Appendix 5.5f

Hasley Canyon Creek County Floodplain Report

LAND DEVELOPMENT DIVISION
STORM DRAIN & HYDROLOGY UNIT

TO: PACE Advanced Water Engineering
17520 Newhope St, Suite 200
Fountain Valley, CA 92708
ATTN: Jose Cruz
CC: Jason Fukumitsu

DATE 08/13/2024

REVIEW OF HYDROLOGY STUDY

PARCEL MAP: 18108

DATE OF REPORT : 5/2024
PLAN CASE NO.: ESTU2023000298

The LA County Floodplain and Floodway Map Revision for Hasley Canyon Creek has been approved.

COMMENTS:

1. This approval supersedes the original approved report dated September 2023.

REVIEWED BY _____
Chung, Lonnie - (626) 458-7102

APPROVED BY: _____
Ngov, Thong

Valencia Commerce Center TPM No. 18108

Los Angeles County Floodplain and Floodway Map Revision for Hasley Canyon Creek
ESTU No. 2023000298

May 2024
Revised September 2023
Revised July 2023
Revised May 2023

HYDROLOGY STUDY APPROVED

REVIEWED BY: _____ DATE 7/25/2024

APPROVED BY: Thong Ngov DATE 8/13/2024

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

Prepared for:

FivePoint Communities, LLC
25124 Springfield Court
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Submitted to:

Los Angeles County Department of Public Works
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PACE JN A535

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Appendix A: Los Angeles County Flood Control District Floodway Maps
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2- Castaic Creek Floodway Map, From 700' D/S of Henry Mayo Dr. to 7700' U/S of Henry Mayo Dr. (No. 335-ML1)
Appendix B: Castaic Creek Floodway Map No. 355-ML1, from 170' D/S of Henry mayo Dr. to 7700' U/S of Henry Mayo Dr. (Dated April 4, 2006 and Approved October 2, 2007)
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Appendix D: As-Built Drawings
1- Commerce Center Drive Bridge (Bridge No. B3794)
2- Flow Diversion Berm (P.D. 2298, Unit III)
Appendix E: HEC-RAS Existing Condition Output
Appendix F: HEC-RAS Proposed Condition Output
Appendix G: HEC-RAS Cross-Section Comparison, Existing vs. Proposed

1 Introduction

1.1 Objective

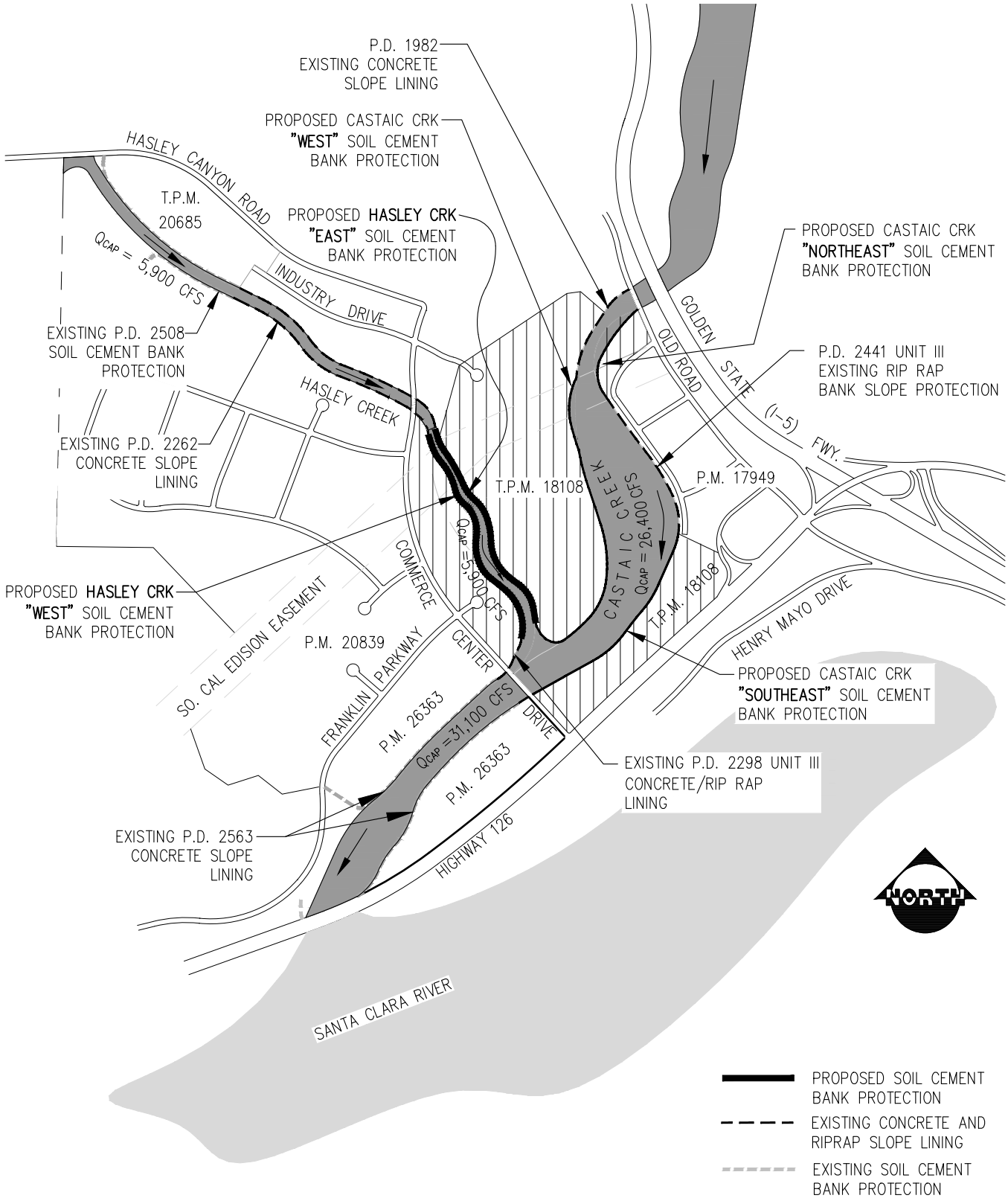
Pacific Advanced Civil Engineering, Inc. (PACE) has been retained by FivePoint Communities to prepare a revision to the Los Angeles (L.A.) County Floodway Maps, herein referred to as ML Maps, along Hasley Canyon Creek for the proposed creek improvements at Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108. The purpose of this report is to describe the hydrology and hydraulic analysis for the Lower Hasley Canyon Creek, for a 3,700-ft study reach that extents from approximately 600 ft downstream of the Commerce Center Drive Bridge over Hasley Canyon Creek to the confluence with Castaic Creek. Additionally, this report presents updated existing conditions and proposed conditions floodplain and floodway limits for this study reach, on L.A. County floodway map no. 335-ML1 and 388-ML1.

1.2 Project Description

The VCC project site is located in an unincorporated area of Los Angeles County, west of the Interstate 5 freeway (I-5) and north of highway State Route 126 (SR-126). Please see **Figure 1-1** for a vicinity map displaying the project site location. The proposed improvements consist of buried soil cement bank protection, a proposed drop structure/stilling basin, two grade control structures, the Franklin Parkway Bridge over Hasley Canyon Creek, and modifications to the existing concrete/rip-rap lined berm constructed per P.D. 2298 Unit III. Design and analysis of these proposed improvements are described in detail in *Drainage Concept Report Volume III of V, Hasley Canyon Creek Bank Protection, EIMP No. 2019000489*, which was approved by LACPW in March 2022 (PACE, October 2021).

The bank protection improvements will be located east of Commerce Center Drive and west of Castaic Creek, along the east and west banks of Hasley Canyon Creek. The proposed bank protection along the east and west banks of Hasley Canyon Creek will be approximately 3,000 linear feet and will protect the VCC Industrial Park Development from potential flooding and erosion. At the upstream end, the bank protection along both the east and west banks will join with the existing concrete slope lining along Hasley Canyon Creek per P.D. 2262. At the downstream end, the proposed Hasley Canyon Creek “East” bank protection joins the proposed Castaic Creek “West” bank protection, and the Hasley Canyon Creek “West” bank protection joins the existing concrete/rip-rap lining, per P.D. 2298-Unit III. The proposed soil cement bank protection will consist of an 8-foot wide soil cement section with varied height and a 1.5:1 (H:V) slope. The bank will then be buried with soil backfill with a variable slope of 3:1 (H:V) or flatter. The river bed excavation required to construct the bank protection will be backfilled and returned to existing grade. A workmap displaying the proposed improvements is included in **Figure 1-2**, and the proposed drop structure is shown in **Figure 1-3.**

In addition to the proposed soil cement bank protection, the proposed improvements include the Franklin Parkway Bridge over Hasley Canyon Creek, which is situated approximately 1,100 ft upstream of the Commerce Center Drive Bridge over Castaic Creek. Improvements also include shortening the existing concrete/rip-rap lined berm, per P.D. 2298, Unit III, to a length of 150-ft to allow flow from Hasley Canyon Creek to enter Castaic Creek upstream of the Commerce Center Drive Bridge. The modified diversion berm is shown in **Figure 1-4**.



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DATE	REV. 02/20/2023
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HASLEY CREEK
SOIL CEMENT BANK PROTECTION
TPM @ 18108

VICINITY MAP

FIGURE
1-1

P:\A535\Engineering\A535-83-Hasley Canyon Creek ML\exhibits\A535-Vicinity Map.dwg By: erandig Date: Jul. 11, 2023 Time: 10:08 am

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PARCEL MAP No. 20839

FRANKLIN PARKWAY

LIVINGSTON AVE

HARRISON PARKWAY

COMMERCE CENTER DRIVE

PROPERTY BOUNDARY

CASTAIC CREEK
Q_{CAP} = 31,100 cfs

EXISTING CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER P.D. NO. 2563

EXISTING HASLEY CREEK CONCRETE/RIPRAP LINING (PER P.D. 2298 UNIT III)

STA 10+50.89
BEGIN WEST BANK SOIL CEMENT
=TIE-IN EXISTING HASLEY CREEK LINING

EXISTING FLOW DIVERSION BERM PER PD 2298 UNIT III (LENGTH TO BE MODIFIED AS SHOWN)

PROPOSED GRADE CONTROL STRUCTURE #1

PROPOSED FRANKLIN PARKWAY BRIDGE

HASLEY CREEK
Q_{CAP} = 5,900 cfs

PROPOSED GRADE CONTROL STRUCTURE #2

PROPOSED DROP/STILLING BASIN STRUCTURE

STA 39+89.01
END WEST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

EXISTING CONCRETE SLOPE LINING PER P.D. 2262

STA 10+00.00
BEGIN EAST BANK SOIL CEMENT
=STA 10+00 TIE-IN
TO CASTAIC CREEK WEST BANK

CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER DCR VOL. II OF V PREPARED BY PACE

STA 39+91.02
END EAST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

CASTAIC CREEK
Q_{CAP} = 31,100 cfs

CASTAIC CREEK
Q_{CAP} = 26,400 cfs

TENTATIVE
PARCEL MAP No. 18108
(GRADING PLAN BY OTHERS)

TENTATIVE
PARCEL MAP No. 18108
(GRADING PLAN BY OTHERS)

100 0 100 200
SCALE 1"=100'

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HASLEY CANYON CREEK FLOODPLAIN AND FLOODWAY MAPPING

LOS ANGELES COUNTY CA.

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HASLEY CANYON CREEK PROPOSED IMPROVEMENTS

FIGURE 1-2

JOB NO. A535

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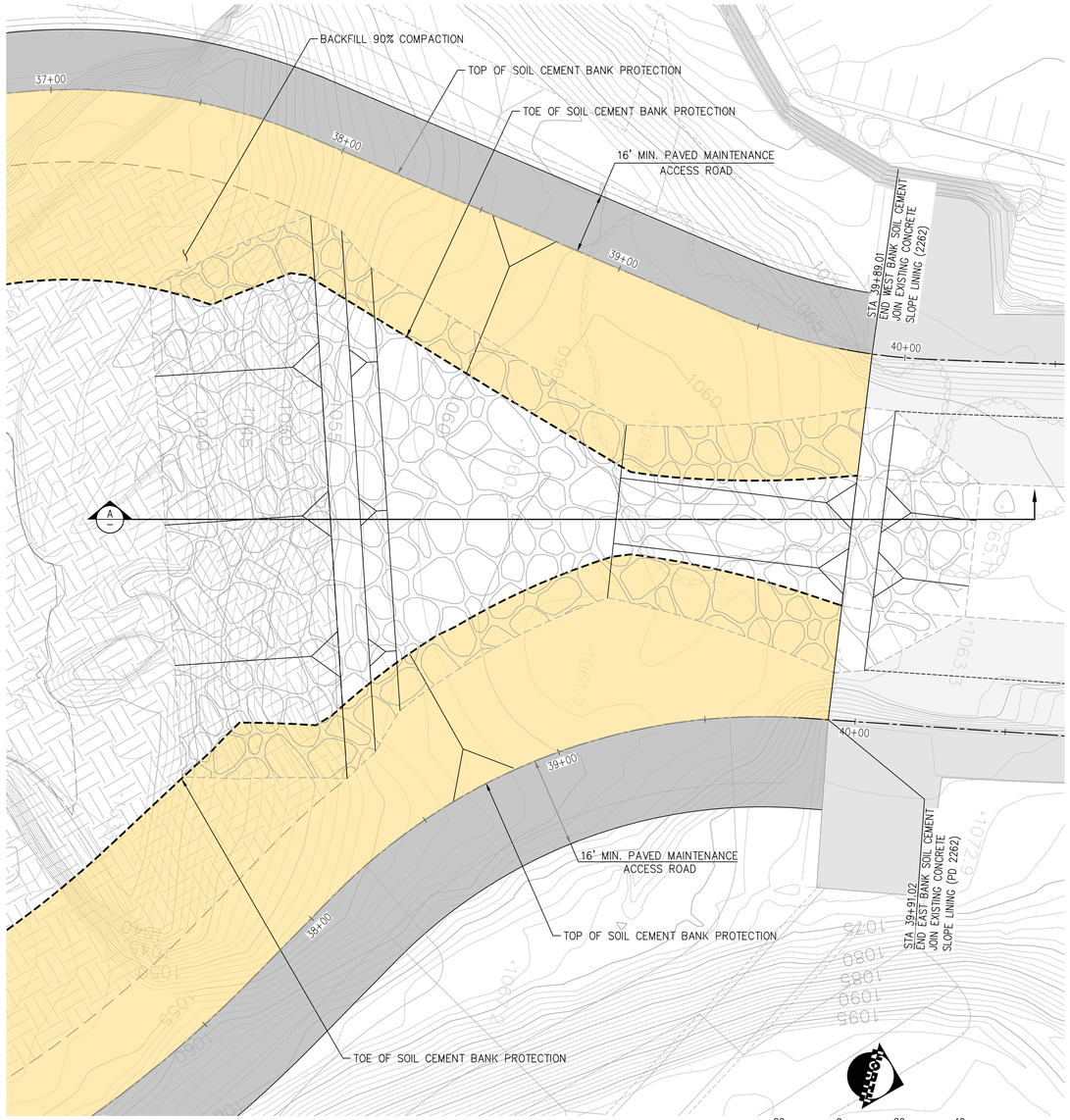
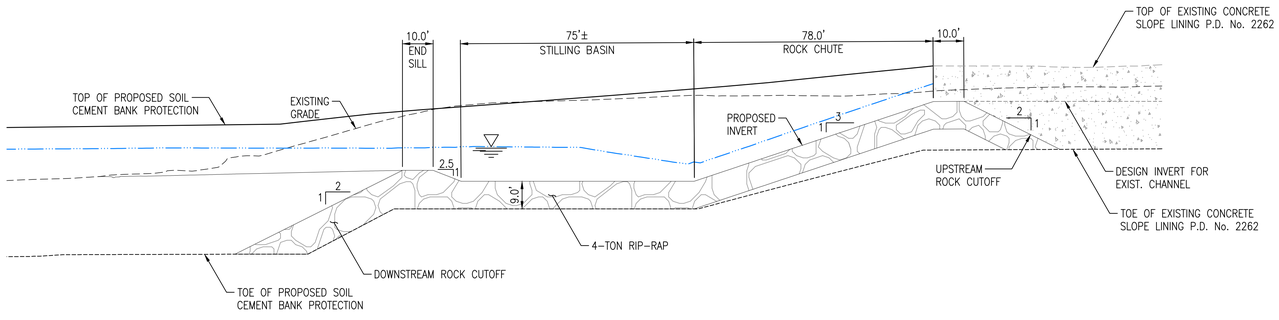


TYPICAL DROP STRUCTURE PLAN



DROP STRUCTURE SECTION 'A'

SCALE 1"=20'

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PROPOSED DROP STRUCTURE

FIGURE 1-3

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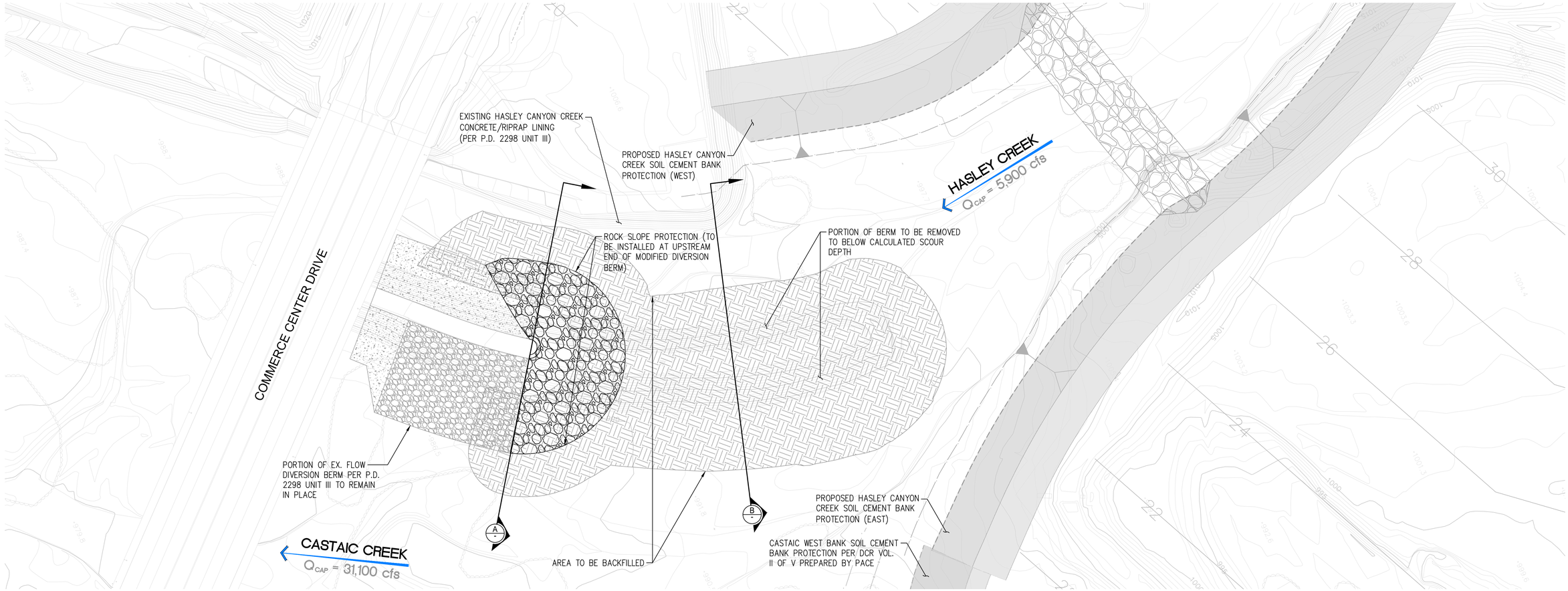
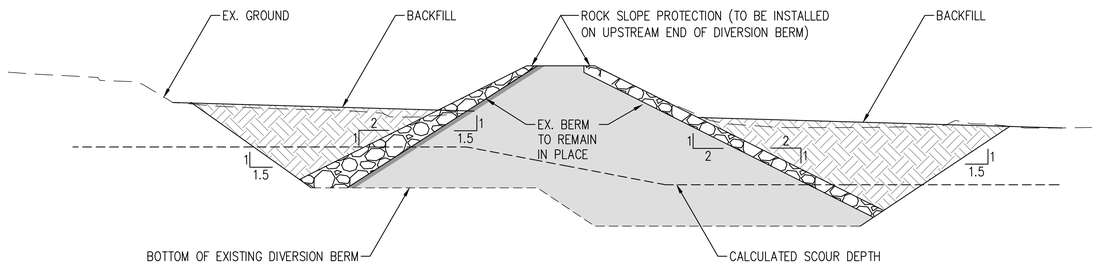


PLAN - MODIFIED DIVERSION BERM

NORTH

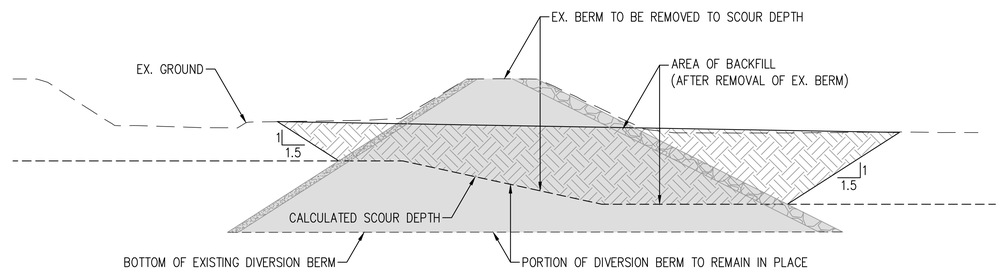
40 0 40 80

SCALE 1"=40'



SECTION A - PORTION OF DIVERSION BERM TO REMAIN

SCALE 1"=20'



SECTION B - PORTION OF DIVERSION BERM TO BE MODIFIED

SCALE 1"=20'

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PROPOSED MODIFICATION OF DIVERSION BERM

FIGURE

1-4

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1.3 L.A. County Adopted Floodway Maps

The study reach of Hasley Canyon Creek is located on existing Los Angeles County Capital Floodway maps (ML maps) 388-ML1 and the confluence with Castaic Creek is shown on 335-ML1. Map No. 388-ML1 was adopted by the Board of Supervisors in November 1980 by Ordinance No. 12260. Map No. 335-ML1 was adopted by the Board of Supervisors in August 1984 by Ordinance No. 84-0136. These ML Maps are included in **Appendix A**.

PACE prepared revisions to the existing ML Maps within Castaic Creek, between Commerce Center Drive and Hwy 126. These revisions are part of a report entitled *Los Angeles County Capital Floodway Revision ML Map No's 335-ML-1&2 Castaic Creek Bank Protection (P.D. No. 2563) for P.M. No. 26363*, which were submitted by L.A. County Department of Public Works for review in December 2006 and approved on October 2, 2007 (PACE, December 2006). The approved ML Maps from the 2007 revision are included in **Appendix B**, and the depicted floodway and floodplain are considered in this study as the existing L.A. County floodway and floodplain within Castaic Creek. The 2007-approved floodway and floodplain in Castaic Creek are narrower than the capital floodway and floodplain adopted in 1980.

2 Hydrology

Hasley Canyon Creek lies within the jurisdiction of the LACPW, which has completed an extensive hydrologic analysis of the watershed and provided updated Capital Flood flow rates for this reach of the Creek.

L.A. County floodplain and floodway maps are based on the Capital Flood (Q_{CAP}), which assumes a burned watershed and resulting bulked flows, and is defined as follows:

1. The design storm is assumed to occur on saturated soils over a period of four days, with the maximum rainfall falling on the fourth day. During the 24-hour period of maximum rainfall, the rainfall intensity typically increases during the first 70-90% of the period and decreases in the remaining time. Furthermore, approximately 80% of the amount of the 24-hour rainfall falls within the same 70-90% of the period.
2. When converting rainfall to runoff, rainfall that is not lost due to hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration or percolation is assumed to be surface runoff.
3. The natural portions of the watershed are assumed to have been burned by fire, which decreases soil infiltration.
4. A bulking factor is assumed. In the area where a watershed is burned, the runoff would carry with it a large layer of eroded topsoil, burned trees and brush. To account for the quantity of debris, the design flow rate is artificially increased by a percentage increase in flow rate, or bulking factor.

PACE obtained hydrology data for the Hasley Canyon Creek Watershed from the LACPW Water Resources Division (WRD) on May 5, 2014, which indicates a peak flow rate of **5,900 cfs** within Hasley Canyon Creek during the Capital Flood. In February 2023, PACE confirmed with LACPW that the hydrology is up-to-date, therefore, a Q_{CAP} of 5,900 cfs was used for floodplain and floodway analysis and mapping. The hydrology data for Lower Hasley Canyon Creek obtained from LACPW is included in **Appendix C**.

3 Hydraulic Analysis

PACE developed updated existing and proposed conditions HEC-RAS hydraulic models (Version 6.2) of the study reach, extending from approximately 600 ft downstream of the Commerce Center Drive Bridge over Hasley Canyon Creek, to approximately 25 ft downstream of the Commerce Center Drive Bridge over Castaic Creek. These HEC-RAS models are steady-state, with subcritical flow regime. The model results were used to delineate updated existing and proposed conditions floodplain and floodway limits within Hasley Canyon Creek. The HEC-RAS hydraulic models are based on the models completed for the Drainage Concept Report Volume III of V (PACE, October 2021), with refinements made to improve results for floodplain mapping.

3.1 Updated Existing Conditions HEC-RAS Model

3.1.1 Cross-Section Geometry

The updated existing condition cross-section geometry are based on 2013 topographic data, consistent with concurrent studies, including the Hasley Canyon DCR Volume III and the Castaic Creek ML Revision, per ESTU No. 109 (PACE, October 2021). This topography includes existing concrete slope lining (per P.D. 2262) at the upstream end of the study reach, existing Hasley Creek concrete/rip rap lining (per P.D. 2298 Unit II) upstream of Commerce Center Drive, existing Castaic Creek soil cement bank protection (per P.D. 2563) downstream of Commerce Center Drive Bridge, and the existing flow diversion berm (per P.D. 2298 Unit III) between Hasley Creek and Castaic Creek. A HEC-RAS workmap showing the HEC-RAS cross-sections, 2013 topographic contours, and ineffective flow areas is included in **Figure 3-1.**

3.1.2 Ineffective Flow Areas

Ineffective flow markers were used to define area with ineffective flow, including at abrupt contractions in the available flow area. A contraction ratio of 1:1 was used to define ineffective flow in these areas, including upstream of cross-section 1448, downstream of cross section 2122, and upstream of cross-section 3105. Additionally, flow east of the diversion berm was assumed to be ineffective at cross-section 1584. Finally, ineffective flow markers were used at cross-section 1080, immediately downstream of the bridge, to restrict effective flow to the Hasley side of the berm. Ineffective flow areas are shown in **Figure 3-1**, and are summarized below:

- Ineffective flow markers are used at cross sections 1080 and 1584 to restrict flow in Hasley Side of the existing Berm
- 1:1 contraction from cross section 1448 to 1804
- Ineffective flow makers are placed at high spots in the terrain between cross-sections 1872 and 2305 to ensure isolated flow areas within the overbank were modeled as ineffective
- Ineffective flow markers at cross section 2391 and 2305 for flows outside of the main channel
- 1:1 contraction from cross section 3105 to 3190

3.1.3 Manning's Roughness

Manning's roughness was set to 0.060 throughout the model, which is the standard roughness value for floodplain mapping.

3.1.4 Hydraulic Structures

The updated existing condition hydraulic model includes the Commerce Center Drive Bridge over Castaic Creek (Bridge No. B3794) as well as a lateral structure used to model the existing flow diversion berm (per P.D. 2298 Unit III). Geometry for the Commerce Center Drive Bridge over Castaic Creek was obtained from as-built plans provided in **Appendix D**. The modeled bridge only includes the portion of the bridge within Hasley Creek, north of the flow diversion berm. This portion of the bridge includes a single pier and a span of approximately 120 ft. The bridge is situated between cross-sections 1189 and 1080.

Debris loading is applied at the existing Commerce Center Drive Bridge in accordance with the USACE (US Army Corps of Engineers) Memorandum of Record, “Hydrology and Hydraulics Policy Memorandum No 4., Debris Loading on Bridges and Culvert.” The Commerce Center Drive Bridge piers do not have slopeing extension, so they fall under debris loading case 1. This case assumes 2 feet of debris loading on each side of each pier for the full depth of flow.

The existing flow diversion berm (per P.D. 2298 Unit III) was represented in the model using a lateral structure with a weir. This lateral structure extends from cross-section 1518 to cross-section 1294. Weir elevations were set at the top of the existing flow diversion berm, which were obtained from as-built plans of the flow diversion berm, included in **Appendix D**. The weir was modeled with a coefficient of 2.0, following HEC-RAS guidance for lateral broad-crested weirs. Note that the existing results show no overtopping of the berm.

3.1.5 Boundary Conditions

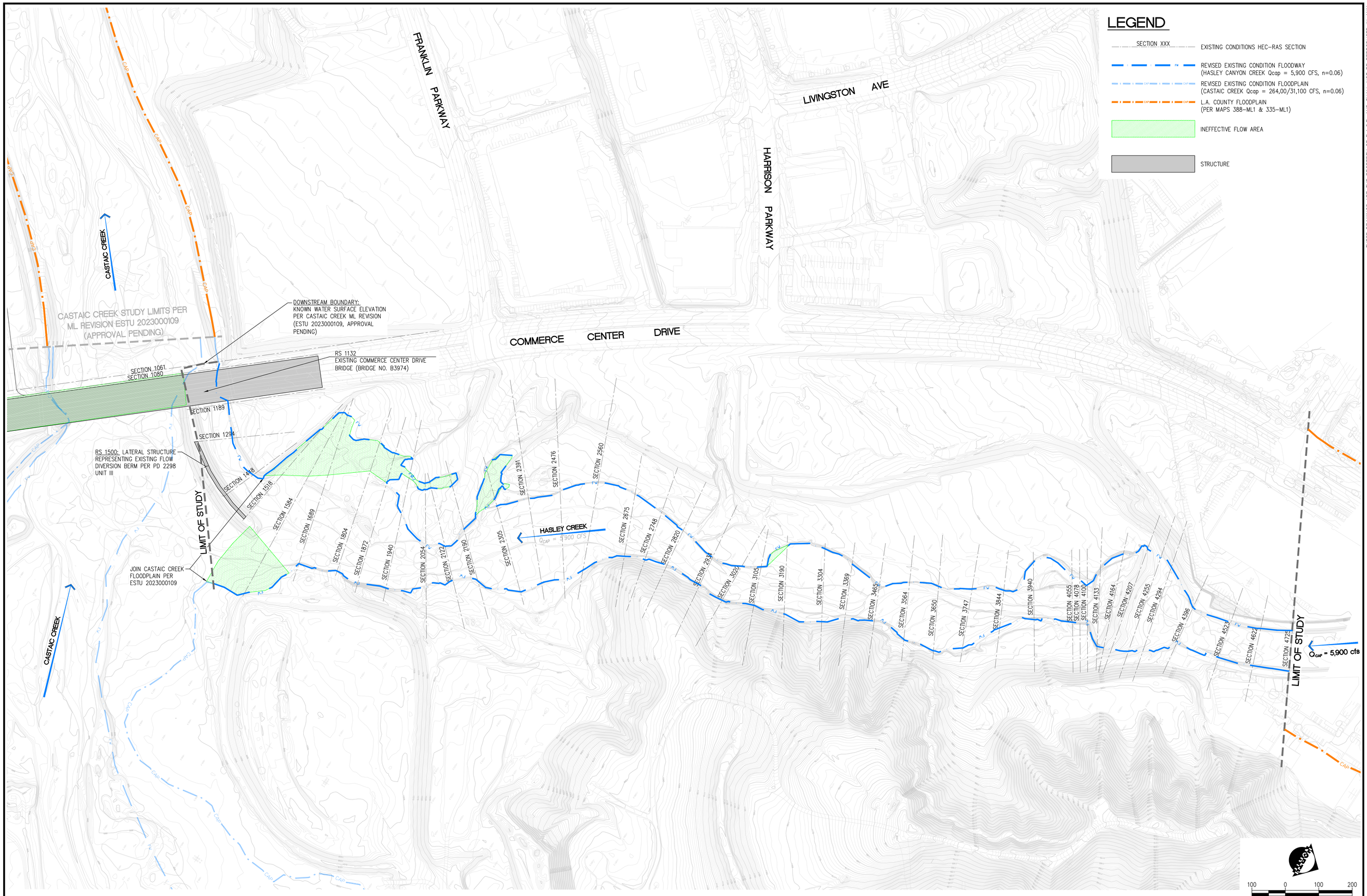
The downstream boundary condition of the model is a known water surface elevation of 993.72 ft for floodplain mapping and 994.11 ft for floodway mapping. These water surface elevations were obtained from the Castaic Creek ML Revision (per ESTU No. 2023000109, approval pending) updated existing conditions model. These water surface elevations are applied to cross-section 1061 in the Hasley Creek model, which is equivalent to cross-section 5434.68 in the Castaic Creek ML Revision HEC-RAS model (per ESTU No. 2023000109, approval pending).

3.1.6 Flow Rates

The updated existing conditions HEC-RAS model features a constant flow of 5,900 cfs, which is the Q_{CAP} for the creek, described in **Section 2** . The model extends approximately 25 ft downstream of the Commerce Center Drive Bridge, downstream of the confluence between Hasley Creek and Castaic Creek. Downstream of the Commerce Center Drive Bridge, cross-sections 1080 and 1061 span both Hasley Creek and Castaic Creek. Within cross-section 1080, an ineffective flow marker is used to restrict flow to the Hasley Creek side of the Commerce Center Drive Bridge, therefore, the modeled flow rate at this section only includes Hasley Creek flow (5,900 cfs). Additionally, cross-section 1061 does not feature a flow rate change, since the water surface elevation at 1061 is set by the known water surface elevation downstream boundary condition of the model (see **Section 3.1.5**) and is therefore independent of the flow rate. Note that the known water surface elevation boundary condition was obtained from the Castaic Creek ML Revision model (per ESTU No. 2023000109, approval pending), which uses a Q_{CAP} of 31,100 cfs, considering the combination of flow within Castaic Creek and Hasley Creek.

3.1.7 Floodway Encroachments

The proposed Hasley Canyon Creek is a well-defined channelized area. This built-out condition means there will be no future development within the channel area, so as discussed with LACPW Land Development Division (LDD) and Storm Water Engineering Division (SWED), the floodway encroachment limits are set equal to the floodplain limits. At the confluence with Castaic Creek, the existing condition floodway transitions to the Castaic Creek floodplain limits, as there is a mapped floodway within Castaic Creek.



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NO	BY	DATE		DATE	APP.

JOB VALENCIA COMMERCE CENTER

HASLEY CANYON CREEK FLOODPLAIN AND FLOODWAY MAPPING

LOS ANGELES COUNTY CA.

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REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

TITLE
EXISTING CONDITIONS HEC-RAS WORKMAP

FIGURE
3-1
JOB NO. A535

P:\A535\Engineering\A535-83-Hasley Canyon Creek ML\exhibits\A535-Existing HEC-RAS Workmap.dwg - Tab: Layout By: erandig on May 30, 2024 at 03:47 pm

3.2 Proposed Conditions HEC-RAS Model

3.2.1 Cross-Section Geometry

The proposed conditions cross-section geometry is based on the proposed Hasley Canyon Creek finished grade contours, which tie into the existing 2013 topographic data. The finished grade backfill consists of an earthen terrace, elevated about four feet above the existing channel thalweg, and a 3:1 side slope above the terrace that extends to the top of the soil cement banks. The proposed cross-sections also include the proposed drop structure and stilling basin at the upstream end of the creek, extending from HEC-RAS cross-section 4396 to cross-section 4265. Finally, the proposed cross-section geometry includes shortening the flow diversion berm at the downstream end of the creek at the confluence of Hasley Canyon Creek with Castaic Creek. Note that some of the cross-section locations differ in the updated existing and proposed conditions geometries, as cross-sections were repositioned in the proposed conditions to span the proposed channel and to be oriented perpendicular to the flow direction. Additional cross-sections are also included at the proposed drop structure and surrounding the proposed Franklin Parkway Bridge. A proposed condition workmap showing the HEC-RAS cross-sections, proposed finished grade contours, 2013 topographic contours, and ineffective flow areas is included in **Figure 3-2.** Note that interpolated cross-sections were used to refine results along the proposed drop structure and within the proposed stilling basin, which experience high energy loss and abrupt changes in water surface elevations. These interpolated sections are not included in **Figure 3-2.**

3.2.2 Ineffective Flow Areas

Ineffective flow areas were defined at cross-section 1518, to account for the abrupt contraction in flow area where the West bank of Hasley Canyon Creek joins the existing concrete/ rock slope near Commerce Center Drive Bridge, approximately between cross-section 1518 and 1448. Similar to the updated existing conditions model, a contraction ratio of 1:1 was used to define ineffective flow. An ineffective flow marker was also used at cross-section 1080, immediately downstream of the Commerce Center Drive bridge, to restrict effective flow to the Hasley side of the diversion berm. Ineffective flow areas are shown in **Figure 3-2**.

3.2.3 Manning's Roughness

Manning's roughness was set to 0.060 throughout the model, which is the standard roughness value for floodplain mapping.

3.2.4 Hydraulic Structures

The proposed conditions hydraulic model includes the existing Commerce Center Drive Bridge over Castaic Creek (Bridge No. B3974), a lateral structure to model the modified flow diversion berm, and the proposed Franklin Parkway Bridge. The Commerce Center Drive Bridge is modeled with the same geometry as the existing conditions model, following as-built plans provided in **Appendix D**. Note that the modeled bridge only includes the portion of the bridge within Hasley Creek, north of the flow diversion berm.

Debris loading is applied at Commerce Center Drive Bridge in accordance with the USACE (US Army Corps of Engineers) Memorandum of Record, "Hydrology and Hydraulics Policy Memorandum No 4., Debris Loading on Bridges and Culvert." Two feet of debris loading is applied to each side of each pier for the full depth of flow.

The proposed Franklin Parkway Bridge is situated between proposed HEC-RAS cross-sections 2305.5 and HEC-RAS cross-section 2190.5. The bridge contains two 6-ft wide bridge piers spaced approximately 110-ft apart, a bridge span of approximately 300-ft, and a bridge deck width of 88 ft. Additional debris loading is not required at Franklin Parkway Bridge. Per the USACE Debris Loading Memorandum, the best practice is to omit standard debris loading assumptions for piers that have a width equal to or greater than six feet.

Similar to the updated existing condition, the flow diversion berm (per P.D. 2298 Unit III) was represented in the model using a lateral structure with a weir. This lateral structure extends from cross-section 1518 to cross-section 1294. The modeled lateral structure is shorter in the proposed condition because a portion of the berm is removed as part of the improvements to the area.

The existing concrete and riprap lined berm was designed to divert flows from Hasley Canyon Creek into Castaic Creek downstream of the Commerce Center Drive Bridge. However, a large storm in January 2005 caused flows to bifurcate the berm. This change caused the berm to become an obstruction to flows and increased chances of blockages to either flow path, into Castaic Creek or under Commerce Center Drive. In the proposed condition, the upstream portion of the flow diversion berm will be removed and lowered to the scour depth. This will remove the obstruction to the flow path and allow water into Castaic Creek Upstream of Commerce Center Drive Bridge.

Approximately 240-ft of the upstream portion of the modeled lateral structure was lowered to reflect the proposed modification to the berm. The weir is modeled with a weir coefficient of 2.0, based on HEC-RAS guidance for lateral broad-crested weirs 3-ft or higher above the natural ground elevation.

3.2.5 Boundary Conditions

The downstream boundary condition of the model is a known water surface elevation of 993.62 ft for floodplain mapping and 994.03 ft for floodway mapping. These water surface elevations were obtained from the Castaic Creek ML Revision (per ESTU No. 2023000109, approval pending) proposed conditions model. These water surface elevations are applied to cross-section 1061 in the Hasley Creek model, which is equivalent to cross-section 5434.68 in the Castaic Creek model.

3.2.6 Flow Rates

The updated existing condition HEC-RAS model features an inflow of 5,900 cfs, which is the Q_{CAP} for Hasley Canyon Creek, described in **Section 2** . Note that flow over the lateral structure reduces the modeled flow rate between cross-sections 1518 and 1189. While the model includes two cross-sections (1081 and 1060) that span Castaic Creek downstream of Commerce Center Drive, the flow rate was not increased at these sections. Ineffective flow markers at cross-section 1081 restrict flow to the Hasley Creek side of the berm. Cross-section 1060 is modeled with a known water surface elevation, thus is not dependent on the modeled flow rate. Please refer to **Section 3.1.6** for further discussion.

3.2.7 Floodway Encroachments

The proposed condition for Hasley Canyon Creek involves the channelization of the creek. This built-out condition means there will be no future development within the channel area, so as discussed with LACPW Land Development Division (LDD) and Storm Water Engineering Division (SWED), the floodway encroachment limits are set equal to the floodplain limits. At the downstream study limits of the Hasley Canyon Creek model, the floodway will transition to the Castaic Creek floodplain and floodway, as seen on Figure 4-2.

3.3 Hasley Canyon Creek and Castaic Creek Confluence Modeling Approach

The confluence of Hasley Canyon Creek with Castaic Creek was extensively studies as part of the proposed bank protection design detailed in the project Drainage Concept Report (DCR) for the subject project under (EIMP No. 2019000489). There are two possible flow paths that can form at the confluence.

Case 1 - Flow will travel from Hasley Canyon Creek into Castaic Creek upstream of the flow diversion berm, with little or no flow traveling through the north side of the flow diversion berm.

Case 2 - All flow from Hasley will travel through the north side of the flow diversion berm and enter Castaic Creek downstream of Commerce Center Drive.

In the Drainage Concept Report (DCR) both conditions are important to model since they capture different elements associated with the design of the soil cement top and toe. When flow enters Castaic

Creek upstream of Commerce Center Drive Bridge (Case 1), no flow is mapped north of the berm because the invert of Castaic Creek is much lower than the invert of Halsey Canyon Creek. However, this modeling approach best captures the water surface and velocities to design the Hasley Canyon Creek East bank connection to the Castaic Creek "West" Soil cement Bank Protection. When the Hasley Canyon Creek flow is modeled going through the north side of the flow diversion berm before entering Castaic Creek downstream of Commerce Center Drive (Case 2), it captures the highest water surface elevation and velocities for the design of the Halsey Canyon Creek West Bank.

For the Hasley Canyon Creek floodplain and floodway analysis, the existing and proposed conditions are modeled in a way that will produce the widest floodplain. In the existing condition, the flow diversion berm either funnels flows from Hasley Canyon Creek through the north side of the flow diversion berm or flows will circumvent the berm and flow into Castaic Creek upstream of Commerce Center Drive. The flows then confluence with Castaic Creek downstream of Commerce Center Drive Bridge (Case 2). Although the existing condition model uses a lateral structure to define the flow diversion berm, it is important to note that in the existing condition, no flows from Hasley Canyon Creek travel over the lateral structure into Castaic Creek. This modeling approach was selected as it produces the widest floodplain along the north side of the berm. If the Case 1 flow condition was used, the area to the north of the berm would be mapped with no floodplain, as the Hasley flow would be contained within the Castaic Creek main channel, which has a much lower invert than the invert within the north side of the diversion berm.

In the proposed condition, Hasley Canyon Creek flows will either enter Castaic Creek upstream of Commerce Center Diver Bridge or flow along the north side of the berm and confluence with Castaic Creek downstream of Commerce Center Drive Bridge. For the purposes of floodplain mapping, the proposed condition Hasley Canyon Creek model analyzes the condition where all flow from Hasley flows on the North side of the berm (Case 2).

A lateral structure is used to model the flow diversion berm because it best captures the proposed berm modifications. As discussed in Section 3.2.4, a large storm in January 2005 caused flows to bifurcated the berm and caused the berm to become an obstruction of Hasley Canyon Creek flows into Castaic Creek. The berm will be modified in a way that will allow storm water for flow unobstructed into Castaic Creek upstream of the Bridge, while continuing to provide protection for the bridge pier located at the diversion berm. In the proposed condition, the lateral structure is lowered to the proposed berm design height, which allows for some flow to leave Hasley Canyon Creek and enter Castaic Creek. Using the Case 2 methodology will capture the highest water surface elevations and widest floodplain for the north side of the berm. Like in the existing condition, if flow was modeled using the Case 1 condition, there would be no mapped floodplain on the north side of the flow diversion berm since the Hasley flows would be contained within the Castaic Creek main channel.

The Castaic Creek HEC-RAS model captures the widest floodplain within the confluence through the use of a flow change upstream of the confluence of Castaic and Hasley Canyon Creek. This flow change captures a condition where all of the Hasley Canyon Creek flow enters Castaic Creek upstream of Commerce Center Drive, with no flows from Hasley Canyon Creek going through the north side of the flow diversion berm (Case 1). Both the existing condition and proposed condition models use the flow change upstream of the confluence. This modeling approach will produce the highest water surface elevations in Castaic Creek in the vicinity of the confluence. More detailed discussion can be found in the Castaic Creek Capital Floodway Revision Analysis, (per ESTU No. 2023000109, approval pending).

The Hasley Canyon Creek floodplain ties into the Castaic Creek floodplain at the study limits along the soil cement bank protection. Engineering judgement is used at the Hasley Canyon Creek downstream limits to ensure that the Castaic Creek Floodway ties into the Hasley Creek Floodway.

PARCEL MAP No. 20839

FRANKLIN PARKWAY

LIVINGSTON AVE

HARRISON PARKWAY

COMMERCE CENTER DRIVE

CASTAIC CREEK

CASTAIC CREEK STUDY LIMITS PER ML REVISION ESTU 2023000109 (APPROVAL PENDING)

DOWNSTREAM BOUNDARY: KNOWN WATER SURFACE ELEVATION PER CASTAIC CREEK ML REVISION PER ESTU 2023000109 (APPROVAL PENDING)

RS 1132
EXISTING COMMERCE CENTER DRIVE BRIDGE (BRIDGE NO. B3974)

STA 10+50.89
BEGIN WEST BANK SOIL CEMENT
=TIE-IN EXISTING HASLEY CREEK LINING

RS 2250
PROPOSED FRANKLIN PARKWAY BRIDGE

TOP OF SOIL CEMENT (WEST BANK)

TOE OF SOIL CEMENT (WEST BANK)

LIMITS OF EXCAVATION (WEST BANK)

RS 1500:
LATERAL STRUCTURE REPRESENTING MODIFIED FLOW DIVERSION BERM

JOIN CASTAIC CREEK FLOODPLAIN PER ESTU 2023000109

LIMIT OF STUDY

HASLEY CREEK
Q_{CAP} = 5'900 CFS

STA 10+00.00
BEGIN EAST BANK SOIL CEMENT
=STA 10+00 TIE-IN
TO CASTAIC CREEK WEST BANK

CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER DCR VOL. II OF V PREPARED BY PACE

TOE OF SOIL CEMENT (EAST BANK)

TOP OF SOIL CEMENT (EAST BANK)

LIMITS OF EXCAVATION (EAST BANK)

PROPOSED DROP/STILLING BASIN STRUCTURE

STA 39+89.01
END WEST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

STA 39+91.02
END EAST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

LIMIT OF STUDY

Q_{CAP} = 5,900 cfs

LEGEND

- INEFFECTIVE FLOW AREA
- STRUCTURE
- PROPOSED SOIL CEMENT BANK PROTECTION (33+00 / 32+00)
- XXXX — PROPOSED CONDITIONS HEC-RAS SECTION
- PROPOSED CONDITION FLOODWAY (HASLEY CANYON CREEK QCAP = 5,900 CFS, n=0.06)
- CAP — PROPOSED CONDITION FLOODPLAIN (CASTAIC CREEK QCAP = 26,400/31,100 CFS, n=0.06)
- CAP — L.A. COUNTY FLOODPLAIN (PER MAPS 388-MLI & 335-MLI)

SCALE 1"=100'

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NO	BY	DATE		DATE	APP.

JOB VALENCIA COMMERCE CENTER

HASLEY CANYON CREEK FLOODPLAIN AND FLOODWAY MAPPING

LOS ANGELES COUNTY CA.

PREPARED
PROJECT ENGINEER
R.C.E. NO.
EXP.
DRAWN | SCALE 1"=100'
DESIGNED
CHECKED | DATE

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

TITLE

PROPOSED CONDITIONS HEC-RAS WORKMAP

FIGURE 3-2

JOB NO. A535

P:\A535\Engineering\A535-83-Hasley Canyon Creek MA\exhibits\A535- Proposed HEC-RAS Workmap.dwg - Tab: REA By: ecandig on May. 30, 2024 at 03:45 pm

4 Floodway and Floodplain Mapping

The results of the updated existing and proposed conditions hydraulic models were used to delineate the updated existing conditions and the proposed conditions capital floodplain and floodway within Hasley Canyon Creek, for a study reach extending from approximately 600 ft downstream of the Commerce Center Drive Bridge over Hasley Canyon Creek to the confluence with Castaic Creek. The updated existing and proposed floodplain and floodway are described below.

4.1 Updated Existing Conditions Floodplain/ Floodway

The updated existing conditions capital floodplain and floodway are shown in **Figure 4-1** alongside the adopted L.A. County capital floodplain. Note that downstream of Commerce Center Drive Bridge, the L.A. County capital floodplain shown on the exhibit reflects revisions that are part of the Castaic Creek ML Revision approved in 2007 (PACE, December 2006). Additionally, **Figure 4-1** shows the updated existing conditions floodplain for Castaic Creek reflecting the Castaic Creek ML Revision (per ESTU No. 2023000109, approval pending). For the purposes of this analysis, the floodway encroachment stations were defined at the limits of the floodplain (see **Section 3.1.7)**. Here-in, for the updated existing conditions analysis the term floodplain denotes both the limits of the floodplain and floodway.

The Hasley Canyon updated existing conditions floodplain more accurately follows the existing conditions topography compared with the L.A. County capital floodplain. The updated existing conditions floodplain is narrower than the L.A. County capital floodplain in most areas. The largest differences are noted along the west bank of Hasley Canyon Creek, in which the updated existing conditions floodplain is situated east of the L.A. County capital floodplain. The updated existing conditions capital floodplain results, including the flow rate, water surface elevation, channel velocity, and top width, are included in **Table 4-1**, and detail out-puts from the HEC-RAS model are provided in **Appendix E**.

Table 4-1: Updated Existing Conditions Capital Floodplain Results

Cross-Section	Flow (cfs)	Water Surface Elevation (ft)	Channel Velocity (ft/s)	Top Width (ft)
4725	5,900	1075.0	9.2	119
4622	5,900	1073.0	9.9	114
4523	5,900	1071.4	9.7	112
4396	5,900	1067.7	11.8	116
4294	5,900	1062.8	9.1	260
4255	5,900	1060.3	8.5	309
4207	5,900	1051.2	8.8	277
4164	5,900	1045.0	3.7	283
4133	5,900	1045.0	2.8	230
4100.5	5,900	1044.3	6.8	119
4078	5,900	1044.1	7.3	129
4055.5	5,900	1043.9	7.2	132
3940.5	5,900	1041.9	9.2	166
3844	5,900	1039.2	10.5	112
3747	5,900	1037.7	8.3	178
3650	5,900	1035.9	8.2	193
3564	5,900	1035.4	5.9	170
3465	5,900	1033.8	9.0	103
3369	5,900	1032.3	8.6	168
3304	5,900	1031.2	7.4	218
3190.5	5,900	1029.9	6.7	204
3105	5,900	1028.6	8.5	118
3020	5,900	1027.9	7.7	118

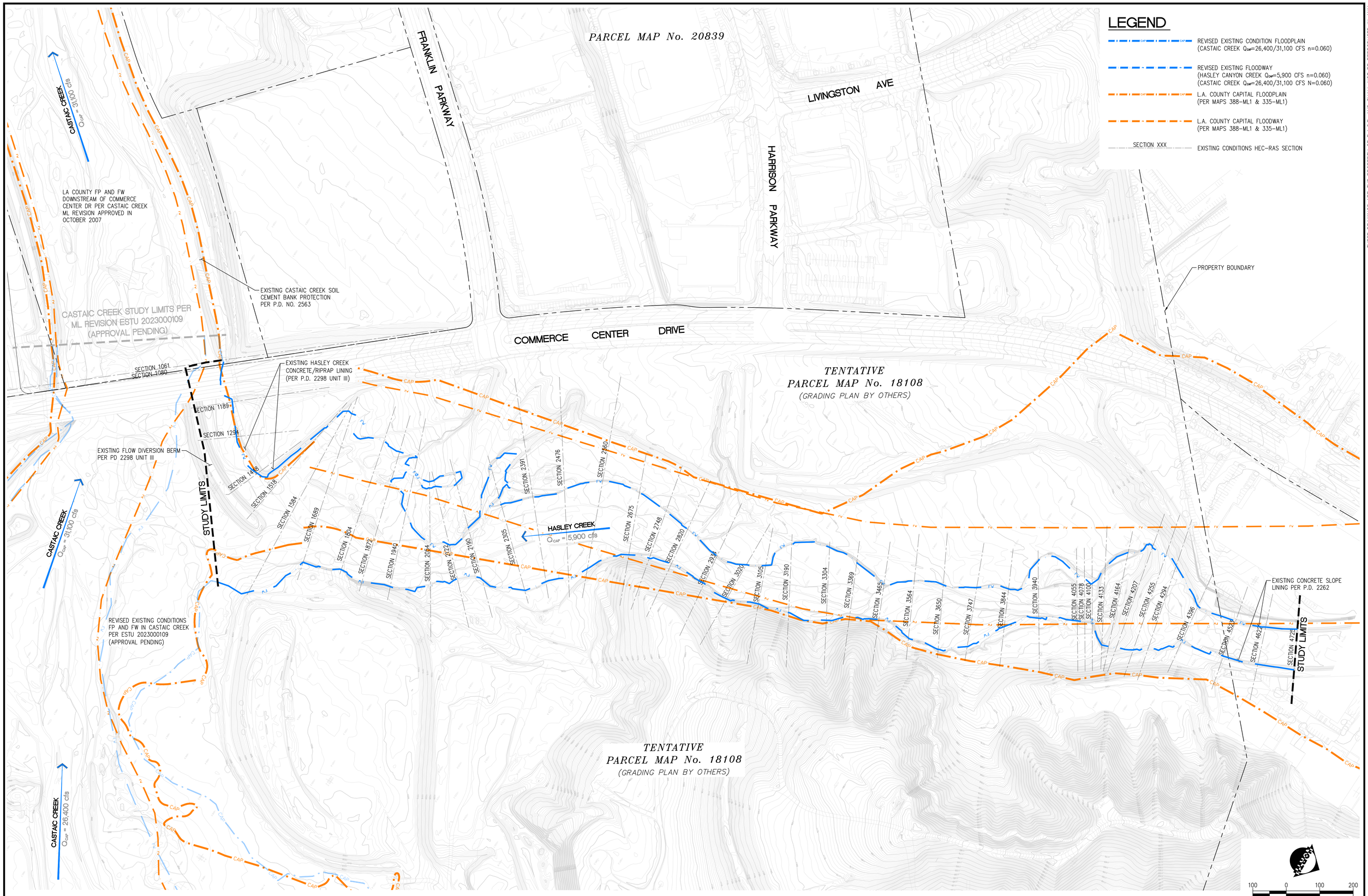
Cross-Section	Flow (cfs)	Water Surface Elevation (ft)	Channel Velocity (ft/s)	Top Width (ft)
2934	5,900	1025.0	12.5	92
2820.5	5,900	1022.1	10.9	118
2748	5,900	1021.0	8.9	147
2675.5	5,900	1019.9	8.0	188
2560.5	5,900	1017.7	7.5	266
2476	5,900	1016.3	6.7	262
2391	5,900	1014.8	7.2	257
2305	5,900	1013.6	6.3	354
2190	5,900	1012.6	6.3	195
2122	5,900	1011.0	9.9	133
2054	5,900	1008.9	11.2	145
1940	5,900	1007.2	8.3	239
1872	5,900	1006.3	7.3	385
1804	5,900	1004.4	9.4	363
1689	5,900	1003.8	4.5	472
1584	5,900	1003.6	3.9	617
1518	5,900	1003.0	5.8	338
1448	5,900	1001.6	9.4	101
1294	5,900	999.9	8.7	105
1189	5,900	999.5	6.6	112
1132		Commerce Center Drive Bridge		
1080	5,900	993.0	12.2	511
1061	5,900	993.7	1.2	513

Notes:

1. *Known water surface elevation based on existing conditions results presented in Castaic Creek ML Revision (per ESTU No. 2023000109, approval pending).*

The updated existing conditions floodplain is unable to tie into the L.A. County capital floodplain at the upstream end of the study limit, because the L.A. County capital floodplain is significantly wider than in existing conditions, and lies west of the existing channel. The upstream end of the updated existing conditions floodplain follows the existing contours for the channel improvements per P.D. 2262. The L.A. County capital floodplain on 388-ML1 has not been updated to reflect these channel improvements, thus the updated existing conditions floodplain does not tie in with the current floodplain on 388-ML1.

The floodplain along the west bank of Hasley Canyon Creek ties in with the Castaic Creek ML Revision (per ESTU No. 2023000109, approval pending) updated existing conditions floodplain at the existing Hasley Creek Concrete/ Rip-rap lining (per P.D. 2298 Unit III). The Castaic Creek ML Revision existing conditions floodplain subsequently ties in with the L.A. County capital floodplain downstream of Commerce Center Drive Bridge. The Hasley Creek existing conditions floodplain along the east bank of Hasley Canyon Creek ties in with the Castaic Creek ML Revision existing conditions floodplain along its north bank, upstream of the flow diversion berm. The Hasley Creek existing conditions floodplain along the east bank at cross-section 1584 was extended downstream, toward Castaic Creek, until it tied in with the Castaic Creek existing conditions floodplain. The Castaic Creek ML revision existing conditions floodplain ties in with the L.A. County capital floodplain upstream of the I-5 Bridge over Castaic Creek.



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NO	BY	DATE		DATE	APP.

JOB VALENCIA COMMERCE CENTER

HASLEY CANYON CREEK FLOODPLAIN AND FLOODWAY MAPPING

LOS ANGELES COUNTY CA.

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

PREPARED
PROJECT ENGINEER
R.C.E. NO.
EXP.
DRAWN SCALE 1"=100'
DESIGNED
CHECKED DATE

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

TITLE
UPDATED EXISTING CONDITIONS CAPITAL FLOODPLAIN AND FLOODWAY

FIGURE 4-1

JOB NO. A535

P:\A535\Engineering\A535-83-Hasley Canyon Creek ML\exhibits\A535-Existing vs Effective FP, FW.dwg - Tab: Layout By: erandig on May, 30, 2024 at 03:41 pm

4.2 Proposed Conditions Floodplain

The proposed conditions capital floodplain is shown in **Figure 4-2**. Similar to the existing condition analysis, the proposed condition floodway limits are set equal to the floodplain limits (see **Section 3.2.7**). For the proposed condition, here-in, the term proposed floodplain denotes both the floodplain and floodway limits.

The proposed conditions capital floodplain follows the proposed backfilled soil cement banks. The results of the hydraulic modeling indicate a narrow proposed floodplain at cross-section 3554, where the west floodplain extent is near the center of the channel, and does not meet the proposed backfilled west bank. Lateral erosion of the soil backfill is anticipated due to the wide floodplain limits upstream and downstream of this location. Therefore, the floodplain was adjusted to reflect a wider and more smoothed floodplain. This procedure of widening and smoothing floodplains has been used on previous map revisions processed through FEMA and is commonly referred to as an Administrative Floodplain. The model shows similar results for cross-sections 2820, 2748, and 2675, where the east floodplain extent does not meet the backfilled east bank. The floodplain was also intentionally adjusted (widened) at these cross-sections.

The hydraulic model results used to delineate the proposed capital floodplain are included in **Table 4-2,** and detail out-puts from the HEC-RAS model are provided in **Appendix F**. The results show narrow top widths at cross-section 3554, 2820, 2748, and 2675, which are intentionally widened in **Figure 4-2.** The results also indicate a reduction in flow rate near the downstream end of the model, downstream of cross-section 1518. This reduction in flow rate is caused by flow discharging into Castaic Creek over the modified flow diversion berm, which is modeled as a lateral weir in HEC-RAS. Note that the known water surface elevation boundary condition at cross-section 1061 was obtained from the Castaic Creek ML revision (per ESTU No. 2023000109, approval pending), which models the total flow within Hasley Creek and Castaic Creek during the capital flood event (31,100 cfs). Therefore, the flow rate in the Hasley Creek model does not need to be increased at this cross-section. Additionally, effective flow at cross-section 1080 is restricted to the Hasley Creek side of the Commerce Center Drive Bridge with an ineffective flow marker, thus the modeled flow rate at this section only considers flow within Hasley Creek.

Figure 4-2 also compares the proposed conditions floodplain in Hasley Canyon Creek with the updated existing conditions floodplain. At the upstream end of the model, at cross-sections 4622 and 4725, the proposed conditions floodplain matches the updated existing conditions, since no changes are proposed in this area. Elsewhere, the proposed floodplain differs from the existing, and is wider in some areas and narrower in others. The width of the proposed floodplain is more consistent throughout Hasley Creek than in the existing conditions.

Like the updated existing condition, the upstream end of the proposed conditions capital floodplain cannot tie into the L.A. County adopted floodplain, as the proposed conditions floodplain is significantly narrower. This difference is caused by the fact that the L.A. County adopted floodplain shown on 388-ML1 does not take into account the existing channel improvements per P.D. 2262. At the downstream end of the study limits, the western floodplain extent ties in with the Castaic Creek proposed floodplain (per ESTU No. 2023000109, approval pending) at cross-section 1080. An administrative floodway is mapped between cross-sections 1189 and 1080 in order to tie the Hasley Canyon Creek floodway into the Castaic Creek floodway.

The eastern extent of the Hasley Creek proposed floodplain (and floodway) ties in with the Castaic Creek proposed floodplain (per ESTU No. 2023000109, approval pending) along its north bank, upstream of the flow diversion berm. The east extent of the Hasley Creek proposed floodplain was extended along the backfilled east bank of Hasley Creek, until it tied in with the Castaic Creek proposed floodplain along its West bank. The flow diversion berm is mapped in the floodplain, since flow is expected to overtop the berm during the capital flood event.

PARCEL MAP No. 20839

FRANKLIN PARKWAY

LIVINGSTON AVE

HARRISON PARKWAY

COMMERCE CENTER DRIVE

CASTAIC CREEK
Q_{cap} = 31,100 cfs

LA COUNTY FP AND FW DOWNSTREAM OF COMMERCE CENTER DR PER CASTAIC CREEK ML REVISION APPROVED IN OCTOBER 2007

EXISTING CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER P.D. NO. 2563

CASTAIC CREEK STUDY LIMITS PER ML REVISION ESTU 2023000109 (APPROVAL PENDING)

EXISTING HASLEY CREEK CONCRETE/RIPRAP LINING (PER P.D. 2298 UNIT III)

STA 10+50.89
BEGIN WEST BANK SOIL CEMENT
=TIE-IN EXISTING HASLEY CREEK LINING

EXISTING FLOW DIVERSION BERM PER PD 2298 UNIT III (LENGTH TO BE MODIFIED AS SHOWN)

BURIED GRADE CONTROL STRUCTURE

STUDY LIMITS

HASLEY CREEK
Q_{CAP} = 5,900 cfs

BS 2250: PROPOSED FRANKLIN PARKWAY BRIDGE

STA 10+00.00
BEGIN EAST BANK SOIL CEMENT
=STA 10+50 TIE-IN
TO CASTAIC CREEK WEST BANK

ADMINISTRATIVE FLOODPLAIN AND FLOODWAY ADJUSTMENT (WIDENING)

REVISED EXISTING CONDITIONS FP AND FW IN CASTAIC CREEK PER ML REVISION ESTU 2023000109 (APPROVAL PENDING)

CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER DCR VOL. II OF V PREPARED BY PACE

CASTAIC CREEK
Q_{cap} = 26,400 cfs

TENTATIVE
PARCEL MAP No. 18108
(GRADING PLAN BY OTHERS)

PROPERTY BOUNDARY

BURIED GRADE CONTROL STRUCTURE

ADMINISTRATIVE FLOODPLAIN AND FLOODWAY ADJUSTMENT (WIDENING)

PROPOSED DROP/STILLING BASIN STRUCTURE

STA 39+89.01
END WEST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

EXISTING CONCRETE SLOPE LINING PER P.D. 2262

STUDY LIMITS

STA 39+91.02
END EAST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

TENTATIVE
PARCEL MAP No. 18108
(GRADING PLAN BY OTHERS)

LEGEND

- REVISED EXISTING CONDITION FLOODPLAIN (CASTAIC CREEK, Q_{cap}=26,400/31,100 CFS n=0.060)
- REVISED EXISTING CONDITION FLOODWAY (HASLEY CANYON CREEK Q_{cap}=5,900 CFS n=0.060) (CASTAIC CREEK Q_{cap}=26,400/31,100 CFS N=0.060)
- PROPOSED CONDITION FLOODPLAIN (CASTAIC CREEK, Q_{cap}=26,400/31,100 CFS N=0.060)
- PROPOSED CONDITION FLOODWAY (HASLEY CANYON CREEK Q_{cap}=5,900 CFS N=0.060) (CASTAIC CREEK Q_{cap}=26,400/31,100 CFS N=0.060
- L.A. COUNTY CAPITAL FLOODPLAIN (PER MAPS 388-ML1 & 335-ML1)
- L.A. COUNTY CAPITAL FLOODWAY (PER MAPS 388-ML1 & 335-ML1)
- PROPOSED SOIL CEMENT BANK PROTECTION
- LIMITS OF EXCAVATION
- XXXX PROPOSED CONDITIONS HEC-RAS SECTION

FLOODPLAIN/WAY STUDY APPROVED
REVIEWED BY: DATE 7/25/2024
APPROVED BY: Thang Nguyen DATE 8/13/2024
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

SCALE 1"=100'

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NO	BY	DATE		DATE	APP.

JOB VALENCIA COMMERCE CENTER

HASLEY CANYON CREEK FLOODPLAIN AND FLOODWAY MAPPING

LOS ANGELES COUNTY CA.

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.paceware.com

PREPARED
PROJECT ENGINEER
R.C.E. NO.
EXP.
DRAWN | SCALE 1"=100'
DESIGNED
CHECKED | DATE

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

TITLE
PROPOSED CONDITIONS CAPITAL FLOODPLAIN AND FLOODWAY

FIGURE
4-2

JOB NO. A535

Table 4-2: Proposed Conditions Capital Floodplain Results

Cross-Section[1]	Flow (cfs)	Water Surface Elevation (ft)	Channel Velocity (ft/s)	Top Width (ft)
4725	5,900	1074.9	9.2	119
4622	5,900	1073.4	9.3	115
4523	5,900	1070.3	12.1	108
4396	5,900	1064.5	12.3	102
4300	5,900	1045.7	13.3	81
4282	5,900	1042.8	8.7	88
4276	5,900	1043.1	5.4	131
4270	5,900	1043.2	3.7	183
4265	5,900	1042.9	5.4	195
4258	5,900	1042.9	5.1	210
4157	5,900	1042.9	2.9	285
4055.5	5,900	1042.3	5.3	292
3940.5	5,900	1040.7	7.4	283
3844	5,900	1038.4	6.9	281
3747	5,900	1037.4	5.6	281
3650	5,900	1035.4	7.8	287
3554	5,900	1033.2	8.3	169
3440.5	5,900	1032.3	5.2	330
3372	5,900	1030.4	8.6	283
3304	5,900	1029.6	6.1	279
3190.5	5,900	1028.9	5.0	251
3105	5,900	1027.9	6.8	262
3020	5,900	1027.1	5.6	275
2934	5,900	1024.9	9.0	253
2820.5	5,900	1021.9	9.0	160
2748	5,900	1021.0	7.2	218
2675.5	5,900	1019.8	7.1	205
2560.5	5,900	1017.6	8.5	279
2476	5,900	1016.2	6.2	262
2391	5,900	1015.1	6.6	243
2305.5	5,900	1014.8	4.9	241
2250		Franklin Parkway Bridge		
2190.5	5,900	1011.4	7.2	221
2122	5,900	1009.8	7.8	218
2054	5,900	1008.3	7.8	219
1940.5	5,900	1007.3	6.3	223
1872	5,900	1005.6	8.3	218
1804	5,900	1003.8	8.6	211
1688.62	5,900	1002.5	6.2	230
1584	5,900	1002.5	3.4	310
1518	5,900	1001.5	6.1	227
1448	4,829[3]	999.5	8.0	157
1294	2,853[3]	997.1	7.2	95
1189	2,853[3]	996.8	4.9	107
1132		Commerce Center Drive Bridge		
1080	2,853[3,4]	993.3	5.5	513
1061	2,853[3,5]	993.6[6]	0.6	513

Notes:

1. *Interpolated cross-sections not included.*
2. *Floodplain shown on **Figure 4-2** has wider top widths at these sections due to administrative adjustment completed to smooth the proposed floodplain.*
3. *Reduction in modeled flow rate in Hasley Creek due to flow over lateral weir (to Castaic Creek).*
4. *Ineffective flow area restricted to Hasley Creek side of the bridge, therefore, Castaic Creek flow not included at this section.*
5. *Hydraulic results are not dependent on flow rate at this cross-section, since it is modeled with a known water surface elevation.*
6. *Known water surface elevation based on proposed conditions results presented in Castaic ML Revision (per ESTU No. 2023000109, approval pending).*

4.3 Existing vs. Proposed Water Surface Elevation Comparison

Table 4-3 provides a comparison of the water surface elevation results between the existing condition and proposed condition models. The comparison shows decreases in water surface elevations along most of the study reach, as the proposed bank protection provides a wider flow area than that in the existing condition. There is a maximum increase in water surface elevation at the location of the proposed Franklin Parkway Bridge of 1.2 feet.

Table 4-3: Water Surface Elevation Comparison for Existing and Proposed Condition (Q_{CAP} = 5,900 cfs)

Cross Section	Existing Condition Water Surface Elevation (ft)	Cross Section	Proposed Condition Water Surface Elevation (ft)	Difference [Proposed - Existing] (ft)
4725	1075.0	4725	1074.9	0.0
4622	1073.0	4622	1073.4	0.4
4523	1071.4	4523	1070.3	-1.1
4396	1067.7	4396	1064.5	-3.2
4055.5	1043.9	4055.5	1042.3	-1.6
3940.5	1041.9	3940.5	1040.7	-1.2
3844	1039.2	3844	1038.4	-0.8
3747	1037.7	3747	1037.4	-0.4
3650	1035.9	3650	1035.4	-0.4
3564	1035.4	3554	1033.2	-2.2
3304	1031.2	3304	1029.6	-1.6
3190.5	1029.9	3190.5	1028.9	-1.1
3105	1028.6	3105	1027.9	-0.7
3020	1027.9	3020	1027.1	-0.8
2934	1025.0	2934	1024.9	-0.1
2820.5	1022.1	2820.5	1021.9	-0.2
2748	1021.0	2748	1021.0	0.0
2675.5	1019.9	2675.5	1019.8	0.0
2560.5	1017.7	2560.5	1017.6	-0.1
2476	1016.3	2476	1016.2	-0.1
2391	1014.8	2391	1015.1	0.4
2305 [2]	1013.6	2305.5 [2]	1014.8	1.2
2250	Proposed Franklin Parkway Bridge			

Cross Section	Existing Condition Water Surface Elevation (ft)	Cross Section	Proposed Condition Water Surface Elevation (ft)	Difference [Proposed - Existing] (ft)
2190	1012.6	2190.5	1011.4	-1.3
2122	1011.0	2122	1009.8	-1.2
2054	1008.9	2054	1008.3	-0.6
1940	1007.2	1940.5	1007.3	0.1
1872	1006.3	1872	1005.6	-0.7
1804	1004.4	1804	1003.8	-0.6
1689	1003.8	1688.6	1002.5	-1.3
1584	1003.6	1584	1002.5	-1.1
1518	1003.0	1518	1001.5	-1.5
1448	1001.6	1448	999.5	-2.0
1294	999.9	1294	997.1	-2.7
1189	999.5	1189	996.8	-2.7
1132	Commerce Center Drive Bridge			
1080	993.0	1080	993.3	0.3
1061	993.7	1061	993.6	-0.1

Notes:

1. *Only cross sections that are in both the existing and proposed condition models are compared on this table.*
2. *It is important to note that cross sections 2305 and 2305.5 are in approximately the same location, but have different cross section lengths and placements between the existing and proposed geometry. They are shown here for comparative purposes at the bridge.*

5 Summary

PACE prepared an LA County Floodplain and Floodway Map Revision along the lower Hasley Canyon Creek for the proposed channel improvements at Valencia Commerce Center Industrial Park Development. The ML Revision presented in this study includes updated existing conditions and proposed conditions capital floodplains and floodways for a study reach extending from approximately 620 ft downstream of Commerce Center Drive Bridge over Hasley Canyon Creek to approximately 25 ft downstream of Commerce Center Drive Bridge over Castaic Creek. This 3,670-ft study reach is situated on L.A. County map no. 335-ML1 and 388-ML1.

The updated existing conditions and proposed conditions floodplain limits were delineated using results of HEC-RAS hydraulic models of the study reach. The existing and proposed condition floodway limits are set equal to the limits of the floodplain. The HEC-RAS steady-state models feature a capital flood event peak flow rate of 5,900 cfs and known water surface elevation downstream boundary conditions obtained from the Castaic Creek ML Revision (ESTU No. 2023000109, approval pending).

The existing conditions HEC-RAS model was developed using 2013 topographic contours, while the proposed conditions model was developed using finished grade contours reflecting the proposed channel improvements. These improvements include buried soil cement bank protection, back-filled soil cement side slopes, a drop structure near the upstream end of the study reach, and modifications to the flow diversion berm upstream of the Commerce Center Drive Bridge. The resulting updated existing conditions and proposed conditions floodplain and floodway limits are shown on **Figure 4-1** and **Figure 4-2**. The updated existing and proposed conditions floodplain and floodway limits are narrower than the LA County floodplain and floodway shown on the current adopted Floodway Map, 388-ML-1. The floodplains and floodways presented in this study tie in with the Castaic Creek ML Revision floodplains and floodways (ESTU No. 2023000109, approval pending) upstream of the flow diversion berm on Hasley Creek's east bank, and downstream of Commerce Center Drive on Hasley Creek's west bank.

References

PACE. (December 2006). *Los Angeles County Capital Floodway Revision ML Map No's 225-ML-1&2, Castaic Creek Bank Protection (P.D. No. 2563) for P.M. No. 26363.*

PACE. (Approval Pending). *Los Angeles County Floodway Revision ML Map No.'s 335-ML-1 and 2 for Castaic Creek, ESTU No. 2023000109.*

PACE. (October 2021). *Drainage Concept Report Volume III of V, Hasley Canyon Creek Bank Protection, EIMP No. 2019000489.*

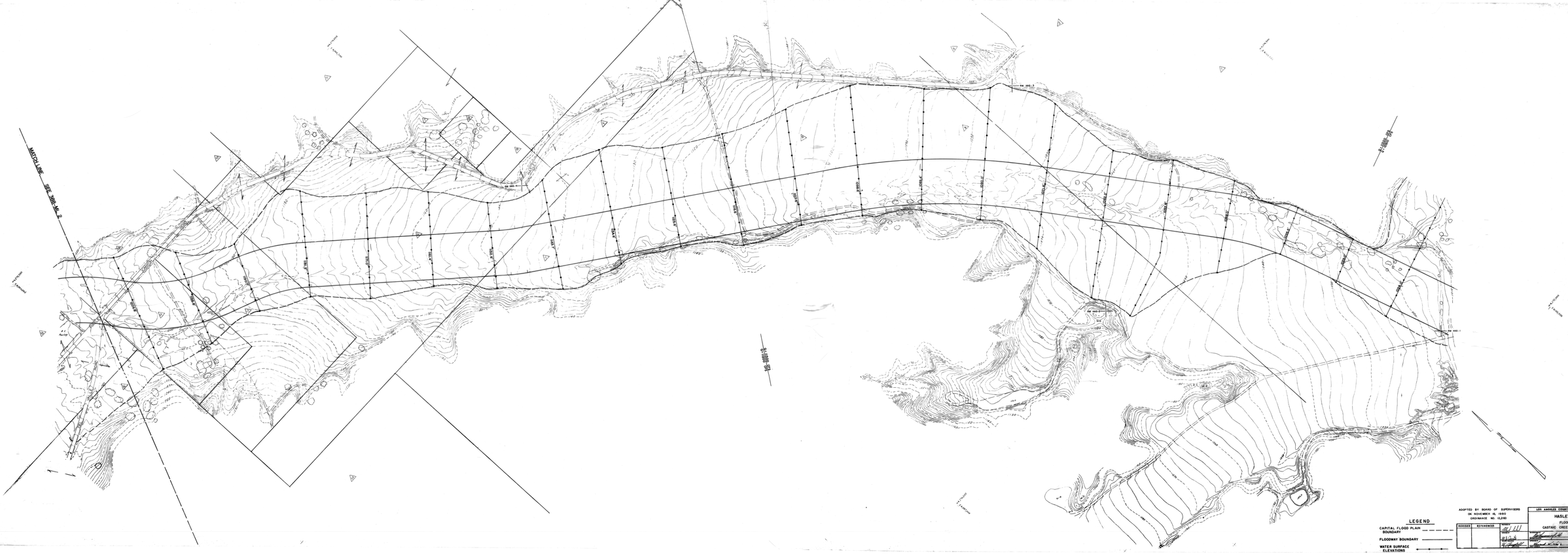
USACE. (August 2004). *Hydrology and Hydraulics Memorandum No. 4, Debris Loading on Bridges and Culverts.*

PACE
Advanced Water Engineering

Appendix A – Los Angeles County Flood Control District Floodway Maps

Hasley Canyon Floodway Map, Castaic Creek to Del Valle Rd.

PACE


MATCH LINE SEE 388-ML 2
LEGEND
CAPITAL FLOOD PLAIN BOUNDARY
FLOODWAY BOUNDARY
WATER SURFACE ELEVATIONS
ADOPTED BY BOARD OF SUPERVISORS ON NOVEMBER 16, 1960 ORDINANCE NO. 12,260
REVISED
REFERENCES
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
HASLEY CANYON
FLOODWAY MAP
CASTAIC CREEK TO DEL VALLE ROAD
10-9-80
1" = 100'
NO. 388-ML 1

Castaic Creek Floodway Map, From 700' D/S of Henry May Dr. to 7700' U/S of Henry Mayo Dr.

PACE

LEGEND

CAPITAL FLOOD PLAIN BOUNDARY

FLOODWAY BOUNDARY

WATER SURFACE ELEVATIONS

ADOPTED BY BOARD OF SUPERVISORS
AUGUST 28, 1964
ORDINANCE NO. 84-0136

REVISED	REFERENCES
	335 T7
	335 T8
	(10/80)

DRAWN: J.DOMENICHELLI

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

CASTAIC CREEK
FLOODWAY MAP
FROM 700' D/S OF HENRY MAYO DR.
TO 7700' U/S OF HENRY MAYO DR.

7/6/84 1" = 100'

NO. 335-MLI

PACE
Advanced Water Engineering

Appendix B – Castaic Creek Floodway Map No. 355-ML1, from 170’ D/S of Henry mayo Dr. to 7700’ U/S of

County of Los Angeles
CHIEF EXECUTIVE OFFICE
713 KENNETH HAHN HALL OF ADMINISTRATION
LOS ANGELES, CALIFORNIA 90012
(213) 974-1101
http://ceo.lacounty.gov

WILLIAM T FUJIOKA
Chief Executive Officer

ADOPTED
BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES

29 OCT 0 2 2007

Board of Supervisors
GLORIA MOLINA
First District
YVONNE B. BURKE
Second District
ZEV YAROSLAVSKY
Third District
DON KNABE
Fourth District
MICHAEL D. ANTONOVICH
Fifth District

October 2, 2007

The Honorable Board of Supervisors
County of Los Angeles
383 Kenneth Hahn Hall of Administration
500 West Temple Street
Los Angeles, CA 90012

Sachi A. Hamai
SACHI A. HAMAI
EXECUTIVE OFFICER

Dear Supervisors:

DEPARTMENT OF PUBLIC WORKS: CASTAIC CREEK FLOODWAY SOIL CEMENT BANK PROTECTION - VESTING TENTATIVE PARCEL MAP 26363, PRIVATE DRAIN 2563 REVISION OF THE ADOPTED FLOODWAY (ML MAP 335 1 AND 2) (SUPERVISORIAL DISTRICT 5) (3 VOTES)

IT IS RECOMMENDED THAT YOUR BOARD ACTING AS THE GOVERNING BODY OF THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT:

1. Conditionally approve the revision of the Castaic Creek floodway map to allow construction of the proposed flood control channel improvements as part of the Valencia Commerce Center Project, Phases 1 and 2, Vesting Tentative Parcel Map 26363.

2. Authorize the Chief Engineer or his designee of the Los Angeles County Flood Control District to accept the improvements upon completion to County standards.

PURPOSE/JUSTIFICATION OF RECOMMENDED ACTION

The purpose of the recommended action is to obtain approval to revise the Castaic Creek floodway, as shown on Attachment A. Approval of the recommendation would allow flood control channel improvements to commence as approved under Vesting Tentative Parcel Map 26363.

Following the completion of the proposed flood control channel improvements and acceptance by the Los Angeles County Flood Control District, a revised floodway map depicting the as-built drainage conditions will be prepared and submitted to your Board for approval.

Implementation of Strategic Plan Goals

The Countywide Strategic Plan directs that we provide Service Excellence (Goal 1) by providing flood protection and a safe habitable environment and Community Services (Goal 6) by enhancing the quality of life for the residents in the County of Los Angeles.

FISCAL IMPACT/FINANCING

There will be no impact to the County General Fund.

FACTS AND PROVISIONS/LEGAL REQUIREMENTS

On August 14, 1984, your Board approved and adopted Ordinance 84-0136 to establish floodway and water surface elevations for Castaic Creek. The ordinance provides for the regulation of construction-related activities within the established floodway to ensure that new developments are adequately protected from anticipated severe flood events.

The Castaic Creek floodway was adopted in accordance with the County's participation in the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA).

Vesting Tentative Parcel Map 26363 proposes a new development that includes flood control channel improvements that will affect the Castaic Creek floodway. The engineering calculations and construction plans for the proposed channel improvements have been reviewed and approved by the Department of Public Works in conformance with the Castaic Creek Floodway Ordinance.

ENVIRONMENTAL DOCUMENTATION

In accordance with Section 15378(b)(4) of the California Environmental Quality Act (CEQA) Guidelines, approval of the recommended action does not constitute a project and, hence, is not subject to the requirements of CEQA.

IMPACT ON CURRENT SERVICES (OR PROJECTS)

The recommended action will not have an impact on current County services or projects.

CONCLUSION

Please return three adopted copies of this letter to the Department of Public Works, Watershed Management Division.

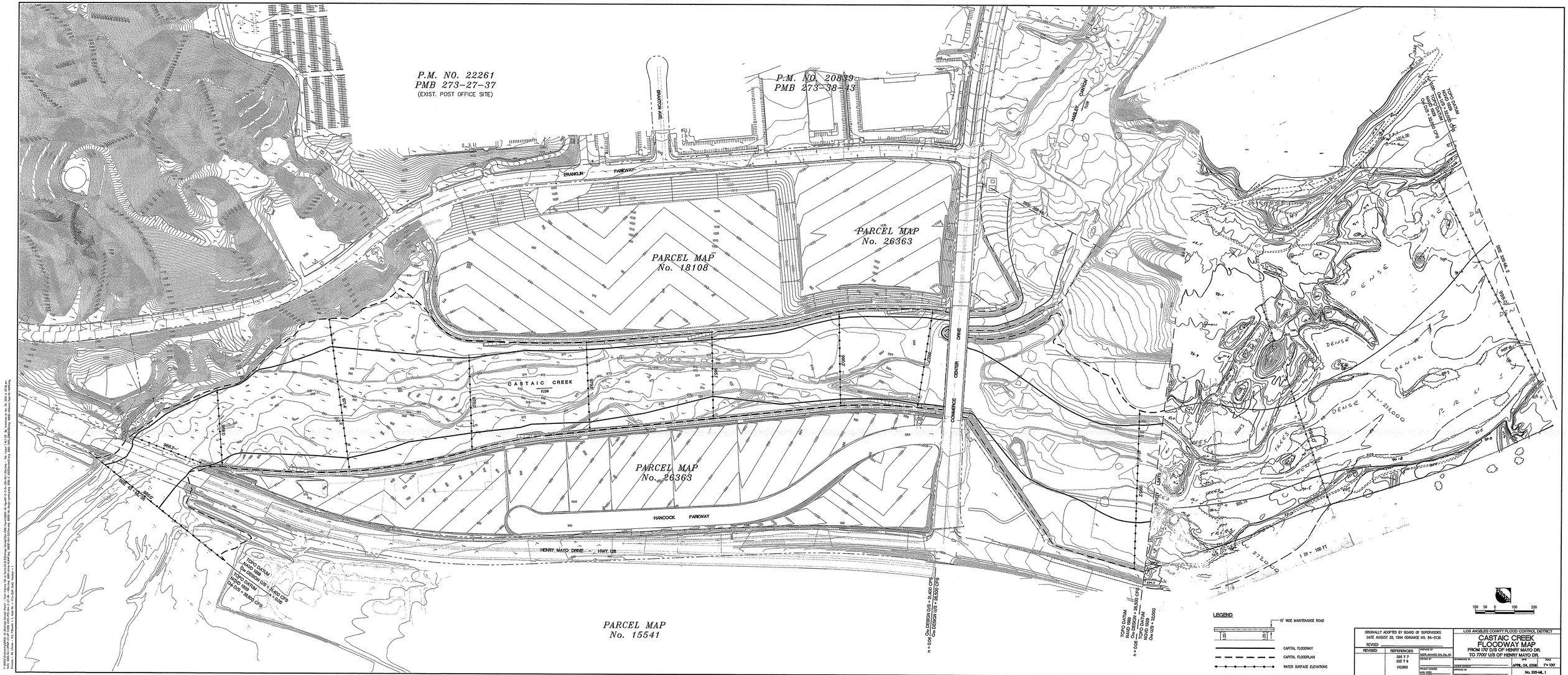
Respectfully submitted,

WILLIAM T FUJIOKA
Chief Executive Officer

WTF:DLW
MP:ad

Attachment

c: County Counsel


P.M. NO. 22261
PMB 273-27-37
(EXIST. POST OFFICE SITE)
P.M. NO. 20839
PMB 273-38-43
BRAXTON AVE.
FRANKLIN PARKWAY
HASLEY CANYON
PARCEL MAP
No. 18108
PARCEL MAP
No. 26363
CASTAIC CREEK
FLOW
COMMERCE CENTER DRIVE
PARCEL MAP
No. 26363
HANCOCK PARKWAY
HENRY MAYO DRIVE HWY. 126
PARCEL MAP
No. 15541
TOPO DATUM
NAVD 1929
Qa DESIGN U/S = 31,400 CFS
n = 0.06
TOPO DATUM
NGVD 1929
Qa D/S = 38,800 CFS
n = 0.06
Qa DESIGN D/S = 31,400 CFS
Qa DESIGN U/S = 28,500 CFS
TOPO DATUM
NAVD 1988
Qa DESIGN = 28,500 CFS
n = 0.06
TOPO DATUM
NGVD 1929
Qa U/S = 32,000
DENSE
TREES
1 IN = 100 FT
LEGEND
16' WIDE MAINTENANCE ROAD
CAPITAL FLOODWAY
CAPITAL FLOODPLAIN
WATER SURFACE ELEVATIONS
100 50 0 100 200
ORIGINALLY ADOPTED BY BOARD OF SUPERVISORS
DATE AUGUST 28, 1984 ORDNANCE NO. 84-0136
REVISED
REVISED
REFERENCES
335 T 7
335 T 8
(10/80)
PREPARED BY
CHECKED BY
PROJECT ENGINEER
PROJECT MANAGER
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
CASTAIC CREEK
FLOODWAY MAP
FROM 170' D/S OF HENRY MAYO DR.
TO 7700' U/S OF HENRY MAYO DR.
DESIGNED BY
DRAWN BY
APPROVED BY
DATE
APRIL 04, 2006
SCALE
1"= 100'
No. 335-ML 1

PACE
Advanced Water Engineering

Appendix C – Hasley Canyon Creek Hydrology Data

WATER RESOURCES DIVISION
HYDROLOGY SECTION

Q-2305

INFORMATION REQUEST SUMMARY

Date: 05/05/2014

Project Name: Hasley Canyon		
Project Location: Hasley Canyon from Hasley Canyon Rd to Commerce Center Dr	T.G. Page: 4459	Grid: E-5 to H-7
Project Engineer: Long Thang		
Technical Review by: Martin Araiza		
Information Requested: Q50 clear, Q50 burn, Q50 burn & bulk, and any other available flow rates		
Information Requested By: Jose Cruz, PACE, Advanced Water Engineering		
Information To Be Used: hydraulics study		
Will Information Be Used In Any Litigation? ☐*Yes* ☒*No*		

Information Provided:
The available flow rates within the specified reach of Hasley Canyon are listed below. Also attached is a map of the referenced reaches.

Reach	Q50 Clear (cfs)	Q50 Burned (cfs)	Q50 Burned & Bulked (cfs)	Q100 (cfs)	Q500 (cfs)
O	3,900	4,200	5,500	7,000	12,800
P	4,000	4,300	5,600		
Q	4,100	4,500	5,700		
R	4,300	4,700	5,900		

Date Provided: 05/01/2014 via e-mail (jcruz@pacewater.com)

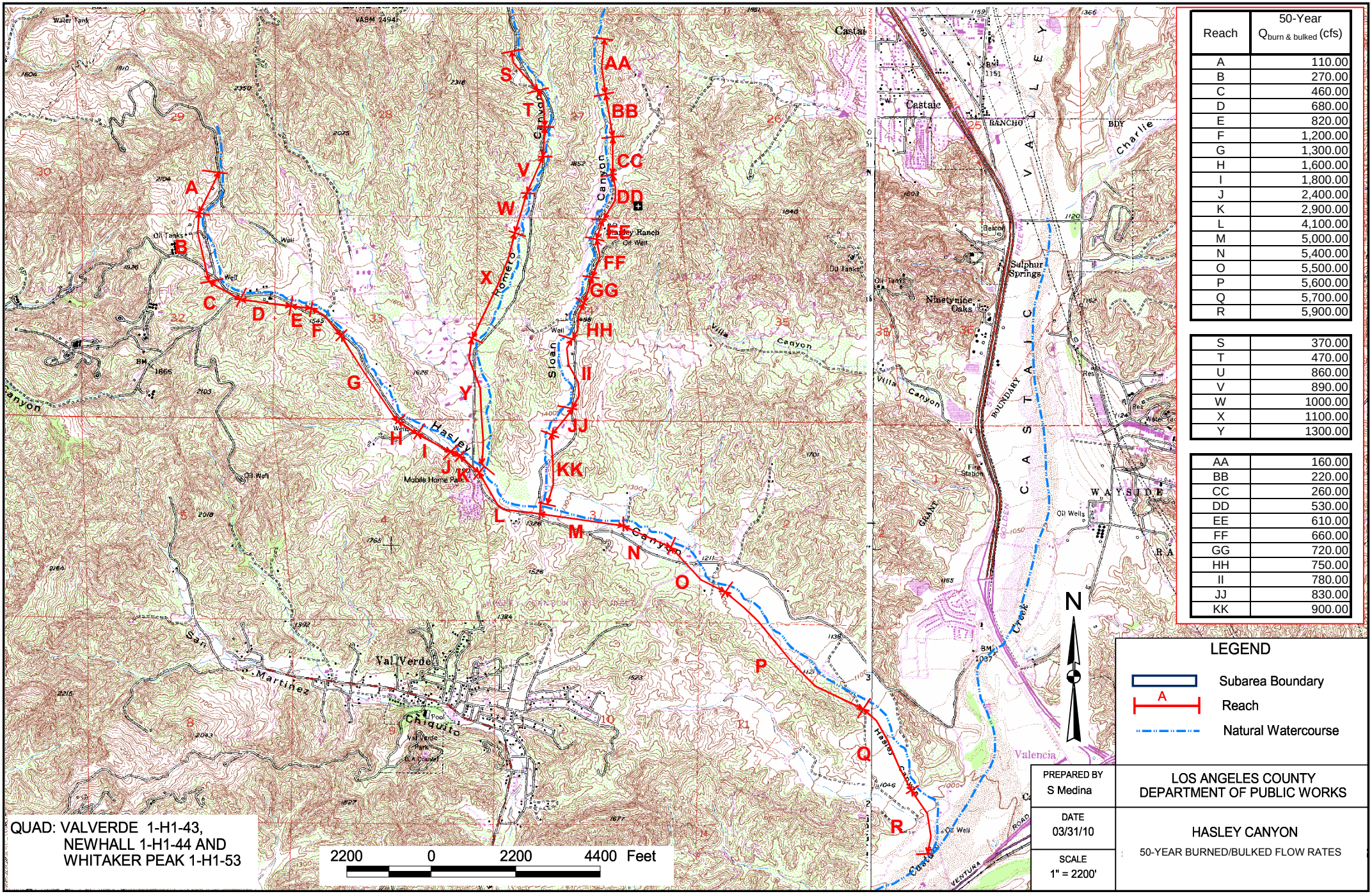
References:

- 2004 SCR Hydrology Study
- Santa Clarita Valley Flood Insurance Study, Vol. II dated 1979

Calculations, Comments, Etc.

The FEMA flow rates were calculated using a modified version of a regression equation developed by the US Army Corps of Engineers as stated in the 1979 study.

The Q50 Clear, Q50 Burn, and Q50 Burn & Bulk flow rates provided were calculated using the revised hydrologic method based on “rainfall isohyets” (Depth Method) (refer to the 2006 Hydrology Manual). The hydrologic study calculated flows resulting from a 50-year design storm. Landuse and drainage conditions may differ than those used/assumed in the 2004 study. The information provided should be used for planning purposes.


A
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CC
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GG
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II
JJ
KK
Hasley Canyon
Sloan Canyon
Romero Canyon
Val Verde
San Martinez
Chiquito
Castaic
Valencia
Sulphur Springs
Ninetynine Oaks
Mobile Home Park
Oil Wells
Water Tank
Oil Tanks
Well
Fire Station
Beacon
Pool
Val Verde Park
Golf Course
Creek
Canyon
Valley
Junction
Road
Freeway
Boundary
Charlie
Wayside
Ranch
Oil Well
Tanks
Res
Station
Tank
Golf
Course
Park
Mobile
Home
Pool
Golf
Course
Oil

PACE
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Appendix D – As-Built Drawings

Commerce Center Drive Bridge

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

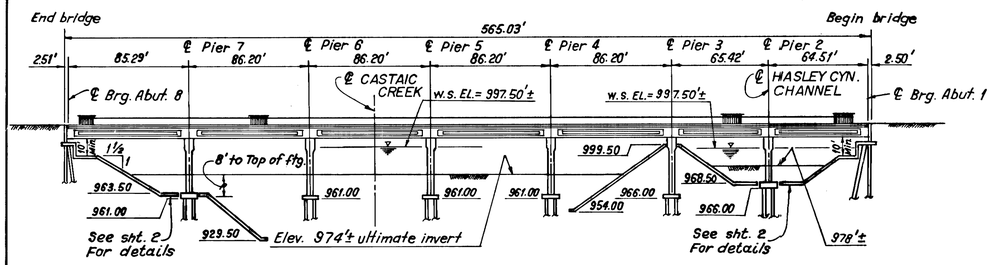
PLANS FOR BRIDGE

ON

COMMERCE CENTER DRIVE

OVER

CASTAIC CREEK



ELEVATION

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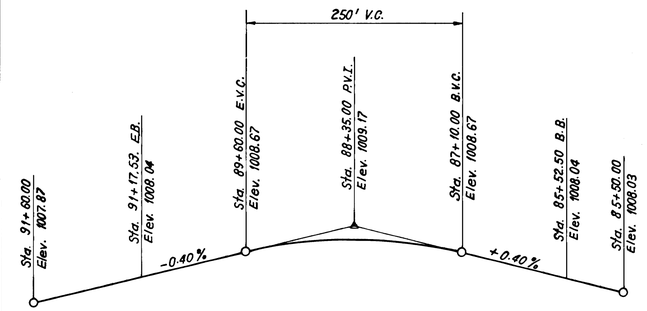


PROFILE

No Scale

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

INDEX TO STANDARD PLANS

The Following State of California Department of Transportation Standard Plans, Dated July 1992, Are a Part of These Contract Drawings.

A 62-C -------Limits of Payment for Excavation and Backfill-Bridge
AT7-D -------Guard Rail Flares
AT7-F -------Miscellaneous Guard Rail Details
B2-5 -------Pile Details-Class 45 and Class 70
B6-21 -------Joint Seals
B7-5 -------Deck Drains
B11-54 -------Concrete Barrier Type 26
B0-5 ------- Deck Construction Joint

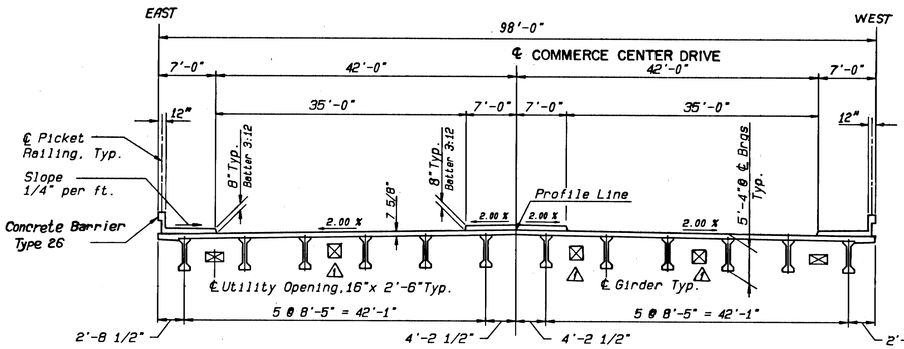
The Following Los Angeles County Department of Public Works Standard Plans, Latest Editon, are Part of These Contract Drawings.

6102-------Picket Railing

AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

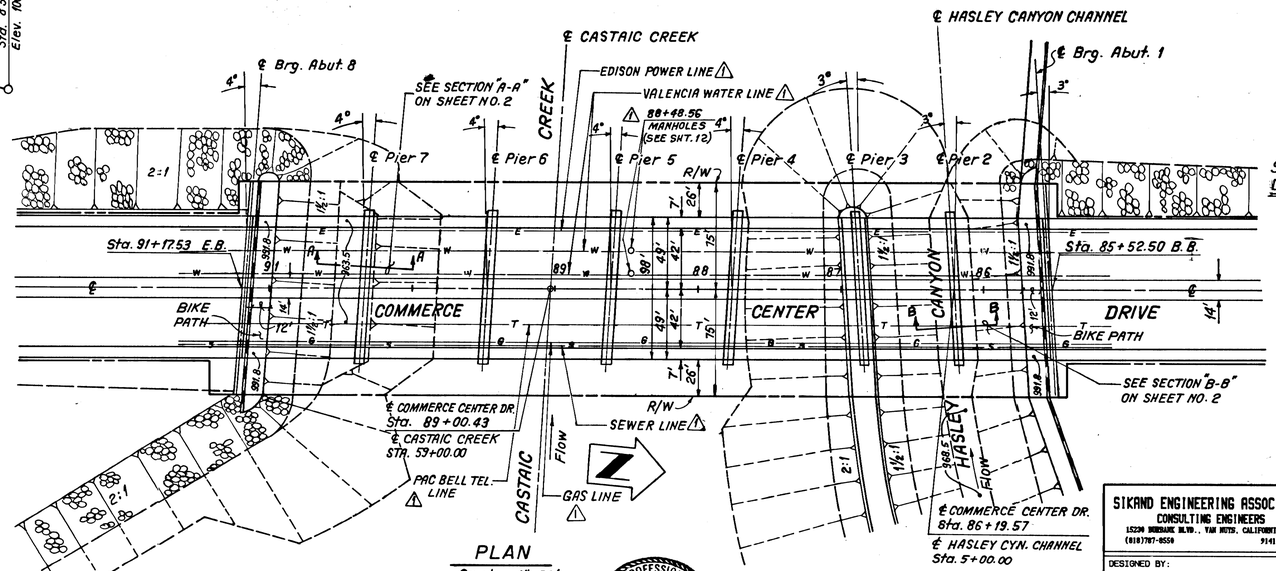
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 1994 EDITION

460-0---------Pull Boxes
465-0---------Conduit Expansion Details



TYPICAL SECTION

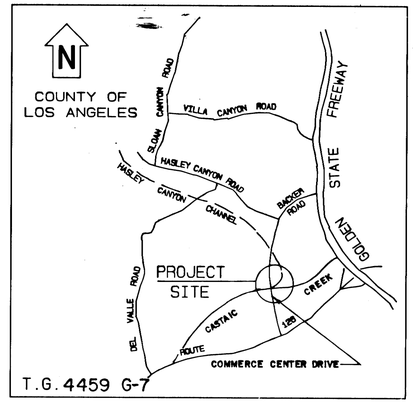
Scale : 1" = 10'



PLAN

Scale: 1"=50'

NOTE: The contractor shall verify all controlling field dimensions before ordering or fabricating any material or starting construction.



