Tidewater Crossing
Draft Hydrologic/Hydraulic Analysis and Pre-Design Report

for

Proposed Flood Control Improvements

September 15, 2006

Prepared for:

ARNAIZ COMPANIES

Prepared by:

DOMENICHELLI & ASSOCIATES

CIVIL ENGINEERING

1107 Investment Blvd., Suite 145

El Dorado Hills, CA 95762

(916) 933-1997

Table of Contents

TABLE OF CONTENTS ..... **I**

LIST OF TABLES ..... **II**

TABLES FROM TEXT II
TABLES FROM THE APPENDICES II

LIST OF FIGURES ..... **II**

FIGURES FROM TEXT II
FIGURES FROM THE APPENDICES II

REFERENCES ..... **IV**

EXECUTIVE SUMMARY **E-1**

INTRODUCTION AND BACKGROUND E-1
EXISTING CONDITIONS HYDROLOGY & HYDRAULICS E-1
PROPOSED CONDITIONS HYDROLOGY & HYDRAULICS E-2
PROPOSED FLOOD CONTROL IMPROVEMENTS E-3

SECTION 1- INTRODUCTION AND BACKGROUND **1-1**

PROJECT DESCRIPTION 1-1
WATERSHED DESCRIPTION/DELINEATION 1-1

SECTION 2 - HYDROLOGIC AND HYDRAULIC ANALYSES **2-1**

HYDROLOGIC METHODOLOGY 2-1
EXISTING CONDITIONS HYDROLOGIC RESULTS 2-4
EXISTING CONDITIONS HYDRAULICS 2-5
PROPOSED FLOOD CONTROL IMPROVEMENTS 2-7
CONCLUSIONS 2-10

SECTION 3 - FLOOD CONTROL IMPROVEMENTS PRE-DESIGN **3-1**

PROJECT LEVEES 3-1
LEVEE TIE-INS 3-1
Upstream Terminus *3-2*
FRENCH CAMP SLOUGH DETENTION/WATER QUALITY BASIN 3-2
DRAINAGE PUMP STATION 3-4
Site Improvements *3-4*
Hydraulics and Facility Sizing *3-4*
Station Power *3-7*
DIVERSION WEIR AND GATE STRUCTURE 3-8
Spillway and Energy Dissipation Structure *3-8*
Alarm/Warning System *3-8*
WEBER SLOUGH DIVERSION AND CHANNEL 3-11

APPENDIX A - HYDROLOGY .....

APPENDIX B - HYDRAULICS .....

APPENDIX C – UPPER WATERSHED HYDRAULICS .....

APPENDIX D – PHOTOGRAPHS .....

APPENDIX E – ELECTRONIC FILES .....

APPENDIX F – WORK MAPS AND OTHER SUPPORTING DATA .....

List of Tables

Tables from Text

Table 2- 1. Summary of 100-year Peak Flows 2-4
Table 2- 2. Summary of Hydraulic Analysis 2-6

Table 3- 1. Hydraulic Institute Design Criteria 3-7

Tables from the Appendices

Table A-1. Summary of isolated areas used in hydrologic model
Table A-2. Summary of storage areas used in hydrologic model
Table A-3. Weighted Curve Numbers Calculations
Table A-4. Lag Time Calculations
Table A-5. HEC-HMS Summary Existing Conditions
Table A-6. HEC-HMS Summary Proposed Conditions Without Detention
Table A-7. HEC-HMS Summary Proposed Conditions

Table B- 1. Existing Conditions HEC-RAS Results Table
Table B- 2. Proposed Conditions HEC-RAS Results Table

List of Figures

Figures from Text

Figure 1- 1. Vicinity Map 1-1
Figure 1- 2. Overall stream schematic 1-2

Figure 2-1. Lone Tree Creek watershed typical groundcover and raised berms. Creek on right with dairy beyond. 2-2
Figure 2-2. Typical channel vegetation (n = 0.04) 2-6
Figure 2-3. Cross section of French Camp Slough at TSRR crossing (Existing conditions 100-yr flow=4,040 cfs). 2-7
Figure 2- 4. Hydrograph at proposed 960' lateral weir 2-8
Figure 2- 5. Proposed Flood Control Improvements and 100-year Water Surface Elevations 2-9

Figure 3-1. Detention Basin layout 3-3
Figure 3- 2. Pump Station Layout 3-5
Figure 3-3. Pump Station Plan and Elevation 3-6
Figure 3-4A. Weir Plan and Profile 3-9
Figure 3-4B. Radial Gate Structure 3-10

Figures from the Appendices

Figure A-1. Overall Watershed
Figure A-2. Lower Watershed
Figure A-3. Composite FEMA FIRM Panels
Figure A-4. FEMA Floodplain at Project Site and Revised FIRM

Figure A-6. Composite Soils Map
Figure A-7. HEC-HMS Basin Schematic Existing Conditions
Figure A-8. HEC-HMS Basin Schematic Proposed Conditions
Figure A-9. Existing and Proposed 100-yr Hydrograph, French Camp Slough at El Dorado St
Figure A-10. 100-yr Hydrograph at Detention Basin Lateral Weir
Figure A-11. Proposed Weber Diversion and Inflow to Detention Basin
Figure A-12. Industrial Development Inflow to Detention Basin 100-yr Hydrograph
Figure A-13. 100-yr Hydrographs at Highway 99
Figure A-14. 100-yr Hydrograph at Lone Tree Creek West of Highway 99

Figure B- 1. Existing HEC-RAS Schematic layout
Figure B- 2. Existing French Camp Slough HEC-RAS Profile
Figure B- 3. Existing Lone Tree Creek HEC-RAS Profile
Figure B- 4. Existing North Fork South Littlejohns Creek HEC-RAS Profile
Figure B- 5. Existing South Fork South Littlejohns Creek HEC-RAS Profile
Figure B- 6. Existing Weber Creek HEC-RAS Profile
Figure B- 7. Proposed HEC-RAS Schematic layout
Figure B- 8. Proposed French Camp Slough HEC-RAS Profile
Figure B- 9. Proposed Lone Tree Creek HEC-RAS Profile
Figure B- 10. Proposed North Fork South Littlejohns Creek HEC-RAS Profile
Figure B- 11. Proposed South Fork South Littlejohns Creek HEC-RAS Profile
Figure B- 12. Proposed Weber Creek HEC-RAS Profile
Figure B- 13. HEC-RAS Work Map

References

1. Federal Emergency Management Agency, Flood Insurance Study, San Joaquin County, California, Unincorporated Areas, November 1979 (Revised April 2, 2002).

2. San Joaquin County, California, Department of Public Works, Hydrology Manual, prepared by Boyle Engineering Corporation, September 1997.

3. U.S. Department of the Army, Corps of Engineers, Sacramento District, Master Water Control Manual, San Joaquin River Basin, California Appendix IV: Water Control Manual, Farmington Dam and Reservoir, Littlejohn Creek Basin, California, Sacramento, California, December 1952 (Revised December 2004).

4. U.S. Army Corps of Engineers Hydrologic Engineering Center, HEC-HMS version 3.0.1, Davis, California, 2006.

5. U.S. Army Corps of Engineers Hydrologic Engineering Center, HEC-RAS version 3.1.3, Davis, California, May 2005.

6. U.S. Department of the Interior, Geological Survey, 7.5-Minute Topographic Maps, Scale 1:24,000, Contour Interval 5, 10, and 20 feet: Avena (1962), Photorevised (1968); Bachelor Valley (1968), Photorevised (1987); Copperopolis (1962), Photorevised (1987); Escalon (1968), Photorevised (1976); Farmington (1968), Photorevised (1987); Knights Ferry (1962), Photorevised (1987); Lathrop (1952), Photorevised (1987); Manteca (1952), Photorevised (1987); Oakdale (1968), Photorevised (1987); Peters (1952), Photorevised (1968); Stockton East, (1968), Photorevised (1987); Stockton West (1962), Photorevised (1987).

7. City of Manteca, Draft Storm Drain Master Plan, prepared by West Yost & Associates, July 2005.

8. Rainfall Frequency Atlas of the United States, Technical Paper No.40, U.S. Department of Commerce, Weather Bureau, May 1961.

9. National Engineering Handbook, Section 4, Hydrology, U.S. Department of Agriculture, Soil Conservation Service, August 1972.

10. National Resource Conservation Service, Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/

Executive Summary

Introduction and Background

The Tidewater Crossing development project consists of 895 acres of planned industrial, commercial and residential development in south Stockton just south and west of the Stockton Municipal Airport. Figure 1-1 provides a location map showing the project boundaries. This report addresses flooding on the site and adjacent lands, and outlines improvements necessary to protect the development from flooding.

More than half of the site is within the Federal Emergency Management Agency's (FEMA) designated 100-year flood zone. A Flood Insurance Study (FIS) dated 1980 was performed by the US Army Corps of Engineers(Army Corps) on behalf of FEMA to determine the flooding limits. To safely remove the proposed development from the 100-year floodplain, several flood control features must be incorporated into the project development. Detailed descriptions of these improvements and the analyses to establish them are provided in this report and are outlined in this Executive Summary.

Existing Conditions Hydrology & Hydraulics

French Camp Slough is the stream that bisects the project site and is the main source of flooding. Figure 1-2 shows a schematic of the streams that converge either just upstream or within the site to become French Camp Slough. These streams are Weber Slough, North and South Fork of South Littlejohns Creek and Lone Tree Creek. The entire watershed encompasses approximately 360 square miles of tributary area.

Farmington Reservoir is the major control feature within the watershed and is operated by the Army Corps to provide flood protection in the lower watershed. Although it has provided significant flood protection over the years, much of the lower watershed including the site still lies within the 100-year floodplain. This is primarily due to the more than 140 square miles of uncontrolled watershed below Farmington Reservoir. Flooding on the Tidewater Crossing project site covers approximately 60% of the property in the FEMA FIS, and is indicated to be 1 to 3 feet deep. As part of this study analysis, a new hydrology model using the Army Corps HEC-HMS program and detailed site topography surveys has been developed to update the flood flow and confirm the extent of flooding.

Results of the new hydrology and site surveys showed that the 100-year flood flows entering the site and the extent of flooding has increased over the FIS results. This was mainly due to slight changes in the upper watershed stream operations and some improvements to channel crossings. For example, recent improvements to Weber Slough from Highway 99 to the project boundary brings more flow across Highway 99 and past the airport, as does the elimination of flows entering the North Fork of Littlejohns Creek at the historical bifurcation between the North and South forks. Both of these changes send more flow to the project site.

Flood depths and limits have also slightly increased in some areas due to the higher flows and based on the new more detailed topography. The added flooding is in terms of more stored water from bank overtopping, rather than higher water surface profiles in the streams.

An updated hydraulic model using the Army Corps HEC-RAS program and detailed survey cross-sections shows that the flood elevations within the French Camp Slough reach are actually lower (up to 1.5 feet) under existing conditions than those shown in the FIS results and on the FEMA Flood Insurance Rate Maps (FIRMs). A review of the FIS hydraulics revealed that the channel data used to calculate the water surface profiles in the FIS were from less precise (5 foot contour interval) maps and various other sources which would provide a less accurate water surface profile. The channel invert (bottom) profile in the FIS is several (over five feet in some locations) higher than the actual channel invert as measured in the recent detailed surveys. Channel incising could account for some of this discrepancy, but is not likely to be the sole reason for this large disparity. The new flood elevations in the current model are used as a basis of the project design. A listing of these new elevations at various point of interest can be found in Section 2, Table 2-2 of this report. Complete hydrologic and hydraulic results can be found in Appendices A and B.

Proposed Conditions Hydrology & Hydraulics

In order to remove the project site from the 100-year floodplain without affecting adjacent properties, significant flood control features must be incorporated into the project components. The main components of the proposed flood control features are improvements to the existing levee system, construction of new levees both on and offsite, and a detention basin to replace lost floodplain storage. The existing levees along French Camp Slough are proposed to be raised to provide at minimum 3.3' freeboard in a 100-year event (3' plus allowance for any settlement). Two new bridges are proposed across French Camp Slough; one upstream and one downstream of Airport Way. Levees within 100' of structures will provide 4' minimum freeboard. The Airport Way crossing has been identified as hydraulically deficient and is proposed to be retrofitted with parapet walls tied in to the levees to provide 4' freeboard at the structure. Back-levees are proposed to be constructed adjacent to Lone Tree Creek and Weber Slough. These levees are proposed to be set back from the existing channel and/or berms to avoid jurisdictional wetland permit issues.

A large detention basin is proposed to store floodwaters that will be displaced by the levee system in the existing floodplain. The detention basin will be a flow-by basin that will reduce the proposed conditions 100-year peak flows in French Camp Slough to or slightly below the existing condition flows. The basin will also store increased runoff from the added impervious areas of the development and overflow from Weber Slough that would enter and flood the site. The proposed conditions modeling efforts resulted in a detention basin facility to store approximately 1,700 ac-ft of floodwater.

In addition to the detention basin, floodwaters that would currently overflow existing channels and flow overland through and beyond the project limits must be addressed. Weber Slough and Lone Tree Creek are both streams that are inadequate in capacity to convey the 100-year flood flows, and will send significant overland flows onto the project site. The hydraulic analyses show that Weber Creek will spill more than 200cfs onto the site, and Lone Tree Creek will spill approximately 750cfs to the west across the Tidewater Southern Railroad (TSRR) eventually reaching the project site west of TSRR.

To address overflow from Weber Slough, an overflow weir and channel are proposed to convey the excess flow to the detention basin as part of the 1,700 ac-ft of storage. In addition, a culvert at the existing Army National Guard driveway (See Figure 2-5) will be upsized to convey flow to the capacity

of the existing downstream channel. Additional work along Weber Slough includes back-levees from French Camp Slough to Airport Way to keep flow in the channel and maintain adequate freeboard from French Camp Slough backwater.

Proposed Flood Control Improvements

Each of the major flood control components have been described above in terms of how they will operate hydraulically to achieve various flood control objectives. Figure 2-5 shows a layout of all of the flood control features proposed for the Tidewater Crossing Development project. The following list provides a more detailed summary of each component:

1. **Improve "Project" Levees -** Using fill from the proposed detention basin, existing project levees will be raised or reconstructed to provide adequate freeboard protection above the 100-year flood water surface profile. The levees will range in height above existing ground from approximately 3 feet to 5 feet. There is also the potential to use floodwalls in areas where the right-of-way or other improvements create tight access.

2. **Construct New Levees -** Construct new levees on Lone Tree Creek from Highway 99 to the confluence with south Littlejohns Creek. The new levees will range from 4 to 7 feet in height. Some areas will likely require floodwalls to avoid filling under large oak trees.

3. **Levee Tie-Ins -** Levee improvements must be tied into existing and proposed roadway crossings. These will include Highway 99, Tidewater Railroad, Airport Way, UPRR and any other proposed bridges. These tie-ins are usually accomplished by transition from levee fill to the bridge structures with floodwalls or filling up to the roadway approach surface.

4. **Construct a flow-by detention basin -** Construct a flow-by detention basin with a total volume of 1,700 acre-feet of storage volume. The diversion to the basin will include an overflow weir approximately 960 feet long in the north levee of French Camp Slough. The basin will be emptied after major storm events by a 50cfs pump station that can evacuate the entire basin volume within approximately 17 days. Figure 3-1 shows a layout of the basin and pump station facilities. The length of the weir is necessary so that the flood flows will not begin to spill until they reach critical levels. The peak overflow of approximately 1000cfs will spill only 0.5 feet deep over the weir, putting the elevation of the weir itself only 0.5 ft below the 100-year high water channel elevation. This also provides assurance that excessive fish loss will not occur. Based on the elevation of the weir, spilling into the basin will only occur during infrequent events (approximately the 50-yr flood frequency or greater) and will only reach the 0.5ft depth for the 100-year flood event.

   To add flexibility to the basin diversion, control gates at a lower elevation than the weir (approximately 2 to 3 feet) will be included in the design. These gates will provide added protection in case of unexpected problems further downstream with the levees such as floating debris against bridges, levee breaches, or some other unforeseen event which would have the potential to cause flooding.

5. **Construct an overflow channel for Weber Slough -** Construct a new overflow channel to the detention basin to convey approximately 200cfs. The channel will be approximately 30 feet wide if earthen lined or as narrow as 15 feet wide if concrete lined with vertical walls.

6. **Replace undersized culvert on Weber Slough -** Install a new double 5ft by 7ft box culvert at the Army National Guard driveway on Weber Slough to replace an existing deficient culvert. This will allow approximately 275cfs to pass downstream in Weber Slough.

Each of these facilities are described in greater detail with schematic plan and elevation views included in Section 3 of this report.

Section 1- Introduction and Background

Project Description

This report analyzes the existing flooding conditions and potential flood control improvements for the Tidewater Crossing residential, commercial, and industrial development near the City of Stockton, CA. The project site consists of approximately 895 acres and is located south of the Stockton Municipal Airport between Highway 99 to the east and the Union Pacific Railroad to the west (see Figure 1-1). Approximately 530 acres of the project site are within 100-year floodplain boundaries as mapped by the Federal Emergency Management Agency (FEMA) with depth of flooding ranging from 1 to 3 feet. South Littlejohns, Temple, and Lone Tree Creeks contribute flows to French Camp Slough, which passes through and floods the project site in a 100-year storm event. Floodwaters also enter the site from Weber Slough to the north. This report will analyze improvements to remove project areas from the floodplain such as placing fill and construction of levees, detention facilities and/or bypass channels. Offsite areas will be addressed as well, considering potential flood control improvements as a regional benefit. A fundamental criterion of the proposed improvements is to maintain existing peak flow at the project's downstream limits such that downstream properties are not subject to greater flooding potential.

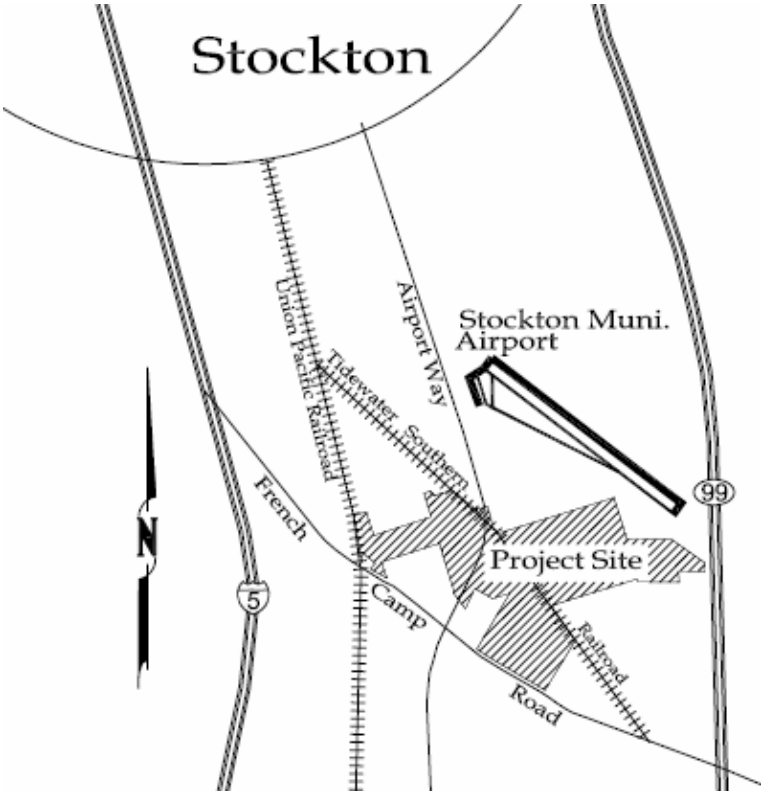


Figure 1- 1. Vicinity Map

Watershed Description/Delineation

Watershed basins were delineated using USGS Topographic mapping (scale 1:24000). Figures A-1 and A-2 in Appendix A delineate the existing watershed boundaries. The watershed drains east to west,

flowing into French Camp Slough, which joins the San Joaquin River west of Interstate 5. Watershed areas contributing to the downstream project limits total approximately 360 square miles.

Approximately 212 square miles drain to the Farmington Flood Control Reservoir, a structure built in 1951 to reduce flooding in the south Stockton area. Within the Farmington watershed are two reservoirs (Salt Springs and Woodward), which are used for storing water and are assumed to be full in this study (inflow=outflow). Farmington reservoir functions to regulate flow in Littlejohns Creek. According to the Water Control Manual for Farmington Dam (Reference 3), the releases are controlled such that the sum of diverted water from Duck Creek and the outflow from Farmington Reservoir does not exceed 2,000 cubic feet per second (cfs). A stream gage at the town of Farmington provides the flow information for the reservoir outlet operations.

Downstream of the inflow from the Duck Creek Diversion, Littlejohns Creek bifurcates into the North Littlejohns and South Littlejohns Creeks, where the flow split historically. Current San Joaquin County operations do not allow this flow split, and all flow continues in South Littlejohns Creek. Farther downstream, South Littlejohns Creek bifurcates into the North Fork and South Fork of South Littlejohns Creek. The North & South Forks rejoin west of Highway 99, where the channel becomes French Camp Slough. Lone Tree Creek joins the South Fork approximately 3,400 feet upstream of the confluence with the North Fork. See Figure 1-2 for stream schematic.

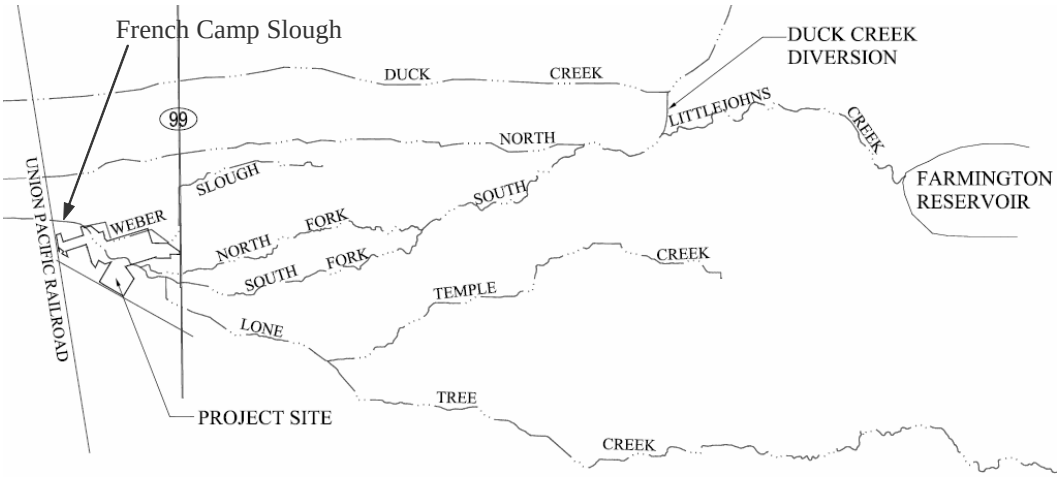


Figure 1- 2. Overall stream schematic

Littlejohns Creek Watershed: The watershed area below Farmington Reservoir contributing to South Littlejohns Creek totals approximately 30 square miles. Channel length between the reservoir and French Camp Slough is approximately 21.5 miles. The land uses are primarily agricultural, with some residential. South Littlejohns Creek becomes a raised channel with raised berms along both banks from approximately 9 miles downstream of Farmington Reservoir to its terminus at French Camp Slough. Drainage to the creek where it is elevated must pass through pipes with and without flap gates, which will cause detention of water on the farmland in major storm events. In general, all of the streams in the project study area become elevated as they approach Highway 99, which creates more flood storage in the lower watershed. See Appendix D for photographs.

Temple Creek Watershed: The watershed area contributing to Temple Creek at the confluence with Lone Tree Creek is approximately 38.1 square miles and is 16.7 miles in length. The confluence with Lone Tree Creek is approximately 3.2 miles east of Highway 99. Watershed land uses are primarily agricultural with sparse residential. Few drainage improvements exist in the watershed resulting in some isolated areas where ponding occurs, and there is no positive drainage to the creek. These isolated areas were removed from the contributory area in the watershed model. See Figure D-28 in Appendix D for post-storm aerial photograph.

Lone Tree Creek Watershed: The watershed area contributing to Lone Tree Creek at the confluence with South Littlejohns Creek is approximately 85.3 square miles, of which 38.1 square miles is from Temple Creek. Lone Tree Creek is approximately 23.3 miles in length. Its confluence with the South Fork of South Littlejohns Creek occurs approximately 4,800 feet downstream (west) of Highway 99. Land uses are primarily agricultural. In many cases the farmers berm the fields to retain irrigation water, which also functions to detain storm water runoff. Some dairies (which must retain storm water), and other agricultural and residential areas have little drainage improvements overall similar to the Temple Creek watershed, resulting in isolated areas which do not drain to the streams.

After crossing Highway 99, Lone Tree Creek joins South Fork South Littlejohns Creek (SFSLJ). The 100-year flow in SFSLJ is sufficient to backwater and spill out of Lone Tree Creek. Additional flow in Lone Tree Creek will break out and flow to the west toward and over the Tidewater Southern RR tracks. This breakout flow will pond east of the tracks and eventually flow west across the tracks onto the project site, before re-entering the system further to the west at the UPRR.

Weber Slough Watershed: The watershed area contributing to Weber Slough at the confluence with French Camp Slough is approximately 7.7 square miles of agricultural, residential, commercial and industrial uses east of Highway 99 and the south portion of Stockton Metropolitan Airport, west of Highway 99. A new channel between the airport and Highway 99 has been constructed sometime after the flood insurance rate map (FIRM) was prepared (see Figure 1-3).

Figure 1- 3. Weber Slough Realignment

The new channel has capacity for approximately 400cfs, whereas the channel beginning near the Tidewater project boundary's northeast corner has capacity for only 300cfs. Floodwaters will break out of the smaller section and flood the project area to the south and east of Tidewater Southern Railroad (TSRR, see Figure A-3) to a depth of 1 foot according to the FIRM map. Through field review, it appears that due to the realignment and improvement of Weber Slough, the flooding is less severe at the airport than is shown on the FIRM and consequently more severe at the project site.

In addition to the inadequate channel capacity, the culvert at the Army National Guard driveway near Airport Way has capacity for only 60cfs (two 30" concrete pipes). From this culvert downstream to the confluence with French Camp Slough, the channel and structures have capacity for approximately 300cfs.

French Camp Slough: The source of French Camp Slough is the confluence of the North and South Forks of South Littlejohns Creek just east of the project boundary. The contributing drainage area at this point is approximately 350 square miles. Tidewater Southern Railroad (TSRR) crosses French Camp Slough approximately 2,100 feet downstream of its source. The next crossing is Airport Way (2,300 feet further downstream) followed by the confluence with Weber Slough and the crossing at Union Pacific Railroad (UPRR, downstream project limits). Army Corps project levees exist along the banks, in some cases set back hundreds of feet from the top of bank. According to discussions with the Army Corps, the levees were designed for a flow of 2,000cfs with three feet of freeboard.

According to the FEMA studies, French Camp Slough will overflow its banks during a 100-year storm event in many locations between its source and the downstream project limits at Union Pacific Railroad (UPRR).

Section 2 - Hydrologic and Hydraulic Analyses

Hydrologic Methodology

The hydrologic analysis used in this study is based on procedures outlined in the County of San Joaquin Hydrology Manual, prepared by Boyle Corporation for San Joaquin County Public Works Department, September 1997. Additional methodologies used in this study are based on procedures developed by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS, previously SCS). A computer model using these procedures within the Army Corps of Engineers' Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS v. 3.0.1) was developed for this study. This modeling procedure was selected to establish hydrographs for the various watersheds. See Figures A-7 and A-8 for the watershed basin schematics used in the model. A multi-day (five-day) precipitation model for a 100-year storm was used based on San Joaquin County methods (Figure A-5).

Rainfall: Rainfall depth-duration-frequency (DDF) data used is from San Joaquin County Hydrology Manual Table B.7 and Figure B-1 for the 14" through 19" average annual rainfall isohyets. The eastern watersheds lie outside San Joaquin County and experience greater average annual rainfall. For these areas, rainfall data was found from US Weather Bureau 100-year, 4-day Isohyetal Map (Reference 8). The San Joaquin County DDF tables were extrapolated to 30" average annual rainfall. 5-day precipitation temporal distributions (hyetographs) were then constructed for the 14, 15, 16, 18, 21, 24, 27 and 30-inch average annual rainfall isohyets using methods described in Section E of the Manual (see Figure A-5). A correlation to the US Weather Bureau four-day isohyets was found by calculating the total depths of each peak four-day San Joaquin distribution and interpolating on the US Weather Bureau isohyetal map. Hyetographs for each subbasin in the model were assigned based on proximity to San Joaquin County or US Weather Bureau rainfall isohyets (see Figures A-1 and A-2).

For comparison, Sacramento County and SCS 100-yr, 10-day precipitation distributions were also simulated in the model. The San Joaquin distribution results in the highest peak runoff and greatest volume. The San Joaquin County distribution is the most conservative and is used as the design storm in this analysis.

Soils/Ground Cover: Runoff quantities are calculated within HEC-HMS using San Joaquin County S-graphs, which correlate percent runoff versus time in percent of lag (Hydrology Manual, Figures E-3a-E-3d). The runoff curve numbers (CN) were selected using Table 2-2a and Table 2-2c from NRCS Technical Release 55 (TR-55). Hydrologic Soil Group (HSG) for the areas within the project watershed have been classified by the NRCS as primarily HSG D, with some HSG A, B, and C (See Figure A-6). Soil survey data has not been developed by the NRCS for Stanislaus and Calaveras Counties. The majority of the areas without soil survey data are upstream of Farmington Reservoir, which controls releases to 2,000cfs, therefore the peak runoff to the reservoir is less critical. The curve numbers for these areas were adjusted based on historical inflow data recorded at the reservoir. Existing cover types and associated weighted curve numbers used in the model are summarized in Appendix A. See Appendix D, Photographs for typical existing ground cover conditions.

Figure 2-1. Lone Tree Creek watershed typical groundcover and raised berms. Creek on right with dairy beyond.

Lag Time: The computation of time of concentration and lag time was estimated using methods developed by San Joaquin County. Hydrology Manual Equation E.2 estimates lag time as a function of length of watercourse, length to watershed centroid, slope of watershed, and a basin factor as tabulated in Figure E-2. As a check, the lag times calculated were converted to time of concentration using equation E.1 Lag=0.8Tc and average velocity was then calculated and analyzed for reasonableness. See Appendix A for calculations.

Visual Inspection: A two-day site visit was conducted by Domenichelli and Associates during January, 2006. The site visit involved visual inspection of land uses and ground cover, existing drainage facilities, channel hydraulic roughness parameters, storage capacity of existing floodplains, photographing existing facilities, and taking measurements of culverts and bridges. The measurements included dimensions to the road crown and were tied to a GPS survey of the roads conducted by Siegfried Engineering in February, 2006. Additional inspection of post-storm conditions such as high water marks in channels and ponding in isolated areas was documented.

Reach Routing: Different reach routing methods were implemented depending on observed conditions. For example, streams with adjacent and well-defined floodplains were modeled using Muskingum-Cunge routing to account for the overbank flow. Streams with raised berms or levees were modeled using diversions and Kinematic Wave routing as flows that overtop the banks will remain outside of the channel and flow separately overland. Overland flows were modeled using either Modified Puls routing, which attenuates outflow by accounting for storage within the reach, or by adding a reservoir at the end of the reach.

Diversion/Reservoir Routing: Between Farmington Reservoir to the east and the project site, the peak flow resulting from a 100-year or greater storm event is greatly attenuated due to restrictions caused by

road and railway crossings such as at Mariposa Road and the Atchison, Topeka & Santa Fe Railroad. Rating curves estimating the hydraulic performance of many crossings in the upper watershed were determined by entering bridge and culvert geometry into HEC-RAS and simulating a range of flows through the structures. In cases where floodwaters in the overbank are able to return to the channel as the stream subsides, a bridge or culvert was modeled as an inline reservoir with outflow limited to the opening's capacity and storage taking place in the agricultural land upstream of the bridge & road. In cases where berms keep the water from returning or the land slopes away from the channel, a diversion model was used to take water in excess of the channel or bridge capacity and track it separately. The diverted water was then modeled through a reservoir to simulate a metered return to the channel through small pipes, or modeled as an overland reach before returning to the channel at a downstream junction.

A key consideration in the routing of flows onto the project site is the capacity of the bridge crossings for all of the streams at Highway 99. A detailed survey and hydraulic analysis for each crossing was conducted, and rating curves were established. These rating curves in conjunction with storage behind the highway regulate the flow entering the site. See Appendix C for calculations.

Calibration: A stream gage located in French Camp Slough at Airport Way operated by the California Dept of Water Resources (DWR) provided stage and flow data from 1976 to November 2005. A stream gage in Lone Tree Creek at Escalon-Bellota Road operated by San Joaquin County provided stage data, but no rating curve has been developed and therefore no flow data is available. Rainfall, inflow and release data for Farmington Dam is available from the Army Corps from 1951 to 2004. The January 1, 2006 storm was estimated to be a 10-year event, enabling a calibration of observed high water marks on Lone Tree Creek to rainfall data from the County's Escalon-Bellota Road gage. The runoff variables modified in calibrating the model were percent of isolated area (see Table A-1) and storage attenuation at road crossings (see Table A-2). Curve Numbers, lag times, precipitation, etc., were not modified in calibrating the model, except as mentioned previously for areas upstream of Farmington Reservoir without soil survey data.

Previous Studies: The study model results have been compared to the flow results provided in the FEMA Flood Insurance Study (FIS), which was performed by the Army Corps in 1977 (Reference 1). Although the land use and rainfall statistics have not changed significantly since that time, some improvements to the channels and roadway crossings have resulted in somewhat different flow values for the current model. In addition, some of the flood routing procedures used by the Corps were different than for the current model. In the Corps model, flow lost to over-banks and upper watershed storage was often not returned to the system model. In the current model most of the flow held in storage is returned to the stream except where areas are designated not to be tributary to the system.

Even with these differences, the current model results are quite similar to those of the original Corps model. Noted differences are:

- North Fork Littlejohns Creek no longer receives flow from bifurcation (per County diversion modification).
- Weber Slough 100-year flooding no longer flows over Highway 99 due to improved crossing of Highway 99 at Arch Lane and Highway 99 overlay improvements.

- Routing methods with storage and return flow to the system in current model, differs from FIS model.
- New surveyed channel sections resulted in different channel capacities than in the FIS study.
- Isolated areas with no positive drainage to the streams are removed from the modeled contributory watershed.

Existing Conditions Hydrologic Results

Table 2-1 contains results of the current existing conditions study model along with values presented in the FEMA FIS for comparison.

Table 2- 1. Summary of 100-year Peak Flows

	FEMA Flood Insurance Study		Current Model (Existing Conditions)	
Flooding Source and Location	**Drainage Area**	**Peak Flow**	**Drainage Area**	**Peak Flow**
	(mi^2)	**(cfs)**	**(mi^2)**	**(cfs)**
French Camp Slough				
El Dorado Street	414.0	**3,970**	344.3	**4,658**
Airport Way	394.8	**3,565**	336.5	**4,038**
Source (Confluence of North and South Forks Littlejohns Creek)	335.1	**3,855**	335.4	**3,930**
South Fork South Littlejohns Creek				
Terminus (French Camp Slough)	321.9	2,900	327.4	2,436
Lone Tree Creek Confluence	--	--	327.4	2,954
Highway 99	234.1	2,600	238.1	2,454
North Fork South Littlejohns Creek				
Terminus (French Camp Slough)	321.9	955	237.0	1,505
Highway 99	234.1	965	229.2	1,505
Lone Tree Creek				
Terminus (South Fork South Littlejohns Creek)	87.8	690	89.3	523
Overflow across TSRR	--	--	--	**590**
Highway 99	86.0	955	87.5	1,113
Weber Slough				
Terminus (French Camp Slough)	n/a	n/a	7.8	385
Overflow to Industrial Area				**202**
Highway 99	n/a	n/a	5.5	410

As seen in Table 2-1, the peak flow leaving the project site at El Dorado Street is higher for the current model when compared to the FIS. According to the hydraulic model (see below) the channels have capacity to convey more water to and under Highway 99. The higher peak flows are attenuated to a similar degree by the available overbank storage within the project boundary and other local flood storage. The flow leaving the study area is dependent mostly on the capacity of the overbank storage as once the storage areas are "full" the attenuation of flows is reduced (inflow roughly equals outflow). The current hydrologic model has two overbank storage areas south of French Camp Slough: Area O and RES Onsite, which do become "full" and peak outflow returning to French Camp Slough upstream of UPRR is 1,200cfs. Peak inflow to RES Onsite is 1,388cfs. Additional storage west of Highway 99 named "RES Indus" was placed in the model north of French Camp Slough to represent the floodplain south of the airport.

Another important resulting flow is the break out flow (overflow) from Lone Tree Creek across Tidewater Southern RR (TSRR). This estimated flow of 750cfs is directed across Area O toward the southeastern portion of the proposed residential development area. With the potential levee improvements, water will be confined to the creek system and resulting water surfaces were analyzed and kept as close as possible to existing levels upstream of the improvements (east of Highway 99).

As stated in the project watershed description, Weber Slough through and leaving the site has diminished capacity to carry the anticipated flows. Even with upgrades to the culverts leaving the project site, flows greater than approximately 300cfs will flood the site upstream of TSRR. Therefore, a diversion structure will need to be constructed to divert flow in excess of 300cfs to an overflow channel to ultimately flow through the industrial development to the detention basin.

Existing Conditions Hydraulics

A hydraulic model was developed for the stream system between Highway 99 and the Union Pacific Railroad. A field survey by Kjeldsen, Sinnock & Neudeck, Inc. (Oct. 2005), supplemented with a Stantec, Inc. survey (Feb. through Aug. 2006) provided geometric information of the channels and over-banks between Highway 99 and the UPRR. Culverts and road/railroad crossings were surveyed so that backwater effects could be analyzed. A roughness coefficient (Manning’s n-value) of 0.04 was used for the main channel and the overbank areas similar to the FIS (see Figure 2-2). Water surface elevations were calculated using HEC-RAS (Reference 5).

Figure 2-2. Typical channel vegetation (n = 0.04)

The results of the hydraulic model showed lower (up to approximately 1.5 feet) water surface elevations than the FIS profile (Reference 1). A comparison of the current HEC-RAS profile to that of the FIS is shown in Table 2-2 at several points of interest. These discrepancies were investigated to determine the possible reason(s) for the current lower profile elevations. It was found that although the same datum was used in each study and top of road elevations were relatively close, elevations for the channel bottom (invert) profile were significantly lower in the current model. The difference was consistently greater than 3 feet and in some cases greater than 5 feet.

Table 2- 2. Summary of Hydraulic Analysis

Location	Current Model		Flood Insurance Study		Difference	
	Flow	Water Surface Elevation	Flow	Water Surface Elevation	Flow	Water Surface Elevation
	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Source (Confluence of North and South Forks South Littlejohns Creek)	3930	25.55	3855	25.7	75	-0.15
Tidewater Southern Railroad Bridge	4040	24.38	3855	25.2	185	-0.82
Airport Way Bridge	4040	23.13	3565	24.5	475	-1.37
Union Pacific Railroad Bridge	4660	16.47	3970	18	690	-1.53

Incising of the channel over time could be an explanation for the deeper channel section, however it is more likely due to the use of less accurate approximations of the channel section in the FIS study. Regardless of the discrepancies, the current model is based on a recent, accurate survey of the site

channels and is tied to a recent topographic survey of the site and surrounding properties. The current project HEC-RAS model uses the new survey data with a starting water surface elevation at the downstream end from the FIS study. This starting water surface elevation is based on the higher channel bottom (and resulting water surface) in the FIS, provides a conservative control elevation for the new model. Figure 2-3 shows the HEC-RAS cross section and resulting water surface for French Camp Slough at the Tidewater Southern Railroad crossing. Complete HEC-RAS output can be found in Appendix B, Hydraulics.

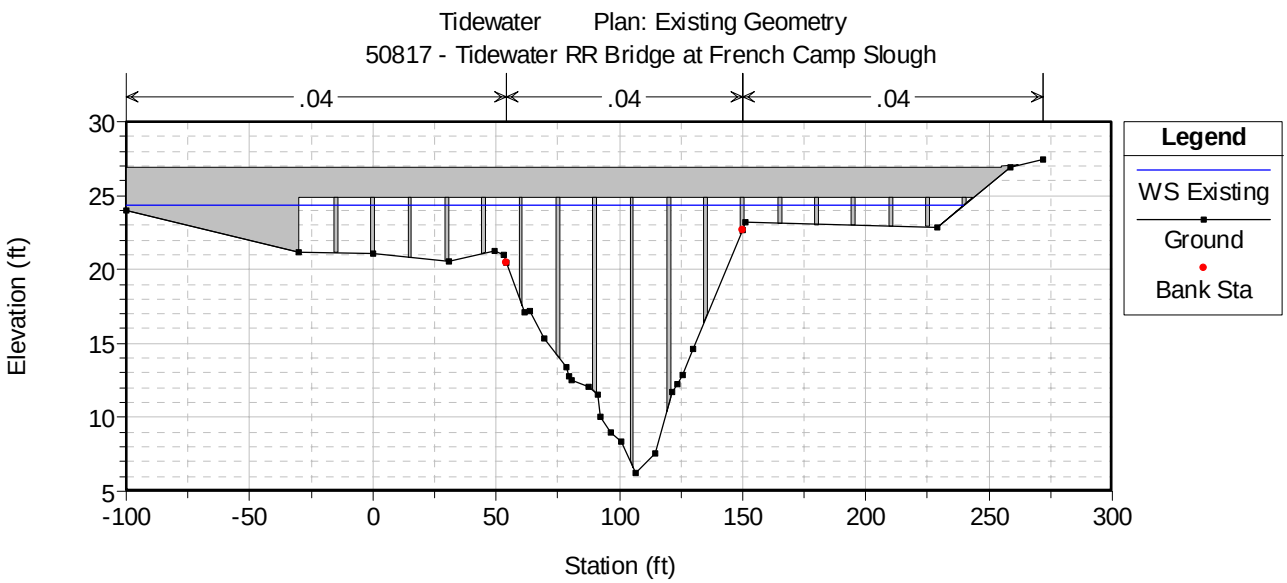


Figure 2-3. Cross section of French Camp Slough at TSRR crossing (Existing conditions 100-yr flow=4,040 cfs).

Proposed Flood Control Improvements

Detention Basin: With the loss of floodplain storage due to the proposed development, a detention basin is necessary to maintain the existing flows and base flood elevations (BFEs) through and at the ends of the project. The proposed conditions will include levee improvements and new levee construction between Highway 99 and UPRR. The levees on Lone Tree Creek will need to be set back to provide approximately 175' of top width flow area, with the overbank flow area acting to maintain BFEs (see Figure 2-5). Based on the proposed channel sections with these improvements, the new HEC-RAS model resulted in negligible changes in the BFEs from the existing conditions model.

The elevation of the top of levees will be approximately four feet above the BFEs to maintain adequate freeboard. To maintain flows close to the existing conditions level, a flow-by detention basin upstream of Tidewater Southern Railroad is proposed to shave off the peak flows in French Camp Slough above the target values. The hydrograph in Figure 2-4 represents flow vs. time at the proposed weir upstream of the TSRR crossing.

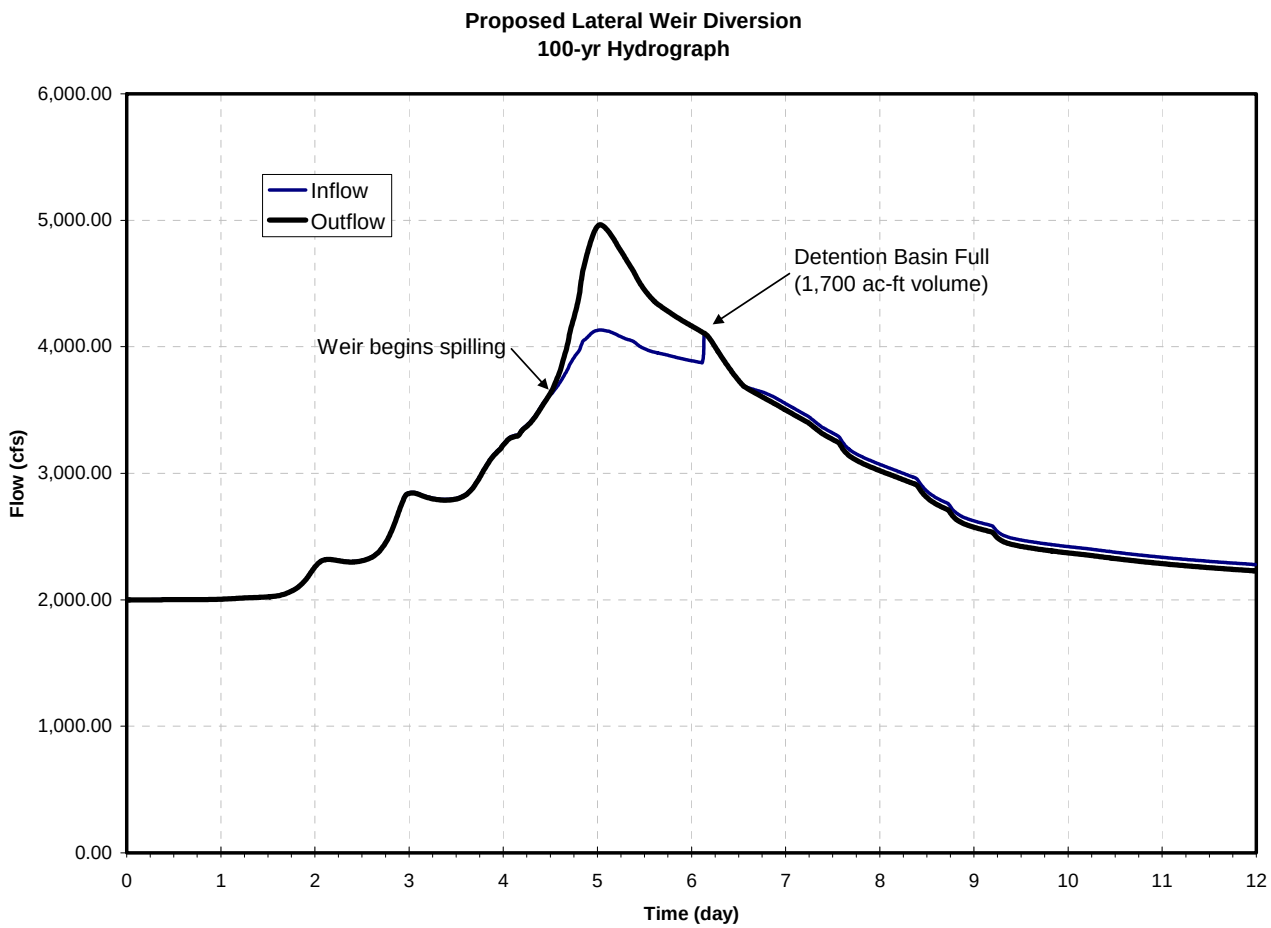
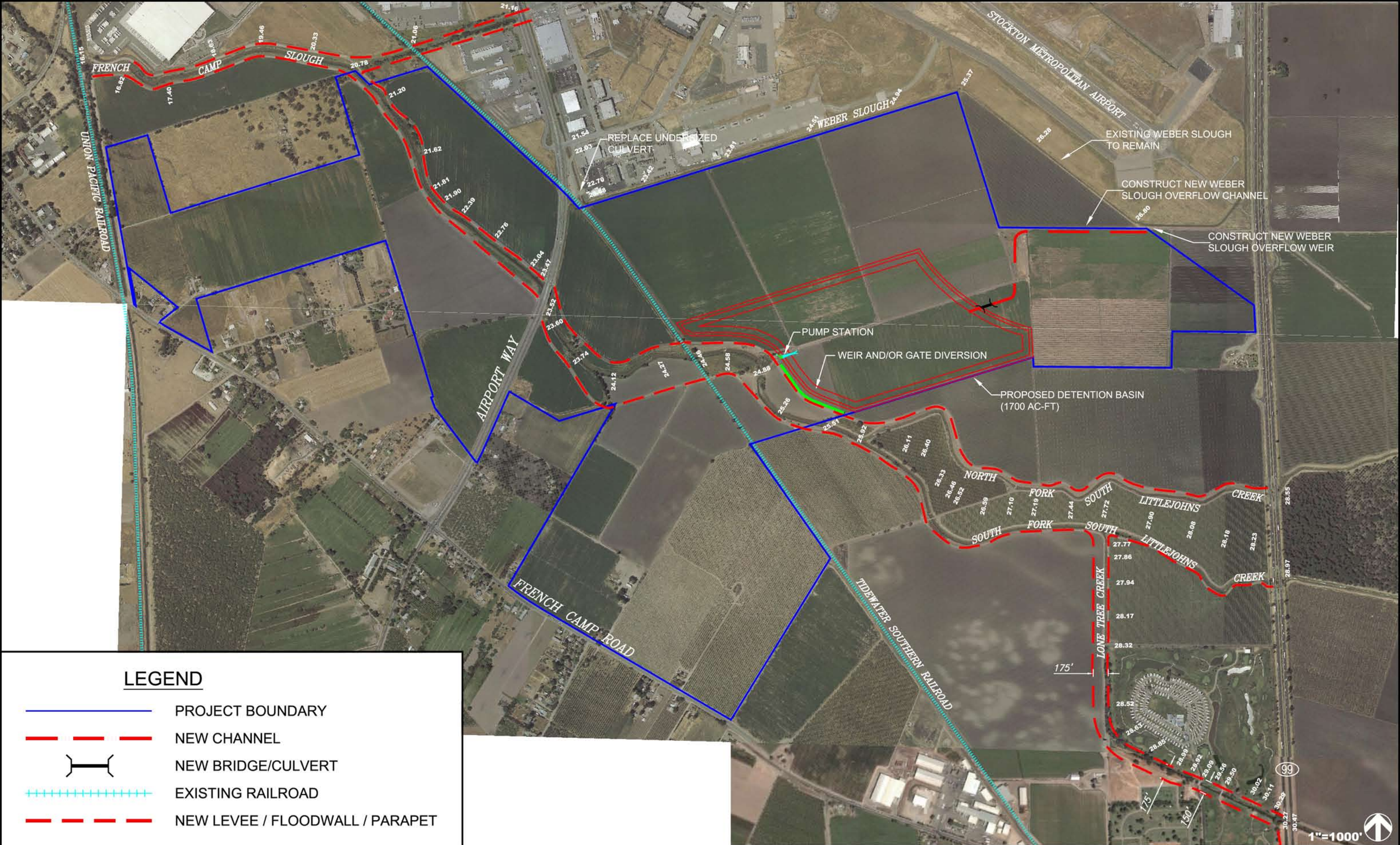


Figure 2- 4. Hydrograph at proposed 960' lateral weir

The existing HEC-HMS model was modified to add the developed conditions with lost storage and higher runoff within the project limits to create a proposed condition model. Additional areas of existing storage outside of the development boundaries were also taken out of the floodplain where the proposed levees contain flows that would have otherwise gone overland. To provide effective detention storage to mitigate for the lost storage and added site runoff, the flow-by detention basin was inserted into the model at a specified location that is convenient for diverting flows and fits in well with the proposed development plan. Figure 2-5 shows the location of the basin as well as other flood control related improvements for the project. After iterative model runs, a basin of approximately 1,700 ac-ft in volume along French Camp Slough just west of the TSRR was required to bring the peak flows at the downstream project boundary back below existing condition levels. This volume includes approximately 1,600 ac-ft diverted from French Camp Slough, with the remainder coming from Weber Slough and the on-site industrial area east of TSRR.



ARNAIZ COMPANIES

TIDEWATER CROSSING

STOCKTON, CA

FIGURE 2-5: PROPOSED FLOOD CONTROL IMPROVEMENTS AND 100-YEAR WATER SURFACE ELEVATIONS

Diversion to Basin and Pump Discharge: To divert the flow from French Camp Slough into the basin, a lateral weir 960 feet in length is proposed to be constructed atop the existing levee along the north bank of French Camp Slough upstream of TSRR. The target peak flow at TSRR is 4,040cfs and peak inflow at the weir is 4,960cfs according to the HMS model. To meet the target flow using a weir, the weir will need to begin overtopping at flows less than 3,600cfs as at peak diversion the weir will be flowing approximately 0.5' deep.

A HEC-RAS unsteady flow model was developed to model the lateral weir and detention basin. The basin is sized such that it can accept diverted flow during and after the design storm peak before becoming full. The design storm peak flow is attenuated and flows downstream of the basin will remain at or below the 4,040cfs target. Again, additional 100-year storms were simulated using SCS and Sacramento County 10-day distributions. The 1,700 ac-ft basin was found to be capable of handling all storm scenarios run. The San Joaquin County 5-day rainfall results in the most conservative design. To empty the basin after the storm event passes, a 50cfs pump station is proposed which can empty the basin in approximately 17 days. The pumps are assumed to be running in the model simulations.

Improve "Project" Levees: Using fill from the proposed detention basin, existing project levees will be raised or reconstructed to provide four feet of freeboard protection above the 100-year flood water surface profile. The levees will range in height above existing ground from approximately 3 feet to 5 feet. There is also the potential to use floodwalls in areas where the right-of-way or other improvements create tight access.

Construct New Levees: New levees will be constructed on Lone Tree Creek from Highway 99 to the confluence with south Littlejohns Creek. The new levees will range from 4 to 7 feet in height. Some areas will likely require floodwalls to avoid filling under large oak trees. Back-levees on Weber Slough will be needed from the French Camp Slough confluence to Airport Way.

Levee Tie-Ins: Levee improvements must be tied into existing and proposed roadway crossings. These will include Highway 99, Tidewater Railroad, Airport Way, UPRR and any other proposed bridges. These tie-ins are usually accomplished by transition from levee fill to the bridge structures with floodwalls or filling up to the roadway approach surface.

Construct an overflow channel for Weber Slough: A new overflow channel will be constructed to the detention basin to convey approximately 200cfs. The channel will be approximately 30 feet wide if earthen lined or as narrow as 15 feet wide if concrete lined with vertical walls.

Replace undersized culvert on Weber Slough: A new double 5ft by 7ft box culvert will be installed at the Army National Guard driveway on Weber Slough to replace an existing deficient culvert. This will allow approximately 300cfs to pass downstream in Weber Slough.

Conclusions

The proposed development is feasible from a flood control perspective by implementing mitigating measures as discussed in this report. Before beginning the final design plans, pre-design level criteria and

component layout plans must be established. The pre-design of the project components is discussed in detail in the following report section.

Once 30% design level plans are complete, the permitting and FEMA certification processes can begin. As part of project approval, it will be necessary to revise the flood maps in the vicinity of the project area through FEMA's Letter of Map Revision (LOMR) process. In addition to the project benefits, there is a regional benefit to offsite areas west of Highway 99. Areas to be removed from the 100-year floodplain through proposed improvements and flood map revision are shown in Figure A-4B.

Below is a summary of flood control improvements (see Figure 2-5):

1. Raise/reconstruct project levees along French Camp Slough and North/South Forks of South Littlejohns Creek to provide 4' freeboard for 100-year water surface profile.

2. Construct new levees along Lone Tree Creek from Highway 99 to the confluence with S. Fork S. Littlejohns Creek.

3. Construct new levees along Weber Slough from Airport Way to the confluence with French Camp Slough.

4. Construct a flow-by detention basin with total volume of 1,700 acre-feet, with a 960' lateral weir along French Camp Slough upstream of TSRR, and a 50 cfs pump station to empty the basin.

5. Construct a Weber Slough diversion structure and collector channel for Weber Slough overflow through the on-site industrial area (approximately 2,800 foot by 60' wide by 7' deep).

6. Replace undersized culvert at Army National Guard driveway on Weber Slough.

Section 3 - Flood Control Improvements Pre-Design

The Tidewater Crossing Development flood control facilities are divided into six project components: Project levees, Levee tie-ins, French Camp Slough detention basin, Basin discharge pump station, Basin diversion weir and gates, Weber Slough diversion and channel improvements. The following sections will describe the project components and the criteria that will be used in the design.

Project Levees

The existing levees between Highway 99 and Union Pacific Railroad are federal (Army Corps) project levees, operated and maintained by the California State Reclamation Board. The primary improvement to provide flood protection for the Tidewater Crossing project will be upgrades to the project levees within the Tidewater project limits and beyond.

Project levees extend from Union Pacific Railroad near Interstate 5 east to Highway 99. These levees are inadequate in height to protect against infrequent flooding. In fact, 100-year flood flows would overtop the levees at several locations. Improvements will include raising or reconstructing the existing levees between 2 and 4 feet higher than existing grades. A minimum 3.3 foot freeboard above the 100-year water surface profile is the base criteria for the design of the levee improvements. The levees will be designed per Reclamation Board standards with appropriate side slopes, top widths, standard penetration designs for interior drainage facilities and geotechnical specifications.

In addition to improvements to the existing levees, new levees will be constructed along Lone Tree Creek and Weber Slough. These new levees will also meet Reclamation Board standards and will include an inspection trench and a standard 10-foot right of way buffer beyond the land side levee toe. Figure 2-5 shows the limits of the levee improvements.

The following report sections describe specific details for appurtenances to the levee improvements.

Levee Tie-Ins

There are several locations where the levees will transition into existing and proposed bridge crossings. Some bridges are well above the 100-year flood elevations and the levee embankment can tie into the bridge approach embankment. Other bridges will rely on solid concrete railing to achieve the required freeboard.

At the eastern (upstream) limits, the project and new levees will terminate at Highway 99. The project design will include a transition from earthen levees to floodwalls that will tie into the existing Highway 99 bridge crossings. Because the existing bridges currently have wood post railings, the project will replace these railings with a standard Caltrans concrete railing. This will provide both a structural tie-in and will add freeboard to achieve the required four feet. All of the Highway 99 crossings have between 2.8 and 3.3 feet of freeboard above 100-year flood profile and will require the new railing tie-in.

The Union Pacific (old Tidewater) Railroad bridge crossing is another location where freeboard is inadequate at less than one foot to bridge soffit. Rather than attempt to reconstruct the timber bridge to

include concrete railings, this crossing will be made by tying into the railroad embankment beyond the limits of the bridge abutments. The railroad crossing will include a closure structure at each levee. Details for the closure structure are provided in the 30% design details.

Upstream Terminus

As described above, the levee improvement project will terminate to the east at Highway 99. The levees, tie-in walls and railing will all have four feet of freeboard above the 100-year water surface profile. Beyond (upstream of) the project limits the Highway roadway surfaces will have 2.92 feet of freeboard at the North Fork and 2.78 feet at the South Fork of South Littlejohns Creek, and 3.28 feet at Lone Tree Creek. During future improvements to widen Highway 99, the remainder of the railings can be converted to concrete to achieve the standard four foot freeboard. Upstream of Highway 99 inadequate channel berms are overtopped and 1 to 4 feet of flooding ponds behind the highway embankment on the overbanks. These floodwaters do not cross the highway except through small diameter cross drains (18-24" dia.) which will be picked up by the interior drainage system on the project site The roadway embankment is elevated above the 100-year water surface profile 1.7 to 3.5 feet across the entire floodplain. The minimum freeboard of 1.7 feet occurs north of N. Fork S. Littlejohns where the ponding is approximately 1.5' deep.

French Camp Slough Detention/Water Quality Basin

As described in the Hydrology and Hydraulics report section, a 1,700 ac-ft detention basin is required to contain flood flows from French Camp Slough (FCS), Weber Slough and runoff from the neighboring industrial area. The basin will be located along the east bank of French Camp Slough and will be designed as a flow-by basin (See Figure 3-1). Since the primary purpose of the basin is to detain peak flood flows during the 100-yr/multi-day storm, the basin will remain dry for most of the season.

The basin will be designed to meet California Stormwater Quality Association (CASQA) standards, TC-22 for extended detention basin design. The basin depth will be dependent on groundwater depth and the footprint of the basin as determined by the development land use plan. Vegetated water quality channels will be constructed along drainage flow-ways within the basin to minimize pollutants introduced to FCS.

A perimeter berm along with a 12-foot wide utility road will be constructed for easy access around the basin and to the associated facilities. Access ramps along the basin perimeter will provide access to the pump station apron, basin and creek side of the diversion structure and access to the far east side of the basin. The access ramps will have a downward slope not greater than 10% with a pipe gate at the top for security. Side slopes around the basin will not be greater than 3:1 for safety and maintenance purposes.

The basin may be designed to act as a multi-use facility. A collector channel will be constructed along the perimeter of the basin to direct local drainage from neighboring facilities to the pump station while leaving the majority of the basin dry. The dry areas isolated from these flows can be used at the City's discretion. Possible uses may include soccer fields or City park facilities. A warning system will be included in the design of the pump station and intake structure to provide warning when these systems become operational.

REV	DATE	BY	DESCRIPTION

SCALE:

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

SUBMITTED
PROJECT ENGINEER R. C. E. NO. DATE
RECOMMENDED
D&A R. C. E. NO. DATE

DOMENICHELLI & ASSOCIATES
1107 Investment Blvd. Suite 145
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

TIDEWATER CROSSING PUMP STATION AND INTAKE STRUCUTRE

FIGURE 3-1 - DETENTION BASIN LAYOUT

SHEET
SHEET OF XX

Drainage Pump Station

Site Improvements

The pump station site for the detention basin will be located near the east bank of FCS to minimize the length of discharge piping from the station (See Figure 3-2). The pump station site will have an asphalt surface and will be graded to drain into the sump structure. A perimeter chain link fence with anti-climb barbed wire will be installed with two points of gated access, one from the development and the other from the access road to the diversion structure. Rock slope protection will be placed along the banks near the sump inlet to protect against higher velocity flows during pumping operations.

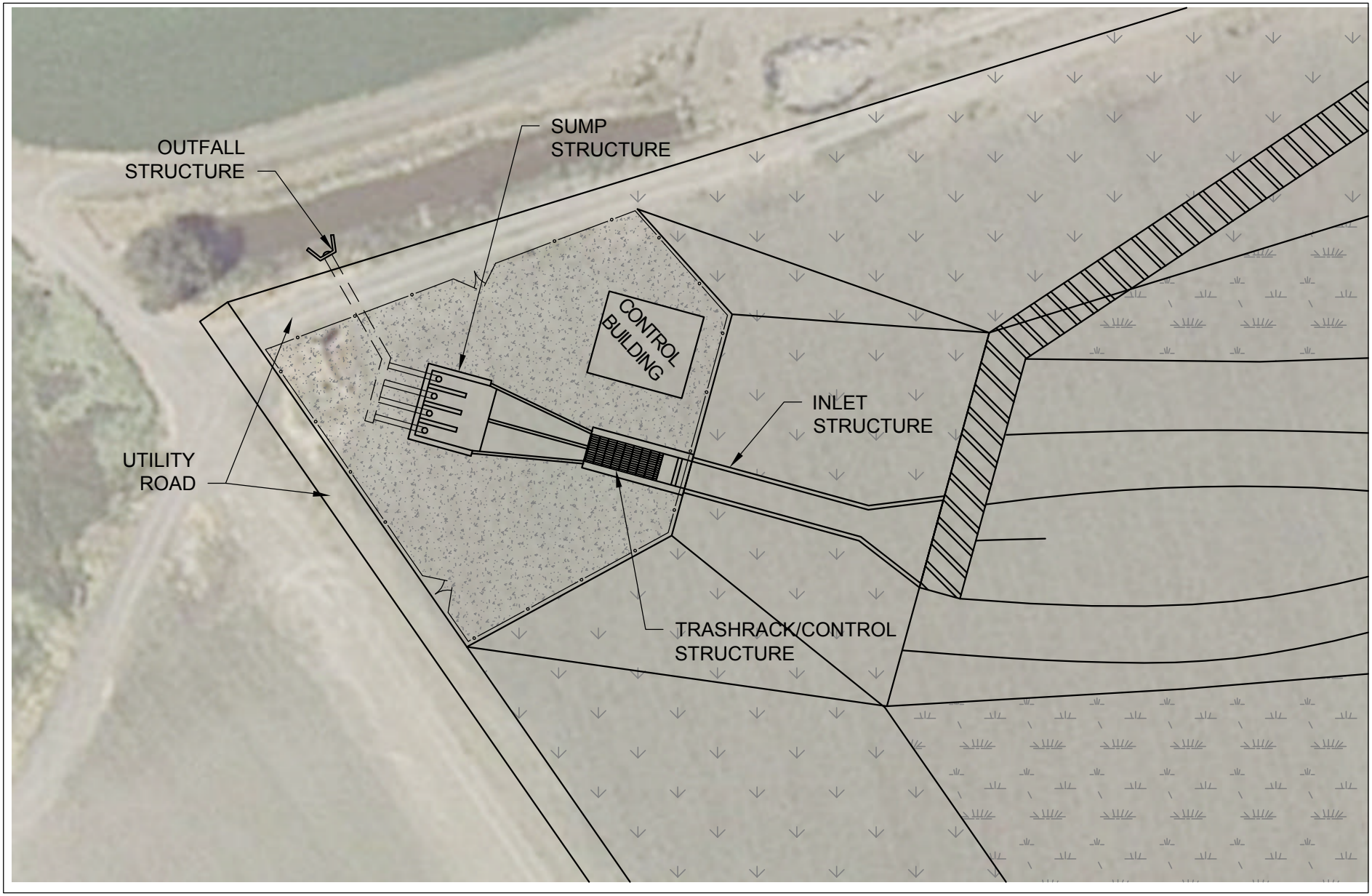
The sump structure will be located toward the center of the pump station site for easy access to the pumps and trashrack facilities. Sufficient space will be provided around the facilities for utility trucks and maintenance personnel. The concrete sump structure will be sized according to Hydraulic Institute Standards and will be described in detail in the following section.

A masonry control and generator building will be located along the side of the sump structure. The two-room building will be positioned on the site for easy access to the generator and controls.

Hydraulics and Facility Sizing

Sump & Inlet Structure: This section refers to the hydraulic design of the station and its associated appurtenances. This design is in concurrence with the City of Stockton's (City) Pump Station Design Guidelines and the Hydraulic Institute Standards. The hydraulic design of the station is based on a maximum operating flow of 50cfs. The station will consist of three 25cfs vertical turbine drainage pumps and a single 10cfs low flow submersible pump. Two of the drainage pumps will be used for draining the basin while the third will used as a backup if one of the others fails. The low flow pump will be used to maintain a dry basin by conveying nuisance flows from local runoff that enter the basin.

The station will include a concrete inlet structure from the basin to the main sump structure (See Figure 3-3). The inlet structure will consist of two concrete retaining walls that follow the side slope of the basin. The retaining walls will extend approximately six feet above the ground to remove any falling hazard that may exist. A concrete apron will extend in front of the inlet structure to an access ramp located along the basin side slope. This will allow access for O&M personnel to the waterside of the structure for debris removal or other maintenance procedures. The apron will be set at the elevation of the low flow water quality channel and will be sloped to drain into the main sump structure. The velocities though the inlet structure range from 2.5fps to 0.4fps.



DOMENICHELLI & ASSOCIATES

Domenichelli & Associates
1107 Investment Blvd. Suite 145
El Dorado Hills, CA 95762

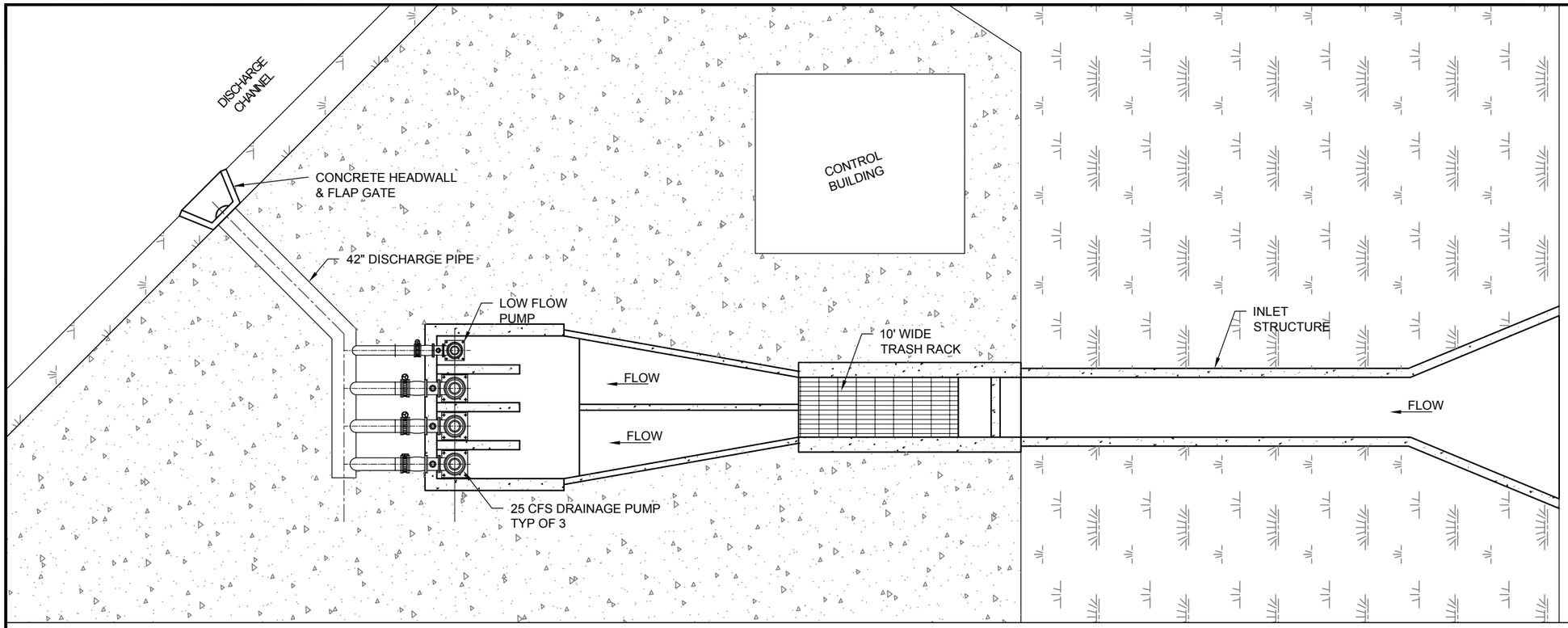
Ph: (916) 933-1997
Fax: (916) 933-4778

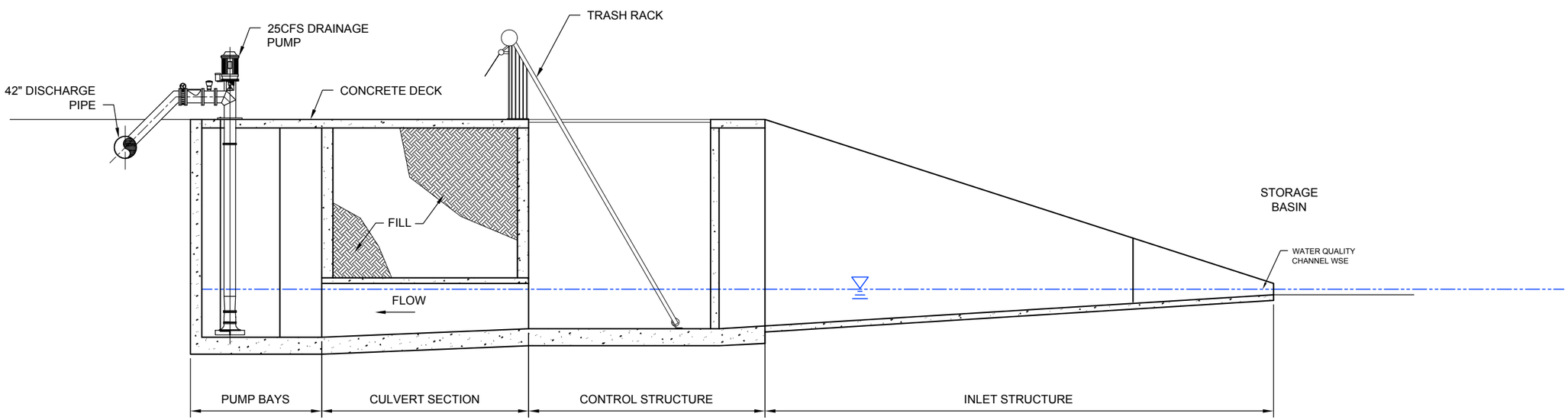
N

PUMP STATION LAYOUT

FIGURE

FIG 3-2





PUMP STATION PLAN & ELEVATION

REV	DATE	BY	DESCRIPTION

SCALE:

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

SUBMITTED
PROJECT ENGINEER R. C. E. NO. DATE
RECOMMENDED
D&A R. C. E. NO. DATE

DOMENICHELLI & ASSOCIATES
1107 Investment Blvd. Suite 145
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

Arnaiz Development Co., Inc
your complete home solution

TIDEWATER CROSSING PUMP STATION AND INTAKE STRUCUTRE

PUMP STATION PLAN AND PROFILE

SHEET
FIG 3-3
SHEET OF XX

Flow from the basin will be channeled through the inlet structure to the trashrack control structure. The control structure will house a 10-foot wide trashrack and automated sluice gate. The inlet structure will slope downward to the control structure to provide the depth necessary to meet a standard 1-fps requirement though the trashrack. The trashracks will be automated to facilitate cleaning and undisrupted flow to the pumps. The trashracks will be operated whenever the pumps are operating to maintain a clear flow path. A trash bin will be positioned on the top deck to collect debris from the trashrack. The trash bin will be designed for easy removal and disposal of debris.

From the control structure, the flow will be directed into two culvert structures conveying flow to the main pump bays. The culverts will be designed to minimize disruption in flow patterns, providing uniform flow into the pump bays. The velocities within the culverts at 50-cfs will range from 1.1 to 0.3 fps. The flow will then distribute evenly to the individual pump bays.

The individual pump bays shall be designed according to the Hydraulic Institute (HI) Standards. The Design of the main pump bays will be based on the bell diameter (D) of the vertical turbine pumps. Based on preliminary research of pumps meeting our specifications, the bell diameter will be approximately 29-inches. The table below lists the design criteria and dimensions of the bay based on the 29-inch bell diameter.

Table 3- 1. Hydraulic Institute Design Criteria

Description	HI Standard	Dimension
Pump inlet bay length (X)	X = 5.0D	145 IN
Pump inlet bay entrance width (W)	W = 2D	58 IN
Distance between the inlet bell and the floor (C)	C = 0.5D	14.5 IN
Pump Submergence (S)	$S = 1.0D+2.3[(12*0.409Q**/D^2)/12gD)^{0.5}]D$ Or Manufactures Recommendations	5.8 FT
Approach Velocity	1.5 fps, MAX	0.8 fps

Discharge Piping and Outfall Structure: The discharge piping will be located approximately 3.0 feet above grade. Each of the four pump discharge pipes will have an air release valve, rubber flap check valve and isolation valve. The discharge piping will be directed downward to a sub-grade steel manifold where flow will be combined and directed to the discharge structure. The discharge pipeline will be a 42-inch ductile iron or HDPE pipe. The velocities within the pipe during a 25cfs and 50cfs flow will be approximately 2.6 fps and 5.2 fps, respectively. An access port and a return pipe from the steel manifold to the sump will be included for inspection and to allow flushing the manifold.

The 42-inch pipeline will discharge to an outfall structure within FCS. The outfall structure will consist of a headwall and 42-inch flap gate. The channel area near the outfall will be lined with rock to prevent bank erosion during times of discharge.

Station Power

The pump station will be connected to the neighboring PG&E power grid. A transformer will be located on-site for this connection. An emergency generator will be located on-site in case of a power failure at the pump station. The generator and control panel will be housed within the masonry control building.

To facilitate noise control at the site, the generator exhaust fan and louver wall penetration will be faced toward the basin. Sound attenuating wall panels will also be included to assist in limiting noise from the generator.

The generator's diesel fuel cell will be located outside of the building. The fuel cell will have double containment and will be designed for impact loads. If required, a fuel circulation system will be included within the generator room.

Diversion Weir and Gate Structure

The diversion weir from FCS to the detention basin will be located along the east bank of the channel. The diversion structure will consist of 960' lateral weir with two 12ft x 3ft radial gates and a spillway and energy dissipation structure within the basin (See Figure 3-4). The gates are included in the design to add flexibility to the basin diversion, providing added protection in case of unexpected problems further downstream with the levees such as floating debris against bridges or other unforeseen event which would have the potential to cause flooding. Diversion of the design storm is provided solely by the weir in the hydraulic analysis; the gates can be used to divert additional flow. The radial gates are recommended to be electrically powered and controlled by a manual switch in the pump station control room.

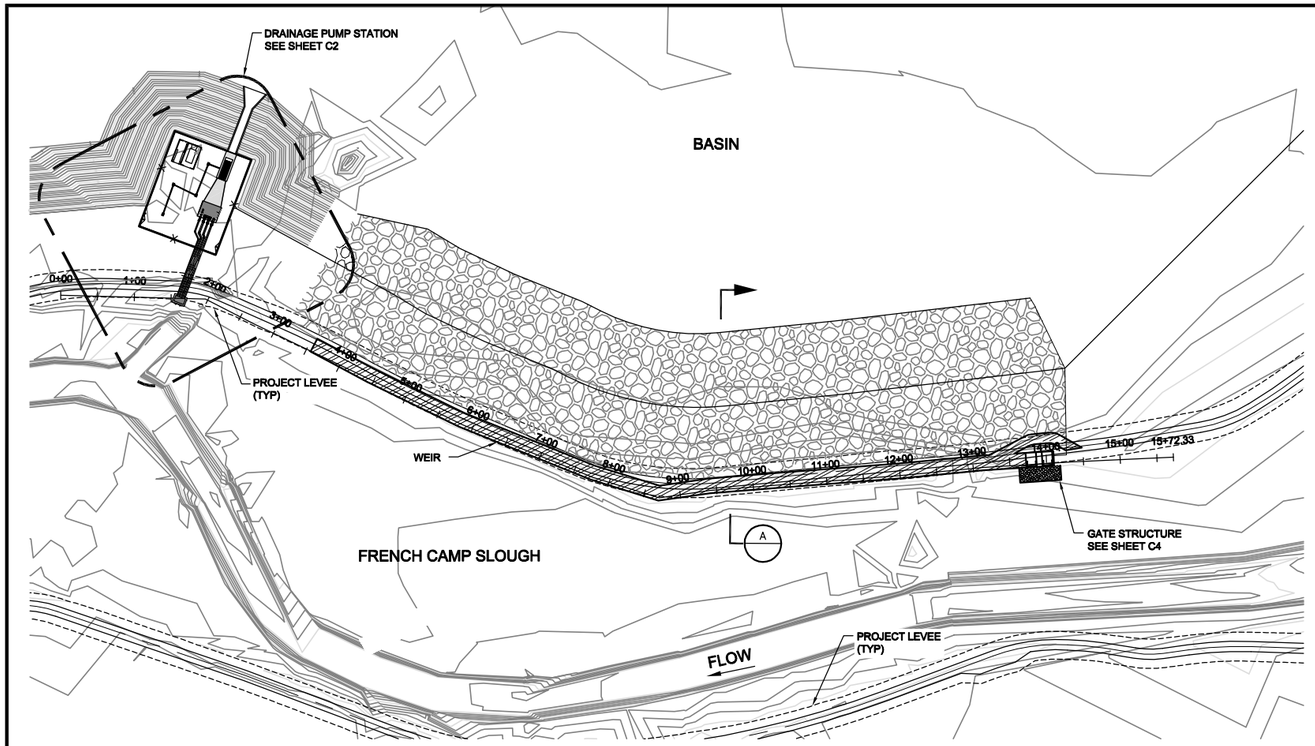
Spillway and Energy Dissipation Structure

From the lateral weir, the flow over the weir is proposed to sheet down the inside of the basin slope, which will be armored against the erosive potential of the flow using rock and geotextiles. The flow through the gates is estimated to be 500 cfs max and will be contained in a concrete spillway down the slope into the basin. The spillway will be concrete lined and will conform to the 3:1 side slopes of the basin. Curbs will be constructed along the edge of the spillway to contain flow spilling into the basin. Rock will be placed along both sides of the spillway to provide additional erosion protection.

