HYDRAULICS REPORT

HYDRAULIC, SCOUR AND SEDIMENTATION ANALYSIS

SANTA GERTRUDIS CREEK PEDESTRIAN BIKETRAIL

WINCHESTER ROAD TO YNEZ ROAD

TEMECULA, CALIFORNIA

Submitted to:

David Evans & Associates, Inc.
41951 Remington Avenue Suite 130
Temecula, CA 92590

REGISTERED PROFESSIONAL ENGINEER
AHMAD TAMIM ATAYEE
C 62925
EXP. 6/30/2020
CIVIL
STATE OF CALIFORNIA

Prepared by:
PO Box 3397
Laguna Hills, California 92654
www.rivertec.com / ***tatayee@rivertec.com***

RIVERTECH INC

DRAFT – November 2019

TABLE OF CONTENTS

1 Introduction/Project Description ..... - 1 -

2 OBJECTIVES AND APPROACH ..... - 2 -

2.1 Methodology ..... - 2 -

3 Hydraulic Analysis ..... - 2 -

3.1 Existing Condition ..... - 3 -
3.2 Proposed Condition ..... - 4 -
3.3 Hydraulic Modeling Results ..... - 4 -

4 Scour Analysis ..... - 7 -

5 Summary and Conclusions ..... - 8 -

Appendix

1 INTRODUCTION/PROJECT DESCRIPTION

The purpose of this memorandum is to document the observations and findings of the scour and hydraulic analyses of Santa Gertrudis Creek at the proposed Pedestrian/Bike Trail immediately between Ynez Road at the upstream limit and downstream of the confluence with Murrieta Creek and upstream of Winchester Road in the City of Temecula, Riverside County, California. The proposed project is the construction of paved pedestrian/bicycle trail (with graded shoulders) along the eastern bank of Santa Gertrudis Creek and.

1. **Description of existing condition hydraulics and flood control channel**
   Rivertech Inc., in support of David Evans and Associates Inc. (DEA), on the bike trail project for the City of Temecula Department of Public Works (Client) by assessing existing hydraulic, scour and sedimentation characteristics and recommending scour mitigation measures for the proposed Santa Gertrudis Creek Bike Trail development project in compliance with the governing regulatory agencies including the City of Temecula and County of Riverside. The project site is a proposed bike trail along Gertrudis Creek, located in the City of Temecula and County of Riverside, California, shown in Figure 1.

2. **Description of proposed project, including mitigation**
   The proposed improvements are the added pedestrian/bike trail and landscaping and also includes the proposed I-15 Winchester Road northbound on-ramp, I-15 freeway expansion and Winchester Road off-ramp expansion. There is minor encroachment on the floodplain and minimal impact on the water-surface elevations and scour depths as a result of the improvements, which is located in the overbanks of the Santa Gertrudis Creek channel. This study confirms that the hydraulics characteristics and scour potential is <u>not</u> negatively impacted from existing to post-project conditions.

3. **Summarize previous studies or reference to official model results**
   Literature and data research did uncover prior studies relevant to the study we are performing for this site, including Structure Hydraulics Report[1], Geotechnical Investigation[2],

4. **Location map** of project is shown in Figure 1.

[1] *Structure Hydraulics Report for the French Valley Parkway Interchange Phase 2 Project*, Parsons, November 21, 2013.
[2] *Geotechnical Investigation, Santa Gertrudis Creek Pedestrian/Bicycle Trail From Ynez Road To Diaz Road Temecula, California*, Prepared by GeoCon, March 3, 2010.

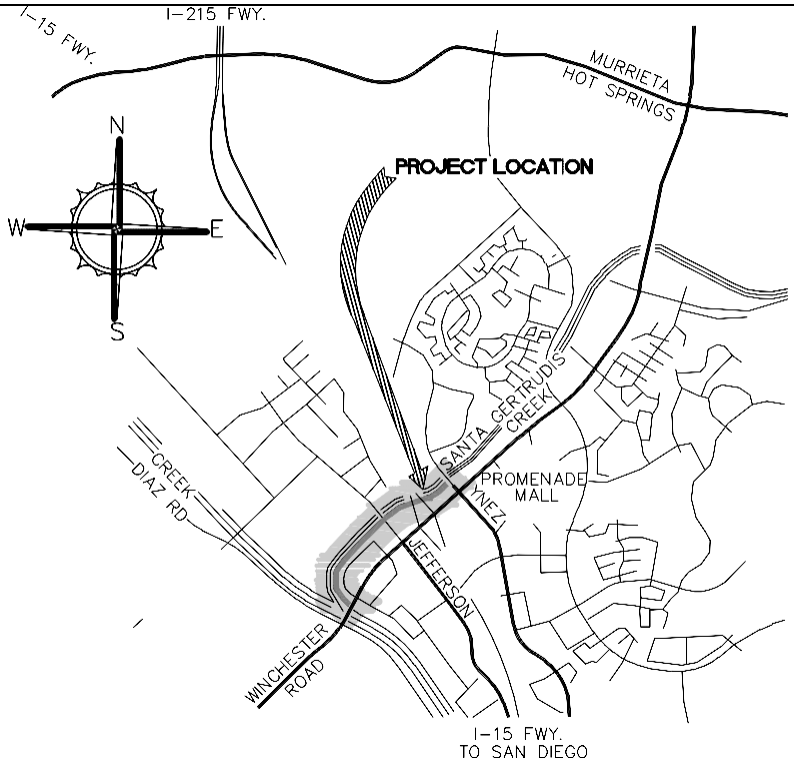


Figure 1 Location Map

2 OBJECTIVES AND APPROACH

The most important project objectives that will help address the needs and solve the problems are as follows:

- Identify the flood potential and risk resulting from the implementation of the project
- Estimate the total scour potential in Santa Gertrudis Creek with the implementation of the project

2.1 METHODOLOGY

The methodologies applied to achieve the aforementioned objectives are described in more detail in Section 3 below. Hydrology has already been established, so no hydrologic analysis is performed in this study. The 100-year peak discharge for the Santa Gertrudis Creek is 11,300 ft^3/s^3, which is the flow used in the hydraulic analysis.

3 HYDRAULIC ANALYSIS

Rivertech applied relevant hydrologic and hydraulic data from plans, studies and other sources to the one-dimensional steady-state hydraulic model, using HEC-RAS[4], for the entire study reach. The following input data was used to set up the hydraulic model:

- Existing topography and hydraulic sections
- Dimensions and elevations from as-built plans
- Soil grain sizes using geotechnical investigations of grab samples taken at site
- Hydrology that has been established in prior studies
- Boundary conditions established in the FIS/FIRM and prior studies

[3] *Murrieta Creek Master Drainage Plan*, Riverside County Flood Control and Water Conservation District, 1986.

[4] *HEC-RAS River Analysis System*, Version 5.0.7, US Army Corps of Engineers, Hydrologic Engineering Center (HEC), 2019.

3.1 EXISTING CONDITION

A summary of the sources and assumptions used and results are provided for the following items:

Site and topographic data

The source of the topographic data is the survey of the site conducted by David Evans and Associates, Inc., the cover page for which is shown in Figure 2.

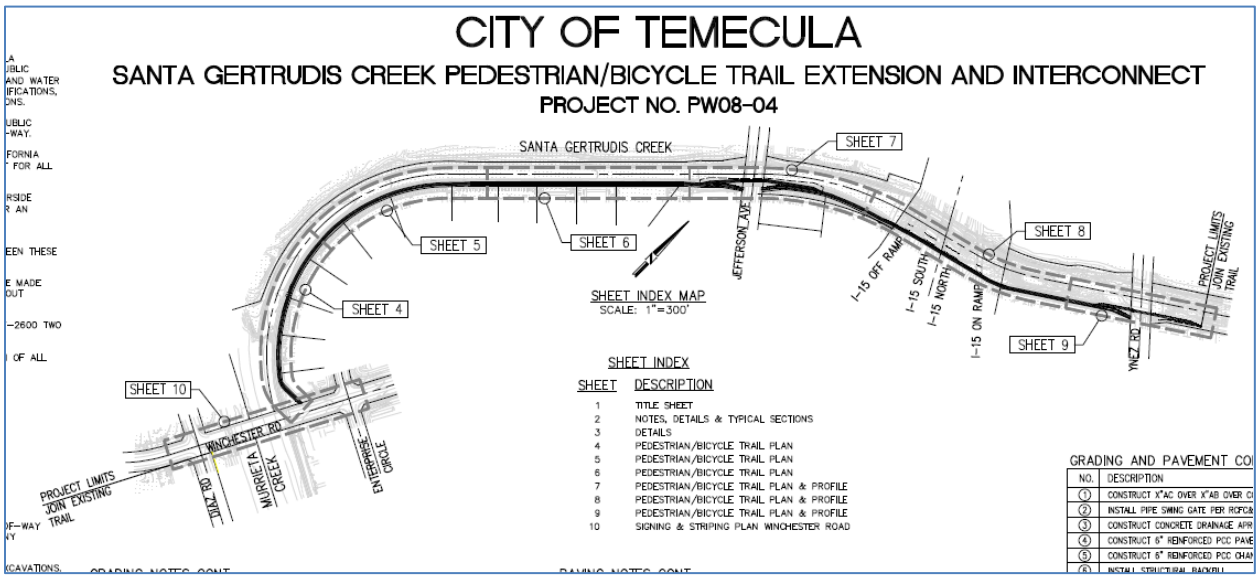


Figure 2. Site Plan[5] (not to scale)

For the hydraulic analysis, the 100-year peak flow is simulated for the purpose of determining the implementation of the project and resulting water-surface elevations in comparison to the existing condition. The channel and bridges were modeled using the HEC-RAS hydraulic program. The physical configuration of the bridges crossing is based on the as-built bridge plans and topographic maps. In general, the roughness coefficients for the concrete-lined and soft-bottom channels were modeled as 0.030 and 0.013, respectively, and 0.050 for the natural overbank. The contraction and expansion coefficients for unconstricted sections are 0.1 and 0.3, respectively, and 0.3 and 0.5 for constricted sections (e.g., bridge crossings), respectively.

The channel slope is relatively uniform except at the bridge sections and check dam, located just downstream of the I-15 southbound off-ramp to Winchester Road. A starting water-surface elevation of 1023.0, based on the FIRM base flood elevation (BFE) at the confluence with Murrieta Creek, is simulated to establish the downstream boundary. This downstream boundary condition is slightly higher than the 1020.4 water-surface used in the channel design.[6] Sensitivity analyses revealed that the difference in water-surface elevations is limited to the most downstream hydraulic section.

---

5 *Santa Gertrudis Creek Pedestrian/Bicycle Trail Extension and Interconnect*, Design Plans, City of Temecula Department of Public Works, prepared by David Evans and Associates, Inc., 2018.

6 *Murrieta Area A.D.P. Murrieta Creek and Santa Gertrudis Channel, P.M. 19582-2*, Riverside County Flood Control and Water Conservation District, October 1987.

The hydraulic models universally simulate low flows using the energy equation option. The bridge modeling approach for high flows is pressure flow and/or the weir analogy, as opposed to the default energy equation method.

There is no designated special flood hazard area (SFHA), i.e., floodplain or floodway, as defined by the Federal Emergency Management Agency (FEMA), as indicated in Figure 3. Flood Insurance Rate Map (FIRM) Panel No. 06065C2720G on which the property is located, designates the Santa Gertrudis Creek floodplain as Zone X (specifically, 1% annual chance flood discharge contained in channel), as depicted in Figure 3.

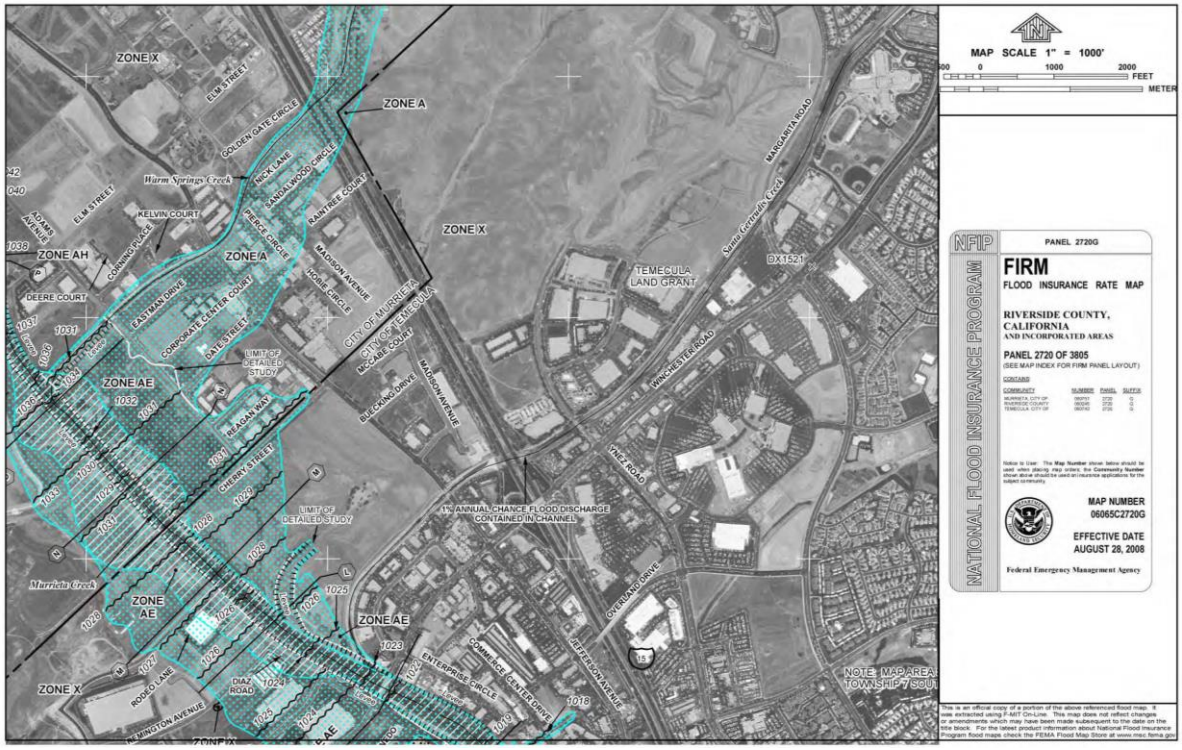


Figure 3. Flood Hazard Areas (source: FEMA)[7]

3.2 Proposed Condition

The post-project, or proposed condition, is the implementation of the pedestrian bike trail, which is situated on the eastern bank of the Santa Gertrudis Creek channel

Future hydraulic conditions

The site plan, shown in the appendix, illustrates the proposed pedestrian bike trail, topography, proposed bridge modifications and the existing flood control channel with minor modifications.

3.3 Hydraulic Modeling Results

We developed existing and proposed condition hydraulic models for the study reach to simulate the implementation of the bike trail and bridge improvements and the effects on hydraulic and scour. The hydraulic models extend from the confluence with Murrieta Creek at the downstream limit and approximately 400 feet upstream of the Ynez Road Bridge at the upstream limit, as depicted in Figure 4.

[7] *Flood Insurance Rate Map (FIRM), Panel No. 06065C2720G*, Federal Emergency Management Agency, August 28, 2008

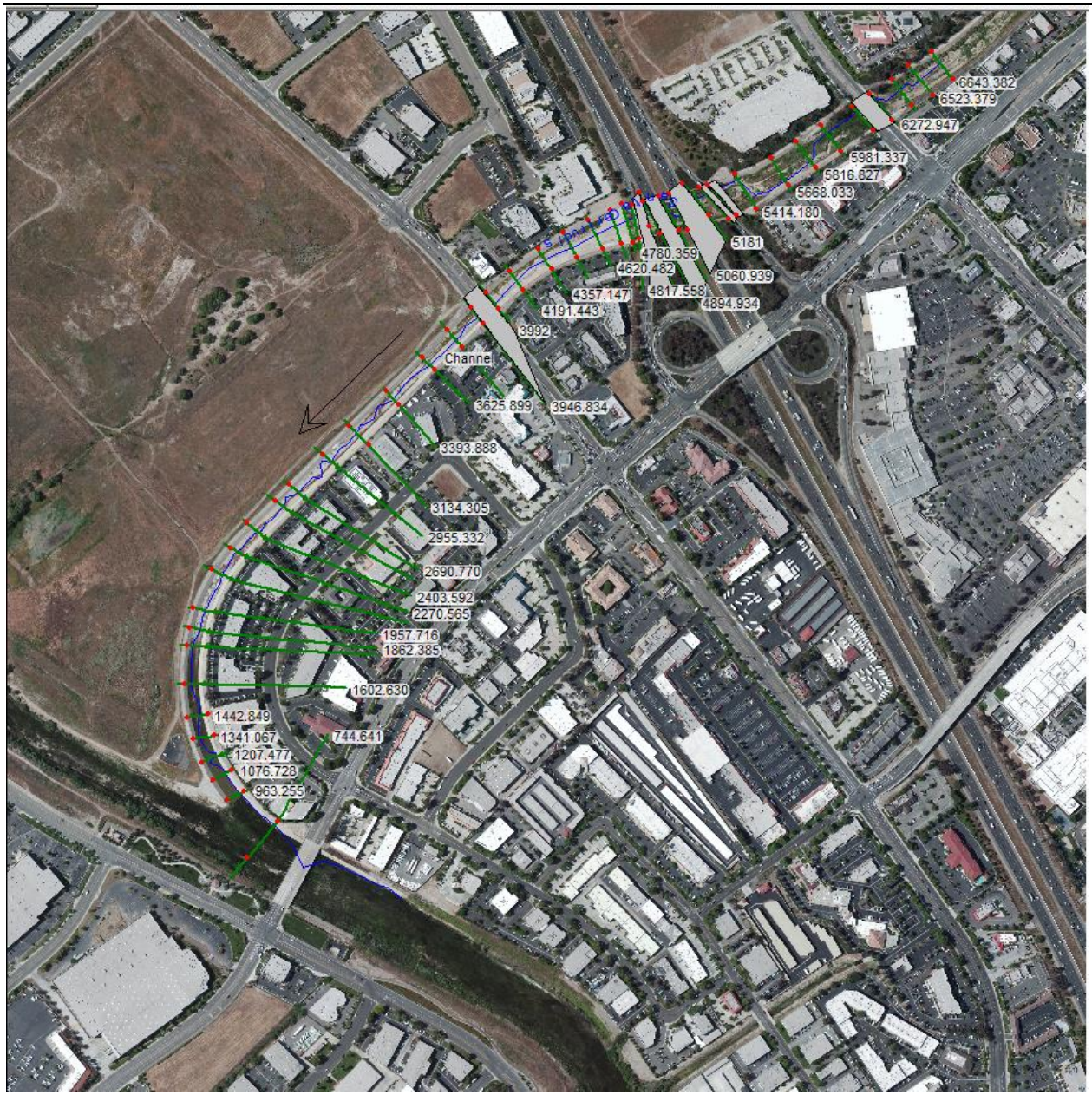


Figure 4. Hydraulic Model Plan View

Using HECRAS, hydraulic models for both scenario were executed for both subcritical and mixed flow regimes. Figures 5 and 6 illustrate the 100-year water-surface profiles for the existing (pre-project) and proposed (post-project) conditions applying mixed and subcritical flow regimes, respectively.

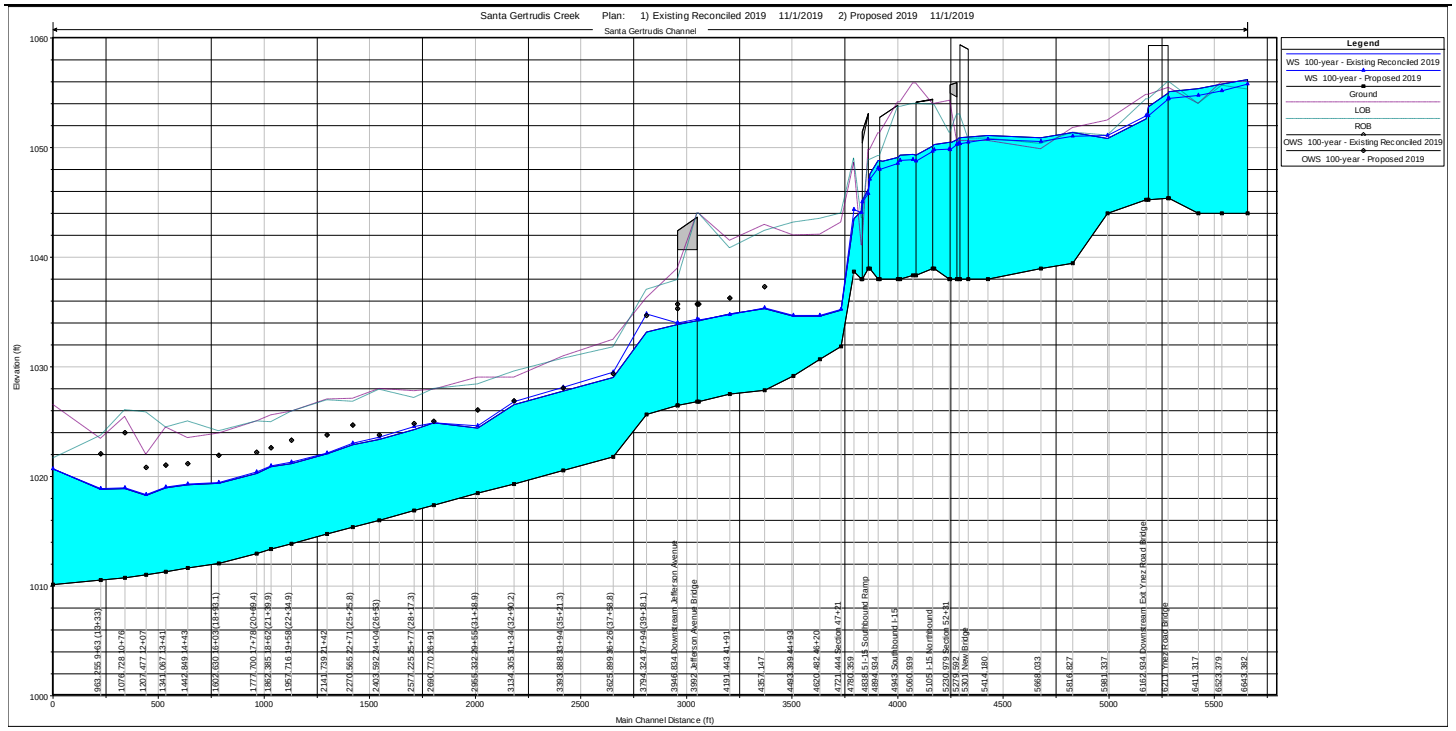


Figure 5. 100-year Water-surface Profile (Mixed Flow Regime)

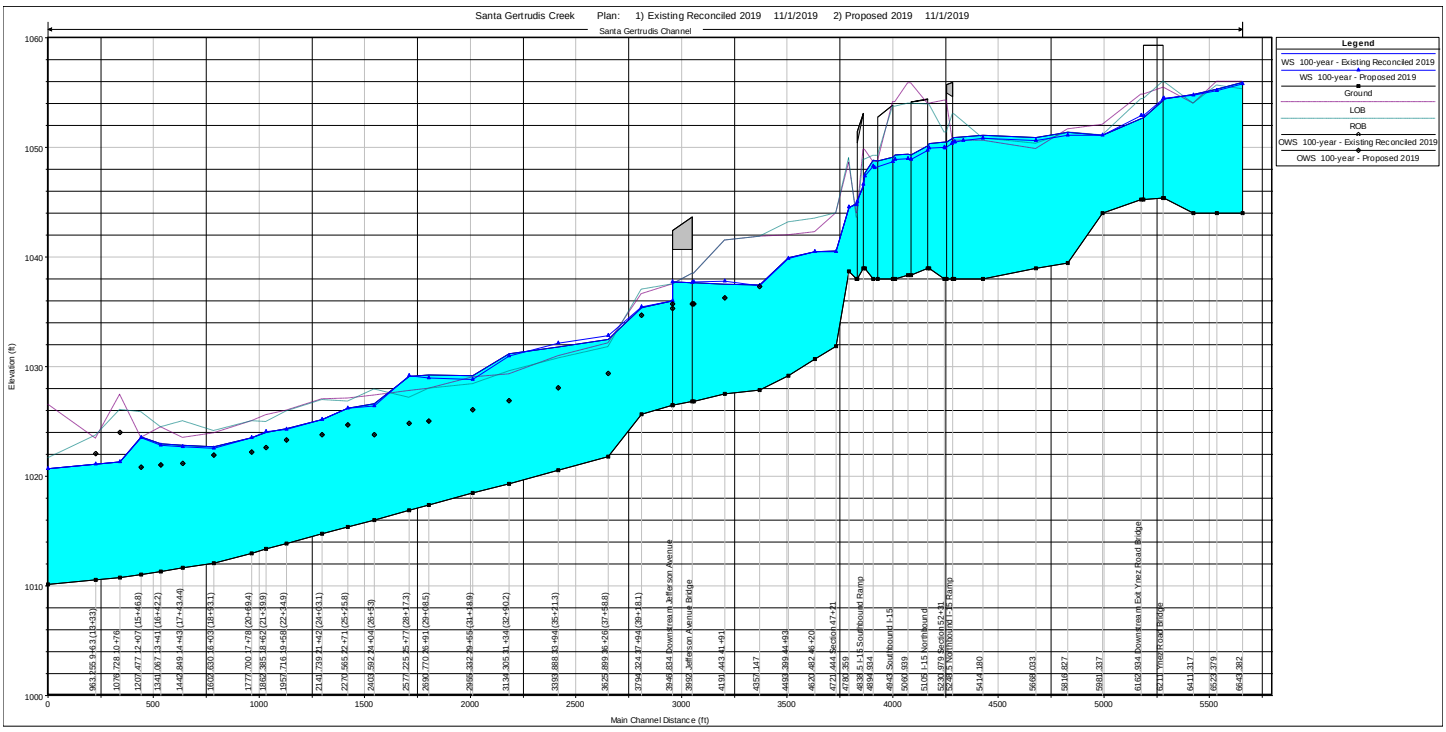


Figure 6. 100-year Water-surface Profile (Subcritical Flow Regime)

For the subcritical regime, which would be used for the purposes of flood hazard mitigation and map changes with the Federal Emergency Management Agency (FEMA), the existing and proposed water-surface are within half a foot with an average difference of less than 0.05 feet for corresponding sections. For the mixed flow, the major differences are in the lower reaches where the proposed condition simulates supercritical flow and hydraulic jumps, which produce slightly higher water-surface elevations downstream of Jefferson Street.

4 SCOUR ANALYSIS

Based on the hydraulic analysis and geotechnical data[8], specifically a particle size distribution (PSD) curve, which is exhibited in the appendix, a scour analysis was performed to estimate the maximum scour at the bridge. The mean particle sizes D_{50}, are 0.59 and 0.14 mm for the channel based on the grab samples taken at the Interstate 15 Bridges just upstream of the check dam. The 0.59 mm size is consistent with prior studies but both sizes were evaluated for sensitivity. The scour estimate is based on both 0.14 and 0.59 mm. Table 1 summarizes the scour analysis performed using the HEC-RAS bridge scour application, which employs the nationwide methodology of evaluating scour at bridges (HEC-18).[i]

Total scour is the summation its three components:

1. Long-term aggradation and degradation (natural process)
2. Contraction scour at bridge sections
3. Local scour at piers and abutments

The methodology applied for computing contraction scour is Laursen's live bed contraction scour equations below. The input variables and results are shown in Table 2.

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{\frac{6}{7}} \left(\frac{W_1}{W_2}\right)^{k_1}$$

$$y_s = y_2 - y_o \ (average\ contraction\ scour)$$

where:

y_s = Average contraction scour depth, ft
y_1 = Average depth in the upstream main channel, ft
y_2 = Average depth in the contracted section, ft
y_o = Existing depth in the contracted section before scour, ft
Q_1 = Flow in the upstream channel transporting sediment, ft^3/s
Q_2 = Flow in the contracted channel, ft^3/s
W_1 = Width of the upstream main channel transporting bed material, ft
W_2 = Width of the contracted channel less pier width(s), ft
k_1 = Exponent determined below

V*/ω	k_1	Mode of Bed Material Transport
<0.05	0.59	Mostly contact bed material discharge
0.05 to 2.0	0.64	Some suspended material discharge
>2.0	0.69	Mostly suspended bed material discharge

Local pier scour was computed using the recommended CSU Scour Equation:

$$\frac{y_s}{a} = 2.0 K_1 K_2 K_3 \left(\frac{y_1}{a}\right)^{0.35} Fr_1^{0.43}$$

where:

K_1= Correction factor for pier nose shape
K_2= Correction factor for angle of attack of flow

[8] *Grain Size Distribution Santa Gertrudis Creek Pedestrian/Bicycle Trail from Ynez Road to Diaz Road,* Temecula, California, performed by GeoCon, January 2014

K_3= Correction factor for bed condition
a = Pier width, ft
L= Length of pier, ft
Fr_1= Froude Number directly upstream of the pier, ft/s
V_1= Mean velocity of flow directly upstream of the pier, ft/s
g = Acceleration of gravity (32.2 ft/s^2)

The last component of scour is the long-term scour, or aggradation/degradation, which is a subjective quantity. A quantitative assessment would be based on observed channel surface measurements or a long duration sediment transport model. However, if this information is not available, a qualitative assessment must be made to determine if there is a measurable and significant long-term scour component. It has been cited that a sediment transport analysis was performed and concluded that degradation is not significant.

The detailed scour results are presented in the appendix.

5 SUMMARY AND CONCLUSIONS

Table 3 summarizes hydraulic and scour results. The complete results are presented in the appendix. The maximum scour represents the cumulative scour depth of contraction and local. i.e., pier and abutment, scour. As can be seen, the highest scour depths occur at the I-15 Southbound Ramp, which is at the deep deposits just upstream of the check dam and at Ynez Road. In both cases, the existing deposits are deeper than the maximum scour depths.

Table 2. Summary of Hydraulic and Scour Results (Post-Project)

River Station	Bridge	Water-Surface Elevation (Upstream)	Maximum Scour Depth (ft)	Comment / Description
6211	Ynez Road	1054.39	16.43	Left abutment + contraction scour
5301	New/Proposed I-15 Northbound Ramp	1050.68	12.28	Pier scour
5248.5	I-15 Northbound Ramp	1050.44	3.89	Pier + contraction scour
5105	I-15 Northbound	1049.88	11.89	Left abutment + contraction scour
4943	I-15 Southbound	1048.75	16.85	Right abutment + contraction scour
4838.5	I-15 Southbound Ramp	1046.82	16.35	Right abutment + contraction scour
3992	Jefferson Avenue	1042.85	0	Non-erodible surface

APPENDIX

Exhibits, model runs, calculations sheets and other supporting data for this study are provided in the following Appendix.

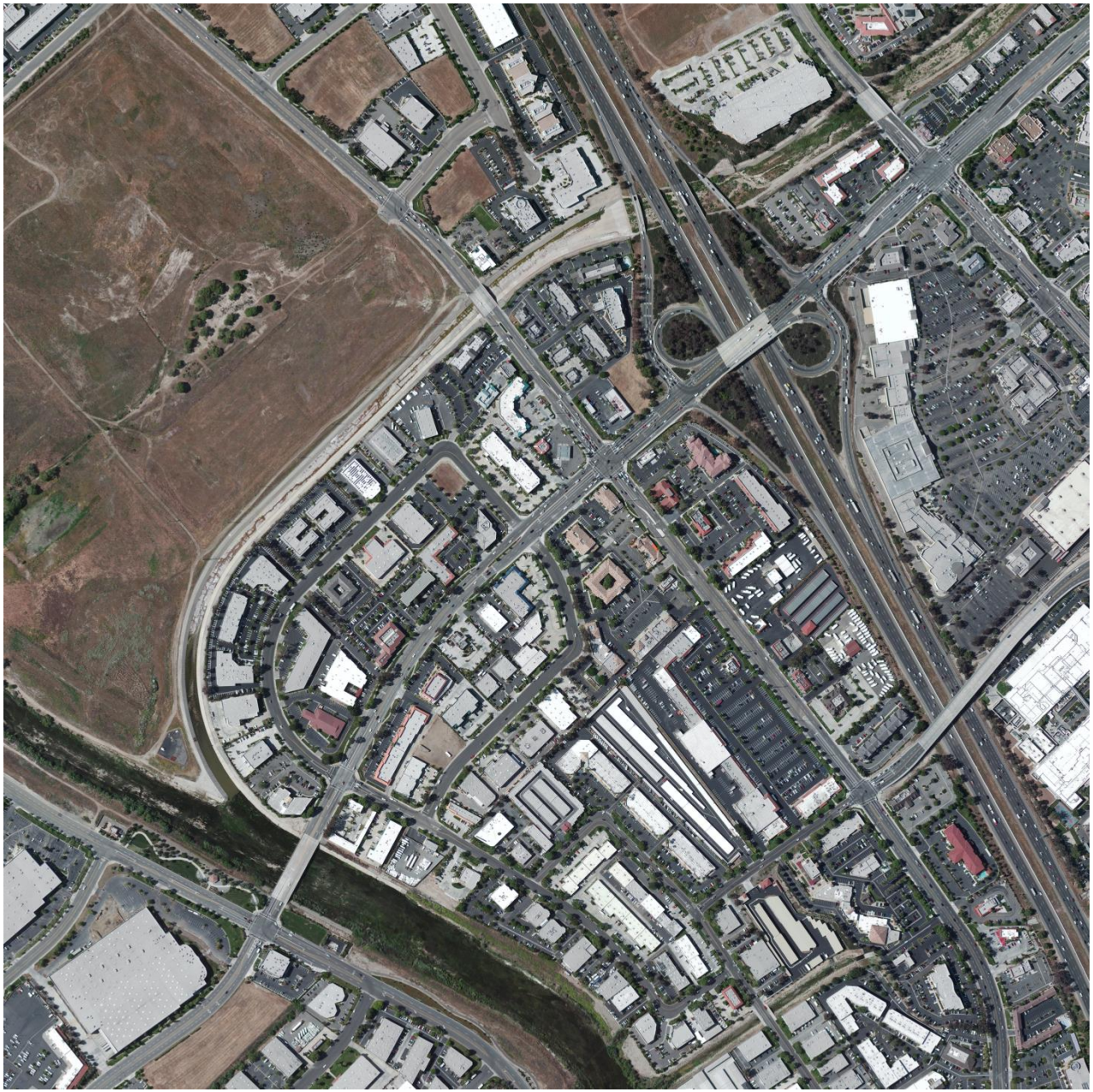
APPENDIX

Exhibits

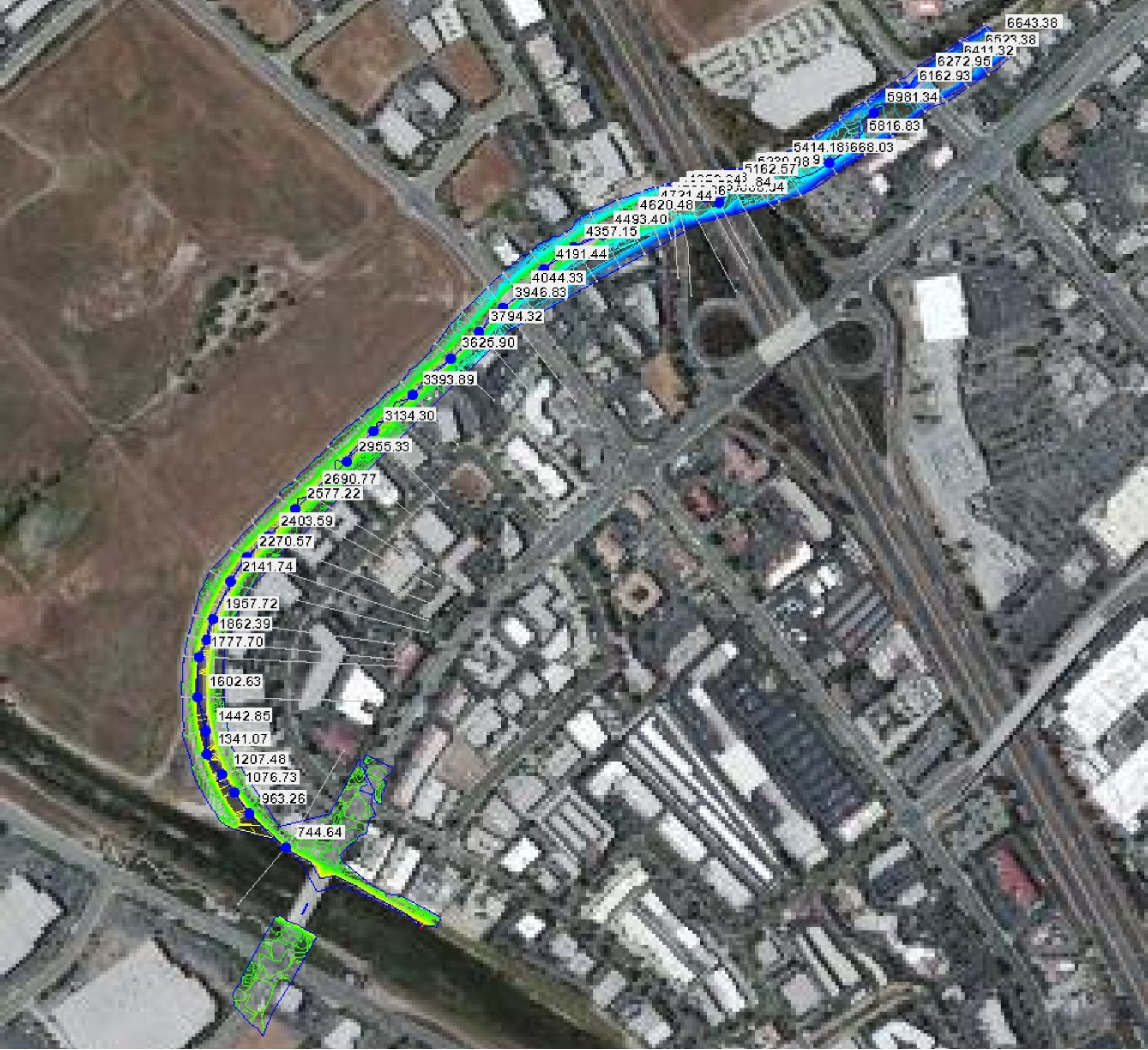
Model Runs

Calculations Sheets

Other Supporting Data



Aerial View of Site (2013)


6643.38
6523.38
6411.32
6272.95
6162.93
5981.34
5816.83
5414.18
5668.03
5162.57
4620.48
4493.40
4357.15
4191.44
4044.33
3946.83
3794.32
3625.90
3393.89
3134.30
2955.33
2690.77
2577.22
2403.59
2270.57
2141.74
1957.72
1862.39
1777.70
1602.63
1442.85
1341.07
1207.48
1076.73
963.26
744.64

NFIP/FEMA Flood Insurance Rate Map (FIRM), Panel No. 06065C2720G (08/28/2008)

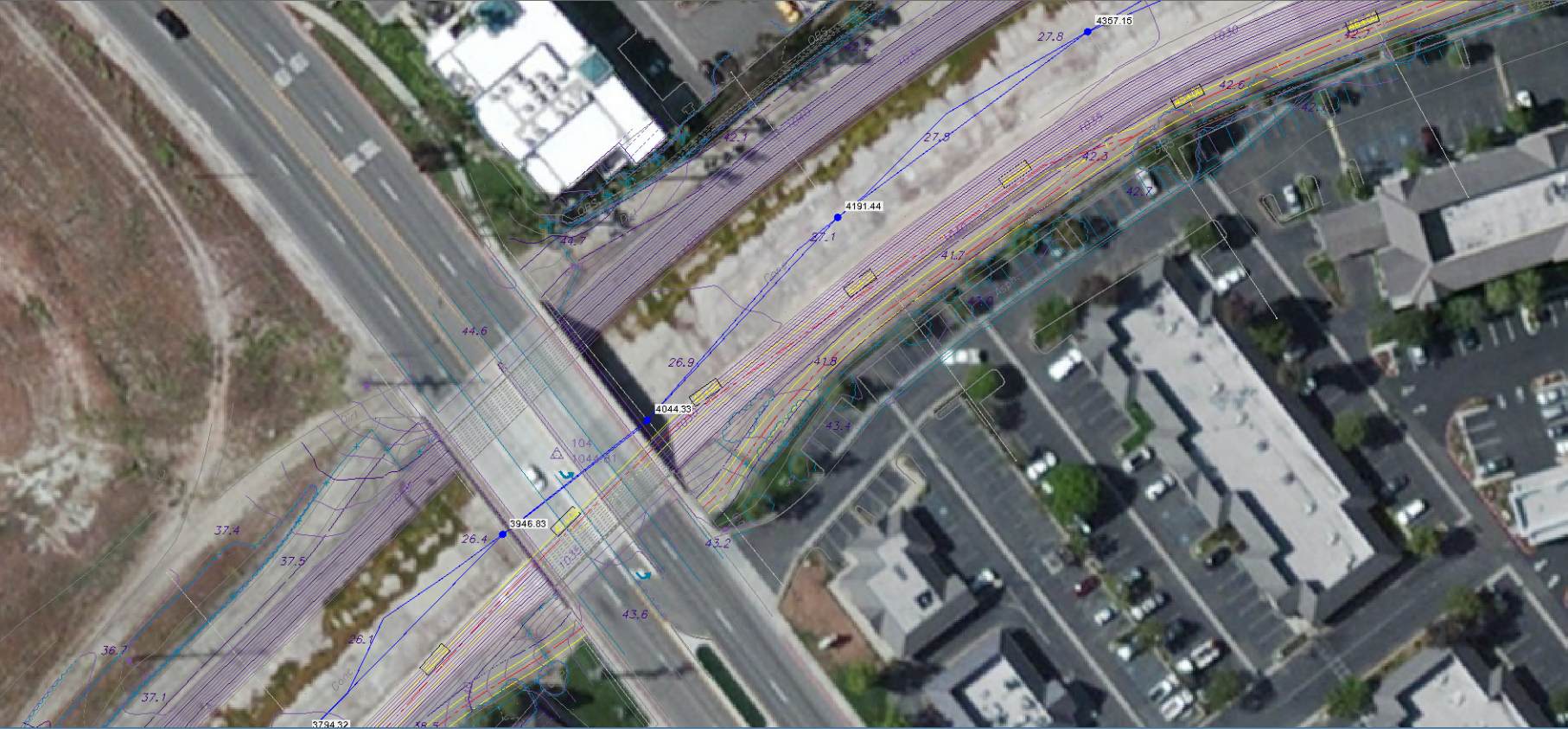
RIVER STATIONING MAPS

Relates hydraulic model stationing to channel and trail stationing

6623.38
6411.32
6272.96
6162.93
5981.34
64.9
45.4
45.2
54.3
44.5
55.2
56.1
52.8
44.3
44.5
62.2
52.7

5816.83
5668.03
5414.18
5279.59
5230.98
53400
1056.84

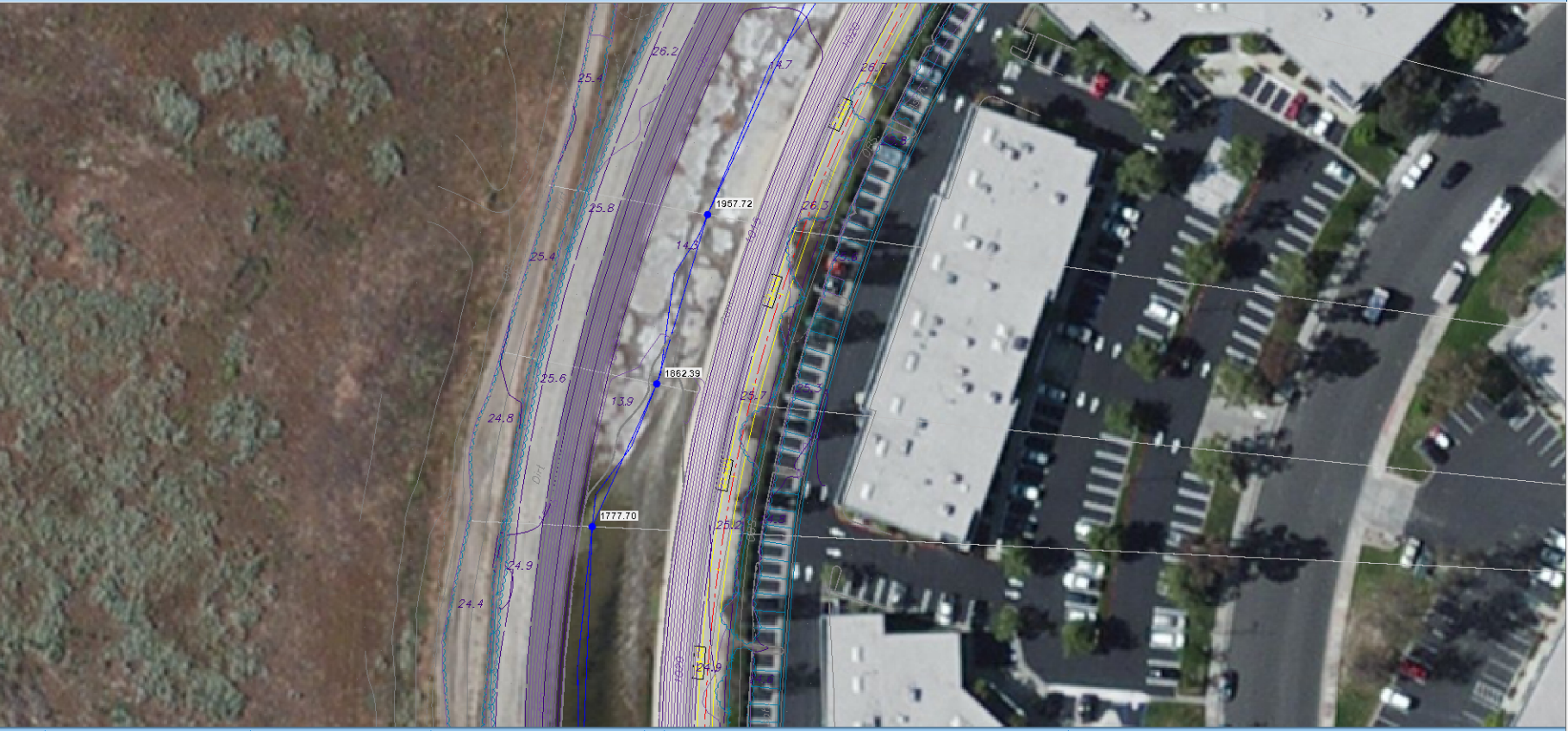
4493.40
4620.48
4721.44
4780.36
4817.56
4856.94
4894.93
4997.84
5060.94
45.5
44.5
43.4
42.8
42.4
28.6
29.6
31.6
39.8
40.0
38.2
37.6
40.6
40.5
38.6
39.7
54.9
42.9
42.7
Conc.
OBS.