PROJECT LOCATION

No Scale

INDEX	
SHEET	TITLE
1	TITLE SHEET
2	TOPOGRAPHY
3	PILE LAYOUT & WINGWALL DETAILS
4	ABUTMENTS
5	PIERS
6-8	PRESTRESSED GIRDER DETAILS
9	GIRDER DIAPHRAGMS
10-11	DECK DETAIL SHEETS
12	MISCELLANEOUS DETAILS
13-15	LOG OF TEST BORINGS

SPECIFICATIONS

DESIGN: Load Factor Design
Bridge Design Specifications (1989 A.A.S.H.T.O. with Interims and Caltrans Supplements)
Design Loading:
Dead Load: Includes 35 psf for future wearing surface
Live Load: HS20-44 and P13 overload
Seismic Load: Peak Rock Acceleration 0.60g., Depth to Alluvium 80'-150 ft.
Design Stresses: Reinforced Concrete: fy = 60,000 psi
f'c = 3,250 psi
n = 9
Transverse deck slab
fs = 20,000 psi
fc = 1,200 psi
n = 10
Prestressed Concrete: See "Prestressing Notes"
Structural Steel (A36): fy = 36,000 psi
Design Soil Pressure (net): 3,000 psf
Pile Design Load: Abuts 45 ton, Piers 70 ton

CONSTRUCTION:
Standard Specifications for Public Works Construction (1994) W/Current Supplements

DATUM:
NEWHALL 1983, ROBM TAG IN CB 4 FT N BCR 70 FT N & 32 FT E CL INT OLD ROAD & HASLEY CANYON ROAD OFF RAMP EL.1065.685 CL 3976

REVIEWED
Steve M. Hemmegger 11/24/97
STRUCTURAL SECTION DATE

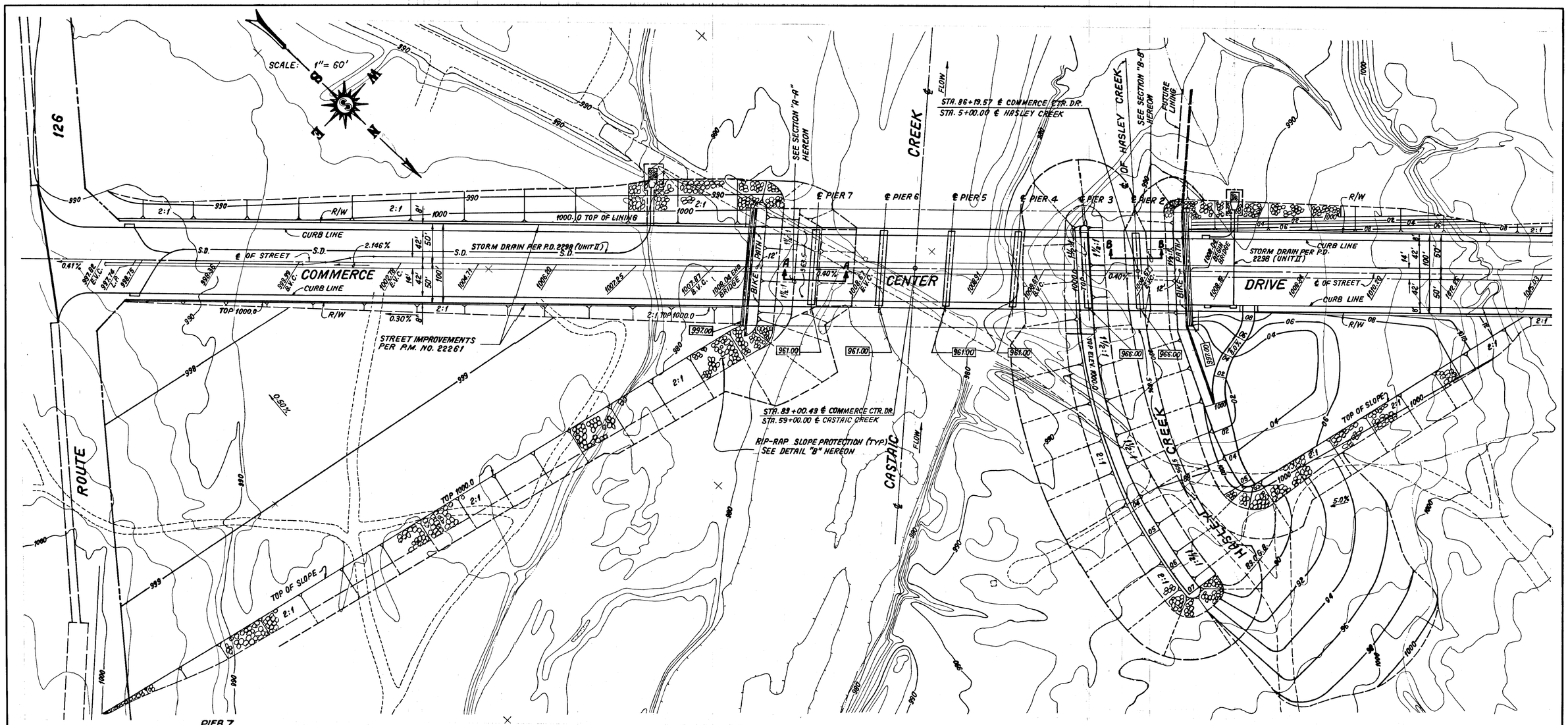
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614612"

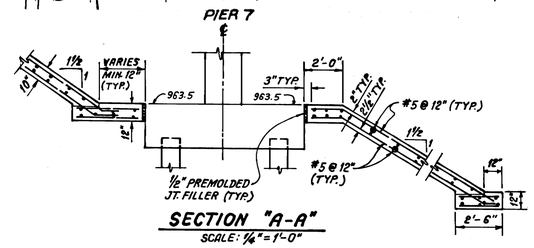
SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA (818)787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	TITLE SHEET
PROJECT ENGINEER: JORA SARKISSIAN	SUBMITTED: 11/24/97 CONSTRUCTION SECTION DIVISION DATE
	APPROVED: 11-25-97 DIRECTOR OF PUBLIC WORKS COUNTY DIRECTOR DATE
	BRIDGE NO.: 3794 PROJECT NO.:
	SHT.: 1 OF: 15 DWG. NO.: 614612

1020-252-20

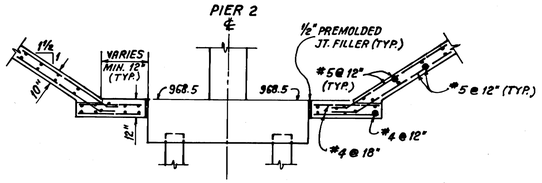
DRAWN	CHECKED	REVISIONS	⚠ ADDED MANHOLES, UTILITY OPENINGS AND UTILITY LINES.



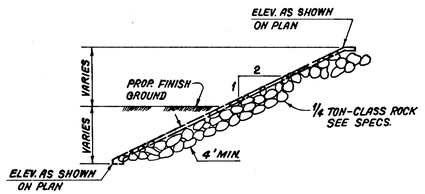
SCALE: 1"= 60'



SECTION "A-A"
SCALE: 1/4"= 1'-0"



SECTION "B-B"
SCALE: 1/4"= 1'-0"



DETAIL "B"
NOT TO SCALE

NOTE: UNLESS OTHERWISE INDICATED:

1. EXISTING TOPOGRAPHY SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR.
2. FOR RELOCATION OR REMOVAL OF EXISTING UTILITIES; SEE SPECS.
3. ☐ INDICATES BOTTOM OF FOOTING ELEVATION.
4. SLOPE PAVING MAY BE PORTLAND CEMENT CONCRETE OR AIR-BLOWN MORTAR. SEE SPECS.
5. FOR GUARD RAIL DETAILS, SEE CALTRANS STD. PLAN A77-D, TYPE I FLARE AND A77-F, A77-E. FOR ANCHORAGE TO BRIDGE SIDEWALK, SEE STD. B11-54. TYP.
6. FOR SITE AND EMBANKMENT PREPARATION, SEE SPECS.
7. FOR TYPICAL SLOPE PAVING DETAILS SEE "MISCELLANEOUS DETAILS" ON SHEET NO. 12
8. LINING AND BIKE PATH TO BE CONSTRUCTED PER P.D. NO. 2298 (UNIT III)

NOTE:

CONTRACTOR'S ATTENTION IS DIRECTED TO THE PRESENCE OF GROUND WATER AT ELEVATION OF 2 TO 4 FEET BELOW THE RIVER BED GRADE. CONTRACTOR WILL BE REQUIRED TO PROVIDE ALL NECESSARY DEWATERING FACILITIES TO ADEQUATELY DEWATER BELOW THE SOFFIT OF PIER FOOTING OR BOTTOM OF THE FOOTING OF THE SLOPE PAVING PRIOR TO THE PLACEMENT OF ANY REINFORCEMENT AND STRUCTURAL OR AIR BLOWN CONCRETE. DEWATERING SHALL CONTINUE UNTIL THE STRENGTH OF STRUCTURAL OR AIR BLOWN CONCRETE BELOW THE WATER TABLE HAS REACHED THE STRENGTH OF 2000 P.S.I.

AS BUILT

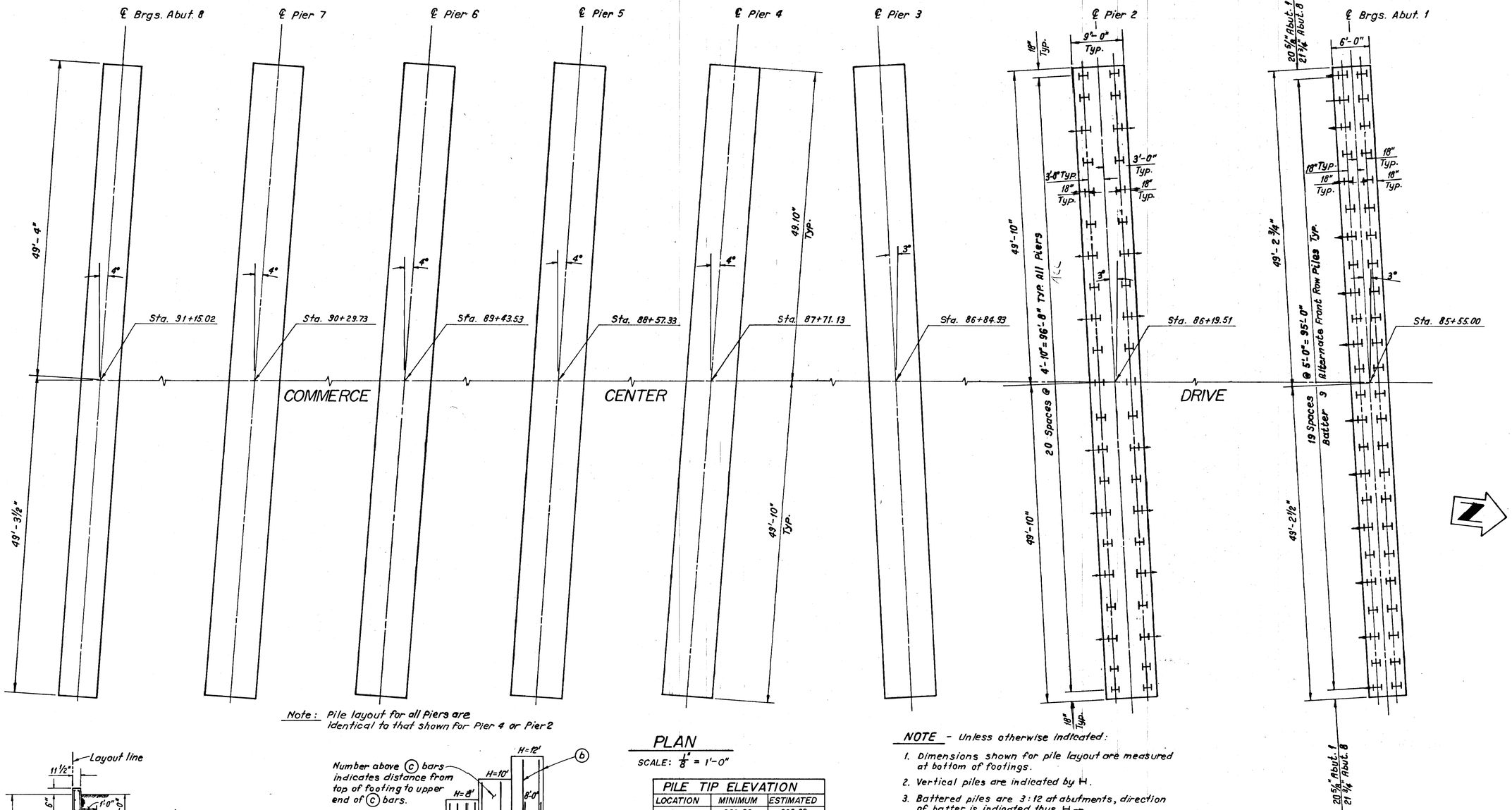
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614611"

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 16230 BURBANK BLVD., VAN NUYS, CALIFORNIA (818)787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	TOPOGRAPHY
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 3794 PROJECT NO.: SHT.: 2 OF: 15 DWG. NO.: 614611

REVISIONS | CHECKED | DRAWN



Note: Pile layout for all Piers are identical to that shown for Pier 4 or Pier 2

Note: Pile layout for Abut. 8 is identical but opposite hand to that shown for Abut. 1

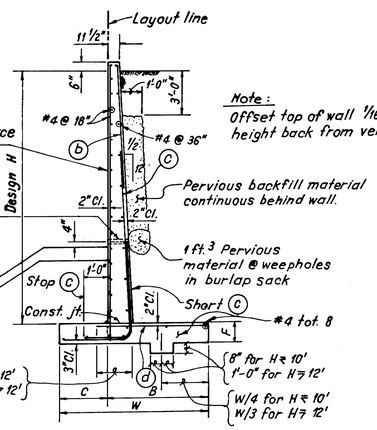
PLAN

SCALE: 1/8" = 1'-0"

PILE TIP ELEVATION		
LOCATION	MINIMUM	ESTIMATED
ABUT 1	960.00	960.00
ABUT 8	950.00	950.00
PIER 2 & 3	926.00	926.00
PIERS 4,5,6,7	922.00	922.00

NOTE - Unless otherwise indicated:

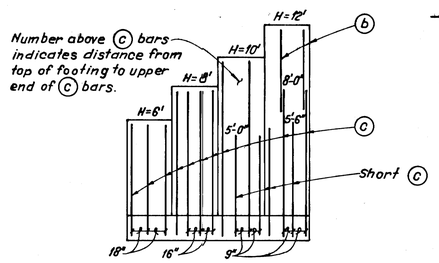
1. Dimensions shown for pile layout are measured at bottom of footings.
2. Vertical piles are indicated by H.
3. Battered piles are 3:12 at abutments, direction of batter is indicated thus H→.
4. Lugs for steel pile shall be ¾" x 5" plates cut to fit. Welded to each side of web and shall be placed as directed by the Engineer. See Specs.
5. Estimated pile tip elevations as shown on this sheet shall be used for bidding purposes.
6. For pile driving, See Specs.
7. For pile details See Caltrans Std. Plan B2-5.
8. All piles are HP 12x53, with
   - Abuts. 40 ton capacity
   - Piers 70 ton capacity



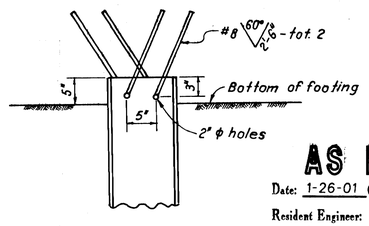
Note: Offset top of wall 1/16" per ft. of height back from vertical.

TYPICAL WINGWALL DETAILS

NO SCALE



Design H	6'	8'	10'	12'
W	4'-2"	5'-2"	6'-2"	7'-2"
C	1'-4"	1'-8"	2'-0"	2'-4"
B	2'-10"	3'-6"	4'-2"	4'-10"
F	1'-2"	1'-2"	1'-2"	1'-2"
ⓑ	—	—	—	#4@18"
©	#5@18"	#5@16"	#5@9"	#6@9"
ⓓ	#5@18"	#4@16"	#4@9"	#5@9"



STEEL PILE ANCHOR

NO SCALE

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zoven Abrahamian

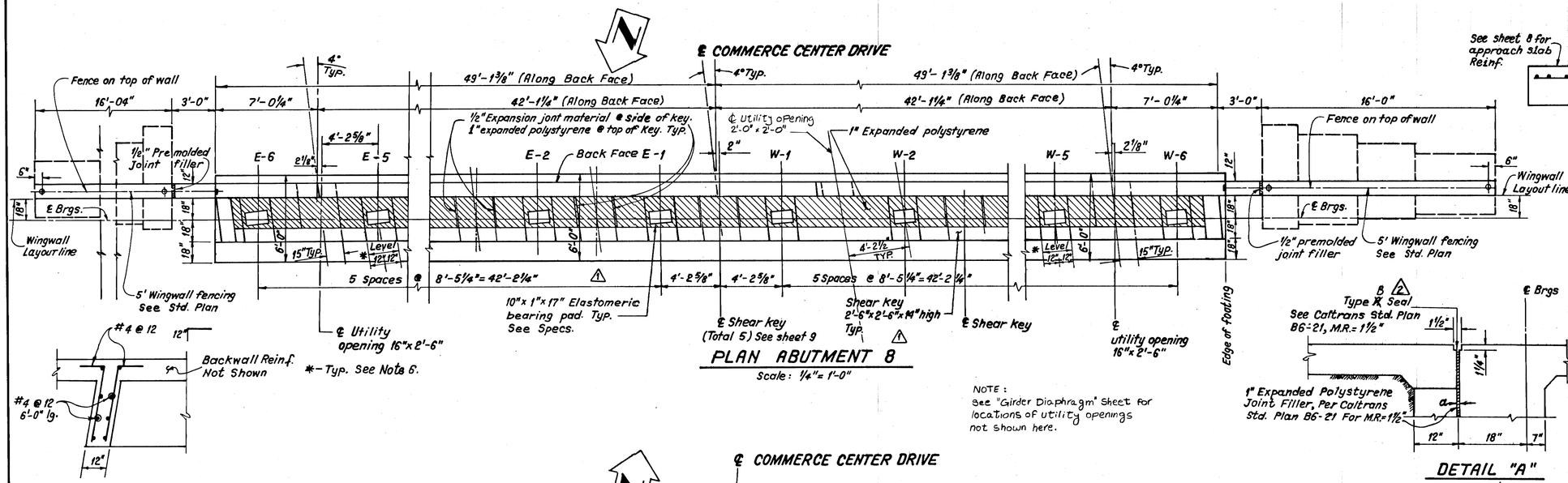
No Changes

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 45289 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614610"

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411 (818)787-8558	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN DRAWN BY: ALBERT GEVORKIAN PROJECT ENGINEER: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK PILE LAYOUT & WINGWALL DETAILS REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE BRIDGE NO.: 3794 PROJECT NO.: SHT.: 3 OF: 15 DWG. NO.: 614610

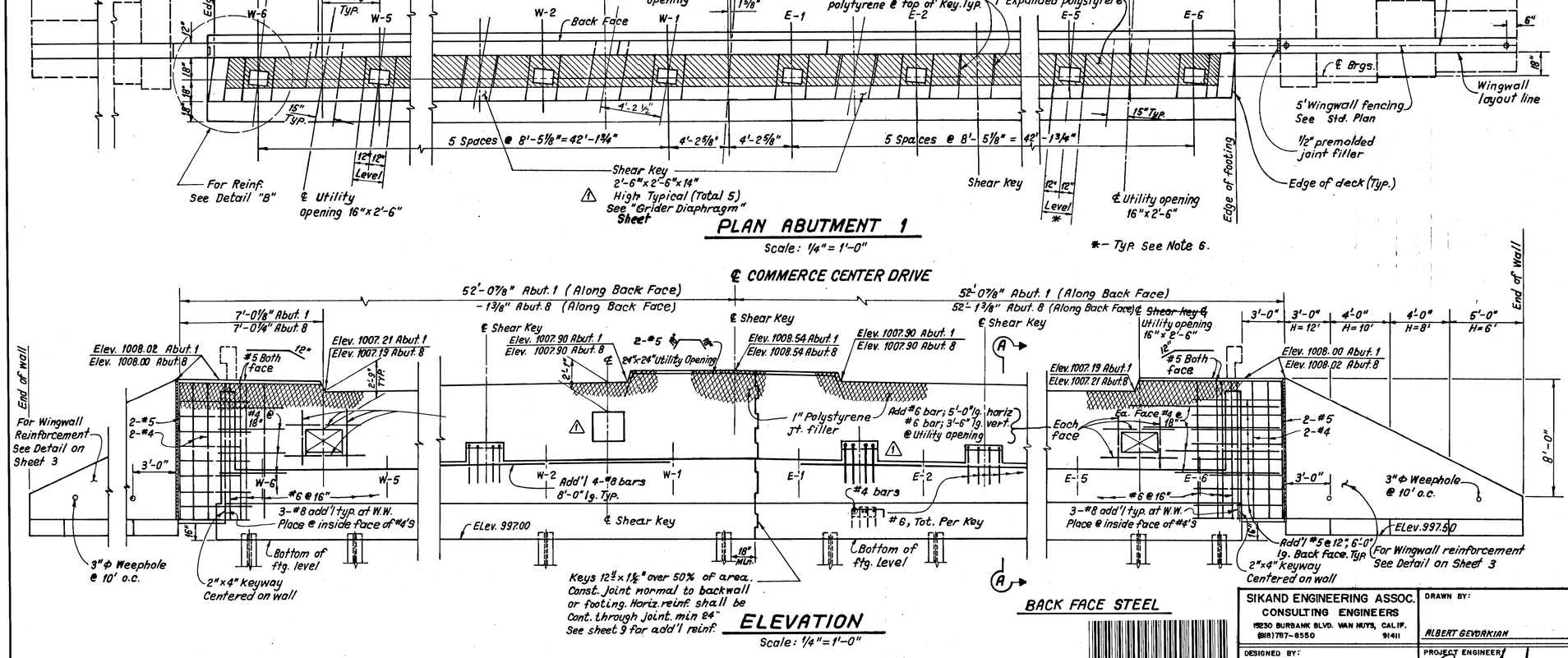
REVISIONS | CHECKED | DRAWN



BEARING SEAT ELEVATION		
GIRDER	ABUTMENT 1	ABUTMENT 8
E-1	1002.56	1002.56
E-2	1002.39	1002.39
E-3	1002.22	1002.21
E-4	1002.04	1002.04
E-5	1001.87	1001.87
E-6	1001.70	1001.70
W-1	1002.56	1002.56
W-2	1002.39	1002.39
W-3	1002.22	1002.23
W-4	1002.06	1002.06
W-5	1001.89	1001.89
W-6	1001.72	1001.72

NOTE - Unless otherwise indicated:

1. Elevation shown is for back face of abutments and wing walls.
2. Bearing seat elevations are top of concrete and are Located at the intersection of ℄ bearing and ℄ girder.
3. Reinforcing steel shall have 2" cover in walls and 3" cover in footings.
4. Premolded joint filler should be fastened with 8 d galvanized nails @ 12"o.c. staggered.
5. Reinforcing steel shall be continuous through construction joints.
6. Bearing seats shall be parallel to roadway grade and level perpendicular to ℄ girder.



ADDED ABUTMENT UTILITY OPENING & REVISED SHEAR KEY LOCATIONS. ⚠

JOINT TYPE SEALS CHANGED TO TYPE "B" SEAL ② AS BUILT
Date 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 9-31-00 CIVIL STATE OF CALIFORNIA

REVISIONS	CHECKED	DRAWN

SIKAND ENGINEERING ASSOC.
CONSULTING ENGINEERS
15230 BURBANK BLVD. VAN NUYS, CALIF. 91411
(818)787-8550

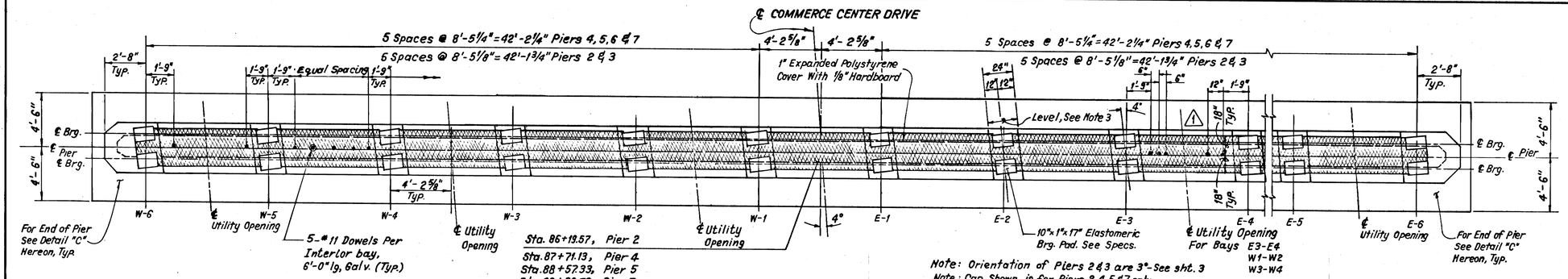
DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE OVER CASTAIC CREEK
ABUTMENTS

REVIEWED
Steve Mikrogeorgis 11/24/97
STRUCTURAL SECTION DATE

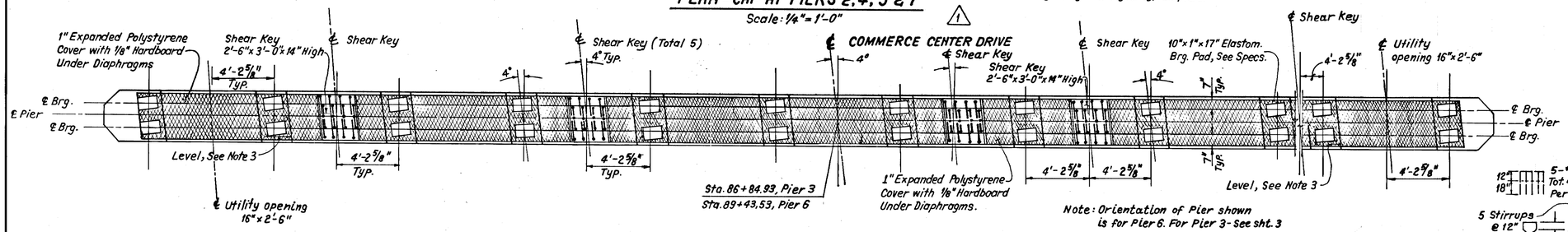
BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 4 OF: 15
DWG. NO.: 614609



PLAN - CAP AT PIERS 2,4,5 & 7

Scale: ¼"=1'-0"

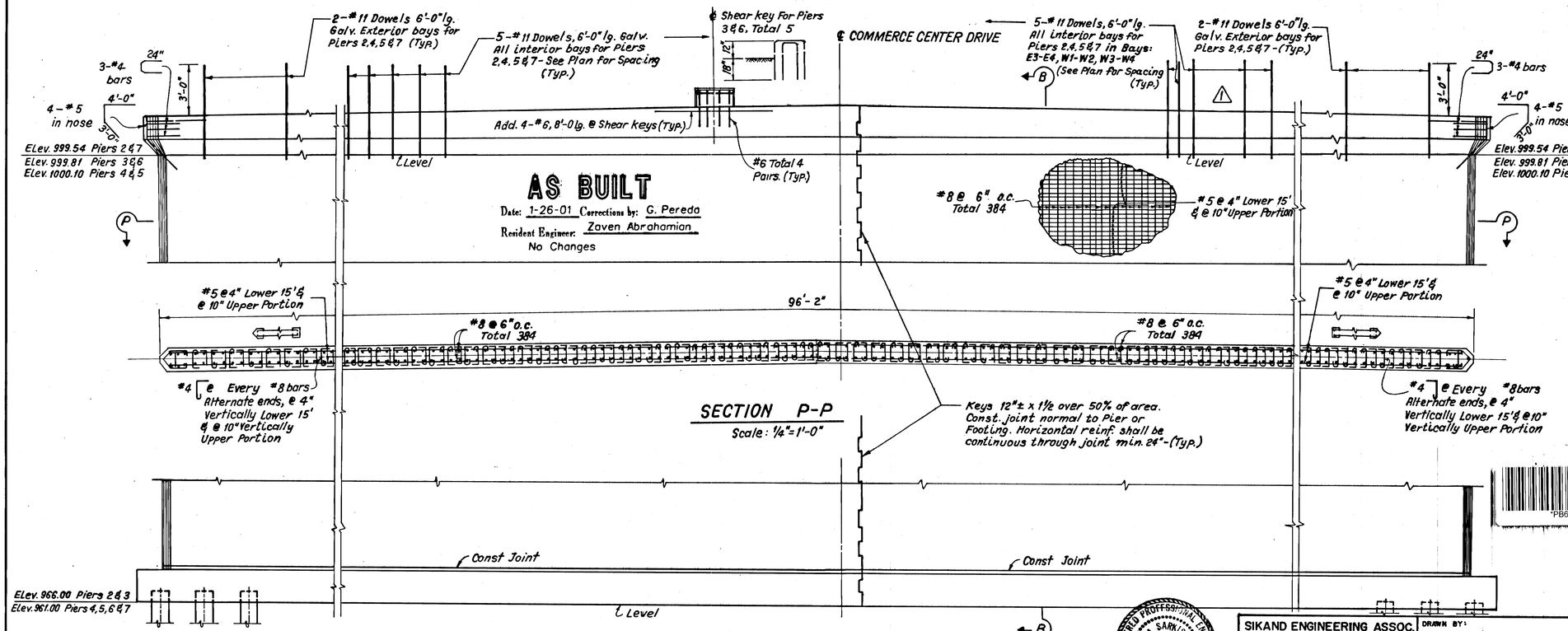
Note: Orientation of Piers 2 & 3 are 3°-See sht. 3
Note: Cap Shown is for Piers 2,4,5 & 7 only. Stem footing and girder layout typ. all piers.



Note: Orientation of Pier shown is for Pier 6. For Pier 3-See sht. 3

PLAN - CAP AT PIERS 3 & 6

Scale: ¼"=1'-0"



AS BUILT
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

SECTION P-P

Scale: ¼"=1'-0"

ELEVATION

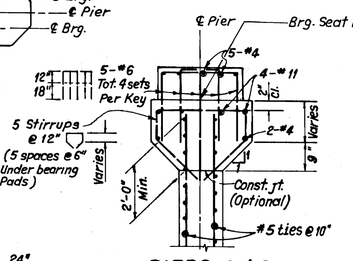
Scale: ¼"=1'-0"

NOTE: Reinforcement Shown is Typ. for both faces of Pier.

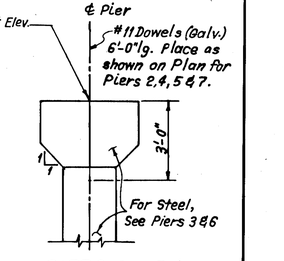
BEARING SEAT ELEVATION						
GIRDER	PIER 2	PIER 3	PIER 4	PIER 5	PIER 6	PIER 7
E-1	1002.81	1003.07	1003.37	1003.42	1003.23	1002.90
E-2	1002.64	1002.89	1003.20	1003.25	1003.07	1002.73
E-3	1002.47	1002.73	1003.03	1003.08	1002.90	1002.55
E-4	1002.29	1002.55	1002.86	1002.91	1002.72	1002.38
E-5	1002.12	1002.38	1002.69	1002.74	1002.55	1002.21
E-6	1001.95	1002.21	1002.52	1002.57	1002.38	1002.04
W-1	1002.81	1003.07	1003.36	1003.42	1003.24	1002.90
W-2	1002.64	1002.90	1003.19	1003.25	1003.07	1002.73
W-3	1002.47	1002.73	1003.02	1003.08	1002.91	1002.57
W-4	1002.31	1002.56	1002.85	1002.91	1002.74	1002.40
W-5	1002.14	1002.40	1002.68	1002.74	1002.57	1002.23
W-6	1001.97	1002.23	1002.51	1002.57	1002.40	1002.06

NOTE: Unless otherwise indicated:

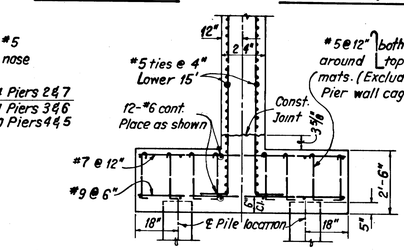
1. Elevations shown in table are at ℄ of pier. See Sect. B-B.
2. Reinforcing steel shall have 2" cover in cap and 3" cover in walls and footing.
3. Finish bearing seats parallel to roadway grade and level transverse to girders.
4. See Sheet 3 for pile layout.



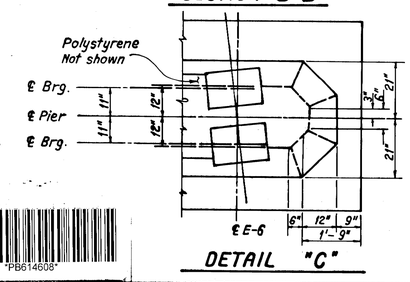
PIERS 3 & 6



PIERS 2,4,5 & 7



SECTION B-B



DETAIL "C"

PB614608

REVISED SHEAR KEY LOCATIONS AT PIERS & DOWEL SPACING AT UTILITY OPENINGS.

REVISIONS	CHECKED	DRAWN
△		

SIKAND ENGINEERING ASSOC.
CONSULTING ENGINEERS
15230 BURBANK BLVD. VAN NUYS, CALIF.
(818) 787-8550 91411

DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

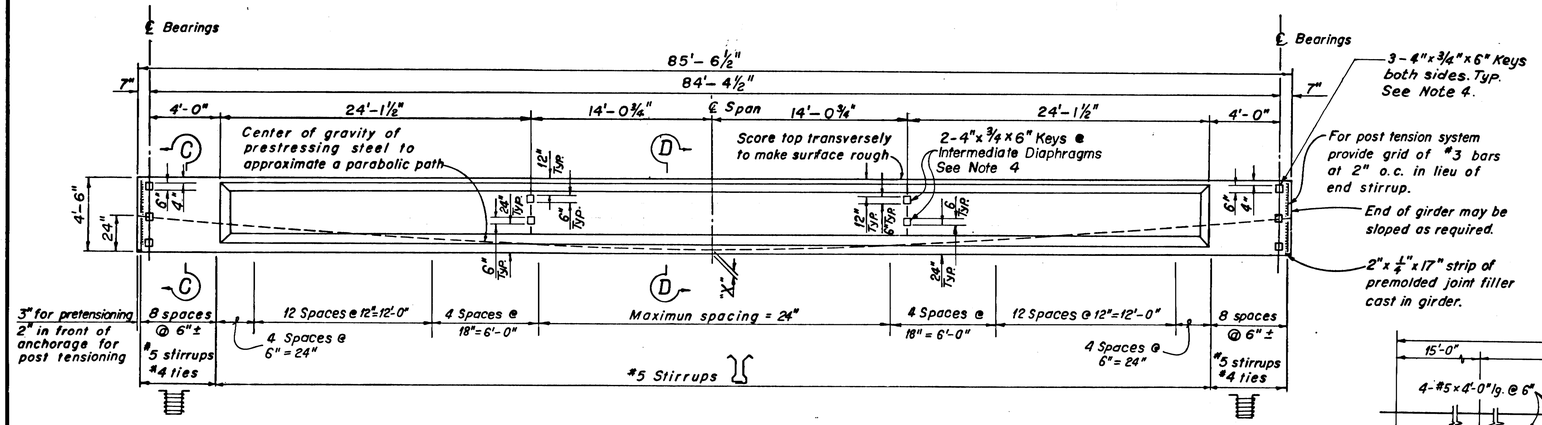
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42690 Exp. 3-31-00 Civil STATE OF CALIFORNIA

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK
PIERS

REVIEWED
Steve M. Hennessey 11/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 5 OF: 15
DWG. NO.: 614608



GIRDER ELEVATION FOR PIER 4 TO ABUT. 8

No Scale

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

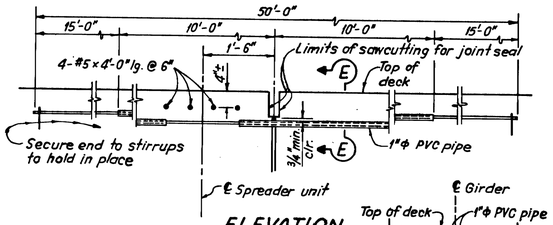
No Changes

NOTE:

1. Girder length shown is for finished girder. Allowance shall be made for elastic shortening.
2. For dowels cast in girder, see Sht.
3. Extend #4 & #6 longitudinal reinforcing 8" post end of girder at Pier
4. Omit keys on exterior face of girder
5. Ends of girder shall be marked for span location.
6. Contractor shall submit shop drawings indicating location and size of holes for dowel through girders.

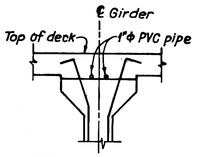
CLEARANCES FOR POST TENSIONED UNITS

1. Units may be bundled vertically in groups of 3 max.
2. Horizontal clearance between units equal to 2 1/2" min.
3. Vertical clearance between bundled units equal to 3" min.
4. Any deviation shall be approved by the Engineer.



ELEVATION

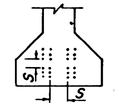
No Scale



SECTION E-E

No Scale

CLEARANCES FOR PRETENSIONED STRANDS



1. Strands may be bundled in groups consisting of 3 vertically and 2 horizontally, and separated at the ends.
2. The minimum distance "S" between groups or individual strands is 1½" for ⅜" strands, 1¾" for ½" strands and 2" for ½" strands.
3. "S" is measured between centers of adjacent strands.
4. Any deviation shall be approved by the Engineer.

GIRDER PRESTRESSING NOTES FOR PIER 4 TO ABUT. 8

"X"	DESIGN STRESSES	Post tension	Pretension
4" 8"	P = Working force, lbs	615,000 700,000	675,000 765,000
	Concrete strength, psi	f'c = 5,000 f'ci = 4,900	f'c = 5,000 f'ci = 4,900

CONCRETE STRENGTH:

f'ci is at time of initial stressing. (Force transfer to conc.) f'c is at 28 days.

WORKING FORCE:

The force remaining per girder after all losses.

CABLE PATH:

Where impractical to obtain cable path shown with a proposed prestressing system, it may vary within limits from 4" to 8" at ℄ girder and from 22" to 26" at the end of the girder subject to the approval of the Engineer. See Specs.

LOSSES:

The stress loss in prestressing steel due to shrinkage, creep, and sequence stressing shall be assumed to be;

pretension steel: 42,000 psi.
post tension steel: 32,000 psi.

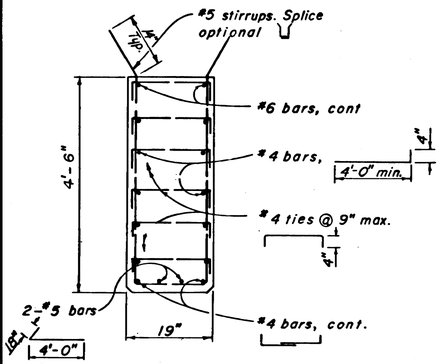
Provision shall be made for any other losses peculiar to the system of prestressing used.

GIRDER DEFLECTIONS: (PRE-TENSION) FOR "X"=4"

Time	Condition		Deflection
Initial	Prestress + D.L.Girder		- 1 3/8"
	Prestress + D.L.Girder		- 2 1/4"
3 months	D.L. Slab	½ pt.	+ 1 5/8"
		¼ pt.	+ 1 1/8"
	Prestress + D.L. Girder + D.L. Slab		- 5/8"
Final	Prestress + D.L. Girder + D.L. Slab		- 3/4"

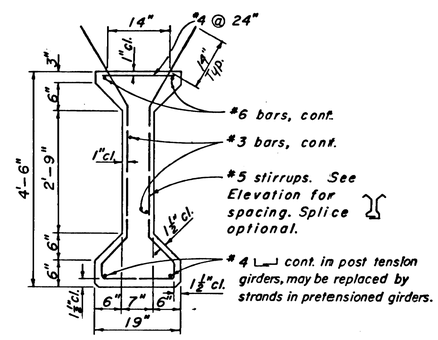
A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

* Includes other dead loads.



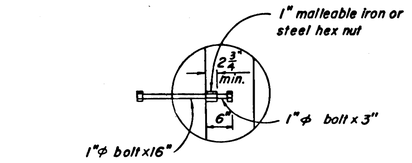
SECTION C-C

No Scale



SECTION D-D

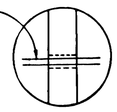
No Scale



ALTERNATE INSERT ASSEMBLY

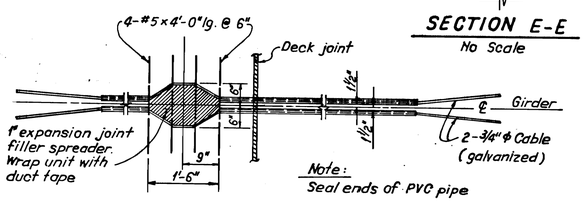
No Scale

"6 dowel 6'-0" long. Place through 1" holes formed in girder. Holes need not be grouted



ALTERNATE DOWEL ASSEMBLY

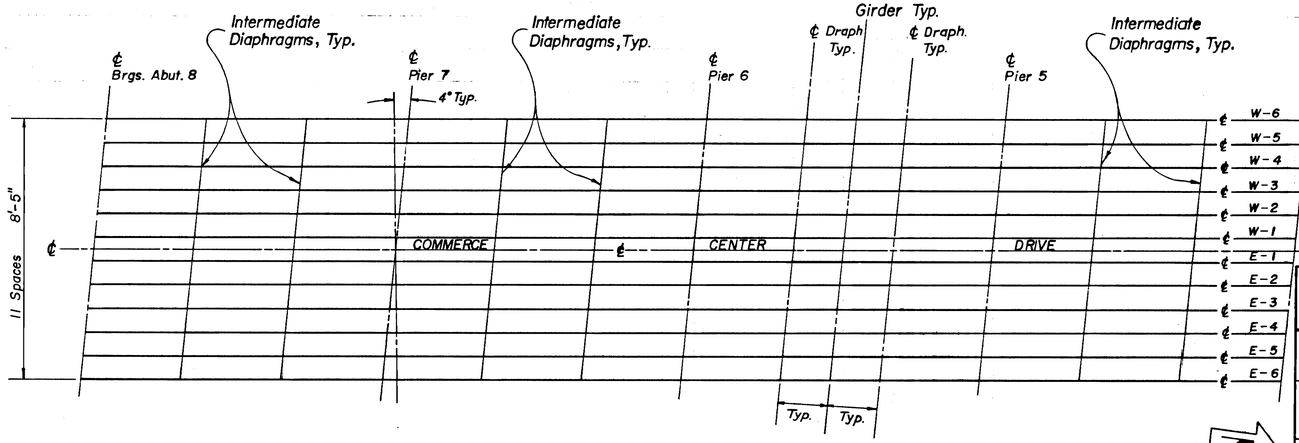
No Scale



Note: Seal ends of PVC pipe

RESTRAINER UNIT DETAIL

No Scale



TYPICAL GIRDER FRAMING PLAN

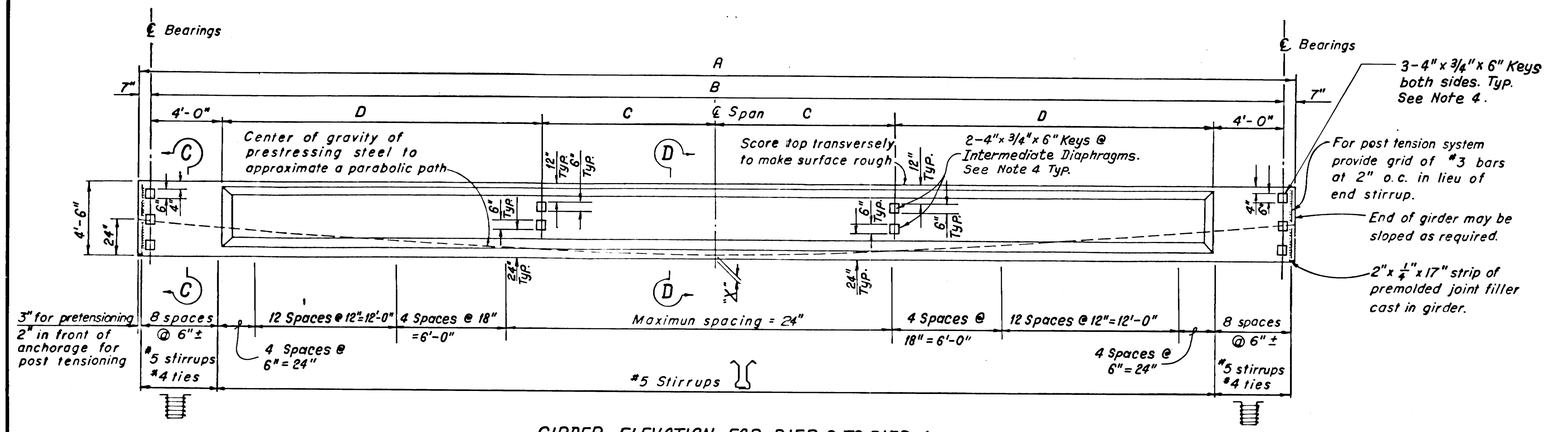
No Scale

PB614607

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	PRESTRESSED GIRDER DETAILS NO. 1
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hamasaki 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO. 3794 JOB NO. SHT. 6 OF 15 DWG. NO. 614607

K-E ALBANENE® LA 4358



GIRDER ELEVATION FOR PIER 3 TO PIER 4

No Scale

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

PRESTRESSING FORCES FOR SPAN 3-4

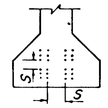
GIRDERS E-2, E-3, E-4, E-5 & E-6			
"X"	DESIGN STRESSES	POST TENSION	PRETENSION
4"	P = WORKING FORCE, lbs	670,000	750,000
8"		765,000	850,00
	CONCRETE STRENGTH, psi	f'c = 5,500	f'c = 5,500
		f'ci = 5,100	f'ci = 4,900

GIRDERS E-1, W-1, W-2, W-3, W-4, W-5 & W-6			
"X"	DESIGN STRESSES	POST TENSION	PRETENSION
4"	P = WORKING FORCE, lbs.	615,000	675,000
8"		700,000	765,000
	CONCRETE STRENGTH, psi	f'c = 5,000	f'c = 5,000
		f'ci = 4,900	f'ci = 4,900

GIRDER DIMENSIONS FOR SPAN 3-4

LOC.	A	B	C	D
W-6	79'-10½"	78'-8½"	13'-1¼"	22'-2¾"
W-5	80'-10⅞"	79'-8⅞"	13'-3½"	22'-7"
W-4	81'-11⅛"	80'-9¼"	13'-5½"	22'-11⅞"
W-3	82'-11½"	81'-9½"	13'-7⅝"	23'-3⅛"
W-2	83'-11⅞"	82'-9⅞"	13'-9⅝"	23'-7⅛"
W-1	85'-0¼"	83'-10¼"	13'-11¾"	23'-11⅜"
E-1	86'-0½"	84'-10½"	14'-1¾"	24'-3½"
E-2	87'-0⅞"	85'-10⅞"	14'-3⅞"	24'-7⅝"
E-3	88'-1¼"	86'-11¼"	14'-5⅞"	24'-11¾"
E-4	89'-1⅝"	87'-11⅝"	14'-7⅞"	25'-3⅞"
E-5	90'-2"	89'-0"	14'-10"	25'-8"
E-6	91'-2¼"	90'-0¼"	15'-0"	26'-0⅛"

CLEARANCES FOR PRETENSIONED STRANDS



1. Strands may be bundled in groups consisting of 3 vertically and 2 horizontally, and separated at the ends.
2. The minimum distance "S" between groups or individual strands is 1½" for ⅜" strands, 1¾" for ½" strands and 2" for ⅝" strands.
3. "S" is measured between centers of adjacent strands.
4. Any deviation shall be approved by the Engineer.

PRESTRESSING NOTES FOR SPAN 3-4

"X"	DESIGN STRESSES	Post tension	Pretension
	P = Working force, lbs		
	Concrete strength, psi	f'c = / f'ci =	f'c = / f'ci =

CONCRETE STRENGTH :

f'_{ci} is at time of initial stressing. (Force transfer to conc)
f'_c is at 28 days.

WORKING FORCE :

The force remaining per girder after all losses.

CABLE PATH :

Where impractical to obtain cable path shown with a proposed prestressing system, it may vary within limits from 4" to 8" at ℄ girder and from 22" to 26" at the end of the girder subject to the approval of the Engineer. See Specs.

LOSSES :

The stress loss in prestressing steel due to shrinkage, creep, and sequence stressing shall be assumed to be;

pretension steel: 42,000 psi.
post tension steel: 32,000 psi.

Provision shall be made for any other losses peculiar to the system of prestressing used.

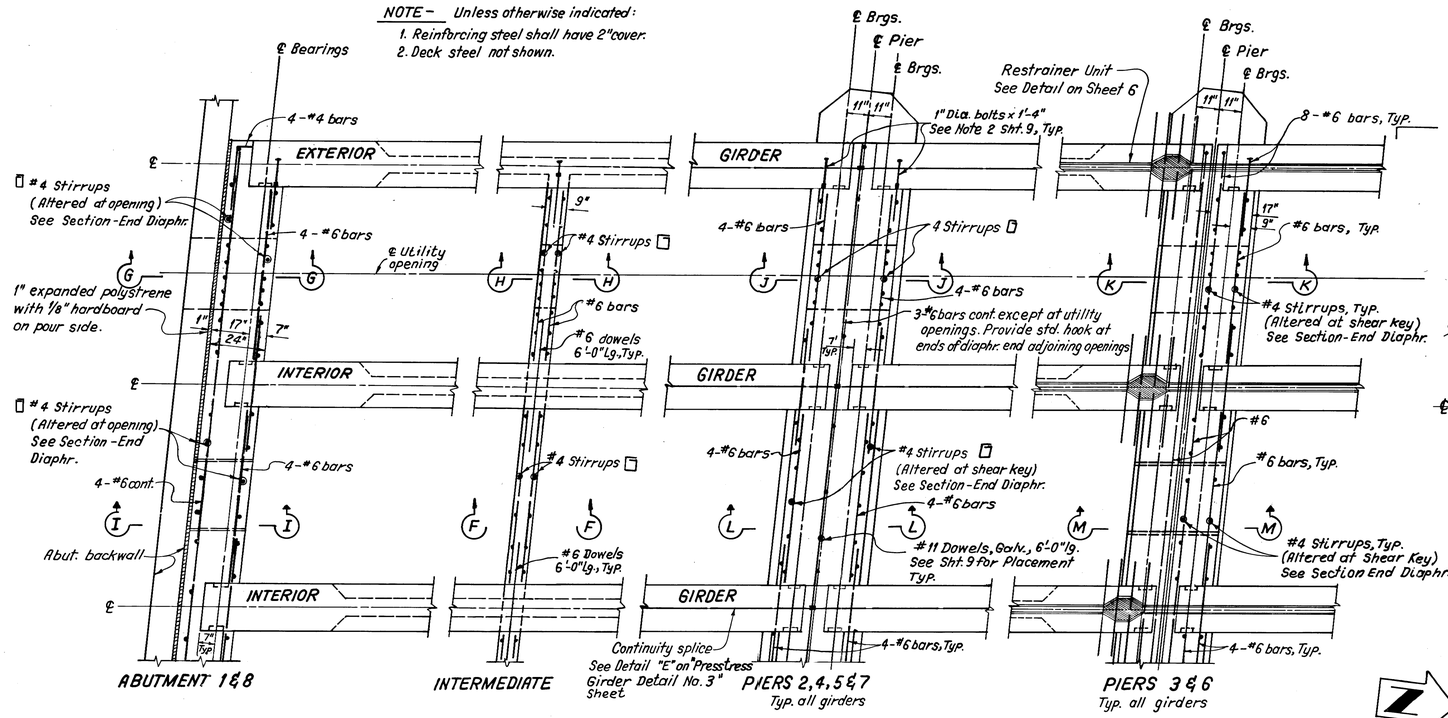
GIRDER DEFLECTIONS: (PRE-TENSION) FOR "X" = 4"

Time	Condition		Deflection
Initial	Prestress † D.L. Girder		- 1¾
3 months	Prestress † D.L. Girder		- 2¼
	D.L. Slab	½ pt.	+ 1½
		¼ pt.	+ 1⅛
	Prestress † D.L. Girder † D.L. Slab		- ¾
Final	Prestress † D.L. Girder † ⅔ D.L. Slab		- ⅞

A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

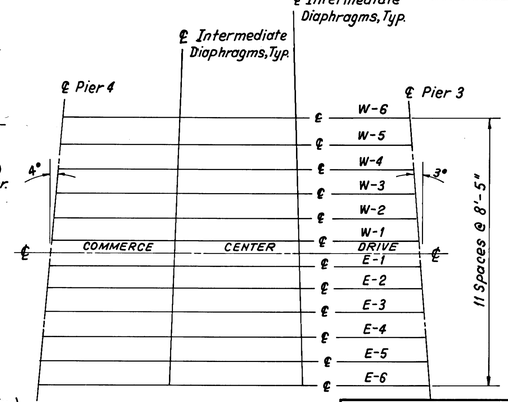
* Includes other dead loads.

NOTE - Unless otherwise indicated:
1. Reinforcing steel shall have 2" cover.
2. Deck steel not shown.



DIAPHRAGM PLAN

Scale: 3/8" = 1'-0"



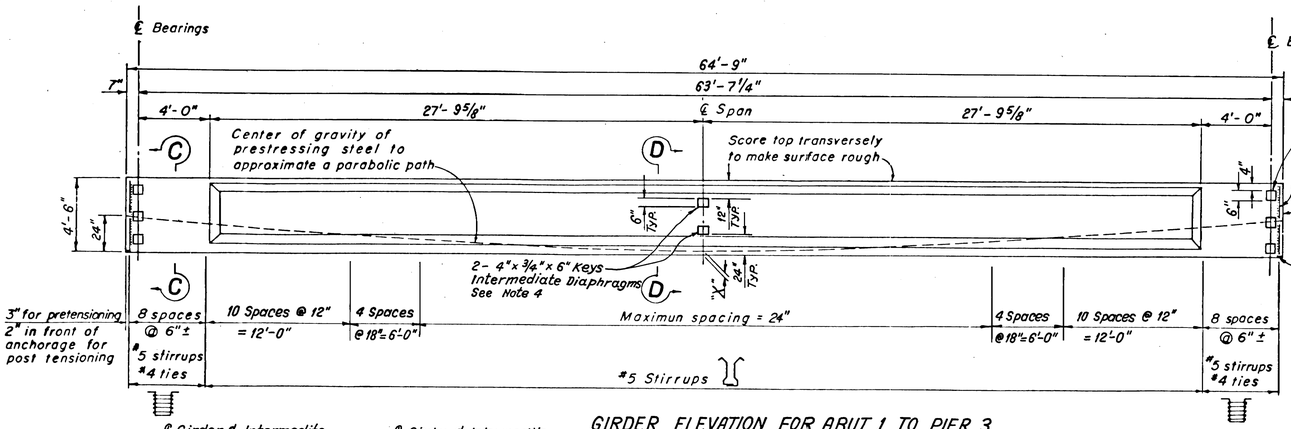
TYPICAL GIRDER FRAMING PLAN FOR SPAN 3-4

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42860 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	PRESTRESSED GIRDER DETAILS NO. 2
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO. 3794 JOB NO.
	SHT. 7 OF 15 DWG. NO. 614606

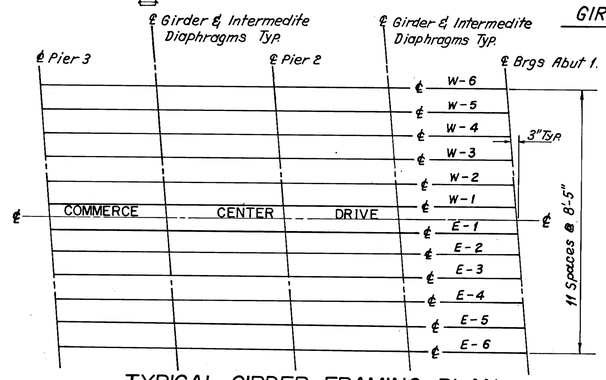
REVISIONS | CHECKED | DRAWN

K-E ALBUQUERQUE LA 4358



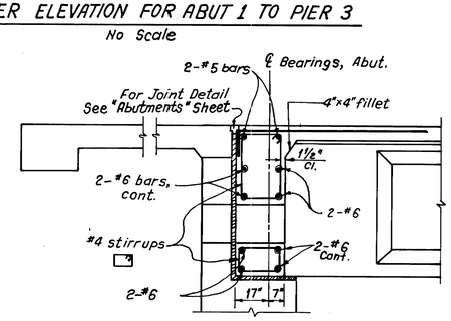
GIRDER ELEVATION FOR ABUT 1 TO PIER 3

No Scale



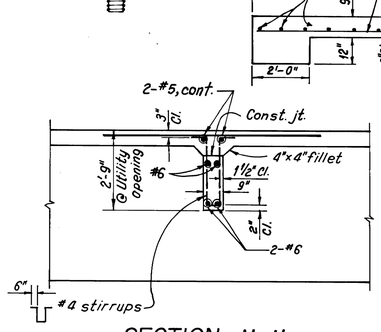
TYPICAL GIRDER FRAMING PLAN

No Scale



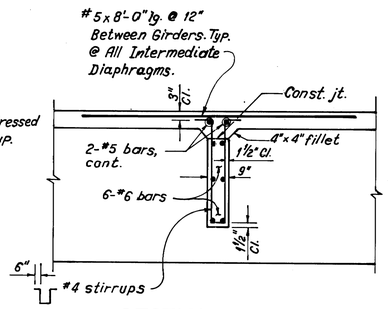
SECTION G-G

Scale: 3/8"=1'-0"



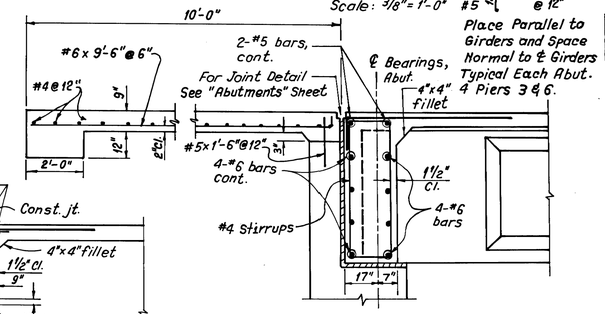
SECTION H-H

Scale: 3/8"=1'-0"



SECTION F-F

Scale: 3/8"=1'-0"



SECTION I-I

Scale: 3/8"=1'-0"

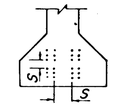
AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

CLEARANCES FOR PRETENSIONED STRANDS



1. Strands may be bundled in groups consisting of 3 vertically and 2 horizontally, and separated at the ends.
2. The minimum distance "S" between groups or individual strands is 1½" for ⅜" strands, 1¾" for 7/16" strands and 2" for ½" strands.
3. "S" is measured between centers of adjacent strands.
4. Any deviation shall be approved by the Engineer.

GIRDER PRESTRESSING NOTES FOR ABUT 1 TO PIER 3

"X"	DESIGN STRESSES	Post tension	Pretension
4"	P = Working force, lbs	370,000	390,000
8"		420,000	445,000
	Concrete strength, psi	f'c = 5,000	f'c = 5,000
		f'ci = 4,000	f'ci = 4,000

CONCRETE STRENGTH:

f'ci is at time of initial stressing. (force transfer to conc)
f'c is at 28 days.

WORKING FORCE:

The force remaining per girder after all losses.

CABLE PATH:

Where impractical to obtain cable path shown with a proposed prestressing system, it may vary within limits from 4" to 8" at ℄ girder and from 22" to 26" at the end of the girder subject to the approval of the Engineer. See Specs.

LOSSES:

The stress loss in prestressing steel due to shrinkage, creep, and sequence stressing shall be assumed to be;

pretension steel: 42,000 psi.
post tension steel: 32,000 psi.

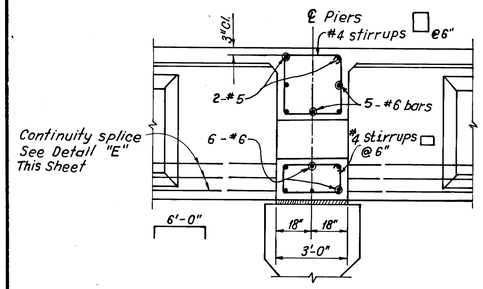
Provision shall be made for any other losses peculiar to the system of prestressing used.

GIRDER DEFLECTIONS: (PRE-TENSION) FOR "X"=4"

Time	Condition		Deflection
Initial	Prestress + D.L.Girder		- 5/8"
3 months	Prestress + D.L.Girder		- 3/4"
	D.L.Slab	½ pt.	+ ½"
		¼ pt.	+ 3/8"
	Prestress + D.L.Girder + D.L.Slab		- 5/8"
Final	Prestress + D.L.Girder + *D.L.Slab		-1/4"

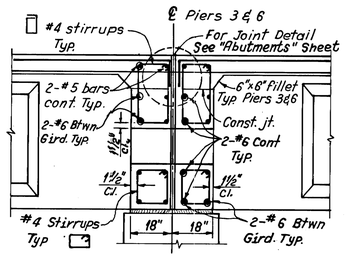
A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

* Includes other dead loads.



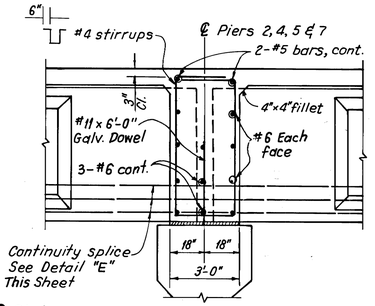
SECTION J-J

Scale: 3/8"=1'-0"



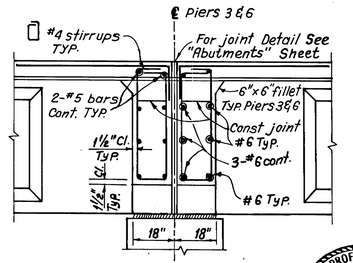
SECTION K-K

Scale: 3/8"=1'-0"



SECTION L-L

Scale: 3/8"=1'-0"



SECTION M-M

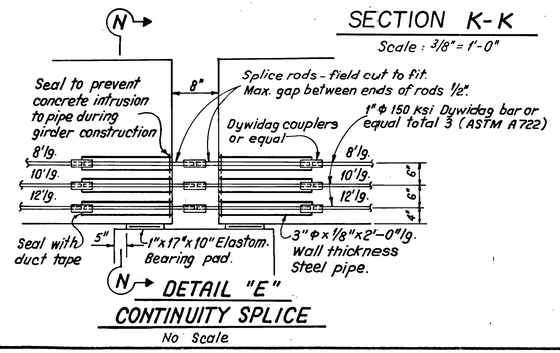
Scale: 3/8"=1'-0"

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 18280 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

NOTE: Contractor may propose alternative continuity splice assembly, subject to approval by the Engineer.

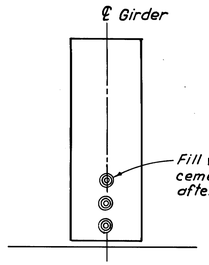
Pipes and rods to be securely wedged and braced in place to prevent displacement during girder concrete pour.

All threads to be oriented correctly.



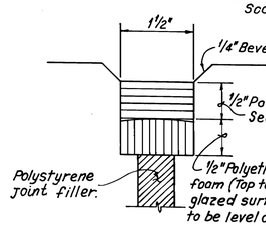
DETAIL "E" CONTINUITY SPLICE

No Scale



SECTION N-N

No Scale



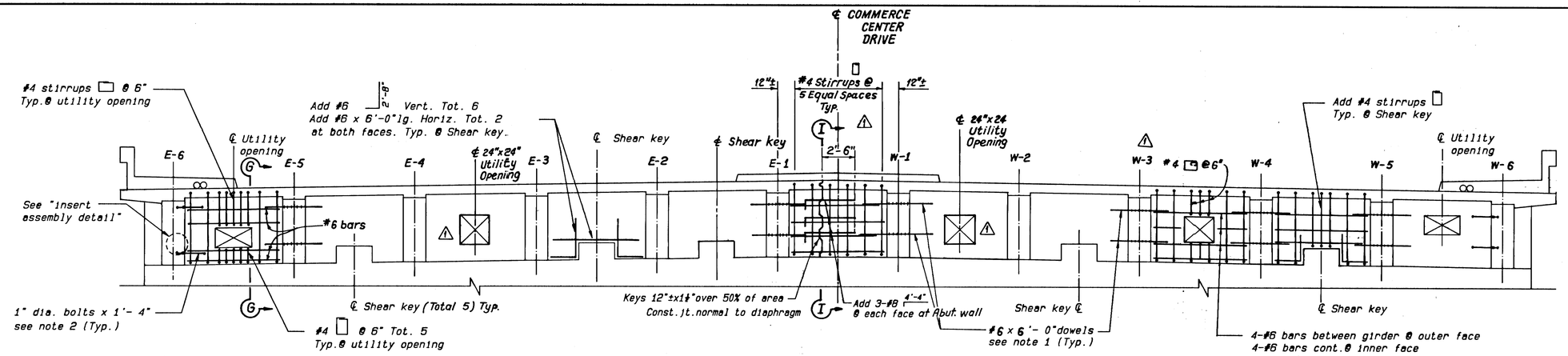
TYPE A SEAL

Full Scale

"PB614605"

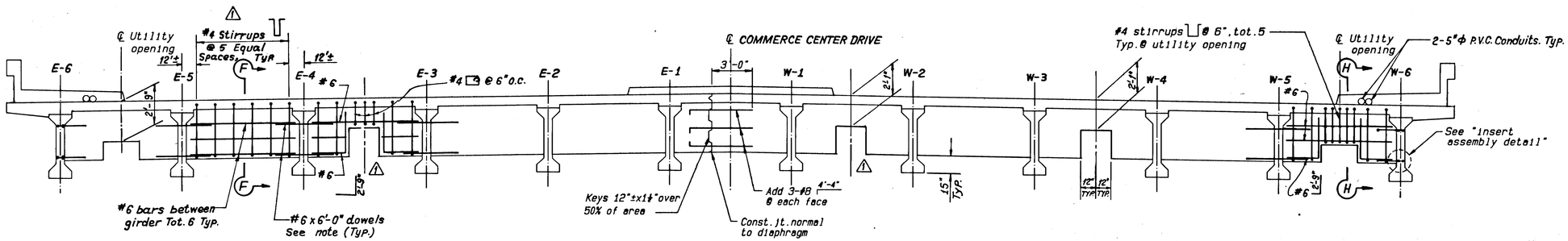
SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 9141	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	PRESTRESSED GIRDER DETAILS NO. 3
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED: Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO. 3794 JOB NO. SHT. 8 OF 15 DWG. NO. 614605

K-E



NORMAL SECTION - END DIAPHRAGM AT ABUT. 1 & 8

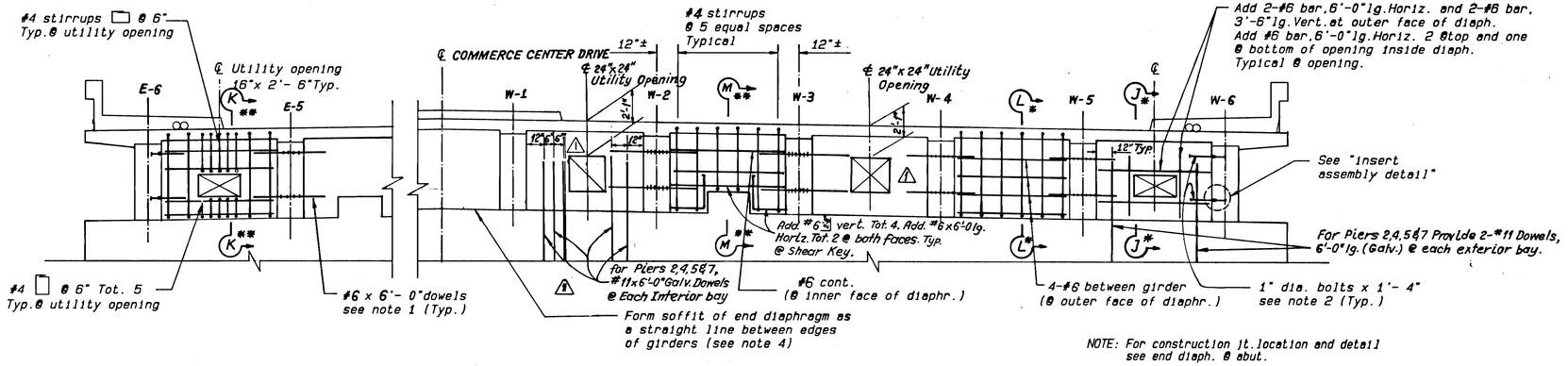
Scale : 1/4" = 1'- 0"



NORMAL SECTION - INTERMEDIATE DIAPHRAGM

Scale : 1/4" = 1'-0"

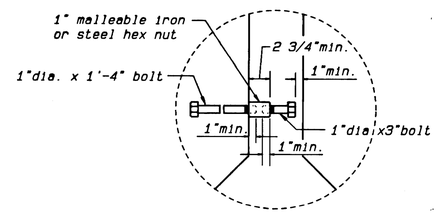
Note: For Joint Seal on Sidewalk at Abut. 1, Pier 3, Pier 6 and Abut. 8, See Caltrans Std. Plan B6-21.



NOTE: For construction jt. location and detail see end diaph. @ abut.

NORMAL SECTION - END DIAPHRAGM AT PIER

Scale : 1/4"= 1'-0"



INSERT ASSEMBLY DETAIL

No Scale

* @ Piers 2,4,5 & 7

** @ Piers 3 & 6

NOTES :

1. #6 x 6'-0" dowels placed through 1 1/2" dia. hole formed in girder, when diaphragms are continuous. Hole need not be grouted.
2. 1"dia. bolts x 1'-4" with insert assemblies when diaphragms are discontinuous. Bolts required for exterior girder.
3. Intermediate and end diaphragms are to be placed 5 days before placing deck.
4. This note certifies forming so as to prevent spalling problems of thin unreinforced concrete under girders.

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

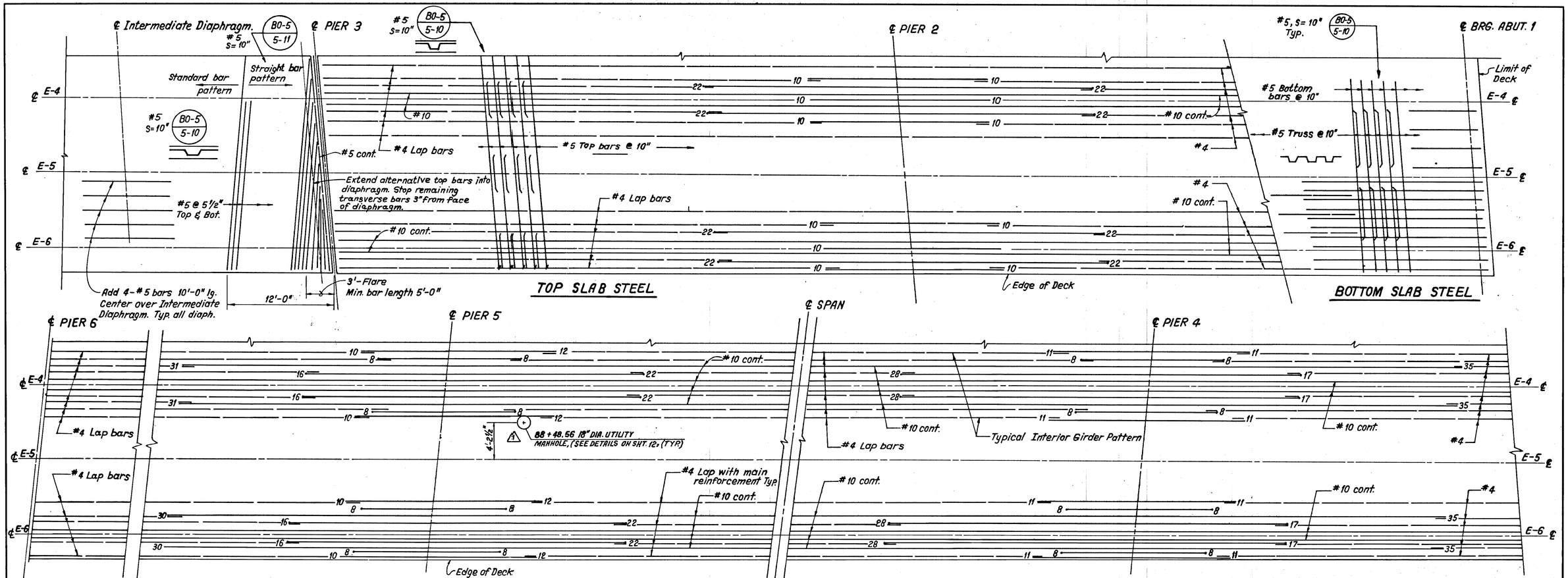
Resident Engineer: Zaven Abrahamian

No Changes

REGISTERED PROFESSIONAL ENGINEER — JORA SARKISSIAN — No. 52890 Exp. 3-31-98 — CIVIL — STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411 (818)787-8558	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	GIRDER DIAPHRAGMS
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 53794 PROJECT NO.: SHT.: 9 OF: 15 DWG. NO.: 614604

DRAWN	CHECKED	REVISIONS	⚠ ADDED UTILITY OPENING MODIFIED DOWEL SPACING OF UTILITY OPENING.



AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

NOTE - Unless otherwise indicated:

1. Grade 60 reinforcing steel shall be spliced as follows:
   a. Only one-half of the bars may be spliced within the required lap length.
   b. Minimum lap splices for No. 6 and smaller bars shall be 32 d No. 7, 8 and bars shall be 45 d and No. 10 and 11 bars shall be 60 d.
   c. Splice lengths shall be determined by the diameter, d of the smaller bar joined.
2. Type "A", "B" and "C" bar splices shall be staggered and identical splices of the same type bar shall be spaced at least 3'-0" apart.
3. Reinforcing steel shall have 2" cover.
4. Deck truss bends shall be 45°.
5. Premolded joint filler shall be fastened with 8d galvanized nails at 12" o.c. staggered.
6. For additional notes and details, see sheet No. 9.
7. All bars # 10. Unless otherwise noted.

Note: Splices for # 10 cont. bars shall be located 25' min. from ℄ piers.

Note: Numbers at ends of # 10 bars indicate distance from ℄ pier.

DECK PLAN

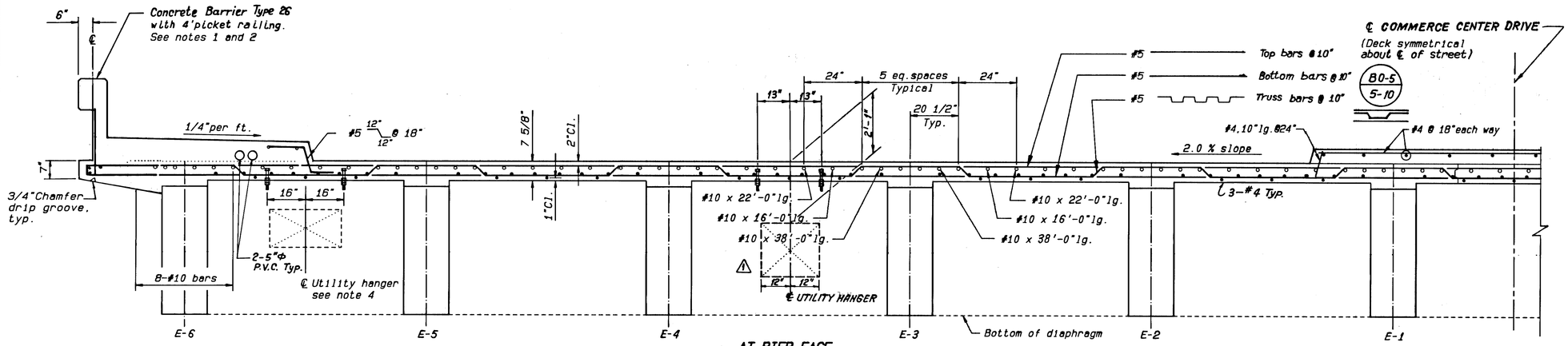
Scale: 3/16" = 1'-0"

SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	DECK DETAIL SHEET 1
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M Hennegar 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 3794 PROJECT NO.:
	SHT.: 10 OF: 15 DWG. NO.: 614603

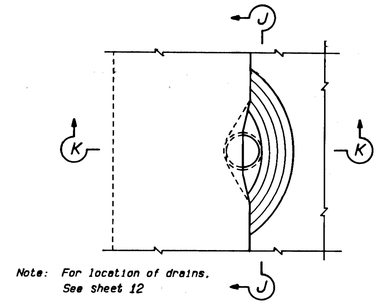
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614603"

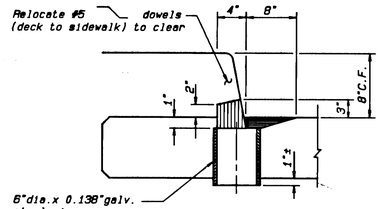
ADDED UTILITY MANHOLE LOCATION. | REVISIONS | CHECKED | DRAWN



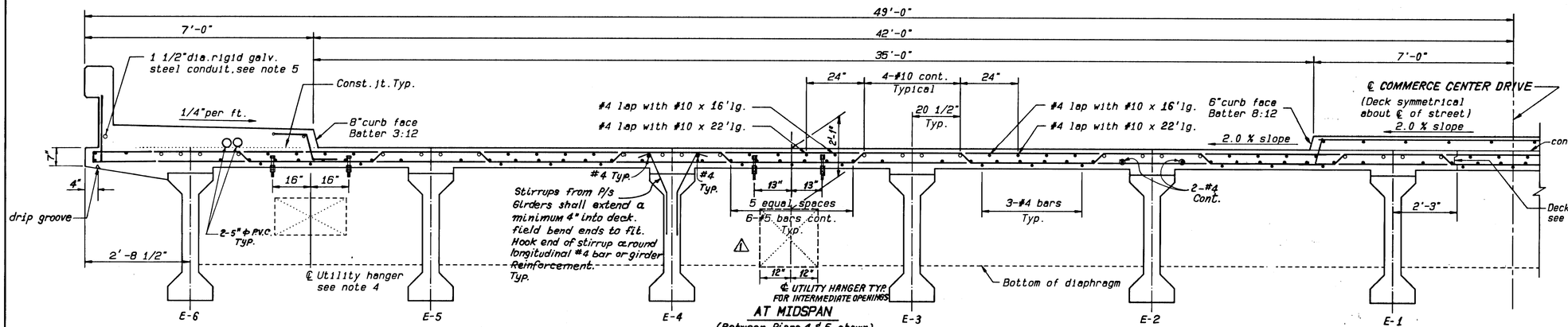
AT PIER FACE
(Pier 5 shown)



DECK DRAIN DETAIL
No Scale

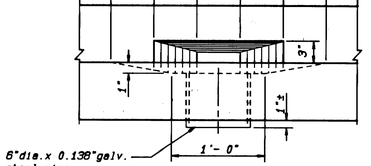


SECTION K-K
No Scale

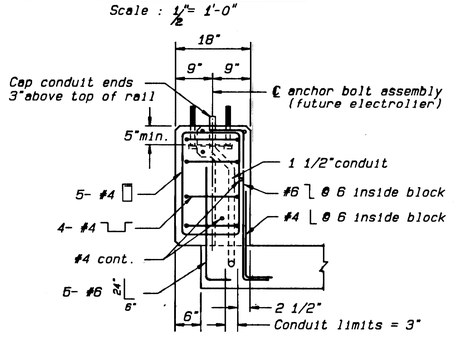


AT MIDSPAN
(Between Piers 4 & 5 shown)

TYPICAL CROSS SECTION
Scale : 1/2"= 1'-0"

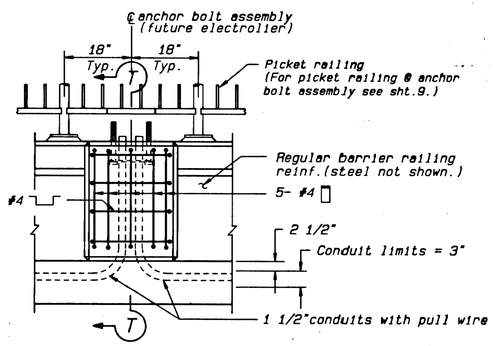


SECTION J-J
No Scale

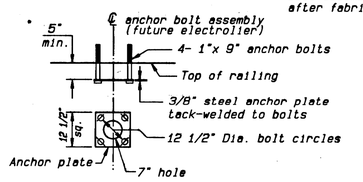


SECTION T-T

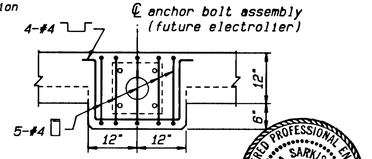
NOTE: Galvanize anchor bolt assembly after fabrication



ELEVATION



BASE DETAILS



PLAN

ANCHOR BOLT ASSEMBLY DETAILS
No Scale

NOTE – Unless otherwise indicated:

1. For Concrete Barrier Type 26, See Caltrans Std. Plan B11-54
2. For 4' picket railing, see L.A.C.D.P.W. Std. Plan 6102-0.
3. Where standard barrier railing expansion joints interfere with picket railing post spacing, joints may be relocated 9"from ℄ post.
4. Utility hangers shall consist of 1"dia.x 9"lg.bolts in pairs @ 10'±. Embed 5"in concrete. Bolt 1"-8UNC-2, thread 6". Furnish 2 nuts per bolt. All parts to be galvanized. See specs.
5. Provide 1 1/2"dia.rigid galvanized steel conduit with pull wire as shown on this plan. Provide expansion fittings at sidewalk joints and abutment per A.P.W.A. Std. Plan 465-0 in Specs.
6. For #5 pull box, see A.P.W.A. Std. Plan 460-0
7. For deck constr.jt, see CALTRANS std.plan B 0-5, bridge detail 5-2.

AS BUILT
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

DRAWN	CHECKED	REVISIONS	⚠ ADDED UTILITY HANGER AND OPENING LOCATIONS.

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
16236 BURBANK BLVD., VAN NUYS, CALIFORNIA 91413
(818)787-8550

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

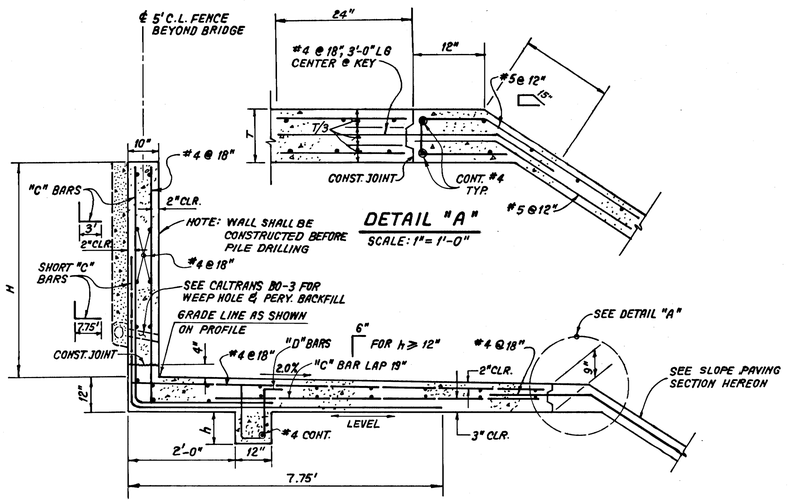
COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK
DECK DETAIL SHEET 2

REVIEWED
Steve M. Hennessey 11/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 11 OF: 15
DWG. NO.: 614602

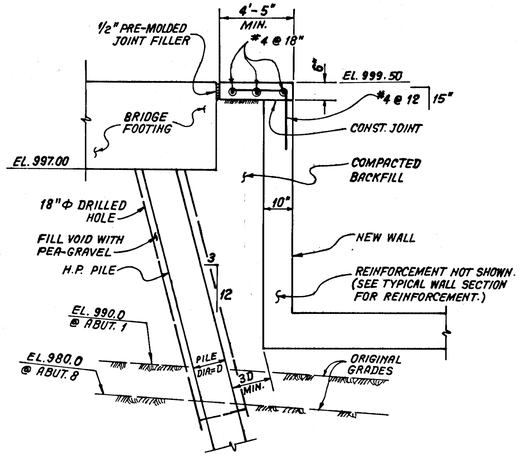
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 32890 Exp. 2-31-00 CIVIL STATE OF CALIFORNIA

PB614602



DETAIL "A"
SCALE: 1" = 1'-0"

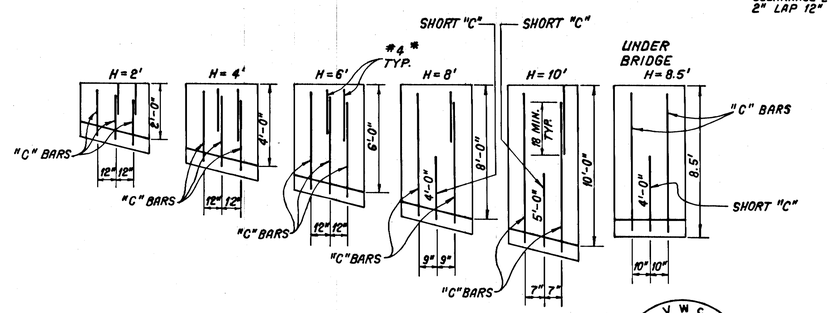
TYPICAL WALL SECTION
SCALE: 1/2" = 1'-0"



CAP CLOSURE UNDER BRIDGE
SCALE: 1/2" = 1'-0"

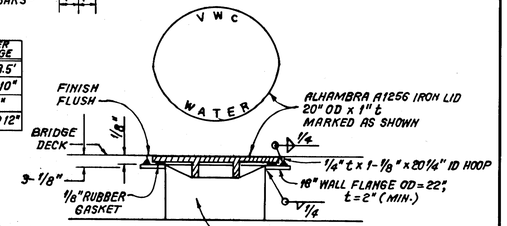
FIGURES AT TOP OF "C" BARS INDICATES DISTANCE FROM TOP OF FOOTING TO UPPER END OF "C" BARS

* * #4 EXTENSION BARS. PROVIDE WHENEVER CLEARANCE EXCEEDS 2" LAP 12"



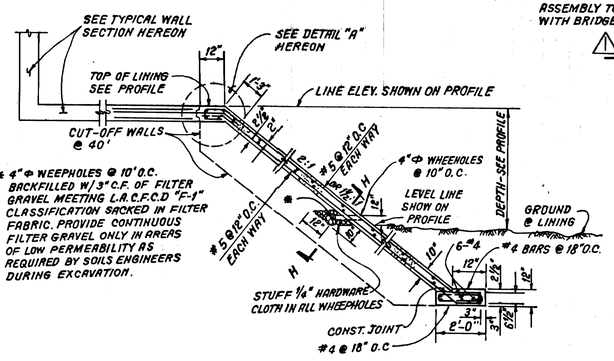
WALL REINFORCING BEYOND BRIDGE					
DESIGN H	2'	4'	6'	8'	10'
"C" BARS	#4 @ 12"	#4 @ 12"	#4 @ 12"	#5 @ 9"	#6 @ 7"
KEY DEPTH	-0-	6"	12"	18"	27"
"D" BARS	—	—	#4 @ 18"	#4 @ 12"	#5 @ 12"

UNDER BRIDGE
H=8.5'
#6 @ 10"
27"
#5 @ 12"



NOTE: SLEEVE AND FLANGE INSERT ASSEMBLY TO BE CAST INTEGRALLY WITH BRIDGE DECK.

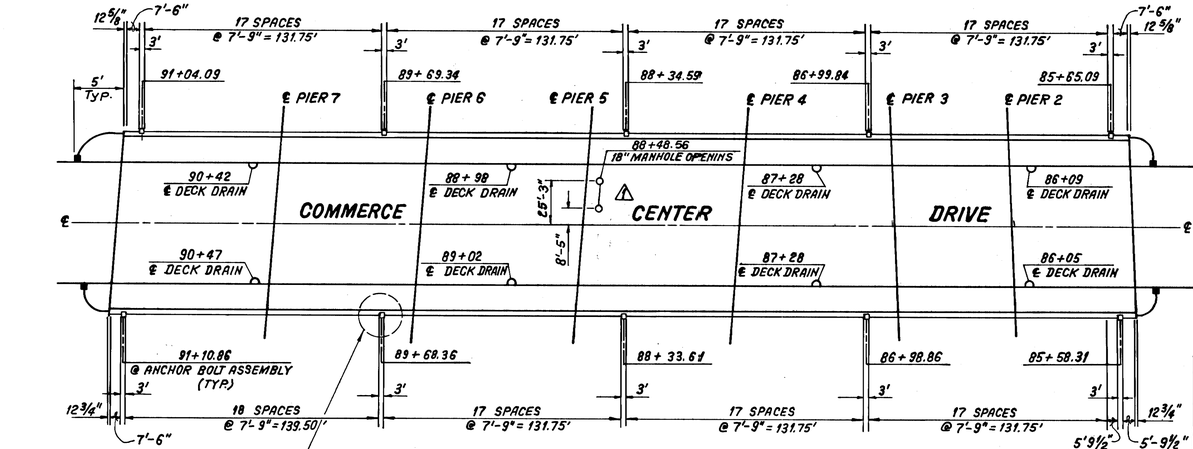
⚠ MANWAY DETAIL
NOT TO SCALE



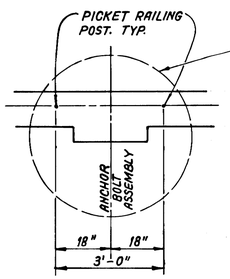
* 4"Φ WEEPHOLES @ 10' O.C. BACKFILLED W/ 3/4" C.F. OF FILTER GRAVEL MEETING L.A.C.F.C.D "F-1" CLASSIFICATION SACKED IN FILTER FABRIC. PROVIDE CONTINUOUS FILTER GRAVEL ONLY IN AREAS OF LOW PERMEABILITY AS REQUIRED BY SOILS ENGINEERS DURING EXCAVATION.

SECTION H-H EXPANSION JOINT
CUT-OFF WALL

NOTE: EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



DECK DRAIN LOCATIONS AND PICKET RAILING POST SPACING
SCALE: 1" = 40'

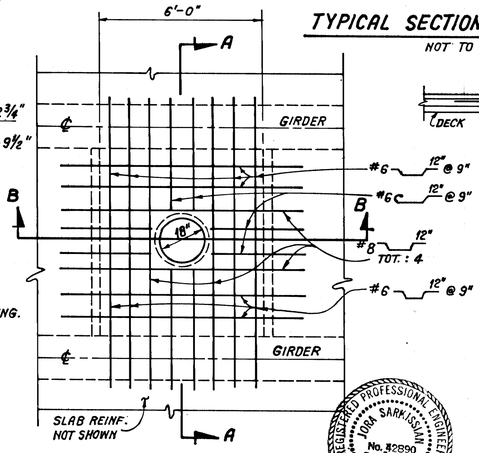


NOTE:

JOINTS SHALL BE PROVIDED IN THE BARRIER RAILINGS AT ABUT. 1, PIER 3, PIER 6 AND ABUT. 8 FOR EXPANSION AND CONTRACTION.
1/2" VERTICAL JOINTS SHALL BE PROVIDED IN THE BARRIER RAILINGS AT PIERS 2,4,5 AND 7.

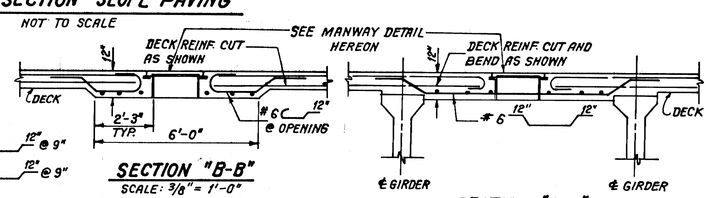
WALL CONSTRUCTION SEQUENCE

1. REMOVE 5' OF EXISTING SOIL.
2. CONSTRUCT AND COMPACT EMBANKMENT TO BOTTOM OF WALL FOOTING.
3. CONSTRUCT WALL.
4. CONSTRUCT AND COMPACT EMBANKMENT TO 6" ABOVE BOTTOM OF ABUTMENT FOOTING.
5. EXCAVATE TO BOTTOM OF ABUTMENT FOOTING 1 WEEK AFTER COMPLETION OF COMPACTED FILL PLACEMENT.
6. PRE-DRILL FOR PILES TO ORIGINAL GROUND LEVELS AND DRIVE PILES.
7. FILL VOID WITH PEA-GRAVEL AND CONSTRUCT ABUTMENT FOOTING.
8. CONTRACTOR MAY SUBMIT ALTERNATE CONSTRUCTION SEQUENCE FOR APPROVAL BY ENGINEER.



⚠ PLAN
SCALE: 3/8" = 1'-0"

TYPICAL SECTION - SLOPE PAVING
NOT TO SCALE



SECTION "B-B"
SCALE: 3/8" = 1'-0"

SECTION "A-A"
SCALE: 3/8" = 1'-0"

⚠ DECK REINFORCEMENT AT UTILITY OPENING
SCALE: 3/8" = 1'-0"

AS BUILT
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42690 Exp. 2-31-02 CIVIL STATE OF CALIFORNIA

⚠ REVISIONS	CHECKED	DRAWN
ADDED DECK REINFORCEMENT FOR UTILITY OPENING AND ADDED LOCATION OF MANHOLES.		

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 MINNEHAHA BLVD., VAN NUYS, CALIFORNIA 91411 (818)787-6550	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN DRAWN BY: ALBERT GEVORKIAN PROJECT ENGINEER: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK MISCELLANEOUS DETAILS REVIEWED Steve M. Hennessee 11/24/17 STRUCTURAL SECTION DATE BRIDGE NO.: 3794 PROJECT NO.: SHT.: 12 OF: 15 DWG. NO.: 614601

"P86146011"

LOG OF BORING 89-025-F6 — BORING NO. WB-F1

SAMPLE DEPTH | BLOWS | PENE. FOOT | MOISTURE | COMPRESSION* | DRY DENSITY | WATER CONTENT** | DEPTH IN FEET | DESCRIPTION

SURFACE CONDITION: Northern side of Castaic Creek.