At the base of the spillway, an energy dissipation structure will be constructed to slow the water before entering the basin. This structure will likely consist of concrete blocks placed in a scattered pattern to disrupt flow as it reaches the bottom of the basin. Rock will be placed beyond the energy dissipater to further assist in reducing velocities entering the basin. This will be a crucial component to prevent erosion of the basin at this location.

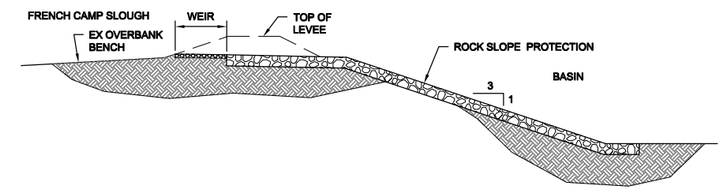
Alarm/Warning System

Because of the large size of the storage facility, the conceptual idea of using the basin for playing fields has been discussed. If the basin is used for this purpose, it is recommended that a warning or alarm system be installed to sound when the water level in French Camp Slough is near spilling over the weir, or if the gates are to be opened. This may include installing alarms along the perimeter of the basin that work on a time delay allowing time for pedestrians to vacate. If the basin is designed as a multi-use facility, a lower section near the diversion structure and pump station will be provided, where the initial flush from the diversion structure can pond. This will allow additional time to vacate the basin.



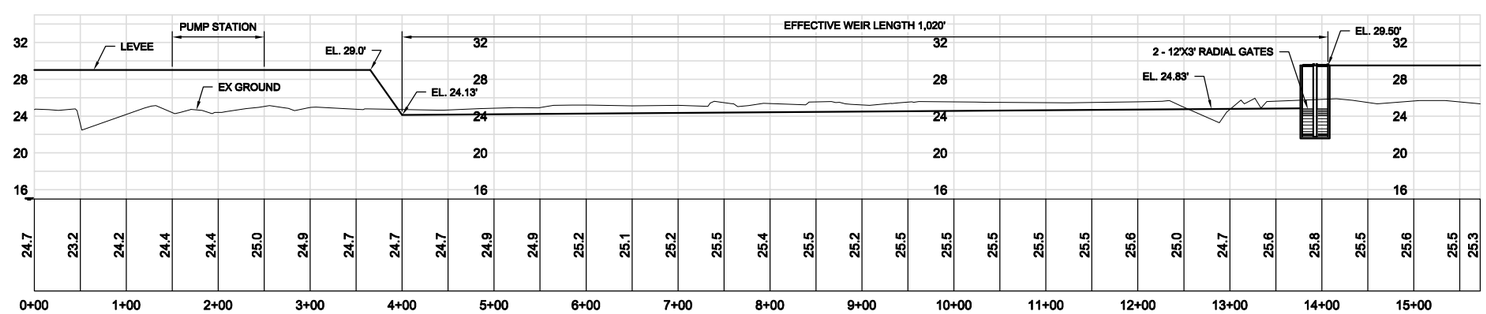
PLAN VIEW - WEIR & GATE STRUCTURE

SCALE 1"=100'



SECTION A - WEIR & SLOPE PROTECTION

NTS



PROFILE - WEIR & GATE STRUCTURE

SCALE 1"=80'

REV	DATE	BY	DESCRIPTION

SCALE:

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

SUBMITTED
PROJECT ENGINEER R. C. E. NO. DATE
RECOMMENDED
D&A R. C. E. NO. DATE

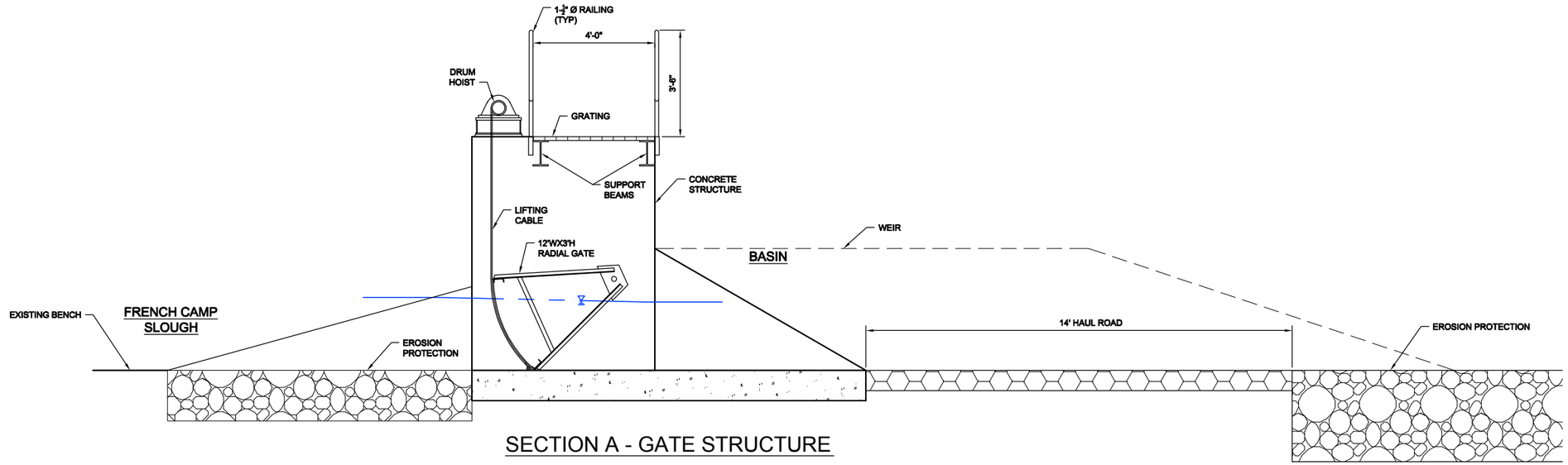
DOMENICHELLI & ASSOCIATES
1107 Investment Blvd. Suite 145
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

TIDEWATER CROSSING PUMP STATION AND INTAKE STRUCUTRE

FIGURE 3-4A - WEIR
PLAN & PROFILE

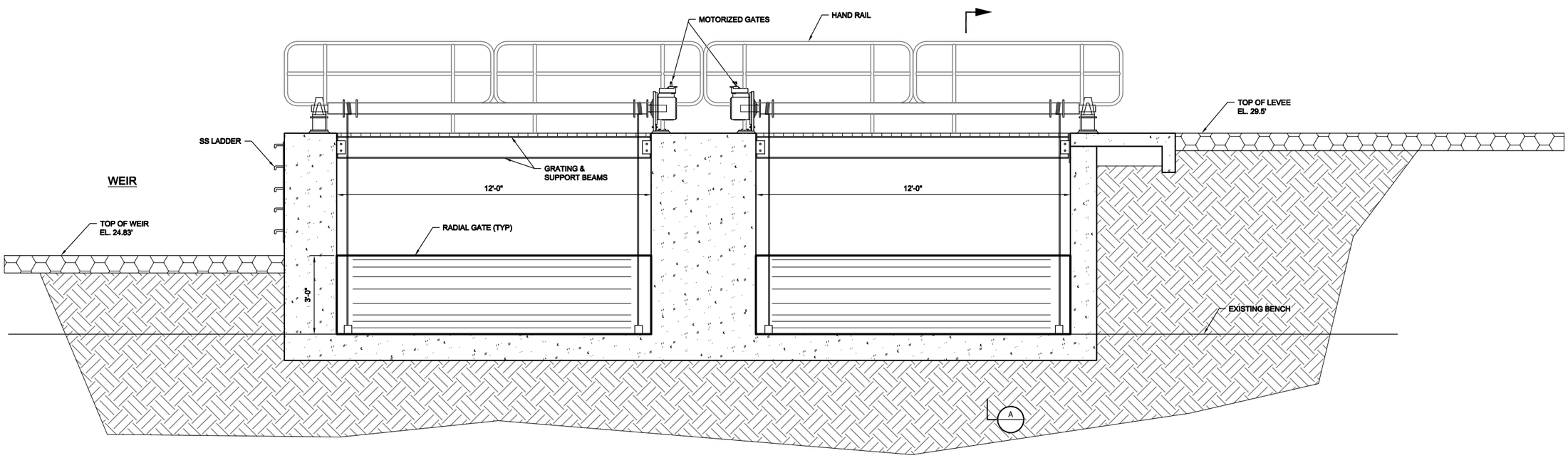
SHEET

SHEET 7 OF XX



SECTION A - GATE STRUCTURE

NTS



FRONT VIEW - GATE STRUCTURE

NTS

REV	DATE	BY	DESCRIPTION

SCALE:

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

SUBMITTED
PROJECT ENGINEER R. C. E. NO. DATE
RECOMMENDED
D&A R. C. E. NO. DATE

DOMENICHELLI & ASSOCIATES
1107 Investment Blvd. Suite 145
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

TIDEWATER CROSSING PUMP STATION AND INTAKE STRUCUTRE

FIGURE 3-4B
RADIAL GATE STRUCTURE

SHEET
C6
SHEET 7 OF XX

Weber Slough Diversion and Channel

The Weber Slough diversion will divert up to approximately 200cfs from the existing Weber Slough channel to the proposed detention basin. The first component of the diversion is a weir on the left bank of the channel to take excess flow from the channel to a side channel. The weir will be a slightly lower left bank (1 foot) for approximately 500 feet with a parallel collection channel. The collection channel will then diverge off of the Weber Slough alignment to the detention basin. The channel can be grass or concrete lined and will be approximately 30 to 40 feet wide at the top and 4 to 6 feet deep if grass lined. If concrete lined, the channel can be as narrow as 20 feet wide with vertical walls, and can be covered as a box culvert if desired.

The other improvement for Weber Slough will be upsizing the existing culvert at the National Guard driveway near Airport Way. The existing pipe culvert will be replaced by a double 5-foot high by 7-foot wide box culvert.

APPENDIX A

HYDROLOGY

Appendix A - Hydrology

Appendix A Tables and Figures

Figure A-1. Overall Watershed

Figure A-2. Lower Watershed

Figure A-3. Composite FEMA FIRM Panels

Figure A-4. FEMA Floodplain at Project Site and Revised FIRM

Figure A-5. San Joaquin County Multi-Day 100-yr Rainfall for 14-30" Isohyets

Figure A-6. Composite Soils Map

Figure A-7. HEC-HMS Basin Schematic Existing Conditions

Figure A-8. HEC-HMS Basin Schematic Proposed Conditions

Figure A-9. Existing and Proposed 100-yr Hydrograph, French Camp Slough at El Dorado St

Figure A-10. 100-yr Hydrograph at Detention Basin Lateral Weir

Figure A-11. Proposed Weber Diversion and Inflow to Detention Basin

Figure A-12. Industrial Development Inflow to Detention Basin 100-yr Hydrograph

Figure A-13. 100-yr Hydrographs at Highway 99

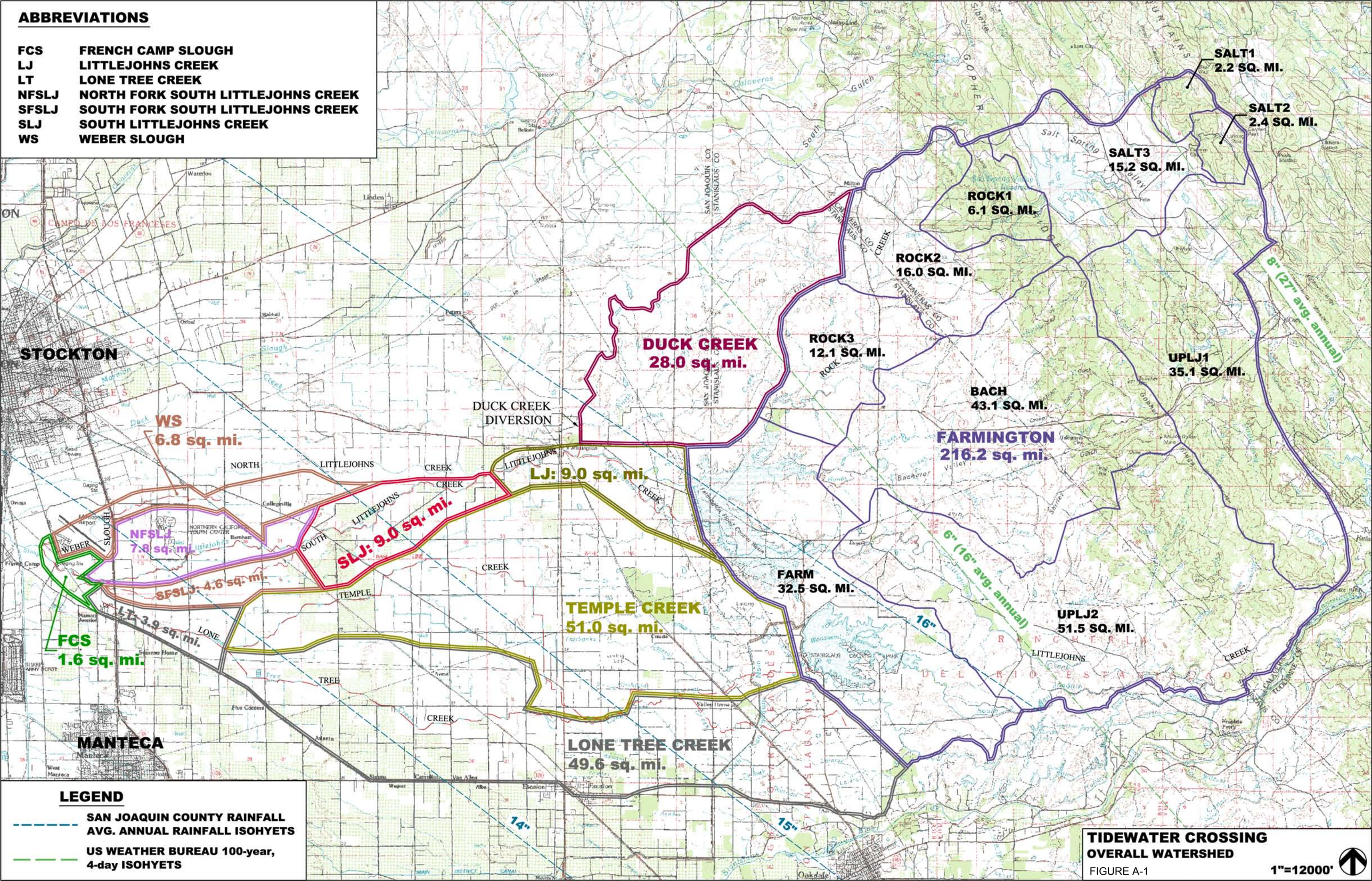
Figure A-14. 100-yr Hydrograph at Lone Tree Creek West of Highway 99

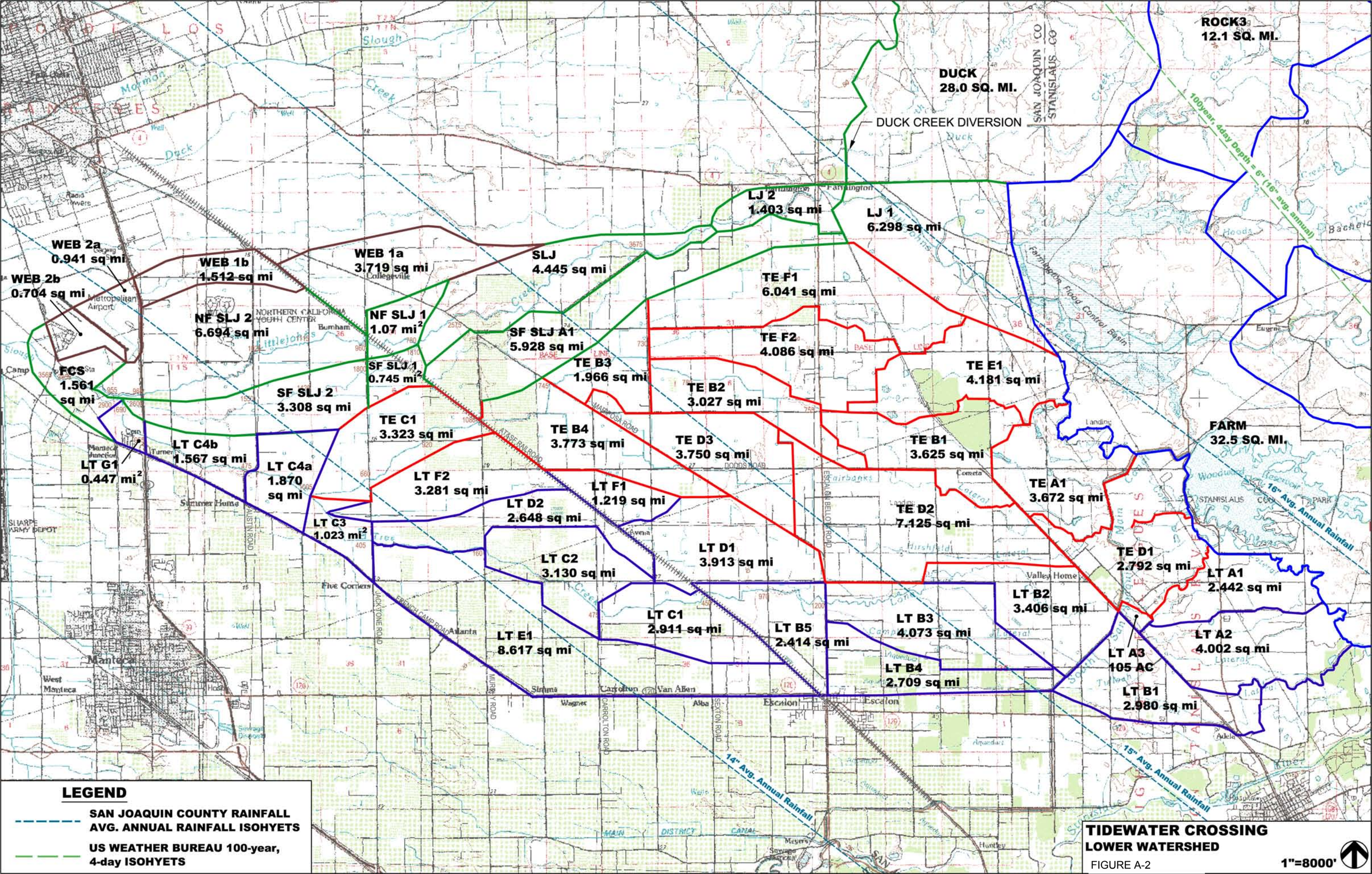
Table A-1. Summary of isolated areas used in hydrologic model

Table A-2. Summary of storage areas used in hydrologic model

Table A-3. Weighted Curve Numbers Calculations

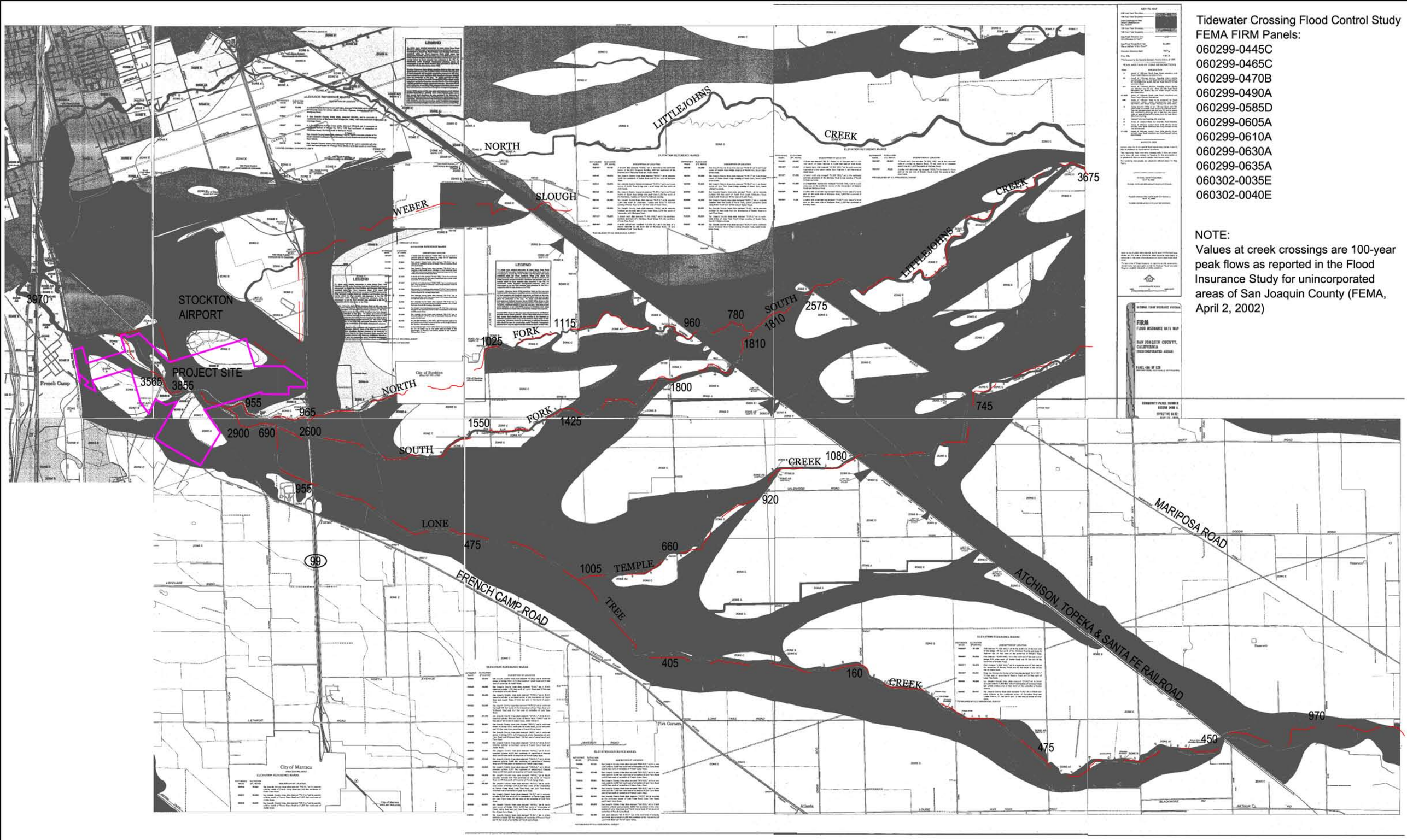
Table A-4. Lag Time Calculations


ABBREVIATIONS
FCS FRENCH CAMP SLOUGH
LJ LITTLEJOHNS CREEK
LT LONE TREE CREEK
NFSLJ NORTH FORK SOUTH LITTLEJOHNS CREEK
SFSLJ SOUTH FORK SOUTH LITTLEJOHNS CREEK
SLJ SOUTH LITTLEJOHNS CREEK
WS WEBER SLOUGH
SALT1
2.2 SQ. MI.
SALT2
2.4 SQ. MI.
SALT3
15.2 SQ. MI.
ROCK1
6.1 SQ. MI.
ROCK2
16.0 SQ. MI.
ROCK3
12.1 SQ. MI.
DUCK CREEK
28.0 sq. mi.
UPLJ1
35.1 SQ. MI.
BACH
43.1 SQ. MI.
FARMINGTON
216.2 sq. mi.
8" (27" avg. annual)
6" (16" avg. annual)
DUCK CREEK
DIVERSION
WS
6.8 sq. mi.
LJ: 9.0 sq. mi.
SLJ: 9.0 sq. mi.
NFSLJ
7.8 sq. mi.
SFSLJ: 4.6 sq. mi.
LT: 3.9 sq. mi.
FCS
1.6 sq. mi.
FARM
32.5 SQ. MI.
TEMPLE CREEK
51.0 sq. mi.
UPLJ2
51.5 SQ. MI.
LONE TREE CREEK
49.6 sq. mi.
STOCKTON
MANTECA
16"
15"
14"
LEGEND
SAN JOAQUIN COUNTY RAINFALL AVG. ANNUAL RAINFALL ISOHYETS
US WEATHER BUREAU 100-year, 4-day ISOHYETS
TIDEWATER CROSSING
OVERALL WATERSHED
FIGURE A-1
1"=12000'

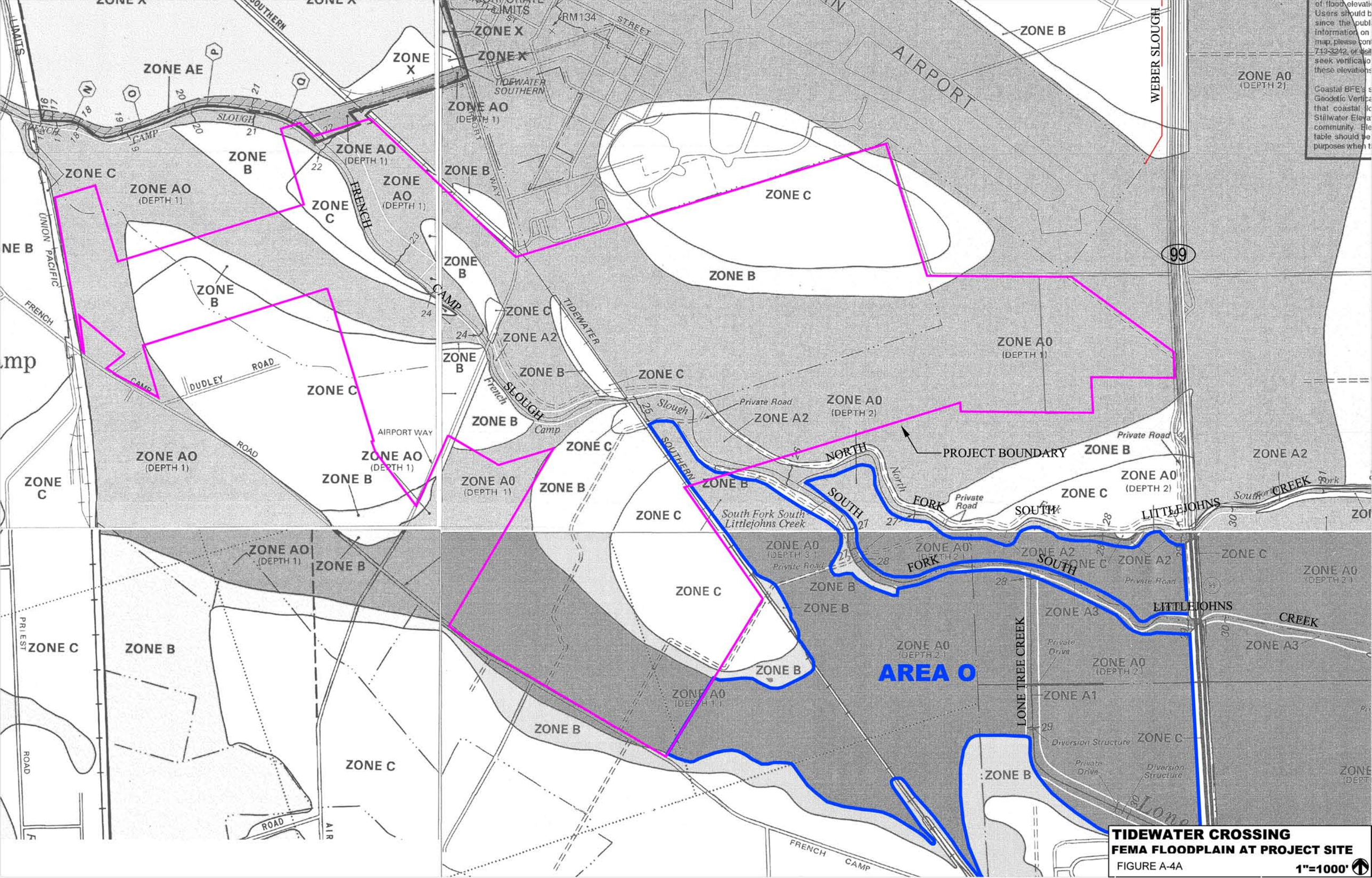

ROCK3
12.1 SQ. MI.
DUCK
28.0 SQ. MI.
DUCK CREEK DIVERSION
SAN JOAQUIN CO
STANISLAUS CO
100year, 4day Depth = 6" (16" avg. annual)
LJ 2
1.403 sq mi
LJ 1
6.298 sq mi
WEB 2a
0.941 sq mi
WEB 2b
0.704 sq mi
WEB 1b
1.512 sq mi
WEB 1a
3.719 sq mi
SLJ
4.445 sq mi
TE F1
6.041 sq mi
NF SLJ 2
6.694 sq mi
NF SLJ 1
1.07 mi²
SF SLJ A1
5.928 sq mi
TE F2
4.086 sq mi
FCS
1.561
sq mi
SF SLJ 1
0.745 mi²
TE B3
1.966 sq mi
TE E1
4.181 sq mi
SF SLJ 2
3.308 sq mi
TE B2
3.027 sq mi
TE C1
3.323 sq mi
TE B4
3.773 sq mi
TE D3
3.750 sq mi
FARM
32.5 SQ. MI.
LT C4b
1.567 sq mi
TE B1
3.625 sq mi
LT G1
0.447 mi²
LT C4a
1.870
sq mi
LT F2
3.281 sq mi
LT F1
1.219 sq mi
TE A1
3.672 sq mi
LT D2
2.648 sq mi
TE D2
7.125 sq mi
LT C3
1.023 mi²
LT D1
3.913 sq mi
TE D1
2.792 sq mi
LT C2
3.130 sq mi
LT A1
2.442 sq mi
LT B2
3.406 sq mi
LT C1
2.911 sq mi
LT B3
4.073 sq mi
LT B5
2.414 sq mi
LT A2
4.002 sq mi
LT E1
8.617 sq mi
LT A3
105 AC
LT B4
2.709 sq mi
LT B1
2.980 sq mi
16" Avg. Annual Rainfall
15" Avg. Annual Rainfall
14" Avg. Annual Rainfall
LEGEND
SAN JOAQUIN COUNTY RAINFALL AVG. ANNUAL RAINFALL ISOHYETS
US WEATHER BUREAU 100-year, 4-day ISOHYETS
TIDEWATER CROSSING
LOWER WATERSHED
FIGURE A-2
1"=8000'

Tidewater Crossing Flood Control Study
FEMA FIRM Panels:
060299-0445C
060299-0465C
060299-0470B
060299-0490A
060299-0585D
060299-0605A
060299-0610A
060299-0630A
060299-0635A
060302-0035E
060302-0040E

NOTE:
Values at creek crossings are 100-year peak flows as reported in the Flood Insurance Study for unincorporated areas of San Joaquin County (FEMA, April 2, 2002)



TIDEWATER CROSSING
COMPOSITE FEMA FIRM PANELS
FIGURE A-3
1"=5000'


ZONE X
ZONE AE
ZONE X
ZONE AO
(DEPTH 1)
ZONE B
ZONE C
ZONE AO
(DEPTH 1)
ZONE C
ZONE B
ZONE C
ZONE AO
(DEPTH 1)
ZONE B
ZONE C
ZONE AO
(DEPTH 1)
ZONE B
ZONE C
ZONE AO
(DEPTH 1)
ZONE B
ZONE C
ZONE AO
(DEPTH 1)
ZONE B
ZONE C
ZONE B
ZONE C
ZONE A2
ZONE B
ZONE C
ZONE B
ZONE A0
(DEPTH 1)
ZONE C
ZONE B
ZONE C
ZONE B
ZONE C
ZONE B
ZONE A0
(DEPTH 1)
ZONE A0
(DEPTH 2)
ZONE A2
ZONE A0
(DEPTH 2)
ZONE B
ZONE A2
ZONE C
ZONE A0
(DEPTH 2)
ZONE A0
(DEPTH 3)
ZONE A0
(DEPTH 2)
ZONE A2
ZONE C
ZONE A2
ZONE A0
(DEPTH 2)
ZONE B
ZONE B
ZONE A3
ZONE A3
ZONE A0
(DEPTH 2)
ZONE B
ZONE A0
(DEPTH 2)
ZONE A1
ZONE C
ZONE B
ZONE B
ZONE C
ZONE B
ZONE C
AREA O
PROJECT BOUNDARY
WEBER SLOUGH
ZONE A0
(DEPTH 2)
ZONE B
AIRPORT
99
TIDEWATER SOUTHERN
TIDEWATER
FRENCH CAMP SLOUGH
DUDLEY ROAD
AIRPORT WAY
UNION PACIFIC
SOUTHERN
STREET
WAY
RM134
Private Road
Private Drive
Diversion Structure
South Fork South Littlejohns Creek
NORTH FORK
SOUTH FORK
LITTLEJOHNS CREEK
LONE TREE CREEK
PRIEST ROAD
FRENCH CAMP ROAD
LIMITS
TIDEWATER CROSSING
FEMA FLOODPLAIN AT PROJECT SITE
FIGURE A-4A
1"=1000'

that coastal flood
Stillwater Elevation
community. Elevat
table should be us
purposes when they

ZONE AO
(DEPTH 1)

ZONE B

ZONE C

FRENCH

SLOUGH

WEBER SLOUGH

ZONE B

ZONE C

ZONE B

30.66 LOW SPOT

ZONE B

CAMP

ZONE B

DUDLEY ROAD

ZONE C

French SLOUGH

ZONE B

AIRPORT WAY

ZONE AO
(DEPTH 1)

ZONE B

ROAD

ZONE C

ZONE B

ZONE C

ZONE C

ZONE B

ZONE B

NORTH

SOUTH

FORK

Private Road

ZONE A2

ZONE B

ZONE A0
(DEPTH 2)

ZONE C

SOUTH

LITTLEJOHNS

CREEK

ZONE A0
(DEPTH 2)

ZONE A2

ZONE C

ZONE A2

ZONE C

ZONE C

ZONE A0
(DEPTH 2)

LITTLEJOHNS

CREEK

ZONE A3

ZONE B

ZONE C

ZONE B

ZONE B

ZONE B

LONE TREE CREEK

FRENCH CAMP

Legend

- Project Boundary
- Area removed from FEMA 100-year flood plain by project improvements (Existing Zone A to be remapped as Zone B)
- Offsite area to north removed from flood plain by combination of project and previous improvements to Weber Slough

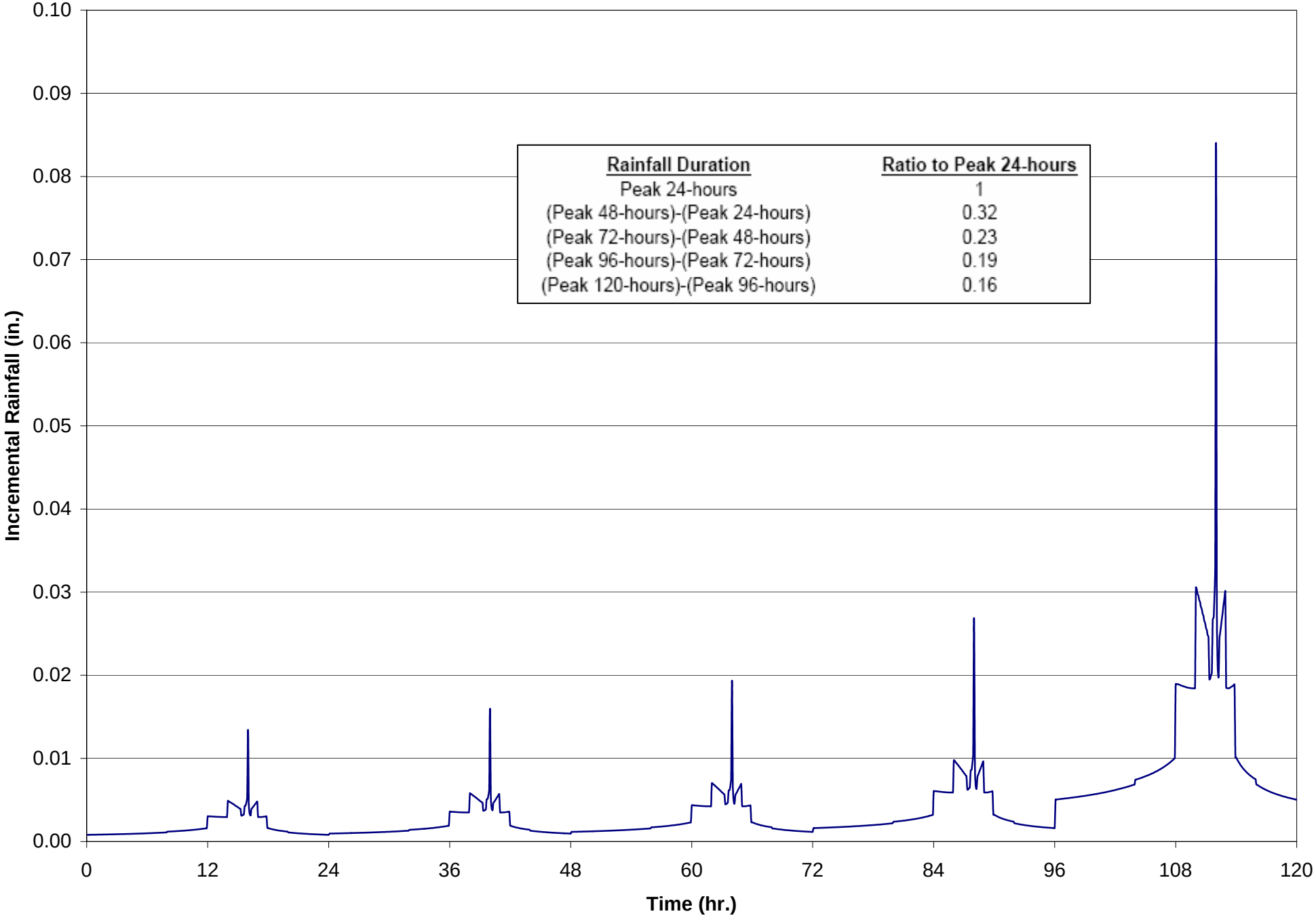
ARNAIZ COMPANIES

TIDEWATER CROSSING
STOCKTON, CA

FIGURE A4-B:
REVISED FIRM MAP

1"=1000'

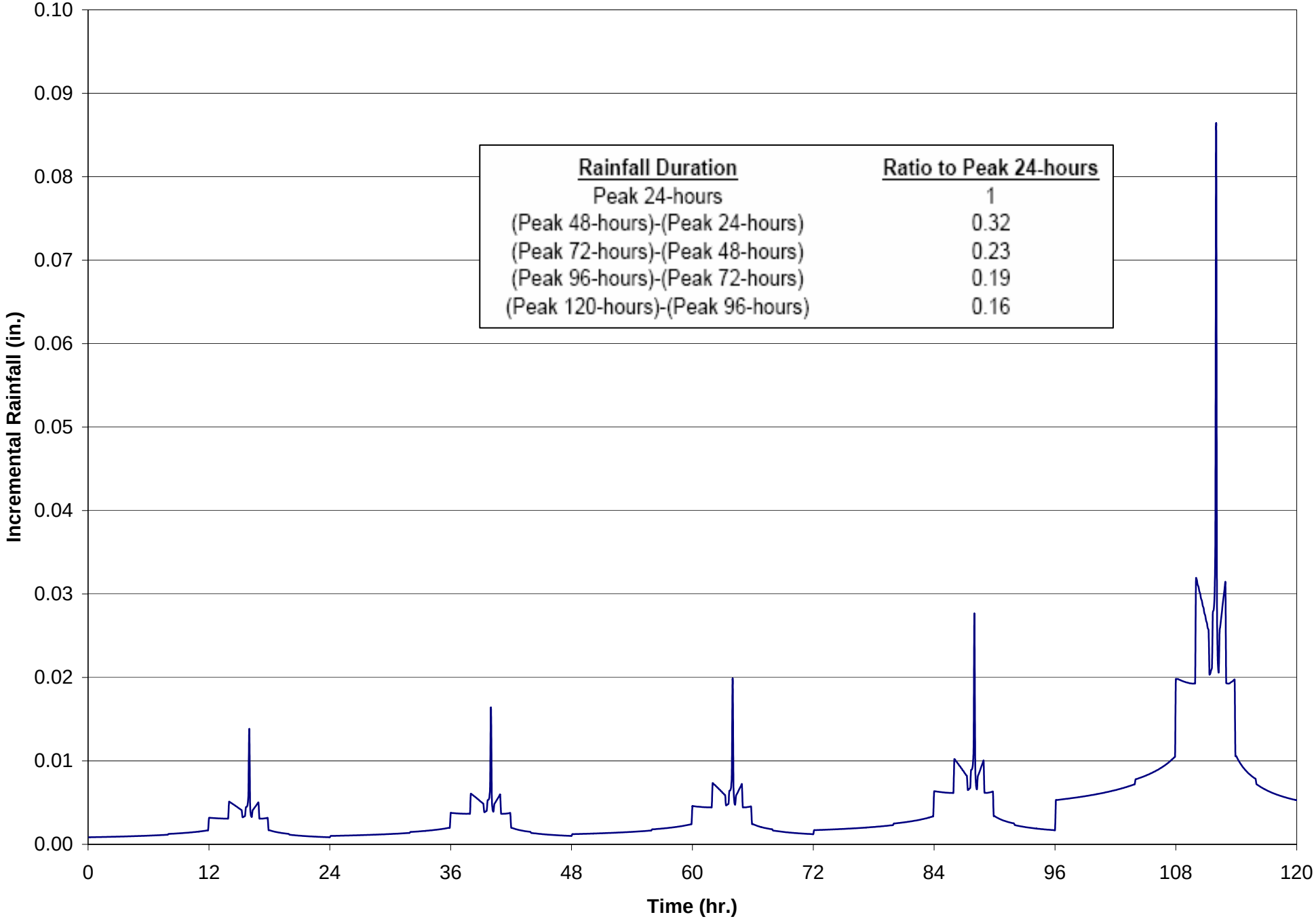
San Joaquin County Multi-Day 100-yr Rainfall
14" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

FIGURE A-5A

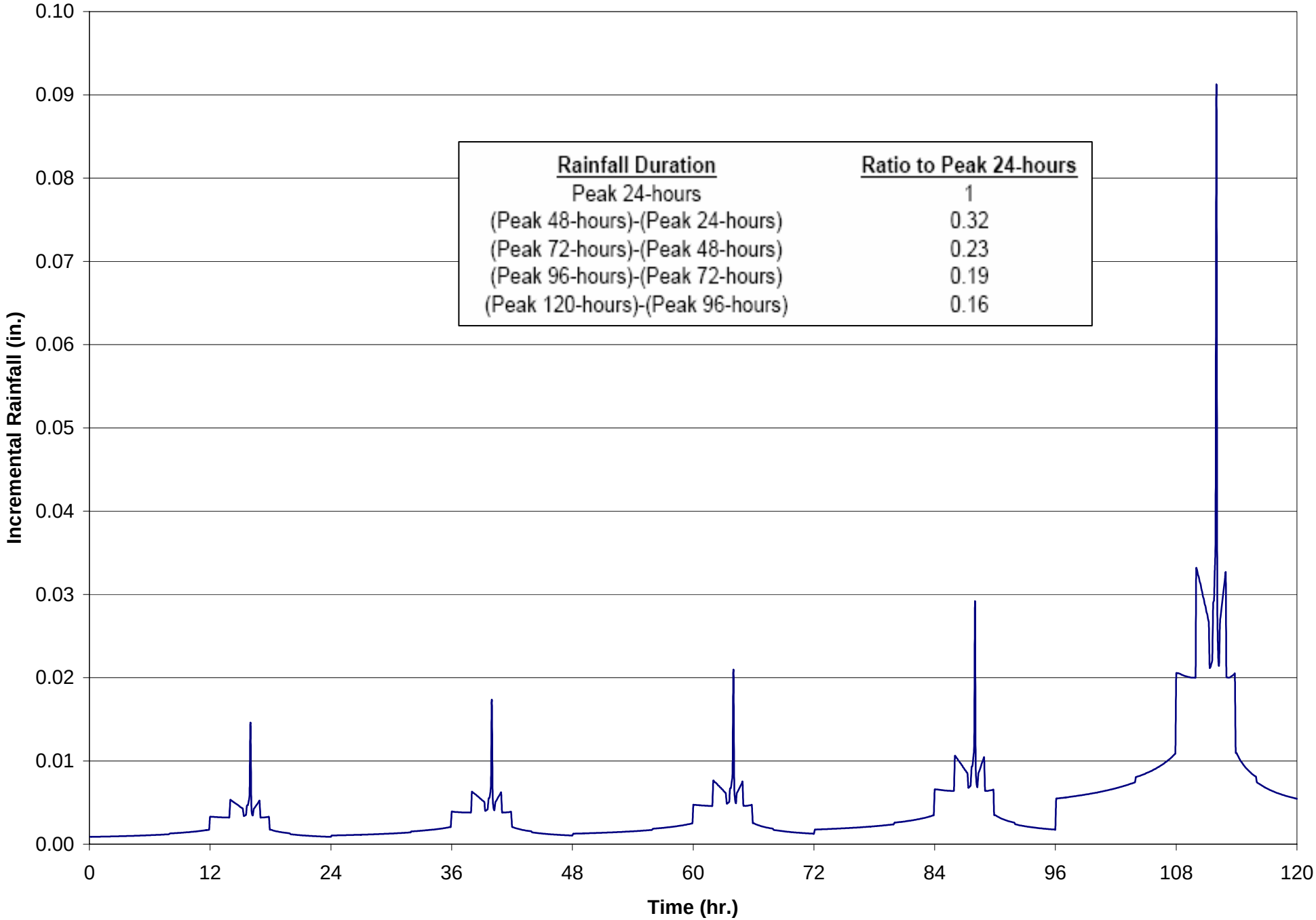
San Joaquin County Multi-Day 100-yr Rainfall
15" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

FIGURE A-5B

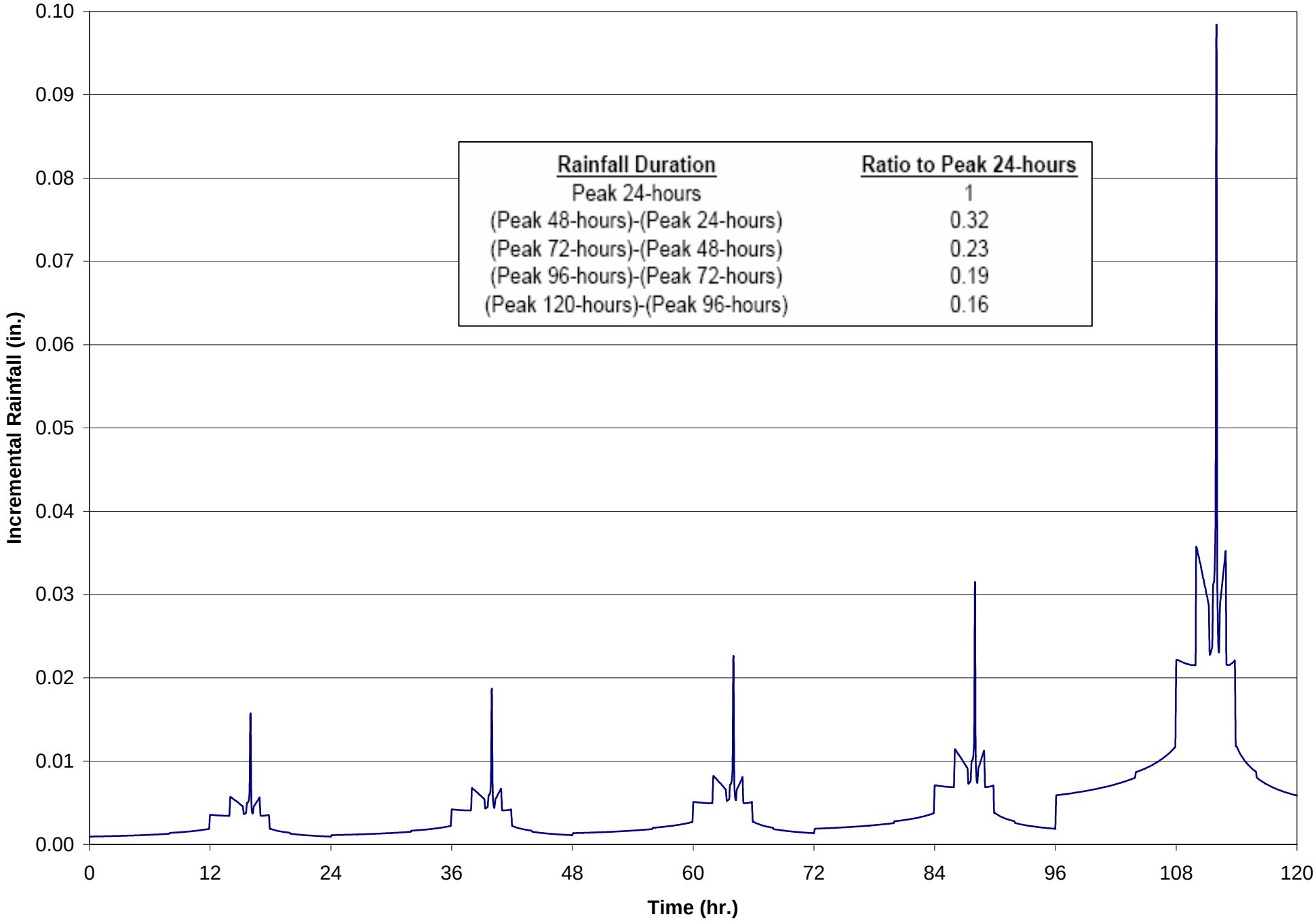
San Joaquin County Multi-Day 100-yr Rainfall
16" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

FIGURE A-5C

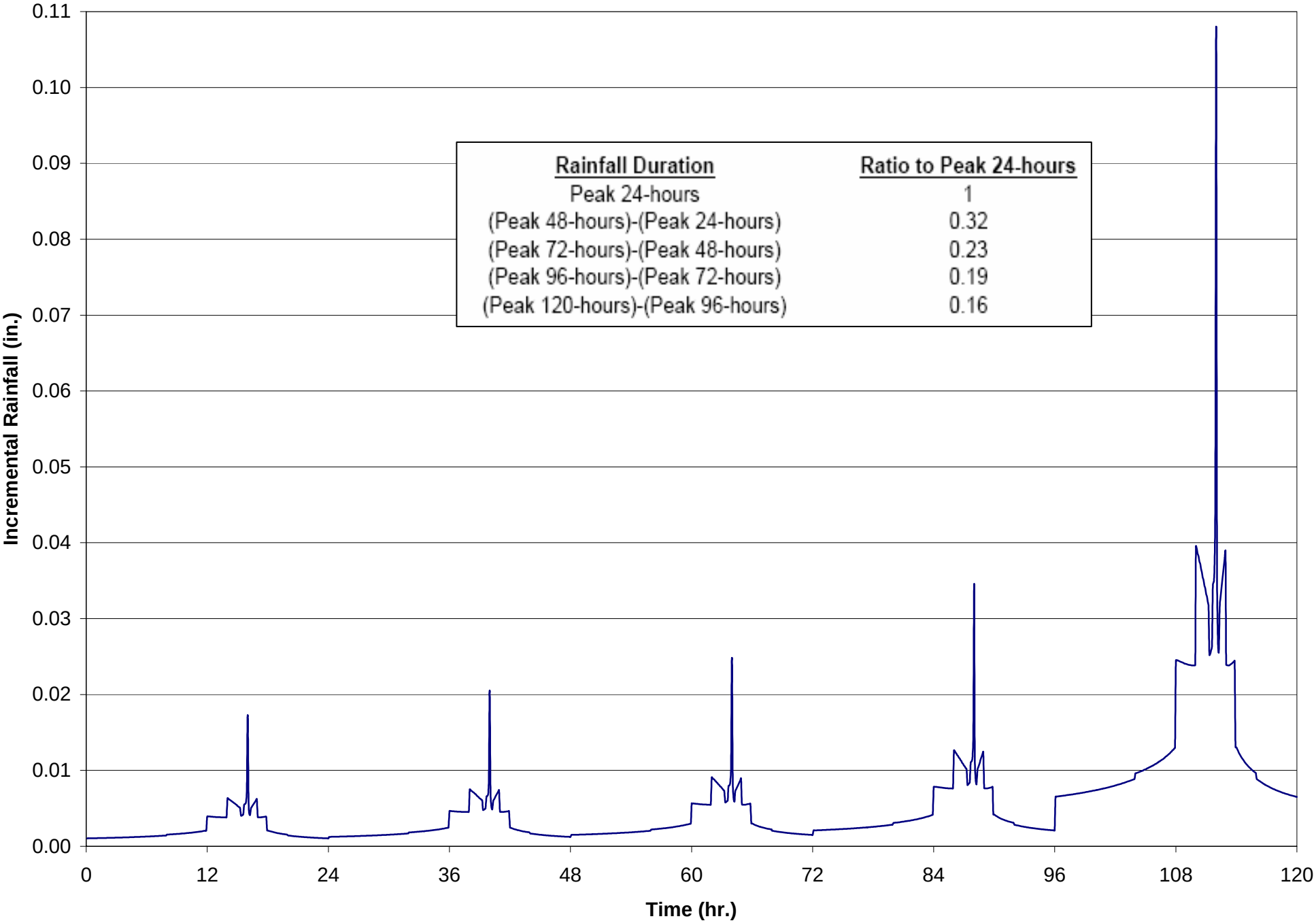
San Joaquin County Multi-Day 100-yr Rainfall
18" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

FIGURE A-5D

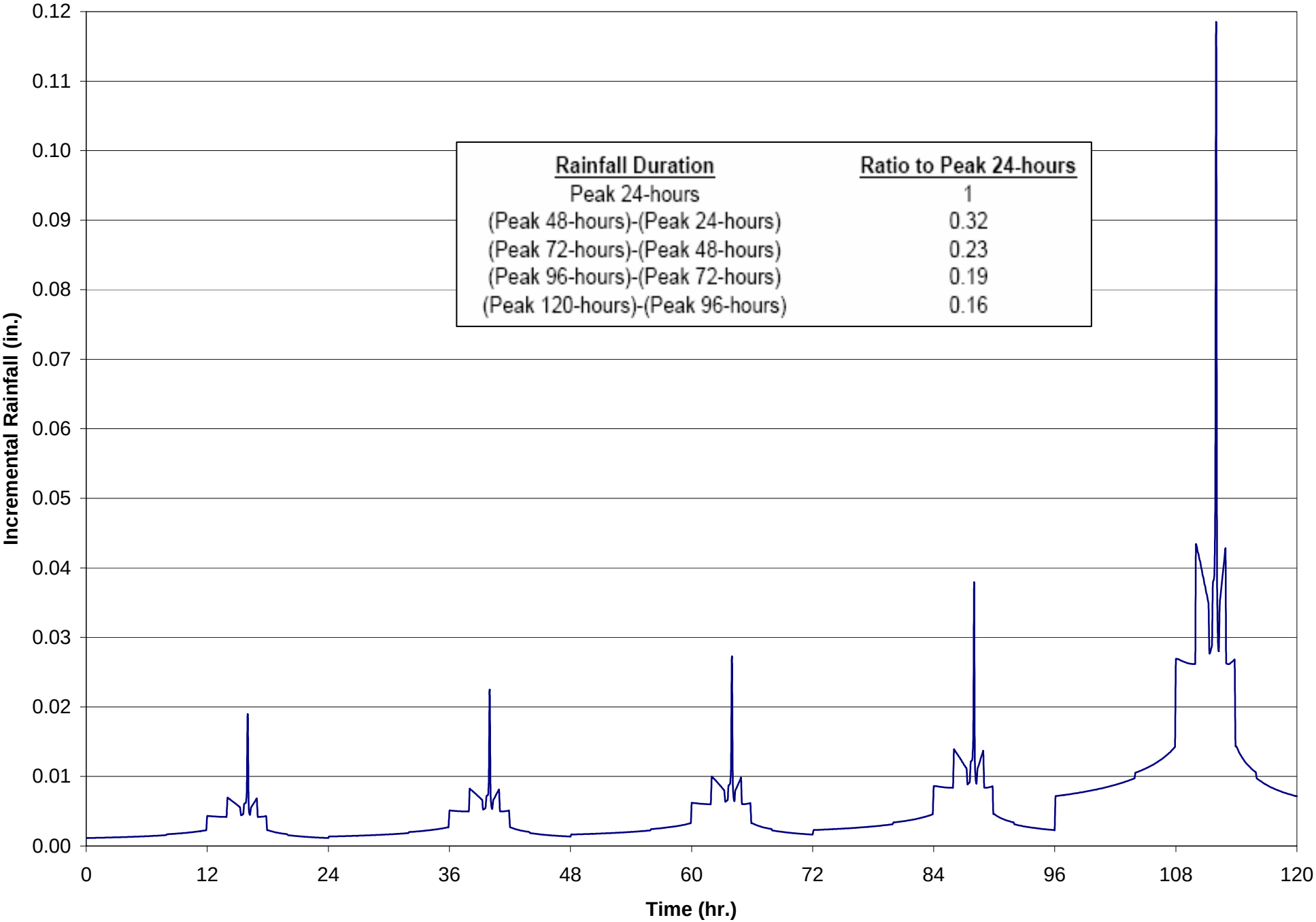
San Joaquin County Multi-Day 100-yr Rainfall
21" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

FIGURE A-5E

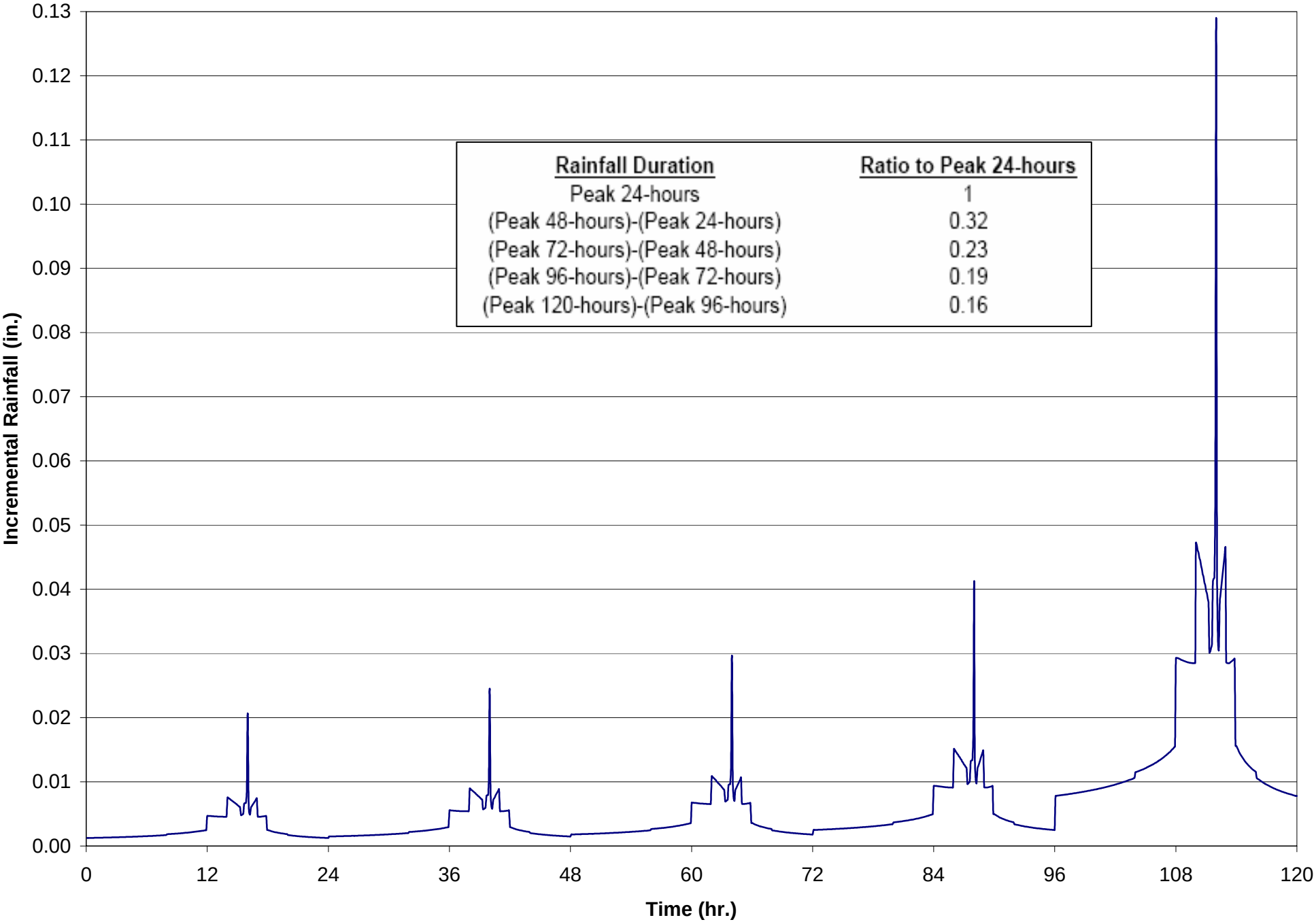
San Joaquin County Multi-Day 100-yr Rainfall
24" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

FIGURE A-5F

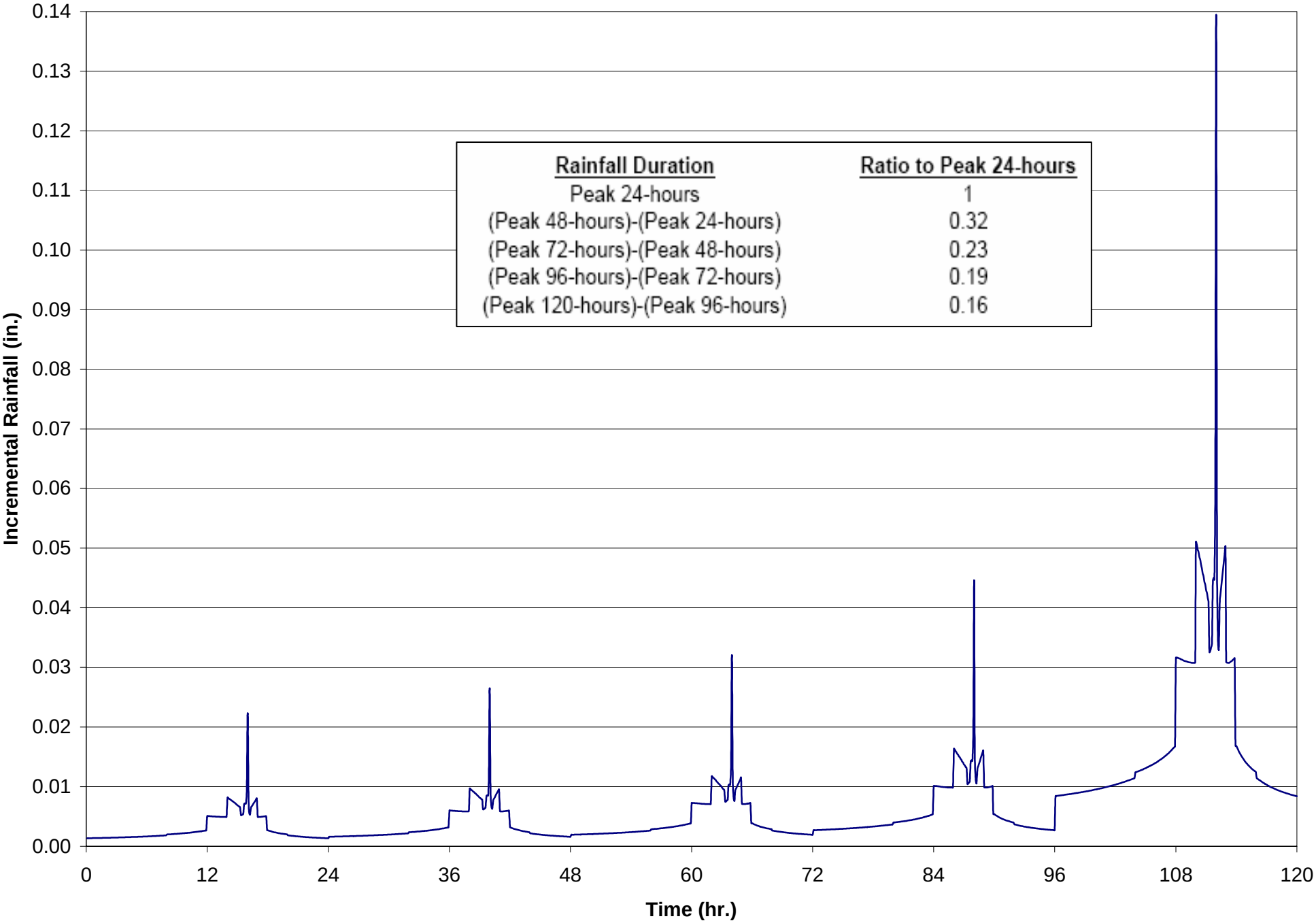
San Joaquin County Multi-Day 100-yr Rainfall
27" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

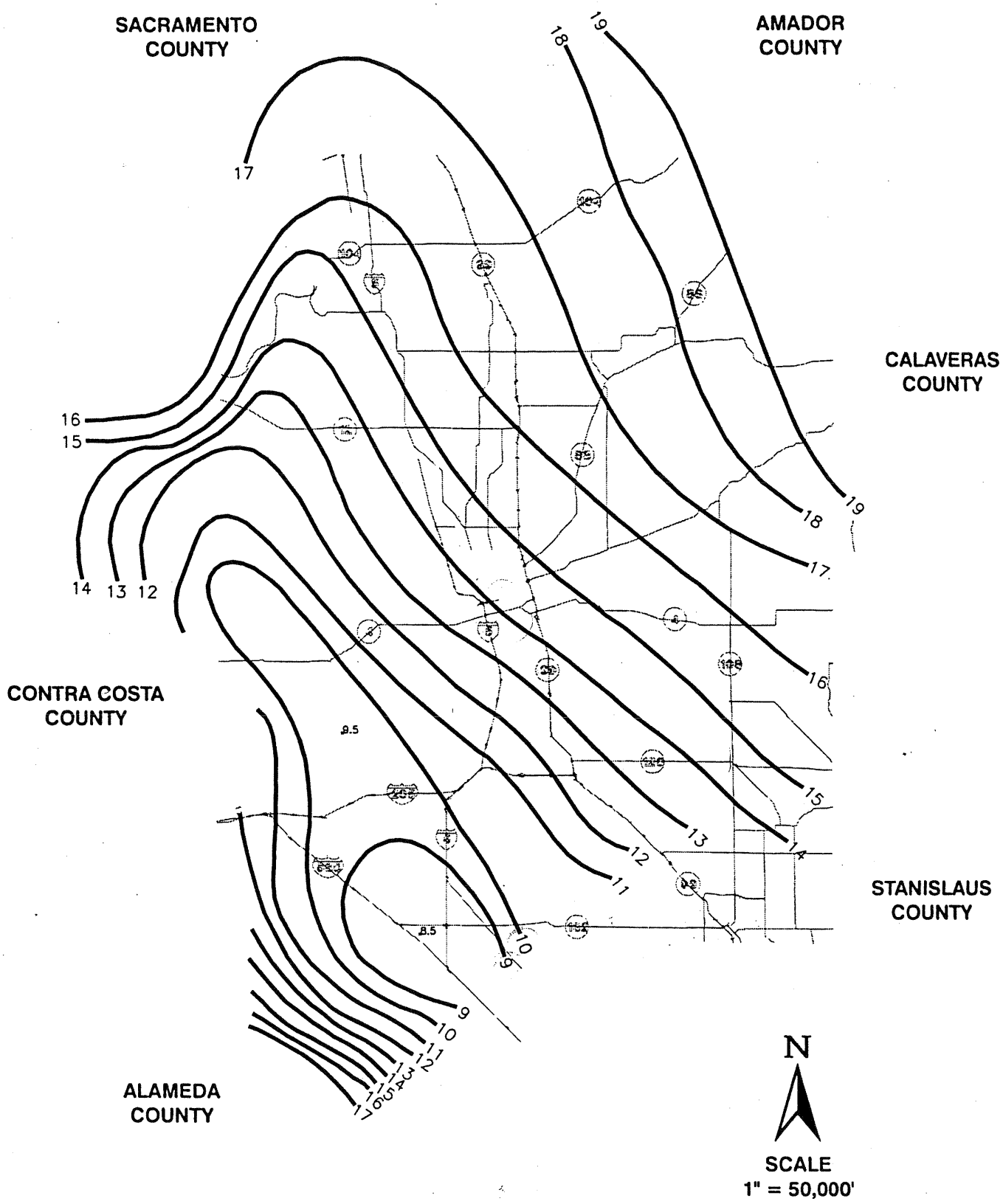
FIGURE A-5G

San Joaquin County Multi-Day 100-yr Rainfall
30" Isohyet



Rainfall Duration	Ratio to Peak 24-hours
Peak 24-hours	1
(Peak 48-hours)-(Peak 24-hours)	0.32
(Peak 72-hours)-(Peak 48-hours)	0.23
(Peak 96-hours)-(Peak 72-hours)	0.19
(Peak 120-hours)-(Peak 96-hours)	0.16

FIGURE A-5H



SAN JOAQUIN COUNTY
HYDROLOGY MANUAL

ISOHYETAL RAINFALL MAP

FIGURE A-5I

TABLE B.7

100-YEAR DEPTH-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

100-year DEPTH-DURATION-FREQUENCY

K = 3.087

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	0.28	0.36	0.43	0.56	0.75	0.98	1.16	1.53	2.02	2.66
10	0.29	0.38	0.45	0.59	0.78	1.04	1.22	1.61	2.12	2.80
11	0.30	0.40	0.47	0.62	0.82	1.09	1.28	1.69	2.23	2.94
12	0.32	0.42	0.50	0.65	0.86	1.14	1.34	1.77	2.34	3.08
13	0.33	0.44	0.52	0.68	0.90	1.19	1.40	1.85	2.44	3.22
14	0.35	0.46	0.54	0.71	0.94	1.24	1.46	1.93	2.55	3.36
15	0.36	0.48	0.56	0.74	0.98	1.30	1.52	2.01	2.66	3.51
16	0.38	0.50	0.59	0.77	1.02	1.35	1.59	2.09	2.76	3.65
17	0.39	0.52	0.61	0.80	1.06	1.40	1.65	2.17	2.87	3.79
18	0.41	0.54	0.63	0.83	1.10	1.45	1.71	2.25	2.98	3.93
19	0.42	0.56	0.65	0.86	1.14	1.50	1.77	2.33	3.08	4.07

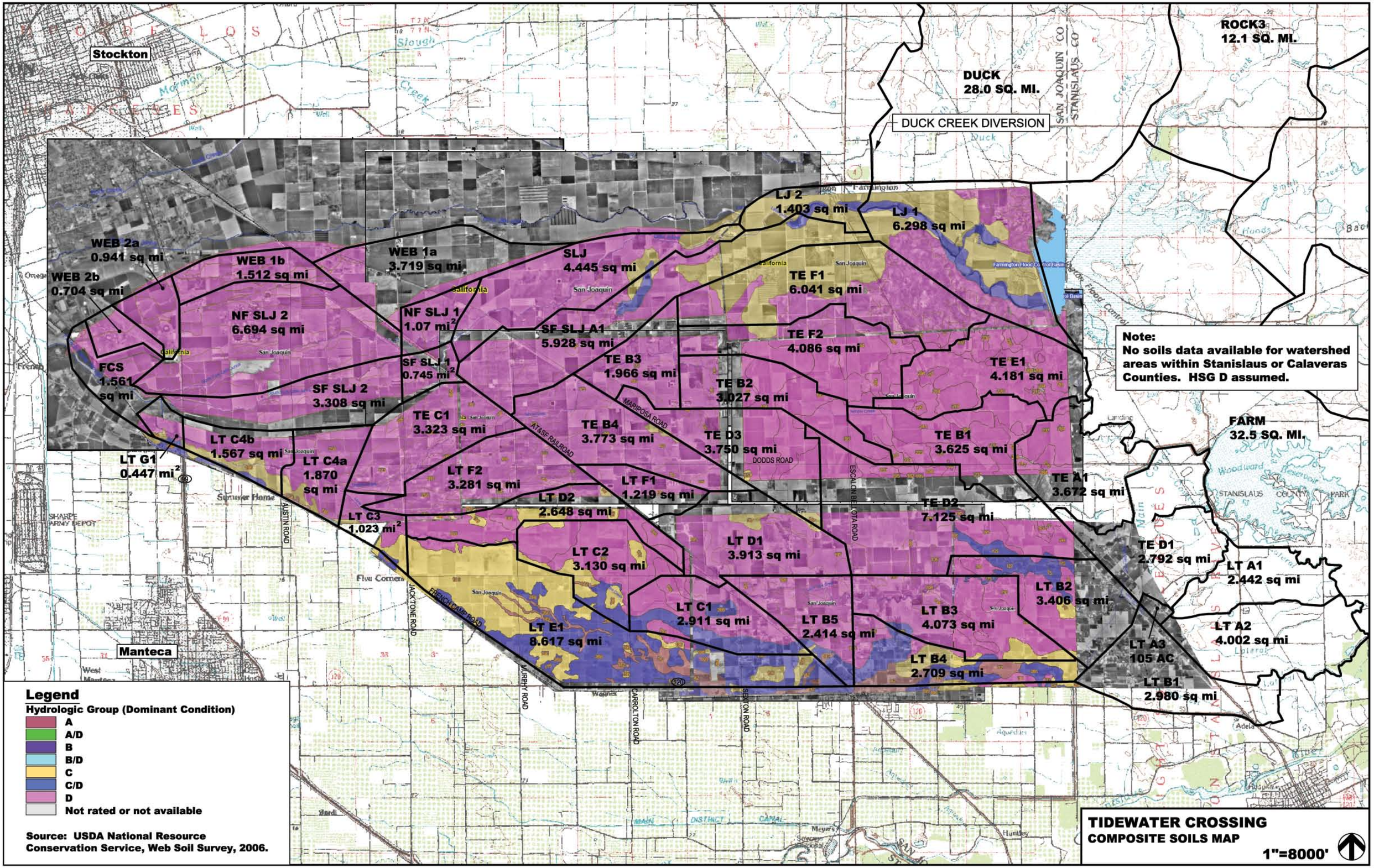
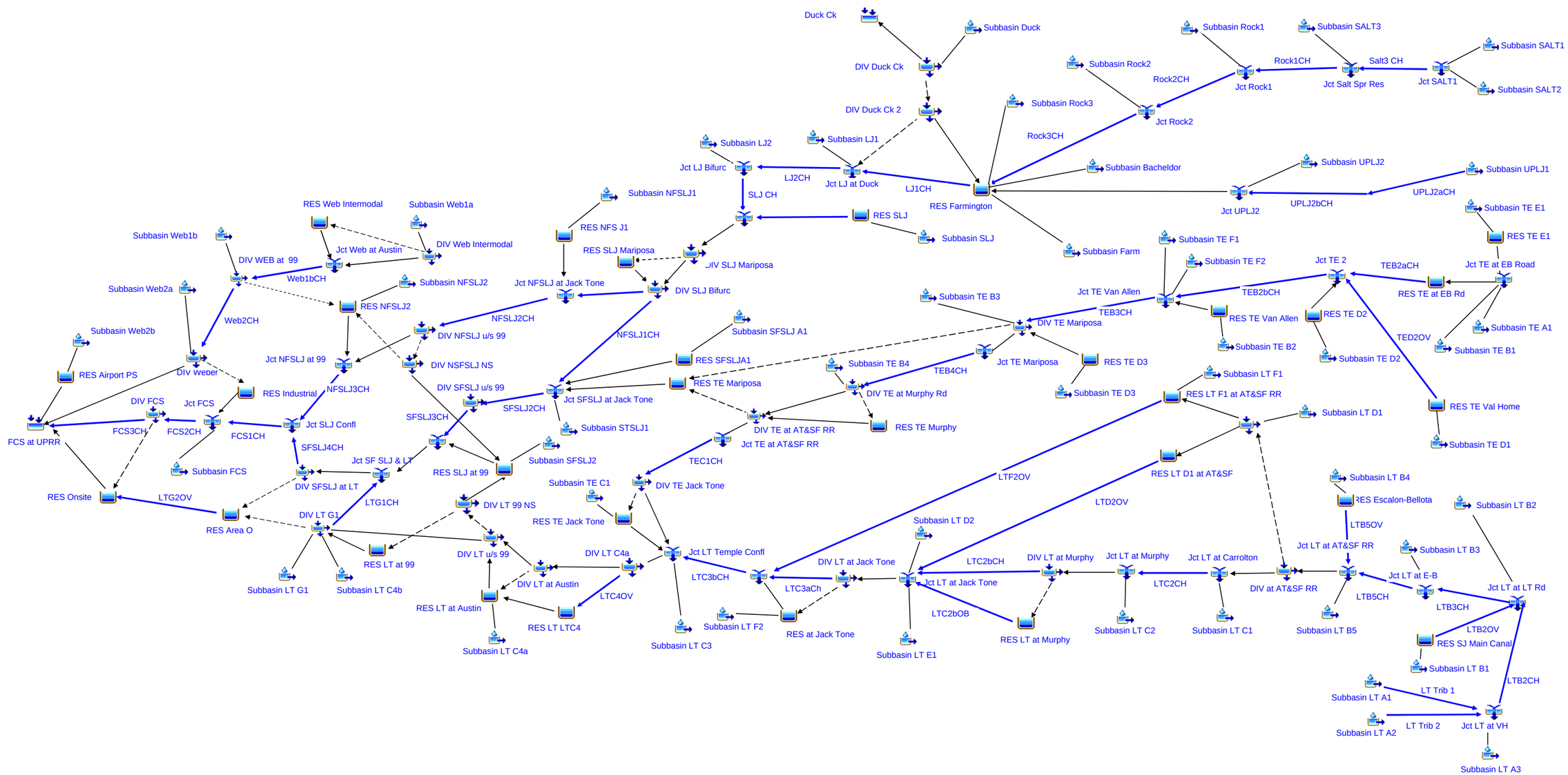