4357.15
4191.44
4044.33
3946.83
3794.32
27.8
27.8
27.1
26.9
26.4
26.1
42.6
42.3
42.2
41.7
41.8
43.4
43.2
43.6
44.6
37.4
37.5
36.7
37.1

3625.90
3393.89
34.3
33.6
32.4
22.4
33.3
31.9
21.8
32.6
31.4
32.5
32.0
32.7
32.2
30.9
31.5
32.0
20.8
31.7
30.4
31.1
31.6
20.2
30.6
25.9
37.6

3134.30
2955.33
2690.77
30.0
31.7
29.5
30.8
29.2
30.2
29.4
19.4
29.6
29.2
28.9
30.6
29.3
29.1
28.9
29.8
28.4
28.6
29.4
28.0
28.3
27.8
27.5
28.9

2577.22
2403.69
2270.67
2141.74
28.5
27.3
28.8
27.7
28.5
27.6
28.6
27.4
28.7
26.8
27.8
27.4
Asph.
Dirt


1957.72
1862.39
1777.70
26.2
25.4
25.8
25.4
25.6
24.8
24.9
24.4
14.7
14.3
13.9
26.7
26.5
26.7
26.2
24.9

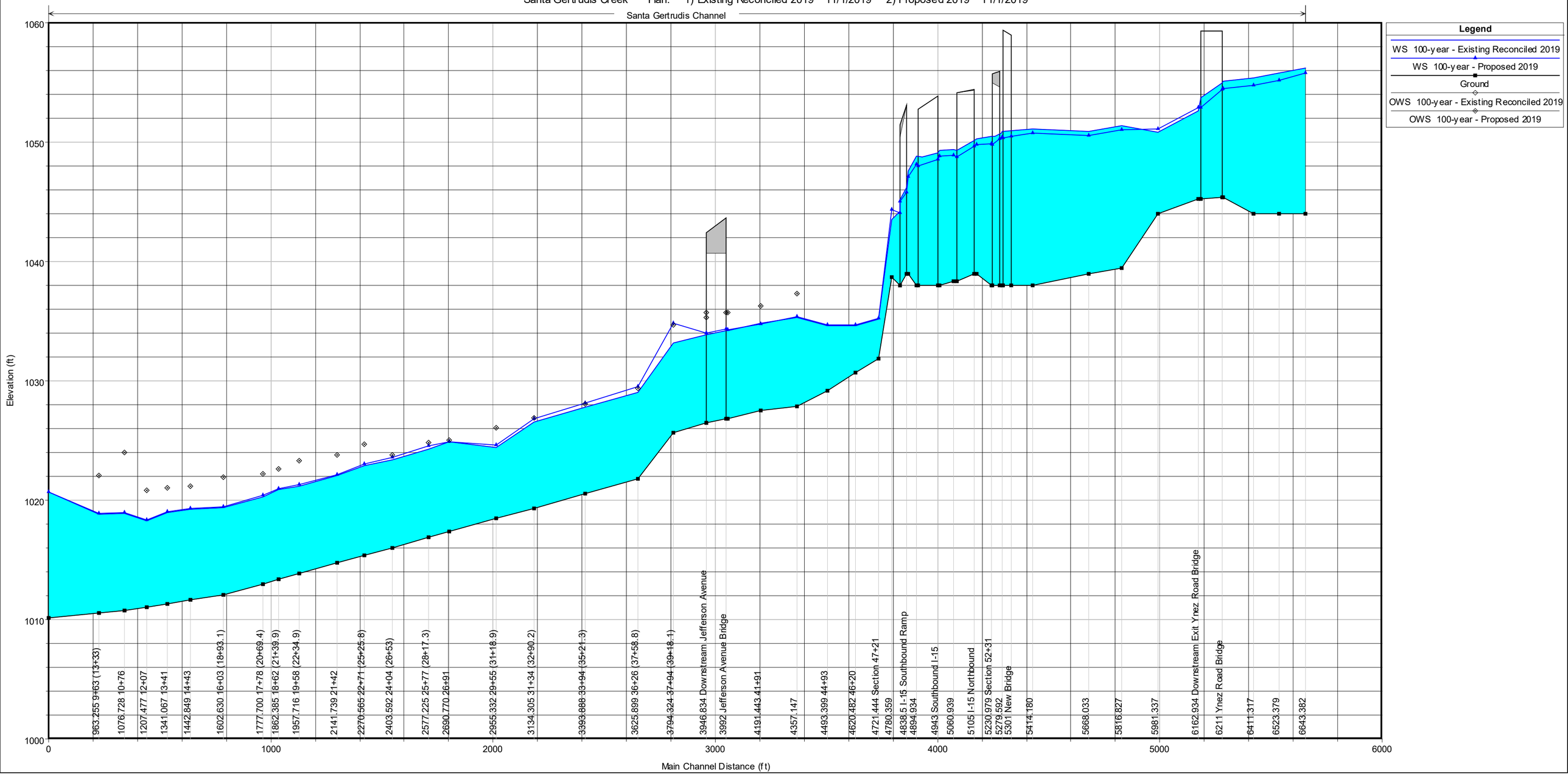
1602.63
1442.85
1341.07
OBS.
24.7
25.1
25.2
24.7
24.5
25.3
25.1
24.3
25.9
25.5
24.3
25.3
23.6
24.2
23.9
Asph.

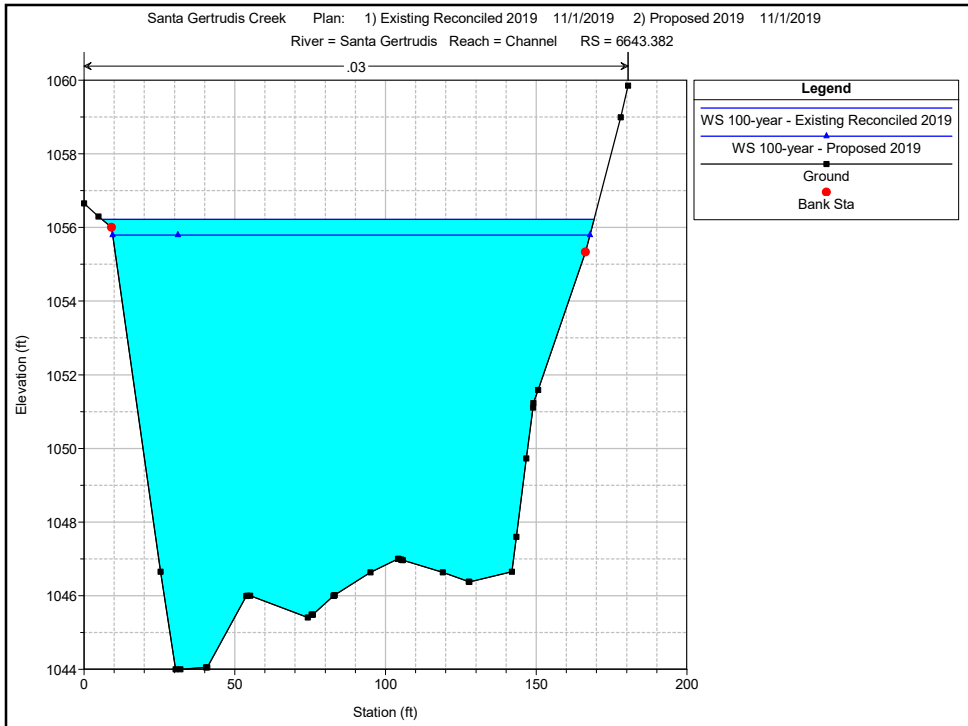
1207.48
1076.73
963.26
744.64
23.4
25.7
24.4
27.4
25.4
27.3
OBS.
Water
Dirt
27.1
27.2
25.3
27.0
26.5
26.6
24.7
27.5
27.5

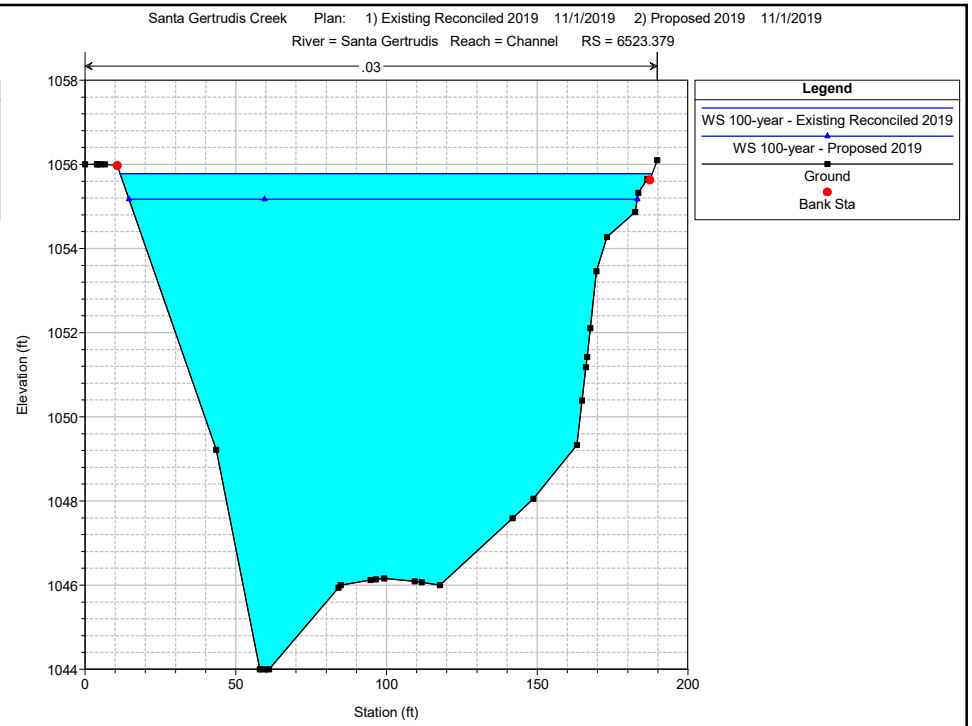
HECRAS PLOTS

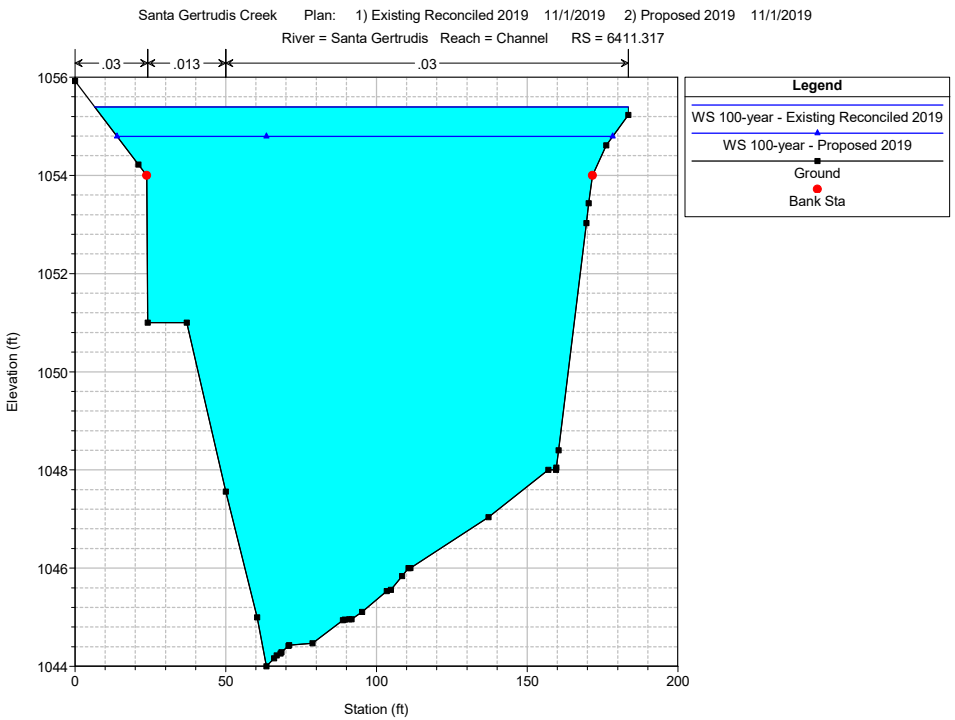
Profiles
Cross-sections

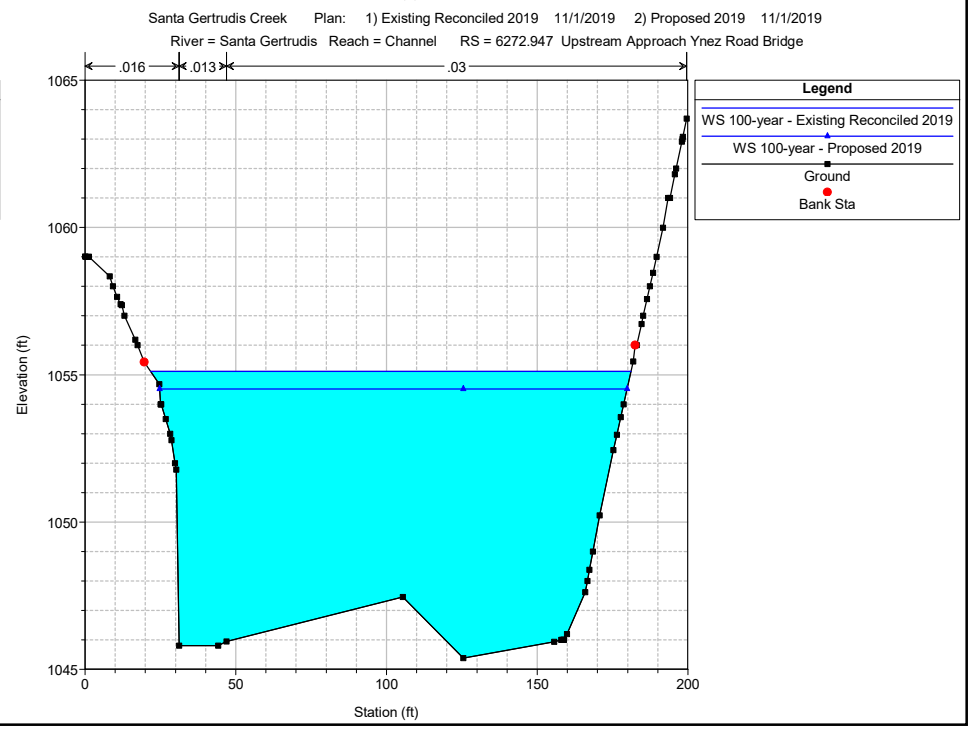
Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019

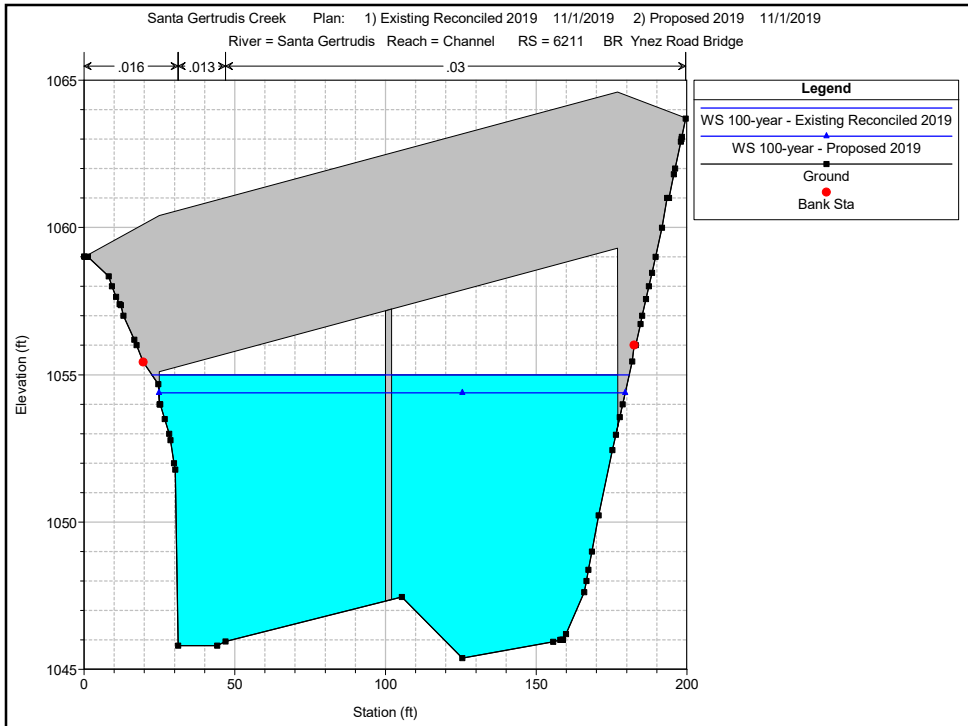


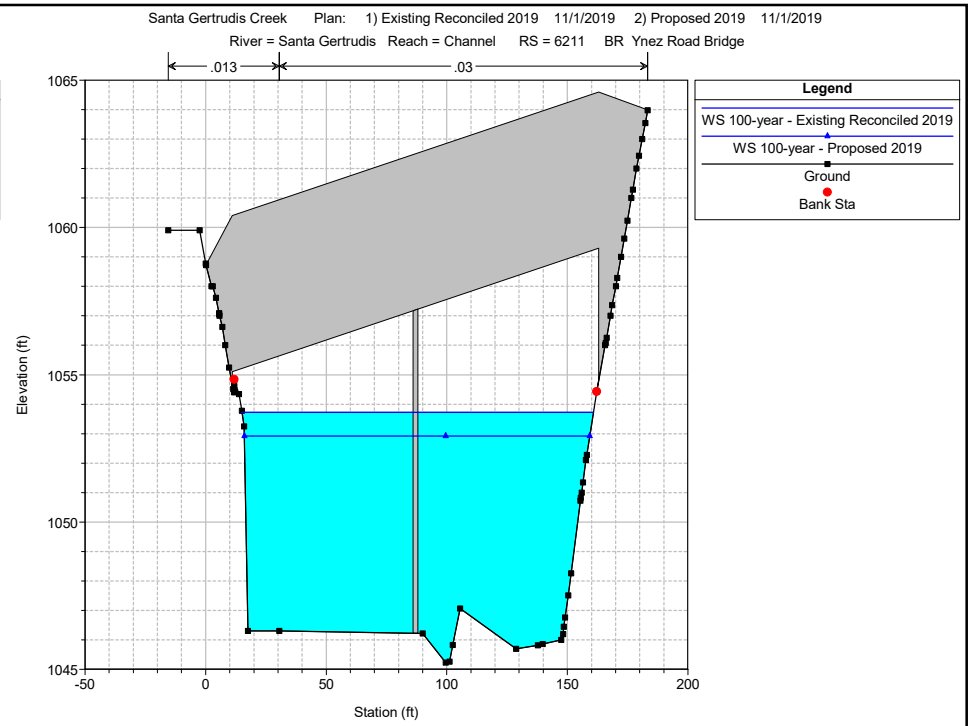

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 6643.382
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

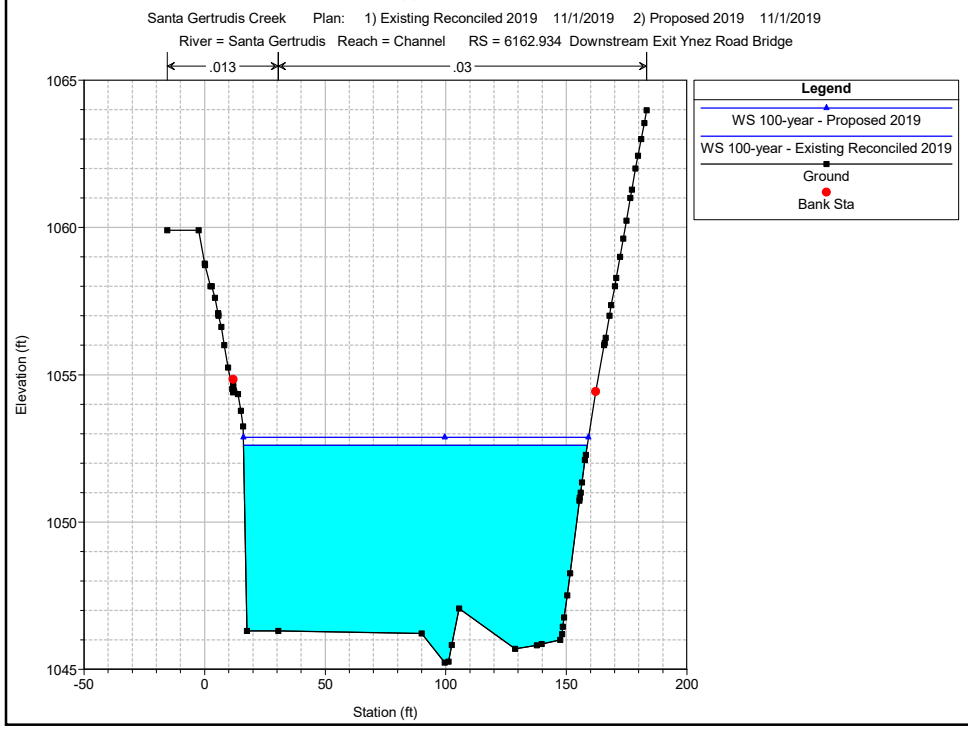

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 6523.379
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

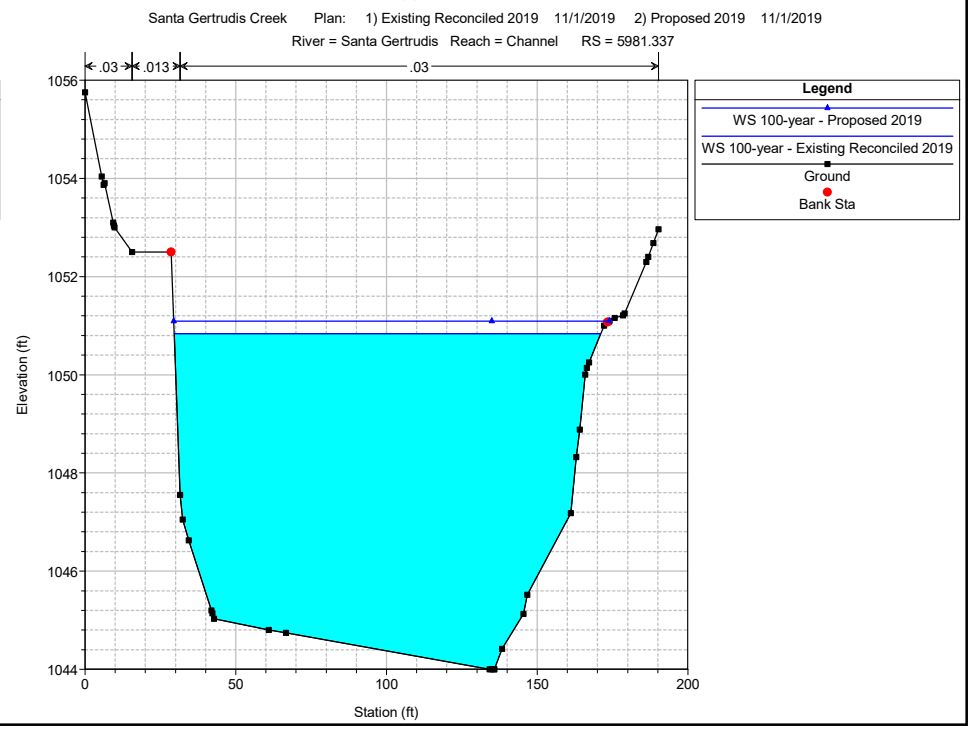

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 6411.317
.03
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

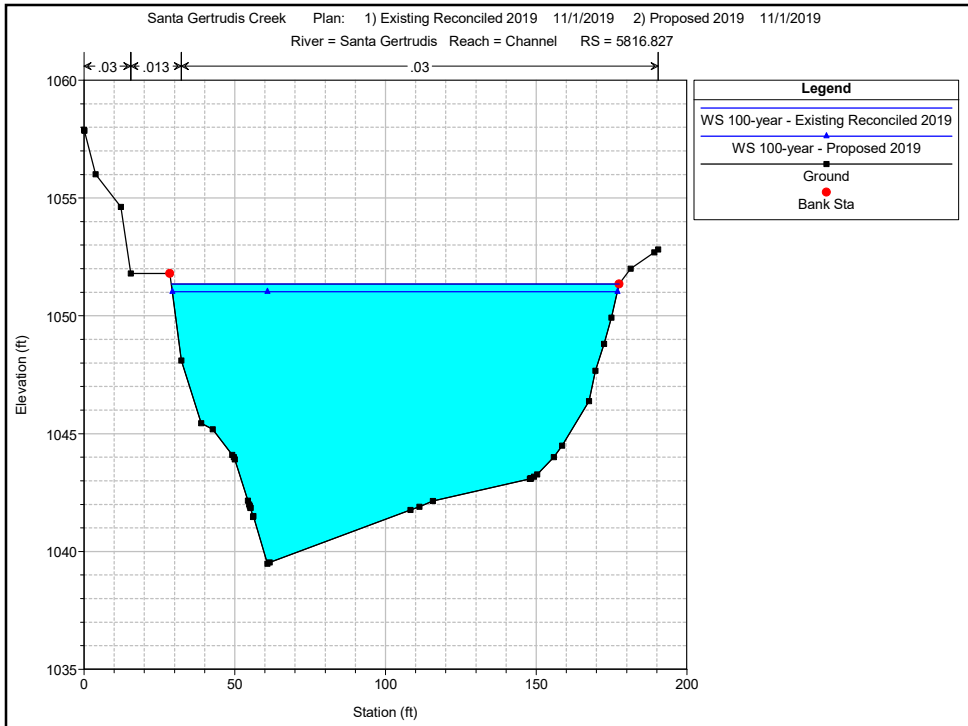

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 6272.947 Upstream Approach Ynez Road Bridge
.016
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

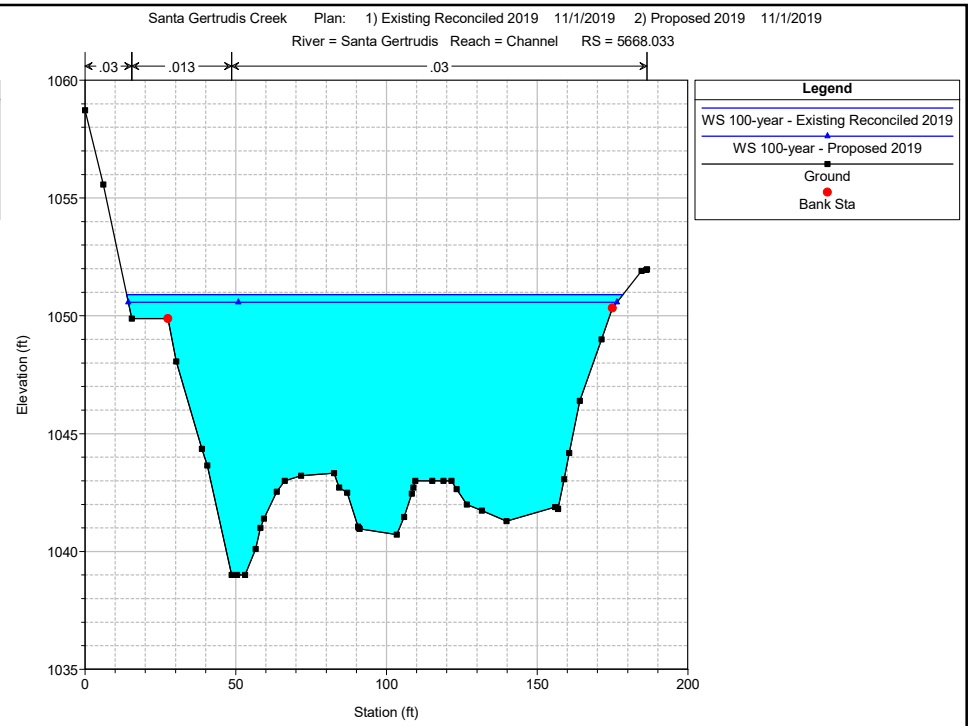

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 6211 BR Ynez Road Bridge
.016
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

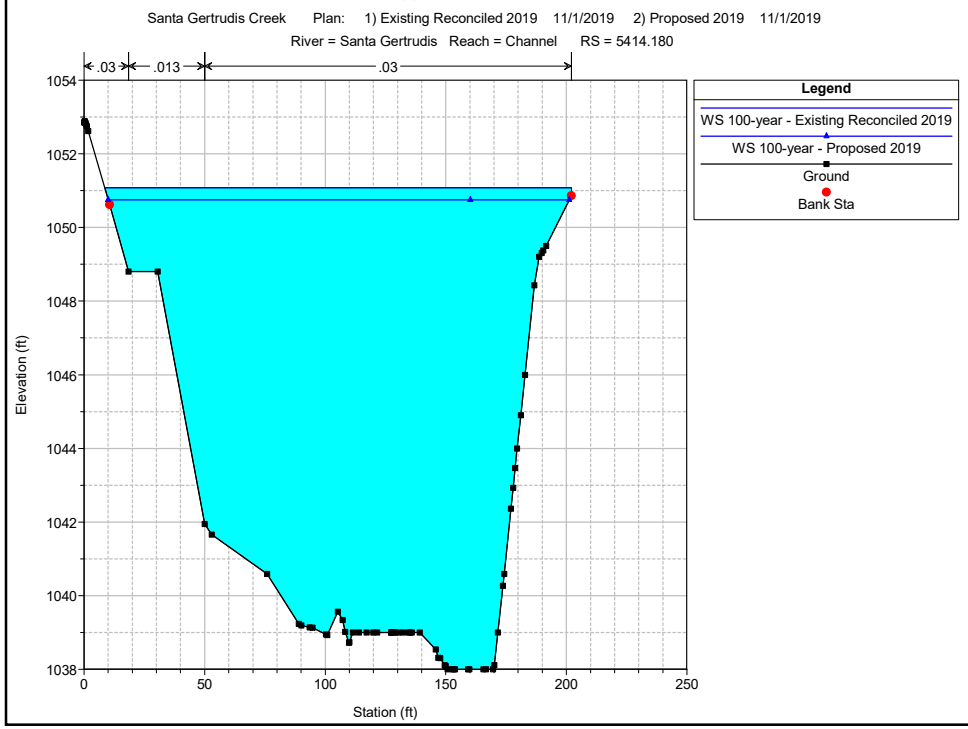

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 6211 BR Ynez Road Bridge
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

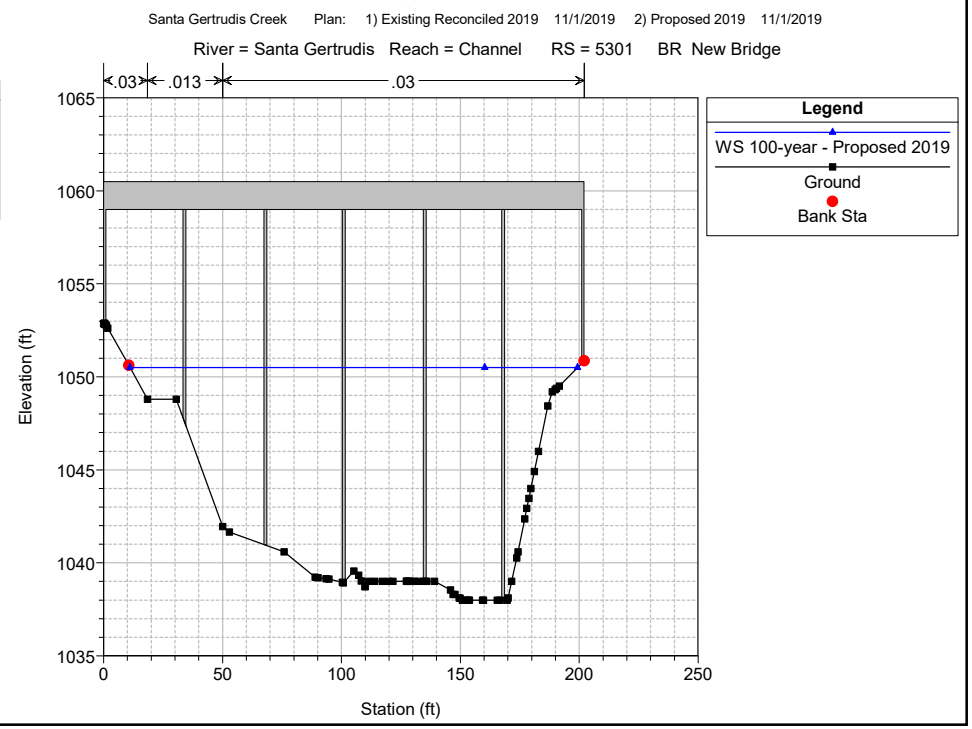

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 6162.934 Downstream Exit Ynez Road Bridge
.013
.03
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

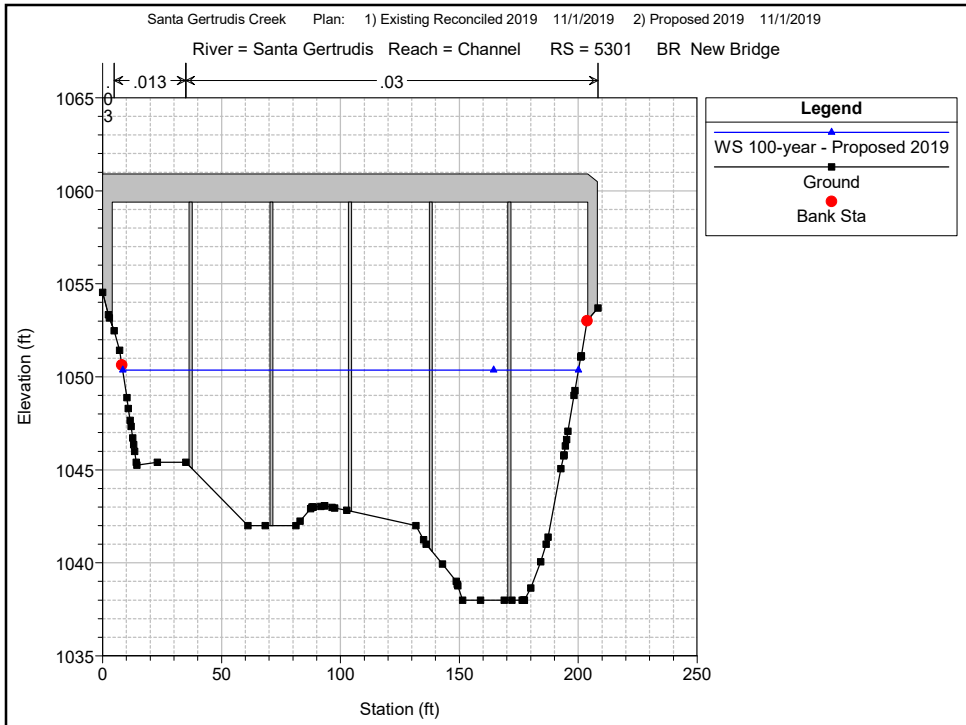

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5981.337
.03
.013
.03
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

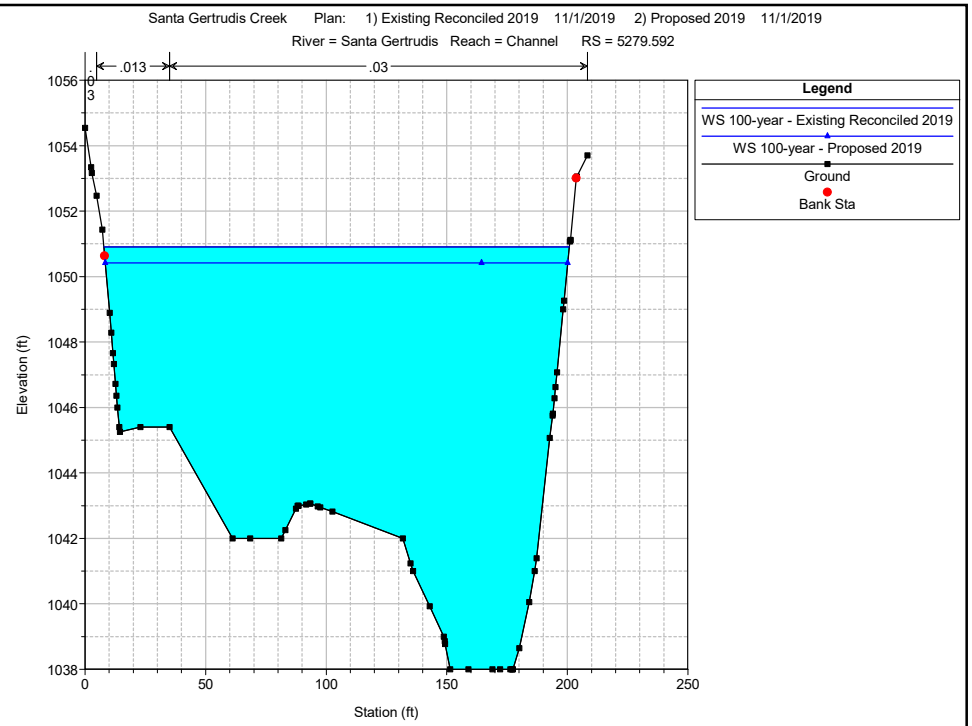

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5816.827
.03
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

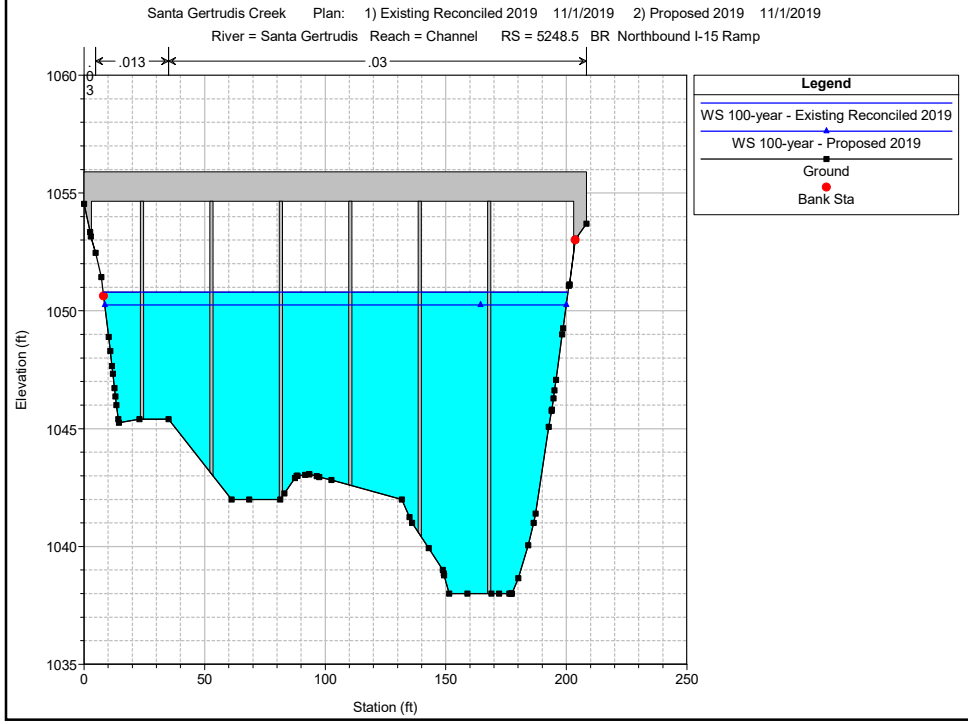

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5668.033
.03
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

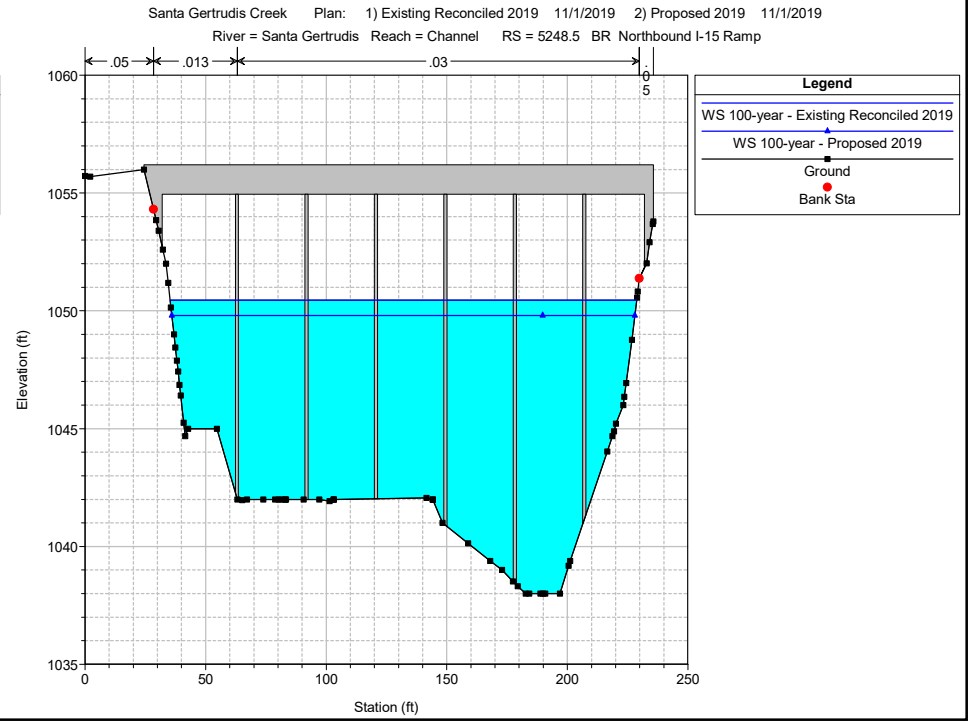

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5414.180
.03
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

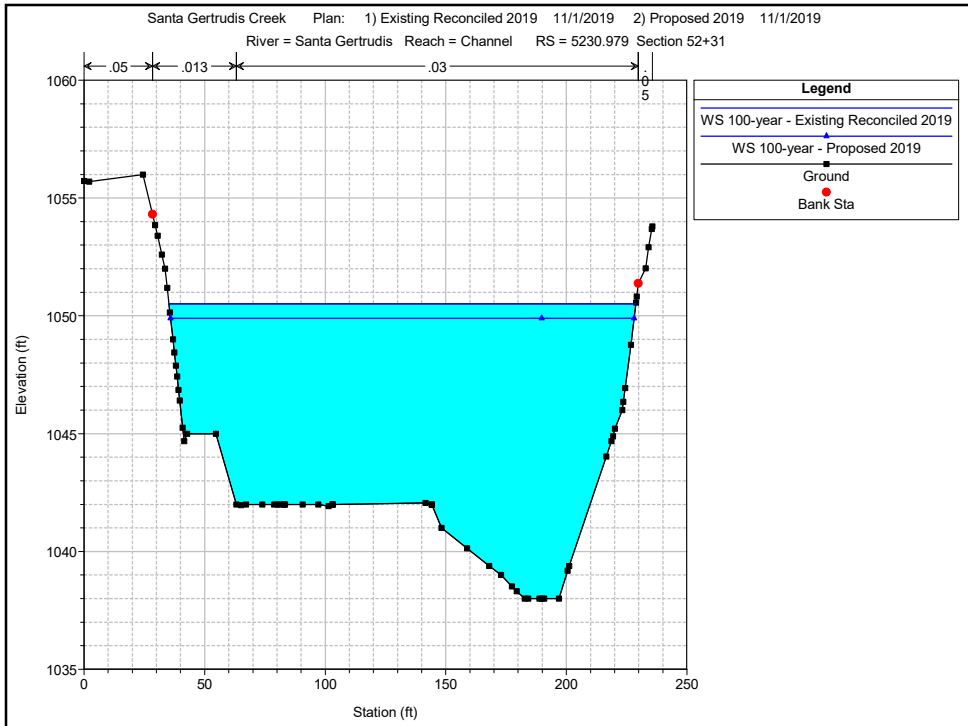

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5301 BR New Bridge
.03
.013
.03
Legend
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

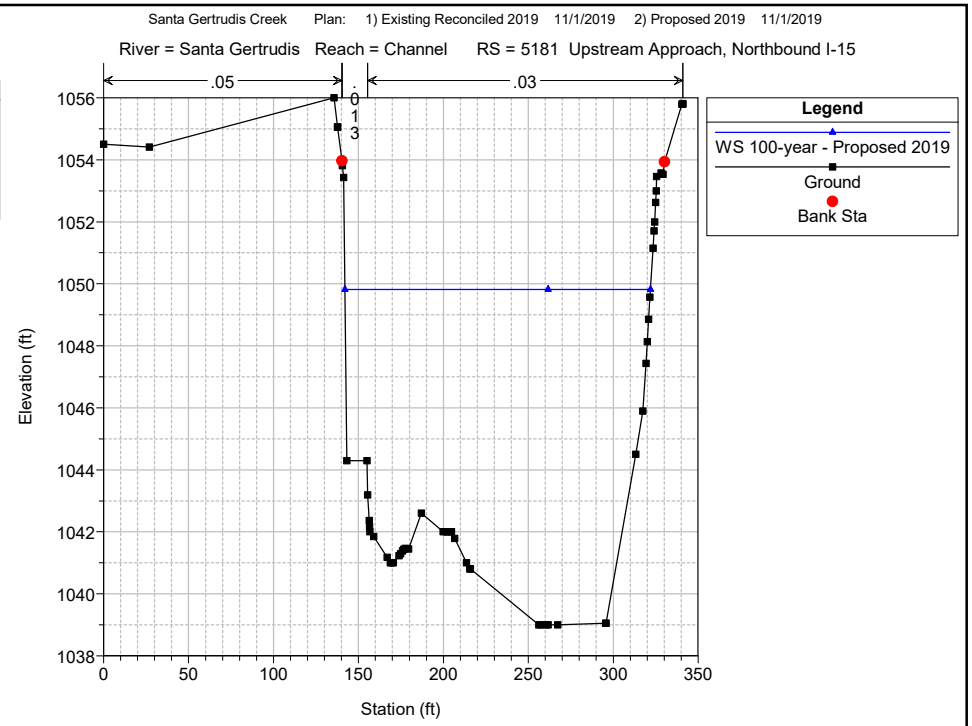

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5301 BR New Bridge
.013
.03
Legend
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

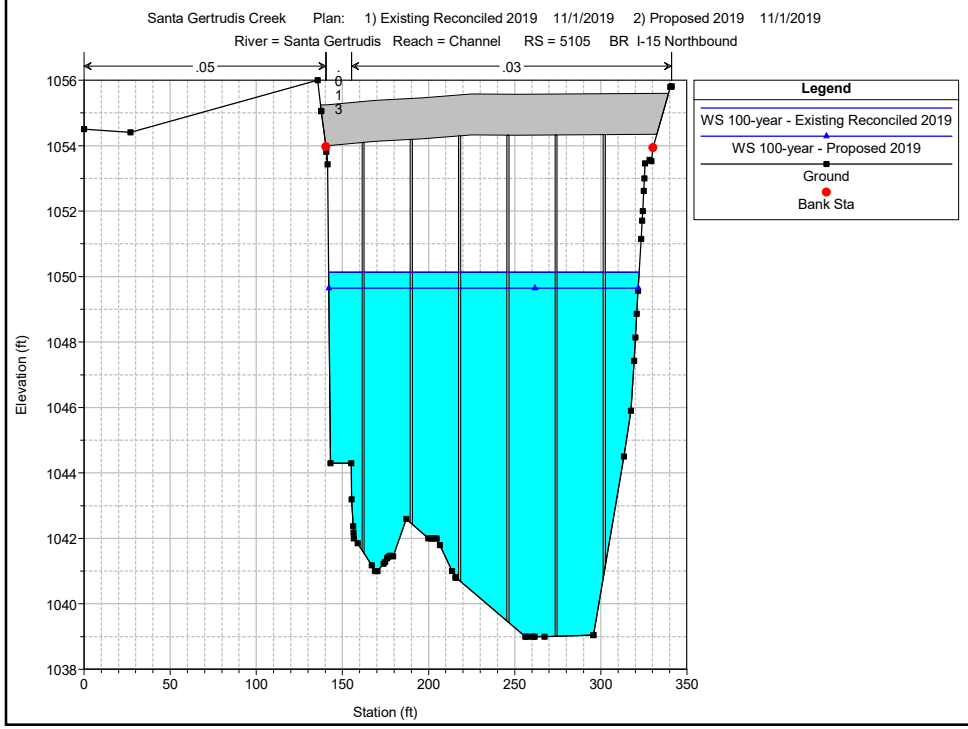

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5279.592
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

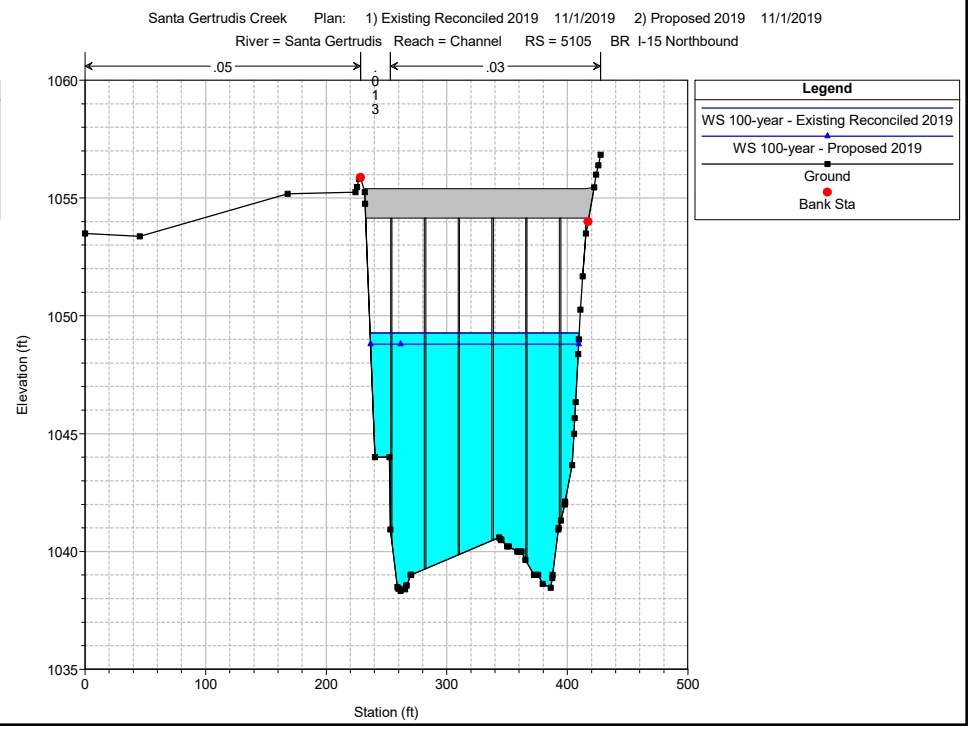

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5248.5 BR Northbound I-15 Ramp
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