ELEVATION: 979

DEPTH IN FEET		DESCRIPTION
0	SP	SAND: Light brownish gray, slightly silty, gravelly, fine to very coarse
	SP/GP	SAND/GRAVEL: Change to tan, very gravelly, (mostly less than 1/2 inch) no silt
5		
10		
15		Gravel increase in size to mostly 1/2 to 1 inch, no cobbles
20		
25		
30		Average size of gravel 1/4 to 2 inches, sand alternating fine to medium with fine to very coarse in 6 to 48 inch layers
35		
40		3 inch silt layer

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
15	30/10"	13			124	
20	54+					
30	50+					

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
40	71+					
60	73+					
80	60+					

LOG OF BORING 89-025-F6 — BORING NO. WB-F1 (Cont'd)

DEPTH IN FEET		DESCRIPTION
40		Some cobbles 40 to 42 feet
45	SP	Decrease in gravel content
50	ML / SP/GP	SILT: Gray-brown SAND: Tan, very gravelly, fine to very coarse, occurs as 6 to 48 inch alternating layers of fine to medium at the top of each layer and grading down into very gravelly, medium to very coarse
55		
60		
65		
70		
75		
80		End of boring at 80 feet Water at 12 feet - no caving

LOG OF BORING 89-025-F6 — BORING NO. WB-F2

SAMPLE DEPTH | BLOWS | PENE. FOOT | MOISTURE | COMPRESSION* | DRY DENSITY | WATER CONTENT** | DEPTH IN FEET | DESCRIPTION

SURFACE CONDITION: Center of concrete batch plant access road

ELEVATION: 981

DEPTH IN FEET		DESCRIPTION
0	Af	FILL: 3/4 inch gravel cap with gravelly sand base
	SP	SAND: Light gray, gravelly, fine to very coarse, pebbles at 6 and 16 feet
5		
10		
15		
20	ML/CL	SILT/CLAY: Medium gray-brown, very clayey silt
25	SP	SAND: Light tan, gravelly, fine to coarse gravel, mostly less than 1 inch size
30	SP/GP	SAND/GRAVEL: Grades to very gravelly, fine to very coarse
35		
40	ML / SP/GP	SILT: Medium brown SAND: Tan, very gravelly, fine to very coarse

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
15	30	15			111	
20	38+					
30	48+					

LOG OF BORING 89-025-F6 — BORING NO. WB-F2 (Cont'd)

SAMPLE DEPTH | BLOWS | PENE. FOOT | MOISTURE | COMPRESSION* | DRY DENSITY | WATER CONTENT** | DEPTH IN FEET | DESCRIPTION

DEPTH IN FEET		DESCRIPTION
40		
45		
50		
55		
60	SP	SAND: Change to gravelly fine to medium, abundant mica
65		SAND: Tan, some fine gravel, abundant mica, fine to medium
70		Grades to gravelly
75	SP/GP	Grades to very gravelly, mostly less than 1/2 inch size
80	GP/SP	GRAVEL: Very sandy, mostly to 1/2 inch size and maximum of 1 inch Coarse gravel in sampler End of boring at 80 feet Water at 13 feet

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
40	73+					
60	71+					
80	130+					

* Percent
** Pounds per cubic foot
\+ SPT

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

REGISTERED PROFESSIONAL ENGINEER — JORA SARKISSIAN — No. 42890 Exp. 3-31-02 — CIVIL — STATE OF CALIFORNIA

REVISIONS | CHECKED | DRAWN

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

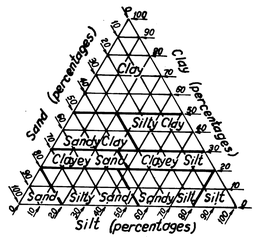


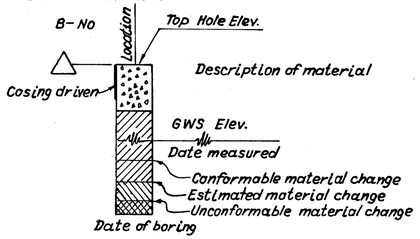
Diagram showing the basis for estimates of grade size distribution used in determination of class names.
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, via, "gravelly sand." The terms "coorse", "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

LEGEND OF EARTH MATERIALS

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

LEGEND OF BORING OPERATIONS

- Plan of any boring
- Rotary boring (wet)
- Auger boring (dry)
- Closed bottom bucker
- Test pit



SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
15239 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411
(818)787-8550

DESIGNED BY: JORA SARKISSIAN

DRAWN BY: ALBERT GEVORKIAN

PROJECT ENGINEER: JORA SARKISSIAN

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK

LOG OF TEST BORINGS SHT. 1

REVIEWED: Steve M. Hennessee 11/24/97
STRUCTURAL SECTION — DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 13 OF: 15
DWG. NO.: 614600

PB614600

LOG OF BORING 89-025-F6 — BORING NO. WB-F3

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
5		13		5.4		118	
15		23+					
25		100+					
35		63+					

DEPTH	IN FEET	DESCRIPTION
0		SURFACE CONDITION: Plowed field, proposed bridge abutment
		ELEVATION: 990
	SM	SAND: Light grayish brown, very silty, gravelly, fine to very coarse gap graded
	SP	Grades to no silt
5		
	SP/GP	Grades to very gravelly
10		
	SP	Change to less gravel
15		
20		
	SP/GP	Increase in 1/2 to 1 inch size gravel content
25		2 inches of 3/4 inch gravel recovered in sampler
30		
35	GP/SP	Increase in gravel content, size mostly less than 2 inches
40		Some caving at 38 to 40 feet depth

LOG OF BORING 89-025-F6 — BORING NO. WB-F3 (Cont'd)

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
		50	68+				
		65	106+				

DEPTH	IN FEET	DESCRIPTION
40		Some coarse gravel 40 to 46 feet
45		
	SP/GP	SAND/GRAVEL: Increase in fine to medium sand
50		Some coarse gravel
	GP/SP	GRAVEL/SAND: Increase in gravel, some cobbles
55		6 inch silt layer
60	SP	SAND: Change to gravelly, fine to coarse
65		End of boring at 65 feet Water at 21 feet - Caving at 38 to 40 feet
70		
75		
80		

LOG OF BORING 89-025-F6 — BORING NO. WB-F4

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
5		35		8		122	
15		59+					
25		39+					
35		51+					

DEPTH	IN FEET	DESCRIPTION
0		SURFACE CONDITION: Edge of plowed field, southern abutment of Backer Road Bridge over Castaic Creek
		ELEVATION: 986
	SM	SAND: Light brown to tan, silty, some gravel, fine to coarse gap graded
	SP	No silt, change to gravelly
5		
	SP/GP	SAND/GRAVEL: Change to very gravelly
10		
15		Sampler contained 2 inches of 1/2 to 3/4 inch size gravel, bit plugged by 2 inch gravel
20		
	SP	Change to less gravel
25		
30		Gravel confined to a few thin sandy gravel layers
35		
40		

LOG OF BORING 89-025-F6 — BORING NO. WB-F4 (Cont'd)

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
		45	82+				
		65	106+				

DEPTH	IN FEET	DESCRIPTION
40		
	SP/GP	SAND/GRAVEL: Grades to very gravelly
	SP	SAND: Change to gravel in thin layers separated by 1 to 4 foot layers of fine to coarse sand
45		
50		Change to some disseminated gravel
55		
	SP/GP	SAND/GRAVEL: Grading more gravel
60	SP	SAND: Less gravel
	SP/GP	SAND/GRAVEL: Change to very gravelly
	ML	SILT: Grayish-brown
	SP/GP	SAND: Tan, very gravelly, fine to very coarse
65		End of boring at 65 feet Water at 18 feet - no caving
70		
75		
80		

* Percent
** Pounds per cubic foot
\+ SPT

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

REVISIONS | CHECKED | DRAWN

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
16230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91406
(818)787-8550

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

DESIGNED BY: JORA SARKISSIAN

DRAWN BY: ALBERT GEVORKIAN

PROJECT ENGINEER: JORA SARKISSIAN

COMMERCE CENTER DRIVE OVER CASTAIC CREEK

LOG OF TEST BORINGS SHT. 2

REVIEWED

Steve M. Hennessee 11/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 14 OF: 15
DWG. NO.: 614599

LOG OF BORING 89-025-F6 BORING NO. WB-F5

SAMPLE	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY UNIT**	WET UNIT**	DEPTH	IN FEET	DESCRIPTION
										SURFACE CONDITION: Located in center of road ELEVATION: 980
									0	
									Af	FILL: Road surfaced with 3/4 inch gravel, base is locally derived sand and gravel
									SP	SAND: Tan, gravelly, fine to very coarse, graded layers 1 to 4 feet thick
									5	
									10	
									15	
									20	

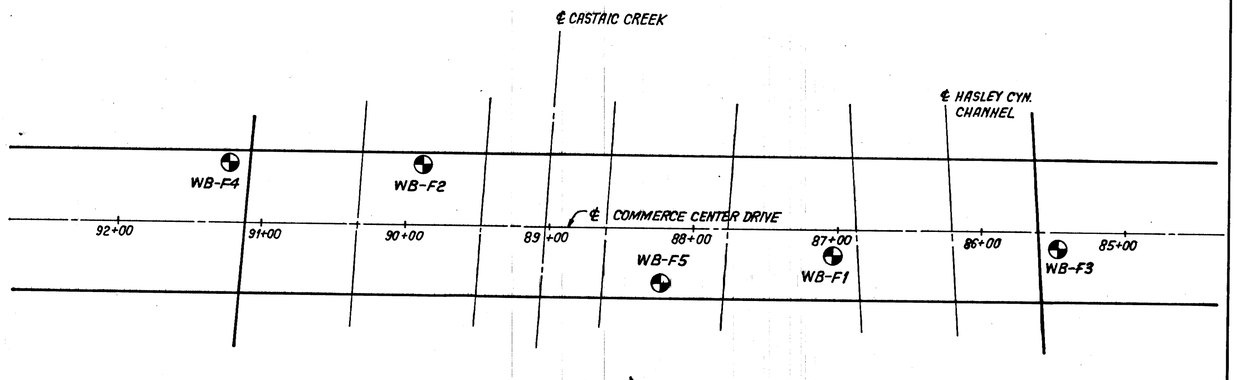
LOG OF BORING 89-025-F6 BORING NO. WB-F5

SAMPLE	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY UNIT**	WET UNIT**	DEPTH	IN FEET	DESCRIPTION
									40	Grades to gravelly
									45	
									ML	SILT: Medium brown
									SP	SAND: Tan, gravelly, fine to very coarse, weakly graded layers to 4 feet
									50	
									55	
60		64+							60	End of boring at 60 feet Water at 12 feet - no caving

LOG OF BORING 89-025-F6 BORING NO. WB-F5 (Cont'd)

SAMPLE	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY UNIT**	WET UNIT**	DEPTH	IN FEET	DESCRIPTION
20		30		12		115			20	
									ML	SILT: Reddish brown, clayey silt
									25	
									SP	SAND: Tan, gravelly to very gravelly, fine to very coarse in graded 1 to 5 foot layers
30		56+							30	
									35	
									GP/SP	GRAVEL/SAND: Change to cobbley, fine to medium
40		53+							SP 40	SAND: Change to minor gravel

* Percent
** Pounds per cubic foot
\+ SPT



APPROXIMATE LOCATION OF BORINGS
SCALE: 1"=50'

GEOTECHNICAL INVESTIGATION
CONDUCTED BY

R.T. FRANKIAN AND ASSOCIATES
234 SOUTH BUENA VISTA STREET
P.O. BOX 7762
BURBANK, CALIFORNIA 91510-7762

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

PB614598

REVISIONS | DRAWN | CHECKED

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
15250 VENTURA BLVD., VAN NUYS, CALIFORNIA
(818)787-8550 91411

DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

REGISTERED PROFESSIONAL ENGINEER — JORA SARKISSIAN — No. 42890 Exp. 3-31-00 — CIVIL — STATE OF CALIFORNIA

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK

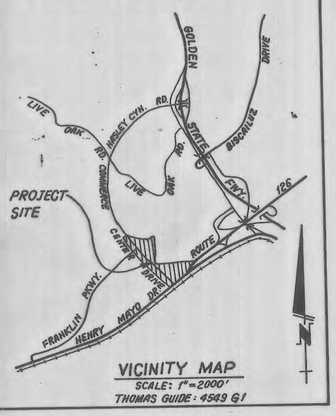
LOG OF TEST BORINGS SHT. 3

REVIEWED
Steve M. Hennessee 1/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 15 OF: 15
DWG. NO.: 614598

Flow Diversion Berm

STORM DRAIN PLANS IN
D.S. No.485 P.D. No.2298 (UNIT III)



VICINITY MAP
SCALE: 1"=2000'
THOMAS GUIDE: 4549 G1

NPDES NOTES

ATTACHMENT A

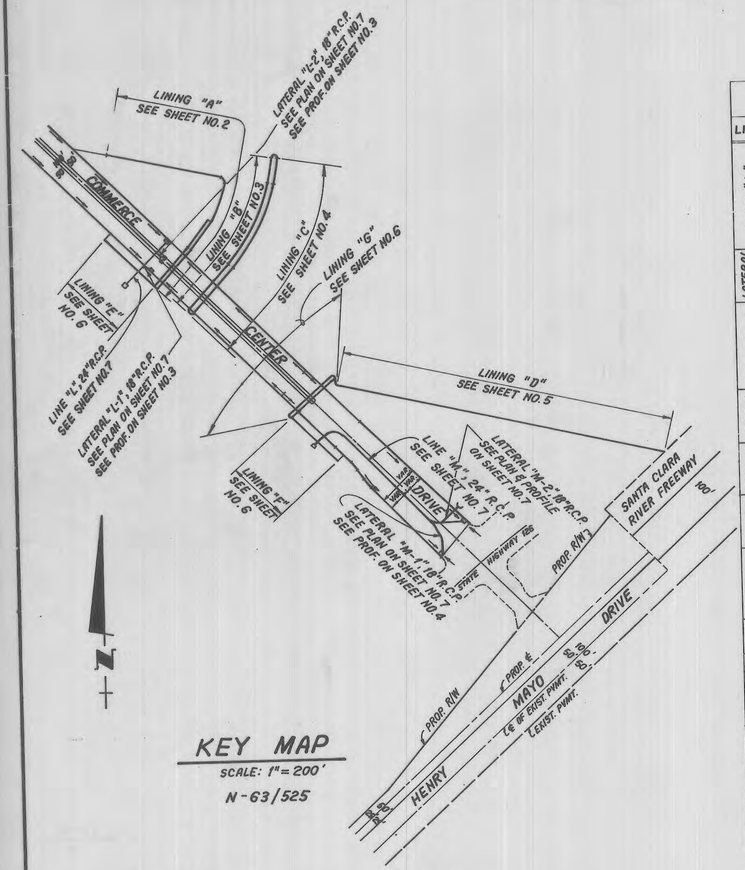
BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES*

The following is intended as an attachment for construction and grading plans and represent the minimum standards of good housekeeping which must be implemented on all construction sites regardless of size.

- ☐ Eroded sediments and other pollutants must be retained on site and may not be transported from the site via sheetflow, swales, area drains, natural drainage courses or wind.
- ☐ Stockpiles of earth and other construction related materials must be protected from being transported from the site by the forces of wind or water.
- ☐ Fuels, oils, solvents and other toxic materials must be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protected from the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system.
- ☐ Excess or waste concrete may not be washed into the public way or any other drainage system. Provisions shall be made to retain concrete wastes on site until they can be disposed of as solid waste.
- ☐ Trash and construction related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.
- ☐ Sediments and other materials may not be tracked from the site by vehicle traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental depositions must be swept up immediately and may not be washed down by rain or other means.
- ☐ Any slopes with disturbed soils or denuded of vegetation must be stabilized so as to inhibit erosion by wind and water.
- ☐ Other_____

B. The following BMPs as outlined in, but not limited to, the Best Management Practice Handbook, California Stormwater Quality Task Force, Sacramento, California, 1993, or the latest revised edition, may apply during construction (additional measures may be required if deemed appropriate by County):

CA001 - DEWATERING OPERATIONS
CA002 - PAVING OPERATIONS
CA003 - STRUCTURE CONSTRUCTION AND PAINTING
CA010 - MATERIAL DELIVERY AND STORAGE
CA012 - SPILL PREVENTION AND CONTROL
CA020 - SOLID WASTE MANAGEMENT
CA021 - HAZARDOUS WASTE MANAGEMENT
CA023 - CONCRETE WASTE MANAGEMENT
CA030 - VEHICLE AND EQUIPMENT CLEANING
CA031 - VEHICLE AND EQUIPMENT FUELING
CA032 - VEHICLE AND EQUIPMENT MAINTENANCE
CA040 - EMPLOYEE/SUBCONTRACTOR TRAINING
ESC01 - SCHEDULING
ESC02 - PRESERVATION OF EXISTING VEGETATION
ESC10 - SEEDING AND PLANTING
ESC11 - MULCHING
ESC20 - GEOTEXTILES AND MATS
ESC21 - DUST CONTROLS
ESC22 - TEMPORARY STREAM CROSSING
ESC23 - CONSTRUCTION ROAD STABILIZATION
ESC24 - STABILIZED CONSTRUCTION ENTRANCE
ESC30 - EARTH DIKE
ESC31 - TEMPORARY DRAINS AND SWALES
ESC32 - SLOPE DRAIN
ESC40 - OUTLET PROTECTION
ESC41 - CHECK DAMS
ESC50 - SILT FENCE
ESC51 - STRAW BALE BARRIERS
ESC52 - SAND BAG BARRIER
ESC53 - BRUSH OR ROCK FILTER
ESC54 - STORM DRAIN INLET PROTECTION



KEY MAP
SCALE: 1"=200'
N-63/525

HYDRAULIC ELEMENTS

LINE	STATION	Q_{50} IN C.F.S	SECTION	S.F.	VELOCITY IN FT./SEC.	DEPTH IN FEET
LINE "L"	5+14.00 TO 5+35.00	12.0	24"R.C.P	0.3225	12.7	0.61
	5+35.00 TO 5+50.00	6.0	24"R.C.P	0.3225	16.8	0.70
	5+50.00 TO 6+37.00	6.0	24"R.C.P	0.0100	5.9	0.89
LATERAL "L-1"	1+02.00 TO 1+35.60	6.0	18" R.C.P	0.1601	15.5	0.95
LINE "M"	4+98.50 TO 5+37.08	10.0	24" R.C.P	0.0020	3.18	9.00'
	5+37.08 TO 9+33.42	10.0	24" R.C.P	0.0020	3.18	7.17'
	9+33.42 TO 10+44.18	5.0	24" R.C.P	0.0004	1.75	4.76'
LATERAL "M-1"	1+02.00 TO 2+01.91	5.0	18" R.C.P	0.0023	2.83	4.51
LATERAL "M-2"	1+01.41 TO 1+34.59	NGL.	18" R.C.P	—	—	—
LATERAL "L-2"	1+01.00 TO 1+22.75	NGL.	18" R.C.P	—	—	—
CASTAIC CREEK	BEGINNING TO END OF LININGS C,D,F & G	50.700	NATURAL CHANNEL WITH 1½:1 SIDE SLOPES	0.0188	10.81	14.9
HASLEY CYN. CREEK	BEGINNING TO END OF LINING E		NATURAL CHANNEL WITH 1½:1 SIDE SLOPES			
	BEGINNING TO STA 10+50.00	50.700		0.0188	10.81	14.9
	LININGS A & B	9.700	NATURAL CHANNEL WITH 1½:1 SIDE SLOPES			
	STA. 10+50.00 TO END OF LININGS A & B			0.0272	6.89	4.4

NGL.- NEGLIGIBLE

NO.	REVISION	REVISED BY	APPROVED BY	DATE

BENCH MARK CL 3976
LACRD BM
RDBM TAG IN C.B. 4 FT. N. B.C.R. TO FT. N.
AND 32 FT. E. CL INT. OLD ROAD AND
HASLEY CYN. ROAD OFF-RAMP

NEWHALL QUAD (1983) ELEV. 1065.685

GENERAL NOTES(Cont'd)

21. ALL BACKFILL AND FILLS OUTSIDE OF STREET RIGHT OF WAY SHALL BE COMPACTED TO 90% OF MAXIMUM DENSITY AS DETERMINED BY A.S.T.M. SOIL COMPACTION TEST D1557-78 METHOD "D" UNLESS OTHERWISE SPECIFIED. THIS SHALL BE CERTIFIED BY A GEOTECHNICAL ENGINEER. THE CERTIFICATION SHALL BE SUBMITTED TO THE DIRECTOR OF PUBLIC WORKS PRIOR TO ACCEPTANCE OF WORK BY THE COUNTY.

22. ALL BACKFILL AND FILLS WITHIN STREET RIGHT OF WAY SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 306-1.3.4 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED AND INSPECTED BY THE DEPARTMENT. CONTRACTOR SHALL NOTIFY THE INSPECTOR AT LEAST 24 HOURS IN ADVANCE FOR SOIL TESTING AS REQUIRED BY THE INSPECTOR.

23. PIPE BEDDING SHALL BE:
IN ACCORDANCE WITH LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS STANDARD DRAWING NO 3092 UNLESS OTHERWISE NOTED. THE BEDDING MATERIAL PLACED FROM THE BOTTOM OF THE PIPE TO 1 FOOT OVER THE TOP OF THE PIPE SHALL BE SAND, CRUSHED AGGREGATE, OR NATIVE FREE-DRAINING GRANULAR MATERIAL AND SHALL HAVE A SAND EQUIVALENT OF 20 OR GREATER.

24. PIPE SHALL BE EMBEDDED 5 INCHES INTO ALL STRUCTURES INCLUDING INLET AND OUTLET HEADWALLS, UNLESS OTHERWISE SPECIFIED.

25. UNLESS OTHERWISE SPECIFIED IN THE PROFILE ON THESE PLANS, THE PIPE SHALL BE MANUFACTURED WITH A MINIMUM CONCRETE COVER OVER THE STEEL IN THE INVERT OF 0.75 INCHES FOR R.C.P. UP TO 96 INCHES IN DIAMETER AND 1.25 INCHES FOR PIPE GREATER THAN 96 INCHES IN DIAMETER.

26. ALL CATCH BASINS WITHIN THE DEDICATED STREET RIGHTS-OF-WAY SHALL BE CONSTRUCTED PER THE STREET PLANS.

27. THE CONTRACTOR SHALL PROVIDE TO THE SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS A SYSTEM FOR CONTRIBUTORY DRAINAGE TO BE OPERABLE AT ALL TIMES UNTIL THIS STORM DRAIN SYSTEM IS ACCEPTED FOR MAINTENANCE. THIS MAY HAVE TO BE DESIGNED BY A CIVIL ENGINEER.

28. ALL REFERENCES ON THIS PLAN TO THE COUNTY ENGINEER, ROAD DEPARTMENT, OR FLOOD CONTROL DISTRICT SHALL APPLY TO THE APPROPRIATE ELEMENTS OF THE DEPARTMENT OF PUBLIC WORKS.

29. EXISTING UTILITIES SHALL BE MAINTAINED IN PLACE BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.

30. WHERE THE UTILITIES ARE INDICATED ON THE DRAWINGS TO BE SUPPORTED, SAID SUPPORTS SHALL BE IN ACCORDANCE WITH STANDARD PLANS FOR CONSTRUCTION NO. 224, UNLESS OTHERWISE INDICATED.

31. ALL OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES SHALL BE SEALED WITH 8 INCHES OF BRICK AND MORTAR OR 6 INCHES OF CONCRETE, UNLESS OTHERWISE SHOWN.

32. MANHOLES NO.1,2,3, AND 4, SHALL USE THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION NO. 630 FOR THE "FRAME AND COVER" AND NO 635 FOR THE "STANDARD DROP STEP".

33. THIS STORM DRAIN WILL NOT BE ACCEPTED FOR MAINTENANCE UNTIL THE STREETS HAVE BEEN PAVED. MANHOLES BROUGHT TO GRADE AND THE SYSTEM CLEANED TO SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS.

34. THE LATEST REVISED STANDARD PLAN OR DRAWING SHALL BE USED UNLES OTHERWISE SPECIFICALLY NOTED.

35. A NPDES PERMIT FROM THE REGIONAL WATER QUALITY CONTROL BOARD IS REQUIRED BEFORE ANY DISCHARGE OF NON-STORM WATER INTO THE STORM DRAIN IS ALLOWED.

LIST OF STANDARDS

	L.A.C.D.P.W.	A.P.W.A.
1. M.H. NO.1	PER	(321-0)
2. CURB OPENING CATCH BASIN	PER	300-0
3. STANDARD M.H. SHAFT	PER	(324-0)
4. M.H. FRAME AND COVER	PER	630-0
5. STEEL STEP	PER	635-0
6. C.B. MANHOLE FRAME AND COVER	PER	312-0
7. C.B. REINFORCEMENT	PER	309-0
8. MONOLITHIC C.B. CONNECTION	PER	308-0
9. C.B. FACE PLATE ASSEMBLY		
10. AND PROTECTION BAR	PER	310-0
11. FRAME AND GRATING FOR C.B.	PER	311-0
12. LOCAL DEPRESSION AT C.B.	PER	313-0
13. J.S. NO.2	PER	(331-0)
14. CHAIN LINK FENCE AND GATES	PER	600-0
15. PIPE BEDDING	PER	3092-0
16. SAFETY REQUIREMENTS	PER	6008-0
17. CONCRETE COLLAR	PER	380-1

GENERAL NOTES:

1. A PERMIT SHALL BE OBTAINED AND A DEPOSIT PAID TO THE DEPARTMENT OF PUBLIC WORKS AT THE PERMIT COUNTER, 900 SOUTH FREMONT AVENUE 8-TH FLOOR, ALHAMBRA AT LEAST 72 HOURS PRIOR TO STARTING WORK UNDER THIS CONTRACT. COPIES OF ALL OTHER REQUIRED PERMITS, SUCH AS FLOOD CONTROL DISTRICT AND ROAD EXCAVATION, MUST BE FILED WITH THE PERMIT APPLICATION.
2. WHEN WORK IS WITHIN A CONTRACT CITY, THE CONTRACTOR MUST CONTACT THE DIRECTOR OF PUBLIC WORKS OF THAT CITY TO DETERMINE THE LOCATION TO PAY THE INSPECTION DEPOSIT.
3. THE CONTRACTOR SHALL CONTACT THE DISTRICT OFFICE LISTED AT THE "APPLICATION FOR STORM DRAIN CONSTRUCTION INSPECTION FORM 1" TO ARRANGE FOR AN ACCEPTABLE CONSTRUCTION START DATE.
4. APPROVAL OF THIS PLAN BY THE COUNTY OF LOS ANGELES DOES NOT CONSTITUTE A REPRESENTATION TO THE ACCURACY OF THE LOCATION, OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THIS NOTE APPLIES TO ALL SHEETS.
5. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION". INCLUDING SUPPLEMENTS AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE DIRECTOR OF PUBLIC WORKS.
6. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 7-10.4.1 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION IN REGARD TO SAFETY ORDERS AND SHALL CONFORM TO THE "MINIMUM PUBLIC SAFETY REQUIREMENTS" AS SHOWN IN LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS STD. 6008-0.
7. ELEVATIONS ARE IN FEET ABOVE U.S.C. & G.S. MEAN SEA LEVEL DATUM OF 1929, UNLESS OTHERWISE INDICATED.
8. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAVE BEEN PLACED, INSPECTED AND APPROVED.
9. ALL STRUCTURAL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH AN ULTIMATE 28 DAY COMPRESSIVE STRENGTH OF 4000 p.s.i. UNLESS OTHERWISE NOTED.
10. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES (OR RADIAL) TO THE CONDUIT CENTER LINE EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
11. ALL STEEL ADJACENT TO FACE OF CONCRETE SHALL HAVE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
12. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL, PER A.S.T.M. A-615-GRADE 60.
13. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE "MANUAL OF STANDARD PRACTICE".
14. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER LINE OF STEEL UNLESS OTHERWISE NOTED.
15. ALL STEEL THAT IS TO BE CONTINUOUS SHALL HAVE A MINIMUN LAP OF 30 BAR DIAMETERS OR 18" WHICHEVER IS GREATER.
16. ALL CONSTRUCTION JOINTS IN THE FOOTING OF SLABS AND WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
17. ALL EXPOSED EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
18. UNLESS OTHERWISE SHOWN, CONCRETE DIMENSIONS SHALL BE MEASURED VERTICALLY OR HORIZONTALLY AND AND PARALLEL OR AT RIGHT ANGLES (OR RADIAL) TO THE CENTER LINE OF CONSTRUCTION.
19. CONCRETE BACKFILL IS REQUIRED WHEN THE THE PIPE HAS LESS THAN ONE FOOT OF COVER. THE CONCRETE BACKFILL SHALL CONSIST OF 1:3:5 MIX, PORTLAND CEMENT CONCRETE POURED FROM WALL TO WALL OF TRENCH AND FROM BOTTOM OF TRENCH TO A MINIMUM OF 4 INCHES OVER THE TOP OF THE PIPE.
20. ALL PIPES SHALL BE PLACED IN TRENCH IN NATURAL GROUND AND/OR COMPACTED FILL. THE GROUND LEVEL BEFORE THE TRENCHING SHALL BE AT LEAST 3 FEET ABOVE THE TOP OF THE PIPE ELEVATION, OR AT FINISH SURFACE ELEVATION, WHICHEVER IS LESS. ALL BACKFILLS IN EASEMENTS SHALL BE COMPACTED TO THE DENSITY REQUIRED BY THE GRADING PLAN.

RIPRAP NOTES

1. ROCKS FOR GROUTED RIPRAP SHALL BE GOOD QUALITY RIVER RUN ROCK. THE SMALLEST DIMENSIONS SHALL EXCEED 6 INCHES AND THE LARGEST DIMENSION SHALL NOT EXCEED 24 INCHES. THE LARGEST DIMENSION SHALL NOT EXCEED 4 TIMES THE SMALLEST DIMENSION.
2. THERE SHALL BE A GROUT BED OF AT LEAST 2 INCHES BENEATH THE FIRST LAYER OF ROCK. ALL THE VOIDS BETWEEN THE ROCKS SHALL BE FILLED WITH GROUT. MAXIMUM SPACING BETWEEN ROCKS SHALL BE 2 INCHES.
3. SURFACE ROCKS SHALL BE IMBEDDED FROM 1/2 TO 2/3 OF THEIR MAXIMUM DIMENSION.

NOTE: CONCRETE MAY BE SUBSTITUTED FOR THE GROUT.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED CIVIL ENGINEER No. 42690 _____ DATE _____

Exp. 12-31-98 — REGISTERED CIVIL ENGINEER — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — JOHN SAARKISSIAN — No. 42690 Exp. 3-31-98 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
SIGNATURE: _____ R.C.E. NO 42690

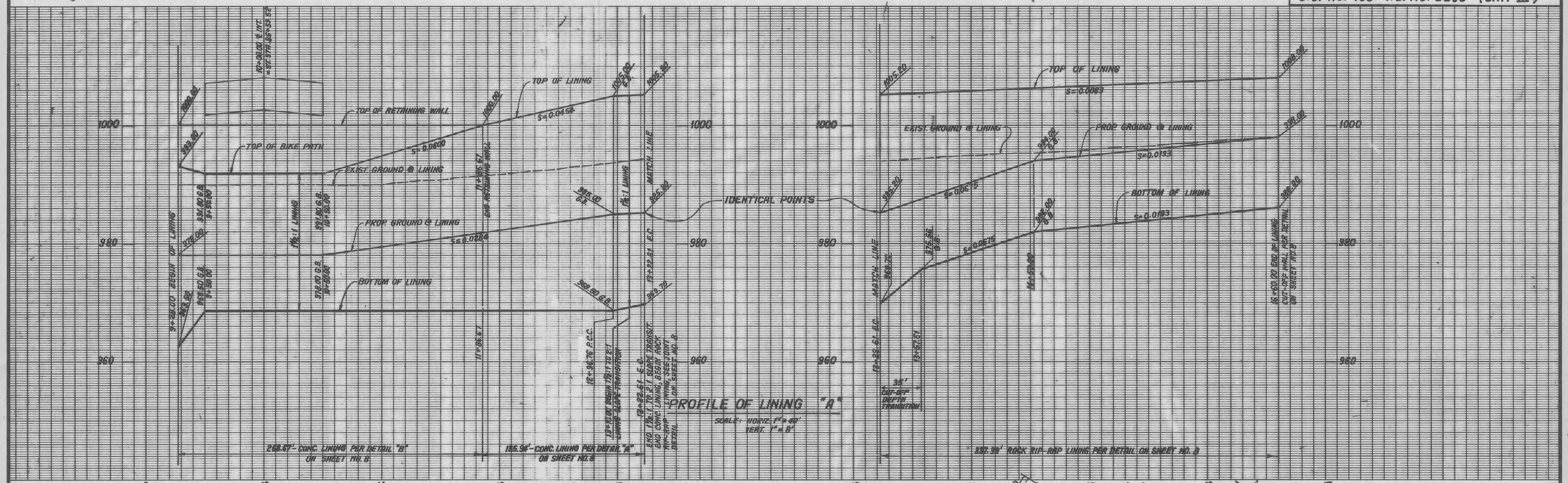
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

LAND DEVELOPMENT DIVISION
APPROVED BY: Ronald D. Anderson for ASSISTANT DEPUTY DIRECTOR DATE: 4-13-98
CHECKED BY: _____ R.C.E. NO 45691 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

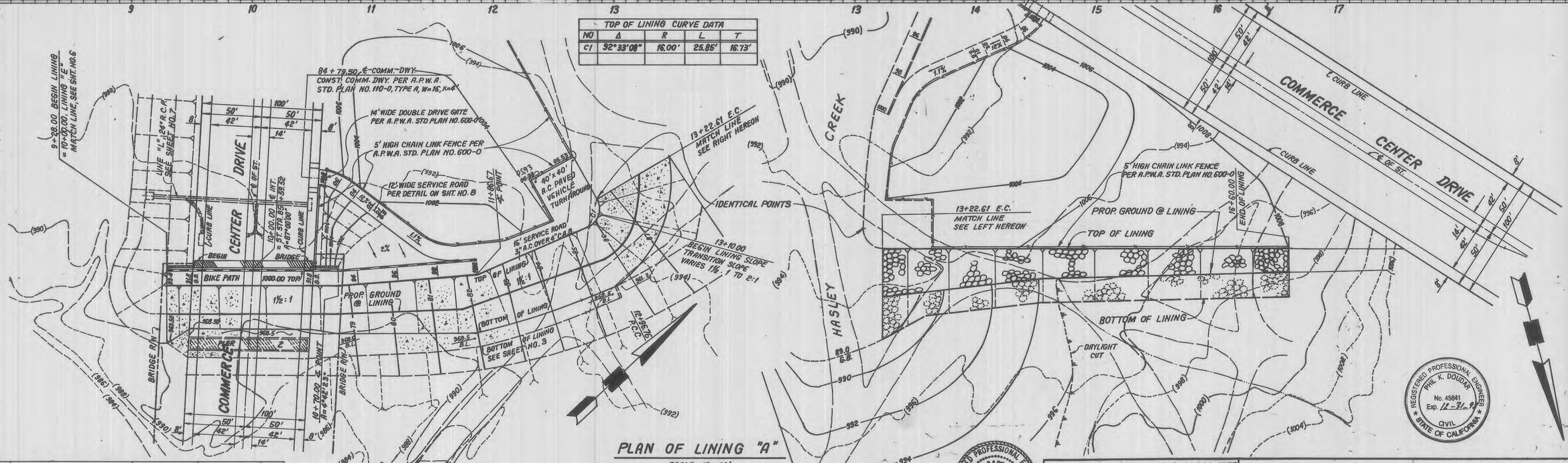
SHT 1 OF 9 SHTS

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO	Δ	R	L	T
C1	92°33'08"	16.00'	25.85'	16.73'



PLAN OF LINING "A"
SCALE: 1"=40'

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOUDAR
No. 45641
Exp. 12-31-99
CIVIL
STATE OF CALIFORNIA

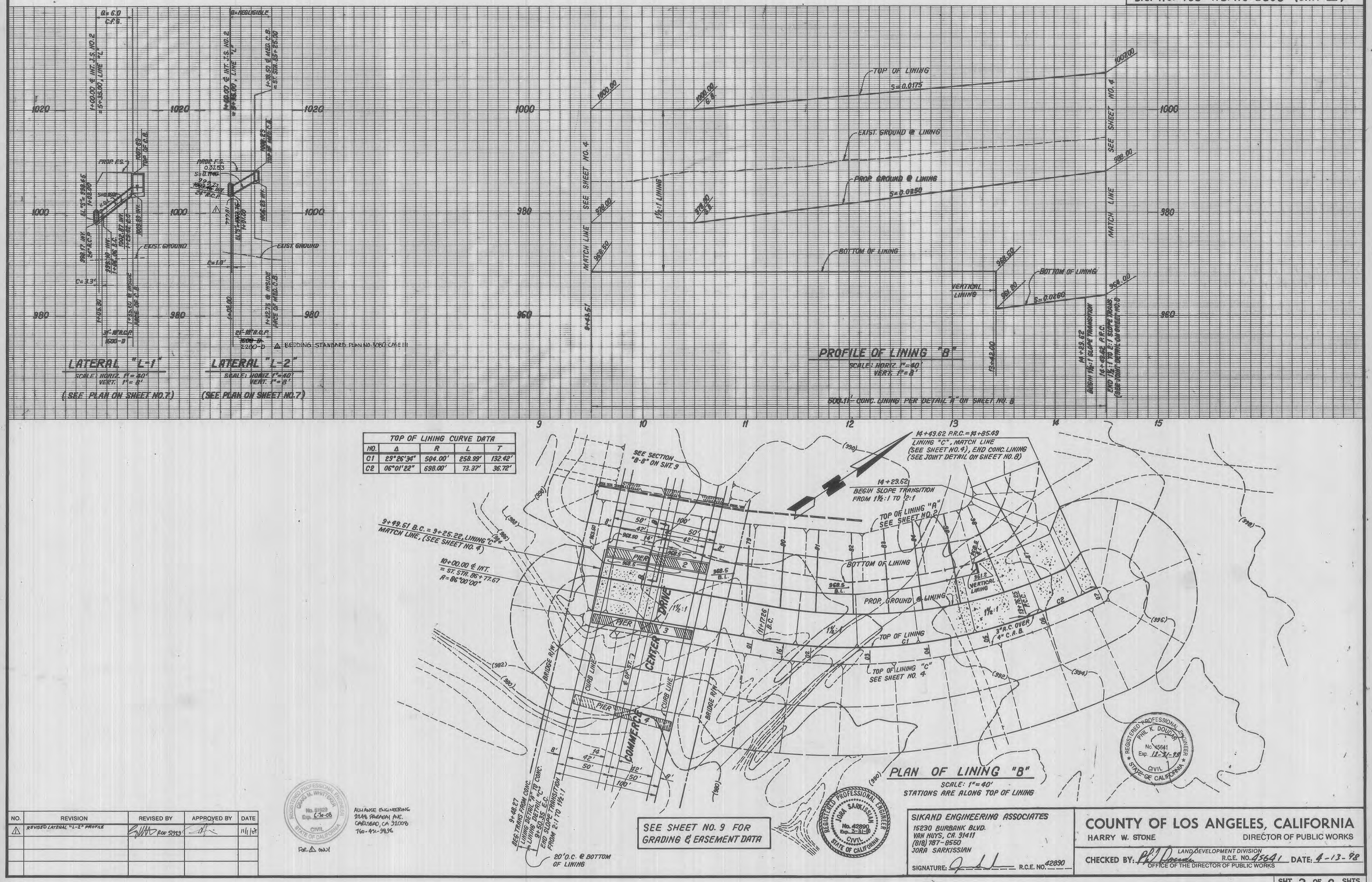
REGISTERED PROFESSIONAL ENGINEER
JORA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 43341 DATE: 4-18-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 2 OF 9 SHTS

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO.	Δ	R	L	T
C1	29°26'34"	504.00'	258.99'	132.42'
C2	06°01'22"	698.00'	73.37'	36.72'

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	REVISED LATERAL "L-2" PROFILE	[signature] RCE 51929	[signature]	11/1/97

REGISTERED PROFESSIONAL ENGINEER CHAD M. WHITTEKER No. 51929 Exp. 6-30-08 CIVIL STATE OF CALIFORNIA

ALLIANCE ENGINEERING
2248 PARADAY AVE.
CARLSBAD, CA 92008
760-431-9896

FOR △ ONLY

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER PHIL K. DOUDAR No. 45641 Exp. 12-31-98 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: [signature] R.C.E. NO. 42890

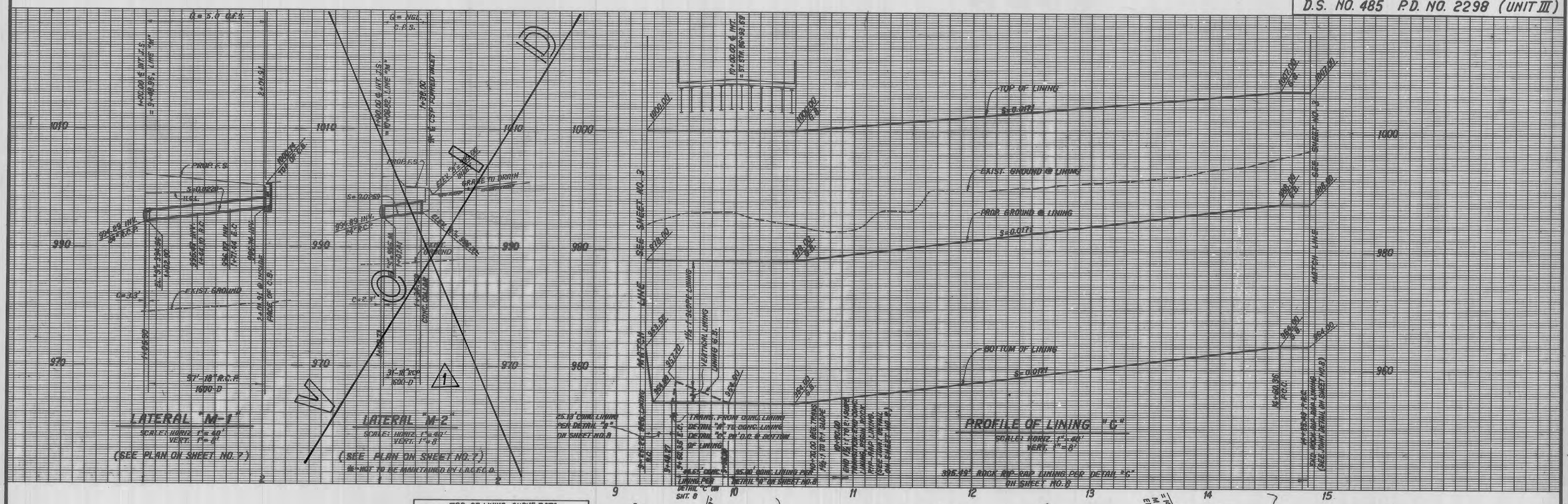
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
CHECKED BY: [signature] R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 3 OF 9 SHTS

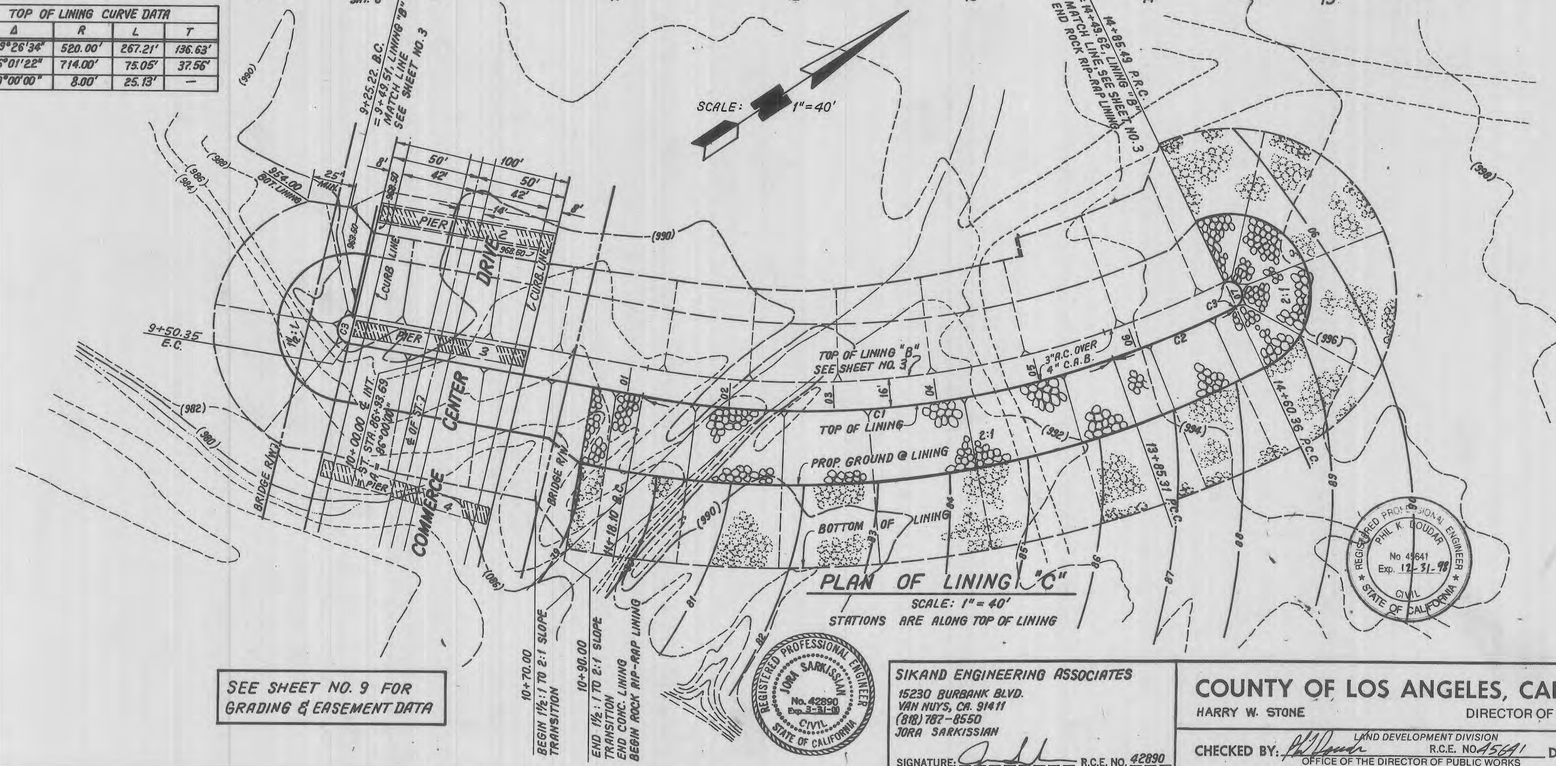
W.O. 1020-252-A

GM Jr (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO.	Δ	R	L	T
C1	29°26'34"	520.00'	267.21'	136.63'
C2	06°01'22"	714.00'	75.05'	37.56'
C3	180°00'00"	8.00'	25.13'	—



NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	VOIDED LAT. "M-2" PROFILE.	42890		7/1/99

REGISTERED PROFESSIONAL ENGINEER
LINA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOUDAR
No 45641
Exp. 12-31-98
CIVIL
STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
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(818) 782-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO. 42890

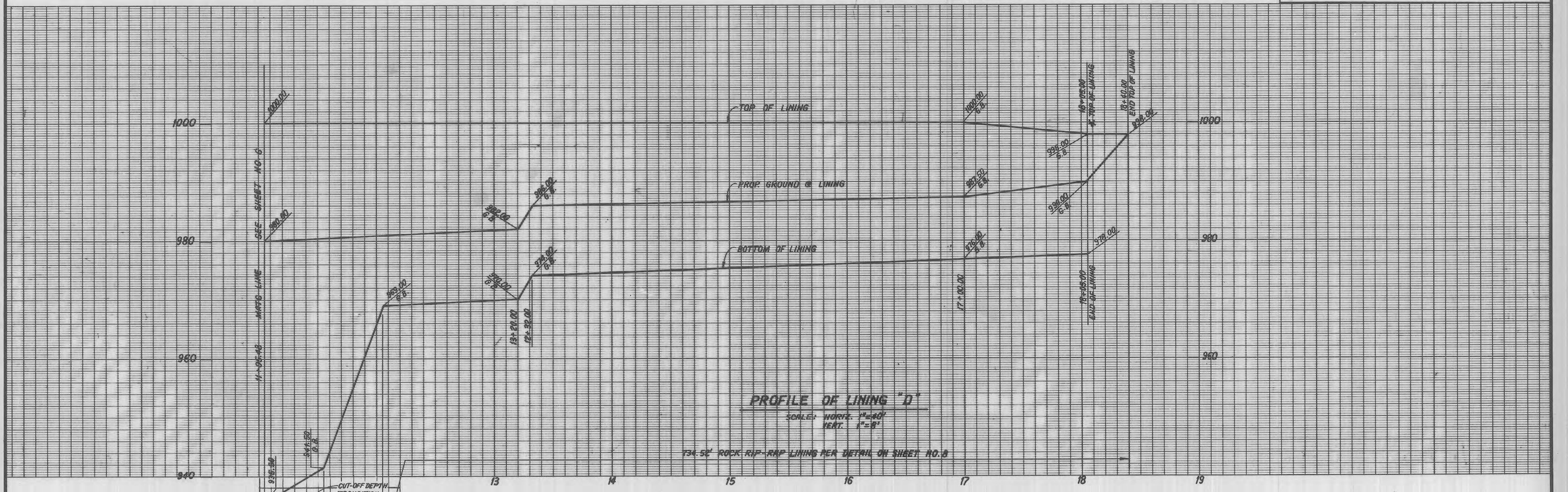
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE
DIRECTOR OF PUBLIC WORKS
CHECKED BY: LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 4 OF 9 SHTS

G.M. Jr. (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



PROFILE OF LINING "D"

SCALE: HORIZ. 1"=40'
VERT. 1"=8'

PLAN OF LINING "D"

SCALE: 1"= 40'

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
JORA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOLGAR
No. 45641
Exp. 12-31-98
CIVIL
STATE OF CALIFORNIA

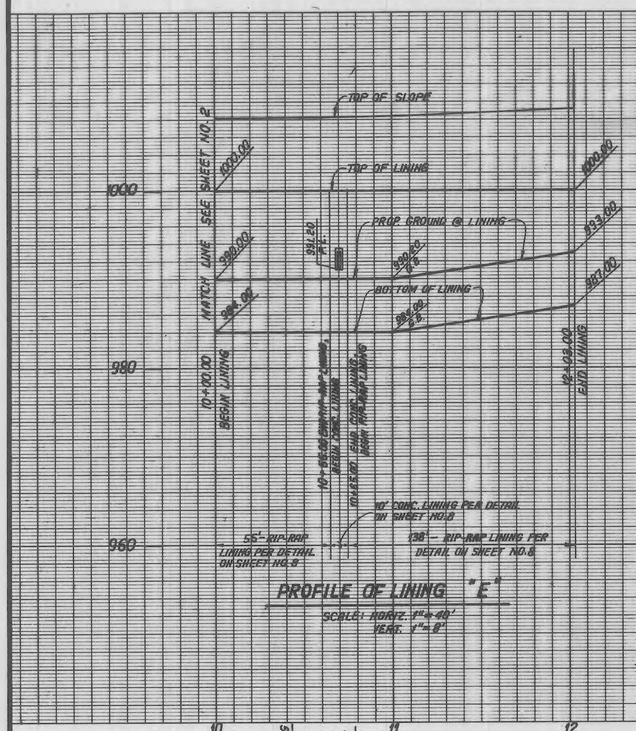
SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

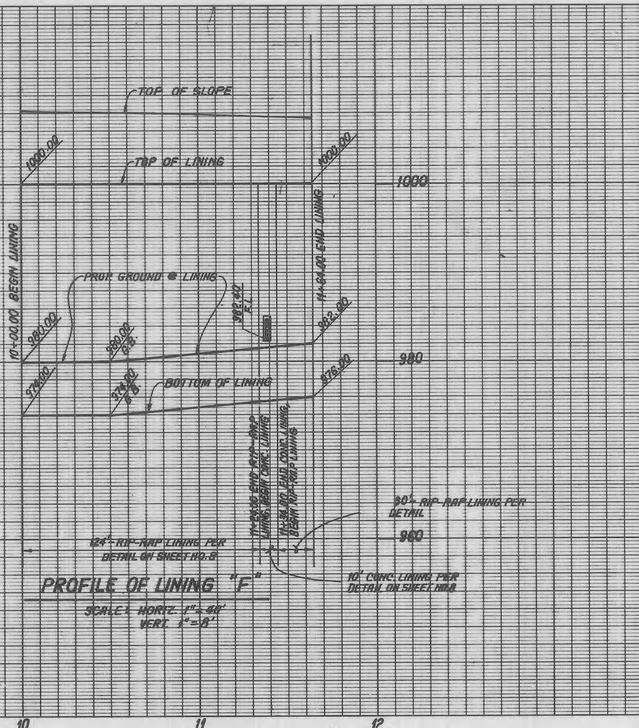
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION
R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

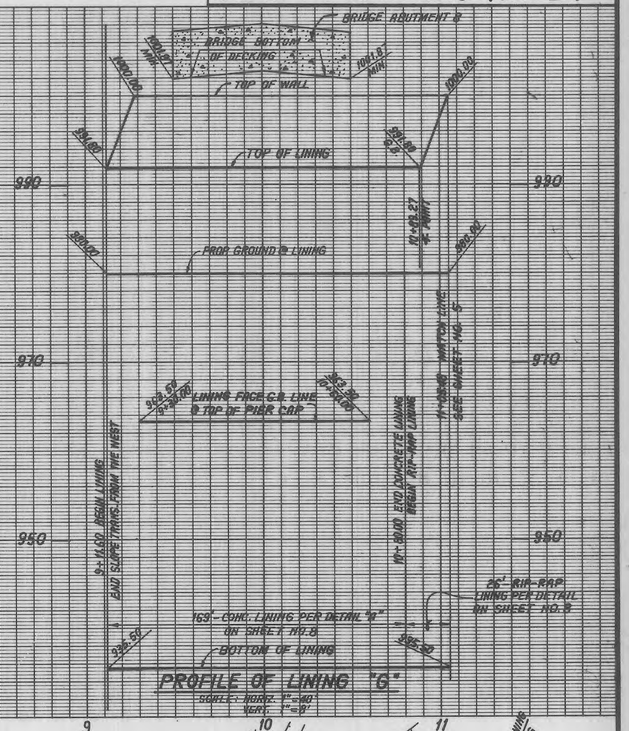
SHT 5 OF 9 SHTS

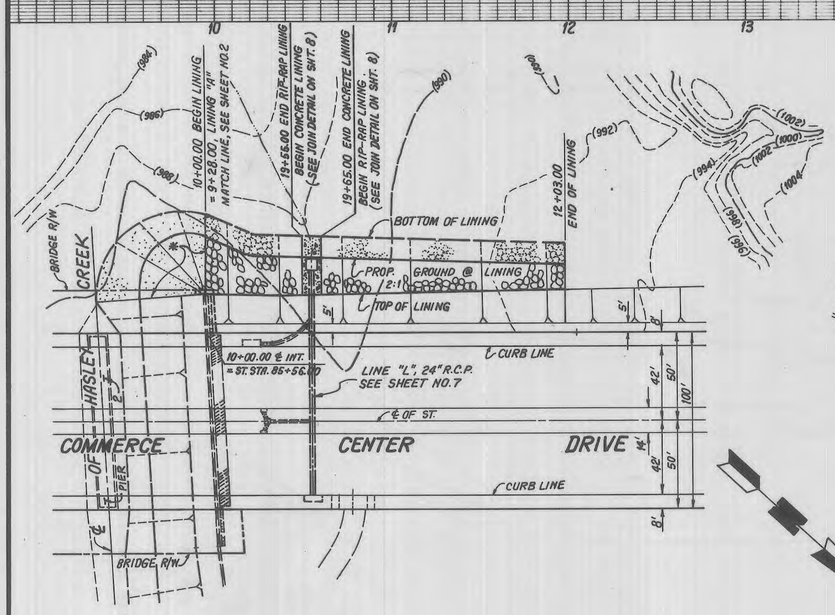
W.O. 1020-252-A

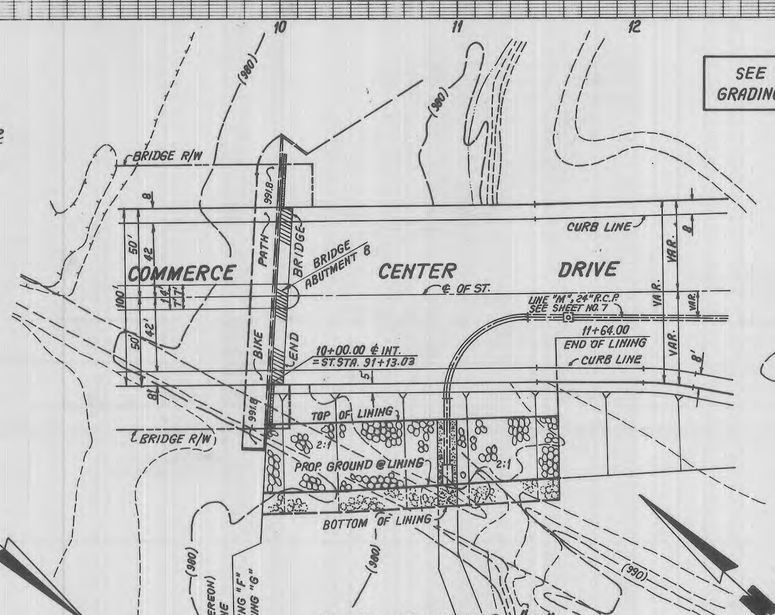
STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)

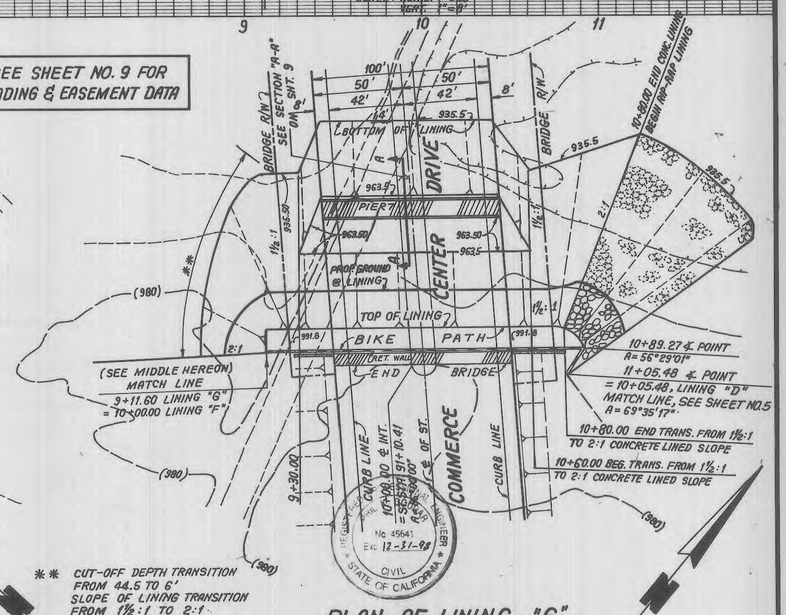












NO.	REVISION	REVISED BY	APPROVED BY	DATE

* CUT-OFF DEPTH TRANSITION FROM 18' TO 6' SLOPE OF LINING TRANSITION FROM 1½:1 TO 2:1 CONCRETE LINING.

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

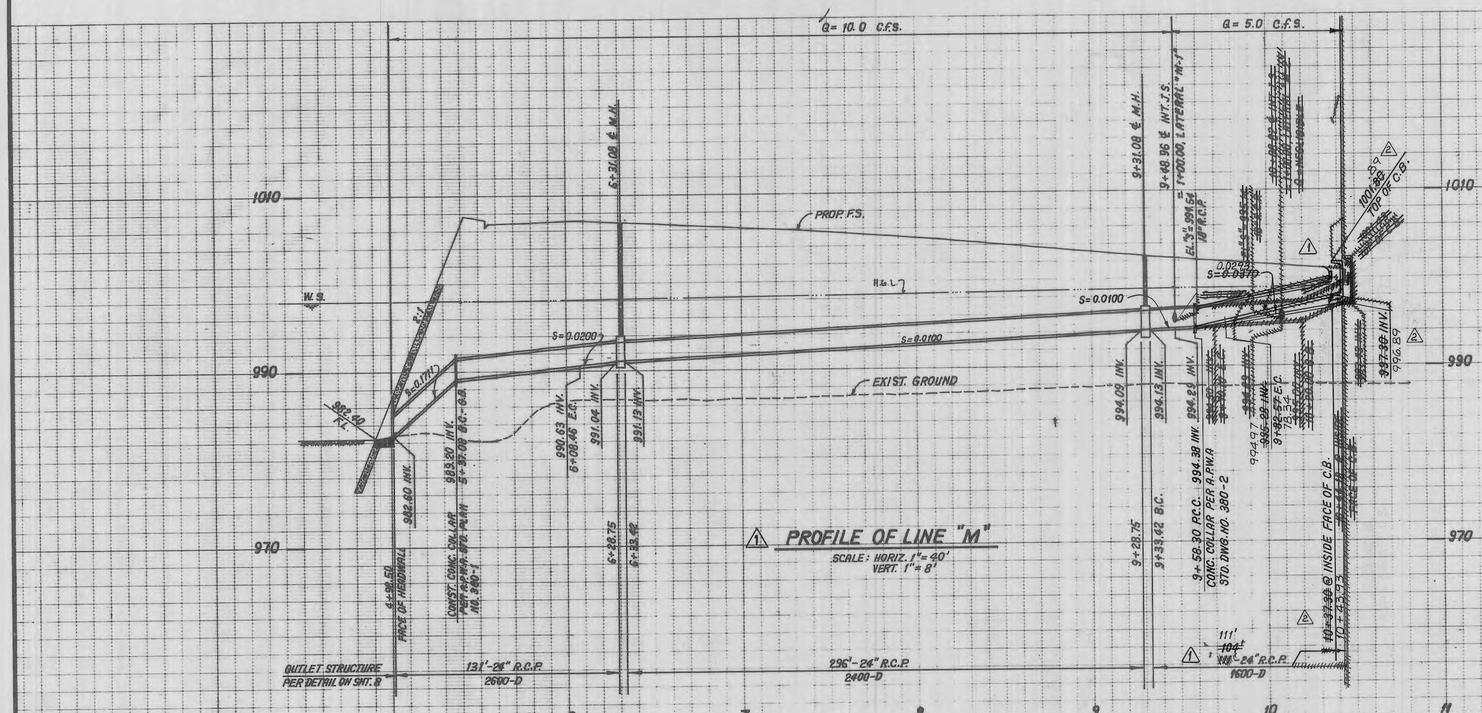
REGISTERED CIVIL ENGINEER No. 45641 EXP. 12-31-98 CIVIL STATE OF CALIFORNIA

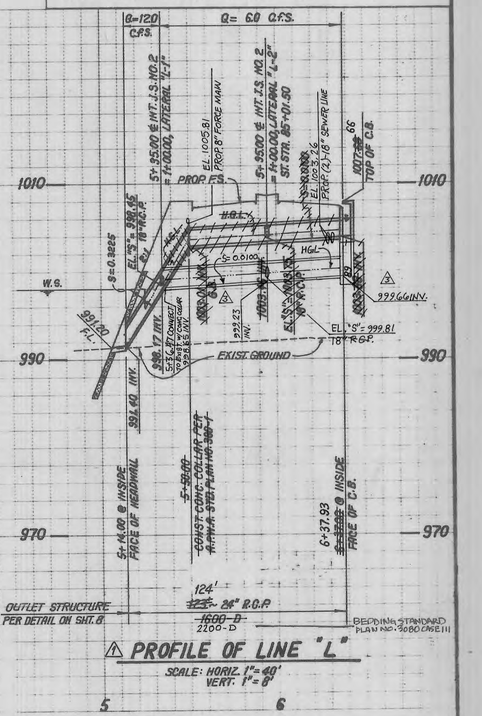
SHT 6 OF 9 SHTS

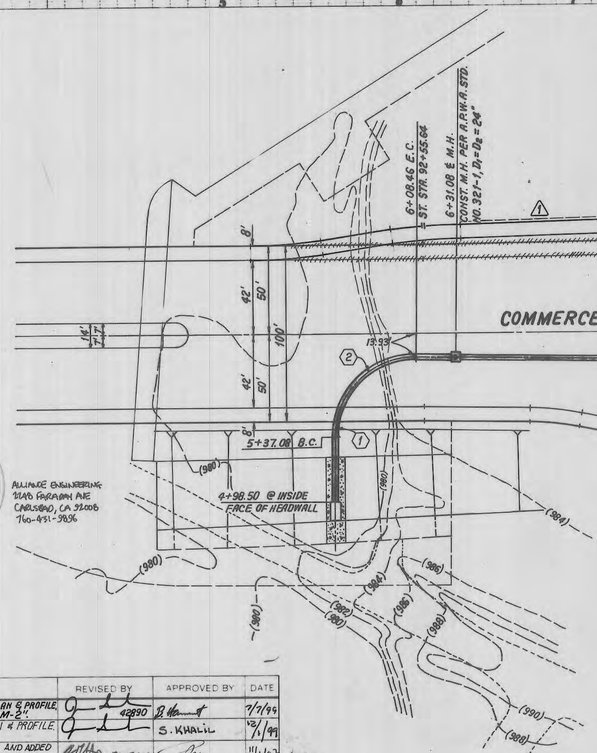
W.O. 1020-252-A

G M Jr (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

STORM DRAIN PLANS IN D.S. 485 P.D. NO. 2298 (UNIT III)



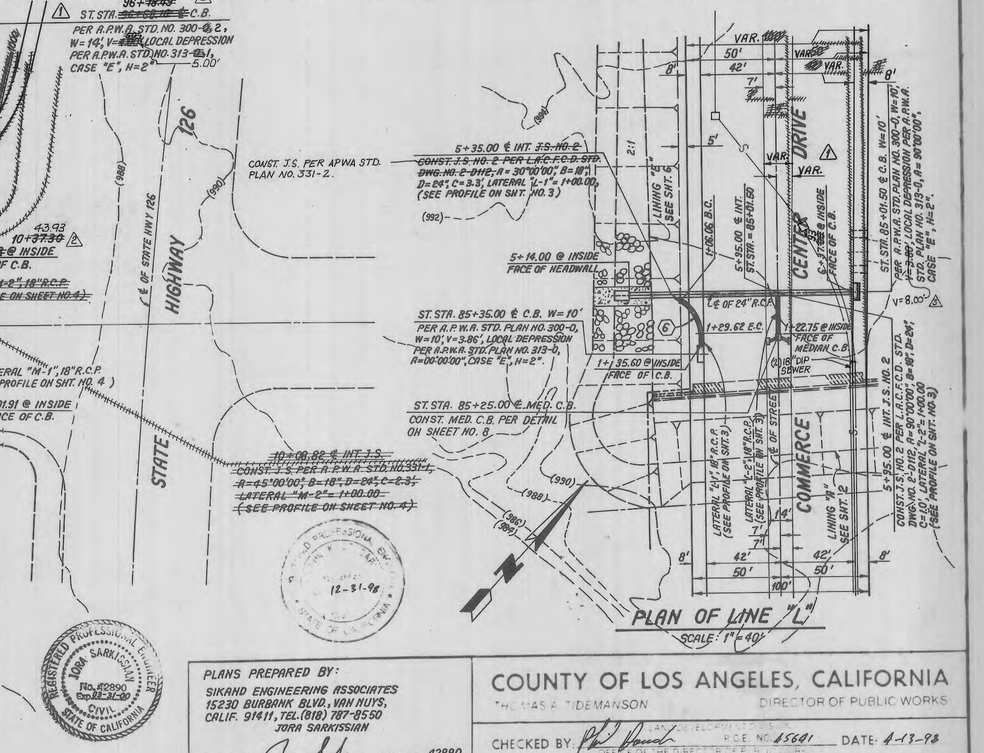




℄ STORM DRAIN CURVE DATA				
	Δ	R	L	T
1	23° 34' 49"	45.00'	18.52'	9.39'
2	67° 18' 32"	45.00'	52.86'	29.96'
3	19° 46' 50"	45.00'	15.54'	7.85'
~~4~~	~~26° 55' 36"~~	~~45.00'~~	~~21.15'~~	~~10.77~~
5	34° 48' 32"	45.00'	27.34'	14.11'
6	60° 00' 00"	22.50'	23.56'	12.99'
7	11° 54' 13"	45.00'	9.34'	4.69'
~~8~~	~~61° 47' 52"~~	~~22.50'~~	~~24.27'~~	~~13.47~~
1/2	51° 02' 11"		20.04'	10.74'

PLAN OF LINE "M"
SCALE: 1"=40'

~~⚠ NOT TO BE MAINTAINED BY L.A.C.F.C.D.~~



PLAN OF LINE "L"
SCALE: 1"=40'

NO	REVISION	REVISED BY	APPROVED BY	DATE
⚠1	REVISED LINE "L" & "M" PLAN & PROFILE ELIMINATED LATERAL "M-2"	42890		7/7/99
⚠2	REVISED LINE "M" PLAN & PROFILE	S. KHALIL		12/1/99
⚠3	REVISED LINE "L" PROFILE AND ADDED PROPOSED (2)-18" SEWER CROSSING	RCE 51913		11/1/07

PLANS PREPARED BY:
SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD., VAN NUYS, CALIF. 91411, TEL. (818) 787-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO 42890

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 12-31-00 CIVIL STATE OF CALIFORNIA

12-31-98

COUNTY OF LOS ANGELES, CALIFORNIA
"HOMAS A. TIDEMANSON DIRECTOR OF PUBLIC WORKS
CHECKED BY: ... ASSISTANT DEPUTY DIRECTOR OF LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 7 OF 9 SHTS

W O K89-2

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)

STRUCTURAL NOTES

GENERAL:

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER OF BAR AND SHALL BE TWO INCHES UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.1.
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.3
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENING.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
8. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELLED.
9. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
10. LONGITUDINAL STEEL SHALL BE LAPPED 20 BAR DIAMETERS AT SPLICES. TRANSVERSE STEEL SHALL BE LAPPED 30 BAR DIAMAETERS AT SPLICES.
11. LONGITUDINAL STEEL SHALL BE CONTINOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
12. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
13. UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS, TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS.; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON THE OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN FOR THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
14. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
15. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 20 BAR DIAMETERS IN LENGTH.
16. IN ALL SECTIONS LAP C AND C2 BARS. THE VERTICAL LENGTH OF C AND C2 BARS HAS BEEN CALCULATED FOR A FOUR INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 30 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
17. CONCRETE QUANTITITES ARE BASED ON A SIX-BY-SIX INCH FILLET AND THE STEEL QUANTITITES DO NOT INCLUDE ANY OPTIONAL SPLICES.
18. IF WALL THICKNESS IS SIX INCHES PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
19. THE DESIGN OF BOX SECTIONS IDENTIFIED BY A NUMERICAL VALUE IS BASED ON A WIDTH OF TRENCH EQUAL TO THE OUTSIDE WIDTH OF THE CONDUIT PLUS THREE FEET. WHEN THE COVER IS EQUAL TO 10 FEET OR LESS THE TRENCH WIDTH IS UNRESTRICTED. WHEN THE COVER IS GREATER THAN 10 FEET AND THE TRENCH WIDTH IS GREATER THAN THE OUTSIDE WIDTH OF THE CONDUIT PLUS 3 FEET FOR A DISTANCE IN EXCESS OF 10 FEET AN ALTERNATE SECTION SHALL BE USED AS INDICATED BELOW
   A. WHEN THE DEPTH OF COVER IS LESS THAN 18 FEET, SECTIONS WITH THE SUFFIX "B" SHALL BE USED.
   B. WHEN THE DEPTH OF COVER IS GREATER THAN 18 FEET AND:
      1. THE TRENCH WIDTH IS LESS THAN THE OUTSIDE WIDTH OF THE CONDUIT PLUS 6 FEET, SECTIONS WITH SUFFIX "A" SHALL BE USED.
      2. THE TRENCH WIDTH IS GREATER THAN THE OUTSIDE WIDTH OF CONDUIT PLUS 6 FEET, SECTIONS WITH THE SUFFIX "A" SHALL BE USED

R. C. RECTANGULAR CHANNEL

1. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF INLETS.
2. TRANSVERSE JOINTS SHALL BE PLACED AT THE JUNCTION OF RECTANGULAR OPEN CHANNEL SECTIONS WITH CLOSED CONDUIT SECTIONS. THE JOINT SHALL NOT BE KEYED AND SHALL HAVE A THREE-EIGHTS-INCH LAYER OF EXPANSION JOINT MATERIAL IN WALLS AND INVERT
3. ALL RECTANGULAR OPEN CHANNEL WALLS SHALL BE FENCED IN ACCORDANCE WITH APWA STANDARD DRAWING 600-O EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
4. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, IN CURVED SECTIONS, THE MAXIMUM SPACING OF BARS SHALL NOT EXCEED THAT SHOWN ON THE TYPICAL SECTIONS. STEEL SHALL BE PLACED RADIALLY FROM THE MAXIMUM SPACING.
5. AT THE BEGINNING AND ENDING OF ALL POURS, A COMPLETE CURTAIN OF REINFORCEMENT COMPOSED OF B1, B4, AND B7 BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
6. LONGITUDINAL STEEL SHALL TERMINATE TWO INCHES FROM TRANSVERSE CONSTRUCTION JOINTS.

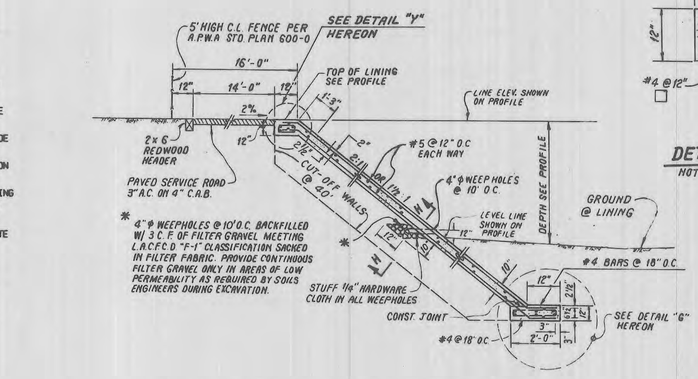
STRUCTURAL DESIGN CRITERIA

LIVE LOAD
H_{20} - S16-44 unless otherwise noted

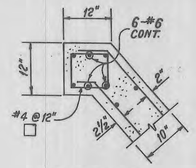
DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 37 p.s.f. per foot of depth
Internal water pressure: 62.4 p.s.f. per foot of depth
Weight of concrete: 150 p.c.f.

ALLOWABLE STRESSES
fc' = 4000 p.s.i. at 28 days
fc = 1800 p.s.i.
fs = 24000
n = 8
shear and bond stresses per A.C.I. 318-63

NO	REVISION	REVISED BY	APPROVED BY	DATE



CONCRETE LINING DETAIL "A"
NOT TO SCALE



DETAIL "Y"
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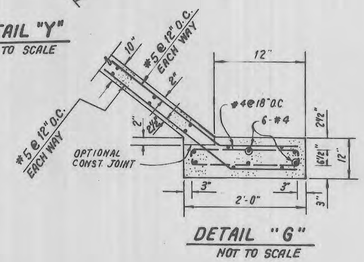

DETAIL "G"
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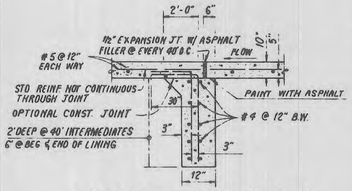
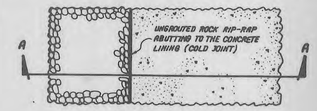
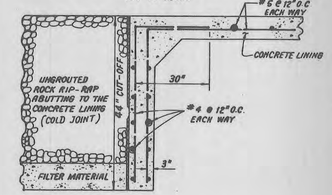


SECTION "H-H" EXPANSION JOINT
CUT-OFF WALL

NOTE EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



CONCRETE LINING-UNGROUTED ROCK RIP-RAP JOIN DETAIL
NOT TO SCALE



SECTION "A-A"
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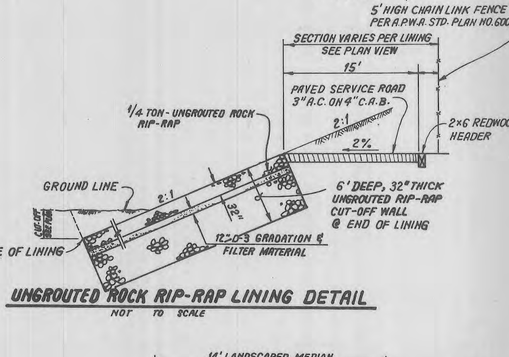

UNGROUTED ROCK RIP-RAP LINING DETAIL
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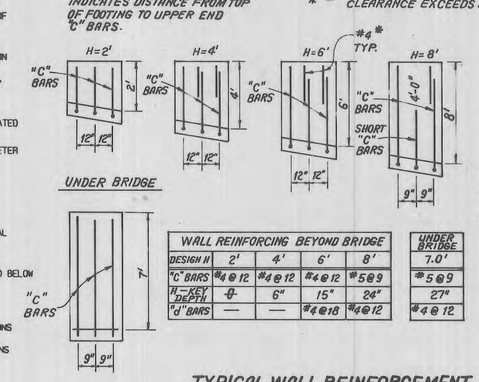
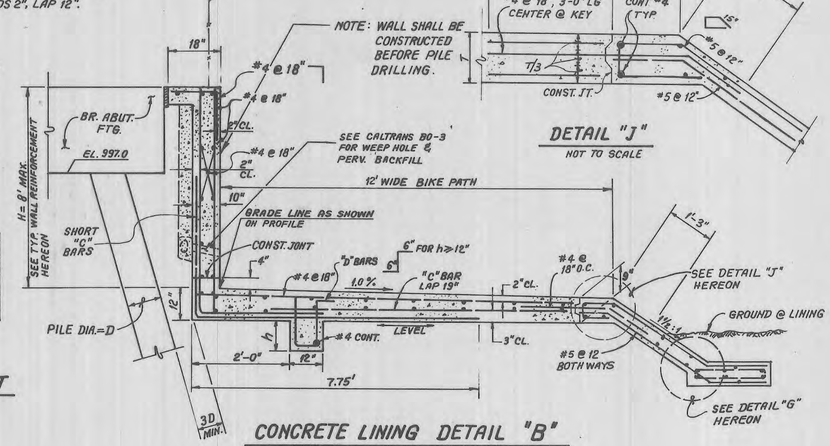


WALL REINFORCING BEYOND BRIDGE					UNDER BRIDGE
DESIGN H	2'	4'	6'	8'	7.0'
"C" BARS	#4@12	#4@12	#4@12	#5@9	#5@9
"H" SEE DEPTH	-0-	6"	15"	24"	27"
"J" BARS	—	—	#4@18	#4@12	#4@12

TYPICAL WALL REINFORCEMENT
NOT TO SCALE



CONCRETE LINING DETAIL "B"
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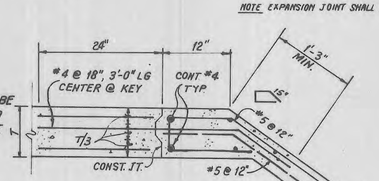
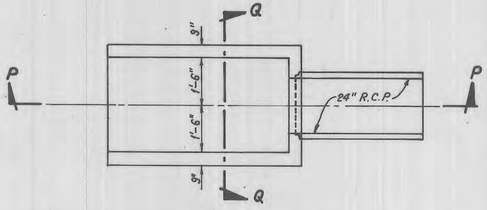
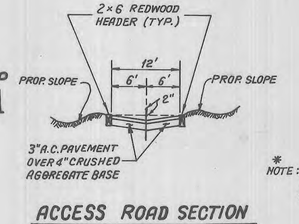


DETAIL "J"
NOT TO SCALE

SECTION P-P
NOT TO SCALE



OUTLET STRUCTURE DETAIL FOR LINES "L" & "M"
NOT TO SCALE

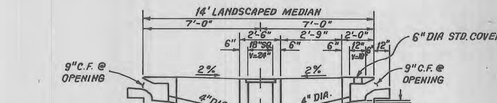


ACCESS ROAD SECTION
NOT TO SCALE

CONCRETE LINING DETAIL "C"
NOT TO SCALE

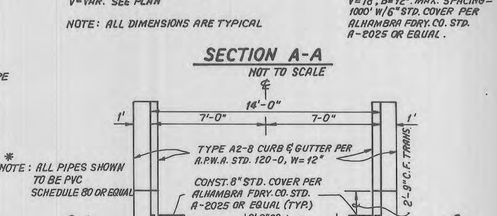
OUTLET STRUCTURES ARE INTO CONCRETE LINING SECTION SEE SHEET NO.6

CUT-OFF WALL DETAIL
NOT TO SCALE



NOTE: ALL DIMENSIONS ARE TYPICAL

SECTION A-A
NOT TO SCALE



NOT TO BE MAINTAINED BY L.A.C.F.C.D.

MEDIAN CATCH BASIN DETAIL
NOT TO SCALE

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN

SIGNATURE: _____ R.C.E. NO. 42890

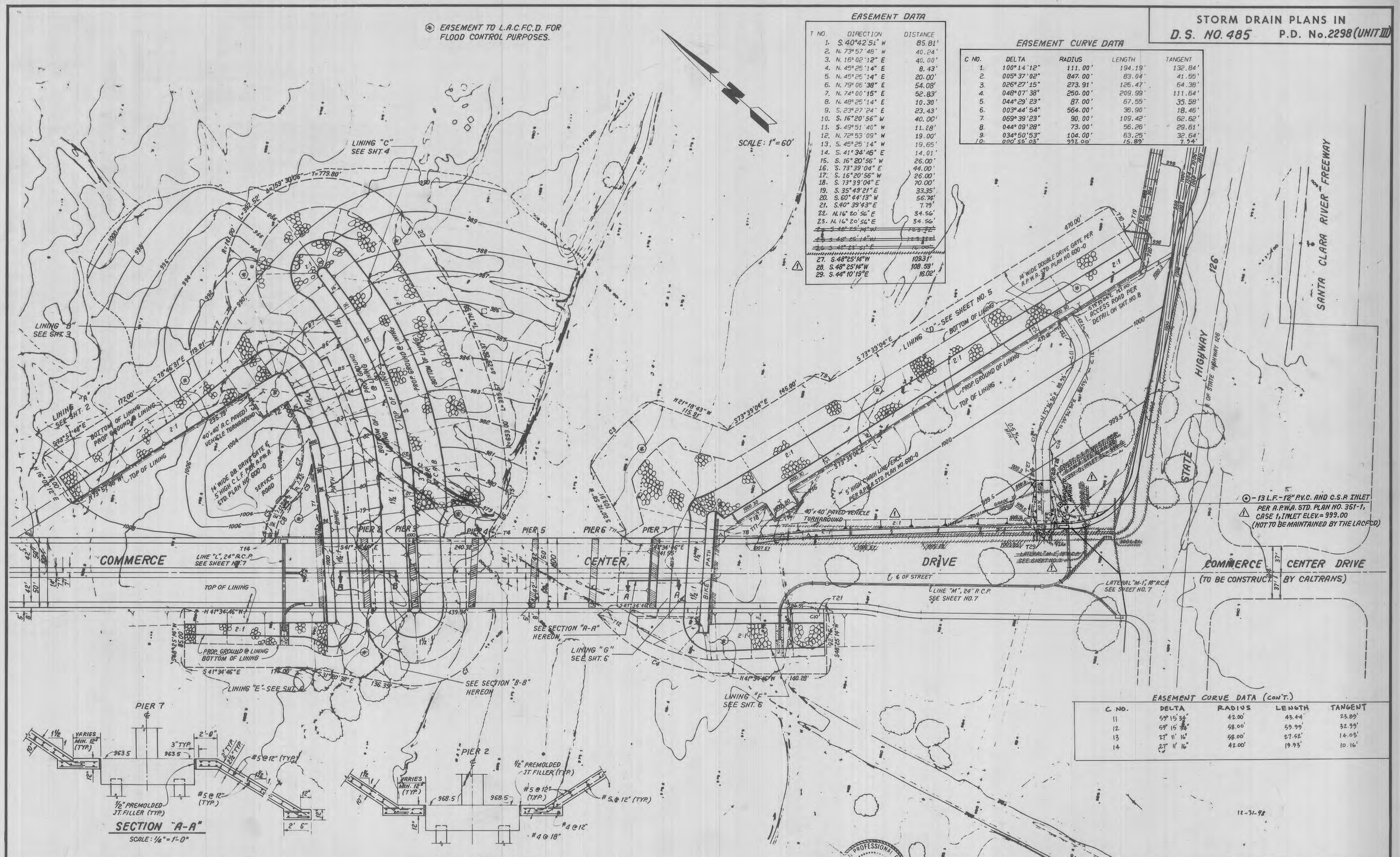
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 8 OF 9 SHTS

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. No. 2298 (UNIT III)



EASEMENT DATA

T NO.	DIRECTION	DISTANCE
1.	S. 40°42'51" W	85.81'
2.	N. 73°57'48" W	40.24'
3.	N. 16°02'12" E	40.00'
4.	N. 45°25'14" E	8.43'
5.	N. 45°25'14" E	20.00'
6.	N. 79°06'38" E	54.08'
7.	N. 74°00'15" E	52.83'
8.	N. 48°25'14" E	10.30'
9.	S. 23°27'24" E	23.43'
10.	S. 16°20'56" W	40.00'
11.	S. 49°51'40" W	11.28'
12.	N. 72°53'09" W	19.00'
13.	S. 45°25'14" W	19.65'
14.	S. 41°34'46" E	14.01'
15.	S. 16°20'56" W	26.00'
16.	S. 73°39'04" E	44.00'
17.	S. 16°20'56" W	26.00'
18.	S. 73°39'04" E	70.00'
19.	S. 35°49'21" E	33.35'
20.	S. 60°44'13" W	56.74'
21.	S. 40°39'43" E	7.79'
22.	N. 16°20'56" E	34.56'
23.	N. 16°20'56" E	34.56'
~~24.~~	~~S. 48°25'14" W~~	~~163.32'~~
~~25.~~	~~S. 48°25'14" W~~	~~123.32'~~
~~26.~~	~~S. 42°25'51" E~~	~~16.00'~~
27.	S. 48°25'14" W	109.31'
28.	S. 48°25'14" W	108.59'
29.	S. 44°10'19" E	16.02'

EASEMENT CURVE DATA

C NO.	DELTA	RADIUS	LENGTH	TANGENT
1.	100°14'12"	111.00'	194.19'	132.84'
2.	005°37'02"	847.00'	83.04'	41.55'
3.	026°27'15"	273.91'	126.47'	64.38'
4.	048°07'38"	250.00'	209.99'	111.64'
5.	044°29'23"	87.00'	67.55'	35.58'
6.	003°44'54"	564.00'	36.90'	18.46'
7.	069°39'23"	90.00'	109.42'	62.62'
8.	044°09'28"	73.00'	56.26'	29.61'
9.	034°50'53"	104.00'	63.25'	32.64'
10.	000°55'03"	992.00'	15.89'	7.94'

EASEMENT CURVE DATA (CON'T.)

C NO.	DELTA	RADIUS	LENGTH	TANGENT
11	59° 15' 34"	42.00'	43.44'	23.89'
12	59° 15' 34"	58.00'	59.99'	32.99'
13	27° 11' 16"	58.00'	27.52'	14.03'
14	27° 11' 16"	42.00'	19.93'	10.16'

12-31-98

SECTION "A-A"
SCALE: 1/4" = 1'-0"

SECTION "B-B"
SCALE: 1/4" = 1'-0"

NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	REVISED EASEMENT DATA. REVISED N'LY CURB LOC. @ C.C.D. & HWY. 126 & GRADING.	42890	B. Hammett	7/3/99

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 9-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
CHECKED BY: R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

