8.05 | | | | |
| Vel Total (ft/s) | 16.88 | Avg. Vel. (ft/s) | | 16.98 |
| 5.53 | | | | |
| Max Chl Dpth (ft) | 9.02 | Hydr. Depth (ft) | | 1.09 |
| 1.39 | | | | |
| Conv. Total (cfs) | 212480.2 | Conv. (cfs) | | 211914.7 |
| 565.5 | | | | |
| Length Wtd. (ft) | 351.49 | Wetted Per. (ft) | | 1259.57 |
| 8.61 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.81 |
| 0.97 | | | | |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 13.77 |
| 5.37 | | | | |
| Frctn Loss (ft) | 0.55 | Cum Volume (acre-ft) | 42.25 | 150.41 |
| 1.82 | | | | |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 10.81 | 29.52 |
| 1.38 | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Note: The energy method has computed a class B profile.

Profile #PF 1

| | Pos | Left Sta | Right Sta | Flow | Area | W.P. |
|---|---|---|---|---|---|---|
| Percent | Hydr | Velocity | | | | |

| Conv | Depth(ft) | (ft/s) | (ft) | (ft) | (cfs) | (sq ft) | (ft) |
|---|---|---|---|---|---|---|---|
| 1 | Chan | | 1103.65 | 1607.70 | 2.01 | 6.08 | 260.49 |
| 0.01 | 0.02 | 0.33 | | | | | |
| 2 | Chan | | 1607.70 | 2111.75 | 3.93 | 11.83 | 504.05 |
| 0.02 | 0.02 | 0.33 | | | | | |
| 3 | Chan | | 2111.75 | 2615.80 | 1.19 | 3.63 | 156.94 |
| 0.01 | 0.02 | 0.33 | | | | | |
| 4 | Chan | | 2615.80 | 3119.85 | 1.10 | 3.35 | 144.44 |
| 0.00 | 0.02 | 0.33 | | | | | |
| 5 | Chan | | 3119.85 | 3623.90 | | | |
| 6 | Chan | | 3623.90 | 4127.95 | | | |
| 7 | Chan | | 4127.95 | 4632.00 | 23184.87 | 1341.38 | 193.65 |
| 99.70 | 7.17 | 17.28 | | | | | |
| 8 | ROB | | 4632.00 | 4635.13 | 46.22 | 7.11 | 3.42 |
| 0.20 | 2.28 | 6.50 | | | | | |
| 9 | ROB | | 4635.13 | 4638.25 | 14.71 | 3.52 | 3.29 |
| 0.06 | 1.13 | 4.17 | | | | | |
| 10 | ROB | | 4638.25 | 4641.38 | 0.97 | 0.55 | 1.90 |
| 0.00 | 0.31 | 1.75 | | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Note: The energy method has computed a class B profile.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 114

INPUT
Description:
Station Elevation Data num= 51

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 12.15 | 63 | 11.15 | 126 | 10.15 | 189 | 9.15 | 252 | 8.15 |
| 315 | 7.15 | 582 | 6.15 | 673 | 5.15 | 802 | 4.47 | 862 | 4.15 |
| 1299 | 3.28 | 1358.86 | 3.15 | 1369.74 | 3.15 | 1389.7 | 3.15 | 1523.94 | 3.15 |
| 1576.55 | 3.39 | 1745.25 | 4.15 | 2136.18 | 5.15 | 2187.87 | 5.15 | 2201.48 | 5.15 |
| 2257.71 | 5.15 | 2267.69 | 5.15 | 2305.79 | 6.15 | 2323.92 | 6.15 | 2369.28 | 6.15 |
| 2456.35 | 7.15 | 2492.63 | 7.15 | 2515.31 | 7.15 | 2551.59 | 7.15 | 2560.66 | 7.15 |
| 2589.69 | 6.15 | 2659.53 | 5.15 | 2720.29 | 4.15 | 2832.76 | 3.15 | 2973.35 | 2.15 |
| 4187.85 | 2.15 | 4270.39 | 2.15 | 4475.37 | 3.15 | 4603.26 | 4.15 | 4696.69 | 5.11 |
| 4700.31 | 5.15 | 4798.27 | 6.15 | 4804.62 | 6.2 | 4920.72 | 7.15 | 4934.32 | 7.15 |
| 4962.44 | 7.15 | 4968.79 | 7.15 | 4982.39 | 7.15 | 5163.79 | 9.85 | 5164 | 9.85 |
| 5484 | 12.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1299 | .035 | 4920.72 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1299 | 4920.72 | 270.4 114.1 | 276 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.16 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.035 |
| 0.035 | | | | |
| W.S. Elev (ft) | 9.15 | Reach Len. (ft) | 270.40 | 114.10 |
| 276.00 | | | | |
| Crit W.S. (ft) | 4.09 | Flow Area (sq ft) | 4336.81 | 19920.11 |
| 257.61 | | | | |
| E.G. Slope (ft/ft) | 0.000056 | Area (sq ft) | 4336.81 | 19920.11 |
| 257.61 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 3420.77 | 19735.95 |
| 98.28 | | | | |
| Top Width (ft) | 4927.70 | Top Width (ft) | 1109.97 | 3621.72 |
| 196.01 | | | | |
| Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | 0.79 | 0.99 |
| 0.38 | | | | |
| Max Chl Dpth (ft) | 7.00 | Hydr. Depth (ft) | 3.91 | 5.50 |
| 1.31 | | | | |
| Conv. Total (cfs) | 3104953.0 | Conv. (cfs) | 456733.7 | 2635098.0 |
| 13122.2 | | | | |
| Length Wtd. (ft) | 125.94 | Wetted Per. (ft) | 1110.00 | 3621.80 |
| 196.02 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.00 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.01 | 0.02 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 13.46 | 68.95 |
| 0.82 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.45 | 10.87 |
| 0.62 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

Profile #PF 1

| Percent | Pos | Left Sta | Right Sta | Flow | Area | W.P. |
|---|---|---|---|---|---|---|
| | Hydr | Velocity (ft) | (ft) | (cfs) | (sq ft) | (ft) |
| Conv | Depth(ft) | (ft/s) | | | | |
| 1 | LOB | 162.38 | 324.75 | 44.41 | 145.61 | 135.73 |
| 0.19 | 1.07 | 0.30 | | | | |
| 2 | LOB | 324.75 | 487.13 | 194.92 | 379.97 | 162.38 |
| 0.84 | 2.34 | 0.51 | | | | |
| 3 | LOB | 487.13 | 649.50 | 303.10 | 495.22 | 162.38 |
| 1.30 | 3.05 | 0.61 | | | | |
| 4 | LOB | 649.50 | 811.88 | 536.05 | 697.22 | 162.38 |
| 2.31 | 4.29 | 0.77 | | | | |
| 5 | LOB | 811.88 | 974.25 | 699.08 | 817.64 | 162.38 |
| 3.01 | 5.04 | 0.86 | | | | |
| 6 | LOB | 974.25 | 1136.63 | 781.72 | 874.33 | 162.38 |
| 3.36 | 5.38 | 0.89 | | | | |
| 7 | LOB | 1136.63 | 1299.00 | 861.49 | 926.82 | 162.38 |
| 3.70 | 5.71 | 0.93 | | | | |
| 8 | Chan | 1299.00 | 1751.72 | 2543.03 | 2594.75 | 452.72 |
| 10.94 | 5.73 | 0.98 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | Chan | 1751.72 | 2204.43 | 1647.40 | 1999.69 | 452.72 |
| 7.08 | 4.42 | 0.82 | | | | |
| 10 | Chan | 2204.43 | 2657.15 | 814.45 | 1310.45 | 452.76 |
| 3.50 | 2.89 | 0.62 | | | | |
| 11 | Chan | 2657.15 | 3109.86 | 2836.81 | 2770.69 | 452.73 |
| 12.20 | 6.12 | 1.02 | | | | |
| 12 | Chan | 3109.86 | 3562.58 | 3548.26 | 3168.78 | 452.72 |
| 15.26 | 7.00 | 1.12 | | | | |
| 13 | Chan | 3562.58 | 4015.29 | 3548.26 | 3168.78 | 452.71 |
| 15.26 | 7.00 | 1.12 | | | | |
| 14 | Chan | 4015.29 | 4468.01 | 3372.26 | 3073.53 | 452.72 |
| 14.50 | 6.79 | 1.10 | | | | |
| 15 | Chan | 4468.01 | 4920.72 | 1425.49 | 1833.45 | 452.73 |
| 6.13 | 4.05 | 0.78 | | | | |
| 16 | ROB | 4920.72 | 4991.13 | 62.34 | 140.22 | 70.41 |
| 0.27 | 1.99 | 0.44 | | | | |
| 17 | ROB | 4991.13 | 5061.54 | 32.42 | 94.73 | 70.42 |
| 0.14 | 1.35 | 0.34 | | | | |
| 18 | ROB | 5061.54 | 5131.95 | 3.52 | 22.67 | 55.19 |
| 0.02 | 0.41 | 0.16 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1

INPUT
Description: Furthest Downstream Cross Section
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 12 | 1 | 2.15 | 416 | 2.15 | 439 | 2.15 | 604 | 2.15 |
| 883 | 2.15 | 1240 | 2.15 | 2131 | 2.15 | 2208 | 2.15 | 4411 | 2.15 |
| 4675 | 2.15 | 4676 | 12 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 0 | .035 | 4676 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 0 | 4676 | 0 | 0 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.16 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 |
| W.S. Elev (ft) | 9.15 | Reach Len. (ft) | | |
| Crit W.S. (ft) | 3.07 | Flow Area (sq ft) | | 32722.97 |
| E.G. Slope (ft/ft) | 0.000021 | Area (sq ft) | | 32722.97 |

| | | | |
|---|---|---|---|
| Q Total (cfs) | 23255.00 | Flow (cfs) | 23255.00 |
| Top Width (ft) | 4675.42 | Top Width (ft) | 4675.42 |
| Vel Total (ft/s) | 0.71 | Avg. Vel. (ft/s) | 0.71 |
| Max Chl Dpth (ft) | 7.00 | Hydr. Depth (ft) | 7.00 |
| Conv. Total (cfs) | 5074022.0 | Conv. (cfs) | 5074022.0 |
| Length Wtd. (ft) | | Wetted Per. (ft) | 4688.07 |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.01 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | |
| C & E Loss (ft) | | Cum SA (acres) | |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | Chan | 0.00 | 584.50 | 2887.97 | 4086.99 | 590.54 |
| 12.42 | 7.00 | 0.71 | | | | |
| 2 | Chan | 584.50 | 1169.00 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 3 | Chan | 1169.00 | 1753.50 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 4 | Chan | 1753.50 | 2338.00 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 5 | Chan | 2338.00 | 2922.50 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 6 | Chan | 2922.50 | 3507.00 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 7 | Chan | 3507.00 | 4091.50 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 8 | Chan | 4091.50 | 4676.00 | 2887.98 | 4086.99 | 590.53 |
| 12.42 | 7.00 | 0.71 | | | | |

SUMMARY OF MANNING'S N VALUES

River:San Elijo Lagoon

| Reach | River Sta. | n1 | n2 | n3 | n4 | n5 |
|---|---|---|---|---|---|---|
| Lower | 10436 | .04 | .04 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Lower | 9816 | .04 | .035 | .04 | | |
| Lower | 9213 | .04 | .035 | .04 | | |
| Lower | 8949 | .04 | .035 | .04 | | |
| Lower | 8793 | .04 | .035 | .013 | .04 | |
| Lower | 8618 | .04 | .035 | .04 | | |
| Lower | 8569 | .04 | .035 | .013 | .04 | |
| Lower | 8167 | .04 | .035 | .04 | | |
| Lower | 7761 | .04 | .035 | .04 | | |
| Lower | 7461 | .04 | .035 | .04 | | |
| Lower | 7100 | Bridge | | | | |
| Lower | 6881 | .04 | .035 | .04 | | |
| Lower | 6682 | .04 | .035 | .04 | .013 | .04 |
| Lower | 6416 | .04 | .035 | .04 | .013 | .04 |
| Lower | 5921 | .04 | .035 | .013 | .04 | |
| Lower | 5355 | .04 | .035 | .04 | .013 | .04 |
| Lower | 4621 | .04 | .035 | .04 | .05 | |
| Lower | 3735 | .04 | .035 | .04 | .05 | |
| Lower | 2499 | .04 | .035 | .04 | | |
| Lower | 2020 | .04 | .035 | .04 | | |
| Lower | 1923 | .04 | .035 | | | |
| Lower | 1900 | Bridge | | | | |
| Lower | 1872 | .04 | .04 | .035 | | |
| Lower | 1276 | .04 | .035 | | | |
| Lower | 569 | .04 | .035 | | | |
| Lower | 500 | Bridge | | | | |
| Lower | 448 | .04 | .035 | | | |
| Lower | 114 | .035 | .035 | .035 | | |
| Lower | 1 | .035 | .035 | .035 | | |

SUMMARY OF REACH LENGTHS

River: San Elijo Lagoon

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Lower | 10436 | 950.3 | 621.4 | 545.2 |
| Lower | 9816 | 477.18 | 604.7 | 728.2 |
| Lower | 9213 | 236.4 | 264.5 | 398.2 |
| Lower | 8949 | 130.434 | 155.9 | 373.34 |
| Lower | 8793 | 164.68 | 175.6 | 204.18 |
| Lower | 8618 | 50 | 48.8 | 58.102 |
| Lower | 8569 | 167 | 403 | 694.2 |
| Lower | 8167 | 164.3 | 406.6 | 536.4 |
| Lower | 7761 | 113.2 | 300.3 | 337 |
| Lower | 7461 | 578.1 | 581.2 | 546.8 |
| Lower | 7100 | Bridge | | |
| Lower | 6881 | 419.4 | 199.3 | 204.6 |
| Lower | 6682 | 389.6 | 265.9 | 226 |
| Lower | 6416 | 587 | 495.5 | 490.8 |
| Lower | 5921 | 813.7 | 567.6 | 810.3 |
| Lower | 5355 | 666.9 | 735.2 | 962.5 |
| Lower | 4621 | 427 | 888 | 1159.6 |
| Lower | 3735 | 598 | 1236.9 | 488.7 |
| Lower | 2499 | 897 | 479.6 | 391.4 |
| Lower | 2020 | 257 | 97.3 | 97 |
| Lower | 1923 | 125 | 51.9 | 36.1 |
| Lower | 1900 | Bridge | | |
| Lower | 1872 | 267 | 596.2 | 1122.6 |
| Lower | 1276 | 797.8 | 706.8 | 209 |
| Lower | 569 | 543.2 | 121.7 | 125 |
| Lower | 500 | Bridge | | |
| Lower | 448 | 578.3 | 333.4 | 325 |
| Lower | 114 | 270.4 | 114.1 | 276 |
| Lower | 1 | 0 | 0 | 0 |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: San Elijo Lagoon

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| Lower | 10436 | .1 | .3 |
| Lower | 9816 | .1 | .3 |
| Lower | 9213 | .1 | .3 |
| Lower | 8949 | .1 | .3 |
| Lower | 8793 | .1 | .3 |
| Lower | 8618 | .1 | .3 |
| Lower | 8569 | .1 | .3 |
| Lower | 8167 | .1 | .3 |
| Lower | 7761 | .1 | .3 |
| Lower | 7461 | .3 | .5 |
| Lower | 7100 | Bridge | |
| Lower | 6881 | .3 | .5 |
| Lower | 6682 | .1 | .3 |
| Lower | 6416 | .1 | .3 |
| Lower | 5921 | .1 | .3 |
| Lower | 5355 | .1 | .3 |
| Lower | 4621 | .1 | .3 |
| Lower | 3735 | .1 | .3 |
| Lower | 2499 | .1 | .3 |
| Lower | 2020 | .1 | .3 |
| Lower | 1923 | .3 | .5 |
| Lower | 1900 | Bridge | |
| Lower | 1872 | .3 | .5 |

| | | | | |
|---|---|---|---|---|
| Lower | 1276 | | .1 | .3 |
| Lower | 569 | | .3 | .5 |
| Lower | 500 | Bridge | | |
| Lower | 448 | | .3 | .5 |
| Lower | 114 | | .1 | .3 |
| Lower | 1 | | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | |
| | | | (cfs) | (ft) | (ft) | (ft) |
| (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | |
| Lower | 10436 | PF 1 | 23255.00 | 6.15 | 19.74 | 9.00 |
| 19.75 | 0.000020 | 0.90 | 27209.78 | 2507.96 | 0.04 | |
| Lower | 9816 | PF 1 | 23255.00 | 3.15 | 19.74 | |
| 19.75 | 0.000007 | 0.62 | 38534.08 | 3132.25 | 0.03 | |
| Lower | 9213 | PF 1 | 23255.00 | 3.15 | 19.73 | |
| 19.74 | 0.000009 | 0.72 | 32776.79 | 2724.41 | 0.03 | |
| Lower | 8949 | PF 1 | 23255.00 | 3.15 | 19.73 | |
| 19.74 | 0.000011 | 0.81 | 29774.77 | 2475.66 | 0.04 | |
| Lower | 8793 | PF 1 | 23255.00 | 3.15 | 19.72 | |
| 19.74 | 0.000015 | 0.93 | 24530.39 | 2155.29 | 0.04 | |
| Lower | 8618 | PF 1 | 23255.00 | 9.65 | 19.70 | |
| 19.73 | 0.000055 | 1.46 | 16277.41 | 2007.88 | 0.08 | |
| Lower | 8569 | PF 1 | 23255.00 | 4.15 | 19.71 | |
| 19.72 | 0.000020 | 1.08 | 21565.70 | 2047.46 | 0.05 | |
| Lower | 8167 | PF 1 | 23255.00 | 4.15 | 19.67 | |
| 19.71 | 0.000043 | 1.62 | 15353.04 | 1766.95 | 0.08 | |
| Lower | 7761 | PF 1 | 23255.00 | 2.15 | 19.61 | |
| 19.68 | 0.000083 | 2.30 | 11347.86 | 1722.20 | 0.11 | |
| Lower | 7461 | PF 1 | 23255.00 | 2.15 | 19.47 | 9.75 |
| 19.64 | 0.000189 | 3.37 | 7670.51 | 1732.99 | 0.16 | |
| Lower | 7100 | | Bridge | | | |
| Lower | 6881 | PF 1 | 23255.00 | 2.15 | 17.42 | 9.15 |
| 17.68 | 0.000313 | 4.06 | 5931.32 | 1871.20 | 0.20 | |
| Lower | 6682 | PF 1 | 23255.00 | 2.15 | 17.49 | 6.93 |
| 17.55 | 0.000074 | 2.04 | 11468.62 | 1530.95 | 0.10 | |
| Lower | 6416 | PF 1 | 23255.00 | 1.15 | 17.50 | |
| 17.53 | 0.000037 | 1.42 | 17550.50 | 1664.74 | 0.07 | |
| Lower | 5921 | PF 1 | 23255.00 | 1.15 | 17.49 | |
| 17.51 | 0.000027 | 1.23 | 19994.61 | 1762.22 | 0.06 | |
| Lower | 5355 | PF 1 | 23255.00 | 1.15 | 17.49 | |
| 17.50 | 0.000012 | 0.80 | 30115.85 | 2530.94 | 0.04 | |
| Lower | 4621 | PF 1 | 23255.00 | 0.15 | 17.49 | |
| 17.49 | 0.000005 | 0.56 | 43109.66 | 3415.51 | 0.03 | |
| Lower | 3735 | PF 1 | 23255.00 | 1.15 | 17.49 | |
| 17.49 | 0.000003 | 0.41 | 56811.49 | 4089.17 | 0.02 | |
| Lower | 2499 | PF 1 | 23255.00 | 1.15 | 17.48 | |
| 17.48 | 0.000007 | 0.65 | 35947.57 | 3642.92 | 0.03 | |
| Lower | 2020 | PF 1 | 23255.00 | 1.15 | 17.36 | |
| 17.47 | 0.000095 | 2.55 | 9183.42 | 4170.24 | 0.11 | |
| Lower | 1923 | PF 1 | 23255.00 | 1.15 | 17.28 | 8.04 |
| 17.44 | 0.000402 | 3.28 | 7117.03 | 4018.76 | 0.28 | |
| Lower | 1900 | | Bridge | | | |
| Lower | 1872 | PF 1 | 23255.00 | 1.15 | 16.99 | |
| 17.14 | 0.000384 | 3.09 | 7564.93 | 4087.33 | 0.27 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Lower | 1276 | PF 1 | 23255.00 | 1.15 | 17.00 | 4.04 |
| 17.03 | 0.000032 | 1.38 | 16933.58 | 5311.94 | 0.07 | |
| Lower | 569 | PF 1 | 23255.00 | 1.15 | 16.83 | 9.32 |
| 16.96 | 0.000791 | 2.95 | 7930.51 | 4666.40 | 0.28 | |
| Lower | 500 | | Bridge | | | |
| Lower | 448 | PF 1 | 23255.00 | 1.15 | 10.17 | 11.41 |
| 14.64 | 0.011978 | 16.98 | 1377.46 | 1261.01 | 2.86 | |
| Lower | 114 | PF 1 | 23255.00 | 2.15 | 9.15 | 4.09 |
| 9.16 | 0.000056 | 0.99 | 24514.53 | 4927.70 | 0.07 | |
| Lower | 1 | PF 1 | 23255.00 | 2.15 | 9.15 | 3.07 |
| 9.16 | 0.000021 | 0.71 | 32722.97 | 4675.42 | 0.05 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : SE_Exist

River: San Elijo Lagoon Reach: Lower RS: 10436 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 8793 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 8618 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 8569 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 7761 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 7461 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 7100 Profile: PF 1
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This
is not physically possible, the momentum answer has been disregarded.
River: San Elijo Lagoon Reach: Lower RS: 7100 Profile: PF 1 Downstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Elijo Lagoon Reach: Lower RS: 6881 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical

depth with the lowest, valid, energy was used.
River: San Elijo Lagoon Reach: Lower RS: 6682 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Elijo Lagoon Reach: Lower RS: 5921 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: San Elijo Lagoon Reach: Lower RS: 5355 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 3735 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 2499 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 2020 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1923 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1900 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1872 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1276 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Elijo Lagoon Reach: Lower RS: 569 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 500 Profile: PF 1
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum
answer has been disregarded.
River: San Elijo Lagoon Reach: Lower RS: 500 Profile: PF 1 Upstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Elijo Lagoon Reach: Lower RS: 500 Profile: PF 1 Downstream
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Elijo Lagoon Reach: Lower RS: 448 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: The energy method has computed a class B profile.
River: San Elijo Lagoon Reach: Lower RS: 114 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

**PROSPOSED**

HEC-RAS Plan: SE_Prop River: San Elijo Lagoon Reach: Lower Profile: PF 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Lower | 10436 | PF 1 | 23255.00 | 6.15 | 18.57 | 9.00 | 18.58 | 0.000029 | 1.00 | 24286.73 | 2457.12 | 0.05 |
| Lower | 9816 | PF 1 | 23255.00 | 3.15 | 18.56 | | 18.57 | 0.000009 | 0.69 | 34866.38 | 3089.81 | 0.03 |
| Lower | 9213 | PF 1 | 23255.00 | 3.15 | 18.55 | | 18.56 | 0.000013 | 0.79 | 29735.48 | 2697.25 | 0.04 |
| Lower | 8949 | PF 1 | 23255.00 | 3.15 | 18.55 | | 18.56 | 0.000015 | 0.89 | 27096.22 | 2454.49 | 0.04 |
| Lower | 8793 | PF 1 | 23255.00 | 3.15 | 18.54 | | 18.55 | 0.000021 | 1.03 | 22282.89 | 2117.39 | 0.05 |
| Lower | 8618 | PF 1 | 23255.00 | 9.65 | 18.50 | | 18.55 | 0.000084 | 1.67 | 14277.52 | 1972.79 | 0.10 |
| Lower | 8569 | PF 1 | 23255.00 | 4.15 | 18.52 | | 18.54 | 0.000028 | 1.20 | 19563.05 | 2005.32 | 0.06 |
| Lower | 8167 | PF 1 | 23255.00 | 4.15 | 18.47 | | 18.52 | 0.000060 | 1.79 | 13776.92 | 1719.68 | 0.09 |
| Lower | 7761 | PF 1 | 23255.00 | 2.15 | 18.38 | | 18.48 | 0.000116 | 2.57 | 10063.92 | 1679.28 | 0.12 |
| Lower | 7461 | PF 1 | 23255.00 | 2.15 | 18.25 | 8.19 | 18.43 | 0.000184 | 3.38 | 7405.81 | 1684.35 | 0.16 |
| Lower | 7100 | | Bridge | | | | | | | | | |
| Lower | 6881 | PF 1 | 23255.00 | 2.15 | 17.44 | 8.02 | 17.65 | 0.000235 | 3.73 | 6451.93 | 1871.74 | 0.18 |
| Lower | 6682 | PF 1 | 23255.00 | 2.15 | 17.49 | 6.93 | 17.55 | 0.000074 | 2.04 | 11468.62 | 1530.95 | 0.10 |
| Lower | 6416 | PF 1 | 23255.00 | 1.15 | 17.50 | | 17.53 | 0.000037 | 1.42 | 17550.50 | 1664.74 | 0.07 |
| Lower | 5921 | PF 1 | 23255.00 | 1.15 | 17.49 | | 17.51 | 0.000027 | 1.23 | 19994.61 | 1762.22 | 0.06 |
| Lower | 5355 | PF 1 | 23255.00 | 1.15 | 17.49 | | 17.50 | 0.000012 | 0.80 | 30116.85 | 2530.94 | 0.04 |
| Lower | 4621 | PF 1 | 23255.00 | 0.15 | 17.49 | | 17.49 | 0.000005 | 0.56 | 43109.66 | 3415.51 | 0.03 |
| Lower | 3735 | PF 1 | 23255.00 | 1.15 | 17.49 | | 17.49 | 0.000003 | 0.41 | 56811.49 | 4089.17 | 0.02 |
| Lower | 2499 | PF 1 | 23255.00 | 1.15 | 17.48 | | 17.48 | 0.000007 | 0.65 | 35947.57 | 3642.92 | 0.03 |
| Lower | 2020 | PF 1 | 23255.00 | 1.15 | 17.36 | | 17.47 | 0.000095 | 2.55 | 9183.42 | 4170.24 | 0.11 |
| Lower | 1923 | PF 1 | 23255.00 | 1.15 | 17.28 | 8.04 | 17.44 | 0.000402 | 3.28 | 7117.03 | 4018.76 | 0.28 |
| Lower | 1900 | | Bridge | | | | | | | | | |
| Lower | 1872 | PF 1 | 23255.00 | 1.15 | 16.99 | | 17.14 | 0.000384 | 3.09 | 7564.93 | 4087.33 | 0.27 |
| Lower | 1276 | PF 1 | 23255.00 | 1.15 | 17.00 | 4.04 | 17.03 | 0.000032 | 1.38 | 16933.58 | 5311.94 | 0.07 |
| Lower | 569 | PF 1 | 23255.00 | 1.15 | 16.83 | 9.32 | 16.96 | 0.000791 | 2.95 | 7930.51 | 4666.40 | 0.28 |
| Lower | 500 | | Bridge | | | | | | | | | |
| Lower | 448 | PF 1 | 23255.00 | 1.15 | 10.17 | 11.41 | 14.64 | 0.011978 | 16.98 | 1377.46 | 1261.01 | 2.86 |
| Lower | 114 | PF 1 | 23255.00 | 2.15 | 9.15 | 4.09 | 9.16 | 0.000056 | 0.99 | 24514.53 | 4927.70 | 0.07 |
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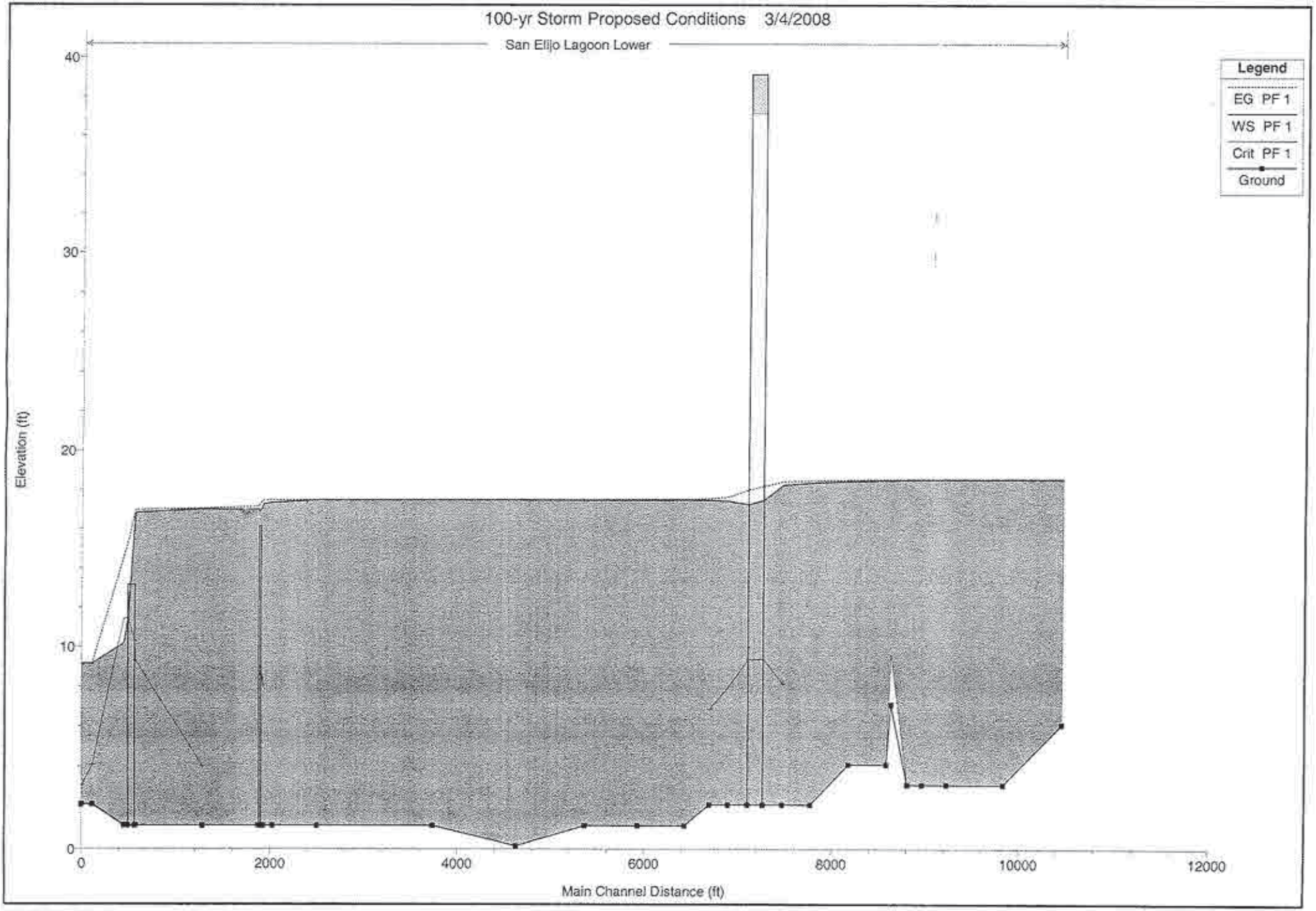
100-yr Storm Proposed Conditions 3/4/2008
San Elijo Lagoon Lower
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
Main Channel Distance (ft)
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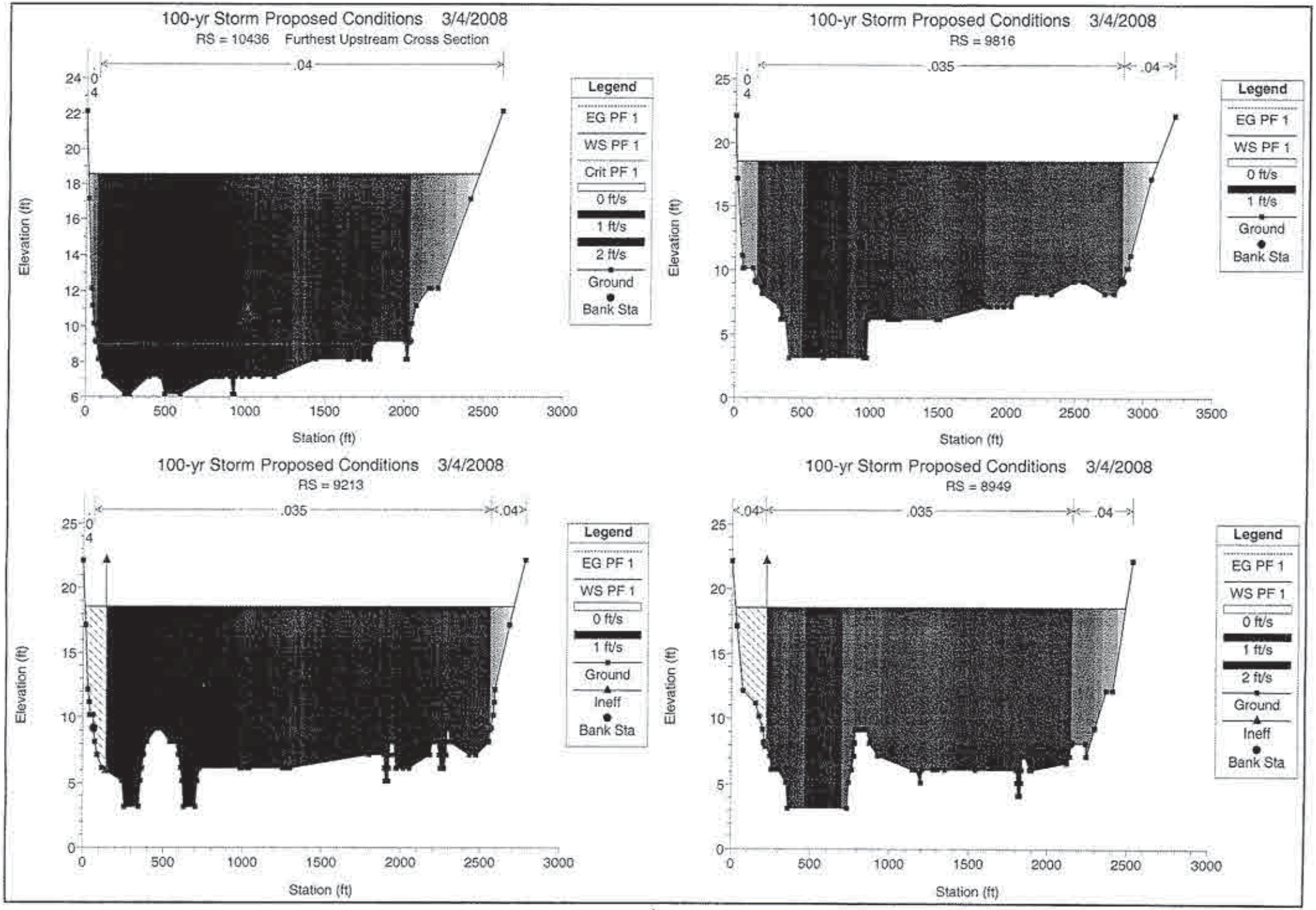
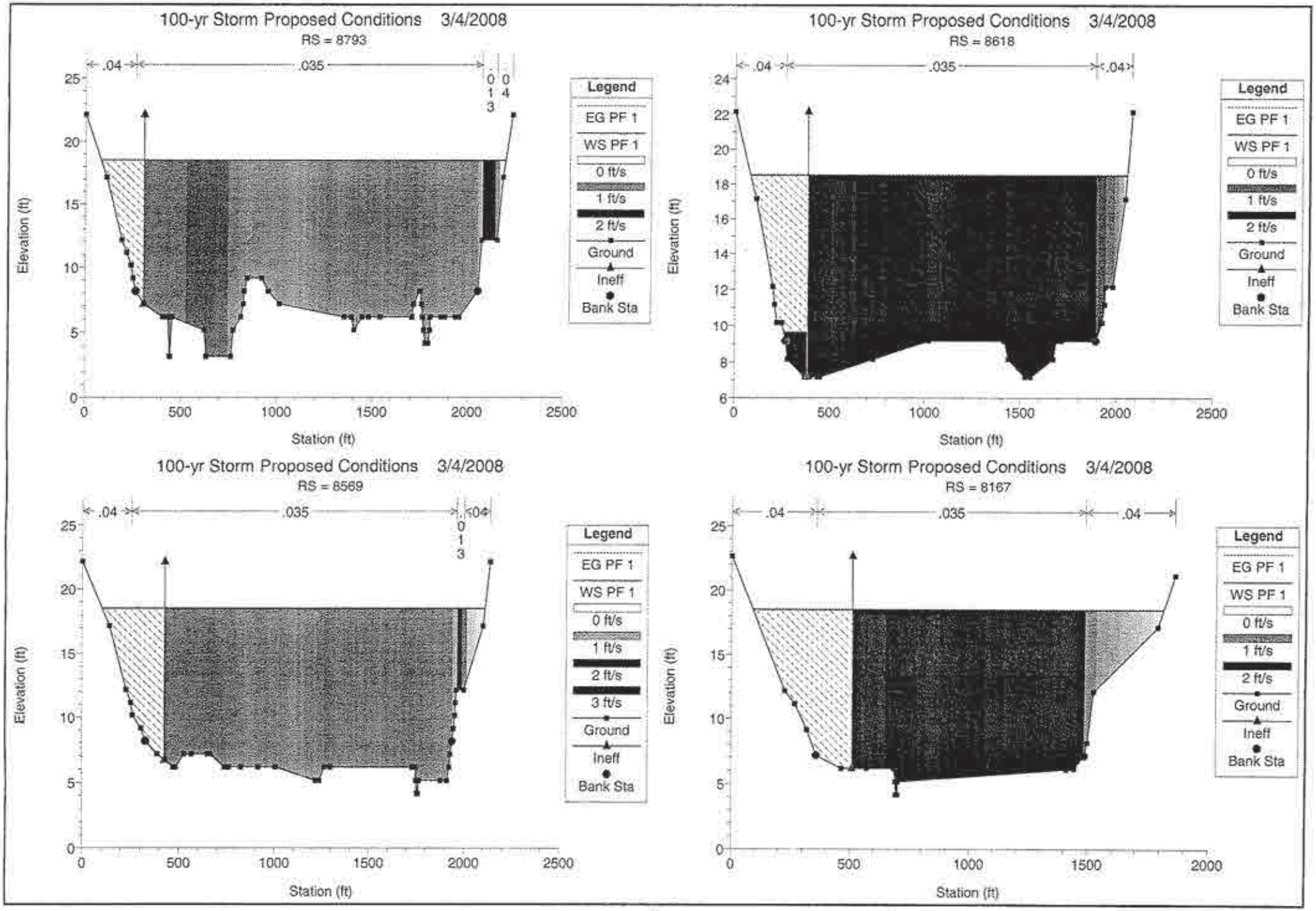
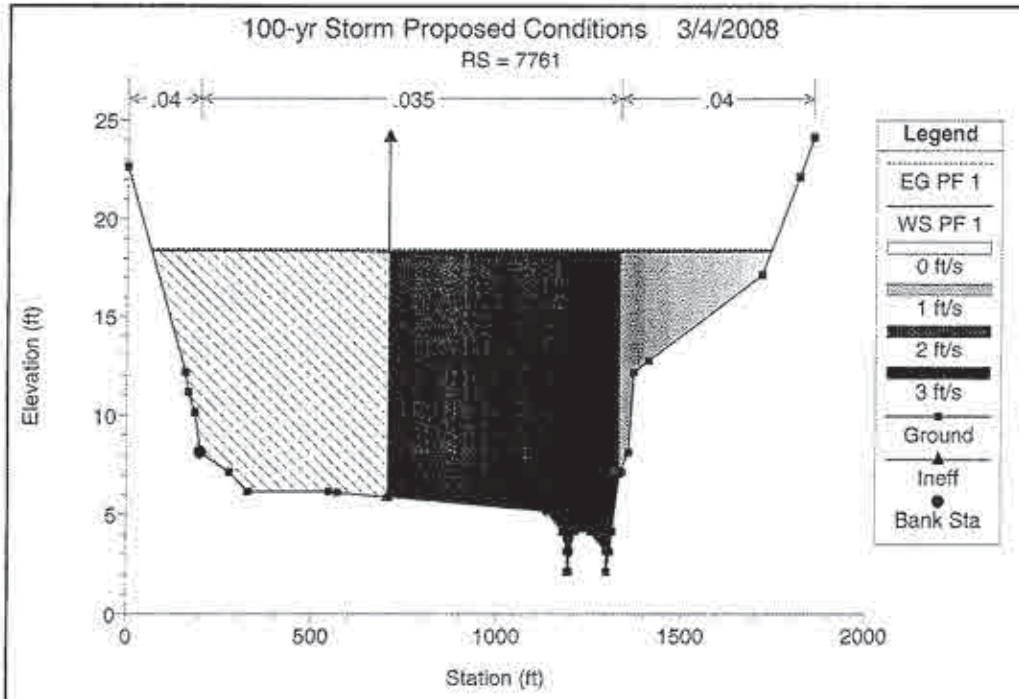
10
20
30
40
0
2000
4000
6000
8000
10000
12000


100-yr Storm Proposed Conditions 3/4/2008
RS = 10436 Furthest Upstream Cross Section
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
100-yr Storm Proposed Conditions 3/4/2008
RS = 9816
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
100-yr Storm Proposed Conditions 3/4/2008
RS = 9213
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100-yr Storm Proposed Conditions 3/4/2008
RS = 8949
.04
.035
.04
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


100-yr Storm Proposed Conditions 3/4/2008
RS = 8793
.04
.035
.013
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
100-yr Storm Proposed Conditions 3/4/2008
RS = 8618
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta
100-yr Storm Proposed Conditions 3/4/2008
RS = 8569
.04
.035
.013
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
Ground
Ineff
Bank Sta
100-yr Storm Proposed Conditions 3/4/2008
RS = 8167
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta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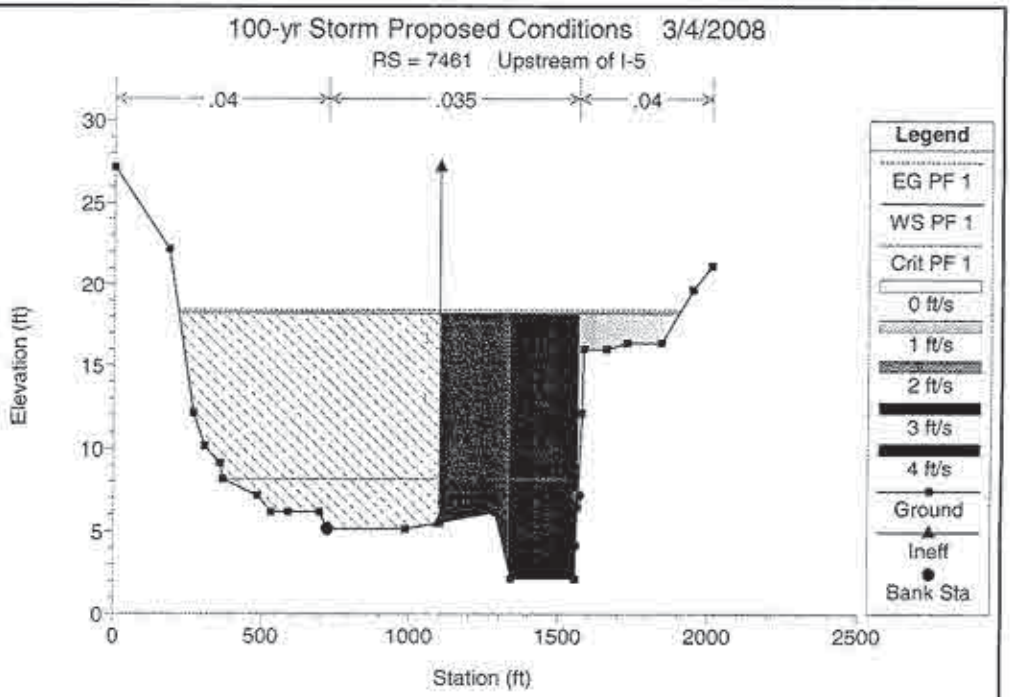
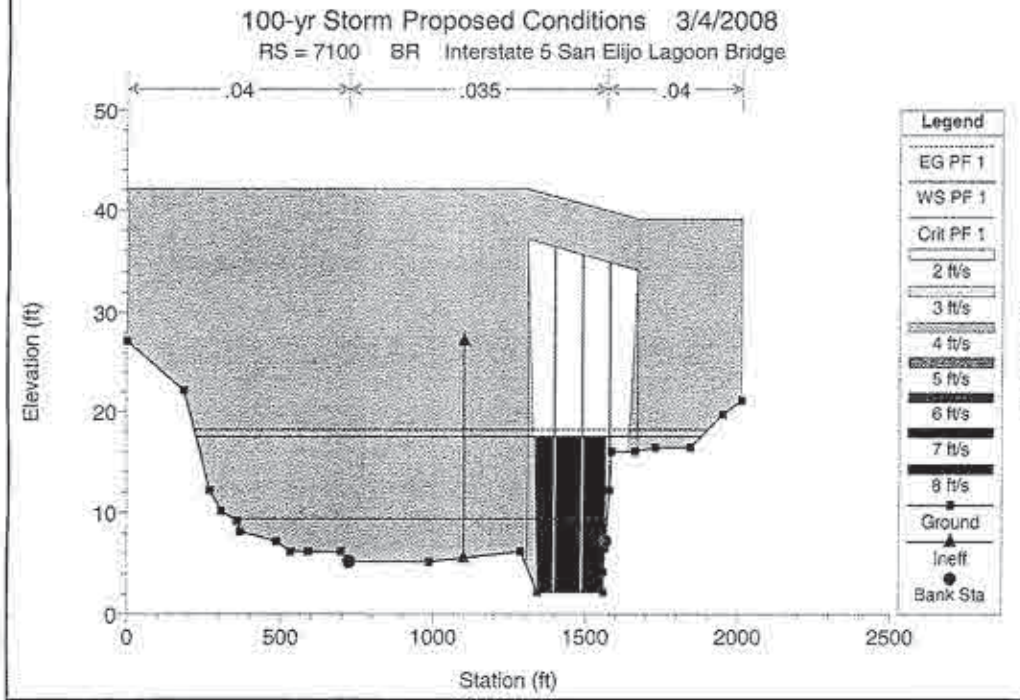
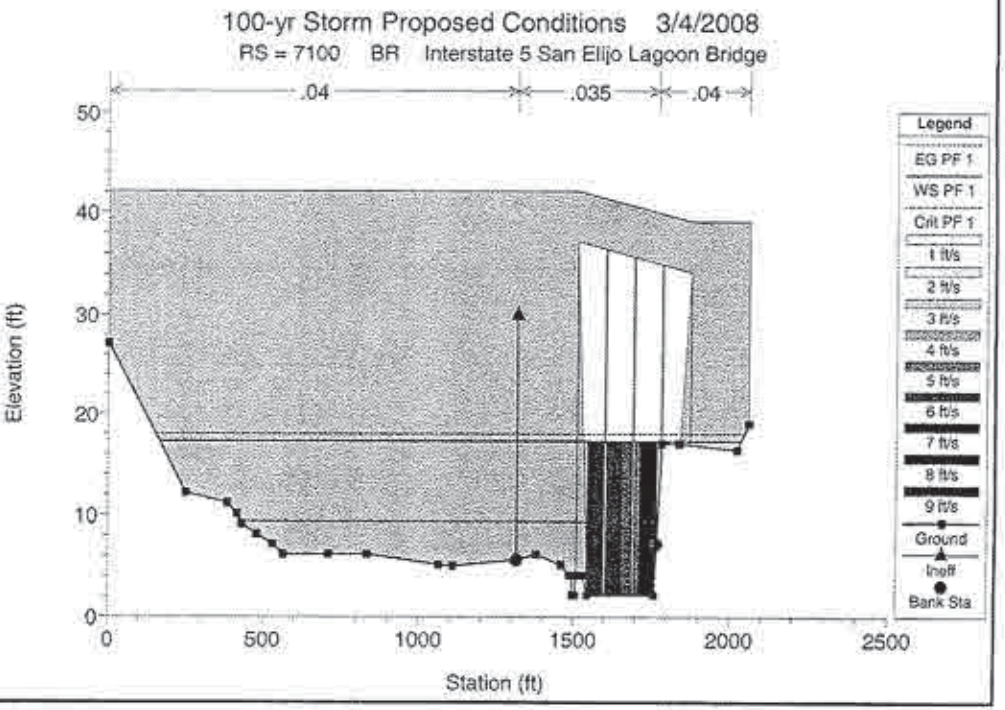
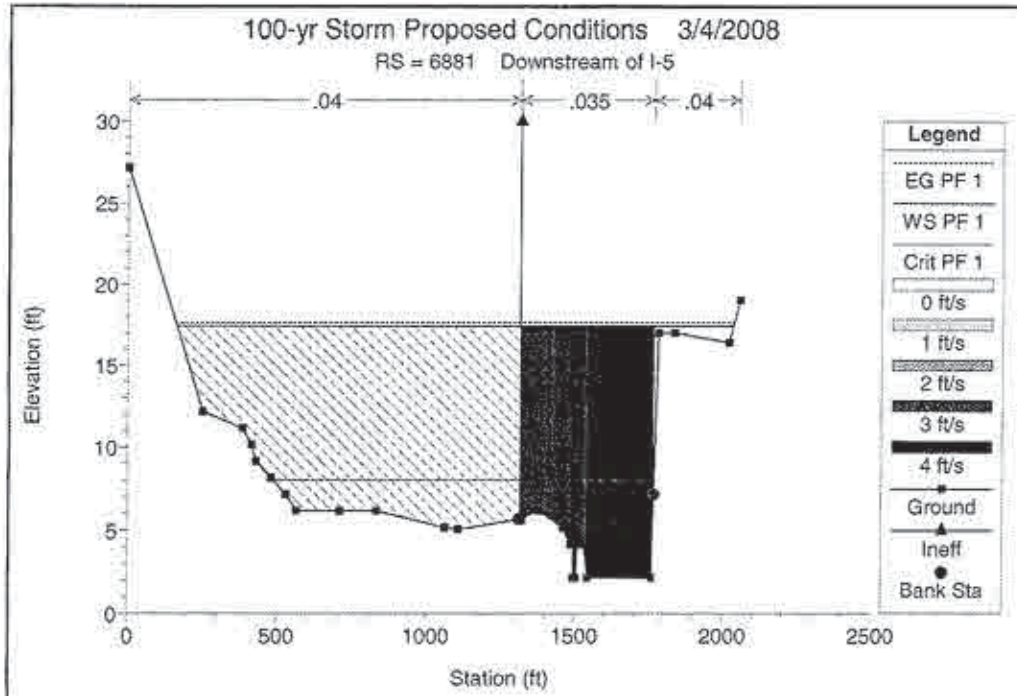
RS = 7761
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
Ground
Ineff
Bank Sta


100-yr Storm Proposed Conditions 3/4/2008
RS = 7461 Upstream of I-5
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta


100-yr Storm Proposed Conditions 3/4/2008
RS = 7100 BR Interstate 5 San Elijo Lagoon Bridge
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta


100-yr Storm Proposed Conditions 3/4/2008
RS = 7100 BR Interstate 5 San Elijo Lagoon Bridge
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Ineff
Bank Sta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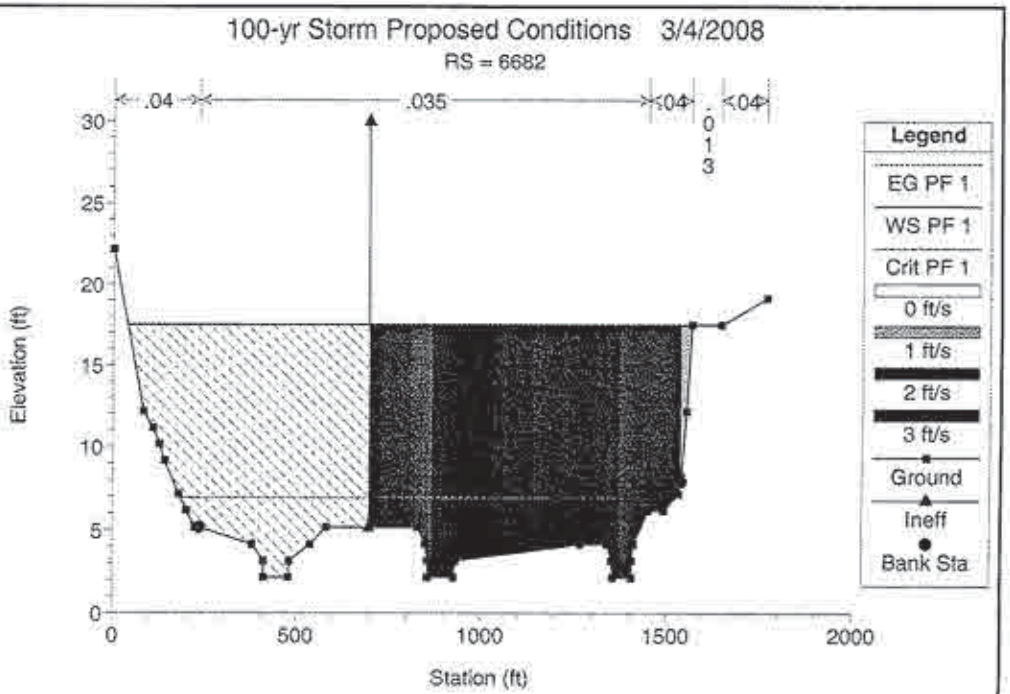
RS = 6881 Downstream of I-5
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta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RS = 6682
.04
.035
.04
.04
.013
Elevation (ft)
Station (ft)
Legend
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WS PF 1
Crit PF 1
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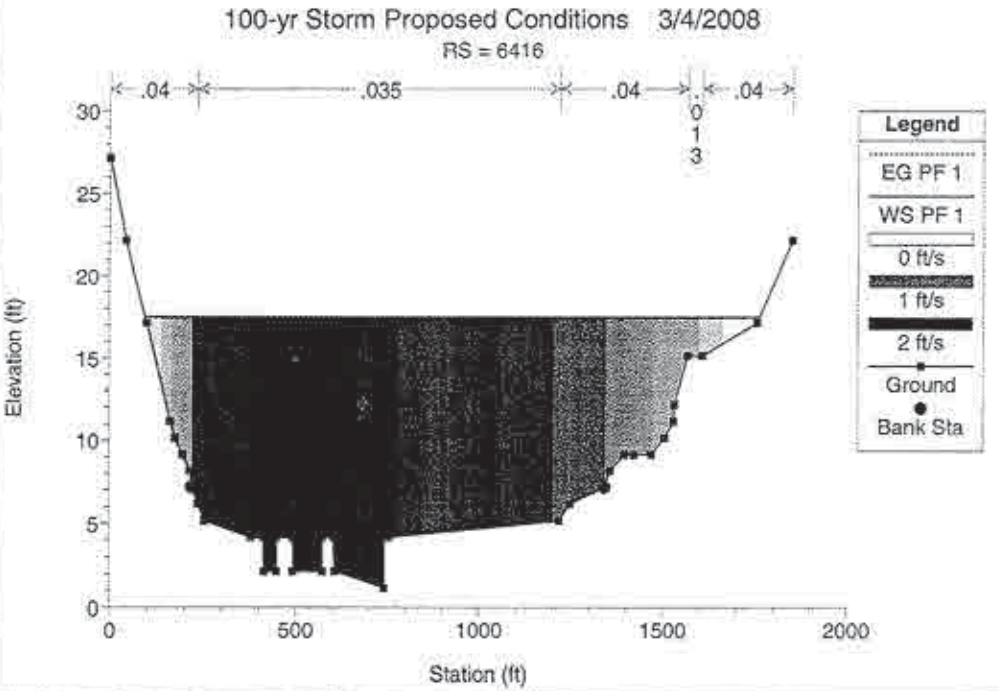
2 ft/s
3 ft/s
Ground
Ineff
Bank Sta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RS = 6416
.04
.035
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
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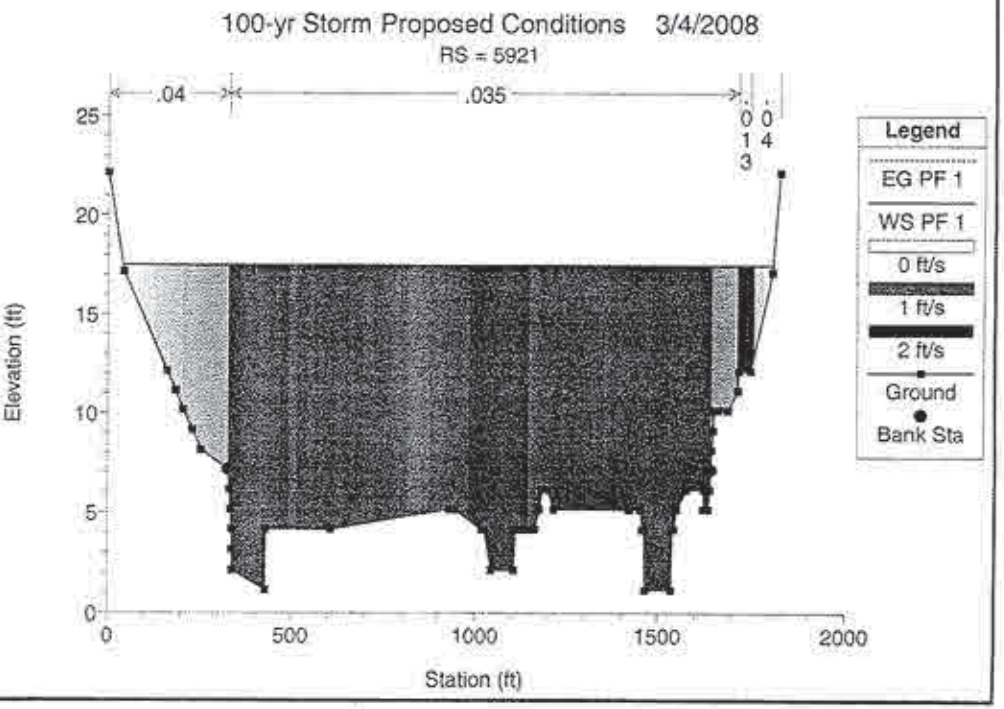
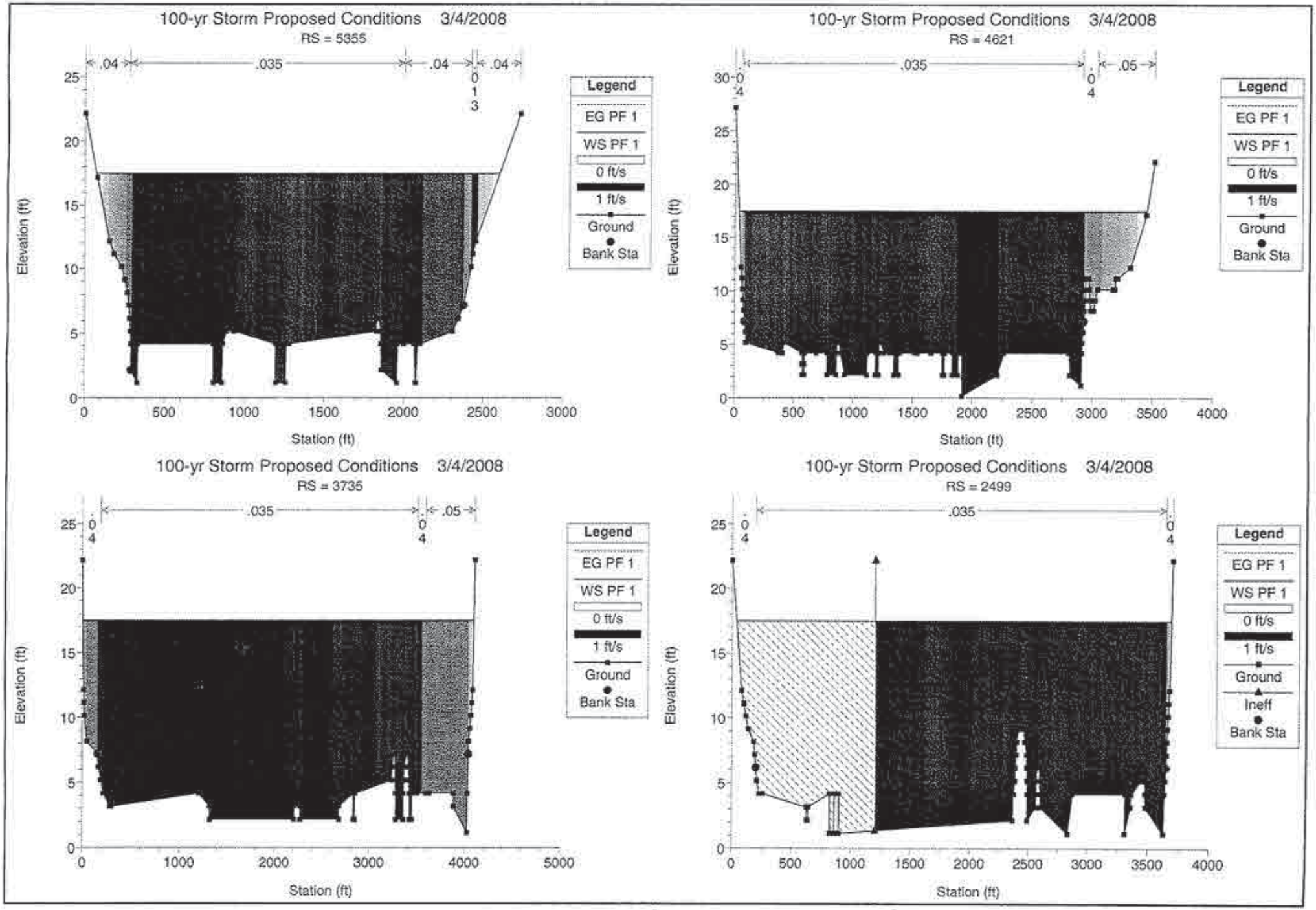
1 ft/s
2 ft/s
Ground
Bank Sta


100-yr Storm Proposed Conditions 3/4/2008
RS = 5921
.04
.035
.013
.014
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
Ground
Bank Sta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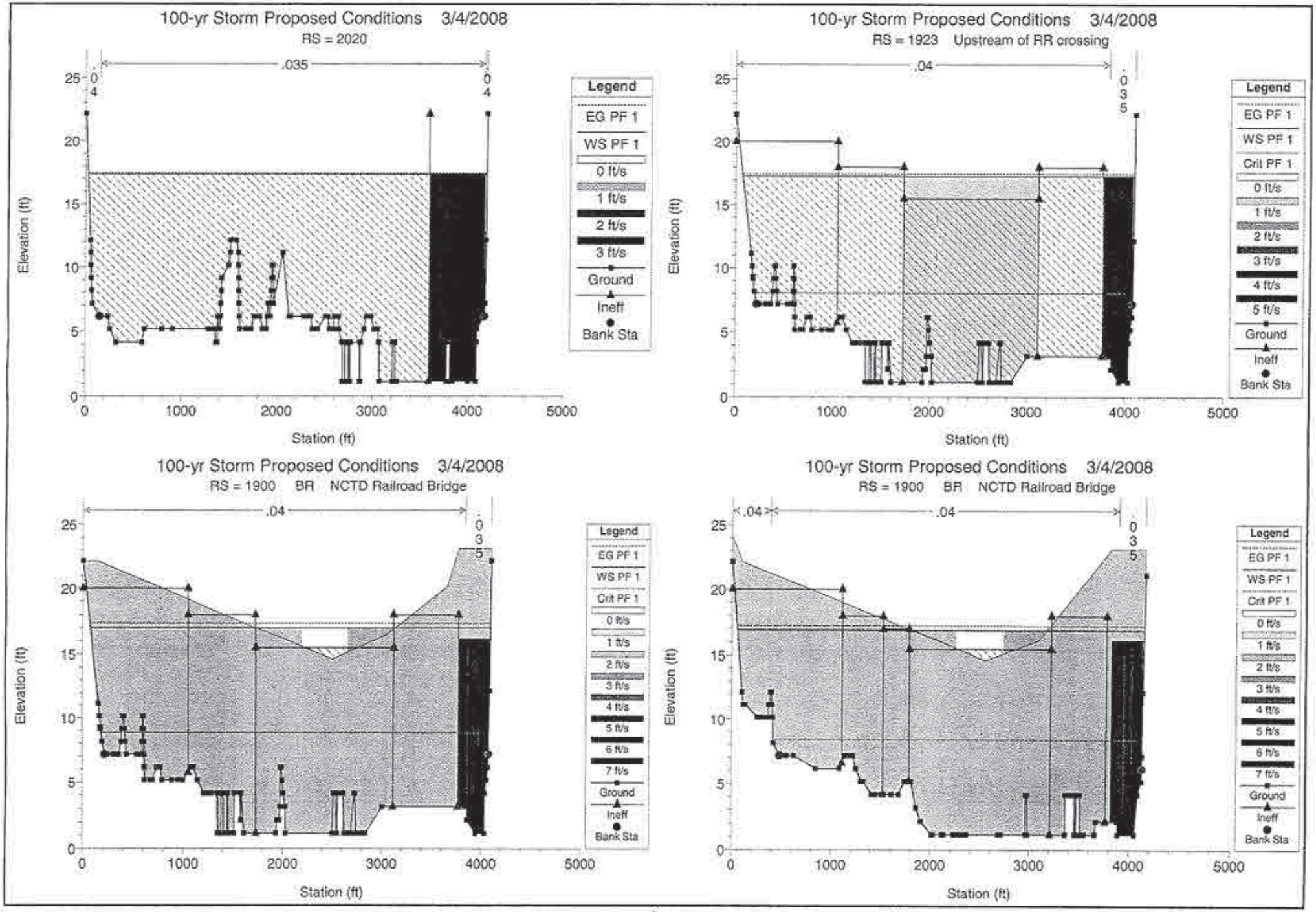
.04
.035
.04
.04
0
1
3
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
100-yr Storm Proposed Conditions 3/4/2008
RS = 4621
.035
.05
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
100-yr Storm Proposed Conditions 3/4/2008
RS = 3735
.035
.05
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
100-yr Storm Proposed Conditions 3/4/2008
RS = 2499
.035
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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.035
.04
.04
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
1000
2000
3000
4000
5000
Legend
EG PF 1
WS PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
Ground
Ineff
Bank Sta
100-yr Storm Proposed Conditions 3/4/2008
RS = 1923 Upstream of RR crossing
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta
100-yr Storm Proposed Conditions 3/4/2008
RS = 1900 BR NCTD Railroad Bridge
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta
100-yr Storm Proposed Conditions 3/4/2008
RS = 1900 BR NCTD Railroad Bridge
.04
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
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2 ft/s
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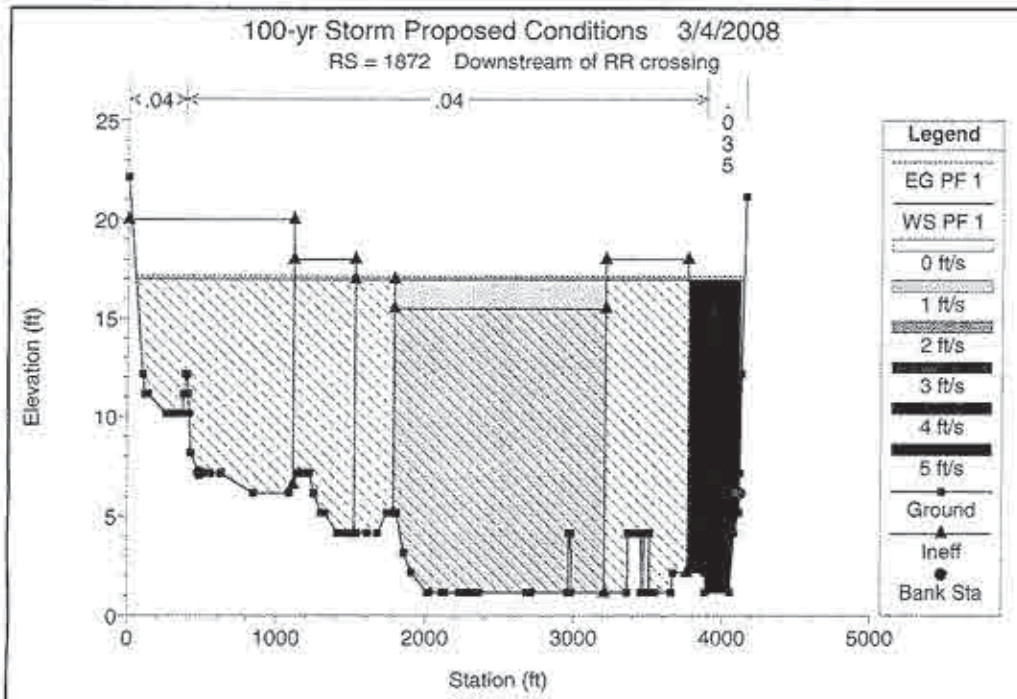
7 ft/s
Ground
Ineff
Bank Sta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RS = 1872 Downstream of RR crossing
.04
.04
.035
Elevation (ft)
Station (ft)
Legend
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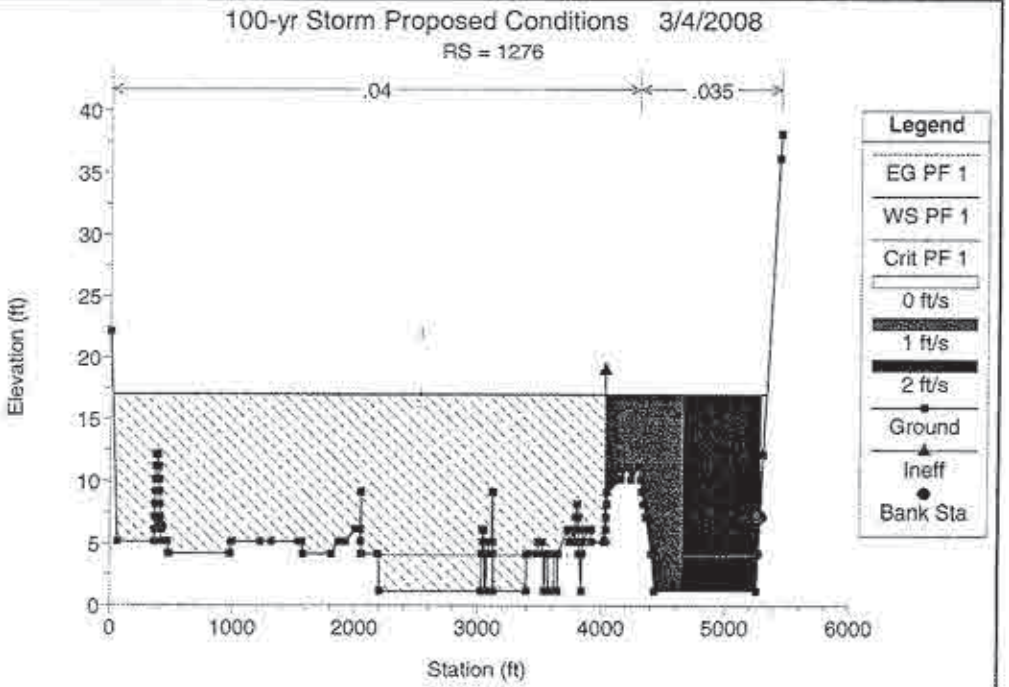
5 ft/s
Ground
Ineff
Bank Sta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.035
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Station (ft)
Legend
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Crit PF 1
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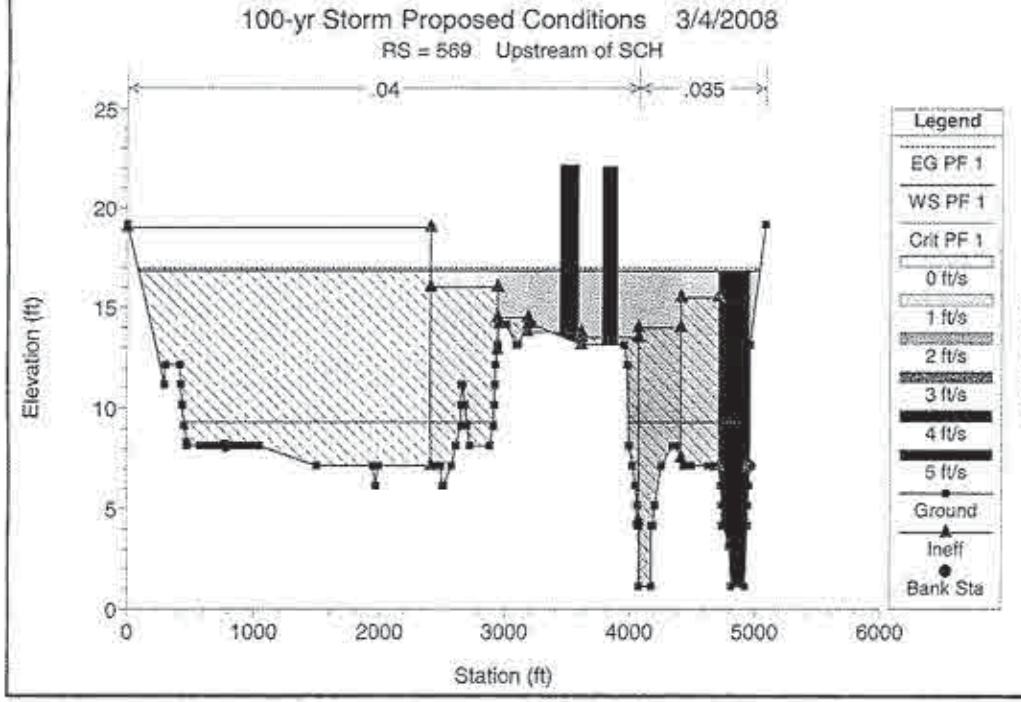
1 ft/s
2 ft/s
Ground
Ineff
Bank Sta


100-yr Storm Proposed Conditions 3/4/2008
RS = 569 Upstream of SCH
.04
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Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
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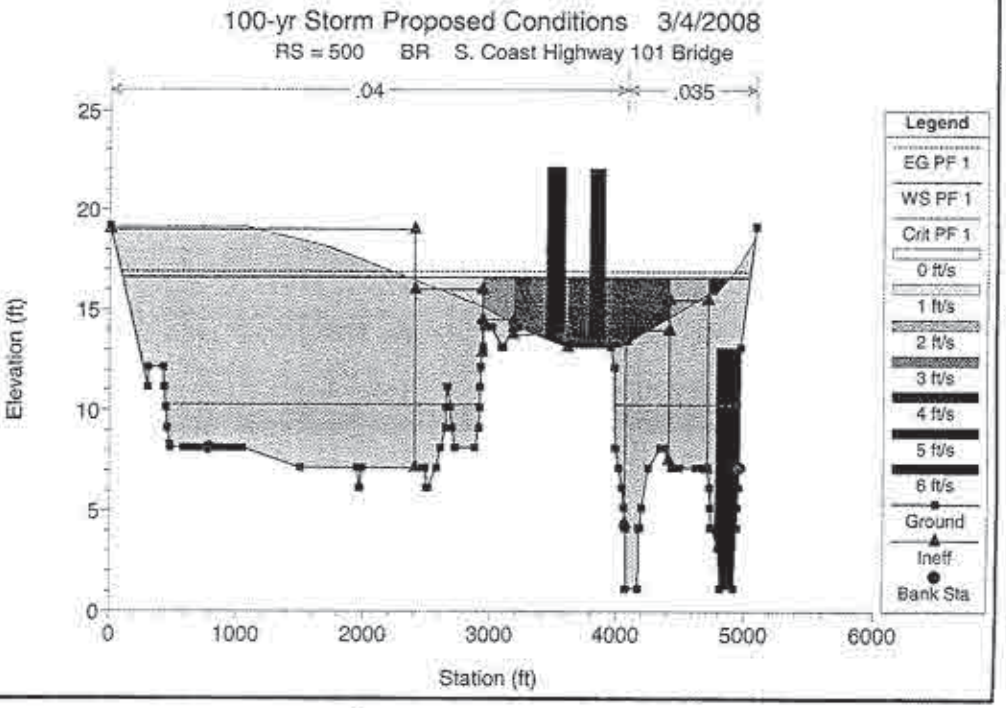
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta


100-yr Storm Proposed Conditions 3/4/2008
RS = 500 BR S. Coast Highway 101 Bridge
.04
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
0 ft/s
1 ft/s
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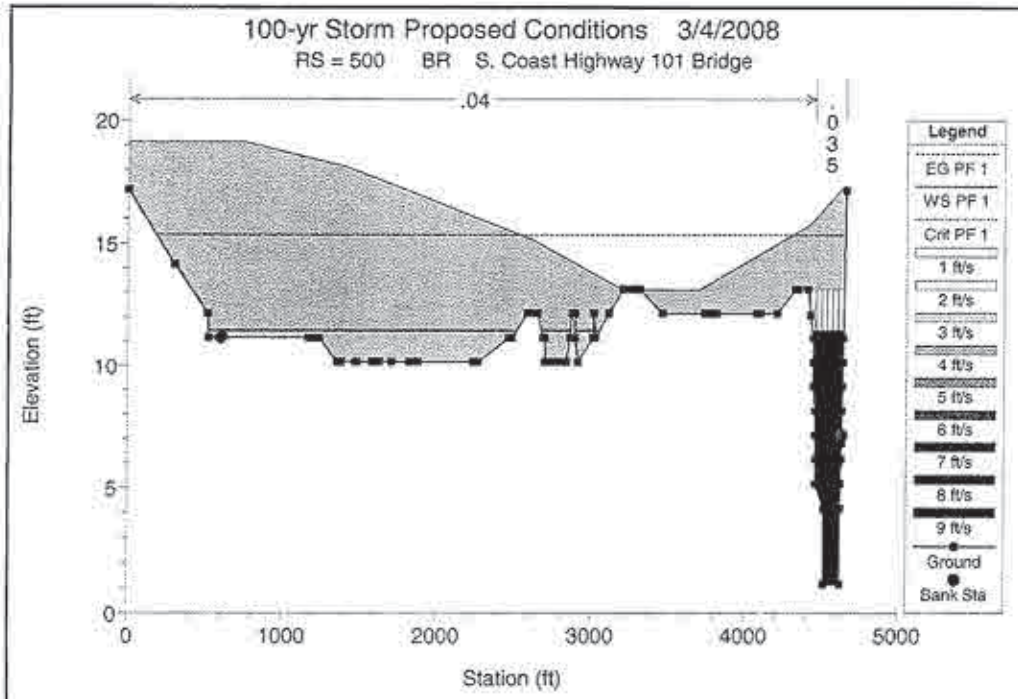
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta


100-yr Storm Proposed Conditions 3/4/2008
RS = 500 BR S. Coast Highway 101 Bridge
.04
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
1 ft/s
2 ft/s
3 ft/s
4 ft/s
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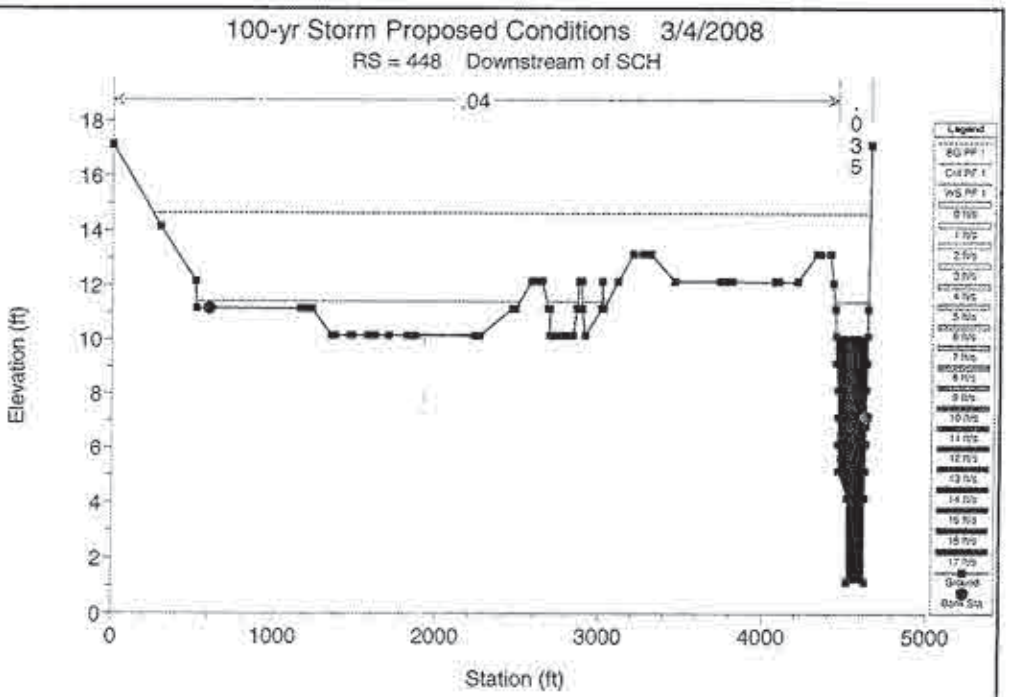
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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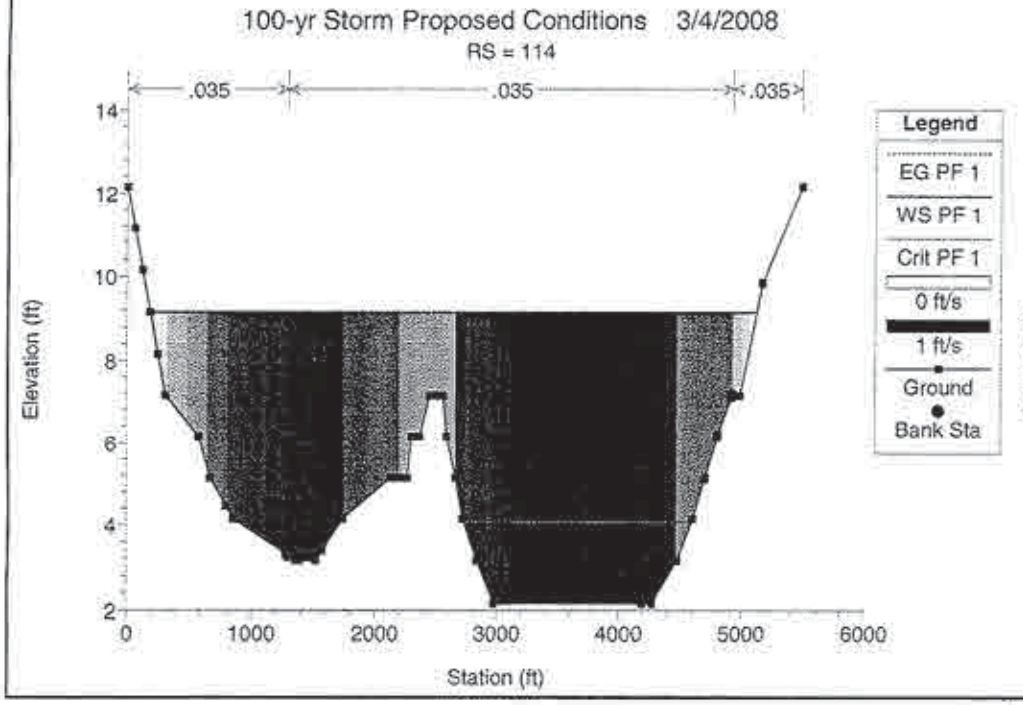
Elevation (ft)
Station (ft)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RS = 114
.035
.035
.035
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Crit PF 1
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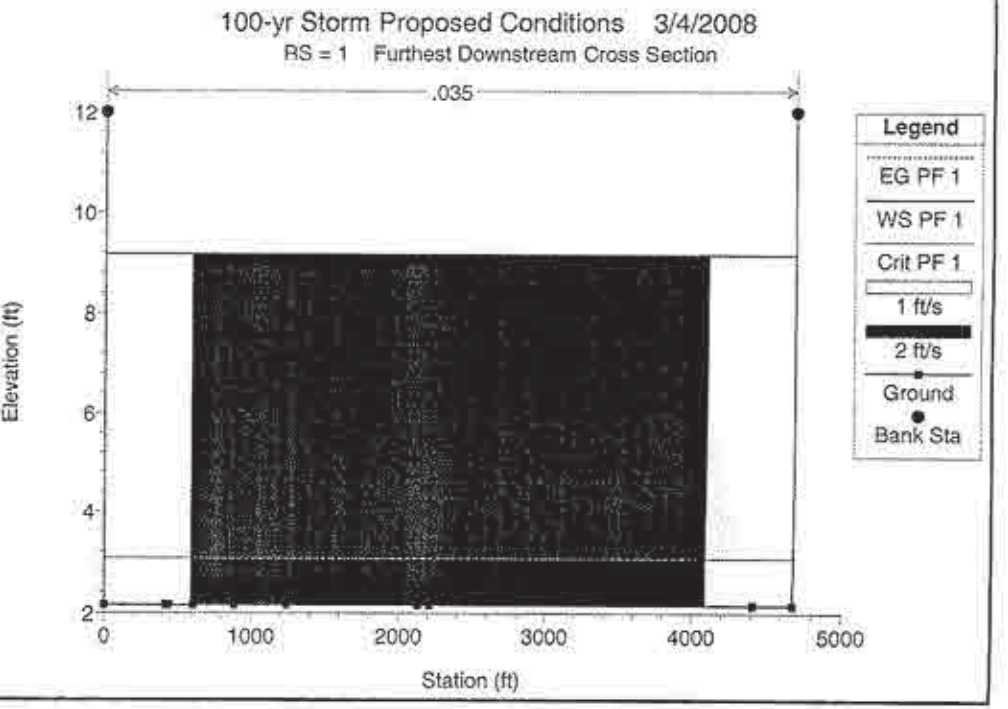
1 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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RS = 1 Furthest Downstream Cross Section
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
1 ft/s
2 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

SE_Prop.rep

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
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PROJECT DATA
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Project File : SE_Prop.prj
Run Date and Time: 3/4/2008 8:27:52 PM

Project in English units

Project Description:
San Elijo Lagoon 100-yr Proposed Floodplain Model

San Elijo Lagoon

PLAN DATA

Plan Title: 100-yr Storm Proposed Conditions
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Proposed\SE_Prop.p02

Geometry Title: Proposed Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Proposed\SE_Prop.g02

Flow Title : 100 yr flood
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Proposed\SE_Prop.f01

Plan Summary Information:

| | | | | | |
|---|---|---|---|---|---|
| Number of: | Cross Sections | = 26 | Multiple Openings | = | 0 |
| | Culverts | = 0 | Inline Structures | = | 0 |
| | Bridges | = 3 | Lateral Structures | = | 0 |

Computational Information

| | |
|---|---|
| Water surface calculation tolerance | = 0.01 |
| Critical depth calculation tolerance | = 0.01 |
| Maximum number of iterations | = 20 |
| Maximum difference tolerance | = 0.3 |
| Flow tolerance factor | = 0.001 |

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance

Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: 100 yr flood
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Proposed\SE_Prop.f01

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| RIVER-1 | Reach-1 | 10436 | 23255 |
| San Elijo Lagoon | Lower | 10436 | 23255 |

Boundary Conditions

| River | Reach | Profile | Upstream |
|---|---|---|---|
| San Elijo Lagoon | Lower | PF 1 | Normal S = 0.0046 |

Known WS = 9.15

Changes in WS and EG

| River | Reach | RS | Profile | Type | Value |
|---|---|---|---|---|---|
| San Elijo Lagoon | Lower | 1 | PF 1 | Known WS | 0 |

GEOMETRY DATA

Geometry Title: Proposed Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\San Elijo\HecRas\Final\Proposed\SE_Prop.g02

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 10436

INPUT
Description: Furthest Upstream Cross Section
Station Elevation Data num= 42

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 15 | 17.15 | 35 | 12.15 | 42 | 11.15 | 50 | 10.15 |
| 69 | 9.15 | 81 | 8.15 | 115 | 7.15 | 247 | 6.15 | 280 | 6.15 |
| 401 | 7.15 | 472 | 7.15 | 499 | 6.15 | 596 | 6.15 | 799 | 7.15 |
| 833 | 7.15 | 860 | 7.15 | 910 | 7.15 | 923 | 6.15 | 933 | 6.15 |
| 941 | 7.15 | 982 | 7.15 | 1030 | 7.15 | 1112 | 7.15 | 1186 | 7.15 |
| 1446 | 8.15 | 1648 | 8.15 | 1655 | 8.15 | 1746 | 8.15 | 1786 | 8.15 |
| 1813 | 9.15 | 2007 | 9.15 | 2012 | 8.15 | 2020 | 8.15 | 2033 | 9.15 |
| 2048 | 10.15 | 2074 | 11.15 | 2152 | 12.15 | 2168 | 12.15 | 2211 | 12.15 |
| 2411 | 17.15 | 2611.9 | 22.15 | | | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 81 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 69 | 2033 | 950.3 | 621.4 545.2 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 18.58 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.040 | 0.040 0.040 |
| W.S. Elev (ft) | 18.57 | Reach Len. (ft) | 950.30 | 621.40 545.20 |
| Crit W.S. (ft) | 9.00 | Flow Area (sq ft) | 362.44 | 21843.49 2080.80 |
| E.G. Slope (ft/ft) | 0.000029 | Area (sq ft) | 362.44 | 21843.49 2080.80 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 243.14 | 21827.09 1184.77 |
| Top Width (ft) | 2457.12 | Top Width (ft) | 58.25 | 1964.00 434.87 |
| Vel Total (ft/s) | 0.96 | Avg. Vel. (ft/s) | 0.67 | 1.00 0.57 |
| Max Chl Dpth (ft) | 12.42 | Hydr. Depth (ft) | 6.22 | 11.12 4.78 |
| Conv. Total (cfs) | 4307242.0 | Conv. (cfs) | 45033.1 | 4042768.0 219440.9 |
| Length Wtd. (ft) | 623.82 | Wetted Per. (ft) | 59.25 | 1964.34 435.01 |
| Min Ch El (ft) | 6.15 | Shear (lb/sq ft) | 0.01 | 0.02 0.01 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.01 | 0.02 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 415.60 | 7734.69 262.73 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 59.96 | 609.07 54.35 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 8.63 | 17.25 | 1.23 | 6.82 | 6.80 |
| 0.01 | 1.05 | 0.18 | | | | |
| 2 | LOB | 17.25 | 25.88 | 9.75 | 26.36 | 8.89 |
| 0.04 | 3.06 | 0.37 | | | | |
| 3 | LOB | 25.88 | 34.50 | 23.73 | 44.96 | 8.89 |
| 0.10 | 5.21 | 0.53 | | | | |
| 4 | LOB | 34.50 | 43.13 | 38.90 | 60.01 | 8.72 |
| 0.17 | 6.96 | 0.65 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | LOB | 43.13 | 51.75 | 50.09 | 69.71 | 8.68 |
| 0.22 | 8.08 | 0.72 | | | | |
| 6 | LOB | 51.75 | 60.38 | 57.20 | 75.34 | 8.64 |
| 0.25 | 8.73 | 0.76 | | | | |
| 7 | LOB | 60.38 | 69.00 | 62.24 | 79.25 | 8.64 |
| 0.27 | 9.19 | 0.79 | | | | |
| 8 | Chan | 69.00 | 314.50 | 3000.82 | 2896.08 | 245.56 |
| 12.90 | 11.80 | 1.04 | | | | |
| 9 | Chan | 314.50 | 560.00 | 3021.62 | 2907.92 | 245.52 |
| 12.99 | 11.84 | 1.04 | | | | |
| 10 | Chan | 560.00 | 805.50 | 3077.54 | 2940.00 | 245.50 |
| 13.23 | 11.98 | 1.05 | | | | |
| 11 | Chan | 805.50 | 1051.00 | 2875.37 | 2823.00 | 245.60 |
| 12.36 | 11.50 | 1.02 | | | | |
| 12 | Chan | 1051.00 | 1296.50 | 2801.85 | 2779.02 | 245.50 |
| 12.05 | 11.32 | 1.01 | | | | |
| 13 | Chan | 1296.50 | 1542.00 | 2507.51 | 2599.98 | 245.50 |
| 10.78 | 10.59 | 0.96 | | | | |
| 14 | Chan | 1542.00 | 1787.50 | 2438.74 | 2556.96 | 245.50 |
| 10.49 | 10.42 | 0.95 | | | | |
| 15 | Chan | 1787.50 | 2033.00 | 2103.64 | 2340.54 | 245.65 |
| 9.05 | 9.53 | 0.90 | | | | |
| 16 | ROB | 2033.00 | 2105.36 | 390.92 | 565.80 | 72.42 |
| 1.68 | 7.82 | 0.69 | | | | |
| 17 | ROB | 2105.36 | 2177.73 | 295.47 | 478.18 | 72.37 |
| 1.27 | 6.61 | 0.62 | | | | |
| 18 | ROB | 2177.73 | 2250.09 | 262.22 | 445.14 | 72.37 |
| 1.13 | 6.15 | 0.59 | | | | |
| 19 | ROB | 2250.09 | 2322.45 | 157.67 | 328.07 | 72.39 |
| 0.68 | 4.53 | 0.48 | | | | |
| 20 | ROB | 2322.45 | 2394.81 | 67.48 | 197.17 | 72.39 |
| 0.29 | 2.72 | 0.34 | | | | |
| 21 | ROB | 2394.81 | 2467.18 | 11.01 | 66.43 | 72.38 |
| 0.05 | 0.92 | 0.17 | | | | |
| 22 | ROB | 2467.18 | 2539.54 | 0.00 | 0.01 | 0.70 |
| 0.00 | 0.01 | 0.01 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 9816

INPUT
Description:
Station Elevation Data num= 42

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 10 | 17.15 | 50 | 11.15 | 56 | 10.15 | 66 | 10.15 |
| 130 | 10.15 | 156 | 9.15 | 198 | 8.15 | 326 | 7.15 | 339 | 6.15 |
| 354 | 6.15 | 371 | 6.15 | 403 | 3.15 | 655 | 3.15 | 658 | 3.15 |
| 951 | 3.15 | 974 | 3.15 | 981 | 6.15 | 1128 | 6.15 | 1163 | 6.15 |
| 1181 | 6.15 | 1214 | 6.15 | 1484 | 6.15 | 1510 | 6.15 | 1859 | 7.15 |
| 1881 | 7.15 | 1928 | 7.15 | 1977 | 7.15 | 2032 | 7.15 | 2070 | 8.15 |
| 2216 | 8.15 | 2327 | 8.15 | 2491 | 9.15 | 2557 | 9.15 | 2713 | 8.15 |
| 2785 | 8.15 | 2843 | 9.15 | 2872 | 10.15 | 2886 | 10.15 | 2899 | 11.15 |
| 3049 | 17.15 | 3219 | 22.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 156 | .035 | 2843 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 156 | 2843 | 477.18 | 604.7 728.2 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.040 | 0.035 | 0.040 |
| W.S. Elev (ft) | 18.56 | Reach Len. (ft) | 477.18 | 604.70 | 728.20 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1080.05 | 32611.74 | 1174.60 |
| E.G. Slope (ft/ft) | 0.000009 | Area (sq ft) | 1080.05 | 32611.74 | 1174.60 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 459.50 | 22424.18 | 371.33 |
| Top Width (ft) | 3089.81 | Top Width (ft) | 148.82 | 2687.00 | 253.99 |
| Vel Total (ft/s) | 0.67 | Avg. Vel. (ft/s) | 0.43 | 0.69 | 0.32 |
| Max Chl Dpth (ft) | 15.41 | Hydr. Depth (ft) | 7.26 | 12.14 | 4.62 |
| Conv. Total (cfs) | 7581374.0 | Conv. (cfs) | 149800.7 | 7310518.0 | 121055.9 |
| Length Wtd. (ft) | 604.98 | Wetted Per. (ft) | 149.71 | 2687.84 | 254.18 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 399.86 | 7346.27 | 242.35 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 57.70 | 575.89 | 50.04 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 19.50 | 3.46 | 22.17 | 12.76 |
| 0.01 | 1.80 | 0.16 | | | | |
| 2 | LOB | 19.50 | 39.00 | 23.74 | 83.83 | 19.72 |
| 0.10 | 4.30 | 0.28 | | | | |
| 3 | LOB | 39.00 | 58.50 | 56.46 | 140.95 | 19.71 |
| 0.24 | 7.23 | 0.40 | | | | |
| 4 | LOB | 58.50 | 78.00 | 73.20 | 164.02 | 19.50 |
| 0.31 | 8.41 | 0.45 | | | | |
| 5 | LOB | 78.00 | 97.50 | 73.20 | 164.02 | 19.50 |
| 0.31 | 8.41 | 0.45 | | | | |
| 6 | LOB | 97.50 | 117.00 | 73.20 | 164.02 | 19.50 |
| 0.31 | 8.41 | 0.45 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | LOB | 117.00 | 136.50 | 73.79 | 164.83 | 19.50 | |
| 0.32 | 8.45 | 0.45 | | | | | |
| 8 | LOB | 136.50 | 156.00 | 82.45 | 176.21 | 19.51 | |
| 0.35 | 9.04 | 0.47 | | | | | |
| 9 | Chan | 156.00 | 491.88 | 2890.07 | 4179.78 | 336.07 | |
| 12.43 | 12.44 | 0.69 | | | | | |
| 10 | Chan | 491.88 | 827.75 | 4129.05 | 5176.28 | 335.88 | |
| 17.76 | 15.41 | 0.80 | | | | | |
| 11 | Chan | 827.75 | 1163.63 | 3409.56 | 4617.90 | 336.49 | |
| 14.66 | 13.75 | 0.74 | | | | | |
| 12 | Chan | 1163.63 | 1499.50 | 2878.37 | 4168.65 | 335.88 | |
| 12.38 | 12.41 | 0.69 | | | | | |
| 13 | Chan | 1499.50 | 1835.38 | 2705.94 | 4016.98 | 335.88 | |
| 11.64 | 11.96 | 0.67 | | | | | |
| 14 | Chan | 1835.38 | 2171.25 | 2373.64 | 3713.33 | 335.89 | |
| 10.21 | 11.06 | 0.64 | | | | | |
| 15 | Chan | 2171.25 | 2507.13 | 2048.12 | 3398.78 | 335.88 | |
| 8.81 | 10.12 | 0.60 | | | | | |
| 16 | Chan | 2507.13 | 2843.00 | 1989.42 | 3340.03 | 335.89 | |
| 8.55 | 9.94 | 0.60 | | | | | |
| 17 | ROB | 2843.00 | 2890.00 | 162.77 | 409.22 | 47.03 | |
| 0.70 | 8.71 | 0.40 | | | | | |
| 18 | ROB | 2890.00 | 2937.00 | 109.44 | 322.57 | 47.06 | |
| 0.47 | 6.86 | 0.34 | | | | | |
| 19 | ROB | 2937.00 | 2984.00 | 63.53 | 232.71 | 47.04 | |
| 0.27 | 4.95 | 0.27 | | | | | |
| 20 | ROB | 2984.00 | 3031.00 | 28.66 | 144.35 | 47.04 | |
| 0.12 | 3.07 | 0.20 | | | | | |
| 21 | ROB | 3031.00 | 3078.00 | 6.72 | 60.44 | 47.03 | |
| 0.03 | 1.29 | 0.11 | | | | | |
| 22 | ROB | 3078.00 | 3125.00 | 0.21 | 5.30 | 18.99 | |
| 0.00 | 0.28 | 0.04 | | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 9213

INPUT
Description:
Station Elevation Data num= 70

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 15 | 17.15 | 30 | 12.15 | 40 | 11.15 | 43 | 10.15 |
| 50 | 10.15 | 63 | 10.15 | 68 | 9.15 | 75 | 8.15 | 90 | 7.15 |
| 121 | 6.15 | 244 | 5.15 | 259 | 3.15 | 349 | 3.15 | 360 | 5.15 |
| 370 | 6.15 | 383 | 7.15 | 400 | 8.15 | 465 | 9.15 | 481 | 9.15 |
| 544 | 8.15 | 564 | 8.15 | 579 | 8.15 | 596 | 7.15 | 611 | 6.15 |
| 619 | 5.15 | 630 | 3.15 | 703 | 3.15 | 713 | 5.15 | 730 | 6.15 |
| 984 | 6.15 | 1016 | 6.15 | 1041 | 6.15 | 1250 | 6.15 | 1283 | 6.15 |
| 1299 | 6.15 | 1799 | 7.15 | 1891 | 7.15 | 1896 | 6.15 | 1900 | 5.15 |
| 1917 | 5.15 | 1921 | 6.15 | 1924 | 7.15 | 1929 | 8.15 | 1954 | 8.15 |
| 1958 | 7.15 | 1967 | 6.15 | 1970 | 6.15 | 2012 | 6.15 | 2050 | 6.15 |
| 2180 | 7.15 | 2195 | 8.15 | 2226 | 8.15 | 2239 | 7.15 | 2247 | 6.15 |
| 2269 | 6.15 | 2284 | 7.15 | 2286 | 8.15 | 2291 | 9.15 | 2299 | 9.15 |
| 2305 | 8.15 | 2429 | 7.15 | 2472 | 7.15 | 2554 | 8.15 | 2561 | 9.15 |
| 2581 | 10.15 | 2586 | 11.15 | 2589 | 12.15 | 2680 | 17.15 | 2780 | 22.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 68 | .035 | 2561 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 68 | 2561 | 236.4 | 264.5 398.2 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 145 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.56 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 | 0.040 |
| W.S. Elev (ft) | 18.55 | Reach Len. (ft) | 236.40 | 264.50 | 398.20 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 29122.48 | 613.00 |
| E.G. Slope (ft/ft) | 0.000013 | Area (sq ft) | 366.76 | 30024.28 | 613.00 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23046.16 | 208.84 |
| Top Width (ft) | 2697.25 | Top Width (ft) | 57.21 | 2493.00 | 147.04 |
| Vel Total (ft/s) | 0.78 | Avg. Vel. (ft/s) | | 0.79 | 0.34 |
| Max Chl Dpth (ft) | 15.40 | Hydr. Depth (ft) | | 12.05 | 4.17 |
| Conv. Total (cfs) | 6554440.0 | Conv. (cfs) | | 6495577.0 | 58862.9 |
| Length Wtd. (ft) | 269.23 | Wetted Per. (ft) | | 2418.44 | 147.50 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | | 0.01 | 0.00 |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 391.94 | 6911.52 | 227.41 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 56.58 | 539.94 | 46.69 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft) (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 8.50 | 17.00 | 0.00 | 6.42 | 6.54 |
| 0.00 | 1.03 | 0.00 | | | | |
| 2 | LOB | 17.00 | 25.50 | 0.00 | 29.63 | 8.96 |
| 0.00 | 3.49 | 0.00 | | | | |
| 3 | LOB | 25.50 | 34.00 | 0.00 | 51.84 | 8.76 |
| 0.00 | 6.10 | 0.00 | | | | |
| 4 | LOB | 34.00 | 42.50 | 0.00 | 62.16 | 8.67 |
| 0.00 | 7.31 | 0.00 | | | | |
| 5 | LOB | 42.50 | 51.00 | 0.00 | 71.38 | 8.53 |
| 0.00 | 8.40 | 0.00 | | | | |
| 6 | LOB | 51.00 | 59.50 | 0.00 | 71.42 | 8.50 |
| 0.00 | 8.40 | 0.00 | | | | |
| 7 | LOB | 59.50 | 68.00 | 0.00 | 73.92 | 8.60 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0.00 | 8.70 | 0.00 | | | | |
| 8 | Chan | 68.00 | 145.00 | 0.00 | 901.80 | 77.12 |
| 0.00 | 11.71 | 0.00 | | | | |
| 9 | Chan | 145.00 | 447.00 | 3348.65 | 3988.58 | 302.44 |
| 14.40 | 13.21 | 0.84 | | | | |
| 10 | Chan | 447.00 | 749.00 | 2899.52 | 3658.91 | 302.54 |
| 12.47 | 12.12 | 0.79 | | | | |
| 11 | Chan | 749.00 | 1051.00 | 3018.29 | 3745.42 | 302.00 |
| 12.98 | 12.40 | 0.81 | | | | |
| 12 | Chan | 1051.00 | 1353.00 | 3014.37 | 3742.50 | 302.00 |
| 12.96 | 12.39 | 0.81 | | | | |
| 13 | Chan | 1353.00 | 1655.00 | 2853.82 | 3621.60 | 302.00 |
| 12.27 | 11.99 | 0.79 | | | | |
| 14 | Chan | 1655.00 | 1957.00 | 2672.28 | 3484.78 | 302.70 |
| 11.49 | 11.54 | 0.77 | | | | |
| 15 | Chan | 1957.00 | 2259.00 | 2780.83 | 3566.79 | 302.22 |
| 11.96 | 11.81 | 0.78 | | | | |
| 16 | Chan | 2259.00 | 2561.00 | 2458.40 | 3313.92 | 302.53 |
| 10.57 | 10.97 | 0.74 | | | | |
| 17 | ROB | 2561.00 | 2588.38 | 104.57 | 234.19 | 27.63 |
| 0.45 | 8.55 | 0.45 | | | | |
| 18 | ROB | 2588.38 | 2615.75 | 53.17 | 155.66 | 27.45 |
| 0.23 | 5.69 | 0.34 | | | | |
| 19 | ROB | 2615.75 | 2643.13 | 31.86 | 114.43 | 27.42 |
| 0.14 | 4.18 | 0.28 | | | | |
| 20 | ROB | 2643.13 | 2670.50 | 15.15 | 73.26 | 27.42 |
| 0.07 | 2.68 | 0.21 | | | | |
| 21 | ROB | 2670.50 | 2697.88 | 3.99 | 32.87 | 27.41 |
| 0.02 | 1.20 | 0.12 | | | | |
| 22 | ROB | 2697.88 | 2725.25 | 0.11 | 2.58 | 10.18 |
| 0.00 | 0.25 | 0.04 | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8949

INPUT
Description:
Station Elevation Data num= 51

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 30 | 17.15 | 70 | 12.15 | 150 | 11.15 | 172 | 10.15 |
| 196 | 9.15 | 210 | 8.15 | 242 | 7.15 | 251 | 6.15 | 270 | 6.15 |
| 291 | 6.15 | 344 | 5.15 | 357 | 3.15 | 732 | 3.15 | 742 | 5.15 |
| 760 | 6.15 | 774 | 7.15 | 778 | 8.15 | 782 | 9.15 | 798 | 9.15 |
| 822 | 9.15 | 850 | 9.15 | 871 | 8.15 | 925 | 7.15 | 1144 | 6.15 |
| 1163 | 6.15 | 1195 | 5.15 | 1205 | 6.15 | 1274 | 6.15 | 1300 | 6.15 |
| 1348 | 6.15 | 1541 | 6.15 | 1801 | 6.15 | 1806 | 5.15 | 1812 | 4.15 |
| 1824 | 4.15 | 1833 | 5.15 | 1834 | 6.15 | 1837 | 7.15 | 1852 | 7.15 |
| 1886 | 6.15 | 1898 | 6.15 | 2119 | 6.65 | 2138 | 7.15 | 2143 | 8.15 |
| 2232 | 8.15 | 2239 | 7.15 | 2290 | 9.27 | 2359 | 12.15 | 2400 | 12.15 |
| 2519 | 22.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 210 | .035 | 2143 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 210 | 2143 | 130.434 | 155.9 | 373.34 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 218 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.56 | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 | 0.040 |
| W.S. Elev (ft) | 18.55 | Reach Len. (ft) | 130.43 | 155.90 | 373.34 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 24521.25 | 2574.97 |
| E.G. Slope (ft/ft) | 0.000015 | Area (sq ft) | 1239.12 | 24605.42 | 2574.97 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 21818.44 | 1436.56 |
| Top Width (ft) | 2454.49 | Top Width (ft) | 188.38 | 1933.00 | 333.11 |
| Vel Total (ft/s) | 0.86 | Avg. Vel. (ft/s) | | 0.89 | 0.56 |
| Max Chl Dpth (ft) | 15.40 | Hydr. Depth (ft) | | 12.74 | 7.73 |
| Conv. Total (cfs) | 6048353.0 | Conv. (cfs) | | 5674722.0 | 373631.6 |
| Length Wtd. (ft) | 167.73 | Wetted Per. (ft) | | 1926.77 | 333.56 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | | 0.01 | 0.01 |
| Alpha | 1.03 | Stream Power (lb/ft s) | | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 387.58 | 6745.66 | 212.84 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 55.91 | 526.50 | 44.50 |

Profile #PF 1

| Percent Conv | Pos Hydr | Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|
| 1 | LOB | | 0.00 | 26.25 | 0.00 | 1.78 | 4.69 |
| 0.00 | 0.39 | | 0.00 | | | | |
| 2 | LOB | | 26.25 | 52.50 | 0.00 | 67.11 | 26.48 |
| 0.00 | 2.56 | | 0.00 | | | | |
| 3 | LOB | | 52.50 | 78.75 | 0.00 | 149.23 | 26.39 |
| 0.00 | 5.69 | | 0.00 | | | | |
| 4 | LOB | | 78.75 | 105.00 | 0.00 | 175.07 | 26.25 |
| 0.00 | 6.67 | | 0.00 | | | | |
| 5 | LOB | | 105.00 | 131.25 | 0.00 | 183.69 | 26.25 |
| 0.00 | 7.00 | | 0.00 | | | | |
| 6 | LOB | | 131.25 | 157.50 | 0.00 | 193.23 | 26.26 |
| 0.00 | 7.36 | | 0.00 | | | | |
| 7 | LOB | | 157.50 | 183.75 | 0.00 | 218.49 | 26.28 |
| 0.00 | 8.32 | | 0.00 | | | | |
| 8 | LOB | | 183.75 | 210.00 | 0.00 | 250.52 | 26.30 |
| 0.00 | 9.54 | | 0.00 | | | | |
| 9 | Chan | | 210.00 | 218.00 | 0.00 | 84.17 | 8.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0.00 | 10.52 | 0.00 | | | | |
| 10 | Chan | 218.00 | 458.63 | 3073.86 | 3302.66 | 240.85 |
| 13.22 | 13.73 | 0.93 | | | | |
| 11 | Chan | 458.63 | 699.25 | 3724.78 | 3704.66 | 240.63 |
| 16.02 | 15.40 | 1.01 | | | | |
| 12 | Chan | 699.25 | 939.88 | 2243.07 | 2735.16 | 241.17 |
| 9.65 | 11.37 | 0.82 | | | | |
| 13 | Chan | 939.88 | 1180.50 | 2465.74 | 2892.44 | 240.64 |
| 10.60 | 12.02 | 0.85 | | | | |
| 14 | Chan | 1180.50 | 1421.13 | 2618.66 | 2999.00 | 240.68 |
| 11.26 | 12.46 | 0.87 | | | | |
| 15 | Chan | 1421.13 | 1661.75 | 2595.51 | 2982.78 | 240.63 |
| 11.16 | 12.40 | 0.87 | | | | |
| 16 | Chan | 1661.75 | 1902.38 | 2612.73 | 2998.76 | 241.45 |
| 11.24 | 12.46 | 0.87 | | | | |
| 17 | Chan | 1902.38 | 2143.00 | 2484.10 | 2905.80 | 240.73 |
| 10.68 | 12.08 | 0.85 | | | | |
| 18 | ROB | 2143.00 | 2190.00 | 306.24 | 488.61 | 47.00 |
| 1.32 | 10.40 | 0.63 | | | | |
| 19 | ROB | 2190.00 | 2237.00 | 307.89 | 490.40 | 47.05 |
| 1.32 | 10.43 | 0.63 | | | | |
| 20 | ROB | 2237.00 | 2284.00 | 310.83 | 493.24 | 47.06 |
| 1.34 | 10.49 | 0.63 | | | | |
| 21 | ROB | 2284.00 | 2331.00 | 220.77 | 401.64 | 47.04 |
| 0.95 | 8.55 | 0.55 | | | | |
| 22 | ROB | 2331.00 | 2378.00 | 148.83 | 316.97 | 47.02 |
| 0.64 | 6.74 | 0.47 | | | | |
| 23 | ROB | 2378.00 | 2425.00 | 116.89 | 274.35 | 47.09 |
| 0.50 | 5.84 | 0.43 | | | | |
| 24 | ROB | 2425.00 | 2472.00 | 25.09 | 109.06 | 47.17 |
| 0.11 | 2.32 | 0.23 | | | | |
| 25 | ROB | 2472.00 | 2519.00 | 0.03 | 0.71 | 4.13 |
| 0.00 | 0.17 | 0.04 | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8793

INPUT
Description:
Station Elevation Data num= 51

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 110 | 17.15 | 190 | 12.15 | 215 | 11.15 | 238 | 10.15 |
| 249 | 9.15 | 262 | 8.15 | 305 | 7.15 | 404 | 6.15 | 431 | 6.15 |
| 441 | 3.15 | 442 | 3.15 | 453 | 6.15 | 621 | 5.15 | 632 | 3.15 |
| 762 | 3.15 | 773 | 5.15 | 812 | 6.15 | 825 | 7.15 | 829 | 8.15 |
| 846 | 9.15 | 919 | 9.15 | 955 | 8.15 | 1013 | 7.15 | 1354 | 6.15 |
| 1389 | 6.15 | 1406 | 5.15 | 1448 | 6.15 | 1480 | 6.15 | 1541 | 6.15 |
| 1544 | 6.15 | 1709 | 6.15 | 1718 | 7.15 | 1747 | 8.15 | 1751 | 8.15 |
| 1758 | 7.15 | 1762 | 6.15 | 1770 | 5.15 | 1778 | 4.15 | 1794 | 4.15 |
| 1802 | 5.15 | 1804 | 6.15 | 1860 | 6.15 | 1881 | 6.15 | 1936 | 6.15 |
| 1955 | 6.15 | 2053 | 8.15 | 2073 | 12.15 | 2153 | 12.15 | 2183 | 17.15 |
| 2233 | 22.15 | | | | | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 262 | .035 | 2073 | .013 | 2153 | .04 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

262 2053 164.68 175.6 204.18 .1 .3

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 305 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.55 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.02 | Wt. n-Val. | | 0.035 | 0.017 |
| W.S. Elev (ft) | 18.54 | Reach Len. (ft) | 164.68 | 175.60 | 204.18 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 21477.92 | 804.97 |
| E.G. Slope (ft/ft) | 0.000021 | Area (sq ft) | 912.03 | 21946.08 | 804.97 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22160.96 | 1094.04 |
| Top Width (ft) | 2117.39 | Top Width (ft) | 182.52 | 1791.00 | 143.87 |
| Vel Total (ft/s) | 1.04 | Avg. Vel. (ft/s) | | 1.03 | 1.36 |
| Max Chl Dpth (ft) | 15.39 | Hydr. Depth (ft) | | 12.29 | 5.59 |
| Conv. Total (cfs) | 5090791.0 | Conv. (cfs) | | 4851293.0 | 239497.9 |
| Length Wtd. (ft) | 176.87 | Wetted Per. (ft) | | 1750.19 | 144.75 |
| Min Ch El (ft) | 3.15 | Shear (lb/sq ft) | | 0.02 | 0.01 |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.02 | 0.01 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 384.36 | 6662.36 | 198.36 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 55.35 | 519.84 | 42.45 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 65.50 | 98.25 | 0.00 | 8.01 | 18.79 |
| 0.00 | 0.43 | 0.00 | | | | |
| 2 | LOB | 98.25 | 131.00 | 0.00 | 56.08 | 32.80 |
| 0.00 | 1.71 | 0.00 | | | | |
| 3 | LOB | 131.00 | 163.75 | 0.00 | 121.93 | 32.81 |
| 0.00 | 3.72 | 0.00 | | | | |
| 4 | LOB | 163.75 | 196.50 | 0.00 | 188.49 | 32.81 |
| 0.00 | 5.76 | 0.00 | | | | |
| 5 | LOB | 196.50 | 229.25 | 0.00 | 239.50 | 32.78 |
| 0.00 | 7.31 | 0.00 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | LOB | 229.25 | 262.00 | 0.00 | 298.02 | 32.84 |
| 0.00 | 9.10 | 0.00 | | | | |
| 7 | Chan | 262.00 | 305.00 | 0.00 | 468.15 | 43.01 |
| 0.00 | 10.89 | 0.00 | | | | |
| 8 | Chan | 305.00 | 523.50 | 2794.53 | 2706.41 | 219.35 |
| 12.02 | 12.39 | 1.03 | | | | |
| 9 | Chan | 523.50 | 742.00 | 3564.00 | 3127.82 | 218.68 |
| 15.33 | 14.31 | 1.14 | | | | |
| 10 | Chan | 742.00 | 960.50 | 2343.85 | 2433.38 | 218.90 |
| 10.08 | 11.14 | 0.96 | | | | |
| 11 | Chan | 960.50 | 1179.00 | 2462.49 | 2504.76 | 218.51 |
| 10.59 | 11.46 | 0.98 | | | | |
| 12 | Chan | 1179.00 | 1397.50 | 2728.56 | 2663.84 | 218.52 |
| 11.73 | 12.19 | 1.02 | | | | |
| 13 | Chan | 1397.50 | 1616.00 | 2849.28 | 2733.99 | 218.53 |
| 12.25 | 12.51 | 1.04 | | | | |
| 14 | Chan | 1616.00 | 1834.50 | 2783.34 | 2699.12 | 219.19 |
| 11.97 | 12.35 | 1.03 | | | | |
| 15 | Chan | 1834.50 | 2053.00 | 2634.91 | 2608.62 | 218.52 |
| 11.33 | 11.94 | 1.01 | | | | |
| 16 | ROB | 2053.00 | 2075.50 | 159.97 | 183.71 | 22.90 |
| 0.69 | 8.17 | 0.87 | | | | |
| 17 | ROB | 2075.50 | 2098.00 | 256.27 | 143.71 | 22.50 |
| 1.10 | 6.39 | 1.78 | | | | |
| 18 | ROB | 2098.00 | 2120.50 | 256.27 | 143.71 | 22.50 |
| 1.10 | 6.39 | 1.78 | | | | |
| 19 | ROB | 2120.50 | 2143.00 | 256.27 | 143.71 | 22.50 |
| 1.10 | 6.39 | 1.78 | | | | |
| 20 | ROB | 2143.00 | 2165.50 | 147.97 | 130.69 | 22.67 |
| 0.64 | 5.81 | 1.13 | | | | |
| 21 | ROB | 2165.50 | 2188.00 | 16.92 | 55.48 | 22.77 |
| 0.07 | 2.47 | 0.30 | | | | |
| 22 | ROB | 2188.00 | 2210.50 | 0.38 | 3.94 | 8.92 |
| 0.00 | 0.44 | 0.10 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8618

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 110 | 17.15 | 200 | 12.15 | 210 | 11.15 | 221 | 10.15 |
| 248 | 10.15 | 268 | 9.15 | 278 | 8.15 | 370 | 7.15 | 397 | 7.15 |
| 436 | 7.15 | 450 | 7.15 | 730 | 8.15 | 1023 | 9.15 | 1414 | 9.15 |
| 1438 | 8.15 | 1526 | 7.15 | 1555 | 7.15 | 1672 | 8.15 | 1688 | 9.15 |
| 1716 | 9.15 | 1893 | 9.15 | 1925 | 10.15 | 1938 | 11.15 | 1943 | 12.15 |
| 1980 | 12.15 | 2043 | 17.15 | 2080 | 22.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 268 | .035 | 1893 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|---|
| 268 | 1893 | 50 | 48.8 | 58.102 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 382 | | F |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 0 | 1910 | 9.65 |

CROSS SECTION OUTPUT Profile #PF 1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.55 | | | | |
| Vel Head (ft) | 0.04 | Wt. n-Val. | | 0.035 | 0.040 |
| W.S. Elev (ft) | 18.50 | Reach Len. (ft) | 50.00 | 48.80 | 58.10 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 13377.26 | 900.26 |
| E.G. Slope (ft/ft) | 0.000084 | Area (sq ft) | 921.96 | 14386.53 | 900.26 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22286.70 | 968.30 |
| Top Width (ft) | 1972.79 | Top Width (ft) | 187.77 | 1625.00 | 160.01 |
| Vel Total (ft/s) | 1.63 | Avg. Vel. (ft/s) | | 1.67 | 1.08 |
| Max Chl Dpth (ft) | 8.85 | Hydr. Depth (ft) | | 8.85 | 5.63 |
| Conv. Total (cfs) | 2536102.0 | Conv. (cfs) | | 2430503.0 | 105599.2 |
| Length Wtd. (ft) | 49.17 | Wetted Per. (ft) | | 1511.00 | 160.45 |
| Min Ch El (ft) | 9.65 | Shear (lb/sq ft) | | 0.05 | 0.03 |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.08 | 0.03 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 380.89 | 6589.12 | 194.36 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 54.65 | 512.95 | 41.74 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 67.00 | 100.50 | 0.00 | 9.34 | 20.29 |
| 0.00 | 0.46 | 0.00 | | | | |
| 2 | LOB | 100.50 | 134.00 | 0.00 | 59.28 | 33.55 |
| 0.00 | 1.77 | 0.00 | | | | |
| 3 | LOB | 134.00 | 167.50 | 0.00 | 121.17 | 33.55 |
| 0.00 | 3.62 | 0.00 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | LOB | 167.50 | 201.00 | 0.00 | 183.54 | 33.56 |
| 0.00 | 5.48 | 0.00 | | | | |
| 5 | LOB | 201.00 | 234.50 | 0.00 | 261.28 | 33.59 |
| 0.00 | 7.80 | 0.00 | | | | |
| 6 | LOB | 234.50 | 268.00 | 0.00 | 287.33 | 33.51 |
| 0.00 | 8.58 | 0.00 | | | | |
| 7 | Chan | 268.00 | 382.00 | 0.00 | 1009.27 | 114.00 |
| 0.00 | 8.85 | 0.00 | | | | |
| 8 | Chan | 382.00 | 597.86 | 3183.81 | 1911.04 | 215.86 |
| 13.69 | 8.85 | 1.67 | | | | |
| 9 | Chan | 597.86 | 813.71 | 3183.82 | 1911.04 | 215.86 |
| 13.69 | 8.85 | 1.67 | | | | |
| 10 | Chan | 813.71 | 1029.57 | 3183.81 | 1911.04 | 215.86 |
| 13.69 | 8.85 | 1.67 | | | | |
| 11 | Chan | 1029.57 | 1245.43 | 3183.82 | 1911.04 | 215.86 |
| 13.69 | 8.85 | 1.67 | | | | |
| 12 | Chan | 1245.43 | 1461.29 | 3183.82 | 1911.04 | 215.86 |
| 13.69 | 8.85 | 1.67 | | | | |
| 13 | Chan | 1461.29 | 1677.14 | 3183.81 | 1911.04 | 215.86 |
| 13.69 | 8.85 | 1.67 | | | | |
| 14 | Chan | 1677.14 | 1893.00 | 3183.82 | 1911.04 | 215.86 |
| 13.69 | 8.85 | 1.67 | | | | |
| 15 | ROB | 1893.00 | 1916.38 | 270.07 | 206.09 | 23.38 |
| 1.16 | 8.82 | 1.31 | | | | |
| 16 | ROB | 1916.38 | 1939.75 | 230.96 | 187.86 | 23.45 |
| 0.99 | 8.04 | 1.23 | | | | |
| 17 | ROB | 1939.75 | 1963.13 | 158.00 | 149.56 | 23.44 |
| 0.68 | 6.40 | 1.06 | | | | |
| 18 | ROB | 1963.13 | 1986.50 | 153.41 | 146.83 | 23.40 |
| 0.66 | 6.28 | 1.04 | | | | |
| 19 | ROB | 1986.50 | 2009.88 | 101.59 | 114.77 | 23.45 |
| 0.44 | 4.91 | 0.89 | | | | |
| 20 | ROB | 2009.88 | 2033.25 | 46.06 | 71.40 | 23.45 |
| 0.20 | 3.05 | 0.65 | | | | |
| 21 | ROB | 2033.25 | 2056.63 | 8.21 | 23.74 | 19.89 |
| 0.04 | 1.20 | 0.35 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8569

INPUT
Description:
Station Elevation Data num= 41

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 140 | 17.15 | 230 | 12.15 | 255 | 11.15 | 264 | 10.15 |
| 308 | 9.15 | 331 | 8.15 | 391 | 7.15 | 473 | 6.15 | 487 | 6.15 |
| 529 | 7.15 | 568 | 7.15 | 651 | 7.15 | 666 | 7.15 | 740 | 6.15 |
| 763 | 6.15 | 827 | 6.15 | 916 | 6.15 | 1007 | 6.15 | 1215 | 5.15 |
| 1237 | 5.15 | 1264 | 6.15 | 1294 | 6.15 | 1726 | 6.15 | 1743 | 6.15 |
| 1746 | 5.15 | 1751 | 4.15 | 1757 | 4.15 | 1761 | 5.15 | 1874 | 5.15 |
| 1909 | 5.15 | 1921 | 6.15 | 1926 | 7.15 | 1936 | 8.15 | 1944 | 9.15 |
| 1951 | 10.15 | 1953 | 11.15 | 1958 | 12.15 | 1997 | 12.15 | 2097 | 17.15 |
| 2134 | 22.15 | | | | | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 255 | .035 | 1958 | .013 | 1997 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 331 | 1936 | 167 | 403 | 694.2 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 429 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.54 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.02 | Wt. n-Val. | | 0.035 | 0.023 |
| W.S. Elev (ft) | 18.52 | Reach Len. (ft) | 167.00 | 403.00 | 694.20 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 18730.38 | 832.67 |
| E.G. Slope (ft/ft) | 0.000028 | Area (sq ft) | 1233.32 | 19822.96 | 832.67 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22387.20 | 867.80 |
| Top Width (ft) | 2005.32 | Top Width (ft) | 229.22 | 1605.00 | 171.10 |
| Vel Total (ft/s) | 1.19 | Avg. Vel. (ft/s) | | 1.20 | 1.04 |
| Max Chl Dpth (ft) | 14.37 | Hydr. Depth (ft) | | 12.43 | 4.87 |
| Conv. Total (cfs) | 4430919.0 | Conv. (cfs) | | 4265571.0 | 165348.2 |
| Length Wtd. (ft) | 414.83 | Wetted Per. (ft) | | 1507.62 | 171.79 |
| Min Ch El (ft) | 4.15 | Shear (lb/sq ft) | | 0.02 | 0.01 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.03 | 0.01 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 379.66 | 6569.96 | 193.20 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 54.42 | 511.14 | 41.52 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 82.75 | 124.13 | 0.00 | 8.92 | 22.36 |
| 0.00 | 0.40 | 0.00 | | | | |
| 2 | LOB | 124.13 | 165.50 | 0.00 | 70.04 | 41.42 |
| 0.00 | 1.69 | 0.00 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3 | LOB | 165.50 | 206.88 | 0.00 | 162.65 | 41.44 | |
| 0.00 | 3.93 | 0.00 | | | | | |
| 4 | LOB | 206.88 | 248.25 | 0.00 | 255.16 | 41.43 | |
| 0.00 | 6.17 | 0.00 | | | | | |
| 5 | LOB | 248.25 | 289.63 | 0.00 | 341.41 | 41.44 | |
| 0.00 | 8.25 | 0.00 | | | | | |
| 6 | LOB | 289.63 | 331.00 | 0.00 | 395.14 | 41.40 | |
| 0.00 | 9.55 | 0.00 | | | | | |
| 7 | Chan | 331.00 | 429.00 | 0.00 | 1092.58 | 98.01 | |
| 0.00 | 11.15 | 0.00 | | | | | |
| 8 | Chan | 429.00 | 617.38 | 2536.91 | 2208.09 | 188.39 | |
| 10.91 | 11.72 | 1.15 | | | | | |
| 9 | Chan | 617.38 | 805.75 | 2605.43 | 2243.65 | 188.38 | |
| 11.20 | 11.91 | 1.16 | | | | | |
| 10 | Chan | 805.75 | 994.13 | 2773.32 | 2329.27 | 188.38 | |
| 11.93 | 12.37 | 1.19 | | | | | |
| 11 | Chan | 994.13 | 1182.50 | 2921.77 | 2403.31 | 188.38 | |
| 12.56 | 12.76 | 1.22 | | | | | |
| 12 | Chan | 1182.50 | 1370.88 | 2904.23 | 2394.73 | 188.39 | |
| 12.49 | 12.71 | 1.21 | | | | | |
| 13 | Chan | 1370.88 | 1559.25 | 2773.32 | 2329.27 | 188.38 | |
| 11.93 | 12.37 | 1.19 | | | | | |
| 14 | Chan | 1559.25 | 1747.63 | 2778.13 | 2332.66 | 188.57 | |
| 11.95 | 12.38 | 1.19 | | | | | |
| 15 | Chan | 1747.63 | 1936.00 | 3094.10 | 2489.38 | 188.76 | |
| 13.31 | 13.22 | 1.24 | | | | | |
| 16 | ROB | 1936.00 | 1960.75 | 208.42 | 208.54 | 25.22 | |
| 0.90 | 8.43 | 1.00 | | | | | |
| 17 | ROB | 1960.75 | 1985.50 | 317.04 | 157.54 | 24.75 | |
| 1.36 | 6.37 | 2.01 | | | | | |
| 18 | ROB | 1985.50 | 2010.25 | 197.73 | 153.15 | 24.77 | |
| 0.85 | 6.19 | 1.29 | | | | | |
| 19 | ROB | 2010.25 | 2035.00 | 70.79 | 125.82 | 24.78 | |
| 0.30 | 5.08 | 0.56 | | | | | |
| 20 | ROB | 2035.00 | 2059.75 | 44.47 | 95.20 | 24.78 | |
| 0.19 | 3.85 | 0.47 | | | | | |
| 21 | ROB | 2059.75 | 2084.50 | 23.28 | 64.57 | 24.78 | |
| 0.10 | 2.61 | 0.36 | | | | | |
| 22 | ROB | 2084.50 | 2109.25 | 6.08 | 27.86 | 22.71 | |
| 0.03 | 1.23 | 0.22 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 8167

INPUT
Description:
Station Elevation Data num= 19

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.65 | 224.7 | 12.15 | 266.8 | 11.15 | 316.8 | 9.15 | 357.3 | 7.15 |
| 462.5 | 6.15 | 569.5 | 6.15 | 682.6 | 6.15 | 690.5 | 5.15 | 692.1 | 4.15 |
| 699.2 | 4.15 | 700.7 | 5.15 | 1411.2 | 6.11 | 1443.4 | 6.15 | 1484.3 | 7.15 |
| 1496.9 | 8.15 | 1521.3 | 12.15 | 1785.4 | 17.15 | 1857.3 | 21.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 357.3 | .035 | 1484.3 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 357.3 | 1484.3 | 164.3 | 406.6 | 536.4 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 507 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.52 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.05 | Wt. n-Val. | | 0.035 | 0.040 |
| W.S. Elev (ft) | 18.47 | Reach Len. (ft) | 164.30 | 406.60 | 536.40 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 12412.99 | 1363.93 |
| E.G. Slope (ft/ft) | 0.000060 | Area (sq ft) | 1548.52 | 14204.73 | 1363.93 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22233.47 | 1021.53 |
| Top Width (ft) | 1719.68 | Top Width (ft) | 267.85 | 1127.00 | 324.83 |
| Vel Total (ft/s) | 1.69 | Avg. Vel. (ft/s) | | 1.79 | 0.75 |
| Max Chl Dpth (ft) | 14.32 | Hydr. Depth (ft) | | 12.70 | 4.20 |
| Conv. Total (cfs) | 2999264.0 | Conv. (cfs) | | 2867514.0 | 131749.8 |
| Length Wtd. (ft) | 414.26 | Wetted Per. (ft) | | 977.97 | 325.28 |
| Min Ch El (ft) | 4.15 | Shear (lb/sq ft) | | 0.05 | 0.02 |
| Alpha | 1.09 | Stream Power (lb/ft s) | | 0.09 | 0.01 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 374.32 | 6412.56 | 175.70 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 53.46 | 498.50 | 37.57 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 89.33 | 133.99 | 0.00 | 46.35 | 44.59 |
| 0.00 | 1.04 | 0.00 | | | | |
| 2 | LOB | 133.99 | 178.65 | 0.00 | 139.56 | 44.71 |
| 0.00 | 3.12 | 0.00 | | | | |
| 3 | LOB | 178.65 | 223.31 | 0.00 | 232.77 | 44.71 |
| 0.00 | 5.21 | 0.00 | | | | |
| 4 | LOB | 223.31 | 267.98 | 0.00 | 304.48 | 44.68 |
| 0.00 | 6.82 | 0.00 | | | | |
| 5 | LOB | 267.98 | 312.64 | 0.00 | 368.93 | 44.70 |
| 0.00 | 8.26 | 0.00 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | LOB | 312.64 | 357.30 | 0.00 | 456.42 | 44.72 | |
| 0.00 | 10.22 | 0.00 | | | | | |
| 7 | Chan | 357.30 | 507.00 | 0.00 | 1791.74 | 149.70 | |
| 0.00 | 11.97 | 0.00 | | | | | |
| 8 | Chan | 507.00 | 646.61 | 3019.28 | 1720.08 | 139.61 | |
| 12.98 | 12.32 | 1.76 | | | | | |
| 9 | Chan | 646.61 | 786.23 | 3317.43 | 1823.46 | 140.27 | |
| 14.27 | 13.06 | 1.82 | | | | | |
| 10 | Chan | 786.23 | 925.84 | 3348.85 | 1830.39 | 139.61 | |
| 14.40 | 13.11 | 1.83 | | | | | |
| 11 | Chan | 925.84 | 1065.46 | 3268.92 | 1804.05 | 139.61 | |
| 14.06 | 12.92 | 1.81 | | | | | |
| 12 | Chan | 1065.46 | 1205.07 | 3189.78 | 1777.71 | 139.61 | |
| 13.72 | 12.73 | 1.79 | | | | | |
| 13 | Chan | 1205.07 | 1344.69 | 3111.41 | 1751.38 | 139.61 | |
| 13.38 | 12.54 | 1.78 | | | | | |
| 14 | Chan | 1344.69 | 1484.30 | 2977.80 | 1705.92 | 139.63 | |
| 12.81 | 12.22 | 1.75 | | | | | |
| 15 | ROB | 1484.30 | 1530.93 | 411.84 | 399.30 | 46.99 | |
| 1.77 | 8.56 | 1.03 | | | | | |
| 16 | ROB | 1530.93 | 1577.55 | 209.81 | 265.61 | 46.63 | |
| 0.90 | 5.70 | 0.79 | | | | | |
| 17 | ROB | 1577.55 | 1624.18 | 158.48 | 224.45 | 46.63 | |
| 0.68 | 4.81 | 0.71 | | | | | |
| 18 | ROB | 1624.18 | 1670.80 | 113.07 | 183.29 | 46.63 | |
| 0.49 | 3.93 | 0.62 | | | | | |
| 19 | ROB | 1670.80 | 1717.43 | 74.01 | 142.14 | 46.63 | |
| 0.32 | 3.05 | 0.52 | | | | | |
| 20 | ROB | 1717.43 | 1764.05 | 41.86 | 100.98 | 46.63 | |
| 0.18 | 2.17 | 0.41 | | | | | |
| 21 | ROB | 1764.05 | 1810.68 | 12.46 | 48.17 | 45.12 | |
| 0.05 | 1.07 | 0.26 | | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 7761

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.65 | 157.8 | 12.15 | 166.2 | 11.15 | 184.5 | 10.15 | 197.2 | 8.15 |
| 276.6 | 7.15 | 326.8 | 6.15 | 545 | 6.15 | 569.5 | 6.11 | 1134.6 | 5.15 |
| 1178.9 | 4.15 | 1191 | 3.15 | 1193 | 2.15 | 1197.2 | 2.15 | 1199.2 | 3.15 |
| 1213.8 | 4.15 | 1254.5 | 4.15 | 1297.2 | 3.15 | 1298.2 | 2.15 | 1308.7 | 3.15 |
| 1314.5 | 4.15 | 1333.6 | 7.15 | 1356.7 | 8.15 | 1371.8 | 12.15 | 1411.2 | 12.72 |
| 1718.6 | 17.15 | 1819.1 | 22.15 | 1857.3 | 24.15 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 197.2 | .035 | 1333.6 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 197.2 | 1333.6 | 113.2 | 300.3 | 337 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 704.8 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 18.48 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.10 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 18.38 | Reach Len. (ft) | 113.20 | 300.30 |
| 337.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 8381.86 |
| 1682.06 | | | | |
| E.G. Slope (ft/ft) | 0.000116 | Area (sq ft) | 607.35 | 14468.91 |
| 1682.06 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 21530.29 |
| 1724.71 | | | | |
| Top Width (ft) | 1679.28 | Top Width (ft) | 133.08 | 1136.40 |
| 409.80 | | | | |
| Vel Total (ft/s) | 2.31 | Avg. Vel. (ft/s) | | 2.57 |
| 1.03 | | | | |
| Max Chl Dpth (ft) | 16.23 | Hydr. Depth (ft) | | 13.33 |
| 4.10 | | | | |
| Conv. Total (cfs) | 2157729.0 | Conv. (cfs) | | 1997701.0 |
| 160028.1 | | | | |
| Length Wtd. (ft) | 302.12 | Wetted Per. (ft) | | 630.15 |
| 410.41 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.10 |
| 0.03 | | | | |
| Alpha | 1.16 | Stream Power (lb/ft s) | | 0.25 |
| 0.03 | | | | |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 370.26 | 6278.73 |
| 156.95 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 52.71 | 487.94 |
| 33.05 | | | | |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 49.30 | 73.95 | 0.00 | 3.22 | 9.85 |
| 0.00 | 0.33 | 0.00 | | | | |
| 2 | LOB | 73.95 | 98.60 | 0.00 | 36.34 | 24.70 |
| 0.00 | 1.47 | 0.00 | | | | |
| 3 | LOB | 98.60 | 123.25 | 0.00 | 76.77 | 24.70 |
| 0.00 | 3.11 | 0.00 | | | | |
| 4 | LOB | 123.25 | 147.90 | 0.00 | 117.21 | 24.70 |
| 0.00 | 4.75 | 0.00 | | | | |
| 5 | LOB | 147.90 | 172.55 | 0.00 | 162.05 | 24.74 |
| 0.00 | 6.57 | 0.00 | | | | |
| 6 | LOB | 172.55 | 197.20 | 0.00 | 211.76 | 24.82 |
| 0.00 | 8.59 | 0.00 | | | | |
| 7 | Chan | 197.20 | 324.10 | 0.00 | 1408.32 | 126.92 |
| 0.00 | 11.10 | 0.00 | | | | |
| 8 | Chan | 324.10 | 451.00 | 0.00 | 1552.38 | 126.90 |
| 0.00 | 12.23 | 0.00 | | | | |
| 9 | Chan | 451.00 | 577.90 | 0.00 | 1553.34 | 126.90 |
| 0.00 | 12.24 | 0.00 | | | | |
| 10 | Chan | 577.90 | 704.80 | 0.00 | 1573.02 | 126.90 |
| 0.00 | 12.40 | 0.00 | | | | |
| 11 | Chan | 704.80 | 862.00 | 4924.72 | 1986.54 | 157.20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21.18 | 12.64 | 2.48 | | | | |
| 12 | Chan | 862.00 | 1019.20 | 5099.39 | 2028.52 | 157.20 |
| 21.93 | 12.90 | 2.51 | | | | |
| 13 | Chan | 1019.20 | 1176.40 | 5353.94 | 2088.74 | 157.21 |
| 23.02 | 13.29 | 2.56 | | | | |
| 14 | Chan | 1176.40 | 1333.60 | 6152.25 | 2278.06 | 158.54 |
| 26.46 | 14.49 | 2.70 | | | | |
| 15 | ROB | 1333.60 | 1399.06 | 748.29 | 536.84 | 66.01 |
| 3.22 | 8.20 | 1.39 | | | | |
| 16 | ROB | 1399.06 | 1464.53 | 371.16 | 351.33 | 65.47 |
| 1.60 | 5.37 | 1.06 | | | | |
| 17 | ROB | 1464.53 | 1529.99 | 268.92 | 289.57 | 65.47 |
| 1.16 | 4.42 | 0.93 | | | | |
| 18 | ROB | 1529.99 | 1595.45 | 180.30 | 227.81 | 65.47 |
| 0.78 | 3.48 | 0.79 | | | | |
| 19 | ROB | 1595.45 | 1660.91 | 106.45 | 166.06 | 65.47 |
| 0.46 | 2.54 | 0.64 | | | | |
| 20 | ROB | 1660.91 | 1726.38 | 48.20 | 103.23 | 65.48 |
| 0.21 | 1.58 | 0.47 | | | | |
| 21 | ROB | 1726.38 | 1791.84 | 1.40 | 7.21 | 17.04 |
| 0.01 | 0.42 | 0.19 | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 7461

INPUT
Description: Upstream of I-5
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 185 | 22.15 | 268.6 | 12.15 | 306.5 | 10.15 | 359.1 | 9.15 |
| 368.5 | 8.15 | 486 | 7.15 | 533.1 | 6.15 | 590.7 | 6.15 | 696.6 | 6.15 |
| 722.74 | 5.15 | 986.5 | 5.15 | 1286.5 | 6.15 | 1342.6 | 2.15 | 1557.6 | 2.15 |
| 1558.7 | 4.15 | 1564.5 | 6.44 | 1566.3 | 7.15 | 1577.8 | 12.15 | 1583.3 | 16 |
| 1660 | 16 | 1727 | 16.4 | 1843 | 16.4 | 1947.8 | 19.7 | 2010.6 | 21.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 722.74 | .035 | 1566.3 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 722.74 | 1566.3 | 578.1 | 581.2 | 546.8 | .3 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1098.3 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 18.43 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.17 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 18.25 | Reach Len. (ft) | 209.00 | 209.00 |
| 209.00 | | | | |
| Crit W.S. (ft) | 8.19 | Flow Area (sq ft) | | 6703.43 |
| 702.38 | | | | |
| E.G. Slope (ft/ft) | 0.000184 | Area (sq ft) | 5069.29 | 11604.28 |
| 702.38 | | | | |

| | | | | |
|---|---|---|---|---|
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22679.23 |
| 575.77 | | | | |
| Top Width (ft) | 1684.35 | Top Width (ft) | 505.18 | 843.56 |
| 335.61 | | | | |
| Vel Total (ft/s) | 3.14 | Avg. Vel. (ft/s) | | 3.38 |
| 0.82 | | | | |
| Max Chl Dpth (ft) | 16.10 | Hydr. Depth (ft) | | 14.32 |
| 2.09 | | | | |
| Conv. Total (cfs) | 1716493.0 | Conv. (cfs) | | 1673994.0 |
| 42498.4 | | | | |
| Length Wtd. (ft) | 209.00 | Wetted Per. (ft) | | 469.90 |
| 337.89 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.16 |
| 0.02 | | | | |
| Alpha | 1.13 | Stream Power (lb/ft s) | | 0.55 |
| 0.02 | | | | |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 362.88 | 6188.86 |
| 147.72 | | | | |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 51.88 | 481.12 |
| 30.16 | | | | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr | Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|
| 1 | LOB | | 180.69 | 271.03 | 0.00 | 170.76 | 53.83 |
| 0.00 | | 3.19 | 0.00 | | | | |
| 2 | LOB | | 271.03 | 361.37 | 0.00 | 727.86 | 90.41 |
| 0.00 | | 8.06 | 0.00 | | | | |
| 3 | LOB | | 361.37 | 451.71 | 0.00 | 939.66 | 90.39 |
| 0.00 | | 10.40 | 0.00 | | | | |
| 4 | LOB | | 451.71 | 542.06 | 0.00 | 1030.75 | 90.35 |
| 0.00 | | 11.41 | 0.00 | | | | |
| 5 | LOB | | 542.06 | 632.40 | 0.00 | 1093.59 | 90.34 |
| 0.00 | | 12.10 | 0.00 | | | | |
| 6 | LOB | | 632.40 | 722.74 | 0.00 | 1106.66 | 90.36 |
| 0.00 | | 12.25 | 0.00 | | | | |
| 7 | Chan | | 722.74 | 816.63 | 0.00 | 1230.42 | 93.89 |
| 0.00 | | 13.10 | 0.00 | | | | |
| 8 | Chan | | 816.63 | 910.52 | 0.00 | 1230.42 | 93.89 |
| 0.00 | | 13.10 | 0.00 | | | | |
| 9 | Chan | | 910.52 | 1004.41 | 0.00 | 1229.89 | 93.89 |
| 0.00 | | 13.10 | 0.00 | | | | |
| 10 | Chan | | 1004.41 | 1098.30 | 0.00 | 1210.12 | 93.89 |
| 0.00 | | 12.89 | 0.00 | | | | |
| 11 | Chan | | 1098.30 | 1215.30 | 4521.66 | 1466.86 | 117.00 |
| 19.44 | | 12.54 | 3.08 | | | | |
| 12 | Chan | | 1215.30 | 1332.30 | 4687.53 | 1499.51 | 117.12 |
| 20.16 | | 12.82 | 3.13 | | | | |
| 13 | Chan | | 1332.30 | 1449.30 | 6839.75 | 1880.49 | 117.03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 29.41 | 16.07 | 3.64 | | | | | |
| 14 | Chan | | 1449.30 | 1566.30 | 6630.29 | 1856.57 | 118.75 |
| 28.51 | 15.87 | 3.57 | | | | | |
| 15 | ROB | | 1566.30 | 1621.84 | 228.18 | 208.84 | 57.79 |
| 0.98 | 3.76 | 1.09 | | | | | |
| 16 | ROB | | 1621.84 | 1677.38 | 98.72 | 124.33 | 55.54 |
| 0.42 | 2.24 | 0.79 | | | | | |
| 17 | ROB | | 1677.38 | 1732.91 | 80.94 | 110.37 | 55.54 |
| 0.35 | 1.99 | 0.73 | | | | | |
| 18 | ROB | | 1732.91 | 1788.45 | 72.16 | 103.02 | 55.54 |
| 0.31 | 1.85 | 0.70 | | | | | |
| 19 | ROB | | 1788.45 | 1843.99 | 72.14 | 103.00 | 55.54 |
| 0.31 | 1.85 | 0.70 | | | | | |
| 20 | ROB | | 1843.99 | 1899.53 | 23.62 | 52.73 | 55.57 |
| 0.10 | 0.95 | 0.45 | | | | | |
| 21 | ROB | | 1899.53 | 1955.06 | 0.00 | 0.09 | 2.38 |
| 0.00 | 0.04 | 0.05 | | | | | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: San Elijo Lagoon
REACH: Lower RS: 7100

INPUT
Description: Interstate 5 San Elijo Lagoon Bridge
Distance from Upstream XS = 209
Deck/Roadway Width = 162
Weir Coefficient = 2.61
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 42.15 | 0 | 1307 | 42.15 | 0 | 1307 | 42.15 | 37.15 |
| 1667 | 39.15 | 34.15 | 1667 | 39.15 | 0 | 2011 | 39.15 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 185 | 22.15 | 268.6 | 12.15 | 306.5 | 10.15 | 359.1 | 9.15 |
| 368.5 | 8.15 | 486 | 7.15 | 533.1 | 6.15 | 590.7 | 6.15 | 696.6 | 6.15 |
| 722.74 | 5.15 | 986.5 | 5.15 | 1286.5 | 6.15 | 1342.6 | 2.15 | 1557.6 | 2.15 |
| 1558.7 | 4.15 | 1564.5 | 6.44 | 1566.3 | 7.15 | 1577.8 | 12.15 | 1583.3 | 16 |
| 1660 | 16 | 1727 | 16.4 | 1843 | 16.4 | 1947.8 | 19.7 | 2010.6 | 21.15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 722.74 | .035 | 1566.3 | .04 |

Bank Sta: Left Right Coeff Contr. Expan.
722.74 1566.3 .3 .5
Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1098.3 | | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 42.15 | 0 | 1509 | 42.15 | 0 | 1509 | 42.15 | 37.15 |
| 1869 | 39.15 | 34.15 | 1869 | 39.15 | 0 | 2500 | 39.15 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 249.7 | 12.15 | 383.5 | 11.15 | 414.1 | 10.15 | 429.6 | 9.15 |
| 478.8 | 8.15 | 529.3 | 7.15 | 564.2 | 6.15 | 710.7 | 6.15 | 834 | 6.15 |
| 1064.8 | 5.15 | 1109.9 | 5.05 | 1315.8 | 5.65 | 1378.7 | 6.15 | 1460 | 5.15 |
| 1486.3 | 4.15 | 1493.4 | 4.15 | 1495.9 | 2.15 | 1504.2 | 2.15 | 1509.3 | 4.15 |
| 1530 | 4.15 | 1544 | 2.15 | 1759 | 2.15 | 1766.4 | 7.15 | 1780.8 | 17 |
| 1835.1 | 17 | 2019 | 16.4 | 2055 | 19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 1315.8 | .035 | 1766.4 | .04 |

Bank Sta: Left Right Coeff Contr. Expan.
1315.8 1766.4 .3 .5

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1315.8 | 30 | F |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 1307 | 37.15 | 1342.6 | 2.15 |

Downstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 1509 | 37.15 | 1544 | 2.15 |

Abutment Data
Upstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 1637 | 16 | 1667 | 34.15 |

Downstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 1837 | 17 | 1869 | 34.15 |

Number of Piers = 3

Pier Data
Pier Station Upstream= 1397 Downstream= 1599
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -11.35 | 5 | 37.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 5 | -11.35 | 5 | 37.15 |

```
Pier Data
Pier Station     Upstream=    1487    Downstream=    1689
Upstream      num=        2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15
Downstream    num=        2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15

Pier Data
Pier Station     Upstream=    1577    Downstream=    1779
Upstream      num=        2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15
Downstream    num=        2
    Width    Elev     Width    Elev
        5  -11.35         5   37.15

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)                  18.43    Element                Inside BR US
Inside BR DS
  W.S. US. (ft)                  18.25    E.G. Elev (ft)               18.19
18.01
  Q Total (cfs)                23255.00   W.S. Elev (ft)               17.49
17.26
  Q Bridge (cfs)               23255.00   Crit W.S. (ft)                9.42
 9.40
  Q Weir (cfs)                            Max Chl Dpth (ft)            15.34
15.11
  Weir Sta Lft (ft)                       Vel Total (ft/s)              6.58
 6.86
  Weir Sta Rgt (ft)                       Flow Area (sq ft)          3531.70
3388.07
  Weir Submerg                            Froude # Chl                  0.31
 0.32
  Weir Max Depth (ft)                     Specif Force (cu ft)      30603.94
29835.12
  Min El Weir Flow (ft)          39.16    Hydr Depth (ft)              11.87
11.54
  Min El Prs (ft)                37.15    W.P. Total (ft)             379.74
```

| | | | |
|---|---|---|---|
| 367.54 | | | |
| Delta EG (ft) | 0.78 | Conv. Total (cfs) | 730857.0 |
| 708580.6 | | | |
| Delta WS (ft) | 0.82 | Top Width (ft) | 297.46 |
| 293.62 | | | |
| BR Open Area (sq ft) | 9267.44 | Frctn Loss (ft) | 0.17 |
| 0.09 | | | |
| BR Open Vel (ft/s) | 6.86 | C & E Loss (ft) | 0.01 |
| 0.27 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.59 |
| 0.62 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 3.87 |
| 4.25 | | | |

Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than
the downstream energy. This is not physically possible, the momentum answer has been
disregarded.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 6881

INPUT
Description: Downstream of I-5
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 249.7 | 12.15 | 383.5 | 11.15 | 414.1 | 10.15 | 429.6 | 9.15 |
| 478.8 | 8.15 | 529.3 | 7.15 | 564.2 | 6.15 | 710.7 | 6.15 | 834 | 6.15 |
| 1064.8 | 5.15 | 1109.9 | 5.05 | 1315.8 | 5.65 | 1378.7 | 6.15 | 1460 | 5.15 |
| 1486.3 | 4.15 | 1493.4 | 4.15 | 1495.9 | 2.15 | 1504.2 | 2.15 | 1509.3 | 4.15 |
| 1530 | 4.15 | 1544 | 2.15 | 1759 | 2.15 | 1766.4 | 7.15 | 1780.8 | 17 |
| 1835.1 | 17 | 2019 | 16.4 | 2055 | 19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 1315.8 | .035 | 1766.4 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1315.8 | 1766.4 | 419.4 | 199.3 | 204.6 | .3 .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1315.8 | 30 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.65 | Element | Left OB | Channel |

| | | | | |
|---|---|---|---|---|
| Right OB | | | | |
| Vel Head (ft) | 0.21 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 17.44 | Reach Len. (ft) | 419.40 | 199.30 |
| 204.60 | | | | |
| Crit W.S. (ft) | 8.02 | Flow Area (sq ft) | | 6207.43 |
| 244.50 | | | | |
| E.G. Slope (ft/ft) | 0.000235 | Area (sq ft) | 11451.66 | 6207.43 |
| 244.50 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23124.68 |
| 130.32 | | | | |
| Top Width (ft) | 1871.74 | Top Width (ft) | 1154.15 | 450.60 |
| 266.99 | | | | |
| Vel Total (ft/s) | 3.60 | Avg. Vel. (ft/s) | | 3.73 |
| 0.53 | | | | |
| Max Chl Dpth (ft) | 15.29 | Hydr. Depth (ft) | | 13.78 |
| 0.92 | | | | |
| Conv. Total (cfs) | 1516744.0 | Conv. (cfs) | | 1508244.0 |
| 8499.9 | | | | |
| Length Wtd. (ft) | 199.33 | Wetted Per. (ft) | | 453.38 |
| 270.07 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.20 |
| 0.01 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | | 0.75 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 323.09 | 6117.57 |
| 144.41 | | | | |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 47.88 | 476.06 |
| 28.14 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 164.48 | 0.00 | 0.24 | 2.83 |
| 0.00 | 0.08 | 0.00 | | | | |
| 2 | LOB | 164.48 | 328.95 | 0.00 | 675.25 | 164.63 |
| 0.00 | 4.11 | 0.00 | | | | |
| 3 | LOB | 328.95 | 493.43 | 0.00 | 1230.84 | 164.54 |
| 0.00 | 7.48 | 0.00 | | | | |
| 4 | LOB | 493.43 | 657.90 | 0.00 | 1790.72 | 164.50 |
| 0.00 | 10.89 | 0.00 | | | | |
| 5 | LOB | 657.90 | 822.38 | 0.00 | 1856.79 | 164.48 |
| 0.00 | 11.29 | 0.00 | | | | |
| 6 | LOB | 822.38 | 986.85 | 0.00 | 1907.40 | 164.48 |
| 0.00 | 11.60 | 0.00 | | | | |
| 7 | LOB | 986.85 | 1151.33 | 0.00 | 2012.00 | 164.48 |
| 0.00 | 12.23 | 0.00 | | | | |
| 8 | LOB | 1151.33 | 1315.80 | 0.00 | 1978.44 | 164.48 |
| 0.00 | 12.03 | 0.00 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | Chan | 1315.80 | 1372.13 | 2153.20 | 651.42 | 56.33 |
| 9.26 | 11.57 | 3.31 | | | | |
| 10 | Chan | 1372.13 | 1428.45 | 2152.27 | 651.26 | 56.33 |
| 9.26 | 11.56 | 3.30 | | | | |
| 11 | Chan | 1428.45 | 1484.78 | 2413.85 | 697.73 | 56.35 |
| 10.38 | 12.39 | 3.46 | | | | |
| 12 | Chan | 1484.78 | 1541.10 | 2875.94 | 781.47 | 57.52 |
| 12.37 | 13.87 | 3.68 | | | | |
| 13 | Chan | 1541.10 | 1597.43 | 3423.59 | 860.56 | 56.35 |
| 14.72 | 15.28 | 3.98 | | | | |
| 14 | Chan | 1597.43 | 1653.75 | 3428.77 | 861.16 | 56.32 |
| 14.74 | 15.29 | 3.98 | | | | |
| 15 | Chan | 1653.75 | 1710.08 | 3428.78 | 861.16 | 56.33 |
| 14.74 | 15.29 | 3.98 | | | | |
| 16 | Chan | 1710.08 | 1766.40 | 3248.29 | 842.66 | 57.86 |
| 13.97 | 14.96 | 3.85 | | | | |
| 17 | ROB | 1766.40 | 1802.48 | 69.91 | 86.76 | 39.12 |
| 0.30 | 2.41 | 0.81 | | | | |
| 18 | ROB | 1802.48 | 1838.55 | 4.35 | 15.86 | 36.08 |
| 0.02 | 0.44 | 0.27 | | | | |
| 19 | ROB | 1838.55 | 1874.63 | 5.55 | 18.37 | 36.08 |
| 0.02 | 0.51 | 0.30 | | | | |
| 20 | ROB | 1874.63 | 1910.70 | 7.85 | 22.62 | 36.08 |
| 0.03 | 0.63 | 0.35 | | | | |
| 21 | ROB | 1910.70 | 1946.78 | 10.46 | 26.86 | 36.08 |
| 0.04 | 0.74 | 0.39 | | | | |
| 22 | ROB | 1946.78 | 1982.85 | 13.36 | 31.11 | 36.08 |
| 0.06 | 0.86 | 0.43 | | | | |
| 23 | ROB | 1982.85 | 2018.93 | 16.53 | 35.36 | 36.08 |
| 0.07 | 0.98 | 0.47 | | | | |
| 24 | ROB | 2018.93 | 2055.00 | 2.32 | 7.55 | 14.50 |
| 0.01 | 0.52 | 0.31 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 6682

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 81.8 | 12.15 | 108 | 11.15 | 126.6 | 10.15 | 139.9 | 9.15 |
| 178.7 | 7.15 | 199.8 | 6.15 | 222.7 | 5.15 | 235.3 | 5.15 | 379.1 | 4.15 |
| 409.3 | 3.15 | 410.4 | 2.15 | 479 | 2.15 | 480.3 | 3.15 | 537.9 | 4.15 |
| 581.1 | 5.15 | 828.3 | 5.15 | 849.6 | 4.15 | 855 | 3.15 | 856.1 | 2.15 |
| 926.2 | 2.15 | 931.6 | 3.15 | 1269.4 | 4.15 | 1341.6 | 4.15 | 1353.1 | 3.15 |
| 1357.5 | 2.15 | 1406.8 | 2.15 | 1407.8 | 3.15 | 1413.4 | 4.15 | 1453.9 | 6.15 |
| 1494.1 | 6.15 | 1535.2 | 7.15 | 1540.2 | 7.91 | 1541.8 | 8.15 | 1555.1 | 12.15 |
| 1569.1 | 17.5 | 1648.1 | 17.5 | 1771.1 | 19.15 | | | | |

Manning's n Values num= 5

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|---|---|
| 0 | .04 | 235.3 | .035 | 1453.9 | .04 | 1569.1 | .013 | 1648.1 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 235.3 | 1540.2 | 389.6 | 265.9 | 226 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 695.7 | 30 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.55 | | | | |
| Vel Head (ft) | 0.06 | Wt. n-Val. | | 0.035 | 0.040 |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 389.60 | 265.90 | 226.00 |
| Crit W.S. (ft) | 6.93 | Flow Area (sq ft) | | 11318.55 | 150.07 |
| E.G. Slope (ft/ft) | 0.000074 | Area (sq ft) | 1518.85 | 17436.84 | 150.07 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23116.26 | 138.74 |
| Top Width (ft) | 1530.95 | Top Width (ft) | 197.18 | 1304.90 | 28.87 |
| Vel Total (ft/s) | 2.03 | Avg. Vel. (ft/s) | | 2.04 | 0.92 |
| Max Chl Dpth (ft) | 15.34 | Hydr. Depth (ft) | | 13.40 | 5.20 |
| Conv. Total (cfs) | 2704984.0 | Conv. (cfs) | | 2688845.0 | 16138.6 |
| Length Wtd. (ft) | 265.65 | Wetted Per. (ft) | | 845.87 | 30.47 |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | | 0.06 | 0.02 |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.13 | 0.02 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 260.65 | 6063.48 | 143.48 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 41.38 | 472.04 | 27.45 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 29.41 | 58.83 | 0.00 | 26.21 | 20.86 |
| 0.00 | 1.27 | 0.00 | | | | |
| 2 | LOB | 58.83 | 88.24 | 0.00 | 125.59 | 29.59 |
| 0.00 | 4.27 | 0.00 | | | | |
| 3 | LOB | 88.24 | 117.65 | 0.00 | 181.52 | 29.44 |
| 0.00 | 6.17 | 0.00 | | | | |
| 4 | LOB | 117.65 | 147.06 | 0.00 | 228.87 | 29.47 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.00 | 7.78 | 0.00 | | | | | |
| 5 | LOB | | 147.06 | 176.48 | 0.00 | 278.45 | 29.45 |
| 0.00 | 9.47 | 0.00 | | | | | |
| 6 | LOB | | 176.48 | 205.89 | 0.00 | 321.44 | 29.44 |
| 0.00 | 10.93 | 0.00 | | | | | |
| 7 | LOB | | 205.89 | 235.30 | 0.00 | 356.78 | 29.43 |
| 0.00 | 12.13 | 0.00 | | | | | |
| 8 | Chan | | 235.30 | 388.77 | 0.00 | 1976.88 | 153.48 |
| 0.00 | 12.88 | 0.00 | | | | | |
| 9 | Chan | | 388.77 | 542.23 | 0.00 | 2230.17 | 154.21 |
| 0.00 | 14.53 | 0.00 | | | | | |
| 10 | Chan | | 542.23 | 695.70 | 0.00 | 1911.25 | 153.48 |
| 0.00 | 12.45 | 0.00 | | | | | |
| 11 | Chan | | 695.70 | 864.60 | 4202.18 | 2131.21 | 169.40 |
| 18.07 | 12.62 | 1.97 | | | | | |
| 12 | Chan | | 864.60 | 1033.50 | 5385.62 | 2470.94 | 168.99 |
| 23.16 | 14.63 | 2.18 | | | | | |
| 13 | Chan | | 1033.50 | 1202.40 | 4881.13 | 2328.84 | 168.90 |
| 20.99 | 13.79 | 2.10 | | | | | |
| 14 | Chan | | 1202.40 | 1371.30 | 4776.86 | 2299.70 | 169.06 |
| 20.54 | 13.62 | 2.08 | | | | | |
| 15 | Chan | | 1371.30 | 1540.20 | 3870.47 | 2087.86 | 169.52 |
| 16.64 | 12.36 | 1.85 | | | | | |
| 16 | ROB | | 1540.20 | 1569.06 | 138.74 | 150.07 | 30.45 |
| 0.60 | 5.20 | 0.92 | | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 6416

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 43 | 22.15 | 100 | 17.15 | 164 | 11.15 | 177 | 10.15 |
| 197 | 9.15 | 217 | 8.15 | 222 | 7.15 | 238 | 6.15 | 255 | 5.15 |
| 379 | 4.15 | 413 | 4.15 | 414 | 2.15 | 448 | 2.15 | 449 | 4.15 |
| 492 | 4.15 | 493 | 2.15 | 571 | 2.15 | 572 | 4.15 | 602 | 4.15 |
| 605 | 2.15 | 740 | 1.15 | 742 | 4.15 | 754 | 4.15 | 1218 | 5.15 |
| 1247 | 6.15 | 1341 | 7.15 | 1356 | 8.15 | 1394 | 9.15 | 1420 | 9.15 |
| 1467 | 9.15 | 1503 | 10.15 | 1527 | 11.15 | 1530 | 12.15 | 1565 | 15.15 |
| 1605 | 15.15 | 1754 | 17.15 | 1850 | 22.15 | | | | |

Manning's n Values num= 5

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|---|---|
| 0 | .04 | 238 | .035 | 1218 | .04 | 1565 | .013 | 1605 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 222 | 1341 | 587 | 495.5 490.8 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft) 17.53 Element Left OB Channel Right OB

| | | | | |
|---|---|---|---|---|
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.040 | 0.035 |
| 0.038 | | | | |
| W.S. Elev (ft) | 17.50 | Reach Len. (ft) | 587.00 | 495.50 |
| 490.80 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 687.53 | 14873.31 |
| 1989.66 | | | | |
| E.G. Slope (ft/ft) | 0.000037 | Area (sq ft) | 687.53 | 14873.31 |
| 1989.66 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 477.70 | 21144.14 |
| 1633.16 | | | | |
| Top Width (ft) | 1664.74 | Top Width (ft) | 126.00 | 1119.00 |
| 419.74 | | | | |
| Vel Total (ft/s) | 1.33 | Avg. Vel. (ft/s) | 0.69 | 1.42 |
| 0.82 | | | | |
| Max Chl Dpth (ft) | 16.35 | Hydr. Depth (ft) | 5.46 | 13.29 |
| 4.74 | | | | |
| Conv. Total (cfs) | 3843772.0 | Conv. (cfs) | 78957.5 | 3494872.0 |
| 269942.1 | | | | |
| Length Wtd. (ft) | 498.38 | Wetted Per. (ft) | 126.49 | 1126.25 |
| 420.13 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.01 | 0.03 |
| 0.01 | | | | |
| Alpha | 1.08 | Stream Power (lb/ft s) | 0.01 | 0.04 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 250.78 | 5964.87 |
| 137.93 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 39.93 | 464.64 |
| 26.28 | | | | |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 83.25 | 111.00 | 1.54 | 10.24 | 15.07 |
| 0.01 | 0.68 | 0.15 | | | | |
| 2 | LOB | 111.00 | 138.75 | 27.86 | 74.46 | 27.87 |
| 0.12 | 2.68 | 0.37 | | | | |
| 3 | LOB | 138.75 | 166.50 | 86.19 | 146.60 | 27.87 |
| 0.37 | 5.28 | 0.59 | | | | |
| 4 | LOB | 166.50 | 194.25 | 153.66 | 207.19 | 27.80 |
| 0.66 | 7.47 | 0.74 | | | | |
| 5 | LOB | 194.25 | 222.00 | 208.44 | 249.05 | 27.88 |
| 0.90 | 8.97 | 0.84 | | | | |
| 6 | Chan | 222.00 | 361.88 | 2371.15 | 1741.16 | 139.94 |
| 10.20 | 12.45 | 1.36 | | | | |
| 7 | Chan | 361.88 | 501.75 | 2855.69 | 1954.79 | 143.58 |
| 12.28 | 13.98 | 1.46 | | | | |
| 8 | Chan | 501.75 | 641.63 | 3215.75 | 2088.19 | 141.72 |
| 13.83 | 14.93 | 1.54 | | | | |
| 9 | Chan | 641.63 | 781.50 | 3324.68 | 2128.94 | 141.48 |
| 14.30 | 15.22 | 1.56 | | | | |
| 10 | Chan | 781.50 | 921.38 | 2622.62 | 1838.10 | 139.88 |
| 11.28 | 13.14 | 1.43 | | | | |
| 11 | Chan | 921.38 | 1061.25 | 2523.12 | 1795.94 | 139.88 |
| 10.85 | 12.84 | 1.40 | | | | |
| 12 | Chan | 1061.25 | 1201.13 | 2425.16 | 1753.77 | 139.88 |
| 10.43 | 12.54 | 1.38 | | | | |
| 13 | Chan | 1201.13 | 1341.00 | 1805.95 | 1572.41 | 139.90 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7.77 | 11.24 | 1.15 | | | | |
| 14 | ROB | 1341.00 | 1404.63 | 540.47 | 572.83 | 63.67 |
| 2.32 | 9.00 | 0.94 | | | | |
| 15 | ROB | 1404.63 | 1468.25 | 476.99 | 531.31 | 63.63 |
| 2.05 | 8.35 | 0.90 | | | | |
| 16 | ROB | 1468.25 | 1531.88 | 379.89 | 464.08 | 63.83 |
| 1.63 | 7.29 | 0.82 | | | | |
| 17 | ROB | 1531.88 | 1595.50 | 150.93 | 196.61 | 63.75 |
| 0.65 | 3.09 | 0.77 | | | | |
| 18 | ROB | 1595.50 | 1659.13 | 63.60 | 129.92 | 63.63 |
| 0.27 | 2.04 | 0.49 | | | | |
| 19 | ROB | 1659.13 | 1722.75 | 18.74 | 76.19 | 63.63 |
| 0.08 | 1.20 | 0.25 | | | | |
| 20 | ROB | 1722.75 | 1786.38 | 2.54 | 18.71 | 38.00 |
| 0.01 | 0.49 | 0.14 | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 5921

INPUT
Description:
Station Elevation Data num= 58

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 42 | 17.15 | 160 | 12.15 | 184 | 11.15 | 205 | 10.15 |
| 230 | 9.15 | 253 | 8.15 | 326.3 | 7.15 | 331 | 6.15 | 334 | 5.15 |
| 337 | 4.15 | 338 | 3.15 | 339 | 2.15 | 429 | 1.15 | 430 | 4.15 |
| 608 | 4.15 | 929 | 5.15 | 944 | 5.15 | 1019 | 4.15 | 1025 | 4.15 |
| 1044 | 2.15 | 1106 | 2.15 | 1112 | 4.15 | 1132 | 4.15 | 1135 | 4.15 |
| 1153 | 4.15 | 1158 | 4.15 | 1165 | 4.15 | 1177 | 5.15 | 1185 | 6.15 |
| 1199 | 6.15 | 1216 | 5.15 | 1420 | 5.15 | 1450 | 5.15 | 1456 | 4.15 |
| 1461 | 4.15 | 1465 | 1.15 | 1535 | 1.15 | 1537 | 4.15 | 1541 | 4.15 |
| 1548 | 5.15 | 1574 | 6.15 | 1619 | 6.15 | 1620 | 5.15 | 1632 | 5.15 |
| 1635 | 6.15 | 1637 | 7.15 | 1639 | 8.15 | 1642 | 9.15 | 1646 | 10.15 |
| 1656 | 10.15 | 1680 | 10.15 | 1682 | 10.15 | 1708 | 11.15 | 1710 | 12.15 |
| 1742 | 12.15 | 1800 | 17.15 | 1820 | 22.15 | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 331 | .035 | 1710 | .013 | 1742 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 326.3 | 1637 | 813.7 | 567.6 | 810.3 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.51 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.040 | 0.035 |
| 0.027 | | | | |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 813.70 | 567.60 |
| 810.30 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1740.16 | 17387.21 |
| 867.24 | | | | |
| E.G. Slope (ft/ft) | 0.000027 | Area (sq ft) | 1740.16 | 17387.21 |
| 867.24 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 1112.50 | 21334.92 |
| 807.58 | | | | |

| | | | | |
|---|---|---|---|---|
| Top Width (ft) | 1762.22 | Top Width (ft) | 287.16 | 1310.70 |
| 164.36 | | | | |
| Vel Total (ft/s) | 1.16 | Avg. Vel. (ft/s) | 0.64 | 1.23 |
| 0.93 | | | | |
| Max Chl Dpth (ft) | 16.34 | Hydr. Depth (ft) | 6.06 | 13.27 |
| 5.28 | | | | |
| Conv. Total (cfs) | 4489123.0 | Conv. (cfs) | 214755.7 | 4118473.0 |
| 155895.0 | | | | |
| Length Wtd. (ft) | 583.62 | Wetted Per. (ft) | 287.38 | 1318.29 |
| 165.40 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.01 | 0.03 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 234.43 | 5781.38 |
| 121.83 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 37.15 | 450.82 |
| 22.99 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 40.79 | 0.01 | 0.16 | 1.66 |
| 0.00 | 0.10 | 0.04 | | | | |
| 2 | LOB | 40.79 | 81.58 | 8.59 | 46.98 | 40.83 |
| 0.04 | 1.15 | 0.18 | | | | |
| 3 | LOB | 81.58 | 122.36 | 39.61 | 117.53 | 40.82 |
| 0.17 | 2.88 | 0.34 | | | | |
| 4 | LOB | 122.36 | 163.15 | 86.68 | 188.02 | 40.82 |
| 0.37 | 4.61 | 0.46 | | | | |
| 5 | LOB | 163.15 | 203.94 | 147.83 | 259.02 | 40.83 |
| 0.64 | 6.35 | 0.57 | | | | |
| 6 | LOB | 203.94 | 244.73 | 222.83 | 331.31 | 40.82 |
| 0.96 | 8.12 | 0.67 | | | | |
| 7 | LOB | 244.73 | 285.51 | 288.42 | 386.70 | 40.80 |
| 1.24 | 9.48 | 0.75 | | | | |
| 8 | LOB | 285.51 | 326.30 | 318.54 | 410.42 | 40.79 |
| 1.37 | 10.06 | 0.78 | | | | |
| 9 | Chan | 326.30 | 490.14 | 3099.76 | 2396.43 | 167.26 |
| 13.33 | 14.63 | 1.29 | | | | |
| 10 | Chan | 490.14 | 653.98 | 2691.82 | 2182.39 | 163.84 |
| 11.58 | 13.32 | 1.23 | | | | |
| 11 | Chan | 653.98 | 817.81 | 2565.60 | 2120.41 | 163.84 |
| 11.03 | 12.94 | 1.21 | | | | |
| 12 | Chan | 817.81 | 981.65 | 2426.25 | 2050.55 | 163.84 |
| 10.43 | 12.52 | 1.18 | | | | |
| 13 | Chan | 981.65 | 1145.49 | 2986.89 | 2325.38 | 164.27 |
| 12.84 | 14.19 | 1.28 | | | | |
| 14 | Chan | 1145.49 | 1309.33 | 2366.73 | 2020.86 | 163.97 |
| 10.18 | 12.33 | 1.17 | | | | |
| 15 | Chan | 1309.33 | 1473.16 | 2458.90 | 2072.50 | 164.92 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10.57 | 12.65 | 1.19 | | | | |
| 16 | Chan | 1473.16 | 1637.00 | 2738.98 | 2218.70 | 166.35 |
| 11.78 | 13.54 | 1.23 | | | | |
| 17 | ROB | 1637.00 | 1659.88 | 151.57 | 179.42 | 23.40 |
| 0.65 | 7.84 | 0.84 | | | | |
| 18 | ROB | 1659.88 | 1682.75 | 137.76 | 167.90 | 22.88 |
| 0.59 | 7.34 | 0.82 | | | | |
| 19 | ROB | 1682.75 | 1705.63 | 123.37 | 157.19 | 22.89 |
| 0.53 | 6.87 | 0.78 | | | | |
| 20 | ROB | 1705.63 | 1728.50 | 195.43 | 125.65 | 23.11 |
| 0.84 | 5.49 | 1.56 | | | | |
| 21 | ROB | 1728.50 | 1751.38 | 154.28 | 118.38 | 22.91 |
| 0.66 | 5.17 | 1.30 | | | | |
| 22 | ROB | 1751.38 | 1774.25 | 35.77 | 81.12 | 22.96 |
| 0.15 | 3.55 | 0.44 | | | | |
| 23 | ROB | 1774.25 | 1797.13 | 9.24 | 36.01 | 22.96 |
| 0.04 | 1.57 | 0.26 | | | | |
| 24 | ROB | 1797.13 | 1820.00 | 0.15 | 1.57 | 4.29 |
| 0.00 | 0.37 | 0.10 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 5355

INPUT
Description:
Station Elevation Data num= 47

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 75 | 17.15 | 153 | 12.15 | 182 | 11.15 | 230 | 10.15 |
| 249 | 9.15 | 266 | 8.15 | 275 | 7.15 | 280 | 6.15 | 286 | 5.15 |
| 289 | 4.15 | 291 | 4.15 | 292 | 2.15 | 330 | 1.15 | 334 | 4.15 |
| 805 | 4.15 | 808 | 1.15 | 861 | 1.15 | 865 | 4.15 | 889 | 5.15 |
| 936 | 5.15 | 1195 | 4.15 | 1198 | 1.15 | 1259 | 1.15 | 1264 | 4.15 |
| 1282 | 4.15 | 1828 | 5.15 | 1831 | 6.15 | 1844 | 6.15 | 1855 | 5.15 |
| 1857 | 4.15 | 1861 | 2.15 | 1958 | 1.15 | 1963 | 4.15 | 2000 | 4.15 |
| 2066 | 4.15 | 2075 | 1.15 | 2078 | 1.15 | 2087 | 4.15 | 2105 | 4.15 |
| 2309 | 5.15 | 2344 | 6.15 | 2376 | 7.15 | 2423 | 10.15 | 2433 | 11.15 |
| 2452 | 12.15 | 2730.76 | 22.15 | | | | | | |

Manning's n Values num= 5

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|---|---|
| 0 | .04 | 280 | .035 | 2000 | .04 | 2423 | .013 | 2452 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 292 | 2376 | 666.9 | 735.2 | 962.5 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.50 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.039 | 0.036 |
| 0.029 | | | | |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 666.90 | 735.20 |
| 962.50 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1312.55 | 27811.11 |
| 992.19 | | | | |
| E.G. Slope (ft/ft) | 0.000012 | Area (sq ft) | 1312.55 | 27811.11 |
| 992.19 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 568.86 | 22129.31 |
| 556.83 | | | | |
| Top Width (ft) | 2530.94 | Top Width (ft) | 222.09 | 2084.00 |
| 224.85 | | | | |
| Vel Total (ft/s) | 0.77 | Avg. Vel. (ft/s) | 0.43 | 0.80 |
| 0.56 | | | | |
| Max Chl Dpth (ft) | 16.34 | Hydr. Depth (ft) | 5.91 | 13.35 |
| 4.41 | | | | |
| Conv. Total (cfs) | 6817244.0 | Conv. (cfs) | 166762.7 | 6487246.0 |
| 163235.5 | | | | |
| Length Wtd. (ft) | 740.73 | Wetted Per. (ft) | 223.98 | 2092.11 |
| 225.11 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.00 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 205.91 | 5486.91 |
| 104.54 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 32.39 | 428.71 |
| 19.37 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent | Pos Hydr | Left Sta Velocity (ft) | Right Sta | Flow | Area | W.P. |
|---|---|---|---|---|---|---|
| Conv | Depth(ft) | (ft/s) | (ft) | (cfs) | (sq ft) | (ft) |
| 1 | LOB | 36.50 | 73.00 | 0.01 | 0.32 | 3.10 |
| 0.00 | 0.10 | 0.03 | | | | |
| 2 | LOB | 73.00 | 109.50 | 7.14 | 50.41 | 36.58 |
| 0.03 | 1.38 | 0.14 | | | | |
| 3 | LOB | 109.50 | 146.00 | 37.22 | 135.81 | 36.57 |
| 0.16 | 3.72 | 0.27 | | | | |
| 4 | LOB | 146.00 | 182.50 | 76.00 | 208.33 | 36.53 |
| 0.33 | 5.71 | 0.36 | | | | |
| 5 | LOB | 182.50 | 219.00 | 100.06 | 245.65 | 36.51 |
| 0.43 | 6.73 | 0.41 | | | | |
| 6 | LOB | 219.00 | 255.50 | 127.27 | 283.88 | 36.54 |
| 0.55 | 7.78 | 0.45 | | | | |
| 7 | LOB | 255.50 | 292.00 | 221.17 | 388.15 | 38.15 |
| 0.95 | 10.63 | 0.57 | | | | |
| 8 | Chan | 292.00 | 552.50 | 2957.81 | 3575.95 | 261.51 |
| 12.72 | 13.73 | 0.83 | | | | |
| 9 | Chan | 552.50 | 813.00 | 2844.65 | 3494.45 | 261.74 |
| 12.23 | 13.41 | 0.81 | | | | |
| 10 | Chan | 813.00 | 1073.50 | 2806.32 | 3464.95 | 261.52 |
| 12.07 | 13.30 | 0.81 | | | | |
| 11 | Chan | 1073.50 | 1334.00 | 3036.99 | 3638.98 | 262.57 |
| 13.06 | 13.97 | 0.83 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12 | Chan | 1334.00 | 1594.50 | 2710.28 | 3388.00 | 260.50 | |
| 11.65 | 13.01 | 0.80 | | | | | |
| 13 | Chan | 1594.50 | 1855.00 | 2520.17 | 3244.38 | 260.71 | |
| 10.84 | 12.45 | 0.78 | | | | | |
| 14 | Chan | 1855.00 | 2115.50 | 3051.09 | 3763.68 | 263.02 | |
| 13.12 | 14.45 | 0.81 | | | | | |
| 15 | Chan | 2115.50 | 2376.00 | 2202.00 | 3240.72 | 260.53 | |
| 9.47 | 12.44 | 0.68 | | | | | |
| 16 | ROB | 2376.00 | 2420.35 | 209.07 | 395.75 | 44.44 | |
| 0.90 | 8.92 | 0.53 | | | | | |
| 17 | ROB | 2420.35 | 2464.69 | 261.07 | 263.93 | 44.43 | |
| 1.12 | 5.95 | 0.99 | | | | | |
| 18 | ROB | 2464.69 | 2509.04 | 56.98 | 181.32 | 44.37 | |
| 0.25 | 4.09 | 0.31 | | | | | |
| 19 | ROB | 2509.04 | 2553.38 | 25.07 | 110.78 | 44.37 | |
| 0.11 | 2.50 | 0.23 | | | | | |
| 20 | ROB | 2553.38 | 2597.73 | 4.63 | 40.24 | 44.37 | |
| 0.02 | 0.91 | 0.12 | | | | | |
| 21 | ROB | 2597.73 | 2642.07 | 0.00 | 0.17 | 3.12 | |
| 0.00 | 0.06 | 0.02 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 4621