Stockton
Manteca
DUCK CREEK DIVERSION
DUCK
28.0 SQ. MI.
ROCK3
12.1 SQ. MI.
FARM
32.5 SQ. MI.
WEB 2a
0.941 sq mi
WEB 2b
0.704 sq mi
WEB 1b
1.512 sq mi
WEB 1a
3.719 sq mi
SLJ
4.445 sq mi
LJ 2
1.403 sq mi
LJ 1
6.298 sq mi
NF SLJ 2
6.694 sq mi
NF SLJ 1
1.07 mi²
SF SLJ A1
5.928 sq mi
TE F1
6.041 sq mi
TE F2
4.086 sq mi
FCS
1.561
sq mi
SF SLJ 2
3.308 sq mi
SF SLJ 1
0.745 mi²
TE B3
1.966 sq mi
TE B2
3.027 sq mi
TE E1
4.181 sq mi
TE C1
3.323 sq mi
TE B4
3.773 sq mi
TE D3
3.750 sq mi
TE B1
3.625 sq mi
LT C4b
1.567 sq mi
LT G1
0.447 mi²
LT C4a
1.870
sq mi
LT F2
3.281 sq mi
LT F1
1.219 sq mi
TE A1
3.672 sq mi
LT D2
2.648 sq mi
TE D2
7.125 sq mi
LT C3
1.023 mi²
LT D1
3.913 sq mi
TE D1
2.792 sq mi
LT A1
2.442 sq mi
LT C2
3.130 sq mi
LT B2
3.406 sq mi
LT C1
2.911 sq mi
LT B3
4.073 sq mi
LT B5
2.414 sq mi
LT A2
4.002 sq mi
LT E1
8.617 sq mi
LT A3
105 AC
LT B4
2.709 sq mi
LT B1
2.980 sq mi
Note:
No soils data available for watershed areas within Stanislaus or Calaveras Counties. HSG D assumed.
Legend
Hydrologic Group (Dominant Condition)
A
A/D
B
B/D
C
C/D
D
Not rated or not available
Source: USDA National Resource Conservation Service, Web Soil Survey, 2006.
TIDEWATER CROSSING
COMPOSITE SOILS MAP
1"=8000'

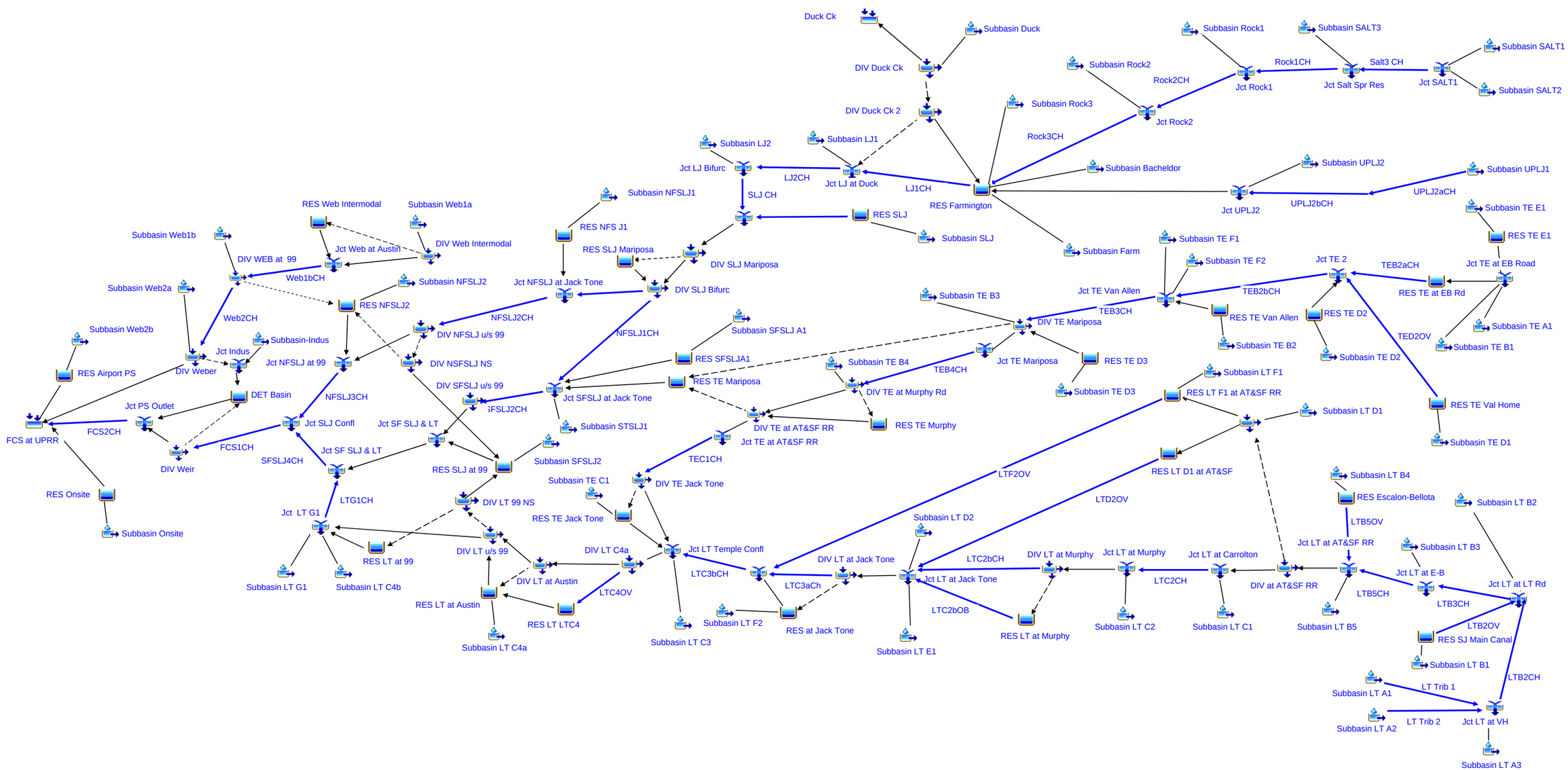
FIGURE A-6



TIDEWATER CROSSING

HEC-HMS EXISTING CONDITION SCHEMATIC

FIGURE A-7



TIDEWATER CROSSING

HEC-HMS PROPOSED CONDITION SCHEMATIC

FIGURE A-8

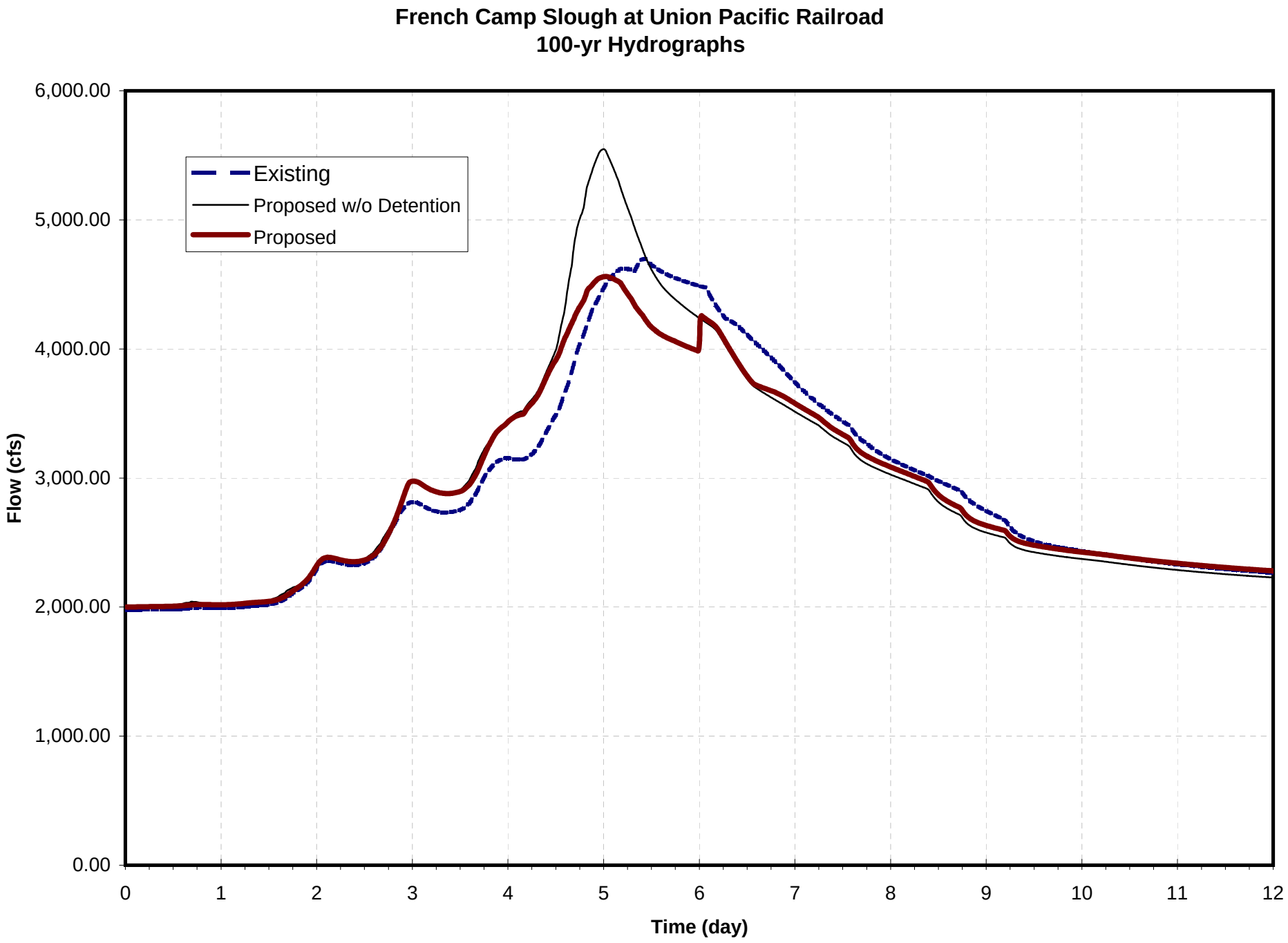

French Camp Slough at Union Pacific Railroad
100-yr Hydrographs
Existing
Proposed w/o Detention
Proposed
Flow (cfs)
6,000.00
5,000.00
4,000.00
3,000.00
2,000.00
1,000.00
0.00
0
1
2
3
4
5
6
7
8
9
10
11
12
Time (day)

FIGURE A-9

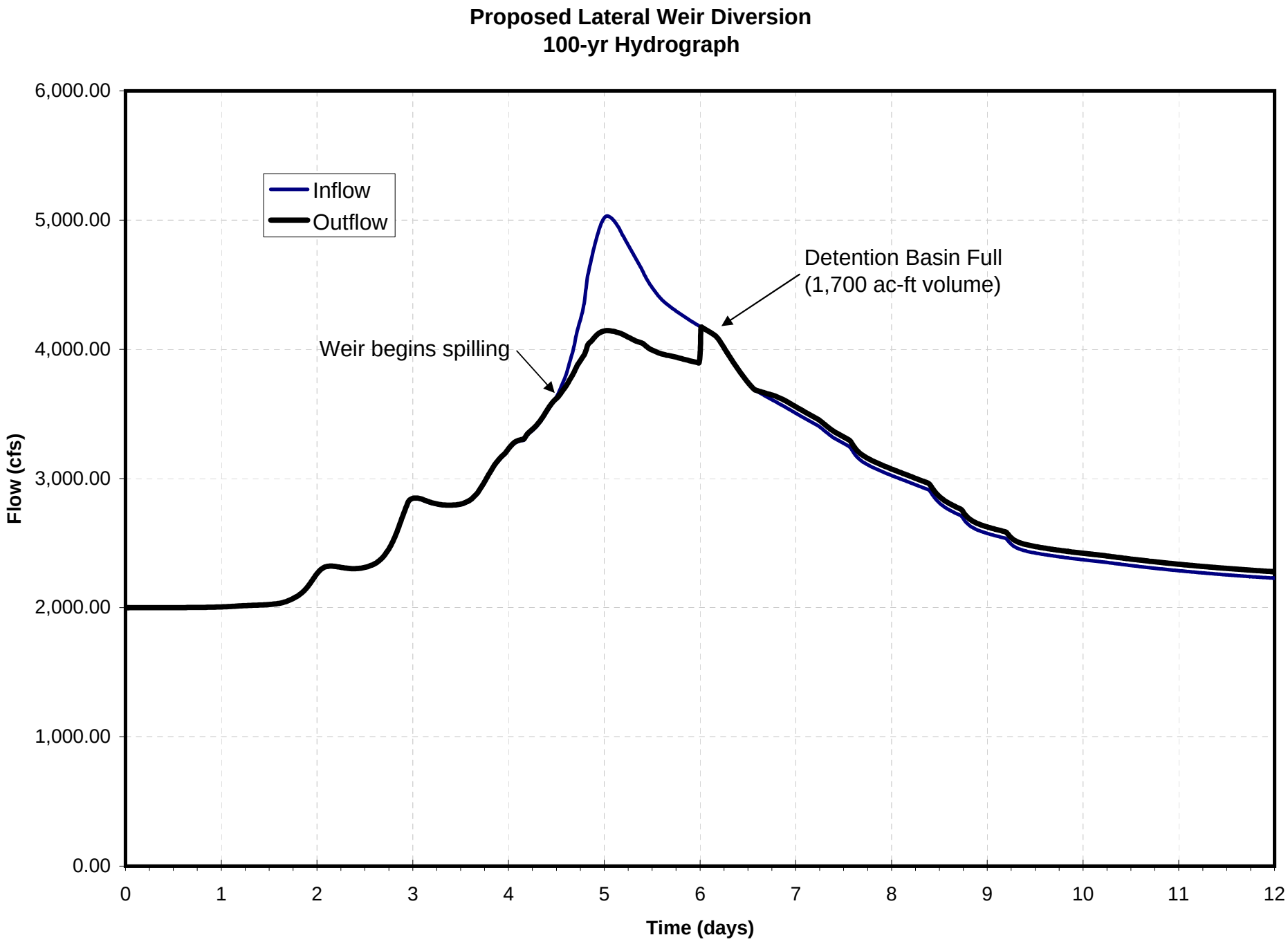

Proposed Lateral Weir Diversion
100-yr Hydrograph
Inflow
Outflow
Detention Basin Full
(1,700 ac-ft volume)
Weir begins spilling
Flow (cfs)
6,000.00
5,000.00
4,000.00
3,000.00
2,000.00
1,000.00
0.00
0
1
2
3
4
5
6
7
8
9
10
11
12
Time (days)

FIGURE A-10

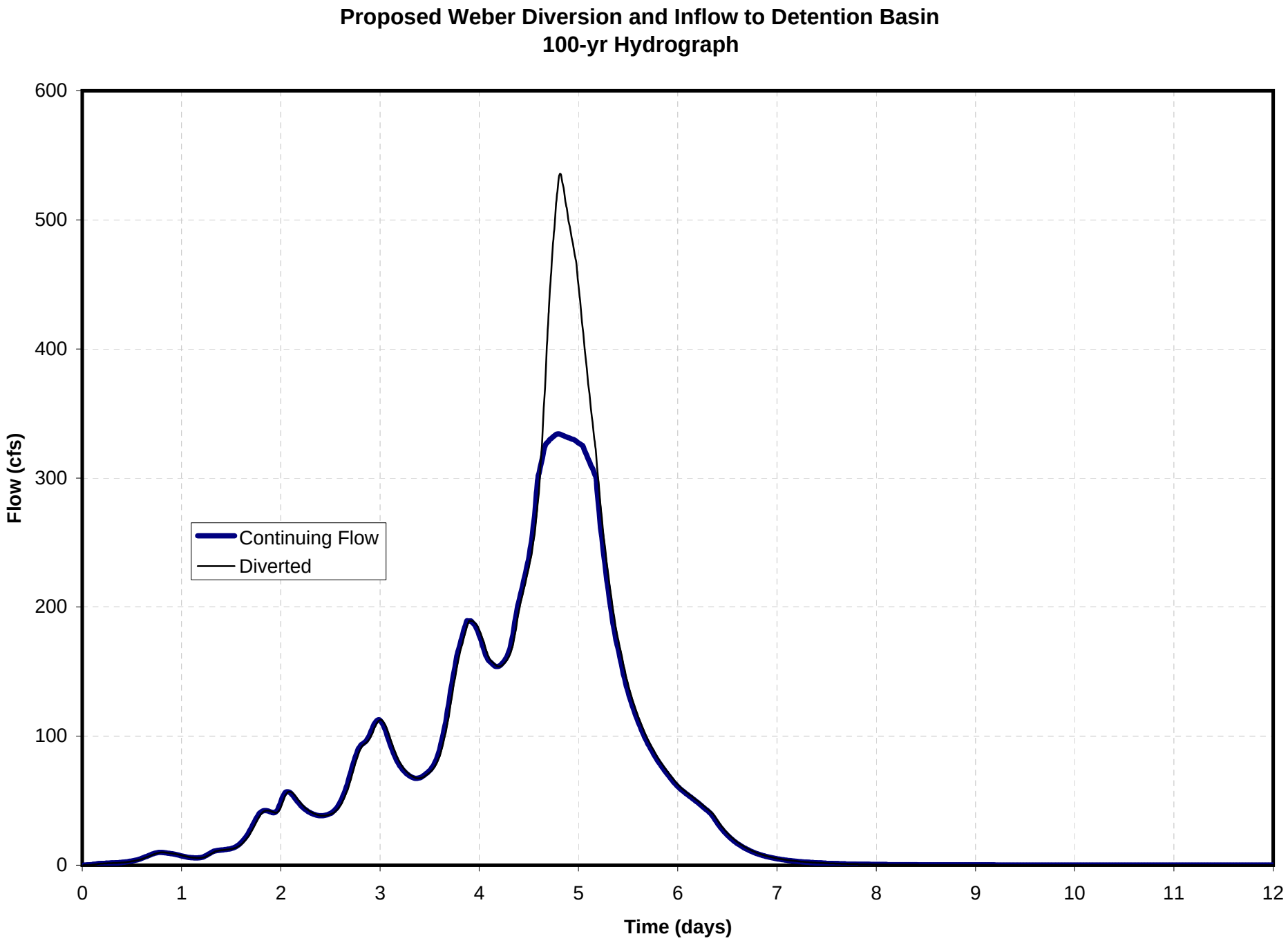

Proposed Weber Diversion and Inflow to Detention Basin
100-yr Hydrograph
Flow (cfs)
600
500
400
300
200
100
0
0
1
2
3
4
5
6
7
8
9
10
11
12
Time (days)
Continuing Flow
Diverted

FIGURE A-11

Inflow to Detention Basin from Weber Slough Diversion and Industrial Development
100-yr Hydrograph

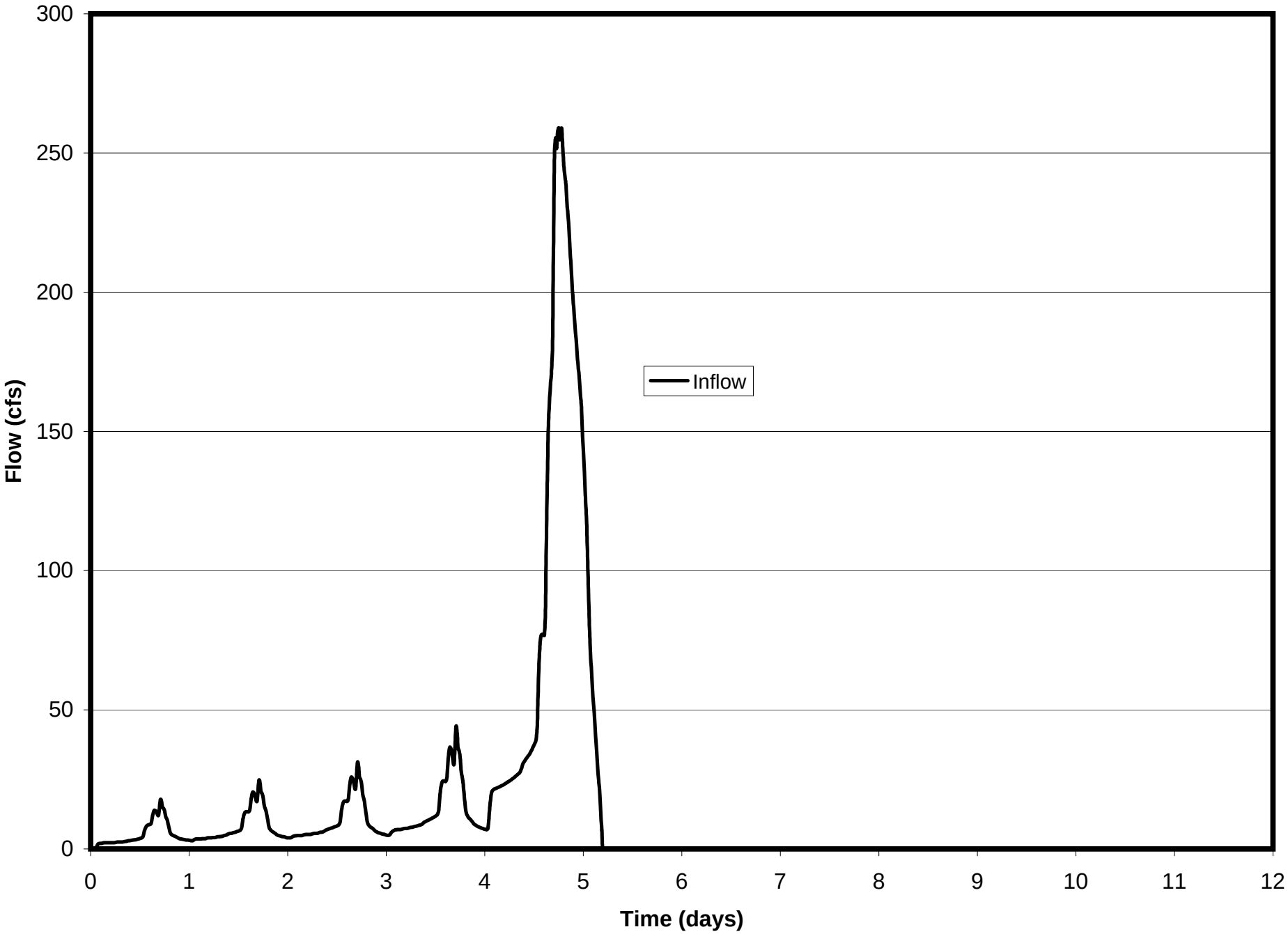


FIGURE A-12

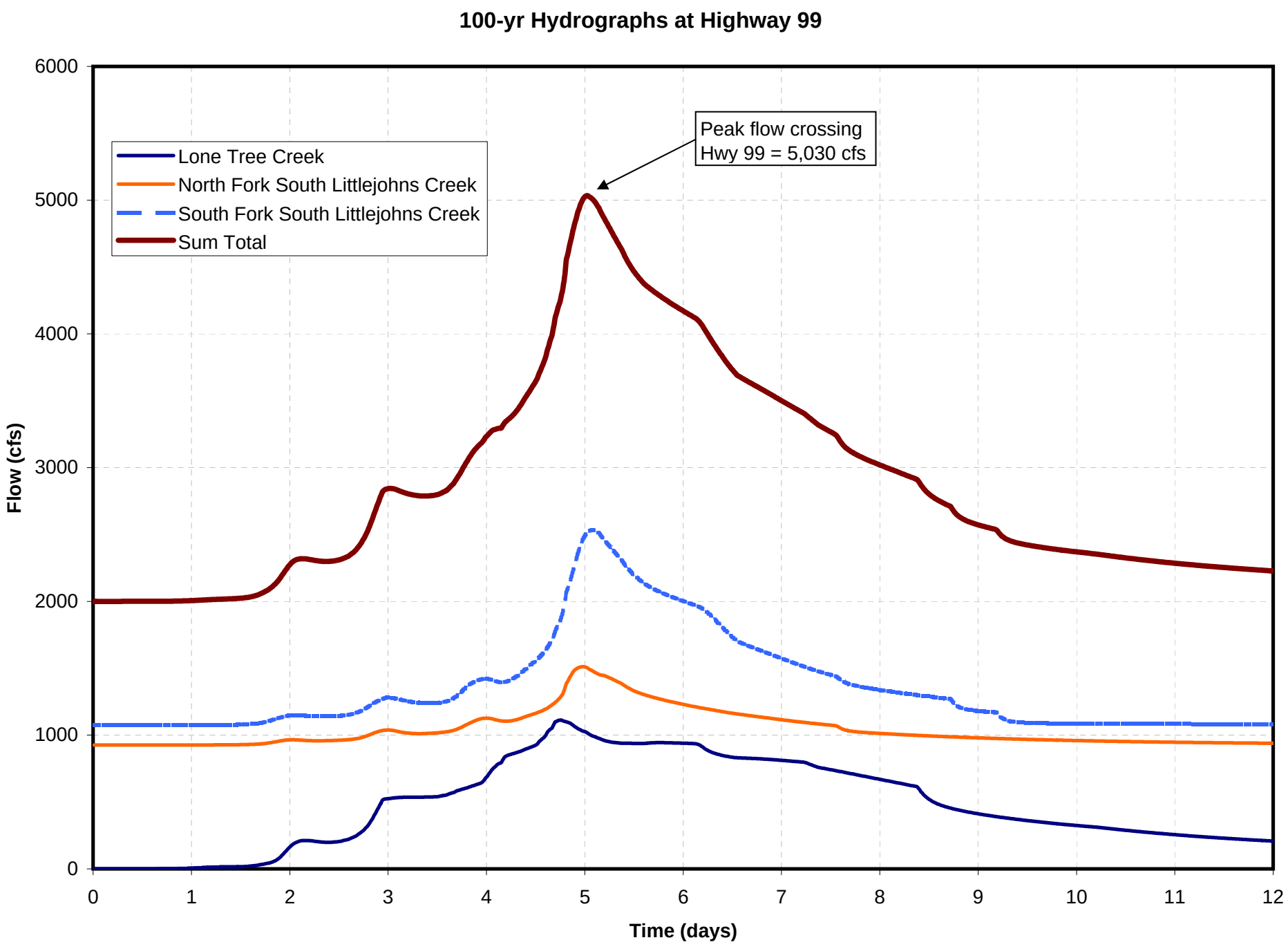

100-yr Hydrographs at Highway 99
Lone Tree Creek
North Fork South Littlejohns Creek
South Fork South Littlejohns Creek
Sum Total
Peak flow crossing
Hwy 99 = 5,030 cfs
Flow (cfs)
Time (days)
0
1000
2000
3000
4000
5000
6000
0
1
2
3
4
5
6
7
8
9
10
11
12

FIGURE A-13

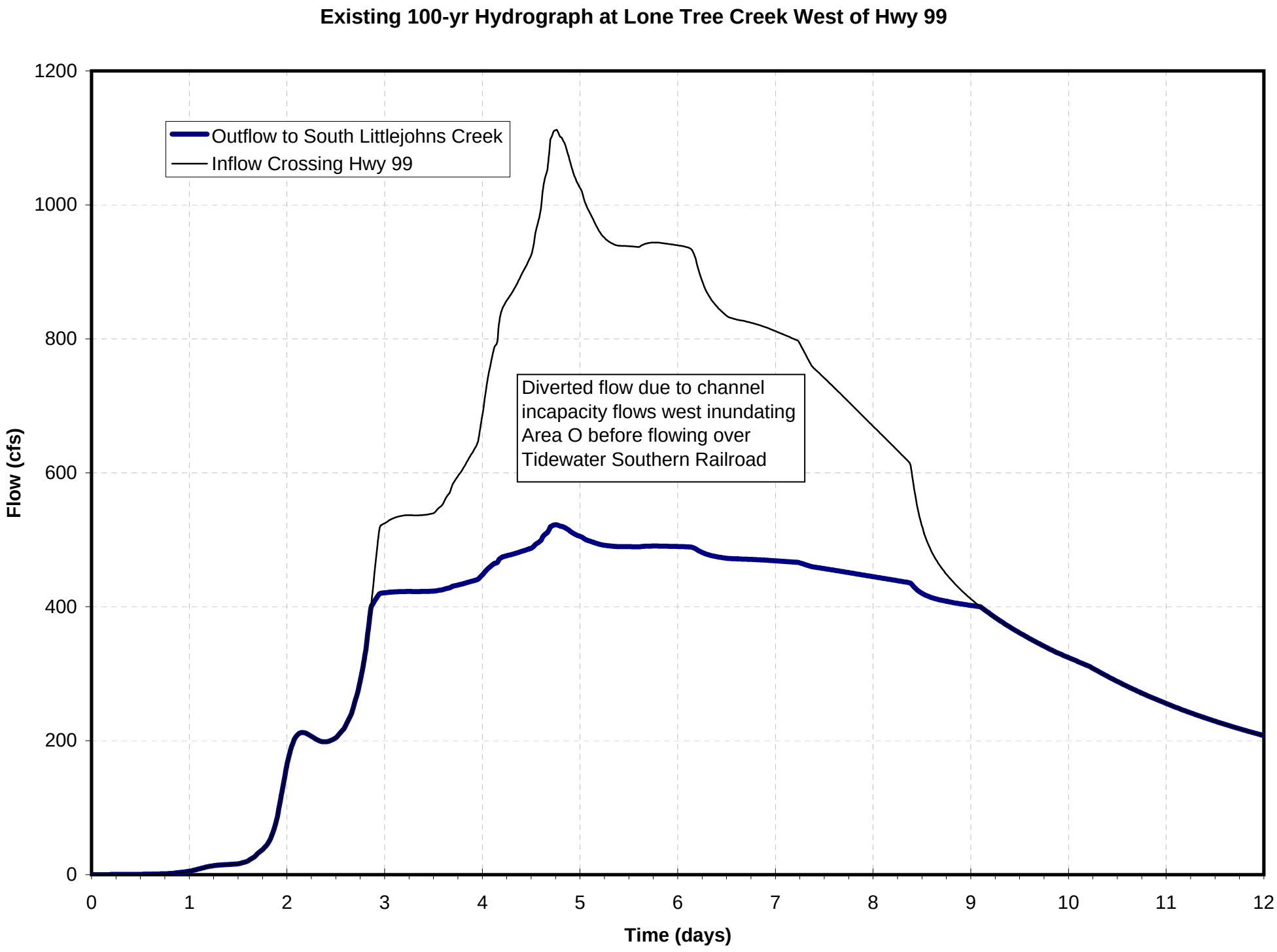

Existing 100-yr Hydrograph at Lone Tree Creek West of Hwy 99
Outflow to South Littlejohns Creek
Inflow Crossing Hwy 99
Diverted flow due to channel incapacity flows west inundating Area O before flowing over Tidewater Southern Railroad
Flow (cfs)
Time (days)
0
200
400
600
800
1000
1200
0
1
2
3
4
5
6
7
8
9
10
11
12

FIGURE A-14

Table A-1. Summary of Isolated areas used in hydrologic model

Sub-basin	Actual Area (mi^2)	Area used in model (mi^2)	Percent of area estimated to be isolated (not contributing to runoff in model, %)
Subbasin LT A1	2.57	2.44	5
Subbasin LT A2	4.21	4.00	5
Subbasin LT A3	0.18	0.16	10
Subbasin LT B1	3.31	2.98	10
Subbasin LT B2	3.40	3.23	5
Subbasin LT B5	2.70	2.29	15
Subbasin LT C1	3.42	2.91	15
Subbasin LT C2	3.68	3.13	15
Subbasin LT C3	0.97	0.92	5
Subbasin LT C4a	1.77	1.59	10
Subbasin LT C4b	1.78	1.33	25
Subbasin LT D1	4.13	3.72	10
Subbasin LT D2	2.80	2.38	15
Subbasin TE A1	3.87	3.67	5
Subbasin TE B1	4.83	3.63	25
Subbasin TE B2	4.03	3.03	25
Subbasin TE B2	3.78	3.03	20
Subbasin TE B4	3.77	2.83	25
Subbasin TE C1	3.32	2.66	20
Subbasin TE D2	7.13	5.34	25
Subbasin TE D3	3.75	3.00	20
Subbasin TE F1	6.04	5.14	15
Subbasin TE F2	4.08	3.47	15
Total (includes all subbasins)	344	331.4	3.7

Table A-2. Summary of storage areas used in hydrologic model

Summary of Reservoir Storage in upper watershed below Farmington Reservoir			Lower Watershed (Between 99 & UPRR)		
Lone Tree Creek					
SJ Main Canal	555		**Existing**		
Escalon-Bellota	270		Onsite	869	
F1 at AT&SFRR	229		Area O	848	
LT D1 at AT&SFRR	622		Weber (RES Industrial)	114	
LT C4	611		Airport	42	
Murphy Rd	486		Total	1873	ac-ft
Jack Tone	1,793				
Austin Rd	261				
Highway 99	346				
			Proposed		
Temple Creek			Detention Basin	1703	ac-ft
Van Allen Rd	582		Onsite	171	
Valley Home Rd	570		Total	1874	ac-ft
Mariposa	788				
Jack Tone Rd	714				
E1	712				
D2	800				
D3	470				
Escalon-Bellota	216				
SF SLJ					
Hwy 99	581				
SLJ	386				
SFSLJA1	483				
Mariposa Rd	280				
NF SLJ					
NFSLJ1	156				
NFSLJ2	918				
Weber Slough					
Web Intermodal	101				
Total	12,930	ac-ft			
Equiv area 1' deep	20.2	square miles			

Domenichelli & Associates, Inc.

TABLE A-3A

Job No. ARNZ-002

Project	Tidewater Crossing	Computed	NLS	Date	02/23/06
Subject	Upper Watershed Hydrology	Checked	JWD	Date	
Task	Lone Tree Creek Weighted Curve Number Calculations	Sheet	1	Of	3

Subbasin	Total Area (acres)	Cover Type	HSG A Area (%)	Curve Number (CN)	HSG B Area (%)	Curve Number (CN)	HSG C Area (%)	Curve Number (CN)	HSG D Area (%)	Curve Number (CN)	Weighted CN	Storage S=1000/CN-10 (in)	Initial Abstract Ia=0.2S (in)
LT A1	1563	Meadow		58		58	25%	80	75%	78	79	2.74	0.55
LT A2	2561	Meadow		58		58	25%	80	75%	78	79	2.74	0.55
LT A3	105	Pasture		61	10%	61	30%	74	60%	80	76	3.11	0.62
LT B1	2104	Pasture/Ag		70	10%	70	30%	75	60%	80	78	2.90	0.58
LT B2	2180	Pasture/Ag		70	15%	70	10%	75	75%	80	78	2.82	0.56
LT B3	2607	Ag- Row Crop C&T	10%	61	20%	70	15%	78	55%	81	76	3.10	0.62
LT B4	1734	Ag- Row Crop C&T	15%	61	30%	70	30%	78	25%	81	74	3.55	0.71
LT B5	1545	Ag- Row Crop C&T	8%	61	30%	70	5%	78	57%	81	76	3.17	0.63
LT C1	1863	Ag- Row Crop C&T		61	45%	70		78	55%	81	76	3.15	0.63
LT C2	2003	Ag- Row Crop C&T		61	20%	70	15%	78	65%	81	78	2.76	0.55
LT C3	655	Ag- Row Crop C&T		61	5%	70	40%	78	55%	81	79	2.62	0.52
LT C4a	1197	Ag- Row Crop C&T	5%	61		70	10%	78	85%	81	80	2.55	0.51
LT C4b	1003	Ag- Row Crop C&T		61	5%	70	20%	78	75%	81	80	2.52	0.50
LT D1	2504	Ag- Row Crop C&T		61		70		78	100%	81	81	2.35	0.47
LT D2	1695	Ag- Row Crop C&T		61		70		78	100%	81	81	2.35	0.47
LT E1	5515	Ag- Row Crop C&T	5%	61	40%	70	45%	78	10%	81	74	3.47	0.69
LT F1	780	Ag- Row Crop C&T		61		70		78	100%	81	81	2.35	0.47
LT F2	2100	Ag- Row Crop C&T		61		70		78	100%	81	81	2.35	0.47
LT G1	286	Ag- Row Crop C&T	5%	61	5%	70		78	90%	81	79	2.59	0.52

Domenichelli & Associates, Inc.

TABLE A-3B

Job No.	ARNZ-002				
Project	Tidewater Crossing	Computed	NLS	Date	02/23/06
Subject	Upper Watershed Hydrology	Checked	JWD	Date	
Task	Lone Tree Creek Weighted Curve Number Calculations	Sheet	2	Of	3

Subbasin	Total Area (acres)	Cover Type	HSG B Area (%)	Curve Number (CN)	HSG C Area (%)	Curve Number (CN)	HSG D Area (%)	Curve Number (CN)	Weighted CN	Storage S=1000/CN-10 (in)	Initial Abstract Ia=0.2S (in)
TE A1	2350	Ag Mix (Row, Orchard,					100%	80	81	2.35	0.47
TE B1	2320	Dairy)					100%	80	81	2.35	0.47
TE B2	1937	"					100%	81	81	2.35	0.47
TE B3	1258	"					100%	81	81	2.35	0.47
TE B4	2415	"					100%	81	81	2.35	0.47
TE C1	2127	"					100%	81	81	2.35	0.47
TE D1	1787	"					100%	81	81	2.35	0.47
TE D2	4560	"					100%	81	81	2.35	0.47
TE D3	2400	"					100%	81	81	2.35	0.47
TE E1	2676	"					100%	81	81	2.35	0.47
TE F1	3866	"					100%	81	81	2.35	0.47
TE F2	2615	"					100%	81	81	2.35	0.47

Domenichelli & Associates, Inc.

TABLE A-3C

Job No.	ARNZ-002		
Project	Tidewater Crossing	Computed	NLS	Date	02/23/06
Subject	Upper Watershed Hydrology	Checked	JWD	Date	
Task	Littlejohns Creek/French Camp Slough Weighted Curve Number Calculation	Sheet	3	Of	3

Subbasin	Total Area (acres)	Cover Type	HSG B Area (%)	Curve Number (CN)	HSG C Area (%)	Curve Number (CN)	HSG D Area (%)	Curve Number (CN)	Weighted CN	Storage S=1000/CN-10 (in)	Initial Abstract Ia=0.2S (in)
FARM*[1]	138240	Woods-grass					100%	80	80	2.50	0.50
DUCK*	17920	Woods/Meadow/Ag					100%	80	80	2.50	0.50
LJ1	4031	Ag - Row crops C&T	20%	70	40%	78	40%	81	78	2.89	0.58
LJ2	898	Ag - Row crops C&T	20%	70	80%	78	0%	81	76	3.09	0.62
SLJ	2845	Ag - Row crops C&T	2%	70	8%	78	90%	81	81	2.42	0.48
NF SLJ1	685	Ag - Row crops C&T					100%	81	81	2.35	0.47
NF SLJ2	4284	Ag - Row crops C&T					100%	81	81	2.35	0.47
SF SLJA1	3794	Ag - Row crops C&T					100%	81	81	2.35	0.47
SF SLJ1	477	Ag - Row crops C&T					100%	81	81	2.35	0.47
SF SLJ2	2117	Ag - Row crops C&T					100%	81	81	2.35	0.47
Web1	3540	Mixed Res, Com, Ind, Ag					100%	84	84	1.90	0.38
Web2	1045	Mixed Res, Ind, Ag					100%	84	84	1.90	0.38
FCS	1016	Ag - Row crops C&T					100%	81	81	2.35	0.47
Post-Development											
Indus	345	Industrial					100%	95	95	0.53	0.11
Onsite	500	Med Density Res, Ag					100%	87	87	1.49	0.30
FCS	171	Ag - Row crops C&T					100%	81	81	2.35	0.47

* No NRCS soil survey data available. HSG D assumed.

[1] Includes all subbasins contributory to Farmington Flood Control Basin

Domenichelli & Associates, Inc.

TABLE A-4A

Job No.	ARNZ-002		
Project	Tidewater Crossing	Computed	NLS	Date	02/23/06
Subject	Upper Watershed Hydrology	Checked	JWD	Date	
Task	Lone Tree Creek Watershed Lag Time Calculations	Sheet	1	Of	3

Subbasin	Area (acres)	L (ft)	Lca (ft)	L (mi)	Lca (mi)	Hi Elev (ft)	Low Elev (ft)	H (ft)	S (ft/mi)	n	Lag[1] (hours)	Reality Check: Tc = 1.25 Lag (hrs)	Reality Check: Avg. Vel. (ft/s)
LT A1	1563	17950	9000	3.40	1.70	208	150	58	17.06	0.2	5.46	6.82	0.73
LT A2	2561	23250	11650	4.40	2.21	214	150	64	14.53	0.2	6.85	8.56	0.75
LT A3	105	3700	1900	0.70	0.36	150	147	3	4.28	0.1	1.08	1.35	0.76
LT B1	2104	21450	10750	4.06	2.04	229	157	72	17.72	0.2	6.20	7.76	0.77
LT B2	2180	14040	7500	2.66	1.42	155	130	25	9.40	0.2	5.20	6.49	0.60
LT B3	2607	22100	9600	4.19	1.82	152	115	37	8.84	0.2	6.86	8.58	0.72
LT B4	1734	22700	10500	4.30	1.99	156	115	41	9.54	0.2	7.07	8.84	0.71
LT B5	1545	14600	7200	2.77	1.36	115	90	25	9.04	0.2	5.23	6.54	0.62
LT C1	1863	18400	7600	3.48	1.44	106	75	31	8.90	0.2	5.85	7.31	0.70
LT C2	2003	15800	7600	2.99	1.44	85	60	25	8.35	0.2	5.59	6.98	0.63
LT C3	655	6000	4400	1.14	0.83	50	43	7	6.16	0.2	3.33	4.16	0.40
LT C4a	1197	8900	4000	1.69	0.76	47.5	39	8.5	5.04	0.2	3.87	4.84	0.51
LT C4b	1003	10600	5100	2.01	0.97	40	30	10	4.98	0.2	4.55	5.69	0.52
LT D1	2504	19600	9200	3.71	1.74	115	79	36	9.70	0.2	6.34	7.92	0.69
LT D2	1695	25000	11200	4.73	2.12	76	50	26	5.49	0.2	8.34	10.43	0.67
LT E1	5515	45700	18400	8.66	3.48	115	50	65	7.51	0.2	11.94	14.93	0.85
LT F1	780	11850	5590	2.24	1.06	90	69	21	9.36	0.2	4.36	5.45	0.60
LT F2	2100	22800	12200	4.32	2.31	69	44	25	5.79	0.2	8.24	10.30	0.61
LT G1	286	5400	2300	1.02	0.44	31	24	7	6.84	0.2	2.45	3.06	0.49

1) Lag calculated per San Joaquin County Hydrology Manual, Sept. 1997

Lag = $24n(L*L_{CA}/S^{0.5})^{0.38}$

Domenichelli & Associates, Inc.

TABLE A-4B

Job No.	ARNZ-002				
Project	Tidewater Crossing	Computed	NLS	Date	02/23/06
Subject	Upper Watershed Hydrology	Checked	JWD	Date	
Task	Temple Creek Watershed Lag Time Calculations	Sheet	2	Of	3

Subbasin	Area (acres)	L (ft)	Lca (ft)	L (mi)	Lca (mi)	Hi Elev (ft)	Low Elev (ft)	H (ft)	S (ft/mi)	n	Lag[1] (hours)	Reality Check: Tc = 1.25 Lag (hrs)	Reality Check: Avg. Vel. (ft/s)
TE A1	2350	11900	5500	2.25	1.04	166	128	38	16.86	0.1	1.94	2.43	1.36
TE B1	2320	23800	13600	4.51	2.58	162	105	57	12.65	0.1	3.76	4.70	1.41
TE B2	1937	20200	11050	3.83	2.09	128	105	23	6.01	0.1	3.76	4.70	1.19
TE B3	1258	12200	6800	2.31	1.29	84	67	17	7.36	0.1	2.49	3.11	1.09
TE B4	2415	25800	8400	4.89	1.59	101	59	42	8.60	0.2	6.95	8.69	0.82
TE C1	2127	23200	9500	4.39	1.80	71	37	34	7.74	0.2	7.14	8.92	0.72
TE D1	1787	16800	10500	3.18	1.99	200	147	53	16.66	0.1	2.84	3.54	1.32
TE D2	4560	47000	24500	8.90	4.64	147	99	48	5.39	0.15	10.75	13.44	0.97
TE D3	2400	24700	13200	4.68	2.50	107	69	38	8.12	0.15	6.16	7.69	0.89
TE E1	2676	25200	13100	4.77	2.48	185	107	78	16.34	0.1	3.61	4.51	1.55
TE F1	3866	35300	18200	6.69	3.45	165	85	80	11.97	0.15	7.40	9.25	1.06
TE F2	2615	26300	14000	4.98	2.65	128	78	50	10.04	0.15	6.19	7.74	0.94

1) Lag calculated per San Joaquin County Hydrology Manual, Sept. 1997

Lag = $24n(L*L_{CA}/S^{0.5})^{0.38}$

Domenichelli & Associates, Inc.

TABLE A-4C

Job No.	ARNZ-002		
Project	Tidewater Crossing	Computed	NLS	Date	02/23/06
Subject	Upper Watershed Hydrology	Checked	JWD	Date	
Task	Littlejohns Creek/French Camp Slough Watershed Lag Time Calculations	Sheet	3	Of	3

Subbasin	Area (acres)	L (ft)	Lca (ft)	L (mi)	Lca (mi)	Hi Elev (ft)	Low Elev (ft)	H (ft)	S (ft/mi)	n	Lag[1] (hours)	Reality Check: Tc = 1.25 Lag (hrs)	Reality Check: Avg. Vel. (ft/s)
SALT1	1408	14500	8000	2.75	1.52	2000	1175	825	300.41	0.04	0.56	0.70	5.77
SALT2	1536	11000	4500	2.08	0.85	2140	1200	940	451.20	0.04	0.37	0.47	6.54
SALT3	9728	20300	80000	3.84	15.15	1240	1075	165	42.92	0.03	1.65	2.06	2.73
ROCK1	3904	23560	11560	4.46	2.19	1250	560	690	154.63	0.04	0.88	1.09	5.98
ROCK2	10240	37450	18000	7.09	3.41	1400	210	1190	167.78	0.04	1.22	1.52	6.84
ROCK3	7744	54350	16000	10.29	3.03	210	150	60	5.83	0.04	2.54	3.17	4.76
UPLJ1	22464	105480	56000	19.98	10.61	1860	550	1310	65.57	0.04	3.32	4.15	7.06
UPLJ2	32960	105620	60000	20.00	11.36	1400	150	1250	62.49	0.04	3.44	4.30	6.82
BACH	27584	78100	51000	14.79	9.66	1090	150	940	63.55	0.04	2.87	3.59	6.04
FARM	20800	65060	30000	12.32	5.68	260	150	110	8.93	0.03	2.39	2.98	6.06
DUCK	17920	86800	53000	16.44	10.04	315	96	219	13.32	0.04	4.09	5.11	4.72
LJ1	4031	25400	12100	4.81	2.29	239	96	143	29.73	0.2	6.27	7.84	0.90
LJ2	898	17500	9500	3.31	1.80	100	78	22	6.64	0.2	6.60	8.25	0.59
SLJ	2845	36700	19300	6.95	3.66	78	49	29	4.17	0.1	6.25	7.82	1.30
NF SLJ1	685	10500	5300	1.99	1.00	65	45	20	10.06	0.1	2.01	2.52	1.16
NF SLJ2	4284	26400	14100	5.00	2.67	56	18	38	7.60	0.1	4.37	5.46	1.34
SF SLJA1	3794	45700	26000	8.66	4.92	110	44	66	7.63	0.2	13.58	16.97	0.75
SF SLJ1	477	8200	4000	1.55	0.76	58	44	14	9.01	0.2	3.36	4.20	0.54
SF SLJ2	2117	24800	12400	4.70	2.35	52	19	33	7.03	0.2	8.25	10.31	0.67
Web 1a	2380	24000	11000	4.55	2.08	75	45	30	6.60	0.1	3.94	4.93	1.35
Web 1b	968	17300	9000	3.28	1.70	45	25	20	6.10	0.1	3.27	4.09	1.17
Web 2a	602	12000	5300	2.27	1.00	25	20	5	2.20	0.1	2.83	3.53	0.94
Web 2b	451	10000	5000	1.89	0.95	22	12	10	5.28	0.04	0.87	1.09	2.54
Industrial	345	4800	2300	0.91	0.44	25	24	1	1.10	0.03	0.50	0.62	2.15
FCS	1016	12100	5500	2.29	1.04	27	18	9	3.93	0.1	2.58	3.22	1.04

1) Lag calculated per San Joaquin County Hydrology Manual, Sept. 1997

Lag = $24n(L*L_{CA}/S^{0.5})^{0.38}$

Tidewater Crossing

TABLE A-5: HEC-HMS Summary of Existing Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
DIV Duck Ck	28	544.19	05Jan2006, 21:00	1.79
DIV Duck Ck 2	0	1600	06Jan2006, 00:30	
DIV FCS	336.9893	3444.96	06Jan2006, 01:00	3.44
DIV LT 99 NS	0	425.29	06Jan2006, 19:30	
DIV LT C4a	85.9424	1305.12	06Jan2006, 00:00	2.5
DIV LT D1 to F1	3.717	535.73	05Jan2006, 23:30	5.24
DIV LT G1	89.3113	522.46	05Jan2006, 19:00	1.64
DIV LT at AT&SF RR	20.941	885.24	06Jan2006, 00:45	2.92
DIV LT at Austin	85.9424	1300.7	06Jan2006, 00:45	2.49
DIV LT at Jack Tone	39.542	945.93	05Jan2006, 23:45	2.48
DIV LT at Murphy	26.981	775.59	05Jan2006, 22:00	2.42
DIV LT u/s 99	87.5324	891.76	06Jan2006, 19:30	2.27
DIV NFSLJ NS	0	181.97	05Jan2006, 23:30	
DIV NFSLJ u/s 99	1.07	1310.66	05Jan2006, 23:30	411.61
DIV SFSLJ at LT	327.6383	2451.72	06Jan2006, 02:30	2.2
DIV SFSLJ u/s 99	235.019	1794.94	05Jan2006, 23:30	2.38
DIV SLJ Bifurc	228.346	1764.92	05Jan2006, 22:15	2.23
DIV SLJ Mariposa	228.346	3232.37	05Jan2006, 22:15	4.12
DIV TE Jack Tone	38.935	699.98	05Jan2006, 23:15	2.67
DIV TE Mariposa	36.105	1466.33	05Jan2006, 20:45	3.46
DIV TE at AT&SF RR	38.935	875.09	05Jan2006, 22:30	2.85
DIV TE at Murphy Rd	38.935	910.36	05Jan2006, 22:00	2.75
DIV Web Intermodal	3.719	314.34	05Jan2006, 19:45	3.37
DIV Web at 99	5.231	410.42	05Jan2006, 20:45	4.17
DIV Weber	6.172	334.25	05Jan2006, 19:45	3.86
Duck Ck	28	544.19	05Jan2006, 21:00	1.79
FCS at UPRR	343.8653	4698.09	06Jan2006, 11:00	3.82
FCS1CH	335.4023	3958.81	06Jan2006, 01:15	3.54
FCS2CH	336.9893	4065.89	06Jan2006, 01:00	3.55
FCS3CH	336.9893	3444.94	06Jan2006, 01:00	3.44
Jct FCS	336.9893	4065.9	06Jan2006, 01:00	3.55
Jct LJ Bifurc	223.901	3880.1	05Jan2006, 21:15	4.15
Jct LJ at Duck Div	222.498	3747.13	05Jan2006, 21:00	4.16
Jct LT Temple Confl	85.9424	1775.62	06Jan2006, 00:00	2.76
Jct LT at AT&SF RR	20.941	1352.42	06Jan2006, 00:45	3.28
Jct LT at Carrolton	23.851	1140.81	05Jan2006, 21:45	2.95
Jct LT at E-B	16.48	1193.98	06Jan2006, 03:00	3.27
Jct LT at F2	43.428	997.27	06Jan2006, 00:30	2.78
Jct LT at Jack Tone	39.542	1515.89	05Jan2006, 23:45	3.23
Jct LT at LT Rd	12.814	987.76	06Jan2006, 01:30	3.18
Jct LT at Murphy	26.981	1438.97	05Jan2006, 22:00	3.02
Jct LT at VH	6.604	788.1	05Jan2006, 22:15	3.8
Jct NFSLJ at 99	7.764	1517.5	06Jan2006, 00:30	60.18
Jct NFSLJ at Jack Tone	1.07	1554.86	05Jan2006, 23:00	414.51
Jct Rock1	25.9	6944.95	05Jan2006, 18:45	6.83
Jct Rock2	41.9	10319.64	05Jan2006, 18:45	6.78
Jct SALT1	4.6	1664.71	05Jan2006, 17:15	7.41
Jct SF SLJ & LT	327.6383	3004.93	06Jan2006, 02:30	2.3

Tidewater Crossing

TABLE A-5: HEC-HMS Summary of Existing Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Jct SF SLJ at 99	238.327	2505.21	06Jan2006, 02:45	2.54
Jct SFSLJ at Jack Tone	235.019	2065.89	05Jan2006, 23:00	2.39
Jct SLJ Confl	335.4023	3958.94	06Jan2006, 01:00	3.54
Jct SLJ at Mariposa	228.346	3989.08	05Jan2006, 22:15	4.15
Jct Salt Spr Res	19.8	5432.83	05Jan2006, 18:15	6.87
Jct TE 2	19.614	720.56	06Jan2006, 03:30	3.14
Jct TE Mariposa	36.105	1466.33	05Jan2006, 20:45	3.46
Jct TE Van Allen	31.243	1504.14	05Jan2006, 21:30	3.49
Jct TE at AT&SFRR	38.935	875.09	05Jan2006, 22:30	2.85
Jct TE at EB Road	11.478	1255.95	05Jan2006, 18:45	3.8
Jct UPLJ2	86.6	12583.47	05Jan2006, 18:45	7.17
Jct Web at Austin	3.719	369.24	05Jan2006, 19:45	4.47
LJ1CH	216.2	2000	01Jan2006, 01:00	4.13
LJ2CH	222.498	3735.65	05Jan2006, 21:15	4.16
LT Trib 1	2.44	318.71	05Jan2006, 22:15	3.8
LT Trib 2	4	476.91	05Jan2006, 23:30	3.8
LTB2CH	6.604	771.97	06Jan2006, 02:15	3.8
LTB2OV	2.98	13.83	07Jan2006, 07:30	1.13
LTB3CH	12.814	978.64	06Jan2006, 03:45	3.18
LTB5CH	16.48	1193.98	06Jan2006, 04:30	3.27
LTB5OV	2.168	32.79	07Jan2006, 00:15	2.99
LTC1CH	20.941	884.85	06Jan2006, 02:45	2.91
LTC2CH	23.851	1136.2	05Jan2006, 23:15	2.94
LTC2bCH	26.981	773.55	05Jan2006, 22:45	2.42
LTC2bOB	0	150.22	06Jan2006, 16:00	
LTC3aCH	39.542	945.38	06Jan2006, 00:00	2.48
LTC3bCH	43.428	997.21	06Jan2006, 00:45	2.78
LTC4OV	0	470.14	06Jan2006, 03:30	
LTC4aCH	85.9424	1304.43	06Jan2006, 00:45	2.5
LTC4bCH	85.9424	1300.68	06Jan2006, 01:15	2.48
LTD2OV	3.717	125.05	06Jan2006, 19:45	5.22
LTF2OV	1.097	147.72	06Jan2006, 14:30	7.18
LTG1CH	89.3113	522.34	05Jan2006, 19:15	1.64
LTG2OV	0	892.25	06Jan2006, 11:00	
NFSLJ1CH	0	1519.34	05Jan2006, 23:00	
NFSLJ2CH	1.07	1553.29	05Jan2006, 23:30	414.5
NFSLJ3CH	7.764	1517.4	06Jan2006, 00:30	60.18
RES Airport PS	0.704	50	05Jan2006, 14:15	4.66
RES Area O	0	894.11	06Jan2006, 08:00	
RES Escalon-Bellota	2.168	32.81	06Jan2006, 13:45	3.1
RES Farmington	216.2	2000	01Jan2006, 01:00	4.13
RES Industrial	0	21.05	06Jan2006, 04:15	
RES LT D1 at AT&SF	3.717	125.23	06Jan2006, 09:30	5.23
RES LT F1 at AT&SF RR	1.097	149.95	06Jan2006, 05:30	7.19
RES LT at 99	0	50.05	07Jan2006, 10:00	
RES LT at Austin	1.59	225.98	07Jan2006, 00:00	15.82
RES LT at Jack Tone	2.789	60.95	07Jan2006, 06:30	5.37
RES LT at Murphy	0	157.78	06Jan2006, 14:00	
RES LTC4	0	220.51	06Jan2006, 23:00	

Tidewater Crossing

TABLE A-5: HEC-HMS Summary of Existing Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
RES NFSLJ1	1.07	37.17	06Jan2006, 02:45	3.95
RES NFSLJ2	6.694	233.02	06Jan2006, 05:00	4.01
RES Onsite	0	1203.46	06Jan2006, 19:00	
RES SFSLJA1	5.928	142.57	06Jan2006, 16:45	4.06
RES SJ Main Canal	2.98	13.83	07Jan2006, 00:00	1.19
RES SLJ	4.445	131.81	06Jan2006, 07:45	4.06
RES SLJ Mariposa	0	98.43	06Jan2006, 04:30	
RES SLJ at 99	3.308	748.9	06Jan2006, 03:15	14.24
RES TE D2	5.344	79.69	06Jan2006, 20:30	3.19
RES TE D3	3	47.56	06Jan2006, 13:15	3.52
RES TE E1	4.181	71.19	06Jan2006, 06:30	3.35
RES TE Jack Tone	2.6584	83.37	07Jan2006, 00:00	3.67
RES TE Mariposa	0	176.37	06Jan2006, 11:45	
RES TE Murphy	0	847.61	05Jan2006, 23:00	
RES TE Val Home	2.792	14.25	06Jan2006, 09:00	1.29
RES TE Van Allen	22.64	576.79	06Jan2006, 08:15	3.26
RES TE at EB Rd	11.478	662.9	05Jan2006, 23:00	3.8
RES Web Intermodal	0	70.49	06Jan2006, 02:15	
Rock1CH	19.8	5469.77	05Jan2006, 18:45	6.87
Rock2CH	25.9	6881.52	05Jan2006, 20:00	6.83
Rock3CH	41.9	10292.37	05Jan2006, 20:15	6.78
SFSLJ1CH	228.346	1762.97	05Jan2006, 23:00	2.23
SFSLJ2CH	235.019	2064.02	05Jan2006, 23:30	2.39
SFSLJ3CH	235.019	1794.85	05Jan2006, 23:45	2.38
SFSLJ4CH	327.6383	2451.65	06Jan2006, 02:30	2.2
SLJ CH	223.901	3871.76	05Jan2006, 22:15	4.15
Salt3 CH	4.6	1657.07	05Jan2006, 18:15	7.41
Subbasin Bachelor	43.1	6905.64	05Jan2006, 18:30	4.62
Subbasin Duck	28	3171.51	05Jan2006, 21:00	4.62
Subbasin FARM	32.5	5617.3	05Jan2006, 18:15	4.84
Subbasin FCS	1.587	249.24	05Jan2006, 18:45	3.78
Subbasin LJ1	6.298	726.17	05Jan2006, 21:30	3.96
Subbasin LJ2	1.403	145.94	05Jan2006, 21:45	3.55
Subbasin LT A1	2.44	326.88	05Jan2006, 22:00	3.8
Subbasin LT A2	4	495.11	05Jan2006, 23:15	3.8
Subbasin LT A3	0.164	35.85	05Jan2006, 17:45	3.8
Subbasin LT B1	2.98	355.33	05Jan2006, 20:45	3.81
Subbasin LT B2	3.23	385.14	05Jan2006, 20:45	3.81
Subbasin LT B3	3.666	376.09	05Jan2006, 22:00	3.6
Subbasin LT B4	2.168	211.98	05Jan2006, 22:00	3.41
Subbasin LT B5	2.293	264.22	05Jan2006, 20:45	3.6
Subbasin LT C1	2.91	291.3	05Jan2006, 21:15	3.18
Subbasin LT C2	3.13	342.62	05Jan2006, 21:00	3.56
Subbasin LT C3	0.921	124.49	05Jan2006, 19:15	3.67
Subbasin LT C4a	1.59	206.71	05Jan2006, 19:45	3.76
Subbasin LT C4b	1.332	163.36	05Jan2006, 20:15	3.76
Subbasin LT D1	3.717	426.76	05Jan2006, 21:30	4.1
Subbasin LT D2	2.384	228.29	05Jan2006, 23:00	3.86
Subbasin LT E1	6.46	452.54	06Jan2006, 01:45	3.18

Tidewater Crossing

TABLE A-5: HEC-HMS Summary of Existing Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Subbasin LT F1	1.097	145.93	05Jan2006, 20:00	4.1
Subbasin LT F2	2.789	268.21	05Jan2006, 23:00	3.86
Subbasin LT G1	0.4469	88.53	05Jan2006, 17:30	3.86
Subbasin NFSLJ1	1.07	180.81	05Jan2006, 18:45	4.06
Subbasin NFSLJ2	6.694	837.82	05Jan2006, 20:00	3.81
Subbasin ROCK1	6.1	1796.35	05Jan2006, 17:30	6.71
Subbasin Rock2	16	4424.4	05Jan2006, 17:30	6.71
Subbasin Rock3	12.1	3058.01	05Jan2006, 19:15	6
Subbasin SALT1	2.2	805.24	05Jan2006, 17:15	7.41
Subbasin SALT2	2.4	936.51	05Jan2006, 17:00	7.41
Subbasin SALT3	15.2	3902.13	05Jan2006, 17:45	6.71
Subbasin SFSLJ A1	5.928	457.18	06Jan2006, 03:00	4.06
Subbasin SFSLJ1	0.745	108.15	05Jan2006, 19:15	4.06
Subbasin SFSLJ2	3.308	316.93	05Jan2006, 23:00	3.81
Subbasin SLJ	4.445	511.14	05Jan2006, 21:30	4.06
Subbasin TE A1	3.672	697.89	05Jan2006, 18:45	4.06
Subbasin TE B1	3.625	558.99	05Jan2006, 20:15	4.06
Subbasin TE B2	3.026	423.32	05Jan2006, 19:45	4.1
Subbasin TE B3	1.862	297.06	05Jan2006, 18:45	4.1
Subbasin TE B4	2.83	311.76	05Jan2006, 22:00	4.1
Subbasin TE C1	2.6584	273.28	05Jan2006, 22:00	3.86
Subbasin TE D1	2.792	476.91	05Jan2006, 19:30	4.06
Subbasin TE D2	5.344	474.61	06Jan2006, 00:45	4.1
Subbasin TE D3	3	347.3	05Jan2006, 21:30	4.1
Subbasin TE E1	4.181	658.45	05Jan2006, 20:15	4.06
Subbasin TE F1	5.135	549.08	05Jan2006, 22:15	4.1
Subbasin TE F2	3.468	400.99	05Jan2006, 21:30	4.1
Subbasin UPLJ1	35.1	8169.54	05Jan2006, 18:45	7.84
Subbasin UPLJ2	51.5	10727.94	05Jan2006, 18:45	6.71
Subbasin Web1a	3.719	531.43	05Jan2006, 19:45	4.47
Subbasin Web1b	1.512	255.85	05Jan2006, 19:30	4.31
Subbasin Web2a	0.941	147.36	05Jan2006, 19:00	4.66
Subbasin Web2b	0.704	152.27	05Jan2006, 17:45	4.66
TEB2aCH	11.478	662.9	05Jan2006, 23:00	3.8
TEB2bCH	19.614	720.56	06Jan2006, 03:45	3.14
TEB3CH	31.243	1503.35	05Jan2006, 21:45	3.49
TEB4CH	36.105	1465.86	05Jan2006, 21:00	3.45
TEC1CH	38.935	874.96	05Jan2006, 23:15	2.84
TED2OV	2.792	5.63	13Jan2006, 01:00	0.35
UPLJ2aCH	35.1	8089.51	05Jan2006, 20:30	7.84
UPLJ2bCH	35.1	7426.86	06Jan2006, 07:15	7.84
Web1bCH	3.719	368.11	05Jan2006, 22:30	4.47
Web2CH	5.231	410.38	05Jan2006, 21:30	4.17

Tidewater Crossing

Table A-6: HEC-HMS Summary of Proposed Conditions Without Detention

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
DIV Duck Ck	28	544.19	05Jan2006, 21:00	1.79
DIV Duck Ck 2	0	1600	06Jan2006, 00:30	
DIV LT 99 NS	0	425.29	06Jan2006, 19:30	
DIV LT C4a	85.9424	1305.12	06Jan2006, 00:00	2.5
DIV LT D1 to F1	3.717	535.73	05Jan2006, 23:30	5.24
DIV LT at AT&SF RR	20.941	885.24	06Jan2006, 00:45	2.92
DIV LT at Austin	85.9424	1300.7	06Jan2006, 00:45	2.49
DIV LT at Jack Tone	39.542	945.93	05Jan2006, 23:45	2.48
DIV LT at Murphy	26.981	775.59	05Jan2006, 22:00	2.42
DIV LT u/s 99	87.5324	891.76	06Jan2006, 19:30	2.27
DIV NFSLJ NS	0	181.97	05Jan2006, 23:30	
DIV NFSLJ u/s 99	1.07	1310.66	05Jan2006, 23:30	411.61
DIV SFSLJ u/s 99	235.019	1794.94	05Jan2006, 23:30	2.38
DIV SLJ Bifurc	228.346	1764.92	05Jan2006, 22:15	2.23
DIV SLJ Mariposa	228.346	3232.37	05Jan2006, 22:15	4.12
DIV TE Jack Tone	38.935	699.98	05Jan2006, 23:15	2.67
DIV TE Mariposa	36.105	1466.33	05Jan2006, 20:45	3.46
DIV TE at AT&SF RR	38.935	875.09	05Jan2006, 22:30	2.85
DIV TE at Murphy Rd	38.935	910.36	05Jan2006, 22:00	2.75
DIV Web Intermodal	3.719	314.34	05Jan2006, 19:45	3.37
DIV Web at 99	5.231	410.42	05Jan2006, 20:45	4.17
DIV Weber	5.935	331.91	05Jan2006, 20:00	3.89
Duck Ck	28	544.19	05Jan2006, 21:00	1.79
FCS at UPRR	343.6283	5546.98	06Jan2006, 00:45	3.86
FCS1CH	335.4023	5010.86	06Jan2006, 01:30	3.84
FCS2CH	335.9413	5110.37	06Jan2006, 01:00	3.85
Jct Indus	0.539	225.29	05Jan2006, 18:15	9.37
Jct LJ Bifurc	223.901	3880.1	05Jan2006, 21:15	4.15
Jct LJ at Duck Div	222.498	3747.13	05Jan2006, 21:00	4.16
Jct LT G1	89.3113	1112.29	05Jan2006, 19:00	2.41
Jct LT Temple Confl	85.9424	1775.62	06Jan2006, 00:00	2.76
Jct LT at AT&SF RR	20.941	1352.42	06Jan2006, 00:45	3.28
Jct LT at Carrolton	23.851	1140.81	05Jan2006, 21:45	2.95
Jct LT at E-B	16.48	1193.98	06Jan2006, 03:00	3.27
Jct LT at F2	43.428	997.27	06Jan2006, 00:30	2.78
Jct LT at Jack Tone	39.542	1515.89	05Jan2006, 23:45	3.23
Jct LT at LT Rd	12.814	987.76	06Jan2006, 01:30	3.18
Jct LT at Murphy	26.981	1438.97	05Jan2006, 22:00	3.02
Jct LT at VH	6.604	788.1	05Jan2006, 22:15	3.8
Jct NFSLJ at 99	7.764	1517.5	06Jan2006, 00:30	60.18
Jct NFSLJ at Jack Tone	1.07	1554.86	05Jan2006, 23:00	414.51
Jct PS Outlet	335.9413	5110.43	06Jan2006, 01:00	3.85
Jct Rock1	25.9	6653.28	05Jan2006, 18:45	6.2
Jct Rock2	41.9	9859.74	05Jan2006, 18:45	6.16
Jct SALT1	4.6	1601.02	05Jan2006, 17:15	6.76
Jct SF SLJ & LT	327.6383	3503.67	06Jan2006, 01:45	2.51
Jct SF SLJ at 99	238.327	2503.45	06Jan2006, 02:45	2.54
Jct SFSLJ at Jack Tone	235.019	2065.89	05Jan2006, 23:00	2.39

Tidewater Crossing

Table A-6: HEC-HMS Summary of Proposed Conditions Without Detention

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Jct SLJ Confl	335.4023	5011.01	06Jan2006, 01:30	3.84
Jct SLJ at Mariposa	228.346	3989.08	05Jan2006, 22:15	4.15
Jct Salt Spr Res	19.8	5205.03	05Jan2006, 18:15	6.24
Jct TE 2	19.614	720.56	06Jan2006, 03:30	3.14
Jct TE Mariposa	36.105	1466.33	05Jan2006, 20:45	3.46
Jct TE Van Allen	31.243	1504.14	05Jan2006, 21:30	3.49
Jct TE at AT&SFRR	38.935	875.09	05Jan2006, 22:30	2.85
Jct TE at EB Road	11.478	1255.95	05Jan2006, 18:45	3.8
Jct UPLJ2	86.6	11978.25	05Jan2006, 18:45	6.61
Jct Web at Austin	3.719	369.24	05Jan2006, 19:45	4.47
Jct Web2	5.231	410.38	05Jan2006, 21:30	4.17
LJ1CH	216.2	2000	01Jan2006, 01:00	4.13
LJ2CH	222.498	3735.65	05Jan2006, 21:15	4.16
LT Trib 1	2.44	318.71	05Jan2006, 22:15	3.8
LT Trib 2	4	476.91	05Jan2006, 23:30	3.8
LTB2CH	6.604	771.97	06Jan2006, 02:15	3.8
LTB2OV	2.98	13.83	07Jan2006, 07:30	1.13
LTB3CH	12.814	978.64	06Jan2006, 03:45	3.18
LTB5CH	16.48	1193.98	06Jan2006, 04:30	3.27
LTB5OV	2.168	32.79	07Jan2006, 00:15	2.99
LTC1CH	20.941	884.85	06Jan2006, 02:45	2.91
LTC2CH	23.851	1136.2	05Jan2006, 23:15	2.94
LTC2bCH	26.981	773.55	05Jan2006, 22:45	2.42
LTC2bOB	0	150.22	06Jan2006, 16:00	
LTC3aCH	39.542	945.38	06Jan2006, 00:00	2.48
LTC3bCH	43.428	997.21	06Jan2006, 00:45	2.78
LTC4OV	0	470.14	06Jan2006, 03:30	
LTC4aCH	85.9424	1304.43	06Jan2006, 00:45	2.5
LTC4bCH	85.9424	1300.68	06Jan2006, 01:15	2.48
LTD2OV	3.717	125.05	06Jan2006, 19:45	5.22
LTF2OV	1.097	147.72	06Jan2006, 14:30	7.18
LTG1CH	89.3113	1111.72	05Jan2006, 19:00	2.41
NFSLJ1CH	0	1519.34	05Jan2006, 23:00	
NFSLJ2CH	1.07	1553.29	05Jan2006, 23:30	414.5
NFSLJ3CH	7.764	1517.4	06Jan2006, 00:30	60.18
RES Airport PS	0.704	50	05Jan2006, 14:15	4.66
RES Escalon-Bellota	2.168	32.81	06Jan2006, 13:45	3.1
RES Farmington	216.2	2000	01Jan2006, 01:00	4.13
RES LT D1 at AT&SF	3.717	125.23	06Jan2006, 09:30	5.23
RES LT F1 at AT&SF RR	1.097	149.95	06Jan2006, 05:30	7.19
RES LT at 99	0	50.05	07Jan2006, 10:00	
RES LT at Austin	1.59	225.98	07Jan2006, 00:00	15.82
RES LT at Jack Tone	2.789	60.95	07Jan2006, 06:30	5.37
RES LT at Murphy	0	157.78	06Jan2006, 14:00	
RES LTC4	0	220.51	06Jan2006, 23:00	
RES NFSLJ1	1.07	37.17	06Jan2006, 02:45	3.95
RES NFSLJ2	6.694	233.02	06Jan2006, 05:00	4.01
RES SFSLJA1	5.928	142.57	06Jan2006, 16:45	4.06
RES SJ Main Canal	2.98	13.83	07Jan2006, 00:00	1.19

Tidewater Crossing

Table A-6: HEC-HMS Summary of Proposed Conditions Without Detention

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
RES SLJ	4.445	131.81	06Jan2006, 07:45	4.06
RES SLJ Mariposa	0	98.43	06Jan2006, 04:30	
RES SLJ at 99	3.308	748.9	06Jan2006, 03:15	14.24
RES TE D2	5.344	79.69	06Jan2006, 20:30	3.19
RES TE D3	3	47.56	06Jan2006, 13:15	3.52
RES TE E1	4.181	71.19	06Jan2006, 06:30	3.35
RES TE Jack Tone	2.6584	83.37	07Jan2006, 00:00	3.67
RES TE Mariposa	0	176.37	06Jan2006, 11:45	
RES TE Murphy	0	847.61	05Jan2006, 23:00	
RES TE Val Home	2.792	14.25	06Jan2006, 09:00	1.29
RES TE Van Allen	22.64	576.79	06Jan2006, 08:15	3.26
RES TE at EB Rd	11.478	662.9	05Jan2006, 23:00	3.8
RES Web Intermodal	0	70.49	06Jan2006, 02:15	
Rock1CH	19.8	5237.66	05Jan2006, 18:45	6.24
Rock2CH	25.9	6590.81	05Jan2006, 20:00	6.2
Rock3CH	41.9	9838.49	05Jan2006, 20:15	6.16
SFSLJ1CH	228.346	1762.97	05Jan2006, 23:00	2.23
SFSLJ2CH	235.019	2064.02	05Jan2006, 23:30	2.39
SFSLJ3CH	238.327	2503.41	06Jan2006, 02:45	2.54
SFSLJ4CH	327.6383	3503.39	06Jan2006, 01:45	2.51
SLJ CH	223.901	3871.76	05Jan2006, 22:15	4.15
Salt3 CH	4.6	1594.25	05Jan2006, 18:15	6.76
Subbasin Bachelor	43.1	6449.81	05Jan2006, 18:30	4.08
Subbasin Duck	28	3171.51	05Jan2006, 21:00	4.62
Subbasin FARM	32.5	5617.3	05Jan2006, 18:15	4.84
Subbasin LJ1	6.298	726.17	05Jan2006, 21:30	3.96
Subbasin LJ2	1.403	145.94	05Jan2006, 21:45	3.55
Subbasin LT A1	2.44	326.88	05Jan2006, 22:00	3.8
Subbasin LT A2	4	495.11	05Jan2006, 23:15	3.8
Subbasin LT A3	0.164	35.85	05Jan2006, 17:45	3.8
Subbasin LT B1	2.98	355.33	05Jan2006, 20:45	3.81
Subbasin LT B2	3.23	385.14	05Jan2006, 20:45	3.81
Subbasin LT B3	3.666	376.09	05Jan2006, 22:00	3.6
Subbasin LT B4	2.168	211.98	05Jan2006, 22:00	3.41
Subbasin LT B5	2.293	264.22	05Jan2006, 20:45	3.6
Subbasin LT C1	2.91	291.3	05Jan2006, 21:15	3.18
Subbasin LT C2	3.13	342.62	05Jan2006, 21:00	3.56
Subbasin LT C3	0.921	124.49	05Jan2006, 19:15	3.67
Subbasin LT C4a	1.59	206.71	05Jan2006, 19:45	3.76
Subbasin LT C4b	1.332	163.36	05Jan2006, 20:15	3.76
Subbasin LT D1	3.717	426.76	05Jan2006, 21:30	4.1
Subbasin LT D2	2.384	228.29	05Jan2006, 23:00	3.86
Subbasin LT E1	6.46	452.54	06Jan2006, 01:45	3.18
Subbasin LT F1	1.097	145.93	05Jan2006, 20:00	4.1
Subbasin LT F2	2.789	268.21	05Jan2006, 23:00	3.86
Subbasin LT G1	0.4469	88.53	05Jan2006, 17:30	3.86
Subbasin NFSLJ1	1.07	180.81	05Jan2006, 18:45	4.06
Subbasin NFSLJ2	6.694	837.82	05Jan2006, 20:00	3.81
Subbasin Onsite	1.048	183.14	05Jan2006, 18:30	4.91

Tidewater Crossing

Table A-6: HEC-HMS Summary of Proposed Conditions Without Detention

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Subbasin ROCK1	6.1	1718.04	05Jan2006, 17:30	6.08
Subbasin Rock2	16	4226.74	05Jan2006, 17:30	6.08
Subbasin Rock3	12.1	2909.48	05Jan2006, 19:15	5.4
Subbasin SALT1	2.2	774.11	05Jan2006, 17:15	6.76
Subbasin SALT2	2.4	900.4	05Jan2006, 17:00	6.76
Subbasin SALT3	15.2	3726.28	05Jan2006, 17:45	6.08
Subbasin SFSLJ A1	5.928	457.18	06Jan2006, 03:00	4.06
Subbasin SFSLJ1	0.745	108.15	05Jan2006, 19:15	4.06
Subbasin SFSLJ2	3.308	316.93	05Jan2006, 23:00	3.81
Subbasin SLJ	4.445	511.14	05Jan2006, 21:30	4.06
Subbasin TE A1	3.672	697.89	05Jan2006, 18:45	4.06
Subbasin TE B1	3.625	558.99	05Jan2006, 20:15	4.06
Subbasin TE B2	3.026	423.32	05Jan2006, 19:45	4.1
Subbasin TE B3	1.862	297.06	05Jan2006, 18:45	4.1
Subbasin TE B4	2.83	311.76	05Jan2006, 22:00	4.1
Subbasin TE C1	2.6584	273.28	05Jan2006, 22:00	3.86
Subbasin TE D1	2.792	476.91	05Jan2006, 19:30	4.06
Subbasin TE D2	5.344	474.61	06Jan2006, 00:45	4.1
Subbasin TE D3	3	347.3	05Jan2006, 21:30	4.1
Subbasin TE E1	4.181	658.45	05Jan2006, 20:15	4.06
Subbasin TE F1	5.135	549.08	05Jan2006, 22:15	4.1
Subbasin TE F2	3.468	400.99	05Jan2006, 21:30	4.1
Subbasin UPLJ1	35.1	7893.06	05Jan2006, 18:45	7.39
Subbasin UPLJ2	51.5	10228.15	05Jan2006, 18:45	6.08
Subbasin Web1a	3.719	531.43	05Jan2006, 19:45	4.47
Subbasin Web1b	1.512	255.85	05Jan2006, 19:30	4.31
Subbasin Web2a	0.704	110.25	05Jan2006, 19:00	4.66
Subbasin Web2b	0.704	152.27	05Jan2006, 17:45	4.66
Subbasin-Indus	0.539	138.89	05Jan2006, 17:15	5.69
TEB2aCH	11.478	662.9	05Jan2006, 23:00	3.8
TEB2bCH	19.614	720.56	06Jan2006, 03:45	3.14
TEB3CH	31.243	1503.35	05Jan2006, 21:45	3.49
TEB4CH	36.105	1465.86	05Jan2006, 21:00	3.45
TEC1CH	38.935	874.96	05Jan2006, 23:15	2.84
TED2OV	2.792	5.63	13Jan2006, 01:00	0.35
UPLJ2aCH	35.1	7816.31	05Jan2006, 20:30	7.39
UPLJ2bCH	35.1	7170.99	06Jan2006, 07:15	7.39
Web1bCH	3.719	368.11	05Jan2006, 22:30	4.47
Web2CH	5.231	410.38	05Jan2006, 21:30	4.17
UPLJ2aCH	35.1	8089.51	05Jan2006, 20:30	7.84
UPLJ2bCH	35.1	7426.86	06Jan2006, 07:15	7.84
Web1bCH	3.719	368.11	05Jan2006, 22:30	4.47
Web2CH	5.231	410.38	05Jan2006, 21:30	4.17