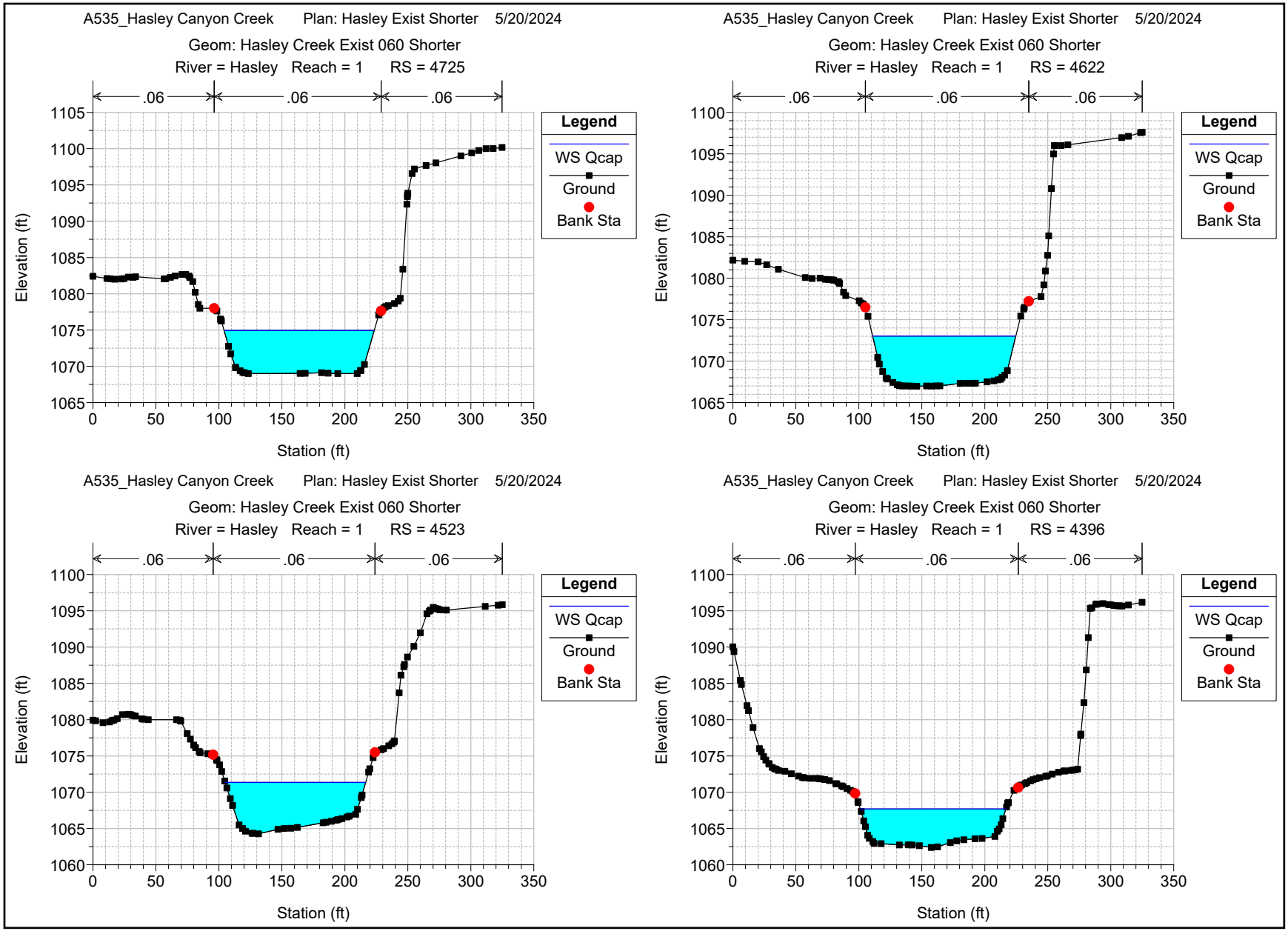
SHT 9 OF 9 SHTS

W.O. 1020-252-A

Appendix E – HEC-RAS Existing Condition Output

HEC-RAS Plan: Hasley Exist Short River: Hasley Reach: 1 Profile: Qcap

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	4725	Qcap	5900.00	1069.00	1074.95	1073.71	1076.25	0.014977	9.17	643.10	119.28	0.70
1	4622	Qcap	5900.00	1066.97	1073.02	1072.08	1074.54	0.018031	9.89	596.41	113.66	0.76
1	4523	Qcap	5900.00	1064.26	1071.35	1070.24	1072.81	0.016555	9.71	607.71	111.53	0.73
1	4396	Qcap	5900.00	1062.38	1067.69	1067.69	1069.86	0.033031	11.81	499.72	115.54	1.00
1	4294	Qcap	5900.00	1059.23	1062.79	1062.79	1064.06	0.039446	9.06	651.42	259.84	1.01
1	4255	Qcap	5900.00	1055.66	1060.30	1060.30	1061.43	0.040298	8.51	693.16	308.55	1.00
1	4207	Qcap	5900.00	1045.48	1051.19	1051.19	1052.40	0.039345	8.81	669.77	277.49	1.00
1	4164	Qcap	5900.00	1036.63	1045.02	1041.32	1045.23	0.002319	3.72	1586.76	282.88	0.28
1	4133	Qcap	5900.00	1034.00	1045.04	1038.18	1045.16	0.000685	2.79	2114.31	229.91	0.16
1	4100.5	Qcap	5900.00	1033.00	1044.32	1040.89	1045.04	0.005702	6.83	864.31	118.66	0.45
1	4078	Qcap	5900.00	1033.00	1044.05	1041.20	1044.88	0.008032	7.32	806.09	129.31	0.52
1	4055.5	Qcap	5900.00	1033.00	1043.89	1040.82	1044.69	0.007666	7.15	825.52	131.62	0.50
1	3940.5	Qcap	5900.00	1031.00	1041.86	1040.21	1043.19	0.024108	9.23	639.39	166.37	0.83
1	3844	Qcap	5900.00	1030.07	1039.23	1038.46	1040.94	0.021704	10.51	561.31	111.83	0.83
1	3747	Qcap	5900.00	1029.14	1037.74	1036.86	1038.82	0.018326	8.33	708.24	177.82	0.74
1	3650	Qcap	5900.00	1028.00	1035.86	1035.17	1036.91	0.019720	8.23	716.65	193.14	0.75
1	3564	Qcap	5900.00	1027.00	1035.38	1032.70	1035.91	0.005479	5.86	1007.68	170.31	0.42
1	3465	Qcap	5900.00	1026.00	1033.78	1031.97	1035.03	0.011771	9.00	655.57	102.52	0.63
1	3369	Qcap	5900.00	1025.00	1032.27	1031.52	1033.42	0.018768	8.59	686.95	167.83	0.75
1	3304	Qcap	5900.00	1023.52	1031.21	1030.34	1032.05	0.015990	7.38	799.00	217.62	0.68
1	3190.5	Qcap	5900.00	1022.00	1029.94	1028.34	1030.64	0.009311	6.69	882.47	203.91	0.54
1	3105	Qcap	5900.00	1021.00	1028.57	1026.85	1029.68	0.011505	8.48	696.04	117.90	0.62
1	3020	Qcap	5900.00	1019.58	1027.86	1025.49	1028.77	0.008338	7.68	768.65	117.56	0.53
1	2934	Qcap	5900.00	1018.21	1024.97	1024.90	1027.42	0.030566	12.54	470.62	91.59	0.98
1	2820.5	Qcap	5900.00	1016.37	1022.13	1021.79	1023.97	0.026073	10.86	543.41	118.32	0.89
1	2748	Qcap	5900.00	1015.00	1020.97	1020.08	1022.21	0.017961	8.94	660.23	147.34	0.74
1	2675.5	Qcap	5900.00	1014.00	1019.87	1019.04	1020.86	0.017003	7.97	740.32	188.21	0.71
1	2560.5	Qcap	5900.00	1012.00	1017.73	1017.21	1018.60	0.021725	7.49	788.08	266.35	0.77
1	2476	Qcap	5900.00	1010.49	1016.34	1015.42	1017.03	0.014574	6.69	881.49	261.92	0.64
1	2391	Qcap	5900.00	1009.71	1014.77	1014.10	1015.58	0.018500	7.24	815.09	257.31	0.72
1	2305	Qcap	5900.00	1007.29	1013.61	1012.41	1014.24	0.012186	6.33	932.80	354.09	0.59
1	2190	Qcap	5900.00	1004.74	1012.63	1010.17	1013.25	0.006352	6.27	940.47	195.42	0.46
1	2122	Qcap	5900.00	1004.00	1010.97	1009.92	1012.49	0.017021	9.87	597.64	132.74	0.74
1	2054	Qcap	5900.00	1003.18	1008.90	1008.82	1010.86	0.031240	11.23	525.28	145.15	0.97
1	1940	Qcap	5900.00	1001.61	1007.20	1006.63	1008.22	0.016244	8.33	760.47	239.10	0.71
1	1872	Qcap	5900.00	1000.95	1006.26	1005.55	1006.97	0.013555	7.29	916.52	385.44	0.64
1	1804	Qcap	5900.00	999.71	1004.39	1004.39	1005.58	0.031418	9.39	699.56	362.83	0.93
1	1689	Qcap	5900.00	997.53	1003.81	1001.40	1004.12	0.004022	4.52	1336.24	472.03	0.36
1	1584	Qcap	5900.00	995.01	1003.61	1000.05	1003.85	0.002138	3.94	1518.17	616.78	0.27
1	1518	Qcap	5900.00	995.00	1002.99	999.80	1003.52	0.004442	5.83	1011.93	337.65	0.40
1	1500		Lat Struct									
1	1448	Qcap	5900.00	993.26	1001.55	999.95	1002.92	0.013127	9.39	628.59	101.05	0.66
1	1294	Qcap	5900.00	991.00	999.93	997.92	1001.11	0.010713	8.70	678.39	105.03	0.60
1	1189	Qcap	5900.00	990.00	999.54	995.80	1000.23	0.004926	6.64	888.32	111.60	0.42
1	1132		Bridge									
1	1080	Qcap	5900.00	980.01	992.97	992.97	995.27	0.031906	12.16	485.07	510.70	1.00
1	1061	Qcap	5900.00	980.00	993.72	984.07	993.74	0.000117	1.20	4914.76	512.90	0.07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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4725
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4622
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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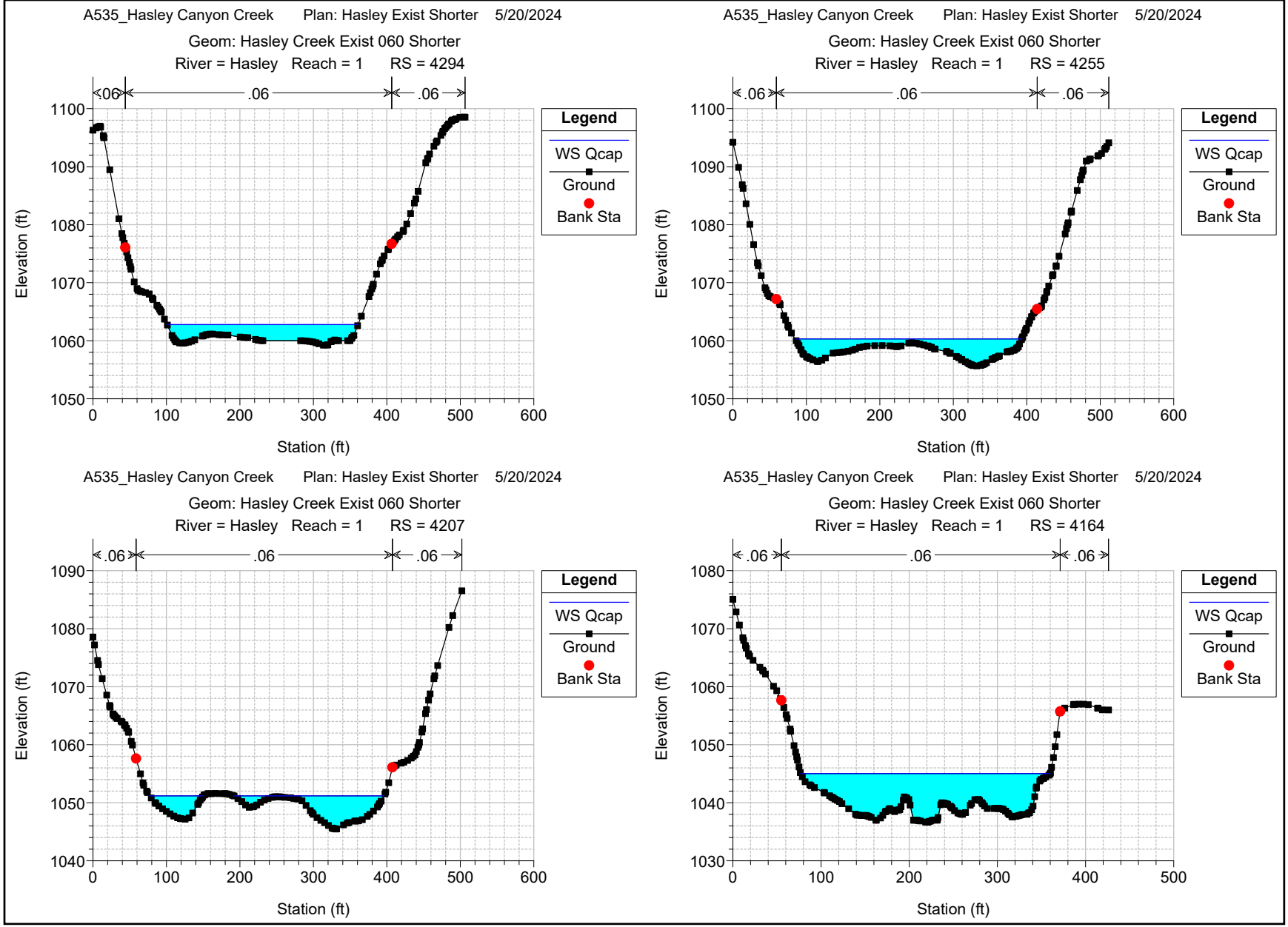
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4523
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4396
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4255
.06
.06
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Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4207
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4164
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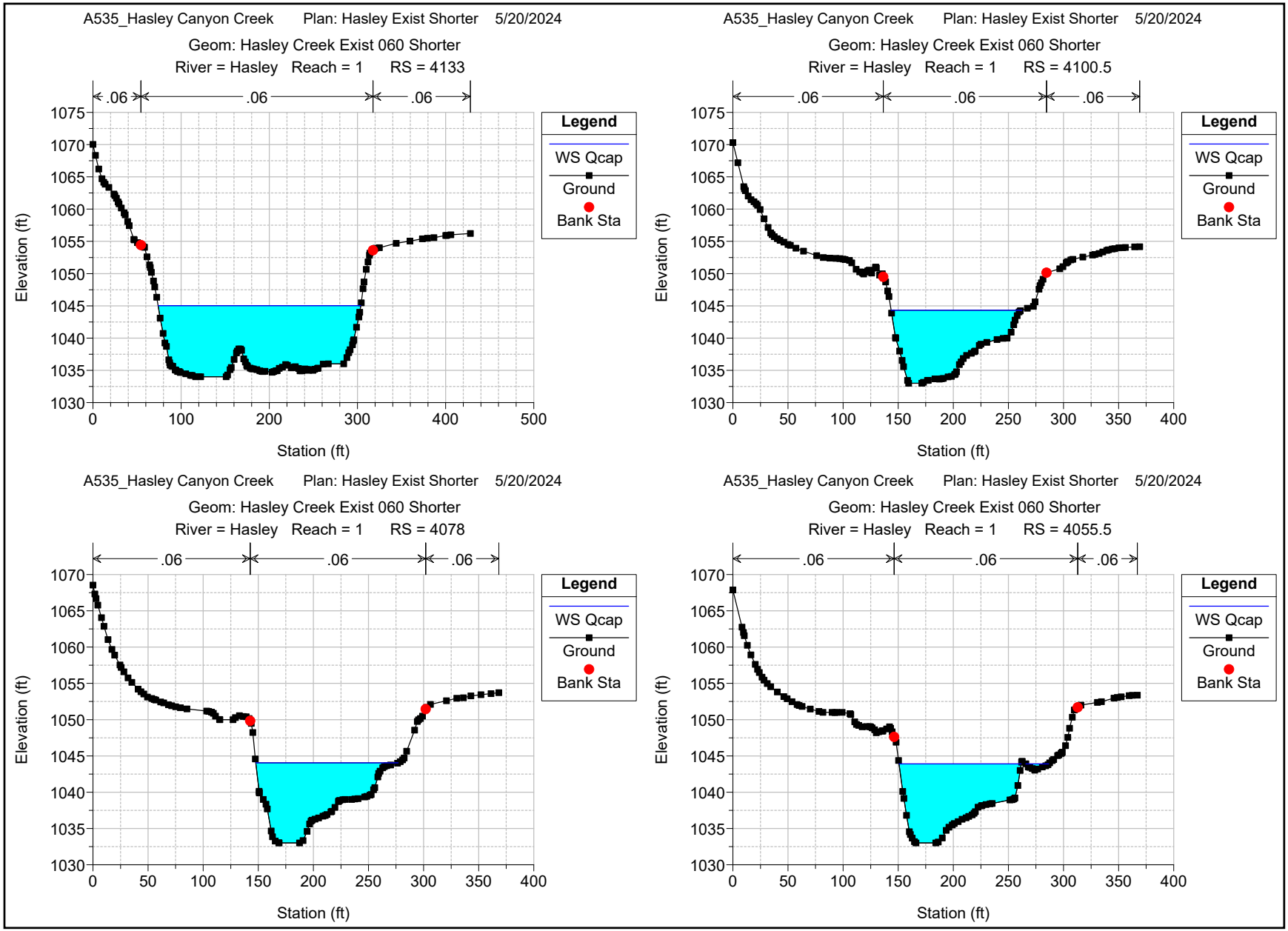
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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River = Hasley Reach = 1 RS = 4133
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Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4100.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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.06
.06
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Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4055.5
.06
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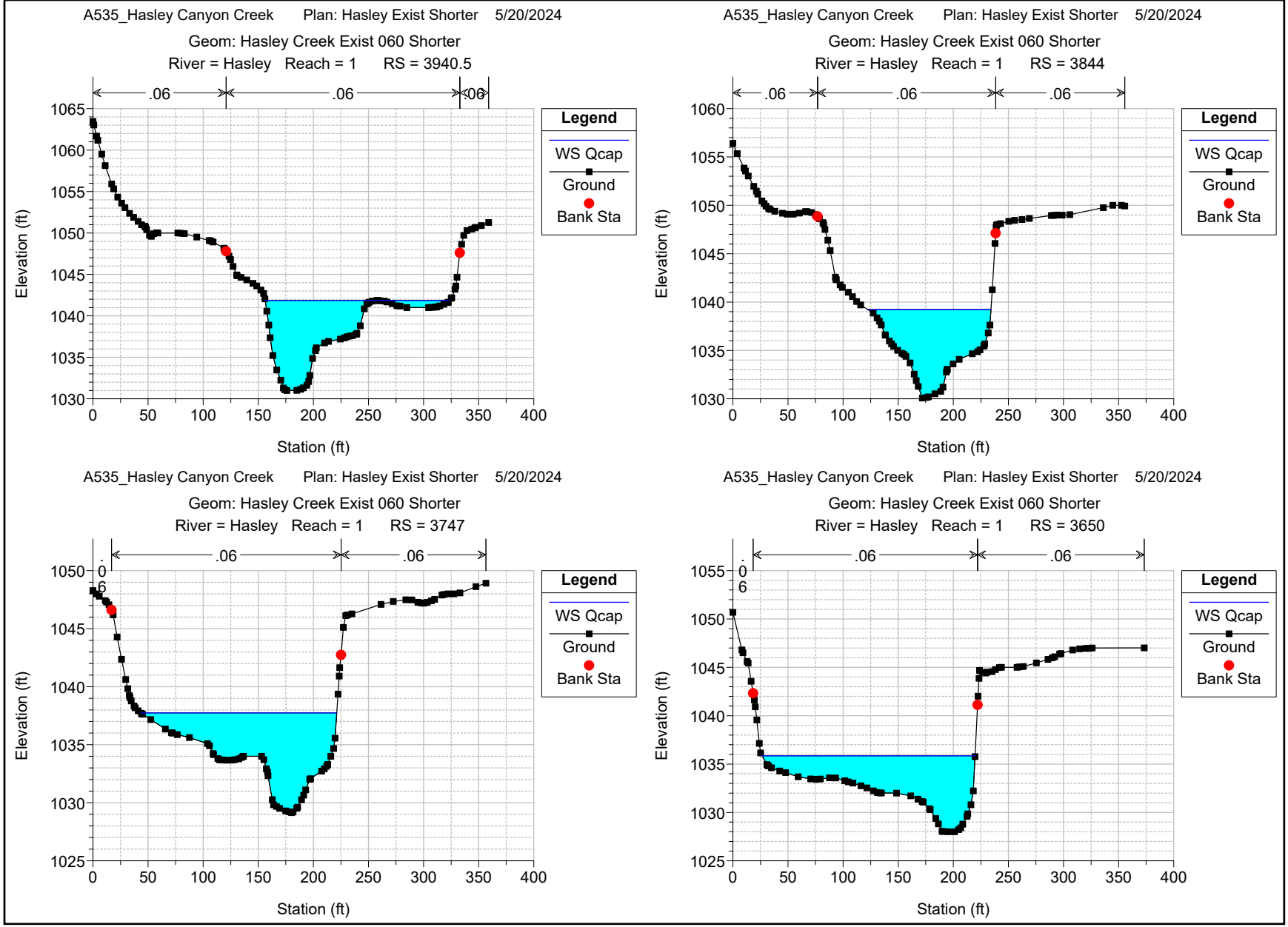
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3844
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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River = Hasley Reach = 1 RS = 3747
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
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.06
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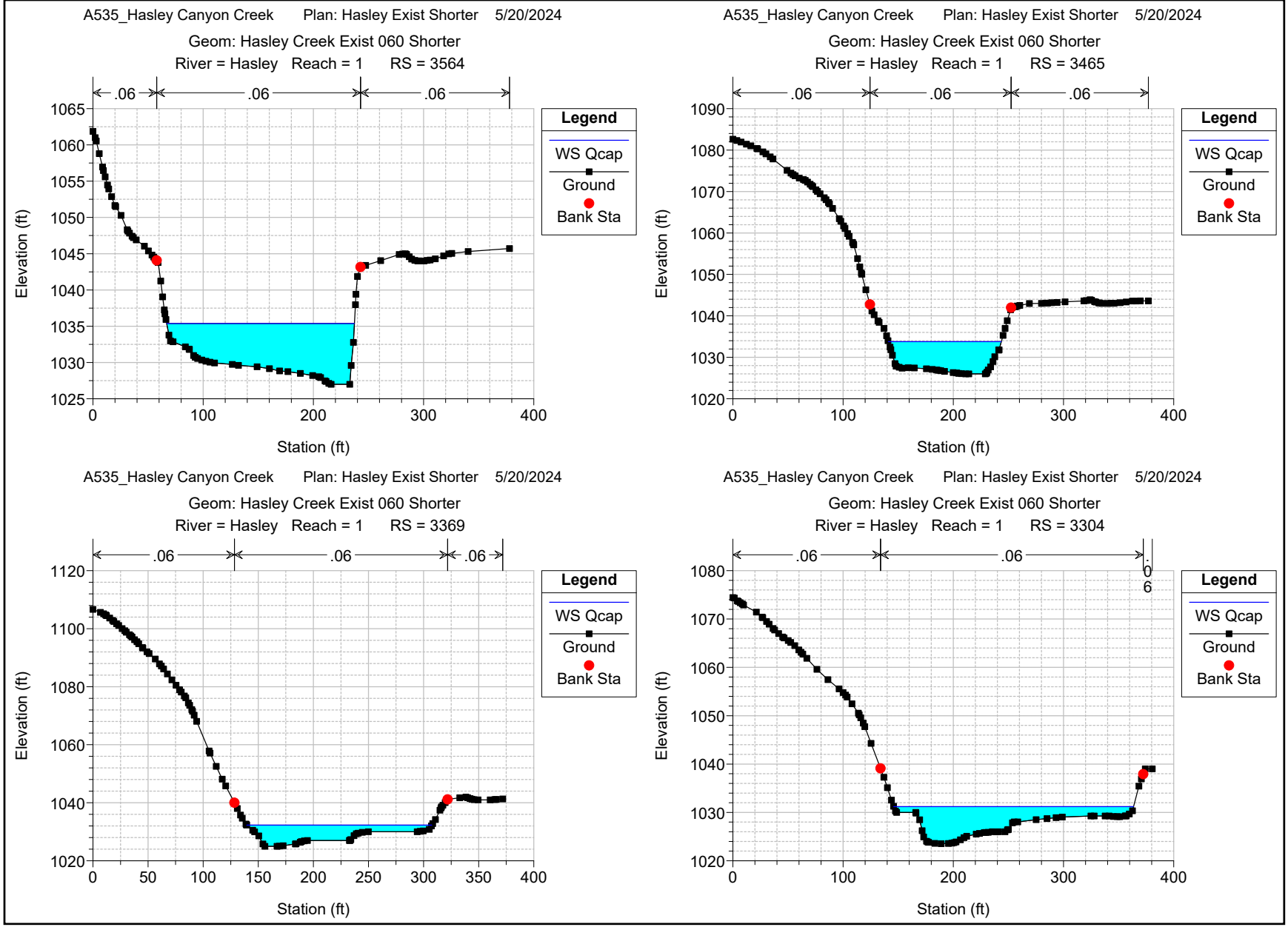
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3564
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.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3465
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3369
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3304
.06
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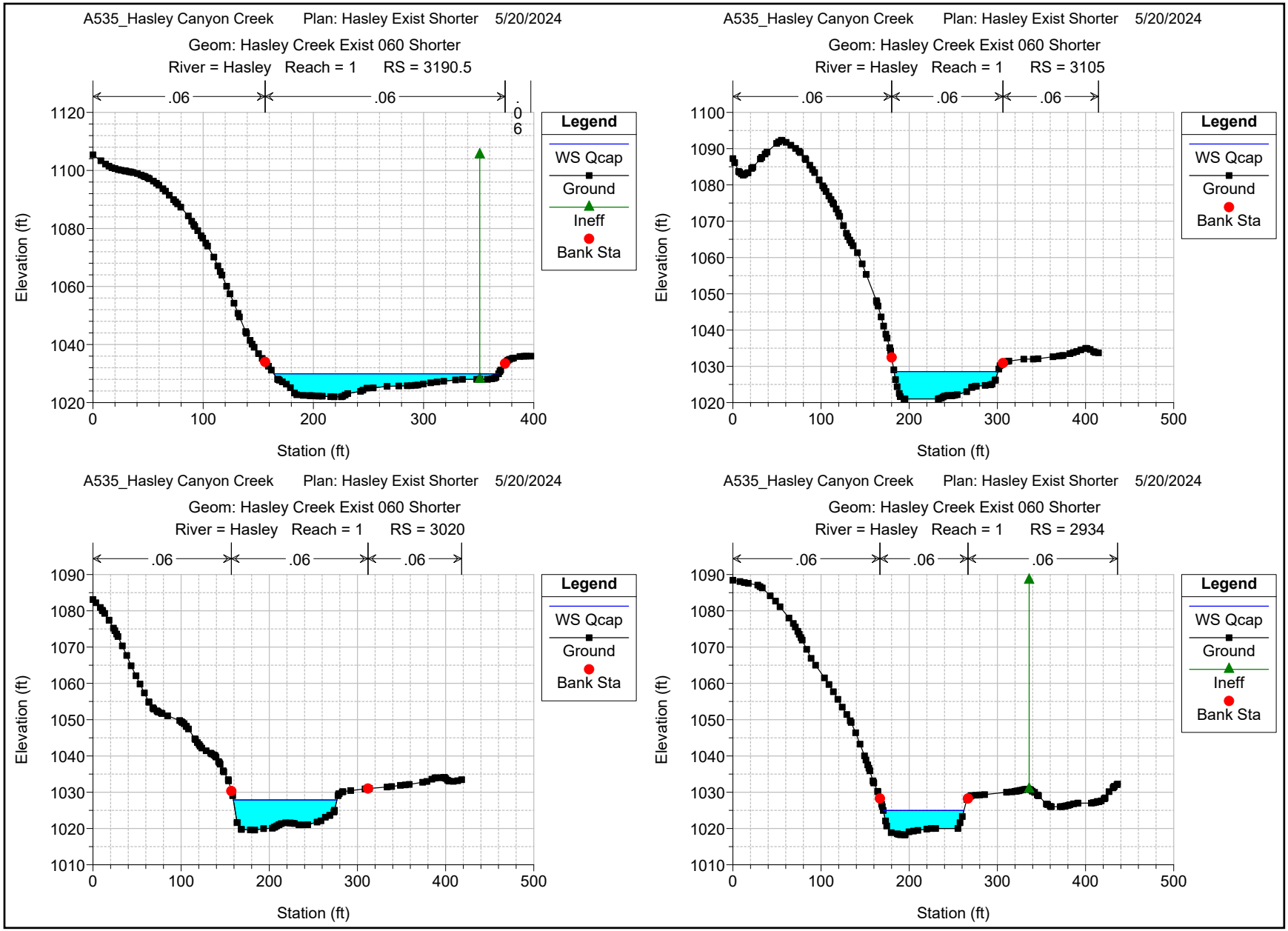
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3190.5
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3105
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3020
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
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.06
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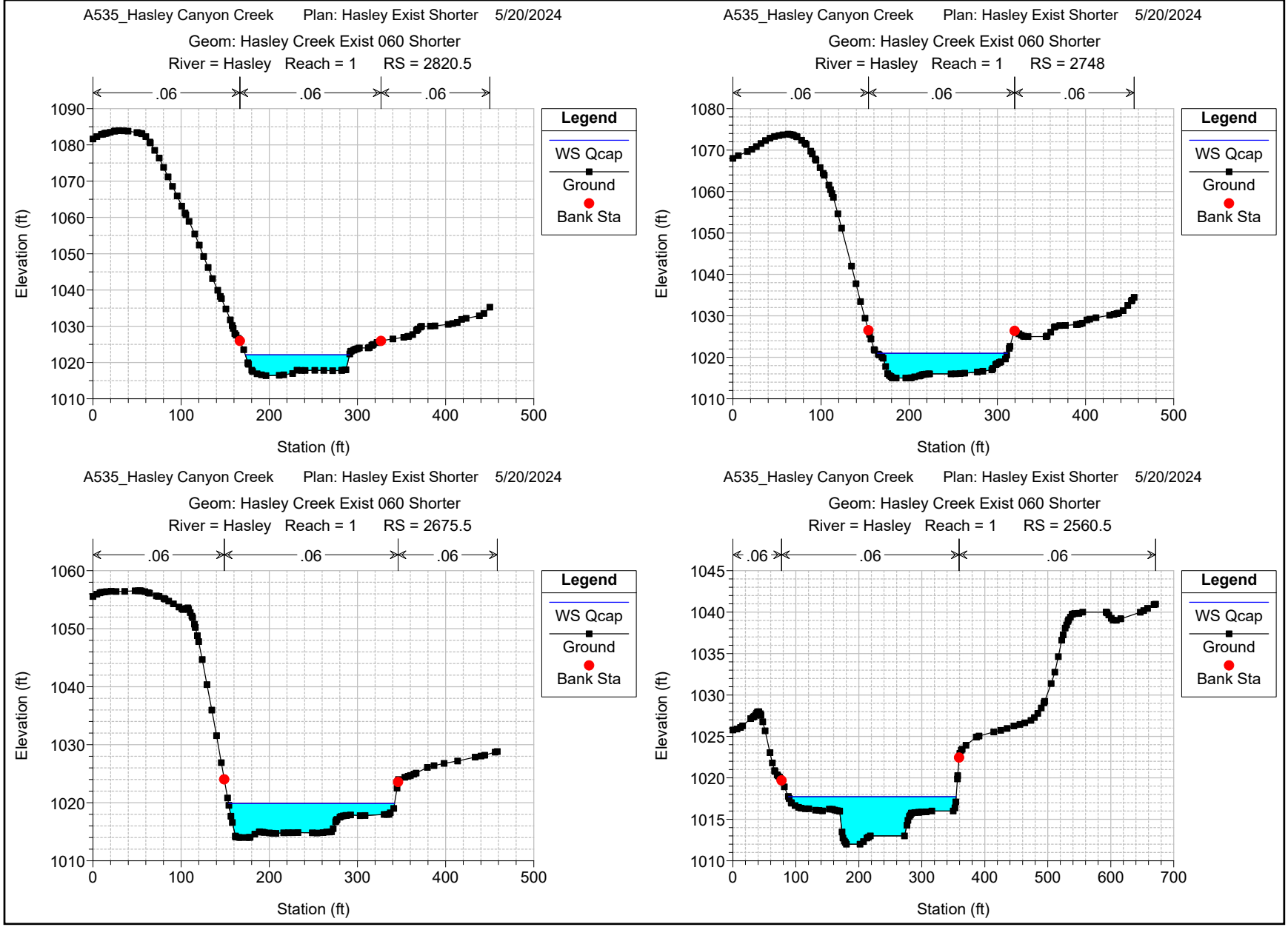
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2748
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2675.5
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.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2560.5
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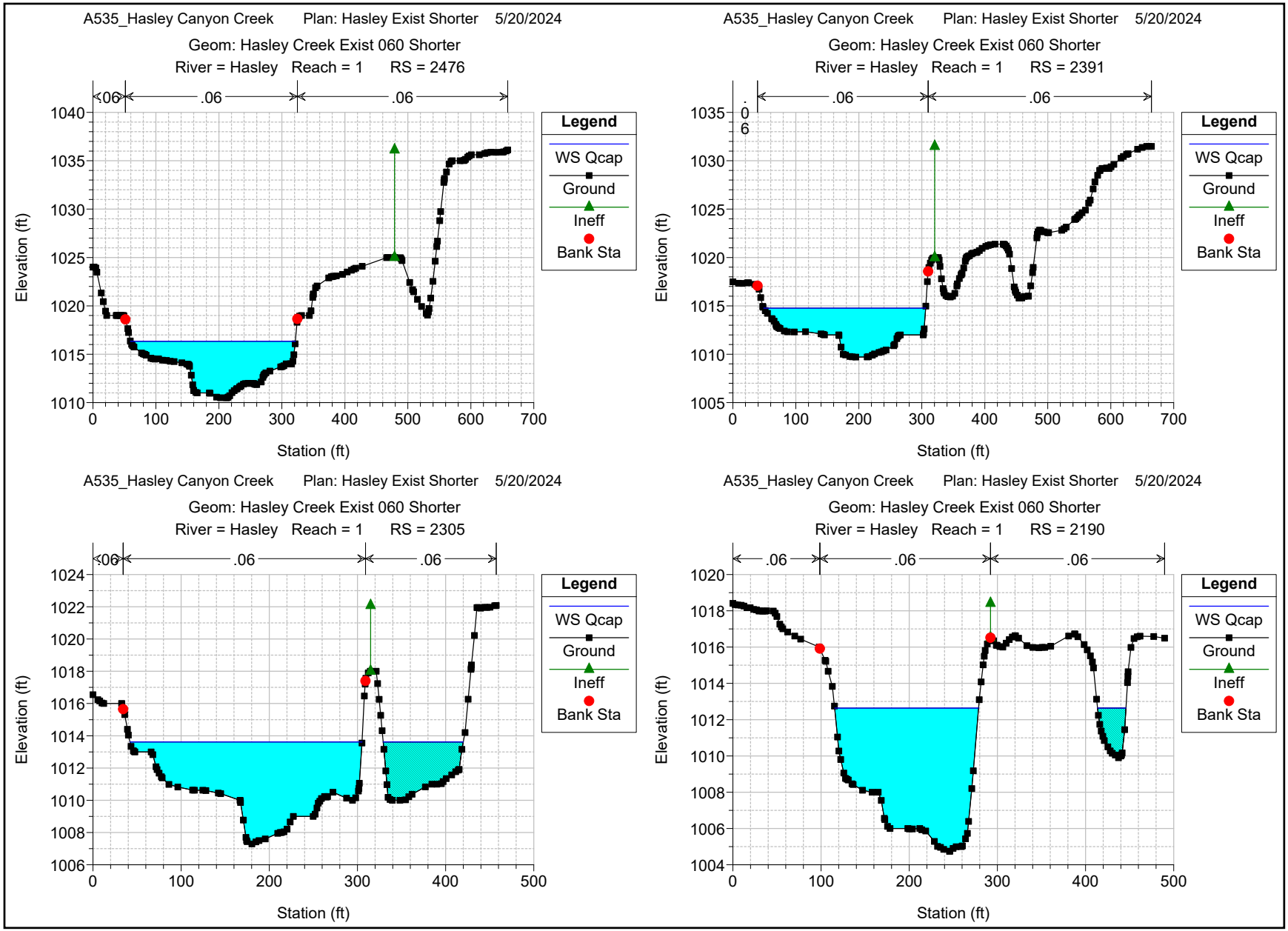
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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River = Hasley Reach = 1 RS = 2476
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Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2391
.06
.06
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Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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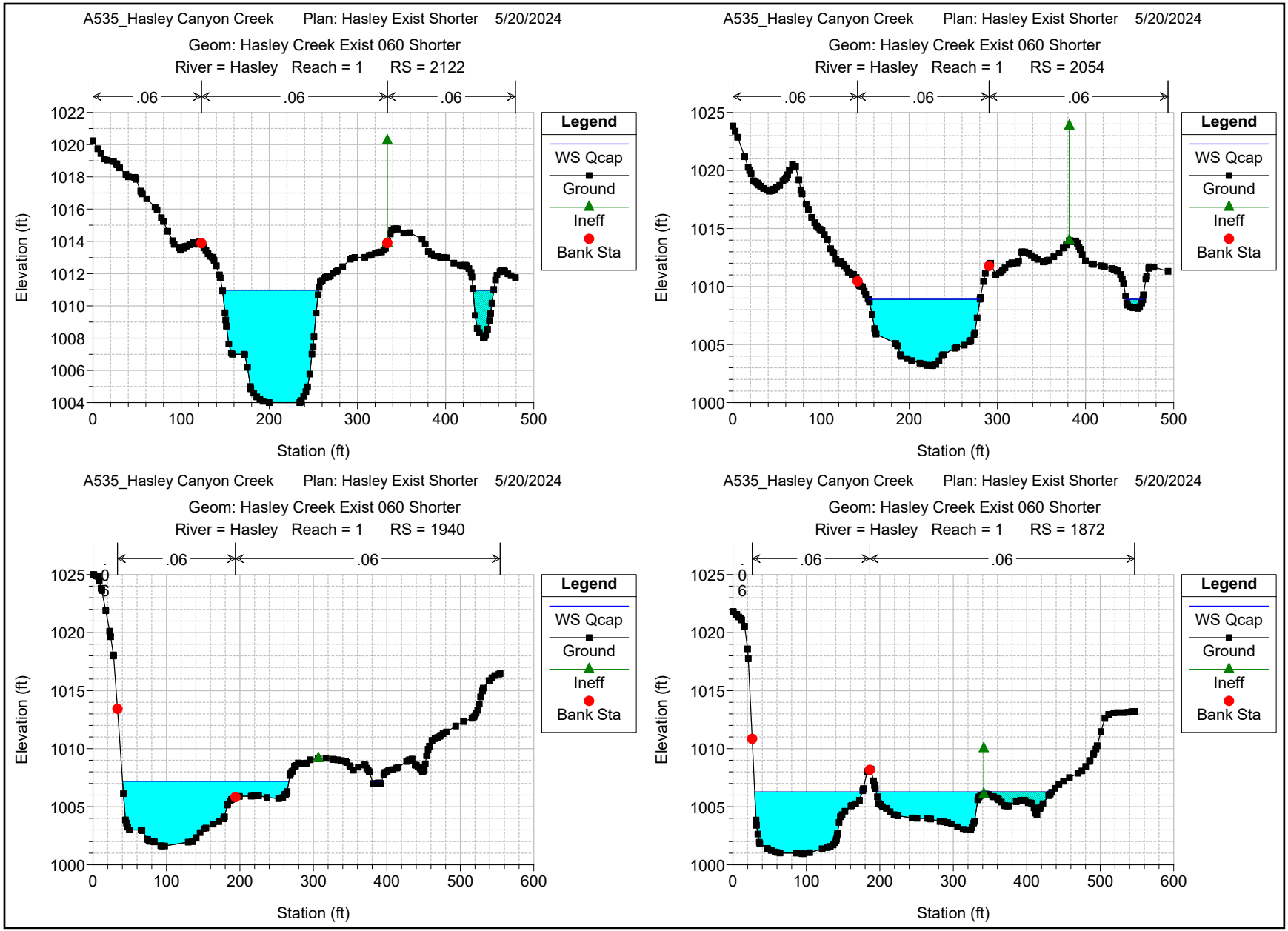
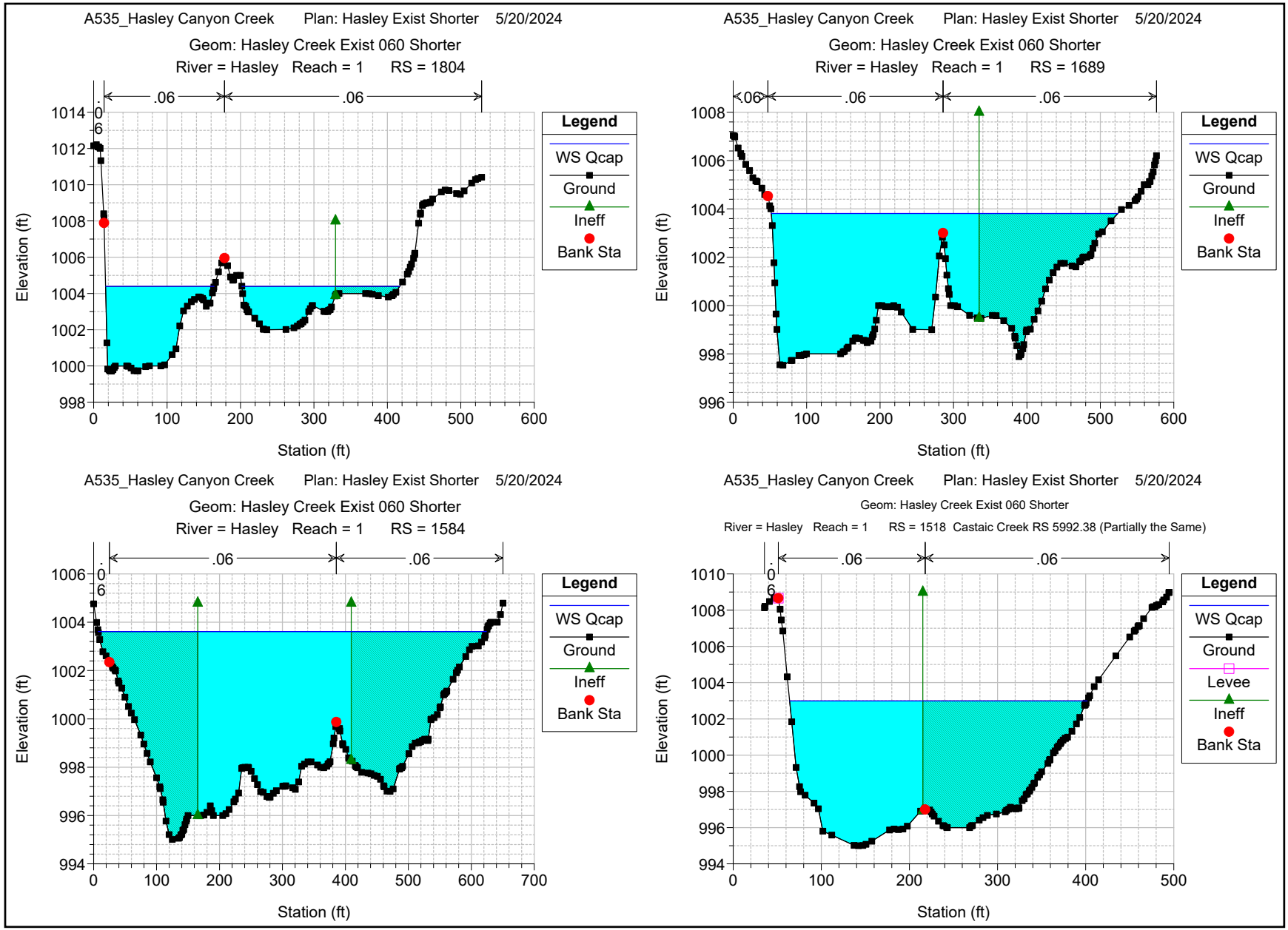
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2305
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2190
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2122
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2054
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1940
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1872
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1804
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1689
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1584
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1518 Castaic Creek RS 5992.38 (Partially the Same)
.06
.06
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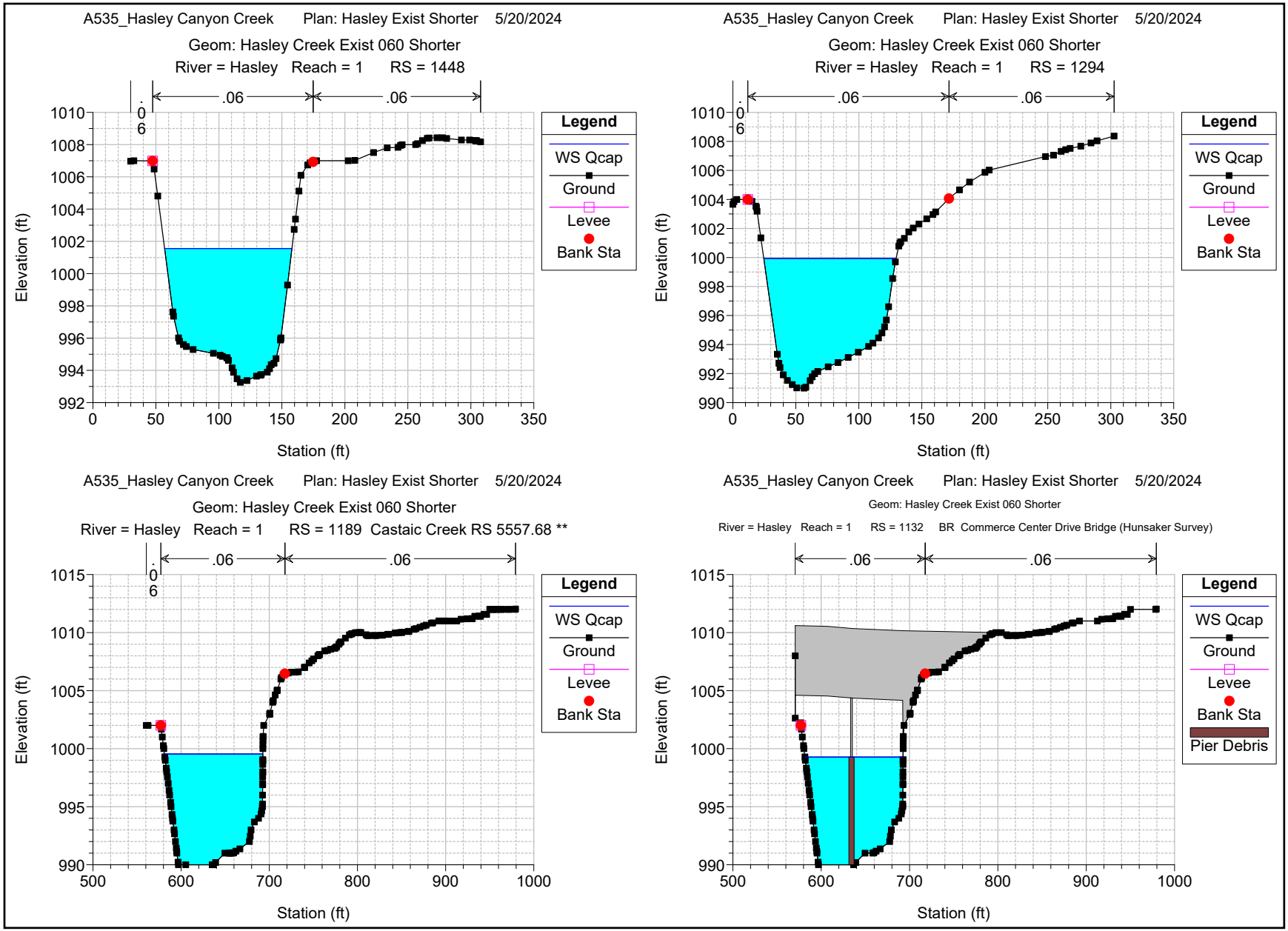
Legend
WS Qcap
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)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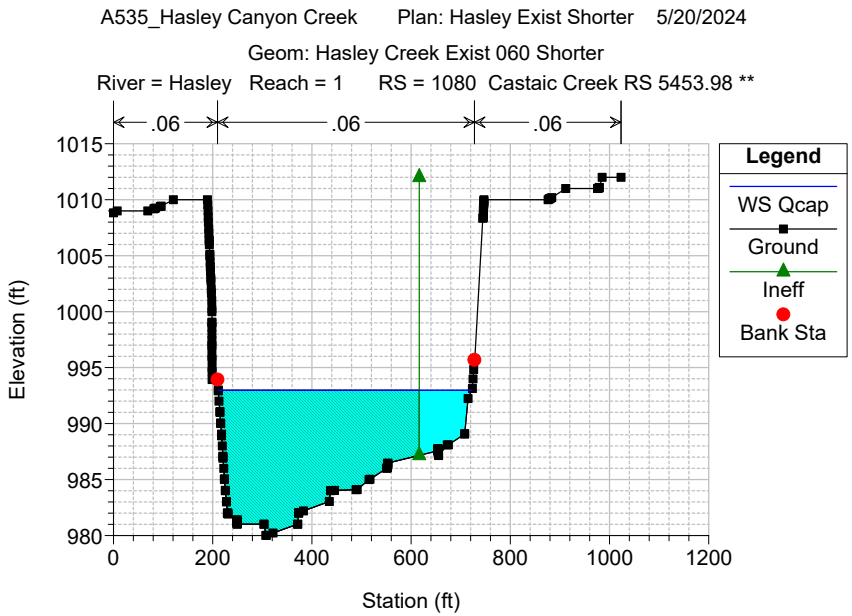
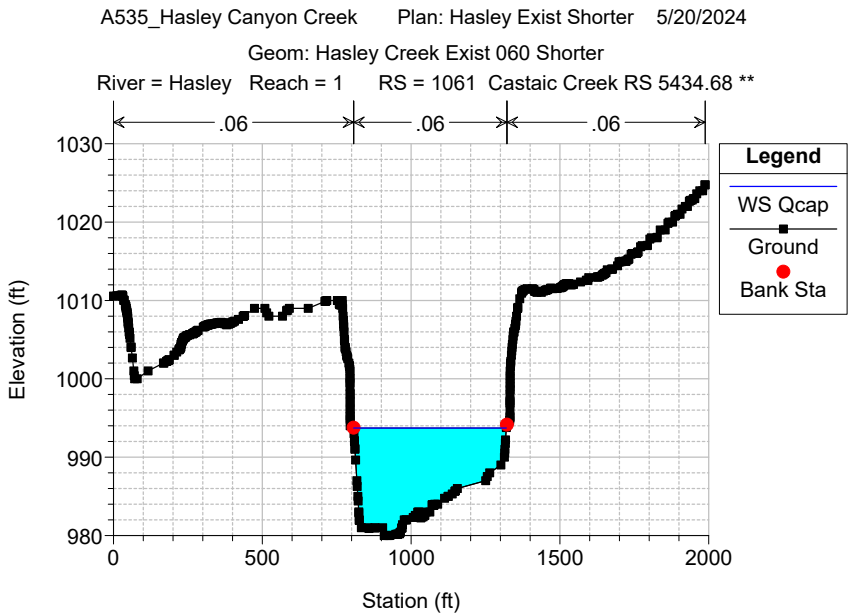
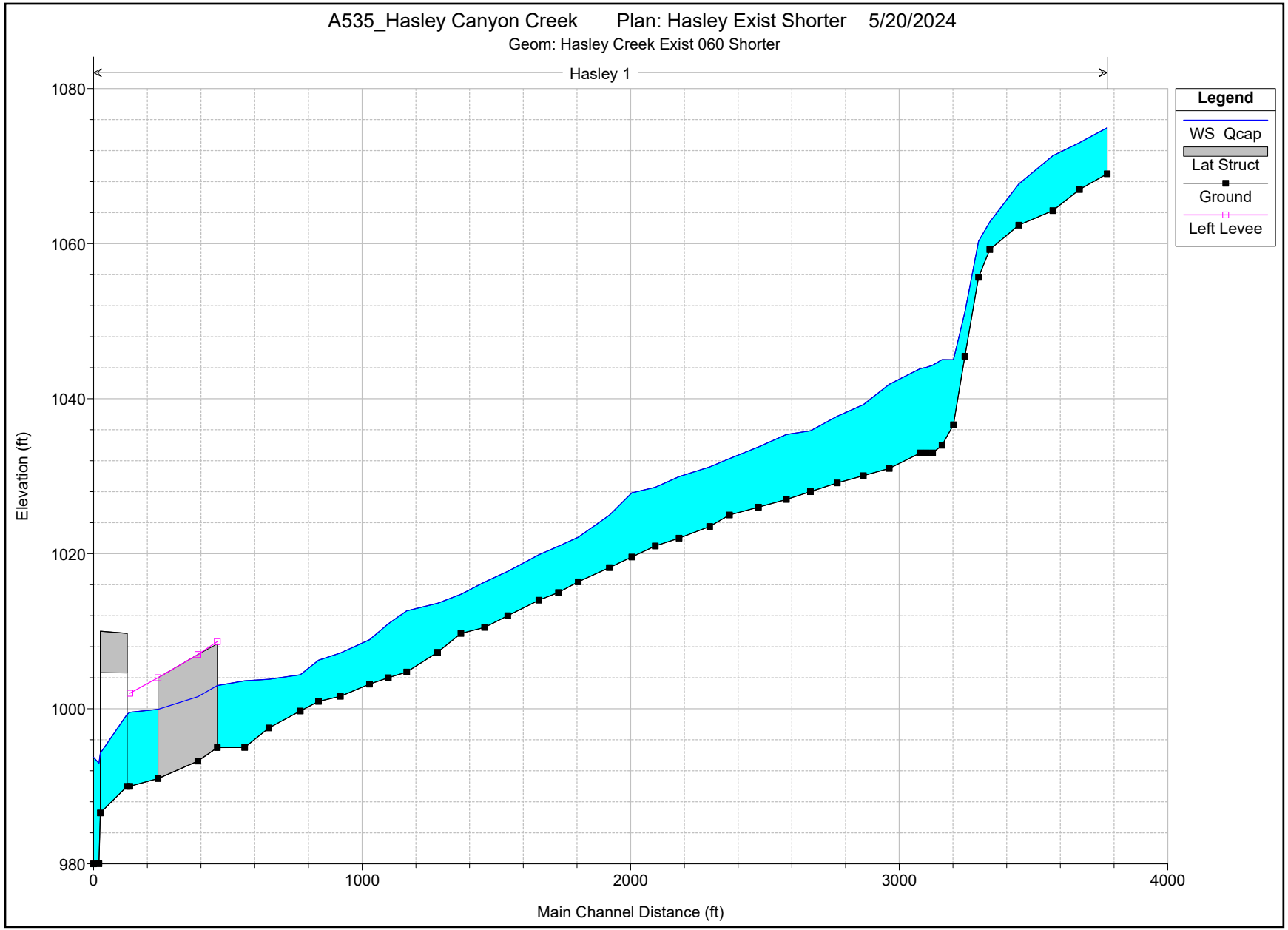
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1448
.06
.06
.06
Legend
WS Qcap
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1294
.06
.06
.06
Legend
WS Qcap
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1189 Castaic Creek RS 5557.68 **
.06
.06
.06
Legend
WS Qcap
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1132 BR Commerce Center Drive Bridge (Hunsaker Survey)
.06
.06
Legend
WS Qcap
Ground
Levee
Bank Sta
Pier Debris
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1080 Castaic Creek RS 5453.98 **
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1015
1010
1005
1000
995
990
985
980
0
200
400
600
800
1000
1200


A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1061 Castaic Creek RS 5434.68 **
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
1030
1020
1010
1000
990
980
0
500
1000
1500
2000

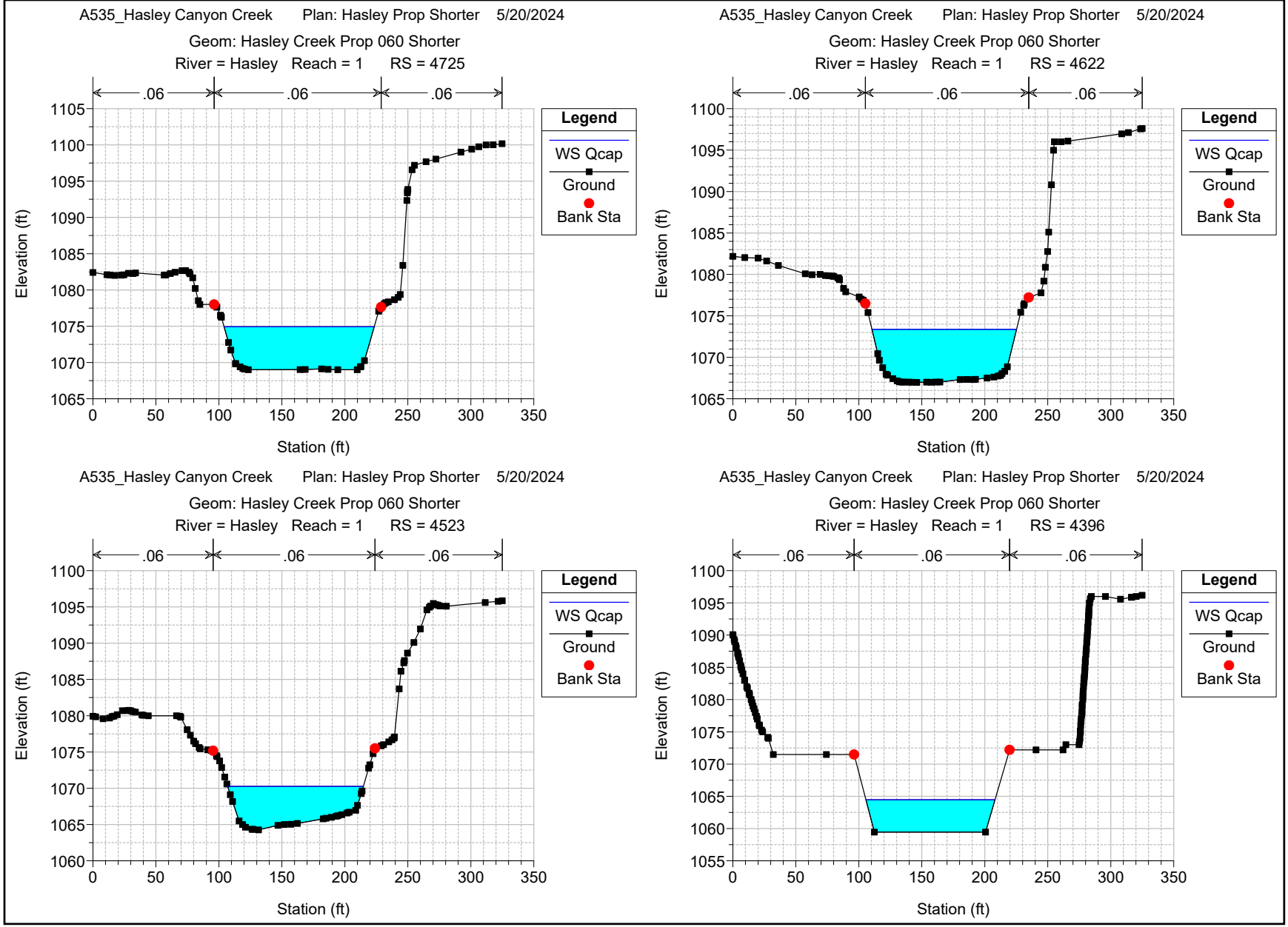

A535_Hasley Canyon Creek Plan: Hasley Exist Shorter 5/20/2024
Geom: Hasley Creek Exist 060 Shorter
Hasley 1
Legend
WS Qcap
Lat Struct
Ground
Left Levee
Elevation (ft)
1080
1060
1040
1020
1000
980
0
1000
2000
3000
4000
Main Channel Distance (ft)

PACE
Advanced Water Engineering

Appendix F – HEC-RAS Proposed Condition Output

HEC-RAS Plan: Hasley Prop Short River: Hasley Reach: 1 Profile: Qcap

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	4725	Qcap	5900.00	1069.00	1074.93		1076.25	0.015085	9.20	641.61	119.23	0.70
1	4622	Qcap	5900.00	1066.97	1073.38		1074.71	0.014708	9.26	636.90	114.79	0.69
1	4523	Qcap	5900.00	1064.26	1070.26	1070.26	1072.53	0.032618	12.09	488.21	107.77	1.00
1	4396	Qcap	5900.00	1059.45	1064.47	1064.47	1066.83	0.033041	12.32	478.74	102.49	1.01
1	4380.00*	Qcap	5900.00	1056.12	1061.39	1061.39	1063.83	0.032698	12.53	470.86	97.48	1.01
1	4364.00*	Qcap	5900.00	1052.78	1058.21	1058.21	1060.71	0.032534	12.67	465.55	94.25	1.01
1	4348.00*	Qcap	5900.00	1049.45	1055.05	1055.05	1057.61	0.032355	12.82	460.17	91.00	1.01
1	4332.00*	Qcap	5900.00	1046.12	1051.92	1051.92	1054.53	0.032166	12.97	454.72	87.75	1.00
1	4316.00*	Qcap	5900.00	1042.78	1048.78	1048.78	1051.46	0.032041	13.14	448.92	84.52	1.01
1	4300	Qcap	5900.00	1039.45	1045.68	1045.68	1048.44	0.031875	13.33	442.57	80.93	1.01
1	4291.00*	Qcap	5900.00	1036.45	1042.77	1042.77	1045.54	0.031735	13.36	441.66	80.28	1.00
1	4282	Qcap	5900.00	1033.45	1042.75		1043.93	0.008721	8.68	679.67	88.21	0.55
1	4280.50*	Qcap	5900.00	1033.45	1042.90		1043.77	0.006130	7.46	790.77	99.56	0.47
1	4279.00*	Qcap	5900.00	1033.45	1042.99		1043.66	0.004604	6.59	895.52	110.16	0.41
1	4277.50*	Qcap	5900.00	1033.45	1043.04		1043.58	0.003597	5.91	998.47	120.68	0.36
1	4276	Qcap	5900.00	1033.45	1043.08		1043.53	0.002906	5.38	1097.17	130.54	0.33
1	4274.50*	Qcap	5900.00	1033.45	1043.12		1043.47	0.002267	4.80	1227.89	144.22	0.29
1	4273.00*	Qcap	5900.00	1033.45	1043.14		1043.44	0.001827	4.36	1354.40	157.23	0.26
1	4271.50*	Qcap	5900.00	1033.45	1043.16		1043.40	0.001505	3.99	1480.41	170.24	0.24
1	4270	Qcap	5900.00	1033.45	1043.17		1043.38	0.001261	3.67	1606.15	183.26	0.22
1	4265	Qcap	5900.00	1037.00	1042.87		1043.33	0.005024	5.44	1083.58	195.36	0.41
1	4258	Qcap	5900.00	1037.00	1042.87		1043.27	0.004329	5.06	1164.93	209.69	0.38
1	4157	Qcap	5900.00	1035.56	1042.93		1043.07	0.001054	2.93	2013.77	285.24	0.19
1	4055.5	Qcap	5900.00	1033.00	1042.33		1042.78	0.008007	5.34	1104.31	291.96	0.48
1	3940.5	Qcap	5900.00	1031.00	1040.67	1040.16	1041.52	0.023000	7.39	798.43	282.70	0.78
1	3844	Qcap	5900.00	1030.00	1038.39		1039.14	0.018028	6.92	852.00	281.35	0.70
1	3747	Qcap	5900.00	1029.17	1037.38		1037.87	0.008942	5.61	1050.92	281.04	0.51
1	3650	Qcap	5900.00	1028.00	1035.44	1035.08	1036.39	0.027795	7.82	754.23	287.38	0.85
1	3554	Qcap	5900.00	1027.00	1033.20		1034.26	0.016585	8.25	714.80	168.82	0.71
1	3440.5	Qcap	5900.00	1025.32	1032.32		1032.74	0.008564	5.21	1133.12	329.61	0.50
1	3372	Qcap	5900.00	1025.00	1030.39	1030.34	1031.54	0.037776	8.63	683.47	283.00	0.98
1	3304	Qcap	5900.00	1023.52	1029.60		1030.17	0.011401	6.07	972.71	278.84	0.57
1	3190.5	Qcap	5900.00	1022.00	1028.89		1029.27	0.005153	4.97	1186.36	251.47	0.40
1	3105	Qcap	5900.00	1021.00	1027.90		1028.62	0.015331	6.78	870.78	261.90	0.66
1	3020	Qcap	5900.00	1019.68	1027.08		1027.56	0.008426	5.55	1062.48	274.61	0.50
1	2934	Qcap	5900.00	1018.19	1024.93	1024.86	1026.17	0.037110	8.96	658.43	253.27	0.98
1	2820.5	Qcap	5900.00	1016.37	1021.89		1023.14	0.020092	8.95	659.33	159.75	0.78
1	2748	Qcap	5900.00	1015.00	1021.00		1021.80	0.014273	7.15	825.64	217.55	0.65
1	2675.5	Qcap	5900.00	1014.00	1019.83		1020.62	0.013165	7.13	827.09	205.07	0.63
1	2560.5	Qcap	5900.00	1012.00	1017.59	1017.48	1018.71	0.034906	8.48	695.90	278.62	0.95
1	2476	Qcap	5900.00	1010.49	1016.24		1016.84	0.011364	6.21	949.96	262.14	0.58
1	2391	Qcap	5900.00	1009.71	1015.12		1015.80	0.012769	6.62	890.92	243.40	0.61
1	2305.5	Qcap	5900.00	1007.88	1014.80	1012.35	1015.18	0.004743	4.94	1194.60	240.85	0.39
1	2250		Bridge									
1	2190.5	Qcap	5900.00	1006.00	1011.35		1012.14	0.014527	7.16	824.10	220.77	0.65
1	2122	Qcap	5900.00	1004.00	1009.79		1010.73	0.018918	7.78	758.49	218.44	0.74
1	2054	Qcap	5900.00	1003.00	1008.30		1009.25	0.019280	7.82	754.87	219.27	0.74
1	1940.5	Qcap	5900.00	1001.76	1007.32		1007.95	0.009805	6.34	930.78	222.69	0.55
1	1872	Qcap	5900.00	1000.96	1005.58	1005.15	1006.66	0.023747	8.34	707.32	217.80	0.82
1	1804	Qcap	5900.00	999.71	1003.87		1005.01	0.024875	8.57	688.82	211.20	0.84
1	1688.62	Qcap	5900.00	997.50	1002.24		1002.93	0.012102	6.68	882.58	228.47	0.60
1	1584	Qcap	5900.00	995.00	1002.13		1002.33	0.002303	3.61	1635.96	307.82	0.28
1	1518	Qcap	5900.00	995.00	1000.76		1001.48	0.010268	7.10	886.71	224.63	0.57
1	1500		Lat Struct									
1	1448	Qcap	3455.69	993.63	998.93		999.55	0.011487	6.67	558.61	156.06	0.58
1	1294	Qcap	2405.79	991.00	996.73	995.54	997.41	0.012205	6.63	362.91	94.09	0.60
1	1189	Qcap	2405.79	990.00	996.44	993.52	996.73	0.003630	4.37	550.49	106.19	0.34
1	1132		Bridge									
1	1080	Qcap	2405.79	980.01	993.40		993.72	0.004037	4.53	530.52	513.28	0.36
1	1061	Qcap	2405.79	980.00	993.62	982.73	993.62	0.000020	0.49	4863.50	512.57	0.03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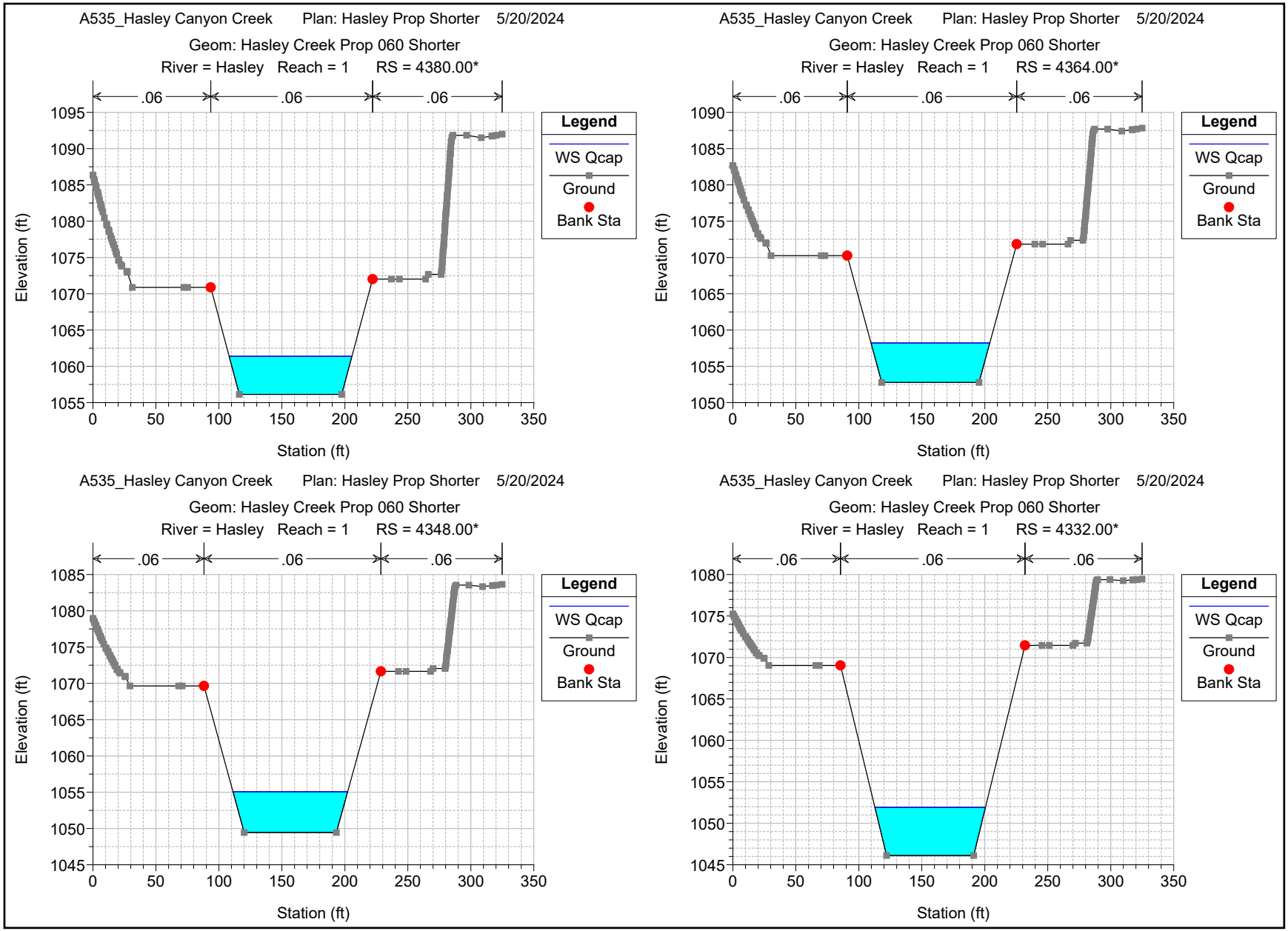
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4725
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4622
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4523
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4396
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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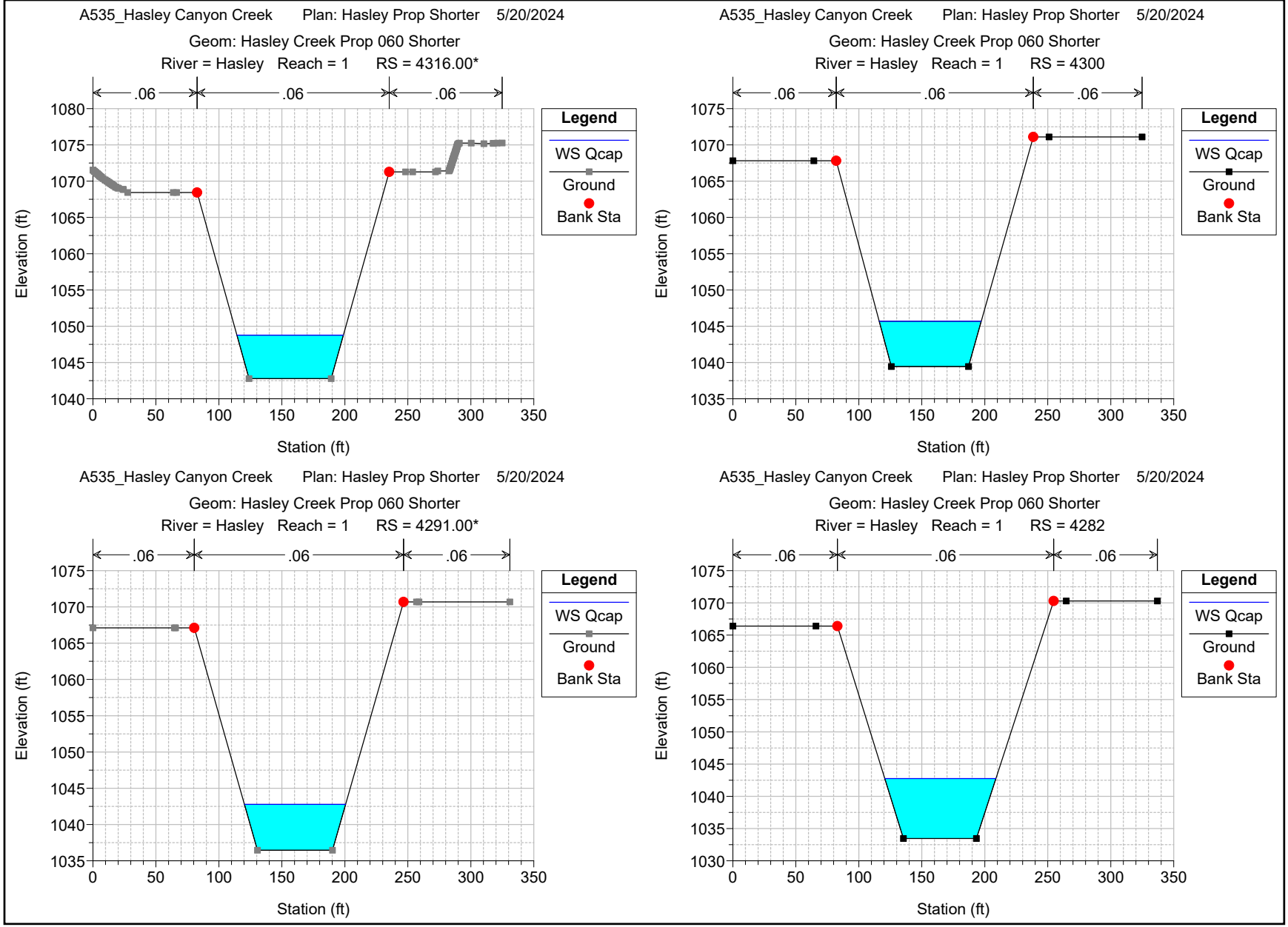
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4380.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4364.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4348.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4332.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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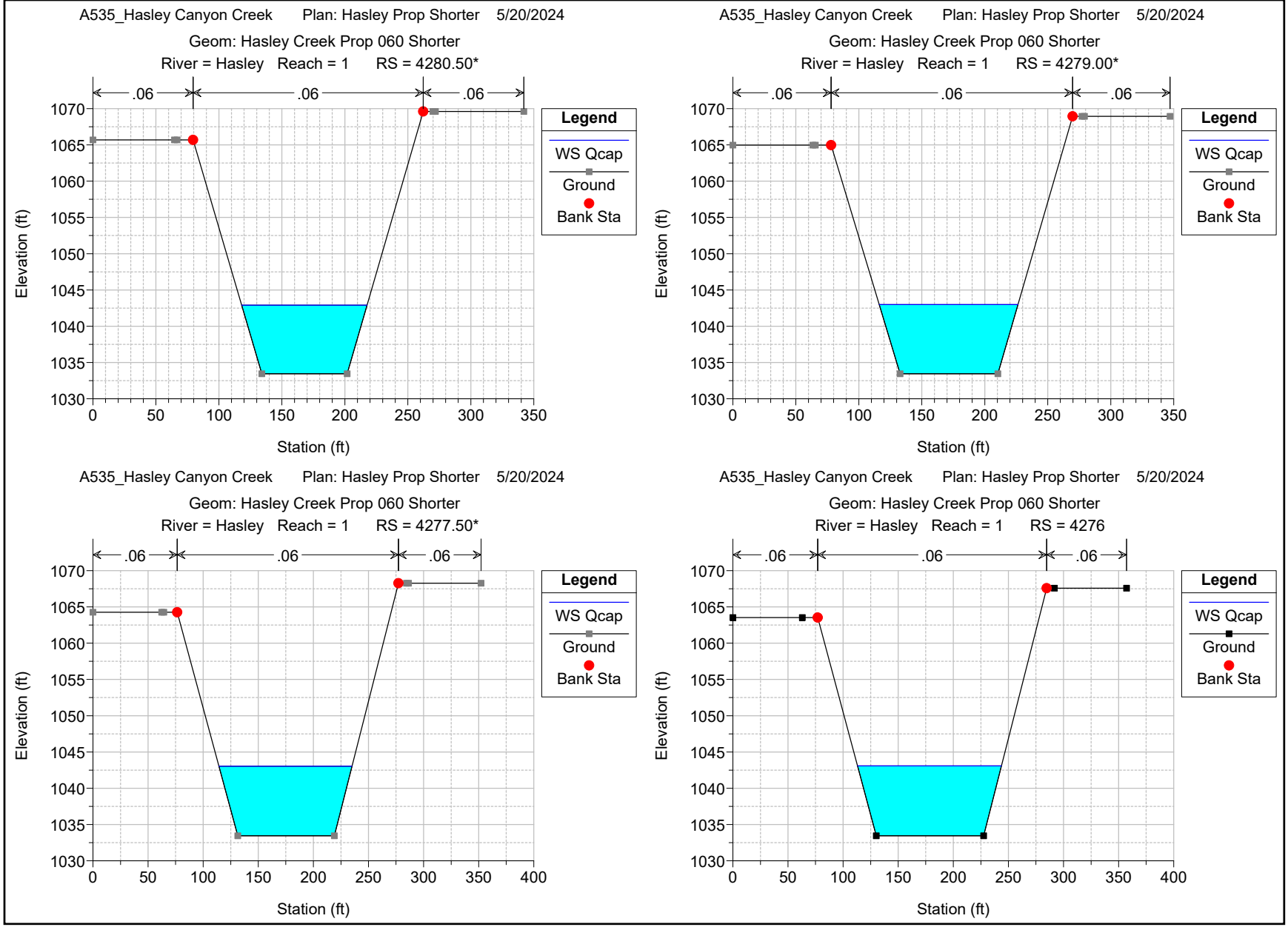
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4316.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4300
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4291.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4282
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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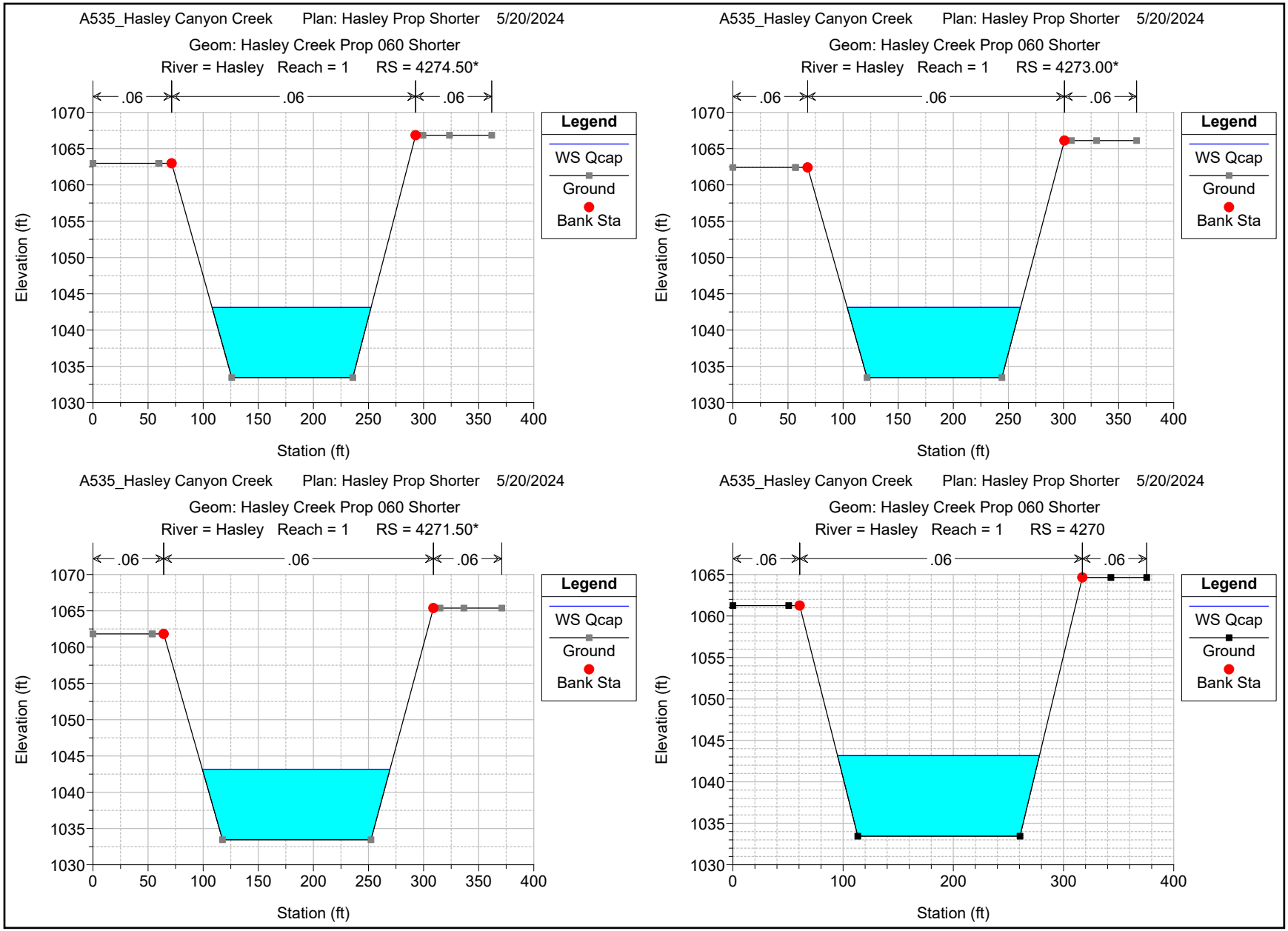
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4280.50*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4279.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4277.50*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4276
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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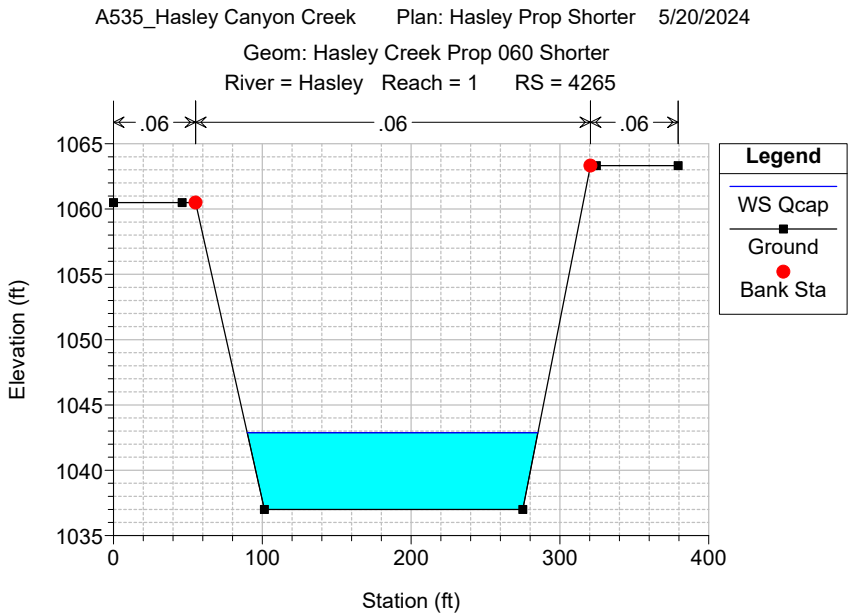
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4274.50*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4273.00*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4271.50*
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4270
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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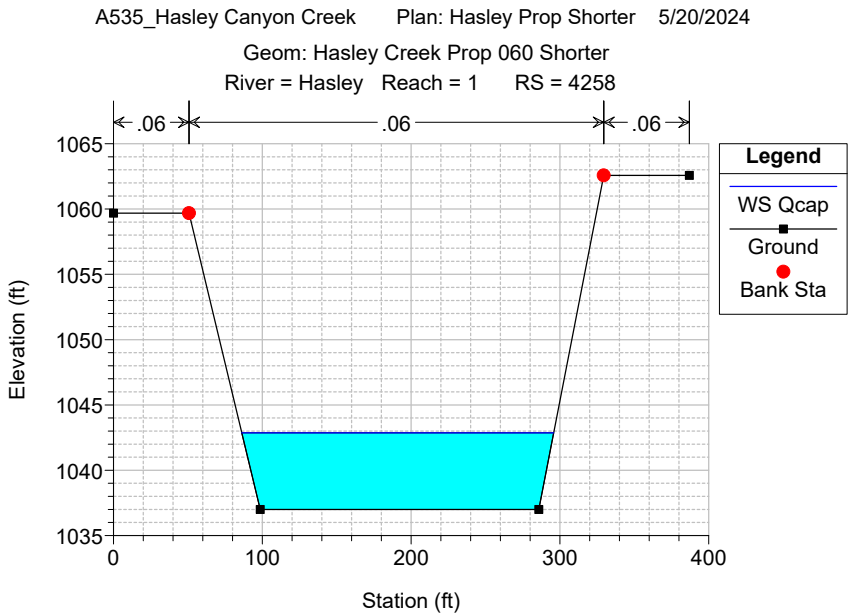
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4265
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
1065
1060
1055
1050
1045
1040
1035
0
100
200
300
400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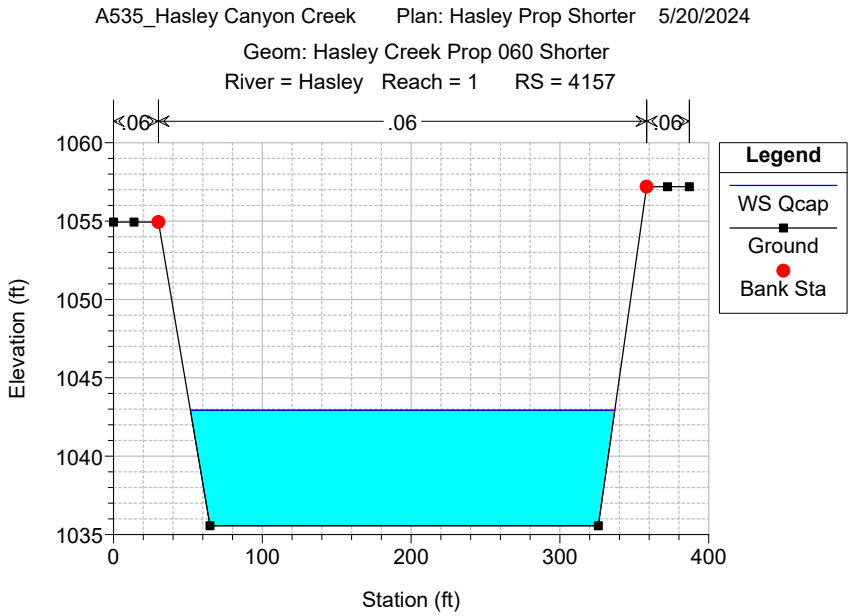
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4258
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
1065
1060
1055
1050
1045
1040
1035
0
100
200
300
400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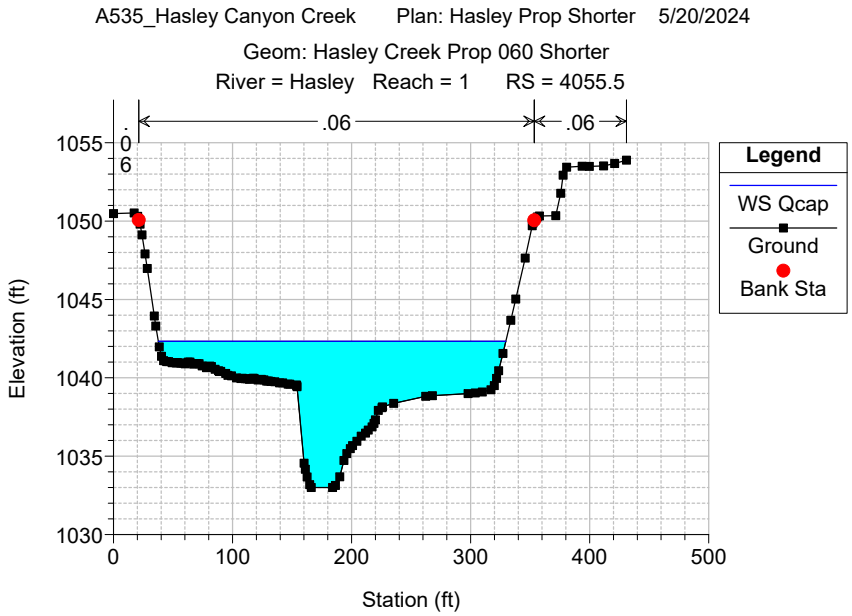
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4157
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
1060
1055
1050
1045
1040
1035
0
100
200
300
400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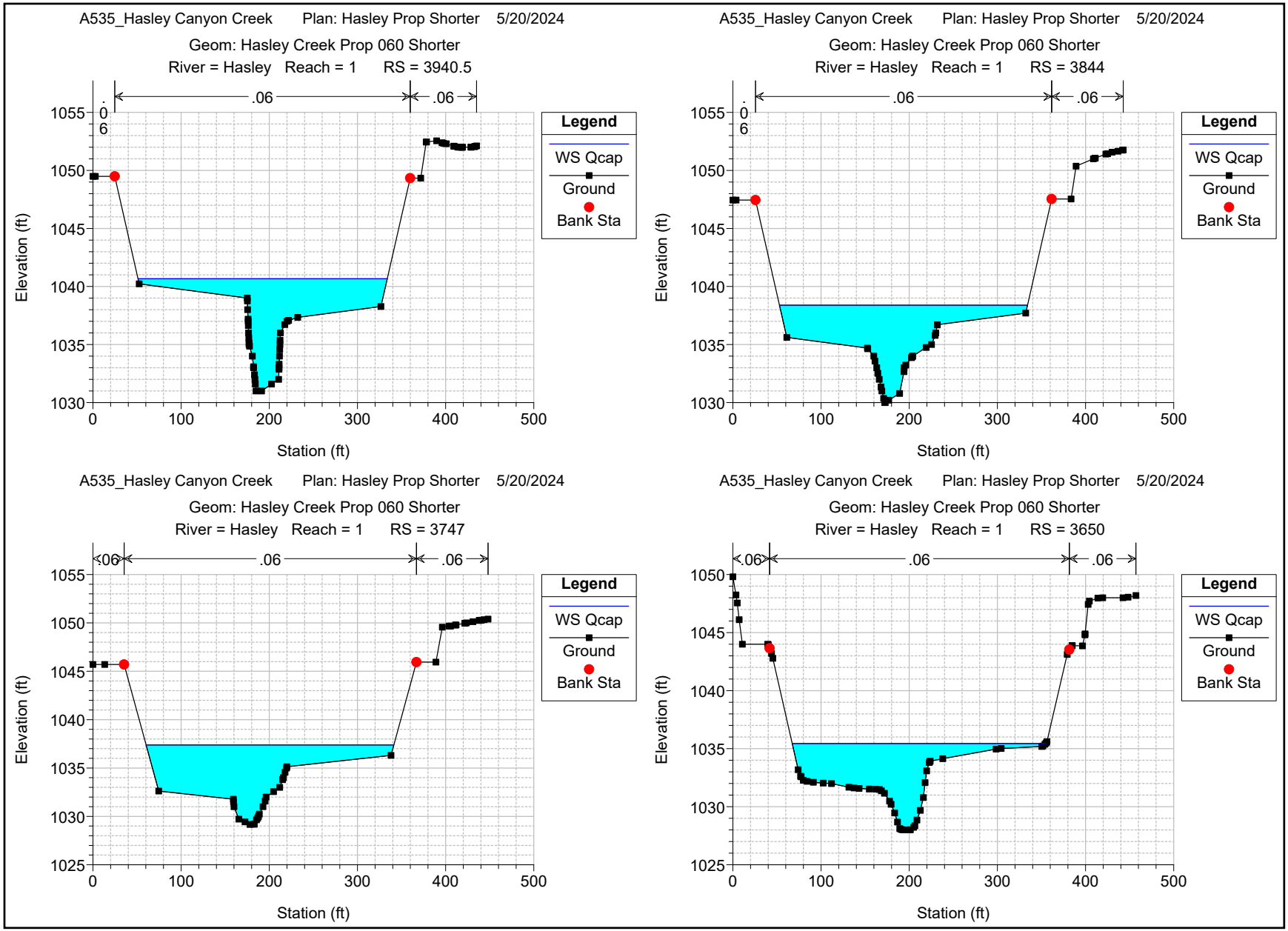
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 4055.5
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
1055
1050
1045
1040
1035
1030
0
100
200
300
400
500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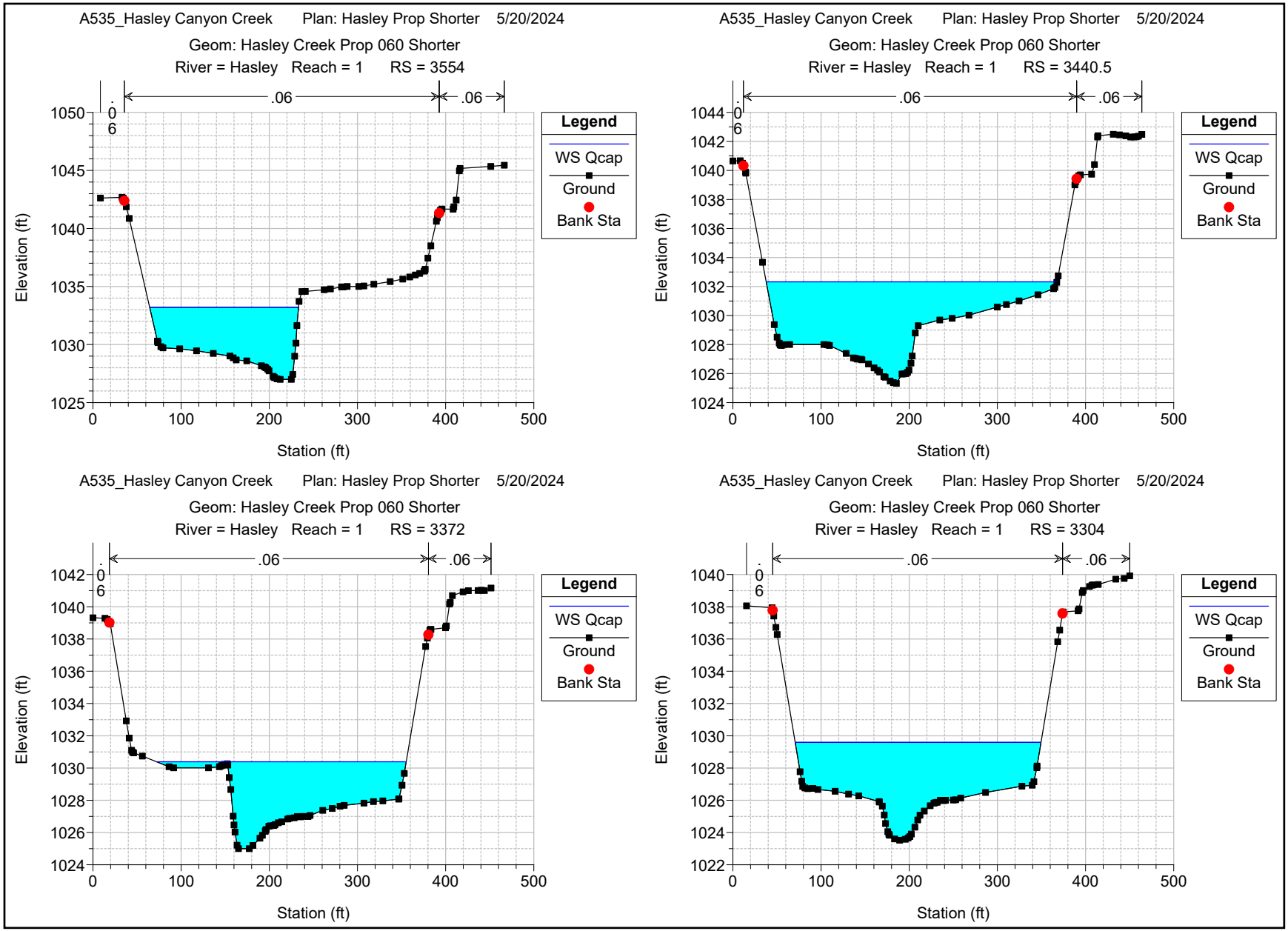
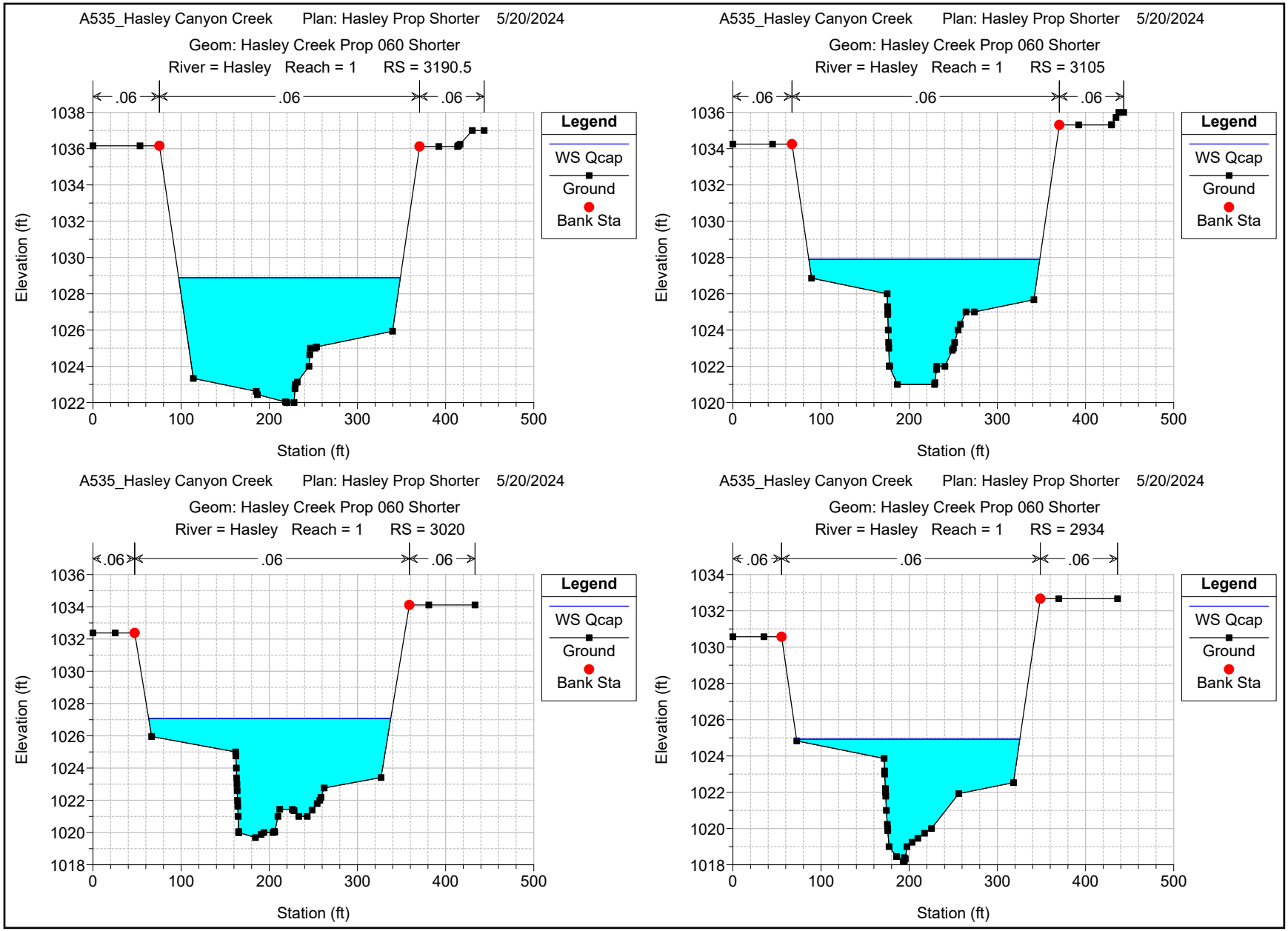
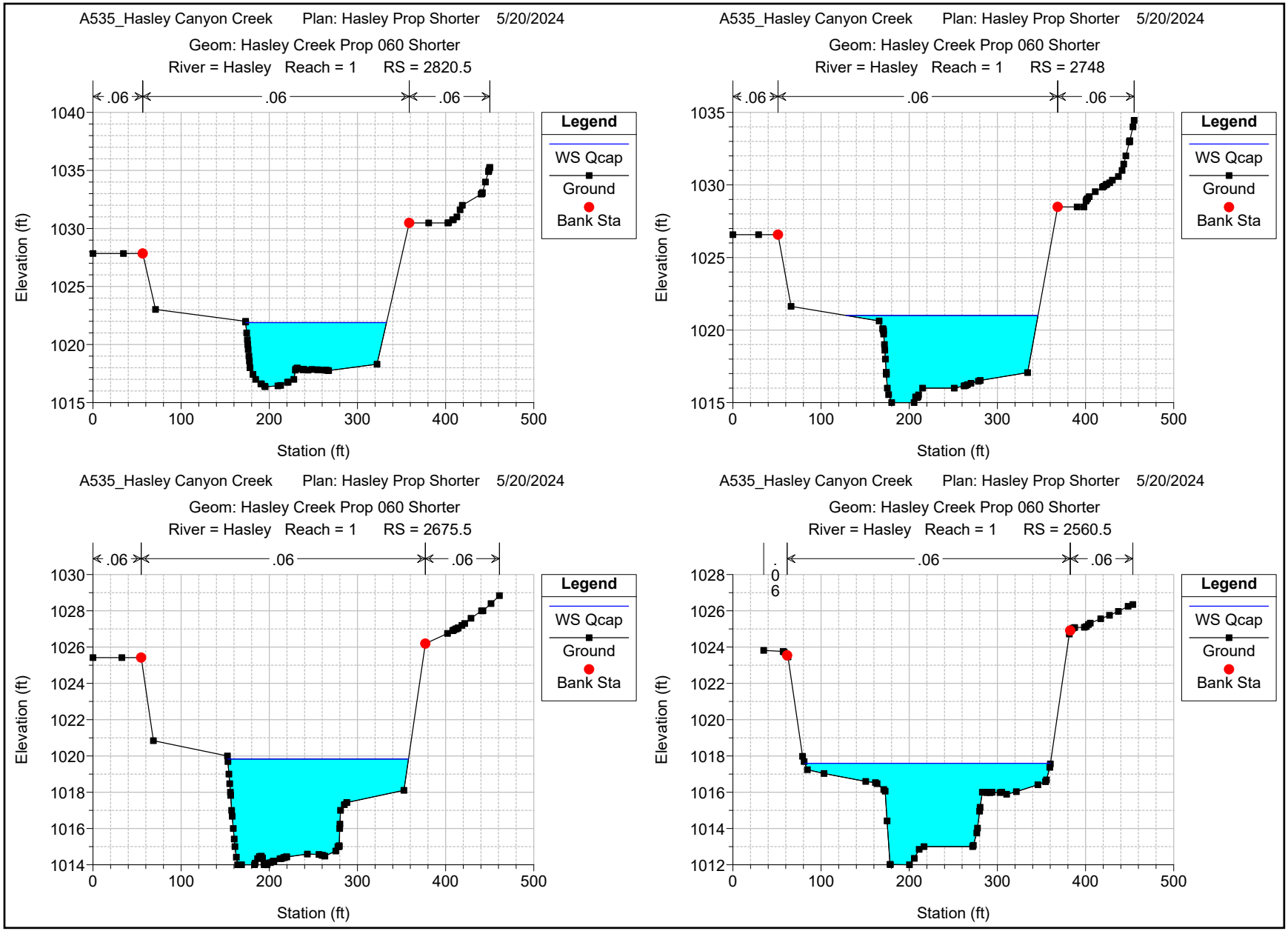
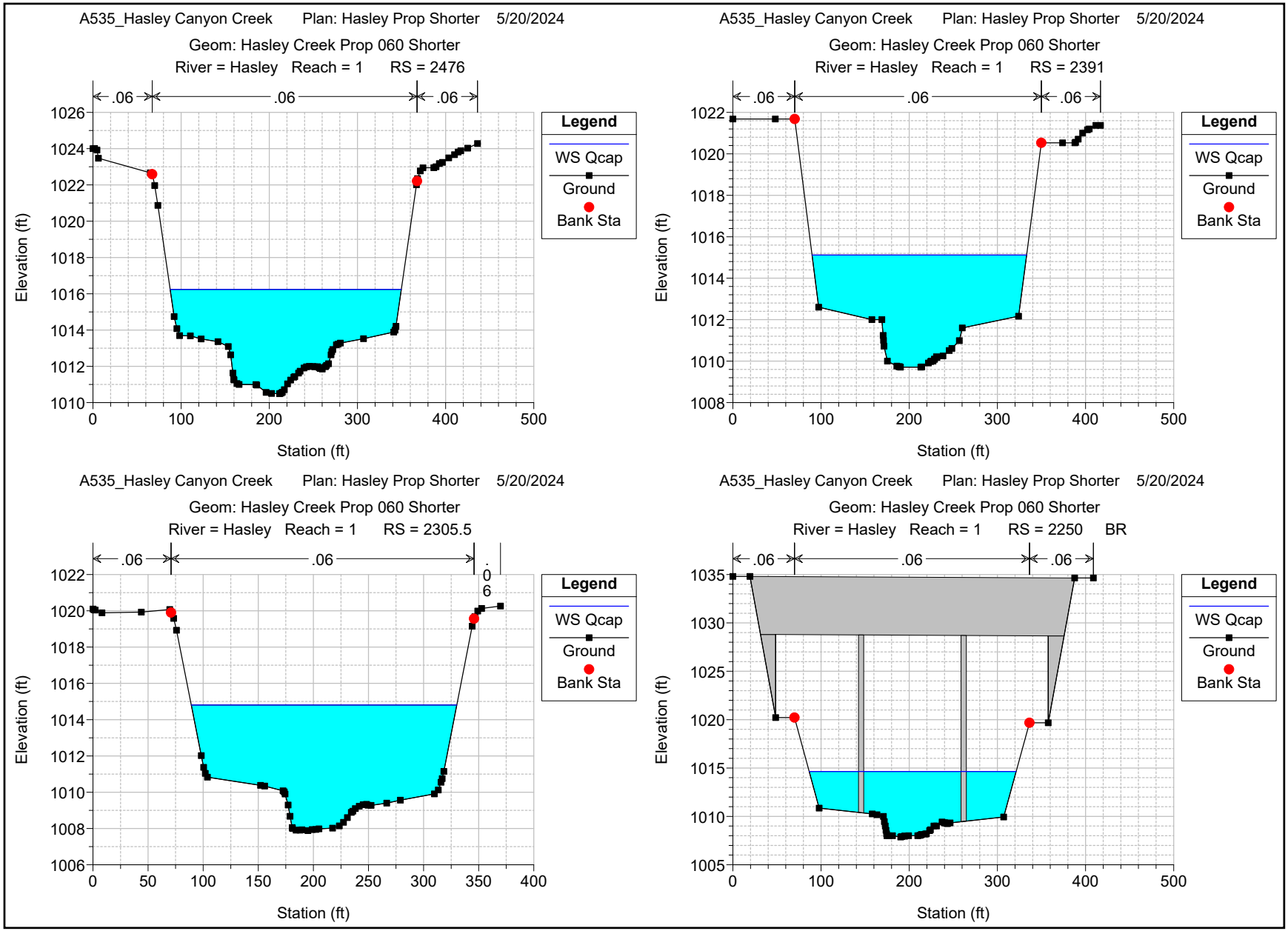
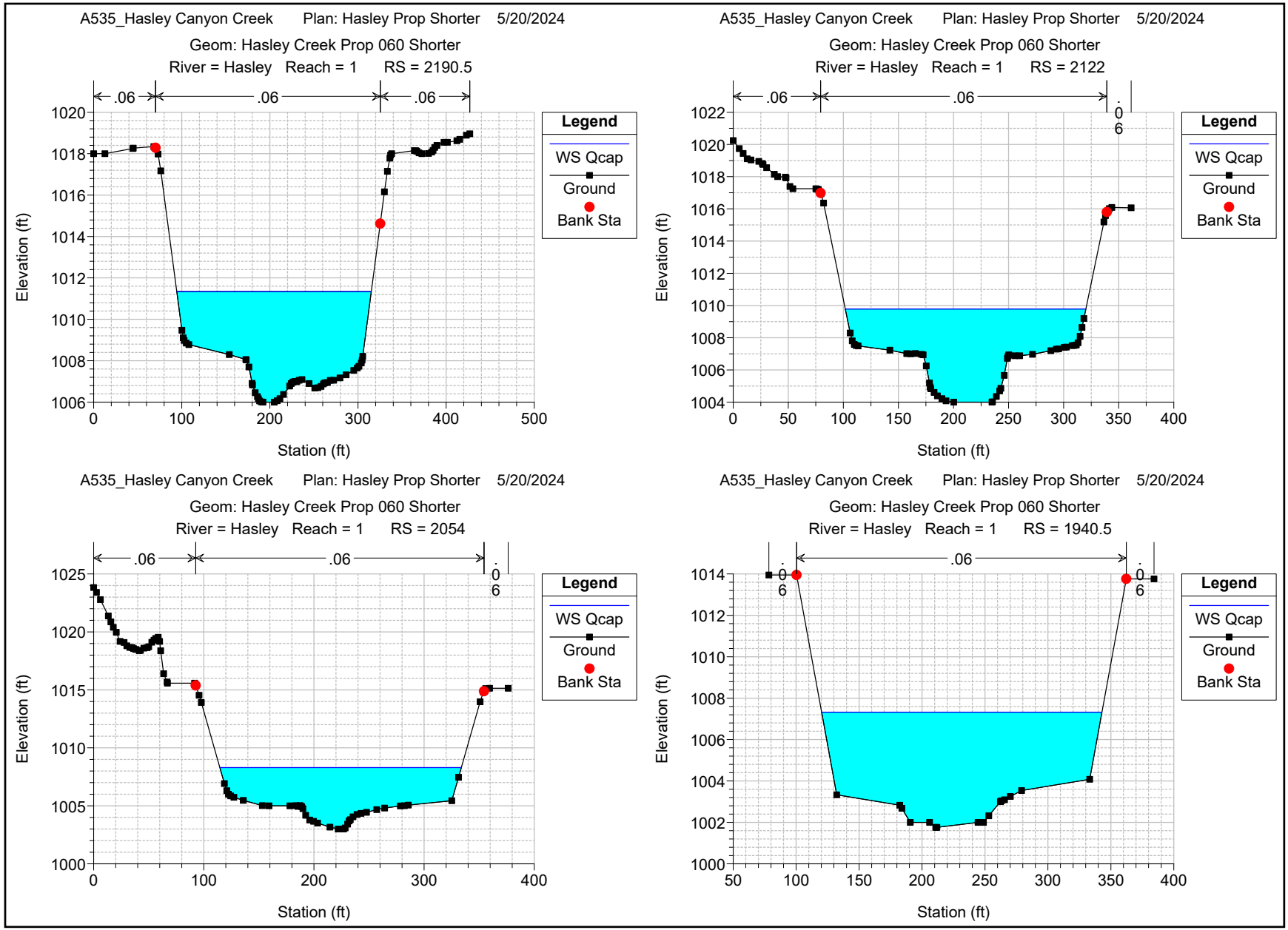
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3940.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3844
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3747
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3650
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)

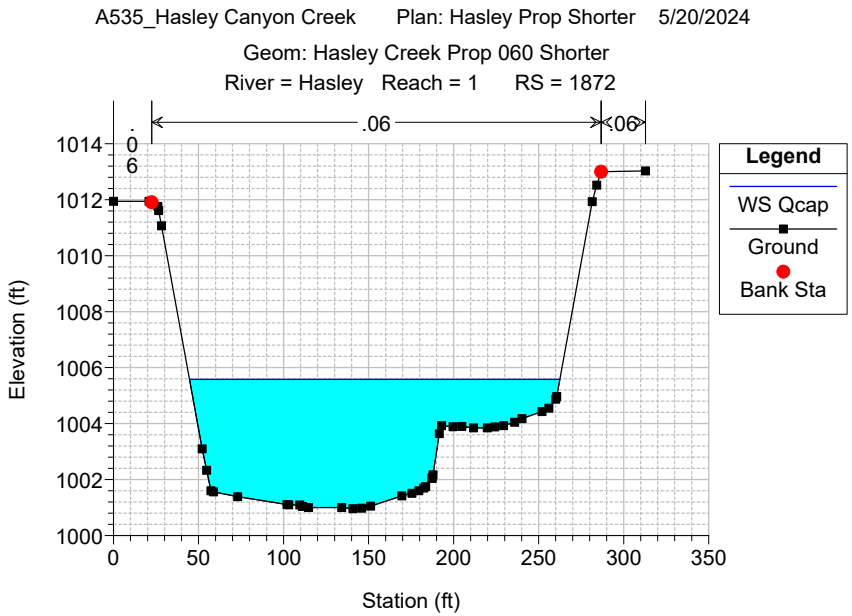

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3554
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3440.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3372
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3304
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)

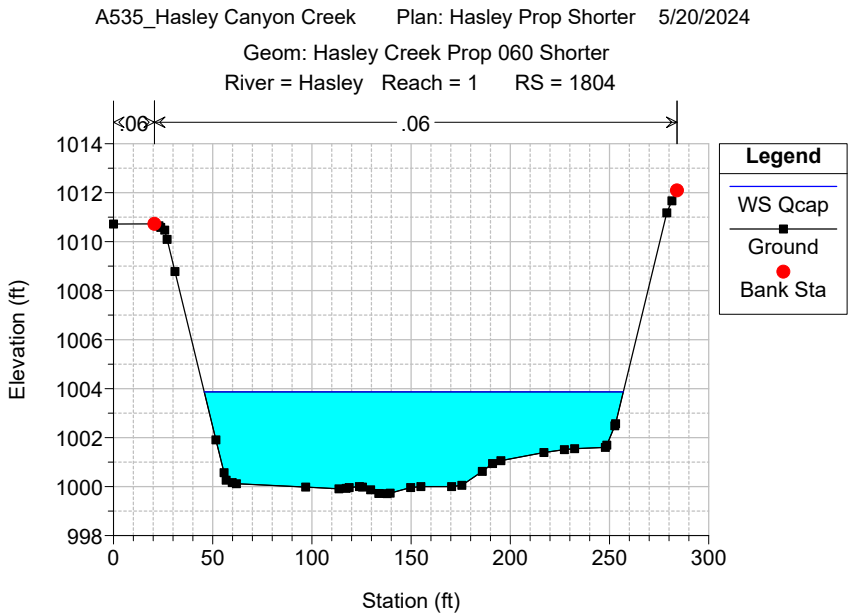

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3190.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3105
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 3020
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2934
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)