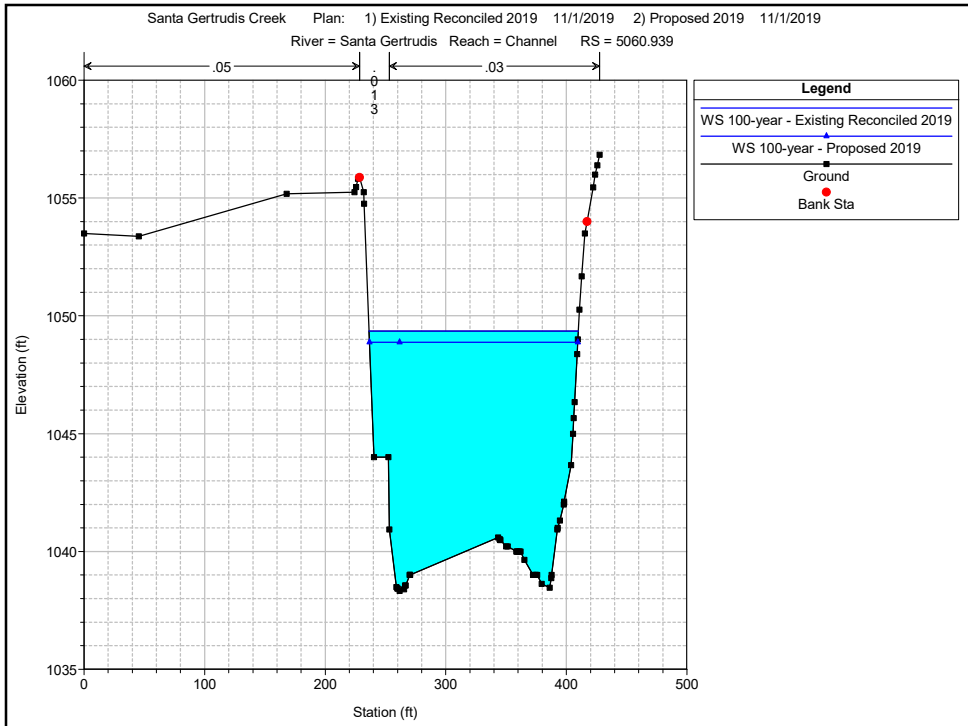

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5248.5 BR Northbound I-15 Ramp
.05
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

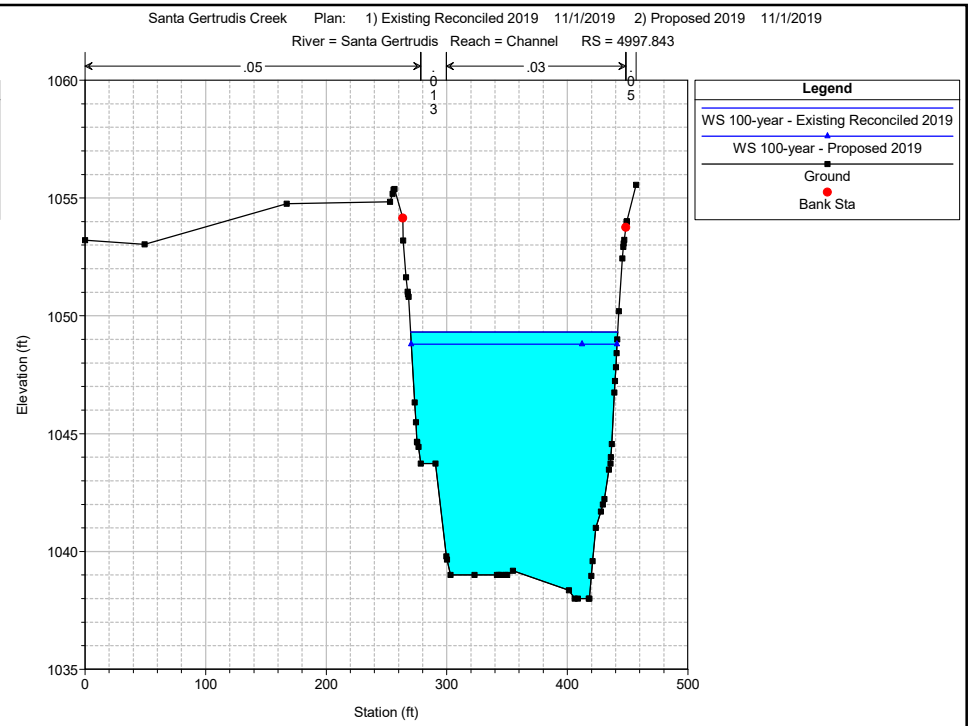

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5230.979 Section 52+31
.05
.013
.03
.05
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

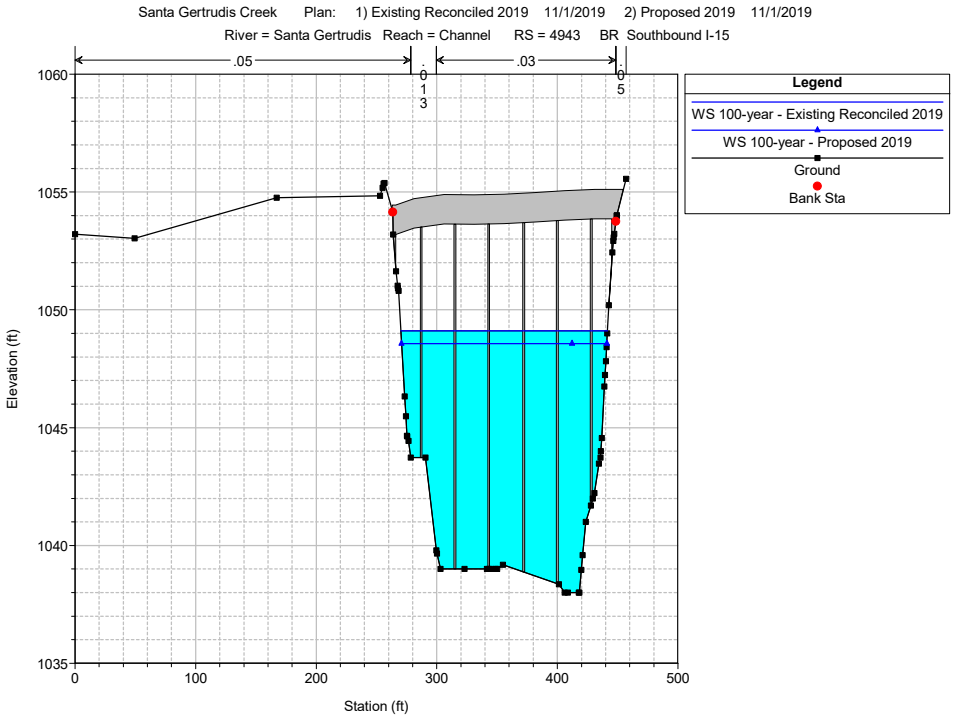

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5181 Upstream Approach, Northbound I-15
.05
.013
.03
Legend
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

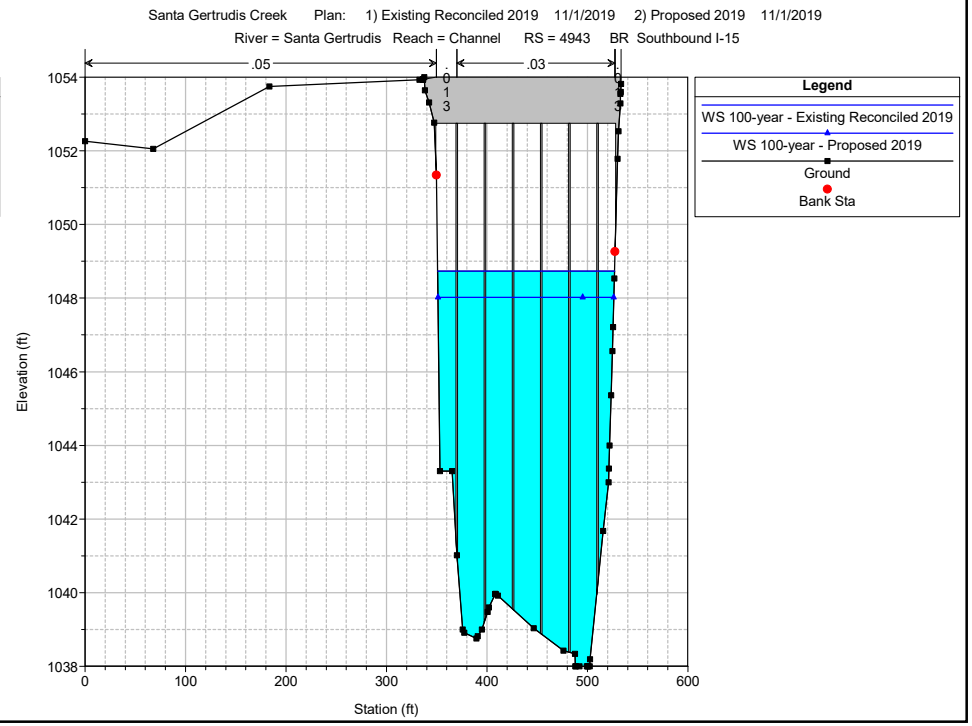

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5105 BR I-15 Northbound
.05
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

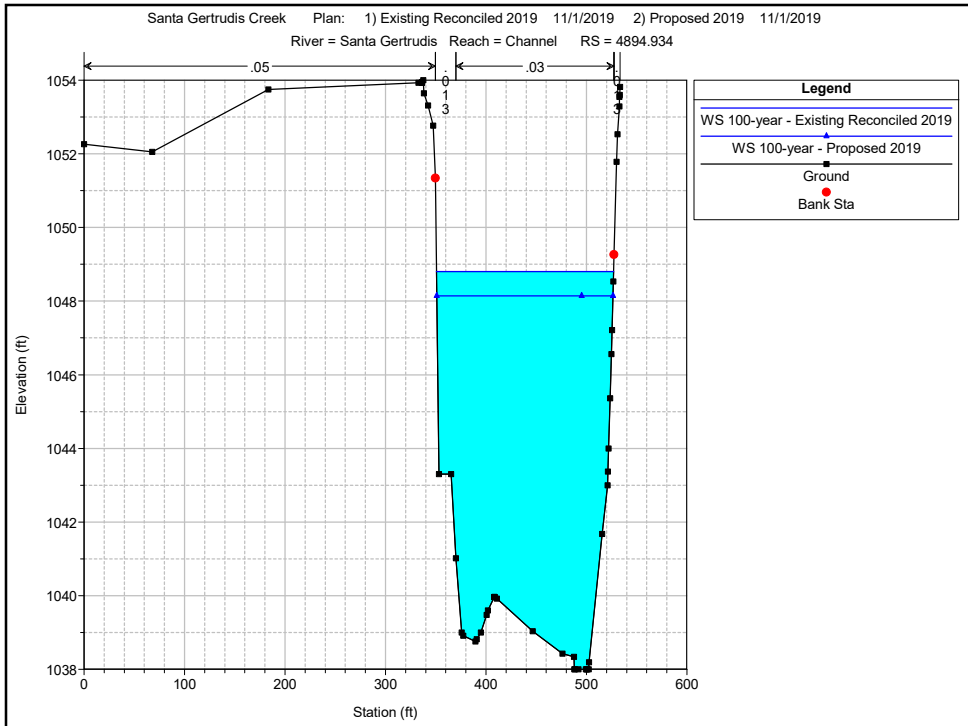

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5105 BR I-15 Northbound
.05
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

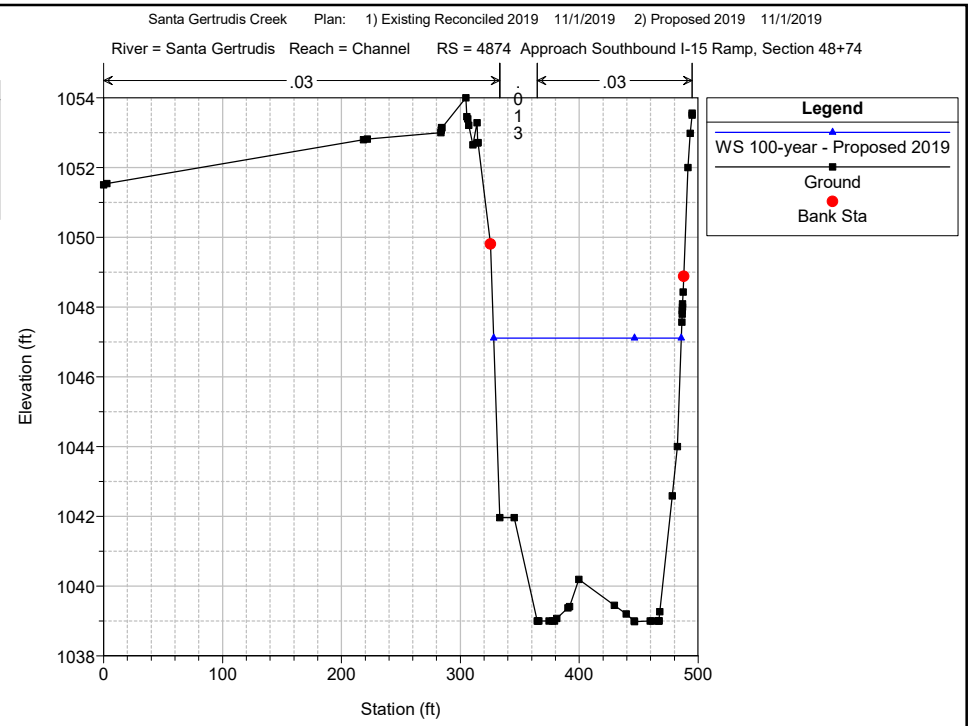

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 5060.939
.05
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

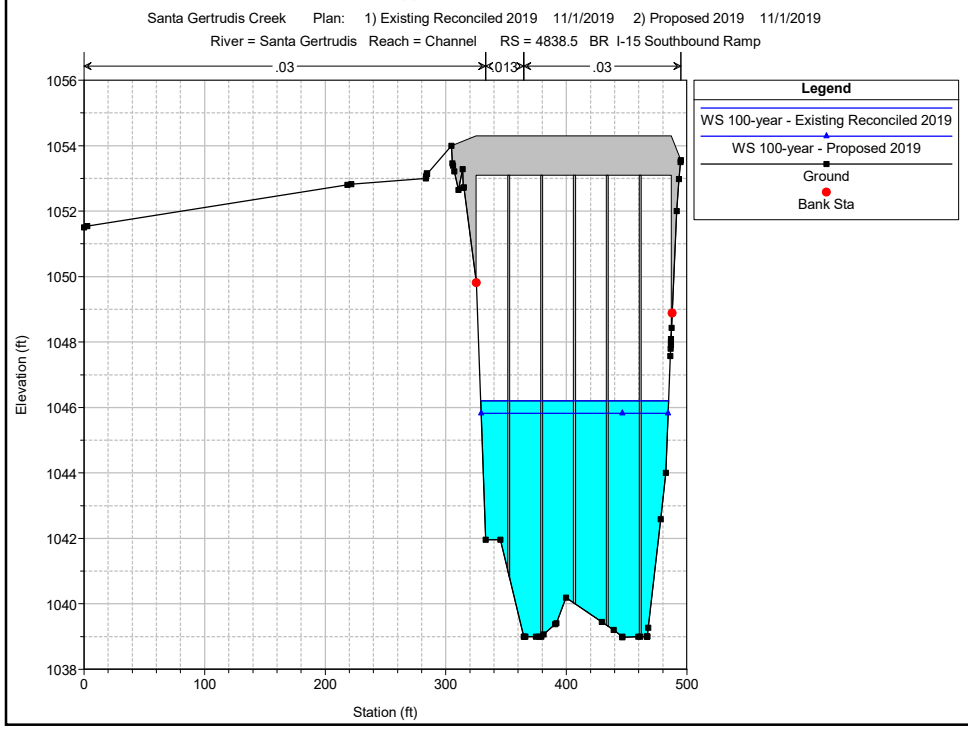

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4997.843
.05
.013
.03
.05
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

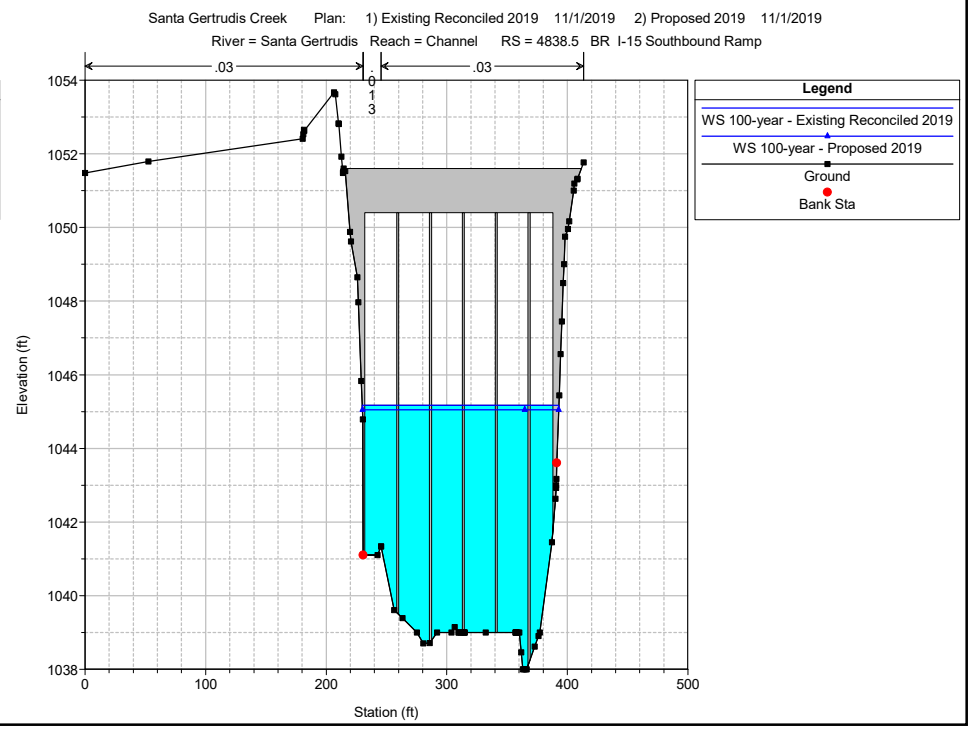

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4943 BR Southbound I-15
.05
.013
.03
.05
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

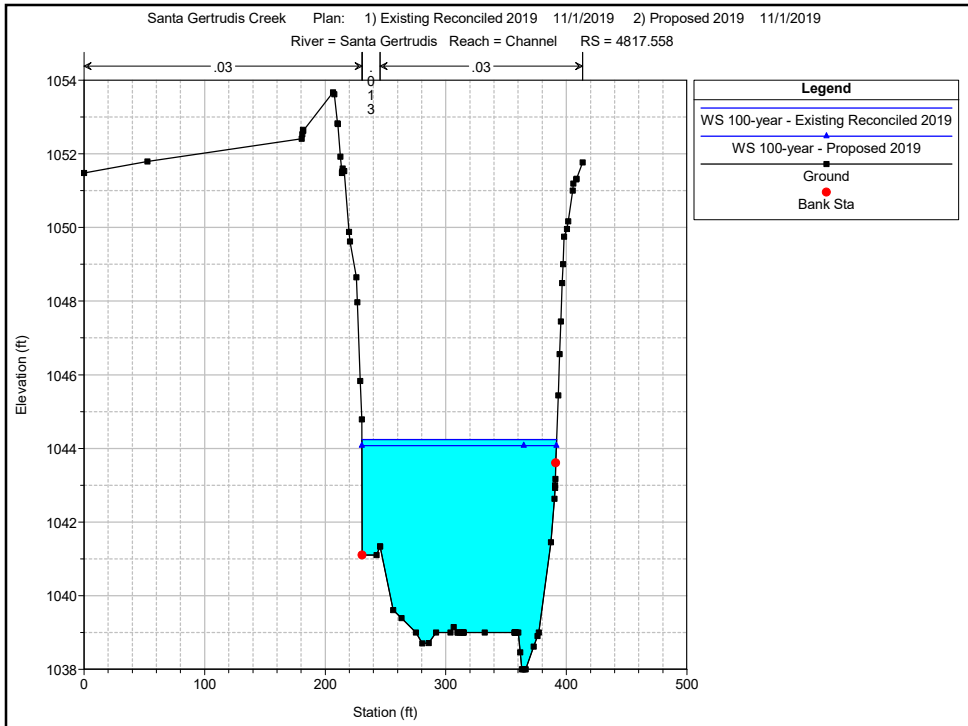

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4943 BR Southbound I-15
.05
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

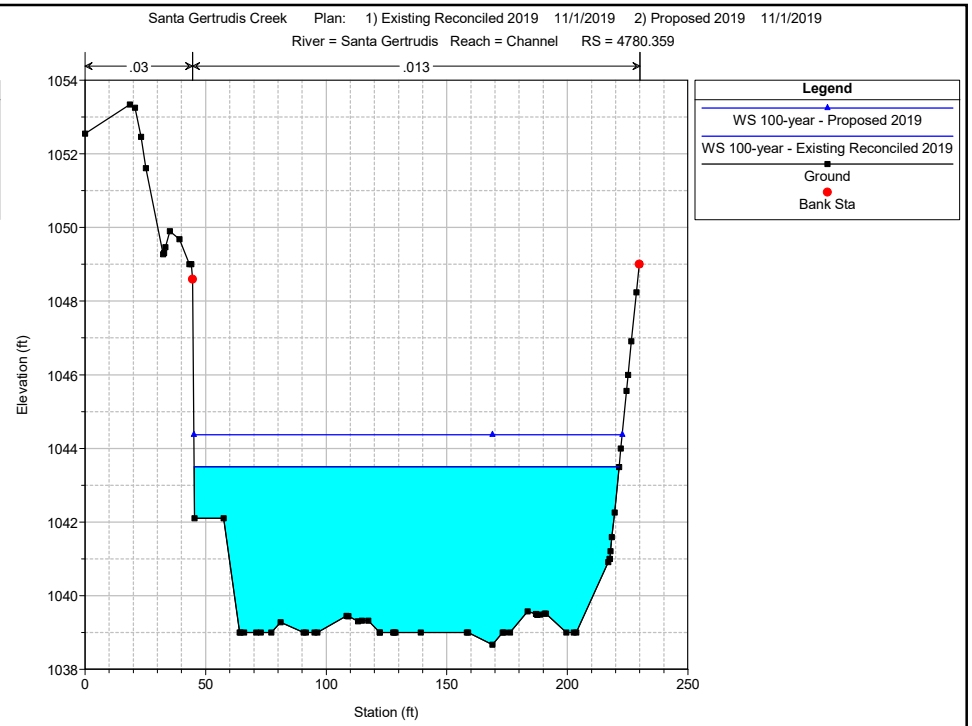

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4894.934
.05
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

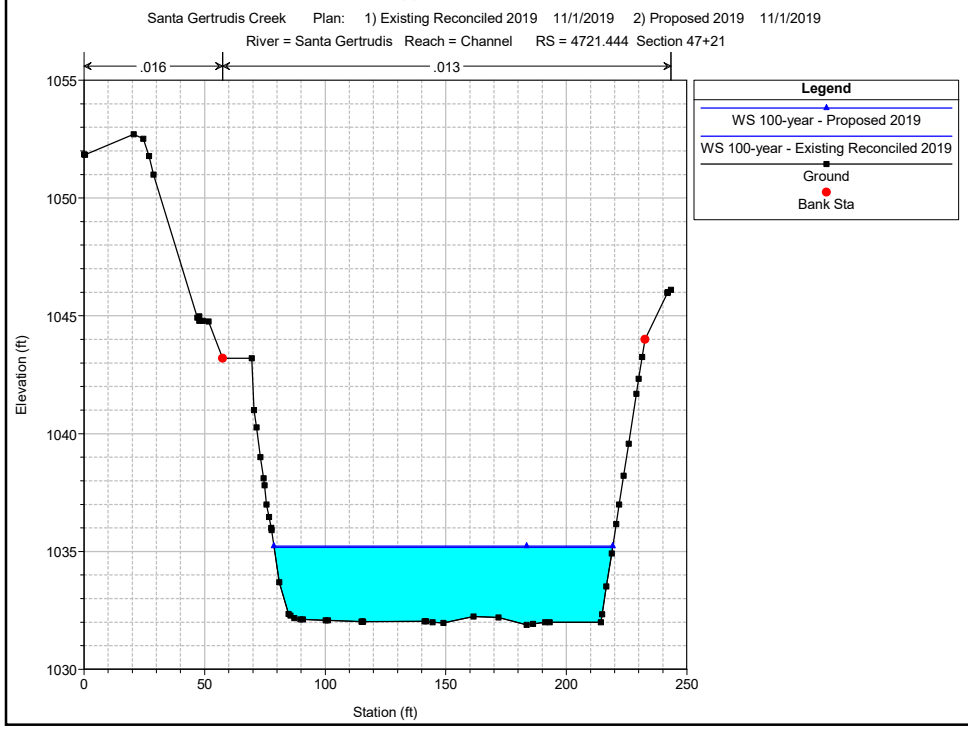

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4874 Approach Southbound I-15 Ramp, Section 48+74
.03
.03
Legend
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

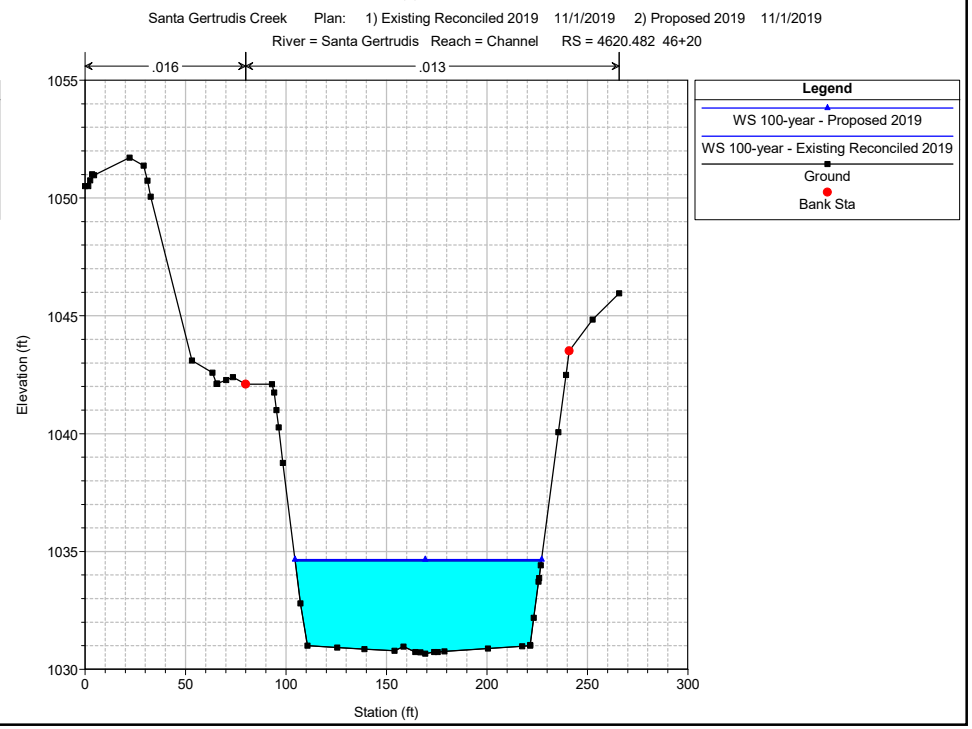

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4838.5 BR I-15 Southbound Ramp
.03
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

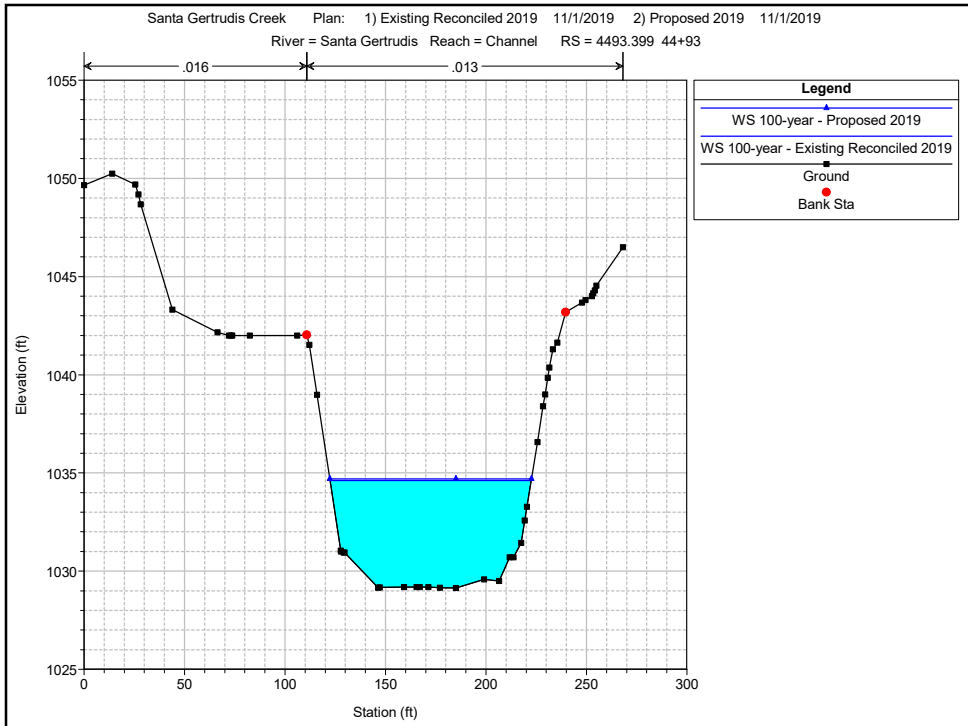

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4838.5 BR I-15 Southbound Ramp
.03
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

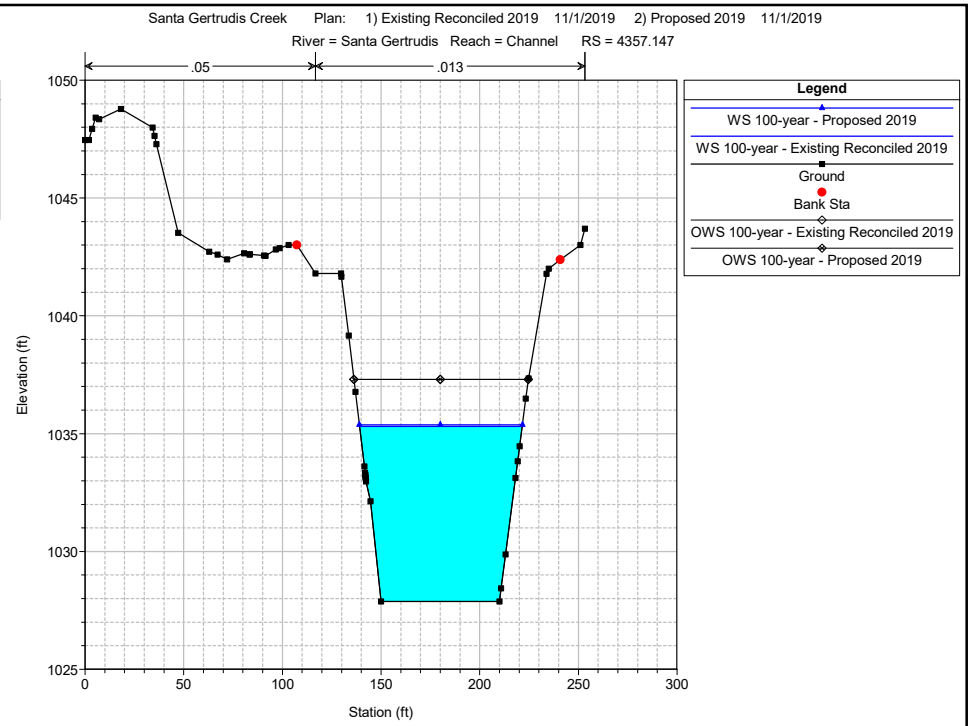

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4817.558
.03
.013
.03
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

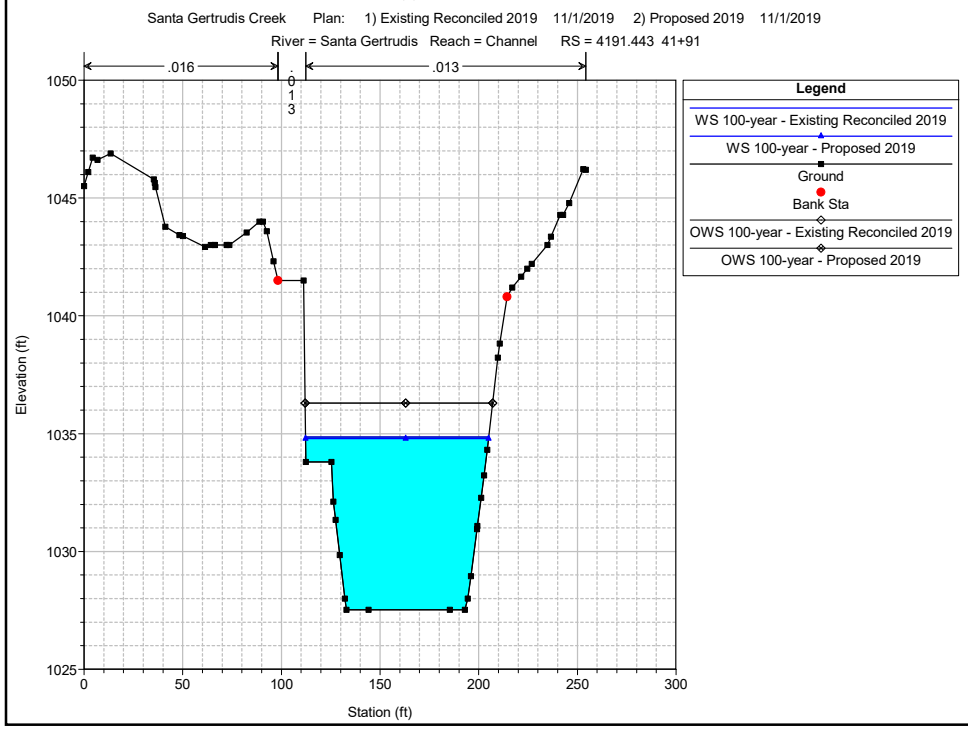

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4780.359
.03
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

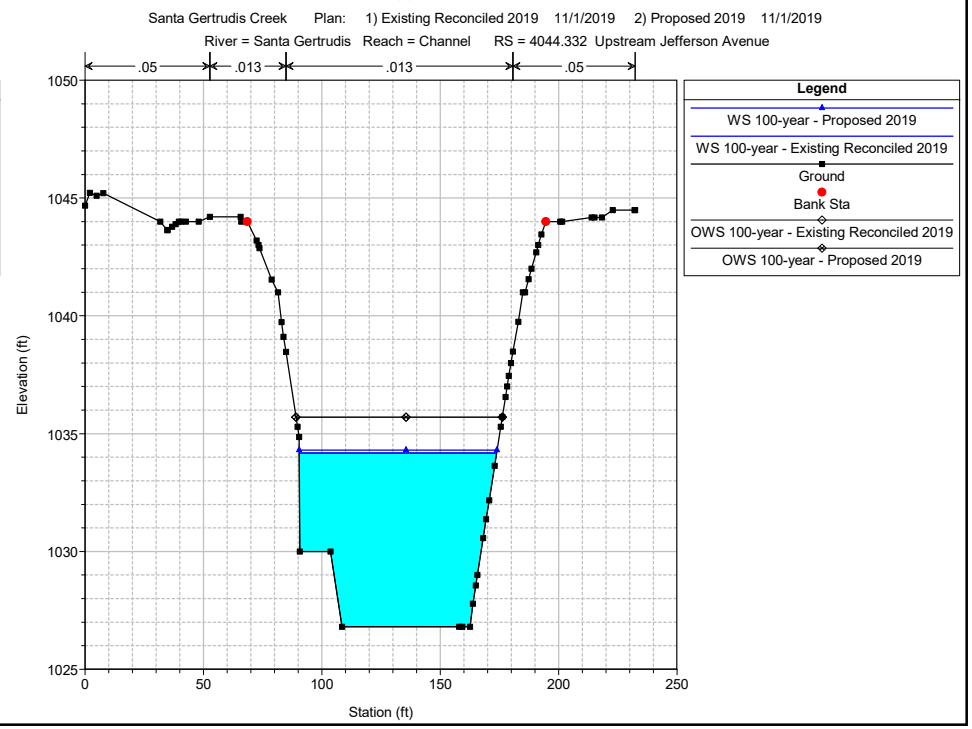

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4721.444 Section 47+21
.016
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

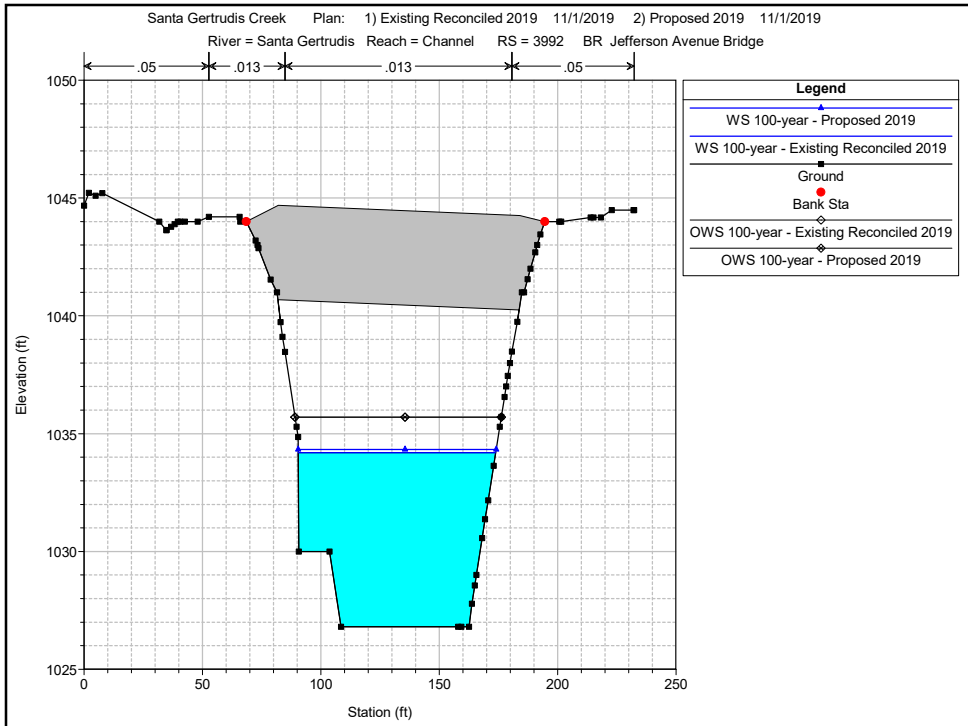

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4620.482 46+20
.016
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

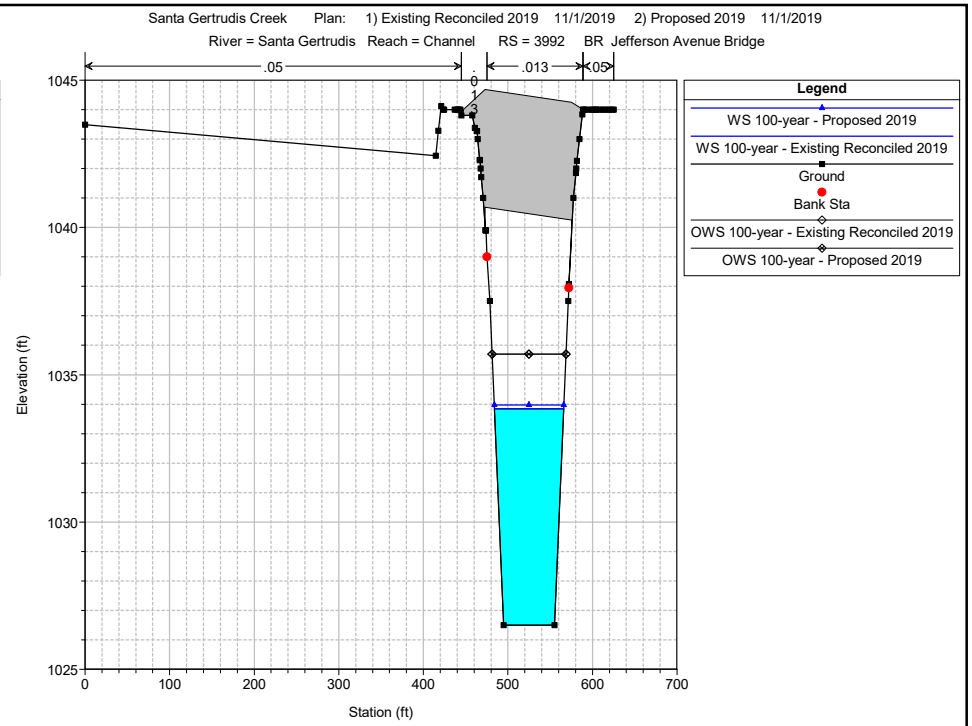

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4493.399 44+93
.016
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

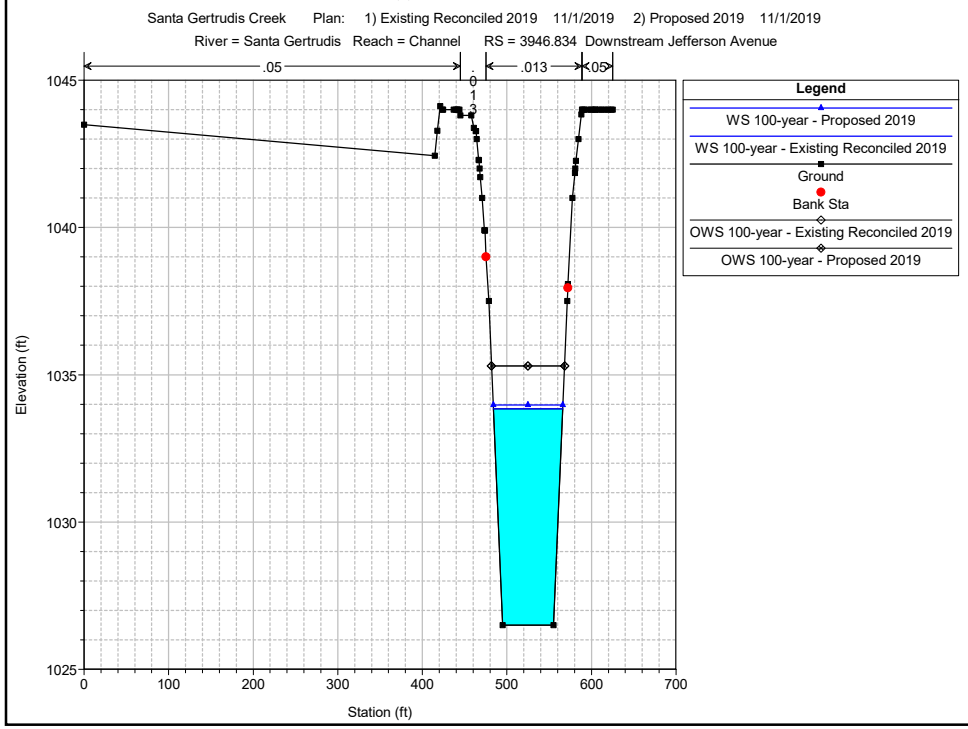

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4357.147
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

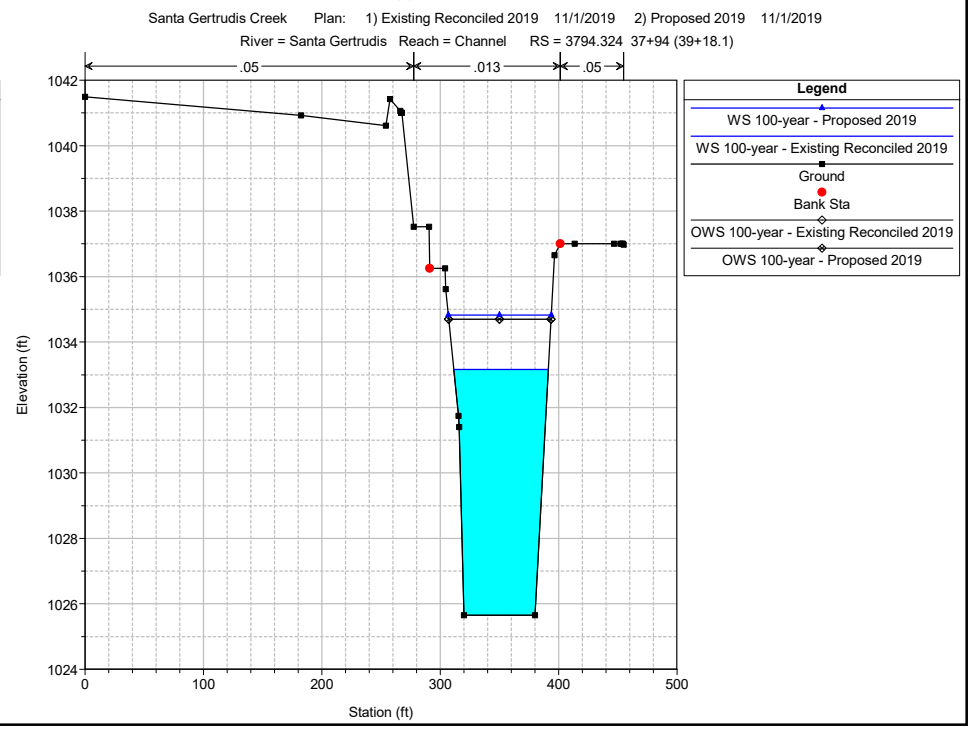

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4191.443 41+91
.016
.013
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

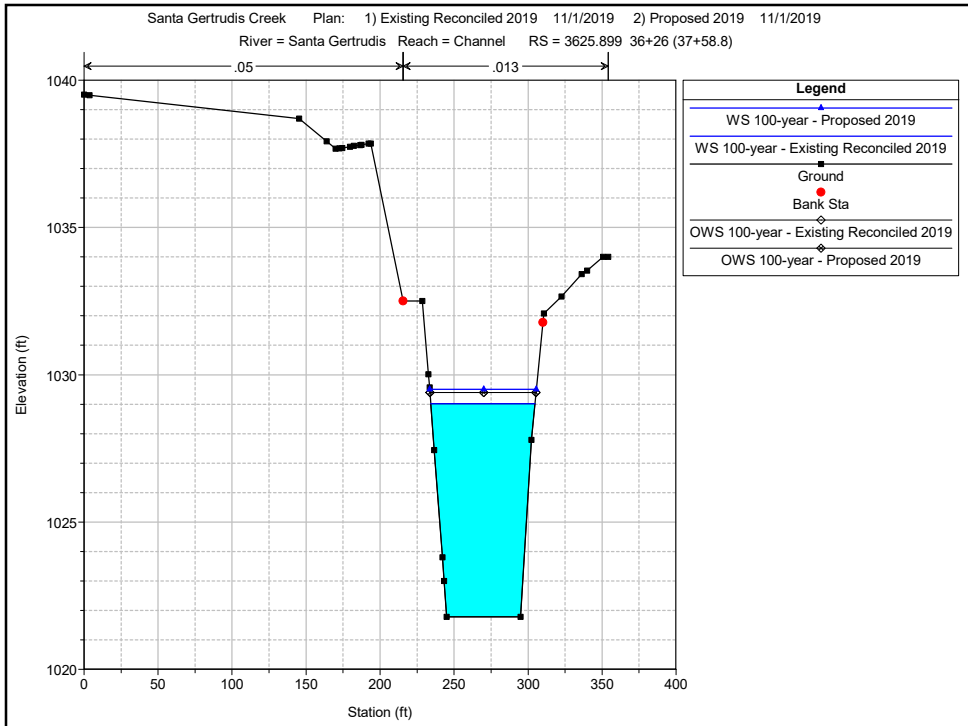

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 4044.332 Upstream Jefferson Avenue
.05
.013
.013
.05
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