Tidewater Crossing

Table A-7: HEC-HMS Summary of Proposed Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
DET Basin	0.539	329.2	07Jan2006, 01:00	32.57
DIV Duck Ck	28	544.19	05Jan2006, 21:00	1.79
DIV Duck Ck 2	0	1600	06Jan2006, 00:30	
DIV LT 99 NS	0	425.29	06Jan2006, 19:30	
DIV LT C4a	85.9424	1305.12	06Jan2006, 00:00	2.5
DIV LT D1 to F1	3.717	535.73	05Jan2006, 23:30	5.24
DIV LT at AT&SF RR	20.941	885.24	06Jan2006, 00:45	2.92
DIV LT at Austin	85.9424	1300.7	06Jan2006, 00:45	2.49
DIV LT at Jack Tone	39.542	945.93	05Jan2006, 23:45	2.48
DIV LT at Murphy	26.981	775.59	05Jan2006, 22:00	2.42
DIV LT u/s 99	87.5324	891.76	06Jan2006, 19:30	2.27
DIV NFSLJ NS	0	242.63	05Jan2006, 23:30	
DIV NFSLJ u/s 99	1.07	1310.66	05Jan2006, 23:30	411.61
DIV SFSLJ u/s 99	235.019	1794.94	05Jan2006, 23:30	2.38
DIV SLJ Bifurc	228.346	1764.92	05Jan2006, 22:15	2.23
DIV SLJ Mariposa	228.346	3232.37	05Jan2006, 22:15	4.12
DIV TE Jack Tone	38.935	699.98	05Jan2006, 23:15	2.67
DIV TE Mariposa	36.105	1466.33	05Jan2006, 20:45	3.46
DIV TE at AT&SF RR	38.935	875.09	05Jan2006, 22:30	2.85
DIV TE at Murphy Rd	38.935	910.36	05Jan2006, 22:00	2.75
DIV Web Intermodal	3.719	314.34	05Jan2006, 19:45	3.37
DIV Web at 99	5.231	410.42	05Jan2006, 20:45	4.17
DIV Weber	6.172	334.25	05Jan2006, 19:45	3.86
DIV Weir	335.4023	4094.55	06Jan2006, 01:30	3.74
Duck Ck	28	544.19	05Jan2006, 21:00	1.79
FCS at UPRR	343.8653	4560.56	06Jan2006, 01:15	3.79
FCS1CH	335.4023	5032.16	06Jan2006, 01:30	3.84
FCS2CH	335.9413	4169.15	07Jan2006, 01:15	3.79
Jct Indus	0.539	259.03	05Jan2006, 18:15	10.14
Jct LJ Bifurc	223.901	3880.1	05Jan2006, 21:15	4.15
Jct LJ at Duck Div	222.498	3747.13	05Jan2006, 21:00	4.16
Jct LT G1	89.3113	1112.29	05Jan2006, 19:00	2.41
Jct LT Temple Confl	85.9424	1775.62	06Jan2006, 00:00	2.76
Jct LT at AT&SF RR	20.941	1352.42	06Jan2006, 00:45	3.28
Jct LT at Carrolton	23.851	1140.81	05Jan2006, 21:45	2.95
Jct LT at E-B	16.48	1193.98	06Jan2006, 03:00	3.27
Jct LT at F2	43.428	997.27	06Jan2006, 00:30	2.78
Jct LT at Jack Tone	39.542	1515.89	05Jan2006, 23:45	3.23
Jct LT at LT Rd	12.814	987.76	06Jan2006, 01:30	3.18
Jct LT at Murphy	26.981	1438.97	05Jan2006, 22:00	3.02
Jct LT at VH	6.604	788.1	05Jan2006, 22:15	3.8
Jct NFSLJ at 99	7.764	1511.51	06Jan2006, 00:15	60.08
Jct NFSLJ at Jack Tone	1.07	1554.86	05Jan2006, 23:00	414.51
Jct PS Outlet	335.9413	4171.43	07Jan2006, 01:00	3.79
Jct Rock1	25.9	6653.28	05Jan2006, 18:45	6.2
Jct Rock2	41.9	9859.74	05Jan2006, 18:45	6.16
Jct SALT1	4.6	1601.02	05Jan2006, 17:15	6.76
Jct SF SLJ & LT	327.6383	3532.78	06Jan2006, 01:45	2.51

Tidewater Crossing

Table A-7: HEC-HMS Summary of Proposed Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Jct SF SLJ at 99	238.327	2533.33	06Jan2006, 02:45	2.55
Jct SFSLJ at Jack Tone	235.019	2065.89	05Jan2006, 23:00	2.39
Jct SLJ Confl	335.4023	5032.37	06Jan2006, 01:30	3.84
Jct SLJ at Mariposa	228.346	3989.08	05Jan2006, 22:15	4.15
Jct Salt Spr Res	19.8	5205.03	05Jan2006, 18:15	6.24
Jct TE 2	19.614	720.56	06Jan2006, 03:30	3.14
Jct TE Mariposa	36.105	1466.33	05Jan2006, 20:45	3.46
Jct TE Van Allen	31.243	1504.14	05Jan2006, 21:30	3.49
Jct TE at AT&SFRR	38.935	875.09	05Jan2006, 22:30	2.85
Jct TE at EB Road	11.478	1255.95	05Jan2006, 18:45	3.8
Jct UPLJ2	86.6	11978.25	05Jan2006, 18:45	6.61
Jct Web at Austin	3.719	369.24	05Jan2006, 19:45	4.47
LJ1CH	216.2	2000	01Jan2006, 01:00	4.13
LJ2CH	222.498	3735.65	05Jan2006, 21:15	4.16
LT Trib 1	2.44	318.71	05Jan2006, 22:15	3.8
LT Trib 2	4	476.91	05Jan2006, 23:30	3.8
LTB2CH	6.604	771.97	06Jan2006, 02:15	3.8
LTB2OV	2.98	13.83	07Jan2006, 07:30	1.13
LTB3CH	12.814	978.64	06Jan2006, 03:45	3.18
LTB5CH	16.48	1193.98	06Jan2006, 04:30	3.27
LTB5OV	2.168	32.79	07Jan2006, 00:15	2.99
LTC1CH	20.941	884.85	06Jan2006, 02:45	2.91
LTC2CH	23.851	1136.2	05Jan2006, 23:15	2.94
LTC2bCH	26.981	773.55	05Jan2006, 22:45	2.42
LTC2bOB	0	150.22	06Jan2006, 16:00	
LTC3aCH	39.542	945.38	06Jan2006, 00:00	2.48
LTC3bCH	43.428	997.21	06Jan2006, 00:45	2.78
LTC4OV	0	470.14	06Jan2006, 03:30	
LTC4aCH	85.9424	1304.43	06Jan2006, 00:45	2.5
LTC4bCH	85.9424	1300.68	06Jan2006, 01:15	2.48
LTD2OV	3.717	125.05	06Jan2006, 19:45	5.22
LTF2OV	1.097	147.72	06Jan2006, 14:30	7.18
LTG1CH	89.3113	1111.72	05Jan2006, 19:00	2.41
NFSLJ1CH	0	1519.34	05Jan2006, 23:00	
NFSLJ2CH	1.07	1553.29	05Jan2006, 23:30	414.5
NFSLJ3CH	7.764	1511.45	06Jan2006, 00:30	60.08
RES Airport PS	0.704	50	05Jan2006, 14:15	4.66
RES Escalon-Bellota	2.168	32.81	06Jan2006, 13:45	3.1
RES Farmington	216.2	2000	01Jan2006, 01:00	4.13
RES LT D1 at AT&SF	3.717	125.23	06Jan2006, 09:30	5.23
RES LT F1 at AT&SF RR	1.097	149.95	06Jan2006, 05:30	7.19
RES LT at 99	0	50.05	07Jan2006, 10:00	
RES LT at Austin	1.59	225.98	07Jan2006, 00:00	15.82
RES LT at Jack Tone	2.789	60.95	07Jan2006, 06:30	5.37
RES LT at Murphy	0	157.78	06Jan2006, 14:00	
RES LTC4	0	220.51	06Jan2006, 23:00	
RES NFSLJ1	1.07	37.17	06Jan2006, 02:45	3.95
RES NFSLJ2	6.694	224.46	06Jan2006, 05:00	3.89
RES Onsite	1.048	40.62	06Jan2006, 02:30	4.84

Tidewater Crossing

Table A-7: HEC-HMS Summary of Proposed Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
RES SFSLJA1	5.928	142.57	06Jan2006, 16:45	4.06
RES SJ Main Canal	2.98	13.83	07Jan2006, 00:00	1.19
RES SLJ	4.445	131.81	06Jan2006, 07:45	4.06
RES SLJ Mariposa	0	98.43	06Jan2006, 04:30	
RES SLJ at 99	3.308	778.39	06Jan2006, 03:15	14.47
RES TE D2	5.344	79.69	06Jan2006, 20:30	3.19
RES TE D3	3	47.56	06Jan2006, 13:15	3.52
RES TE E1	4.181	71.19	06Jan2006, 06:30	3.35
RES TE Jack Tone	2.6584	83.37	07Jan2006, 00:00	3.67
RES TE Mariposa	0	176.37	06Jan2006, 11:45	
RES TE Murphy	0	847.61	05Jan2006, 23:00	
RES TE Val Home	2.792	14.25	06Jan2006, 09:00	1.29
RES TE Van Allen	22.64	576.79	06Jan2006, 08:15	3.26
RES TE at EB Rd	11.478	662.9	05Jan2006, 23:00	3.8
RES Web Intermodal	0	70.49	06Jan2006, 02:15	
Rock1CH	19.8	5237.66	05Jan2006, 18:45	6.24
Rock2CH	25.9	6590.81	05Jan2006, 20:00	6.2
Rock3CH	41.9	9838.49	05Jan2006, 20:15	6.16
SFSLJ1CH	228.346	1762.97	05Jan2006, 23:00	2.23
SFSLJ2CH	235.019	2064.02	05Jan2006, 23:30	2.39
SFSLJ3CH	238.327	2533.31	06Jan2006, 02:45	2.55
SFSLJ4CH	327.6383	3532.61	06Jan2006, 02:00	2.51
SLJ CH	223.901	3871.76	05Jan2006, 22:15	4.15
Salt3 CH	4.6	1594.25	05Jan2006, 18:15	6.76
Subbasin Bachelor	43.1	6449.81	05Jan2006, 18:30	4.08
Subbasin Duck	28	3171.51	05Jan2006, 21:00	4.62
Subbasin FARM	32.5	5617.3	05Jan2006, 18:15	4.84
Subbasin LJ1	6.298	726.17	05Jan2006, 21:30	3.96
Subbasin LJ2	1.403	145.94	05Jan2006, 21:45	3.55
Subbasin LT A1	2.44	326.88	05Jan2006, 22:00	3.8
Subbasin LT A2	4	495.11	05Jan2006, 23:15	3.8
Subbasin LT A3	0.164	35.85	05Jan2006, 17:45	3.8
Subbasin LT B1	2.98	355.33	05Jan2006, 20:45	3.81
Subbasin LT B2	3.23	385.14	05Jan2006, 20:45	3.81
Subbasin LT B3	3.666	376.09	05Jan2006, 22:00	3.6
Subbasin LT B4	2.168	211.98	05Jan2006, 22:00	3.41
Subbasin LT B5	2.293	264.22	05Jan2006, 20:45	3.6
Subbasin LT C1	2.91	291.3	05Jan2006, 21:15	3.18
Subbasin LT C2	3.13	342.62	05Jan2006, 21:00	3.56
Subbasin LT C3	0.921	124.49	05Jan2006, 19:15	3.67
Subbasin LT C4a	1.59	206.71	05Jan2006, 19:45	3.76
Subbasin LT C4b	1.332	163.36	05Jan2006, 20:15	3.76
Subbasin LT D1	3.717	426.76	05Jan2006, 21:30	4.1
Subbasin LT D2	2.384	228.29	05Jan2006, 23:00	3.86
Subbasin LT E1	6.46	452.54	06Jan2006, 01:45	3.18
Subbasin LT F1	1.097	145.93	05Jan2006, 20:00	4.1
Subbasin LT F2	2.789	268.21	05Jan2006, 23:00	3.86
Subbasin LT G1	0.4469	88.53	05Jan2006, 17:30	3.86
Subbasin NFSLJ1	1.07	180.81	05Jan2006, 18:45	4.06

Tidewater Crossing

Table A-7: HEC-HMS Summary of Proposed Conditions

100-year 5-day San Joaquin County Multi-Day Distribution

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Subbasin NFSLJ2	6.694	837.82	05Jan2006, 20:00	3.81
Subbasin Onsite	1.048	184.2	05Jan2006, 18:30	4.96
Subbasin ROCK1	6.1	1718.04	05Jan2006, 17:30	6.08
Subbasin Rock2	16	4226.74	05Jan2006, 17:30	6.08
Subbasin Rock3	12.1	2909.48	05Jan2006, 19:15	5.4
Subbasin SALT1	2.2	774.11	05Jan2006, 17:15	6.76
Subbasin SALT2	2.4	900.4	05Jan2006, 17:00	6.76
Subbasin SALT3	15.2	3726.28	05Jan2006, 17:45	6.08
Subbasin SFSLJ A1	5.928	457.18	06Jan2006, 03:00	4.06
Subbasin SFSLJ1	0.745	108.15	05Jan2006, 19:15	4.06
Subbasin SFSLJ2	3.308	316.93	05Jan2006, 23:00	3.81
Subbasin SLJ	4.445	511.14	05Jan2006, 21:30	4.06
Subbasin TE A1	3.672	697.89	05Jan2006, 18:45	4.06
Subbasin TE B1	3.625	558.99	05Jan2006, 20:15	4.06
Subbasin TE B2	3.026	423.32	05Jan2006, 19:45	4.1
Subbasin TE B3	1.862	297.06	05Jan2006, 18:45	4.1
Subbasin TE B4	2.83	311.76	05Jan2006, 22:00	4.1
Subbasin TE C1	2.6584	273.28	05Jan2006, 22:00	3.86
Subbasin TE D1	2.792	476.91	05Jan2006, 19:30	4.06
Subbasin TE D2	5.344	474.61	06Jan2006, 00:45	4.1
Subbasin TE D3	3	347.3	05Jan2006, 21:30	4.1
Subbasin TE E1	4.181	658.45	05Jan2006, 20:15	4.06
Subbasin TE F1	5.135	549.08	05Jan2006, 22:15	4.1
Subbasin TE F2	3.468	400.99	05Jan2006, 21:30	4.1
Subbasin UPLJ1	35.1	7893.06	05Jan2006, 18:45	7.39
Subbasin UPLJ2	51.5	10228.15	05Jan2006, 18:45	6.08
Subbasin Web1a	3.719	531.43	05Jan2006, 19:45	4.47
Subbasin Web1b	1.512	255.85	05Jan2006, 19:30	4.31
Subbasin Web2a	0.941	147.36	05Jan2006, 19:00	4.66
Subbasin Web2b	0.704	152.27	05Jan2006, 17:45	4.66
Subbasin-Indus	0.539	138.89	05Jan2006, 17:15	5.69
TEB2aCH	11.478	662.9	05Jan2006, 23:00	3.8
TEB2bCH	19.614	720.56	06Jan2006, 03:45	3.14
TEB3CH	31.243	1503.35	05Jan2006, 21:45	3.49
TEB4CH	36.105	1465.86	05Jan2006, 21:00	3.45
TEC1CH	38.935	874.96	05Jan2006, 23:15	2.84
TED2OV	2.792	5.63	13Jan2006, 01:00	0.35
UPLJ2aCH	35.1	7816.31	05Jan2006, 20:30	7.39
UPLJ2bCH	35.1	7170.99	06Jan2006, 07:15	7.39
Web1bCH	3.719	368.11	05Jan2006, 22:30	4.47
Web2CH	5.231	410.38	05Jan2006, 21:30	4.17
Web1bCH	3.719	368.11	05Jan2006, 22:30	4.47
Web2CH	5.231	410.38	05Jan2006, 21:30	4.17

APPENDIX B

HYDRAULICS

Appendix B - Hydraulics

Appendix B Tables and Figures

Figure B- 1. Existing HEC-RAS Schematic layout

Figure B- 2. Existing French Camp Slough HEC-RAS Profile

Figure B- 3. Existing Lone Tree Creek HEC-RAS Profile

Figure B- 4. Existing North Fork South Littlejohns Creek HEC-RAS Profile

Figure B- 5. Existing South Fork South Littlejohns Creek HEC-RAS Profile

Figure B- 6. Existing Weber Creek HEC-RAS Profile

Figure B- 7. Proposed HEC-RAS Schematic layout

Figure B- 8. Proposed French Camp Slough HEC-RAS Profile

Figure B- 9. Proposed Lone Tree Creek HEC-RAS Profile

Figure B- 10. Proposed North Fork South Littlejohns Creek HEC-RAS Profile

Figure B- 11. Proposed South Fork South Littlejohns Creek HEC-RAS Profile

Figure B- 12. Proposed Weber Creek HEC-RAS Profile

Figure B- 13. HEC-RAS Work Map

Table B- 1. Existing Conditions HEC-RAS Results Table

Table B- 2. Proposed Conditions HEC-RAS Results Table

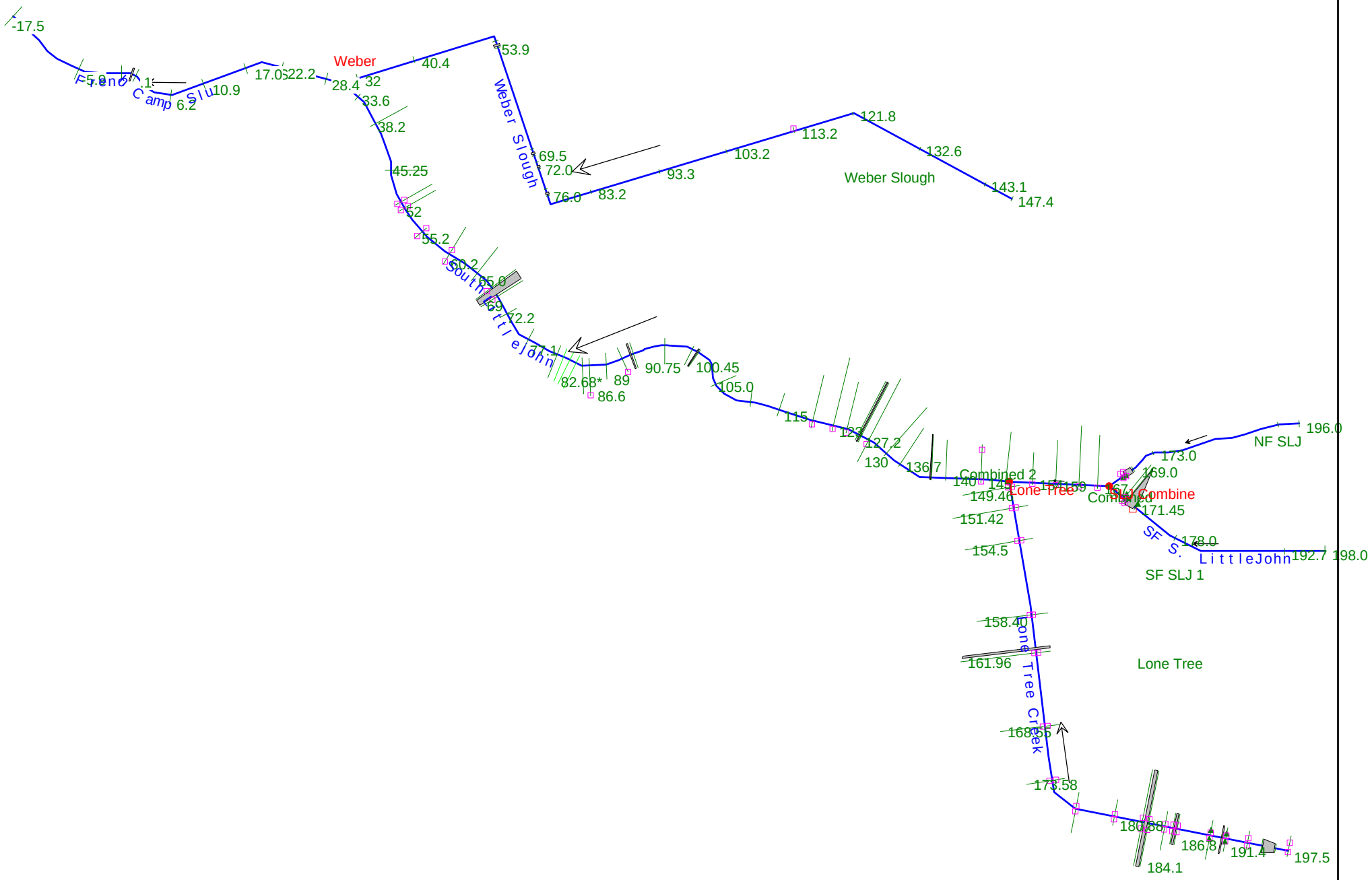


FIGURE B-1: EXISTING HEC-RAS SCHEMATIC LAYOUT

HEC-RAS Plan: Existing Profile: Existing

TABLE B-1: EXISTING HEC-RAS RESULTS TABLE

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Weber Slough	Weber Slough	147.4	400.00	20.47	27.54		1.94	233.92	68.45	0.16
Weber Slough	Weber Slough	143.1	400.00	20.52	27.42		2.37	201.78	55.72	0.18
Weber Slough	Weber Slough	132.6	400.00	20.81	27.05		2.69	180.02	57.13	0.21
Weber Slough	Weber Slough	121.8	400.00	21.14	26.31		3.86	121.77	45.00	0.32
Weber Slough	Weber Slough	113.2	400.00	18.88	25.98	22.02	2.44	173.97	43.64	0.19
Weber Slough	Weber Slough	103.2	400.00	18.36	25.64		2.55	162.95	53.10	0.21
Weber Slough	Weber Slough	93.3	400.00	18.03	25.11		3.03	133.71	45.45	0.26
Weber Slough	Weber Slough	83.2	400.00	17.50	24.89		1.78	233.73	56.78	0.14
Weber Slough	Weber Slough	76.0	350.00	16.92	24.74	20.28	2.03	195.06	48.19	0.15
Weber Slough	Weber Slough	75.5 Army Depot 2x30"	Culvert							
Weber Slough	Weber Slough	75	350.00	16.42	24.27		2.01	196.52	48.19	0.15
Weber Slough	Weber Slough	72.0	350.00	17.00	24.11	20.48	2.67	138.63	41.38	0.22
Weber Slough	Weber Slough	71.5 Driveway	Culvert							
Weber Slough	Weber Slough	71	350.00	16.85	23.11		3.31	105.73	27.21	0.30
Weber Slough	Weber Slough	70.0	350.00	16.68	23.07	20.01	2.85	134.67	50.25	0.24
Weber Slough	Weber Slough	69.5 Driveway	Culvert							
Weber Slough	Weber Slough	69	350.00	16.48	21.42		4.42	79.19	26.10	0.45
Weber Slough	Weber Slough	53.9	350.00	13.57	20.77	16.53	1.94	180.06	40.17	0.16
Weber Slough	Weber Slough	53.4 Airport Way	Culvert							
Weber Slough	Weber Slough	52.9	350.00	13.37	20.68		1.90	184.55	40.60	0.16
Weber Slough	Weber Slough	40.4	350.00	12.32	20.62		0.89	425.62	82.06	0.06
Weber Slough	Weber Slough	32	350.00	12.32	20.60		0.89	423.65	81.90	0.06
South Littlejohn	Combined	167	3885.00	16.41	27.97	23.62	2.43	2988.16	1111.09	0.15
South Littlejohn	Combined	164	3885.00	14.50	27.91	21.98	2.20	3697.34	1289.82	0.12
South Littlejohn	Combined	159	3885.00	14.72	27.78	23.04	2.95	2570.38	966.22	0.17
South Littlejohn	Combined	154	3885.00	15.86	27.56	22.69	3.71	1917.75	674.17	0.21
South Littlejohn	Combined 2	148.5	4385.00	14.90	27.38		3.25	2341.96	735.25	0.17
South Littlejohn	Combined 2	145	4385.00	14.72	27.11	22.23	4.54	1599.80	463.15	0.25
South Littlejohn	Combined 2	140	4385.00	14.39	26.85		4.27	1732.99	551.39	0.24
South Littlejohn	Combined 2	137.2	4385.00	14.22	26.75	21.29	4.24	1842.85	630.56	0.24
South Littlejohn	Combined 2	137 Farm Road	Bridge							
South Littlejohn	Combined 2	136.7	4385.00	14.22	26.33		4.79	1642.98	619.74	0.27
South Littlejohn	Combined 2	134	4385.00	13.70	26.20		4.14	2086.64	873.56	0.24
South Littlejohn	Combined 2	130	4385.00	14.27	26.11	21.25	3.48	2524.27	1023.68	0.20
South Littlejohn	Combined 2	127.2	4385.00	13.86	26.05	21.02	3.45	2241.29	875.91	0.21
South Littlejohn	Combined 2	127 Farm Road	Bridge							
South Littlejohn	Combined 2	126.7	4385.00	13.40	26.04		3.04	2518.97	891.74	0.18
South Littlejohn	Combined 2	125	4385.00	14.61	25.92	21.05	3.82	2077.71	718.99	0.22
South Littlejohn	Combined 2	123	4385.00	14.07	25.85	20.62	2.58	3173.83	1060.40	0.15
South Littlejohn	Combined 2	120	4385.00	13.53	25.69	19.64	3.10	2374.14	700.57	0.18
South Littlejohn	Combined 2	115	4385.00	13.06	25.51		3.12	1827.78	319.39	0.17
South Littlejohn	Combined 2	110.8	3930.00	11.73	25.22		4.26	1176.90	241.99	0.23
South Littlejohn	Combined 2	105.0	3930.00	12.67	25.04		3.68	1561.59	388.01	0.21
South Littlejohn	Combined 2	100.45	3930.00	11.83	24.63	19.07	4.61	1111.91	288.88	0.27
South Littlejohn	Combined 2	100 Farm Road	Bridge							
South Littlejohn	Combined 2	99.45	3930.00	11.63	24.43		4.76	1070.47	289.09	0.27
South Littlejohn	Combined 2	95.40	4040.00	12.36	24.13		4.87	1129.57	331.40	0.29
South Littlejohn	Combined 2	90.75	4040.00	6.21	23.99	15.98	3.50	1436.02	336.59	0.19
South Littlejohn	Combined 2	90.1 TSRR	Bridge							
South Littlejohn	Combined 2	89.5	4040.00	5.71	23.87	15.52	3.29	1548.59	337.02	0.18
South Littlejohn	Combined 2	89	4040.00	5.71	23.80		3.33	1524.63	334.98	0.18
South Littlejohn	Combined 2	86.6	4040.00	5.94	23.75	15.24	3.21	1855.83	510.75	0.17
South Littlejohn	Combined 2	85.60	4040.00	7.93	23.72		3.41	1792.53	496.30	0.18
South Littlejohn	Combined 2	84.64*	4040.00	7.93	23.68		3.45	1775.79	496.12	0.19
South Littlejohn	Combined 2	83.66*	4040.00	8.92	23.64		3.59	1731.74	492.32	0.20
South Littlejohn	Combined 2	82.68*	4040.00	9.92	23.60		3.72	1687.19	482.52	0.21
South Littlejohn	Combined 2	81.7	4040.00	10.91	23.56		3.86	1638.51	472.68	0.22
South Littlejohn	Combined 2	77.1	4040.00	9.78	23.02		5.37	968.40	310.41	0.31
South Littlejohn	Combined 2	72.2	4040.00	10.58	22.81		3.93	1254.58	269.10	0.25
South Littlejohn	Combined 2	69.4	4040.00	9.55	22.75	15.00	3.05	1721.30	496.08	0.17
South Littlejohn	Combined 2	69 Airport Way	Bridge							
South Littlejohn	Combined 2	67.9	4040.00	9.15	22.65	14.60	2.93	1808.59	498.52	0.16
South Littlejohn	Combined 2	65.0	4040.00	10.29	22.39		4.50	1395.01	590.34	0.28
South Littlejohn	Combined 2	60.2	4040.00	8.76	22.21	16.58	3.69	1815.68	610.00	0.20
South Littlejohn	Combined 2	55.2	4040.00	7.69	21.58	16.79	5.92	845.64	166.63	0.32
South Littlejohn	Combined 2	52	4040.00	6.41	21.39	16.46	5.05	1435.24	600.00	0.27
South Littlejohn	Combined 2	50.0	4040.00	6.30	21.34	16.35	4.95	1466.79	600.00	0.26
South Littlejohn	Combined 2	45.25	4040.00	5.97	21.15		4.04	1651.71	586.00	0.20
South Littlejohn	Combined 2	38.2	4040.00	3.80	20.93		3.68	1805.31	589.89	0.19
South Littlejohn	Combined 2	33.6	4040.00	4.66	20.34		5.65	776.65	107.29	0.30
SF S. LittleJohn	SF SLJ 1	198.0	1845.00	19.81	30.26		5.21	354.02	54.27	0.36
SF S. LittleJohn	SF SLJ 1	192.7	1845.00	19.04	29.85		4.69	393.67	56.56	0.31

TABLE B-1: EXISTING HEC-RAS RESULTS TABLE

HEC-RAS Plan: Existing Profile: Existing (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
SF S. LittleJohn	SF SLJ 1	178.0	1845.00	17.03	28.79		4.56	405.23	63.40	0.30
SF S. LittleJohn	SF SLJ 1	171.45	1845.00	18.46	28.46	23.43	4.06	468.69	78.19	0.26
SF S. LittleJohn	SF SLJ 1	171 Highway 99	Bridge							
SF S. LittleJohn	SF SLJ 1	169.95	1845.00	17.51	27.97	23.73	5.16	385.46	603.89	0.33
SF S. LittleJohn	SF SLJ 1	169.5	1845.00	17.51	27.97	23.73	4.86	446.64	603.88	0.31
NF S. LittleJohn	NF SLJ	196.0	1410.00	20.52	30.47		4.84	308.78	91.58	0.33
NF S. LittleJohn	NF SLJ	192.75	1410.00	20.13	30.25		4.49	317.93	58.38	0.31
NF S. LittleJohn	NF SLJ	173.0	1410.00	18.04	28.61		4.83	296.21	47.45	0.32
NF S. LittleJohn	NF SLJ	169.0	1410.00	17.61	28.32	23.55	4.66	309.65	52.03	0.30
NF S. LittleJohn	NF SLJ	168 Highway 99	Bridge							
NF S. LittleJohn	NF SLJ	167.5	1410.00	16.86	28.01	22.52	4.31	349.48	79.39	0.27
NF S. LittleJohn	NF SLJ	167.45	1410.00	16.81	27.98	22.46	4.29	350.82	79.52	0.27
Lone Tree Creek	Lone Tree	197.5	1130.00	23.06	30.51	26.90	2.39	634.02	195.00	0.17
Lone Tree Creek	Lone Tree	196.1	1130.00	22.66	30.25	26.69	4.08	282.25	60.17	0.30
Lone Tree Creek	Lone Tree	195.5 Hwy 99	Bridge							
Lone Tree Creek	Lone Tree	194.8	1130.00	22.53	30.02		4.16	276.09	58.89	0.31
Lone Tree Creek	Lone Tree	193.45	1130.00	21.68	30.13	26.32	1.84	724.82	209.45	0.15
Lone Tree Creek	Lone Tree	191.4	1130.00	22.97	29.85	26.80	3.98	299.59	224.00	0.31
Lone Tree Creek	Lone Tree	191	Bridge							
Lone Tree Creek	Lone Tree	189.92	1130.00	22.80	29.73	26.89	3.93	318.43	365.00	0.31
Lone Tree Creek	Lone Tree	186.8	1130.00	22.63	29.05	26.96	5.74	196.77	42.95	0.47
Lone Tree Creek	Lone Tree	186.7 Cart West	Bridge							
Lone Tree Creek	Lone Tree	186.4	1130.00	22.63	28.95	26.96	5.87	192.49	42.66	0.49
Lone Tree Creek	Lone Tree	185.64	1130.00	22.12	29.27	26.77	1.76	800.55	246.87	0.14
Lone Tree Creek	Lone Tree	184.1	1130.00	22.16	28.61	26.63	6.11	185.91	43.33	0.49
Lone Tree Creek	Lone Tree	183.7 RV Road	Bridge							
Lone Tree Creek	Lone Tree	183.5	1130.00	22.16	28.32	26.63	6.50	173.94	40.64	0.54
Lone Tree Creek	Lone Tree	180.88	1130.00	19.99	28.57	24.66	1.89	765.51	237.05	0.14
Lone Tree Creek	Lone Tree	177.23	1130.00	20.31	28.08	24.47	4.42	255.53	45.74	0.33
Lone Tree Creek	Lone Tree	173.58	1130.00	19.83	27.30	24.85	4.86	232.52	50.40	0.40
Lone Tree Creek	Lone Tree	168.55	500.00	18.33	27.52	21.65	0.33	1752.28	547.01	0.02
Lone Tree Creek	Lone Tree	161.96	500.00	17.77	27.51	22.77	0.22	2403.74	837.83	0.02
Lone Tree Creek	Lone Tree	161.5 Farm Road	Bridge							
Lone Tree Creek	Lone Tree	158.40	500.00	17.04	27.51	21.74	0.29	2013.72	663.54	0.02
Lone Tree Creek	Lone Tree	154.5	500.00	16.62	27.50	21.19	0.33	1846.64	634.00	0.02
Lone Tree Creek	Lone Tree	151.42	500.00	15.19	27.50	19.78	0.29	2190.21	705.52	0.02
Lone Tree Creek	Lone Tree	149.46	500.00	14.20	27.50	19.18	0.46	1523.63	536.07	0.03
French Camp Slu	FCS 2	28.4	4040.00	2.72	19.91		5.44	827.39	129.01	0.28
French Camp Slu	FCS 2	22.2	4040.00	2.88	19.05		6.38	738.24	120.22	0.33
French Camp Slu	FCS 2	17.0	4040.00	2.15	18.24		6.56	689.56	114.58	0.35
French Camp Slu	FCS 2	10.9	4040.00	2.35	17.08		6.94	622.50	109.08	0.39
French Camp Slu	FCS 2	6.2	4040.00	0.64	16.52		5.78	777.24	164.15	0.31
French Camp Slu	FCS 2	.1	4040.00	1.94	15.88	10.99	5.22	917.31	140.04	0.28
French Camp Slu	FCS 2	.08 Union Pacific Ra	Bridge							
French Camp Slu	FCS 2	.01	4040.00	1.94	15.10		5.85	810.71	132.01	0.33
French Camp Slu	FCS 2	-5.9	4040.00	1.00	14.52		4.46	905.48	87.29	0.24
French Camp Slu	FCS 2	-17.5	4040.00	1.50	14.00	6.32	3.24	1246.12	135.20	0.19

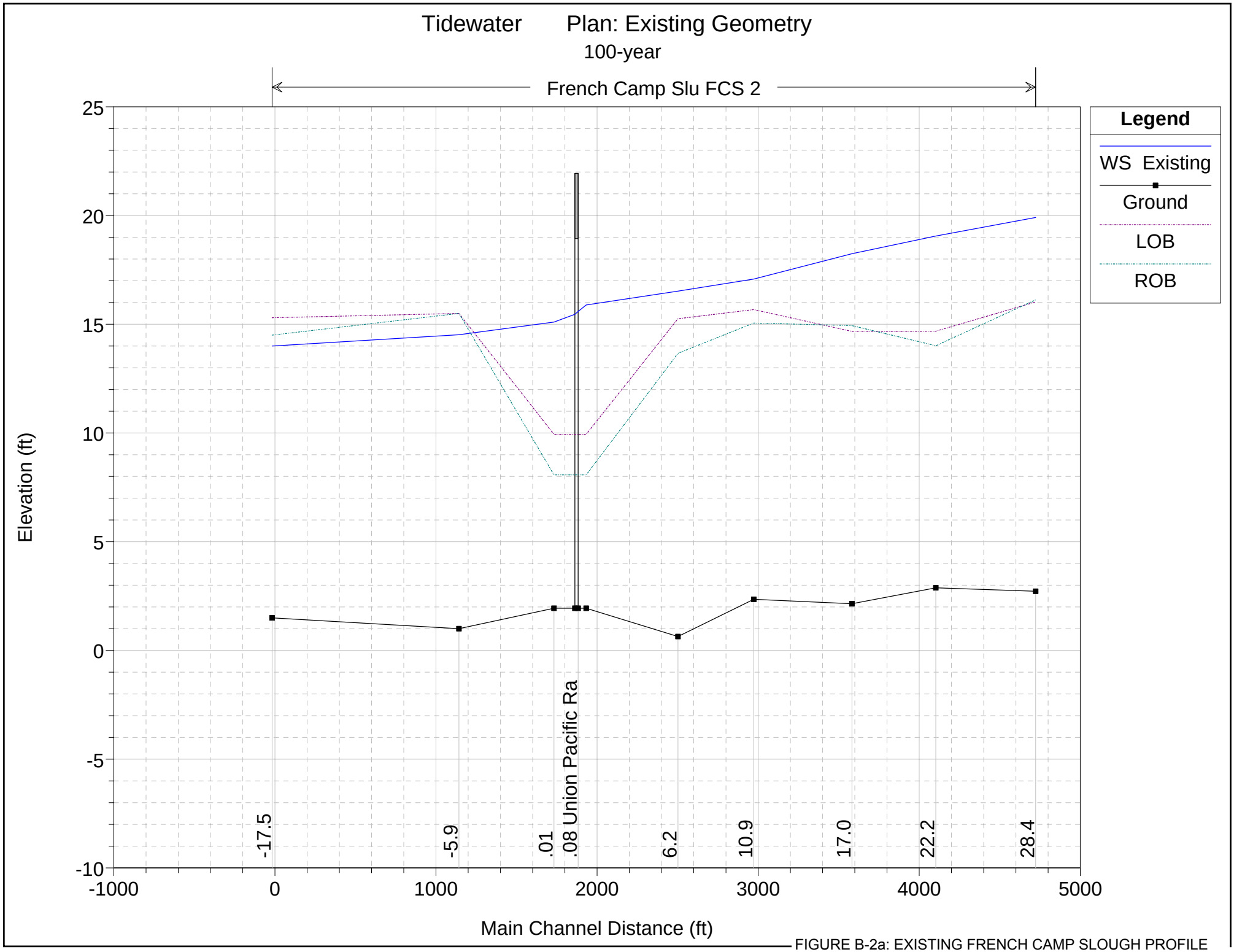


FIGURE B-2a: EXISTING FRENCH CAMP SLOUGH PROFILE

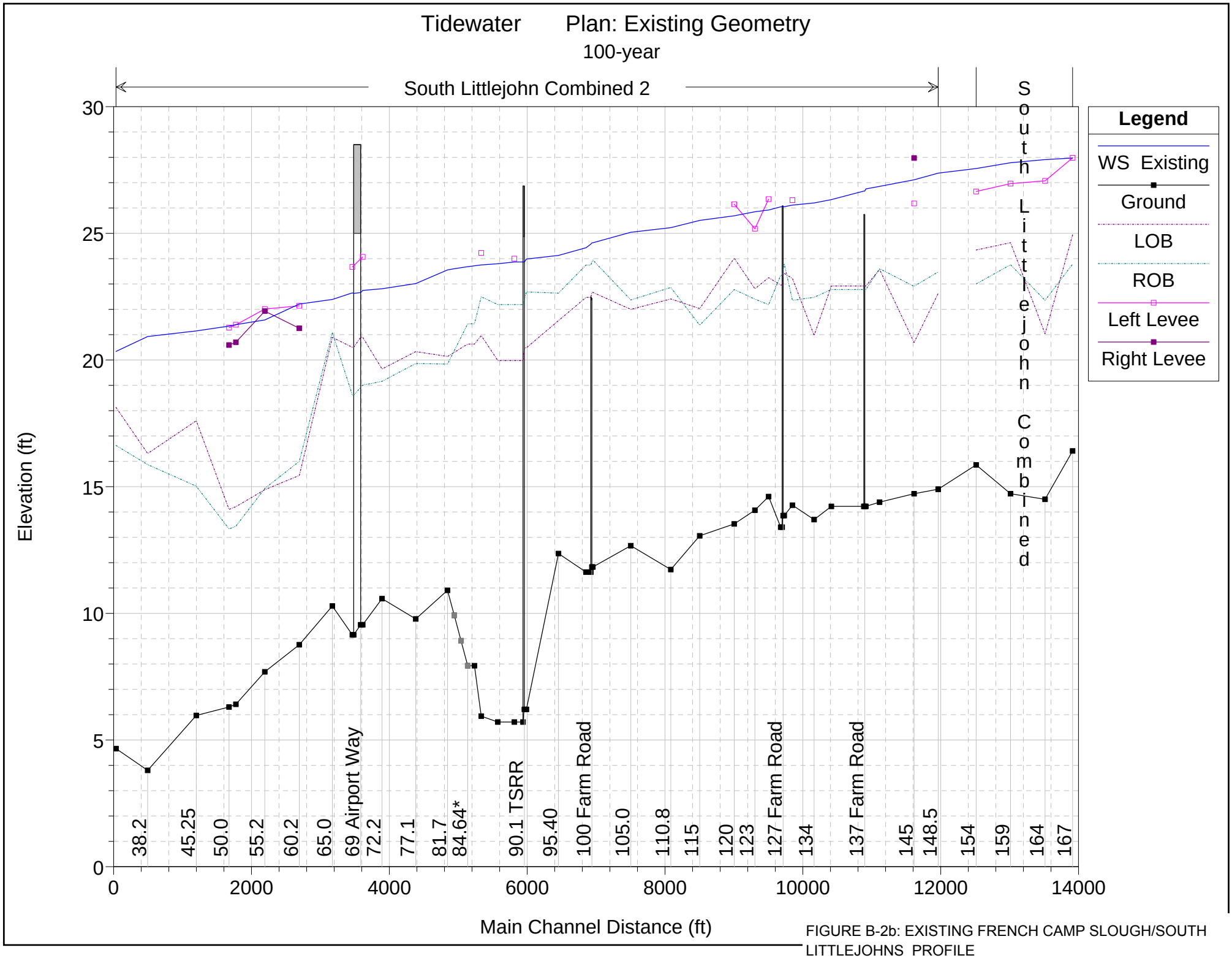


FIGURE B-2b: EXISTING FRENCH CAMP SLOUGH/SOUTH LITTLEJOHNS PROFILE

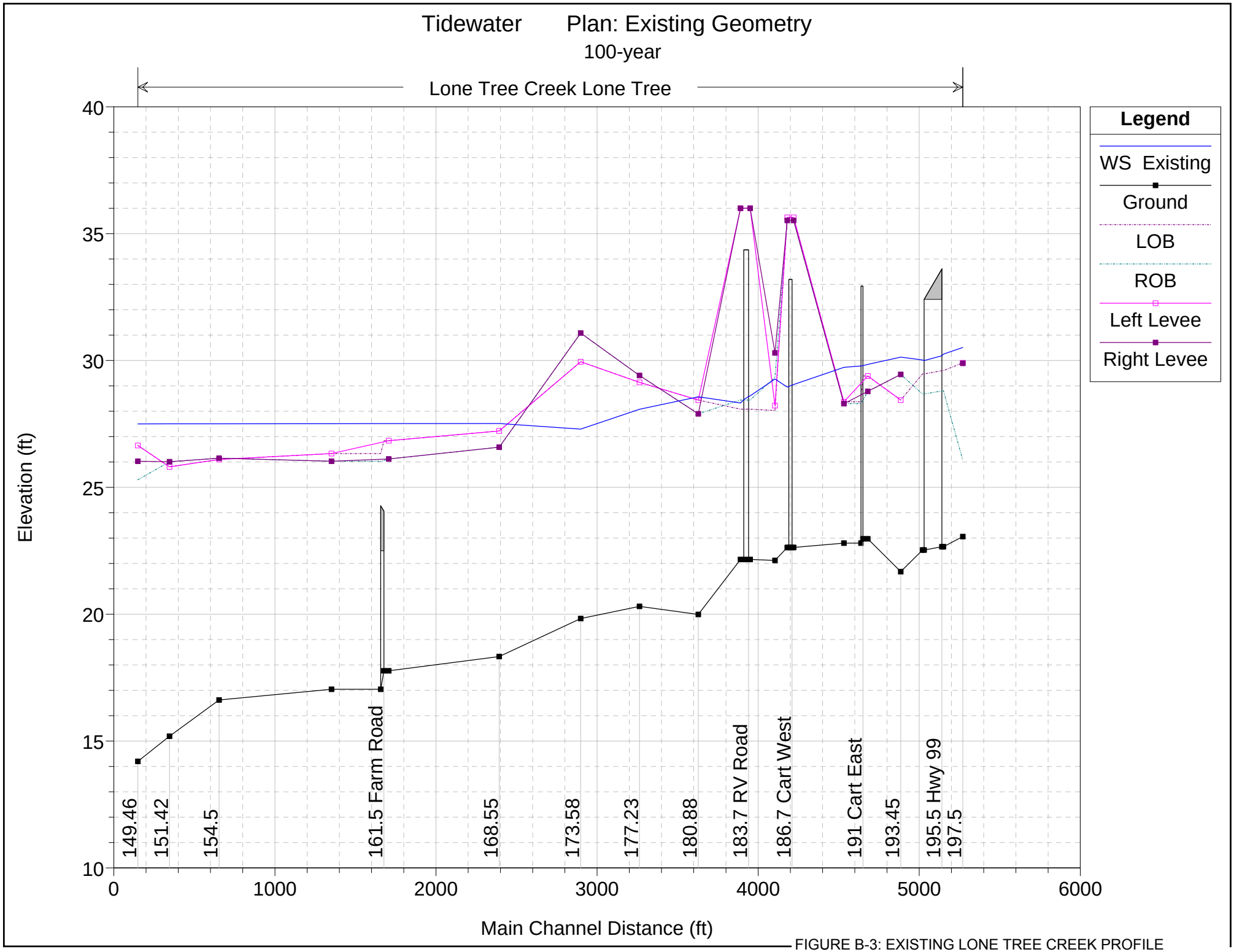


FIGURE B-3: EXISTING LONE TREE CREEK PROFILE

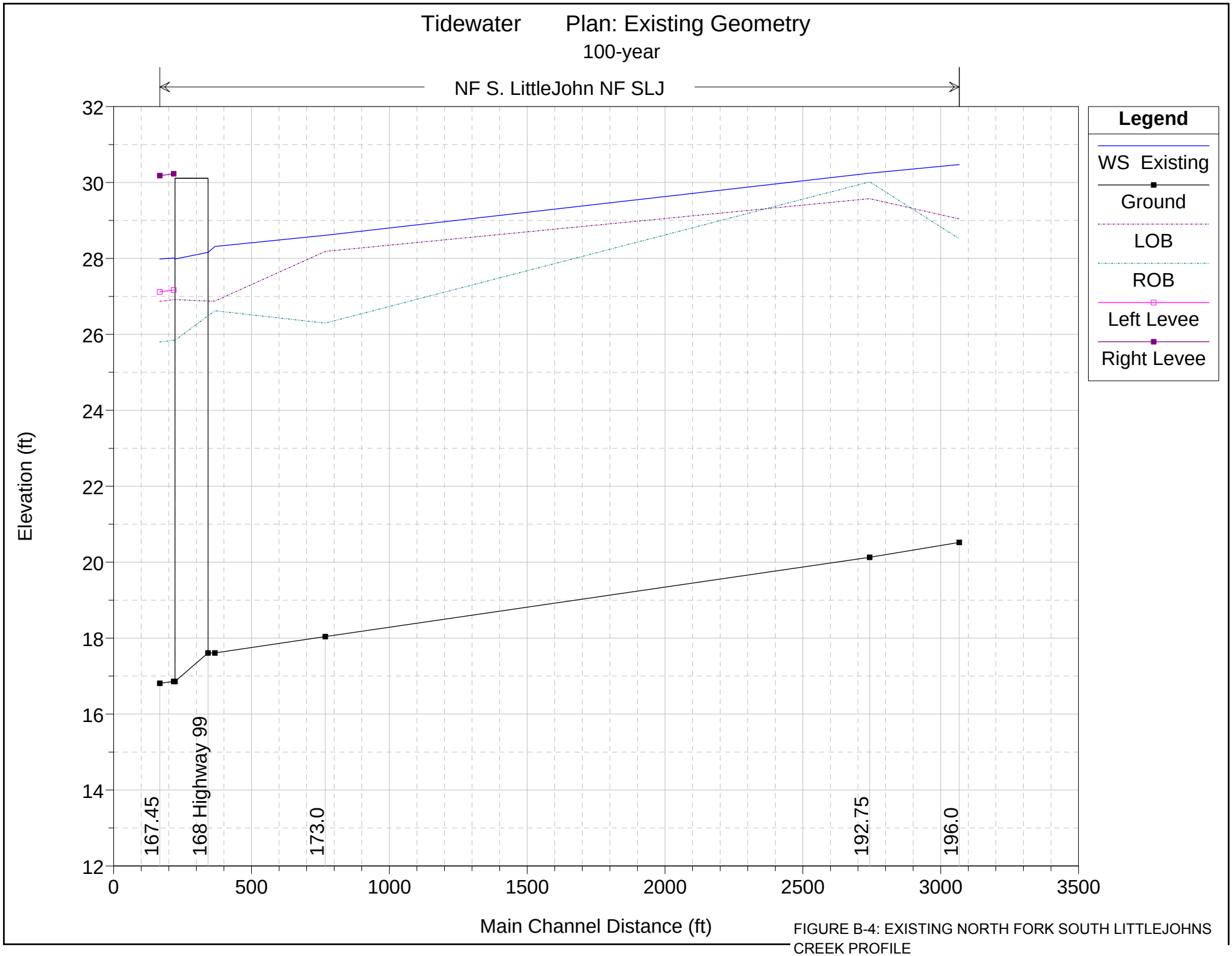


FIGURE B-4: EXISTING NORTH FORK SOUTH LITTLEJOHNS CREEK PROFILE

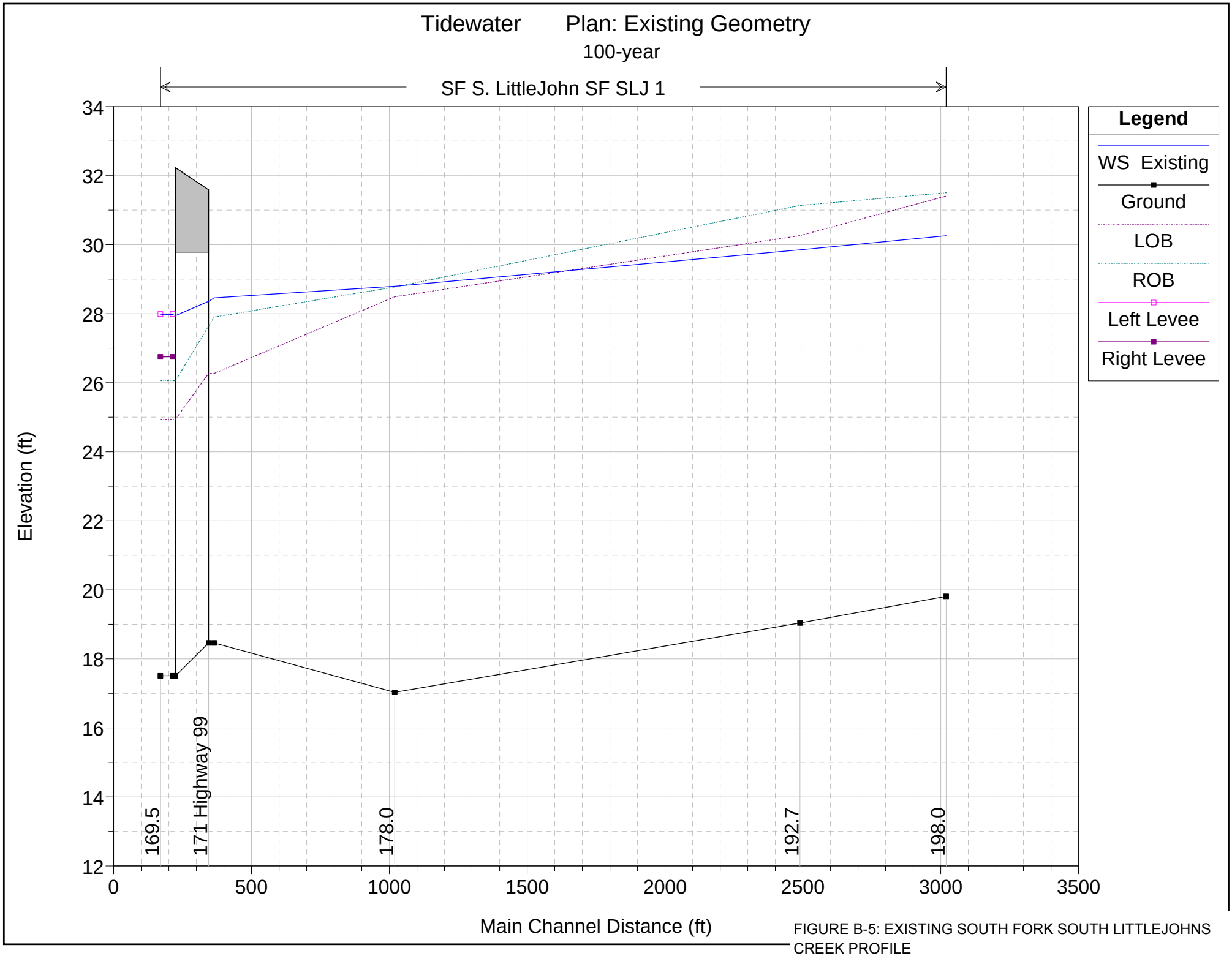


FIGURE B-5: EXISTING SOUTH FORK SOUTH LITTLEJOHNS CREEK PROFILE

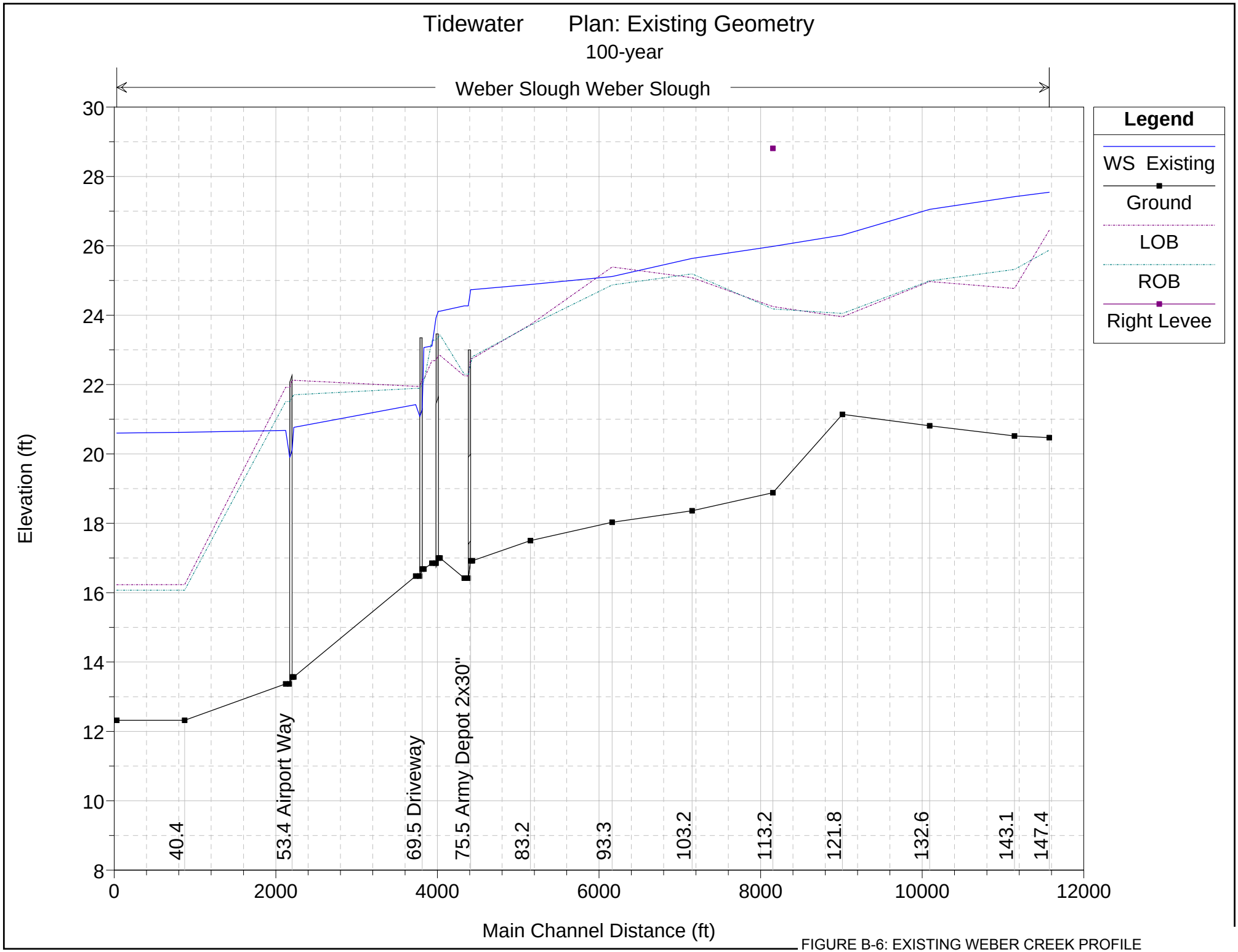


FIGURE B-6: EXISTING WEBER CREEK PROFILE

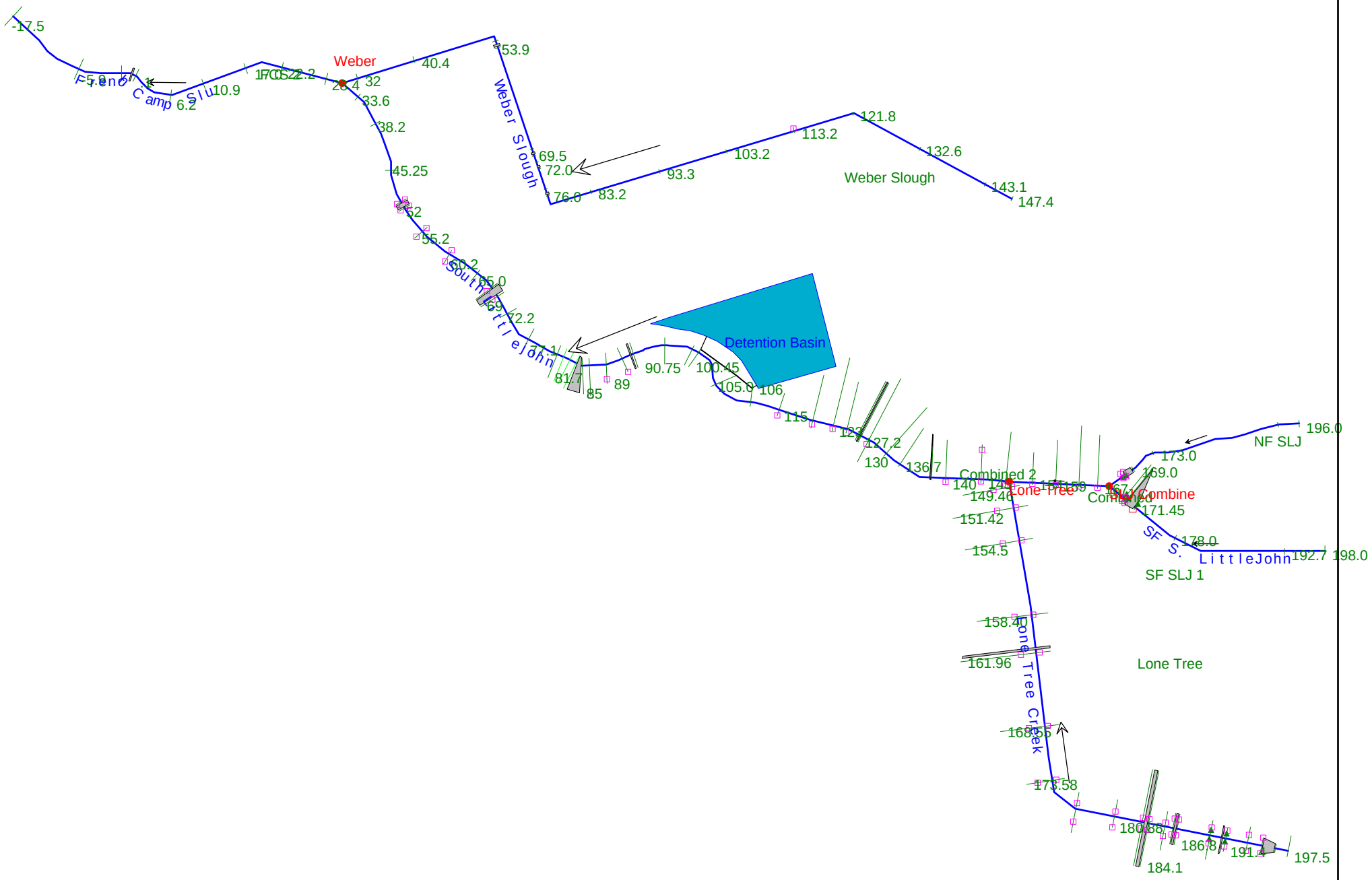


FIGURE B-7: PROPOSED CONDITIONS HEC-RAS SCHEMATIC LAYOUT

TABLE B-2: PROPOSED HEC-RAS RESULTS TABLE

HEC-RAS Plan: 9-13-06 Profile: Constrained

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Weber Slough	Weber Slough	147.4	300.00	20.47	26.80		1.78	183.25	68.45	0.15
Weber Slough	Weber Slough	143.1	300.00	20.52	26.68		2.17	160.48	55.72	0.18
Weber Slough	Weber Slough	132.6	300.00	20.81	26.28		2.55	135.91	57.13	0.22
Weber Slough	Weber Slough	121.8	300.00	21.14	25.37		3.90	81.66	32.71	0.37
Weber Slough	Weber Slough	113.2	300.00	18.88	24.94	21.58	2.33	130.81	37.57	0.20
Weber Slough	Weber Slough	103.2	300.00	18.36	24.51		2.53	118.78	31.01	0.23
Weber Slough	Weber Slough	93.3	300.00	18.03	23.81		3.17	94.62	26.53	0.30
Weber Slough	Weber Slough	83.2	300.00	17.50	23.42		1.92	156.16	42.70	0.18
Weber Slough	Weber Slough	76.0	300.00	16.92	23.08	20.03	2.70	115.02	48.19	0.24
Weber Slough	Weber Slough	75.5 14X4.5' Culvert	Culvert							
Weber Slough	Weber Slough	75	300.00	16.42	22.70		2.60	121.02	48.19	0.23
Weber Slough	Weber Slough	72.0	300.00	17.00	22.33	20.22	3.69	81.33	24.77	0.36
Weber Slough	Weber Slough	71.5 Driveway	Culvert							
Weber Slough	Weber Slough	71	300.00	16.85	22.03		3.86	77.62	24.25	0.38
Weber Slough	Weber Slough	70.0	300.00	16.68	21.92	19.77	3.44	87.28	27.27	0.34
Weber Slough	Weber Slough	69.5 Driveway	Culvert							
Weber Slough	Weber Slough	69	300.00	16.48	21.54		3.64	82.38	26.56	0.36
Weber Slough	Weber Slough	53.9	300.00	13.57	21.16	16.31	1.53	196.21	41.71	0.12
Weber Slough	Weber Slough	53.4 Airport Way	Culvert							
Weber Slough	Weber Slough	52.9	300.00	13.37	21.09		1.49	201.57	42.20	0.12
Weber Slough	Weber Slough	40.4	300.00	12.32	21.06		0.71	462.15	86.23	0.05
Weber Slough	Weber Slough	32	300.00	12.32	21.04		0.71	460.93	86.10	0.05
South Littlejohn	Combined	167	4000.00	16.41	28.23	23.72	2.22	3274.82	1112.66	0.13
South Littlejohn	Combined	164	4000.00	14.50	28.18	22.08	2.02	4023.10	1281.34	0.11
South Littlejohn	Combined	159	4000.00	14.72	28.08	23.14	2.67	2820.80	952.36	0.15
South Littlejohn	Combined	154	4000.00	15.86	27.90	22.79	3.37	2111.64	660.05	0.19
South Littlejohn	Combined 2	148.5	4965.00	14.90	27.72	21.29	3.29	2598.10	741.57	0.17
South Littlejohn	Combined 2	145	4965.00	14.72	27.44	22.72	4.68	1718.45	444.62	0.26
South Littlejohn	Combined 2	140	4965.00	14.39	27.19	22.16	4.32	1939.02	573.92	0.24
South Littlejohn	Combined 2	137.2	4965.00	14.22	27.10	21.73	4.25	2061.63	640.63	0.23
South Littlejohn	Combined 2	137 Farm Road	Bridge							
South Littlejohn	Combined 2	136.7	4965.00	14.22	26.70		4.70	1873.27	630.83	0.26
South Littlejohn	Combined 2	134	4965.00	13.70	26.59		3.93	2430.48	889.69	0.22
South Littlejohn	Combined 2	130	4965.00	14.27	26.52	21.74	3.26	2942.32	1035.72	0.18
South Littlejohn	Combined 2	127.2	4965.00	13.86	26.46	21.49	3.29	2605.04	890.31	0.20
South Littlejohn	Combined 2	127 Farm Road	Bridge							
South Littlejohn	Combined 2	126.7	4965.00	13.40	26.44		2.96	2875.78	934.89	0.18
South Littlejohn	Combined 2	125	4965.00	14.61	26.33	21.51	3.69	2370.85	723.53	0.21
South Littlejohn	Combined 2	123	4965.00	14.07	26.26	21.08	2.51	3547.77	1026.18	0.14
South Littlejohn	Combined 2	120	4965.00	13.53	26.11	20.07	3.05	2671.20	705.71	0.17
South Littlejohn	Combined 2	115	4965.00	13.06	25.92	18.35	3.28	1959.34	322.81	0.18
South Littlejohn	Combined 2	110.8	4965.00	11.73	25.51		5.11	1246.38	245.03	0.28
South Littlejohn	Combined 2	106 Lateral Weir	Lat Struct							
South Littlejohn	Combined 2	105.0	4965.00	12.67	25.26		4.40	1646.40	389.21	0.24
South Littlejohn	Combined 2	100.45	4130.00	11.83	24.88		4.58	1184.87	290.95	0.26
South Littlejohn	Combined 2	99.45	4130.00	11.63	24.81		4.59	1182.18	292.21	0.26
South Littlejohn	Combined 2	95.40	4130.00	12.36	24.58		4.44	1281.31	341.64	0.26
South Littlejohn	Combined 2	90.75	4130.00	6.21	24.46	16.09	3.29	1595.41	340.43	0.18
South Littlejohn	Combined 2	90.1 TSRR	Bridge							
South Littlejohn	Combined 2	89.5	4130.00	5.71	24.36	15.61	3.09	1716.15	343.43	0.16
South Littlejohn	Combined 2	89	4130.00	5.71	24.30	15.61	3.13	1745.23	394.50	0.16
South Littlejohn	Combined 2	86.6	4130.00	5.94	24.27	15.34	2.89	2123.39	520.93	0.15
South Littlejohn	Combined 2	85.60	4130.00	7.93	24.25	16.91	3.05	2059.22	507.99	0.16
South Littlejohn	Combined 2	85 New Bridge 1	Bridge							
South Littlejohn	Combined 2	84.64*	4130.00	7.93	24.21		3.08	2038.71	504.29	0.16
South Littlejohn	Combined 2	83.66*	4130.00	8.92	24.18		3.18	1996.36	498.95	0.17
South Littlejohn	Combined 2	82.68*	4130.00	9.92	24.15		3.27	1952.92	493.69	0.18
South Littlejohn	Combined 2	81.7	4130.00	10.91	24.12		3.36	1906.09	487.00	0.18
South Littlejohn	Combined 2	77.1	4130.00	9.78	23.74		4.70	1199.26	325.47	0.26
South Littlejohn	Combined 2	72.2	4130.00	10.58	23.60		3.43	1466.90	269.10	0.20
South Littlejohn	Combined 2	69.4	4130.00	9.55	23.52	15.06	3.14	1413.75	188.08	0.17
South Littlejohn	Combined 2	69 Airport Way	Bridge							
South Littlejohn	Combined 2	67.9	4130.00	9.15	23.47	14.66	3.02	1480.39	190.92	0.16
South Littlejohn	Combined 2	65.0	4130.00	10.29	23.04		5.24	917.43	182.46	0.32
South Littlejohn	Combined 2	60.2	4130.00	8.76	22.76	16.65	4.66	1079.40	185.00	0.25
South Littlejohn	Combined 2	55.2	4130.00	7.69	22.39	16.87	5.30	977.26	166.34	0.28
South Littlejohn	Combined 2	52	4130.00	6.41	21.90	16.55	6.14	777.81	103.59	0.32
South Littlejohn	Combined 2	51 New Bridge 2	Bridge							
South Littlejohn	Combined 2	50.0	4130.00	6.30	21.81	16.44	6.13	779.61	103.70	0.32
South Littlejohn	Combined 2	45.25	4130.00	5.97	21.62		4.65	1061.37	152.97	0.23
South Littlejohn	Combined 2	38.2	4130.00	3.80	21.20		4.90	981.44	152.00	0.25

TABLE B-2: PROPOSED HEC-RAS RESULTS TABLE

HEC-RAS Plan: 9-13-06 Profile: Constrained (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
South Littlejohn	Combined 2	33.6	4130.00	4.66	20.78		5.50	826.65	116.92	0.28
SF S. LittleJohn	SF SLJ 1	198.0	2475.00	19.81	31.32		5.98	414.00	59.24	0.40
SF S. LittleJohn	SF SLJ 1	192.7	2475.00	19.04	30.82		5.50	452.56	66.57	0.35
SF S. LittleJohn	SF SLJ 1	178.0	2475.00	17.03	29.44		5.60	446.69	65.53	0.35
SF S. LittleJohn	SF SLJ 1	171.45	2475.00	18.46	28.97	24.26	5.07	509.48	86.46	0.31
SF S. LittleJohn	SF SLJ 1	171 Highway 99	Bridge							
SF S. LittleJohn	SF SLJ 1	169.95	2475.00	17.51	28.11	24.71	6.71	414.16	620.00	0.42
SF S. LittleJohn	SF SLJ 1	169.5	2475.00	17.51	28.11	24.71	6.30	479.13	620.00	0.40
NF S. LittleJohn	NF SLJ	196.0	1315.00	20.52	30.41		4.57	303.34	89.06	0.31
NF S. LittleJohn	NF SLJ	192.75	1315.00	20.13	30.21		4.21	315.97	58.32	0.29
NF S. LittleJohn	NF SLJ	173.0	1315.00	18.04	28.90		4.33	310.32	52.93	0.28
NF S. LittleJohn	NF SLJ	169.0	1500.00	17.61	28.55	23.77	4.79	322.09	53.73	0.31
NF S. LittleJohn	NF SLJ	168 Highway 99	Bridge							
NF S. LittleJohn	NF SLJ	167.5	1500.00	16.86	28.24	22.71	4.44	363.48	80.66	0.27
NF S. LittleJohn	NF SLJ	167.45	1500.00	16.81	28.21	22.67	4.43	364.81	80.79	0.27
Lone Tree Creek	Lone Tree	197.5	1111.00	23.06	30.71		2.21	672.52	195.00	0.15
Lone Tree Creek	Lone Tree	196.1	1111.00	22.66	30.48	26.67	3.85	296.18	62.96	0.28
Lone Tree Creek	Lone Tree	195.5 Hwy 99	Bridge							
Lone Tree Creek	Lone Tree	194.8	1111.00	22.53	30.29	26.54	3.90	292.31	62.20	0.28
Lone Tree Creek	Lone Tree	193.45	1111.00	21.68	30.31	26.25	3.12	464.91	127.31	0.21
Lone Tree Creek	Lone Tree	191.4	1111.00	22.97	30.13	26.76	3.67	320.93	125.26	0.28
Lone Tree Creek	Lone Tree	191.0 Cart East	Bridge							
Lone Tree Creek	Lone Tree	189.92	1111.00	22.80	30.04	26.86	3.57	344.73	125.66	0.27
Lone Tree Creek	Lone Tree	186.8	1111.00	22.63	29.53	26.92	5.14	217.61	44.34	0.40
Lone Tree Creek	Lone Tree	186.7 Cart West	Bridge							
Lone Tree Creek	Lone Tree	186.4	1111.00	22.63	29.47	26.92	5.20	214.90	44.16	0.40
Lone Tree Creek	Lone Tree	185.64	1111.00	22.12	29.59	26.97	3.45	372.35	101.80	0.27
Lone Tree Creek	Lone Tree	184.1	1111.00	22.16	29.13	26.59	5.39	209.94	48.54	0.41
Lone Tree Creek	Lone Tree	183.7 RV Road	Bridge							
Lone Tree Creek	Lone Tree	183.5	1111.00	22.16	28.97	26.59	5.56	202.14	46.91	0.43
Lone Tree Creek	Lone Tree	180.88	1111.00	19.99	28.98	24.62	2.67	471.81	128.51	0.19
Lone Tree Creek	Lone Tree	177.23	1111.00	20.31	28.85	24.50	2.12	557.02	140.43	0.15
Lone Tree Creek	Lone Tree	173.58	1111.00	19.83	28.63	24.81	2.93	432.85	141.35	0.22
Lone Tree Creek	Lone Tree	168.55	1111.00	18.33	28.52	23.35	1.63	731.71	164.15	0.11
Lone Tree Creek	Lone Tree	161.96	1111.00	17.77	28.32	25.40	2.37	543.81	163.96	0.17
Lone Tree Creek	Lone Tree	161.5 Farm Road	Bridge							
Lone Tree Creek	Lone Tree	158.40	1111.00	17.04	28.17	25.55	2.07	598.69	163.37	0.14
Lone Tree Creek	Lone Tree	154.5	1111.00	16.62	27.94	23.37	2.28	566.79	165.09	0.15
Lone Tree Creek	Lone Tree	151.42	1111.00	15.19	27.86	21.94	1.95	647.89	163.80	0.12
Lone Tree Creek	Lone Tree	149.46	1111.00	14.20	27.77	21.39	2.50	554.62	164.18	0.15
French Camp Slu	FCS 2	28.4	4400.00	2.72	20.33		5.62	882.43	132.30	0.28
French Camp Slu	FCS 2	22.2	4400.00	2.88	19.46		6.58	787.56	123.06	0.34
French Camp Slu	FCS 2	17.0	4400.00	2.15	18.63		6.79	733.66	117.14	0.36
French Camp Slu	FCS 2	10.9	4400.00	2.35	17.40		7.25	657.65	111.14	0.40
French Camp Slu	FCS 2	6.2	4400.00	0.64	16.82		6.03	826.85	165.88	0.32
French Camp Slu	FCS 2	.1	4400.00	1.94	16.15	11.29	5.48	954.17	142.71	0.29
French Camp Slu	FCS 2	.08 Union Pacific Ra	Bridge							
French Camp Slu	FCS 2	.01	4400.00	1.94	15.28		6.21	834.46	133.84	0.35
French Camp Slu	FCS 2	-5.9	4400.00	1.00	14.61		4.82	913.61	87.55	0.26
French Camp Slu	FCS 2	-17.5	4400.00	1.50	14.00	6.58	3.53	1246.12	135.20	0.20