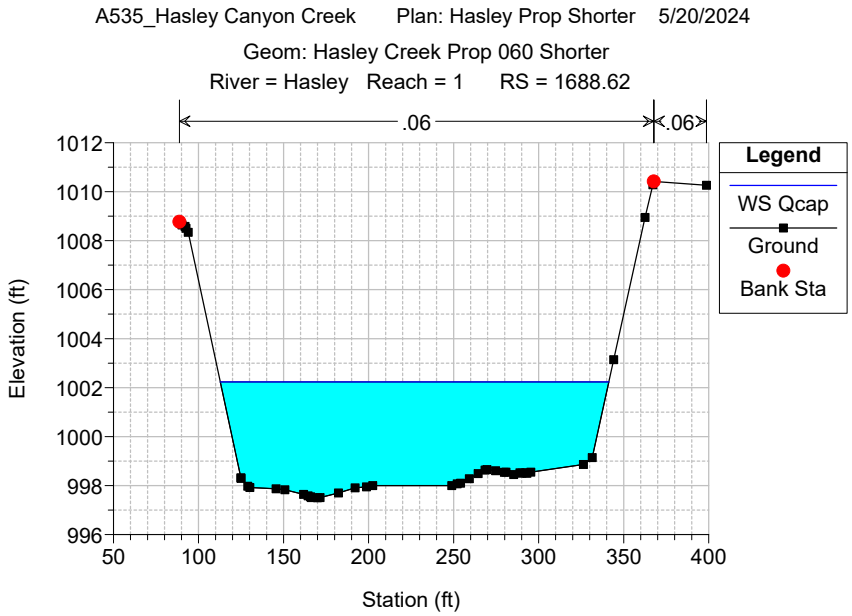

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2820.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2748
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2675.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2560.5
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2476
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2391
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2305.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2250 BR
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2190.5
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2122
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 2054
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)
A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1940.5
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1872
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1804
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)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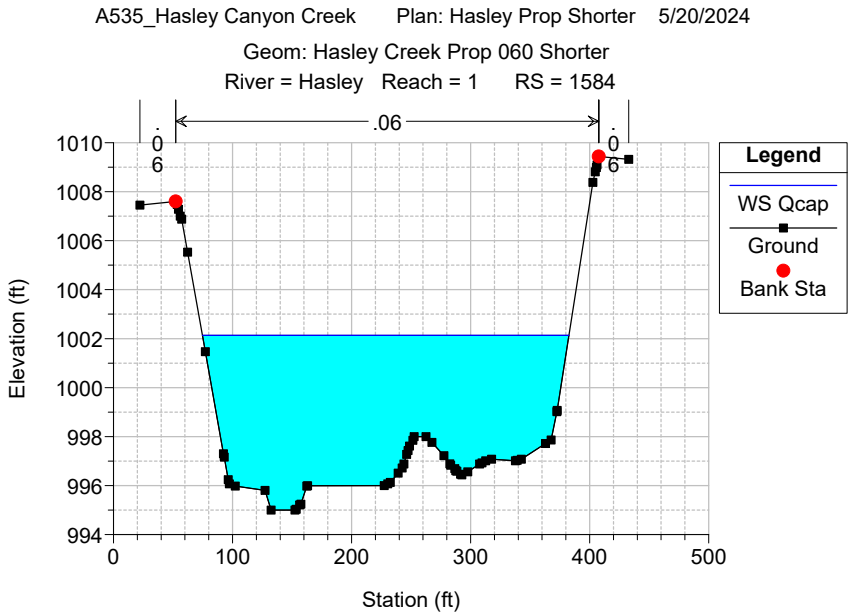
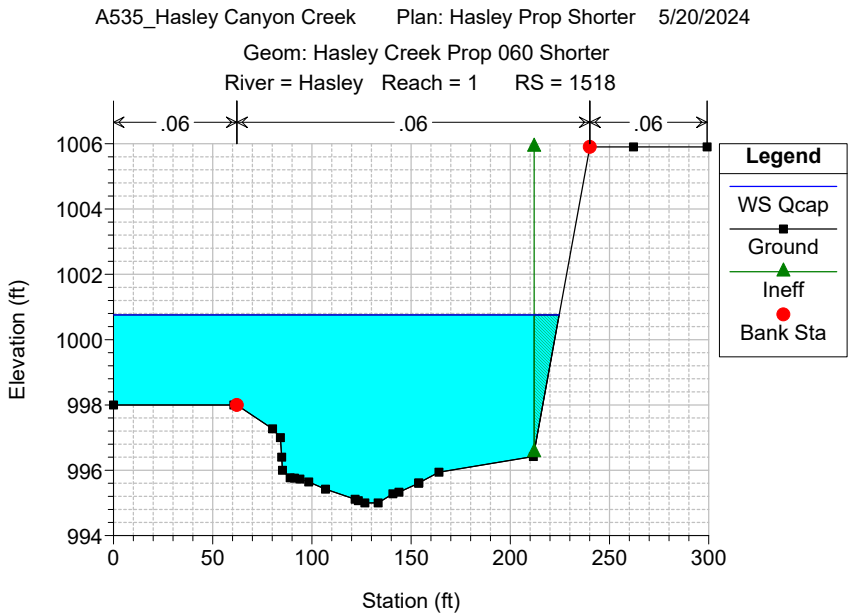
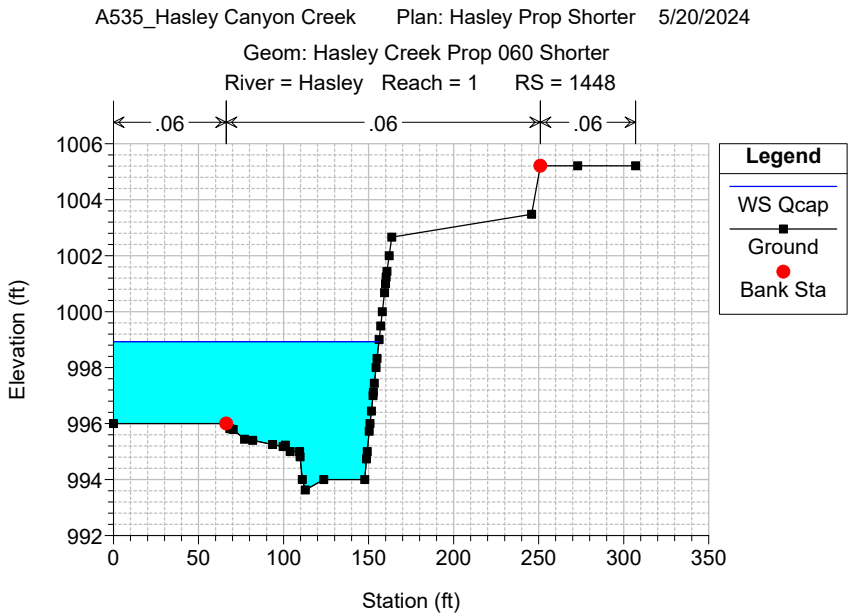
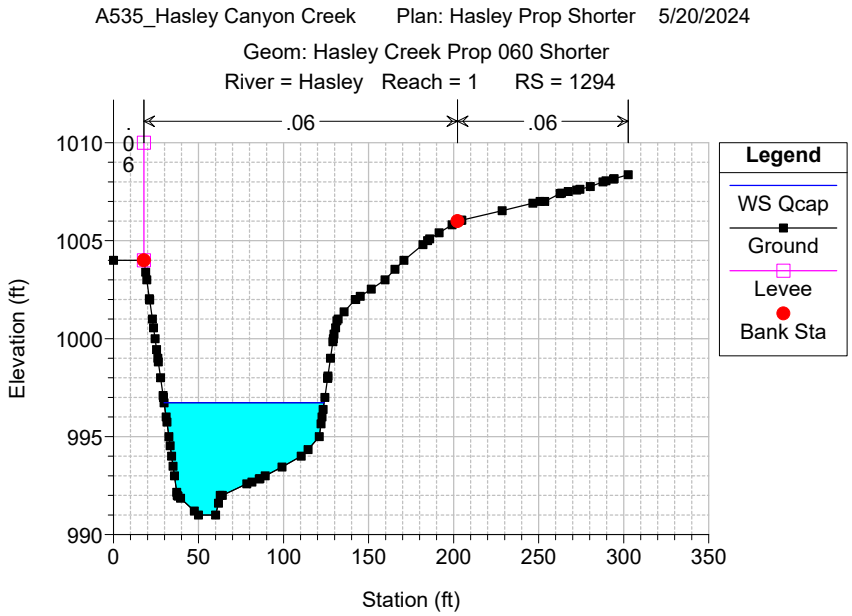
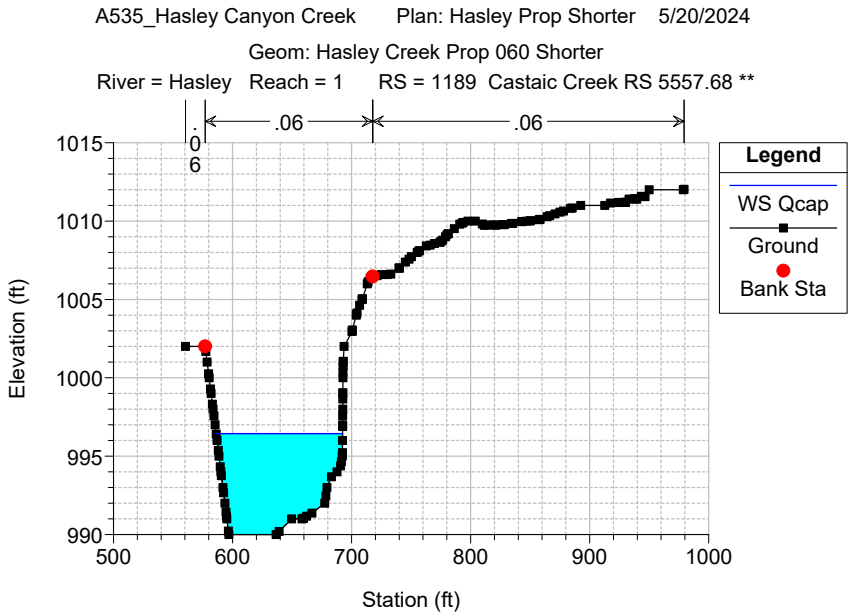
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1688.62
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)

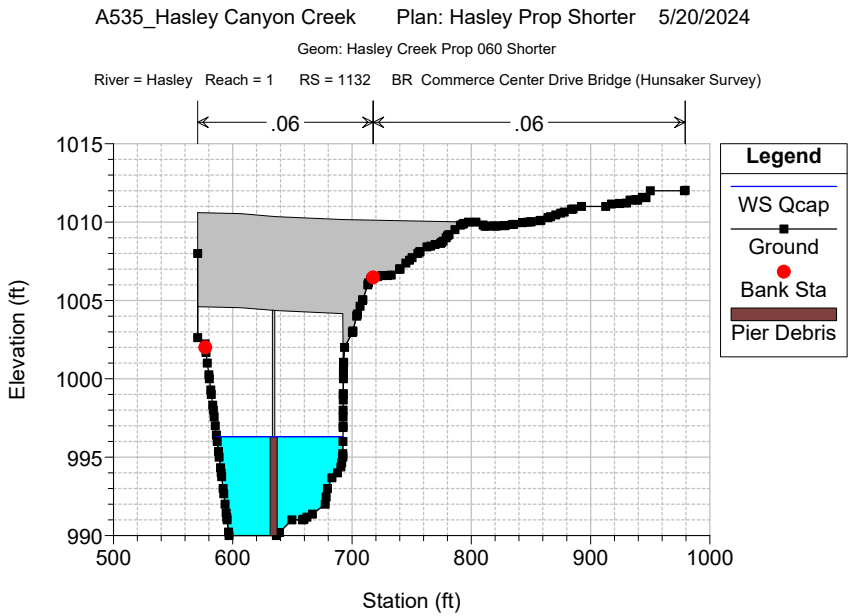

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1584
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)

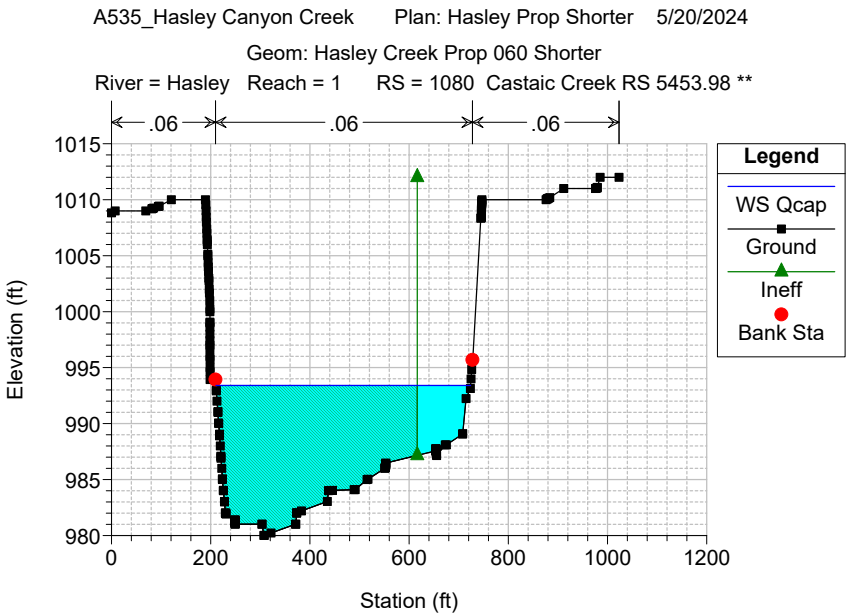

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1518
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

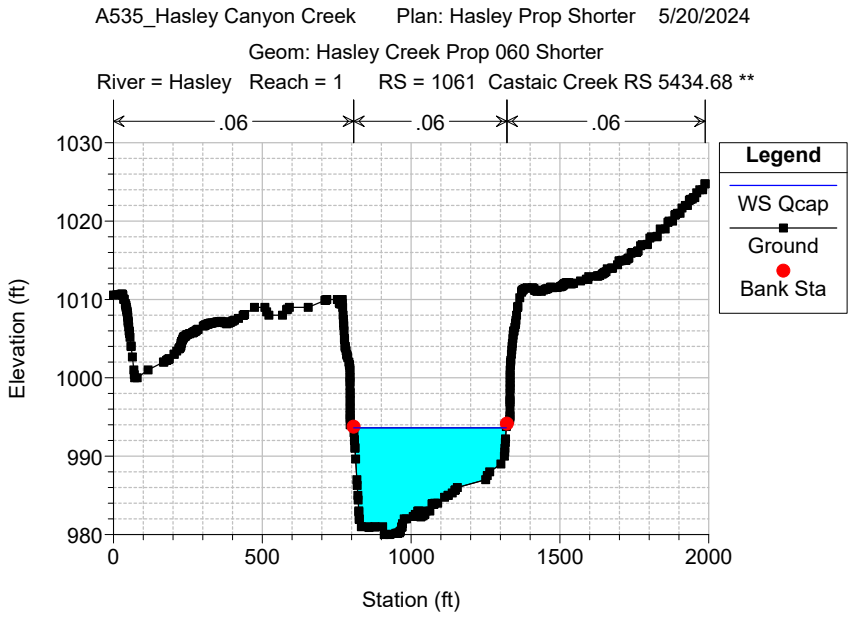

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1448
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)

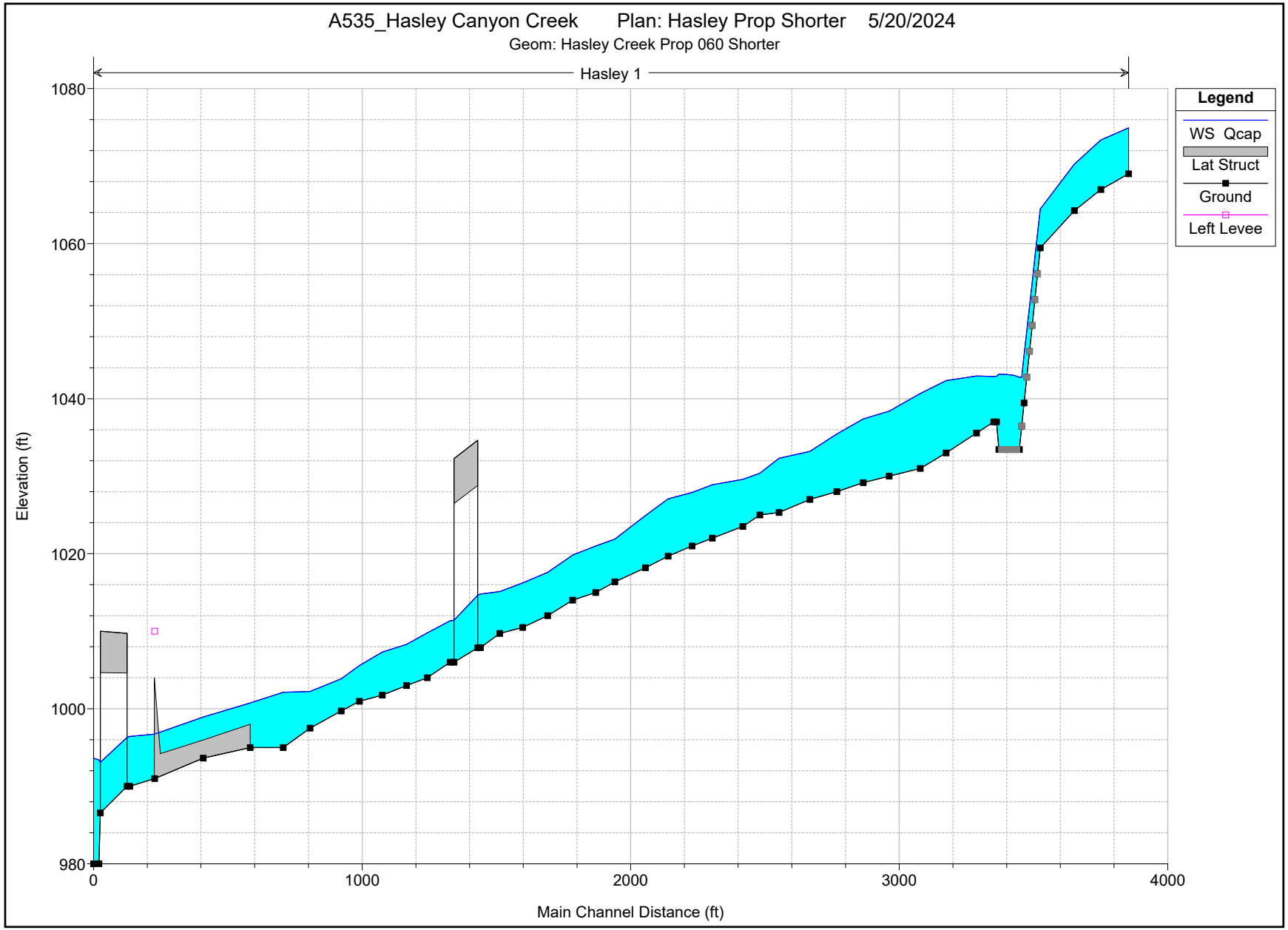

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1294
.06
.06
.06
Legend
WS Qcap
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1189 Castaic Creek RS 5557.68 **
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)


A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1132 BR Commerce Center Drive Bridge (Hunsaker Survey)
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Pier Debris
Elevation (ft)
Station (ft)

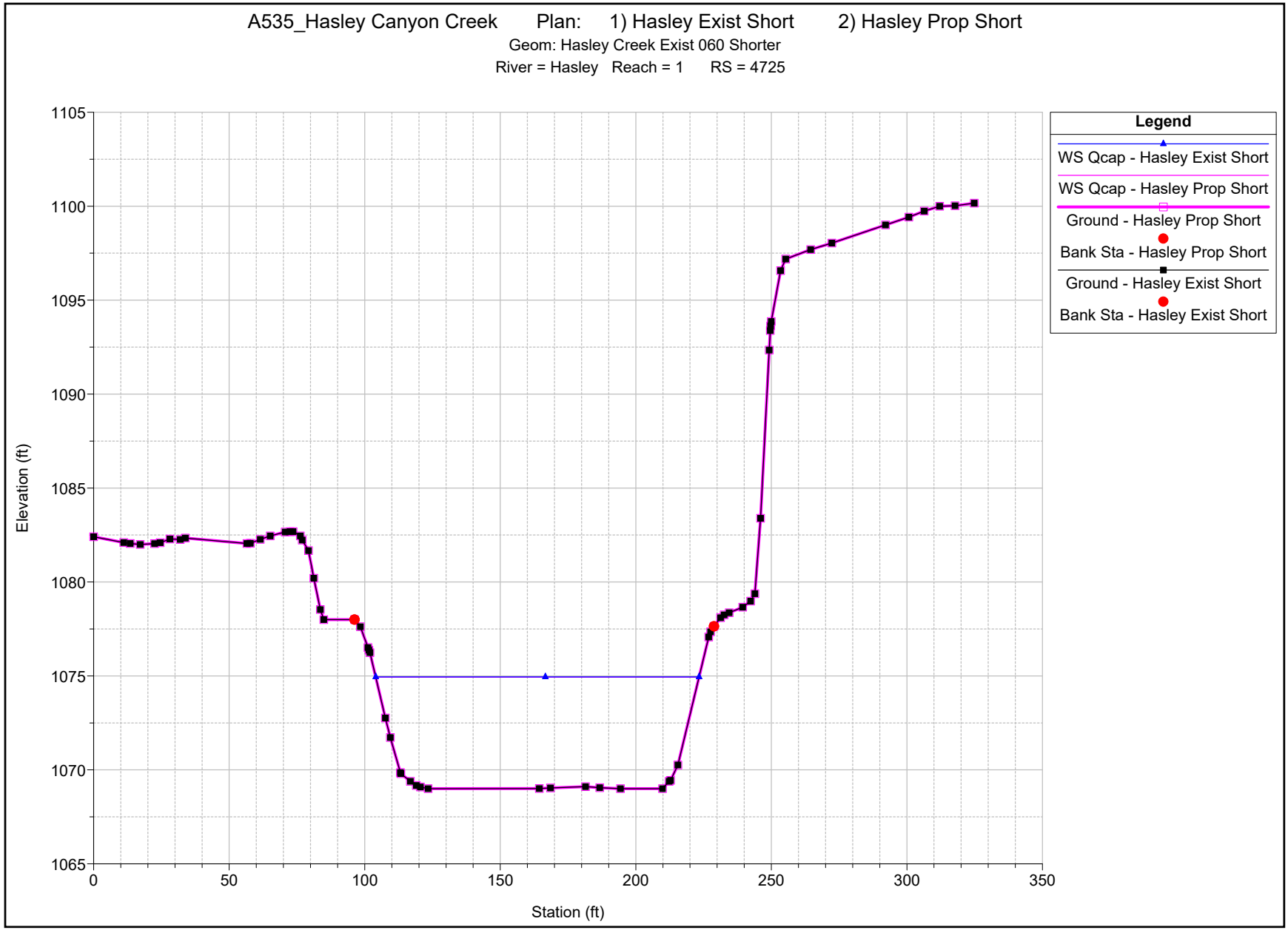

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1080 Castaic Creek RS 5453.98 **
.06
.06
.06
Legend
WS Qcap
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

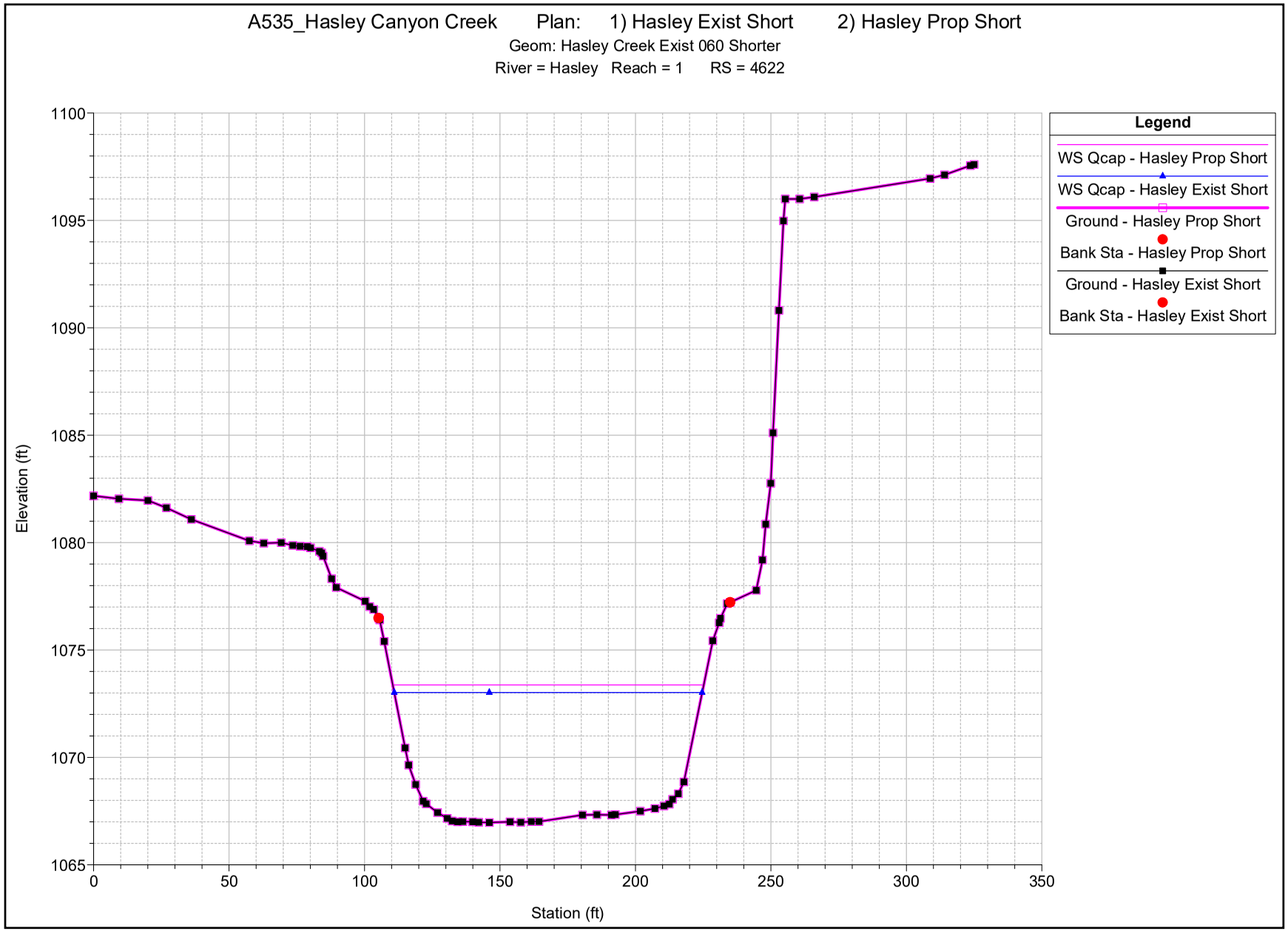

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
River = Hasley Reach = 1 RS = 1061 Castaic Creek RS 5434.68 **
.06
.06
.06
Legend
WS Qcap
Ground
Bank Sta
Elevation (ft)
Station (ft)

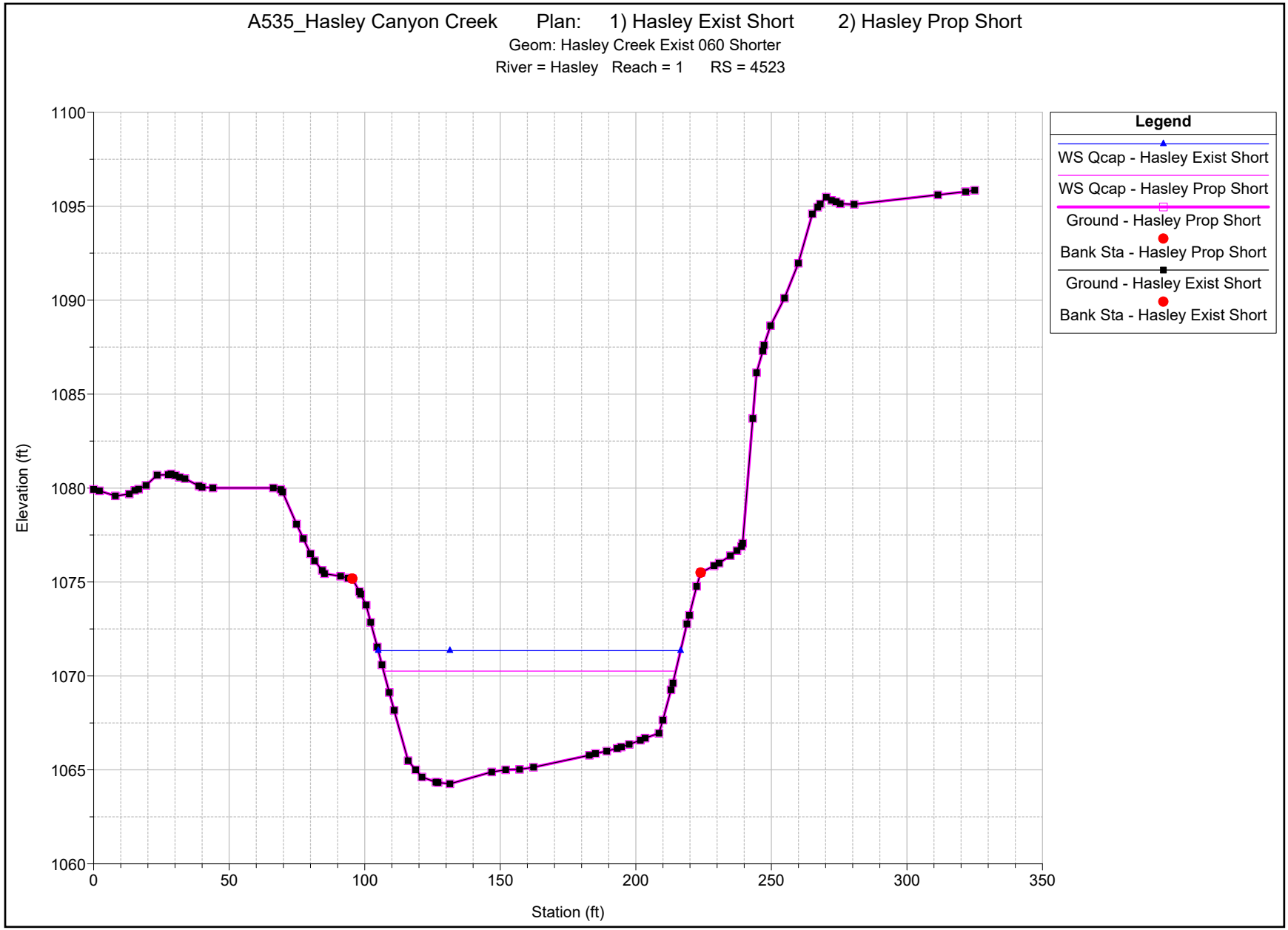

A535_Hasley Canyon Creek Plan: Hasley Prop Shorter 5/20/2024
Geom: Hasley Creek Prop 060 Shorter
Hasley 1
Legend
WS Qcap
Lat Struct
Ground
Left Levee
Elevation (ft)
1080
1060
1040
1020
1000
980
0
1000
2000
3000
4000
Main Channel Distance (ft)

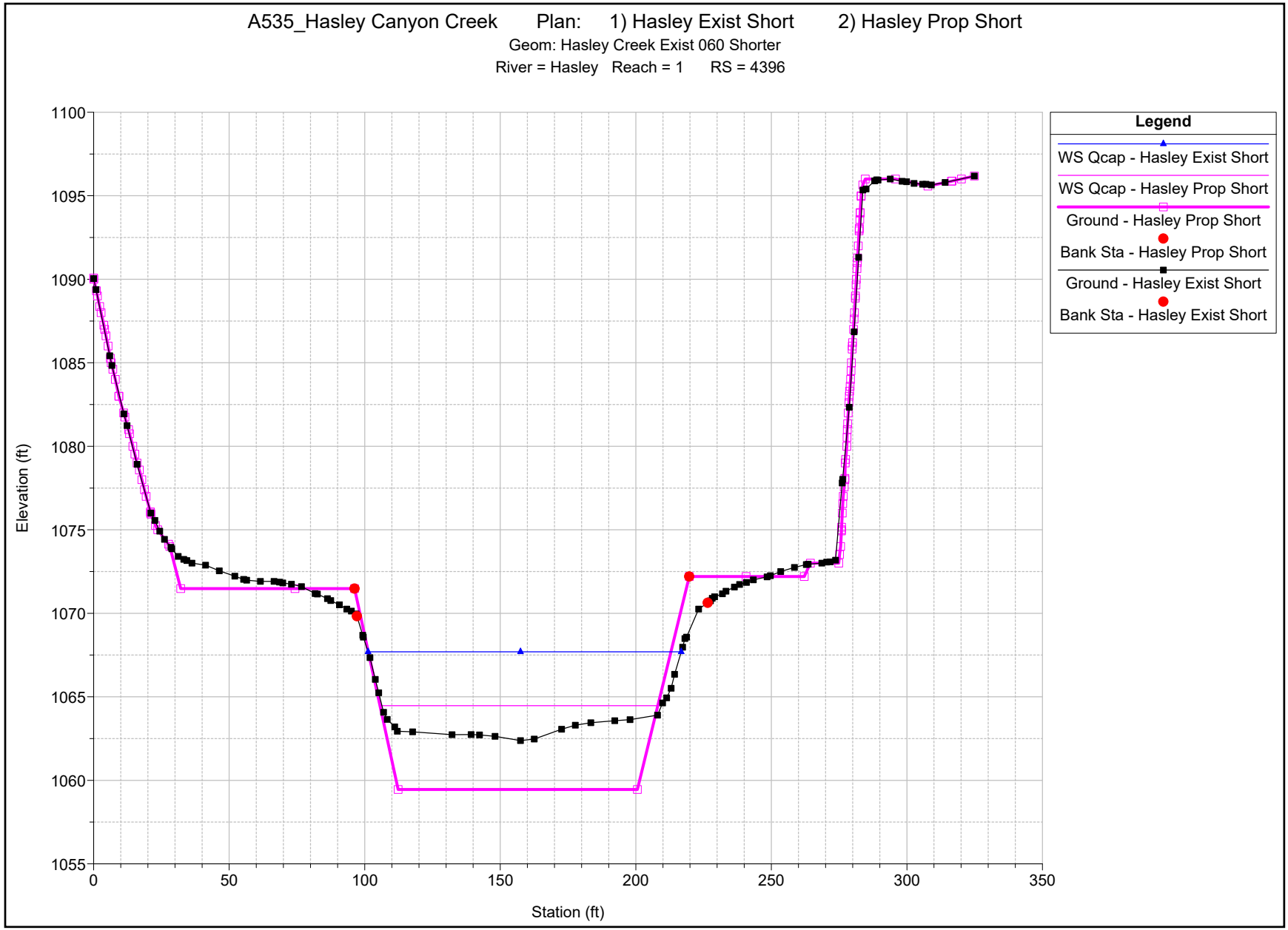
PACE
Advanced Water Engineering

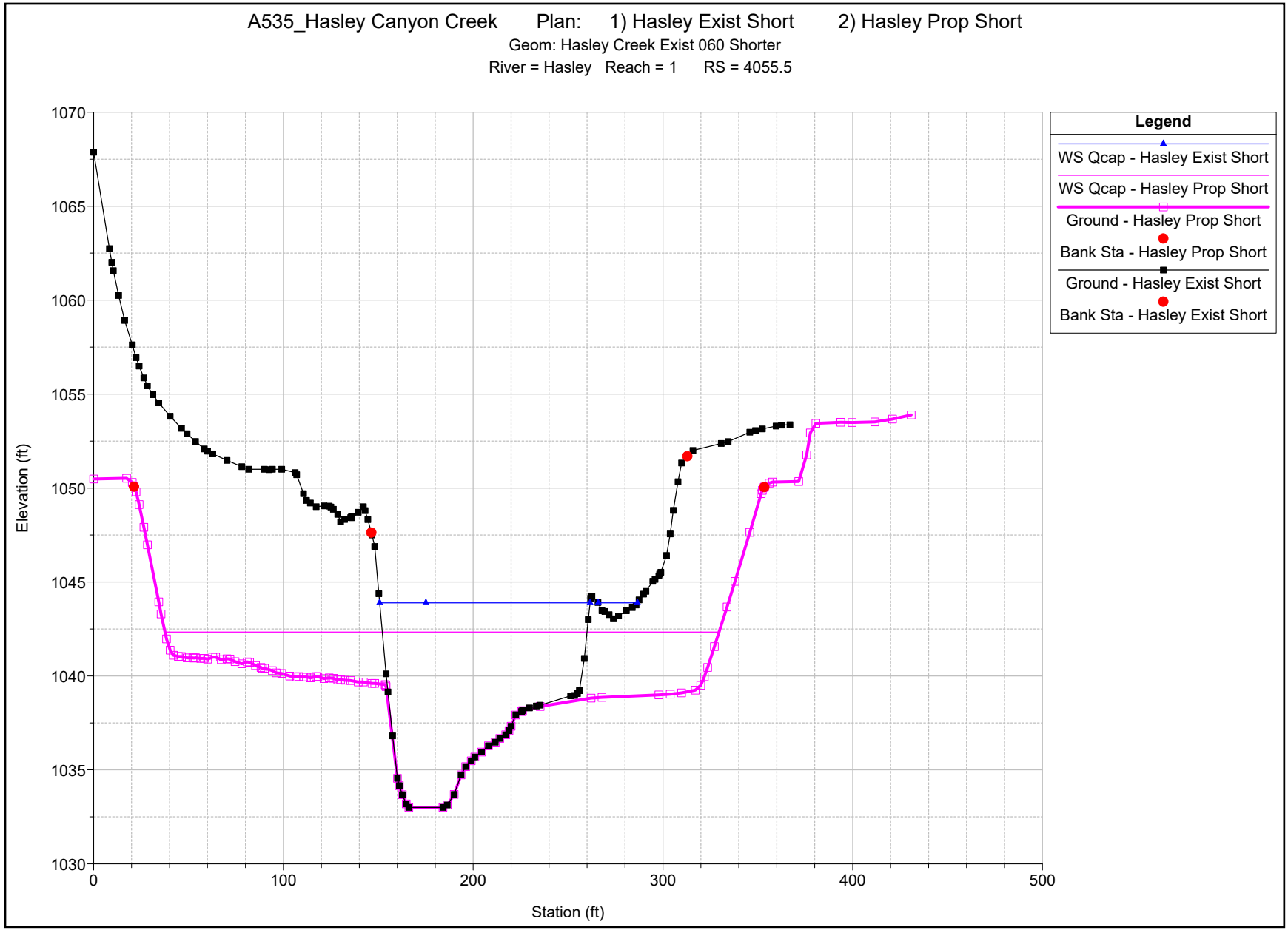
Appendix G – HEC-RAS Cross-Section Comparison, Existing vs. Proposed


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4725
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1105
1100
1095
1090
1085
1080
1075
1070
1065
0
50
100
150
200
250
300
350
Station (ft)


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4622
Legend
WS Qcap - Hasley Prop Short
WS Qcap - Hasley Exist Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1100
1095
1090
1085
1080
1075
1070
1065
0
50
100
150
200
250
300
350
Station (ft)


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4523
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
Station (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
0
50
100
150
200
250
300
350

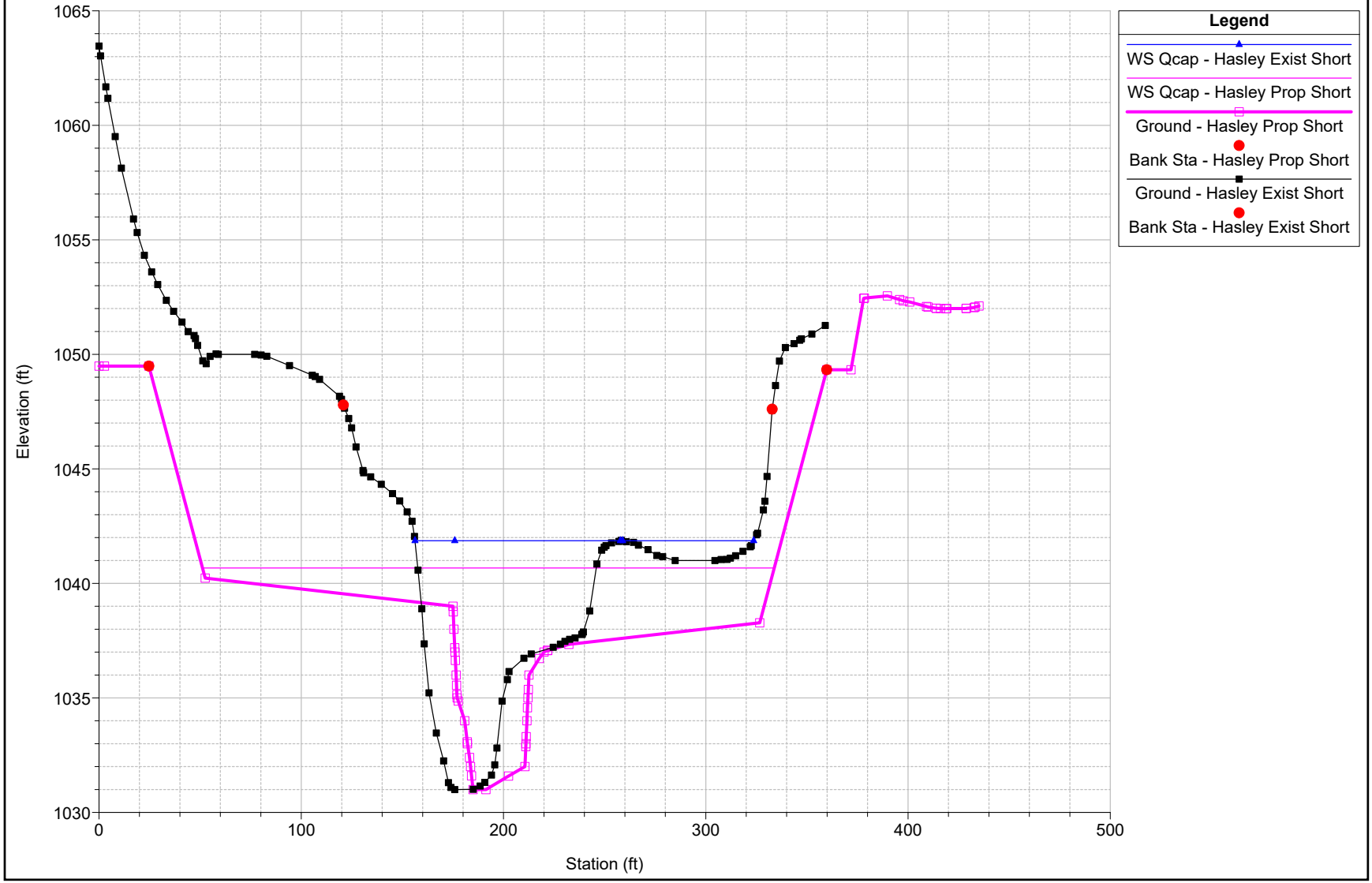

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4396
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
Station (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
1055
0
50
100
150
200
250
300
350

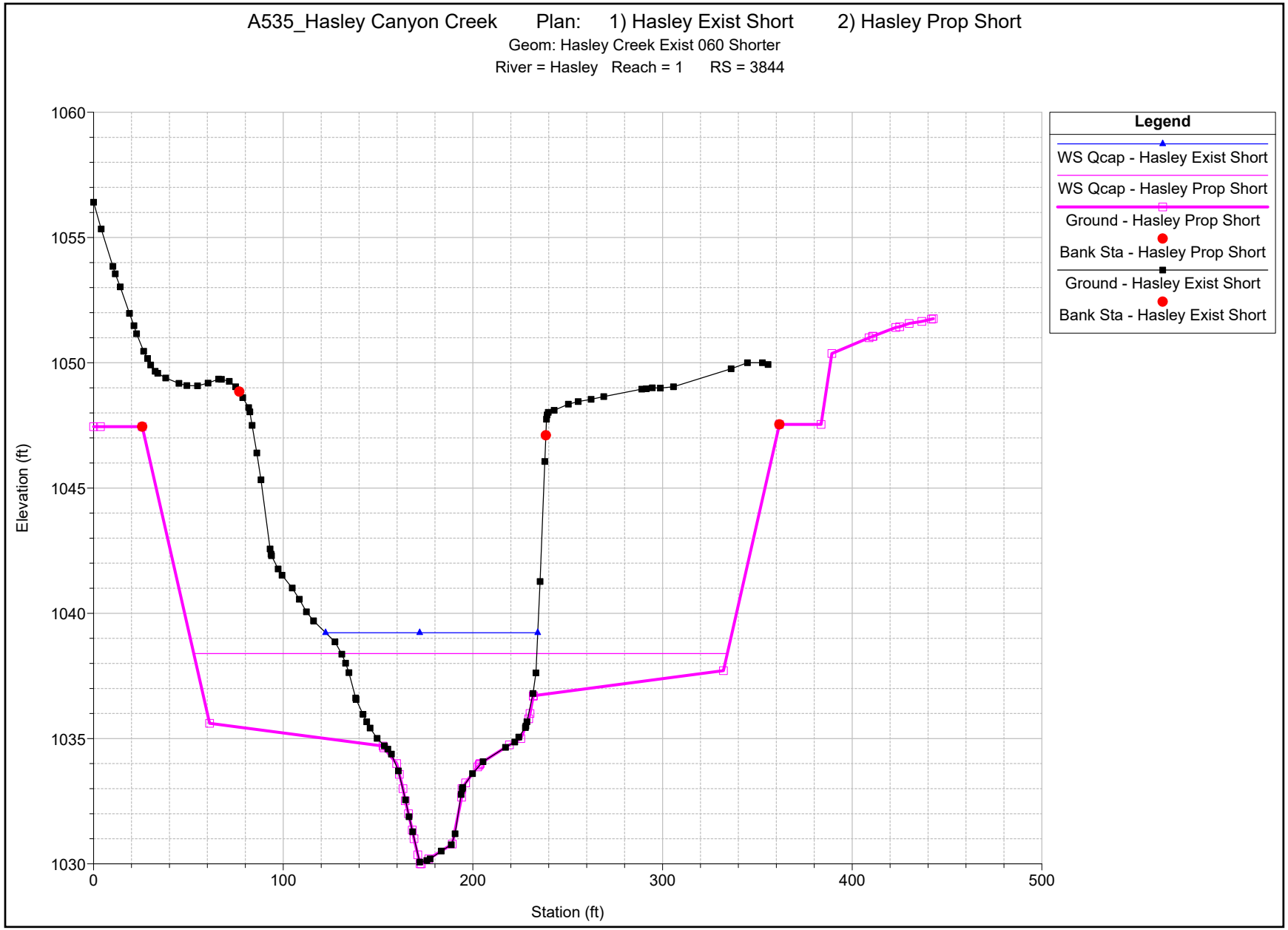

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 4055.5
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
Station (ft)
1070
1065
1060
1055
1050
1045
1040
1035
1030
0
100
200
300
400
500

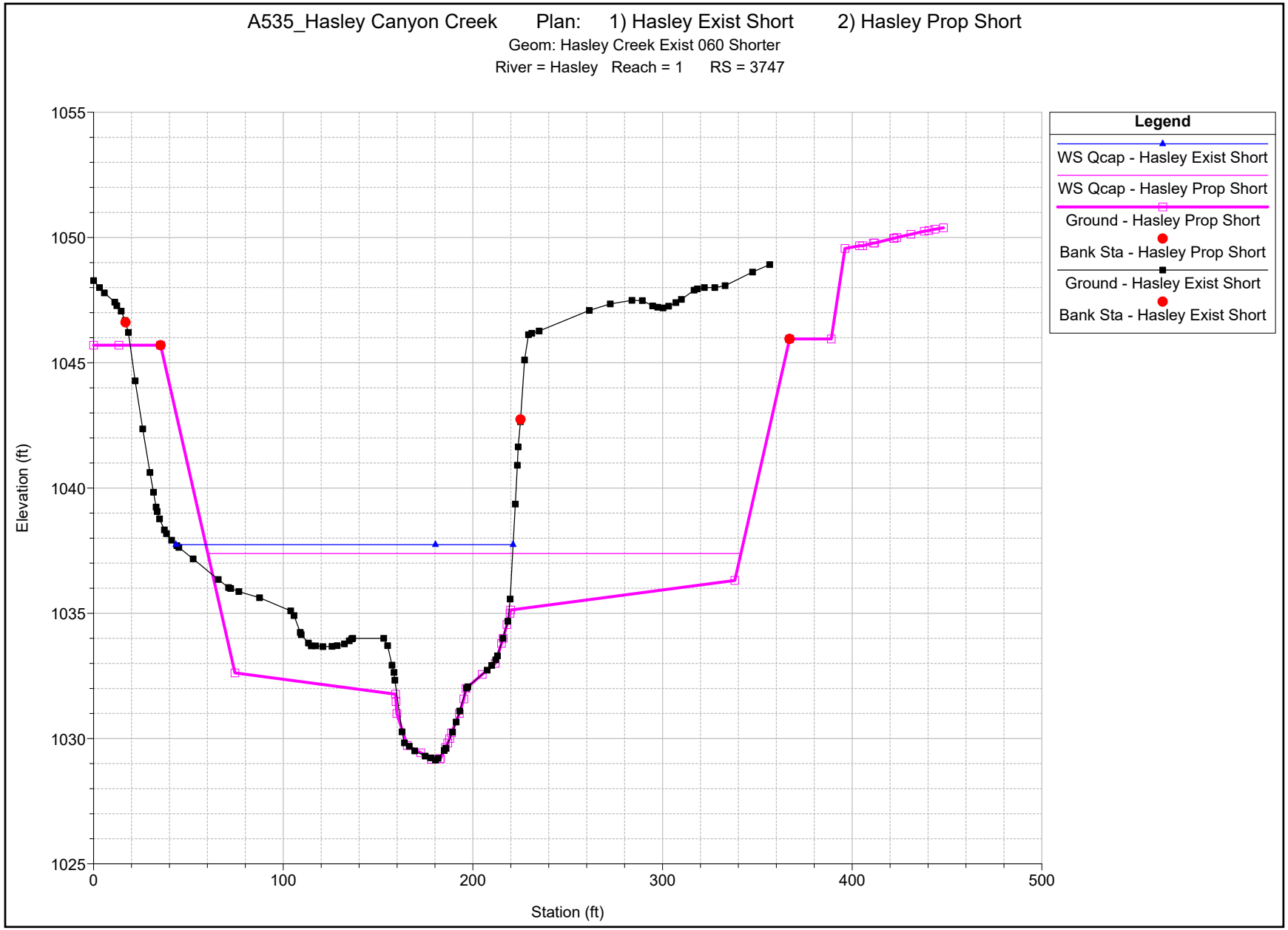
A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short

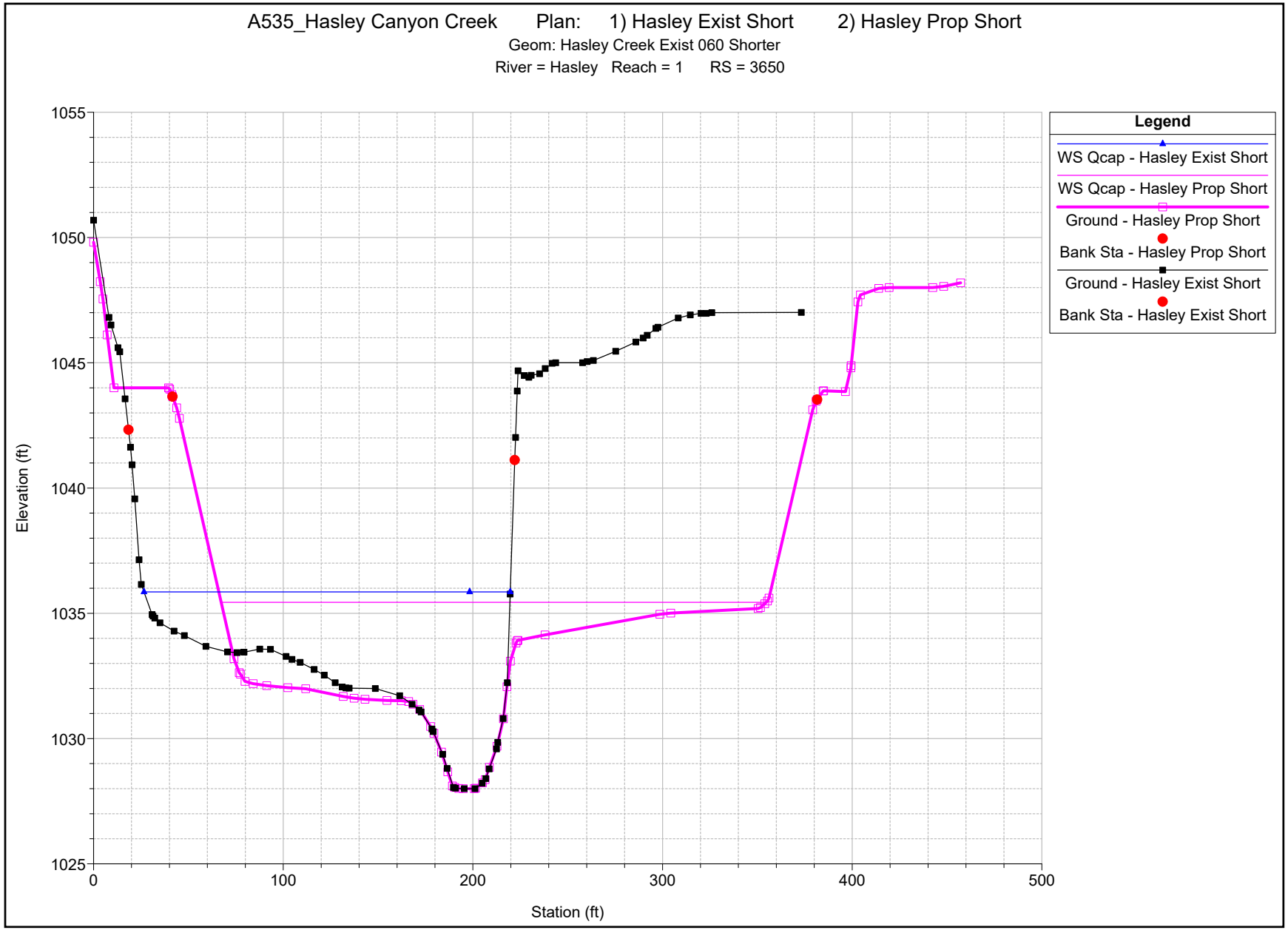
Geom: Hasley Creek Exist 060 Shorter

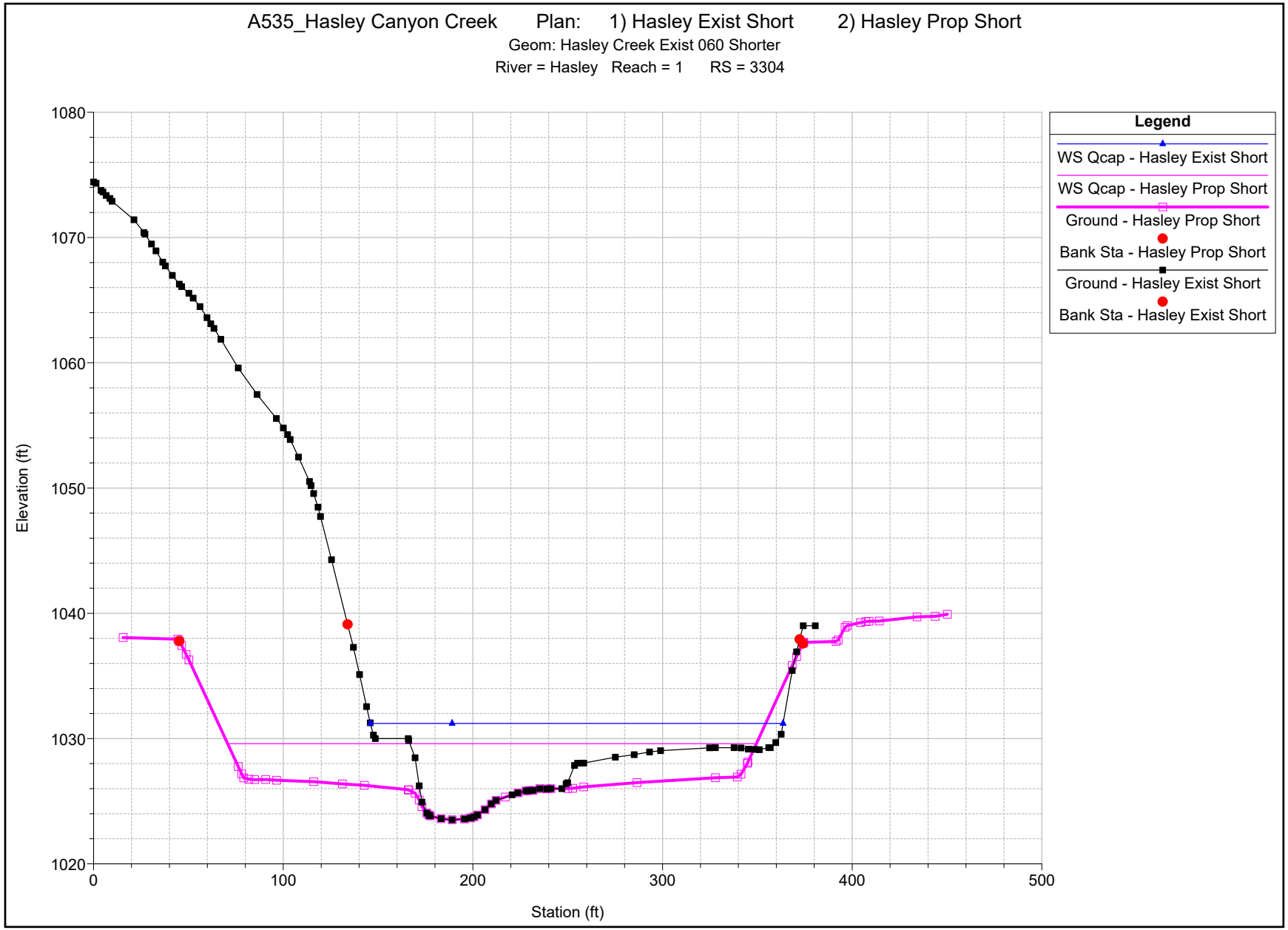
River = Hasley Reach = 1 RS = 3940.5

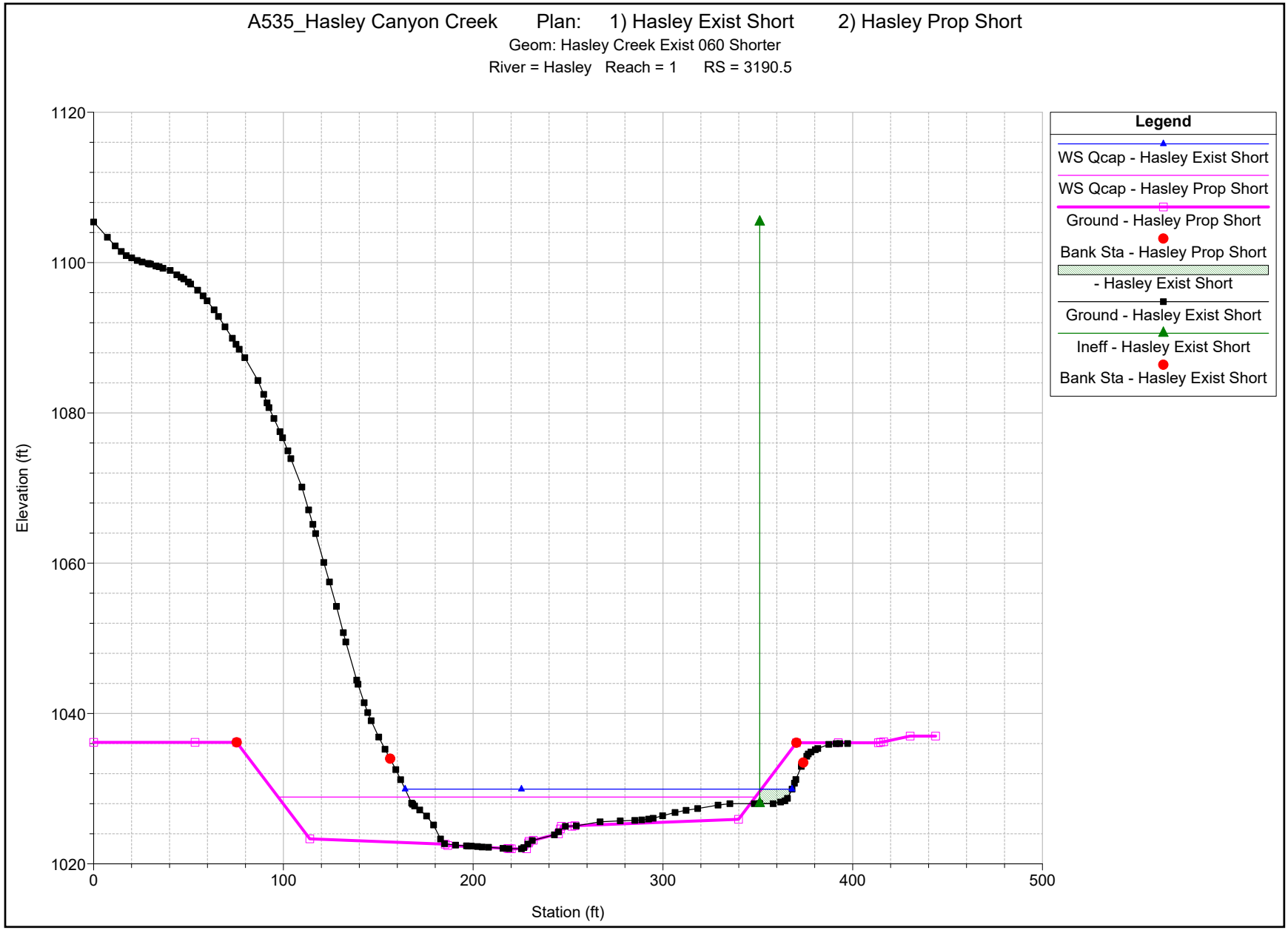


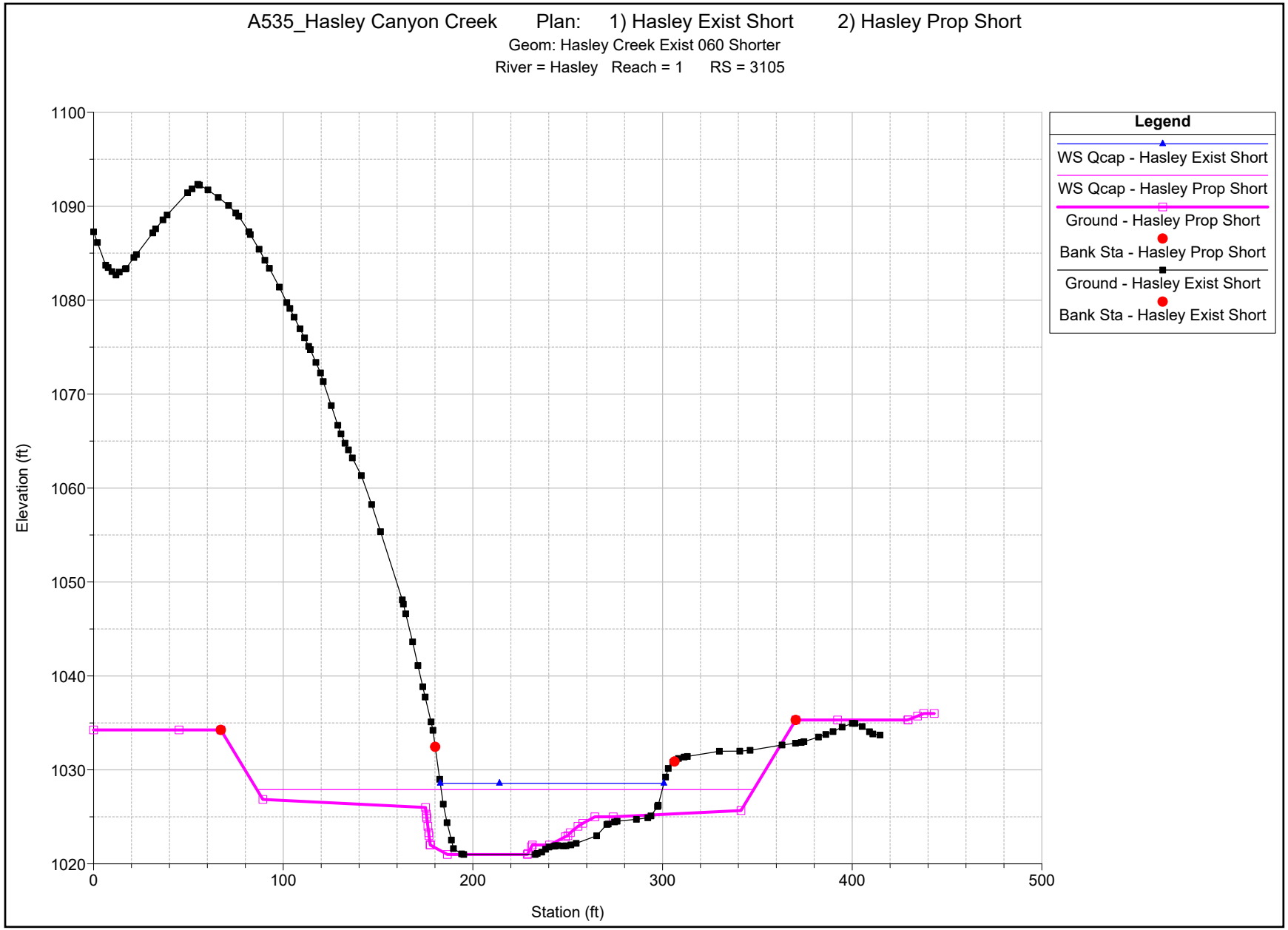

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3844
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1060
1055
1050
1045
1040
1035
1030
0
100
200
300
400
500
Station (ft)

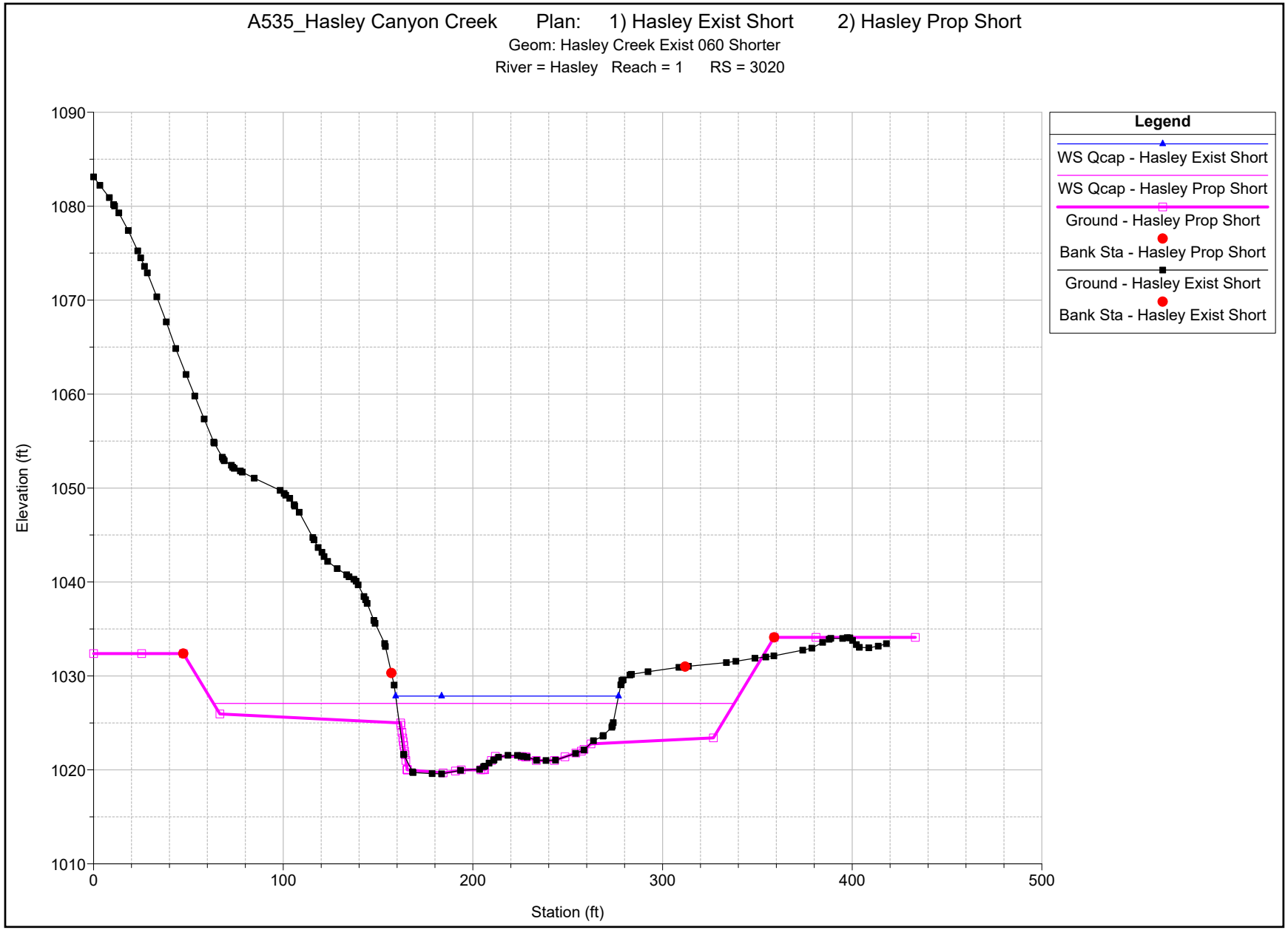

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3747
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1055
1050
1045
1040
1035
1030
1025
0
100
200
300
400
500
Station (ft)

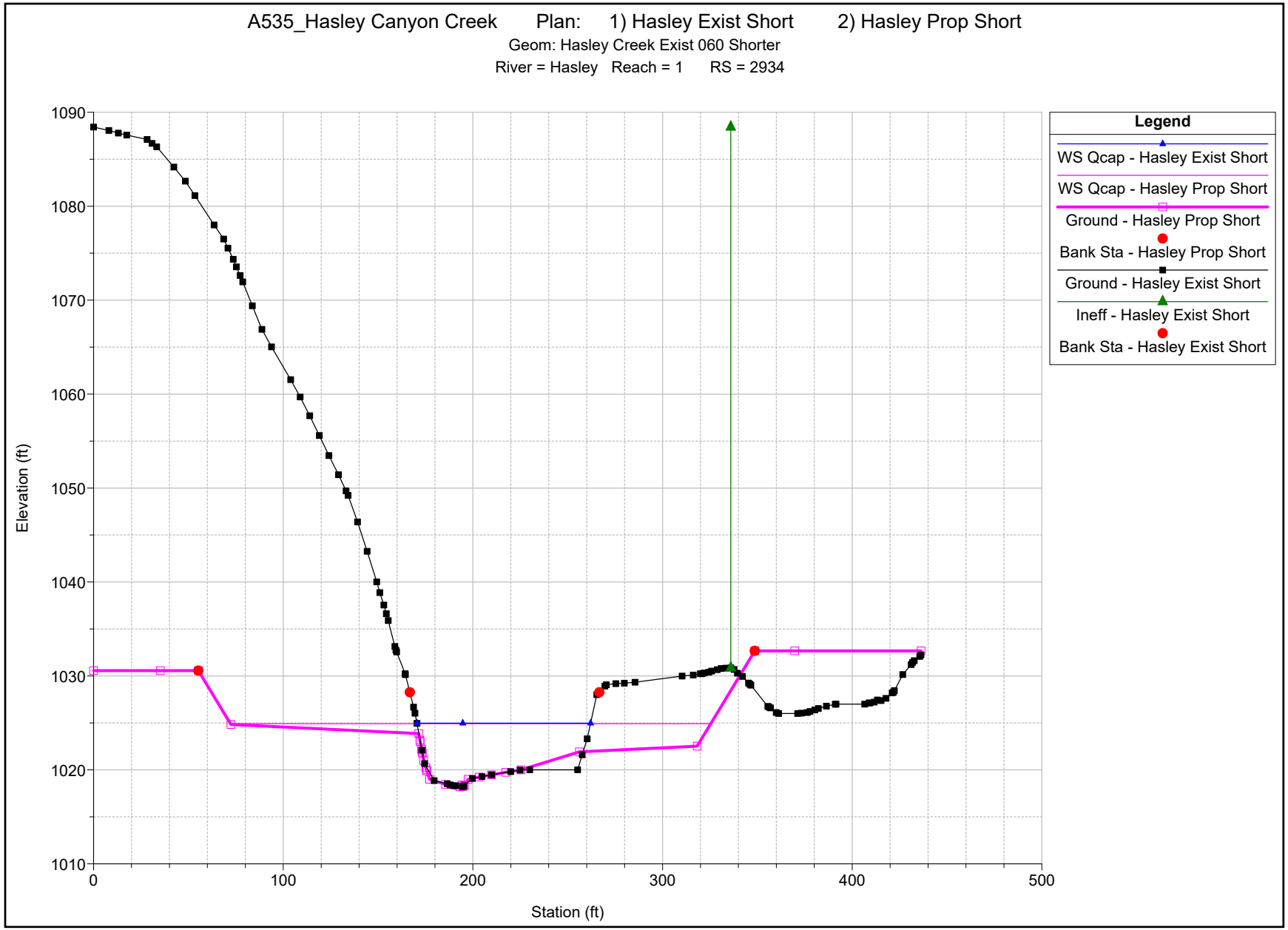

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3650
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1055
1050
1045
1040
1035
1030
1025
0
100
200
300
400
500
Station (ft)

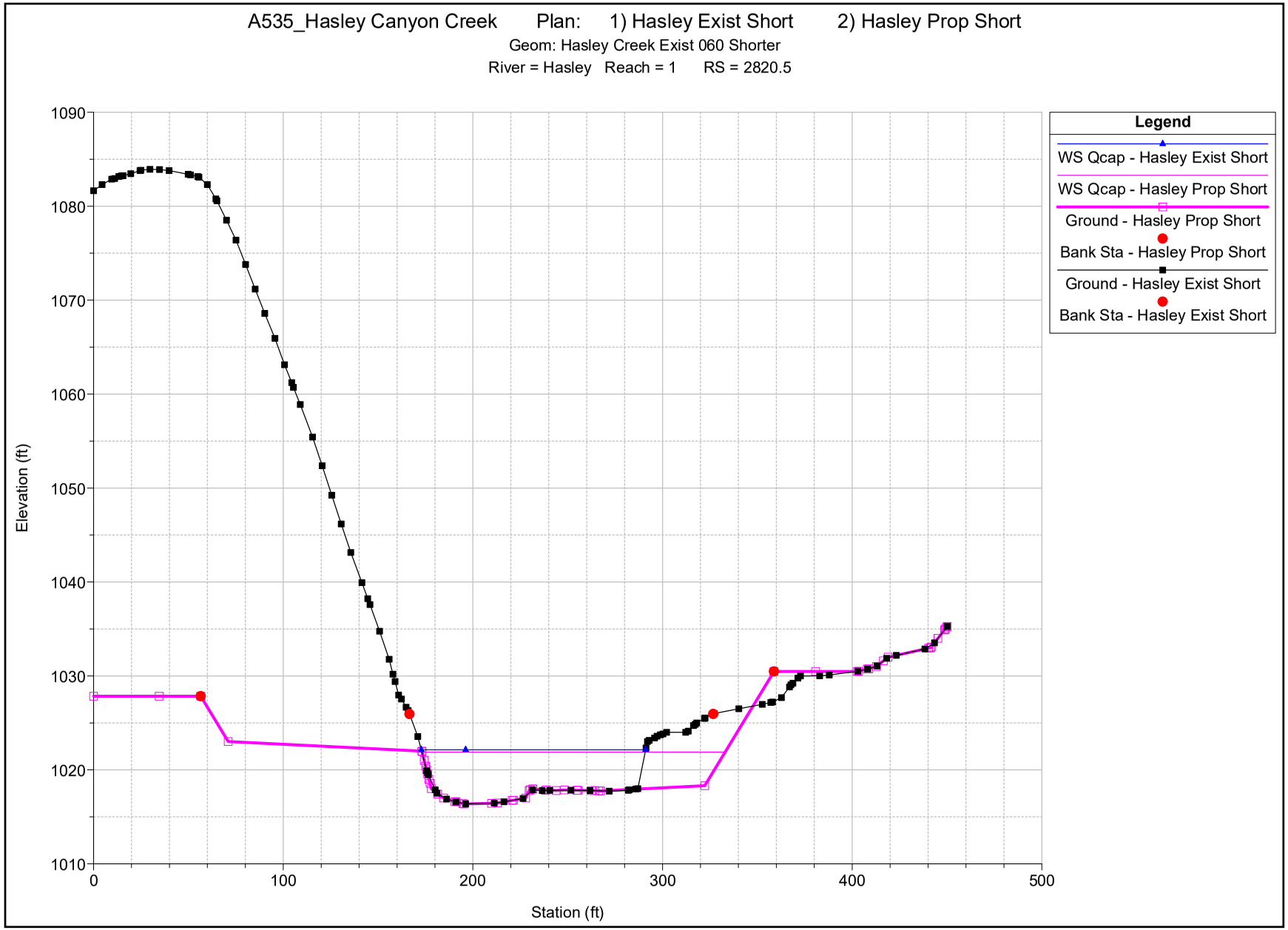

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3304
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1080
1070
1060
1050
1040
1030
1020
0
100
200
300
400
500
Station (ft)

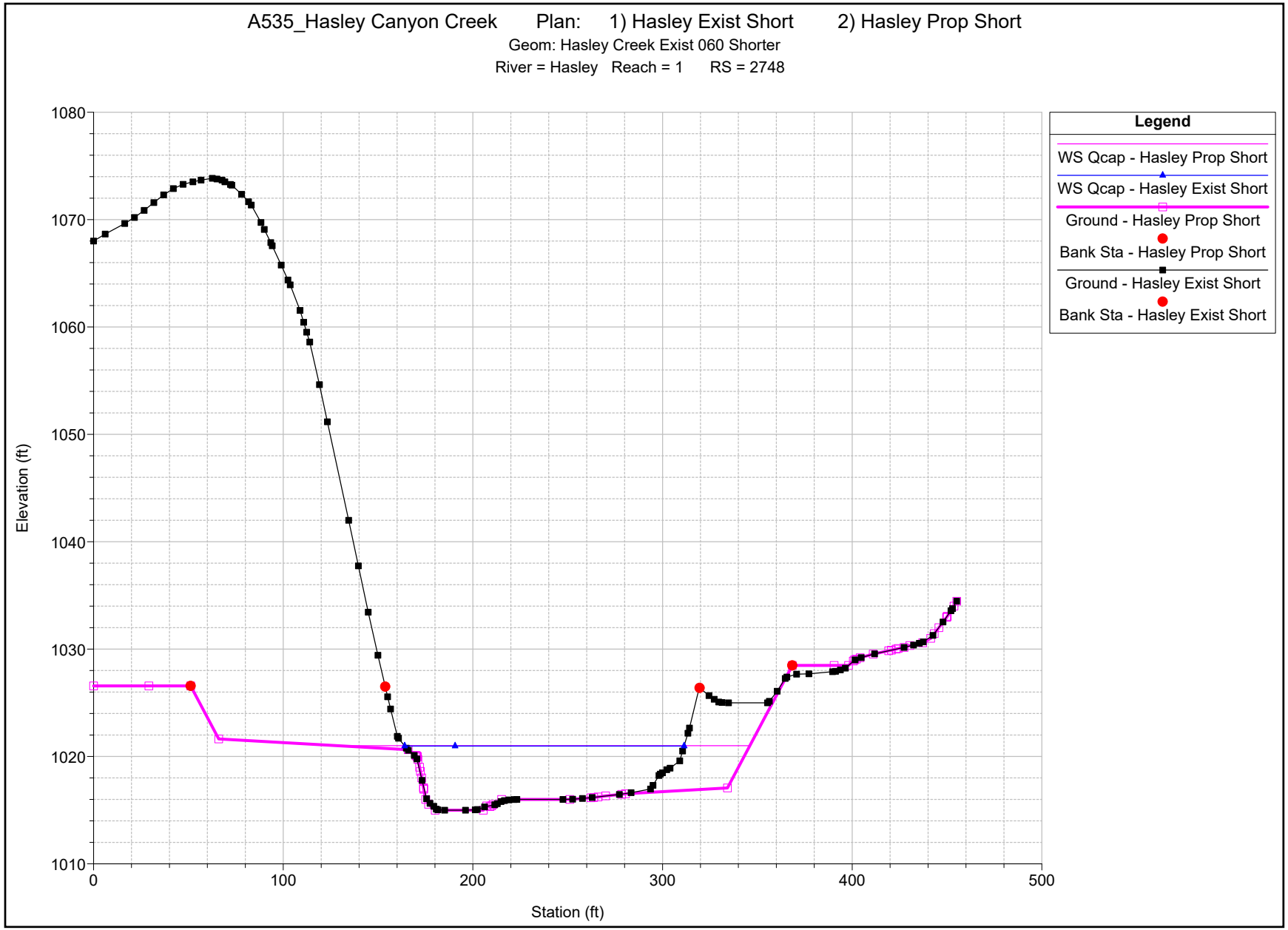

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3190.5
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1120
1100
1080
1060
1040
1020
0
100
200
300
400
500
Station (ft)

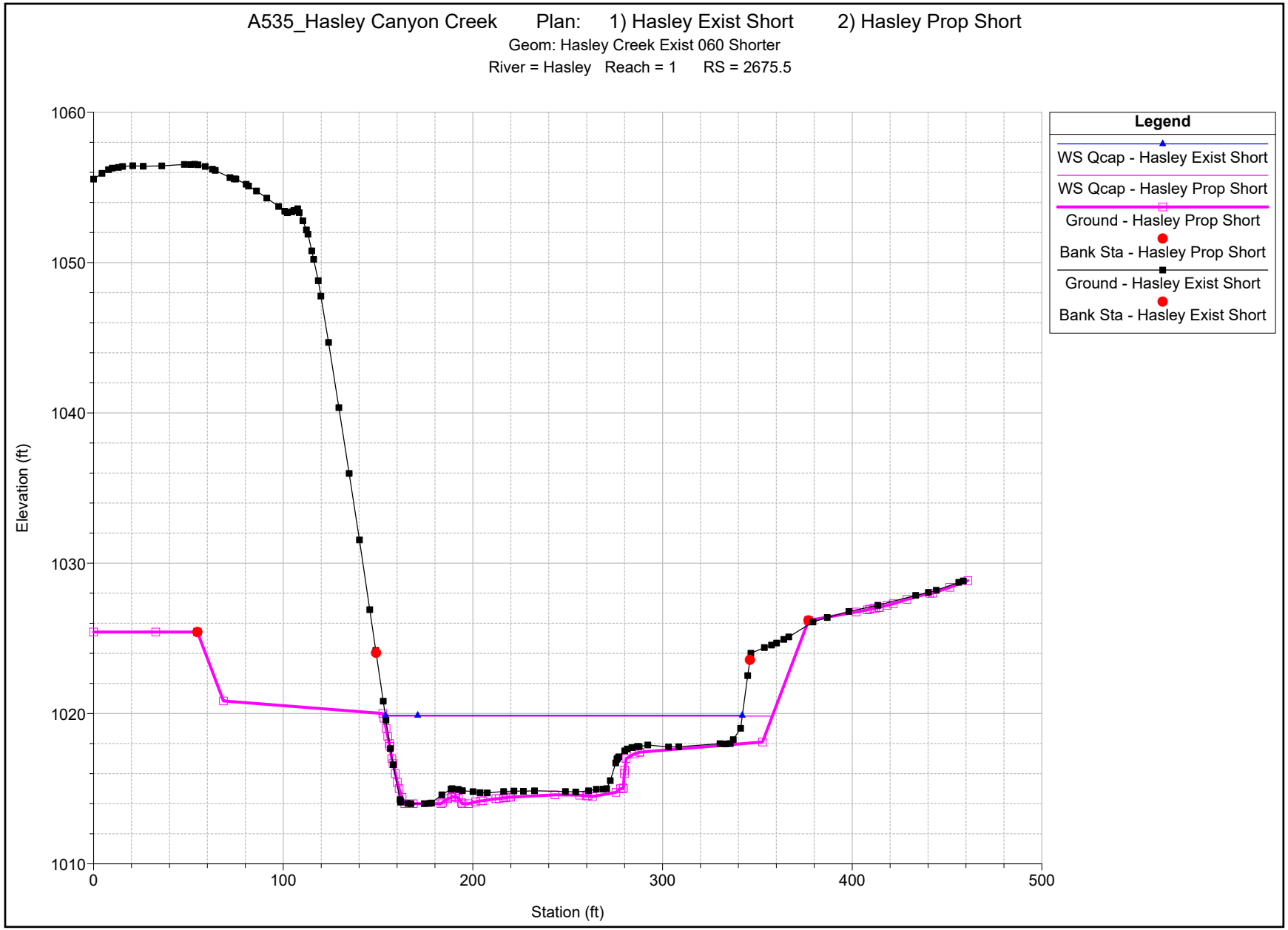

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3105
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1100
1090
1080
1070
1060
1050
1040
1030
1020
0
100
200
300
400
500
Station (ft)

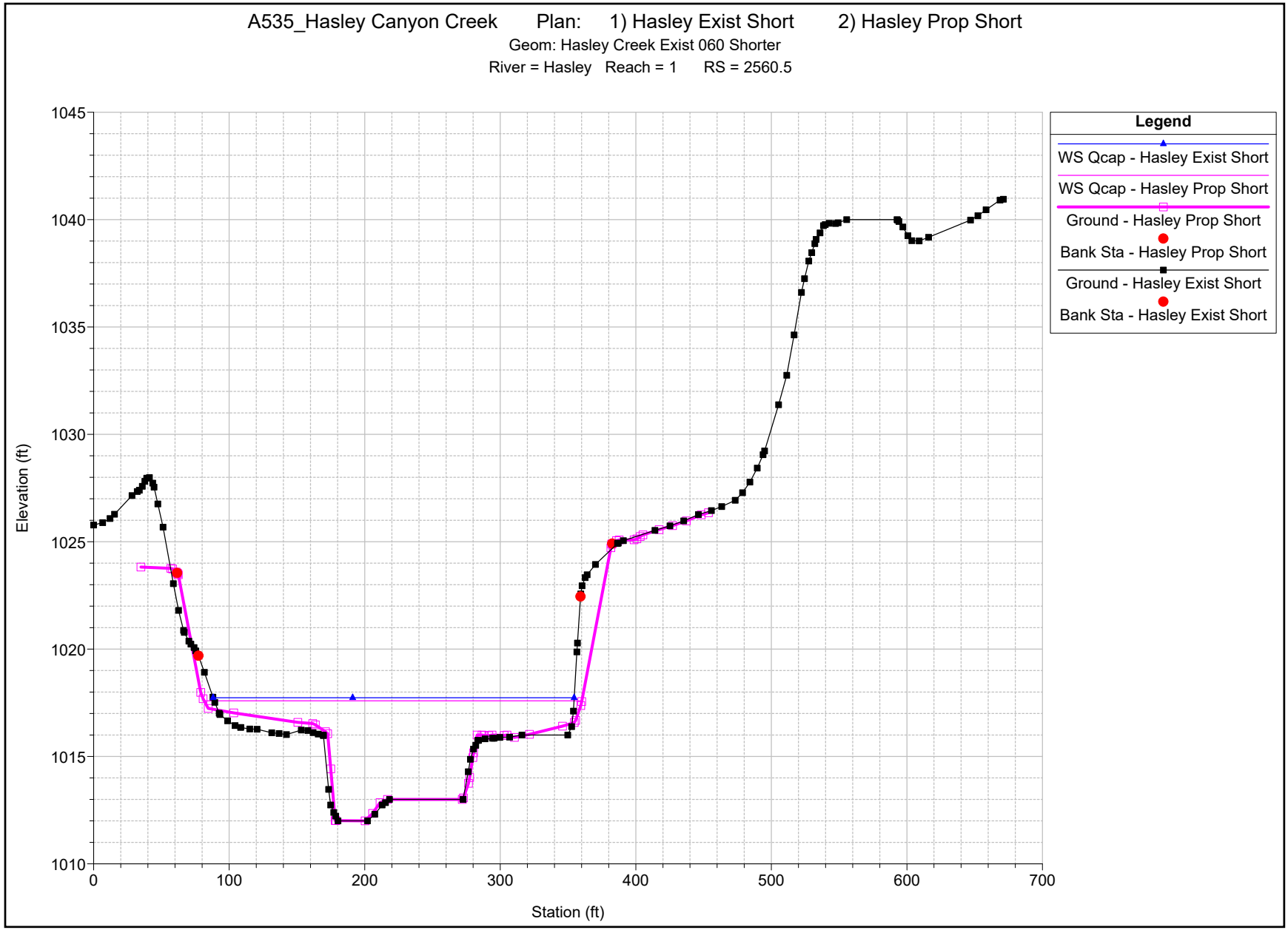

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 3020
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1090
1080
1070
1060
1050
1040
1030
1020
1010
0
100
200
300
400
500
Station (ft)


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2934
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1090
1080
1070
1060
1050
1040
1030
1020
1010
0
100
200
300
400
500
Station (ft)


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2820.5
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1090
1080
1070
1060
1050
1040
1030
1020
1010
0
100
200
300
400
500
Station (ft)


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2748
Legend
WS Qcap - Hasley Prop Short
WS Qcap - Hasley Exist Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1080
1070
1060
1050
1040
1030
1020
1010
0
100
200
300
400
500
Station (ft)

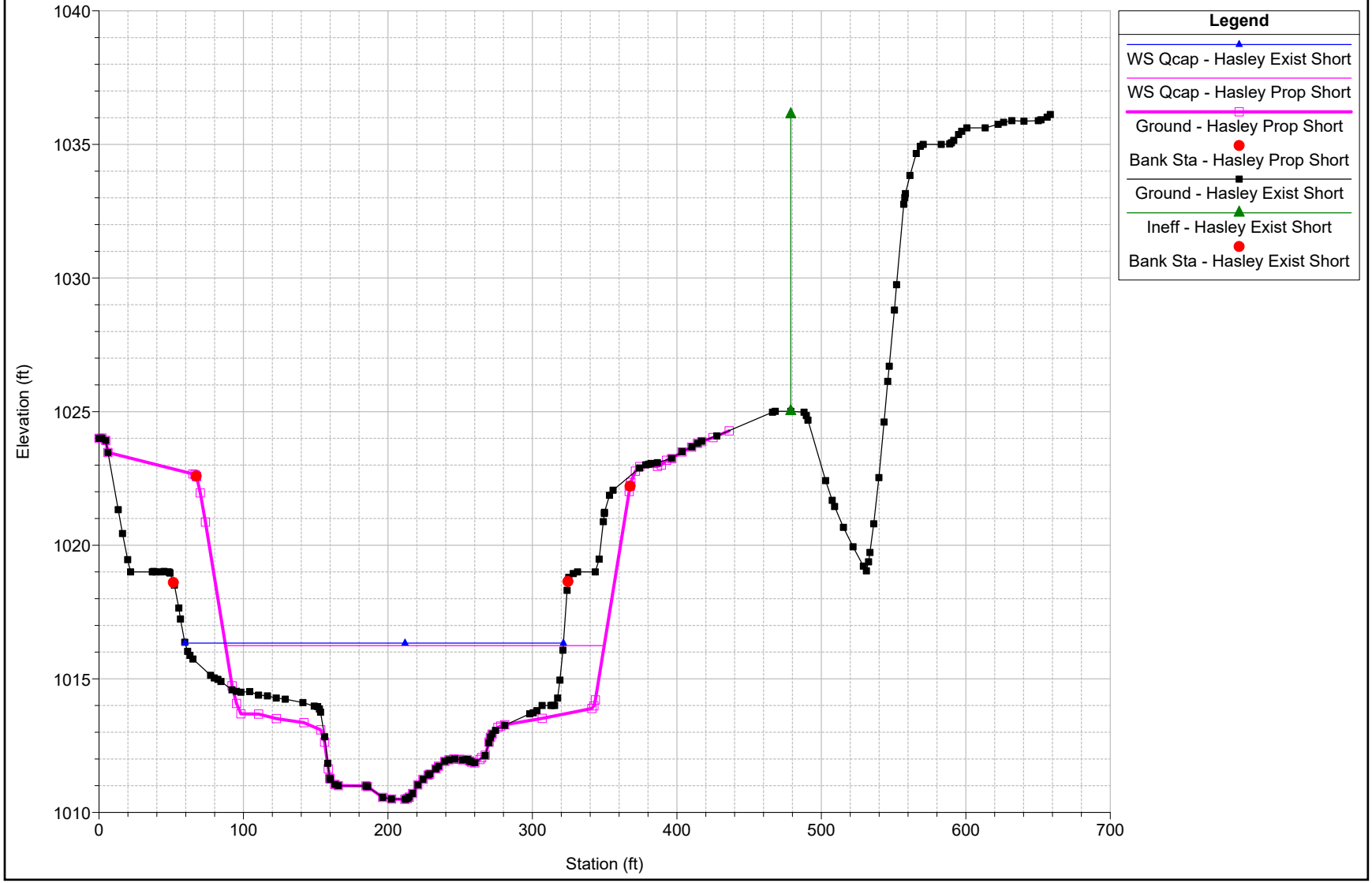

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2675.5
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1060
1050
1040
1030
1020
1010
0
100
200
300
400
500
Station (ft)

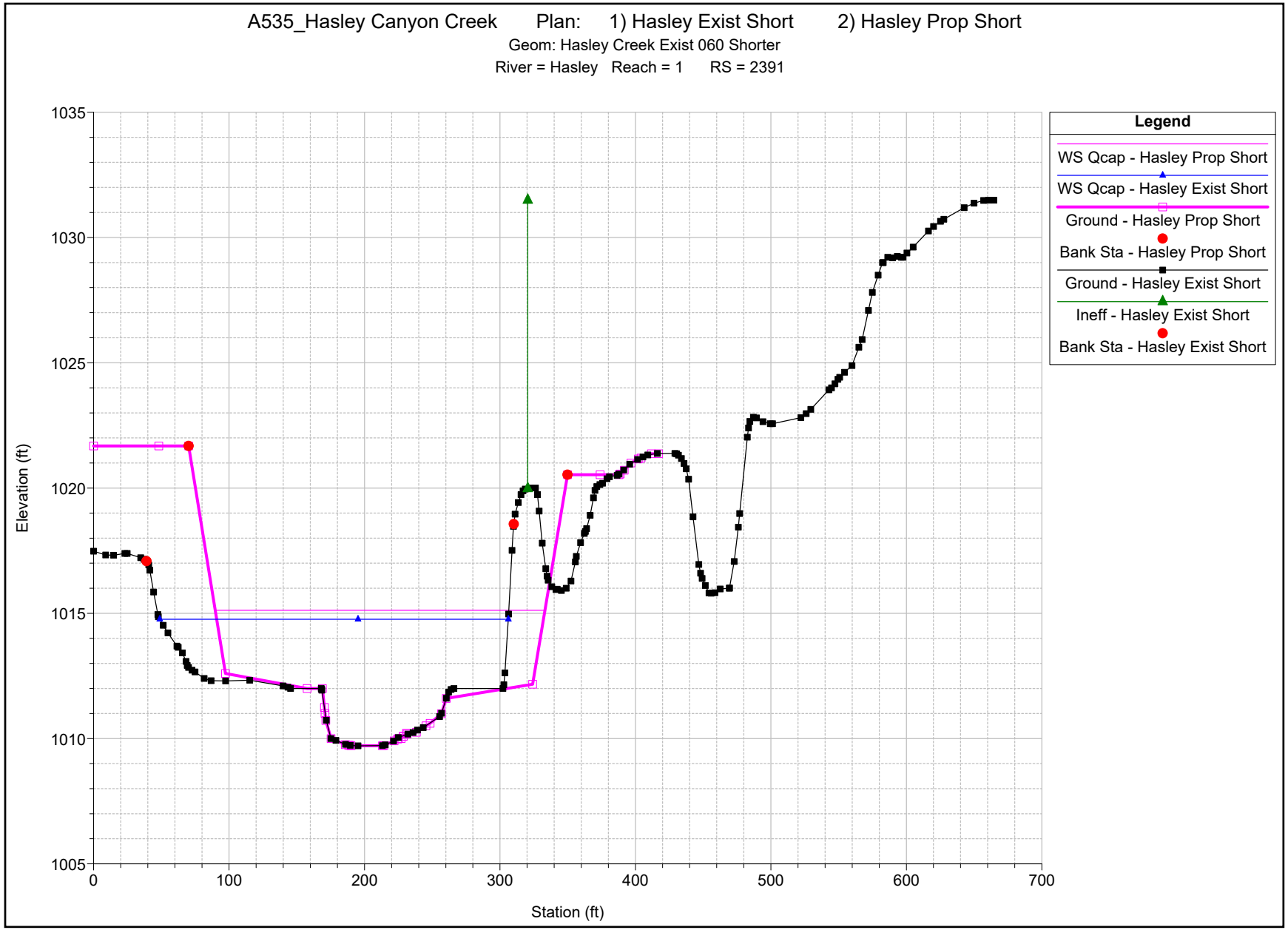

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2560.5
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
Station (ft)
1045
1040
1035
1030
1025
1020
1015
1010
0
100
200
300
400
500
600
700

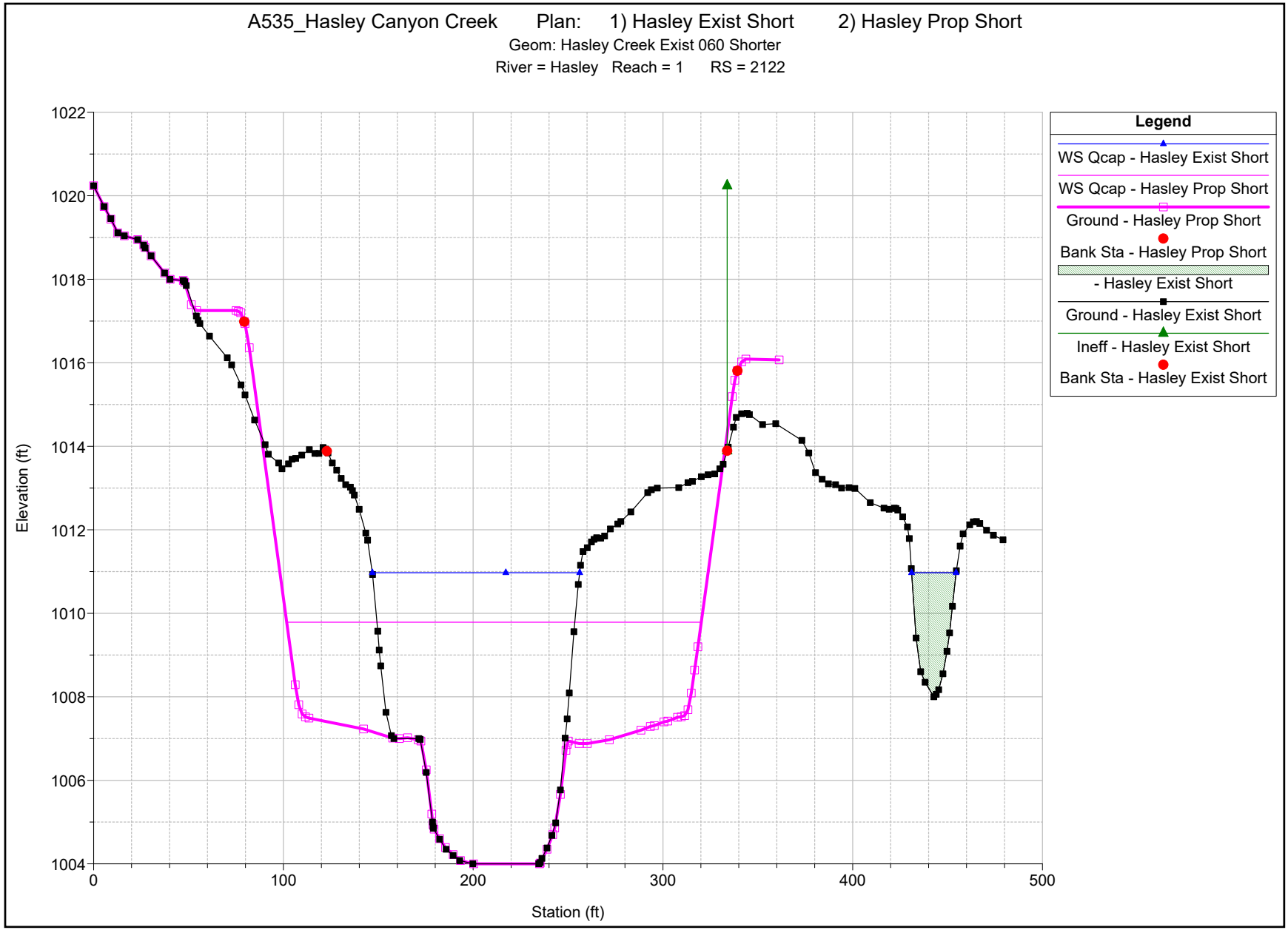
A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short