INPUT
Description:
Station Elevation Data num= 86

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.15 | 50 | 12.15 | 57 | 11.15 | 63 | 10.15 | 68 | 9.15 |
| 74 | 8.15 | 81 | 7.15 | 92 | 6.15 | 95 | 5.15 | 370 | 4.15 |
| 404 | 4.15 | 418 | 5.15 | 419 | 5.15 | 569 | 4.15 | 571 | 3.15 |
| 572 | 2.15 | 587 | 2.15 | 588 | 3.15 | 589 | 4.15 | 688 | 4.15 |
| 778 | 4.15 | 780 | 2.15 | 855 | 2.15 | 861 | 4.15 | 864 | 5.15 |
| 879 | 5.15 | 891 | 4.15 | 929 | 2.15 | 1114 | 2.15 | 1119 | 4.15 |
| 1187 | 4.15 | 1188 | 2.15 | 1211 | 2.15 | 1212 | 4.15 | 1214 | 4.15 |
| 1219 | 5.15 | 1229 | 5.15 | 1257 | 4.15 | 1309 | 4.15 | 1336 | 4.15 |
| 1341 | 4.15 | 1342 | 2.15 | 1381 | 2.15 | 1382 | 4.15 | 1389 | 4.15 |
| 1512 | 4.15 | 1538 | 4.15 | 1655 | 4.15 | 1747 | 4.15 | 1748 | 2.15 |
| 1764 | 2.15 | 1766 | 4.15 | 1830 | 4.15 | 1831 | 2.15 | 1878 | 2.15 |
| 1880 | 4.15 | 1909 | 4.15 | 1911 | .15 | 2210 | 2.15 | 2265 | 4.15 |
| 2808 | 4.15 | 2815 | 2.15 | 2908 | 1.15 | 2913 | 4.15 | 2915 | 5.15 |
| 2923 | 6.15 | 2928 | 7.15 | 2933 | 8.15 | 2937 | 9.15 | 2942 | 10.15 |
| 2946 | 11.15 | 2968 | 11.15 | 2971 | 10.15 | 2976 | 9.15 | 2981 | 8.15 |
| 3007 | 8.15 | 3022 | 9.15 | 3040 | 10.15 | 3171 | 10.15 | 3184 | 10.15 |
| 3193 | 11.15 | 3206 | 11.15 | 3208 | 11.15 | 3313 | 12.15 | 3443 | 17.15 |
| 3513 | 22.15 | | | | | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 63 | .035 | 2915 | .04 | 3040 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 81 | 2928 | 427 | 888 | 1159.6 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.49 | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.036 | 0.035 | 0.046 |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 427.00 | 888.00 | 1159.60 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 290.43 | 39712.73 | 3106.50 |
| E.G. Slope (ft/ft) | 0.000005 | Area (sq ft) | 290.43 | 39712.73 | 3106.50 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 95.41 | 22385.21 | 774.38 |
| Top Width (ft) | 3415.51 | Top Width (ft) | 48.79 | 2847.00 | 519.72 |
| Vel Total (ft/s) | 0.54 | Avg. Vel. (ft/s) | 0.33 | 0.56 | 0.25 |
| Max Chl Dpth (ft) | 17.34 | Hydr. Depth (ft) | 5.95 | 13.95 | 5.98 |
| Conv. Total (cfs) | 10106570.0 | Conv. (cfs) | 41465.9 | 9728561.0 | 336544.9 |
| Length Wtd. (ft) | 888.22 | Wetted Per. (ft) | 49.98 | 2863.74 | 520.76 |
| Min Ch El (ft) | 0.15 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 193.64 | 4917.08 | 59.26 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 30.32 | 387.09 | 11.14 |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 30.38 | 40.50 | 0.95 | 10.31 | 8.66 |
| 0.00 | 1.24 | 0.09 | | | | |
| 2 | LOB | 40.50 | 50.63 | 8.12 | 40.53 | 10.55 |
| 0.03 | 4.00 | 0.20 | | | | |
| 3 | LOB | 50.63 | 60.75 | 17.02 | 62.43 | 10.24 |
| 0.07 | 6.17 | 0.27 | | | | |
| 4 | LOB | 60.75 | 70.88 | 28.61 | 79.93 | 10.29 |
| 0.12 | 7.89 | 0.36 | | | | |
| 5 | LOB | 70.88 | 81.00 | 40.71 | 97.23 | 10.24 |
| 0.18 | 9.60 | 0.42 | | | | |
| 6 | Chan | 81.00 | 436.88 | 2425.10 | 4552.09 | 356.12 |
| 10.43 | 12.79 | 0.53 | | | | |
| 7 | Chan | 436.88 | 792.75 | 2593.54 | 4750.21 | 358.19 |
| 11.15 | 13.35 | 0.55 | | | | |
| 8 | Chan | 792.75 | 1148.63 | 3088.78 | 5267.40 | 356.84 |
| 13.28 | 14.80 | 0.59 | | | | |
| 9 | Chan | 1148.63 | 1504.50 | 2669.39 | 4847.90 | 360.94 |
| 11.48 | 13.62 | 0.55 | | | | |
| 10 | Chan | 1504.50 | 1860.38 | 2671.90 | 4841.15 | 359.18 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.49 | 13.60 | 0.55 | | | | | |
| 11 | Chan | | 1860.38 | 2216.25 | 3504.04 | 5696.44 | 359.19 |
| 15.07 | 16.01 | 0.62 | | | | | |
| 12 | Chan | | 2216.25 | 2572.13 | 2640.70 | 4789.62 | 355.91 |
| 11.36 | 13.46 | 0.55 | | | | | |
| 13 | Chan | | 2572.13 | 2928.00 | 2791.76 | 4967.90 | 357.39 |
| 12.00 | 13.96 | 0.56 | | | | | |
| 14 | ROB | | 2928.00 | 3001.13 | 187.26 | 582.29 | 73.93 |
| 0.81 | 7.96 | 0.32 | | | | | |
| 15 | ROB | | 3001.13 | 3074.25 | 172.26 | 579.79 | 73.19 |
| 0.74 | 7.93 | 0.30 | | | | | |
| 16 | ROB | | 3074.25 | 3147.38 | 131.66 | 536.54 | 73.13 |
| 0.57 | 7.34 | 0.25 | | | | | |
| 17 | ROB | | 3147.38 | 3220.50 | 118.49 | 503.79 | 73.18 |
| 0.51 | 6.89 | 0.24 | | | | | |
| 18 | ROB | | 3220.50 | 3293.63 | 90.77 | 429.25 | 73.13 |
| 0.39 | 5.87 | 0.21 | | | | | |
| 19 | ROB | | 3293.63 | 3366.75 | 60.49 | 336.52 | 73.17 |
| 0.26 | 4.60 | 0.18 | | | | | |
| 20 | ROB | | 3366.75 | 3439.88 | 13.41 | 136.28 | 73.18 |
| 0.06 | 1.86 | 0.10 | | | | | |
| 21 | ROB | | 3439.88 | 3513.00 | 0.05 | 2.04 | 7.86 |
| 0.00 | 0.26 | 0.03 | | | | | |

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 3735

INPUT
Description:
Station Elevation Data num= 68

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 12 | 12.15 | 17 | 11.15 | 20 | 10.15 | 47 | 8.15 |
| 157 | 7.15 | 167 | 6.15 | 193 | 5.15 | 215 | 4.15 | 285 | 3.15 |
| 301 | 3.15 | 1203 | 4.15 | 1318 | 3.15 | 1320 | 2.15 | 2205 | 2.15 |
| 2207 | 3.15 | 2269 | 3.15 | 2271 | 2.15 | 2681 | 2.15 | 2682 | 3.15 |
| 2830.5 | 4.15 | 2831.5 | 4.15 | 2832.5 | 2.15 | 2846.5 | 2.15 | 2847.5 | 4.15 |
| 2849.5 | 4.15 | 3228.5 | 5.15 | 3238.5 | 6.15 | 3252.5 | 7.15 | 3262.5 | 7.15 |
| 3266.5 | 6.15 | 3269.5 | 5.15 | 3271.5 | 4.15 | 3274.5 | 4.15 | 3276.5 | 2.15 |
| 3352.5 | 2.15 | 3353.5 | 4.15 | 3355.5 | 4.15 | 3358.5 | 5.15 | 3363.5 | 6.15 |
| 3386.5 | 7.15 | 3402.5 | 7.15 | 3410.5 | 6.15 | 3413.5 | 5.15 | 3416.5 | 4.15 |
| 3418.5 | 4.15 | 3419.5 | 2.15 | 3444.5 | 2.15 | 3445.5 | 4.15 | 3449.5 | 4.15 |
| 3502.5 | 4.15 | 3588.5 | 4.15 | 3596.5 | 4.15 | 3618.5 | 4.15 | 3630.5 | 4.15 |
| 3875.5 | 4.15 | 3878.5 | 4.15 | 3880.5 | 3.15 | 4026.5 | 1.15 | 4028.5 | 4.15 |
| 4029.5 | 4.15 | 4035.5 | 7.15 | 4039.5 | 8.15 | 4054.5 | 9.15 | 4064.5 | 10.15 |
| 4073.5 | 11.15 | 4082.5 | 12.15 | 4105.5 | 22.15 | | | | |

Manning's n Values num= 4

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|---|---|
| 0 | .04 | 193 | .035 | 3502.5 | .04 | 3588.5 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 157 | 4035.5 | 598 1236.9 | 488.7 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| E.G. Elev (ft) | 17.49 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.036 |
| 0.050 | | | | |
| W.S. Elev (ft) | 17.49 | Reach Len. (ft) | 598.00 | 1236.90 |
| 488.70 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1373.70 | 55040.79 |
| 397.00 | | | | |
| E.G. Slope (ft/ft) | 0.000003 | Area (sq ft) | 1373.70 | 55040.79 |
| 397.00 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 380.66 | 22802.88 |
| 71.46 | | | | |
| Top Width (ft) | 4089.17 | Top Width (ft) | 151.40 | 3878.50 |
| 59.27 | | | | |
| Vel Total (ft/s) | 0.41 | Avg. Vel. (ft/s) | 0.28 | 0.41 |
| 0.18 | | | | |
| Max Chl Dpth (ft) | 16.34 | Hydr. Depth (ft) | 9.07 | 14.19 |
| 6.70 | | | | |
| Conv. Total (cfs) | 13427730.0 | Conv. (cfs) | 219797.1 | |
| 13166670.0 41262.1 | | | | |
| Length Wtd. (ft) | 1229.18 | Wetted Per. (ft) | 153.67 | 3890.58 |
| 60.70 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 185.49 | 3951.27 |
| 12.62 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 29.33 | 318.54 |
| 3.44 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 19.63 | 10.05 | 64.03 | 16.20 |
| 0.04 | 4.56 | 0.16 | | | | |
| 2 | LOB | 19.63 | 39.25 | 39.60 | 157.66 | 19.70 |
| 0.17 | 8.03 | 0.25 | | | | |
| 3 | LOB | 39.25 | 58.88 | 50.22 | 181.62 | 19.65 |
| 0.22 | 9.25 | 0.28 | | | | |
| 4 | LOB | 58.88 | 78.50 | 52.80 | 187.07 | 19.63 |
| 0.23 | 9.53 | 0.28 | | | | |
| 5 | LOB | 78.50 | 98.13 | 54.46 | 190.58 | 19.63 |
| 0.23 | 9.71 | 0.29 | | | | |
| 6 | LOB | 98.13 | 117.75 | 56.14 | 194.08 | 19.63 |
| 0.24 | 9.89 | 0.29 | | | | |
| 7 | LOB | 117.75 | 137.38 | 57.83 | 197.58 | 19.63 |
| 0.25 | 10.07 | 0.29 | | | | |
| 8 | LOB | 137.38 | 157.00 | 59.55 | 201.08 | 19.63 |
| 0.26 | 10.25 | 0.30 | | | | |
| 9 | Chan | 157.00 | 641.81 | 2828.25 | 6717.56 | 484.91 |
| 12.16 | 13.86 | 0.42 | | | | |
| 10 | Chan | 641.81 | 1126.63 | 2787.51 | 6636.47 | 484.81 |
| 11.99 | 13.69 | 0.42 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11 | Chan | 1126.63 | 1611.44 | 3127.07 | 7111.74 | 485.05 | |
| 13.45 | 14.67 | 0.44 | | | | | |
| 12 | Chan | 1611.44 | 2096.25 | 3368.47 | 7434.75 | 484.81 | |
| 14.48 | 15.34 | 0.45 | | | | | |
| 13 | Chan | 2096.25 | 2581.06 | 3318.13 | 7370.75 | 485.28 | |
| 14.27 | 15.20 | 0.45 | | | | | |
| 14 | Chan | 2581.06 | 3065.88 | 2827.24 | 6708.99 | 487.70 | |
| 12.16 | 13.84 | 0.42 | | | | | |
| 15 | Chan | 3065.88 | 3550.69 | 2508.43 | 6308.40 | 490.63 | |
| 10.79 | 13.01 | 0.40 | | | | | |
| 16 | Chan | 3550.69 | 4035.50 | 2037.77 | 6752.13 | 487.38 | |
| 8.76 | 13.93 | 0.30 | | | | | |
| 17 | ROB | 4035.50 | 4044.25 | 17.44 | 82.93 | 8.88 | |
| 0.07 | 9.48 | 0.21 | | | | | |
| 18 | ROB | 4044.25 | 4053.00 | 15.33 | 76.36 | 8.77 | |
| 0.07 | 8.73 | 0.20 | | | | | |
| 19 | ROB | 4053.00 | 4061.75 | 13.36 | 70.38 | 8.79 | |
| 0.06 | 8.04 | 0.19 | | | | | |
| 20 | ROB | 4061.75 | 4070.50 | 10.97 | 62.56 | 8.80 | |
| 0.05 | 7.15 | 0.18 | | | | | |
| 21 | ROB | 4070.50 | 4079.25 | 8.61 | 54.10 | 8.80 | |
| 0.04 | 6.18 | 0.16 | | | | | |
| 22 | ROB | 4079.25 | 4088.00 | 5.18 | 40.69 | 9.27 | |
| 0.02 | 4.65 | 0.13 | | | | | |
| 23 | ROB | 4088.00 | 4096.75 | 0.58 | 9.97 | 7.38 | |
| 0.00 | 1.47 | 0.06 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 2499

INPUT
Description:
Station Elevation Data num= 72

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 80 | 12.15 | 99 | 11.15 | 100 | 11.09 | 116 | 10.15 |
| 136 | 9.15 | 181 | 8.15 | 192 | 7.15 | 200 | 6.15 | 208 | 5.15 |
| 229 | 4.15 | 235 | 4.15 | 259 | 4.15 | 628 | 3.15 | 629 | 2.15 |
| 640 | 2.15 | 641 | 2.15 | 643 | 3.15 | 820 | 4.15 | 825 | 1.15 |
| 860 | 1.15 | 864 | 4.15 | 899 | 4.15 | 901 | 1.15 | 2367 | 2.15 |
| 2368 | 4.15 | 2373 | 4.15 | 2383 | 5.15 | 2385 | 6.15 | 2394 | 7.15 |
| 2398 | 8.15 | 2409 | 9.15 | 2454 | 9.15 | 2465 | 8.15 | 2481 | 7.15 |
| 2483 | 6.15 | 2486 | 5.15 | 2487 | 4.15 | 2489 | 4.15 | 2490 | 2.15 |
| 2559 | 3.15 | 2560 | 4.15 | 2562 | 4.15 | 2564 | 5.15 | 2570 | 6.15 |
| 2589 | 6.15 | 2592 | 5.15 | 2595 | 4.15 | 2597 | 4.15 | 2598 | 3.15 |
| 2833 | 1.15 | 2870 | 4.15 | 3305 | 4.15 | 3309 | 1.15 | 3351 | 3.15 |
| 3352 | 4.15 | 3357 | 4.15 | 3432 | 5.15 | 3465 | 5.15 | 3468 | 4.15 |
| 3473 | 3.15 | 3627 | 1.15 | 3628 | 4.15 | 3636 | 5.15 | 3639 | 6.15 |
| 3643 | 7.15 | 3647 | 8.15 | 3651 | 9.15 | 3657 | 10.15 | 3661 | 11.15 |
| 3667 | 12.15 | 3692 | 22.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 200 | .035 | 3639 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 200 | 3639 | 897 479.6 | 391.4 | .1 | .3 |

| Ineffective Flow Sta L | Sta R | num= Elev | 1 Permanent |
|---|---|---|---|
| 0 | 1205 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.48 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 |
| 0.040 | | | | |
| W.S. Elev (ft) | 17.48 | Reach Len. (ft) | 897.00 | 479.60 |
| 391.40 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 35684.99 |
| 262.58 | | | | |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 1088.56 | 50358.38 |
| 262.58 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23171.57 |
| 83.43 | | | | |
| Top Width (ft) | 3642.92 | Top Width (ft) | 162.61 | 3439.00 |
| 41.31 | | | | |
| Vel Total (ft/s) | 0.65 | Avg. Vel. (ft/s) | | 0.65 |
| 0.32 | | | | |
| Max Chl Dpth (ft) | 16.33 | Hydr. Depth (ft) | | 14.66 |
| 6.36 | | | | |
| Conv. Total (cfs) | 9083974.0 | Conv. (cfs) | | 9051386.0 |
| 32588.5 | | | | |
| Length Wtd. (ft) | 479.06 | Wetted Per. (ft) | | 2443.61 |
| 43.00 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.01 |
| 0.00 | | | | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 168.59 | 2454.85 |
| 8.93 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 27.18 | 214.65 |
| 2.87 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 25.00 | 50.00 | 0.00 | 9.93 | 12.70 |
| 0.00 | 0.79 | 0.00 | | | | |
| 2 | LOB | 50.00 | 75.00 | 0.00 | 78.46 | 25.19 |
| 0.00 | 3.14 | 0.00 | | | | |
| 3 | LOB | 75.00 | 100.00 | 0.00 | 142.11 | 25.07 |
| 0.00 | 5.68 | 0.00 | | | | |
| 4 | LOB | 100.00 | 125.00 | 0.00 | 177.65 | 25.04 |
| 0.00 | 7.11 | 0.00 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | LOB | 125.00 | 150.00 | 0.00 | 207.30 | 25.02 |
| 0.00 | 8.29 | 0.00 | | | | |
| 6 | LOB | 150.00 | 175.00 | 0.00 | 222.87 | 25.01 |
| 0.00 | 8.91 | 0.00 | | | | |
| 7 | LOB | 175.00 | 200.00 | 0.00 | 250.24 | 25.11 |
| 0.00 | 10.01 | 0.00 | | | | |
| 8 | Chan | 200.00 | 702.50 | 0.00 | 6936.21 | 503.24 |
| 0.00 | 13.80 | 0.00 | | | | |
| 9 | Chan | 702.50 | 1205.00 | 0.00 | 7737.19 | 505.94 |
| 0.00 | 15.40 | 0.00 | | | | |
| 10 | Chan | 1205.00 | 1610.67 | 4459.47 | 6482.58 | 405.67 |
| 19.18 | 15.98 | 0.69 | | | | |
| 11 | Chan | 1610.67 | 2016.33 | 4331.52 | 6370.33 | 405.67 |
| 18.63 | 15.70 | 0.68 | | | | |
| 12 | Chan | 2016.33 | 2422.00 | 3899.17 | 5991.10 | 407.41 |
| 16.77 | 14.77 | 0.65 | | | | |
| 13 | Chan | 2422.00 | 2827.67 | 3510.88 | 5635.95 | 409.28 |
| 15.10 | 13.89 | 0.62 | | | | |
| 14 | Chan | 2827.67 | 3233.33 | 3366.79 | 5477.21 | 405.79 |
| 14.48 | 13.50 | 0.61 | | | | |
| 15 | Chan | 3233.33 | 3639.00 | 3603.75 | 5727.83 | 409.80 |
| 15.50 | 14.12 | 0.63 | | | | |
| 16 | ROB | 3639.00 | 3645.63 | 27.33 | 69.55 | 6.83 |
| 0.12 | 10.50 | 0.39 | | | | |
| 17 | ROB | 3645.63 | 3652.25 | 20.61 | 58.64 | 6.81 |
| 0.09 | 8.85 | 0.35 | | | | |
| 18 | ROB | 3652.25 | 3658.88 | 15.88 | 49.97 | 6.75 |
| 0.07 | 7.54 | 0.32 | | | | |
| 19 | ROB | 3658.88 | 3665.50 | 11.31 | 40.79 | 6.75 |
| 0.05 | 6.16 | 0.28 | | | | |
| 20 | ROB | 3665.50 | 3672.13 | 6.67 | 30.22 | 7.04 |
| 0.03 | 4.56 | 0.22 | | | | |
| 21 | ROB | 3672.13 | 3678.75 | 1.61 | 12.92 | 7.14 |
| 0.01 | 1.95 | 0.12 | | | | |
| 22 | ROB | 3678.75 | 3685.38 | 0.02 | 0.49 | 1.68 |
| 0.00 | 0.31 | 0.04 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 2020

INPUT
Description:
Station Elevation Data num= 137

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 50 | 12.15 | 53 | 11.15 | 55 | 10.15 | 58 | 9.15 |
| 62 | 8.15 | 71 | 7.15 | 148 | 6.15 | 158 | 6.15 | 236 | 6.15 |
| 256 | 5.15 | 320 | 4.15 | 591 | 4.15 | 615 | 5.15 | 799 | 5.15 |
| 910 | 5.15 | 1282 | 5.15 | 1340 | 5.15 | 1351 | 5.15 | 1361 | 4.15 |
| 1376 | 4.15 | 1379 | 5.15 | 1382 | 6.15 | 1389 | 6.15 | 1390 | 5.15 |
| 1391 | 5.15 | 1405 | 5.15 | 1408 | 6.15 | 1414 | 7.15 | 1417 | 8.15 |
| 1420 | 9.15 | 1494 | 10.15 | 1509 | 11.15 | 1513 | 12.15 | 1572 | 12.15 |
| 1590 | 11.15 | 1593 | 10.15 | 1596 | 9.15 | 1598 | 8.15 | 1601 | 7.15 |
| 1606 | 6.15 | 1611 | 5.15 | 1672 | 5.15 | 1674 | 5.15 | 1730 | 5.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1762 | 6.15 | 1780 | 6.15 | 1802 | 6.15 | 1821 | 6.15 | 1849 | 5.15 |
| 1853 | 5.15 | 1866 | 5.15 | 1888 | 5.15 | 1897 | 6.15 | 1905 | 7.15 |
| 1913 | 7.15 | 1921 | 6.15 | 1932 | 6.15 | 1934 | 7.15 | 1937 | 8.15 |
| 1941 | 9.15 | 1944 | 10.15 | 1954 | 10.15 | 1956 | 9.15 | 1958 | 8.15 |
| 1963 | 7.15 | 2058 | 11.15 | 2125 | 6.15 | 2145 | 6.15 | 2279 | 6.15 |
| 2307 | 6.15 | 2353 | 6.15 | 2368 | 5.15 | 2425 | 5.15 | 2506 | 6.15 |
| 2533 | 6.15 | 2548 | 5.15 | 2556 | 5.15 | 2566 | 5.15 | 2592 | 5.15 |
| 2597 | 6.15 | 2644 | 6.15 | 2647 | 5.15 | 2680 | 4.15 | 2684 | 4.15 |
| 2685 | 1.15 | 2713 | 1.15 | 2714 | 4.15 | 2716 | 4.15 | 2744 | 4.15 |
| 2749 | 4.15 | 2750 | 1.15 | 2765 | 1.15 | 2766 | 4.15 | 2769 | 4.15 |
| 2866 | 4.15 | 2867 | 4.15 | 2868 | 1.15 | 2873 | 1.15 | 2874 | 4.15 |
| 2878 | 4.15 | 2912 | 5.15 | 2934 | 6.15 | 2940 | 6.15 | 2950 | 6.15 |
| 2956 | 6.15 | 2972 | 6.15 | 2985 | 6.15 | 3014 | 5.15 | 3025 | 5.15 |
| 3056 | 5.15 | 3061 | 4.15 | 3069 | 4.15 | 3074 | 1.15 | 3210 | 1.15 |
| 3213 | 4.15 | 3224 | 4.15 | 3230 | 4.15 | 3235 | 4.15 | 3236 | 1.15 |
| 3251 | 1.15 | 3258 | 1.15 | 3774 | 1.15 | 3780 | 4.15 | 3809 | 4.15 |
| 3814 | 1.15 | 3827 | 1.15 | 3841 | 1.15 | 4000 | 1.15 | 4089 | 1.15 |
| 4090 | 4.15 | 4093 | 4.15 | 4095 | 5.15 | 4174 | 6.15 | 4182 | 7.15 |
| 4190 | 12.15 | 4198 | 22.15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 148 | .035 | 4174 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 148 | 4174 | 257 | 97.3 | 97 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 3588 | | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.47 | | | | |
| Vel Head (ft) | 0.10 | Wt. n-Val. | | 0.035 | 0.040 |
| W.S. Elev (ft) | 17.36 | Reach Len. (ft) | 257.00 | 97.30 | 97.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 9025.11 | 158.31 |
| E.G. Slope (ft/ft) | 0.000095 | Area (sq ft) | 1068.98 | 51295.48 | 158.31 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23054.03 | 200.97 |
| Top Width (ft) | 4170.24 | Top Width (ft) | 124.07 | 4026.00 | 20.17 |
| Vel Total (ft/s) | 2.53 | Avg. Vel. (ft/s) | | 2.55 | 1.27 |
| Max Chl Dpth (ft) | 16.21 | Hydr. Depth (ft) | | 15.40 | 7.85 |
| Conv. Total (cfs) | 2381829.0 | Conv. (cfs) | | 2361245.0 | 20584.2 |
| Length Wtd. (ft) | 97.30 | Wetted Per. (ft) | | 589.94 | 24.17 |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.09 | 0.04 |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.23 | 0.05 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 146.37 | 1895.24 | 7.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 24.23 | 173.55 | 2.60 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 18.50 | 37.00 | 0.00 | 17.09 | 13.33 |
| 0.00 | 1.31 | 0.00 | | | | |
| 2 | LOB | 37.00 | 55.50 | 0.00 | 85.11 | 19.18 |
| 0.00 | 4.60 | 0.00 | | | | |
| 3 | LOB | 55.50 | 74.00 | 0.00 | 172.48 | 18.81 |
| 0.00 | 9.32 | 0.00 | | | | |
| 4 | LOB | 74.00 | 92.50 | 0.00 | 191.91 | 18.50 |
| 0.00 | 10.37 | 0.00 | | | | |
| 5 | LOB | 92.50 | 111.00 | 0.00 | 196.35 | 18.50 |
| 0.00 | 10.61 | 0.00 | | | | |
| 6 | LOB | 111.00 | 129.50 | 0.00 | 200.80 | 18.50 |
| 0.00 | 10.85 | 0.00 | | | | |
| 7 | LOB | 129.50 | 148.00 | 0.00 | 205.24 | 18.50 |
| 0.00 | 11.09 | 0.00 | | | | |
| 8 | Chan | 148.00 | 639.43 | 0.00 | 6219.48 | 491.48 |
| 0.00 | 12.66 | 0.00 | | | | |
| 9 | Chan | 639.43 | 1130.86 | 0.00 | 6002.48 | 491.43 |
| 0.00 | 12.21 | 0.00 | | | | |
| 10 | Chan | 1130.86 | 1622.29 | 0.00 | 4960.48 | 493.90 |
| 0.00 | 10.09 | 0.00 | | | | |
| 11 | Chan | 1622.29 | 2113.71 | 0.00 | 5143.02 | 493.14 |
| 0.00 | 10.47 | 0.00 | | | | |
| 12 | Chan | 2113.71 | 2605.14 | 0.00 | 5665.30 | 491.63 |
| 0.00 | 11.53 | 0.00 | | | | |
| 13 | Chan | 2605.14 | 3096.57 | 0.00 | 6383.41 | 505.56 |
| 0.00 | 12.99 | 0.00 | | | | |
| 14 | Chan | 3096.57 | 3588.00 | 0.00 | 7896.20 | 494.83 |
| 0.00 | 16.07 | 0.00 | | | | |
| 15 | Chan | 3588.00 | 4174.00 | 23054.03 | 9025.11 | 589.94 |
| 99.14 | 15.40 | 2.55 | | | | |
| 16 | ROB | 4174.00 | 4177.00 | 50.48 | 33.08 | 3.02 |
| 0.22 | 11.03 | 1.53 | | | | |
| 17 | ROB | 4177.00 | 4180.00 | 47.65 | 31.96 | 3.02 |
| 0.20 | 10.65 | 1.49 | | | | |
| 18 | ROB | 4180.00 | 4183.00 | 42.68 | 30.58 | 3.19 |
| 0.18 | 10.19 | 1.40 | | | | |
| 19 | ROB | 4183.00 | 4186.00 | 30.34 | 25.96 | 3.54 |
| 0.13 | 8.65 | 1.17 | | | | |
| 20 | ROB | 4186.00 | 4189.00 | 20.20 | 20.33 | 3.54 |
| 0.09 | 6.78 | 0.99 | | | | |
| 21 | ROB | 4189.00 | 4192.00 | 8.80 | 13.46 | 4.38 |
| 0.04 | 4.49 | 0.65 | | | | |
| 22 | ROB | 4192.00 | 4195.00 | 0.82 | 2.95 | 3.48 |
| 0.00 | 1.36 | 0.28 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1923

INPUT
Description: Upstream of RR crossing
Station Elevation Data num= 110

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 160 | 11.15 | 171 | 10.15 | 178 | 9.28 | 179 | 9.15 |
| 195 | 8.15 | 220 | 7.15 | 250 | 7.15 | 308 | 7.15 | 349 | 7.15 |
| 363 | 7.15 | 388 | 8.15 | 391 | 9.15 | 401 | 10.15 | 412 | 10.15 |
| 418 | 9.15 | 426 | 8.15 | 438 | 7.15 | 541 | 7.15 | 569 | 7.15 |
| 592 | 7.15 | 594 | 8.15 | 596 | 9.15 | 600 | 10.15 | 605 | 10.15 |
| 608 | 9.15 | 610 | 8.15 | 612 | 7.15 | 615 | 6.15 | 616 | 5.15 |
| 674 | 5.15 | 686 | 5.15 | 697 | 5.15 | 739 | 6.15 | 774 | 6.15 |
| 792 | 5.15 | 892 | 5.15 | 953 | 5.15 | 1000 | 5.15 | 1085 | 6.15 |
| 1105 | 6.15 | 1144 | 5.15 | 1207 | 4.15 | 1258 | 4.15 | 1281 | 4.15 |
| 1342 | 4.15 | 1345 | 1.15 | 1382 | 1.15 | 1385 | 4.15 | 1400 | 4.15 |
| 1403 | 1.15 | 1418 | 1.15 | 1426 | 1.15 | 1439 | 1.15 | 1443 | 4.15 |
| 1447 | 4.15 | 1452 | 1.15 | 1507 | 1.15 | 1512 | 4.15 | 1569 | 4.15 |
| 1576 | 2.15 | 1584 | 4.15 | 1607 | 1.15 | 1928 | 1.15 | 1942 | 2.15 |
| 1966 | 2.15 | 1971 | 3.15 | 1974 | 6.15 | 1986 | 6.15 | 1991 | 5.15 |
| 2003 | 4.15 | 2022 | 3.15 | 2026 | 1.15 | 2501 | 1.15 | 2511 | 4.15 |
| 2532 | 4.15 | 2544 | 1.15 | 2548 | 1.15 | 2556 | 4.15 | 2610 | 4.15 |
| 2617 | 1.15 | 2641 | 1.15 | 2659 | 1.15 | 2668 | 1.15 | 2688 | 1.15 |
| 2721 | 4.15 | 2728 | 4.15 | 2737 | 1.15 | 2741 | 1.15 | 2749 | 1.15 |
| 2756 | 1.15 | 2771 | 1.15 | 2780 | 1.15 | 2787 | 1.15 | 2836 | 1.15 |
| 3003 | 3.15 | 3835 | 3.15 | 3841 | 3.15 | 3848 | 3.15 | 3856 | 3.15 |
| 3857 | 2.15 | 3940 | 1.15 | 4030 | 1.15 | 4033 | 4.15 | 4036 | 4.15 |
| 4053 | 5.15 | 4068 | 6.15 | 4070 | 7.15 | 4083 | 12.15 | 4096 | 22.15 |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 3835 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 220 | 4070 | 125 | 51.9 | 36.1 | .3 | .5 |

Ineffective Flow num= 4

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1051 | 20 | T |
| 1051 | 1725 | 18 | T |
| 1725 | 3110 | 15.5 | T |
| 3110 | 3765 | 18 | T |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.44 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.17 | Wt. n-Val. | | 0.036 |
| 0.035 | | | | |
| W.S. Elev (ft) | 17.28 | Reach Len. (ft) | 25.00 | 25.00 |
| 25.00 | | | | |
| Crit W.S. (ft) | 8.04 | Flow Area (sq ft) | | 7000.82 |
| 116.21 | | | | |
| E.G. Slope (ft/ft) | 0.000402 | Area (sq ft) | 785.39 | 53693.13 |
| 116.21 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 23255.00 | Flow (cfs) | | | 22957.82 |
| 297.18 | | | | | |
| Top Width (ft) | 4018.76 | Top Width (ft) | | 149.10 | 3850.00 |
| 19.66 | | | | | |
| Vel Total (ft/s) | 3.27 | Avg. Vel. (ft/s) | | | 3.28 |
| 2.56 | | | | | |
| Max Chl Dpth (ft) | 16.13 | Hydr. Depth (ft) | | | 4.14 |
| 5.91 | | | | | |
| Conv. Total (cfs) | 1159186.0 | Conv. (cfs) | | | 1144372.0 |
| 14813.6 | | | | | |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | | | 1696.58 |
| 22.33 | | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | | 0.10 |
| 0.13 | | | | | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | | 0.34 |
| 0.33 | | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | | 140.90 | 1777.99 |
| 6.73 | | | | | |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | | 23.42 | 164.76 |
| 2.55 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 55.00 | 82.50 | 0.00 | 4.62 | 11.63 |
| 0.00 | 0.40 | 0.00 | | | | |
| 2 | LOB | 82.50 | 110.00 | 0.00 | 47.92 | 27.56 |
| 0.00 | 1.74 | 0.00 | | | | |
| 3 | LOB | 110.00 | 137.50 | 0.00 | 99.92 | 27.56 |
| 0.00 | 3.63 | 0.00 | | | | |
| 4 | LOB | 137.50 | 165.00 | 0.00 | 152.18 | 27.57 |
| 0.00 | 5.53 | 0.00 | | | | |
| 5 | LOB | 165.00 | 192.50 | 0.00 | 217.49 | 27.61 |
| 0.00 | 7.91 | 0.00 | | | | |
| 6 | LOB | 192.50 | 220.00 | 0.00 | 263.26 | 27.52 |
| 0.00 | 9.57 | 0.00 | | | | |
| 7 | Chan | 220.00 | 635.50 | 0.00 | 4100.64 | 417.72 |
| 0.00 | 9.87 | 0.00 | | | | |
| 8 | Chan | 635.50 | 1051.00 | 0.00 | 4957.84 | 415.54 |
| 0.00 | 11.93 | 0.00 | | | | |
| 9 | Chan | 1051.00 | 1725.00 | 0.00 | 9477.38 | 681.13 |
| 0.00 | 14.06 | 0.00 | | | | |
| 10 | Chan | 1725.00 | 2186.67 | 807.62 | 819.68 | 463.68 |
| 3.47 | 1.78 | 0.99 | | | | |
| 11 | Chan | 2186.67 | 2648.33 | 807.67 | 819.68 | 463.64 |
| 3.47 | 1.78 | 0.99 | | | | |
| 12 | Chan | 2648.33 | 3110.00 | 809.22 | 819.68 | 462.30 |
| 3.48 | 1.78 | 0.99 | | | | |
| 13 | Chan | 3110.00 | 3765.00 | 0.00 | 9252.19 | 655.00 |
| 0.00 | 14.13 | 0.00 | | | | |
| 14 | Chan | 3765.00 | 4070.00 | 20533.31 | 4541.77 | 306.96 |
| 88.30 | 14.89 | 4.52 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 15 | ROB | 4070.00 | 4073.25 | 97.06 | 30.88 | 3.48 |
| 0.42 | 9.50 | 3.14 | | | | |
| | | 4073.25 | 4076.50 | 76.73 | 26.81 | 3.48 |
| 16 | ROB | | | | | |
| 0.33 | 8.25 | 2.86 | | | | |
| | | 4076.50 | 4079.75 | 58.35 | 22.75 | 3.48 |
| 17 | ROB | | | | | |
| 0.25 | 7.00 | 2.56 | | | | |
| | | 4079.75 | 4083.00 | 42.04 | 18.69 | 3.48 |
| 18 | ROB | | | | | |
| 0.18 | 5.75 | 2.25 | | | | |
| | | 4083.00 | 4086.25 | 19.53 | 12.60 | 4.10 |
| 19 | ROB | | | | | |
| 0.08 | 3.88 | 1.55 | | | | |
| | | 4086.25 | 4089.50 | 3.47 | 4.47 | 4.10 |
| 20 | ROB | | | | | |
| 0.01 | 1.38 | 0.78 | | | | |
| | | 4089.50 | 4092.75 | 0.00 | 0.01 | 0.21 |
| 21 | ROB | | | | | |
| 0.00 | 0.06 | 0.10 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: San Elijo Lagoon
REACH: Lower RS: 1900

INPUT
Description: NCTD Railroad Bridge
Distance from Upstream XS = 25
Deck/Roadway Width = 22.001
Weir Coefficient = 2.61
Upstream Deck/Roadway Coordinates
num= 10

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | .15 | 146 | 22.15 | .15 | 1673 | 17.15 | .15 |
| 2010 | 16.15 | .15 | 2493.1 | 14.65 | .15 | 3042.2 | 16.5 | .15 |
| 3648.9 | 20.15 | .15 | 3765.6 | 23.15 | .15 | 3765.6 | 23.15 | 16.15 |
| 4096 | 23.15 | 16.15 | | | | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 110

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 160 | 11.15 | 171 | 10.15 | 178 | 9.28 | 179 | 9.15 |
| 195 | 8.15 | 220 | 7.15 | 250 | 7.15 | 308 | 7.15 | 349 | 7.15 |
| 363 | 7.15 | 388 | 8.15 | 391 | 9.15 | 401 | 10.15 | 412 | 10.15 |
| 418 | 9.15 | 426 | 8.15 | 438 | 7.15 | 541 | 7.15 | 569 | 7.15 |
| 592 | 7.15 | 594 | 8.15 | 596 | 9.15 | 600 | 10.15 | 605 | 10.15 |
| 608 | 9.15 | 610 | 8.15 | 612 | 7.15 | 615 | 6.15 | 616 | 5.15 |
| 674 | 5.15 | 686 | 5.15 | 697 | 5.15 | 739 | 6.15 | 774 | 6.15 |
| 792 | 5.15 | 892 | 5.15 | 953 | 5.15 | 1000 | 5.15 | 1085 | 6.15 |
| 1105 | 6.15 | 1144 | 5.15 | 1207 | 4.15 | 1258 | 4.15 | 1281 | 4.15 |
| 1342 | 4.15 | 1345 | 1.15 | 1382 | 1.15 | 1385 | 4.15 | 1400 | 4.15 |
| 1403 | 1.15 | 1418 | 1.15 | 1426 | 1.15 | 1439 | 1.15 | 1443 | 4.15 |
| 1447 | 4.15 | 1452 | 1.15 | 1507 | 1.15 | 1512 | 4.15 | 1569 | 4.15 |
| 1576 | 2.15 | 1584 | 4.15 | 1607 | 1.15 | 1928 | 1.15 | 1942 | 2.15 |
| 1966 | 2.15 | 1971 | 3.15 | 1974 | 6.15 | 1986 | 6.15 | 1991 | 5.15 |
| 2003 | 4.15 | 2022 | 3.15 | 2026 | 1.15 | 2501 | 1.15 | 2511 | 4.15 |
| 2532 | 4.15 | 2544 | 1.15 | 2548 | 1.15 | 2556 | 4.15 | 2610 | 4.15 |
| 2617 | 1.15 | 2641 | 1.15 | 2659 | 1.15 | 2668 | 1.15 | 2688 | 1.15 |
| 2721 | 4.15 | 2728 | 4.15 | 2737 | 1.15 | 2741 | 1.15 | 2749 | 1.15 |
| 2756 | 1.15 | 2771 | 1.15 | 2780 | 1.15 | 2787 | 1.15 | 2836 | 1.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3003 | 3.15 | 3835 | 3.15 | 3841 | 3.15 | 3848 | 3.15 | 3856 | 3.15 |
| 3857 | 2.15 | 3940 | 1.15 | 4030 | 1.15 | 4033 | 4.15 | 4036 | 4.15 |
| 4053 | 5.15 | 4068 | 6.15 | 4070 | 7.15 | 4083 | 12.15 | 4096 | 22.15 |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 3835 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 220 | 4070 | .3 | .5 |

Ineffective Flow num= 4

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1051 | 20 | T |
| 1051 | 1725 | 18 | T |
| 1725 | 3110 | 15.5 | T |
| 3110 | 3765 | 18 | T |

Downstream Deck/Roadway Coordinates num= 9

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 24.15 | .15 | 100 | 22.15 | .15 | 1725.1 | 17.15 | .15 |
| 2070.1 | 16.15 | .15 | 2550 | 14.65 | .15 | 3085.6 | 16.15 | .15 |
| 3808.67 | 23.15 | .15 | 3808.67 | 23.15 | 16.15 | 4150 | 23.15 | 16.15 |

Downstream Bridge Cross Section Data

Station Elevation Data num= 89

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 100 | 12.15 | 113 | 11.15 | 127 | 11.15 | 135 | 11.15 |
| 257 | 10.15 | 282 | 10.15 | 308 | 10.15 | 311 | 10.15 | 360 | 10.15 |
| 369 | 10.15 | 373 | 11.15 | 375 | 11.15 | 382 | 11.15 | 386 | 12.15 |
| 400 | 12.15 | 403 | 11.15 | 411 | 10.15 | 419 | 8.15 | 480 | 7.15 |
| 541 | 7.15 | 555 | 7.15 | 624 | 7.15 | 845 | 6.15 | 1084 | 6.15 |
| 1141 | 7.15 | 1191 | 7.15 | 1219 | 7.15 | 1249 | 6.15 | 1301 | 5.15 |
| 1311 | 5.15 | 1324 | 5.15 | 1409 | 4.15 | 1436 | 4.15 | 1444 | 4.15 |
| 1502 | 4.15 | 1536 | 4.15 | 1607 | 4.15 | 1680 | 4.15 | 1740 | 5.15 |
| 1781 | 5.15 | 1801 | 5.15 | 1805 | 5.15 | 1855 | 3.15 | 1905 | 2.15 |
| 2014 | 1.15 | 2027 | 1.15 | 2116 | 1.15 | 2134 | 1.15 | 2232 | 1.15 |
| 2255 | 1.15 | 2291 | 1.15 | 2310 | 1.15 | 2349 | 1.15 | 2363 | 1.15 |
| 2684 | 1.15 | 2714 | 1.15 | 2961 | 1.15 | 2964 | 4.15 | 2969 | 4.15 |
| 2970 | 4.15 | 2978 | 4.15 | 2980 | 1.15 | 3361 | 1.15 | 3362 | 4.15 |
| 3389 | 4.15 | 3428 | 4.15 | 3454 | 4.15 | 3456 | 1.15 | 3472 | 1.15 |
| 3473 | 4.15 | 3477 | 4.15 | 3505 | 4.15 | 3508 | 4.15 | 3509 | 1.15 |
| 3549 | 1.15 | 3659 | 1.15 | 3670 | 2.15 | 3877 | 2.15 | 3880 | 2.15 |
| 3884 | 2.15 | 3887 | 1.15 | 4051 | 1.15 | 4080 | 4.15 | 4114 | 5.15 |
| 4116 | 6.15 | 4119 | 7.15 | 4126 | 12.15 | 4150 | 21.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 386 | .04 | 3887 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 480 | 4116 | .3 | .5 |

Ineffective Flow num= 5

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1109 | 20 | T |
| 1109 | 1521 | 18 | T |
| 1521 | 1784 | 17 | T |
| 1784 | 3207 | 15.5 | T |
| 3207 | 3761 | 18 | T |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95

Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 1

Abutment Data

| Upstream | num= | 2 | |
|---|---|---|---|
| Sta | Elev | Sta | Elev |
| 13765.6 | 12.15 | 13800 | 2.15 |
| Downstream | num= | 2 | |
| Sta | Elev | Sta | Elev |
| 13808.67 | 12.15 | 13843.07 | 2.15 |

Number of Piers = 19

Pier Data
Pier Station Upstream= 3781.6 Downstream= 3824.67

| Upstream | num= | 2 | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| Downstream | num= | 2 | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3797.6 Downstream= 3840.67

| Upstream | num= | 2 | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| Downstream | num= | 2 | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3813.6 Downstream= 3856.67

| Upstream | num= | 2 | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| Downstream | num= | 2 | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3829.6 Downstream= 3872.67

| Upstream | num= | 2 | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| Downstream | num= | 2 | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3845.6 Downstream= 3888.67

| Upstream | num= | 2 | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |
| Downstream | num= | 2 | |
| Width | Elev | Width | Elev |
| 3 | 1.15 | 3 | 16.15 |

Pier Data

```
Pier Station      Upstream=  3861.6    Downstream= 3904.67
Upstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15
Downstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15

Pier Data
Pier Station      Upstream=  3877.6    Downstream= 3920.67
Upstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15
Downstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15

Pier Data
Pier Station      Upstream=  3893.6    Downstream= 3936.67
Upstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15
Downstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15

Pier Data
Pier Station      Upstream=  3909.6    Downstream= 3952.67
Upstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15
Downstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15

Pier Data
Pier Station      Upstream=  3925.6    Downstream= 3968.67
Upstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15
Downstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15

Pier Data
Pier Station      Upstream=  3941.6    Downstream= 3984.67
Upstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15
Downstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15

Pier Data
Pier Station      Upstream=  3957.6    Downstream= 4000.67
Upstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15
Downstream      num=        2
    Width    Elev     Width    Elev
        3    1.15         3   16.15

Pier Data
```

Pier Station Upstream= 3973.6 Downstream= 4016.67
Upstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 3989.6 Downstream= 4032.67
Upstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 4005.6 Downstream= 4048.67
Upstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 4021.6 Downstream= 4064.67
Upstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 4037.6 Downstream= 4080.67
Upstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 4053.6 Downstream= 4096.67
Upstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Pier Data
Pier Station Upstream= 4069.6 Downstream= 4112.67
Upstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Downstream num= 2
| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 1.15 | 3 | 16.15 |

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 17.44 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 17.28 | E.G. Elev (ft) | 17.36 |
| 17.25 | | | |
| Q Total (cfs) | 23255.00 | W.S. Elev (ft) | 16.98 |
| 16.89 | | | |
| Q Bridge (cfs) | 20546.32 | Crit W.S. (ft) | 8.86 |
| 8.42 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 15.83 |
| 15.74 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.91 |
| 4.79 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 4740.71 |
| 4856.83 | | | |
| Weir Submerg | | Froude # Chl | 0.23 |
| 0.22 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 31155.79 |
| 32511.56 | | | |
| Min El Weir Flow (ft) | 15.51 | Hydr Depth (ft) | 3.43 |
| 3.60 | | | |
| Min El Prs (ft) | 16.15 | W.P. Total (ft) | 2447.03 |
| 2445.46 | | | |
| Delta EG (ft) | 0.30 | Conv. Total (cfs) | 346128.6 |
| 349885.2 | | | |
| Delta WS (ft) | 0.28 | Top Width (ft) | 1392.46 |
| 1348.23 | | | |
| BR Open Area (sq ft) | 3507.72 | Frctn Loss (ft) | 0.10 |
| 0.00 | | | |
| BR Open Vel (ft/s) | 5.86 | C & E Loss (ft) | 0.01 |
| 0.10 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.55 |
| 0.55 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 2.68 |
| 2.62 | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1872

INPUT
Description: Downstream of RR crossing
Station Elevation Data num= 89

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 100 | 12.15 | 113 | 11.15 | 127 | 11.15 | 135 | 11.15 |
| 257 | 10.15 | 282 | 10.15 | 308 | 10.15 | 311 | 10.15 | 360 | 10.15 |
| 369 | 10.15 | 373 | 11.15 | 375 | 11.15 | 382 | 11.15 | 386 | 12.15 |
| 400 | 12.15 | 403 | 11.15 | 411 | 10.15 | 419 | 8.15 | 480 | 7.15 |
| 541 | 7.15 | 555 | 7.15 | 624 | 7.15 | 845 | 6.15 | 1084 | 6.15 |
| 1141 | 7.15 | 1191 | 7.15 | 1219 | 7.15 | 1249 | 6.15 | 1301 | 5.15 |
| 1311 | 5.15 | 1324 | 5.15 | 1409 | 4.15 | 1436 | 4.15 | 1444 | 4.15 |
| 1502 | 4.15 | 1536 | 4.15 | 1607 | 4.15 | 1680 | 4.15 | 1740 | 5.15 |
| 1781 | 5.15 | 1801 | 5.15 | 1805 | 5.15 | 1855 | 3.15 | 1905 | 2.15 |
| 2014 | 1.15 | 2027 | 1.15 | 2116 | 1.15 | 2134 | 1.15 | 2232 | 1.15 |
| 2255 | 1.15 | 2291 | 1.15 | 2310 | 1.15 | 2349 | 1.15 | 2363 | 1.15 |
| 2684 | 1.15 | 2714 | 1.15 | 2961 | 1.15 | 2964 | 4.15 | 2969 | 4.15 |
| 2970 | 4.15 | 2978 | 4.15 | 2980 | 1.15 | 3361 | 1.15 | 3362 | 4.15 |
| 3389 | 4.15 | 3428 | 4.15 | 3454 | 4.15 | 3456 | 1.15 | 3472 | 1.15 |
| 3473 | 4.15 | 3477 | 4.15 | 3505 | 4.15 | 3508 | 4.15 | 3509 | 1.15 |
| 3549 | 1.15 | 3659 | 1.15 | 3670 | 2.15 | 3877 | 2.15 | 3880 | 2.15 |
| 3884 | 2.15 | 3887 | 1.15 | 4051 | 1.15 | 4080 | 4.15 | 4114 | 5.15 |
| 4116 | 6.15 | 4119 | 7.15 | 4126 | 12.15 | 4150 | 21.15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .04 | 386 | .04 | 3887 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 480 | 4116 | 267 | 596.2 1122.6 | .3 | .5 |

Ineffective Flow num= 5

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1109 | 20 | T |
| 1109 | 1521 | 18 | T |
| 1521 | 1784 | 17 | T |
| 1784 | 3207 | 15.5 | T |
| 3207 | 3761 | 18 | T |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.14 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.15 | Wt. n-Val. | | 0.036 |
| 0.035 W.S. Elev (ft) | 16.99 | Reach Len. (ft) | 267.00 | 596.20 |
| 1122.60 Crit W.S. (ft) | | Flow Area (sq ft) | | 7451.25 |
| 113.68 E.G. Slope (ft/ft) | 0.000384 | Area (sq ft) | 2721.74 | 50364.47 |
| 113.68 Q Total (cfs) | 23255.00 | Flow (cfs) | | 22999.22 |
| 255.78 Top Width (ft) | 4087.33 | Top Width (ft) | 428.42 | 3636.00 |
| 22.91 Vel Total (ft/s) | 3.07 | Avg. Vel. (ft/s) | | 3.09 |
| 2.25 Max Chl Dpth (ft) | 15.84 | Hydr. Depth (ft) | | 4.19 |
| 4.96 Conv. Total (cfs) | 1186909.0 | Conv. (cfs) | | 1173854.0 |
| 13054.8 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 600.44 | Wetted Per. (ft) | | 1781.47 | 25.55 |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.10 | 0.11 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.31 | 0.24 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 140.52 | 1755.39 | 6.61 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 23.36 | 162.28 | 2.55 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 60.00 | 0.00 | 3.55 | 8.46 |
| 0.00 | 0.42 | 0.00 | | | | |
| 2 | LOB | 60.00 | 120.00 | 0.00 | 224.03 | 60.24 |
| 0.00 | 3.73 | 0.00 | | | | |
| 3 | LOB | 120.00 | 180.00 | 0.00 | 358.83 | 60.00 |
| 0.00 | 5.98 | 0.00 | | | | |
| 4 | LOB | 180.00 | 240.00 | 0.00 | 387.41 | 60.00 |
| 0.00 | 6.46 | 0.00 | | | | |
| 5 | LOB | 240.00 | 300.00 | 0.00 | 409.34 | 60.00 |
| 0.00 | 6.82 | 0.00 | | | | |
| 6 | LOB | 300.00 | 360.00 | 0.00 | 410.53 | 60.00 |
| 0.00 | 6.84 | 0.00 | | | | |
| 7 | LOB | 360.00 | 420.00 | 0.00 | 367.04 | 60.72 |
| 0.00 | 6.12 | 0.00 | | | | |
| 8 | LOB | 420.00 | 480.00 | 0.00 | 561.02 | 60.01 |
| 0.00 | 9.35 | 0.00 | | | | |
| 9 | Chan | 480.00 | 1109.00 | 0.00 | 6559.72 | 629.01 |
| 0.00 | 10.43 | 0.00 | | | | |
| 10 | Chan | 1109.00 | 1521.00 | 0.00 | 4751.44 | 412.04 |
| 0.00 | 11.53 | 0.00 | | | | |
| 11 | Chan | 1521.00 | 1784.00 | 0.00 | 3303.48 | 263.01 |
| 0.00 | 12.56 | 0.00 | | | | |
| 12 | Chan | 1784.00 | 2258.33 | 556.90 | 707.77 | 474.39 |
| 2.39 | 1.49 | 0.79 | | | | |
| 13 | Chan | 2258.33 | 2732.67 | 556.94 | 707.77 | 474.33 |
| 2.39 | 1.49 | 0.79 | | | | |
| 14 | Chan | 2732.67 | 3207.00 | 554.72 | 707.77 | 477.18 |
| 2.39 | 1.49 | 0.78 | | | | |
| 15 | Chan | 3207.00 | 3761.00 | 0.00 | 8291.54 | 562.14 |
| 0.00 | 14.97 | 0.00 | | | | |
| 16 | Chan | 3761.00 | 4116.00 | 21330.66 | 5327.96 | 355.57 |
| 91.73 | 15.01 | 4.00 | | | | |
| 17 | ROB | 4116.00 | 4120.25 | 126.79 | 42.77 | 4.70 |
| 0.55 | 10.06 | 2.96 | | | | |
| 18 | ROB | 4120.25 | 4124.50 | 71.28 | 31.58 | 5.22 |
| 0.31 | 7.43 | 2.26 | | | | |
| 19 | ROB | 4124.50 | 4128.75 | 35.20 | 19.96 | 4.78 |
| 0.15 | 4.70 | 1.76 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 20 | ROB | 4128.75 | 4133.00 | 17.39 | 12.81 | 4.54 |
| 0.07 | 3.01 | 1.36 | | | | |
| 21 | ROB | 4133.00 | 4137.25 | 4.96 | 6.04 | 4.54 |
| 0.02 | 1.42 | 0.82 | | | | |
| 22 | ROB | 4137.25 | 4141.50 | 0.16 | 0.52 | 1.78 |
| 0.00 | 0.31 | 0.30 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1276

INPUT
Description:
Station Elevation Data num= 135

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.15 | 60 | 5.15 | 360 | 5.15 | 363 | 6.15 | 366 | 7.15 |
| 368 | 8.15 | 370 | 9.15 | 372 | 10.15 | 375 | 11.15 | 377 | 12.15 |
| 392 | 12.15 | 398 | 11.15 | 401 | 10.15 | 403 | 9.15 | 405 | 8.15 |
| 408 | 7.15 | 412 | 6.35 | 413 | 6.15 | 416 | 5.15 | 424 | 5.15 |
| 458 | 5.15 | 466 | 5.15 | 476 | 4.15 | 479 | 4.15 | 974 | 4.15 |
| 983 | 4.15 | 988 | 5.15 | 996 | 5.15 | 1227 | 5.15 | 1317 | 5.15 |
| 1537 | 5.15 | 1564 | 5.15 | 1574 | 4.15 | 1807 | 4.15 | 1868 | 5.15 |
| 1925 | 5.15 | 2002 | 6.15 | 2040 | 6.15 | 2044 | 5.15 | 2047 | 9.15 |
| 2050 | 4.15 | 2182 | 4.15 | 2188 | 4.15 | 2201 | 1.15 | 3027 | 1.15 |
| 3028 | 4.15 | 3033 | 4.15 | 3036 | 6.15 | 3040 | 5.15 | 3045 | 5.15 |
| 3047 | 4.15 | 3047 | 6.15 | 3051 | 4.15 | 3052 | 1.15 | 3070 | 1.15 |
| 3071 | 4.15 | 3085 | 4.15 | 3089 | 5.15 | 3098 | 5.15 | 3108 | 5.15 |
| 3114 | 9.15 | 3118 | 5.15 | 3121 | 9.15 | 3121 | 4.15 | 3123 | 4.15 |
| 3124 | 1.15 | 3393 | 1.15 | 3395 | 4.15 | 3406 | 4.15 | 3476 | 4.15 |
| 3483 | 4.15 | 3489 | 5.15 | 3519 | 5.15 | 3521 | 4.15 | 3534 | 4.15 |
| 3536 | 1.15 | 3545 | 1.15 | 3547 | 4.15 | 3568 | 4.15 | 3570 | 1.15 |
| 3616 | 1.15 | 3619 | 4.15 | 3627 | 4.15 | 3642 | 4.15 | 3644 | 4.15 |
| 3645 | 1.15 | 3648 | 4.15 | 3652 | 4.15 | 3724 | 6.15 | 3738 | 5.15 |
| 3775 | 6.15 | 3775 | 5.15 | 3789 | 5.15 | 3790 | 5.15 | 3791 | 6.15 |
| 3794 | 7.15 | 3800 | 8.15 | 3805 | 8.15 | 3811 | 7.15 | 3813 | 6.15 |
| 3817 | 5.15 | 3818 | 5.15 | 3820 | 4.15 | 3822 | 4.15 | 3841 | 1.15 |
| 3842 | 4.15 | 3846 | 4.15 | 3847 | 6.15 | 3848 | 5.15 | 3895 | 6.15 |
| 3910 | 6.15 | 3913 | 6.15 | 3917 | 6.15 | 3919 | 5.15 | 4026 | 5.15 |
| 4034 | 6.15 | 4037 | 7.15 | 4043 | 8.15 | 4046 | 9.15 | 4153 | 10.15 |
| 4205 | 11.15 | 4238 | 10.15 | 4303 | 11.15 | 4311 | 10.15 | 4324 | 9.15 |
| 4336 | 8.15 | 4359 | 7.15 | 4406 | 4.15 | 4432 | 1.15 | 5255 | 1.15 |
| 5268 | 4.15 | 5287 | 7.15 | 5304 | 12.15 | 5433 | 36.15 | 5443 | 38.15 |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4303 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 412 | 5287 | 797.8 | 706.8 209 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 4027.5 | 19 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 17.03 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | | 0.035 |
| 0.035 | | | | |
| W.S. Elev (ft) | 17.00 | Reach Len. (ft) | 797.80 | 706.80 |
| 209.00 | | | | |
| Crit W.S. (ft) | 4.04 | Flow Area (sq ft) | | 16745.21 |
| 188.37 | | | | |
| E.G. Slope (ft/ft) | 0.000032 | Area (sq ft) | 4173.98 | 65267.85 |
| 188.37 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23136.36 |
| 118.64 | | | | |
| Top Width (ft) | 5311.94 | Top Width (ft) | 393.84 | 4875.00 |
| 43.09 | | | | |
| Vel Total (ft/s) | 1.37 | Avg. Vel. (ft/s) | | 1.38 |
| 0.63 | | | | |
| Max Chl Dpth (ft) | 15.85 | Hydr. Depth (ft) | | 13.30 |
| 4.37 | | | | |
| Conv. Total (cfs) | 4116557.0 | Conv. (cfs) | | 4095555.0 |
| 21002.3 | | | | |
| Length Wtd. (ft) | 702.09 | Wetted Per. (ft) | | 1261.00 |
| 44.26 | | | | |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.03 |
| 0.01 | | | | |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.04 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 119.39 | 964.07 |
| 2.72 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 20.84 | 104.04 |
| 1.70 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 51.50 | 0.00 | 157.47 | 34.65 |
| 0.00 | 4.72 | 0.00 | | | | |
| 2 | LOB | 51.50 | 103.00 | 0.00 | 600.28 | 51.83 |
| 0.00 | 11.66 | 0.00 | | | | |
| 3 | LOB | 103.00 | 154.50 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | 0.00 | | | | |
| 4 | LOB | 154.50 | 206.00 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | 0.00 | | | | |
| 5 | LOB | 206.00 | 257.50 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | 0.00 | | | | |
| 6 | LOB | 257.50 | 309.00 | 0.00 | 610.52 | 51.50 |
| 0.00 | 11.85 | 0.00 | | | | |
| 7 | LOB | 309.00 | 360.50 | 0.00 | 610.48 | 51.53 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.00 | 11.85 | 0.00 | | | | | |
| 8 | LOB | 360.50 | 412.00 | 0.00 | 363.66 | 53.86 | |
| 0.00 | 7.06 | 0.00 | | | | | |
| 9 | Chan | 412.00 | 1014.58 | 0.00 | 7655.38 | 602.91 | |
| 0.00 | 12.70 | 0.00 | | | | | |
| 10 | Chan | 1014.58 | 1617.17 | 0.00 | 7191.65 | 602.63 | |
| 0.00 | 11.93 | 0.00 | | | | | |
| 11 | Chan | 1617.17 | 2219.75 | 0.00 | 7520.31 | 607.89 | |
| 0.00 | 12.48 | 0.00 | | | | | |
| 12 | Chan | 2219.75 | 2822.33 | 0.00 | 9553.81 | 602.58 | |
| 0.00 | 15.85 | 0.00 | | | | | |
| 13 | Chan | 2822.33 | 3424.92 | 0.00 | 9151.06 | 626.27 | |
| 0.00 | 15.19 | 0.00 | | | | | |
| 14 | Chan | 3424.92 | 4027.50 | 0.00 | 7450.42 | 619.09 | |
| 0.00 | 12.36 | 0.00 | | | | | |
| 15 | Chan | 4027.50 | 4657.25 | 8320.61 | 6865.68 | 630.68 | |
| 35.78 | 10.90 | 1.21 | | | | | |
| 16 | Chan | 4657.25 | 5287.00 | 14815.74 | 9879.53 | 630.33 | |
| 63.71 | 15.69 | 1.50 | | | | | |
| 17 | ROB | 5287.00 | 5306.50 | 99.44 | 136.59 | 20.26 | |
| 0.43 | 7.00 | 0.73 | | | | | |
| 18 | ROB | 5306.50 | 5326.00 | 19.04 | 50.23 | 19.83 | |
| 0.08 | 2.58 | 0.38 | | | | | |
| 19 | ROB | 5326.00 | 5345.50 | 0.17 | 1.56 | 4.16 | |
| 0.00 | 0.38 | 0.11 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 569

INPUT
Description: Upstream of SCH
Station Elevation Data num= 92

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | 300 | 11.15 | 305 | 12.15 | 421 | 12.15 | 427 | 11.15 |
| 440 | 10.15 | 451 | 9.15 | 470.71 | 8.33 | 475 | 8.15 | 578 | 8.15 |
| 584 | 8.15 | 647 | 8.15 | 692 | 8.15 | 744 | 8.15 | 775 | 8.15 |
| 779 | 8.15 | 815 | 8.15 | 825 | 8.15 | 879 | 8.15 | 890 | 8.15 |
| 955 | 8.15 | 975 | 8.15 | 985 | 8.15 | 1017 | 8.15 | 1045 | 8.15 |
| 1500 | 7.15 | 1945 | 7.15 | 1966 | 6.15 | 1970 | 6.15 | 1989 | 7.15 |
| 2467 | 7.15 | 2482 | 7.15 | 2497 | 6.15 | 2508 | 6.15 | 2574 | 7.15 |
| 2606 | 8.15 | 2650 | 9.15 | 2653 | 10.15 | 2656 | 11.15 | 2665 | 11.15 |
| 2682 | 10.15 | 2695 | 9.15 | 2719 | 8.15 | 2875 | 8.15 | 2909 | 9.15 |
| 2917 | 10.15 | 2921 | 11.15 | 2926 | 12.15 | 2942 | 13.15 | 2946 | 14.15 |
| 3010 | 14.15 | 3088 | 13.15 | 3098 | 13.15 | 3101 | 13.15 | 3183 | 14.15 |
| 3217 | 14.15 | 3607 | 13.15 | 3947 | 13.15 | 3975 | 12.15 | 3985 | 8.15 |
| 4012 | 7.15 | 4039 | 6.15 | 4054 | 5.15 | 4062 | 4.15 | 4069 | 4.15 |
| 4072 | 1.15 | 4169 | 1.15 | 4171 | 4.15 | 4182 | 4.15 | 4195 | 5.15 |
| 4245 | 7.15 | 4334 | 8.15 | 4364 | 8.15 | 4423 | 7.15 | 4484 | 7.15 |
| 4616 | 7.15 | 4662 | 7.15 | 4701 | 7.15 | 4722 | 6.15 | 4728 | 5.15 |
| 4732 | 4.15 | 4743 | 4.15 | 4790 | 3.15 | 4810 | 1.15 | 4915 | 1.15 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4934 | 4.15 | 4937 | 4.15 | 4940 | 5.15 | 4947 | 6.15 | 4953 | 7.15 |
| 4958 | 13.15 | 5075 | 19.15 | | | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4069 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 779 | 4953 | 543.2 | 121.7 | .3 | .5 |

Ineffective Flow num= 7

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2405 | 19 | T |
| 2405 | 2938 | 16 | T |
| 2938 | 3183 | 14.5 | T |
| 3183 | 3607 | 13.75 | T |
| 3607 | 4060 | 13.5 | T |
| 4060 | 4400 | 14 | T |
| 4400 | 4700 | 15.5 | T |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 3434.16 | 3586.35 | 22.17 | 3772.38 | 3896.39 | 22.07 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.13 | Wt. n-Val. | | 0.036 | 0.035 |
| W.S. Elev (ft) | 16.83 | Reach Len. (ft) | 10.00 | 10.00 | 10.00 |
| Crit W.S. (ft) | 9.32 | Flow Area (sq ft) | | 7765.29 | 165.22 |
| E.G. Slope (ft/ft) | 0.000791 | Area (sq ft) | 4197.18 | 33544.22 | 165.22 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 22934.04 | 320.96 |
| Top Width (ft) | 4666.40 | Top Width (ft) | 691.89 | 3897.80 | 76.71 |
| Vel Total (ft/s) | 2.93 | Avg. Vel. (ft/s) | | 2.95 | 1.94 |
| Max Chl Dpth (ft) | 15.68 | Hydr. Depth (ft) | | 3.42 | 2.15 |
| Conv. Total (cfs) | 826923.5 | Conv. (cfs) | | 815510.4 | 11413.1 |
| Length Wtd. (ft) | 10.00 | Wetted Per. (ft) | | 2291.71 | 79.61 |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.17 | 0.10 |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 0.49 | 0.20 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 42.73 | 162.41 | 1.87 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 10.89 | 32.86 | 1.41 |

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 0.00 | 97.38 | 0.00 | 1.41 | 10.27 |
| 0.00 | 0.14 | 0.00 | | | | |
| 2 | LOB | 97.38 | 194.75 | 0.00 | 153.09 | 97.41 |
| 0.00 | 1.57 | 0.00 | | | | |
| 3 | LOB | 194.75 | 292.13 | 0.00 | 405.94 | 97.41 |
| 0.00 | 4.17 | 0.00 | | | | |
| 4 | LOB | 292.13 | 389.50 | 0.00 | 464.99 | 97.48 |
| 0.00 | 4.78 | 0.00 | | | | |
| 5 | LOB | 389.50 | 486.88 | 0.00 | 636.93 | 97.56 |
| 0.00 | 6.54 | 0.00 | | | | |
| 6 | LOB | 486.88 | 584.25 | 0.00 | 844.94 | 97.38 |
| 0.00 | 8.68 | 0.00 | | | | |
| 7 | LOB | 584.25 | 681.63 | 0.00 | 844.94 | 97.38 |
| 0.00 | 8.68 | 0.00 | | | | |
| 8 | LOB | 681.63 | 779.00 | 0.00 | 844.94 | 97.38 |
| 0.00 | 8.68 | 0.00 | | | | |
| 9 | Chan | 779.00 | 1321.00 | 0.00 | 4786.75 | 542.00 |
| 0.00 | 8.83 | 0.00 | | | | |
| 10 | Chan | 1321.00 | 1863.00 | 0.00 | 5209.83 | 542.00 |
| 0.00 | 9.61 | 0.00 | | | | |
| 11 | Chan | 1863.00 | 2405.00 | 0.00 | 5269.04 | 542.05 |
| 0.00 | 9.72 | 0.00 | | | | |
| 12 | Chan | 2405.00 | 2938.00 | 284.50 | 440.89 | 533.80 |
| 1.22 | 0.83 | 0.65 | | | | |
| 13 | Chan | 2938.00 | 3183.00 | 733.66 | 570.16 | 245.14 |
| 3.15 | 2.33 | 1.29 | | | | |
| 14 | Chan | 3183.00 | 3607.00 | 1134.05 | 779.38 | 278.67 |
| 4.88 | 2.87 | 1.46 | | | | |
| 15 | Chan | 3607.00 | 4060.00 | 1758.91 | 1094.61 | 337.25 |
| 7.56 | 3.33 | 1.61 | | | | |
| 16 | Chan | 4060.00 | 4400.00 | 1595.48 | 961.25 | 342.95 |
| 6.86 | 2.83 | 1.66 | | | | |
| 17 | Chan | 4400.00 | 4700.00 | 402.82 | 398.16 | 300.00 |
| 1.73 | 1.33 | 1.01 | | | | |
| 18 | Chan | 4700.00 | 4953.00 | 17024.63 | 3520.83 | 253.89 |
| 73.21 | 13.92 | 4.84 | | | | |
| 19 | ROB | 4953.00 | 4968.25 | 166.35 | 68.38 | 18.07 |
| 0.72 | 4.48 | 2.43 | | | | |
| 20 | ROB | 4968.25 | 4983.50 | 82.92 | 42.10 | 15.27 |
| 0.36 | 2.76 | 1.97 | | | | |
| 21 | ROB | 4983.50 | 4998.75 | 47.60 | 30.17 | 15.27 |
| 0.20 | 1.98 | 1.58 | | | | |
| 22 | ROB | 4998.75 | 5014.00 | 20.58 | 18.25 | 15.27 |
| 0.09 | 1.20 | 1.13 | | | | |
| 23 | ROB | 5014.00 | 5029.25 | 3.52 | 6.32 | 15.27 |
| 0.02 | 0.41 | 0.56 | | | | |
| 24 | ROB | 5029.25 | 5044.50 | 0.00 | 0.01 | 0.46 |
| 0.00 | 0.01 | 0.05 | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross

sections.

BRIDGE

RIVER: San Elijo Lagoon
REACH: Lower RS: 500

INPUT
Description: S. Coast Highway 101 Bridge
Distance from Upstream XS = 10
Deck/Roadway Width = 70
Weir Coefficient = 2.61
Upstream Deck/Roadway Coordinates
num= 13

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | .15 | 318.36 | 19.15 | .15 | 1068.36 | 19.15 | .15 |
| 1718.36 | 18.15 | .15 | 2938.36 | 15.15 | .15 | 3518.36 | 13.15 | .15 |
| 4018.36 | 13.15 | .15 | 4701.36 | 15.81 | .15 | 4711.36 | 15.81 | 1.15 |
| 4764.6 | 15.81 | 1.15 | 4764.6 | 15.81 | 13.15 | 4947 | 17.32 | 13.15 |
| 5188.36 | 19.92 | | | | | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 92

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | 300 | 11.15 | 305 | 12.15 | 421 | 12.15 | 427 | 11.15 |
| 440 | 10.15 | 451 | 9.15 | 470.71 | 8.33 | 475 | 8.15 | 578 | 8.15 |
| 584 | 8.15 | 647 | 8.15 | 692 | 8.15 | 744 | 8.15 | 775 | 8.15 |
| 779 | 8.15 | 815 | 8.15 | 825 | 8.15 | 879 | 8.15 | 890 | 8.15 |
| 955 | 8.15 | 975 | 8.15 | 985 | 8.15 | 1017 | 8.15 | 1045 | 8.15 |
| 1500 | 7.15 | 1945 | 7.15 | 1966 | 6.15 | 1970 | 6.15 | 1989 | 7.15 |
| 2467 | 7.15 | 2482 | 7.15 | 2497 | 6.15 | 2508 | 6.15 | 2574 | 7.15 |
| 2606 | 8.15 | 2650 | 9.15 | 2653 | 10.15 | 2656 | 11.15 | 2665 | 11.15 |
| 2682 | 10.15 | 2695 | 9.15 | 2719 | 8.15 | 2875 | 8.15 | 2909 | 9.15 |
| 2917 | 10.15 | 2921 | 11.15 | 2926 | 12.15 | 2942 | 13.15 | 2946 | 14.15 |
| 3010 | 14.15 | 3088 | 13.15 | 3098 | 13.15 | 3101 | 13.15 | 3183 | 14.15 |
| 3217 | 14.15 | 3607 | 13.15 | 3947 | 13.15 | 3975 | 12.15 | 3985 | 8.15 |
| 4012 | 7.15 | 4039 | 6.15 | 4054 | 5.15 | 4062 | 4.15 | 4069 | 4.15 |
| 4072 | 1.15 | 4169 | 1.15 | 4171 | 4.15 | 4182 | 4.15 | 4195 | 5.15 |
| 4245 | 7.15 | 4334 | 8.15 | 4364 | 8.15 | 4423 | 7.15 | 4484 | 7.15 |
| 4616 | 7.15 | 4662 | 7.15 | 4701 | 7.15 | 4722 | 6.15 | 4728 | 5.15 |
| 4732 | 4.15 | 4743 | 4.15 | 4790 | 3.15 | 4810 | 1.15 | 4915 | 1.15 |
| 4934 | 4.15 | 4937 | 4.15 | 4940 | 5.15 | 4947 | 6.15 | 4953 | 7.15 |
| 4958 | 13.15 | 5075 | 19.15 | | | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4069 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
779 4953 .3 .5
Ineffective Flow num= 7

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 2405 | 19 | T |
| 2405 | 2938 | 16 | T |
| 2938 | 3183 | 14.5 | T |
| 3183 | 3607 | 13.75 | T |
| 3607 | 4060 | 13.5 | T |
| 4060 | 4400 | 14 | T |
| 4400 | 4700 | 15.5 | T |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 3434.16 | 3586.35 | 22.17 | 3772.38 | 3896.39 | 22.07 |

Downstream Deck/Roadway Coordinates
num= 10

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 19.15 | .15 | 750 | 19.15 | .15 | 1400 | 18.15 | .15 |
| 2620 | 15.15 | .15 | 3200 | 13.15 | .15 | 3700 | 13.15 | .15 |
| 4427.11 | 15.81 | 1.15 | 4427.11 | 15.81 | 13.15 | 4642 | 17.32 | 13.15 |
| 4657 | 17.15 | 13.15 | | | | | | |

Downstream Bridge Cross Section Data
Station Elevation Data num= 88

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 17.15 | 297 | 14.15 | 514 | 12.15 | 520 | 11.15 | 599.6 | 11.15 |
| 1163 | 11.15 | 1184 | 11.15 | 1215 | 11.15 | 1226 | 11.15 | 1231 | 11.15 |
| 1350 | 10.15 | 1363 | 10.15 | 1376 | 10.15 | 1468 | 10.15 | 1479 | 10.15 |
| 1576 | 10.15 | 1620 | 10.15 | 1704 | 10.15 | 1819 | 10.15 | 1872 | 10.15 |
| 2230 | 10.15 | 2264 | 10.15 | 2464 | 11.15 | 2471 | 11.15 | 2484 | 11.15 |
| 2583 | 12.15 | 2591 | 12.15 | 2613 | 12.15 | 2645 | 12.15 | 2646 | 12.15 |
| 2647 | 12.15 | 2686 | 11.15 | 2696 | 11.15 | 2697 | 10.15 | 2719 | 10.15 |
| 2771 | 10.15 | 2783 | 10.15 | 2798 | 10.15 | 2828 | 10.15 | 2838 | 10.15 |
| 2863 | 11.15 | 2875 | 12.15 | 2891 | 12.15 | 2892 | 11.15 | 2912 | 10.15 |
| 3012 | 11.15 | 3014 | 12.15 | 3025 | 11.15 | 3112 | 12.15 | 3206 | 13.15 |
| 3262 | 13.15 | 3265 | 13.15 | 3275 | 13.15 | 3311 | 13.15 | 3461 | 12.15 |
| 3737 | 12.15 | 3745 | 12.15 | 3788 | 12.15 | 3812 | 12.15 | 4075 | 12.15 |
| 4097 | 12.15 | 4210 | 12.15 | 4327 | 13.15 | 4347 | 13.15 | 4408 | 13.15 |
| 4409 | 13.15 | 4427.11 | 12.09 | 4443 | 11.15 | 4445 | 10.15 | 4446 | 9.15 |
| 4457 | 8.15 | 4458 | 7.15 | 4459 | 6.15 | 4460 | 5.15 | 4515 | 4.15 |
| 4516 | 1.15 | 4621 | 1.15 | 4622 | 4.15 | 4624 | 4.15 | 4626 | 5.15 |
| 4629 | 6.15 | 4631 | 6.82 | 4632 | 7.15 | 4634 | 8.15 | 4637 | 9.15 |
| 4640 | 10.15 | 4642 | 11.15 | 4657 | 17.15 | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4457 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
599.6 4632 .3 .5

Ineffective Flow num= 0

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 4821.2 Downstream= 4463.8
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -27.85 | 3 | 13.15 |

Pier Data
Pier Station Upstream= 4866.81 Downstream= 4607.2
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|

```
       3  -27.85        3   13.15
Downstream      num=          2
    Width    Elev     Width    Elev
       3  -27.85        3   13.15

Pier Data
Pier Station      Upstream=  4912.4     Downstream=  4535.5
Upstream      num=          2
    Width    Elev     Width    Elev
       3  -27.85        3   13.15
Downstream      num=          2
    Width    Elev     Width    Elev
       3  -27.85        3   13.15

Pier Data
Pier Station      Upstream=  4952.5     Downstream=    4500
Upstream      num=          2
    Width    Elev     Width    Elev
       3  -27.85        3   13.15
Downstream      num=          2
    Width    Elev     Width    Elev
       3  -27.85        3   13.15

Pier Data
Pier Station      Upstream=  4953.7     Downstream= 4571.33
Upstream      num=          2
    Width    Elev     Width    Elev
       3  -27.85        3   13.15
Downstream      num=          2
    Width    Elev     Width    Elev
       3  -27.85        3   13.15

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1


  E.G. US. (ft)                16.96    Element                Inside BR US
Inside BR DS
  W.S. US. (ft)                16.83    E.G. Elev (ft)               16.90
15.36
  Q Total (cfs)             23255.00    W.S. Elev (ft)               16.63
11.46
  Q Bridge (cfs)            12675.34    Crit W.S. (ft)               10.27
11.46
  Q Weir (cfs)                          Max Chl Dpth (ft)            15.48
10.31
  Weir Sta Lft (ft)                     Vel Total (ft/s)              4.22
15.77
```

| | | | |
|---|---|---|---|
| Weir Sta Rgt (ft) | 1474.41 | Flow Area (sq ft) | 5504.94 |
| Weir Submerg | 0.98 | Froude # Chl | 0.20 |
| Weir Max Depth (ft) | 18055.11 | Specif Force (cu ft) | 24706.63 |
| Min El Weir Flow (ft) | 13.51 | Hydr Depth (ft) | 2.52 |
| Min El Prs (ft) | 13.15 | W.P. Total (ft) | 2632.87 |
| Delta EG (ft) | 2.32 | Conv. Total (cfs) | 382144.6 |
| Delta WS (ft) | 6.65 | Top Width (ft) | 2249.29 |
| BR Open Area (sq ft) | 1813.92 | Frctn Loss (ft) | 0.46 |
| BR Open Vel (ft/s) | 8.60 | C & E Loss (ft) | 1.09 |
| Coef of Q | 1.60 | Shear Total (lb/sq ft) | 0.48 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 2.04 |

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

energy was used.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 448

INPUT
Description: Downstream of SCH
Station Elevation Data num= 88

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 17.15 | 297 | 14.15 | 514 | 12.15 | 520 | 11.15 | 599.6 | 11.15 |
| 1163 | 11.15 | 1184 | 11.15 | 1215 | 11.15 | 1226 | 11.15 | 1231 | 11.15 |
| 1350 | 10.15 | 1363 | 10.15 | 1376 | 10.15 | 1468 | 10.15 | 1479 | 10.15 |
| 1576 | 10.15 | 1620 | 10.15 | 1704 | 10.15 | 1819 | 10.15 | 1872 | 10.15 |
| 2230 | 10.15 | 2264 | 10.15 | 2464 | 11.15 | 2471 | 11.15 | 2484 | 11.15 |
| 2583 | 12.15 | 2591 | 12.15 | 2613 | 12.15 | 2645 | 12.15 | 2646 | 12.15 |
| 2647 | 12.15 | 2686 | 11.15 | 2696 | 11.15 | 2697 | 10.15 | 2719 | 10.15 |
| 2771 | 10.15 | 2783 | 10.15 | 2798 | 10.15 | 2828 | 10.15 | 2838 | 10.15 |
| 2863 | 11.15 | 2875 | 12.15 | 2891 | 12.15 | 2892 | 11.15 | 2912 | 10.15 |
| 3012 | 11.15 | 3014 | 12.15 | 3025 | 11.15 | 3112 | 12.15 | 3206 | 13.15 |
| 3262 | 13.15 | 3265 | 13.15 | 3275 | 13.15 | 3311 | 13.15 | 3461 | 12.15 |
| 3737 | 12.15 | 3745 | 12.15 | 3788 | 12.15 | 3812 | 12.15 | 4075 | 12.15 |
| 4097 | 12.15 | 4210 | 12.15 | 4327 | 13.15 | 4347 | 13.15 | 4408 | 13.15 |
| 4409 | 13.15 | 4427.11 | 12.09 | 4443 | 11.15 | 4445 | 10.15 | 4446 | 9.15 |
| 4457 | 8.15 | 4458 | 7.15 | 4459 | 6.15 | 4460 | 5.15 | 4515 | 4.15 |
| 4516 | 1.15 | 4621 | 1.15 | 4622 | 4.15 | 4624 | 4.15 | 4626 | 5.15 |
| 4629 | 6.15 | 4631 | 6.82 | 4632 | 7.15 | 4634 | 8.15 | 4637 | 9.15 |
| 4640 | 10.15 | 4642 | 11.15 | 4657 | 17.15 | | | | |

Manning's n Values num= 2

| Sta | n Val | Sta | n Val |
|---|---|---|---|
| 0 | .04 | 4457 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 599.6 | 4632 | 578.3 | 333.4 | 325 | .3 | .5 |

Ineffective Flow num= 0

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.64 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.46 | Wt. n-Val. | | 0.035 | 0.035 |
| W.S. Elev (ft) | 10.17 | Reach Len. (ft) | 578.30 | 333.40 | 325.00 |
| Crit W.S. (ft) | 11.41 | Flow Area (sq ft) | | 1366.27 | 11.19 |
| E.G. Slope (ft/ft) | 0.011978 | Area (sq ft) | | 1366.27 | 11.19 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | | 23193.11 | 61.89 |
| Top Width (ft) | 1261.01 | Top Width (ft) | | 1252.96 | 8.05 |
| Vel Total (ft/s) | 16.88 | Avg. Vel. (ft/s) | | 16.98 | 5.53 |
| Max Chl Dpth (ft) | 9.02 | Hydr. Depth (ft) | | 1.09 | 1.39 |
| Conv. Total (cfs) | 212480.2 | Conv. (cfs) | | 211914.7 | 565.5 |

| | | | | |
|---|---|---|---|---|
| Length Wtd. (ft) | 351.49 | Wetted Per. (ft) | | 1259.57 |
| Min Ch El (ft) | 1.15 | Shear (lb/sq ft) | | 0.81 |
| Alpha | 1.01 | Stream Power (lb/ft s) | | 13.77 |
| Frctn Loss (ft) | 0.55 | Cum Volume (acre-ft) | 42.25 | 150.41 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 10.81 | 29.52 |

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Note: The energy method has computed a class B profile.

Profile #PF 1

| Percent | Pos | Hydr | Left Sta | Velocity (ft) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|---|---|
| Conv | Depth(ft) | | | (ft/s) | | | | |
| 1 | | Chan | | 1103.65 | 1607.70 | 2.01 | 6.08 | 260.49 |
| 0.01 | 0.02 | | | 0.33 | | | | |
| 2 | | Chan | | 1607.70 | 2111.75 | 3.93 | 11.83 | 504.05 |
| 0.02 | 0.02 | | | 0.33 | | | | |
| 3 | | Chan | | 2111.75 | 2615.80 | 1.19 | 3.63 | 156.94 |
| 0.01 | 0.02 | | | 0.33 | | | | |
| 4 | | Chan | | 2615.80 | 3119.85 | 1.10 | 3.35 | 144.44 |
| 0.00 | 0.02 | | | 0.33 | | | | |
| 5 | | Chan | | 3119.85 | 3623.90 | | | |
| 6 | | Chan | | 3623.90 | 4127.95 | | | |
| 7 | | Chan | | 4127.95 | 4632.00 | 23184.87 | 1341.38 | 193.65 |
| 99.70 | 7.17 | | | 17.28 | | | | |
| 8 | | ROB | | 4632.00 | 4635.13 | 46.22 | 7.11 | 3.42 |
| 0.20 | 2.28 | | | 6.50 | | | | |
| 9 | | ROB | | 4635.13 | 4638.25 | 14.71 | 3.52 | 3.29 |
| 0.06 | 1.13 | | | 4.17 | | | | |
| 10 | | ROB | | 4638.25 | 4641.38 | 0.97 | 0.55 | 1.90 |
| 0.00 | 0.31 | | | 1.75 | | | | |

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Note: The energy method has computed a class B profile.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 114

INPUT
Description:

Station Elevation Data num= 51

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 12.15 | 63 | 11.15 | 126 | 10.15 | 189 | 9.15 | 252 | 8.15 |
| 315 | 7.15 | 582 | 6.15 | 673 | 5.15 | 802 | 4.47 | 862 | 4.15 |
| 1299 | 3.28 | 1358.86 | 3.15 | 1369.74 | 3.15 | 1389.7 | 3.15 | 1523.94 | 3.15 |
| 1576.55 | 3.39 | 1745.25 | 4.15 | 2136.18 | 5.15 | 2187.87 | 5.15 | 2201.48 | 5.15 |
| 2257.71 | 5.15 | 2267.69 | 5.15 | 2305.79 | 6.15 | 2323.92 | 6.15 | 2369.28 | 6.15 |
| 2456.35 | 7.15 | 2492.63 | 7.15 | 2515.31 | 7.15 | 2551.59 | 7.15 | 2560.66 | 7.15 |
| 2589.69 | 6.15 | 2659.53 | 5.15 | 2720.29 | 4.15 | 2832.76 | 3.15 | 2973.35 | 2.15 |
| 4187.85 | 2.15 | 4270.39 | 2.15 | 4475.37 | 3.15 | 4603.26 | 4.15 | 4696.69 | 5.11 |
| 4700.31 | 5.15 | 4798.27 | 6.15 | 4804.62 | 6.2 | 4920.72 | 7.15 | 4934.32 | 7.15 |
| 4962.44 | 7.15 | 4968.79 | 7.15 | 4982.39 | 7.15 | 5163.79 | 9.85 | 5164 | 9.85 |
| 5484 | 12.15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1299 | .035 | 4920.72 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1299 | 4920.72 | 270.4 | 114.1 276 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.16 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.035 |
| 0.035 | | | | |
| W.S. Elev (ft) | 9.15 | Reach Len. (ft) | 270.40 | 114.10 |
| 276.00 | | | | |
| Crit W.S. (ft) | 4.09 | Flow Area (sq ft) | 4336.81 | 19920.11 |
| 257.61 | | | | |
| E.G. Slope (ft/ft) | 0.000056 | Area (sq ft) | 4336.81 | 19920.11 |
| 257.61 | | | | |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 3420.77 | 19735.95 |
| 98.28 | | | | |
| Top Width (ft) | 4927.70 | Top Width (ft) | 1109.97 | 3621.72 |
| 196.01 | | | | |
| Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | 0.79 | 0.99 |
| 0.38 | | | | |
| Max Chl Dpth (ft) | 7.00 | Hydr. Depth (ft) | 3.91 | 5.50 |
| 1.31 | | | | |
| Conv. Total (cfs) | 3104953.0 | Conv. (cfs) | 456733.7 | 2635098.0 |
| 13122.2 | | | | |
| Length Wtd. (ft) | 125.94 | Wetted Per. (ft) | 1110.00 | 3621.80 |
| 196.02 | | | | |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.00 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 0.01 | 0.02 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 13.46 | 68.95 |
| 0.82 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.45 | 10.87 |
| 0.62 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | LOB | 162.38 | 324.75 | 44.41 | 145.61 | 135.73 |
| 0.19 | 1.07 | 0.30 | | | | |
| 2 | LOB | 324.75 | 487.13 | 194.92 | 379.97 | 162.38 |
| 0.84 | 2.34 | 0.51 | | | | |
| 3 | LOB | 487.13 | 649.50 | 303.10 | 495.22 | 162.38 |
| 1.30 | 3.05 | 0.61 | | | | |
| 4 | LOB | 649.50 | 811.88 | 536.05 | 697.22 | 162.38 |
| 2.31 | 4.29 | 0.77 | | | | |
| 5 | LOB | 811.88 | 974.25 | 699.08 | 817.64 | 162.38 |
| 3.01 | 5.04 | 0.86 | | | | |
| 6 | LOB | 974.25 | 1136.63 | 781.72 | 874.33 | 162.38 |
| 3.36 | 5.38 | 0.89 | | | | |
| 7 | LOB | 1136.63 | 1299.00 | 861.49 | 926.82 | 162.38 |
| 3.70 | 5.71 | 0.93 | | | | |
| 8 | Chan | 1299.00 | 1751.72 | 2543.03 | 2594.75 | 452.72 |
| 10.94 | 5.73 | 0.98 | | | | |
| 9 | Chan | 1751.72 | 2204.43 | 1647.40 | 1999.69 | 452.72 |
| 7.08 | 4.42 | 0.82 | | | | |
| 10 | Chan | 2204.43 | 2657.15 | 814.45 | 1310.45 | 452.76 |
| 3.50 | 2.89 | 0.62 | | | | |
| 11 | Chan | 2657.15 | 3109.86 | 2836.81 | 2770.69 | 452.73 |
| 12.20 | 6.12 | 1.02 | | | | |
| 12 | Chan | 3109.86 | 3562.58 | 3548.26 | 3168.78 | 452.72 |
| 15.26 | 7.00 | 1.12 | | | | |
| 13 | Chan | 3562.58 | 4015.29 | 3548.26 | 3168.78 | 452.71 |
| 15.26 | 7.00 | 1.12 | | | | |
| 14 | Chan | 4015.29 | 4468.01 | 3372.26 | 3073.53 | 452.72 |
| 14.50 | 6.79 | 1.10 | | | | |
| 15 | Chan | 4468.01 | 4920.72 | 1425.49 | 1833.45 | 452.73 |
| 6.13 | 4.05 | 0.78 | | | | |
| 16 | ROB | 4920.72 | 4991.13 | 62.34 | 140.22 | 70.41 |
| 0.27 | 1.99 | 0.44 | | | | |
| 17 | ROB | 4991.13 | 5061.54 | 32.42 | 94.73 | 70.42 |
| 0.14 | 1.35 | 0.34 | | | | |
| 18 | ROB | 5061.54 | 5131.95 | 3.52 | 22.67 | 55.19 |
| 0.02 | 0.41 | 0.16 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: San Elijo Lagoon
REACH: Lower RS: 1

INPUT
Description: Furthest Downstream Cross Section
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 12 | 1 | 2.15 | 416 | 2.15 | 439 | 2.15 | 604 | 2.15 |
| 883 | 2.15 | 1240 | 2.15 | 2131 | 2.15 | 2208 | 2.15 | 4411 | 2.15 |
| 4675 | 2.15 | 4676 | 12 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 0 | .035 | 4676 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 0 | 4676 | 0 | 0 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. Elev (ft) | 9.16 | Element | Left OB Channel Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 |
| W.S. Elev (ft) | 9.15 | Reach Len. (ft) | |
| Crit W.S. (ft) | 3.07 | Flow Area (sq ft) | 32722.97 |
| E.G. Slope (ft/ft) | 0.000021 | Area (sq ft) | 32722.97 |
| Q Total (cfs) | 23255.00 | Flow (cfs) | 23255.00 |
| Top Width (ft) | 4675.42 | Top Width (ft) | 4675.42 |
| Vel Total (ft/s) | 0.71 | Avg. Vel. (ft/s) | 0.71 |
| Max Chl Dpth (ft) | 7.00 | Hydr. Depth (ft) | 7.00 |
| Conv. Total (cfs) | 5074022.0 | Conv. (cfs) | 5074022.0 |
| Length Wtd. (ft) | | Wetted Per. (ft) | 4688.07 |
| Min Ch El (ft) | 2.15 | Shear (lb/sq ft) | 0.01 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.01 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | |
| C & E Loss (ft) | | Cum SA (acres) | |

Profile #PF 1

| Percent Conv | Pos Hydr Depth(ft) | Left Sta Velocity (ft/s) | Right Sta (ft) | Flow (cfs) | Area (sq ft) | W.P. (ft) |
|---|---|---|---|---|---|---|
| 1 | Chan | 0.00 | 584.50 | 2887.97 | 4086.99 | 590.54 |
| 12.42 | 7.00 | 0.71 | | | | |
| 2 | Chan | 584.50 | 1169.00 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 3 | Chan | 1169.00 | 1753.50 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 4 | Chan | 1753.50 | 2338.00 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | Chan | 2338.00 | 2922.50 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 6 | Chan | 2922.50 | 3507.00 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 7 | Chan | 3507.00 | 4091.50 | 2913.18 | 4091.50 | 584.50 |
| 12.53 | 7.00 | 0.71 | | | | |
| 8 | Chan | 4091.50 | 4676.00 | 2887.98 | 4086.99 | 590.53 |
| 12.42 | 7.00 | 0.71 | | | | |

SUMMARY OF MANNING'S N VALUES

River:San Elijo Lagoon

| Reach | River Sta. | n1 | n2 | n3 | n4 | n5 |
|---|---|---|---|---|---|---|
| Lower | 10436 | .04 | .04 | | | |
| Lower | 9816 | .04 | .035 | .04 | | |
| Lower | 9213 | .04 | .035 | .04 | | |
| Lower | 8949 | .04 | .035 | .04 | | |
| Lower | 8793 | .04 | .035 | .013 | .04 | |
| Lower | 8618 | .04 | .035 | .04 | | |
| Lower | 8569 | .04 | .035 | .013 | .04 | |
| Lower | 8167 | .04 | .035 | .04 | | |
| Lower | 7761 | .04 | .035 | .04 | | |
| Lower | 7461 | .04 | .035 | .04 | | |
| Lower | 7100 | Bridge | | | | |
| Lower | 6881 | .04 | .035 | .04 | | |
| Lower | 6682 | .04 | .035 | .04 | .013 | .04 |
| Lower | 6416 | .04 | .035 | .04 | .013 | .04 |
| Lower | 5921 | .04 | .035 | .013 | .04 | |
| Lower | 5355 | .04 | .035 | .04 | .013 | .04 |
| Lower | 4621 | .04 | .035 | .04 | .05 | |
| Lower | 3735 | .04 | .035 | .04 | .05 | |
| Lower | 2499 | .04 | .035 | .04 | | |
| Lower | 2020 | .04 | .035 | .04 | | |
| Lower | 1923 | .04 | .035 | | | |

| | | | | |
|---|---|---|---|---|
| Lower | 1900 | Bridge | | |
| Lower | 1872 | .04 | .04 | .035 |
| Lower | 1276 | .04 | .035 | |
| Lower | 569 | .04 | .035 | |
| Lower | 500 | Bridge | | |
| Lower | 448 | .04 | .035 | |
| Lower | 114 | .035 | .035 | .035 |
| Lower | 1 | .035 | .035 | .035 |

SUMMARY OF REACH LENGTHS

River: San Elijo Lagoon

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| Lower | 10436 | 950.3 | 621.4 | 545.2 |
| Lower | 9816 | 477.18 | 604.7 | 728.2 |
| Lower | 9213 | 236.4 | 264.5 | 398.2 |
| Lower | 8949 | 130.434 | 155.9 | 373.34 |
| Lower | 8793 | 164.68 | 175.6 | 204.18 |
| Lower | 8618 | 50 | 48.8 | 58.102 |
| Lower | 8569 | 167 | 403 | 694.2 |
| Lower | 8167 | 164.3 | 406.6 | 536.4 |
| Lower | 7761 | 113.2 | 300.3 | 337 |
| Lower | 7461 | 578.1 | 581.2 | 546.8 |
| Lower | 7100 | Bridge | | |
| Lower | 6881 | 419.4 | 199.3 | 204.6 |
| Lower | 6682 | 389.6 | 265.9 | 226 |
| Lower | 6416 | 587 | 495.5 | 490.8 |
| Lower | 5921 | 813.7 | 567.6 | 810.3 |
| Lower | 5355 | 666.9 | 735.2 | 962.5 |
| Lower | 4621 | 427 | 888 | 1159.6 |
| Lower | 3735 | 598 | 1236.9 | 488.7 |
| Lower | 2499 | 897 | 479.6 | 391.4 |
| Lower | 2020 | 257 | 97.3 | 97 |
| Lower | 1923 | 125 | 51.9 | 36.1 |
| Lower | 1900 | Bridge | | |
| Lower | 1872 | 267 | 596.2 | 1122.6 |
| Lower | 1276 | 797.8 | 706.8 | 209 |
| Lower | 569 | 543.2 | 121.7 | 125 |
| Lower | 500 | Bridge | | |
| Lower | 448 | 578.3 | 333.4 | 325 |
| Lower | 114 | 270.4 | 114.1 | 276 |
| Lower | 1 | 0 | 0 | 0 |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: San Elijo Lagoon

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Lower | 10436 | | .1 | .3 |
| Lower | 9816 | | .1 | .3 |
| Lower | 9213 | | .1 | .3 |
| Lower | 8949 | | .1 | .3 |
| Lower | 8793 | | .1 | .3 |
| Lower | 8618 | | .1 | .3 |
| Lower | 8569 | | .1 | .3 |
| Lower | 8167 | | .1 | .3 |
| Lower | 7761 | | .1 | .3 |
| Lower | 7461 | | .3 | .5 |
| Lower | 7100 | Bridge | | |
| Lower | 6881 | | .3 | .5 |
| Lower | 6682 | | .1 | .3 |
| Lower | 6416 | | .1 | .3 |
| Lower | 5921 | | .1 | .3 |
| Lower | 5355 | | .1 | .3 |
| Lower | 4621 | | .1 | .3 |
| Lower | 3735 | | .1 | .3 |
| Lower | 2499 | | .1 | .3 |
| Lower | 2020 | | .1 | .3 |
| Lower | 1923 | | .3 | .5 |
| Lower | 1900 | Bridge | | |
| Lower | 1872 | | .3 | .5 |
| Lower | 1276 | | .1 | .3 |
| Lower | 569 | | .3 | .5 |
| Lower | 500 | Bridge | | |
| Lower | 448 | | .3 | .5 |
| Lower | 114 | | .1 | .3 |
| Lower | 1 | | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | |
| | | | (cfs) | (ft) | (ft) | (ft) |
| | (ft) | (ft/s) | (sq ft) | (ft) | | |
| Lower | 10436 | PF 1 | 23255.00 | 6.15 | 18.57 | 9.00 |
| 18.58 | 0.000029 | 1.00 | 24286.73 | 2457.12 | 0.05 | |
| Lower | 9816 | PF 1 | 23255.00 | 3.15 | 18.56 | |
| 18.57 | 0.000009 | 0.69 | 34866.38 | 3089.81 | 0.03 | |
| Lower | 9213 | PF 1 | 23255.00 | 3.15 | 18.55 | |
| 18.56 | 0.000013 | 0.79 | 29735.48 | 2697.25 | 0.04 | |
| Lower | 8949 | PF 1 | 23255.00 | 3.15 | 18.55 | |
| 18.56 | 0.000015 | 0.89 | 27096.22 | 2454.49 | 0.04 | |
| Lower | 8793 | PF 1 | 23255.00 | 3.15 | 18.54 | |
| 18.55 | 0.000021 | 1.03 | 22282.89 | 2117.39 | 0.05 | |
| Lower | 8618 | PF 1 | 23255.00 | 9.65 | 18.50 | |
| 18.55 | 0.000084 | 1.67 | 14277.52 | 1972.79 | 0.10 | |
| Lower | 8569 | PF 1 | 23255.00 | 4.15 | 18.52 | |
| 18.54 | 0.000028 | 1.20 | 19563.05 | 2005.32 | 0.06 | |
| Lower | 8167 | PF 1 | 23255.00 | 4.15 | 18.47 | |
| 18.52 | 0.000060 | 1.79 | 13776.92 | 1719.68 | 0.09 | |
| Lower | 7761 | PF 1 | 23255.00 | 2.15 | 18.38 | |
| 18.48 | 0.000116 | 2.57 | 10063.92 | 1679.28 | 0.12 | |
| Lower | 7461 | PF 1 | 23255.00 | 2.15 | 18.25 | 8.19 |
| 18.43 | 0.000184 | 3.38 | 7405.81 | 1684.35 | 0.16 | |
| Lower | 7100 | | Bridge | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Lower | 6881 | PF 1 | 23255.00 | 2.15 | 17.44 | 8.02 |
| 17.65 | 0.000235 | 3.73 | 6451.93 | 1871.74 | 0.18 | |
| Lower | 6682 | PF 1 | 23255.00 | 2.15 | 17.49 | 6.93 |
| 17.55 | 0.000074 | 2.04 | 11468.62 | 1530.95 | 0.10 | |
| Lower | 6416 | PF 1 | 23255.00 | 1.15 | 17.50 | |
| 17.53 | 0.000037 | 1.42 | 17550.50 | 1664.74 | 0.07 | |
| Lower | 5921 | PF 1 | 23255.00 | 1.15 | 17.49 | |
| 17.51 | 0.000027 | 1.23 | 19994.61 | 1762.22 | 0.06 | |
| Lower | 5355 | PF 1 | 23255.00 | 1.15 | 17.49 | |
| 17.50 | 0.000012 | 0.80 | 30115.85 | 2530.94 | 0.04 | |
| Lower | 4621 | PF 1 | 23255.00 | 0.15 | 17.49 | |
| 17.49 | 0.000005 | 0.56 | 43109.66 | 3415.51 | 0.03 | |
| Lower | 3735 | PF 1 | 23255.00 | 1.15 | 17.49 | |
| 17.49 | 0.000003 | 0.41 | 56811.49 | 4089.17 | 0.02 | |
| Lower | 2499 | PF 1 | 23255.00 | 1.15 | 17.48 | |
| 17.48 | 0.000007 | 0.65 | 35947.57 | 3642.92 | 0.03 | |
| Lower | 2020 | PF 1 | 23255.00 | 1.15 | 17.36 | |
| 17.47 | 0.000095 | 2.55 | 9183.42 | 4170.24 | 0.11 | |
| Lower | 1923 | PF 1 | 23255.00 | 1.15 | 17.28 | 8.04 |
| 17.44 | 0.000402 | 3.28 | 7117.03 | 4018.76 | 0.28 | |
| Lower | 1900 | | Bridge | | | |
| Lower | 1872 | PF 1 | 23255.00 | 1.15 | 16.99 | |
| 17.14 | 0.000384 | 3.09 | 7564.93 | 4087.33 | 0.27 | |
| Lower | 1276 | PF 1 | 23255.00 | 1.15 | 17.00 | 4.04 |
| 17.03 | 0.000032 | 1.38 | 16933.58 | 5311.94 | 0.07 | |
| Lower | 569 | PF 1 | 23255.00 | 1.15 | 16.83 | 9.32 |
| 16.96 | 0.000791 | 2.95 | 7930.51 | 4666.40 | 0.28 | |
| Lower | 500 | | Bridge | | | |
| Lower | 448 | PF 1 | 23255.00 | 1.15 | 10.17 | 11.41 |
| 14.64 | 0.011978 | 16.98 | 1377.46 | 1261.01 | 2.86 | |
| Lower | 114 | PF 1 | 23255.00 | 2.15 | 9.15 | 4.09 |
| 9.16 | 0.000056 | 0.99 | 24514.53 | 4927.70 | 0.07 | |
| Lower | 1 | PF 1 | 23255.00 | 2.15 | 9.15 | 3.07 |
| 9.16 | 0.000021 | 0.71 | 32722.97 | 4675.42 | 0.05 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : SE_Prop

River: San Elijo Lagoon Reach: Lower RS: 10436 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 8793 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 8618 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 8569 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 7461 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 7100 Profile: PF 1
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This
is not physically possible, the momentum answer has been disregarded.
River: San Elijo Lagoon Reach: Lower RS: 7100 Profile: PF 1 Downstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Elijo Lagoon Reach: Lower RS: 6881 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: San Elijo Lagoon Reach: Lower RS: 6682 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: San Elijo Lagoon Reach: Lower RS: 5921 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: San Elijo Lagoon Reach: Lower RS: 5355 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 3735 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 2499 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 2020 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1923 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1900 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1872 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: San Elijo Lagoon Reach: Lower RS: 1276 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: San Elijo Lagoon Reach: Lower RS: 569 Profile: PF 1

Warning:Divided flow computed for this cross-section.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: San Elijo Lagoon Reach: Lower RS: 500 Profile: PF 1

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

River: San Elijo Lagoon Reach: Lower RS: 500 Profile: PF 1 Upstream

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: San Elijo Lagoon Reach: Lower RS: 500 Profile: PF 1 Downstream

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: San Elijo Lagoon Reach: Lower RS: 448 Profile: PF 1

Warning:Divided flow computed for this cross-section.

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Note: The energy method has computed a class B profile.

River: San Elijo Lagoon Reach: Lower RS: 114 Profile: PF 1

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

# Appendix C

## Location Hydraulic Study Form

## Floodplain Encroachment Form

## As-builts

## LOCATION HYDRAULIC STUDY FORM

Dist. *11* Co. *SD* Rte. *005* P.M. *038.6*
EA *11-235800* Bridge No. *57-0458*
Floodplain Description:
***Fresh and brackish wetlands with areas of shallow open water, mudflats, and salt marshes. Location of interest: I-5 / Manchester Interchange***

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

***This project includes improvements to the I-5 Bridge over San Elijo Lagoon with 10+4+buffer alternative. The alternative requires the existing I-5 bridge to be widened and would not have a significant impact to the existing floodplain.***

2. ADT: Current ***200,000*** Projected ***345,000 (year 2020)***

3. Hydraulic Data: Base Flood $Q_{100}$= ***23,255*** $ft^3$ / s
***Appendix 'A' and 'D' – multiply the cross sectional area by velocity:***
***San Elijo Creek - 916 $ft^2$ X 2.3 ft/s + Escondido Creek - 3065 $ft^2$ X 6.9 ft/s***

$WSE_{100}$= ***18.25 ft (upstream of I-5 Bridge)*** The flood of record, if greater than $Q_{100}$:
Q= ***N/A*** $ft^3$ / s WSE= ***N/A***
Overtopping flood Q=***(no increase from existing condition)*** $ft^3$ / s
WSE=***(lowered from existing condition)***

Are NFIP maps and studies available? YES **X** NO_____

4. Is the highway location alternative within a regulatory floodway ?
YES_____ NO ***X***

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain. ***(See Appendix 'A')***

Potential $Q_{100}$ backwater damages:

A. Residences? NO___YES ***(no increase from existing condition)***
B. Other Bldgs? NO___YES ***(no increase from existing condition)***
C. Crops? NO___YES ***(no increase from existing condition)***
D. Natural and beneficial

FLOODPLAIN VALUES? NO **X** YES_____

6. Type of Traffic:

A. Emergency supply or evacuation route? NO_____YES **X**
B. Emergency vehicle access? NO_____YES **X**

C. Practicable detour available? NO_____YES__X____
D. School bus or mail route? NO_____YES__X____

7. Estimated duration of traffic interruption for 100-year event hours: ***Since the 100-yr Q for the City of Encinitas is based on the 6-hour 100-yr storm, the duration of traffic interruption will be approximately 6 hours (no increase from existing conditions).***

8. Estimated value of $Q_{100}$ flood damages (if any) – moderate risk level.

A. Roadway $ ***(no increase from existing condition)***
B Property $ ***(no increase from existing condition)***
Total $ ***(no increase from existing condition)***

9. Assessment of Level of Risk Low__X____
Moderate____
High_____

For High Risk projects, during design phase, additional Design Study Risk Analysis May be necessary to determine design alternative.

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible floodplain development? NO__X____Yes_____

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

Signature – Hydraulic/Project Engineer_____Date_____

## FLOODPLAIN ENCROACHMENT REPORT

Dist. *11* Co. *SD* Rte. *005* P.M. *038.6*
Bridge No. *57-0458*
Limits: ***Pacific Ocean to 2 miles east of I-5 / Manchester Avenue Interchange***

Floodplain Description: ***Fresh and brackish wetlands with areas of shallow open water, mudflats, and salt marshes.***

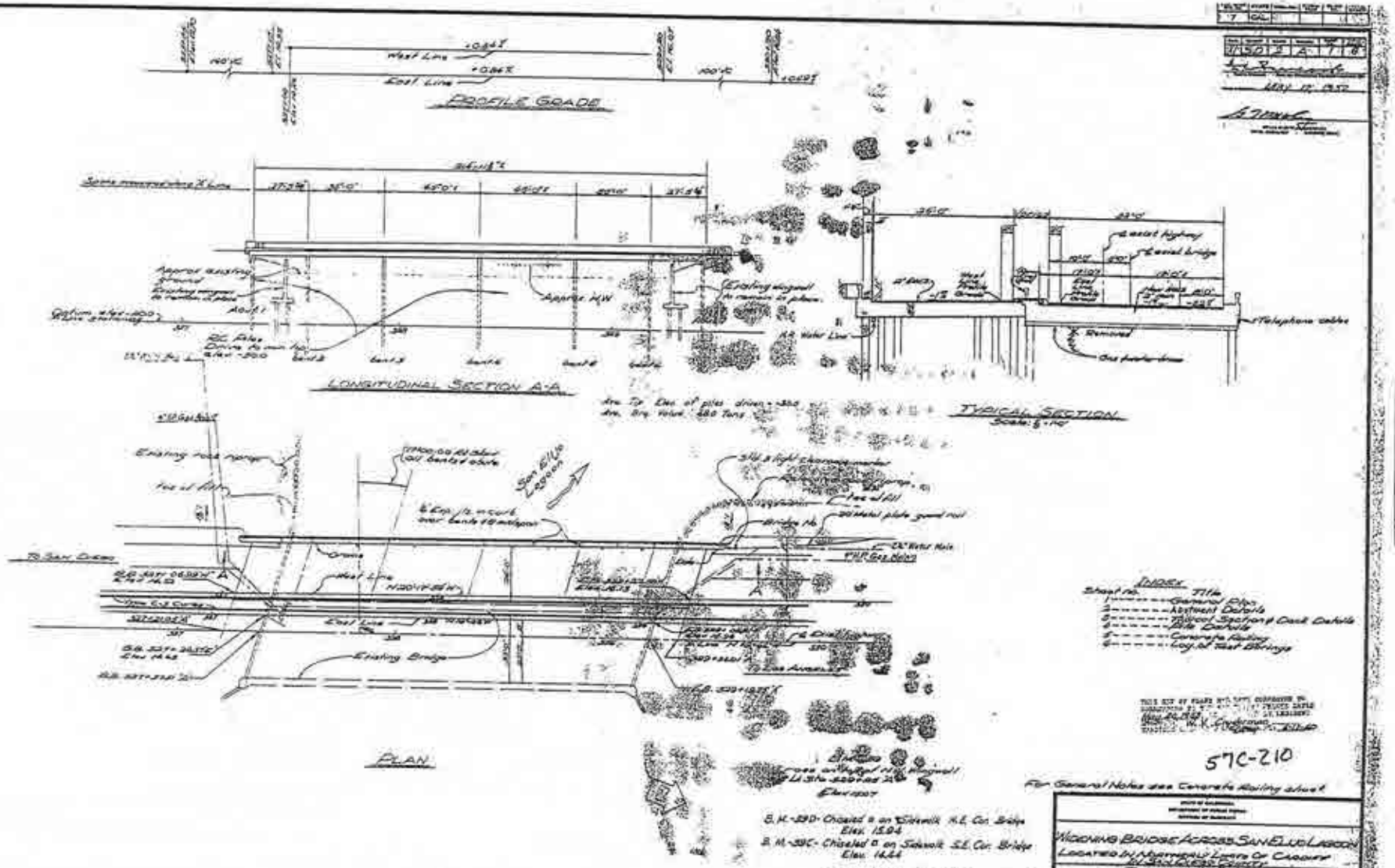
| | | No | Yes |
|---|---|---|---|
| 1. | Is the proposed action a longitudinal encroachment of the base floodplain? | X | |
| 2. | Are the risks associated with the implementation of the proposed action significant? | X | |
| 3. | Will the proposed action support probable incompatible floodplain development? | X | |
| 4. | Are there any significant impacts on natural and beneficial floodplain values? | X | |
| 5. | Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain. | X | |
| 6. | Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q). | X | |
| 7. | Are Location Hydraulic Studies that document the above answers on file? If not explain. | | X |

PREPARED BY:

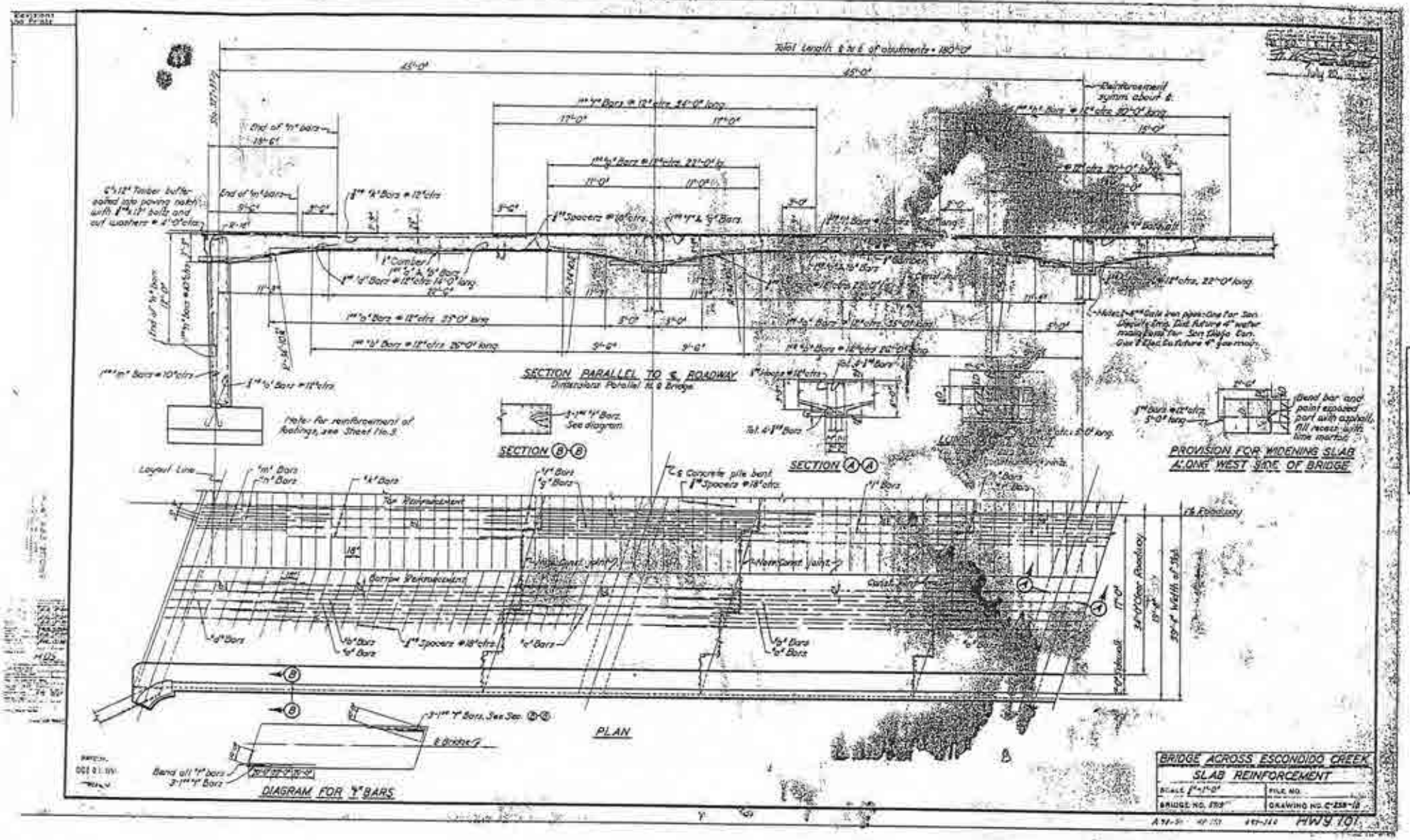
_____ _____
Signature - Dist. Hydraulic Engineer Date

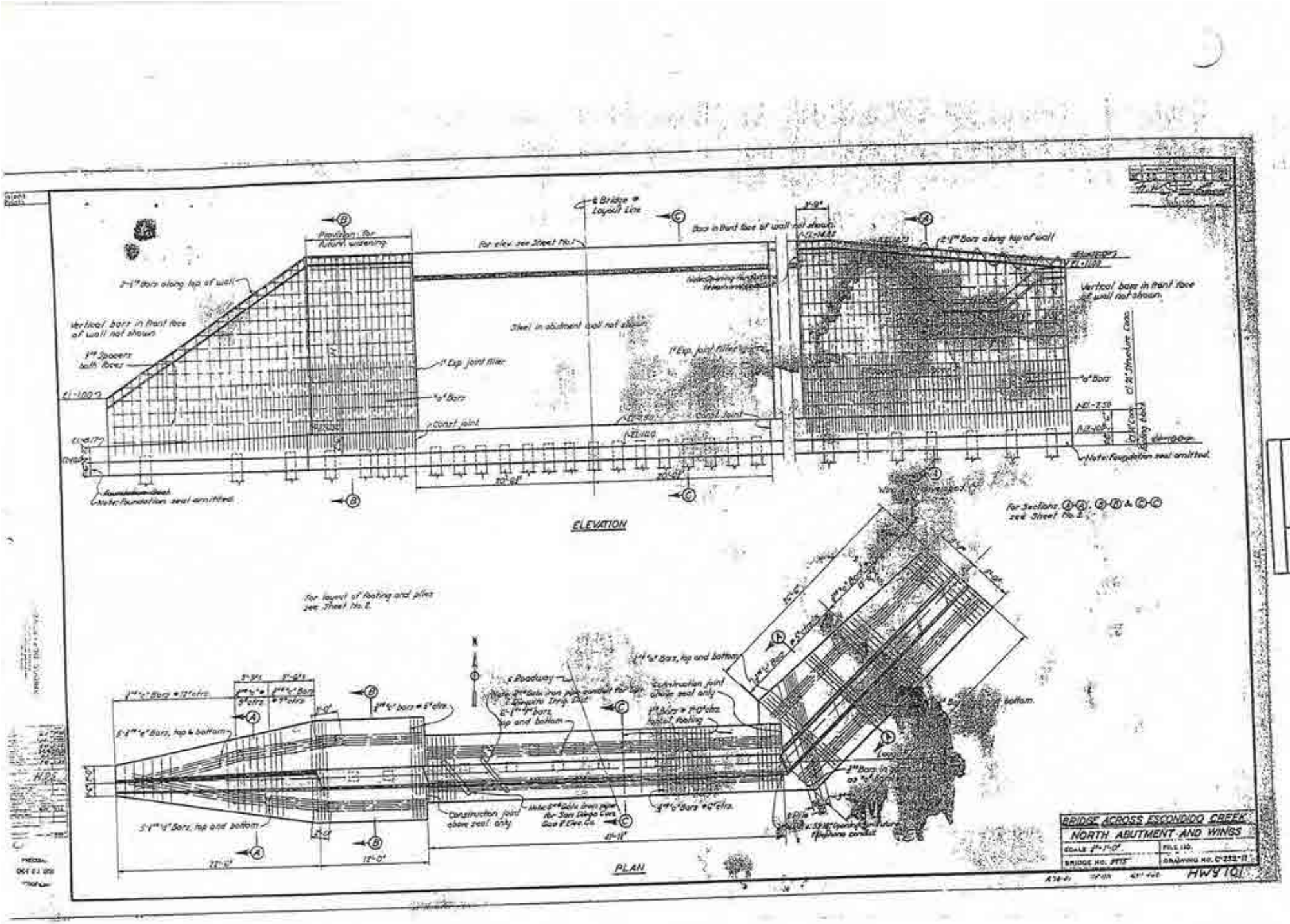
_____ _____
Signature - Dist. Environmental Branch Chief Date

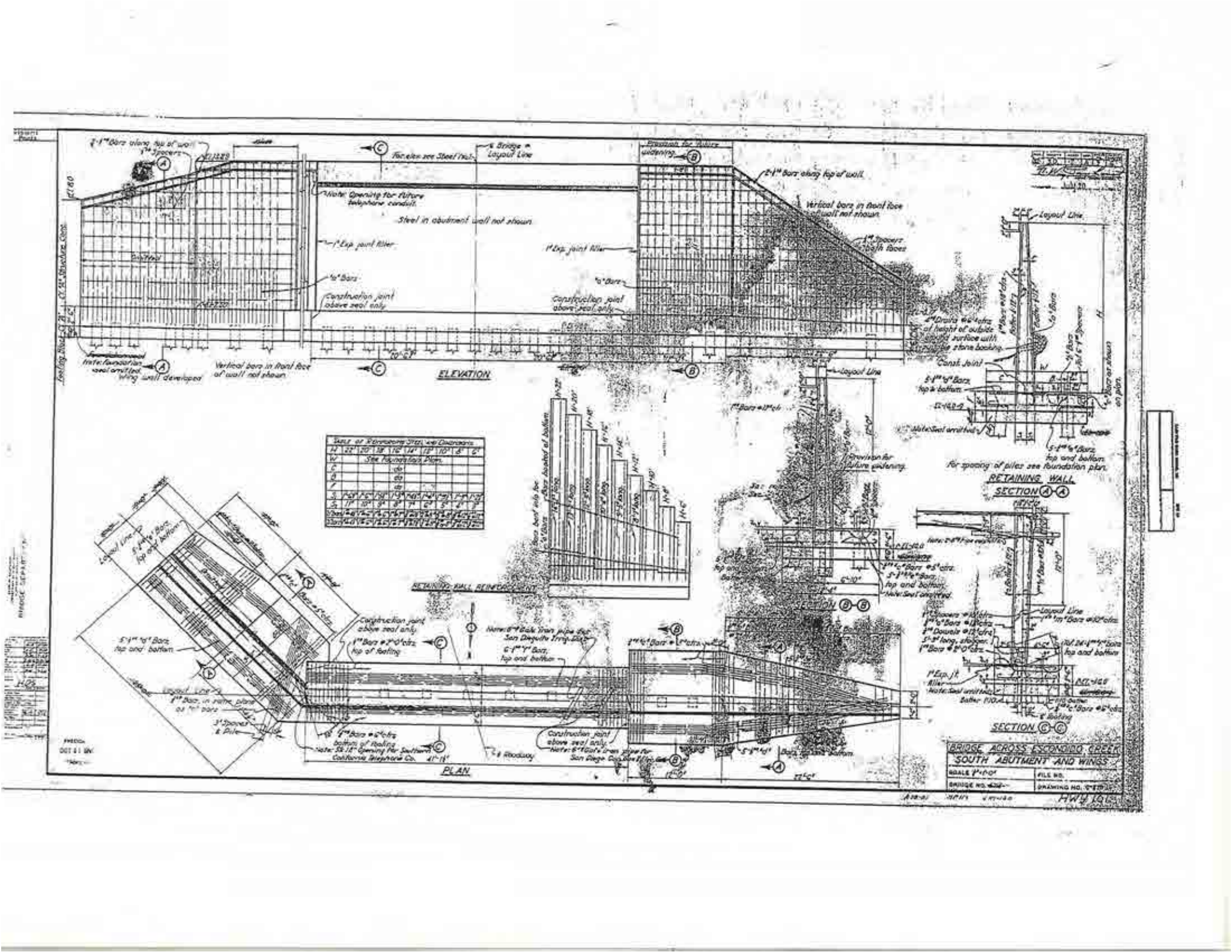
_____ _____
Signature - Dist. Project Engineer Date

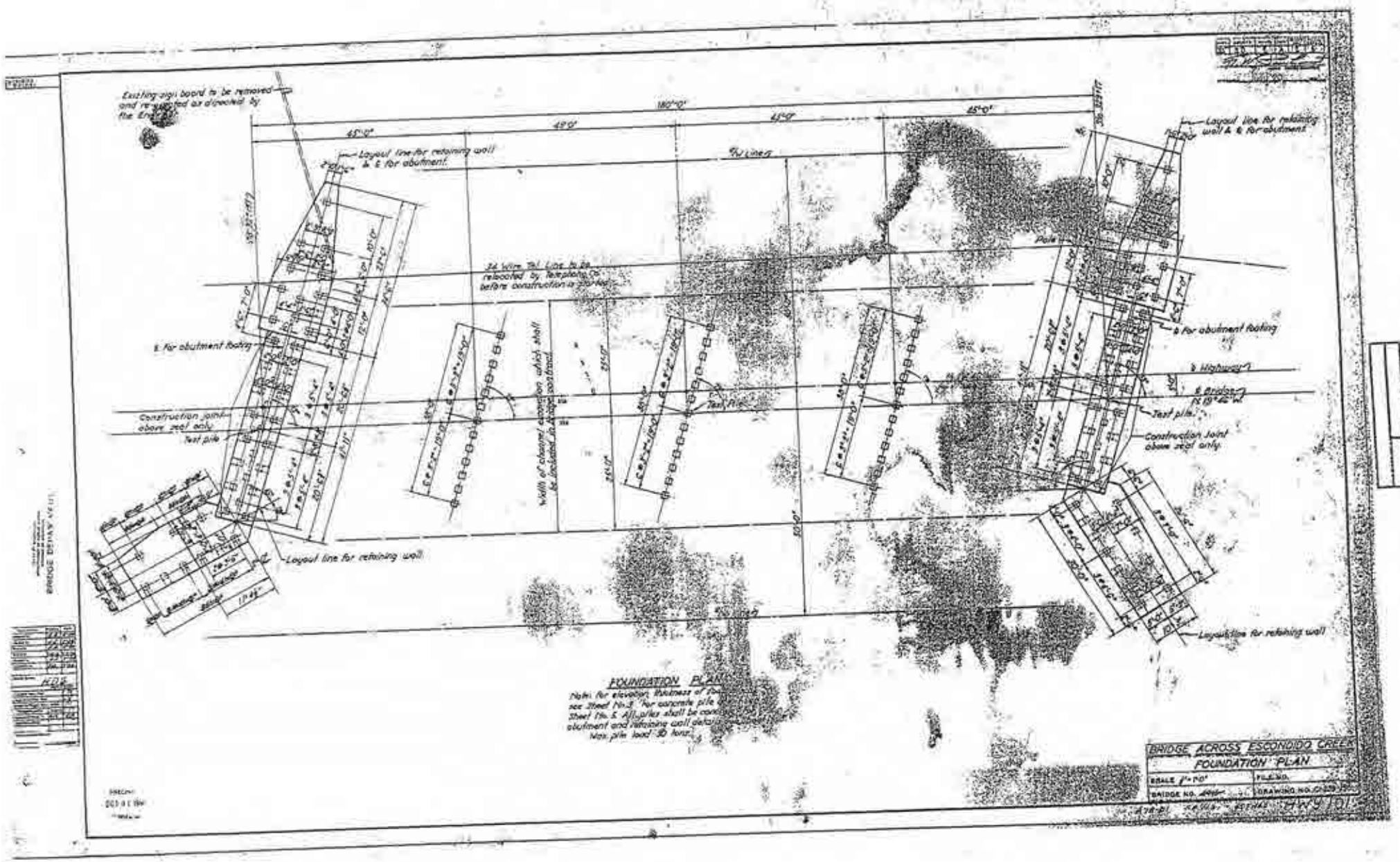

PROFILE GRADE
LONGITUDINAL SECTION A-A
TYPICAL SECTION
PLAN
INDEX
B.M.-390- Chiseled □ on Sidewalk N.E. Cor. Bridge
Elev. 15.94
B.M.-391- Chiseled □ on Sidewalk S.E. Cor. Bridge
Elev. 14.44
L.L. H20 S16-44 (WIDENING)
57C-210
WIDENING BRIDGE ACROSS SAN ELIJO LAGOON
GENERAL PLAN

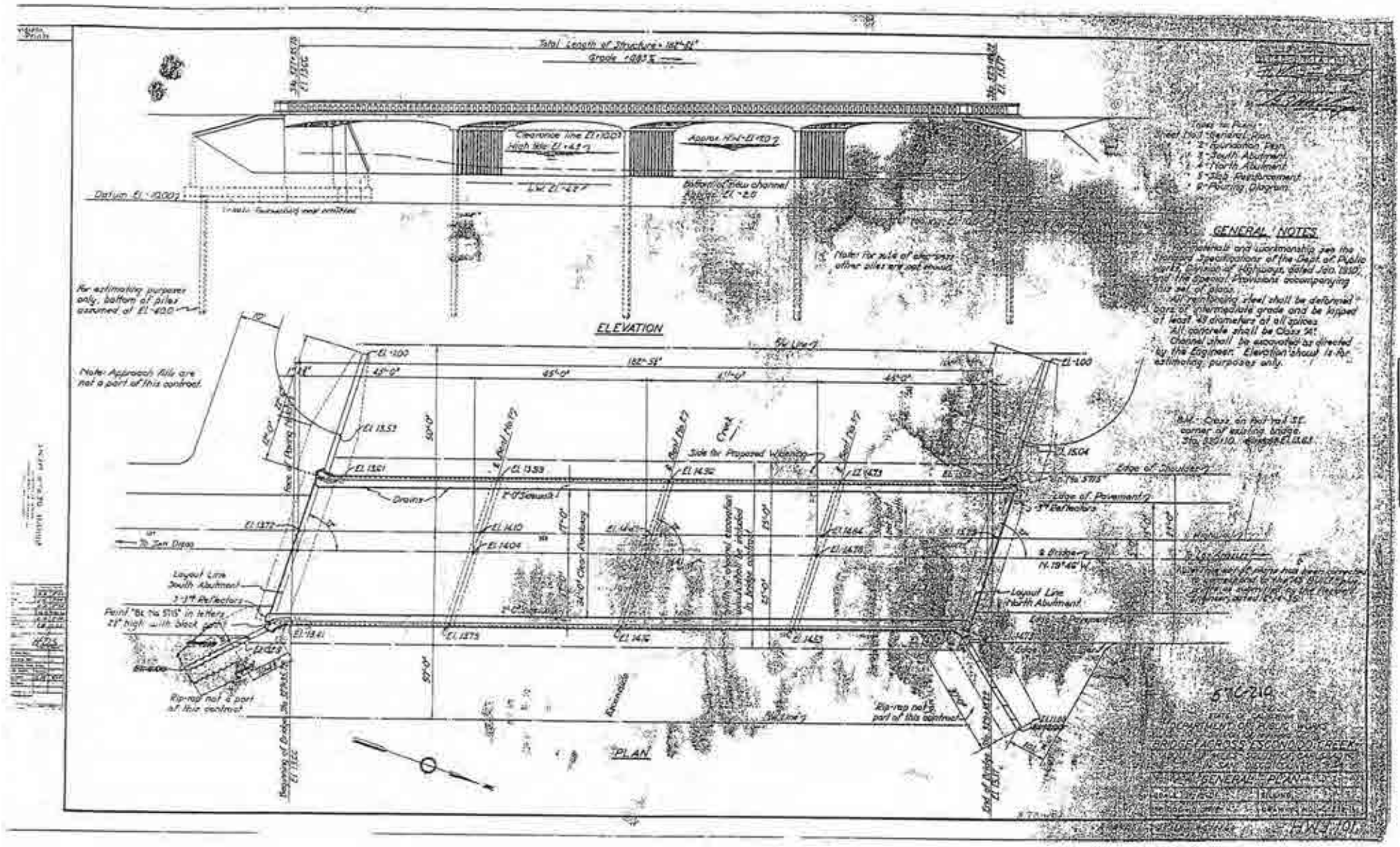
Construction Joint
POURING DIAGRAM
Note: Numbers indicate successive steps of pouring. For removing forms, including floors for construction joints, see Section 26, Article j, of the Standard Specifications, dated Jan. 1936.
END POST
ELEVATION
DATE
Date to be recessed into inside panel of right hand end post as bridge is approached.
HOOKED BAR DATA
DRAIN DETAIL
PLAN
SEC. A-A
SEC. B-B
RAIL DETAILS
Note: Exposed edges of railing and posts shall be chamfered ¾" except rail openings which shall not be chamfered.
CONCRETE PILE DETAIL
129 Required.
Exact length to be determined by test pile.
BRIDGE ACROSS ESCONDIDO CREEK
POURING DIAGRAM
FILE NO.
DRAWING NO. C-278-19
HWY 101

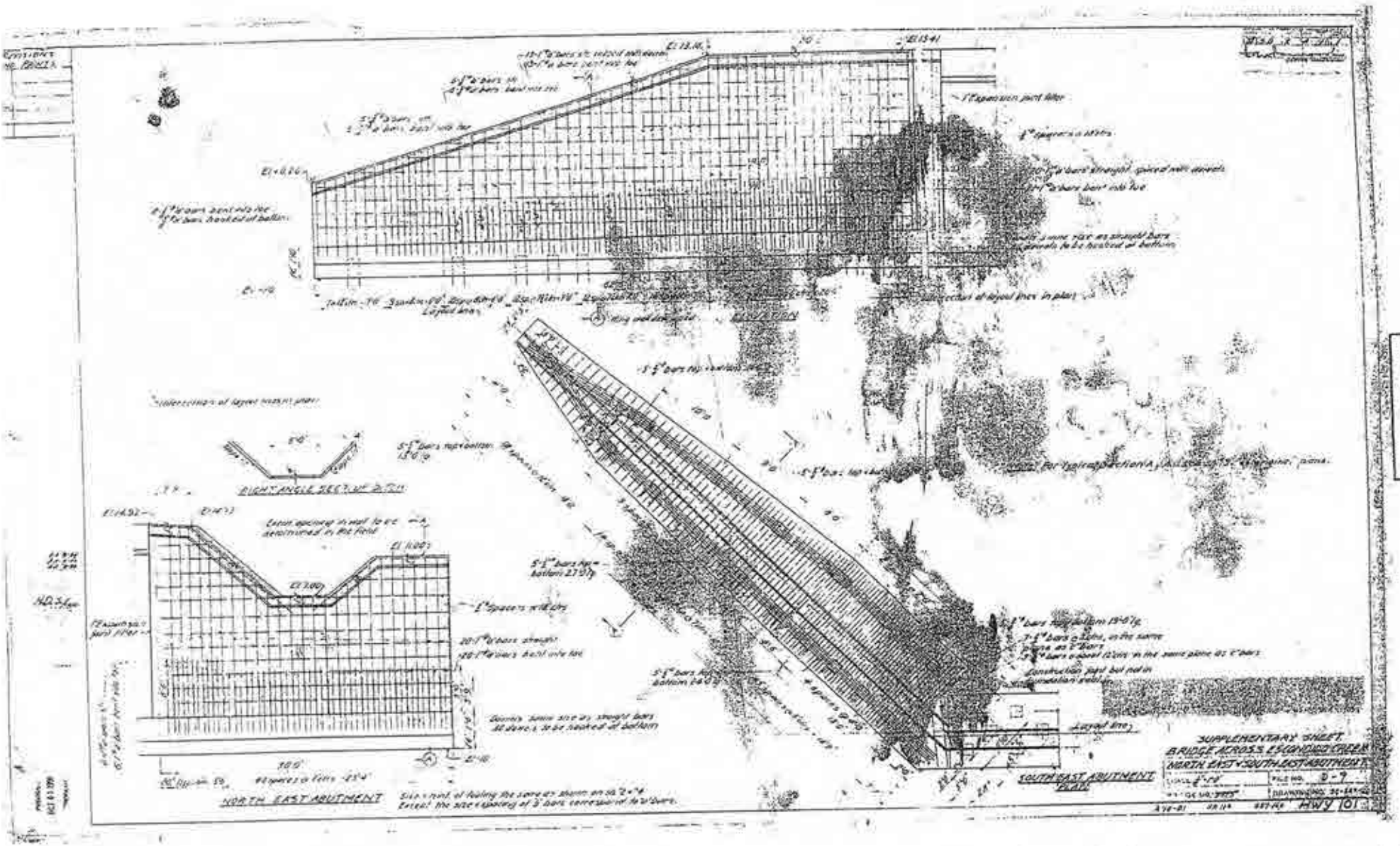

Total Length ℄ to ℄ of abutments = 180'-0"
45'-0"
SECTION PARALLEL TO ℄ ROADWAY
Dimensions Parallel to ℄ Bridge
SECTION (B)-(B)
SECTION (A)-(A)
PROVISION FOR WIDENING SLAB ALONG WEST SIDE OF BRIDGE
PLAN
DIAGRAM FOR 'Y' BARS
Reinforcement symm. about ℄
6"x12" Timber buffer bolted into paving notch with 1"ø x 12' bolts and cut washers @ 2'-0" ctrs.
Note: For reinforcement of footings, see Sheet No. 3
Layout Line
Construction joint
Contr. Joint
℄ Roadway
℄ Bridge
Bend all 'Y' bars 3'-1" 'Y' Bars
BRIDGE ACROSS ESCONDIDO CREEK
SLAB REINFORCEMENT
SCALE 1/4"=1'-0"
FILE NO.
BRIDGE NO. 57/8
DRAWING NO. C-258-18
HWY 101

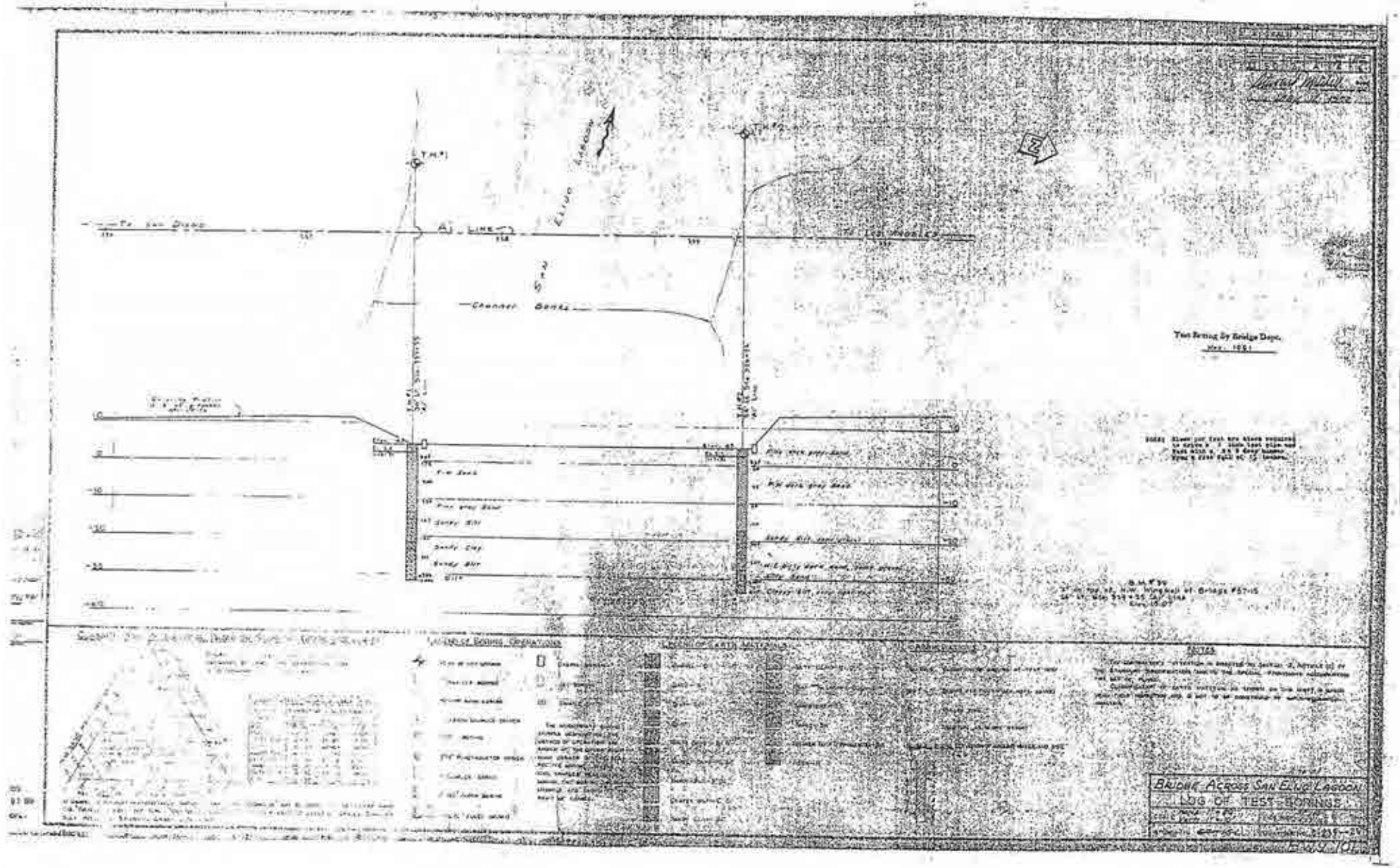

ELEVATION
PLAN
Vertical bars in front face of wall not shown.
Sheet in abutment wall not shown.
1" Exp. joint filler
Construct. joint
Note: foundation seal omitted.
For layout of footing and piles see Sheet No. 2.
For sections A-A, B-B & C-C see Sheet No. 2.
Construction joint above seal only
Roadway
BRIDGE ACROSS ESCONDIDO CREEK
NORTH ABUTMENT AND WINGS
HW91Q

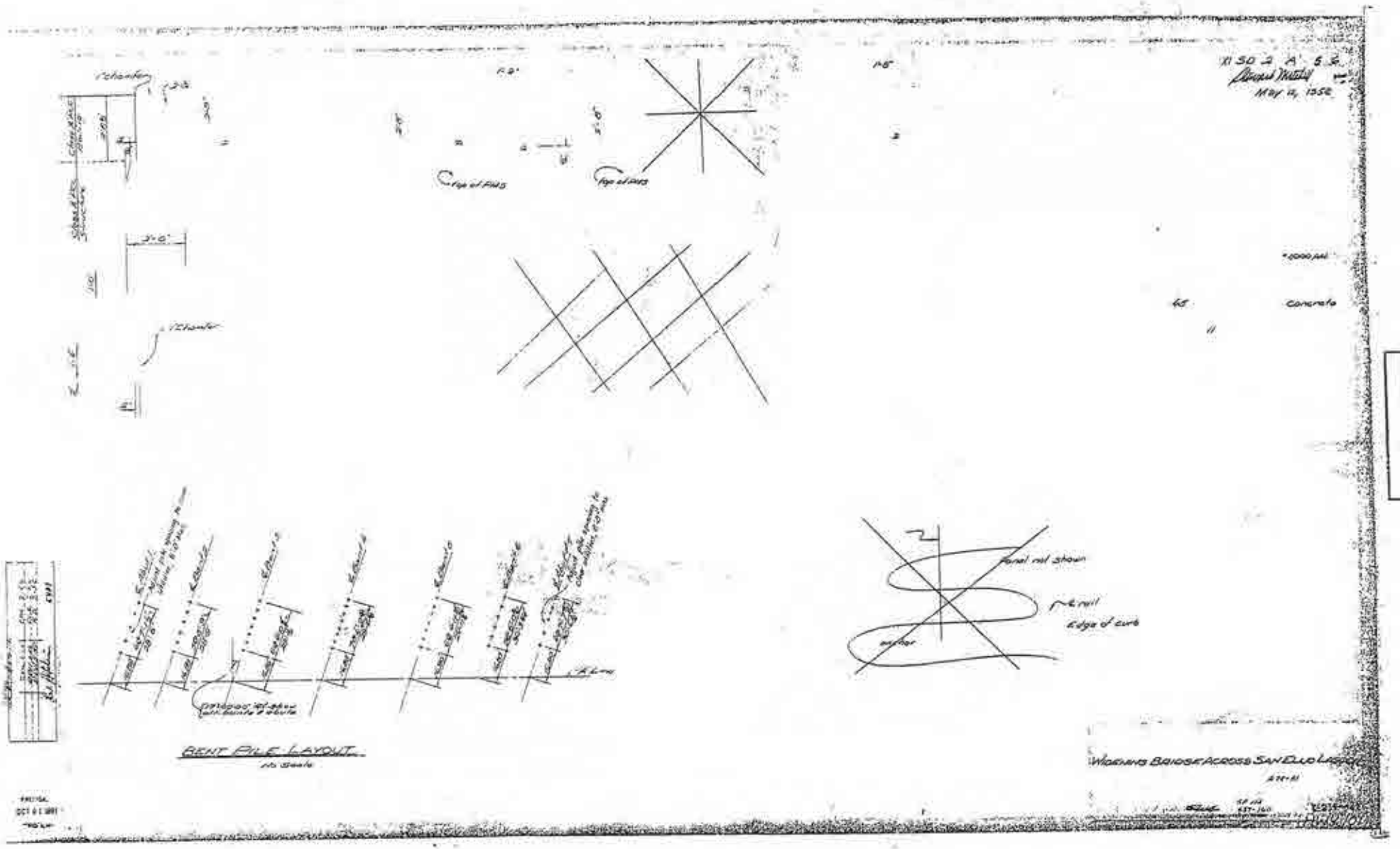

ELEVATION
PLAN
RETAINING WALL REINFORCEMENT
SECTION A-A
SECTION B-B
SECTION C-C
RETAINING WALL
BRIDGE ACROSS ESCONDIDO CREEK
SOUTH ABUTMENT AND WINGS
Vertical bars in front face of wall not shown.
Steel in abutment wall not shown.
Provision for future widening.
Construction joint above seal only.
Layout Line
Bridge Layout Line
Note: Openings for future telephone conduit.
Vertical bars in front face of wall not shown.
For spacing of piles see foundation plan.
Note: Seal omitted.
Note: Seal omitted where footing bears on rock.
Weep Holes
Roadway
Backfill
Footing
Piles
Batter
Const. Joint
Provision for future widening.
Note: Foundation seal omitted where footing bears on rock.
Wing wall developed
Note: See Steel Tab.
Note: Openings for future telephone conduit.
Steel in abutment wall not shown.
Construction joint above seal only.
Vertical bars in front face of wall not shown.
Note: 6"ø Galv. Iron pipe for San Dieguito Irrig. Ditch
Note: 6"ø Galv. Iron pipe for San Diego Consolidated Irrig. Ditch
Note: 2"ø Openings for Southern California Telephone Co.
Note: Seal omitted.
Note: Seal omitted where footing bears on rock.
Note: 2"ø Pipe expansion joint
Note: Seal omitted.
Note: Seal omitted where footing bears on rock.


Existing sign board to be removed and re-erected as directed by the Engineer.
Layout line for retaining wall & ℄ for abutment.
180'-0"
45'-0"
49'-0"
℄ Lines
Layout line for retaining wall & ℄ for abutment
Pole
34 Wire Tel. Line to be rebooted by Telephone Co. before construction is started
℄ for abutment footing
℄ Highway
℄ Bridge
N 19° 42' W
Test pile
Construction joint above seal only
Test pile
Construction joint above seal only
Layout line for retaining wall
Layout line for retaining wall
FOUNDATION PLAN
Note: For elevation, thickness of footing, see Sheet No. 3 for concrete pile details see Sheet No. 5. All piles shall be cut off at abutment and retaining wall details
Max. pile load 30 tons
BRIDGE ACROSS ESCONDIDO CREEK
FOUNDATION PLAN
SCALE 1"=10'
BRIDGE NO. 44W-
DRAWING NO. 0-239-
44W-81

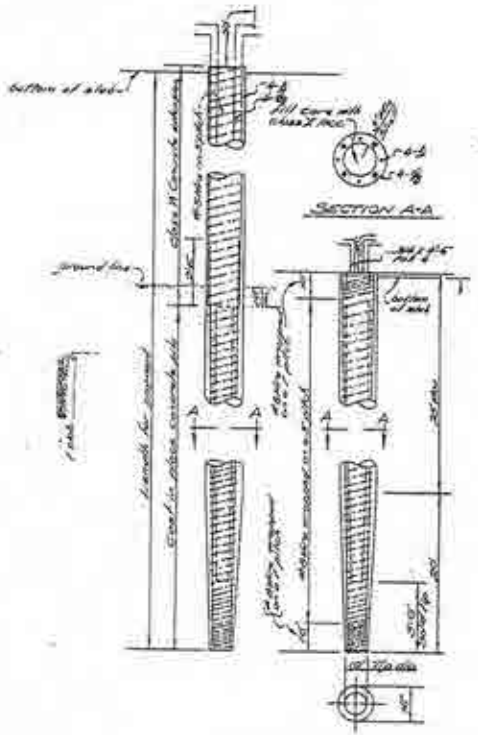

Total Length of Structure = 182'-8"
Grade +0.83 %
Clearance line El. 1.00
High Wtr El. +4.3 ?
Approx. H.W. El. +1.0 ?
Datum El. -10.00
Bottom of New channel Approx. El. -2.0
Note: For sizes of other piles see sheet
For estimating purposes only, bottom of piles assumed at El. -40.0
ELEVATION
Note: Approach fills are not a part of this contract.
Side for Proposed Widening
Edge of Shoulder
Edge of Pavement
Drains
Layout Line South Abutment
Layout Line North Abutment
Point "Bk. No. 5715" in letters 12" high with block out
Rip-rap not a part of this contract
Rip-rap not a part of this contract
PLAN
GENERAL NOTES
All reinforcing steel shall be deformed bars of intermediate grade and be lapped at least 48 diameters at all splices.
All concrete shall be Class 5A.
Channel shall be excavated as directed by the Engineer. Elevation shown is for estimating purposes only.
Bk. - Cross on Ref. rail S.E. corner of existing bridge. Sta. 22+10.0, Offset 8.0 Rt.
Sheet No. 1 General Plan
2 Foundation Plan
3 South Abutment
4 North Abutment
5 Slab Reinforcement
6 Pouring Diagram
5-SD-219
DEPARTMENT OF PUBLIC WORKS
BRIDGE ACROSS ESCONDIDO CREEK
GENERAL PLAN
HWY. 101


RIGHT ANGLE SECTION OF DITCH
NORTH EAST ABUTMENT
SOUTH EAST ABUTMENT PLATE
SUPPLEMENTARY SHEET.
BRIDGE ACROSS ESCONDIDO CREEK
NORTH EAST + SOUTH EAST ABUTMENTS
HWY 101


BRIDGE ACROSS SAN ELIJO LAGOON
LOG OF TEST BORINGS


Edge of Pads
Edge of Pads
Concrete
Panel rail shown
Edge of curb
RENT PILE LAYOUT
No Scale

W. 50-2. A 4-16
Revised Method
May 12, 1952




CAST-IN-PLACE CONCRETE PILE
ALTERNATIVE "W"

Design load 45 tons

Piles to be prestressed to 6,000 psi until driving has been completed

Note 10" Longitudinal reinforcement shall be prestressed to 3000 lbs per bar

Design load 45 tons

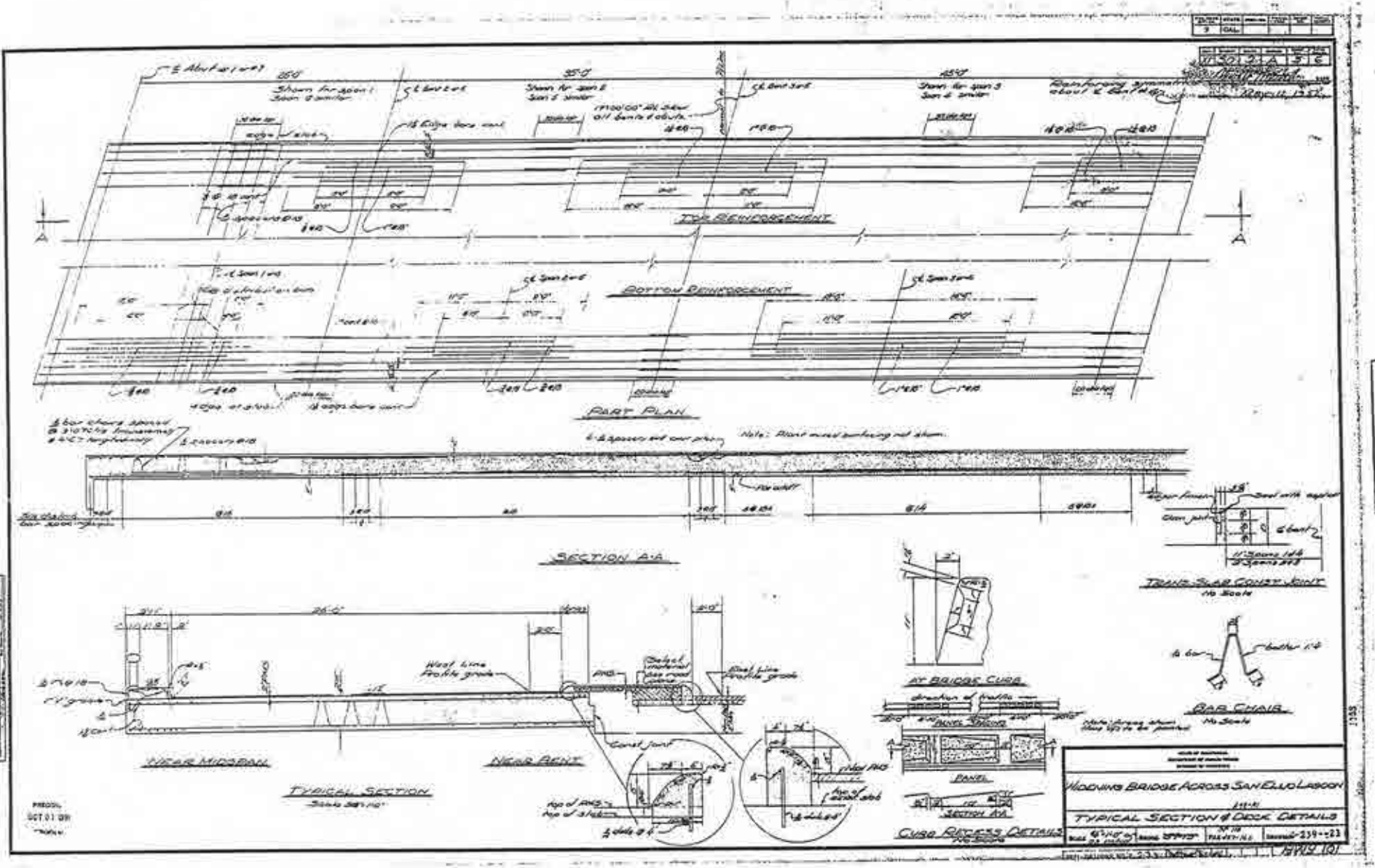
Design load 45 tons

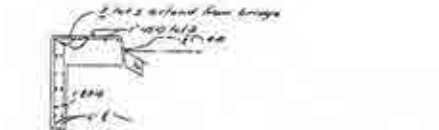
Design load 45 tons

WIDENING BRIDGE ACROSS SAN ELIJO LAGOON

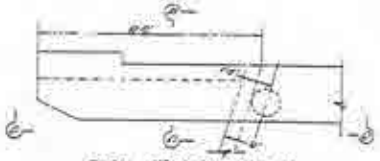
HWY. 101

RECEIVED
OCT 01 1951

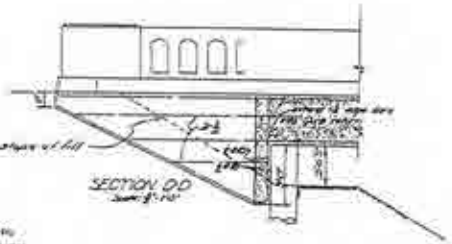

TOP REINFORCEMENT
BOTTOM REINFORCEMENT
PART PLAN
SECTION A-A
TYPICAL SECTION
NEAR MIDSPAN
NEAR ABUT.
TRANS-SLAB CONST. JOINT
BAR CHAIR
AT BRIDGE CURB
CURB RECESS DETAILS
PANEL
SECTION AA
WIDENING BRIDGE ACROSS SAN ELIJO LAGOON
TYPICAL SECTION & DECK DETAILS
BRIDGE DEPARTMENT



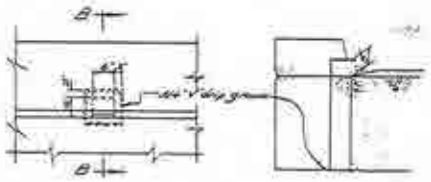
SECTION AA



ELEV. 1ST CURB RETURN

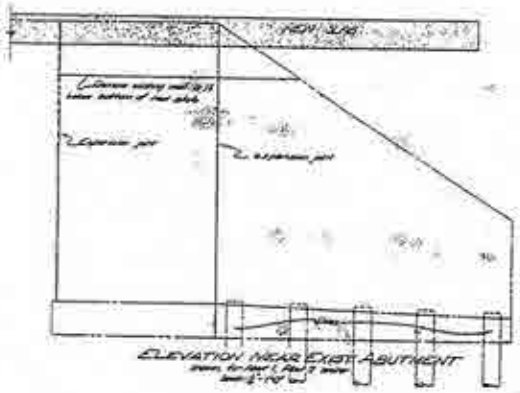


SECTION DD



PLAN SECTION BB

DRAIN DETAIL



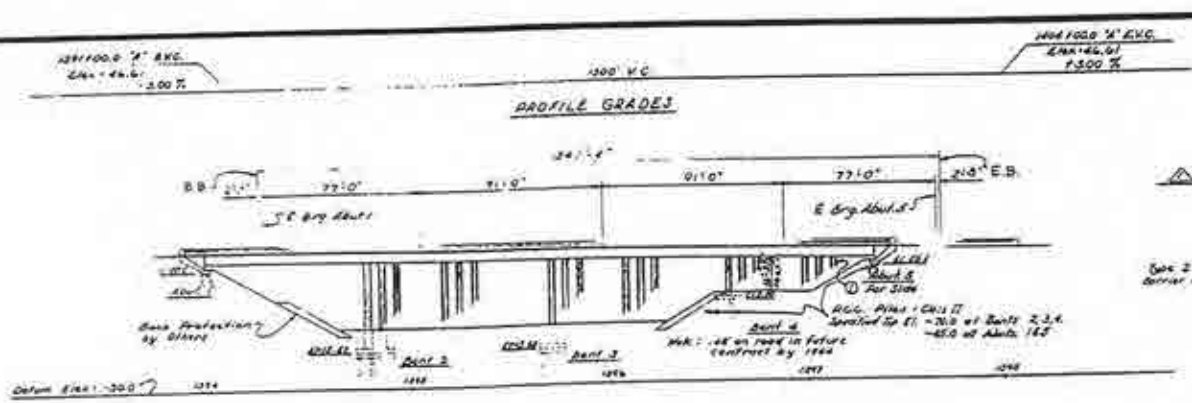
ELEVATION NEAR EXIST. ABUTMENT

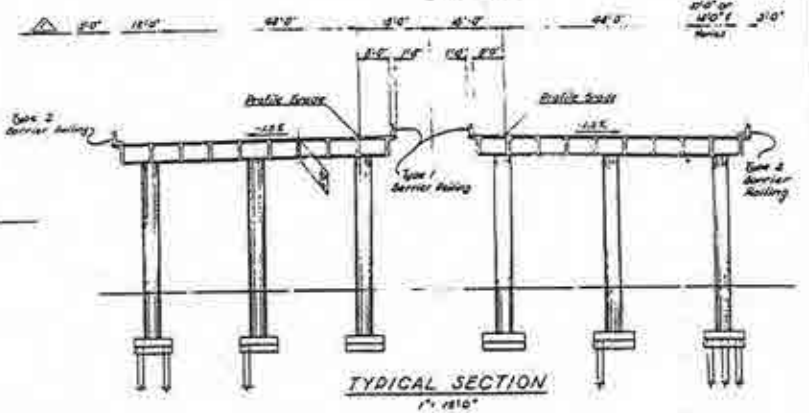
WIDENING BRIDGE ACROSS
SAN ELIJO LAGOON

ABUTMENT DETAILS

BRIDGE DEPARTMENT

OCT 01 '88



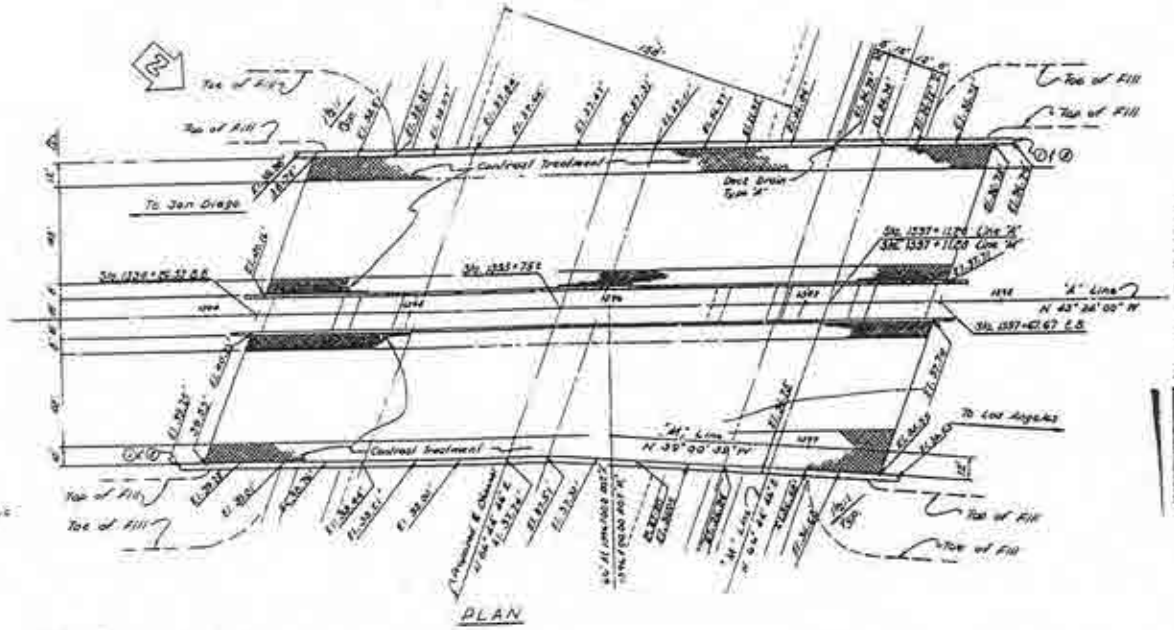




TYPICAL SECTION

1" = 10'-0"

ELEVATION

| | Abut. 1 | Bent 2 | Bent 3 | Bent 4 | Abut. 5 |
|---|---|---|---|---|---|
| Specified Tip | El. - 45.0' | El. - 70.0' | El. - 70.0' | El. - 70.0' | El. - 45.0' |
| Average Tip | El. - 48.3' | El. - 72.1' | El. - 74.3' | El. - 76.6' | El. - 54.4' |
| Maximum Tip | El. - 58.1' | El. - 116.5' | El. - 76.1' | El. - 96.5' | El. - 71.8' |
| Minimum Tip | El. - 48.3' | El. - 71.4' | El. - 73.2' | El. - 76.1' | El. - 44.8' |




Note: Bench Marks used
#37 4" Iron Pipe El. 12.86
97 Ls Sta. 1388+98 "M" Line
*38 1" Iron Pipe El. 39.26
2.76' Rt of Sta. 1403+98 "A" Line
Dist. Highway Monument

APPROXIMATE QUANTITIES

| | |
|---|---|
| STRUCTURE EXCAVATION | -450-C.Y. |
| STRUCTURE EXCAVATION (TYPE "A") | -990-C.Y. |
| STRUCTURE BACKFILL | -360-C.Y. |
| FURNISHING CONCRETE PILING (CLASS II) | 372-L.F. |
| DRIVING CONCRETE PILES | 933-Ea. |
| *CLASS "A" CONCRETE (BRIDGE) | 2470-C.Y. |
| CLASS "A" CONCRETE (FOOTING BLOCK) | 525-C.Y. |
| *BAR REINFORCING STEEL (BRIDGE) | 450,000-Lbs. |
| MISCELLANEOUS METAL (BRIDGE) | 50,000-Lbs. |
| BARRIER RAILING (TYPE 1) | 710 L.F. |
| BARRIER RAILING (TYPE 2) | 710 L.F. |
| CONTRACT TREATMENT | 2,200-S.Y. |

*FINAL QUANTITIES

AS BUILT PLANS
Contract No. 43-11V136.7-I
Date Completed
Document No. Addm 136

INDEX TO PLANS


| Sheet No. | Title |
|---|---|
| 1 | General Plan |
| 2 | Grid Grades |
| 3 | Foundation Plan |
| 4 | Abutments 1 & 5 |
| 5 | Abutments 1 & 5 |
| 6 | Bents 2, 3, 4 & 4L |
| 7 | Bents 2, 3, 4 & 4L |
| 8 | Typical Section |
| 9 | Girder Layout No. 1 |
| 10 | Girder Layout No. 2 |
| 11 | Girder Reinforcement |
| 12 | Concrete Pile Details |
| 13 | Standard Details No. 1 |
| 14 | Standard Details No. 2 |
| 15 | Barrier Railing Sheet 1 |
| 16 | Barrier Railing Sheet 2 |
| 17 | Log of Test Borings |
| 18 | Lighting Plan |


① = Point Br. No. & Date
② = Name of Structure
LL = N30-31W-44 E Alternate

For "General Notes" see "Standard Details No. 2" etc.

| | |
|---|---|
| 1 | Add Bridge Widened, Quantities Increased |
| NO. | DESCRIPTION |

REVISIONS

DESIGN SECTION ... 6

O. Brindley

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

11V136.7-I

SAN ELIJO LAGOON & UNDERCROSSING

LOCATED 4.4 MI. E. EASTERLY OF INTERSECTION OF HIGHWAY 101 & CHESTERFIELD DRIVE IN TOWN OF CARDIFF IN SAN DIEGO COUNTY

GENERAL PLAN

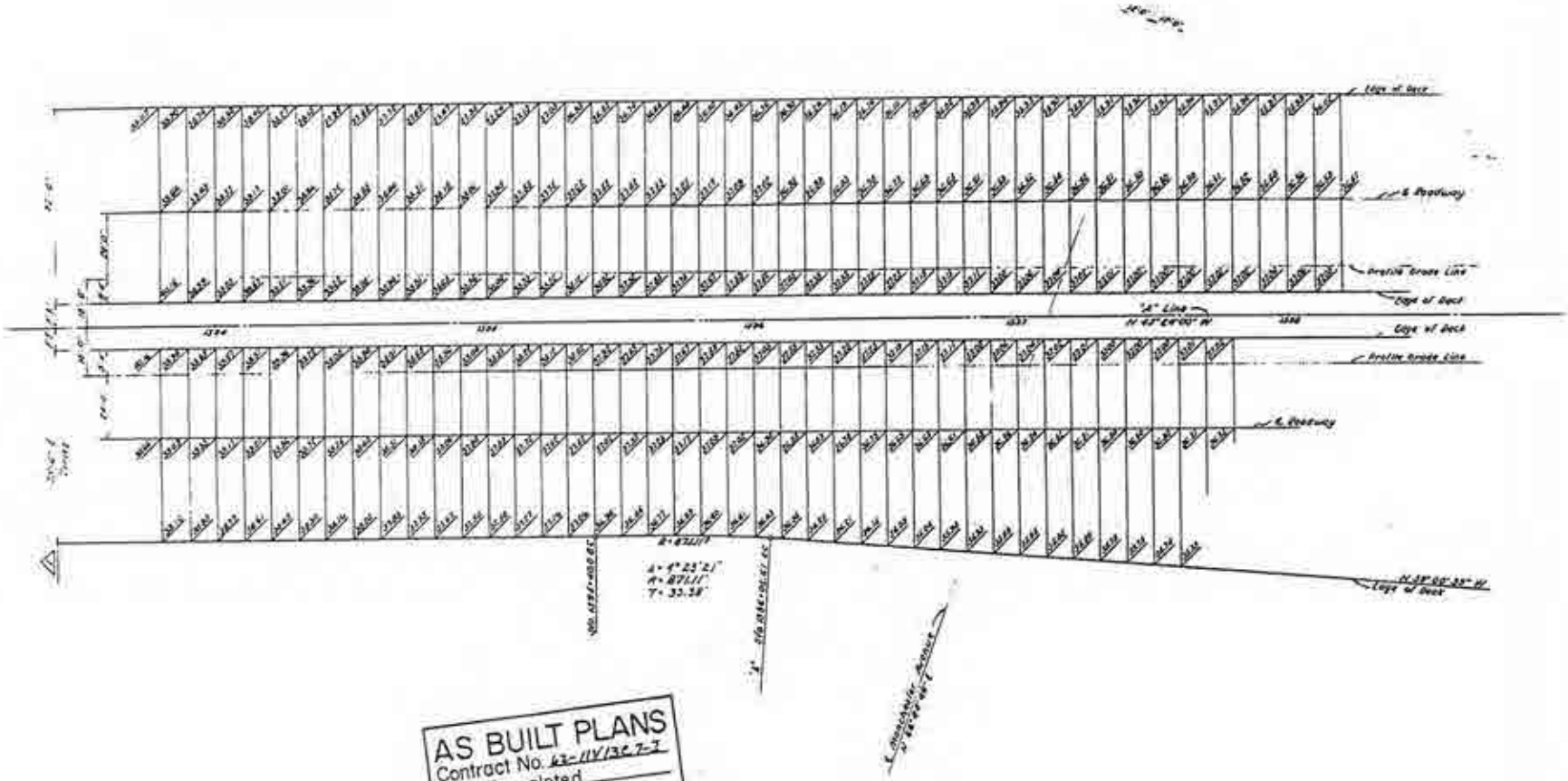
Except as noted Scale F = 30'-0" | Bridge 57-668 | Plot | Drawing 6892-1

MISC. DRAWING No. M-6892

F-0068241137

| DIST. | COUNTY | ROUTE | SECTION | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | 5 | A | 282 | 18 |

May 22 1961




AS BUILT PLANS
Contract No. 82-11V136.7-7
Date Completed
Document No. 80662 136

| REVISIONS | | | |
|---|---|---|---|
| | Pavement, Edge Line added | UB | |

| | |
|---|---|
| DESIGN SECTION | 6 |
| Design Supervisor | John L. Gould |
| Designed | R. Taylor |
| Detailed | W. Edwards 6-'60 |
| Quantities | R. Jones |
| Checked | J. Thompson |

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

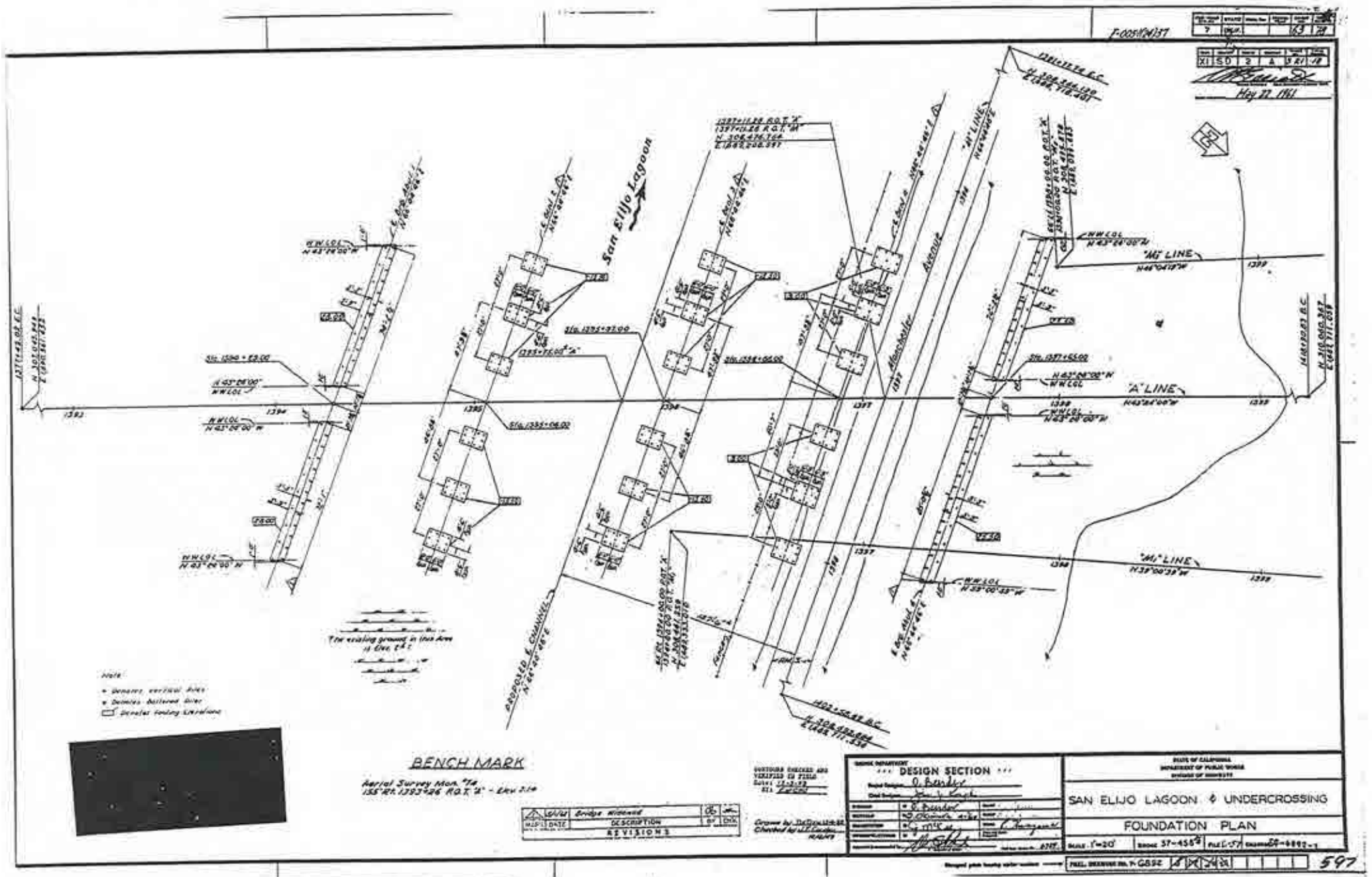
SAN ELIJO LAGOON & UNDERCROSSING

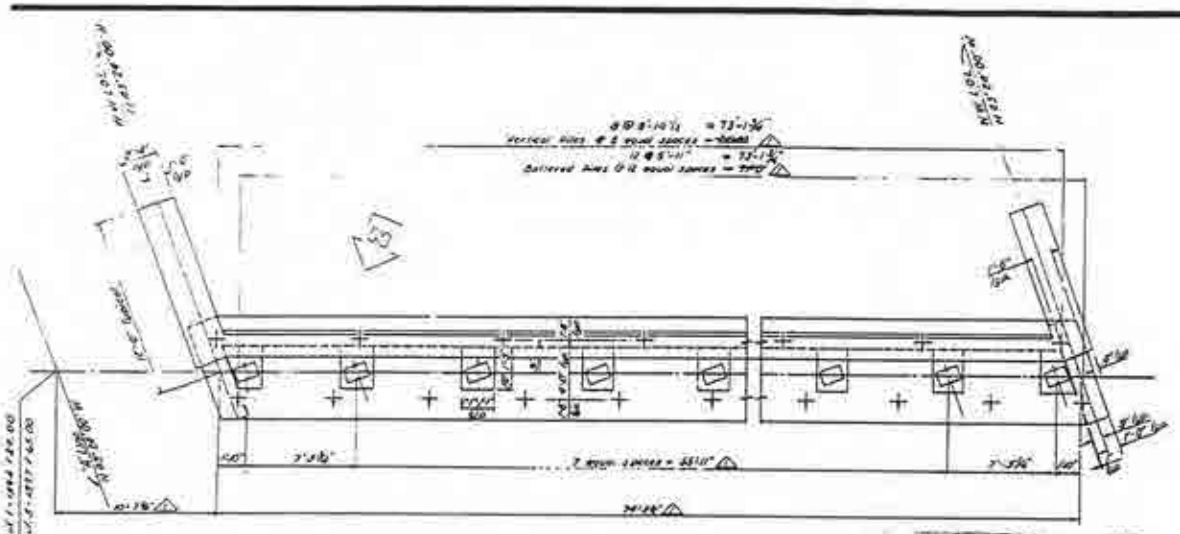
GRID GRADES

| SCALE 1" = 50' | BRIDGE 57-466 R | FILE | DRAWING 57-6492-1 |
|---|---|---|---|

Record plan history under remarks

REL. DRAWING NO. F-6892

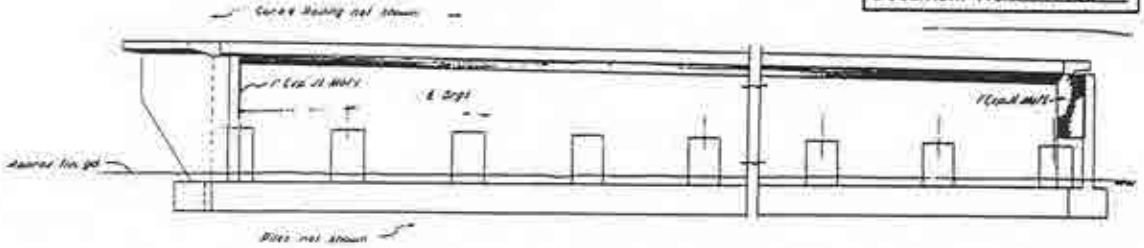

San Elijo Lagoon
Manchester Avenue
"A" LINE
"M" LINE
"M1" LINE
PROPOSED 6' CHANNEL
BENCH MARK
Aerial Survey Mon. "A"
135'Rt. 1393+26 R.O.T. "A" - Elev. 2.14
DESIGN SECTION
O. Bentley
SAN ELIJO LAGOON ⌀ UNDERCROSSING
FOUNDATION PLAN
SCALE: 1"=20'
BRIDGE 57-455
DRAWING 28-6892-1
PROJ. DRAWING No. 1-6892
597



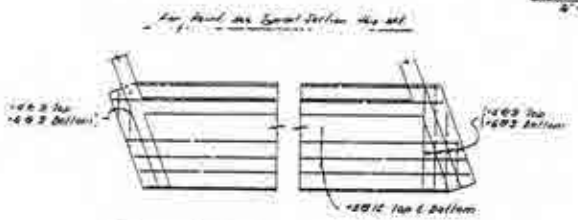
PLAN
3/8" = 1'-0"

ABUTMENT 1 SHOWN-ABUTMENT 3 IS SIMILAR BY ROTATION

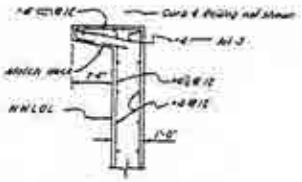
AS BUILT PLANS
Contract No. 43-11V136 7-1
Date Completed
Document No. A0001136



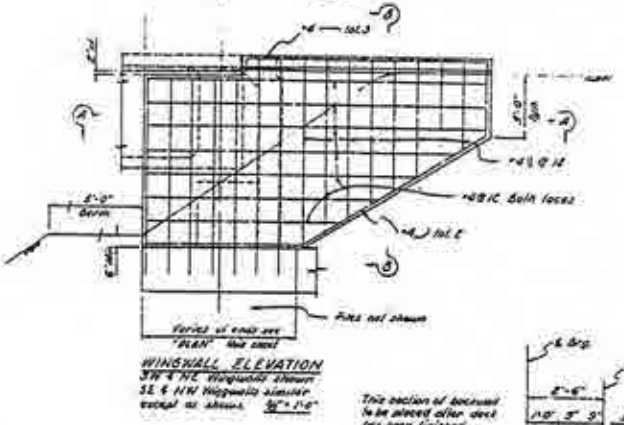
ELEVATION
3/8" = 1'-0"



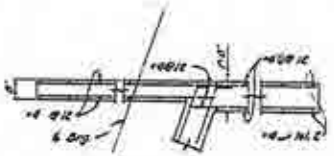
TYPICAL FOOTING CORNER REINFORCEMENT
No Scale



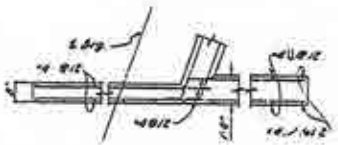
SECTION B-B
3/8" = 1'-0"



WINGWALL ELEVATION
SW & NE Wingwalls shown
SE & NW Wingwalls similar except as shown.
3/8" = 1'-0"

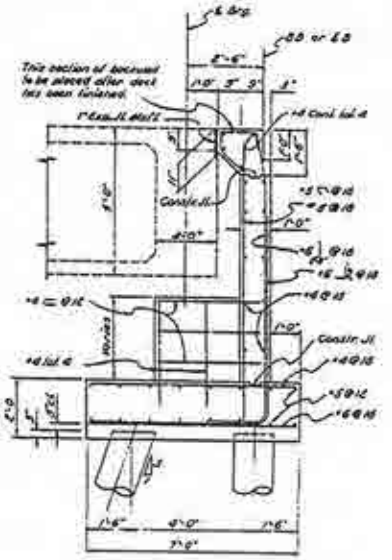


SE & NW WINGWALLS



SW & NE WINGWALLS

SECTIONS A-A
3/8" = 1'-0"



TYPICAL SECTION
3/8" = 1'-0"

| DESIGN SECTION | 6 |
|---|---|
| Design Engineer | O. Bender |
| Chief Engineer | |

| Bridge Widened | | | |
|---|---|---|---|
| MARK | DATE | DESCRIPTION | BY |
| REVISIONS | | | |

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

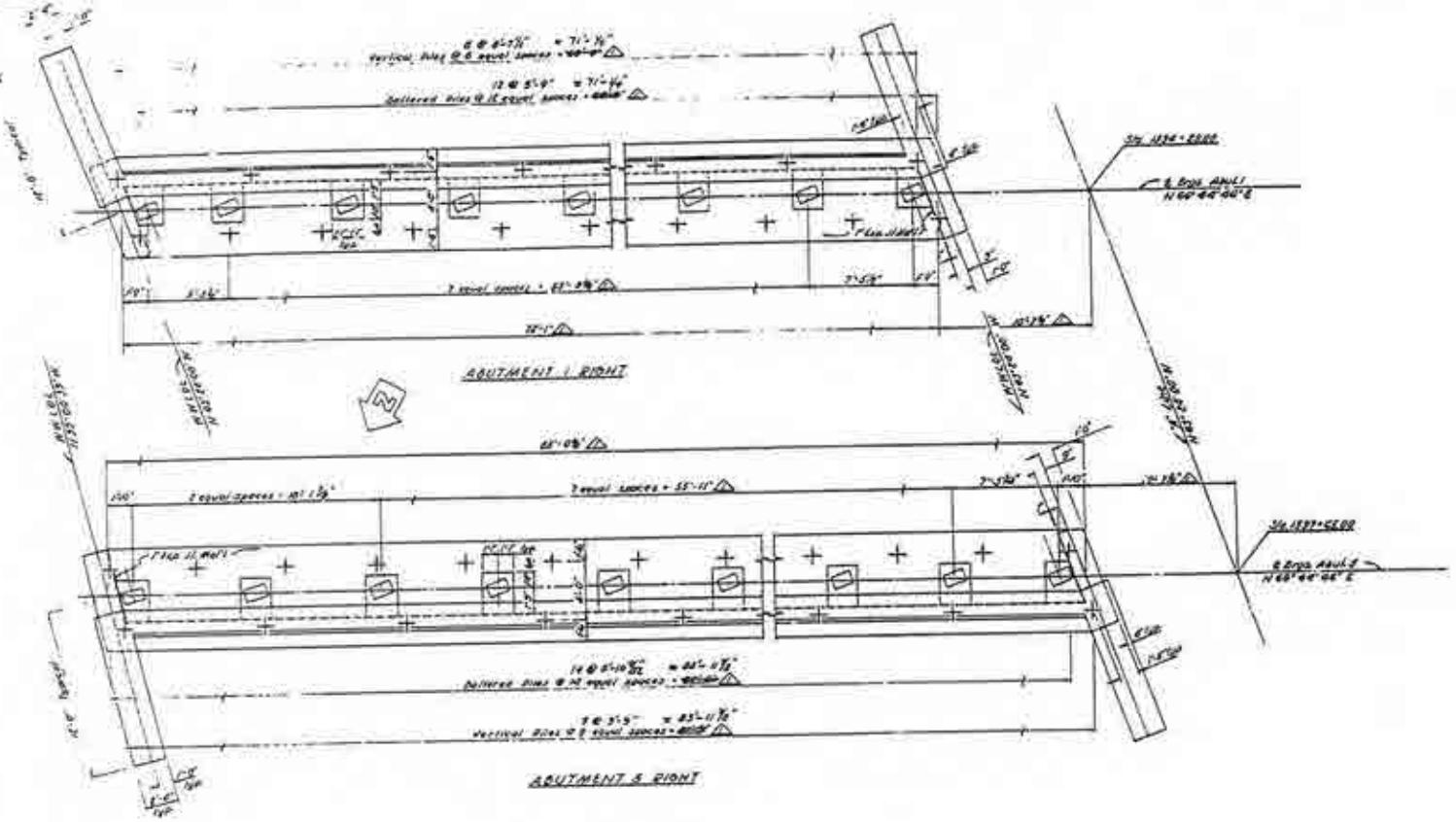
SAN ELIJO LAGOON & UNDERCROSSING

ABUTMENTS 1L & 5L

| DESIGN AS shown | ENGINEER 57-668 | FILE | CALCULATIONS |
|---|---|---|---|

REVISED DRAWING No. P-0592

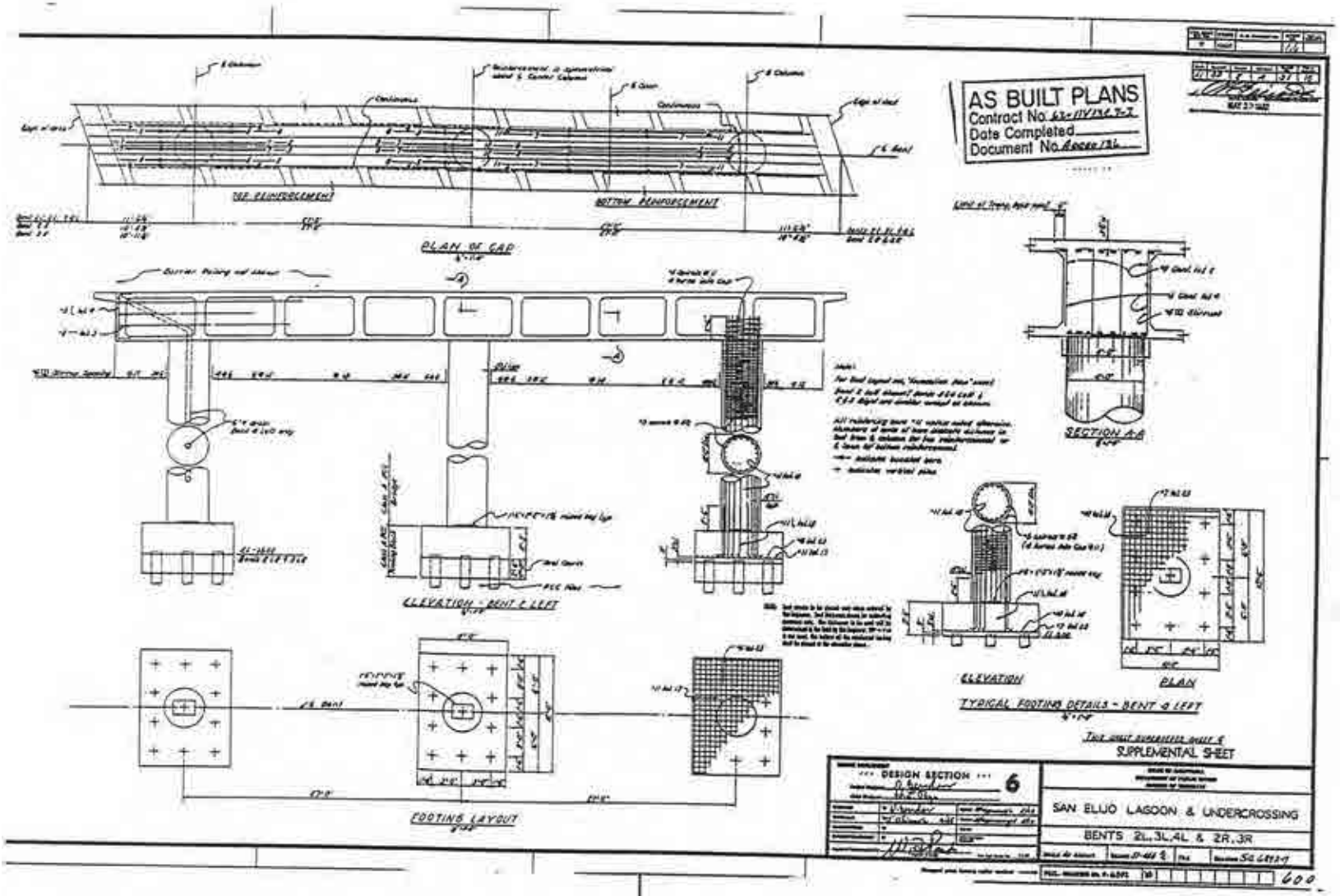
598

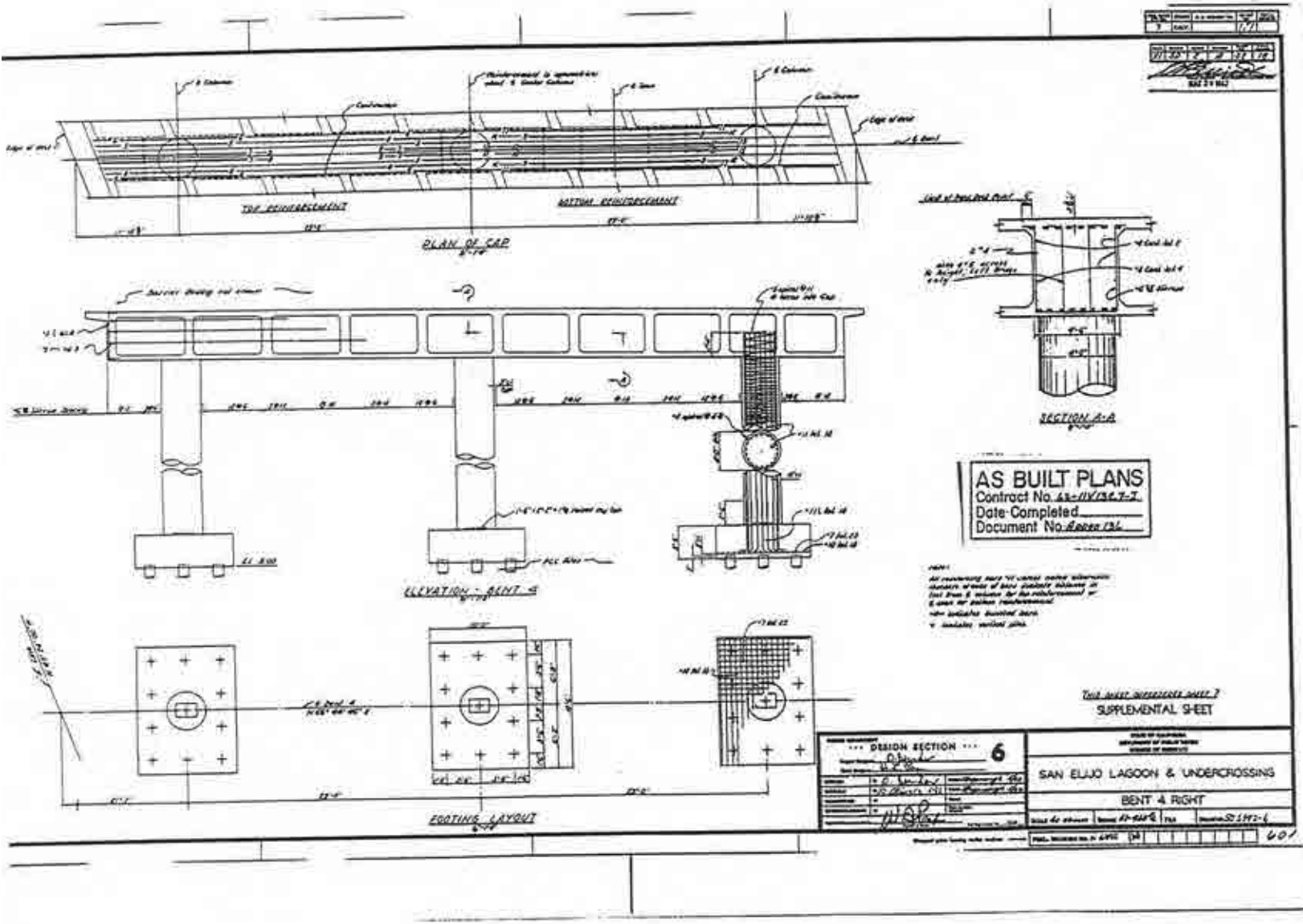



Note:
For Elevations & Sections and Abutment see "Abut 1L & 5L" sht
+ Denotes Vertical Piles
+ Denotes Battered Piles

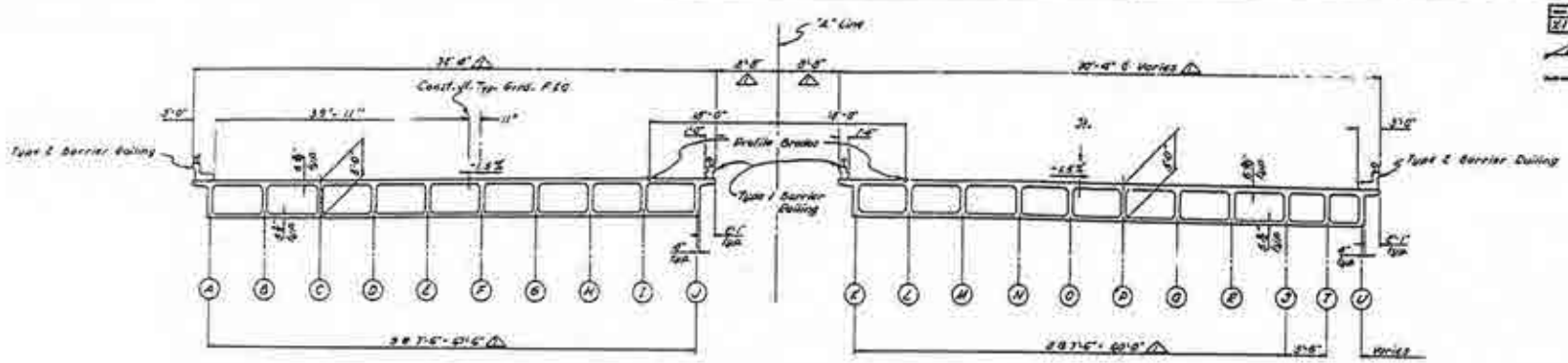
AS BUILT PLANS
Contract No. 43-111V13C 7-7
Date Completed
Document No. Aeeee 136

| | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

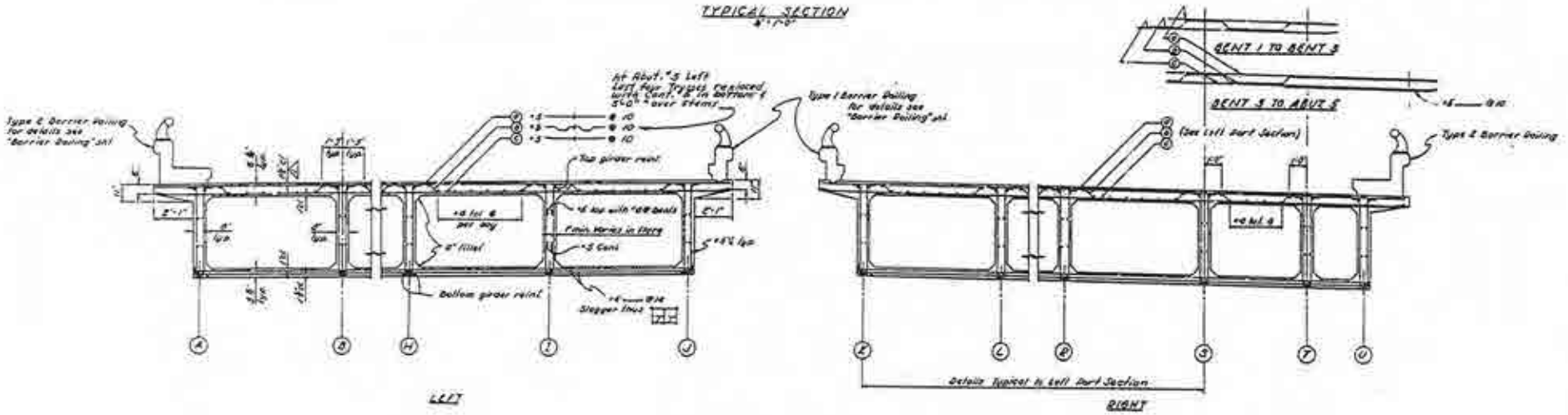

AS BUILT PLANS
Contract No. 63-111134,3-2
Date Completed
Document No. 80020136
TOP REINFORCEMENT
BOTTOM REINFORCEMENT
PLAN OF CAP
SECTION A-B
ELEVATION - BENT 2 LEFT
ELEVATION
PLAN
TYPICAL FOOTING DETAILS - BENT 4 LEFT
FOOTING LAYOUT
SUPPLEMENTAL SHEET
DESIGN SECTION 6
SAN ELIJO LAGOON & UNDERCROSSING
BENTS 2L, 3L, 4L & 2R, 3R
600


TOP REINFORCEMENT
BOTTOM REINFORCEMENT
PLAN OF CAP
ELEVATION - BENT 4
SECTION A-A
FOOTING LAYOUT
AS BUILT PLANS
Contract No. 43-111X/136.7-7
Date Completed
Document No. 80004 131
SUPPLEMENTAL SHEET
DESIGN SECTION 6
SAN ELIJO LAGOON & UNDERCROSSING
BENT 4 RIGHT

May 22, 1981




TYPICAL SECTION




TYPICAL PART SECTION

AS BUILT PLANS
Contract No. 43-11V136.7-7
Date Completed
Document No. ADDED 136

| MARK | DATE | DESCRIPTION | BY | CHK |
|---|---|---|---|---|
| 1 | | Bridge Widened | | |

REVISIONS

DESIGN SECTION 6

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

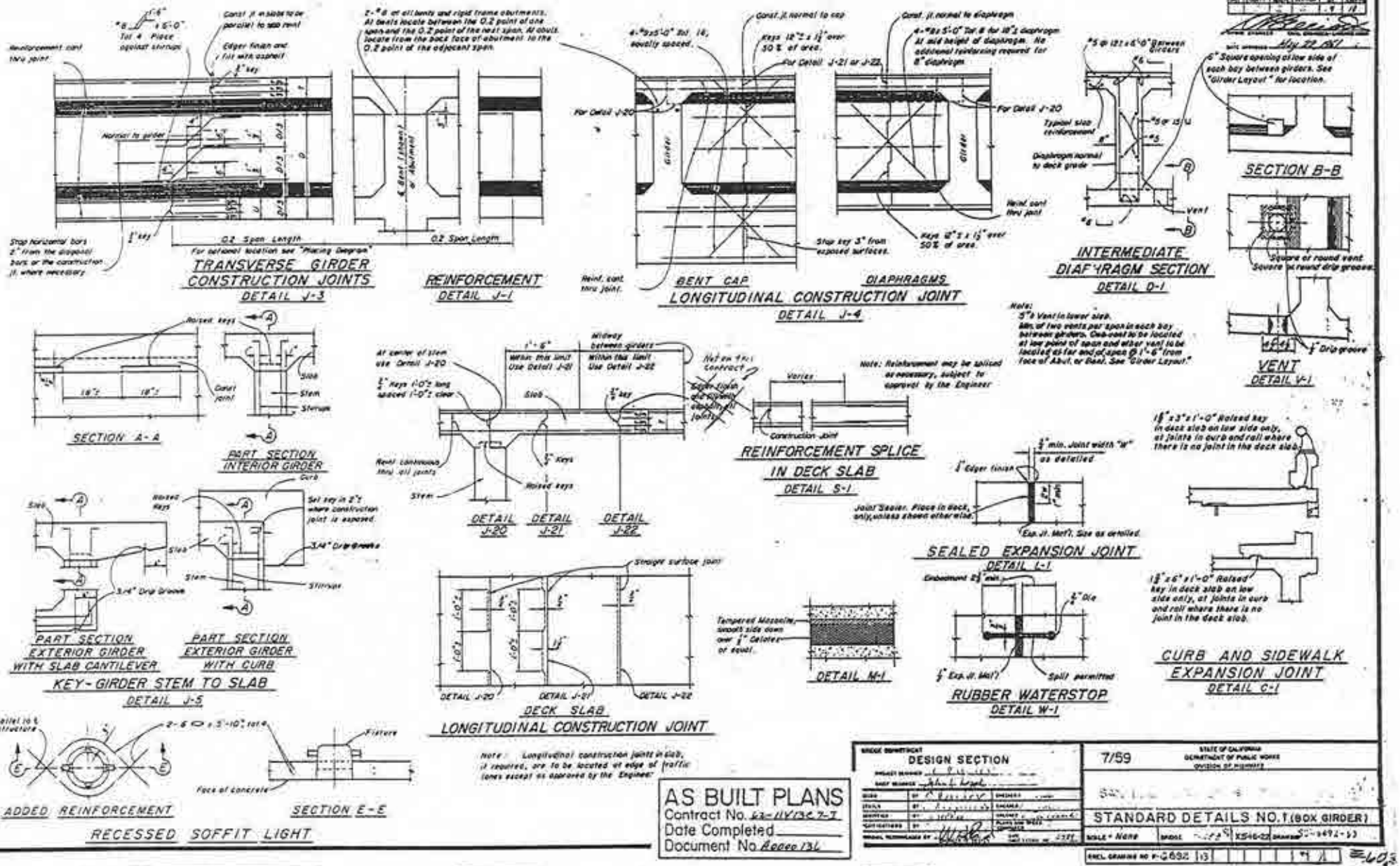
SAN ELIJO LAGOON & UNDERCROSSING

TYPICAL SECTION

SCALE AS SHOWN | BRIDGE 57-665 | FILE | DRAWING 5-7771-8

PROJ. DRAWING No. P-GB92

407




AS BUILT PLANS
Contract No. 43-114134 7-T
Date Completed
Document No. 86666 134

DESIGN SECTION

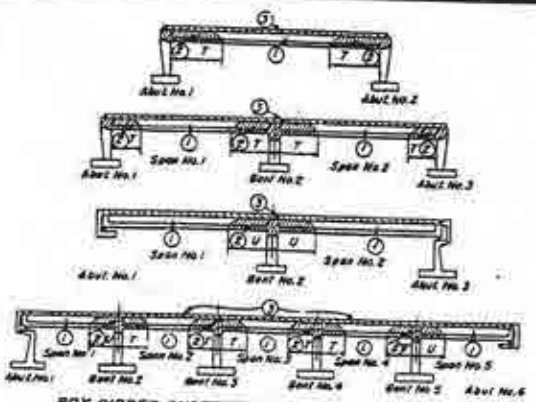
7/59

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

STANDARD DETAILS NO. 1 (BOX GIRDER)

SCALE = None

7/28/61/37




BOX GIRDER SUPERSTRUCTURE PLACING DIAGRAM

Numbers (1) and (2) indicate sequence of placing bottom slab and girder stem concrete. (2) may be placed simultaneously with (1) when approved by the Engineer, and provided that the (1) sections are placed in adjoining spans.