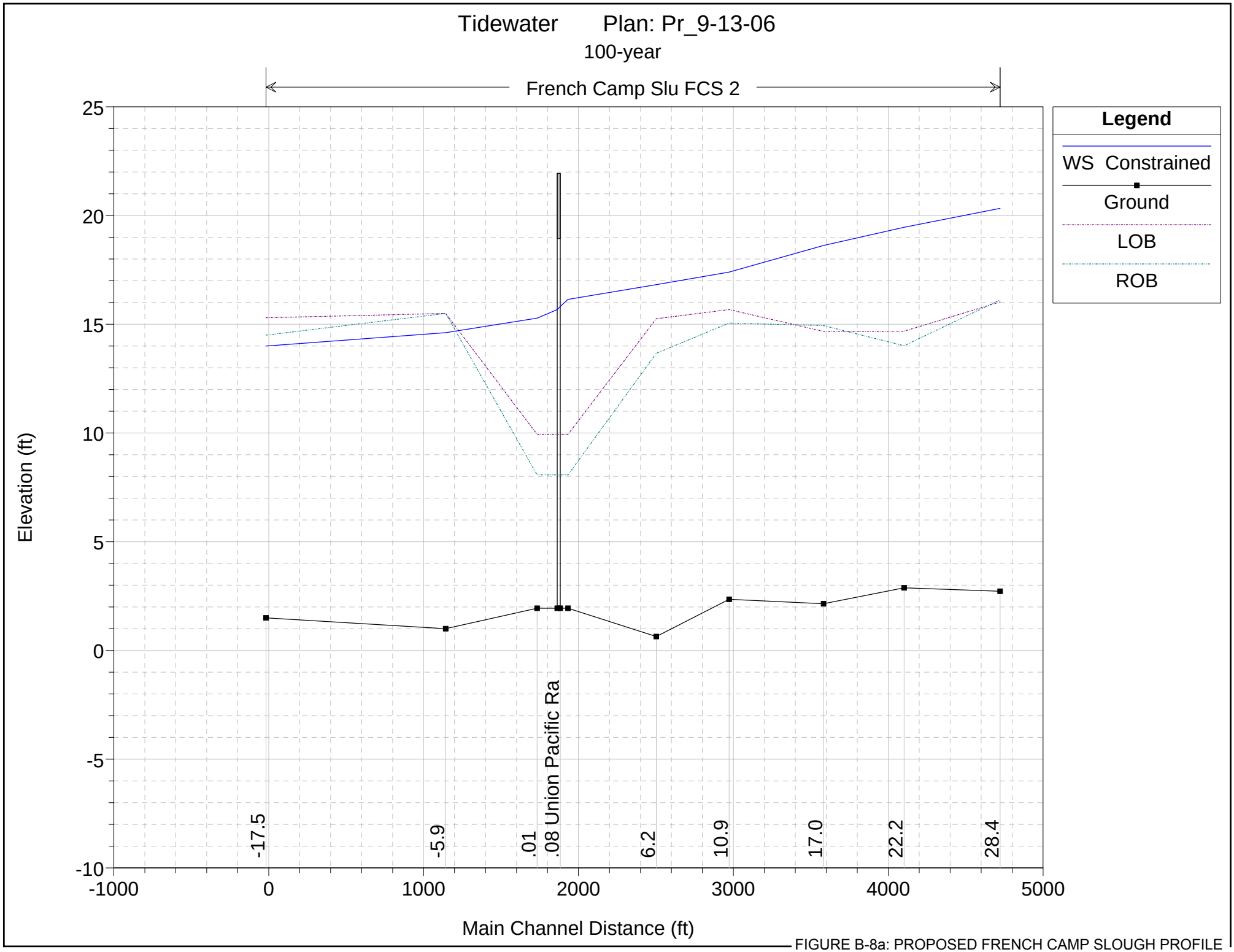


FIGURE B-8a: PROPOSED FRENCH CAMP SLOUGH PROFILE

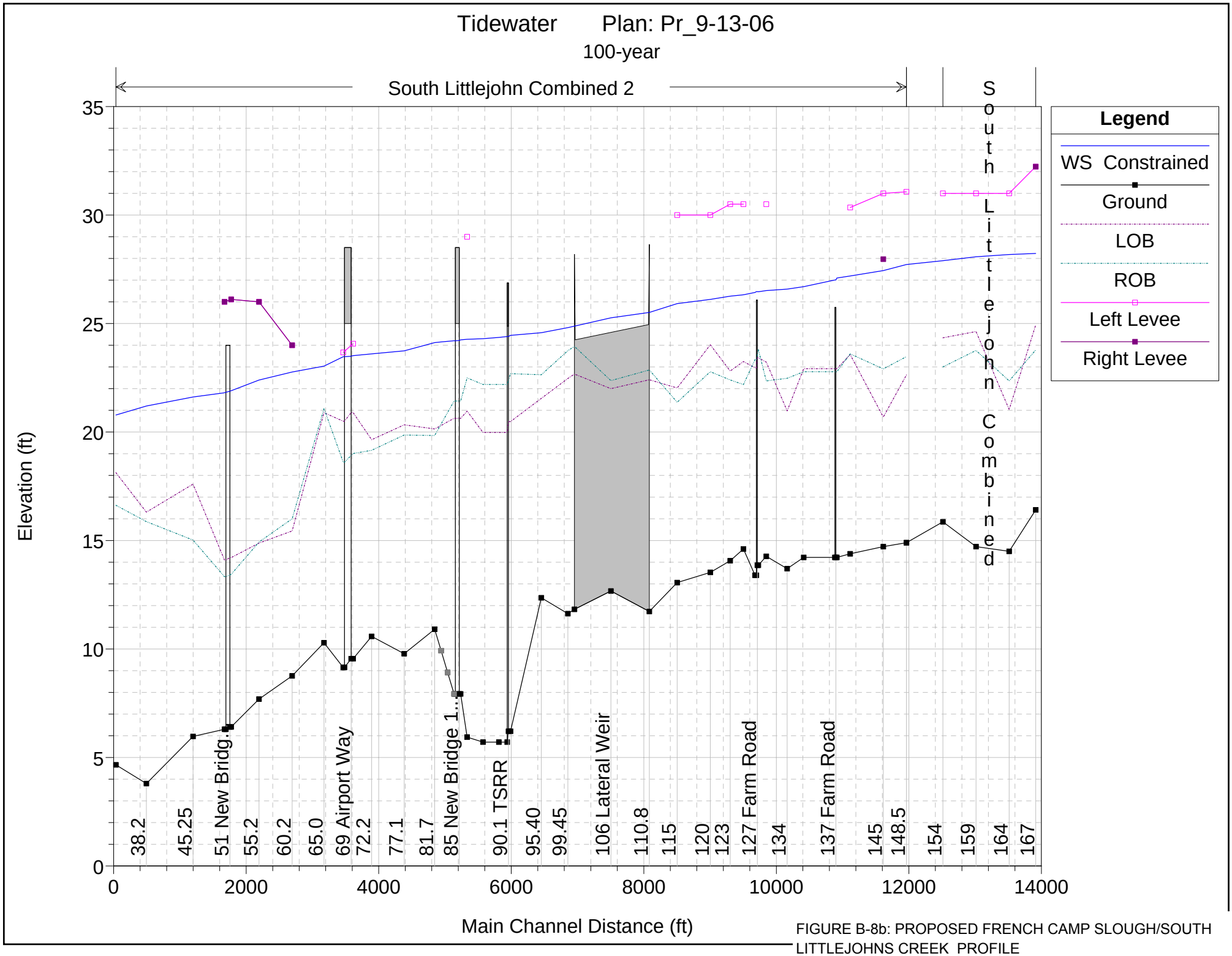


FIGURE B-8b: PROPOSED FRENCH CAMP SLOUGH/SOUTH LITTLEJOHNS CREEK PROFILE

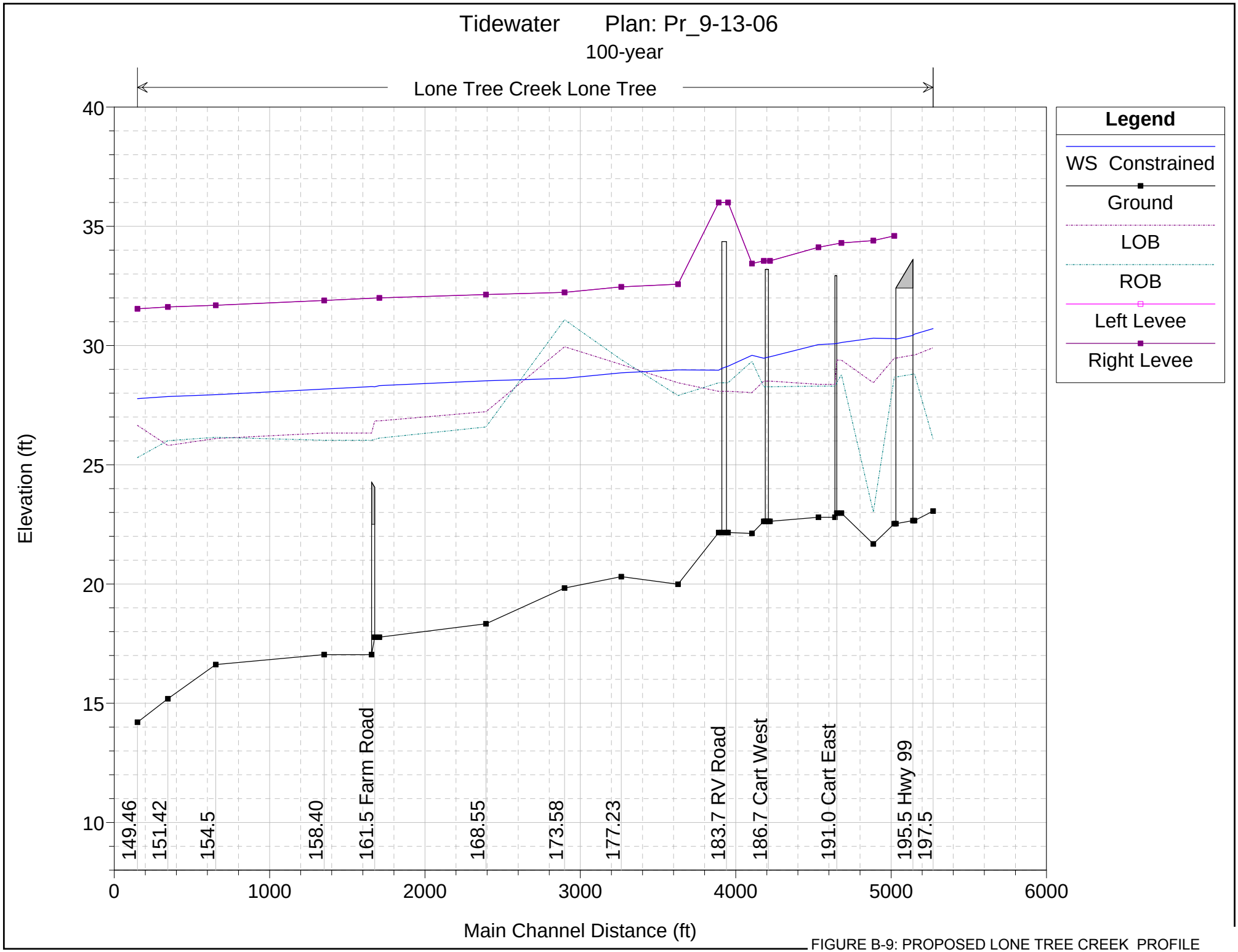


FIGURE B-9: PROPOSED LONE TREE CREEK PROFILE

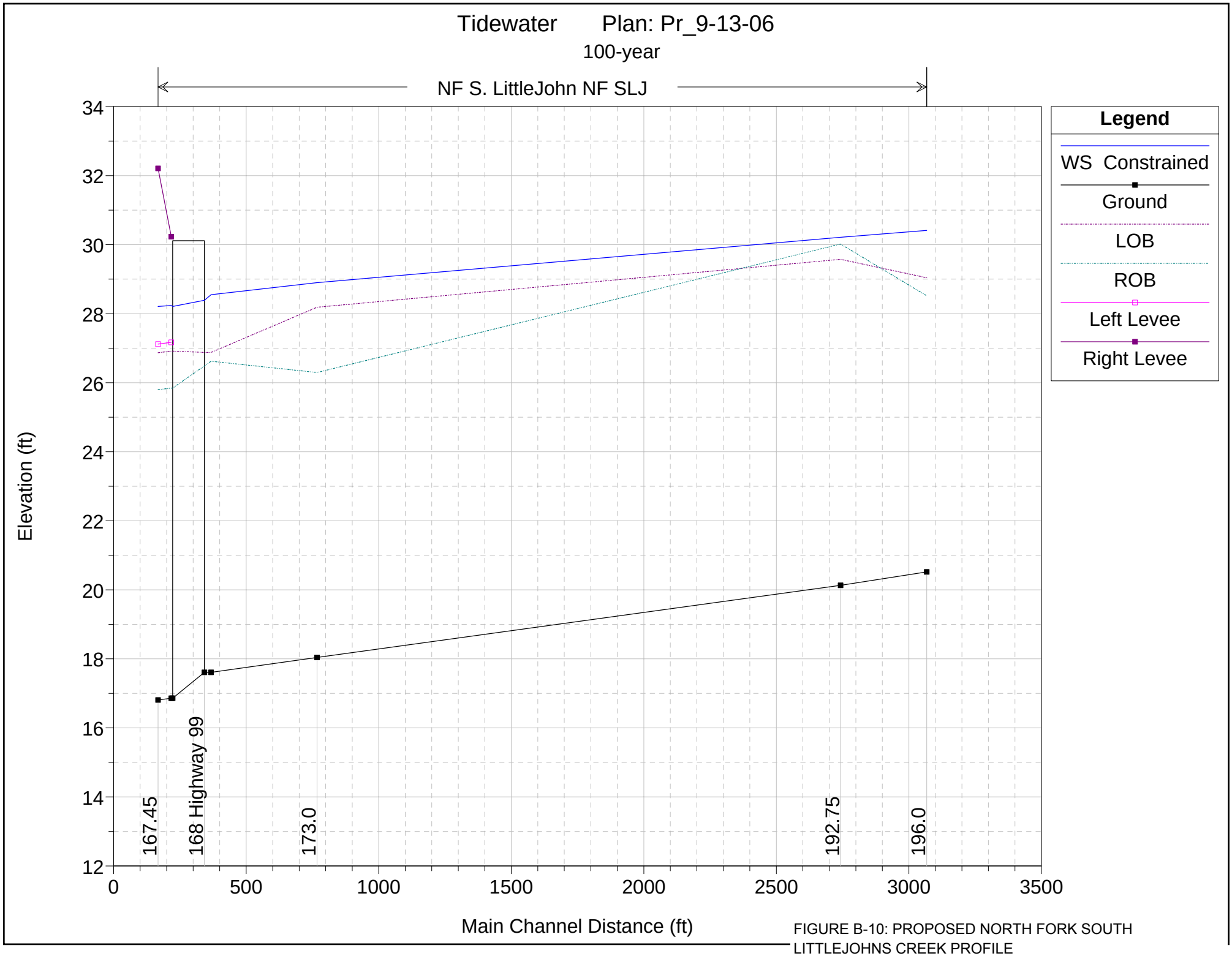


FIGURE B-10: PROPOSED NORTH FORK SOUTH LITTLEJOHNS CREEK PROFILE

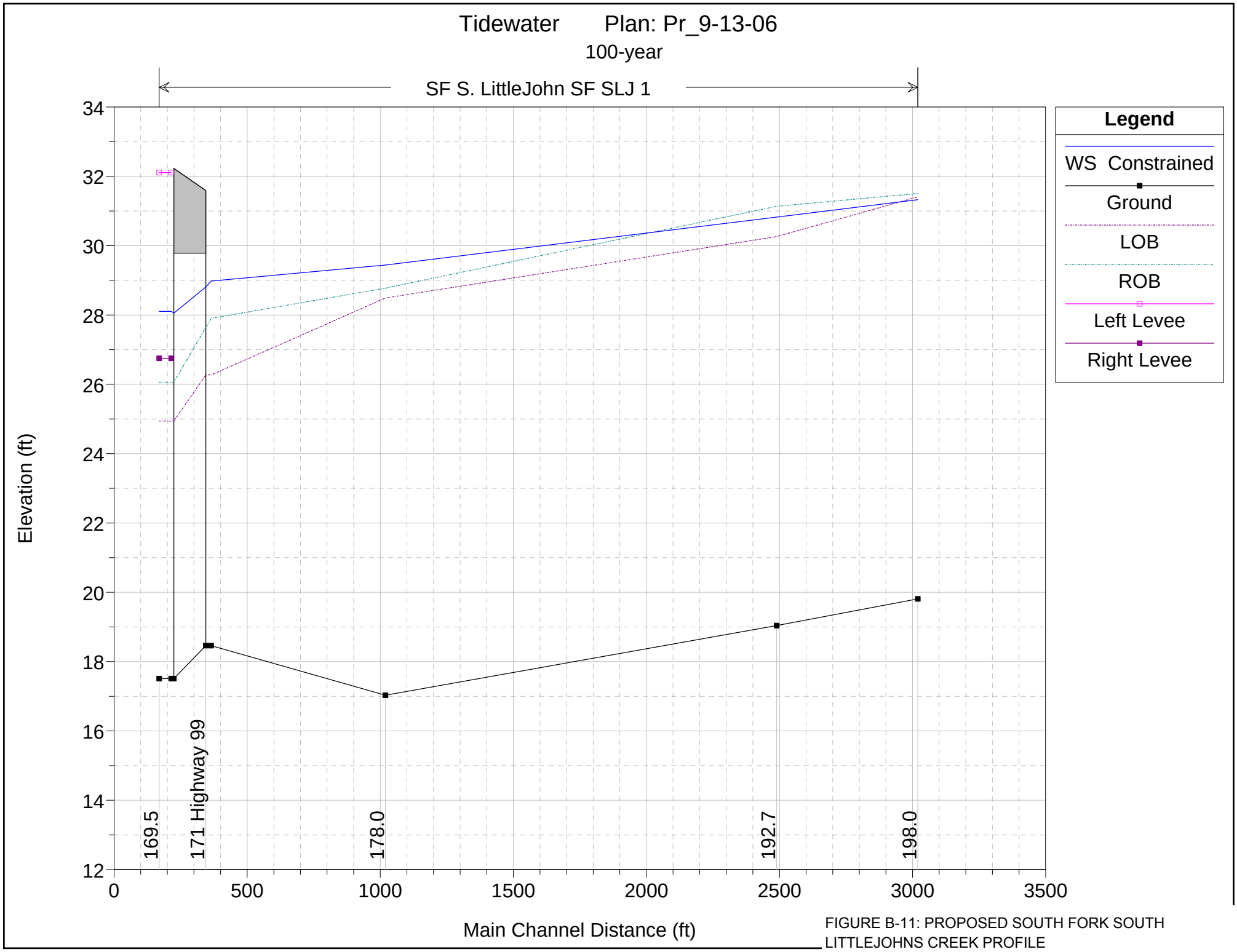


FIGURE B-11: PROPOSED SOUTH FORK SOUTH LITTLEJOHNS CREEK PROFILE

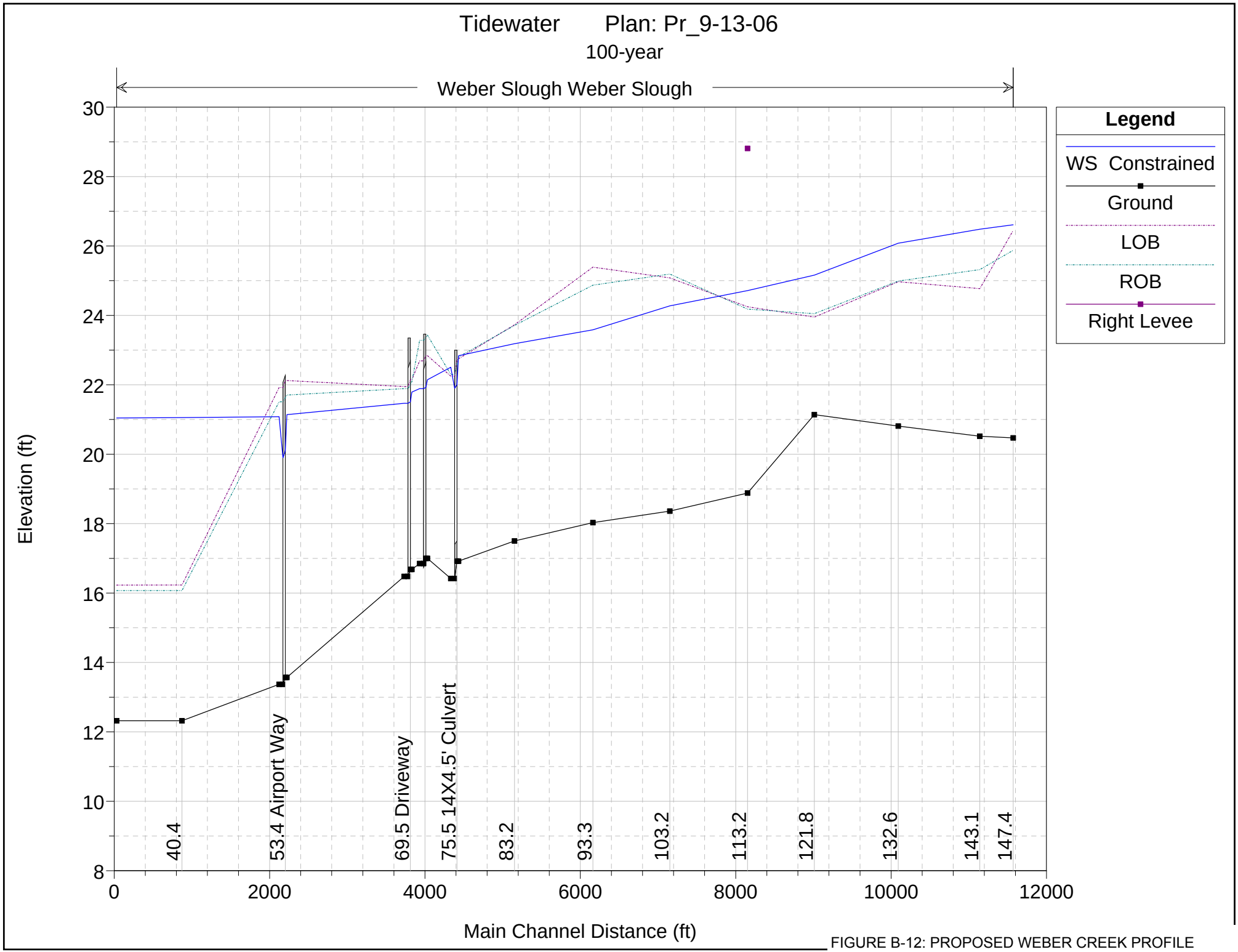
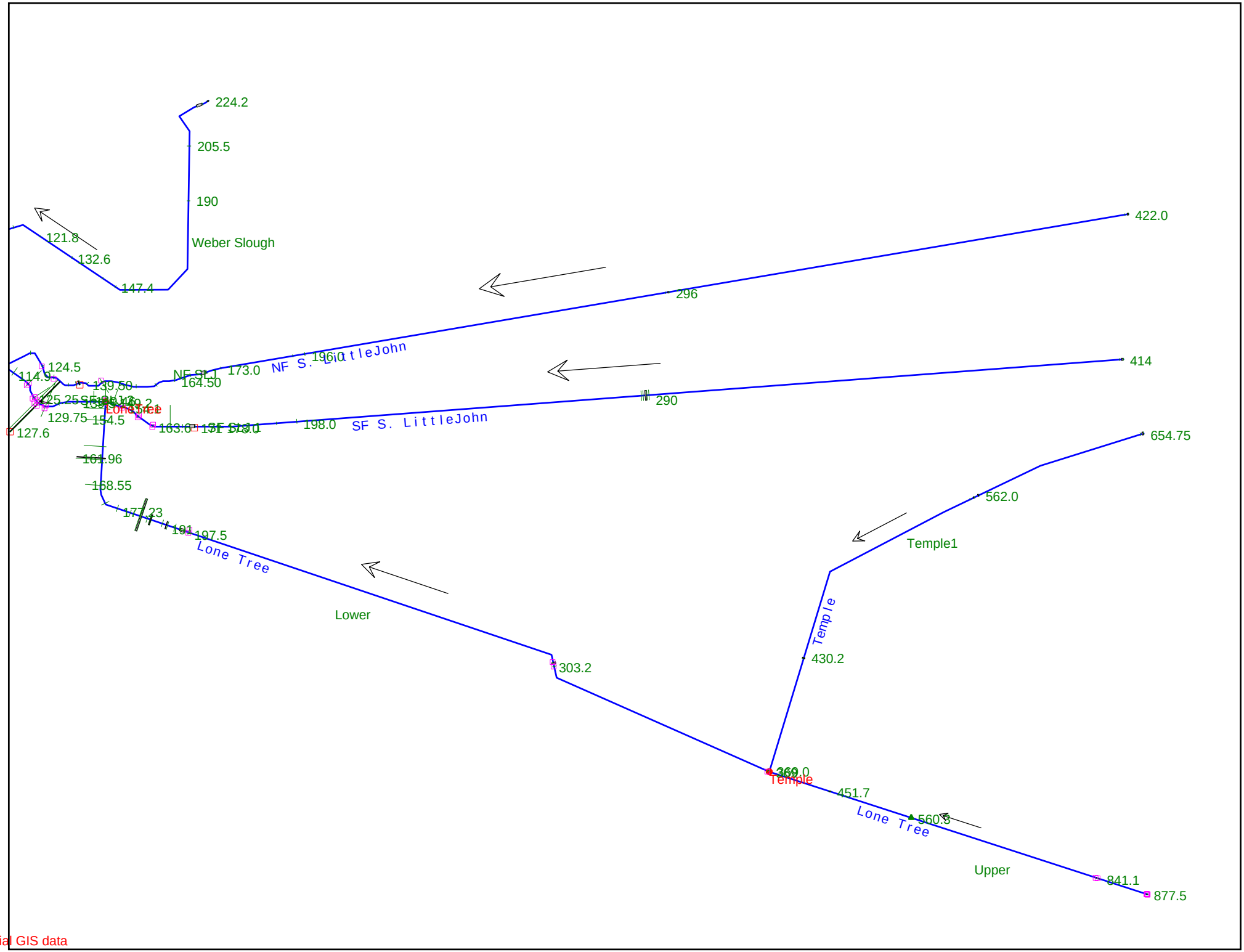


FIGURE B-12: PROPOSED WEBER CREEK PROFILE

APPENDIX C

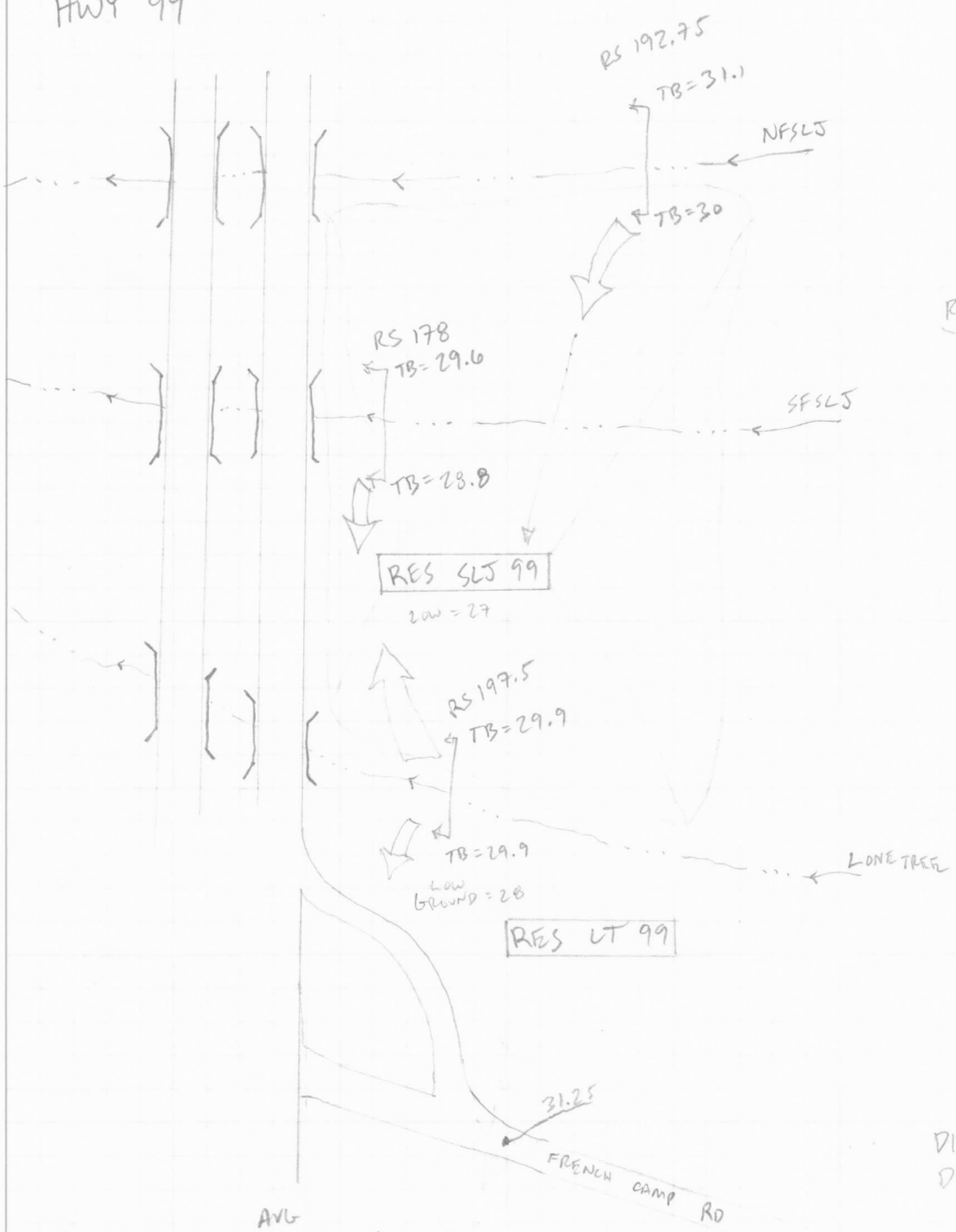
UPPER WATERSHED HYDRAULICS

Stream Capacity Calculations (Overbank losses, stream commingling, reservoir modeling)
Stream Crossing Capacity Calculations (Reservoir Storage/Discharge Relationship)


224.2
205.5
190
Weber Slough
121.8
132.6
147.4
422.0
296
NF S. LittleJohn
173.0
164.50
124.5
114.9
139.50
129.75
154.5
127.6
163.6
198.0
SF S. LittleJohn
290
414
654.75
562.0
Temple1
Temple
430.2
161.96
168.55
177.23
191
197.5
Lone Tree
Lower
303.2
369.0
Temple
451.7
Lone Tree
560.5
Upper
841.1
877.5
Partial GIS data

TIDEWATER

HWY 99



RS 192.75

Q	ELEV	DIV
1250	30.1	30
1500	30.6	200
1750	31.2	400
2000	31.8	550

RS 178

Q	ELEV	DIV
1750	29.0	10
2000	29.5	220
2300	30	450
2500	30.25	600

RS 197.5

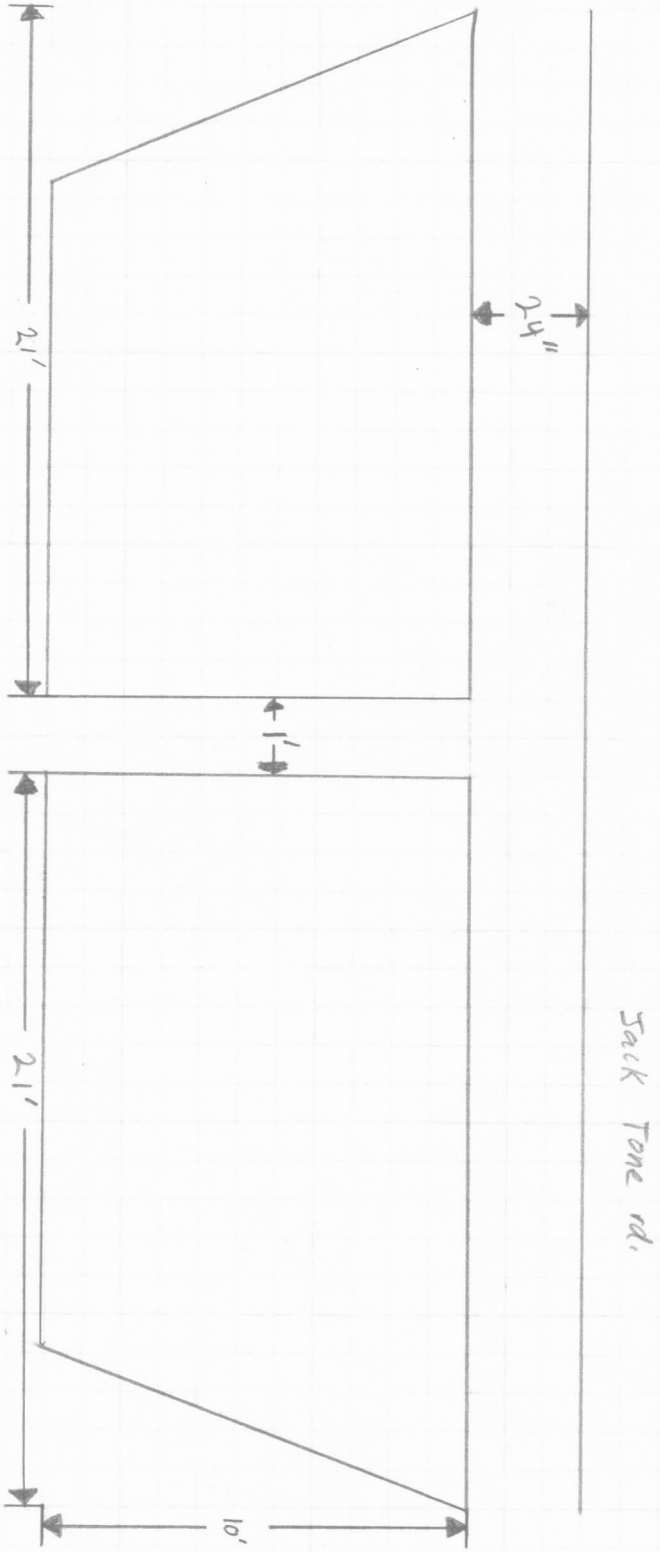
Q	ELEV	DIV
750	29.6	0
1000	30.4	150
1250	31.0	350
1500	31.6	550
1750	32.1	700
2000	32.6	850

DIV R = 0.75 DIV
DIV L = 0.25 DIV

	ELEV	AREA	AVG DEPTH	STORAGE	OUTFLOW
RES	29	160	2	320	10
	30	293	2.5	730	20
SLJ 99	31	480	3	1440	35
	32	1215	3.3	4000	200
	33	—	4	—	—
	30	36	2	72	5
LT 99	31	76	2.5	190	15
	32	115	3	345	400 → OVER FRENCH CAMP 0.75'
	33	135	3.5	475	2000 1700' WEIR UNDER 99?

STAEDTLER® No. 937 811E Engineer's Computation Pad

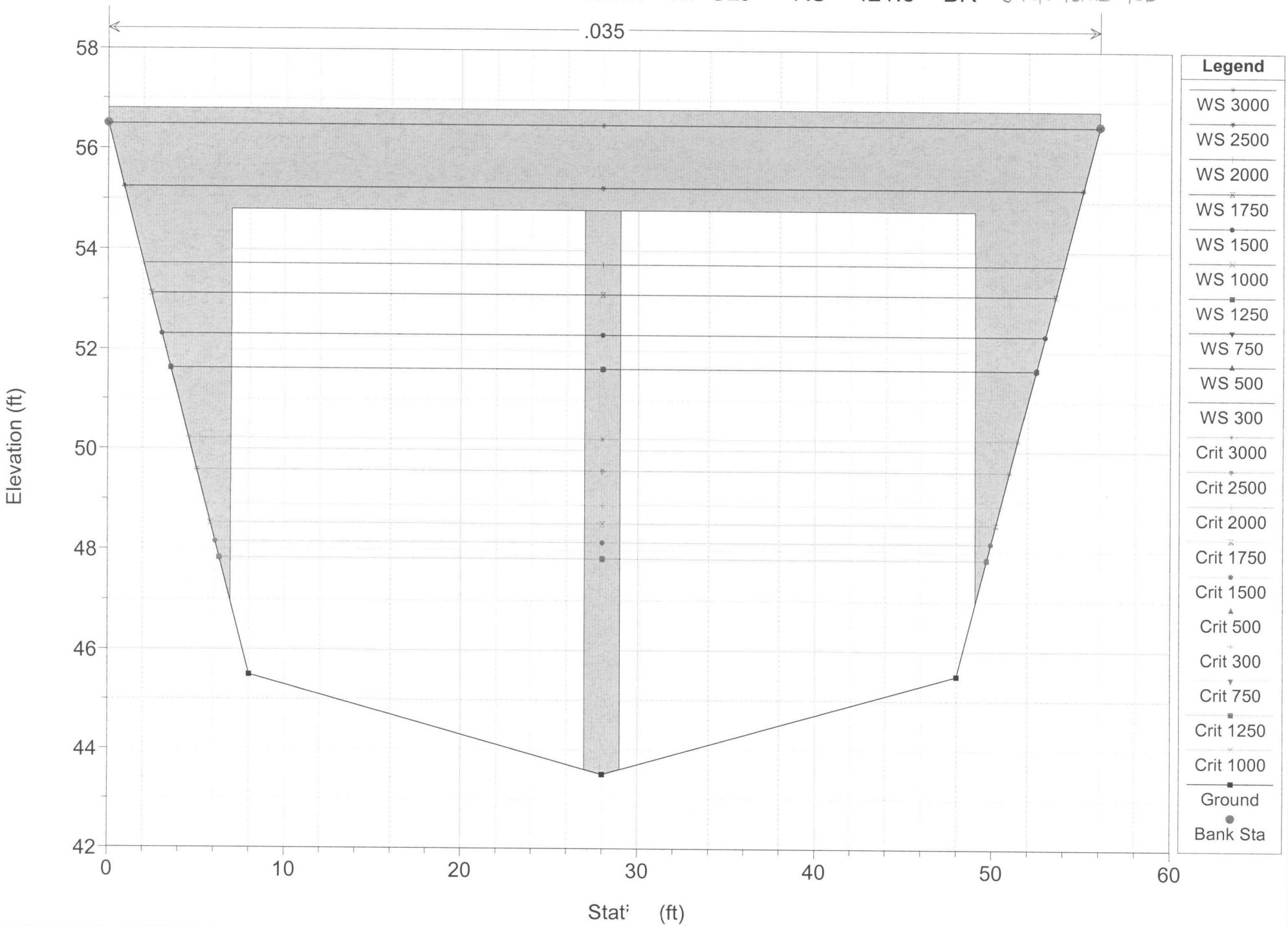
NORTH FORK SOUTH LITTLEJOHNS CREEK
@ JACK TONE ROAD



STAEDTLER® No. 937 811E Engineer's Computation Pad

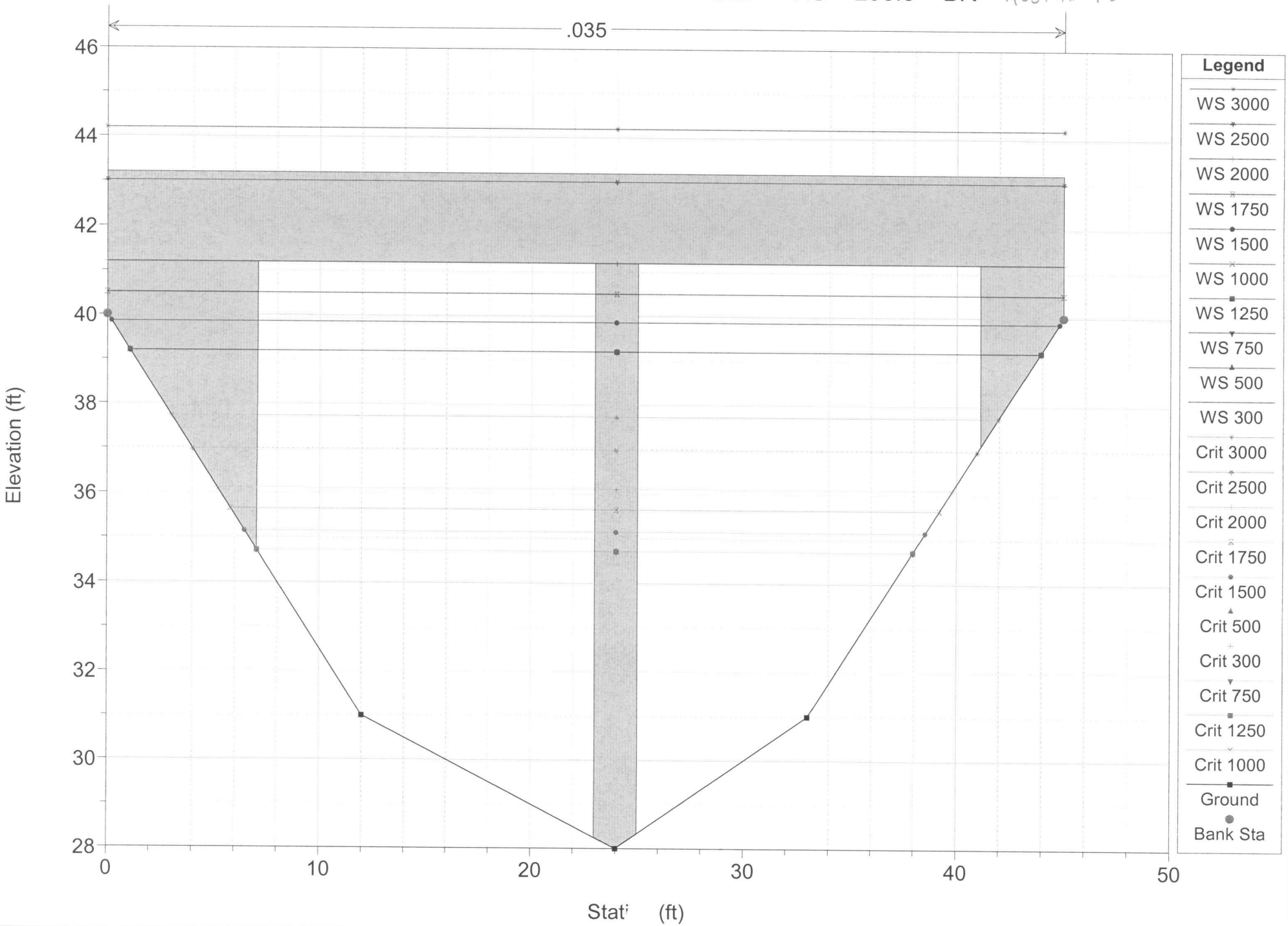
Upper Watershed Plan: Test

River = NF S. LittleJohn Reach = NF SLJ RS = 421.5 BR JACK TONE RD



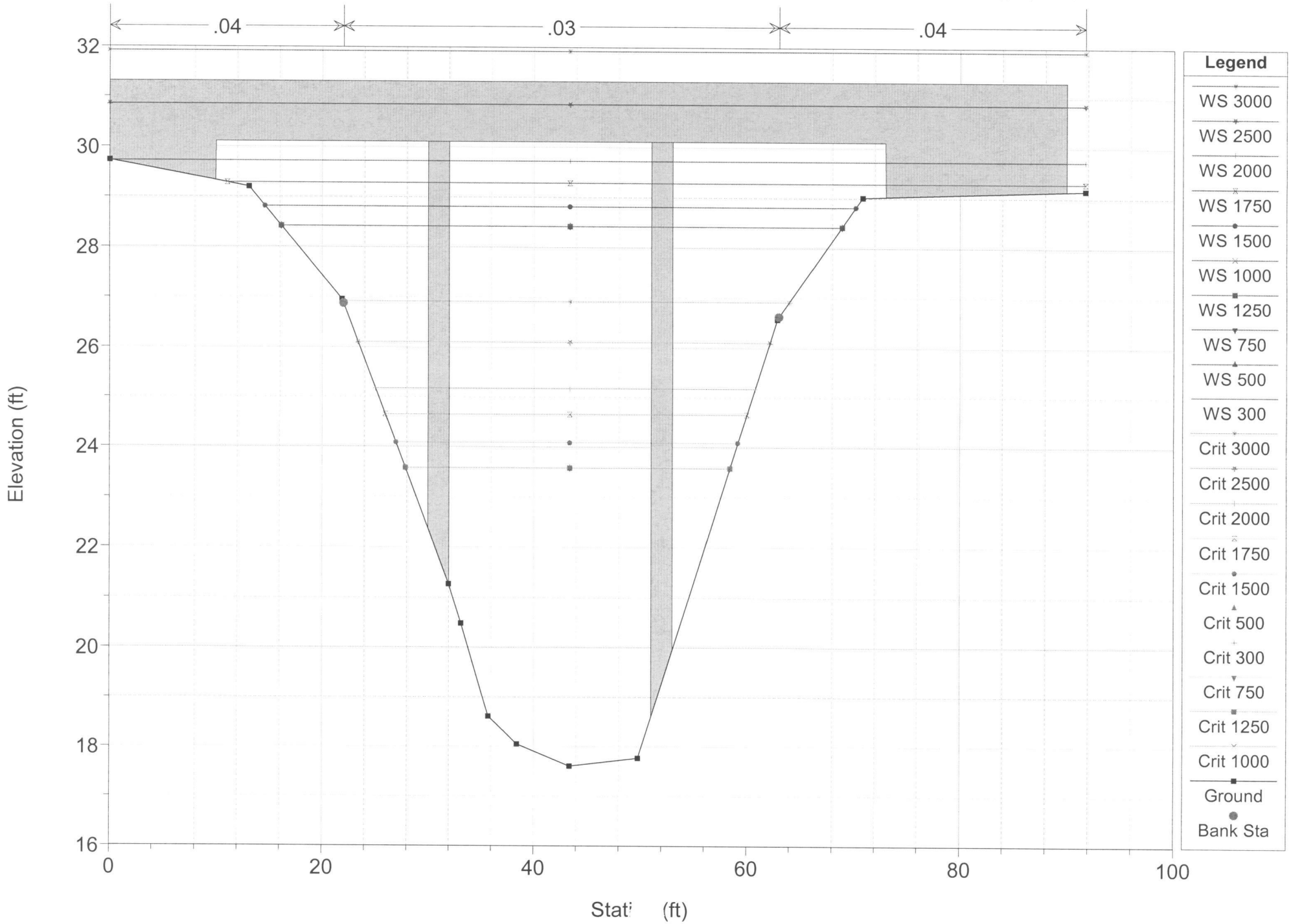
Upper Watershed Plan: Test

River = NF S. LittleJohn Reach = NF SLJ RS = 295.5 BR AUSTIN RD

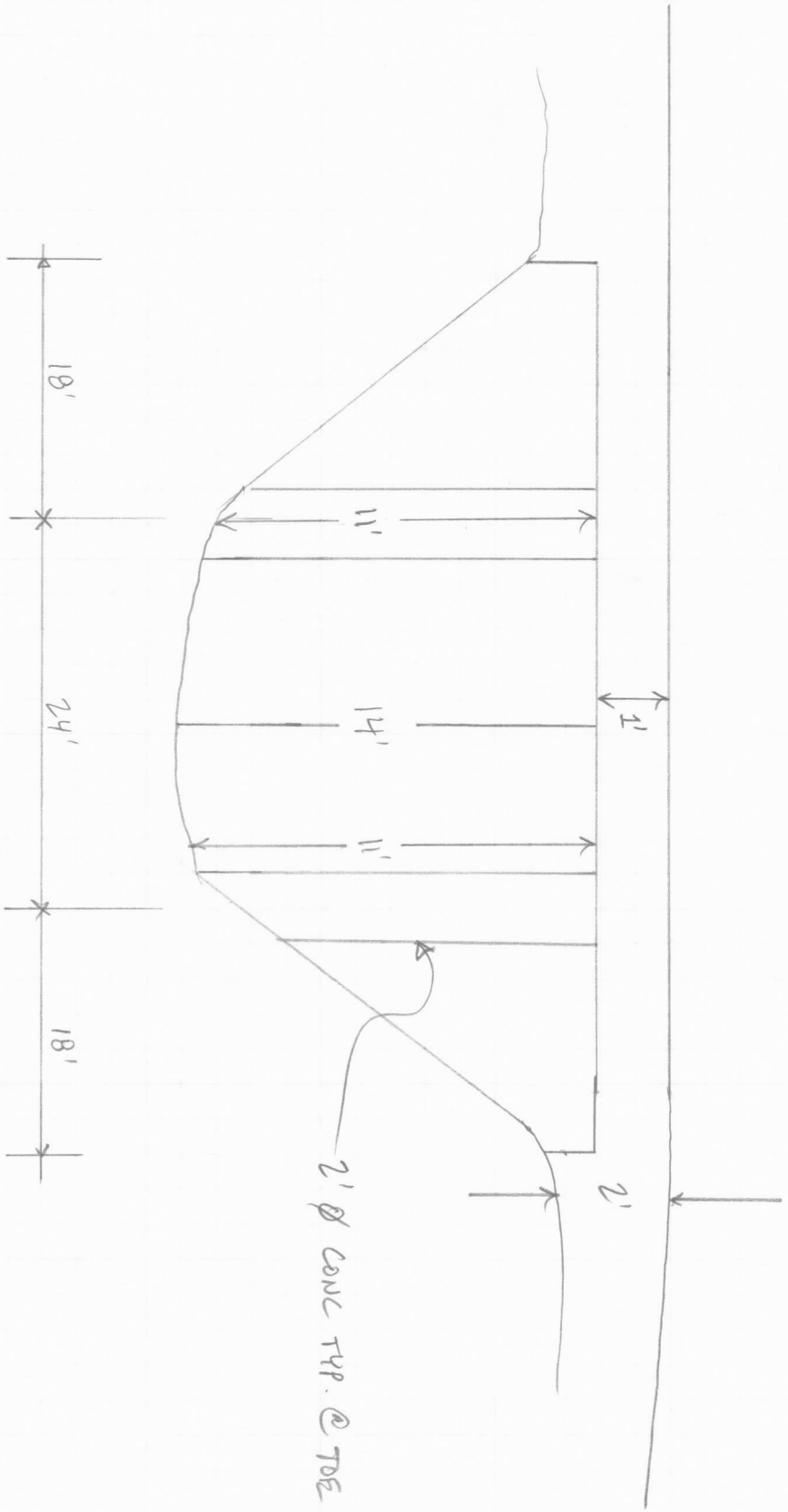


Upper Watershed Plan: Test

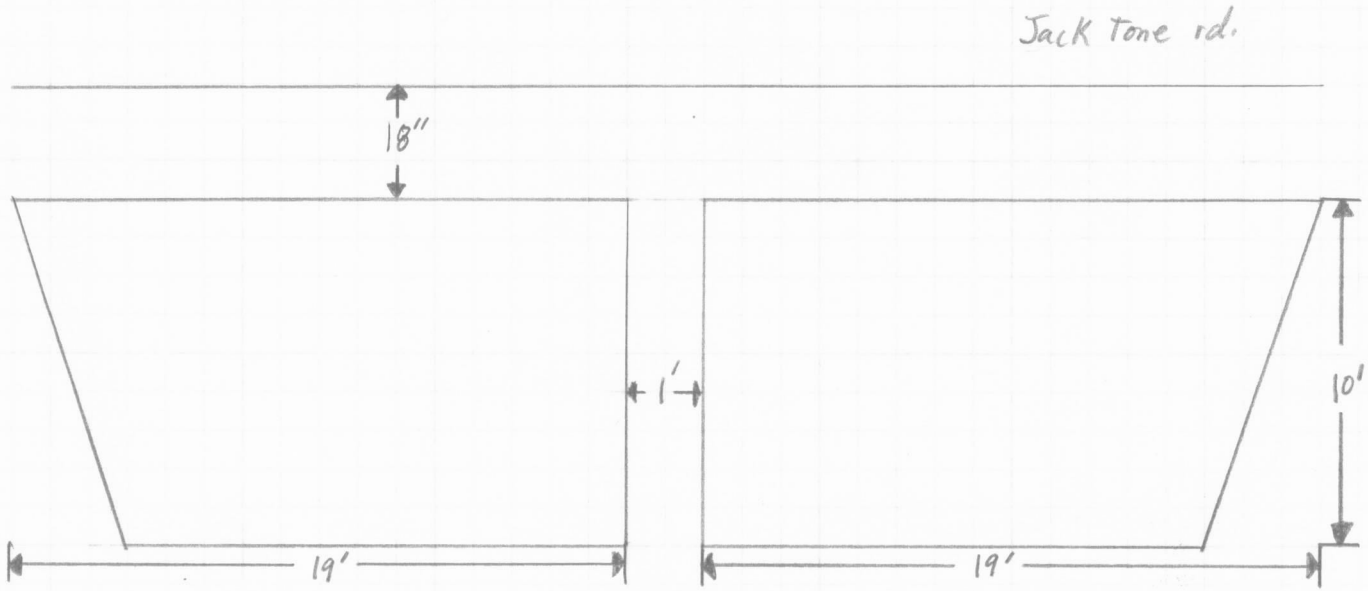
River = NF S. LittleJohn Reach = NF SLJ RS = 168 BR HWY 99



S. FORK S. LITTLEJOHNS
@ AUSTIN ROAD

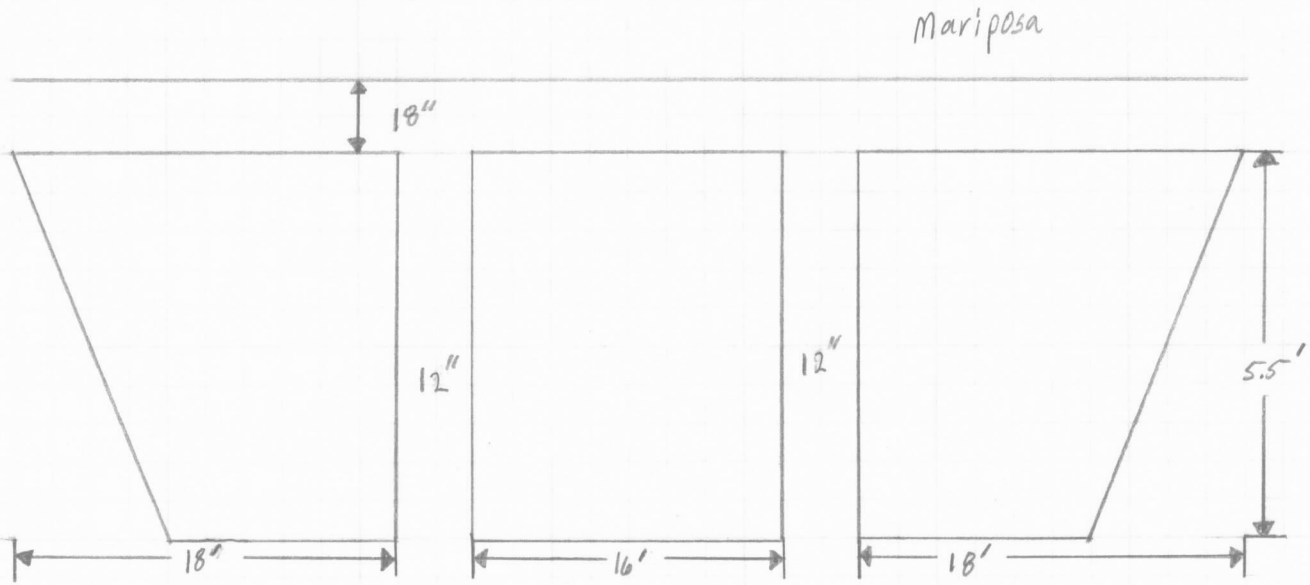


STAEDTLER® No. 937 811E Engineer's Computation Pad



South fork South Littlejohns Creek and Jack Tone rd

STAEDTLER® No. 937 811E
Engineer's Computation Pad

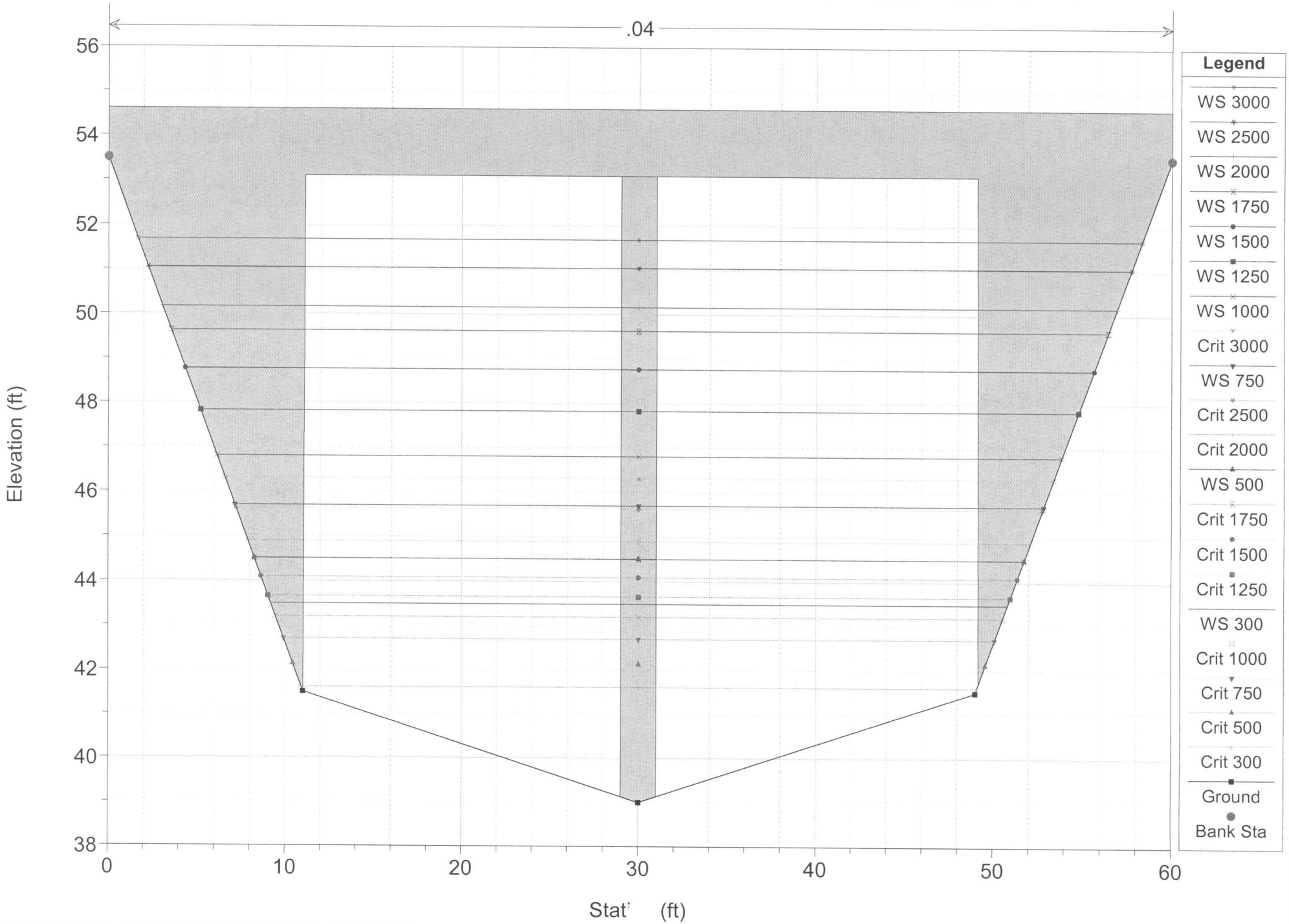


S. Littlejohn Creek and Mariposa

STAEDTLER® No. 937 811E
Engineer's Computation Pad

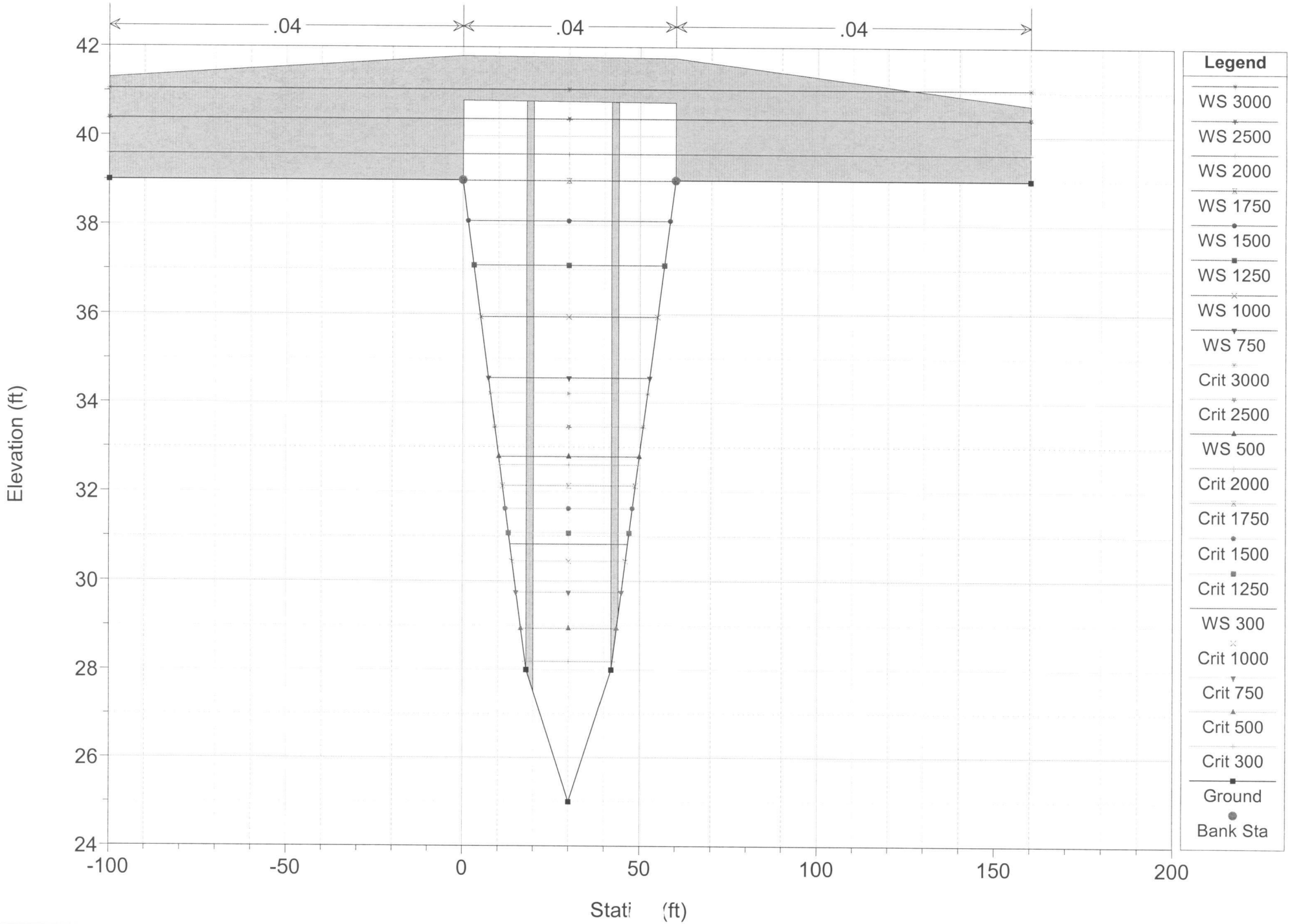
Upper Watershed Plan: Test

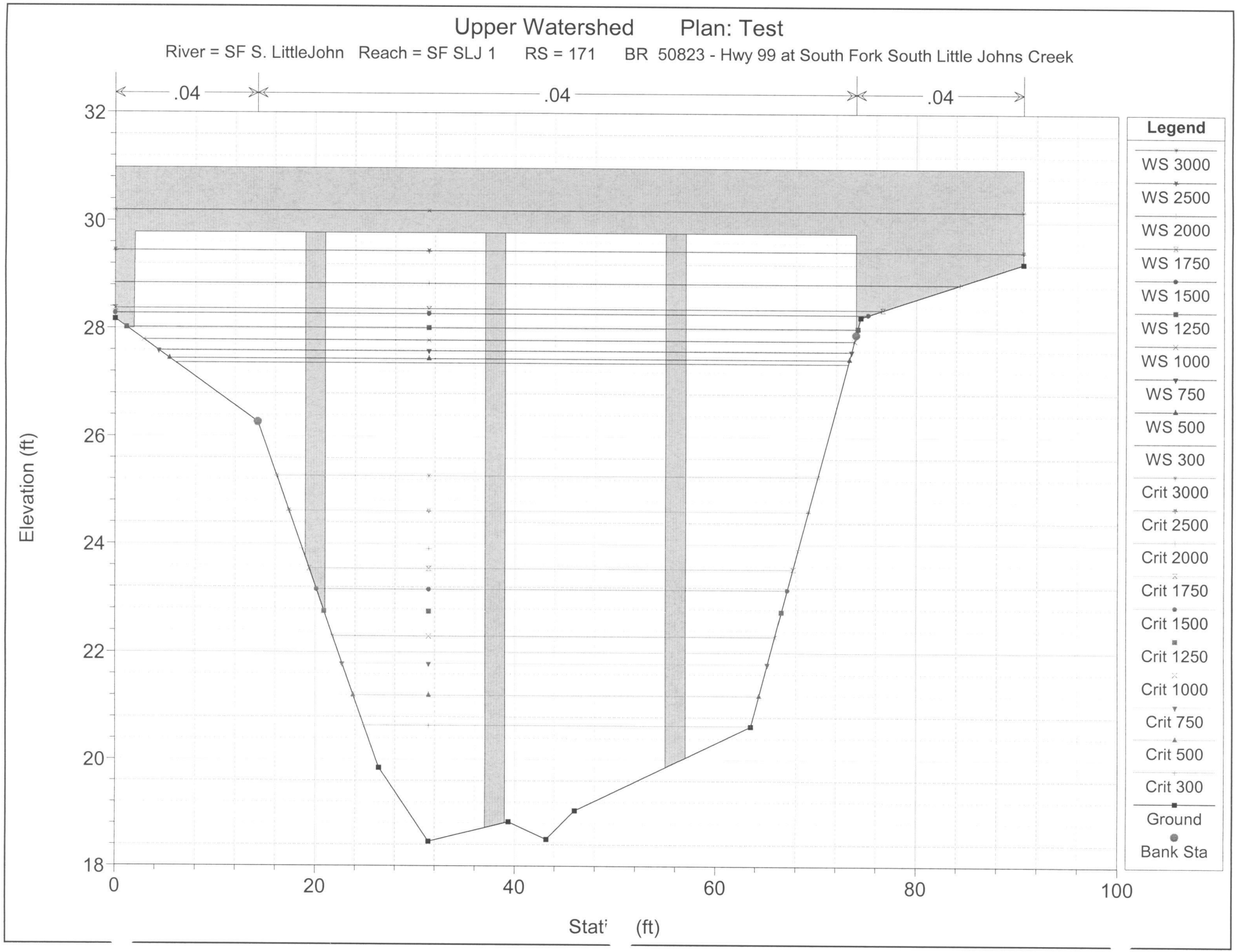
River = SF S. LittleJohn Reach = SF SLJ 1 RS = 413.5 BR JACK TONE RD



Upper Watershed Plan: Test

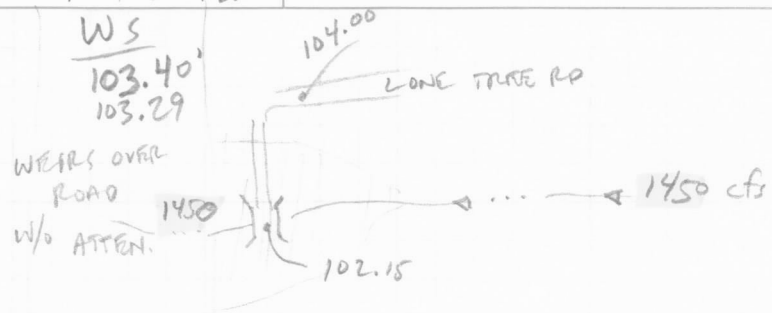
River = SF S. LittleJohn Reach = SF SLJ 1 RS = 289 BR AUSTIN RD



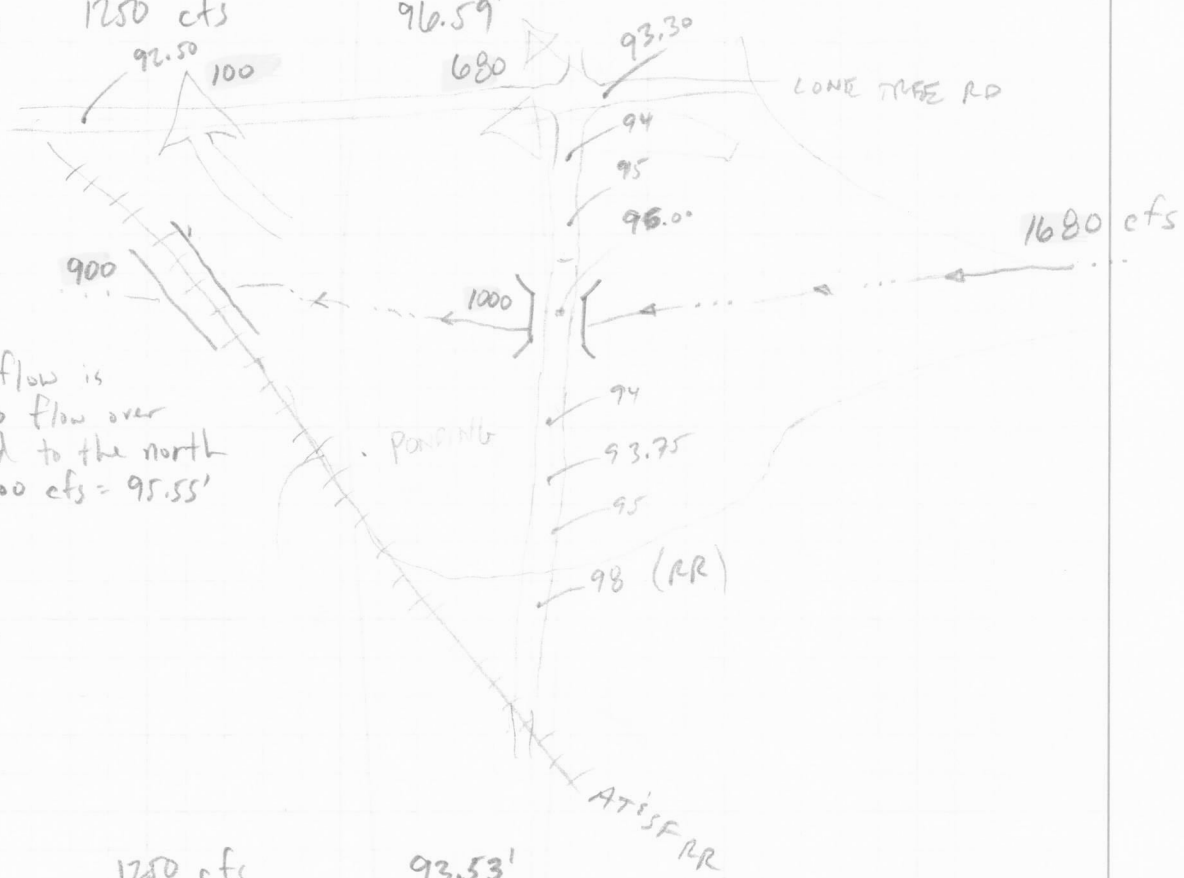

Upper Watershed Plan: Test
River = SF S. LittleJohn Reach = SF SLJ 1 RS = 171 BR 50823 - Hwy 99 at South Fork South Little Johns Creek
.04
.04
.04
Elevation (ft)
32
30
28
26
24
22
20
18
0
20
40
60
80
100
Stat (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Crit 3000
Crit 2500
Crit 2000
Crit 1750
Crit 1500
Crit 1250
Crit 1000
Crit 750
Crit 500
Crit 300
Ground
Bank Sta

LONE TREE CREEK | CROSSING RATING TABLE

RS 877 BRENNAN RD: 1750 cfs WS 103.40'
1450 cfs 103.29



RS 812 SEXTON RD: 1250 cfs 96.59'



AT 1250 cfs, flow is deep enough to flow over Lone Tree road to the north 3' Deep. 1000 cfs = 95.55'

RS 808 AT&SF RR 1250 cfs 93.53'
1000 cfs 93.27'

NEGLIGIBLE STORAGE; EXCESS FLOW IS DIVERTED TO NORTH BEHIND RR

SEXTON + AT&SFRR COMBINED INFLOW-DIV TABLE

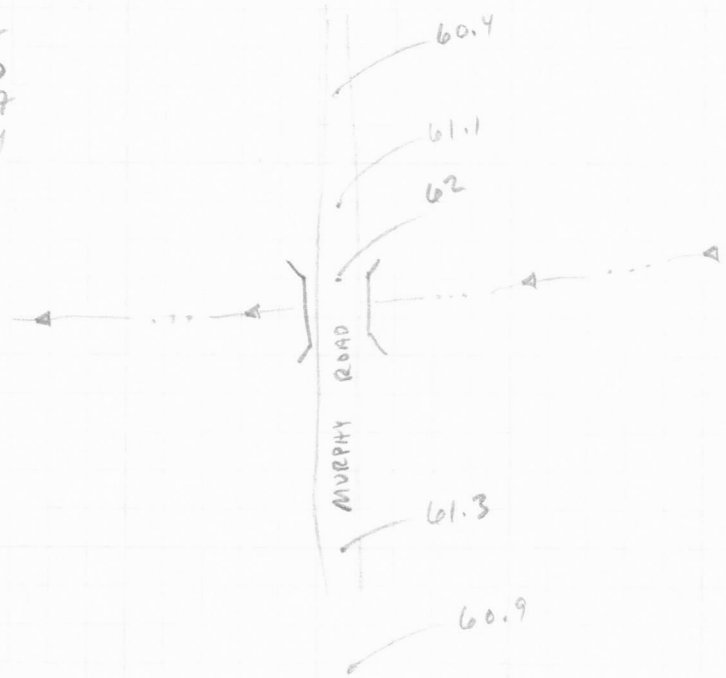
IN	DIV
0	0
800	0
1000	150
1200	330
1500	600
2000	1050

STAEDTLER® No. 937 811E Engineer's Computation Pad

LONE TREE CREEK | CROSSINGS RATING TABLES

RS 560 MURPHY RD:

	WS
1500	62.82
1250	62.70
1000	62.47
750	61.94



ELEV	AREA	STORAGE	OUTFLOW
60.05	0	0	500
61.94	580	500	750
62.47	800	650	1000
62.7	850	675	1250
62.8	900	700	1500

RESULTS IN HYDROGRAPH:

USE DIVERSION TO METERED RES TO SIMULATE OVERBANK STORAGE

INFLOW	DIV
0	0
500	0
750	150
1000	350
1250	550
1500	700

→

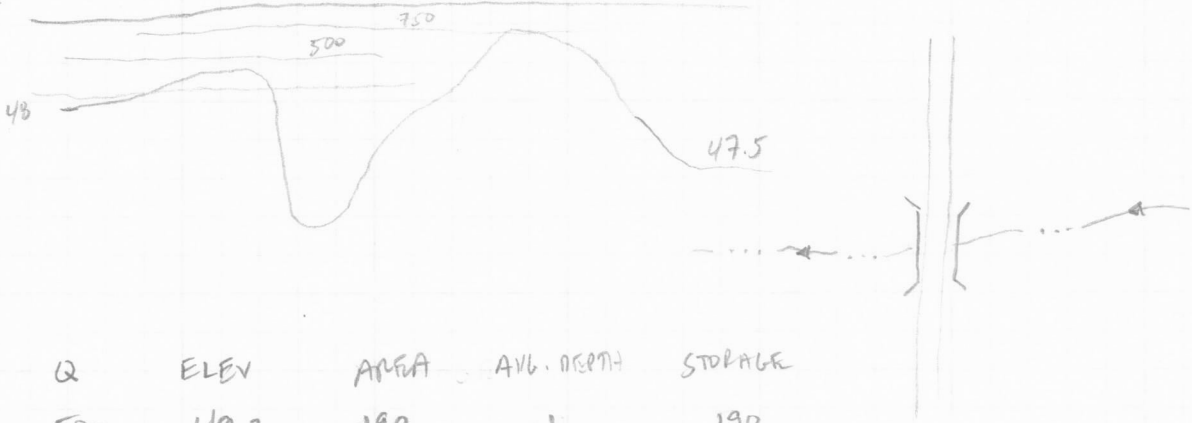
STORAGE	DISCHARGE
0	0
100	10
300	50
600	100
700	120

STAEDTLER® No. 937 811E Engineer's Computation Pad

RS 450

JACK TONE RD.