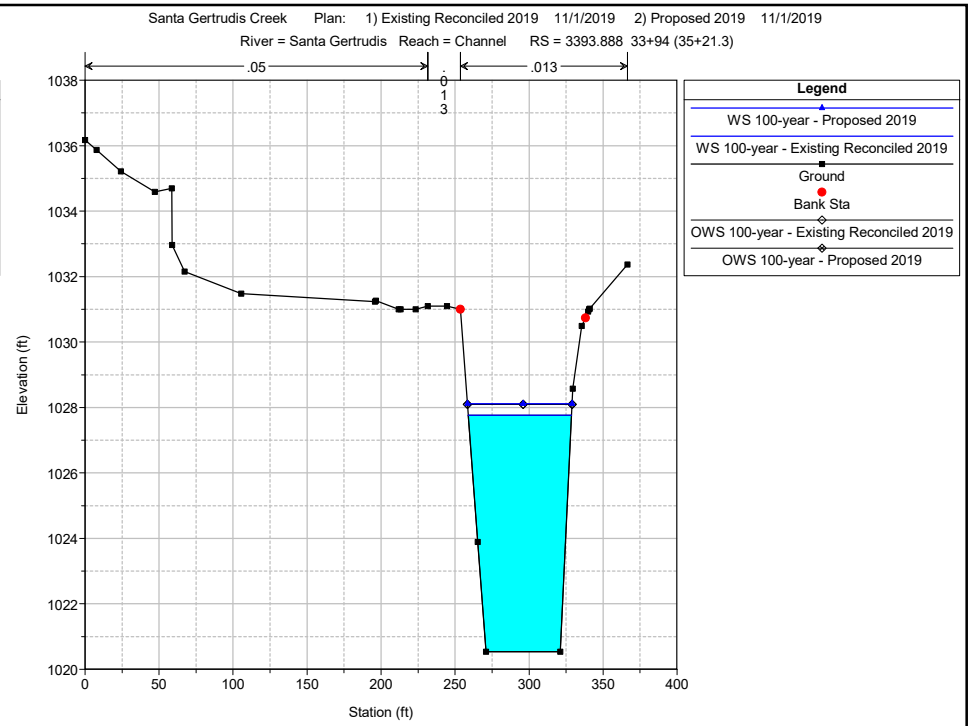

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 3992 BR Jefferson Avenue Bridge
.05
.013
.013
.05
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

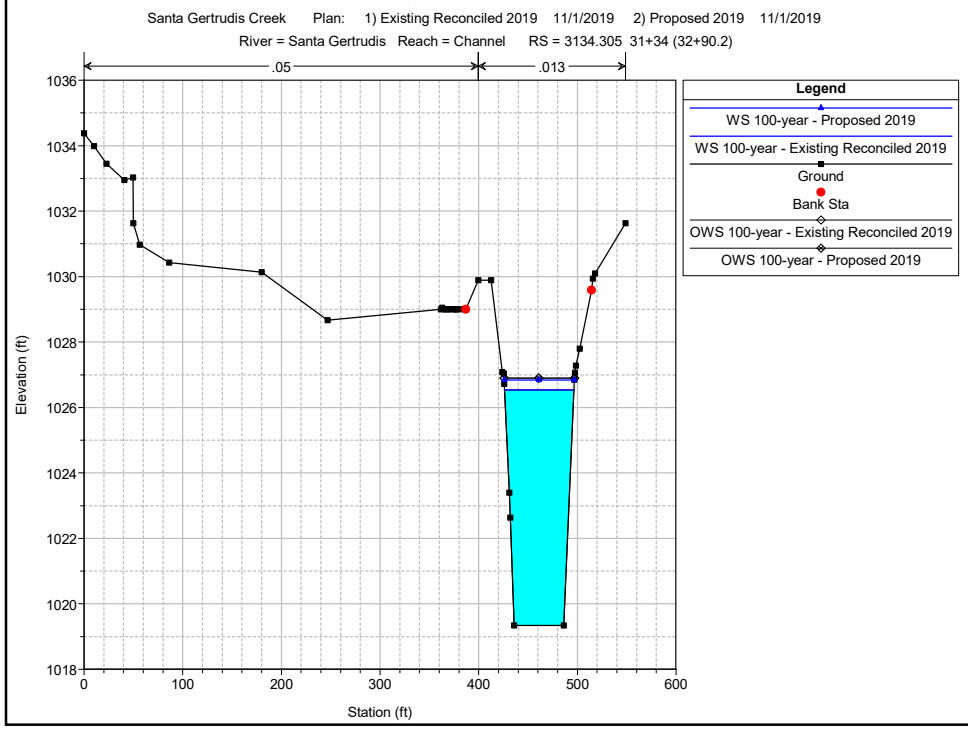

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 3992 BR Jefferson Avenue Bridge
.05
.013
.05
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

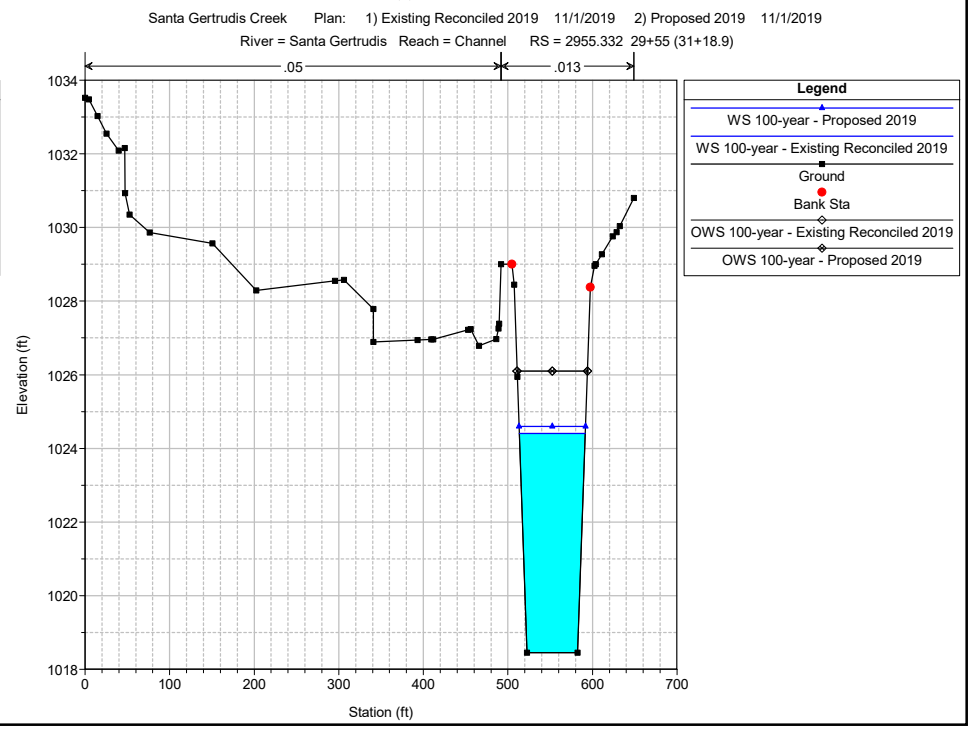

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 3946.834 Downstream Jefferson Avenue
.05
.013
.05
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

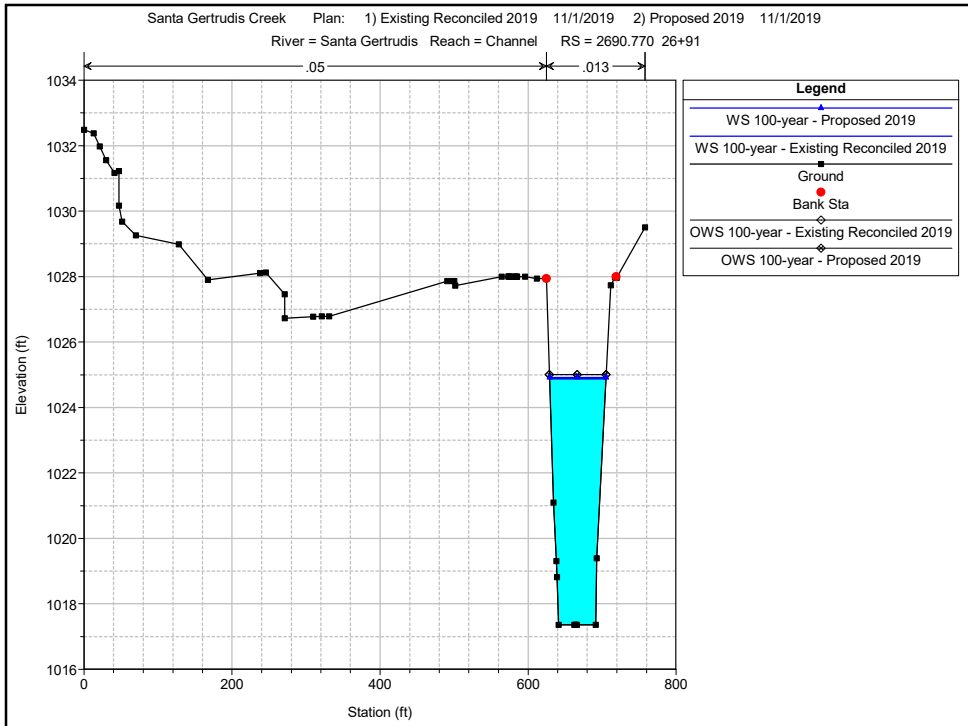

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 3794.324 37+94 (39+18.1)
.05
.013
.05
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

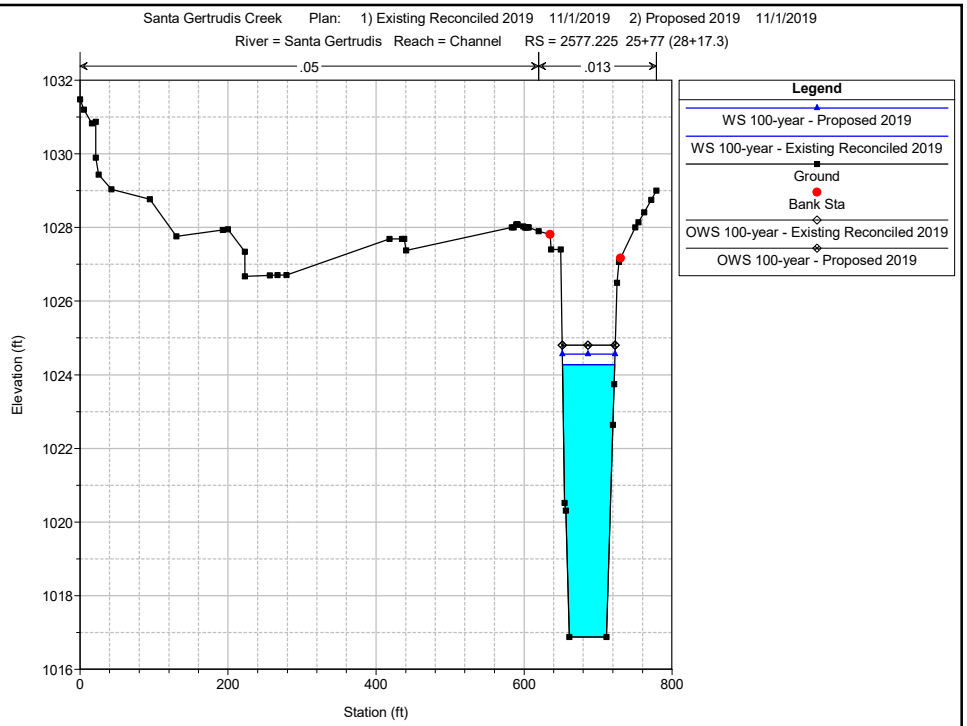

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 3625.899 36+26 (37+58.8)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

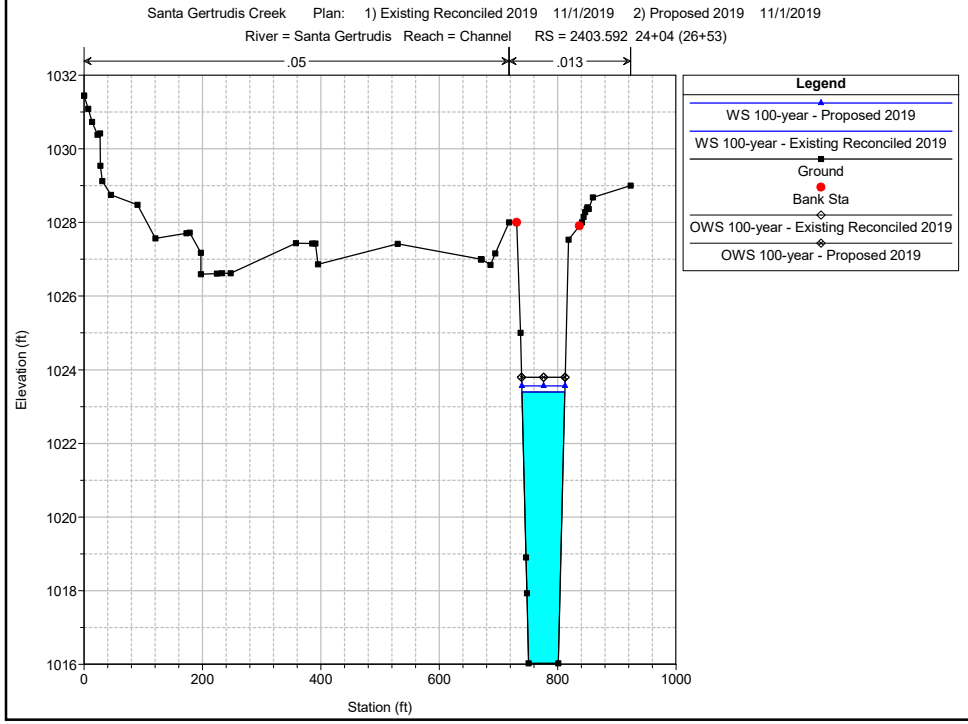

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 3393.888 33+94 (35+21.3)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

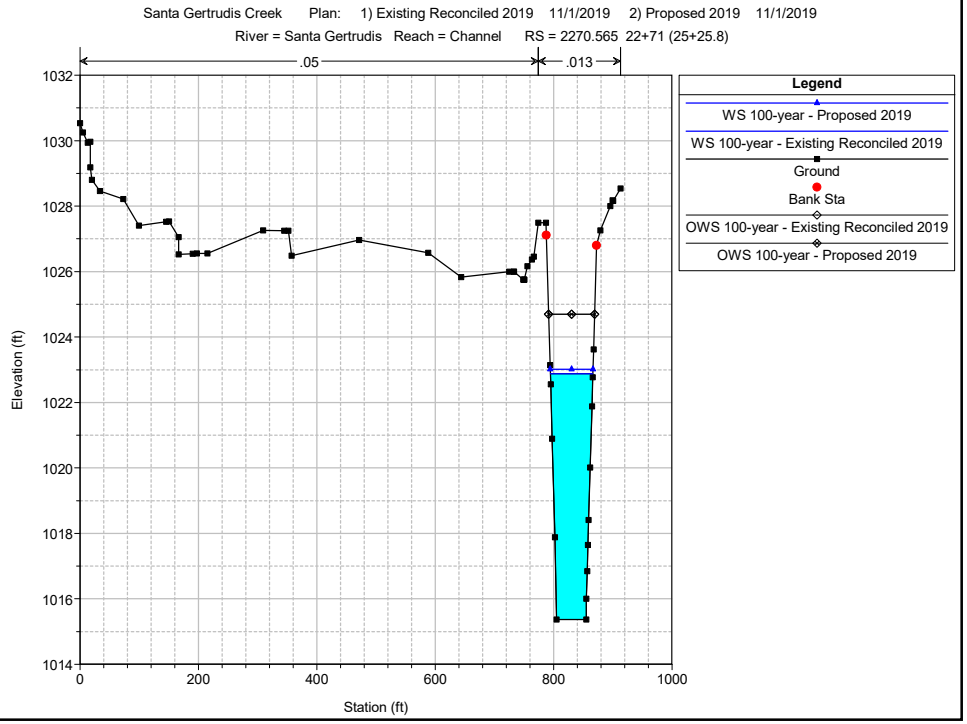

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 3134.305 31+34 (32+90.2)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

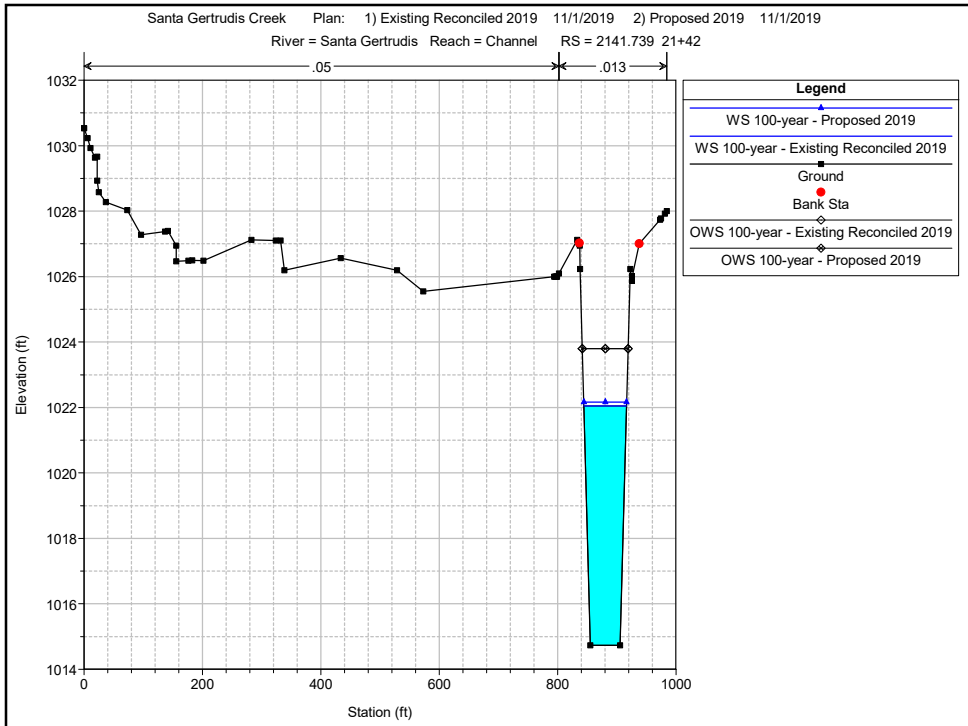

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 2955.332 29+55 (31+18.9)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

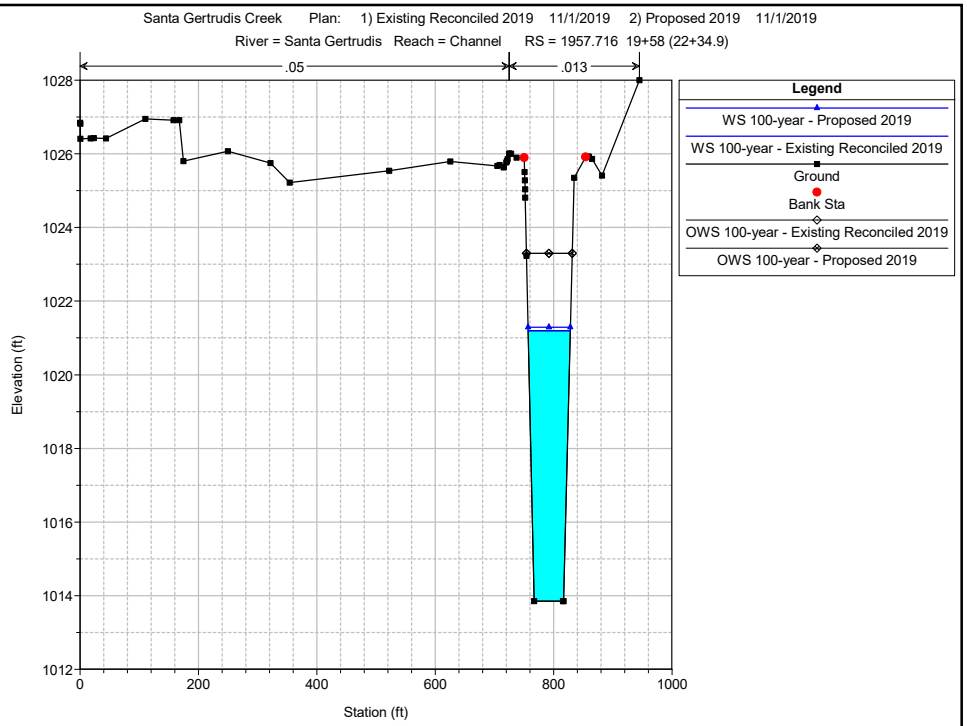

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 2690.770 26+91
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

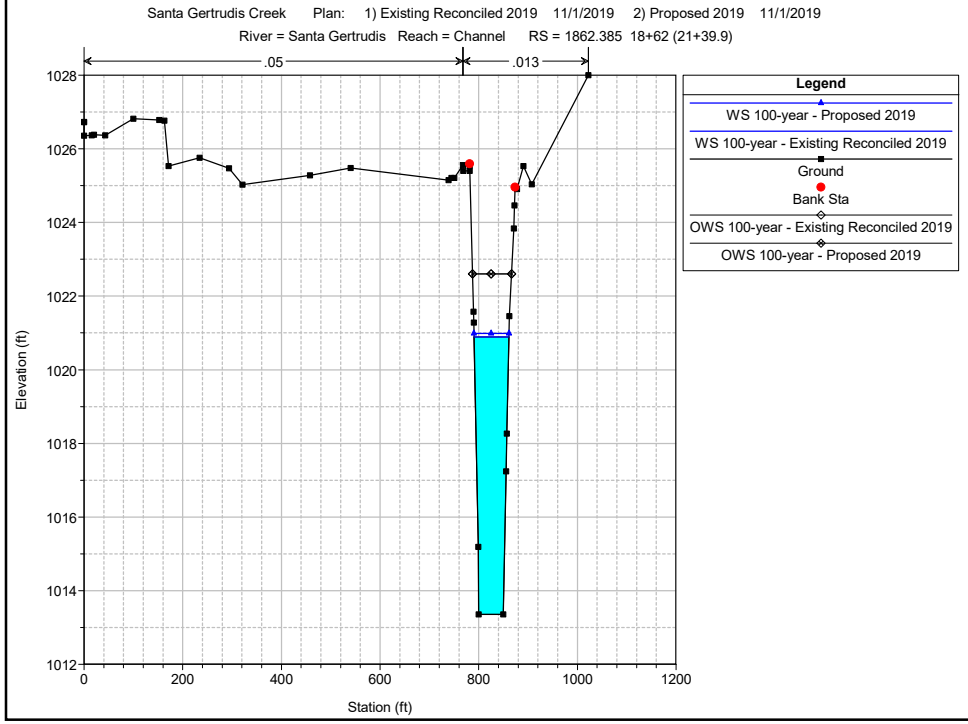

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 2577.225 25+77 (28+17.3)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

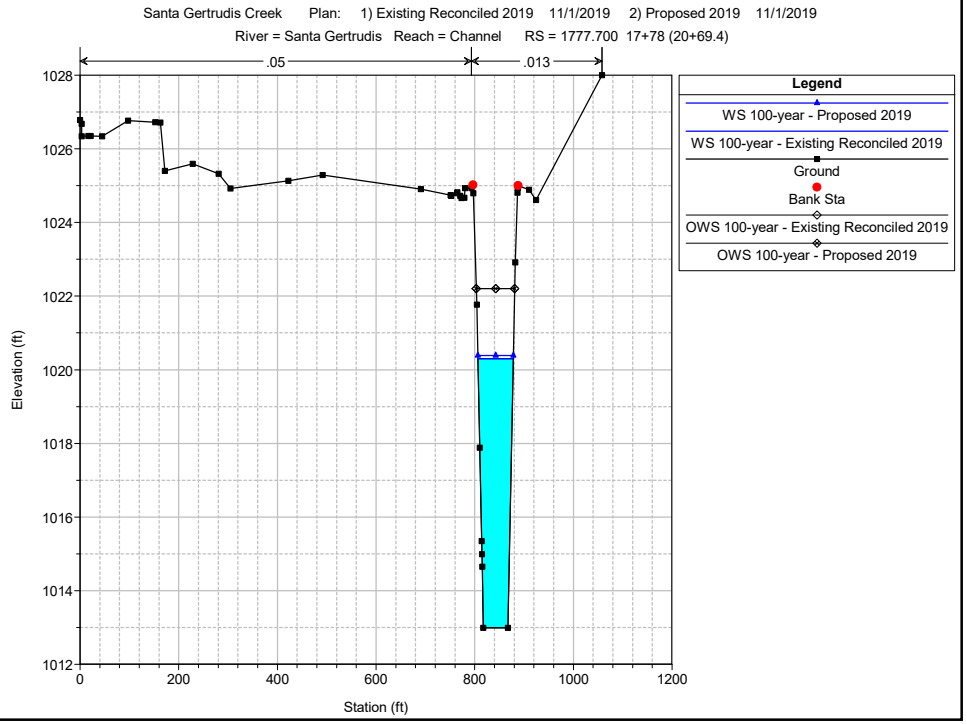

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 2403.592 24+04 (26+53)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

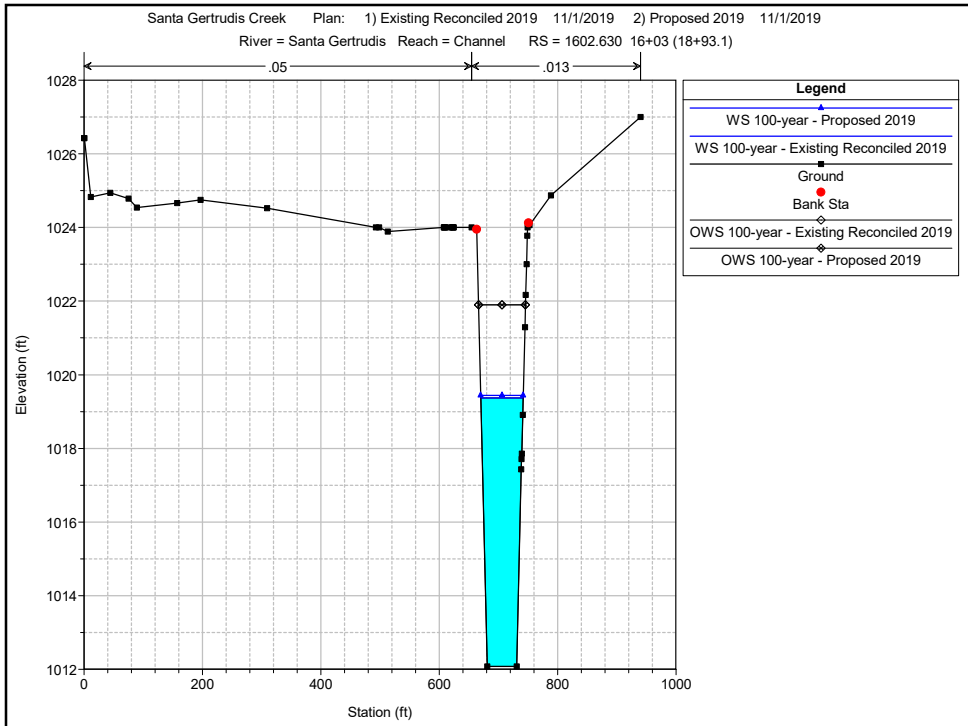

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 2270.565 22+71 (25+25.8)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

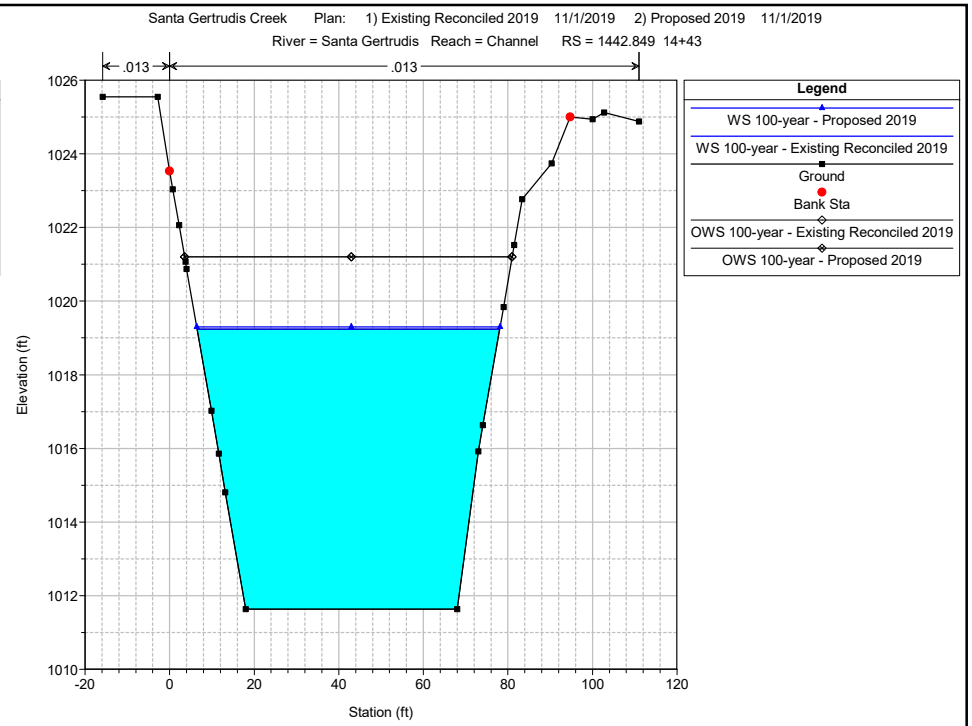

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 2141.739 21+42
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

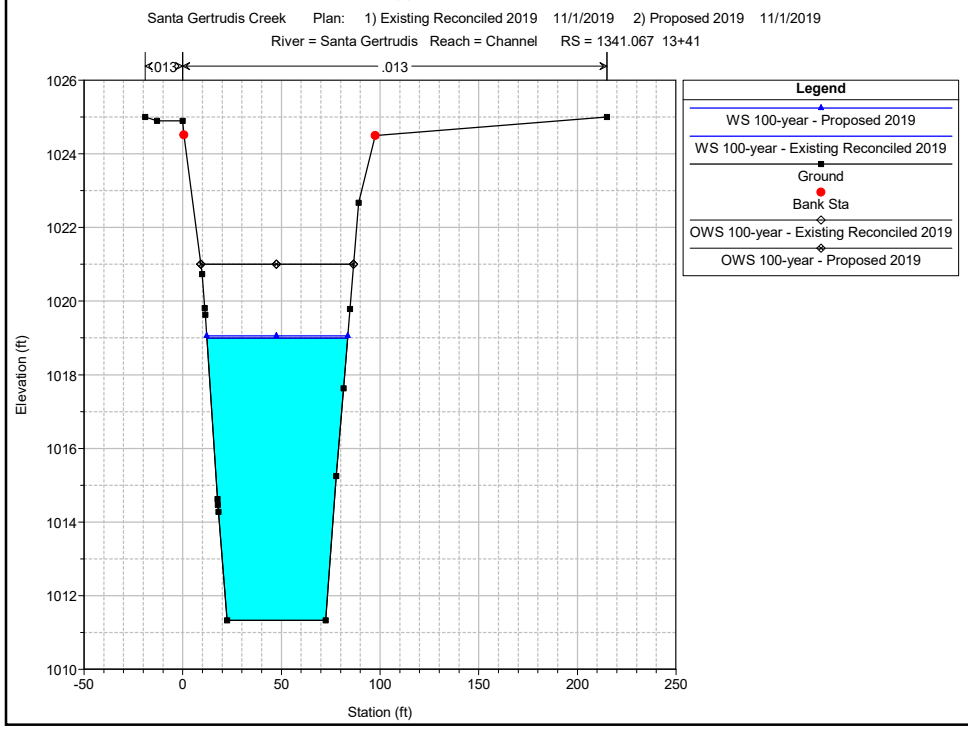

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1957.716 19+58 (22+34.9)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

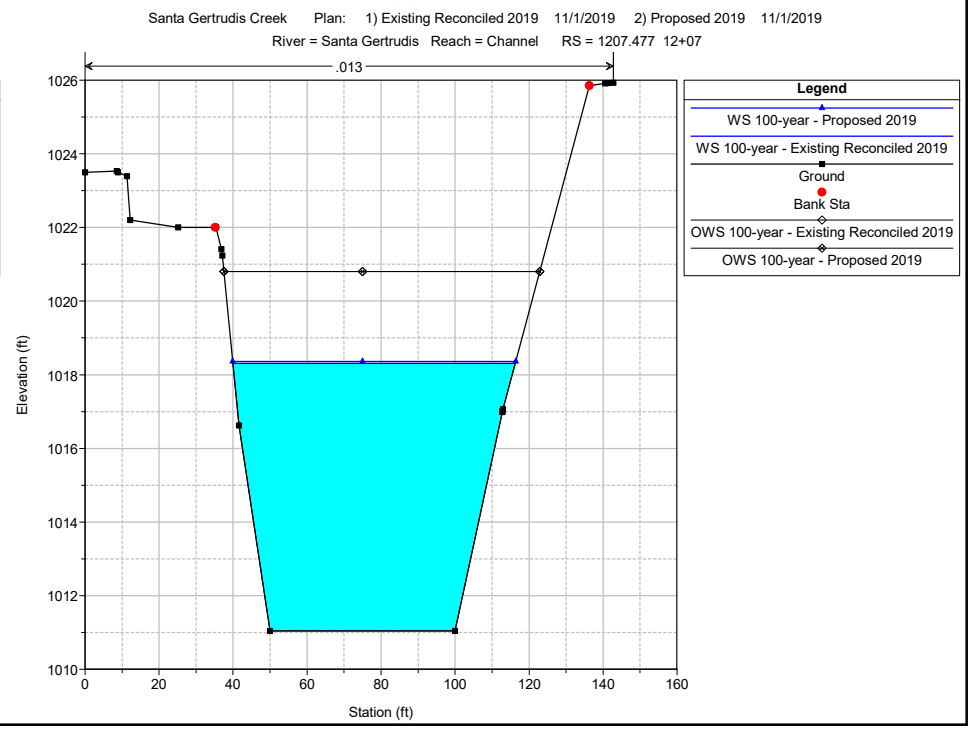

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1862.385 18+62 (21+39.9)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

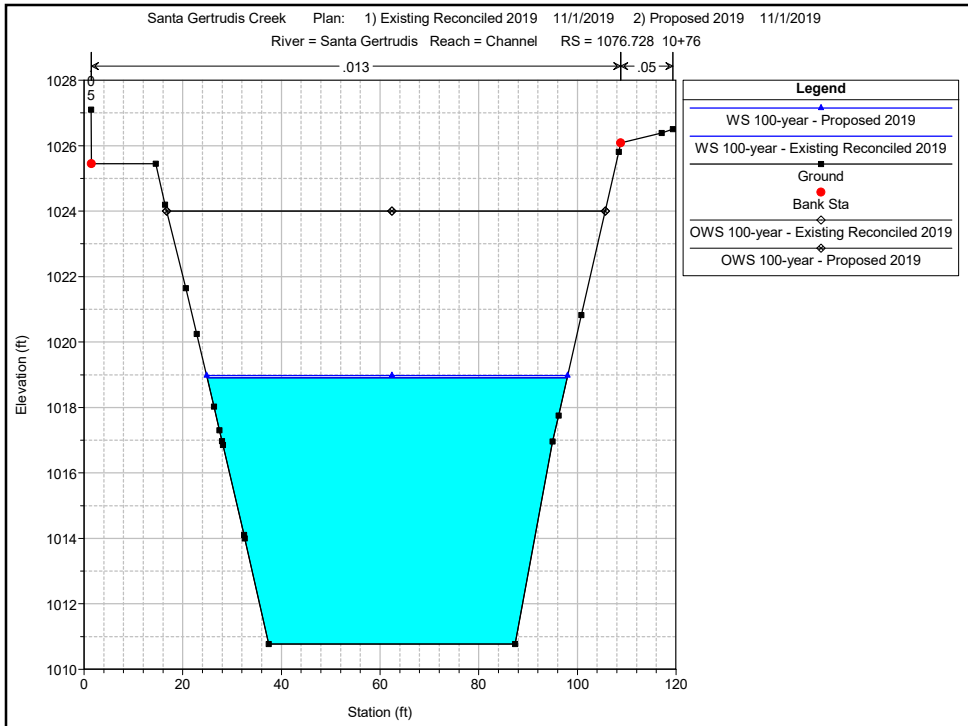

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1777.700 17+78 (20+69.4)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

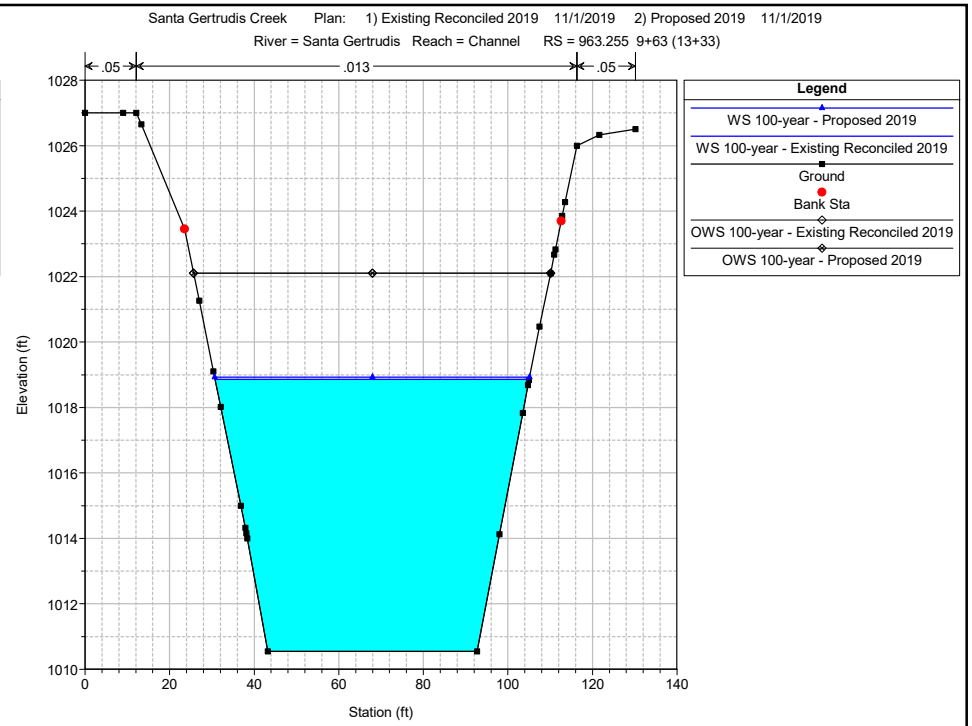

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1602.630 16+03 (18+93.1)
.05
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

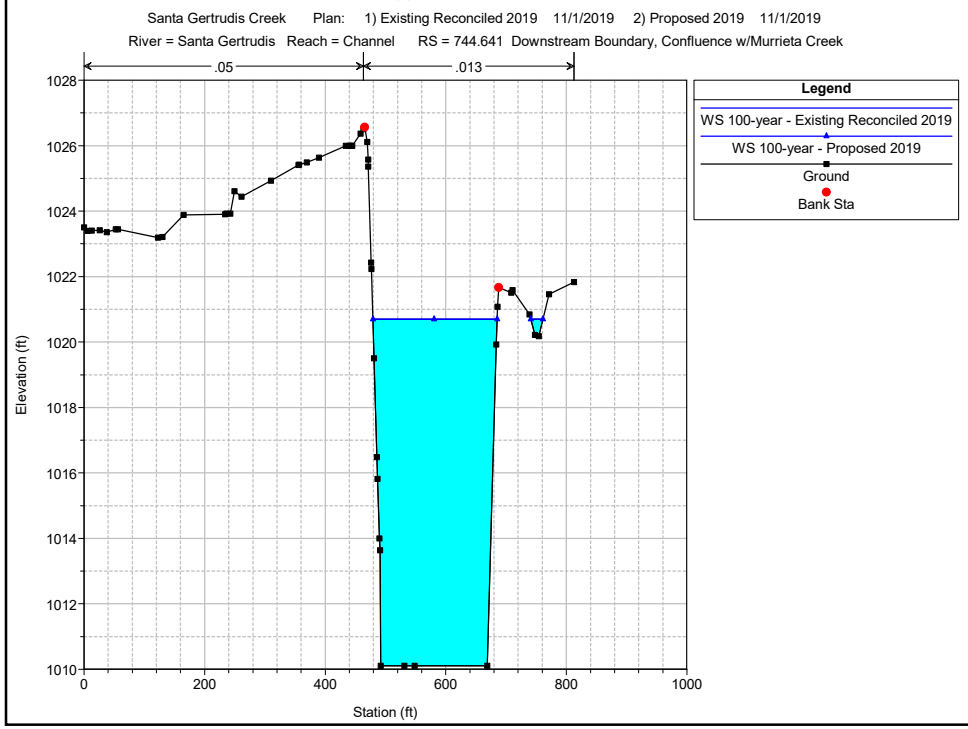

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1442.849 14+43
.013
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)


Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1341.067 13+41
.013
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)


Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1207.477 12+07
.013
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

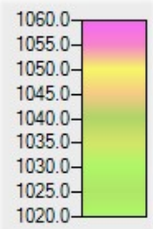

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 1076.728 10+76
.013
.05
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)

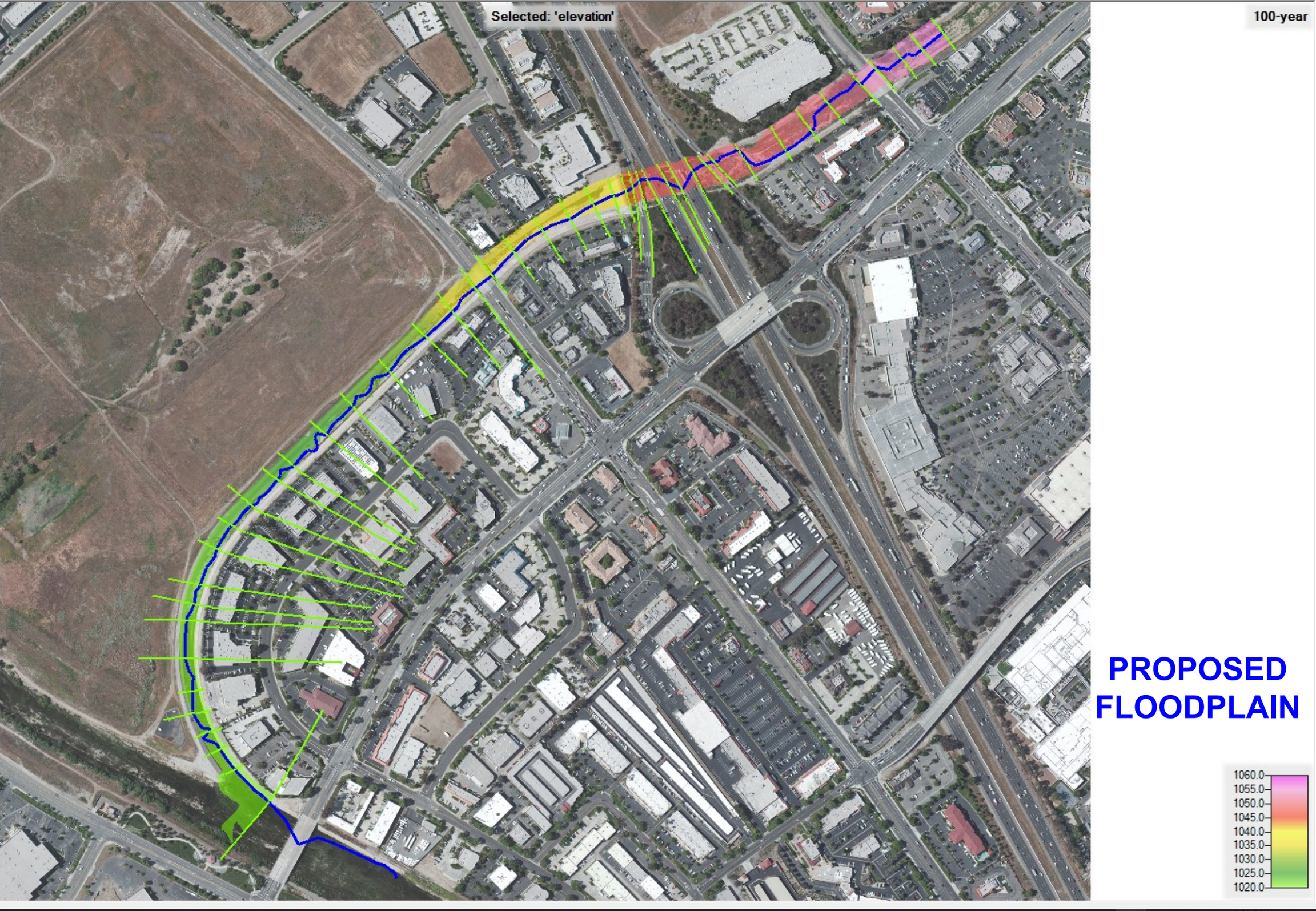

Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 963.255 9+63 (13+33)
.05
.013
.05
Legend
WS 100-year - Proposed 2019
WS 100-year - Existing Reconciled 2019
Ground
Bank Sta
OWS 100-year - Existing Reconciled 2019
OWS 100-year - Proposed 2019
Elevation (ft)
Station (ft)


Santa Gertrudis Creek Plan: 1) Existing Reconciled 2019 11/1/2019 2) Proposed 2019 11/1/2019
River = Santa Gertrudis Reach = Channel RS = 744.641 Downstream Boundary, Confluence w/Murrieta Creek
.05
.013
Legend
WS 100-year - Existing Reconciled 2019
WS 100-year - Proposed 2019
Ground
Bank Sta
Elevation (ft)
Station (ft)

FLOODPLAIN MAPS

EXISTING FLOODPLAIN




Selected: 'elevation'
100-year
PROPOSED
FLOODPLAIN
1060.0
1055.0
1050.0
1045.0
1040.0
1035.0
1030.0
1025.0
1020.0