Top slab concrete (3) shall be placed separately from (1) and (2). (3) may be placed continuously or in parts as approved by the Engineer, however the only joints permitted shall be located within 2'-0" of the girder joints between (1) and (2).

T = ¼ span length

U = ⅛ span length

For any deviation from the above the contractor shall submit a diagram to the Engineer.

## GENERAL NOTES

Specifications:

Design: A.A.S.H.O. dated 1957 with revisions and as supplemented by Bridge Planning and Design Manual.

Construction: Standard Specifications, Division of Highways, dated January 1960 and the Special Provisions.

Live Loading: H20-S16-44 and alternative.

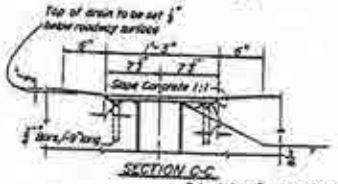
Unit Stresses:

Reinforced Concrete:
$f_s$ = 20,000 p.s.i.
n = 10
$f_c$ = 1,200 p.s.i.

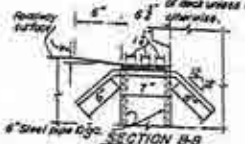
Structural Steel:
$f_s$ = 18,000 p.s.i.

Footing Pressure ____ tons p.s.f.

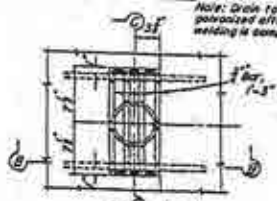
Pile Loading 45 tons. Type PCC - Class II




SECTION C-C



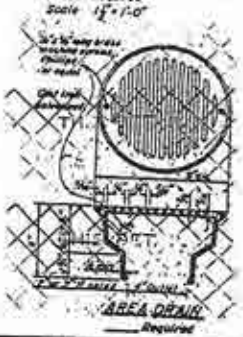

SECTION B-B




PLAN

DRAIN DETAIL TYPE "A"

Required
Scale 1½" = 1'-0"

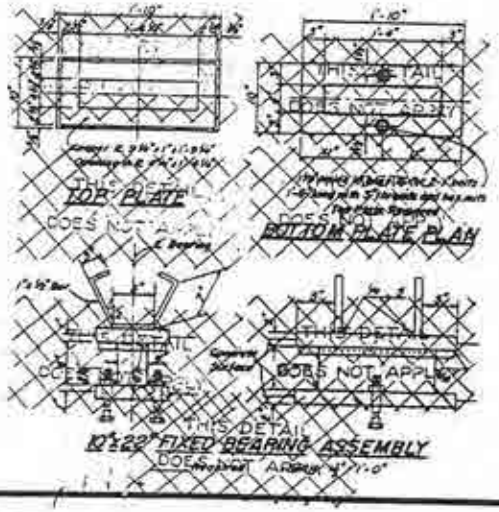


AREA DRAIN Required

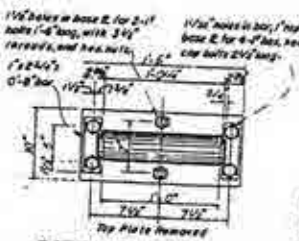
AS BUILT PLANS
Contract No. 43-11V136 7-7
Date Completed ____
Document No. 40066136

| MARK | DATE | DESCRIPTION | BY | CHK |
|---|---|---|---|---|
| 1 | 11/62 | 8 Bar Reinforcing revised | LD | |

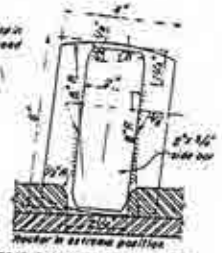
REVISIONS



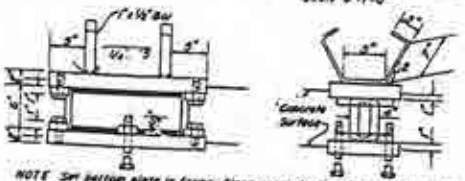

12"x22" FIXED BEARING ASSEMBLY




BOTTOM PLATE PLAN

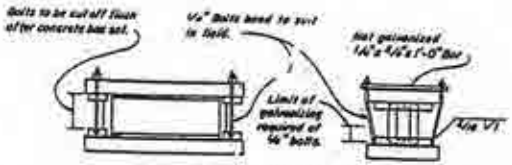



END VIEW OF ROCKER
Scale 6"=1'-0"




NOTE Set bottom plate in forms. Place concrete directly against bottom plate. All bearing assemblies to be galvanized after fabrication.

12"x18" EXPANSION BEARING ASSEMBLY
91 Required
Scale 1½"=1'-0"




DETAIL OF ERECTION BOLTS
Scale 1½"=1'-0"

| DESIGN SECTION | DESIGN 6 |
|---|---|
| Project Engineer O. Benedict | |
| Chief Engineer A. L. Boyd | |
| DESIGNED O. Benedict | DETAILED |
| CHECKED O. Benedict | TRACED |
| QUANTITIES O. Benedict | CHECKED |
| APPROVED A. L. Boyd | |

9/59

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

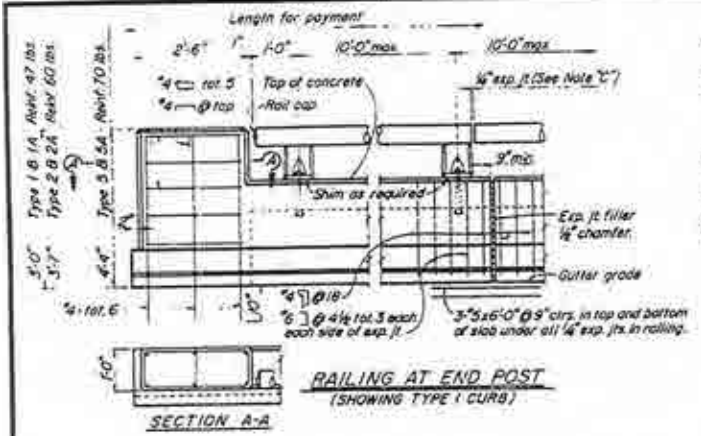
SAN ELIJO LAGOON 4 UNDERCROSSING

STANDARD DETAILS NO. 2 (BOX GIRDER)

SCALE As Noted | BRIDGE 57-456 | DATE 9-28-60 | DRAWING 58-6892-1 4

PROJ. DRAWING NO. P-6892 [N]

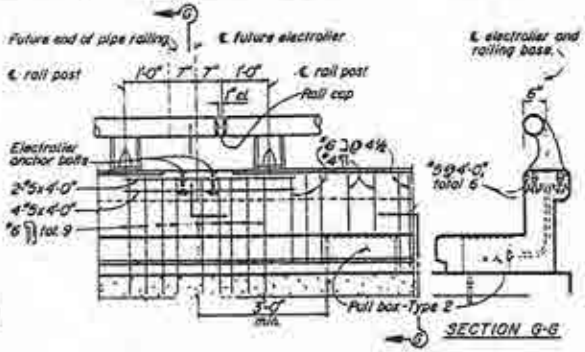
60-4




RAILING AT END POST
(SHOWING TYPE 1 CURB)

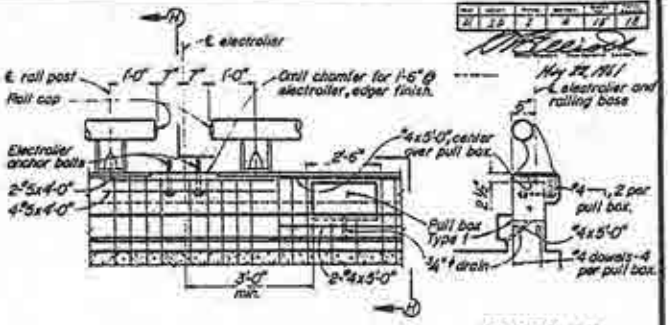


SECTION A-A



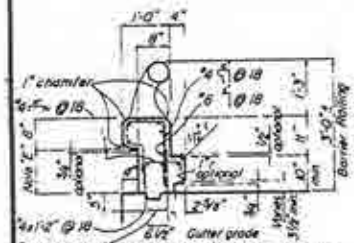

SECTION G-G

RAILING CLOSURE AT ELECTROLIER
(SHOWING TYPE 2 CURB)

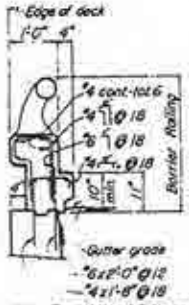



SECTION H-H

RAILING AT ELECTROLIER
(SHOWING TYPE 1 CURB)

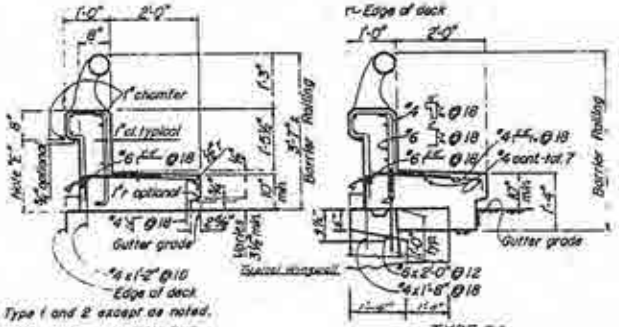



TYPE 1
Conc. 1.61 cu. ft. / lin. ft.
Reinf. 11.8 lbs. / lin. ft.



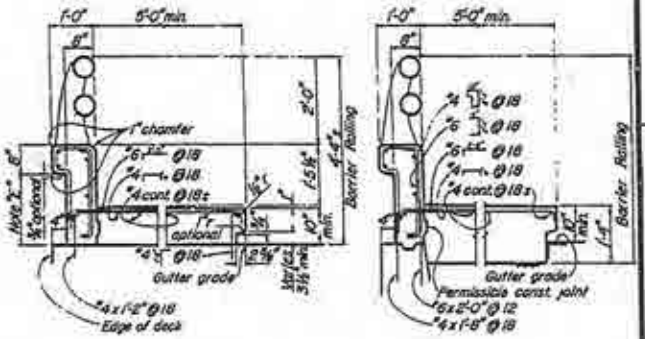

TYPE 1A
Conc. 1.61 cu. ft. / lin. ft.
Reinf. 12.0 lbs. / lin. ft.

Note: Type 1A and 2A are similar to Type 1 and 2 except as noted.




TYPE 2
Conc. 3.43 cu. ft. / lin. ft.
Reinf. 14.7 lbs. / lin. ft.

TYPE 2A
Conc. 4.30 cu. ft. / lin. ft.
Reinf. 17.3 lbs. / lin. ft.



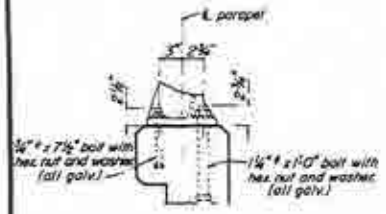

TYPE 3
Conc. 6.10 cu. ft. / lin. ft.
Reinf. 17.2 lbs. / lin. ft.
For 5'-0" width

Conc. 0.84 cu. ft. / lin. ft.
Reinf. 2.1 lbs. / lin. ft.
Per additional ft. (width)

TYPE 5A
Conc. 8.35 cu. ft. / lin. ft.
Reinf. 19.7 lbs. / lin. ft.

Conc. 1.34 cu. ft. / lin. ft.
Reinf. 2.1 lbs. / lin. ft.

## TYPICAL CURB AND RAIL SECTIONS




RAIL POST ANCHOR BOLT DETAIL
Scale: 1½" = 1'-0"

AS BUILT PLANS
Contract No. 43-114136 F-1
Date Completed
Document No. 4666136

Note:
A. Railing shall conform to horizontal and vertical alignment.
B. Posts shall be normal to railing.
C. Curb and wall exp. jts. to be located at all deck joints, at ℄ piers or bents and at uniform spacing (40' max.) between those specified. Joint size to be ¼" min. and increased to match deck joints.
D. Construct 3" deep x 12" wide overflow scupper 2" above deck at low points in grade.
E. Dimension will vary with cross-slope of deck.
F. Walls are to be backfilled before railing is placed.
G. Clearance to reinforcing steel in curb and railing to be 1".

DESIGN SECTION 6

10/60

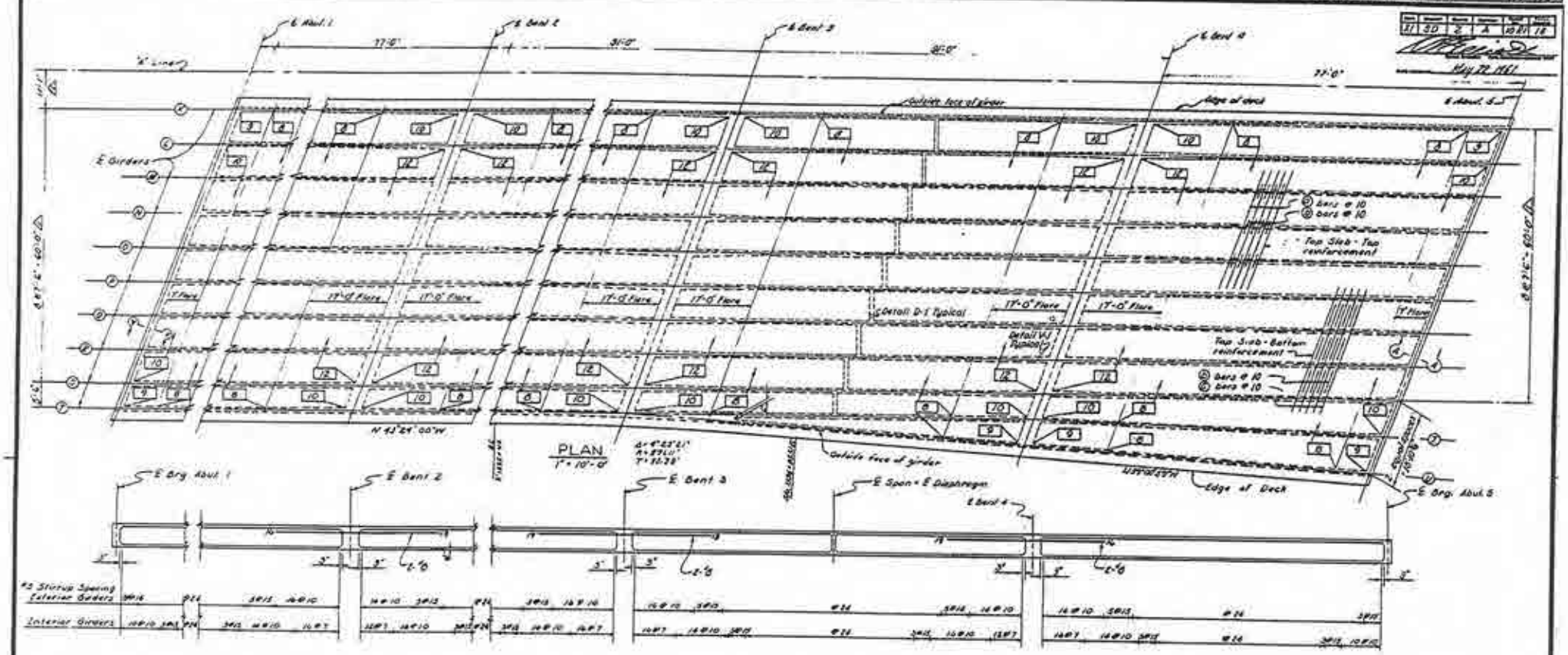
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SAN ELIJO LAGOON UNDERCROSSING

BARRIER RAILING SHEET 1

Except as noted wire 3/4" ø 1'-0" | Bridge 57-454 % | XS-9-63 | File | Drawing SD 6292-15

Bridge plan showing name number → PREL. DRAWING NO. 48 #93 24




LONGITUDINAL SECTION
1" = 10'-0"

Note:
For Section "AA" see "Girder Layout No. 1"

AS BUILT PLANS
Contract No. 43-11V13C 7-1
Date Completed
Document No. 40020136

| NUM | DATE | DESCRIPTION | BY | CHK |
|---|---|---|---|---|
| | | Title, Dimensions, & Girders Added | | |

REVISIONS

DESIGN SECTION 6

SAN ELIJO LAGOON & UNDERCROSSING

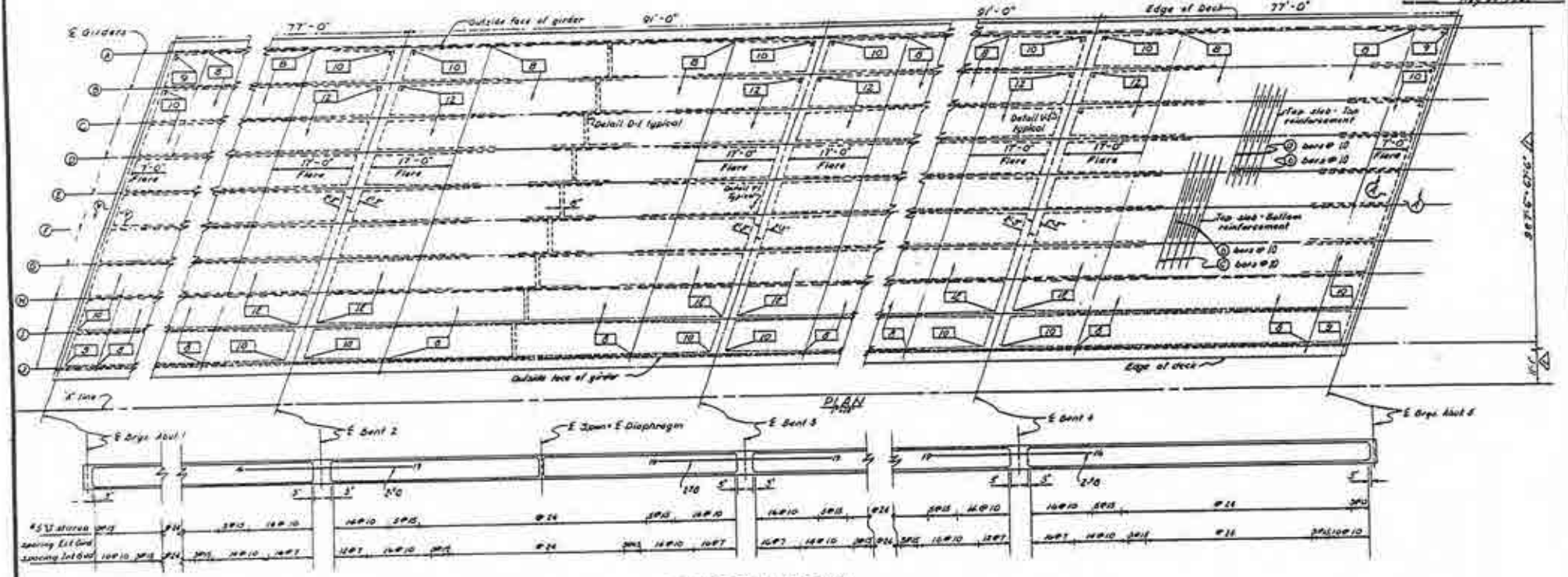
GIRDER LAYOUT NO. 2

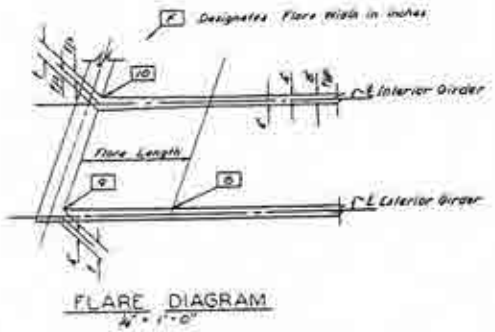
SCALE As Shown | BRIDGE 57-455R | FILE | DRAWING 50-6892-13

FINAL DRAWING NO. P-6892 | 10

F-005(241)37

604

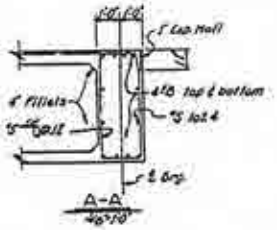



FLARE DIAGRAM
4" = 1'-0"

ULTIMATE DEAD LOAD DEFLECTION DIAGRAM
No Scale

Structure symmetrical about ℄ Bent 3




AS BUILT PLANS
Contract No. 43-111V13C.7-I
Date Completed
Document No. Addn 136

| MARK | DATE | REVISIONS | BY | CHK |
|---|---|---|---|---|
| 1 | 11/67 | Dimensions: ℄ Girders Added | | |

··· DESIGN SECTION ··· 6

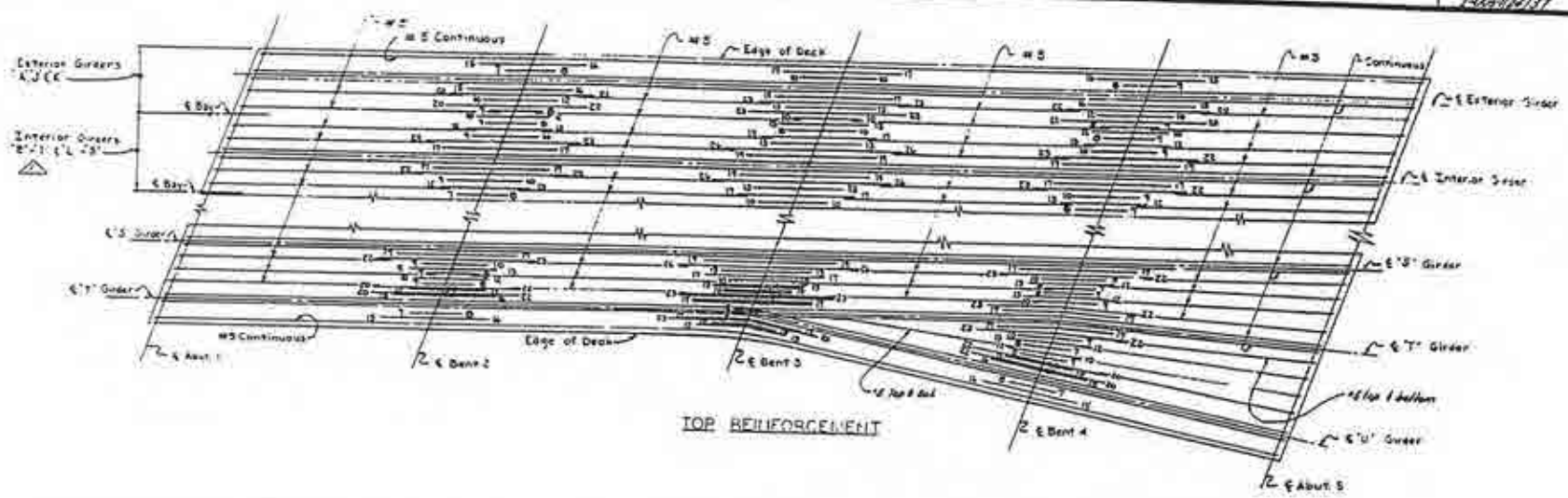
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SAN ELIJO LAGOON ℄ UNDERCROSSING

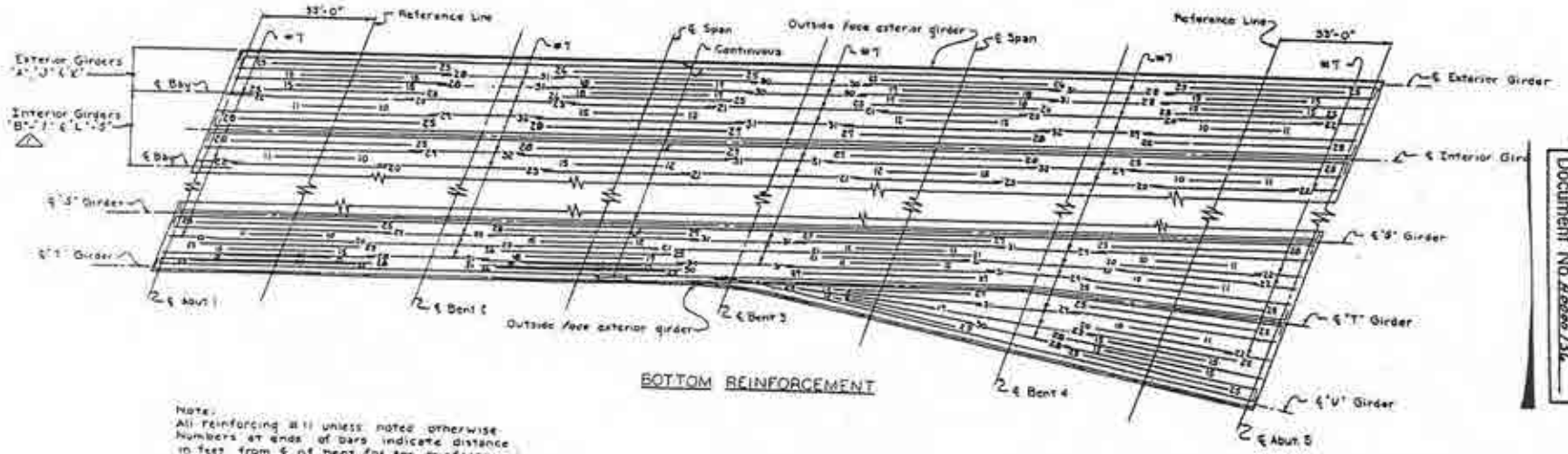
GIRDER LAYOUT NO. 1

Scale As Shown | Bridge 57-450R | F.A.S. | Sheet 604

PROJECT NO. F-0892




TOP REINFORCEMENT




BOTTOM REINFORCEMENT

Note:
All reinforcing #11 unless noted otherwise.
Numbers at ends of bars indicate distance in feet from ℄ of bent for top reinforcement and ℄ span or reference line for bottom reinforcement.
Not more than one third of the reinforcement may be spliced in any 3' length. All splices of bars in bundles shall be made with 35 diameter lap.
(#) indicates bundled bars

AS BUILT PLANS
Contract No. 42-0W336 2-Z
Date Completed
Document No. 20000134

··· DESIGN SECTION ··· 6

| NO. | DESCRIPTION | BY | APP'D |
|---|---|---|---|
| | REVISIONS | | |

SAN ELIJO LAGOON ℄ UNDERCROSSING

GIRDER REINFORCEMENT

| Hor. Scale | Vert. Scale | Bridge No. | File | Drawing No. |
|---|---|---|---|---|
| 1"=1'-0" | 1"=1'-0" | 57-456 | | 57-0692-11 |

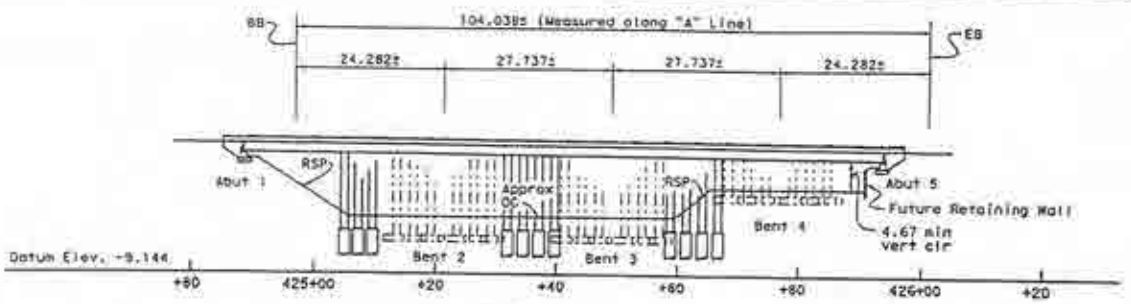
PREL. DRAWING No. 57-0692 11

10 of 10

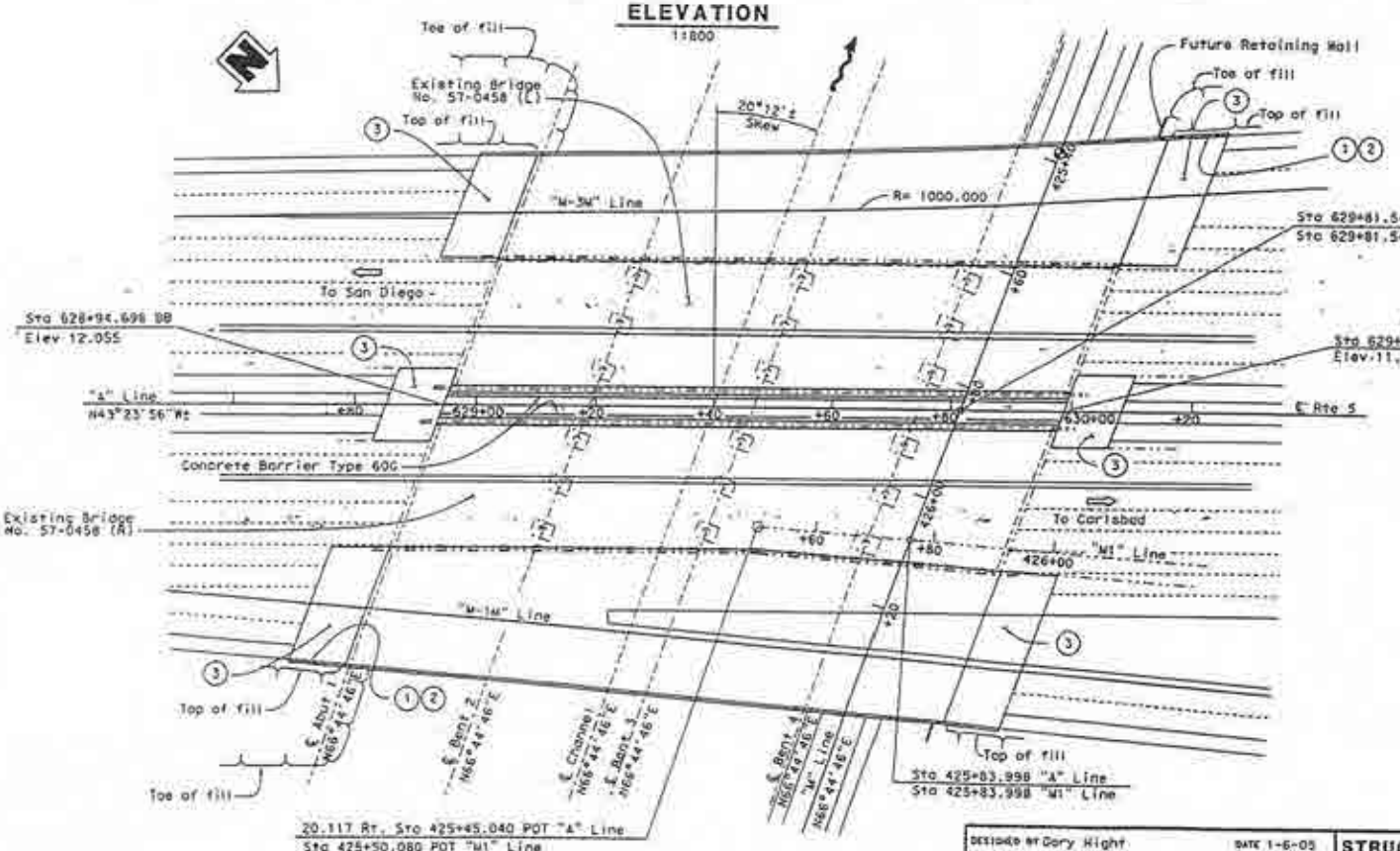
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST | COUNTY | ROUTE | KILOMETER POST / TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |

Caltrans Metric




ELEVATION
1:800




PLAN
1:800

Notes:

1. Point "Manchester Ave" & UC (Widen)
2. Point "Bridge No. & year completed
3. Structure Approach Slab Type N(9S)

LEGEND

- Denotes new construction
- Denotes existing structure
- Denotes point of min vertical clearance

| | |
|---|---|
| * DATE OF ESTIMATE | 12-28-05 - PSE |
| BRIDGE REMOVAL | = N/A |
| STRUCTURE DEPTH | = 1.40 m |
| LENGTH | = 104.308 m |
| WIDTH | = 19 to 27 m |
| AREA | = 5240 m² |
| COST/℄ INCLUDING 10% MOBILIZATION & 25% CONTINGENCY | = $ 2004 |
| TOTAL COST | = $ 10,500,000 |

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| | | |
|---|---|---|
| DESIGNED BY Cory Hight | DATE 1-6-05 | STRUCTURE DESIGN SECTION 18 |
| DRAWN BY D. Elliott | DATE 1-6-05 | |
| CHECKED BY | DATE | |
| APPROVED | DATE | |

PLANNING STUDY

MANCHESTER AVENUE UC (WIDEN)

BRIDGE NO. 57-0458 R/L | CU 11

SCALE: Shown as noted | EA 235800

FILE = manchester.dgn

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

Notes:

Ⓐ Concrete Barrier Type 60G

Ⓑ Match exist cross slope

Ⓒ Temporary Railing (Type K) - see "Road Plans"

Ⓓ Assume 1.219 m CIDH Pile at Bents

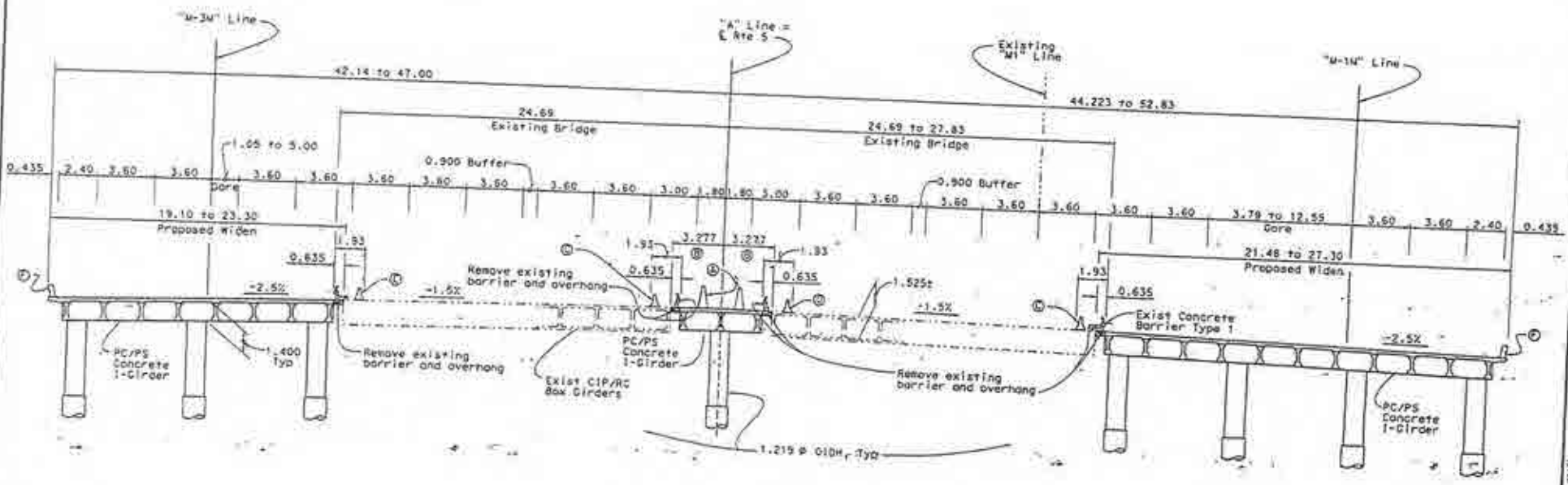
Ⓔ Assume concrete pile footing at Abutments

Ⓕ Concrete Barrier Type 732

Indicates remove existing over hang and concrete barrier

Caltrans Metric

| DIST | COUNTY | ROUTE | KILOMETER POST TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |




## TYPICAL SECTION

1:250

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| | |
|---|---|
| DESIGNED BY Gary Hight | DATE 1-6-05 |
| DRAWN BY D. Elliott | DATE 1-6-05 |
| CHECKED BY | DATE |
| APPROVED | DATE |

FILE =>manchester3.dgn

STRUCTURE DESIGN SECTION **18**

**PLANNING STUDY**

**MANCHESTER AVENUE UC (WIDEN)**

BRIDGE NO. 57-0458 R/L | DU 11

SCALE: Shown as noted | EA 235800

USERNAME =>elliott DATE PLOTTED => 06-JAN-2005 TIME PLOTTED => 08:52

**I-5 North Coast Widening Floodplain Studies**
Caltrans
DE Project 1683

# RECORD OF CONVERSATION

**DATE:** 09/21/07 **TIME:** 8:30 AM **DE FILE No.** 1683-300

**RECORDED BY:** Glen Parker

**SPOKE WITH:** Ray Martinez

**TELEPHONE No.** 703-317-6251

**NATURE OF CALL:** ☐ Incoming ☒ Outgoing ☐ Meeting

**DISTRIBUTION:** Ray Martinez (Michael Baker), Glen Parker (Dokken Engineering), Tim Brownson (Caltrans), Wen Cheng (Michael Baker), Mike Skowronek (Michael Baker)

**SUBJECT OF CONVERSATION: Acceptable FEMA floodplain modeling procedures**

ITEMS DISCUSSED:

**Available Backup Data to generate previously approved floodplain models:** Glen explained that a formal request has been submitted for backup floodplain information for lagoons and creeks along I-5 with Zone AE floodplains between San Diego and Oceanside. In some cases the HEC-2 data provided by Michael Baker Corporation was limited and did not have enough information to recreate previously generated floodplain models with reasonable accuracy. Glen said in these cases, Dokken Engineering would prefer to create HEC-RAS models which tie in with FEMA cross sections to use as a basis for existing conditions. Ray said Dokken Engineering must use their expertise to decide whether the existing FEMA data can be reused and to document efforts in a Technical Studies Data Notebook (TSDN). There have been past situations which required an existing model to be recreated and it is acceptable to FEMA as long as the appropriate documentation supports the procedure. Glen agreed to document the scenarios where existing models could not be used with accuracy.

**Coordination with FEMA and Caltrans:** Glen said that Caltrans is in the planning phase for the I-5 North Coast Widening, which will widen I-5 from San Diego to Oceanside. At this point in time, a preferred alternative has not been identified and therefore no coordination has occurred between Caltrans and FEMA to begin processing LOMRs. Glen said the final design of this project would likely occur in different phases several years in the future. It would be beneficial to coordinate with FEMA when needed during the process. Glen asked who the appropriate FEMA contacts may be to continue coordination when needed throughout the process. Ray said to coordinate with Wen Chen and Michael Skowronek, who work at the RMC for FEMA Region IX and can act as Outreach Coordinators on behalf of FEMA, when appropriate depending on the development of the project.

# SECTION 6

# Cottonwood Creek Culvert Analysis

# SECTION 6: COTTONWOOD CREEK CULVERT ANALYSIS

## 6.0 PROJECT PURPOSE AND VICINITY MAP:

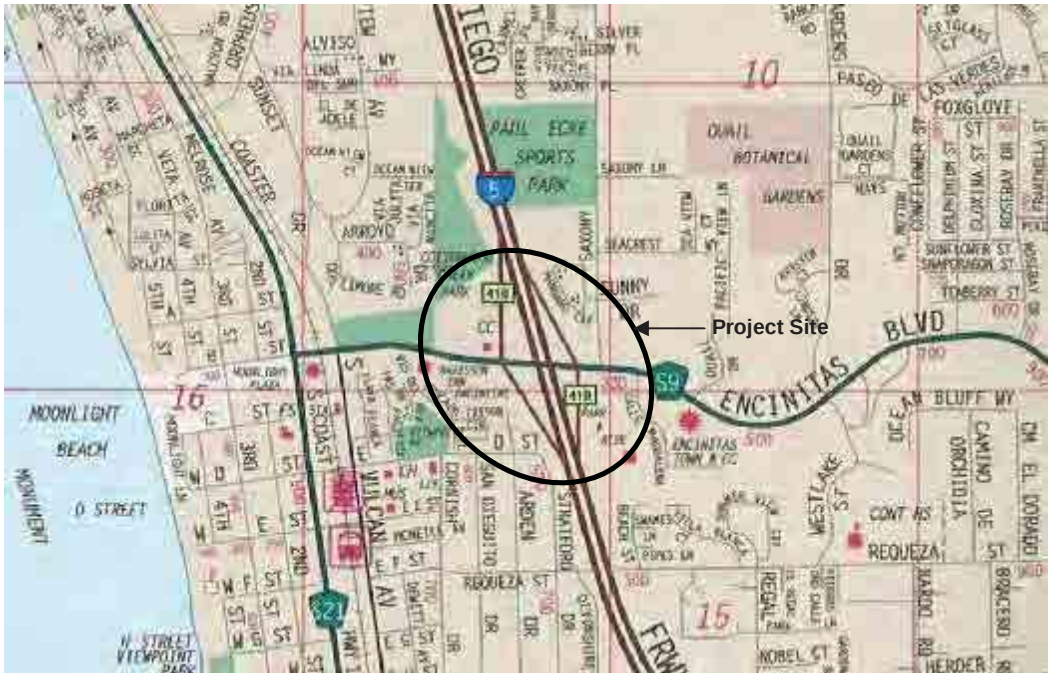



**Figure 1: Project Vicinity Map**

The Cottonwood Creek is located in the City of Encinitas, CA. The project site is located approximately 3,800 feet upstream of the creek mouth at the Pacific Ocean. (Thomas Guide page 1147: C-6 and C-7).

This study was prepared for the California Department of Transportation (Caltrans) to determine the extents of any localized flooding from the 100-year storm event to the Interstate-5 (I-5).

This study specifically addresses the following:

1) The existing extents of inundation upstream of the Cottonwood Creek/ I-5 crossing during the 100-year storm event.

2) Changes in the inundation limits resulting from the 10+4 buffer alternative for the I-5 corridor.

The Cottonwood Creek is not presently within a FEMA floodplain and has been highly channelized and undergrounded east of I-5 throughout the City of Encinitas. The proposed 10+4 buffer alternative for the I-5 corridor will have no effect on the inundation area caused from the existing backwater effects of the Cottonwood Creek Culvert flowing under the I-5.

## 6.1 DESCRIPTION OF WATERSHED:

The Cottonwood Creek watershed is located within the Carlsbad Watershed, Hydraulic Unit 904.10-904.63 (Figure 2), and covers an area of 2,175 acres. The creek drains the western slopes of the ridge running parallel to and west of El Camino Real and the Encinitas Creek drainage. Cottonwood Creek discharges into the Pacific Ocean via a storm drain at Moonlight State Beach. The elevation within the watershed ranges from 400 feet to sea level.

**Figure 2: Regional Basin Area**

The Cottonwood Creek is a perennial stream fed by urban runoff, excess irrigation water from residential/commercial landscape, and agricultural uses, with some contribution from groundwater resurfacing into the creek. The dominant land use within the watershed is urban development. Downstream of the project site, the Cottonwood Creek flows through natural streams and underground culverts, discharging through a storm drain onto Moonlight State Beach and into the Pacific Ocean. The waters are not identified as an impaired water body on the California Section 303(d) Water Quality Limited Waters List.

## 6.2 CULVERT MODELING METHODOLOGY:

The area of analysis ranges from approximately 200 feet upstream to 900 feet downstream of the I-5 crossing. In this region, the Cottonwood Creek would experience a peak flow of 1668.52 cfs during the 100-year storm event. The culvert crossing beneath I-5 changes shape twice before it outfalls into a natural channel section of the Cottonwood Creek (Figure 3). The cross culvert begins as a 10’ Pipe Arch Culvert (Figure 4) for 714 feet, then transitions to a 6’x 8’ Double Box Culvert (Figure 5) for 544 feet and finally transitions again to a 7’x 4’ Triple Box Culvert (Figure 6) for 116 feet before it ends downstream at a triple box headwall (Figure 7). A peak flow analysis determined the headwater elevation upstream of the cross culvert to be 91.8 feet. All elevations given in this report are based on the North American Vertical Datum of 1988 (NAVD 88).

**Figure 3: Cottonwood Creek Downstream of Culvert**

**Figure 4: Upstream Headwall to Pipe Arch Culvert**

**Figure 5: Double 6'x 8' Box Culvert**

**Figure 6: Triple 7'x 4' Box Culvert**

**Figure 7: Downstream Headwall of Triple Box Culvert**

### 6.2.1 CulvertMaster:

Bentley CulvertMaster v3.1 was used to analyze the culvert hydraulics and determine the headwater elevation upstream of the I-5. The culvert was analyzed as a 10' Pipe Arch Culvert 1,374 feet long, because the system was found to be under inlet control (Figure 8) and the change in the culvert shape would have little effect on the computed headwater elevation. Under inlet control, the culvert barrel is capable of passing more storm water than the culvert inlet can accept. During the 100-year storm the headwater elevation upstream of the culvert inlet will rise above the top of the culvert. The storm water passing into the culvert will occur as orifice flow, once the inlet is submerged. The flow will pass through the critical depth near the culvert entrance and transition to supercritical throughout the culvert. The existing cross culvert has an average slope of approximately 1.3% and one 45 degree bend between the transition from the double box culvert to the triple box culvert. The invert elevations were taken from metric digital topography (0.5 meter contours, NAVD 88), provided by Caltrans.

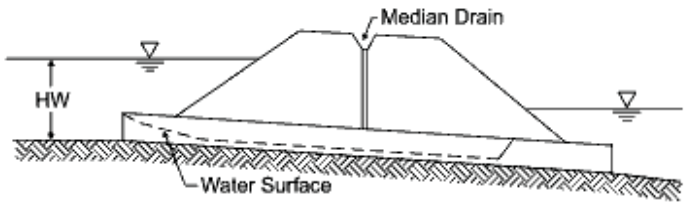



**Figure 8: Inlet Control Flow Condition**

### 6.2.2 StormCAD:

Bentley StormCAD v5.6 was used to analyze the culvert system crossing beneath I-5. The three sections of the culvert system were modeled to study the transitions between and the characteristics of each section as they affect each other. See Appendix B for the culvert system Summary Table.

Because the system is under inlet control and the downstream outlet is anticipated to be inundated, the system will experience pressure flow during the peak 100-year storm.

The culvert system will experience pressure flow in two locations during the peak 100-year storm.

1) The transition between the 10'Pipe Arch and Double 6'x 8' Box Culverts.
2) The transition between the Double 6'x 8' Box and Triple 7'x 4' Box Culverts and throughout the length of the Triple 7'x 4'Box Culvert.

The flow regime within all three culvert sections is supercritical with velocities ranging from approximately 20 to 29 ft/s. The greatest velocities would occur towards the middle of each culvert section.

### 6.2.3 Tailwater Elevation:

Trials for varying tailwater elevations were performed, ranging from a free outfall to a tailwater elevation of 65 feet. The large head on the system will overcome any backwater effects from the tailwater elevation. The tailwater elevation used in the analysis was based on the Triple 7'x 4' Box Culvert section flowing at capacity with a normal depth of 4 feet. The tailwater elevation was input as 56.5 feet.

### 6.2.4 Discharge:

Discharge information was obtained from the *Cottonwood Creek / Moonlight Beach: Final Hydrology Report, by Nolte Associates, Inc.* for the City of Encinitas, dated July 2003. For the purposes of the culvert analysis, 1,668.52 cfs was identified as the peak 100-year storm discharge at the upstream headwall to the 10' Pipe Arch Culvert. This location relates to node number 808 of the Hydrology Map (see Appendix C).

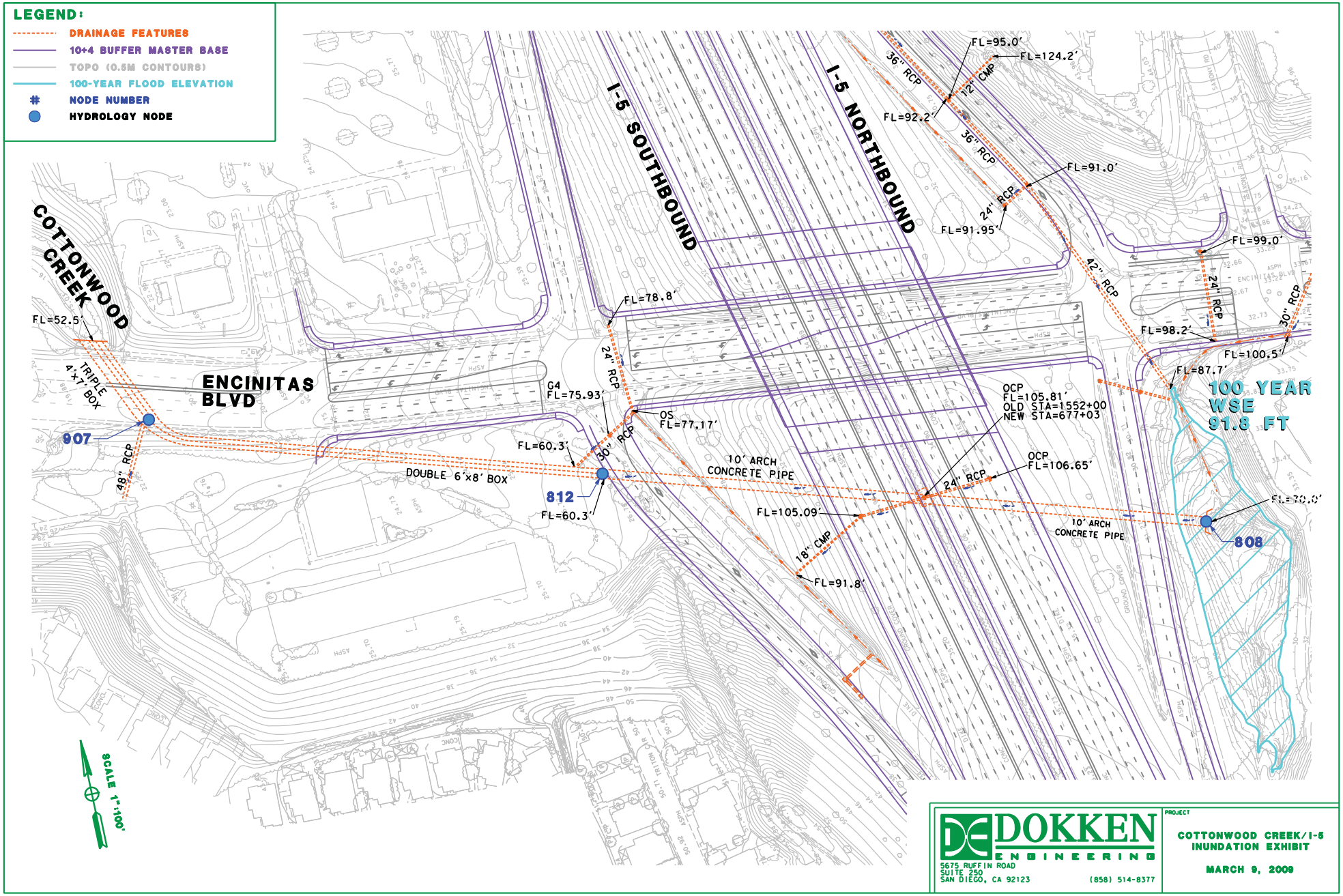
For the StormCAD analysis, two additional discharges were obtained from the hydrology report. Node number 812 relates to the transition from the section of 10' Pipe Arch Culvert to the section of Double 6'x 8' Box Culvert, with a 100-year storm discharge of 1,979.59 cfs. Node number 907 relates to the transition point from the section of Double 6'x 8' Box Culvert to the section of Triple 7'x 4' Box Culvert, with a 100-year storm discharge of 2,133.45 cfs.

## 6.3 SUMMARY AND CONCLUSION:

The anticipated flow in the cross culvert is received from urban runoff from the City of Encinitas and released into the Cottonwood Creek which flows directly to the Pacific Ocean. Since the cross culvert operates under inlet control the flow will backup at the upstream end of the culvert to a maximum elevation of 91.8 feet, during the peak of the 100-year storm event. This elevation will be contained within the natural depression located in the southeast quadrant of the Encinitas Blvd./ I-5 Interchange and no damage to adjacent properties is expected.

# APPENDIX 'A'

# Inundation Exhibit




DOKKEN ENGINEERING
5675 RUFFIN ROAD
SUITE 250
SAN DIEGO, CA 92123
(858) 514-8377

PROJECT

COTTONWOOD CREEK/I-5 INUNDATION EXHIBIT

MARCH 9, 2009

# APPENDIX 'B'

# CulvertMaster Report

# StormCAD Report

# Culvert Designer/Analyzer Report
# Cottonwood Creek Arch Culvert

| Analysis Component | | | |
|---|---|---|---|
| Storm Event | Design | Discharge | 1,668.52 cfs |

| Peak Discharge Method: User-Specified | | | |
|---|---|---|---|
| Design Discharge | 1,668.52 cfs | Check Discharge | 2,133.45 cfs |

| Tailwater Conditions: Constant Tailwater | |
|---|---|
| Tailwater Elevation | 56.50 ft |

| Name | Description | Discharge | HW Elev. | Velocity |
|---|---|---|---|---|
| Culvert-1 | 1-120 x 114 inch Arch | 1,668.52 cfs | 91.84 ft | 27.40 ft/s |
| Weir | Not Considered | N/A | N/A | N/A |

# Culvert Designer/Analyzer Report
# Cottonwood Creek Arch Culvert

Component:Culvert-1

| Culvert Summary | | | | | |
|---|---|---|---|---|---|
| Computed Headwater Eleva | 91.84 | ft | Discharge | 1,668.52 | cfs |
| Inlet Control HW Elev. | 91.84 | ft | Tailwater Elevation | 56.50 | ft |
| Outlet Control HW Elev. | 87.33 | ft | Control Type | Inlet Control | |
| Headwater Depth/Height | 2.30 | | | | |

| Grades | | | | | |
|---|---|---|---|---|---|
| Upstream Invert | 70.00 | ft | Downstream Invert | 52.50 | ft |
| Length | 1,374.00 | ft | Constructed Slope | 0.012737 | ft/ft |

| Hydraulic Profile | | | | | |
|---|---|---|---|---|---|
| Profile | S2 | | Depth, Downstream | 6.52 | ft |
| Slope Type | Steep | | Normal Depth | 6.48 | ft |
| Flow Regime | Supercritical | | Critical Depth | 8.71 | ft |
| Velocity Downstream | 27.40 | ft/s | Critical Slope | 0.007931 | ft/ft |

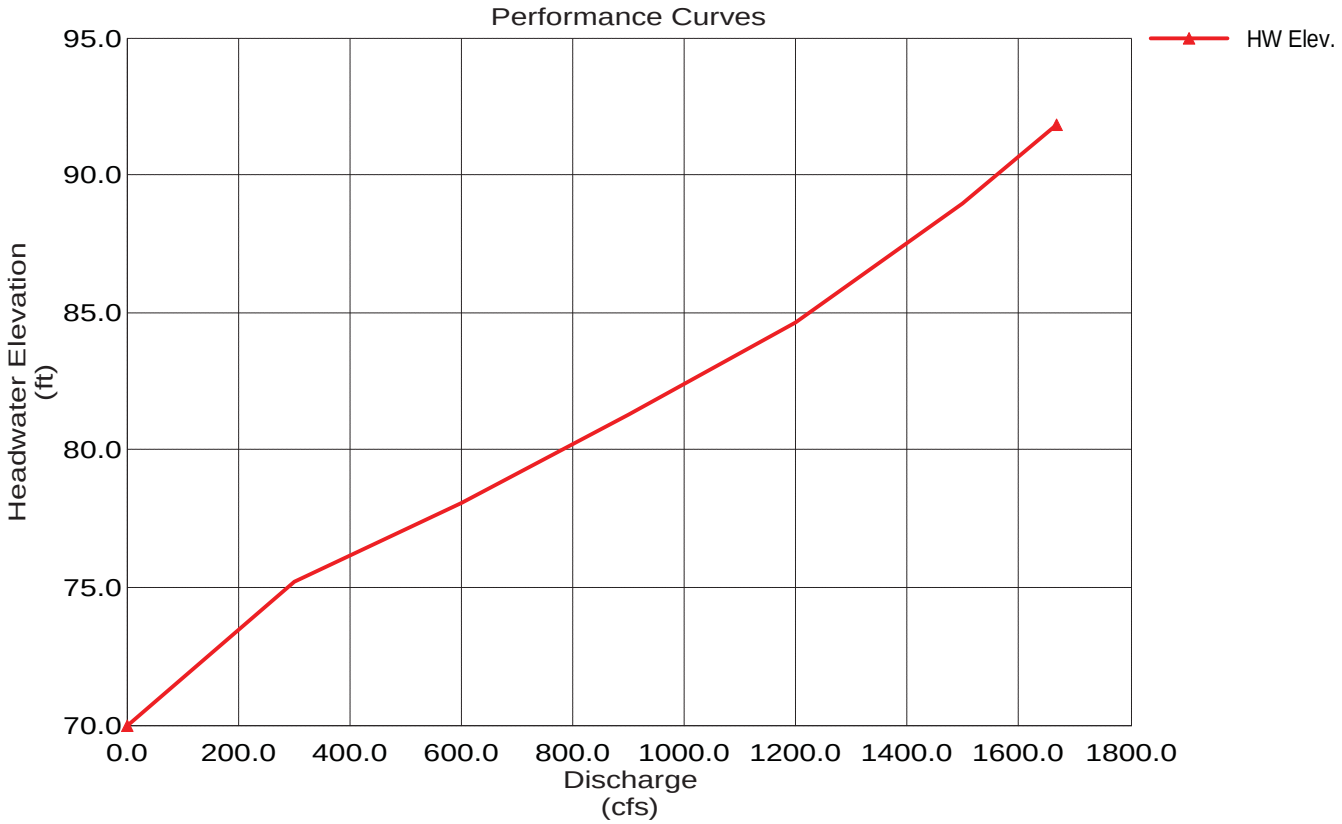
| Section | | | | | |
|---|---|---|---|---|---|
| Section Shape | Arch | | Mannings Coefficient | 0.013 | |
| Section Material | Concrete | | Span | 10.00 | ft |
| Section Size | 120 x 114 inch | | Rise | 9.50 | ft |
| Number Sections | 1 | | | | |

| Outlet Control Properties | | | | | |
|---|---|---|---|---|---|
| Outlet Control HW Elev. | 87.33 | ft | Upstream Velocity Head | 7.18 | ft |
| Ke | 0.20 | | Entrance Loss | 1.44 | ft |

| Inlet Control Properties | | | | | |
|---|---|---|---|---|---|
| Inlet Control HW Elev. | 91.84 | ft | Flow Control | Submerged | |
| Inlet Type | Cottonwood Culvert | | Area Full | 73.6 | ft2 |
| K | 0.00180 | | HDS 5 Chart | 1 | |
| M | 2.50000 | | HDS 5 Scale | 1 | |
| C | 0.02894 | | Equation Form | 1 | |
| Y | 0.74000 | | | | |

# Performance Curves Report
# Cottonwood Creek Arch Culvert

| Range Data: | | | | |
|---|---|---|---|---|
| | Minimum | Maximum | Increment | |
| Discharge | 0.00 | 1,668.52 | 300.00 | cfs |



# StormCAD Summary Table

| Section Description | Upstream Node | Downstream Node | Length (ft) | Number of Sections | Section Size | Total Flow (cfs) | Full Capacity (cfs) | Average Velocity (ft/s) | Velocity In (ft/s) | Velocity Out (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10' Pipe Arch | Node #808 | Node #812 | 714 | 1 | 10 x 9.5 ft | 1,668.52 | 2,061.49 | 28.66 | 21.39 | 14.21 | 70 | 60.3 |
| Double 6'x8' Box | Node #812 | Node #907 | 544 | 2 | 6 x 8 ft | 1,979.59 | 1,711.43 | 20.62 | 20.62 | 20.62 | 60.3 | 53.85 |
| Triple 7'x4' Box | Node #907 | Cottonwood Creek | 116 | 3 | 7 x 4 ft | 2,133.45 | 1,220.94 | 25.4 | 25.4 | 25.4 | 53.85 | 52.49 |

| Section Description | Upstream Node | Downstream Node | Constructed Slope (ft/ft) | Depth In (ft) | Depth Out (ft) | Avg End Depth / Rise (d/D) (%) | Hydraulic Grade Line In (ft) | Hydraulic Grade Line Out (ft) | Hydraulic Slope (ft/ft) | Energy Grade Line In (ft) | Energy Grade Line Out (ft) | Energy Slope (ft/ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10' Pipe Arch | Node #808 | Node #812 | 0.014 | 8.68 | 11.64 | 106.9 | 78.68 | 71.94 | 0.009 | 85.79 | 75.08 | 0.015 |
| Double 6'x8' Box | Node #812 | Node #907 | 0.012 | 11.64 | 9.46 | 131.8 | 71.94 | 63.31 | 0.016 | 78.54 | 69.92 | 0.016 |
| Triple 7'x4' Box | Node #907 | Cottonwood Creek | 0.012 | 6.8 | 4.01 | 135.2 | 60.65 | 56.5 | 0.036 | 70.68 | 66.52 | 0.036 |

# APPENDIX 'C'

## Backup Data

### Hydrology Computer Program Printout

### Hydrology Map

```
**************************************************************************

  INTEGRATED RATIONAL METHOD/UH METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2001,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2002 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2002  License ID 1504

                              Analysis prepared by:

                                  Nolte Associates, Inc.
                              15090 Avenue of Science, Ste. 101
                                   San Diego, CA 92128


--------------------------------------------------------------------------
  FILE NAME: N:\SD0948\HH\AES\REV100.DAT
  TIME/DATE OF STUDY: 11:10 06/27/2003
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  1985 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

  UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
    WATERSHED LAG = 0.80 * Tc
    S.C.S. S-GRAPH USED.
    SAN DIEGO COUNTY DEPTH-AREA FACTORS USED (See Page II-B-4.)
    TYPE B:  6-HOUR DESIGN STORM USED.
      UNADJUSTED  6-HOUR RAINFALL DEPTH (INCHES) =  2.50
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
```

```
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 INITIAL SUBAREA FLOW-LENGTH =   863.48
 UPSTREAM ELEVATION =    406.00
 DOWNSTREAM ELEVATION =    342.00
 ELEVATION DIFFERENCE =     64.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =    8.139
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 *CAUTION: SUBAREA FLOWLENGTH EXCEEDS COUNTY
    NOMOGRAPH DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.811
 SUBAREA RUNOFF(CFS) =     41.10
 TOTAL AREA(ACRES) =     10.68   TOTAL RUNOFF(CFS) =     41.10

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  342.00  DOWNSTREAM ELEVATION(FEET) =  289.00
 STREET LENGTH(FEET) =   883.13   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      85.43
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.95
   HALFSTREET FLOOD WIDTH(FEET) =   22.63
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   12.91
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   12.25
 STREET FLOW TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =   9.28
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.420
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  73
 AREA(ACRES) =     5.36
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 AREA(ACRES) =     9.39
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     2.68
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     9.39
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 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7476
 SUBAREA AREA(ACRES) =    26.82      SUBAREA RUNOFF(CFS) =    88.63
 TOTAL AREA(ACRES) =    37.50        PEAK FLOW RATE(CFS) =     129.73

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.07   HALFSTREET FLOOD WIDTH(FEET) =  28.05
 FLOW VELOCITY(FEET/SEC.) = 13.32   DEPTH*VELOCITY(FT*FT/SEC.) =  14.28
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  883.1 FT WITH ELEVATION-DROP =  53.0 FT, IS   67.1 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    102.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =  1746.61 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    206.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  289.00  DOWNSTREAM ELEVATION(FEET) =  228.00
 STREET LENGTH(FEET) =  1077.34   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     146.83
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  1.12
   HALFSTREET FLOOD WIDTH(FEET) =   30.19
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   13.16
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   14.75
 STREET FLOW TRAVEL TIME(MIN.) =   1.36   Tc(MIN.) =  10.64
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  73
 AREA(ACRES) =     8.53
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     6.82
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     1.71
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4950
 SUBAREA AREA(ACRES) =   17.06      SUBAREA RUNOFF(CFS) =   34.17
 TOTAL AREA(ACRES) =   54.56        PEAK FLOW RATE(CFS) =     163.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.16   HALFSTREET FLOOD WIDTH(FEET) =  31.82
 FLOW VELOCITY(FEET/SEC.) = 13.32   DEPTH*VELOCITY(FT*FT/SEC.) =  15.42
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
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      AND L = 1077.3 FT WITH ELEVATION-DROP =  61.0 FT, IS   27.3 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    206.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    206.00 =  2823.95 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     3.68
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     0.65
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5676
 INITIAL SUBAREA FLOW-LENGTH =   868.58
 UPSTREAM ELEVATION =    404.00
 DOWNSTREAM ELEVATION =    360.00
 ELEVATION DIFFERENCE =     44.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   16.447
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 *CAUTION: SUBAREA FLOWLENGTH EXCEEDS COUNTY
    NOMOGRAPH DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.056
 SUBAREA RUNOFF(CFS) =      7.51
 TOTAL AREA(ACRES) =      4.33   TOTAL RUNOFF(CFS) =      7.51

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  360.00  DOWNSTREAM ELEVATION(FEET) =  340.00
 STREET LENGTH(FEET) =   610.73   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.28
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.50
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 HALFSTREET FLOOD WIDTH(FEET) =    2.87
 AVERAGE FLOW VELOCITY(FEET/SEC.) =   10.88
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.42
STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =  17.38
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.949
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  86
SUBAREA AREA(ACRES) =   15.96      SUBAREA RUNOFF(CFS) =   23.53
TOTAL AREA(ACRES) =   20.29        PEAK FLOW RATE(CFS) =      31.04

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.61   HALFSTREET FLOOD WIDTH(FEET) =   7.52
FLOW VELOCITY(FEET/SEC.) = 10.77   DEPTH*VELOCITY(FT*FT/SEC.) =   6.52
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  610.7 FT WITH ELEVATION-DROP =  20.0 FT, IS   27.0 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    202.00
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =  1479.31 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   322.00
 FLOW LENGTH(FEET) =   648.78   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.11
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     31.04
 PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =  18.21
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =  2128.09 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.862
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA(ACRES) =     4.04
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     8.09
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     4.04
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.6125
 SUBAREA AREA(ACRES) =   16.17   SUBAREA RUNOFF(CFS) =   28.34
 TOTAL AREA(ACRES) =    36.46   TOTAL RUNOFF(CFS) =   59.38
 TC(MIN) =  18.21

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  52
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------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    284.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.24   CHANNEL SLOPE =  0.0590
 CHANNEL FLOW THRU SUBAREA(CFS) =     59.38
 FLOW VELOCITY(FEET/SEC) =   9.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =  19.29
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =  2772.33 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.757
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     2.09
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     0.28
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =    10.43
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     1.11
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7908
 SUBAREA AREA(ACRES) =   13.91   SUBAREA RUNOFF(CFS) =   30.33
 TOTAL AREA(ACRES) =    50.37   TOTAL RUNOFF(CFS) =   89.71
 TC(MIN) =  19.29

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  52
------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    284.00  DOWNSTREAM(FEET) =    270.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   996.53   CHANNEL SLOPE =  0.0140
 CHANNEL FLOW THRU SUBAREA(CFS) =     89.71
 FLOW VELOCITY(FEET/SEC) =   5.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =  22.34
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =  3768.86 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.508
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "A"
```

```
 S.C.S. CURVE NUMBER (AMC II) =  89
 AREA(ACRES) =     4.86
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     7.29
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 AREA(ACRES) =    21.86
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     9.72
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     4.86
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7575
 SUBAREA AREA(ACRES) =   48.59   SUBAREA RUNOFF(CFS) =   92.30
 TOTAL AREA(ACRES) =    98.96   TOTAL RUNOFF(CFS) =  182.01
 TC(MIN) =  22.34

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   270.00  DOWNSTREAM(FEET) =   228.00
 FLOW LENGTH(FEET) =  1273.32   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.76
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    182.01
 PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =  23.32
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =  5042.18 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.440
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  89
 AREA(ACRES) =     3.77
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     3.77
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 AREA(ACRES) =     3.77
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
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 AREA(ACRES) =     3.77
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     3.77
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7500
 SUBAREA AREA(ACRES) =   18.85   SUBAREA RUNOFF(CFS) =   34.49
 TOTAL AREA(ACRES) =   117.81   TOTAL RUNOFF(CFS) =  216.50
 TC(MIN) =  23.32

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       216.50     23.32        2.440       117.81
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =  5042.18 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       163.90     10.64        4.046        54.56
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    206.00 =  2823.95 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1       294.44      10.64        4.046
    2       315.33      23.32        2.440

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    315.33   Tc(MIN.) =   23.32
 TOTAL AREA(ACRES) =    172.37

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   228.00  DOWNSTREAM(FEET) =   214.00
 FLOW LENGTH(FEET) =   470.13   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.67
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    315.33
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =  23.65
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    304.00 =  5512.31 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
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****************************************************************************
 FLOW PROCESS FROM NODE     304.00 TO NODE     304.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     300.00 TO NODE     301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH =   211.18
 UPSTREAM ELEVATION =     390.00
 DOWNSTREAM ELEVATION =     374.00
 ELEVATION DIFFERENCE =      16.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =     7.991
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.868
 SUBAREA RUNOFF(CFS) =       1.92
 TOTAL AREA(ACRES) =       0.79   TOTAL RUNOFF(CFS) =       1.92

****************************************************************************
 FLOW PROCESS FROM NODE     301.00 TO NODE     302.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     374.00  DOWNSTREAM(FEET) =     334.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    199.45   CHANNEL SLOPE =  0.2006
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.92
 FLOW VELOCITY(FEET/SEC) =    5.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =    0.62   Tc(MIN.) =    8.61
 LONGEST FLOWPATH FROM NODE     300.00 TO NODE     302.00 =    410.63 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     302.00 TO NODE     302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.640
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =      1.46
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =      0.97
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4700
 SUBAREA AREA(ACRES) =     2.43   SUBAREA RUNOFF(CFS) =     5.30
 TOTAL AREA(ACRES) =      3.22   TOTAL RUNOFF(CFS) =     7.22
 TC(MIN) =    8.61

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     302.00 TO NODE     303.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     334.00  DOWNSTREAM(FEET) =     280.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   491.68   CHANNEL SLOPE =  0.1098
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       7.22
 FLOW VELOCITY(FEET/SEC) =   7.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   9.73
 LONGEST FLOWPATH FROM NODE     300.00 TO NODE     303.00 =   902.31 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     303.00 TO NODE     303.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.287
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  73
 AREA(ACRES) =     3.09
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     3.09
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     2.65
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4475
 SUBAREA AREA(ACRES) =     8.83   SUBAREA RUNOFF(CFS) =   16.94
 TOTAL AREA(ACRES) =    12.05   TOTAL RUNOFF(CFS) =   24.16
 TC(MIN) =   9.73

****************************************************************************
 FLOW PROCESS FROM NODE     303.00 TO NODE     304.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     280.00  DOWNSTREAM(FEET) =     214.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   989.60   CHANNEL SLOPE =  0.0667
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.16
 FLOW VELOCITY(FEET/SEC) =   8.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =  11.76
 LONGEST FLOWPATH FROM NODE     300.00 TO NODE     304.00 =  1891.91 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     304.00 TO NODE     304.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.795
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  75
 AREA(ACRES) =     7.35
```

```
MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  82
AREA(ACRES) =     7.35
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  86
AREA(ACRES) =     1.84
INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  92
AREA(ACRES) =     1.84
SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5251
SUBAREA AREA(ACRES) =   18.38   SUBAREA RUNOFF(CFS) =   36.62
TOTAL AREA(ACRES) =    30.43   TOTAL RUNOFF(CFS) =   60.78
TC(MIN) =  11.76

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         60.78     11.76        3.795        30.43
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =  1891.91 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        294.44     10.98        3.966       172.37
    2        315.33     23.65        2.418       172.37
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    304.00 =  5512.31 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1       352.60      10.98        3.966
    2       342.48      11.76        3.795
    3       354.05      23.65        2.418

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    354.05   Tc(MIN.) =   23.65
 TOTAL AREA(ACRES) =    202.80

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH =   355.73
 UPSTREAM ELEVATION =    366.00
 DOWNSTREAM ELEVATION =    350.00
 ELEVATION DIFFERENCE =     16.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   12.341
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.678
 SUBAREA RUNOFF(CFS) =     16.68
 TOTAL AREA(ACRES) =      9.07   TOTAL RUNOFF(CFS) =     16.68

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  350.00  DOWNSTREAM ELEVATION(FEET) =  326.00
 STREET LENGTH(FEET) =   654.34   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      33.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.61
   HALFSTREET FLOOD WIDTH(FEET) =    7.69
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   11.36
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    6.92
 STREET FLOW TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =  13.30
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.504
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     0.96
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =    18.24
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4975
 SUBAREA AREA(ACRES) =   19.20      SUBAREA RUNOFF(CFS) =   33.47
 TOTAL AREA(ACRES) =   28.27        PEAK FLOW RATE(CFS) =      50.15

 END OF SUBAREA STREET FLOW HYDRAULICS:
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```
 DEPTH(FEET) = 0.70   HALFSTREET FLOOD WIDTH(FEET) =  11.80
 FLOW VELOCITY(FEET/SEC.) = 10.53   DEPTH*VELOCITY(FT*FT/SEC.) =   7.40
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  654.3 FT WITH ELEVATION-DROP =  24.0 FT, IS   32.2 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    402.00
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =  1010.07 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    326.00  DOWNSTREAM(FEET) =    258.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   617.27   CHANNEL SLOPE =  0.1102
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =     50.15
 FLOW VELOCITY(FEET/SEC) =  12.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =  14.14
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =  1627.34 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    403.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.369
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     3.41
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     7.96
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5750
 SUBAREA AREA(ACRES) =   11.37   SUBAREA RUNOFF(CFS) =   22.02
 TOTAL AREA(ACRES) =    39.64   TOTAL RUNOFF(CFS) =   72.18
 TC(MIN) =  14.14

****************************************************************************
 FLOW PROCESS FROM NODE    403.00 TO NODE    304.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    258.00  DOWNSTREAM(FEET) =    214.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   747.42   CHANNEL SLOPE =  0.0589
 CHANNEL FLOW THRU SUBAREA(CFS) =     72.18
 FLOW VELOCITY(FEET/SEC) =  10.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.19   Tc(MIN.) =  15.33
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    304.00 =  2374.76 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.197
```

```
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  75
 AREA(ACRES) =     2.00
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA(ACRES) =     6.00
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    12.00
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5550
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   35.49
 TOTAL AREA(ACRES) =    59.64   TOTAL RUNOFF(CFS) =  107.67
 TC(MIN) =  15.33

****************************************************************************
 FLOW PROCESS FROM NODE     304.00 TO NODE     304.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        107.67     15.33        3.197        59.64
 LONGEST FLOWPATH FROM NODE     400.00 TO NODE     304.00 =  2374.76 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        352.60     10.98        3.966       202.80
    2        342.48     11.76        3.795       202.80
    3        354.05     23.65        2.418       202.80
 LONGEST FLOWPATH FROM NODE     200.00 TO NODE     304.00 =  5512.31 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1       439.39       10.98        3.966
    2       433.20       11.76        3.795
    3       396.24       15.33        3.197
    4       435.46       23.65        2.418

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    439.39   Tc(MIN.) =   10.98
 TOTAL AREA(ACRES) =    262.44

****************************************************************************
 FLOW PROCESS FROM NODE     304.00 TO NODE     304.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     304.00 TO NODE     407.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   214.00  DOWNSTREAM(FEET) =   193.00
 FLOW LENGTH(FEET) =   577.82   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.92
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    439.39
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  11.32
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    407.00 =  6090.13 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    407.00 TO NODE    407.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     0.85
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     1.98
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.6700
 INITIAL SUBAREA FLOW-LENGTH =   454.26
 UPSTREAM ELEVATION =    310.00
 DOWNSTREAM ELEVATION =    290.00
 ELEVATION DIFFERENCE =     20.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   10.066
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.194
 SUBAREA RUNOFF(CFS) =      7.95
 TOTAL AREA(ACRES) =      2.83   TOTAL RUNOFF(CFS) =      7.95

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  256.00
 STREET LENGTH(FEET) =   884.29   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
```

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 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.08
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =    2.69
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   11.16
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.07
 STREET FLOW TRAVEL TIME(MIN.) =   1.32   Tc(MIN.) =  11.39
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.874
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 SUBAREA AREA(ACRES) =    7.84      SUBAREA RUNOFF(CFS) =   18.22
 TOTAL AREA(ACRES) =   10.67       PEAK FLOW RATE(CFS) =      26.17

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =   4.98
 FLOW VELOCITY(FEET/SEC.) = 12.11   DEPTH*VELOCITY(FT*FT/SEC.) =   6.64
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  884.3 FT WITH ELEVATION-DROP =  34.0 FT, IS   15.2 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    406.00
 LONGEST FLOWPATH FROM NODE    404.00 TO NODE    406.00 =  1338.55 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    406.00 TO NODE    407.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    256.00  DOWNSTREAM(FEET) =    193.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   938.32   CHANNEL SLOPE =  0.0671
 CHANNEL FLOW THRU SUBAREA(CFS) =     26.17
 FLOW VELOCITY(FEET/SEC) =   8.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.87   Tc(MIN.) =  13.26
 LONGEST FLOWPATH FROM NODE    404.00 TO NODE    407.00 =  2276.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    407.00 TO NODE    407.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.512
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA(ACRES) =     1.73
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     9.08
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     1.44
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     2.16
```

```
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.6505
 SUBAREA AREA(ACRES) =    14.41   SUBAREA RUNOFF(CFS) =   32.91
 TOTAL AREA(ACRES) =     25.08   TOTAL RUNOFF(CFS) =   59.09
 TC(MIN) =  13.26

****************************************************************************
 FLOW PROCESS FROM NODE     407.00 TO NODE     407.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         59.09     13.26        3.512        25.08
 LONGEST FLOWPATH FROM NODE     404.00 TO NODE     407.00 =  2276.87 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        439.39     11.32        3.888       262.44
    2        433.20     12.10        3.725       262.44
    3        396.24     15.69        3.151       262.44
    4        435.46     24.00        2.395       262.44
 LONGEST FLOWPATH FROM NODE     200.00 TO NODE     407.00 =  6090.13 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1        492.76     11.32        3.888
    2        488.91     12.10        3.725
    3        467.52     13.26        3.512
    4        449.25     15.69        3.151
    5        475.76     24.00        2.395

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    492.76   Tc(MIN.) =   11.32
 TOTAL AREA(ACRES) =    287.52

****************************************************************************
 FLOW PROCESS FROM NODE     407.00 TO NODE     407.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     407.00 TO NODE     603.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   193.00  DOWNSTREAM(FEET) =   152.00
 FLOW LENGTH(FEET) =  1311.97   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.89
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    492.76
 PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =  12.13
 LONGEST FLOWPATH FROM NODE     200.00 TO NODE     603.00 =  7402.10 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    500.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 INITIAL SUBAREA FLOW-LENGTH =   430.00
 UPSTREAM ELEVATION =    342.00
 DOWNSTREAM ELEVATION =    326.00
 ELEVATION DIFFERENCE =     16.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =    3.613
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MINUTES
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
 SUBAREA RUNOFF(CFS) =     14.58
 TOTAL AREA(ACRES) =      2.62   TOTAL RUNOFF(CFS) =     14.58

****************************************************************************
 FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  326.00  DOWNSTREAM ELEVATION(FEET) =  320.00
 STREET LENGTH(FEET) =   899.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      44.68
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.88
   HALFSTREET FLOOD WIDTH(FEET) =   19.76
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.27
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.77
 STREET FLOW TRAVEL TIME(MIN.) =   3.51   Tc(MIN.) =   9.51
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.351
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 SUBAREA AREA(ACRES) =   14.55      SUBAREA RUNOFF(CFS) =   60.14
 TOTAL AREA(ACRES) =   17.17        PEAK FLOW RATE(CFS) =      74.72
```

```
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.03   HALFSTREET FLOOD WIDTH(FEET) =  26.07
 FLOW VELOCITY(FEET/SEC.) =  4.38   DEPTH*VELOCITY(FT*FT/SEC.) =   4.50
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  899.0 FT WITH ELEVATION-DROP =   6.0 FT, IS   37.1 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    502.00
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =  1329.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  320.00  DOWNSTREAM ELEVATION(FEET) =  218.00
 STREET LENGTH(FEET) =  4215.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      74.73
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.85
   HALFSTREET FLOOD WIDTH(FEET) =   18.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.17
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    6.93
 STREET FLOW TRAVEL TIME(MIN.) =   8.60   Tc(MIN.) =  18.11
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.871
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.03
 TOTAL AREA(ACRES) =   17.18        PEAK FLOW RATE(CFS) =     74.74

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.85   HALFSTREET FLOOD WIDTH(FEET) =  18.23
 FLOW VELOCITY(FEET/SEC.) =  8.17   DEPTH*VELOCITY(FT*FT/SEC.) =   6.93
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    503.00 =  5544.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    503.00 TO NODE    503.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.871
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 SUBAREA AREA(ACRES) =  299.00   SUBAREA RUNOFF(CFS) =  429.28
 TOTAL AREA(ACRES) =   316.18   TOTAL RUNOFF(CFS) =  504.03
 TC(MIN) =  18.11
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    503.00 TO NODE    704.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    218.00  DOWNSTREAM(FEET) =    217.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   141.00   CHANNEL SLOPE =  0.0035
 CHANNEL FLOW THRU SUBAREA(CFS) =    504.03
 FLOW VELOCITY(FEET/SEC) =   4.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =  18.62
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    704.00 =  5685.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    704.00 TO NODE    705.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    217.50  DOWNSTREAM(FEET) =    208.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   875.68   CHANNEL SLOPE =  0.0108
 CHANNEL FLOW THRU SUBAREA(CFS) =    504.03
 FLOW VELOCITY(FEET/SEC) =   8.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.78   Tc(MIN.) =  20.40
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    705.00 =  6560.68 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    705.00 TO NODE    705.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.659
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  73
 AREA(ACRES) =    11.12
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA(ACRES) =     1.59
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA(ACRES) =     3.18
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4100
 SUBAREA AREA(ACRES) =   15.89   SUBAREA RUNOFF(CFS) =   17.33
 TOTAL AREA(ACRES) =   332.07   TOTAL RUNOFF(CFS) =  521.35
 TC(MIN) =  20.40

****************************************************************************
 FLOW PROCESS FROM NODE    705.00 TO NODE    603.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    208.00  DOWNSTREAM(FEET) =    152.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1611.18   CHANNEL SLOPE =  0.0348
 CHANNEL FLOW THRU SUBAREA(CFS) =    521.35
```

```
 FLOW VELOCITY(FEET/SEC) =  14.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =  22.22
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    603.00 =  8171.86 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.517
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  70
 AREA(ACRES) =    17.33
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     4.95
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     2.48
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.3650
 SUBAREA AREA(ACRES) =   24.76   SUBAREA RUNOFF(CFS) =   22.75
 TOTAL AREA(ACRES) =   356.83   TOTAL RUNOFF(CFS) =  544.10
 TC(MIN) =  22.22

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1       544.10     22.22       2.517       356.83
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    603.00 =  8171.86 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1       492.76     12.13       3.718       287.52
    2       488.91     12.92       3.571       287.52
    3       467.52     14.08       3.379       287.52
    4       449.25     16.51       3.049       287.52
    5       475.76     24.81       2.344       287.52
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    603.00 =  7402.10 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
    1       861.13      12.13       3.718
    2       872.40      12.92       3.571
    3       872.88      14.08       3.379
    4       898.52      16.51       3.049
    5       987.14      22.22       2.517
    6       982.44      24.81       2.344
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    987.14   Tc(MIN.) =   22.22
 TOTAL AREA(ACRES) =    644.35

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  73
 AREA(ACRES) =     3.10
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     1.86
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     1.24
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4900
 INITIAL SUBAREA FLOW-LENGTH =   503.56
 UPSTREAM ELEVATION =    218.00
 DOWNSTREAM ELEVATION =    200.00
 ELEVATION DIFFERENCE =     18.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   16.115
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 *CAUTION: SUBAREA FLOWLENGTH EXCEEDS COUNTY
    NOMOGRAPH DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.096
 SUBAREA RUNOFF(CFS) =      9.41
 TOTAL AREA(ACRES) =      6.20   TOTAL RUNOFF(CFS) =      9.41

****************************************************************************
 FLOW PROCESS FROM NODE    601.00 TO NODE    602.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    200.00  DOWNSTREAM(FEET) =    188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   535.99   CHANNEL SLOPE =  0.0224
 CHANNEL FLOW THRU SUBAREA(CFS) =      9.41
 FLOW VELOCITY(FEET/SEC) =   3.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.43   Tc(MIN.) =  18.54
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    602.00 =  1039.55 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     602.00 TO NODE     602.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.829
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  73
 AREA(ACRES) =     2.93
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     6.84
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5400
 SUBAREA AREA(ACRES) =    9.77   SUBAREA RUNOFF(CFS) =   14.92
 TOTAL AREA(ACRES) =    15.97   TOTAL RUNOFF(CFS) =   24.33
 TC(MIN) =  18.54

****************************************************************************
 FLOW PROCESS FROM NODE     602.00 TO NODE     603.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    188.00  DOWNSTREAM(FEET) =    152.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1999.29   CHANNEL SLOPE =  0.0180
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.33
 FLOW VELOCITY(FEET/SEC) =   4.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.86   Tc(MIN.) =  26.40
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE     603.00 =  3038.84 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     603.00 TO NODE     603.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.252
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  70
 AREA(ACRES) =     4.71
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    18.83
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5400
 SUBAREA AREA(ACRES) =   23.54   SUBAREA RUNOFF(CFS) =   28.63
 TOTAL AREA(ACRES) =    39.51   TOTAL RUNOFF(CFS) =   52.96
 TC(MIN) =  26.40

****************************************************************************
 FLOW PROCESS FROM NODE     603.00 TO NODE     603.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
```

| STREAM NUMBER | RUNOFF (CFS) | Tc (MIN.) | INTENSITY (INCH/HOUR) | AREA (ACRE) |
|---|---|---|---|---|
| 1 | 52.96 | 26.40 | 2.252 | 39.51 |

LONGEST FLOWPATH FROM NODE 600.00 TO NODE 603.00 = 3038.84 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

| STREAM NUMBER | RUNOFF (CFS) | Tc (MIN.) | INTENSITY (INCH/HOUR) | AREA (ACRE) |
|---|---|---|---|---|
| 1 | 861.13 | 12.13 | 3.718 | 644.35 |
| 2 | 872.40 | 12.92 | 3.571 | 644.35 |
| 3 | 872.88 | 14.08 | 3.379 | 644.35 |
| 4 | 898.52 | 16.51 | 3.049 | 644.35 |
| 5 | 987.14 | 22.22 | 2.517 | 644.35 |
| 6 | 982.44 | 24.81 | 2.344 | 644.35 |

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 603.00 = 8171.86 FEET.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | RUNOFF (CFS) | Tc (MIN.) | INTENSITY (INCH/HOUR) |
|---|---|---|---|
| 1 | 893.20 | 12.13 | 3.718 |
| 2 | 905.79 | 12.92 | 3.571 |
| 3 | 908.18 | 14.08 | 3.379 |
| 4 | 937.64 | 16.51 | 3.049 |
| 5 | 1034.52 | 22.22 | 2.517 |
| 6 | 1033.32 | 24.81 | 2.344 |
| 7 | 996.88 | 26.40 | 2.252 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 1034.52 Tc(MIN.) = 22.22
TOTAL AREA(ACRES) = 683.86

**********
FLOW PROCESS FROM NODE 603.00 TO NODE 603.00 IS CODE = 12
---
>>>>>CLEAR MEMORY BANK # 1 <<<<<
==========

**********
FLOW PROCESS FROM NODE 603.00 TO NODE 603.00 IS CODE = 10
---
>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========

**********
FLOW PROCESS FROM NODE 604.00 TO NODE 605.00 IS CODE = 21
---
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
INITIAL SUBAREA FLOW-LENGTH = 403.68
UPSTREAM ELEVATION = 318.00
DOWNSTREAM ELEVATION = 308.00
ELEVATION DIFFERENCE = 10.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) = 14.701
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.285
SUBAREA RUNOFF(CFS) = 5.49
TOTAL AREA(ACRES) = 3.04 TOTAL RUNOFF(CFS) = 5.49

```
****************************************************************************
 FLOW PROCESS FROM NODE    605.00 TO NODE    603.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    308.00  DOWNSTREAM(FEET) =    152.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1392.20   CHANNEL SLOPE =  0.1121
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      5.49
 FLOW VELOCITY(FEET/SEC) =   6.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.40   Tc(MIN.) =  18.10
 LONGEST FLOWPATH FROM NODE    604.00 TO NODE    603.00 =  1795.88 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.873
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =     7.47
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA(ACRES) =     2.24
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     5.23
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5750
 SUBAREA AREA(ACRES) =   14.94   SUBAREA RUNOFF(CFS) =   24.68
 TOTAL AREA(ACRES) =    17.98   TOTAL RUNOFF(CFS) =   30.17
 TC(MIN) =  18.10

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        30.17     18.10        2.873        17.98
 LONGEST FLOWPATH FROM NODE    604.00 TO NODE    603.00 =  1795.88 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       893.20     12.13        3.718       683.86
    2       905.79     12.92        3.571       683.86
    3       908.18     14.08        3.379       683.86
    4       937.64     16.51        3.049       683.86
    5      1034.52     22.22        2.517       683.86
    6      1033.32     24.81        2.344       683.86
```

```
    7      996.88     26.40        2.252       683.86
 LONGEST FLOWPATH FROM NODE     500.00 TO NODE     603.00 =  8171.86 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1       916.52       12.13        3.718
     2       930.06       12.92        3.571
     3       933.83       14.08        3.379
     4       966.07       16.51        3.049
     5       936.70       18.10        2.873
     6      1060.96       22.22        2.517
     7      1057.94       24.81        2.344
     8      1020.53       26.40        2.252

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   1060.96   Tc(MIN.) =   22.22
 TOTAL AREA(ACRES) =    701.84

****************************************************************************
 FLOW PROCESS FROM NODE     603.00 TO NODE     603.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     603.00 TO NODE     603.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     700.00 TO NODE     701.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 INITIAL SUBAREA FLOW-LENGTH =   251.59
 UPSTREAM ELEVATION =    318.00
 DOWNSTREAM ELEVATION =    314.00
 ELEVATION DIFFERENCE =      4.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   15.901
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.123
 SUBAREA RUNOFF(CFS) =      2.46
 TOTAL AREA(ACRES) =      1.75   TOTAL RUNOFF(CFS) =      2.46

****************************************************************************
 FLOW PROCESS FROM NODE     701.00 TO NODE     702.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    314.00  DOWNSTREAM(FEET) =    214.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1153.04   CHANNEL SLOPE =  0.0867
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.46
 FLOW VELOCITY(FEET/SEC) =   5.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.63   Tc(MIN.) =  19.53
```

```
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =  1404.63 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.735
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =     3.48
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    13.93
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5100
 SUBAREA AREA(ACRES) =   17.41   SUBAREA RUNOFF(CFS) =   24.29
 TOTAL AREA(ACRES) =    19.16   TOTAL RUNOFF(CFS) =   26.75
 TC(MIN) =  19.53

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    214.00  DOWNSTREAM(FEET) =    172.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   550.24   CHANNEL SLOPE =  0.0763
 CHANNEL FLOW THRU SUBAREA(CFS) =     26.75
 FLOW VELOCITY(FEET/SEC) =   8.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =  20.55
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =  1954.87 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    703.00 TO NODE    703.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.647
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =     9.49
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     9.49
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.6500
 SUBAREA AREA(ACRES) =   18.98   SUBAREA RUNOFF(CFS) =   32.65
 TOTAL AREA(ACRES) =    38.14   TOTAL RUNOFF(CFS) =   59.40
 TC(MIN) =  20.55

****************************************************************************
 FLOW PROCESS FROM NODE    703.00 TO NODE    603.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   172.00  DOWNSTREAM(FEET) =   152.00
 FLOW LENGTH(FEET) =   611.64   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.22
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     59.40
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =  21.18
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    603.00 =  2566.51 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.596
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     0.95
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     2.85
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     0.95
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.8500
 SUBAREA AREA(ACRES) =    4.75   SUBAREA RUNOFF(CFS) =   10.48
 TOTAL AREA(ACRES) =    42.89   TOTAL RUNOFF(CFS) =   69.88
 TC(MIN) =  21.18

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         69.88     21.18        2.596        42.89
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    603.00 =  2566.51 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        916.52     12.13        3.718       701.84
    2        930.06     12.92        3.571       701.84
    3        933.83     14.08        3.379       701.84
    4        966.07     16.51        3.049       701.84
    5        936.70     18.10        2.873       701.84
    6       1060.96     22.22        2.517       701.84
    7       1057.94     24.81        2.344       701.84
    8       1020.53     26.40        2.252       701.84
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    603.00 =  8171.86 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
```

| NUMBER | (CFS) | (MIN.) | (INCH/HOUR) |
|---|---|---|---|
| 1 | 965.30 | 12.13 | 3.718 |
| 2 | 980.85 | 12.92 | 3.571 |
| 3 | 987.52 | 14.08 | 3.379 |
| 4 | 1025.58 | 16.51 | 3.049 |
| 5 | 999.85 | 18.10 | 2.873 |
| 6 | 1098.71 | 21.18 | 2.596 |
| 7 | 1128.73 | 22.22 | 2.517 |
| 8 | 1121.04 | 24.81 | 2.344 |
| 9 | 1081.16 | 26.40 | 2.252 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 1128.73 Tc(MIN.) = 22.22
TOTAL AREA(ACRES) = 744.73

**********
FLOW PROCESS FROM NODE 603.00 TO NODE 603.00 IS CODE = 12
----------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
==========

**********
FLOW PROCESS FROM NODE 603.00 TO NODE 706.00 IS CODE = 31
----------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 152.00 DOWNSTREAM(FEET) = 130.00
FLOW LENGTH(FEET) = 1366.96 MANNING'S N = 0.013
DEPTH OF FLOW IN 102.0 INCH PIPE IS 72.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.23
ESTIMATED PIPE DIAMETER(INCH) = 102.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1128.73
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 23.08
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 706.00 = 9538.82 FEET.

**********
FLOW PROCESS FROM NODE 706.00 TO NODE 706.00 IS CODE = 81
----------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.456
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7000
SOIL CLASSIFICATION IS "A"
S.C.S. CURVE NUMBER (AMC II) = 89
AREA(ACRES) = 7.25
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
AREA(ACRES) = 7.25
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 92
AREA(ACRES) = 7.25
INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 92
AREA(ACRES) = 7.25
SUBAREA AVERAGE RUNOFF COEFFICIENT = 0.7500

```
 SUBAREA AREA(ACRES) =   29.00   SUBAREA RUNOFF(CFS) =   53.41
 TOTAL AREA(ACRES) =   773.73   TOTAL RUNOFF(CFS) = 1182.14
 TC(MIN) =  23.08

****************************************************************************
 FLOW PROCESS FROM NODE    706.00 TO NODE    707.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   125.00
 FLOW LENGTH(FEET) =   277.72   MANNING'S N =  0.013
 DEPTH OF FLOW IN  96.0 INCH PIPE IS  77.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.05
 ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   1182.14
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  23.26
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    707.00 =  9816.54 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    707.00 TO NODE    707.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.444
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  89
 AREA(ACRES) =     6.15
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     6.15
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    18.44
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.6200
 SUBAREA AREA(ACRES) =   30.74   SUBAREA RUNOFF(CFS) =   46.58
 TOTAL AREA(ACRES) =   804.47   TOTAL RUNOFF(CFS) = 1228.72
 TC(MIN) =  23.26

****************************************************************************
 FLOW PROCESS FROM NODE    707.00 TO NODE    808.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   125.00  DOWNSTREAM(FEET) =    94.00
 FLOW LENGTH(FEET) =   617.87   MANNING'S N =  0.013
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  64.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  40.30
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   1228.72
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  23.51
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    808.00 = 10434.41 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    808.00 TO NODE    808.00 IS CODE =  10
```

```
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     800.00 TO NODE     801.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  90
 INITIAL SUBAREA FLOW-LENGTH =   504.47
 UPSTREAM ELEVATION =    298.00
 DOWNSTREAM ELEVATION =    253.00
 ELEVATION DIFFERENCE =     45.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =    7.798
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 *CAUTION: SUBAREA FLOWLENGTH EXCEEDS COUNTY
    NOMOGRAPH DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.945
 SUBAREA RUNOFF(CFS) =     22.19
 TOTAL AREA(ACRES) =      6.41   TOTAL RUNOFF(CFS) =     22.19

****************************************************************************
 FLOW PROCESS FROM NODE     801.00 TO NODE     802.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  253.00  DOWNSTREAM ELEVATION(FEET) =  222.00
 STREET LENGTH(FEET) =   947.75   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      78.24
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.82
   HALFSTREET FLOOD WIDTH(FEET) =   17.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.49
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.81
 STREET FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =   9.46
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.365
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 SUBAREA AREA(ACRES) =   30.20      SUBAREA RUNOFF(CFS) =  112.05
 TOTAL AREA(ACRES) =   36.61        PEAK FLOW RATE(CFS) =     134.24

 END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.97   HALFSTREET FLOOD WIDTH(FEET) =  23.42
 FLOW VELOCITY(FEET/SEC.) =  9.54   DEPTH*VELOCITY(FT*FT/SEC.) =   9.23
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  947.8 FT WITH ELEVATION-DROP =  31.0 FT, IS   80.8 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    802.00
 LONGEST FLOWPATH FROM NODE    800.00 TO NODE    802.00 =  1452.22 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  222.00  DOWNSTREAM ELEVATION(FEET) =  176.00
 STREET LENGTH(FEET) =  1799.95   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     181.67
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  1.34
   HALFSTREET FLOOD WIDTH(FEET) =   39.89
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.62
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   12.91
 STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =  12.58
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.633
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     5.28
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    15.85
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =    14.09
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7400
 SUBAREA AREA(ACRES) =   35.22      SUBAREA RUNOFF(CFS) =   94.67
 TOTAL AREA(ACRES) =   71.83        PEAK FLOW RATE(CFS) =    228.91

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.44   HALFSTREET FLOOD WIDTH(FEET) =  44.12
 FLOW VELOCITY(FEET/SEC.) =  9.99   DEPTH*VELOCITY(FT*FT/SEC.) =  14.36
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1799.9 FT WITH ELEVATION-DROP =  46.0 FT, IS   69.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    803.00
 LONGEST FLOWPATH FROM NODE    800.00 TO NODE    803.00 =  3252.17 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     803.00 TO NODE     804.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     176.00  DOWNSTREAM(FEET) =     146.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1447.71   CHANNEL SLOPE =  0.0207
 CHANNEL FLOW THRU SUBAREA(CFS) =     228.91
 FLOW VELOCITY(FEET/SEC) =   8.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.74   Tc(MIN.) =  15.32
 LONGEST FLOWPATH FROM NODE     800.00 TO NODE     804.00 =  4699.88 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     804.00 TO NODE     804.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.199
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =      3.81
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     68.59
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =      3.81
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5800
 SUBAREA AREA(ACRES) =    76.21   SUBAREA RUNOFF(CFS) =  141.40
 TOTAL AREA(ACRES) =    148.04   TOTAL RUNOFF(CFS) =  370.31
 TC(MIN) =  15.32

****************************************************************************
 FLOW PROCESS FROM NODE     804.00 TO NODE     805.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     146.00  DOWNSTREAM(FEET) =     145.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    84.19   CHANNEL SLOPE =  0.0119
 CHANNEL FLOW THRU SUBAREA(CFS) =     370.31
 FLOW VELOCITY(FEET/SEC) =   7.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.18   Tc(MIN.) =  15.50
 LONGEST FLOWPATH FROM NODE     800.00 TO NODE     805.00 =  4784.07 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     805.00 TO NODE     805.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.175
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =      0.55
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
```

```
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     16.45
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =      1.28
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5720
 SUBAREA AREA(ACRES) =   18.28   SUBAREA RUNOFF(CFS) =   33.20
 TOTAL AREA(ACRES) =   166.32   TOTAL RUNOFF(CFS) =  403.50
 TC(MIN) =  15.50

****************************************************************************
 FLOW PROCESS FROM NODE     805.00 TO NODE     806.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     145.00  DOWNSTREAM(FEET) =     132.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   681.49   CHANNEL SLOPE =  0.0191
 CHANNEL FLOW THRU SUBAREA(CFS) =     403.50
 FLOW VELOCITY(FEET/SEC) =  10.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =  16.63
 LONGEST FLOWPATH FROM NODE     800.00 TO NODE     806.00 =  5465.56 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     806.00 TO NODE     806.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.035
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA(ACRES) =      3.64
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     16.39
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     16.39
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7250
 SUBAREA AREA(ACRES) =   36.42   SUBAREA RUNOFF(CFS) =   80.13
 TOTAL AREA(ACRES) =   202.74   TOTAL RUNOFF(CFS) =  483.63
 TC(MIN) =  16.63

****************************************************************************
 FLOW PROCESS FROM NODE     806.00 TO NODE     807.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     132.00  DOWNSTREAM(FEET) =     118.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   732.89   CHANNEL SLOPE =  0.0191
 CHANNEL FLOW THRU SUBAREA(CFS) =     483.63
 FLOW VELOCITY(FEET/SEC) =  10.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =  17.77
```

```
 LONGEST FLOWPATH FROM NODE    800.00 TO NODE    807.00 =  6198.45 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    807.00 TO NODE    807.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.907
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =     8.02
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =    12.03
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5600
 SUBAREA AREA(ACRES) =   20.05   SUBAREA RUNOFF(CFS) =   32.64
 TOTAL AREA(ACRES) =   222.79   TOTAL RUNOFF(CFS) =  516.27
 TC(MIN) =  17.77

****************************************************************************
 FLOW PROCESS FROM NODE    807.00 TO NODE    808.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   118.00  DOWNSTREAM(FEET) =    94.00
 FLOW LENGTH(FEET) =   883.44   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  51.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.85
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    516.27
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  18.34
 LONGEST FLOWPATH FROM NODE    800.00 TO NODE    808.00 =  7081.89 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    808.00 TO NODE    808.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       516.27     18.34        2.849       222.79
 LONGEST FLOWPATH FROM NODE    800.00 TO NODE    808.00 =  7081.89 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1      1109.52     13.48        3.473       804.47
    2      1119.80     14.26        3.350       804.47
    3      1119.47     15.42        3.185       804.47
    4      1145.39     17.85        2.899       804.47
    5      1113.11     19.45        2.743       804.47
    6      1201.63     22.50        2.497       804.47
    7      1228.72     23.51        2.427       804.47
    8      1214.37     26.13        2.267       804.47
```

```
    9     1170.95    27.72        2.182      804.47
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    808.00 = 10434.41 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1      1532.96       13.48        3.473
    2      1558.85       14.26        3.350
    3      1581.23       15.42        3.185
    4      1652.79       17.85        2.899
    5      1641.96       18.34        2.849
    6      1610.14       19.45        2.743
    7      1654.08       22.50        2.497
    8      1668.52       23.51        2.427
    9      1625.22       26.13        2.267
   10      1566.45       27.72        2.182

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   1668.52   Tc(MIN.) =   23.51
 TOTAL AREA(ACRES) =   1027.26

****************************************************************************
 FLOW PROCESS FROM NODE    808.00 TO NODE    808.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    808.00 TO NODE    708.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    94.00  DOWNSTREAM(FEET) =    92.00
 FLOW LENGTH(FEET) =   199.86   MANNING'S N =  0.013
 DEPTH OF FLOW IN 126.0 INCH PIPE IS  94.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.03
 ESTIMATED PIPE DIAMETER(INCH) = 126.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   1668.52
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  23.65
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    708.00 = 10634.27 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    708.00 TO NODE    708.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.418
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 AREA(ACRES) =    10.24
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =    13.16
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
```

```
 AREA(ACRES) =     5.85
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7850
 SUBAREA AREA(ACRES) =   29.25   SUBAREA RUNOFF(CFS) =   55.51
 TOTAL AREA(ACRES) =  1056.51   TOTAL RUNOFF(CFS) = 1724.03
 TC(MIN) =  23.65

****************************************************************************
 FLOW PROCESS FROM NODE    708.00 TO NODE    812.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    92.00  DOWNSTREAM(FEET) =    86.00
 FLOW LENGTH(FEET) =   547.29   MANNING'S N =  0.013
 DEPTH OF FLOW IN 126.0 INCH PIPE IS  93.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.11
 ESTIMATED PIPE DIAMETER(INCH) = 126.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   1724.03
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  24.01
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    812.00 = 11181.56 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    812.00 TO NODE    812.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    809.00 TO NODE    810.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     5.96
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     5.96
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.8250
 INITIAL SUBAREA FLOW-LENGTH =   895.68
 UPSTREAM ELEVATION =    190.00
 DOWNSTREAM ELEVATION =    176.00
 ELEVATION DIFFERENCE =     14.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   12.765
 *CAUTION: SUBAREA FLOWLENGTH EXCEEDS COUNTY
    NOMOGRAPH DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.599
 SUBAREA RUNOFF(CFS) =     35.39
 TOTAL AREA(ACRES) =     11.92   TOTAL RUNOFF(CFS) =     35.39

****************************************************************************
 FLOW PROCESS FROM NODE    810.00 TO NODE    811.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  176.00  DOWNSTREAM ELEVATION(FEET) =  152.00
```

```
STREET LENGTH(FEET) =  1003.63   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.250
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      49.93
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.93
  HALFSTREET FLOOD WIDTH(FEET) =   21.67
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.14
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.54
STREET FLOW TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =  14.82
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.268
MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  82
SUBAREA AREA(ACRES) =   17.78      SUBAREA RUNOFF(CFS) =   29.05
TOTAL AREA(ACRES) =   29.70        PEAK FLOW RATE(CFS) =      64.44

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 1.00   HALFSTREET FLOOD WIDTH(FEET) =  24.89
FLOW VELOCITY(FEET/SEC.) =  8.22   DEPTH*VELOCITY(FT*FT/SEC.) =   8.23
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1003.6 FT WITH ELEVATION-DROP =  24.0 FT, IS   26.9 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    811.00
LONGEST FLOWPATH FROM NODE    809.00 TO NODE    811.00 =  1899.31 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    811.00 TO NODE    812.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  152.00  DOWNSTREAM ELEVATION(FEET) =   86.00
STREET LENGTH(FEET) =  3186.74   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.250
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      64.45
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.02
  HALFSTREET FLOOD WIDTH(FEET) =   25.79
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.71
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.87
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   6.89   Tc(MIN.) =  21.71
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.555
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  82
 SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.01
 TOTAL AREA(ACRES) =   29.71        PEAK FLOW RATE(CFS) =   64.45

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.02   HALFSTREET FLOOD WIDTH(FEET) =  25.79
 FLOW VELOCITY(FEET/SEC.) =  7.71   DEPTH*VELOCITY(FT*FT/SEC.) =   7.87
 LONGEST FLOWPATH FROM NODE    809.00 TO NODE    812.00 =  5086.05 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    812.00 TO NODE    812.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.555
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA(ACRES) =    20.28
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =    30.41
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7700
 SUBAREA AREA(ACRES) =   50.69   SUBAREA RUNOFF(CFS) =   99.72
 TOTAL AREA(ACRES) =    80.40   TOTAL RUNOFF(CFS) =  164.18
 TC(MIN) =  21.71

****************************************************************************
 FLOW PROCESS FROM NODE    812.00 TO NODE    812.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        164.18     21.71        2.555        80.40
 LONGEST FLOWPATH FROM NODE    809.00 TO NODE    812.00 =  5086.05 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       1612.17     14.00        3.390      1056.51
    2       1635.28     14.78        3.274      1056.51
    3       1653.93     15.94        3.118      1056.51
    4       1719.01     18.35        2.847      1056.51
    5       1707.06     18.84        2.800      1056.51
    6       1672.81     19.96        2.697      1056.51
    7       1711.18     23.00        2.461      1056.51
    8       1724.03     24.01        2.394      1056.51
    9       1677.10     26.64        2.239      1056.51
   10       1616.39     28.23        2.157      1056.51
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    812.00 = 11181.56 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1     1735.90       14.00         3.390
     2     1763.40       14.78         3.274
     3     1788.45       15.94         3.118
     4     1866.34       18.35         2.847
     5     1856.89       18.84         2.800
     6     1828.36       19.96         2.697
     7     1812.62       21.71         2.555
     8     1869.34       23.00         2.461
     9     1877.86       24.01         2.394
    10     1820.96       26.64         2.239
    11     1754.97       28.23         2.157

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   1877.86   Tc(MIN.) =   24.01
 TOTAL AREA(ACRES) =   1136.91

****************************************************************************
 FLOW PROCESS FROM NODE     812.00 TO NODE     812.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     812.00 TO NODE     812.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     709.00 TO NODE     710.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     2.09
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     2.09
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5250
 INITIAL SUBAREA FLOW-LENGTH =   418.28
 UPSTREAM ELEVATION =    253.00
 DOWNSTREAM ELEVATION =    220.00
 ELEVATION DIFFERENCE =     33.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   10.634
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.049
 SUBAREA RUNOFF(CFS) =      8.88
 TOTAL AREA(ACRES) =      4.18   TOTAL RUNOFF(CFS) =      8.88

****************************************************************************
 FLOW PROCESS FROM NODE     710.00 TO NODE     711.00 IS CODE =  61
----------------------------------------------------------------------------
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```
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  220.00  DOWNSTREAM ELEVATION(FEET) =  177.00
 STREET LENGTH(FEET) =   797.12   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.57
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.49
   HALFSTREET FLOOD WIDTH(FEET) =    2.82
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   13.81
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    6.72
 STREET FLOW TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =  11.60
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.829
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 AREA(ACRES) =     4.89
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     5.98
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7075
 SUBAREA AREA(ACRES) =   10.87      SUBAREA RUNOFF(CFS) =   29.44
 TOTAL AREA(ACRES) =   15.05        PEAK FLOW RATE(CFS) =      38.33

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =   7.12
 FLOW VELOCITY(FEET/SEC.) = 13.94   DEPTH*VELOCITY(FT*FT/SEC.) =   8.31
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  797.1 FT WITH ELEVATION-DROP =  43.0 FT, IS   25.9 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    711.00
 LONGEST FLOWPATH FROM NODE    709.00 TO NODE    711.00 =  1215.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    711.00 TO NODE    812.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  177.00  DOWNSTREAM ELEVATION(FEET) =   86.00
 STREET LENGTH(FEET) =  1973.67   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
```

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 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      85.11
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.80
   HALFSTREET FLOOD WIDTH(FEET) =   16.15
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   11.32
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    9.07
 STREET FLOW TRAVEL TIME(MIN.) =   2.91   Tc(MIN.) =  14.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.314
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     3.21
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 AREA(ACRES) =    12.82
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     3.21
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =    12.82
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.8800
 SUBAREA AREA(ACRES) =   32.06      SUBAREA RUNOFF(CFS) =   93.50
 TOTAL AREA(ACRES) =   47.11        PEAK FLOW RATE(CFS) =    131.83

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.91   HALFSTREET FLOOD WIDTH(FEET) =  21.11
 FLOW VELOCITY(FEET/SEC.) = 11.24   DEPTH*VELOCITY(FT*FT/SEC.) =  10.28
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1973.7 FT WITH ELEVATION-DROP =  91.0 FT, IS   79.1 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    812.00
 LONGEST FLOWPATH FROM NODE    709.00 TO NODE    812.00 =  3189.07 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    812.00 TO NODE    812.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       131.83    14.50        3.314        47.11
 LONGEST FLOWPATH FROM NODE    709.00 TO NODE    812.00 =  3189.07 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1      1735.90    14.00        3.390      1136.91
     2      1763.40    14.78        3.274      1136.91
     3      1788.45    15.94        3.118      1136.91
     4      1866.34    18.35        2.847      1136.91
```

```
     5      1856.89     18.84       2.800      1136.91
     6      1828.36     19.96       2.697      1136.91
     7      1812.62     21.71       2.555      1136.91
     8      1869.34     23.00       2.461      1136.91
     9      1877.86     24.01       2.394      1136.91
    10      1820.96     26.64       2.239      1136.91
    11      1754.97     28.23       2.157      1136.91
 LONGEST FLOWPATH FROM NODE     500.00 TO NODE     812.00 = 11181.56 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1      1864.76     14.00       3.390
     2      1873.92     14.50       3.314
     3      1893.63     14.78       3.274
     4      1912.49     15.94       3.118
     5      1979.59     18.35       2.847
     6      1968.25     18.84       2.800
     7      1935.63     19.96       2.697
     8      1914.25     21.71       2.555
     9      1967.24     23.00       2.461
    10      1973.09     24.01       2.394
    11      1910.02     26.64       2.239
    12      1840.75     28.23       2.157

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   1979.59   Tc(MIN.) =   18.35
 TOTAL AREA(ACRES) =   1184.02

****************************************************************************
 FLOW PROCESS FROM NODE     812.00 TO NODE     907.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     86.00  DOWNSTREAM(FEET) =     68.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   546.05   CHANNEL SLOPE =  0.0330
 CHANNEL FLOW THRU SUBAREA(CFS) =   1979.59
 FLOW VELOCITY(FEET/SEC) =  22.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =  18.76
 LONGEST FLOWPATH FROM NODE     500.00 TO NODE     907.00 = 11727.61 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     907.00 TO NODE     907.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.807
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     2.42
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     2.07
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
```

```
 AREA(ACRES) =     2.42
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.8500
 SUBAREA AREA(ACRES) =     6.91   SUBAREA RUNOFF(CFS) =   16.49
 TOTAL AREA(ACRES) =  1190.93   TOTAL RUNOFF(CFS) = 1996.08
 TC(MIN) =  18.76

****************************************************************************
 FLOW PROCESS FROM NODE     907.00 TO NODE     907.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     907.00 TO NODE     907.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     900.00 TO NODE     901.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 INITIAL SUBAREA FLOW-LENGTH =   339.27
 UPSTREAM ELEVATION =    184.00
 DOWNSTREAM ELEVATION =    160.00
 ELEVATION DIFFERENCE =     24.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   11.227
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.909
 SUBAREA RUNOFF(CFS) =      4.57
 TOTAL AREA(ACRES) =      2.60   TOTAL RUNOFF(CFS) =      4.57

****************************************************************************
 FLOW PROCESS FROM NODE     901.00 TO NODE     902.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    160.00  DOWNSTREAM(FEET) =    150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   752.09   CHANNEL SLOPE =  0.0133
 CHANNEL FLOW THRU SUBAREA(CFS) =      4.57
 FLOW VELOCITY(FEET/SEC) =   2.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.26   Tc(MIN.) =  16.49
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    902.00 =  1091.36 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     902.00 TO NODE     902.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.051
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
```

```
 SUBAREA AREA(ACRES) =   13.32   SUBAREA RUNOFF(CFS) =   18.29
 TOTAL AREA(ACRES) =    15.92   TOTAL RUNOFF(CFS) =   22.86
 TC(MIN) =  16.49

****************************************************************************
 FLOW PROCESS FROM NODE    902.00 TO NODE    903.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   150.00  DOWNSTREAM(FEET) =   140.00
 FLOW LENGTH(FEET) =   789.23   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.97
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     22.86
 PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =  17.96
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    903.00 =  1880.59 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    903.00 TO NODE    903.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.888
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 SUBAREA AREA(ACRES) =   21.02   SUBAREA RUNOFF(CFS) =   27.32
 TOTAL AREA(ACRES) =    36.94   TOTAL RUNOFF(CFS) =   50.18
 TC(MIN) =  17.96

****************************************************************************
 FLOW PROCESS FROM NODE    903.00 TO NODE    904.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   140.00  DOWNSTREAM(FEET) =   139.00
 FLOW LENGTH(FEET) =  1231.95   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.89
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     50.18
 PIPE TRAVEL TIME(MIN.) =   5.27    Tc(MIN.) =  23.23
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    904.00 =  3112.54 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    904.00 TO NODE    904.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.446
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 SUBAREA AREA(ACRES) =   24.59   SUBAREA RUNOFF(CFS) =   27.07
 TOTAL AREA(ACRES) =    61.53   TOTAL RUNOFF(CFS) =   77.24
 TC(MIN) =  23.23
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    904.00 TO NODE    905.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   139.00  DOWNSTREAM(FEET) =   138.00
 FLOW LENGTH(FEET) =   957.04   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.75
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     77.24
 PIPE TRAVEL TIME(MIN.) =   3.36    Tc(MIN.) =  26.58
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    905.00 =  4069.58 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    905.00 TO NODE    905.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.242
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =    22.72
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     2.52
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4999
 SUBAREA AREA(ACRES) =   25.24   SUBAREA RUNOFF(CFS) =   28.29
 TOTAL AREA(ACRES) =    86.77   TOTAL RUNOFF(CFS) =  105.53
 TC(MIN) =  26.58

****************************************************************************
 FLOW PROCESS FROM NODE    905.00 TO NODE    906.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   138.00  DOWNSTREAM(FEET) =   107.00
 FLOW LENGTH(FEET) =  1028.08   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.15
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    105.53
 PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =  27.53
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    906.00 =  5097.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    906.00 TO NODE    906.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.192
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
```

```
 AREA(ACRES) =    22.64
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     2.52
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5001
 SUBAREA AREA(ACRES) =   25.16   SUBAREA RUNOFF(CFS) =   27.58
 TOTAL AREA(ACRES) =   111.93   TOTAL RUNOFF(CFS) =  133.11
 TC(MIN) =  27.53

****************************************************************************
 FLOW PROCESS FROM NODE    906.00 TO NODE    907.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   107.00  DOWNSTREAM(FEET) =    68.00
 FLOW LENGTH(FEET) =  1031.92   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.17
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    133.11
 PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =  28.34
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    907.00 =  6129.58 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    907.00 TO NODE    907.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.151
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =     7.68
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     7.68
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.8500
 SUBAREA AREA(ACRES) =   15.36   SUBAREA RUNOFF(CFS) =   28.09
 TOTAL AREA(ACRES) =   127.29   TOTAL RUNOFF(CFS) =  161.20
 TC(MIN) =  28.34

****************************************************************************
 FLOW PROCESS FROM NODE    907.00 TO NODE    907.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       161.20     28.34        2.151       127.29
 LONGEST FLOWPATH FROM NODE    900.00 TO NODE    907.00 =  6129.58 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
```

| | | | | |
|---|---|---|---|---|
| 1 | 1884.30 | 14.42 | 3.327 | 1190.93 |
| 2 | 1893.04 | 14.92 | 3.254 | 1190.93 |
| 3 | 1912.52 | 15.19 | 3.216 | 1190.93 |
| 4 | 1930.51 | 16.35 | 3.067 | 1190.93 |
| 5 | 1996.08 | 18.76 | 2.807 | 1190.93 |
| 6 | 1984.47 | 19.25 | 2.761 | 1190.93 |
| 7 | 1951.26 | 20.38 | 2.662 | 1190.93 |
| 8 | 1929.08 | 22.12 | 2.524 | 1190.93 |
| 9 | 1981.54 | 23.41 | 2.434 | 1190.93 |
| 10 | 1987.00 | 24.42 | 2.368 | 1190.93 |
| 11 | 1923.04 | 27.05 | 2.217 | 1190.93 |
| 12 | 1853.30 | 28.65 | 2.136 | 1190.93 |

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 907.00 = 11727.61 FEET.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | RUNOFF (CFS) | Tc (MIN.) | INTENSITY (INCH/HOUR) |
|---|---|---|---|
| 1 | 1988.54 | 14.42 | 3.327 |
| 2 | 1999.61 | 14.92 | 3.254 |
| 3 | 2020.35 | 15.19 | 3.216 |
| 4 | 2043.57 | 16.35 | 3.067 |
| 5 | 2119.62 | 18.76 | 2.807 |
| 6 | 2110.08 | 19.25 | 2.761 |
| 7 | 2081.56 | 20.38 | 2.662 |
| 8 | 2066.47 | 22.12 | 2.524 |
| 9 | 2124.05 | 23.41 | 2.434 |
| 10 | 2133.45 | 24.42 | 2.368 |
| 11 | 2079.48 | 27.05 | 2.217 |
| 12 | 2027.47 | 28.34 | 2.151 |
| 13 | 2013.37 | 28.65 | 2.136 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 2133.45 Tc(MIN.) = 24.42
TOTAL AREA(ACRES) = 1318.22

**********
FLOW PROCESS FROM NODE 907.00 TO NODE 1011.00 IS CODE = 31
----------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 68.00 DOWNSTREAM(FEET) = 37.00
FLOW LENGTH(FEET) = 322.75 MANNING'S N = 0.013
DEPTH OF FLOW IN 90.0 INCH PIPE IS 68.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 59.57
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2133.45
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 24.51
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 1011.00 = 12050.36 FEET.

**********
FLOW PROCESS FROM NODE 1011.00 TO NODE 1011.00 IS CODE = 12
----------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
==========

**********
FLOW PROCESS FROM NODE 1011.00 TO NODE 1011.00 IS CODE = 10
----------

```
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
 FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  21
--------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 INITIAL SUBAREA FLOW-LENGTH =   412.96
 UPSTREAM ELEVATION =    299.00
 DOWNSTREAM ELEVATION =    284.00
 ELEVATION DIFFERENCE =     15.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   13.088
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.541
 SUBAREA RUNOFF(CFS) =      3.90
 TOTAL AREA(ACRES) =      2.00   TOTAL RUNOFF(CFS) =      3.90

********************************************************************************
 FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  61
--------------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  284.00  DOWNSTREAM ELEVATION(FEET) =  252.00
 STREET LENGTH(FEET) =   496.24   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.34
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =    2.58
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   13.93
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.95
 STREET FLOW TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =  13.68
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.441
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 SUBAREA AREA(ACRES) =   16.32      SUBAREA RUNOFF(CFS) =   30.89
 TOTAL AREA(ACRES) =   18.32        PEAK FLOW RATE(CFS) =      34.78

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =   5.26
 FLOW VELOCITY(FEET/SEC.) = 15.62   DEPTH*VELOCITY(FT*FT/SEC.) =   8.66
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
```

```
      AND L =  496.2 FT WITH ELEVATION-DROP =  32.0 FT, IS   32.5 CFS,
      WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1002.00
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1002.00 =   909.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   252.00  DOWNSTREAM(FEET) =   192.00
 FLOW LENGTH(FEET) =  1414.03   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     34.78
 PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =  15.16
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1003.00 =  2323.23 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1003.00 TO NODE   1003.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.221
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    13.41
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =    13.41
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7500
 SUBAREA AREA(ACRES) =   26.82   SUBAREA RUNOFF(CFS) =   64.78
 TOTAL AREA(ACRES) =    45.14   TOTAL RUNOFF(CFS) =   99.57
 TC(MIN) =  15.16

****************************************************************************
 FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   192.00  DOWNSTREAM(FEET) =   174.00
 FLOW LENGTH(FEET) =   865.83   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.72
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     99.57
 PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =  16.08
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1004.00 =  3189.06 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1004.00 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.101
```

```
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     7.36
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA(ACRES) =     3.68
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    42.95
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     7.36
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5770
 SUBAREA AREA(ACRES) =   61.35   SUBAREA RUNOFF(CFS) =  109.76
 TOTAL AREA(ACRES) =   106.49   TOTAL RUNOFF(CFS) =  209.33
 TC(MIN) =  16.08

****************************************************************************
 FLOW PROCESS FROM NODE   1004.00 TO NODE   1005.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   174.00  DOWNSTREAM(FEET) =   150.00
 FLOW LENGTH(FEET) =  1455.10   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.98
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   209.33
 PIPE TRAVEL TIME(MIN.) =   1.43    Tc(MIN.) =  17.51
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00 =  4644.16 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.935
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  70
 AREA(ACRES) =     2.93
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     5.86
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA(ACRES) =     2.93
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    43.94
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
```

```
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     2.93
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5400
 SUBAREA AREA(ACRES) =   58.59   SUBAREA RUNOFF(CFS) =   92.87
 TOTAL AREA(ACRES) =   165.08   TOTAL RUNOFF(CFS) =  302.20
 TC(MIN) =  17.51

****************************************************************************
 FLOW PROCESS FROM NODE   1005.00 TO NODE   1006.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   150.00  DOWNSTREAM(FEET) =   140.00
 FLOW LENGTH(FEET) =   212.37   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.56
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    302.20
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  17.64
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1006.00 =  4856.53 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1006.00 TO NODE   1006.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.921
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =     4.34
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =    10.12
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4900
 SUBAREA AREA(ACRES) =   14.46   SUBAREA RUNOFF(CFS) =   20.70
 TOTAL AREA(ACRES) =   179.54   TOTAL RUNOFF(CFS) =  322.90
 TC(MIN) =  17.64

****************************************************************************
 FLOW PROCESS FROM NODE   1006.00 TO NODE   1007.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   140.00  DOWNSTREAM(FEET) =   130.00
 FLOW LENGTH(FEET) =   840.51   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.02
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    322.90
 PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =  18.46
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1007.00 =  5697.04 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1007.00 TO NODE   1007.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.837
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     9.75
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     9.75
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7000
 SUBAREA AREA(ACRES) =   19.50   SUBAREA RUNOFF(CFS) =   38.72
 TOTAL AREA(ACRES) =   199.04   TOTAL RUNOFF(CFS) =  361.62
 TC(MIN) =  18.46

****************************************************************************
 FLOW PROCESS FROM NODE   1007.00 TO NODE   1008.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    130.00  DOWNSTREAM(FEET) =    103.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1053.05   CHANNEL SLOPE =  0.0256
 CHANNEL FLOW THRU SUBAREA(CFS) =    361.62
 FLOW VELOCITY(FEET/SEC) =  11.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.55   Tc(MIN.) =  20.01
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1008.00 =  6750.09 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1008.00 TO NODE   1008.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.693
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =     8.34
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA(ACRES) =     6.25
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     6.25
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5599
 SUBAREA AREA(ACRES) =   20.84   SUBAREA RUNOFF(CFS) =   31.42
 TOTAL AREA(ACRES) =   219.88   TOTAL RUNOFF(CFS) =  393.04
 TC(MIN) =  20.01

****************************************************************************
 FLOW PROCESS FROM NODE   1008.00 TO NODE   1008.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.693
```

```
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     26.93
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA(ACRES) =     11.54
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA(ACRES) =     26.93
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     11.54
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5475
 SUBAREA AREA(ACRES) =   76.94   SUBAREA RUNOFF(CFS) =  113.43
 TOTAL AREA(ACRES) =   296.82   TOTAL RUNOFF(CFS) =  506.47
 TC(MIN) =  20.01

****************************************************************************
 FLOW PROCESS FROM NODE   1008.00 TO NODE   1009.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    103.00  DOWNSTREAM(FEET) =     92.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1598.60   CHANNEL SLOPE =  0.0069
 CHANNEL FLOW THRU SUBAREA(CFS) =    506.47
 FLOW VELOCITY(FEET/SEC) =   6.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.08   Tc(MIN.) =  24.10
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1009.00 =  8348.69 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1009.00 TO NODE   1009.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.389
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA(ACRES) =     28.32
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  91
 AREA(ACRES) =     12.14
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA(ACRES) =     28.32
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     12.14
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5425
 SUBAREA AREA(ACRES) =   80.92   SUBAREA RUNOFF(CFS) =  104.87
 TOTAL AREA(ACRES) =   377.74   TOTAL RUNOFF(CFS) =  611.34
```

```
 TC(MIN) =  24.10

****************************************************************************
 FLOW PROCESS FROM NODE    1009.00 TO NODE    1010.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     92.00  DOWNSTREAM(FEET) =     66.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   246.16   CHANNEL SLOPE =  0.1056
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =    611.34
 FLOW VELOCITY(FEET/SEC) =  26.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =  24.25
 LONGEST FLOWPATH FROM NODE    1000.00 TO NODE    1010.00 =  8594.85 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1010.00 TO NODE    1010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.379
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =    17.52
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     1.95
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4550
 SUBAREA AREA(ACRES) =   19.47   SUBAREA RUNOFF(CFS) =   21.07
 TOTAL AREA(ACRES) =   397.21   TOTAL RUNOFF(CFS) =  632.41
 TC(MIN) =  24.25

****************************************************************************
 FLOW PROCESS FROM NODE    1010.00 TO NODE    1011.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     66.00  DOWNSTREAM(FEET) =     37.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   504.35   CHANNEL SLOPE =  0.0575
 CHANNEL FLOW THRU SUBAREA(CFS) =    632.41
 FLOW VELOCITY(FEET/SEC) =  20.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.42   Tc(MIN.) =  24.67
 LONGEST FLOWPATH FROM NODE    1000.00 TO NODE    1011.00 =  9099.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1011.00 TO NODE    1011.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        632.41     24.67        2.353       397.21
 LONGEST FLOWPATH FROM NODE    1000.00 TO NODE    1011.00 =  9099.20 FEET.
```

```
 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       1988.54    14.51        3.313      1318.22
     2       1999.61    15.01        3.241      1318.22
     3       2020.35    15.29        3.204      1318.22
     4       2043.57    16.44        3.056      1318.22
     5       2119.62    18.85        2.798      1318.22
     6       2110.08    19.34        2.753      1318.22
     7       2081.56    20.47        2.654      1318.22
     8       2066.47    22.21        2.517      1318.22
     9       2124.05    23.50        2.427      1318.22
    10       2133.45    24.51        2.362      1318.22
    11       2079.48    27.15        2.212      1318.22
    12       2027.47    28.43        2.147      1318.22
    13       2013.37    28.74        2.132      1318.22
 LONGEST FLOWPATH FROM NODE     500.00 TO NODE    1011.00 = 12050.36 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
     1       2437.66    14.51        3.313
     2       2458.68    15.01        3.241
     3       2484.82    15.29        3.204
     4       2530.43    16.44        3.056
     5       2651.35    18.85        2.798
     6       2650.67    19.34        2.753
     7       2642.28    20.47        2.654
     8       2657.57    22.21        2.517
     9       2737.04    23.50        2.427
    10       2763.31    24.51        2.362
    11       2757.28    24.67        2.353
    12       2674.00    27.15        2.212
    13       2604.49    28.43        2.147
    14       2586.35    28.74        2.132

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   2763.31   Tc(MIN.) =   24.51
 TOTAL AREA(ACRES) =   1715.43

****************************************************************************
 FLOW PROCESS FROM NODE    1011.00 TO NODE    1012.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    37.00  DOWNSTREAM(FEET) =    30.00
 FLOW LENGTH(FEET) =   894.52   MANNING'S N =  0.013
 DEPTH OF FLOW IN 120.0 INCH PIPE IS  95.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.68
 ESTIMATED PIPE DIAMETER(INCH) = 120.00    NUMBER OF PIPES =   2
 PIPE-FLOW(CFS) =   2763.31
 PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  25.23
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    1012.00 = 12944.88 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1012.00 TO NODE    1012.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.319
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA(ACRES) =     6.72
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  90
  AREA(ACRES) =     6.72
  SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7750
  SUBAREA AREA(ACRES) =   13.44   SUBAREA RUNOFF(CFS) =   24.15
  TOTAL AREA(ACRES) =  1728.87   TOTAL RUNOFF(CFS) = 2787.47
  TC(MIN) =  25.23

****************************************************************************
  FLOW PROCESS FROM NODE   1012.00 TO NODE   1106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    30.00  DOWNSTREAM(FEET) =    29.00
  FLOW LENGTH(FEET) =    92.17   MANNING'S N =  0.013
  DEPTH OF FLOW IN 114.0 INCH PIPE IS  88.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.51
  ESTIMATED PIPE DIAMETER(INCH) = 114.00    NUMBER OF PIPES =   2
  PIPE-FLOW(CFS) =   2787.47
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  25.30
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE   1106.00 = 13037.05 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1106.00 TO NODE   1106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.315
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .5000
  SOIL CLASSIFICATION IS "B"
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA(ACRES) =    16.70
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA(ACRES) =     5.57
  SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.6126
  SUBAREA AREA(ACRES) =   22.27   SUBAREA RUNOFF(CFS) =   31.58
  TOTAL AREA(ACRES) =  1751.14   TOTAL RUNOFF(CFS) = 2819.04
  TC(MIN) =  25.30

****************************************************************************
  FLOW PROCESS FROM NODE   1106.00 TO NODE   1106.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1106.00 TO NODE   1106.00 IS CODE =  10
----------------------------------------------------------------------------
```

```
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
 FLOW PROCESS FROM NODE    1100.00 TO NODE    1101.00 IS CODE =  21
--------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 INITIAL SUBAREA FLOW-LENGTH =   301.15
 UPSTREAM ELEVATION =     162.00
 DOWNSTREAM ELEVATION =    146.00
 ELEVATION DIFFERENCE =     16.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   11.637
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.820
 SUBAREA RUNOFF(CFS) =      12.45
 TOTAL AREA(ACRES) =       7.24   TOTAL RUNOFF(CFS) =     12.45

********************************************************************************
 FLOW PROCESS FROM NODE    1101.00 TO NODE    1102.00 IS CODE =  61
--------------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) =  146.00  DOWNSTREAM ELEVATION(FEET) =  141.00
 STREET LENGTH(FEET) =   516.05   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.12
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.68
   HALFSTREET FLOOD WIDTH(FEET) =   10.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.52
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.74
 STREET FLOW TRAVEL TIME(MIN.) =   1.56   Tc(MIN.) =  13.19
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.523
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     6.38
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA(ACRES) =     6.38
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4750
 SUBAREA AREA(ACRES) =   12.76      SUBAREA RUNOFF(CFS) =   21.35
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 TOTAL AREA(ACRES) =   20.00        PEAK FLOW RATE(CFS) =      33.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.77   HALFSTREET FLOOD WIDTH(FEET) =  14.62
 FLOW VELOCITY(FEET/SEC.) =  5.23   DEPTH*VELOCITY(FT*FT/SEC.) =   4.01
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  516.0 FT WITH ELEVATION-DROP =   5.0 FT, IS   19.1 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1102.00
 LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1102.00 =   817.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1102.00 TO NODE   1103.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  141.00  DOWNSTREAM ELEVATION(FEET) =   78.00
 STREET LENGTH(FEET) =   618.39   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.85
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.57
   HALFSTREET FLOOD WIDTH(FEET) =    6.16
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   19.45
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   11.18
 STREET FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =  13.72
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.434
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 SUBAREA AREA(ACRES) =   14.88      SUBAREA RUNOFF(CFS) =   28.11
 TOTAL AREA(ACRES) =   34.88        PEAK FLOW RATE(CFS) =      61.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =   8.76
 FLOW VELOCITY(FEET/SEC.) = 18.53   DEPTH*VELOCITY(FT*FT/SEC.) =  11.74
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  618.4 FT WITH ELEVATION-DROP =  63.0 FT, IS   29.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1103.00
 LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1103.00 =  1435.59 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1103.00 TO NODE   1104.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   78.00  DOWNSTREAM ELEVATION(FEET) =   74.00
 STREET LENGTH(FEET) =   699.52   CURB HEIGHT(INCHES) =  6.0
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STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.250
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      69.90
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.03
  HALFSTREET FLOOD WIDTH(FEET) =   26.24
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.18
STREET FLOW TRAVEL TIME(MIN.) =   2.88   Tc(MIN.) =  16.60
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.038
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  80
SUBAREA AREA(ACRES) =   11.70      SUBAREA RUNOFF(CFS) =   15.99
TOTAL AREA(ACRES) =   46.58        PEAK FLOW RATE(CFS) =      77.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 1.06   HALFSTREET FLOOD WIDTH(FEET) =  27.65
FLOW VELOCITY(FEET/SEC.) =  4.11   DEPTH*VELOCITY(FT*FT/SEC.) =   4.36
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  699.5 FT WITH ELEVATION-DROP =   4.0 FT, IS   14.7 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1104.00
LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1104.00 =  2135.11 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1104.00 TO NODE   1105.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   74.00  DOWNSTREAM ELEVATION(FEET) =   68.00
 STREET LENGTH(FEET) =   959.99   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      97.23
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  1.37
   HALFSTREET FLOOD WIDTH(FEET) =   41.30
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.82
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    6.62
 STREET FLOW TRAVEL TIME(MIN.) =   3.32   Tc(MIN.) =  19.92
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 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.701
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =  80
AREA(ACRES) =    24.88
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  86
AREA(ACRES) =     6.22
SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.4600
SUBAREA AREA(ACRES) =   31.10      SUBAREA RUNOFF(CFS) =   38.63
TOTAL AREA(ACRES) =   77.68        PEAK FLOW RATE(CFS) =    116.53

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 1.45   HALFSTREET FLOOD WIDTH(FEET) =  44.68
FLOW VELOCITY(FEET/SEC.) =  4.96   DEPTH*VELOCITY(FT*FT/SEC.) =   7.20
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  960.0 FT WITH ELEVATION-DROP =   6.0 FT, IS   37.5 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1105.00
LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1105.00 =  3095.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1105.00 TO NODE   1106.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   68.00  DOWNSTREAM ELEVATION(FEET) =   29.00
 STREET LENGTH(FEET) =  1305.50   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     116.54
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  1.15
   HALFSTREET FLOOD WIDTH(FEET) =   31.49
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.66
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   11.11
 STREET FLOW TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =  22.17
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.520
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .5500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.01
 TOTAL AREA(ACRES) =   77.69        PEAK FLOW RATE(CFS) =    116.54

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.15   HALFSTREET FLOOD WIDTH(FEET) =  31.49
 FLOW VELOCITY(FEET/SEC.) =  9.66   DEPTH*VELOCITY(FT*FT/SEC.) =  11.11
 LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1106.00 =  4400.60 FEET.
```

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**************************************************************************
 FLOW PROCESS FROM NODE   1106.00 TO NODE   1106.00 IS CODE =  11
--------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        116.54     22.17        2.520        77.69
 LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1106.00 =  4400.60 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       2514.73     15.31        3.200      1751.14
    2       2534.16     15.81        3.134      1751.14
    3       2559.47     16.09        3.100      1751.14
    4       2601.85     17.23        2.966      1751.14
    5       2716.99     19.63        2.726      1751.14
    6       2715.28     20.12        2.683      1751.14
    7       2704.65     21.25        2.591      1751.14
    8       2716.84     22.99        2.462      1751.14
    9       2794.26     24.29        2.376      1751.14
   10       2819.04     25.30        2.315      1751.14
   11       2812.79     25.45        2.306      1751.14
   12       2726.28     27.92        2.172      1751.14
   13       2655.27     29.21        2.110      1751.14
   14       2636.78     29.52        2.095      1751.14
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE   1106.00 = 13037.05 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1       2606.50     15.31        3.200
    2       2627.87     15.81        3.134
    3       2654.22     16.09        3.100
    4       2700.88     17.23        2.966
    5       2824.73     19.63        2.726
    6       2824.74     20.12        2.683
    7       2818.03     21.25        2.591
    8       2770.67     22.17        2.520
    9       2830.69     22.99        2.462
   10       2904.15     24.29        2.376
   11       2926.09     25.30        2.315
   12       2919.41     25.45        2.306
   13       2826.72     27.92        2.172
   14       2752.83     29.21        2.110
   15       2733.67     29.52        2.095

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   2926.09   Tc(MIN.) =   25.30
 TOTAL AREA(ACRES) =   1828.83

**************************************************************************
 FLOW PROCESS FROM NODE   1106.00 TO NODE   1206.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    29.00  DOWNSTREAM(FEET) =    23.00
 FLOW LENGTH(FEET) =   728.01   MANNING'S N =  0.013
 DEPTH OF FLOW IN 120.0 INCH PIPE IS  98.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.24
 ESTIMATED PIPE DIAMETER(INCH) = 120.00    NUMBER OF PIPES =   2
 PIPE-FLOW(CFS) =   2926.09
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  25.87
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE   1206.00 = 13765.06 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1206.00 TO NODE   1206.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   1206.00 TO NODE   1206.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   1200.00 TO NODE   1201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =     4.67
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     3.12
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.6503
 INITIAL SUBAREA FLOW-LENGTH =   760.88
 UPSTREAM ELEVATION =    158.00
 DOWNSTREAM ELEVATION =     84.00
 ELEVATION DIFFERENCE =     74.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   10.462
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 *CAUTION: SUBAREA FLOWLENGTH EXCEEDS COUNTY
    NOMOGRAPH DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.091
 SUBAREA RUNOFF(CFS) =     20.72
 TOTAL AREA(ACRES) =      7.79   TOTAL RUNOFF(CFS) =     20.72

****************************************************************************
 FLOW PROCESS FROM NODE   1201.00 TO NODE   1202.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   84.00  DOWNSTREAM ELEVATION(FEET) =   68.00
 STREET LENGTH(FEET) =  1117.30   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00
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 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      48.22
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.81
   HALFSTREET FLOOD WIDTH(FEET) =   16.31
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.31
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.08
 STREET FLOW TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =  13.42
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.485
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =    22.97
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     5.74
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5500
 SUBAREA AREA(ACRES) =   28.71      SUBAREA RUNOFF(CFS) =   55.03
 TOTAL AREA(ACRES) =   36.50        PEAK FLOW RATE(CFS) =      75.75

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.92   HALFSTREET FLOOD WIDTH(FEET) =  21.45
 FLOW VELOCITY(FEET/SEC.) =  6.29   DEPTH*VELOCITY(FT*FT/SEC.) =   5.80
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1117.3 FT WITH ELEVATION-DROP =  16.0 FT, IS   44.1 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1202.00
 LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1202.00 =  1878.18 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1202.00 TO NODE   1203.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    68.00  DOWNSTREAM(FEET) =    57.00
 FLOW LENGTH(FEET) =  1141.82   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.84
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     75.75
 PIPE TRAVEL TIME(MIN.) =   1.76    Tc(MIN.) =  15.17
 LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1203.00 =  3020.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1203.00 TO NODE   1203.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.219
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
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```
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =    39.85
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     9.96
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5500
 SUBAREA AREA(ACRES) =   49.81   SUBAREA RUNOFF(CFS) =   88.19
 TOTAL AREA(ACRES) =    86.31   TOTAL RUNOFF(CFS) =  163.94
 TC(MIN) =  15.17

****************************************************************************
 FLOW PROCESS FROM NODE   1203.00 TO NODE   1204.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    57.00  DOWNSTREAM(FEET) =    52.00
 FLOW LENGTH(FEET) =   779.06   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.36
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    163.94
 PIPE TRAVEL TIME(MIN.) =   1.14    Tc(MIN.) =  16.31
 LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1204.00 =  3799.06 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1204.00 TO NODE   1204.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.072
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 AREA(ACRES) =    26.15
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     8.72
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.8000
 SUBAREA AREA(ACRES) =   34.87   SUBAREA RUNOFF(CFS) =   85.70
 TOTAL AREA(ACRES) =   121.18   TOTAL RUNOFF(CFS) =  249.64
 TC(MIN) =  16.31

****************************************************************************
 FLOW PROCESS FROM NODE   1204.00 TO NODE   1205.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    27.00
 FLOW LENGTH(FEET) =   923.60   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.66
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    249.64
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =  17.02
```

```
 LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1205.00 =  4722.66 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1205.00 TO NODE   1205.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.989
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  90
 SUBAREA AREA(ACRES) =   24.32   SUBAREA RUNOFF(CFS) =   54.51
 TOTAL AREA(ACRES) =   145.50   TOTAL RUNOFF(CFS) =  304.16
 TC(MIN) =  17.02

****************************************************************************
 FLOW PROCESS FROM NODE   1205.00 TO NODE   1206.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     27.00  DOWNSTREAM(FEET) =     23.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   333.96   CHANNEL SLOPE =  0.0120
 CHANNEL FLOW THRU SUBAREA(CFS) =    304.16
 FLOW VELOCITY(FEET/SEC) =   7.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =  17.78
 LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1206.00 =  5056.62 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1206.00 TO NODE   1206.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1       304.16     17.78       2.906       145.50
 LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1206.00 =  5056.62 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1      2606.50     15.89       3.125      1828.83
    2      2627.87     16.39       3.063      1828.83
    3      2654.22     16.66       3.030      1828.83
    4      2700.88     17.80       2.904      1828.83
    5      2824.73     20.20       2.676      1828.83
    6      2824.74     20.69       2.635      1828.83
    7      2818.03     21.82       2.547      1828.83
    8      2770.67     22.75       2.479      1828.83
    9      2830.69     23.56       2.423      1828.83
   10      2904.15     24.86       2.341      1828.83
   11      2926.09     25.87       2.282      1828.83
   12      2919.41     26.02       2.273      1828.83
   13      2826.72     28.50       2.144      1828.83
   14      2752.83     29.79       2.083      1828.83
   15      2733.67     30.10       2.069      1828.83
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE   1206.00 = 13765.06 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1      2889.31       15.89        3.125
     2      2916.40       16.39        3.063
     3      2945.85       16.66        3.030
     4      3003.54       17.78        2.906
     5      3004.87       17.80        2.904
     6      3104.89       20.20        2.676
     7      3100.60       20.69        2.635
     8      3084.61       21.82        2.547
     9      3030.19       22.75        2.479
    10      3084.37       23.56        2.423
    11      3149.22       24.86        2.341
    12      3164.94       25.87        2.282
    13      3157.35       26.02        2.273
    14      3051.14       28.50        2.144
    15      2970.93       29.79        2.083
    16      2950.30       30.10        2.069

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   3164.94   Tc(MIN.) =   25.87
 TOTAL AREA(ACRES) =   1974.33

****************************************************************************
 FLOW PROCESS FROM NODE    1206.00 TO NODE    1304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    14.00
 FLOW LENGTH(FEET) =   422.38   MANNING'S N =  0.013
 DEPTH OF FLOW IN 138.0 INCH PIPE IS 105.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  37.34
 ESTIMATED PIPE DIAMETER(INCH) = 138.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   3164.94
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =  26.06
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    1304.00 = 14187.44 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1304.00 TO NODE    1304.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    1304.00 TO NODE    1304.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    1300.00 TO NODE    1301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
```

```
 S.C.S. CURVE NUMBER (AMC II) =  80
 INITIAL SUBAREA FLOW-LENGTH =   861.76
 UPSTREAM ELEVATION =     92.00
 DOWNSTREAM ELEVATION =     64.00
 ELEVATION DIFFERENCE =     28.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MINUTES) =   23.190
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 *CAUTION: SUBAREA FLOWLENGTH EXCEEDS COUNTY
    NOMOGRAPH DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.448
 SUBAREA RUNOFF(CFS) =      8.64
 TOTAL AREA(ACRES) =      7.84   TOTAL RUNOFF(CFS) =      8.64

****************************************************************************
 FLOW PROCESS FROM NODE   1301.00 TO NODE   1302.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   64.00  DOWNSTREAM ELEVATION(FEET) =   63.00
 STREET LENGTH(FEET) =  1597.75   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.88
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  1.08
   HALFSTREET FLOOD WIDTH(FEET) =   28.27
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.36
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.46
 STREET FLOW TRAVEL TIME(MIN.) =  19.58   Tc(MIN.) =  42.77
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.650
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =    32.03
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     8.00
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5499
 SUBAREA AREA(ACRES) =   40.03      SUBAREA RUNOFF(CFS) =   36.32
 TOTAL AREA(ACRES) =   47.87        PEAK FLOW RATE(CFS) =      44.96

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.25   HALFSTREET FLOOD WIDTH(FEET) =  35.94
 FLOW VELOCITY(FEET/SEC.) =  1.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.82
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1597.8 FT WITH ELEVATION-DROP =   1.0 FT, IS   33.2 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1302.00
```

```
 LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1302.00 =  2459.51 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1302.00 TO NODE   1303.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   63.00  DOWNSTREAM ELEVATION(FEET) =   56.00
 STREET LENGTH(FEET) =  1107.08   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      59.80
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.97
   HALFSTREET FLOOD WIDTH(FEET) =   23.59
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.20
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.08
 STREET FLOW TRAVEL TIME(MIN.) =   4.40   Tc(MIN.) =  47.17
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.549
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =    27.87
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =     6.97
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.5500
 SUBAREA AREA(ACRES) =   34.84      SUBAREA RUNOFF(CFS) =   29.68
 TOTAL AREA(ACRES) =   82.71        PEAK FLOW RATE(CFS) =      74.64

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.03   HALFSTREET FLOOD WIDTH(FEET) =  26.41
 FLOW VELOCITY(FEET/SEC.) =  4.28   DEPTH*VELOCITY(FT*FT/SEC.) =   4.43
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1107.1 FT WITH ELEVATION-DROP =   7.0 FT, IS   48.4 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1303.00
 LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1303.00 =  3566.59 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1303.00 TO NODE   1304.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   56.00  DOWNSTREAM ELEVATION(FEET) =   14.00
 STREET LENGTH(FEET) =   860.80   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.250
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.250

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.025
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      93.24
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.82
   HALFSTREET FLOOD WIDTH(FEET) =   16.82
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   11.61
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    9.49
 STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =  48.40
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.523
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .7000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  89
 AREA(ACRES) =     3.49
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) =  80
 AREA(ACRES) =    15.70
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA(ACRES) =    15.70
 SUBAREA AVERAGE RUNOFF COEFFICIENT =  0.7000
 SUBAREA AREA(ACRES) =   34.89      SUBAREA RUNOFF(CFS) =   37.20
 TOTAL AREA(ACRES) =  117.60        PEAK FLOW RATE(CFS) =    111.84