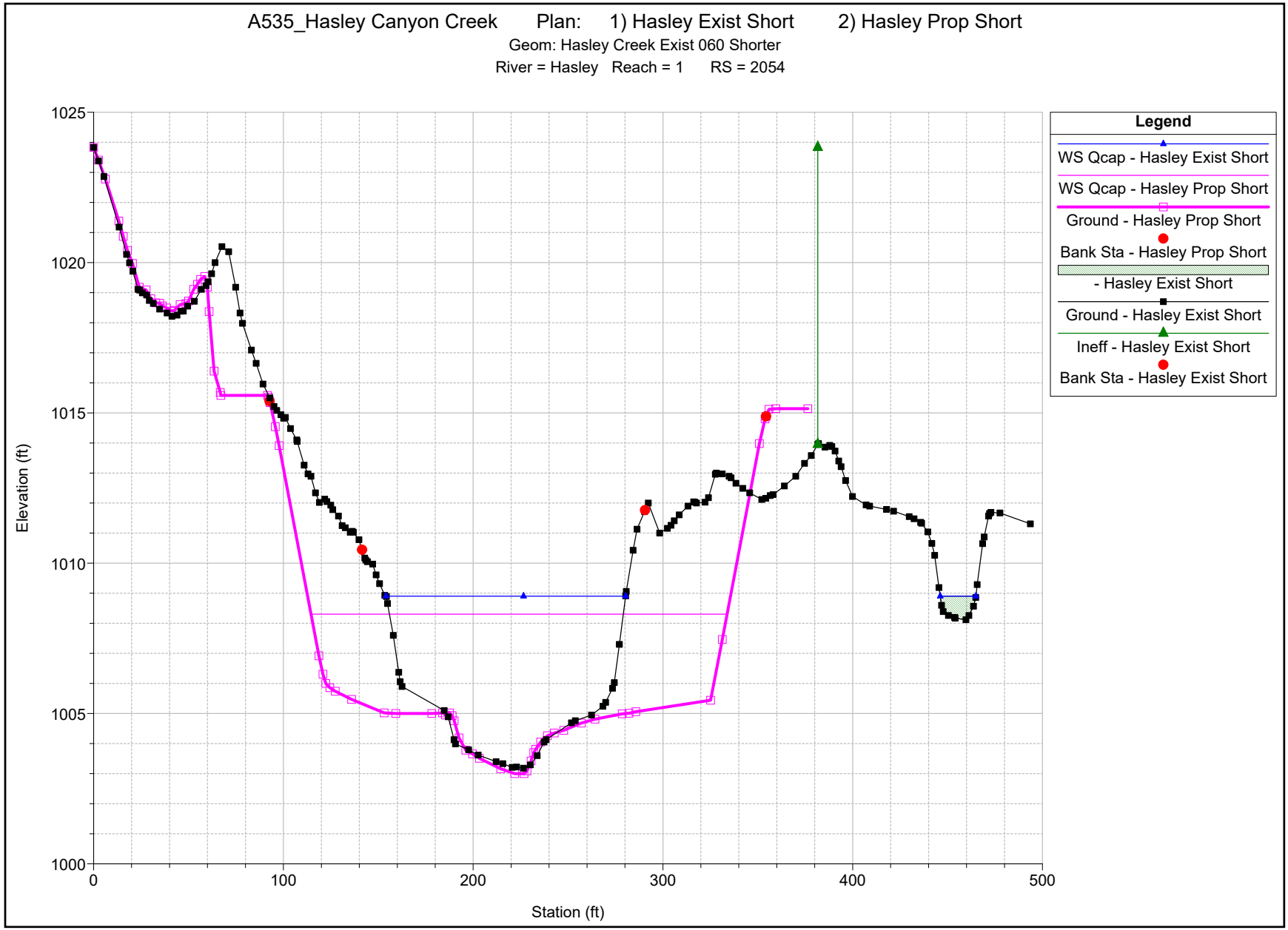
Geom: Hasley Creek Exist 060 Shorter

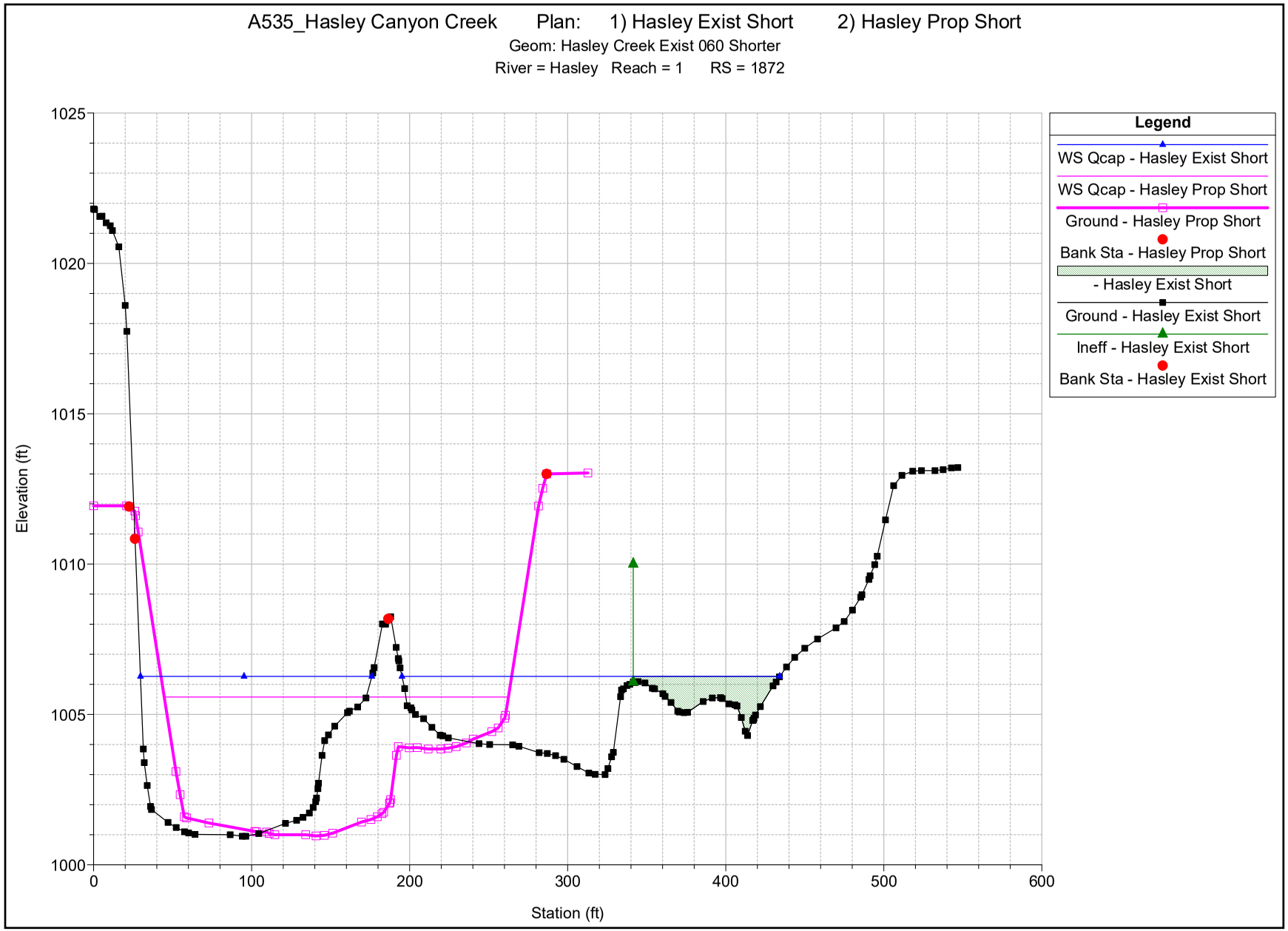
River = Hasley Reach = 1 RS = 2476

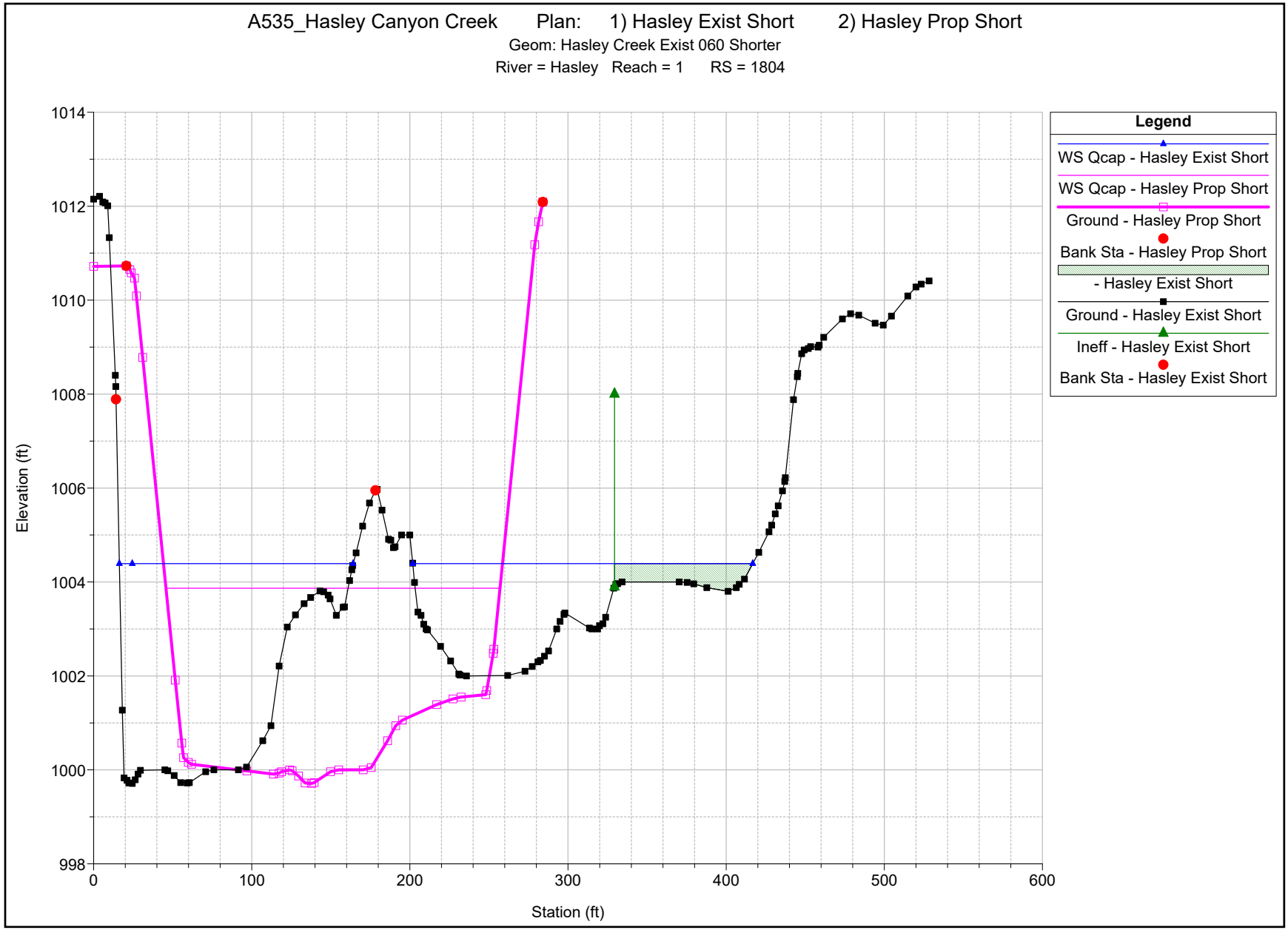


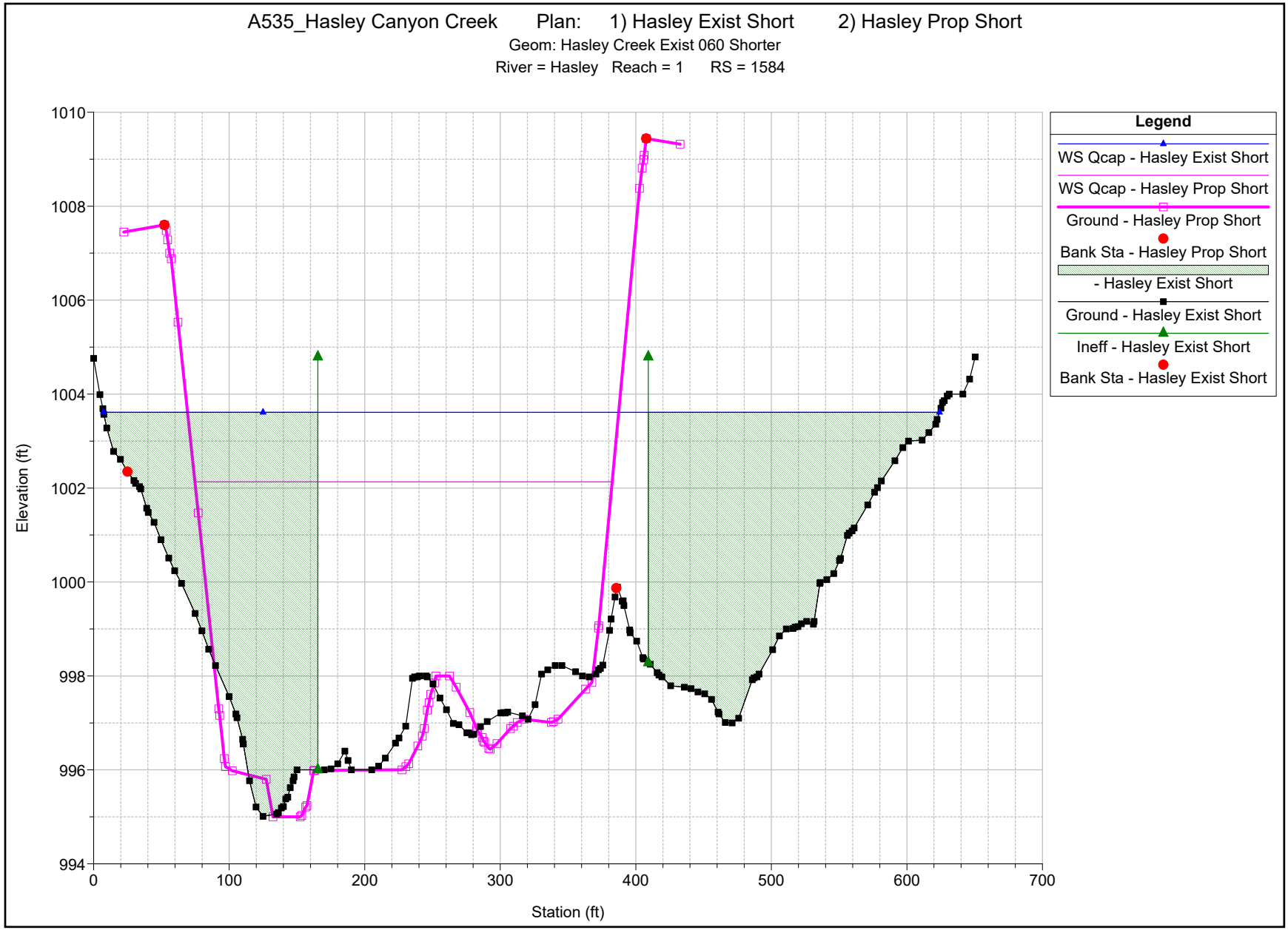

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2391
Elevation (ft)
Station (ft)
1035
1030
1025
1020
1015
1010
1005
0
100
200
300
400
500
600
700
Legend
WS Qcap - Hasley Prop Short
WS Qcap - Hasley Exist Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short

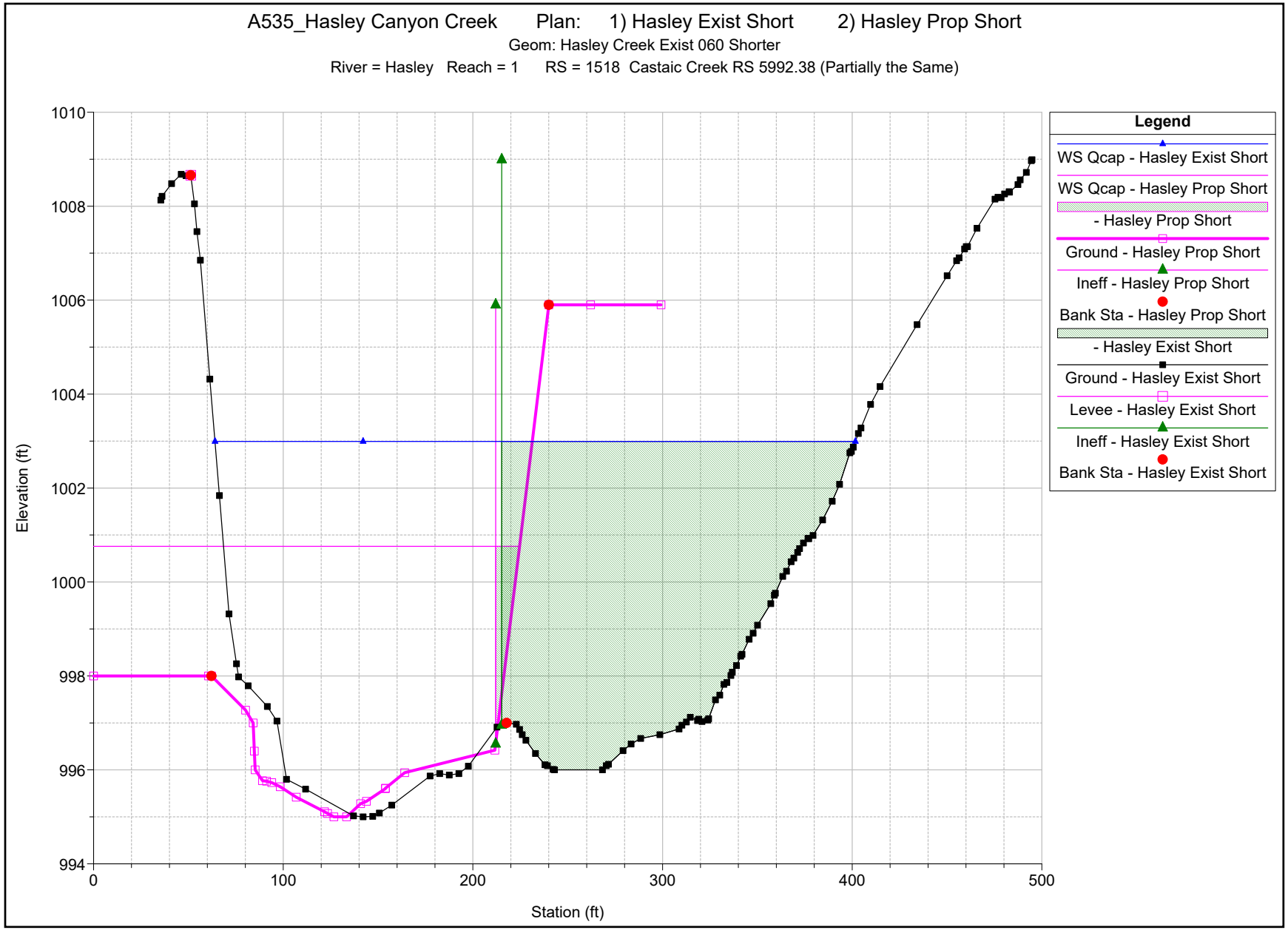

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2122
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1022
1020
1018
1016
1014
1012
1010
1008
1006
1004
0
100
200
300
400
500
Station (ft)

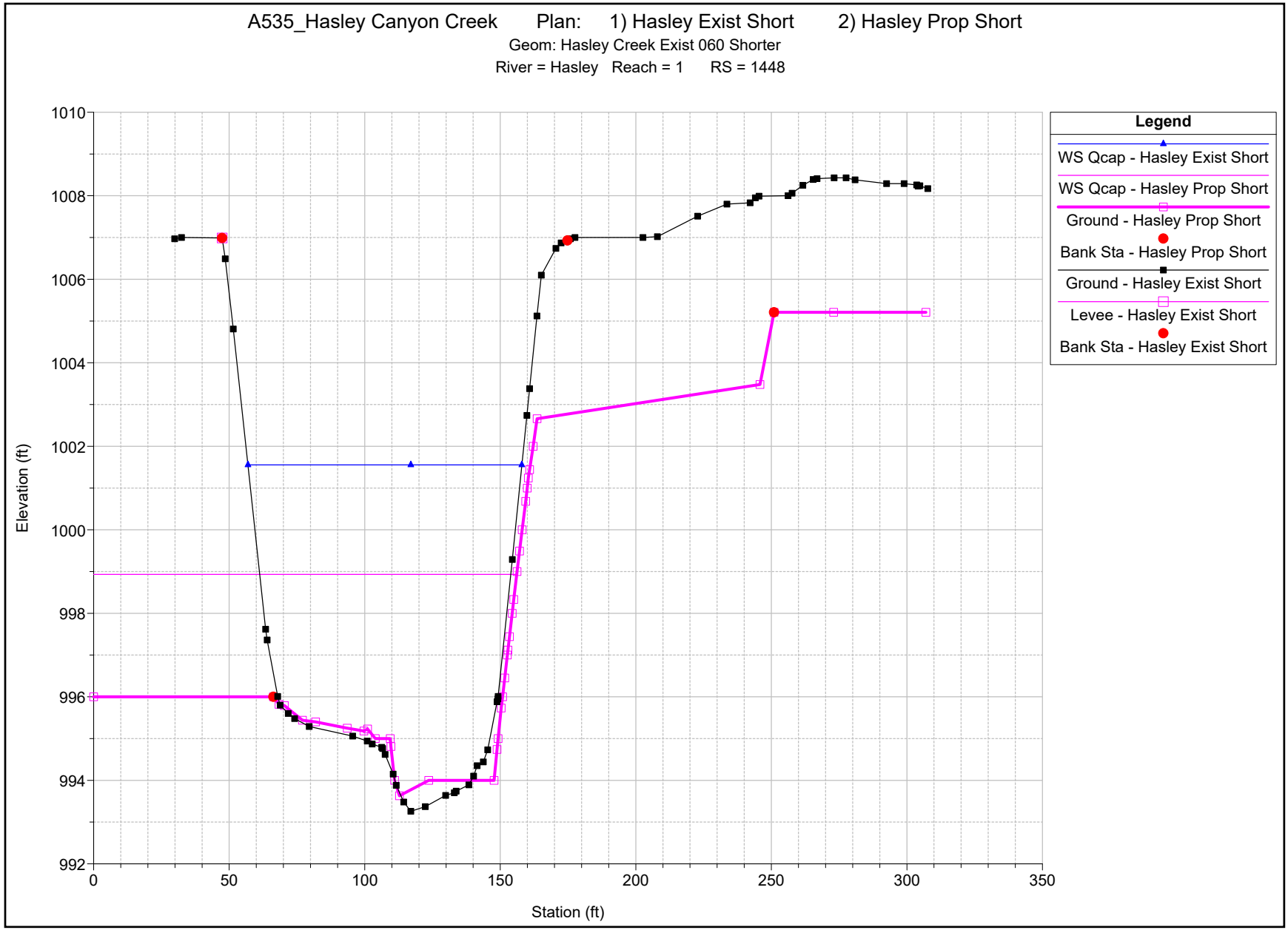

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 2054
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1025
1020
1015
1010
1005
1000
0
100
200
300
400
500
Station (ft)

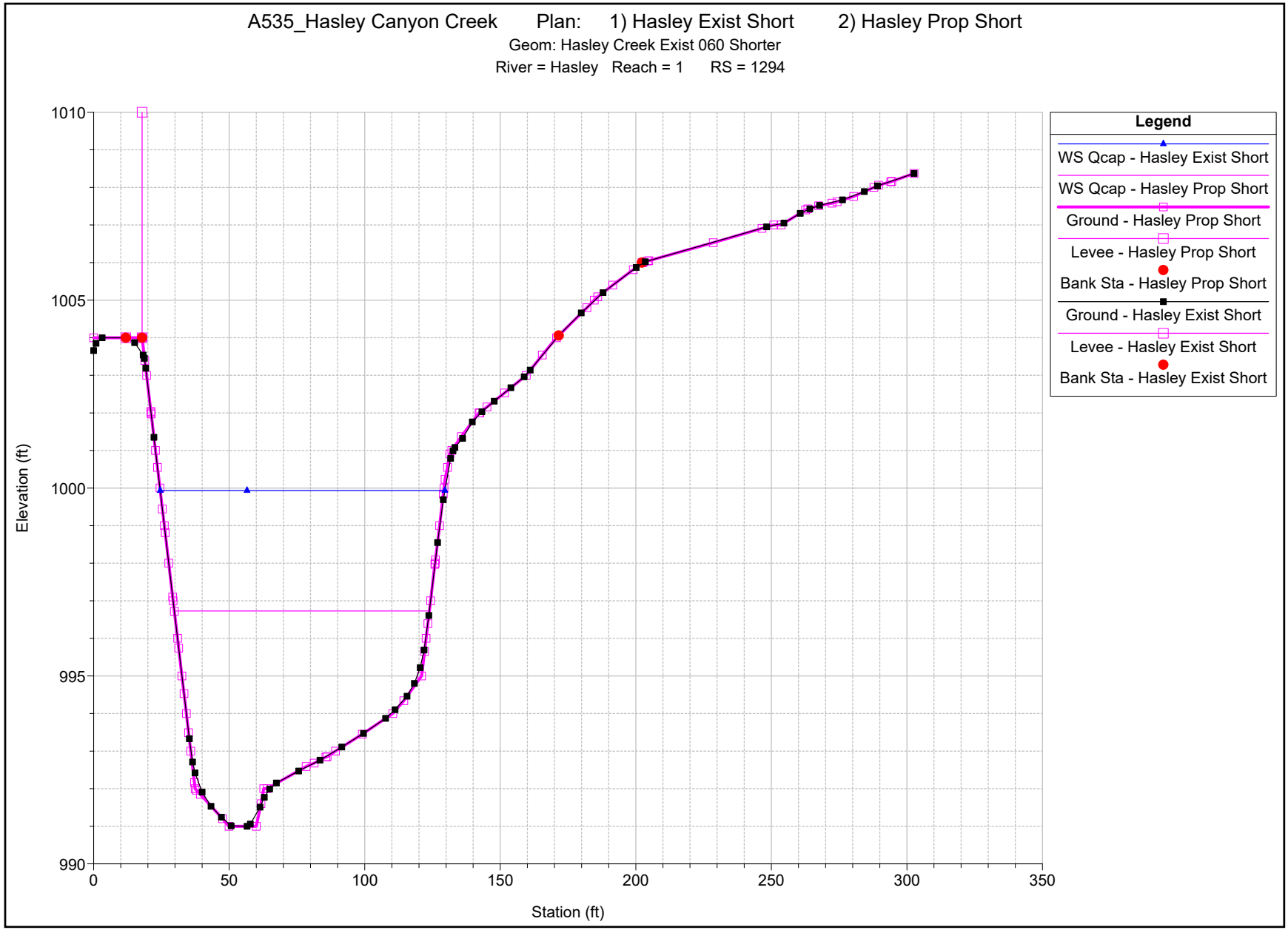

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1872
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1025
1020
1015
1010
1005
1000
0
100
200
300
400
500
600
Station (ft)

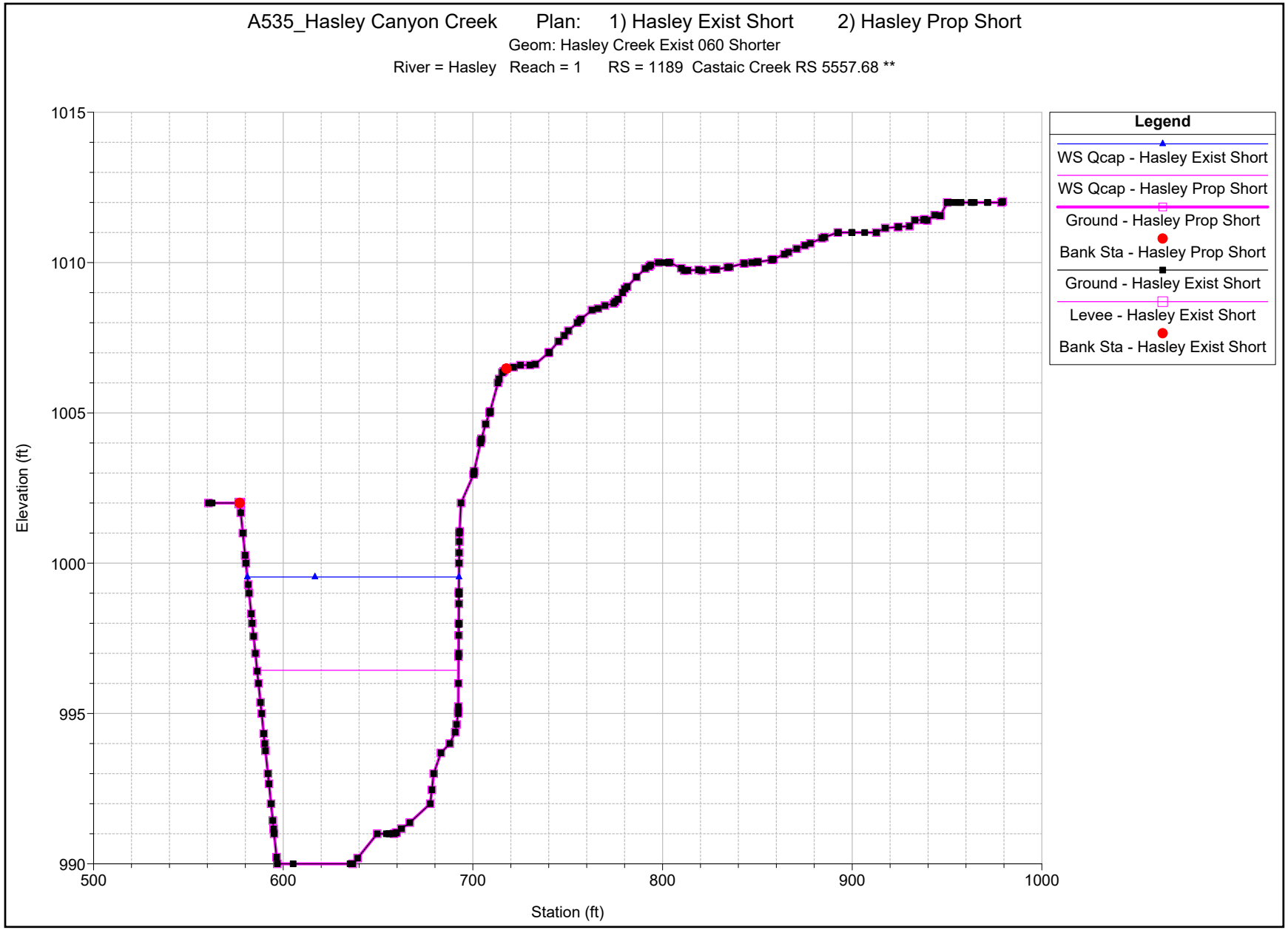

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1804
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
Station (ft)
1014
1012
1010
1008
1006
1004
1002
1000
998
0
100
200
300
400
500
600

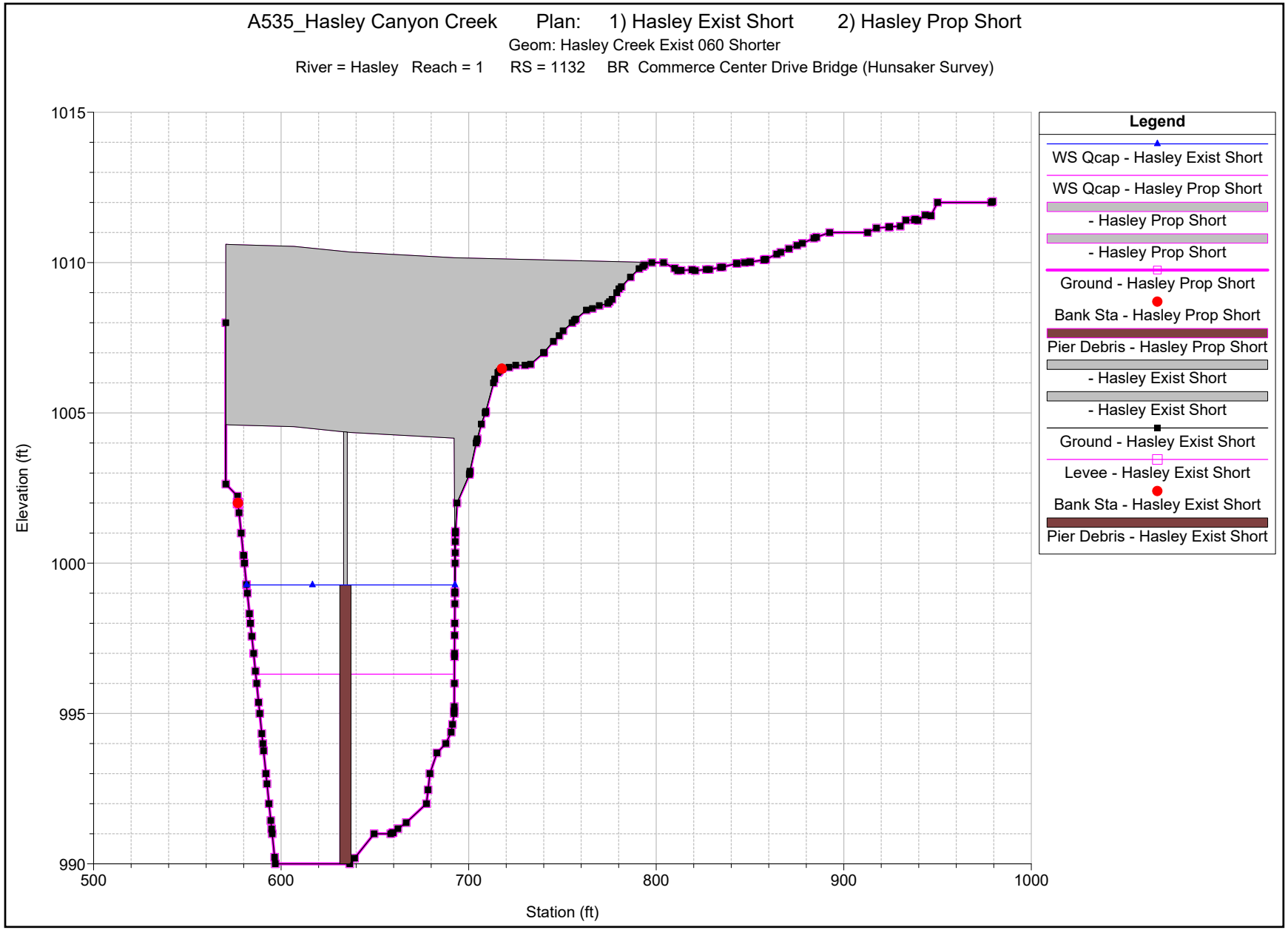

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1584
Elevation (ft)
Station (ft)
1010
1008
1006
1004
1002
1000
998
996
994
0
100
200
300
400
500
600
700
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short

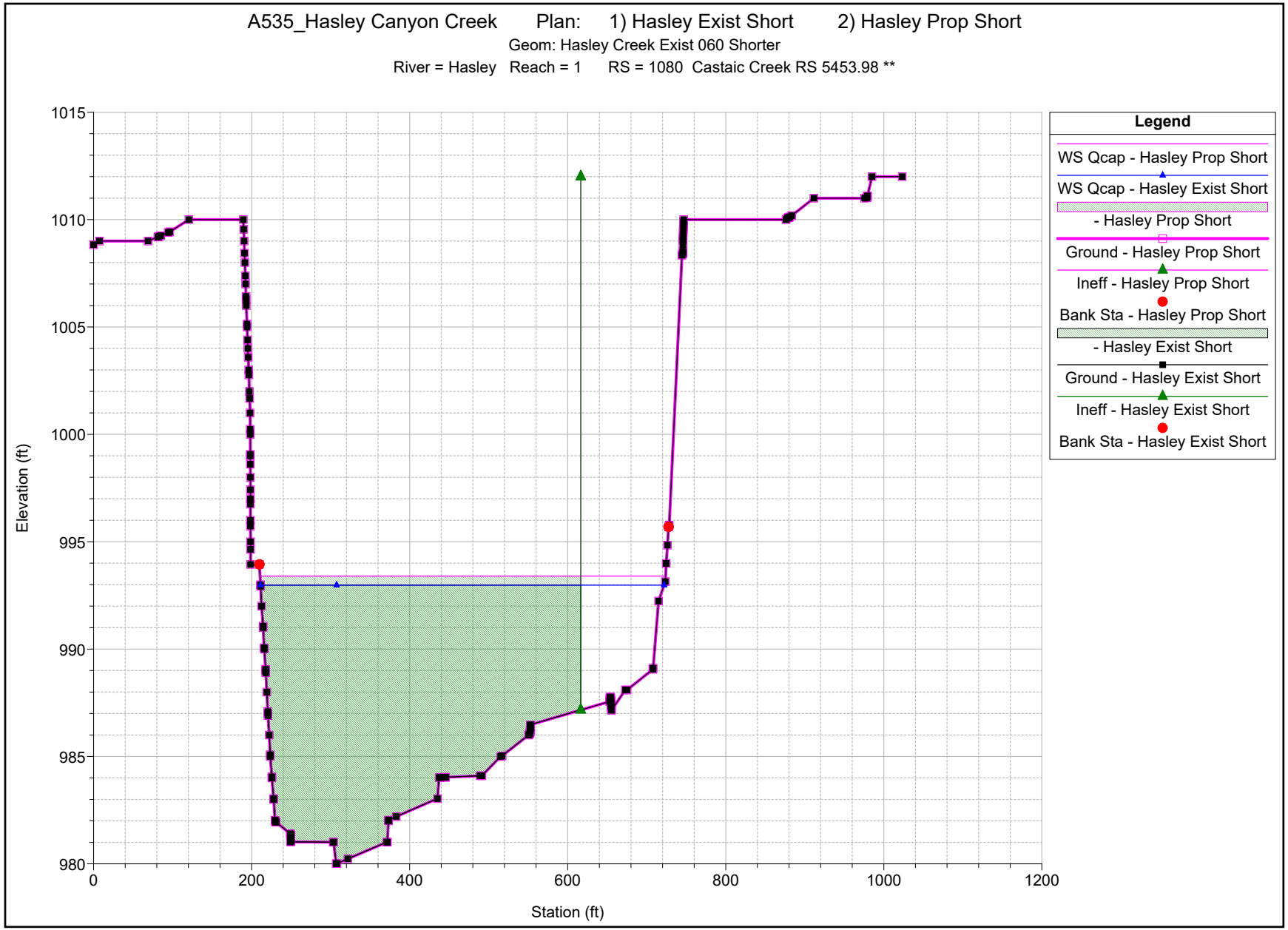

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1518 Castaic Creek RS 5992.38 (Partially the Same)
Elevation (ft)
Station (ft)
1010
1008
1006
1004
1002
1000
998
996
994
0
100
200
300
400
500
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
- Hasley Prop Short
Ground - Hasley Prop Short
Ineff - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Levee - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short

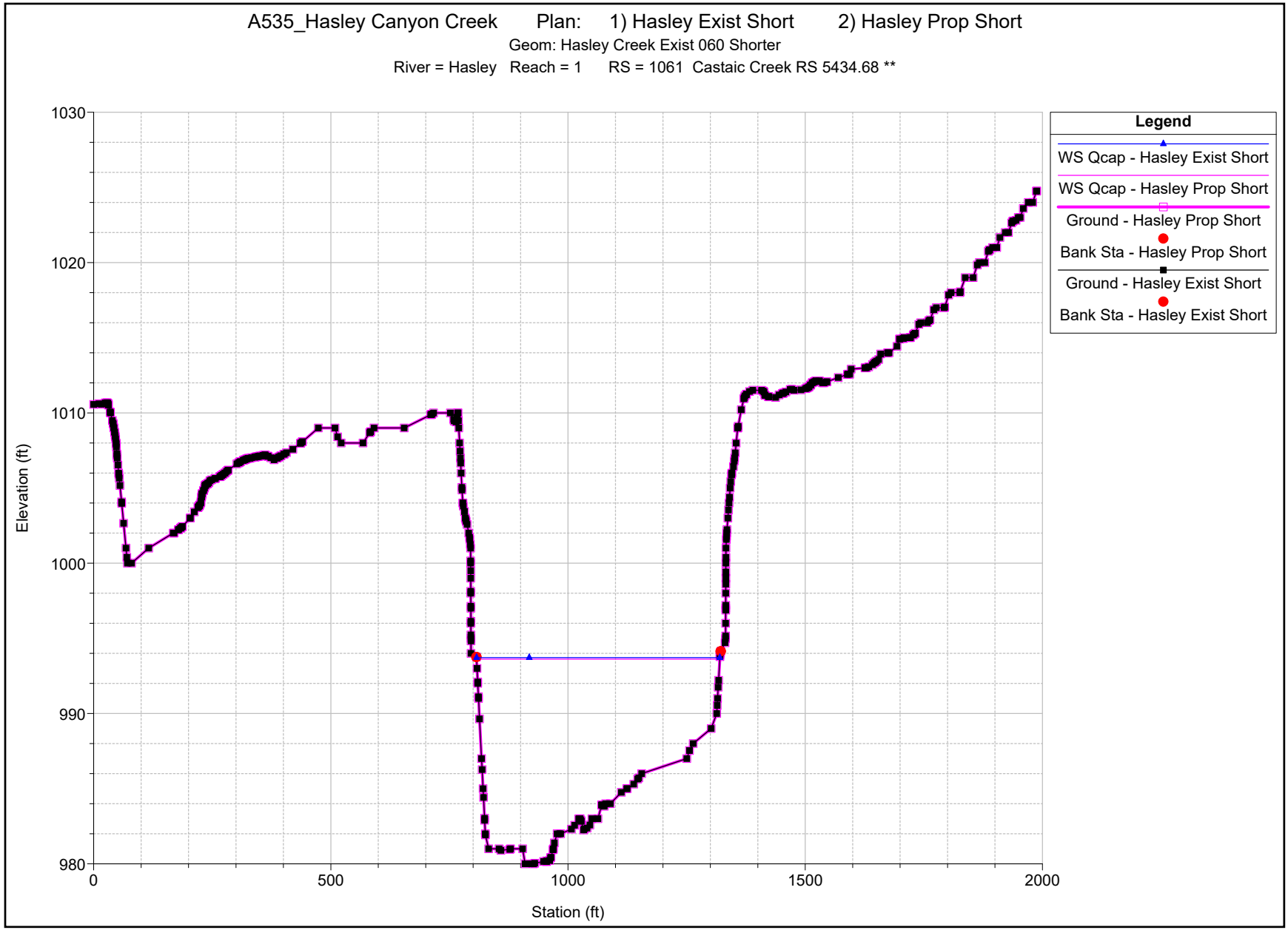

A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1448
Elevation (ft)
Station (ft)
1010
1008
1006
1004
1002
1000
998
996
994
992
0
50
100
150
200
250
300
350
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Levee - Hasley Exist Short
Bank Sta - Hasley Exist Short


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1294
Elevation (ft)
Station (ft)
1010
1005
1000
995
990
0
50
100
150
200
250
300
350
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Levee - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Levee - Hasley Exist Short
Bank Sta - Hasley Exist Short


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1189 Castaic Creek RS 5557.68 **
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Levee - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1015
1010
1005
1000
995
990
500
600
700
800
900
1000
Station (ft)


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1132 BR Commerce Center Drive Bridge (Hunsaker Survey)
Elevation (ft)
Station (ft)
1015
1010
1005
1000
995
990
500
600
700
800
900
1000
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
- Hasley Prop Short
- Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Pier Debris - Hasley Prop Short
- Hasley Exist Short
- Hasley Exist Short
Ground - Hasley Exist Short
Levee - Hasley Exist Short
Bank Sta - Hasley Exist Short
Pier Debris - Hasley Exist Short


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1080 Castaic Creek RS 5453.98 **
Elevation (ft)
Station (ft)
1015
1010
1005
1000
995
990
985
980
0
200
400
600
800
1000
1200
Legend
WS Qcap - Hasley Prop Short
WS Qcap - Hasley Exist Short
- Hasley Prop Short
Ground - Hasley Prop Short
Ineff - Hasley Prop Short
Bank Sta - Hasley Prop Short
- Hasley Exist Short
Ground - Hasley Exist Short
Ineff - Hasley Exist Short
Bank Sta - Hasley Exist Short


A535_Hasley Canyon Creek Plan: 1) Hasley Exist Short 2) Hasley Prop Short
Geom: Hasley Creek Exist 060 Shorter
River = Hasley Reach = 1 RS = 1061 Castaic Creek RS 5434.68 **
Legend
WS Qcap - Hasley Exist Short
WS Qcap - Hasley Prop Short
Ground - Hasley Prop Short
Bank Sta - Hasley Prop Short
Ground - Hasley Exist Short
Bank Sta - Hasley Exist Short
Elevation (ft)
1030
1020
1010
1000
990
980
0
500
1000
1500
2000
Station (ft)

Appendix 5.5g

Castaic Creek County Floodplain Report

Capital Floodway Revision Analysis

Los Angeles County Floodway Revision ML Map No.'s 335-ML-1 and 2 for Castaic Creek
ESTU No. 2023000109

November 2024

Prepared For:

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Submitted To:

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PACE JN A535

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B. HEC-RAS Revised Existing Conditions Capital Floodplain and Floodway
C. HEC-RAS Proposed Condition Capital Floodplain and Floodway
D. HEC-RAS Cross Section Comparison – Existing Vs. Proposed Conditions

Enclosure

1. HEC-RAS version 6.2 hydraulic models of existing and proposed floodplain and floodway

1 Introduction

Pacific Advanced Civil Engineering, Inc. (PACE) has been retained by FivePoint Communities to prepare a report for LA County Floodplain and Floodway Map Layer Revision along lower Castaic Creek. This report proposes a revision to the existing LA County Adopted Floodway Map for Castaic Creek between Commerce Center Drive and the Old Road/ Interstate 5 (I-5) Bridges. Furthermore, this report presents the proposed condition floodway and floodplain based on channel improvements for the Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108. The project site is located within the unincorporated area of Los Angeles County, three miles west of the City of Santa Clarita.

The Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 requires bank protection along Castaic Creek. The proposed improvements along Castaic Creek consist of approximately 8,400 lineal feet (LF) of soil cement bank protection broken up into three segments.

(1) Proposed **"West"** Soil Cement Bank Protection - an approximately 4,000-LF section of soil cement bank protection on the west bank beginning near the confluence of Castaic Creek and Hasley Creek and extending to the existing concrete slope lining (PD No. 1982) adjacent to Live Oak Road

(2) Proposed **"Southeast"** Soil Cement Bank Protection – an approximately 3,000-LF section of soil cement bank protection on the east bank that will extend from Commerce Center Drive (CCD) Bridge to the existing rip-rap slope protection (PD No. 2441)

(3) Proposed **"Northeast"** Soil Cement Bank Protection – an approximately 1,400-LF section of soil cement bank protection on the east bank, that begins at the northern end of the existing rip-rap slope protection (PD No. 2441) to the Old Road Bridge

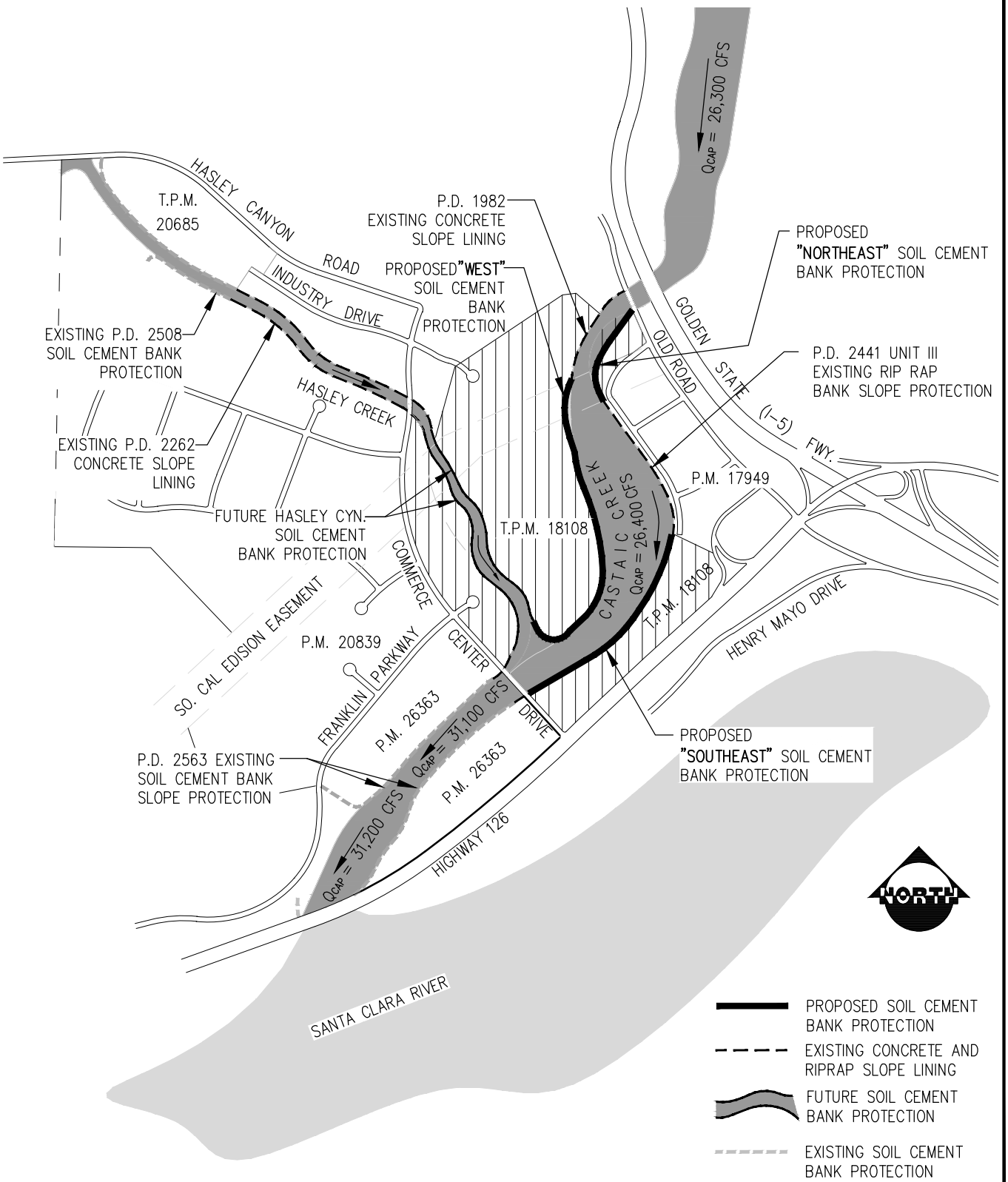
The Drainage Concept Report for the proposed soil cement bank protection titled, **Drainage Concept Report Volume II of V, Castaic Creek Bank Protection, ESTU No. 2001000012**, was approved by LACPW in September 2019. Refer to Figure 1-1 for project location map.

The existing Los Angeles County Capital Floodway maps (335-ML-1 & 2) were adopted by the Board of Supervisors on August 28, 1984 by Ordinance No. 84-0136. PACE prepared revisions to the existing Los Angeles County Capital Floodway maps, herein referred to as ML Maps, as part of a report titled, **Los Angeles County Capital Floodway Revision ML Map No's 335-ML-1&2 Castaic Creek Bank Protection (P.D. No. 2563) for P.M. No. 26363**, in December 2006. The revisions were submitted to LA County Department of Public Works for review and approved on October 2, 2007. The 2007 revisions changed the ML mapped floodway and floodplain between Commerce Center Drive and Hwy 126.

PACE obtained current hydrology data for the capital flood (Q_{cap}) within Castaic Creek watershed, from Los Angeles County Department of Public Works (LACPW). The hydraulic analysis performed for Castaic Creek was based on the current hydrology provided.

Some of the major items discussed or included in this report include:

- A summary of the hydrology and hydraulic study utilized to determine the existing and proposed capital floodway and floodplain.
- LA County adopted floodway ML Maps No.'s 335-ML-1 & 2.
- Updated existing conditions capital floodplain and floodway hydraulic analysis from Commerce Center Drive to upstream of the Interstate-5 (I-5) Bridge.
- Proposed conditions floodplain and floodway hydraulic analysis from Commerce Center Drive to upstream of the Interstate-5 (I-5) Bridge, RS 12350 (approx. 7,200 ft in length).
- Updated existing and proposed conditions capital floodplain and floodway mapping.



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DRAWN	B.D.P.
CHECKED	J.C.
DATE	Nov, 2022
JOB NO.	A535

CASTAIC CREEK
SOIL CEMENT BANK PROTECTION
TPM # 18108

INDEX MAP

FIGURE 1-1

P:\A535\Engineering\A535-72_Castaic Creek ML\exhibits\A535.72-Figure-1.1.dwg By: erandig Date: Apr. 17, 2023 Time: 08:39 am

2 Hydrology

2.1 Regional Hydrology

Castaic Creek is located within Castaic Creek basin watershed, which has a contributing drainage area of approximately 202 square-miles. PACE obtained current hydrology data for the Capital Flood (Q_{cap}) for Castaic Creek from LACPW. The Q_{cap} discharge rates for Castaic Creek are summarized in Table 2-1.

The Los Angeles County Flood Control District (LACFCD) analyzes hydraulics based on the Capital Flood, Q_{cap}. The Q_{cap} assumes a burned watershed and bulked peak flows. The design storm established by LACFCD is the Q_{cap} capital flood, which is defined as follows:

1. The design storm is assumed to occur on already saturated soils over a period of four days, with the maximum rainfall falling on the fourth day. During the 24-hour period of maximum rainfall, the rainfall intensity typically increases during the first 70-90% of the period and decreases in the remaining time. Furthermore, approximately 80% of the amount of the 24-hour rainfall falls within the same 70-90% of the period.
2. When converting rainfall to runoff, rainfall that is not lost due to hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration or percolation is assumed to be surface runoff.
3. The natural portions of the watershed are assumed to have been burned by fire, which decreases soil infiltration.
4. In the area where a watershed is burned, the runoff would carry with it a large layer of eroded topsoil, burned trees and brush. To account for the quantity of debris, the design flow rate is artificially increased by a percentage increase in flow rate, or bulking factor.

Table 2-1 presents the capital flood discharge rates for Castaic Creek between the Old Road and the Hwy 126 Bridges.

Table 2-1: Design Hydrology

Storm Event	Design Flow (cfs)	Location
CAP (1)	26,300	Upstream of the Old Road Bridge and I-5 Bridge
CAP (1)	26,400	Old Road Bridge and I-5 Bridge to Hasley Creek Confluence
CAP (1)	31,100	Hasley Creek Confluence to unnamed canyon approximately 1,200 ft upstream of Highway 126
CAP (1)	31,200	unnamed canyon approximately 1,200 ft upstream of Highway 126 to State highway 126 Bridge

Notes:
(1) Source LACPW (Water Resources Division, See Appendix A)

3 Existing Hydraulic Analysis and Floodplain/ Floodway Mapping

Included in this report are three floodplain/ floodway map limits: (1) LA County Adopted Capital Floodplain and Floodway, (2) the Updated Existing Condition Capital Floodplain and Floodway, and the (3) Proposed Condition Capital Floodplain and Floodway. HEC-RAS hydraulic models were created for the updated existing condition and proposed conditions floodplain and floodways using 2013 topography, updated flowrates, and the proposed soil cement bank protection channel geometry.

3.1 HEC-RAS Models

A hydraulic model was developed for Castaic Creek using recent topography and hydrology data to determine the limits of the capital floodplain and floodway for the updated existing condition and proposed condition. A manning's roughness value of 0.06 was used in the revised modeling, which is consistent with LACPW floodplain mapping requirements. The hydraulic model was prepared using HEC-RAS software version 6.2.0, as developed by the U.S. Army Corps of Engineers. Table 3-1 below shows the different HEC-RAS hydraulic models generated for Castaic Creek and utilized for the updated existing and proposed conditions floodplain and floodway hydraulic analysis.

Table 3-1: HEC-RAS Models for Castaic Creek

HEC-RAS File Name	Description	Use
Updated Existing Conditions	Q_{cap}, n=0.060	To determine existing capital floodplain and floodway within Castaic Creek from Interstate-5/ Old Rd. to upstream of Hwy. 126 (RS 13371 to RS 1981.79)
Proposed Conditions	Q_{cap}, n=0.060	To determine proposed capital floodplain and floodway within Castaic Creek from Interstate-5/ Old Rd. to upstream of Hwy. 126 (RS 13371 to RS 1981.79)

Note:
See Appendices B and C for copies of the detailed HEC-RAS hydraulic output for the existing and proposed conditions.

3.1.1 Cross Section Geometry

The HEC-RAS model cross section lay-out was based on the Drainage Concept Report titled, **Drainage Concept Report Volume II of V, Castaic Creek Bank Protection, ESTU No. 2001000012**, approved in September 2019, with updates to facilitate floodplain mapping. Additional cross sections were added to capture locations of abrupt change in cross section geometry – specifically in areas around a berm at the Hasley Creek confluence.

3.1.2 Hydraulic Structures

The hydraulic models include three existing bridges over Castaic Creek within the study area: the Commerce Center Drive Bridge, the Old Road Bridge, and the I-5. Debris loading is applied at each bridge in accordance with the USACE (US Army Corps of Engineers) Memorandum of Record, "Hydrology and Hydraulics Policy Memorandum No 4., Debris Loading on Bridges and Culverts." The piers for the Old Road Bridge and the I-5 Bridge do not have sloping extensions, so they fall under debris loading Case 1. This case assumes 2 feet of debris loading on each side of each pier for the full depth of flow. At the Commerce Center Drive bridge, Case 1 debris loading is applied to piers 1,2,3,4, and 6. Pier 5 is wider than 6', so additional debris loading does not need to be added.

3.1.3 Ineffective Flow Areas and Expansion and Contraction Coefficients

Ineffective flow markers were used to define area with ineffective flow, including at abrupt contractions and expansions in the available flow area. In the existing condition a contraction ratio of 1:1 was used to define ineffective flow downstream of cross section 11811.16, where flow expands downstream of the Old Road Bridge, and also downstream of cross section 7688.71 where flow expands as it breaks out over the left bank. These areas of ineffective flow are detailed on Figure 3.3.

In both the existing and proposed conditions, ineffective flow markers are used to make flows on the north side of the flow diversion berm at Commerce Center Drive ineffective. The flows on this side of the berm will generally come from Hasley Canyon Creek, so they are modeled as ineffective for Castaic Creek. More detailed discussion on the modeling of the confluence can be found in Section 3.6.

The expansion and contraction coefficients specified at each cross section follow the guidance in the HEC-RAS Manual. Generally, cross sections expansion and contraction coefficients are set to 0.3 and 0.1, respectively. This represents areas of gradual transition and are also the default values within HEC-RAS. At bridge sections, the expansion and contraction coefficients are set to 0.5 and 0.3 respectively, as required in the HEC-RAS Manual.

3.2 LA County Adopted Capital Floodplain and Floodway

The current existing Los Angeles County Capital Floodway Maps (335-ML-1 & 2) were adopted by the Board of Supervisors on August 28, 1984 by Ordinance No. 84-0136. Refer to Figures 3-1 and 3-2 for LA County Capital Floodway (ML) maps (reference only).

Soil cement bank protection was built in 2007 per P.D. 2563 downstream of the Commerce Center Drive bridge. At construction completion, PACE submitted a revision for the Los Angeles County Capital Floodway Maps and the revisions were adopted by the Board of Supervisors on October 2, 2007. However, the current ML maps have not been updated to reflect these improvements. Upon discussion with LACPW it was determined that the downstream portion of the present study should tie-in to the adopted 2007 floodway and floodplain limits, while the upstream limits will still tie-in to the adopted ML maps from 1984.

3.3 Updated Existing Condition Capital Floodplain

The existing condition hydraulic analysis was generated in order to establish the current existing LA County floodplain from Commerce Center Drive to the Old Rd. / Interstate-5 Bridges. The updated existing conditions hydraulic analysis utilized more current topography (dated 2013), updated Q_{cap} discharge rates, and Manning's value (n) of 0.06. Table 3-2 provides a summary of the updated existing conditions hydraulic analysis. See Figure 3-3 for mapping of the updated existing condition floodplain.

3.4 Updated Existing Condition Capital Floodway

Floodways are defined as the channel of a river that is reserved in order to discharge the base flood without cumulatively increasing the water surface elevation by more than a designated height, usually set at 1.0 ft. Cross section floodways were defined in accordance with LACDPW requirements where, *"Floodway limits are established at the point where the velocity of flow equals 10 ft/sec or the water surface elevation rises 1ft above the flood plain water surface elevation. The first of either criteria reached controls the floodway width. If the velocity of flow in the flood plain for a particular section exceeds 10 ft/sec, the flood plain lines and floodway lines are one and the same."*

The updated existing condition floodway hydraulic model was generated using the following steps. First, the updated existing condition floodplain was analyzed and all sections with velocity greater than 10 ft/sec were set to have no encroachment. Next, HEC-RAS encroachment methods 4 and 1 were used to generate a floodway. HEC-RAS encroachment method 4 computes encroachment stations to achieve a maximum of a 1.0-foot rise with an equal loss of conveyance on the left and right banks. Then, Method 1 is then used to refine the encroachment stations, where the user specifies the locations of the encroachment stations at each individual cross section. Floodway encroachment results for change in water surface elevation and velocity were checked to ensure they meet the LACDPW criteria.

3.5 Updated Existing Condition Capital Floodplain and Floodway Results

The existing condition floodway hydraulic analysis was generated in order to establish the updated existing condition floodplain and floodway limits from Commerce Center Drive to the Old Rd./ Interstate-5 Bridges. The updated existing conditions hydraulic analysis utilized more current topography, updated Q_{cap} discharge rates, and Manning's value (n) of 0.06.

Table 3-2 provides a summary of the updated existing conditions hydraulic analysis for the floodplain and floodway. The table compares several hydraulic elements. The most important elements to analyze are the water surface elevations and top widths. The maximum rise allowable in water surface elevations is 1.0 ft. The water surface elevations increase as a result of encroaching into the floodplain to determine an acceptable floodway boundary. Table 3-2 shows the differences between the floodplain and floodway are all within the 1.0 ft maximum allowable rise in water.

The limits of the floodplain and floodway for the updated existing conditions extend from the Commerce Center Drive to the Old Rd./ Interstate-5 Bridges. The updated existing hydraulic analysis establishes the current existing capital floodway for LA County ML maps (335 ML-1&2). See Figure 3-3 for mapping of the updated existing floodplain and floodway.

Table 3-2: Updated Existing Conditions Floodplain and Floodway Comparison, Q_{cap}= 26,400 cfs/ 31,200 cfs (n=0.06)

HEC-RAS River Station	Profile	W.S.E (ft)	FP - FW Delta W.S.E. (ft)	Top Width (ft)	Sta W.S.E. Left (ft)	Sta W.S.E. Right (ft)	Enc. Sta. Left (ft)	Enc. Sta. Right (ft)
12350	FP	1041.6		1200.6	25.2	1225.9		
12350	FW	1041.5	**0.0**	320.0	775.0	1095.0	775.0	1095.0
12146	FP	1040.5		877.9	132.7	1083.4		
12146	FW	1040.5	**0.0**	263.7	662.8	926.5	662.7	928.1
12059.65 BR U	FP	1040.2		201.2	664.1	925.3		
12059.65 BR U	FW	1040.2	**0.0**	248.74	662.8	926.5	662.7	928.1
12059.65 BR D	FP	1038.3		229.7	686.3	926.8		
12059.65 BR D	FW	1038.4	**0.0**	235.61	686.4	926.0	686.0	926.0
11957.32	FP	1038.4		240.3	686.4	926.7		
11957.32	FW	1038.4	**0.0**	239.6	686.4	926.0	686.0	926.0
11923	FP	1038.3		243.1	687.4	930.4		
11923	FW	1038.3	**0.0**	240.2	687.3	927.5	687.0	927.5
11917.82 BR U	FP	1035.9		201.2	688.5	929.4		
11917.82 BR U	FW	1036.0	**0.1**	199.73	687.3	927.5	687.0	927.5
11917.82 BR D	FP	1035.4		229.7	674.8	919.7		
11917.82 BR D	FW	1035.6	**0.1**	229.7	17.8	926.6	0.0	0.0
11878.32	*FP*	*1035.5*		*631.7*	*18.0*	*926.4*		
11878.32	*FW*	*1035.6*	***0.1***	*635.7*	*17.8*	*926.6*	*0.0*	*0.0*
11845.64	FP	1035.4		304.1	666.5	970.6		
11845.64	FW	1035.5	**0.1**	308.5	664.8	973.3	656.3	982.7
11811.76	*FP*	*1033.3*		*289.6*	*633.2*	*987.9*		
11811.76	*FW*	*1034.2*	***0.9***	*301.7*	*631.1*	*990.9*	*0.0*	*0.0*
11551.18	FP	1031.5		999.9	91.8	1091.7		
11551.18	FW	1032.1	**0.6**	419.0	580.0	999.0	580.0	999.0
11242.98	FP	1029.4		999.0	419.5	1418.4		
11242.98	FW	1030.2	**0.8**	541.0	820.0	1361.0	820.0	1361.0
10982.86	FP	1027.8		1115.5	515.7	1631.2		
10982.86	FW	1028.8	**1.0**	601.0	975.0	1576.0	975.0	1576.0
10738.26	FP	1026.2		1286.8	71.0	1357.8		
10738.26	FW	1026.9	**0.6**	582.0	640.0	1222.0	640.0	1222.0

HEC-RAS River Station	Profile	W.S.E (ft)	FP - FW Delta W.S.E. (ft)	Top Width (ft)	Sta W.S.E. Left (ft)	Sta W.S.E. Right (ft)	Enc. Sta. Left (ft)	Enc. Sta. Right (ft)
10490.82	FP	1023.8		1441.7	24.2	1476.3		
10490.82	FW	1024.3	**0.5**	645.0	735.0	1380.0	735.0	1380.0
10351.28	FP	1021.6		1339.5	171.2	1552.1		
10351.28	FW	1022.3	**0.7**	585.0	905.0	1490.0	905.0	1490.0
10141.82	FP	1019.1		1090.0	296.6	1616.3		
10141.82	FW	1019.9	**0.8**	555.0	930.0	1485.0	930.0	1485.0
9931.16	FP	1017.2		915.0	812.2	1727.2		
9931.16	FW	1017.9	**0.7**	630.0	920.0	1550.0	920.0	1550.0
9670.57	FP	1015.1		1042.0	802.0	1844.0		
9670.57	FW	1016.1	**0.9**	776.0	865.0	1641.0	865.0	1641.0
9501.81	FP	1013.8		754.8	745.0	1499.8		
9501.81	FW	1014.8	**1.0**	618.0	790.0	1408.0	790.0	1408.0
9298.99	FP	1011.8		674.7	704.4	1379.1		
9298.99	FW	1012.7	**0.8**	549.0	753.0	1302.0	753.0	1302.0
9042.81	FP	1009.3		909.4	654.0	1563.4		
9042.81	FW	1010.2	**0.8**	677.0	748.0	1425.0	748.0	1425.0
8724.84	FP	1006.3		1290.3	663.9	1954.1		
8724.84	FW	1007.3	**1.0**	919.0	768.0	1687.0	768.0	1687.0
8396.13	FP	1003.3		1376.5	540.7	1917.2		
8396.13	FW	1004.0	**0.7**	931.0	754.0	1685.0	754.0	1685.0
8049.79	FP	1002.0		1280.0	424.7	1704.6		
8049.79	FW	1002.4	**0.4**	925.0	650.0	1575.0	650.0	1575.0
7688.71	FP	1001.4		1215.3	572.2	1787.5		
7688.71	FW	1001.7	**0.3**	800.0	640.0	1440.0	640.0	1440.0
7326.46	FP	1000.2		1365.1	76.8	1453.6		
7326.46	FW	1000.7	**0.5**	515.0	580.0	1095.0	580.0	1095.0
6966.68	FP	999.2		1209.2	75.6	1284.8		
6966.68	FW	999.7	**0.6**	525.0	525.0	1050.0	525.0	1050.0
6623.5	FP	998.0		846.9	192.6	1041.9		
6623.5	FW	998.6	**0.6**	425.0	545.0	970.0	545.0	970.0
6304.52	FP	997.0		937.6	217.8	1155.4		
6304.52	FW	997.9	**0.8**	400.0	510.0	910.0	510.0	910.0
6087.88	FP	996.6		839.2	382.0	1221.2		
6087.88	FW	997.4	**0.8**	390.0	535.0	925.0	535.0	925.0
5781.35	FP	996.0		721.5	492.0	1213.5		
5781.35	FW	996.7	**0.6**	430.0	560.0	990.0	560.0	990.0
5629.45	FP	995.3		607.8	600.0	1263.1		
5629.45	FW	996.2	**0.9**	430.0	635.0	1065.0	635.0	1065.0
5557.68	FP	994.6		510.0	140.2	691.2		
5557.68	FW	995.2	**0.6**	315.0	200.0	515.0	200.0	515.0
5500 BR U	FP	994.3		383.6	140.2	690.3		

HEC-RAS River Station	Profile	W.S.E (ft)	FP - FW Delta W.S.E. (ft)	Top Width (ft)	Sta W.S.E. Left (ft)	Sta W.S.E. Right (ft)	Enc. Sta. Left (ft)	Enc. Sta. Right (ft)
5500 BR U	FW	994.7	**0.4**	291	200.0	515.0	200.0	515.0
5500 BR D	FP	993.7		465.0	140.2	723.0		
5500 BR D	FW	994.3	**0.5**	380.79	207.0	635.0	207.0	635.0
5453.98	FP	993.8		516.0	207.1	723.1		
5453.98	FW	994.3	**0.5**	428.0	207.0	635.0	207.0	635.0
5434.68	FP	993.7		521.8	800.3	1322.2		
5434.68	FW	994.3	**0.6**	452.2	820.0	1272.2	820.0	1272.2
5340.04	FP	992.5		473.8	790.6	1264.4		
5340.04	FW	993.4	**0.9**	440.4	800.0	1240.4	800.0	1240.4

Note:
Bridge Locations: I-5 Bridge at RS 12059.65, Old Rd. Bridge at RS 11917.82, Commerce Ctr. Dr. Bridge at RS 5500
Italicized sections indicate Velocity is greater than 10 ft/s, so there is no encroachment.

3.6 Castaic Creek and Hasley Canyon Creek Confluence Modeling Approach

The confluence of Castaic Creek with Hasley Canyon Creek was extensively studied as part of the proposed bank protection design detailed in the project Drainage Concept Report (DCR) for the subject project under EIMP No. 2019000489. There are two possible flow paths that can form at the confluence.

Case 1 - Flow will travel from Hasley Canyon Creek into Castaic Creek upstream of the flow diversion berm, with little or no flow traveling through the north side of the flow diversion berm.

Case 2 - All flow from Hasley will travel through the north side of the flow diversion berm and enter Castaic Creek downstream of Commerce Center Drive.

In the Drainage Concept Report (DCR) both conditions are important to model since they capture different elements associated with the design of the soil cement top and toe. When flow enters Castaic Creek upstream of Commerce Center Drive Bridge (Case 1), no flow is mapped north of the berm because the invert of Castaic Creek is much lower than the invert of Halsey Canyon Creek. However, this modeling approach best captures the water surface and velocities to design the Hasley Canyon Creek East bank connection to the Castaic Creek “West” Soil cement Bank Protection. When the Hasley Canyon Creek flow is modeled going through the north side of the flow diversion berm before entering Castaic Creek downstream of Commerce Center Drive (Case 2), it captures the highest water surface elevation and velocities for the design of the Halsey Canyon Creek West Bank.

For the Hasley Canyon Creek floodplain and floodway analysis, the existing and proposed conditions are modeled in a way that will produce the widest floodplain. In the existing condition, the flow diversion berm either funnels flows from Hasley Canyon Creek through the north side of the flow diversion berm or flows will circumvent the berm and flow into Castaic Creek upstream of Commerce Center Drive. The flows then confluence with Castaic Creek downstream of Commerce Center Drive Bridge (Case 2). This modeling approach was selected as it produces the widest floodplain along the north side of the berm. If the Case 1 flow condition was used, the area to the north of the berm would be mapped with no floodplain, as the Hasley flow would be contained within the Castaic Creek main channel, which has a much lower invert than the invert within the north side of the diversion berm.

In the proposed condition, Hasley Canyon Creek flows will either enter Castaic Creek upstream of Commerce Center Drive Bridge or flow along the north side of the berm and confluence with Castaic Creek downstream of Commerce Center Drive Bridge. For the purposes of floodplain mapping, the proposed

condition Hasley Canyon Creek model analyzes the condition where all flow from Hasley Canyon Creek flows on the north side of the berm (Case 2). More detailed discussion can be found in the Hasley Canyon Creek Capital Floodway Revision Analysis, (per ESTU No. 2023000298, approval pending).

The Castaic Creek HEC-RAS model captures the widest floodplain within the confluence through the use of a flow change upstream of the confluence of Castaic and Hasley Canyon Creek. This flow change captures a condition where all of the Hasley Canyon Creek flow enters Castaic Creek upstream of Commerce Center Drive, with no flows from Hasley Canyon Creek going through the north side of the flow diversion berm (Case 1). Both the existing condition and proposed condition models use the flow change upstream of the confluence. This modeling approach will produce the highest water surface elevations in Castaic Creek in the vicinity of the confluence. The final mapped floodplain and floodway are discussed further in Section 6

SEE MAP NO. 335-MLI
SANTA CLARA RIVER
LACFC CASTAIC CREEK
CASTAIC CREEK
HENRY MAYO DRIVE
SOUTHERN PACIFIC RR
LEGEND
CAPITAL FLOOD PLAIN BOUNDARY
FLOODWAY BOUNDARY
MAPPED SURFACE ELEVATIONS
ADOPTED BY BOARD OF SUPERVISORS
AUGUST 28, 1984
ORDINANCE NO. 84-0136
REVISED
REFERENCES
335 T7
335 T8
(10/80)
J.DOMENICHELLI
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
CASTAIC CREEK
FLOODWAY MAP
FROM 700' D/S OF HENRY MAYO DR.
TO 7700' U/S OF HENRY MAYO DR.
7/6/84
1" = 100'
NO. 335-MLI

LEGEND

CAPITAL FLOOD PLAIN BOUNDARY

FLOODWAY BOUNDARY

WATER SURFACE ELEVATIONS

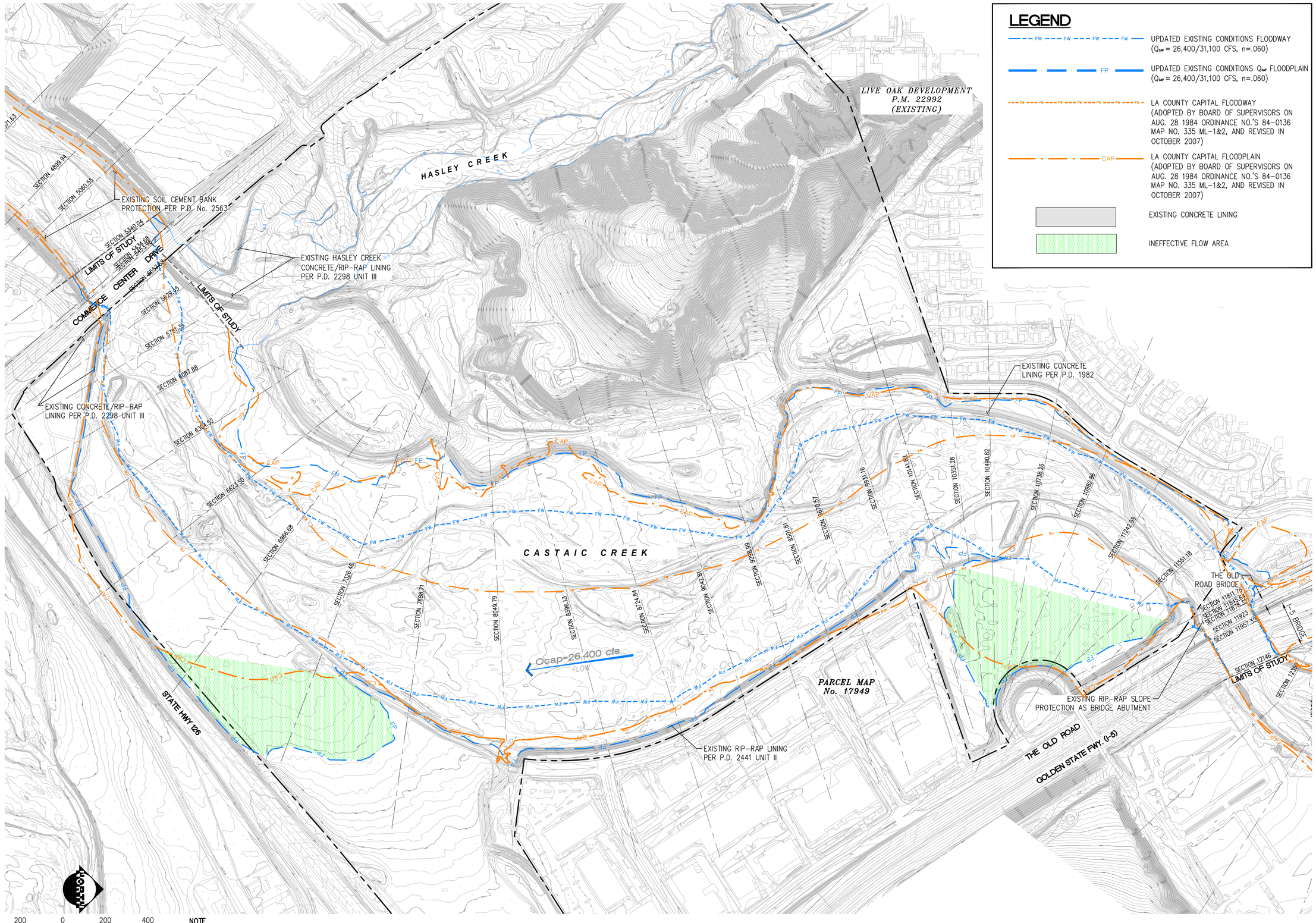
ADOPTED BY BOARD OF SUPERVISORS
AUGUST 28, 1984
ORDINANCE NO. 84-0136

REVISED	REFERENCES
	335 T9
	335 T10

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

CASTAIC CREEK
FLOODWAY MAP
FROM 7700' U/S OF HENRY MAYO DR.
TO 4700' U/S OF GOLDEN STATE FWY

DESIGNED	J. DOMENICHELLI		
		7/6/84	1"= 100'
		NO.	335-ML2



NOTE
1. CONTOURS SHOWN ON THIS MAP IS BASED ON AERIAL TOPOGRAPHY DATED OCT. 2013

PLAN

NO	BY	DATE	REVISIONS	DATE	APP.

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA
PRELIMINARY NOT FOR CONSTRUCTION
PROJECT ENGINEER DATE

PREPARED BY JOSE CRUZ
PROJECT ENGINEER R.C.E. NO. --- # 72249
EXP. 6/30/24
DRAWN M.M.T.
SCALE 1"=200'
DESIGNED E.M.R.
CHECKED J.C.
DATE 2/22/23

TITLE
UPDATED EXISTING CONDITIONS CAPITAL FLOODPLAIN & FLOODWAY MAPPING

JOB
VALENCIA COMMERCE CENTER
CASTAIC CREEK FLOODPLAIN & FLOODWAY MAPPING FROM COMMERCE CENTER DRIVE TO I-5 FWY
LOS ANGELES COUNTY CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

FIGURE
3-3

JOB NO. A535

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

4 Proposed Channel Improvements

The proposed channel improvements at Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 consist of soil cement bank protection combined with launch stone rip-rap along both banks of Castaic Creek. Refer to Section 7.0 of the "Drainage Concept Report Volume II of V, Castaic Creek Bank Protection ESTU No. 2001000012," prepared by PACE approved September 2019 for detailed description of the proposed soil cement bank protection. Below is a summary of the soil cement bank protection design.

4.1 Bank Protection Description

The proposed soil cement bank protection will be constructed in three segments, "West," "Northeast," and "Southeast." The bank protection proposed for the west bank will be constructed as a continuous section beginning near the confluence of Castaic Creek and Hasley Creek and extending roughly 4,000 LF upstream, where it will join the existing concrete slope lining (PD No. 1982) adjacent to Live Oak Road. The bank protection proposed for the east bank will be constructed in two separate sections due to an existing rip-rap slope protection (PD No. 2441-Unit II) located adjacent to Hancock Parkway. The southeast section of the proposed bank protection will be approximately 3,000 LF and will extend from the Commerce Center Drive (CCD) Bridge to the existing rip-rap slope protection (PD No. 2441). The northeast section of the proposed soil cement bank protection will be around 1,400 LF and extends from the existing rip-rap slope protection (PD No. 2441) to the Old Road Bridge.

In addition to the proposed bank protection, there will be modifications to the existing flow diversion berm at the Castaic Creek confluence with Hasley Canyon Creek. The existing flow diversion berm (P.D. 2298 Unit III) was designed to divert flows from Hasley Canyon Creek into Castaic Creek downstream of the Commerce Center Drive Bridge. However, a large storm in January 2005 caused flows to bifurcate the berm. This change caused the berm to become an obstruction to flows and increased chances of blockages to either flow path, into Castaic Creek or under Commerce Center Drive. In the proposed condition, the upstream portion of the flow diversion berm will be removed and lowered to the scour depth. This will remove the obstruction to the flow path and allow water into Castaic Creek Upstream of Commerce Center Drive Bridge. The proposed modifications to the flow diversion berm are detailed in Figure 4-2.

4.2 Bank Protection Design Summary

The proposed bank protection will consist of a standard soil cement section to provide scour and freeboard flood control protection for all storm events up to the Capital Flood. The critical factors in determining the design of the bank protection were based on the following criteria:

1. Flood control stability and durability of bank protection.
2. Safety concerns regarding access to and from the channel in dry and wet conditions.
3. Bank protection maintenance considerations.
4. Environmental compatibility with the native area and resource enhancement concepts, and aesthetic considerations.
5. Constructability and cost of construction.

Soil cement bank protection is constructed as a monolithic and homogenous structure consisting of approximately 90% native soils and 10% cement. The typical section consists of 8-foot wide and 6- to 12-inch thick layers of soil cement. Each layer of soil cement is set back from the edge of the previous layer, at a 1.5 (H) : 1 (V) slope. The entire section varies in total height based on varying freeboard, flow depth and toe-down requirements. A typical cross section is shown in Figure 4-1.

The proposed soil cement bank protection addresses the above design criteria as follows:

1. Soil cement provides a stable riverbank protection material, in terms of both surface erosion and structural stability. Preliminary geotechnical analyses indicate that locally available native soils are considered acceptable for use in soil cement.
2. The soil cement bank protection will be completely buried with a 3:1 slope soil backfill. Due to transitions from proposed soil cement bank protection (buried condition) to existing concrete and rip-rap bank protection (exposed conditions), some soil cement areas will be exposed.

The proposed channel improvements are used to revise channel geometry in the proposed condition HEC-RAS model.

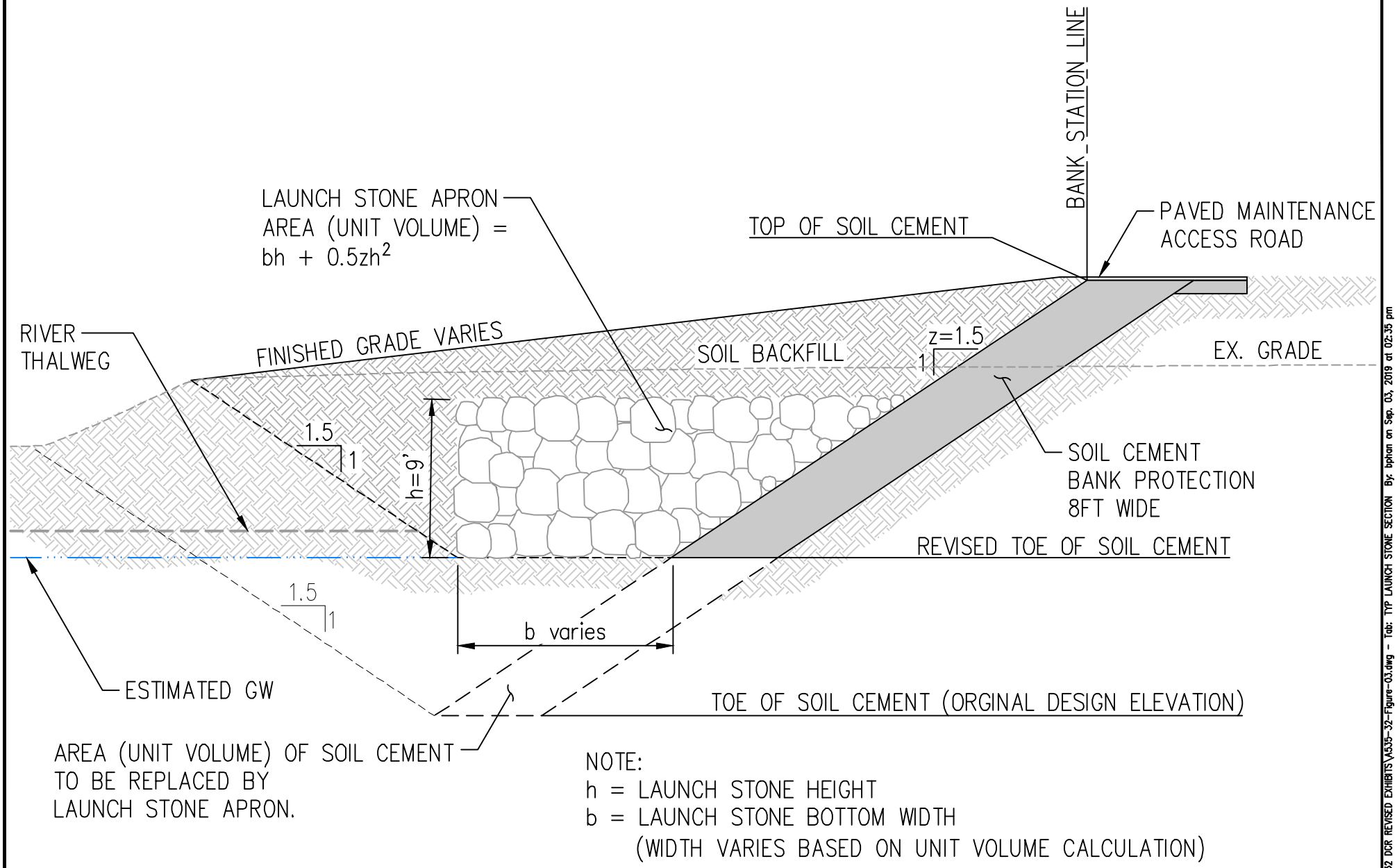


FIGURE 4-1

SOIL CEMENT / LAUNCH STONE BANK PROTECTION TYPICAL SECTION

P:\A535\Engineering\GlobalExhibits\A535-32 DCR REVISED EXHIBITS\A535-32-Figure-03.dwg - Tab: TYP LAUNCH STONE SECTION By: bphan on Sep. 03, 2019 at 02:35 pm

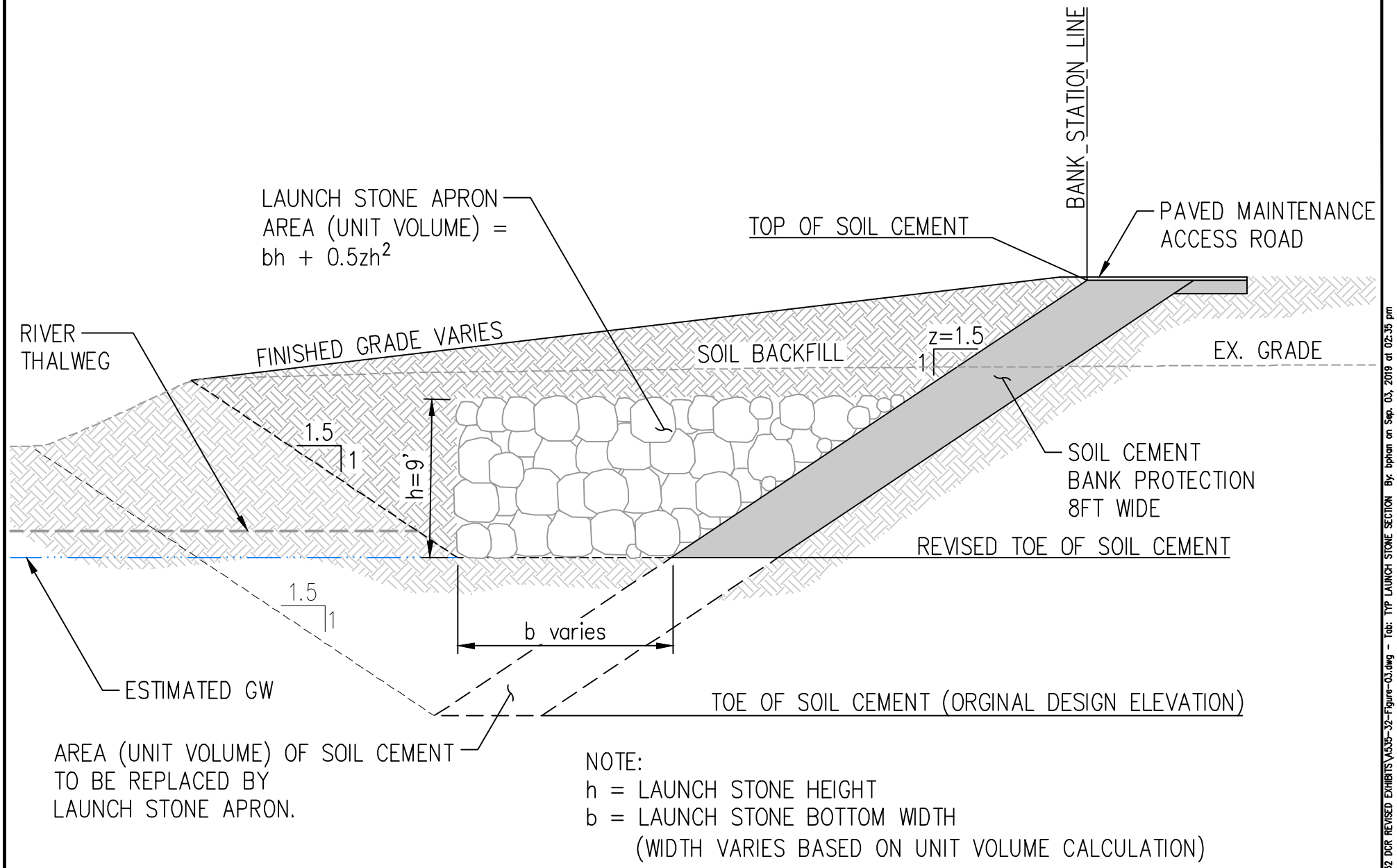


FIGURE 4-1

SOIL CEMENT / LAUNCH STONE BANK PROTECTION TYPICAL SECTION

P:\A535\Engineering\GlobalExhibits\A535-32 DCR REVISED EXHIBITS\A535-32-Figure-03.dwg - Tab: TYP LAUNCH STONE SECTION By: bphan on Sep. 03, 2019 at 02:35 pm

5 Sediment Transport Considerations

A Fluvial Study was completed for Castaic Creek in January 2006, and approved by LACPW in April 2006, to assess creek bed impacts from potential modifications of fluvial operation from the proposed TPM. No. 18108 development. The study provides a comprehensive assessment of short-term and long-term bed adjustments based on the level of information available. The Fluvial Study describes the following: (1) general adjustment, (2) long term adjustment, (3) other scour, (4) study reach gradation, (5) SAM modeling and analysis, and (6) total scour potential for the purpose of determining soil cement bank protection toe-down and freeboard.

5.1 Types of Adjustments

Modifications to the Castaic Creek System are measured as bed adjustment in feet. Types of adjustments included in the fluvial study include general, long-term, and other scour adjustments. General adjustment consists of scour that occurs in an individual discharge event and may be considered as the difference between sediment inflow and outflow. For example, aggradation describes a situation where sediment inflow is higher than sediment outflow for the same reach. In contrast, if sediment outflow exceeds inflow for a given reach, degradation in the form of scour will occur. Long-term adjustment consists of fluvial process that occur over many rainy seasons and contribute to fluctuation of bed elevation of a river or creek. Other scour types include local scour, bend scour, low-flow incisement, and bedform formation.

5.2 Summary of Fluvial Analyses

The fluvial study analyzed the individual degradational components of eight subreaches of Castaic Creek. The locations of each subreach are shown in Figure 5-1. The relevant subreaches and their results are summarized below.

Subreach SRA1: SAM numerical calculations predict 2.4 feet of degradation in this reach, while long-term aggradation is expected based on the analysis of SRA2. No long-term data is presently available for SRA1. The expected aggradation is a result of the bed recovering from gravel mining. Aggradation is expected to be approximately 0.7 feet. Other scour is dominated in this subreach by scouring at the Interstate 5 Bridge and Old Road Bridge piers. Toe-down and freeboard calculations on the outside of the curve of the reach may be impacted by the bend in this portion of the Creek. Aggradation is set to the Los Angeles County Flood Control District Design Manual (LACFCDDM) depth of 2.5 feet for most sections because the total aggradation predicted by LACFCDDM is greater than that predicted by Los Angeles County Department of Public Works Hydrology and Sedimentation Manual (LACH&SM).

Subreach SRA2: SAM calculations estimate degradation of 1.5 feet, and long-term analysis has shown aggradation of 0.7 feet as the bed recovers from historic gravel mining. Some local bend scour can be found in this subreach. When it is present, bend scour will dominate the total toe-down value. Aggradation is set to the LACFCDDM depth of 2.5 feet for all sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

Subreach SRA3: SAM estimates 0.3 feet of aggradation in this reach. Long-term historic analysis predicts aggradation of 0.6 feet. Section 8050 in this subreach shows approximately no change in cross-section between 2004 and 2005 suggesting armoring. The presence of historical gravel mining is prominent in 8050 whereby a deep, wide gravel pit is evident in the historic data, and the 1999 section also appears to be recovering from the mining activity. Local scour is expected to be significant in this reach because of the presence of a major bend in the Creek's path. Aggradation is set to the LACFCDDM depth of 2.5 feet for all sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

Subreach SRA4: SAM numerical calculations predict 1.9 feet of aggradation in this reach, while long-term degradation is expected to be 1.3 feet. Other scour is dominated in this subreach by scouring at Commerce Center Bridge piers. Outside of the curve of the reach will also be impacted by the bend in this portion of

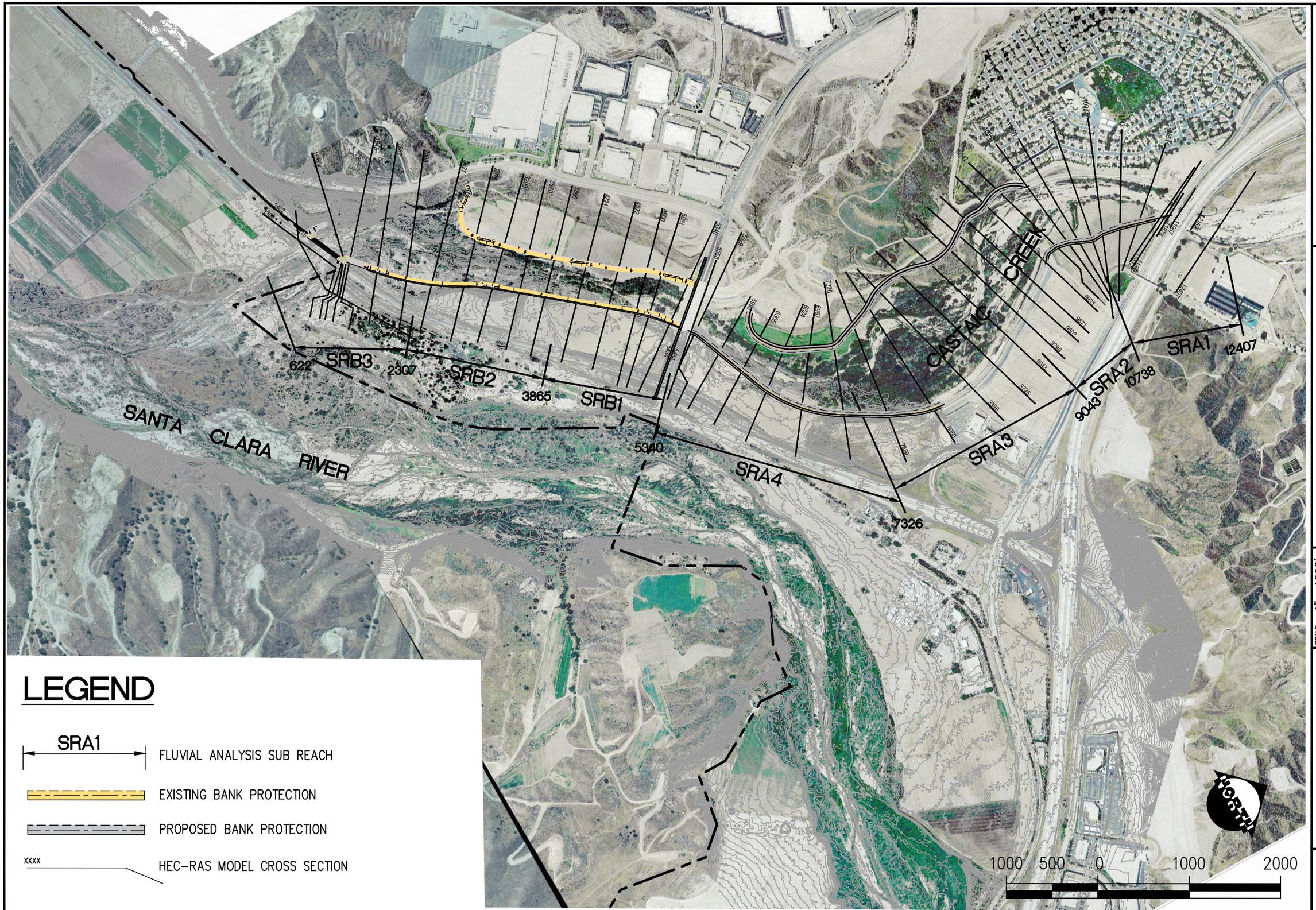
the Creek. The small change in average bed height between 2004 and 2005 suggests the bed is at or approaching the armoring depth below which no additional degradation will occur without a change in sediment inflow characteristics or a change in hydrology. Aggradation in this subreach exceeds three feet at every section and the large general adjustment dominates the components. Hasley Creek confluences in this subreach. The result of the confluence is an increase in discharge. Additionally, some sediment delivery from the Hasley Canyon Creek watershed may occur. This may explain some downstream aggradation observed in SRB3.

Subreach SRB1: SAM calculations estimate degradation of 3.3 feet, and long-term analysis has shown degradation of 2.1 feet. Minor amounts of local scour can be found in most of this subreach as most of it is quite straight. Aggradation is set to the LACFCDDM depth of 2.5 feet for most sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

Subreach SRB2: SAM estimates degradation of 1.0 feet of degradation in this reach. Long-term historic analysis predicts degradation of 2.7 and 0.8 feet in sections 2975 and 2627, respectively. Section 2975 considers agricultural fill, while 2627 does not. Historic sections show continuous degradation since the construction of the Dam. The thalweg depths in both 1999 and 2004 are lower than in 2005 despite the continued degradation into 2005. Little local scour can be found in this subreach as it is quite straight. Aggradation is set to the LACFCDDM depth of 2.5 feet for all sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

5.3 Proposed Soil Cement Bank Protection Sediment Transport Considerations

The proposed soil cement bank protection is intended to provide long-term erosion protection from lateral migration of the bank and flood protection for the adjacent proposed development areas. The proposed bank protection was designed based on current LA County Hydraulic Design Criteria. The soil Cement bank protection was designed for flood protection up to the Q_{cap} (31,100 cfs) flood event. All sediment transport considerations were used in the design of the proposed soil cement bank protection to determine the top and toe of the bank.



TITLE

HEC-RAS
CROSS SECTION
LOCATION MAP

JOB

CASTAIC CREEK
FLUVIAL STUDY

LOS ANGELES COUNTY CA

SCALE	1"= 1000'
DESIGNED	EMR
DRAWN	DP
CHECKED	J.C.
DATE	02/27/23
JOB NO.	8065E

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299

FIGURE

5-1

P:\A535\Engineering\A535-72_Castaic Creek ML\exhibits\A535.73-Figure-4.1_8197 Castaic Creek-Fluvial Study Workmap.dwg - Tab: Layout1 By: erandig on Apr. 17, 2023 at 10:26 am
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7104-Santa Clara Reach Analysis.dwg; 7904-E-LACO Floodway map (12-29-04).dwg; 8197-3660-EXH-TBLK.dwg; 8197-HEC-SECS.dwg; 7142-Lining.Sections.dwg; 7142-Lining.dwg
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6 Proposed Hydraulic Analysis and Floodplain/ Floodway Mapping

The proposed condition HEC-RAS model uses the updated existing condition model as a base. Channel geometry is revised to include the new bank alignments for the proposed soil cement bank protection.

6.1 Proposed Capital Floodplain

The proposed condition floodplain analysis was completed to establish the floodplain limits with the proposed soil cement bank protection included in the cross section geometry. The analysis includes the proposed bank protection, 2013 topography, updated Q_{cap} discharge rates, and Manning's value of 0.06. Table 6-1 provides a summary of the proposed condition hydraulic analysis. Refer to Figure 6-1 for capital floodplain mapping.

6.2 Proposed Capital Floodway

The proposed condition floodway analysis was completed with the same methodology used in the updated existing condition analysis. First, the updated existing condition floodplain was analyzed and all sections with velocity greater than 10 ft/sec were set to have no encroachment. Next, HEC-RAS encroachment methods 4 and 1 were used to generate a floodway. HEC-RAS encroachment method 4 computes encroachment stations to achieve a maximum of a 1.0-foot rise with an equal loss of conveyance on the left and right banks. Then, Method 1 is then used to refine the encroachment stations, where the user specifies the locations of the encroachment stations at each individual cross section. Table 6-1 below provides a summary of the proposed floodplain and floodway hydraulic analysis.