HECRAS RESULTS

Tabular

HEC-RAS River: Santa Gertrudis Reach: Channel Profile: 100-year

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Slope	Vel Total	Vel Chnl	Flow Area	Top Width	Max Chl Dpth	Hydr Depth	Froude # Chl	Froude # Chl	Shear Total	Shear Chan
				(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sq ft)	(ft)	(ft)	(ft)			(lb/sq ft)	(lb/sq ft)
Channel	6643.382	100-year	Existing Reconciled 2019	11300.00	1044.00	1056.22	1052.44	0.001561	8.15	8.16	1385.77	163.27	12.22	8.49	0.49	0.49	0.80	0.83
Channel	6643.382	100-year	Proposed 2019	11300.00	1044.00	1055.80	1052.45	0.001834	8.58	8.58	1317.71	158.38	11.80	8.32	0.52	0.52	0.92	0.93
Channel	6523.379	100-year	Existing Reconciled 2019	11300.00	1044.00	1055.78		0.002364	8.89	8.89	1270.48	176.52	11.78	7.20	0.58	0.58	1.04	1.05
Channel	6523.379	100-year	Proposed 2019	11300.00	1044.00	1055.17		0.002982	9.69	9.69	1165.57	168.65	11.17	6.91	0.65	0.65	1.26	1.26
Channel	6411.317	100-year	Existing Reconciled 2019	11300.00	1044.00	1055.40		0.002202	9.19	9.32	1229.45	177.12	11.40	6.94	0.57	0.57	0.94	1.10
Channel	6411.317	100-year	Proposed 2019	11300.00	1044.00	1054.79		0.002340	9.90	9.95	1141.50	164.44	10.79	6.94	0.63	0.63	0.98	1.08
Channel	6272.947	100-year	Existing Reconciled 2019	11300.00	1045.38	1055.11	1052.50	0.002284	9.18	9.18	1231.04	159.32	9.73	7.73	0.58	0.58	1.07	1.07
Channel	6272.947	100-year	Proposed 2019	11300.00	1045.38	1054.52	1052.29	0.002365	9.70	9.70	1164.63	155.05	9.14	7.51	0.62	0.62	1.06	1.06
Channel	6211			Bridge														
Channel	6162.934	100-year	Existing Reconciled 2019	11300.00	1045.23	1052.61	1052.61	0.007585	13.68	13.68	826.07	142.19	7.38	5.81	1.00	1.00	2.67	2.67
Channel	6162.934	100-year	Proposed 2019	11300.00	1045.23	1052.88	1052.21	0.004889	12.32	12.32	916.88	143.11	7.65	6.41	0.86	0.86	1.86	1.86
Channel	5981.337	100-year	Existing Reconciled 2019	11300.00	1044.00	1050.84	1051.09	0.008663	14.20	14.20	795.68	144.83	6.84	5.49	1.07	1.07	2.92	2.92
Channel	5981.337	100-year	Proposed 2019	11300.00	1044.00	1051.09	1051.09	0.007433	13.67	13.67	826.82	144.43	7.09	5.72	1.01	1.01	2.59	2.60
Channel	5816.827	100-year	Existing Reconciled 2019	11300.00	1039.48	1051.36	1048.50	0.002139	9.13	9.13	1237.94	151.79	11.88	8.16	0.56	0.56	1.06	1.06
Channel	5816.827	100-year	Proposed 2019	11300.00	1039.48	1051.03	1048.50	0.002337	9.54	9.54	1184.37	147.64	11.55	8.02	0.59	0.59	1.14	1.14
Channel	5668.033	100-year	Existing Reconciled 2019	11300.00	1039.00	1050.90		0.002409	9.48	9.50	1192.33	156.12	11.90	7.64	0.59	0.59	1.10	1.16
Channel	5668.033	100-year	Proposed 2019	11300.00	1039.00	1050.57		0.002351	9.83	9.88	1149.40	162.09	11.57	7.09	0.63	0.63	1.00	1.09
Channel	5414.180	100-year	Existing Reconciled 2019	11300.00	1038.00	1051.08		0.000904	6.42	6.42	1760.23	193.51	13.08	9.10	0.37	0.37	0.50	0.51
Channel	5414.180	100-year	Proposed 2019	11300.00	1038.00	1050.75	1045.73	0.000961	6.90	6.90	1638.66	191.20	12.75	8.57	0.41	0.41	0.50	0.50
Channel	5279.592	100-year	Existing Reconciled 2019	11300.00	1038.00	1050.91	1046.54	0.001004	6.59	6.59	1713.75	193.05	12.91	8.88	0.39	0.39	0.54	0.54
Channel	5279.592	100-year	Proposed 2019	11300.00	1038.00	1050.42	1046.91	0.001171	7.28	7.28	1552.66	191.79	12.42	8.10	0.45	0.45	0.57	0.57
Channel	5248.5			Bridge														
Channel	5230.979	100-year	Existing Reconciled 2019	11300.00	1038.00	1050.51		0.001026	6.63	6.63	1704.37	193.60	12.51	8.80	0.39	0.39	0.55	0.55
Channel	5230.979	100-year	Proposed 2019	11300.00	1038.00	1049.89		0.001203	7.31	7.31	1546.57	192.20	11.89	8.05	0.45	0.45	0.59	0.59
Channel	5181	100-year	Proposed 2019	11300.00	1039.00	1049.82	1046.01	0.001168	7.26	7.26	1556.02	179.88	10.82	8.65	0.44	0.44	0.60	0.60
Channel	5162.570	100-year	Existing Reconciled 2019	11300.00	1039.00	1050.30	1046.02	0.001127	7.09	7.09	1593.90	174.84	11.30	9.12	0.41	0.41	0.62	0.62
Channel	5105			Bridge														
Channel	5060.939	100-year	Existing Reconciled 2019	11300.00	1038.33	1049.35		0.001297	7.48	7.48	1510.45	169.57	11.02	8.91	0.44	0.44	0.70	0.70
Channel	5060.939	100-year	Proposed 2019	11300.00	1038.33	1048.87		0.001360	7.77	7.77	1454.58	172.79	10.54	8.42	0.47	0.47	0.68	0.68
Channel	4997.843	100-year	Existing Reconciled 2019	11300.00	1038.00	1049.31	1044.97	0.001118	7.13	7.13	1585.27	171.88	11.31	9.22	0.41	0.41	0.62	0.62
Channel	4997.843	100-year	Proposed 2019	11300.00	1038.00	1048.80	1045.10	0.001342	7.63	7.63	1481.85	170.75	10.80	8.68	0.46	0.46	0.70	0.70
Channel	4943			Bridge														
Channel	4894.934	100-year	Existing Reconciled 2019	11300.00	1038.00	1048.80		0.001225	7.32	7.32	1543.59	172.45	10.80	8.95	0.43	0.43	0.66	0.66
Channel	4894.934	100-year	Proposed 2019	11300.00	1038.00	1048.14		0.001355	7.76	7.76	1456.64	175.25	10.14	8.31	0.47	0.47	0.68	0.68
Channel	4874	100-year	Proposed 2019	11300.00	1038.98	1047.11	1045.55	0.002837	10.38	10.38	1088.77	157.71	8.13	6.90	0.70	0.70	1.19	1.19
Channel	4856.941	100-year	Existing Reconciled 2019	11300.00	1038.98	1047.59	1045.92	0.003413	10.48	10.48	1077.88	152.85	8.61	7.05	0.70	0.70	1.47	1.47
Channel	4838.5			Bridge														
Channel	4817.558	100-year	Existing Reconciled 2019	11300.00	1038.00	1044.24	1044.90	0.011882	15.03	15.04	751.62	161.03	6.24	4.67	1.22	1.22	3.42	3.45
Channel	4817.558	100-year	Proposed 2019	11300.00	1038.00	1044.08	1044.78	0.010613	15.07	15.08	749.67	161.38	6.08	4.65	1.23	1.23	3.00	3.07
Channel	4780.359	100-year	Existing Reconciled 2019	11300.00	1038.67	1043.50	1044.50	0.002952	15.90	15.90	710.60	171.34	4.83	4.15	1.38	1.38	0.76	0.76
Channel	4780.359	100-year	Proposed 2019	11300.00	1038.67	1044.37	1044.53	0.001674	13.17	13.17	858.06	177.64	5.70	4.83	1.06	1.06	0.49	0.49
Channel	4721.444	100-year	Existing Reconciled 2019	11300.00	1031.89	1035.17	1038.06	0.012979	26.86	26.86	420.64	140.31	3.28	3.00	2.74	2.74	2.40	2.40
Channel	4721.444	100-year	Proposed 2019	11300.00	1031.89	1035.23	1038.06	0.012245	26.38	26.38	428.28	140.47	3.34	3.05	2.66	2.66	2.30	2.30

HEC-RAS River: Santa Gertrudis Reach: Channel Profile: 100-year (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Slope	Vel Total	Vel Chnl	Flow Area	Top Width	Max Chl Dpth	Hydr Depth	Froude # Chl	Froude # Chl	Shear Total	Shear Chan
				(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sq ft)	(ft)	(ft)	(ft)			(lb/sq ft)	(lb/sq ft)
Channel	4620.482	100-year	Existing Reconciled 2019	11300.00	1030.67	1034.60	1037.49	0.009656	25.90	25.90	436.23	122.49	3.93	3.56	2.42	2.42	2.11	2.11
Channel	4620.482	100-year	Proposed 2019	11300.00	1030.67	1034.66	1037.49	0.009179	25.50	25.50	443.21	122.66	3.99	3.61	2.36	2.36	2.04	2.04
Channel	4493.399	100-year	Existing Reconciled 2019	11300.00	1029.14	1034.62	1037.37	0.005879	24.14	24.14	468.19	100.10	5.48	4.68	1.97	1.97	1.68	1.68
Channel	4493.399	100-year	Proposed 2019	11300.00	1029.14	1034.70	1037.37	0.005592	23.75	23.75	475.79	100.33	5.56	4.74	1.92	1.92	1.62	1.62
Channel	4357.147	100-year	Existing Reconciled 2019	11300.00	1027.88	1035.30	1037.43	0.003232	21.60	21.60	523.12	81.69	7.42	6.40	1.50	1.50	1.22	1.22
Channel	4357.147	100-year	Proposed 2019	11300.00	1027.88	1035.38	1037.40	0.003093	21.23	21.23	532.38	82.64	7.50	6.44	1.47	1.47	1.18	1.18
Channel	4191.443	100-year	Existing Reconciled 2019	11300.00	1027.52	1034.86	1036.91	0.003191	21.42	21.42	527.45	82.92	7.34	6.36	1.50	1.50	1.20	1.20
Channel	4191.443	100-year	Proposed 2019	11300.00	1027.52	1034.79	1036.81	0.003642	21.26	21.26	531.46	92.87	7.27	5.72	1.57	1.57	1.23	1.23
Channel	4044.332	100-year	Existing Reconciled 2019	11300.00	1026.80	1034.18	1036.32	0.003288	21.66	21.66	521.68	82.29	7.38	6.34	1.52	1.52	1.23	1.23
Channel	4044.332	100-year	Proposed 2019	11300.00	1026.80	1034.30	1036.33	0.003271	21.24	21.24	531.96	83.55	7.50	6.37	1.48	1.48	1.20	1.20
Channel	3992			Bridge														
Channel	3946.834	100-year	Existing Reconciled 2019	11300.00	1026.50	1033.84	1036.00	0.003273	21.67	21.67	521.54	82.03	7.34	6.36	1.51	1.51	1.23	1.23
Channel	3946.834	100-year	Proposed 2019	11300.00	1026.50	1033.97	1036.00	0.003085	21.24	21.24	532.04	82.42	7.47	6.46	1.47	1.47	1.18	1.18
Channel	3794.324	100-year	Existing Reconciled 2019	11300.00	1025.65	1033.17	1035.43	0.003333	21.89	21.89	516.30	79.91	7.52	6.46	1.52	1.52	1.26	1.26
Channel	3794.324	100-year	Proposed 2019	11300.00	1025.65	1034.83	1035.43	0.001697	17.26	17.26	654.87	87.00	9.18	7.53	1.11	1.11	0.74	0.74
Channel	3625.899	100-year	Existing Reconciled 2019	11300.00	1021.78	1029.02	1032.48	0.005072	26.15	26.15	432.10	70.37	7.23	6.14	1.86	1.86	1.82	1.82
Channel	3625.899	100-year	Proposed 2019	11300.00	1021.78	1029.50	1032.82	0.004056	24.20	24.20	466.86	72.06	7.72	6.48	1.68	1.68	1.54	1.54
Channel	3393.888	100-year	Existing Reconciled 2019	11300.00	1020.54	1027.77	1031.80	0.004996	26.21	26.21	431.20	68.78	7.23	6.27	1.85	1.85	1.82	1.82
Channel	3393.888	100-year	Proposed 2019	11300.00	1020.54	1028.12	1032.13	0.004240	24.68	24.68	457.82	70.70	7.58	6.48	1.71	1.71	1.60	1.60
Channel	3134.305	100-year	Existing Reconciled 2019	11300.00	1019.34	1026.53	1031.16	0.005134	26.28	26.28	430.00	70.19	7.19	6.13	1.87	1.87	1.84	1.84
Channel	3134.305	100-year	Proposed 2019	11300.00	1019.34	1026.84	1030.94	0.004438	25.01	25.01	451.85	71.10	7.50	6.36	1.75	1.75	1.65	1.65
Channel	2955.332	100-year	Existing Reconciled 2019	11300.00	1018.45	1024.41	1028.40	0.006698	27.50	27.50	410.91	77.93	5.96	5.27	2.11	2.11	2.11	2.11
Channel	2955.332	100-year	Proposed 2019	11300.00	1018.45	1024.60	1028.39	0.006026	26.55	26.55	425.56	78.49	6.15	5.42	2.01	2.01	1.95	1.95
Channel	2690.770	100-year	Existing Reconciled 2019	11300.00	1017.36	1024.88	1029.23	0.004371	24.70	24.70	457.50	72.53	7.52	6.31	1.73	1.73	1.61	1.61
Channel	2690.770	100-year	Proposed 2019	11300.00	1017.36	1024.92	1028.97	0.004237	24.07	24.07	469.54	76.23	7.56	6.16	1.71	1.71	1.54	1.54
Channel	2577.225	100-year	Existing Reconciled 2019	11300.00	1016.88	1024.27	1029.07	0.004484	24.94	24.94	453.12	72.51	7.39	6.25	1.76	1.76	1.65	1.65
Channel	2577.225	100-year	Proposed 2019	11300.00	1016.88	1024.56	1029.16	0.003932	24.04	24.04	469.96	71.18	7.68	6.60	1.65	1.65	1.51	1.51
Channel	2403.592	100-year	Existing Reconciled 2019	11300.00	1016.03	1023.40	1026.60	0.004551	25.09	25.09	450.46	72.34	7.37	6.23	1.77	1.77	1.67	1.67
Channel	2403.592	100-year	Proposed 2019	11300.00	1016.03	1023.56	1026.44	0.004217	24.44	24.44	462.28	72.83	7.53	6.35	1.71	1.71	1.57	1.57
Channel	2270.565	100-year	Existing Reconciled 2019	11300.00	1015.37	1022.88	1026.22	0.004490	25.00	25.00	451.92	71.79	7.51	6.30	1.76	1.76	1.65	1.65
Channel	2270.565	100-year	Proposed 2019	11300.00	1015.37	1023.02	1026.23	0.004211	24.46	24.46	461.95	72.23	7.65	6.40	1.71	1.71	1.57	1.57
Channel	2141.739	100-year	Existing Reconciled 2019	11300.00	1014.73	1022.05	1025.09	0.004661	25.32	25.32	446.37	71.96	7.32	6.20	1.79	1.79	1.70	1.70
Channel	2141.739	100-year	Proposed 2019	11300.00	1014.73	1022.17	1025.10	0.004409	24.84	24.84	454.87	72.31	7.44	6.29	1.75	1.75	1.63	1.63
Channel	1957.716	100-year	Existing Reconciled 2019	11300.00	1013.85	1021.19	1024.31	0.004665	25.40	25.40	444.87	71.20	7.34	6.25	1.79	1.79	1.71	1.71
Channel	1957.716	100-year	Proposed 2019	11300.00	1013.85	1021.29	1024.31	0.004445	24.99	24.99	452.22	71.50	7.44	6.32	1.75	1.75	1.65	1.65
Channel	1862.385	100-year	Existing Reconciled 2019	11300.00	1013.36	1020.89	1024.01	0.004529	25.15	25.15	449.34	70.90	7.53	6.34	1.76	1.76	1.67	1.67
Channel	1862.385	100-year	Proposed 2019	11300.00	1013.36	1020.99	1024.10	0.004342	24.79	24.79	455.89	71.19	7.63	6.40	1.73	1.73	1.62	1.62
Channel	1777.700	100-year	Existing Reconciled 2019	11300.00	1012.99	1020.30	1023.49	0.004730	25.45	25.45	443.97	71.80	7.31	6.18	1.80	1.80	1.72	1.72
Channel	1777.700	100-year	Proposed 2019	11300.00	1012.99	1020.39	1023.50	0.004553	25.12	25.12	449.77	72.04	7.39	6.24	1.77	1.77	1.67	1.67
Channel	1602.630	100-year	Existing Reconciled 2019	11300.00	1012.08	1019.37	1022.56	0.004785	25.56	25.56	442.04	71.57	7.29	6.18	1.81	1.81	1.74	1.74
Channel	1602.630	100-year	Proposed 2019	11300.00	1012.08	1019.44	1022.56	0.004628	25.27	25.27	447.09	71.79	7.36	6.23	1.79	1.79	1.69	1.69
Channel	1442.849	100-year	Existing Reconciled 2019	11300.00	1011.63	1019.24	1022.13	0.004227	24.58	24.58	459.65	71.53	7.60	6.43	1.71	1.71	1.59	1.59
Channel	1442.849	100-year	Proposed 2019	11300.00	1011.63	1019.30	1022.13	0.004100	24.33	24.33	464.49	71.74	7.67	6.47	1.69	1.69	1.55	1.55
Channel	1341.067	100-year	Existing Reconciled 2019	11300.00	1011.33	1019.00	1021.86	0.004038	24.26	24.26	465.79	71.36	7.67	6.53	1.67	1.67	1.54	1.54
Channel	1341.067	100-year	Proposed 2019	11300.00	1011.33	1019.06	1021.86	0.003926	24.03	24.03	470.26	71.53	7.73	6.57	1.65	1.65	1.51	1.51

HEC-RAS River: Santa Gertrudis Reach: Channel Profile: 100-year (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Slope	Vel Total	Vel Chnl	Flow Area	Top Width	Max Chl Dpth	Hydr Depth	Froude # Chl	Froude # Chl	Shear Total	Shear Chan
				(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sq ft)	(ft)	(ft)	(ft)			(lb/sq ft)	(lb/sq ft)
Channel	1207.477	100-year	Existing Reconciled 2019	11300.00	1011.04	1018.31	1021.27	0.004518	24.59	24.59	459.53	76.30	7.27	6.02	1.77	1.77	1.62	1.62
Channel	1207.477	100-year	Proposed 2019	11300.00	1011.04	1018.36	1021.25	0.004412	24.39	24.39	463.31	76.48	7.32	6.06	1.75	1.75	1.59	1.59
Channel	1076.728	100-year	Existing Reconciled 2019	11300.00	1010.77	1018.91	1021.32	0.003339	22.69	22.69	497.94	72.97	8.13	6.82	1.53	1.53	1.33	1.33
Channel	1076.728	100-year	Proposed 2019	11300.00	1010.77	1018.98	1021.32	0.003236	22.45	22.45	503.37	73.20	8.21	6.88	1.51	1.51	1.30	1.30
Channel	963.255	100-year	Existing Reconciled 2019	11300.00	1010.55	1018.86	1021.08	0.003093	22.05	22.05	512.50	74.28	8.31	6.90	1.48	1.48	1.25	1.25
Channel	963.255	100-year	Proposed 2019	11300.00	1010.55	1018.92	1021.08	0.003005	21.83	21.83	517.61	74.49	8.37	6.95	1.46	1.46	1.22	1.22
Channel	744.641	100-year	Existing Reconciled 2019	11300.00	1010.11	1020.70	1015.09	0.000122	5.60	5.62	2017.91	226.15	10.59	8.92	0.32	0.32	0.07	0.07
Channel	744.641	100-year	Proposed 2019	11300.00	1010.11	1020.70	1015.09	0.000122	5.60	5.62	2017.91	226.15	10.59	8.92	0.32	0.32	0.07	0.07

SCOUR RESULTS

Hydraulic Design Data – Section 62+11

Contraction Scour

	Left	Channel	Right	
Input Data				
Average Depth (ft):	0.40	7.68	0.36	
Approach Velocity (ft/s):		1.30	9.95	1.20
Br Average Depth (ft):			7.52	
BR Opening Flow (cfs):			11300.00	
BR Top WD (ft):		150.06		
Grain Size D50 (mm):		0.39	0.39	0.39
Approach Flow (cfs):		5.10	11292.00	2.89
Approach Top WD (ft):		9.88	147.88	6.69
K1 Coefficient:	0.640	0.690	0.640	
Results				
Scour Depth Ys (ft):		0.09		
Critical Velocity (ft/s):			1.71	
Equation:	Live			

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose	
Pier Width (ft):	2.00	
Grain Size D50 (mm):		0.39000
Depth Upstream (ft):		7.51
Velocity Upstream (ft/s):		9.70
K1 Nose Shape:	1.00	
Pier Angle:	0.00	
Pier Length (ft):	96.00	
K2 Angle Coef:	1.00	
K3 Bed Cond Coef:	1.10	
Grain Size D90 (mm):		1.50000
K4 Armouring Coef:	1.00	

Results

Scour Depth Ys (ft):	4.80
Froude #:	0.62
Equation:	CSU equation

Pier Scour Limited to Maximum of Ys = 2.4 * a

Abutment Scour

	Left	Right	
Input Data			
Station at Toe (ft):	24.99	177.07	
Toe Sta at appr (ft):	29.17	166.31	
Abutment Length (ft):		15.24	12.06
Depth at Toe (ft):	0.41	1.25	
K1 Shape Coef:	1.00 - Vertical abutment		
Degree of Skew (degrees):		90.00	90.00
K2 Skew Coef:	1.00	1.00	
Projected Length L' (ft):		15.24	12.06
Avg Depth Obstructed Ya (ft):		2.96	3.62
Flow Obstructed Qe (cfs):		414.99	413.14
Area Obstructed Ae (sq ft):		45.14	43.64
Results			
Scour Depth Ys (ft):	16.06	16.34	
Qe/Ae = Ve:	9.19	9.47	
Froude #:	0.94	0.88	
Equation:	Froehlich	Froehlich	

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Channel: 4.89

Left abutment scour + contraction scour (ft): 16.15

Right abutment scour + contraction scour (ft): 16.43

Hydraulic Design Data – 53+01

Contraction Scour

	Left	Channel	Right	
Input Data				
Average Depth (ft):	0.66	7.73	0.12	
Approach Velocity (ft/s):		4.18	9.88	0.58
Br Average Depth (ft):			8.42	
BR Opening Flow (cfs):			11300.00	
BR Top WD (ft):		182.02		
Grain Size D50 (mm):		0.59	0.59	0.59
Approach Flow (cfs):		36.25	11263.65	0.10
Approach Top WD (ft):		13.12	147.50	1.46
K1 Coefficient:	0.640	0.690	0.640	
Results				
Scour Depth Ys (ft):		0.00		
Critical Velocity (ft/s):			1.96	
Equation:	Live			

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose	
Pier Width (ft):	1.25	
Grain Size D50 (mm):		0.59000
Depth Upstream (ft):		8.60
Velocity Upstream (ft/s):		6.90
K1 Nose Shape:	1.00	
Pier Angle:	27.00	
Pier Length (ft):	40.00	
K2 Angle Coef:	3.32	
K3 Bed Cond Coef:	1.10	
Grain Size D90 (mm):		1.50000
K4 Armouring Coef:	1.00	

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	12.28	
Froude #:	0.41	
Equation:	CSU equation	

Abutment Scour

	Left	Right	
Input Data			
Station at Toe (ft):	1.00	201.00	
Toe Sta at appr (ft):	17.91	173.91	
Abutment Length (ft):		13.12	2.53
Depth at Toe (ft):	-2.02	0.03	
K1 Shape Coef:	1.00 - Vertical abutment		
Degree of Skew (degrees):		90.00	90.00
K2 Skew Coef:	1.00	1.00	
Projected Length L' (ft):		13.12	2.53
Avg Depth Obstructed Ya (ft):		0.66	3.33
Flow Obstructed Qe (cfs):		36.25	81.51
Area Obstructed Ae (sq ft):		8.67	8.42
Results			
Scour Depth Ys (ft):	5.77	9.78	
Qe/Ae = Ve:	4.18	9.68	
Froude #:	0.91	0.93	
Equation:	Froehlich	Froehlich	

Hydraulic Design Data – 52+48.5

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	0.06	8.60	
Approach Velocity (ft/s):		0.24	6.90
Br Average Depth (ft):			7.93
BR Opening Flow (cfs):			11300.00
BR Top WD (ft):		183.86	
Grain Size D50 (mm):		0.59	0.59
Approach Flow (cfs):		0.01	11299.99
Approach Top WD (ft):		0.56	190.64
K1 Coefficient:	0.590	0.690	
Results			
Scour Depth Ys (ft):		0.89	
Critical Velocity (ft/s):			2.00
Equation:	Live		

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.25
Grain Size D50 (mm):	0.59000
Depth Upstream (ft):	8.10
Velocity Upstream (ft/s):	7.28
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	29.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	1.50000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	3.00
Froude #:	0.45
Equation:	CSU equation

Pier Scour Limited to Maximum of Ys = 2.4 * a

Abutment Scour

	Left	Right	
Input Data			
Station at Toe (ft):	3.00	203.00	
Toe Sta at appr (ft):	3.00	203.00	
Abutment Length (ft):		0.56	0.00
Depth at Toe (ft):	-2.66	-2.04	
K1 Shape Coef:	1.00 - Vertical abutment		
Degree of Skew (degrees):		90.00	90.00
K2 Skew Coef:	1.00	1.00	
Projected Length L' (ft):		0.56	0.00
Avg Depth Obstructed Ya (ft):		0.06	
Flow Obstructed Qe (cfs):		0.01	
Area Obstructed Ae (sq ft):		0.04	
Results			
Scour Depth Ys (ft):	0.18		
Qe/Ae = Ve:	0.25		
Froude #:	0.18		
Equation:	Froehlich Default		

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Channel: 3.89

Left abutment scour + contraction scour (ft): 0.18

Hydraulic Design Data – 51+05

Hydraulic Design Data

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):		8.05	
Approach Velocity (ft/s):			7.31
Br Average Depth (ft):			8.46
BR Opening Flow (cfs):			11300.00
BR Top WD (ft):		172.15	
Grain Size D50 (mm):			0.14
Approach Flow (cfs):			11300.00
Approach Top WD (ft):			192.20
K1 Coefficient:		0.690	
Results			
Scour Depth Ys (ft):		0.23	
Critical Velocity (ft/s):			1.22
Equation:	Live		

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose	
Pier Width (ft):	1.25	
Grain Size D50 (mm):		0.14000
Depth Upstream (ft):		8.65
Velocity Upstream (ft/s):		7.26
K1 Nose Shape:	1.00	
Pier Angle:	0.00	
Pier Length (ft):	77.00	
K2 Angle Coef:	1.00	
K3 Bed Cond Coef:	1.10	
Grain Size D90 (mm):		1.50000
K4 Armouring Coef:	1.00	

Results

Scour Depth Ys (ft):	3.00
Froude #:	0.44
Equation:	CSU equation

Pier Scour Limited to Maximum of Ys = 2.4 * a

Abutment Scour

	Left	Right	
Input Data			
Station at Toe (ft):	141.00	332.51	
Toe Sta at appr (ft):	29.06	232.00	
Abutment Length (ft):		0.57	0.00
Depth at Toe (ft):	-3.78	-4.53	
K1 Shape Coef:	1.00 - Vertical abutment		
Degree of Skew (degrees):		90.00	90.00
K2 Skew Coef:	1.00	1.00	
Projected Length L' (ft):		0.57	0.00
Avg Depth Obstructed Ya (ft):		8.05	
Flow Obstructed Qe (cfs):		33.45	
Area Obstructed Ae (sq ft):		4.58	
Results			
Scour Depth Ys (ft):	11.66		
Qe/Ae = Ve:	7.30		
Froude #:	0.45		
Equation:	Froehlich Default		

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Channel: 3.23

Left abutment scour + contraction scour (ft): 11.89

Hydraulic Design Data – 49+43

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):		8.42	
Approach Velocity (ft/s):			7.77
Br Average Depth (ft):			8.47
BR Opening Flow (cfs):			11300.00
BR Top WD (ft):		161.23	
Grain Size D50 (mm):			0.14
Approach Flow (cfs):			11300.00
Approach Top WD (ft):			172.79
K1 Coefficient:		0.690	
Results			
Scour Depth Ys (ft):		0.36	
Critical Velocity (ft/s):			1.23
Equation:	Live		

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.50
Grain Size D50 (mm):	0.14000
Depth Upstream (ft):	8.68
Velocity Upstream (ft/s):	7.63
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	69.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	1.50000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	3.60
Froude #:	0.46
Equation:	CSU equation

Pier Scour Limited to Maximum of Ys = 2.4 * a

Abutment Scour

	Left	Right	
Input Data			
Station at Toe (ft):	266.00	445.01	
Toe Sta at appr (ft):	231.03	413.69	
Abutment Length (ft):		2.30	3.29
Depth at Toe (ft):	-2.94	-3.10	
K1 Shape Coef:	1.00 - Vertical abutment		
Degree of Skew (degrees):		90.00	90.00
K2 Skew Coef:	1.00	1.00	
Projected Length L' (ft):		2.30	3.29
Avg Depth Obstructed Ya (ft):		8.42	8.42
Flow Obstructed Qe (cfs):		150.72	214.93
Area Obstructed Ae (sq ft):		19.40	27.67
Results			
Scour Depth Ys (ft):	15.34	16.49	
Qe/Ae = Ve:	7.77	7.77	
Froude #:	0.47	0.47	
Equation:	Froehlich	Froehlich	

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Channel: 3.96

Left abutment scour + contraction scour (ft): 15.70

Right abutment scour + contraction scour (ft): 16.85

Hydraulic Design Data – 48+38.5

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):		8.31	
Approach Velocity (ft/s):			7.76
Br Average Depth (ft):			5.70
BR Opening Flow (cfs):			11300.00
BR Top WD (ft):		146.74	
Grain Size D50 (mm):		0.15	0.15 0.15
Approach Flow (cfs):			11300.00
Approach Top WD (ft):			175.25
K1 Coefficient:	0.640	0.690	
Results			
Scour Depth Ys (ft):		3.69	
Critical Velocity (ft/s):			1.26
Equation:	Live		

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.67
Grain Size D50 (mm):	0.15000
Depth Upstream (ft):	6.90
Velocity Upstream (ft/s):	10.38
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	30.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	1.50000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	4.01
Froude #:	0.70
Equation:	CSU equation

Pier Scour Limited to Maximum of Ys = 2.4 * a

Abutment Scour

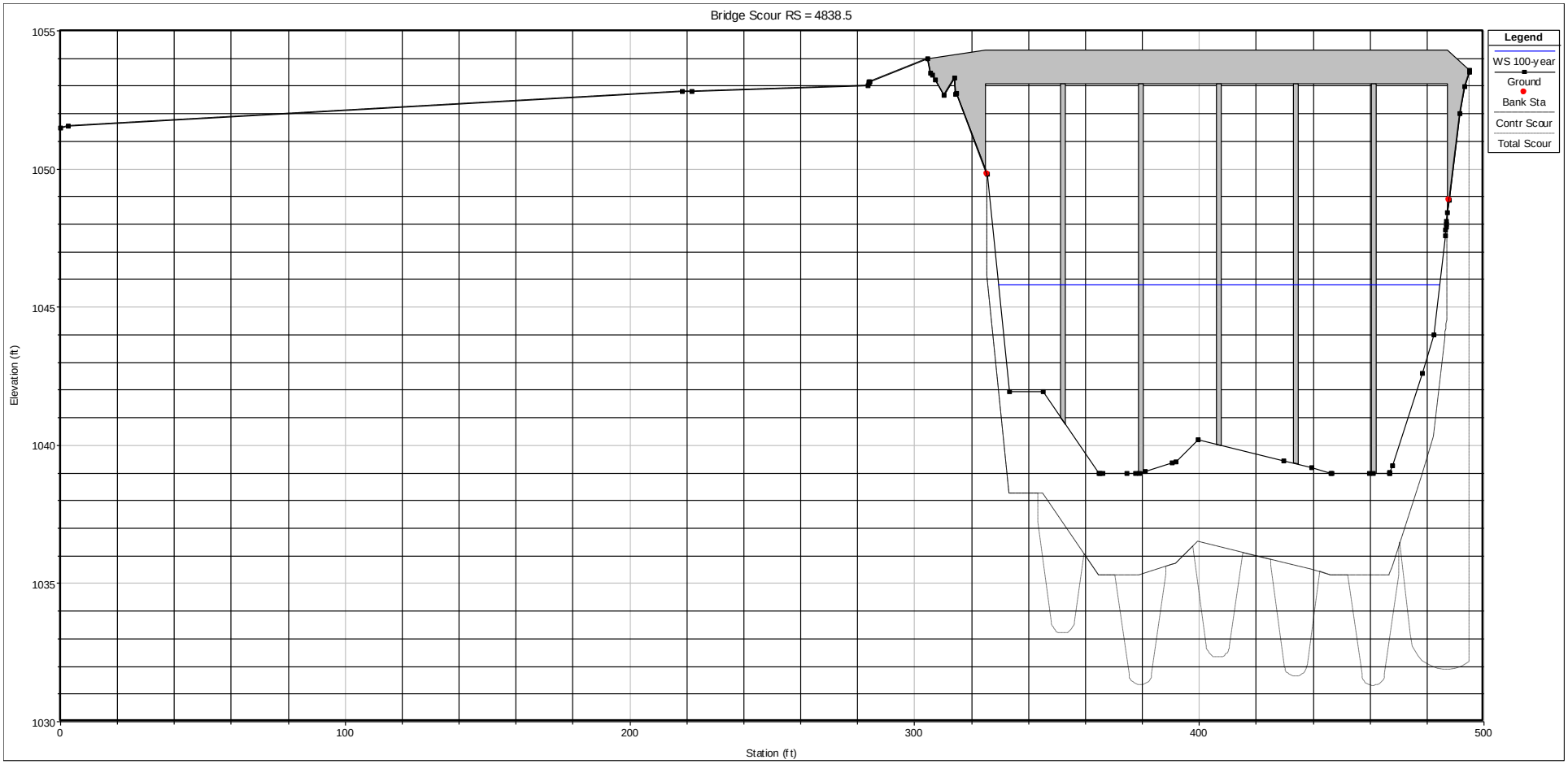
	Left	Right	
Input Data			
Station at Toe (ft):	325.00	487.00	
Toe Sta at appr (ft):	349.23	526.68	
Abutment Length (ft):		0.00	0.79
Depth at Toe (ft):	-2.83	-1.11	
K1 Shape Coef:	1.00 - Vertical abutment		
Degree of Skew (degrees):		90.00	90.00
K2 Skew Coef:	1.00	1.00	
Projected Length L' (ft):		0.00	0.79
Avg Depth Obstructed Ya (ft):			8.31
Flow Obstructed Qe (cfs):			50.84
Area Obstructed Ae (sq ft):			6.55
Results			
Scour Depth Ys (ft):		12.66	
Qe/Ae = Ve:		7.76	
Froude #:	0.47		
Equation: Default	Froehlich		

Combined Scour Depths

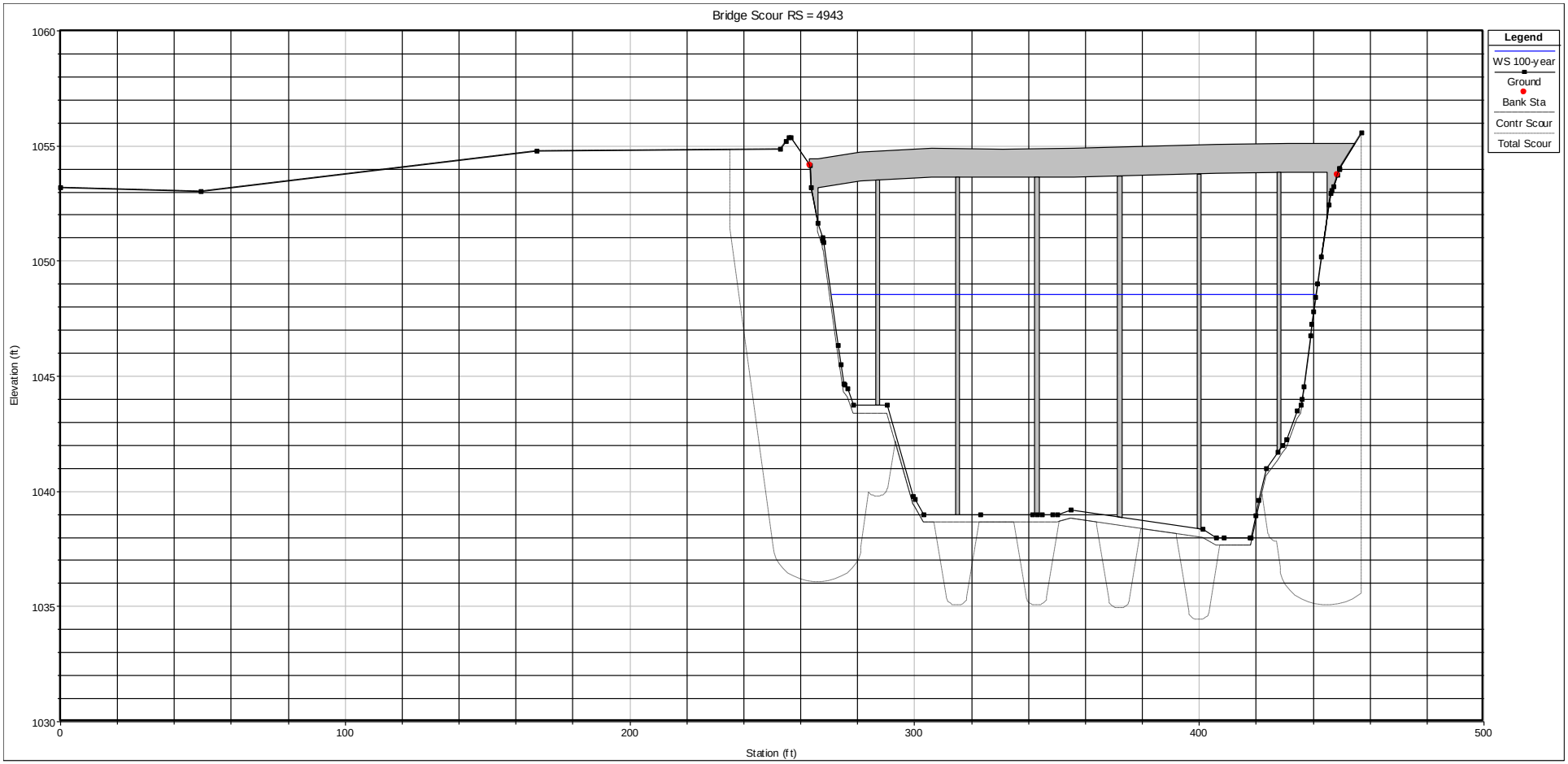
Pier Scour + Contraction Scour (ft):

Channel: 7.70

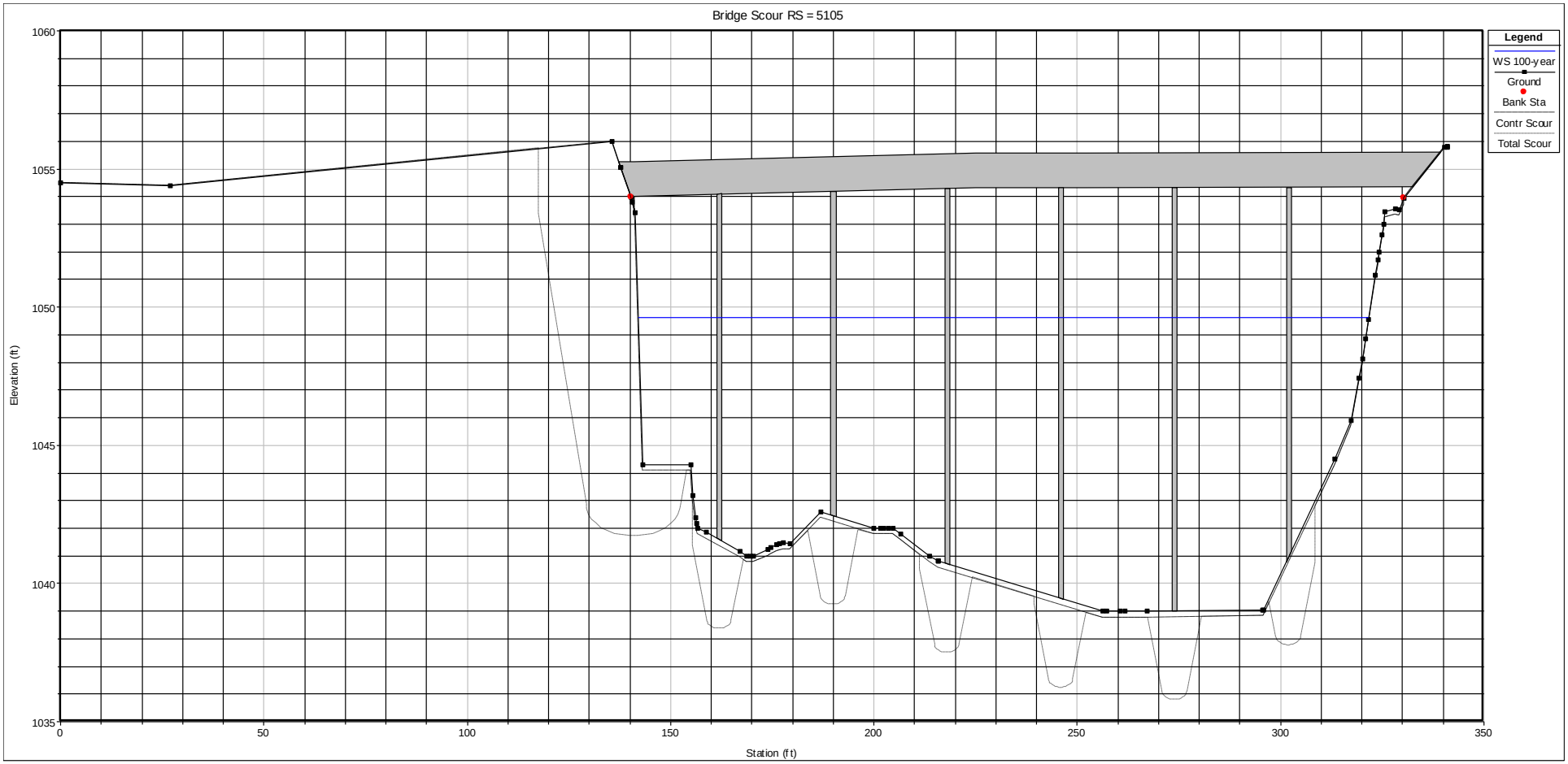
Right abutment scour + contraction scour (ft): 16.35



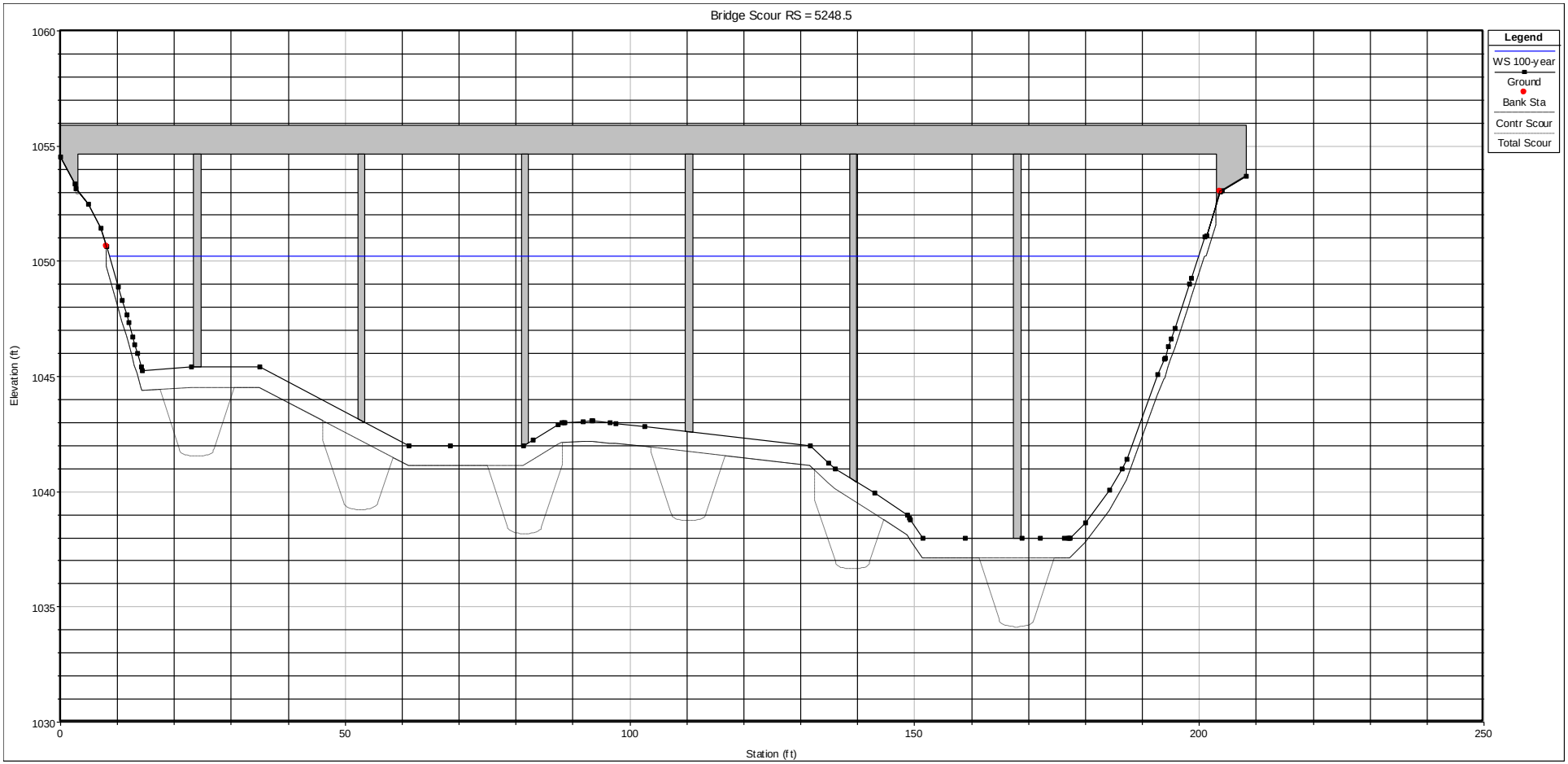
I-15 Southbound Ramp (Station 48+38.5)



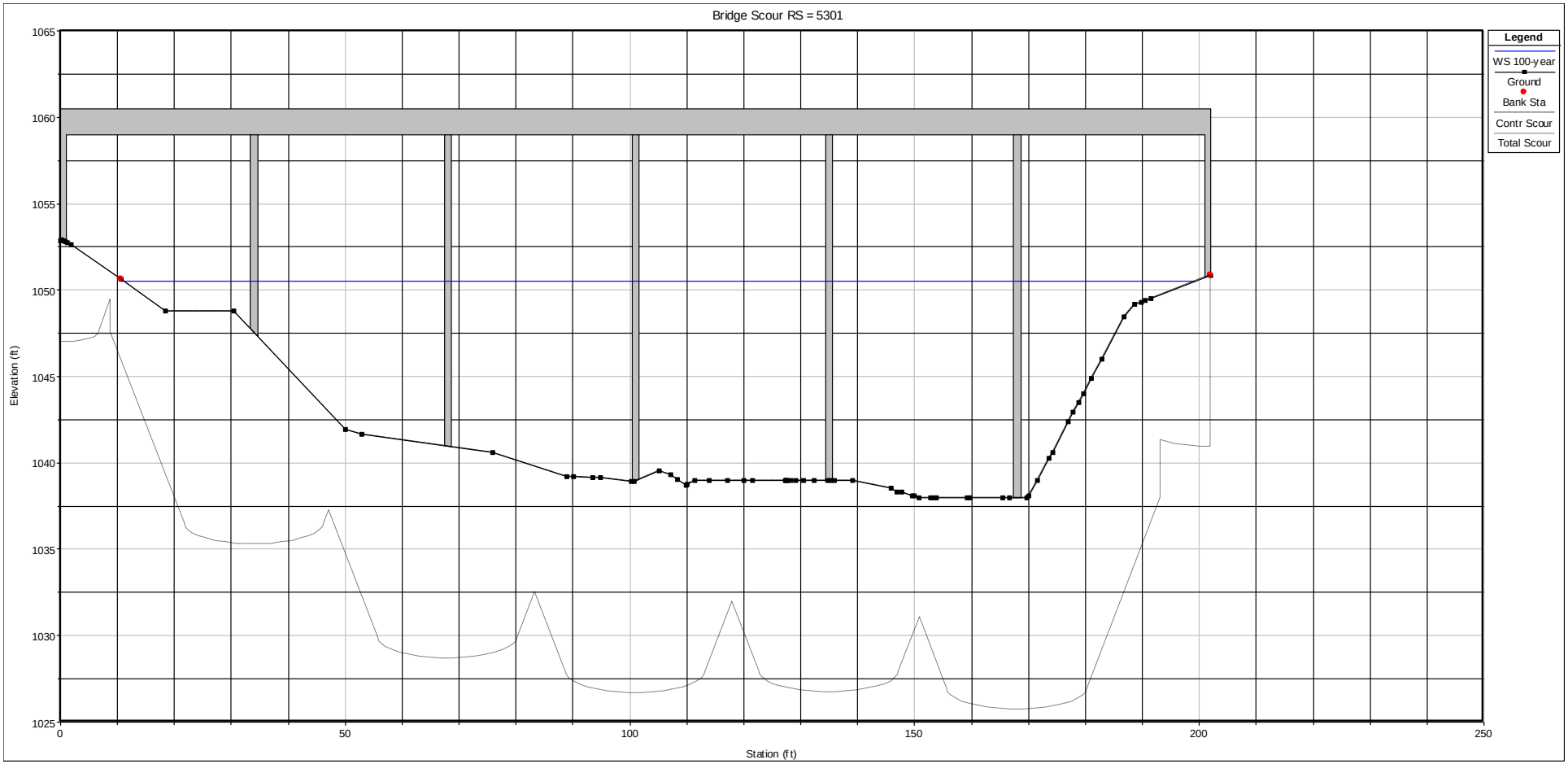
I-15 Southbound (Station 49+43)