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.86   HALFSTREET FLOOD WIDTH(FEET) =  18.85
 FLOW VELOCITY(FEET/SEC.) = 11.56   DEPTH*VELOCITY(FT*FT/SEC.) =   9.98
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  860.8 FT WITH ELEVATION-DROP =  42.0 FT, IS   80.8 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1304.00
 LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1304.00 =  4427.39 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1304.00 TO NODE   1304.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        111.84    48.40        1.523       117.60
 LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1304.00 =  4427.39 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       2889.31    16.08        3.101      1974.33
    2       2916.40    16.58        3.040      1974.33
    3       2945.85    16.86        3.008      1974.33
```

| | | | | |
|---|---|---|---|---|
| 4 | 3003.54 | 17.98 | 2.885 | 1974.33 |
| 5 | 3004.87 | 17.99 | 2.884 | 1974.33 |
| 6 | 3104.89 | 20.39 | 2.660 | 1974.33 |
| 7 | 3100.60 | 20.88 | 2.620 | 1974.33 |
| 8 | 3084.61 | 22.01 | 2.533 | 1974.33 |
| 9 | 3030.19 | 22.94 | 2.466 | 1974.33 |
| 10 | 3084.37 | 23.75 | 2.411 | 1974.33 |
| 11 | 3149.22 | 25.05 | 2.330 | 1974.33 |
| 12 | 3164.94 | 26.06 | 2.271 | 1974.33 |
| 13 | 3157.35 | 26.21 | 2.262 | 1974.33 |
| 14 | 3051.14 | 28.68 | 2.135 | 1974.33 |
| 15 | 2970.93 | 29.98 | 2.075 | 1974.33 |
| 16 | 2950.30 | 30.29 | 2.061 | 1974.33 |

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 1304.00 = 14187.44 FEET.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | RUNOFF (CFS) | Tc (MIN.) | INTENSITY (INCH/HOUR) |
|---|---|---|---|
| 1 | 2944.26 | 16.08 | 3.101 |
| 2 | 2972.44 | 16.58 | 3.040 |
| 3 | 3002.49 | 16.86 | 3.008 |
| 4 | 3062.58 | 17.98 | 2.885 |
| 5 | 3063.95 | 17.99 | 2.884 |
| 6 | 3168.93 | 20.39 | 2.660 |
| 7 | 3165.63 | 20.88 | 2.620 |
| 8 | 3151.88 | 22.01 | 2.533 |
| 9 | 3099.28 | 22.94 | 2.466 |
| 10 | 3155.04 | 23.75 | 2.411 |
| 11 | 3222.34 | 25.05 | 2.330 |
| 12 | 3239.95 | 26.06 | 2.271 |
| 13 | 3232.66 | 26.21 | 2.262 |
| 14 | 3130.95 | 28.68 | 2.135 |
| 15 | 3053.04 | 29.98 | 2.075 |
| 16 | 3032.97 | 30.29 | 2.061 |
| 17 | 2293.09 | 48.40 | 1.523 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3239.95 Tc(MIN.) = 26.06
TOTAL AREA(ACRES) = 2091.93

**********
FLOW PROCESS FROM NODE 1304.00 TO NODE 1304.00 IS CODE = 12
---
>>>>>CLEAR MEMORY BANK # 1 <<<<<
==========
==========
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2091.93 TC(MIN.) = 26.06
PEAK FLOW RATE(CFS) = 3239.95
*** PEAK FLOW RATE TABLE ***

| | Q(CFS) | Tc(MIN.) |
|---|---|---|
| 1 | 2944.26 | 16.08 |
| 2 | 2972.44 | 16.58 |
| 3 | 3002.49 | 16.86 |
| 4 | 3062.58 | 17.98 |
| 5 | 3063.95 | 17.99 |
| 6 | 3168.93 | 20.39 |
| 7 | 3165.63 | 20.88 |
| 8 | 3151.88 | 22.01 |

| | | |
|---|---|---|
| 9 | 3099.28 | 22.94 |
| 10 | 3155.04 | 23.75 |
| 11 | 3222.34 | 25.05 |
| 12 | 3239.95 | 26.06 |
| 13 | 3232.66 | 26.21 |
| 14 | 3130.95 | 28.68 |
| 15 | 3053.04 | 29.98 |
| 16 | 3032.97 | 30.29 |
| 17 | 2293.09 | 48.40 |

==========

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END OF RATIONAL METHOD ANALYSIS

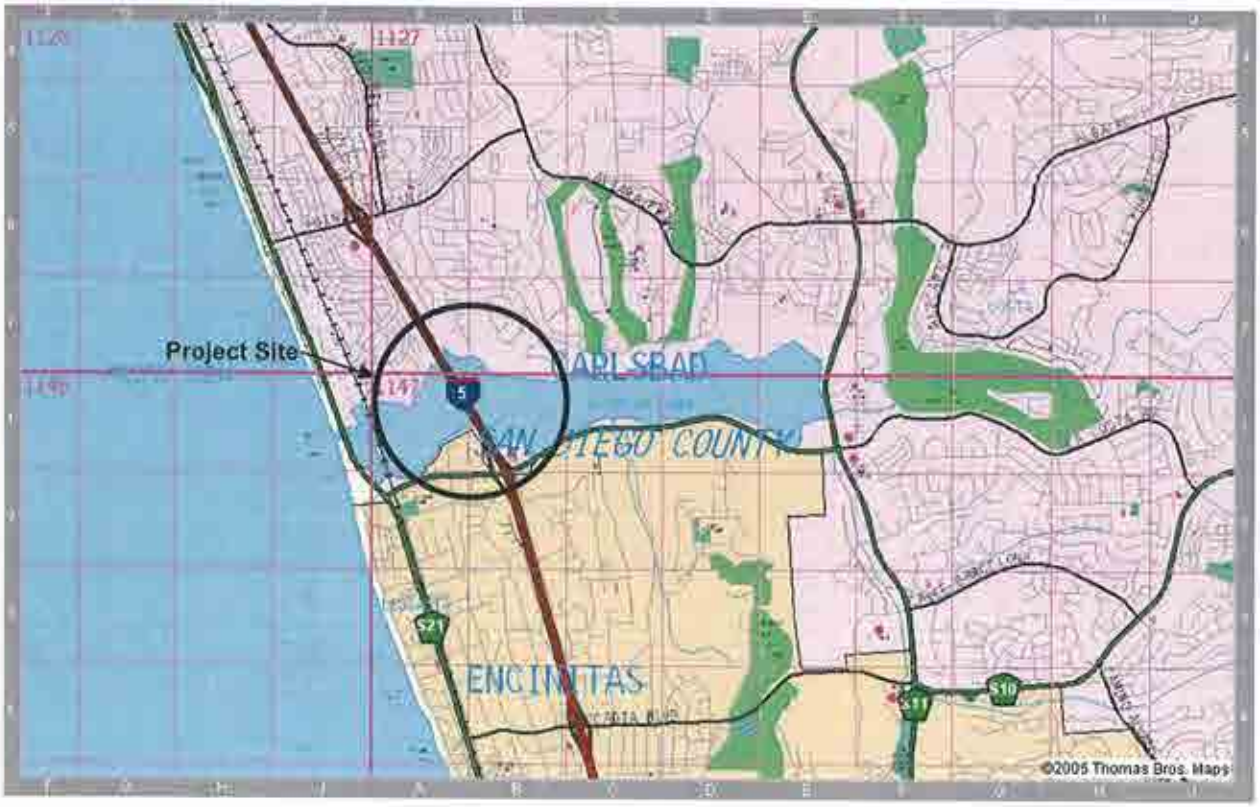
N
GRAPHIC SCALE
SCALE 1"= 500'
LEGEND
FLOW LINE
MAJOR SUB-AREA LIMITS
MINOR SUB-AREA LIMITS
NODE NUMBER (TYP.)
701
SUBAREA
0301
DISCHARGE POINT

# SECTION 7

# Batiquitos Lagoon Location Hydraulic Study

# SECTION 7: BATIQUITOS LAGOON LOCATION HYDRAULIC STUDY

## 7.0 PROJECT PURPOSE AND VICINITY MAP:




**The Batiquitos Lagoon is located 30 miles north of San Diego in the City of Carlsbad.**
**Figure 1: Project Vicinity Map**

This study was prepared for Caltrans for the purpose of determining impacts to the Batiquitos Lagoon 100-year floodplain from the proposed improvements to Interstate-5.

This study specifically addresses the following:

1) The Batiquitos Lagoon 100-year floodplain as it presently exists,

2) The Batiquitos Lagoon 100-year floodplain after the I-5 Bridge has been replaced,

3) Performing a risk assessment associated with any possible floodplain encroachment.

The replacement of the existing I-5 Bridge (No. 57-0459) requires that the bridge be widened 31 feet on each side, to a total width of 226 ft. The proposed bridge would be 246 feet long, lengthening it 14.5 feet on each side. The existing bridge consists of two bridges 217 ft long, with a total width of 164 ft. The existing bridge piers are 3 feet in diameter. To accommodate the widening, the piers will be replaced with 4 foot diameter concrete piers.

## 7.1 DESCRIPTION OF WATERSHED:

The Batiquitos Lagoon is located in the Carlsbad Hydrologic Unit 904.40 (See Figure 2) within the Carlsbad Watershed. The primary tributaries to the watershed are the San Marcos Creek and the Encinitas Creek. The San Marcos Creek originates on the western slopes of the Merriam Mountains in west central San Diego County and discharges into the Pacific Ocean via the Batiquitos Lagoon. The Encinitas Creek originates in the hills southwest of Questhaven Road and parallels El Camino Real before its confluence with the San Marcos Creek at the southeastern corner of the Batiquitos Lagoon.

**Figure 2: Carlsbad Watershed**

## 7.2 FLOODPLAIN MODELING METHODOLOGY:

The area of analysis ranges from approximately 5,500 ft upstream to 3,800 ft downstream of the I-5 crossing. The upstream portion of the study reach was initiated at the convergence between the San Marcos Creek and the Encinitas Creek. Within the study limits, the I-5 Bridge serves as a major constriction point. Once past the I-5 Bridge, the lagoon opens up to approximately 1,000 feet across. The other constrictions occur downstream at the North County Transit District (NCTD) Railroad and the Carlsbad Boulevard Bridges. The model terminates at the outfall of Batiquitos Lagoon into the Pacific Ocean.

## 7.3 HEC-RAS INPUT

### 7.3.1 Cross Sectional Geometry:

The cross sections of the Batiquitos Lagoon were placed at sections that experienced changes in size and direction to model the characteristics of the lagoon. In areas consisting of irregular and varying topography, average perpendicular cuts were made to generate cross sections along the flow path of the lagoon. The contours used for the model were obtained from an exhibit titled *Grading Plan for Mitigated Alternative B* from the Batiquitos Lagoon Enhancement Project Environmental Impact Report/Environmental Impact Statement (EIR/EIS), compiled by the U.S. Army Corps of Engineers in June 1990 using the Mean Lower Low Water (MLLW) datum. Caltrans also provided digital topography in the area just along the I-5 corridor. Areas where islands exist within the lagoon were assigned three separate sections to allow HEC-RAS to define the beginning, middle, and end of the obstruction (See Appendix A). The vertical datums were converted to North American Vertical Datum of 1988 (NAVD 88) for this study. Conversions from the Bench Mark Data Sheets on the National Oceanic and Atmospheric Administration's website were used to convert from MLLW to NAVD 88. Due to the constriction at the bridges, the channel has limited effectiveness for conveying flow. Ineffective flow areas, low flow regions with velocities close or equal to zero, were added to the model to accurately replicate the lagoon.

#### 7.3.1.1 Bridges

Five bridges affect the WSE of the lagoon within the I-5 corridor study area. They include the northbound and southbound Carlsbad Boulevard Bridges, the NCTD Railroad Trestle Bridge and the northbound and southbound I-5 Bridges.

The Bridges are modeled at the following cross sections:

- Cross section #400 - Carlsbad Boulevard Bridges
- Cross section #1300 - NCTD Railroad Trestle Bridge
- Cross section #4000 - I-5 Bridges

Expansion/contraction coefficients (0.1 and 0.3) are utilized throughout the modeled reach to represent energy losses due to gradual transitions in the geometry of the lagoon channel. The coefficients are adjusted for more significant expansions and contractions as the lagoon narrows at each of the bridges. The I-5 crossing (0.5 and 0.5) has abrupt transitions while the NCTD Railroad Bridge and Carlsbad Boulevard Bridge (0.3 and 0.5) are not as constricting.

The existing I-5 Bridges and Carlsbad Boulevard Bridges were modeled from as-builts, included in Appendix C. There was no as-built record available for the railroad trestle bridge, and it was modeled based on measurements gathered during field investigations. The Bridge Across Batiquitos Lagoon Advanced Planning Study, dated 9/04, was used to model the proposed replacement I-5 Bridge. In addition, the smaller diameter piers (1.5 feet) were modeled as twice their diameters and the larger diameter piers (4 feet) were increased by 25%. This approach was used to account for debris which could catch on the bridge piers and provide additional blockage to the flow.

**Figure 3: Carlsbad Boulevard Bridges**

The furthest downstream bridges are the Carlsbad Boulevard Bridges (Figure 3) which span the outfall of the lagoon to the Pacific Ocean. The two bridges consist of five rows of 1.5 foot octagonal shaped piers. The Carlsbad Boulevard Bridges were modeled as one bridge, because of their close proximity to each other. To simulate the energy loss of the flowing water interacting with the dead water between the bridges the Manning's n value of the upstream cross section was increased to 0.06. The bridge was modeled with 3 foot piers, after applying the clogging factor. The energy equation (Standard Step Method) was used to analyze the Carlsbad Boulevard Bridges.

**Figure 4: NCTD Railroad Trestle Bridge**

The NCTD Railroad Trestle Bridge (Figure 4) separates the middle lagoon from the outer lagoon and is the next major constriction point upstream of Carlsbad Boulevard. The wooden trestle bridge consists of twenty-one 1.5 foot pile trestle bents that support the tracks well above the 100-yr WSE. The railroad bridge piers were modeled as 3 foot diameter piers to account for debris. The Yarnell (Class A) bridge method was used to model the trestle bridge, with a Yarnell K value of 2.50 for the pile trestle bents.

**Figure 5: Interstate 5 Bridges**

The existing I-5 Bridges (Figure 5) separate the middle lagoon from the outer lagoon and are the furthest upstream constriction point in this model. The two bridges consist of two rows of 3 foot circular concrete piers. The existing I-5 Bridges were modeled as one bridge, because of their close proximity. To simulate the energy loss of the flowing water interacting with the dead water between the bridges the Manning's n value of the upstream cross section was increased to 0.06. The existing bridge was modeled with 4 foot piers to account for debris.

The proposed I-5 Bridge would replace the two existing I-5 Bridges with one large bridge, 226 feet wide and 246 feet long. The two rows of 3 foot piers will be replaced with two rows of 4 foot piers. The rows would be 15 feet farther apart and the opening beneath the bridge crossing would be widened 29 feet to the new bridge length. The proposed bridge was modeled with 5 foot piers to account for debris. The energy equation (Standard Step Method) was used to analyze the I-5 Bridge.

### 7.3.1.2 Ineffective Flow Areas

The cross section exhibits in Appendix A show the ineffective flow areas for the post project conditions. Upstream and downstream of the bridges, low flow regions with velocities close to or equal zero form within the floodplain. These regions have been designated as areas of ineffective flow, and modeled accordingly.

### 7.3.1.3 Flood Insurance Study (FIS) Cross Sections

The Flood Insurance Rate Map (FIRM) (Appendix A) designates the outer lagoon (upstream of the Pacific Ocean) as a Zone AE floodplain with a 100-yr water surface

elevation of 7.13 feet (NAVD 88), and no FEMA cross sections labeled. The rest of the project vicinity is designated as a Zone A floodplain. This indicates that no detailed hydraulic analyses have been performed in these areas and no base floodplain elevations have been determined.

#### 7.3.1.4 Existing Floodplain Conditions

A new existing model was required for comparison with the effects of the proposed bridge improvements. The existing conditions model was created based on the grading plan for the Batiquitos Lagoon Enhancement Project EIR/EIS, dated 1990.

### 7.3.2 Manning's Roughness Coefficients:

Each cross section is divided into three segments: left overbank, main channel, and right overbank. These segments represent the different regions of the waterway in terms of roughness coefficients. The main channel is the base of the lagoon and the left and right overbanks make up the sides. For the left and right overbanks, a roughness value of 0.035 was used to simulate high grass pastures, scattered brush and heavy weeds. The main channel is a waterway with a top width greater than 100 feet and contains no vegetation or debris. For this segment a roughness coefficient of 0.030 was used.

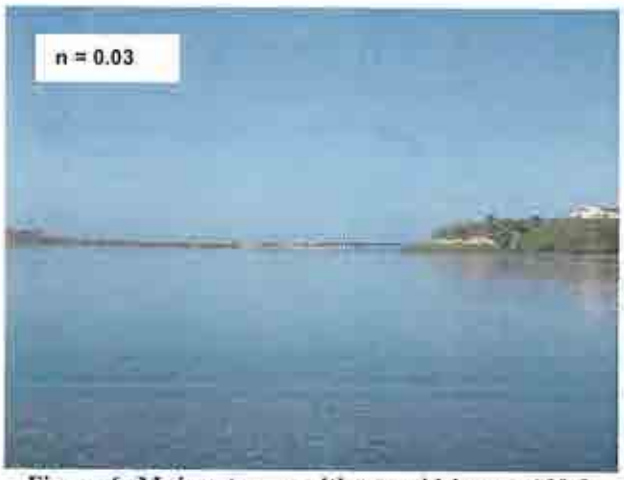



**Figure 6: Major stream with top width over 100 ft**

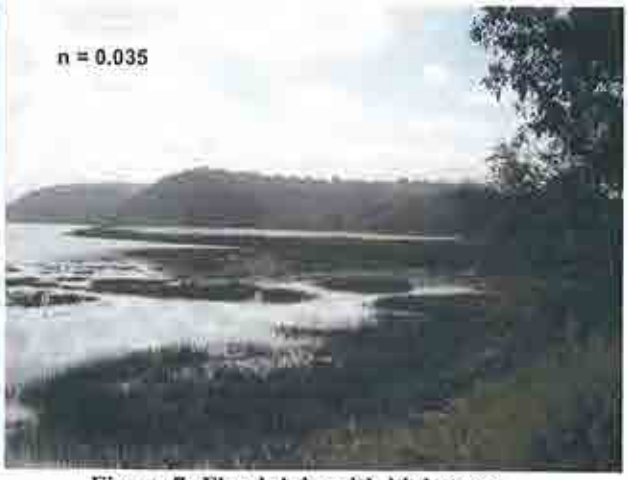



**Figure 7: Floodplain with high grass**

### 7.3.3 Starting Water Surface Elevation:

The model was analyzed in a subcritical flow regime. At the mouth of the Batiquitos Lagoon lies a FEMA designated Zone AE floodplain. The downstream starting water surface elevation was input as 7.17 ft (NAVD 88).

### 7.3.4 Discharge:

In a study performed by the State of California Department of Public Works Division of Highways titled *Batiquitos Lagoon Study and Recommendations,* September 1959, the 100-year flood for the lagoon was measured at 11,000 cfs. Since this study, the watershed has

undergone major development and this value was estimated to be low. The Hydrologic Summary in the *San Marcos Creek Bridge at West Carlsbad Blvd (1994)* as-builts, was used to establish the 100-year flood through the lagoon. According to the report, the 100-year base flood flow at the Carlsbad Boulevard Bridge is 12,000 cfs.

## 7.4 HEC-RAS OUTPUT

The water surface elevations displayed in the appendices and output of this study are based on flooding that would occur during a 100-year storm. Appendix B contains water surface elevations, channel velocities, top widths, Froude Numbers, and bottom elevations for each cross section list in Table A.

**Table A: Floodplain Comparison**

| River Station | Existing W.S. Elevation (ft) | Proposed W.S. Elevation (ft) | Change in Elevation (ft) | Existing Top Width (ft) | Proposed Top Width (ft) | Change in Top Width (ft) |
|---|---|---|---|---|---|---|
| 9724 | 11.37 | 10.53 | -0.84 | 1526.92 | 1482.77 | -44.15 |
| 9162 | 11.36 | 10.52 | -0.84 | 1665.57 | 1644 | -21.57 |
| 8558 | 11.33 | 10.48 | -0.85 | 1298.03 | 1246.88 | -51.15 |
| 7922 | 11.32 | 10.46 | -0.86 | 1719.03 | 1648.06 | -70.97 |
| 7547 | 11.32 | 10.46 | -0.86 | 1528.84 | 1506.62 | -22.22 |
| 6962 | 11.31 | 10.46 | -0.85 | 1572.21 | 1548.45 | -23.76 |
| 6431 | 11.3 | 10.45 | -0.85 | 1967 | 1945.4 | -21.6 |
| 5864 | 11.29 | 10.43 | -0.86 | 1911.35 | 1886.7 | -24.65 |
| 5293 | 11.29 | 10.42 | -0.87 | 1993.45 | 1591.98 | -401.47 |
| 4871 | 11.28 | 10.41 | -0.87 | 2173.11 | 2167.86 | -5.25 |
| 4407 | 11.27 | 10.41 | -0.86 | 2898.08 | 2780.56 | -117.52 |
| 4209 | 11.23 | 10.19 | -1.04 | 3055.56 | 3016.29 | -39.27 |
| 4159* | 10.96 | N/A | N/A | 3067.71 | N/A | N/A |
| 4000 | I-5 Bridge | | | | | |
| 3797 | 9.64 | 9.67 | 0.03 | 2200.43 | 2201.92 | 1.49 |
| 3581 | 9.8 | 9.8 | 0.00 | 1907.17 | 1907.17 | 0 |
| 3204 | 9.8 | 9.8 | 0.00 | 1594.47 | 1594.47 | 0 |
| 2754 | 9.8 | 9.8 | 0.00 | 1270.86 | 1270.87 | 0.01 |
| 2428 | 9.8 | 9.8 | 0.00 | 1657.88 | 1657.88 | 0 |
| 2076 | 9.8 | 9.8 | 0.00 | 2099.63 | 2099.64 | 0.01 |
| 1740 | 9.78 | 9.78 | 0.00 | 2060.58 | 2060.58 | 0 |
| 1454 | 9.46 | 9.46 | 0.00 | 239.8 | 239.8 | 0 |
| 1300 | NCTD Railroad Bridge | | | | | |
| 1207 | 8.76 | 8.76 | 0.00 | 278.54 | 278.54 | 0 |
| 976 | 8.9 | 8.9 | 0.00 | 1636.29 | 1636.29 | 0 |
| 874 | 8.72 | 8.72 | 0.00 | 456.59 | 456.59 | 0 |
| 581 | 8.26 | 8.26 | 0.00 | 232.83 | 232.83 | 0 |
| 400 | Carlsbad Boulevard Bridge | | | | | |
| 342 | 7.39 | 7.39 | 0.00 | 220.55 | 220.55 | 0 |
| 47 | 7.17 | 7.17 | 0.00 | 170.28 | 170.28 | 0 |

*Indicates cross section only in existing model

The lagoon bottom elevations are fairly flat and the flow velocities within the lagoon are less than 2 ft/s. The velocity increases at the three bridges where the flow contracts under the crossings and then slows down again as the flow expands into the next downstream section of the lagoon. Table A indicates that the proposed I-5 Bridge would reduce the flow constriction at the

existing bridge crossing and effectively lower the upstream WSE by 1 foot. This decrease to the 100-yr floodplain propagates through the upper extents of the study area without returning to the existing floodplain. This is a result of the fairly flat bottom elevations of the lagoon. No change occurs downstream of the proposed I-5 Bridge, except for a minor increase directly downstream. This study demonstrates that the Carlsbad Boulevard Bridges and the NTCD Railroad Bridge are the controlling structures for the floodplain in the outer and middle lagoons of Batiquitos Lagoon.

### 7.4.1 Warning Messages

Warning messages encountered during the proposed model include the following:

***The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections,*** displayed at cross sections #400, #581, #874, #976, #1207, #1300, #1454, #1740, #2076, #3797, #4000, #4209, #4407, and #7922. Portions of the Batiquitos Lagoon were relatively uniform and allowed for cross sections to be placed several hundred feet apart. These changes are appropriate based on the spacing of the sections.

***Divided flow computed for this cross-section***, displayed at cross section #5293. This was caused by a sand nesting area that appears as an island in the model.

## 7.5 RISK ASSESSMENT

Within the Batiquitos Lagoon, the replacement of the I-5 Bridge would cause a decrease to flood water elevations upstream of the I-5 Bridge crossing. The impacts to the floodplain would not be considered a significant or longitudinal encroachment. Since the 100-year flood would still be contained within the existing lagoon boundaries, there would be no increased risk to life or property associated with the proposed improvements. No additional roadways beyond existing conditions would flood upstream from the proposed I-5 Bridge replacement. Therefore, no transportation routes will be interrupted or terminated beyond existing conditions.

Additionally, no floodplain values will be adversely impacted without mitigation. Natural and beneficial floodplain values, as defined in Chapter 17 "Definitions" in the Caltrans Standard Environmental Reference (SER), include fish, wildlife, plants, outdoor recreation, aquaculture, forestry, etc., that are found within a designated floodplain. Listed below are the beneficial uses of the Batiquitos Lagoon obtained from the Water Quality Control Plan for the San Diego Basin along with a short description and determination of impacts.

- Contact and non-contact water recreation. Includes the uses of water for recreational activities involving proximity to water and contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, diving, surfing, white water activities, fishing, use of natural hot springs, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities. The I-5 bridge replacement will not have any effect on the lagoon's recreational uses aside from during the construction stage. Fishing

is allowed from the rocks under Interstate-5, and will be temporarily disturbed during bridge replacement construction.

- Preservation of biological habitats of special significance. Included uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection. The construction areas associated with the bridge widening may impact a limited amount of biological habitats. Currently, a Natural Environment Study (NES) is being prepared to support the I-5 North Coast Widening Project. The NES will assess if any biological habitats of special significance may be impacted and what mitigation measures, if any, are needed.

- Estuarine habitat. Includes uses of water that support estuarine ecosystems including, but not limited to, preservations or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). The NES will assess if any estuarine habitat may be impacted and what mitigation measures, if any, are needed.

- Wildlife habitat. This includes uses of water that supports terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, or wildlife water and food sources. The NES will assess if any wildlife habitat may be impacted and what mitigation measures, if any, are needed.

- Rare, threatened, or endangered species. Included uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under the state or federal law as rare, threatened or endangered. The NES will assess if any rare, threatened or endangered species may be impacted and what mitigation measures, if any, are needed.

- Marine habitat. Included uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds). The NES will assess if any marine habitat may be impacted and what mitigation measures, if any, are needed.

- Migration of aquatic organisms. Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish. The NES will assess if any migration of aquatic organisms may be impacted and what mitigation measures, if any, are needed.

- Spawning, reproduction, and/or early development. Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish. The NES will assess if any spawning, reproduction, or early development may be impacted and what mitigation measures, if any, are needed.

The proposed bridge replacement has been designed to minimize disturbance to the floodplain. The bridge design has been through several iterations to select an alternative which is compatible

with floodplain development and least harmful to the environment, while maintaining feasibility for improving I-5. Efforts should be made to limit the footprint of the construction site and reduce construction time in order to minimize impacts to natural and beneficial floodplain values, hazards to human life, and property loss.

## 7.6 SUMMARY AND CONCLUSION:

The Batiquitos Lagoon is a considerably flat channel that would flow in a subcritical state during a 100-year flood with both bridge conditions. The upstream section of the lagoon is fed by the San Marcos Creek and Encinitas Creek. The mouth of the lagoon could exhibit an increase in water surface elevation due to the presence of rising swells from the Pacific Ocean. However, this rise would be limited to the outer lagoon, and have little effect on the floodplain of the Lagoon as a whole.

Both the existing and proposed I-5 Bridges and piers were simulated in HEC-RAS. It was determined that the resulting upstream water surface elevation would drop approximately one foot with the proposed bridge replacement. The replacement bridge will be longer and wider, include a retaining wall on each overbank under the bridge, and introduce pier walls 1 foot larger in diameter to support the larger bridge. The proposed replacement bridge of I-5 would improve the ability of the Batiquitos Lagoon to convey the 100-yr storm event upstream of the I-5 Bridge.

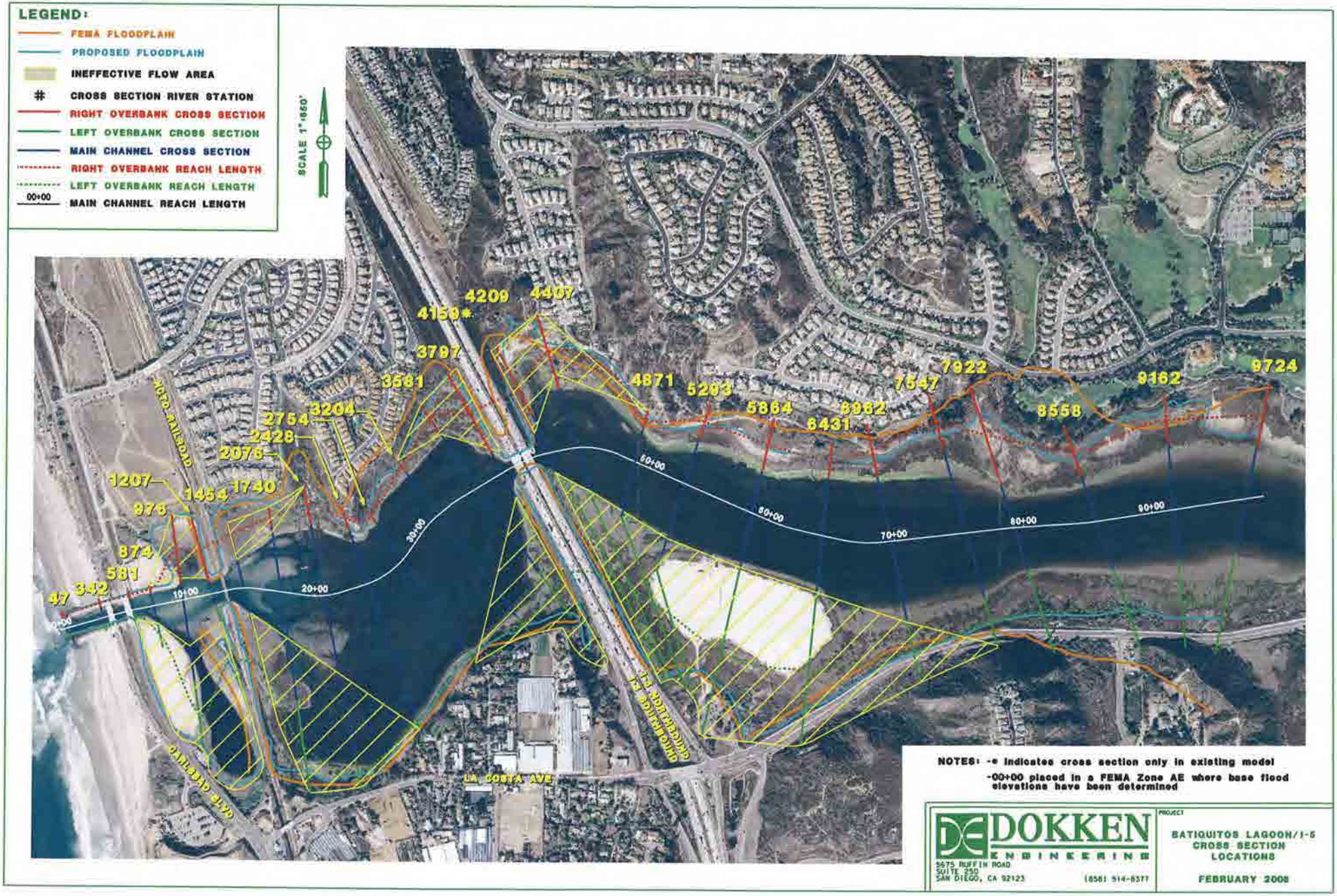
# APPENDIX A

## Cross Section Location Exhibits

## Batiquitos Lagoon EIR/EIS Exhibit

## Flood Insurance Rate Map (FIRM)

## USGS Map




NOTES: -e indicates cross section only in existing model

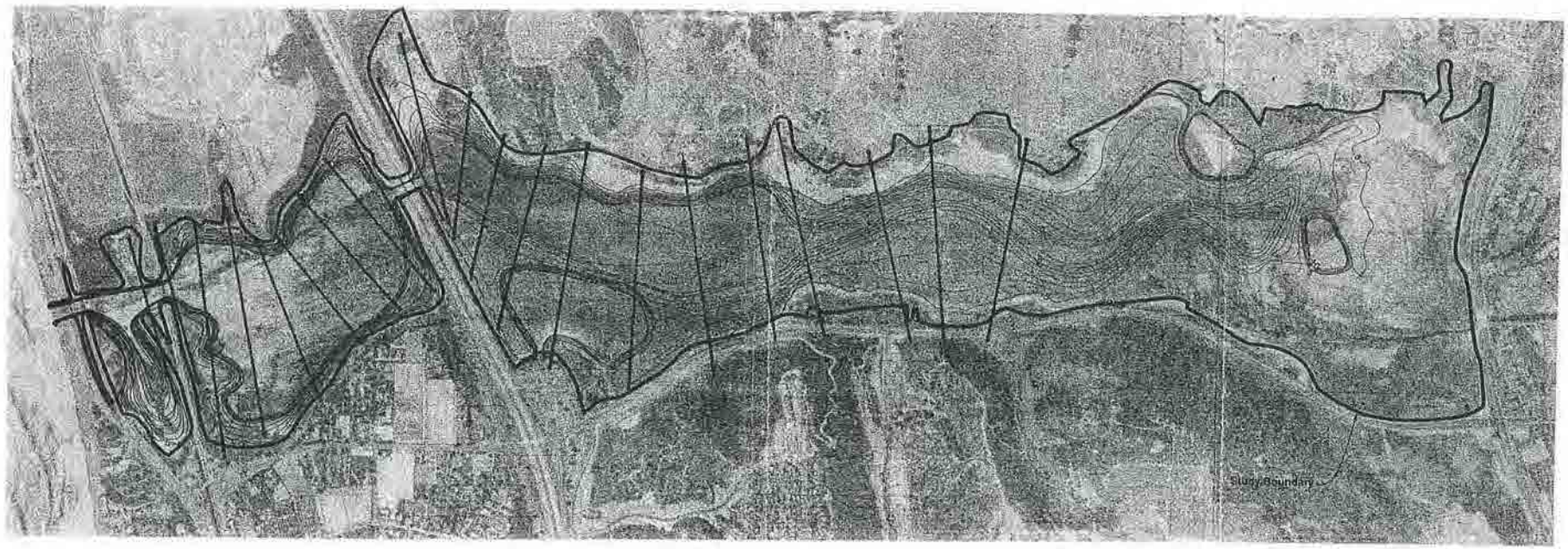
-00+00 placed in a FEMA Zone AE where base flood elevations have been determined

DOKKEN ENGINEERING
5675 RUFFIN ROAD
SUITE 250
SAN DIEGO, CA 92123
(858) 514-8377

PROJECT

BATIQUITOS LAGOON/I-5
CROSS SECTION
LOCATIONS

FEBRUARY 2008




0 400' 1200'

Legend

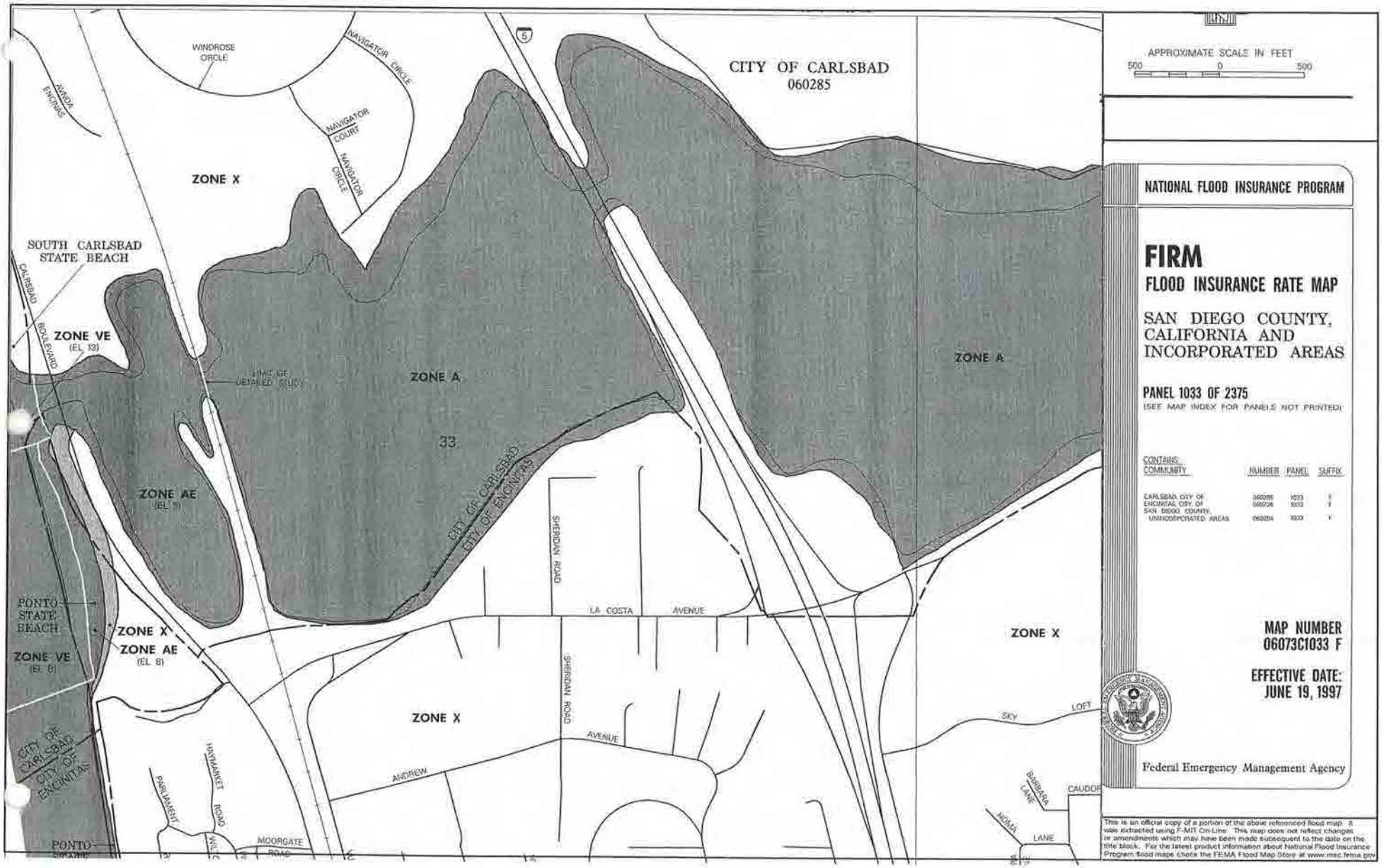
ft MLLW

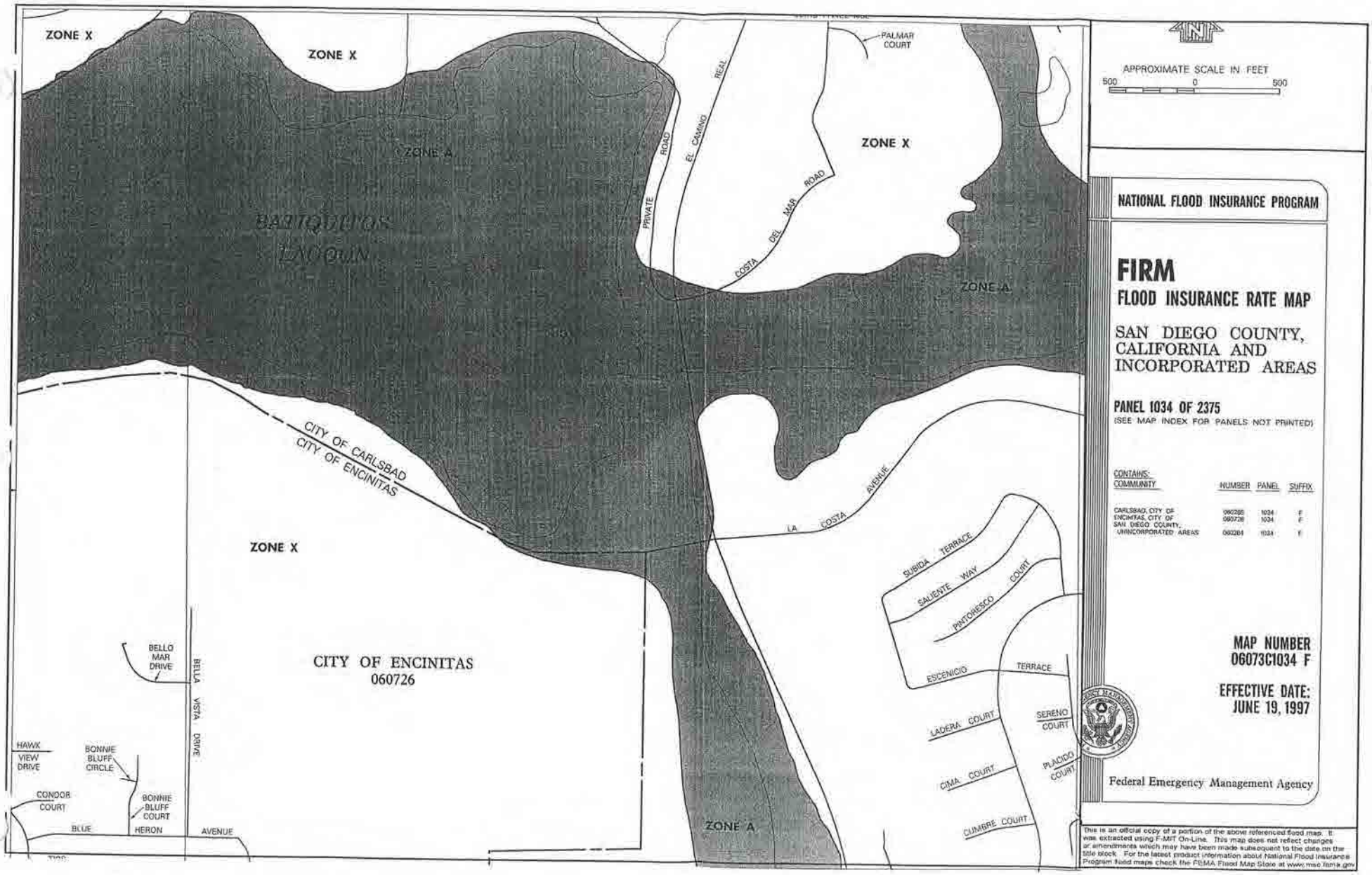
FIGURE D-4
**Grading Plan for Mitigated Alternative B**

BATIQUITOS LAGOON
ENHANCEMENT PROJECT EIR/EIS

City of Carlsbad
U.S. Army Corps of Engineers

Aerial base map by Photo Genetics, June 21, 1989
D.N.L. Completed May 1990


CITY OF CARLSBAD
060285
WINDROSE CIRCLE
NAVIGATOR CIRCLE
NAVIGATOR COURT
NAVIGATOR CIRCLE
ANNDA ENCINAS
ZONE X
SOUTH CARLSBAD STATE BEACH
CARLSBAD BOULEVARD
ZONE VE
(EL 13)
LIMIT OF DETAILED STUDY
ZONE A
33
ZONE A
ZONE AE
(EL 7)
CITY OF CARLSBAD
CITY OF ENCINITAS
SHERIDAN ROAD
LA COSTA AVENUE
PONTO STATE BEACH
ZONE X
ZONE AE
(EL 8)
ZONE VE
(EL 8)
ZONE X
SHERIDAN ROAD
AVENUE
ANDREW
SKY LOFT
BARBARA LANE
CAUDOR
NOMA LANE
PARLIAMENT
HAYMARKET ROAD
MOORGATE ROAD
CITY OF CARLSBAD
CITY OF ENCINITAS
PONTO
APPROXIMATE SCALE IN FEET
500 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS
PANEL 1033 OF 2375
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CARLSBAD, CITY OF 060285 1033 F
ENCINITAS, CITY OF 060726 1033 F
SAN DIEGO COUNTY, UNINCORPORATED AREAS 060284 1033 F
MAP NUMBER
06073C1033 F
EFFECTIVE DATE:
JUNE 19, 1997
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


ZONE X
ZONE X
ZONE A
BATIQUITOS LAGOON
PALMAR COURT
PRIVATE ROAD
EL CAMINO REAL
COSTA DEL MAR ROAD
ZONE X
ZONE A
CITY OF CARLSBAD
CITY OF ENCINITAS
LA COSTA AVENUE
ZONE X
CITY OF ENCINITAS
060726
BELLO MAR DRIVE
BELLA VISTA DRIVE
HAWK VIEW DRIVE
BONNIE BLUFF CIRCLE
CONDOR COURT
BONNIE BLUFF COURT
BLUE HERON
AVENUE
SUBIDA TERRACE
SALIENTE WAY
PINTORESCO COURT
ESCENICIO TERRACE
LADERA COURT
SERENO COURT
CIMA COURT
PLACIDO COURT
CUMBRE COURT
ZONE A
APPROXIMATE SCALE IN FEET
500 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS
PANEL 1034 OF 2375
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CARLSBAD, CITY OF 060285 1034 F
ENCINITAS, CITY OF 060726 1034 F
SAN DIEGO COUNTY, UNINCORPORATED AREAS 060284 1034 F
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Federal Emergency Management Agency
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Table 6. Summary of Pacific Ocean Wave Elevations

| Location | Wave Runup Elevation (Feet) 10-Year | 100-Year | 500-Year | Wave Setup Elevation (Feet) 10-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|---|
| At Mouth of Batiquitos Lagoon | 9.5 | 13.3 | 15.8 | 4.8 | 5.4 | 6.5 |
| Just South of Mouth of Batiquitos Lagoon | 6.5 | 8.2 | 10.3 | | | |
| Shoreline Adjacent to California Western University | 13.8 | 20.9 | 24.0 | | | |
| Shoreline Between the Intersections of Hill Street and Cordova Street to the Intersection of Point Loma Avenue and Sunset Cliffs Boulevard | 12.0 | 17.8 | 20.6 | | | |
| Shoreline Between the Intersection of Loma Point and Sunset Cliffs Boulevard to the Ocean Beach Park Municipal Pier | 6.6 | 8.7 | 10.6 | | | |
| Shoreline 1,000 feet South of False Point | 9.47 | 13.47 | 15.9 | | | |
| Shoreline North of False Point to the Intersection of Bird Rock Avenue and Dolphine Place | 12.2 | 18.0 | 20.9 | | | |
| Shoreline from the Intersection of Chelsea Avenue and Caminode La Coasta to a Point About 500 feet North of the Intersection of Caminode La Coasta and La Canada | 8.6 | 12.0 | 14.3 | | | |
| Shoreline from Palomar Avenue South Approximately 1,500 Feet | 7.7 | 10.4 | 12.5 | | | |
| Shoreline from Palomar Avenue to Fern Glen | 7.1 | 9.4 | 11.5 | | | |
| Shoreline from Fern Glen to Pearl Street | 6.0 | 7.6 | 9.5 | | | |

# USGS Map

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

ENCINITAS QUADRANGLE
CALIFORNIA—SAN DIEGO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 OCEANSIDE 15' QUADRANGLE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1947. Field checked 1947–48. Revised from aerial photographs taken 1967. Field checked 1968

Selected hydrographic data compiled from USC&GS Surveys (1924, 1934-35)
This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grid based on California coordinate system, zone 6
1000-meter Universal Transverse Mercator grid ticks,
zone 11, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Fine red dashed lines indicate selected fence lines

UTM GRID AND 1975 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Revisions shown in purple compiled from aerial photographs taken 1975. This information not field checked

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOWER LOW WATER

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route

ENCINITAS, CALIF.
SE/4 OCEANSIDE 15' QUADRANGLE
N3300—W11715/7.5

1968
PHOTOREVISED 1975
AMS 2550 III SE—SERIES V895

# APPENDIX B

## Results Summary

## HEC-RAS Cross Section Input/Output

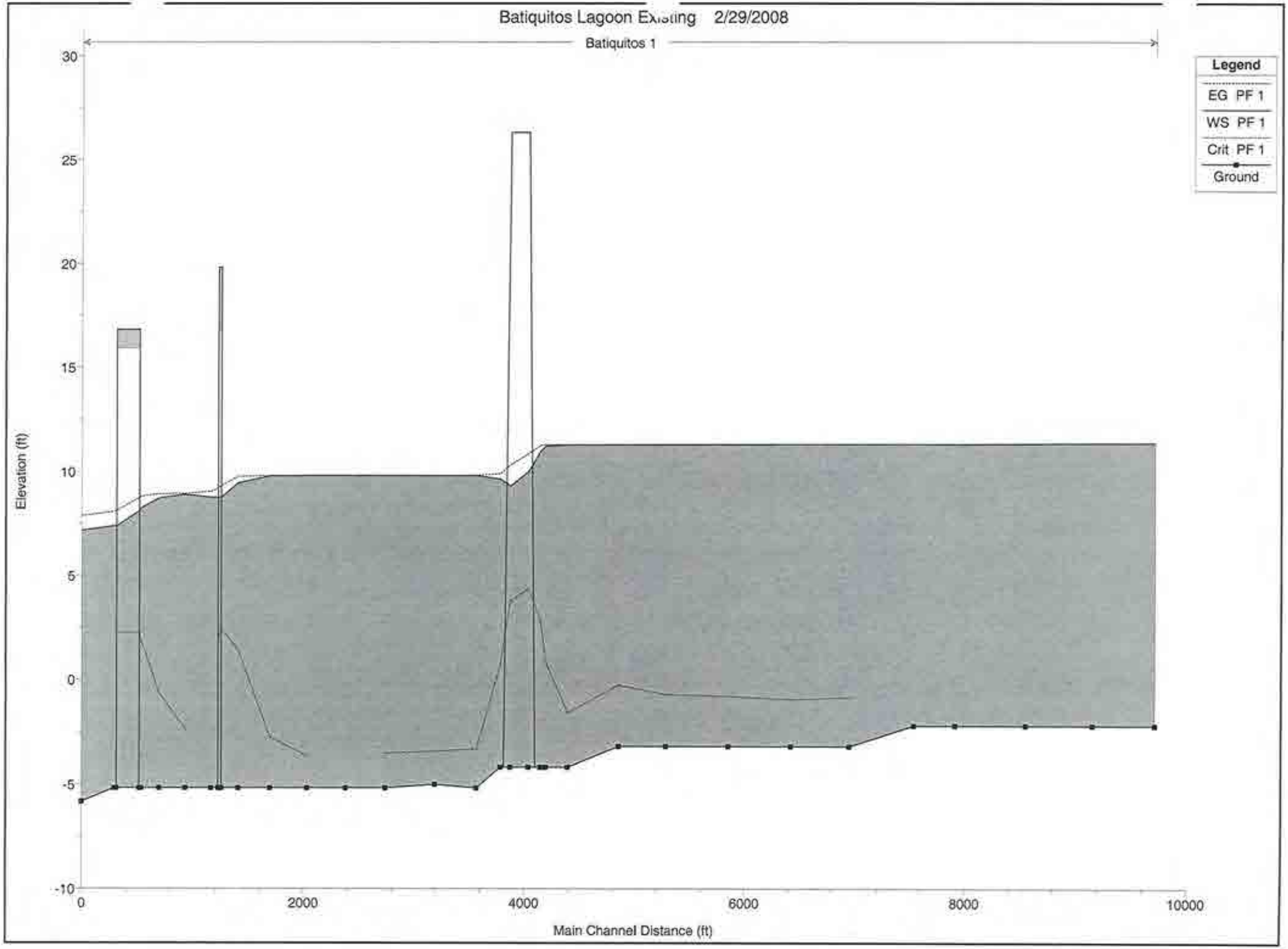
### Existing

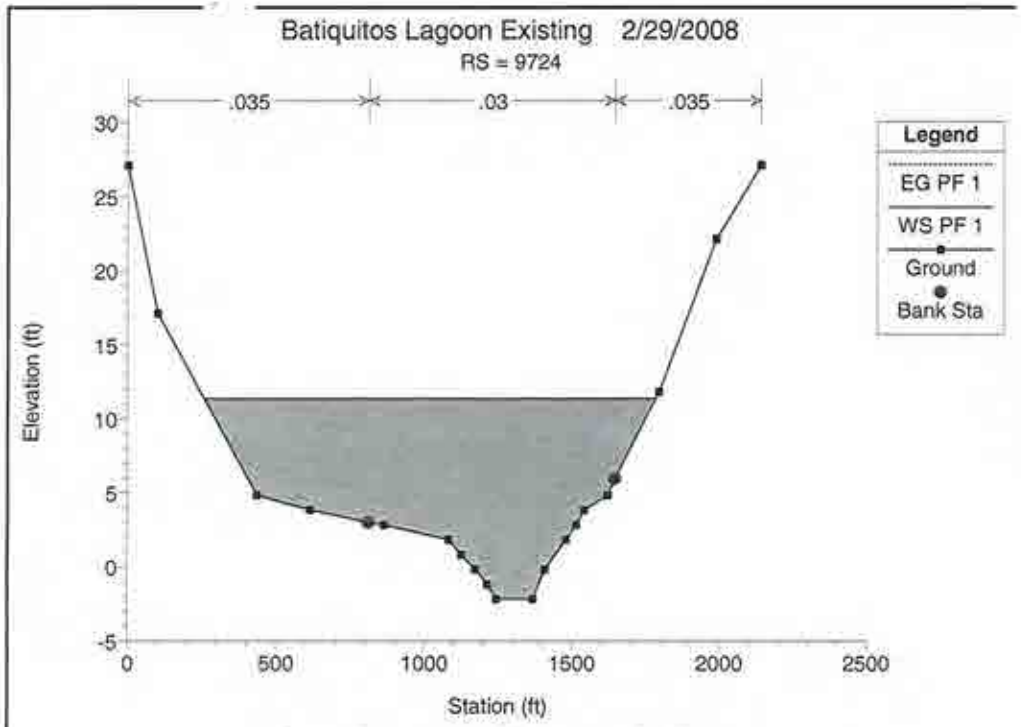
### Proposed

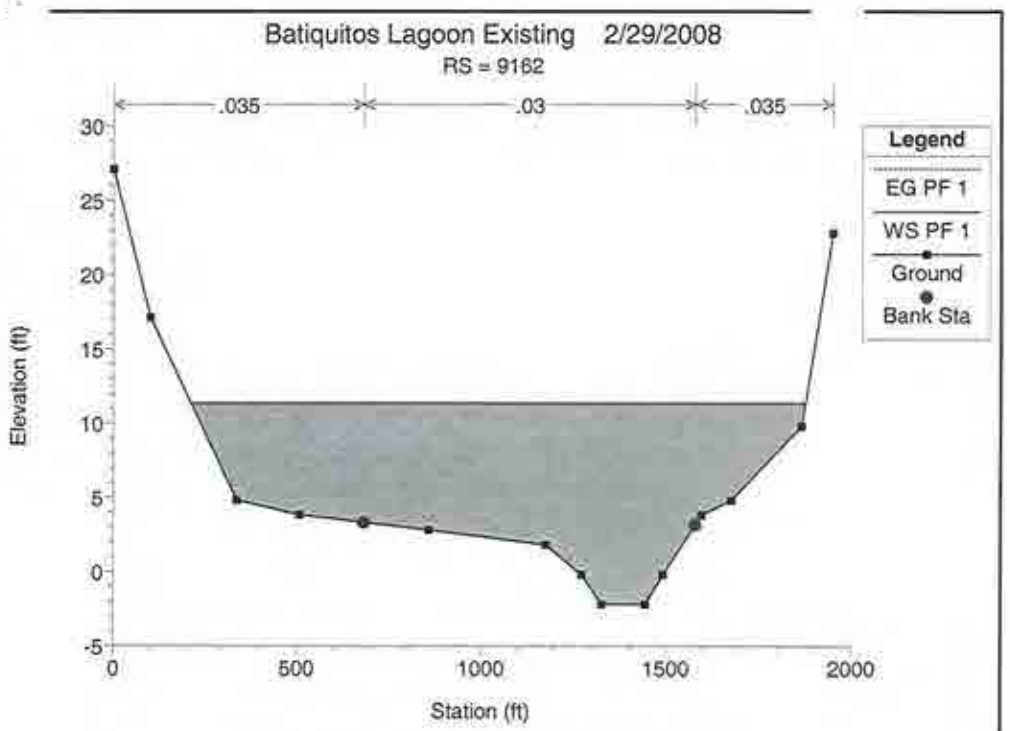
# EXISTING

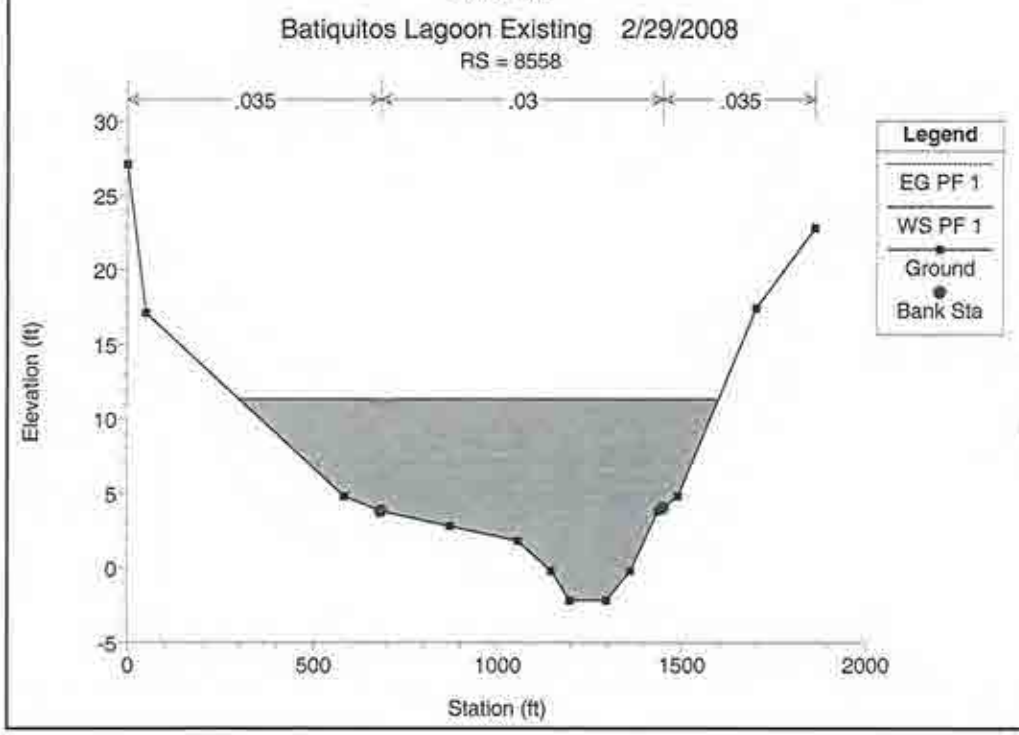
HEC-RAS Plan: BL_Exist River: Batiquitos Reach: 1 Profile: PF 1

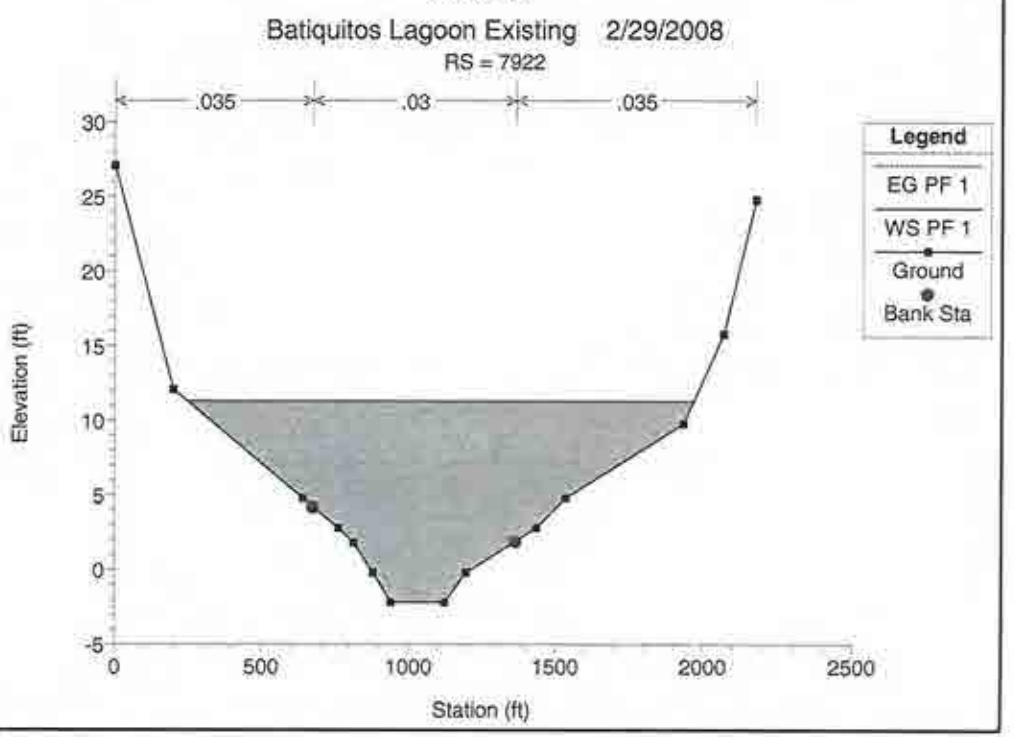
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 1 | 9724 | PF 1 | 12000.00 | -2.18 | 11.37 | | 11.38 | 0.000024 | 1.12 | 12231.76 | 1526.92 | 0.06 |
| 1 | 9162 | PF 1 | 12000.00 | -2.18 | 11.36 | | 11.37 | 0.000019 | 1.02 | 13538.79 | 1665.57 | 0.06 |
| 1 | 8558 | PF 1 | 12000.00 | -2.18 | 11.33 | | 11.36 | 0.000035 | 1.36 | 9973.96 | 1298.03 | 0.08 |
| 1 | 7922 | PF 1 | 12000.00 | -2.18 | 11.32 | | 11.34 | 0.000024 | 1.22 | 12244.24 | 1719.03 | 0.06 |
| 1 | 7547 | PF 1 | 12000.00 | -2.18 | 11.32 | | 11.33 | 0.000008 | 0.76 | 16745.06 | 1528.84 | 0.04 |
| 1 | 6962 | PF 1 | 12000.00 | -3.18 | 11.31 | -0.82 | 11.32 | 0.000008 | 0.79 | 15734.69 | 1572.21 | 0.04 |
| 1 | 6431 | PF 1 | 12000.00 | -3.18 | 11.30 | -0.93 | 11.32 | 0.000011 | 0.94 | 13387.49 | 1967.00 | 0.05 |
| 1 | 5864 | PF 1 | 12000.00 | -3.18 | 11.29 | -0.78 | 11.31 | 0.000015 | 1.10 | 11637.82 | 1911.35 | 0.05 |
| 1 | 5293 | PF 1 | 12000.00 | -3.18 | 11.29 | -0.69 | 11.30 | 0.000014 | 0.98 | 12758.45 | 1993.45 | 0.05 |
| 1 | 4871 | PF 1 | 12000.00 | -3.18 | 11.28 | -0.25 | 11.29 | 0.000015 | 1.04 | 12614.78 | 2173.11 | 0.05 |
| 1 | 4407 | PF 1 | 12000.00 | -4.18 | 11.27 | -1.54 | 11.29 | 0.000010 | 0.92 | 13579.51 | 2898.08 | 0.04 |
| 1 | 4209 | PF 1 | 12000.00 | -4.18 | 11.23 | 0.85 | 11.28 | 0.000049 | 1.82 | 6582.54 | 3055.56 | 0.09 |
| 1 | 4159 | PF 1 | 12000.00 | -4.18 | 10.96 | 2.66 | 11.25 | 0.001048 | 4.34 | 2765.97 | 3067.71 | 0.22 |
| 1 | 4000 | | Bridge | | | | | | | | | |
| 1 | 3797 | PF 1 | 12000.00 | -4.18 | 9.64 | 0.74 | 9.90 | 0.000213 | 4.08 | 2941.05 | 2200.43 | 0.20 |
| 1 | 3581 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.30 | 9.82 | 0.000010 | 0.95 | 12574.48 | 1907.17 | 0.04 |
| 1 | 3204 | PF 1 | 12000.00 | -5.00 | 9.80 | -3.41 | 9.81 | 0.000006 | 0.74 | 16485.04 | 1594.47 | 0.03 |
| 1 | 2754 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.51 | 9.81 | 0.000007 | 0.73 | 16536.97 | 1270.86 | 0.03 |
| 1 | 2428 | PF 1 | 12000.00 | -5.18 | 9.80 | | 9.81 | 0.000003 | 0.55 | 22514.18 | 1657.88 | 0.03 |
| 1 | 2076 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.65 | 9.81 | 0.000005 | 0.68 | 17987.88 | 2099.63 | 0.03 |
| 1 | 1740 | PF 1 | 12000.00 | -5.18 | 9.78 | -2.73 | 9.80 | 0.000020 | 1.19 | 10060.15 | 2060.58 | 0.06 |
| 1 | 1454 | PF 1 | 12000.00 | -5.18 | 9.46 | 1.42 | 9.76 | 0.000321 | 4.42 | 2715.52 | 239.80 | 0.23 |
| 1 | 1300 | | Bridge | | | | | | | | | |
| 1 | 1207 | PF 1 | 12000.00 | -5.18 | 8.76 | | 9.04 | 0.000269 | 4.46 | 2978.39 | 278.54 | 0.22 |
| 1 | 976 | PF 1 | 12000.00 | -5.18 | 8.90 | -2.33 | 8.95 | 0.000041 | 1.83 | 6710.87 | 1636.29 | 0.09 |
| 1 | 874 | PF 1 | 12000.00 | -5.18 | 8.72 | -0.63 | 8.92 | 0.000162 | 3.60 | 3480.47 | 456.59 | 0.17 |
| 1 | 581 | PF 1 | 12000.00 | -5.18 | 8.26 | 1.86 | 8.82 | 0.002188 | 6.27 | 2123.91 | 232.83 | 0.31 |
| 1 | 400 | | Bridge | | | | | | | | | |
| 1 | 342 | PF 1 | 12000.00 | -5.18 | 7.39 | | 8.08 | 0.000736 | 6.93 | 1926.47 | 220.55 | 0.35 |
| 1 | 47 | PF 1 | 12000.00 | -5.83 | 7.17 | 0.79 | 7.87 | 0.000652 | 6.99 | 1881.59 | 170.28 | 0.34 |

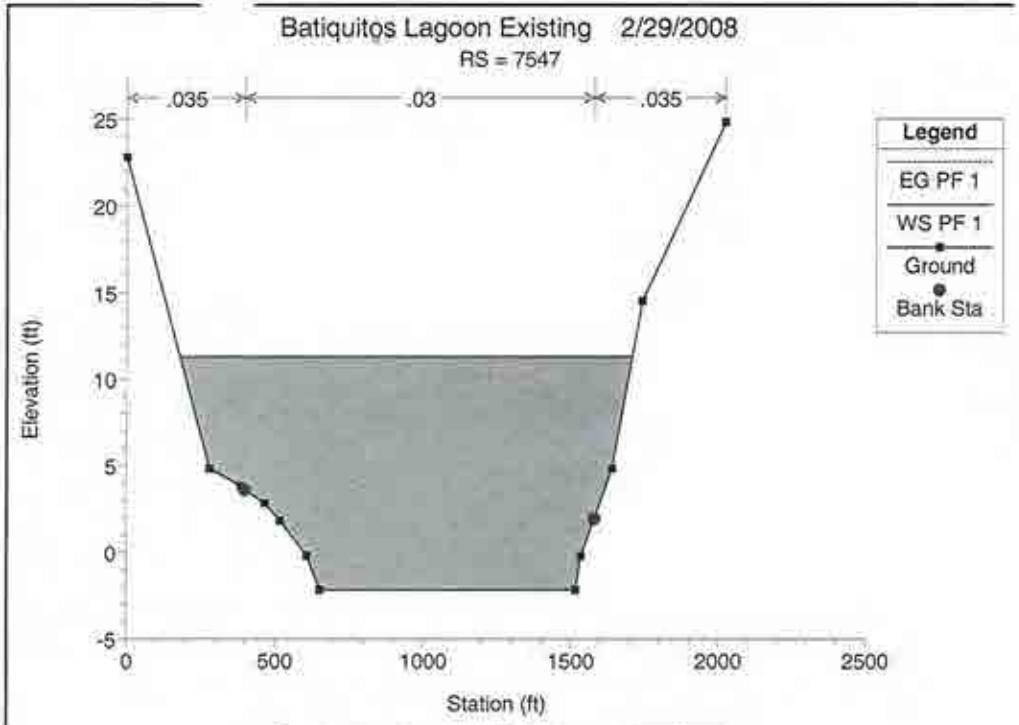

Batiquitos Lagoon Existing 2/29/2008
Batiquitos 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
30
25
20
15
10
5
0
-5
-10
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

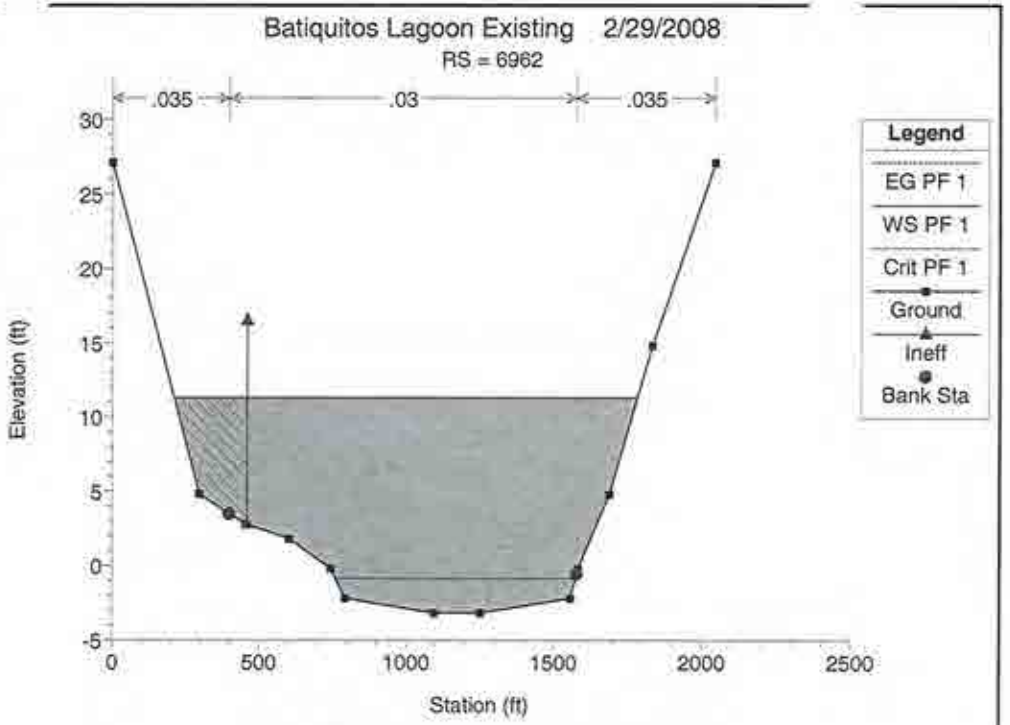

Batiquitos Lagoon Existing 2/29/2008
RS = 9724
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

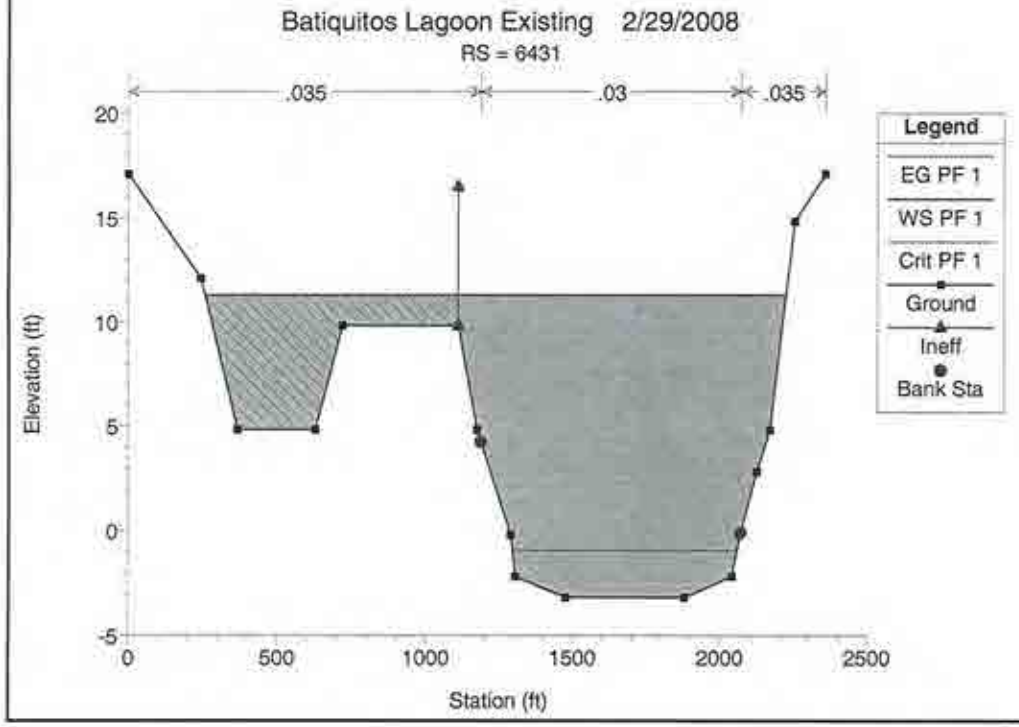

Batiquitos Lagoon Existing 2/29/2008
RS = 9162
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

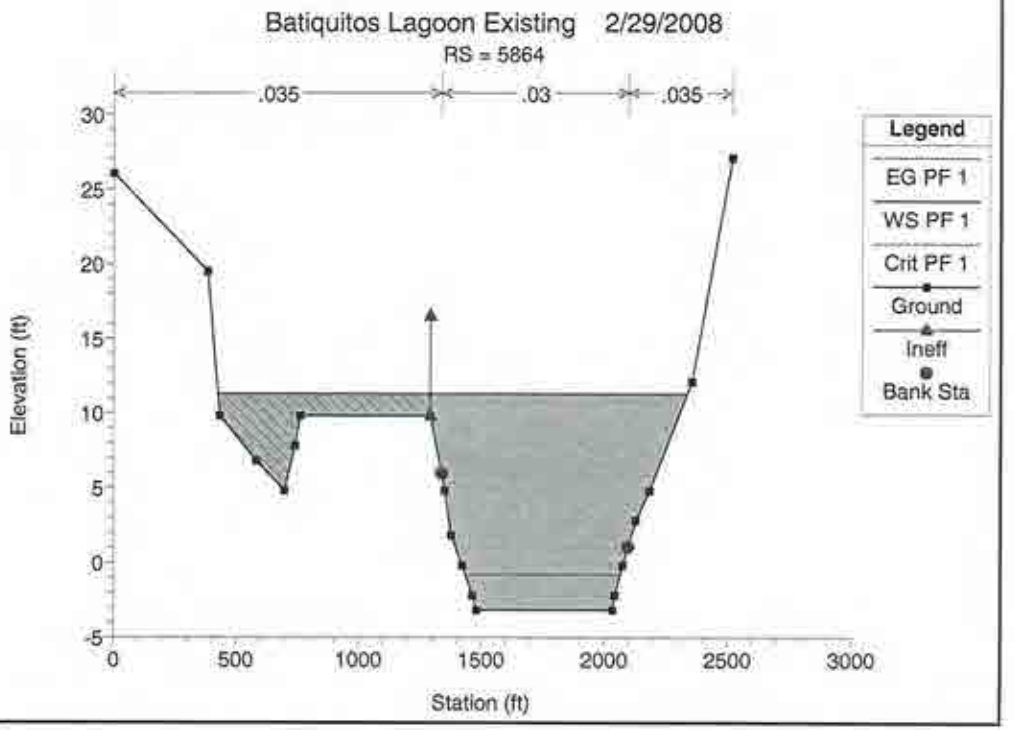

Batiquitos Lagoon Existing 2/29/2008
RS = 8558
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

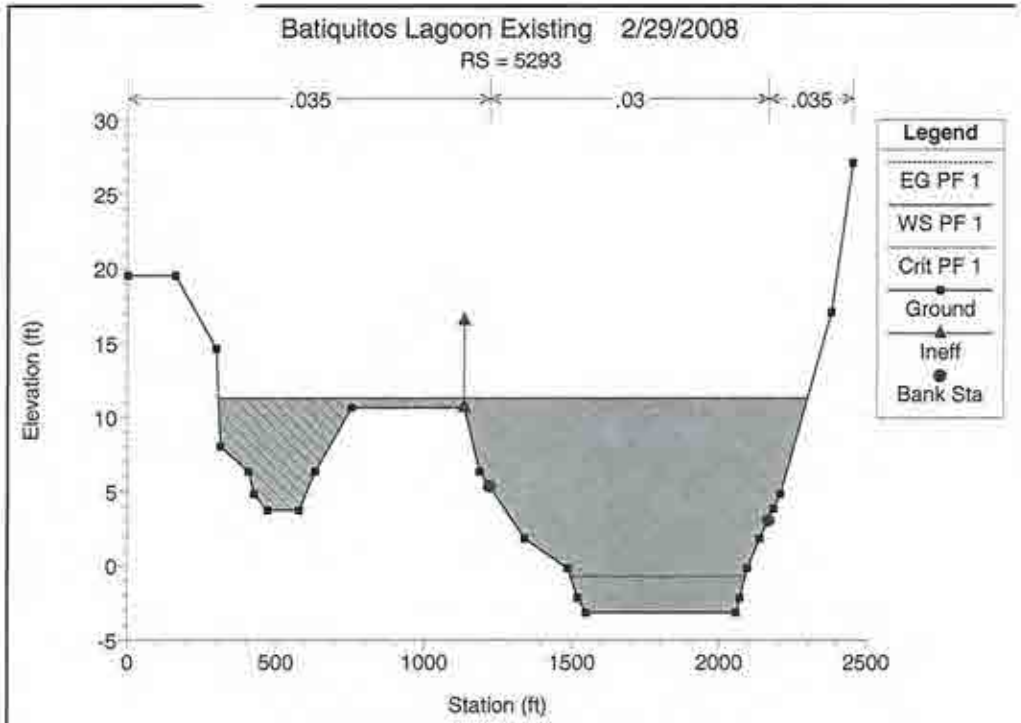

Batiquitos Lagoon Existing 2/29/2008
RS = 7922
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

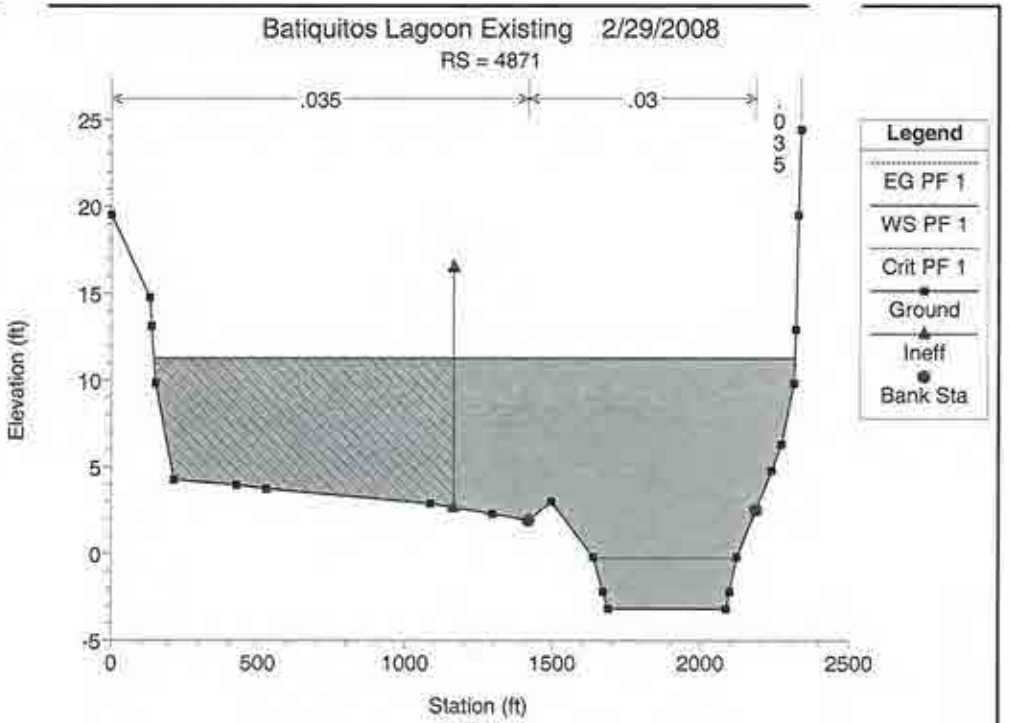

Batiquitos Lagoon Existing 2/29/2008
RS = 7547
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

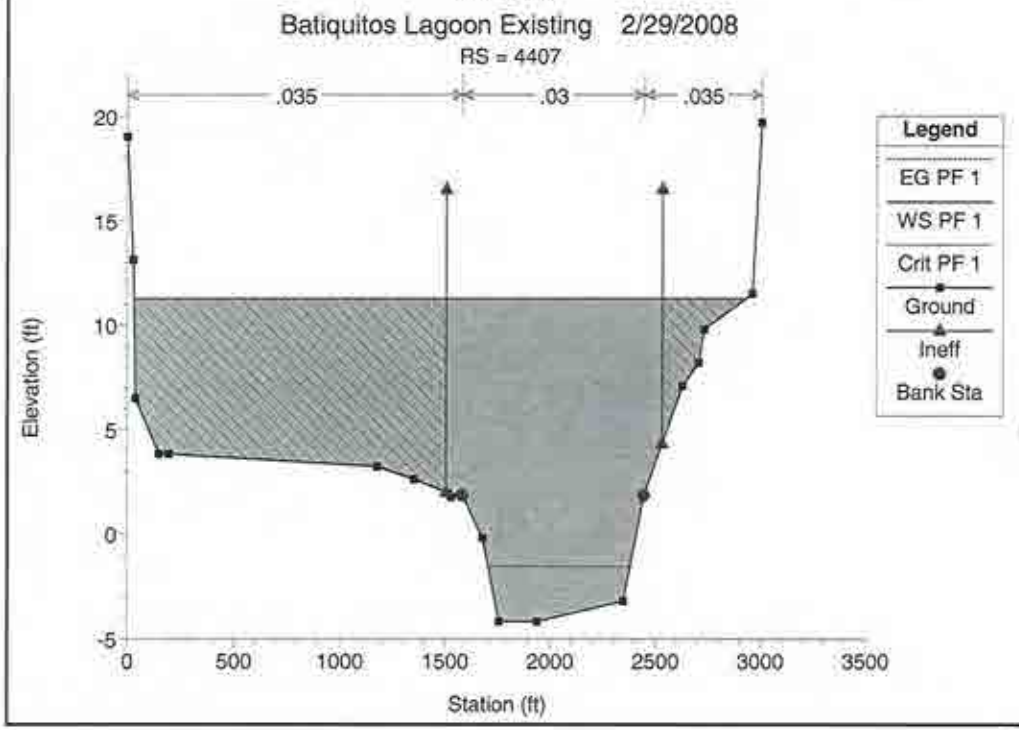

Batiquitos Lagoon Existing 2/29/2008
RS = 6962
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

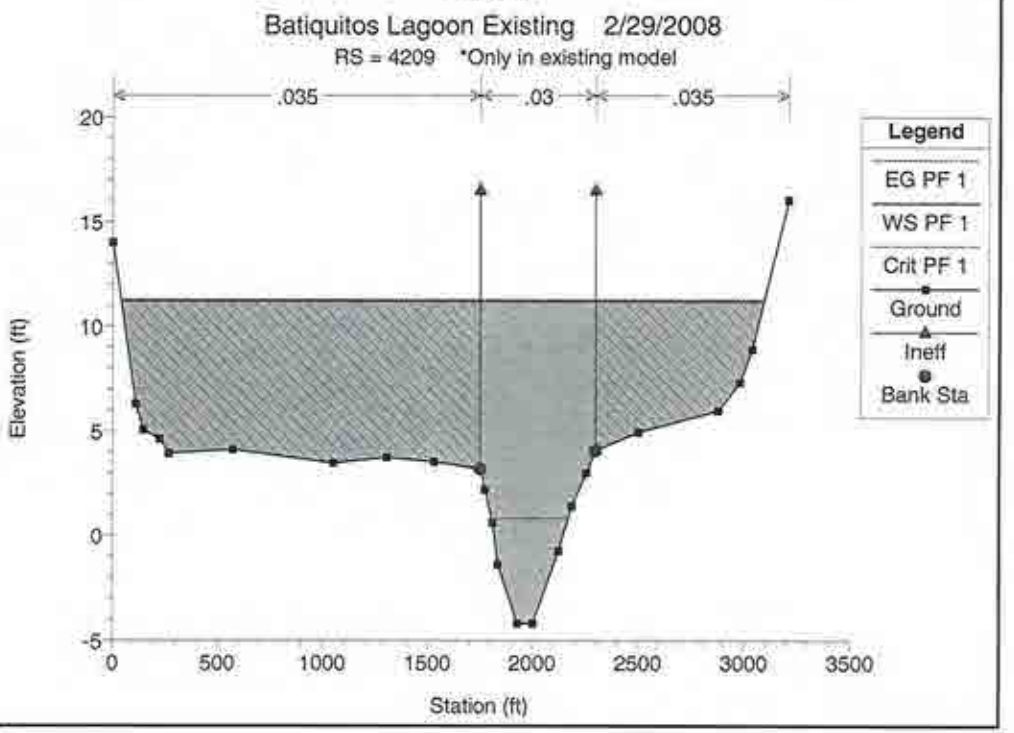

Batiquitos Lagoon Existing 2/29/2008
RS = 6431
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

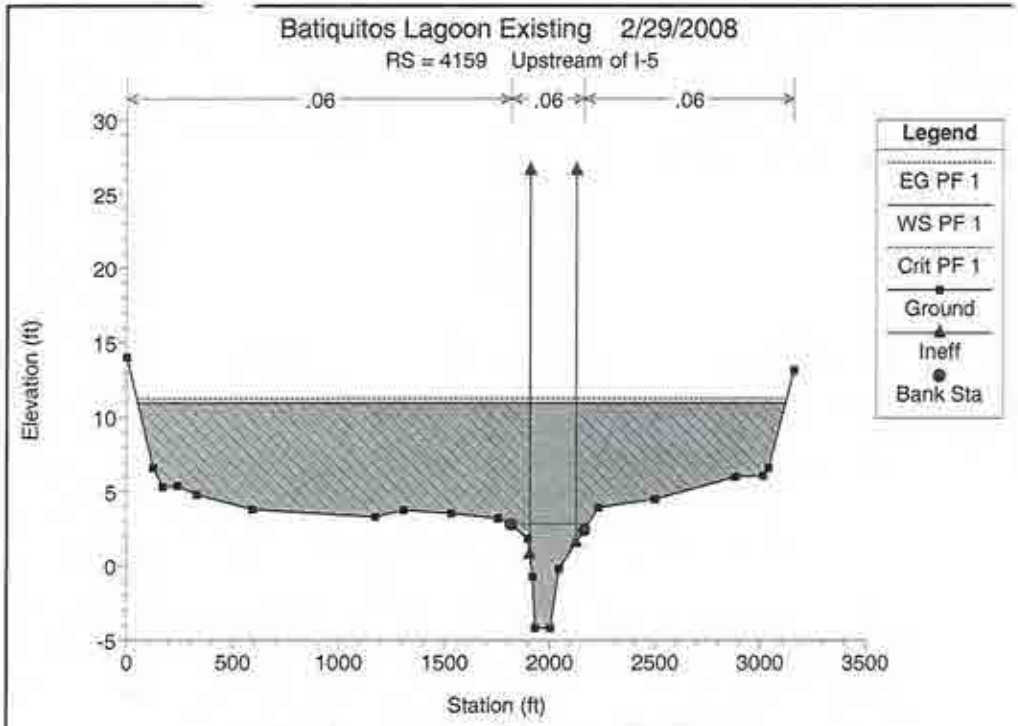

Batiquitos Lagoon Existing 2/29/2008
RS = 5864
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

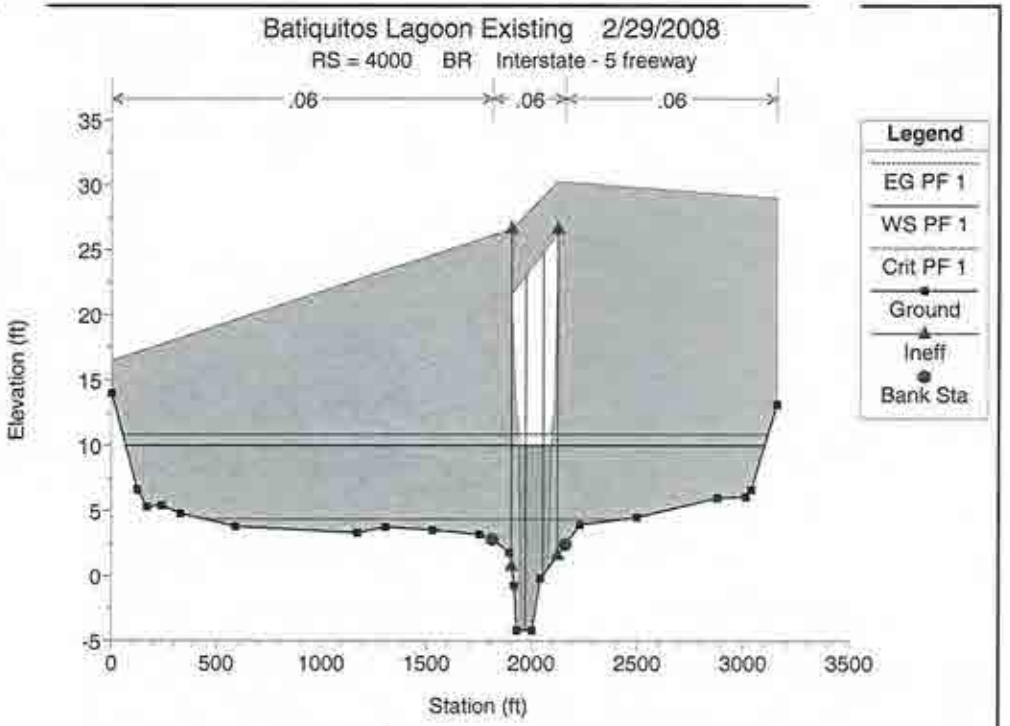

Batiquitos Lagoon Existing 2/29/2008
RS = 5293
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

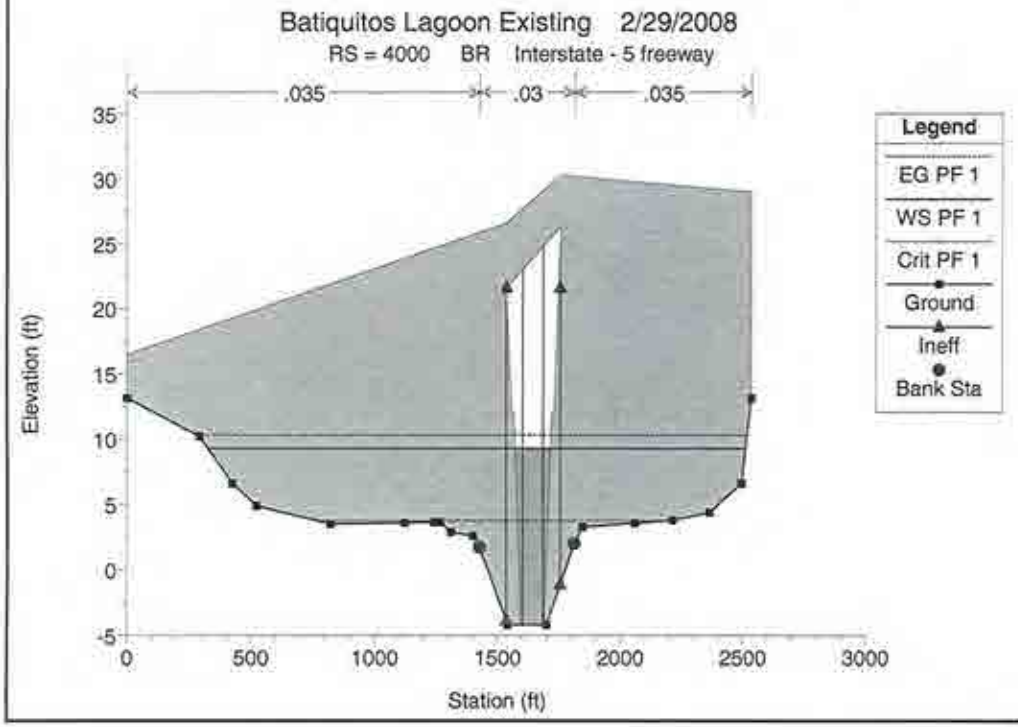

Batiquitos Lagoon Existing 2/29/2008
RS = 4871
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

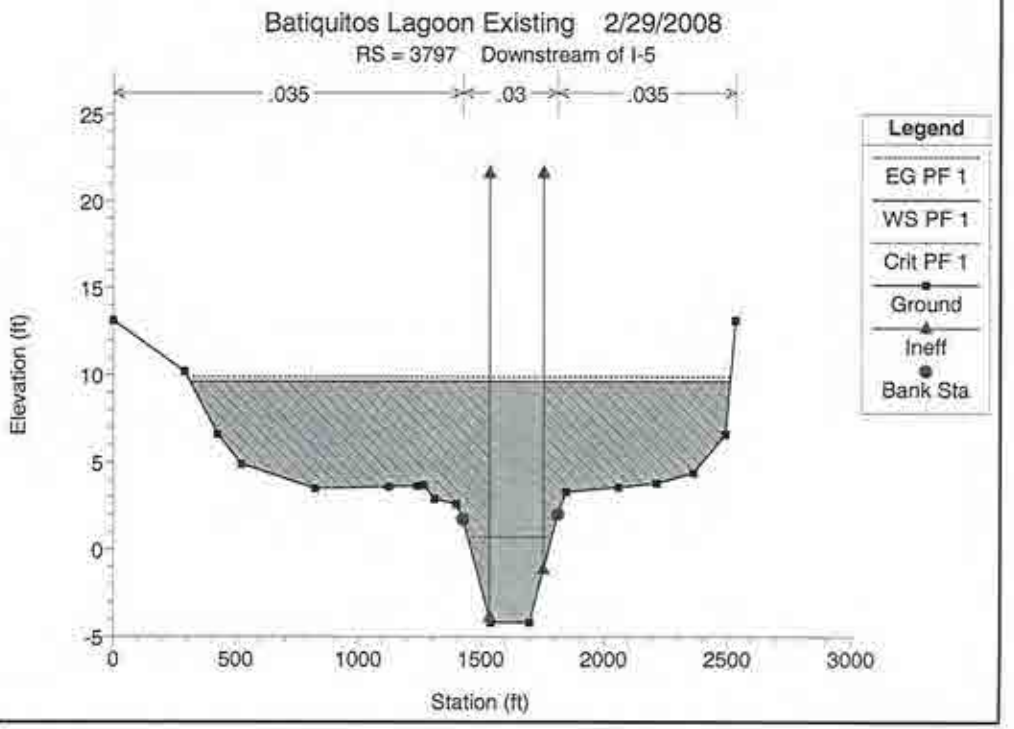

Batiquitos Lagoon Existing 2/29/2008
RS = 4407
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

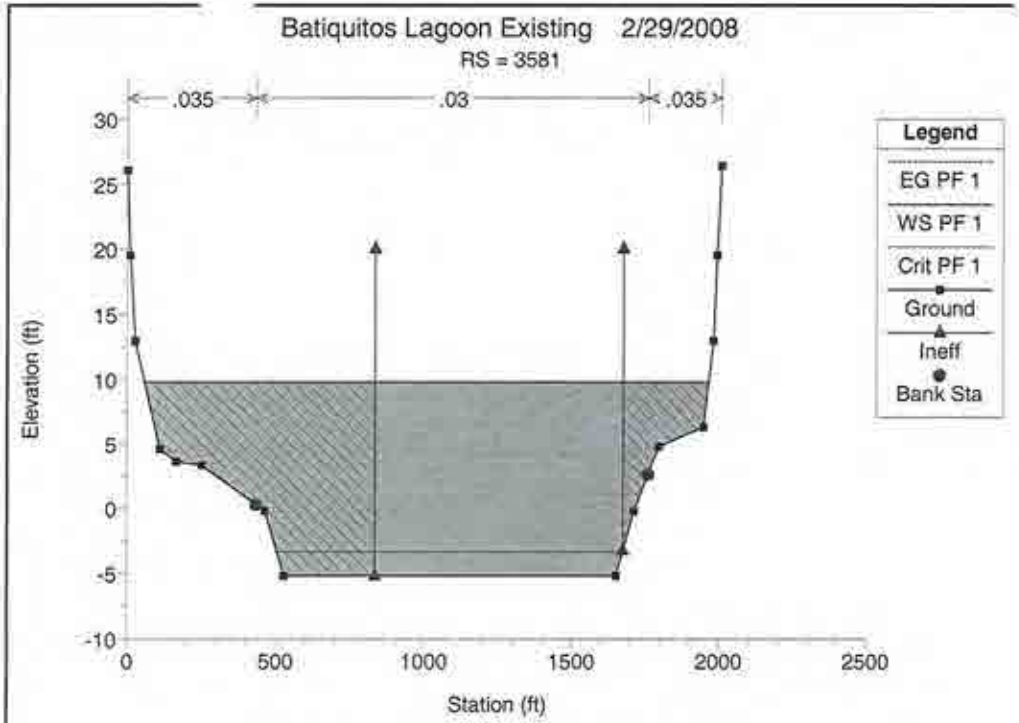

Batiquitos Lagoon Existing 2/29/2008
RS = 4209 *Only in existing model
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

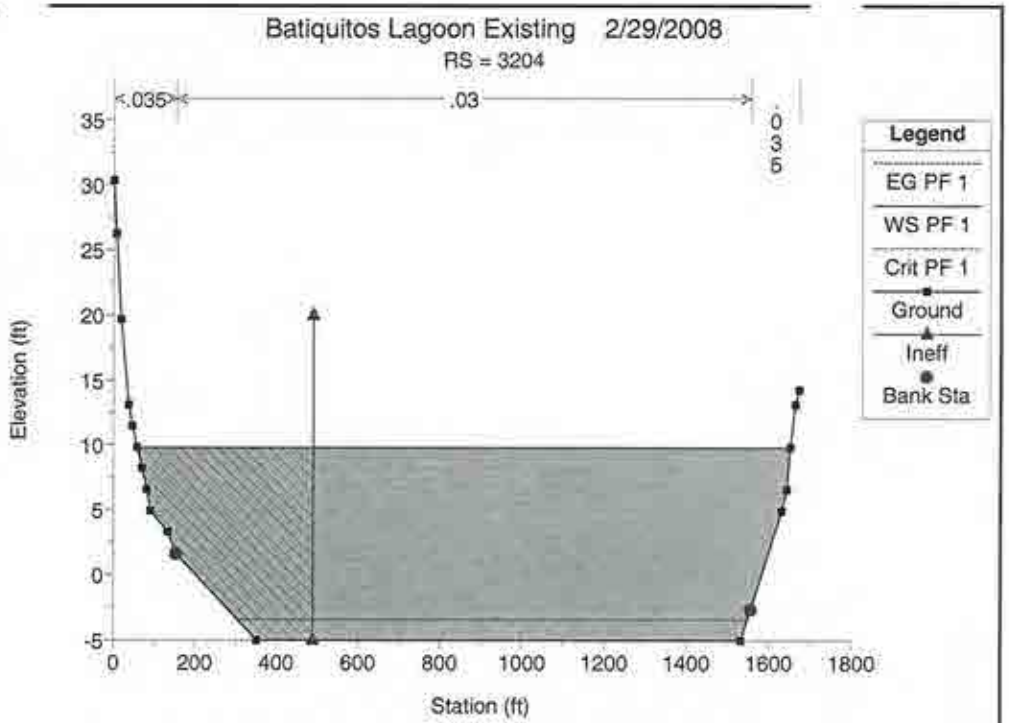

Batiquitos Lagoon Existing 2/29/2008
RS = 4159 Upstream of I-5
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

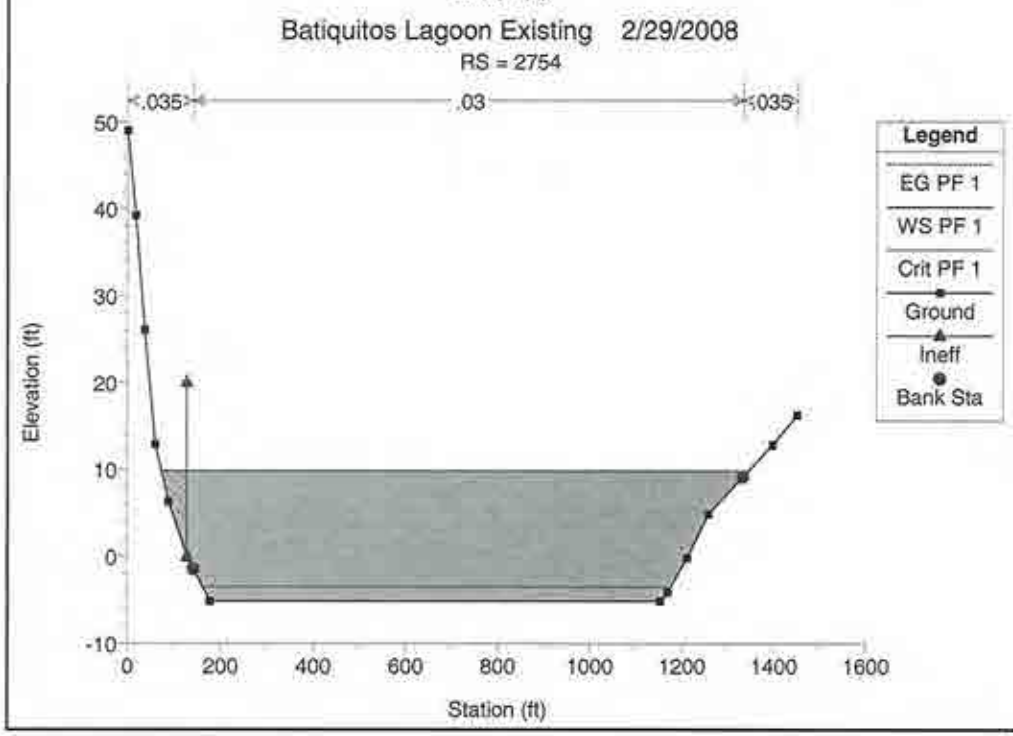

Batiquitos Lagoon Existing 2/29/2008
RS = 4000 BR Interstate - 5 freeway
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

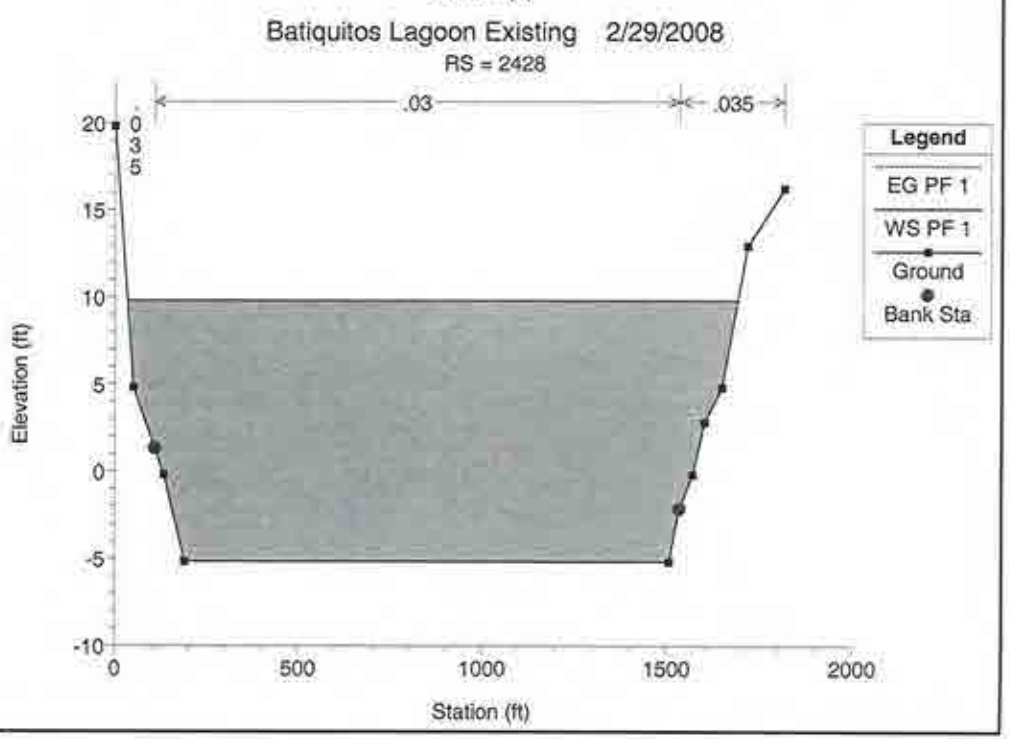

Batiquitos Lagoon Existing 2/29/2008
RS = 4000 BR Interstate - 5 freeway
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

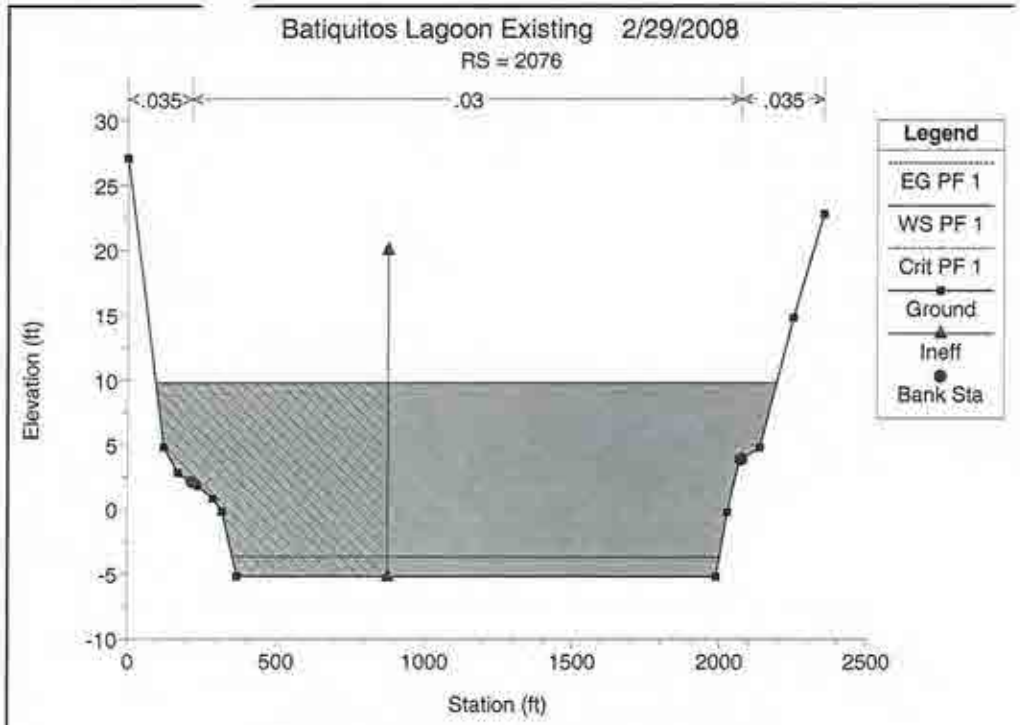

Batiquitos Lagoon Existing 2/29/2008
RS = 3797 Downstream of I-5
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

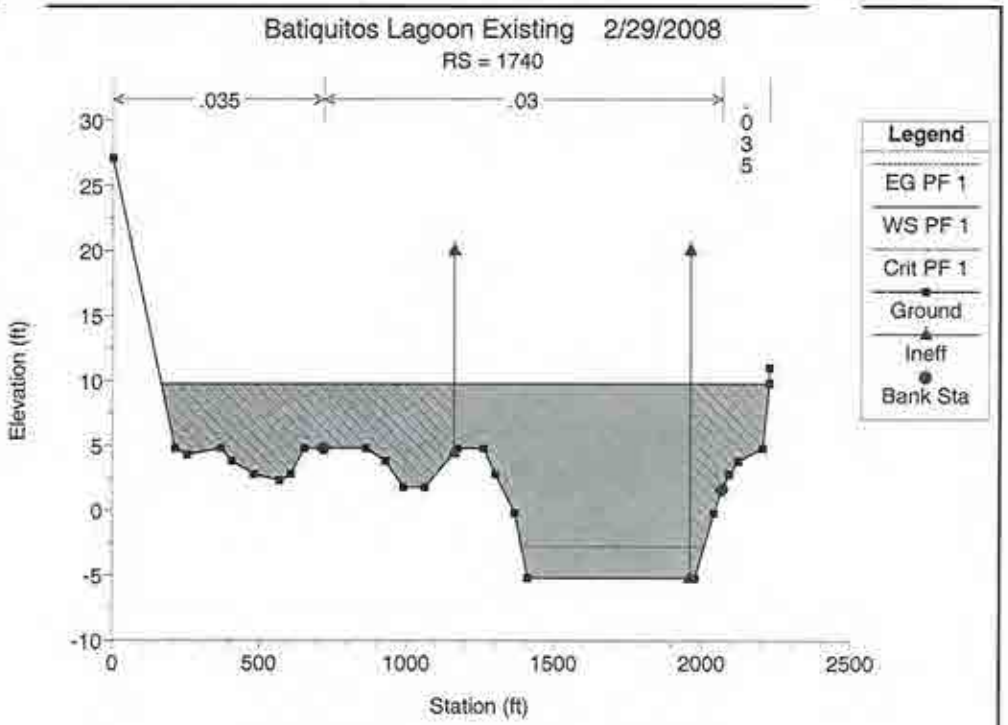

Batiquitos Lagoon Existing 2/29/2008
RS = 3581
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

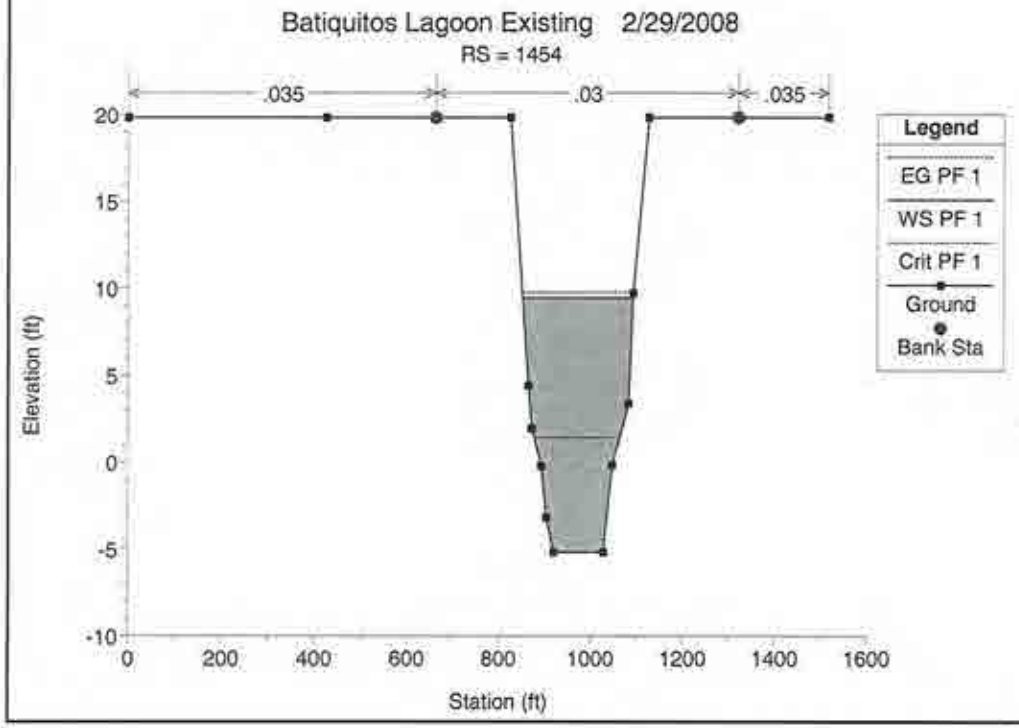

Batiquitos Lagoon Existing 2/29/2008
RS = 3204
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

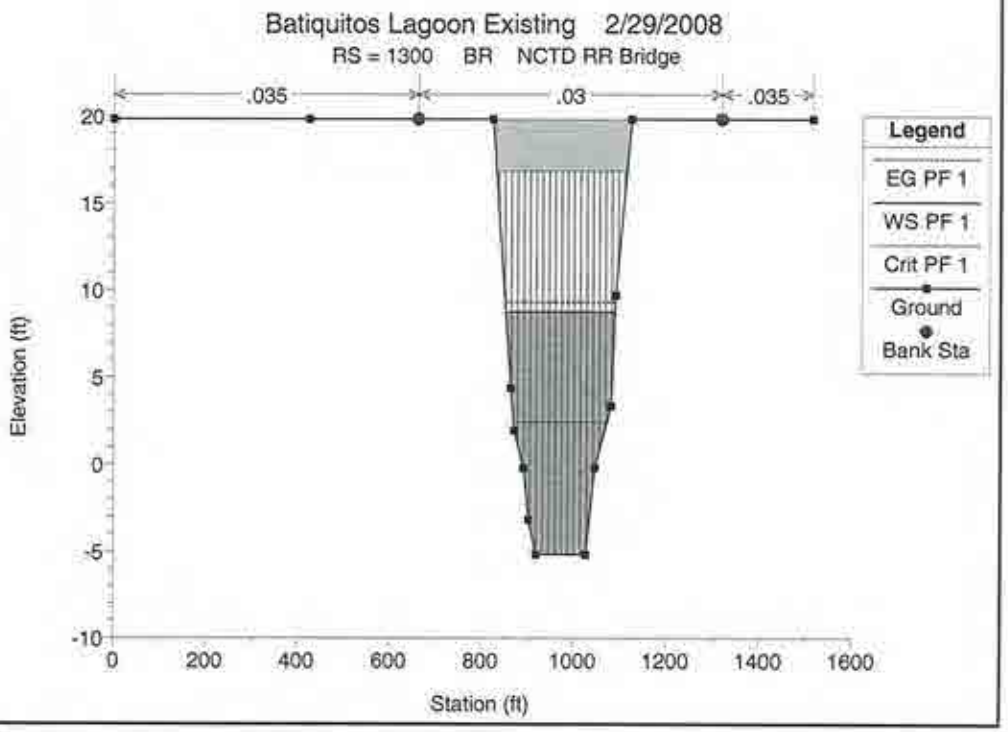

Batiquitos Lagoon Existing 2/29/2008
RS = 2754
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

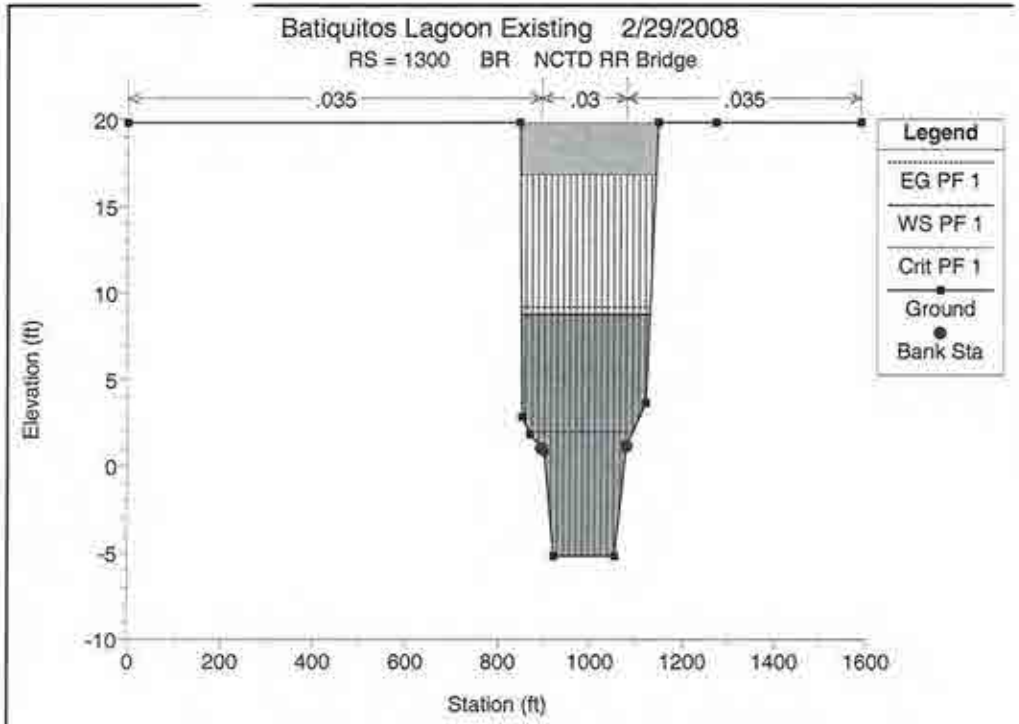

Batiquitos Lagoon Existing 2/29/2008
RS = 2428
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

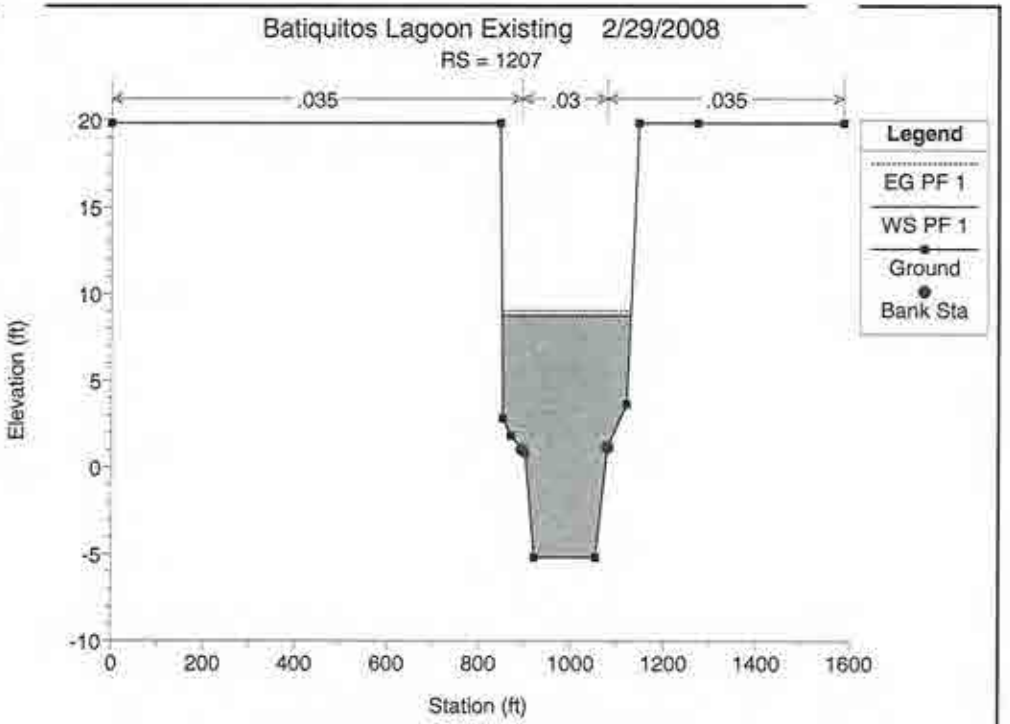

Batiquitos Lagoon Existing 2/29/2008
RS = 2076
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

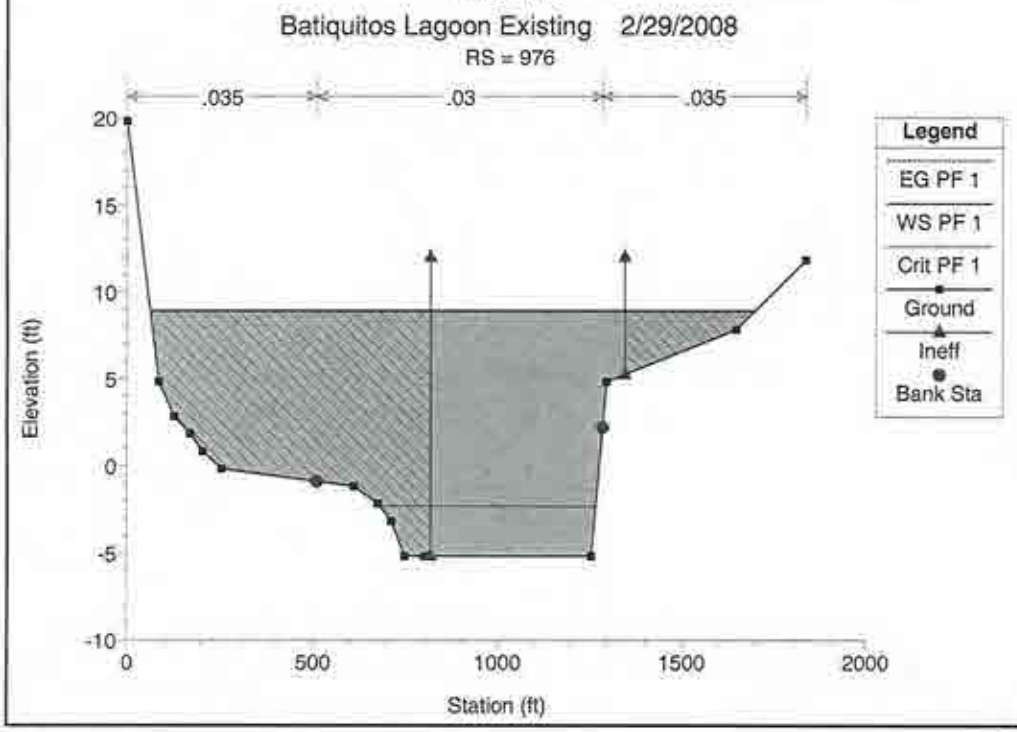

Batiquitos Lagoon Existing 2/29/2008
RS = 1740
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

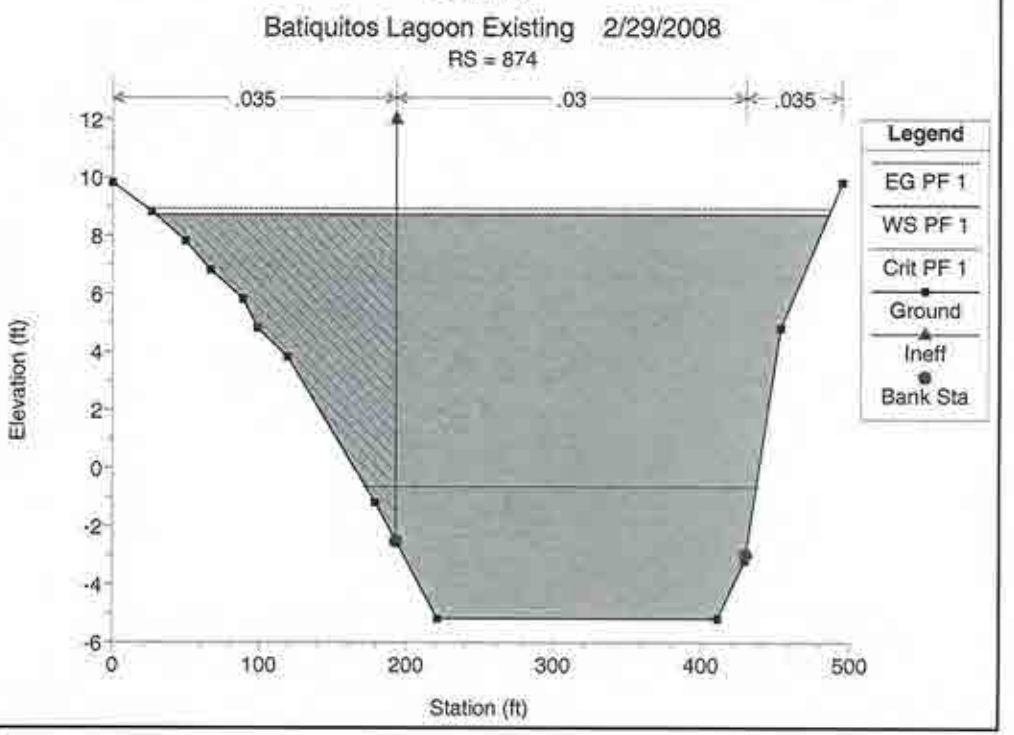

Batiquitos Lagoon Existing 2/29/2008
RS = 1454
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

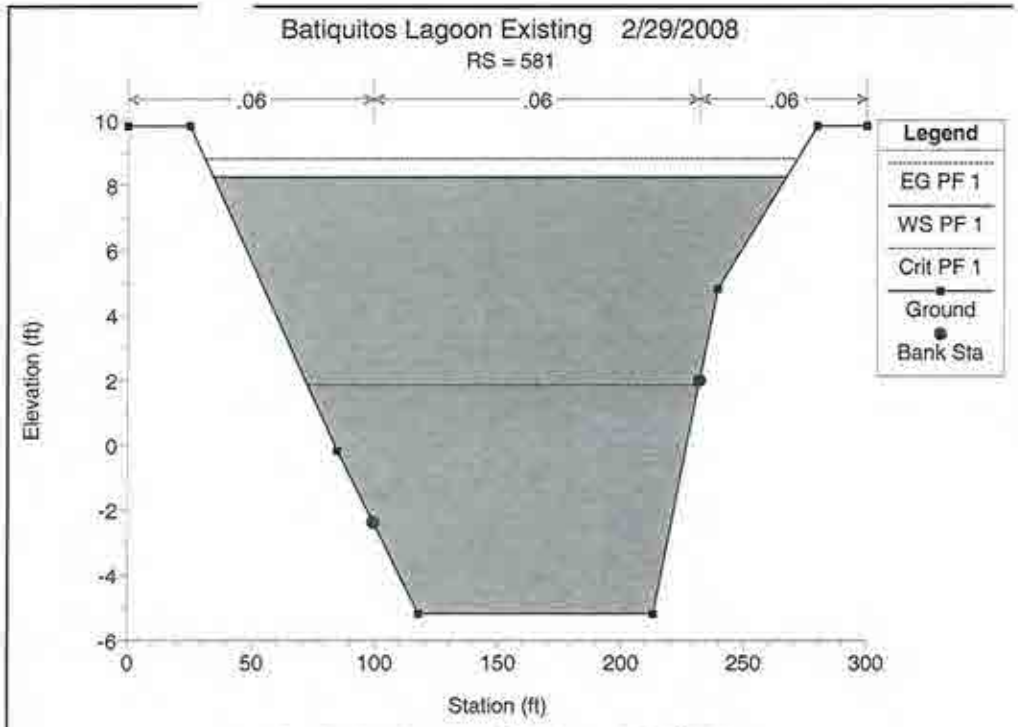

Batiquitos Lagoon Existing 2/29/2008
RS = 1300 BR NCTD RR Bridge
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

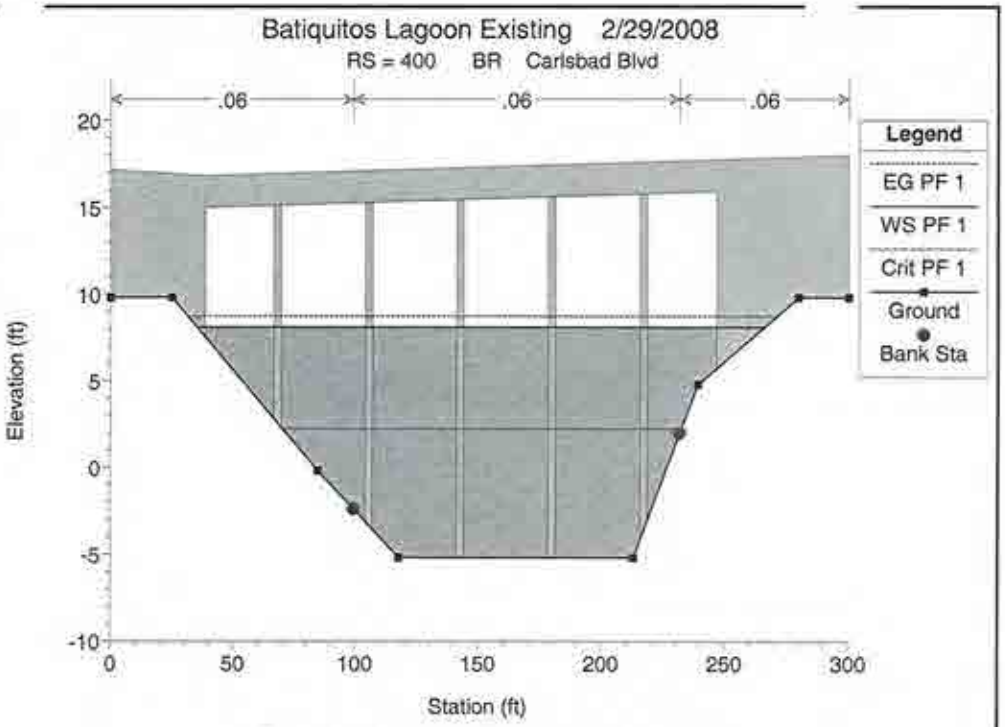

Batiquitos Lagoon Existing 2/29/2008
RS = 1300 BR NCTD RR Bridge
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

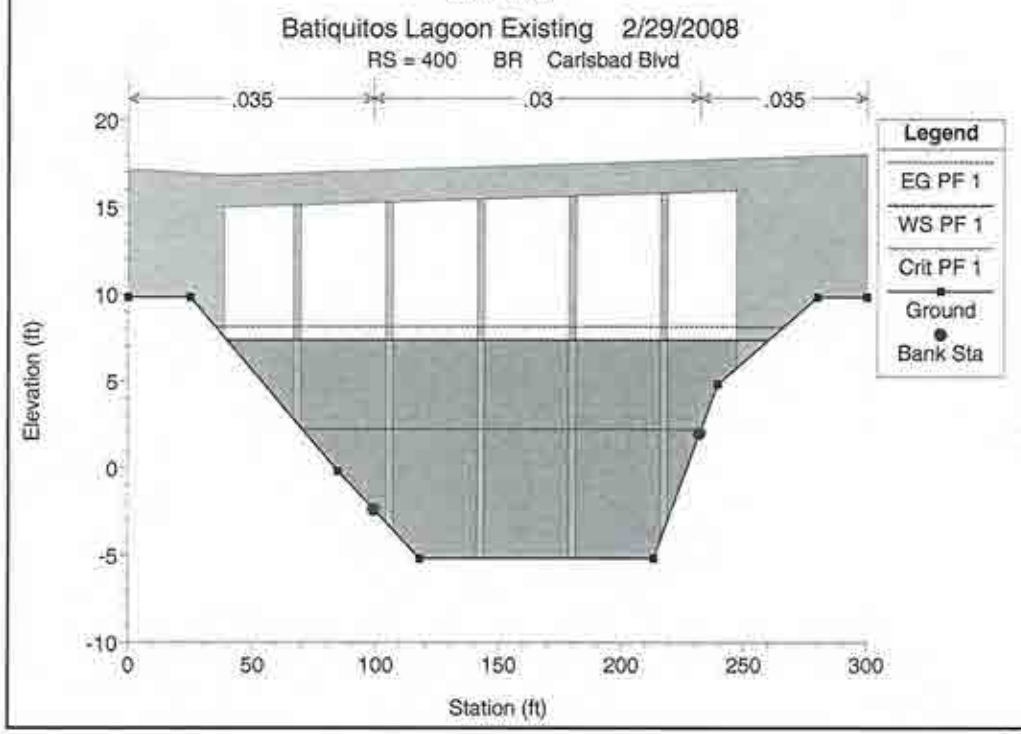

Batiquitos Lagoon Existing 2/29/2008
RS = 1207
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

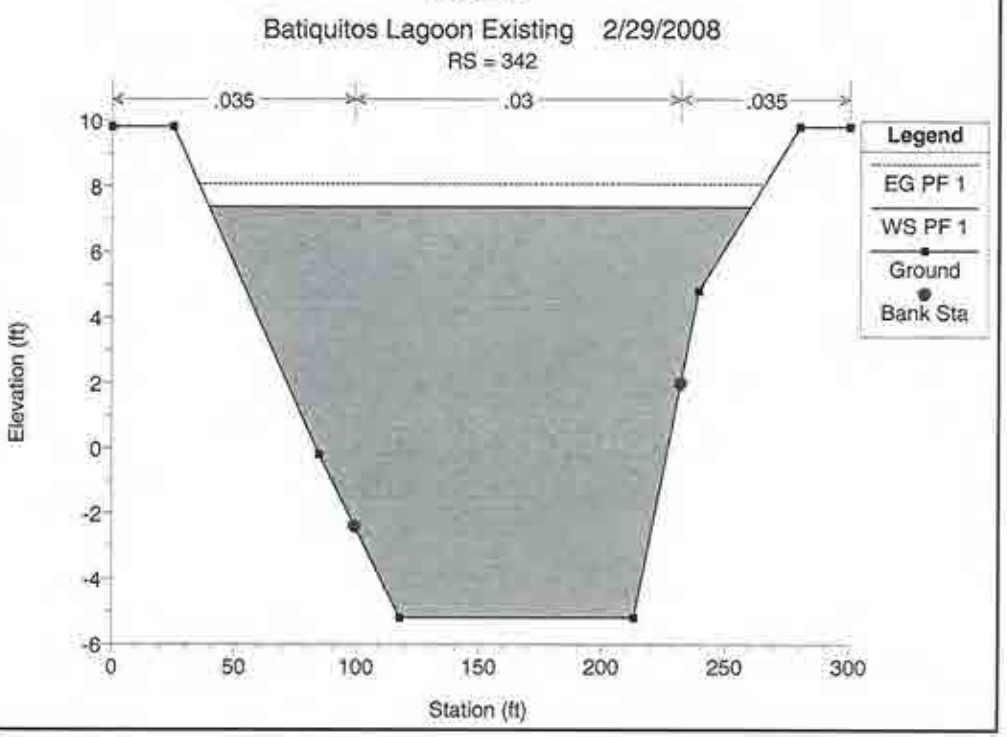

Batiquitos Lagoon Existing 2/29/2008
RS = 976
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

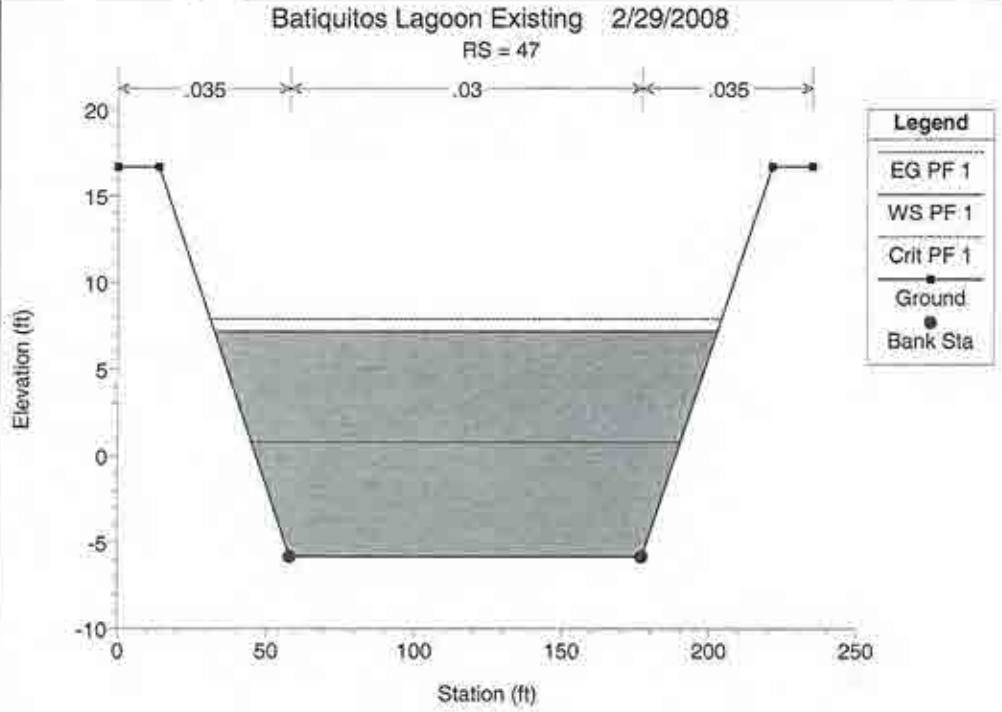

Batiquitos Lagoon Existing 2/29/2008
RS = 874
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Existing 2/29/2008
RS = 581
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Existing 2/29/2008
RS = 400 BR Carlsbad Blvd
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

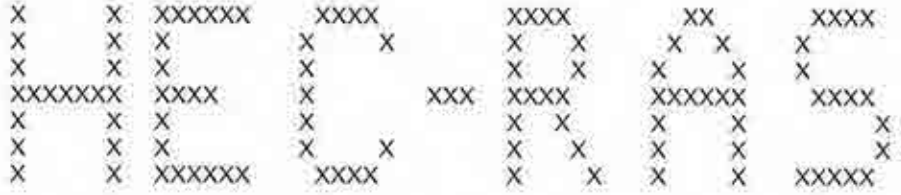

Batiquitos Lagoon Existing 2/29/2008
RS = 400 BR Carlsbad Blvd
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Existing 2/29/2008
RS = 342
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Existing 2/29/2008
RS = 47
.035
.03
.035
20
15
10
5
0
-5
-10
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

BL_Exist.rep

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California



PROJECT DATA
Project Title: Batiquitos Lagoon Existing
Project File : BL_Exist.prj
Run Date and Time: 2/29/2008 6:05:15 PM

Project in English units

Project Description:
Batiquitos Lagoon Existing Model

PLAN DATA

Plan Title: Batiquitos Lagoon Existing
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Existing\BL_Exist.p02

Geometry Title: Existing Batiquitos Lagoon
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Existing\BL_Exist.g02

Flow Title : 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Existing\BL_Exist.f02

Plan Summary Information:

| | | | | | |
|---|---|---|---|---|---|
| Number of: | Cross Sections | = 27 | Multiple Openings | = | 0 |
| | Culverts | = 0 | Inline Structures | = | 0 |
| | Bridges | = 3 | Lateral Structures | = | 0 |

Computational Information

| | |
|---|---|
| Water surface calculation tolerance | = 0.01 |
| Critical depth calculation tolerance | = 0.01 |
| Maximum number of iterations | = 20 |
| Maximum difference tolerance | = 0.3 |
| Flow tolerance factor | = 0.001 |

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Existing\BL_Exist.f02

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| Batiquitos | 1 | 9724 | 12000 |

Boundary Conditions

| River | Reach | Profile | Upstream |
|---|---|---|---|
| Batiquitos | 1 | PF 1 | Normal S = 0.000332 |

Known WS = 7.17

GEOMETRY DATA

Geometry Title: Existing Batiquitos Lagoon
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Existing\BL_Exist.g02

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 9724

INPUT
Description:
Station Elevation Data num= 21

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 100 | 17.1 | 435.4 | 4.82 | 614.2 | 3.82 | 811.59 | 2.99 |
| 865.5 | 2.82 | 1082.7 | 1.82 | 1125.4 | .82 | 1173.6 | -.18 | 1214 | -1.18 |
| 1245.1 | -2.18 | 1367.5 | -2.18 | 1408.5 | -.18 | 1480.4 | 1.82 | 1514.2 | 2.82 |
| 1542.1 | 3.82 | 1621.8 | 4.82 | 1645.6 | 5.95 | 1795 | 11.82 | 1987.6 | 22.1 |
| 2140.05 | 27.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 811.59 | .03 | 1645.6 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 811.59 | 1645.6 | 333.14 | 561.59 744.21 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| E.G. Elev (ft) | 11.38 | Element | Left OB | Channel |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Right OB | | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.37 | Reach Len. (ft) | 333.14 | 561.59 | 744.21 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 3417.34 | 8440.90 | 373.51 |
| E.G. Slope (ft/ft) | 0.000024 | Area (sq ft) | 3417.34 | 8440.90 | 373.51 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 2363.68 | 9486.94 | 149.39 |
| Top Width (ft) | 1526.92 | Top Width (ft) | 555.02 | 834.01 | 137.89 |
| Vel Total (ft/s) | 0.98 | Avg. Vel. (ft/s) | 0.69 | 1.12 | 0.40 |
| Max Chl Dpth (ft) | 13.55 | Hydr. Depth (ft) | 6.16 | 10.12 | 2.71 |
| Conv. Total (cfs) | 2473976.0 | Conv. (cfs) | 487306.4 | 1955871.0 | 30798.6 |
| Length Wtd. (ft) | 528.16 | Wetted Per. (ft) | 555.15 | 834.21 | 137.99 |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.01 | 0.00 |
| Alpha | 1.14 | Stream Power (lb/ft s) | 0.01 | 0.02 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 526.89 | 2466.72 | 255.23 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 102.24 | 193.78 | 52.75 |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 9162

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 100 | 17.1 | 336 | 4.82 | 507.6 | 3.82 | 682.2 | 3.32 |
| 858 | 2.82 | 1176.6 | 1.82 | 1273 | -.18 | 1327.8 | -2.18 | 1444.8 | -2.18 |
| 1493.8 | -.18 | 1580.99 | 3.19 | 1597.2 | 3.82 | 1678 | 4.82 | 1866 | 9.82 |
| 1949.7 | 22.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 682.2 | .03 | 1580.99 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 682.2 | 1580.99 | 423.98 | 604.81 765.06 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.37 | Element | | Left OB | Channel |
| Right OB | | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.035 | 0.030 |
| 0.035 | | | | | |
| W.S. Elev (ft) | 11.36 | Reach Len. (ft) | | 423.98 | 604.81 |
| 765.06 | | | | | |

| | | | | |
|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | 2978.52 | 9097.38 |
| 1462.89 | | | | |
| E.G. Slope (ft/ft) | 0.000019 | Area (sq ft) | 2978.52 | 9097.38 |
| 1462.89 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 1904.61 | 9298.98 |
| 796.42 | | | | |
| Top Width (ft) | 1665.57 | Top Width (ft) | 471.86 | 898.79 |
| 294.92 | | | | |
| Vel Total (ft/s) | 0.89 | Avg. Vel. (ft/s) | 0.64 | 1.02 |
| 0.54 | | | | |
| Max Chl Dpth (ft) | 13.54 | Hydr. Depth (ft) | 6.31 | 10.12 |
| 4.96 | | | | |
| Conv. Total (cfs) | 2720540.0 | Conv. (cfs) | 431796.2 | 2108186.0 |
| 180557.5 | | | | |
| Length Wtd. (ft) | 590.62 | Wetted Per. (ft) | 472.03 | 898.96 |
| 295.12 | | | | |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.01 |
| 0.01 | | | | |
| Alpha | 1.14 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 502.43 | 2353.66 |
| 239.55 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 98.32 | 182.61 |
| 49.05 | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 8558

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 50 | 17.1 | 582.7 | 4.82 | 681.71 | 3.827 | 682.45 | 3.82 |
| 869.56 | 2.82 | 1054.2 | 1.82 | 1145.4 | -.18 | 1196.3 | -2.18 | 1296 | -2.18 |
| 1360.3 | -.18 | 1435.8 | 3.82 | 1447.8 | 4.046 | 1488.9 | 4.82 | 1700.7 | 17.42 |
| 1860.9 | 22.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 681.71 | .03 | 1447.8 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 681.71 | 1447.8 | 666.77 | 636.64 683.13 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.36 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.33 | Reach Len. (ft) | 666.77 | 636.64 |
| 683.13 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1612.95 | 7721.34 |
| 639.67 | | | | |
| E.G. Slope (ft/ft) | 0.000035 | Area (sq ft) | 1612.95 | 7721.34 |
| 639.67 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 1056.14 | 10523.98 |

| | | | | | |
|---|---|---|---|---|---|
| 419.89 | | | | | |
| Top Width (ft) | 1298.03 | Top Width (ft) | 381.41 | 766.09 | |
| 150.53 | | | | | |
| Vel Total (ft/s) | 1.20 | Avg. Vel. (ft/s) | 0.65 | 1.36 | |
| 0.66 | | | | | |
| Max Chl Dpth (ft) | 13.51 | Hydr. Depth (ft) | 4.23 | 10.08 | |
| 4.25 | | | | | |
| Conv. Total (cfs) | 2034380.0 | Conv. (cfs) | 179048.6 | 1784147.0 | |
| 71184.3 | | | | | |
| Length Wtd. (ft) | 643.24 | Wetted Per. (ft) | 381.49 | 766.30 | |
| 150.73 | | | | | |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.02 | |
| 0.01 | | | | | |
| Alpha | 1.16 | Stream Power (lb/ft s) | 0.01 | 0.03 | |
| 0.01 | | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 480.09 | 2236.90 | |
| 221.08 | | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 94.16 | 171.05 | |
| 45.14 | | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 7922

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 200 | 12.1 | 640.88 | 4.82 | 675.6 | 4.19 | 762.2 | 2.82 |
| 813.7 | 1.82 | 878.9 | -.18 | 941.5 | -2.18 | 1123.4 | -2.18 | 1197.6 | -.18 |
| 1364.1 | 1.91 | 1436.1 | 2.82 | 1534.8 | 4.82 | 1933.1 | 9.82 | 2067 | 15.82 |
| 2175 | 24.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 675.6 | .03 | 1364.1 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 675.6 | 1364.1 | 399.23 | 375.4 392.28 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.34 | Element | Left OB | Channel | |
| Right OB | | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 | |
| 0.035 | | | | | |
| W.S. Elev (ft) | 11.32 | Reach Len. (ft) | 399.23 | 375.40 | |
| 392.28 | | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1514.38 | 7728.76 | |
| 3001.10 | | | | | |
| E.G. Slope (ft/ft) | 0.000024 | Area (sq ft) | 1514.38 | 7728.76 | |
| 3001.10 | | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 734.02 | 9438.22 | |
| 1827.76 | | | | | |
| Top Width (ft) | 1719.03 | Top Width (ft) | 428.14 | 688.50 | |
| 602.39 | | | | | |
| Vel Total (ft/s) | 0.98 | Avg. Vel. (ft/s) | 0.48 | 1.22 | |
| 0.61 | | | | | |

| | | | | |
|---|---|---|---|---|
| Max Chl Dpth (ft) | 13.50 | Hydr. Depth (ft) | 3.54 | 11.23 |
| 4.98 | | | | |
| Conv. Total (cfs) | 2439833.0 | Conv. (cfs) | 149241.1 | 1918972.0 |
| 371619.2 | | | | |
| Length Wtd. (ft) | 378.02 | Wetted Per. (ft) | 428.20 | 688.62 |
| 602.48 | | | | |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.29 | Stream Power (lb/ft s) | 0.00 | 0.02 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 456.15 | 2124.00 |
| 192.53 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 87.97 | 160.42 |
| 39.24 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 7547

INPUT
Description:
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.82 | 278.9 | 4.82 | 385.05 | 3.82 | 397.5 | 3.6 | 464.9 | 2.82 |
| 516.8 | 1.82 | 605.7 | -.18 | 651.6 | -2.18 | 1516.2 | -2.18 | 1534.2 | -.18 |
| 1578.3 | 1.93 | 1638.9 | 4.82 | 1740.6 | 14.52 | 2022.3 | 24.82 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 397.5 | .03 | 1578.3 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 397.5 | 1578.3 | 637.78 | 584.87 | 537.79 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.33 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.32 | Reach Len. (ft) | 637.78 | 584.87 |
| 537.79 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1164.88 | 14877.37 |
| 702.81 | | | | |
| E.G. Slope (ft/ft) | 0.000008 | Area (sq ft) | 1164.88 | 14877.37 |
| 702.81 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 426.62 | 11311.59 |
| 261.79 | | | | |
| Top Width (ft) | 1528.84 | Top Width (ft) | 219.30 | 1180.80 |
| 128.74 | | | | |
| Vel Total (ft/s) | 0.72 | Avg. Vel. (ft/s) | 0.37 | 0.76 |
| 0.37 | | | | |
| Max Chl Dpth (ft) | 13.50 | Hydr. Depth (ft) | 5.31 | 12.60 |

| | | | | | |
|---|---|---|---|---|---|
| 5.46 | | | | | |
| Conv. Total (cfs) | 4232189.0 | Conv. (cfs) | 150460.1 | 3989399.0 | 92329.6 |
| Length Wtd. (ft) | 584.20 | Wetted Per. (ft) | 219.51 | 1181.04 | 129.12 |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.08 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 443.87 | 2026.59 | 175.86 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 85.00 | 152.37 | 35.95 |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 6962

INPUT
Description:
Station Elevation Data num= 15

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 296.3 | 4.82 | 397.53 | 3.51 | 454.1 | 2.82 | 601.4 | 1.82 |
| 744.5 | -.18 | 793.02 | -2.18 | 1095.5 | -3.18 | 1251.9 | -3.18 | 1558.1 | -2.18 |
| 1578.3 | -.54 | 1582.8 | -.18 | 1688.4 | 4.82 | 1832.8 | 14.82 | 2044.7 | 27.1 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 397.53 | .03 | 1578.3 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 397.53 | 1578.3 | 820.71 | 532.08 | 332.07 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 459.32 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.31 | Reach Len. (ft) | 820.71 | 532.08 | 332.07 |
| Crit W.S. (ft) | -0.82 | Flow Area (sq ft) | | 14428.08 | 1306.61 |
| E.G. Slope (ft/ft) | 0.000008 | Area (sq ft) | 1003.96 | 14933.45 | 1306.61 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11443.22 | 556.78 |
| Top Width (ft) | 1572.21 | Top Width (ft) | 187.58 | 1180.77 | 203.86 |
| Vel Total (ft/s) | 0.76 | Avg. Vel. (ft/s) | | 0.79 | 0.43 |
| Max Chl Dpth (ft) | 14.49 | Hydr. Depth (ft) | | 12.89 | 6.41 |
| Conv. Total (cfs) | 4120405.0 | Conv. (cfs) | | 3929226.0 | 191178.9 |

| | | | | |
|---|---|---|---|---|
| Length Wtd. (ft) | 524.52 | Wetted Per. (ft) | | 1119.11 |
| 204.22 | | | | |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | | 0.01 |
| 0.00 | | | | |
| Alpha | 1.05 | Stream Power (lb/ft s) | | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 428.00 | 1826.46 |
| 163.45 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 82.02 | 136.51 |
| 33.89 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 6431

INPUT
Description:
Station Elevation Data num= 19

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 17.1 | 244.4 | 12.1 | 367.1 | 4.82 | 629.95 | 4.82 | 720.2 | 9.82 |
| 1111.2 | 9.82 | 1176.8 | 4.82 | 1189.6 | 4.26 | 1291.4 | -.18 | 1306.1 | -2.18 |
| 1476.5 | -3.18 | 1880.7 | -3.18 | 2041.4 | -2.18 | 2069.8 | -.18 | 2071.3 | -.1 |
| 2126.7 | 2.82 | 2171 | 4.82 | 2254 | 14.82 | 2358.1 | 17.1 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1189.6 | .03 | 2071.3 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1189.6 | 2071.3 | 687.07 | 567.98 494.69 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1111.2 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.32 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.30 | Reach Len. (ft) | 687.07 | 567.98 |
| 494.69 | | | | |
| Crit W.S. (ft) | -0.93 | Flow Area (sq ft) | 347.92 | 11982.69 |
| 1056.89 | | | | |
| E.G. Slope (ft/ft) | 0.000011 | Area (sq ft) | 3346.19 | 11982.69 |
| 1056.89 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 133.43 | 11323.63 |
| 542.94 | | | | |
| Top Width (ft) | 1967.00 | Top Width (ft) | 931.78 | 881.70 |
| 153.52 | | | | |
| Vel Total (ft/s) | 0.90 | Avg. Vel. (ft/s) | 0.38 | 0.94 |
| 0.51 | | | | |
| Max Chl Dpth (ft) | 14.48 | Hydr. Depth (ft) | 4.44 | 13.59 |
| 6.88 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 3581051.0 | Conv. (cfs) | 39819.3 | 3379208.0 | 162023.2 |
| Length Wtd. (ft) | 565.48 | Wetted Per. (ft) | 78.60 | 882.01 | 154.03 |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 0.00 | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 387.02 | 1662.07 | 154.44 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 71.48 | 123.91 | 32.53 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 5864

INPUT
Description:
Station Elevation Data num= 22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 26.06 | 383.9 | 19.5 | 433.1 | 9.82 | 582.05 | 6.82 | 697.2 | 4.82 |
| 739.9 | 7.82 | 761.85 | 9.82 | 1292.7 | 9.82 | 1337.7 | 5.98 | 1351.3 | 4.82 |
| 1378.7 | 1.82 | 1423 | -.18 | 1465.6 | -2.18 | 1481.4 | -3.18 | 2033.7 | -3.18 |
| 2043.6 | -2.18 | 2075.8 | -.18 | 2098 | 1.08 | 2128.7 | 2.82 | 2184.7 | 4.82 |
| 2356 | 12.1 | 2517.7 | 27.1 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1337.7 | .03 | 2098 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1337.7 | 2098 | 390.15 | 571.18 | 519.72 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1292.7 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.31 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.29 | Reach Len. (ft) | 390.15 | 571.18 | 519.72 |
| Crit W.S. (ft) | -0.78 | Flow Area (sq ft) | 152.60 | 10287.39 | 1197.83 |
| E.G. Slope (ft/ft) | 0.000015 | Area (sq ft) | 2278.12 | 10287.39 | 1197.83 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 57.29 | 11358.11 | 584.60 |
| Top Width (ft) | 1911.35 | Top Width (ft) | 912.08 | 760.30 | 238.97 |
| Vel Total (ft/s) | 1.03 | Avg. Vel. (ft/s) | 0.38 | 1.10 | |

| | | | | | |
|---|---|---|---|---|---|
| 0.49 | | | | | |
| Max Chl Dpth (ft) | 14.47 | Hydr. Depth (ft) | | 3.39 | 13.53 |
| 5.01 | | | | | |
| Conv. Total (cfs) | 3055505.0 | Conv. (cfs) | | 14588.2 | 2892064.0 |
| 148852.8 | | | | | |
| Length Wtd. (ft) | 568.00 | Wetted Per. (ft) | | 45.16 | 760.79 |
| 239.19 | | | | | |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | | 0.00 | 0.01 |
| 0.00 | | | | | |
| Alpha | 1.10 | Stream Power (lb/ft s) | | 0.00 | 0.01 |
| 0.00 | | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | | 342.66 | 1516.88 |
| 141.64 | | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 56.94 | 113.21 |
| 30.30 | | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 5293

INPUT
Description:
Station Elevation Data num= 26

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.52 | 160 | 19.52 | 298.6 | 14.62 | 312.4 | 8.02 | 407 | 6.32 |
| 426 | 4.82 | 471.1 | 3.72 | 577.5 | 3.72 | 631.6 | 6.32 | 754.6 | 10.62 |
| 1134 | 10.62 | 1187.7 | 6.32 | 1220.5 | 5.35 | 1339.8 | 1.82 | 1485 | -.18 |
| 1521.4 | -2.18 | 1548.5 | -3.18 | 2057.5 | -3.18 | 2071.6 | -2.18 | 2096.4 | -.18 |
| 2138.6 | 1.82 | 2167.1 | 3.06 | 2184.7 | 3.82 | 2208.2 | 4.82 | 2380 | 17.05 |
| 2453.9 | 27.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1220.5 | .03 | 2167.1 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1220.5 | 2167.1 | 333.66 | 422.8 462.78 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1134 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.30 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.29 | Reach Len. (ft) | 333.66 | 422.80 |
| 462.78 | | | | |
| Crit W.S. (ft) | -0.69 | Flow Area (sq ft) | 329.96 | 11833.12 |
| 595.37 | | | | |
| E.G. Slope (ft/ft) | 0.000014 | Area (sq ft) | 2898.08 | 11833.12 |
| 595.37 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 125.74 | 11620.46 |

| | | | | | |
|---|---|---|---|---|---|
| 253.80 | | | | | |
| Top Width (ft) | 1993.45 | Top Width (ft) | 914.93 | 946.60 | 131.92 |
| Vel Total (ft/s) | 0.94 | Avg. Vel. (ft/s) | 0.38 | 0.98 | 0.43 |
| Max Chl Dpth (ft) | 14.47 | Hydr. Depth (ft) | 3.81 | 12.50 | 4.51 |
| Conv. Total (cfs) | 3259258.0 | Conv. (cfs) | 34150.5 | 3156173.0 | 68934.4 |
| Length Wtd. (ft) | 417.35 | Wetted Per. (ft) | 86.69 | 946.93 | 132.19 |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 319.48 | 1371.85 | 130.94 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 48.75 | 102.02 | 28.09 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 4871

INPUT
Description:
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.52 | 130.99 | 14.76 | 135.66 | 13.12 | 149.84 | 9.84 | 213.25 | 4.27 |
| 426.51 | 3.97 | 528.22 | 3.74 | 1085.96 | 2.89 | 1295.93 | 2.3 | 1418.64 | 1.94 |
| 1496.82 | 3 | 1637.82 | -.18 | 1671.62 | -2.18 | 1689.32 | -3.18 | 2086.82 | -3.18 |
| 2099.42 | -2.18 | 2123.42 | -.18 | 2187.32 | 2.54 | 2240.92 | 4.82 | 2272.76 | 6.32 |
| 2314.23 | 9.84 | 2319.61 | 12.94 | 2328.55 | 19.51 | 2338.17 | 24.43 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1418.64 | .03 | 2187.32 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1418.64 | 2187.32 | 195.16 | 464.8 | 912.1 .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1165 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.28 | Reach Len. (ft) | 195.16 | 464.80 | 912.10 |
| Crit W.S. (ft) | -0.25 | Flow Area (sq ft) | 2275.37 | 9615.89 | 723.51 |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.000015 | Area (sq ft) | 9942.95 | 9615.89 | 723.51 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 1625.22 | 9998.92 | 375.86 |
| Top Width (ft) | 2173.11 | Top Width (ft) | 1275.02 | 768.68 | 129.41 |
| Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | 0.71 | 1.04 | 0.52 |
| Max Chl Dpth (ft) | 14.46 | Hydr. Depth (ft) | 8.97 | 12.51 | 5.59 |
| Conv. Total (cfs) | 3079432.0 | Conv. (cfs) | 417063.4 | 2565916.0 | 96452.9 |
| Length Wtd. (ft) | 455.85 | Wetted Per. (ft) | 253.64 | 768.99 | 130.02 |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | 0.01 | 0.01 | 0.01 |
| Alpha | 1.08 | Stream Power (lb/ft s) | 0.01 | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 270.30 | 1267.76 | 123.94 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 40.37 | 93.69 | 26.70 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 4407

INPUT
Description:
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.02 | 26.509 | 13.12 | 37.89 | 6.5 | 149.6 | 3.82 | 195.5 | 3.82 |
| 1178.9 | 3.22 | 1352.78 | 2.63 | 1514.8 | 1.96 | 1528.8 | 1.77 | 1582.2 | 1.87 |
| 1677.4 | -.18 | 1757.3 | -4.18 | 1937.9 | -4.18 | 2347.4 | -3.18 | 2444 | 1.85 |
| 2627.9 | 7.1 | 2703.3 | 8.2 | 2730.2 | 9.8 | 2957.9 | 11.5 | 3002.1 | 19.7 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1582.2 | .03 | 2444 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1582.2 | 2444 | 100.52 | 198.16 | 344.06 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1504.5 | 16.5 | F |
| 2530.8 | 3002.1 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.27 | Reach Len. (ft) | 100.52 | 198.16 | |

| | | | | |
|---|---|---|---|---|
| 344.06 | | | | |
| Crit W.S. (ft) | -1.54 | Flow Area (sq ft) | 732.36 | 12136.61 |
| 710.54 | | | | |
| E.G. Slope (ft/ft) | 0.000010 | Area (sq ft) | 12214.58 | 12136.61 |
| 1730.73 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 442.04 | 11167.66 |
| 390.30 | | | | |
| Top Width (ft) | 2898.08 | Top Width (ft) | 1552.52 | 861.80 |
| 483.76 | | | | |
| Vel Total (ft/s) | 0.88 | Avg. Vel. (ft/s) | 0.60 | 0.92 |
| 0.55 | | | | |
| Max Chl Dpth (ft) | 15.45 | Hydr. Depth (ft) | 9.43 | 14.08 |
| 8.19 | | | | |
| Conv. Total (cfs) | 3766162.0 | Conv. (cfs) | 138733.5 | 3504935.0 |
| 122493.6 | | | | |
| Length Wtd. (ft) | 198.73 | Wetted Per. (ft) | 77.70 | 862.05 |
| 86.84 | | | | |
| Min Ch El (ft) | -4.18 | Shear (lb/sq ft) | 0.01 | 0.01 |
| 0.01 | | | | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 220.66 | 1151.71 |
| 98.24 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 34.03 | 85.00 |
| 20.28 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 4209

INPUT
Description: *Only in existing model
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 108.7 | 6.31 | 145.96 | 5.05 | 223.6 | 4.63 | 267.08 | 3.94 |
| 574.53 | 4.12 | 1052.8 | 3.47 | 1306.4 | 3.75 | 1531.8 | 3.54 | 1750 | 3.206 |
| 1753.6 | 3.2 | 1773.29 | 2.21 | 1810.56 | .63 | 1835.4 | -1.37 | 1929.7 | -4.18 |
| 2002.8 | -4.18 | 2124.22 | -.72 | 2186.34 | 1.42 | 2254.66 | 3.01 | 2298 | 4.081 |
| 2500 | 4.96 | 2879.9 | 6 | 2981.37 | 7.33 | 3040.37 | 8.92 | 3208.07 | 16.04 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1750 | .03 | 2298 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1750 | 2298 | 62.5 | 49.9 | 84 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1750 | 16.5 | F |
| 2298 | 3208.07 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.28 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.05 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 11.23 | Reach Len. (ft) | 62.50 | 49.90 |
| 84.00 | | | | |
| Crit W.S. (ft) | 0.85 | Flow Area (sq ft) | | 6582.54 |
| E.G. Slope (ft/ft) | 0.000049 | Area (sq ft) | 12299.04 | 6582.54 |
| 4247.60 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 3055.56 | Top Width (ft) | 1710.82 | 548.00 |
| 796.74 | | | | |
| Vel Total (ft/s) | 1.82 | Avg. Vel. (ft/s) | | 1.82 |
| Max Chl Dpth (ft) | 15.41 | Hydr. Depth (ft) | | 12.01 |
| Conv. Total (cfs) | 1709433.0 | Conv. (cfs) | | 1709433.0 |
| Length Wtd. (ft) | 49.90 | Wetted Per. (ft) | | 548.30 |
| Min Ch El (ft) | -4.18 | Shear (lb/sq ft) | | 0.04 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.07 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 192.38 | 1109.13 |
| 74.63 | | | | |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 30.27 | 81.79 |
| 15.22 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 4159

INPUT
Description: Upstream of I-5
Station Elevation Data num= 23

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 124.28 | 6.6 | 170 | 5.3 | 238.75 | 5.4 | 329.7 | 4.8 |
| 591.5 | 3.8 | 1172.2 | 3.31 | 1306.4 | 3.75 | 1531.8 | 3.54 | 1753.6 | 3.2 |
| 1815.5 | 2.82 | 1895.6 | 1.82 | 1917.4 | -.737 | 1929.7 | -4.18 | 2002.8 | -4.18 |
| 2043 | -.18 | 2161 | 2.418 | 2230.1 | 3.94 | 2499.1 | 4.5 | 2879.9 | 6 |
| 3012.7 | 6.06 | 3039.1 | 6.6 | 3158.4 | 13.12 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .06 | 1815.5 | .06 | 2161 | .06 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1815.5 | 2161 | 357.7 | 362.51 374.53 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1904.4 | 26.6 | F |
| 2123.4 | 3158.4 | 26.6 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.25 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.29 | Wt. n-Val. | | 0.060 |
| W.S. Elev (ft) | 10.96 | Reach Len. (ft) | 108.58 | 108.58 108.58 |
| Crit W.S. (ft) | 2.86 | Flow Area (sq ft) | | 2765.97 |
| E.G. Slope (ft/ft) | 0.001048 | Area (sq ft) | 12166.98 | 3879.36 5472.96 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 3067.71 | Top Width (ft) | 1764.39 | 345.50 957.82 |
| Vel Total (ft/s) | 4.34 | Avg. Vel. (ft/s) | | 4.34 |
| Max Chl Dpth (ft) | 15.14 | Hydr. Depth (ft) | | 12.63 |
| Conv. Total (cfs) | 370621.9 | Conv. (cfs) | | 370621.9 |
| Length Wtd. (ft) | 108.58 | Wetted Per. (ft) | | 219.78 |
| Min Ch El (ft) | -4.18 | Shear (lb/sq ft) | | 0.82 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 3.57 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 174.83 | 1103.14 65.26 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 27.77 | 81.28 13.53 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Batiquitos
REACH: 1 RS: 4000

INPUT
Description: Interstate - 5 freeway

Distance from Upstream XS = 108.58
Deck/Roadway Width = 163.9
Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 16.5 | 0 | 1904.4 | 26.6 | 0 | 1904.4 | 26.6 | 21.6 |
| 2123.4 | 30.3 | 26.3 | 2123.4 | 30.3 | 0 | 3158.4 | 29 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 23

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 124.28 | 6.6 | 170 | 5.3 | 238.75 | 5.4 | 329.7 | 4.8 |
| 591.5 | 3.8 | 1172.2 | 3.31 | 1306.4 | 3.75 | 1531.8 | 3.54 | 1753.6 | 3.2 |
| 1815.5 | 2.82 | 1895.6 | 1.82 | 1917.4 | -.737 | 1929.7 | -4.18 | 2002.8 | -4.18 |
| 2043 | -.18 | 2161 | 2.418 | 2230.1 | 3.94 | 2499.1 | 4.5 | 2879.9 | 6 |
| 3012.7 | 6.06 | 3039.1 | 6.6 | 3158.4 | 13.12 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .06 | 1815.5 | .06 | 2161 | .06 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 1815.5 | 2161 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1904.4 | 26.6 | F |
| 2123.4 | 3158.4 | 26.6 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 16.5 | 0 | 1536.1 | 26.6 | -5 | 1536.1 | 26.6 | 21.6 |
| 1755.1 | 30.3 | 26.3 | 1755.1 | 30.3 | -5 | 2534.4 | 29 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.12 | 291.3 | 10.2 | 426.2 | 6.6 | 523.6 | 4.9 | 824.5 | 3.5 |
| 1125 | 3.6 | 1242.4 | 3.658 | 1267.4 | 3.67 | 1312.3 | 2.9 | 1402 | 2.6 |
| 1427.1 | 1.743 | 1542 | -4.18 | 1699.5 | -4.18 | 1813.5 | 2.035 | 1847.7 | 3.3 |
| 2060.7 | 3.58 | 2214.2 | 3.8 | 2362.9 | 4.4 | 2493.9 | 6.6 | 2534.4 | 13.12 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1427.1 | .03 | 1813.5 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 1427.1 | 1813.5 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1536.1 | 21.6 | F |
| 1755.1 | 2534.4 | 21.6 | F |

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

```
Abutment Data
Upstream      num=        4
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
  1904.4   20.85 1927.88      121937.208      12 1950.33   -2.18
Downstream      num=         4
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
1536.095   20.851559.575      121568.903      121593.025   -2.18

Abutment Data
Upstream      num=        4
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
 2073.93   -2.182095.916      12 2104.71      12  2123.4   25.46
Downstream      num=         4
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
  1693.1   -2.181720.392      12 1729.72      12  1755.1   25.46

Number of Piers =  2

Pier Data
Pier Station      Upstream=  1971.9    Downstream=  1603.6
Upstream      num=        2
    Width   Elev    Width   Elev
        4     -5        4     30
Downstream      num=         2
    Width   Elev    Width   Elev
        4     -5        4     30

Pier Data
Pier Station      Upstream=  2054.9    Downstream=  1686.6
Upstream      num=        2
    Width   Elev    Width   Elev
        4     -5        4     30
Downstream      num=         2
    Width   Elev    Width   Elev
        4     -5        4     30

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1


  E.G. US. (ft)                11.25    Element                  Inside BR US
Inside BR DS
  W.S. US. (ft)                10.96    E.G. Elev (ft)               10.86
10.32
  Q Total (cfs)             12000.00    W.S. Elev (ft)               10.01
 9.30
  Q Bridge (cfs)            12000.00    Crit W.S. (ft)                4.37
```

| | | | |
|---|---|---|---|
| 3.79 Q Weir (cfs) | | Max Chl Dpth (ft) | 14.19 |
| 13.48 Weir Sta Lft (ft) | | Vel Total (ft/s) | 7.40 |
| 8.11 Weir Sta Rgt (ft) | | Flow Area (sq ft) | 1620.59 |
| 1480.07 Weir Submerg | | Froude # Chl | 0.39 |
| 0.43 Weir Max Depth (ft) | | Specif Force (cu ft) | 12640.44 |
| 12301.03 Min El Weir Flow (ft) | 26.61 | Hydr Depth (ft) | 11.12 |
| 11.07 Min El Prs (ft) | 26.30 | W.P. Total (ft) | 204.31 |
| 197.55 Delta EG (ft) | 1.35 | Conv. Total (cfs) | 159629.1 |
| 280693.4 Delta WS (ft) | 1.32 | Top Width (ft) | 145.78 |
| 133.70 BR Open Area (sq ft) | 4101.17 | Frctn Loss (ft) | 0.49 |
| 0.04 BR Open Vel (ft/s) | 8.11 | C & E Loss (ft) | 0.05 |
| 0.38 Coef of Q | | Shear Total (lb/sq ft) | 2.80 |
| 0.85 Br Sel Method | Energy only | Power Total (lb/ft s) | 20.72 |
| 6.93 | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 3797

INPUT
Description: Downstream of I-5
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.12 | 291.3 | 10.2 | 426.2 | 6.6 | 523.6 | 4.9 | 824.5 | 3.5 |
| 1125 | 3.6 | 1242.4 | 3.658 | 1267.4 | 3.67 | 1312.3 | 2.9 | 1402 | 2.6 |
| 1427.1 | 1.743 | 1542 | -4.18 | 1699.5 | -4.18 | 1813.5 | 2.035 | 1847.7 | 3.3 |
| 2060.7 | 3.58 | 2214.2 | 3.8 | 2362.9 | 4.4 | 2493.9 | 6.6 | 2534.4 | 13.12 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1427.1 | .03 | 1813.5 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1427.1 | 1813.5 | 139.64 | 216.41 | 305.8 | .1 .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1536.1 | 21.6 | F |
| 1755.1 | 2534.4 | 21.6 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.90 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 0.26 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 9.64 | Reach Len. (ft) | 139.64 | 216.41 305.80 |
| Crit W.S. (ft) | 0.74 | Flow Area (sq ft) | | 2941.05 |
| E.G. Slope (ft/ft) | 0.000213 | Area (sq ft) | 5963.03 | 4644.87 3866.05 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 2200.43 | Top Width (ft) | 1114.75 | 386.40 699.27 |
| Vel Total (ft/s) | 4.08 | Avg. Vel. (ft/s) | | 4.08 |
| Max Chl Dpth (ft) | 13.82 | Hydr. Depth (ft) | | 13.43 |
| Conv. Total (cfs) | 822801.4 | Conv. (cfs) | | 822801.4 |
| Length Wtd. (ft) | 216.41 | Wetted Per. (ft) | | 219.09 |
| Min Ch El (ft) | -4.18 | Shear (lb/sq ft) | | 0.18 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.73 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 153.50 | 1084.12 54.44 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 24.42 | 79.60 11.62 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 3581

INPUT
Description:

Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 26.07 | 9.84 | 19.52 | 26.67 | 12.94 | 110.5 | 4.58 | 165.82 | 3.63 |
| 251.1 | 3.33 | 434.64 | .3 | 464 | -.18 | 528.73 | -5.18 | 1651.8 | -5.18 |
| 1712.7 | -.18 | 1759.95 | 2.64 | 1796.4 | 4.82 | 1947.5 | 6.32 | 1981.2 | 12.92 |
| 1993.6 | 19.52 | 2008.1 | 26.4 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 434.64 | .03 | 1759.95 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 434.64 | 1759.95 | 342.87 | 377.21 427.94 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 834.65 | 20 | F |
| 1675.4 | 2008.1 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.82 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 342.87 | 377.21 |
| 427.94 Crit W.S. (ft) | -3.30 | Flow Area (sq ft) | | 12574.48 |
| E.G. Slope (ft/ft) | 0.000010 | Area (sq ft) | 2457.50 | 19086.93 |
| 892.03 Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 1907.17 | Top Width (ft) | 376.52 | 1325.31 |
| 205.34 Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | | 0.95 |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | | 14.96 |
| Conv. Total (cfs) | 3780524.0 | Conv. (cfs) | | 3780524.0 |
| Length Wtd. (ft) | 377.82 | Wetted Per. (ft) | | 840.83 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.01 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.01 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 140.01 | 1025.17 |
| 37.74 C & E Loss (ft) | 0.00 | Cum SA (acres) | 22.03 | 75.35 |
| 8.44 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 3204

INPUT
Description:
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 30.35 | 6.527 | 26.247 | 18.209 | 19.685 | 36.211 | 13.123 | 45.801 | 11.483 |
| 57.201 | 9.843 | 69.291 | 8.202 | 81.66 | 6.562 | 89.961 | 4.921 | 132.995 | 3.281 |
| 152.161 | 1.64 | 153.19 | 1.606 | 351.772 | | -51532.677 | | -5 1556.36 | -2.64 |
| 1632.251 | 4.921 | 1644.196 | 6.562 | 1652.047 | 9.843 | 1664.037 | 13.123 | 1673.196 | 14.272 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 153.19 | .03 | 1556.36 | .035 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
153.19 1556.36 465.52 449.84 452.33 .1 .3

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 489.5 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 | 0.035 |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 465.52 | 449.84 | 452.33 |
| Crit W.S. (ft) | -3.41 | Flow Area (sq ft) | | 15766.40 | 718.63 |
| E.G. Slope (ft/ft) | 0.000006 | Area (sq ft) | 467.77 | 20089.39 | 718.63 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11710.72 | 289.28 |
| Top Width (ft) | 1594.47 | Top Width (ft) | 95.71 | 1403.17 | 95.59 |
| Vel Total (ft/s) | 0.73 | Avg. Vel. (ft/s) | | 0.74 | 0.40 |
| Max Chl Dpth (ft) | 14.80 | Hydr. Depth (ft) | | 14.78 | 7.52 |
| Conv. Total (cfs) | 4818616.0 | Conv. (cfs) | | 4702456.0 | 116159.7 |
| Length Wtd. (ft) | 449.92 | Wetted Per. (ft) | | 1066.98 | 96.73 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 0.01 | 0.00 |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 128.49 | 855.54 | 29.83 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 20.17 | 63.54 | 6.96 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 2754

INPUT
Description:
Station Elevation Data num= 15

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 49.02 | 17 | 39.22 | 37.3 | 26.07 | 60.37 | 12.92 | 88.635 | 6.32 |
| 128.99 | -.18 | 141.46 | -1.47 | 177.17 | -5.18 | 1153.4 | -5.18 | 1169.4 | -4.18 |
| 1211.6 | -.18 | 1258 | 4.82 | 1332.4 | 9.1 | 1397 | 12.82 | 1450.33 | 16.22 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 141.46 | .03 | 1332.4 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 141.46 | 1332.4 | 664.97 | 357.33 | 202.94 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 128 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 664.97 | 357.33 | 202.94 |
| Crit W.S. (ft) | -3.51 | Flow Area (sq ft) | 142.32 | 16390.38 | 4.28 |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 430.14 | 16390.38 | 4.28 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 74.20 | 11925.57 | 0.23 |
| Top Width (ft) | 1270.86 | Top Width (ft) | 67.74 | 1190.94 | 12.19 |
| Vel Total (ft/s) | 0.73 | Avg. Vel. (ft/s) | 0.52 | 0.73 | 0.05 |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | 10.57 | 13.76 | 0.35 |
| Conv. Total (cfs) | 4689236.0 | Conv. (cfs) | 28993.7 | 4660152.0 | 90.2 |
| Length Wtd. (ft) | 357.77 | Wetted Per. (ft) | 13.54 | 1191.74 | 12.21 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 123.70 | 667.18 | 26.08 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 19.30 | 50.14 | 6.40 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 2428

INPUT
Description:
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 49.8 | 4.82 | 108.24 | 1.33 | 133.5 | -.18 | 190.4 | -5.18 |
| 1506.2 | -5.18 | 1532.3 | -2.18 | 1533 | -2.14 | 1569.7 | -.18 | 1601.8 | 2.82 |
| 1649 | 4.82 | 1717.5 | 12.92 | 1816.06 | 16.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 108.24 | .03 | 1533 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 108.24 | 1533 | 605.62 | 351.98 | 312.8 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 605.62 | 351.98 |
| 312.80 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 434.38 | 21017.82 |
| 1061.98 | | | | |
| E.G. Slope (ft/ft) | 0.000003 | Area (sq ft) | 434.38 | 21017.82 |
| 1061.98 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 109.35 | 11594.10 |
| 296.55 | | | | |
| Top Width (ft) | 1657.88 | Top Width (ft) | 74.98 | 1424.76 |
| 158.14 | | | | |
| Vel Total (ft/s) | 0.53 | Avg. Vel. (ft/s) | 0.25 | 0.55 |
| 0.28 | | | | |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | 5.79 | 14.75 |
| 6.72 | | | | |
| Conv. Total (cfs) | 6479592.0 | Conv. (cfs) | 59044.7 | 6260419.0 |
| 160128.5 | | | | |
| Length Wtd. (ft) | 352.46 | Wetted Per. (ft) | 75.82 | 1425.20 |
| 158.67 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 117.10 | 513.75 |
| 23.59 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 18.21 | 39.41 |
| 6.01 | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 2076

INPUT
Description:

Station Elevation Data num= 15

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 121.01 | 4.82 | 168.3 | 2.82 | 215.76 | 2.12 | 235.6 | 1.82 |
| 286.2 | .82 | 317.2 | -.18 | 366.98 | -5.18 | 1988.8 | -5.18 | 2026.4 | -.18 |
| 2068 | 3.82 | 2073.8 | 3.9 | 2136.9 | 4.82 | 2250.8 | 14.822 | 354.471 | 22.8 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 215.76 | .03 | 2073.8 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 215.76 | 2073.8 | 472.02 | 336.44 300.63 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 876 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 472.02 | 336.44 |
| 300.63 | | | | |
| Crit W.S. (ft) | -3.65 | Flow Area (sq ft) | | 17503.56 |
| 484.32 | | | | |
| E.G. Slope (ft/ft) | 0.000005 | Area (sq ft) | 697.84 | 26627.23 |
| 484.32 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11880.49 |
| 119.51 | | | | |
| Top Width (ft) | 2099.63 | Top Width (ft) | 121.79 | 1858.04 |
| 119.80 | | | | |
| Vel Total (ft/s) | 0.67 | Avg. Vel. (ft/s) | | 0.68 |
| 0.25 | | | | |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | | 14.61 |
| 4.04 | | | | |
| Conv. Total (cfs) | 5232575.0 | Conv. (cfs) | | 5180462.0 |
| 52113.6 | | | | |
| Length Wtd. (ft) | 336.26 | Wetted Per. (ft) | | 1198.32 |
| 120.03 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.00 |
| 0.00 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 109.23 | 321.25 |
| 18.04 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 16.84 | 26.15 |
| 5.01 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 1740

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 212.8 | 4.82 | 254.8 | 4.32 | 369.77 | 4.82 | 406.76 | 3.82 |
| 481.75 | 2.82 | 569.17 | 2.32 | 607.56 | 2.82 | 653.9 | 4.82 | 719.69 | 4.82 |
| 862 | 4.82 | 928.95 | 3.82 | 989.36 | 1.82 | 1063 | 1.82 | 1174.2 | 4.82 |
| 1261.9 | 4.82 | 1301.6 | 2.82 | 1368.1 | -.18 | 1412.4 | -5.18 | 1976.8 | -5.18 |
| 2040.7 | -.18 | 2067.9 | 1.63 | 2070.8 | 1.82 | 2092.9 | 2.82 | 2123.4 | 3.82 |
| 2205.5 | 4.82 | 2226.1 | 83 | 9.82 | 2226.2 | 11 | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 719.69 | .03 | 2067.9 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 719.69 | 2067.9 | 661.13 | 285.69 | 333.19 | .1 .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1161 | 20 | F |
| 1961 | 2226.2 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.80 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 9.78 | Reach Len. (ft) | 661.13 | 285.69 |
| 333.19 | | | | |
| Crit W.S. (ft) | -2.73 | Flow Area (sq ft) | | 10060.15 |
| E.G. Slope (ft/ft) | 0.000020 | Area (sq ft) | 3130.67 | 14066.95 |
| 884.23 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 2060.58 | Top Width (ft) | 554.25 | 1348.21 |
| 158.11 | | | | |
| Vel Total (ft/s) | 1.19 | Avg. Vel. (ft/s) | | 1.19 |
| Max Chl Dpth (ft) | 14.96 | Hydr. Depth (ft) | | 12.58 |
| Conv. Total (cfs) | 2693652.0 | Conv. (cfs) | | 2693652.0 |
| Length Wtd. (ft) | 285.69 | Wetted Per. (ft) | | 800.40 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.02 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 88.48 | 164.10 |
| 13.32 | | | | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 13.18 | 13.77 |
| 4.05 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than

0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 1454

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 426 | 19.82 | 662.8 | 19.82 | 824.8 | 19.82 | 864.6 | 4.4 |
| 871.69 | 1.93 | 892.99 | -.23 | 903.6 | -3.18 | 919.7 | -5.18 | 1027.5 | -5.18 |
| 1046.9 | -.18 | 1081.81 | 3.36 | 1091.75 | 9.71 | 1124.8 | 19.82 | 1319.8 | 19.82 |
| 1516.177 | 19.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 662.8 | .03 | 1319.8 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 662.8 | 1319.8 | 253.92 | 247.22 263.76 | .3 | .5 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.76 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.30 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 9.46 | Reach Len. (ft) | 153.20 | 153.20 |
| 153.20 | | | | |
| Crit W.S. (ft) | 1.42 | Flow Area (sq ft) | | 2715.52 |
| E.G. Slope (ft/ft) | 0.000321 | Area (sq ft) | | 2715.52 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 239.80 | Top Width (ft) | | 239.80 |
| Vel Total (ft/s) | 4.42 | Avg. Vel. (ft/s) | | 4.42 |
| Max Chl Dpth (ft) | 14.64 | Hydr. Depth (ft) | | 11.32 |
| Conv. Total (cfs) | 669741.2 | Conv. (cfs) | | 669741.2 |
| Length Wtd. (ft) | 153.20 | Wetted Per. (ft) | | 244.39 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.22 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.98 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | 64.73 | 109.07 |
| 9.94 | | | | |
| C & E Loss (ft) | | Cum SA (acres) | 8.97 | 8.56 |
| 3.44 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: Batiquitos
REACH: 1 RS: 1300

INPUT
Description: NCTD RR Bridge

Distance from Upstream XS = 153.2
Deck/Roadway Width = 28
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 824.8 | 19.82 | 16.82 | 1124.8 | 19.82 | 16.82 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 426 | 19.82 | 662.8 | 19.82 | 824.8 | 19.82 | 864.6 | 4.4 |
| 871.69 | 1.93 | 892.99 | -.23 | 903.6 | -3.18 | 919.7 | -5.18 | 1027.5 | -5.18 |
| 1046.9 | -.18 | 1081.81 | 3.36 | 1091.75 | 9.71 | 1124.8 | 19.82 | 1319.8 | 19.82 |
| 1516.177 | 19.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 662.8 | .03 | 1319.8 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 662.8 | 1319.8 | .3 | .5 |

Downstream Deck/Roadway Coordinates
num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 846.3 | 19.82 | 16.82 | 1146.3 | 19.82 | 16.82 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 846.3 | 19.82 | 851.8 | 2.82 | 869.1 | 1.82 | 893.89 | 1.033 |
| 900.6 | .82 | 920.5 | -5.18 | 1053.3 | -5.18 | 1078.8 | 1.163 | 1120.14 | 3.64 |
| 1146.3 | 19.82 | 1272.6 | 19.82 | 1587.8 | 19.82 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 893.89 | .03 | 1078.8 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 893.89 | 1078.8 | .1 | .3 |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =

Weir crest shape = Broad Crested

Number of Piers = 21

Pier Data
Pier Station Upstream= 838.44 Downstream= 859.94

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |
| Downstream num= 2 | | | |
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |

Pier Data
Pier Station Upstream= 852.07 Downstream= 873.57

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |
| Downstream num= 2 | | | |
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |

Pier Data
Pier Station Upstream= 865.71 Downstream= 887.21

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |
| Downstream num= 2 | | | |
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |

Pier Data
Pier Station Upstream= 879.35 Downstream= 900.85

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |
| Downstream num= 2 | | | |
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |

Pier Data
Pier Station Upstream= 892.98 Downstream= 914.48

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |
| Downstream num= 2 | | | |
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |

Pier Data
Pier Station Upstream= 906.62 Downstream= 928.12

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |
| Downstream num= 2 | | | |
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |

Pier Data
Pier Station Upstream= 920.25 Downstream= 941.75

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | -5 | 3 | 20 |

```
Downstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  933.89    Downstream=  955.39
Upstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  947.53    Downstream=  969.03
Upstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  961.16    Downstream=  982.66
Upstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=   974.8    Downstream=   996.3
Upstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  988.44    Downstream= 1009.94
Upstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream= 1002.07    Downstream= 1023.57
Upstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream= 1015.71    Downstream= 1037.21
Upstream      num=         2
    Width   Elev     Width   Elev
        3      -5         3     20
```

```
Downstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20

Pier Data
Pier Station      Upstream= 1029.35    Downstream= 1050.85
Upstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20

Pier Data
Pier Station      Upstream= 1042.98    Downstream= 1064.48
Upstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20

Pier Data
Pier Station      Upstream= 1056.62    Downstream= 1078.12
Upstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20

Pier Data
Pier Station      Upstream= 1070.25    Downstream= 1091.75
Upstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20

Pier Data
Pier Station      Upstream= 1083.89    Downstream= 1105.39
Upstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20

Pier Data
Pier Station      Upstream= 1097.53    Downstream= 1119.03
Upstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20

Pier Data
Pier Station      Upstream= 1111.16    Downstream= 1132.66
Upstream      num=        2
    Width   Elev     Width   Elev
        3     -5         3     20
```

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -5 | 3 | 20 |

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Yarnell KVal = 2.5
Selected Low Flow Methods = Yarnell

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 9.76 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 9.46 | E.G. Elev (ft) | 9.32 |
| 9.19 | | | |
| Q Total (cfs) | 12000.00 | W.S. Elev (ft) | 8.76 |
| 8.76 | | | |
| Q Bridge (cfs) | 12000.00 | Crit W.S. (ft) | 2.45 |
| 1.97 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 13.94 |
| 13.94 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 6.04 |
| 5.16 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 1987.68 |
| 2325.85 | | | |
| Weir Submerg | | Froude # Chl | 0.33 |
| 0.27 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 14311.80 |
| 15820.38 | | | |
| Min El Weir Flow (ft) | 19.83 | Hydr Depth (ft) | 10.70 |
| 10.64 | | | |
| Min El Prs (ft) | 16.82 | W.P. Total (ft) | 563.36 |
| 660.77 | | | |
| Delta EG (ft) | 0.72 | Conv. Total (cfs) | 228170.5 |
| 263124.1 | | | |
| Delta WS (ft) | 0.70 | Top Width (ft) | 185.69 |
| 218.54 | | | |
| BR Open Area (sq ft) | 3615.28 | Frctn Loss (ft) | |
| BR Open Vel (ft/s) | 6.04 | C & E Loss (ft) | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.61 |
| 0.46 | | | |
| Br Sel Method | Yarnell | Power Total (lb/ft s) | 3.68 |
| 2.36 | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross

sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 1207

INPUT
Description:
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 846.3 | 19.82 | 851.8 | 2.82 | 869.1 | 1.82 | 893.89 | 1.033 |
| 900.6 | .82 | 920.5 | -5.18 | 1053.3 | -5.18 | 1078.8 | 1.163 | 1120.14 | 3.64 |
| 1146.3 | 19.82 | 1272.6 | 19.82 | 1587.8 | 19.82 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 893.89 | .03 | 1078.8 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 893.89 | 1078.8 | 502.13 | 230.8 182.26 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.04 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.28 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 8.76 | Reach Len. (ft) | 502.13 | 230.80 |
| 182.26 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 298.81 | 2395.65 |
| 283.93 | | | | |
| E.G. Slope (ft/ft) | 0.000269 | Area (sq ft) | 298.81 | 2395.65 |
| 283.93 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 700.97 | 10678.73 |
| 620.30 | | | | |
| Top Width (ft) | 278.54 | Top Width (ft) | 44.01 | 184.91 |
| 49.61 | | | | |
| Vel Total (ft/s) | 4.03 | Avg. Vel. (ft/s) | 2.35 | 4.46 |
| 2.18 | | | | |
| Max Chl Dpth (ft) | 13.94 | Hydr. Depth (ft) | 6.79 | 12.96 |
| 5.72 | | | | |
| Conv. Total (cfs) | 731147.3 | Conv. (cfs) | 42709.5 | 650643.6 |
| 37794.3 | | | | |
| Length Wtd. (ft) | 237.12 | Wetted Per. (ft) | 48.37 | 186.58 |
| 51.14 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.10 | 0.22 |
| 0.09 | | | | |
| Alpha | 1.12 | Stream Power (lb/ft s) | 0.24 | 0.96 |
| 0.20 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 64.24 | 96.33 |
| 9.48 | | | | |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 8.90 | 7.46 |
| 3.36 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 976

INPUT
Description:
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 85.3 | 4.82 | 127.16 | 2.82 | 170.01 | 1.82 | 204.32 | .82 |
| 254.92 | -.18 | 510.5 | -.899 | 610.56 | -1.18 | 675.36 | -2.18 | 711.42 | -3.18 |
| 747.93 | -5.18 | 800.15 | -5.18 | 1255.2 | -5.18 | 1284.8 | 2.202 | 1295.3 | 4.82 |
| 1647 | 7.82 | 1837.36 | 11.82 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 510.5 | .03 | 1284.8 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 510.5 | 1284.8 | 685.58 | 233.76 | 362.43 | .1 .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 818.12 | 12 | F |
| 1345.15 | 1837.36 | 12 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 8.95 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.05 | Wt. n-Val. | | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 8.90 | Reach Len. (ft) | 685.58 | 233.76 |
| 362.43 | | | | |
| Crit W.S. (ft) | -2.33 | Flow Area (sq ft) | | 6461.51 |
| 249.36 | | | | |
| E.G. Slope (ft/ft) | 0.000041 | Area (sq ft) | 3648.61 | 10024.98 |
| 991.64 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11825.71 |
| 174.29 | | | | |
| Top Width (ft) | 1636.29 | Top Width (ft) | 448.40 | 774.30 |
| 413.59 | | | | |
| Vel Total (ft/s) | 1.79 | Avg. Vel. (ft/s) | | 1.83 |
| 0.70 | | | | |
| Max Chl Dpth (ft) | 14.08 | Hydr. Depth (ft) | | 13.85 |
| 4.13 | | | | |
| Conv. Total (cfs) | 1870150.0 | Conv. (cfs) | | 1842987.0 |
| 27163.1 | | | | |
| Length Wtd. (ft) | 236.59 | Wetted Per. (ft) | | 467.59 |
| 60.67 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.04 |
| 0.01 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | | 0.07 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 41.49 | 63.42 |
| 6.81 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 6.07 | 4.92 |
| 2.39 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 874

INPUT
Description:
Station Elevation Data num= 15

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 26.66 | 8.82 | 49.4 | 7.82 | 66.5 | 6.82 | 88.6 | 5.82 |
| 98.5 | 4.82 | 119.03 | 3.82 | 178.99 | -1.18 | 193.01 | -2.5 | 221.36 | -5.18 |
| 410.95 | -5.18 | 429.1 | -3.18 | 429.75 | -2.97 | 453.33 | 4.82 | 494.49 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 193.01 | .03 | 429.75 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 193.01 | 429.75 | 243.66 | 160.93 164.42 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 193.01 | 12 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 8.92 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.20 | Wt. n-Val. | | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 8.72 | Reach Len. (ft) | 243.66 | 160.93 |
| 164.42 | | | | |
| Crit W.S. (ft) | -0.63 | Flow Area (sq ft) | | 3233.89 |
| 246.58 | | | | |
| E.G. Slope (ft/ft) | 0.000162 | Area (sq ft) | 802.43 | 3233.89 |
| 246.58 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11646.90 |
| 353.10 | | | | |
| Top Width (ft) | 456.59 | Top Width (ft) | 164.14 | 236.74 |
| 55.71 | | | | |
| Vel Total (ft/s) | 3.45 | Avg. Vel. (ft/s) | | 3.60 |
| 1.43 | | | | |
| Max Chl Dpth (ft) | 13.90 | Hydr. Depth (ft) | | 13.66 |
| 4.43 | | | | |
| Conv. Total (cfs) | 942345.8 | Conv. (cfs) | | 914617.4 |
| 27728.4 | | | | |
| Length Wtd. (ft) | 165.29 | Wetted Per. (ft) | | 237.01 |
| 57.20 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.14 |
| 0.04 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | | 0.50 |
| 0.06 | | | | |
| Frctn Loss (ft) | 0.07 | Cum Volume (acre-ft) | 6.47 | 27.85 |
| 1.66 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 1.24 | 2.20 | 0.44 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 581

INPUT
Description:
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .06 | 99.233 | .06 | 231.87 | .06 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 99.233 | 231.87 | 240.36 | 239.2 | 239.01 | .3 .5 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.82 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.56 | Wt. n-Val. | 0.060 | 0.060 | 0.060 |
| W.S. Elev (ft) | 8.26 | Reach Len. (ft) | 16.86 | 16.86 | 16.86 |
| Crit W.S. (ft) | 1.86 | Flow Area (sq ft) | 351.12 | 1689.08 | 83.70 |
| E.G. Slope (ft/ft) | 0.002188 | Area (sq ft) | 351.12 | 1689.08 | 83.70 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 1242.29 | 10587.60 | 170.12 |
| Top Width (ft) | 232.83 | Top Width (ft) | 64.91 | 132.64 | 35.28 |
| Vel Total (ft/s) | 5.65 | Avg. Vel. (ft/s) | 3.54 | 6.27 | 2.03 |
| Max Chl Dpth (ft) | 13.44 | Hydr. Depth (ft) | 5.41 | 12.73 | 2.37 |
| Conv. Total (cfs) | 256565.4 | Conv. (cfs) | 26560.7 | 226367.6 | 3637.1 |
| Length Wtd. (ft) | 16.86 | Wetted Per. (ft) | 65.77 | 134.18 | 36.02 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.73 | 1.72 | 0.32 |
| Alpha | 1.13 | Stream Power (lb/ft s) | 2.58 | 10.78 | 0.65 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 3.24 | 18.75 | |

1.04
C & E Loss (ft) 0.02 Cum SA (acres) 0.60 1.52
0.27

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: Batiquitos
REACH: 1 RS: 400

INPUT
Description: Carlsbad Blvd
Distance from Upstream XS = 16.86
Deck/Roadway Width = 205.22
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 17.17 | 0 | 38.7 | 16.82 | 0 | 38.7 | 16.82 | 14.99 |
| 246.7 | 17.74 | 15.91 | 246.7 | 17.74 | -5 | 300 | 18 | -5 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .06 | 99.233 | .06 | 231.87 | .06 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 99.233 | 231.87 | .3 | .5 |

Downstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 17.17 | 0 | 38.7 | 16.82 | 0 | 38.7 | 16.82 | 14.99 |
| 246.7 | 17.74 | 15.91 | 246.7 | 17.74 | -5 | 300 | 18 | -5 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 99.233 | .03 | 231.87 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 99.233 | 231.87 | .1 | .3 |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95

```
Elevation at which weir flow begins          =
Energy head used in spillway design          =
Spillway height used in design               =
Weir crest shape                             = Broad Crested

Number of Piers =  5

Pier Data
Pier Station     Upstream=    68.2    Downstream=    68.2
Upstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20
Downstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20

Pier Data
Pier Station     Upstream=  105.45    Downstream=  105.45
Upstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20
Downstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20

Pier Data
Pier Station     Upstream=   142.7    Downstream=   142.7
Upstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20
Downstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20

Pier Data
Pier Station     Upstream=  179.95    Downstream=  179.95
Upstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20
Downstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20

Pier Data
Pier Station     Upstream=   217.2    Downstream=   217.2
Upstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20
Downstream     num=        2
    Width   Elev    Width   Elev
        3     -6        3     20