Table 6-1: Proposed Conditions Floodplain and Floodway Comparison, Q_{cap}= 26,400 cfs/ 31,200 cfs (n=0.06)

HEC-RAS River Station	Profile	W.S.E (ft)	FP - FW Delta W.S.E. (ft)	Top Width (ft)	Sta W.S.E. Left (ft)	Sta W.S.E. Right (ft)	Enc. Sta. Left (ft)	Enc. Sta. Right (ft)
12350	FP	1041.2		1185.4	30.6	1224.5		
12350	FW	1041.2	**0.0**	317.0	777.5	1094.5	777.5	1094.5
12146	FP	1040.0		259.8	154.0	1082.4		
12146	FW	1040.1	**0.0**	259.8	664.5	924.4	662.7	928.1
12059.65 BR U	FP	1039.8		246.6	665.1	665.1		
12059.65 BR U	FW	1039.8	**0.0**	246.7	664.5	924.4	662.7	928.1
12059.65 BR D	FP	1037.8		234.9	687.9	687.9		
12059.65 BR D	FW	1037.8	**0.0**	234.9	687.9	926.8	0	0
11957.32	*FP*	*1037.8*		*238.9*	*687.9*	*926.8*		
11957.32	*FW*	*1037.8*	***0.0***	*239.0*	*687.9*	*926.8*	*0*	*0*
11923	FP	1037.7		241.2	688.6	929.8		
11923	FW	1037.8	**0.0**	240.6	688.9	929.5	688.9	929.5
11917.82 BR U	FP	1036.0		201.0	689.1	689.1		
11917.82 BR U	FW	1036.1	**0.1**	201.1	688.9	929.5	688.9	929.5
11917.82 BR D	FP	1035.8		229.7	674.8	674.8		
11917.82 BR D	FW	1035.9	**0.1**	229.7	658.8	928.3	658.8	928.3
11878.32	FP	1036.0		269.5	658.8	928.3		
11878.32	FW	1036.1	**0.1**	269.6	658.8	928.3	658.8	928.3
11845.64	FP	1036.0		324.9	657.4	982.4		
11845.64	FW	1036.1	**0.1**	325.6	657.1	982.7	656.3	982.7
11811.76	*FP*	*1035.2*		*346.2*	*628.4*	*1010.4*		
11811.76	*FW*	*1035.4*	***0.2***	*402.5*	*626.0*	*1081.5*	*0*	*0*
11551.18	FP	1033.3		579.6	556.8	1136.3		
11551.18	FW	1033.8	**0.5**	408.0	621.0	1029.0	621.0	1029.0
11242.98	FP	1031.2		614.5	808.2	1422.7		

HEC-RAS River Station	Profile	W.S.E (ft)	FP - FW Delta W.S.E. (ft)	Top Width (ft)	Sta W.S.E. Left (ft)	Sta W.S.E. Right (ft)	Enc. Sta. Left (ft)	Enc. Sta. Right (ft)
11242.98	FW	1031.6	**0.4**	431.0	923.0	1354.0	923.0	1354.0
10982.86	FP	1028.9		696.4	937.1	1633.6		
10982.86	FW	1029.3	**0.5**	523.0	1066.0	1589.0	1066.0	1589.0
10738.26	FP	1026.5		858.3	502.6	1360.9		
10738.26	FW	1026.9	**0.4**	560.0	675.0	1235.0	675.0	1235.0
10490.82	FP	1023.9		817.0	649.0	1477.6		
10490.82	FW	1024.2	**0.3**	560.0	825.0	1385.0	825.0	1385.0
10351.28	FP	1021.4		760.4	789.1	1549.5		
10351.28	FW	1021.8	**0.3**	530.0	955.0	1485.0	955.0	1485.0
10141.82	FP	1018.9		824.7	824.2	1648.9		
10141.82	FW	1019.7	**0.7**	635.0	890.0	1525.0	890.0	1525.0
9931.16	FP	1017.3		946.2	811.7	1757.9		
9931.16	FW	1018.0	**0.7**	700.0	900.0	1600.0	900.0	1600.0
9670.57	FP	1014.1		1024.8	803.9	1828.7		
9670.57	FW	1014.8	**0.8**	780.0	920.0	1700.0	920.0	1700.0
9501.81	FP	1012.4		1016.1	747.2	1763.3		
9501.81	FW	1013.1	**0.7**	785.0	855.0	1640.0	855.0	1640.0
9298.99	FP	1010.9		1029.2	705.7	1734.9		
9298.99	FW	1011.6	**0.7**	860.0	810.0	1670.0	810.0	1670.0
9042.81	FP	1009.0		1142.9	654.2	1797.1		
9042.81	FW	1009.9	**0.8**	910.8	799.2	1710.0	799.2	1710.0
8724.84	FP	1006.1		1388.3	663.8	2052.1		
8724.84	FW	1007.1	**1.0**	1018.4	858.7	1877.1	858.7	1877.1
8396.13	FP	1003.5		1436.2	539.9	1976.1		
8396.13	FW	1004.3	**0.8**	940.0	785.0	1725.0	785.0	1725.0
8049.79	FP	1002.6		1289.1	473.6	1762.7		
8049.79	FW	1003.4	**0.7**	930.0	690.0	1620.0	690.0	1620.0
7688.71	FP	1002.2		1034.6	555.3	1589.8		
7688.71	FW	1003.0	**0.7**	835.0	645.0	1480.0	645.0	1480.0
7326.46	FP	1001.6		731.3	518.7	1250.0		
7326.46	FW	1002.4	**0.8**	529.0	573.0	1102.0	573.0	1102.0
6966.68	FP	1001.0		624.3	554.9	1179.2		
6966.68	FW	1001.7	**0.7**	463.0	624.0	1087.0	624.0	1087.0
6623.5	FP	999.8		461.9	615.5	1077.3		
6623.5	FW	1000.4	**0.6**	305.0	673.0	978.0	673.0	978.0
6304.52	FP	998.3		362.1	675.3	1037.4		
6304.52	FW	998.8	**0.5**	246.8	720.0	966.8	720.0	966.8
6087.88	FP	997.6		497.0	711.3	1208.4		
6087.88	FW	998.3	**0.7**	341.5	730.0	1071.5	730.0	1071.5
5781.35	FP	995.9		518.2	694.9	1213.1		
5781.35	FW	996.4	**0.5**	359.0	715.0	1074.0	715.0	1074.0
5629.45	FP	994.8		456.6	742.4	1256.0		
5629.45	FW	995.5	**0.7**	324.6	740.4	1065.0	740.4	1065.0
5557.68	FP	994.4		508.1	140.2	690.8		
5557.68	FW	994.9	**0.5**	320.0	200.0	520.0	200.0	520.0
5500 BR U	FP	994.1		475.6	140.2	140.2		
5500 BR U	FW	994.4	**0.3**	296.0	200.0	520.0	200.0	520.0
5500 BR D	FP	993.6		468.7	204.4	204.4		
5500 BR D	FW	994.1	**0.5**	380.4	207.0	635.0	207.0	635.0

HEC-RAS River Station	Profile	W.S.E (ft)	FP - FW Delta W.S.E. (ft)	Top Width (ft)	Sta W.S.E. Left (ft)	Sta W.S.E. Right (ft)	Enc. Sta. Left (ft)	Enc. Sta. Right (ft)
5453.98	FP	993.7		521.4	203.1	724.5		
5453.98	FW	994.2	**0.6**	428.0	207.0	635.0	207.0	635.0
5434.68	FP	993.6		520.0	800.3	1320.2		
5434.68	FW	994.2	**0.6**	452.2	820.0	1272.2	820.0	1272.2

Note:
Bridge Locations: I-5 Bridge at RS 12059.65, Old Rd. Bridge at RS 11917.82, Commerce Ctr. Dr. Bridge at RS 5500
Italicized sections indicate Velocity is greater than 10 ft/s, so there is no encroachment.

6.2.1 Tie-In Locations

The proposed capital floodplain and floodways are tied into the effective ML map in accordance with standard top width tie-in requirements. Proposed top widths must tie in within 5% tolerance of the effective top width. The tie-in cross sections, top widths, and tolerance are detailed in Table 6-2.

Table 6-2: Top width Tie-In Locations

Floodplain			
Cross Section	**ML Effective Top Width (ft)**	**Proposed Top Width (ft)**	**Top Width Tolerance (%)**
12146	260.0	259.8	0.1
5453.98	501.3	521.4	3.8
Floodway			
Cross Section	**ML Effective Top Width (ft)**	**Proposed Top Width (ft)**	**Top Width Tolerance (%)**
12146	255.8	259.8	1.6
5453.98	441.1	428.0	-3.1

6.2.2 Updated Existing Condition and Proposed Condition Comparison

Table 6-3 and Table 6-4 were prepared to show the comparison between existing and proposed floodplain and floodway hydraulic analysis, respectively. The installation of the proposed soil cement bank protection causes a maximum increase in water surface elevation of 1.8 ft and an increase in velocity of a maximum of 3.4 ft/s as shown in Table 6-3. Refer to Figure 6-1 for capital floodway mapping. Figure 6-2 and Figure 6-3 which are the revised ML Map No.'s 335 ML-1 and 2 were created to replace the existing LA County adopted ML Maps.

Table 6-3: Updated Existing and Proposed Conditions Floodplain Water Surface Elevations and Velocities Comparison, Q_{cap}= 26,400 cfs/ 31,100 cfs/ 31,200 cfs (n=0.06)

HEC-RAS River Station	Updated Existing W.S.E. (ft)	Proposed W.S.E (ft)	Delta (ft)	Updated Existing Velocity (ft/s)	Proposed Velocity (ft/s)	Delta (ft/s)
12350	1041.6	1041.2	-0.3	6.5	6.8	0.3
12146	**1040.5**	**1040.0**	**-0.4**	**8.1**	**8.4**	**0.3**
12059.65	Golden State Freeway, I-5					
11957.32	1038.4	1037.8	-0.6	9.6	10.0	0.4
11923	1038.3	1037.7	-0.6	9.4	9.8	0.4
11917.82	The Old Road Bridge					
11878.32	1035.5	1036.0	0.5	10.5	9.9	-0.6
11845.64	1035.4	1036.0	0.6	10.0	9.0	-0.9
11811.76	1033.3	1035.2	1.8	13.3	10.6	-2.8
11551.18	1031.5	1033.3	1.8	7.7	8.5	0.8
11242.98	1029.4	1031.2	1.8	7.1	8.1	0.9
10982.86	1027.8	1028.9	1.0	6.8	9.2	2.4

10738.26	1026.2	1026.5	0.3	6.8	8.6	1.9
10490.82	1023.8	1023.9	0.1	7.2	7.4	0.2
10351.28	1021.6	1021.4	-0.1	8.1	8.4	0.3
10141.82	1019.1	1018.9	-0.2	6.9	6.7	-0.1
9931.16	1017.2	1017.3	0.1	6.2	5.8	-0.4
9670.57	1015.1	1014.1	-1.1	5.7	7.5	1.8
9501.81	1013.8	1012.4	-1.4	6.2	5.7	-0.5
9298.99	1011.8	1010.9	-0.9	7.6	5.7	-2.0
9042.81	1009.3	1009.0	-0.3	6.6	5.7	-0.9
8724.84	1006.3	1006.1	-0.2	5.8	5.7	-0.1
8396.13	1003.3	1003.5	0.2	5.1	4.6	-0.4
8049.79	1002.0	1002.6	0.6	4.0	3.5	-0.5
7688.71	1001.4	1002.2	0.8	3.5	3.2	-0.3
7326.46	1000.2	1001.6	1.4	5.1	4.2	-0.9
6966.68	999.2	1001.0	1.8	4.0	4.4	0.5
6623.5	998.0	999.8	1.8	5.0	6.3	1.3
6304.52	997.0	998.3	1.2	4.4	7.5	3.0
6087.88	996.6	997.6	1.0	4.4	5.7	1.3
5781.35	996.0	995.9	-0.1	5.4	8.8	3.4
5629.45	995.3	994.8	-0.5	6.7	8.7	2.1
5557.68	994.6	994.4	-0.2	7.6	7.8	0.2
5500	Commerce Center Drive Bridge					
5453.98	**993.8**	**993.7**	**-0.1**	**6.5**	**6.6**	**0.1**
5434.68	993.7	993.6	-0.1	6.3	6.4	0.1

Note:
Bolded cross sections indicate tie-in locations where the proposed condition top width is within 5% of the effective ML water surface.

Table 6-4 shows a comparison between the updated existing floodway and proposed condition floodway.

Table 6-4: Updated Existing and Proposed Conditions Floodway Water Surface Elevation and Top Width Comparison, Q_{cap}= 26,400 cfs/ 31,100 cfs/ 31,200 cfs (n=0.06)

HEC-RAS River Station	Updated Existing W.S.E (ft)	Proposed W.S.E. (ft)	W.S.E. Delta (ft)	Updated Existing Top width (ft)	Proposed Top width (ft)	Top width Delta (ft)
12350	1041.5	1041.2	-0.3	320.0	317.0	-3.0
12146	**1040.5**	**1040.1**	**-0.4**	**263.7**	**259.8**	**-3.9**
12059.65 BR U	1040.2	1039.8	-0.4	248.7	246.7	-2.1
12059.65 BR D	1038.4	1037.8	-0.6	235.6	234.9	-0.7
11957.32	1038.4	1037.8	-0.5	239.6	239.0	-0.7
11923	1038.3	1037.8	-0.5	240.2	240.6	0.4
11917.82 BR U	1036.0	1036.1	0.0	199.7	201.1	1.3
11917.82 BR D	1035.6	1035.9	0.4	229.7	229.7	0.0
11878.32	1035.6	1036.1	0.5	635.7	269.6	-366.2
11845.64	1035.5	1036.1	0.6	308.5	325.6	17.1
11811.76	1034.2	1035.4	1.2	301.7	402.5	100.8
11551.18	1032.1	1033.8	1.7	419.0	408.0	-11.0
11242.98	1030.2	1031.6	1.4	541.0	431.0	-110.0
10982.86	1028.8	1029.3	0.5	601.0	523.0	-78.0
10738.26	1026.9	1026.9	0.1	582.0	560.0	-22.0
10490.82	1024.3	1024.2	-0.1	645.0	560.0	-85.0
10351.28	1022.3	1021.8	-0.5	585.0	530.0	-55.0

10141.82	1019.9	1019.7	-0.2	555.0	635.0	80.0
9931.16	1017.9	1018.0	0.1	630.0	700.0	70.0
9670.57	1016.1	1014.8	-1.2	776.0	780.0	4.0
9501.81	1014.8	1013.1	-1.7	618.0	785.0	167.0
9298.99	1012.7	1011.6	-1.0	549.0	860.0	311.0
9042.81	1010.2	1009.9	-0.3	677.0	910.8	233.8
8724.84	1007.3	1007.1	-0.2	919.0	1018.4	99.4
8396.13	1004.0	1004.3	0.3	931.0	940.0	9.0
8049.79	1002.4	1003.4	0.9	925.0	930.0	5.0
7688.71	1001.7	1003.0	1.3	800.0	835.0	35.0
7326.46	1000.7	1002.4	1.7	515.0	529.0	14.0
6966.68	999.7	1001.7	2.0	525.0	463.0	-62.0
6623.5	998.6	1000.4	1.8	425.0	305.0	-120.0
6304.52	997.9	998.8	1.0	400.0	246.8	-153.2
6087.88	997.4	998.3	0.9	390.0	341.5	-48.5
5781.35	996.7	996.4	-0.3	430.0	359.0	-71.1
5629.45	996.2	995.5	-0.7	430.0	324.6	-105.4
5557.68	995.2	994.9	-0.3	315.0	320.0	5.0
5500 BR U	994.7	994.4	-0.2	291.0	296.0	5.0
5500 BR D	994.3	994.1	-0.1	380.8	380.4	-0.4
5453.98	**994.3**	**994.2**	**-0.1**	**428.0**	**428.0**	**0.0**
5434.68	994.3	994.2	-0.1	452.2	452.2	0.1

Notes:
1. Bridge Locations: I-5 Bridge at RS 12059.65, Old Rd. Bridge at RS 11917.82, and Commerce Ctr. Dr. Bridge at RS 5500
2. Bolded cross sections indicate tie-in locations where the proposed condition top width is within 5% of the effective ML water surface.

LEGEND

- UPDATED EXISTING CONDITIONS FLOODWAY (Q_{ew} = 26,400/31,100 CFS, n=.060)
- UPDATED EXISTING CONDITIONS Q_{ew} FLOODPLAIN (Q_{ew} = 26,400/31.100 CFS, n=.060)
- PROPOSED CONDITIONS FLOODWAY (Q_{ew} = 26,400/31,100 CFS, n=.060)
- PROPOSED CONDITIONS FLOODPLAIN (Q_{ew} =26,400/31,100 cfs, n=0.06)
- LA COUNTY CAPITAL FLOODWAY (ADOPTED BY BOARD OF SUPERVISORS ON AUG. 28 1984 ORDINANCE NO.'S 84-0136 MAP NO. 335 ML-1&2, AND REVISED IN OCTOBER 2007)
- LA COUNTY CAPITAL FLOODPLAIN (ADOPTED BY BOARD OF SUPERVISORS ON AUG. 28 1984 ORDINANCE NO.'S 84-0136 MAP NO. 335 ML-1&2, AND REVISED IN OCTOBER 2007)
- PROPOSED SOIL CEMENT BANK PROTECTION AND LAUNCH STONE
- LIMIT OF CONSTRUCTION

HASLEY CREEK

CASTAIC CREEK

Qcap=26,400 cfs

FLOW

EXISTING SOIL CEMENT BANK PROTECTION PER P.D. No. 2563

EXISTING HASLEY CREEK CONCRETE/RIP-RAP LINING PER P.D. 2298 UNIT III

COMMERCE CENTER DRIVE

LIMITS OF STUDY

SECTION 4699.94

SECTION 5060.55

SECTION 5340.04

SECTION 5434.68

SECTION 5529.81

SECTION 5629.15

SECTION 5781.35

SECTION 6097.88

SECTION 6304.52

SECTION 6623.50

SECTION 6896.68

SECTION 7328.46

SECTION 7698.71

SECTION 8049.79

SECTION 8396.83

SECTION 8744.84

SECTION 9042.81

SECTION 9298.99

SECTION 9501.91

SECTION 9831.16

SECTION 9990.67

SECTION 10151.82

SECTION 10351.28

SECTION 10490.82

SECTION 10738.26

SECTION 10985.86

SECTION 11242.88

SECTION 11551.18

SECTION 11811.76

SECTION 11845.64

SECTION 11878.32

SECTION 11923

SECTION 11957.32

SECTION 12146

SECTION 12456

TENTATIVE PARCEL MAP No. 18108
(PROPOSED GRADING PER HUNSAKER AND ASSOCIATES)

PROPERTY BOUNDARY

LIVE OAK DEVELOPMENT P.M. 22992 (EXISTING)

TOP OF SOIL CEMENT BANK PROTECTION

LIMITS OF LAUNCH STONE

EXISTING CONCRETE LINING PER P.D. 1982

TOE OF SOIL CEMENT BANK PROTECTION

LIMITS OF EXCAVATION

LIMITS OF CONSTRUCTION

LIMITS OF LAUNCH STONE

TOE OF SOIL CEMENT BANK PROTECTION

TOP OF SOIL CEMENT BANK PROTECTION

LIMITS OF CONSTRUCTION

LIMIT OF EXCAVATION

P.M. NO. 17949 (EXISTING)

THE OLD ROAD BRIDGE

EXISTING RIP-RAP SLOPE PROTECTION AS BRIDGE ABUTMENT

I-5 BRIDGE

LIMITS OF STUDY

THE OLD ROAD

GOLDEN STATE FWY. (I-5)

STATE HWY 126

LIMITS OF LAUNCH STONE

TOP OF SOIL CEMENT BANK PROTECTION

TOE OF SOIL CEMENT BANK PROTECTION

LIMITS OF EXCAVATION

LIMITS OF CONSTRUCTION

TENTATIVE PARCEL MAP No. 18108
(PROPOSED GRADING PER HUNSAKER AND ASSOCIATES)

EXISTING CONCRETE/RIP-RAP LINING PER P.D. 2441 UNIT II

NORTH

200 0 200 400

SCALE 1"=200'

NOTE

1. CONTOURS SHOWN ON THIS MAP IS BASED ON AERIAL TOPOGRAPHY DATED OCT. 2013

PLAN

NO	BY	DATE	REVISIONS	DATE	APP.

PROFESSIONAL ENGINEER * REGISTERED * JOSE CRUZ * No. 72249 * CIVIL * STATE OF CALIFORNIA

PRELIMINARY NOT FOR CONSTRUCTION

PROJECT ENGINEER DATE

PREPARED BY
JOSE CRUZ
PROJECT ENGINEER
R.C.E. NO. # 72249
EXP. 6/30/24

DRAWN M.M.T. | SCALE 1"=200'
DESIGNED E.M.R.
CHECKED J.C. | DATE 2/22/23

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

TITLE
PROPOSED CONDITION CAPITAL FLOODPLAN & FLOODWAY MAPPING

JOB
VALENCIA COMMERCE CENTER
CASTAIC CREEK FLOODPLAIN & FLOODWAY MAPPING FROM COMMERCE CENTER DRIVE TO I-5 FWY
LOS ANGELES COUNTY CA

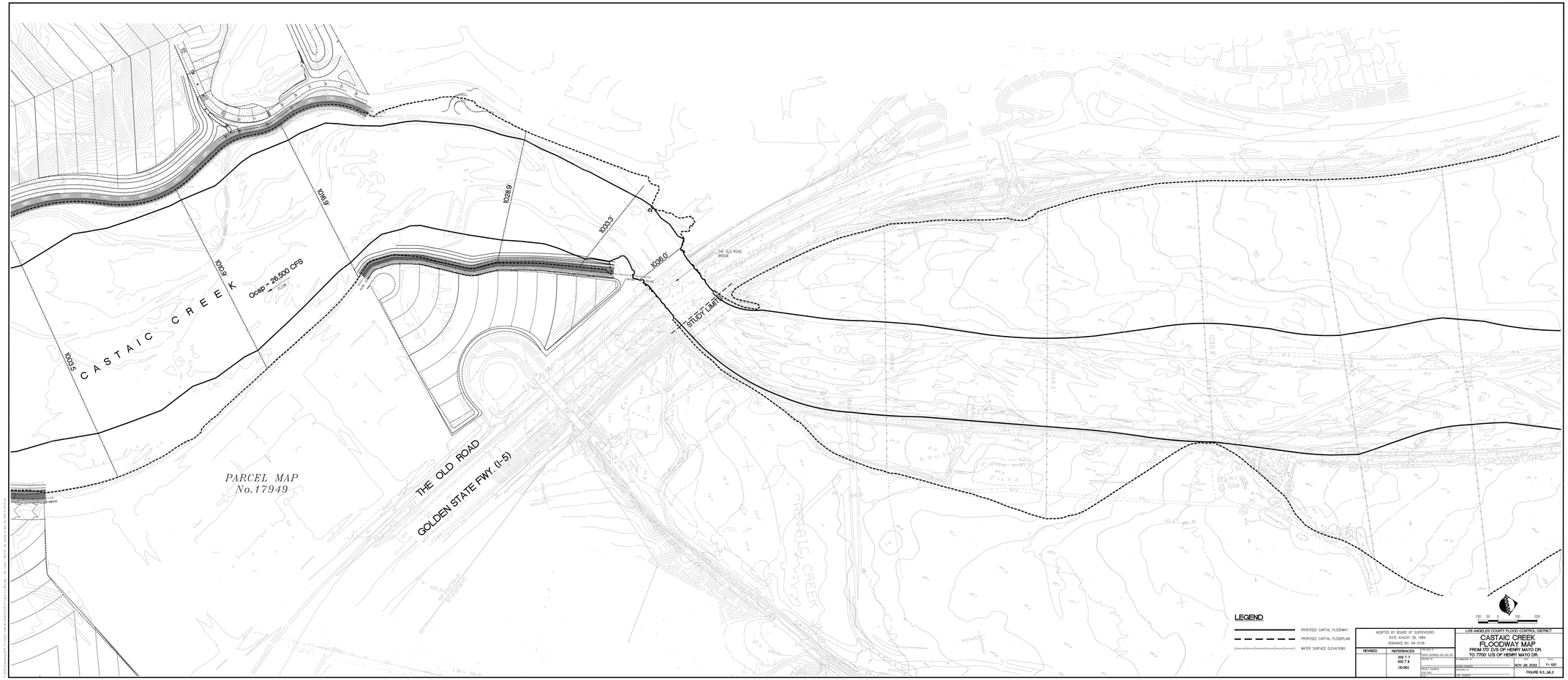
PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

FIGURE
6-1

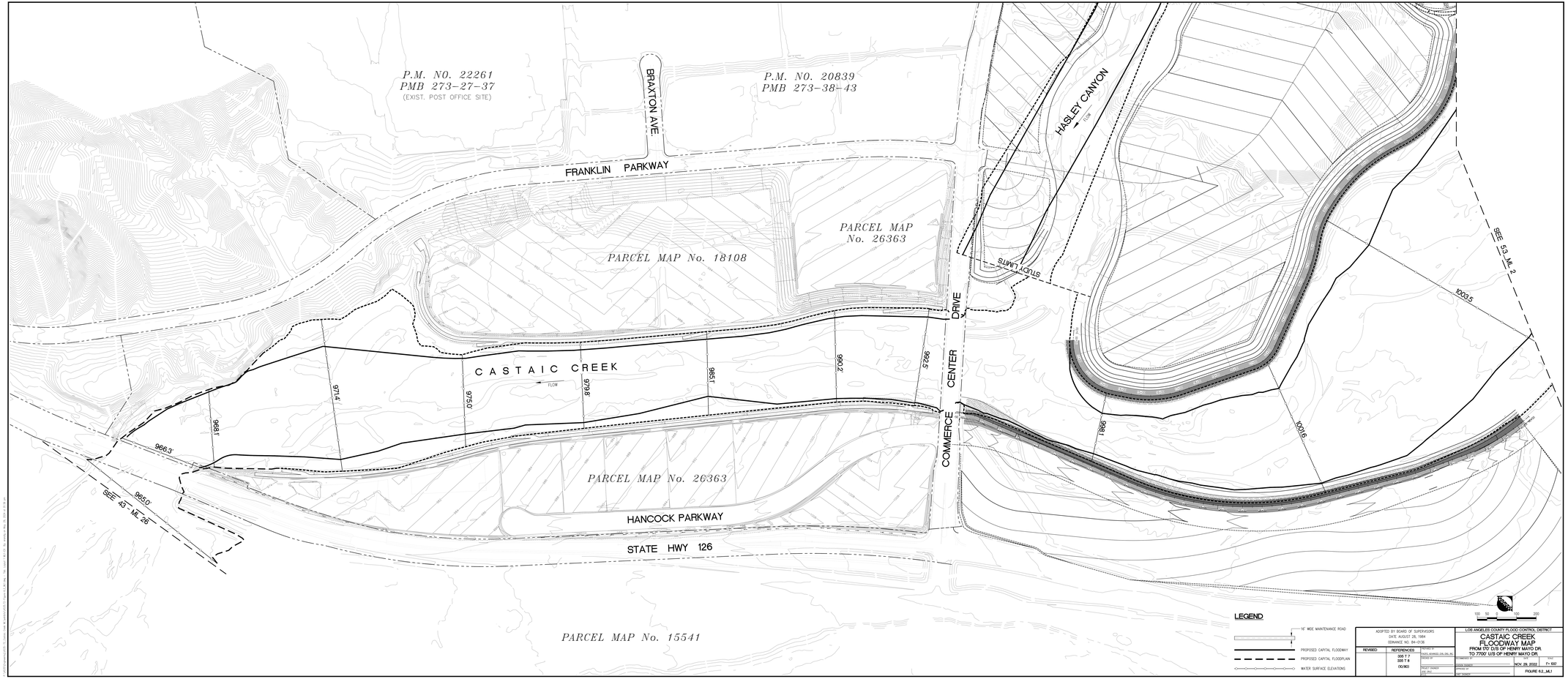
JOB NO. A535

Dimscale = 1; LTscale = 1; PSltscale = 1; ACAD Ver. = 23.0s (LMS Tech); Visretain = 1

\\pacedc01...\projects\A535\Engineering\A535-72_Castaic Creek ML Exhibits\A535-72-Figure-6-1.dwg - Tab: 24x36 - by mturner on 10/23/24 at 8:28:14 AM



CASTAIC CREEK
Qcap = 26,500 CFS
1003.5
1010.9'
1016.9'
1028.9'
1033.3'
1036.0'
STUDY LIMITS
THE OLD ROAD BRIDGE
PARCEL MAP
No.17949
THE OLD ROAD
GOLDEN STATE FWY. (I-5)
CASTAIC CREEK
LEGEND
PROPOSED CAPITAL FLOODWAY
PROPOSED CAPITAL FLOODPLAIN
WATER SURFACE ELEVATIONS
100 50 0 100 200
ADOPTED BY BOARD OF SUPERVISORS
DATE AUGUST 28, 1984
ORDINANCE NO. 84-0136
REVISED
REFERENCES
335 T 7
335 T 8
00/803
DRAWN BY
PAUL ANDRES DIA, DIA, INC.
DESIGN BY
PROJECT ENGINEER
JOB ONLY
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
CASTAIC CREEK
FLOODWAY MAP
FROM 170' D/S OF HENRY MAYO DR.
TO 7700' U/S OF HENRY MAYO DR.
RECOMMENDED BY
DESIGN ENGINEER
APPROVED BY
CHIEF ENGINEER
NOV. 29, 2002
SCALE
F= 100
FIGURE 6.3_M.2


P.M. NO. 22261
PMB 273-27-37
(EXIST. POST OFFICE SITE)
BRAXTON AVE.
P.M. NO. 20839
PMB 273-38-43
HASLEY CANYON
FLOW
FRANKLIN PARKWAY
PARCEL MAP
No. 26363
PARCEL MAP No. 18108
STUDY LIMITS
SEE 53_ML 2
1003.5
DRIVE
CASTAIC CREEK
FLOW
971.4'
975.0'
979.8'
985.1'
990.2'
992.5'
COMMERCE CENTER
998.1'
1001.6'
968.1'
966.3'
965.0'
SEE 43 - ML 26
PARCEL MAP No. 26363
HANCOCK PARKWAY
STATE HWY 126
PARCEL MAP No. 15541
LEGEND
16' WIDE MAINTENANCE ROAD
PROPOSED CAPITAL FLOODWAY
PROPOSED CAPITAL FLOODPLAIN
WATER SURFACE ELEVATIONS
100 50 0 100 200
ADOPTED BY BOARD OF SUPERVISORS
DATE AUGUST 28, 1984
ORDINANCE NO. 84-0136
REVISED
REFERENCES
335 T 7
335 T 8
00/803
DRAWN BY
TRACE ADDRESS DIV. DIV. NO.
DESIGNED BY
PROJECT ENGINEER
DATE DRAWN
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
CASTAIC CREEK
FLOODWAY MAP
FROM 170' D/S OF HENRY MAYO DR.
TO 7700' U/S OF HENRY MAYO DR.
DESIGNED BY
CHECKED BY
APPROVED BY
DATE DESIGNED
NOV. 29, 2002
SCALE
F= 100
FIGURE 6.2_ML1

7 Summary

Pacific Advanced Civil Engineering, Inc. (PACE) has been retained by FivePoint Communities to prepare a report for LA County Floodplain and Floodway Revision along lower Castaic Creek. This report proposes a revision to existing LA County Adopted Floodway Maps No.'s 335 ML-1and 2 for Castaic Creek between Commerce Center Drive to the Old Rd. / Interstate-5 Bridges. The purpose of this report is to show the following:

1. Existing LA County Adopted Floodway and Floodplain boundaries.
2. Updated existing hydraulic analysis based on current LACPW Q_{cap} hydrology and hydraulic design criteria.
3. Proposed conditions hydraulic analysis based on current LACPW Q_{cap} hydrology and hydraulic design criteria.
4. Methods utilized to generate the existing and proposed conditions floodway boundaries. PACE has created revised LA County ML Maps 335 ML-1 and 2 to replace the existing LA County Adopted ML Maps.

PACE proposes that LA County revise the current adopted capital floodplain and floodway Maps 335-ML-1 and 2 upon completion of Castaic Creek channel improvements. Upon LACPW staff review and approval of this document, the ML Map Revision shall be presented to the Los Angeles county Board of Supervisors for Acceptance of Revision.

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Appendix A – LACPW Capital Flood Flow Rates

Reach	Capital Flood Flow Rate (cfs)
A	24,100
B	25,300
C	25,400
D	25,600
E	26,200
F	26,300
G	26,400
H	31,100
I	31,200

QUAD: VALVERDE 1-H1-45
NEW HALL 1-H1-44
WHITAKER PEAK 1-H1-55

2,200 1,100 0 2,200 Feet

ATTACHMENT A

LEGEND

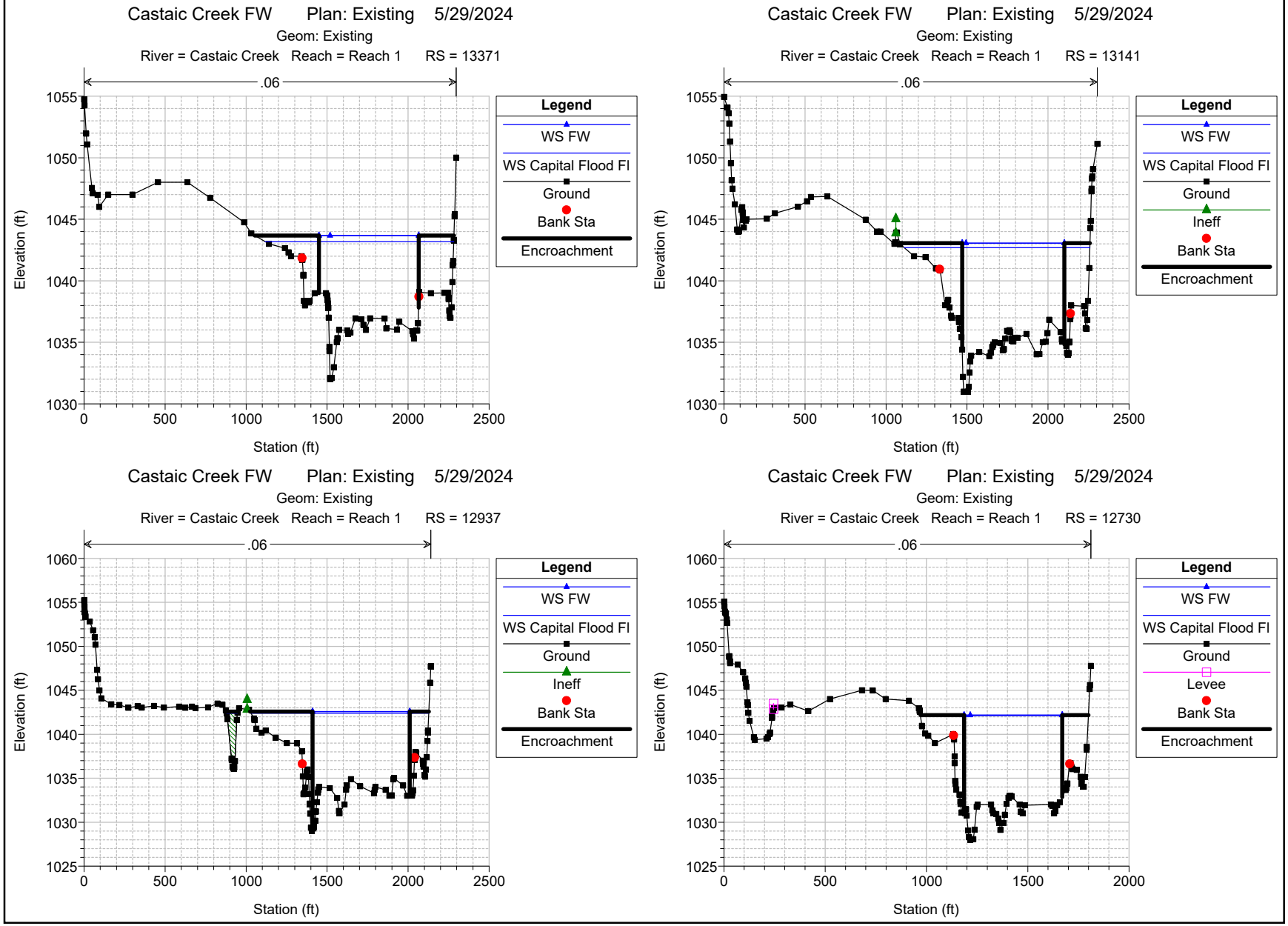
A — Reach

Natural Watercourse

PREPARED BY SSL	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DATE 04/03/17	Lower Castaic Creek Capital Flood Flow Rates
SCALE 1" = 2200'	

PACE
Advanced Water Engineering

Appendix B – HEC-RAS Existing Condition Results


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 13371
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 13141
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12937
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12730
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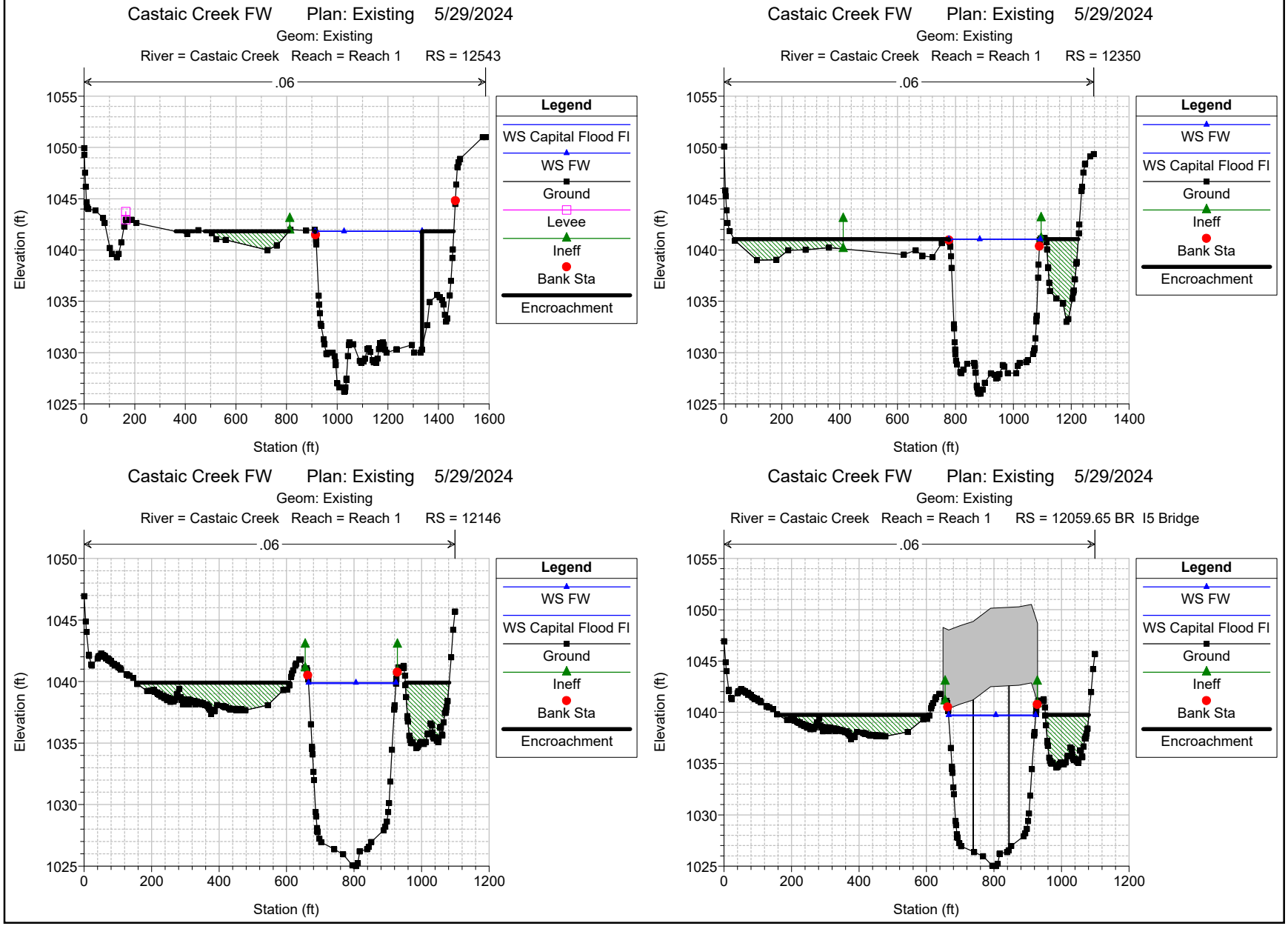
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12543
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Elevation (ft)
Station (ft)
Legend
WS Capital Flood Fl
WS FW
Ground
Levee
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12350
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12146
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12059.65 BR I5 Bridge
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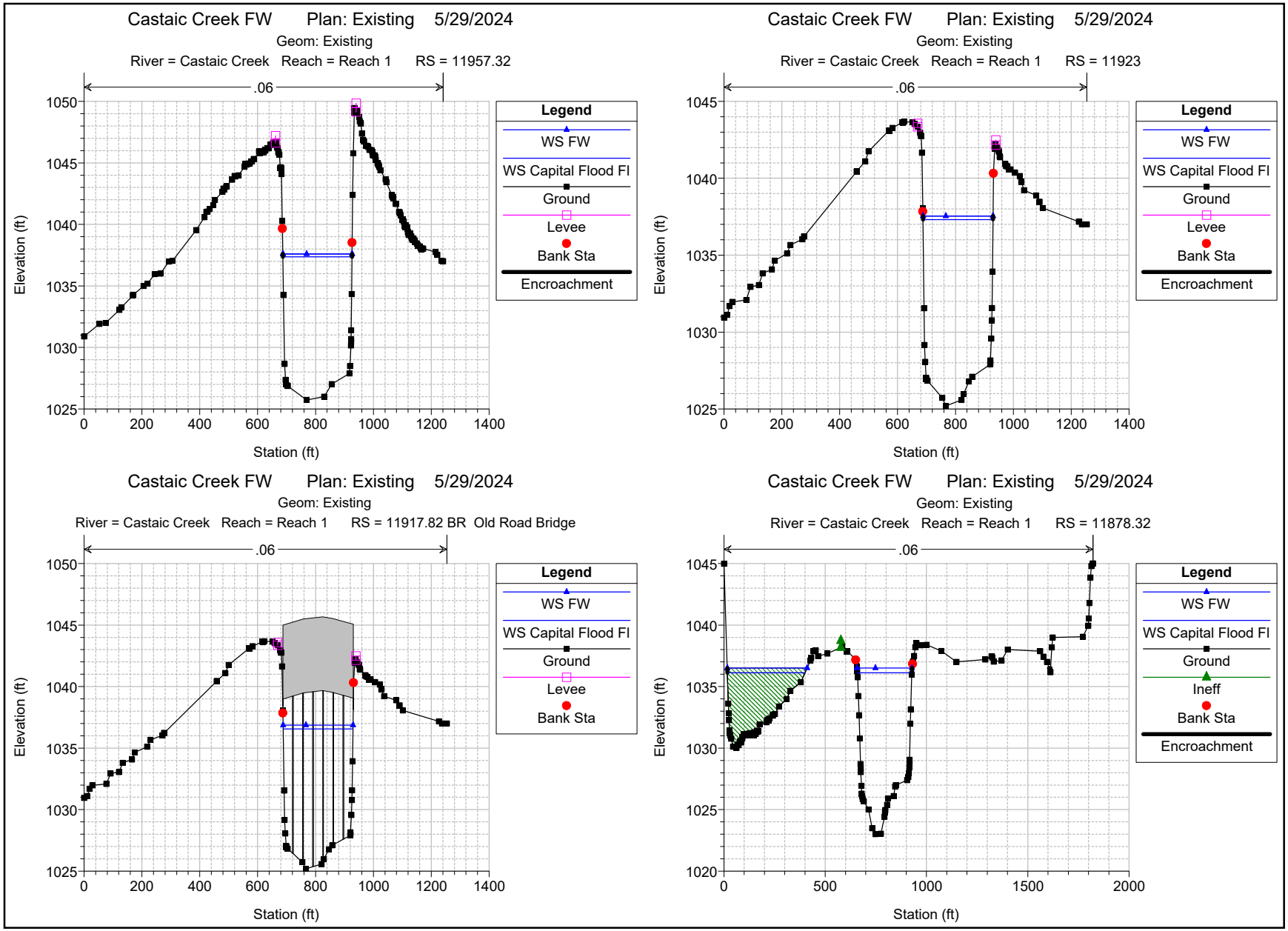
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11957.32
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11923
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11917.82 BR Old Road Bridge
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11878.32
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Elevation (ft)
Station (ft)
Legend
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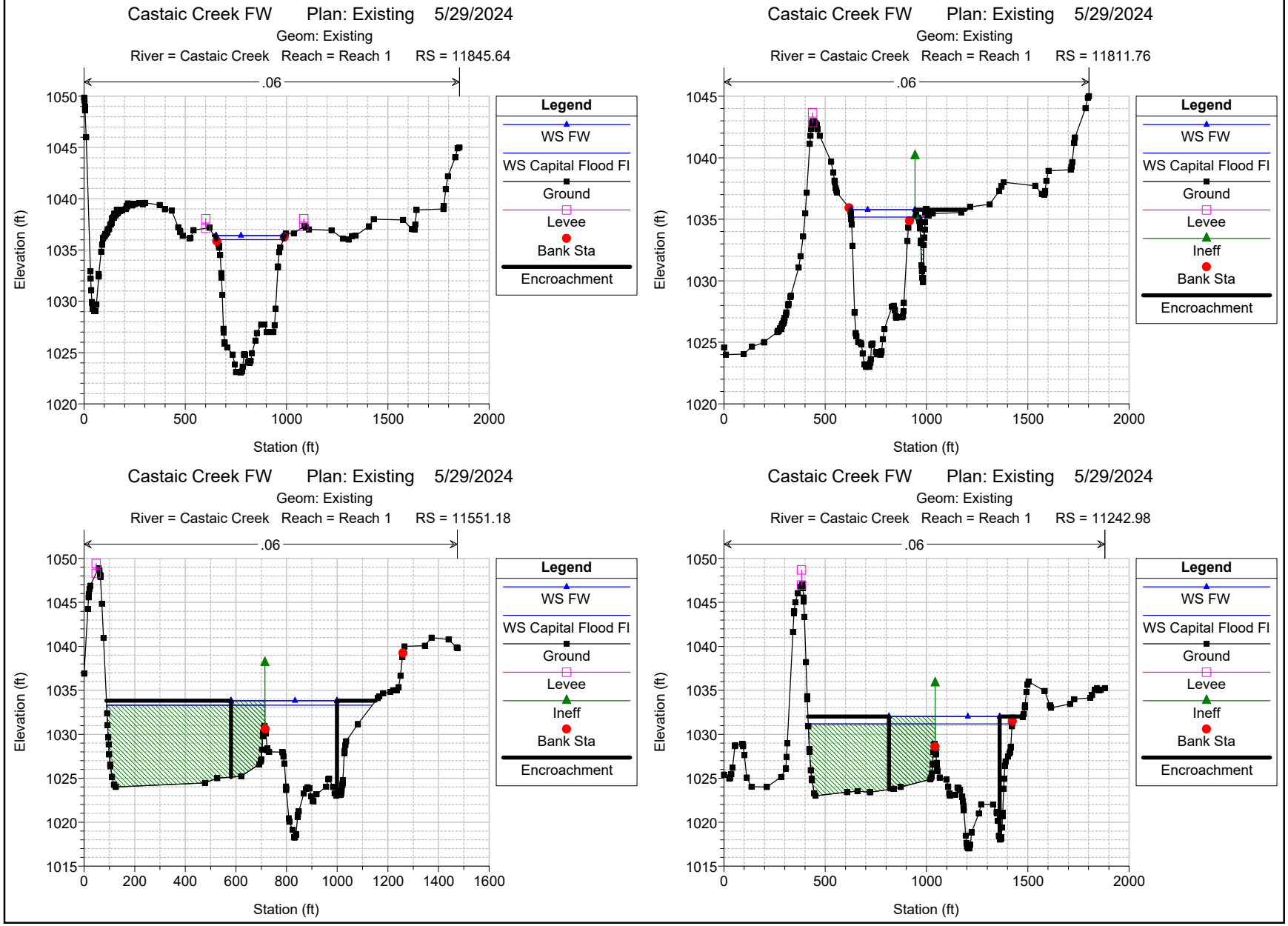
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment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River = Castaic Creek Reach = Reach 1 RS = 11845.64
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment
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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11811.76
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11551.18
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11242.98
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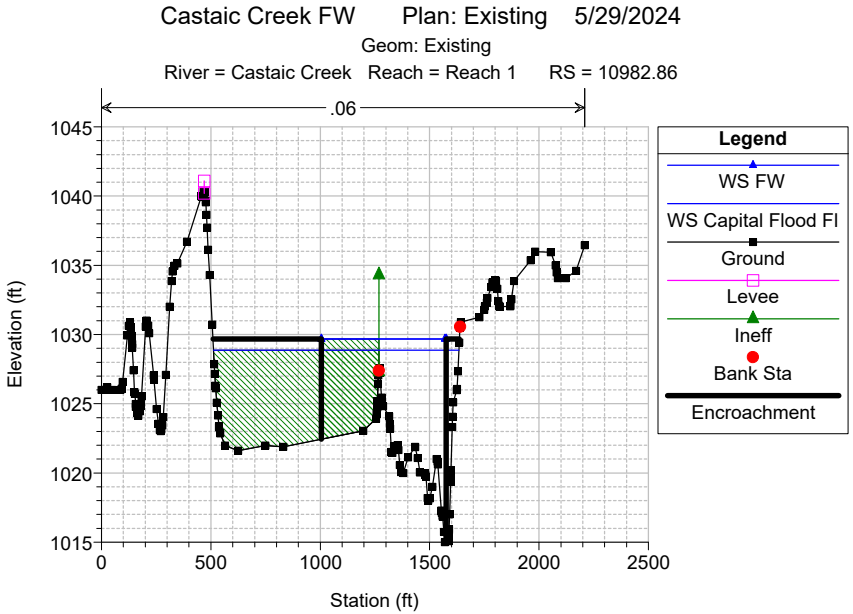
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10982.86
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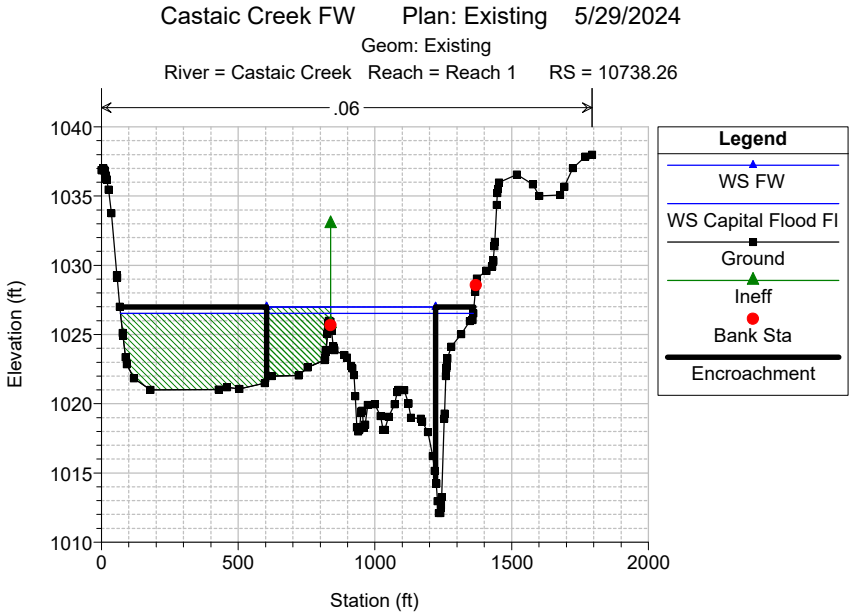
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10738.26
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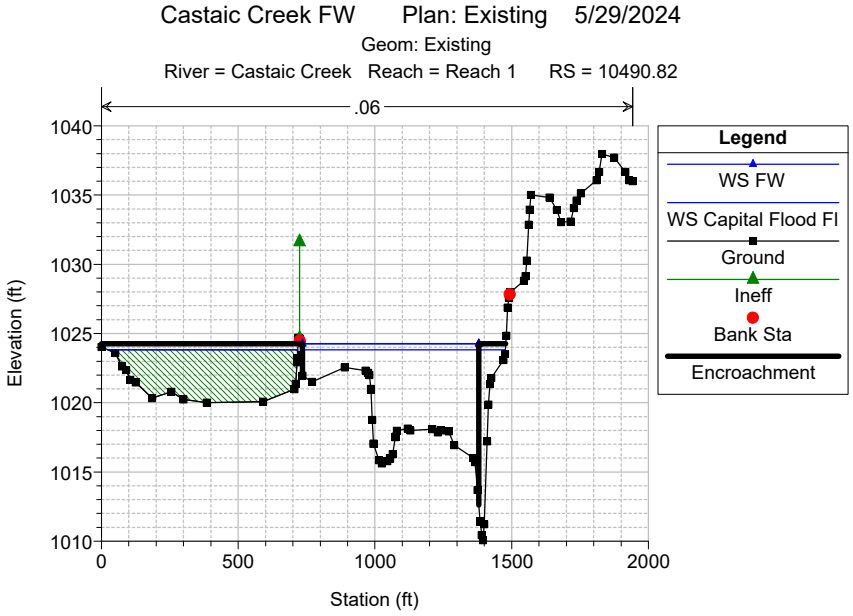
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10490.82
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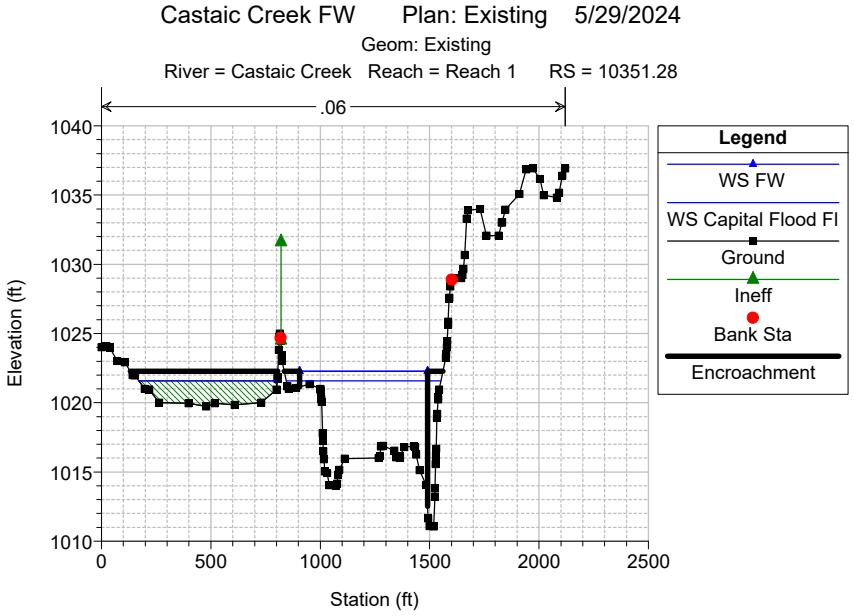
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10351.28
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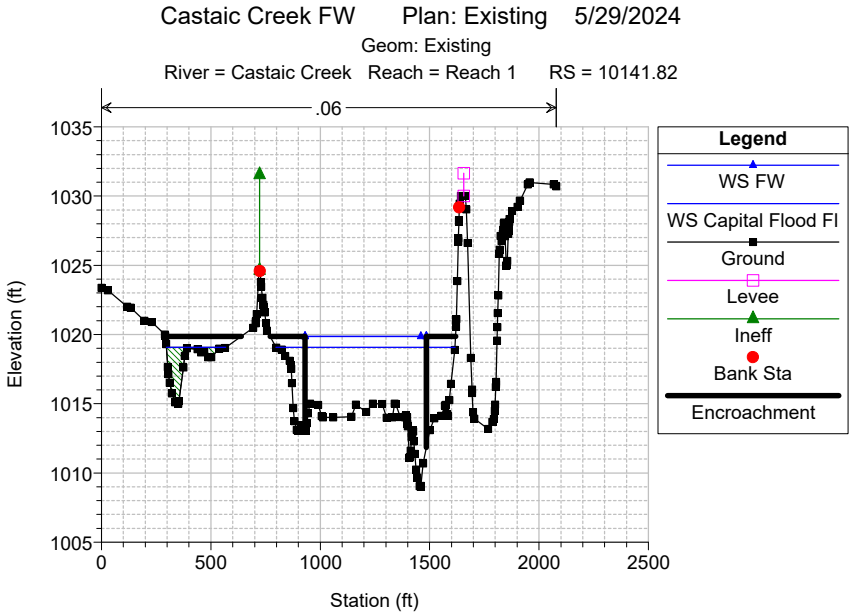
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10141.82
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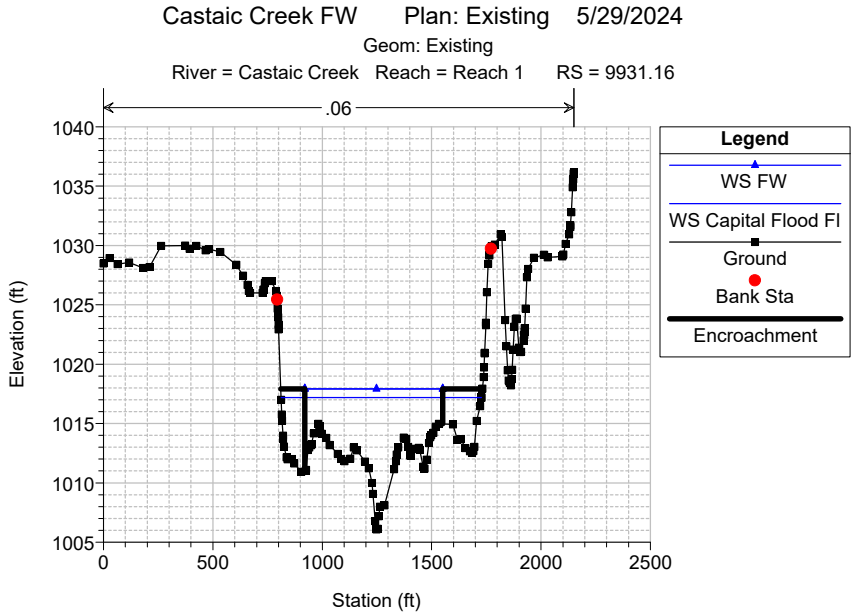
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9931.16
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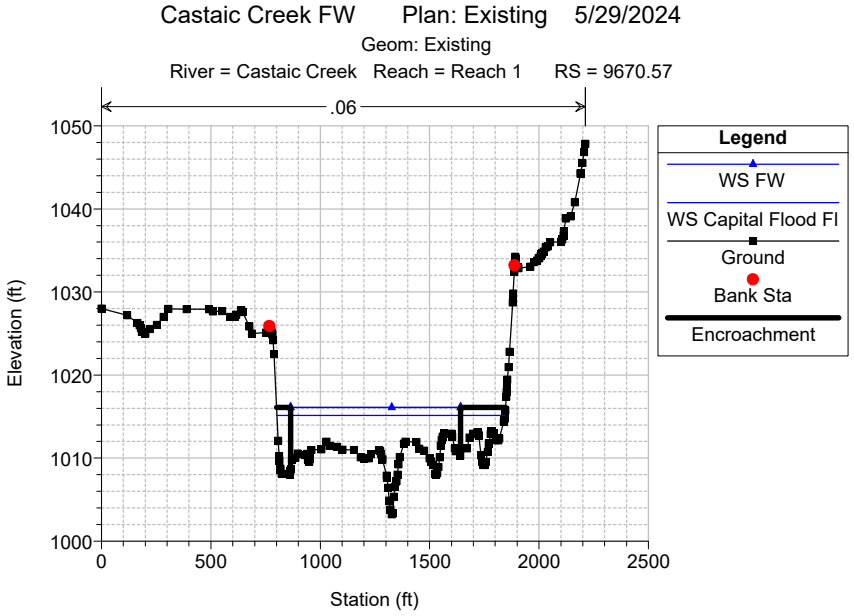
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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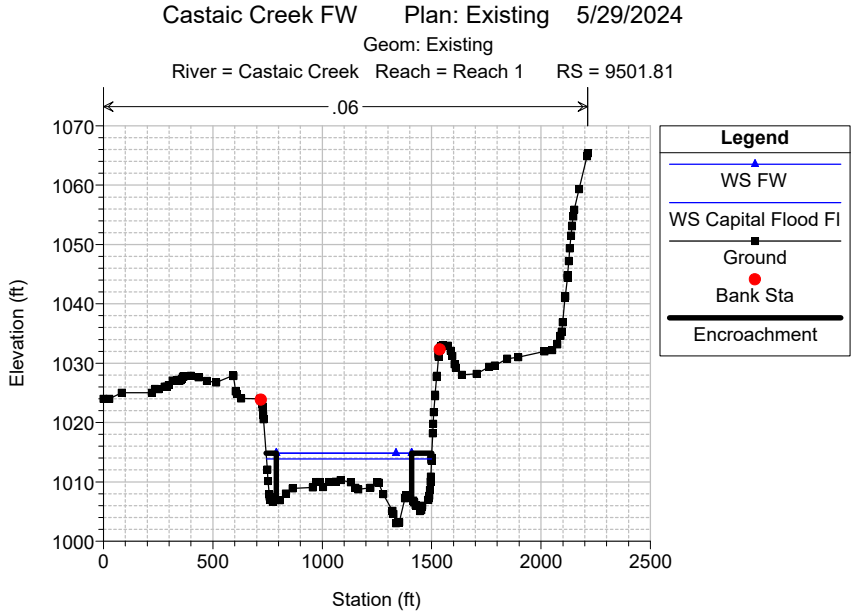
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9670.57
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9501.81
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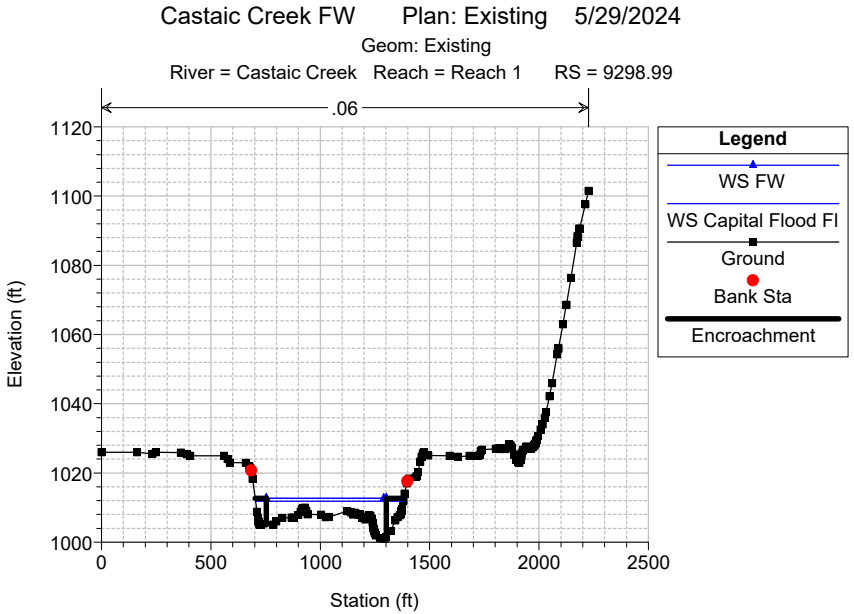
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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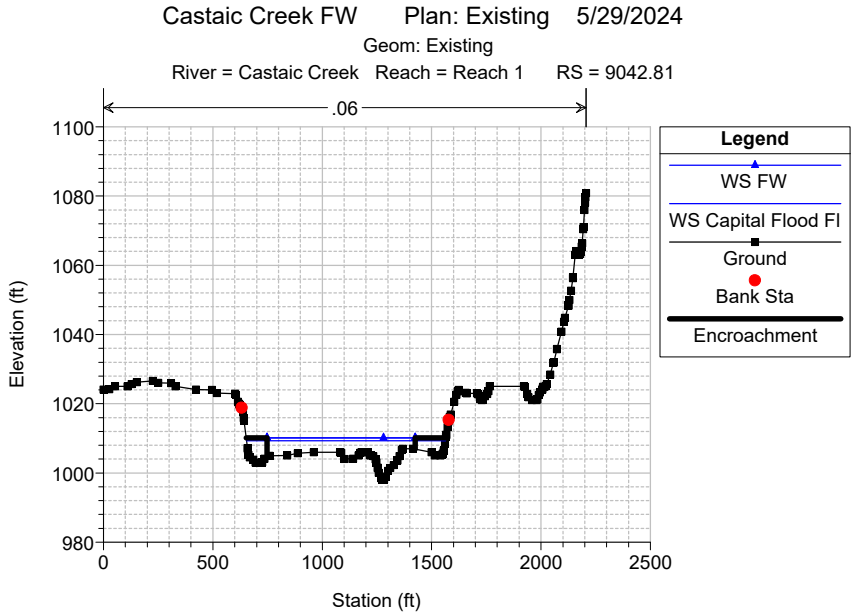
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9298.99
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9042.81
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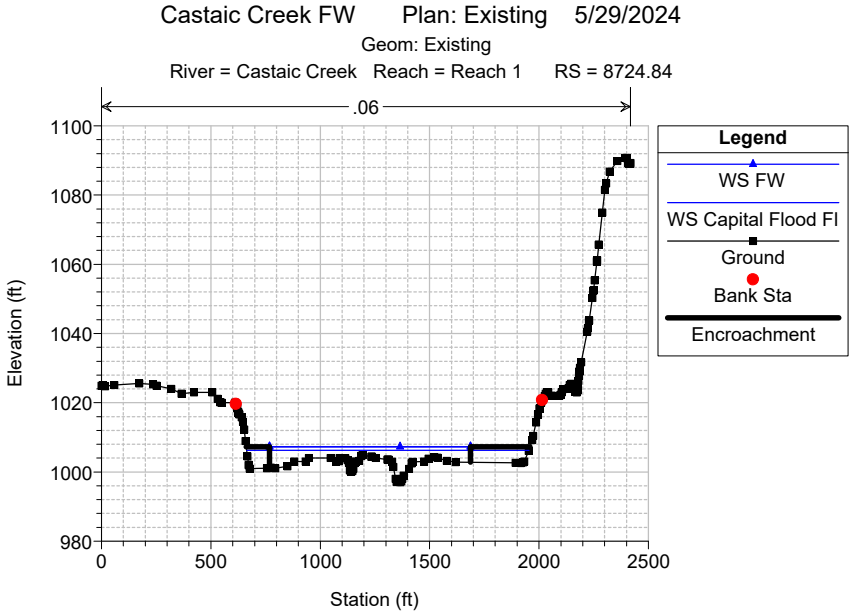
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 8724.84
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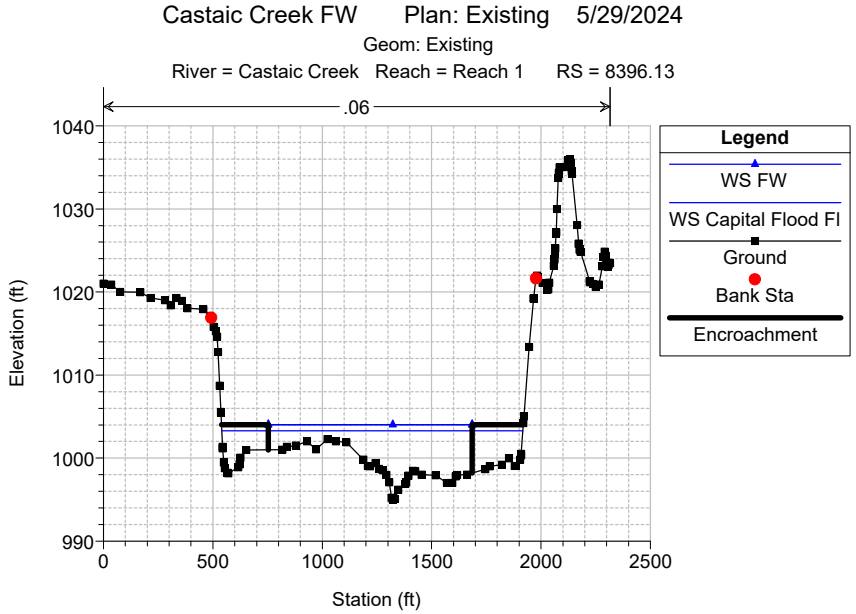
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 8396.13
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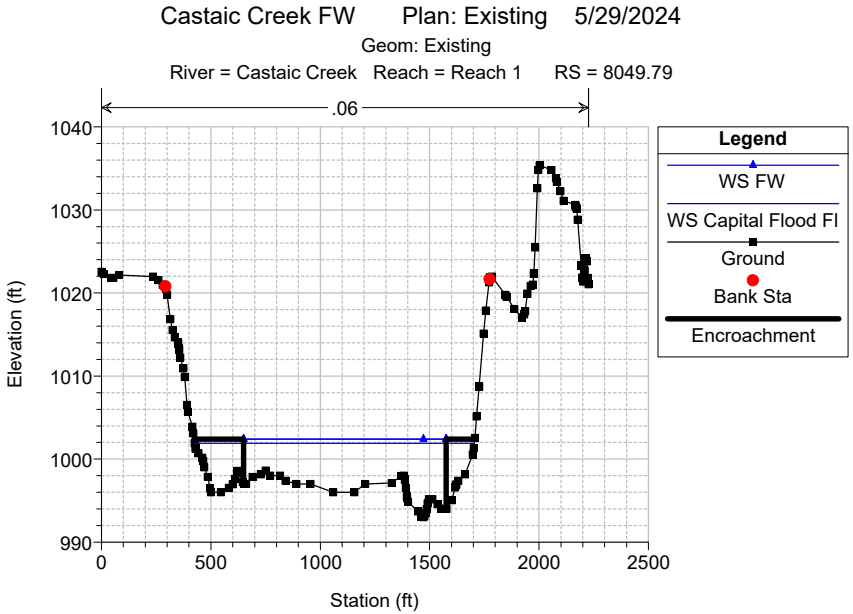
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 8049.79
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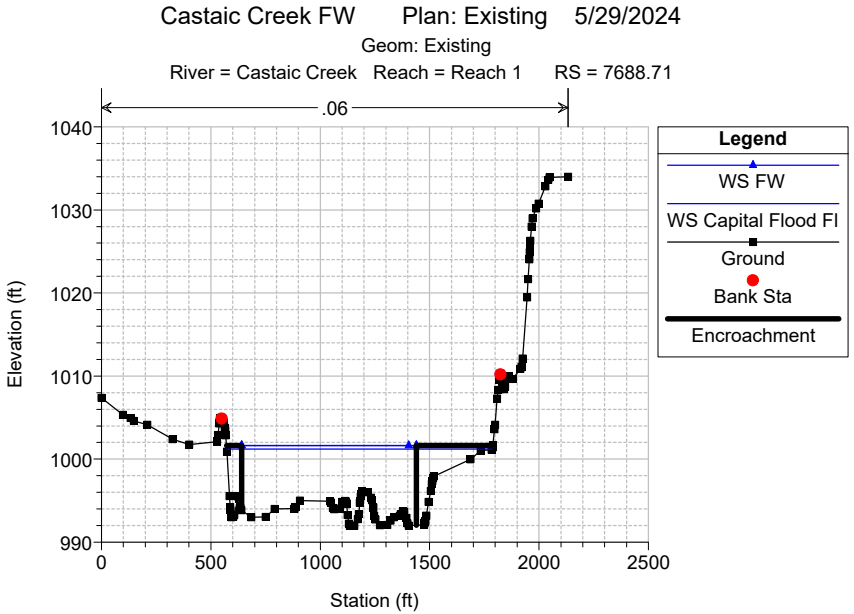
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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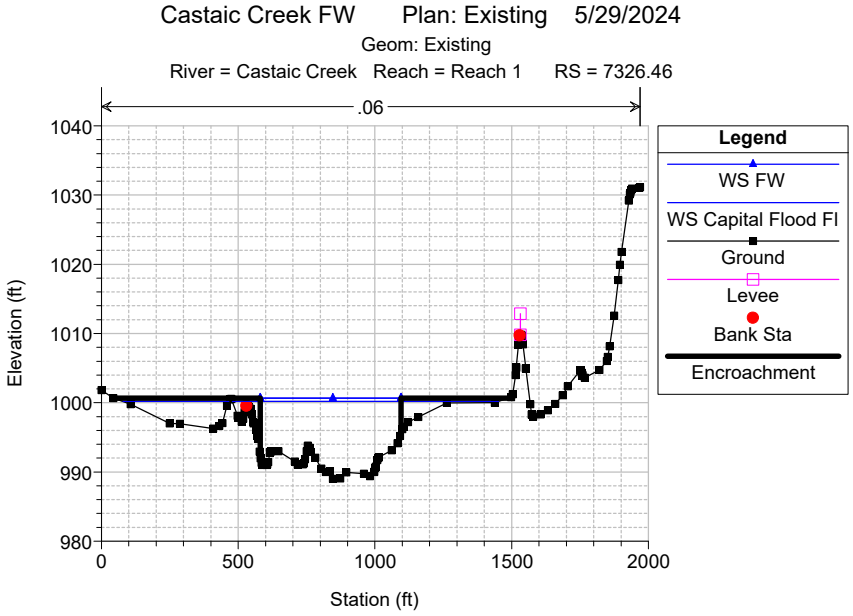
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 7688.71
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 7326.46
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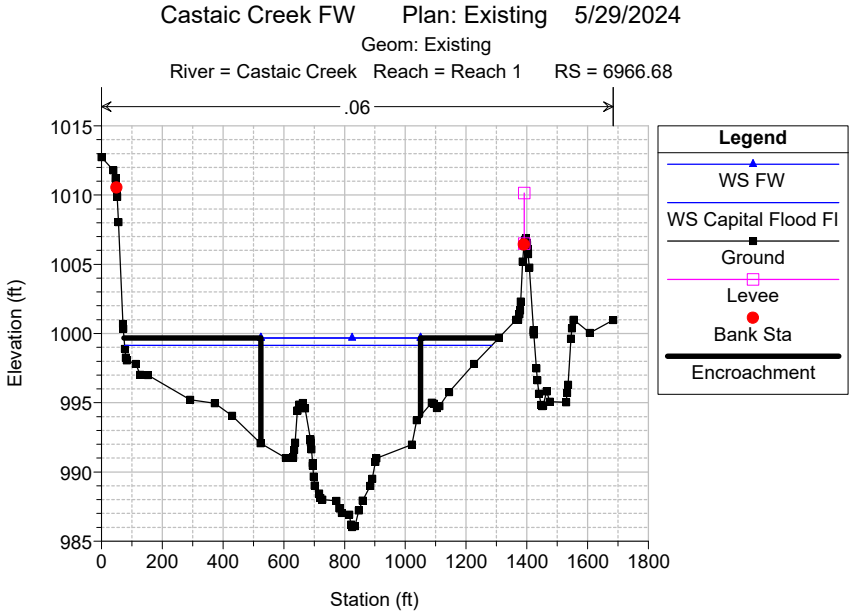
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment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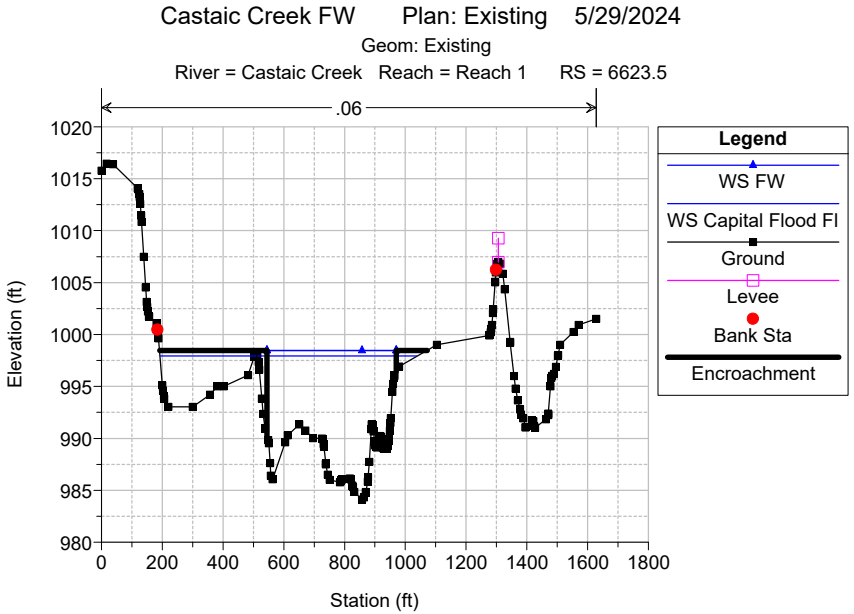
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6966.68
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment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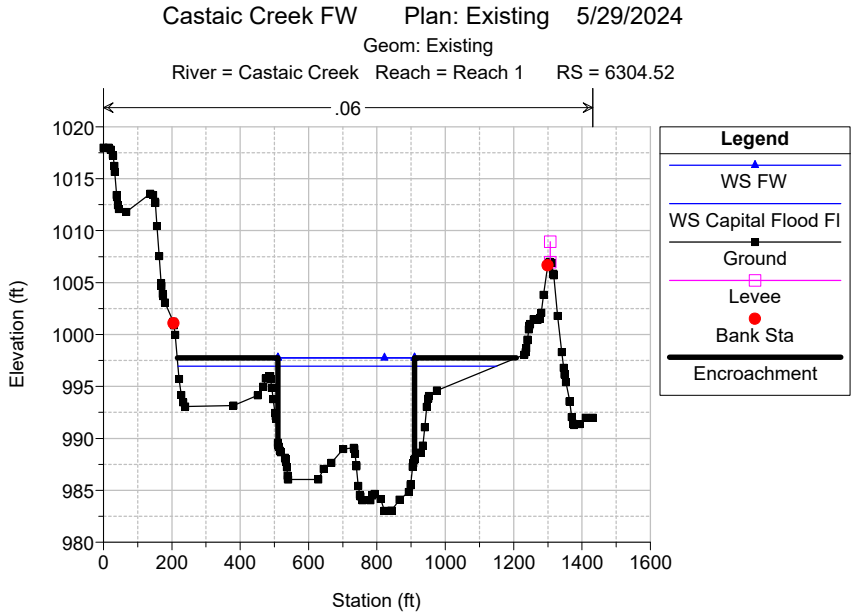
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6623.5
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6304.52
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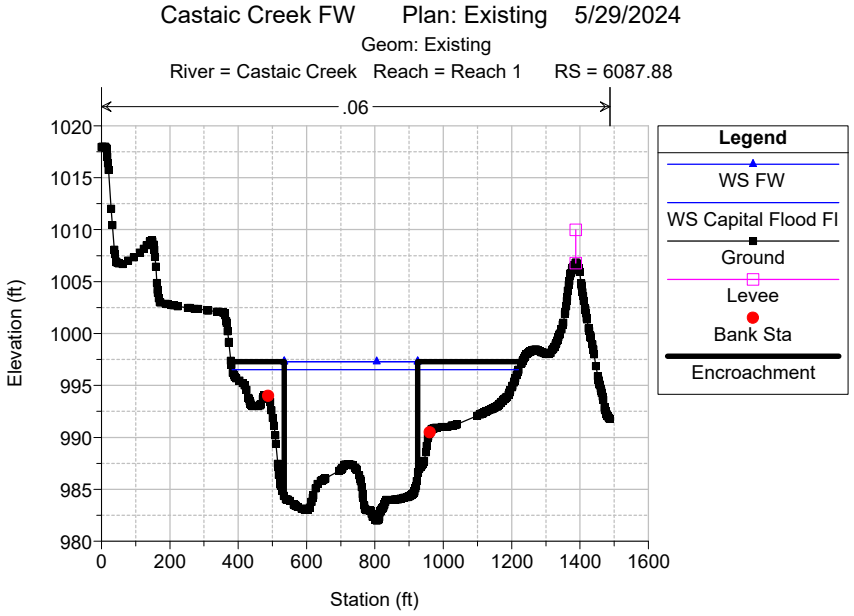
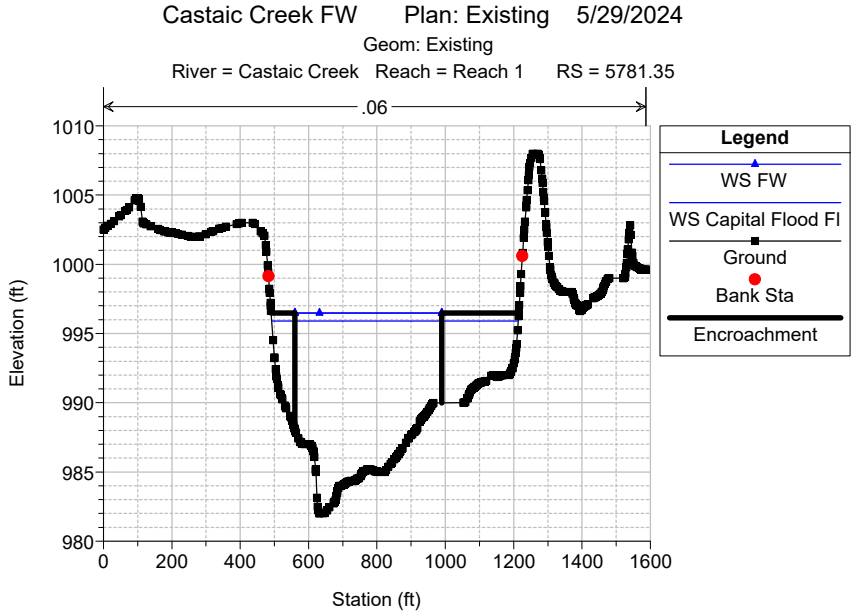
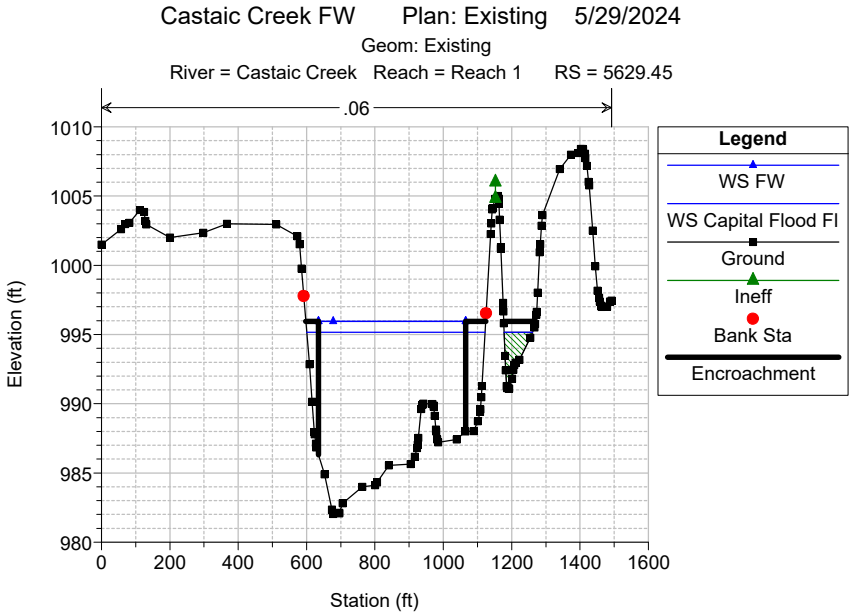
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6087.88
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Levee
Bank Sta
Encroachment


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5781.35
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5629.45
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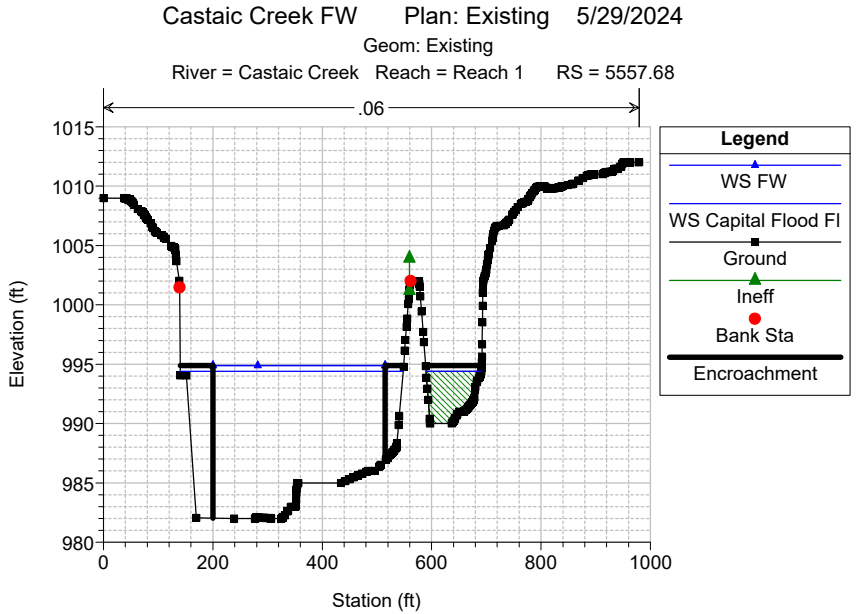
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5557.68
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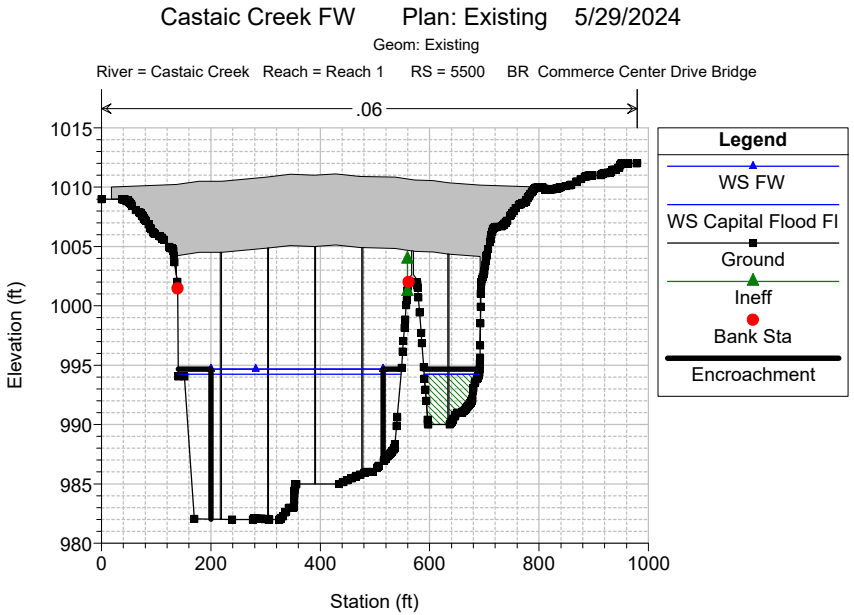
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5500 BR Commerce Center Drive Bridge
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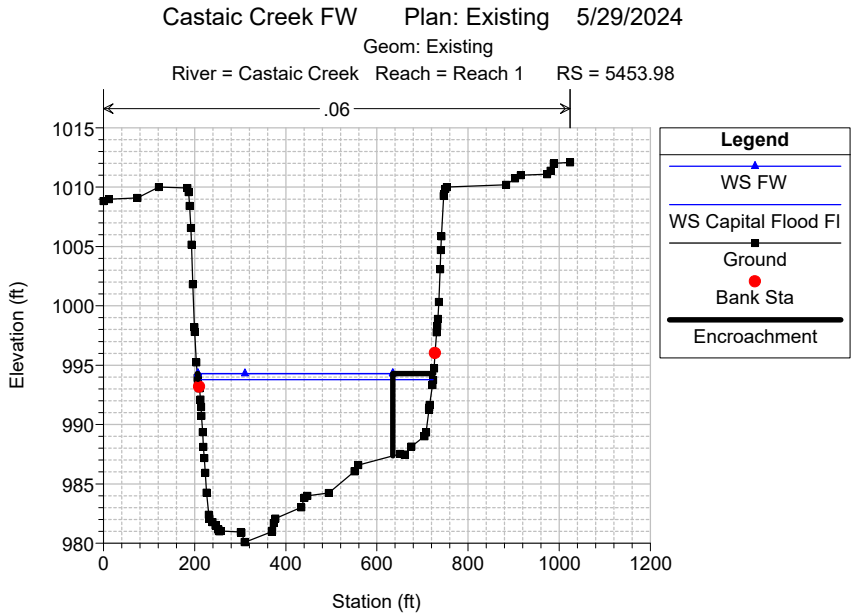
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Ineff
Bank Sta
Encroachment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Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5453.98
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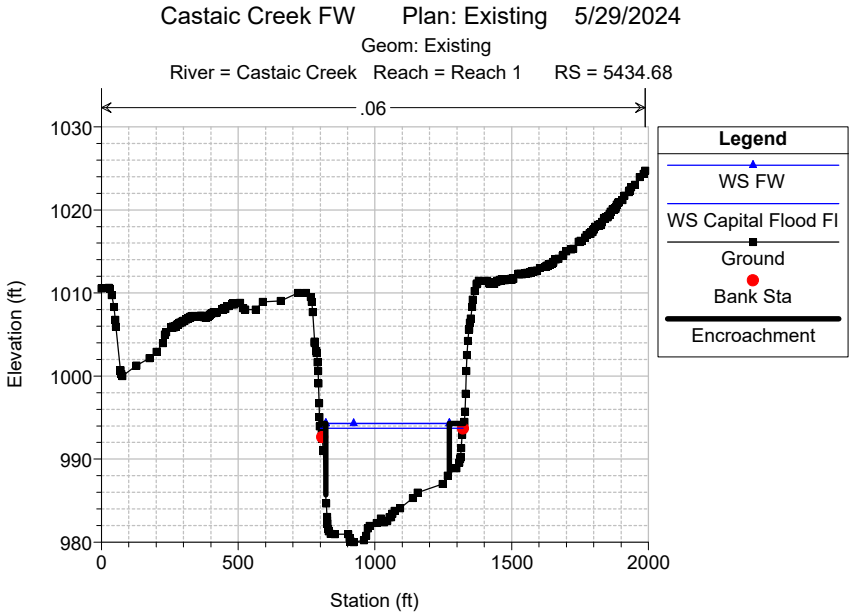
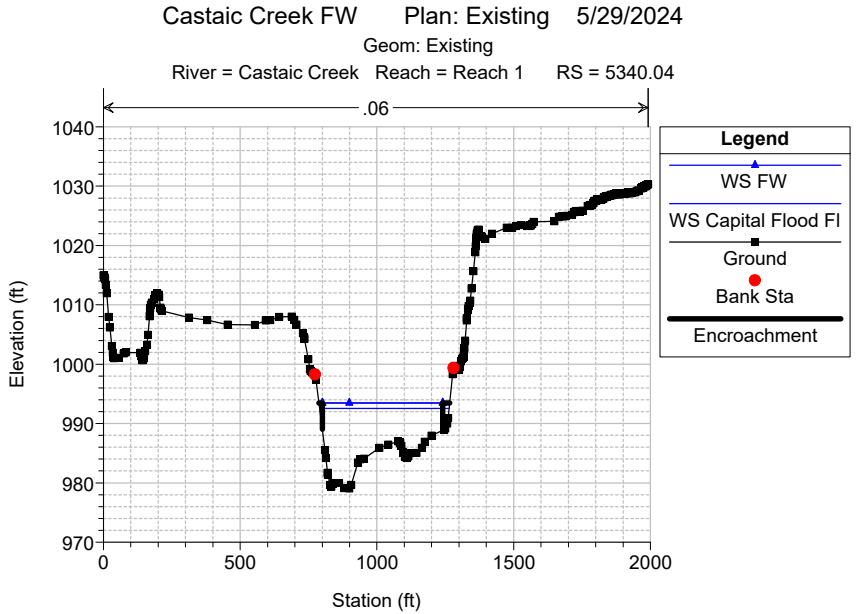
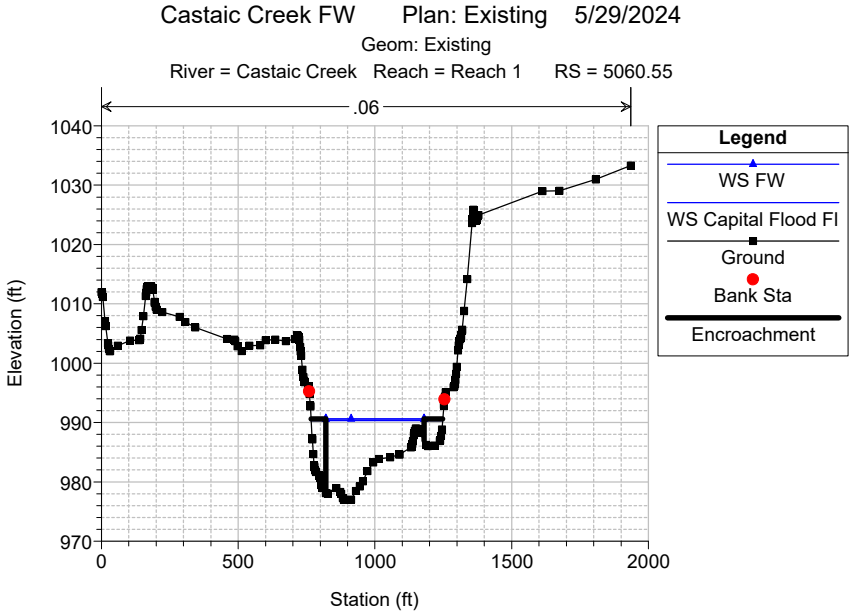
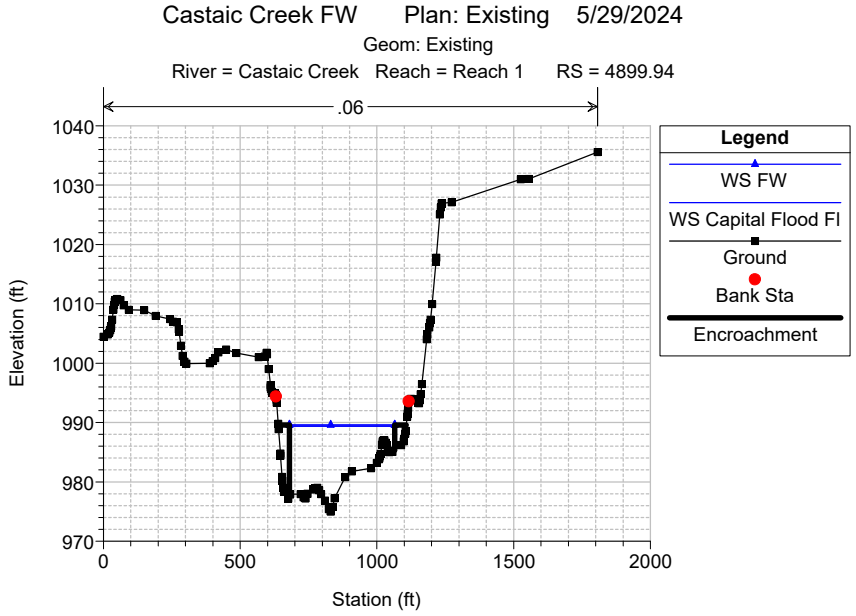
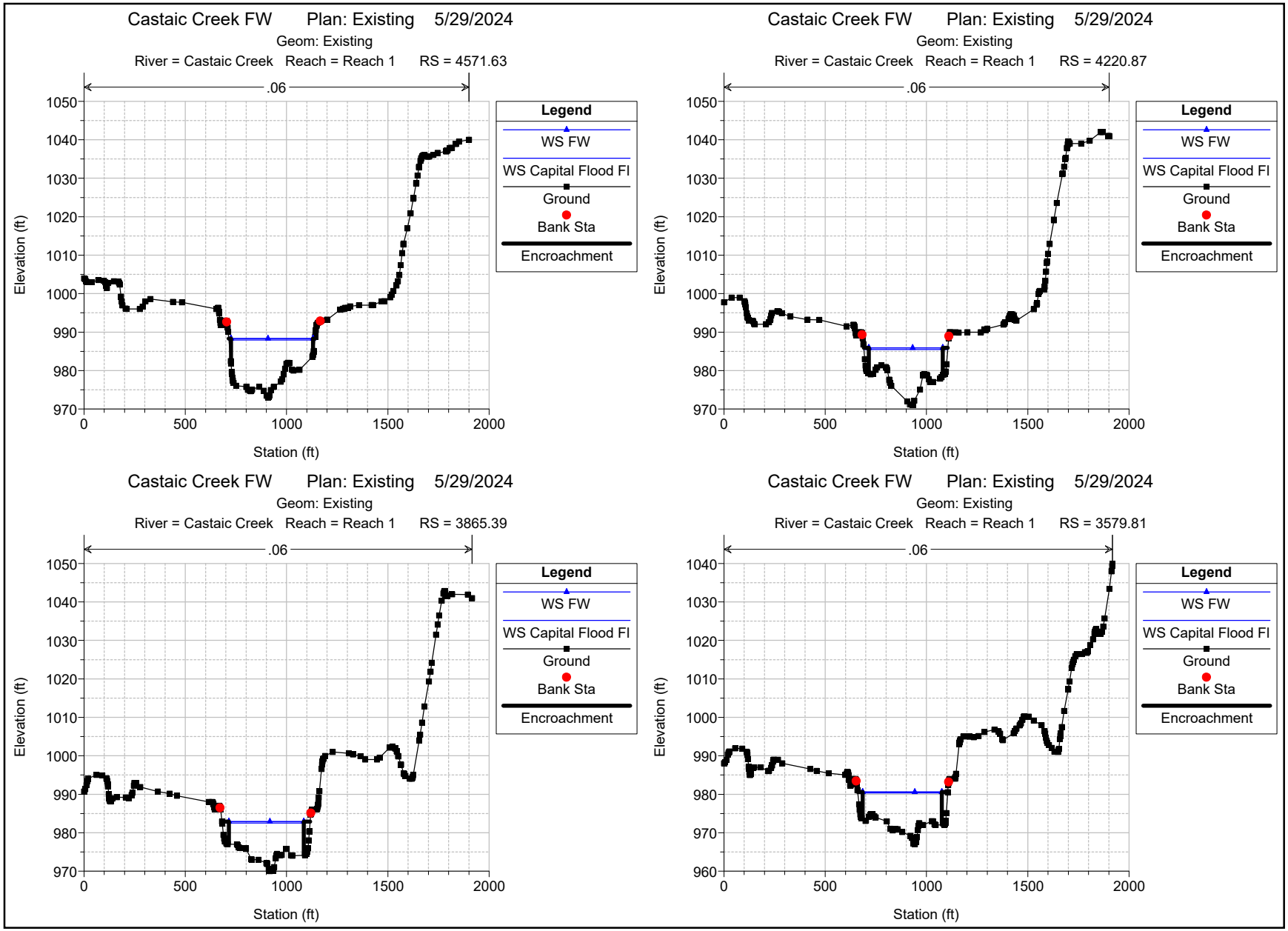
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment

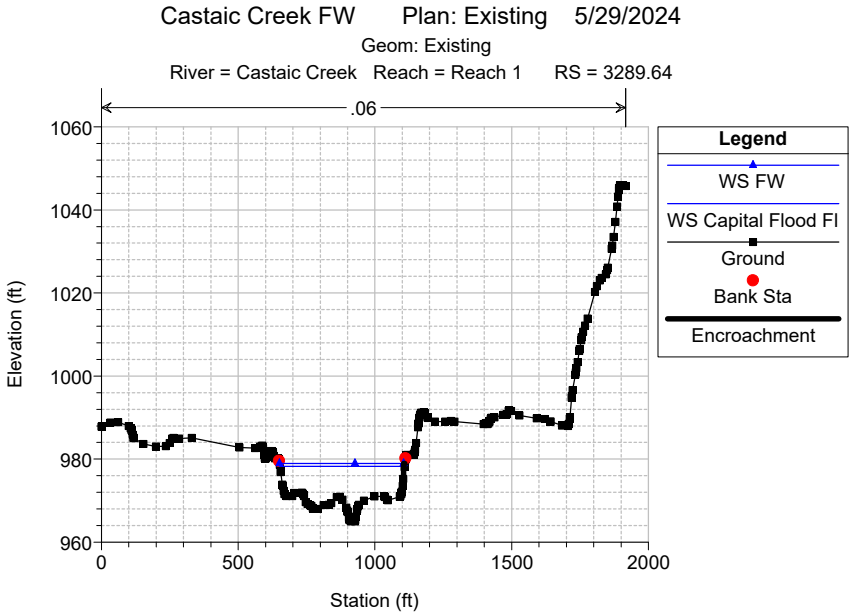

Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5434.68
.06
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
1030
1020
1010
1000
990
980
0
500
1000
1500
2000

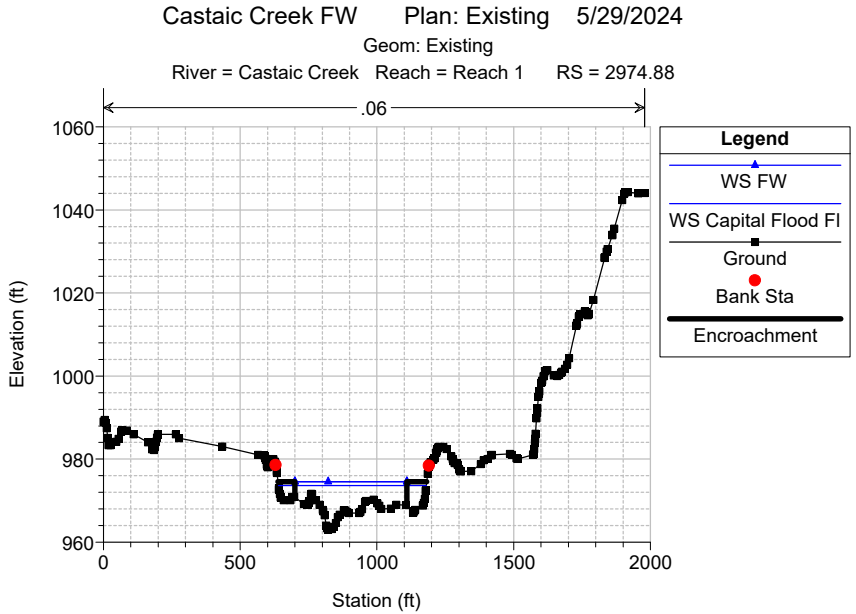

Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5340.04
.06
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
1040
1030
1020
1010
1000
990
980
970
0
500
1000
1500
2000

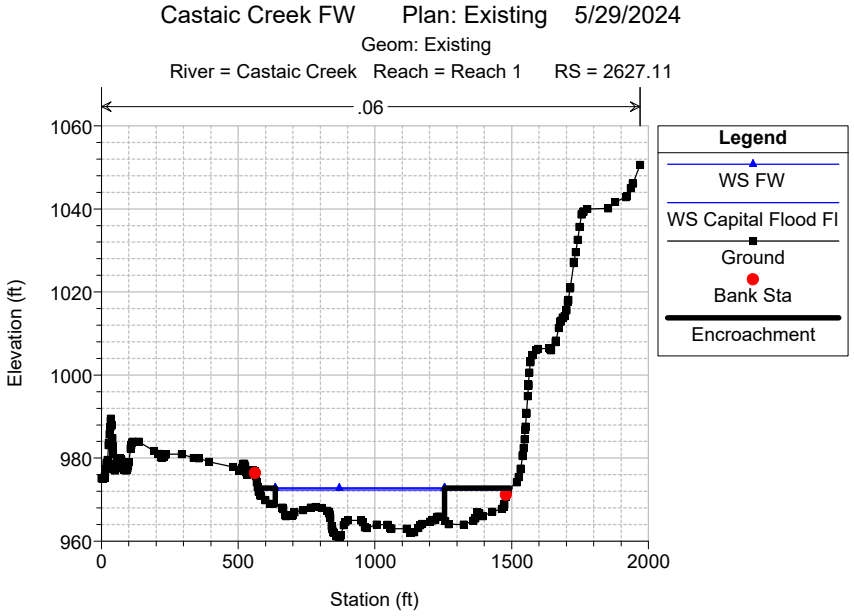

Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5060.55
.06
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
1040
1030
1020
1010
1000
990
980
970
0
500
1000
1500
2000