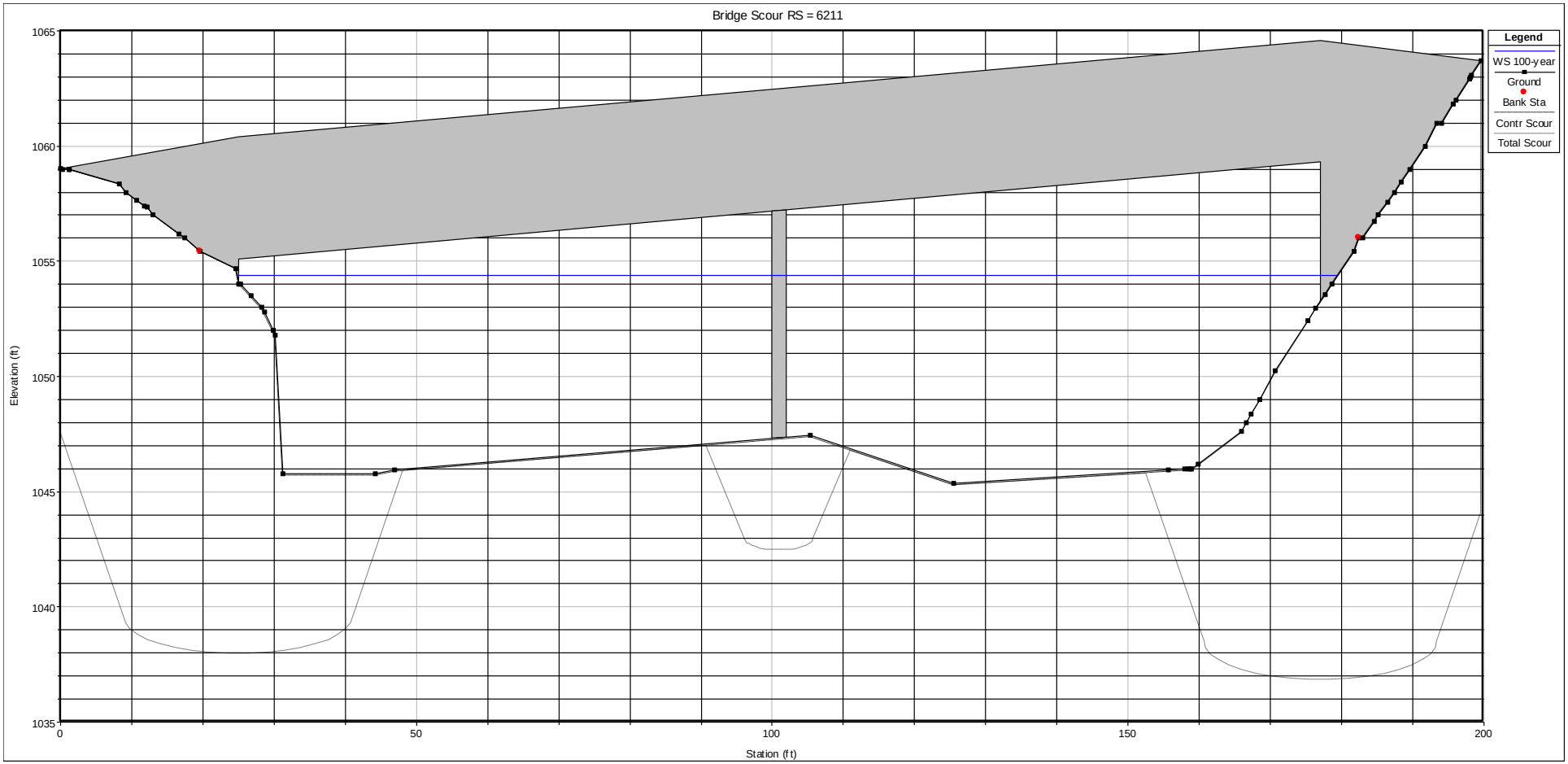
I-15 Northbound (Station 51+05)



Existing I-15 Northbound Ramp (Station 52+48.5)

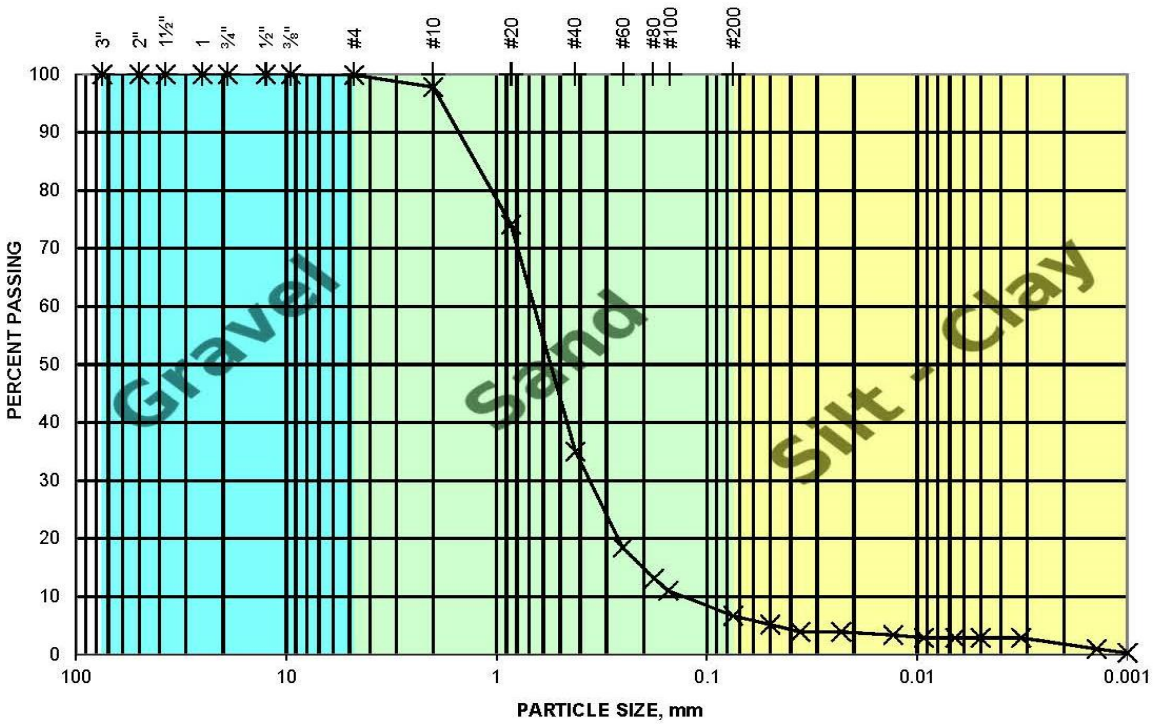


New/Proposed I-15 Northbound Ramp



Ynez Road (Station 62+11)

Sample Locations



SAMPLE ID	SAMPLE DESCRIPTION
S-2	SP-SM - SAND with Silt

D_{60} (mm)	D_{50} (mm)	D_{30} (mm)	D_{10} (mm)	C_c	C_u
0.70	0.59	0.37	0.13	1.50	5.24

GEOCON WEST, INC.
ENVIRONMENTAL GEOTECHNICAL MATERIALS
41571 CORNING PLACE - SUITE 101 - MURRIETA, CA 92562
PHONE (951) 304-2300 - FAX (951) 304-2392

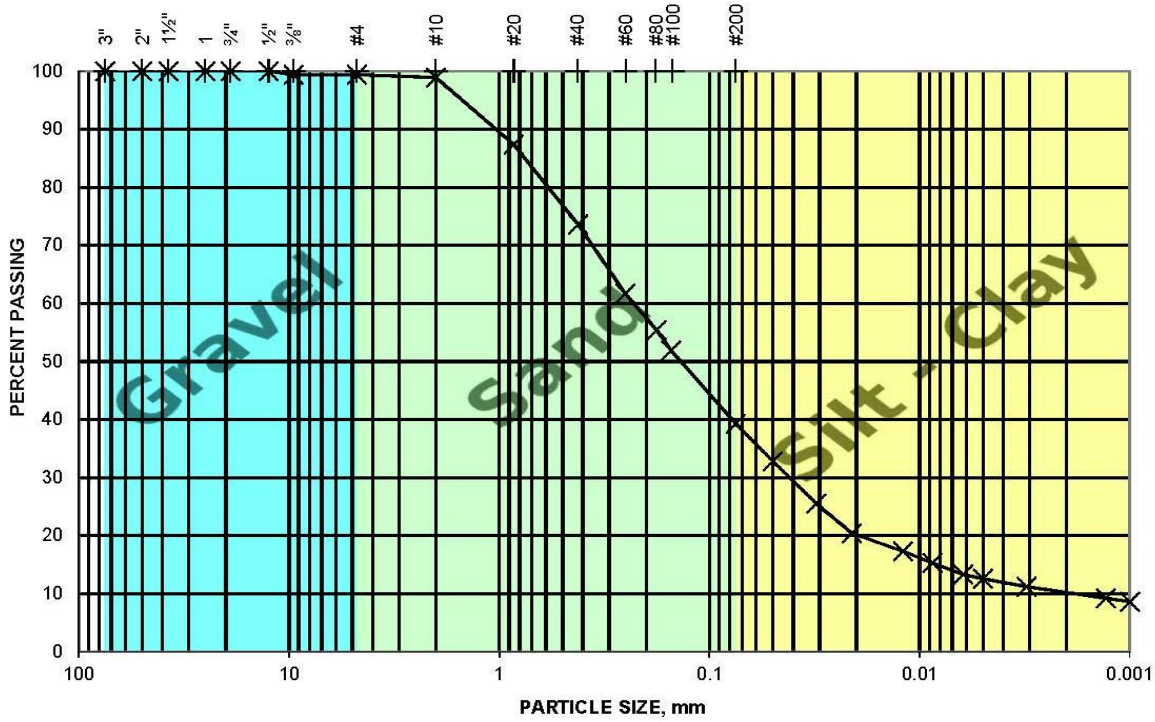
CER / CER

GRAIN SIZE DISTRIBUTION

SANTA GERTRUDIS CREEK
PEDESTRIAN/BICYCLE TRAIL
FROM YNEZ ROAD TO DIAZ ROAD
TEMECULA, CALIFORNIA

JANUARY, 2014 | PROJECT NO. T2471-62-01 | FIG 1

Grain Size Distribution Curve (S-2)



SAMPLE ID	SAMPLE DESCRIPTION
S-3	SM - Silty SAND

D_{60} (mm)	D_{50} (mm)	D_{30} (mm)	D_{10} (mm)	C_c	C_u
0.23	0.14	0.043	0.0020	3.9	114.4

GEOCON WEST, INC.
ENVIRONMENTAL GEOTECHNICAL MATERIALS
41571 CORNING PLACE - SUITE 101 - MURRIETA, CA 92562
PHONE (951) 304-2300 - FAX (951) 304-2392

CER / CER

GRAIN SIZE DISTRIBUTION
SANTA GERTRUDIS CREEK
PEDESTRIAN/BICYCLE TRAIL
FROM YNEZ ROAD TO DIAZ ROAD
TEMECULA, CALIFORNIA

JANUARY, 2014 | PROJECT NO. T2471-62-01 | FIG 2

Grain Size Distribution Curve (S-3)

HECRAS OUTPUT

Detailed Report

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Santa Gertrudis Creek
Project File : SantaGertrudisCreek.prj
Run Date and Time: 11/1/2019 10:06:03 AM

Project in English units

Project Description:
Santa Gertrudis Creek Bike Trail
Hydraulics and Scour Analysis
February 2014
Subcontract to Hall & Foreman Inc. - Temecula

PLAN DATA

Plan Title: Proposed Condition 2019
Plan File : C:\Projects\Santa Gertrudis Creek Biketrail\HECRAS\HEC-RAS Model\SantaGertrudisCreek.p10

Geometry Title: Proposed Condition 2019
Geometry File : C:\Projects\Santa Gertrudis Creek Biketrail\HECRAS\HEC-RAS Model\SantaGertrudisCreek.g08

Flow Title : Existing
Flow File : C:\Projects\Santa Gertrudis Creek Biketrail\HECRAS\HEC-RAS Model\SantaGertrudisCreek.f01

Plan Summary Information:

Number of:	Cross Sections	= 45	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 7	Lateral Structures	=	0

Computational Information

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

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

FLOW DATA

Flow Title: Existing
Flow File : C:\Projects\Santa Gertrudis Creek Biketrail\HECRAS\HEC-RAS Model\SantaGertrudisCreek.f01

Flow Data (cfs)

River	Reach	RS	100-year
Santa Gertrudis	Channel	6643.382	11300

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Santa Gertrudis	Channel	100-year	Critical	Known WS = 1020.7

Observed Water Surface Marks

River	Reach	RS	100-year
Santa Gertrudis	Channel	4357.147	1037.3
Santa Gertrudis	Channel	4191.443	1036.3
Santa Gertrudis	Channel	4044.332	1035.7
Santa Gertrudis	Channel	3992	1035.7
Santa Gertrudis	Channel	3946.834	1035.3
Santa Gertrudis	Channel	3794.324	1034.7
Santa Gertrudis	Channel	3625.899	1029.4
Santa Gertrudis	Channel	3393.888	1028.1
Santa Gertrudis	Channel	3134.305	1026.9
Santa Gertrudis	Channel	2955.332	1026.1
Santa Gertrudis	Channel	2690.770	1025
Santa Gertrudis	Channel	2577.225	1024.8
Santa Gertrudis	Channel	2403.592	1023.8
Santa Gertrudis	Channel	2270.565	1024.7
Santa Gertrudis	Channel	2141.739	1023.8
Santa Gertrudis	Channel	1957.716	1023.3
Santa Gertrudis	Channel	1862.385	1022.6
Santa Gertrudis	Channel	1777.700	1022.2
Santa Gertrudis	Channel	1602.630	1021.9
Santa Gertrudis	Channel	1442.849	1021.2
Santa Gertrudis	Channel	1341.067	1021
Santa Gertrudis	Channel	1207.477	1020.8
Santa Gertrudis	Channel	1076.728	1024
Santa Gertrudis	Channel	963.255	1022.1

GEOMETRY DATA

Geometry Title: Proposed Condition 2019
Geometry File : C:\Projects\Santa Gertrudis Creek Biketrail\HECRAS\HEC-RAS Model\SantaGertrudisCreek.g08

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 6643.382

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1056.65	4.77	1056.3	9.08	1056	25.39	1046.65	30.31	1044
31.94	1044	40.47	1044.05	40.85	1044.05	53.85	1045.99	54.15	1046
55.12	1046	74.16	1045.41	75.53	1045.49	75.72	1045.49	75.91	1045.49
82.75	1046	82.76	1046	82.98	1046.01	83.14	1046.02	95.02	1046.63
104.19	1047	104.29	1047	104.33	1047	105.17	1046.98	105.33	1046.97
105.78	1046.96	119.01	1046.63	127.65	1046.38	127.86	1046.37	141.94	1046.65
143.4	1047.6	146.75	1049.73	148.91	1051.11	149.09	1051.23	150.65	1051.59
166.33	1055.33	177.99	1058.99	180.47	1059.85				

Manning's n Values num= 1

Sta	n Val
0	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.08	166.33	120	120	120	.1	.3

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 6523.379

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1056	3.96	1056	4.15	1056	5.22	1056	6.54	1056
10.68	1055.97	43.56	1049.22	57.98	1044	58.45	1044	60.1	1044
61.04	1044	84.08	1045.94	84.77	1046	94.71	1046.12	96.47	1046.14
99.26	1046.16	109.39	1046.09	111.73	1046.07	117.69	1046	141.82	1047.59
148.71	1048.05	163.17	1049.33	164.91	1050.39	166.14	1051.18	166.52	1051.42
167.58	1052.11	169.65	1053.46	173.16	1054.27	182.53	1054.87	183.58	1055.32
186.56	1055.65	187.36	1055.63	189.79	1056.1				

Manning's n Values num= 1

Sta	n Val
0	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.68	187.36	112.06	112.06	112.06	.1	.3

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 6411.317

INPUT
Description:
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1055.92	20.97	1054.22	23.8	1054	24.1	1051	37.1	1051
50	1047.557	60.4	1045	63.46	1044	66.06	1044.16	66.83	1044.22
68.16	1044.26	68.49	1044.29	70.8	1044.42	71	1044.43	78.82	1044.47
88.86	1044.94	89.52	1044.95	90.99	1044.96	91.67	1044.96	95.17	1045.11
103.35	1045.53	104.8	1045.56	108.46	1045.84	110.66	1046	110.81	1046
111.2	1046	137.11	1047.04	157.03	1048	159.6	1048	159.67	1048.05
160.37	1048.4	169.65	1053.03	170.35	1053.43	171.68	1054	176.22	1054.61

```
  183.57 1055.23

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03    24.1    .013      50     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          23.8  171.68           138.37  138.37  138.37             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 6272.947

INPUT
Description: Upstream Approach Ynez Road Bridge
Station Elevation Data    num=      61
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1059.01     .33    1059    1.25    1059    1.28    1059     8.2 1058.34
    9.19    1058   10.65 1057.64   11.82 1057.39   12.17 1057.36   13.02    1057
   16.65 1056.19   17.39    1056   19.62 1055.43   24.64 1054.68   25.05    1054
   25.21    1054   25.31    1054   26.72  1053.5   28.29    1053   28.63 1052.78
   29.86    1052   30.21 1051.78    31.2  1045.8    44.2  1045.8   46.96 1045.95
  105.38 1047.46  125.45 1045.38  155.62 1045.93  157.96    1046  158.32    1046
  158.57    1046  158.84    1046  158.85    1046  159.88 1046.19   165.9 1047.62
  166.62    1048   167.3 1048.38  168.43    1049  170.72 1050.23  175.23 1052.44
  176.39 1052.96   177.7 1053.56  178.68    1054   181.8 1055.45  182.44    1056
  183.01    1056  184.57 1056.72  185.19    1057  186.45 1057.57   187.4    1058
  188.43 1058.46  189.62    1059  191.77 1059.99  193.37    1061  194.01    1061
  195.69 1061.81  196.08    1062  197.98 1062.91  198.15    1063   198.3 1063.08
  199.61  1063.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016    31.2    .013   46.96     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19.62  182.44           110.01  110.01  110.01             .3       .5

BRIDGE


RIVER: Santa Gertrudis
REACH: Channel            RS: 6211

INPUT
Description: Ynez Road Bridge
Distance from Upstream XS =       3
Deck/Roadway Width        =      96
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0    1059              25  1060.4  1055.1     177  1064.6  1059.3
     200  1063.7

Upstream Bridge Cross Section Data
Station Elevation Data    num=      61
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1059.01     .33    1059    1.25    1059    1.28    1059     8.2 1058.34
    9.19    1058   10.65 1057.64   11.82 1057.39   12.17 1057.36   13.02    1057
   16.65 1056.19   17.39    1056   19.62 1055.43   24.64 1054.68   25.05    1054
   25.21    1054   25.31    1054   26.72  1053.5   28.29    1053   28.63 1052.78
   29.86    1052   30.21 1051.78    31.2  1045.8    44.2  1045.8   46.96 1045.95
  105.38 1047.46  125.45 1045.38  155.62 1045.93  157.96    1046  158.32    1046
  158.57    1046  158.84    1046  158.85    1046  159.88 1046.19   165.9 1047.62
  166.62    1048   167.3 1048.38  168.43    1049  170.72 1050.23  175.23 1052.44
  176.39 1052.96   177.7 1053.56  178.68    1054   181.8 1055.45  182.44    1056
```

```
  183.01    1056  184.57 1056.72  185.19    1057  186.45 1057.57   187.4    1058
  188.43 1058.46  189.62    1059  191.77 1059.99  193.37    1061  194.01    1061
  195.69 1061.81  196.08    1062  197.98 1062.91  198.15    1063   198.3 1063.08
  199.61  1063.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016    31.2    .013   46.96     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
         19.62  182.44             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1058.7              11  1060.4  1055.1     163  1064.6  1059.3
     183    1064

Downstream Bridge Cross Section Data
Station Elevation Data    num=      62
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -15.5  1059.9    -2.5  1059.9       0 1058.78      .2 1058.72    2.41    1058
    2.94    1058    4.26 1057.61    5.57 1057.06    5.63 1057.09    5.76    1057
    6.94 1056.62    8.16    1056    9.72 1055.24   11.41 1054.52   11.82 1054.41
   11.83 1054.41   11.84 1054.59   11.87 1054.71   11.88 1054.84   13.83 1054.34
   14.96 1053.78   15.98 1053.25    17.6  1046.3    30.6  1046.3      90 1046.22
   99.51 1045.23  101.19 1045.26  102.52 1045.83  105.47 1047.06  128.74  1045.7
   137.7 1045.82  139.74 1045.86  147.49    1046  148.19 1046.19  148.57 1046.44
  149.08 1046.76  150.32 1047.51  151.53 1048.26  155.46 1050.72  155.61 1050.82
  155.91    1051  156.45 1051.34  157.63  1052.1  158.03 1052.28  162.17 1054.43
  165.67    1056  165.85 1056.08  166.24 1056.25  167.84    1057   168.6 1057.36
  170.08    1058   170.7 1058.29  172.28    1059   173.6 1059.62  174.91 1060.23
  176.54    1061  177.15 1061.28  178.68    1062  179.72 1062.44  180.97    1063
  182.32 1063.54  183.33 1063.98

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
   -15.5    .013    30.6     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
         11.88  162.17             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream=     101    Downstream=      87
Upstream     num=       2
    Width   Elev    Width   Elev
       2    1045       2    1058
Downstream     num=       2
    Width   Elev    Width   Elev
       2    1045       2    1058

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =    1.33
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
```

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

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

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 6162.934

INPUT
Description: Downstream Exit Ynez Road Bridge
Station Elevation Data    num=      62
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -15.5  1059.9    -2.5  1059.9       0 1058.78      .2 1058.72    2.41    1058
    2.94    1058    4.26 1057.61    5.57 1057.06    5.63 1057.09    5.76    1057
    6.94 1056.62    8.16    1056    9.72 1055.24   11.41 1054.52   11.82 1054.41
   11.83 1054.41   11.84 1054.59   11.87 1054.71   11.88 1054.84   13.83 1054.34
   14.96 1053.78   15.98 1053.25    17.6  1046.3    30.6  1046.3      90 1046.22
   99.51 1045.23  101.19 1045.26  102.52 1045.83  105.47 1047.06  128.74  1045.7
   137.7 1045.82  139.74 1045.86  147.49    1046  148.19 1046.19  148.57 1046.44
  149.08 1046.76  150.32 1047.51  151.53 1048.26  155.46 1050.72  155.61 1050.82
  155.91    1051  156.45 1051.34  157.63  1052.1  158.03 1052.28  162.17 1054.43
  165.67    1056  165.85 1056.08  166.24 1056.25  167.84    1057   168.6 1057.36
  170.08    1058   170.7 1058.29  172.28    1059   173.6 1059.62  174.91 1060.23
  176.54    1061  177.15 1061.28  178.68    1062  179.72 1062.44  180.97    1063
  182.32 1063.54  183.33 1063.98

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
   -15.5    .013    30.6     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         11.88  162.17            181.6   181.6   181.6             .3       .5

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 5981.337

INPUT
Description:
Station Elevation Data    num=      41
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1055.75    5.53 1054.04     6.2 1053.87    6.48  1053.9    9.32  1053.1
    9.55 1053.04    9.73    1053    15.6  1052.5    28.6  1052.5   31.57 1047.55
   32.38 1047.05    34.4 1046.63   41.93  1045.2   42.25 1045.14   42.76 1045.03
   60.97  1044.8   66.62 1044.74  134.16    1044  134.82    1044  135.72    1044
  135.79    1044  138.33 1044.42  145.39 1045.13  146.73 1045.52  161.12 1047.18
  162.96 1048.32  164.08 1048.88   165.9    1050  166.46 1050.14  167.15 1050.25
  172.16    1051  173.37 1051.07  173.62 1051.07  173.96  1051.1  175.67 1051.16
  178.49 1051.21  178.96 1051.25   186.2  1052.3  186.85  1052.4  188.51 1052.68
  190.19 1052.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03    15.6    .013   31.57     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          28.6  173.37            164.51  164.51  164.51             .1       .3
```

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 5816.827

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1057.9	.07	1057.86	3.84	1056.01	12.22	1054.62	15.5	1051.8
28.5	1051.8	32.27	1048.11	38.83	1045.44	42.64	1045.19	49.16	1044.1
49.65	1044	50.01	1043.91	54.4	1042.16	54.79	1042	55	1041.92
55.16	1041.84	55.21	1041.86	56	1041.46	56.14	1041.51	60.8	1039.48
61.62	1039.53	108.27	1041.76	111.28	1041.9	115.71	1042.14	147.9	1043.08
147.93	1043.09	148.09	1043.1	148.18	1043.1	148.33	1043.11	149.22	1043.17
150.3	1043.27	155.81	1044	158.6	1044.49	167.49	1046.38	169.66	1047.67
172.51	1048.81	174.95	1049.93	177.5	1051.35	181.34	1052	189.16	1052.7
190.44	1052.82								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	15.5	.013	32.27	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
28.5	177.5	148.79	148.79	148.79	.1	.3

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 5668.033

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1058.72	6.1	1055.57	15.5	1049.88	27.48	1049.88	30.3	1048.07
38.8	1044.36	40.51	1043.65	48.67	1039	50.46	1039	53.07	1039
56.56	1040.1	58.2	1041	59.34	1041.4	63.64	1042.54	66.27	1043
71.64	1043.22	82.57	1043.32	84.24	1042.72	86.91	1042.49	90.59	1041.06
90.76	1041	91.1	1040.96	103.43	1040.72	105.88	1041.46	108.36	1042.46
108.87	1042.72	109.56	1043	115.15	1043	118.89	1043	121.54	1043
123.23	1042.65	126.66	1042	131.61	1041.74	139.8	1041.29	155.93	1041.89
156.9	1041.81	156.95	1041.82	158.92	1043.07	160.64	1044.18	164.08	1046.39
171.37	1049	174.98	1050.33	184.59	1051.91	186.15	1051.95	186.4	1051.97

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	15.5	.013	48.67	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
27.48	174.98	253.85	253.85	253.85	.1	.3

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 5414.180

INPUT
Description:
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1052.85	.25	1052.89	.4	1052.84	.44	1052.84	.55	1052.84
.77	1052.8	1.18	1052.75	1.78	1052.62	10.57	1050.62	18.5	1048.8
30.5	1048.8	50	1041.95	52.88	1041.66	75.93	1040.59	88.98	1039.23
90.16	1039.19	93.52	1039.14	94.77	1039.13	100.32	1038.95	100.8	1038.93

```
  105.22 1039.56  107.23 1039.34  108.31 1039.02  109.88 1038.72  109.99 1038.74
  111.42    1039     114    1039  117.16    1039  119.94    1039   121.6    1039
  127.35    1039  127.45    1039  127.51    1039  127.55    1039  128.36    1039
  129.14    1039  130.45    1039  132.33    1039  134.69    1039  135.25    1039
   135.9    1039  139.17    1039  145.88 1038.54  146.87 1038.31  147.71  1038.3
  149.54 1038.11  149.89 1038.09  150.78    1038  152.84    1038  153.24    1038
  153.86    1038   159.3    1038  159.75    1038  165.56    1038   166.7    1038
  169.64    1038  170.08 1038.11  171.52    1039  173.66 1040.27  174.19 1040.59
  177.01 1042.36   177.9 1042.93  178.76 1043.47   179.6    1044  181.09  1044.9
  182.83    1046  186.73 1048.43  188.67  1049.2  189.81 1049.31  190.44 1049.38
  191.56  1049.5  202.07 1050.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03    18.5    .013      50     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         10.57  202.07           134.59  134.59  134.59             .1       .3

BRIDGE


RIVER: Santa Gertrudis
REACH: Channel            RS: 5301

INPUT
Description: New Bridge
Distance from Upstream XS =      93
Deck/Roadway Width        =      40
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1060.5               1  1060.5    1059     201  1060.5    1059
     202  1060.5

Upstream Bridge Cross Section Data
Station Elevation Data    num=      72
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1052.85     .25 1052.89      .4 1052.84     .44 1052.84     .55 1052.84
     .77  1052.8    1.18 1052.75    1.78 1052.62   10.57 1050.62    18.5  1048.8
    30.5  1048.8      50 1041.95   52.88 1041.66   75.93 1040.59   88.98 1039.23
   90.16 1039.19   93.52 1039.14   94.77 1039.13  100.32 1038.95   100.8 1038.93
  105.22 1039.56  107.23 1039.34  108.31 1039.02  109.88 1038.72  109.99 1038.74
  111.42    1039     114    1039  117.16    1039  119.94    1039   121.6    1039
  127.35    1039  127.45    1039  127.51    1039  127.55    1039  128.36    1039
  129.14    1039  130.45    1039  132.33    1039  134.69    1039  135.25    1039
   135.9    1039  139.17    1039  145.88 1038.54  146.87 1038.31  147.71  1038.3
  149.54 1038.11  149.89 1038.09  150.78    1038  152.84    1038  153.24    1038
  153.86    1038   159.3    1038  159.75    1038  165.56    1038   166.7    1038
  169.64    1038  170.08 1038.11  171.52    1039  173.66 1040.27  174.19 1040.59
  177.01 1042.36   177.9 1042.93  178.76 1043.47   179.6    1044  181.09  1044.9
  182.83    1046  186.73 1048.43  188.67  1049.2  189.81 1049.31  190.44 1049.38
  191.56  1049.5  202.07 1050.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03    18.5    .013      50     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
         10.57  202.07             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1060.9               4  1060.9  1059.4     204  1060.9  1059.4
     208  1060.5

Downstream Bridge Cross Section Data
```

```
Station Elevation Data    num=      66
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1054.54    2.48 1053.34    2.76 1053.16    4.83 1052.47    7.15 1051.43
    8.11 1050.63   10.16 1048.89   10.83 1048.29   11.58 1047.66   11.95 1047.33
   12.66 1046.72   13.07 1046.36   13.46    1046   14.16  1045.4    14.4 1045.25
      23  1045.4      35  1045.4   61.14    1042   68.42    1042   81.28    1042
   83.04 1042.25   87.46 1042.91   88.05    1043   88.34    1043   88.57    1043
   91.72 1043.04   93.26 1043.06    93.4 1043.06   96.46 1042.98   97.58 1042.95
  102.61 1042.82  131.73    1042   134.9 1041.24  136.05    1041  142.93 1039.93
  148.71    1039  149.13 1038.86  149.32 1038.77  151.41    1038  158.93    1038
  168.88    1038  172.11    1038  176.38    1038     177    1038  177.16    1038
  177.39    1038  180.04 1038.65   184.2 1040.05  186.49    1041   187.3 1041.39
  192.74 1045.07   193.9 1045.75  193.98 1045.81  194.62 1046.28  195.08 1046.62
  195.68 1047.07  198.26    1049  198.59 1049.26  201.04 1051.07   201.3 1051.11
  201.35 1051.12  203.68 1053.01  203.72 1053.01  203.76 1053.02  204.01 1053.06
  208.29  1053.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03    4.83    .013      35     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
          8.11  203.68             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  5

Pier Data
Pier Station     Upstream=      34    Downstream=      37
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25    1059
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25  1059.4

Pier Data
Pier Station     Upstream=      68    Downstream=      71
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25    1059
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25  1059.4

Pier Data
Pier Station     Upstream=     101    Downstream=     104
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25    1059
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25  1059.4

Pier Data
Pier Station     Upstream=     135    Downstream=     138
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25    1059
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25  1059.4
```

```
Pier Data
Pier Station     Upstream=     168    Downstream=     171
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25    1059
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1020    1.25  1059.4

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =    1.33
Selected Low Flow Methods = Highest Energy Answer

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

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

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 5279.592

INPUT
Description:
Station Elevation Data    num=      66
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1054.54    2.48 1053.34    2.76 1053.16    4.83 1052.47    7.15 1051.43
    8.11 1050.63   10.16 1048.89   10.83 1048.29   11.58 1047.66   11.95 1047.33
   12.66 1046.72   13.07 1046.36   13.46    1046   14.16  1045.4    14.4 1045.25
      23  1045.4      35  1045.4   61.14    1042   68.42    1042   81.28    1042
   83.04 1042.25   87.46 1042.91   88.05    1043   88.34    1043   88.57    1043
   91.72 1043.04   93.26 1043.06    93.4 1043.06   96.46 1042.98   97.58 1042.95
  102.61 1042.82  131.73    1042   134.9 1041.24  136.05    1041  142.93 1039.93
  148.71    1039  149.13 1038.86  149.32 1038.77  151.41    1038  158.93    1038
  168.88    1038  172.11    1038  176.38    1038     177    1038  177.16    1038
  177.39    1038  180.04 1038.65   184.2 1040.05  186.49    1041   187.3 1041.39
  192.74 1045.07   193.9 1045.75  193.98 1045.81  194.62 1046.28  195.08 1046.62
  195.68 1047.07  198.26    1049  198.59 1049.26  201.04 1051.07   201.3 1051.11
  201.35 1051.12  203.68 1053.01  203.72 1053.01  203.76 1053.02  204.01 1053.06
  208.29  1053.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03    4.83    .013      35     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          8.11  203.68            48.61   48.61   48.61             .1       .3

BRIDGE


RIVER: Santa Gertrudis
REACH: Channel            RS: 5248.5

INPUT
```

```
Description: Northbound I-15 Ramp
Distance from Upstream XS =      12
Deck/Roadway Width        =      32
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1055.9               3  1055.9 1054.65     203  1055.9 1054.65
     203  1055.9         2048.29  1055.9

Upstream Bridge Cross Section Data
Station Elevation Data    num=      66
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1054.54    2.48 1053.34    2.76 1053.16    4.83 1052.47    7.15 1051.43
    8.11 1050.63   10.16 1048.89   10.83 1048.29   11.58 1047.66   11.95 1047.33
   12.66 1046.72   13.07 1046.36   13.46    1046   14.16  1045.4    14.4 1045.25
      23  1045.4      35  1045.4   61.14    1042   68.42    1042   81.28    1042
   83.04 1042.25   87.46 1042.91   88.05    1043   88.34    1043   88.57    1043
   91.72 1043.04   93.26 1043.06    93.4 1043.06   96.46 1042.98   97.58 1042.95
  102.61 1042.82  131.73    1042   134.9 1041.24  136.05    1041  142.93 1039.93
  148.71    1039  149.13 1038.86  149.32 1038.77  151.41    1038  158.93    1038
  168.88    1038  172.11    1038  176.38    1038     177    1038  177.16    1038
  177.39    1038  180.04 1038.65   184.2 1040.05  186.49    1041   187.3 1041.39
  192.74 1045.07   193.9 1045.75  193.98 1045.81  194.62 1046.28  195.08 1046.62
  195.68 1047.07  198.26    1049  198.59 1049.26  201.04 1051.07   201.3 1051.11
  201.35 1051.12  203.68 1053.01  203.72 1053.01  203.76 1053.02  204.01 1053.06
  208.29  1053.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03    4.83    .013      35     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
          8.11  203.68             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
   24.35  1056.2              32  1056.2 1054.95     232  1056.2 1054.95
  235.71  1056.2

Downstream Bridge Cross Section Data
Station Elevation Data    num=      69
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1055.72    2.09  1055.7   24.35    1056   28.46 1054.31   29.47 1053.85
   30.48  1053.4   32.29  1052.6   33.52    1052   34.44 1051.19    35.6 1050.14
   36.84    1049   37.45 1048.44   38.05 1047.89   38.55 1047.43   39.13 1046.86
   39.62 1046.41   40.88 1045.25    41.5 1044.68    42.7    1045    54.7    1045
   63.12    1042   65.14 1041.96   67.16    1042   73.92    1042    78.8    1042
   80.26    1042   81.15    1042   82.99    1042   83.02    1042    83.3    1042
   90.68    1042   97.19    1042  101.36 1041.93   103.1    1042  103.11    1042
  103.13    1042  141.61 1042.06  144.15    1042  144.19    1042  144.27 1041.98
  148.21    1041  158.88 1040.13  167.98 1039.39  172.93    1039  177.46 1038.52
  179.34 1038.32  182.77    1038  184.12    1038  188.89    1038  189.91    1038
  190.84    1038  196.86    1038  200.52 1039.18  201.16 1039.38  216.56 1044.03
  218.73 1044.68  219.39 1044.89  220.19 1045.21  223.16    1046  223.61 1046.35
  224.34 1046.93  226.72 1048.77  228.86 1050.56  229.16 1050.82  229.77 1051.38
  232.83 1052.02  234.07 1052.91  235.34 1053.68  235.71 1053.79

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   28.46    .013   63.12     .03  229.77     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         28.46  229.77             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
```

```
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  6

Pier Data
Pier Station     Upstream=      24    Downstream=      63
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056

Pier Data
Pier Station     Upstream=    52.8    Downstream=    91.8
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056

Pier Data
Pier Station     Upstream=    81.6    Downstream=   120.6
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056

Pier Data
Pier Station     Upstream=   110.4    Downstream=   149.4
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056

Pier Data
Pier Station     Upstream=   139.2    Downstream=   178.2
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056

Pier Data
Pier Station     Upstream=     168    Downstream=     207
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1056