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
      Energy Only

Additional Bridge Parameters
      Add Friction component to Momentum
```

Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 8.82 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 8.26 | E.G. Elev (ft) | 8.74 |
| 8.13 | | | |
| Q Total (cfs) | 12000.00 | W.S. Elev (ft) | 8.11 |
| 7.37 | | | |
| Q Bridge (cfs) | 12000.00 | Crit W.S. (ft) | 2.26 |
| 2.26 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 13.29 |
| 12.55 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 6.31 |
| 6.83 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 1900.43 |
| 1758.06 | | | |
| Weir Submerg | | Froude # Chl | 0.35 |
| 0.40 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 13376.28 |
| 12246.40 | | | |
| Min El Weir Flow (ft) | 16.83 | Hydr Depth (ft) | 9.85 |
| 9.15 | | | |
| Min El Prs (ft) | 15.91 | W.P. Total (ft) | 306.18 |
| 297.89 | | | |
| Delta EG (ft) | 0.74 | Conv. Total (cfs) | 164463.1 |
| 290350.8 | | | |
| Delta WS (ft) | 0.87 | Top Width (ft) | 193.00 |
| 192.10 | | | |
| BR Open Area (sq ft) | 3316.68 | Frctn Loss (ft) | 0.57 |
| 0.02 | | | |
| BR Open Vel (ft/s) | 6.83 | C & E Loss (ft) | 0.04 |
| 0.03 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 2.06 |
| 0.63 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 13.03 |
| 4.30 | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 342

INPUT
Description:
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 99.233 | .03 | 231.87 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 99.233 | 231.87 | 295.11 | 295.34 295.96 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 8.08 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.69 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 7.39 | Reach Len. (ft) | 295.11 | 295.34 |
| 295.96 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 296.85 | 1573.56 |
| 56.05 | | | | |
| E.G. Slope (ft/ft) | 0.000736 | Area (sq ft) | 296.85 | 1573.56 |
| 56.05 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 987.08 | 10912.51 |
| 100.41 | | | | |
| Top Width (ft) | 220.55 | Top Width (ft) | 59.71 | 132.64 |
| 28.21 | | | | |
| Vel Total (ft/s) | 6.23 | Avg. Vel. (ft/s) | 3.33 | 6.93 |
| 1.79 | | | | |
| Max Chl Dpth (ft) | 12.57 | Hydr. Depth (ft) | 4.97 | 11.86 |
| 1.99 | | | | |
| Conv. Total (cfs) | 442406.2 | Conv. (cfs) | 36390.8 | 402313.5 |
| 3701.9 | | | | |
| Length Wtd. (ft) | 295.34 | Wetted Per. (ft) | 60.50 | 134.18 |
| 28.89 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.23 | 0.54 |
| 0.09 | | | | |
| Alpha | 1.15 | Stream Power (lb/ft s) | 0.75 | 3.74 |
| 0.16 | | | | |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 1.57 | 10.59 |
| 0.75 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.29 | 0.85 |
| 0.18 | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 47

INPUT
Description:
Station Elevation Data num= 6

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 16.67 | 13.7 | 16.67 | 57.9 | -5.83 | 177.1 | -5.83 | 221.3 | 16.67 |
| 235 | 16.67 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 57.9 | .03 | 177.1 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
57.9 177.1 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.87 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.70 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 7.17 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.79 | Flow Area (sq ft) | 166.00 | 1549.60 | 166.00 |
| E.G. Slope (ft/ft) | 0.000652 | Area (sq ft) | 166.00 | 1549.60 | 166.00 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 580.59 | 10838.82 | 580.59 |
| Top Width (ft) | 170.28 | Top Width (ft) | 25.54 | 119.20 | 25.54 |
| Vel Total (ft/s) | 6.38 | Avg. Vel. (ft/s) | 3.50 | 6.99 | 3.50 |
| Max Chl Dpth (ft) | 13.00 | Hydr. Depth (ft) | 6.50 | 13.00 | 6.50 |
| Conv. Total (cfs) | 469809.3 | Conv. (cfs) | 22730.5 | 424348.3 | 22730.5 |
| Length Wtd. (ft) | | Wetted Per. (ft) | 28.66 | 119.20 | 28.66 |
| Min Ch El (ft) | -5.83 | Shear (lb/sq ft) | 0.24 | 0.53 | 0.24 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 0.83 | 3.70 | 0.83 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

SUMMARY OF MANNING'S N VALUES

River:Batiquitos

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| 1 | 9724 | .035 | .03 | .035 |
| 1 | 9162 | .035 | .03 | .035 |
| 1 | 8558 | .035 | .03 | .035 |
| 1 | 7922 | .035 | .03 | .035 |
| 1 | 7547 | .035 | .03 | .035 |
| 1 | 6962 | .035 | .03 | .035 |
| 1 | 6431 | .035 | .03 | .035 |
| 1 | 5864 | .035 | .03 | .035 |
| 1 | 5293 | .035 | .03 | .035 |
| 1 | 4871 | .035 | .03 | .035 |
| 1 | 4407 | .035 | .03 | .035 |
| 1 | 4209 | .035 | .03 | .035 |
| 1 | 4159 | .06 | .06 | .06 |
| 1 | 4000 | Bridge | | |
| 1 | 3797 | .035 | .03 | .035 |

BL_Exist.rep

| | | | | |
|---|---|---|---|---|
| 1 | 3581 | .035 | .03 | .035 |
| 1 | 3204 | .035 | .03 | .035 |
| 1 | 2754 | .035 | .03 | .035 |
| 1 | 2428 | .035 | .03 | .035 |
| 1 | 2076 | .035 | .03 | .035 |
| 1 | 1740 | .035 | .03 | .035 |
| 1 | 1454 | .035 | .03 | .035 |
| 1 | 1300 | Bridge | | |
| 1 | 1207 | .035 | .03 | .035 |
| 1 | 976 | .035 | .03 | .035 |
| 1 | 874 | .035 | .03 | .035 |
| 1 | 581 | .06 | .06 | .06 |
| 1 | 400 | Bridge | | |
| 1 | 342 | .035 | .03 | .035 |
| 1 | 47 | .035 | .03 | .035 |

SUMMARY OF REACH LENGTHS

River: Batiquitos

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| 1 | 9724 | 333.14 | 561.59 | 744.21 |
| 1 | 9162 | 423.98 | 604.81 | 765.06 |
| 1 | 8558 | 666.77 | 636.64 | 683.13 |
| 1 | 7922 | 399.23 | 375.4 | 392.28 |
| 1 | 7547 | 637.78 | 584.87 | 537.79 |
| 1 | 6962 | 820.71 | 532.08 | 332.07 |
| 1 | 6431 | 687.07 | 567.98 | 494.69 |
| 1 | 5864 | 390.15 | 571.18 | 519.72 |
| 1 | 5293 | 333.66 | 422.8 | 462.78 |
| 1 | 4871 | 195.16 | 464.8 | 912.1 |
| 1 | 4407 | 100.52 | 198.16 | 344.06 |
| 1 | 4209 | 62.5 | 49.9 | 84 |
| 1 | 4159 | 357.7 | 362.51 | 374.53 |
| 1 | 4000 | Bridge | | |
| 1 | 3797 | 139.64 | 216.41 | 305.8 |
| 1 | 3581 | 342.87 | 377.21 | 427.94 |
| 1 | 3204 | 465.52 | 449.84 | 452.33 |
| 1 | 2754 | 664.97 | 357.33 | 202.94 |
| 1 | 2428 | 605.62 | 351.98 | 312.8 |
| 1 | 2076 | 472.02 | 336.44 | 300.63 |
| 1 | 1740 | 661.13 | 285.69 | 333.19 |
| 1 | 1454 | 253.92 | 247.22 | 263.76 |
| 1 | 1300 | Bridge | | |
| 1 | 1207 | 502.13 | 230.8 | 182.26 |
| 1 | 976 | 685.58 | 233.76 | 362.43 |
| 1 | 874 | 243.66 | 160.93 | 164.42 |
| 1 | 581 | 240.36 | 239.2 | 239.01 |
| 1 | 400 | Bridge | | |
| 1 | 342 | 295.11 | 295.34 | 295.96 |
| 1 | 47 | | | |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Batiquitos

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| 1 | 9724 | .1 | .3 |
| 1 | 9162 | .1 | .3 |
| 1 | 8558 | .1 | .3 |
| 1 | 7922 | .1 | .3 |
| 1 | 7547 | .1 | .3 |
| 1 | 6962 | .1 | .3 |
| 1 | 6431 | .1 | .3 |
| 1 | 5864 | .1 | .3 |
| 1 | 5293 | .1 | .3 |
| 1 | 4871 | .1 | .3 |
| 1 | 4407 | .1 | .3 |
| 1 | 4209 | .1 | .3 |
| 1 | 4159 | .3 | .5 |
| 1 | 4000 | Bridge | |
| 1 | 3797 | .1 | .3 |
| 1 | 3581 | .1 | .3 |
| 1 | 3204 | .1 | .3 |
| 1 | 2754 | .1 | .3 |
| 1 | 2428 | .1 | .3 |
| 1 | 2076 | .1 | .3 |
| 1 | 1740 | .1 | .3 |
| 1 | 1454 | .3 | .5 |
| 1 | 1300 | Bridge | |
| 1 | 1207 | .1 | .3 |
| 1 | 976 | .1 | .3 |
| 1 | 874 | .1 | .3 |
| 1 | 581 | .3 | .5 |
| 1 | 400 | Bridge | |
| 1 | 342 | .1 | .3 |
| 1 | 47 | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl (ft) | (ft) |
| 1 | 9724 | PF 1 | 12000.00 | -2.18 | 11.37 | |
| 11.38 | 0.000024 | 1.12 | 12231.76 | 1526.92 | 0.06 | |
| 1 | 9162 | PF 1 | 12000.00 | -2.18 | 11.36 | |
| 11.37 | 0.000019 | 1.02 | 13538.79 | 1665.57 | 0.06 | |
| 1 | 8558 | PF 1 | 12000.00 | -2.18 | 11.33 | |
| 11.36 | 0.000035 | 1.36 | 9973.96 | 1298.03 | 0.08 | |
| 1 | 7922 | PF 1 | 12000.00 | -2.18 | 11.32 | |
| 11.34 | 0.000024 | 1.22 | 12244.24 | 1719.03 | 0.06 | |
| 1 | 7547 | PF 1 | 12000.00 | -2.18 | 11.32 | |
| 11.33 | 0.000008 | 0.76 | 16745.06 | 1528.84 | 0.04 | |
| 1 | 6962 | PF 1 | 12000.00 | -3.18 | 11.31 | -0.82 |
| 11.32 | 0.000008 | 0.79 | 15734.69 | 1572.21 | 0.04 | |
| 1 | 6431 | PF 1 | 12000.00 | -3.18 | 11.30 | -0.93 |
| 11.32 | 0.000011 | 0.94 | 13387.49 | 1967.00 | 0.05 | |
| 1 | 5864 | PF 1 | 12000.00 | -3.18 | 11.29 | -0.78 |
| 11.31 | 0.000015 | 1.10 | 11637.82 | 1911.35 | 0.05 | |
| 1 | 5293 | PF 1 | 12000.00 | -3.18 | 11.29 | -0.69 |
| 11.30 | 0.000014 | 0.98 | 12758.45 | 1993.45 | 0.05 | |
| 1 | 4871 | PF 1 | 12000.00 | -3.18 | 11.28 | -0.25 |
| 11.29 | 0.000015 | 1.04 | 12614.78 | 2173.11 | 0.05 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | | 4407 | PF 1 | 12000.00 | -4.18 | 11.27 | -1.54 |
| | 11.29 | 0.000010 | 0.92 | 13579.51 | 2898.08 | 0.04 | |
| 1 | | 4209 | PF 1 | 12000.00 | -4.18 | 11.23 | 0.85 |
| | 11.28 | 0.000049 | 1.82 | 6582.54 | 3055.56 | 0.09 | |
| 1 | | 4159 | PF 1 | 12000.00 | -4.18 | 10.96 | 2.86 |
| | 11.25 | 0.001048 | 4.34 | 2765.97 | 3067.71 | 0.22 | |
| 1 | | 4000 | | Bridge | | | |
| 1 | | 3797 | PF 1 | 12000.00 | -4.18 | 9.64 | 0.74 |
| | 9.90 | 0.000213 | 4.08 | 2941.05 | 2200.43 | 0.20 | |
| 1 | | 3581 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.30 |
| | 9.82 | 0.000010 | 0.95 | 12574.48 | 1907.17 | 0.04 | |
| 1 | | 3204 | PF 1 | 12000.00 | -5.00 | 9.80 | -3.41 |
| | 9.81 | 0.000006 | 0.74 | 16485.04 | 1594.47 | 0.03 | |
| 1 | | 2754 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.51 |
| | 9.81 | 0.000007 | 0.73 | 16536.97 | 1270.86 | 0.03 | |
| 1 | | 2428 | PF 1 | 12000.00 | -5.18 | 9.80 | |
| | 9.81 | 0.000003 | 0.55 | 22514.18 | 1657.88 | 0.03 | |
| 1 | | 2076 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.65 |
| | 9.81 | 0.000005 | 0.68 | 17987.88 | 2099.63 | 0.03 | |
| 1 | | 1740 | PF 1 | 12000.00 | -5.18 | 9.78 | -2.73 |
| | 9.80 | 0.000020 | 1.19 | 10060.15 | 2060.58 | 0.06 | |
| 1 | | 1454 | PF 1 | 12000.00 | -5.18 | 9.46 | 1.42 |
| | 9.76 | 0.000321 | 4.42 | 2715.52 | 239.80 | 0.23 | |
| 1 | | 1300 | | Bridge | | | |
| 1 | | 1207 | PF 1 | 12000.00 | -5.18 | 8.76 | |
| | 9.04 | 0.000269 | 4.46 | 2978.39 | 278.54 | 0.22 | |
| 1 | | 976 | PF 1 | 12000.00 | -5.18 | 8.90 | -2.33 |
| | 8.95 | 0.000041 | 1.83 | 6710.87 | 1636.29 | 0.09 | |
| 1 | | 874 | PF 1 | 12000.00 | -5.18 | 8.72 | -0.63 |
| | 8.92 | 0.000162 | 3.60 | 3480.47 | 456.59 | 0.17 | |
| 1 | | 581 | PF 1 | 12000.00 | -5.18 | 8.26 | 1.86 |
| | 8.82 | 0.002188 | 6.27 | 2123.91 | 232.83 | 0.31 | |
| 1 | | 400 | | Bridge | | | |
| 1 | | 342 | PF 1 | 12000.00 | -5.18 | 7.39 | |
| | 8.08 | 0.000736 | 6.93 | 1926.47 | 220.55 | 0.35 | |
| 1 | | 47 | PF 1 | 12000.00 | -5.83 | 7.17 | 0.79 |
| | 7.87 | 0.000652 | 6.99 | 1881.59 | 170.28 | 0.34 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : BL_Exist

River: Batiquitos Reach: 1 RS: 7922 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 6962 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 6431 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 5864 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was

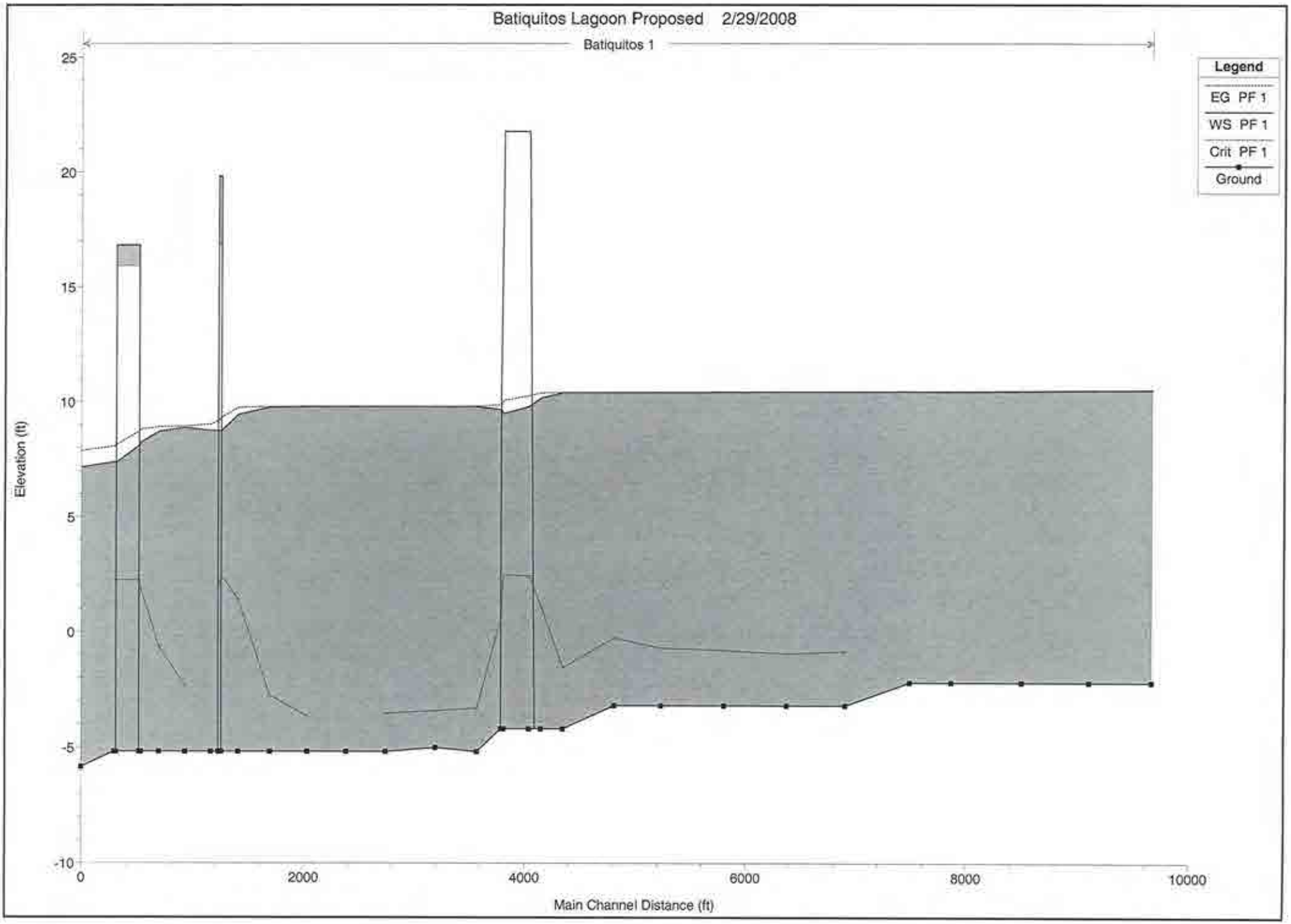
used.
River: Batiquitos Reach: 1 RS: 5293 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 4871 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 4407 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 4209 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 4159 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Batiquitos Reach: 1 RS: 4000 Profile: PF 1 Upstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Batiquitos Reach: 1 RS: 4000 Profile: PF 1 Downstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Batiquitos Reach: 1 RS: 3797 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Batiquitos Reach: 1 RS: 3581 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 3204 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 2754 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.

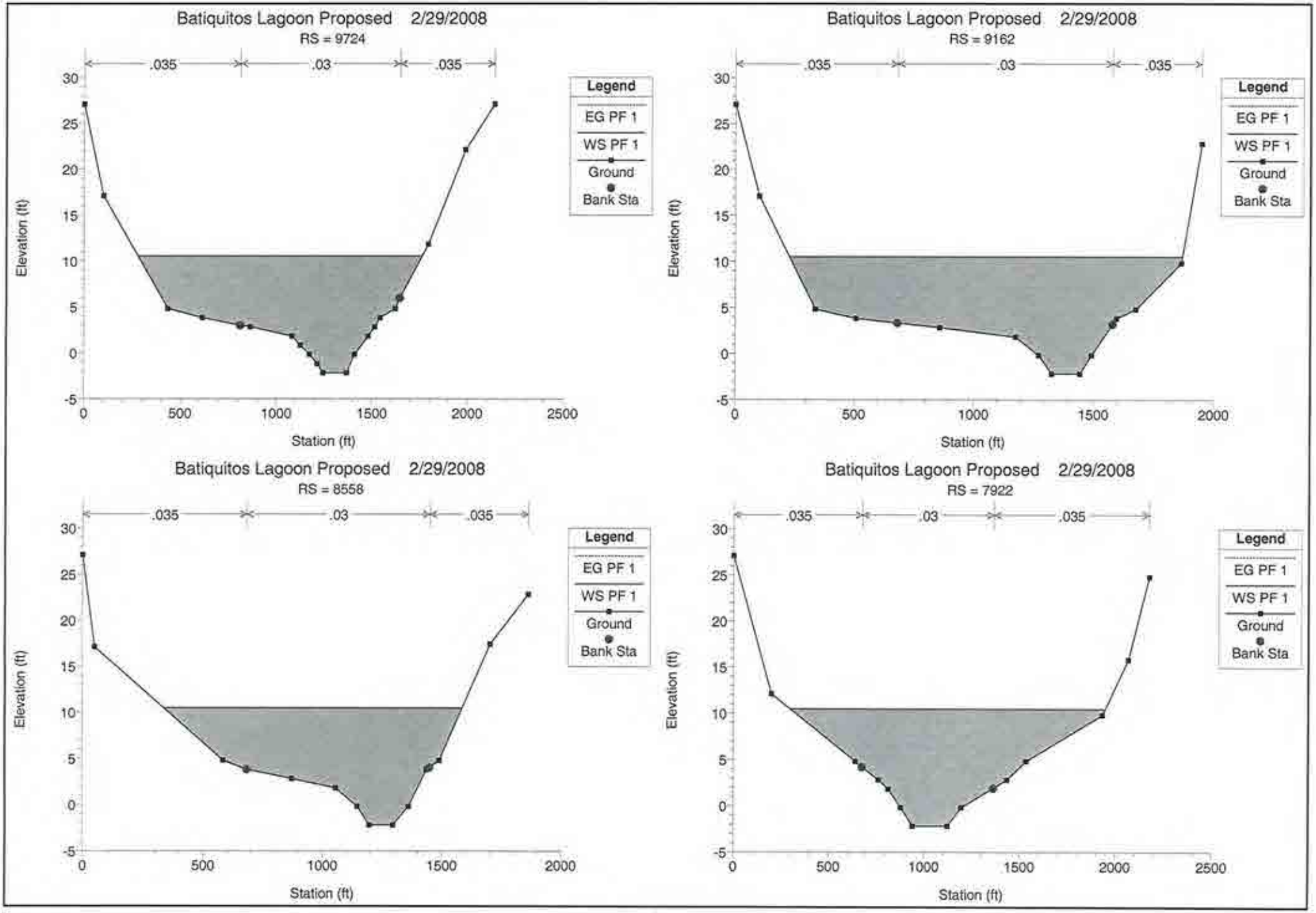
River: Batiquitos Reach: 1 RS: 2076 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 1740 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 1454 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 1300 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 1207 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 976 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 874 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 581 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 400 Profile: PF 1 Upstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 400 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

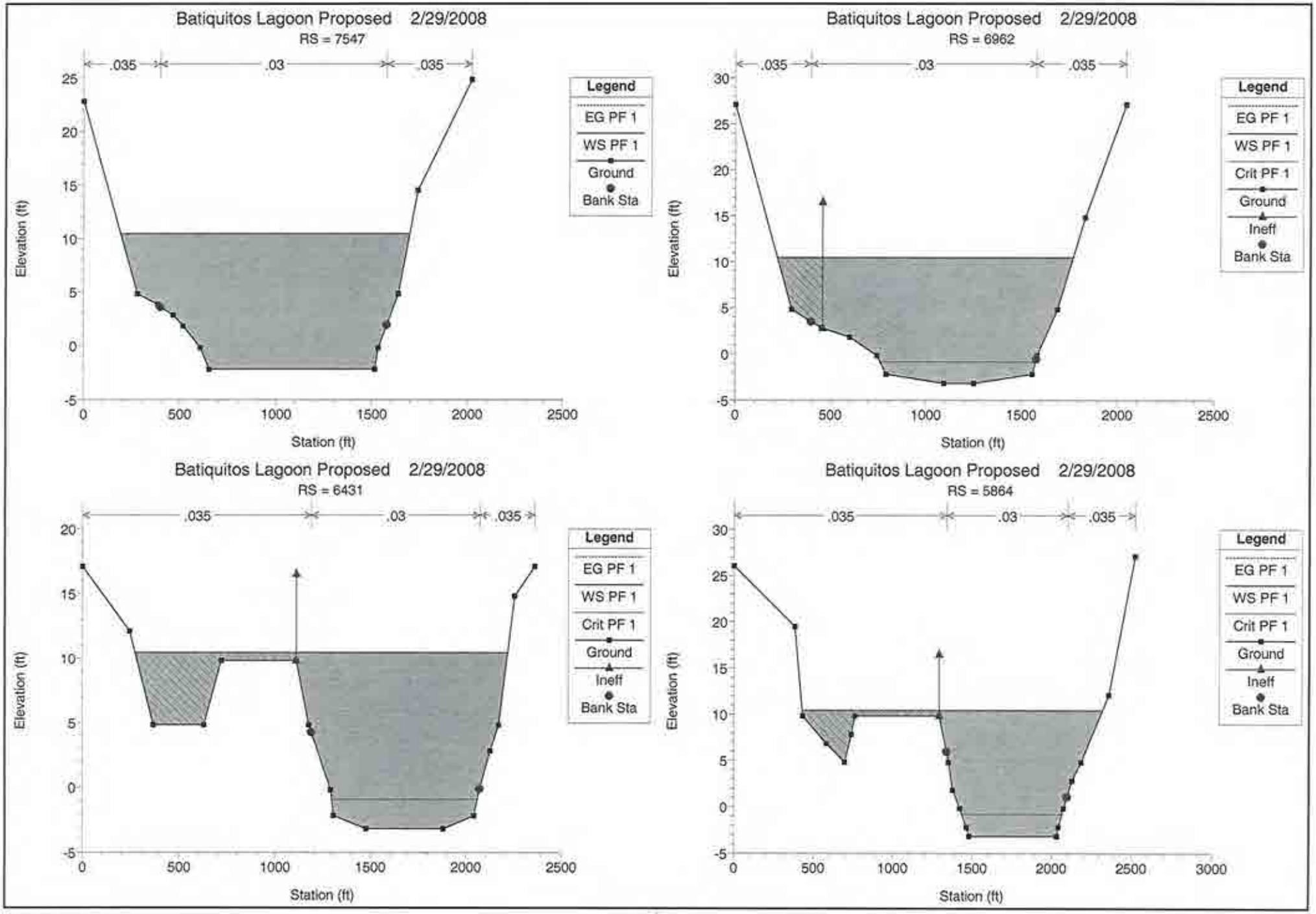
**PROSPOSED**

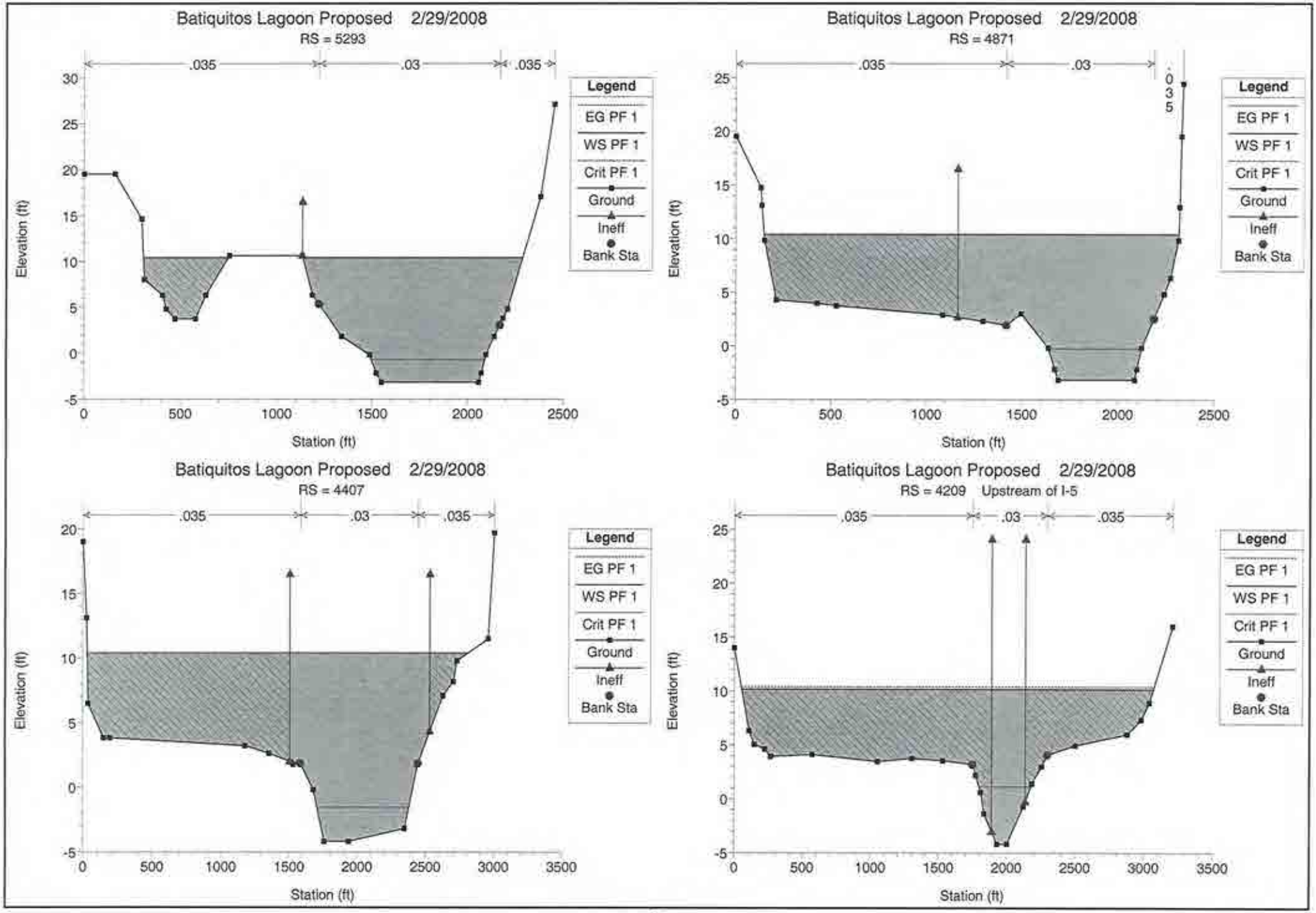
HEC-RAS Plan: BL_Prop River: Batiquitos Reach: 1 Profile: PF 1

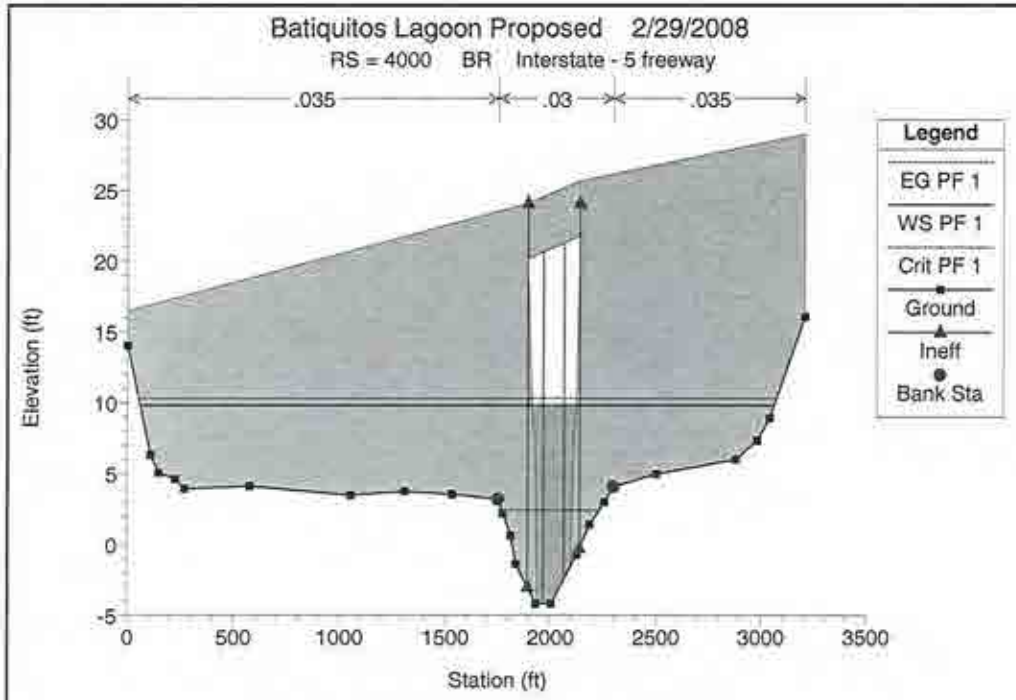
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 1 | 9724 | PF 1 | 12000.00 | -2.18 | 10.53 | | 10.55 | 0.000032 | 1.24 | 10972.47 | 1482.77 | 0.07 |
| 1 | 9162 | PF 1 | 12000.00 | -2.18 | 10.52 | | 10.54 | 0.000027 | 1.14 | 12147.54 | 1644.00 | 0.07 |
| 1 | 8558 | PF 1 | 12000.00 | -2.18 | 10.48 | | 10.51 | 0.000048 | 1.51 | 8892.53 | 1246.88 | 0.09 |
| 1 | 7922 | PF 1 | 12000.00 | -2.18 | 10.46 | | 10.48 | 0.000034 | 1.37 | 10802.49 | 1648.06 | 0.07 |
| 1 | 7547 | PF 1 | 12000.00 | -2.18 | 10.46 | | 10.47 | 0.000010 | 0.82 | 15447.14 | 1506.62 | 0.04 |
| 1 | 6962 | PF 1 | 12000.00 | -3.18 | 10.46 | -0.82 | 10.47 | 0.000011 | 0.85 | 14606.95 | 1548.45 | 0.04 |
| 1 | 6431 | PF 1 | 12000.00 | -3.18 | 10.45 | -0.93 | 10.46 | 0.000014 | 1.01 | 12434.49 | 1945.40 | 0.05 |
| 1 | 5864 | PF 1 | 12000.00 | -3.18 | 10.43 | -0.78 | 10.45 | 0.000019 | 1.19 | 10747.00 | 1886.70 | 0.06 |
| 1 | 5293 | PF 1 | 12000.00 | -3.18 | 10.42 | -0.69 | 10.44 | 0.000017 | 1.06 | 11758.10 | 1591.98 | 0.05 |
| 1 | 4871 | PF 1 | 12000.00 | -3.18 | 10.41 | -0.25 | 10.43 | 0.000020 | 1.13 | 11618.72 | 2167.86 | 0.06 |
| 1 | 4407 | PF 1 | 12000.00 | -4.18 | 10.41 | -1.54 | 10.42 | 0.000013 | 0.98 | 12690.49 | 2780.56 | 0.05 |
| 1 | 4209 | PF 1 | 12000.00 | -4.18 | 10.19 | 1.15 | 10.40 | 0.000177 | 3.69 | 3255.50 | 3016.29 | 0.18 |
| 1 | 4000 | | Bridge | | | | | | | | | |
| 1 | 3797 | PF 1 | 12000.00 | -4.18 | 9.67 | 0.58 | 9.88 | 0.000175 | 3.67 | 3268.60 | 2201.92 | 0.18 |
| 1 | 3581 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.30 | 9.82 | 0.000010 | 0.95 | 12574.54 | 1907.17 | 0.04 |
| 1 | 3204 | PF 1 | 12000.00 | -5.00 | 9.80 | -3.41 | 9.81 | 0.000006 | 0.74 | 16485.11 | 1594.47 | 0.03 |
| 1 | 2754 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.51 | 9.81 | 0.000007 | 0.73 | 16537.05 | 1270.87 | 0.03 |
| 1 | 2428 | PF 1 | 12000.00 | -5.18 | 9.80 | | 9.81 | 0.000003 | 0.55 | 22514.29 | 1657.88 | 0.03 |
| 1 | 2076 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.65 | 9.81 | 0.000005 | 0.68 | 17987.96 | 2099.64 | 0.03 |
| 1 | 1740 | PF 1 | 12000.00 | -5.18 | 9.78 | -2.73 | 9.80 | 0.000020 | 1.19 | 10060.20 | 2060.58 | 0.06 |
| 1 | 1454 | PF 1 | 12000.00 | -5.18 | 9.46 | 1.42 | 9.76 | 0.000321 | 4.42 | 2715.54 | 239.80 | 0.23 |
| 1 | 1300 | | Bridge | | | | | | | | | |
| 1 | 1207 | PF 1 | 12000.00 | -5.18 | 8.76 | | 9.04 | 0.000269 | 4.46 | 2978.39 | 278.54 | 0.22 |
| 1 | 976 | PF 1 | 12000.00 | -5.18 | 8.90 | -2.33 | 8.95 | 0.000041 | 1.83 | 6710.87 | 1636.29 | 0.09 |
| 1 | 874 | PF 1 | 12000.00 | -5.18 | 8.72 | -0.63 | 8.92 | 0.000162 | 3.60 | 3480.47 | 456.59 | 0.17 |
| 1 | 581 | PF 1 | 12000.00 | -5.18 | 8.26 | 1.86 | 8.82 | 0.002188 | 6.27 | 2123.91 | 232.83 | 0.31 |
| 1 | 400 | | Bridge | | | | | | | | | |
| 1 | 342 | PF 1 | 12000.00 | -5.18 | 7.39 | | 8.08 | 0.000736 | 6.93 | 1926.47 | 220.55 | 0.35 |
| 1 | 47 | PF 1 | 12000.00 | -5.83 | 7.17 | 0.79 | 7.87 | 0.000652 | 6.99 | 1881.59 | 170.26 | 0.34 |

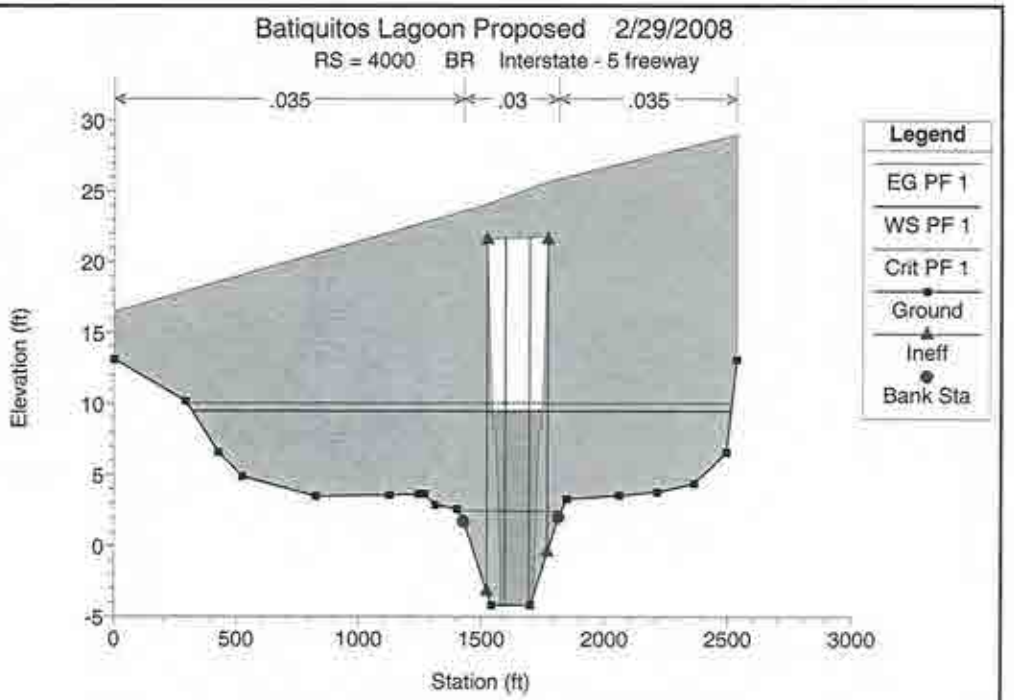

Batiquitos Lagoon Proposed 2/29/2008
Batiquitos 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
25
20
15
10
5
0
-5
-10
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 9724
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 9162
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 8558
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 7922
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 7547
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 6962
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 6431
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 5864
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


Batiquitos Lagoon Proposed 2/29/2008
RS = 5293
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 4871
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 4407
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 4209 Upstream of I-5
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


Batiquitos Lagoon Proposed 2/29/2008
RS = 4000 BR Interstate - 5 freeway
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 4000 BR Interstate - 5 freeway
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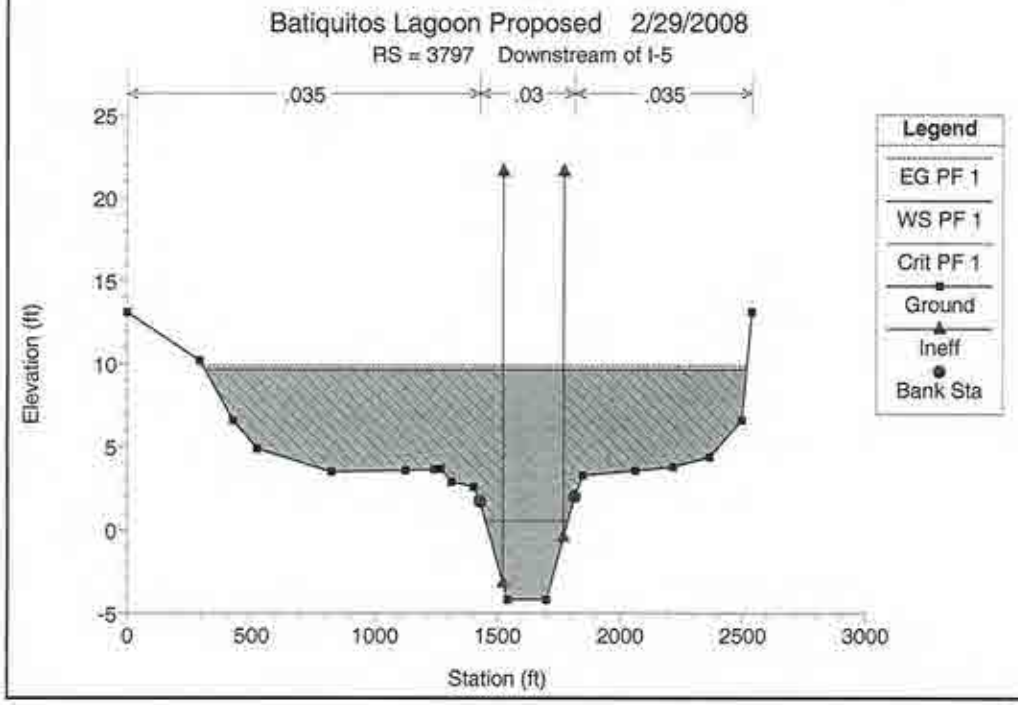
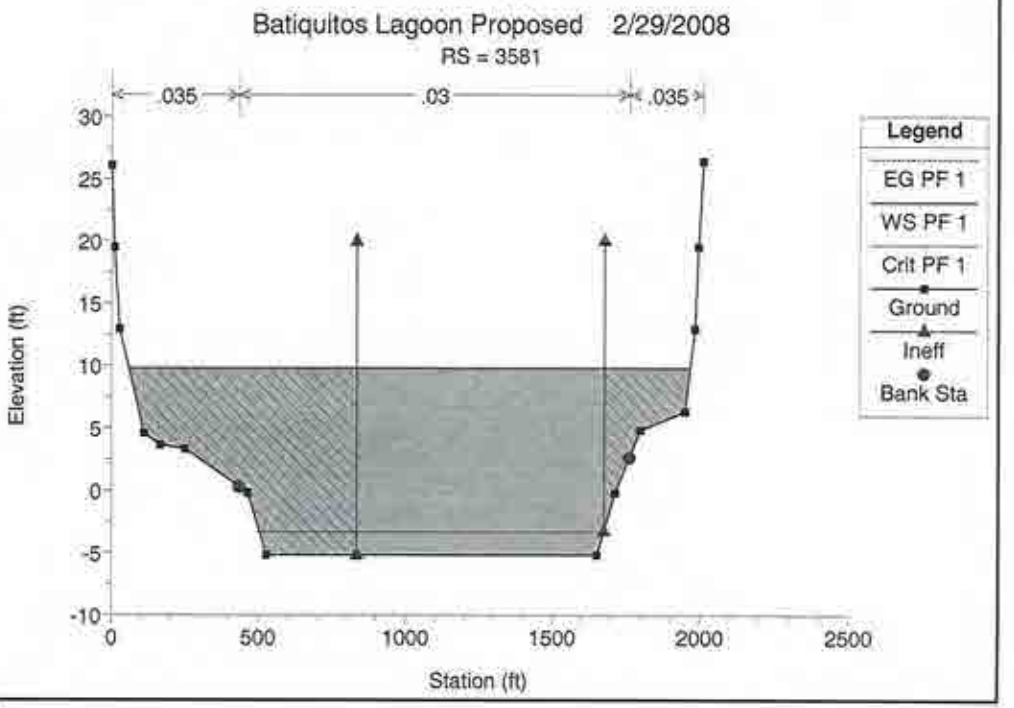
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 3797 Downstream of I-5
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 3581
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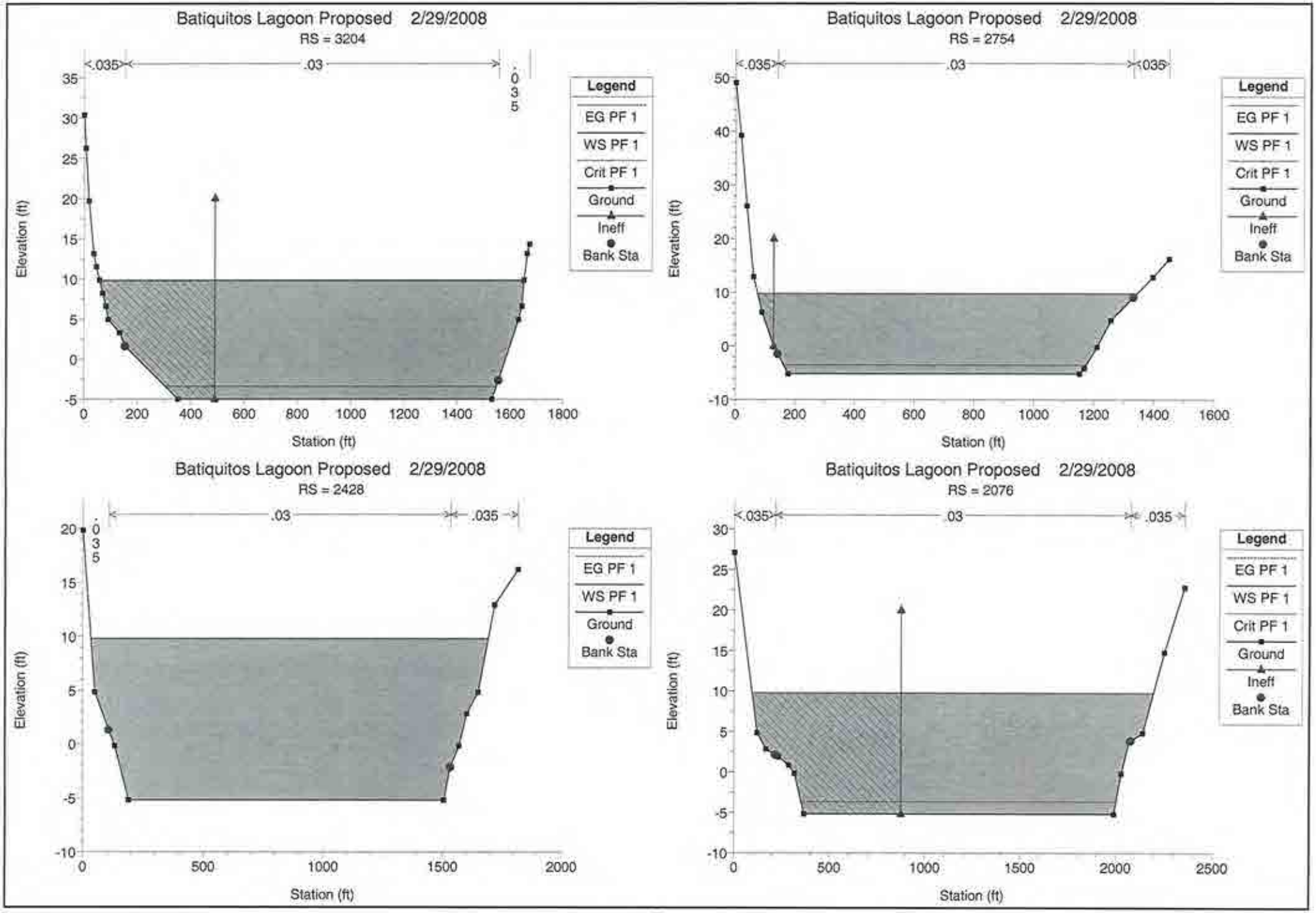
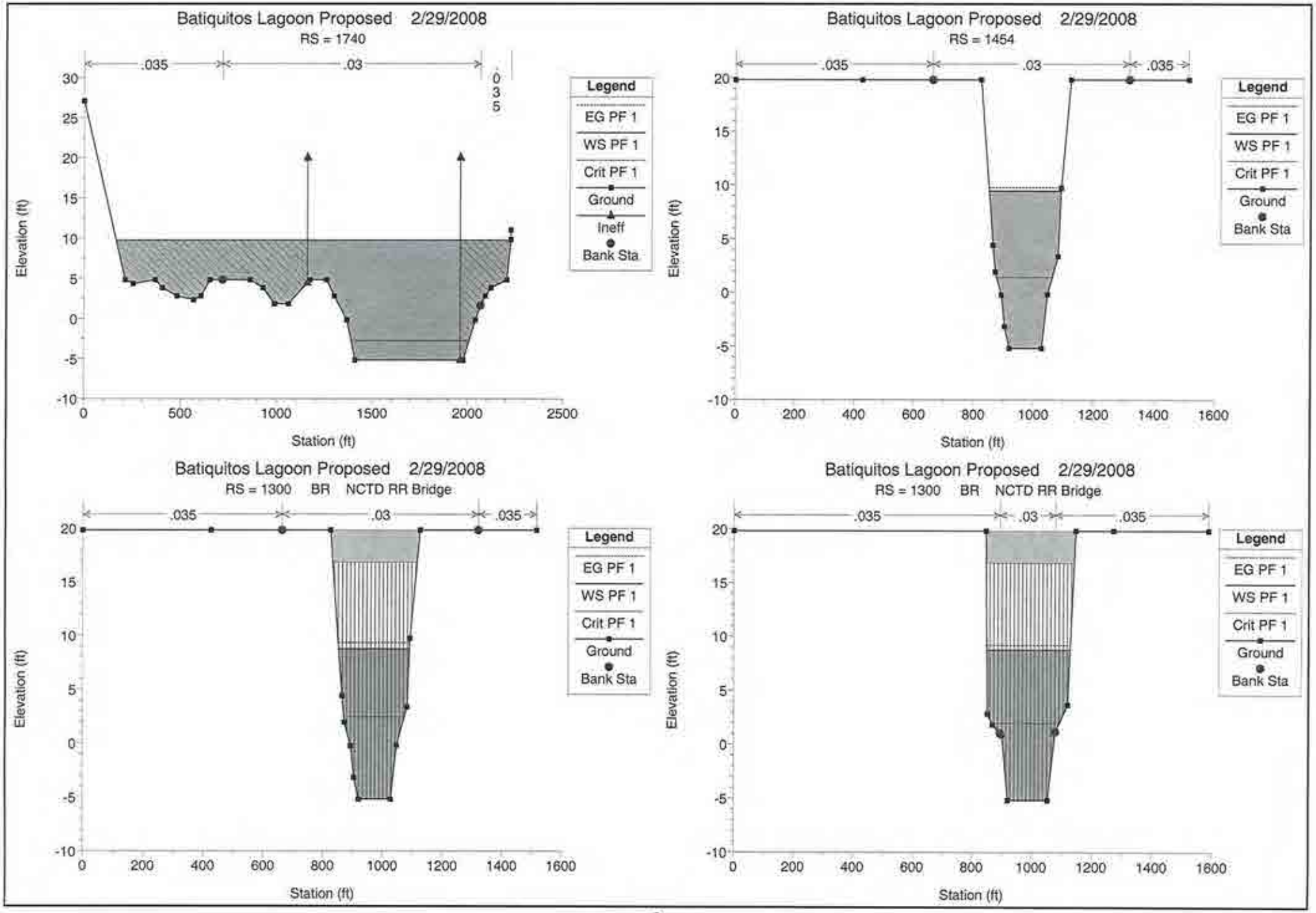
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 3204
<.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 2754
<.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 2428
.03
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Batiquitos Lagoon Proposed 2/29/2008
RS = 2076
<.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


Batiquitos Lagoon Proposed 2/29/2008
RS = 1740
.035
.03
0
3
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 1454
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 1300 BR NCTD RR Bridge
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 1300 BR NCTD RR Bridge
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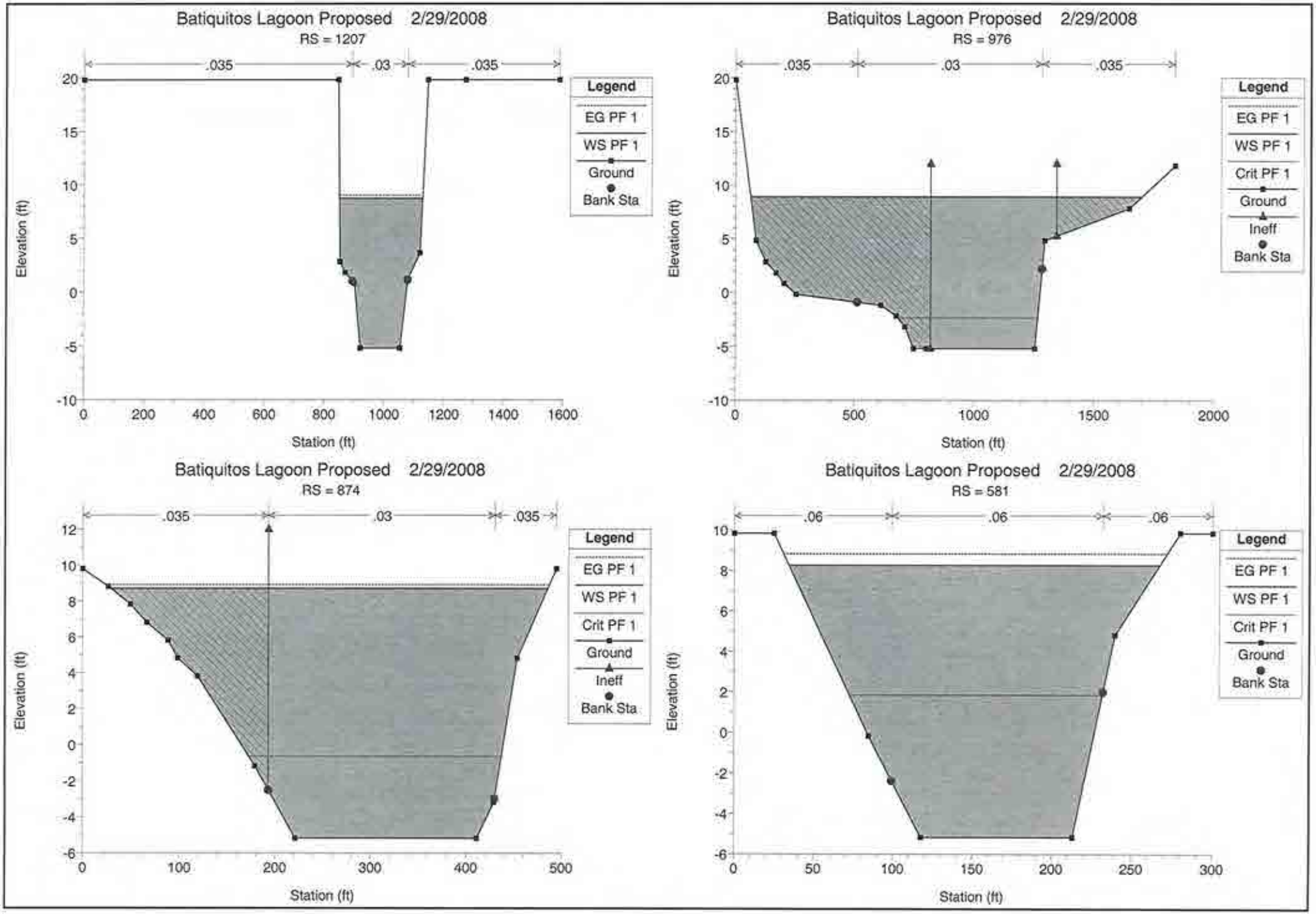
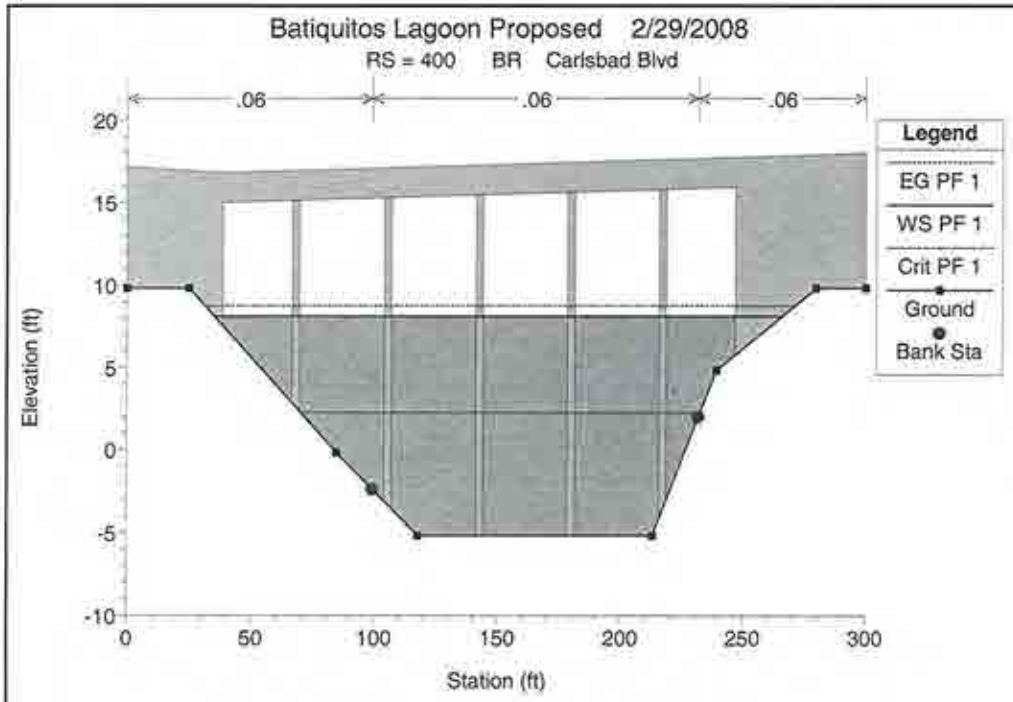
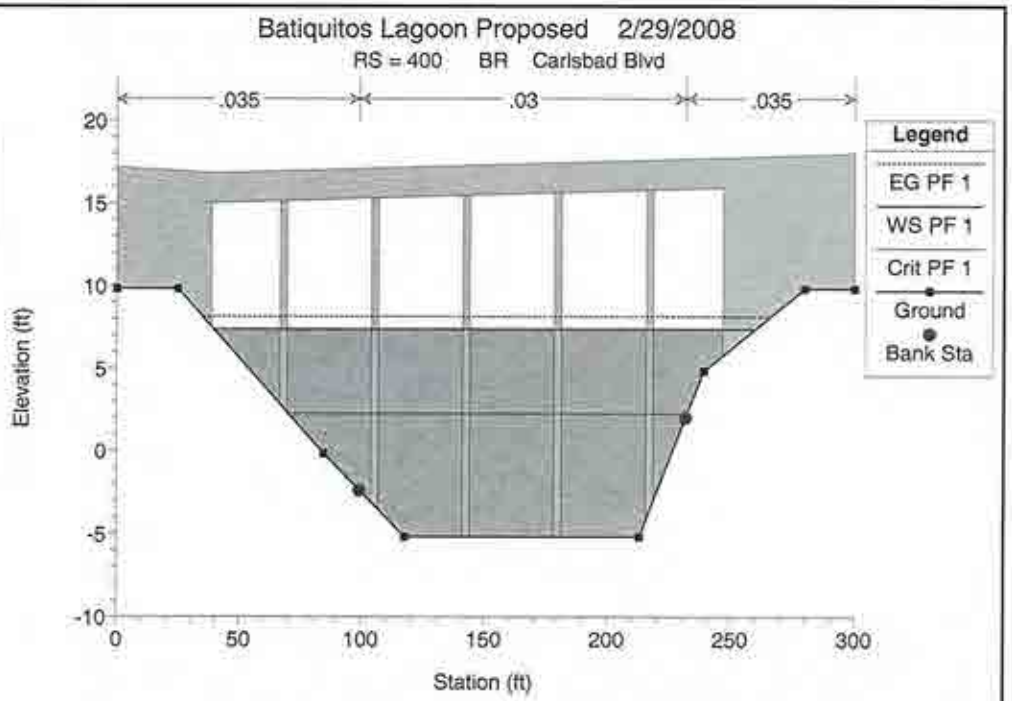
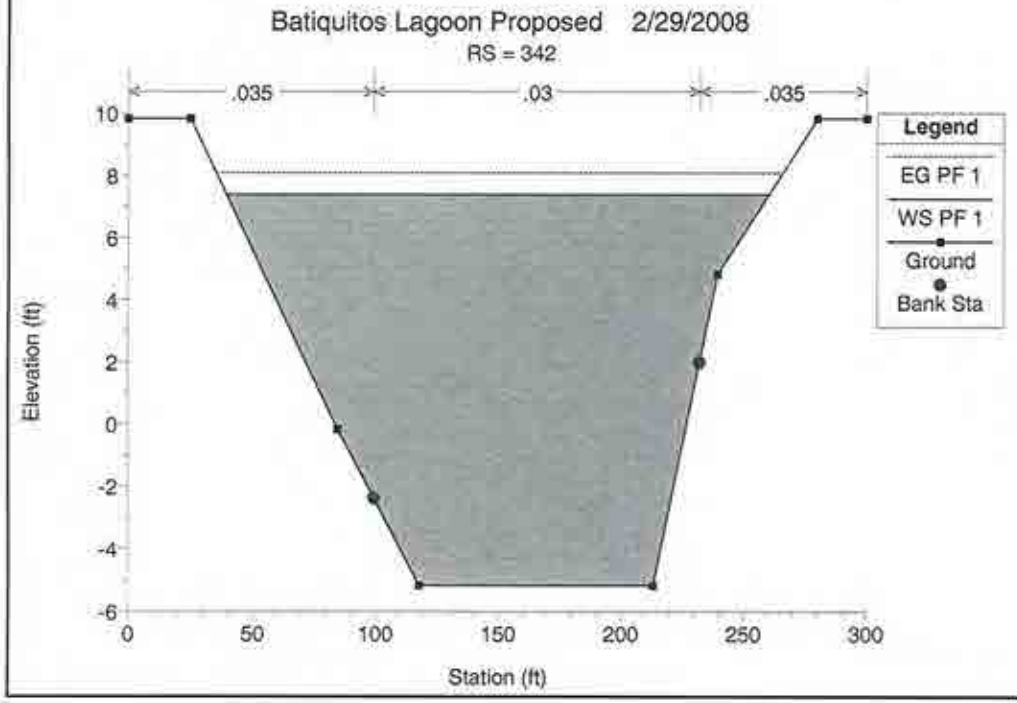
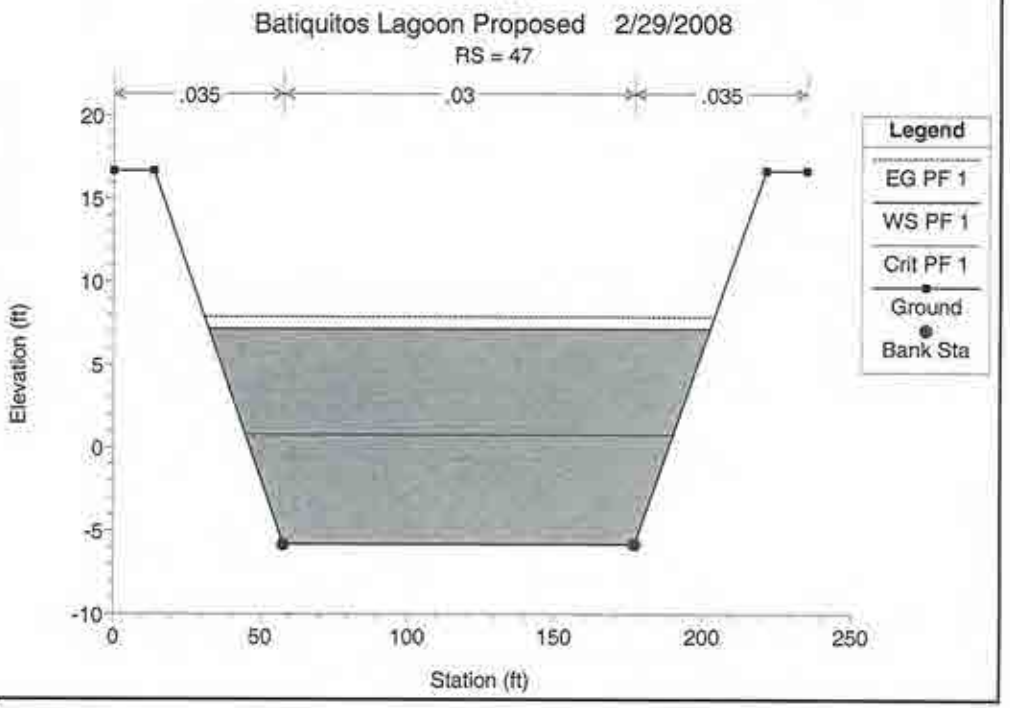
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 1207
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 976
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 874
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Batiquitos Lagoon Proposed 2/29/2008
RS = 581
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 400 BR Carlsbad Blvd
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

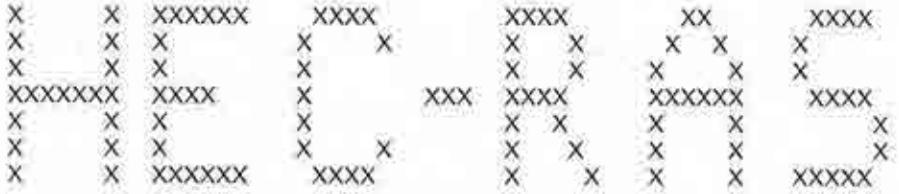

Batiquitos Lagoon Proposed 2/29/2008
RS = 400 BR Carlsbad Blvd
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 342
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Batiquitos Lagoon Proposed 2/29/2008
RS = 47
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

BL_Prop.rep

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California



PROJECT DATA
Project Title: Batiquitos Lagoon Proposed
Project File : BL_Prop.prj
Run Date and Time: 2/29/2008 6:09:17 PM

Project in English units

Project Description:
Batiquitos Lagoon Proposed Model

PLAN DATA

Plan Title: Batiquitos Lagoon Proposed
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Proposed\BL_Prop.p04

Geometry Title: Batiquitos Lagoon Proposed
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Proposed\BL_Prop.g03

Flow Title : 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Proposed\BL_Prop.f02

Plan Summary Information:
Number of: Cross Sections = 26 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 3 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Proposed\BL_Prop.f02

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| Batiquitos | 1 | 9724 | 12000 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Batiquitos | 1 | PF 1 | Normal S = 0.000332 | Known WS = 7.17 |

GEOMETRY DATA

Geometry Title: Batiquitos Lagoon Proposed
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Batiquitos\HEC RAS\Final\Proposed\BL_Prop.g03

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 9724

INPUT
Description:
Station Elevation Data num= 21

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 100 | 17.1 | 435.4 | 4.82 | 614.2 | 3.82 | 811.59 | 2.99 |
| 865.5 | 2.82 | 1082.7 | 1.82 | 1125.4 | .82 | 1173.6 | -.18 | 1214 | -1.18 |
| 1245.1 | -2.18 | 1367.5 | -2.18 | 1408.5 | -.18 | 1480.4 | 1.82 | 1514.2 | 2.82 |
| 1542.1 | 3.82 | 1621.8 | 4.82 | 1645.6 | 5.95 | 1795 | 11.82 | 1987.6 | 22.1 |
| 2140.05 | 27.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 811.59 | .03 | 1645.6 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 811.59 | 1645.6 | 333.14 | 561.59 744.21 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| E.G. Elev (ft) | 10.55 | Element | Left OB | Channel |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Right OB | | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 10.53 | Reach Len. (ft) | 333.14 | 561.59 | 744.21 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2962.45 | 7742.98 | 267.04 |
| E.G. Slope (ft/ft) | 0.000032 | Area (sq ft) | 2962.45 | 7742.98 | 267.04 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 2247.97 | 9639.98 | 112.05 |
| Top Width (ft) | 1482.77 | Top Width (ft) | 532.17 | 834.01 | 116.59 |
| Vel Total (ft/s) | 1.09 | Avg. Vel. (ft/s) | 0.76 | 1.24 | 0.42 |
| Max Chl Dpth (ft) | 12.71 | Hydr. Depth (ft) | 5.57 | 9.28 | 2.29 |
| Conv. Total (cfs) | 2108520.0 | Conv. (cfs) | 394990.5 | 1693840.0 | 19688.8 |
| Length Wtd. (ft) | 529.06 | Wetted Per. (ft) | 532.28 | 834.21 | 116.68 |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.02 | 0.00 |
| Alpha | 1.13 | Stream Power (lb/ft s) | 0.01 | 0.02 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 442.37 | 2369.11 | 209.17 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 93.59 | 193.75 | 47.10 |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 9162

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 100 | 17.1 | 336 | 4.82 | 507.6 | 3.82 | 682.2 | 3.32 |
| 858 | 2.82 | 1176.6 | 1.82 | 1273 | -.18 | 1327.8 | -2.18 | 1444.8 | -2.18 |
| 1493.8 | -.18 | 1580.99 | 3.19 | 1597.2 | 3.82 | 1678 | 4.82 | 1866 | 9.82 |
| 1949.7 | 22.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 682.2 | .03 | 1580.99 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 682.2 | 1580.99 | 423.98 | 604.81 765.06 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.54 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.52 | Reach Len. (ft) | 423.98 | 604.81 |
| 765.06 | | | | |

| | | | | |
|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | 2588.60 | 8341.73 |
| 1217.22 | | | | |
| E.G. Slope (ft/ft) | 0.000027 | Area (sq ft) | 2588.60 | 8341.73 |
| 1217.22 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 1818.03 | 9482.54 |
| 699.44 | | | | |
| Top Width (ft) | 1644.00 | Top Width (ft) | 455.70 | 898.79 |
| 289.50 | | | | |
| Vel Total (ft/s) | 0.99 | Avg. Vel. (ft/s) | 0.70 | 1.14 |
| 0.57 | | | | |
| Max Chl Dpth (ft) | 12.70 | Hydr. Depth (ft) | 5.68 | 9.28 |
| 4.20 | | | | |
| Conv. Total (cfs) | 2308864.0 | Conv. (cfs) | 349797.7 | 1824491.0 |
| 134575.9 | | | | |
| Length Wtd. (ft) | 591.23 | Wetted Per. (ft) | 455.85 | 898.96 |
| 289.64 | | | | |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.14 | Stream Power (lb/ft s) | 0.01 | 0.02 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 421.14 | 2265.43 |
| 196.49 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 89.81 | 182.58 |
| 43.63 | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 8558

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 50 | 17.1 | 582.7 | 4.82 | 681.71 | 3.827 | 682.45 | 3.82 |
| 869.56 | 2.82 | 1054.2 | 1.82 | 1145.4 | -.18 | 1196.3 | -2.18 | 1296 | -2.18 |
| 1360.3 | -.18 | 1435.8 | 3.82 | 1447.8 | 4.046 | 1488.9 | 4.82 | 1700.7 | 17.42 |
| 1860.9 | 22.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 681.71 | .03 | 1447.8 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 681.71 | 1447.8 | 666.77 | 636.64 683.13 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.51 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.48 | Reach Len. (ft) | 666.77 | 636.64 |
| 683.13 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1304.46 | 7070.26 |
| 517.81 | | | | |
| E.G. Slope (ft/ft) | 0.000048 | Area (sq ft) | 1304.46 | 7070.26 |
| 517.81 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 933.82 | 10694.82 |

| | | | | |
|---|---|---|---|---|
| 371.36 | | | | |
| Top Width (ft) | 1246.88 | Top Width (ft) | 344.55 | 766.09 |
| 136.25 | | | | |
| Vel Total (ft/s) | 1.35 | Avg. Vel. (ft/s) | 0.72 | 1.51 |
| 0.72 | | | | |
| Max Chl Dpth (ft) | 12.66 | Hydr. Depth (ft) | 3.79 | 9.23 |
| 3.80 | | | | |
| Conv. Total (cfs) | 1728527.0 | Conv. (cfs) | 134510.6 | 1540525.0 |
| 53492.1 | | | | |
| Length Wtd. (ft) | 642.44 | Wetted Per. (ft) | 344.62 | 766.30 |
| 136.42 | | | | |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.03 |
| 0.01 | | | | |
| Alpha | 1.15 | Stream Power (lb/ft s) | 0.01 | 0.04 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 402.19 | 2158.43 |
| 181.25 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 85.92 | 171.02 |
| 39.89 | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 7922

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 200 | 12.1 | 640.88 | 4.82 | 675.6 | 4.19 | 762.2 | 2.82 |
| 813.7 | 1.82 | 878.9 | -.18 | 941.5 | -2.18 | 1123.4 | -2.18 | 1197.6 | -.18 |
| 1364.1 | 1.91 | 1436.1 | 2.82 | 1534.8 | 4.82 | 1933.1 | 9.82 | 2067 | 15.82 |
| 2175 | 24.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 675.6 | .03 | 1364.1 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 675.6 | 1364.1 | 399.23 | 375.4 392.28 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.48 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.46 | Reach Len. (ft) | 399.23 | 375.40 |
| 392.28 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1169.94 | 7139.14 |
| 2493.41 | | | | |
| E.G. Slope (ft/ft) | 0.000034 | Area (sq ft) | 1169.94 | 7139.14 |
| 2493.41 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 614.57 | 9765.94 |
| 1619.50 | | | | |
| Top Width (ft) | 1648.06 | Top Width (ft) | 376.28 | 688.50 |
| 583.28 | | | | |
| Vel Total (ft/s) | 1.11 | Avg. Vel. (ft/s) | 0.53 | 1.37 |
| 0.65 | | | | |

| | | | | |
|---|---|---|---|---|
| Max Chl Dpth (ft) | 12.64 | Hydr. Depth (ft) | 3.11 | 10.37 |
| 4.27 | | | | |
| Conv. Total (cfs) | 2065840.0 | Conv. (cfs) | 105800.2 | 1681238.0 |
| 278801.6 | | | | |
| Length Wtd. (ft) | 377.69 | Wetted Per. (ft) | 376.33 | 688.62 |
| 583.35 | | | | |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.01 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.29 | Stream Power (lb/ft s) | 0.00 | 0.03 |
| 0.01 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 383.26 | 2054.60 |
| 157.64 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 80.40 | 160.39 |
| 34.25 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 7547

INPUT
Description:
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22.82 | 278.9 | 4.82 | 385.05 | 3.82 | 397.5 | 3.6 | 464.9 | 2.82 |
| 516.8 | 1.82 | 605.7 | -.18 | 651.6 | -2.18 | 1516.2 | -2.18 | 1534.2 | -.18 |
| 1578.3 | 1.93 | 1638.9 | 4.82 | 1740.6 | 14.52 | 2022.3 | 24.82 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 397.5 | .03 | 1578.3 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 397.5 | 1578.3 | 637.78 | 584.87 537.79 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.47 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.46 | Reach Len. (ft) | 637.78 | 584.87 |
| 537.79 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 983.01 | 13867.58 |
| 596.55 | | | | |
| E.G. Slope (ft/ft) | 0.000010 | Area (sq ft) | 983.01 | 13867.58 |
| 596.55 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 379.22 | 11384.25 |
| 236.54 | | | | |
| Top Width (ft) | 1506.62 | Top Width (ft) | 206.05 | 1180.80 |
| 119.77 | | | | |
| Vel Total (ft/s) | 0.78 | Avg. Vel. (ft/s) | 0.39 | 0.82 |
| 0.40 | | | | |
| Max Chl Dpth (ft) | 12.64 | Hydr. Depth (ft) | 4.77 | 11.74 |

| | | | | | |
|---|---|---|---|---|---|
| 4.98 | | | | | |
| Conv. Total (cfs) | 3740318.0 | Conv. (cfs) | 118198.8 | 3548393.0 | 73726.8 |
| Length Wtd. (ft) | 584.23 | Wetted Per. (ft) | 206.24 | 1181.04 | 120.11 |
| Min Ch El (ft) | -2.18 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 0.00 | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 373.39 | 1964.08 | 143.73 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 77.73 | 152.34 | 31.09 |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 6962

INPUT
Description:
Station Elevation Data num= 15

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 296.3 | 4.82 | 397.53 | 3.51 | 454.1 | 2.82 | 601.4 | 1.82 |
| 744.5 | -.18 | 793.02 | -2.18 | 1095.5 | -3.18 | 1251.9 | -3.18 | 1558.1 | -2.18 |
| 1578.3 | -.54 | 1582.8 | -.18 | 1688.4 | 4.82 | 1832.8 | 14.82 | 2044.7 | 27.1 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 397.53 | .03 | 1578.3 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 397.53 | 1578.3 | 820.71 | 532.08 | 332.07 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 459.32 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.47 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 | 0.035 |
| W.S. Elev (ft) | 10.46 | Reach Len. (ft) | 820.71 | 532.08 | 332.07 |
| Crit W.S. (ft) | -0.82 | Flow Area (sq ft) | | 13469.66 | 1137.30 |
| E.G. Slope (ft/ft) | 0.000011 | Area (sq ft) | 848.17 | 13922.10 | 1137.30 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11481.71 | 518.29 |
| Top Width (ft) | 1548.45 | Top Width (ft) | 176.19 | 1180.77 | 191.49 |
| Vel Total (ft/s) | 0.82 | Avg. Vel. (ft/s) | | 0.85 | 0.46 |
| Max Chl Dpth (ft) | 13.64 | Hydr. Depth (ft) | | 12.04 | 5.94 |
| Conv. Total (cfs) | 3662081.0 | Conv. (cfs) | | 3503913.0 | 158167.9 |

| | | | | |
|---|---|---|---|---|
| Length Wtd. (ft) | 524.80 | Wetted Per. (ft) | | 1119.11 |
| 191.82 | | | | |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | | 0.01 |
| 0.00 | | | | |
| Alpha | 1.04 | Stream Power (lb/ft s) | | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 359.98 | 1777.52 |
| 133.02 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 74.93 | 136.48 |
| 29.17 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 6431

INPUT
Description:
Station Elevation Data num= 19

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 17.1 | 244.4 | 12.1 | 367.1 | 4.82 | 629.95 | 4.82 | 720.2 | 9.82 |
| 1111.2 | 9.82 | 1176.8 | 4.82 | 1189.6 | 4.26 | 1291.4 | -.18 | 1306.1 | -2.18 |
| 1476.5 | -3.18 | 1880.7 | -3.18 | 2041.4 | -2.18 | 2069.8 | -.18 | 2071.3 | -.1 |
| 2126.7 | 2.82 | 2171 | 4.82 | 2254 | 14.82 | 2358.1 | 17.1 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1189.6 | .03 | 2071.3 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1189.6 | 2071.3 | 687.07 | 567.98 | 494.69 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1111.2 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.46 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.45 | Reach Len. (ft) | 687.07 | 567.98 |
| 494.69 | | | | |
| Crit W.S. (ft) | -0.93 | Flow Area (sq ft) | 280.61 | 11225.73 |
| 928.15 | | | | |
| E.G. Slope (ft/ft) | 0.000014 | Area (sq ft) | 2552.45 | 11225.73 |
| 928.15 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 104.56 | 11389.27 |
| 506.16 | | | | |
| Top Width (ft) | 1945.40 | Top Width (ft) | 917.31 | 881.70 |
| 146.39 | | | | |
| Vel Total (ft/s) | 0.97 | Avg. Vel. (ft/s) | 0.37 | 1.01 |
| 0.55 | | | | |
| Max Chl Dpth (ft) | 13.63 | Hydr. Depth (ft) | 3.58 | 12.73 |
| 6.34 | | | | |

| | | | | |
|---|---|---|---|---|
| Conv. Total (cfs) | 3193505.0 | Conv. (cfs) | 27827.3 | 3030976.0 |
| 134702.4 | | | | |
| Length Wtd. (ft) | 565.57 | Wetted Per. (ft) | 78.60 | 882.01 |
| 146.85 | | | | |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.01 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 327.95 | 1623.93 |
| 125.15 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 64.63 | 123.89 |
| 27.88 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 5864

INPUT
Description:
Station Elevation Data num= 22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 26.06 | 383.9 | 19.5 | 433.1 | 9.82 | 582.05 | 6.82 | 697.2 | 4.82 |
| 739.9 | 7.82 | 761.85 | 9.82 | 1292.7 | 9.82 | 1337.7 | 5.98 | 1351.3 | 4.82 |
| 1378.7 | 1.82 | 1423 | -.18 | 1465.6 | -2.18 | 1481.4 | -3.18 | 2033.7 | -3.18 |
| 2043.6 | -2.18 | 2075.8 | -.18 | 2098 | 1.08 | 2128.7 | 2.82 | 2184.7 | 4.82 |
| 2356 | 12.1 | 2517.7 | 27.1 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1337.7 | .03 | 2098 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1337.7 | 2098 | 390.15 | 571.18 519.72 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1292.7 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.45 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.43 | Reach Len. (ft) | 390.15 | 571.18 |
| 519.72 | | | | |
| Crit W.S. (ft) | -0.78 | Flow Area (sq ft) | 113.84 | 9632.45 |
| 1000.71 | | | | |
| E.G. Slope (ft/ft) | 0.000019 | Area (sq ft) | 1494.33 | 9632.45 |
| 1000.71 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 39.52 | 11443.77 |
| 516.71 | | | | |
| Top Width (ft) | 1886.70 | Top Width (ft) | 907.70 | 760.30 |
| 218.70 | | | | |
| Vel Total (ft/s) | 1.12 | Avg. Vel. (ft/s) | 0.35 | 1.19 |

| | | | | |
|---|---|---|---|---|
| 0.52 | | | | |
| Max Chl Dpth (ft) | 13.61 | Hydr. Depth (ft) | 2.53 | 12.67 |
| 4.58 | | | | |
| Conv. Total (cfs) | 2717729.0 | Conv. (cfs) | 8951.1 | 2591755.0 |
| 117023.4 | | | | |
| Length Wtd. (ft) | 568.59 | Wetted Per. (ft) | 45.16 | 760.79 |
| 218.90 | | | | |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | 0.00 | 0.02 |
| 0.01 | | | | |
| Alpha | 1.09 | Stream Power (lb/ft s) | 0.00 | 0.02 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 296.03 | 1487.94 |
| 114.20 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 50.24 | 113.18 |
| 25.80 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 5293

INPUT
Description:
Station Elevation Data num= 26

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.52 | 160 | 19.52 | 298.6 | 14.62 | 312.4 | 8.02 | 407 | 6.32 |
| 426 | 4.82 | 471.1 | 3.72 | 577.5 | 3.72 | 631.6 | 6.32 | 754.6 | 10.62 |
| 1134 | 10.62 | 1187.7 | 6.32 | 1220.5 | 5.35 | 1339.8 | 1.82 | 1485 | -.18 |
| 1521.4 | -2.18 | 1548.5 | -3.18 | 2057.5 | -3.18 | 2071.6 | -2.18 | 2096.4 | -.18 |
| 2138.6 | 1.82 | 2167.1 | 3.06 | 2184.7 | 3.82 | 2208.2 | 4.82 | 2380 | 17.05 |
| 2453.9 | 27.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1220.5 | .03 | 2167.1 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1220.5 | 2167.1 | 333.66 | 422.8 462.78 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1134 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.44 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.42 | Reach Len. (ft) | 333.66 | 422.80 |
| 462.78 | | | | |
| Crit W.S. (ft) | -0.69 | Flow Area (sq ft) | 255.53 | 11015.87 |
| 486.71 | | | | |
| E.G. Slope (ft/ft) | 0.000017 | Area (sq ft) | 2184.86 | 11015.87 |
| 486.71 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 94.85 | 11685.96 |

| | | | | | |
|---|---|---|---|---|---|
| 219.19 | | | | | |
| Top Width (ft) | 1591.98 | Top Width (ft) | 525.59 | 946.60 | |
| 119.79 | | | | | |
| Vel Total (ft/s) | 1.02 | Avg. Vel. (ft/s) | 0.37 | 1.06 | |
| 0.45 | | | | | |
| Max Chl Dpth (ft) | 13.60 | Hydr. Depth (ft) | 3.04 | 11.64 | |
| 4.06 | | | | | |
| Conv. Total (cfs) | 2876583.0 | Conv. (cfs) | 22738.1 | 2801303.0 | |
| 52542.4 | | | | | |
| Length Wtd. (ft) | 417.55 | Wetted Per. (ft) | 84.21 | 946.93 | |
| 120.03 | | | | | |
| Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | 0.00 | 0.01 | |
| 0.00 | | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.01 | |
| 0.00 | | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 279.56 | 1352.57 | |
| 105.32 | | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 43.82 | 101.99 | |
| 23.79 | | | | | |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 4871

INPUT
Description:
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.52 | 130.99 | 14.76 | 135.66 | 13.12 | 149.84 | 9.84 | 213.25 | 4.27 |
| 426.51 | 3.97 | 528.22 | 3.74 | 1085.96 | 2.89 | 1295.93 | 2.3 | 1418.64 | 1.94 |
| 1496.82 | 3 | 1637.82 | -.18 | 1671.62 | -2.18 | 1689.32 | -3.18 | 2086.82 | -3.18 |
| 2099.42 | -2.18 | 2123.42 | -.18 | 2187.32 | 2.54 | 2240.92 | 4.82 | 2272.76 | 6.32 |
| 2314.23 | 9.84 | 2319.61 | 12.94 | 2328.55 | 19.51 | 2338.17 | 24.43 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1418.64 | .03 | 2187.32 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1418.64 | 2187.32 | 195.16 | 464.8 | 912.1 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1165 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.43 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 10.41 | Reach Len. (ft) | 195.16 | 464.80 |
| 912.10 | | | | |
| Crit W.S. (ft) | -0.25 | Flow Area (sq ft) | 2055.88 | 8950.68 |

| | | | | |
|---|---|---|---|---|
| 612.17 E.G. Slope (ft/ft) | 0.000020 | Area (sq ft) | 8841.17 | 8950.68 |
| 612.17 Q Total (cfs) | 12000.00 | Flow (cfs) | 1563.66 | 10109.29 |
| 327.05 Top Width (ft) | 2167.86 | Top Width (ft) | 1271.28 | 768.68 |
| 127.91 Vel Total (ft/s) | 1.03 | Avg. Vel. (ft/s) | 0.76 | 1.13 |
| 0.53 Max Chl Dpth (ft) | 13.59 | Hydr. Depth (ft) | 8.11 | 11.64 |
| 4.79 Conv. Total (cfs) | 2702800.0 | Conv. (cfs) | 352188.5 | 2276948.0 |
| 73662.8 Length Wtd. (ft) | 455.35 | Wetted Per. (ft) | 253.64 | 768.99 |
| 128.29 Min Ch El (ft) | -3.18 | Shear (lb/sq ft) | 0.01 | 0.01 |
| 0.01 Alpha | 1.09 | Stream Power (lb/ft s) | 0.01 | 0.02 |
| 0.00 Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 237.33 | 1255.67 |
| 99.49 C & E Loss (ft) | 0.00 | Cum SA (acres) | 36.94 | 93.67 |
| 22.47 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 4407

INPUT
Description:
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.02 | 26.509 | 13.12 | 37.89 | 6.5 | 149.6 | 3.82 | 195.5 | 3.82 |
| 1178.9 | 3.22 | 1352.78 | 2.63 | 1514.8 | 1.96 | 1528.8 | 1.77 | 1582.2 | 1.87 |
| 1677.4 | -.18 | 1757.3 | -4.18 | 1937.9 | -4.18 | 2347.4 | -3.18 | 2444 | 1.85 |
| 2627.9 | 7.1 | 2703.3 | 8.2 | 2730.2 | 9.8 | 2957.9 | 11.5 | 3002.1 | 19.7 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1582.2 | .03 | 2444 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1582.2 | 2444 | 100.52 | 198.16 344.06 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1504.5 | 16.5 | F |
| 2530.8 | 3002.1 | 16.5 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.42 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 10.41 | Reach Len. (ft) | 100.52 | 198.16 344.06 |
| Crit W.S. (ft) | -1.54 | Flow Area (sq ft) | 665.05 | 11390.08 635.35 |
| E.G. Slope (ft/ft) | 0.000013 | Area (sq ft) | 10870.36 | 11390.08 1361.93 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 420.33 | 11217.98 361.69 |
| Top Width (ft) | 2780.56 | Top Width (ft) | 1551.03 | 861.80 367.73 |
| Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | 0.63 | 0.98 0.57 |
| Max Chl Dpth (ft) | 14.59 | Hydr. Depth (ft) | 8.56 | 13.22 7.32 |
| Conv. Total (cfs) | 3372838.0 | Conv. (cfs) | 118140.9 | 3153036.0 101661.0 |
| Length Wtd. (ft) | 198.65 | Wetted Per. (ft) | 77.70 | 862.05 86.84 |
| Min Ch El (ft) | -4.18 | Shear (lb/sq ft) | 0.01 | 0.01 0.01 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.01 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 193.17 | 1147.15 78.82 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 30.61 | 84.97 17.28 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 4209

INPUT
Description: Upstream of I-5
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 108.7 | 6.31 | 145.96 | 5.05 | 223.6 | 4.63 | 267.08 | 3.94 |
| 574.53 | 4.12 | 1052.8 | 3.47 | 1306.4 | 3.75 | 1531.8 | 3.54 | 1750 | 3.206 |
| 1753.6 | 3.2 | 1773.29 | 2.21 | 1810.56 | .63 | 1835.4 | -1.37 | 1929.7 | -4.18 |
| 2002.8 | -4.18 | 2124.22 | -.72 | 2186.34 | 1.42 | 2254.66 | 3.01 | 2298 | 4.081 |
| 2500 | 4.96 | 2879.9 | 6 | 2981.37 | 7.33 | 3040.37 | 8.92 | 3208.07 | 16.04 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1750 | .03 | 2298 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1750 | 2298 | 357.7 | 362.51 374.53 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1890.86 | 24.1 | F |
| 2136.9 | 3208.07 | 24.1 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 10.40 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.21 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 10.19 | Reach Len. (ft) | 110.66 | 110.66 |
| 110.66 Crit W.S. (ft) | 1.15 | Flow Area (sq ft) | | 3255.50 |
| E.G. Slope (ft/ft) | 0.000177 | Area (sq ft) | 10524.08 | 6011.54 |
| 3430.20 Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 3016.29 | Top Width (ft) | 1696.09 | 548.00 |
| 772.20 Vel Total (ft/s) | 3.69 | Avg. Vel. (ft/s) | | 3.69 |
| Max Chl Dpth (ft) | 14.37 | Hydr. Depth (ft) | | 13.23 |
| Conv. Total (cfs) | 901875.4 | Conv. (cfs) | | 901875.4 |
| Length Wtd. (ft) | 110.66 | Wetted Per. (ft) | | 246.11 |
| Min Ch El (ft) | -4.18 | Shear (lb/sq ft) | | 0.15 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.54 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 168.49 | 1107.57 |
| 59.89 C & E Loss (ft) | 0.08 | Cum SA (acres) | 26.87 | 81.76 |
| 12.78 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE

RIVER: Batiquitos
REACH: 1 RS: 4000

INPUT
Description: Interstate - 5 freeway
Distance from Upstream XS = 110.66
Deck/Roadway Width = 229.27
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 16.5 | 0 | 1890.86 | 24.105 | -5 | 1890.86 | 24.105 | 20.17 |
| 2136.9 | 25.696 | 21.76 | 2136.9 | 25.696 | 0 | 3208.07 | 29 | 0 |

Upstream Bridge Cross Section Data

Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 108.7 | 6.31 | 145.96 | 5.05 | 223.6 | 4.63 | 267.08 | 3.94 |
| 574.53 | 4.12 | 1052.8 | 3.47 | 1306.4 | 3.75 | 1531.8 | 3.54 | 1750 | 3.206 |
| 1753.6 | 3.2 | 1773.29 | 2.21 | 1810.56 | .63 | 1835.4 | -1.37 | 1929.7 | -4.18 |
| 2002.8 | -4.18 | 2124.22 | -.72 | 2186.34 | 1.42 | 2254.66 | 3.01 | 2298 | 4.081 |
| 2500 | 4.96 | 2879.9 | 6 | 2981.37 | 7.33 | 3040.37 | 8.92 | 3208.07 | 16.04 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1750 | .03 | 2298 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
1750 2298 .3 .5

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1890.86 | 24.1 | F |
| 2136.9 | 3208.07 | 24.1 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 16.5 | 0 | 1522.56 | 24.105 | -5 | 1522.56 | 24.105 | 21.6 |
| 1768.62 | 25.696 | 21.76 | 1768.62 | 25.696 | -5 | 2534.4 | 29 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.12 | 291.3 | 10.2 | 426.2 | 6.6 | 523.6 | 4.9 | 824.5 | 3.5 |
| 1125 | 3.6 | 1242.4 | 3.658 | 1267.4 | 3.67 | 1312.3 | 2.9 | 1402 | 2.6 |
| 1427.1 | 1.743 | 1542 | -4.18 | 1699.5 | -4.18 | 1813.5 | 2.035 | 1847.7 | 3.3 |
| 2060.7 | 3.58 | 2214.2 | 3.8 | 2362.9 | 4.4 | 2493.9 | 6.6 | 2534.4 | 13.12 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1427.1 | .03 | 1813.5 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
1427.1 1813.5 .01 .3

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1522.56 | 21.6 | F |
| 1768.62 | 2534.4 | 21.6 | F |

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 4

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|
| 1890.86 | 20.17 | 1914.34 | 8.31 | 1923.668 | 8.3 | 1936.79 | -2.86 |

Downstream num= 4

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|
| 1522.555 | 21.61 | 1546.035 | 8.31 | 1555.363 | 8.31 | 1579.485 | -1.43 |

Abutment Data

```
Upstream      num=        4
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 2087.43   -5.882109.416      8.3 2118.21      8.3  2136.9   21.76
Downstream      num=          4
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
  1706.6   -5.881733.892      8.3 1743.22      8.3 1768.62   21.76

Number of Piers =  2

Pier Data
Pier Station      Upstream= 1964.68     Downstream= 1596.38
Upstream      num=        2
    Width    Elev     Width    Elev
        5      -5         5      30
Downstream      num=          2
    Width    Elev     Width    Elev
        5      -5         5      30

Pier Data
Pier Station      Upstream=  2063.1     Downstream=  1694.8
Upstream      num=        2
    Width    Elev     Width    Elev
        5      -5         5      30
Downstream      num=          2
    Width    Elev     Width    Elev
        5      -5         5      30

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)                  10.40    Element                 Inside BR US
Inside BR DS
  W.S. US. (ft)                  10.19    E.G. Elev (ft)                10.28
10.07
  Q Total (cfs)                12000.00   W.S. Elev (ft)                 9.81
 9.50
  Q Bridge (cfs)               12000.00   Crit W.S. (ft)                 2.44
 2.49
  Q Weir (cfs)                            Max Chl Dpth (ft)             13.99
13.68
  Weir Sta Lft (ft)                       Vel Total (ft/s)               5.52
 6.02
  Weir Sta Rgt (ft)                       Flow Area (sq ft)           2173.72
1994.39
  Weir Submerg                            Froude # Chl                   0.29
 0.33
  Weir Max Depth (ft)                     Specif Force (cu ft)       15828.83
```

| | | | |
|---|---|---|---|
| 14844.71 | | | |
| Min El Weir Flow (ft) | 24.11 | Hydr Depth (ft) | 10.93 |
| 10.41 | | | |
| Min El Prs (ft) | 21.76 | W.P. Total (ft) | 260.69 |
| 254.48 | | | |
| Delta EG (ft) | 0.52 | Conv. Total (cfs) | 442718.8 |
| 389748.3 | | | |
| Delta WS (ft) | 0.51 | Top Width (ft) | 207.17 |
| 191.58 | | | |
| BR Open Area (sq ft) | 4597.86 | Frctn Loss (ft) | 0.19 |
| 0.01 | | | |
| BR Open Vel (ft/s) | 6.02 | C & E Loss (ft) | 0.03 |
| 0.18 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.38 |
| 0.46 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 2.11 |
| 2.79 | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 3797

INPUT
Description: Downstream of I-5
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.12 | 291.3 | 10.2 | 426.2 | 6.6 | 523.6 | 4.9 | 824.5 | 3.5 |
| 1125 | 3.6 | 1242.4 | 3.658 | 1267.4 | 3.67 | 1312.3 | 2.9 | 1402 | 2.6 |
| 1427.1 | 1.743 | 1542 | -4.18 | 1699.5 | -4.18 | 1813.5 | 2.035 | 1847.7 | 3.3 |
| 2060.7 | 3.58 | 2214.2 | 3.8 | 2362.9 | 4.4 | 2493.9 | 6.6 | 2534.4 | 13.12 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 1427.1 | .03 | 1813.5 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 1427.1 | 1813.5 | 139.64 | 216.41 | 305.8 | .01 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1522.56 | 21.6 | F |
| 1768.62 | 2534.4 | 21.6 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.88 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.21 | Wt. n-Val. | | 0.030 |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 9.67 | Reach Len. (ft) | 139.64 | 216.41 |
| 305.80 | | | | |
| Crit W.S. (ft) | 0.58 | Flow Area (sq ft) | | 3268.60 |
| E.G. Slope (ft/ft) | 0.000175 | Area (sq ft) | 6001.28 | 4658.12 |
| 3890.03 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 2201.92 | Top Width (ft) | 1116.04 | 386.40 |
| 699.49 | | | | |
| Vel Total (ft/s) | 3.67 | Avg. Vel. (ft/s) | | 3.67 |
| Max Chl Dpth (ft) | 13.85 | Hydr. Depth (ft) | | 13.28 |
| Conv. Total (cfs) | 907748.1 | Conv. (cfs) | | 907748.1 |
| Length Wtd. (ft) | 216.41 | Wetted Per. (ft) | | 246.19 |
| Min Ch El (ft) | -4.18 | Shear (lb/sq ft) | | 0.14 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.53 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 153.56 | 1084.16 |
| 54.53 | | | | |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 24.42 | 79.60 |
| 11.62 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 3581

INPUT
Description:
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 26.07 | 9.84 | 19.52 | 26.67 | 12.94 | 110.5 | 4.58 | 165.82 | 3.63 |
| 251.1 | 3.33 | 434.64 | .3 | 464 | -.18 | 528.73 | -5.18 | 1651.8 | -5.18 |
| 1712.7 | -.18 | 1759.95 | 2.64 | 1796.4 | 4.82 | 1947.5 | 6.32 | 1981.2 | 12.92 |
| 1993.6 | 19.52 | 2008.1 | 26.4 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 434.64 | .03 | 1759.95 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 434.64 | 1759.95 | 342.87 | 377.21 | 427.94 | .1 .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 834.65 | 20 | F |
| 1675.4 | 2008.1 | 20 | F |

CROSS SECTION OUTPUT  Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.82 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 342.87 | 377.21 |
| 427.94 | | | | |
| Crit W.S. (ft) | -3.30 | Flow Area (sq ft) | | 12574.54 |
| E.G. Slope (ft/ft) | 0.000010 | Area (sq ft) | 2457.53 | 19087.02 |
| 892.05 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 1907.17 | Top Width (ft) | 376.52 | 1325.31 |
| 205.34 | | | | |
| Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | | 0.95 |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | | 14.96 |
| Conv. Total (cfs) | 3780552.0 | Conv. (cfs) | | 3780552.0 |
| Length Wtd. (ft) | 377.82 | Wetted Per. (ft) | | 840.83 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.01 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.01 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 140.01 | 1025.17 |
| 37.74 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 22.03 | 75.35 |
| 8.44 | | | | |

Note:  Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1  RS: 3204

INPUT
Description:
Station Elevation Data  num=  20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 30.35 | 6.527 | 26.247 | 18.209 | 19.685 | 36.211 | 13.123 | 45.801 | 11.483 |
| 57.201 | 9.843 | 69.291 | 8.202 | 81.66 | 6.562 | 89.961 | 4.921 | 132.995 | 3.281 |
| 152.161 | 1.64 | 153.19 | 1.606 | 351.772 | -5 | 1532.677 | -5 | 1556.36 | -2.64 |
| 1632.251 | 4.921 | 1644.196 | 6.562 | 1652.047 | 9.843 | 1664.037 | 13.123 | 1673.196 | 14.272 |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 153.19 | .03 | 1556.36 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 153.19 | 1556.36 | 465.52 | 449.84 | 452.33 | .1 | .3 |

Ineffective Flow  num=  1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 489.5 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 | 0.035 |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 465.52 | 449.84 | 452.33 |
| Crit W.S. (ft) | -3.41 | Flow Area (sq ft) | | 15766.47 | 718.64 |
| E.G. Slope (ft/ft) | 0.000006 | Area (sq ft) | 467.78 | 20089.48 | 718.64 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11710.72 | 289.28 |
| Top Width (ft) | 1594.47 | Top Width (ft) | 95.71 | 1403.17 | 95.60 |
| Vel Total (ft/s) | 0.73 | Avg. Vel. (ft/s) | | 0.74 | 0.40 |
| Max Chl Dpth (ft) | 14.80 | Hydr. Depth (ft) | | 14.78 | 7.52 |
| Conv. Total (cfs) | 4818652.0 | Conv. (cfs) | | 4702491.0 | 116161.3 |
| Length Wtd. (ft) | 449.92 | Wetted Per. (ft) | | 1066.98 | 96.73 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 0.01 | 0.00 |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 128.49 | 855.55 | 29.83 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 20.17 | 63.54 | 6.96 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 2754

INPUT
Description:
Station Elevation Data num= 15

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 49.02 | 17 | 39.22 | 37.3 | 26.07 | 60.37 | 12.92 | 88.635 | 6.32 |
| 128.99 | -.18 | 141.46 | -1.47 | 177.17 | -5.18 | 1153.4 | -5.18 | 1169.4 | -4.18 |
| 1211.6 | -.18 | 1258 | 4.82 | 1332.4 | 9.1 | 1397 | 12.82 | 1450.33 | 16.22 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 141.46 | .03 | 1332.4 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 141.46 | 1332.4 | 664.97 357.33 | 202.94 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 128 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 664.97 | 357.33 |
| 202.94 | | | | |
| Crit W.S. (ft) | -3.51 | Flow Area (sq ft) | 142.32 | 16390.45 |
| 4.28 | | | | |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 430.14 | 16390.45 |
| 4.28 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 74.20 | 11925.57 |
| 0.23 | | | | |
| Top Width (ft) | 1270.87 | Top Width (ft) | 67.74 | 1190.94 |
| 12.19 | | | | |
| Vel Total (ft/s) | 0.73 | Avg. Vel. (ft/s) | 0.52 | 0.73 |
| 0.05 | | | | |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | 10.57 | 13.76 |
| 0.35 | | | | |
| Conv. Total (cfs) | 4689272.0 | Conv. (cfs) | 28994.0 | 4660188.0 |
| 90.2 | | | | |
| Length Wtd. (ft) | 357.77 | Wetted Per. (ft) | 13.54 | 1191.74 |
| 12.21 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.00 | | | | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 123.70 | 667.18 |
| 26.08 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 19.30 | 50.14 |
| 6.40 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 2428

INPUT
Description:
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 49.8 | 4.82 | 108.24 | 1.33 | 133.5 | -.18 | 190.4 | -5.18 |
| 1506.2 | -5.18 | 1532.3 | -2.18 | 1533 | -2.14 | 1569.7 | -.18 | 1601.8 | 2.82 |
| 1649 | 4.82 | 1717.5 | 12.92 | 1816.06 | 16.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 108.24 | .03 | 1533 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 108.24 | 1533 | 605.62 | 351.98 | 312.8 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 605.62 | 351.98 |
| 312.80 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 434.38 | 21017.91 |
| 1061.99 | | | | |
| E.G. Slope (ft/ft) | 0.000003 | Area (sq ft) | 434.38 | 21017.91 |
| 1061.99 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 109.35 | 11594.09 |
| 296.55 | | | | |
| Top Width (ft) | 1657.88 | Top Width (ft) | 74.98 | 1424.76 |
| 158.14 | | | | |
| Vel Total (ft/s) | 0.53 | Avg. Vel. (ft/s) | 0.25 | 0.55 |
| 0.28 | | | | |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | 5.79 | 14.75 |
| 6.72 | | | | |
| Conv. Total (cfs) | 6479642.0 | Conv. (cfs) | 59045.7 | 6260465.0 |
| 160130.7 | | | | |
| Length Wtd. (ft) | 352.46 | Wetted Per. (ft) | 75.82 | 1425.20 |
| 158.67 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 117.10 | 513.75 |
| 23.59 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 18.21 | 39.41 |
| 6.01 | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 2076

INPUT
Description:
Station Elevation Data num= 15

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 121.01 | 4.82 | 168.3 | 2.82 | 215.76 | 2.12 | 235.6 | 1.82 |
| 286.2 | .82 | 317.2 | -.18 | 366.98 | -5.18 | 1988.8 | -5.18 | 2026.4 | -.18 |
| 2068 | 3.82 | 2073.8 | 3.9 | 2136.9 | 4.82 | 2250.8 | 14.82 | 2354.471 | 22.8 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 215.76 | .03 | 2073.8 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 215.76 | 2073.8 | 472.02 | 336.44 | 300.63 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 876 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.81 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 472.02 | 336.44 |
| 300.63 | | | | |
| Crit W.S. (ft) | -3.65 | Flow Area (sq ft) | | 17503.63 |
| 484.32 | | | | |
| E.G. Slope (ft/ft) | 0.000005 | Area (sq ft) | 697.84 | 26627.34 |
| 484.32 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11880.49 |
| 119.52 | | | | |
| Top Width (ft) | 2099.64 | Top Width (ft) | 121.79 | 1858.04 |
| 119.81 | | | | |
| Vel Total (ft/s) | 0.67 | Avg. Vel. (ft/s) | | 0.68 |
| 0.25 | | | | |
| Max Chl Dpth (ft) | 14.98 | Hydr. Depth (ft) | | 14.61 |
| 4.04 | | | | |
| Conv. Total (cfs) | 5232614.0 | Conv. (cfs) | | 5180499.0 |
| 52114.7 | | | | |
| Length Wtd. (ft) | 336.26 | Wetted Per. (ft) | | 1198.32 |
| 120.03 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.00 |
| 0.00 | | | | |
| Alpha | 1.03 | Stream Power (lb/ft s) | | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 109.23 | 321.26 |
| 18.04 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 16.84 | 26.15 |
| 5.01 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 1740

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27.1 | 212.8 | 4.82 | 254.8 | 4.32 | 369.77 | 4.82 | 406.76 | 3.82 |
| 481.75 | 2.82 | 569.17 | 2.32 | 607.56 | 2.82 | 653.9 | 4.82 | 719.69 | 4.82 |
| 862 | 4.82 | 928.95 | 3.82 | 989.36 | 1.82 | 1063 | 1.82 | 1174.2 | 4.82 |
| 1261.9 | 4.82 | 1301.6 | 2.82 | 1368.1 | -.18 | 1412.4 | -5.18 | 1976.8 | -5.18 |
| 2040.7 | -.18 | 2067.9 | 1.63 | 2070.8 | 1.82 | 2092.9 | 2.82 | 2123.4 | 3.82 |
| 2205.5 | 4.82 | 2226.183 | 9.82 | 2226.2 | 11 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 719.69 | .03 | 2067.9 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 719.69 | 2067.9 | 661.13 | 285.69 333.19 | .1 | .3 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 1161 | 20 | F |
| 1961 | 2226.2 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.80 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 9.78 | Reach Len. (ft) | 661.13 | 285.69 |
| 333.19 | | | | |
| Crit W.S. (ft) | -2.73 | Flow Area (sq ft) | | 10060.20 |
| E.G. Slope (ft/ft) | 0.000020 | Area (sq ft) | 3130.71 | 14067.03 |
| 884.24 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 12000.00 |
| Top Width (ft) | 2060.58 | Top Width (ft) | 554.25 | 1348.21 |
| 158.11 | | | | |
| Vel Total (ft/s) | 1.19 | Avg. Vel. (ft/s) | | 1.19 |
| Max Chl Dpth (ft) | 14.96 | Hydr. Depth (ft) | | 12.58 |
| Conv. Total (cfs) | 2693676.0 | Conv. (cfs) | | 2693676.0 |
| Length Wtd. (ft) | 285.69 | Wetted Per. (ft) | | 800.40 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.02 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 88.48 | 164.10 |
| 13.32 | | | | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 13.18 | 13.77 |
| 4.05 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 1454

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 426 | 19.82 | 662.8 | 19.82 | 824.8 | 19.82 | 864.6 | 4.4 |

```
  871.69    1.93  892.99    -.23   903.6   -3.18   919.7   -5.18  1027.5   -5.18
  1046.9    -.18 1081.81    3.36 1091.75    9.71  1124.8   19.82  1319.8   19.82
1516.177   19.82

Manning's n Values          num=      3
     Sta   n Val     Sta    n Val     Sta   n Val
       0    .035   662.8     .03  1319.8    .035

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
         662.8  1319.8              253.92  247.22  263.76             .3        .5

CROSS SECTION OUTPUT  Profile #PF 1


  E.G. Elev (ft)              9.76    Element                Left OB    Channel
Right OB
  Vel Head (ft)               0.30    Wt. n-Val.                        0.030

  W.S. Elev (ft)              9.46    Reach Len. (ft)        153.20     153.20
 153.20
  Crit W.S. (ft)              1.42    Flow Area (sq ft)                 2715.54

  E.G. Slope (ft/ft)      0.000321    Area (sq ft)                      2715.54

  Q Total (cfs)          12000.00     Flow (cfs)                       12000.00

  Top Width (ft)            239.80    Top Width (ft)                    239.80

  Vel Total (ft/s)            4.42    Avg. Vel. (ft/s)                    4.42

  Max Chl Dpth (ft)          14.64    Hydr. Depth (ft)                  11.32

  Conv. Total (cfs)       669747.4    Conv. (cfs)                     669747.4

  Length Wtd. (ft)          153.20    Wetted Per. (ft)                  244.39

  Min Ch El (ft)             -5.18    Shear (lb/sq ft)                    0.22

  Alpha                       1.00    Stream Power (lb/ft s)              0.98

  Frctn Loss (ft)                     Cum Volume (acre-ft)    64.73      109.07
   9.94
  C & E Loss (ft)                     Cum SA (acres)           8.97        8.56
   3.44


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

BRIDGE


RIVER: Batiquitos
REACH: 1                    RS: 1300

INPUT
Description: NCTD RR Bridge
Distance from Upstream XS =    153.2
Deck/Roadway Width        =       28
Weir Coefficient          =      2.6
```

Upstream Deck/Roadway Coordinates
num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 824.8 | 19.82 | 16.82 | 1124.8 | 19.82 | 16.82 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 426 | 19.82 | 662.8 | 19.82 | 824.8 | 19.82 | 864.6 | 4.4 |
| 871.69 | 1.93 | 892.99 | -.23 | 903.6 | -3.18 | 919.7 | -5.18 | 1027.5 | -5.18 |
| 1046.9 | -.18 | 1081.81 | 3.36 | 1091.75 | 9.71 | 1124.8 | 19.82 | 1319.8 | 19.82 |
| 1516.177 | 19.82 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 662.8 | .03 | 1319.8 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 662.8 | 1319.8 | .3 | .5 |

Downstream Deck/Roadway Coordinates
num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 846.3 | 19.82 | 16.82 | 1146.3 | 19.82 | 16.82 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 846.3 | 19.82 | 851.8 | 2.82 | 869.1 | 1.82 | 893.89 | 1.033 |
| 900.6 | .82 | 920.5 | -5.18 | 1053.3 | -5.18 | 1078.8 | 1.163 | 1120.14 | 3.64 |
| 1146.3 | 19.82 | 1272.6 | 19.82 | 1587.8 | 19.82 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 893.89 | .03 | 1078.8 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 893.89 | 1078.8 | .1 | .3 |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 21

Pier Data
Pier Station Upstream= 838.44 Downstream= 859.94
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -5 | 3 | 20 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -5 | 3 | 20 |

Pier Data
Pier Station Upstream= 852.07 Downstream= 873.57
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -5 | 3 | 20 |

```
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  865.71    Downstream=  887.21
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  879.35    Downstream=  900.85
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  892.98    Downstream=  914.48
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  906.62    Downstream=  928.12
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  920.25    Downstream=  941.75
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  933.89    Downstream=  955.39
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  947.53    Downstream=  969.03
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
```

```
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  961.16    Downstream=  982.66
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=   974.8    Downstream=   996.3
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream=  988.44    Downstream= 1009.94
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream= 1002.07    Downstream= 1023.57
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream= 1015.71    Downstream= 1037.21
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream= 1029.35    Downstream= 1050.85
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
Downstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20

Pier Data
Pier Station      Upstream= 1042.98    Downstream= 1064.48
Upstream      num=        2
    Width   Elev     Width   Elev
        3      -5         3     20
```

```
Downstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20

Pier Data
Pier Station     Upstream= 1056.62    Downstream= 1078.12
Upstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20
Downstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20

Pier Data
Pier Station     Upstream= 1070.12    Downstream= 1091.75
Upstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20
Downstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20

Pier Data
Pier Station     Upstream= 1083.89    Downstream= 1105.39
Upstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20
Downstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20

Pier Data
Pier Station     Upstream= 1097.53    Downstream= 1119.03
Upstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20
Downstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20

Pier Data
Pier Station     Upstream= 1111.16    Downstream= 1132.66
Upstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20
Downstream      num=        2
    Width   Elev    Width   Elev
       3      -5       3     20

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Yarnell                  KVal =     2.5
Selected Low Flow Methods = Yarnell

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
```

Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 9.76 | Element | Inside BR US |
| Inside BR DS W.S. US. (ft) | 9.46 | E.G. Elev (ft) | 9.32 |
| 9.19 Q Total (cfs) | 12000.00 | W.S. Elev (ft) | 8.76 |
| 8.76 Q Bridge (cfs) | 12000.00 | Crit W.S. (ft) | 2.45 |
| 1.97 Q Weir (cfs) | | Max Chl Dpth (ft) | 13.94 |
| 13.94 Weir Sta Lft (ft) | | Vel Total (ft/s) | 6.04 |
| 5.16 Weir Sta Rgt (ft) | | Flow Area (sq ft) | 1987.64 |
| 2325.85 Weir Submerg | | Froude # Chl | 0.33 |
| 0.27 Weir Max Depth (ft) | | Specif Force (cu ft) | 14311.58 |
| 15820.38 Min El Weir Flow (ft) | 19.83 | Hydr Depth (ft) | 10.70 |
| 10.64 Min El Prs (ft) | 16.82 | W.P. Total (ft) | 563.39 |
| 660.77 Delta EG (ft) | 0.72 | Conv. Total (cfs) | 228155.8 |
| 263124.1 Delta WS (ft) | 0.70 | Top Width (ft) | 185.69 |
| 218.54 BR Open Area (sq ft) | 3615.24 | Frctn Loss (ft) | |
| BR Open Vel (ft/s) | 6.04 | C & E Loss (ft) | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.61 |
| 0.46 Br Sel Method | Yarnell | Power Total (lb/ft s) | 3.68 |
| 2.36 | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 1207

INPUT
Description:
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 846.3 | 19.82 | 851.8 | 2.82 | 869.1 | 1.82 | 893.89 | 1.033 |
| 900.6 | .82 | 920.5 | -5.18 | 1053.3 | -5.18 | 1078.8 | 1.163 | 1120.14 | 3.64 |
| 1146.3 | 19.82 | 1272.6 | 19.82 | 1587.8 | 19.82 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

0 .035 893.89 .03 1078.8 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
893.89 1078.8 502.13 230.8 182.26 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 9.04 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.28 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 8.76 | Reach Len. (ft) | 502.13 | 230.80 |
| 182.26 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 298.81 | 2395.65 |
| 283.93 | | | | |
| E.G. Slope (ft/ft) | 0.000269 | Area (sq ft) | 298.81 | 2395.65 |
| 283.93 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 700.97 | 10678.73 |
| 620.30 | | | | |
| Top Width (ft) | 278.54 | Top Width (ft) | 44.01 | 184.91 |
| 49.61 | | | | |
| Vel Total (ft/s) | 4.03 | Avg. Vel. (ft/s) | 2.35 | 4.46 |
| 2.18 | | | | |
| Max Chl Dpth (ft) | 13.94 | Hydr. Depth (ft) | 6.79 | 12.96 |
| 5.72 | | | | |
| Conv. Total (cfs) | 731147.3 | Conv. (cfs) | 42709.5 | 650643.6 |
| 37794.3 | | | | |
| Length Wtd. (ft) | 237.12 | Wetted Per. (ft) | 48.37 | 186.58 |
| 51.14 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.10 | 0.22 |
| 0.09 | | | | |
| Alpha | 1.12 | Stream Power (lb/ft s) | 0.24 | 0.96 |
| 0.20 | | | | |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 64.24 | 96.33 |
| 9.48 | | | | |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 8.90 | 7.46 |
| 3.36 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 976

INPUT
Description:
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19.82 | 85.3 | 4.82 | 127.16 | 2.82 | 170.01 | 1.82 | 204.32 | .82 |
| 254.92 | -.18 | 510.5 | -.899 | 610.56 | -1.18 | 675.36 | -2.18 | 711.42 | -3.18 |
| 747.93 | -5.18 | 800.15 | -5.18 | 1255.2 | -5.18 | 1284.8 | 2.202 | 1295.3 | 4.82 |
| 1647 | 7.82 | 1837.36 | 11.82 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

```
      0    .035    510.5      .03  1284.8    .035

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
        510.5  1284.8                685.58  233.76  362.43          .1          .3
Ineffective Flow      num=       2
   Sta L    Sta R     Elev  Permanent
       0  818.12       12          F
 1345.15 1837.36       12          F

CROSS SECTION OUTPUT  Profile #PF 1

  E.G. Elev (ft)                8.95    Element                 Left OB    Channel
Right OB
  Vel Head (ft)                 0.05    Wt. n-Val.                         0.030
  0.035
  W.S. Elev (ft)                8.90    Reach Len. (ft)         685.58     233.76
 362.43
  Crit W.S. (ft)               -2.33    Flow Area (sq ft)                  6461.51
 249.36
  E.G. Slope (ft/ft)         0.000041   Area (sq ft)            3648.61    10024.98
 991.64
  Q Total (cfs)             12000.00    Flow (cfs)                         11825.71
 174.29
  Top Width (ft)             1636.29    Top Width (ft)          448.40     774.30
 413.59
  Vel Total (ft/s)              1.79    Avg. Vel. (ft/s)                   1.83
  0.70
  Max Chl Dpth (ft)            14.08    Hydr. Depth (ft)                   13.85
  4.13
  Conv. Total (cfs)         1870150.0     Conv. (cfs)                        1842987.0
  27163.1
  Length Wtd. (ft)            236.59    Wetted Per. (ft)                   467.59
  60.67
  Min Ch El (ft)               -5.18    Shear (lb/sq ft)                   0.04
  0.01
  Alpha                         1.03    Stream Power (lb/ft s)             0.07
  0.01
  Frctn Loss (ft)               0.02    Cum Volume (acre-ft)    41.49      63.42
  6.81
  C & E Loss (ft)               0.01    Cum SA (acres)           6.07      4.92
  2.39


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.
Note:   Multiple critical depths were found at this location.  The critical depth
with the lowest, valid,
        water surface was used.

CROSS SECTION


RIVER: Batiquitos
REACH: 1                        RS: 874

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 26.66 | 8.82 | 49.4 | 7.82 | 66.5 | 6.82 | 88.6 | 5.82 |
| 98.5 | 4.82 | 119.03 | 3.82 | 178.99 | -1.18 | 193.01 | -2.5 | 221.36 | -5.18 |
| 410.95 | -5.18 | 429.1 | -3.18 | 429.75 | -2.97 | 453.33 | 4.82 | 494.49 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 193.01 | .03 | 429.75 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 193.01 | 429.75 | 243.66 | 160.93 164.42 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 193.01 | 12 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.20 | Wt. n-Val. | | 0.030 | 0.035 |
| W.S. Elev (ft) | 8.72 | Reach Len. (ft) | 243.66 | 160.93 | 164.42 |
| Crit W.S. (ft) | -0.63 | Flow Area (sq ft) | | 3233.89 | 246.58 |
| E.G. Slope (ft/ft) | 0.000162 | Area (sq ft) | 802.43 | 3233.89 | 246.58 |
| Q Total (cfs) | 12000.00 | Flow (cfs) | | 11646.90 | 353.10 |
| Top Width (ft) | 456.59 | Top Width (ft) | 164.14 | 236.74 | 55.71 |
| Vel Total (ft/s) | 3.45 | Avg. Vel. (ft/s) | | 3.60 | 1.43 |
| Max Chl Dpth (ft) | 13.90 | Hydr. Depth (ft) | | 13.66 | 4.43 |
| Conv. Total (cfs) | 942345.8 | Conv. (cfs) | | 914617.4 | 27728.4 |
| Length Wtd. (ft) | 165.29 | Wetted Per. (ft) | | 237.01 | 57.20 |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | | 0.14 | 0.04 |
| Alpha | 1.06 | Stream Power (lb/ft s) | | 0.50 | 0.06 |
| Frctn Loss (ft) | 0.07 | Cum Volume (acre-ft) | 6.47 | 27.85 | 1.66 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 1.24 | 2.20 | 0.44 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 581

INPUT
Description:
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .06 | 99.233 | .06 | 231.87 | .06 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 99.233 | 231.87 | 240.36 | 239.2 | 239.01 | .3 | .5 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 8.82 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.56 | Wt. n-Val. | 0.060 | 0.060 |
| 0.060 | | | | |
| W.S. Elev (ft) | 8.26 | Reach Len. (ft) | 16.86 | 16.86 |
| 16.86 | | | | |
| Crit W.S. (ft) | 1.86 | Flow Area (sq ft) | 351.12 | 1689.08 |
| 83.70 | | | | |
| E.G. Slope (ft/ft) | 0.002188 | Area (sq ft) | 351.12 | 1689.08 |
| 83.70 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 1242.29 | 10587.60 |
| 170.12 | | | | |
| Top Width (ft) | 232.83 | Top Width (ft) | 64.91 | 132.64 |
| 35.28 | | | | |
| Vel Total (ft/s) | 5.65 | Avg. Vel. (ft/s) | 3.54 | 6.27 |
| 2.03 | | | | |
| Max Chl Dpth (ft) | 13.44 | Hydr. Depth (ft) | 5.41 | 12.73 |
| 2.37 | | | | |
| Conv. Total (cfs) | 256565.4 | Conv. (cfs) | 26560.7 | 226367.6 |
| 3637.1 | | | | |
| Length Wtd. (ft) | 16.86 | Wetted Per. (ft) | 65.77 | 134.18 |
| 36.02 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.73 | 1.72 |
| 0.32 | | | | |
| Alpha | 1.13 | Stream Power (lb/ft s) | 2.58 | 10.78 |
| 0.65 | | | | |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 3.24 | 18.75 |
| 1.04 | | | | |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.60 | 1.52 |
| 0.27 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: Batiquitos
REACH: 1 RS: 400

INPUT

Description: Carlsbad Blvd
Distance from Upstream XS = 16.86
Deck/Roadway Width = 205.22
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 17.17 | 0 | 38.7 | 16.82 | 0 | 38.7 | 16.82 | 14.99 |
| 246.7 | 17.74 | 15.91 | 246.7 | 17.74 | -5 | 300 | 18 | -5 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .06 | 99.233 | .06 | 231.87 | .06 |

Bank Sta: Left Right Coeff Contr. Expan.
99.233 231.87 .3 .5

Downstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 17.17 | 0 | 38.7 | 16.82 | 0 | 38.7 | 16.82 | 14.99 |
| 246.7 | 17.74 | 15.91 | 246.7 | 17.74 | -5 | 300 | 18 | -5 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 99.233 | .03 | 231.87 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
99.233 231.87 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 68.2 Downstream= 68.2
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -6 | 3 | 20 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | -6 | 3 | 20 |

Pier Data
Pier Station Upstream= 105.45 Downstream= 105.45

```
Upstream      num=        2
    Width    Elev     Width    Elev
        3      -6         3      20
Downstream    num=        2
    Width    Elev     Width    Elev
        3      -6         3      20

Pier Data
Pier Station      Upstream=   142.7    Downstream=   142.7
Upstream      num=        2
    Width    Elev     Width    Elev
        3      -6         3      20
Downstream    num=        2
    Width    Elev     Width    Elev
        3      -6         3      20

Pier Data
Pier Station      Upstream=  179.95    Downstream=  179.95
Upstream      num=        2
    Width    Elev     Width    Elev
        3      -6         3      20
Downstream    num=        2
    Width    Elev     Width    Elev
        3      -6         3      20

Pier Data
Pier Station      Upstream=   217.2    Downstream=   217.2
Upstream      num=        2
    Width    Elev     Width    Elev
        3      -6         3      20
Downstream    num=        2
    Width    Elev     Width    Elev
        3      -6         3      20

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)                  8.82    Element                Inside BR US
Inside BR DS
  W.S. US. (ft)                  8.26    E.G. Elev (ft)                 8.74
 8.13
  Q Total (cfs)             12000.00     W.S. Elev (ft)                 8.11
 7.37
  Q Bridge (cfs)            12000.00     Crit W.S. (ft)                 2.26
 2.26
  Q Weir (cfs)                           Max Chl Dpth (ft)             13.29
12.55
```

| | | | |
|---|---|---|---|
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 6.31 |
| 6.83 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 1900.43 |
| 1758.06 | | | |
| Weir Submerg | | Froude # Chl | 0.35 |
| 0.40 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 13376.28 |
| 12246.40 | | | |
| Min El Weir Flow (ft) | 16.83 | Hydr Depth (ft) | 9.85 |
| 9.15 | | | |
| Min El Prs (ft) | 15.91 | W.P. Total (ft) | 306.18 |
| 297.89 | | | |
| Delta EG (ft) | 0.74 | Conv. Total (cfs) | 164463.1 |
| 290350.8 | | | |
| Delta WS (ft) | 0.87 | Top Width (ft) | 193.00 |
| 192.10 | | | |
| BR Open Area (sq ft) | 3316.68 | Frctn Loss (ft) | 0.57 |
| 0.02 | | | |
| BR Open Vel (ft/s) | 6.83 | C & E Loss (ft) | 0.04 |
| 0.03 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 2.06 |
| 0.63 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 13.03 |
| 4.30 | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 342

INPUT
Description:
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.82 | 25 | 9.82 | 84.7 | -.18 | 99.233 | -2.38 | 117.75 | -5.18 |
| 213.12 | -5.18 | 231.87 | 2 | 239.24 | 4.82 | 279.84 | 9.82 | 300 | 9.82 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 99.233 | .03 | 231.87 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 99.233 | 231.87 | 295.11 | 295.34 295.96 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 8.08 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.69 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 7.39 | Reach Len. (ft) | 295.11 | 295.34 |
| 295.96 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 296.85 | 1573.56 |
| 56.05 | | | | |
| E.G. Slope (ft/ft) | 0.000736 | Area (sq ft) | 296.85 | 1573.56 |
| 56.05 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 987.08 | 10912.51 |
| 100.41 | | | | |
| Top Width (ft) | 220.55 | Top Width (ft) | 59.71 | 132.64 |
| 28.21 | | | | |
| Vel Total (ft/s) | 6.23 | Avg. Vel. (ft/s) | 3.33 | 6.93 |
| 1.79 | | | | |
| Max Chl Dpth (ft) | 12.57 | Hydr. Depth (ft) | 4.97 | 11.86 |
| 1.99 | | | | |
| Conv. Total (cfs) | 442406.2 | Conv. (cfs) | 36390.8 | 402313.5 |
| 3701.9 | | | | |
| Length Wtd. (ft) | 295.34 | Wetted Per. (ft) | 60.50 | 134.18 |
| 28.89 | | | | |
| Min Ch El (ft) | -5.18 | Shear (lb/sq ft) | 0.23 | 0.54 |
| 0.09 | | | | |
| Alpha | 1.15 | Stream Power (lb/ft s) | 0.75 | 3.74 |
| 0.16 | | | | |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 1.57 | 10.59 |
| 0.75 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.29 | 0.85 |
| 0.18 | | | | |

CROSS SECTION

RIVER: Batiquitos
REACH: 1 RS: 47

INPUT
Description:
Station Elevation Data num= 6

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 16.67 | 13.7 | 16.67 | 57.9 | -5.83 | 177.1 | -5.83 | 221.3 | 16.67 |
| 235 | 16.67 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 57.9 | .03 | 177.1 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 57.9 | 177.1 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 7.87 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.70 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 7.17 | Reach Len. (ft) | | |
| Crit W.S. (ft) | 0.79 | Flow Area (sq ft) | 166.00 | 1549.60 |
| 166.00 | | | | |
| E.G. Slope (ft/ft) | 0.000652 | Area (sq ft) | 166.00 | 1549.60 |
| 166.00 | | | | |
| Q Total (cfs) | 12000.00 | Flow (cfs) | 580.59 | 10838.82 |

| | | | | |
|---|---|---|---|---|
| 580.59 | | | | |
| Top Width (ft) | 170.28 | Top Width (ft) | 25.54 | 119.20 |
| 25.54 | | | | |
| Vel Total (ft/s) | 6.38 | Avg. Vel. (ft/s) | 3.50 | 6.99 |
| 3.50 | | | | |
| Max Chl Dpth (ft) | 13.00 | Hydr. Depth (ft) | 6.50 | 13.00 |
| 6.50 | | | | |
| Conv. Total (cfs) | 469809.3 | Conv. (cfs) | 22730.5 | 424348.3 |
| 22730.5 | | | | |
| Length Wtd. (ft) | | Wetted Per. (ft) | 28.66 | 119.20 |
| 28.66 | | | | |
| Min Ch El (ft) | -5.83 | Shear (lb/sq ft) | 0.24 | 0.53 |
| 0.24 | | | | |
| Alpha | 1.12 | Stream Power (lb/ft s) | 0.83 | 3.70 |
| 0.83 | | | | |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | |
| C & E Loss (ft) | | Cum SA (acres) | | |

SUMMARY OF MANNING'S N VALUES

River:Batiquitos

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| 1 | 9724 | .035 | .03 | .035 |
| 1 | 9162 | .035 | .03 | .035 |
| 1 | 8558 | .035 | .03 | .035 |
| 1 | 7922 | .035 | .03 | .035 |
| 1 | 7547 | .035 | .03 | .035 |
| 1 | 6962 | .035 | .03 | .035 |
| 1 | 6431 | .035 | .03 | .035 |
| 1 | 5864 | .035 | .03 | .035 |
| 1 | 5293 | .035 | .03 | .035 |
| 1 | 4871 | .035 | .03 | .035 |
| 1 | 4407 | .035 | .03 | .035 |
| 1 | 4209 | .035 | .03 | .035 |
| 1 | 4000 | Bridge | | |
| 1 | 3797 | .035 | .03 | .035 |
| 1 | 3581 | .035 | .03 | .035 |
| 1 | 3204 | .035 | .03 | .035 |
| 1 | 2754 | .035 | .03 | .035 |
| 1 | 2428 | .035 | .03 | .035 |
| 1 | 2076 | .035 | .03 | .035 |
| 1 | 1740 | .035 | .03 | .035 |
| 1 | 1454 | .035 | .03 | .035 |
| 1 | 1300 | Bridge | | |
| 1 | 1207 | .035 | .03 | .035 |
| 1 | 976 | .035 | .03 | .035 |
| 1 | 874 | .035 | .03 | .035 |
| 1 | 581 | .06 | .06 | .06 |
| 1 | 400 | Bridge | | |
| 1 | 342 | .035 | .03 | .035 |
| 1 | 47 | .035 | .03 | .035 |

SUMMARY OF REACH LENGTHS

River: Batiquitos

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| 1 | 9724 | 333.14 | 561.59 | 744.21 |
| 1 | 9162 | 423.98 | 604.81 | 765.06 |
| 1 | 8558 | 666.77 | 636.64 | 683.13 |
| 1 | 7922 | 399.23 | 375.4 | 392.28 |
| 1 | 7547 | 637.78 | 584.87 | 537.79 |
| 1 | 6962 | 820.71 | 532.08 | 332.07 |
| 1 | 6431 | 687.07 | 567.98 | 494.69 |
| 1 | 5864 | 390.15 | 571.18 | 519.72 |
| 1 | 5293 | 333.66 | 422.8 | 462.78 |
| 1 | 4871 | 195.16 | 464.8 | 912.1 |
| 1 | 4407 | 100.52 | 198.16 | 344.06 |
| 1 | 4209 | 357.7 | 362.51 | 374.53 |
| 1 | 4000 | Bridge | | |
| 1 | 3797 | 139.64 | 216.41 | 305.8 |
| 1 | 3581 | 342.87 | 377.21 | 427.94 |
| 1 | 3204 | 465.52 | 449.84 | 452.33 |
| 1 | 2754 | 664.97 | 357.33 | 202.94 |
| 1 | 2428 | 605.62 | 351.98 | 312.8 |
| 1 | 2076 | 472.02 | 336.44 | 300.63 |
| 1 | 1740 | 661.13 | 285.69 | 333.19 |
| 1 | 1454 | 253.92 | 247.22 | 263.76 |
| 1 | 1300 | Bridge | | |
| 1 | 1207 | 502.13 | 230.8 | 182.26 |
| 1 | 976 | 685.58 | 233.76 | 362.43 |
| 1 | 874 | 243.66 | 160.93 | 164.42 |
| 1 | 581 | 240.36 | 239.2 | 239.01 |
| 1 | 400 | Bridge | | |
| 1 | 342 | 295.11 | 295.34 | 295.96 |
| 1 | 47 | | | |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Batiquitos

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| 1 | 9724 | .1 | .3 |
| 1 | 9162 | .1 | .3 |
| 1 | 8558 | .1 | .3 |
| 1 | 7922 | .1 | .3 |
| 1 | 7547 | .1 | .3 |
| 1 | 6962 | .1 | .3 |
| 1 | 6431 | .1 | .3 |
| 1 | 5864 | .1 | .3 |
| 1 | 5293 | .1 | .3 |
| 1 | 4871 | .1 | .3 |
| 1 | 4407 | .1 | .3 |
| 1 | 4209 | .3 | .5 |
| 1 | 4000 | Bridge | |
| 1 | 3797 | .01 | .3 |
| 1 | 3581 | .1 | .3 |
| 1 | 3204 | .1 | .3 |
| 1 | 2754 | .1 | .3 |
| 1 | 2428 | .1 | .3 |

| | | | | |
|---|---|---|---|---|
| 1 | 2076 | | .1 | .3 |
| 1 | 1740 | | .1 | .3 |
| 1 | 1454 | | .3 | .5 |
| 1 | 1300 | Bridge | | |
| 1 | 1207 | | .1 | .3 |
| 1 | 976 | | .1 | .3 |
| 1 | 874 | | .1 | .3 |
| 1 | 581 | | .3 | .5 |
| 1 | 400 | Bridge | | |
| 1 | 342 | | .1 | .3 |
| 1 | 47 | | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | |
| | | | (cfs) | (ft) | (ft) | |
| (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) |
| 1 | 9724 | PF 1 | 12000.00 | -2.18 | 10.53 | |
| 10.55 | 0.000032 | 1.24 | 10972.47 | 1482.77 | 0.07 | |
| 1 | 9162 | PF 1 | 12000.00 | -2.18 | 10.52 | |
| 10.54 | 0.000027 | 1.14 | 12147.54 | 1644.00 | 0.07 | |
| 1 | 8558 | PF 1 | 12000.00 | -2.18 | 10.48 | |
| 10.51 | 0.000048 | 1.51 | 8892.53 | 1246.88 | 0.09 | |
| 1 | 7922 | PF 1 | 12000.00 | -2.18 | 10.46 | |
| 10.48 | 0.000034 | 1.37 | 10802.49 | 1648.06 | 0.07 | |
| 1 | 7547 | PF 1 | 12000.00 | -2.18 | 10.46 | |
| 10.47 | 0.000010 | 0.82 | 15447.14 | 1506.62 | 0.04 | |
| 1 | 6962 | PF 1 | 12000.00 | -3.18 | 10.46 | -0.82 |
| 10.47 | 0.000011 | 0.85 | 14606.95 | 1548.45 | 0.04 | |
| 1 | 6431 | PF 1 | 12000.00 | -3.18 | 10.45 | -0.93 |
| 10.46 | 0.000014 | 1.01 | 12434.49 | 1945.40 | 0.05 | |
| 1 | 5864 | PF 1 | 12000.00 | -3.18 | 10.43 | -0.78 |
| 10.45 | 0.000019 | 1.19 | 10747.00 | 1886.70 | 0.06 | |
| 1 | 5293 | PF 1 | 12000.00 | -3.18 | 10.42 | -0.69 |
| 10.44 | 0.000017 | 1.06 | 11758.10 | 1591.98 | 0.05 | |
| 1 | 4871 | PF 1 | 12000.00 | -3.18 | 10.41 | -0.25 |
| 10.43 | 0.000020 | 1.13 | 11618.72 | 2167.86 | 0.06 | |
| 1 | 4407 | PF 1 | 12000.00 | -4.18 | 10.41 | -1.54 |
| 10.42 | 0.000013 | 0.98 | 12690.49 | 2780.56 | 0.05 | |
| 1 | 4209 | PF 1 | 12000.00 | -4.18 | 10.19 | 1.15 |
| 10.40 | 0.000177 | 3.69 | 3255.50 | 3016.29 | 0.18 | |
| 1 | 4000 | | Bridge | | | |
| 1 | 3797 | PF 1 | 12000.00 | -4.18 | 9.67 | 0.58 |
| 9.88 | 0.000175 | 3.67 | 3268.60 | 2201.92 | 0.18 | |
| 1 | 3581 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.30 |
| 9.82 | 0.000010 | 0.95 | 12574.54 | 1907.17 | 0.04 | |
| 1 | 3204 | PF 1 | 12000.00 | -5.00 | 9.80 | -3.41 |
| 9.81 | 0.000006 | 0.74 | 16485.11 | 1594.47 | 0.03 | |
| 1 | 2754 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.51 |
| 9.81 | 0.000007 | 0.73 | 16537.05 | 1270.87 | 0.03 | |
| 1 | 2428 | PF 1 | 12000.00 | -5.18 | 9.80 | |
| 9.81 | 0.000003 | 0.55 | 22514.29 | 1657.88 | 0.03 | |
| 1 | 2076 | PF 1 | 12000.00 | -5.18 | 9.80 | -3.65 |
| 9.81 | 0.000005 | 0.68 | 17987.96 | 2099.64 | 0.03 | |
| 1 | 1740 | PF 1 | 12000.00 | -5.18 | 9.78 | -2.73 |
| 9.80 | 0.000020 | 1.19 | 10060.20 | 2060.58 | 0.06 | |
| 1 | 1454 | PF 1 | 12000.00 | -5.18 | 9.46 | 1.42 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 9.76 | 0.000321 | 4.42 | 2715.54 | 239.80 | 0.23 | |
| 1 | | 1300 | | Bridge | | | |
| 1 | | 1207 | PF 1 | 12000.00 | -5.18 | 8.76 | |
| | 9.04 | 0.000269 | 4.46 | 2978.39 | 278.54 | 0.22 | |
| 1 | | 976 | PF 1 | 12000.00 | -5.18 | 8.90 | -2.33 |
| | 8.95 | 0.000041 | 1.83 | 6710.87 | 1636.29 | 0.09 | |
| 1 | | 874 | PF 1 | 12000.00 | -5.18 | 8.72 | -0.63 |
| | 8.92 | 0.000162 | 3.60 | 3480.47 | 456.59 | 0.17 | |
| 1 | | 581 | PF 1 | 12000.00 | -5.18 | 8.26 | 1.86 |
| | 8.82 | 0.002188 | 6.27 | 2123.91 | 232.83 | 0.31 | |
| 1 | | 400 | | Bridge | | | |
| 1 | | 342 | PF 1 | 12000.00 | -5.18 | 7.39 | |
| | 8.08 | 0.000736 | 6.93 | 1926.47 | 220.55 | 0.35 | |
| 1 | | 47 | PF 1 | 12000.00 | -5.83 | 7.17 | 0.79 |
| | 7.87 | 0.000652 | 6.99 | 1881.59 | 170.28 | 0.34 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : BL_Prop

River: Batiquitos Reach: 1 RS: 7922 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 6962 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 6431 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 5864 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 5293 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 4871 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 4407 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 4209 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: Batiquitos Reach: 1 RS: 4000 Profile: PF 1 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Batiquitos Reach: 1 RS: 4000 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Batiquitos Reach: 1 RS: 3797 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Batiquitos Reach: 1 RS: 3581 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 3204 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 2754 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 2076 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 1740 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 1454 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 1300 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 1207 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 976 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Batiquitos Reach: 1 RS: 874 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Batiquitos Reach: 1 RS: 581 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 400 Profile: PF 1 Upstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Batiquitos Reach: 1 RS: 400 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

# APPENDIX C

## Location Hydraulic Study Form

## Floodplain Encroachment Form

## As-builts

## Planning Study

## Backup Data

## LOCATION HYDRAULIC STUDY FORM

Dist. *11* Co. *SD* Rte. *005* K.P.
EA Bridge No. *57-0459*
Floodplain Description:
***A salt water lagoon fed by ocean tides and two fresh water streams with several bridge crossings. Location of interest: I-5 / Batiquitos Lagoon Intersection***

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

***This project includes an improvement to the I-5 / Bridge over Batiquitos Lagoon with 10+4+buffer alternative. The alternative requires the existing I-5 bridge to be replaced and would not have a significant impact to the existing floodplain.***

2. ADT: Current **272,050 (year 2015)** Projected **321,050 (year 2030)**
***(ADT values taken from Wilson & Company's Traffic Demand Forecasting Report for the I-5 North Coast Corridor Project)***

3. Hydraulic Data: Base Flood $Q_{100}$= **12,000** $ft^3 / s$

$WSE_{100}$= **10.19 feet (Upstream face of I-5 Bridge)**
The flood of record, if greater than $Q_{100}$:
Q= *N/A* $ft^3 / s$ WSE= *N/A*
Overtopping flood Q=***(no increase from existing condition)*** $ft^3 / s$
WSE= ***(no increase from existing condition)***

Are NFIP maps and studies available? YES **X** NO_____

4. Is the highway location alternative within a regulatory floodway ?
YES_____ NO ***X***

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain. ***(See Appendix 'A')***

Potential $Q_{100}$ backwater damages:

A. Residences? NO___YES ***(no increase from existing condition)***
B. Other Bldgs? NO___YES ***(no increase from existing condition)***
C. Crops? NO***X***YES _____
D. Natural and beneficial

FLOODPLAIN VALUES? NO **X** YES_____

6. Type of Traffic:

| | | |
|---|---|---|
| A. Emergency supply or evacuation route? | NO_____ | YES__X____ |
| B. Emergency vehicle access? | NO_____ | YES__X____ |
| C. Practicable detour available? | NO_____ | YES__X____ |
| D. School bus or mail route? | NO_____ | YES__X____ |

7. Estimated duration of traffic interruption for 100-year event hours: ***I-5 crossing is above the floodplain, therefore, no traffic interruptions are anticipated.***

8. Estimated value of $Q_{100}$ flood damages (if any) – moderate risk level.

| | | |
|---|---|---|
| A. | Roadway | $ ***(no increase from existing condition)*** |
| B | Property | $ ***(no increase from existing condition)*** |
| | Total | $ ***(no increase from existing condition)*** |

9. Assessment of Level of Risk Low__X____
Moderate____
High_____

For High Risk projects, during design phase, additional Design Study Risk Analysis May be necessary to determine design alternative.

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible
Floodplain development? NO__X____YES _____

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

Signature – Hydraulic/Project Engineer_____Date_____

## FLOODPLAIN ENCROACHMENT REPORT SUMMARY

Dist. *11* Co. *SD* Rte. *005* K.P.
Bridge No. *57-0459*
Limits: ***I-5 / Batiquitos Lagoon Intersection***

Floodplain Description: **A saltwater lagoon fed by ocean tides and two freshwater streams with several bridge crossings.**

| | | No | Yes |
|---|---|---|---|
| 1. | Is the proposed action a longitudinal encroachment of the base floodplain? | X | |
| 2. | Are the risks associated with the implementation of the proposed action significant? | X | |
| 3. | Will the proposed action support probable incompatible floodplain development? | X | |
| 4. | Are there any significant impacts on natural and beneficial floodplain values? | X | |
| 5. | Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain. | X | |
| 6. | Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q). | X | |
| 7. | Are Location Hydraulic Studies that document the above answers on file? If not explain. | | X |

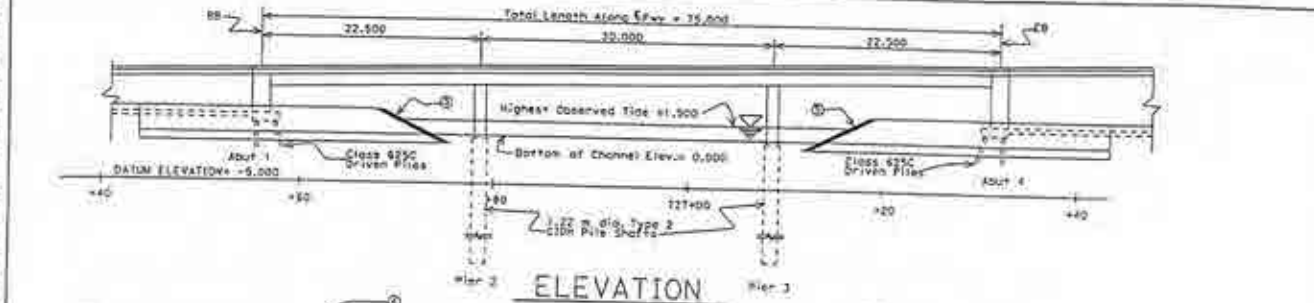
PREPARED BY:

_____ _____
Signature - Dist. Hydraulic Engineer Date

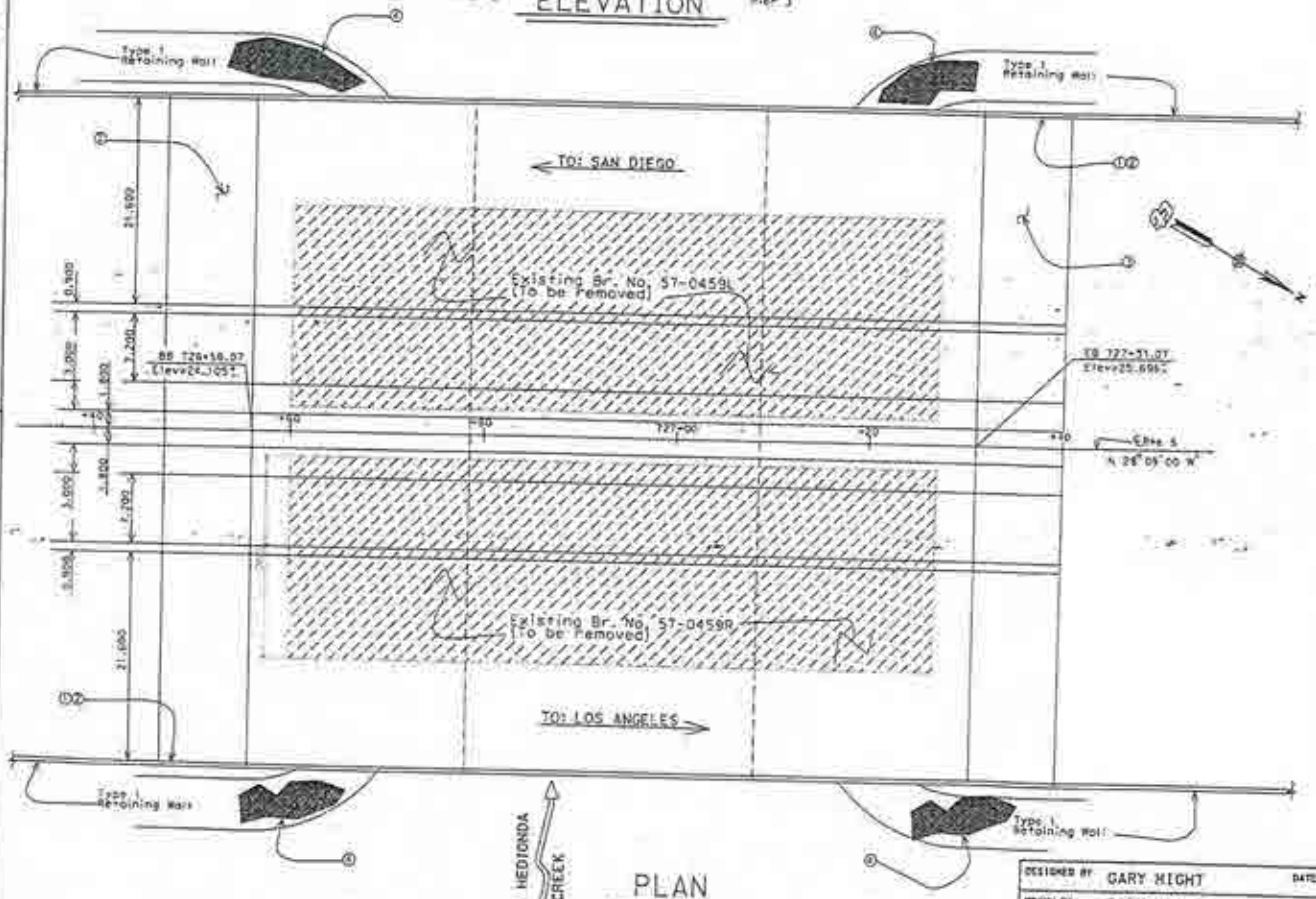
_____ _____
Signature - Dist. Environmental Branch Chief Date

_____ _____
Signature - Dist. Project Engineer Date

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES




ELEVATION




PLAN

LEGEND

—— Denotes existing structure
—— Denotes new construction

① Paint "BATIQUITOS LAGOON BR."
② Paint "BR. NO. 57-0459"
③ Approach Slab Type N(9S)
④ Rock Slope Protection
See "Road Plans"

ASSUMPTIONS:

1 2 Stage construction
2 Abutments: Class 625C (Alt "V") Driven Piles
3 Piers: 1.22 m dia. Type 2 CIDH Pile Shafts

| | |
|---|---|
| Date of Estimate | 12-28-01-PLA |
| Structure Depth | 1.200 M |
| Length | 75.000 M |
| Width | 69.880 M |
| Area | 5241 Sq M |
| Bridge Removal | 2807 Sq M |
| Cost/SM Including 10% Mobilization & 25% Contongencies | $ 2215 |
| Total Cost | $12,269,000 |

(1 OF 2)

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| DESIGNED BY | GARY HIGHT | DATE | 9-04 |
|---|---|---|---|
| DRAWN BY | GARY HIGHT | DATE | 9-04 |
| CHECKED BY | | DATE | |
| APPROVED | | DATE | |

STRUCTURE DESIGN SECTION

**PLANNING STUDY**

BRIDGES ACROSS BATIQUITOS LAGOON (REPLACE)

| BRIDGE NO. | 57-0459 | DIST | 11 |
|---|---|---|---|
| SCALE | No Scale | EA | 235800 |

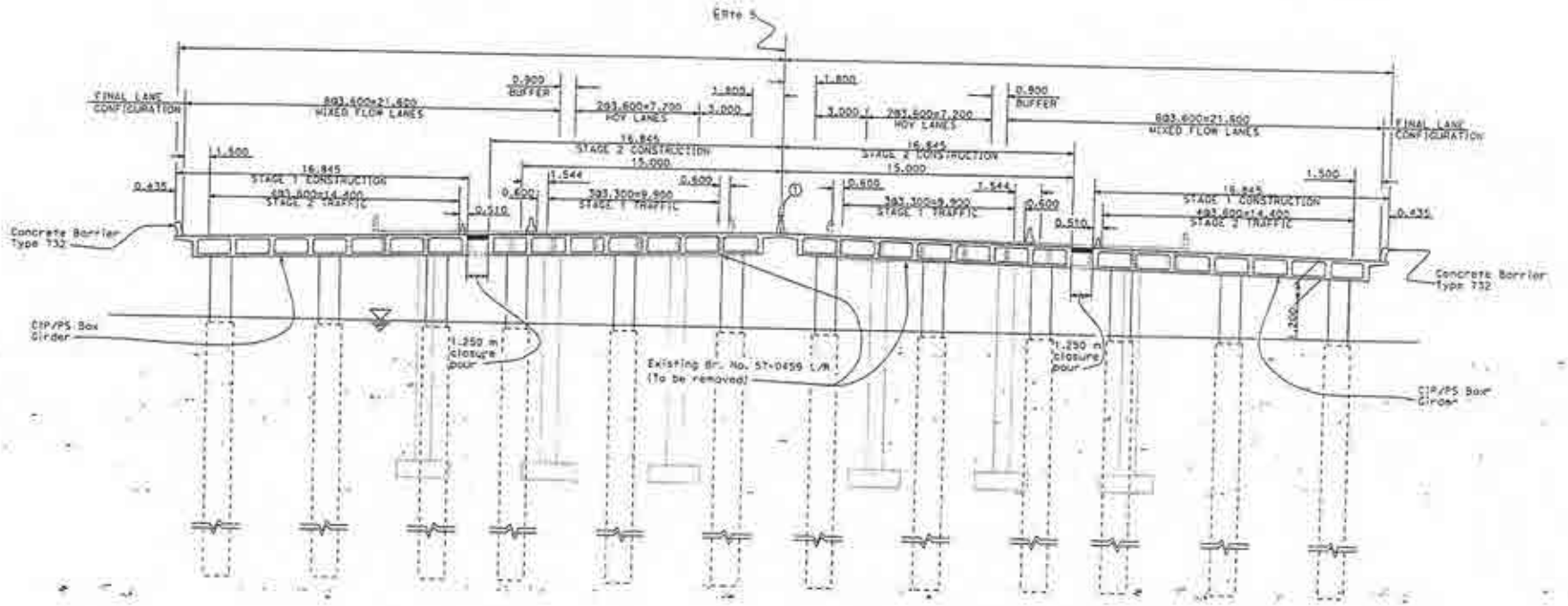
| DIST | COUNTY | ROUTE | ESTIMATED POST TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |

FILE =j batiquitos.dgn

DATE PLOTTED =j 05-JAN-2005 TIME PLOTTED =j 13:07

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST. | COUNTY | ROUTE | KILOMETER POST TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |




# ELEVATION

NOTES:

① Concrete Railing Type 60G

LEGEND

—— Denotes existing structure
—— Denotes new construction

(2 OF 2)

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| | | | |
|---|---|---|---|
| DESIGNED BY | GARY HIGHT | DATE | 9-04 |
| DRAWN BY | GARY HIGHT | DATE | 9-04 |
| CHECKED BY | | DATE | |
| APPROVED | | DATE | |

STRUCTURE DESIGN SECTION

**PLANNING STUDY**

BRIDGES ACROSS BATIQUITOS LAGOON (REPLACE)

| | | | |
|---|---|---|---|
| BRIDGE NO. | 57-0459 | CU | 11 |
| SCALE: | No Scale | EA | 235800 |

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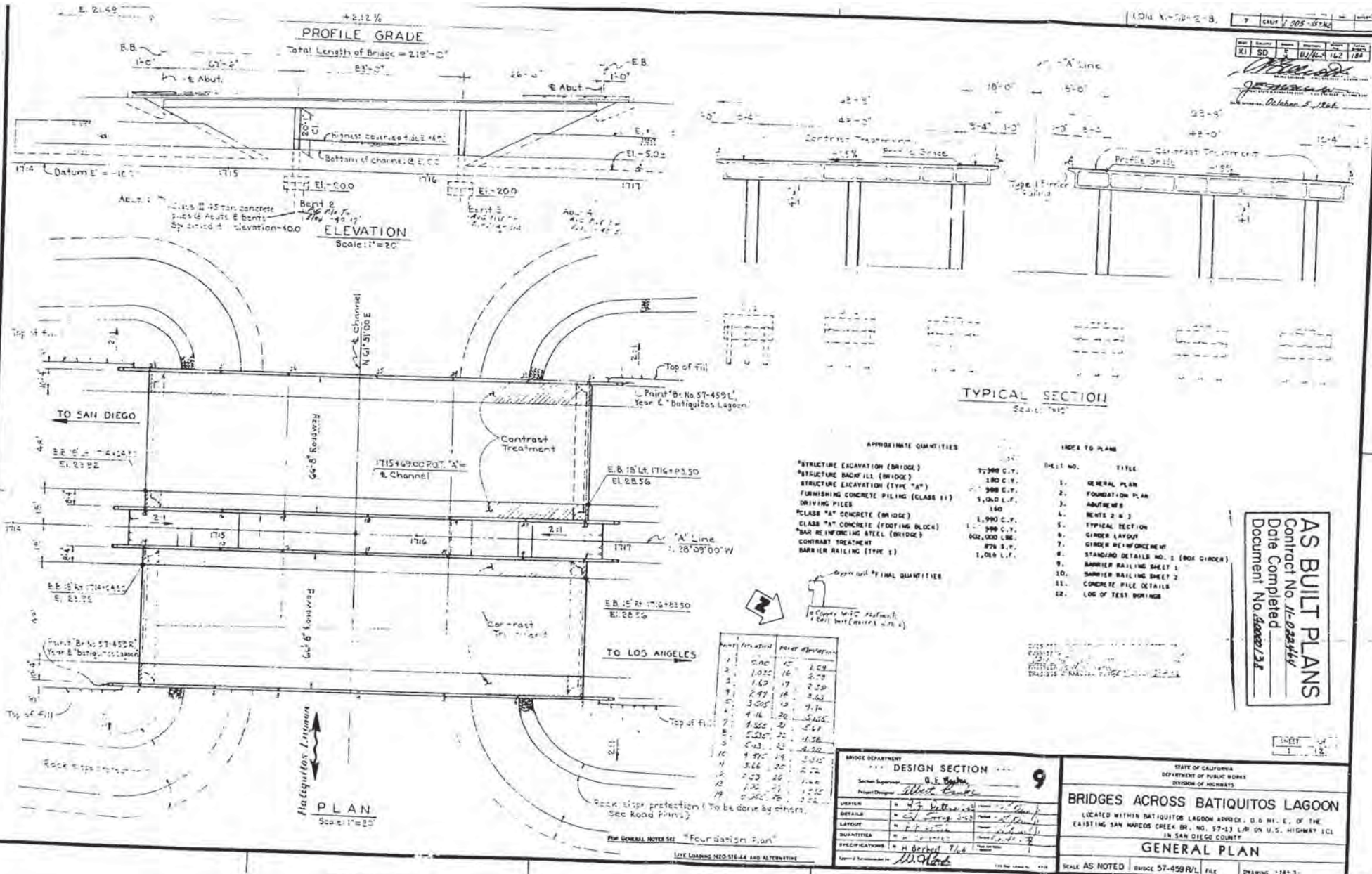
USERNAME =J: gthight




APPROXIMATE QUANTITIES

| | |
|---|---|
| *STRUCTURE EXCAVATION (BRIDGE) | 7,300 C.Y. |
| *STRUCTURE BACKFILL (BRIDGE) | 180 C.Y. |
| STRUCTURE EXCAVATION (TYPE "A") | 900 C.Y. |
| FURNISHING CONCRETE PILING (CLASS 11) | 5,040 L.F. |
| DRIVING PILES | 160 |
| *CLASS "A" CONCRETE (BRIDGE) | 1,990 C.Y. |
| CLASS "A" CONCRETE (FOOTING BLOCK) | 1,900 C.Y. |
| *BAR REINFORCING STEEL (BRIDGE) | 602,000 LBS. |
| CONTRAST TREATMENT | 876 S.F. |
| BARRIER RAILING (TYPE 1) | 1,016 L.F. |

Items with * final quantities

INDEX TO PLANS

| SHEET NO. | TITLE |
|---|---|
| 1. | GENERAL PLAN |
| 2. | FOUNDATION PLAN |
| 3. | ABUTMENTS |
| 4. | BENTS 2 & 3 |
| 5. | TYPICAL SECTION |
| 6. | GIRDER LAYOUT |
| 7. | GIRDER REINFORCEMENT |
| 8. | STANDARD DETAILS NO. 1 (BOX GIRDER) |
| 9. | BARRIER RAILING SHEET 1 |
| 10. | BARRIER RAILING SHEET 2 |
| 11. | CONCRETE PILE DETAILS |
| 12. | LOG OF TEST BORINGS |

AS BUILT PLANS
Contract No. 11-022414
Date Completed
Document No. 4000731

| Point | Tangent | Point | Deflection |
|---|---|---|---|
| 1 | 0.00 | 15 | 1.64 |
| 2 | 1.035 | 16 | 2.73 |
| 3 | 1.69 | 17 | 2.59 |
| 4 | 2.97 | 18 | 3.63 |
| 5 | 3.505 | 19 | 4.14 |
| 6 | 4.14 | 20 | 5.425 |
| 7 | 4.555 | 21 | 5.61 |
| 8 | 5.235 | 22 | 4.56 |
| 9 | 5.13 | 23 | 4.22 |
| 10 | 4.97 | 24 | 3.30 |
| 11 | 3.66 | 25 | 2.72 |
| 12 | 2.53 | 26 | 1.66 |
| 13 | 1.30 | 27 | 1.35 |
| 14 | 0.35 | 28 | 1.22 |

BRIDGE DEPARTMENT
DESIGN SECTION 9
Section Supervisor: O. E. Hopkins
Project Designer: Albert Hawks

| | | |
|---|---|---|
| DESIGN | | |
| DETAILS | | |
| LAYOUT | | |
| QUANTITIES | | |
| SPECIFICATIONS | H. Gerhart 7/64 | |

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

# BRIDGES ACROSS BATIQUITOS LAGOON

LOCATED WITHIN BATIQUITOS LAGOON APPROX. 0.0 MI. E. OF THE EXISTING SAN MARCOS CREEK BR. NO. 57-13 L/R ON U.S. HIGHWAY 101 IN SAN DIEGO COUNTY

## GENERAL PLAN

SCALE AS NOTED | BRIDGE 57-459 R/L | FILE | DRAWING 7143-

P-

REVISION DATES

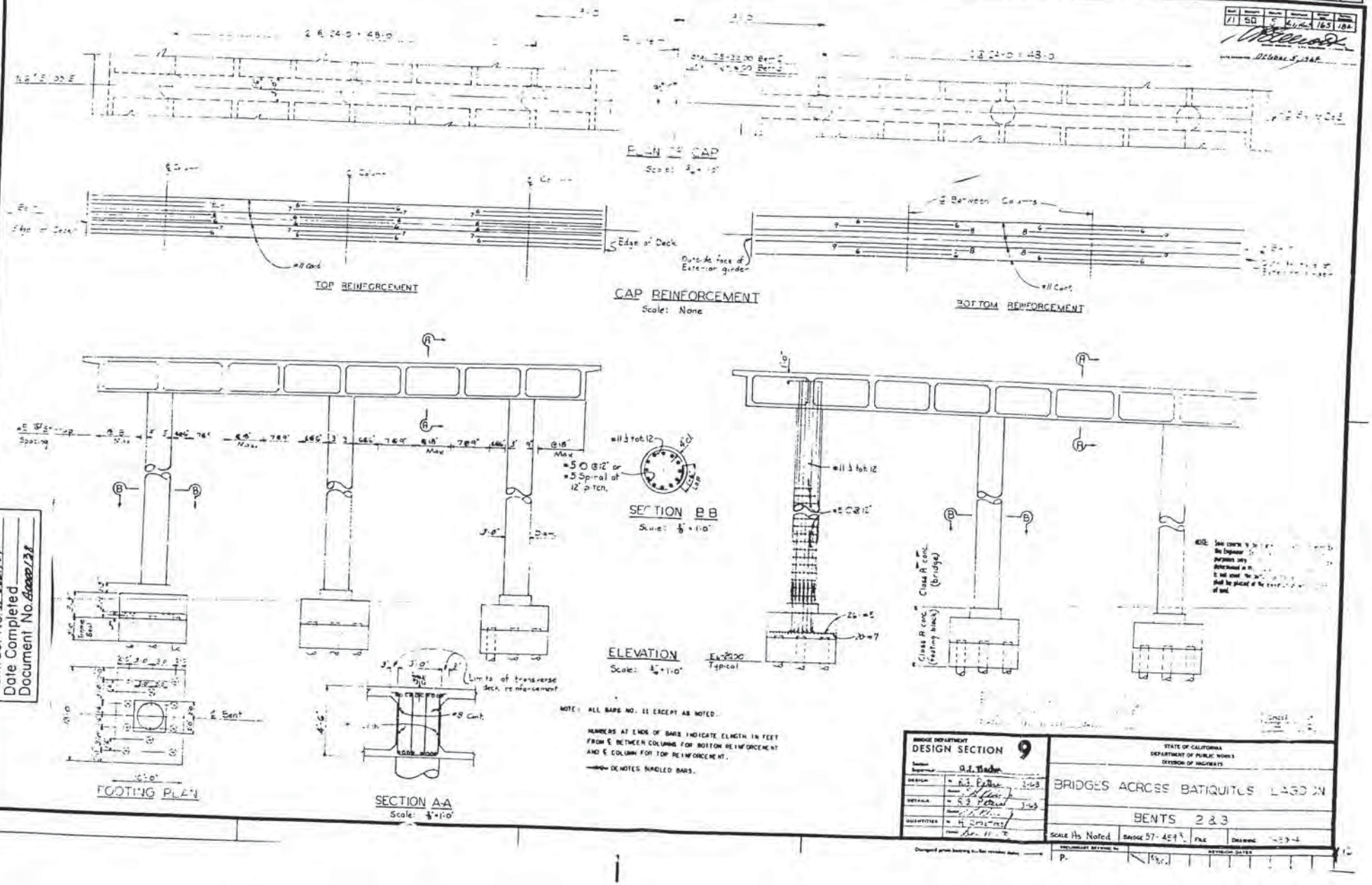
SHEET 1 OF 12

October 5, 1964

LOG X-SD-2-B

7 | CALIF. | 005-057 R/L

XI | SD | 2 | 11/64-4 | 162 | 184




AS BUILT PLANS
Contract No. 11-022476
Date Completed
Document No. 6000138

BRIDGE DEPARTMENT
DESIGN SECTION 9

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

# BRIDGES ACROSS BATIQUITOS LAGOON

## BENTS 2 & 3

SCALE As Noted | BRIDGE 57-459 | FILE | DRAWING

INDEX OF SHEETS

| Sheet No. | | | |
|---|---|---|---|
| * | * | 1 | Title and Location Plan |
| * | * | 2 | Typical Sections |
| * | * | 3 | Layout Plan and Profile |
| * | * | 4 | Drainage Plan |
| * | * | 5 | Detour Layout 1 |
| * | * | 6 | Detour Layout 2 |
| * | * | 7 | Detour Layout 3 |
| * | * | 8 | Detour Layout 4 |
| * | * | 9 | Pavement Delineation |
| * | * | 10 | Channel Scour and Slope Protection Plan |
| * | * | 11 | Channel Scour and Slope Protection Section |
| * | * | 12 | Channel Slope Protection Details |
| | | | STRUCTURE PLANS |
| * | * | 13 | General Plan |
| * | * | 14 | Deck Contours & Foundation Plan |
| * | * | 15 | Abutments |
| * | * | 16 | Bents |
| * | * | 17 | Typical Section & Deck Details |
| * | * | 18 | Structure Approach Type N(300) |
| * | * | 19 | Structure Approach Drainage Details |
| * | * | 20 | Log of Test Borings |

CITY OF CARLSBAD

COMMUNITY DEVELOPMENT DEPARTMENT

# PROJECT PLANS FOR CONSTRUCTION OF SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BOULEVARD

## FEDERAL AID PROJECT NO. BRLN-5308(1)
## BR. NO. 57C - 211L

To be supplemented by Standard Plans dated July 1992

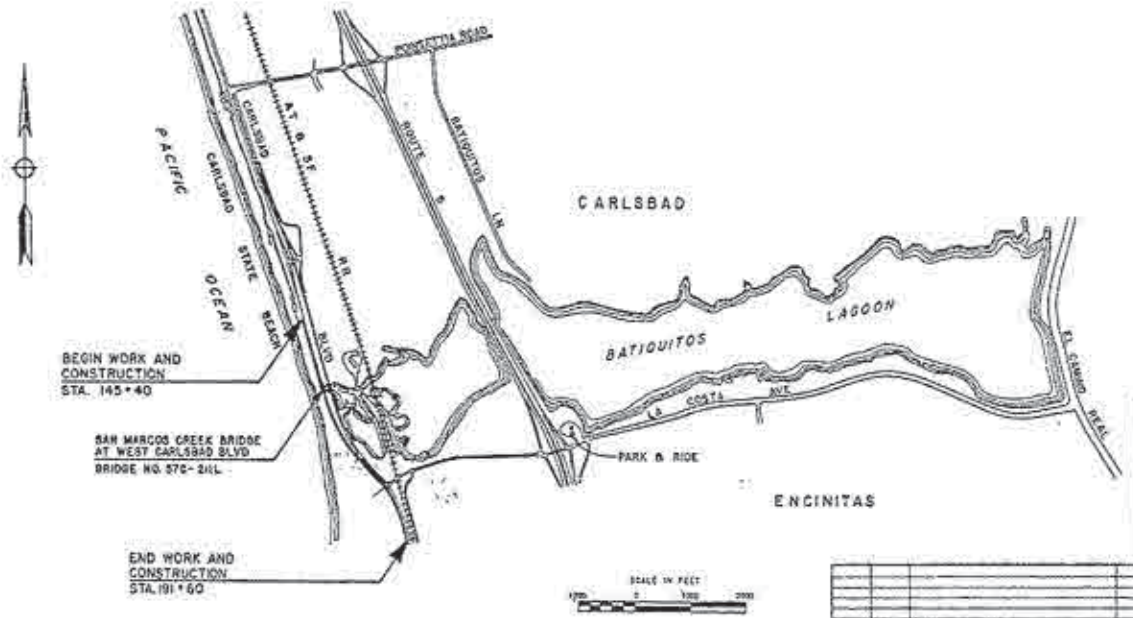
| DIST | COUNTY | ROUTE | POST MILE TOTAL | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 1 | 20 |

ROBERTO DE LA TORRE
REGISTERED CIVIL ENGINEER

APRIL 22, 1994
PLANS APPROVAL DATE

R. A. RUTHLIN
No. 43943
Exp. 3/31/95
CIVIL
STATE OF CALIFORNIA

MOFFATT & NICHOL ENGINEERS
350 WEST WARDLOW ROAD
LONG BEACH, CA. 90807




"AS BUILT"
R.A. Ruthlin 7/6/95
RCE 11691 EXP. 12/95 DATE
REVIEWED BY:
CORRECTION DATE

SHEET 1 — CITY OF CARLSBAD ENGINEERING DEPARTMENT — SHEET 20

SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BOULEVARD

TITLE AND LOCATION PLAN

APPROVED Paul Malmen 8/10/94
CITY ENGINEER RCE 20881 EXP. 12/31/95 DATE

DRAWING NO. 344-2

Contract No.

| DATE | INITIAL | REVISION DESCRIPTION | DATE | INITIAL | DATE | INITIAL |
|---|---|---|---|---|---|---|
| | | | | | | |

CHIEF OF WORK — DESIGN APPROVAL — CITY APPROVAL

The Contractor shall possess a Class A license at the time this contract is awarded

AUGUST 8 1994

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

344-2
1 of 20

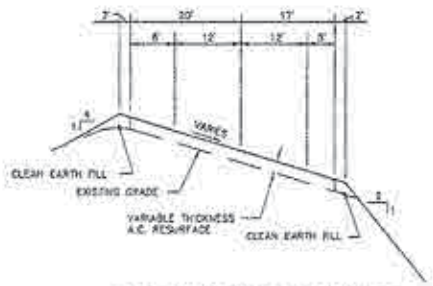
| DIST | COUNTY | ROUTE | POST MILE | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 2 | 20 |

REGISTERED CIVIL ENGINEER

APRIL 22 1994
PLANS APPROVAL DATE

No. 18343
Exp. 3/31/95
CIVIL
STATE OF CALIFORNIA

WOFFATT & NICHOL ENGINEERS
250 WEST WARDLOW ROAD
LONG BEACH, CA. 90807

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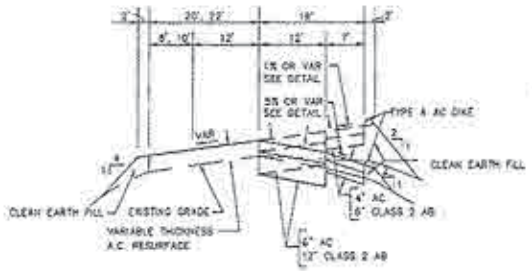
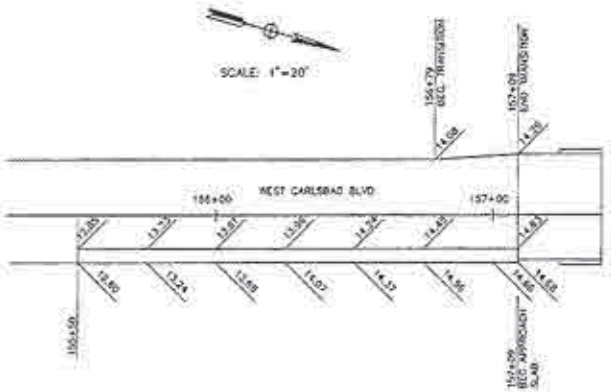
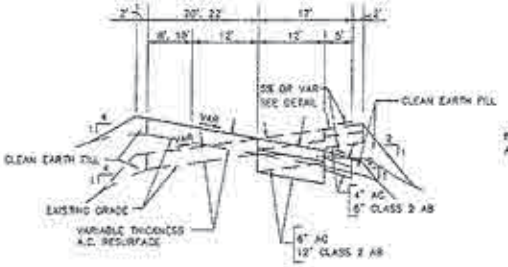
STA 154+50 TO 155+50




WEST CARLSBAD BOULEVARD
STA 159+77 TO 160+50

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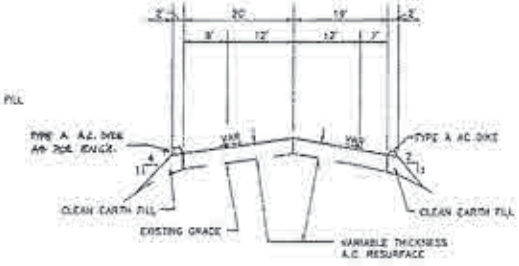
STA 155+50 TO 157+09

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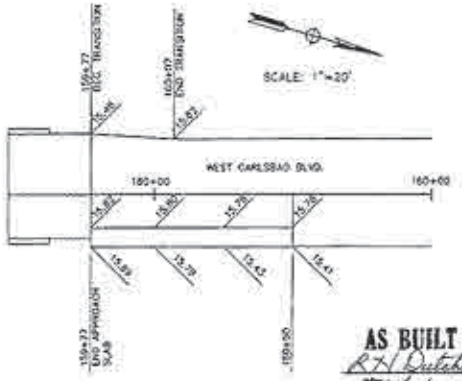



AS BUILT
R.T. Dutcher
DATE 7/12/95

TYPICAL CROSS SECTIONS
& CONSTRUCTION DETAILS

C-1

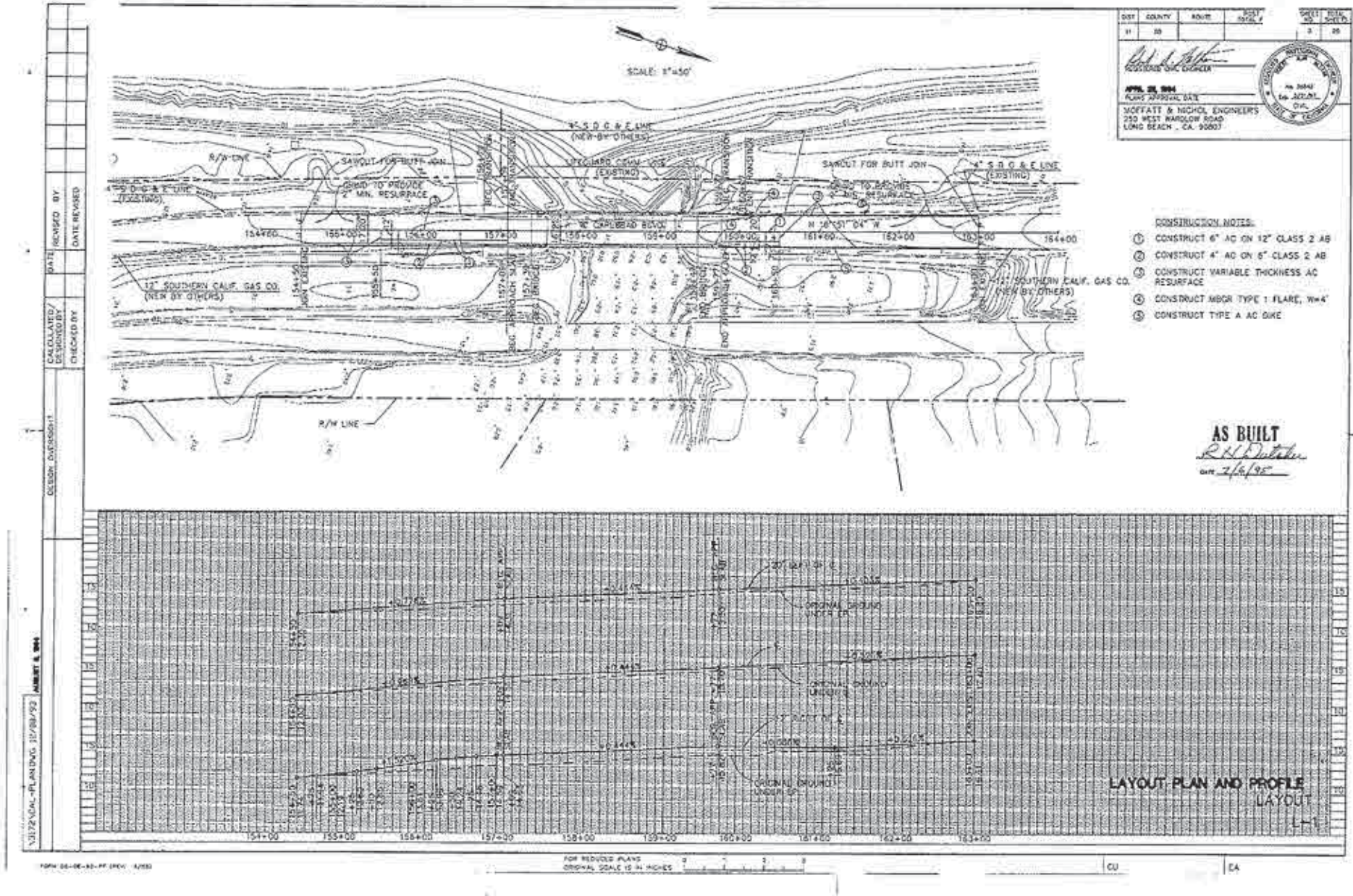
| DATE | REVISED BY | DATE REVISED |
|---|---|---|
| | | |

CALCULATED/ DESIGNED BY
CHECKED BY
DESIGN OVERSIGHT
AUGUST 8 1994
\3172\CAL-SECT.DWG

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU EA

344-2
2 OF 20




DIST 11 | COUNTY SD | ROUTE | SHEET TOTAL # | SHEET NO. 3 | TOTAL SHEETS 20

GOVERNING CIVIL ENGINEER

APRIL 28, 1994
PLANS APPROVAL DATE

MOFFATT & NICHOL ENGINEERS
250 WEST WARDLOW ROAD
LONG BEACH, CA. 90807

REGISTERED CIVIL ENGINEER No. 35642 Exp. 6/30/95 CIVIL STATE OF CALIFORNIA

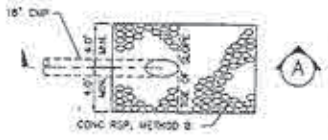
DESIGN OVERSIGHT | CALCULATED/DESIGNED BY | CHECKED BY | DATE | REVISED BY | DATE REVISED

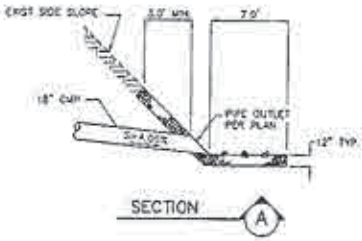
VISTA/VAL-PLANTING 10/08/93 AMBT & SM

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU | EA

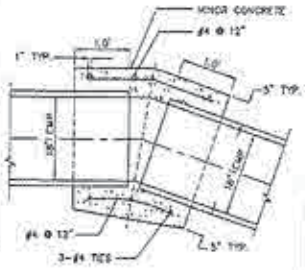
344-2
3 of 20



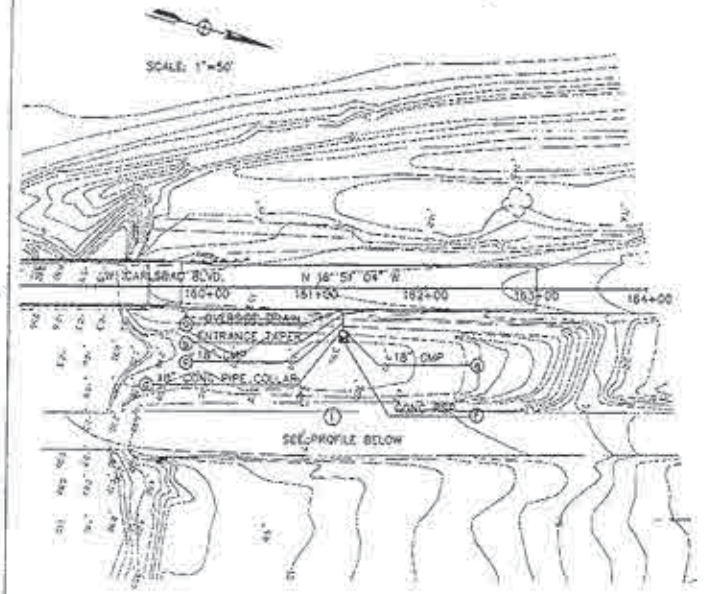

CONCRETE SLOPE PROTECTION

N.T.S.




CONCRETE PIPE COLLAR

N.T.S.