RD = 50.95



Q	ELEV	AREA	AVG. DEPTH	STORAGE
500	49.2	190	1	190
750	49.8	280	1.5	420
1000	50.9	645	2	1300
1250	51.3	790	2.2	1740
1500	51.6	940	2.4	2300

AGAIN, USE DIV TO RES TO AVOID THIS HYDROGRAPH:

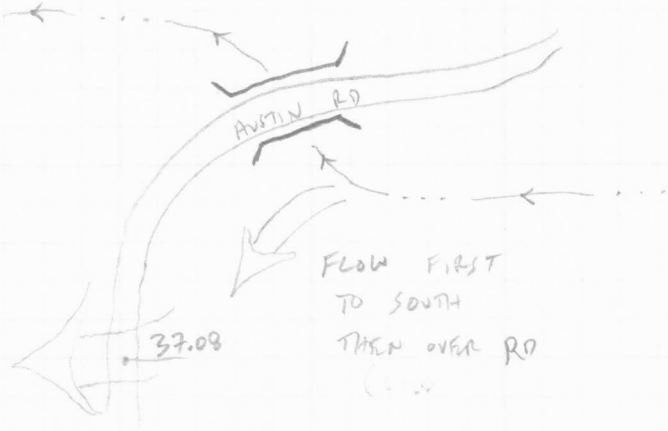
IN	DIV	STOR.	OUTFLOW
0	0	0	0
500	50	190	10
750	200	420	20
1000	350	1300	40
1250	475	1740	60
1500	600	2300	70

RS 302.5

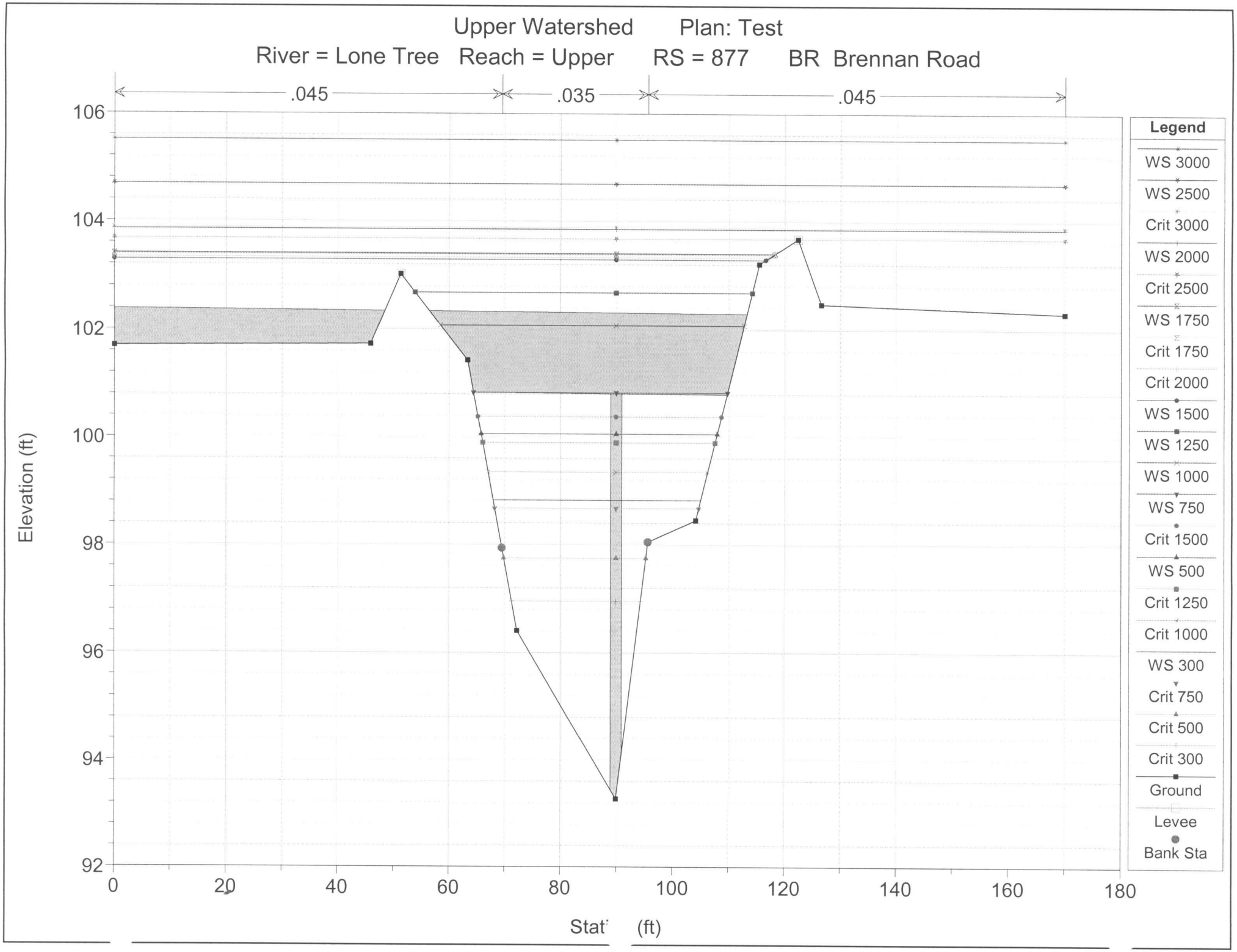
AUSTIN RD

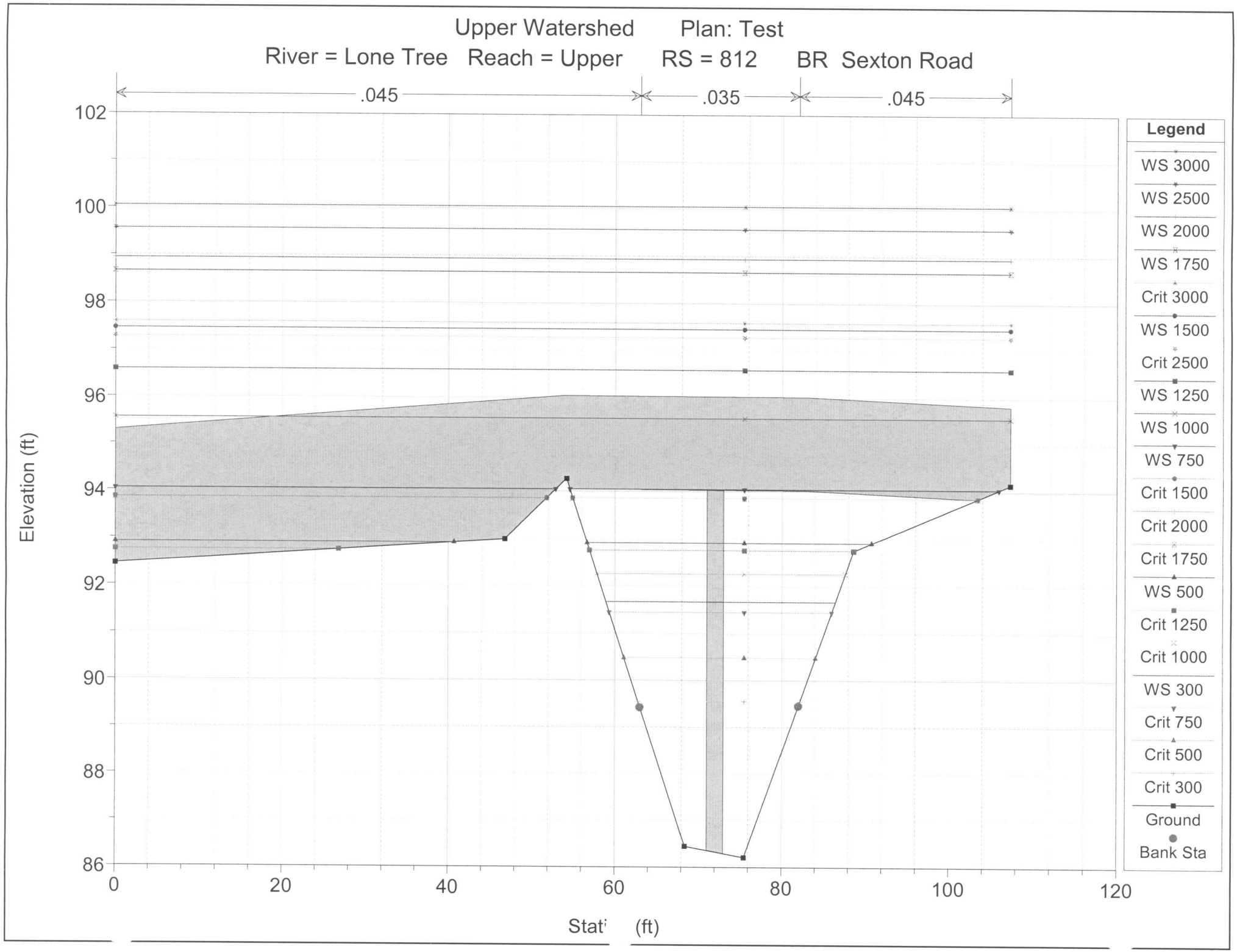
DECK ELEV = 39.4

Q	ELEV	AREA	DEPTH	STORAGE
1250	37	12.5	0.1	1.3
1500	38.6	32	1	32
1750	38.9	49	1.1	55
2000	39.1	65	1.3	85
2500	39.5	83	1.5	125
3000	40.0	145	1.7	250



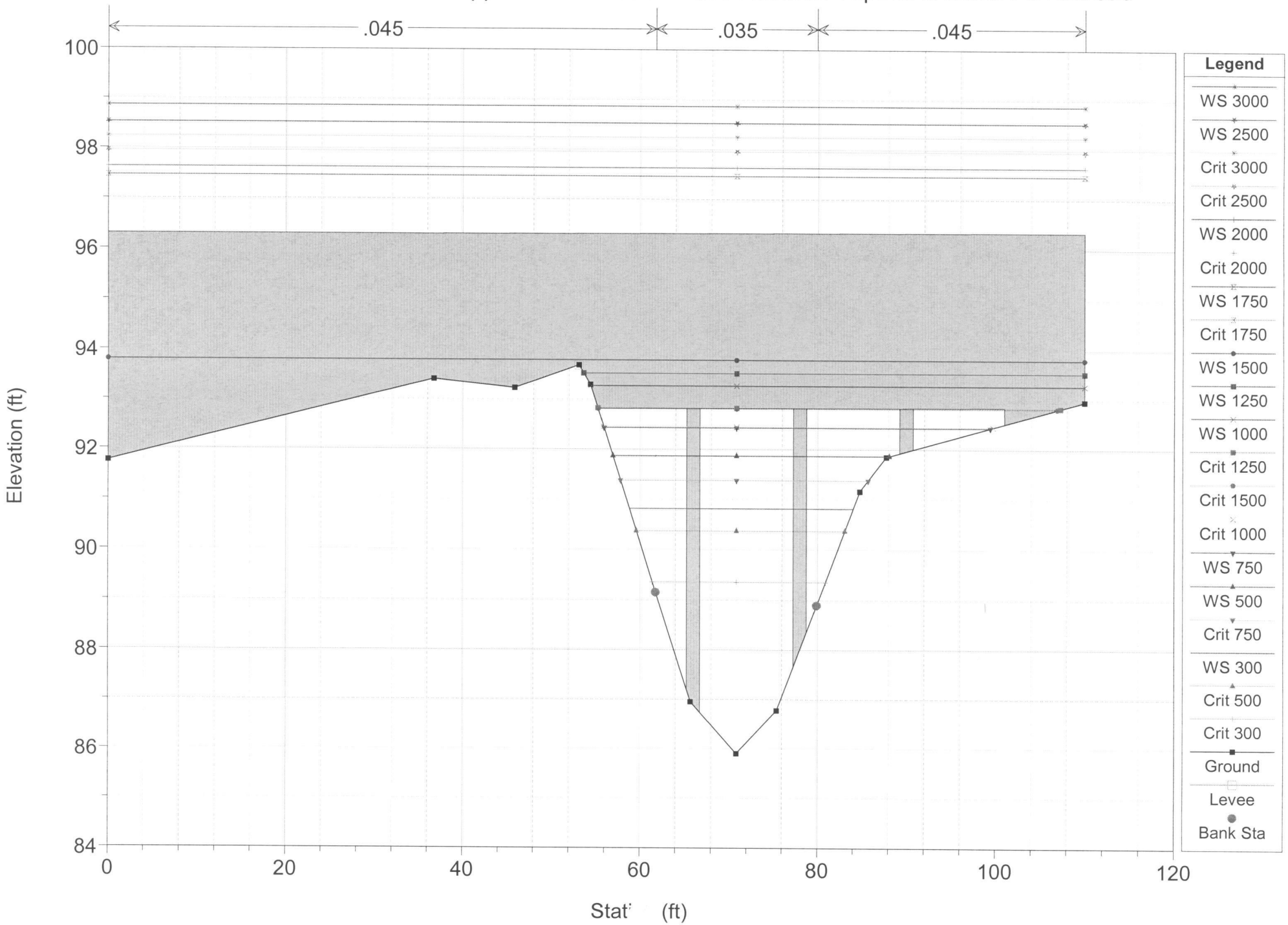
STAEDTLER® No. 937 811E Engineer's Computation Pad

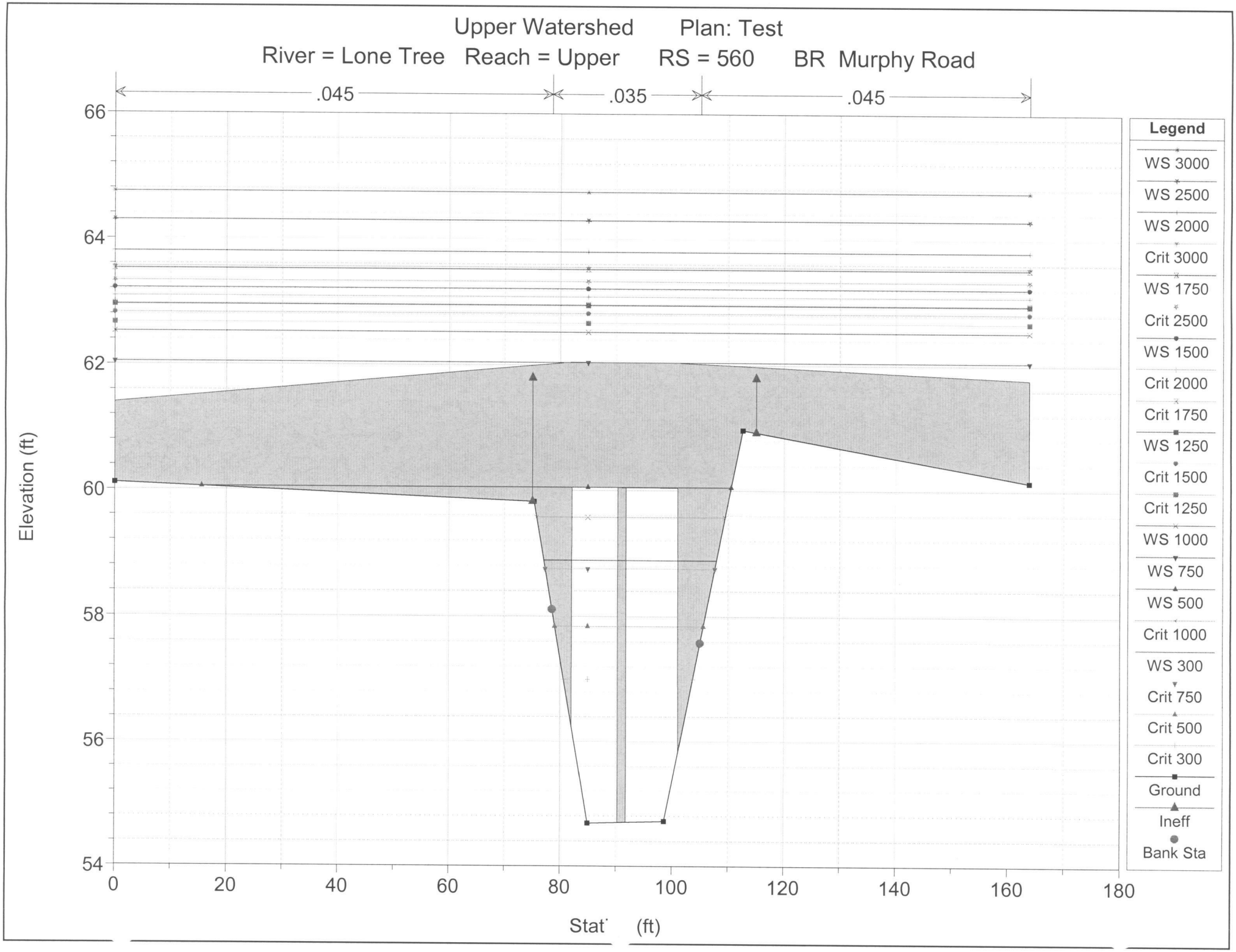

Upper Watershed Plan: Test
River = Lone Tree Reach = Upper RS = 877 BR Brennan Road
.045
.035
.045
Elevation (ft)
Stat (ft)
Legend
WS 3000
WS 2500
Crit 3000
WS 2000
Crit 2500
WS 1750
Crit 1750
Crit 2000
WS 1500
WS 1250
WS 1000
WS 750
Crit 1500
WS 500
Crit 1250
Crit 1000
WS 300
Crit 750
Crit 500
Crit 300
Ground
Levee
Bank Sta

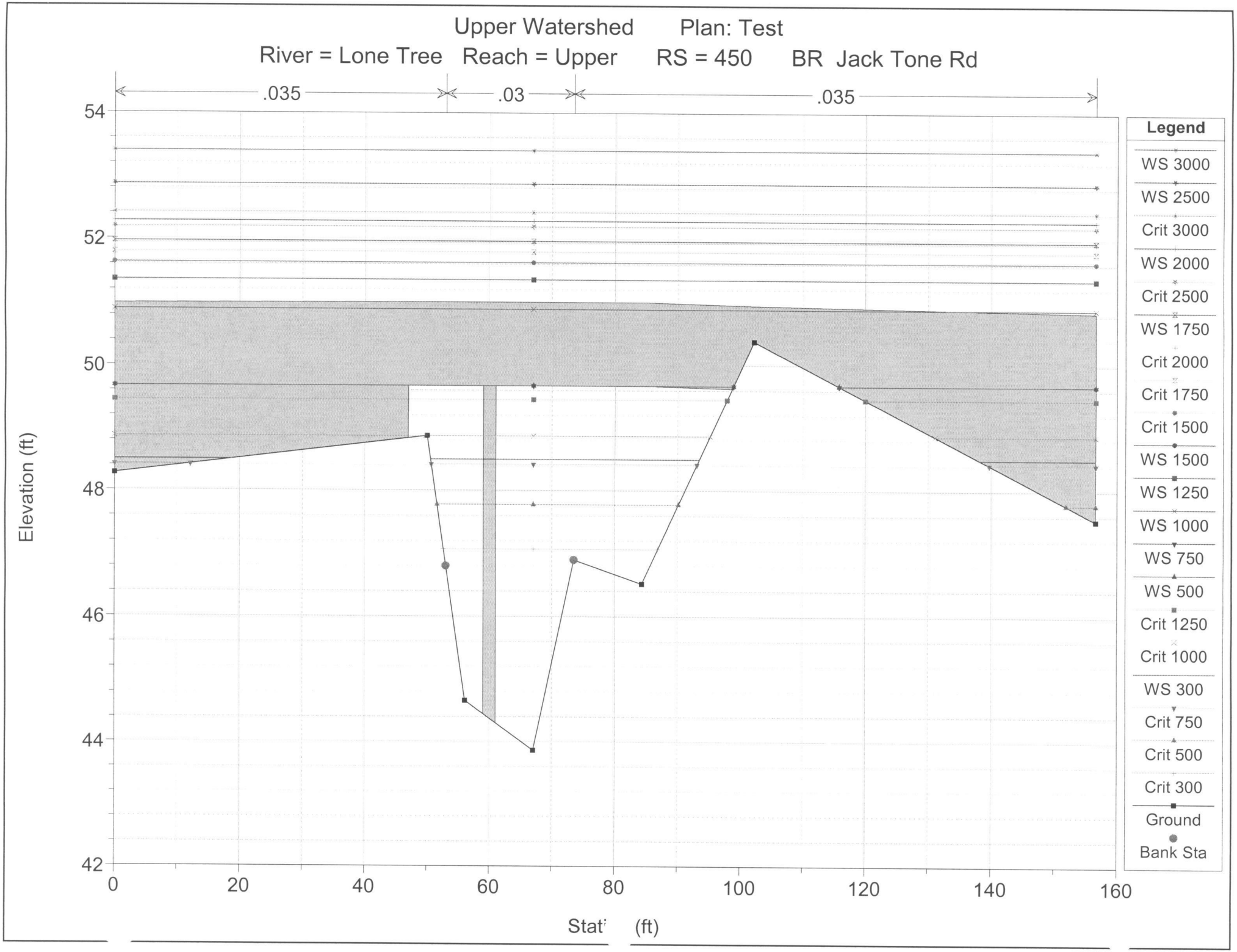

Upper Watershed Plan: Test
River = Lone Tree Reach = Upper RS = 812 BR Sexton Road
.045
.035
.045
Elevation (ft)
102
100
98
96
94
92
90
88
86
0
20
40
60
80
100
120
Stat (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
Crit 3000
WS 1500
Crit 2500
WS 1250
WS 1000
WS 750
Crit 1500
Crit 2000
Crit 1750
WS 500
Crit 1250
Crit 1000
WS 300
Crit 750
Crit 500
Crit 300
Ground
Bank Sta

Upper Watershed Plan: Test

River = Lone Tree Reach = Upper RS = 808 BR Atchison Topeka & Santa Fe Railroad

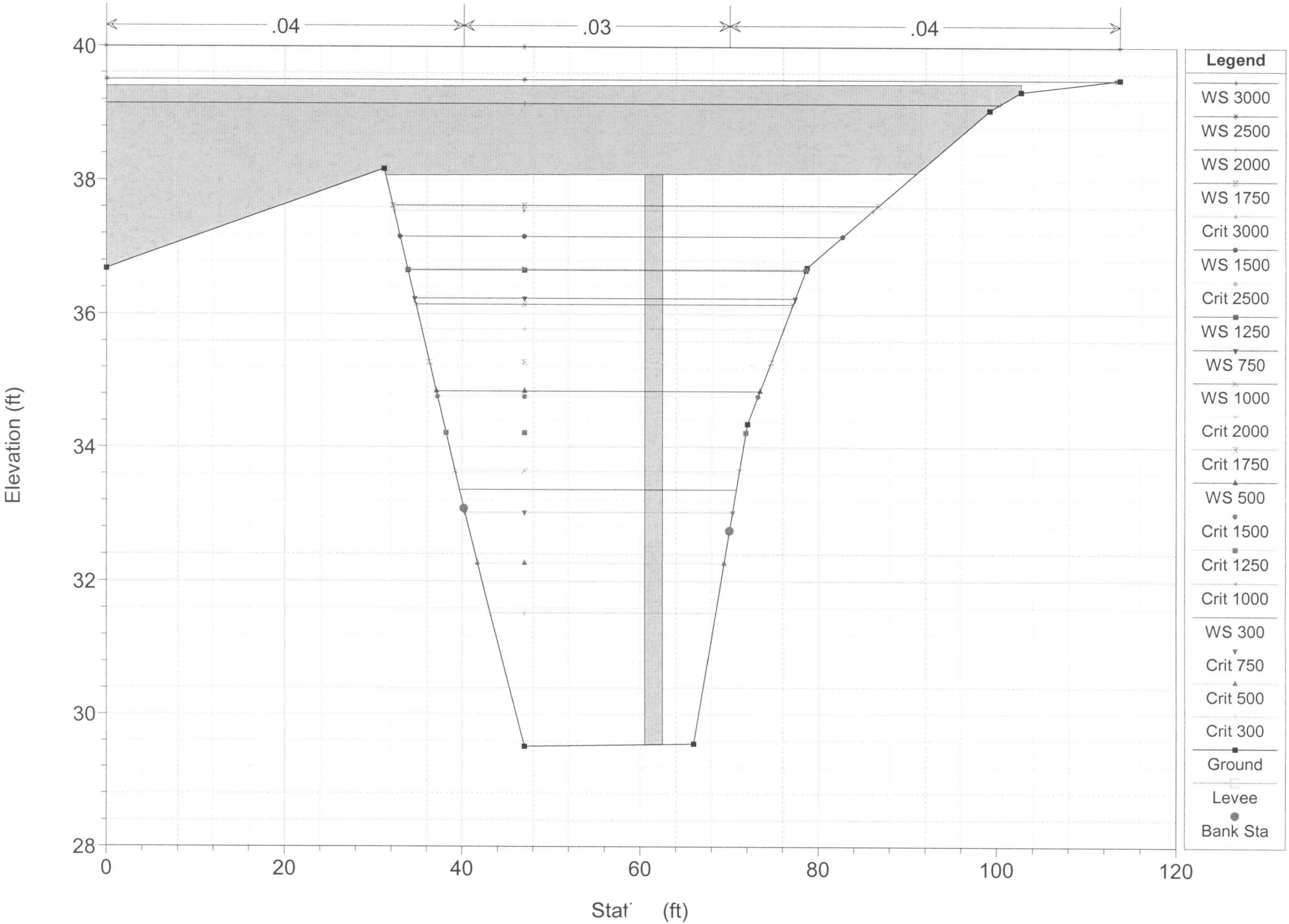



Upper Watershed Plan: Test
River = Lone Tree Reach = Upper RS = 560 BR Murphy Road
.045
.035
.045
Elevation (ft)
66
64
62
60
58
56
54
0
20
40
60
80
100
120
140
160
180
Stat (ft)
Legend
WS 3000
WS 2500
WS 2000
Crit 3000
WS 1750
Crit 2500
WS 1500
Crit 2000
Crit 1750
WS 1250
Crit 1500
Crit 1250
WS 1000
WS 750
WS 500
Crit 1000
WS 300
Crit 750
Crit 500
Crit 300
Ground
Ineff
Bank Sta


Upper Watershed Plan: Test
River = Lone Tree Reach = Upper RS = 450 BR Jack Tone Rd
.035
.03
.035
Elevation (ft)
54
52
50
48
46
44
42
0
20
40
60
80
100
120
140
160
Stat (ft)
Legend
WS 3000
WS 2500
Crit 3000
WS 2000
Crit 2500
WS 1750
Crit 2000
Crit 1750
Crit 1500
WS 1500
WS 1250
WS 1000
WS 750
WS 500
Crit 1250
Crit 1000
WS 300
Crit 750
Crit 500
Crit 300
Ground
Bank Sta

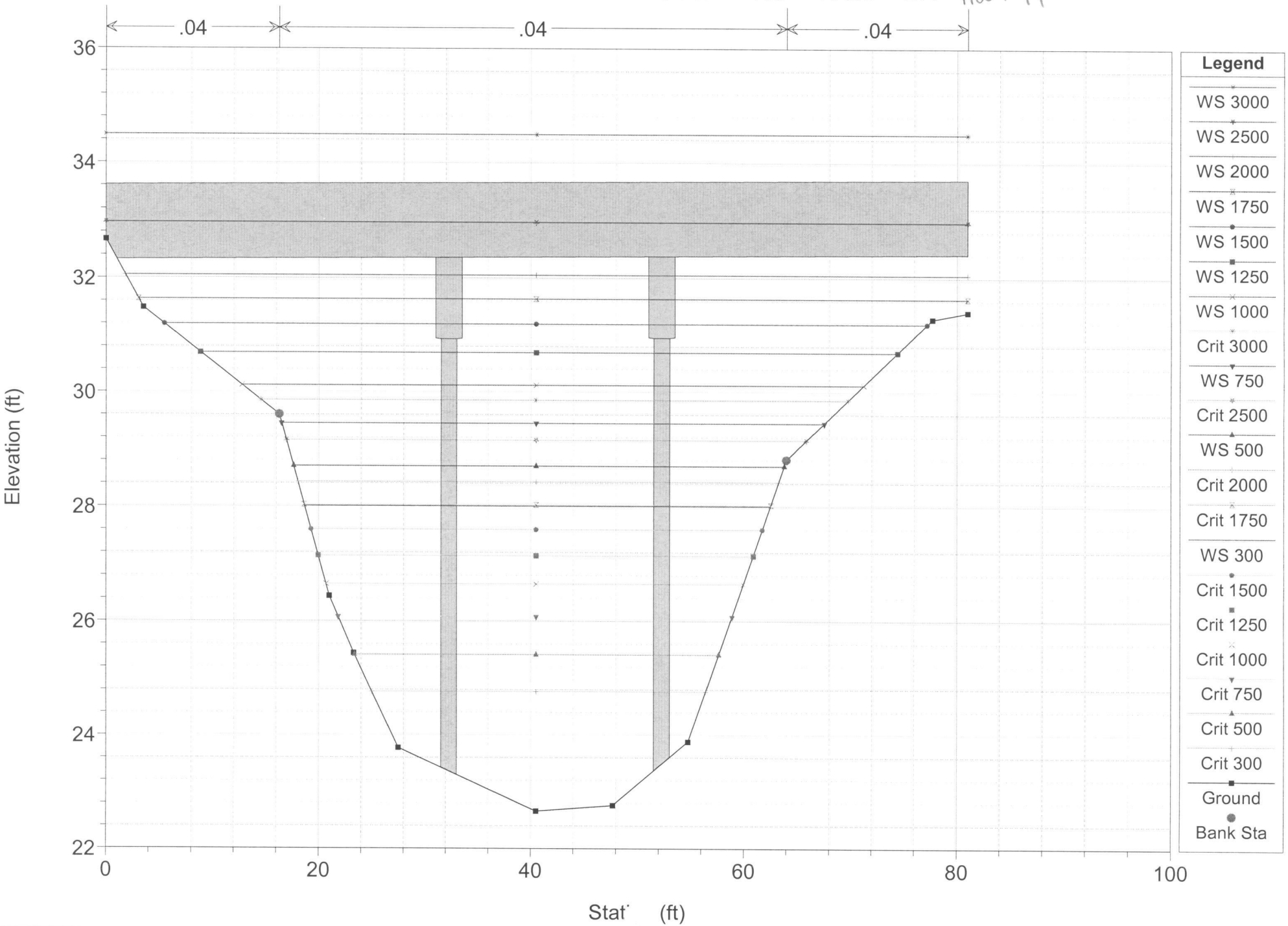
Upper Watershed Plan: Test

River = Lone Tree Reach = Lower RS = 302.5 BR Austin Rd at Lone Tree

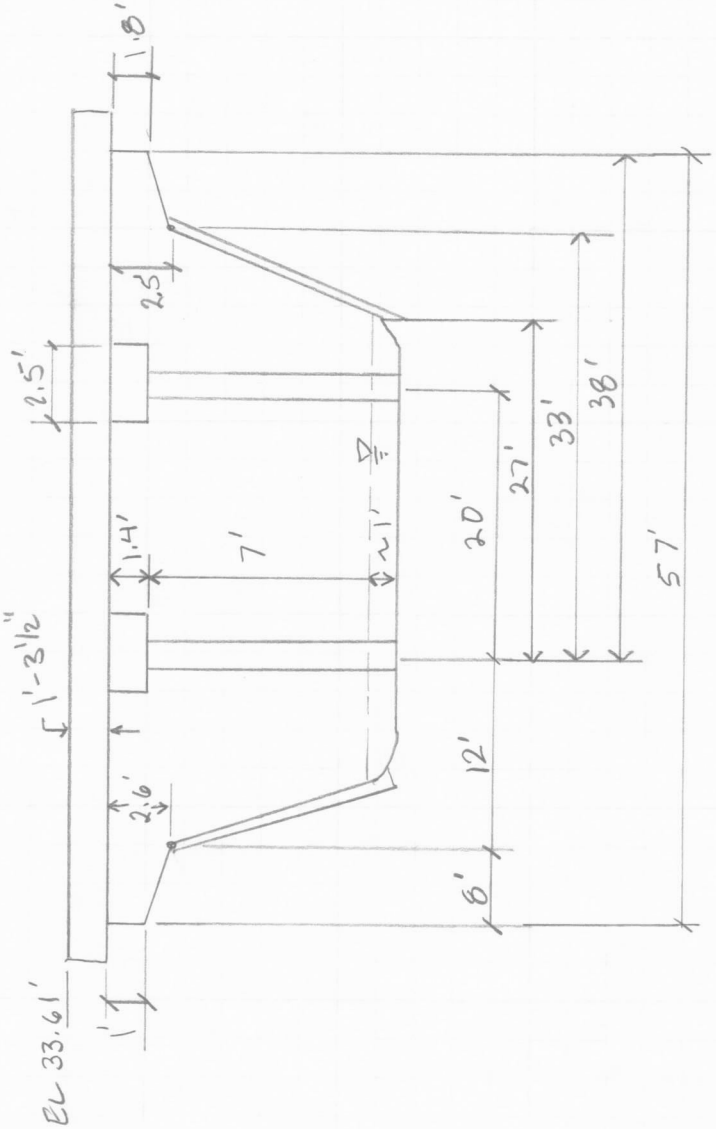


Upper Watershed Plan: Test

River = Lone Tree Reach = Lower RS = 195.5 BR Hwy 99



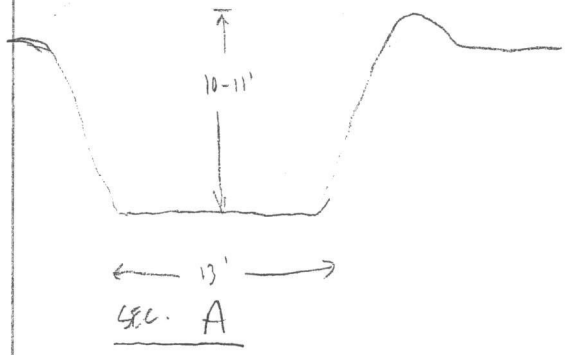
LONE TREE CK @ HIGHWAY 99 | 2/17/06

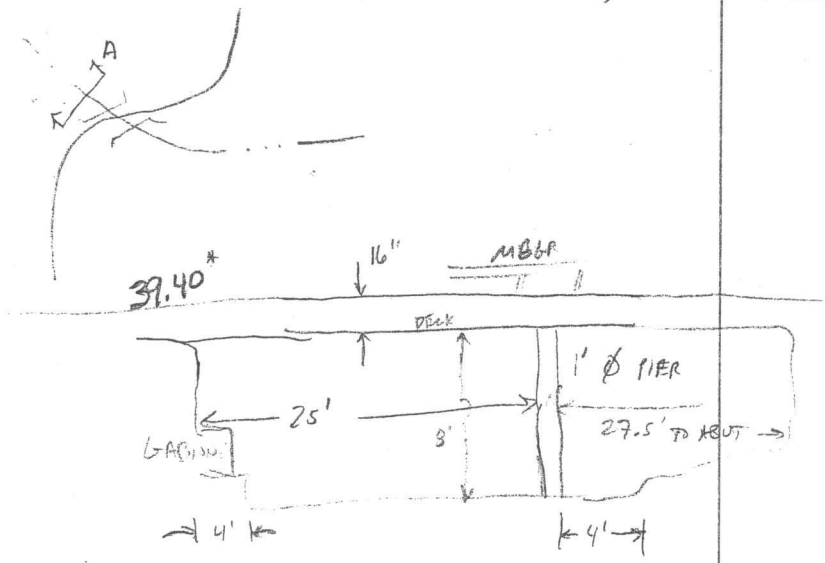


LOOKING D/S

TELL KSN WHEN SHOOTING X-SEC, CONTINUE INTO FIELDS (OVER LEVEES, BERMS) 1/10/06

LONE TREE @ AUSTIN RD
PICS 1070 - 1075



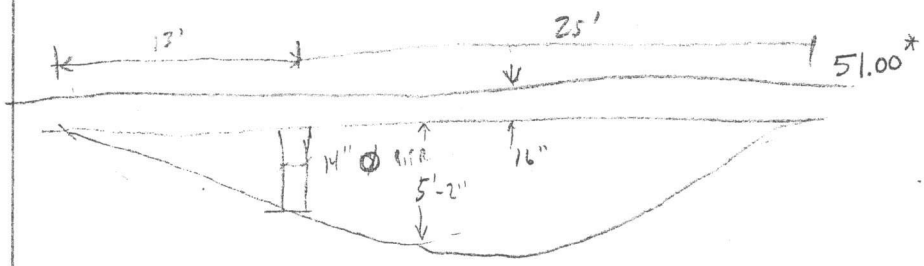


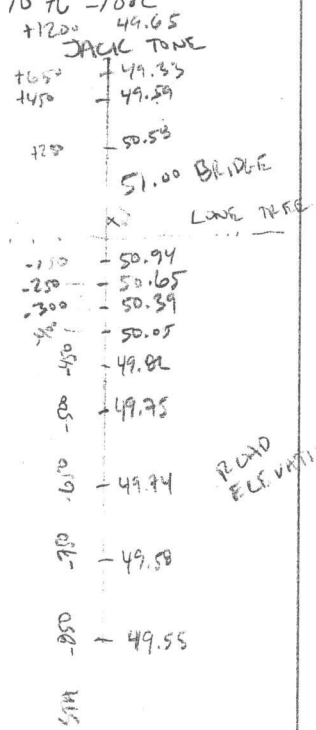
• VISIBLE HIGH WATER 24" BELOW BOTTOM OF DECK (JAN 1, 2006 STORM)

• SURVEY NEEDS: BRIDGE, 1 SEC 100' UPSTREAM
2 SEC 100', 200' DOWNSTREAM

LONE TREE @ JACK TONE RD — HIGH WATER 10" BELOW BOTTOM OF DECK

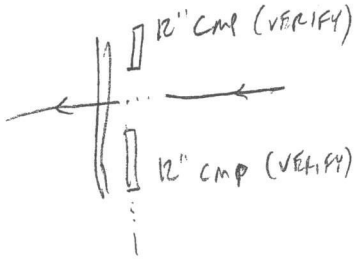
PICS 1076 - 1082





SURVEY: 3 SECTIONS: BRIDGE, 100' U/S & D/S.

TEMPLE @ JACK TONE RD.
NO PICS



SURVEY
BRIDGE GEOM.
U/S, D/S 100'
ROAD
SIDE CULVERTS

LONE TREE @ MURPHY RD DOUBLE BOX
18' x 6' 30° SKEW

SURVEY
BRIDGE GEOM.
U/S, D/S 100'
ROAD
SIDE CULVERT

* FROM SIEGFRIED ROAD SURVEY

STAEDTLER® No. 937 811E Engineer's Computation Pad

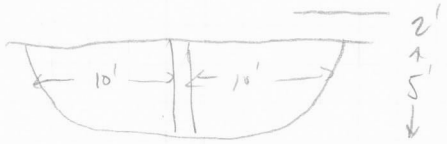
1/10/06

LONE TREE @ LONE TREE RD - HIGH WATER 10" BELOW BOTTOM OF DECK

PICS 1083 - 1085

LONE TREE @ CARROLTON

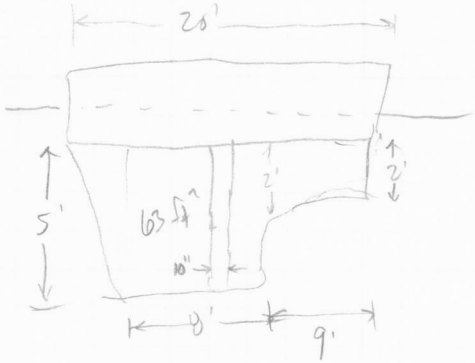
PICS 1086 - 88

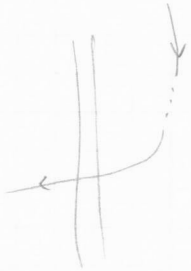


LONE TREE @ VAN ALLEN

PICS 89 - 95

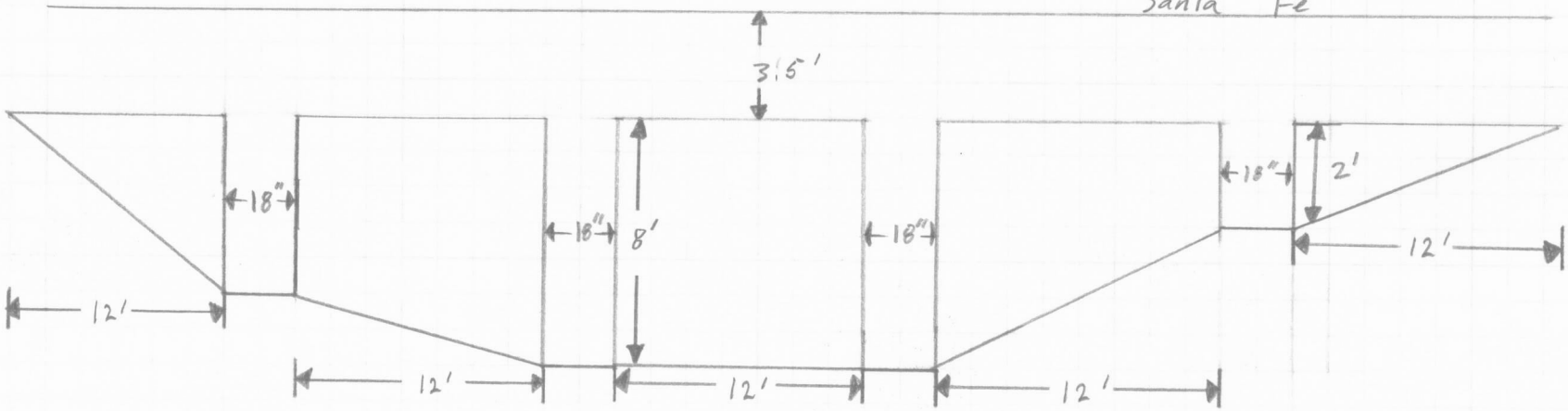
63 sq. ft. @ 6 ft/s = 380 cfs





A

train Atchison Topeka and Santa Fe

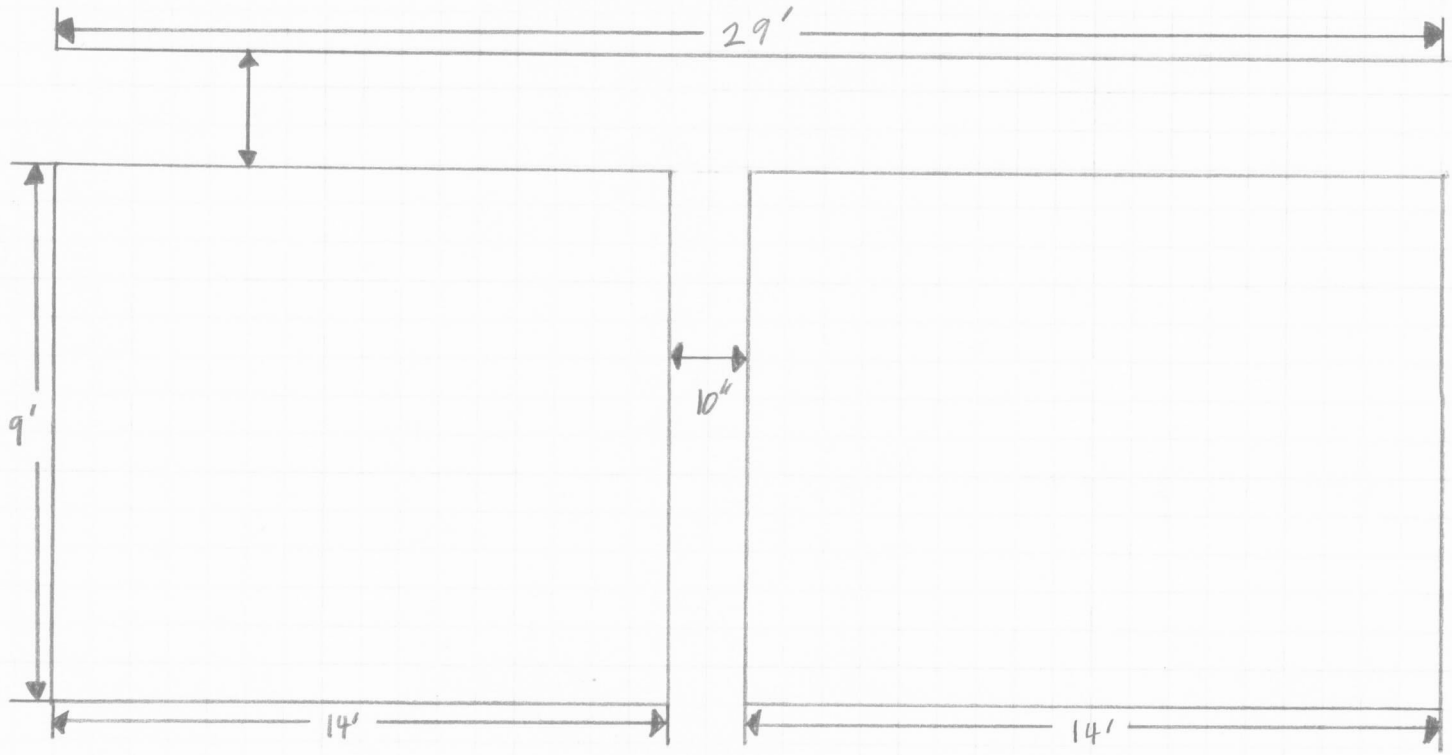


note 2 ft/sec
Adv. 1.25'

Lone Tree Creek and Atchison Topeka / Santa Fe

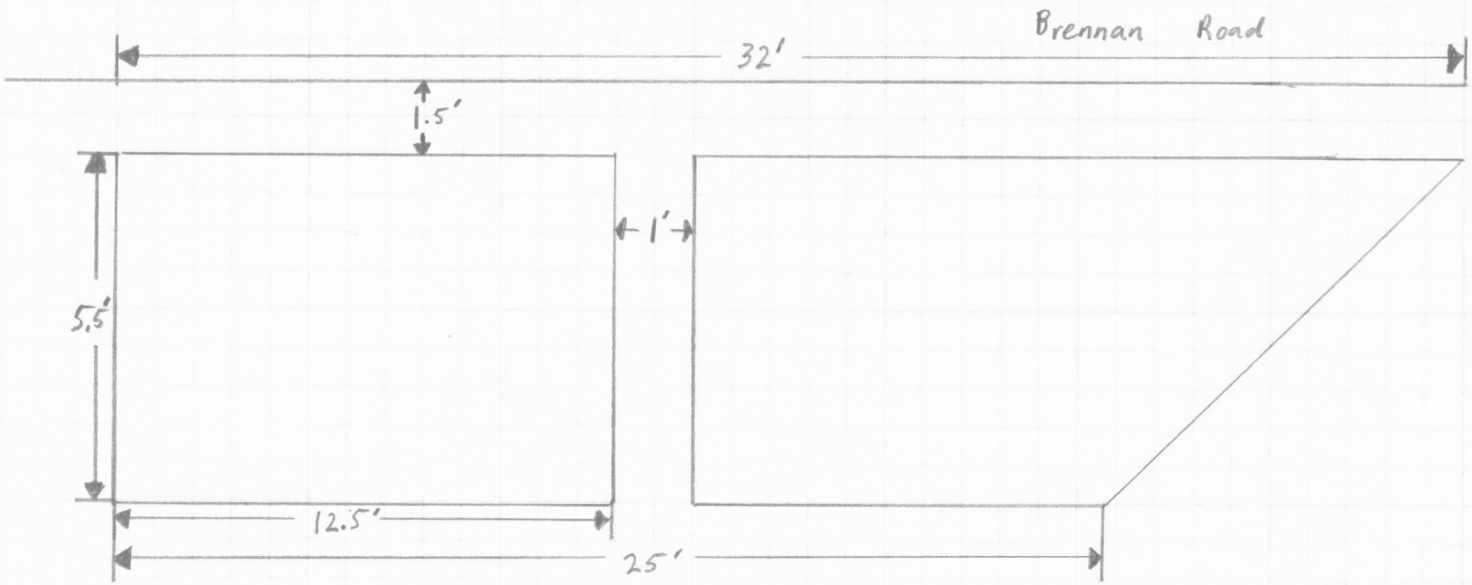
STAEDTLER® No. 937 811E Engineer's Computation Pad

B



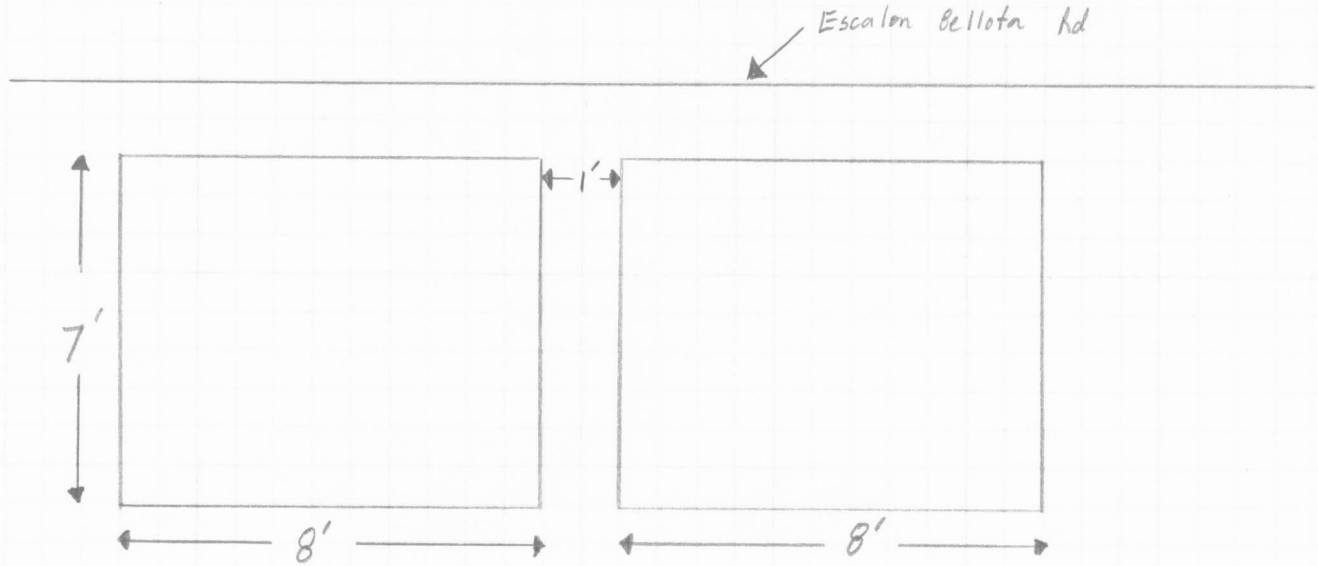
Lone Tree Creek and Sexton Rd.

STAEDTLER® No. 937 811E Engineer's Computation Pad



Lone Creek and Brennan Rd.

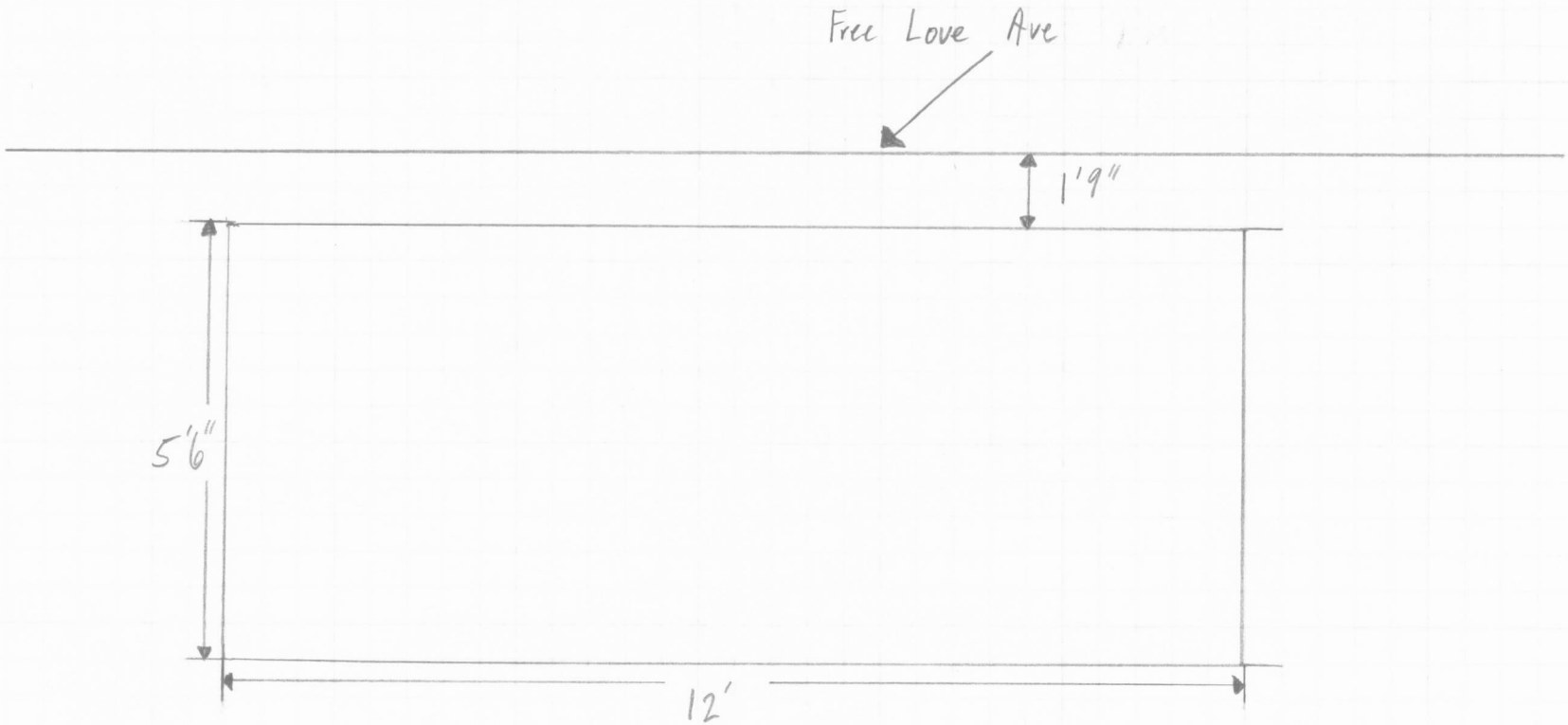
STAEDTLER® No. 937 811E
Engineer's Computation Pad



Lone Creek and Escalon Bellota rd.

STAEDTLER® No. 937 811E Engineer's Computation Pad

8

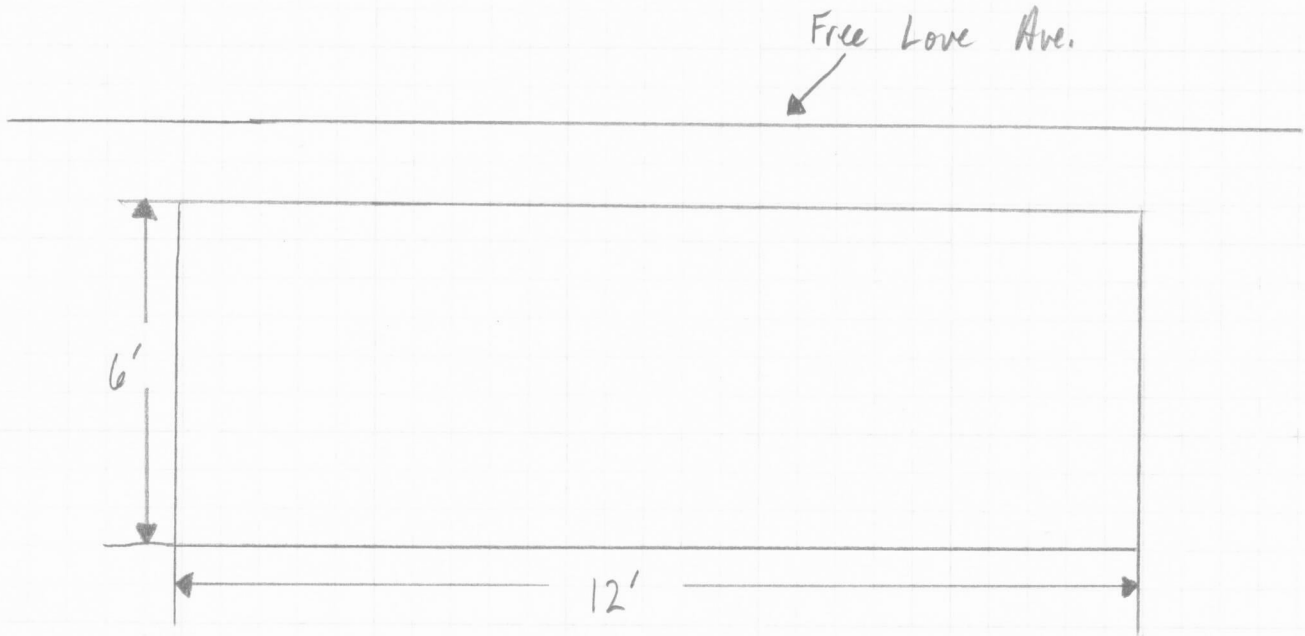


note: Sandy soil

Lone Creek and Free Love Ave

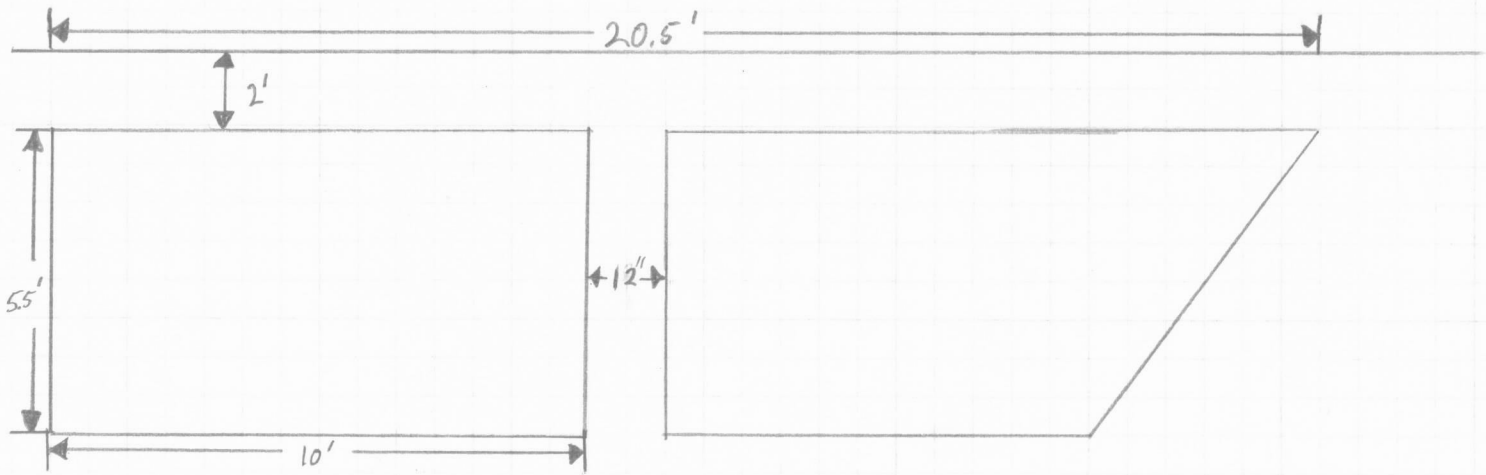
STAEDTLER® No. 937 811E Engineer's Computation Pad

A



Lone Creek and Free Love Ave.

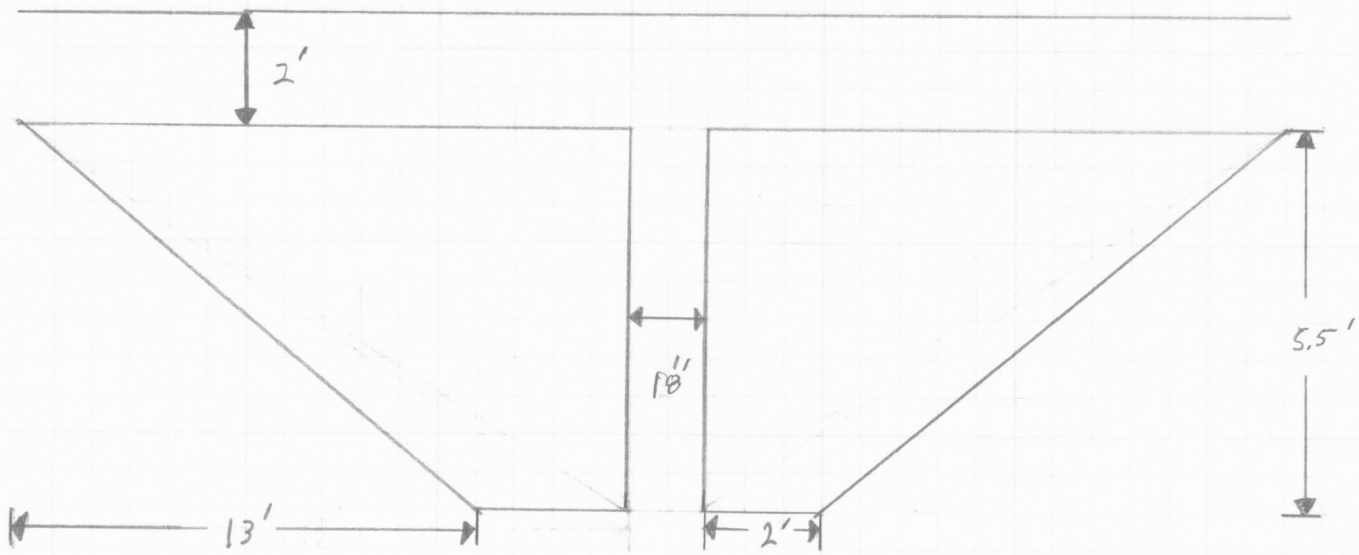
STAEDTLER® No. 937 811E Engineer's Computation Pad



Lone tree Creek and Carrolton rd.

STAEDTLER® No. 937 811E Engineer's Computation Pad

Atchison Topeka and Santa Fe



Lone Tree Tributary

STAEDTLER® No. 937 811E Engineer's Computation Pad

TEMPLE CREEK | CROSSING RATINGS

RS 430 JACK TONE RD. DECK = 51.57

Q	ELEV		AREA	AVG DEPTH	STORAGE
300	49.9				
500	50.1	WEIR			
750	52.1	Lower - model is constrained	280	1	280
1000	52.7		355	1.4	500
1250	53.3		450	1.7	770

AT & SF RR

Q	ELEV	AREA	AVG DEPTH	STORAGE
750	63.2			
1000	64.0			
1250	64.3			
1500	65.9			
1750	67.5			

EXCESS FLOWS TO SFSLJ

MURPHY RD

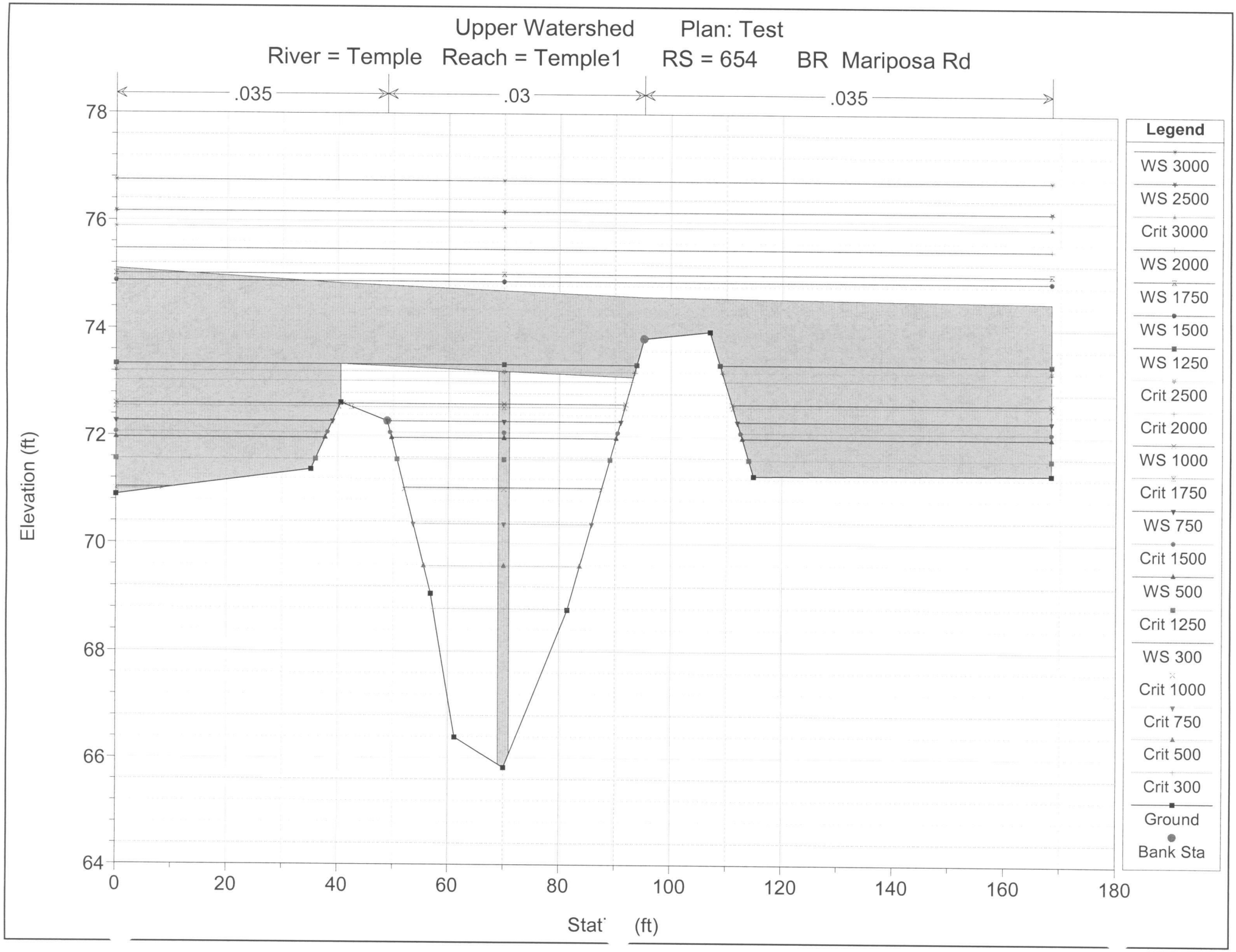
Q	ELEV	AREA	AVG DEPTH	STORAGE
500	62.9			
750	64.1	40	1	40
1000	65.65	205	1.5	310
1250	66.4	410	2	820

MARIPOSA RD

Q	EL	AREA	D	STOR
1250	72.8			
1500	74.8			
1750	75			
2000	75.3			
2500	75.7			

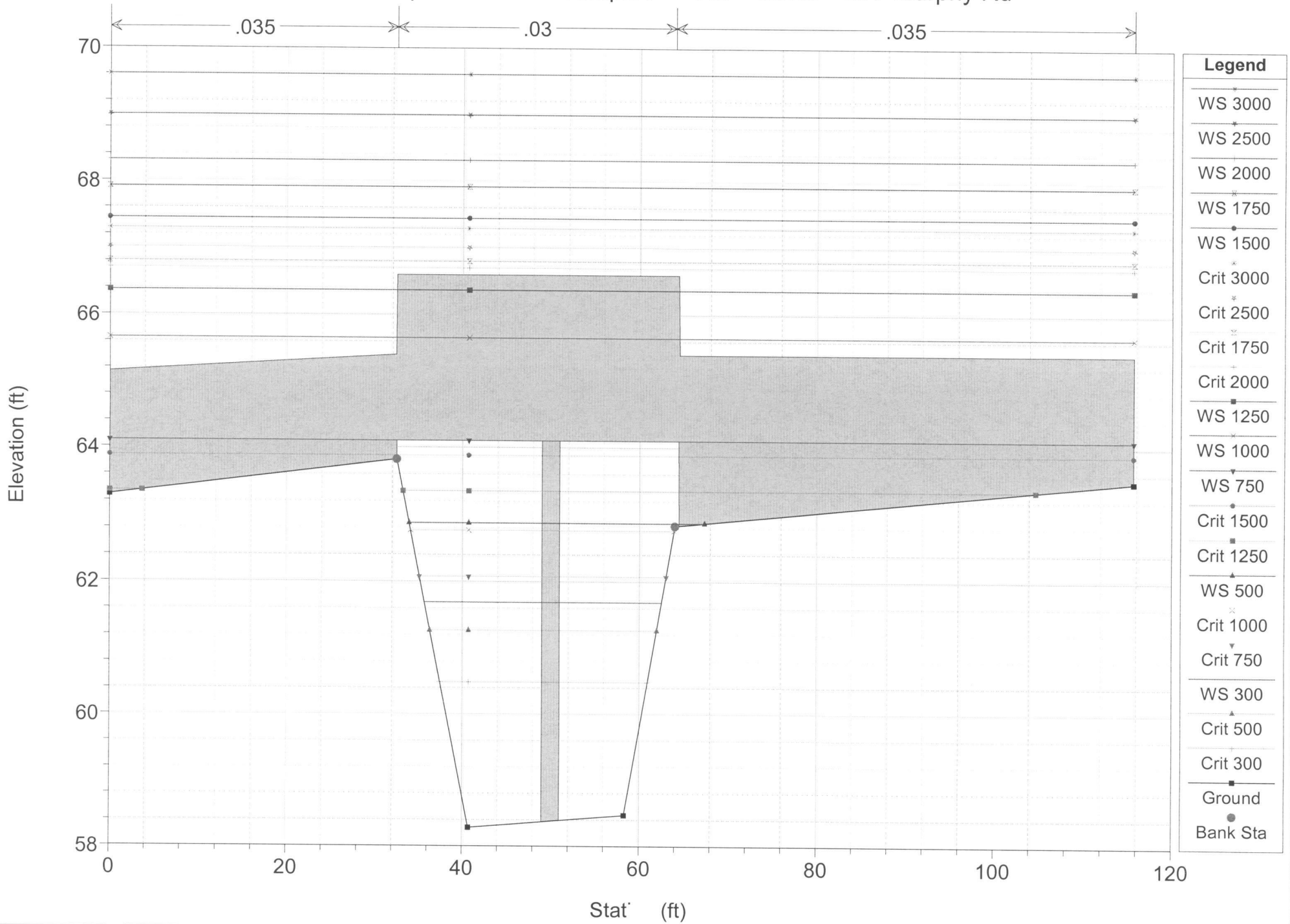
FLOWS TO SFSLJ

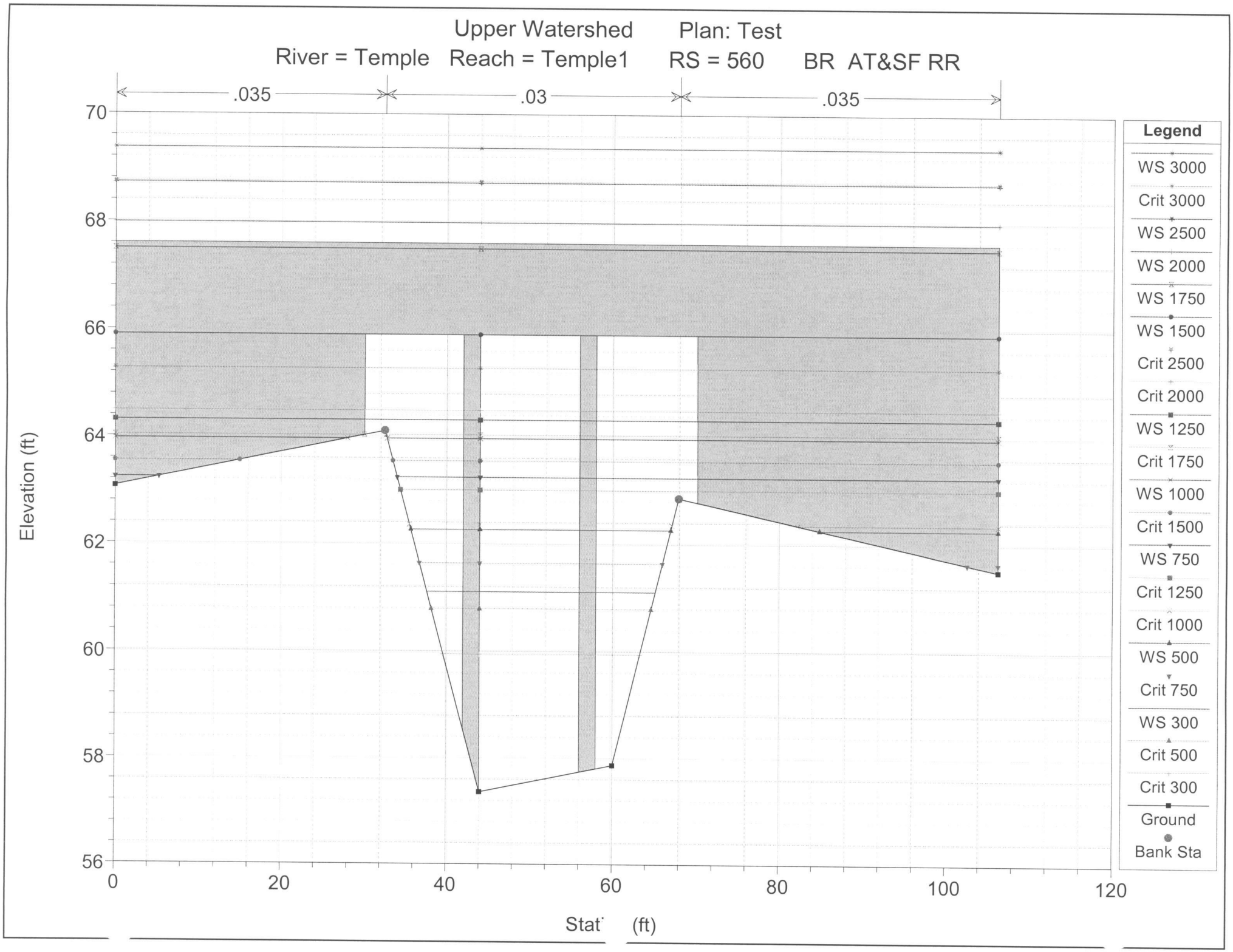
STAEDTLER® No. 937 811E Engineer's Computation Pad

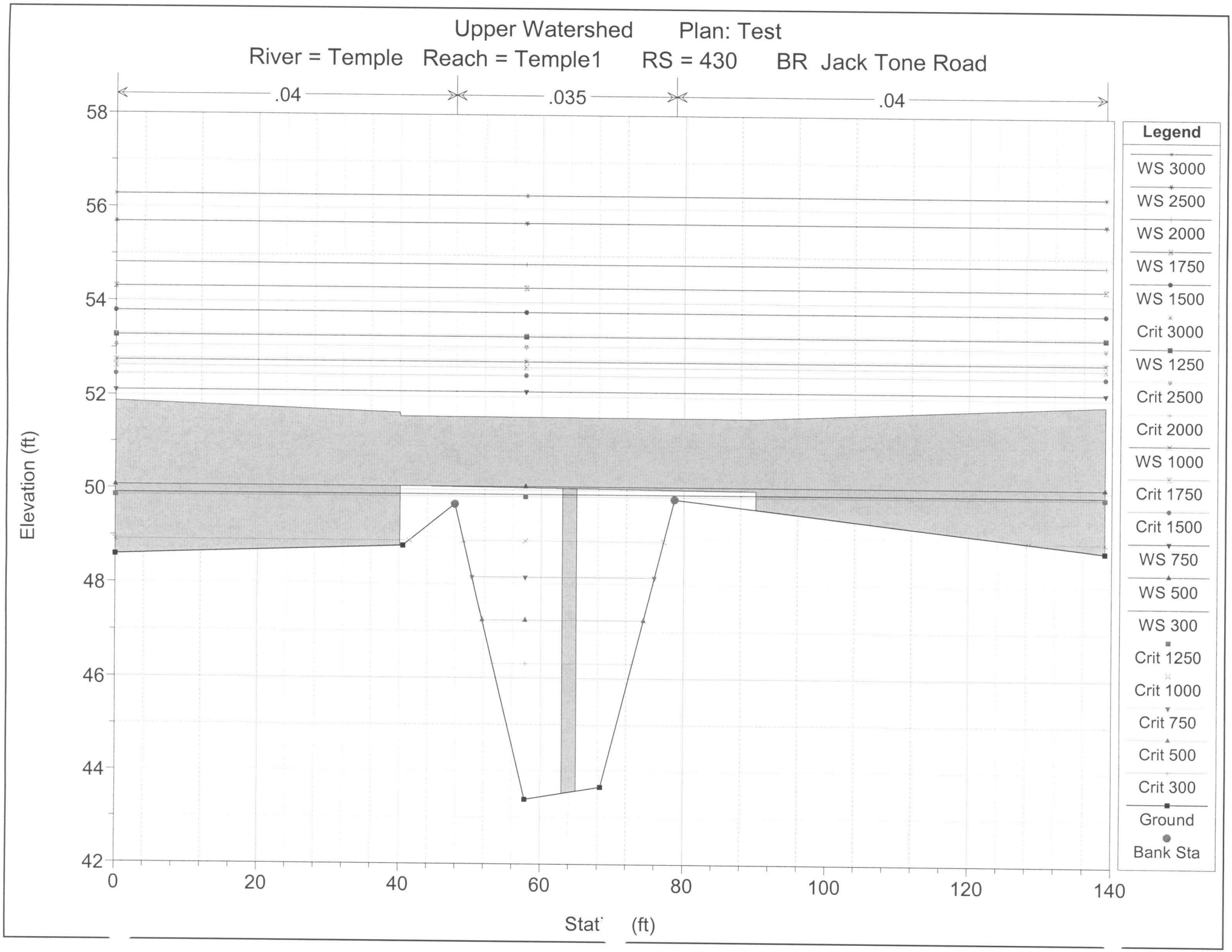

Upper Watershed Plan: Test
River = Temple Reach = Temple1 RS = 654 BR Mariposa Rd
.035
.03
.035
Elevation (ft)
78
76
74
72
70
68
66
64
0
20
40
60
80
100
120
140
160
180
Stat (ft)
Legend
WS 3000
WS 2500
Crit 3000
WS 2000
WS 1750
WS 1500
WS 1250
Crit 2500
Crit 2000
WS 1000
Crit 1750
WS 750
Crit 1500
WS 500
Crit 1250
WS 300
Crit 1000
Crit 750
Crit 500
Crit 300
Ground
Bank Sta

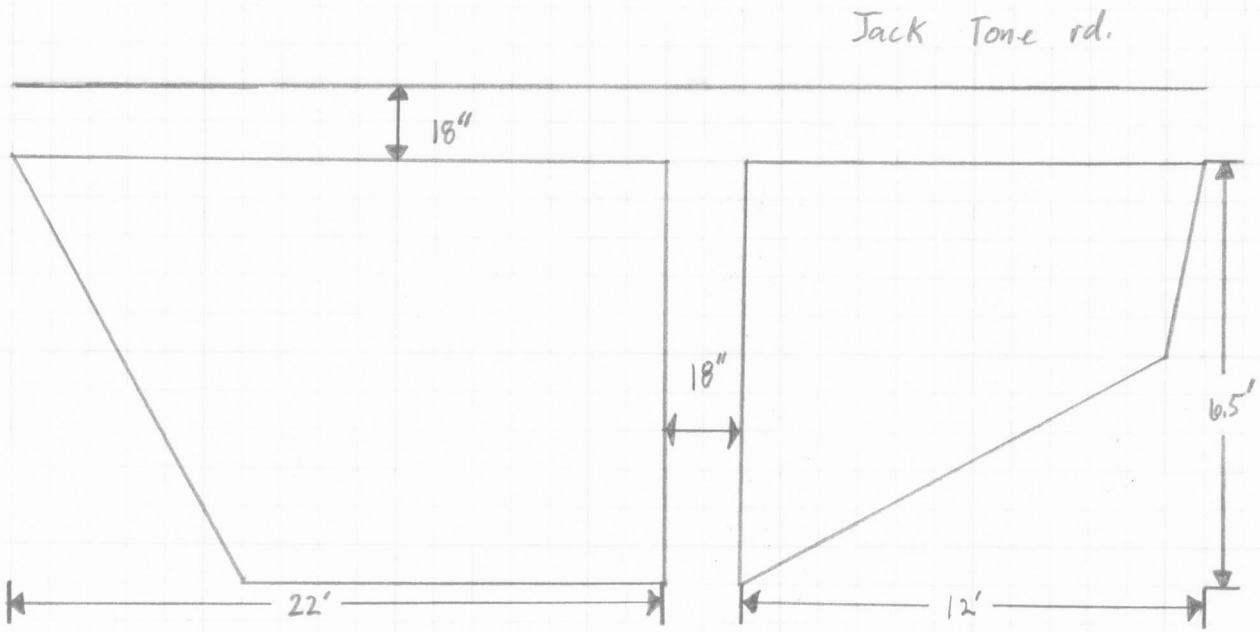
Upper Watershed Plan: Test

River = Temple Reach = Temple1 RS = 561.5 BR Murphy Rd



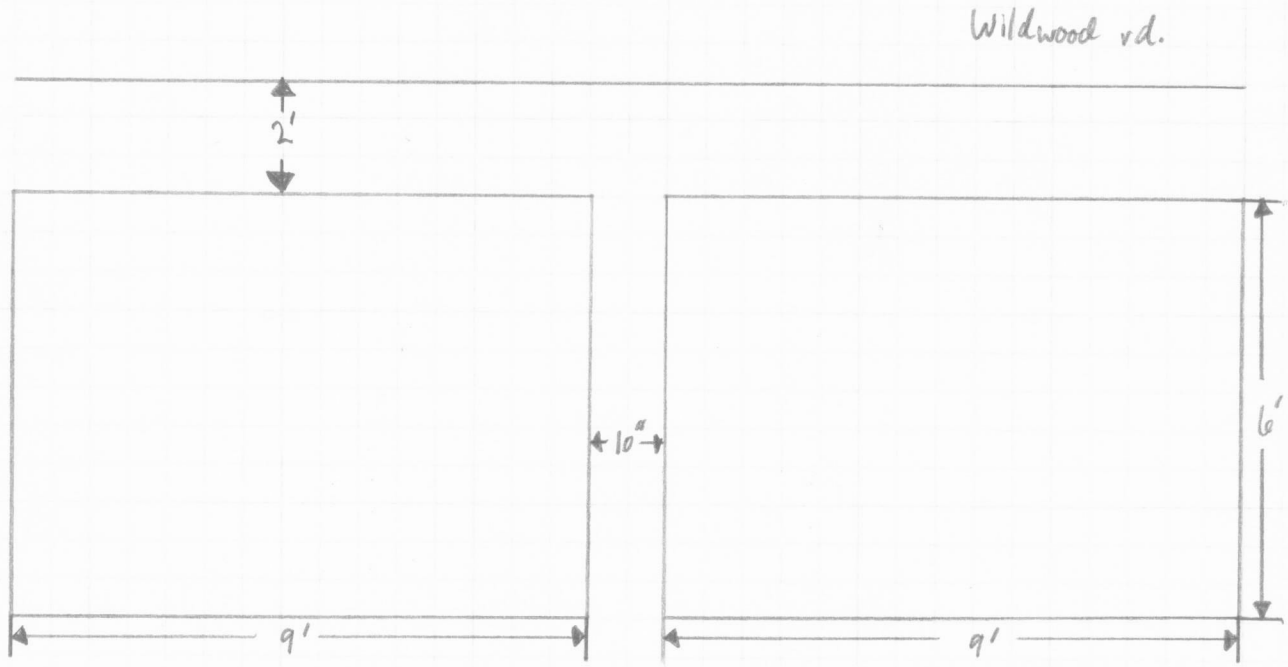

Upper Watershed
Plan: Test
River = Temple
Reach = Temple1
RS = 560
BR AT&SF RR
.035
.03
.035
70
68
66
64
62
60
58
56
Elevation (ft)
0
20
40
60
80
100
120
Stat (ft)
Legend
WS 3000
Crit 3000
WS 2500
WS 2000
WS 1750
WS 1500
Crit 2500
Crit 2000
WS 1250
Crit 1750
WS 1000
Crit 1500
WS 750
Crit 1250
Crit 1000
WS 500
Crit 750
WS 300
Crit 500
Crit 300
Ground
Bank Sta


Upper Watershed Plan: Test
River = Temple Reach = Temple1 RS = 430 BR Jack Tone Road
.04
.035
.04
Elevation (ft)
58
56
54
52
50
48
46
44
42
0
20
40
60
80
100
120
140
Stat (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
Crit 3000
WS 1250
Crit 2500
Crit 2000
WS 1000
Crit 1750
Crit 1500
WS 750
WS 500
WS 300
Crit 1250
Crit 1000
Crit 750
Crit 500
Crit 300
Ground
Bank Sta



Temple and Jack Tone rd.