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =    1.33
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
```

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

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

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 5230.979

INPUT
Description: Section 52+31
Station Elevation Data    num=      69
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1055.72    2.09  1055.7   24.35    1056   28.46 1054.31   29.47 1053.85
   30.48  1053.4   32.29  1052.6   33.52    1052   34.44 1051.19    35.6 1050.14
   36.84    1049   37.45 1048.44   38.05 1047.89   38.55 1047.43   39.13 1046.86
   39.62 1046.41   40.88 1045.25    41.5 1044.68    42.7    1045    54.7    1045
   63.12    1042   65.14 1041.96   67.16    1042   73.92    1042    78.8    1042
   80.26    1042   81.15    1042   82.99    1042   83.02    1042    83.3    1042
   90.68    1042   97.19    1042  101.36 1041.93   103.1    1042  103.11    1042
  103.13    1042  141.61 1042.06  144.15    1042  144.19    1042  144.27 1041.98
  148.21    1041  158.88 1040.13  167.98 1039.39  172.93    1039  177.46 1038.52
  179.34 1038.32  182.77    1038  184.12    1038  188.89    1038  189.91    1038
  190.84    1038  196.86    1038  200.52 1039.18  201.16 1039.38  216.56 1044.03
  218.73 1044.68  219.39 1044.89  220.19 1045.21  223.16    1046  223.61 1046.35
  224.34 1046.93  226.72 1048.77  228.86 1050.56  229.16 1050.82  229.77 1051.38
  232.83 1052.02  234.07 1052.91  235.34 1053.68  235.71 1053.79

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   28.46    .013   63.12     .03  229.77     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         28.46  229.77            68.41   68.41   68.41             .3       .5

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 5181

INPUT
Description: Upstream Approach, Northbound I-15
Station Elevation Data    num=      61
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1054.5   27.01 1054.41  135.62    1056  137.69 1055.06   137.7 1055.05
   140.4 1053.97  140.59 1053.81  141.32 1053.43   143.1  1044.3   155.1  1044.3
  155.38 1043.19  156.27 1042.37  156.49 1042.17  156.67    1042   158.9 1041.85
  166.98 1041.18  168.78    1041  169.72    1041   170.4    1041  173.84 1041.23
  174.74 1041.29  175.99 1041.39  176.71 1041.44  177.62 1041.47  179.49 1041.45
  187.05  1042.6  199.86    1042  201.66    1042  202.25    1042  203.52    1042
  204.69    1042  206.58 1041.79  213.61    1041  215.74 1040.81  215.75 1040.81
  215.92 1040.81  256.19    1039  257.33    1039  260.55    1039  261.62    1039
  267.28    1039  295.49 1039.05  295.75 1039.05  313.35  1044.5  317.43  1045.9
  319.31 1047.43  320.07 1048.14  320.84 1048.86  321.63 1049.57  323.37 1051.15
  323.99 1051.71  324.31    1052  324.94 1052.62  325.33    1053   325.6 1053.46
  328.22 1053.57  329.29 1053.53  330.28 1053.94  340.33 1055.79  340.94 1055.79
     341 1055.81

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   140.4    .013  155.38     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         140.4  330.28           101.63  101.63  101.63             .3       .5

BRIDGE


RIVER: Santa Gertrudis
REACH: Channel            RS: 5105

INPUT
Description: I-15 Northbound
Distance from Upstream XS =      10
Deck/Roadway Width        =      77
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       7
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     120 1055.25             141 1055.25    1054     169 1055.38 1054.13
     197 1055.46 1054.21     225 1055.58 1054.33     252 1055.57 1054.32
     381 1055.62 1054.37

Upstream Bridge Cross Section Data
Station Elevation Data    num=      61
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1054.5   27.01 1054.41  135.62    1056  137.69 1055.06   137.7 1055.05
   140.4 1053.97  140.59 1053.81  141.32 1053.43   143.1  1044.3   155.1  1044.3
  155.38 1043.19  156.27 1042.37  156.49 1042.17  156.67    1042   158.9 1041.85
  166.98 1041.18  168.78    1041  169.72    1041   170.4    1041  173.84 1041.23
  174.74 1041.29  175.99 1041.39  176.71 1041.44  177.62 1041.47  179.49 1041.45
  187.05  1042.6  199.86    1042  201.66    1042  202.25    1042  203.52    1042
  204.69    1042  206.58 1041.79  213.61    1041  215.74 1040.81  215.75 1040.81
  215.92 1040.81  256.19    1039  257.33    1039  260.55    1039  261.62    1039
  267.28    1039  295.49 1039.05  295.75 1039.05  313.35  1044.5  317.43  1045.9
  319.31 1047.43  320.07 1048.14  320.84 1048.86  321.63 1049.57  323.37 1051.15
  323.99 1051.71  324.31    1052  324.94 1052.62  325.33    1053   325.6 1053.46
  328.22 1053.57  329.29 1053.53  330.28 1053.94  340.33 1055.79  340.94 1055.79
     341 1055.81

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   140.4    .013  155.38     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
         140.4  330.28             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     232  1055.4             233  1055.4 1054.15     415  1055.4 1054.15
  422.14 1055.45

Downstream Bridge Cross Section Data
Station Elevation Data    num=      65
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1053.5    45.5 1053.37  167.88 1055.18  224.16 1055.25  225.52 1055.47
  227.15 1055.82  228.51 1055.87  232.01 1055.25  232.15 1054.76   240.4    1044
   252.4    1044  253.22 1040.93   258.9 1038.49   259.8 1038.43  260.08 1038.42
  261.69 1038.33   265.3  1038.4  266.25 1038.56  266.62 1038.56  270.11    1039
  270.15    1039  270.16    1039  270.42    1039  343.44 1040.59  344.69 1040.51
  344.71 1040.51  344.98 1040.49   345.2 1040.49  349.96 1040.21  351.37 1040.21
  358.42    1040  358.73    1040  359.61    1040  360.58    1040  361.11    1040
  362.02    1040  365.18 1039.64  372.42    1039  374.23    1039  374.92    1039
  375.85    1039  379.55 1038.63  386.23 1038.46  387.52 1038.87  387.86    1039
  392.58 1040.94  392.78    1041  394.69 1041.31  397.72    1042  398.03 1042.06
   398.1 1042.12     404 1043.66  405.39 1044.99   406.1 1045.66  406.81 1046.34
  408.94 1048.37  409.59    1049  410.95 1050.27  412.62 1051.68  415.38 1053.49
```

```
  417.28    1054  422.14 1055.45  423.93    1056  425.67 1056.39  427.51 1056.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  228.51    .013  253.22     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
        228.51  417.28             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  6

Pier Data
Pier Station     Upstream=     162    Downstream=     254
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055

Pier Data
Pier Station     Upstream=     190    Downstream=     282
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055

Pier Data
Pier Station     Upstream=     218    Downstream=     310
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055

Pier Data
Pier Station     Upstream=     246    Downstream=     338
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055

Pier Data
Pier Station     Upstream=     274    Downstream=     366
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055

Pier Data
Pier Station     Upstream=     302    Downstream=     394
Upstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055
```

```
Downstream     num=       2
    Width   Elev    Width   Elev
    1.25    1030    1.25    1055

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =    1.33
Selected Low Flow Methods = Highest Energy Answer

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

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

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 5060.939

INPUT
Description:
Station Elevation Data    num=      65
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1053.5    45.5 1053.37  167.88 1055.18  224.16 1055.25  225.52 1055.47
  227.15 1055.82  228.51 1055.87  232.01 1055.25  232.15 1054.76   240.4    1044
   252.4    1044  253.22 1040.93   258.9 1038.49   259.8 1038.43  260.08 1038.42
  261.69 1038.33   265.3  1038.4  266.25 1038.56  266.62 1038.56  270.11    1039
  270.15    1039  270.16    1039  270.42    1039  343.44 1040.59  344.69 1040.51
  344.71 1040.51  344.98 1040.49   345.2 1040.49  349.96 1040.21  351.37 1040.21
  358.42    1040  358.73    1040  359.61    1040  360.58    1040  361.11    1040
  362.02    1040  365.18 1039.64  372.42    1039  374.23    1039  374.92    1039
  375.85    1039  379.55 1038.63  386.23 1038.46  387.52 1038.87  387.86    1039
  392.58 1040.94  392.78    1041  394.69 1041.31  397.72    1042  398.03 1042.06
   398.1 1042.12     404 1043.66  405.39 1044.99   406.1 1045.66  406.81 1046.34
  408.94 1048.37  409.59    1049  410.95 1050.27  412.62 1051.68  415.38 1053.49
  417.28    1054  422.14 1055.45  423.93    1056  425.67 1056.39  427.51 1056.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  228.51    .013  253.22     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        228.51  417.28             63.1    63.1    63.1             .3       .5

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4997.843

INPUT
Description:
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1053.21   49.37 1053.04   167.2 1054.76   252.9 1054.84  255.04 1055.18
  255.88 1055.35  256.58 1055.38  263.48 1054.15  263.75  1053.2  266.16 1051.64
  267.62 1051.02  267.88 1050.91  268.18 1050.81  273.27 1046.33  274.29 1045.49
   275.3 1044.66  275.52 1044.63  276.63 1044.44   278.5 1043.73   290.5 1043.73
```

```
  299.63 1039.79  300.21 1039.66  303.09    1039  323.04    1039  341.54    1039
  343.09    1039  344.89    1039   348.7    1039  350.08    1039   354.9 1039.18
   401.2 1038.35  405.93    1038  408.78    1038  417.76    1038  418.35    1038
  419.94 1038.96  420.99 1039.59  423.51    1041   427.7  1041.7  429.34    1042
  430.65 1042.23  434.38 1043.48  435.82 1043.73  436.13    1044  436.73 1044.56
  439.06 1046.74  439.59 1047.24  440.18 1047.82   440.8 1048.41  441.42    1049
  442.72  1050.2  445.72 1052.43  446.32 1052.93  446.68 1053.07  447.16 1053.22
   448.6 1053.75  449.21    1054  449.28    1054  449.35 1054.01   456.9 1055.56

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   278.5    .013  299.63     .03   448.6     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        263.48   448.6           102.91  102.91  102.91             .3       .5

BRIDGE


RIVER: Santa Gertrudis
REACH: Channel            RS: 4943

INPUT
Description: Southbound I-15
Distance from Upstream XS =      10
Deck/Roadway Width        =      86
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      11
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     263 1054.45             266 1054.45  1053.2     281 1054.72 1053.47
     306 1054.89 1053.64     331 1054.88 1053.63     356 1054.91 1053.66
     381 1054.97 1053.72     406 1055.06 1053.81     431 1055.11 1053.86
     445 1055.11 1053.86     455 1055.11

Upstream Bridge Cross Section Data
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1053.21   49.37 1053.04   167.2 1054.76   252.9 1054.84  255.04 1055.18
  255.88 1055.35  256.58 1055.38  263.48 1054.15  263.75  1053.2  266.16 1051.64
  267.62 1051.02  267.88 1050.91  268.18 1050.81  273.27 1046.33  274.29 1045.49
   275.3 1044.66  275.52 1044.63  276.63 1044.44   278.5 1043.73   290.5 1043.73
  299.63 1039.79  300.21 1039.66  303.09    1039  323.04    1039  341.54    1039
  343.09    1039  344.89    1039   348.7    1039  350.08    1039   354.9 1039.18
   401.2 1038.35  405.93    1038  408.78    1038  417.76    1038  418.35    1038
  419.94 1038.96  420.99 1039.59  423.51    1041   427.7  1041.7  429.34    1042
  430.65 1042.23  434.38 1043.48  435.82 1043.73  436.13    1044  436.73 1044.56
  439.06 1046.74  439.59 1047.24  440.18 1047.82   440.8 1048.41  441.42    1049
  442.72  1050.2  445.72 1052.43  446.32 1052.93  446.68 1053.07  447.16 1053.22
   448.6 1053.75  449.21    1054  449.28    1054  449.35 1054.01   456.9 1055.56

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   278.5    .013  299.63     .03   448.6     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
        263.48   448.6             .3       .5

Downstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     326  1053.9             349    1054 1052.75     374    1054 1052.75
     399    1054 1052.75     424    1054 1052.75     449    1054 1052.75
     474    1054 1052.75     499    1054 1052.75     528    1054 1052.75
   533.5    1054

Downstream Bridge Cross Section Data
Station Elevation Data    num=      54
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0 1052.26   67.78 1052.05  183.32 1053.75  332.74 1053.93  336.24 1053.93
  336.26 1053.94  336.28 1053.94  336.29 1053.94  337.72    1054  338.37 1053.64
  342.33 1053.31  347.37 1052.77  349.68 1051.34   353.2  1043.3   365.2  1043.3
  370.15 1041.02  375.64    1039  377.47 1038.91  389.44 1038.76  390.68 1038.82
  394.86    1039  400.53 1039.48  402.03  1039.6  408.32 1039.96  408.34 1039.96
  408.37 1039.96  408.48 1039.96  410.87 1039.92  446.49 1039.03  476.14 1038.43
  487.43 1038.34  487.85    1038  488.62    1038  491.96    1038  499.44    1038
  500.18    1038  500.59    1038  502.32    1038  502.67 1038.19  515.75 1041.68
  521.09    1043  521.47 1043.37  522.11    1044  523.47 1045.36  524.71 1046.56
  525.38 1047.21  526.73 1048.53  527.48 1049.26  530.03 1051.78  530.93 1052.53
  532.65 1053.29  532.95 1053.55  533.04  1053.6   533.5 1053.82

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  349.68    .013  370.15     .03  527.48    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
        349.68  527.48             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  6

Pier Data
Pier Station     Upstream=     287    Downstream=     370
Upstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055
Downstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055

Pier Data
Pier Station     Upstream=     315    Downstream=     398
Upstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055
Downstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055

Pier Data
Pier Station     Upstream=     343    Downstream=     426
Upstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055
Downstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055

Pier Data
Pier Station     Upstream=     372    Downstream=     454
Upstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055
Downstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055

Pier Data
Pier Station     Upstream=     400    Downstream=     482
Upstream     num=       2
    Width   Elev    Width   Elev
```

```
     1.5    1020     1.5    1055
Downstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055

Pier Data
Pier Station     Upstream=     428    Downstream=     510
Upstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055
Downstream     num=       2
    Width   Elev    Width   Elev
     1.5    1020     1.5    1055

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =    1.33
Selected Low Flow Methods = Highest Energy Answer

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

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

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4894.934

INPUT
Description:
Station Elevation Data    num=      54
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1052.26   67.78 1052.05  183.32 1053.75  332.74 1053.93  336.24 1053.93
  336.26 1053.94  336.28 1053.94  336.29 1053.94  337.72    1054  338.37 1053.64
  342.33 1053.31  347.37 1052.77  349.68 1051.34   353.2  1043.3   365.2  1043.3
  370.15 1041.02  375.64    1039  377.47 1038.91  389.44 1038.76  390.68 1038.82
  394.86    1039  400.53 1039.48  402.03  1039.6  408.32 1039.96  408.34 1039.96
  408.37 1039.96  408.48 1039.96  410.87 1039.92  446.49 1039.03  476.14 1038.43
  487.43 1038.34  487.85    1038  488.62    1038  491.96    1038  499.44    1038
  500.18    1038  500.59    1038  502.32    1038  502.67 1038.19  515.75 1041.68
  521.09    1043  521.47 1043.37  522.11    1044  523.47 1045.36  524.71 1046.56
  525.38 1047.21  526.73 1048.53  527.48 1049.26  530.03 1051.78  530.93 1052.53
  532.65 1053.29  532.95 1053.55  533.04  1053.6   533.5 1053.82

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  349.68    .013  370.15     .03  527.48    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        349.68  527.48            37.99   37.99   37.99             .3       .5

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4874
```

```
INPUT
Description: Approach Southbound I-15 Ramp, Section 48+74
Station Elevation Data    num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1051.5    2.67 1051.54  218.38  1052.8  221.67 1052.82  283.57    1053
  283.83 1053.07  284.12 1053.15   284.4 1053.14   304.6    1054  305.54 1053.46
  306.12 1053.39  307.15 1053.21  310.43 1052.65  313.95 1053.28  314.47 1052.71
  314.89 1052.72  325.45 1049.81   333.2 1041.96   345.2 1041.96  364.65    1039
  365.22    1039  365.96    1039  374.63    1039   377.5    1039  379.12    1039
  381.12 1039.07  390.59 1039.38  391.69 1039.41  399.72 1040.19  429.53 1039.45
  439.32  1039.2  446.29    1039  446.45 1038.98  459.69    1039  461.19    1039
  466.93    1039  466.97    1039  467.01 1039.01  467.82 1039.27  478.22 1042.59
  482.55    1044  486.31 1047.57  486.55  1047.8  486.66  1047.9  486.76    1048
  486.86 1048.09  487.22 1048.43   487.8 1048.88  491.45    1052  493.38 1052.98
  494.82  1053.5  494.97 1053.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   333.2    .013  364.65     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        325.45   487.8            39.38   39.38   39.38             .3       .5

BRIDGE


RIVER: Santa Gertrudis
REACH: Channel            RS: 4838.5

INPUT
Description: I-15 Southbound Ramp
Distance from Upstream XS =     6.5
Deck/Roadway Width        =      30
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
   304.6    1054             325  1054.3    1030     325  1054.3  1053.1
     487  1054.3  1053.1     487  1054.3    1030  494.97 1053.56    1030

Upstream Bridge Cross Section Data
Station Elevation Data    num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1051.5    2.67 1051.54  218.38  1052.8  221.67 1052.82  283.57    1053
  283.83 1053.07  284.12 1053.15   284.4 1053.14   304.6    1054  305.54 1053.46
  306.12 1053.39  307.15 1053.21  310.43 1052.65  313.95 1053.28  314.47 1052.71
  314.89 1052.72  325.45 1049.81   333.2 1041.96   345.2 1041.96  364.65    1039
  365.22    1039  365.96    1039  374.63    1039   377.5    1039  379.12    1039
  381.12 1039.07  390.59 1039.38  391.69 1039.41  399.72 1040.19  429.53 1039.45
  439.32  1039.2  446.29    1039  446.45 1038.98  459.69    1039  461.19    1039
  466.93    1039  466.97    1039  467.01 1039.01  467.82 1039.27  478.22 1042.59
  482.55    1044  486.31 1047.57  486.55  1047.8  486.66  1047.9  486.76    1048
  486.86 1048.09  487.22 1048.43   487.8 1048.88  491.45    1052  493.38 1052.98
  494.82  1053.5  494.97 1053.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   333.2    .013  364.65     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
        325.45   487.8             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     157  1051.6             232  1051.6             232  1051.6  1050.4
     388  1051.6  1050.4     388  1051.6    1030     413  1051.6    1030

Downstream Bridge Cross Section Data
```

```
Station Elevation Data    num=      76
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1051.48   52.59 1051.79   180.5 1052.41  180.94 1052.53  181.42 1052.65
   181.9 1052.63  206.39 1053.67  207.51 1053.62  210.29 1052.83  210.38 1052.81
  212.49 1051.92  213.87 1051.48  213.96 1051.49  214.06 1051.52   214.4  1051.6
  215.76 1051.53  219.73 1049.88  220.45 1049.62  225.94 1048.65  226.72 1047.97
  229.11 1045.83  230.28 1044.79   230.7  1041.1   242.7  1041.1  245.53 1041.34
  245.54 1041.34  256.36 1039.61  263.35 1039.39  275.12    1039  280.65  1038.7
  285.89 1038.71  291.88    1039  303.98    1039  306.65 1039.15  309.64    1039
  310.05    1039   311.5    1039  313.81    1039  314.61    1039  314.84    1039
  314.85    1039  332.18    1039  356.88    1039  357.13    1039  357.28    1039
  357.56    1039  358.01    1039  358.68    1039  360.01    1039  361.64 1038.46
  362.99    1038  364.22    1038  365.57    1038  366.36    1038  372.94 1038.62
  375.96  1038.9  377.01    1039  387.14 1041.45  390.16 1042.63  390.55 1042.93
  390.63    1043  390.81 1043.17  391.24 1043.61   393.2 1045.44  394.41 1046.56
  395.44 1047.45  396.62 1048.49   397.2    1049  397.99 1049.75  400.37 1049.96
  401.47 1050.17  405.14    1051  405.83 1051.19  408.24 1051.31  408.42 1051.32
  413.41 1051.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   230.7    .013  245.53     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
         230.7  391.24             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  5

Pier Data
Pier Station     Upstream=  352.25    Downstream=  259.25
Upstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055

Pier Data
Pier Station     Upstream=   379.5    Downstream=   286.5
Upstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055

Pier Data
Pier Station     Upstream=  406.75    Downstream=  313.75
Upstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055

Pier Data
Pier Station     Upstream=     434    Downstream=     341
Upstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055
Downstream     num=       2
```

```
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055

Pier Data
Pier Station     Upstream=  461.25    Downstream=  368.25
Upstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055
Downstream     num=       2
    Width   Elev    Width   Elev
    1.67    1020    1.67    1055

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =    1.33
Selected Low Flow Methods = Highest Energy Answer

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

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

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4817.558

INPUT
Description:
Station Elevation Data    num=      76
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1051.48   52.59 1051.79   180.5 1052.41  180.94 1052.53  181.42 1052.65
   181.9 1052.63  206.39 1053.67  207.51 1053.62  210.29 1052.83  210.38 1052.81
  212.49 1051.92  213.87 1051.48  213.96 1051.49  214.06 1051.52   214.4  1051.6
  215.76 1051.53  219.73 1049.88  220.45 1049.62  225.94 1048.65  226.72 1047.97
  229.11 1045.83  230.28 1044.79   230.7  1041.1   242.7  1041.1  245.53 1041.34
  245.54 1041.34  256.36 1039.61  263.35 1039.39  275.12    1039  280.65  1038.7
  285.89 1038.71  291.88    1039  303.98    1039  306.65 1039.15  309.64    1039
  310.05    1039   311.5    1039  313.81    1039  314.61    1039  314.84    1039
  314.85    1039  332.18    1039  356.88    1039  357.13    1039  357.28    1039
  357.56    1039  358.01    1039  358.68    1039  360.01    1039  361.64 1038.46
  362.99    1038  364.22    1038  365.57    1038  366.36    1038  372.94 1038.62
  375.96  1038.9  377.01    1039  387.14 1041.45  390.16 1042.63  390.55 1042.93
  390.63    1043  390.81 1043.17  391.24 1043.61   393.2 1045.44  394.41 1046.56
  395.44 1047.45  396.62 1048.49   397.2    1049  397.99 1049.75  400.37 1049.96
  401.47 1050.17  405.14    1051  405.83 1051.19  408.24 1051.31  408.42 1051.32
  413.41 1051.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   230.7    .013  245.53     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         230.7  391.24             37.2    37.2    37.2             .3       .5

CROSS SECTION
```

```
RIVER: Santa Gertrudis
REACH: Channel            RS: 4780.359

INPUT
Description:
Station Elevation Data    num=      67
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1052.55    18.6 1053.34   20.66 1053.25   23.22 1052.46    25.2 1051.61
   32.32 1049.27   32.79 1049.31   33.32 1049.46    35.1  1049.9   39.08 1049.68
   43.32    1049   44.08    1049   44.56 1048.59    45.4  1042.1    57.4  1042.1
   64.11    1039   64.53    1039   65.97    1039   70.94    1039   72.87    1039
   77.17    1039   81.08 1039.28   90.61    1039   91.59    1039    95.1    1039
   96.28    1039  108.43 1039.45  108.76 1039.44  109.22 1039.44  113.17  1039.3
  114.74 1039.32  117.43 1039.32  122.17    1039  122.22    1039  127.76    1039
  128.17    1039  128.72    1039  139.16    1039  158.29    1039  158.87    1039
  168.97 1038.67   173.2    1039  173.65    1039  176.16    1039  183.47 1039.57
  187.01  1039.5  187.52 1039.48  188.74 1039.49  190.52 1039.51  191.08 1039.51
  199.56    1039  202.63    1039  203.63    1039  217.01 1040.91  217.45    1041
  217.56    1041  217.91 1041.21  218.47 1041.59  219.62 1042.26  221.47 1043.49
   222.2    1044  224.52 1045.56  225.18    1046  226.57 1046.91   228.7 1048.24
  229.86    1049   230.1    1049

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .03   44.56    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         44.56  229.86            58.91   58.91   58.91             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4721.444

INPUT
Description: Section 47+21
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1051.85     .37 1051.83   20.57  1052.7   24.61 1052.51   26.95 1051.78
   28.76    1051   47.04 1044.93   47.73 1044.98   47.83 1044.79   49.21 1044.79
   51.56 1044.76    57.5  1043.2    69.5  1043.2    70.5    1041    71.5 1040.26
   73.16    1039   74.43 1038.11   74.86 1037.81   75.69    1037   76.76 1036.47
    77.6    1036   77.76 1035.91   80.97 1033.69   84.78 1032.35   85.62 1032.28
   87.15 1032.17   89.67 1032.12   90.72 1032.12  100.21 1032.08  101.11 1032.08
  115.04 1032.03   115.3 1032.03  115.51 1032.03  115.76 1032.03  141.25 1032.04
  141.81 1032.04   144.5    1032     149 1031.97  161.43 1032.24   171.9  1032.2
  183.57 1031.89  186.13 1031.93  191.18    1032  193.07    1032  214.26    1032
  214.81 1032.34  216.61 1033.52  218.76 1034.92  220.63 1036.16  221.91    1037
  223.76 1038.22  225.82 1039.57  229.06 1041.69  230.02 1042.33  231.44 1043.26
  232.56    1044  241.89 1045.97  241.99    1046  242.01    1046  243.34  1046.1

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0    .016    57.5    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5  232.56           100.96  100.96  100.96             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4620.482

INPUT
Description: 46+20
Station Elevation Data    num=      47
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0  1050.5    1.67  1050.5    2.54 1050.75     3.5 1051.01    4.45 1050.97
   22.12 1051.71   29.12 1051.37   31.12 1050.74   32.66 1050.06   53.22  1043.1
   63.38 1042.59   65.43 1042.11   65.59 1042.11   65.72 1042.12    70.2 1042.28
   73.58  1042.4      80  1042.1      93  1042.1   94.12 1041.75    95.2    1041
    96.3 1040.26   98.45 1038.76  107.24  1032.8  110.66    1031   125.4 1030.92
  139.03 1030.85  153.99 1030.79  158.37 1030.96  164.26 1030.74   166.9 1030.72
   169.2 1030.67  173.69 1030.73  175.41 1030.74  178.85 1030.76   200.4 1030.88
  217.58 1030.98  221.43    1031  221.47 1031.03   223.3 1032.19   225.7 1033.72
  225.94 1033.87  226.79 1034.42  235.56 1040.06  239.29 1042.49  240.85 1043.51
  252.48 1044.84  265.78 1045.96

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0    .016      80    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            80  240.85           127.08  127.08  127.08             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4493.399

INPUT
Description: 44+93
Station Elevation Data    num=      49
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1049.66   13.98 1050.24   25.48 1049.68   27.02 1049.19   28.21 1048.67
   44.01 1043.31   66.47 1042.16   72.16    1042   73.03    1042   73.72    1042
   82.41    1042  106.05    1042  110.82 1042.03  112.06 1041.52  115.87 1038.98
  127.78 1031.04  127.83    1031  129.18 1030.95  129.64 1030.94  146.26 1029.16
  147.12 1029.17  159.25 1029.19  165.48 1029.19  167.07 1029.19   171.3 1029.18
  177.12 1029.16  185.04 1029.14  199.02 1029.58  206.49  1029.5  211.79 1030.71
   213.7 1030.71  217.57 1031.43  219.32 1032.57   220.4 1033.28  225.56 1036.57
  228.39 1038.39  229.38    1039  230.69 1039.84  231.54 1040.37  233.23  1041.3
  235.54 1041.64  239.61 1043.18  247.78 1043.68  249.58  1043.8  252.72    1044
  253.34 1044.15  254.07  1044.3  254.93 1044.54  268.22  1046.5

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0    .016  110.82    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        110.82  239.61           136.25  136.25  136.25             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4357.147

INPUT
Description:
Station Elevation Data    num=      48
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1047.46    1.96 1047.46    3.59 1047.93     5.4 1048.41    7.18 1048.34
   18.17 1048.78   34.19 1047.99   35.27 1047.64   36.11 1047.28    47.2 1043.52
   62.84 1042.72   67.07  1042.6   71.95  1042.4   80.64 1042.65   83.41  1042.6
   83.59 1042.61   90.63 1042.56   91.53 1042.55   96.65 1042.82   98.67 1042.87
  103.07    1043  107.29    1043   116.8  1041.8   129.8  1041.8  129.97 1041.66
   133.6 1039.16  137.02 1036.77  141.52 1033.61   141.9 1033.34  142.03 1033.25
  142.13 1033.18  142.21 1033.12  142.43 1032.97   144.7 1032.13     150 1027.88
     210 1027.88   210.8 1028.44  213.03 1029.87   218.1 1033.12  219.22 1033.83
  220.21 1034.46  223.37 1036.49  224.73 1037.35  233.88 1041.79     235    1042
  240.89 1042.38     251    1043  253.34  1043.7

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
```

```
       0     .05   116.8    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        107.29  240.89           165.67  165.67  165.67             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4191.443

INPUT
Description: 41+91
Station Elevation Data    num=      56
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1045.51    2.05  1046.1    4.42 1046.72    6.75 1046.62   13.42 1046.89
   35.37 1045.79   35.86 1045.64   36.24 1045.47   41.24 1043.78   48.26 1043.43
   50.15 1043.38   61.33 1042.92   64.17    1043    66.2    1043   66.37    1043
   72.33    1043    72.4    1043   73.67    1043   82.38 1043.54   88.94    1044
   90.71    1044   92.55 1043.59   96.02 1042.31    98.3  1041.5   111.3  1041.5
   112.3  1033.8   125.3  1033.8  126.25 1032.11  127.38 1031.34  129.54 1029.85
  132.23    1028     133 1027.52  144.22 1027.52  185.41 1027.52     193 1027.52
  194.46    1028     196 1028.95  199.13 1030.95  199.36 1031.09  201.21 1032.28
  202.68 1033.23   204.4 1034.32   209.7 1038.23  210.62 1038.83  214.31 1040.81
  217.02  1041.2   221.5 1041.66  224.66    1042  226.93  1042.2  234.79    1043
  236.62 1043.36  241.23 1044.28   242.7 1044.28  245.84 1044.78  252.91 1046.23
  254.22  1046.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016    98.3    .013   112.3    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          98.3  214.31           147.11  147.11  147.11             .3       .5

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 4044.332

INPUT
Description: Upstream Jefferson Avenue
Station Elevation Data    num=      64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1044.68    2.05 1045.22    4.89  1045.1    7.71 1045.21    31.8    1044
   34.77 1043.63   34.84 1043.64   36.73 1043.78   38.25 1043.89   39.64    1044
   40.63    1044   42.61    1044   47.94    1044    52.7  1044.2    65.7  1044.2
   65.95    1044   68.58    1044   72.37 1043.19   73.19    1043    73.7 1042.87
   78.73 1041.54   81.49    1041   82.94 1039.74   83.84 1039.11   84.85 1038.47
   89.73 1035.29    90.4 1034.86    90.7    1030   103.7    1030   108.5  1026.8
  158.02  1026.8  159.39  1026.8  162.57  1026.8  163.75 1027.78     165 1028.56
  165.68    1029  168.14 1030.57  169.39 1031.37  170.65 1032.17  172.94 1033.64
  175.57  1035.3  176.22 1035.71  177.56 1036.56  178.26    1037  178.96 1037.45
  179.83    1038  180.65 1038.49  182.99 1039.75   184.8    1041   185.8    1041
  187.25 1041.56  188.51    1042  190.51  1042.7  191.38    1043  192.74 1043.46
  194.53    1044   200.7    1044  201.51    1044  213.91 1044.17   215.1 1044.17
  218.18 1044.17   222.8 1044.49  232.05 1044.48  232.26 1044.48

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    52.7    .013   84.85    .013  180.65     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         68.58  194.53             97.5    97.5    97.5             .3       .5

BRIDGE
```

```
RIVER: Santa Gertrudis
REACH: Channel            RS: 3992

INPUT
Description: Jefferson Avenue Bridge
Distance from Upstream XS =       7
Deck/Roadway Width        =      90
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
   68.58    1044              82 1044.69 1040.69     184 1044.25 1040.25
   194.5    1044

Upstream Bridge Cross Section Data
Station Elevation Data    num=      64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1044.68    2.05 1045.22    4.89  1045.1    7.71 1045.21    31.8    1044
   34.77 1043.63   34.84 1043.64   36.73 1043.78   38.25 1043.89   39.64    1044
   40.63    1044   42.61    1044   47.94    1044    52.7  1044.2    65.7  1044.2
   65.95    1044   68.58    1044   72.37 1043.19   73.19    1043    73.7 1042.87
   78.73 1041.54   81.49    1041   82.94 1039.74   83.84 1039.11   84.85 1038.47
   89.73 1035.29    90.4 1034.86    90.7    1030   103.7    1030   108.5  1026.8
  158.02  1026.8  159.39  1026.8  162.57  1026.8  163.75 1027.78     165 1028.56
  165.68    1029  168.14 1030.57  169.39 1031.37  170.65 1032.17  172.94 1033.64
  175.57  1035.3  176.22 1035.71  177.56 1036.56  178.26    1037  178.96 1037.45
  179.83    1038  180.65 1038.49  182.99 1039.75   184.8    1041   185.8    1041
  187.25 1041.56  188.51    1042  190.51  1042.7  191.38    1043  192.74 1043.46
  194.53    1044   200.7    1044  201.51    1044  213.91 1044.17   215.1 1044.17
  218.18 1044.17   222.8 1044.49  232.05 1044.48  232.26 1044.48

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    52.7    .013   84.85    .013  180.65     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         68.58  194.53             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
  447.06    1044             473 1044.69 1040.69     575 1044.25 1040.25
     589    1044

Downstream Bridge Cross Section Data
Station Elevation Data    num=      53
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1043.49  414.89 1042.44  417.79 1043.28  421.01 1044.12  423.92    1044
  424.45    1044  437.18    1044  439.41    1044  441.26    1044  442.04    1044
  443.75    1044     445  1043.8     458  1043.8  460.97 1043.38  463.22 1043.27
  463.38 1043.27  464.14    1043  466.48  1042.3  467.03 1042.28   467.5    1042
  468.51 1041.71  470.84    1041  473.28  1039.9  473.82  1039.9  474.07 1039.89
  475.17    1039   478.5  1037.5     495  1026.5     555  1026.5   571.5  1037.5
  571.95 1037.95  572.04 1038.02  572.18 1038.08  577.36    1041  580.29 1041.85
   580.8    1042  581.72 1042.26  584.63    1043  587.94 1043.84  588.93    1044
  589.06    1044  591.32    1044  595.33    1044  599.34    1044  601.63    1044
  604.48    1044  604.61    1044  609.12    1044  612.17    1044  616.17    1044
  619.49    1044  623.18    1044  625.05    1044

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     445    .013  475.17    .013  588.93     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
        475.17  571.95             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
```

```
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

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

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

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

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 3946.834

INPUT
Description: Downstream Jefferson Avenue
Station Elevation Data    num=      53
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1043.49  414.89 1042.44  417.79 1043.28  421.01 1044.12  423.92    1044
  424.45    1044  437.18    1044  439.41    1044  441.26    1044  442.04    1044
  443.75    1044     445  1043.8     458  1043.8  460.97 1043.38  463.22 1043.27
  463.38 1043.27  464.14    1043  466.48  1042.3  467.03 1042.28   467.5    1042
  468.51 1041.71  470.84    1041  473.28  1039.9  473.82  1039.9  474.07 1039.89
  475.17    1039   478.5  1037.5     495  1026.5     555  1026.5   571.5  1037.5
  571.95 1037.95  572.04 1038.02  572.18 1038.08  577.36    1041  580.29 1041.85
   580.8    1042  581.72 1042.26  584.63    1043  587.94 1043.84  588.93    1044
  589.06    1044  591.32    1044  595.33    1044  599.34    1044  601.63    1044
  604.48    1044  604.61    1044  609.12    1044  612.17    1044  616.17    1044
  619.49    1044  623.18    1044  625.05    1044

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     445    .013  475.17    .013  588.93     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        475.17  571.95              147     147     147             .3       .5

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 3794.324

INPUT
Description: 37+94 (39+18.1)
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1041.49  182.33 1040.92  254.01 1040.61  257.58 1041.42  266.11 1041.06
  266.96    1041  267.11    1041  267.48    1041   277.5 1037.52   290.5 1037.52
     291 1036.25   304.1 1036.25  304.56 1035.62  315.32 1031.74  315.82  1031.4
     320 1025.65     380 1025.65   396.5 1036.65  401.39    1037  413.58    1037
  446.77    1037  452.25    1037  453.46    1037  454.21    1037  454.85 1036.97
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   277.5    .013  401.39     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           291  401.39            159.3   159.3   159.3             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 3625.899

INPUT
Description: 36+26 (37+58.8)
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1039.51    3.77 1039.49  145.29  1038.7  163.83 1037.93  169.84 1037.67
   172.6 1037.69   174.4  1037.7   179.7 1037.74  182.33 1037.77   186.7  1037.8
  187.43 1037.81  192.24 1037.85  193.64 1037.85   215.6  1032.5   228.6  1032.5
  232.73 1030.02  233.41 1029.57  236.63 1027.44  242.14  1023.8  243.35    1023
     245 1021.78     295 1021.78  302.23 1027.79     310 1031.78  310.73 1032.08
  322.59 1032.66  336.29 1033.42  339.98 1033.54  350.78    1034  354.11    1034

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05   215.6    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         215.6     310            237.5   237.5   237.5             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 3393.888

INPUT
Description: 33+94 (35+21.3)
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1036.17    7.84 1035.87   24.15 1035.21   47.21 1034.59   58.56  1034.7
   58.83 1032.96   67.28 1032.15   105.5 1031.48  195.91 1031.23  196.61 1031.26
  211.89    1031  213.17    1031   223.3    1031   231.5  1031.1   244.5  1031.1
  253.59    1031   265.3 1023.89     271 1020.54     321 1020.54  329.51 1028.57
  335.67 1030.49  338.25 1030.74  339.99 1030.93  340.52    1031  340.92 1031.02
  366.43 1032.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   231.5    .013  253.59    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        253.59  338.25            231.1   231.1   231.1             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 3134.305

INPUT
Description: 31+34 (32+90.2)
Station Elevation Data    num=      39
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1034.38     9.9 1033.99    22.7 1033.45   40.76 1032.95   49.64 1033.03
   49.85 1031.63   56.46 1030.97   86.29 1030.43  180.05 1030.13  246.86 1028.67
   361.5    1029   362.8 1029.05  364.98    1029  366.68    1029  368.65    1029
  370.95    1029  373.86    1029  376.79    1029  377.29    1029   377.7    1029
```

```
  383.32    1029  386.84    1029   399.7 1029.89   412.7 1029.89     424 1027.08
  425.54 1027.03  425.99 1026.72  430.99  1023.4  432.15 1022.63     436 1019.34
     486 1019.34  496.93 1026.85  497.36 1027.06  498.56 1027.28  502.36  1027.8
  514.26 1029.59  515.71 1029.94   517.8 1030.09   548.8 1031.63

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05   399.7    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        386.84  514.26            171.3   171.3   171.3             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 2955.332

INPUT
Description: 29+55 (31+18.9)
Station Elevation Data    num=      38
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1033.52    4.44 1033.48    14.8 1033.03   25.18 1032.55    39.8 1032.09
   46.96 1032.16   47.12 1030.93   52.45 1030.35   76.36 1029.86  150.45 1029.57
   202.3 1028.29  295.68 1028.55  306.23 1028.58  340.92 1027.79  341.06 1026.89
   393.3 1026.94  409.51 1026.96  411.54 1026.96  452.96 1027.22  456.02 1027.24
   465.9 1026.79  486.35 1026.97  488.73 1027.26  489.79 1027.39  491.92    1029
  504.92    1029   507.4 1028.45  511.12 1025.94   522.4 1018.45   582.4 1018.45
  597.32 1028.38  602.54 1028.96  604.02    1029     611 1029.27  623.97 1029.76
  628.41 1029.87  632.36 1030.04   649.1  1030.8

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05  491.92    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        504.92  597.32            210.4   210.4   210.4             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 2690.770

INPUT
Description: 26+91
Station Elevation Data    num=      51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1032.48   13.09 1032.38   21.37 1031.98   29.66 1031.56   41.27 1031.16
   46.95 1031.22   47.08 1030.17   51.29 1029.68   70.14 1029.26  127.82 1028.98
  167.53  1027.9  237.75  1028.1  245.58 1028.12  271.18 1027.46  271.28 1026.73
  309.41 1026.77  321.14 1026.78  331.13 1026.78   490.8 1027.86  498.77 1027.86
  500.26 1027.86  501.42 1027.72  564.11    1028  573.47    1028  573.67 1028.01
   575.6    1028  575.96    1028  580.03    1028  582.95    1028  583.42    1028
     585    1028  585.12    1028  595.83    1028   611.8 1027.94   624.8 1027.94
   634.5 1021.09  638.46  1019.3  639.26 1018.82  641.26 1017.36  662.34 1017.36
  664.08 1017.36  664.75 1017.36  666.06 1017.36   691.4 1017.36  692.68 1019.39
  711.75 1027.73  717.45 1027.98  718.95    1028   719.7 1027.96  720.21 1027.98
  758.27  1029.5

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05   624.8    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         624.8  718.95             91.2    91.2    91.2             .1       .3

CROSS SECTION
```

```
RIVER: Santa Gertrudis
REACH: Channel            RS: 2577.225

INPUT
Description: 25+77 (28+17.3)
Station Elevation Data    num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1031.48    5.31  1031.2   15.92 1030.83    21.1 1030.87   21.22  1029.9
   25.06 1029.44   42.23 1029.04   94.47 1028.77  130.21 1027.76  192.92 1027.93
  199.88 1027.95  222.57 1027.34  222.66 1026.67  256.32  1026.7  266.64 1026.71
  278.98 1026.71   418.1 1027.69  435.04 1027.69  438.23 1027.69  440.74 1027.38
  583.47    1028  585.85    1028  589.21 1028.08  590.63 1028.08  590.81 1028.08
  591.08 1028.08  598.85 1028.03  601.47    1028  601.54    1028  603.13    1028
  604.92    1028  606.39    1028  619.48  1027.9  635.42 1027.81   636.4  1027.4
   649.4  1027.4   654.9 1020.52  656.29 1020.31   661.4 1016.88   711.2 1016.88
  719.88 1022.64  721.58 1023.74  725.83  1026.5  728.27 1027.06  730.42 1027.17
  750.46    1028  754.59 1028.14  762.19 1028.41  771.89 1028.75  778.67    1029

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05  619.48    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        635.42  730.42            164.3   164.3   164.3             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 2403.592

INPUT
Description: 24+04 (26+53)
Station Elevation Data    num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1031.44     .21 1031.44    6.87 1031.09    13.5 1030.73   22.77 1030.38
   27.28 1030.42   27.38 1029.54   30.72 1029.12   45.59 1028.75   90.36 1028.48
  120.55 1027.57  172.73 1027.71  178.45 1027.72  197.04 1027.18  197.11 1026.59
  224.44 1026.61  232.76 1026.62   247.8 1026.62  357.64 1027.44  385.65 1027.43
  391.02 1027.43  395.26 1026.86  529.98 1027.42  670.49    1027  671.05 1026.99
  671.13    1027  686.28 1026.85  694.52 1027.16   717.8    1028   730.8    1028
  737.24    1025  746.68  1018.9  748.19 1017.93     751 1016.03     801 1016.03
  818.25 1027.53  836.66 1027.91  840.84    1028  843.79 1028.15  846.46 1028.28
  848.98 1028.37  850.27 1028.41  852.43 1028.37  859.35 1028.68     923    1029

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05   717.8    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         730.8  836.66            127.2   127.2   127.2             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 2270.565

INPUT
Description: 22+71 (25+25.8)
Station Elevation Data    num=      56
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1030.53     4.9 1030.25   13.14 1029.94   17.15 1029.97   17.24 1029.18
   20.21  1028.8   33.41 1028.46   72.99 1028.22   99.56  1027.4  145.25 1027.52
  150.24 1027.53  166.43 1027.05   166.5 1026.52  190.23 1026.54  197.44 1026.55
  214.89 1026.55  309.32 1027.26  345.11 1027.25     352 1027.25  357.46 1026.49
  471.46 1026.96  588.31 1026.57  643.91 1025.83  724.84    1026  732.95    1026
   733.2    1026  748.64 1025.75  749.55 1025.75  750.04 1025.75  750.51 1025.75
```

```
   755.9 1026.16  763.17 1026.37  766.34 1026.46     774 1027.49     787 1027.49
  787.41 1027.11  794.02 1023.14  794.92 1022.56  797.51 1020.89  802.25 1017.88
     805 1015.37     855 1015.37  855.28    1016  856.63 1016.85  857.91 1017.65
  859.12 1018.41  861.66 1020.01  864.64 1021.88  866.04 1022.77   867.4 1023.62
  872.49  1026.8  878.77 1027.26  895.68    1028  899.28 1028.18  900.68 1028.16
  912.98 1028.54

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05     774    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        787.41  872.49            122.7   122.7   122.7             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 2141.739

INPUT
Description: 21+42
Station Elevation Data    num=      48
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1030.53     .26 1030.53    5.68 1030.23   11.08 1029.93   18.59 1029.63
   22.25 1029.66   22.33 1028.93   25.03 1028.58   37.01 1028.27   72.71 1028.03
   96.48 1027.28  136.99 1027.38   141.4 1027.39  155.63 1026.95  155.68 1026.47
  176.45 1026.49  182.74  1026.5  201.66 1026.49  282.88 1027.12     324  1027.1
  331.99  1027.1  338.33 1026.19  433.68 1026.56  528.68 1026.19  572.94 1025.55
  794.04    1026  795.65    1026  797.53    1026   797.6    1026  797.98    1026
  798.74    1026  802.04 1026.09   833.1 1027.12  835.12 1027.04  836.21    1027
  836.85 1027.02  837.09 1026.95     838 1026.23   855.3 1014.73   905.3 1014.73
   922.5 1026.23  925.82 1025.85  926.19 1026.01  938.01    1027  972.74 1027.74
  974.64 1027.78  981.22 1027.92  984.42    1028

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05  802.04    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        836.85  938.01            168.2   168.2   168.2             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 1957.716

INPUT
Description: 19+58 (22+34.9)
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1026.84     .48 1026.82     .52 1026.41   17.93 1026.42   23.18 1026.43
   44.01 1026.42  110.52 1026.95  158.03 1026.91  167.36 1026.91  174.78  1025.8
  249.49 1026.07  321.39 1025.75  354.07 1025.22  522.02 1025.54  625.55 1025.79
  705.11 1025.67  708.38  1025.7  715.78 1025.64  715.83 1025.64  720.22 1025.77
  721.06  1025.8  722.22 1025.85  724.89    1026  725.66 1026.01  727.88    1026
   737.2  1025.9   750.2  1025.9  750.99 1025.51  751.36 1025.28  751.73 1025.04
  752.08 1024.81  754.15 1023.23   766.8 1013.85  815.73 1013.85   816.8 1013.85
   834.5 1025.35  854.04 1025.91  854.33 1025.91   858.7 1025.92   859.1 1025.92
  859.16 1025.91  864.93 1025.86  881.76 1025.41     945    1028

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05  724.89    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         750.2  854.04               95      95      95             .1       .3
```

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 1862.385

INPUT
Description: 18+62 (21+39.9)
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1026.73	.23	1026.72	.27	1026.36	15.46	1026.37	20.02	1026.38
42.61	1026.37	99.98	1026.82	152.65	1026.78	163.02	1026.77	171.29	1025.53
234.07	1025.76	293.89	1025.47	320.88	1025.03	457.72	1025.28	540.53	1025.48
738.7	1025.15	744.51	1025.21	750.4	1025.21	768	1025.56	768.4	1025.4
781.4	1025.4	781.55	1025.59	781.62	1025.54	789.28	1021.58	789.73	1021.28
799.07	1015.19	800	1013.36	850	1013.36	855.58	1017.24	857.18	1018.27
862.1	1021.46	871.11	1023.84	872.57	1024.46	873.85	1024.96	877.89	1024.91
890.41	1025.53	907.7	1025.04	1022	1028				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.05	768	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
781.55	873.85	70.5	70.5	70.5	.1	.3

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 1777.700

INPUT
Description: 17+78 (20+69.4)
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1026.78	2.94	1026.68	2.98	1026.34	17.15	1026.35	21.41	1026.35
44.62	1026.34	97.55	1026.77	152.21	1026.72	163.02	1026.71	171.65	1025.4
228.01	1025.59	280.93	1025.32	304.56	1024.92	422.07	1025.13	491.38	1025.29
690.63	1024.91	751.4	1024.74	751.95	1024.73	752.67	1024.72	764.4	1024.79
765.08	1024.82	770.28	1024.72	773.08	1024.66	779.05	1024.67	780	1024.93
793	1024.93	796.72	1025.02	797.11	1024.79	804.22	1021.77	810.23	1017.88
814.09	1015.35	814.63	1014.99	815.15	1014.65	817.6	1012.99	867.3	1012.99
882.21	1022.92	887	1024.81	887.32	1024.94	887.86	1025	887.93	1025
909.86	1024.89	924.38	1024.61	1058	1028				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.05	793	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
796.72	887.86	176.3	176.3	176.3	.1	.3

CROSS SECTION

RIVER: Santa Gertrudis
REACH: Channel RS: 1602.630

INPUT
Description: 16+03 (18+93.1)
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1026.43	.64	1026.43	11.14	1024.83	44.33	1024.94	75.31	1024.78
89.08	1024.54	157.04	1024.66	196.71	1024.75	309.07	1024.52	492.83	1024
498.27	1024	513.24	1023.89	607.62	1024	607.87	1024	609.13	1024
609.48	1024	617.58	1024	621.64	1024	623.05	1024	623.73	1024
624.49	1024	654.42	1024	663.2	1023.95	681	1012.08	731	1012.08
738.56	1017.43	739.02	1017.71	739.25	1017.86	740.92	1018.91	744.69	1021.29

```
  746.09 1022.17  747.39    1023  748.61 1023.78  748.96    1024  751.05 1024.12
  752.42 1024.06  788.45 1024.87     940    1027

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05  654.42    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         663.2  751.05            149.7   149.7   149.7             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 1442.849

INPUT
Description: 14+43
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -15.8 1025.55    -2.8 1025.55       0 1023.53     .75 1023.04    2.23 1022.06
    3.73 1021.07    4.02 1020.87    9.86 1017.02   11.61 1015.86   13.16 1014.81
      18 1011.63      68 1011.63      73 1015.92   74.08 1016.63   78.95 1019.84
   81.46 1021.52   83.34 1022.77   90.33 1023.74   94.75    1025     100 1024.94
  102.77 1025.12  110.96 1024.88

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
   -15.8    .013       0    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0   94.75            101.2   101.2   101.2             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 1341.067

INPUT
Description: 13+41
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -19    1025     -13  1024.9       0  1024.9     .58 1024.51    9.77 1020.73
   11.16 1019.81   11.44 1019.63   17.57 1014.62    17.8 1014.47   18.09 1014.28
    22.5 1011.33    72.5 1011.33   77.83 1015.25   81.48 1017.63   84.79 1019.79
   89.14 1022.67   97.52  1024.5   97.56  1024.5     215    1025

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
     -19    .013       0    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           .58   97.52             95.4    95.4    95.4             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 1207.477

INPUT
Description: 12+07
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1023.5    8.52 1023.53     8.9  1023.5   11.37 1023.39    12.2  1022.2
    25.2    1022   35.16    1022   35.35    1022   36.83 1021.41    37.1 1021.24
    41.6 1016.62      50 1011.04     100 1011.04  112.76 1016.99  112.77    1017
  112.79 1017.01  112.97 1017.07  136.26 1025.85  140.55 1025.91  141.32 1025.92
```

```
  142.79 1025.93

Manning's n Values        num=       1
     Sta   n Val
       0    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         35.16  136.26            100.3   100.3   100.3             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 1076.728

INPUT
Description: 10+76
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     1.4  1027.1     1.5 1025.45    14.5 1025.45   16.39  1024.2   20.62 1021.64
   22.83 1020.25   26.32 1018.03   27.46  1017.3   27.98 1016.97   28.16 1016.85
    32.4 1014.11   32.57    1014    37.4 1010.77    87.4 1010.77   94.98 1016.96
   96.17 1017.75  100.81 1020.82  108.38 1025.81  108.79 1026.08  117.08 1026.39
  119.35  1026.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     1.4     .05     1.5    .013  108.79     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           1.5  108.79           113.47  113.47  113.47             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 963.255

INPUT
Description: 9+63 (13+33)
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1027    8.99    1027   12.08    1027   13.32 1026.65   23.54 1023.45
   26.98 1021.26   30.36  1019.1   32.06 1018.02   36.84    1015   37.91 1014.32
   38.14 1014.16    38.4    1014    43.2 1010.55    92.7 1010.55   98.03 1014.13
  103.51 1017.83  104.76 1018.68     105 1018.84  107.49 1020.47  110.08 1022.09
  110.97 1022.67  111.23 1022.83  112.61  1023.7  112.84 1023.85   113.5 1024.27
  116.32    1026  121.61 1026.33  130.15  1026.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   12.08    .013  116.32     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         23.54  112.61            226.5   226.5   226.5             .1       .3

CROSS SECTION


RIVER: Santa Gertrudis
REACH: Channel            RS: 744.641

INPUT
Description: Downstream Boundary, Confluence w/Murrieta Creek
Station Elevation Data    num=      51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1023.5    5.59 1023.39   12.75  1023.4   26.24 1023.41    37.5 1023.36
   52.61 1023.44   56.39 1023.44  122.76 1023.19  129.79 1023.21  165.05 1023.88
  233.88  1023.9  235.94 1023.92  242.38 1023.92  249.36 1024.61  261.13 1024.44
```

```
  310.05 1024.93  355.44 1025.41  356.86 1025.42  369.54 1025.49  389.45 1025.63
  434.42    1026  440.06    1026  442.04    1026  444.61    1026  458.63 1026.37
  463.21  1026.5  465.46 1026.56  469.72 1026.11  471.23 1025.58  471.58 1025.36
  476.28 1022.43  476.61 1022.23  480.99  1019.5  485.82 1016.48  486.89 1015.82
  489.82    1014  491.13 1013.64  492.02 1010.11  531.47 1010.11  548.27 1010.11
     669 1010.11   683.7 1019.92  685.68 1021.08   688.1 1021.66  708.41 1021.51
  710.92 1021.59  739.01 1020.84  747.98 1020.22  754.41 1020.18  771.18 1021.46
  812.88 1021.83

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05  463.21    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        465.46   688.1                0       0       0             .1       .3


SUMMARY OF MANNING'S N VALUES

River:Santa Gertrudis

      Reach          River Sta.       n1        n2        n3        n4

 Channel              6643.382          .03
 Channel              6523.379          .03
 Channel              6411.317          .03      .013       .03
 Channel              6272.947         .016      .013       .03
 Channel              6211         Bridge
 Channel              6162.934         .013       .03
 Channel              5981.337          .03      .013       .03
 Channel              5816.827          .03      .013       .03
 Channel              5668.033          .03      .013       .03
 Channel              5414.180          .03      .013       .03
 Channel              5301         Bridge
 Channel              5279.592          .03      .013       .03
 Channel              5248.5       Bridge
 Channel              5230.979          .05      .013       .03       .05
 Channel              5181              .05      .013       .03
 Channel              5105         Bridge
 Channel              5060.939          .05      .013       .03
 Channel              4997.843          .05      .013       .03       .05
 Channel              4943         Bridge
 Channel              4894.934          .05      .013       .03      .013
 Channel              4874              .03      .013       .03
 Channel              4838.5       Bridge
 Channel              4817.558          .03      .013       .03
 Channel              4780.359          .03      .013
 Channel              4721.444         .016      .013
 Channel              4620.482         .016      .013
 Channel              4493.399         .016      .013
 Channel              4357.147          .05      .013
 Channel              4191.443         .016      .013      .013
 Channel              4044.332          .05      .013      .013       .05
 Channel              3992         Bridge
 Channel              3946.834          .05      .013      .013       .05
 Channel              3794.324          .05      .013       .05
 Channel              3625.899          .05      .013
 Channel              3393.888          .05      .013      .013
 Channel              3134.305          .05      .013
 Channel              2955.332          .05      .013
 Channel              2690.770          .05      .013
 Channel              2577.225          .05      .013
 Channel              2403.592          .05      .013
 Channel              2270.565          .05      .013
 Channel              2141.739          .05      .013
 Channel              1957.716          .05      .013
 Channel              1862.385          .05      .013
 Channel              1777.700          .05      .013
```

Channel	1602.630	.05	.013	
Channel	1442.849	.013	.013	
Channel	1341.067	.013	.013	
Channel	1207.477	.013		
Channel	1076.728	.05	.013	.05
Channel	963.255	.05	.013	.05
Channel	744.641	.05	.013	

SUMMARY OF REACH LENGTHS

River: Santa Gertrudis

Reach	River Sta.	Left	Channel	Right
Channel	6643.382	120	120	120
Channel	6523.379	112.06	112.06	112.06
Channel	6411.317	138.37	138.37	138.37
Channel	6272.947	110.01	110.01	110.01
Channel	6211	Bridge		
Channel	6162.934	181.6	181.6	181.6
Channel	5981.337	164.51	164.51	164.51
Channel	5816.827	148.79	148.79	148.79
Channel	5668.033	253.85	253.85	253.85
Channel	5414.180	134.59	134.59	134.59
Channel	5301	Bridge		
Channel	5279.592	48.61	48.61	48.61
Channel	5248.5	Bridge		
Channel	5230.979	68.41	68.41	68.41
Channel	5181	101.63	101.63	101.63
Channel	5105	Bridge		
Channel	5060.939	63.1	63.1	63.1
Channel	4997.843	102.91	102.91	102.91
Channel	4943	Bridge		
Channel	4894.934	37.99	37.99	37.99
Channel	4874	39.38	39.38	39.38
Channel	4838.5	Bridge		
Channel	4817.558	37.2	37.2	37.2
Channel	4780.359	58.91	58.91	58.91
Channel	4721.444	100.96	100.96	100.96
Channel	4620.482	127.08	127.08	127.08
Channel	4493.399	136.25	136.25	136.25
Channel	4357.147	165.67	165.67	165.67
Channel	4191.443	147.11	147.11	147.11
Channel	4044.332	97.5	97.5	97.5
Channel	3992	Bridge		
Channel	3946.834	147	147	147
Channel	3794.324	159.3	159.3	159.3
Channel	3625.899	237.5	237.5	237.5
Channel	3393.888	231.1	231.1	231.1
Channel	3134.305	171.3	171.3	171.3
Channel	2955.332	210.4	210.4	210.4
Channel	2690.770	91.2	91.2	91.2
Channel	2577.225	164.3	164.3	164.3
Channel	2403.592	127.2	127.2	127.2
Channel	2270.565	122.7	122.7	122.7
Channel	2141.739	168.2	168.2	168.2
Channel	1957.716	95	95	95
Channel	1862.385	70.5	70.5	70.5
Channel	1777.700	176.3	176.3	176.3
Channel	1602.630	149.7	149.7	149.7
Channel	1442.849	101.2	101.2	101.2
Channel	1341.067	95.4	95.4	95.4
Channel	1207.477	100.3	100.3	100.3
Channel	1076.728	113.47	113.47	113.47
Channel	963.255	226.5	226.5	226.5
Channel	744.641	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Santa Gertrudis