LEGEND

- ○ DRAINAGE SYSTEM
- ○ DRAINAGE UNIT
- RSP ROCK SLOPE PROTECTION
- CMP CORRUGATED METAL PIPE
- CONC CONCRETE
- FL FLOW LINE
- OG ORIGINAL GROUND

| DIST | COUNTY | ROUTE | POST MILE | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 4 | 20 |

REGISTERED CIVIL ENGINEER

APRIL 22 1994

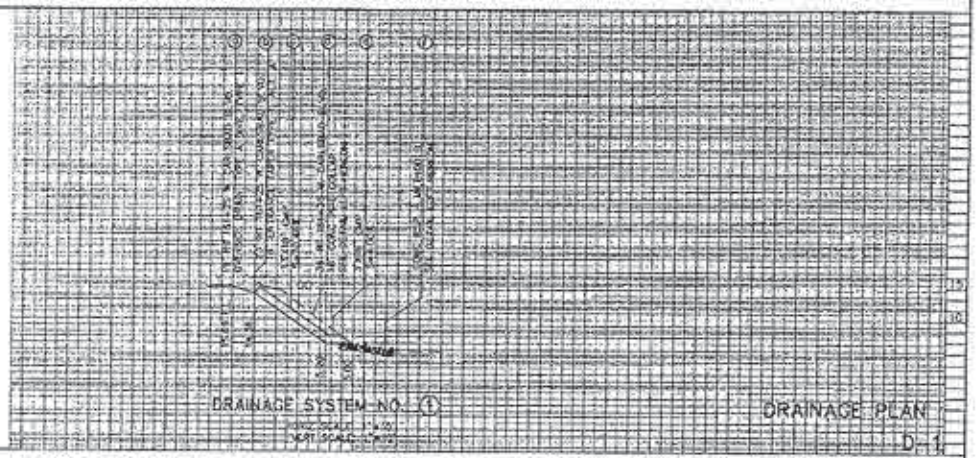
PLANS APPROVAL DATE

MOFFATT & NICHOL ENGINEERS
250 WEST WARDLOW ROAD
LONG BEACH, CA. 90807

AS BUILT
R H Batchelor
DATE 7/26/95

| DRAINAGE SYSTEM NO. | DRAINAGE UNIT | CONC. ROCK SLOPE PROTECTION (LIGHT METHOD B) | CONC. PIPE COLLAR | 18" ENTRANCE TAPER | 18" ALTERNATIVE PIPE | | MAX. COVER | DESCRIPTION | STATION | DRAINAGE PLAN SHEET NO. | DRAINAGE SYSTEM NO. | DRAINAGE UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CY | EA | EA | LF | FT | | | | | | |
| 1 | b | | | 1 | | | | 18" ENTRANCE TAPER | 23' RT 161+25 @ W. CARLSBAD BLVD. | D-1 | 1 | b |
| | a | | | | 13 | 2 | | 18" elbo | 23' RT 161+25 @ W. CARLSBAD BLVD. | | | a |
| | 6 | | 1 | | | | | 18" CONC. PIPE COLLAR | 36' RT 161+25 @ W. CARLSBAD BLVD. | | | d |
| | 4 | | | | 5 | 1.5 | | 18" CMP | 36' RT 161+25 @ W. CARLSBAD BLVD. | | | c |
| | 1 | 3.6 | | | | | | CONC. RSP, LIGHT METHOD | 41' RT 161+25 @ W. CARLSBAD BLVD. | | | 1 |
| SHEET TOTAL | | 3.6 | 1 | 1 | 18 | | | | | | | |

DRAINAGE QUANTITIES




\3172\CAL-DRA.DWG AUGUST 8 1994

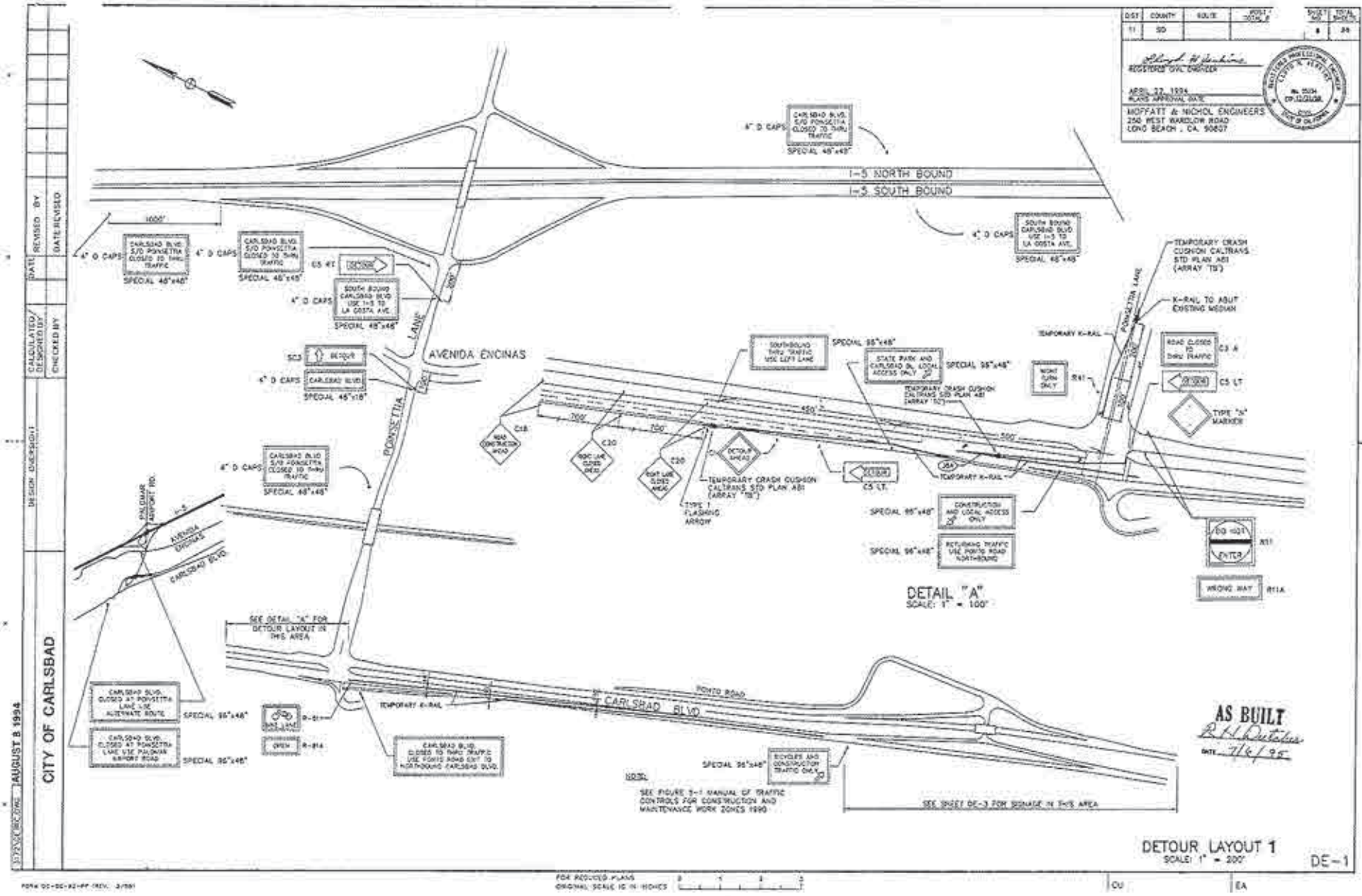
| DESIGN OVERSIGHT | CALCULATED/ DESIGNED BY | CHECKED BY | DATE | REVISED BY | DATE REVISED |
|---|---|---|---|---|---|

FORM 80-06-83-MF (REV. 3/88)

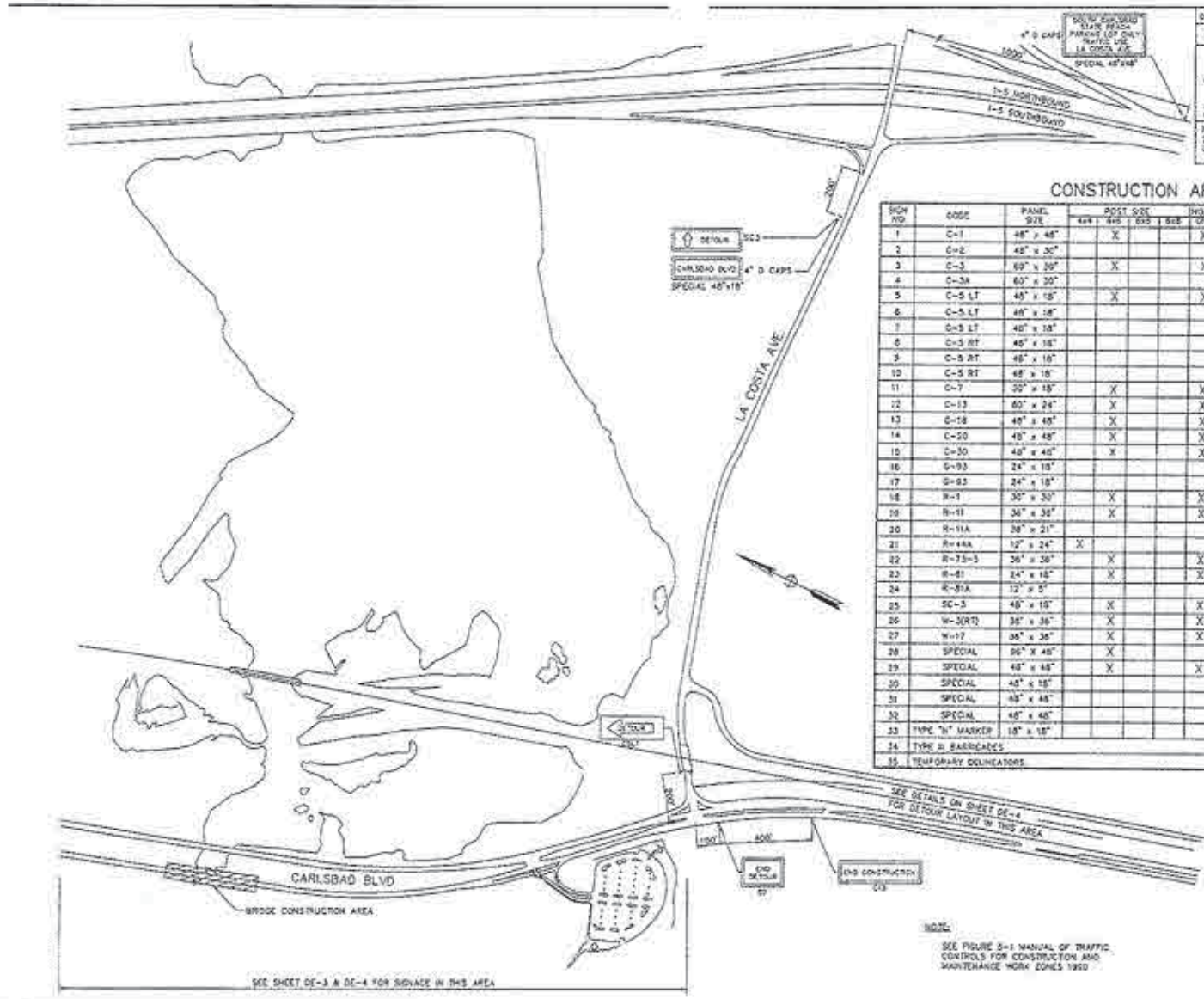
FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU EA

344-2
4 of 20


I-5 NORTH BOUND
I-5 SOUTH BOUND
AVENIDA ENCINAS
POINSETTIA LANE
CARLSBAD BLVD
PALOMAR AIRPORT RD.
AVENIDA ENCINAS
TEMPORARY CRASH CUSHION CALTRANS STD PLAN ABI (ARRAY "TS")
K-RAIL TO ADJT EXISTING MEDIAN
TEMPORARY K-RAIL
TEMPORARY CRASH CUSHION CALTRANS STD PLAN ABI (ARRAY "TS")
TYPE 1 FLASHING ARROW
TYPE "N" MARKER
DETAIL "A"
SCALE: 1" = 100'
SEE DETAIL "A" FOR DETOUR LAYOUT IN THIS AREA
TEMPORARY K-RAIL
POINTO ROAD
CARLSBAD BLVD
SEE FIGURE 5-1 MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES 1990
SEE SHEET DE-3 FOR SIGNAGE IN THIS AREA
AS BUILT
DETOUR LAYOUT 1
SCALE: 1" = 200'
DE-1
CITY OF CARLSBAD
AUGUST 8 1994
APRIL 22 1994
MOFFATT & NICHOL ENGINEERS
250 WEST WARDLOW ROAD
LONG BEACH, CA. 90807

344-2
5 of 20




## CONSTRUCTION AREA SIGNS

| SIGN NO | CODE | PANEL SIZE | POST SIZE 4x4 | 4x6 | 6x6 | 6x8 | NO. OF POST ONE | TWO | CODE | NUMBER OF SIGNS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | C-1 | 48" x 48" | | X | | | X | | | 2 EA. |
| 2 | C-2 | 48" x 30" | | | | | | | MOUNTED ON CHAIN LINK FENCE | 3 EA. |
| 3 | C-3 | 60" x 30" | | X | | | X | | | 1 EA. |
| 4 | C-3A | 60" x 30" | | | | | | | MOUNTED ON CHAIN LINK FENCE | 1 EA. |
| 5 | C-5 LT | 48" x 18" | | X | | | X | | | 2 EA. |
| 6 | C-5 LT | 48" x 18" | | | | | | | MOUNTED ON CHAIN LINK FENCE | 9 EA. |
| 7 | C-5 LT | 48" x 18" | | | | | | | MOUNTED WITH G-93 | 1 EA. |
| 8 | C-5 RT | 48" x 18" | | | | | | | MOUNTED WITH G-93 | 1 EA. |
| 9 | C-5 RT | 48" x 18" | | | | | | | | 1 EA. |
| 10 | C-5 RT | 48" x 18" | | | | | | | MOUNTED ON TYPE III BARRICADE | 1 EA. |
| 11 | C-7 | 30" x 18" | | X | | | X | | | 1 EA. |
| 12 | C-13 | 60" x 24" | | X | | | X | | | 1 EA. |
| 13 | C-18 | 48" x 48" | | X | | | X | | | 4 EA. |
| 14 | C-20 | 48" x 48" | | X | | | X | | | 8 EA. |
| 15 | C-30 | 48" x 48" | | X | | | X | | | 4 EA. |
| 16 | G-93 | 24" x 18" | | | | | | | | 2 EA. |
| 17 | G-93 | 24" x 18" | | | | | | | MOUNTED WITH C-5 RT | 1 EA. |
| 18 | R-1 | 30" x 30" | | X | | | X | | | 3 EA. |
| 19 | R-11 | 36" x 36" | | X | | | X | | | 1 EA. |
| 20 | R-11A | 36" x 21" | | | | | | | MOUNTED WITH R-11 | 1 EA. |
| 21 | R-44A | 12" x 24" | X | | | | | | | 1 EA. |
| 22 | R-75-5 | 36" x 36" | | X | | | X | | | 1 EA. |
| 23 | R-81 | 24" x 18" | | X | | | X | | | 3 EA. |
| 24 | R-81A | 12" x 9" | | | | | | | MOUNTED WITH R-81 | 2 EA. |
| 25 | SC-3 | 48" x 18" | | X | | | X | | | 2 EA. |
| 26 | W-3(RT) | 36" x 36" | | X | | | X | | | 1 EA. |
| 27 | W-17 | 36" x 36" | | X | | | X | | | 1 EA. |
| 28 | SPECIAL | 96" X 48" | | X | | | | X | | 5 EA. |
| 29 | SPECIAL | 48" x 48" | | X | | | X | | | 3 EA. |
| 30 | SPECIAL | 48" x 18" | | | | | | | MOUNTED WITH SC-3 | 2 EA. |
| 31 | SPECIAL | 48" x 48" | | | | | | | MOUNTED WITH C-5 RT | 1 EA. |
| 32 | SPECIAL | 48" x 48" | | | | | | | MOUNTED WITH C-5 LT | 1 EA. |
| 33 | TYPE "N" MARKER | 18" x 18" | | | | | | | MOUNTED ON CHAIN LINK FENCE | 8 EA. |
| 34 | TYPE III BARRICADES | | | | | | | | | 1 EA. |
| 35 | TEMPORARY DELINEATORS | | | | | | | | | 200 EA |

AS BUILT
R.H. Dutcher
DATE 4/6/95

NOTE:
SEE FIGURE 5-1 MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES 1990

DETOUR LAYOUT 2
SCALE 1" = 200'

DE-2

| DIST | COUNTY | ROUTE | POST MILE(S) | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 6 | 20 |

Lloyd H. Perkins
REGISTERED CIVIL ENGINEER
APRIL 22, 1994
PLANS APPROVAL DATE

MOFFATT & NICHOL ENGINEERS
250 WEST NARCOLOW ROAD
LONG BEACH, CA. 90807

CITY OF CARLSBAD

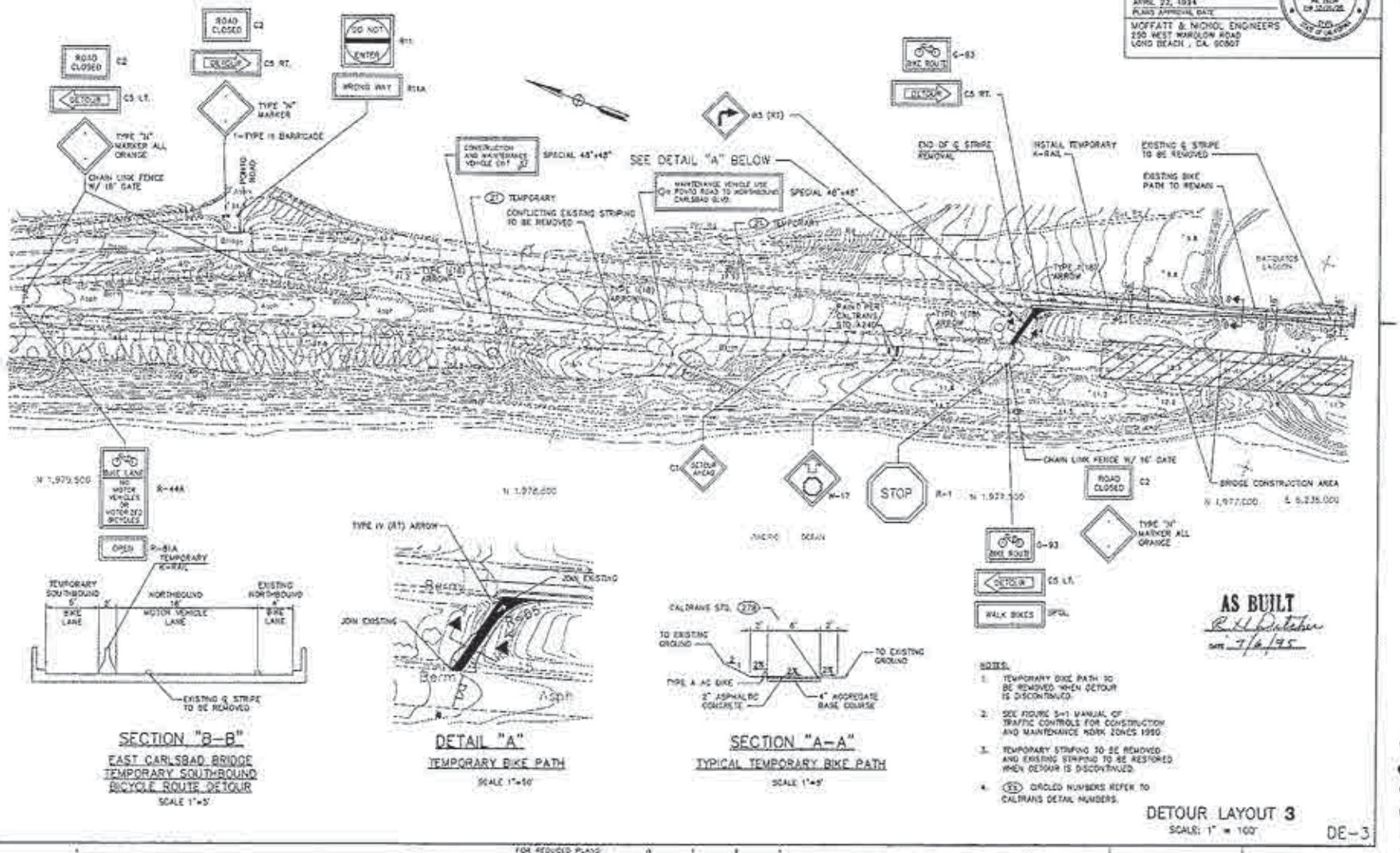
DESIGN OVERSIGHT
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

STYLE/CHECKPLOTTING AUGUST 8 1994

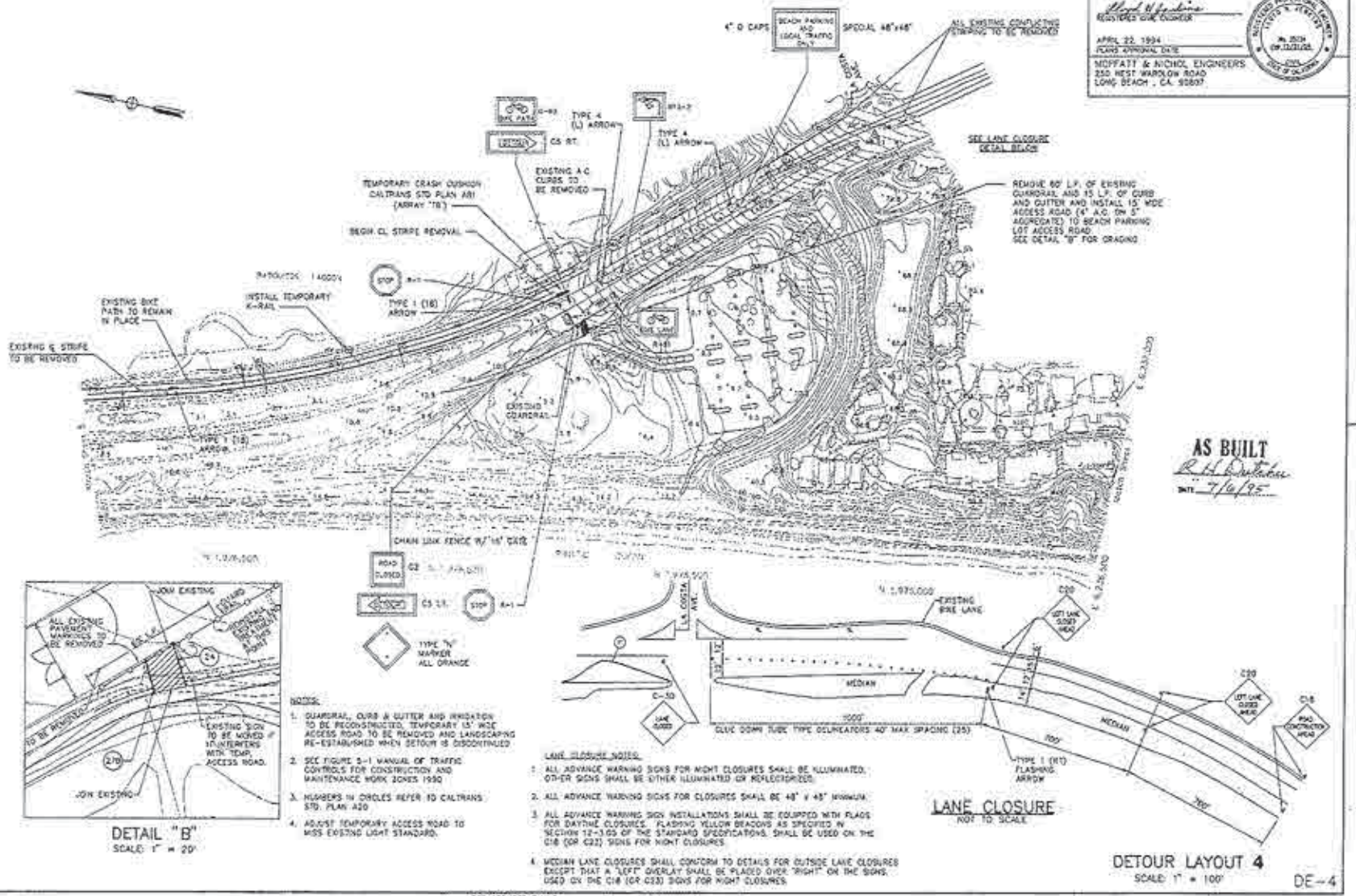
FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU EA

341-2
6 of 20


ROAD CLOSED C2
DETOUR C5 LT.
TYPE "H" MARKER ALL ORANGE
CHAIN LINK FENCE W/ 16' GATE
ROAD CLOSED C2
DETOUR C5 RT.
TYPE "H" MARKER
1=TYPE III BARRICADE
POINTO ROAD
DO NOT ENTER R5
WRONG WAY R5A
CONSTRUCTION AND MAINTENANCE VEHICLE ONLY SPECIAL 48"x48"
SEE DETAIL "A" BELOW
MAINTENANCE VEHICLE USE ON POINTO ROAD TO NORTHBOUND CARLSBAD BLVD. SPECIAL 48"x48"
(21) TEMPORARY CONFLICTING EXISTING STRIPING TO BE REMOVED
(21) TEMPORARY
R3 (R1)
BIKE ROUTE G-93
DETOUR C5 RT.
END OF ℄ STRIPE REMOVAL
INSTALL TEMPORARY K-RAIL
EXISTING ℄ STRIPE TO BE REMOVED
EXISTING BIKE PATH TO REMAIN
PAINT PER CALTRANS STD. A24D
TYPE V (R1) ARROW
BATIQUITOS LAGOON
CHAIN LINK FENCE W/ 16' GATE
BRIDGE CONSTRUCTION AREA
N 1,977,000 E 6,235,000
ROAD CLOSED C2
TYPE "H" MARKER ALL ORANGE
BIKE ROUTE G-93
DETOUR C5 LT.
WALK BIKES SPCL
BIKE LANE NO MOTOR VEHICLES OR MOTORIZED BICYCLES R-44A
OPEN R-81A
TEMPORARY K-RAIL
TEMPORARY SOUTHBOUND 5' BIKE LANE
NORTHBOUND 16' MOTOR VEHICLE LANE
EXISTING NORTHBOUND 4' BIKE LANE
EXISTING ℄ STRIPE TO BE REMOVED
SECTION "B-B"
EAST CARLSBAD BRIDGE TEMPORARY SOUTHBOUND BICYCLE ROUTE DETOUR
SCALE 1"=5'
TYPE IV (R1) ARROW
JOIN EXISTING
Berm
Asph
DETAIL "A"
TEMPORARY BIKE PATH
SCALE 1"=50'
CALTRANS STD. (27A)
TO EXISTING GROUND
TYPE A AC DIKE
2" ASPHALTIC CONCRETE
4" AGGREGATE BASE COURSE
SECTION "A-A"
TYPICAL TEMPORARY BIKE PATH
SCALE 1"=5'
NOTES:
1. TEMPORARY BIKE PATH TO BE REMOVED WHEN DETOUR IS DISCONTINUED.
2. SEE FIGURE 5-1 MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES 1990
3. TEMPORARY STRIPING TO BE REMOVED AND EXISTING STRIPING TO BE RESTORED WHEN DETOUR IS DISCONTINUED.
4. (XX) CIRCLED NUMBERS REFER TO CALTRANS DETAIL NUMBERS.
AS BUILT
DATE 7/6/95
DETOUR LAYOUT 3
SCALE: 1" = 100'
DE-3
DIST 11 | COUNTY SD | ROUTE | POST MILE | SHEET NO. 7 | TOTAL SHEETS 89
APRIL 22, 1994
PLANS APPROVAL DATE
MOFFATT & NICHOL ENGINEERS
250 WEST MARIGOLD ROAD
LONG BEACH, CA. 90807
DESIGN OVERSIGHT
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED
AUGUST 8 1994
CITY OF CARLSBAD
FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES
CU EA

344-2
7 of 20







DETAIL "B"
SCALE: 1" = 20'

NOTES:
1. GUARDRAIL, CURB & GUTTER AND IRRIGATION TO BE RECONSTRUCTED. TEMPORARY 15' WIDE ACCESS ROAD TO BE REMOVED AND LANDSCAPING RE-ESTABLISHED WHEN DETOUR IS DISCONTINUED
2. SEE FIGURE 5-1 MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES 1990
3. NUMBERS IN CIRCLES REFER TO CALTRANS STD. PLAN A20
4. ADJUST TEMPORARY ACCESS ROAD TO MISS EXISTING LIGHT STANDARD.

LANE CLOSURE NOTES:
1. ALL ADVANCE WARNING SIGNS FOR NIGHT CLOSURES SHALL BE ILLUMINATED. OTHER SIGNS SHALL BE EITHER ILLUMINATED OR REFLECTORIZED.
2. ALL ADVANCE WARNING SIGNS FOR CLOSURES SHALL BE 48" x 48" MINIMUM.
3. ALL ADVANCE WARNING SIGN INSTALLATIONS SHALL BE EQUIPPED WITH FLAGS FOR DAYTIME CLOSURES. FLASHING YELLOW BEACONS AS SPECIFIED IN SECTION 12-3.03 OF THE STANDARD SPECIFICATIONS, SHALL BE USED ON THE C18 (OR C22) SIGNS FOR NIGHT CLOSURES.
4. MEDIAN LANE CLOSURES SHALL CONFORM TO DETAILS FOR OUTSIDE LANE CLOSURES EXCEPT THAT A "LEFT" OVERLAY SHALL BE PLACED OVER "RIGHT" ON THE SIGNS USED ON THE C18 (OR C22) SIGNS FOR NIGHT CLOSURES.

LANE CLOSURE
NOT TO SCALE

DETOUR LAYOUT 4
SCALE: 1" = 100'

DE-4

| DIST | COUNTY | ROUTE | POST MILE |
|---|---|---|---|
| 11 | SD | | |

| SHEET NO. | TOTAL SHEETS |
|---|---|
| 8 | 38 |

REGISTERED CIVIL ENGINEER
APRIL 22, 1994
PLANS APPROVAL DATE
MOFFATT & NICHOL ENGINEERS
250 WEST WARDLOW ROAD
LONG BEACH, CA. 90807

| DESIGN OVERSIGHT | CALCULATED/ DESIGNED BY | CHECKED BY | DATE | REVISED BY | DATE REVISED |
|---|---|---|---|---|---|
| | | | | | |

CITY OF CARLSBAD

AUGUST 8 1994

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

CU EA

FORM CO-DE-82-PF (REV. 2/93)

2944-2
8 of 20

| DIST | COUNTY | ROUTE | | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 9 | 20 |

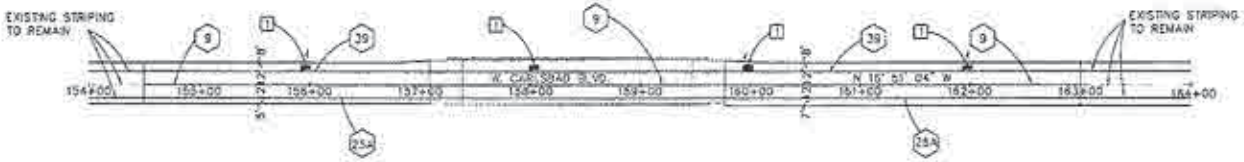
RESIDENT'S ENGINEER

APRIL 30, 1994
PLANS APPROVAL DATE

MOFFATT & NICHOL ENGINEERS
250 WEST WARDLOW ROAD
LONG BEACH, CA. 90807

REGISTERED PROFESSIONAL ENGINEER
LLOYD A. HARDING
No. 26234
EXP. 12/31/95
STATE OF CALIFORNIA

SCALE: 1"=30'




AS BUILT
R. H. Dettaba
DATE 7/6/95

LEGEND

(00) DENOTES STRIPING DETAIL PER STANDARD PLANS A20A, A20B, A20C, AND A20D.

[1] INSTALL "BIKE LANE" LEGEND AND ARROW PER A24A, AND A24D.

~ COMBINATION R26D/R81 SIGN ON TELSPAR POST.

NOTES:

1. ALL SIGNING AND STRIPING SHALL BE IN ACCORDANCE WITH THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD PLANS AND SPECIFICATIONS DATED JULY 1992 OR THE LATEST REVISION THEREOF.
2. SIGNS SHALL BE INSTALLED ON 1 3/4" DIAMETER SQUARE TELSPAR BREAKAWAY POST WITH ANCHOR AND SLEEVE.
3. STENCILS USED FOR THE BIKE LANE LEGEND AND ARROWS SHALL MATCH THE CITY OF CARLSBAD UTILITIES AND MAINTENANCE DEPARTMENT PAVEMENT LEGEND STENCILS. CONTRACTOR TO NOTIFY PROJECT INSPECTOR 72 HOURS IN ADVANCE OF STRIPING TO VERIFY THAT STENCILS MATCH.

TRAFFIC STRIPES, PAVEMENT MARKERS & PAVEMENT MARKERS

| SHEET NO. | STATION LIMITS | DIRECTION | LF\EA | DETAIL NO. | PAVEMENT MARKER (EA.) NON REFLECTIVE TYPE A | TYPE C | REFLECTIVE TYPE G | TYPE H | PAINT TRAFFIC STRIPE (2 COAT) (LF) WHITE | YELLOW | PAVEMENT MARKING (SQ. FT.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PD-1 | 154+50 TO 163+00 | S/B | | 25A | | | | 36 | 6" | 4" | |
| PD-1 | 154+50 TO 163+00 | S/B | | 39 | | | | | 850' | | |
| PD-1 | 154+50 TO 163+00 | S/B | | 9 | | | 18 | | | 850' | |
| PD-1 | BIKE LANE LEGEND | S/B | 4 | | | | | | | | 44 |
| PD-1 | BIKE LANE ARROW | S/B | 4 | | | | | | | | 100 |

PAVEMENT DELINEATION QUANTITIES

PAVEMENT DELINEATION PLAN

PD-1

9 of 20
5444-7

DESIGN OVERSIGHT | CALCULATED/DESIGNED BY | CHECKED BY | DATE | REVISED BY | DATE REVISED

AUGUST 8 1994

3373VCAL-STRI.DWG

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU | EA

| DIST | COUNTY | ROUTE | POST MILE |
|---|---|---|---|
| 11 | SD | | |

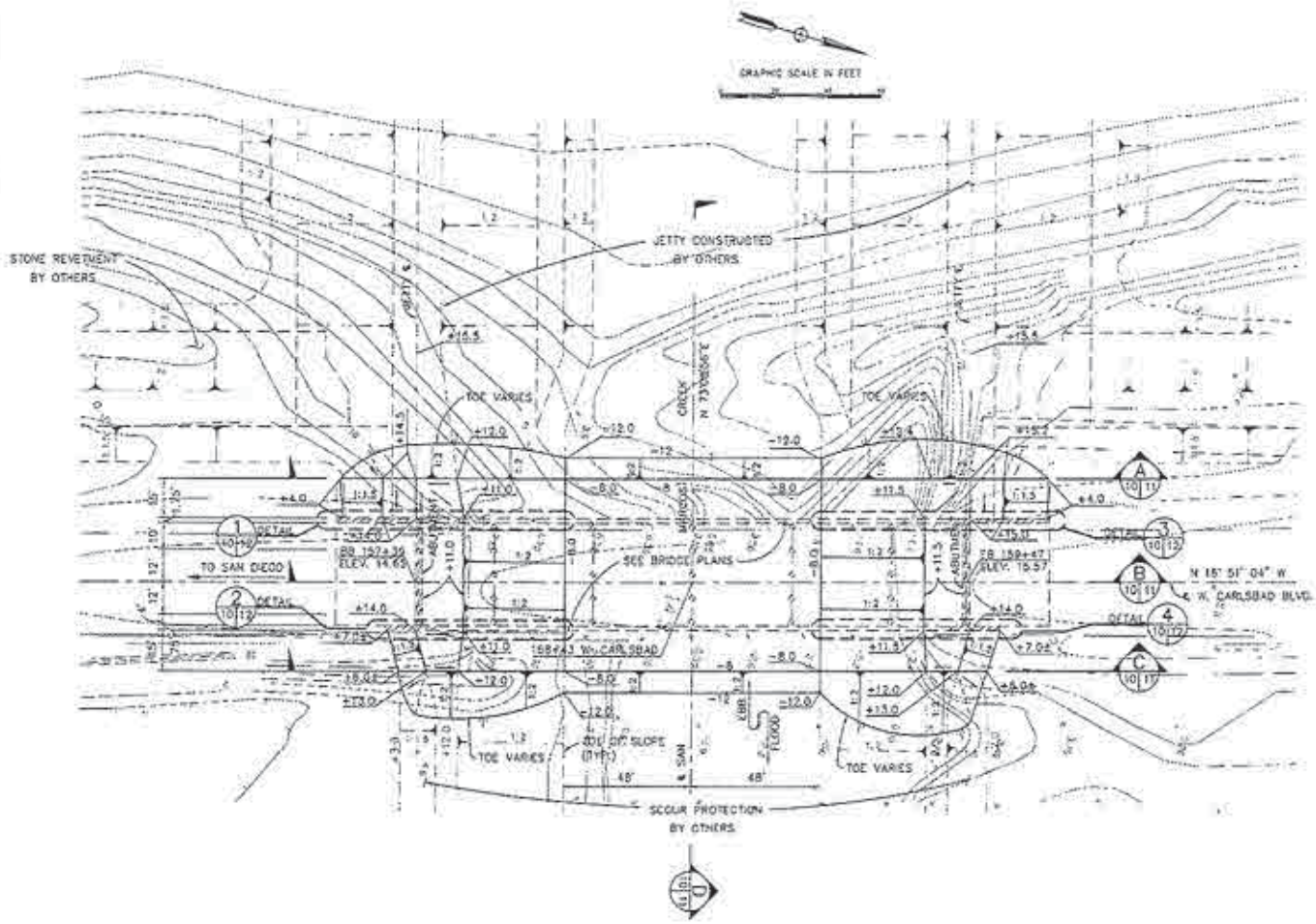
SHEET NO. 10 | TOTAL SHEETS 24

REGISTERED CIVIL ENGINEER

APRIL 22 1994
PLANS APPROVAL DATE

No. 30542 Exp. 6/30/97 CIVIL

MOFFATT & NICHOL ENGINEERS
250 WEST WARDLOW ROAD
LONG BEACH, CA. 90807




AS BUILT
R.L. Dutcher
DATE 7/6/95

NOTES:

1. ALL ELEVATIONS AND DEPTHS ARE IN FEET BASED ON NGVD DATUM.
2. TOPOGRAPHIC SURVEY DATA BY WILCHOIR, 1990.

PROPOSED STRUCTURES BY OTHERS

CONTOUR LINES

X 3.70 ELEVATION IN FEET-TYP.

# CHANNEL SCOUR AND SLOPE PROTECTION PLAN

CP-1

| DATE | REVISED BY | DATE REVISED |
|---|---|---|
| | | |

CALCULATED/DESIGNED BY
CHECKED BY
DRAWN BY
CHECKED BY

DIVISION OVERSIGHT

AUGUST 8 1994

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU | EA

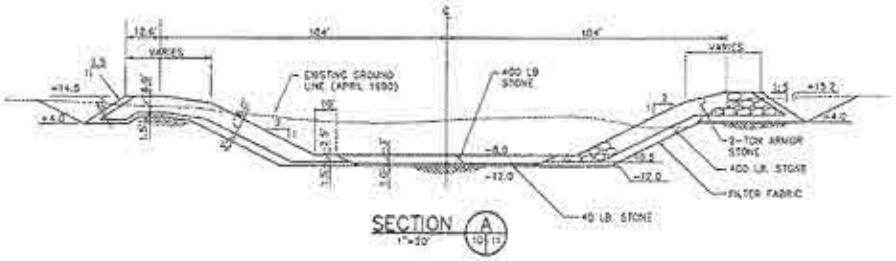
344-2
10 of 20

| DIST | COUNTY | ROUTE | POST MILE | SHEET NO | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 11 | 38 |

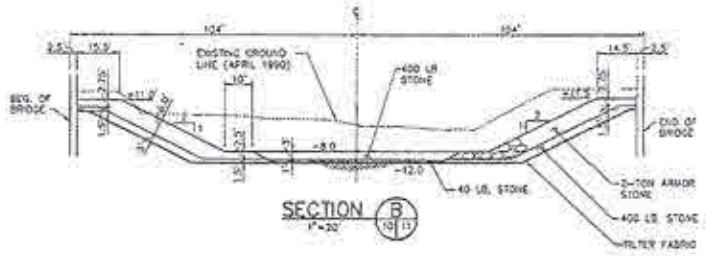
REGISTERED CIVIL ENGINEER

APRIL 22 1994
PLANS APPROVAL DATE

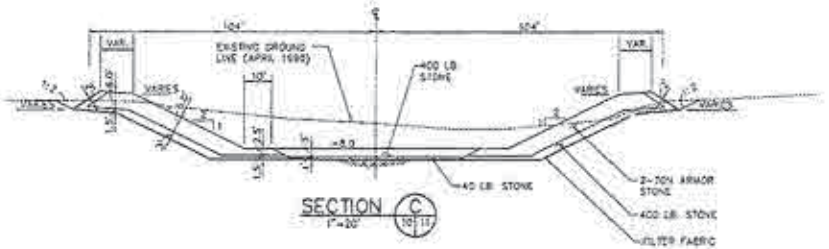
MOFFATT & NICHOL ENGINEERS
350 WEST WARDLOW ROAD
LONG BEACH, CA. 90807



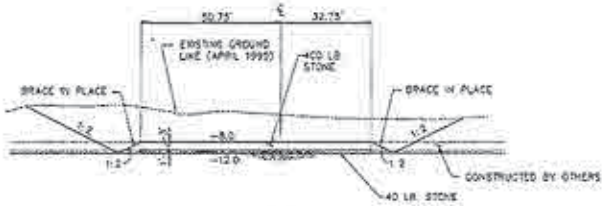

SECTION A
1"=20'




SECTION B
1"=20'




SECTION C
1"=20'




SECTION D
1"=20'

AS BUILT
R.H. Dutcher
DATE 7/6/95

CHANNEL SCOUR AND SLOPE PROTECTION SECTION

CP-2

AUGUST 8 1994

DESIGN OVERSIGHT

CALCULATED/ DESIGNED BY

CHECKED BY

DATE REVISED BY

DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU EA

344-2
11 of 38

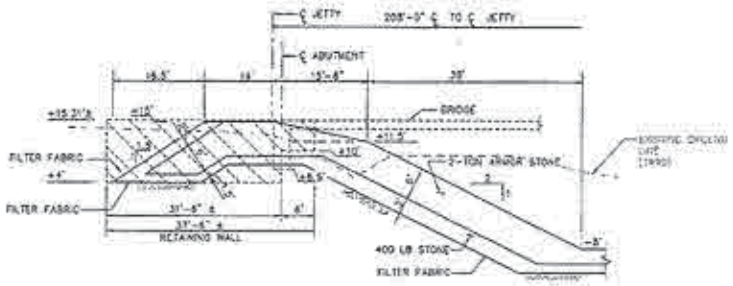
| DIST | COUNTY | ROUTE | POST TOTAL | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 12 | 20 |

RECOMMENDED FOR APPROVAL

APRIL 22 1998
PLANS APPROVAL DATE

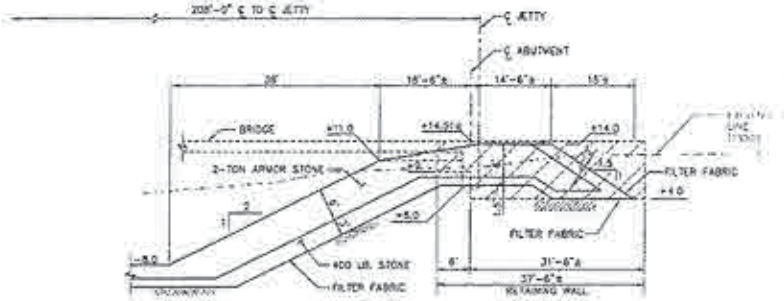
MOFFATT & NICHOL ENGINEERS
250 WEST HARBOR ROAD
LONG BEACH, CA. 90802

No. 38047 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA



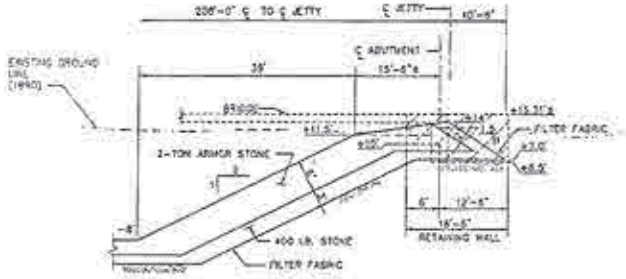

NORTH ABUTMENT – WEST SIDE

DETAIL 3 (10|12) 1"=10'




SOUTH ABUTMENT – WEST SIDE

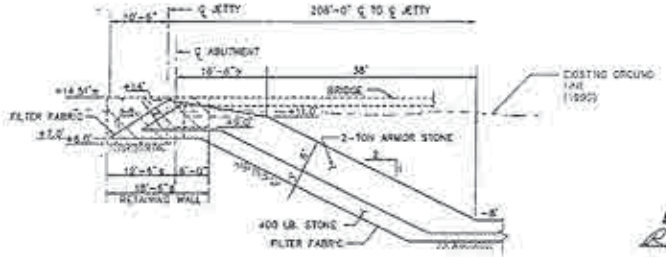
DETAIL 1 (10|12) 1"=10'




NORTH ABUTMENT – EAST SIDE

DETAIL 4 (10|12) 1"=10'

NOTES:
1. ALL ELEVATIONS AND DEPTHS ARE IN FEET AND ARE BASED ON NGVD DATUM.




SOUTH ABUTMENT – EAST SIDE

DETAIL 2 (10|12) 1"=10'

AS BUILT
R.H. Dettbo
DATE 7/16/98

CHANNEL SLOPE PROTECTION DETAILS

CP-3

| DESIGN OVERSIGHT | CALCULATED/ DESIGNED BY | DATE | REVISED BY | DATE REVISED |
|---|---|---|---|---|
| | CHECKED BY | | | |

CITY OF CARLSBAD

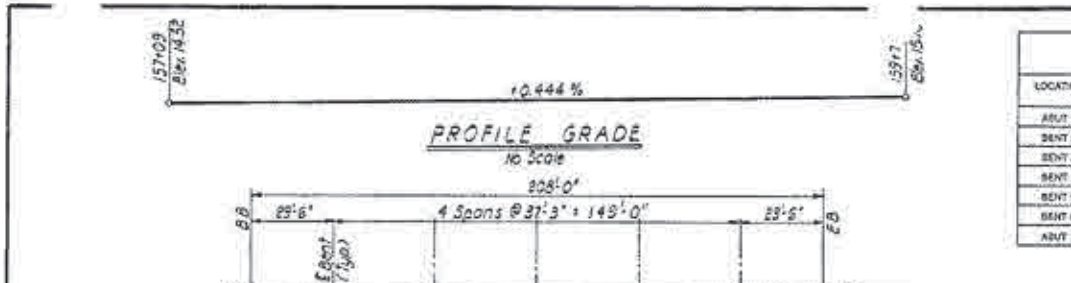
AUGUST 8 1994

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU | EA

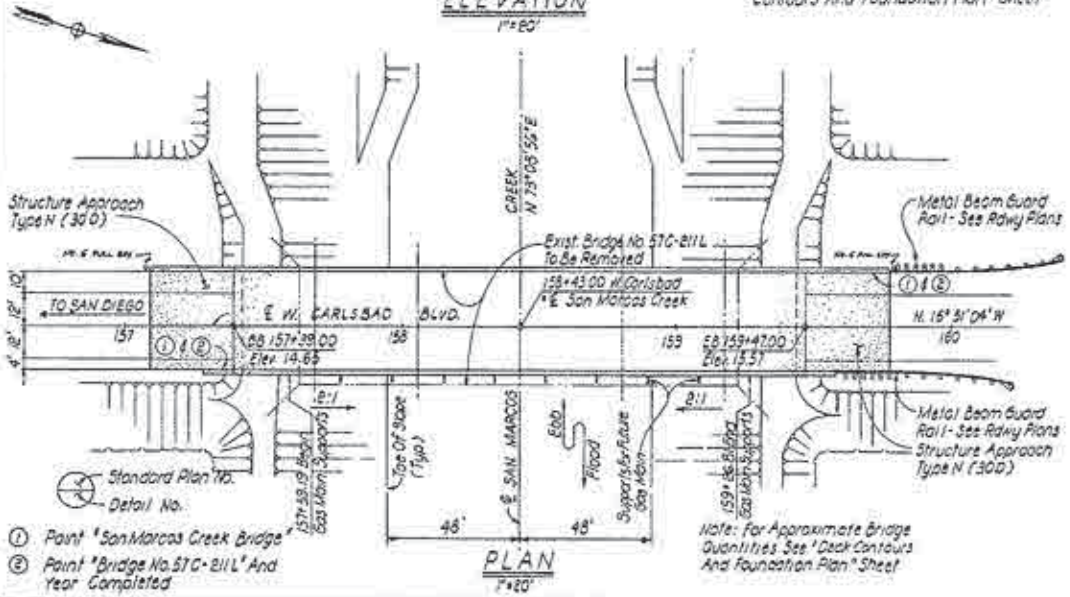
FORM 05-06-83-MF (REV. 3/96)

344-2 12 of 20




** For Hydrologic Summary See "Deck Contours And Foundation Plan" Sheet

ELEVATION
1"=20'




PLAN
1"=20'

Note: For Approximate Bridge Quantities See "Deck Contours And Foundation Plan" Sheet

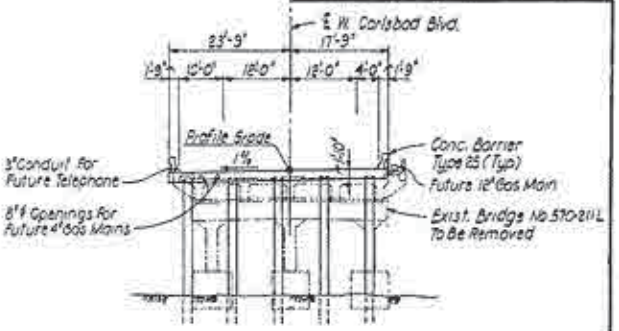
PILE DATA
19" OCTAGONAL PRESTRESSED CONCRETE PILES
CORROSION RESISTANT

| LOCATION | DESIGN LOADING (SERVICE LOAD) | SPECIFIED TIP ELEVATION | PROBABLE TIP ELEVATION |
|---|---|---|---|
| ABUT 1 | 100 TONS | -24 | -29 |
| BENT 2 | 100 TONS | -34 | -39 |
| BENT 3 | 100 TONS | -34 | -39 |
| BENT 4 | 100 TONS | -34 | -39 |
| BENT 5 | 100 TONS | -34 | -39 |
| BENT 6 | 100 TONS | -34 | -29 |
| ABUT 7 | 100 TONS | -24 | -29 |

| DIST | COUNTY | ROUTE | POST TOTAL | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 13 | 20 |

M. Ma
REGISTERED CIVIL ENGINEER
APRIL 22 1998
PLANS APPROVAL DATE
A.L. RIV 18880 6-30-97 CIVIL
MOFFATT & NICHOL ENGINEERS
LONG BEACH, CALIFORNIA
(310) 426-9551

CITY OF CARLSBAD
RECOMMENDED BY: _____ DATE: _____ R/C #: _____
APPROVED BY: _____ DATE: _____ R/C #: _____




TYPICAL SECTION
1"=10'

GENERAL NOTES
LOAD FACTOR DESIGN

DESIGN: CALTRANS BRIDGE DESIGN SPECIFICATIONS (1983 AASHTO WITH INTERIMS AND REVISIONS BY CALTRANS)
DEAD LOAD: INCLUDES 35 PSF FOR FUTURE WEARING SURFACE
LIVE LOAD: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD
SEISMIC LOADING (CALTRANS SPECTRA): PEAK ROCK ACCELERATION = 0.5g; DEPTH OF ALLUVIUM = 60 FT TO 150 FT
REINFORCED CONCRETE: $f'_c$ = 3,250 PSI; n = 9

INDEX TO BRIDGE PLANS

| | |
|---|---|
| BR1 | GENERAL PLAN |
| BR2 | DECK CONTOURS & FOUNDATION PLAN |
| BR3 | ABUTMENTS |
| BR4 | BENTS |
| BR5 | TYPICAL SECTION & DECK DETAILS |
| BR6 | STRUCTURE APPROACH TYPE N (30') |
| BR7 | STRUCTURE APPROACH DRAINAGE DETAILS |
| BR8 | LOG OF TEST BORINGS |

APPLICABLE CALTRANS STANDARD PLANS DATED JULY, 1990

| | |
|---|---|
| A62C | EXCAVATION AND BACKFILL BRIDGE - LIMITS OF PAYMENT |
| D80-2 | EDGE DRAIN OUTLET AND VENT DETAILS |
| B0-1 | BRIDGE DETAILS |
| B0-3 | BRIDGE DETAILS |
| B0-5 | BRIDGE DETAILS |
| B3-1 | RETAINING WALL TYPE 1, H = 4'-20' |
| B3-8 | RETAINING WALL DETAILS NO. 1 |
| B6-21 | JOINT SEALS |
| B11-53 | CONCRETE BARRIER TYPE 25 |
| ES-2D | SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS - ELECTRICAL DETAILS, STRUCTURE INSTALLATIONS |
| ES-7C | SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS - ELECTRICAL DETAILS, STRUCTURE INSTALLATIONS |
| ES-8 | SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS - PULL BOX DETAILS |

AS BUILT
R. L. Detweiler
DATE 7/6/98

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| DESIGN | M. RAHMAN | CHECKED | SREER | LOAD FACTOR DESIGN | | | |
| DETAILS | M. VAN RYN | CHECKED | RAHMAN | LAYOUT | M. JENKINS | CHECKED | KASHUBA |
| QUANTITIES | M. CHOU | CHECKED | AHN | ESTIMATING | M. WHIPPLE | CHECKED | WHIPPLE |

PREPARED FOR THE CITY OF CARLSBAD
WORK PROJECT NO.

K. Robert Mudd
PROJECT ENGINEER

BRIDGE NO. 57C-211L
POST MILE

SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BLVD

GENERAL PLAN

DESIGNATED SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

CU
EA

DESIGNED PRINTS BEARING EARLIER REVISION DATES —

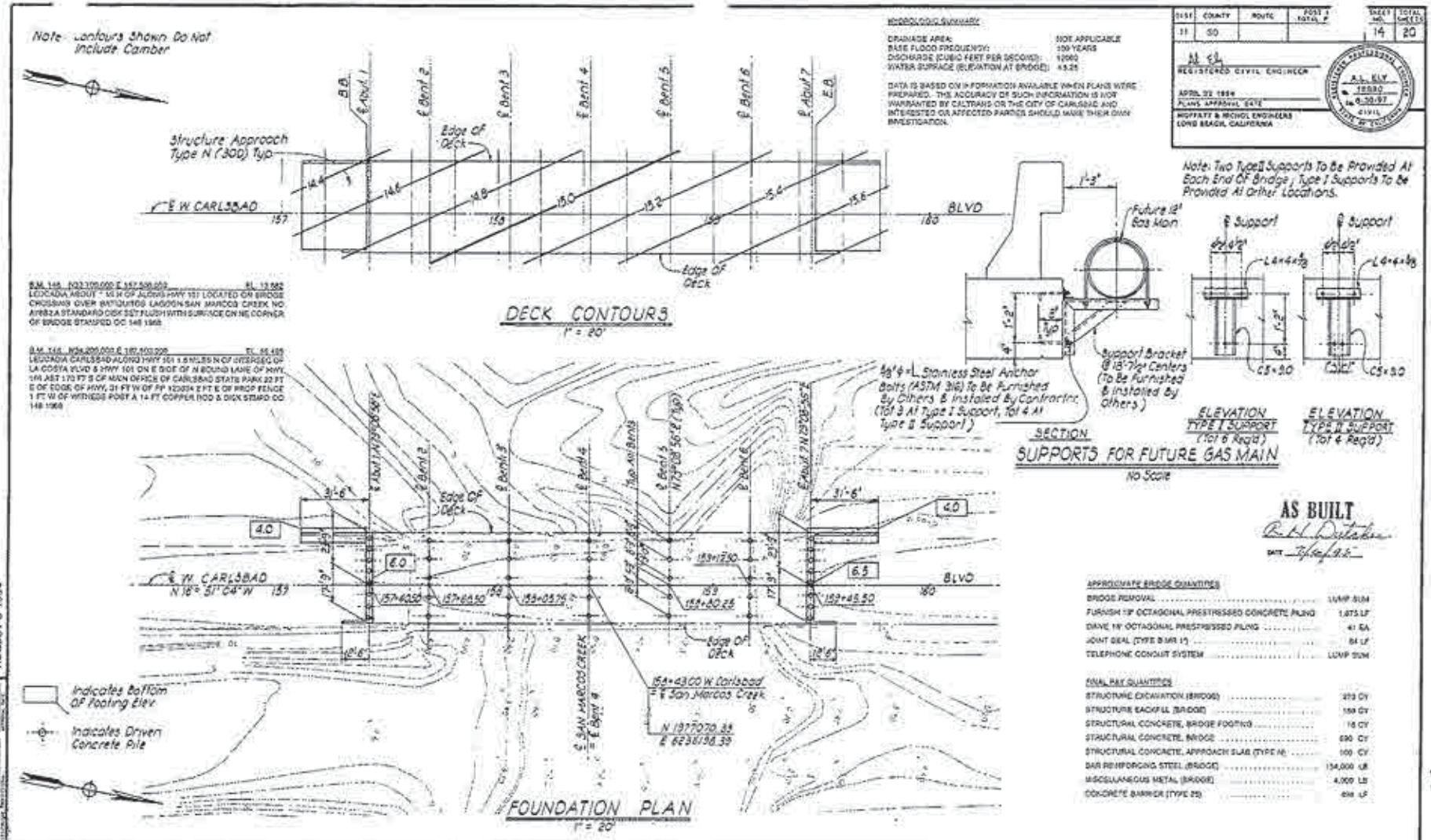
| REVISION DATES (PRELIMINARY ENGINEERING ONLY) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

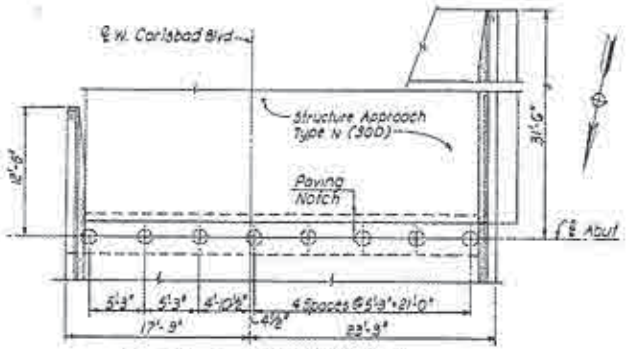
SHEET 5 OF 5 BR1

AUGUST 8 1994

3172

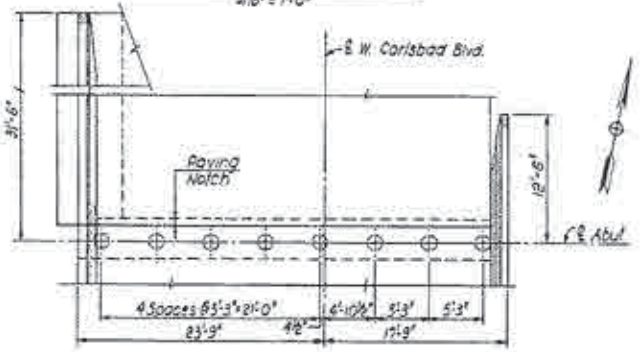
344-C-1
13 of 20


Note: Contours Shown Do Not Include Camber
Structure Approach Type N (300) Typ
℄ E W CARLSBAD
BLVD
℄ Bent 2
℄ Bent 3
℄ Bent 4
℄ Bent 5
℄ Bent 6
℄ Abut 1
℄ Abut 7
Edge of Deck
DECK CONTOURS
1" = 20'
HYDROLOGIC SUMMARY
DRAINAGE AREA: NOT APPLICABLE
BASE FLOOD FREQUENCY: 100 YEARS
DISCHARGE (CUBIC FEET PER SECOND): 12000
WATER SURFACE (ELEVATION AT BRIDGE): 45.25
DATA IS BASED ON INFORMATION AVAILABLE WHEN PLANS WERE PREPARED. THE ACCURACY OF SUCH INFORMATION IS NOT WARRANTED BY CALTRANS OR THE CITY OF CARLSBAD AND INTERESTED OR AFFECTED PARTIES SHOULD MAKE THEIR OWN INVESTIGATION.
DIST 11 | COUNTY SD | ROUTE | POST # TOTAL #
SHEET NO. 14 | TOTAL SHEETS 20
REGISTERED CIVIL ENGINEER
APRIL 22 1994
PLANS APPROVAL DATE
MOFFATT & NICHOL ENGINEERS
LONG BEACH, CALIFORNIA
A.L. ELY 18580 re 6-30-97 CIVIL
Note: Two Type II Supports To Be Provided At Each End Of Bridge, Type I Supports To Be Provided At Other Locations.
Future 12" Gas Main
℄ Support
Support Bracket @ 18'-7" ± Centers (To Be Furnished & Installed By Others)
SECTION
SUPPORTS FOR FUTURE GAS MAIN
No Scale
ELEVATION TYPE I SUPPORT (Tot 6 Reqd)
ELEVATION TYPE II SUPPORT (Tot 4 Reqd)
AS BUILT
Indicates Bottom Of Footing Elev
Indicates Driven Concrete Pile
℄ SAN MARCOS CREEK
158+43.00 W Carlsbad
℄ W San Marcos Creek
N 1917070.38
E 6236198.39
Edge of Deck
FOUNDATION PLAN
1" = 20'
APPROXIMATE BRIDGE QUANTITIES
BRIDGE REMOVAL ..... LUMP SUM
FURNISH 18" OCTAGONAL PRESTRESSED PILING ..... 1,875 LF
DRIVE 18" OCTAGONAL PRESTRESSED PILING ..... 41 EA
JOINT SEAL (TYPE B MR 1") ..... 84 LF
TELEPHONE CONDUIT SYSTEM ..... LUMP SUM
FINAL PAY QUANTITIES
STRUCTURE EXCAVATION (BRIDGE) ..... 270 CY
STRUCTURE BACKFILL (BRIDGE) ..... 159 CY
STRUCTURAL CONCRETE, BRIDGE FOOTING ..... 16 CY
STRUCTURAL CONCRETE, BRIDGE ..... 690 CY
STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N) ..... 100 CY
BAR REINFORCING STEEL (BRIDGE) ..... 134,000 LB
MISCELLANEOUS METAL (BRIDGE) ..... 4,000 LB
CONCRETE BARRIER (TYPE 25) ..... 600 LF
PREPARED FOR THE CITY OF CARLSBAD WORK PROJECT NO.
PROJECT ENGINEER
PROJECT NO. STC-2112
POST MILE
SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BLVD
DECK CONTOURS & FOUNDATION PLAN
DESIGN RAHMAN | DRAWN | CHECKED BREER
DETAILS MAI, VAN RYN | TRACED | CHECKED RAHMAN
QUANTITIES CHOU | CHECKED AHN
PHOTOGRAMMETRY AS OF: | SURVEYED | FIELD CHECKED
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
AUGUST 8 1994
344-2
14 of 20



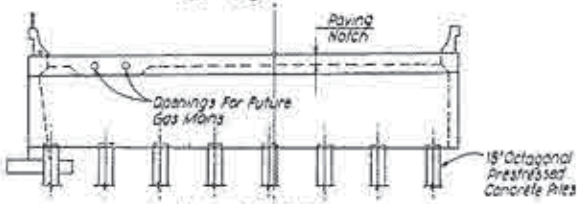

PLAN - ABUTMENT 1

3/16" = 1'-0"




PLAN - ABUTMENT 7

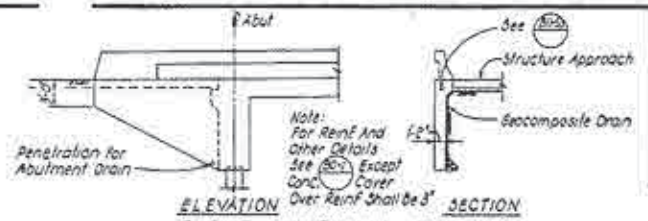
3/16" = 1'-0"




ELEVATION

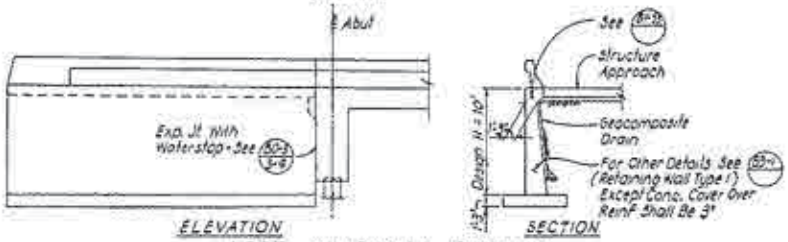
Abut 7 Shown, Abut 1 Similar

3/16" = 1'-0"



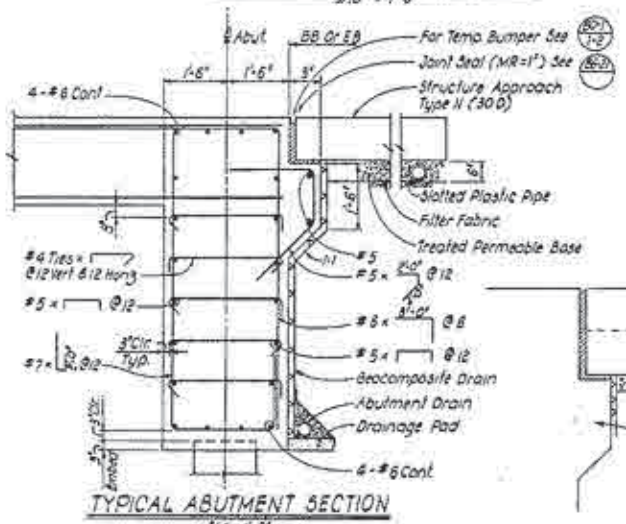

RIGHT WINGWALL DETAILS

3/16" = 1'-0"




LEFT WINGWALL DETAILS

3/16" = 1'-0"



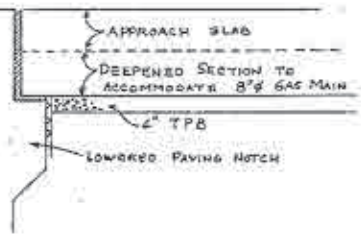

TYPICAL ABUTMENT SECTION

3/8" = 1'-0"

AS BUILT

R.H. Quitadamo

date 7/16/92




| DIST | COUNTY | ROUTE | POST M / TOTAL PR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 15 | 20 |

R.H. Quitadamo
REGISTERED CIVIL ENGINEER
APRIL 22 1994
PLANS APPROVAL DATE
MOFFATT & NICHOL ENGINEERS
LONG BEACH, CALIFORNIA

R.H. QUITADAMO No. 18580 Exp. 6-30-97 CIVIL STATE OF CALIFORNIA

| | | | |
|---|---|---|---|
| DESIGN | RAHMAN | DRAWN | BREER |
| DETAILS | MAI | CHECKED | RAHMAN |
| QUANTITIES | CHOU | CHECKED | AHN |

PREPARED FOR THE CITY OF CARLSBAD
WORK PROJECT NO.

DESIGNED UNDER THE SUPERVISION OF R.H. Quitadamo

| | |
|---|---|
| BRIDGE NO. | 57C-211L |
| POST MILE | |

SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BLVD

ABUTMENTS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

CU
EA

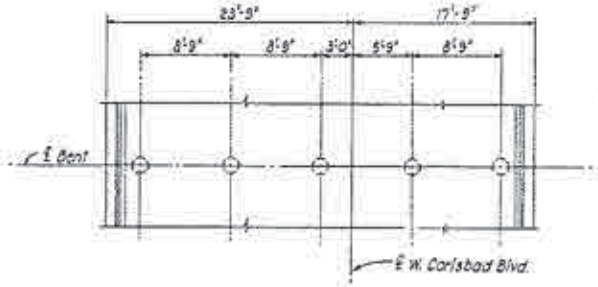
DESIGNED PREVIOUS BEARING
EARLIER REVISION DATES

| REVISION DATES (PRIOR TO THIS REVISION) | INITIAL DATE | DRAWING NO. |
|---|---|---|
| | | 80-3 |

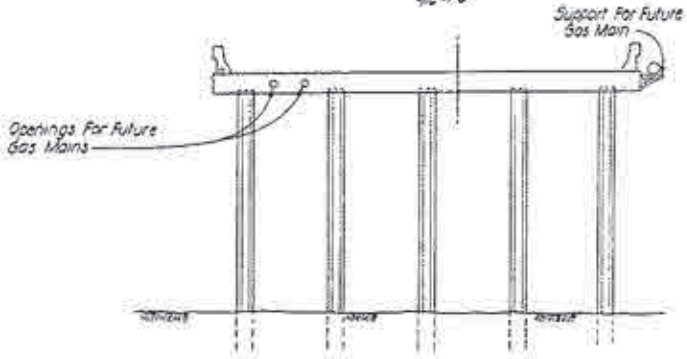
AUGUST 8 1994

3/12

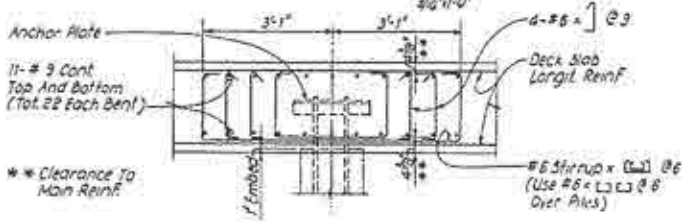
344-2
15 of 20



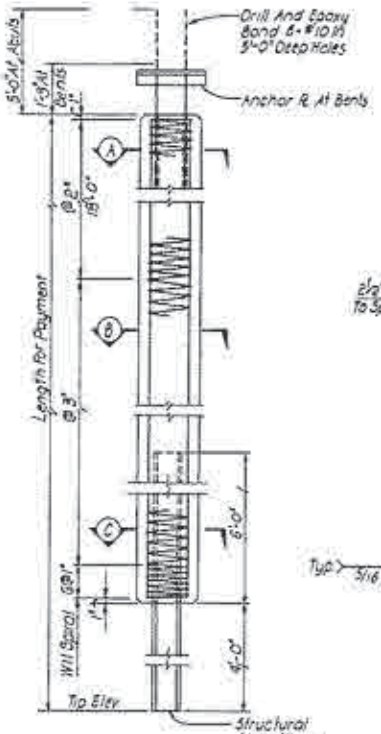

PLAN - TYPICAL BENT
3/16"=1'-0"




ELEVATION - TYPICAL BENT
3/16"=1'-0"

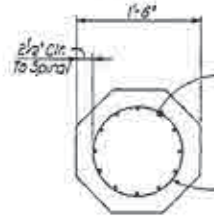



TYPICAL BENT CAP SECTION
3/4" = 1'-0"

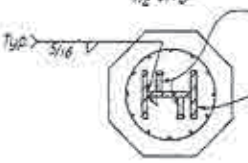



ELEVATION
3/16"=1'-0"

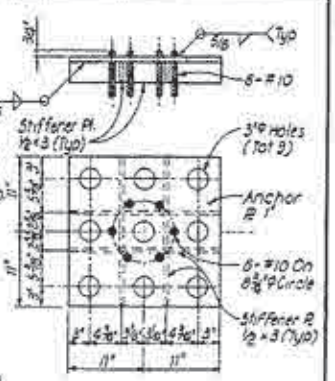
SECTION (A)
1/2"=1'-0"




SECTION (B)
1/2"=1'-0"




SECTION (C)
1/2"=1'-0"




ANCHOR PLATE DETAIL
1/2" = 1'-0"

NOTES

$P_e$ = PRESTRESS FORCE (AFTER LOSSES)
f'c @ 28 DAYS = 7,000 P.S.I.
f'ci @ TRANSFER = 4,000 P.S.I.
DESIGN LOADING = 100 TONS.
CONCRETE SHALL CONTAIN NOT LESS THAN 752 POUNDS OF CEMENT PER CUBIC YARD.
FOR LAPPED SPLICES, SPIRAL REINFORCEMENT SHALL BE LAPPED AT LEAST 50 DIAMETERS.
SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT ENDS SHALL BE TERMINATED BY A 135° HOOK AROUND LONGITUDINAL REINF.

PRESTRESSED PILE DETAILS

| DIST | COUNTY | ROUTE | POST TOTAL | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 16 | 20 |

A.L. ELY
REGISTERED CIVIL ENGINEER
APRIL 22 1994
PLANS APPROVAL DATE
No. 16880 Ex. 6-30-97 CIVIL
MORRATT & NICHOL ENGINEERS
LONG BEACH, CALIFORNIA

AS BUILT
R.H. Dettloff
Gen. Foreman

| | | | | | |
|---|---|---|---|---|---|
| DESIGN | RAHMAN | CHECKED | GREER | PREPARED FOR THE CITY OF CARLSBAD WORK PROJECT NO. | |
| DETAILS | VAN RYN, MAI | CHECKED | RAHMAN | | |
| QUANTITIES | CHOU | CHECKED | AHN | | |

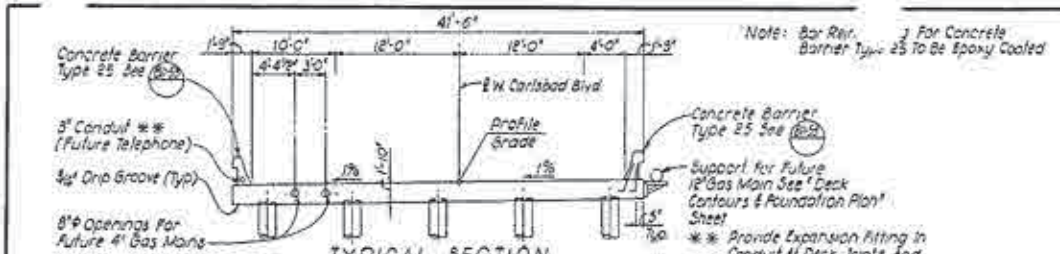
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3 4

| | | |
|---|---|---|
| CU | 57C-2111L | SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BLVD |
| EA | | BENTS |

DESIGNED FINANCE BEARING EXPIRATION REVISION DATES — DENTS ON PLATES (SPEC.) MINOR STAGE SPLICE — SHEET NO. OF SHEETS: DR4 8

3/72 AUGUST 8 1994

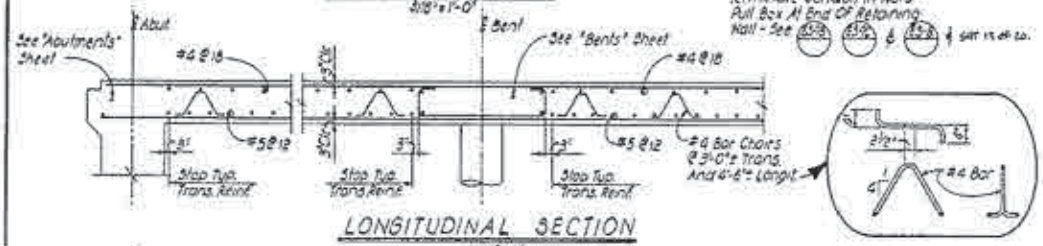
344-2
16 of 20




TYPICAL SECTION

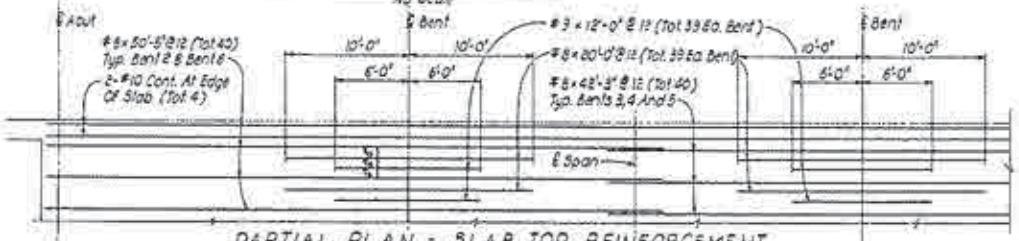
3/16"=1'-0"

Note: Bar Reinf. For Concrete Barrier Type 25 To Be Epoxy Coated



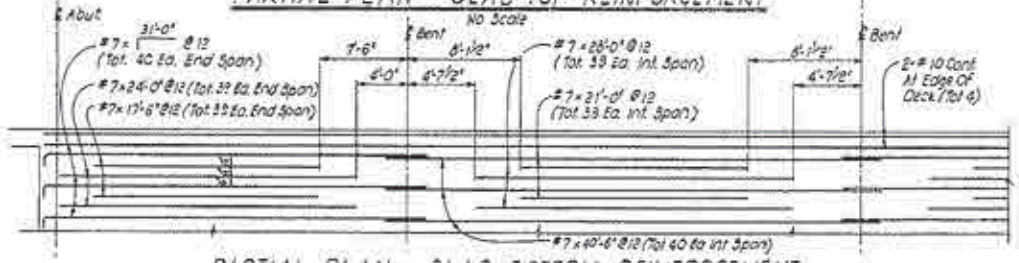

LONGITUDINAL SECTION

No Scale




PARTIAL PLAN - SLAB TOP REINFORCEMENT

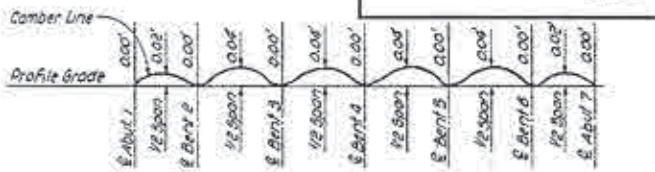
No Scale




PARTIAL PLAN - SLAB BOTTOM REINFORCEMENT

No Scale

Note: Camber Diagram Does Not Include Allowance For Falsework Settlement




CAMBER DIAGRAM

No Scale

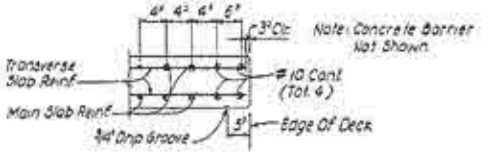
Structural Concrete, Bridge

Structural Concrete, Bridge Footing

Structural Concrete, Approach Slab

CONCRETE STRENGTH & TYPE LIMITS

No Scale




EDGE OF SLAB DETAIL

No Scale

| BAR SPLICE LENGTH | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bar Size | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 |
| All Bars, Except Top Bars | 23" | 28" | 34" | 39" | 45" | 58" | 76" | 85" |
| Top Bars | 23" | 28" | 34" | 53" | 60" | 77" | 97" | 100" |

REINFORCEMENT NOTES:

Splices In Top Main Bars To Be Located Near Center Of Span

Splices In Bottom Main Bars To Be Located Near Bent

Spacing Of All Transverse Bars Is Measured Along ℄ Roadway

Place All Transverse Bars Parallel To Bents

AS BUILT

R.H. Whittaker

DATE 7/15/92

| DIST | COUNTY | ROUTE | POST MILE | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 17 | 20 |

M. Ely
REGISTERED CIVIL ENGINEER

APRIL 22 1994
PLANS APPROVAL DATE

KOFFMAN & NICHOL ENGINEERS
LONG BEACH, CALIFORNIA

A.L. ELY
No. 18680
Exp. 6-30-95
CIVIL
STATE OF CALIFORNIA

| | | | |
|---|---|---|---|
| DESIGN | RAHMAN | CHECKED | GREER |
| DETAILS | VAN RYN | CHECKED | RAHMAN |
| QUANTITIES | CHOU | CHECKED | AHN |

PREPARED FOR THE CITY OF CARLSBAD
WORK PROJECT NO.

BRIDGE NO. 57C-211L
POST MILE

SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BLVD

TYPICAL SECTION & DECK DETAILS

DISCARD PRINTS BEARING EARLIER REVISION DATES

DRAWING NO. BR-5 6

AUGUST 8 1994

3/92

344-2
17 of 20

RELEASED 11-2-92

AUGUST 8 1994

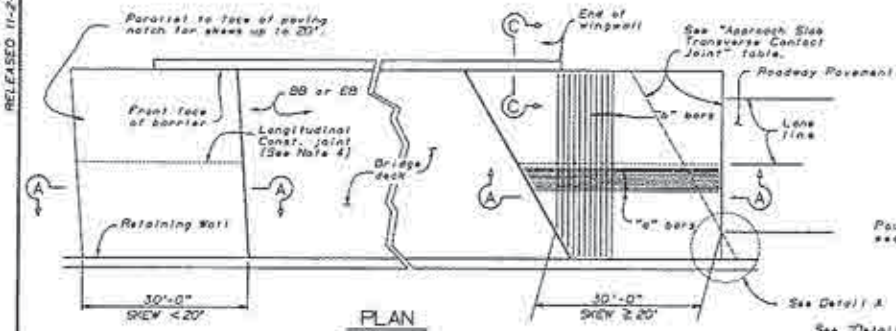
3/12

| APPROACH SLAB TRANSVERSE CONTACT JOINT | | |
|---|---|---|
| APPROACH SKEW | W/ AC ROADWAY PAVEMENT | W/ PCC ROADWAY PAVEMENT |
| < 20° | Parallel to face of paving notch | Parallel to face of paving notch |
| 20° - 45° | Parallel to face of P N use (Detail A) | Stagger lines 24" to 36" apart. |
| > 45° | Parallel to face of P N use (Detail A) | Stagger at each lane line. |

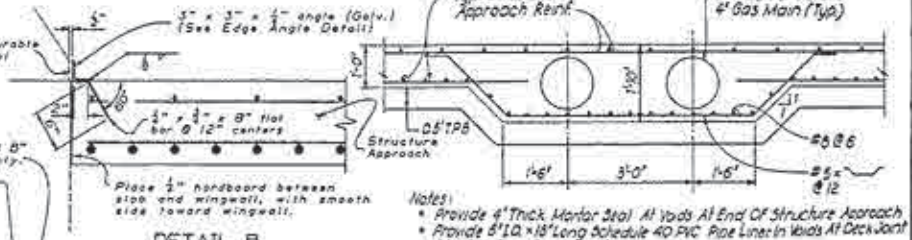
| DIST. | COUNTY | ROUTE | POST TOTAL # | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 18 | 20 |

REGISTERED ENGINEER - CIVIL

APRIL 23 1996
PLANS APPROVAL DATE

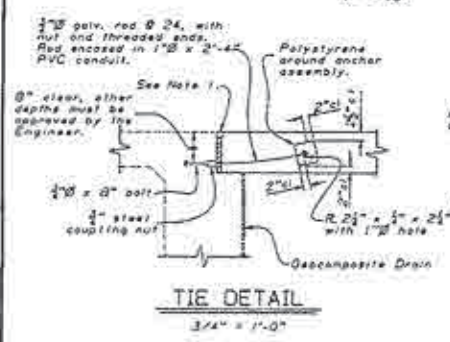



PLAN
1" = 10'

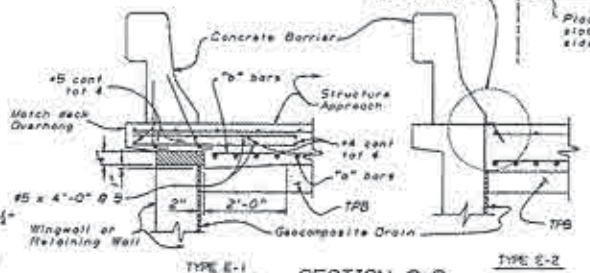



DETAIL B
1½" = 1'-0"

Notes:
- Provide 4" Thick Mortar Seal At Voids At End Of Structure Approach
- Provide 8" I.D. x 18" Long Schedule 40 PVC Pipe Liner In Voids At Deck Joint (Center Over Deck Joint)

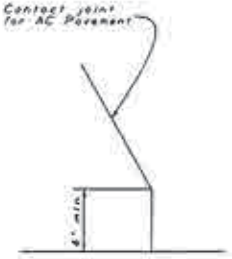



TIE DETAIL
3/4" = 1'-0"



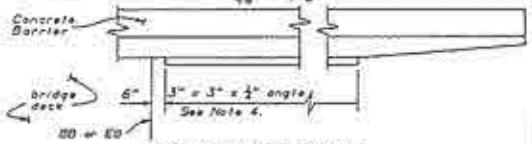

SECTION C-C
3/4" = 1'-0"

(TYPE E-1 TO BE USED UNLESS OTHERWISE SHOWN ON PLANS)

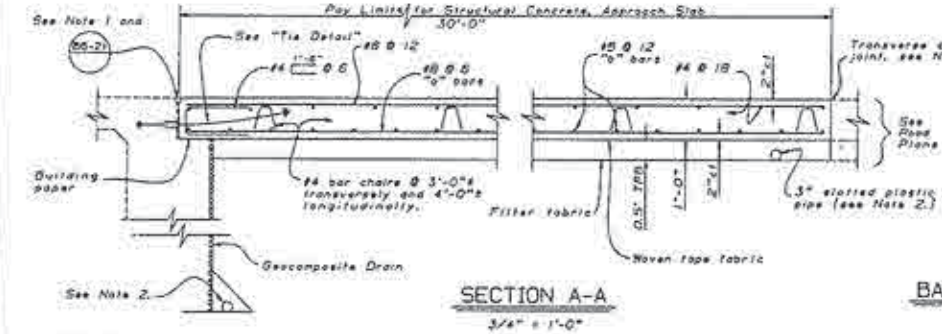



DETAIL A
No Scale

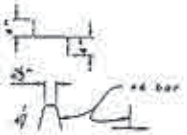
DETAIL AT OPENINGS FOR FUTURE GAS MAINS
¾" = 1'-0"




EDGE ANGLE DETAIL
1½" = 1'-0"




SECTION A-A
3/4" = 1'-0"




BAR CHAIR DETAIL
No Scale

NOTES

1. For details not shown or noted, see Structure Plans.
2. For drainage details, see "Structure Approach Drainage Details" sheet.
3. Longitudinal Construction Joints, when permitted by the Engineer, shall be located on lane lines.
4. End angle at beginning of barrier transition, and at wingwall or end of structure approach, as applicable.
5. For transverse contact joint with new PCC paving, refer to Standard Plan A39-A.
6. At the contractor's option, approach slab transverse reinforcement may be placed parallel to paving notch. Spacing of transverse reinforcement is measured along ℄ roadway.

▨ Polystyrene to be removed.

7. Bar Reinforcing for Structure Approach Slab to be epoxy coated.

AS BUILT
R.H. Dietrich
Date 11-6-96

| STANDARD DRAWING | | | | |
|---|---|---|---|---|
| FILE NO. XS 22-24 | DESIGN | M. Tsatsakis | CHECKED | E. Thorkildsen |
| DRAWING DATE REVISED | DETAILS | T. A. F. Cassinos | APPROVED | E. Thorkildsen |
| | SUBMITTED BY M. Wo | | | |

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN

CU
EA

SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BLVD

STRUCTURE APPROACH TYPE N(30D)

BRIDGE NO. 57C-0191
AFEET 0018

SHEET OF
BA-6 8

344-2
18 of 20

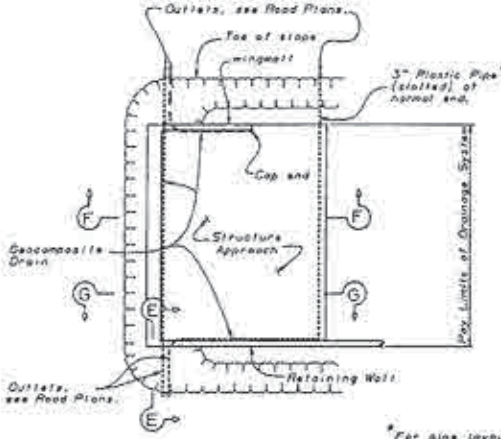
RELEASED 11-2-92

AUGUST 8 1994

3/72

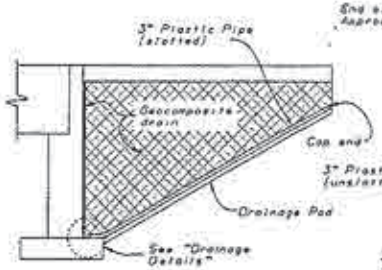
| DIST | COUNTY | ROUTE | POST TOTAL | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 11 | SD | | | 19 | 20 |

N. Fu
REGISTERED ENGINEER - CIVIL
A.L. FLY
No. 58880
Exp. 6-30-97
CIVIL
APRIL 22 1994
PLANS APPROVAL DATE



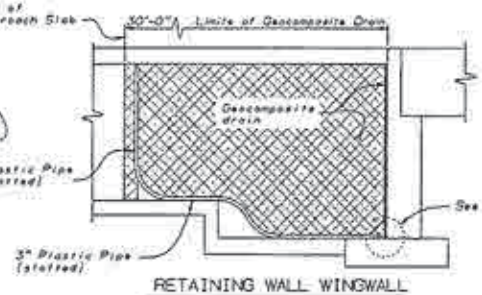

TYPICAL PLAN
1" = 10'

*For pipe layout at staggered end, see Detail B.



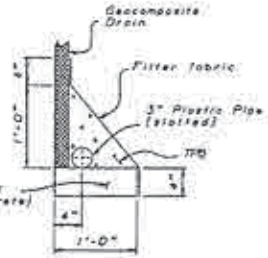

CANTILEVER WINGWALL

SECTION F-F
1/4" = 1'-0"

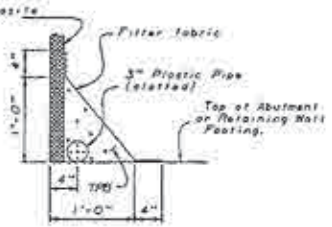



RETAINING WALL WINGWALL

SECTION G-G
1/4" = 1'-0"

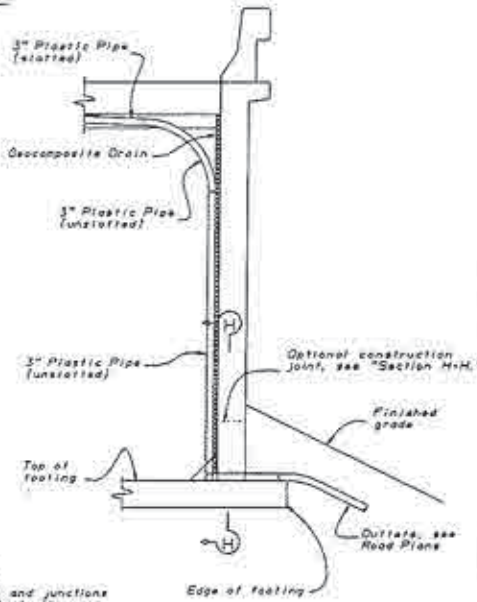



WITHOUT FOOTING




WITH FOOTING

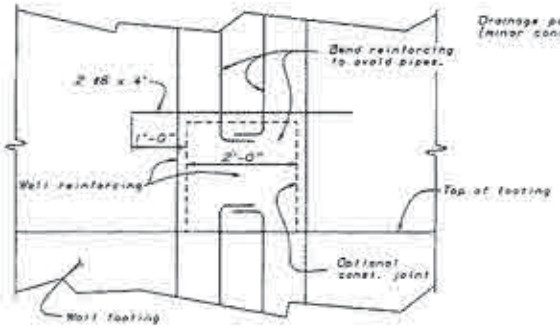
DRAINAGE DETAILS
1/2" = 1'-0"



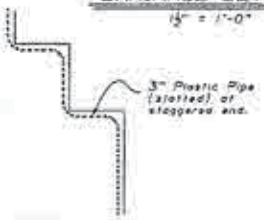

NOTE:
Bends and junctions in 3" plastic pipe are 30" radius min.

SECTION E-E
1/2" = 1'-0"

AS BUILT
R.H. Catchu
Date 7/6/95



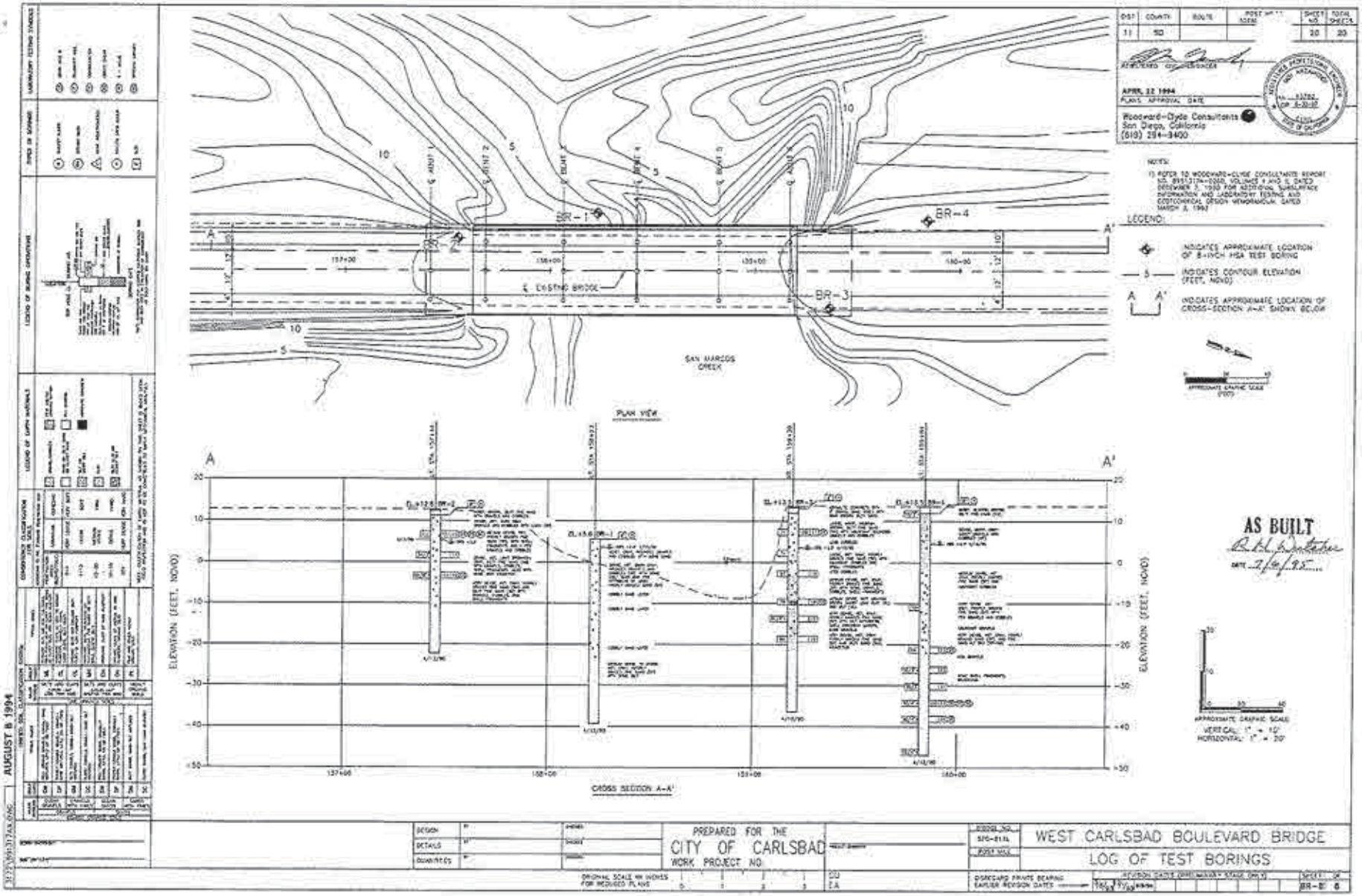

SECTION H-H
1" = 1'-0"




DETAIL B
No Scale

| STANDARD DRAWING | | | | | STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION | DIVISION OF STRUCTURES STRUCTURE DESIGN | BRIDGE NO. 57C-0115 POST MILE | SAN MARCOS CREEK BRIDGE AT WEST CARLSBAD BLVD |
|---|---|---|---|---|---|---|---|---|
| FILE NO. XS 22-13 | DESIGN J.F. Castaneda | CHECKED T. Thanikachalam | | | | | | STRUCTURE APPROACH DRAINAGE DETAILS |
| REVISED DATE 8/92 | DETAILS J.F. Castaneda | CHECKING T. Thanikachalam | | | | | | |
| | QUANTITIES M. Ho | | | | CU EA | | | BR-7 8 |

3-4-2
19 of 20


PLAN VIEW
CROSS SECTION A-A'
BR-1
BR-2
BR-3
BR-4
E. EXISTING BRIDGE
SAN MARCOS CREEK
ELEVATION (FEET, NGVD)
LEGEND:
INDICATES APPROXIMATE LOCATION OF 8-INCH HSA TEST BORING
INDICATES CONTOUR ELEVATION (FEET, NGVD)
INDICATES APPROXIMATE LOCATION OF CROSS-SECTION A-A' SHOWN BELOW
AS BUILT
APPROXIMATE GRAPHIC SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 20'
APRIL 22 1994
PLANS APPROVAL DATE
Woodward-Clyde Consultants
San Diego, California
(619) 294-3400
PREPARED FOR THE
CITY OF CARLSBAD
WORK PROJECT NO.
WEST CARLSBAD BOULEVARD BRIDGE
LOG OF TEST BORINGS
AUGUST 8 1994

344-2
20 of 20

**I-5 North Coast Widening Floodplain Studies**
Caltrans
DE Project 1683

# RECORD OF CONVERSATION

**DATE:** 09/21/07 **TIME:** 8:30 AM **DE FILE No.** 1683-300

**RECORDED BY:** Glen Parker

**SPOKE WITH:** Ray Martinez

**TELEPHONE No.** 703-317-6251

**NATURE OF CALL:** ☐ Incoming ☒ Outgoing ☐ Meeting

**DISTRIBUTION:** Ray Martinez (Michael Baker), Glen Parker (Dokken Engineering), Tim Brownson (Caltrans), Wen Cheng (Michael Baker), Mike Skowronek (Michael Baker)

**SUBJECT OF CONVERSATION: Acceptable FEMA floodplain modeling procedures**

ITEMS DISCUSSED:

**Available Backup Data to generate previously approved floodplain models:** Glen explained that a formal request has been submitted for backup floodplain information for lagoons and creeks along I-5 with Zone AE floodplains between San Diego and Oceanside. In some cases the HEC-2 data provided by Michael Baker Corporation was limited and did not have enough information to recreate previously generated floodplain models with reasonable accuracy. Glen said in these cases, Dokken Engineering would prefer to create HEC-RAS models which tie in with FEMA cross sections to use as a basis for existing conditions. Ray said Dokken Engineering must use their expertise to decide whether the existing FEMA data can be reused and to document efforts in a Technical Studies Data Notebook (TSDN). There have been past situations which required an existing model to be recreated and it is acceptable to FEMA as long as the appropriate documentation supports the procedure. Glen agreed to document the scenarios where existing models could not be used with accuracy.

**Coordination with FEMA and Caltrans:** Glen said that Caltrans is in the planning phase for the I-5 North Coast Widening, which will widen I-5 from San Diego to Oceanside. At this point in time, a preferred alternative has not been identified and therefore no coordination has occurred between Caltrans and FEMA to begin processing LOMRs. Glen said the final design of this project would likely occur in different phases several years in the future. It would be beneficial to coordinate with FEMA when needed during the process. Glen asked who the appropriate FEMA contacts may be to continue coordination when needed throughout the process. Ray said to coordinate with Wen Chen and Michael Skowronek, who work at the RMC for FEMA Region IX and can act as Outreach Coordinators on behalf of FEMA, when appropriate depending on the development of the project.

# SECTION 8

# Agua Hedionda Lagoon Location Hydraulic Study

# SECTION 8: AGUA HEDIONDA LOCATION HYDRAULIC STUDY

## 8.0 PROJECT PURPOSE AND VICINITY MAP

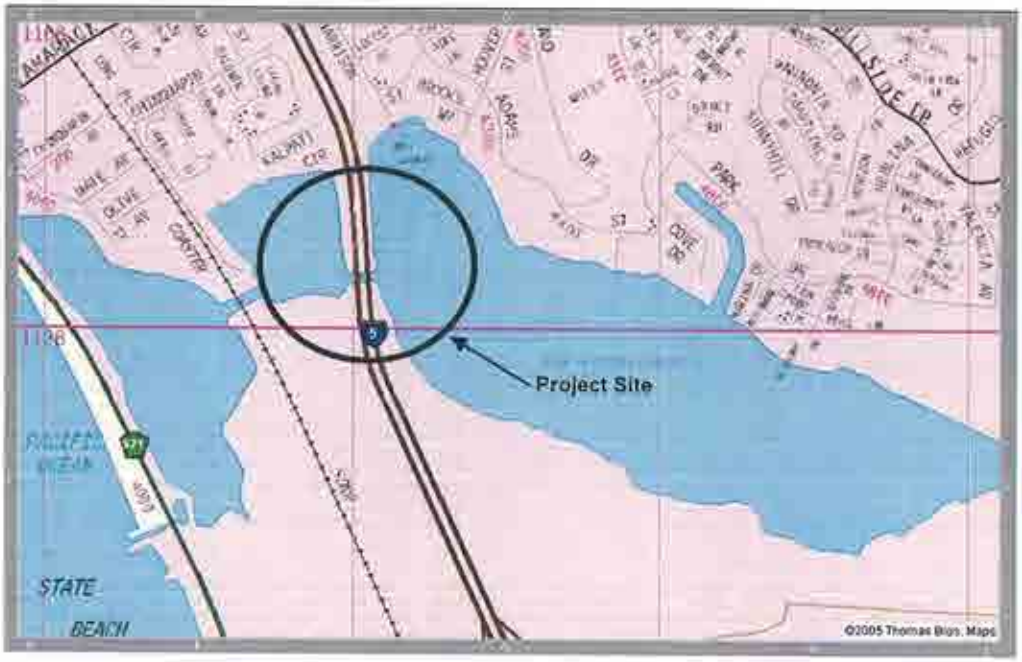



**Figure 1: Project Vicinity Map**

The Agua Hedionda Lagoon is located in a coastal wetland in the City of Carlsbad, approximately 35 miles north of the City of San Diego. (Thomas Bros. page 1106; F-7, G-7).

This study was prepared for the California Department of Transportation (Caltrans) to determine the impacts to the Agua Hedionda Lagoon base (100-year) flood from the proposed improvements to the Interstate-5 freeway.

This study specifically addresses the following:

1) The Agua Hedionda Lagoon 100-year floodplain as it presently exists,

2) The Agua Hedionda Lagoon 100-year floodplain after the I-5 Bridge has been replaced,

3) Performing a risk assessment associated with any possible floodplain encroachment.

The replacement of the existing I-5 Bridge (No. 57-0282) requires that the bridge be widened from 158 feet to 252.9 feet. The proposed bridge would be 170.6 ft long, which is shorter than existing conditions. Additionally, the number of piers would reduce from six to two.

## 8.1 DESCRIPTION OF LAGOON

The Agua Hedionda Lagoon (Hydraulic Unit 904.10-904.63), located within the Carlsbad Watershed, covers a watershed area of 210 square miles. Agua Hedionda Creek originates on the southwestern slopes of the San Marcos Mountains, in west central San Diego County and discharges into the Pacific Ocean via Agua Hedionda Lagoon (Figure 2).

**Figure 2: Regional Basin Area**

The Agua Hedionda Lagoon is unique among San Diego County lagoons, in that recreational and commercial uses are permitted; yet the lagoon is a healthy, tidal body, with large wetlands supporting several endangered species located in the Carlsbad Watershed. The majority of the lagoon is owned and maintained by Encina Power, owners of a 900-megawatt power plant located on the outer segment of the lagoon. The entire 400-acre lagoon, created in 1954, was completely re-dredged in 1998 to an average depth of 8 to 11 feet, significantly increasing tidal flushing. An extensive eelgrass planting program was initiated after the dredging, resulting in additional marine nursery areas.

Three aquaculture facilities enjoy the tidal health of the lagoon: a white seabass research facility jointly managed by Hubbs-Seaworld, the California Department of Fish and Game (CDFG) and a commercial mussel growing facility. In 2000, CDFG acquired 186 acres of wetland located at the eastern end of the lagoon for an Ecological Reserve. The Agua Hedionda Lagoon Foundation opened a 3,800 square foot Nature Center in 2001, with educational displays and foot access planned for the wetlands and lagoon.

The watershed is drained by the Agua Hedionda and Macario Creeks and is a component of the Carlsbad Hydrologic Unit. The creeks accumulate storm water runoff from continuing residential and commercial development but typically remain low flow during the summer. The lagoon and wetland form a major element of Carlsbad's Habitat Management Program and are connected by corridors to other elements of the program. The wetlands and surrounding slopes of coastal sage

scrub provide habitat for sensitive species including the California Gnatcatcher, Least Bell's Vireo, and Light-footed Clapper Rail.

## 8.2 FLOODPLAIN MODELING METHODOLOGY

The area of analysis ranges from approximately 3,450 feet upstream to 3,350 feet downstream of the I-5 crossing. In this region, 9,850 cfs passes from a 2,000 foot wide channel through the opening beneath the existing interstate bridge. During a 100-year storm event, a broad, slow moving river would form in the lagoon's easterly basin and funnel through the bridge. From there, it would expand into the middle lagoon before being constricted under the North County Transit District (NCTD) railroad crossing. The flow opens up into Agua Hedionda's outer lagoon before the final constriction under Carlsbad Boulevard. Once past Carlsbad Boulevard, Agua Hedionda Lagoon discharges into the Pacific Ocean.

## 8.3 HEC-RAS INPUT

The HEC-RAS River Analysis System v3.1.3 is a graphically based computer program which has been developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center. Input required by the software included channel cross sectional geometry, channel roughness coefficients, starting water surface elevations, and a 100-year storm event discharge. For this study, HEC-RAS was analyzed using the Standard Step Method under subcritical flow conditions.

### 8.3.1 Cross Sectional Geometry

Cross sections were cut perpendicular to the flow path at points that were most representative of the shape of the lagoon. Agua Hedionda Lagoon is a FEMA Zone A indicating that no base flood elevations have been determined. The contours used for the model were obtained from topographic soundings of the lagoon floor received from the Encina Power Plant, and from San Diego County topography maps. Topographic information compiled by the County of San Diego, in English units, used the National Geodetic Vertical Datum of 1929 (NGVD 29), and Encina Power Plant, in English units, used the Mean Lower Low Water datum (MLLW). Caltrans provided digital topography, in Metric units, compiled by AMCE Consulting Engineers (NAVD 88). Conversions from the Bench Mark Data Sheets on the National Oceanic and Atmospheric Administration's website were used to convert from MLLW to NAVD 88 (Appendix C). Individual topographic sheets were combined and scaled accordingly to create a complete topographic map of the lagoon. Measurements were converted to English units and final HEC-RAS input elevations were converted to the North American Vertical Datum of 1988 (NAVD 88).

#### 8.3.1.1 Bridge

Three bridges affect the WSE of the lagoon within the I-5 corridor study area. They include the Carlsbad Boulevard Bridge, the NCTD Railroad Trestle Bridge, and the I-5 Bridge.

The Bridges are modeled at the following cross sections:

- Cross section #75 – Carlsbad Boulevard Bridge
- Cross section #2400 – NCTD Railroad Trestle Bridge
- Cross section #3400 – I-5 Bridge

Expansion/ contraction coefficients (0.1 and 0.3) were utilized throughout the model to represent energy losses due to gradual transitions in the geometry of the lagoon channel. The coefficients were adjusted for more significant expansions and contractions as the lagoon narrows at each of the bridges. I-5 and the North County Transit District Railroad Bridge (0.5 and 0.5) had abrupt transitions while the Carlsbad Boulevard Bridge (0.3 and 0.5) was a more gradual constriction.

The existing bridges were modeled from as-builts, included in Appendix C. NCTD is planning to replace the existing railroad trestle bridge with a concrete structure that would span the main channel and reduce the obstructions from thirteen 1 foot bridge bents to two 5.5 foot concrete piers within the floodplain. At the time of this report no completion date was set and the floodplain was modeled with the trestle bridge in place. If and when NCTD completes the replacement of their railroad crossing, the floodplain would probably lower from the removal of the highly constrictive railroad trestle bridge. The Agua Hedionda Creek Bridge (Replace) Advanced Planning Study, dated Sept-2004, was used to model the proposed replacement I-5 Bridge. In addition, the smaller diameter piers (1 foot) were modeled as twice their diameters and the larger diameter piers (4 feet) were increased by 25%. This approach was used to account for debris which could catch on the bridge piers and provide additional blockage to the flow.

**Figure 3: Carlsbad Boulevard Bridge at the Pacific Ocean**

The furthest downstream bridge is the Carlsbad Boulevard Bridge (Figure 3) which spans the outfall of the lagoon to the Pacific Ocean. The existing bridge spans the entire channel with no piers (Figure 4). The HEC-RAS analysis determined that the flood waters would come in contact with the bottom soffit of the bridge during a 100-yr flood event.

**Figure 4: Carlsbad Boulevard Bridge spanning the Agua Hedionda Creek outlet.**

The NCTD Railroad Trestle Bridge (Figure 5) separates the middle lagoon from the outer lagoon and is the next major constriction point upstream of Carlsbad Boulevard. The wooden trestle bridge consists of thirteen 1 foot pile trestle bents that support the tracks well above the 100-yr WSE. The railroad bridge piers were modeled as 2 foot diameter piers to account for debris. The Yarnell (Class A) bridge method was used to model the trestle bridge, with a Yarnell K value of 2.50 for the pile trestle bents.

**Figure 5: NCTD Railroad Trestle Bridge.**

The existing I-5 Bridge deck (Figure 6) is entirely above the floodplain and only the piers of the bridge (Figure 7) cause any effect on the floodplain. The bridge analysis portion was modeled using the Energy Method. For the existing condition, six rows of piers continue through the entire width of the bridge. The existing rows consist of thirty-two

1.5 foot diameter piers in each row. The proposed replacement bridge would consist of two rows of 4 foot piers, with sixteen piers in each row. The existing bridge piers were modeled as 2 feet in diameter and the proposed bridge piers were modeled as 5 foot in diameter to account for debris.

**Figure 6: I-5 Bridge, looking east.**

**Figure 7: I-5 Bridge piers.**

#### 8.3.1.2 Ineffective Flow Areas

The cross section exhibits in Appendix A show the ineffective flow areas for the post project conditions. Ineffective flow areas were used to model the pooling that would occur in each of the lagoon's sections. The constriction and expansion zones upstream and downstream of the I-5 Bridge and NCTD Railroad Bridge are modeled as areas of ineffective flow.

#### 8.3.1.3 Flood Insurance Study Cross Sections

No detailed hydraulic analyses have been performed in this area, and no base floodplain elevation has been determined as shown in the Flood Insurance Rate Map (FIRM) in Appendix A.

#### 8.3.1.4 Existing Floodplain Conditions

Several hydraulic models were developed to determine the most accurate methods in which to depict the floodplain of the Agua Hedionda Lagoon. The floodplain in the vicinity of the I-5 Bridge is a Zone A. No backup data is available for the original development of the floodplain, and no base flood elevations have been established by FEMA for Zone A floodplains. An existing conditions model was created from gathered topography, bridge as-builts and field investigations. This existing conditions model was used for comparison with the proposed bridge improvements.

### 8.3.2 Manning's Roughness Coefficient

Each cross section contains a left overbank, main channel, and right overbank, which represent the different regions of the waterway in terms of roughness coefficients. The main channel is the base of the lagoon and the left and right overbanks are the sides. For the right overbank (north side) and the left overbank (south side), a roughness value of 0.035 was used to simulate a floodplain with short grass. The main channel was simulated as a major stream, top width at flood stage greater than 100 feet, with no boulders or brush (0.03).

**Figure 8: Floodplain with short grass.**

**Figure 9: Major stream with top width over 100 ft.**

### 8.3.3 Starting Water Elevation

The Agua Hedionda Lagoon was run under a subcritical flow regime. The downstream segment of the lagoon flowing into the Pacific Ocean is categorized as a FEMA Zone AE, which has a determined base flood elevation. The downstream starting water surface elevation was input as 11.18 ft (NAVD 88).

### 8.3.4 Discharge

For the purposes of the floodplain analysis, 9,850 cfs was identified as the peak 100-year storm discharge. Discharge information was obtained from the *Federal Emergency Management Agency Flood Insurance Study, San Diego County, California, Volume 1 of 7 (July 2002)*, at El Camino Real.

## 8.4 HEC-RAS OUTPUT

The water surface elevations which, are displayed in the appendices and output of this study, are based on flooding that would occur during a 100-year storm. Appendix B contains water surface elevations, channel velocity, top width, flow regime, and bottom elevations for each cross section. As shown in Table A, no significant changes to the existing 100-year floodplain would occur from the I-5 Bridge replacement.

**TABLE A: Floodplain Comparison**

| River Station | Q Total | Existing W.S. Elev. | Proposed W.S. Elev. | Change in Elevation | Existing Top Width | Proposed Top Width | Change in Width |
|---|---|---|---|---|---|---|---|
| | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) |
| 6860 | 9850 | 12.27 | 12.33 | 0.06 | 1811.56 | 1813.23 | 1.67 |
| 5638 | 9850 | 12.26 | 12.33 | 0.07 | 1578.85 | 1579.24 | 0.39 |
| 4633 | 9850 | 12.26 | 12.33 | 0.07 | 1564.59 | 1564.85 | 0.26 |
| 3981 | 9850 | 12.26 | 12.33 | 0.07 | 1863.25 | 1863.75 | 0.50 |
| 3576 | 9850 | 12.22 | 12.28 | 0.06 | 1048.38 | 1049.38 | 1.00 |
| 3552* | 9850 | 12.21 | N/A | N/A | 1024.99 | N/A | N/A |
| 3400 | 9850 | I-5 Bridge | | | | | |
| 3296 | 9850 | 12.12 | 12.12 | 0.00 | 1118.88 | 1118.88 | 0.00 |
| 2973 | 9850 | 12.13 | 12.13 | 0.00 | 1081.45 | 1081.45 | 0.00 |
| 2676 | 9850 | 12.13 | 12.13 | 0.00 | 1059.03 | 1059.03 | 0.00 |
| 2451 | 9850 | 11.87 | 11.87 | 0.00 | 151.95 | 151.95 | 0.00 |
| 2400 | 9850 | NCTD Railroad Trestle Bridge | | | | | |
| 2348 | 9850 | 11.51 | 11.51 | 0.00 | 151.09 | 151.09 | 0.00 |
| 1833 | 9850 | 11.68 | 11.68 | 0.00 | 2321.18 | 2321.18 | 0.00 |
| 1251 | 9850 | 11.68 | 11.68 | 0.00 | 825.89 | 825.89 | 0.00 |
| 618 | 9850 | 11.67 | 11.67 | 0.00 | 629.02 | 629.02 | 0.00 |
| 321 | 9850 | 11.66 | 11.66 | 0.00 | 516.98 | 516.98 | 0.00 |
| 106 | 9850 | 11.26 | 11.26 | 0.00 | 251.27 | 251.27 | 0.00 |
| 75 | 9850 | Carlsbad Boulevard Bridge | | | | | |
| 0 | 9850 | 11.18 | 11.18 | 0.00 | 249.21 | 249.21 | 0.00 |

* Cross section only in existing model

### 8.4.1 Warning Messages

***The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections,*** was displayed at cross sections #106, #321, #1251, #1833, #2348, #2400, #2451, #2676, #3296, #3400, #3576, and #3981. These warnings are appropriate as the size of the cross sections change drastically in these ranges. In addition, portions of the Agua Hedionda Lagoon were relatively uniform and allowed for cross sections to be placed several hundred feet apart.

## 8.5 RISK ASSESSMENT

Within the Agua Hedionda Lagoon, the widening to the I-5 Bridge would cause a negligible increase to flood water elevations upstream. The impacts to the floodplain would not be considered a significant or longitudinal encroachment. Since the 100-year flood would still be contained within the lagoon boundaries, there would be no increased risk to life or property associated with the proposed improvements. No additional roadways would flood upstream from the proposed I-5 Bridge widening. Therefore, no transportation routes will be interrupted or terminated beyond existing conditions.

Additionally, no floodplain values will be adversely impacted without mitigation. Natural and beneficial floodplain values, as defined in Chapter 17 "Definitions" in the Caltrans Standard Environmental Reference (SER), include fish, wildlife, plants, outdoor recreation, aquaculture, forestry, etc., that are found within a designated floodplain. Listed below are the beneficial uses of the Agua Hedionda Lagoon obtained from the Water Quality Control Plan for the San Diego Basin along with a short description and determination of impacts.

- Industrial service supply. This includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization. The Encina Power Plant directly downstream of I-5 utilizes Agua Hedionda Lagoon for industrial purposes. The I-5 Bridge replacement will not restrict lagoon flows and therefore will not affect the industrial services of the Encina Power Plant.

- Contact and non-contact water recreation. Includes the uses of water for recreational activities involving proximity to water and contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, diving, surfing, white water activities, fishing, use of natural hot springs, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities. The inner lagoon area of Agua Hedionda is designated for recreational use. Since the area around the I-5 crossing lies within a buffer zone between a powerboat area and a personal watercraft area, the proposed conditions would not alter the amount of water recreation that may occur within the inner lagoon.

- Commercial and Sport Fishing. Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses

involving intended for human consumption or bait purposes. Only fishing from the shoreline or from a passive vessel is limited to the passive use area. The passive use area is toward the east end of the inner lagoon implying that the bridge replacement will have no affect on fishing in the lagoon.

- Estuarine habitat. Includes uses of water that support estuarine ecosystems including, but not limited to, preservations or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). The construction areas associated with the bridge widening may impact a limited amount of estuarine habitat. Currently, a Natural Environment Study (NES) is being prepared to support the I-5 North Coast Widening Project. The NES will assess if any estuarine habitat may be impacted and what mitigation measures, if any, are needed.

- Wildlife habitat. This includes uses of water that supports terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, or wildlife water and food sources. The NES will assess if any wildlife habitat may be impacted and what mitigation measures, if any, are needed.

- Rare, threatened, or endangered species. Included uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under the state or federal law as rare, threatened or endangered. The NES will assess if any rare, threatened or endangered species may be impacted and what mitigation measures, if any, are needed.

- Marine habitat. Included uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds.) The NES will assess if any marine habitat may be impacted and what mitigation measures, if any, are needed.

- Aquaculture. Includes the uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes. The NES will assess if any aquaculture may be impacted and what mitigation measures, if any, are needed.

- Migration of aquatic organisms. Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish. The NES will assess if any migration of aquatic organisms may be impacted and what mitigation measures, if any, are needed.

- Spawning, reproduction, and/or early development. Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish. The NES will assess if any spawning, reproduction, or early development may be impacted and what mitigation measures, if any, are needed.

- Shellfish harvesting. Includes uses of water that support habitats suitable for collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption,

commercial, or sport purposes. The NES will assess if any shellfish harvesting may be impacted and what mitigation measures, if any, are needed.

The proposed bridge replacement has been designed to minimize disturbance to the floodplain. The bridge design has been through several iterations to select an alternative which is compatible with floodplain development and least harmful to the environment, while maintaining feasibility for improving I-5. Efforts should be made to limit the footprint of the construction site and reduce construction time in order to minimize impacts to natural and beneficial floodplain values, hazards to human life, and property loss.

## 8.6 SUMMARY AND CONCLUSION

Three sources of topography were combined to generate hydrographic data of the lagoon's bottom, detailed topographic survey near the I-5 Bridge and additional surface information for the overbanks surrounding the lagoon. The berms for the three crossings (outer, middle and inner lagoons) limit the reach of tidal action, controlled by the Encina Power Plant which draws water from the lagoon and discharges the cooling water into a second discharge channel that empties directly into the Pacific Ocean. The water surface profile of the Agua Hedionda Lagoon within the studied reach drops 13.8 inches over 6,800 feet. The overall schematic of the lagoon during the 100-year storm can be described as a slow moving water body with relatively no change in waters surface elevations.

Throughout a 100-year storm event, a water body flowing in subcritical flow has been anticipated within the Agua Hedionda Lagoon. From the water surface profiles generated by the HEC-RAS model, it was determined that only a slight change in water surface elevation upstream of the I-5 Bridge occurred during the 100-year storm event. The replacement bridge generates a minimal hydraulic impact to the existing floodplain upstream of the I-5 Bridge. Due to the flatness of the Agua Hedionda Lagoon geometry, a small increase in water surface elevation would require a significant distance upstream to taper back into the existing floodplain. Since the change is slight and the proposed floodplain remains inside the FEMA floodplain, impacts to the existing floodplain are considered negligible.

# APPENDIX 'A'

## Cross Section Locations Exhibits

### County Topography Exhibit

### Encina Power Plant Topography Exhibit

Outer Lagoon
Middle Lagoon
Inner Lagoon

## Flood Insurance Rate Map (FIRM)

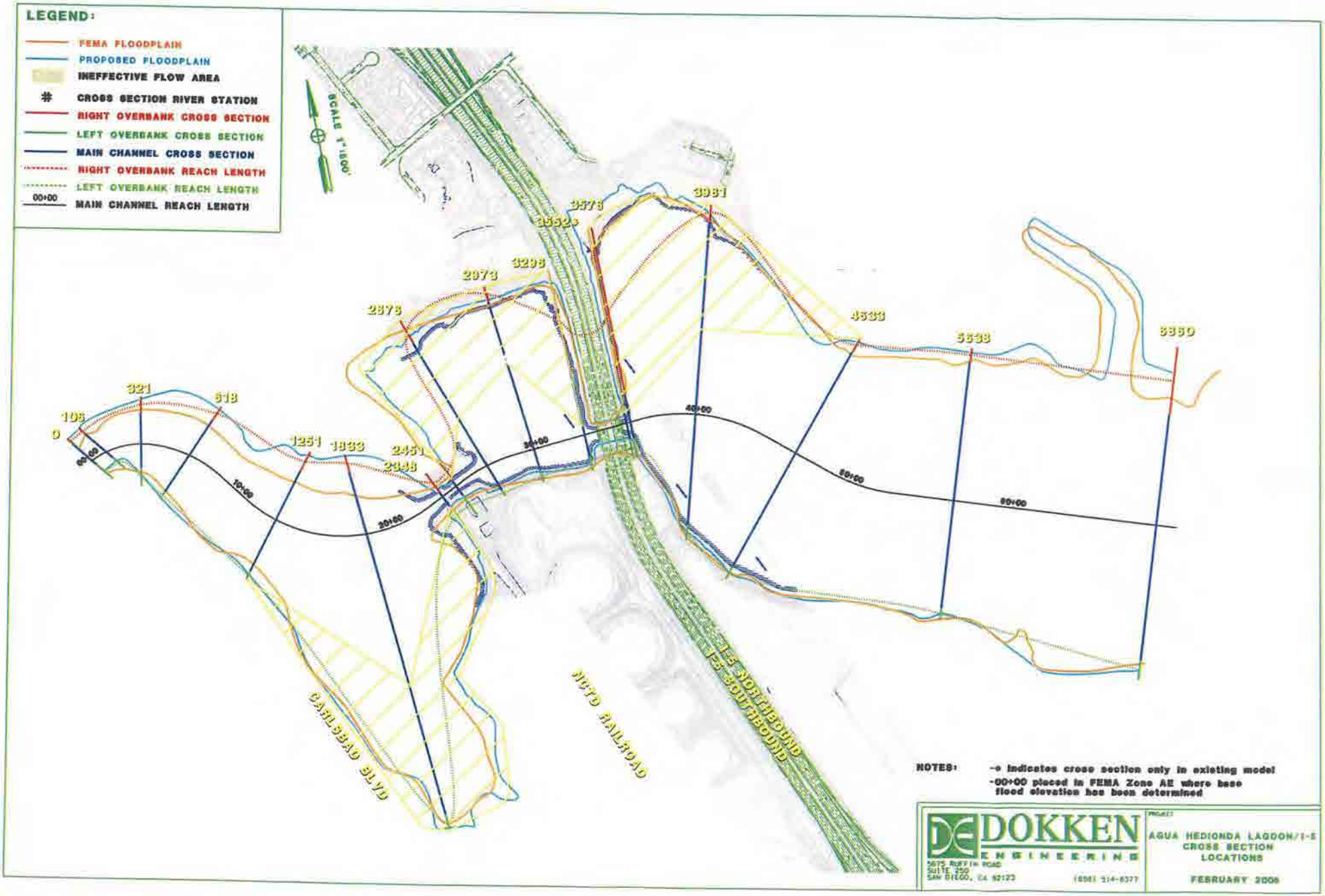
## Summary of Discharges

NOTES:
- indicates cross section only in existing model
-00+00 placed in FEMA Zone AE where base flood elevation has been determined

DOKKEN ENGINEERING
5675 RUFFIN ROAD
SUITE 250
SAN DIEGO, CA 92123
(858) 514-8377

PROJECT
AGUA HEDIONDA LAGOON/I-5
CROSS SECTION
LOCATIONS

FEBRUARY 2008




NOTES:
- o indicates cross section only in existing model
- 00+00 placed in FEMA Zone AE where base flood elevation has been determined

DOKKEN ENGINEERING
5675 RUFFIN ROAD
SUITE 250
SAN DIEGO, CA 92123
(858) 514-8377

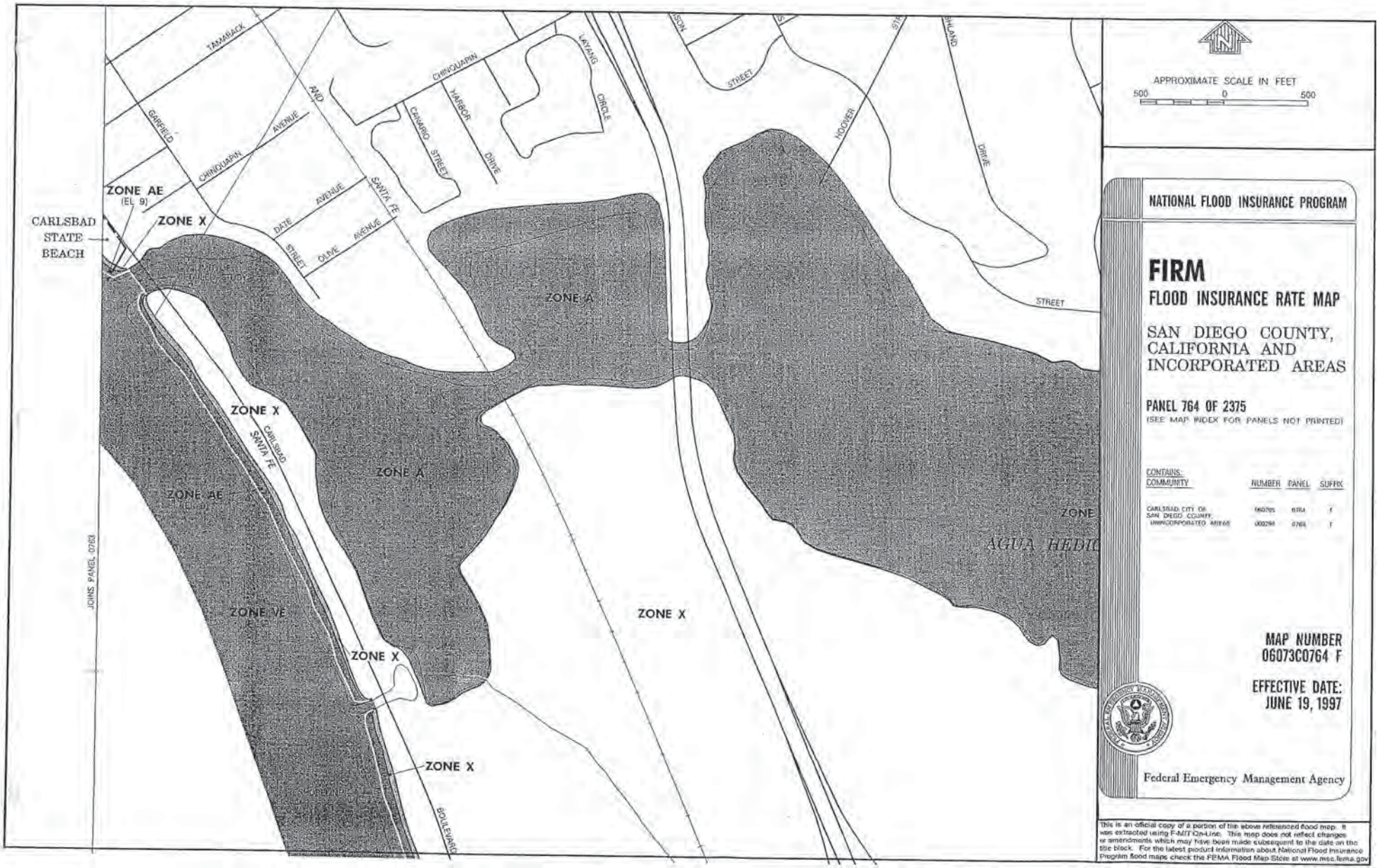
PROJECT
AGUA HEDIONDA LAGOON/I-5
CROSS SECTION
LOCATIONS

FEBRUARY 2008

# County Topography Exhibit

# Encina Power Plant
# Topography Exhibit

## Inner Lagoon




APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

**PANEL 764 OF 2375**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

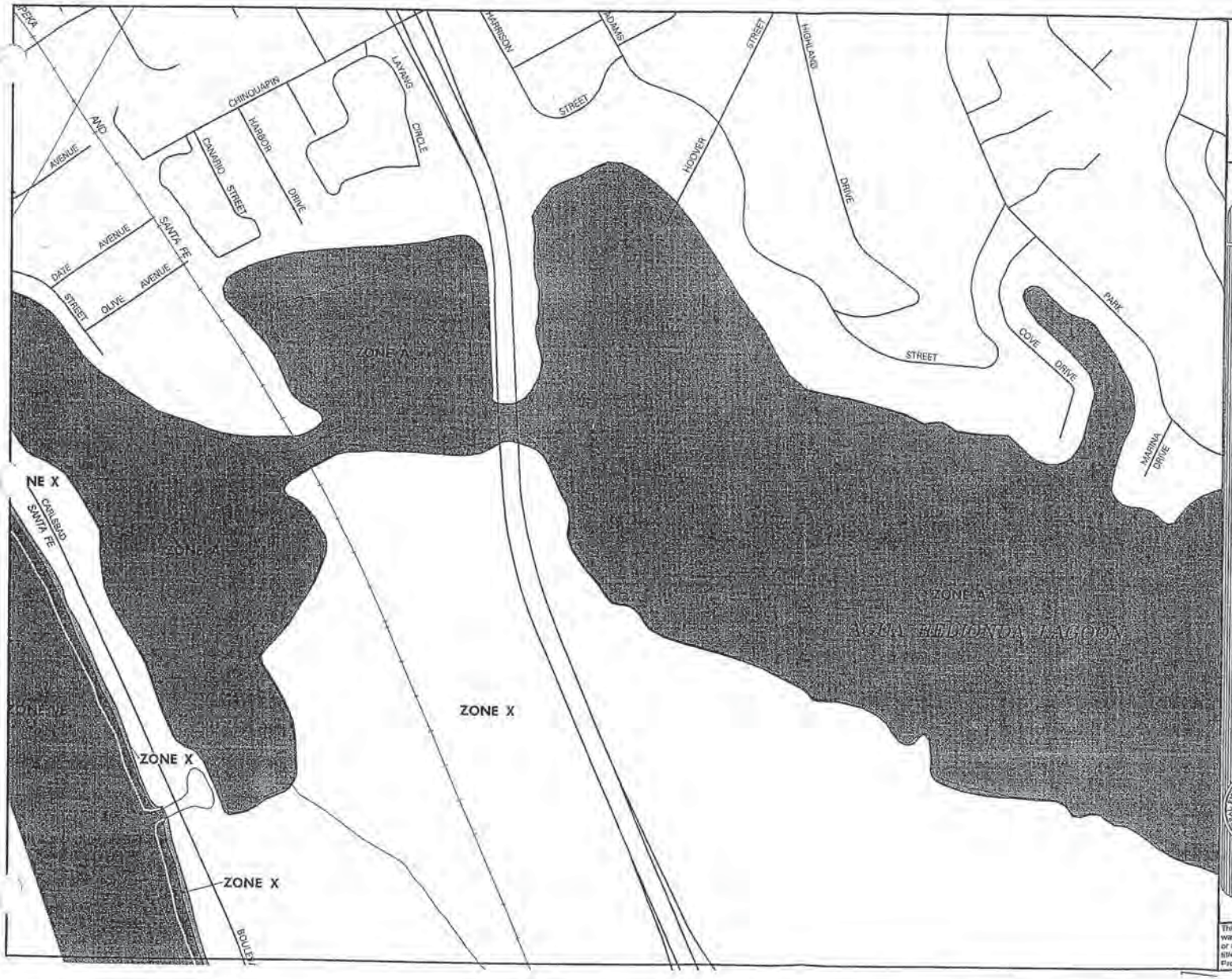
| CONTAINS: COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| CARLSBAD, CITY OF | 060705 | 0764 | F |
| SAN DIEGO COUNTY, UNINCORPORATED AREAS | 060284 | 0764 | F |

**MAP NUMBER**
**06073C0764 F**

**EFFECTIVE DATE:**
**JUNE 19, 1997**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov




APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

**PANEL 764 OF 2375**
(SEE MAP INDEX FOR PANELS NOT PRINTED)

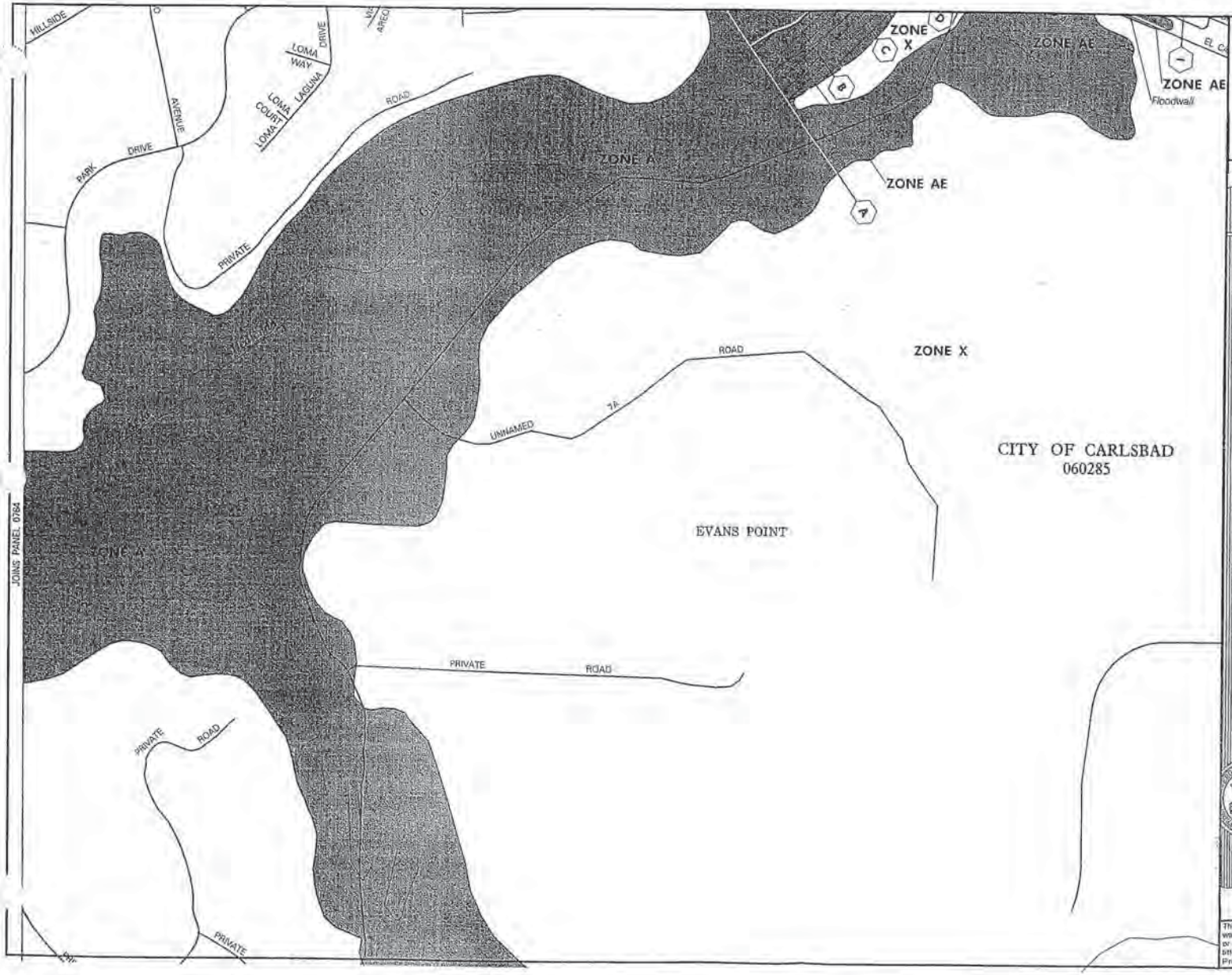
| CONTAINS: COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| CARLSBAD, CITY OF | 060285 | 0764 | F |
| SAN DIEGO COUNTY, UNINCORPORATED AREAS | 060284 | 0764 | F |

**MAP NUMBER**
**06073C0764 F**

**EFFECTIVE DATE:**
**JUNE 19, 1997**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov




APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

**PANEL 768 OF 2375**
(SEE MAP INDEX FOR PANELS NOT PRINTED)

| CONTAINS: COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| CARLSBAD, CITY OF | 060285 | 0768 | F |

**MAP NUMBER**
**06073C0768 F**

**EFFECTIVE DATE:**
**JUNE 19, 1997**

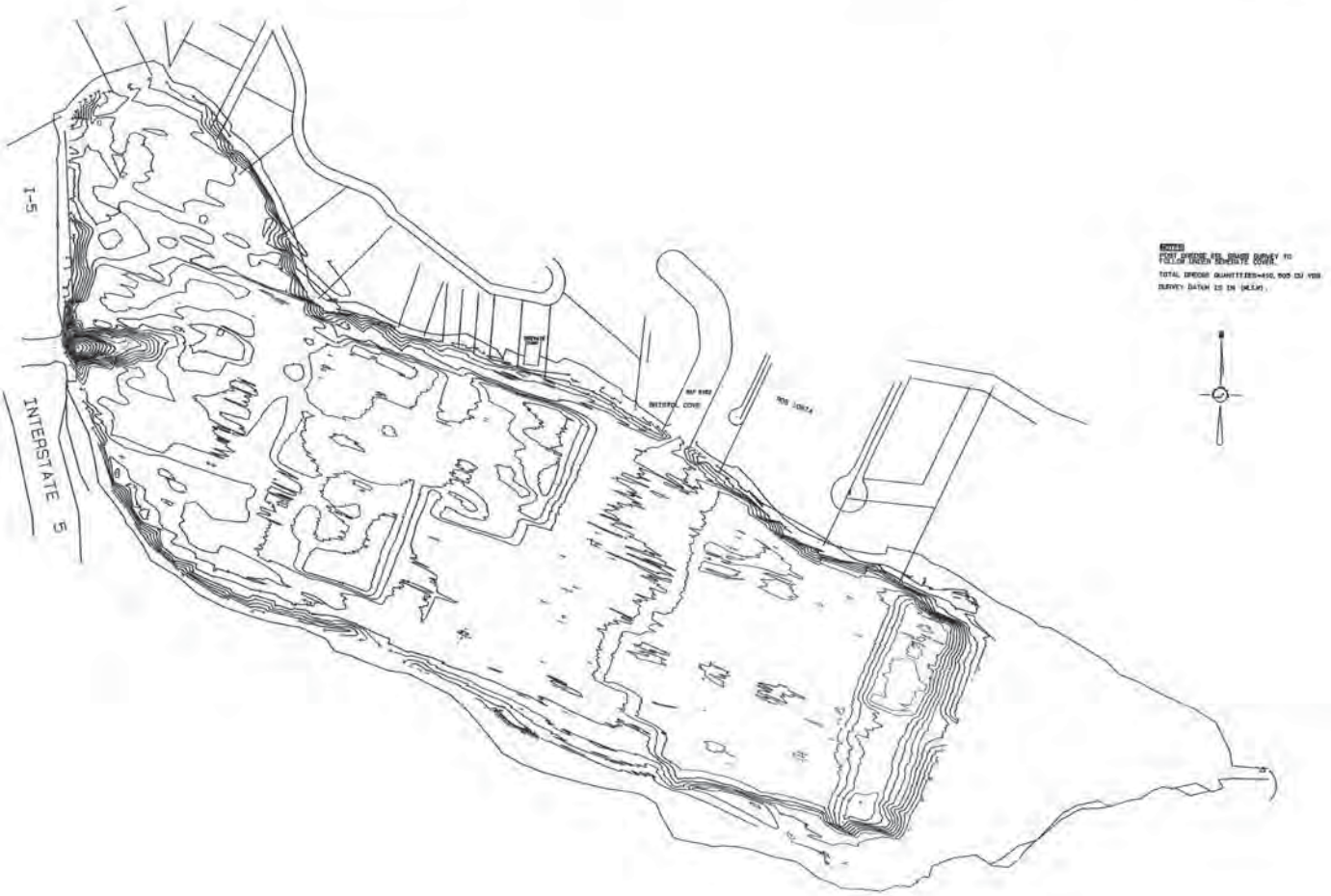
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Table 4. Summary of Discharges

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (cfs) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Agua Hedionda Creek | | | | | |
| At Confluence with Buena Creek | 6.3 | 1,600 | 4,800 | 7,000 | 15,500 |
| 2,200 Feet Upstream of Rancho Carlsbad Drive | 16.5 | --[1] | --[1] | 7,810 | --[1] |
| Upstream of Calavera Creek | 17.3 | --[1] | --[1] | 8,080 | --[1] |
| At El Camino Real | 23.8 | --[1] | --[1] | 9,850 | --[1] |
| Beaver Hollow Creek | | | | | |
| Approximately 1,200 Feet Downstream of Beaver Hollow Road | 5.0 | --[1] | --[1] | 4,000 | --[1] |
| Beeler Creek | | | | | |
| At U.S. Geological Survey (USGS) Gage on Downstream Side of Pomerado Road | 5.5 | 700 | 2,400 | 3,600 | 9,200 |
| Borrego Palm Canyon | | | | | |
| At Apex of Alluvial Fan | 23.3 | 3,100 | 7,700 | 10,650 | 14,800 |
| Box Canyon | | | | | |
| At Apex of Alluvial Fan | 5.9 | 850 | 2,600 | 3,850 | 4,950 |
| Broadway Creek | | | | | |
| At Mouth | 3.8 | 500 | 1,200 | 1,600 | 4,200 |
| Buena Creek | | | | | |
| At Mouth | 6.3 | 1,880 | 3,520 | 4,100 | 5,420 |
| At Buena Creek Road | 1.5 | --[1] | --[1] | 1,980 | --[1] |
| Buena Vista Creek | | | | | |
| Upstream of Interstate Highway 5 | 20.8 | 2,000 | 5,600 | 8,500 | 19,000 |
| At Sunset Drive | 15.9 | 1,700 | 5,100 | 8,000 | 18,000 |
| At Hacienda Drive | 9.8 | 1,500 | 4,900 | 7,300 | 16,000 |
| At Confluence with Tributary 1 | 7.7 | 1,490 | 3,390 | 4,290 | 5,680 |
| At Confluence with Tributary 2 | 5.1 | 1,030 | 2,280 | 2,840 | 3,730 |
| At Confluence with Tributary 4 | 4.0 | 860 | 1,850 | 2,300 | 2,910 |
| At Intersection of Vista Way and Arcadia Avenue | 0.2 | 40 | 100 | 130 | 170 |

[1]Data Not Available




NOTES:
POST DREDGE AS-BUILT SURVEY TO FOLLOW UNDER SEPARATE COVER.

TOTAL DREDGE QUANTITIES=450, 905 CU YDS

SURVEY DATUM IS IN (MLLW).

| | | | |
|---|---|---|---|
| C FOR PERMITTING REVISED QUANTITIES TO REFLECT BORROW PIT<br>DWN. FTS 6/6/97<br>APPD. TJC 6/7/97 | D DRAWING UPDATE REVISED TITLE BLOCK TITLE & PROJECT NUMBER.<br>DWN. TJC 6/7/97<br>APPD. TJC 6/7/97 | E FOR PERMITTING ADDED TWO NEW EXCAVATED MITIGATION AREAS SITE 3 & SITE 4. PROFILES & NOTE.<br>DWN. TJC 6/10/97<br>APPD. MCD 6/10/97 | F FOR PERMITTING<br>DWN. TJC 11-07-97<br>APPD. MCD 11-10-97 | G FOR PERMITTING<br>DWN. TJC 12-11-97<br>APPD. MCD 12-11-97 | H<br>DWN. TJC 01-08-98<br>APPD. MCD 01-08-98 |

CONFIDENTIAL

T-MODEL VERSION
VERSION 6.2
DRAWING ELECTRONIC FILE NAME:
S9790021.PRO

| | | |
|---|---|---|
| PLOT SCALE: 200 | SCALE: 1"=200' | DATE |
| DESIGNED: R. L. STEIN | | 3-97 |
| DRAFTED: M.R.T. | | 3-97 |
| CHKD BY: T.J.C. | | 3-97 |

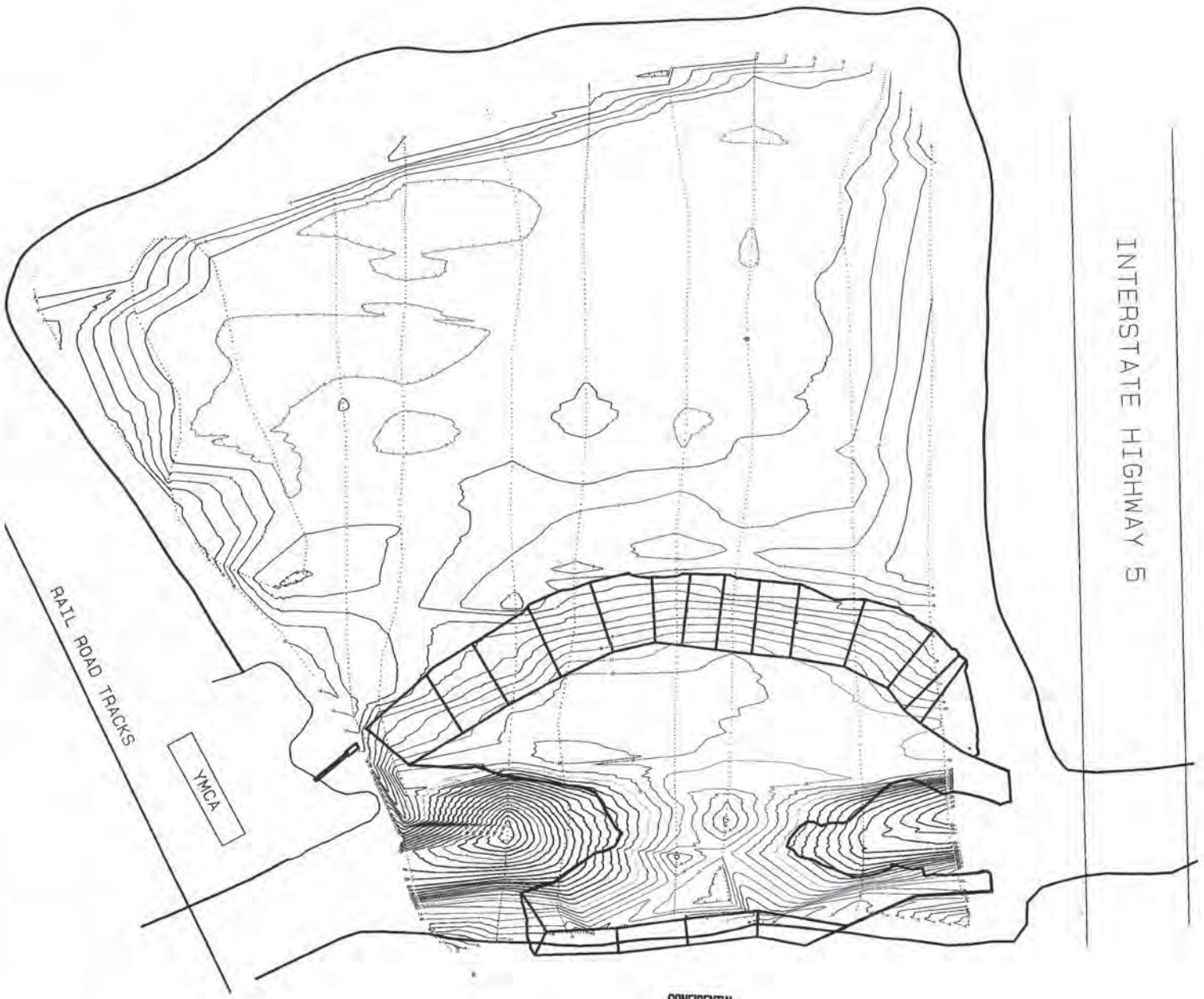
FACILITY: TACOMA POWER PLANT

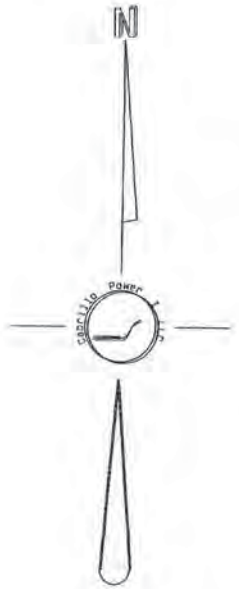
AGUA HEDIONDA
INNER LAGOON

PROJECT NO. 13-7370

DRAWING NO. S-10

REV. 1




CONFIDENTIAL

NOTES:

1. DATUM IS AT MLLW (MEAN LOW LOW WATER).
2. EELGRASS MITIGATION SHALL BE IN ACCORDANCE WITH SOUTHERN CALIFORNIA EELGRASS MITIGATION POLICY ADOPTED ON JULY 31, 1991.
3. EELGRASS SURVEYED ON 12/11/1997 BY MERKEL & ASSOC, INC.
   EELGRASS BEDS NOT LABELED ARE HD.
   EELGRASS BED DENSITY LEGEND
   LD=LOW DENSITY (1 TO 80 STEMS PER 1/4 METER)
   MD=MEDIUM DENSITY (80 TO 240 STEMS PER 1/4 METER)
   HD=HIGH DENSITY (>240 STEMS PER 1/4 METER)
   EELGRASS APPROXIMATE TOTAL AREA = 525,329.911 sq.ft. ( 13.686 ACRES )
4. POST DREDGE EELGRASS APPROXIMATE TOTAL AREA = 550,849.393 sq.ft. ( 12.64
5. APPROXIMATE TOTAL EELGRASS AREA AFFECTED BY DREDGING = 44,680,618 sq.ft.
   EELGRASS MITIGATION AREA DUE TO DREDGING = 53,618,522 sq.ft. ( 1.230 ACR

| B | DRAWING UPDATE: MODIFIED TITLE BLOCK, CHANGED PROJECT NUMBER TO 13-7370 & MODIFIED TITLE. DWN: TJC 6/5/97 APPD: TJC 6/5/97 |
|---|---|
| C | FOR PERMITTING: MODIFIED AND & SLOPE FOR 7:1, ADDED MITIGATION AREAS (SITE 1 & 2) & NEW PROFILE. DWN: TJC 6/10/97 APPD: MED 6/10/97 |
| D | FOR PRESENCE: SURVEY TAKEN ON 12-3-97. ELEV'S RECORDED IN M.L.W. DWN: TJC 12/10/97 APPD: MED 12/10/97 |
| E | FOR POST DREDGE: SURVEY TAKEN ON 02-09-98. ELEV'S RECORDED IN MLLW. DRAWING SCALE TO 1 INCH = 50 FEET. DWN: TJC 3/10/98 APPD: MED 3/10/98 |
| F | RED-LANDON: CONDITION SURVEY ON 11-02-04 ELEV'S RECORDED IN MLLW. DATA: KRB 11-03-04 APPD: MED 11-03-04 |

T-MODEL VERSION: VERSION 9.3
DRAWING ELECTRONIC FILE NAME: S97E0006.PRO

| PLOT SCALE: 1= | SCALE 1"=50' | DATE |
|---|---|---|
| DIGITIZATOR N.G. DATUM | | 1/19/97 |
| SURVEYED DTL.N.T. | | 8/22/96 |
| DRAWN BY: T.J.C. | | 1/15/97 |

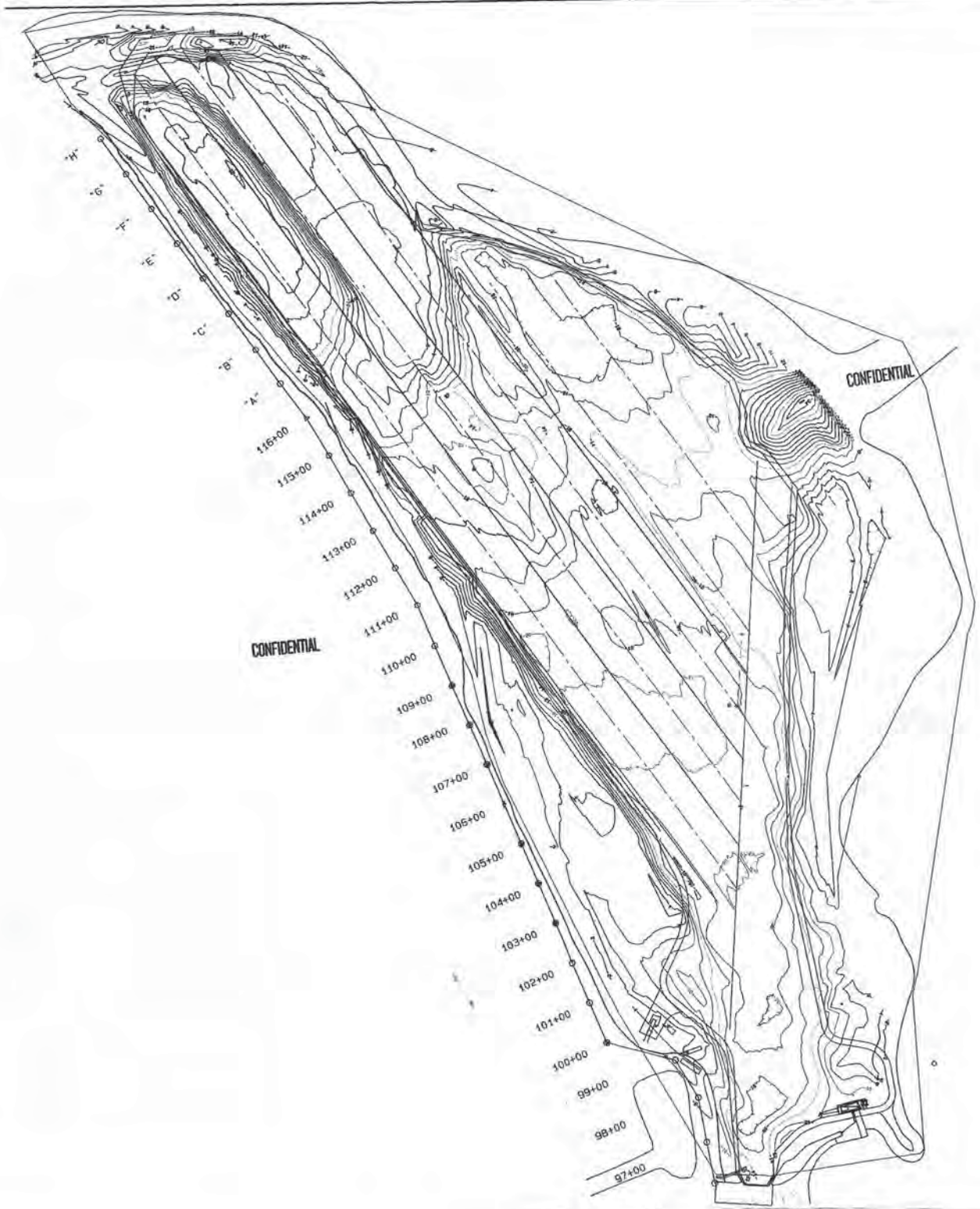
Cabrillo Pov

FACILITY: ENCINA POWER PLANT

AGUA HED
MIDDLE L

PROJECT No. 13-7370

SHEET: 1



DATA: IN MLLW

SOUNDING EQUIPMENT:

DEPTH - RAYTHEON MODEL DE-719C FATHOMETER WITH CDDM DIGITRACE DIGITIZER OUTPUT.

DGPS - LEICA MODEL MX400B DGPS NAVIGATOR.

CONFIDENTIAL

| | |
|---|---|
| T-SHEET VERSION: VERSION: 9.7 | Cabrillo Pow |
| DRAWING ELECTRONIC FILE NAME: S970017.PRO | FACILITY: ENCINA POWER STATION |
| PLOT SCALE: 400 SCALE 1"=100' DATE | AGUA HED |
| DIGITIZATION V.S.DYSON 2-1-97 | OUTER LA |
| SURVEYED BY: S.K.T. 2-11-97 | |
| DRAWN BY: T.J.C. 3-18-97 | |
| | PROJECT NO. 13-7370 |

COUNTY OF SAN DIEGO

TOPOGRAPHIC SURVEY

## -LEGEND-

- Horizontal Control Monument, Third Order; Vertical Control Monument, Second Order or Better
- Horizontal Control Monument, Second Order or Better; Vertical Control Monument, Third Order
- Horizontal Control Monument, Second Order or Better
- Horizontal Control Monument & Bench Mark, Second Order or Better
- Horizontal Control Monument, Third Order
- Horizontal Control Monument & Bench Mark, Third Order
- Bench Mark, Second Order or Better
- Vertical Control Monument, Third Order
- Found Section, Street or Subdivision Corner.
- Photograph, Radio Point
- Geographic Tick

BOUNDARIES IN ORDER OF PRECEDENCE

- National
- County
- City (Line of Barrier with County)
- Reservation
- Railroad, State or County Park
- Land Grant
- Township, Range, Section or Subdivision (Name of Subdivision within Bdry.)

PREPARED UNDER THE DIRECTION OF THE COUNTY ENGINEER OF THE COUNTY OF SAN DIEGO, CALIFORNIA.

MAP CONTROL DATA FURNISHED BY THE COUNTY OF SAN DIEGO.

HORIZONTAL CONTROL IS BASED ON NORTH AMERICAN 1927 DATUM.

LAND LINES SHOWN ARE APPROXIMATE.

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED 12-11-74 BY SAN-LO AERIAL SURVEYS, INC. 7990 DAGGET STREET SAN DIEGO, CALIFORNIA

ORTHOPHOTO IMAGE PREPARED FROM PHOTOGRAPHY DATED 12-11-74 BY VTN CONSOLIDATED, INC.

PRECISION
SEP 10 1975

SCALE 1:2400

300 0 300 600 900 1200 1500

CONTOUR INTERVAL 5 FEET

U.S.C.&G.S. SEA LEVEL DATUM OF 1929

TWO THOUSAND FOOT CALIFORNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE VALUES ARE SHOWN ON THE SOUTH AND WEST MARGINS

INDEX TO ADJOINING SHEETS

| | | |
|---|---|---|
| 358-1665 | 358-1671 | 358-1677 |
| 354-1665 | 354-1671 | 354-1677 |
| 350-1665 | 350-1671 | 350-1677 |

SAN DIEGO COUNTY
CALIFORNIA

EDITION OF 1975

SHEET 354-1671

# COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

## -LEGEND-

- Horizontal Control Monument, Third Order
- Vertical Control Monument, Second Order or Better
- Horizontal Control Monument, Second Order or Better
- Vertical Control Monument, Third Order
- Horizontal Control Monument, Second Order or Better
- (Horizontal Control Monument & Bench Mark, Second Order or Better)
- Horizontal Control Monument, Third Order
- Horizontal Control Monument & Bench Mark, Third Order
- Bench Mark, Second Order or Better
- Vertical Control Monument, Third Order
- Found Section, Quarter or Subdivision Corner
- Photograph, Radial Point
- Geographic Tick

**BOUNDARIES IN ORDER OF PRECEDENCE**
*(Land Lines Shown are Approximate)*

- National
- County
- City
- Reservation
- National, State or County Park
- Land Grant
- Township, Range, Section or Subdivision (Name of Subdivision within Entry.)