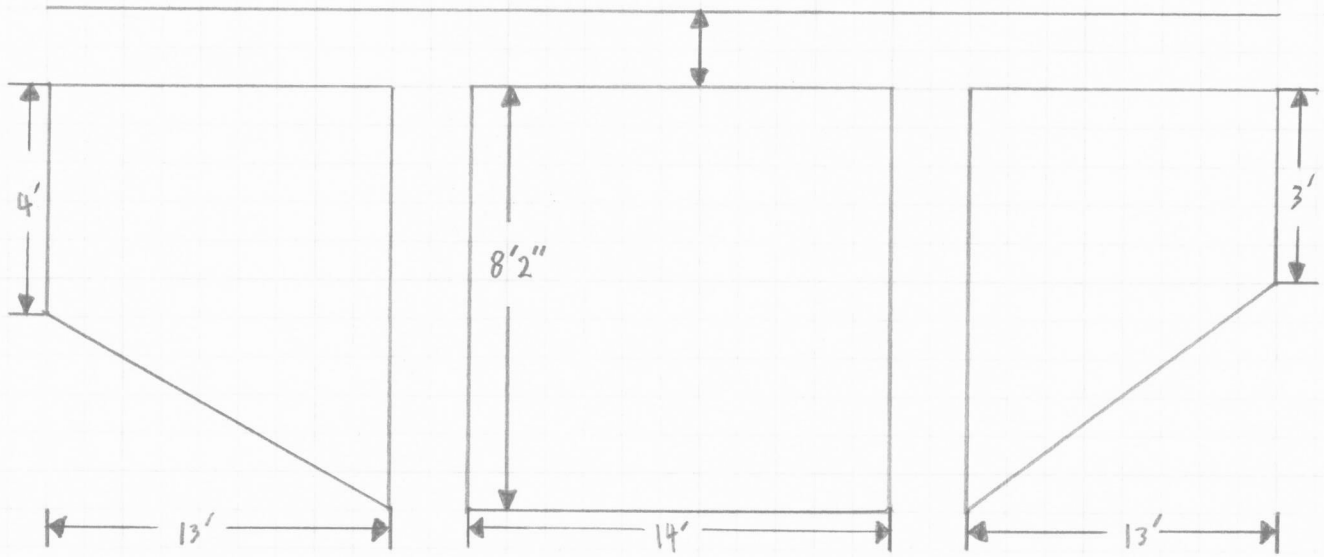
STAEDTLER® No. 937 811E
Engineer's Computation Pad



Temple and Wildwood rd.

STAEDTLER® No. 937 811E
Engineer's Computation Pad

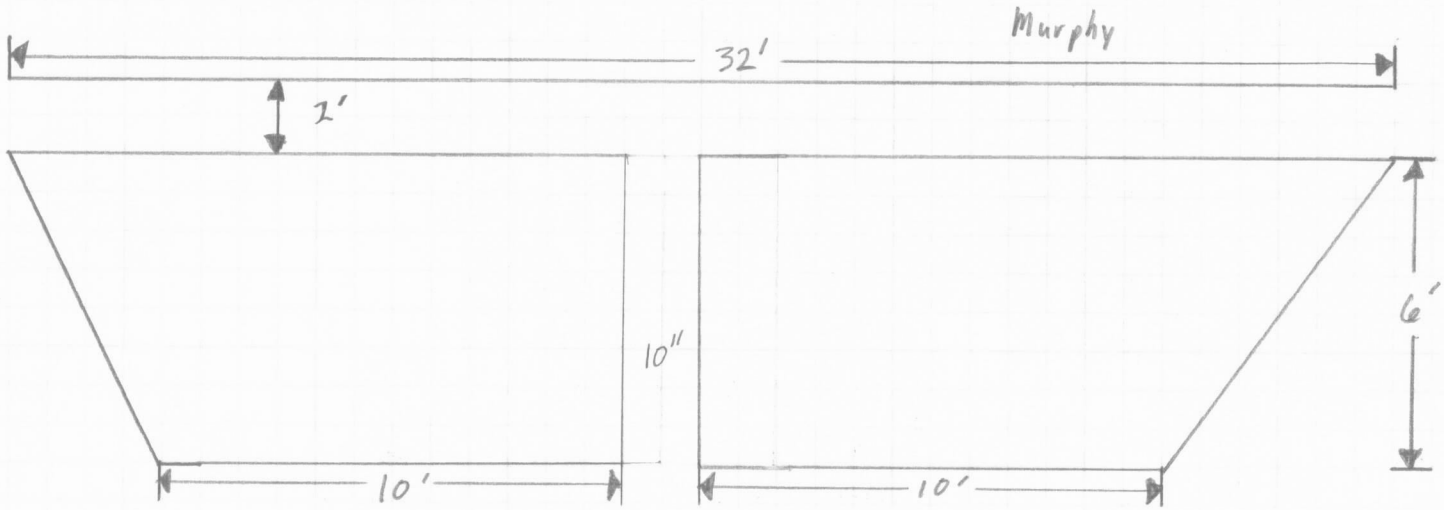
B



Temple and Atchison Topeka and Santa Fe RR

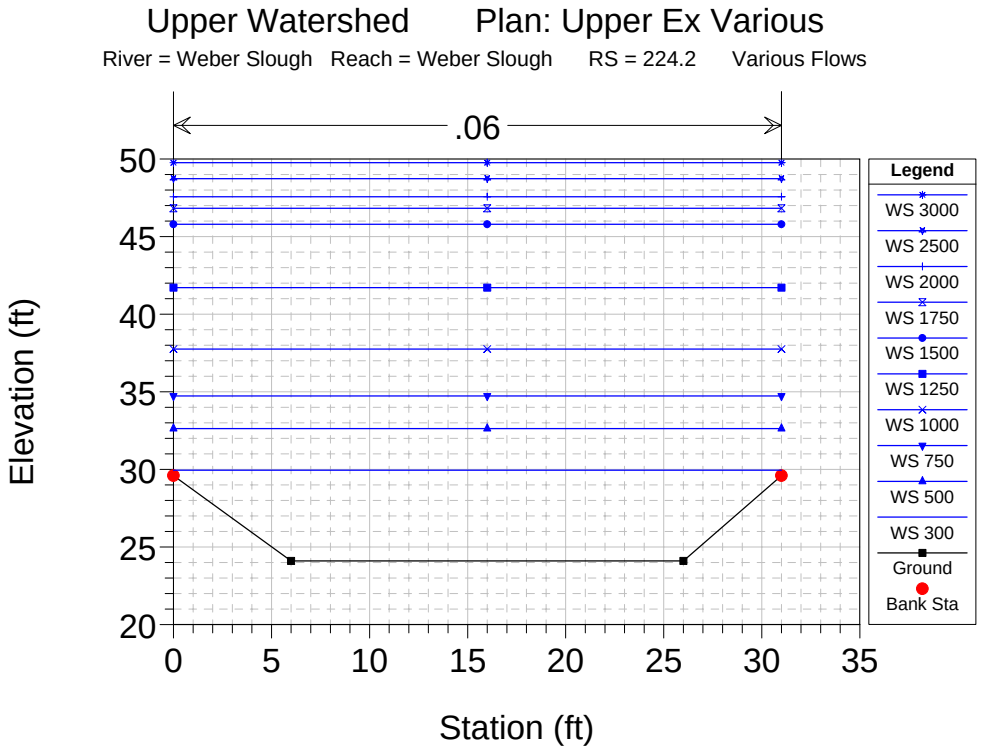
STAEDTLER® No. 937 811E Engineer's Computation Pad

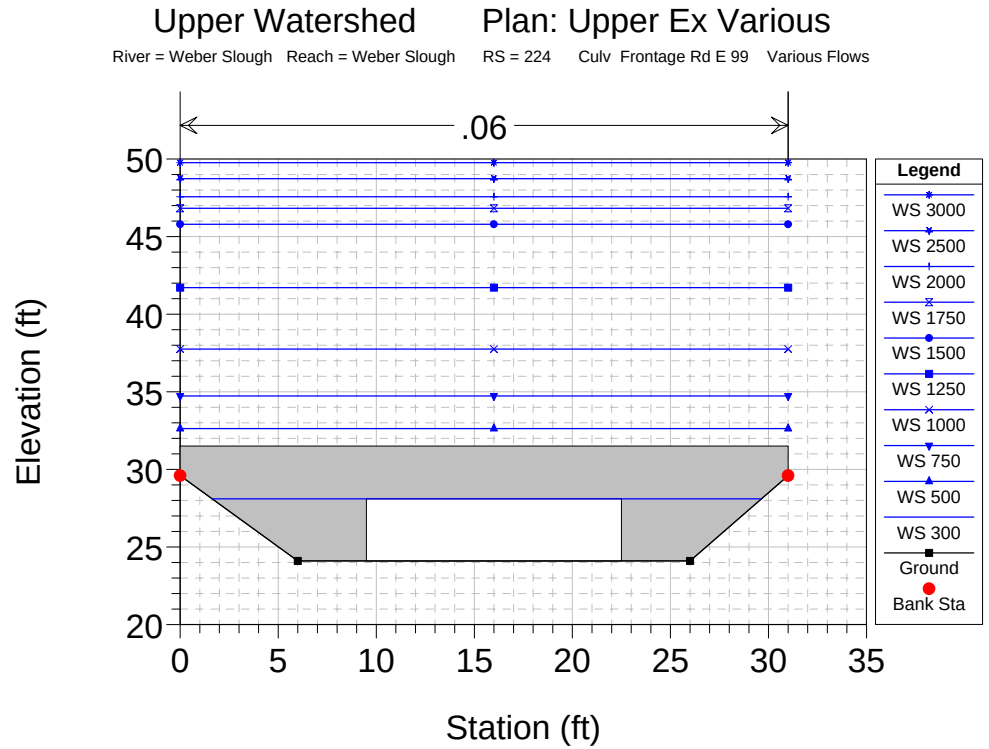
A

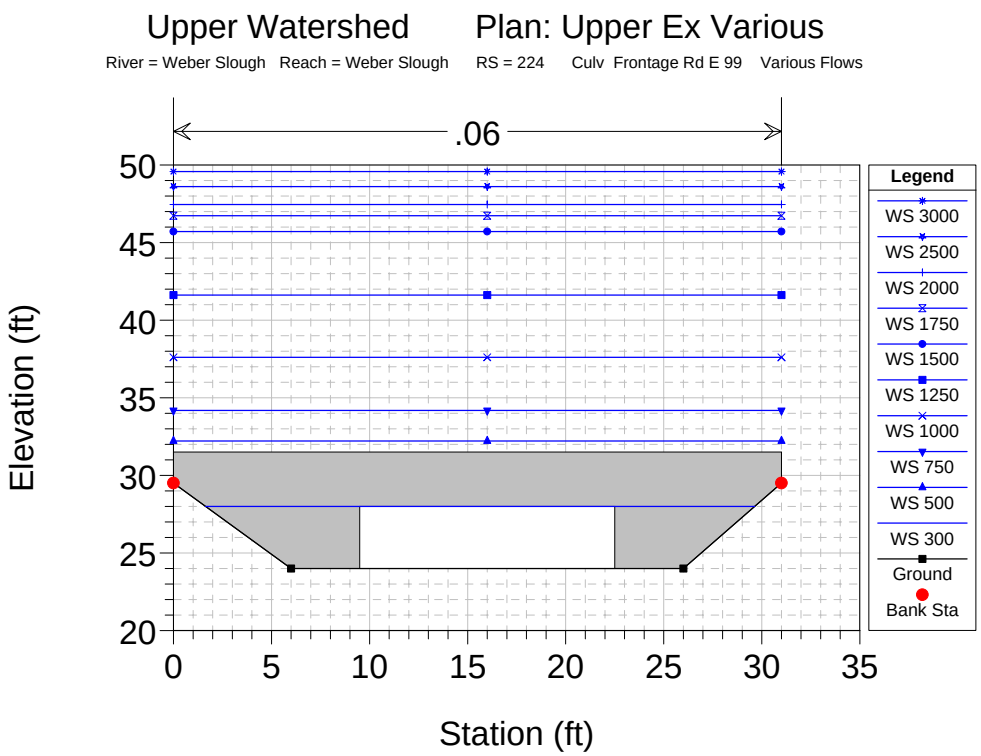


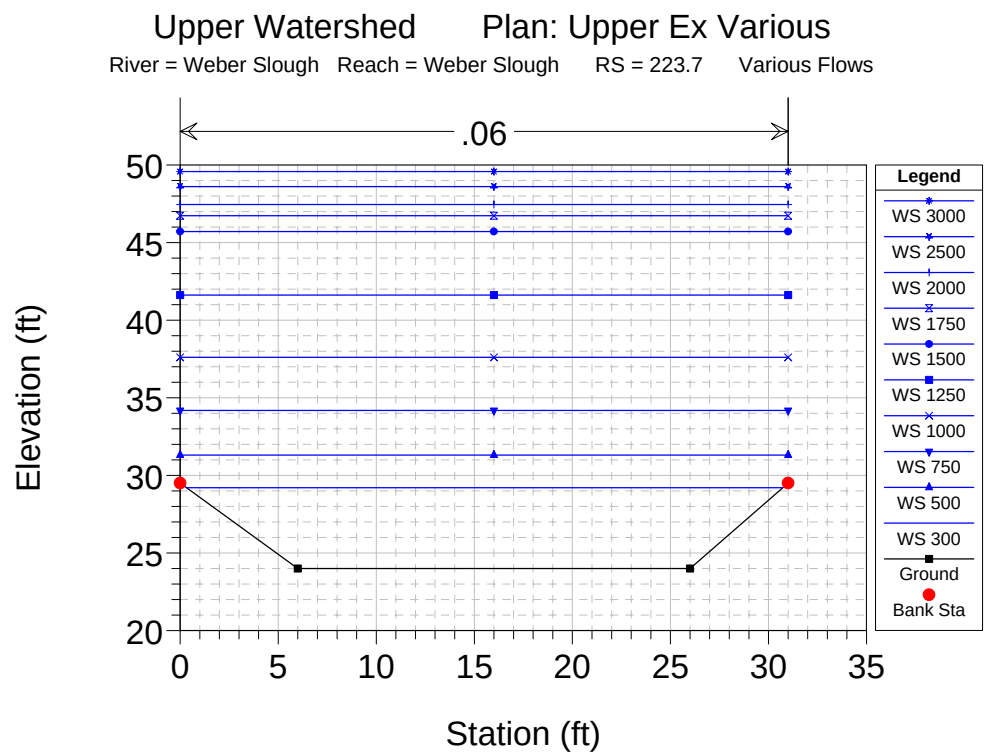
Temple and Murphy rd.

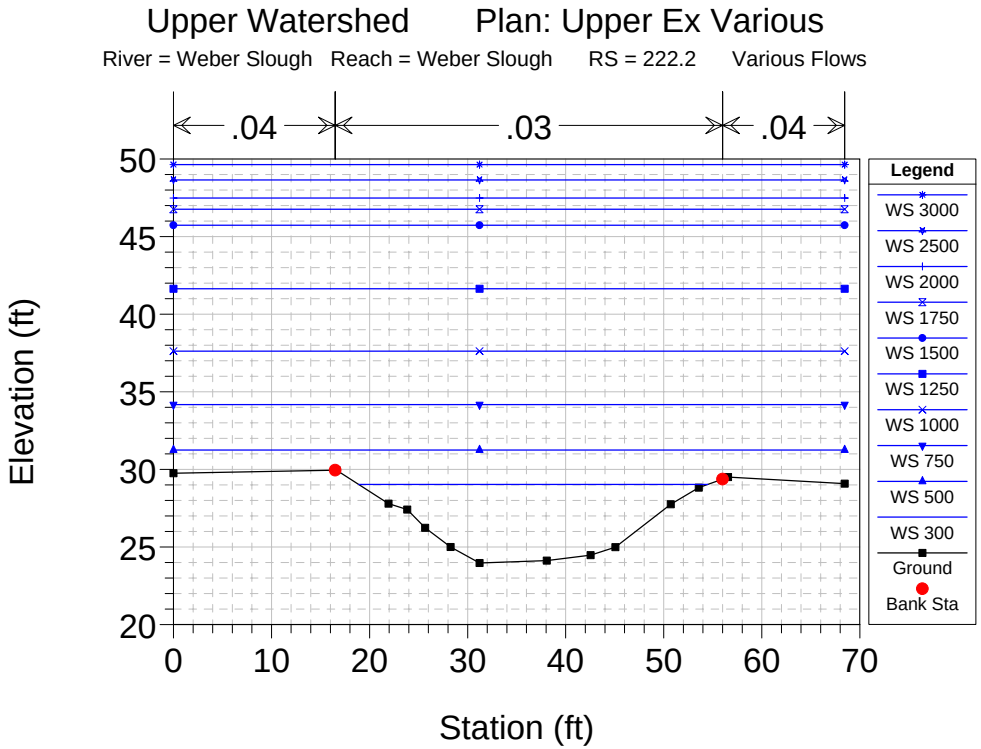
STAEDTLER® No. 937 811E
Engineer's Computation Pad

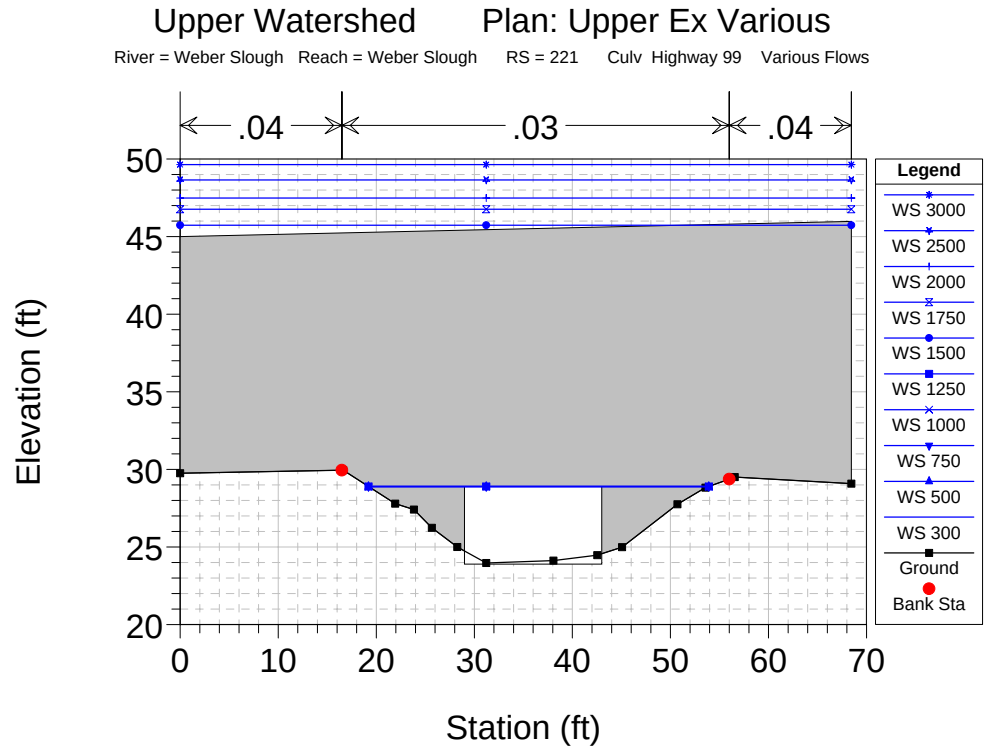

Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 224.2 Various Flows
.06
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta

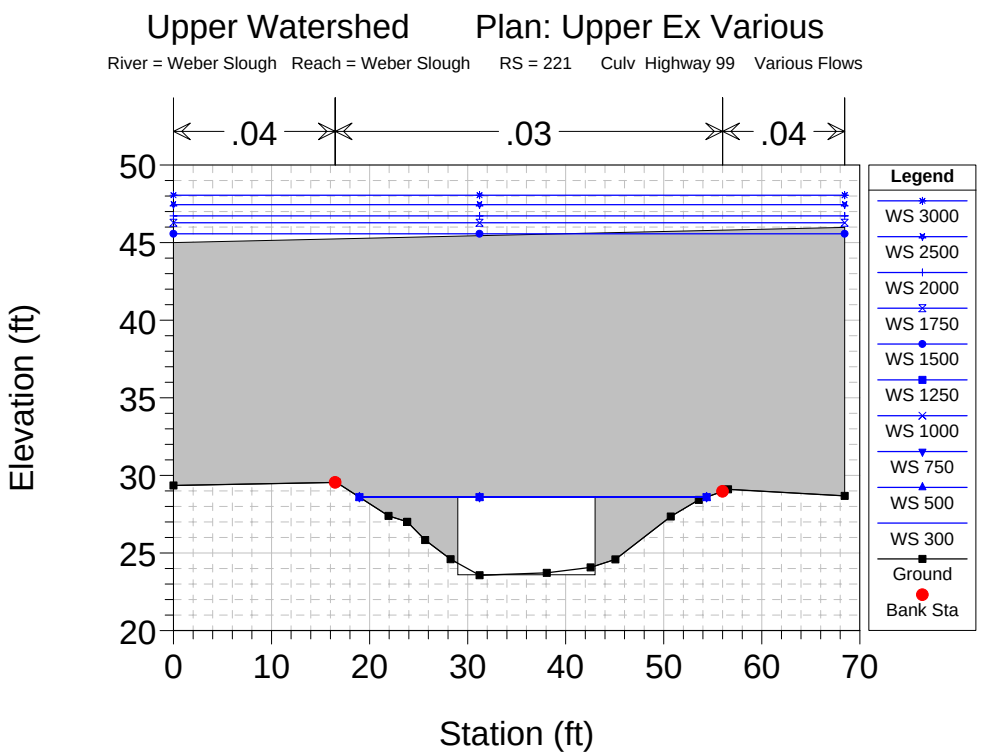

Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 224 Culv Frontage Rd E 99 Various Flows
.06
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta

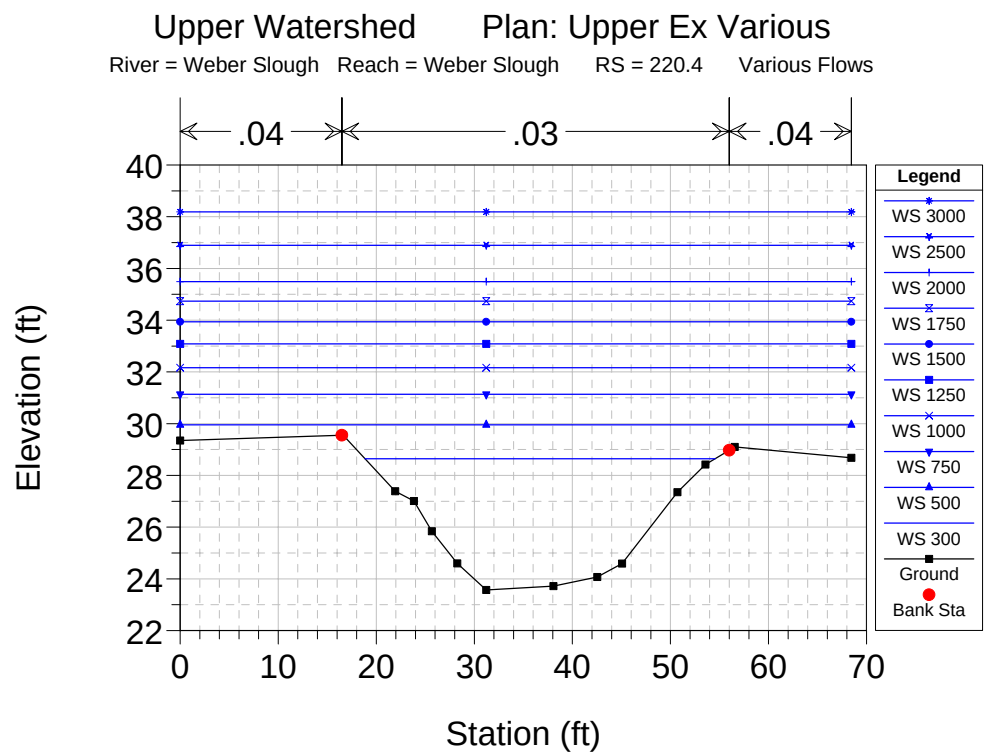

Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 224 Culv Frontage Rd E 99 Various Flows
.06
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta


Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 223.7 Various Flows
.06
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta


Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 222.2 Various Flows
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta

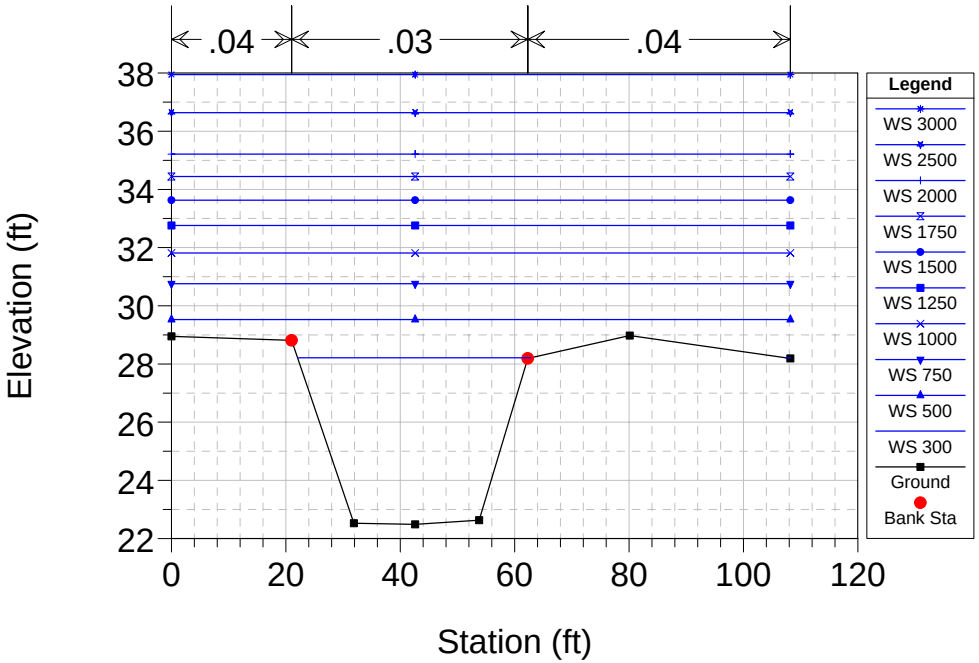

Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 221 Culv Highway 99 Various Flows
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta


Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 221 Culv Highway 99 Various Flows
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta


Upper Watershed Plan: Upper Ex Various
River = Weber Slough Reach = Weber Slough RS = 220.4 Various Flows
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 3000
WS 2500
WS 2000
WS 1750
WS 1500
WS 1250
WS 1000
WS 750
WS 500
WS 300
Ground
Bank Sta

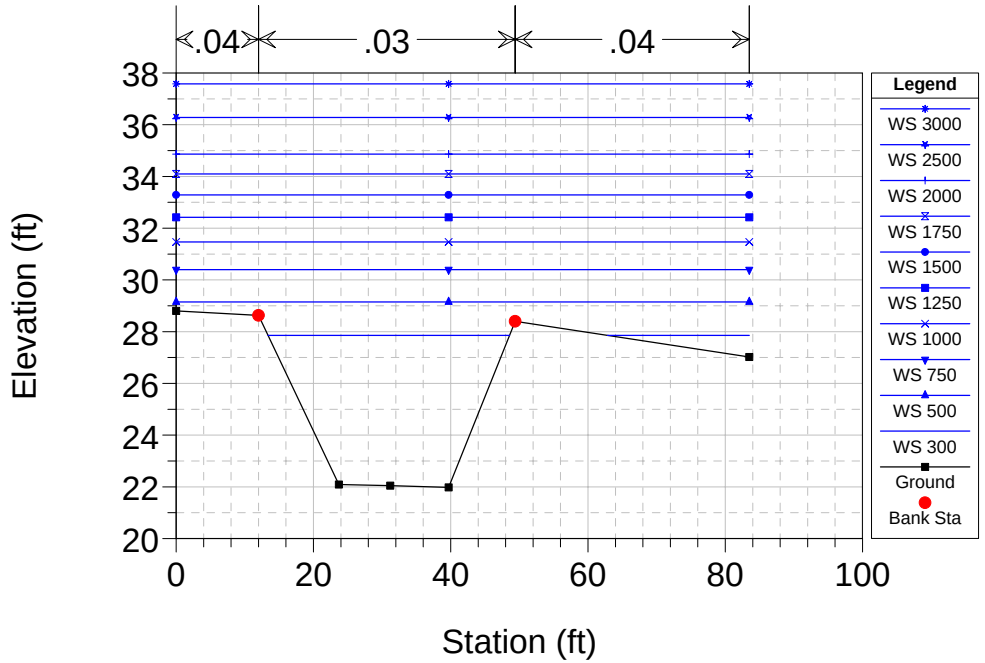
Upper Watershed Plan: Upper Ex Various

River = Weber Slough Reach = Weber Slough RS = 205.5 Various Flows



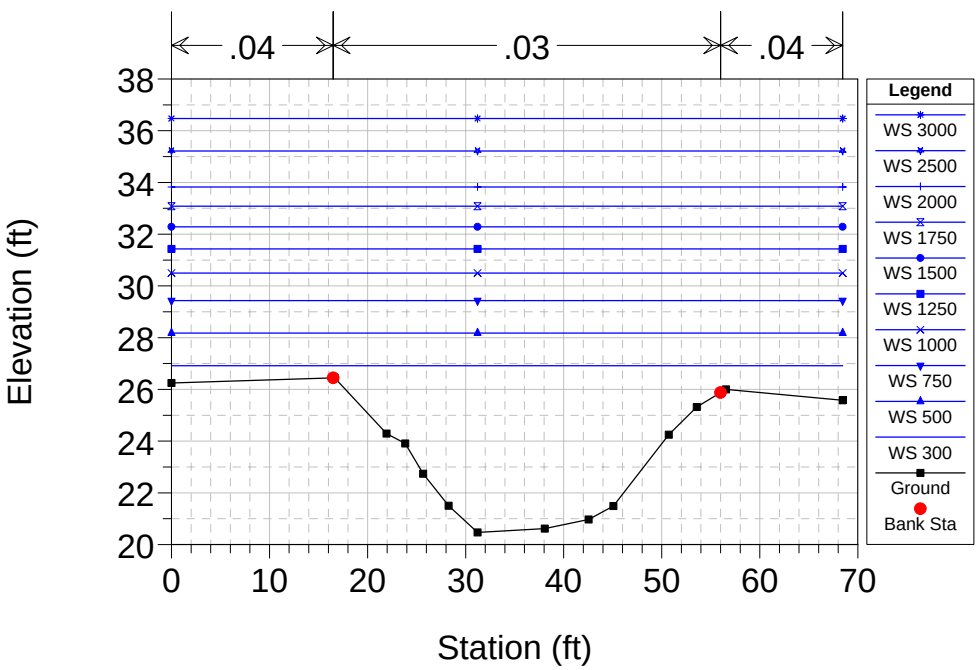
Upper Watershed Plan: Upper Ex Various

River = Weber Slough Reach = Weber Slough RS = 190 Various Flows



Upper Watershed Plan: Upper Ex Various

River = Weber Slough Reach = Weber Slough RS = 147.4 Various Flows



HEC-RAS Plan: Various

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Weber Slough	Weber Slough	224.2	300.00	24.10	29.95	25.95	1.99	151.01	31.00	0.16
Weber Slough	Weber Slough	224.2	500.00	24.10	32.63	26.66	2.14	234.06	31.00	0.14
Weber Slough	Weber Slough	224.2	750.00	24.10	34.73	27.41	2.51	299.21	31.00	0.14
Weber Slough	Weber Slough	224.2	1000.00	24.10	37.76	28.07	2.54	393.06	31.00	0.13
Weber Slough	Weber Slough	224.2	450.00	24.10	32.16	26.49	2.05	219.75	31.00	0.14
Weber Slough	Weber Slough	224.2	550.00	24.10	33.07	26.82	2.22	247.67	31.00	0.14
Weber Slough	Weber Slough	224.2	650.00	24.10	33.89	27.12	2.38	273.34	31.00	0.14
Weber Slough	Weber Slough	224.2	850.00	24.10	35.74	27.68	2.57	330.72	31.00	0.14
Weber Slough	Weber Slough	224.2	950.00	24.10	37.03	27.94	2.56	370.59	31.00	0.13
Weber Slough	Weber Slough	224.2	1050.00	24.10	38.49	28.19	2.52	415.90	31.00	0.12
Weber Slough	Weber Slough	224 Frontage Rd E 99	Culvert							
Weber Slough	Weber Slough	223.7	300.00	24.00	29.20		2.29	131.11	30.40	0.19
Weber Slough	Weber Slough	223.7	500.00	24.00	31.31		2.55	196.44	31.00	0.18
Weber Slough	Weber Slough	223.7	750.00	24.00	34.19		2.63	285.50	31.00	0.15
Weber Slough	Weber Slough	223.7	1000.00	24.00	37.61		2.55	391.57	31.00	0.13
Weber Slough	Weber Slough	223.7	450.00	24.00	30.79		2.50	180.27	31.00	0.18
Weber Slough	Weber Slough	223.7	550.00	24.00	31.85		2.58	213.05	31.00	0.17
Weber Slough	Weber Slough	223.7	650.00	24.00	32.98		2.62	247.98	31.00	0.16
Weber Slough	Weber Slough	223.7	850.00	24.00	35.48		2.61	325.76	31.00	0.14
Weber Slough	Weber Slough	223.7	950.00	24.00	36.88		2.58	368.91	31.00	0.13
Weber Slough	Weber Slough	223.7	1050.00	24.00	38.36		2.53	414.98	31.00	0.12
Weber Slough	Weber Slough	222.2	300.00	23.97	29.03	26.41	2.62	114.41	35.61	0.26
Weber Slough	Weber Slough	222.2	500.00	23.97	31.25	27.17	2.31	248.04	68.45	0.18
Weber Slough	Weber Slough	222.2	750.00	23.97	34.17	27.99	2.00	448.26	68.45	0.12
Weber Slough	Weber Slough	222.2	1000.00	23.97	37.62	28.64	1.79	683.81	68.45	0.09
Weber Slough	Weber Slough	222.2	450.00	23.97	30.71	26.99	2.39	211.08	68.45	0.20
Weber Slough	Weber Slough	222.2	550.00	23.97	31.80	27.34	2.23	285.74	68.45	0.17
Weber Slough	Weber Slough	222.2	650.00	23.97	32.95	27.68	2.11	364.39	68.45	0.14
Weber Slough	Weber Slough	222.2	850.00	23.97	35.48	28.26	1.91	537.87	68.45	0.11
Weber Slough	Weber Slough	222.2	950.00	23.97	36.88	28.52	1.83	633.60	68.45	0.10
Weber Slough	Weber Slough	222.2	1050.00	23.97	38.37	28.76	1.76	735.63	68.45	0.09
Weber Slough	Weber Slough	221 Highway 99	Culvert							
Weber Slough	Weber Slough	220.4	300.00	23.57	28.65		2.61	114.92	35.71	0.26
Weber Slough	Weber Slough	220.4	500.00	23.57	29.95		2.93	186.71	68.45	0.25
Weber Slough	Weber Slough	220.4	750.00	23.57	31.14		3.23	267.76	68.45	0.25
Weber Slough	Weber Slough	220.4	1000.00	23.57	32.16		3.48	337.90	68.45	0.24
Weber Slough	Weber Slough	220.4	450.00	23.57	29.68		2.86	168.14	68.45	0.25
Weber Slough	Weber Slough	220.4	550.00	23.57	30.21		3.00	204.22	68.45	0.25
Weber Slough	Weber Slough	220.4	650.00	23.57	30.69		3.12	237.06	68.45	0.25
Weber Slough	Weber Slough	220.4	850.00	23.57	31.56		3.34	296.79	68.45	0.24
Weber Slough	Weber Slough	220.4	950.00	23.57	31.97		3.43	324.50	68.45	0.24
Weber Slough	Weber Slough	220.4	1050.00	23.57	32.35		3.53	351.04	68.45	0.24
Weber Slough	Weber Slough	205.5	300.00	22.49	28.21		1.70	176.21	41.61	0.14
Weber Slough	Weber Slough	205.5	500.00	22.49	29.53		2.06	286.88	108.20	0.15
Weber Slough	Weber Slough	205.5	750.00	22.49	30.76		2.28	419.98	108.20	0.15
Weber Slough	Weber Slough	205.5	1000.00	22.49	31.81		2.44	534.48	108.20	0.15
Weber Slough	Weber Slough	205.5	450.00	22.49	29.24		2.00	256.42	108.20	0.15
Weber Slough	Weber Slough	205.5	550.00	22.49	29.79		2.11	315.65	108.20	0.15
Weber Slough	Weber Slough	205.5	650.00	22.49	30.29		2.20	369.59	108.20	0.15
Weber Slough	Weber Slough	205.5	850.00	22.49	31.20		2.35	467.47	108.20	0.15
Weber Slough	Weber Slough	205.5	950.00	22.49	31.61		2.41	512.67	108.20	0.15
Weber Slough	Weber Slough	205.5	1050.00	22.49	32.01		2.47	555.83	108.20	0.15
Weber Slough	Weber Slough	190	300.00	21.98	27.86		2.00	157.49	55.84	0.17
Weber Slough	Weber Slough	190	500.00	21.98	29.15		2.35	250.88	83.50	0.18
Weber Slough	Weber Slough	190	750.00	21.98	30.40		2.61	355.02	83.50	0.18
Weber Slough	Weber Slough	190	1000.00	21.98	31.47		2.83	444.23	83.50	0.18
Weber Slough	Weber Slough	190	450.00	21.98	28.87		2.28	227.08	83.50	0.18
Weber Slough	Weber Slough	190	550.00	21.98	29.42		2.41	273.38	83.50	0.18
Weber Slough	Weber Slough	190	650.00	21.98	29.93		2.51	315.61	83.50	0.18
Weber Slough	Weber Slough	190	850.00	21.98	30.84		2.70	392.07	83.50	0.18
Weber Slough	Weber Slough	190	950.00	21.98	31.26		2.79	427.28	83.50	0.18
Weber Slough	Weber Slough	190	1050.00	21.98	31.66		2.87	460.81	83.50	0.18
Weber Slough	Weber Slough	147.4	300.00	20.47	26.92		1.73	190.95	68.45	0.15

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Weber Slough	Weber Slough	147.4	500.00	20.47	28.18		2.09	277.33	68.45	0.16
Weber Slough	Weber Slough	147.4	750.00	20.47	29.43		2.44	363.06	68.45	0.17
Weber Slough	Weber Slough	147.4	1000.00	20.47	30.50		2.74	435.96	68.45	0.17
Weber Slough	Weber Slough	147.4	450.00	20.47	27.89		2.01	257.56	68.45	0.15
Weber Slough	Weber Slough	147.4	550.00	20.47	28.45		2.16	295.89	68.45	0.16
Weber Slough	Weber Slough	147.4	650.00	20.47	28.96		2.31	330.65	68.45	0.16
Weber Slough	Weber Slough	147.4	850.00	20.47	29.87		2.57	393.39	68.45	0.17
Weber Slough	Weber Slough	147.4	950.00	20.47	30.29		2.68	422.15	68.45	0.17
Weber Slough	Weber Slough	147.4	1050.00	20.47	30.69		2.80	449.46	68.45	0.17
Weber Slough	Weber Slough	143.1	300.00	20.52	26.80		2.12	167.42	55.72	0.17
Weber Slough	Weber Slough	143.1	500.00	20.52	28.05		2.59	236.87	55.72	0.19
Weber Slough	Weber Slough	143.1	750.00	20.52	29.28		3.06	305.59	55.72	0.20
Weber Slough	Weber Slough	143.1	1000.00	20.52	30.33		3.46	363.92	55.72	0.21
Weber Slough	Weber Slough	143.1	450.00	20.52	27.76		2.48	220.99	55.72	0.18
Weber Slough	Weber Slough	143.1	550.00	20.52	28.31		2.69	251.76	55.72	0.19
Weber Slough	Weber Slough	143.1	650.00	20.52	28.81		2.88	279.63	55.72	0.20
Weber Slough	Weber Slough	143.1	850.00	20.52	29.72		3.23	329.87	55.72	0.21
Weber Slough	Weber Slough	143.1	950.00	20.52	30.13		3.39	352.87	55.72	0.21
Weber Slough	Weber Slough	143.1	1050.00	20.52	30.52		3.54	374.70	55.72	0.21
Weber Slough	Weber Slough	132.6	300.00	20.81	26.46		2.41	146.36	57.13	0.20
Weber Slough	Weber Slough	132.6	500.00	20.81	27.69		2.85	216.74	57.13	0.21
Weber Slough	Weber Slough	132.6	750.00	20.81	28.91		3.30	286.08	57.13	0.22
Weber Slough	Weber Slough	132.6	1000.00	20.81	29.94		3.68	344.86	57.13	0.23
Weber Slough	Weber Slough	132.6	450.00	20.81	27.41		2.75	200.61	57.13	0.21
Weber Slough	Weber Slough	132.6	550.00	20.81	27.96		2.94	231.77	57.13	0.22
Weber Slough	Weber Slough	132.6	650.00	20.81	28.45		3.13	259.88	57.13	0.22
Weber Slough	Weber Slough	132.6	850.00	20.81	29.34		3.46	310.55	57.13	0.23
Weber Slough	Weber Slough	132.6	950.00	20.81	29.74		3.61	333.74	57.13	0.23
Weber Slough	Weber Slough	132.6	1050.00	20.81	30.13		3.76	355.72	57.13	0.23
Weber Slough	Weber Slough	121.8	300.00	21.14	25.78		3.44	97.74	45.00	0.31
Weber Slough	Weber Slough	121.8	500.00	21.14	27.01		3.96	153.45	45.00	0.31
Weber Slough	Weber Slough	121.8	750.00	21.14	28.19		4.53	206.57	45.00	0.32
Weber Slough	Weber Slough	121.8	1000.00	21.14	29.18		5.04	250.86	45.00	0.33
Weber Slough	Weber Slough	121.8	450.00	21.14	26.73		3.84	140.73	45.00	0.31
Weber Slough	Weber Slough	121.8	550.00	21.14	27.27		4.08	165.06	45.00	0.31
Weber Slough	Weber Slough	121.8	650.00	21.14	27.75		4.31	186.59	45.00	0.31
Weber Slough	Weber Slough	121.8	850.00	21.14	28.61		4.74	225.06	45.00	0.32
Weber Slough	Weber Slough	121.8	950.00	21.14	28.99		4.94	242.53	45.00	0.33
Weber Slough	Weber Slough	121.8	1050.00	21.14	29.36		5.14	258.99	45.00	0.33
Weber Slough	Weber Slough	113.2	300.00	18.88	25.51		2.04	153.51	42.44	0.16
Weber Slough	Weber Slough	113.2	500.00	18.88	26.71		2.64	206.64	50.08	0.19
Weber Slough	Weber Slough	113.2	750.00	18.88	27.86		3.18	277.46	67.58	0.21
Weber Slough	Weber Slough	113.2	1000.00	18.88	28.84		3.60	351.14	87.21	0.22
Weber Slough	Weber Slough	113.2	450.00	18.88	26.43		2.50	193.78	44.92	0.19
Weber Slough	Weber Slough	113.2	550.00	18.88	26.96		2.76	220.06	57.33	0.20
Weber Slough	Weber Slough	113.2	650.00	18.88	27.42		2.99	248.69	63.62	0.20
Weber Slough	Weber Slough	113.2	850.00	18.88	28.27		3.35	305.78	71.48	0.22
Weber Slough	Weber Slough	113.2	950.00	18.88	28.65		3.53	335.28	82.64	0.22
Weber Slough	Weber Slough	113.2	1050.00	18.88	29.02		3.65	367.34	87.21	0.22
Weber Slough	Weber Slough	103.2	300.00	18.36	25.25		2.13	143.84	44.69	0.17
Weber Slough	Weber Slough	103.2	500.00	18.36	26.39		2.75	204.73	55.71	0.20
Weber Slough	Weber Slough	103.2	750.00	18.36	27.50		3.31	266.46	55.71	0.22
Weber Slough	Weber Slough	103.2	1000.00	18.36	28.44		3.76	318.88	55.71	0.23
Weber Slough	Weber Slough	103.2	450.00	18.36	26.12		2.63	189.93	55.71	0.19
Weber Slough	Weber Slough	103.2	550.00	18.36	26.63		2.88	218.01	55.71	0.20
Weber Slough	Weber Slough	103.2	650.00	18.36	27.08		3.11	242.91	55.71	0.21
Weber Slough	Weber Slough	103.2	850.00	18.36	27.89		3.50	288.35	55.71	0.23
Weber Slough	Weber Slough	103.2	950.00	18.36	28.26		3.68	308.89	55.71	0.23
Weber Slough	Weber Slough	103.2	1050.00	18.36	28.62		3.84	328.86	55.71	0.24
Weber Slough	Weber Slough	93.3	300.00	18.03	24.92		2.38	126.11	33.30	0.21
Weber Slough	Weber Slough	93.3	500.00	18.03	25.96		3.07	179.51	57.30	0.24
Weber Slough	Weber Slough	93.3	750.00	18.03	27.02		3.62	240.04	57.30	0.26
Weber Slough	Weber Slough	93.3	1000.00	18.03	27.93		4.05	292.17	57.30	0.27
Weber Slough	Weber Slough	93.3	450.00	18.03	25.71		2.94	164.92	57.30	0.23
Weber Slough	Weber Slough	93.3	550.00	18.03	26.19		3.19	192.37	57.30	0.24

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Weber Slough	Weber Slough	93.3	650.00	18.03	26.61		3.42	216.71	57.30	0.25
Weber Slough	Weber Slough	93.3	850.00	18.03	27.40		3.80	261.79	57.30	0.26
Weber Slough	Weber Slough	93.3	950.00	18.03	27.75		3.97	282.20	57.30	0.27
Weber Slough	Weber Slough	93.3	1050.00	18.03	28.10		4.12	302.24	57.30	0.27
Weber Slough	Weber Slough	83.2	300.00	17.50	24.64		1.97	168.86	56.78	0.16
Weber Slough	Weber Slough	83.2	500.00	17.50	25.60		2.59	223.34	56.78	0.19
Weber Slough	Weber Slough	83.2	750.00	17.50	26.60		3.16	280.25	56.78	0.22
Weber Slough	Weber Slough	83.2	1000.00	17.50	27.48		3.62	329.88	56.78	0.23
Weber Slough	Weber Slough	83.2	450.00	17.50	25.36		2.47	209.42	56.78	0.19
Weber Slough	Weber Slough	83.2	550.00	17.50	25.81		2.72	235.28	56.78	0.20
Weber Slough	Weber Slough	83.2	650.00	17.50	26.21		2.95	258.06	56.78	0.21
Weber Slough	Weber Slough	83.2	850.00	17.50	26.97		3.35	300.94	56.78	0.22
Weber Slough	Weber Slough	83.2	950.00	17.50	27.31		3.54	320.35	56.78	0.23
Weber Slough	Weber Slough	83.2	1050.00	17.50	27.65		3.70	339.62	56.78	0.24
Weber Slough	Weber Slough	76.0	300.00	16.92	24.50	20.03	1.84	183.54	48.19	0.14
Weber Slough	Weber Slough	76.0	500.00	16.92	25.39	20.95	2.52	226.41	48.19	0.18
Weber Slough	Weber Slough	76.0	750.00	16.92	26.33	21.81	3.17	271.63	48.19	0.21
Weber Slough	Weber Slough	76.0	1000.00	16.92	27.15	22.54	3.70	311.21	48.19	0.23
Weber Slough	Weber Slough	76.0	450.00	16.92	25.16	20.74	2.38	215.20	48.19	0.17
Weber Slough	Weber Slough	76.0	550.00	16.92	25.58	21.13	2.66	235.82	48.19	0.19
Weber Slough	Weber Slough	76.0	650.00	16.92	25.96	21.49	2.93	253.86	48.19	0.20
Weber Slough	Weber Slough	76.0	850.00	16.92	26.67	22.12	3.39	288.13	48.19	0.22
Weber Slough	Weber Slough	76.0	950.00	16.92	26.99	22.41	3.60	303.58	48.19	0.23
Weber Slough	Weber Slough	76.0	1050.00	16.92	27.31	22.66	3.79	319.09	48.19	0.24
Weber Slough	Weber Slough	75.5 2x30" Culvert	Culvert							
Weber Slough	Weber Slough	75	300.00	16.42	23.63		2.01	165.95	48.19	0.16
Weber Slough	Weber Slough	75	500.00	16.42	25.16		2.39	239.29	48.19	0.17
Weber Slough	Weber Slough	75	750.00	16.42	26.17		2.99	288.21	48.19	0.19
Weber Slough	Weber Slough	75	1000.00	16.42	27.02		3.50	329.28	48.19	0.21
Weber Slough	Weber Slough	75	450.00	16.42	24.90		2.26	227.09	48.19	0.16
Weber Slough	Weber Slough	75	550.00	16.42	25.39		2.51	250.39	48.19	0.17
Weber Slough	Weber Slough	75	650.00	16.42	25.80		2.76	270.47	48.19	0.18
Weber Slough	Weber Slough	75	850.00	16.42	26.51		3.21	304.75	48.19	0.20
Weber Slough	Weber Slough	75	950.00	16.42	26.86		3.40	321.42	48.19	0.21
Weber Slough	Weber Slough	75	1050.00	16.42	27.17		3.60	336.29	48.19	0.22
Weber Slough	Weber Slough	72.0	300.00	17.00	23.47	20.22	2.69	112.08	41.38	0.24
Weber Slough	Weber Slough	72.0	500.00	17.00	24.98	21.13	3.12	174.49	41.38	0.23
Weber Slough	Weber Slough	72.0	750.00	17.00	25.93	22.06	3.88	213.66	41.38	0.27
Weber Slough	Weber Slough	72.0	1000.00	17.00	26.72	22.81	4.52	246.31	41.38	0.30
Weber Slough	Weber Slough	72.0	450.00	17.00	24.74	20.94	2.96	164.53	41.38	0.23
Weber Slough	Weber Slough	72.0	550.00	17.00	25.20	21.33	3.28	183.47	41.38	0.24
Weber Slough	Weber Slough	72.0	650.00	17.00	25.59	21.70	3.59	199.60	41.38	0.25
Weber Slough	Weber Slough	72.0	850.00	17.00	26.24	22.35	4.16	226.72	41.38	0.28
Weber Slough	Weber Slough	72.0	950.00	17.00	26.57	22.67	4.41	240.06	41.38	0.29
Weber Slough	Weber Slough	72.0	1050.00	17.00	26.85	22.93	4.65	251.75	41.38	0.30
Weber Slough	Weber Slough	71.5	Culvert							
Weber Slough	Weber Slough	71	300.00	16.85	22.32		3.53	84.93	25.26	0.34
Weber Slough	Weber Slough	71	500.00	16.85	24.09		3.69	143.82	41.38	0.30
Weber Slough	Weber Slough	71	750.00	16.85	25.07		4.45	184.59	41.38	0.33
Weber Slough	Weber Slough	71	1000.00	16.85	25.86		5.10	217.26	41.38	0.35
Weber Slough	Weber Slough	71	450.00	16.85	23.83		3.55	132.94	41.38	0.29
Weber Slough	Weber Slough	71	550.00	16.85	24.31		3.86	152.93	41.38	0.30
Weber Slough	Weber Slough	71	650.00	16.85	24.72		4.16	169.94	41.38	0.31
Weber Slough	Weber Slough	71	850.00	16.85	25.39		4.73	197.66	41.38	0.34
Weber Slough	Weber Slough	71	950.00	16.85	25.71		4.98	210.73	41.38	0.35
Weber Slough	Weber Slough	71	1050.00	16.85	26.00		5.23	222.80	41.38	0.36
Weber Slough	Weber Slough	70.0	300.00	16.68	22.26	19.77	3.11	96.83	34.69	0.29
Weber Slough	Weber Slough	70.0	500.00	16.68	24.07	20.64	3.12	185.20	50.25	0.24
Weber Slough	Weber Slough	70.0	750.00	16.68	25.07	21.50	3.77	235.11	50.25	0.27
Weber Slough	Weber Slough	70.0	1000.00	16.68	25.86	22.23	4.35	275.12	50.25	0.29
Weber Slough	Weber Slough	70.0	450.00	16.68	23.81	20.44	3.00	171.84	50.25	0.24
Weber Slough	Weber Slough	70.0	550.00	16.68	24.30	20.83	3.26	196.35	50.25	0.25
Weber Slough	Weber Slough	70.0	650.00	16.68	24.71	21.18	3.52	217.18	50.25	0.26

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Weber Slough	Weber Slough	70.0	850.00	16.68	25.39	21.80	4.03	251.11	50.25	0.28
Weber Slough	Weber Slough	70.0	950.00	16.68	25.70	22.06	4.25	267.12	50.25	0.29
Weber Slough	Weber Slough	70.0	1050.00	16.68	26.00	22.46	4.47	281.92	50.25	0.29
Weber Slough	Weber Slough	69.5	Culvert							
Weber Slough	Weber Slough	69	300.00	16.48	21.11		4.21	71.21	24.90	0.44
Weber Slough	Weber Slough	69	500.00	16.48	21.95		5.34	93.67	28.15	0.51
Weber Slough	Weber Slough	69	750.00	16.48	22.93		5.99	137.94	50.25	0.51
Weber Slough	Weber Slough	69	1000.00	16.48	23.81		6.34	181.90	50.25	0.49
Weber Slough	Weber Slough	69	450.00	16.48	21.74		5.14	87.61	27.31	0.51
Weber Slough	Weber Slough	69	550.00	16.48	22.16		5.52	100.77	39.74	0.52
Weber Slough	Weber Slough	69	650.00	16.48	22.56		5.80	119.13	50.25	0.51
Weber Slough	Weber Slough	69	850.00	16.48	23.29		6.15	155.86	50.25	0.50
Weber Slough	Weber Slough	69	950.00	16.48	23.65		6.27	173.73	50.25	0.49
Weber Slough	Weber Slough	69	1050.00	16.48	23.97		6.41	189.85	50.25	0.49
Weber Slough	Weber Slough	53.9	300.00	13.57	20.61	16.31	1.73	173.83	39.56	0.15
Weber Slough	Weber Slough	53.9	500.00	13.57	20.82	17.07	2.75	182.10	40.37	0.23
Weber Slough	Weber Slough	53.9	750.00	13.57	21.25	17.85	3.75	199.84	42.04	0.30
Weber Slough	Weber Slough	53.9	1000.00	13.57	21.92	18.49	4.36	230.50	60.97	0.34
Weber Slough	Weber Slough	53.9	450.00	13.57	20.75	16.90	2.51	179.59	40.13	0.21
Weber Slough	Weber Slough	53.9	550.00	13.57	20.89	17.24	2.97	184.92	40.64	0.25
Weber Slough	Weber Slough	53.9	650.00	13.57	21.05	17.55	3.39	191.61	41.27	0.28
Weber Slough	Weber Slough	53.9	850.00	13.57	21.48	18.12	4.05	209.79	43.16	0.32
Weber Slough	Weber Slough	53.9	950.00	13.57	21.77	18.36	4.27	222.45	46.94	0.34
Weber Slough	Weber Slough	53.9	1050.00	13.57	22.08	18.62	4.42	242.04	79.79	0.35
Weber Slough	Weber Slough	53.4	Culvert							
Weber Slough	Weber Slough	52.9	300.00	13.37	20.55		1.67	179.32	40.10	0.14
Weber Slough	Weber Slough	52.9	500.00	13.37	20.63		2.74	182.79	40.43	0.23
Weber Slough	Weber Slough	52.9	750.00	13.37	20.79		3.96	189.31	41.06	0.33
Weber Slough	Weber Slough	52.9	1000.00	13.37	21.01		5.05	198.18	41.89	0.41
Weber Slough	Weber Slough	52.9	450.00	13.37	20.61		2.48	181.78	40.34	0.21
Weber Slough	Weber Slough	52.9	550.00	13.37	20.66		2.99	183.90	40.54	0.25
Weber Slough	Weber Slough	52.9	650.00	13.37	20.72		3.49	186.41	40.78	0.29
Weber Slough	Weber Slough	52.9	850.00	13.37	20.87		4.41	192.58	41.37	0.36
Weber Slough	Weber Slough	52.9	950.00	13.37	20.96		4.84	196.23	41.71	0.39
Weber Slough	Weber Slough	52.9	1050.00	13.37	21.06		5.24	200.23	42.08	0.42
Weber Slough	Weber Slough	40.4	300.00	12.32	20.51		0.77	416.54	81.31	0.05
Weber Slough	Weber Slough	40.4	500.00	12.32	20.54		1.29	418.54	81.47	0.09
Weber Slough	Weber Slough	40.4	750.00	12.32	20.58		1.91	422.02	81.76	0.13
Weber Slough	Weber Slough	40.4	1000.00	12.32	20.64		2.53	426.65	82.17	0.18
Weber Slough	Weber Slough	40.4	450.00	12.32	20.53		1.16	417.97	81.43	0.08
Weber Slough	Weber Slough	40.4	550.00	12.32	20.54		1.41	419.15	81.52	0.10
Weber Slough	Weber Slough	40.4	650.00	12.32	20.56		1.66	420.49	81.64	0.12
Weber Slough	Weber Slough	40.4	850.00	12.32	20.60		2.16	423.73	81.90	0.15
Weber Slough	Weber Slough	40.4	950.00	12.32	20.62		2.41	425.63	82.06	0.17
Weber Slough	Weber Slough	40.4	1050.00	12.32	20.65		2.65	427.73	82.29	0.19
Weber Slough	Weber Slough	32	300.00	12.32	20.49		0.78	415.00	81.18	0.06
Weber Slough	Weber Slough	32	500.00	12.32	20.49		1.30	414.32	81.12	0.09
Weber Slough	Weber Slough	32	750.00	12.32	20.46		1.95	412.50	80.97	0.14
Weber Slough	Weber Slough	32	1000.00	12.32	20.43		2.62	409.54	80.72	0.19
Weber Slough	Weber Slough	32	450.00	12.32	20.49		1.17	414.55	81.14	0.08
Weber Slough	Weber Slough	32	550.00	12.32	20.48		1.43	414.04	81.10	0.10
Weber Slough	Weber Slough	32	650.00	12.32	20.47		1.69	413.36	81.04	0.12
Weber Slough	Weber Slough	32	850.00	12.32	20.45		2.22	411.45	80.88	0.16
Weber Slough	Weber Slough	32	950.00	12.32	20.44		2.49	410.22	80.78	0.18
Weber Slough	Weber Slough	32	1050.00	12.32	20.42		2.76	408.81	80.66	0.20
Temple	Temple1	654.75	300.00	65.82	71.09	68.55	2.62	115.96	50.41	0.26
Temple	Temple1	654.75	500.00	65.82	72.11	69.33	2.77	235.16	135.50	0.25
Temple	Temple1	654.75	750.00	65.82	72.60	70.09	3.29	304.73	148.81	0.29
Temple	Temple1	654.75	1000.00	65.82	73.14	70.70	3.51	385.71	152.33	0.29
Temple	Temple1	654.75	1250.00	65.82	74.32	71.87	2.96	573.30	168.40	0.22
Temple	Temple1	654.75	1500.00	65.82	74.88	72.14	3.02	667.85	168.40	0.22
Temple	Temple1	654.75	1750.00	65.82	75.01	72.36	3.40	690.44	168.40	0.24
Temple	Temple1	654.75	2000.00	65.82	75.47	72.56	3.47	767.97	168.40	0.24

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Temple	Temple1	654.75	2500.00	65.82	76.17	72.97	3.73	884.74	168.40	0.24
Temple	Temple1	654.75	3000.00	65.82	76.75	73.26	4.00	982.62	168.40	0.25
Temple	Temple1	654 Mariposa Rd	Bridge							
Temple	Temple1	653.0	300.00	65.64	70.92	68.37	2.61	116.52	51.27	0.26
Temple	Temple1	653.0	500.00	65.64	71.87		2.84	227.77	134.82	0.26
Temple	Temple1	653.0	750.00	65.64	72.14	69.91	3.75	264.19	139.05	0.34
Temple	Temple1	653.0	1000.00	65.64	72.46	70.51	4.35	310.46	149.52	0.38
Temple	Temple1	653.0	1250.00	65.64	72.84	71.69	4.61	367.55	151.66	0.39
Temple	Temple1	653.0	1500.00	65.64	73.01	71.97	5.17	393.01	152.60	0.43
Temple	Temple1	653.0	1750.00	65.64	73.45		5.09	461.69	155.12	0.41
Temple	Temple1	653.0	2000.00	65.64	73.90		5.11	533.92	168.40	0.39
Temple	Temple1	653.0	2500.00	65.64	74.66		5.08	662.08	168.40	0.37
Temple	Temple1	653.0	3000.00	65.64	75.35		5.13	778.02	168.40	0.35
Temple	Temple1	562.0	300.00	58.28	61.79	60.34	3.92	76.44	27.14	0.41
Temple	Temple1	562.0	500.00	58.28	62.99	61.08	4.50	111.96	42.76	0.41
Temple	Temple1	562.0	750.00	58.28	64.68	61.84	3.62	279.41	115.70	0.28
Temple	Temple1	562.0	1000.00	58.28	65.65	62.51	3.50	391.15	115.70	0.25
Temple	Temple1	562.0	1250.00	58.28	66.37	63.85	3.59	474.41	115.70	0.24
Temple	Temple1	562.0	1500.00	58.28	67.44	64.21	3.38	598.19	115.70	0.21
Temple	Temple1	562.0	1750.00	58.28	67.91	64.48	3.59	652.85	115.70	0.22
Temple	Temple1	562.0	2000.00	58.28	68.31	64.71	3.82	698.90	115.70	0.23
Temple	Temple1	562.0	2500.00	58.28	68.99	65.12	4.27	777.28	115.70	0.24
Temple	Temple1	562.0	3000.00	58.28	69.60	65.48	4.68	848.14	115.70	0.26
Temple	Temple1	561.5 AT&SF RR	Bridge							
Temple	Temple1	561.0	300.00	57.36	61.37	59.66	3.60	83.36	28.36	0.37
Temple	Temple1	561.0	500.00	57.36	62.58	60.41	4.02	136.77	62.93	0.37
Temple	Temple1	561.0	750.00	57.36	63.73	61.20	4.06	224.72	93.63	0.33
Temple	Temple1	561.0	1000.00	57.36	64.63	61.97	4.03	318.16	106.30	0.31
Temple	Temple1	561.0	1250.00	57.36	65.24	62.78	4.22	383.33	106.30	0.30
Temple	Temple1	561.0	1500.00	57.36	66.91	63.25	3.47	560.68	106.30	0.22
Temple	Temple1	561.0	1750.00	57.36	67.50	63.64	3.63	623.31	106.30	0.22
Temple	Temple1	561.0	2000.00	57.36	67.98	63.97	3.83	674.55	106.30	0.23
Temple	Temple1	561.0	2500.00	57.36	68.72	64.49	4.27	753.27	106.30	0.24
Temple	Temple1	561.0	3000.00	57.36	69.37	64.89	4.69	822.09	106.30	0.26
Temple	Temple1	560 Murphy Rd	Bridge							
Temple	Temple1	559.5	300.00	57.11	59.73	59.41	6.36	47.14	23.79	0.80
Temple	Temple1	559.5	500.00	57.11	60.16	60.16	8.66	57.77	25.22	1.01
Temple	Temple1	559.5	750.00	57.11	60.94	60.94	9.55	78.56	27.80	1.00
Temple	Temple1	559.5	1000.00	57.11	61.72	61.72	9.84	104.25	43.54	0.95
Temple	Temple1	559.5	1250.00	57.11	62.55	62.55	9.34	151.26	69.85	0.84
Temple	Temple1	559.5	1500.00	57.11	63.03	63.03	9.46	186.05	78.86	0.81
Temple	Temple1	559.5	1750.00	57.11	63.39	63.39	9.74	216.89	90.84	0.81
Temple	Temple1	559.5	2000.00	57.11	63.75	63.71	9.86	251.77	102.72	0.79
Temple	Temple1	559.5	2500.00	57.11	64.49	64.24	9.74	329.80	106.30	0.73
Temple	Temple1	559.5	3000.00	57.11	65.43	64.64	9.04	430.49	106.30	0.63
Temple	Temple1	430.2	300.00	43.39	49.96	46.06	1.78	234.41	139.00	0.15
Temple	Temple1	430.2	500.00	43.39	51.06	46.93	1.84	386.15	139.00	0.14
Temple	Temple1	430.2	750.00	43.39	52.11	47.80	1.96	532.20	139.00	0.14
Temple	Temple1	430.2	1000.00	43.39	52.74	48.48	2.22	620.71	139.00	0.15
Temple	Temple1	430.2	1250.00	43.39	53.27	49.84	2.45	694.61	139.00	0.16
Temple	Temple1	430.2	1500.00	43.39	53.79	50.09	2.64	766.02	139.00	0.16
Temple	Temple1	430.2	1750.00	43.39	54.31	50.31	2.79	838.32	139.00	0.17
Temple	Temple1	430.2	2000.00	43.39	54.81	50.51	2.93	908.45	139.00	0.17
Temple	Temple1	430.2	2500.00	43.39	55.81	50.85	3.14	1046.77	139.00	0.17
Temple	Temple1	430.2	3000.00	43.39	56.40	51.15	3.48	1129.70	139.00	0.19
Temple	Temple1	430 Jack Tone Rd	Bridge							
Temple	Temple1	429.5	300.00	43.32	49.91		1.72	236.34	139.00	0.14
Temple	Temple1	429.5	500.00	43.32	50.76		1.91	354.99	139.00	0.15
Temple	Temple1	429.5	750.00	43.32	51.63		2.09	475.13	139.00	0.15
Temple	Temple1	429.5	1000.00	43.32	52.37		2.23	578.58	139.00	0.15
Temple	Temple1	429.5	1250.00	43.32	53.03		2.37	670.58	139.00	0.15

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Temple	Temple1	429.5	1500.00	43.32	53.64		2.49	754.88	139.00	0.15
Temple	Temple1	429.5	1750.00	43.32	54.19		2.60	832.20	139.00	0.16
Temple	Temple1	429.5	2000.00	43.32	54.71		2.72	904.04	139.00	0.16
Temple	Temple1	429.5	2500.00	43.32	55.70		2.91	1040.79	139.00	0.16
Temple	Temple1	429.5	3000.00	43.32	56.29		3.22	1123.06	139.00	0.17
Temple	Temple1	369.0	300.00	43.65	45.37	45.37	7.10	42.23	27.21	1.00
Temple	Temple1	369.0	500.00	43.65	46.02	46.02	8.23	60.73	29.19	1.01
Temple	Temple1	369.0	750.00	43.65	46.71	46.71	9.21	81.43	31.27	1.01
Temple	Temple1	369.0	1000.00	43.65	47.30	47.30	9.95	100.51	33.79	1.00
Temple	Temple1	369.0	1250.00	43.65	47.85	47.85	10.49	120.51	38.17	0.97
Temple	Temple1	369.0	1500.00	43.65	48.36	48.36	10.96	140.77	42.15	0.95
Temple	Temple1	369.0	1750.00	43.65	48.84	48.84	11.30	162.03	45.96	0.93
Temple	Temple1	369.0	2000.00	43.65	49.29	49.29	11.60	183.46	49.36	0.91
Temple	Temple1	369.0	2500.00	43.65	49.90	49.90	12.64	214.97	53.58	0.94
Temple	Temple1	369.0	3000.00	43.65	51.22	51.22	11.10	334.58	100.00	0.74
SF S. LittleJohn	SF SLJ 1	414	300.00	39.00	43.54	41.48	2.33	128.65	41.73	0.23
SF S. LittleJohn	SF SLJ 1	414	500.00	39.00	44.57	42.01	2.89	172.98	43.64	0.26
SF S. LittleJohn	SF SLJ 1	414	750.00	39.00	45.79	42.56	3.30	227.44	45.87	0.26
SF S. LittleJohn	SF SLJ 1	414	1000.00	39.00	46.92	43.03	3.56	280.61	47.94	0.26
SF S. LittleJohn	SF SLJ 1	414	1250.00	39.00	47.97	43.46	3.77	331.76	49.86	0.26
SF S. LittleJohn	SF SLJ 1	414	1500.00	39.00	48.94	43.88	3.94	381.12	51.65	0.26
SF S. LittleJohn	SF SLJ 1	414	1750.00	39.00	49.84	44.27	4.09	428.00	53.28	0.25
SF S. LittleJohn	SF SLJ 1	414	2000.00	39.00	50.41	44.64	4.36	459.00	54.34	0.26
SF S. LittleJohn	SF SLJ 1	414	2500.00	39.00	51.39	45.32	4.88	512.74	56.12	0.28
SF S. LittleJohn	SF SLJ 1	414	3000.00	39.00	52.14	45.94	5.40	555.69	57.51	0.31
SF S. LittleJohn	SF SLJ 1	413.5 Jack Tone Rd	Bridge							
SF S. LittleJohn	SF SLJ 1	413	300.00	39.00	43.38	41.48	2.46	122.09	41.44	0.25
SF S. LittleJohn	SF SLJ 1	413	500.00	39.00	44.38	42.01	3.04	164.54	43.28	0.27
SF S. LittleJohn	SF SLJ 1	413	750.00	39.00	45.58	42.55	3.44	217.73	45.48	0.28
SF S. LittleJohn	SF SLJ 1	413	1000.00	39.00	46.70		3.70	269.93	47.53	0.27
SF S. LittleJohn	SF SLJ 1	413	1250.00	39.00	47.73		3.91	320.03	49.43	0.27
SF S. LittleJohn	SF SLJ 1	413	1500.00	39.00	48.69		4.07	368.32	51.19	0.27
SF S. LittleJohn	SF SLJ 1	413	1750.00	39.00	49.57		4.23	414.00	52.80	0.27
SF S. LittleJohn	SF SLJ 1	413	2000.00	39.00	50.11		4.52	442.67	53.79	0.28
SF S. LittleJohn	SF SLJ 1	413	2500.00	39.00	51.00		5.09	491.01	55.41	0.30
SF S. LittleJohn	SF SLJ 1	413	3000.00	39.00	51.64		5.69	527.23	56.60	0.33
SF S. LittleJohn	SF SLJ 1	290	300.00	25.00	30.92		2.58	116.11	30.90	0.23
SF S. LittleJohn	SF SLJ 1	290	500.00	25.00	32.86		2.77	180.56	35.49	0.22
SF S. LittleJohn	SF SLJ 1	290	750.00	25.00	34.63		3.04	247.08	39.67	0.21
SF S. LittleJohn	SF SLJ 1	290	1000.00	25.00	36.00		3.29	303.81	42.92	0.22
SF S. LittleJohn	SF SLJ 1	290	1250.00	25.00	37.15		3.52	354.77	45.64	0.22
SF S. LittleJohn	SF SLJ 1	290	1500.00	25.00	38.15		3.74	401.39	47.99	0.23
SF S. LittleJohn	SF SLJ 1	290	1750.00	25.00	39.05		3.92	456.34	260.00	0.23
SF S. LittleJohn	SF SLJ 1	290	2000.00	25.00	39.69		3.96	622.32	260.00	0.23
SF S. LittleJohn	SF SLJ 1	290	2500.00	25.00	40.59		3.99	856.11	260.00	0.22
SF S. LittleJohn	SF SLJ 1	290	3000.00	25.00	41.40		3.95	1066.78	260.00	0.21
SF S. LittleJohn	SF SLJ 1	289.5	300.00	25.00	30.87	28.19	2.53	118.50	33.41	0.24
SF S. LittleJohn	SF SLJ 1	289.5	500.00	25.00	32.83	28.91	2.63	190.19	39.82	0.21
SF S. LittleJohn	SF SLJ 1	289.5	750.00	25.00	34.61	29.64	2.82	266.19	45.64	0.21
SF S. LittleJohn	SF SLJ 1	289.5	1000.00	25.00	35.99	30.27	3.01	332.26	50.15	0.21
SF S. LittleJohn	SF SLJ 1	289.5	1250.00	25.00	37.15	30.83	3.19	392.43	53.94	0.21
SF S. LittleJohn	SF SLJ 1	289.5	1500.00	25.00	38.15	31.34	3.35	448.04	57.21	0.21
SF S. LittleJohn	SF SLJ 1	289.5	1750.00	25.00	39.05	31.81	3.49	511.74	260.00	0.21
SF S. LittleJohn	SF SLJ 1	289.5	2000.00	25.00	39.69	32.24	3.53	677.48	260.00	0.21
SF S. LittleJohn	SF SLJ 1	289.5	2500.00	25.00	40.58	33.04	3.61	909.81	260.00	0.20
SF S. LittleJohn	SF SLJ 1	289.5	3000.00	25.00	41.39	33.76	3.62	1119.49	260.00	0.20
SF S. LittleJohn	SF SLJ 1	289 Austin Rd	Bridge							
SF S. LittleJohn	SF SLJ 1	288.5	300.00	25.00	30.71		2.65	113.21	32.88	0.25
SF S. LittleJohn	SF SLJ 1	288.5	500.00	25.00	32.70		2.70	184.98	39.38	0.22
SF S. LittleJohn	SF SLJ 1	288.5	750.00	25.00	34.49		2.88	260.52	45.23	0.21
SF S. LittleJohn	SF SLJ 1	288.5	1000.00	25.00	35.87		3.07	325.98	49.74	0.21
SF S. LittleJohn	SF SLJ 1	288.5	1250.00	25.00	37.02		3.24	385.55	53.52	0.21
SF S. LittleJohn	SF SLJ 1	288.5	1500.00	25.00	38.02		3.40	440.57	56.78	0.22