Reach	River Sta.	Contr.	Expan.
Channel	6643.382	.1	.3
Channel	6523.379	.1	.3
Channel	6411.317	.1	.3
Channel	6272.947	.3	.5
Channel	6211	Bridge	
Channel	6162.934	.3	.5
Channel	5981.337	.1	.3
Channel	5816.827	.1	.3
Channel	5668.033	.1	.3
Channel	5414.180	.1	.3
Channel	5301	Bridge	
Channel	5279.592	.1	.3
Channel	5248.5	Bridge	
Channel	5230.979	.3	.5
Channel	5181	.3	.5
Channel	5105	Bridge	
Channel	5060.939	.3	.5
Channel	4997.843	.3	.5
Channel	4943	Bridge	
Channel	4894.934	.3	.5
Channel	4874	.3	.5
Channel	4838.5	Bridge	
Channel	4817.558	.3	.5
Channel	4780.359	.1	.3
Channel	4721.444	.1	.3
Channel	4620.482	.1	.3
Channel	4493.399	.1	.3
Channel	4357.147	.1	.3
Channel	4191.443	.3	.5
Channel	4044.332	.3	.5
Channel	3992	Bridge	
Channel	3946.834	.3	.5
Channel	3794.324	.1	.3
Channel	3625.899	.1	.3
Channel	3393.888	.1	.3
Channel	3134.305	.1	.3
Channel	2955.332	.1	.3
Channel	2690.770	.1	.3
Channel	2577.225	.1	.3
Channel	2403.592	.1	.3
Channel	2270.565	.1	.3
Channel	2141.739	.1	.3
Channel	1957.716	.1	.3
Channel	1862.385	.1	.3
Channel	1777.700	.1	.3
Channel	1602.630	.1	.3
Channel	1442.849	.1	.3
Channel	1341.067	.1	.3
Channel	1207.477	.1	.3
Channel	1076.728	.1	.3
Channel	963.255	.1	.3
Channel	744.641	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Channel	6643.382	100-year	Existing Reconciled 2019	11300.00	1044.00	1056.22	1052.44	1057.26	0.001561	8.16	1385.77	163.27	0.49
Channel	6643.382	100-year	Proposed 2019	11300.00	1044.00	1055.80	1052.45	1056.94	0.001834	8.58	1317.71	158.38	0.52
Channel	6523.379	100-year	Existing Reconciled 2019	11300.00	1044.00	1055.78		1057.01	0.002364	8.89	1270.48	176.52	0.58
Channel	6523.379	100-year	Proposed 2019	11300.00	1044.00	1055.17		1056.63	0.002982	9.69	1165.57	168.65	0.65
Channel	6411.317	100-year	Existing Reconciled 2019	11300.00	1044.00	1055.40		1056.74	0.002202	9.32	1229.45	177.12	0.57
Channel	6411.317	100-year	Proposed 2019	11300.00	1044.00	1054.79		1056.33	0.002340	9.95	1141.50	164.44	0.63
Channel	6272.947	100-year	Existing Reconciled 2019	11300.00	1045.38	1055.11	1052.50	1056.42	0.002284	9.18	1231.04	159.32	0.58
Channel	6272.947	100-year	Proposed 2019	11300.00	1045.38	1054.52	1052.29	1055.98	0.002365	9.70	1164.63	155.05	0.62
Channel	6211			Bridge									
Channel	6162.934	100-year	Existing Reconciled 2019	11300.00	1045.23	1052.61	1052.61	1055.51	0.007585	13.68	826.07	142.19	1.00
Channel	6162.934	100-year	Proposed 2019	11300.00	1045.23	1052.88	1052.21	1055.24	0.004889	12.32	916.88	143.11	0.86
Channel	5981.337	100-year	Existing Reconciled 2019	11300.00	1044.00	1050.84	1051.09	1053.97	0.008663	14.20	795.68	144.83	1.07
Channel	5981.337	100-year	Proposed 2019	11300.00	1044.00	1051.09	1051.09	1054.00	0.007433	13.67	826.82	144.43	1.01
Channel	5816.827	100-year	Existing Reconciled 2019	11300.00	1039.48	1051.36	1048.50	1052.65	0.002139	9.13	1237.94	151.79	0.56
Channel	5816.827	100-year	Proposed 2019	11300.00	1039.48	1051.03	1048.50	1052.44	0.002337	9.54	1184.37	147.64	0.59
Channel	5668.033	100-year	Existing Reconciled 2019	11300.00	1039.00	1050.90		1052.30	0.002409	9.50	1192.33	156.12	0.59
Channel	5668.033	100-year	Proposed 2019	11300.00	1039.00	1050.57		1052.08	0.002351	9.88	1149.40	162.09	0.63
Channel	5414.180	100-year	Existing Reconciled 2019	11300.00	1038.00	1051.08		1051.72	0.000904	6.42	1760.23	193.51	0.37
Channel	5414.180	100-year	Proposed 2019	11300.00	1038.00	1050.75	1045.73	1051.49	0.000961	6.90	1638.66	191.20	0.41
Channel	5279.592	100-year	Existing Reconciled 2019	11300.00	1038.00	1050.91	1046.54	1051.59	0.001004	6.59	1713.75	193.05	0.39
Channel	5279.592	100-year	Proposed 2019	11300.00	1038.00	1050.42	1046.91	1051.24	0.001171	7.28	1552.66	191.79	0.45
Channel	5248.5			Bridge									
Channel	5230.979	100-year	Existing Reconciled 2019	11300.00	1038.00	1050.51		1051.19	0.001026	6.63	1704.37	193.60	0.39
Channel	5230.979	100-year	Proposed 2019	11300.00	1038.00	1049.89		1050.72	0.001203	7.31	1546.57	192.20	0.45
Channel	5181	100-year	Proposed 2019	11300.00	1039.00	1049.82	1046.01	1050.64	0.001168	7.26	1556.02	179.88	0.44
Channel	5162.570	100-year	Existing Reconciled 2019	11300.00	1039.00	1050.30	1046.02	1051.09	0.001127	7.09	1593.90	174.84	0.41
Channel	5105			Bridge									
Channel	5060.939	100-year	Existing Reconciled 2019	11300.00	1038.33	1049.35		1050.22	0.001297	7.48	1510.45	169.57	0.44
Channel	5060.939	100-year	Proposed 2019	11300.00	1038.33	1048.87		1049.81	0.001360	7.77	1454.58	172.79	0.47
Channel	4997.843	100-year	Existing Reconciled 2019	11300.00	1038.00	1049.31	1044.97	1050.10	0.001118	7.13	1585.27	171.88	0.41
Channel	4997.843	100-year	Proposed 2019	11300.00	1038.00	1048.80	1045.10	1049.71	0.001342	7.63	1481.85	170.75	0.46
Channel	4943			Bridge									
Channel	4894.934	100-year	Existing Reconciled 2019	11300.00	1038.00	1048.80		1049.64	0.001225	7.32	1543.59	172.45	0.43
Channel	4894.934	100-year	Proposed 2019	11300.00	1038.00	1048.14		1049.08	0.001355	7.76	1456.64	175.25	0.47

Channel	4874	100-year	Proposed 2019	11300.00	1038.98	1047.11	1045.55	1048.78	0.002837	10.38	1088.77	157.71	0.70
Channel	4856.941	100-year	Existing Reconciled 2019	11300.00	1038.98	1047.59	1045.92	1049.30	0.003413	10.48	1077.88	152.85	0.70
Channel	4838.5			Bridge									
Channel	4817.558	100-year	Existing Reconciled 2019	11300.00	1038.00	1044.24	1044.90	1047.76	0.011882	15.04	751.62	161.03	1.22
Channel	4817.558	100-year	Proposed 2019	11300.00	1038.00	1044.08	1044.78	1047.61	0.010613	15.08	749.67	161.38	1.23
Channel	4780.359	100-year	Existing Reconciled 2019	11300.00	1038.67	1043.50	1044.50	1047.43	0.002952	15.90	710.60	171.34	1.38
Channel	4780.359	100-year	Proposed 2019	11300.00	1038.67	1044.37	1044.53	1047.07	0.001674	13.17	858.06	177.64	1.06
Channel	4721.444	100-year	Existing Reconciled 2019	11300.00	1031.89	1035.17	1038.06	1046.39	0.012979	26.86	420.64	140.31	2.74
Channel	4721.444	100-year	Proposed 2019	11300.00	1031.89	1035.23	1038.06	1046.04	0.012245	26.38	428.28	140.47	2.66
Channel	4620.482	100-year	Existing Reconciled 2019	11300.00	1030.67	1034.60	1037.49	1045.03	0.009656	25.90	436.23	122.49	2.42
Channel	4620.482	100-year	Proposed 2019	11300.00	1030.67	1034.66	1037.49	1044.76	0.009179	25.50	443.21	122.66	2.36
Channel	4493.399	100-year	Existing Reconciled 2019	11300.00	1029.14	1034.62	1037.37	1043.68	0.005879	24.14	468.19	100.10	1.97
Channel	4493.399	100-year	Proposed 2019	11300.00	1029.14	1034.70	1037.37	1043.46	0.005592	23.75	475.79	100.33	1.92
Channel	4357.147	100-year	Existing Reconciled 2019	11300.00	1027.88	1035.30	1037.43	1042.55	0.003232	21.60	523.12	81.69	1.50
Channel	4357.147	100-year	Proposed 2019	11300.00	1027.88	1035.38	1037.40	1042.38	0.003093	21.23	532.38	82.64	1.47
Channel	4191.443	100-year	Existing Reconciled 2019	11300.00	1027.52	1034.86	1036.91	1041.99	0.003191	21.42	527.45	82.92	1.50
Channel	4191.443	100-year	Proposed 2019	11300.00	1027.52	1034.79	1036.81	1041.82	0.003642	21.26	531.46	92.87	1.57
Channel	4044.332	100-year	Existing Reconciled 2019	11300.00	1026.80	1034.18	1036.32	1041.47	0.003288	21.66	521.68	82.29	1.52
Channel	4044.332	100-year	Proposed 2019	11300.00	1026.80	1034.30	1036.33	1041.31	0.003271	21.24	531.96	83.55	1.48
Channel	3992			Bridge									
Channel	3946.834	100-year	Existing Reconciled 2019	11300.00	1026.50	1033.84	1036.00	1041.14	0.003273	21.67	521.54	82.03	1.51
Channel	3946.834	100-year	Proposed 2019	11300.00	1026.50	1033.97	1036.00	1040.98	0.003085	21.24	532.04	82.42	1.47
Channel	3794.324	100-year	Existing Reconciled 2019	11300.00	1025.65	1033.17	1035.43	1040.61	0.003333	21.89	516.30	79.91	1.52
Channel	3794.324	100-year	Proposed 2019	11300.00	1025.65	1034.83	1035.43	1039.45	0.001697	17.26	654.87	87.00	1.11
Channel	3625.899	100-year	Existing Reconciled 2019	11300.00	1021.78	1029.02	1032.48	1039.64	0.005072	26.15	432.10	70.37	1.86
Channel	3625.899	100-year	Proposed 2019	11300.00	1021.78	1029.50	1032.82	1038.61	0.004056	24.20	466.86	72.06	1.68
Channel	3393.888	100-year	Existing Reconciled 2019	11300.00	1020.54	1027.77	1031.80	1038.44	0.004996	26.21	431.20	68.78	1.85
Channel	3393.888	100-year	Proposed 2019	11300.00	1020.54	1028.12	1032.13	1037.59	0.004240	24.68	457.82	70.70	1.71
Channel	3134.305	100-year	Existing Reconciled 2019	11300.00	1019.34	1026.53	1031.16	1037.26	0.005134	26.28	430.00	70.19	1.87
Channel	3134.305	100-year	Proposed 2019	11300.00	1019.34	1026.84	1030.94	1036.56	0.004438	25.01	451.85	71.10	1.75
Channel	2955.332	100-year	Existing Reconciled 2019	11300.00	1018.45	1024.41	1028.40	1036.16	0.006698	27.50	410.91	77.93	2.11
Channel	2955.332	100-year	Proposed 2019	11300.00	1018.45	1024.60	1028.39	1035.55	0.006026	26.55	425.56	78.49	2.01
Channel	2690.770	100-year	Existing Reconciled 2019	11300.00	1017.36	1024.88	1029.23	1034.36	0.004371	24.70	457.50	72.53	1.73
Channel	2690.770	100-year	Proposed 2019	11300.00	1017.36	1024.92	1028.97	1033.92	0.004237	24.07	469.54	76.23	1.71
Channel	2577.225	100-year	Existing Reconciled 2019	11300.00	1016.88	1024.27	1029.07	1033.94	0.004484	24.94	453.12	72.51	1.76
Channel	2577.225	100-year	Proposed 2019	11300.00	1016.88	1024.56	1029.16	1033.55	0.003932	24.04	469.96	71.18	1.65
Channel	2403.592	100-year	Existing Reconciled 2019	11300.00	1016.03	1023.40	1026.60	1033.18	0.004551	25.09	450.46	72.34	1.77

Channel	2403.592	100-year	Proposed 2019	11300.00	1016.03	1023.56	1026.44	1032.85	0.004217	24.44	462.28	72.83	1.71
Channel	2270.565	100-year	Existing Reconciled 2019	11300.00	1015.37	1022.88	1026.22	1032.60	0.004490	25.00	451.92	71.79	1.76
Channel	2270.565	100-year	Proposed 2019	11300.00	1015.37	1023.02	1026.23	1032.32	0.004211	24.46	461.95	72.23	1.71
Channel	2141.739	100-year	Existing Reconciled 2019	11300.00	1014.73	1022.05	1025.09	1032.01	0.004661	25.32	446.37	71.96	1.79
Channel	2141.739	100-year	Proposed 2019	11300.00	1014.73	1022.17	1025.10	1031.76	0.004409	24.84	454.87	72.31	1.75
Channel	1957.716	100-year	Existing Reconciled 2019	11300.00	1013.85	1021.19	1024.31	1031.22	0.004665	25.40	444.87	71.20	1.79
Channel	1957.716	100-year	Proposed 2019	11300.00	1013.85	1021.29	1024.31	1031.00	0.004445	24.99	452.22	71.50	1.75
Channel	1862.385	100-year	Existing Reconciled 2019	11300.00	1013.36	1020.89	1024.01	1030.72	0.004529	25.15	449.34	70.90	1.76
Channel	1862.385	100-year	Proposed 2019	11300.00	1013.36	1020.99	1024.10	1030.53	0.004342	24.79	455.89	71.19	1.73
Channel	1777.700	100-year	Existing Reconciled 2019	11300.00	1012.99	1020.30	1023.49	1030.37	0.004730	25.45	443.97	71.80	1.80
Channel	1777.700	100-year	Proposed 2019	11300.00	1012.99	1020.39	1023.50	1030.19	0.004553	25.12	449.77	72.04	1.77
Channel	1602.630	100-year	Existing Reconciled 2019	11300.00	1012.08	1019.37	1022.56	1029.52	0.004785	25.56	442.04	71.57	1.81
Channel	1602.630	100-year	Proposed 2019	11300.00	1012.08	1019.44	1022.56	1029.37	0.004628	25.27	447.09	71.79	1.79
Channel	1442.849	100-year	Existing Reconciled 2019	11300.00	1011.63	1019.24	1022.13	1028.63	0.004227	24.58	459.65	71.53	1.71
Channel	1442.849	100-year	Proposed 2019	11300.00	1011.63	1019.30	1022.13	1028.50	0.004100	24.33	464.49	71.74	1.69
Channel	1341.067	100-year	Existing Reconciled 2019	11300.00	1011.33	1019.00	1021.86	1028.14	0.004038	24.26	465.79	71.36	1.67
Channel	1341.067	100-year	Proposed 2019	11300.00	1011.33	1019.06	1021.86	1028.03	0.003926	24.03	470.26	71.53	1.65
Channel	1207.477	100-year	Existing Reconciled 2019	11300.00	1011.04	1018.31	1021.27	1027.71	0.004518	24.59	459.53	76.30	1.77
Channel	1207.477	100-year	Proposed 2019	11300.00	1011.04	1018.36	1021.25	1027.60	0.004412	24.39	463.31	76.48	1.75
Channel	1076.728	100-year	Existing Reconciled 2019	11300.00	1010.77	1018.91	1021.32	1026.91	0.003339	22.69	497.94	72.97	1.53
Channel	1076.728	100-year	Proposed 2019	11300.00	1010.77	1018.98	1021.32	1026.81	0.003236	22.45	503.37	73.20	1.51
Channel	963.255	100-year	Existing Reconciled 2019	11300.00	1010.55	1018.86	1021.08	1026.41	0.003093	22.05	512.50	74.28	1.48
Channel	963.255	100-year	Proposed 2019	11300.00	1010.55	1018.92	1021.08	1026.33	0.003005	21.83	517.61	74.49	1.46
Channel	744.641	100-year	Existing Reconciled 2019	11300.00	1010.11	1020.70	1015.09	1021.19	0.000122	5.62	2017.91	226.15	0.32
Channel	744.641	100-year	Proposed 2019	11300.00	1010.11	1020.70	1015.09	1021.19	0.000122	5.62	2017.91	226.15	0.32

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Channel	6643.382	100-year	Existing Reconciled 2019	1057.26	1056.22	1.04	0.23	0.02	0.16	11298.44	1.40	163.27
Channel	6643.382	100-year	Proposed 2019	1056.94	1055.80	1.14	0.28	0.03		11299.73	0.27	158.38
Channel	6523.379	100-year	Existing Reconciled 2019	1057.01	1055.78	1.23	0.26	0.01		11299.98	0.02	176.52
Channel	6523.379	100-year	Proposed 2019	1056.63	1055.17	1.46	0.29	0.01		11300.00		168.65
Channel	6411.317	100-year	Existing Reconciled 2019	1056.74	1055.40	1.34	0.31	0.01	22.34	11262.18	15.48	177.12
Channel	6411.317	100-year	Proposed 2019	1056.33	1054.79	1.54	0.33	0.02	5.10	11292.00	2.89	164.44
Channel	6272.947	100-year	Existing Reconciled 2019	1056.42	1055.11	1.31	0.01	0.03		11300.00		159.32
Channel	6272.947	100-year	Proposed 2019	1055.98	1054.52	1.46	0.01	0.03		11300.00		155.05
Channel	6211			Bridge								
Channel	6162.934	100-year	Existing Reconciled 2019	1055.51	1052.61	2.91	1.50	0.04		11300.00		142.19
Channel	6162.934	100-year	Proposed 2019	1055.24	1052.88	2.36	1.08	0.16		11300.00		143.11
Channel	5981.337	100-year	Existing Reconciled 2019	1053.97	1050.84	3.13	0.60	0.47		11300.00		144.83
Channel	5981.337	100-year	Proposed 2019	1054.00	1051.09	2.90	0.63	0.45		11300.00	0.00	144.43
Channel	5816.827	100-year	Existing Reconciled 2019	1052.65	1051.36	1.29	0.34	0.01		11300.00		151.79
Channel	5816.827	100-year	Proposed 2019	1052.44	1051.03	1.41	0.35	0.01		11300.00		147.64
Channel	5668.033	100-year	Existing Reconciled 2019	1052.30	1050.90	1.40	0.35	0.23	4.02	11294.96	1.02	156.12
Channel	5668.033	100-year	Proposed 2019	1052.08	1050.57	1.51	0.36	0.23	36.25	11263.65	0.10	162.09
Channel	5414.180	100-year	Existing Reconciled 2019	1051.72	1051.08	0.64	0.13	0.00	0.25	11299.75		193.51
Channel	5414.180	100-year	Proposed 2019	1051.49	1050.75	0.74	0.13	0.01	0.01	11299.99		191.20
Channel	5279.592	100-year	Existing Reconciled 2019	1051.59	1050.91	0.68			0.02	11299.98		193.05
Channel	5279.592	100-year	Proposed 2019	1051.24	1050.42	0.82				11300.00		191.79
Channel	5248.5			Bridge								
Channel	5230.979	100-year	Existing Reconciled 2019	1051.19	1050.51	0.68	0.07	0.03		11300.00		193.60
Channel	5230.979	100-year	Proposed 2019	1050.72	1049.89	0.83	0.08	0.01		11300.00		192.20
Channel	5181	100-year	Proposed 2019	1050.64	1049.82	0.82				11300.00		179.88
Channel	5162.570	100-year	Existing Reconciled 2019	1051.09	1050.30	0.78				11300.00		174.84
Channel	5105			Bridge								
Channel	5060.939	100-year	Existing Reconciled 2019	1050.22	1049.35	0.87	0.08	0.04		11300.00		169.57
Channel	5060.939	100-year	Proposed 2019	1049.81	1048.87	0.94	0.09	0.02		11300.00		172.79
Channel	4997.843	100-year	Existing Reconciled 2019	1050.10	1049.31	0.79				11300.00		171.88

Channel	4997.843	100-year	Proposed 2019	1049.71	1048.80	0.90				11300.00		170.75
Channel	4943			Bridge								
Channel	4894.934	100-year	Existing Reconciled 2019	1049.64	1048.80	0.83	0.07	0.26	0.02	11299.98		172.45
Channel	4894.934	100-year	Proposed 2019	1049.08	1048.14	0.94	0.07	0.22		11300.00		175.25
Channel	4874	100-year	Proposed 2019	1048.78	1047.11	1.67				11300.00		157.71
Channel	4856.941	100-year	Existing Reconciled 2019	1049.30	1047.59	1.71				11300.00		152.85
Channel	4838.5			Bridge								
Channel	4817.558	100-year	Existing Reconciled 2019	1047.76	1044.24	3.51	0.20	0.12	0.03	11299.54	0.43	161.03
Channel	4817.558	100-year	Proposed 2019	1047.61	1044.08	3.54	0.13	0.42	0.79	11299.03	0.19	161.38
Channel	4780.359	100-year	Existing Reconciled 2019	1047.43	1043.50	3.93	0.32	0.73		11300.00		171.34
Channel	4780.359	100-year	Proposed 2019	1047.07	1044.37	2.70	0.21	0.81		11300.00		177.64
Channel	4721.444	100-year	Existing Reconciled 2019	1046.39	1035.17	11.22	1.12	0.24		11300.00		140.31
Channel	4721.444	100-year	Proposed 2019	1046.04	1035.23	10.82	1.06	0.21		11300.00		140.47
Channel	4620.482	100-year	Existing Reconciled 2019	1045.03	1034.60	10.43	0.94	0.41		11300.00		122.49
Channel	4620.482	100-year	Proposed 2019	1044.76	1034.66	10.10	0.90	0.40		11300.00		122.66
Channel	4493.399	100-year	Existing Reconciled 2019	1043.68	1034.62	9.05	0.58	0.54		11300.00		100.10
Channel	4493.399	100-year	Proposed 2019	1043.46	1034.70	8.77	0.55	0.53		11300.00		100.33
Channel	4357.147	100-year	Existing Reconciled 2019	1042.55	1035.30	7.25	0.53	0.04		11300.00		81.69
Channel	4357.147	100-year	Proposed 2019	1042.38	1035.38	7.00	0.56	0.00		11300.00		82.64
Channel	4191.443	100-year	Existing Reconciled 2019	1041.99	1034.86	7.13	0.48	0.05		11300.00		82.92
Channel	4191.443	100-year	Proposed 2019	1041.82	1034.79	7.03	0.51	0.01		11300.00		92.87
Channel	4044.332	100-year	Existing Reconciled 2019	1041.47	1034.18	7.29	0.01	1.66		11300.00		82.29
Channel	4044.332	100-year	Proposed 2019	1041.31	1034.30	7.01	0.01	1.53		11300.00		83.55
Channel	3992			Bridge								
Channel	3946.834	100-year	Existing Reconciled 2019	1041.14	1033.84	7.30	0.49	0.04		11300.00		82.03
Channel	3946.834	100-year	Proposed 2019	1040.98	1033.97	7.01	0.33	1.19		11300.00		82.42
Channel	3794.324	100-year	Existing Reconciled 2019	1040.61	1033.17	7.44	0.65	0.32		11300.00		79.91
Channel	3794.324	100-year	Proposed 2019	1039.45	1034.83	4.63	0.40	0.45		11300.00		87.00
Channel	3625.899	100-year	Existing Reconciled 2019	1039.64	1029.02	10.63	1.20	0.00		11300.00		70.37
Channel	3625.899	100-year	Proposed 2019	1038.61	1029.50	9.10	0.98	0.04		11300.00		72.06
Channel	3393.888	100-year	Existing Reconciled 2019	1038.44	1027.77	10.67	1.17	0.01		11300.00		68.78
Channel	3393.888	100-year	Proposed 2019	1037.59	1028.12	9.47	1.00	0.03		11300.00		70.70
Channel	3134.305	100-year	Existing Reconciled 2019	1037.26	1026.53	10.73	1.00	0.10		11300.00		70.19

Channel	3134.305	100-year	Proposed 2019	1036.56	1026.84	9.72	0.88	0.12	11300.00		71.10
Channel	2955.332	100-year	Existing Reconciled 2019	1036.16	1024.41	11.75	1.13	0.68	11300.00		77.93
Channel	2955.332	100-year	Proposed 2019	1035.55	1024.60	10.96	1.06	0.59	11300.00		78.49
Channel	2690.770	100-year	Existing Reconciled 2019	1034.36	1024.88	9.48	0.40	0.02	11300.00		72.53
Channel	2690.770	100-year	Proposed 2019	1033.92	1024.92	9.00	0.37	0.00	11300.00		76.23
Channel	2577.225	100-year	Existing Reconciled 2019	1033.94	1024.27	9.66	0.74	0.01	11300.00		72.51
Channel	2577.225	100-year	Proposed 2019	1033.55	1024.56	8.98	0.67	0.03	11300.00		71.18
Channel	2403.592	100-year	Existing Reconciled 2019	1033.18	1023.40	9.78	0.57	0.02	11300.00		72.34
Channel	2403.592	100-year	Proposed 2019	1032.85	1023.56	9.29	0.54	0.00	11300.00		72.83
Channel	2270.565	100-year	Existing Reconciled 2019	1032.60	1022.88	9.72	0.56	0.02	11300.00		71.79
Channel	2270.565	100-year	Proposed 2019	1032.32	1023.02	9.30	0.53	0.03	11300.00		72.23
Channel	2141.739	100-year	Existing Reconciled 2019	1032.01	1022.05	9.96	0.78	0.01	11300.00		71.96
Channel	2141.739	100-year	Proposed 2019	1031.76	1022.17	9.59	0.74	0.01	11300.00		72.31
Channel	1957.716	100-year	Existing Reconciled 2019	1031.22	1021.19	10.03	0.44	0.06	11300.00		71.20
Channel	1957.716	100-year	Proposed 2019	1031.00	1021.29	9.70	0.42	0.05	11300.00		71.50
Channel	1862.385	100-year	Existing Reconciled 2019	1030.72	1020.89	9.83	0.33	0.02	11300.00		70.90
Channel	1862.385	100-year	Proposed 2019	1030.53	1020.99	9.55	0.31	0.03	11300.00		71.19
Channel	1777.700	100-year	Existing Reconciled 2019	1030.37	1020.30	10.07	0.84	0.01	11300.00		71.80
Channel	1777.700	100-year	Proposed 2019	1030.19	1020.39	9.81	0.81	0.01	11300.00		72.04
Channel	1602.630	100-year	Existing Reconciled 2019	1029.52	1019.37	10.16	0.67	0.23	11300.00		71.57
Channel	1602.630	100-year	Proposed 2019	1029.37	1019.44	9.93	0.65	0.22	11300.00		71.79
Channel	1442.849	100-year	Existing Reconciled 2019	1028.63	1019.24	9.39	0.42	0.07	11300.00		71.53
Channel	1442.849	100-year	Proposed 2019	1028.50	1019.30	9.20	0.41	0.07	11300.00		71.74
Channel	1341.067	100-year	Existing Reconciled 2019	1028.14	1019.00	9.15	0.41	0.03	11300.00		71.36
Channel	1341.067	100-year	Proposed 2019	1028.03	1019.06	8.97	0.40	0.03	11300.00		71.53
Channel	1207.477	100-year	Existing Reconciled 2019	1027.71	1018.31	9.40	0.39	0.42	11300.00		76.30
Channel	1207.477	100-year	Proposed 2019	1027.60	1018.36	9.24	0.38	0.42	11300.00		76.48
Channel	1076.728	100-year	Existing Reconciled 2019	1026.91	1018.91	8.00	0.36	0.13	11300.00		72.97
Channel	1076.728	100-year	Proposed 2019	1026.81	1018.98	7.83	0.35	0.13	11300.00		73.20
Channel	963.255	100-year	Existing Reconciled 2019	1026.41	1018.86	7.56	0.07	1.12	11300.00		74.28
Channel	963.255	100-year	Proposed 2019	1026.33	1018.92	7.41	0.07	1.12	11300.00		74.49
Channel	744.641	100-year	Existing Reconciled 2019	1021.19	1020.70	0.49			11296.00	4.00	226.15
Channel	744.641	100-year	Proposed 2019	1021.19	1020.70	0.49			11296.00	4.00	226.15

Profile Output Table - Standard Table 3

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Slope (ft/ft)	Vel Total (ft/s)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Max Chl Dpth (ft)	Hydr Depth (ft)	Froude # Chl	Froude # Chl	Shear Total (lb/sq ft)	Shear Chan (lb/sq ft)
Channel	6643.382	100-year	Existing Reconciled 2019	11300.00	1044.00	1056.22	1052.44	0.001561	8.15	8.16	1385.77	163.27	12.22	8.49	0.49	0.49	0.80	0.83
Channel	6643.382	100-year	Proposed 2019	11300.00	1044.00	1055.80	1052.45	0.001834	8.58	8.58	1317.71	158.38	11.80	8.32	0.52	0.52	0.92	0.93
Channel	6523.379	100-year	Existing Reconciled 2019	11300.00	1044.00	1055.78		0.002364	8.89	8.89	1270.48	176.52	11.78	7.20	0.58	0.58	1.04	1.05
Channel	6523.379	100-year	Proposed 2019	11300.00	1044.00	1055.17		0.002982	9.69	9.69	1165.57	168.65	11.17	6.91	0.65	0.65	1.26	1.26
Channel	6411.317	100-year	Existing Reconciled 2019	11300.00	1044.00	1055.40		0.002202	9.19	9.32	1229.45	177.12	11.40	6.94	0.57	0.57	0.94	1.10
Channel	6411.317	100-year	Proposed 2019	11300.00	1044.00	1054.79		0.002340	9.90	9.95	1141.50	164.44	10.79	6.94	0.63	0.63	0.98	1.08
Channel	6272.947	100-year	Existing Reconciled 2019	11300.00	1045.38	1055.11	1052.50	0.002284	9.18	9.18	1231.04	159.32	9.73	7.73	0.58	0.58	1.07	1.07
Channel	6272.947	100-year	Proposed 2019	11300.00	1045.38	1054.52	1052.29	0.002365	9.70	9.70	1164.63	155.05	9.14	7.51	0.62	0.62	1.06	1.06
Channel	6211			Bridge														
Channel	6162.934	100-year	Existing Reconciled 2019	11300.00	1045.23	1052.61	1052.61	0.007585	13.68	13.68	826.07	142.19	7.38	5.81	1.00	1.00	2.67	2.67
Channel	6162.934	100-year	Proposed 2019	11300.00	1045.23	1052.88	1052.21	0.004889	12.32	12.32	916.88	143.11	7.65	6.41	0.86	0.86	1.86	1.86
Channel	5981.337	100-year	Existing Reconciled 2019	11300.00	1044.00	1050.84	1051.09	0.008663	14.20	14.20	795.68	144.83	6.84	5.49	1.07	1.07	2.92	2.92
Channel	5981.337	100-year	Proposed 2019	11300.00	1044.00	1051.09	1051.09	0.007433	13.67	13.67	826.82	144.43	7.09	5.72	1.01	1.01	2.59	2.60
Channel	5816.827	100-year	Existing Reconciled 2019	11300.00	1039.48	1051.36	1048.50	0.002139	9.13	9.13	1237.94	151.79	11.88	8.16	0.56	0.56	1.06	1.06
Channel	5816.827	100-year	Proposed 2019	11300.00	1039.48	1051.03	1048.50	0.002337	9.54	9.54	1184.37	147.64	11.55	8.02	0.59	0.59	1.14	1.14
Channel	5668.033	100-year	Existing Reconciled 2019	11300.00	1039.00	1050.90		0.002409	9.48	9.50	1192.33	156.12	11.90	7.64	0.59	0.59	1.10	1.16
Channel	5668.033	100-year	Proposed 2019	11300.00	1039.00	1050.57		0.002351	9.83	9.88	1149.40	162.09	11.57	7.09	0.63	0.63	1.00	1.09
Channel	5414.180	100-year	Existing Reconciled 2019	11300.00	1038.00	1051.08		0.000904	6.42	6.42	1760.23	193.51	13.08	9.10	0.37	0.37	0.50	0.51
Channel	5414.180	100-year	Proposed 2019	11300.00	1038.00	1050.75	1045.73	0.000961	6.90	6.90	1638.66	191.20	12.75	8.57	0.41	0.41	0.50	0.50
Channel	5279.592	100-year	Existing Reconciled 2019	11300.00	1038.00	1050.91	1046.54	0.001004	6.59	6.59	1713.75	193.05	12.91	8.88	0.39	0.39	0.54	0.54
Channel	5279.592	100-year	Proposed 2019	11300.00	1038.00	1050.42	1046.91	0.001171	7.28	7.28	1552.66	191.79	12.42	8.10	0.45	0.45	0.57	0.57
Channel	5248.5			Bridge														
Channel	5230.979	100-year	Existing Reconciled 2019	11300.00	1038.00	1050.51		0.001026	6.63	6.63	1704.37	193.60	12.51	8.80	0.39	0.39	0.55	0.55
Channel	5230.979	100-year	Proposed 2019	11300.00	1038.00	1049.89		0.001203	7.31	7.31	1546.57	192.20	11.89	8.05	0.45	0.45	0.59	0.59
Channel	5181	100-year	Proposed 2019	11300.00	1039.00	1049.82	1046.01	0.001168	7.26	7.26	1556.02	179.88	10.82	8.65	0.44	0.44	0.60	0.60
Channel	5162.570	100-year	Existing Reconciled 2019	11300.00	1039.00	1050.30	1046.02	0.001127	7.09	7.09	1593.90	174.84	11.30	9.12	0.41	0.41	0.62	0.62
Channel	5105			Bridge														
Channel	5060.939	100-year	Existing Reconciled 2019	11300.00	1038.33	1049.35		0.001297	7.48	7.48	1510.45	169.57	11.02	8.91	0.44	0.44	0.70	0.70
Channel	5060.939	100-year	Proposed 2019	11300.00	1038.33	1048.87		0.001360	7.77	7.77	1454.58	172.79	10.54	8.42	0.47	0.47	0.68	0.68
Channel	4997.843	100-year	Existing Reconciled 2019	11300.00	1038.00	1049.31	1044.97	0.001118	7.13	7.13	1585.27	171.88	11.31	9.22	0.41	0.41	0.62	0.62
Channel	4997.843	100-year	Proposed 2019	11300.00	1038.00	1048.80	1045.10	0.001342	7.63	7.63	1481.85	170.75	10.80	8.68	0.46	0.46	0.70	0.70
Channel	4943			Bridge														
Channel	4894.934	100-year	Existing Reconciled 2019	11300.00	1038.00	1048.80		0.001225	7.32	7.32	1543.59	172.45	10.80	8.95	0.43	0.43	0.66	0.66
Channel	4894.934	100-year	Proposed 2019	11300.00	1038.00	1048.14		0.001355	7.76	7.76	1456.64	175.25	10.14	8.31	0.47	0.47	0.68	0.68
Channel	4874	100-year	Proposed 2019	11300.00	1038.98	1047.11	1045.55	0.002837	10.38	10.38	1088.77	157.71	8.13	6.90	0.70	0.70	1.19	1.19
Channel	4856.941	100-year	Existing Reconciled 2019	11300.00	1038.98	1047.59	1045.92	0.003413	10.48	10.48	1077.88	152.85	8.61	7.05	0.70	0.70	1.47	1.47
Channel	4838.5			Bridge														
Channel	4817.558	100-year	Existing Reconciled 2019	11300.00	1038.00	1044.24	1044.90	0.011882	15.03	15.04	751.62	161.03	6.24	4.67	1.22	1.22	3.42	3.45
Channel	4817.558	100-year	Proposed 2019	11300.00	1038.00	1044.08	1044.78	0.010613	15.07	15.08	749.67	161.38	6.08	4.65	1.23	1.23	3.00	3.07
Channel	4780.359	100-year	Existing Reconciled 2019	11300.00	1038.67	1043.50	1044.50	0.002952	15.90	15.90	710.60	171.34	4.83	4.15	1.38	1.38	0.76	0.76
Channel	4780.359	100-year	Proposed 2019	11300.00	1038.67	1044.37	1044.53	0.001674	13.17	13.17	858.06	177.64	5.70	4.83	1.06	1.06	0.49	0.49
Channel	4721.444	100-year	Existing Reconciled 2019	11300.00	1031.89	1035.17	1038.06	0.012979	26.86	26.86	420.64	140.31	3.28	3.00	2.74	2.74	2.40	2.40
Channel	4721.444	100-year	Proposed 2019	11300.00	1031.89	1035.23	1038.06	0.012245	26.38	26.38	428.28	140.47	3.34	3.05	2.66	2.66	2.30	2.30
Channel	4620.482	100-year	Existing Reconciled 2019	11300.00	1030.67	1034.60	1037.49	0.009656	25.90	25.90	436.23	122.49	3.93	3.56	2.42	2.42	2.11	2.11
Channel	4620.482	100-year	Proposed 2019	11300.00	1030.67	1034.66	1037.49	0.009179	25.50	25.50	443.21	122.66	3.99	3.61	2.36	2.36	2.04	2.04
Channel	4493.399	100-year	Existing Reconciled 2019	11300.00	1029.14	1034.62	1037.37	0.005879	24.14	24.14	468.19	100.10	5.48	4.68	1.97	1.97	1.68	1.68
Channel	4493.399	100-year	Proposed 2019	11300.00	1029.14	1034.70	1037.37	0.005592	23.75	23.75	475.79	100.33	5.56	4.74	1.92	1.92	1.62	1.62
Channel	4357.147	100-year	Existing Reconciled 2019	11300.00	1027.88	1035.30	1037.43	0.003232	21.60	21.60	523.12	81.69	7.42	6.40	1.50	1.50	1.22	1.22
Channel	4357.147	100-year	Proposed 2019	11300.00	1027.88	1035.38	1037.40	0.003093	21.23	21.23	532.38	82.64	7.50	6.44	1.47	1.47	1.18	1.18

Channel	4191.443	100-year	Existing Reconciled 2019	11300.00	1027.52	1034.86	1036.91	0.003191	21.42	21.42	527.45	82.92	7.34	6.36	1.50	1.50	1.20	1.20
Channel	4191.443	100-year	Proposed 2019	11300.00	1027.52	1034.79	1036.81	0.003642	21.26	21.26	531.46	92.87	7.27	5.72	1.57	1.57	1.23	1.23
Channel	4044.332	100-year	Existing Reconciled 2019	11300.00	1026.80	1034.18	1036.32	0.003288	21.66	21.66	521.68	82.29	7.38	6.34	1.52	1.52	1.23	1.23
Channel	4044.332	100-year	Proposed 2019	11300.00	1026.80	1034.30	1036.33	0.003271	21.24	21.24	531.96	83.55	7.50	6.37	1.48	1.48	1.20	1.20
Channel	3992			Bridge														
Channel	3946.834	100-year	Existing Reconciled 2019	11300.00	1026.50	1033.84	1036.00	0.003273	21.67	21.67	521.54	82.03	7.34	6.36	1.51	1.51	1.23	1.23
Channel	3946.834	100-year	Proposed 2019	11300.00	1026.50	1033.97	1036.00	0.003085	21.24	21.24	532.04	82.42	7.47	6.46	1.47	1.47	1.18	1.18
Channel	3794.324	100-year	Existing Reconciled 2019	11300.00	1025.65	1033.17	1035.43	0.003333	21.89	21.89	516.30	79.91	7.52	6.46	1.52	1.52	1.26	1.26
Channel	3794.324	100-year	Proposed 2019	11300.00	1025.65	1034.83	1035.43	0.001697	17.26	17.26	654.87	87.00	9.18	7.53	1.11	1.11	0.74	0.74
Channel	3625.899	100-year	Existing Reconciled 2019	11300.00	1021.78	1029.02	1032.48	0.005072	26.15	26.15	432.10	70.37	7.23	6.14	1.86	1.86	1.82	1.82
Channel	3625.899	100-year	Proposed 2019	11300.00	1021.78	1029.50	1032.82	0.004056	24.20	24.20	466.86	72.06	7.72	6.48	1.68	1.68	1.54	1.54
Channel	3393.888	100-year	Existing Reconciled 2019	11300.00	1020.54	1027.77	1031.80	0.004996	26.21	26.21	431.20	68.78	7.23	6.27	1.85	1.85	1.82	1.82
Channel	3393.888	100-year	Proposed 2019	11300.00	1020.54	1028.12	1032.13	0.004240	24.68	24.68	457.82	70.70	7.58	6.48	1.71	1.71	1.60	1.60
Channel	3134.305	100-year	Existing Reconciled 2019	11300.00	1019.34	1026.53	1031.16	0.005134	26.28	26.28	430.00	70.19	7.19	6.13	1.87	1.87	1.84	1.84
Channel	3134.305	100-year	Proposed 2019	11300.00	1019.34	1026.84	1030.94	0.004438	25.01	25.01	451.85	71.10	7.50	6.36	1.75	1.75	1.65	1.65
Channel	2955.332	100-year	Existing Reconciled 2019	11300.00	1018.45	1024.41	1028.40	0.006698	27.50	27.50	410.91	77.93	5.96	5.27	2.11	2.11	2.11	2.11
Channel	2955.332	100-year	Proposed 2019	11300.00	1018.45	1024.60	1028.39	0.006026	26.55	26.55	425.56	78.49	6.15	5.42	2.01	2.01	1.95	1.95
Channel	2690.770	100-year	Existing Reconciled 2019	11300.00	1017.36	1024.88	1029.23	0.004371	24.70	24.70	457.50	72.53	7.52	6.31	1.73	1.73	1.61	1.61
Channel	2690.770	100-year	Proposed 2019	11300.00	1017.36	1024.92	1028.97	0.004237	24.07	24.07	469.54	76.23	7.56	6.16	1.71	1.71	1.54	1.54
Channel	2577.225	100-year	Existing Reconciled 2019	11300.00	1016.88	1024.27	1029.07	0.004484	24.94	24.94	453.12	72.51	7.39	6.25	1.76	1.76	1.65	1.65
Channel	2577.225	100-year	Proposed 2019	11300.00	1016.88	1024.56	1029.16	0.003932	24.04	24.04	469.96	71.18	7.68	6.60	1.65	1.65	1.51	1.51
Channel	2403.592	100-year	Existing Reconciled 2019	11300.00	1016.03	1023.40	1026.60	0.004551	25.09	25.09	450.46	72.34	7.37	6.23	1.77	1.77	1.67	1.67
Channel	2403.592	100-year	Proposed 2019	11300.00	1016.03	1023.56	1026.44	0.004217	24.44	24.44	462.28	72.83	7.53	6.35	1.71	1.71	1.57	1.57
Channel	2270.565	100-year	Existing Reconciled 2019	11300.00	1015.37	1022.88	1026.22	0.004490	25.00	25.00	451.92	71.79	7.51	6.30	1.76	1.76	1.65	1.65
Channel	2270.565	100-year	Proposed 2019	11300.00	1015.37	1023.02	1026.23	0.004211	24.46	24.46	461.95	72.23	7.65	6.40	1.71	1.71	1.57	1.57
Channel	2141.739	100-year	Existing Reconciled 2019	11300.00	1014.73	1022.05	1025.09	0.004661	25.32	25.32	446.37	71.96	7.32	6.20	1.79	1.79	1.70	1.70
Channel	2141.739	100-year	Proposed 2019	11300.00	1014.73	1022.17	1025.10	0.004409	24.84	24.84	454.87	72.31	7.44	6.29	1.75	1.75	1.63	1.63
Channel	1957.716	100-year	Existing Reconciled 2019	11300.00	1013.85	1021.19	1024.31	0.004665	25.40	25.40	444.87	71.20	7.34	6.25	1.79	1.79	1.71	1.71
Channel	1957.716	100-year	Proposed 2019	11300.00	1013.85	1021.29	1024.31	0.004445	24.99	24.99	452.22	71.50	7.44	6.32	1.75	1.75	1.65	1.65
Channel	1862.385	100-year	Existing Reconciled 2019	11300.00	1013.36	1020.89	1024.01	0.004529	25.15	25.15	449.34	70.90	7.53	6.34	1.76	1.76	1.67	1.67
Channel	1862.385	100-year	Proposed 2019	11300.00	1013.36	1020.99	1024.10	0.004342	24.79	24.79	455.89	71.19	7.63	6.40	1.73	1.73	1.62	1.62
Channel	1777.700	100-year	Existing Reconciled 2019	11300.00	1012.99	1020.30	1023.49	0.004730	25.45	25.45	443.97	71.80	7.31	6.18	1.80	1.80	1.72	1.72
Channel	1777.700	100-year	Proposed 2019	11300.00	1012.99	1020.39	1023.50	0.004553	25.12	25.12	449.77	72.04	7.39	6.24	1.77	1.77	1.67	1.67
Channel	1602.630	100-year	Existing Reconciled 2019	11300.00	1012.08	1019.37	1022.56	0.004785	25.56	25.56	442.04	71.57	7.29	6.18	1.81	1.81	1.74	1.74
Channel	1602.630	100-year	Proposed 2019	11300.00	1012.08	1019.44	1022.56	0.004628	25.27	25.27	447.09	71.79	7.36	6.23	1.79	1.79	1.69	1.69
Channel	1442.849	100-year	Existing Reconciled 2019	11300.00	1011.63	1019.24	1022.13	0.004227	24.58	24.58	459.65	71.53	7.60	6.43	1.71	1.71	1.59	1.59
Channel	1442.849	100-year	Proposed 2019	11300.00	1011.63	1019.30	1022.13	0.004100	24.33	24.33	464.49	71.74	7.67	6.47	1.69	1.69	1.55	1.55
Channel	1341.067	100-year	Existing Reconciled 2019	11300.00	1011.33	1019.00	1021.86	0.004038	24.26	24.26	465.79	71.36	7.67	6.53	1.67	1.67	1.54	1.54
Channel	1341.067	100-year	Proposed 2019	11300.00	1011.33	1019.06	1021.86	0.003926	24.03	24.03	470.26	71.53	7.73	6.57	1.65	1.65	1.51	1.51
Channel	1207.477	100-year	Existing Reconciled 2019	11300.00	1011.04	1018.31	1021.27	0.004518	24.59	24.59	459.53	76.30	7.27	6.02	1.77	1.77	1.62	1.62
Channel	1207.477	100-year	Proposed 2019	11300.00	1011.04	1018.36	1021.25	0.004412	24.39	24.39	463.31	76.48	7.32	6.06	1.75	1.75	1.59	1.59
Channel	1076.728	100-year	Existing Reconciled 2019	11300.00	1010.77	1018.91	1021.32	0.003339	22.69	22.69	497.94	72.97	8.13	6.82	1.53	1.53	1.33	1.33
Channel	1076.728	100-year	Proposed 2019	11300.00	1010.77	1018.98	1021.32	0.003236	22.45	22.45	503.37	73.20	8.21	6.88	1.51	1.51	1.30	1.30
Channel	963.255	100-year	Existing Reconciled 2019	11300.00	1010.55	1018.86	1021.08	0.003093	22.05	22.05	512.50	74.28	8.31	6.90	1.48	1.48	1.25	1.25
Channel	963.255	100-year	Proposed 2019	11300.00	1010.55	1018.92	1021.08	0.003005	21.83	21.83	517.61	74.49	8.37	6.95	1.46	1.46	1.22	1.22
Channel	744.641	100-year	Existing Reconciled 2019	11300.00	1010.11	1020.70	1015.09	0.000122	5.60	5.62	2017.91	226.15	10.59	8.92	0.32	0.32	0.07	0.07
Channel	744.641	100-year	Proposed 2019	11300.00	1010.11	1020.70	1015.09	0.000122	5.60	5.62	2017.91	226.15	10.59	8.92	0.32	0.32	0.07	0.07