PREPARED UNDER THE DIRECTION
of
DEPARTMENT OF TRANSPORTATION
County of San Diego
CONTROL DATA FURNISHED
by
SURVEY SECTION
Department of Transportation
HORIZONTAL CONTROL BASED
on
NORTH AMERICAN 1927 DATUM
VERTICAL CONTROL BASED
on
U.S.C. & G.S. 1929 SEA LEVEL DATUM
ORTHOPHOTO IMAGE PREPARED
from
PHOTOGRAPHY DATED 9-17-75
by
RICK ENGINEERING
TOPOGRAPHY COMPILED
by
PHOTOGRAMMETRIC METHODS
from
PHOTOGRAPHY DATED 9-17-75
by
RICK ENGINEERING
FINAL MAP PREPARED
by
MAPPING SECTION
Department of Transportation

*This Map Complies with*
**NATIONAL MAP ACCURACY STANDARDS**

SCALE 1" 2400 (1"= 200')
INDEX CONTOUR INTERVAL 25 FEET
CONTOUR INTERVAL 5 FEET
TWO THOUSAND FOOT CALIFORNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE VALUES ARE SHOWN ON THE SOUTH AND WEST MARGINS

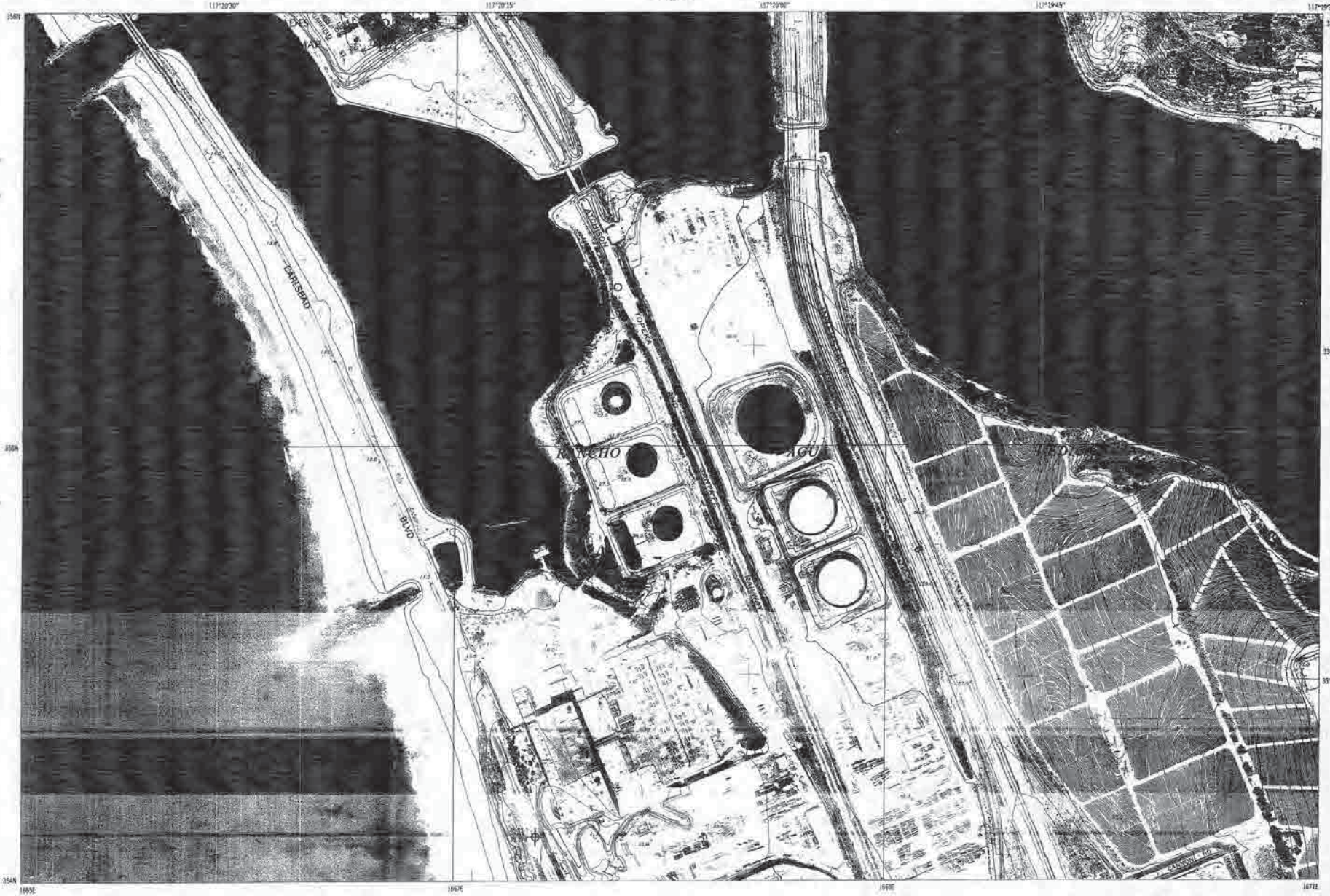
INDEX TO ADJOINING SHEETS

| | | |
|---|---|---|
| 362-1659 | 362-1665 | 362-1671 |
| 358-1659 | 358-1665 | 358-1671 |
| | 354-1665 | 354-1671 |

# SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 358-1665

# COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY




## -LEGEND-

- Horizontal Control Monument, Second Order or Better
- Vertical Control Monument, Second Order or Better
- Horizontal Control Monument, Third Order
- Vertical Control Monument, Third Order
- National Control Monument, Second Order or Better
- Horizontal Control Monument & Bench Mark, Second Order or Better
- Horizontal Control Monument, Third Order
- Horizontal Control Monument & Bench Mark, Third Order
- Bench Mark, Second Order or Better
- Vertical Control Monument, Third Order
- Found Section, Quarter or Subdivision Corner
- Monument, Made Point
- Triangulation Station

**BOUNDARIES IN ORDER OF PRECEDENCE**
*(Land Lines Shown are Approximate)*

- National
- County
- City
- Reservation
- National, State or County Park
- Land Grant
- Township, Range, Section or Subdivision (Name of Subdivision within Item)

PREPARED UNDER THE DIRECTION
of
DEPARTMENT OF TRANSPORTATION
County of San Diego

CONTROL DATA FURNISHED
by
SURVEY SECTION
Department of Transportation

HORIZONTAL CONTROL BASED
on
NORTH AMERICAN 1927 DATUM

VERTICAL CONTROL BASED
on
U.S.C. & G.S. 1929 SEA LEVEL DATUM

ORTHOPHOTO IMAGE PREPARED
from
PHOTOGRAPHY DATED: 9-17-75
by
SAN-LO AERIAL SURVEYS

TOPOGRAPHY COMPILED
by
PHOTOGRAMMETRIC METHODS
from
PHOTOGRAPHY DATED: 9-17-75
by
RICK ENGINEERING

FINAL MAP PREPARED
by
MAPPING SECTION
Department of Transportation

This Map Complies with
NATIONAL MAP ACCURACY STANDARDS

SCALE 1: 2400 (1"= 200')
INDEX CONTOUR INTERVAL: 25 FEET
CONTOUR INTERVAL: 5 FEET

TWO THOUSAND FOOT CALIFORNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE VALUES ARE SHOWN ON THE SOUTH AND WEST MARGINS
THE GEOGRAPHIC VALUES ARE SHOWN ON THE NORTH AND EAST MARGINS

INDEX TO ADJOINING SHEETS

| | | |
|---|---|---|
| 358-1659 | 358-1665 | 358-1671 |
| | 354-1665 | 354-1671 |
| | 350-1665 | 350-1671 |

# SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 354-1665

# Encina Power Plant
# Topography Exhibit

## Middle Lagoon

DOKKEN
ENGINEERING
www.dokkenengineering.com

# Encina Power Plant
# Topography Exhibit

## Outer Lagoon

# APPENDIX 'B'

## Results Summary

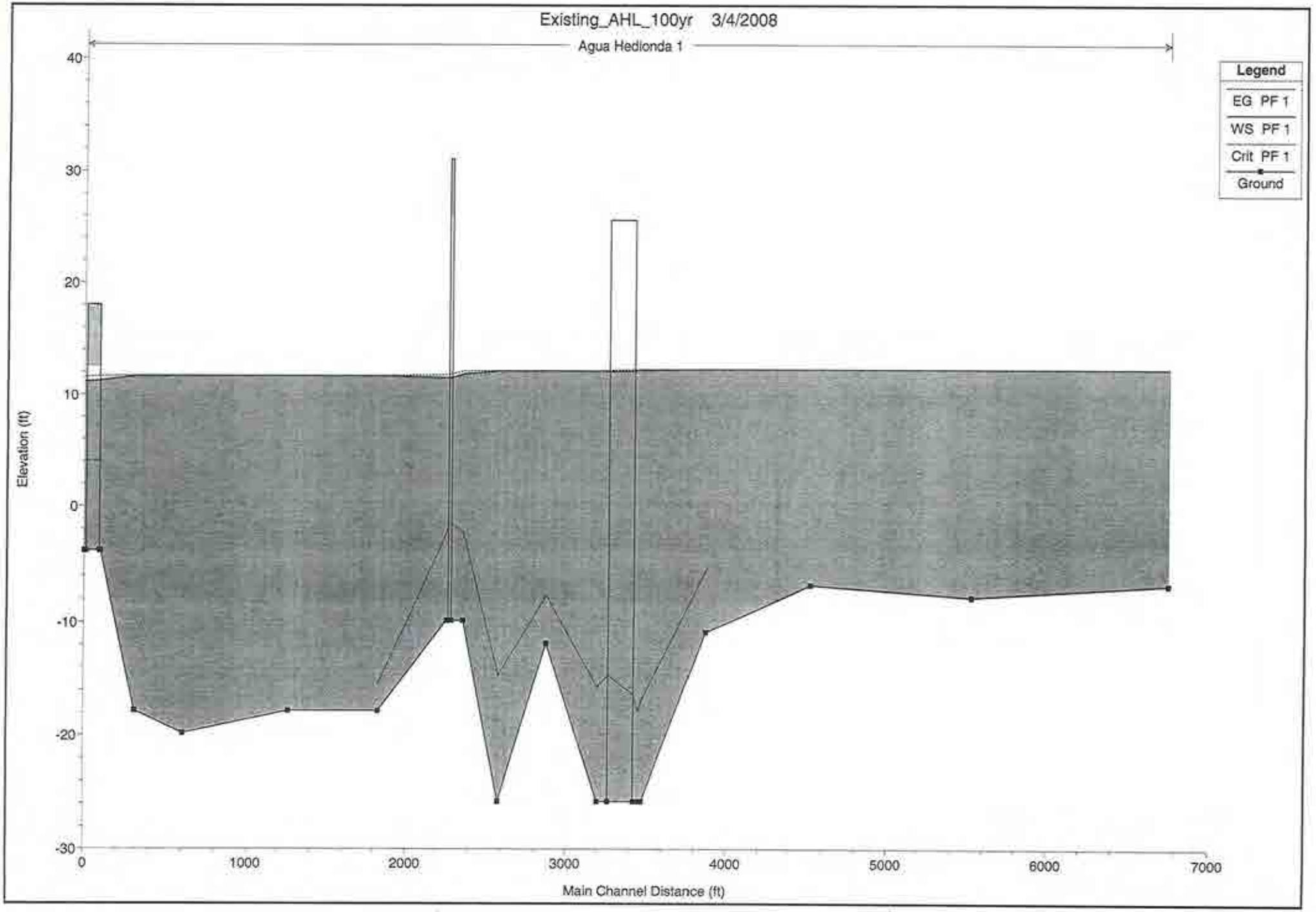
## HEC-RAS Cross Section Input/Output

**Existing**
**Proposed**

# EXISTING

HEC-RAS Plan: ExistingAHL River: Agua Hedionda Reach: 1 Profile: PF 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 1 | 6860 | PF 1 | 9850.00 | -6.81 | 12.27 | | 12.27 | 0.000001 | 0.36 | 28390.56 | 1811.56 | 0.02 |
| 1 | 5638 | PF 1 | 9850.00 | -7.81 | 12.26 | | 12.27 | 0.000001 | 0.38 | 26405.65 | 1578.85 | 0.02 |
| 1 | 4633 | PF 1 | 9850.00 | -6.81 | 12.26 | | 12.27 | 0.000001 | 0.38 | 26392.34 | 1564.59 | 0.02 |
| 1 | 3981 | PF 1 | 9850.00 | -10.81 | 12.26 | -5.39 | 12.26 | 0.000002 | 0.45 | 22283.34 | 1863.25 | 0.02 |
| 1 | 3576 | PF 1 | 9850.00 | -25.80 | 12.22 | -16.75 | 12.26 | 0.000014 | 1.69 | 5984.83 | 1048.38 | 0.05 |
| 1 | 3552 | PF 1 | 9850.00 | -25.80 | 12.21 | -17.74 | 12.26 | 0.000015 | 1.70 | 5908.30 | 1024.99 | 0.06 |
| 1 | 3400 | | Bridge | | | | | | | | | |
| 1 | 3296 | PF 1 | 9850.00 | -25.80 | 12.12 | -15.63 | 12.15 | 0.000010 | 1.36 | 7332.46 | 1118.88 | 0.05 |
| 1 | 2973 | PF 1 | 9850.00 | -11.81 | 12.13 | -7.61 | 12.14 | 0.000005 | 0.77 | 12844.06 | 1081.45 | 0.03 |
| 1 | 2676 | PF 1 | 9850.00 | -25.81 | 12.13 | -14.57 | 12.14 | 0.000006 | 0.97 | 10297.05 | 1059.03 | 0.04 |
| 1 | 2451 | PF 1 | 9850.00 | -9.81 | 11.87 | -2.28 | 12.11 | 0.000128 | 3.96 | 2551.94 | 151.95 | 0.16 |
| 1 | 2400 | | Bridge | | | | | | | | | |
| 1 | 2348 | PF 1 | 9850.00 | -9.81 | 11.51 | -2.28 | 11.76 | 0.000135 | 4.04 | 2519.91 | 151.09 | 0.16 |
| 1 | 1833 | PF 1 | 9850.00 | -17.81 | 11.68 | -15.35 | 11.69 | 0.000000 | 0.28 | 35315.71 | 2321.18 | 0.01 |
| 1 | 1251 | PF 1 | 9850.00 | -17.81 | 11.68 | | 11.68 | 0.000003 | 0.63 | 16014.37 | 825.89 | 0.02 |
| 1 | 618 | PF 1 | 9850.00 | -19.81 | 11.67 | | 11.68 | 0.000007 | 0.92 | 10960.75 | 629.02 | 0.04 |
| 1 | 321 | PF 1 | 9850.00 | -17.81 | 11.66 | | 11.68 | 0.000012 | 1.24 | 8471.83 | 516.98 | 0.05 |
| 1 | 106 | PF 1 | 9850.00 | -3.81 | 11.26 | 4.10 | 11.64 | 0.000365 | 5.24 | 2237.35 | 251.27 | 0.26 |
| 1 | 75 | | Bridge | | | | | | | | | |
| 1 | 0 | PF 1 | 9850.00 | -3.81 | 11.18 | 4.11 | 11.56 | 0.000374 | 5.28 | 2216.26 | 249.21 | 0.26 |


Existing_AHL_100yr 3/4/2008
Agua Hedionda 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
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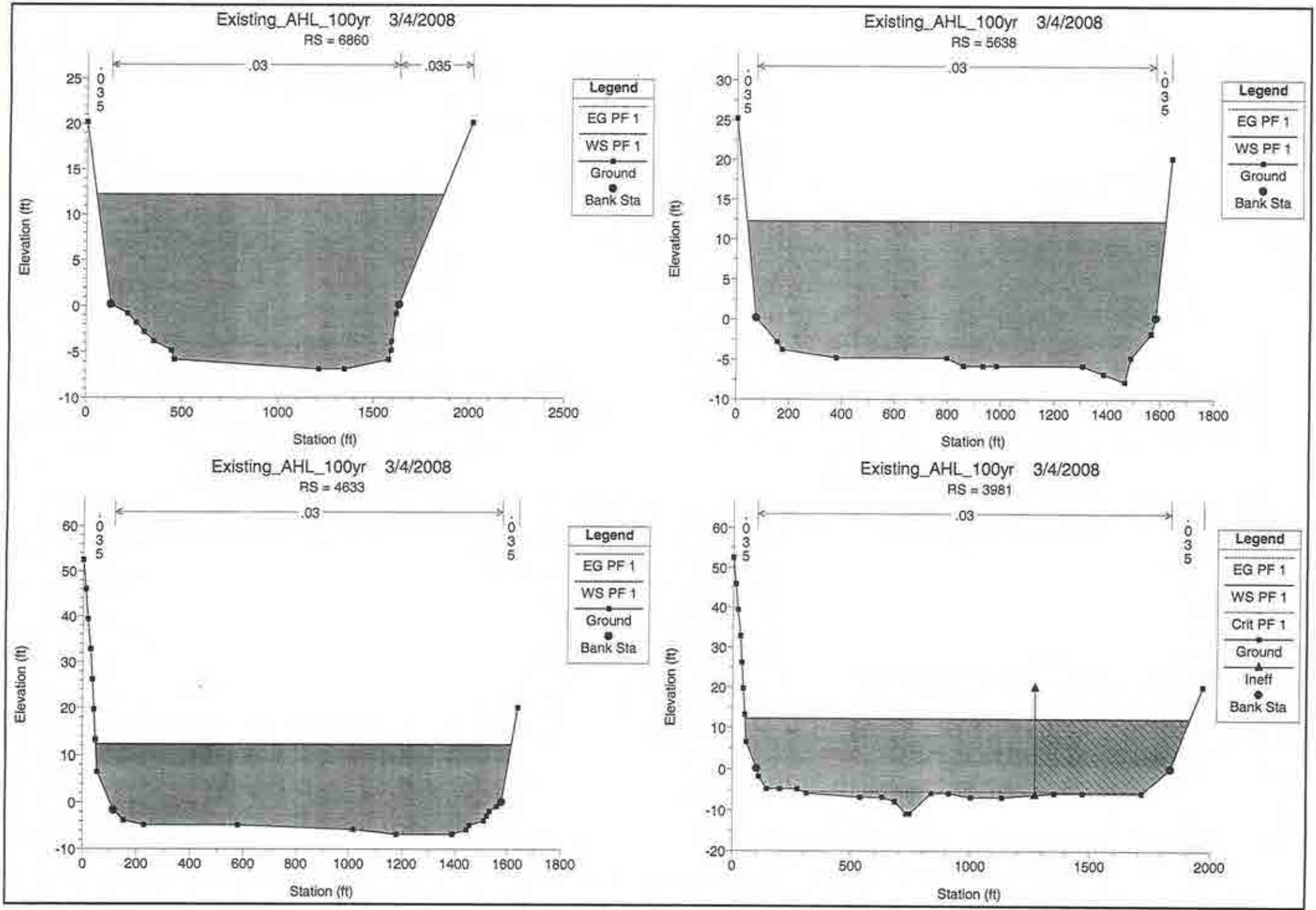
30
20
10
0
-10
-20
-30
0
1000
2000
3000
4000
5000
6000
7000
Main Channel Distance (ft)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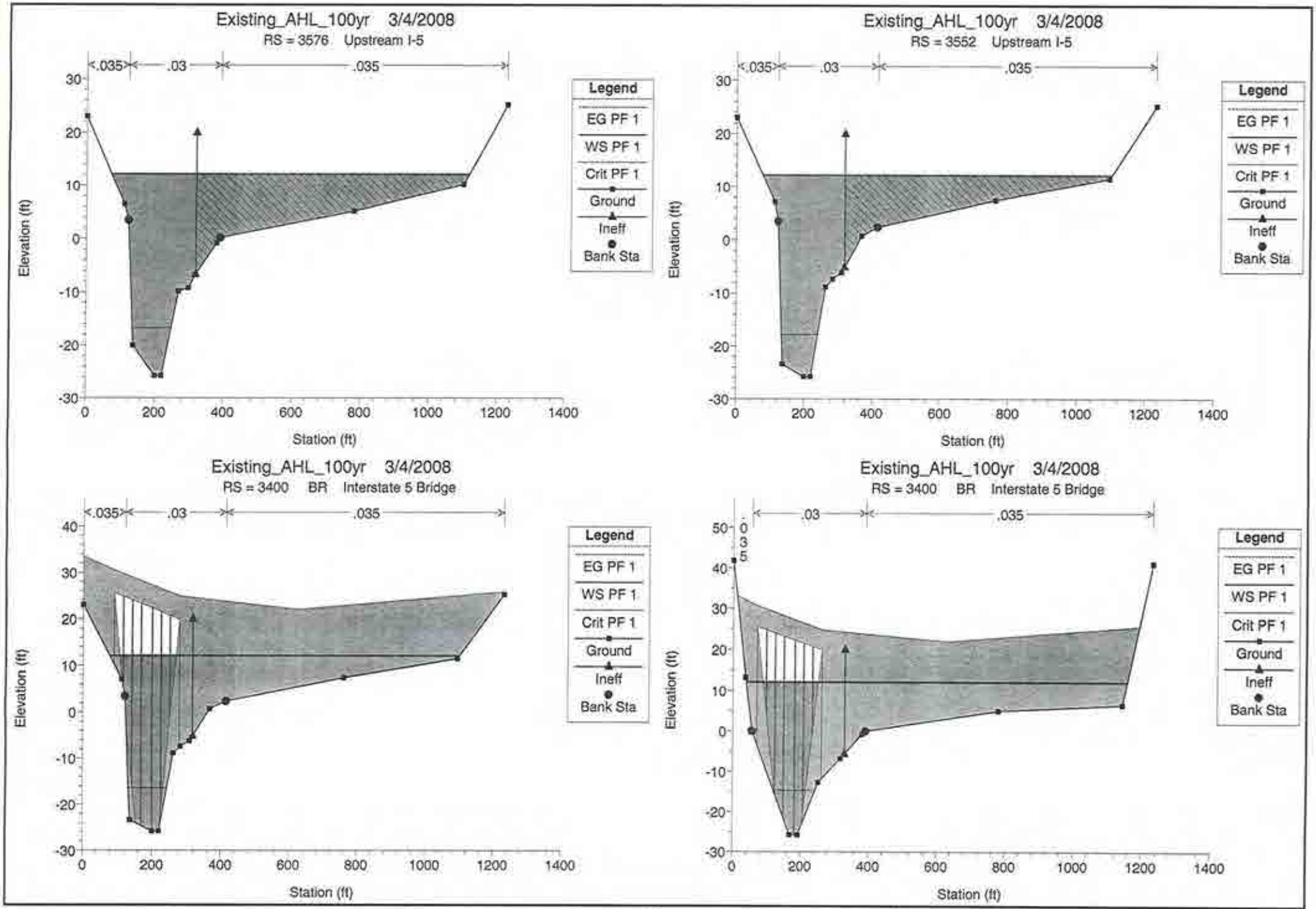
RS = 6860
.03
.035
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 5638
.03
.035
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 4633
.03
.035
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 3981
.03
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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RS = 3576 Upstream I-5
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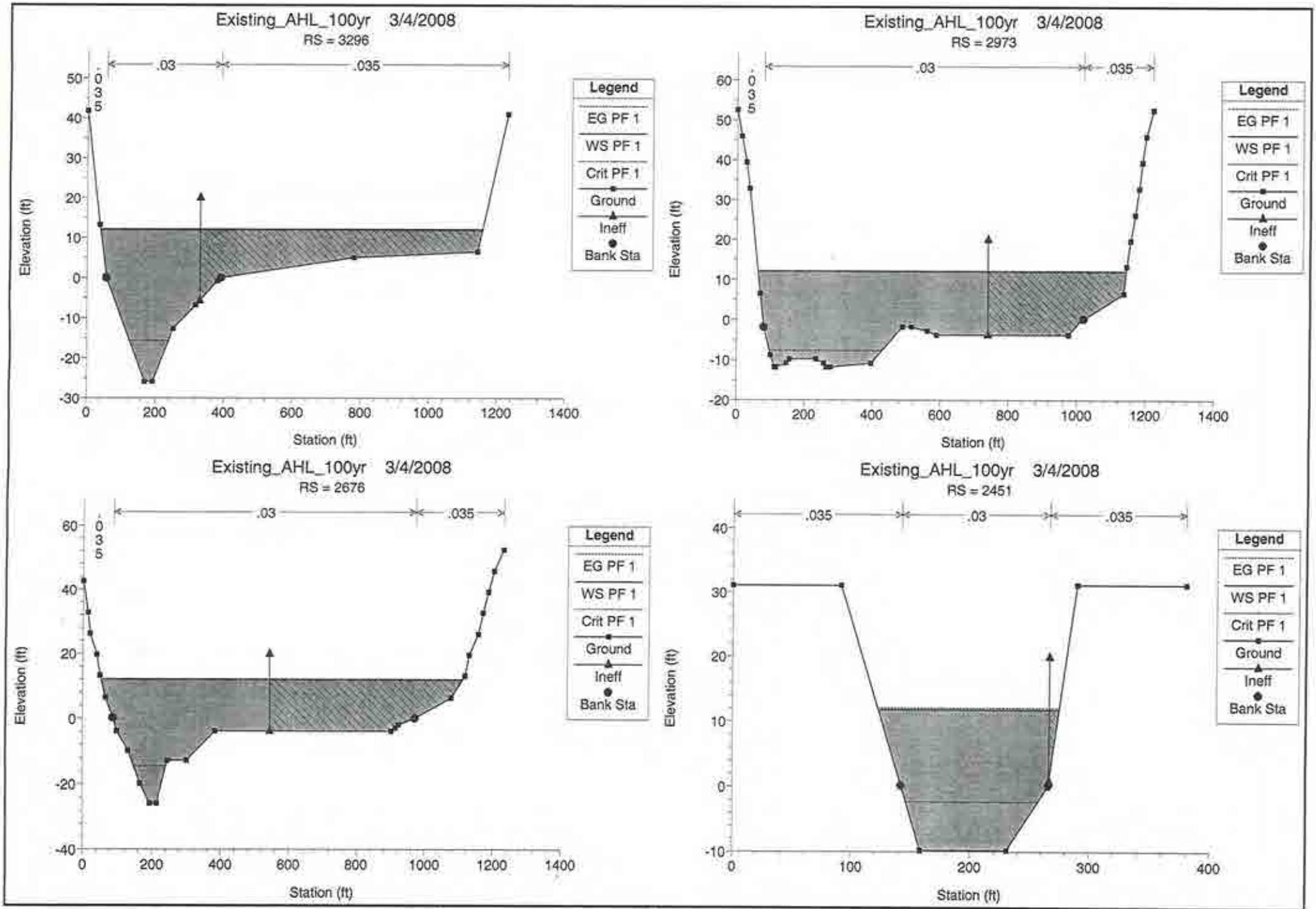
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 3552 Upstream I-5
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 3400 BR Interstate 5 Bridge
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 3400 BR Interstate 5 Bridge
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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.035
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WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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RS = 2973
.03
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 2676
.03
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
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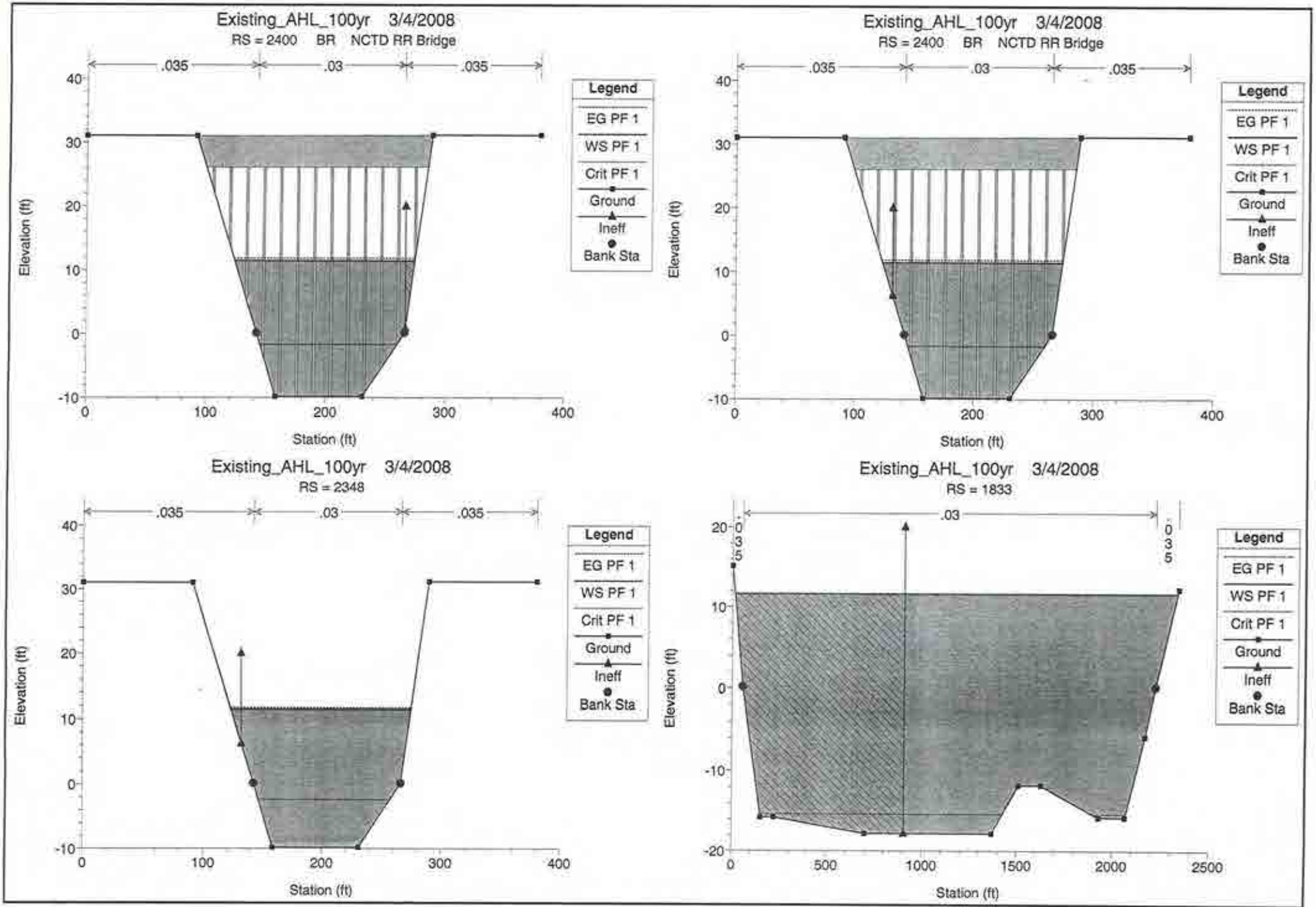
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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RS = 2400 BR NCTD RR Bridge
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.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 2400 BR NCTD RR Bridge
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 2348
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 1833
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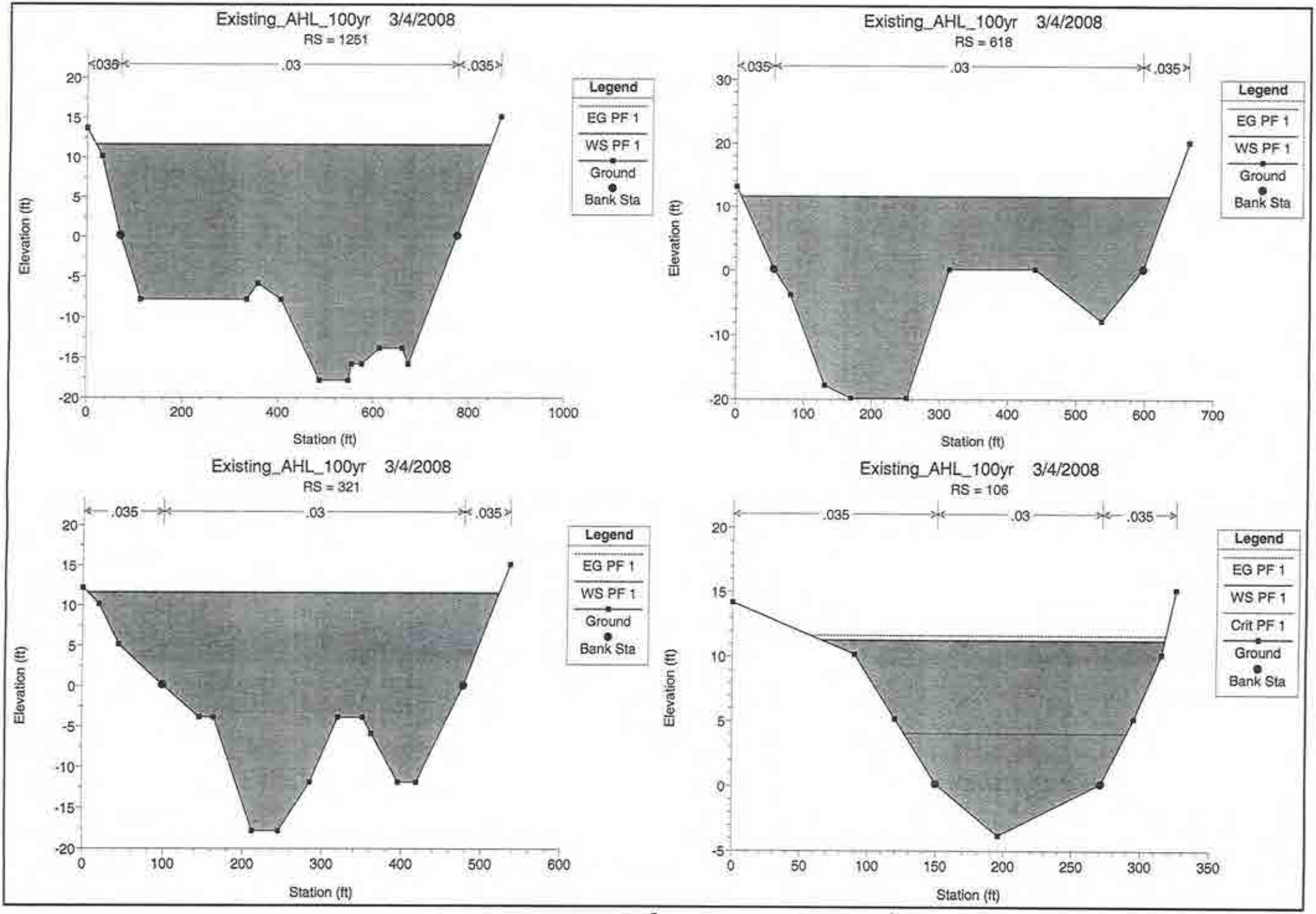
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 618
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 321
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Existing_AHL_100yr 3/4/2008
RS = 106
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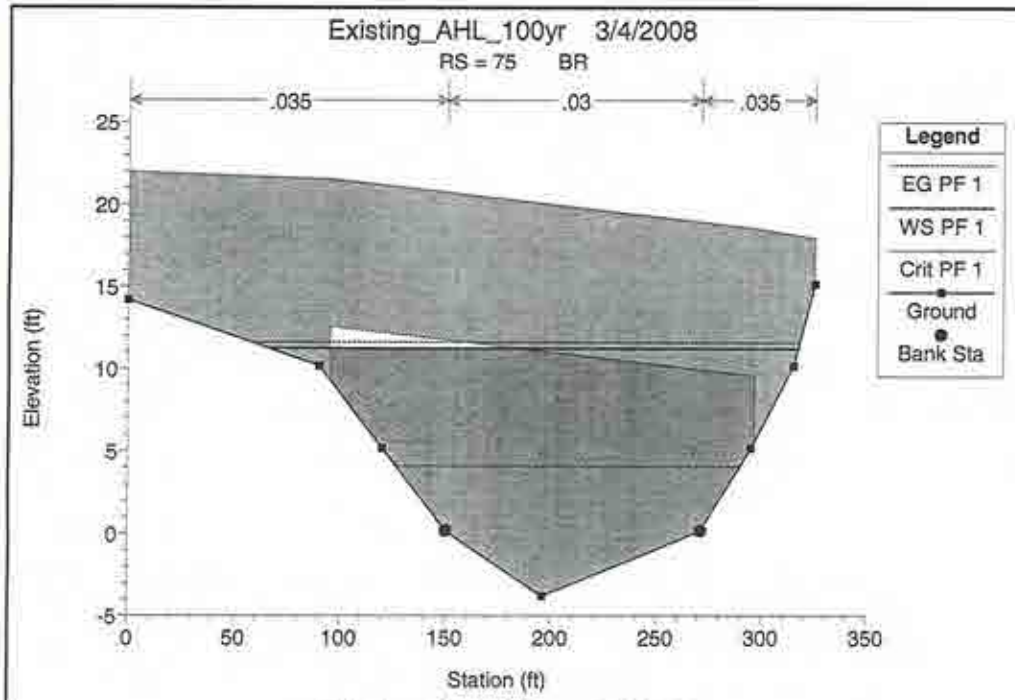
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Existing_AHL_100yr 3/4/2008
RS = 75 BR
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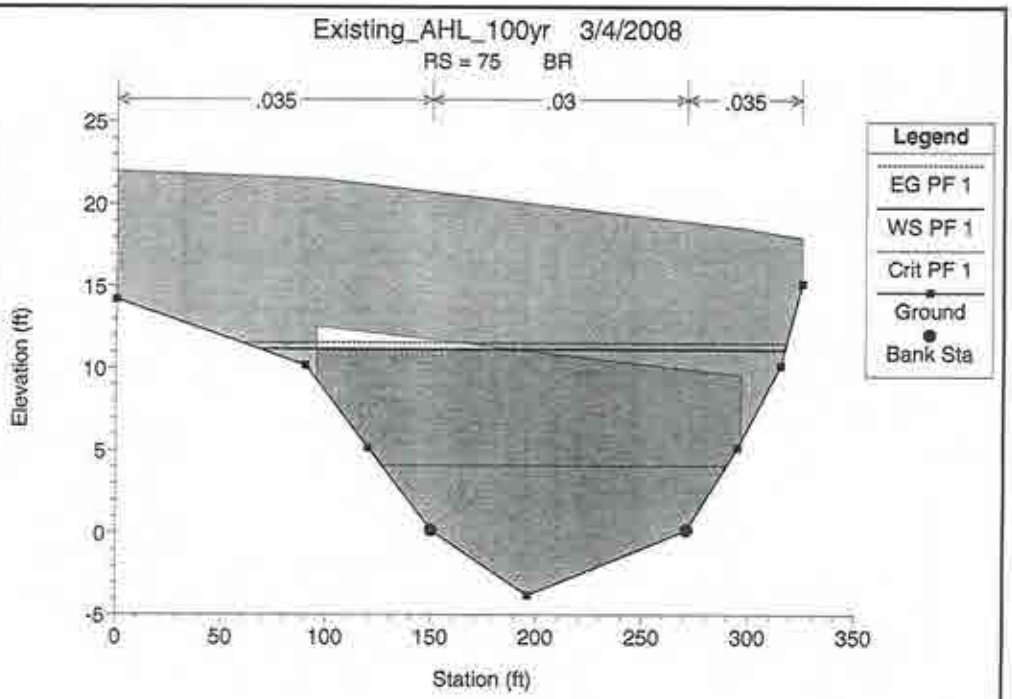
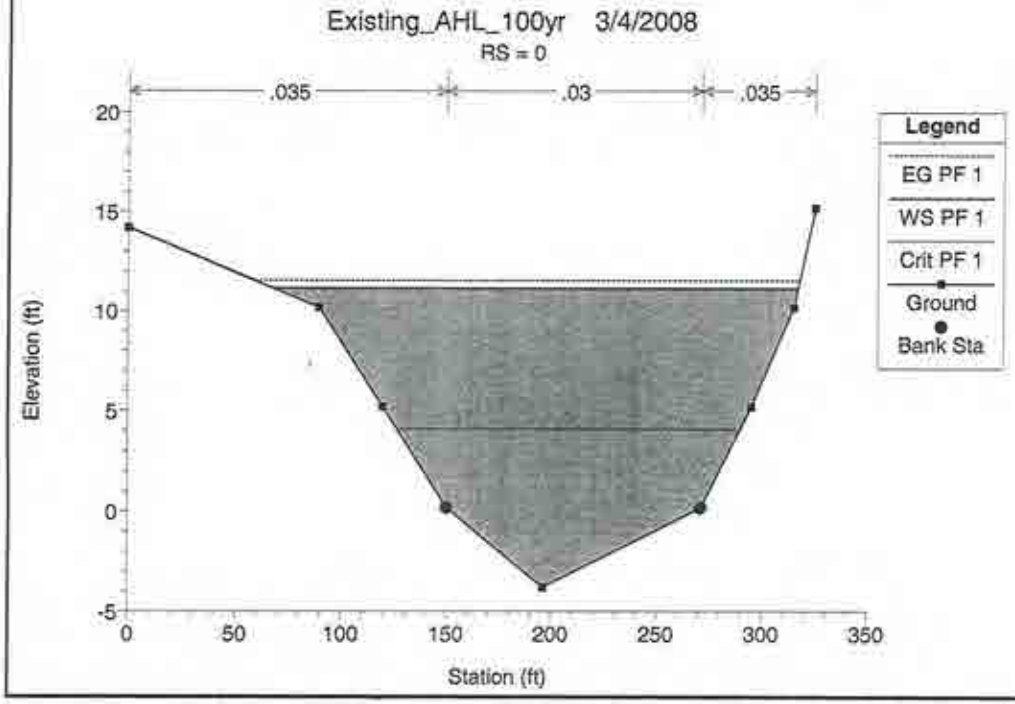
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


Existing_AHL_100yr 3/4/2008
RS = 75 BR
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta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RS = 0
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X        X           X   X    X    X    X
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X     X  X        X     X     X   X    X    X        X
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PROJECT DATA
Project Title: AguaHedionda_Existing
Project File : AH_Exist.prj
Run Date and Time: 3/4/2008 10:28:09 AM

Project in English units

Project Description:
Agua Hedionda Lagoon Existing Conditions
April 2005
Dokken Engineering

PLAN DATA

Plan Title: Existing_AHL_100yr
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Final\Existing\AH_Exist.p04

Geometry Title: Agua Hedionda Existing Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Final\Existing\AH_Exist.g02

Flow Title : 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Final\Existing\AH_Exist.f06

Plan Summary Information:

| | | | | | |
|---|---|---|---|---|---|
| Number of: | Cross Sections | = 17 | Multiple Openings | = | 0 |
| | Culverts | = 0 | Inline Structures | = | 0 |
| | Bridges | = 3 | Lateral Structures | = | 0 |

Computational Information

| | |
|---|---|
| Water surface calculation tolerance | = 0.01 |
| Critical depth calculation tolerance | = 0.01 |
| Maximum number of iterations | = 20 |
| Maximum difference tolerance | = 0.3 |
| Flow tolerance factor | = 0.001 |

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only

Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Final\Existing\AH_Exist.f06

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| Agua Hedionda | 1 | 6860 | 9850 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Agua Hedionda | 1 | PF 1 | Normal S = 8.1833E-04 | |

Known WS = 11.178

GEOMETRY DATA

Geometry Title: Agua Hedionda Existing Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Final\Existing\AH_Exist.g02

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 6860

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 20.19 | 128 | .19 | 216 | -.81 | 260 | -1.81 | 303 | -2.81 |
| 353.5 | -3.81 | 445 | -4.81 | 460 | -5.81 | 1214 | -6.81 | 1348 | -6.81 |
| 1578 | -5.81 | 1592 | -4.81 | 1595 | -3.81 | 1617.6 | -.81 | 1631 | .19 |
| 2014 | 20.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 128 | .03 | 1631 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 128 | 1631 | 1237 | 1222 | 1222 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.27 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 12.27 | Reach Len. (ft) | 1237.00 | 1222.00 |
| 1222.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 466.70 | 26527.39 |
| 1396.47 | | | | |
| E.G. Slope (ft/ft) | 0.000001 | Area (sq ft) | 466.70 | 26527.39 |
| 1396.47 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 70.04 | 9568.90 |
| 211.06 | | | | |
| Top Width (ft) | 1811.56 | Top Width (ft) | 77.29 | 1503.00 |
| 231.27 | | | | |
| Vel Total (ft/s) | 0.35 | Avg. Vel. (ft/s) | 0.15 | 0.36 |
| 0.15 | | | | |
| Max Chl Dpth (ft) | 19.08 | Hydr. Depth (ft) | 6.04 | 17.65 |
| 6.04 | | | | |
| Conv. Total (cfs) | 9166439.0 | Conv. (cfs) | 65176.1 | 8904848.0 |
| 196415.0 | | | | |
| Length Wtd. (ft) | 1222.08 | Wetted Per. (ft) | 78.23 | 1503.51 |
| 231.58 | | | | |
| Min Ch El (ft) | -6.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 60.27 | 3276.82 |
| 178.72 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 9.66 | 167.84 |
| 25.86 | | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 5638

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 25.19 | 75 | .19 | 155 | -2.81 | 175 | -3.81 | 379 | -4.81 |
| 797 | -4.81 | 860 | -5.81 | 934 | -5.81 | 985 | -5.81 | 1308 | -5.81 |
| 1387 | -6.81 | 1467 | -7.81 | 1490 | -4.81 | 1565 | -1.81 | 1582 | .19 |
| 1641 | 20.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 75 | .03 | 1582 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 75 | 1582 | 1293 | 1005 | 696 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.27 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 12.26 | Reach Len. (ft) | 1293.00 | 1005.00 |

| | | | | |
|---|---|---|---|---|
| 696.00 Crit W.S. (ft) | | Flow Area (sq ft) | 218.71 | 25971.88 |
| 215.06 E.G. Slope (ft/ft) | 0.000001 | Area (sq ft) | 218.71 | 25971.88 |
| 215.06 Q Total (cfs) | 9850.00 | Flow (cfs) | 33.89 | 9782.83 |
| 33.28 Top Width (ft) | 1578.85 | Top Width (ft) | 36.22 | 1507.00 |
| 35.62 Vel Total (ft/s) | 0.37 | Avg. Vel. (ft/s) | 0.15 | 0.38 |
| 0.15 Max Chl Dpth (ft) | 20.07 | Hydr. Depth (ft) | 6.04 | 17.23 |
| 6.04 Conv. Total (cfs) | 8640078.0 | Conv. (cfs) | 29723.7 | 8581159.0 |
| 29195.0 Length Wtd. (ft) | 1006.26 | Wetted Per. (ft) | 38.18 | 1507.48 |
| 37.61 Min Ch El (ft) | -7.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 50.53 | 2540.43 |
| 156.11 C & E Loss (ft) | 0.00 | Cum SA (acres) | 8.05 | 125.62 |
| 22.12 | | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 4633

INPUT
Description:
Station Elevation Data num= 23

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 52.5 | 9 | 46 | 18 | 39.4 | 29 | 32.8 | 36 | 26.2 |
| 42.5 | 19.7 | 49 | 13.12 | 55.5 | 6.5 | 116 | -1.605 | 153 | -3.81 |
| 230 | -4.81 | 579 | -4.81 | 1017 | -5.81 | 1180 | -6.81 | 1392 | -6.81 |
| 1445 | -5.81 | 1456 | -4.81 | 1511 | -3.81 | 1522 | -2.81 | 1532 | -1.81 |
| 1559 | -.81 | 1577 | .19 | 1639 | 20.19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 116 | .03 | 1577 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 116 | 1577 | 348 | 652 | 1178 .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.27 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 W.S. Elev (ft) | 12.26 | Reach Len. (ft) | 348.00 | 652.00 |
| 1178.00 Crit W.S. (ft) | | Flow Area (sq ft) | 610.18 | 25556.21 |
| 225.95 E.G. Slope (ft/ft) | 0.000001 | Area (sq ft) | 610.18 | 25556.21 |

| | | | | | |
|---|---|---|---|---|---|
| 225.95 | | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 125.71 | 9689.33 | 34.96 |
| Top Width (ft) | 1564.59 | Top Width (ft) | 66.16 | 1461.00 | 37.43 |
| Vel Total (ft/s) | 0.37 | Avg. Vel. (ft/s) | 0.21 | 0.38 | 0.15 |
| Max Chl Dpth (ft) | 19.07 | Hydr. Depth (ft) | 9.22 | 17.49 | 6.04 |
| Conv. Total (cfs) | 8670044.0 | Conv. (cfs) | 110653.5 | 8528620.0 | 30770.8 |
| Length Wtd. (ft) | 649.72 | Wetted Per. (ft) | 69.12 | 1461.28 | 39.33 |
| Min Ch El (ft) | -6.81 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 38.23 | 1946.02 | 152.59 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 6.53 | 91.38 | 21.54 |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 3981

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 52.5 | 10 | 45.9 | 20 | 39.4 | 32 | 32.8 | 38 | 26.2 |
| 45 | 19.7 | 52 | 13.2 | 58 | 6.5 | 100 | .19 | 110 | -1.81 |
| 144 | -4.81 | 200 | -4.81 | 273 | -4.81 | 312 | -5.81 | 537 | -6.81 |
| 629 | -6.81 | 683 | -7.81 | 730 | -10.81 | 745 | -10.81 | 837 | -5.81 |
| 909 | -5.81 | 1002 | -6.81 | 1132 | -6.81 | 1352 | -5.81 | 1469 | -5.81 |
| 1716 | -5.81 | 1834 | .19 | 1970 | 20.19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 100 | .03 | 1834 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 100 | 1834 | 591 | 395 | 850 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 1270.4 | 1970 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 | |
| W.S. Elev (ft) | 12.26 | Reach Len. (ft) | 591.00 | 395.00 | 850.00 |
| Crit W.S. (ft) | -5.39 | Flow Area (sq ft) | 389.37 | 21893.98 | |
| E.G. Slope (ft/ft) | 0.000002 | Area (sq ft) | 389.37 | 31740.32 | |

| | | | | |
|---|---|---|---|---|
| 495.47 Q Total (cfs) | 9850.00 | Flow (cfs) | 82.81 | 9767.19 |
| Top Width (ft) | 1863.25 | Top Width (ft) | 47.16 | 1734.00 |
| 82.09 Vel Total (ft/s) | 0.44 | Avg. Vel. (ft/s) | 0.21 | 0.45 |
| Max Chl Dpth (ft) | 23.07 | Hydr. Depth (ft) | 8.26 | 18.71 |
| Conv. Total (cfs) | 7703926.0 | Conv. (cfs) | 64767.1 | 7639159.0 |
| Length Wtd. (ft) | 396.63 | Wetted Per. (ft) | 50.21 | 1170.99 |
| Min Ch El (ft) | -10.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 34.24 | 1517.21 |
| 142.83 C & E Loss (ft) | 0.00 | Cum SA (acres) | 6.07 | 67.47 |
| 19.92 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 3576

INPUT
Description: Upstream I-5
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 110 | 6.5 | 123 | 3.462 | 137 | -20 | 200 | -25.8 |
| 220 | -25.8 | 269 | -9.81 | 298 | -9.185 | 317 | -6.81 | 380 | -.81 |
| 390 | .19 | 780 | 5.19 | 1103 | 10.19 | 1231 | 25.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 123 | .03 | 390 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 123 | 390 | 24 | 24 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 319 | 1231 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.26 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.04 | Wt. n-Val. | 0.035 | 0.030 |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 12.22 | Reach Len. (ft) | 24.00 | 24.00 |
| Crit W.S. (ft) | -16.75 | Flow Area (sq ft) | 202.92 | 5781.91 |
| E.G. Slope (ft/ft) | 0.000014 | Area (sq ft) | 202.92 | 6878.89 |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 80.60 | 9769.40 |
| Top Width (ft) | 1048.38 | Top Width (ft) | 51.10 | 267.00 |
| Vel Total (ft/s) | 1.65 | Avg. Vel. (ft/s) | 0.40 | 1.69 |
| Max Chl Dpth (ft) | 38.02 | Hydr. Depth (ft) | 3.97 | 29.50 |
| Conv. Total (cfs) | 2613775.0 | Conv. (cfs) | 21387.7 | 2592387.0 |
| Length Wtd. (ft) | 24.00 | Wetted Per. (ft) | 51.88 | 212.29 |
| Min Ch El (ft) | -25.80 | Shear (lb/sq ft) | 0.00 | 0.02 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.00 | 0.04 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 30.22 | 1342.11 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 5.41 | 58.40 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 3552

INPUT
Description: Upstream I-5
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 112.46 | 7.11 | 123 | 3.462 | 136.81 | -23.37 | 200 | -25.8 |
| 220 | -25.8 | 263.19 | -8.84 | 283.48 | -7.34 | 310.14 | -6.16 | 369.28 | .71 |
| 415.65 | 2.37 | 760.58 | 7.42 | 1094.49 | 11.53 | 1231 | 25.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 123 | .03 | 415.65 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 123 | 415.65 | 277.2 | 254.1 370.5 | .5 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 319 | 1231 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.26 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.04 | Wt. n-Val. | 0.035 | 0.030 |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 12.21 | Reach Len. (ft) | 28.70 | 28.70 |
| 28.70 | | | | |
| Crit W.S. (ft) | -17.74 | Flow Area (sq ft) | 165.21 | 5743.10 |
| E.G. Slope (ft/ft) | 0.000015 | Area (sq ft) | 165.21 | 6963.31 |
| 3441.43 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 62.03 | 9787.97 |
| Top Width (ft) | 1024.99 | Top Width (ft) | 46.66 | 292.65 |
| 685.68 | | | | |
| Vel Total (ft/s) | 1.67 | Avg. Vel. (ft/s) | 0.38 | 1.70 |
| Max Chl Dpth (ft) | 38.01 | Hydr. Depth (ft) | 3.54 | 29.30 |
| Conv. Total (cfs) | 2551953.0 | Conv. (cfs) | 16070.0 | 2535883.0 |
| Length Wtd. (ft) | 28.70 | Wetted Per. (ft) | 47.64 | 215.77 |
| Min Ch El (ft) | -25.80 | Shear (lb/sq ft) | 0.00 | 0.02 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.04 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 30.12 | 1338.30 |
| 84.95 | | | | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 5.38 | 58.25 |
| 11.61 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE

RIVER: Agua Hedionda
REACH: 1 RS: 3400

INPUT
Description: Interstate 5 Bridge
Distance from Upstream XS = 28.7
Deck/Roadway Width = 158
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 7

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 33.6 | -10 | 90 | 30.6 | -10 | 90 | 30.6 | 25.6 |
| 280.5 | 24.9 | 19.9 | 280.5 | 24.9 | -20 | 626 | 22 | -20 |
| 1374.4 | 26.8 | -20 | | | | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 112.46 | 7.11 | 123 | 3.462 | 136.81 | -23.37 | 200 | -25.8 |
| 220 | -25.8 | 263.19 | -8.84 | 283.48 | -7.34 | 310.14 | -6.16 | 369.28 | .71 |
| 415.65 | 2.37 | 760.58 | 7.42 | 1094.49 | 11.53 | 1231 | 25.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 123 | .03 | 415.65 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 123 | 415.65 | .5 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 319 | 1231 | 20 | F |

Downstream Deck/Roadway Coordinates num= 7

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 33.6 | -10 | 71 | 30.6 | -10 | 71 | 30.6 | 25.6 |
| 261.5 | 24.9 | 19.9 | 261.5 | 24.9 | -20 | 628 | 22 | -20 |
| 1356 | 26.8 | -20 | | | | | | |

Downstream Bridge Cross Section Data

Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.8 | 36.9 | 13.2 | 56 | 0 | 168.94 | -25.8 | 192.55 | -25.8 |
| 252.17 | -12.66 | 317 | -6.81 | 380 | -.81 | 390 | 0 | 780 | 5 |
| 1143 | 6.5 | 1231 | 41 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 56 | .03 | 390 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 56 | 390 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 328.9 | 1231 | 20 | F |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data

Upstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 90 | 25.5 | 156.25 | -25.8 |

Downstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 71 | 25.6 | 137.25 | -25.8 |

Abutment Data

Upstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 220 | -25.8 | 280.5 | 19.9 |

Downstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 200 | -25.8 | 261.5 | 19.9 |

Number of Piers = 6

Pier Data

Pier Station Upstream= 117.25 Downstream= 98.25

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 29.776 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 29.67 |

Pier Data
Pier Station Upstream= 143.25 Downstream= 124.25

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 28.89 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 28.765 |

Pier Data
Pier Station Upstream= 169.25 Downstream= 150.25

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 28.24 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 28.15 |

Pier Data
Pier Station Upstream= 201.25 Downstream= 182.25

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 27.32 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 27.32 |

Pier Data
Pier Station Upstream= 227.25 Downstream= 208.25

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 26.425 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 26.36 |

Pier Data
Pier Station Upstream= 253.25 Downstream= 234.25

| Upstream num= 2 | | | |
|---|---|---|---|
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 25.5 |
| **Downstream num= 2** | | | |
| Width | Elev | Width | Elev |
| 3 | 0 | 3 | 25.45 |

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 12.26 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 12.21 | E.G. Elev (ft) | 12.23 |
| 12.20 | | | |
| Q Total (cfs) | 9850.00 | W.S. Elev (ft) | 12.12 |
| 12.08 | | | |
| Q Bridge (cfs) | 9850.00 | Crit W.S. (ft) | -16.30 |
| -14.62 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 37.92 |
| 37.88 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 2.61 |
| 2.70 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 3775.85 |
| 3643.70 | | | |
| Weir Submerg | | Froude # Chl | 0.09 |
| 0.09 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 61526.13 |
| 56978.31 | | | |
| Min El Weir Flow (ft) | 22.01 | Hydr Depth (ft) | 26.05 |
| 25.21 | | | |
| Min El Prs (ft) | 25.60 | W.P. Total (ft) | 477.44 |
| 465.70 | | | |
| Delta EG (ft) | 0.11 | Conv. Total (cfs) | 757025.7 |
| 711282.1 | | | |
| Delta WS (ft) | 0.09 | Top Width (ft) | 144.92 |
| 144.55 | | | |
| BR Open Area (sq ft) | 5325.10 | Frctn Loss (ft) | 0.03 |
| 0.00 | | | |
| BR Open Vel (ft/s) | 2.70 | C & E Loss (ft) | 0.00 |
| 0.04 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.08 |
| 0.09 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.22 |
| 0.25 | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 3296

INPUT
Description:
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.8 | 36.9 | 13.2 | 56 | 0 | 168.94 | -25.8 | 192.55 | -25.8 |
| 252.17 | -12.66 | 317 | -6.81 | 380 | -.81 | 390 | 0 | 780 | 5 |
| 1143 | 6.5 | 1231 | 41 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 56 | .03 | 390 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 56 | 390 | 252.4 | 322 | 470.7 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 328.9 | 1231 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.15 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.035 | 0.030 |
| W.S. Elev (ft) | 12.12 | Reach Len. (ft) | 252.40 | 322.00 |
| 470.70 | | | | |
| Crit W.S. (ft) | -15.63 | Flow Area (sq ft) | 106.32 | 7226.14 |
| E.G. Slope (ft/ft) | 0.000010 | Area (sq ft) | 106.32 | 8136.60 |
| 6106.14 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 41.10 | 9808.90 |
| Top Width (ft) | 1118.88 | Top Width (ft) | 17.54 | 334.00 |
| 767.34 | | | | |
| Vel Total (ft/s) | 1.34 | Avg. Vel. (ft/s) | 0.39 | 1.36 |
| Max Chl Dpth (ft) | 37.92 | Hydr. Depth (ft) | 6.06 | 26.48 |
| Conv. Total (cfs) | 3157175.0 | Conv. (cfs) | 13173.7 | 3144002.0 |
| Length Wtd. (ft) | 321.72 | Wetted Per. (ft) | 21.32 | 277.56 |
| Min Ch El (ft) | -25.80 | Shear (lb/sq ft) | 0.00 | 0.02 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.02 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 29.85 | 1312.32 |
| 79.09 | | | | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 5.32 | 57.23 |
| 10.79 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2973

INPUT
Description:
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 52.5 | 13.5 | 45.9 | 28 | 39.4 | 37.6 | 32.8 | 69 | 6.5 |
| 80 | -1.836 | 100 | -8.81 | 112 | -11.81 | 117 | -11.81 | 147 | -10.81 |
| 157 | -9.81 | 234 | -9.81 | 257 | -10.81 | 265 | -11.81 | 277 | -11.81 |
| 397 | -10.81 | 489 | -1.81 | 516 | -1.81 | 562 | -2.81 | 589 | -3.81 |
| 976 | -3.81 | 1015 | .19 | 1020 | .19 | 1137 | 6.5 | 1145 | 13.2 |
| 1156 | 19.7 | 1169.5 | 26.2 | 1181 | 32.8 | 1190 | 39.4 | 1201.5 | 45.9 |
| 1223 | 52.5 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 80 | .03 | 1020 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 80 | 1020 | 252 | 298 | 530 .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 739.7 | 1223 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.14 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| W.S. Elev (ft) | 12.13 | Reach Len. (ft) | 252.00 | 298.00 |
| 530.00 | | | | |
| Crit W.S. (ft) | -7.61 | Flow Area (sq ft) | 126.76 | 12717.29 |
| E.G. Slope (ft/ft) | 0.000005 | Area (sq ft) | 126.76 | 17088.30 |
| 1047.22 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 36.92 | 9813.08 |
| Top Width (ft) | 1081.45 | Top Width (ft) | 17.73 | 940.00 |
| 123.73 | | | | |
| Vel Total (ft/s) | 0.77 | Avg. Vel. (ft/s) | 0.29 | 0.77 |
| Max Chl Dpth (ft) | 23.94 | Hydr. Depth (ft) | 7.15 | 19.28 |
| Conv. Total (cfs) | 4535717.0 | Conv. (cfs) | 17001.9 | 4518715.0 |
| Length Wtd. (ft) | 297.72 | Wetted Per. (ft) | 22.58 | 661.87 |
| Min Ch El (ft) | -11.81 | Shear (lb/sq ft) | 0.00 | 0.01 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 29.18 | 1219.09 |
| 40.44 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 5.22 | 52.53 |
| 5.97 | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2676

INPUT
Description:
Station Elevation Data num= 27

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 42.6 | 14 | 32.8 | 20.5 | 26.2 | 40.6 | 19.7 | 50 | 13.2 |
| 66 | 6.5 | 88 | .19 | 99 | -3.81 | 132 | -9.81 | 166.5 | -19.81 |
| 194 | -25.81 | 214 | -25.81 | 246 | -12.81 | 302 | -12.81 | 384 | -3.81 |
| 902 | -3.81 | 915 | -2.81 | 923 | -1.81 | 971 | .19 | 1078 | 6.5 |
| 1118 | 13.2 | 1130 | 19.7 | 1157 | 26.2 | 1170 | 32.8 | 1186 | 39.4 |
| 1202 | 45.9 | 1230 | 52.5 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 88 | .03 | 971 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 88 | 971 | 214 | 224 | 878 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 544.7 | 1230 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.14 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| W.S. Elev (ft) | 12.13 | Reach Len. (ft) | 214.00 | 224.00 |
| 878.00 | | | | |
| Crit W.S. (ft) | -14.57 | Flow Area (sq ft) | 230.98 | 10066.07 |
| E.G. Slope (ft/ft) | 0.000006 | Area (sq ft) | 230.98 | 16697.18 |
| 1034.08 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 82.94 | 9767.06 |
| Top Width (ft) | 1059.03 | Top Width (ft) | 35.44 | 883.00 |
| 140.59 | | | | |
| Vel Total (ft/s) | 0.96 | Avg. Vel. (ft/s) | 0.36 | 0.97 |
| Max Chl Dpth (ft) | 37.94 | Hydr. Depth (ft) | 6.52 | 22.04 |
| Conv. Total (cfs) | 3916494.0 | Conv. (cfs) | 32978.8 | 3883515.0 |
| Length Wtd. (ft) | 224.20 | Wetted Per. (ft) | 37.45 | 463.05 |
| Min Ch El (ft) | -25.81 | Shear (lb/sq ft) | 0.00 | 0.01 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 28.14 | 1103.53 |
| 27.78 | | | | |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 5.07 | 46.29 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2451

INPUT
Description:
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 142 | 266 | 103 | 103 | .5 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 266.5 | 380 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.11 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.24 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.87 | Reach Len. (ft) | 73.00 | 73.00 |
| 73.00 | | | | |
| Crit W.S. (ft) | -2.28 | Flow Area (sq ft) | 112.69 | 2433.57 |
| 5.67 | | | | |
| E.G. Slope (ft/ft) | 0.000128 | Area (sq ft) | 112.69 | 2433.57 |
| 50.58 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 157.90 | 9682.38 |
| 9.72 | | | | |
| Top Width (ft) | 151.95 | Top Width (ft) | 19.29 | 124.00 |
| 8.66 | | | | |
| Vel Total (ft/s) | 3.86 | Avg. Vel. (ft/s) | 1.40 | 3.98 |
| 1.71 | | | | |
| Max Chl Dpth (ft) | 21.68 | Hydr. Depth (ft) | 5.84 | 19.63 |
| 11.34 | | | | |
| Conv. Total (cfs) | 872276.7 | Conv. (cfs) | 13983.0 | 857433.1 |
| 860.6 | | | | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 22.55 | 128.27 |
| 0.84 | | | | |
| Min Ch El (ft) | -9.81 | Shear (lb/sq ft) | 0.04 | 0.15 |
| 0.05 | | | | |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.06 | 0.60 |

0.09
Frctn Loss (ft)
16.85
C & E Loss (ft)
2.86

| | | |
|---|---|---|
| Cum Volume (acre-ft) | 27.30 | 1054.34 |
| Cum SA (acres) | 4.93 | 43.70 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE

RIVER: Agua Hedionda
REACH: 1 RS: 2400

INPUT
Description: NCTD RR Bridge
Distance from Upstream XS = 73
Deck/Roadway Width = 19
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 91 | 31.07 | 26.07 | 289 | 31.22 | 26.22 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 142 | 266 | .5 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 266.5 | 380 | 20 | F |

Downstream Deck/Roadway Coordinates
num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 91 | 31.07 | 26.07 | 289 | 31.22 | 26.22 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

Bank Sta: Left Right Coeff Contr. Expan.
142 266 .1 .3

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 131.9 | 20 | F |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 13

Pier Data
Pier Station Upstream= 105.14 Downstream= 105.14
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Pier Data
Pier Station Upstream= 119.28 Downstream= 119.28
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Pier Data
Pier Station Upstream= 133.43 Downstream= 133.43
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Pier Data
Pier Station Upstream= 147.57 Downstream= 147.57
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Pier Data
Pier Station Upstream= 161.7 Downstream= 161.7
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Pier Data
Pier Station Upstream= 175.86 Downstream= 175.86

```
Upstream      num=        2
    Width   Elev     Width   Elev
        2     -10         2     30
Downstream      num=          2
    Width   Elev     Width   Elev
        2     -10         2     30

Pier Data
Pier Station      Upstream=      190    Downstream=      190
Upstream      num=        2
    Width   Elev     Width   Elev
        2     -10         2     30
Downstream      num=          2
    Width   Elev     Width   Elev
        2     -10         2     30

Pier Data
Pier Station      Upstream=   204.14    Downstream=   204.14
Upstream      num=        2
    Width   Elev     Width   Elev
        2     -10         2     30
Downstream      num=          2
    Width   Elev     Width   Elev
        2     -10         2     30

Pier Data
Pier Station      Upstream=    218.3    Downstream=    218.3
Upstream      num=        2
    Width   Elev     Width   Elev
        2     -10         2     30
Downstream      num=          2
    Width   Elev     Width   Elev
        2     -10         2     30

Pier Data
Pier Station      Upstream=   232.43    Downstream=   232.43
Upstream      num=        2
    Width   Elev     Width   Elev
        2     -10         2     30
Downstream      num=          2
    Width   Elev     Width   Elev
        2     -10         2     30

Pier Data
Pier Station      Upstream=   246.57    Downstream=   246.57
Upstream      num=        2
    Width   Elev     Width   Elev
        2     -10         2     30
Downstream      num=          2
    Width   Elev     Width   Elev
        2     -10         2     30

Pier Data
Pier Station      Upstream=    260.7    Downstream=    260.7
Upstream      num=        2
    Width   Elev     Width   Elev
        2     -10         2     30
Downstream      num=          2
    Width   Elev     Width   Elev
        2     -10         2     30

Pier Data
Pier Station      Upstream=   274.86    Downstream=   274.86
```

```
Upstream      num=        2
    Width    Elev     Width    Elev
        2      -10         2      30
Downstream      num=        2
    Width    Elev     Width    Elev
        2      -10         2      30

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Yarnell                  KVal =     2.5
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
```

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 12.11 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 11.87 | E.G. Elev (ft) | 11.84 |
| 11.84 | | | |
| Q Total (cfs) | 9850.00 | W.S. Elev (ft) | 11.51 |
| 11.51 | | | |
| Q Bridge (cfs) | 9850.00 | Crit W.S. (ft) | -1.54 |
| -1.54 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 21.32 |
| 21.32 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.59 |
| 4.55 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 2143.94 |
| 2163.38 | | | |
| Weir Submerg | | Froude # Chl | 0.19 |
| 0.18 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 22022.32 |
| 22119.44 | | | |
| Min El Weir Flow (ft) | 31.08 | Hydr Depth (ft) | 17.40 |
| 17.74 | | | |
| Min El Prs (ft) | 26.22 | W.P. Total (ft) | 486.37 |
| 489.40 | | | |
| Delta EG (ft) | 0.35 | Conv. Total (cfs) | 286367.1 |
| 288726.5 | | | |
| Delta WS (ft) | 0.36 | Top Width (ft) | 130.56 |
| 130.56 | | | |
| BR Open Area (sq ft) | 4301.02 | Frctn Loss (ft) | |
| BR Open Vel (ft/s) | 4.59 | C & E Loss (ft) | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.33 |
| 0.32 | | | |
| Br Sel Method | Yarnell | Power Total (lb/ft s) | 1.50 |
| 1.46 | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2348

INPUT
Description:
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 142 | 266 | 1845 | 423 | 526 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 131.9 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.76 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.25 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.51 | Reach Len. (ft) | 1845.00 | 423.00 |
| 526.00 | | | | |
| Crit W.S. (ft) | -2.28 | Flow Area (sq ft) | 83.47 | 2388.93 |
| 47.51 | | | | |
| E.G. Slope (ft/ft) | 0.000135 | Area (sq ft) | 105.85 | 2388.93 |
| 47.51 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 151.44 | 9645.94 |
| 52.61 | | | | |
| Top Width (ft) | 151.09 | Top Width (ft) | 18.70 | 124.00 |
| 8.39 | | | | |
| Vel Total (ft/s) | 3.91 | Avg. Vel. (ft/s) | 1.81 | 4.04 |
| 1.11 | | | | |
| Max Chl Dpth (ft) | 21.32 | Hydr. Depth (ft) | 8.26 | 19.27 |
| 5.66 | | | | |
| Conv. Total (cfs) | 848967.4 | Conv. (cfs) | 13053.0 | 831380.0 |
| 4534.5 | | | | |
| Length Wtd. (ft) | 434.50 | Wetted Per. (ft) | 11.81 | 128.27 |
| 14.09 | | | | |
| Min Ch El (ft) | -9.81 | Shear (lb/sq ft) | 0.06 | 0.16 |
| 0.03 | | | | |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.11 | 0.63 |

| | | | | | |
|---|---|---|---|---|---|
| 0.03 | | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 27.06 | 1049.13 | |
| 16.73 | | | | | |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 4.89 | 43.43 | |
| 2.84 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 1833

INPUT
Description:
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 15.19 | 55 | .19 | 152 | -15.81 | 221 | -15.81 | 700 | -17.81 |
| 1368 | -17.81 | 1508 | -11.81 | 1627 | -11.81 | 1930 | -15.81 | 2066 | -15.81 |
| 2166 | -5.81 | 2221 | .19 | 2339 | 12.19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 55 | .03 | 2221 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 55 | 2221 | 1900 561.4 | 250 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 905.2 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.69 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.68 | Reach Len. (ft) | 1900.00 | 561.40 |
| 250.00 | | | | |
| Crit W.S. (ft) | -15.35 | Flow Area (sq ft) | | 34666.08 |
| 649.63 | | | | |
| E.G. Slope (ft/ft) | 0.000000 | Area (sq ft) | 242.23 | 58155.45 |
| 649.63 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | | 9793.16 |
| 56.84 | | | | |
| Top Width (ft) | 2321.18 | Top Width (ft) | 42.15 | 2166.00 |
| 113.03 | | | | |
| Vel Total (ft/s) | 0.28 | Avg. Vel. (ft/s) | | 0.28 |
| 0.09 | | | | |
| Max Chl Dpth (ft) | 29.49 | Hydr. Depth (ft) | | 26.35 |
| 5.75 | | | | |
| Conv. Total (cfs) | 15283390.0 | Conv. (cfs) | | |
| 15195200.0 | 88188.5 | | | |

| | | | | |
|---|---|---|---|---|
| Length Wtd. (ft) | 562.70 | Wetted Per. (ft) | | 1316.78 |
| 113.61 | | | | |
| Min Ch El (ft) | -17.81 | Shear (lb/sq ft) | | 0.00 |
| 0.00 | | | | |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 19.69 | 755.17 |
| 12.52 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.60 | 32.31 |
| 2.11 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 1251

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.69 | 31 | 10.19 | 70 | .19 | 113 | -7.81 | 334 | -7.81 |
| 357 | -5.81 | 406 | -7.81 | 487 | -17.81 | 547 | -17.81 | 554 | -15.81 |
| 575 | -15.81 | 613 | -13.81 | 660 | -13.81 | 673 | -15.81 | 774 | .19 |
| 865 | 15.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 70 | .03 | 774 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 70 | 774 | 702 653.4 | 609 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.68 | Reach Len. (ft) | 702.00 | 653.40 |
| 609.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 262.88 | 15351.11 |
| 400.38 | | | | |
| E.G. Slope (ft/ft) | 0.000003 | Area (sq ft) | 262.88 | 15351.11 |
| 400.38 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 52.91 | 9708.43 |
| 88.67 | | | | |
| Top Width (ft) | 825.89 | Top Width (ft) | 52.19 | 704.00 |
| 69.70 | | | | |
| Vel Total (ft/s) | 0.62 | Avg. Vel. (ft/s) | 0.20 | 0.63 |
| 0.22 | | | | |
| Max Chl Dpth (ft) | 29.49 | Hydr. Depth (ft) | 5.04 | 21.81 |

| | | | | | |
|---|---|---|---|---|---|
| 5.74 | | | | | |
| Conv. Total (cfs) | 6002828.0 | Conv. (cfs) | 32243.7 | 5916549.0 | 54035.4 |
| Length Wtd. (ft) | 653.40 | Wetted Per. (ft) | 53.53 | 707.23 | 70.64 |
| Min Ch El (ft) | -17.81 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 8.67 | 281.49 | 9.51 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 1.55 | 13.82 | 1.58 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 618

INPUT
Description:
Station Elevation Data num= 11

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.19 | 55 | .19 | 80 | -3.81 | 131 | -17.81 | 170 | -19.81 |
| 252 | -19.81 | 314 | .19 | 440 | .19 | 537 | -7.81 | 597 | .19 |
| 664 | 20.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 55 | .03 | 597 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 55 | 597 | 167 | 297 | 458 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.67 | Reach Len. (ft) | 167.00 | 297.00 |
| 458.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 278.71 | 10461.34 |
| 220.69 | | | | |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 278.71 | 10461.34 |
| 220.69 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 97.42 | 9676.24 |
| 76.34 | | | | |
| Top Width (ft) | 629.02 | Top Width (ft) | 48.56 | 542.00 |
| 38.45 | | | | |
| Vel Total (ft/s) | 0.90 | Avg. Vel. (ft/s) | 0.35 | 0.92 |
| 0.35 | | | | |
| Max Chl Dpth (ft) | 31.48 | Hydr. Depth (ft) | 5.74 | 19.30 |
| 5.74 | | | | |

| | | | | |
|---|---|---|---|---|
| Conv. Total (cfs) | 3766376.0 | Conv. (cfs) | 37249.4 | 3699935.0 |
| 29191.6 | | | | |
| Length Wtd. (ft) | 295.95 | Wetted Per. (ft) | 49.90 | 548.26 |
| 40.13 | | | | |
| Min Ch El (ft) | -19.81 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.00 | | | | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 4.31 | 87.90 |
| 5.17 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.73 | 4.47 |
| 0.83 | | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 321

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 12.19 | 20 | 10.19 | 45 | 5.19 | 100 | .19 | 146 | -3.81 |
| 164 | -3.81 | 212 | -17.81 | 245 | -17.81 | 285 | -11.81 | 320 | -3.81 |
| 351 | -3.81 | 362 | -5.81 | 396 | -11.81 | 419 | -11.81 | 478 | .19 |
| 536 | 15.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 100 | .03 | 478 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 100 | 478 | 161 | 216 | 368 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.66 | Reach Len. (ft) | 161.00 | 216.00 |
| 368.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 602.93 | 7614.77 |
| 254.13 | | | | |
| E.G. Slope (ft/ft) | 0.000012 | Area (sq ft) | 602.93 | 7614.77 |
| 254.13 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 298.42 | 9436.20 |
| 115.38 | | | | |
| Top Width (ft) | 516.98 | Top Width (ft) | 94.65 | 378.00 |
| 44.33 | | | | |
| Vel Total (ft/s) | 1.16 | Avg. Vel. (ft/s) | 0.49 | 1.24 |
| 0.45 | | | | |
| Max Chl Dpth (ft) | 29.47 | Hydr. Depth (ft) | 6.37 | 20.14 |
| 5.73 | | | | |
| Conv. Total (cfs) | 2887208.0 | Conv. (cfs) | 87472.4 | 2765915.0 |
| 33819.9 | | | | |
| Length Wtd. (ft) | 219.41 | Wetted Per. (ft) | 95.44 | 383.44 |
| 45.79 | | | | |
| Min Ch El (ft) | -17.81 | Shear (lb/sq ft) | 0.00 | 0.01 |

| | | | | | |
|---|---|---|---|---|---|
| 0.00 | | | | | |
| Alpha | | 1.10 | Stream Power (lb/ft s) | 0.00 | 0.02 |
| 0.00 | | | | | |
| Frctn Loss (ft) | | 0.01 | Cum Volume (acre-ft) | 2.62 | 26.28 |
| 2.67 | | | | | |
| C & E Loss (ft) | | 0.04 | Cum SA (acres) | 0.46 | 1.34 |
| 0.39 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 106

INPUT
Description:
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 150 | 271 | 98 | 99 | 95 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.64 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.37 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.26 | Reach Len. (ft) | 6.00 | 6.00 |
| 6.00 | | | | |
| Crit W.S. (ft) | 4.10 | Flow Area (sq ft) | 377.27 | 1581.75 |
| 278.33 | | | | |
| E.G. Slope (ft/ft) | 0.000365 | Area (sq ft) | 377.27 | 1581.75 |
| 278.33 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 826.33 | 8290.46 |
| 733.21 | | | | |
| Top Width (ft) | 251.27 | Top Width (ft) | 84.13 | 121.00 |
| 46.14 | | | | |
| Vel Total (ft/s) | 4.40 | Avg. Vel. (ft/s) | 2.19 | 5.24 |
| 2.63 | | | | |
| Max Chl Dpth (ft) | 15.07 | Hydr. Depth (ft) | 4.48 | 13.07 |
| 6.03 | | | | |
| Conv. Total (cfs) | 515743.8 | Conv. (cfs) | 43266.3 | 434086.7 |
| 38390.8 | | | | |
| Length Wtd. (ft) | 6.00 | Wetted Per. (ft) | 84.98 | 121.28 |
| 47.53 | | | | |
| Min Ch El (ft) | -3.81 | Shear (lb/sq ft) | 0.10 | 0.30 |
| 0.13 | | | | |
| Alpha | 1.24 | Stream Power (lb/ft s) | 0.22 | 1.56 |

| | | | | | |
|---|---|---|---|---|---|
| 0.35 | | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.81 | 3.47 | |
| 0.42 | | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.13 | 0.10 | |
| 0.01 | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: Agua Hedionda
REACH: 1 RS: 75

INPUT
Description:
Distance from Upstream XS = 6
Deck/Roadway Width = 82
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

| num= | 6 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
| 0 | 22 | 0 | 95.5 | 21.55 | 0 | 95.5 | 21.55 | 12.55 |
| 296.5 | 18.62 | 9.62 | 296.5 | 18.62 | 0 | 350 | 17.5 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

| Bank Sta: | Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|
| | 150 | 271 | .3 | .5 |

Downstream Deck/Roadway Coordinates

| num= | 6 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
| 0 | 22 | 0 | 95.5 | 21.55 | 0 | 95.5 | 21.55 | 12.55 |
| 296.5 | 18.62 | 9.62 | 296.5 | 18.62 | 0 | 350 | 17.5 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

| Bank Sta: | Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|
| | 150 | 271 | .1 | .3 |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd = .8
Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 11.64 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 11.26 | E.G. Elev (ft) | 11.63 |
| 11.57 | | | |
| Q Total (cfs) | 9850.00 | W.S. Elev (ft) | 11.25 |
| 11.18 | | | |
| Q Bridge (cfs) | 9850.00 | Crit W.S. (ft) | 4.11 |
| 4.11 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 15.06 |
| 14.99 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.79 |
| 4.80 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 2058.40 |
| 2052.22 | | | |
| Weir Submerg | | Froude # Chl | 0.26 |
| 0.26 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 14125.60 |
| 13994.05 | | | |
| Min El Weir Flow (ft) | 18.03 | Hydr Depth (ft) | 23.04 |
| 21.84 | | | |
| Min El Prs (ft) | 12.55 | W.P. Total (ft) | 318.31 |
| 313.68 | | | |
| Delta EG (ft) | 0.08 | Conv. Total (cfs) | 354292.1 |
| 356935.0 | | | |
| Delta WS (ft) | 0.08 | Top Width (ft) | 89.35 |
| 93.98 | | | |
| BR Open Area (sq ft) | 2116.59 | Frctn Loss (ft) | 0.06 |
| 0.01 | | | |
| BR Open Vel (ft/s) | 4.80 | C & E Loss (ft) | 0.00 |
| 0.00 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.31 |
| 0.31 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 1.49 |
| 1.49 | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 0

INPUT
Description:
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 150 | 271 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.56 | | | | |
| Vel Head (ft) | 0.38 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.18 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 4.11 | Flow Area (sq ft) | 370.26 | 1571.55 | 274.45 |
| E.G. Slope (ft/ft) | 0.000374 | Area (sq ft) | 370.26 | 1571.55 | 274.45 |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 822.84 | 8300.36 | 726.80 |
| Top Width (ft) | 249.21 | Top Width (ft) | 82.23 | 121.00 | 45.98 |
| Vel Total (ft/s) | 4.44 | Avg. Vel. (ft/s) | 2.22 | 5.28 | 2.65 |
| Max Chl Dpth (ft) | 14.99 | Hydr. Depth (ft) | 4.50 | 12.99 | 5.97 |
| Conv. Total (cfs) | 509603.7 | Conv. (cfs) | 42570.8 | 429431.1 | 37601.8 |
| Length Wtd. (ft) | | Wetted Per. (ft) | 83.08 | 121.28 | 47.34 |
| Min Ch El (ft) | -3.81 | Shear (lb/sq ft) | 0.10 | 0.30 | 0.14 |
| Alpha | 1.24 | Stream Power (lb/ft s) | 0.23 | 1.60 | 0.36 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

SUMMARY OF MANNING'S N VALUES

River:Agua Hedionda

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| 1 | 6860 | .035 | .03 | .035 |
| 1 | 5638 | .035 | .03 | .035 |
| 1 | 4633 | .035 | .03 | .035 |
| 1 | 3981 | .035 | .03 | .035 |
| 1 | 3576 | .035 | .03 | .035 |
| 1 | 3552 | .035 | .03 | .035 |
| 1 | 3400 | Bridge | | |
| 1 | 3296 | .035 | .03 | .035 |
| 1 | 2973 | .035 | .03 | .035 |
| 1 | 2676 | .035 | .03 | .035 |
| 1 | 2451 | .035 | .03 | .035 |
| 1 | 2400 | Bridge | | |
| 1 | 2348 | .035 | .03 | .035 |
| 1 | 1833 | .035 | .03 | .035 |
| 1 | 1251 | .035 | .03 | .035 |
| 1 | 618 | .035 | .03 | .035 |
| 1 | 321 | .035 | .03 | .035 |
| 1 | 106 | .035 | .03 | .035 |
| 1 | 75 | Bridge | | |
| 1 | 0 | .035 | .03 | .035 |

SUMMARY OF REACH LENGTHS

River: Agua Hedionda

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| 1 | 6860 | 1237 | 1222 | 1222 |
| 1 | 5638 | 1293 | 1005 | 696 |
| 1 | 4633 | 348 | 652 | 1178 |
| 1 | 3981 | 591 | 395 | 850 |
| 1 | 3576 | 24 | 24 | 24 |
| 1 | 3552 | 277.2 | 254.1 | 370.5 |
| 1 | 3400 | Bridge | | |
| 1 | 3296 | 252.4 | 322 | 470.7 |
| 1 | 2973 | 252 | 298 | 530 |
| 1 | 2676 | 214 | 224 | 878 |
| 1 | 2451 | 103 | 103 | 103 |
| 1 | 2400 | Bridge | | |
| 1 | 2348 | 1845 | 423 | 526 |
| 1 | 1833 | 1900 | 561.4 | 250 |
| 1 | 1251 | 702 | 653.4 | 609 |
| 1 | 618 | 167 | 297 | 458 |
| 1 | 321 | 161 | 216 | 368 |
| 1 | 106 | 98 | 99 | 95 |
| 1 | 75 | Bridge | | |
| 1 | 0 | | | |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Agua Hedionda

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | | 6860 | .1 | .3 |
| 1 | | 5638 | .1 | .3 |
| 1 | | 4633 | .1 | .3 |
| 1 | | 3981 | .1 | .3 |
| 1 | | 3576 | .1 | .3 |
| 1 | | 3552 | .5 | .5 |
| 1 | | 3400 | Bridge | |
| 1 | | 3296 | .1 | .3 |
| 1 | | 2973 | .1 | .3 |
| 1 | | 2676 | .1 | .3 |
| 1 | | 2451 | .5 | .5 |
| 1 | | 2400 | Bridge | |
| 1 | | 2348 | .1 | .3 |
| 1 | | 1833 | .1 | .3 |
| 1 | | 1251 | .1 | .3 |
| 1 | | 618 | .1 | .3 |
| 1 | | 321 | .1 | .3 |
| 1 | | 106 | .3 | .5 |
| 1 | | 75 | Bridge | |
| 1 | | 0 | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (cfs) (sq ft) | Top Width (ft) (ft) | Froude # Chl (ft) | (ft) |
| 1 | 6860 | PF 1 | 9850.00 | -6.81 | 12.27 | |
| 12.27 | 0.000001 | 0.36 | 28390.56 | 1811.56 | 0.02 | |
| 1 | 5638 | PF 1 | 9850.00 | -7.81 | 12.26 | |
| 12.27 | 0.000001 | 0.38 | 26405.65 | 1578.85 | 0.02 | |
| 1 | 4633 | PF 1 | 9850.00 | -6.81 | 12.26 | |
| 12.27 | 0.000001 | 0.38 | 26392.34 | 1564.59 | 0.02 | |
| 1 | 3981 | PF 1 | 9850.00 | -10.81 | 12.26 | -5.39 |
| 12.26 | 0.000002 | 0.45 | 22283.34 | 1863.25 | 0.02 | |
| 1 | 3576 | PF 1 | 9850.00 | -25.80 | 12.22 | -16.75 |
| 12.26 | 0.000014 | 1.69 | 5984.83 | 1048.38 | 0.05 | |
| 1 | 3552 | PF 1 | 9850.00 | -25.80 | 12.21 | -17.74 |
| 12.26 | 0.000015 | 1.70 | 5908.30 | 1024.99 | 0.06 | |
| 1 | 3400 | | Bridge | | | |
| 1 | 3296 | PF 1 | 9850.00 | -25.80 | 12.12 | -15.63 |
| 12.15 | 0.000010 | 1.36 | 7332.46 | 1118.88 | 0.05 | |
| 1 | 2973 | PF 1 | 9850.00 | -11.81 | 12.13 | -7.61 |
| 12.14 | 0.000005 | 0.77 | 12844.06 | 1081.45 | 0.03 | |
| 1 | 2676 | PF 1 | 9850.00 | -25.81 | 12.13 | -14.57 |
| 12.14 | 0.000006 | 0.97 | 10297.05 | 1059.03 | 0.04 | |
| 1 | 2451 | PF 1 | 9850.00 | -9.81 | 11.87 | -2.28 |
| 12.11 | 0.000128 | 3.98 | 2551.94 | 151.95 | 0.16 | |
| 1 | 2400 | | Bridge | | | |
| 1 | 2348 | PF 1 | 9850.00 | -9.81 | 11.51 | -2.28 |
| 11.76 | 0.000135 | 4.04 | 2519.91 | 151.09 | 0.16 | |
| 1 | 1833 | PF 1 | 9850.00 | -17.81 | 11.68 | -15.35 |
| 11.69 | 0.000000 | 0.28 | 35315.71 | 2321.18 | 0.01 | |
| 1 | 1251 | PF 1 | 9850.00 | -17.81 | 11.68 | |
| 11.68 | 0.000003 | 0.63 | 16014.37 | 825.89 | 0.02 | |
| 1 | 618 | PF 1 | 9850.00 | -19.81 | 11.67 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 11.68 | 0.000007 | 0.92 | 10960.75 | 629.02 | 0.04 | |
| 1 | | 321 | PF 1 | 9850.00 | -17.81 | 11.66 | |
| | 11.68 | 0.000012 | 1.24 | 8471.83 | 516.98 | 0.05 | |
| 1 | | 106 | PF 1 | 9850.00 | -3.81 | 11.26 | 4.10 |
| | 11.64 | 0.000365 | 5.24 | 2237.35 | 251.27 | 0.26 | |
| 1 | | 75 | | Bridge | | | |
| 1 | | 0 | PF 1 | 9850.00 | -3.81 | 11.18 | 4.11 |
| | 11.56 | 0.000374 | 5.28 | 2216.26 | 249.21 | 0.26 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : ExistingAHL

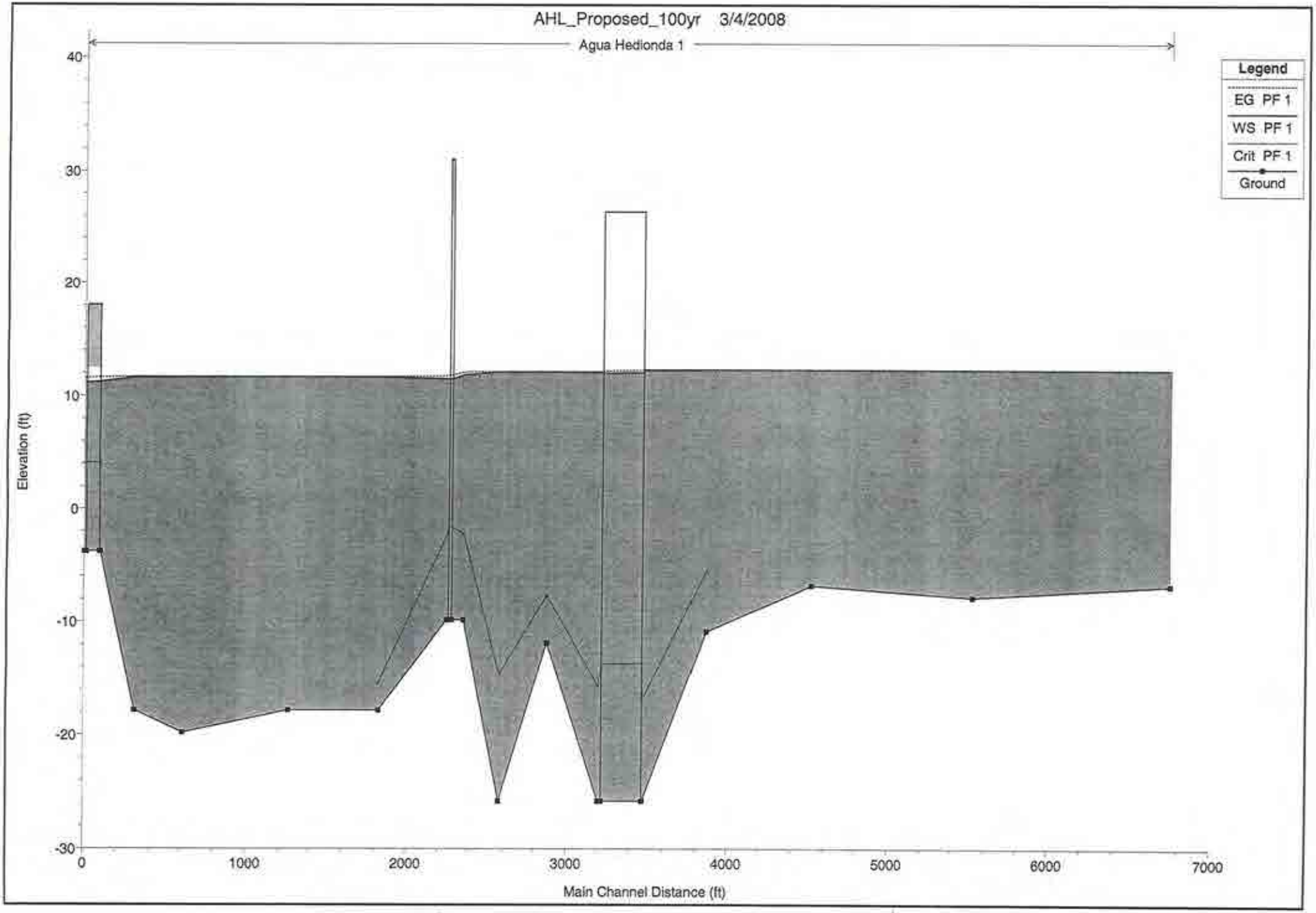
River: Agua Hedionda Reach: 1 RS: 3981 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Agua Hedionda Reach: 1 RS: 3576 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Agua Hedionda Reach: 1 RS: 3552 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 3400 Profile: PF 1 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 3400 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 3296 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2973 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Agua Hedionda Reach: 1 RS: 2676 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Agua Hedionda Reach: 1 RS: 2451 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

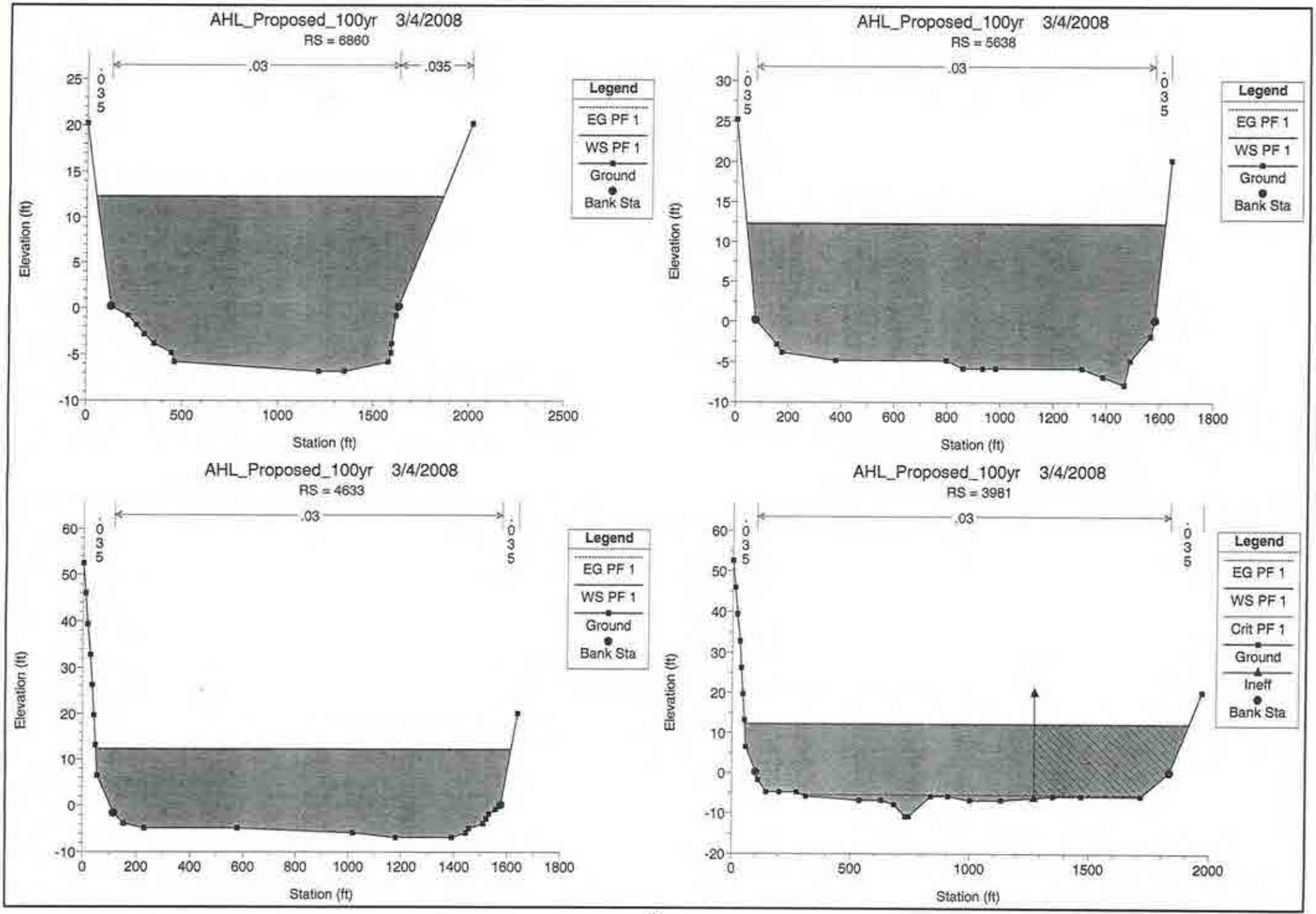
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2400 Profile: PF 1 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2400 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2348 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 1833 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Agua Hedionda Reach: 1 RS: 1251 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Agua Hedionda Reach: 1 RS: 321 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Agua Hedionda Reach: 1 RS: 106 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

**PROSPOSED**

HEC-RAS Plan: PropAHL River: Agua Hedionda Reach: 1 Profile: PF 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 1 | 6860 | PF 1 | 9850.00 | -6.81 | 12.33 | | 12.33 | 0.000001 | 0.36 | 28509.12 | 1813.23 | 0.02 |
| 1 | 5630 | PF 1 | 9850.00 | -7.81 | 12.33 | | 12.33 | 0.000001 | 0.38 | 26508.97 | 1579.24 | 0.02 |
| 1 | 4633 | PF 1 | 9850.00 | -6.81 | 12.33 | | 12.33 | 0.000001 | 0.38 | 26494.76 | 1564.85 | 0.02 |
| 1 | 3981 | PF 1 | 9850.00 | -10.81 | 12.33 | -5.39 | 12.33 | 0.000002 | 0.44 | 22363.06 | 1863.75 | 0.02 |
| 1 | 3576 | PF 1 | 9850.00 | -25.80 | 12.28 | -16.75 | 12.32 | 0.000014 | 1.69 | 6001.08 | 1049.38 | 0.05 |
| 1 | 3400 | | Bridge | | | | | | | | | |
| 1 | 3296 | PF 1 | 9850.00 | -25.80 | 12.12 | -15.63 | 12.15 | 0.000010 | 1.36 | 7332.46 | 1118.88 | 0.05 |
| 1 | 2973 | PF 1 | 9850.00 | -11.81 | 12.13 | -7.61 | 12.14 | 0.000005 | 0.77 | 12844.06 | 1081.45 | 0.03 |
| 1 | 2676 | PF 1 | 9850.00 | -25.81 | 12.13 | -14.57 | 12.14 | 0.000006 | 0.97 | 10297.05 | 1059.03 | 0.04 |
| 1 | 2451 | PF 1 | 9850.00 | -9.81 | 11.87 | -2.28 | 12.11 | 0.000128 | 3.98 | 2551.94 | 151.95 | 0.16 |
| 1 | 2400 | | Bridge | | | | | | | | | |
| 1 | 2348 | PF 1 | 9850.00 | -9.81 | 11.51 | -2.28 | 11.76 | 0.000135 | 4.04 | 2519.91 | 151.09 | 0.16 |
| 1 | 1633 | PF 1 | 9850.00 | -17.81 | 11.69 | -15.35 | 11.69 | 0.000000 | 0.28 | 35315.71 | 2321.18 | 0.01 |
| 1 | 1251 | PF 1 | 9850.00 | -17.81 | 11.68 | | 11.68 | 0.000003 | 0.63 | 16014.37 | 825.89 | 0.02 |
| 1 | 618 | PF 1 | 9850.00 | -19.81 | 11.67 | | 11.68 | 0.000007 | 0.92 | 10960.75 | 629.02 | 0.04 |
| 1 | 321 | PF 1 | 9850.00 | -17.81 | 11.66 | | 11.68 | 0.000012 | 1.24 | 8471.83 | 516.98 | 0.05 |
| 1 | 106 | PF 1 | 9850.00 | -3.81 | 11.26 | 4.10 | 11.64 | 0.000365 | 5.24 | 2237.35 | 251.27 | 0.26 |
| 1 | 75 | | Bridge | | | | | | | | | |
| 1 | 0 | PF 1 | 9850.00 | -3.81 | 11.18 | 4.11 | 11.56 | 0.000374 | 5.28 | 2216.26 | 249.21 | 0.26 |


AHL_Proposed_100yr 3/4/2008
Agua Hedionda 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
40
30
20
10
0
-10
-20
-30
0
1000
2000
3000
4000
5000
6000
7000
Main Channel Distance (ft)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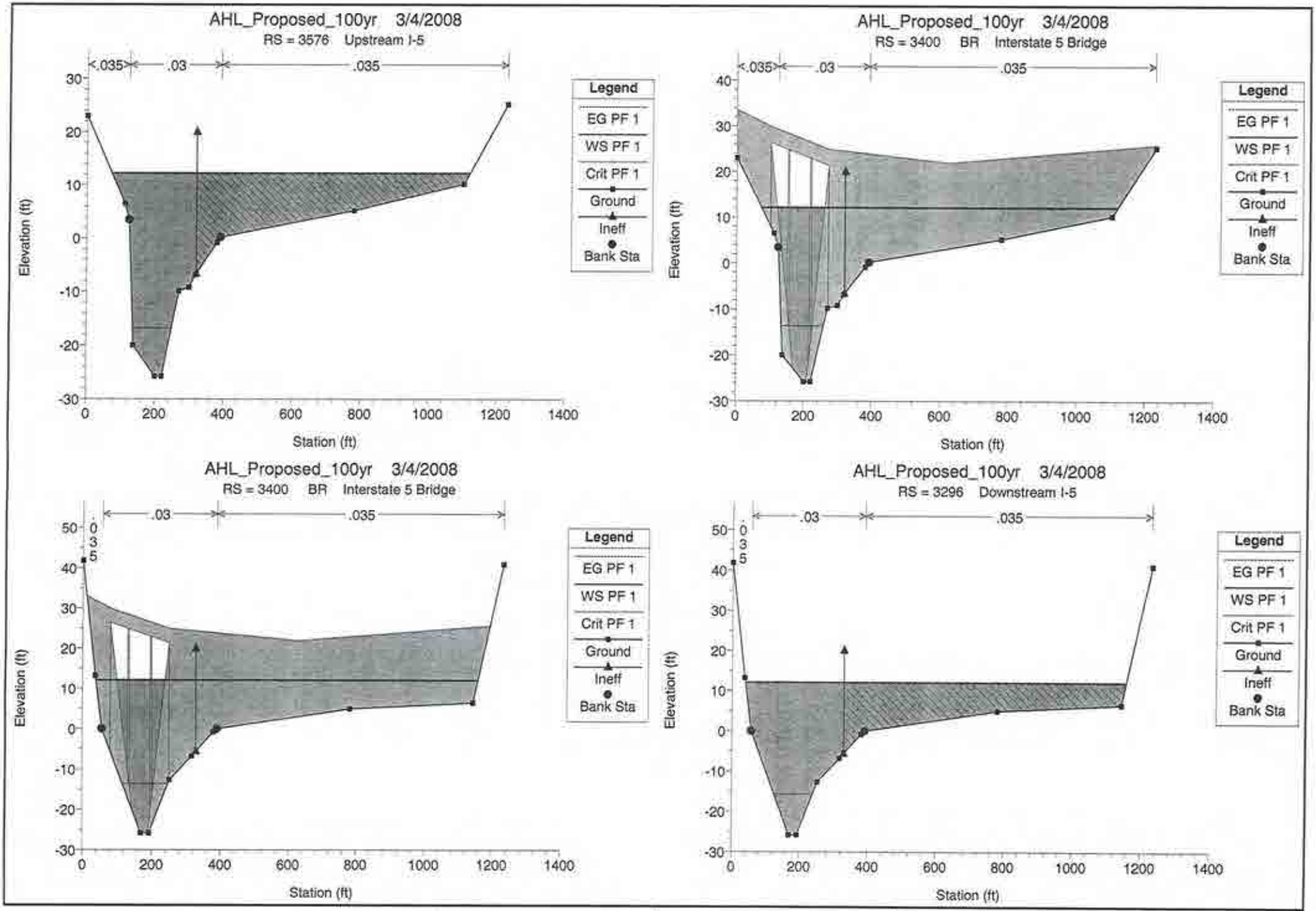
RS = 6860
.03
.035
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 5638
.03
.035
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 4633
.03
.035
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 3981
.03
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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RS = 3576 Upstream I-5
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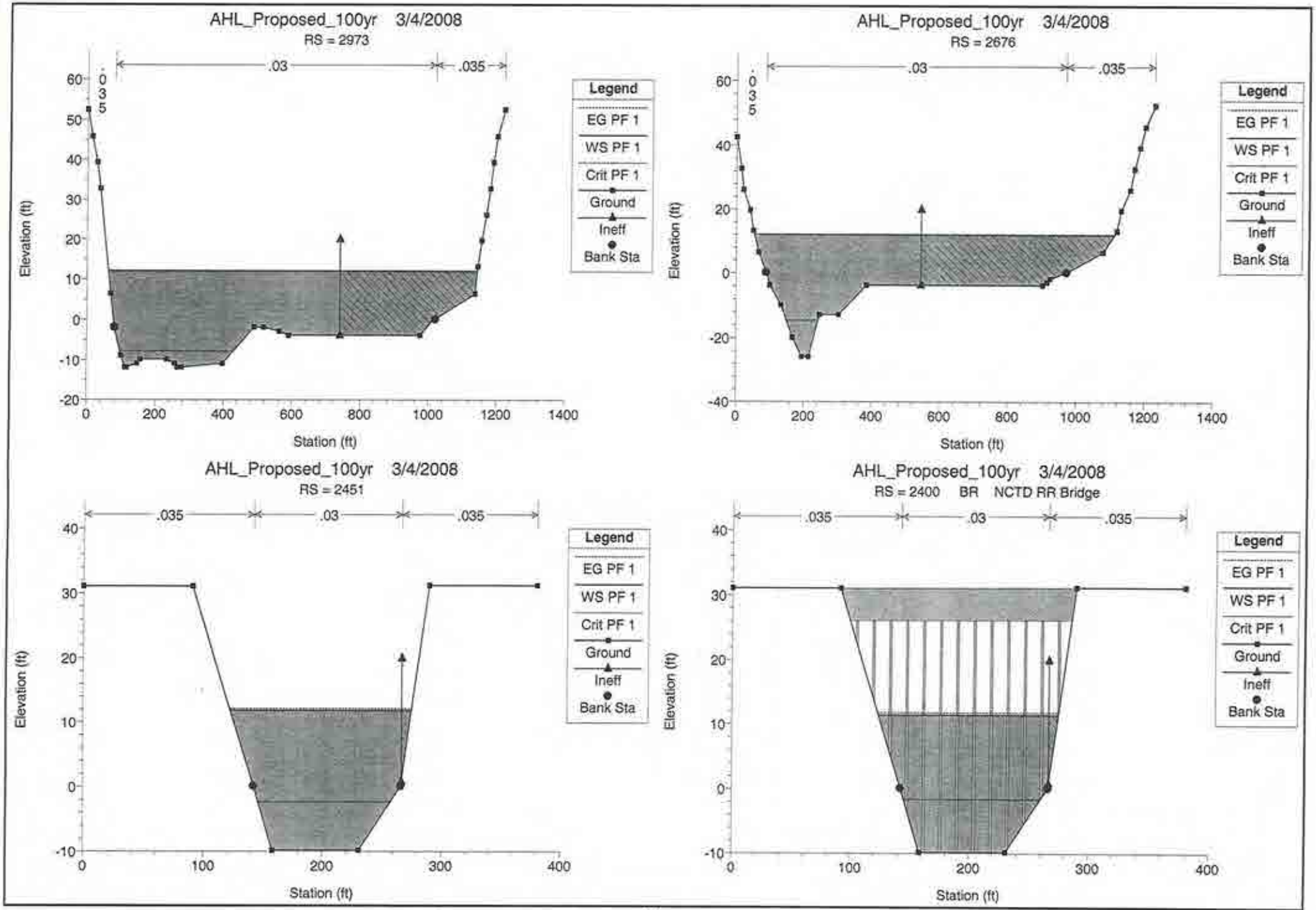
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 3400 BR Interstate 5 Bridge
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 3400 BR Interstate 5 Bridge
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 3296 Downstream I-5
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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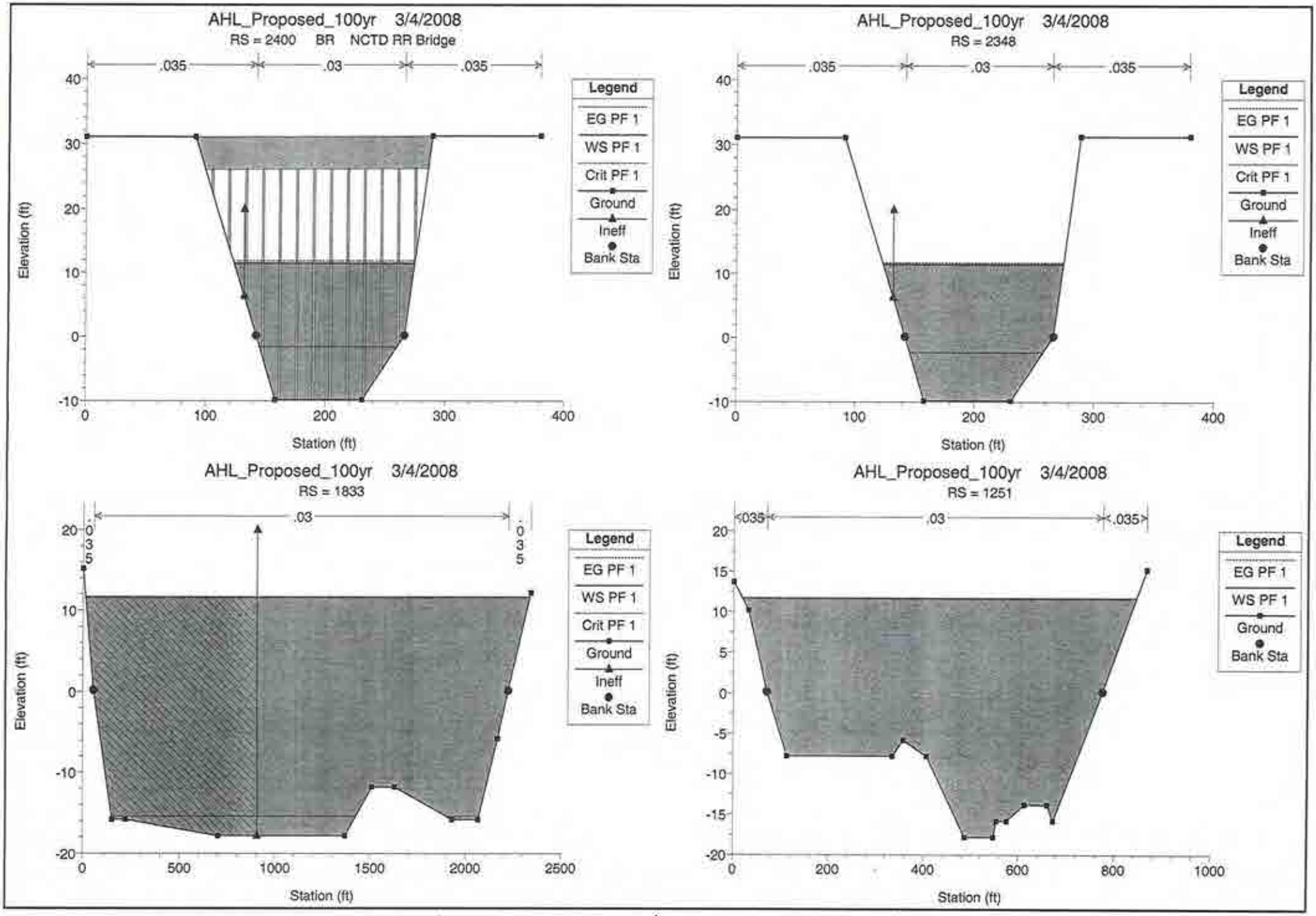
RS = 2973
.03
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
AHL_Proposed_100yr 3/4/2008
RS = 2676
.03
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
AHL_Proposed_100yr 3/4/2008
RS = 2451
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
AHL_Proposed_100yr 3/4/2008
RS = 2400 BR NCTD RR Bridge
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta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RS = 2400 BR NCTD RR Bridge
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 2348
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 1833
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
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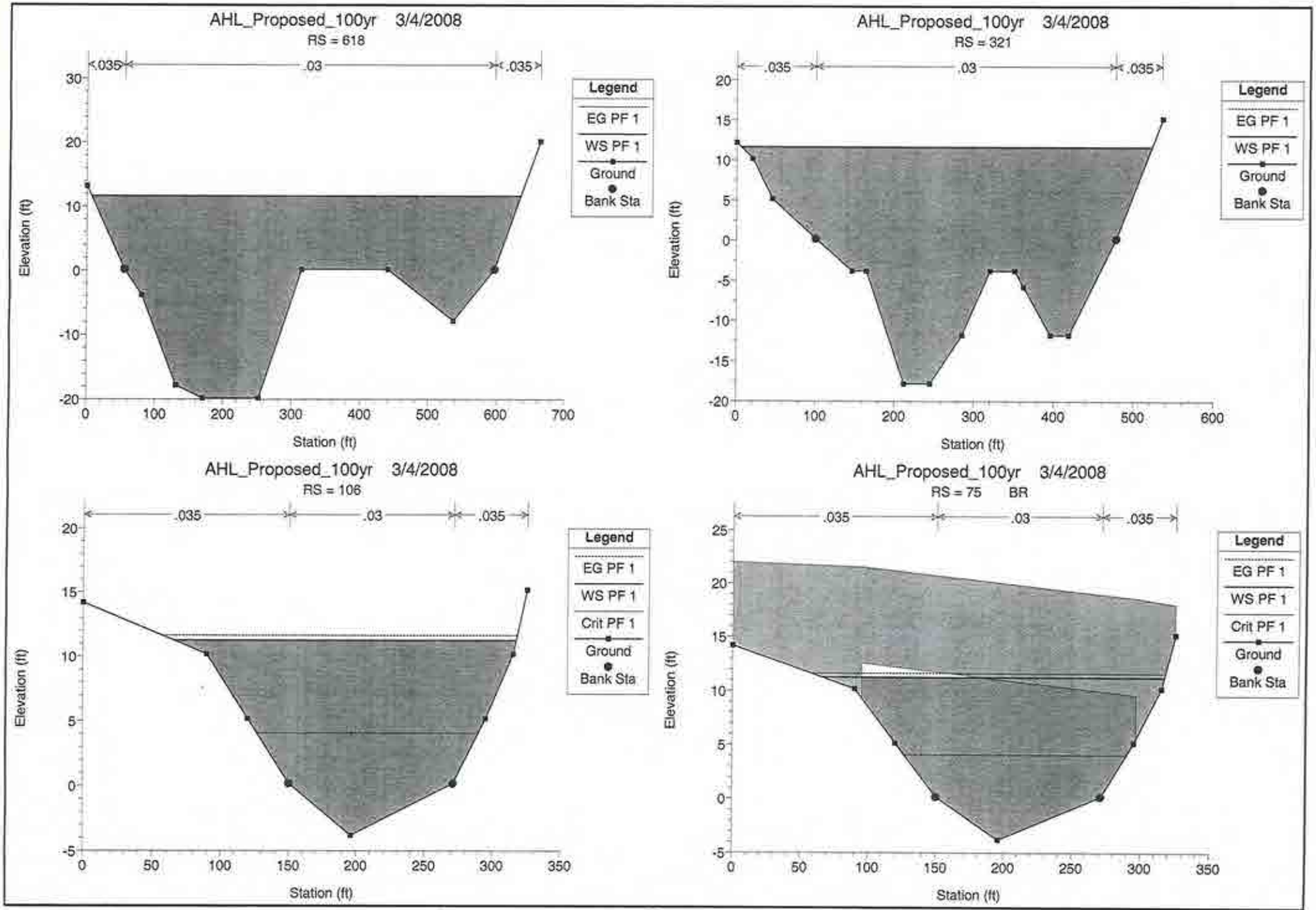
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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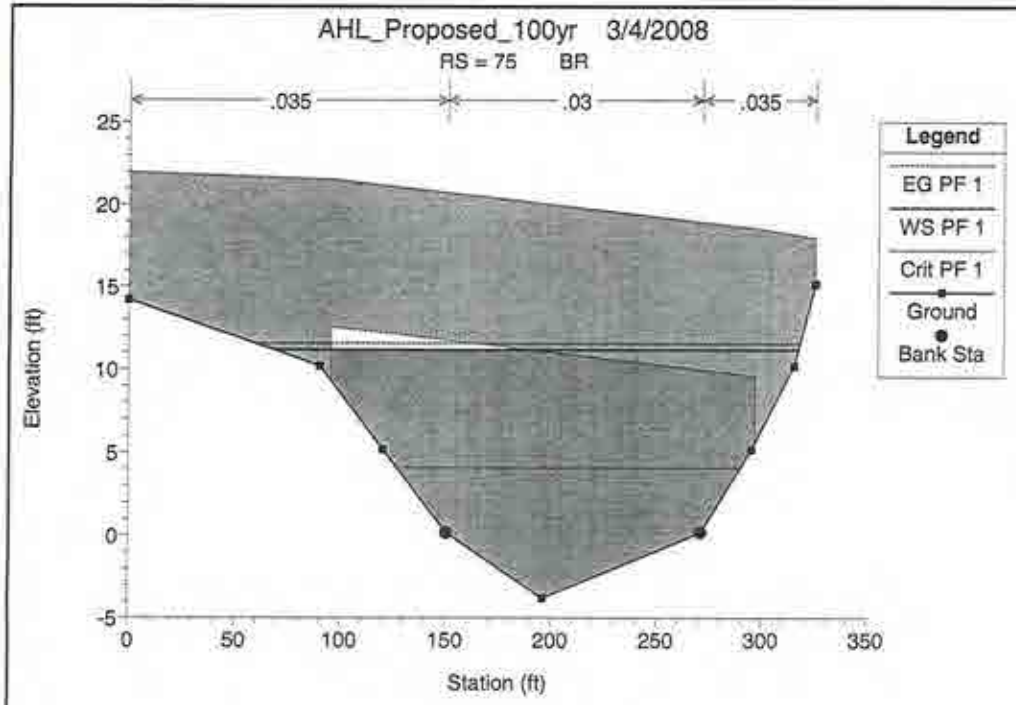
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 321
.035
.03
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 106
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
AHL_Proposed_100yr 3/4/2008
RS = 75 BR
.035
.03
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


AHL_Proposed_100yr 3/4/2008
RS = 75 BR
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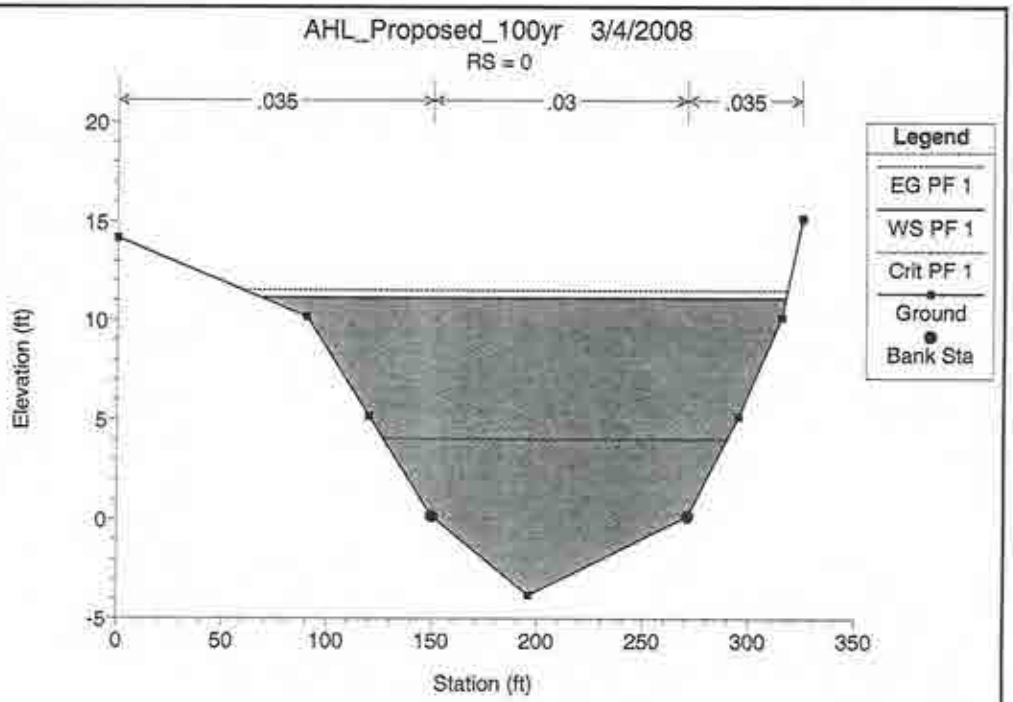
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


AHL_Proposed_100yr 3/4/2008
RS = 0
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
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PROJECT DATA
Project Title: Proposed Agua Hedionda
Project File : Proposed.prj
Run Date and Time: 3/4/2008 10:34:49 AM

Project in English units

Project Description:
Agua Hedionda Lagoon Proposed Conditions
April 2005
Dokken Engineering

PLAN DATA

Plan Title: AHL_Proposed_100yr
Plan File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Proposed\Proposed.p04

Geometry Title: Agua Hedionda Proposed Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Proposed\Proposed.g02

Flow Title : 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Proposed\Proposed.f06

Plan Summary Information:

| | | | | | |
|---|---|---|---|---|---|
| Number of: | Cross Sections | = 16 | Multiple Openings | = | 0 |
| | Culverts | = 0 | Inline Structures | = | 0 |
| | Bridges | = 3 | Lateral Structures | = | 0 |

Computational Information

| | |
|---|---|
| Water surface calculation tolerance | = 0.01 |
| Critical depth calculation tolerance | = 0.01 |
| Maximum number of iterations | = 20 |
| Maximum difference tolerance | = 0.3 |
| Flow tolerance factor | = 0.001 |

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only

Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: 100-yr Storm
Flow File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Proposed\Proposed.f06

Flow Data (cfs)

| River | Reach | RS | PF 1 |
|---|---|---|---|
| Agua Hedionda | 1 | 6860 | 9850 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Agua Hedionda | 1 | PF 1 | Normal S = 8.1833E-04 | Known WS = 11.178 |

GEOMETRY DATA

Geometry Title: Agua Hedionda Proposed Geometry
Geometry File : p:\1683_TO64_I5_Floodplain\420_Env_ Stud\Agua Hedionda\HecRas\Proposed\Proposed.g02

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 6860

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 20.19 | 128 | .19 | 216 | -.81 | 260 | -1.81 | 303 | -2.81 |
| 353.5 | -3.81 | 445 | -4.81 | 460 | -5.81 | 1214 | -6.81 | 1348 | -6.81 |
| 1578 | -5.81 | 1592 | -4.81 | 1595 | -3.81 | 1617.6 | -.81 | 1631 | .19 |
| 2014 | 20.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 128 | .03 | 1631 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 128 | 1631 | 1237 | 1222 | 1222 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.33 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 12.33 | Reach Len. (ft) | 1237.00 | 1222.00 |
| 1222.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 471.77 | 26625.71 |
| 1411.64 | | | | |
| E.G. Slope (ft/ft) | 0.000001 | Area (sq ft) | 471.77 | 26625.71 |
| 1411.64 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 70.60 | 9566.64 |
| 212.76 | | | | |
| Top Width (ft) | 1813.23 | Top Width (ft) | 77.71 | 1503.00 |
| 232.52 | | | | |
| Vel Total (ft/s) | 0.35 | Avg. Vel. (ft/s) | 0.15 | 0.36 |
| 0.15 | | | | |
| Max Chl Dpth (ft) | 19.14 | Hydr. Depth (ft) | 6.07 | 17.72 |
| 6.07 | | | | |
| Conv. Total (cfs) | 9225310.0 | Conv. (cfs) | 66121.8 | 8959923.0 |
| 199264.9 | | | | |
| Length Wtd. (ft) | 1222.08 | Wetted Per. (ft) | 78.65 | 1503.51 |
| 232.84 | | | | |
| Min Ch El (ft) | -6.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 60.22 | 3274.79 |
| 173.12 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 9.61 | 167.54 |
| 24.92 | | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 5638

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 25.19 | 75 | .19 | 155 | -2.81 | 175 | -3.81 | 379 | -4.81 |
| 797 | -4.81 | 860 | -5.81 | 934 | -5.81 | 985 | -5.81 | 1308 | -5.81 |
| 1387 | -6.81 | 1467 | -7.81 | 1490 | -4.81 | 1565 | -1.81 | 1582 | .19 |
| 1641 | 20.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 75 | .03 | 1582 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 75 | 1582 | 1293 | 1005 | 696 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.33 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 12.33 | Reach Len. (ft) | 1293.00 | 1005.00 |

| | | | | |
|---|---|---|---|---|
| 696.00 Crit W.S. (ft) | | Flow Area (sq ft) | 221.08 | 26070.49 |
| 217.40 E.G. Slope (ft/ft) | 0.000001 | Area (sq ft) | 221.08 | 26070.49 |
| 217.40 Q Total (cfs) | 9850.00 | Flow (cfs) | 34.16 | 9782.29 |
| 33.55 Top Width (ft) | 1579.24 | Top Width (ft) | 36.42 | 1507.00 |
| 35.81 Vel Total (ft/s) | 0.37 | Avg. Vel. (ft/s) | 0.15 | 0.38 |
| 0.15 Max Chl Dpth (ft) | 20.14 | Hydr. Depth (ft) | 6.07 | 17.30 |
| 6.07 Conv. Total (cfs) | 8695304.0 | Conv. (cfs) | 30155.2 | 8635530.0 |
| 29618.9 Length Wtd. (ft) | 1006.27 | Wetted Per. (ft) | 38.39 | 1507.48 |
| 37.82 Min Ch El (ft) | -7.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 50.39 | 2535.64 |
| 150.27 C & E Loss (ft) | 0.00 | Cum SA (acres) | 7.99 | 125.32 |
| 21.15 | | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 4633

INPUT
Description:
Station Elevation Data num= 23

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 52.5 | 9 | 46 | 18 | 39.4 | 29 | 32.8 | 36 | 26.2 |
| 42.5 | 19.7 | 49 | 13.12 | 55.5 | 6.5 | 116 | -1.605 | 153 | -3.81 |
| 230 | -4.81 | 579 | -4.81 | 1017 | -5.81 | 1180 | -6.81 | 1392 | -6.81 |
| 1445 | -5.81 | 1456 | -4.81 | 1511 | -3.81 | 1522 | -2.81 | 1532 | -1.81 |
| 1559 | -.81 | 1577 | .19 | 1639 | 20.19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 116 | .03 | 1577 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 116 | 1577 | 348 | 652 | 1178 .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.33 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 W.S. Elev (ft) | 12.33 | Reach Len. (ft) | 348.00 | 652.00 |
| 1178.00 Crit W.S. (ft) | | Flow Area (sq ft) | 614.51 | 25651.84 |
| 228.40 E.G. Slope (ft/ft) | 0.000001 | Area (sq ft) | 614.51 | 25651.84 |

| | | | | |
|---|---|---|---|---|
| 228.40 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 126.29 | 9688.47 |
| 35.24 | | | | |
| Top Width (ft) | 1564.85 | Top Width (ft) | 66.22 | 1461.00 |
| 37.63 | | | | |
| Vel Total (ft/s) | 0.37 | Avg. Vel. (ft/s) | 0.21 | 0.38 |
| 0.15 | | | | |
| Max Chl Dpth (ft) | 19.14 | Hydr. Depth (ft) | 9.28 | 17.56 |
| 6.07 | | | | |
| Conv. Total (cfs) | 8724960.0 | Conv. (cfs) | 111867.1 | 8581875.0 |
| 31217.6 | | | | |
| Length Wtd. (ft) | 649.71 | Wetted Per. (ft) | 69.21 | 1461.28 |
| 39.54 | | | | |
| Min Ch El (ft) | -6.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 37.98 | 1938.98 |
| 146.71 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 6.46 | 91.09 |
| 20.57 | | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 3981

INPUT
Description:
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 52.5 | 10 | 45.9 | 20 | 39.4 | 32 | 32.8 | 38 | 26.2 |
| 45 | 19.7 | 52 | 13.2 | 58 | 6.5 | 100 | .19 | 110 | -1.81 |
| 144 | -4.81 | 200 | -4.81 | 273 | -4.81 | 312 | -5.81 | 537 | -6.81 |
| 629 | -6.81 | 683 | -7.81 | 730 | -10.81 | 745 | -10.81 | 837 | -5.81 |
| 909 | -5.81 | 1002 | -6.81 | 1132 | -6.81 | 1352 | -5.81 | 1469 | -5.81 |
| 1716 | -5.81 | 1834 | .19 | 1970 | 20.19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 100 | .03 | 1834 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 100 | 1834 | 591 | 395 | 850 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 1270.4 | 1970 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.33 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.035 | 0.030 |
| W.S. Elev (ft) | 12.33 | Reach Len. (ft) | 591.00 | 395.00 |
| 850.00 | | | | |
| Crit W.S. (ft) | -5.39 | Flow Area (sq ft) | 392.45 | 21970.61 |
| E.G. Slope (ft/ft) | 0.000002 | Area (sq ft) | 392.45 | 31853.84 |

| | | | | |
|---|---|---|---|---|
| 500.86 Q Total (cfs) | 9850.00 | Flow (cfs) | 83.32 | 9766.68 |
| Top Width (ft) | 1863.75 | Top Width (ft) | 47.22 | 1734.00 |
| 82.53 Vel Total (ft/s) | 0.44 | Avg. Vel. (ft/s) | 0.21 | 0.44 |
| Max Chl Dpth (ft) | 23.14 | Hydr. Depth (ft) | 8.31 | 18.77 |
| Conv. Total (cfs) | 7749322.0 | Conv. (cfs) | 65549.4 | 7683772.0 |
| Length Wtd. (ft) | 396.65 | Wetted Per. (ft) | 50.29 | 1170.99 |
| Min Ch El (ft) | -10.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 33.96 | 1508.62 |
| 136.85 C & E Loss (ft) 18.94 | 0.00 | Cum SA (acres) | 6.01 | 67.17 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 3576

INPUT
Description: Upstream I-5
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 110 | 6.5 | 123 | 3.462 | 137 | -20 | 200 | -25.8 |
| 220 | -25.8 | 269 | -9.81 | 298 | -9.185 | 317 | -6.81 | 380 | -.81 |
| 390 | .19 | 780 | 5.19 | 1103 | 10.19 | 1231 | 25.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 123 | .03 | 390 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 123 | 390 | 301.2 | 278.1 394.5 | .5 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 319 | 1231 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.32 | Element | Left OB | Channel |
| Right OB Vel Head (ft) | 0.04 | Wt. n-Val. | 0.035 | 0.030 |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 12.28 | Reach Len. (ft) | 4.00 | 4.00 |
| 4.00 | | | | |
| Crit W.S. (ft) | -16.75 | Flow Area (sq ft) | 206.30 | 5794.78 |
| E.G. Slope (ft/ft) | 0.000014 | Area (sq ft) | 206.30 | 6896.43 |
| 5241.99 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 82.06 | 9767.94 |
| Top Width (ft) | 1049.38 | Top Width (ft) | 51.54 | 267.00 |
| 730.84 | | | | |
| Vel Total (ft/s) | 1.64 | Avg. Vel. (ft/s) | 0.40 | 1.69 |
| Max Chl Dpth (ft) | 38.08 | Hydr. Depth (ft) | 4.00 | 29.57 |
| Conv. Total (cfs) | 2623875.0 | Conv. (cfs) | 21859.0 | 2602016.0 |
| Length Wtd. (ft) | 4.00 | Wetted Per. (ft) | 52.32 | 212.29 |
| Min Ch El (ft) | -25.80 | Shear (lb/sq ft) | 0.00 | 0.02 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.00 | 0.04 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 29.90 | 1332.92 |
| 80.82 | | | | |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 5.34 | 58.10 |
| 11.01 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE

RIVER: Agua Hedionda
REACH: 1 RS: 3400

INPUT
Description: Interstate 5 Bridge
Distance from Upstream XS = 4
Deck/Roadway width = 252.85
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 7

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 33.6 | -20 | 99.95 30 | -20 | 99.95 30 | 26.391 |
| 270.55 25 | 21.391 | 270.55 25 | -20 | 626 22 | -20 |
| 1374.4 26.8 | -20 | | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 110 | 6.5 | 123 | 3.462 | 137 | -20 | 200 | -25.8 |
| 220 | -25.8 | 269 | -9.81 | 298 | -9.185 | 317 | -6.81 | 380 | -.81 |
| 390 | .19 | 780 | 5.19 | 1103 | 10.19 | 1231 | 25.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 123 | .03 | 390 | .035 |

Bank Sta: Left 123 Right 390 Coeff Contr. .5 Expan. .5

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 319 | 1231 | 20 | F |

Downstream Deck/Roadway Coordinates num= 7

| Sta Hi | Cord | Lo Cord | Sta Hi | Cord | Lo Cord | Sta Hi | Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 33.6 | -20 | 80.95 | 30 | -20 | 80.95 | 30 | 26.391 |
| 251.55 | 25 | 21.391 | 251.55 | 25 | -20 | 628 | 22 | -20 |
| 1356 | 26.8 | -20 | | | | | | |

Downstream Bridge Cross Section Data

Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.8 | 36.9 | 13.2 | 56 | 0 | 168.94 | -25.8 | 192.55 | -25.8 |
| 252.17 | -12.66 | 317 | -6.81 | 380 | -.81 | 390 | 0 | 780 | 5 |
| 1143 | 6.5 | 1231 | 41 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 56 | .03 | 390 | .035 |

Bank Sta: Left 56 Right 390 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 328.9 | 1231 | 20 | F |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data

Upstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 99.95 | 26.39 | 172 | -25.8 |

Downstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 80.95 | 26.39 | 152.3 | -25.8 |

Abutment Data

Upstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 208.3 | -25.8 | 270.55 | 21.39 |

Downstream num= 2

| Sta | Elev | Sta | Elev |
|---|---|---|---|
| 189.3 | -25.8 | 251.55 | 21.39 |

Number of Piers = 2

Pier Data
Pier Station Upstream= 152.44 Downstream= 133.44

```
Upstream      num=         2
    Width    Elev     Width    Elev
        5       0         5  29.776
Downstream    num=         2
    Width    Elev     Width    Elev
        5       0         5   29.67

Pier Data
Pier Station      Upstream=  218.06    Downstream=  199.06
Upstream      num=         2
    Width    Elev     Width    Elev
        5       0         5   28.89
Downstream    num=         2
    Width    Elev     Width    Elev
        5       0         5  28.765

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
```

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 12.32 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 12.28 | E.G. Elev (ft) | 12.26 |
| 12.22 | | | |
| Q Total (cfs) | 9850.00 | W.S. Elev (ft) | 12.10 |
| 12.05 | | | |
| Q Bridge (cfs) | 9850.00 | Crit W.S. (ft) | -13.60 |
| -13.63 | | | |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 37.90 |
| 37.85 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 3.28 |
| 3.28 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 3001.54 |
| 3006.60 | | | |
| Weir Submerg | | Froude # Chl | 0.12 |
| 0.12 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 46290.06 |
| 46367.23 | | | |
| Min El Weir Flow (ft) | 22.01 | Hydr Depth (ft) | 23.34 |
| 23.36 | | | |
| Min El Prs (ft) | 26.39 | W.P. Total (ft) | 258.80 |
| 259.15 | | | |
| Delta EG (ft) | 0.17 | Conv. Total (cfs) | 768333.8 |
| 763184.4 | | | |
| Delta WS (ft) | 0.16 | Top Width (ft) | 128.60 |
| 128.68 | | | |
| BR Open Area (sq ft) | 4697.91 | Frctn Loss (ft) | 0.04 |
| 0.00 | | | |

| | | | |
|---|---|---|---|
| BR Open Vel (ft/s) | 3.28 | C & E Loss (ft) | 0.00 |
| 0.07 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.12 |
| 0.12 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.39 |
| 0.40 | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 3296

INPUT
Description: Downstream I-5
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.8 | 36.9 | 13.2 | 56 | 0 | 168.94 | -25.8 | 192.55 | -25.8 |
| 252.17 | -12.66 | 317 | -6.81 | 380 | -.81 | 390 | 0 | 780 | 5 |
| 1143 | 6.5 | 1231 | 41 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 56 | .03 | 390 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 56 | 390 | 252.4 | 322 | 470.7 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 328.9 | 1231 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.15 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.035 | 0.030 |
| W.S. Elev (ft) | 12.12 | Reach Len. (ft) | 252.40 | 322.00 |
| 470.70 | | | | |
| Crit W.S. (ft) | -15.63 | Flow Area (sq ft) | 106.32 | 7226.14 |
| E.G. Slope (ft/ft) | 0.000010 | Area (sq ft) | 106.32 | 8136.60 |
| 6106.14 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 41.10 | 9808.90 |
| Top Width (ft) | 1118.88 | Top Width (ft) | 17.54 | 334.00 |
| 767.34 | | | | |
| Vel Total (ft/s) | 1.34 | Avg. Vel. (ft/s) | 0.39 | 1.36 |

| | | | | |
|---|---|---|---|---|
| Max Chl Dpth (ft) | 37.92 | Hydr. Depth (ft) | 6.06 | 26.48 |
| Conv. Total (cfs) | 3157175.0 | Conv. (cfs) | 13173.7 | 3144002.0 |
| Length Wtd. (ft) | 321.72 | Wetted Per. (ft) | 21.32 | 277.56 |
| Min Ch El (ft) | -25.80 | Shear (lb/sq ft) | 0.00 | 0.02 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.02 |
| Frctn Loss (ft) 79.09 | 0.00 | Cum Volume (acre-ft) | 29.85 | 1312.32 |
| C & E Loss (ft) 10.79 | 0.01 | Cum SA (acres) | 5.32 | 57.23 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2973

INPUT
Description:
Station Elevation Data num= 31

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 52.5 | 13.5 | 45.9 | 28 | 39.4 | 37.6 | 32.8 | 69 | 6.5 |
| 80 | -1.836 | 100 | -8.81 | 112 | -11.81 | 117 | -11.81 | 147 | -10.81 |
| 157 | -9.81 | 234 | -9.81 | 257 | -10.81 | 265 | -11.81 | 277 | -11.81 |
| 397 | -10.81 | 489 | -1.81 | 516 | -1.81 | 562 | -2.81 | 589 | -3.81 |
| 976 | -3.81 | 1015 | .19 | 1020 | .19 | 1137 | 6.5 | 1145 | 13.2 |
| 1156 | 19.7 | 1169.5 | 26.2 | 1181 | 32.8 | 1190 | 39.4 | 1201.5 | 45.9 |
| 1223 | 52.5 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 80 | .03 | 1020 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 80 | 1020 | 252 | 298 | 530 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 739.7 | 1223 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.14 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| W.S. Elev (ft) 530.00 | 12.13 | Reach Len. (ft) | 252.00 | 298.00 |
| Crit W.S. (ft) | -7.61 | Flow Area (sq ft) | 126.76 | 12717.29 |

| | | | | |
|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.000005 | Area (sq ft) | 126.76 | 17088.30 1047.22 |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 36.92 | 9813.08 |
| Top Width (ft) | 1081.45 | Top Width (ft) | 17.73 | 940.00 123.73 |
| Vel Total (ft/s) | 0.77 | Avg. Vel. (ft/s) | 0.29 | 0.77 |
| Max Chl Dpth (ft) | 23.94 | Hydr. Depth (ft) | 7.15 | 19.28 |
| Conv. Total (cfs) | 4535717.0 | Conv. (cfs) | 17001.9 | 4518715.0 |
| Length Wtd. (ft) | 297.72 | Wetted Per. (ft) | 22.58 | 661.87 |
| Min Ch El (ft) | -11.81 | Shear (lb/sq ft) | 0.00 | 0.01 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 29.18 | 1219.09 40.44 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 5.22 | 52.53 5.97 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2676

INPUT
Description:
Station Elevation Data num= 27

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 42.6 | 14 | 32.8 | 20.5 | 26.2 | 40.6 | 19.7 | 50 | 13.2 |
| 66 | 6.5 | 88 | .19 | 99 | -3.81 | 132 | -9.81 | 166.5 | -19.81 |
| 194 | -25.81 | 214 | -25.81 | 246 | -12.81 | 302 | -12.81 | 384 | -3.81 |
| 902 | -3.81 | 915 | -2.81 | 923 | -1.81 | 971 | .19 | 1078 | 6.5 |
| 1118 | 13.2 | 1130 | 19.7 | 1157 | 26.2 | 1170 | 32.8 | 1186 | 39.4 |
| 1202 | 45.9 | 1230 | 52.5 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 88 | .03 | 971 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 88 | 971 | 214 | 224 878 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 544.7 | 1230 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.14 | Element | Left OB | Channel |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 Right OB |

| | | | | |
|---|---|---|---|---|
| W.S. Elev (ft) | 12.13 | Reach Len. (ft) | 214.00 | 224.00 878.00 |
| Crit W.S. (ft) | -14.57 | Flow Area (sq ft) | 230.98 | 10066.07 |
| E.G. Slope (ft/ft) | 0.000006 | Area (sq ft) | 230.98 | 16697.18 1034.08 |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 82.94 | 9767.06 |
| Top Width (ft) | 1059.03 | Top Width (ft) | 35.44 | 883.00 140.59 |
| Vel Total (ft/s) | 0.96 | Avg. Vel. (ft/s) | 0.36 | 0.97 |
| Max Chl Dpth (ft) | 37.94 | Hydr. Depth (ft) | 6.52 | 22.04 |
| Conv. Total (cfs) | 3916494.0 | Conv. (cfs) | 32978.8 | 3883515.0 |
| Length Wtd. (ft) | 224.20 | Wetted Per. (ft) | 37.45 | 463.05 |
| Min Ch El (ft) | -25.81 | Shear (lb/sq ft) | 0.00 | 0.01 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 0.00 | 0.01 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 28.14 | 1103.53 27.78 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 5.07 | 46.29 4.36 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2451

INPUT
Description:
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 142 | 266 | 103 | 103 | .5 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 266.5 | 380 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 12.11 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.24 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.87 | Reach Len. (ft) | 73.00 | 73.00 |
| 73.00 | | | | |
| Crit W.S. (ft) | -2.28 | Flow Area (sq ft) | 112.69 | 2433.57 |
| 5.67 | | | | |
| E.G. Slope (ft/ft) | 0.000128 | Area (sq ft) | 112.69 | 2433.57 |
| 50.58 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 157.90 | 9682.38 |
| 9.72 | | | | |
| Top Width (ft) | 151.95 | Top Width (ft) | 19.29 | 124.00 |
| 8.66 | | | | |
| Vel Total (ft/s) | 3.86 | Avg. Vel. (ft/s) | 1.40 | 3.98 |
| 1.71 | | | | |
| Max Chl Dpth (ft) | 21.68 | Hydr. Depth (ft) | 5.84 | 19.63 |
| 11.34 | | | | |
| Conv. Total (cfs) | 872276.7 | Conv. (cfs) | 13983.0 | 857433.1 |
| 860.6 | | | | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 22.55 | 128.27 |
| 0.84 | | | | |
| Min Ch El (ft) | -9.81 | Shear (lb/sq ft) | 0.04 | 0.15 |
| 0.05 | | | | |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.06 | 0.60 |
| 0.09 | | | | |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | 27.30 | 1054.34 |
| 16.85 | | | | |
| C & E Loss (ft) | | Cum SA (acres) | 4.93 | 43.70 |
| 2.86 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE

RIVER: Agua Hedionda
REACH: 1 RS: 2400

INPUT
Description: NCTD RR Bridge
Distance from Upstream XS = 73
Deck/Roadway Width = 19
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 91 | 31.07 | 26.07 | 289 | 31.22 | 26.22 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 142 | 266 | .5 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 266.5 | 380 | 20 | F |

Downstream Deck/Roadway Coordinates num= 2

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 91 | 31.07 | 26.07 | 289 | 31.22 | 26.22 |

Downstream Bridge Cross Section Data

Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 142 | 266 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 131.9 | 20 | F |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 13

Pier Data
Pier Station Upstream= 105.14 Downstream= 105.14
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Pier Data
Pier Station Upstream= 119.28 Downstream= 119.28
Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 2 | -10 | 2 | 30 |

Pier Data
Pier Station Upstream= 133.43 Downstream= 133.43
Upstream num= 2

```
    Width   Elev     Width   Elev
      2      -10       2      30
Downstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30

Pier Data
Pier Station      Upstream=  147.57    Downstream=  147.57
Upstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30
Downstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30

Pier Data
Pier Station      Upstream=   161.7    Downstream=   161.7
Upstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30
Downstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30

Pier Data
Pier Station      Upstream=  175.86    Downstream=  175.86
Upstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30
Downstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30

Pier Data
Pier Station      Upstream=      190    Downstream=      190
Upstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30
Downstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30

Pier Data
Pier Station      Upstream=  204.14    Downstream=  204.14
Upstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30
Downstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30

Pier Data
Pier Station      Upstream=   218.3    Downstream=   218.3
Upstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30
Downstream      num=          2
    Width   Elev     Width   Elev
      2      -10       2      30

Pier Data
Pier Station      Upstream=  232.43    Downstream=  232.43
Upstream      num=          2
```

```
    Width   Elev    Width   Elev
      2     -10       2      30
Downstream      num=        2
    Width   Elev    Width   Elev
      2     -10       2      30

Pier Data
Pier Station     Upstream=  246.57    Downstream=  246.57
Upstream      num=        2
    Width   Elev    Width   Elev
      2     -10       2      30
Downstream      num=        2
    Width   Elev    Width   Elev
      2     -10       2      30

Pier Data
Pier Station     Upstream=   260.7    Downstream=   260.7
Upstream      num=        2
    Width   Elev    Width   Elev
      2     -10       2      30
Downstream      num=        2
    Width   Elev    Width   Elev
      2     -10       2      30

Pier Data
Pier Station     Upstream=  274.86    Downstream=  274.86
Upstream      num=        2
    Width   Elev    Width   Elev
      2     -10       2      30
Downstream      num=        2
    Width   Elev    Width   Elev
      2     -10       2      30

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Yarnell                 KVal =     2.5
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1


  E.G. US. (ft)              12.11    Element                Inside BR US
Inside BR DS
  W.S. US. (ft)              11.87    E.G. Elev (ft)              11.84
11.84
  Q Total (cfs)            9850.00    W.S. Elev (ft)              11.51
11.51
  Q Bridge (cfs)           9850.00    Crit W.S. (ft)              -1.54
-1.54
  Q Weir (cfs)                        Max Chl Dpth (ft)           21.32
21.32
```

| | | | |
|---|---|---|---|
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.59 |
| 4.55 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 2143.94 |
| 2163.38 | | | |
| Weir Submerg | | Froude # Chl | 0.19 |
| 0.18 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 22022.32 |
| 22119.44 | | | |
| Min El Weir Flow (ft) | 31.08 | Hydr Depth (ft) | 17.40 |
| 17.74 | | | |
| Min El Prs (ft) | 26.22 | W.P. Total (ft) | 486.37 |
| 489.40 | | | |
| Delta EG (ft) | 0.35 | Conv. Total (cfs) | 286367.1 |
| 288726.5 | | | |
| Delta WS (ft) | 0.36 | Top Width (ft) | 130.56 |
| 130.56 | | | |
| BR Open Area (sq ft) | 4301.02 | Frctn Loss (ft) | |
| BR Open Vel (ft/s) | 4.59 | C & E Loss (ft) | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.33 |
| 0.32 | | | |
| Br Sel Method | Yarnell | Power Total (lb/ft s) | 1.50 |
| 1.46 | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 2348

INPUT
Description:
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31.07 | 91 | 31.07 | 142 | .19 | 158 | -9.81 | 231 | -9.81 |
| 266 | .19 | 289 | 31.22 | 380 | 31.22 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 142 | .03 | 266 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 142 | 266 | 1845 | 423 | 526 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 131.9 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.76 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.25 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.51 | Reach Len. (ft) | 1845.00 | 423.00 |
| 526.00 | | | | |
| Crit W.S. (ft) | -2.28 | Flow Area (sq ft) | 83.47 | 2388.93 |
| 47.51 | | | | |
| E.G. Slope (ft/ft) | 0.000135 | Area (sq ft) | 105.85 | 2388.93 |
| 47.51 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 151.44 | 9645.94 |
| 52.61 | | | | |
| Top Width (ft) | 151.09 | Top Width (ft) | 18.70 | 124.00 |
| 8.39 | | | | |
| Vel Total (ft/s) | 3.91 | Avg. Vel. (ft/s) | 1.81 | 4.04 |
| 1.11 | | | | |
| Max Chl Dpth (ft) | 21.32 | Hydr. Depth (ft) | 8.26 | 19.27 |
| 5.66 | | | | |
| Conv. Total (cfs) | 848967.4 | Conv. (cfs) | 13053.0 | 831380.0 |
| 4534.5 | | | | |
| Length Wtd. (ft) | 434.50 | Wetted Per. (ft) | 11.81 | 128.27 |
| 14.09 | | | | |
| Min Ch El (ft) | -9.81 | Shear (lb/sq ft) | 0.06 | 0.16 |
| 0.03 | | | | |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.11 | 0.63 |
| 0.03 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 27.06 | 1049.13 |
| 16.73 | | | | |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 4.89 | 43.43 |
| 2.84 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 1833

INPUT
Description:
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 15.19 | 55 | .19 | 152 | -15.81 | 221 | -15.81 | 700 | -17.81 |
| 1368 | -17.81 | 1508 | -11.81 | 1627 | -11.81 | 1930 | -15.81 | 2066 | -15.81 |
| 2166 | -5.81 | 2221 | .19 | 2339 | 12.19 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 55 | .03 | 2221 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 55 | 2221 | 1900 | 561.4 | 250 | .1 .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 905.2 | 20 | F |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.00 | Wt. n-Val. | | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.68 | Reach Len. (ft) | 1900.00 | 561.40 | 250.00 |
| Crit W.S. (ft) | -15.35 | Flow Area (sq ft) | | 34666.08 | 649.63 |
| E.G. Slope (ft/ft) | 0.000000 | Area (sq ft) | 242.23 | 58155.45 | 649.63 |
| Q Total (cfs) | 9850.00 | Flow (cfs) | | 9793.16 | 56.84 |
| Top Width (ft) | 2321.18 | Top Width (ft) | 42.15 | 2166.00 | 113.03 |
| Vel Total (ft/s) | 0.28 | Avg. Vel. (ft/s) | | 0.28 | 0.09 |
| Max Chl Dpth (ft) | 29.49 | Hydr. Depth (ft) | | 26.35 | 5.75 |
| Conv. Total (cfs) | 15283390.0 | Conv. (cfs) | | | 15195200.0 88188.5 |
| Length Wtd. (ft) | 562.70 | Wetted Per. (ft) | | 1316.78 | 113.61 |
| Min Ch El (ft) | -17.81 | Shear (lb/sq ft) | | 0.00 | 0.00 |
| Alpha | 1.02 | Stream Power (lb/ft s) | | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 19.69 | 755.17 | 12.52 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.60 | 32.31 | 2.11 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 1251

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.69 | 31 | 10.19 | 70 | .19 | 113 | -7.81 | 334 | -7.81 |
| 357 | -5.81 | 406 | -7.81 | 487 | -17.81 | 547 | -17.81 | 554 | -15.81 |
| 575 | -15.81 | 613 | -13.81 | 660 | -13.81 | 673 | -15.81 | 774 | .19 |
| 865 | 15.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 70 | .03 | 774 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 70 | 774 | 702 653.4 | 609 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.68 | Reach Len. (ft) | 702.00 | 653.40 |
| 609.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 262.88 | 15351.11 |
| 400.38 | | | | |
| E.G. Slope (ft/ft) | 0.000003 | Area (sq ft) | 262.88 | 15351.11 |
| 400.38 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 52.91 | 9708.43 |
| 88.67 | | | | |
| Top Width (ft) | 825.89 | Top Width (ft) | 52.19 | 704.00 |
| 69.70 | | | | |
| Vel Total (ft/s) | 0.62 | Avg. Vel. (ft/s) | 0.20 | 0.63 |
| 0.22 | | | | |
| Max Chl Dpth (ft) | 29.49 | Hydr. Depth (ft) | 5.04 | 21.81 |
| 5.74 | | | | |
| Conv. Total (cfs) | 6002828.0 | Conv. (cfs) | 32243.7 | 5916549.0 |
| 54035.4 | | | | |
| Length Wtd. (ft) | 653.40 | Wetted Per. (ft) | 53.53 | 707.23 |
| 70.64 | | | | |
| Min Ch El (ft) | -17.81 | Shear (lb/sq ft) | 0.00 | 0.00 |
| 0.00 | | | | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.00 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 8.67 | 281.49 |
| 9.51 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 1.55 | 13.82 |
| 1.58 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 618

INPUT
Description:
Station Elevation Data num= 11

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.19 | 55 | .19 | 80 | -3.81 | 131 | -17.81 | 170 | -19.81 |
| 252 | -19.81 | 314 | .19 | 440 | .19 | 537 | -7.81 | 597 | .19 |
| 664 | 20.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 0 | .035 | 55 | .03 | 597 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 55 | 597 | 167 | 297 | 458 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.68 | Element | | | |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.035 | 0.030 | 0.035 |
| W.S. Elev (ft) | 11.67 | Reach Len. (ft) | 167.00 | 297.00 | 458.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 278.71 | 10461.34 | 220.69 |
| E.G. Slope (ft/ft) | 0.000007 | Area (sq ft) | 278.71 | 10461.34 | 220.69 |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 97.42 | 9676.24 | 76.34 |
| Top Width (ft) | 629.02 | Top Width (ft) | 48.56 | 542.00 | 38.45 |
| Vel Total (ft/s) | 0.90 | Avg. Vel. (ft/s) | 0.35 | 0.92 | 0.35 |
| Max Chl Dpth (ft) | 31.48 | Hydr. Depth (ft) | 5.74 | 19.30 | 5.74 |
| Conv. Total (cfs) | 3766376.0 | Conv. (cfs) | 37249.4 | 3699935.0 | 29191.6 |
| Length Wtd. (ft) | 295.95 | Wetted Per. (ft) | 49.90 | 548.26 | 40.13 |
| Min Ch El (ft) | -19.81 | Shear (lb/sq ft) | 0.00 | 0.01 | 0.00 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 0.00 | 0.01 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 4.31 | 87.90 | 5.17 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.73 | 4.47 | 0.83 |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 321

INPUT
Description:
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 12.19 | 20 | 10.19 | 45 | 5.19 | 100 | .19 | 146 | -3.81 |
| 164 | -3.81 | 212 | -17.81 | 245 | -17.81 | 285 | -11.81 | 320 | -3.81 |
| 351 | -3.81 | 362 | -5.81 | 396 | -11.81 | 419 | -11.81 | 478 | .19 |
| 536 | 15.19 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 100 | .03 | 478 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 100 | 478 | 161 | 216 | 368 | .1 .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.68 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.66 | Reach Len. (ft) | 161.00 | 216.00 |
| 368.00 | | | | |
| Crit W.S. (ft) | | Flow Area (sq ft) | 602.93 | 7614.77 |
| 254.13 | | | | |
| E.G. Slope (ft/ft) | 0.000012 | Area (sq ft) | 602.93 | 7614.77 |
| 254.13 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 298.42 | 9436.20 |
| 115.38 | | | | |
| Top Width (ft) | 516.98 | Top Width (ft) | 94.65 | 378.00 |
| 44.33 | | | | |
| Vel Total (ft/s) | 1.16 | Avg. Vel. (ft/s) | 0.49 | 1.24 |
| 0.45 | | | | |
| Max Chl Dpth (ft) | 29.47 | Hydr. Depth (ft) | 6.37 | 20.14 |
| 5.73 | | | | |
| Conv. Total (cfs) | 2887208.0 | Conv. (cfs) | 87472.4 | 2765915.0 |
| 33819.9 | | | | |
| Length Wtd. (ft) | 219.41 | Wetted Per. (ft) | 95.44 | 383.44 |
| 45.79 | | | | |
| Min Ch El (ft) | -17.81 | Shear (lb/sq ft) | 0.00 | 0.01 |
| 0.00 | | | | |
| Alpha | 1.10 | Stream Power (lb/ft s) | 0.00 | 0.02 |
| 0.00 | | | | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 2.62 | 26.28 |
| 2.67 | | | | |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.46 | 1.34 |
| 0.39 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 106

INPUT
Description:
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 150 | 271 | 98 | 99 | 95 | .3 .5 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.64 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.37 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.26 | Reach Len. (ft) | 6.00 | 6.00 |
| 6.00 | | | | |
| Crit W.S. (ft) | 4.10 | Flow Area (sq ft) | 377.27 | 1581.75 |
| 278.33 | | | | |
| E.G. Slope (ft/ft) | 0.000365 | Area (sq ft) | 377.27 | 1581.75 |
| 278.33 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 826.33 | 8290.46 |
| 733.21 | | | | |
| Top Width (ft) | 251.27 | Top Width (ft) | 84.13 | 121.00 |
| 46.14 | | | | |
| Vel Total (ft/s) | 4.40 | Avg. Vel. (ft/s) | 2.19 | 5.24 |
| 2.63 | | | | |
| Max Chl Dpth (ft) | 15.07 | Hydr. Depth (ft) | 4.48 | 13.07 |
| 6.03 | | | | |
| Conv. Total (cfs) | 515743.8 | Conv. (cfs) | 43266.3 | 434086.7 |
| 38390.8 | | | | |
| Length Wtd. (ft) | 6.00 | Wetted Per. (ft) | 84.98 | 121.28 |
| 47.53 | | | | |
| Min Ch El (ft) | -3.81 | Shear (lb/sq ft) | 0.10 | 0.30 |
| 0.13 | | | | |
| Alpha | 1.24 | Stream Power (lb/ft s) | 0.22 | 1.56 |
| 0.35 | | | | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.81 | 3.47 |
| 0.42 | | | | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.13 | 0.10 |
| 0.01 | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: Agua Hedionda
REACH: 1 RS: 75

INPUT
Description:
Distance from Upstream XS = 6
Deck/Roadway Width = 82
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 22 | 0 | 95.5 | 21.55 | 0 | 95.5 | 21.55 | 12.55 |
| 296.5 | 18.62 | 9.62 | 296.5 | 18.62 | 0 | 350 | 17.5 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

Bank Sta: Left 150 Right 271 Coeff Contr. .3 Expan. .5

Downstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 22 | 0 | 95.5 | 21.55 | 0 | 95.5 | 21.55 | 12.55 |
| 296.5 | 18.62 | 9.62 | 296.5 | 18.62 | 0 | 350 | 17.5 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

Bank Sta: Left 150 Right 271 Coeff Contr. .1 Expan. .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd = .8
Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

| | | | |
|---|---|---|---|
| E.G. US. (ft) | 11.64 | Element | Inside BR US |
| Inside BR DS | | | |
| W.S. US. (ft) | 11.26 | E.G. Elev (ft) | 11.63 |
| 11.57 | | | |
| Q Total (cfs) | 9850.00 | W.S. Elev (ft) | 11.25 |
| 11.18 | | | |
| Q Bridge (cfs) | 9850.00 | Crit W.S. (ft) | 4.11 |
| 4.11 | | | |

| | | | |
|---|---|---|---|
| Q Weir (cfs) | | Max Chl Dpth (ft) | 15.06 |
| 14.99 | | | |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.79 |
| 4.80 | | | |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 2058.40 |
| 2052.22 | | | |
| Weir Submerg | | Froude # Chl | 0.26 |
| 0.26 | | | |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 14125.60 |
| 13994.05 | | | |
| Min El Weir Flow (ft) | 18.03 | Hydr Depth (ft) | 23.04 |
| 21.84 | | | |
| Min El Prs (ft) | 12.55 | W.P. Total (ft) | 318.31 |
| 313.68 | | | |
| Delta EG (ft) | 0.08 | Conv. Total (cfs) | 354292.1 |
| 356935.0 | | | |
| Delta WS (ft) | 0.08 | Top Width (ft) | 89.35 |
| 93.98 | | | |
| BR Open Area (sq ft) | 2116.59 | Frctn Loss (ft) | 0.06 |
| 0.01 | | | |
| BR Open Vel (ft/s) | 4.80 | C & E Loss (ft) | 0.00 |
| 0.00 | | | |
| Coef of Q | | Shear Total (lb/sq ft) | 0.31 |
| 0.31 | | | |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 1.49 |
| 1.49 | | | |

CROSS SECTION

RIVER: Agua Hedionda
REACH: 1 RS: 0

INPUT
Description:
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14.19 | 90 | 10.19 | 120 | 5.19 | 150 | .19 | 196 | -3.81 |
| 271 | .19 | 295 | 5.19 | 315 | 10.19 | 325 | 15.19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .035 | 150 | .03 | 271 | .035 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 150 | 271 | .1 | .3 |

CROSS SECTION OUTPUT Profile #PF 1

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 11.56 | Element | Left OB | Channel |
| Right OB | | | | |
| Vel Head (ft) | 0.38 | Wt. n-Val. | 0.035 | 0.030 |
| 0.035 | | | | |
| W.S. Elev (ft) | 11.18 | Reach Len. (ft) | | |
| Crit W.S. (ft) | 4.11 | Flow Area (sq ft) | 370.26 | 1571.55 |
| 274.45 | | | | |
| E.G. Slope (ft/ft) | 0.000374 | Area (sq ft) | 370.26 | 1571.55 |
| 274.45 | | | | |
| Q Total (cfs) | 9850.00 | Flow (cfs) | 822.84 | 8300.36 |

| | | | | |
|---|---|---|---|---|
| 726.80 | | | | |
| Top Width (ft) | 249.21 | Top Width (ft) | 82.23 | 121.00 |
| 45.98 | | | | |
| Vel Total (ft/s) | 4.44 | Avg. Vel. (ft/s) | 2.22 | 5.28 |
| 2.65 | | | | |
| Max Chl Dpth (ft) | 14.99 | Hydr. Depth (ft) | 4.50 | 12.99 |
| 5.97 | | | | |
| Conv. Total (cfs) | 509603.7 | Conv. (cfs) | 42570.8 | 429431.1 |
| 37601.8 | | | | |
| Length Wtd. (ft) | | Wetted Per. (ft) | 83.08 | 121.28 |
| 47.34 | | | | |
| Min Ch El (ft) | -3.81 | Shear (lb/sq ft) | 0.10 | 0.30 |
| 0.14 | | | | |
| Alpha | 1.24 | Stream Power (lb/ft s) | 0.23 | 1.60 |
| 0.36 | | | | |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | |
| C & E Loss (ft) | | Cum SA (acres) | | |

SUMMARY OF MANNING'S N VALUES

River:Agua Hedionda

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| 1 | 6860 | .035 | .03 | .035 |
| 1 | 5638 | .035 | .03 | .035 |
| 1 | 4633 | .035 | .03 | .035 |
| 1 | 3981 | .035 | .03 | .035 |
| 1 | 3576 | .035 | .03 | .035 |
| 1 | 3400 | Bridge | | |
| 1 | 3296 | .035 | .03 | .035 |
| 1 | 2973 | .035 | .03 | .035 |
| 1 | 2676 | .035 | .03 | .035 |
| 1 | 2451 | .035 | .03 | .035 |
| 1 | 2400 | Bridge | | |
| 1 | 2348 | .035 | .03 | .035 |
| 1 | 1833 | .035 | .03 | .035 |
| 1 | 1251 | .035 | .03 | .035 |
| 1 | 618 | .035 | .03 | .035 |
| 1 | 321 | .035 | .03 | .035 |
| 1 | 106 | .035 | .03 | .035 |
| 1 | 75 | Bridge | | |
| 1 | 0 | .035 | .03 | .035 |

SUMMARY OF REACH LENGTHS

River: Agua Hedionda

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| 1 | 6860 | 1237 | 1222 | 1222 |
| 1 | 5638 | 1293 | 1005 | 696 |
| 1 | 4633 | 348 | 652 | 1178 |
| 1 | 3981 | 591 | 395 | 850 |

| | | Proposed.rep | | |
|---|---|---|---|---|
| 1 | 3576 | 301.2 | 278.1 | 394.5 |
| 1 | 3400 | Bridge | | |
| 1 | 3296 | 252.4 | 322 | 470.7 |
| 1 | 2973 | 252 | 298 | 530 |
| 1 | 2676 | 214 | 224 | 878 |
| 1 | 2451 | 103 | 103 | 103 |
| 1 | 2400 | Bridge | | |
| 1 | 2348 | 1845 | 423 | 526 |
| 1 | 1833 | 1900 | 561.4 | 250 |
| 1 | 1251 | 702 | 653.4 | 609 |
| 1 | 618 | 167 | 297 | 458 |
| 1 | 321 | 161 | 216 | 368 |
| 1 | 106 | 98 | 99 | 95 |
| 1 | 75 | Bridge | | |
| 1 | 0 | | | |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Agua Hedionda

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| 1 | 6860 | .1 | .3 |
| 1 | 5638 | .1 | .3 |
| 1 | 4633 | .1 | .3 |
| 1 | 3981 | .1 | .3 |
| 1 | 3576 | .5 | .5 |
| 1 | 3400 | Bridge | |
| 1 | 3296 | .1 | .3 |
| 1 | 2973 | .1 | .3 |
| 1 | 2676 | .1 | .3 |
| 1 | 2451 | .5 | .5 |
| 1 | 2400 | Bridge | |
| 1 | 2348 | .1 | .3 |
| 1 | 1833 | .1 | .3 |
| 1 | 1251 | .1 | .3 |
| 1 | 618 | .1 | .3 |
| 1 | 321 | .1 | .3 |
| 1 | 106 | .3 | .5 |
| 1 | 75 | Bridge | |
| 1 | 0 | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. |
|---|---|---|---|---|---|---|
| E.G. Elev | E.G. Slope | Vel Chnl | Flow Area (cfs) | Top Width (ft) | Froude # Chl (ft) | (ft) |
| (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | |
| 1 | 6860 | PF 1 | 9850.00 | -6.81 | 12.33 | |
| 12.33 | 0.000001 | 0.36 | 28509.12 | 1813.23 | 0.02 | |
| 1 | 5638 | PF 1 | 9850.00 | -7.81 | 12.33 | |
| 12.33 | 0.000001 | 0.38 | 26508.97 | 1579.24 | 0.02 | |
| 1 | 4633 | PF 1 | 9850.00 | -6.81 | 12.33 | |
| 12.33 | 0.000001 | 0.38 | 26494.76 | 1564.85 | 0.02 | |
| 1 | 3981 | PF 1 | 9850.00 | -10.81 | 12.33 | -5.39 |
| 12.33 | 0.000002 | 0.44 | 22363.06 | 1863.75 | 0.02 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | | 3576 | PF 1 | 9850.00 | -25.80 | 12.28 | -16.75 |
| | 12.32 | 0.000014 | 1.69 | 6001.08 | 1049.38 | 0.05 | |
| 1 | | 3400 | | Bridge | | | |
| 1 | | 3296 | PF 1 | 9850.00 | -25.80 | 12.12 | -15.63 |
| | 12.15 | 0.000010 | 1.36 | 7332.46 | 1118.88 | 0.05 | |
| 1 | | 2973 | PF 1 | 9850.00 | -11.81 | 12.13 | -7.61 |
| | 12.14 | 0.000005 | 0.77 | 12844.06 | 1081.45 | 0.03 | |
| 1 | | 2676 | PF 1 | 9850.00 | -25.81 | 12.13 | -14.57 |
| | 12.14 | 0.000006 | 0.97 | 10297.05 | 1059.03 | 0.04 | |
| 1 | | 2451 | PF 1 | 9850.00 | -9.81 | 11.87 | -2.28 |
| | 12.11 | 0.000128 | 3.98 | 2551.94 | 151.95 | 0.16 | |
| 1 | | 2400 | | Bridge | | | |
| 1 | | 2348 | PF 1 | 9850.00 | -9.81 | 11.51 | -2.28 |
| | 11.76 | 0.000135 | 4.04 | 2519.91 | 151.09 | 0.16 | |
| 1 | | 1833 | PF 1 | 9850.00 | -17.81 | 11.68 | -15.35 |
| | 11.69 | 0.000000 | 0.28 | 35315.71 | 2321.18 | 0.01 | |
| 1 | | 1251 | PF 1 | 9850.00 | -17.81 | 11.68 | |
| | 11.68 | 0.000003 | 0.63 | 16014.37 | 825.89 | 0.02 | |
| 1 | | 618 | PF 1 | 9850.00 | -19.81 | 11.67 | |
| | 11.68 | 0.000007 | 0.92 | 10960.75 | 629.02 | 0.04 | |
| 1 | | 321 | PF 1 | 9850.00 | -17.81 | 11.66 | |
| | 11.68 | 0.000012 | 1.24 | 8471.83 | 516.98 | 0.05 | |
| 1 | | 106 | PF 1 | 9850.00 | -3.81 | 11.26 | 4.10 |
| | 11.64 | 0.000365 | 5.24 | 2237.35 | 251.27 | 0.26 | |
| 1 | | 75 | | Bridge | | | |
| 1 | | 0 | PF 1 | 9850.00 | -3.81 | 11.18 | 4.11 |
| | 11.56 | 0.000374 | 5.28 | 2216.26 | 249.21 | 0.26 | |

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PropAHL

River: Agua Hedionda Reach: 1 RS: 3981 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Agua Hedionda Reach: 1 RS: 3576 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 3400 Profile: PF 1 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 3400 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 3296 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2973 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Agua Hedionda Reach: 1 RS: 2676 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Agua Hedionda Reach: 1 RS: 2451 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2400 Profile: PF 1 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2400 Profile: PF 1 Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 2348 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Agua Hedionda Reach: 1 RS: 1833 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Agua Hedionda Reach: 1 RS: 1251 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Agua Hedionda Reach: 1 RS: 321 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Agua Hedionda Reach: 1 RS: 106 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

# APPENDIX 'C'

## Location Hydraulic Study Form

## Floodplain Encroachment Form

## Planning Studies

## As-builts

## Backup Data

## LOCATION HYDRAULIC STUDY FORM

Dist. *11* Co. *SD* Rte. *005* K.P.
EA Bridge No. *57-0282*
Floodplain Description:
***A lagoon with a regular tidal exchange with both commercial and recreational uses and several bridge crossings. Location of interest: I-5 / Agua Hedionda Lagoon Intersection***

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

***This project includes an improvement to the I-5 / Bridge over Agua Hedionda Lagoon with 10+4+buffer alternative. The alternative requires the existing I-5 bridge to be replaced and would not have a significant impact to the existing floodplain.***

2. ADT: Current **276,850 (year 2015)** Projected **328,200 (year 2030)**
***(ADT values taken from Wilson & Company's Traffic Demand Forecasting Report for the I-5 North Coast Corridor Project)***

3. Hydraulic Data: Base Flood $Q_{100}$= ***9,850*** $ft^3 / s$

$WSE_{100}$= **12.28 feet (Upstream face of I-5 Bridge)**
The flood of record, if greater than $Q_{100}$:
Q= *N/A* $ft^3 / s$ WSE= *N/A*
Overtopping flood Q=***(no increase from existing condition)*** $ft^3 / s$
WSE= ***(no increase from existing condition)***

Are NFIP maps and studies available? YES **X** NO

4. Is the highway location alternative within a regulatory floodway ?
YES NO *X*

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain. ***(See Appendix 'A')***

Potential $Q_{100}$ backwater damages:

A. Residences? NO YES ***(no increase from existing condition)***
B. Other Bldgs? NO YES ***(no increase from existing condition)***
C. Crops? NO *X* YES
D. Natural and beneficial

FLOODPLAIN VALUES? NO **X** YES

6. Type of Traffic:

| | | |
|---|---|---|
| A. Emergency supply or evacuation route? | NO_____ | YES__X__ |
| B. Emergency vehicle access? | NO_____ | YES__X__ |
| C. Practicable detour available? | NO_____ | YES__X__ |
| D. School bus or mail route? | NO_____ | YES__X__ |

7. Estimated duration of traffic interruption for 100-year event hours: ***I-5 crossing is above the floodplain, therefore, no traffic interruptions are anticipated.***

8. Estimated value of $Q_{100}$ flood damages (if any) – moderate risk level.

| | | |
|---|---|---|
| A. | Roadway | $ ***(no increase from existing condition)*** |
| B | Property | $ ***(no increase from existing condition)*** |
| | Total | $ ***(no increase from existing condition)*** |

9. Assessment of Level of Risk Low__X__
Moderate____
High_____

For High Risk projects, during design phase, additional Design Study Risk Analysis May be necessary to determine design alternative.

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible
Floodplain development? NO__X__ YES _____

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

Signature – Hydraulic/Project Engineer_____Date_____

## FLOODPLAIN ENCROACHMENT REPORT SUMMARY

Dist. *11* Co. *SD* Rte. *005* K.P.
Bridge No. *57-0282*
Limits: ***I-5 / Agua Hedionda Lagoon Intersection***

Floodplain Description: **A lagoon with a regular tidal exchange with both commercial and recreational uses and several bridge crossings.**

| | | No | Yes |
|---|---|---|---|
| 1. | Is the proposed action a longitudinal encroachment of the base floodplain? | X | |
| 2. | Are the risks associated with the implementation of the proposed action significant? | X | |
| 3. | Will the proposed action support probable incompatible floodplain development? | X | |
| 4. | Are there any significant impacts on natural and beneficial floodplain values? | X | |
| 5. | Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain. | X | |
| 6. | Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q). | X | |
| 7. | Are Location Hydraulic Studies that document the above answers on file? If not explain. | | X |

PREPARED BY:

_____ _____
Signature - Dist. Hydraulic Engineer Date

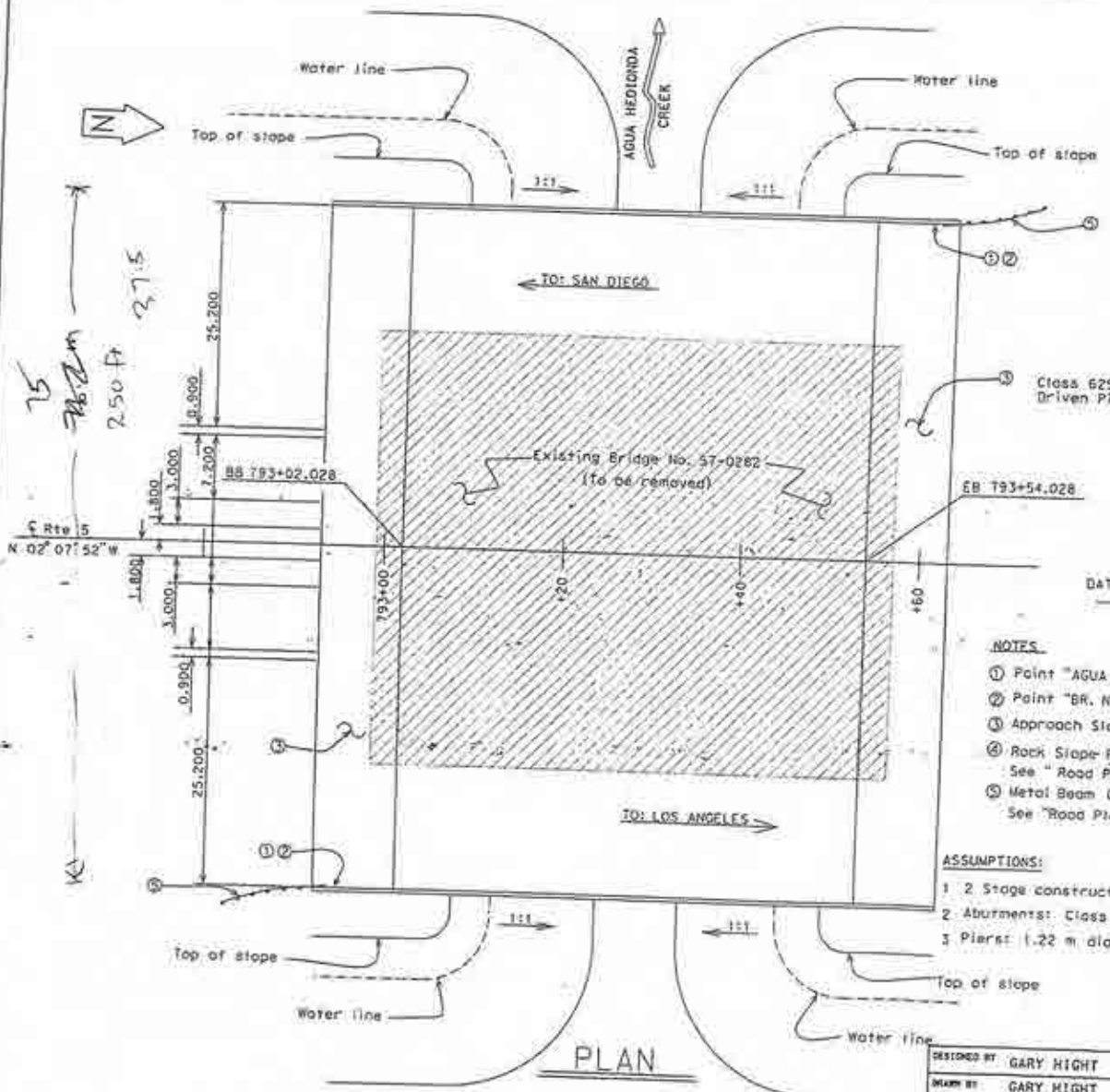
_____ _____
Signature - Dist. Environmental Branch Chief Date

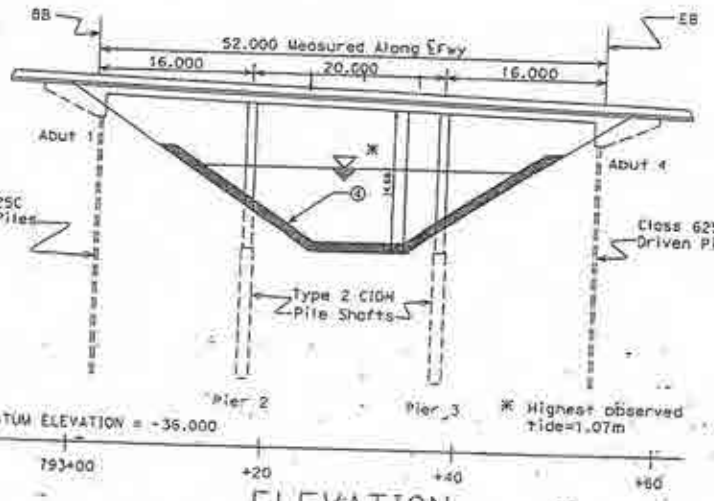
_____ _____
Signature - Dist. Project Engineer Date

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST | COUNTY | ROUTE | ILLUSTRATION POST MILE PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |

Metric




NOTES

① Point "AGUA HEDIONDA BRIDGE"
② Point "BR. NO. 57-0282"
③ Approach Slab Type N(9S)
④ Rock Slope Protection See "Road Plans"
⑤ Metal Beam Guard Rail See "Road Plans"

ASSUMPTIONS:

1 2 Stage construction
2 Abutments: Class 625C (Alt "V") Driven Piles
3 Piers: 1.22 m dia. Type 2 CIDH Pile Shafts

| | |
|---|---|
| Date of Estimate | 12-28-04 - P6J |
| Structure Depth. | 1.100 M |
| Length | 52.000 M |
| Width | 77.070 M |
| Area | 4008 Sq M |
| Bridge Removal Cost/SM including 10% Mobilization & 25% Contongencies | 2796 Sq M |
| | $ 2245 |
| Total Cost | $9,599,000 |

(1 OF 2)

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

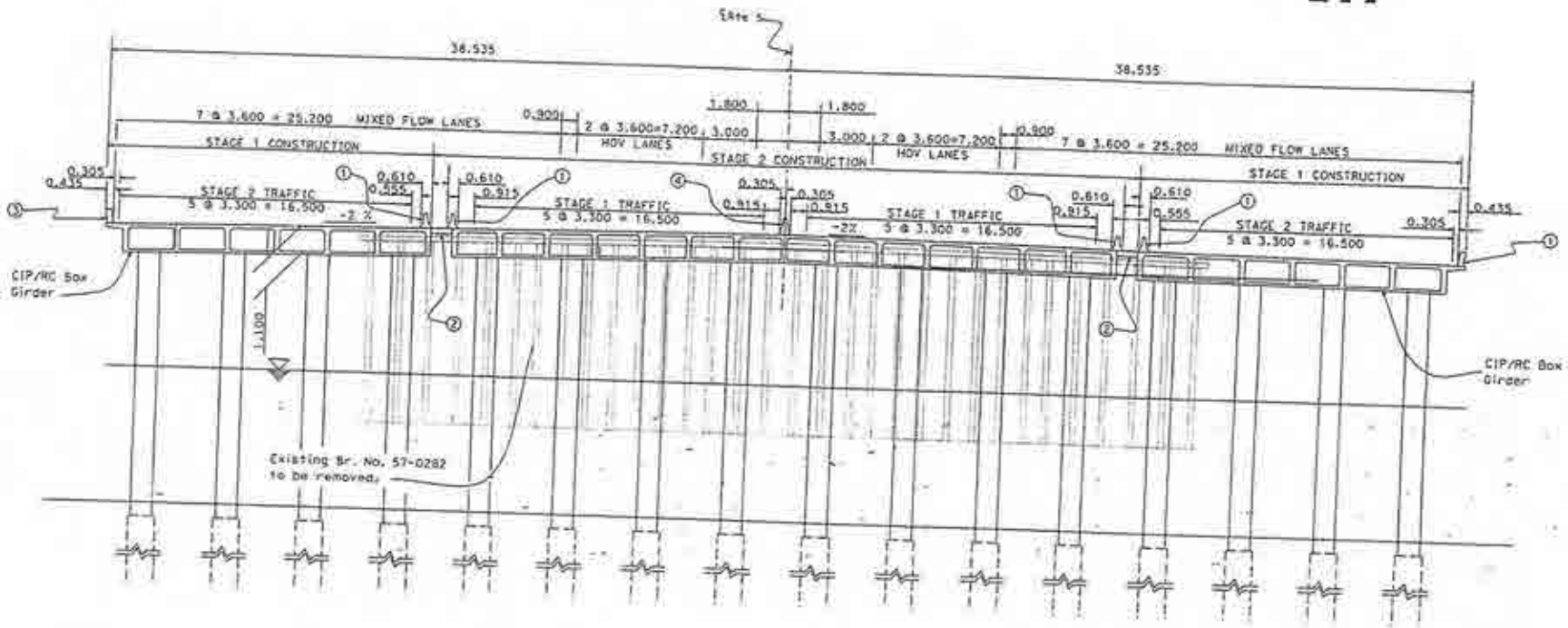
| | | | |
|---|---|---|---|
| DESIGNED BY GARY HIGHT | DATE Sept-2004 | STRUCTURE DESIGN SECTION 18 | PLANNING STUDY |
| DRAWN BY GARY HIGHT | DATE Sept-2004 | | AGUA HEDIONDA CREEK BR (REPLACE) |
| CHECKED BY | DATE | | BRIDGE NO. 57-0282 / CU 11 |
| APPROVED | DATE | | SCALE: No Scale / EA 235800 |

FILE => Agua Hedionda.dgn

DGNNAME => gridplot DATE PLOTTED => 05-JAN-2005 TIME PLOTTED => 13:34

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST. | COUNTY | ROUTE | KILOMETER POST TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |




# TYPICAL SECTION

NOTES:

① Temporary Rail (Type K) See "Road Plans"

② Closure Pour

③ Concrete Barrier Type 732

④ Concrete Barrier Type 60G

LEGEND

—— Denotes existing structure

—— Denotes new construction

(2 OF 2)

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

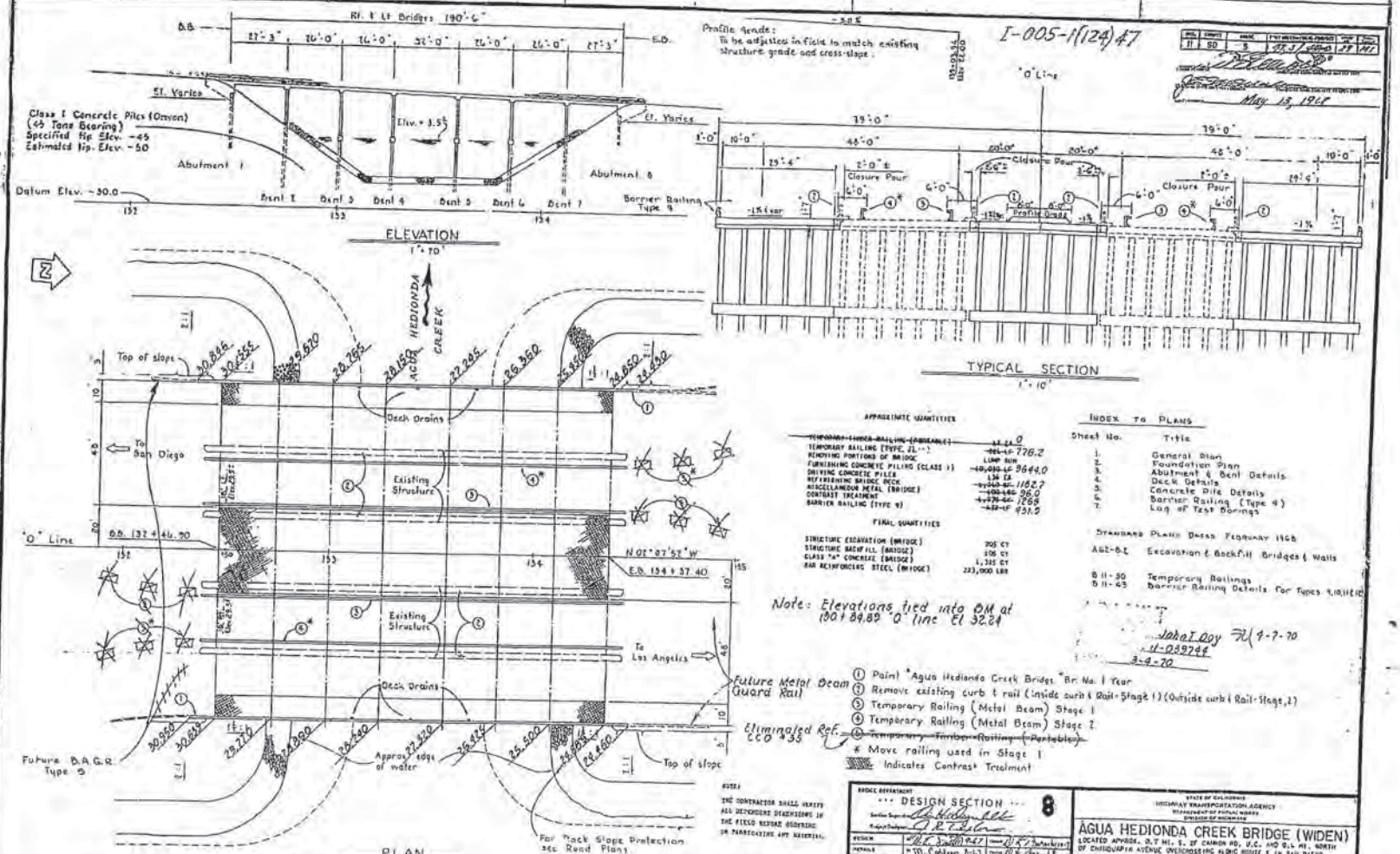
| | | | |
|---|---|---|---|
| DESIGNED BY GARY HIGHT | DATE Sept-2004 | STRUCTURE DESIGN SECTION 18 | PLANNING STUDY |
| DRAWN BY GARY HIGHT | DATE Sept-2004 | | AGUA HEDIONDA CREEK BR (REPLACE) |
| CHECKED BY | DATE | | BRIDGE NO. 57-0282 CU 11 |
| APPROVED | DATE | | SCALE No Scale EA 239800 |

FILE =J Agua Hedionda.dgn

DATE PLOTTED =J 05-JAN-2005 TIME PLOTTED =J 13:43

USERNAME =J gajohi

STRUCTURES DESIGN ADVANCE PLANNING STUDY SHEET (METRIC) (REV. 6/6/96)




APPROXIMATE QUANTITIES

| | |
|---|---|
| ~~TEMPORARY TIMBER RAILING (REMOVABLE)~~ | ~~12 LF~~ 0 |
| TEMPORARY RAILING (TYPE ~~ES~~) | ~~121 LF~~ 776.2 |
| REMOVING PORTIONS OF BRIDGE | LUMP SUM |
| FURNISHING CONCRETE PILING (CLASS I) | ~~10,050 LF~~ 9644.0 |
| DRIVING CONCRETE PILES | 134 EA |
| REFURBISHING BRIDGE DECK | ~~1,060 SF~~ 1182.7 |
| MISCELLANEOUS METAL (BRIDGE) | ~~100 LB~~ 96.0 |
| CONTRAST TREATMENT | ~~1,870 SF~~ 1268 |
| BARRIER RAILING (TYPE 9) | ~~432 LF~~ 431.3 |

FINAL QUANTITIES

| | |
|---|---|
| STRUCTURE EXCAVATION (BRIDGE) | 705 CY |
| STRUCTURE BACK FILL (BRIDGE) | 206 CY |
| CLASS "A" CONCRETE (BRIDGE) | 1,335 CY |
| BAR REINFORCING STEEL (BRIDGE) | 223,000 LBS |

INDEX TO PLANS

| Sheet No. | Title |
|---|---|
| 1. | General Plan |
| 2. | Foundation Plan |
| 3. | Abutment & Bent Details |
| 4. | Deck Details |
| 5. | Concrete Pile Details |
| 6. | Barrier Railing (Type 9) |
| 7. | Log of Test Borings |

STANDARD PLANS DATED FEBRUARY 1968

A62-B,E Excavation & Backfill Bridges & Walls

B 11-30 Temporary Railings
B 11-43 Barrier Railing Details for Types 9,10,11E,12

Jahat Doy 7/9-7-70
11-039744
3-4-70

NOTES:
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

FOR GENERAL NOTES SEE "Foundation Plan" Sheet

DESIGN SECTION 8

STATE OF CALIFORNIA
HIGHWAY TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

# AGUA HEDIONDA CREEK BRIDGE (WIDEN)

LOCATED APPROX. 0.7 MI. S. OF CANNON RD. U.C. AND 0.6 MI. NORTH OF ENCINITAS AVENUE OVERCROSSING ALONG ROUTE 5 IN SAN DIEGO COUNTY

## GENERAL PLAN

BRIDGE NO. 57-282 | POST MILE 48.0 | DRAWING NO. 5-282-1 | SHEET 1 | OF 7

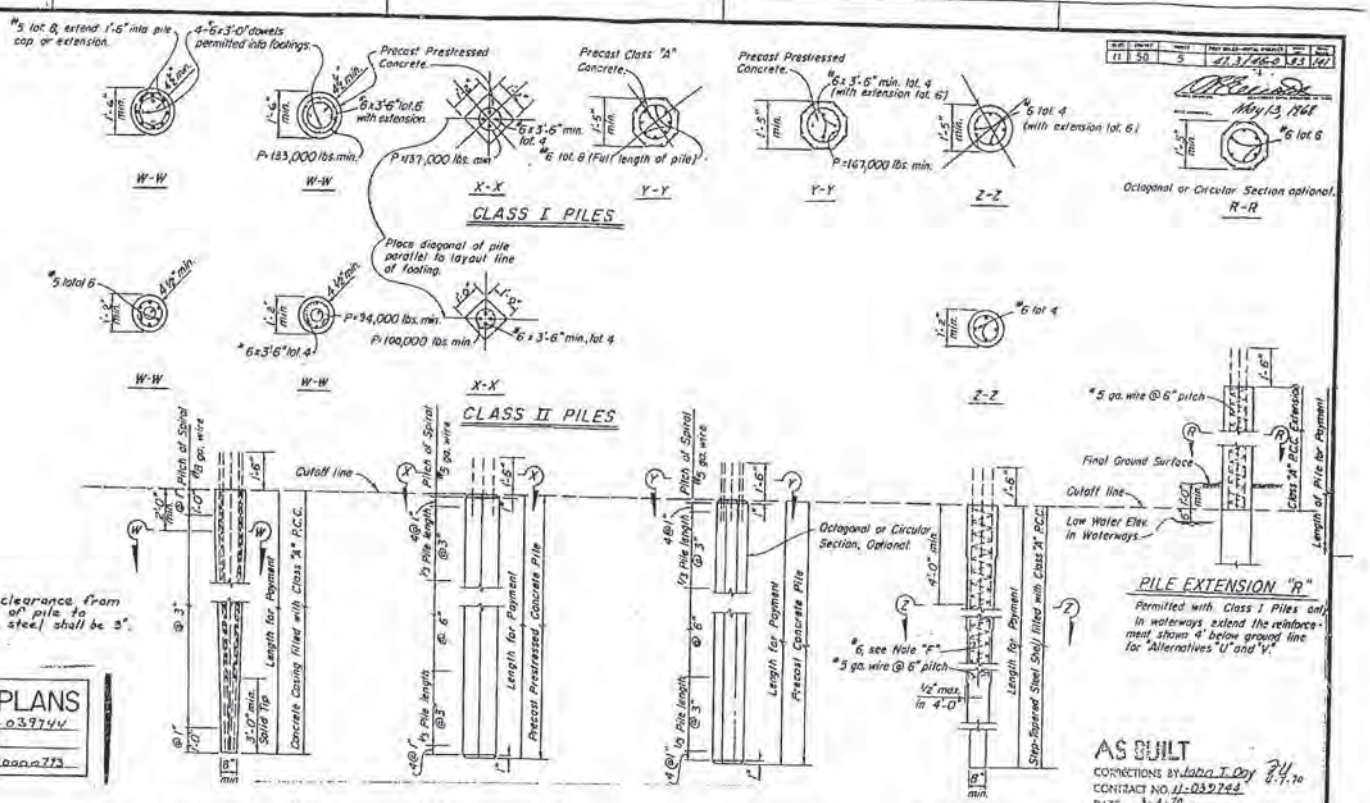
WO 039741
CU 11208

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT DRAWN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA, PURSUANT TO AUTHORIZATION OF THE DIRECTOR OF PUBLIC WORKS.

DATE ____ SIGNATURE ____ TITLE ____

AS BUILT PLANS
Contract No. 11-039744
Date Completed ____
Document No. Hooa273

29




NOTE: Minimum clearance from outside face of pile to reinforcing steel shall be 3".

AS BUILT PLANS
Contract No. 11-039744
Date Completed
Document No. 8000713

AS BUILT
CORRECTIONS BY John T. Day 7-7-70
CONTRACT NO. 11-039744
DATE 3-4-70

PILE NOTES:

Alternatives "W" and "Y" may be driven full length or may be extended.

All exposed piles or pile extensions shall be consistent in cross-section throughout the project.

PRECAST PRESTRESSED PILES:

P = Prestressing Force (After losses) If section used is larger than the min. section shown, then "P" shall provide 700 psi min.
Concrete Stress: f'c @ 28 days = 6,000 p.s.i. (Alternative "X")
4,500 p.s.i. (Alternative "Y")
5,000 p.s.i. (Alternative "W")

Alternative "X" may not extend above ground line nor be used with pile extension "R".

NOTE F: In Alternative "Z" the No. 6 bars shall extend a minimum of 12" below the lowest of the following:

1. Bottom of footing.
2. Top of final ground surface.
3. Top of original ground surface when piles are driven through fills.

Unless indicated to the contrary all piles shall be Class I piles. Class I piles may be substituted for Class II piles.

A 10" minimum diameter pipe extension (thickness = 0.1793" min.) may be used at the tip of Alternative "Z" when taper is 30' or more in length.

All dowels or bars extending into slab or footing having a depth less than 2'-0" shall be hooked.

DESIGN LOADING = 45 TONS

Note: This Sheet supersedes Sheet No. B 2-1 of the STANDARD PLANS

Altered Std. (1968)

12/66 STATE OF CALIFORNIA TRANSPORTATION AGENCY DEPARTMENT OF PUBLIC WORKS Division of Highways XS-10-17

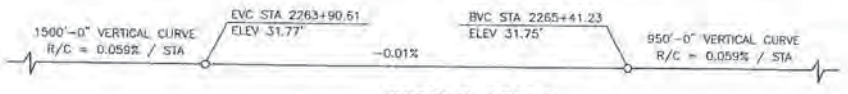
AGUA HEDIONDA CREEK BRIDGE (WIDEN)
SPECIAL DETAILS
CONCRETE PILE DETAILS

BRIDGE NO. 57-262 POST MILE 48.0 DRAWING NO. 57-262-5 SHEET 5 OF 7

WO

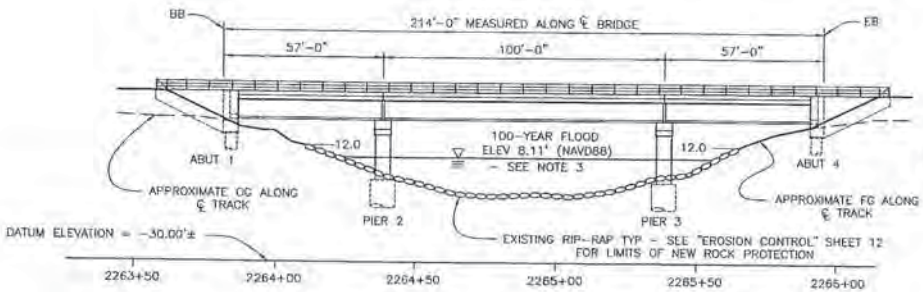
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE March 26, 1970 SIGNATURE [illegible] TITLE Chief, Office of Bridge Standards



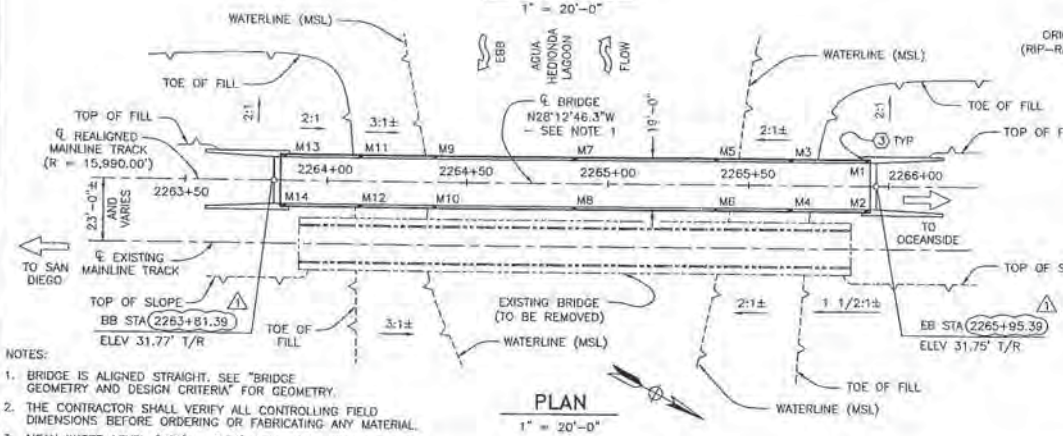

## PROFILE GRADE

NO SCALE




## ELEVATION

1" = 20'-0"

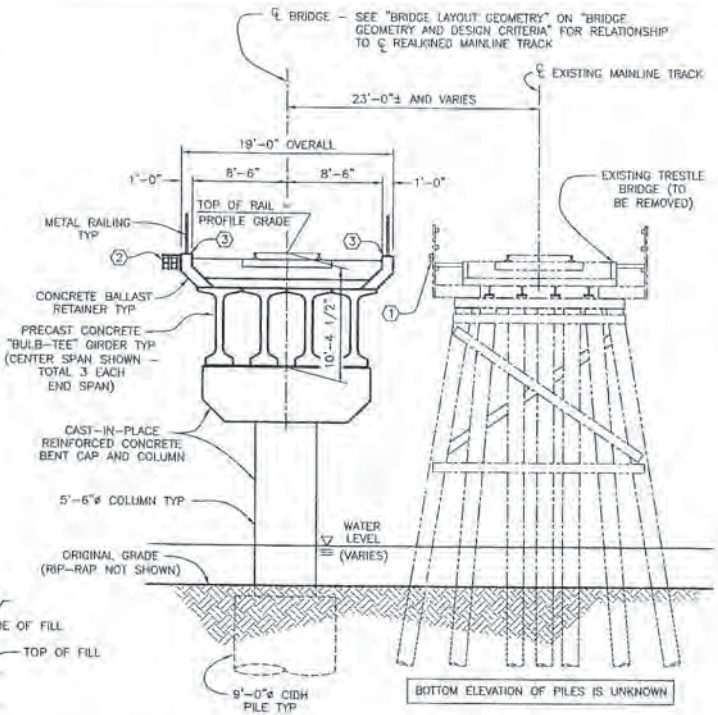



## PLAN

1" = 20'-0"

NOTES:

1. BRIDGE IS ALIGNED STRAIGHT. SEE "BRIDGE GEOMETRY AND DESIGN CRITERIA" FOR GEOMETRY.
2. THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.
3. MEAN WATER LEVEL (MSL) = 2.54', MEAN HIGH WATER = 4.41', AND MEAN LOW WATER = 0.72' (NAVD88).




## TYPICAL SECTION

1" = 5'-0"

① - 4"ø MCI FIBER OPTIC CABLE CONDUIT - TOTAL 2 (TO BE RELOCATED BY OTHERS)

② - 4"ø CONDUITS - TOTAL 4 (2 MCI, 2 FUTURE)

SEE "CONDUIT END DETAIL" ON MISCELLANEOUS DETAILS SHEET 41.

③ - CAST-IN-PLACE 2"ø BRASS DISK NUMBERED AS SHOWN IN THE TOP OF BALLAST RETAINER AT EACH MIDSPAN AND SUPPORT LOCATION. SURVEY AND PROVIDE ELEVATIONS OF EACH DISK PRIOR TO THE PLACEMENT OF TRACK AND BALLAST AND AGAIN AT COMPLETION OF PROJECT.

| REV. | DATE | DESCRIPTION | BY | CHK | APP |
|---|---|---|---|---|---|
| 1 | 10/05 | REVISED STATIONING ALONG NEW ALIGNMENT | KG | | |

CONFIDENTIAL INFORMATION: All plans, drawings, specifications, and/or information furnished herewith shall remain the property of the North San Diego County Transit Development Board, and shall be held confidential, and shall not be used for any purpose not provided for in agreements with the North San Diego County Transit Development Board.