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
SF S. LittleJohn	SF SLJ 1	288.5	1750.00	25.00	38.92		3.55	493.12	59.73	0.22
SF S. LittleJohn	SF SLJ 1	288.5	2000.00	25.00	39.53		3.65	636.41	260.00	0.22
SF S. LittleJohn	SF SLJ 1	288.5	2500.00	25.00	40.37		3.79	854.33	260.00	0.21
SF S. LittleJohn	SF SLJ 1	288.5	3000.00	25.00	41.04		3.91	1027.27	260.00	0.21
SF S. LittleJohn	SF SLJ 1	288.0	300.00	25.00	30.66		2.70	111.28	32.69	0.26
SF S. LittleJohn	SF SLJ 1	288.0	500.00	25.00	32.66		2.73	183.41	39.25	0.22
SF S. LittleJohn	SF SLJ 1	288.0	750.00	25.00	34.45		2.90	258.94	45.11	0.21
SF S. LittleJohn	SF SLJ 1	288.0	1000.00	25.00	35.83		3.08	324.31	49.63	0.21
SF S. LittleJohn	SF SLJ 1	288.0	1250.00	25.00	36.99		3.26	383.76	53.41	0.21
SF S. LittleJohn	SF SLJ 1	288.0	1500.00	25.00	37.98		3.42	438.65	56.67	0.22
SF S. LittleJohn	SF SLJ 1	288.0	1750.00	25.00	38.88		3.56	491.09	59.62	0.22
SF S. LittleJohn	SF SLJ 1	288.0	2000.00	25.00	39.50		3.68	627.13	260.00	0.22
SF S. LittleJohn	SF SLJ 1	288.0	2500.00	25.00	40.34		3.82	845.32	260.00	0.22
SF S. LittleJohn	SF SLJ 1	288.0	3000.00	25.00	41.00		3.94	1018.56	260.00	0.22
SF S. LittleJohn	SF SLJ 1	198.0	300.00	19.81	27.57		1.35	222.34	43.48	0.11
SF S. LittleJohn	SF SLJ 1	198.0	500.00	19.81	27.95		2.09	239.34	45.02	0.16
SF S. LittleJohn	SF SLJ 1	198.0	750.00	19.81	28.55		2.81	267.16	47.43	0.21
SF S. LittleJohn	SF SLJ 1	198.0	1000.00	19.81	29.21		3.34	299.08	50.05	0.24
SF S. LittleJohn	SF SLJ 1	198.0	1250.00	19.81	29.86		3.76	332.52	52.66	0.26
SF S. LittleJohn	SF SLJ 1	198.0	1500.00	19.81	30.48		4.10	365.92	55.14	0.28
SF S. LittleJohn	SF SLJ 1	198.0	1750.00	19.81	31.00		4.43	395.28	57.24	0.30
SF S. LittleJohn	SF SLJ 1	198.0	2000.00	19.81	31.59		4.66	430.83	68.37	0.30
SF S. LittleJohn	SF SLJ 1	198.0	2500.00	19.81	32.54		5.08	520.12	113.25	0.31
SF S. LittleJohn	SF SLJ 1	198.0	3000.00	19.81	33.45		5.30	624.09	113.25	0.31
SF S. LittleJohn	SF SLJ 1	192.7	300.00	19.04	27.50		1.11	269.32	49.46	0.08
SF S. LittleJohn	SF SLJ 1	192.7	500.00	19.04	27.80		1.76	284.23	50.36	0.13
SF S. LittleJohn	SF SLJ 1	192.7	750.00	19.04	28.29		2.42	309.38	51.85	0.17
SF S. LittleJohn	SF SLJ 1	192.7	1000.00	19.04	28.86		2.95	339.05	53.56	0.21
SF S. LittleJohn	SF SLJ 1	192.7	1250.00	19.04	29.44		3.37	370.58	55.31	0.23
SF S. LittleJohn	SF SLJ 1	192.7	1500.00	19.04	30.00		3.73	402.14	57.01	0.25
SF S. LittleJohn	SF SLJ 1	192.7	1750.00	19.04	30.46		4.08	428.82	59.25	0.26
SF S. LittleJohn	SF SLJ 1	192.7	2000.00	19.04	31.03		4.32	466.33	66.85	0.27
SF S. LittleJohn	SF SLJ 1	192.7	2500.00	19.04	31.95		4.81	531.51	77.65	0.29
SF S. LittleJohn	SF SLJ 1	192.7	3000.00	19.04	32.85		5.17	602.04	77.65	0.29
SF S. LittleJohn	SF SLJ 1	178.0	300.00	17.03	27.39		0.91	329.01	51.99	0.06
SF S. LittleJohn	SF SLJ 1	178.0	500.00	17.03	27.53		1.49	335.97	52.43	0.10
SF S. LittleJohn	SF SLJ 1	178.0	750.00	17.03	27.77		2.15	348.54	53.23	0.15
SF S. LittleJohn	SF SLJ 1	178.0	1000.00	17.03	28.07		2.74	364.99	54.25	0.19
SF S. LittleJohn	SF SLJ 1	178.0	1250.00	17.03	28.42		3.26	383.82	55.39	0.22
SF S. LittleJohn	SF SLJ 1	178.0	1500.00	17.03	28.78		3.71	404.14	61.74	0.24
SF S. LittleJohn	SF SLJ 1	178.0	1750.00	17.03	29.00		4.20	418.78	64.29	0.27
SF S. LittleJohn	SF SLJ 1	178.0	2000.00	17.03	29.51		4.48	451.49	68.55	0.28
SF S. LittleJohn	SF SLJ 1	178.0	2500.00	17.03	30.24		5.10	504.26	72.43	0.30
SF S. LittleJohn	SF SLJ 1	178.0	3000.00	17.03	31.10		5.51	566.46	72.43	0.31
SF S. LittleJohn	SF SLJ 1	171.45	300.00	18.46	27.37	20.54	0.78	389.76	67.21	0.05
SF S. LittleJohn	SF SLJ 1	171.45	500.00	18.46	27.45	21.06	1.28	395.60	67.98	0.09
SF S. LittleJohn	SF SLJ 1	171.45	750.00	18.46	27.61	21.61	1.87	406.37	69.38	0.13
SF S. LittleJohn	SF SLJ 1	171.45	1000.00	18.46	27.82	22.09	2.41	421.32	71.28	0.16
SF S. LittleJohn	SF SLJ 1	171.45	1250.00	18.46	28.07	22.52	2.90	439.29	73.50	0.19
SF S. LittleJohn	SF SLJ 1	171.45	1500.00	18.46	28.34	22.91	3.35	459.67	76.30	0.22
SF S. LittleJohn	SF SLJ 1	171.45	1750.00	18.46	28.46	23.29	3.84	468.33	78.12	0.25
SF S. LittleJohn	SF SLJ 1	171.45	2000.00	18.46	28.94	23.62	4.09	507.96	85.93	0.25
SF S. LittleJohn	SF SLJ 1	171.45	2500.00	18.46	29.58	24.27	4.68	565.33	90.64	0.28
SF S. LittleJohn	SF SLJ 1	171.45	3000.00	18.46	30.44	24.89	5.01	643.19	90.64	0.29
SF S. LittleJohn	SF SLJ 1	171 Highway 99	Bridge							
SF S. LittleJohn	SF SLJ 1	169.95	300.00	17.96	27.35		0.72	423.00	71.49	0.05
SF S. LittleJohn	SF SLJ 1	169.95	500.00	17.96	27.40		1.19	426.63	71.94	0.08
SF S. LittleJohn	SF SLJ 1	169.95	750.00	17.96	27.49		1.76	433.27	72.76	0.12
SF S. LittleJohn	SF SLJ 1	169.95	1000.00	17.96	27.62		2.31	442.91	73.93	0.15
SF S. LittleJohn	SF SLJ 1	169.95	1250.00	17.96	27.78		2.82	454.63	75.23	0.18
SF S. LittleJohn	SF SLJ 1	169.95	1500.00	17.96	27.95		3.29	468.19	78.09	0.21
SF S. LittleJohn	SF SLJ 1	169.95	1750.00	17.96	27.92		3.86	465.92	77.61	0.25
SF S. LittleJohn	SF SLJ 1	169.95	2000.00	17.96	28.36		4.14	501.17	84.64	0.26
SF S. LittleJohn	SF SLJ 1	169.95	2500.00	17.96	28.83		4.85	542.54	90.64	0.29

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
SF S. LittleJohn	SF SLJ 1	169.95	3000.00	17.96	29.36		5.40	590.73	90.64	0.32
SF S. LittleJohn	SF SLJ 1	168.2	300.00	16.41	27.34		0.45	1223.81	613.77	0.03
SF S. LittleJohn	SF SLJ 1	168.2	500.00	16.41	27.39		0.72	1253.83	614.17	0.05
SF S. LittleJohn	SF SLJ 1	168.2	750.00	16.41	27.48		1.03	1309.45	614.91	0.07
SF S. LittleJohn	SF SLJ 1	168.2	1000.00	16.41	27.62		1.28	1391.90	616.00	0.08
SF S. LittleJohn	SF SLJ 1	168.2	1250.00	16.41	27.78		1.48	1494.06	617.35	0.09
SF S. LittleJohn	SF SLJ 1	168.2	1500.00	16.41	27.97		1.62	1612.39	619.71	0.10
SF S. LittleJohn	SF SLJ 1	168.2	1750.00	16.41	27.95		1.91	1598.10	619.27	0.12
SF S. LittleJohn	SF SLJ 1	168.2	2000.00	16.41	28.43		1.78	1892.52	620.00	0.11
SF S. LittleJohn	SF SLJ 1	168.2	2500.00	16.41	28.96		1.82	2220.61	620.00	0.11
SF S. LittleJohn	SF SLJ 1	168.2	3000.00	16.41	29.55		1.80	2589.40	620.00	0.10
SF S. LittleJohn	SF SLJ 1	163.6	300.00	14.50	27.33	16.51	0.68	523.61	88.00	0.04
SF S. LittleJohn	SF SLJ 1	163.6	500.00	14.50	27.36	17.22	1.13	526.18	88.00	0.06
SF S. LittleJohn	SF SLJ 1	163.6	750.00	14.50	27.42	17.96	1.68	530.92	88.00	0.09
SF S. LittleJohn	SF SLJ 1	163.6	1000.00	14.50	27.50	18.61	2.21	538.57	88.00	0.11
SF S. LittleJohn	SF SLJ 1	163.6	1250.00	14.50	27.61	19.18	2.73	548.37	88.00	0.14
SF S. LittleJohn	SF SLJ 1	163.6	1500.00	14.50	27.75	19.70	3.21	560.10	88.00	0.16
SF S. LittleJohn	SF SLJ 1	163.6	1750.00	14.50	27.63	20.18	3.81	549.85	88.00	0.20
SF S. LittleJohn	SF SLJ 1	163.6	2000.00	14.50	28.08	20.68	4.09	589.63	88.00	0.21
SF S. LittleJohn	SF SLJ 1	163.6	2500.00	14.50	28.51	21.50	4.84	627.05	88.00	0.24
SF S. LittleJohn	SF SLJ 1	163.6	3000.00	14.50	29.02	22.22	5.45	671.94	88.00	0.27
SF S. LittleJohn	SF SLJ 1	159.1	300.00	14.72	27.32	17.51	0.83	440.03	82.00	0.04
SF S. LittleJohn	SF SLJ 1	159.1	500.00	14.72	27.33	18.31	1.39	440.70	82.00	0.07
SF S. LittleJohn	SF SLJ 1	159.1	750.00	14.72	27.34	19.13	2.08	441.75	82.00	0.11
SF S. LittleJohn	SF SLJ 1	159.1	1000.00	14.72	27.37	19.83	2.76	444.28	82.00	0.15
SF S. LittleJohn	SF SLJ 1	159.1	1250.00	14.72	27.41	20.45	3.43	447.69	82.00	0.18
SF S. LittleJohn	SF SLJ 1	159.1	1500.00	14.72	27.47	20.97	4.08	451.86	82.00	0.22
SF S. LittleJohn	SF SLJ 1	159.1	1750.00	14.72	27.20	21.47	4.96	430.06	82.00	0.27
SF S. LittleJohn	SF SLJ 1	159.1	2000.00	14.72	27.61	21.95	5.32	463.57	82.00	0.28
SF S. LittleJohn	SF SLJ 1	159.1	2500.00	14.72	27.83	22.85	6.43	481.50	82.00	0.34
SF S. LittleJohn	SF SLJ 1	159.1	3000.00	14.72	28.15	23.67	7.34	508.27	82.00	0.38
SF S. LittleJohn	SF SLJ 1	154.1	300.00	15.86	27.31	17.87	0.78	460.25	81.00	0.04
SF S. LittleJohn	SF SLJ 1	154.1	500.00	15.86	27.30	18.59	1.30	459.34	81.00	0.07
SF S. LittleJohn	SF SLJ 1	154.1	750.00	15.86	27.27	19.33	1.96	457.28	81.00	0.11
SF S. LittleJohn	SF SLJ 1	154.1	1000.00	15.86	27.25	19.97	2.62	455.36	81.00	0.14
SF S. LittleJohn	SF SLJ 1	154.1	1250.00	15.86	27.22	20.54	3.29	452.92	81.00	0.18
SF S. LittleJohn	SF SLJ 1	154.1	1500.00	15.86	27.18	21.03	3.97	449.74	81.00	0.22
SF S. LittleJohn	SF SLJ 1	154.1	1750.00	15.86	26.72	21.49	4.98	412.61	81.00	0.28
SF S. LittleJohn	SF SLJ 1	154.1	2000.00	15.86	27.07	21.92	5.38	440.88	81.00	0.30
SF S. LittleJohn	SF SLJ 1	154.1	2500.00	15.86	26.91	22.74	6.91	427.62	81.00	0.39
SF S. LittleJohn	SF SLJ 1	154.1	3000.00	15.86	26.67	23.50	8.61	408.01	81.00	0.49
NF S. LittleJohn	NF SLJ	422.0	1300.00	43.50	51.72	47.70	4.10	316.81	49.04	0.28
NF S. LittleJohn	NF SLJ	422.0	1300.00	43.50	51.72	47.70	4.10	316.81	49.04	0.28
NF S. LittleJohn	NF SLJ	422.0	1300.00	43.50	51.72	47.70	4.10	316.81	49.04	0.28
NF S. LittleJohn	NF SLJ	422.0	1300.00	43.50	51.72	47.70	4.10	316.81	49.04	0.28
NF S. LittleJohn	NF SLJ	422.0	1300.00	43.50	51.72	47.70	4.10	316.81	49.04	0.28
NF S. LittleJohn	NF SLJ	422.0	1500.00	43.50	52.42	48.01	4.27	351.54	50.06	0.28
NF S. LittleJohn	NF SLJ	422.0	1750.00	43.50	53.25	48.38	4.45	393.51	51.27	0.28
NF S. LittleJohn	NF SLJ	422.0	2000.00	43.50	53.88	48.74	4.69	426.07	52.18	0.29
NF S. LittleJohn	NF SLJ	422.0	2500.00	43.50	55.49	49.37	4.88	512.32	54.53	0.28
NF S. LittleJohn	NF SLJ	422.0	3000.00	43.50	57.00	50.01	5.03	595.86	56.00	0.27
NF S. LittleJohn	NF SLJ	421.5 Jack Tone Rd	Bridge							
NF S. LittleJohn	NF SLJ	421.0	1300.00	43.50	51.53	47.70	4.22	307.79	48.78	0.30
NF S. LittleJohn	NF SLJ	421.0	1300.00	43.50	51.53	47.70	4.22	307.79	48.78	0.30
NF S. LittleJohn	NF SLJ	421.0	1300.00	43.50	51.53	47.70	4.22	307.79	48.78	0.30
NF S. LittleJohn	NF SLJ	421.0	1300.00	43.50	51.53	47.70	4.22	307.79	48.78	0.30
NF S. LittleJohn	NF SLJ	421.0	1300.00	43.50	51.53	47.70	4.22	307.79	48.78	0.30
NF S. LittleJohn	NF SLJ	421.0	1500.00	43.50	52.23		4.39	341.99	49.78	0.29
NF S. LittleJohn	NF SLJ	421.0	1750.00	43.50	53.05		4.57	383.27	50.98	0.29
NF S. LittleJohn	NF SLJ	421.0	2000.00	43.50	53.66		4.82	414.59	51.86	0.30
NF S. LittleJohn	NF SLJ	421.0	2500.00	43.50	55.16		5.06	494.13	54.05	0.29
NF S. LittleJohn	NF SLJ	421.0	3000.00	43.50	56.50		5.28	568.27	56.00	0.29
NF S. LittleJohn	NF SLJ	296	1300.00	28.00	39.35	34.30	4.33	300.01	43.28	0.29

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
NF S. LittleJohn	NF SLJ	296	1300.00	28.00	39.35	34.30	4.33	300.01	43.28	0.29
NF S. LittleJohn	NF SLJ	296	1300.00	28.00	39.35	34.30	4.33	300.01	43.28	0.29
NF S. LittleJohn	NF SLJ	296	1300.00	28.00	39.35	34.30	4.33	300.01	43.28	0.29
NF S. LittleJohn	NF SLJ	296	1300.00	28.00	39.35	34.30	4.33	300.01	43.28	0.29
NF S. LittleJohn	NF SLJ	296	1500.00	28.00	40.04	34.74	4.54	330.20	45.00	0.30
NF S. LittleJohn	NF SLJ	296	1750.00	28.00	40.73	35.24	4.84	361.54	45.00	0.30
NF S. LittleJohn	NF SLJ	296	2000.00	28.00	41.88	35.73	4.84	412.92	45.00	0.28
NF S. LittleJohn	NF SLJ	296	2500.00	28.00	43.01	36.58	5.39	464.05	45.00	0.30
NF S. LittleJohn	NF SLJ	296	3000.00	28.00	44.20	37.35	5.80	517.29	45.00	0.30
NF S. LittleJohn	NF SLJ	295.5 Austin Rd	Bridge							
NF S. LittleJohn	NF SLJ	295.0	1300.00	28.00	39.13		4.48	290.26	42.67	0.30
NF S. LittleJohn	NF SLJ	295.0	1300.00	28.00	39.13		4.48	290.26	42.67	0.30
NF S. LittleJohn	NF SLJ	295.0	1300.00	28.00	39.13		4.48	290.26	42.67	0.30
NF S. LittleJohn	NF SLJ	295.0	1300.00	28.00	39.13		4.48	290.26	42.67	0.30
NF S. LittleJohn	NF SLJ	295.0	1300.00	28.00	39.13		4.48	290.26	42.67	0.30
NF S. LittleJohn	NF SLJ	295.0	1500.00	28.00	39.79		4.70	319.04	44.44	0.31
NF S. LittleJohn	NF SLJ	295.0	1750.00	28.00	40.45		5.02	348.69	45.00	0.32
NF S. LittleJohn	NF SLJ	295.0	2000.00	28.00	41.04		5.33	375.51	45.00	0.32
NF S. LittleJohn	NF SLJ	295.0	2500.00	28.00	41.99		5.98	418.07	45.00	0.35
NF S. LittleJohn	NF SLJ	295.0	3000.00	28.00	42.87		6.56	457.66	45.00	0.36
NF S. LittleJohn	NF SLJ	196.0	1300.00	20.52	30.32		4.57	295.56	78.71	0.31
NF S. LittleJohn	NF SLJ	196.0	1300.00	20.52	30.32		4.57	295.56	78.71	0.31
NF S. LittleJohn	NF SLJ	196.0	1300.00	20.52	30.32		4.57	295.56	78.71	0.31
NF S. LittleJohn	NF SLJ	196.0	1300.00	20.52	30.32		4.57	295.56	78.71	0.31
NF S. LittleJohn	NF SLJ	196.0	1300.00	20.52	30.32		4.57	295.56	78.71	0.31
NF S. LittleJohn	NF SLJ	196.0	1500.00	20.52	30.85		4.81	345.86	100.78	0.32
NF S. LittleJohn	NF SLJ	196.0	1750.00	20.52	31.47		5.01	408.10	100.78	0.32
NF S. LittleJohn	NF SLJ	196.0	2000.00	20.52	32.04		5.18	465.66	100.78	0.32
NF S. LittleJohn	NF SLJ	196.0	2500.00	20.52	33.28		5.29	591.12	100.78	0.30
NF S. LittleJohn	NF SLJ	196.0	3000.00	20.52	34.41		5.42	705.02	100.78	0.29
NF S. LittleJohn	NF SLJ	192.75	1300.00	20.13	30.11		4.22	310.24	58.16	0.29
NF S. LittleJohn	NF SLJ	192.75	1300.00	20.13	30.11		4.22	310.24	58.16	0.29
NF S. LittleJohn	NF SLJ	192.75	1300.00	20.13	30.11		4.22	310.24	58.16	0.29
NF S. LittleJohn	NF SLJ	192.75	1300.00	20.13	30.11		4.22	310.24	58.16	0.29
NF S. LittleJohn	NF SLJ	192.75	1300.00	20.13	30.11		4.22	310.24	58.16	0.29
NF S. LittleJohn	NF SLJ	192.75	1500.00	20.13	30.64		4.50	340.86	59.02	0.30
NF S. LittleJohn	NF SLJ	192.75	1750.00	20.13	31.24		4.80	379.03	68.07	0.31
NF S. LittleJohn	NF SLJ	192.75	2000.00	20.13	31.79		5.08	416.57	68.07	0.31
NF S. LittleJohn	NF SLJ	192.75	2500.00	20.13	33.00		5.44	498.89	68.07	0.31
NF S. LittleJohn	NF SLJ	192.75	3000.00	20.13	34.10		5.76	573.53	68.07	0.31
NF S. LittleJohn	NF SLJ	173.0	1300.00	18.04	28.75		4.37	302.76	47.95	0.29
NF S. LittleJohn	NF SLJ	173.0	1300.00	18.04	28.75		4.37	302.76	47.95	0.29
NF S. LittleJohn	NF SLJ	173.0	1300.00	18.04	28.75		4.37	302.76	47.95	0.29
NF S. LittleJohn	NF SLJ	173.0	1300.00	18.04	28.75		4.37	302.76	47.95	0.29
NF S. LittleJohn	NF SLJ	173.0	1300.00	18.04	28.75		4.37	302.76	47.95	0.29
NF S. LittleJohn	NF SLJ	173.0	1500.00	18.04	29.18		4.74	325.63	55.17	0.31
NF S. LittleJohn	NF SLJ	173.0	1750.00	18.04	29.69		5.14	356.76	63.60	0.32
NF S. LittleJohn	NF SLJ	173.0	2000.00	18.04	30.16		5.50	386.90	63.60	0.33
NF S. LittleJohn	NF SLJ	173.0	2500.00	18.04	31.47		5.83	469.88	63.60	0.33
NF S. LittleJohn	NF SLJ	173.0	3000.00	18.04	32.61		6.16	542.47	63.60	0.33
NF S. LittleJohn	NF SLJ	169.0	1300.00	17.61	28.52	23.30	4.17	320.48	53.51	0.27
NF S. LittleJohn	NF SLJ	169.0	1300.00	17.61	28.52	23.30	4.17	320.48	53.51	0.27
NF S. LittleJohn	NF SLJ	169.0	1300.00	17.61	28.52	23.30	4.17	320.48	53.51	0.27
NF S. LittleJohn	NF SLJ	169.0	1300.00	17.61	28.52	23.30	4.17	320.48	53.51	0.27
NF S. LittleJohn	NF SLJ	169.0	1300.00	17.61	28.52	23.30	4.17	320.48	53.51	0.27
NF S. LittleJohn	NF SLJ	169.0	1500.00	17.61	28.93	23.75	4.55	342.88	56.45	0.28
NF S. LittleJohn	NF SLJ	169.0	1750.00	17.61	29.41	24.26	4.98	378.38	83.95	0.30
NF S. LittleJohn	NF SLJ	169.0	2000.00	17.61	29.87	24.76	5.32	419.38	91.74	0.31
NF S. LittleJohn	NF SLJ	169.0	2500.00	17.61	31.24	25.62	5.46	544.95	91.74	0.30
NF S. LittleJohn	NF SLJ	169.0	3000.00	17.61	32.43	26.39	5.62	653.97	91.74	0.29
NF S. LittleJohn	NF SLJ	168 Highway 99	Bridge							
NF S. LittleJohn	NF SLJ	167.5	1300.00	16.86	28.10		3.98	338.65	55.91	0.25
NF S. LittleJohn	NF SLJ	167.5	1300.00	16.86	28.10		3.98	338.65	55.91	0.25

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
NF S. LittleJohn	NF SLJ	167.5	1300.00	16.86	28.10		3.98	338.65	55.91	0.25
NF S. LittleJohn	NF SLJ	167.5	1300.00	16.86	28.10		3.98	338.65	55.91	0.25
NF S. LittleJohn	NF SLJ	167.5	1300.00	16.86	28.10		3.98	338.65	55.91	0.25
NF S. LittleJohn	NF SLJ	167.5	1500.00	16.86	28.44		4.40	360.29	78.61	0.27
NF S. LittleJohn	NF SLJ	167.5	1750.00	16.86	28.86		4.84	395.26	88.77	0.29
NF S. LittleJohn	NF SLJ	167.5	2000.00	16.86	29.26		5.22	431.42	91.74	0.31
NF S. LittleJohn	NF SLJ	167.5	2500.00	16.86	30.07		5.80	505.88	91.74	0.33
NF S. LittleJohn	NF SLJ	167.5	3000.00	16.86	30.84		6.26	576.35	91.74	0.34
NF S. LittleJohn	NF SLJ	164.50	1300.00	16.86	27.89		3.96	369.57	78.72	0.25
NF S. LittleJohn	NF SLJ	164.50	1300.00	16.86	27.89		3.96	369.57	78.72	0.25
NF S. LittleJohn	NF SLJ	164.50	1300.00	16.86	27.89		3.96	369.57	78.72	0.25
NF S. LittleJohn	NF SLJ	164.50	1300.00	16.86	27.89		3.96	369.57	78.72	0.25
NF S. LittleJohn	NF SLJ	164.50	1300.00	16.86	27.89		3.96	369.57	78.72	0.25
NF S. LittleJohn	NF SLJ	164.50	1500.00	16.86	28.21		4.34	394.43	80.48	0.27
NF S. LittleJohn	NF SLJ	164.50	1750.00	16.86	28.59		4.77	426.20	82.67	0.29
NF S. LittleJohn	NF SLJ	164.50	2000.00	16.86	28.96		5.15	457.05	84.74	0.30
NF S. LittleJohn	NF SLJ	164.50	2500.00	16.86	29.74		5.76	524.40	89.10	0.32
NF S. LittleJohn	NF SLJ	164.50	3000.00	16.86	30.47		6.29	593.75	99.05	0.34
NF S. LittleJohn	NF SLJ	159.2	1300.00	17.02	27.58		4.26	355.30	83.44	0.27
NF S. LittleJohn	NF SLJ	159.2	1300.00	17.02	27.58		4.26	355.30	83.44	0.27
NF S. LittleJohn	NF SLJ	159.2	1300.00	17.02	27.58		4.26	355.30	83.44	0.27
NF S. LittleJohn	NF SLJ	159.2	1300.00	17.02	27.58		4.26	355.30	83.44	0.27
NF S. LittleJohn	NF SLJ	159.2	1300.00	17.02	27.58		4.26	355.30	83.44	0.27
NF S. LittleJohn	NF SLJ	159.2	1500.00	17.02	27.84		4.70	377.14	84.45	0.29
NF S. LittleJohn	NF SLJ	159.2	1750.00	17.02	28.17		5.18	405.44	85.73	0.32
NF S. LittleJohn	NF SLJ	159.2	2000.00	17.02	28.49		5.62	432.70	86.95	0.34
NF S. LittleJohn	NF SLJ	159.2	2500.00	17.02	29.20		6.28	495.57	89.70	0.36
NF S. LittleJohn	NF SLJ	159.2	3000.00	17.02	29.90		6.82	561.70	96.00	0.38
NF S. LittleJohn	NF SLJ	153.70	1300.00	16.66	27.33		3.86	396.56	91.93	0.25
NF S. LittleJohn	NF SLJ	153.70	1300.00	16.66	27.33		3.86	396.56	91.93	0.25
NF S. LittleJohn	NF SLJ	153.70	1300.00	16.66	27.33		3.86	396.56	91.93	0.25
NF S. LittleJohn	NF SLJ	153.70	1300.00	16.66	27.33		3.86	396.56	91.93	0.25
NF S. LittleJohn	NF SLJ	153.70	1300.00	16.66	27.33		3.86	396.56	91.93	0.25
NF S. LittleJohn	NF SLJ	153.70	1500.00	16.66	27.55		4.29	416.43	93.12	0.27
NF S. LittleJohn	NF SLJ	153.70	1750.00	16.66	27.83		4.76	442.96	94.68	0.30
NF S. LittleJohn	NF SLJ	153.70	2000.00	16.66	28.10		5.19	468.62	96.16	0.32
NF S. LittleJohn	NF SLJ	153.70	2500.00	16.66	28.75		5.86	533.32	104.05	0.35
NF S. LittleJohn	NF SLJ	153.70	3000.00	16.66	29.43		6.31	605.73	106.35	0.36
NF S. LittleJohn	NF SLJ	149.2	1300.00	16.01	27.38		1.83	1531.84	621.96	0.11
NF S. LittleJohn	NF SLJ	149.2	1300.00	16.01	27.38		1.83	1531.84	621.96	0.11
NF S. LittleJohn	NF SLJ	149.2	1300.00	16.01	27.38		1.83	1531.84	621.96	0.11
NF S. LittleJohn	NF SLJ	149.2	1300.00	16.01	27.38		1.83	1531.84	621.96	0.11
NF S. LittleJohn	NF SLJ	149.2	1300.00	16.01	27.38		1.83	1531.84	621.96	0.11
NF S. LittleJohn	NF SLJ	149.2	1500.00	16.01	27.62		1.90	1681.78	622.93	0.12
NF S. LittleJohn	NF SLJ	149.2	1750.00	16.01	27.94		1.95	1880.22	624.20	0.12
NF S. LittleJohn	NF SLJ	149.2	2000.00	16.01	28.25		1.99	2071.35	625.42	0.12
NF S. LittleJohn	NF SLJ	149.2	2500.00	16.01	28.97		1.96	2528.93	632.00	0.11
NF S. LittleJohn	NF SLJ	149.2	3000.00	16.01	29.71		1.91	2992.75	632.00	0.10
NF S. LittleJohn	NF SLJ	144.2	1300.00	14.91	27.30	22.31	2.25	1132.38	385.01	0.14
NF S. LittleJohn	NF SLJ	144.2	1300.00	14.91	27.30	22.31	2.25	1132.38	385.01	0.14
NF S. LittleJohn	NF SLJ	144.2	1300.00	14.91	27.30	22.31	2.25	1132.38	385.01	0.14
NF S. LittleJohn	NF SLJ	144.2	1300.00	14.91	27.30	22.31	2.25	1132.38	385.01	0.14
NF S. LittleJohn	NF SLJ	144.2	1300.00	14.91	27.30	22.31	2.25	1132.38	385.01	0.14
NF S. LittleJohn	NF SLJ	144.2	1500.00	14.91	27.54	22.82	2.39	1222.79	386.06	0.14
NF S. LittleJohn	NF SLJ	144.2	1750.00	14.91	27.85	23.39	2.50	1344.31	387.47	0.15
NF S. LittleJohn	NF SLJ	144.2	2000.00	14.91	28.18	23.92	2.28	1715.21	461.00	0.13
NF S. LittleJohn	NF SLJ	144.2	2500.00	14.91	28.91	25.88	2.29	2052.31	461.00	0.13
NF S. LittleJohn	NF SLJ	144.2	3000.00	14.91	29.65	26.12	2.27	2393.08	461.00	0.12
NF S. LittleJohn	NF SLJ	139.50	1300.00	14.79	26.98		4.04	394.42	84.49	0.25
NF S. LittleJohn	NF SLJ	139.50	1300.00	14.79	26.98		4.04	394.42	84.49	0.25
NF S. LittleJohn	NF SLJ	139.50	1300.00	14.79	26.98		4.04	394.42	84.49	0.25
NF S. LittleJohn	NF SLJ	139.50	1300.00	14.79	26.98		4.04	394.42	84.49	0.25
NF S. LittleJohn	NF SLJ	139.50	1300.00	14.79	26.98		4.04	394.42	84.49	0.25
NF S. LittleJohn	NF SLJ	139.50	1500.00	14.79	27.14		4.53	408.10	85.25	0.28
NF S. LittleJohn	NF SLJ	139.50	1750.00	14.79	27.37		5.08	427.61	86.33	0.31

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
NF S. LittleJohn	NF SLJ	139.50	2000.00	14.79	27.62		5.58	449.64	89.16	0.33
NF S. LittleJohn	NF SLJ	139.50	2500.00	14.79	28.24		6.32	507.80	95.13	0.37
NF S. LittleJohn	NF SLJ	139.50	3000.00	14.79	28.91		6.81	571.77	95.13	0.38
NF S. LittleJohn	NF SLJ	137.55	1300.00	14.72	26.97	20.60	3.14	514.14	117.99	0.19
NF S. LittleJohn	NF SLJ	137.55	1300.00	14.72	26.97	20.60	3.14	514.14	117.99	0.19
NF S. LittleJohn	NF SLJ	137.55	1300.00	14.72	26.97	20.60	3.14	514.14	117.99	0.19
NF S. LittleJohn	NF SLJ	137.55	1300.00	14.72	26.97	20.60	3.14	514.14	117.99	0.19
NF S. LittleJohn	NF SLJ	137.55	1300.00	14.72	26.97	20.60	3.14	514.14	117.99	0.19
NF S. LittleJohn	NF SLJ	137.55	1500.00	14.72	27.13	21.02	3.53	533.17	121.26	0.21
NF S. LittleJohn	NF SLJ	137.55	1750.00	14.72	27.36	21.50	3.96	561.07	123.35	0.23
NF S. LittleJohn	NF SLJ	137.55	2000.00	14.72	27.61	21.93	4.32	592.92	123.35	0.25
NF S. LittleJohn	NF SLJ	137.55	2500.00	14.72	28.24	22.76	4.86	670.50	123.35	0.27
NF S. LittleJohn	NF SLJ	137.55	3000.00	14.72	28.92	23.49	5.25	754.60	123.35	0.28
NF S. LittleJohn	NF SLJ	137 Farm Road	Bridge							
NF S. LittleJohn	NF SLJ	136.55	1300.00	14.22	26.90		2.91	567.18	123.35	0.17
NF S. LittleJohn	NF SLJ	136.55	1300.00	14.22	26.90		2.91	567.18	123.35	0.17
NF S. LittleJohn	NF SLJ	136.55	1300.00	14.22	26.90		2.91	567.18	123.35	0.17
NF S. LittleJohn	NF SLJ	136.55	1300.00	14.22	26.90		2.91	567.18	123.35	0.17
NF S. LittleJohn	NF SLJ	136.55	1300.00	14.22	26.90		2.91	567.18	123.35	0.17
NF S. LittleJohn	NF SLJ	136.55	1500.00	14.22	27.04		3.28	583.83	123.35	0.19
NF S. LittleJohn	NF SLJ	136.55	1750.00	14.22	27.23		3.71	607.06	123.35	0.21
NF S. LittleJohn	NF SLJ	136.55	2000.00	14.22	27.44		4.09	632.86	123.35	0.23
NF S. LittleJohn	NF SLJ	136.55	2500.00	14.22	27.94		4.71	695.02	123.35	0.26
NF S. LittleJohn	NF SLJ	136.55	3000.00	14.22	28.47		5.21	759.97	123.35	0.28
NF S. LittleJohn	NF SLJ	134.3	1300.00	13.34	26.77		3.59	419.07	76.91	0.21
NF S. LittleJohn	NF SLJ	134.3	1300.00	13.34	26.77		3.59	419.07	76.91	0.21
NF S. LittleJohn	NF SLJ	134.3	1300.00	13.34	26.77		3.59	419.07	76.91	0.21
NF S. LittleJohn	NF SLJ	134.3	1300.00	13.34	26.77		3.59	419.07	76.91	0.21
NF S. LittleJohn	NF SLJ	134.3	1300.00	13.34	26.77		3.59	419.07	76.91	0.21
NF S. LittleJohn	NF SLJ	134.3	1500.00	13.34	26.86		4.09	426.23	77.39	0.24
NF S. LittleJohn	NF SLJ	134.3	1750.00	13.34	26.99		4.68	436.34	78.07	0.27
NF S. LittleJohn	NF SLJ	134.3	2000.00	13.34	27.14		5.24	447.79	78.83	0.30
NF S. LittleJohn	NF SLJ	134.3	2500.00	13.34	27.50		6.24	478.17	84.57	0.35
NF S. LittleJohn	NF SLJ	134.3	3000.00	13.34	27.91		7.06	512.35	84.57	0.39
NF S. LittleJohn	NF SLJ	129.6	1300.00	14.42	26.65	20.38	3.40	526.25	106.70	0.19
NF S. LittleJohn	NF SLJ	129.6	1300.00	14.42	26.65	20.38	3.40	526.25	106.70	0.19
NF S. LittleJohn	NF SLJ	129.6	1300.00	14.42	26.65	20.38	3.40	526.25	106.70	0.19
NF S. LittleJohn	NF SLJ	129.6	1300.00	14.42	26.65	20.38	3.40	526.25	106.70	0.19
NF S. LittleJohn	NF SLJ	129.6	1300.00	14.42	26.65	20.38	3.40	526.25	106.70	0.19
NF S. LittleJohn	NF SLJ	129.6	1500.00	14.42	26.71	20.81	3.88	532.58	107.03	0.22
NF S. LittleJohn	NF SLJ	129.6	1750.00	14.42	26.80	21.29	4.46	541.66	107.49	0.25
NF S. LittleJohn	NF SLJ	129.6	2000.00	14.42	26.90	21.74	5.02	552.29	108.04	0.28
NF S. LittleJohn	NF SLJ	129.6	2500.00	14.42	27.16	22.59	6.06	582.09	116.00	0.33
NF S. LittleJohn	NF SLJ	129.6	3000.00	14.42	27.50	23.80	6.88	620.57	116.00	0.37
NF S. LittleJohn	NF SLJ	124.5	1300.00	13.02	26.51	19.93	3.33	473.09	85.75	0.19
NF S. LittleJohn	NF SLJ	124.5	1300.00	13.02	26.51	19.93	3.33	473.09	85.75	0.19
NF S. LittleJohn	NF SLJ	124.5	1300.00	13.02	26.51	19.93	3.33	473.09	85.75	0.19
NF S. LittleJohn	NF SLJ	124.5	1300.00	13.02	26.51	19.93	3.33	473.09	85.75	0.19
NF S. LittleJohn	NF SLJ	124.5	1300.00	13.02	26.51	19.93	3.33	473.09	85.75	0.19
NF S. LittleJohn	NF SLJ	124.5	1500.00	13.02	26.52	20.37	3.84	474.00	86.46	0.22
NF S. LittleJohn	NF SLJ	124.5	1750.00	13.02	26.53	20.89	4.47	475.06	87.27	0.26
NF S. LittleJohn	NF SLJ	124.5	2000.00	13.02	26.55	21.37	5.11	476.18	88.12	0.29
NF S. LittleJohn	NF SLJ	124.5	2500.00	13.02	26.62	22.19	6.34	482.58	91.00	0.36
NF S. LittleJohn	NF SLJ	124.5	3000.00	13.02	26.70	22.90	7.50	490.42	91.00	0.42
NF S. LittleJohn	NF SLJ	119.35	1300.00	13.22	26.45		2.62	588.52	99.64	0.15
NF S. LittleJohn	NF SLJ	119.35	1300.00	13.22	26.45		2.62	588.52	99.64	0.15
NF S. LittleJohn	NF SLJ	119.35	1300.00	13.22	26.45		2.62	588.52	99.64	0.15
NF S. LittleJohn	NF SLJ	119.35	1300.00	13.22	26.45		2.62	588.52	99.64	0.15
NF S. LittleJohn	NF SLJ	119.35	1300.00	13.22	26.45		2.62	588.52	99.64	0.15
NF S. LittleJohn	NF SLJ	119.35	1500.00	13.22	26.44		3.02	587.44	99.58	0.17
NF S. LittleJohn	NF SLJ	119.35	1750.00	13.22	26.42		3.54	585.46	99.48	0.20
NF S. LittleJohn	NF SLJ	119.35	2000.00	13.22	26.39		4.06	582.92	99.36	0.23
NF S. LittleJohn	NF SLJ	119.35	2500.00	13.22	26.37		5.09	580.77	99.25	0.29
NF S. LittleJohn	NF SLJ	119.35	3000.00	13.22	26.33		6.14	576.96	99.06	0.35

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Lone Tree	Upper	877.5	300.00	93.27	99.00	96.68	3.01	105.39	37.81	0.27
Lone Tree	Upper	877.5	500.00	93.27	100.22	97.45	3.61	154.70	42.91	0.29
Lone Tree	Upper	877.5	750.00	93.27	101.13	98.23	4.41	195.33	46.69	0.32
Lone Tree	Upper	877.5	1000.00	93.27	102.08	98.98	4.90	242.56	54.36	0.33
Lone Tree	Upper	877.5	1250.00	93.27	102.68	99.54	5.50	277.13	60.35	0.36
Lone Tree	Upper	877.5	1500.00	93.27	103.29	100.04	5.51	392.34	116.63	0.34
Lone Tree	Upper	877.5	1750.00	93.27	103.40	100.49	6.28	406.00	118.37	0.39
Lone Tree	Upper	877.5	2000.00	93.27	103.85	100.92	6.26	526.89	170.00	0.38
Lone Tree	Upper	877.5	2500.00	93.27	104.69	101.64	6.23	669.71	170.00	0.36
Lone Tree	Upper	877.5	3000.00	93.27	105.51	103.05	6.16	809.30	170.00	0.34
Lone Tree	Upper	877 Brennan Rd	Bridge							
Lone Tree	Upper	876.3	300.00	93.27	98.75	96.68	3.25	96.18	36.78	0.31
Lone Tree	Upper	876.3	500.00	93.27	99.99	97.45	3.82	144.77	41.93	0.31
Lone Tree	Upper	876.3	750.00	93.27	100.91	98.23	4.62	185.32	45.78	0.34
Lone Tree	Upper	876.3	1000.00	93.27	101.54	98.98	5.42	214.81	49.02	0.38
Lone Tree	Upper	876.3	1250.00	93.27	102.10	99.54	6.10	243.72	54.57	0.41
Lone Tree	Upper	876.3	1500.00	93.27	102.67	100.04	6.60	276.87	60.31	0.43
Lone Tree	Upper	876.3	1750.00	93.27	103.05	100.49	6.78	365.52	115.12	0.43
Lone Tree	Upper	876.3	2000.00	93.27	103.63	100.92	6.56	490.40	169.32	0.40
Lone Tree	Upper	876.3	2500.00	93.27	104.60	101.64	6.37	654.38	170.00	0.37
Lone Tree	Upper	876.3	3000.00	93.27	105.42	103.06	6.28	793.43	170.00	0.35
Lone Tree	Upper	841.1	300.00	86.48	91.97		3.32	94.79	26.32	0.28
Lone Tree	Upper	841.1	500.00	86.48	93.28		4.05	153.47	77.44	0.30
Lone Tree	Upper	841.1	750.00	86.48	94.51		4.20	266.86	96.20	0.28
Lone Tree	Upper	841.1	1000.00	86.48	95.61		4.12	372.70	96.20	0.26
Lone Tree	Upper	841.1	1250.00	86.48	96.62		4.08	470.64	96.20	0.24
Lone Tree	Upper	841.1	1500.00	86.48	97.49		4.15	553.77	96.20	0.23
Lone Tree	Upper	841.1	1750.00	86.48	98.68		3.98	668.08	96.20	0.21
Lone Tree	Upper	841.1	2000.00	86.48	98.96		4.37	695.38	96.20	0.23
Lone Tree	Upper	841.1	2500.00	86.48	99.59		5.01	755.53	96.20	0.25
Lone Tree	Upper	841.1	3000.00	86.48	100.08		5.64	802.89	96.20	0.28
Lone Tree	Upper	813.0	300.00	86.21	91.88	89.24	3.32	98.29	28.31	0.27
Lone Tree	Upper	813.0	500.00	86.21	93.17	90.10	4.06	160.66	86.00	0.30
Lone Tree	Upper	813.0	750.00	86.21	94.43	91.00	4.15	284.58	107.30	0.27
Lone Tree	Upper	813.0	1000.00	86.21	95.55	91.80	3.98	405.48	107.30	0.24
Lone Tree	Upper	813.0	1250.00	86.21	96.59	92.50	3.88	516.24	107.30	0.22
Lone Tree	Upper	813.0	1500.00	86.21	97.46	93.78	3.92	609.69	107.30	0.22
Lone Tree	Upper	813.0	1750.00	86.21	98.66	94.22	3.73	738.29	107.30	0.20
Lone Tree	Upper	813.0	2000.00	86.21	98.94	94.59	4.09	768.46	107.30	0.21
Lone Tree	Upper	813.0	2500.00	86.21	99.56	95.05	4.68	835.21	107.30	0.24
Lone Tree	Upper	813.0	3000.00	86.21	100.05	95.45	5.26	887.66	107.30	0.26
Lone Tree	Upper	812 Sexton Rd	Bridge							
Lone Tree	Upper	810.35*	300.00	85.90	91.38	89.15	3.70	88.71	27.90	0.32
Lone Tree	Upper	810.35*	500.00	85.90	92.58	90.02	4.62	130.79	46.70	0.35
Lone Tree	Upper	810.35*	750.00	85.90	93.49	90.93	5.51	179.27	56.16	0.38
Lone Tree	Upper	810.35*	1000.00	85.90	94.80	91.73	4.59	358.07	109.95	0.29
Lone Tree	Upper	810.35*	1250.00	85.90	95.79	92.65	4.40	467.36	109.95	0.26
Lone Tree	Upper	810.35*	1500.00	85.90	96.94	93.78	4.10	593.95	109.95	0.23
Lone Tree	Upper	810.35*	1750.00	85.90	98.54	94.07	3.64	769.22	109.95	0.19
Lone Tree	Upper	810.35*	2000.00	85.90	98.81	94.33	3.99	799.05	109.95	0.21
Lone Tree	Upper	810.35*	2500.00	85.90	99.41	94.78	4.58	865.71	109.95	0.23
Lone Tree	Upper	810.35*	3000.00	85.90	99.89	95.18	5.17	917.79	109.95	0.25
Lone Tree	Upper	808 AT&SF RR	Bridge							
Lone Tree	Upper	807.7	300.00	85.58	90.60	88.72	4.19	77.27	25.36	0.37
Lone Tree	Upper	807.7	500.00	85.58	91.60	89.62	5.40	112.69	50.95	0.43
Lone Tree	Upper	807.7	750.00	85.58	90.58	90.58	10.57	76.57	25.25	0.94
Lone Tree	Upper	807.7	1000.00	85.58	91.95	91.95	9.74	131.96	57.40	0.74
Lone Tree	Upper	807.7	1250.00	85.58	92.46	92.46	10.40	161.49	58.28	0.76
Lone Tree	Upper	807.7	1500.00	85.58	93.49	92.88	9.50	224.51	67.83	0.64
Lone Tree	Upper	807.7	1750.00	85.58	94.05	93.05	8.93	319.96	112.60	0.58
Lone Tree	Upper	807.7	2000.00	85.58	94.61	93.66	8.64	383.01	112.60	0.54
Lone Tree	Upper	807.7	2500.00	85.58	95.59	94.36	8.38	493.84	112.60	0.49

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Lone Tree	Upper	807.7	3000.00	85.58	96.48	94.76	8.30	593.45	112.60	0.47
Lone Tree	Upper	560.3	300.00	54.69	59.13	56.89	3.06	100.95	31.90	0.28
Lone Tree	Upper	560.3	500.00	54.69	60.61	57.66	3.53	152.34	141.30	0.27
Lone Tree	Upper	560.3	750.00	54.69	62.04	58.40	2.81	438.45	163.80	0.19
Lone Tree	Upper	560.3	1000.00	54.69	62.52	59.05	3.19	516.83	163.80	0.21
Lone Tree	Upper	560.3	1250.00	54.69	62.96	59.63	3.49	587.64	163.80	0.22
Lone Tree	Upper	560.3	1500.00	54.69	63.22	60.19	3.89	630.37	163.80	0.25
Lone Tree	Upper	560.3	1750.00	54.69	63.52	60.67	4.19	680.43	163.80	0.26
Lone Tree	Upper	560.3	2000.00	54.69	63.80	61.25	4.47	725.34	163.80	0.27
Lone Tree	Upper	560.3	2500.00	54.69	64.30	61.87	4.97	807.56	163.80	0.29
Lone Tree	Upper	560.3	3000.00	54.69	64.75	62.19	5.43	880.83	163.80	0.31
Lone Tree	Upper	560 Murphy Rd	Bridge							
Lone Tree	Upper	559.3	300.00	54.69	58.81	56.89	3.36	90.89	30.58	0.32
Lone Tree	Upper	559.3	500.00	54.69	59.65	57.66	4.42	118.10	34.04	0.38
Lone Tree	Upper	559.3	750.00	54.69	60.75	58.40	5.09	162.15	150.18	0.39
Lone Tree	Upper	559.3	1000.00	54.69	61.18	59.05	6.22	182.47	163.80	0.46
Lone Tree	Upper	559.3	1250.00	54.69	61.80	59.63	6.79	213.23	163.80	0.48
Lone Tree	Upper	559.3	1500.00	54.69	61.92	60.28	5.89	417.24	163.80	0.41
Lone Tree	Upper	559.3	1750.00	54.69	62.32	60.76	5.96	483.38	163.80	0.40
Lone Tree	Upper	559.3	2000.00	54.69	62.68	61.40	6.06	543.10	163.80	0.40
Lone Tree	Upper	559.3	2500.00	54.69	63.36	61.87	6.24	653.58	163.80	0.39
Lone Tree	Upper	559.3	3000.00	54.69	63.97	62.19	6.43	753.49	163.80	0.39
Lone Tree	Upper	451.7	300.00	43.86	48.65	46.75	3.07	130.18	97.00	0.28
Lone Tree	Upper	451.7	500.00	43.86	49.55	47.57	3.27	242.33	137.03	0.27
Lone Tree	Upper	451.7	750.00	43.86	50.16	48.33	3.73	328.87	151.27	0.28
Lone Tree	Upper	451.7	1000.00	43.86	50.89	49.08	3.70	442.78	156.60	0.26
Lone Tree	Upper	451.7	1250.00	43.86	51.34	49.42	3.90	514.33	156.60	0.27
Lone Tree	Upper	451.7	1500.00	43.86	51.64	49.68	4.24	560.47	156.60	0.29
Lone Tree	Upper	451.7	1750.00	43.86	51.97	49.89	4.48	612.07	156.60	0.30
Lone Tree	Upper	451.7	2000.00	43.86	52.29	50.12	4.68	662.04	156.60	0.30
Lone Tree	Upper	451.7	2500.00	43.86	52.87	50.37	5.04	753.27	156.60	0.31
Lone Tree	Upper	451.7	3000.00	43.86	53.40	50.85	5.37	836.86	156.60	0.32
Lone Tree	Upper	450 Jack Tone Rd	Bridge							
Lone Tree	Upper	448.8	300.00	43.10	48.33	46.06	2.92	138.89	86.30	0.26
Lone Tree	Upper	448.8	500.00	43.10	49.09	46.89	3.53	208.04	104.90	0.29
Lone Tree	Upper	448.8	750.00	43.10	49.48		4.47	248.97	108.59	0.35
Lone Tree	Upper	448.8	1000.00	43.10	49.48	48.62	5.94	249.75	108.89	0.46
Lone Tree	Upper	448.8	1250.00	43.10	49.50	48.90	7.37	251.72	109.64	0.57
Lone Tree	Upper	448.8	1500.00	43.10	49.90	49.35	7.56	298.09	126.08	0.57
Lone Tree	Upper	448.8	1750.00	43.10	50.13	49.60	8.08	328.23	135.69	0.59
Lone Tree	Upper	448.8	2000.00	43.10	50.41	49.83	8.33	368.24	147.50	0.60
Lone Tree	Upper	448.8	2500.00	43.10	51.05		8.41	468.74	158.40	0.57
Lone Tree	Upper	448.8	3000.00	43.10	51.71		8.18	572.97	158.40	0.53
Lone Tree	Upper	369	300.00	34.73	38.65		5.14	58.74	23.92	0.56
Lone Tree	Upper	369	500.00	34.73	39.79		5.35	125.04	85.13	0.48
Lone Tree	Upper	369	750.00	34.73	41.11		4.65	249.44	108.77	0.36
Lone Tree	Upper	369	1000.00	34.73	42.47		3.85	435.84	158.40	0.27
Lone Tree	Upper	369	1250.00	34.73	43.48		3.52	595.02	158.40	0.23
Lone Tree	Upper	369	1500.00	34.73	44.03		3.66	681.74	158.40	0.23
Lone Tree	Upper	369	1750.00	34.73	44.72		3.64	790.79	158.40	0.22
Lone Tree	Upper	369	2000.00	34.73	45.32		3.68	887.17	158.40	0.21
Lone Tree	Upper	369	2500.00	34.73	46.37		3.82	1052.35	158.40	0.21
Lone Tree	Upper	369	3000.00	34.73	47.24		4.01	1191.38	158.40	0.21
Lone Tree	Lower	368.0	300.00	34.63	38.72	36.52	2.92	103.34	31.77	0.28
Lone Tree	Lower	368.0	500.00	34.63	39.81	37.23	3.67	139.86	35.60	0.30
Lone Tree	Lower	368.0	750.00	34.63	40.98	37.96	4.31	184.85	41.02	0.32
Lone Tree	Lower	368.0	1000.00	34.63	42.22	38.55	4.62	239.87	49.12	0.31
Lone Tree	Lower	368.0	1250.00	34.63	43.15	39.09	4.98	290.11	58.89	0.31
Lone Tree	Lower	368.0	1500.00	34.63	43.64	39.60	5.43	354.53	94.62	0.33
Lone Tree	Lower	368.0	1750.00	34.63	44.32	40.09	5.60	420.93	101.13	0.33
Lone Tree	Lower	368.0	2000.00	34.63	44.92	40.56	5.77	486.37	113.70	0.33
Lone Tree	Lower	368.0	2500.00	34.63	45.97	41.41	5.98	605.88	113.70	0.32
Lone Tree	Lower	368.0	3000.00	34.63	46.84	42.16	6.25	704.57	113.70	0.32

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Lone Tree	Lower	303.2	300.00	29.63	33.53	31.52	3.09	97.46	31.20	0.30
Lone Tree	Lower	303.2	500.00	29.63	34.99	32.23	3.52	146.41	36.43	0.29
Lone Tree	Lower	303.2	750.00	29.63	36.37	32.96	4.00	201.36	42.84	0.29
Lone Tree	Lower	303.2	1000.00	29.63	36.42	33.55	5.29	203.39	43.06	0.38
Lone Tree	Lower	303.2	1250.00	29.63	36.99	34.09	6.00	228.57	46.65	0.41
Lone Tree	Lower	303.2	1500.00	29.63	38.63	34.60	5.45	353.18	94.49	0.33
Lone Tree	Lower	303.2	1750.00	29.63	38.87	35.09	6.08	376.29	96.60	0.37
Lone Tree	Lower	303.2	2000.00	29.63	39.14	35.56	6.61	402.70	98.96	0.39
Lone Tree	Lower	303.2	2500.00	29.63	39.50	36.41	7.77	439.19	105.91	0.45
Lone Tree	Lower	303.2	3000.00	29.63	39.99	37.16	8.54	494.51	113.70	0.48
Lone Tree	Lower	302.5 Austin Rd	Bridge							
Lone Tree	Lower	302.0	300.00	29.51	33.36	31.40	3.14	95.86	31.05	0.31
Lone Tree	Lower	302.0	500.00	29.51	34.85	32.11	3.54	145.65	36.34	0.29
Lone Tree	Lower	302.0	750.00	29.51	36.24	32.84	4.01	200.77	42.77	0.29
Lone Tree	Lower	302.0	1000.00	29.51	36.15	33.43	5.44	197.11	42.38	0.39
Lone Tree	Lower	302.0	1250.00	29.51	36.66	33.97	6.20	219.31	44.73	0.43
Lone Tree	Lower	302.0	1500.00	29.51	37.16	34.48	6.86	242.58	49.70	0.46
Lone Tree	Lower	302.0	1750.00	29.51	37.62	34.97	7.44	266.76	54.57	0.48
Lone Tree	Lower	302.0	2000.00	29.51	38.06	35.44	7.94	291.67	59.16	0.50
Lone Tree	Lower	302.0	2500.00	29.51	38.62	36.30	8.89	364.03	95.49	0.54
Lone Tree	Lower	302.0	3000.00	29.51	38.96	37.04	10.02	396.92	98.45	0.59
Lone Tree	Lower	197.5	300.00	23.06	28.07	24.76	1.67	196.24	64.58	0.14
Lone Tree	Lower	197.5	500.00	23.06	28.82	25.36	2.25	246.26	69.31	0.18
Lone Tree	Lower	197.5	750.00	23.06	29.63	25.98	2.78	305.22	79.95	0.21
Lone Tree	Lower	197.5	1000.00	23.06	30.41	26.59	2.19	614.46	195.00	0.16
Lone Tree	Lower	197.5	1250.00	23.06	31.05	27.16	2.24	739.07	195.00	0.15
Lone Tree	Lower	197.5	1500.00	23.06	31.61	27.62	2.31	847.84	195.00	0.15
Lone Tree	Lower	197.5	1750.00	23.06	32.11	27.97	2.39	945.36	195.00	0.15
Lone Tree	Lower	197.5	2000.00	23.06	32.57	28.28	2.47	1034.90	195.00	0.15
Lone Tree	Lower	197.5	2500.00	23.06	33.69	28.86	2.49	1253.71	195.00	0.14
Lone Tree	Lower	197.5	3000.00	23.06	35.24	29.36	2.36	1556.80	195.00	0.13
Lone Tree	Lower	196.1	300.00	22.66	28.02	24.67	1.75	171.09	43.90	0.16
Lone Tree	Lower	196.1	500.00	22.66	28.73	25.28	2.47	202.83	46.27	0.21
Lone Tree	Lower	196.1	750.00	22.66	29.49	25.90	3.14	240.08	51.36	0.25
Lone Tree	Lower	196.1	1000.00	22.66	30.17	26.44	3.67	277.57	59.20	0.27
Lone Tree	Lower	196.1	1250.00	22.66	30.76	26.91	4.12	314.23	66.40	0.29
Lone Tree	Lower	196.1	1500.00	22.66	31.26	27.36	4.53	349.34	72.63	0.31
Lone Tree	Lower	196.1	1750.00	22.66	31.71	27.77	4.89	383.94	78.19	0.32
Lone Tree	Lower	196.1	2000.00	22.66	32.13	28.13	5.21	416.67	79.41	0.33
Lone Tree	Lower	196.1	2500.00	22.66	33.23	28.83	5.48	505.27	81.00	0.33
Lone Tree	Lower	196.1	3000.00	22.66	34.84	29.49	5.29	635.42	81.00	0.29
Lone Tree	Lower	195.5 Hwy 99	Bridge							
Lone Tree	Lower	194.8	300.00	22.53	27.93		1.74	172.59	44.01	0.15
Lone Tree	Lower	194.8	500.00	22.53	28.55		2.49	200.69	46.12	0.21
Lone Tree	Lower	194.8	750.00	22.53	29.23		3.22	233.31	50.42	0.26
Lone Tree	Lower	194.8	1000.00	22.53	29.84		3.81	265.91	56.72	0.29
Lone Tree	Lower	194.8	1250.00	22.53	30.37		4.32	297.26	63.17	0.31
Lone Tree	Lower	194.8	1500.00	22.53	30.80		4.80	326.06	68.57	0.33
Lone Tree	Lower	194.8	1750.00	22.53	31.18		5.24	353.02	73.99	0.35
Lone Tree	Lower	194.8	2000.00	22.53	31.54		5.63	380.84	78.07	0.37
Lone Tree	Lower	194.8	2500.00	22.53	32.32		6.18	442.27	80.35	0.39
Lone Tree	Lower	194.8	3000.00	22.53	33.11		6.56	506.31	81.00	0.39
Lone Tree	Lower	193.45	300.00	21.68	27.91		1.32	288.50	171.78	0.11
Lone Tree	Lower	193.45	500.00	21.68	28.54		1.67	402.53	190.74	0.14
Lone Tree	Lower	193.45	750.00	21.68	29.25		1.88	541.15	199.61	0.14
Lone Tree	Lower	193.45	1000.00	21.68	29.90		1.99	676.42	209.45	0.14
Lone Tree	Lower	193.45	1250.00	21.68	30.46		2.09	794.25	209.45	0.14
Lone Tree	Lower	193.45	1500.00	21.68	30.94		2.20	893.92	209.45	0.15
Lone Tree	Lower	193.45	1750.00	21.68	31.36		2.31	981.58	209.45	0.15
Lone Tree	Lower	193.45	2000.00	21.68	31.76		2.41	1064.56	209.45	0.15
Lone Tree	Lower	193.45	2500.00	21.68	32.59		2.54	1238.74	209.45	0.15
Lone Tree	Lower	193.45	3000.00	21.68	33.42		2.64	1412.89	209.45	0.15

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Lone Tree	Lower	191.4	300.00	22.97	27.84	24.86	1.60	231.64	166.89	0.15
Lone Tree	Lower	191.4	500.00	22.97	28.45	25.43	1.91	349.00	207.15	0.17
Lone Tree	Lower	191.4	750.00	22.97	29.17	26.03	1.99	503.90	221.23	0.17
Lone Tree	Lower	191.4	1000.00	22.97	29.84	26.55	2.01	651.99	224.00	0.16
Lone Tree	Lower	191.4	1250.00	22.97	30.40	27.55	2.06	779.19	224.00	0.15
Lone Tree	Lower	191.4	1500.00	22.97	30.88	27.92	2.14	886.09	224.00	0.15
Lone Tree	Lower	191.4	1750.00	22.97	31.30	28.20	2.23	979.84	224.00	0.15
Lone Tree	Lower	191.4	2000.00	22.97	31.70	28.39	2.31	1068.61	224.00	0.16
Lone Tree	Lower	191.4	2500.00	22.97	32.53	28.67	2.41	1255.69	224.00	0.15
Lone Tree	Lower	191.4	3000.00	22.97	33.37	28.93	2.49	1442.92	224.00	0.15
Lone Tree	Lower	191 Cart East	Bridge							
Lone Tree	Lower	189.92	300.00	22.80	27.77		1.55	249.56	164.41	0.15
Lone Tree	Lower	189.92	500.00	22.80	28.34		1.91	348.15	188.47	0.17
Lone Tree	Lower	189.92	750.00	22.80	29.02		2.05	480.19	191.50	0.17
Lone Tree	Lower	189.92	1000.00	22.80	29.68		2.12	605.51	191.50	0.17
Lone Tree	Lower	189.92	1250.00	22.80	30.24		2.21	713.20	191.50	0.16
Lone Tree	Lower	189.92	1500.00	22.80	30.71		2.32	803.13	191.50	0.17
Lone Tree	Lower	189.92	1750.00	22.80	31.12		2.44	881.70	191.50	0.17
Lone Tree	Lower	189.92	2000.00	22.80	31.51		2.55	956.09	191.50	0.17
Lone Tree	Lower	189.92	2500.00	22.80	32.34		2.70	1114.92	191.50	0.17
Lone Tree	Lower	189.92	3000.00	22.80	33.18		2.80	1275.58	191.50	0.17
Lone Tree	Lower	186.8	300.00	22.63	27.57	24.88	2.20	136.38	38.56	0.21
Lone Tree	Lower	186.8	500.00	22.63	27.96	25.49	3.30	151.50	39.74	0.30
Lone Tree	Lower	186.8	750.00	22.63	28.50	26.12	4.33	173.31	41.32	0.37
Lone Tree	Lower	186.8	1000.00	22.63	29.03	26.68	5.10	195.89	42.89	0.42
Lone Tree	Lower	186.8	1250.00	22.63	29.46	27.17	5.82	214.67	44.15	0.47
Lone Tree	Lower	186.8	1500.00	22.63	29.77	27.65	6.57	228.39	45.05	0.51
Lone Tree	Lower	186.8	1750.00	22.63	29.99	28.07	7.34	238.32	46.26	0.57
Lone Tree	Lower	186.8	2000.00	22.63	30.17	28.47	8.11	246.97	49.41	0.62
Lone Tree	Lower	186.8	2500.00	22.63	30.69	29.20	9.20	275.00	58.46	0.68
Lone Tree	Lower	186.8	3000.00	22.63	31.71	29.86	8.90	385.09	138.66	0.62
Lone Tree	Lower	186.7 Cart West	Bridge							
Lone Tree	Lower	186.4	300.00	22.63	27.54		2.22	135.24	38.47	0.21
Lone Tree	Lower	186.4	500.00	22.63	27.89		3.36	148.95	39.54	0.30
Lone Tree	Lower	186.4	750.00	22.63	28.39		4.44	168.96	41.03	0.39
Lone Tree	Lower	186.4	1000.00	22.63	28.89		5.26	189.94	42.48	0.44
Lone Tree	Lower	186.4	1250.00	22.63	29.28		6.05	206.71	43.62	0.49
Lone Tree	Lower	186.4	1500.00	22.63	29.53		6.90	217.44	44.33	0.55
Lone Tree	Lower	186.4	1750.00	22.63	29.65		7.85	223.04	44.70	0.62
Lone Tree	Lower	186.4	2000.00	22.63	29.68		8.92	224.29	44.78	0.70
Lone Tree	Lower	186.4	2500.00	22.63	29.57	29.21	11.39	219.55	44.47	0.90
Lone Tree	Lower	186.4	3000.00	22.63	29.86	29.86	12.91	232.43	45.31	1.00
Lone Tree	Lower	185.64	300.00	22.12	27.54		1.48	267.97	155.82	0.14
Lone Tree	Lower	185.64	500.00	22.12	27.92		2.01	328.59	164.62	0.18
Lone Tree	Lower	185.64	750.00	22.12	28.48		2.31	425.19	176.60	0.20
Lone Tree	Lower	185.64	1000.00	22.12	29.06		2.41	529.25	180.51	0.20
Lone Tree	Lower	185.64	1250.00	22.12	29.54		2.55	615.74	183.94	0.20
Lone Tree	Lower	185.64	1500.00	22.12	29.88		2.75	679.94	186.70	0.21
Lone Tree	Lower	185.64	1750.00	22.12	30.14		2.98	727.23	188.70	0.22
Lone Tree	Lower	185.64	2000.00	22.12	30.33		3.25	763.19	190.00	0.24
Lone Tree	Lower	185.64	2500.00	22.12	30.71		3.68	835.15	190.00	0.26
Lone Tree	Lower	185.64	3000.00	22.12	31.03		4.08	896.68	190.00	0.28
Lone Tree	Lower	184.1	300.00	22.16	27.43	24.49	2.15	139.65	36.81	0.19
Lone Tree	Lower	184.1	500.00	22.16	27.65	25.11	3.38	147.88	37.40	0.30
Lone Tree	Lower	184.1	750.00	22.16	28.01	25.77	4.64	161.54	38.35	0.40
Lone Tree	Lower	184.1	1000.00	22.16	28.53	26.34	5.17	233.46	169.04	0.44
Lone Tree	Lower	184.1	1250.00	22.16	29.11	26.87	4.89	342.06	213.17	0.41
Lone Tree	Lower	184.1	1500.00	22.16	29.51	27.34	2.04	449.38	318.58	0.17
Lone Tree	Lower	184.1	1750.00	22.16	29.79	28.82	1.59	545.16	364.37	0.13
Lone Tree	Lower	184.1	2000.00	22.16	29.98	29.04	4.83	617.07	391.79	0.40
Lone Tree	Lower	184.1	2500.00	22.16	30.42	29.51	0.00	800.76	448.40	0.00
Lone Tree	Lower	184.1	3000.00	22.16	30.79	29.80	0.38	976.33	491.97	0.03
Lone Tree	Lower	183.7 RV Road	Bridge							

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Lone Tree	Lower	183.5	300.00	22.16	27.39		2.17	138.21	36.71	0.20
Lone Tree	Lower	183.5	500.00	22.16	27.55		3.47	144.08	37.13	0.31
Lone Tree	Lower	183.5	750.00	22.16	27.80		4.88	153.62	37.80	0.43
Lone Tree	Lower	183.5	1000.00	22.16	28.07	26.34	6.09	164.51	74.68	0.52
Lone Tree	Lower	183.5	1250.00	22.16	28.38	26.87	6.88	208.81	159.64	0.59
Lone Tree	Lower	183.5	1500.00	22.16	28.72		7.09	267.54	181.33	0.60
Lone Tree	Lower	183.5	1750.00	22.16	29.03		7.12	326.18	200.73	0.60
Lone Tree	Lower	183.5	2000.00	22.16	29.39		6.75	413.58	287.74	0.57
Lone Tree	Lower	183.5	2500.00	22.16	29.97		6.08	612.89	390.24	0.51
Lone Tree	Lower	183.5	3000.00	22.16	30.47		5.48	824.38	454.50	0.45
Lone Tree	Lower	180.88	300.00	19.99	27.36		1.05	367.86	149.88	0.08
Lone Tree	Lower	180.88	500.00	19.99	27.49		1.66	386.61	150.81	0.13
Lone Tree	Lower	180.88	750.00	19.99	27.70		2.29	419.22	152.41	0.18
Lone Tree	Lower	180.88	1000.00	19.99	27.95		2.79	458.08	154.55	0.21
Lone Tree	Lower	180.88	1250.00	19.99	28.22		3.18	500.34	157.80	0.24
Lone Tree	Lower	180.88	1500.00	19.99	28.50		3.51	543.95	162.44	0.26
Lone Tree	Lower	180.88	1750.00	19.99	28.71		3.91	579.00	171.00	0.28
Lone Tree	Lower	180.88	2000.00	19.99	29.03		4.05	634.43	171.00	0.28
Lone Tree	Lower	180.88	2500.00	19.99	29.53		4.41	720.18	171.00	0.30
Lone Tree	Lower	180.88	3000.00	19.99	30.00		4.72	799.38	171.00	0.31
Lone Tree	Lower	177.23	300.00	20.31	27.33		0.87	445.95	158.46	0.07
Lone Tree	Lower	177.23	500.00	20.31	27.42		1.41	459.04	159.18	0.11
Lone Tree	Lower	177.23	750.00	20.31	27.57		2.00	482.91	160.48	0.15
Lone Tree	Lower	177.23	1000.00	20.31	27.75		2.49	513.05	162.12	0.19
Lone Tree	Lower	177.23	1250.00	20.31	27.96		2.89	547.68	163.98	0.22
Lone Tree	Lower	177.23	1500.00	20.31	28.19		3.23	584.68	165.94	0.24
Lone Tree	Lower	177.23	1750.00	20.31	28.34		3.59	609.31	167.23	0.26
Lone Tree	Lower	177.23	2000.00	20.31	28.65		3.73	662.62	170.00	0.27
Lone Tree	Lower	177.23	2500.00	20.31	29.11		4.10	741.29	174.00	0.29
Lone Tree	Lower	177.23	3000.00	20.31	29.54		4.45	817.91	181.56	0.31
Lone Tree	Lower	173.58	300.00	19.83	27.30		1.04	347.47	151.85	0.09
Lone Tree	Lower	173.58	500.00	19.83	27.31		1.72	350.29	152.93	0.14
Lone Tree	Lower	173.58	750.00	19.83	27.35		2.55	355.65	154.95	0.21
Lone Tree	Lower	173.58	1000.00	19.83	27.39		3.34	362.68	157.55	0.27
Lone Tree	Lower	173.58	1250.00	19.83	27.45		4.10	371.23	160.67	0.33
Lone Tree	Lower	173.58	1500.00	19.83	27.51		4.82	380.96	164.14	0.39
Lone Tree	Lower	173.58	1750.00	19.83	27.34		5.96	354.53	154.52	0.49
Lone Tree	Lower	173.58	2000.00	19.83	27.64		6.13	402.86	171.71	0.49
Lone Tree	Lower	173.58	2500.00	19.83	27.78		7.29	427.59	177.10	0.58
Lone Tree	Lower	173.58	3000.00	19.83	27.92		8.33	451.92	179.51	0.65
Lone Tree	Lower	168.55	300.00	18.33	27.30		0.28	1505.73	502.01	0.02
Lone Tree	Lower	168.55	500.00	18.33	27.32		0.47	1515.80	502.01	0.03
Lone Tree	Lower	168.55	750.00	18.33	27.35		0.69	1534.90	502.01	0.05
Lone Tree	Lower	168.55	1000.00	18.33	27.41		0.91	1560.42	502.01	0.07
Lone Tree	Lower	168.55	1250.00	18.33	27.47		1.11	1591.38	502.01	0.08
Lone Tree	Lower	168.55	1500.00	18.33	27.54		1.29	1626.77	502.01	0.09
Lone Tree	Lower	168.55	1750.00	18.33	27.38		1.60	1548.40	502.01	0.12
Lone Tree	Lower	168.55	2000.00	18.33	27.70		1.62	1707.12	502.01	0.11
Lone Tree	Lower	168.55	2500.00	18.33	27.88		1.91	1796.71	502.01	0.13
Lone Tree	Lower	168.55	3000.00	18.33	28.06		2.15	1891.15	502.01	0.15
Lone Tree	Lower	161.96	300.00	17.77	27.29	21.80	0.20	2148.85	793.64	0.01
Lone Tree	Lower	161.96	500.00	17.77	27.31	22.77	0.32	2160.82	793.64	0.02
Lone Tree	Lower	161.96	750.00	17.77	27.34	23.69	0.48	2183.69	793.64	0.04
Lone Tree	Lower	161.96	1000.00	17.77	27.38	24.77	0.63	2214.60	793.64	0.05
Lone Tree	Lower	161.96	1250.00	17.77	27.42	24.93	0.77	2252.63	793.64	0.06
Lone Tree	Lower	161.96	1500.00	17.77	27.48	25.02	0.90	2296.77	793.64	0.07
Lone Tree	Lower	161.96	1750.00	17.77	27.29	25.08	1.14	2142.33	793.64	0.09
Lone Tree	Lower	161.96	2000.00	17.77	27.61	25.14	1.14	2399.38	793.64	0.08
Lone Tree	Lower	161.96	2500.00	17.77	27.76	25.20	1.34	2517.92	793.64	0.10
Lone Tree	Lower	161.96	3000.00	17.77	27.92	25.34	1.51	2646.79	793.64	0.11
Lone Tree	Lower	161.5 Farm Road	Bridge							
Lone Tree	Lower	158.4	300.00	17.04	27.29		0.26	1684.05	598.54	0.02
Lone Tree	Lower	158.4	500.00	17.04	27.30		0.43	1690.60	598.54	0.03

HEC-RAS Plan: Various (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Lone Tree	Lower	158.4	750.00	17.04	27.32		0.64	1703.19	598.54	0.05
Lone Tree	Lower	158.4	1000.00	17.04	27.35		0.84	1720.38	598.54	0.06
Lone Tree	Lower	158.4	1250.00	17.04	27.39		1.03	1741.79	598.54	0.07
Lone Tree	Lower	158.4	1500.00	17.04	27.43		1.22	1766.99	598.54	0.09
Lone Tree	Lower	158.4	1750.00	17.04	27.20		1.58	1628.27	598.54	0.11
Lone Tree	Lower	158.4	2000.00	17.04	27.53		1.56	1826.91	598.54	0.11
Lone Tree	Lower	158.4	2500.00	17.04	27.65		1.85	1898.68	598.54	0.13
Lone Tree	Lower	158.4	3000.00	17.04	27.79		2.10	1979.42	598.54	0.14
Lone Tree	Lower	154.5	300.00	16.62	27.29		0.29	1595.89	598.00	0.02
Lone Tree	Lower	154.5	500.00	16.62	27.29		0.48	1597.83	598.00	0.03
Lone Tree	Lower	154.5	750.00	16.62	27.30		0.72	1601.61	598.00	0.05
Lone Tree	Lower	154.5	1000.00	16.62	27.31		0.96	1606.87	598.00	0.07
Lone Tree	Lower	154.5	1250.00	16.62	27.32		1.19	1613.61	598.00	0.08
Lone Tree	Lower	154.5	1500.00	16.62	27.33		1.42	1621.79	598.00	0.10
Lone Tree	Lower	154.5	1750.00	16.62	27.01		1.95	1428.94	598.00	0.14
Lone Tree	Lower	154.5	2000.00	16.62	27.36		1.86	1642.33	598.00	0.13
Lone Tree	Lower	154.5	2500.00	16.62	27.41		2.28	1670.95	598.00	0.16
Lone Tree	Lower	154.5	3000.00	16.62	27.47		2.66	1708.19	598.00	0.19
Lone Tree	Lower	151.42	300.00	15.19	27.29		0.23	2047.23	705.52	0.02
Lone Tree	Lower	151.42	500.00	15.19	27.29		0.39	2047.91	705.52	0.03
Lone Tree	Lower	151.42	750.00	15.19	27.29		0.58	2049.25	705.52	0.04
Lone Tree	Lower	151.42	1000.00	15.19	27.29		0.78	2051.14	705.52	0.05
Lone Tree	Lower	151.42	1250.00	15.19	27.29		0.97	2053.58	705.52	0.06
Lone Tree	Lower	151.42	1500.00	15.19	27.30		1.16	2056.59	705.52	0.08
Lone Tree	Lower	151.42	1750.00	15.19	26.94		1.60	1805.44	705.52	0.11
Lone Tree	Lower	151.42	2000.00	15.19	27.31		1.54	2064.36	705.52	0.10
Lone Tree	Lower	151.42	2500.00	15.19	27.33		1.91	2078.19	705.52	0.12
Lone Tree	Lower	151.42	3000.00	15.19	27.36		2.26	2099.92	705.52	0.15
Lone Tree	Lower	149.46	300.00	14.20	27.28		0.35	1403.72	536.07	0.02
Lone Tree	Lower	149.46	500.00	14.20	27.28		0.58	1402.71	536.07	0.04
Lone Tree	Lower	149.46	750.00	14.20	27.28		0.88	1400.73	536.07	0.06
Lone Tree	Lower	149.46	1000.00	14.20	27.27		1.17	1397.93	536.07	0.08
Lone Tree	Lower	149.46	1250.00	14.20	27.27		1.47	1394.29	536.07	0.10
Lone Tree	Lower	149.46	1500.00	14.20	27.26		1.77	1389.77	536.07	0.12
Lone Tree	Lower	149.46	1750.00	14.20	26.85		2.55	1173.05	536.07	0.17
Lone Tree	Lower	149.46	2000.00	14.20	27.24		2.39	1377.90	536.07	0.16
Lone Tree	Lower	149.46	2500.00	14.20	27.21		3.02	1364.88	536.07	0.20
Lone Tree	Lower	149.46	3000.00	14.20	27.19		3.67	1352.03	536.07	0.24

APPENDIX D

PHOTOGRAPHS

Littlejohns Creek

Figure D-1: Littlejohns Creek at Sonora Road

Figure D-2: South Littlejohns Creek at Van Allen Road

Figure D-3: North Fork of South Littlejohns Creek at Jack Tone Road

Figure D-4: South Fork of South Littlejohns Creek at Jack Tone Road

Figure D-5: North Fork of South Littlejohns Creek at Austin Road

Figure D-6: South Fork of South Littlejohns Creek at Austin Road

Figure D-7: North Fork of South Littlejohns Creek at Private Road East of Highway 99

Figure D-8: South Fork of South Littlejohns Creek at Private Road East of Highway 99

French Camp Slough

Figure D-9: French Camp Slough at Union Pacific (Old Tidewater Southern) Railroad Trestle Bridge

Figure D-10: French Camp Slough at Airport Way

Lone Tree Creek

Figure D-11: Lone Tree Creek at Escalon Bellota Road (Note stream gage)

Figure D-12: Lone Tree Creek at Brennan Road

Figure D-13: Lone Tree Creek at Sexton Road

Figure D-14: Lone Tree Creek at Atchison Topeka and Santa Fe Railroad

Figure D-15: Lone Tree Creek at Van Allen Road

Figure D-16: Lone Tree Creek at Carrolton Road

Figure D-17: Lone Tree Creek at Lone Tree Road Looking Downstream

Figure D-18: Lone Tree Creek at Murphy Road Looking Downstream

Figure D-19: Lone Tree Creek at Jack Tone Road Looking Downstream

Figure D-20: Lone Tree Creek at Austin Road Looking Downstream

Figure D-21: Lone Tree Creek at Golf Course RV Park Bridge Looking Downstream

Weber Slough

Figure D-22: Weber Slough Detention Basin at Intermodal Transfer Facility

Figure D-23: Weber Slough Looking West at Highway 99

Figure D-24: Weber Slough Undersized Culvert at Army Depot Driveway

Figure D-25: Weber Slough at Airport Storm Drain Pumps Outlets Just Upstream of Airport Way

Figure D-26: Weber Slough at Airport Way 22'x8' Box Culvert Looking Downstream

Post-Storm Aerial Photographs (April 8, 2006)

Figure D-27: Aerial of Farmington Basin Outlet, April 8, 2006.

Figure D-28: April 8, 2006 Post-storm ponding illustrating isolated areas. Building complexes are dairies which must retain storm water. Typical of watersheds west of Farmington Reservoir.

Figure D-29: Looking west, N. Fork South Littlejohns at Highway 99. Ponding against Highway 99. April 8, 2006.

Figure D-30: April 8, 2006. Looking south at confluence of N. & S. Forks South Littlejohns Creek; proposed detention basin location on left in location of existing backwater ponding.

APPENDIX E

ELECTRONIC FILES