DESIGNED BY K. GAZAWAY
DRAWN BY T. BRITTAIN
CHECKED BY D. LAMPKIN
APPROVED BY
DATE 07/07/05

NORTH COUNTY TRANSIT DISTRICT

SIMON WONG ENGINEERING
8990 Miramar Road, Suite 200
San Diego, CA 92121
(858) 560-3110

Job No. 518-131

SUBMITTED:

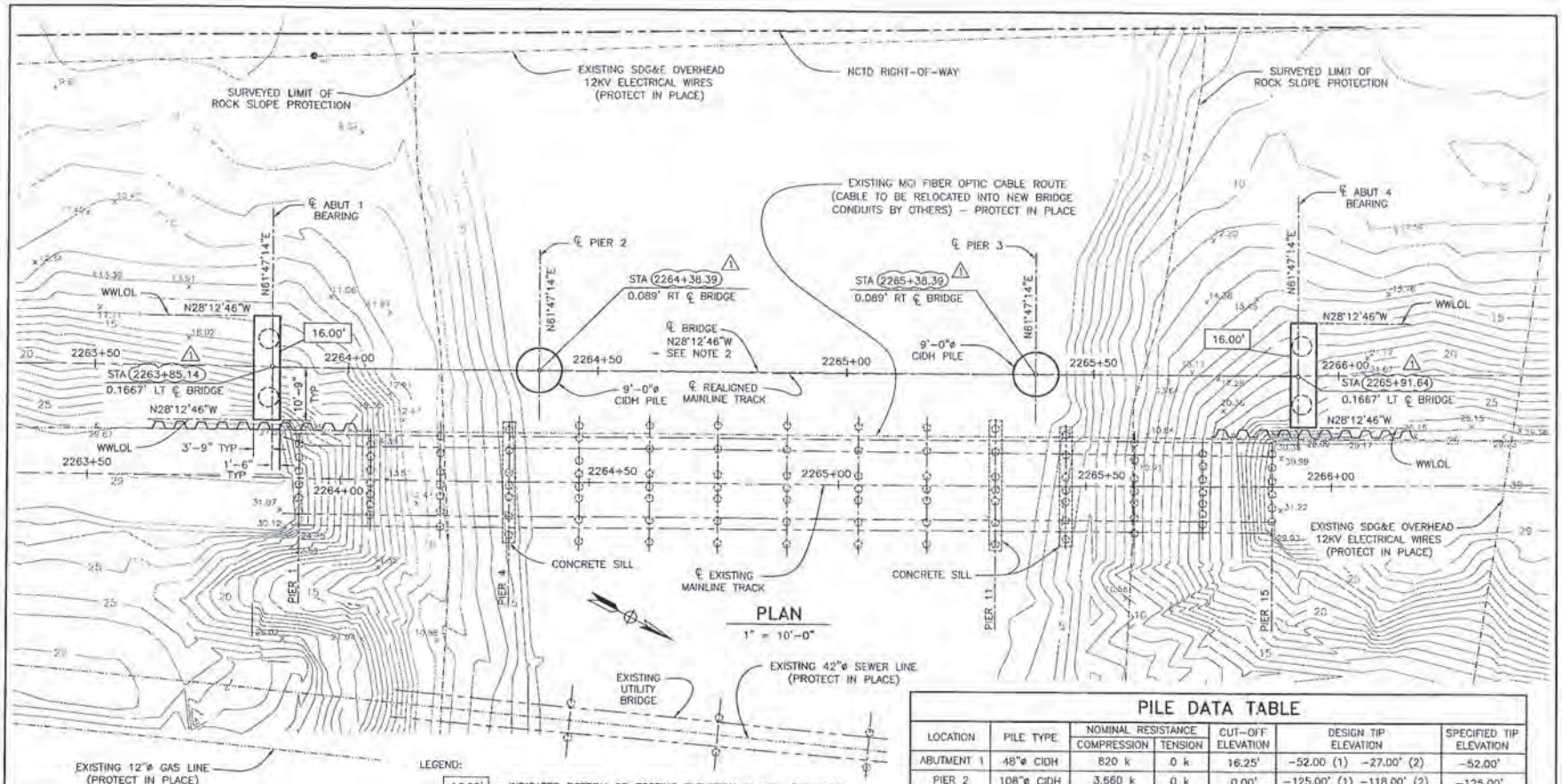
APPROVED:

# BRIDGE 230.6 REPLACEMENT

## GENERAL PLAN

SCALE: AS SHOWN
CONTRACT NO.
DRAWING NO. GR1
REV.
SHEET NO. 29

PW2000-ALL 518-131 07/07/05




## PLAN

1" = 10'-0"

## PILE DATA TABLE

| LOCATION | PILE TYPE | NOMINAL RESISTANCE COMPRESSION | NOMINAL RESISTANCE TENSION | CUT-OFF ELEVATION | DESIGN TIP ELEVATION | SPECIFIED TIP ELEVATION |
|---|---|---|---|---|---|---|
| ABUTMENT 1 | 48"ø CIDH | 820 k | 0 k | 16.25' | -52.00' (1) -27.00' (2) | -52.00' |
| PIER 2 | 108"ø CIDH | 3,660 k | 0 k | 0.00' | -125.00' (1) -118.00' (2) | -125.00' |
| PIER 3 | 108"ø CIDH | 3,660 k | 0 k | 0.00' | -117.00' (1) -81.00' (2) | -117.00' |
| ABUTMENT 4 | 48"ø CIDH | 820 k | 0 k | 16.25' | -67.00' (1) -27.00' (2) | -67.00 |

DESIGN TIP ELEVATION IS CONTROLLED BY THE FOLLOWING DEMANDS:
(1) COMPRESSION (2) LATERAL

NOTES:

1. CONTOUR LINES GENERATED FROM AERIAL TOPOGRAPHY.
2. BRIDGE IS ALIGNED STRAIGHT. SEE "BRIDGE LAYOUT GEOMETRY" ON "BRIDGE GEOMETRY AND DESIGN CRITERIA" FOR GEOMETRY.
3. THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND:

16.00' – INDICATES BOTTOM OF FOOTING ELEVATION IN FEET (NAVD88)
○ – INDICATES EXISTING TIMBER PILE
◯ – INDICATES 48"ø CIDH PILE
x – INDICATES SPOT ELEVATION PER GROUND SURVEY
– INDICATES APPROXIMATE LOCATION OF CONSTRUCTION SHORING. CONTRACTOR TO DESIGN AND CONSTRUCT.

| REV. | DATE | DESCRIPTION | BY | CHK | APP |
|---|---|---|---|---|---|
| 1 | 10/05 | REVISED STATIONING ALONG NEW ALIGNMENT | | KG | |

CONFIDENTIAL INFORMATION:
All plans, drawings, specifications, and/or information furnished herewith shall remain the property of the North San Diego County Transit Development Board, and shall be held confidential, and shall not be used for any purpose not provided for in agreements with the North San Diego County Transit Development Board.

DESIGNED BY K. GAZAWAY
DRAWN BY T. BRITTAIN
CHECKED BY D. LAMPKIN
APPROVED BY
DATE 07/07/05

NORTH COUNTY TRANSIT DISTRICT
SIMON WONG ENGINEERING
9965 Hibert Street, Suite 300
San Diego, CA 92131
(858) 586-3115

SUBMITTED: APPROVED:

# BRIDGE 230.6 REPLACEMENT

## FOUNDATION PLAN

SCALE AS SHOWN
CONTRACT NO.
DRAWING NO. BR3
REV. SHEET NO. 31

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service

Datums Page



**Station ID:** 9410230
**Name:** LA JOLLA, PACIFIC OCEAN CALIFORNIA
**NOAA Chart:** 18765
**USGS Quad:** LA JOLLA

**PUBLICATION DATE:** 04/21/2003
**Latitude:** 32° 52.0' N
**Longitude:** 117° 15.5' W

To reach the tidal bench marks from La Jolla, CA, from Interstate I-5 traveling south, take exit for Genesee Avenue and go west to Torrey Pines Road, take left on Torrey Pines Road and go south to La Jolla Shores Drive on the right. Take right and go south on La Jolla Shores Drive to Discovery Way on the right (marked Scripps Pier & Aquarium). Then take Discovery Way to the bottom of the hill and to the pier and station. The tidal bench marks are located in the vicinity of Scripps Pier. Tide gauges are in room in the SW corner in the building near offshore end of the Pier.

## T I D A L  B E N C H  M A R K S

**PRIMARY BENCH MARK STAMPING:** 7 1958
DESIGNATION: 941 0230 TIDAL 7

MONUMENTATION: Bench Mark disk — VM#: 1641
AGENCY: US Coast and Geodetic Survey (USC&GS) — PID#: DC0986
SETTING CLASSIFICATION: Concrete retaining wall

The primary bench mark is a disk set in top of a concrete retaining wall, 17.31 m (56.8 ft) east of SE corner of Center for Coastal Studies Building, 10.97 m (36.0 ft) NE of the intersection of the dock and Scripps maintenance yard, 9.39 m (30.8 ft) north of centerline of Discovery Way, 0.46 m (1.5 ft) south of the SW corner of the Benthic Laboratory Control Center, and 1 m (2 ft) above the street level.

**BENCH MARK STAMPING:** 6 1952
DESIGNATION: 941 0230 TIDAL 6

MONUMENTATION: Bench Mark disk — VM#: 1644
AGENCY: US Coast and Geodetic Survey (USC&GS) — PID#: DC0990
SETTING CLASSIFICATION: Concrete sea wall

The bench mark is a disk set in top of a 2 m (7 ft) concrete sea wall, 30 m (98 ft) north of east end of pier, 6.10 m (20.0 ft) south of north edge of concrete ramp leading to the beach, 3.81 m (12.5 ft) north of the NW corner of Center for Coastal Studies Building, 0.50 m (1.6 ft) east of the point where the seawall makes a 130-degree turn away from the beach, and 4 m (12 ft) below pier floor.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service



**Station ID:** 9410230 **PUBLICATION DATE:** 04/21/2003
**Name:** LA JOLLA, PACIFIC OCEAN CALIFORNIA
**NOAA Chart:** 18765 **Latitude:** 32° 52.0' N
**USGS Quad:** LA JOLLA **Longitude:** 117° 15.5' W

## T I D A L B E N C H M A R K S

**BENCH MARK STAMPING:** **BASIC 1929 RESET 1963 RESET 1964**
DESIGNATION: 941 0230 TIDAL BASIC RST

MONUMENTATION: Bench Mark disk VM#: 1646
AGENCY: US Coast and Geodetic Survey (USC&GS) PID#: DC1308
SETTING CLASSIFICATION: Concrete loading platform

The bench mark is a disk set flush in the concrete loading platform of the Center for Coastal Studies, located 9 m (30 ft) north of the extended centerline of the pier, 1.46 m (4.8 ft) north of the south edge of the top step leading to the door to building and just outside door, and 0.15 m (0.5 ft) east of a 2 m (6 ft) retaining wall.

**BENCH MARK STAMPING:** **NO 9 1971**
DESIGNATION: 941 0230 TIDAL 9

MONUMENTATION: Bench Mark disk VM#: 1647
AGENCY: US Coast and Geodetic Survey (USC&GS) PID#: DC1312
SETTING CLASSIFICATION: Concrete street light foundation

The bench mark is a disk set flush in a 1 m (3 ft) square concrete street light (# 3820) foundation, 4.88 (16.0 ft) east of the center of road through campus parallel to the shore line (Discovery Way), 4.50 m (14.8 ft) north of the centerline of blacktop walkway to metal door of Scholander Hall, 3.66 m (12.0 ft) SW of the SW corner of the western-most extension of the Scholander Hall, and flush with the ground.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service



**Station ID: 9410230** **PUBLICATION DATE: 04/21/2003**
**Name: LA JOLLA, PACIFIC OCEAN CALIFORNIA**
**NOAA Chart: 18765** **Latitude: 32° 52.0' N**
**USGS Quad: LA JOLLA** **Longitude: 117° 15.5' W**

## T I D A L B E N C H M A R K S

**BENCH MARK STAMPING: NO 10 1974**
DESIGNATION: 941 0230 TIDAL 10

MONUMENTATION: Tidal Station disk VM#: 1648
AGENCY: National Ocean Survey (NOS) PID#: DC1310
SETTING CLASSIFICATION: Concrete planter

The bench mark is a disk set in SE corner of concrete planter, located north of the north set of steps leading to Scripps Institution of Oceanography Storehouse (Building T42), 53 m (175 ft) NE of bench mark 7 1958 in the east area of the maintenance yards, 1.61 m (5.3 ft) east of the SE corner of planter, 0.21 m (0.7 ft) west of the west wall of the storehouse, and 1.07 m (3.5 ft) above ground level.

**BENCH MARK STAMPING: 0230 M 1977**
DESIGNATION: 941 0230 M TIDAL

MONUMENTATION: Tidal Station disk VM#: 1650
AGENCY: National Ocean Survey (NOS) PID#: DC1313
SETTING CLASSIFICATION: Copper-clad steel rod

The bench mark is a disk located 37.80 m (124.0 ft) west of the NW corner of the Public Affairs Office Building, 22.25 m (73.0 ft) NW of the NE corner of the Public Affairs Office, 1.16 m (3.8 ft) west of the west edge of the pathway, and 1.07 m (3.5 ft) north of an orange fiberglass witness post. The bench mark is set 6 cm (0.2 ft) below ground level, crimped to a copper-clad 5/8-inch steel rod driven to a depth of 12.8 m (42 ft), and encased in a 4-inch PVC pipe set in an irregular concrete mass.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service



**Station ID:** 9410230 **PUBLICATION DATE:** 04/21/2003
**Name:** LA JOLLA, PACIFIC OCEAN CALIFORNIA
**NOAA Chart:** 18765 **Latitude:** 32° 52.0' N
**USGS Quad:** LA JOLLA **Longitude:** 117° 15.5' W

## T I D A L B E N C H M A R K S

**BENCH MARK STAMPING:** 0230 N 1977
DESIGNATION: 941 0230 N TIDAL

| | | |
|---|---|---|
| MONUMENTATION: | Tidal Station disk | VM#: 1651 |
| AGENCY: | National Ocean Survey (NOS) | PID#: DC1314 |
| SETTING CLASSIFICATION: | Copper-clad steel rod | |

The bench mark is a disk set located 18.59 m (61.0 ft) south of the SW corner of Ritter Hall, 15.67 m (51.4 ft) NE of the NE corner of Building T-3, 5.55 m (18.2 ft) NNE of a fire pull box, and 0.61 m (2.0 ft) east of an orange witness post. The bench mark is set flush with ground level, set on a copper-clad 5/8-inch steel rod driven to a depth of 13.4 m (44 ft), and encased in a 4-inch PVC pipe protruding 0.09 m (0.3 ft) above ground level.

**BENCH MARK STAMPING:** 0230 P 1988
DESIGNATION: 941 0230 P

| | | |
|---|---|---|
| MONUMENTATION: | Tidal Station disk | VM#: 1652 |
| AGENCY: | National Ocean Service (NOS) | PID: |
| SETTING CLASSIFICATION: | Concrete pier | |

The bench mark is a disk set flush in the concrete pier floor, 25.91 m (85.0 ft) ESE of the offshore end of the Scripp's Pier, 4.85 m (15.9 ft) SSW of small yale lift crane located on the north side of pier, and 1.34 m (4.4 ft) NW from the NW corner of the Scripp's building on the outer pier.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service



**Station ID:** 9410230 **PUBLICATION DATE:** 04/21/2003
**Name:** LA JOLLA, PACIFIC OCEAN
CALIFORNIA
**NOAA Chart:** 18765 **Latitude:** 32° 52.0' N
**USGS Quad:** LA JOLLA **Longitude:** 117° 15.5' W

## T I D A L B E N C H M A R K S

**BENCH MARK STAMPING:** 0230 Q 1991
DESIGNATION: 941 0230 Q

MONUMENTATION: Tidal Station disk VM#: 6654
AGENCY: National Ocean Service (NOS) PID:
SETTING CLASSIFICATION: Concrete retaining wall

The bench mark is a disk set in the SE corner of the retaining wall for the inshore pump station directly south of the inshore end of the Scripps Pier, 21.34 m (70.0 ft) SSW of a fire hydrant near the foot of the pier, 20.73 m (68.0 ft) west of the SW corner of Scholander Hall near where the round building joins, and 0.30 m (1.0 ft) west of the east end of the south foot.

**BENCH MARK STAMPING:** 0230 R 1993
DESIGNATION: 941 0230 R

MONUMENTATION: Tidal Station disk VM#: 6766
AGENCY: National Ocean Service (NOS) PID:
SETTING CLASSIFICATION: Concrete slab

The bench mark is a disk set flush in a 1 m x 2 m (4 ft x 6 ft) concrete slab surrounding a storm drain manhole, located north of the Scripps pier, atop the dirt bank above the beach, 41 m (134 ft) north of the NW corner of the Grounds Department Garage, 11 m (36 ft) west of the SW corner of a four-store office building, 7 m (24 ft) SE of the SE corner of a large concrete storm drain out fall on the beach, and 0.52 m (1.7 ft) west of the center of the manhole.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service



**Station ID:** 9410230 **PUBLICATION DATE:** 04/21/2003
**Name:** LA JOLLA, PACIFIC OCEAN CALIFORNIA
**NOAA Chart:** 18765 **Latitude:** 32° 52.0' N
**USGS Quad:** LA JOLLA **Longitude:** 117° 15.5' W

## T I D A L B E N C H M A R K S

**BENCH MARK STAMPING:** 0230 S 2000
DESIGNATION: 941 0230 S

| | | | |
|---|---|---|---|
| MONUMENTATION: | Tidal Station disk | VM#: | 16180 |
| AGENCY: | National Ocean Service (NOS) | PID: | |
| SETTING CLASSIFICATION: | Concrete pier | | |

The bench mark is a disk set directly above concrete piling #17 midway along the Scripps Pier, 186 m (610 ft) east of the offshore end of the pier, 150 m (492 ft) west of the inshore end of the pier, 6.50 m (21.3 ft) north of the south edge of the pier, and 0.30m (1 ft) south of the north edge of the pier.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service



**Station ID:** 9410230 **PUBLICATION DATE:** 04/21/2003
**Name:** LA JOLLA, PACIFIC OCEAN CALIFORNIA
**NOAA Chart:** 18765 **Latitude:** 32° 52.0' N
**USGS Quad:** LA JOLLA **Longitude:** 117° 15.5' W

## T I D A L  D A T U M S

Tidal datums at LA JOLLA, PACIFIC OCEAN based on:

LENGTH OF SERIES: 19 Years
TIME PERIOD: January 1983 - December 2001
TIDAL EPOCH: 1983-2001
CONTROL TIDE STATION:

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

| | |
|---|---|
| HIGHEST OBSERVED WATER LEVEL (11/13/1997) | = 2.332 |
| MEAN HIGHER HIGH WATER (MHHW) | = 1.624 |
| MEAN HIGH WATER (MHW) | = 1.402 |
| MEAN TIDE LEVEL (MTL) | = 0.839 |
| MEAN SEA LEVEL (MSL) | = 0.833 |
| MEAN LOW WATER (MLW) | = 0.276 |
| NORTH AMERICAN VERTICAL DATUM-1988 (NAVD) | = 0.058 |
| MEAN LOWER LOW WATER (MLLW) | = 0.000 |
| LOWEST OBSERVED WATER LEVEL (12/17/1933) | = -0.874 |

National Geodetic Vertical Datum (NGVD 29)

Bench Mark Elevation Information In METERS above:

| Stamping or Designation | MLLW | MHW |
|---|---|---|
| 7 1958 | 10.968 | 9.566 |
| 6 1952 | 4.657 | 3.255 |
| BASIC 1929 RESET 1963 RESET 1964 | 10.081 | 8.680 |
| NO 9 1971 | 9.666 | 8.264 |
| NO 10 1974 | 11.450 | 10.048 |
| 0230 M 1977 | 9.360 | 7.958 |
| 0230 N 1977 | 11.222 | 9.820 |
| 0230 P 1988 | 10.141 | 8.739 |
| 0230 Q 1991 | 9.376 | 7.974 |
| 0230 R 1993 | 11.201 | 9.799 |
| 0230 S 2000 | 9.640 | 8.238 |

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service



**Station ID:** 9410230
**Name:** LA JOLLA, PACIFIC OCEAN CALIFORNIA
**NOAA Chart:** 18765
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**PUBLICATION DATE:** 04/21/2003
**Latitude:** 32° 52.0' N
**Longitude:** 117° 15.5' W

## D E F I N I T I O N S

Mean Sea Level (MSL) is a tidal datum determined over a 19-year National Tidal Datum Epoch. It pertains to local mean sea level and should not be confused with the fixed datums of North American Vertical Datum of 1988 (NAVD 88).

NGVD 29 is a fixed datum adopted as a national standard geodetic reference for heights but is now considered superseded. NGVD 29 is sometimes referred to as Sea Level Datum of 1929 or as Mean Sea Level on some early issues of Geological Survey Topographic Quads. NGVD 29 was originally derived from a general adjustment of the first-order leveling networks of the U.S. and Canada after holding mean sea level observed at 26 long term tide stations as fixed. Numerous local and wide-spread adjustments have been made since establishment in 1929. Bench mark elevations relative to NGVD 29 are available from the National Geodetic Survey (NGS) data base via the World Wide Web at National Geodetic Survey.

NAVD 88 is a fixed datum derived from a simultaneous, least squares, minimum constraint adjustment of Canadian/Mexican/United States leveling observations. Local mean sea level observed at Father Point/Rimouski, Canada was held fixed as the single initial constraint. NAVD 88 replaces NGVD 29 as the national standard geodetic reference for heights. Bench mark elevations relative to NAVD 88 are available from NGS through the World Wide Web at National Geodetic Survey.

NGVD 29 and NAVD 88 are fixed geodetic datums whose elevation relationships to local MSL and other tidal datums may not be consistent from one location to another.

The Vertical Mark Number (VM#) and PID# shown on the bench mark sheet are unique identifiers for bench marks in the tidal and geodetic databases, respectively. Each bench mark in either database has a single, unique VM# and/or PID# assigned. Where both VM# and PID# are indicated, both tidal and geodetic elevations are available for the bench mark listed.

The NAVD 88 elevation is shown on the Elevations of Tidal Datums Table Referred to MLLW only when two or more of the bench marks listed have NAVD 88 elevations. The NAVD 88 elevation relationship shown in the table is derived from an average of several bench mark elevations relative to tide station datum. As a result of this averaging, NAVD 88 bench mark elevations computed indirectly from the tidal datums elevation table may differ slightly from NAVD 88 elevations listed for each bench mark in the NGS database.

## Elevation Information

PID: DC0986
VM: 1641
Station ID: 9410230
Epoch: 1983-2001
Date: Tue Mar 4 12:03:58 EST 2008

| | | |
|---|---|---|
| MHHW | = | 5.33 feet (1.624 meters) |
| MHW | = | 4.60 feet (1.402 meters) |
| MTL | = | 2.75 feet (0.839 meters) |
| MSL | = | 2.73 feet (0.833 meters) |
| NGVD29 | = | 2.29 feet (0.700 meters) |
| MLW | = | 0.90 feet (0.276 meters) |
| NAVD88 | = | 0.18 feet (0.057 meters) |
| MLLW | = | 0.00 feet (0.000 meters) |

The NAVD 88 and the NGVD 29 elevations related to MLLW were computed from Bench Mark, 941 0230 TIDAL 7, at the station.

Displayed tidal datums are Mean Higher High Water(MHHW), Mean High Water (MHW), Mean Tide Level(MTL), Mean Sea Level (MSL), Mean Low Water(MLW), and Mean Lower Low Water(MLLW) referenced on 1983-2001 Epoch.

INDEX OF SHEETS


1. TITLE SHEET
2. WORK TO BE DONE & LEGEND
3. ROADWAY CROSS-SECTIONS
4. STA. 10+00 TO 21+00
4A. STORM DRAIN PLAN & PROFILE
5. STA. 21+00 TO 24+00
6. GENERAL PLAN
7. DECK GRID GRADES
8. FOUNDATION PLAN
9. NORTH ABUTMENT
10. SOUTH ABUTMENT
11. ABUTMENT DETAILS
12. TYPICAL SECTION
13. GIRDER LAYOUT
14. GIRDER DETAILS
15. PRESTRESSED GIRDER DETAILS
16. BRIDGE DETAILS-1
17. BRIDGE DETAILS-2
18. UTILITIES PLAN & PROFILE
19. UTILITY DETAILS
20. RAILING DETAILS
21. ROCK SLOPE PROTECTION
22. RETAINING WALL LAYOUT
23. RETAINING WALL DETAILS
24. LOG OF TEST BORINGS
25. TRAFFIC STRIPING PLAN
26. REGIONAL STANDARD DRAWINGS-1
27. REGIONAL STANDARD DRAWINGS-2

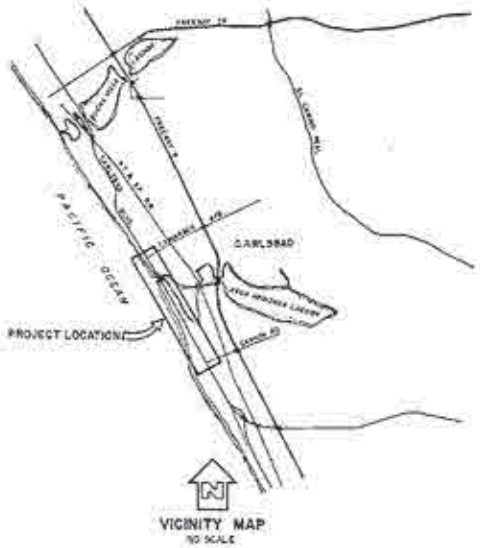

CITY OF CARLSBAD

# PLANS FOR CONSTRUCTION OF

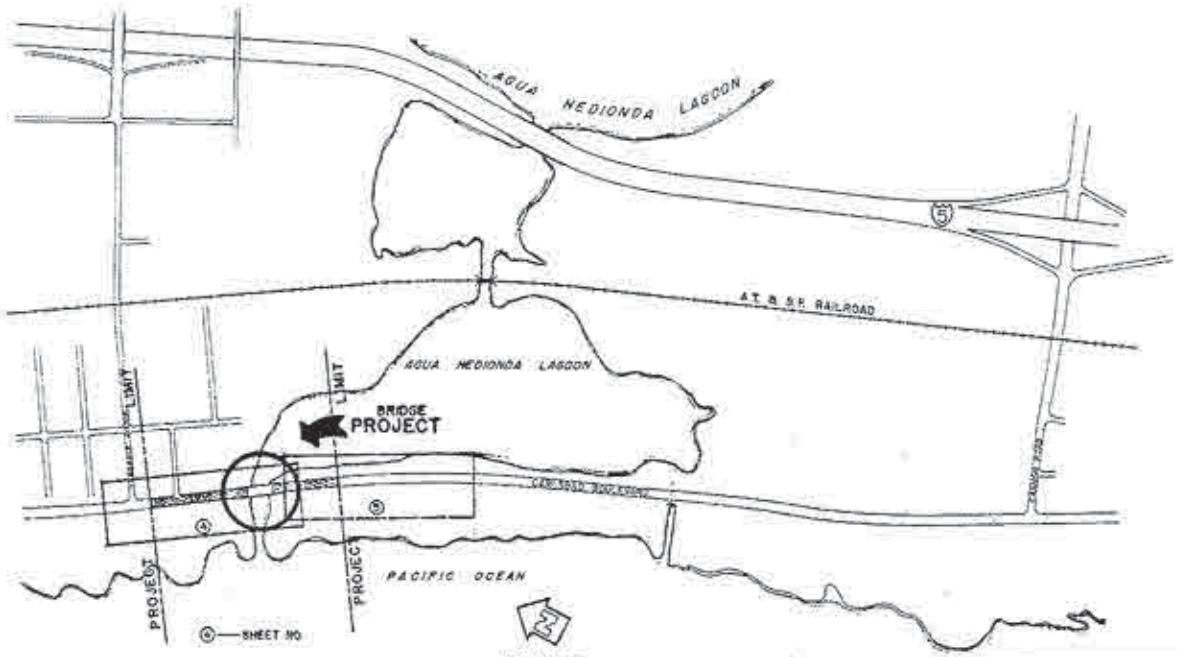
# CARLSBAD BOULEVARD BRIDGE

## AT THE AGUA HEDIONDA LAGOON

FEDERAL AID PROJECT BRM-5101(9); M-5101(12)
BRIDGE NO. 57C-133




VICINITY MAP
NO SCALE




KEY MAP
SCALE: 1"=400'

McDANIEL ENGINEERING COMPANY, INC.

| DATE | BY | DESCRIPTION | APP'D |
|---|---|---|---|
| | | REVISIONS | |

SHEET 1 — CITY OF CARLSBAD ENGINEERING DEPARTMENT — SHEETS 27

CARLSBAD BOULEVARD BRIDGE
TITLE SHEET

APPROVED Richard H. Ore, Jr.
RE 21494 CITY ENGINEER
DATE June 30, 87
SCALE
VERT. —
HORIZ. NOTED
OWNER BLK
ZONE & TEMPORARY
FIELD BK.
PROJECT NO. 3098
DRAWING NO. 207-6

F388

## GENERAL NOTES

1. EXISTING UTILITIES:

Before excavating the Contractor shall verify the location of all underground utilities. The existence and location of any underground utilities or structures was determined by a search of available records and/or inquiry to all applicable utility companies. To the best of our knowledge, there are no other existing underground utilities except as shown hereon, however, the Contractor shall take precautionary measures as required to protect the utility lines shown here and any other utility lines which may be uncovered during his operations.

The Contractor shall notify Utility Companies prior to starting work near company facilities and shall coordinate his work with utility companies affected.

SAN DIEGO GAS & ELECTRIC CO., Tel (619) 438-6000

PACIFIC TELEPHONE CO, Tel 1-800-422-4133

CITY OF CARLSBAD UTILITIES DEPARTMENT, Tel (619) 438-5604

## ROADWAY PLAN ABBREVIATIONS

"Caltrans Standard Plans" refers to details contained in the State of California Department of Transportation Standard Plans dated JULY, 1984.

A.C. — Asphalt Concrete
M.B.G.R — Metal Beam Guard Rail
E.C. — End Curve
B.C. — Begin Curve
B.V.C. — Begin Vertical Curve
E.V.C. — End Vertical Curve
R.R.V.C. — Point of Reverse Vertical Curve
Lt. — Left
Rt. — Right
Typ. — Typical
P.C.R. — Point of Curve Return
Sta. — Station
V.C. — Vertical Curve
No — Number
℄ — Centerline
R.C.P. — Reinforced Concrete Pipe
Reg. — Regional
Std. — Standard
Drwg. — Drawing
P.C.C. — Portland Cement Concrete
R/W — Right of Way
Min. — Minimum
Max. — Maximum
A.C.P. — Asbestos Concrete Pipe
I.E. — Invert Elevation

Δ — Angle
B — Bearing
R — Radius
"R" Line — Right Line
"L" Line — Left Line
S — South
N — North
E — East
W — West

## BASIS OF BEARINGS

The basis of bearings is the CENTERLINE OF THE CANNON ROAD PER MAP NO. 2696, IE N66°54'10"E

## BENCHMARK & DATUM

The well monument at CANNON ROAD IS ELEV. 48.17 MSL (Elev 48.60 MSL based on 2 City of Carlsbad Bench Marks)
Note: Elev. 48.17 MSL was used for this project.

## APPROXIMATE EARTHWORK QUANTITIES

Roadway Excavation — 2,500 CY
Roadway Embankment — 8,200 CY
Imported Borrow — 5,700 CY

## GENERAL SYMBOLS

A/2 — Section Identification / Drawing No. Where Section Is Shown
A/— — Section Identification / Section Shown On Same Drawing
1/2 — Detail Identification / Drawing No. Where Detail Is Shown
1/— — Detail Identification / Detail Shown On Same Drawing
15 — Denotes Length, Delta, And/Or Bearing
(2) — Numbered Construction Note On Same Drawing

## WORK TO BE DONE

The improvements consist of the following work to be done in accordance with these Plans, The Special Provisions, Standard Drawings and Regional Standard Drawings as follows:

| WORK TO BE DONE | REG. STD. DRWG. | SYMBOL OR DETAIL |
|---|---|---|
| Cut Slope | — | |
| Fill Slope | — | |
| 4" Asphalt Concrete on 6" Class 2 Aggregate Base | — | |
| Variable Thickness Asphalt Concrete Overlay | — | |
| 6" Type "A" Asphalt Concrete Berm (Temporary) | — | |
| Type G Curb & Gutter | See "G-2" Sheet No. 26 | |
| 4" P.C.C. Sidewalk | G-7.1 See Sheet No. 26 | |
| Type B Curb Inlet | D-2.1 See Sheet No. 26 | |
| Type B-5 Storm Drain Cleanout | D10 See Sheet No. 27 | |
| Reinforced Concrete Pipe (Size, B Class per Plan) | | |
| Straight Headwall - Type "B" | See "D-32" Sheet No. 26 | |
| Concrete Stairway | See Sheet No. 5 | |
| Concrete Bridge | See Sheets 6-20 | as shown |
| Retaining Wall | See Details Sheet No. 23 | |
| Pedestrian Ramp | See "G-6" Sheet No. 26 | |
| Concrete Energy Dissipator | D-41, 43 Sheet No. 27 | |
| Pipe Hand Railing | See Sheet No. 5 | |
| Metal Beam Guard Rail | CALTRANS A77 C-1 & C-2 | |
| Thrust Block | See Detail Sheet No. 19 | |
| Cable Anchor Assembly (Breakaway - Type A) | CALTRANS A77-E | |
| Street Light (22,000 lumen) | E-1 See Sheet No. 18 | |
| 12" Right Gate Valve | — | |
| 1" Manual Air Release | See W-3 Sheet 27 | |
| 12" CMLC Welded Steel Pipe | — | |
| 10" CMLC Welded Steel Pipe | — | |
| 12" Asbestos Cement Pipe (CL-150) | — | |

## SPECIFICATIONS AND PLANS

Standard Specifications, July, 1984.
Department of Transportation, State of California

Standard Plans, July, 1984
Department of Transportation, State of California

San Diego Area Regional Standard Drawings, October, 1982
Department of Public Works, County of San Diego. See Sheets 26 & 27.

McDANIEL ENGINEERING COMPANY, INC.
MAY CASS STREET SAN DIEGO, CALIFORNIA 92106 - (714) 223-8100

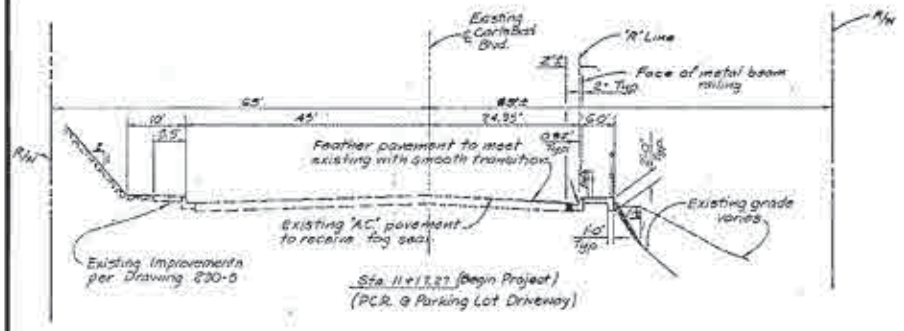
DATE BY DESCRIPTION APP'D
REVISIONS

SHEET 2 | CITY OF CARLSBAD ENGINEERING DEPARTMENT | SHEETS 27

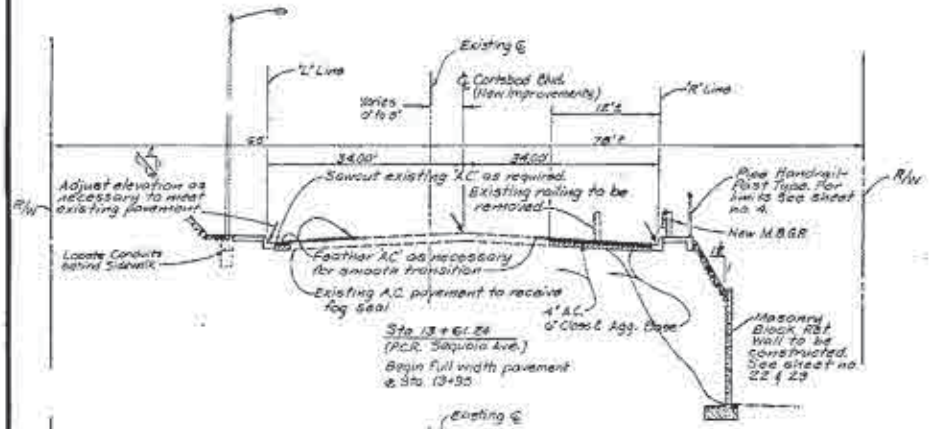
CARLSBAD BOULEVARD BRIDGE
WORK TO BE DONE & LEGEND

APPROVED [signature] RE 21614 CITY ENGINEER — DATE 6-4-84
DES. BY — DRN. BY — CHK'D BY — FIELD BK. — PROJECT NO. 3098 — SCALE VERT. AS HORZ. NOTED — DRWG. NO. 223-R

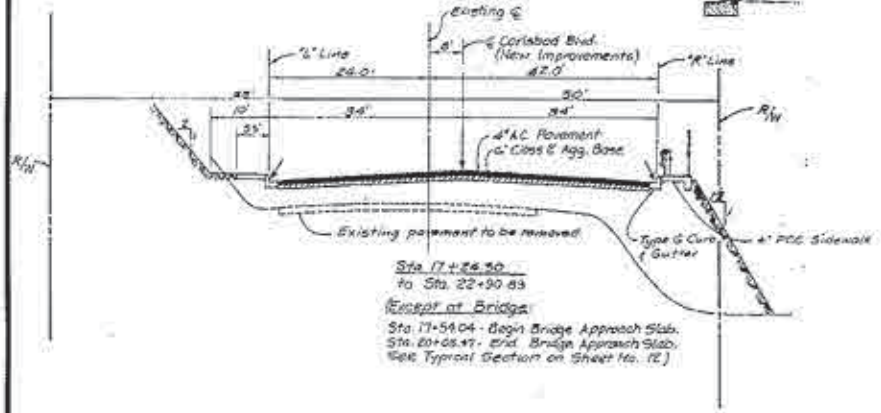
FEE




Sta. 11+13.27 (Begin Project)
(P.C.R. @ Parking Lot Driveway)



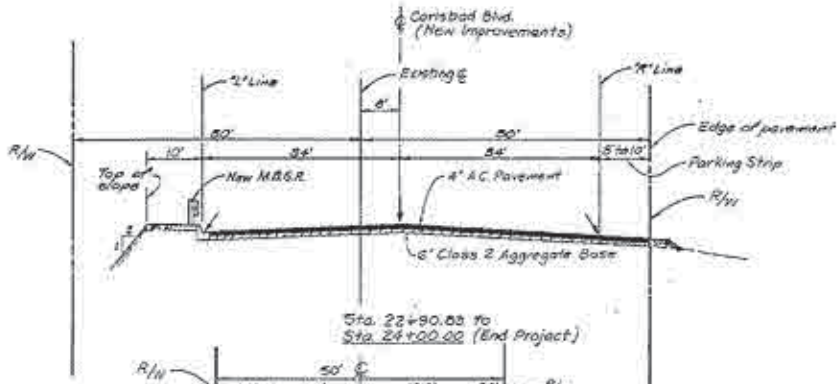

Sta. 13+61.26
(P.C.R. Sequoia Ave.)
Begin full width pavement @ Sta. 13+95



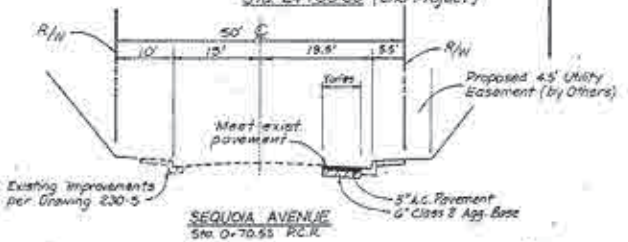

Sta. 17+26.30
to Sta. 22+90.89

Except at Bridge

Sta. 17+54.04 - Begin Bridge Approach Slab.
Sta. 20+05.47 - End Bridge Approach Slab.
See Typical Section on Sheet No. 12




Sta. 22+90.89 to
Sta. 24+00.00 (End Project)




SEQUOIA AVENUE
Sta. 0+70.55 P.C.R.

## TYPICAL SECTIONS

SCALE: HORIZ —— 1"=10'
VERT —— 1"=4'

℄ — Basis of Stationing
↓ — Denotes Elevations shown on plans
Note: Profiles & Curblines are Gutter Grades. Add 0.5' for Top of Curb Grades

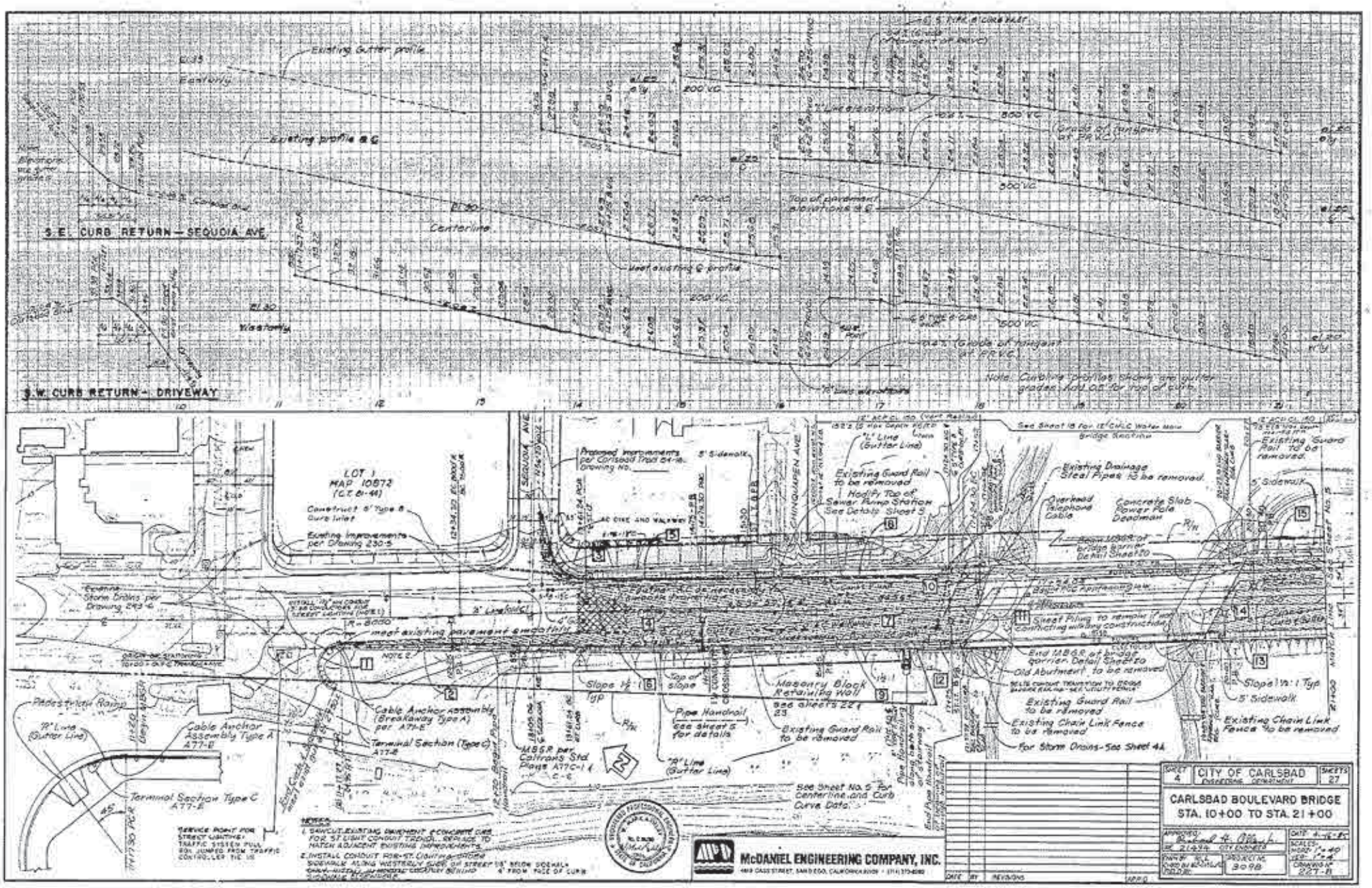
McDANIEL ENGINEERING COMPANY, INC.

| DATE | BY | DESCRIPTION | APP'D |
|---|---|---|---|
| | | REVISIONS | |

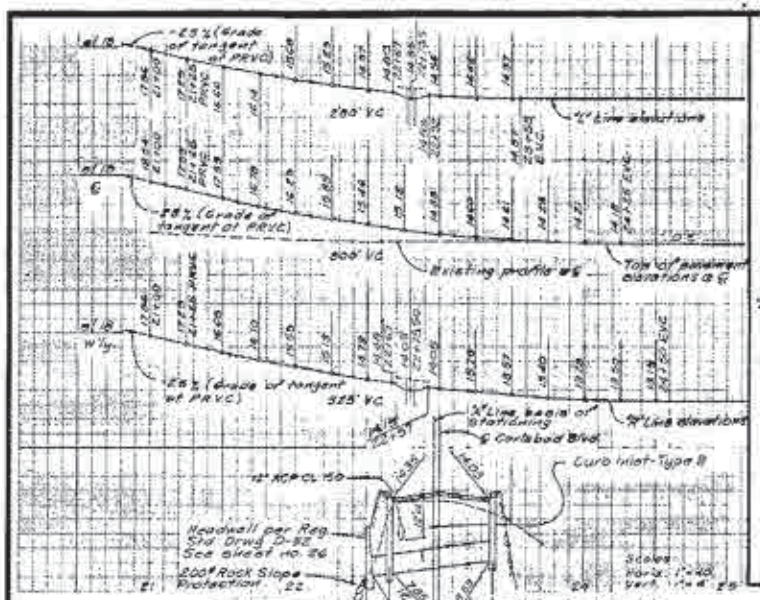
SHEET 3 — CITY OF CARLSBAD ENGINEERING DEPARTMENT — SHEETS 27

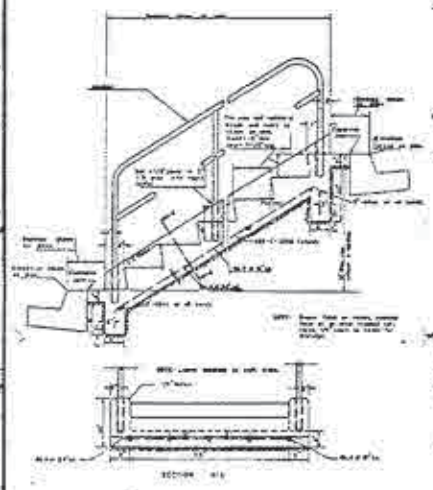
CARLSBAD BOULEVARD BRIDGE
ROADWAY CROSS-SECTIONS

APPROVED [signature] DATE 8-11-25
RCE 24424 CITY ENGINEER
DES BY N.A. CHK'D BY [illegible] FIELD BY
SCALE VERT. AS NOTED HORZ. NOTED
PROJECT NO 3098
DRAWING NO

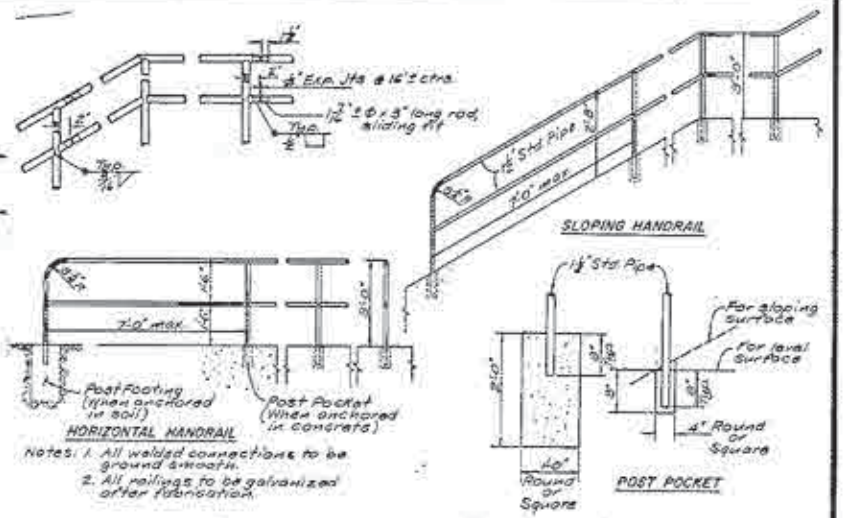

S.E. CURB RETURN – SEQUOIA AVE.
S.W. CURB RETURN – DRIVEWAY
Existing Gutter profile
Existing profile @ C
Centerline
Top of pavement elevations @ C
Note: Curbing profiles shown are gutter grades. Add 0.5' for top of curb.
LOT 1
MAP 10872
(C.T. 21-44)
Construct 6' Type B Curb Inlet
Existing Improvements per Drawing 230-5
Proposed Improvements per Carlsbad Tract 84-16, Drawing No.
5' Sidewalk
Existing Guard Rail to be removed
Modify Top of Sewer Pump Station See Details Sheet 3
Existing Drainage Steel Pipes to be removed.
Overhead Telephone Cable
Concrete Slab Power Pole Deadman
Existing Storm Drains per Drawing 249-6
meet existing pavement smoothly
Slope ½":1' typ
Top of slope
Masonry Block Retaining Wall see sheets 22 & 23
Pedestrian Ramp
"A" Line (Gutter Line)
Cable Anchor Assembly Type A 77-B
Cable Anchor Assembly (Breakaway Type A) per A77-E
Terminal Section (Type C)
Terminal Section Type C A77-E
Pipe Handrail see sheet 5 for details
Existing Guard Rail to be removed
MBSR per Caltrans Std. Plans A77C-1 & C-6
See Sheet No. 5 for centerline and Curb Curve Data.
Sheet Piling to remain
End MBSR at bridge barrier. Detail Sheet 20
Old Abutment to be removed
Existing Guard Rail to be removed
Existing Chain Link Fence to be removed
For Storm Drains - See Sheet 44
Slope 1½":1' Typ
5' Sidewalk
Existing Chain Link Fence to be removed
Existing Guard Rail to be removed
See Sheet 18 for 12" C.I.C.C. Water Main Bridge Section
Bridge Layout
SEQUOIA AVE
CHINQUAPEN AVE
R=8000
NOTES
1. SAWCUT EXISTING PAVEMENT & CONCRETE CURB FOR ST. LIGHT CONDUIT TRENCH. REPLACE TO MATCH ADJACENT EXISTING IMPROVEMENTS.
2. INSTALL CONDUIT FOR ST. LIGHTING UNDER SIDEWALK ALONG WESTERLY SIDE OF STREET 18" BELOW SIDEWALK 4' FROM FACE OF CURB.
SERVICE POINT FOR STREET LIGHTING TRAFFIC SYSTEM PULL BOX JUMPED FROM TRAFFIC CONTROLLER THE US
McDANIEL ENGINEERING COMPANY, INC.
CITY OF CARLSBAD
ENGINEERING DEPARTMENT
CARLSBAD BOULEVARD BRIDGE
STA. 10+00 TO STA. 21+00
SHEET 4
SHEETS 27
DATE 4-16-85
SCALES: HOR. 1"=40' VER. 1"=4'
PROJECT NO. 3098
DRAWING NO. 227-11
DRAWN BY
TRACED BY
CHECKED BY
DATE
BY
REVISIONS

F598 JOB NO.

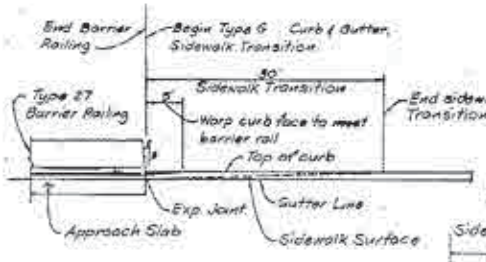


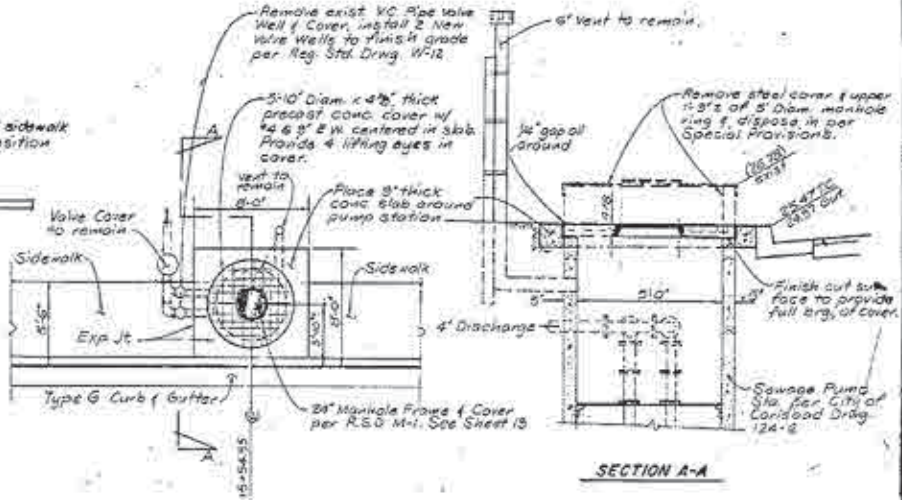
CONCRETE STEPS




PIPE HANDRAIL - POST TYPE




SIDEWALK TRANSITION AT BRIDGE




SEWAGE PUMP STATION MODIFICATION DETAILS

| NO. | BRG. or DELTA | RADIUS | LENGTH | NOTES |
|---|---|---|---|---|
| | Sheet No 4 | | | |
| 1 | 131°55'13" | 25.00 | 68.91 | Curb Ret. |
| 2 | S 34°24'37" E | - | 843.99 | Rt. Curb |
| 3 | 81° 21'43" | 35.00 | 55.81 | Curb Ret. |
| 4 | 13.62'18" | 7500.00 | 848.00 | ℄ (New) |
| 5 | 0°54'07" | 7534.00 | 118.60 | Lt. Curb |
| 6 | 0°54'07" | 7496.00 | 117.86 | Rt. Curb |
| 7 | 1°-52'-18" | 7500.00 | 846.90 | ℄ (New) |
| 8 | 1°-52'-18" | 7466.00 | 243.00 | Lt. Curb |
| 9 | 1°-52'-18" | 7534.00 | 246.11 | Rt. Curb |
| 10 | N 56°59'14" E | - | 53.78 | Lt. Curb |
| 11 | N 36°-59'-14" E | - | 56.63 | ℄ (New) |
| 12 | N 56°59'-14" E | - | 113.25 | Rt. Curb |
| 13 | N 36°-59'-14" E | - | 116.19 | Rt. Curb |
| 14 | N 36°-59'-14" E | - | 96.83 | ℄ (New) |
| 15 | N 36°-59'-14" E | - | 30.90 | Lt. Curb |
| | Sheet No. 5 | | | |
| 16 | N 36°-59'-14" E | - | 300.00 | Rt. Curb |
| 17 | N 36°59'-14" E | - | 300.00 | ℄ (New) |

McDANIEL ENGINEERING COMPANY, INC.
4848 CASS STREET, SAN DIEGO, CALIFORNIA 92109 • (714) 270-8230

REVISIONS

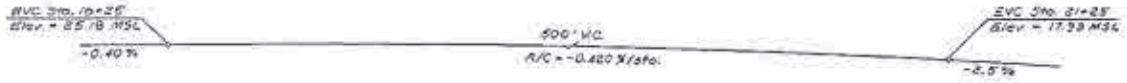
| DATE | DESCRIPTION | APP'D |
|---|---|---|

SHEET 5 | CITY OF CARLSBAD ENGINEERING DEPARTMENT | SHEETS 27

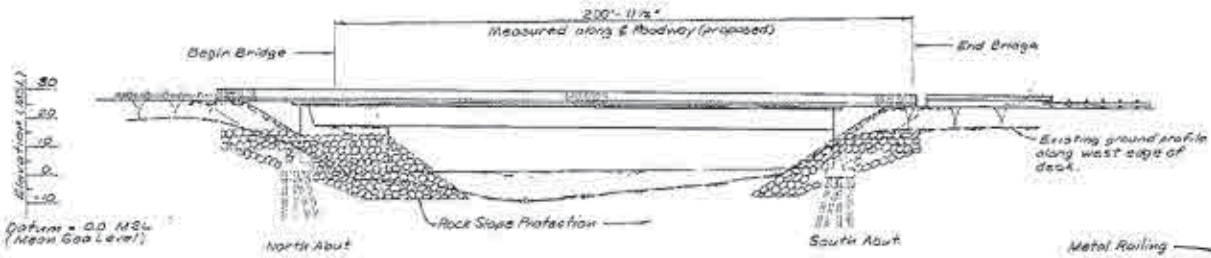
CARLSBAD BOULEVARD BRIDGE
STA. 21+00 TO STA. 24+00

APPROVED: [signature] DATE: 4-26-95
RE 21479 CITY ENGINEER
SCALE: HORZ. 1"=10' VERT. 1"=10'
DRAWN BY: R.S.A. CHKD BY: FIELD BK:
PROJECT NO 3098
DRAWING NO 127-1

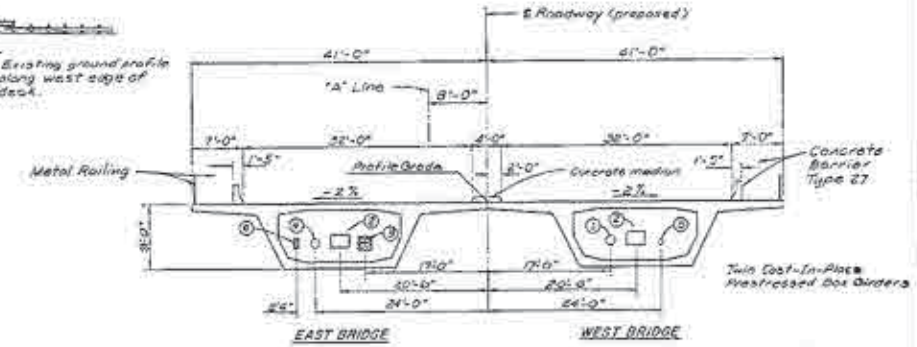
F888



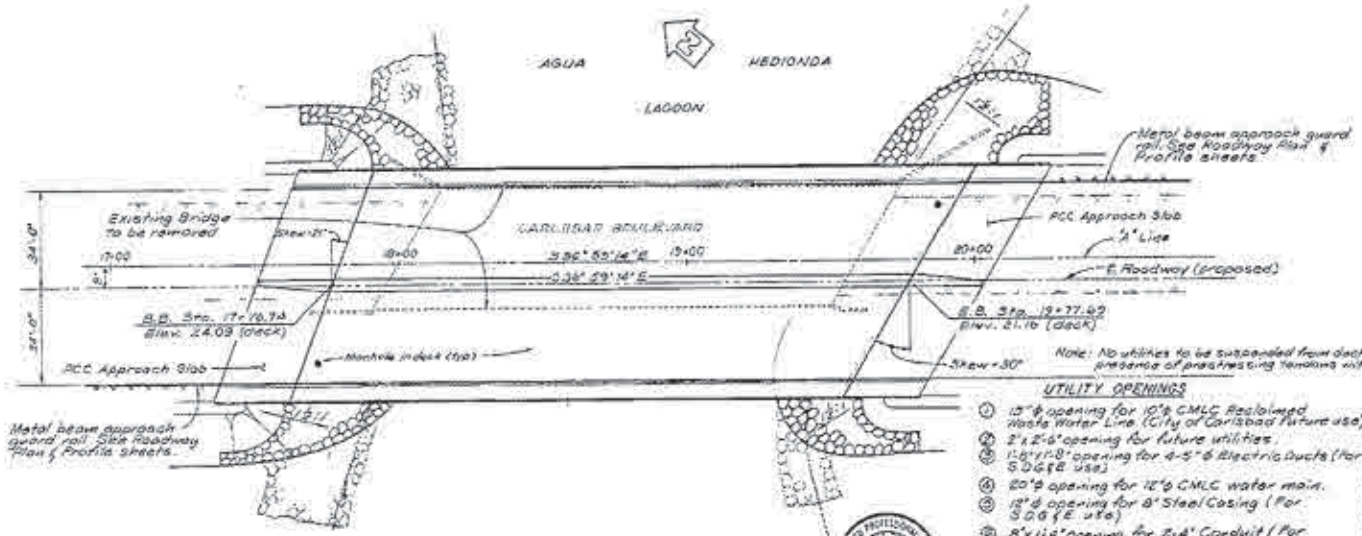

**PROFILE GRADE**
No Scale




**ELEVATION**
1"=20'




**TYPICAL SECTION**
1/8"=1'




**PLAN**
1"=20'

**UTILITY OPENINGS**

1. 15"ϕ opening for 10"ϕ CMLC Reclaimed Water Line (City of Carlsbad future use)
2. 2'x2'-6" opening for future utilities.
3. 1'-8"x1'-8" opening for 4-5" ϕ Electric Ducts (For SDG&E use)
4. 20"ϕ opening for 12"ϕ CMLC water main.
5. 12"ϕ opening for 8" Steel Casing (For SDG&E use)
6. 8"x16" opening for 2-4" Conduit (For Pacific Telephone use)

APPROXIMATE BRIDGE QUANTITIES

| | | | Lump Sum |
|---|---|---|---|
| 1. | | Bridge Removal | Lump Sum |
| 2. | (F) | Structure Excavation, Bridge | 160. C.Y. |
| 3. | (F) | Structure Backfill (Type A) | 610. C.Y. |
| 4. | (F) | Structure Backfill (), Bridge | 320. C.Y. |
| 5. | (F) | Structural Concrete, Bridge | 435. C.Y. |
| 6. | (F) | Structural Concrete, Bridge (Miscellaneous) | 1,560. C.Y. |
| 7. | (F) | Structural Concrete, Bridge Footing | 310. C.Y. |
| 8. | (F) | Seal Course Concrete | 345. C.Y. |
| 9. | (F) | Bridge Approach Slab | 155. C.Y. |
| 10. | (F) | Bar Reinforcing Steel, Bridge | 114,400. Lbs. * |
| 11. | | Prestressing Cast-In-Place Concrete | Lump Sum |
| 12. | | Furnish 72 tpn or 12x57 steel piling | 3,888. L.F. |
| 13. | | Drive 72 ton or 12x57 steel piling | 135. Ea. |
| 14. | | Concrete Barrier (Type 27) | 509. L.F. |
| 15. | | Concrete Bridge Median | 24. C.Y. |
| 16. | | Metal Bridge Railing | 369. L.F. |
| 17. | | Joint Seal (Type N-240-A) | 183. L.F. |
| 18. | | Rock Slope Protection (2 Ton) | 1,196. C.Y. |
| 19. | | Joint Seal (Type A1) | 200. L.F. |
| | (F) | Denotes Field Dry Quantity | |
| | * | Does not include reinforcing for retaining walls | |

RETAINING WALL QUANTITIES - SEE SHEET 22

McDANIEL ENGINEERING COMPANY, INC.
9845 CABOSTREET SAN DIEGO, CALIFORNIA 92126 • (714) 271-8200

| DATE | BY | DESCRIPTION | APPD. |
|---|---|---|---|
| | | REVISIONS | |

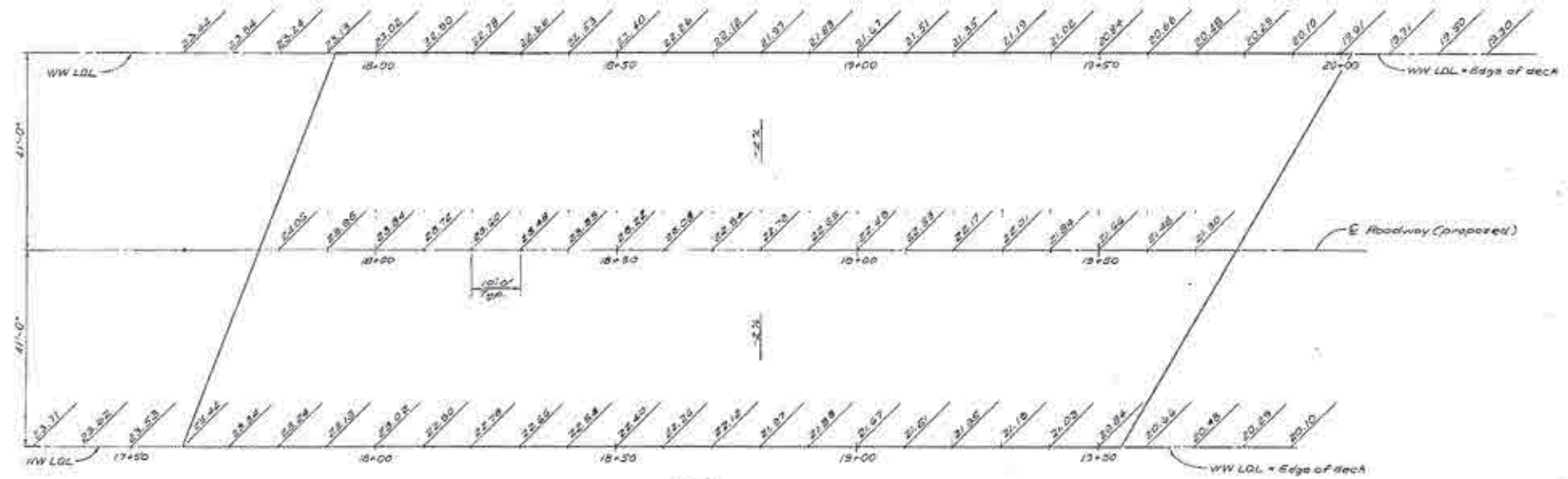
SHEET 6 | CITY OF CARLSBAD ENGINEERING DEPARTMENT | SHEETS 27

CARLSBAD BOULEVARD BRIDGE
GENERAL PLAN

APPROVED [signature] 4-15-94
RE 21494 CITY ENGINEER DATE

DWN BY [illegible] CHK'D BY [illegible] FIELD BK —
PROJECT NO 3098
DRAWING NO 227-B

F98

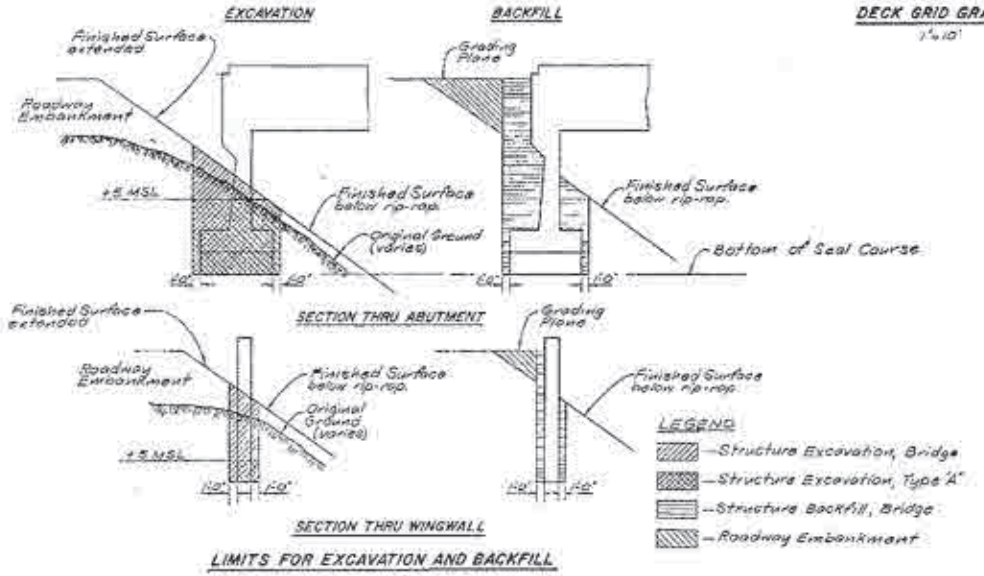



## DECK GRID GRADES

1"=10'

## BRIDGE PLAN ABBREVIATIONS

| | |
|---|---|
| Abut. | Abutment |
| Brg. | Bearing |
| BB | Begin Bridge |
| ℄ | Centerline |
| Clr. | Clear |
| EB | End Bridge |
| El. | Elevation |
| Elast. | Elastomeric |
| Galv. | Galvanized |
| MSL | Mean Sea Level |
| No. | Number |
| R/W | Right Of Way |
| Typ. | Typical |
| PCC | Portland Cement Concrete |
| WW LGL. | Wingwall Layout Line |
| F.G. | Finished Grade |




- GENERAL NOTES

LOAD FACTOR DESIGN

DESIGN: BRIDGE DESIGN SPECIFICATIONS 1977 AASHTO WITH INTERIMS AND CALTRANS SUPPLEMENTS.

DEAD LOAD: Includes 35 psf for future wearing surface.

LIVE LOADING: HS20-44 and alternative mod Force Design Load.

REINFORCED CONCRETE: $f'_c$ = 3,500 psi
$f_y$ = 60,000 psi
n = 9

TRANSVERSE DECK SLABS: $f_c$ = 1,300 psi
(conventionally reinforced portion of working stress design) $f_s$ = 24,000 psi
n = 10

PRESTRESSED CONCRETE: See "Prestressing Notes"

DRIVEN PILES

Abutments: HP 10X57 STEEL PILES
Design loading = 70 tons.

McDANIEL ENGINEERING COMPANY, INC.
4644 CASS STREET, SAN DIEGO, CALIFORNIA 92109 - (714) 270-9080

| DATE | BY | DESCRIPTION | APP'D |
|---|---|---|---|
| | | REVISIONS | |

SHEET 7 | CITY OF CARLSBAD ENGINEERING DEPARTMENT | SHEETS 27

CARLSBAD BOULEVARD BRIDGE
DECK GRID GRADES

APPROVED: Richard H. Ellerbe 4-16-85
R.E. [illegible] CITY ENGINEER DATE

DRN. BY [illegible] CHK'D BY [illegible] FIELD BK [illegible] | PROJECT NO. 3098 | DRAWING NO. 227-B

# Federal Emergency Management Agency

Washington, D.C. 20472

**MAR 3 0 1998**

The Honorable Bud Lewis
Mayor, City of Carlsbad
1200 Carlsbad Village Drive
Carlsbad, California 92008

IN REPLY REFER TO CASE NO. 97-09-1191A
Community: City of Carlsbad, California
Community No.: 060285
Map Panel Affected: 06073C0764 F
Map Effective Date: June 19, 1997
218-65-NS

Dear Mayor Lewis:

We reviewed a request dated September 16, 1997, from [redacted] for a Letter of Map Revision. All required information for this request, including the required review and processing fee, was received on March 5, 1998. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we determined the structures on the property described below are in a Special Flood Hazard Area (SFHA), the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). The three structures, Buildings 1, 2, and 3, as shown on the effective NFIP map, remain in the SFHA designated Zone A. This property was elevated by the placement of fill after the date of the earliest NFIP map showing the area in the SFHA.

| | |
|---|---|
| Property Description: | Lot 1, Tract 72-16, Bristol Cove Condominiums, as shown on the Plat recorded as File No. 73-237179, in the Office of the Recorder, San Diego County, California |
| Street Address: | 4525 Cove Drive |
| Flooding Source: | Agua Hedionda Lagoon |

The elevations of both the lowest adjacent grade to a structure (the lowest ground touching the structure) and the lowest floor (including basement/crawl space) must be at or above the base flood elevation (BFE) for the structure to be outside the SFHA. Because the elevation of the lowest adjacent grade to each structure, 7.5 feet, and the lowest floor of each structure, 6.9 feet, on Lot 1 is lower than the BFE, 8.5 feet, Buildings 1, 2, and 3 are within the SFHA; therefore, flood insurance is required. These elevations are referenced to the National Geodetic Vertical Datum of 1929.

This determination is based on the flood data presently available. Should you wish to resubmit this request, the NFIP regulations provide a period of 90 days from the date of this letter for resubmission of revised data without repayment of review and processing fee. Data submitted after 90 days will be subject to all submittal/payment procedures.

The enclosed document provides additional information about your options for obtaining a Letter of Map Revision. If you have any questions about this letter, please contact Mr. Mike Grimm of our staff in Washington, DC, either by telephone at (202) 646-2878 or by facsimile at (202) 646-4596.

Sincerely,

For Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure

cc: [redacted]

Date: October 25, 2002 | Case No.: 02-09-1460A | LOMA-DEN

# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP AMENDMENT
## DETERMINATION DOCUMENT (NON-REMOVAL)

| COMMUNITY AND MAP PANEL INFORMATION | | LEGAL PROPERTY DESCRIPTION |
|---|---|---|
| COMMUNITY | CITY OF CARLSBAD, SAN DIEGO COUNTY, CALIFORNIA | Lot 1, Carlsbad Tract 71-1, as shown on the Plat recorded as File No. 224925, in the Office of the Recorder, San Diego County, California |
| | COMMUNITY NO.: 060285 | |
| AFFECTED MAP PANEL | NUMBER: 06073C0764F | |
| | NAME: SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS | |
| | DATE: 06/19/1997 | |
| FLOODING SOURCE: AGUA HEDIONDA LAGOON | | APPROXIMATE LATITUDE & LONGITUDE OF PROPERTY: 33.145, -117.324<br>SOURCE OF LAT & LONG: PRECISION MAPPING STREETS 4.0 DATUM: NAD 83 |

### DETERMINATION

| LOT | BLOCK/ SECTION | SUBDIVISION | STREET | OUTCOME WHAT IS NOT REMOVED FROM THE SFHA | FLOOD ZONE | 1% ANNUAL CHANCE FLOOD ELEVATION (NGVD 29) | LOWEST ADJACENT GRADE ELEVATION (NGVD 29) | LOWEST LOT ELEVATION (NGVD 29) |
|---|---|---|---|---|---|---|---|---|
| 1 | — | Carlsbad Tract 71-1 | 4517/4519 Cove Drive | Structure | A | 8.5 feet | 7.6 feet | — |

**Special Flood Hazard Area (SFHA)** - The SFHA is an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).

ADDITIONAL CONSIDERATIONS (Please refer to the appropriate section on Attachment 1 for the additional considerations listed below.)

ZONE A

This document provides the Federal Emergency Management Agency's determination regarding a request for a Letter of Map Amendment for the property described above. Using the information submitted and the effective National Flood Insurance Program map, we have determined that the structure(s) on the property(ies) is/are located in the SFHA, an area inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). Therefore, flood insurance is required for the property described above. The lowest adjacent grade elevation to a structure must be at or above the Base Flood Elevation for a structure to be outside of the SFHA.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination and information regarding your options for obtaining a Letter of Map Amendment. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, 3601 Eisenhower Avenue, Suite 600, Alexandria, VA 22304-6439.

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP AMENDMENT
# DETERMINATION DOCUMENT (NON-REMOVAL)

ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

**ZONE A (This Additional Consideration applies to the preceding 1 Property.)**

The National Flood Insurance Program map affecting this property depicts a Special Flood Hazard Area that was determined using the best flood hazard data available to FEMA, but without performing a detailed engineering analysis. The flood elevation used to make this determination is based on approximate methods and has not been formalized through the standard process for establishing base flood elevations published in the Flood Insurance Study. This flood elevation is subject to change.

, attachment provides additional information regarding this request. If you have any questions about this attachment, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, 3601 Eisenhower Avenue, Suite 600, Alexandria, VA 22304-6439.

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and Mitigation Administration

Date: May 1, 2001 | Case No.: 01-09-553A | LOMR-F

# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION BASED ON FILL DETERMINATION DOCUMENT (REMOVAL)

| COMMUNITY AND MAP PANEL INFORMATION | | LEGAL PROPERTY DESCRIPTION |
|---|---|---|
| COMMUNITY | CITY OF CARLSBAD, SAN DIEGO COUNTY, CALIFORNIA | A portion of Lot 1, Tract 89-13, The Hamptons, as shown on Map No. 14144 recorded as File No. 2001-0082920, in the Office of the Recorder, San Diego County, California<br><br>The legal description of the portion mentioned above is as follows:<br><br>COMMENCING at the southwest corner of tract; thence N 25°25'55" E, 274.26 feet to the TRUE POINT OF BEGINNNING; thence S 64°34'05" E, 6.00 feet; thence S 25°25'55" W, 132.89 feet; thence S 64°32'42" E, 46.95 feet; thence S 47°42'43" E, 65.07 feet; |
| | COMMUNITY NO.: 060285 | |
| AFFECTED MAP PANEL | NUMBER: 06073C0764F | |
| | NAME: SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS | |
| | DATE: 06/19/1997 | |
| FLOODING SOURCE: AGUA HEDIONDA LAGOON | | APPROXIMATE LATITUDE & LONGITUDE OF PROPERTY: 33.143, -117.321<br>SOURCE OF LAT & LONG: PRECISION MAPPING STREETS 4.0 DATUM: NAD 83 |

## DETERMINATION

| L | BLOCK/ SECTION | SUBDIVISION | STREET | OUTCOME WHAT IS REMOVED FROM THE SFHA | FLOOD ZONE | 1% ANNUAL CHANCE FLOOD ELEVATION (NGVD 29) | LOWEST ADJACENT GRADE ELEVATION (NGVD 29) | LOWEST FLOOR ELEVATION (NGVD 29) | LOWEST LOT ELEVATION (NGVD 29) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | — | The Hamptons | — | Portion of Property | X (unshaded) | 8.5 feet | — | — | 8.6 feet |

**Special Flood Hazard Area (SFHA)** - The SFHA is an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).

ADDITIONAL CONSIDERATIONS (Please refer to the appropriate section on Attachment 1 for the additional considerations listed below.)

| | |
|---|---|
| LEGAL PROPERTY DESCRIPTION (CONTINUED) | ZONE A |
| FILL RECOMMENDATION | STUDY UNDERWAY |
| PORTIONS REMAIN IN THE SFHA | |

This document provides the Federal Emergency Management Agency's determination regarding a request for a Letter of Map Revision based on Fill for the property described above. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we have determined that the property(ies) is/are not located in the SFHA, an area inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This document revises the effective NFIP map to remove the subject property from the SFHA located on the effective NFIP map; therefore, the Federal mandatory flood insurance requirement does not apply. However, the lender has the option to continue the flood insurance requirement to protect its financial risk on the loan. A Preferred Risk Policy (PRP) is available for buildings located outside the SFHA. Information about the PRP and how one can apply is enclosed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, 3601 Eisenhower Avenue, Suite 600, Alexandria, VA 22304-6439.

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Federal Emergency Management Agency

Washington, D.C. 20472

# LETTER OF MAP REVISION BASED ON FILL DETERMINATION DOCUMENT (REMOVAL)

ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

**LEGAL PROPERTY DESCRIPTION (CONTINUED)**

thence S 40°50'02" E, 208.14 feet; thence S 47°39'18" E, 78.14 feet; thence S 53°47'58" E, 28.00 feet; thence N 76°28'53" E, 94.99 feet; thence N 25°25'55"E, 48.49 feet; thence N 56°35'23" E, 81.17 feet; thence N 42°00'30" E, 50.00 feet; thence 26.04 feet along a curve to the left having a radius of 90.00 feet; thence N 25°25'55" E, 323.97 feet; thence 44.47 feet along a curve to the left having a radius of 20.00 feet; thence 429.22 feet along a curve to the right having a radius of 449.00 feet; thence N 47°11'49" W, 40.05 feet; thence 17.64 feet along a curve to the right having a radius of 469.00 feet; thence 57.35 feet along a curve to the left having a radius of 30.00 feet, thence S 25°25'55" W, 171.42 feet; thence 18.56 feet along a curve to the left having a radius of 150.00 feet; thence S 32°31'17" W, 55.53 feet to the TRUE POINT OF BEGINNING

**FILL RECOMMENDATION (This Additional Consideration applies to the preceding 1 Property.)**

Although the criteria for removal of the subject area based on fill have been met for this request, Subparagraph 65.5(a)(4) of the National Flood Insurance Program regulations stipulates that if a structure is involved in a request for a Letter of Map Revision based on Fill, the Federal Emergency Management Agency's determination is based on comparisons of the lowest floor (including basement/crawl space) and the lowest adjacent grade elevations with the base flood elevation. If the entire structure is at or above the elevation of the base flood, the structure may be excluded from the Special Flood Hazard Area.

**F IONS OF THE PROPERTY REMAIN IN THE SFHA (This Additional Consideration applies to the preceding 1 Property.)**

This Determination Document has removed the subject of the determination from the Special Flood Hazard Area (SFHA). However, portions of the property may remain in the SFHA. Therefore, any future construction or substantial improvement on the property remains subject to Federal, State/Commonwealth, and local regulations for floodplain management.

**ZONE A (This Additional Consideration applies to the preceding 1 Property.)**

The NFIP map affecting this property depicts an SFHA that was determined using the best flood hazard data available to FEMA, but without performing a detailed engineering analysis. The flood elevation used to make this determination is based on approximate methods and has not been formalized through the standard process for establishing base flood elevations published in the Flood Insurance Study. This flood elevation is subject to change.

**STUDY UNDERWAY (This additional consideration applies to all properties in the LOMR-F DETERMINATION DOCUMENT (REMOVAL))**

This determination is based on the flood data presently available. However, the Federal Emergency Management Agency is currently revising the National Flood Insurance Program (NFIP) map for the community. New flood data could be generated that may affect this property. When the new NFIP map is issued it will supersede this determination. The Federal requirement for the purchase of flood insurance will then be based on the newly revised NFIP map.

Th attachment provides additional information regarding this request. If you have any questions about this attachment, please contact the FEMA Map / ance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, 3601 Eisenhower Av ue, Suite 600, Alexandria, VA 22304-6439.

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

**I-5 North Coast Widening Floodplain Studies**
Caltrans
DE Project 1683

# RECORD OF CONVERSATION

**DATE:** 09/21/07 **TIME:** 8:30 AM **DE FILE No.** 1683-300

**RECORDED BY:** Glen Parker

**SPOKE WITH:** Ray Martinez

**TELEPHONE No.** 703-317-6251

**NATURE OF CALL:** ☐ Incoming ☒ Outgoing ☐ Meeting

**DISTRIBUTION:** Ray Martinez (Michael Baker), Glen Parker (Dokken Engineering), Tim Brownson (Caltrans), Wen Cheng (Michael Baker), Mike Skowronek (Michael Baker)

**SUBJECT OF CONVERSATION: Acceptable FEMA floodplain modeling procedures**

ITEMS DISCUSSED:

**Available Backup Data to generate previously approved floodplain models:** Glen explained that a formal request has been submitted for backup floodplain information for lagoons and creeks along I-5 with Zone AE floodplains between San Diego and Oceanside. In some cases the HEC-2 data provided by Michael Baker Corporation was limited and did not have enough information to recreate previously generated floodplain models with reasonable accuracy. Glen said in these cases, Dokken Engineering would prefer to create HEC-RAS models which tie in with FEMA cross sections to use as a basis for existing conditions. Ray said Dokken Engineering must use their expertise to decide whether the existing FEMA data can be reused and to document efforts in a Technical Studies Data Notebook (TSDN). There have been past situations which required an existing model to be recreated and it is acceptable to FEMA as long as the appropriate documentation supports the procedure. Glen agreed to document the scenarios where existing models could not be used with accuracy.

**Coordination with FEMA and Caltrans:** Glen said that Caltrans is in the planning phase for the I-5 North Coast Widening, which will widen I-5 from San Diego to Oceanside. At this point in time, a preferred alternative has not been identified and therefore no coordination has occurred between Caltrans and FEMA to begin processing LOMRs. Glen said the final design of this project would likely occur in different phases several years in the future. It would be beneficial to coordinate with FEMA when needed during the process. Glen asked who the appropriate FEMA contacts may be to continue coordination when needed throughout the process. Ray said to coordinate with Wen Chen and Michael Skowronek, who work at the RMC for FEMA Region IX and can act as Outreach Coordinators on behalf of FEMA, when appropriate depending on the development of the project.

## LOCATION HYDRAULIC STUDY FORM

Dist. *11* Co. *SD* Rte. *005* K.P. *R49.1/R54.0*
EA Bridge No. *57-0713*
Floodplain Description:
***Fresh water River bounded by a levee system near the river mouth with areas of shallow water, salt marshes, and high deposit of sand. Location of interest: I-5/San Luis Rey River***

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

***This project includes an improvement to the I-5 / San Luis Rey River Interchange with 10+4+buffer alternative. The alternative requires the existing I-5 right bridge to be widened and would not have significant impacts to the existing floodplain.***

2. ADT: Current *143,500* Projected *206,130 (year 2030)*
***(Current ADT values taken from SANDAG: Transportation Forecast Information Center)***

3. Hydraulic Data: Base Flood $Q_{100}$= *53,000* $ft^3 / s$

$WSE_{100}$= *19.42 ft (upstream face of I-5 Bridge)* The flood of record, if greater than $Q_{100}$:
Q= *N/A* $ft^3 / s$ WSE= *N/A*
Overtopping flood Q=*(no increase from existing condition)* $ft^3 / s$
WSE=*(no increase from existing condition)*

Are NFIP maps and studies available? YES X NO

4. Is the highway location alternative within a regulatory floodway ?
YES NO *X*

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain. ***(See Appendix 'A')***

Potential $Q_{100}$ backwater damages:

A. Residences? NO *X* YES
B. Other Bldgs? NO *X* YES
C. Crops? NO *X* YES
D. Natural and beneficial

FLOODPLAIN VALUES? NO X YES

6. Type of Traffic:

| | | |
|---|---|---|
| A. Emergency supply or evacuation route? | NO_____ | YES__X__ |
| B. Emergency vehicle access? | NO_____ | YES__X__ |
| C. Practicable detour available? | NO_____ | YES__X__ |
| D. School bus or mail route? | NO_____ | YES__X__ |

7. Estimated duration of traffic interruption for 100-year event hours: **I-5 Crossing is above the Floodplain, therefore, no traffic interruptions are anticipated.**

8. Estimated value of $Q_{100}$ flood damages (if any) – moderate risk level.

| | | |
|---|---|---|
| A. | Roadway | $ ***(no increase from existing condition)*** |
| B | Property | $ ***(no increase from existing condition)*** |
| | Total | $ ***(no increase from existing condition)*** |

9. Assessment of Level of Risk Low__X__
Moderate____
High_____

For High Risk projects, during design phase, additional Design Study Risk Analysis May be necessary to determine design alternative.

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible
Floodplain development? NO__*X*__YES

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

Signature – Hydraulic/Project Engineer_____Date_____

## FLOODPLAIN ENCROACHMENT REPORT SUMMARY

Dist. *11* Co. *SD* Rte. *005* K.P. *R49.1/R54.0*
Bridge No. *57-0713*
Limits: ***I-5 / San Luis Rey River***

Floodplain Description: ***Fresh water River bounded by a levee system near the river mouth with areas of shallow water, salt marshes, and high deposit of sand. Location of interest: I-5 / San Luis Rey River***

| | | No | Yes |
|---|---|---|---|
| 1. | Is the proposed action a longitudinal encroachment of the base floodplain? | X | |
| 2. | Are the risks associated with the implementation of the proposed action significant? | X | |
| 3. | Will the proposed action support probable incompatible floodplain development? | X | |
| 4. | Are there any significant impacts on natural and beneficial floodplain values? | X | |
| 5. | Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain. | X | |
| 6. | Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q). | X | |
| 7. | Are Location Hydraulic Studies that document the above answers on file? If not explain. | | X |

PREPARED BY:

_____ _____
Signature – Hydraulic/Project Engineer Date

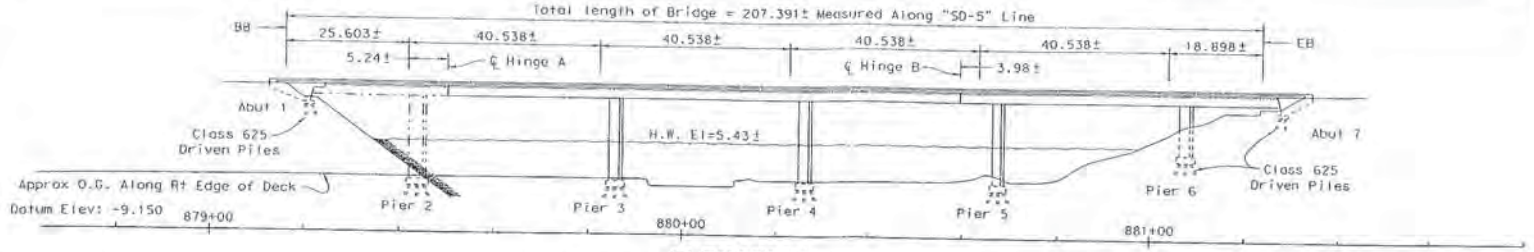
CONCURRED BY:

_____ _____
Signature – Caltrans Engineer Date

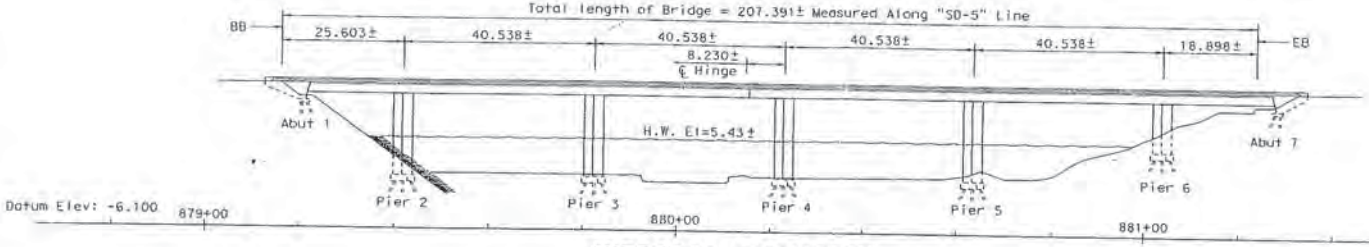
_____ _____
Signature – FHWA Transportation Engineer Date

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST | COUNTY | ROUTE | KILOMETER POST TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |




**ELEVATION**
(For the widening on the right side of bridge)
1:500



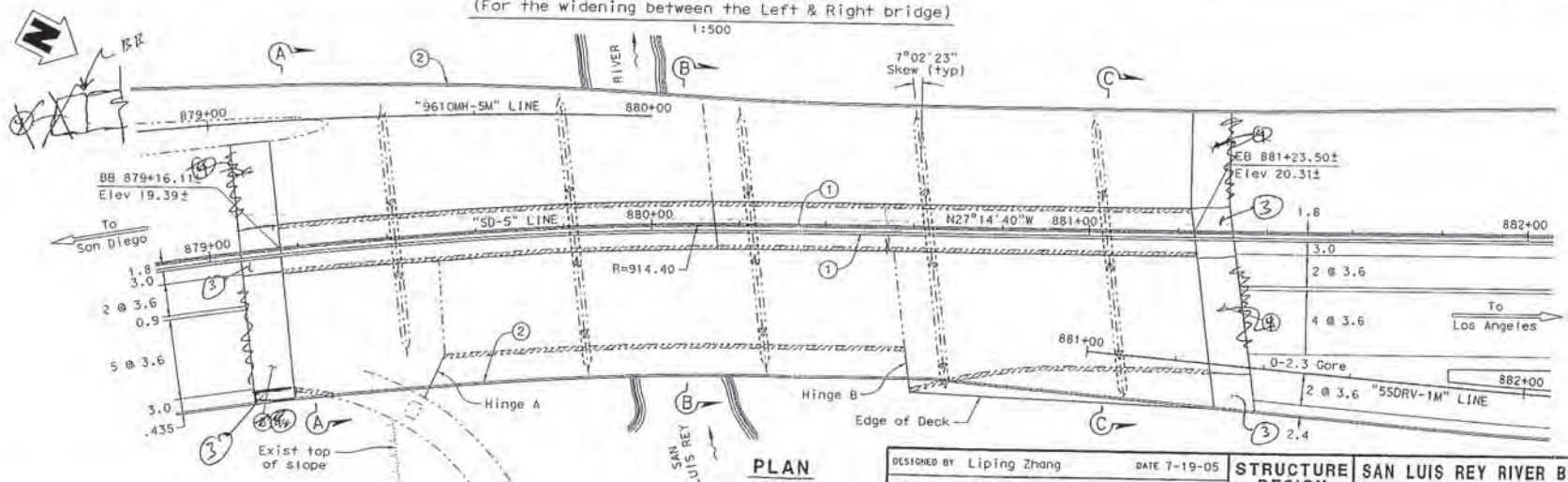

**MIRRORED ELEVATION**
(For the widening between the Left & Right bridge)
1:500

LEGEND:

- Indicates Existing Structure
- Indicates New Structure
- Indicates Bridge Removal

NOTES:

1. Concrete Barrier Type 60
2. Concrete Barrier Type 732
3. Structure Approach Slab Type N(9S)
4. ~~Structure Approach Slab, Type B~~




**PLAN**
1:500

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| | | |
|---|---|---|
| DESIGNED BY Liping Zhang | DATE 7-19-05 | STRUCTURE DESIGN SECTION 18 |
| DRAWN BY Phil Silva | DATE 7-19-05 | |
| CHECKED BY | DATE | |
| APPROVED | DATE | |

SAN LUIS REY RIVER BRIDGE (WIDEN)
PLANNING STUDY
BRIDGE NO. 57-0713 | CU 11 | EA 235800
SCALE: 1:250

FILE = San Luis Rey River APS.dgn

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 99-11-04)

USERNAME = tfrancis DATE PLOTTED = 19-JUL-2005 TIME PLOTTED = 10:18

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

| DIST | COUNTY | ROUTE | KILOMETER POST TOTAL PROJECT |
|---|---|---|---|
| 11 | SD | 5 | |

NOTES:

(1) Concrete Barrier Type 60

(2) Existing Barrier Type 9 to be removed

(3) Concrete Barrier Type 732

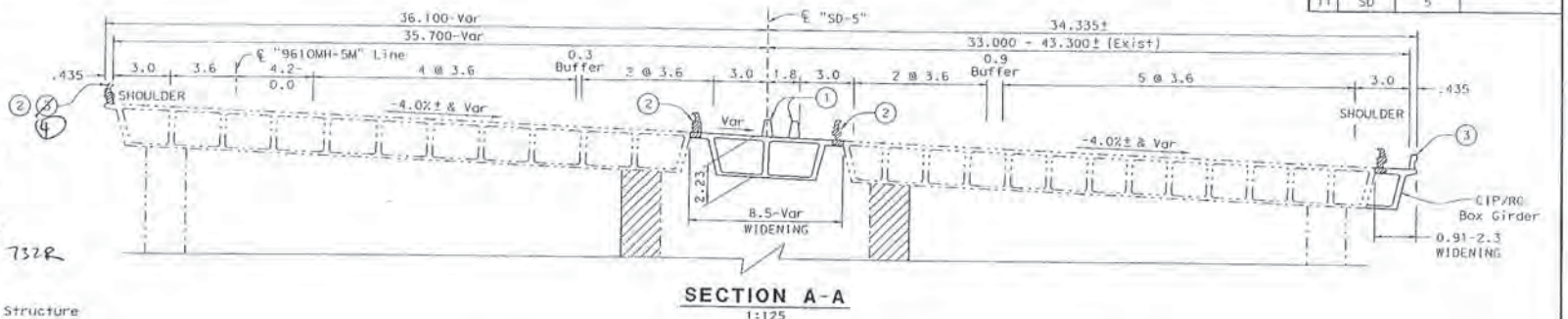
(4) Concrete Barrier Type 732B

LEGEND:

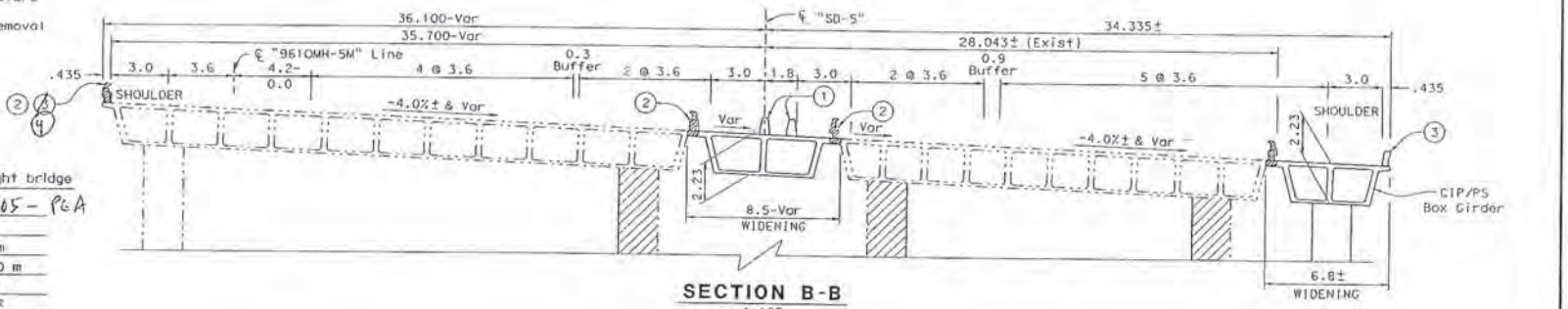
Indicates Existing Structure

Indicates New Structure

Indicates Bridge Removal



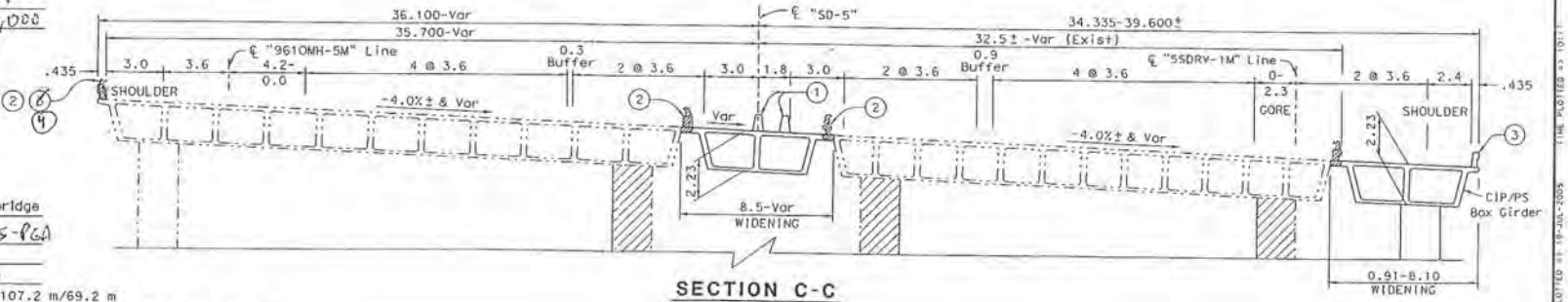

SECTION A-A
1:125




SECTION B-B
1:125

Widening between the Left & Right bridge

| | | |
|---|---|---|
| DATE OF ESTIMATE | = | 9-22-05 - PGA |
| BRIDGE REMOVAL | = | 0 |
| STRUCTURE DEPTH | = | 2.130 m |
| LENGTH | = | 207.390 m |
| WIDTH | = | 8.50 m |
| AREA | = | 1763 m² |
| COST/ ☐M INCLUDING 10% MOBILIZATION & 25% CONTINGENCY | = | $3294 |
| TOTAL COST | = | $5,809,000 |




SECTION C-C
1:125

Widening on the Right Side of bridge

| | | |
|---|---|---|
| DATE OF ESTIMATE | = | 9-22-05-PGA |
| BRIDGE REMOVAL | = | 0 |
| STRUCTURE DEPTH | = | 2.230 m |
| LENGTH | = | 10.3 m/107.2 m/69.2 m |
| WIDTH | = | 0.9 m to 2.3 m/6.8 m±/0.91 m to 8.10 m |
| AREA | = | 16 m²/783 m²/465 m² |
| COST/ ☐S INCLUDING 10% MOBILIZATION & 25% CONTINGENCY | = | $3262 |
| TOTAL COST | = | $4,124,000 |

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

| | | | |
|---|---|---|---|
| DESIGNED BY | Liping Zhang | DATE | 7-19-05 |
| DRAWN BY | Phil Silva | DATE | 7-19-05 |
| CHECKED BY | | DATE | |
| APPROVED | | DATE | |

STRUCTURE DESIGN SECTION 18

SAN LUIS REY RIVER BRIDGE (WIDEN)

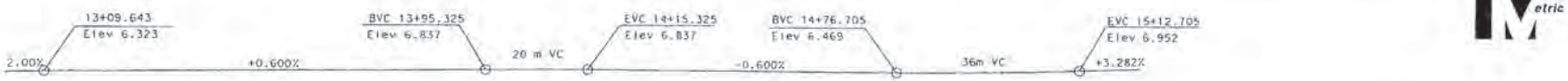
PLANNING STUDY

| | |
|---|---|
| BRIDGE NO. 57-0713 | CU 11 |
| SCALE: 1:250 | EA 235800 |

FILE = i:\San Luis Rey River APS.dgn

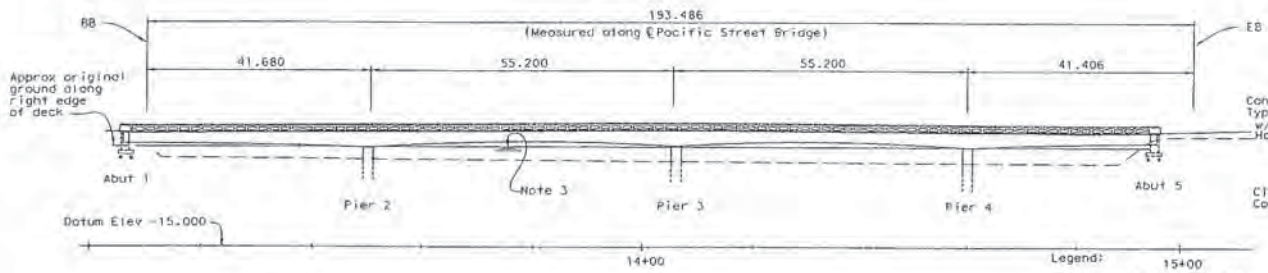
STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 03-17-04)

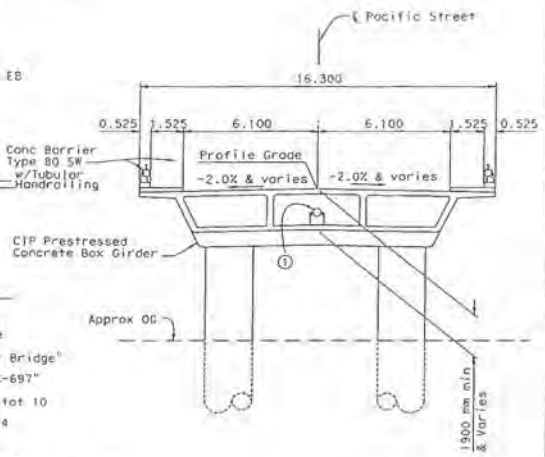
DATE PLOTTED = 19-JUL-2005 TIME PLOTTED = 10:11




## PROFILE GRADE

No Scale




Legend:

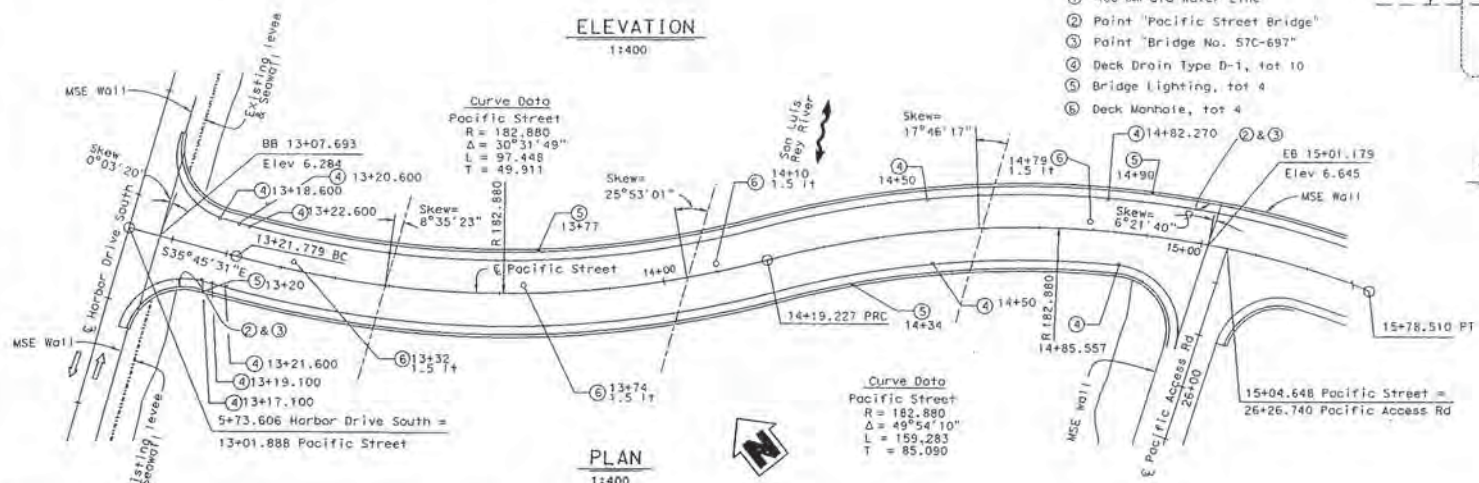
1. 400 mm dia Water Line
2. Paint "Pacific Street Bridge"
3. Paint "Bridge No. 57C-697"
4. Deck Drain Type D-1, tot 10
5. Bridge Lighting, tot 4
6. Deck Manhole, tot 4

## TYPICAL SECTION

1:100

## ELEVATION

1:400




## PLAN

1:400

Curve Data
Pacific Street
R = 182.880
Δ = 49°54'10"
L = 159.283
T = 85.090

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

Notes:

1. For "General Notes", "Standard Plans" and "Index to Bridge Plans", see "Deck Contours" sheet.
2. For "Pile Data Table", see "Foundation Plan No. 1" sheet.
3. For "Hydraulic Data Summary" table, see "Foundation Plan No. 2" sheet.


TY·LIN INTERNATIONAL
5030 CAMINO DE LA SIESTA, SUITE 204, SAN DIEGO, CA. 92108
(619) 692-1920 www.tylin.com


Bayo Golchoobian
No. 47315
Exp. 12/31/05
CIVIL
STATE OF CALIFORNIA

| NO. | DESCRIPTION | APP'D | DATE |
|---|---|---|---|
| 1 | 100% Submittal | | 5/23/05 |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

Description:
Location:
Record From:
Elev: Datum:

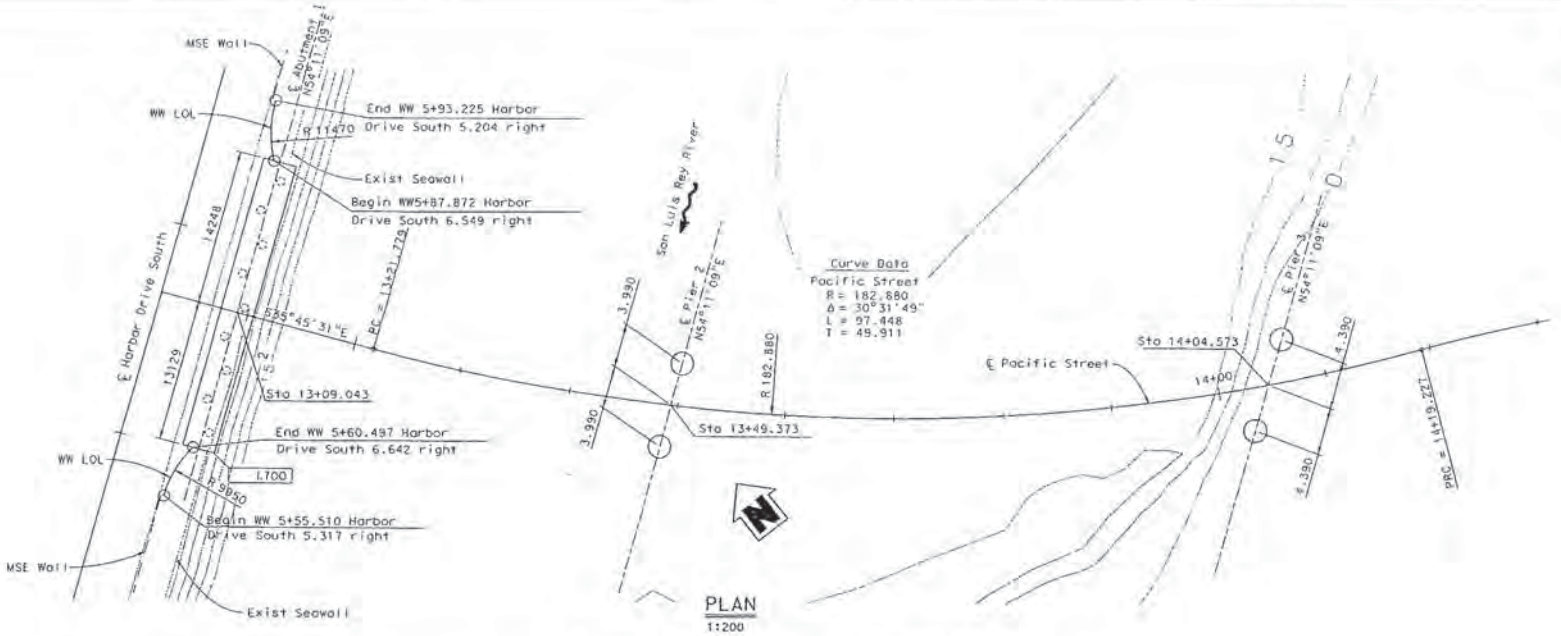
CITY OF OCEANSIDE
ENGINEERING DEPARTMENT

PACIFIC STREET BRIDGE
OVER SAN LUIS REY RIVER
GENERAL PLAN

APPROVED 5/24/05
R.C.E. 35085 CITY ENGINEER

ENGINEER OF WORK: Bayo Golchoobian R.C.E.
Checked By: AKF
Approval Date: 5/24/05
PLAN NUMBER: R- 13765
SCALE: AS NOTED

Plotname: a:\Projects\1251\A3\Dgn\Elevation.dgn Date: 5/24/2005 Time: 12:36:38 PM User: BGOLCH




Notes:

1. [ ] - indicates bottom of footing elevation.
2. For CIDH Pile cut-off elevation see "Pile Data Table".
3. For limits of excavation & backfill, see A62B & A62C
4. See Drawings R-13750 to R-13764 for MSE wall plans and details.

## BENCH MARK

City of Oceanside Benchmark H-1, a brass disk in the southwesterly corner of a 1.8m X 1.8m concrete footing at the top of landing at the Coast Guard dock.
Elevation = 2.736m MSL (8.977 ft)

## PILE DATA TABLE - CIDH CONCRETE PILES

| Location | Pile Type | Nominal Resistance (kN) | | Pile Cut-off Elevation (m) | Design Tip Elevation* (m) | Specified Tip Elevation (m) |
|---|---|---|---|---|---|---|
| | | Compression | Tension | | | |
| Abutment 1 | 1.200 m dia CIDH | 6,850 | 0 | +1.775 | -32.0 (1, 3 & 4) | -32.0 |
| Pier 2 | 2.130 m dia CIDH | 24,600 | 5,950 | +1.46 | -43.5 (1, 4 & 5)<br>-18.0 (2, 4 & 5)<br>-43.5 (3, 4 & 5) | -43.5 |
| Pier 3 | 2.130 m dia CIDH | 26,250 | 4,000 | 0.0 | -47.0 (1, 4 & 5)<br>-15.0 (2, 4 & 5)<br>-47.0 (3, 4 & 5) | -47.0 |
| Pier 4 | 2.130 m dia CIDH | 24,900 | 5,450 | -0.62 | -45.5 (1, 4 & 5)<br>-17.0 (2, 4 & 5)<br>-45.5 (3, 4 & 5) | -45.5 |
| Abutment 5 | 1.200 m dia CIDH | 6,830 | 0 | +0.275 TO +2.475 | -29.0 (1, 3 &4) | -29.0 |

Notes:
* Design tip elevation is controlled by the following demands:
(1) Compression, (2) Tension, (3) Lateral loads, (4) Soil liquefaction from Elev 0.0 to -13.5 at Abutment 1, from GSE to Elev -10.5 at Piers 2 to 4 and from Elev 0.0 to -10.5 at Abutment 5, (5) Scour from GSE to Elev -6.9 at Piers 2 to 4.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

T·Y LIN INTERNATIONAL
5030 CAMINO DE LA SIESTA, SUITE 204, SAN DIEGO, CA. 92108
(619) 692-1920
www.tylin.com

Roya Salehhoolari No. 4735 Exp. 12/31/06 CIVIL

| NO. | DESCRIPTION | APP'D | DATE |
|---|---|---|---|
| 1 | 100% Submittal | | 5/23/05 |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

Description:
Location:
Record From:
Elev.: Datum:

CITY OF OCEANSIDE ENGINEERING DEPARTMENT

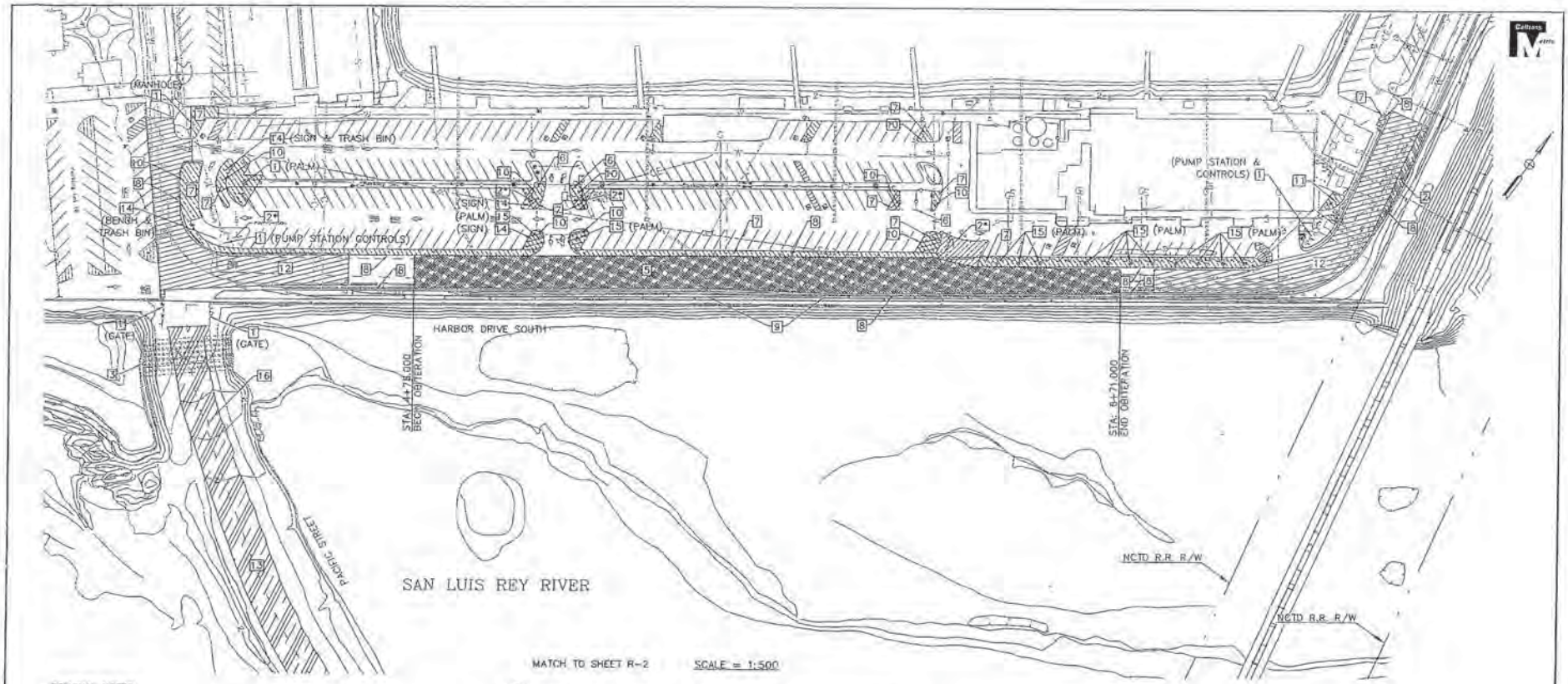
PACIFIC STREET BRIDGE
OVER SAN LUIS REY RIVER
FOUNDATION PLAN No.1

APPROVED 5/24/05
R.C.E. 35086 CITY ENGINEER

ENGINEER OF WORK: Roya Salehhoolari R.C.E.
Checked: RS 5/24/05
PLAN NUMBER R- 13767
SCALE: AS NOTED

Caltrans Metric

Filename: G:\projects\925\931\dgn\931001b.dgn Date: 5/23/2005 Time: 12:07:05 PM User: RUSSELL




MATCH TO SHEET R-2 SCALE = 1:500

REMOVAL NOTES:

1. PROTECT IN PLACE
2. REMOVE AC PAVEMENT
3. REMOVE PIPES
4. REMOVE GUARD RAIL
5. OBLITERATE EXISTING SURFACING
6. REMOVE TRASH BIN ENCLOSURES (CONCRETE PADS TO REMAIN)
7. REMOVE HARDSCAPE, INCLUDING CURB
8. REMOVE CURB & GUTTER
9. REMOVE LEVEE AND CONCRETE WALL AS REQUIRED TO CONSTRUCT THE BRIDGE ABUTMENT AND WINGWALLS
10. PLACE FULL DEPTH AC
11. REMOVE LANDSCAPE AND ASSOCIATED IRRIGATION FACILITIES
12. COLDPLANE 51mm (2") OF EXISTING PAVEMENT

*AFTER HARBOR DRIVE CLOSURE

13. REMOVE PAVING, CURB, AND HARDSCAPE (AFTER NEW BRIDGE AND PACIFIC ACCESS ROAD ARE OPENED TO TRAFFIC)
14. SALVAGE
15. REMOVE TREE
16. REMOVE CONC SLAB, GEOFABRIC, AC BERM, RIPRAP, AND ARCH PIPE (AFTER NEW BRIDGE AND PACIFIC ACCESS ROAD ARE OPENED TO TRAFFIC)
17. REMOVE PORTION OF BIKE PATH WHICH IS IN CONFLICT WITH THE PROPOSED DESIGN

LEGEND OF SHADED AREAS

- AREA OF LANDSCAPE REMOVAL
- AREA OF ASPHALT REMOVAL
- AREA OF COLD PLANNING
- AREA OF OBLITERATION

WILLDAN
Serving Public Agencies
5930 Cornerstone Ct. West, Ste 300
San Diego, California 92121
858/467-6950 fax 858/467-1346

REGISTERED PROFESSIONAL ENGINEER — KAREN HOUSE — 42282 — EXP. 3-31-06 — CIVIL ENGINEER — STATE OF CALIFORNIA

| NO. | DESCRIPTION | APP'D | DATE |
|---|---|---|---|
| | | | |

Description:
Location:
Record From:
Elev: Datum:

SHEET 8 | CITY OF OCEANSIDE ENGINEERING DEPARTMENT | 54 288175

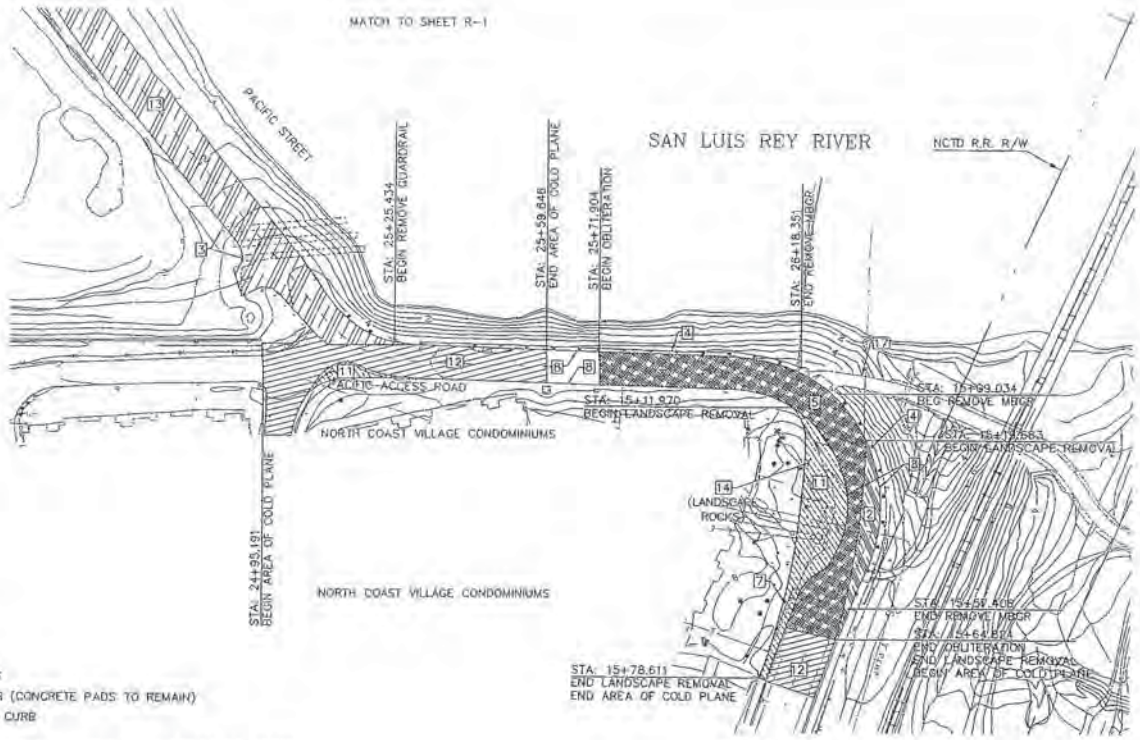
PACIFIC STREET BRIDGE
OVER SAN LUIS REY RIVER
REMOVAL PLAN
R-1

R.C.E. 24552 CITY ENGINEER

ENGINEER OF WORK: AFSANEH HOUSE R.C.E.

Checked By: Plan Number: P-13710A
Approved Date: Scale: 1"=50'

Drawing Path: S:\Willdan Projects\BRIDGE & STRUCTURAL\Drawings - Pacific Street Bridge\Design-Pacific Street\D-PPR-PACRIS1.DWG Date: 06/15/05




SCALE = 1:500

REMOVAL NOTES:

1. PROTECT IN PLACE
2. REMOVE AC PAVEMENT
3. REMOVE PIPES
4. REMOVE GUARD RAIL
5. OBLITERATE EXISTING SURFACING
6. REMOVE TRASH BIN ENCLOSURES (CONCRETE PADS TO REMAIN)
7. REMOVE HARDSCAPE, INCLUDING CURB
8. REMOVE CURB & GUTTER
9. REMOVE LEVEE AND CONCRETE WALL AS REQUIRED TO CONSTRUCT THE BRIDGE ABUTMENT AND WINGWALLS
10. PLACE FULL DEPTH AC
11. REMOVE LANDSCAPE AND ASSOCIATED IRRIGATION FACILITIES
12. COLD PLANE 51mm (2") OF EXISTING PAVEMENT
13. REMOVE PAVING, CURB, AND HARDSCAPE (AFTER NEW BRIDGE AND PACIFIC ACCESS ROAD ARE OPENED TO TRAFFIC)
14. SALVAGE
15. REMOVE TREE
16. REMOVE CONC SLAB, GEOFABRIC, AC BERM, AND PIPE (AFTER NEW BRIDGE AND PACIFIC ACCESS ROAD ARE OPENED TO TRAFFIC)
17. REMOVE PORTION OF BIKE PATH WHICH IS IN CONFLICT WITH THE PROPOSED DESIGN

LEGEND OF SHADED AREAS

- AREA OF LANDSCAPE REMOVAL
- AREA OF ASPHALT REMOVAL
- AREA OF COLD PLANNING
- AREA OF OBLITERATION

WILLDAN
Serving Public Agencies
5930 Cornerstone Ct. West, Ste 300
San Diego, California 92121
858/467-6950 fax 858/467-1346

| NO. | DESCRIPTION | APP'D | DATE |
|---|---|---|---|
| | | | |

Description:
Location:
Record From:
Elev: Datum:

SHEET 9 | CITY OF OCEANSIDE ENGINEERING DEPARTMENT | 54 SHEETS

PACIFIC STREET BRIDGE
OVER SAN LUIS REY RIVER
REMOVAL PLAN
R-2

APPROVED
R.C.E. 35096 CITY ENGINEER

ENGINEER OF WORK: AFSANEH MOUSE R.C.E.
Checked By: CJP
Approval Date: 2/4/15
Plan Number: R-27108
Scale: 1:500

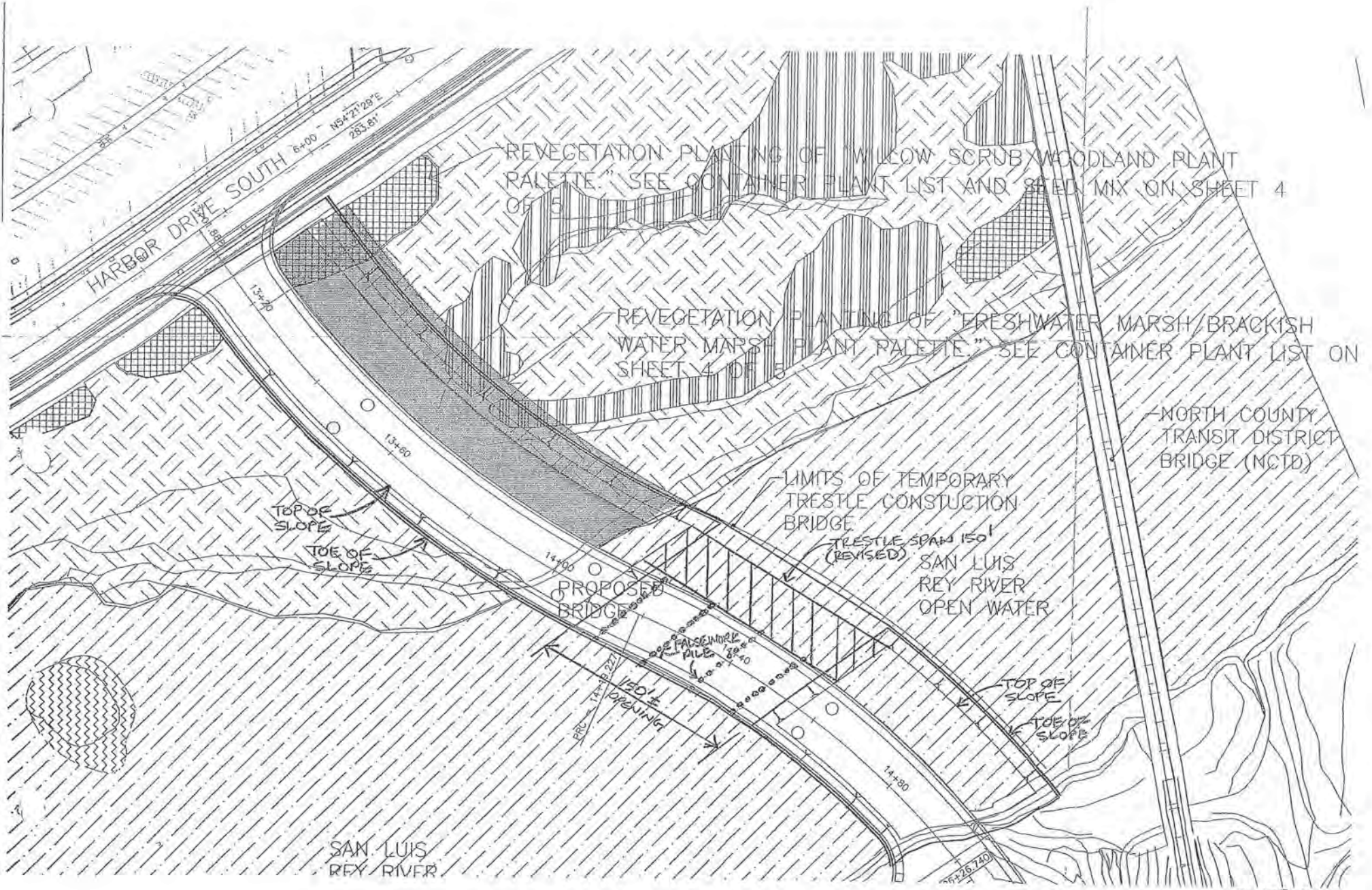
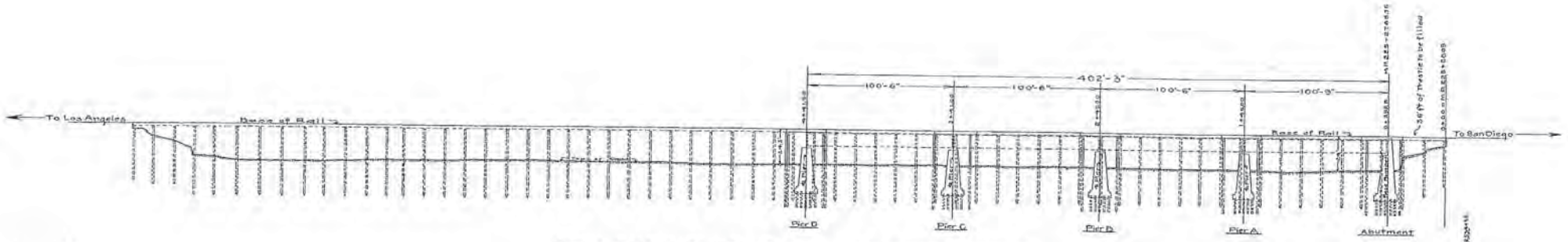

HARBOR DRIVE SOUTH
6+00
N54°21'29"E
283.81'
REVEGETATION PLANTING OF "WILLOW SCRUB/WOODLAND PLANT PALETTE." SEE CONTAINER PLANT LIST AND SEED MIX ON SHEET 4 OF 5
REVEGETATION PLANTING OF "FRESHWATER MARSH/BRACKISH WATER MARSH PLANT PALETTE." SEE CONTAINER PLANT LIST ON SHEET 4 OF 5
NORTH COUNTY TRANSIT DISTRICT BRIDGE (NCTD)
LIMITS OF TEMPORARY TRESTLE CONSTUCTION BRIDGE
TRESTLE SPAN 150' (REVISED)
SAN LUIS REY RIVER OPEN WATER
PROPOSED BRIDGE
FALSEWORK PILE
150'± OPENING
TOP OF SLOPE
TOE OF SLOPE
13+40
13+60
14+00
14+80
SAN LUIS REY RIVER

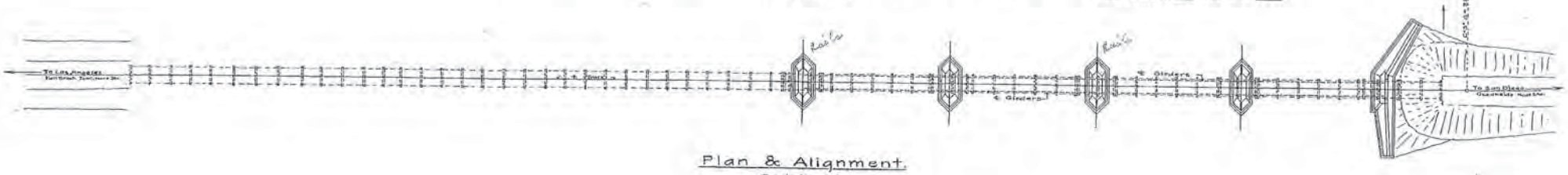
FIGURE 13




Cross Section Showing Present and Proposed Structures

Scale 1in=40ft.

Note-New Work shown in Red.




Plan & Alignment.

Scale 1in=40ft.

Prints may be had from Plans on File B & D on North or East Side

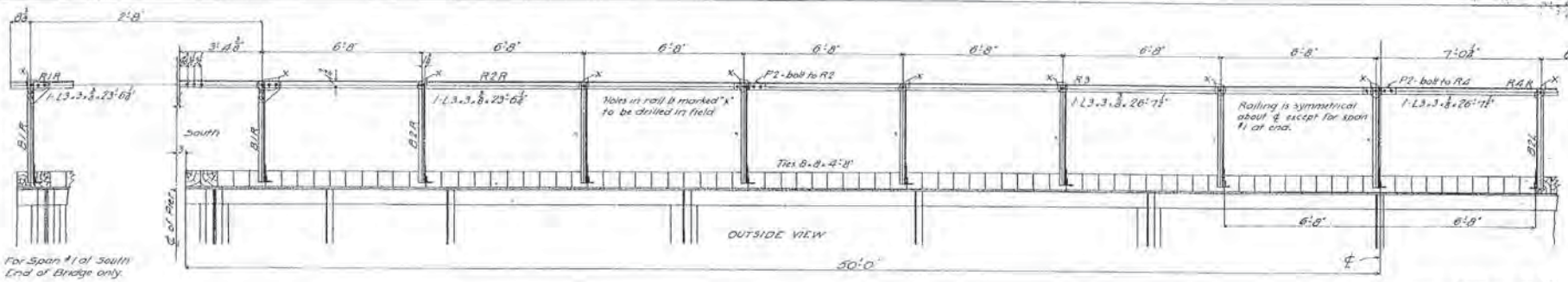
BR. 226.4
SAN DIEGO

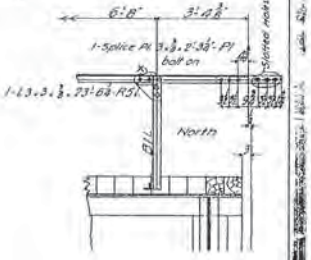
# THE A. T. AND S. F. RY. CO.
COAST LINES.

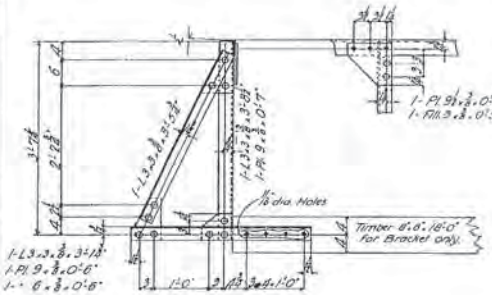
BRIDGE NO. A-226, ON MILE 226, 4 TH. DISTRICT, L. A. DIVISION
SAN LUIS REY RIVER
PROPOSED RENEWAL OF PORTION WITH 4 CL. AA DECK GIRDERS
BALLAST DECK, SINGLE TRACK, WITH HAND RAILS

LOS ANGELES, CAL. APRIL 25, 1916 | SCALE AS NOTED. C.E.C.L. No. 186-12228 | G. W. HARRIS. CHIEF ENGINEER.

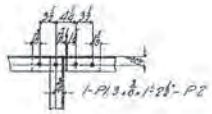
186-12228




BRACKETS - B1 & B2



Rail Connection & Splice

Bolts with square head & nut & stand. cast OG washer.

Bolts with hex. head & nut.

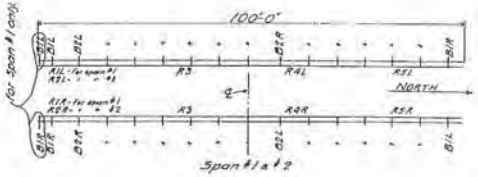
BRIDGES ORDERED.

| Date | Contr. No. | No. of Spans | Bridge No. | Location | Manufactured by |
|---|---|---|---|---|---|
| Dec. '09 | B 9364 | 3 | 1081 & 3980 | Jim Ned Creek - D. & N.T. Ry. Co. Intermediate District Southern Division | Lassig Plant. |

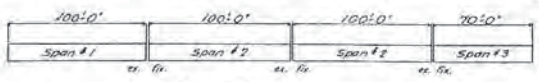
5% excess ordered.

List of Pieces. - for Contr. B 9364

| No. | Mark | Description. |
|---|---|---|
| 1 | R1R | Railing |
| 1 | R1L | " |
| 2 | R2R | " |
| 2 | R2L | " |
| 6 | R3 | " |
| 3 | R4R | " |
| 3 | R4L | " |
| 3 | R5R | " |
| 3 | R5L | " |
| 7 | B1R | Bracket |
| 7 | B1L | " |
| 39 | B2R | " |
| 39 | B2L | " |
| 390 | 3/4 Bolts | with square head & nut & 4" cast O.G. washer, 2" long |
| 190 | 3/4 " | with hex. head & nut - 0'-2" long |
| 35 | 3/4 " | " " " " - 0'-2" long |




Note: For Span #3 see sheet # -B 9365




Erection Diagram.

General Notes.
Material: Structural Steel.
Rivets: 3/4" dia.
Open Holes: 7/8" dia. except as noted.
Reaming: None.
Painting: One coat of raw linseed oil.

BE5-448

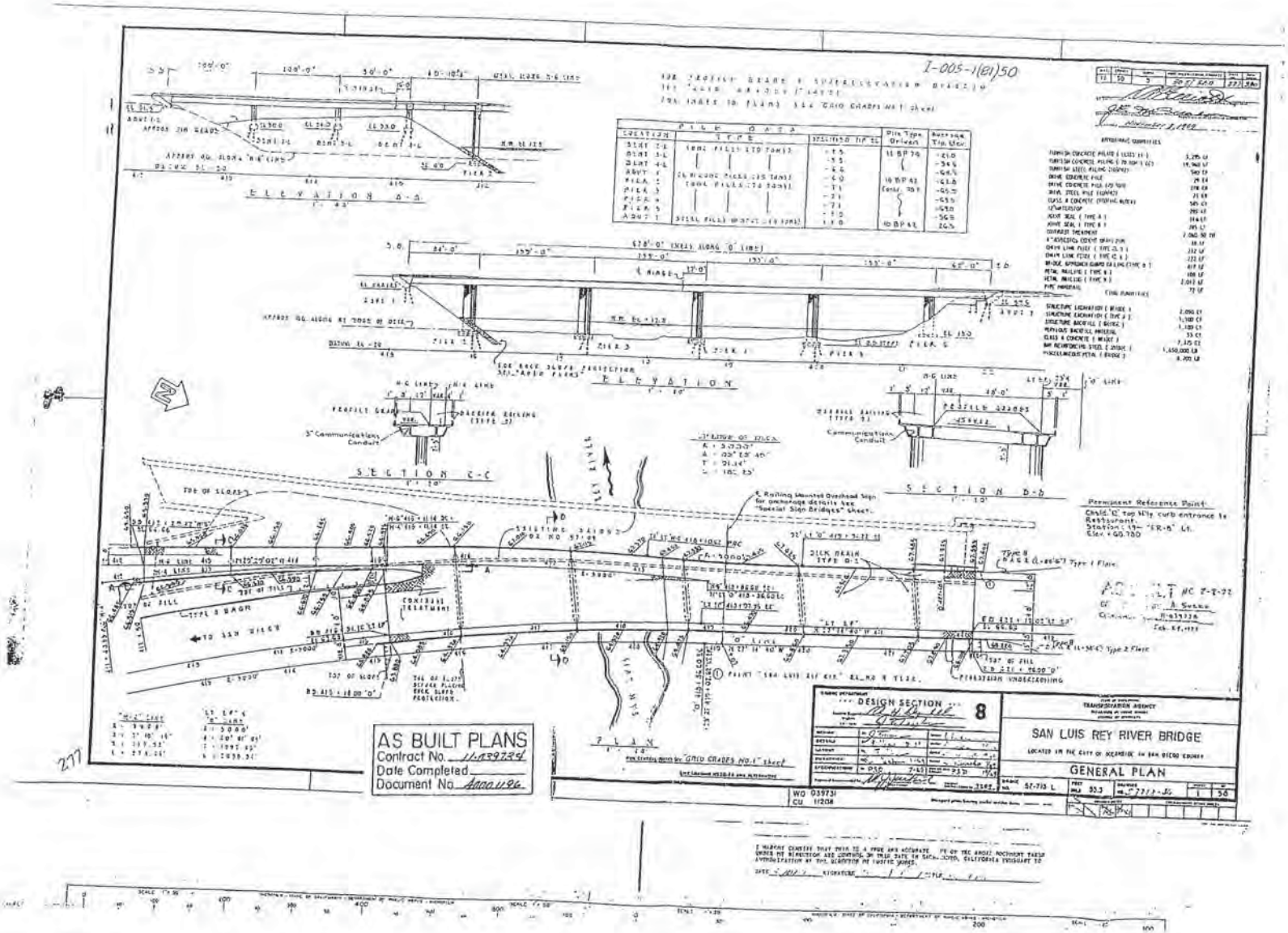
# A. T. & S. F. Ry.

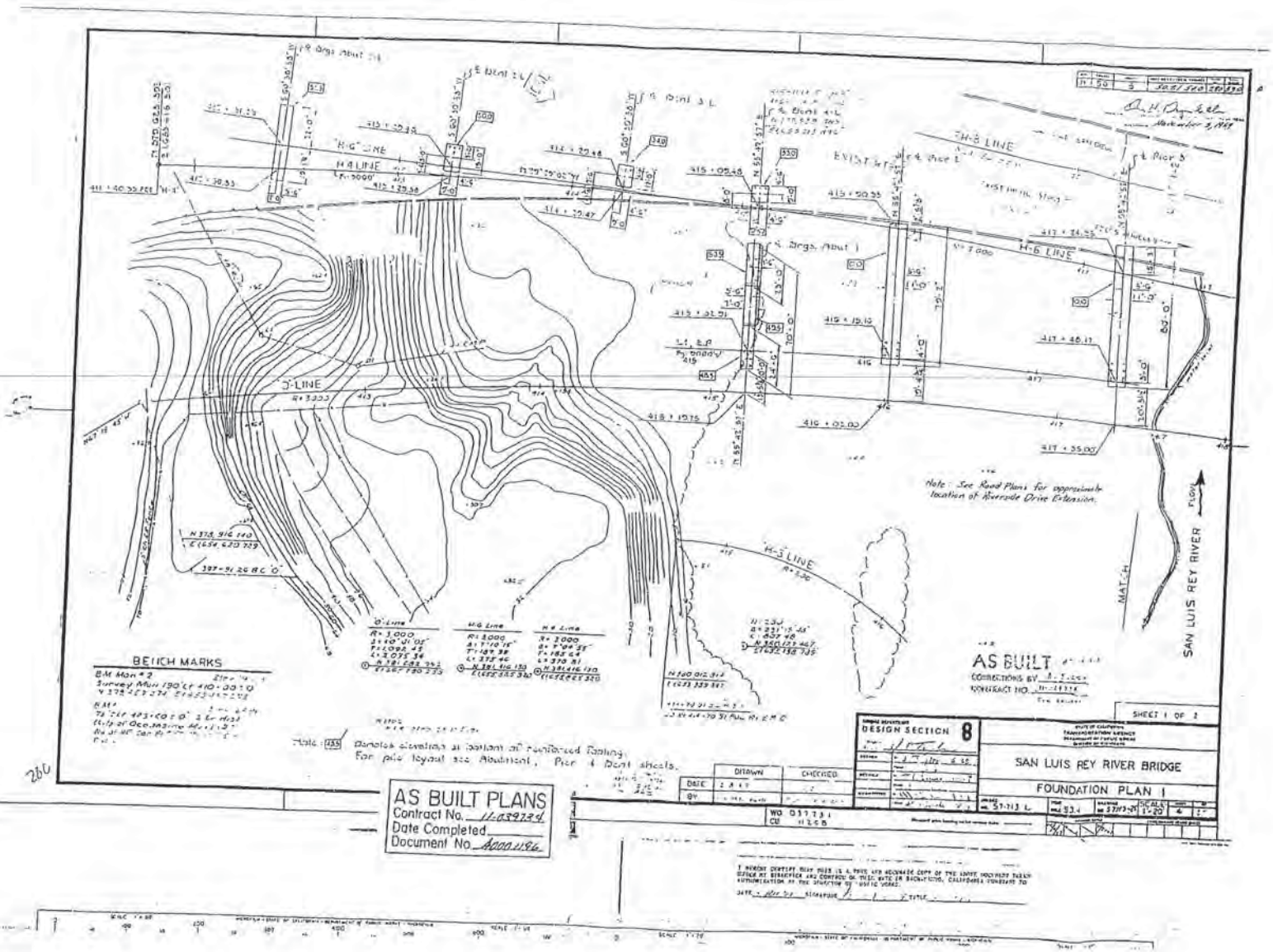
100'-0" S.T. Deck Plate Gird. Spans. Class A-A

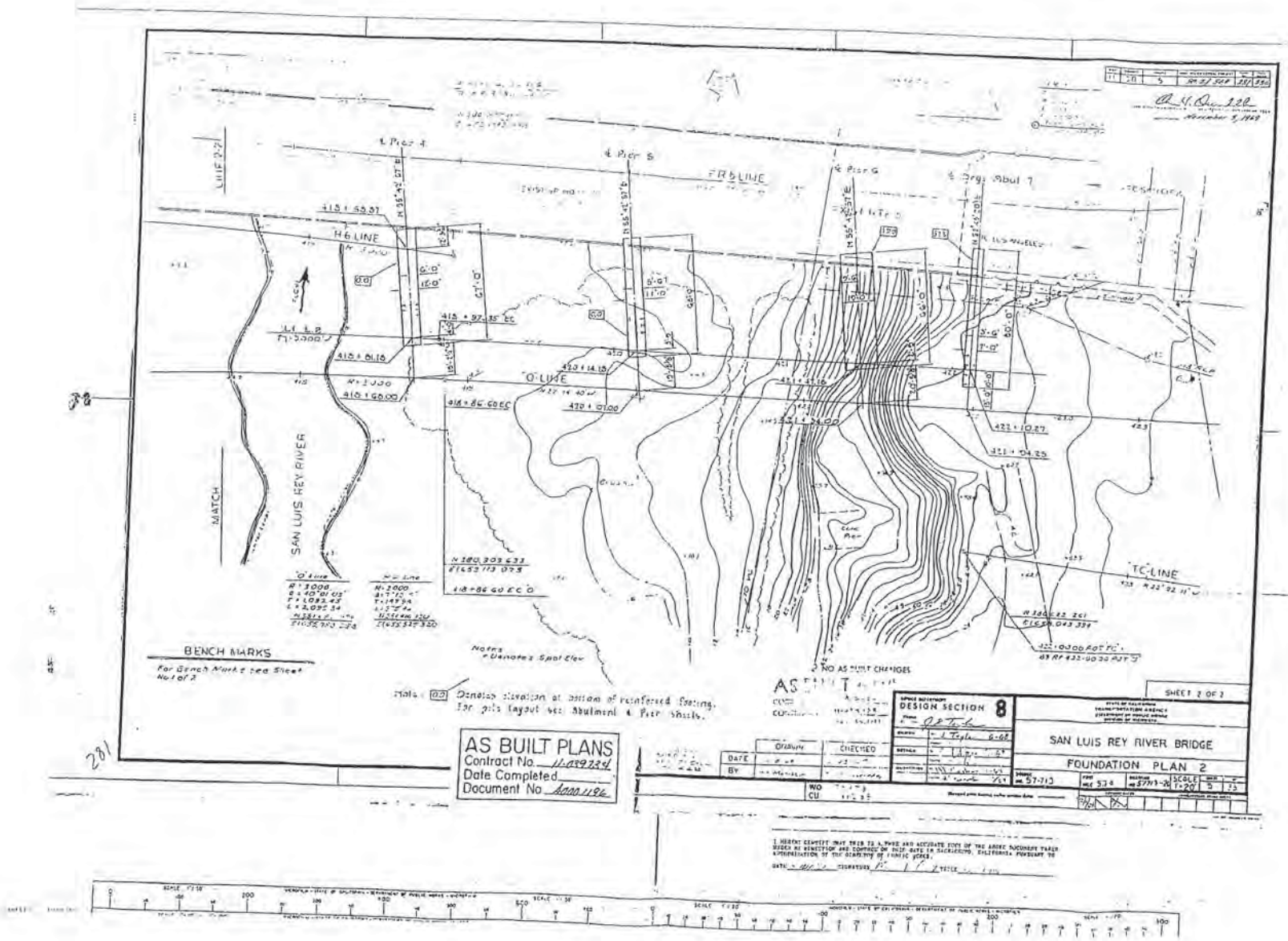
Details of: Railing & Brackets.

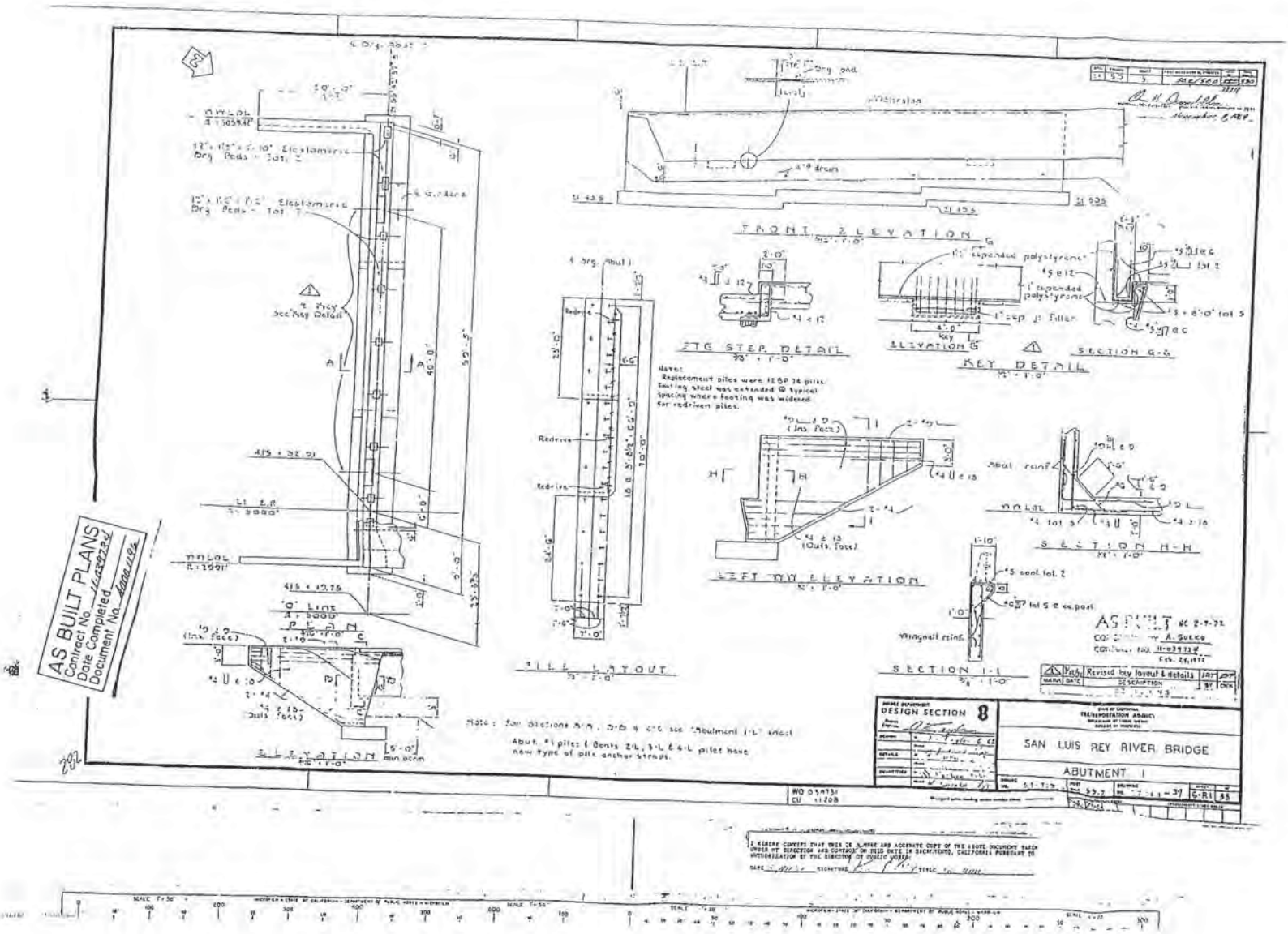
Correct:
W. F. Rench
Bridge Engineer System

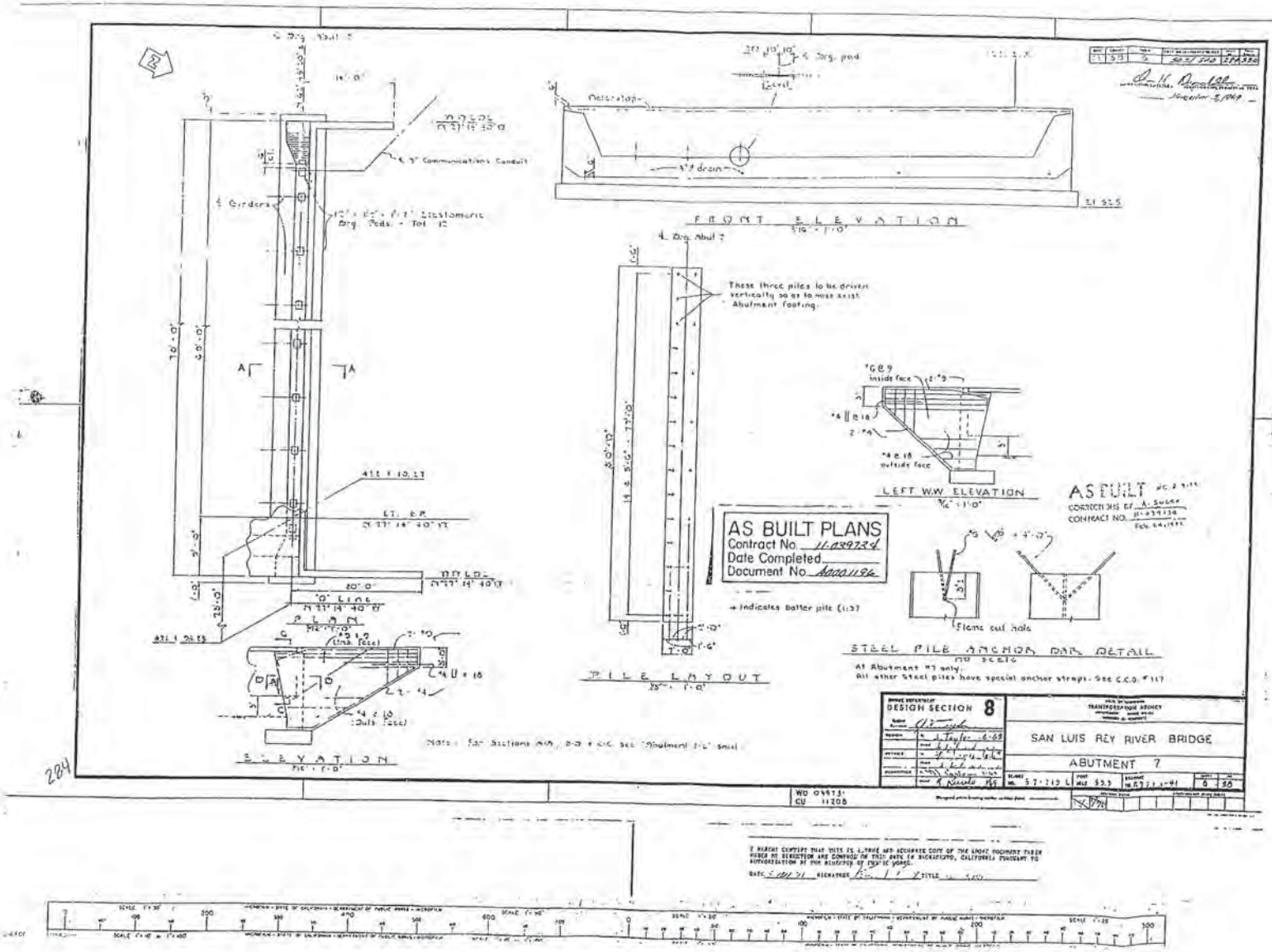
Scale: 1/2"=1'-0" Detailed at Chicago Office American Bridge Co.

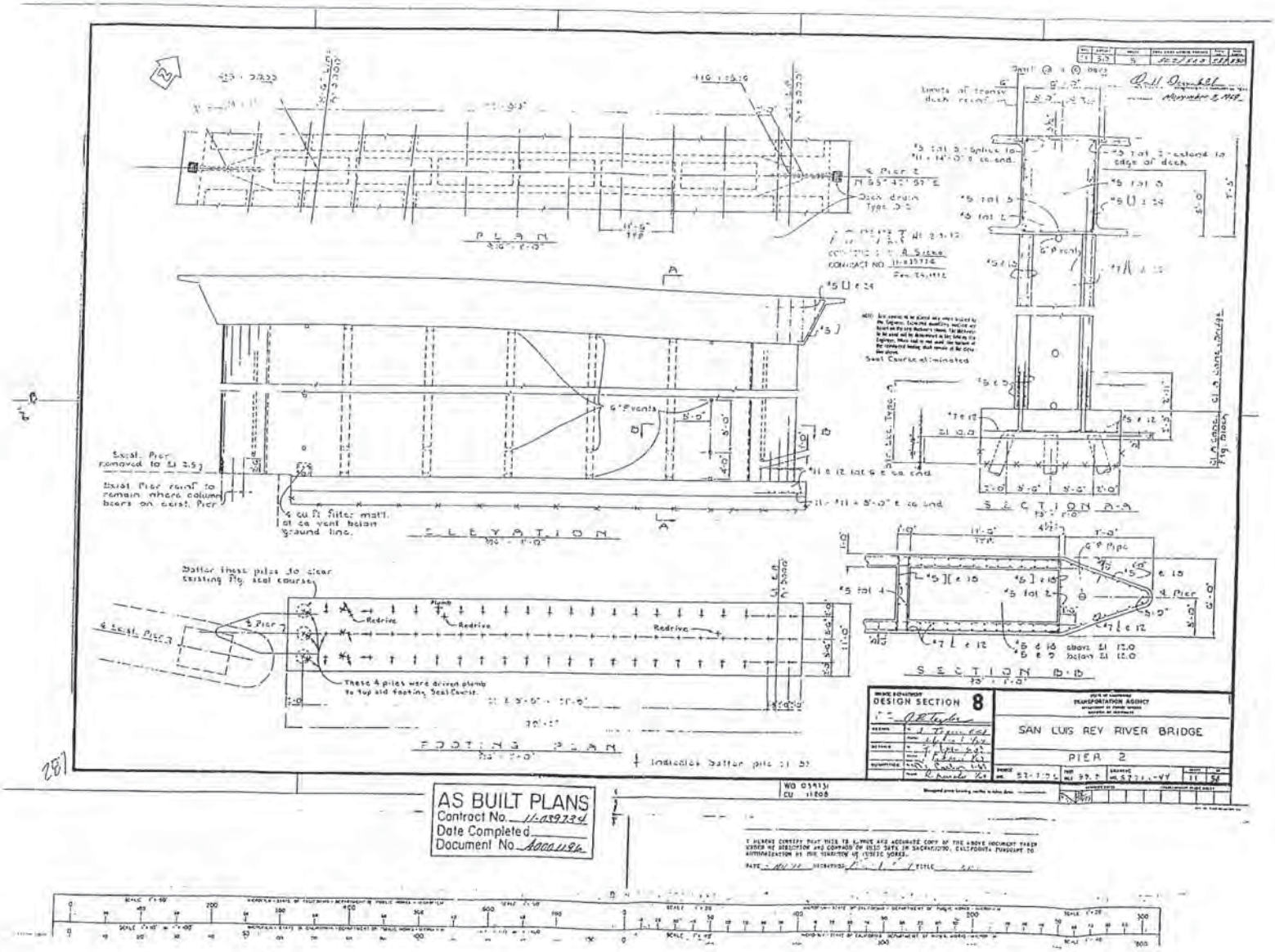

I-005-1(61)50
ELEVATION A-A
ELEVATION
SECTION C-C
SECTION D-D
PLAN
AS BUILT PLANS
Contract No. 11439734
Date Completed
Document No. A000196
DESIGN SECTION 8
SAN LUIS REY RIVER BRIDGE
LOCATED IN THE CITY OF OCEANSIDE IN SAN DIEGO COUNTY
GENERAL PLAN
WO 03973J
CU 11208
57-713 L
Permanent Reference Point:
Chisled 'D' top kitty curb entrance to Restaurant.
Station: 19+ "ER-B" Lt.
Elev. = 60.780

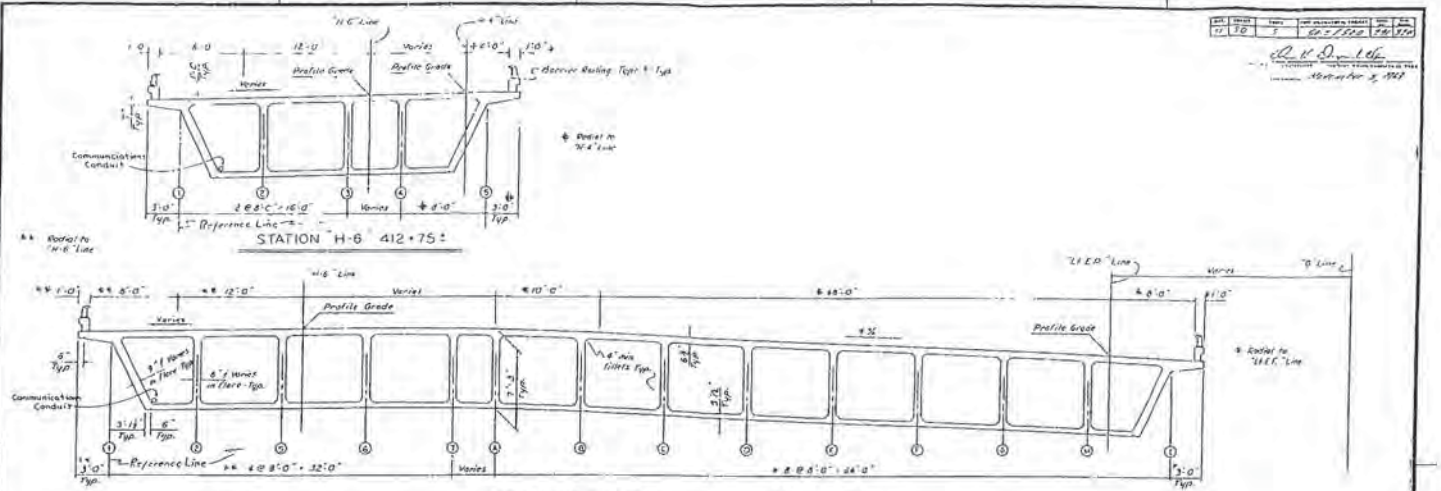

H-8 LINE
H-3 LINE
J-LINE
EXIST. RT
EXIST. LT
S. Brgs. Abut 1
S. Brgs. Abut 2
S. Brgs. Abut 3
S. Brgs. Abut 4
S. Pier 2
S. Pier 3
S. Pier 4
Note: See Road Plans for approximate location of Riverside Drive Extension.
SAN LUIS REY RIVER
FLOW
MAT'L
BENCH MARKS
AS BUILT
CORRECTIONS BY
CONTRACT NO.
AS BUILT PLANS
Contract No. 11-039734
Date Completed
Document No. A0001196
DESIGN SECTION 8
SAN LUIS REY RIVER BRIDGE
FOUNDATION PLAN 1
SHEET 1 OF 2
DRAWN
CHECKED
WO 031731
CU 1126
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE LIGHT, HIGHWAY PUBLIC SIGNAL OR DIRECTIVE AND CONTROL OR TRAFFIC MADE OR BACKDATED, CALIFORNIA PURSUANT TO AUTHORIZATION OF THE DIRECTOR OF PUBLIC WORKS.


SAN LUIS REY RIVER
MATCH
BENCH MARKS
AS BUILT PLANS
Contract No. 11-089234
Date Completed
Document No. 6000-1196
DESIGN SECTION 8
SAN LUIS REY RIVER BRIDGE
FOUNDATION PLAN 2
SHEET 2 OF 2


FRONT ELEVATION
FTG STEP DETAIL
KEY DETAIL
SECTION G-G
ELEVATION G
SECTION H-H
LEFT WW ELEVATION
SECTION 1-1
ELEVATION
SILL LAYOUT
Note: Replacement piles were 12 BP 74 piles. Existing steel was extended @ typical spacing where footing was widened for redriven piles.
Note: For Sections B-B, D-D & G-G see "Abutment 1-L" sheet
Abut. #1 piles (Bents 2-L, 3-L & 4-L piles have new type of pile anchor straps.
AS BUILT PLANS
Contract No. 11-029224
Date Completed
Document No.
DESIGN SECTION 8
SAN LUIS REY RIVER BRIDGE
ABUTMENT 1
WO 03431
CU 11208


FRONT ELEVATION
1/16" = 1'-0"
PILE LAYOUT
3/8" = 1'-0"
LEFT W.W. ELEVATION
3/16" = 1'-0"
STEEL PILE ANCHOR BAR DETAIL
NO SCALE
ELEVATION
PLAN
AS BUILT PLANS
Contract No. 11-039734
Date Completed
Document No. A0041196
AS BUILT
CORRECTIONS BY A. Suarez
CONTRACT NO. 11-039734
Feb. 24, 1972
DESIGN SECTION 8
SAN LUIS REY RIVER BRIDGE
ABUTMENT 7
WO 046731
CU 11208
Indicates batter pile (1:3)
Flame cut hole
At Abutment #7 only.
All other Steel piles have special anchor straps. See C.C.O. #117
Note: For Sections A-A, B-B & C-C, see "Abutment #6" sheet.


PLAN
ELEVATION
SECTION A-A
SECTION B-B
FOOTING PLAN
Excist. Pier removed to El 25.5
Excist. Pier remains where column bears on excist. Pier
4 sq ft filter matl. at ea vent below ground line.
Seal Course eliminated
Batter these piles to clear existing Pig. seal course.
These 4 piles were driven plumb to top old footing Seal Course.
Indicates batter pile 1:12
Limits of transv deck reinf
Deck drain Type D-5
6" P vents
G P Pipe
DESIGN SECTION 8
SAN LUIS REY RIVER BRIDGE
PIER 2
AS BUILT PLANS
Contract No. 11-239734
Date Completed
Document No. A0001196




NO AS BUILT CHANGES

AS BUILT BY [illegible] DATE 2-9-76

CORRECTION BY A. Sutro

CONTRACT [illegible] 11-039734

Feb. 27, 1976

SCALE: 1" = 10'

AS BUILT PLANS
Contract No. 11-039734
Date Completed
Document No. 6000 1196

DESIGN SECTION 8

SAN LUIS REY RIVER BRIDGE

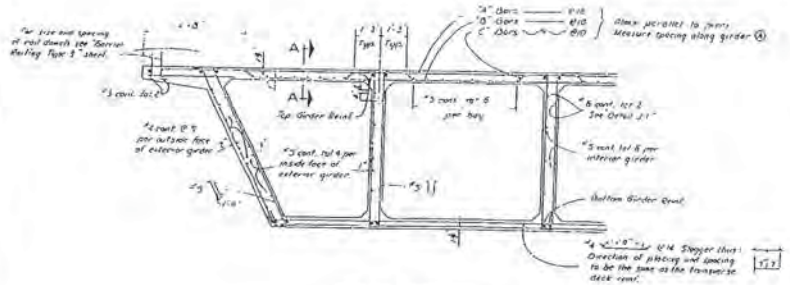
TYPICAL SECTIONS

WD 039731
CU 11208

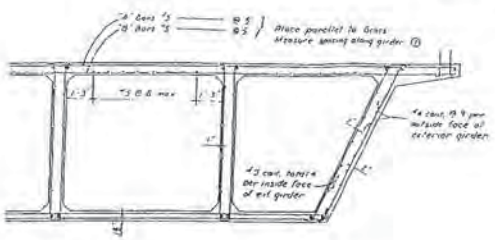
291

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE KNOX HOLLOWAY TABLE UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA, PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

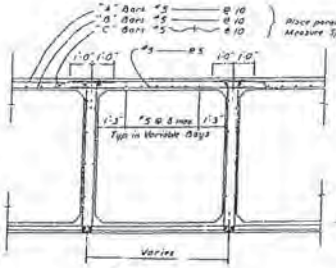
DATE 10/1/71 SIGNATURE [illegible] TITLE [illegible]



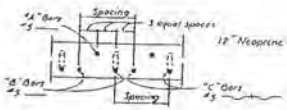

@ 8'-0" SPACING



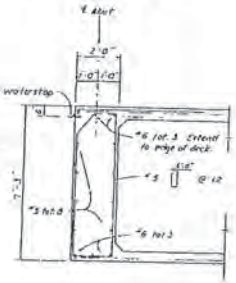
RAMP SECTION




VARIABLE BAY



SECTION A-A



END DIAPHRAGM

NO AS BUILT CHANGES

AS BUILT

CORRECTED BY _____

CONTRACT NO. _____

Feb. 24, 1972

AS BUILT PLANS
Contract No. 11-039734
Date Completed _____
Document No. A000186

DESIGN SECTION 8

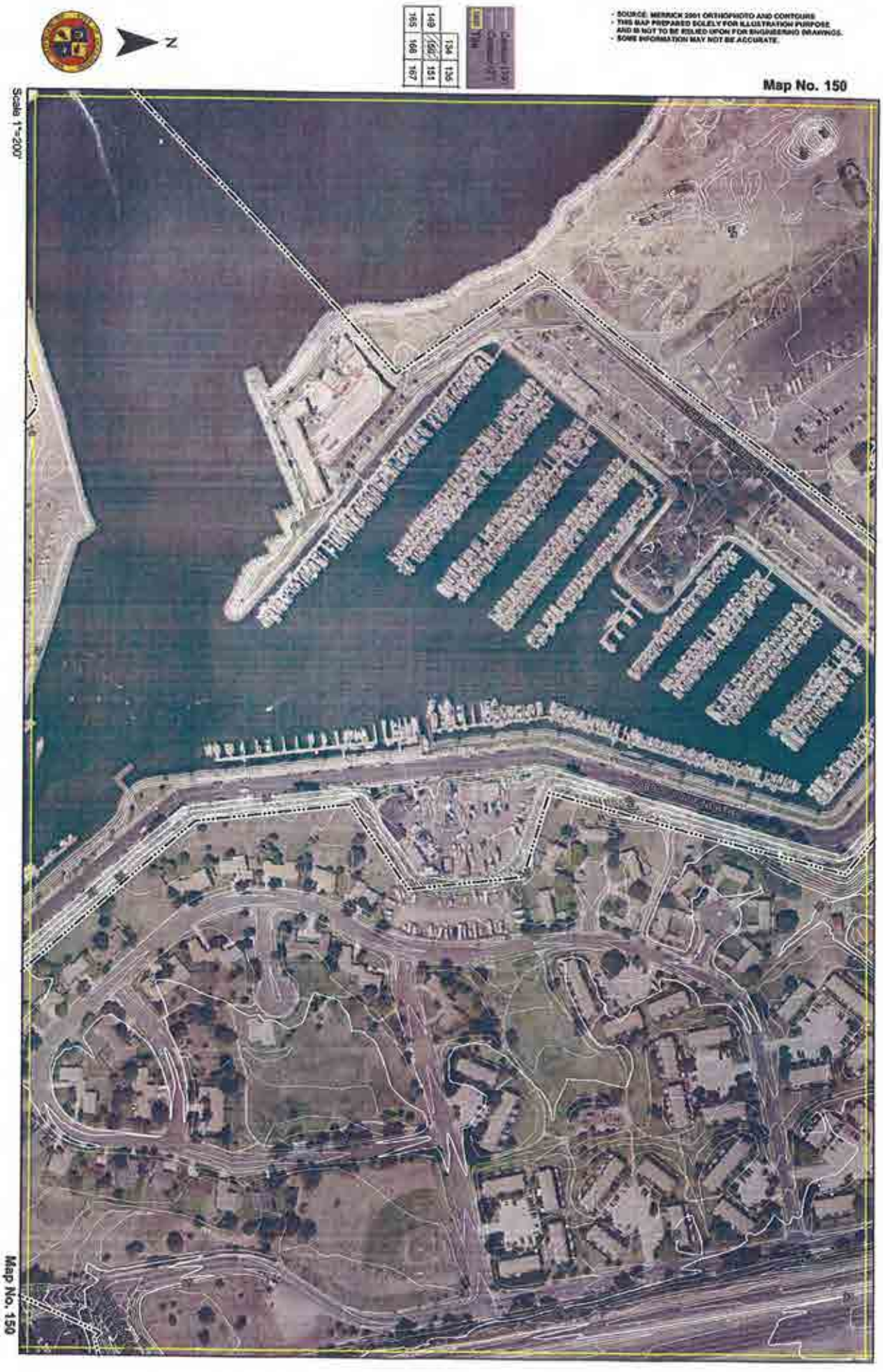
SAN LUIS REY RIVER BRIDGE

PART SECTIONS

WO 039731
CU 11206

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT PREPARED UNDER MY DIRECTION AND COMPOSED ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE _____ SIGNATURE _____ TITLE _____



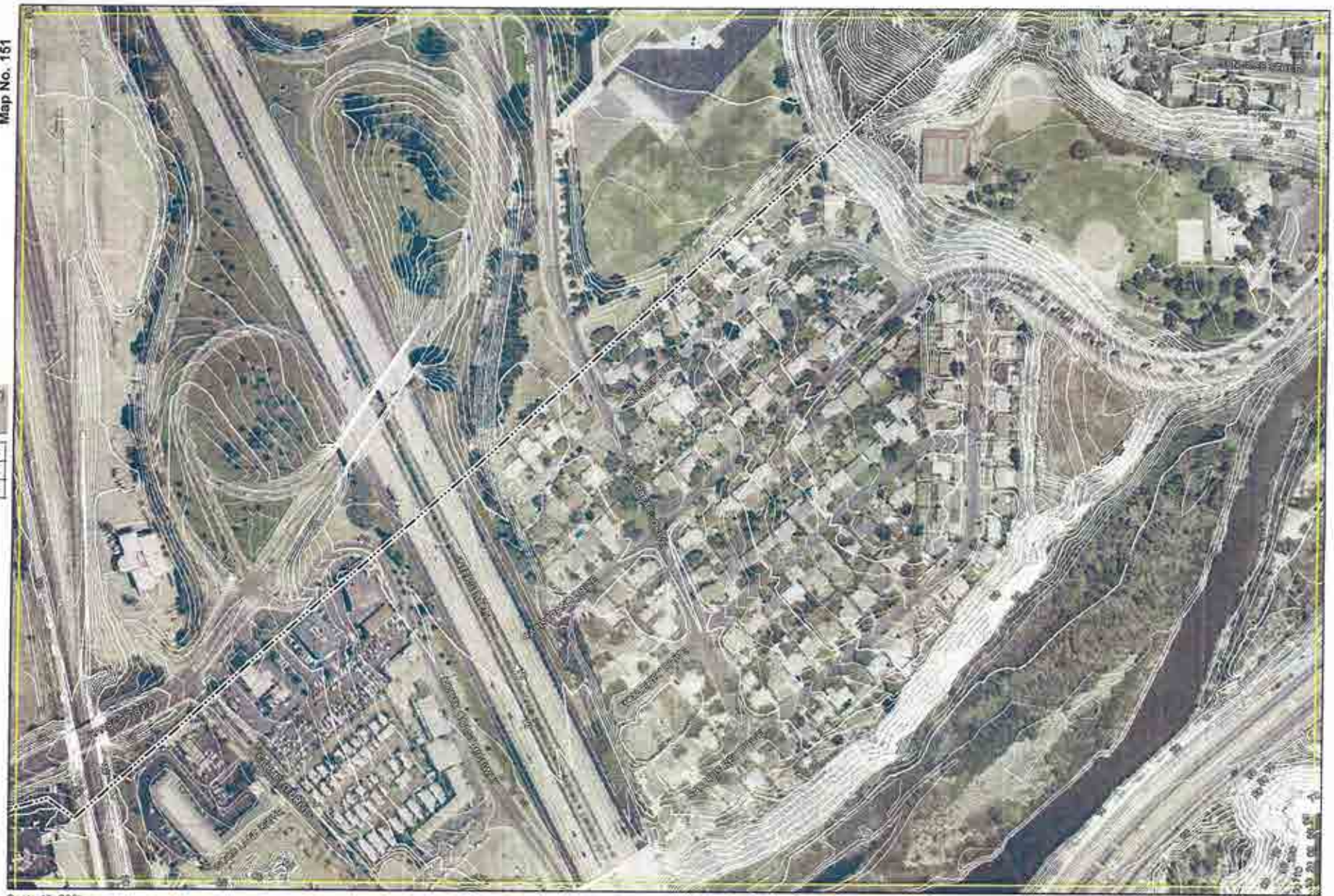

- SOURCE: MERRICK 2001 ORTHOPHOTO AND CONTOURS
- THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE AND IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS.
- SOME INFORMATION MAY NOT BE ACCURATE.

Map No. 151

- SOURCE: MERRICK 2021 ORTHOPHOTO AND CONTOURS
- THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE AND IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS
- SOME INFORMATION MAY NOT BE ACCURATE.

Contour (10')
Contour (2')
Tile

| | | |
|---|---|---|
| 134 | 135 | 136 |
| 150 | 151 | 152 |
| 166 | 167 | 168 |



N

Scale 1"=200'

Map No. 151

Map No. 152

SOURCE: MERRICK 2001 ORTHOPHOTO AND CONTOURS.
THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE AND IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS.
- SOME INFORMATION MAY NOT BE ACCURATE.

Contour (10')
Contour (2')
Tile

| | | |
|---|---|---|
| 135 | 136 | 137 |
| 151 | 152 | 153 |
| 167 | 168 | 169 |

N

Scale 1"=200'

Map No. 152

Map No. 166

- SOURCE: NEARMAP, 2021 ORTHOPHOTO AND CONTOURS
- THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE AND IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS.
- SOME INFORMATION MAY NOT BE ACCURATE.

Contour (1ft)
Contour (5ft)
Title

| | | |
|---|---|---|
| 149 | 150 | 151 |
| 165 | 166 | 167 |
| | 180 | 181 |

N

Scale 1"=200'

Map No. 166

Map No. 167

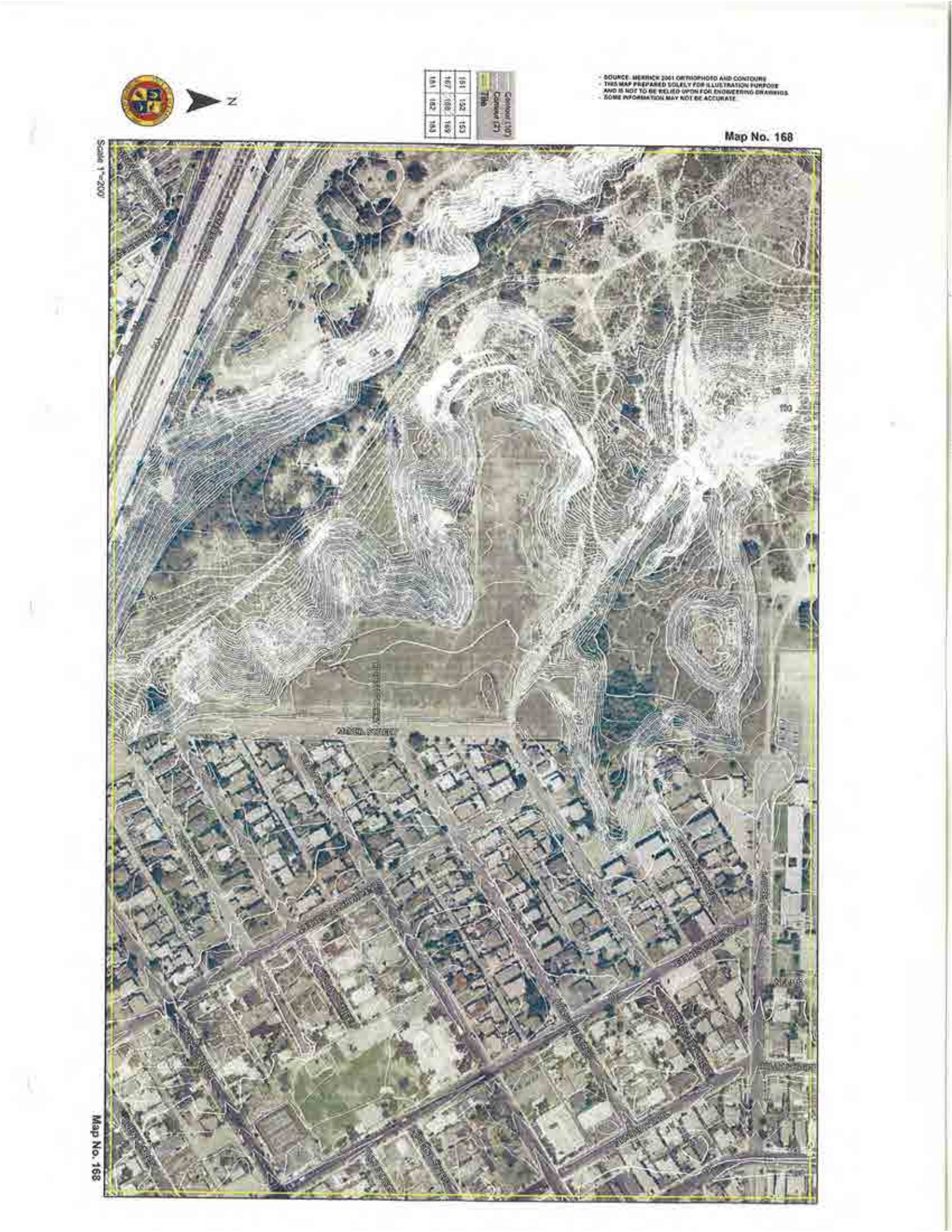
SOURCE: MERRICK 2001 ORTHOPHOTO AND CONTOURS
THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE AND IS NOT TO BE RELIED UPON FOR ENGINEERING OR ANY SOME INFORMATION MAY NOT BE ACCURATE.

| | | |
|---|---|---|
| 150 | 151 | 152 |
| 166 | 167 | 168 |
| 180 | 181 | 182 |

N

Scale 1"=200'

Map No. 167


N
Contour (100')
Contour (20')
Title
151 152 153
167 168 169
181 182 183
- SOURCE: MERRICK 2001 ORTHOPHOTO AND CONTOURS
- THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE AND IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS.
- SOME INFORMATION MAY NOT BE ACCURATE.
Map No. 168
Scale 1"=200'
Map No. 168

- SOURCE: MERRICK 2001 ORTHOPHOTO AND CONTOURS.
- THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSES AND IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS.
- SOME INFORMATION MAY NOT BE ACCURATE.

- SOURCE: MERRICK 2001 ORTHOPHOTO AND CONTOURS
- THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE AND IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS.
- SOME INFORMATION MAY NOT BE ACCURATE.

**Map No. 181**

Scale 1"=200'



Map No. 181

**I-5 North Coast Widening Floodplain Studies**
Caltrans
DE Project 1683

# RECORD OF CONVERSATION

**DATE:** 09/21/07 **TIME:** 8:30 AM **DE FILE No.** 1683-300

**RECORDED BY:** Glen Parker

**SPOKE WITH:** Ray Martinez

**TELEPHONE No.** 703-317-6251

**NATURE OF CALL:** ☐ Incoming ☒ Outgoing ☐ Meeting

**DISTRIBUTION:** Ray Martinez (Michael Baker), Glen Parker (Dokken Engineering), Tim Brownson (Caltrans), Wen Cheng (Michael Baker), Mike Skowronek (Michael Baker)

**SUBJECT OF CONVERSATION: Acceptable FEMA floodplain modeling procedures**

ITEMS DISCUSSED:

**Available Backup Data to generate previously approved floodplain models:** Glen explained that a formal request has been submitted for backup floodplain information for lagoons and creeks along I-5 with Zone AE floodplains between San Diego and Oceanside. In some cases the HEC-2 data provided by Michael Baker Corporation was limited and did not have enough information to recreate previously generated floodplain models with reasonable accuracy. Glen said in these cases, Dokken Engineering would prefer to create HEC-RAS models which tie in with FEMA cross sections to use as a basis for existing conditions. Ray said Dokken Engineering must use their expertise to decide whether the existing FEMA data can be reused and to document efforts in a Technical Studies Data Notebook (TSDN). There have been past situations which required an existing model to be recreated and it is acceptable to FEMA as long as the appropriate documentation supports the procedure. Glen agreed to document the scenarios where existing models could not be used with accuracy.

**Coordination with FEMA and Caltrans:** Glen said that Caltrans is in the planning phase for the I-5 North Coast Widening, which will widen I-5 from San Diego to Oceanside. At this point in time, a preferred alternative has not been identified and therefore no coordination has occurred between Caltrans and FEMA to begin processing LOMRs. Glen said the final design of this project would likely occur in different phases several years in the future. It would be beneficial to coordinate with FEMA when needed during the process. Glen asked who the appropriate FEMA contacts may be to continue coordination when needed throughout the process. Ray said to coordinate with Wen Chen and Michael Skowronek, who work at the RMC for FEMA Region IX and can act as Outreach Coordinators on behalf of FEMA, when appropriate depending on the development of the project.