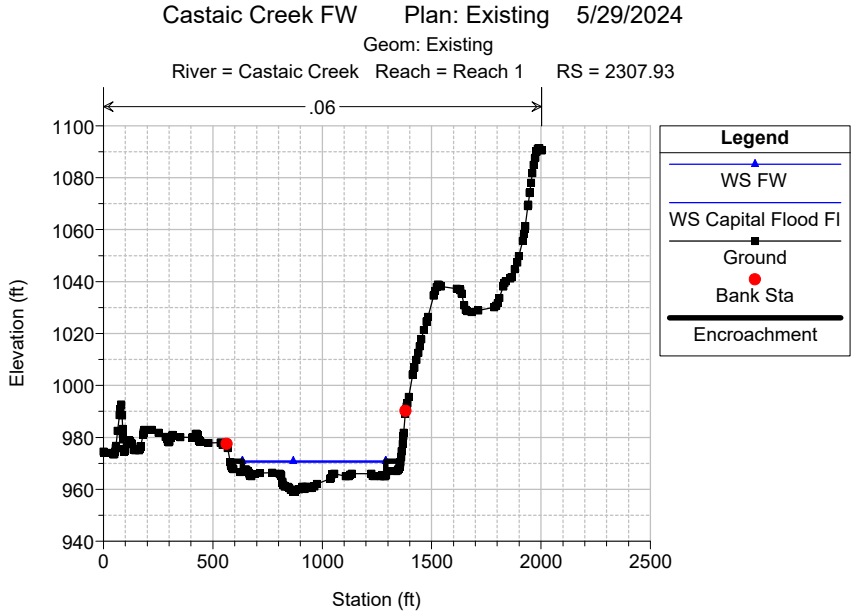

Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 4899.94
.06
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
1040
1030
1020
1010
1000
990
980
970
0
500
1000
1500
2000

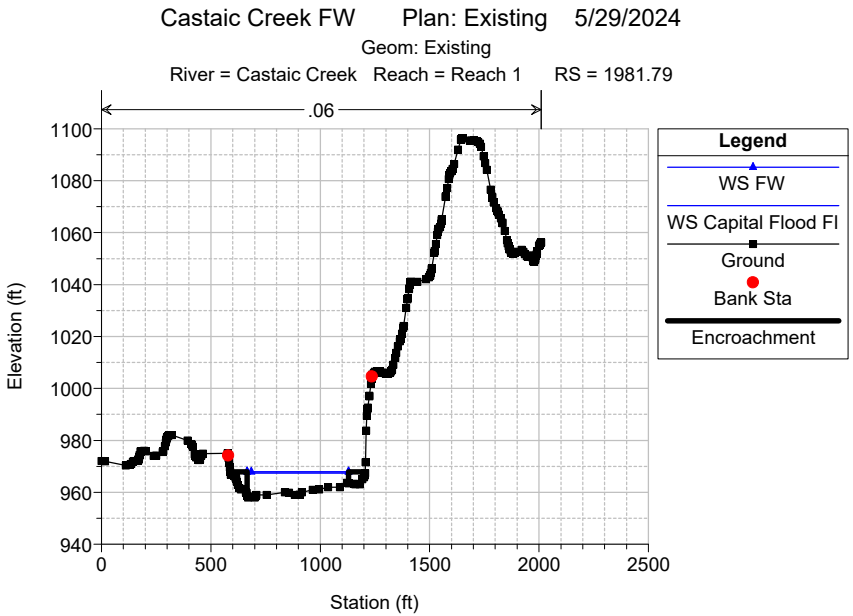

Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 4571.63
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 4220.87
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 3865.39
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 3579.81
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 3289.64
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 2974.88
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment

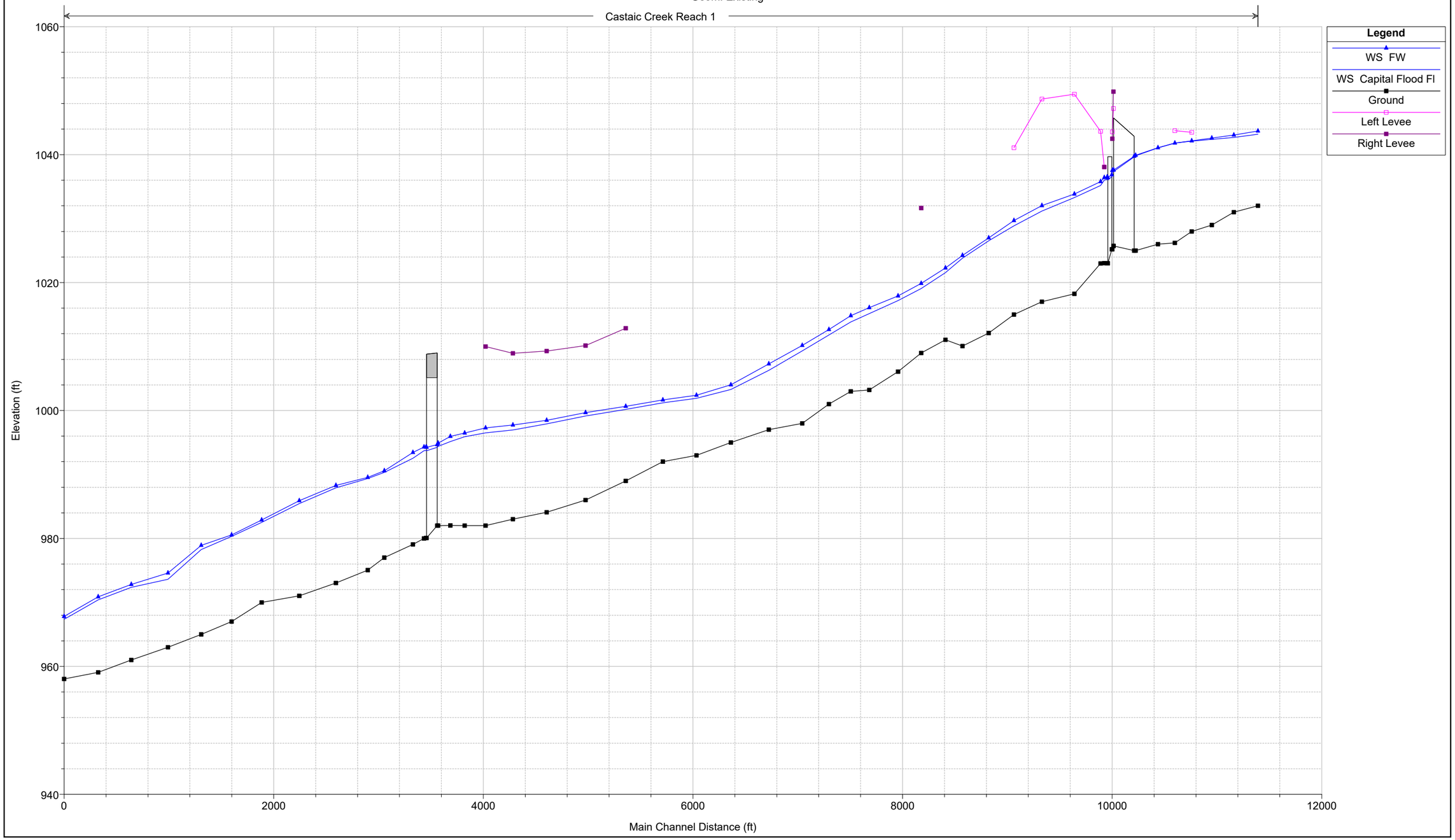

Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 2627.11
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 2307.93
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment


Castaic Creek FW Plan: Existing 5/29/2024
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 1981.79
.06
Elevation (ft)
1100
1080
1060
1040
1020
1000
980
960
940
0
500
1000
1500
2000
2500
Station (ft)
Legend
WS FW
WS Capital Flood Fl
Ground
Bank Sta
Encroachment

Castaic Creek FW Plan: Existing 5/29/2024

Geom: Existing



HEC-RAS Plan: Exist River: Castaic Creek Reach: Reach 1

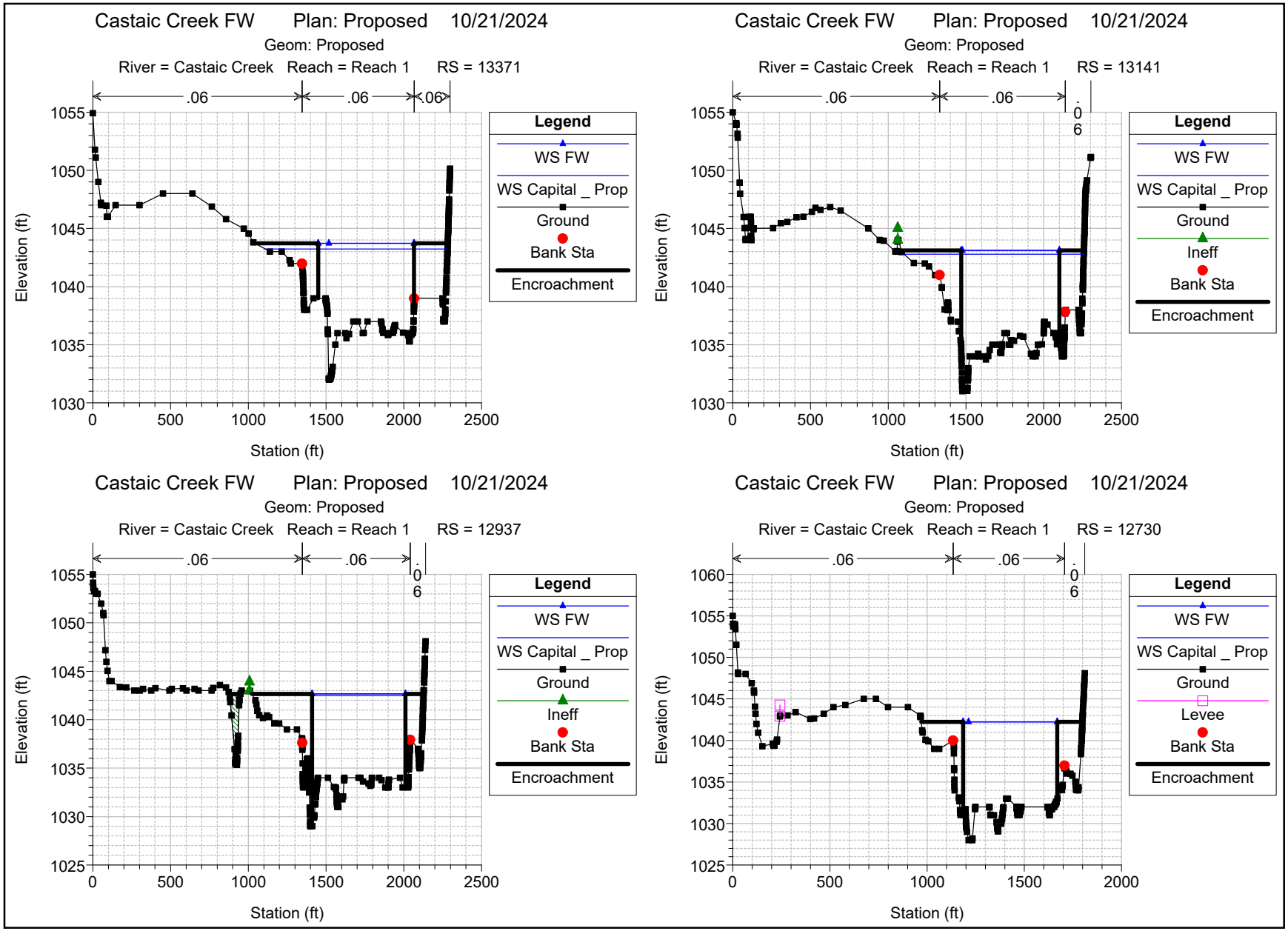
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	13371	Capital Flood Fl	26300.00	1032.00	1043.18		1043.53	0.003258	4.90	5715.79	1163.62	0.34
Reach 1	13371	FW	26300.00	1032.00	1043.68		1044.21	0.003998	5.83	4510.55	615.00	0.38
Reach 1	13141	Capital Flood Fl	26300.00	1031.00	1042.70	1038.43	1042.95	0.001852	4.06	6775.90	1146.05	0.26
Reach 1	13141	FW	26300.00	1031.00	1043.06	1038.54	1043.45	0.002529	5.02	5240.47	630.00	0.31
Reach 1	12937	Capital Flood Fl	26300.00	1029.00	1042.39	1037.07	1042.61	0.001326	3.85	7430.92	1162.71	0.23
Reach 1	12937	FW	26300.00	1029.14	1042.59	1037.44	1042.96	0.002129	4.84	5436.32	600.00	0.28
Reach 1	12730	Capital Flood Fl	26300.00	1027.98	1042.12	1035.81	1042.36	0.001219	4.08	6860.37	829.12	0.22
Reach 1	12730	FW	26300.00	1027.98	1042.17	1035.97	1042.57	0.001880	5.07	5192.21	485.00	0.27
Reach 1	12543	Capital Flood Fl	26300.00	1026.20	1041.82	1034.91	1042.14	0.001454	4.53	5801.86	958.45	0.25
Reach 1	12543	FW	26300.00	1026.20	1041.82	1034.95	1042.26	0.001857	5.36	4905.85	422.29	0.28
Reach 1	12350	Capital Flood Fl	26300.00	1026.00	1041.05	1034.83	1041.78	0.002965	6.91	4142.75	1171.93	0.35
Reach 1	12350	FW	26300.00	1026.00	1041.07	1034.81	1041.85	0.003099	7.08	3715.71	315.77	0.36
Reach 1	12146	Capital Flood Fl	26300.00	1025.00	1039.83	1034.35	1040.96	0.004512	8.55	3075.58	840.91	0.44
Reach 1	12146	FW	26300.00	1025.00	1039.91	1034.33	1041.03	0.004419	8.49	3097.35	259.09	0.43
Reach 1	12059.65		Bridge									
Reach 1	11957.32	Capital Flood Fl	26300.00	1025.73	1037.37	1034.06	1039.08	0.008248	10.48	2508.38	239.25	0.57
Reach 1	11957.32	FW	26300.00	1025.73	1037.59	1034.06	1039.23	0.007705	10.27	2561.94	239.25	0.55
Reach 1	11923	Capital Flood Fl	26300.00	1025.20	1037.31	1033.88	1038.96	0.007884	10.31	2550.75	241.85	0.56
Reach 1	11923	FW	26300.00	1025.20	1037.54	1033.88	1039.12	0.007358	10.09	2606.13	241.85	0.54
Reach 1	11917.82		Bridge									
Reach 1	11878.32	Capital Flood Fl	26300.00	1023.01	1036.13	1032.69	1037.65	0.007687	9.88	2663.11	653.20	0.55
Reach 1	11878.32	FW	26300.00	1023.01	1036.51	1032.68	1037.91	0.006848	9.51	2765.23	665.05	0.53
Reach 1	11845.64	Capital Flood Fl	26300.00	1023.04	1036.01	1032.49	1037.34	0.007929	9.24	2847.38	332.63	0.55
Reach 1	11845.64	FW	26300.00	1023.04	1036.42	1032.48	1037.63	0.006812	8.82	2983.00	332.63	0.52
Reach 1	11811.76	Capital Flood Fl	26400.00	1023.00	1035.17	1032.65	1036.90	0.010332	10.54	2507.83	344.44	0.63
Reach 1	11811.76	FW	26400.00	1023.00	1035.77	1032.64	1037.28	0.008277	9.85	2696.37	315.89	0.57
Reach 1	11551.18	Capital Flood Fl	26400.00	1018.25	1033.30	1030.28	1034.42	0.008260	8.47	3117.22	1049.55	0.55
Reach 1	11551.18	FW	26400.00	1018.25	1033.83	1030.60	1035.26	0.007699	9.59	2753.70	419.00	0.54
Reach 1	11242.98	Capital Flood Fl	26400.00	1017.01	1031.19	1027.79	1032.20	0.006119	8.07	3270.60	1007.08	0.49
Reach 1	11242.98	FW	26400.00	1017.01	1032.02	1028.09	1033.12	0.005736	8.38	3151.14	546.00	0.47
Reach 1	10982.86	Capital Flood Fl	26400.00	1015.00	1028.86	1026.39	1030.19	0.009153	9.25	2853.60	1121.25	0.58
Reach 1	10982.86	FW	26400.00	1015.00	1029.69	1026.96	1031.17	0.009147	9.76	2707.40	571.00	0.58
Reach 1	10738.26	Capital Flood Fl	26400.00	1012.10	1026.52	1024.67	1027.67	0.011492	8.60	3070.83	1290.94	0.63
Reach 1	10738.26	FW	26400.00	1014.61	1026.98	1025.40	1028.54	0.013169	10.02	2634.58	618.31	0.67
Reach 1	10490.82	Capital Flood Fl	26400.00	1010.07	1023.82	1022.07	1024.69	0.011605	7.48	3531.71	1442.80	0.61
Reach 1	10490.82	FW	26400.00	1012.60	1024.26	1022.83	1025.23	0.011827	7.92	3331.93	645.00	0.61
Reach 1	10351.28	Capital Flood Fl	26400.00	1011.06	1021.57	1019.83	1022.60	0.014268	8.14	3244.04	1339.60	0.67
Reach 1	10351.28	FW	26400.00	1012.53	1022.28	1020.39	1023.33	0.011647	8.21	3215.79	585.00	0.62
Reach 1	10141.82	Capital Flood Fl	26400.00	1009.00	1019.08	1017.33	1019.81	0.009739	6.85	3853.70	1089.96	0.56
Reach 1	10141.82	FW	26400.00	1009.00	1019.87	1017.99	1020.85	0.009757	7.93	3330.87	555.00	0.57
Reach 1	9931.16	Capital Flood Fl	26400.00	1006.09	1017.18		1017.78	0.008295	6.24	4227.48	915.02	0.51
Reach 1	9931.16	FW	26400.00	1006.09	1017.92		1018.75	0.008835	7.34	3594.34	630.00	0.54
Reach 1	9670.57	Capital Flood Fl	26400.00	1003.22	1015.14		1015.64	0.007171	5.67	4655.47	1042.02	0.47
Reach 1	9670.57	FW	26400.00	1003.22	1016.08		1016.66	0.006214	6.07	4346.26	776.00	0.45
Reach 1	9501.81	Capital Flood Fl	26400.00	1003.00	1013.84		1014.44	0.006272	6.20	4261.24	754.84	0.46
Reach 1	9501.81	FW	26400.00	1003.00	1014.83		1015.53	0.006378	6.69	3946.84	618.00	0.47
Reach 1	9298.99	Capital Flood Fl	26400.00	1001.00	1011.82		1012.72	0.010831	7.63	3458.05	674.72	0.59
Reach 1	9298.99	FW	26400.00	1001.00	1012.67		1013.75	0.011458	8.33	3169.24	549.00	0.61
Reach 1	9042.81	Capital Flood Fl	26400.00	998.00	1009.32		1010.00	0.010022	6.62	3985.24	909.37	0.56
Reach 1	9042.81	FW	26400.00	998.00	1010.17		1011.00	0.009570	7.32	3607.77	677.00	0.56
Reach 1	8724.84	Capital Flood Fl	26400.00	997.00	1006.28		1006.79	0.009918	5.74	4597.26	1290.32	0.54
Reach 1	8724.84	FW	26400.00	997.00	1007.28		1007.92	0.009458	6.46	4089.47	919.00	0.54
Reach 1	8396.13	Capital Flood Fl	26400.00	995.00	1003.29		1003.69	0.007308	5.11	5167.20	1376.34	0.46
Reach 1	8396.13	FW	26400.00	995.00	1004.01		1004.62	0.008735	6.28	4203.12	931.00	0.52

HEC-RAS Plan: Exist River: Castaic Creek Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	8049.79	Capital Flood Fl	26400.00	993.00	1001.92		1002.17	0.003023	4.04	6538.19	1279.06	0.31
Reach 1	8049.79	FW	26400.00	993.00	1002.40		1002.76	0.003691	4.85	5440.30	925.00	0.35
Reach 1	7688.71	Capital Flood Fl	26400.00	992.00	1001.21		1001.41	0.001876	3.57	7388.85	1212.09	0.26
Reach 1	7688.71	FW	26400.00	992.00	1001.65		1001.92	0.001878	4.19	6305.99	800.00	0.26
Reach 1	7326.46	Capital Flood Fl	26400.00	989.00	1000.18	995.63	1000.49	0.003617	4.64	6136.86	1361.03	0.35
Reach 1	7326.46	FW	26400.00	989.00	1000.65	995.65	1001.12	0.002595	5.49	4807.26	515.00	0.32
Reach 1	6966.68	Capital Flood Fl	26400.00	986.01	999.15	994.71	999.38	0.002284	3.80	6954.62	1209.34	0.28
Reach 1	6966.68	FW	26400.00	986.01	999.67	994.62	1000.13	0.002557	5.43	4866.13	525.00	0.31
Reach 1	6623.5	Capital Flood Fl	26400.00	984.09	997.92	993.59	998.31	0.003605	5.02	5256.13	840.48	0.35
Reach 1	6623.5	FW	26400.00	984.09	998.47	993.31	999.07	0.003088	6.23	4236.12	425.00	0.35
Reach 1	6304.52	Capital Flood Fl	26400.00	983.01	996.96	991.13	997.27	0.002775	4.46	5917.97	932.22	0.31
Reach 1	6304.52	FW	26400.00	983.01	997.74	991.15	998.23	0.002076	5.64	4683.39	400.00	0.29
Reach 1	6087.88	Capital Flood Fl	26400.00	982.00	996.50	989.74	996.79	0.001308	4.46	6600.36	837.76	0.24
Reach 1	6087.88	FW	26400.00	982.00	997.28	989.88	997.73	0.001732	5.36	4922.44	390.00	0.27
Reach 1	5781.35	Capital Flood Fl	31100.00	982.00	995.91		996.37	0.003094	5.46	5700.17	720.90	0.34
Reach 1	5781.35	FW	31100.00	982.00	996.48		997.21	0.003453	6.84	4545.76	430.00	0.37
Reach 1	5629.45	Capital Flood Fl	31100.00	982.03	995.15	990.95	995.86	0.004102	6.75	4608.76	604.52	0.40
Reach 1	5629.45	FW	31100.00	982.03	995.95	991.10	996.71	0.003787	7.02	4431.95	430.00	0.39
Reach 1	5557.68	Capital Flood Fl	31100.00	982.00	994.39	989.91	995.33	0.004743	7.75	4012.22	509.06	0.44
Reach 1	5557.68	FW	31100.00	982.00	994.90	990.53	996.13	0.005719	8.91	3491.32	315.00	0.47
Reach 1	5500		Bridge									
Reach 1	5453.98	Capital Flood Fl	31100.00	980.08	993.77		994.44	0.003627	6.54	4753.01	516.03	0.38
Reach 1	5453.98	FW	31100.00	980.08	994.30		995.04	0.003380	6.86	4532.49	428.00	0.37
Reach 1	5434.68	Capital Flood Fl	31100.00	980.00	993.72		994.35	0.003251	6.32	4920.45	521.84	0.36
Reach 1	5434.68	FW	31100.00	980.00	994.30		994.92	0.002848	6.33	4910.20	452.15	0.34
Reach 1	5340.04	Capital Flood Fl	31100.00	979.08	992.53		993.68	0.008042	8.58	3624.42	473.83	0.55
Reach 1	5340.04	FW	31100.00	979.08	993.44		994.41	0.005647	7.89	3942.13	440.38	0.46
Reach 1	5060.55	Capital Flood Fl	31100.00	977.01	990.34		991.47	0.008103	8.54	3639.99	480.82	0.55
Reach 1	5060.55	FW	31100.00	977.01	990.59		992.25	0.010930	10.34	3007.98	360.00	0.63
Reach 1	4899.94	Capital Flood Fl	31100.00	975.04	989.37		990.33	0.005943	7.88	3948.14	466.52	0.48
Reach 1	4899.94	FW	31100.00	975.04	989.56		990.76	0.006939	8.79	3538.06	385.00	0.51
Reach 1	4571.63	Capital Flood Fl	31100.00	973.03	987.92		988.78	0.004273	7.40	4201.15	424.98	0.42
Reach 1	4571.63	FW	31100.00	973.03	988.30		989.11	0.003812	7.23	4299.50	405.00	0.39
Reach 1	4220.87	Capital Flood Fl	31100.00	971.03	985.46		986.73	0.008016	9.04	3441.18	413.64	0.55
Reach 1	4220.87	FW	31100.00	971.03	985.91		987.23	0.007556	9.22	3372.70	365.00	0.53
Reach 1	3865.39	Capital Flood Fl	31100.00	970.00	982.51		983.78	0.008487	9.02	3446.43	434.13	0.56
Reach 1	3865.39	FW	31100.00	970.00	982.88		984.31	0.008796	9.60	3239.90	370.00	0.57
Reach 1	3579.81	Capital Flood Fl	31100.00	967.00	980.32		981.46	0.007431	8.59	3622.59	444.01	0.53
Reach 1	3579.81	FW	31100.00	967.00	980.56		981.86	0.007985	9.13	3407.69	390.00	0.54
Reach 1	3289.64	Capital Flood Fl	31100.00	965.00	978.28		979.36	0.006966	8.34	3730.23	455.54	0.51
Reach 1	3289.64	FW	31100.00	965.00	978.93		979.86	0.005429	7.73	4022.70	454.20	0.46
Reach 1	2974.88	Capital Flood Fl	31200.00	963.00	973.62	973.12	975.57	0.023266	11.21	2782.99	540.80	0.87
Reach 1	2974.88	FW	31200.00	963.00	974.59		976.76	0.019712	11.82	2640.58	410.00	0.82
Reach 1	2627.11	Capital Flood Fl	31200.00	961.00	972.35		972.74	0.003153	5.01	6225.07	912.68	0.34
Reach 1	2627.11	FW	31200.00	961.00	972.80		973.44	0.004450	6.42	4857.86	620.00	0.40
Reach 1	2307.93	Capital Flood Fl	31200.00	959.06	970.40	968.39	971.19	0.008189	7.10	4394.81	776.86	0.53
Reach 1	2307.93	FW	31200.00	959.06	970.87		971.68	0.007025	7.22	4321.81	655.00	0.50
Reach 1	1981.79	Capital Flood Fl	31200.00	958.04	967.36	965.21	968.36	0.009101	8.04	3878.27	615.74	0.57
Reach 1	1981.79	FW	31200.00	958.04	967.82	965.48	969.06	0.009099	8.91	3502.78	465.00	0.57

PACE
Advanced Water Engineering

Appendix C – HEC-RAS Proposed Condition Results


Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 13371
.06
.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 13141
.06
.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 12937
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 12730
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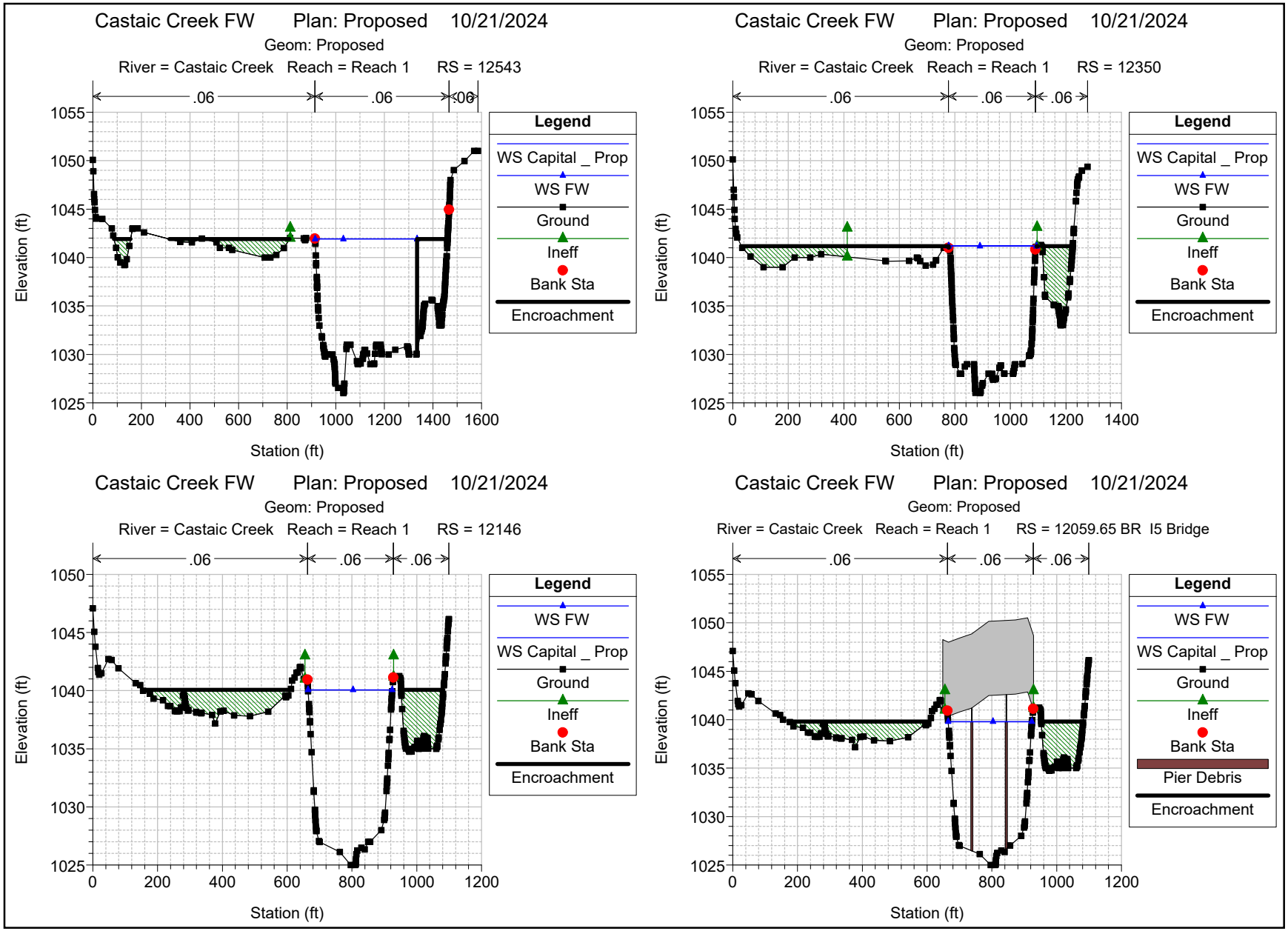
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Levee
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 12543
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.06
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Elevation (ft)
Station (ft)
Legend
WS Capital _ Prop
WS FW
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 12350
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Capital _ Prop
WS FW
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 12146
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 12059.65 BR I5 Bridge
.06
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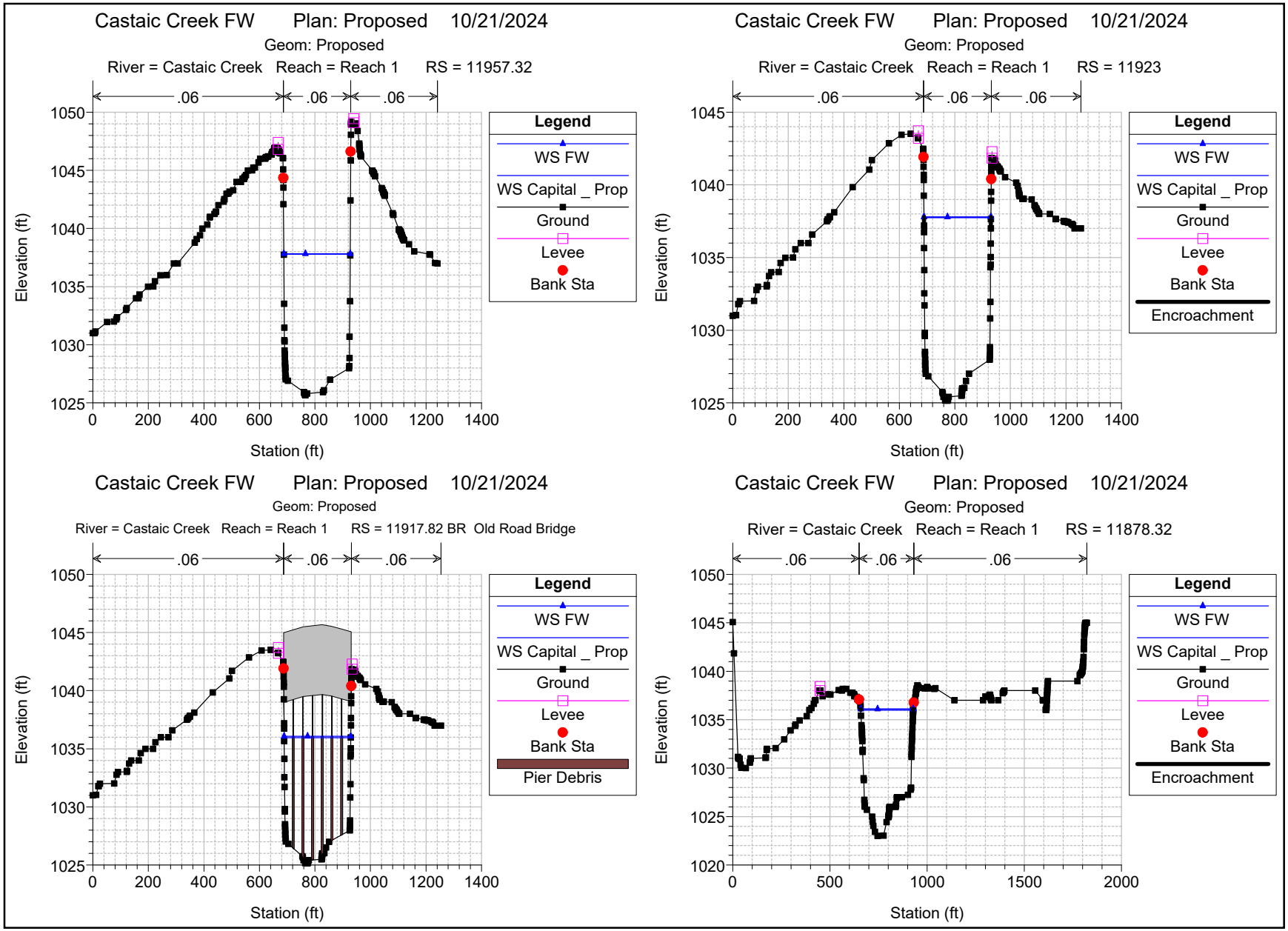
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Pier Debris
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11957.32
.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Levee
Bank Sta
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11923
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Levee
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11917.82 BR Old Road Bridge
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Levee
Bank Sta
Pier Debris
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11878.32
.06
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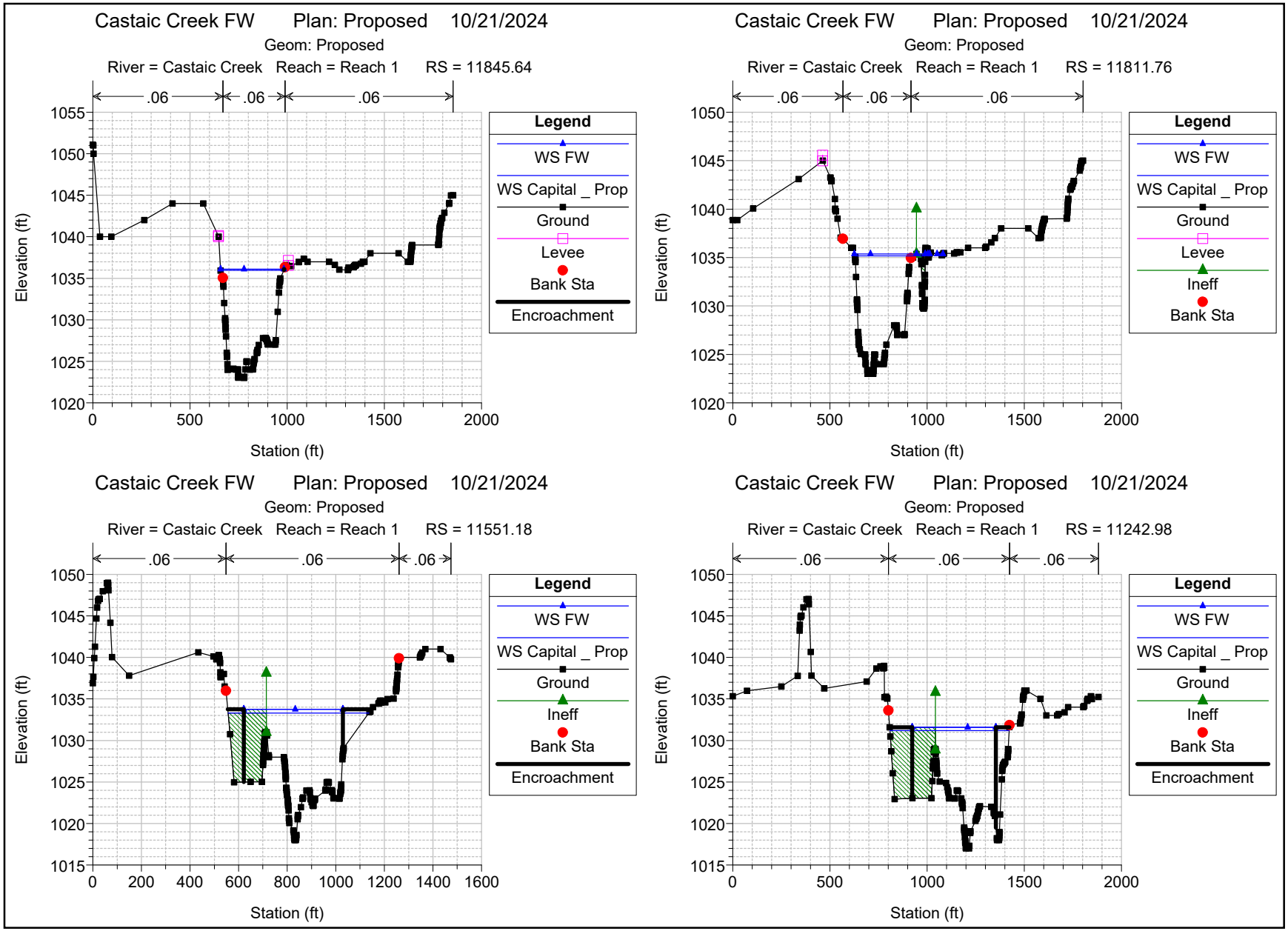
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Levee
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11845.64
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.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Levee
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11811.76
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Levee
Ineff
Bank Sta
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11551.18
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 11242.98
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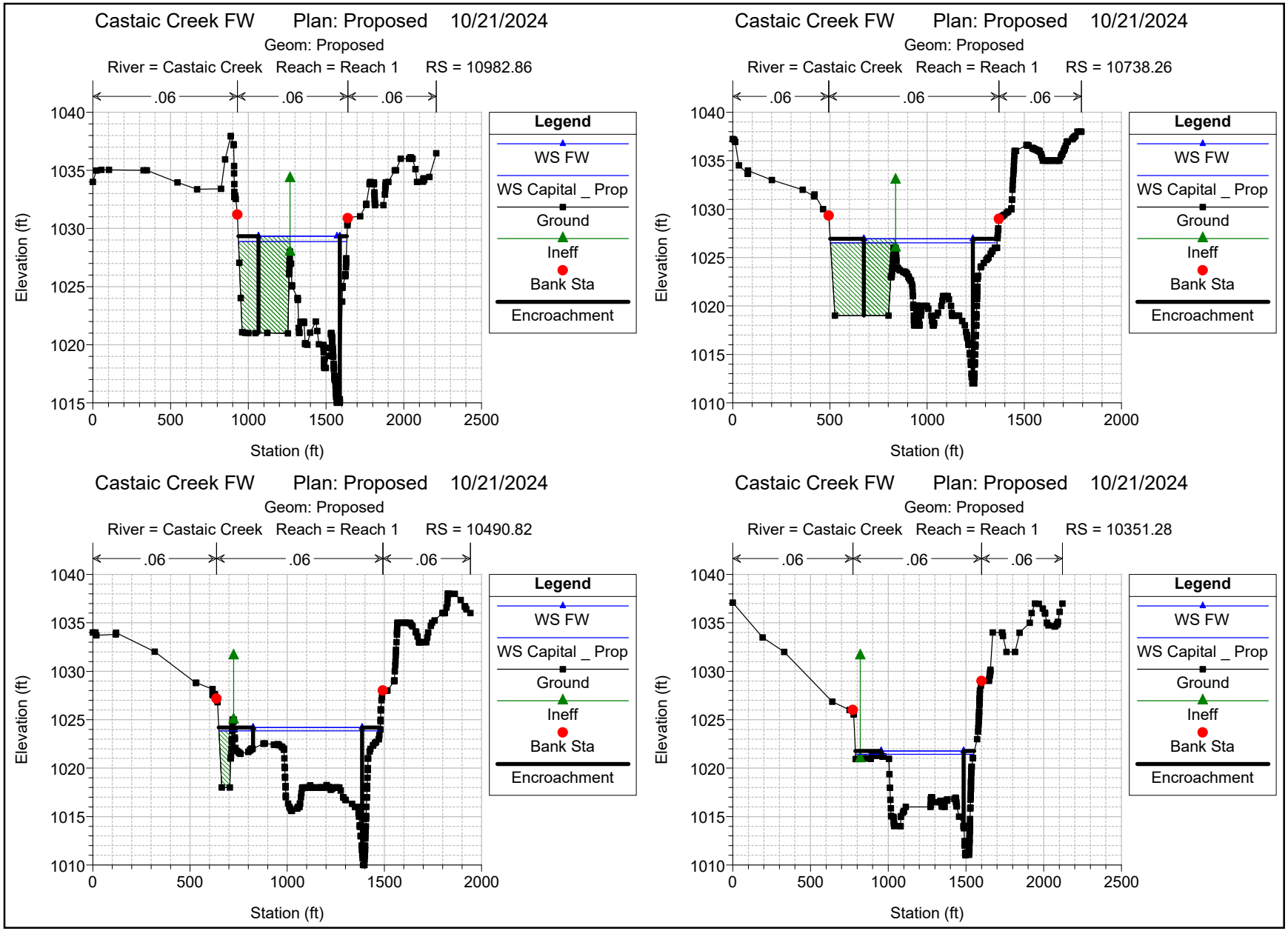
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 10982.86
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.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 10738.26
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 10490.82
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 10351.28
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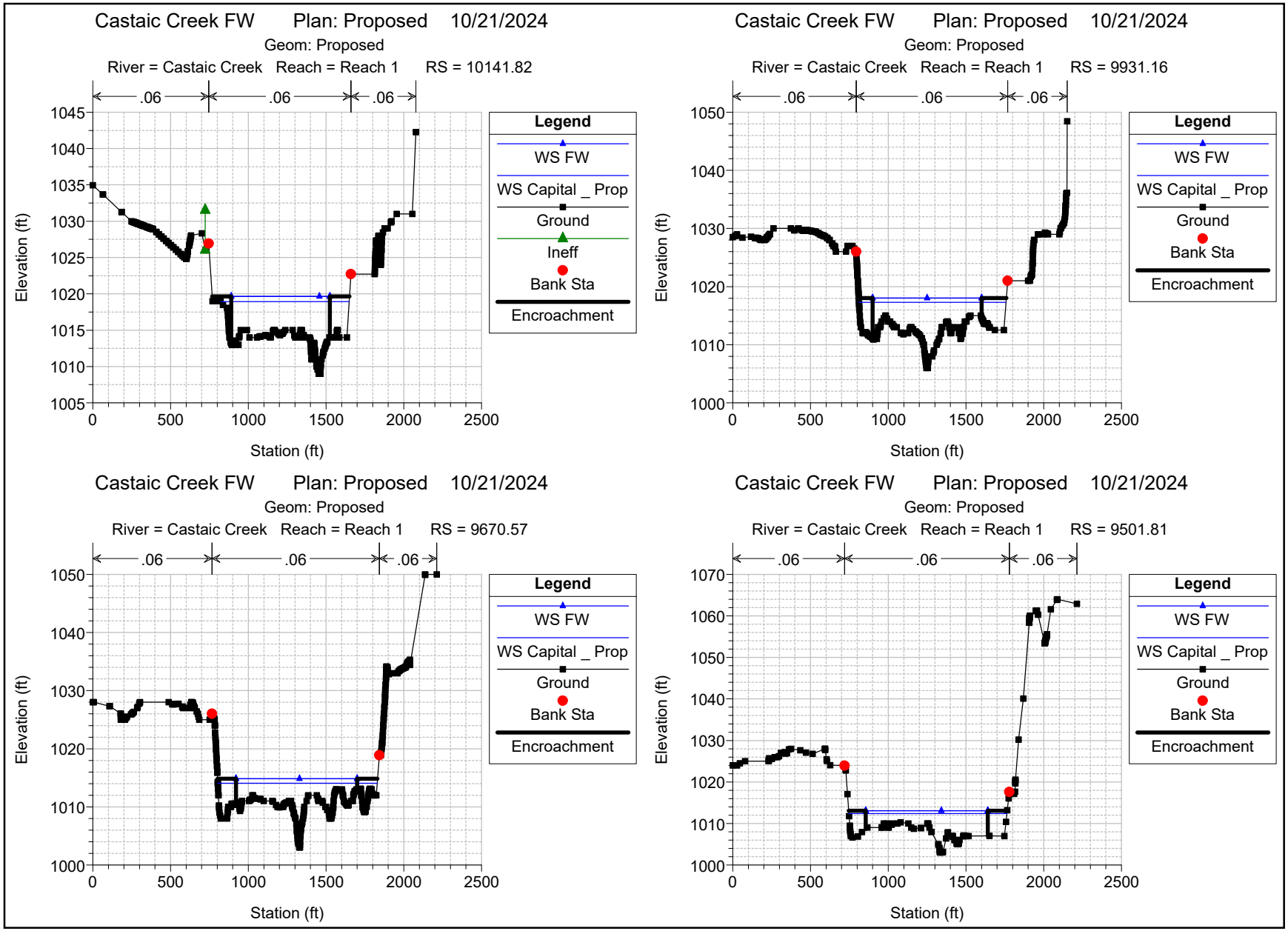
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 10141.82
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.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 9931.16
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
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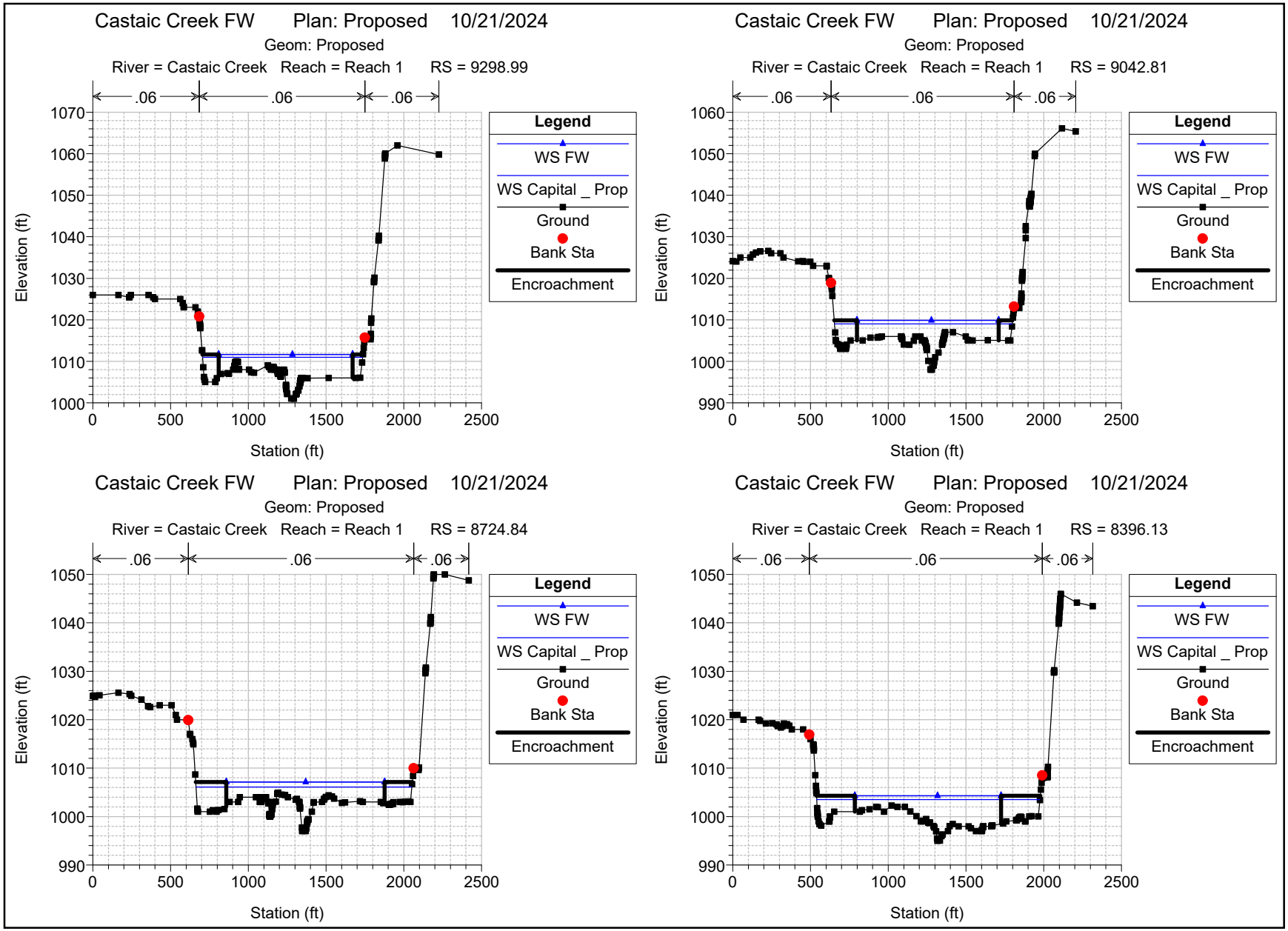
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 9501.81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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 9298.99
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.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 9042.81
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 8724.84
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 8396.13
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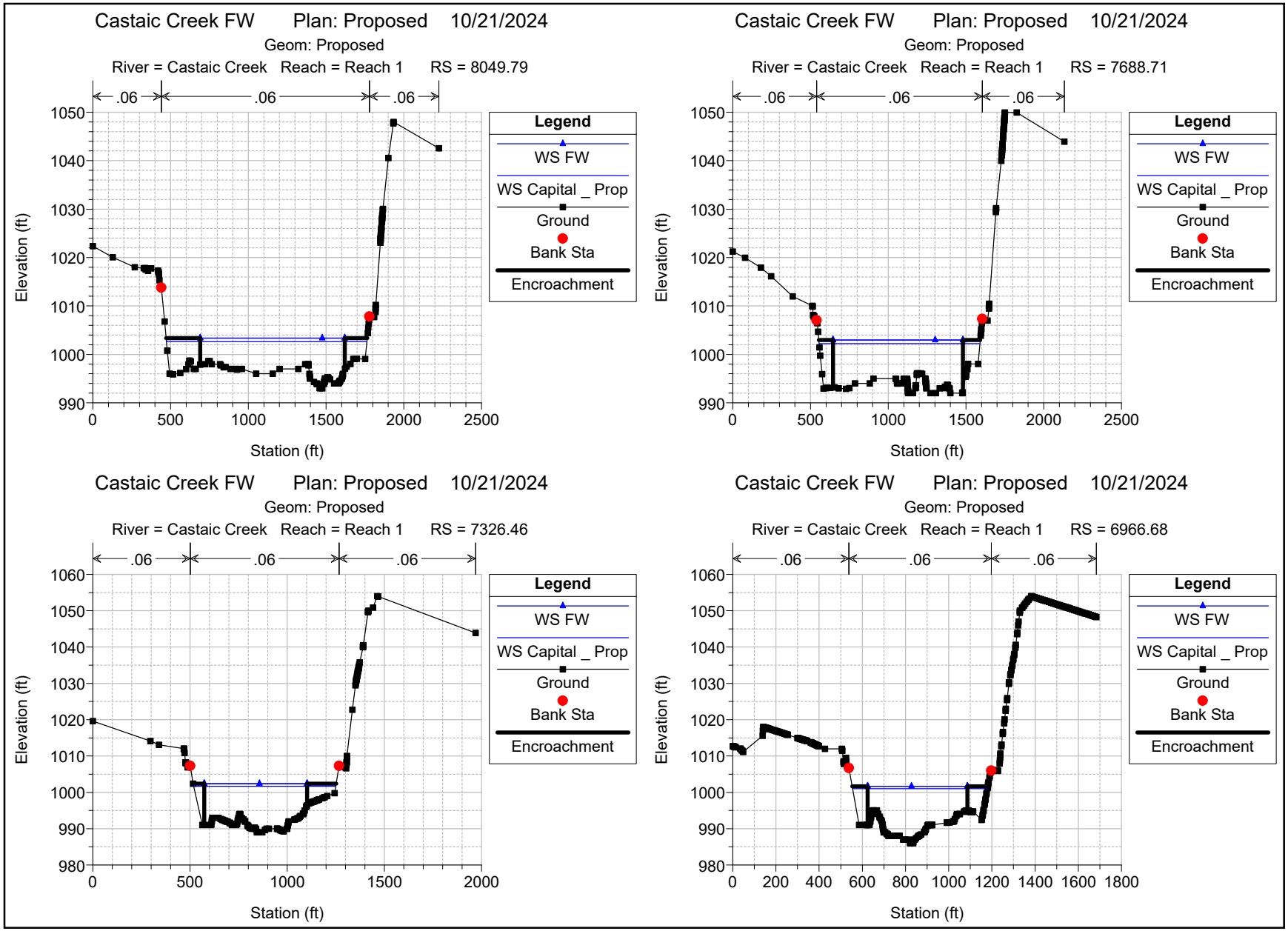
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 8049.79
.06
.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 7688.71
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 7326.46
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 6966.68
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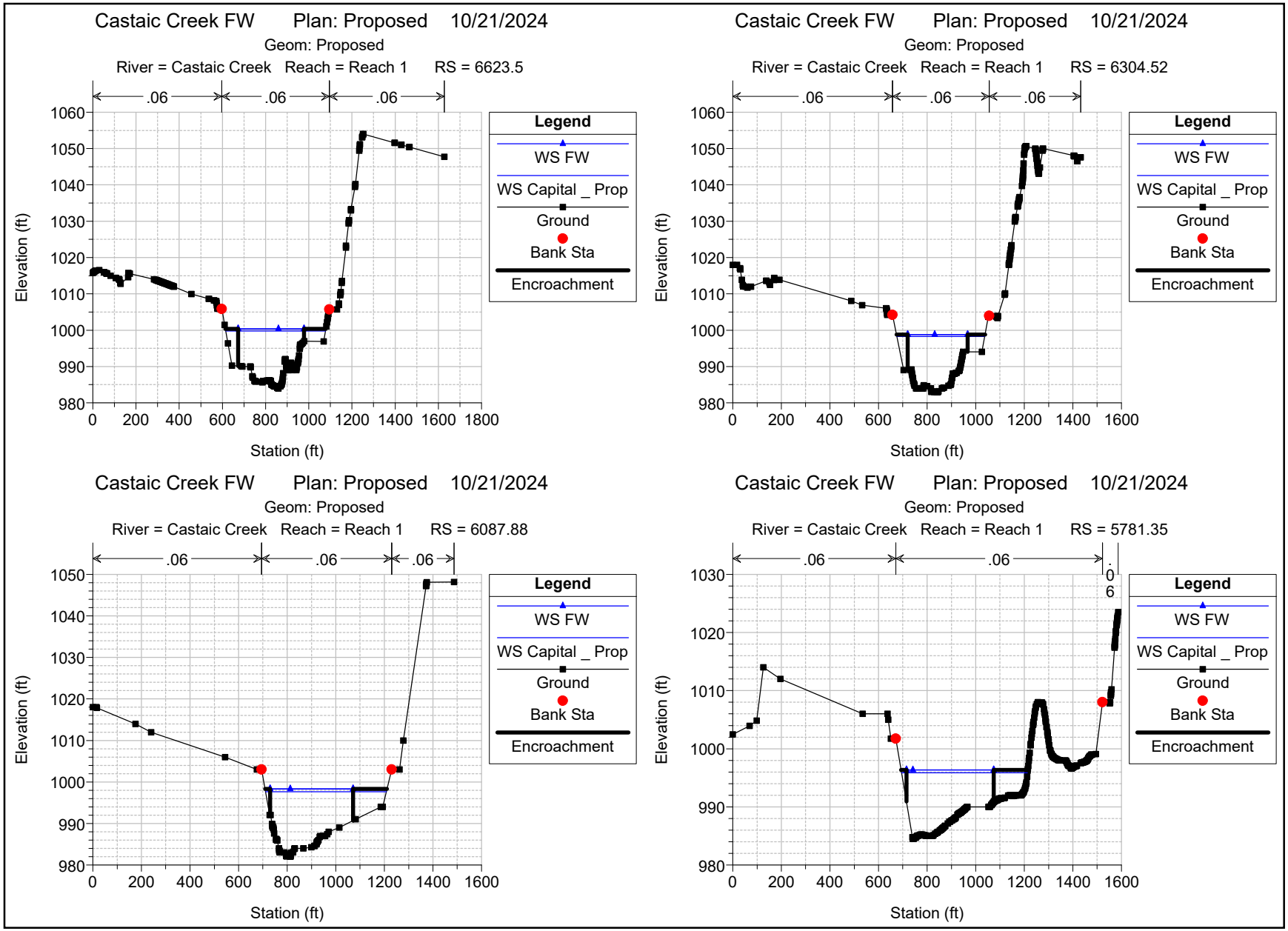
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 6623.5
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 6304.52
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 6087.88
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5781.35
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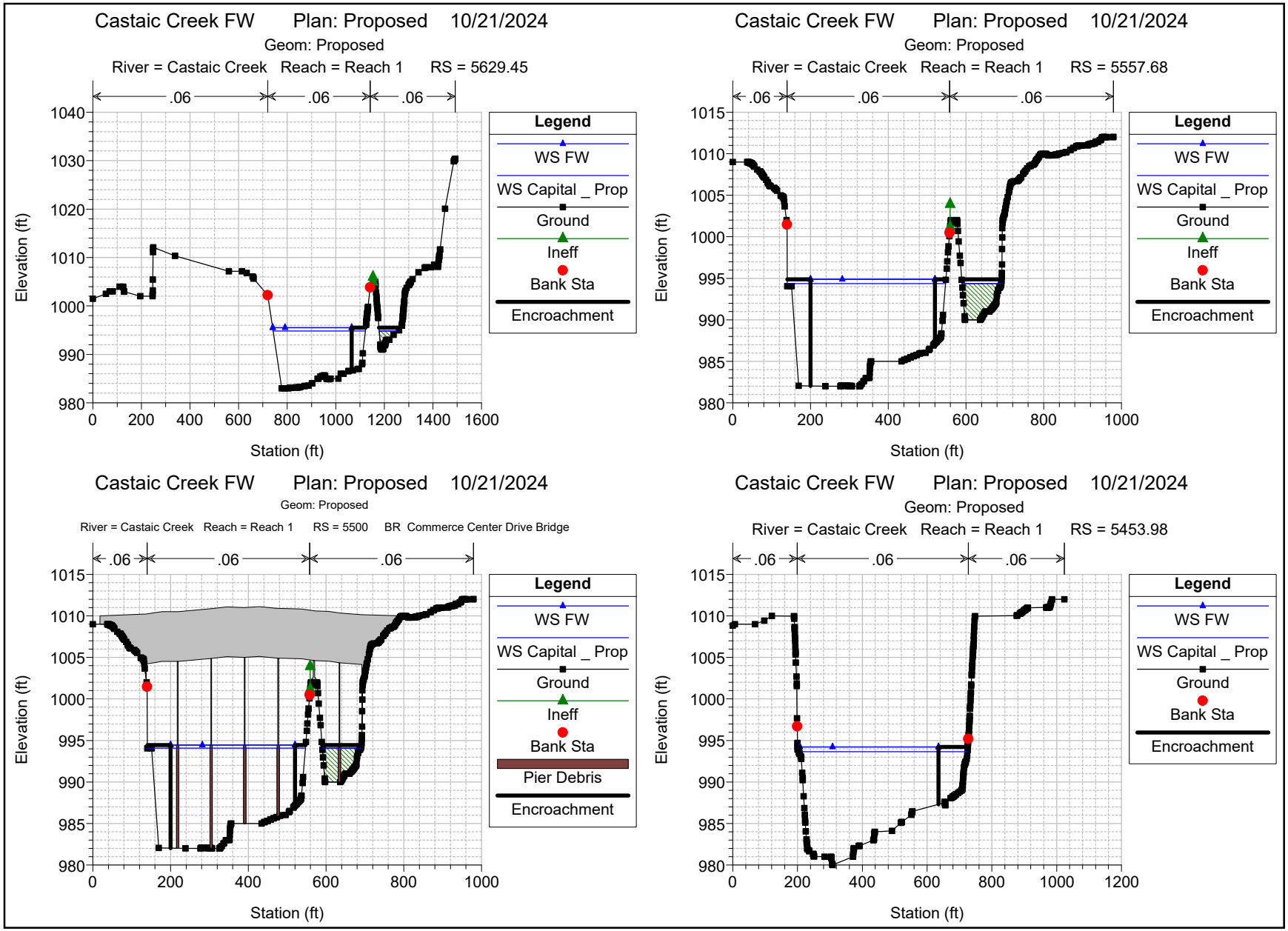
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5629.45
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5557.68
.06 .06 .06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5500 BR Commerce Center Drive Bridge
.06 .06 .06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Ineff
Bank Sta
Pier Debris
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5453.98
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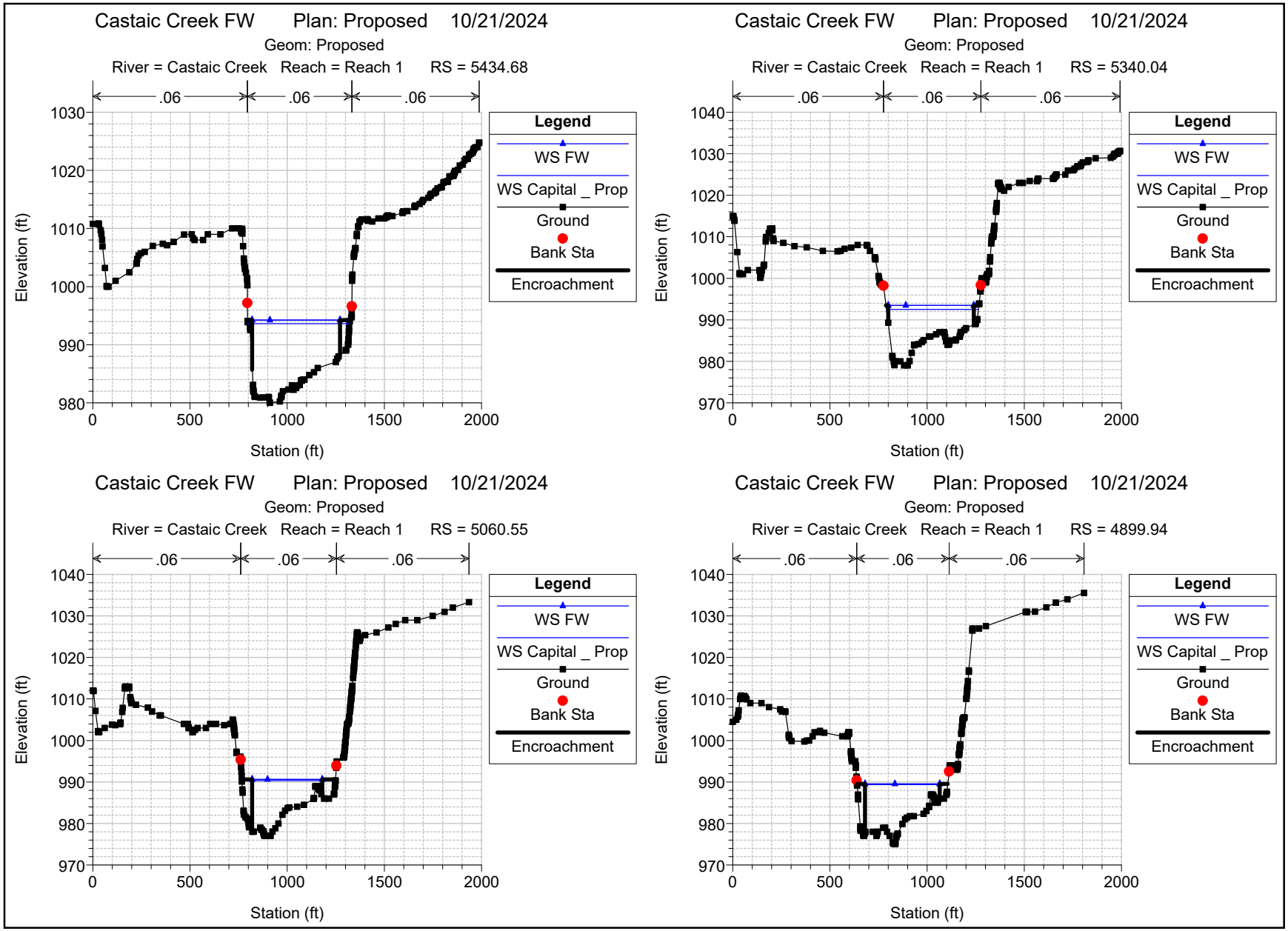
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5434.68
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5340.04
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 5060.55
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 4899.94
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.06
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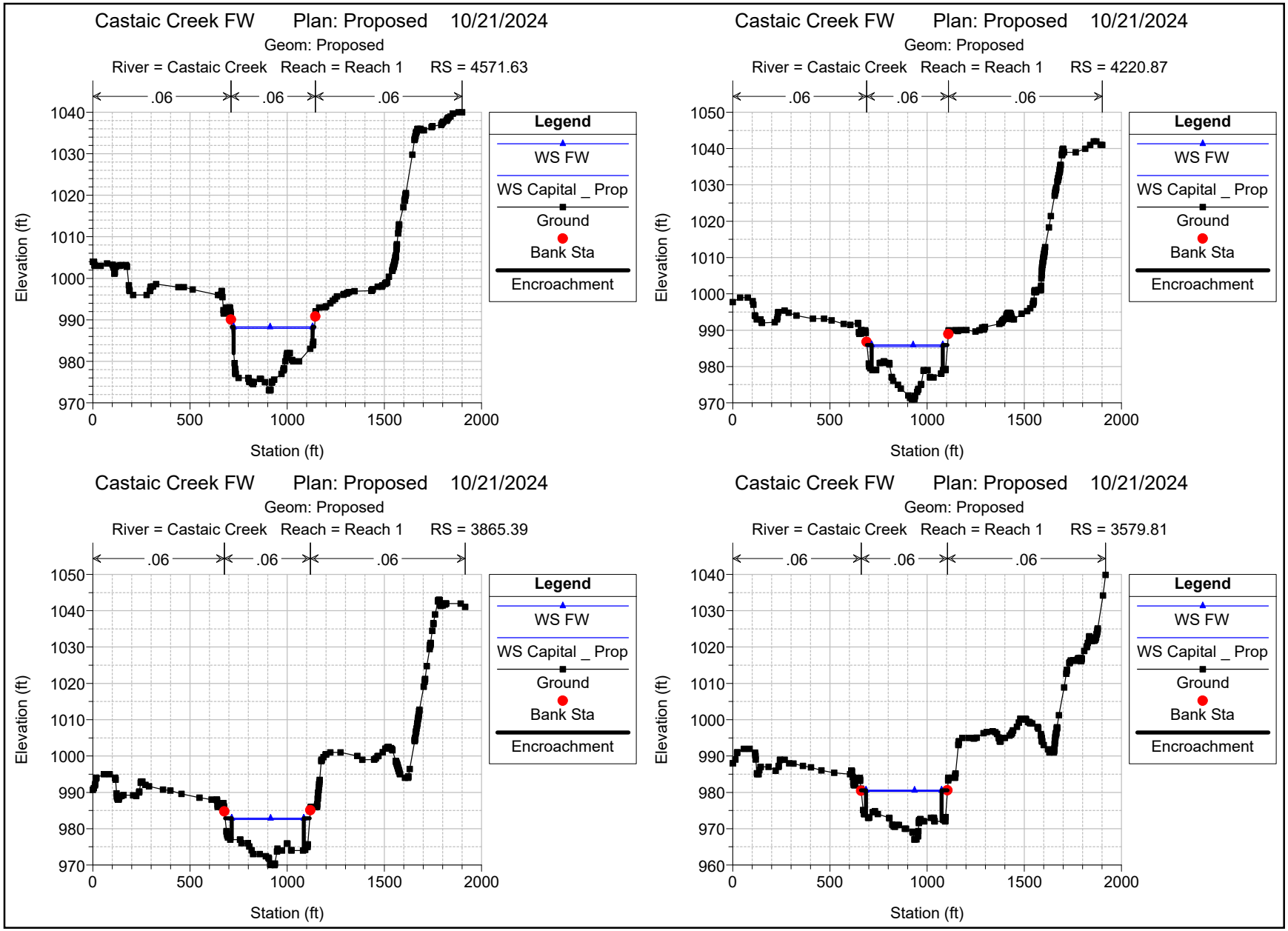
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 4571.63
.06
.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 4220.87
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 3865.39
.06
.06
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 3579.81
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.06
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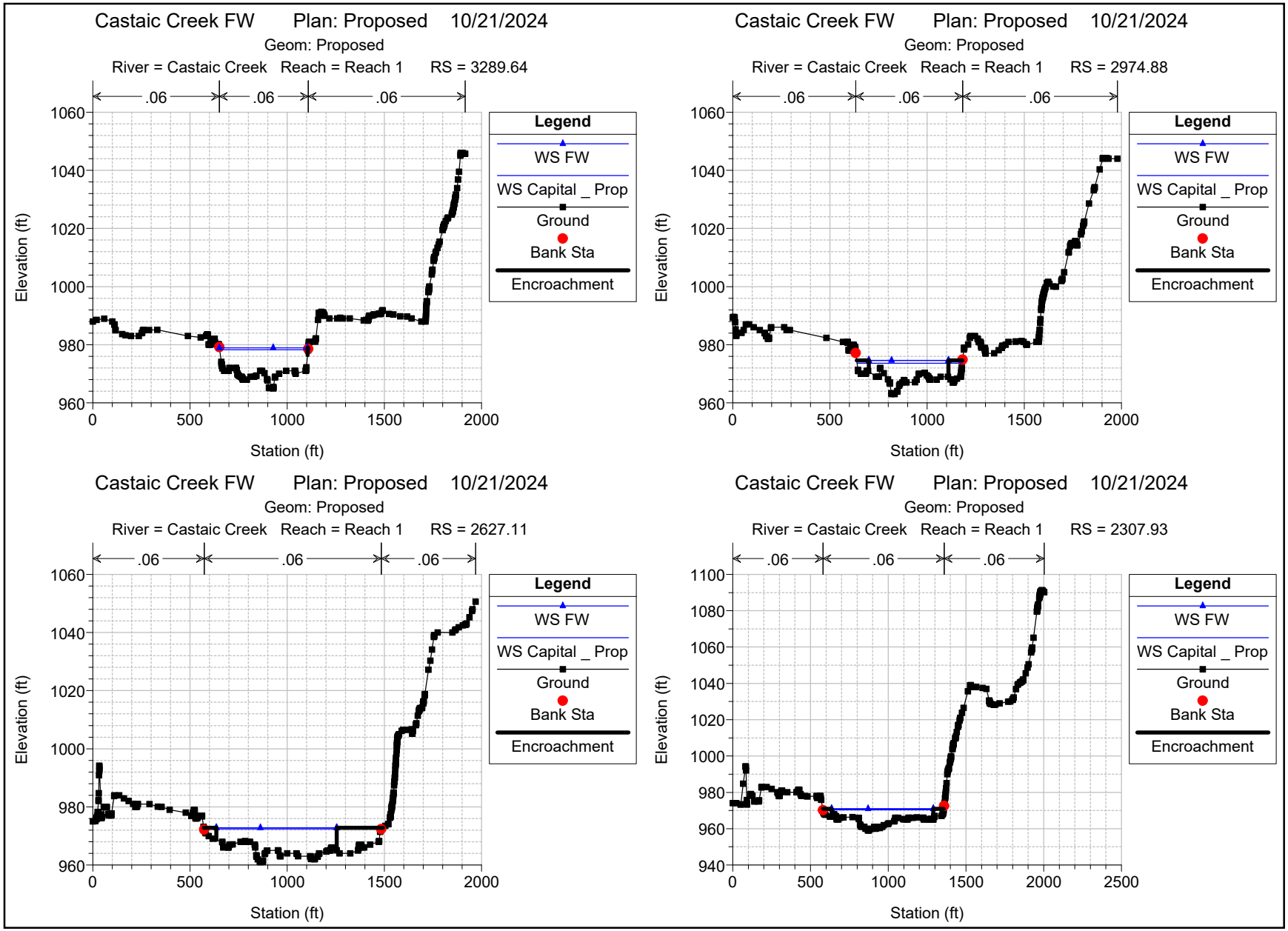
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment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Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 3289.64
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 2974.88
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 2627.11
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment
Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 2307.93
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.06
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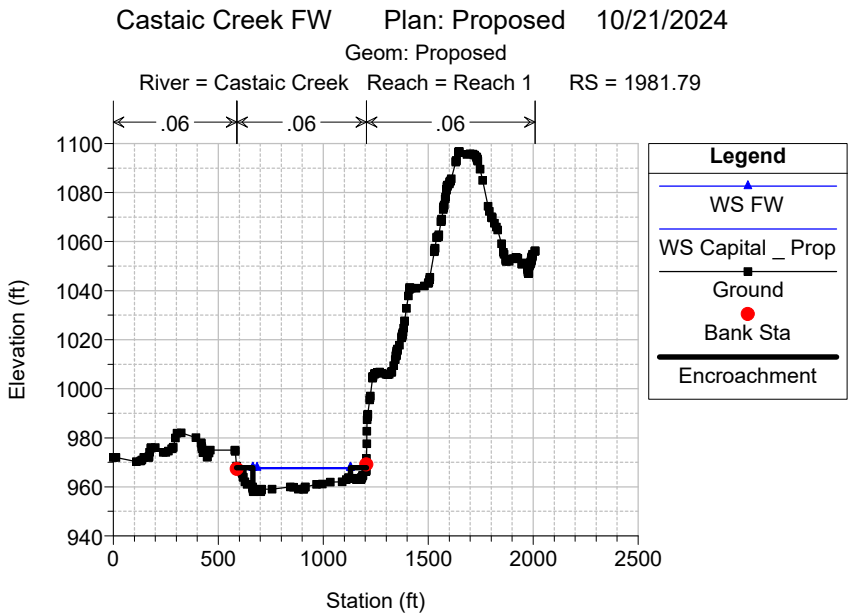
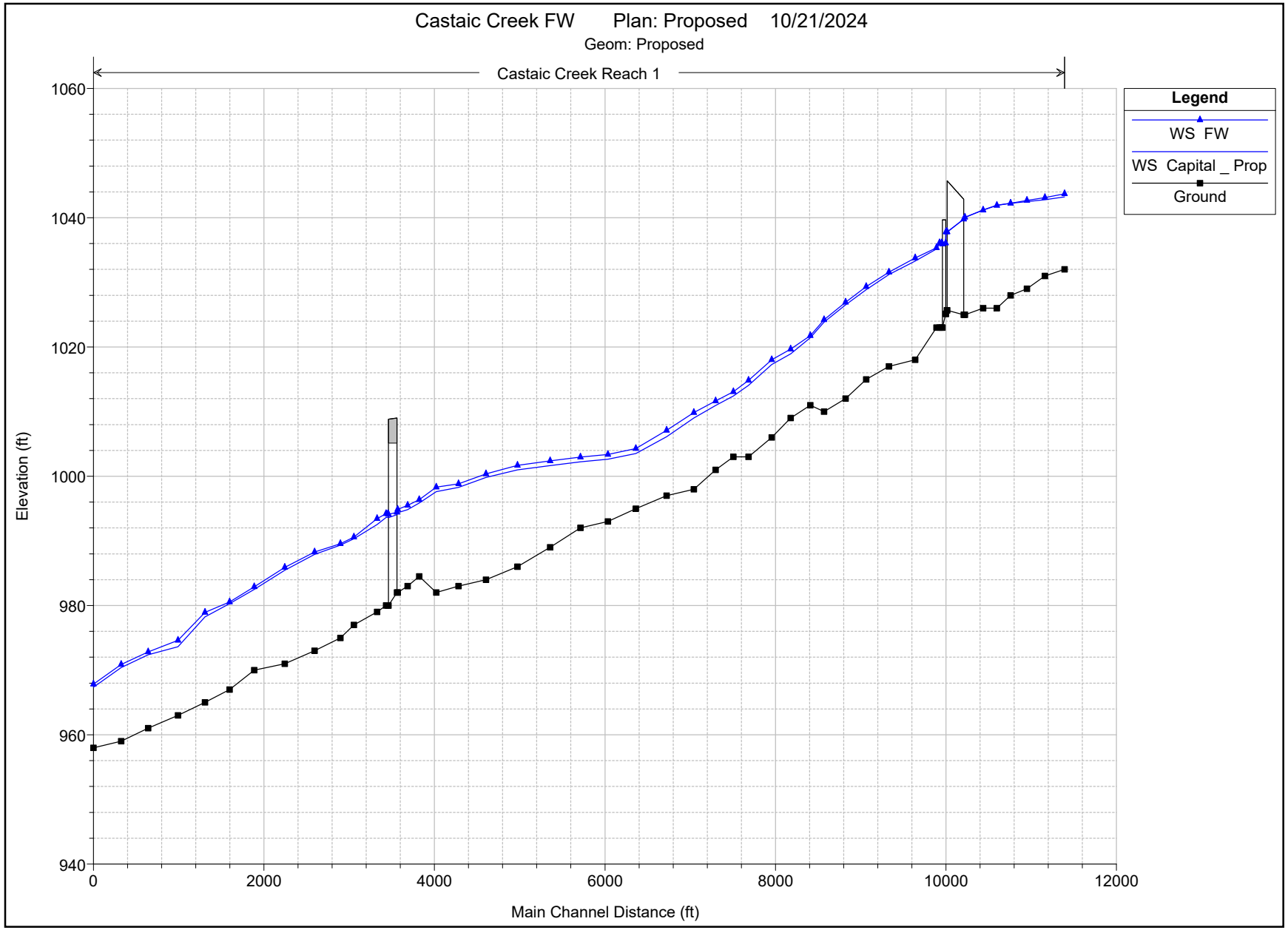
Elevation (ft)
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment


Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
River = Castaic Creek Reach = Reach 1 RS = 1981.79
.06
.06
.06
Elevation (ft)
1100
1080
1060
1040
1020
1000
980
960
940
0
500
1000
1500
2000
2500
Station (ft)
Legend
WS FW
WS Capital _ Prop
Ground
Bank Sta
Encroachment


Castaic Creek FW Plan: Proposed 10/21/2024
Geom: Proposed
Castaic Creek Reach 1
Legend
WS FW
WS Capital _ Prop
Ground
Elevation (ft)
1060
1040
1020
1000
980
960
940
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)

HEC-RAS Plan: Proposed River: Castaic Creek Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	13371	Capital _ Prop	26300.00	1032.00	1043.24		1043.58	0.003127	4.83	5790.46	1175.08	0.33
Reach 1	13371	FW	26300.00	1032.00	1043.72		1044.24	0.003911	5.79	4541.04	615.00	0.38
Reach 1	13141	Capital _ Prop	26300.00	1031.00	1042.78	1038.42	1043.02	0.001785	4.01	6865.69	1155.53	0.26
Reach 1	13141	FW	26300.00	1031.00	1043.10	1038.52	1043.49	0.002484	4.99	5270.66	630.00	0.30
Reach 1	12937	Capital _ Prop	26300.00	1029.00	1042.50	1036.93	1042.70	0.001220	3.75	7632.84	1168.65	0.22
Reach 1	12937	FW	26300.00	1029.02	1042.67	1037.31	1043.01	0.001967	4.72	5568.11	600.00	0.27
Reach 1	12730	Capital _ Prop	26300.00	1028.00	1042.23	1035.80	1042.47	0.001172	4.02	6968.77	829.48	0.22
Reach 1	12730	FW	26300.00	1028.00	1042.25	1035.98	1042.64	0.001840	5.03	5228.47	485.00	0.27
Reach 1	12543	Capital _ Prop	26300.00	1026.00	1041.94	1034.87	1042.26	0.001400	4.48	5873.80	1117.55	0.24
Reach 1	12543	FW	26300.00	1026.00	1041.91	1034.93	1042.35	0.001800	5.31	4954.98	420.32	0.27
Reach 1	12350	Capital _ Prop	26300.00	1026.01	1041.22	1034.82	1041.91	0.002807	6.77	4273.94	1185.39	0.34
Reach 1	12350	FW	26300.00	1026.01	1041.18	1034.80	1041.95	0.003023	7.01	3750.28	316.99	0.36
Reach 1	12146	Capital _ Prop	26300.00	1025.00	1040.04	1034.35	1041.14	0.004257	8.39	3136.53	846.39	0.43
Reach 1	12146	FW	26300.00	1025.00	1040.06	1034.33	1041.15	0.004235	8.37	3141.95	259.84	0.42
Reach 1	12059.65		Bridge									
Reach 1	11957.32	Capital _ Prop	26300.00	1025.66	1037.78	1033.94	1039.33	0.007164	10.00	2631.18	238.93	0.53
Reach 1	11957.32	FW	26300.00	1025.66	1037.82	1033.94	1039.36	0.007068	9.95	2642.32	238.96	0.53
Reach 1	11923	Capital _ Prop	26300.00	1025.14	1037.74	1033.79	1039.24	0.006841	9.83	2676.41	241.20	0.52
Reach 1	11923	FW	26300.00	1025.14	1037.79	1033.79	1039.28	0.006747	9.79	2687.48	240.60	0.52
Reach 1	11917.82		Bridge									
Reach 1	11878.32	Capital _ Prop	26300.00	1023.00	1035.98	1032.61	1037.52	0.007874	9.94	2646.82	269.46	0.56
Reach 1	11878.32	FW	26300.00	1023.00	1036.11	1032.60	1037.61	0.007550	9.81	2681.70	269.55	0.55
Reach 1	11845.64	Capital _ Prop	26300.00	1023.00	1035.97	1032.21	1037.24	0.006936	9.04	2914.19	324.94	0.52
Reach 1	11845.64	FW	26300.00	1023.00	1036.10	1032.23	1037.34	0.006618	8.91	2958.56	325.61	0.51
Reach 1	11811.76	Capital _ Prop	26400.00	1023.00	1035.16	1032.63	1036.89	0.010387	10.56	2503.15	346.22	0.63
Reach 1	11811.76	FW	26400.00	1023.00	1035.36	1032.63	1037.01	0.009745	10.32	2564.39	402.47	0.61
Reach 1	11551.18	Capital _ Prop	26400.00	1018.01	1033.30	1030.28	1034.41	0.008214	8.46	3120.39	579.56	0.55
Reach 1	11551.18	FW	26400.00	1018.01	1033.76	1030.13	1034.94	0.006308	8.72	3027.59	408.00	0.50
Reach 1	11242.98	Capital _ Prop	26400.00	1017.00	1031.19	1027.78	1032.20	0.006100	8.06	3274.82	614.54	0.48
Reach 1	11242.98	FW	26400.00	1017.00	1031.59	1028.25	1032.86	0.007132	9.04	2921.78	431.00	0.52
Reach 1	10982.86	Capital _ Prop	26400.00	1015.00	1028.87	1026.40	1030.19	0.009173	9.24	2856.20	696.42	0.58
Reach 1	10982.86	FW	26400.00	1015.00	1029.33	1026.55	1030.73	0.008833	9.49	2780.96	523.00	0.57
Reach 1	10738.26	Capital _ Prop	26400.00	1012.00	1026.52	1024.67	1027.67	0.011593	8.60	3068.34	858.32	0.63
Reach 1	10738.26	FW	26400.00	1012.00	1026.94	1025.04	1028.32	0.011366	9.43	2800.82	560.00	0.63
Reach 1	10490.82	Capital _ Prop	26400.00	1010.00	1023.86	1021.97	1024.71	0.011268	7.40	3566.78	816.96	0.60
Reach 1	10490.82	FW	26400.00	1011.45	1024.20	1022.71	1025.30	0.012029	8.41	3140.57	560.00	0.63
Reach 1	10351.28	Capital _ Prop	26400.00	1011.00	1021.43	1019.83	1022.51	0.016302	8.36	3157.37	760.35	0.71
Reach 1	10351.28	FW	26400.00	1013.97	1021.76	1020.43	1023.09	0.015228	9.26	2850.18	530.00	0.70
Reach 1	10141.82	Capital _ Prop	26400.00	1009.00	1018.92	1017.20	1019.62	0.009186	6.71	3935.60	824.69	0.54
Reach 1	10141.82	FW	26400.00	1009.00	1019.66	1017.58	1020.44	0.007965	7.09	3725.93	635.00	0.52
Reach 1	9931.16	Capital _ Prop	26400.00	1006.00	1017.29		1017.82	0.006951	5.84	4519.95	946.15	0.47
Reach 1	9931.16	FW	26400.00	1006.00	1018.01		1018.71	0.007545	6.72	3930.85	700.00	0.50
Reach 1	9670.57	Capital _ Prop	26400.00	1003.00	1014.06		1014.92	0.017455	7.45	3543.12	1024.81	0.71
Reach 1	9670.57	FW	26400.00	1003.00	1014.84		1015.82	0.015298	7.97	3313.30	780.00	0.68
Reach 1	9501.81	Capital _ Prop	26400.00	1003.00	1012.41		1012.92	0.007212	5.74	4597.90	1016.05	0.48
Reach 1	9501.81	FW	26400.00	1003.00	1013.09		1013.77	0.008335	6.62	3989.25	785.00	0.52
Reach 1	9298.99	Capital _ Prop	26400.00	1001.00	1010.94		1011.43	0.006976	5.65	4669.14	1029.16	0.47
Reach 1	9298.99	FW	26400.00	1001.00	1011.64		1012.19	0.006656	5.96	4426.44	860.00	0.46
Reach 1	9042.81	Capital _ Prop	26400.00	998.00	1009.02		1009.52	0.008065	5.67	4660.10	1142.88	0.49
Reach 1	9042.81	FW	26400.00	998.00	1009.86		1010.42	0.007236	5.98	4412.74	910.83	0.48

HEC-RAS Plan: Proposed River: Castaic Creek Reach: Reach 1 (Continued)

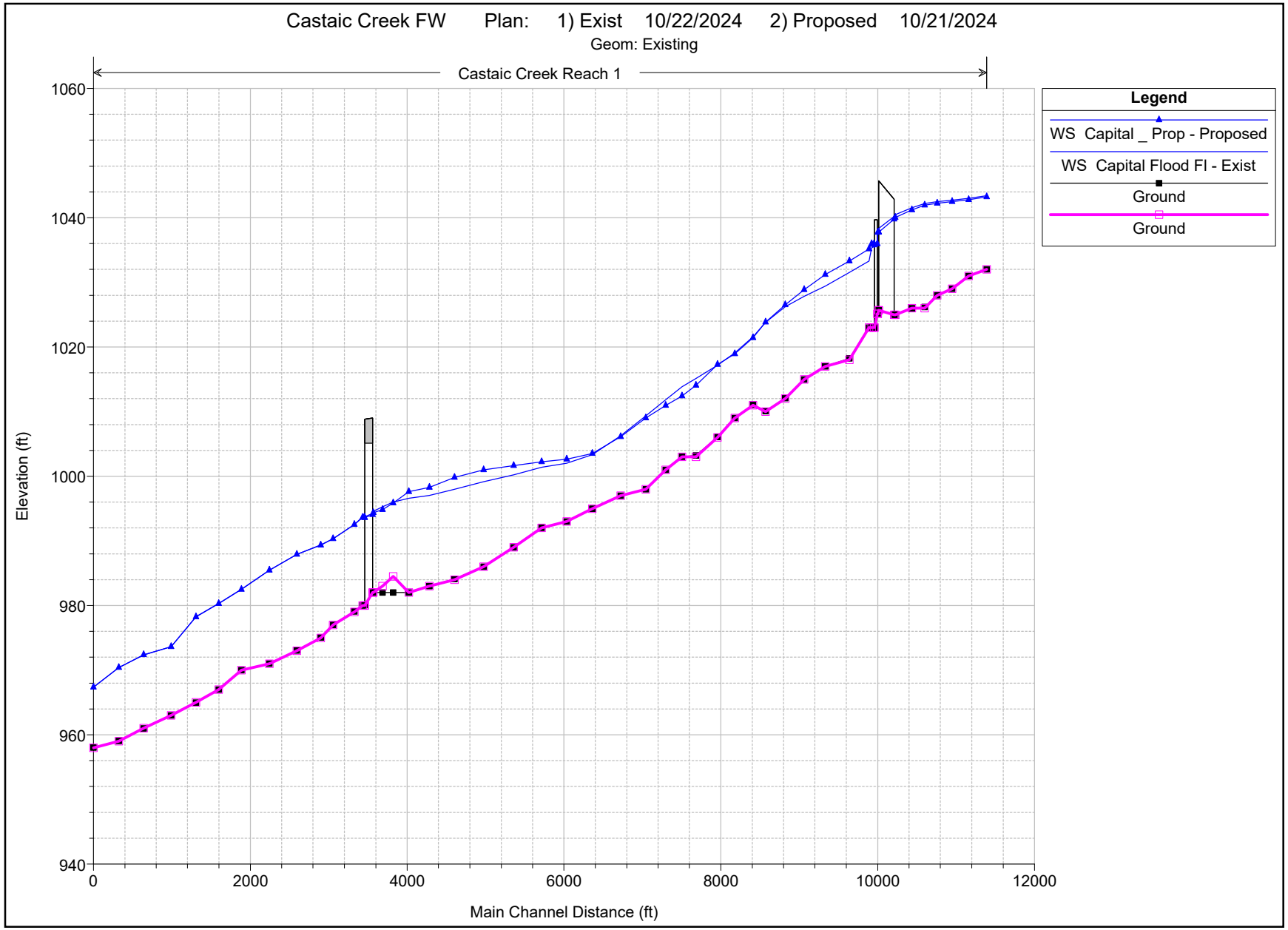
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	8724.84	Capital _ Prop	26400.00	997.00	1006.11		1006.61	0.010473	5.67	4657.98	1388.33	0.55
Reach 1	8724.84	FW	26400.00	997.00	1007.11		1007.73	0.009971	6.30	4190.54	1018.35	0.55
Reach 1	8396.13	Capital _ Prop	26400.00	995.00	1003.52		1003.86	0.005590	4.63	5696.37	1436.15	0.41
Reach 1	8396.13	FW	26400.00	995.00	1004.30		1004.81	0.006525	5.73	4605.86	940.00	0.46
Reach 1	8049.79	Capital _ Prop	26400.00	993.00	1002.63		1002.82	0.001895	3.50	7548.30	1289.12	0.25
Reach 1	8049.79	FW	26400.00	993.00	1003.35		1003.61	0.002087	4.08	6465.03	930.00	0.27
Reach 1	7688.71	Capital _ Prop	26400.00	992.00	1002.22		1002.38	0.001000	3.15	8381.02	1034.56	0.20
Reach 1	7688.71	FW	26400.00	992.00	1002.96		1003.14	0.000995	3.40	7770.71	835.00	0.20
Reach 1	7326.46	Capital _ Prop	26400.00	989.00	1001.64		1001.91	0.001668	4.22	6257.58	731.34	0.25
Reach 1	7326.46	FW	26400.00	989.00	1002.39		1002.71	0.001427	4.53	5831.45	529.00	0.24
Reach 1	6966.68	Capital _ Prop	26400.00	986.00	1000.98		1001.29	0.001588	4.42	5969.07	624.28	0.25
Reach 1	6966.68	FW	26400.00	986.00	1001.69		1002.09	0.001783	5.09	5183.08	463.00	0.27
Reach 1	6623.5	Capital _ Prop	26400.00	984.01	999.80		1000.42	0.003470	6.29	4196.86	461.87	0.37
Reach 1	6623.5	FW	26400.00	984.01	1000.38		1001.18	0.003265	7.16	3685.18	305.00	0.36
Reach 1	6304.52	Capital _ Prop	26400.00	983.00	998.28		999.14	0.004409	7.45	3541.83	362.11	0.42
Reach 1	6304.52	FW	26400.00	983.00	998.82		999.93	0.004372	8.48	3112.93	246.84	0.42
Reach 1	6087.88	Capital _ Prop	26400.00	982.00	997.64		998.14	0.002726	5.70	4631.89	497.04	0.33
Reach 1	6087.88	FW	26400.00	982.00	998.31		998.94	0.002521	6.37	4144.61	341.53	0.32
Reach 1	5781.35	Capital _ Prop	31100.00	984.50	995.88		997.08	0.009840	8.81	3531.04	518.19	0.59
Reach 1	5781.35	FW	31100.00	984.50	996.36		997.92	0.009580	10.00	3108.77	358.95	0.60
Reach 1	5629.45	Capital _ Prop	31100.00	983.00	994.82	991.18	996.01	0.006375	8.74	3559.53	456.55	0.50
Reach 1	5629.45	FW	31100.00	983.00	995.50	991.44	996.80	0.006229	9.15	3399.06	324.58	0.50
Reach 1	5557.68	Capital _ Prop	31100.00	982.00	994.36	989.89	995.30	0.004797	7.78	3995.63	508.07	0.44
Reach 1	5557.68	FW	31100.00	982.00	994.87	990.50	996.08	0.005657	8.83	3522.10	320.00	0.47
Reach 1	5500		Bridge									
Reach 1	5453.98	Capital _ Prop	31100.00	980.00	993.66		994.33	0.003810	6.60	4714.36	521.37	0.39
Reach 1	5453.98	FW	31100.00	980.00	994.21		994.95	0.003485	6.90	4506.32	428.00	0.37
Reach 1	5434.68	Capital _ Prop	31100.00	980.00	993.62		994.25	0.003417	6.39	4865.64	519.95	0.37
Reach 1	5434.68	FW	31100.00	980.00	994.23		994.86	0.002906	6.37	4881.83	452.23	0.34
Reach 1	5340.04	Capital _ Prop	31100.00	979.00	992.52		993.67	0.008116	8.60	3615.15	473.63	0.55
Reach 1	5340.04	FW	31100.00	979.00	993.44		994.41	0.005669	7.90	3938.94	440.52	0.47
Reach 1	5060.55	Capital _ Prop	31100.00	977.00	990.32		991.45	0.008074	8.52	3648.33	481.62	0.55
Reach 1	5060.55	FW	31100.00	977.00	990.59		992.25	0.010920	10.33	3010.21	360.00	0.63
Reach 1	4899.94	Capital _ Prop	31100.00	975.00	989.35		990.32	0.005960	7.88	3946.33	466.36	0.48
Reach 1	4899.94	FW	31100.00	975.00	989.55		990.75	0.006976	8.80	3533.21	385.00	0.51
Reach 1	4571.63	Capital _ Prop	31100.00	973.00	987.91		988.76	0.004282	7.40	4200.52	424.99	0.42
Reach 1	4571.63	FW	31100.00	973.00	988.29		989.10	0.003815	7.23	4300.82	405.00	0.39
Reach 1	4220.87	Capital _ Prop	31100.00	971.00	985.45		986.71	0.008001	9.03	3444.02	413.24	0.55
Reach 1	4220.87	FW	31100.00	971.00	985.91		987.23	0.007537	9.21	3376.08	365.00	0.53
Reach 1	3865.39	Capital _ Prop	31100.00	970.00	982.51		983.77	0.008461	9.01	3450.78	433.93	0.56
Reach 1	3865.39	FW	31100.00	970.00	982.88		984.31	0.008777	9.59	3243.12	370.00	0.57
Reach 1	3579.81	Capital _ Prop	31100.00	967.01	980.31		981.45	0.007441	8.58	3624.14	444.05	0.53
Reach 1	3579.81	FW	31100.00	967.01	980.56		981.86	0.008014	9.13	3406.23	390.00	0.54
Reach 1	3289.64	Capital _ Prop	31100.00	965.01	978.25		979.34	0.007023	8.35	3722.46	455.10	0.52
Reach 1	3289.64	FW	31100.00	965.01	978.92		979.85	0.005437	7.73	4022.09	453.64	0.46
Reach 1	2974.88	Capital _ Prop	31200.00	963.00	973.63	973.14	975.56	0.022824	11.14	2801.48	540.83	0.86
Reach 1	2974.88	FW	31200.00	963.00	974.60		976.76	0.019621	11.79	2645.69	410.00	0.82
Reach 1	2627.11	Capital _ Prop	31200.00	961.01	972.37		972.75	0.003154	5.00	6239.20	913.45	0.34
Reach 1	2627.11	FW	31200.00	961.01	972.82		973.46	0.004429	6.41	4866.53	620.00	0.40
Reach 1	2307.93	Capital _ Prop	31200.00	959.00	970.41	968.40	971.19	0.008208	7.10	4393.07	777.14	0.53
Reach 1	2307.93	FW	31200.00	959.00	970.88		971.69	0.007084	7.23	4314.09	655.00	0.50

HEC-RAS Plan: Proposed River: Castaic Creek Reach: Reach 1 (Continued)

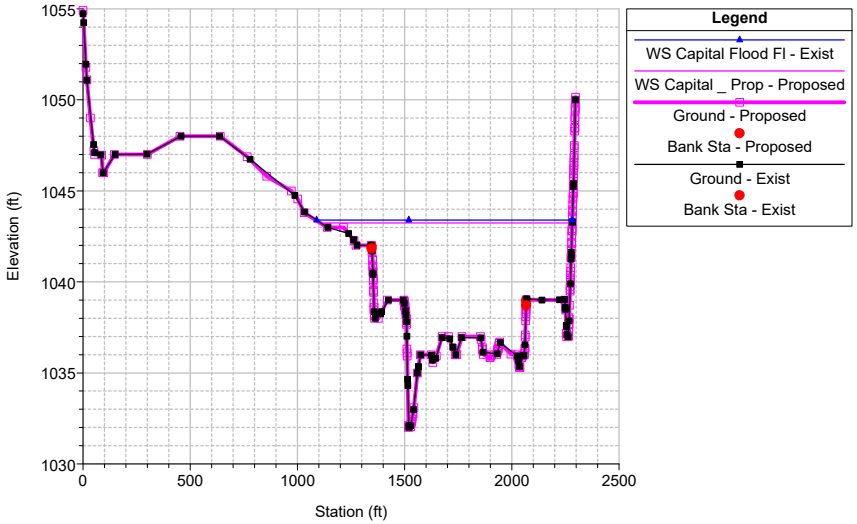
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1981.79	Capital _ Prop	31200.00	958.00	967.36	965.21	968.37	0.009101	8.04	3882.98	616.95	0.56
Reach 1	1981.79	FW	31200.00	958.00	967.82	965.47	969.05	0.009099	8.91	3503.44	465.00	0.57

PACE
Advanced Water Engineering

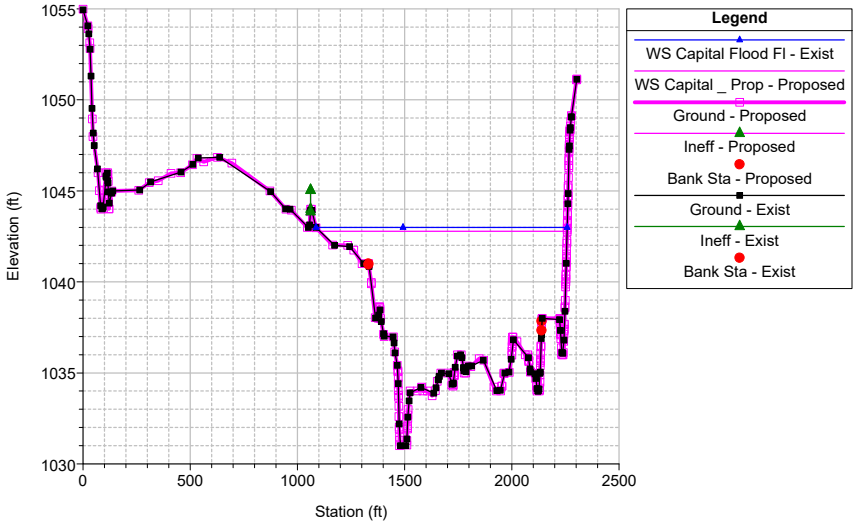
Appendix D – HEC-RAS Cross Section Comparison Existing vs. Proposed Conditions


Castaic Creek FW Plan: 1) Exist 10/22/2024 2) Proposed 10/21/2024
Geom: Existing
Castaic Creek Reach 1
Legend
WS Capital _ Prop - Proposed
WS Capital Flood Fl - Exist
Ground
Ground
Elevation (ft)
Main Channel Distance (ft)
1060
1040
1020
1000
980
960
940
0
2000
4000
6000
8000
10000
12000

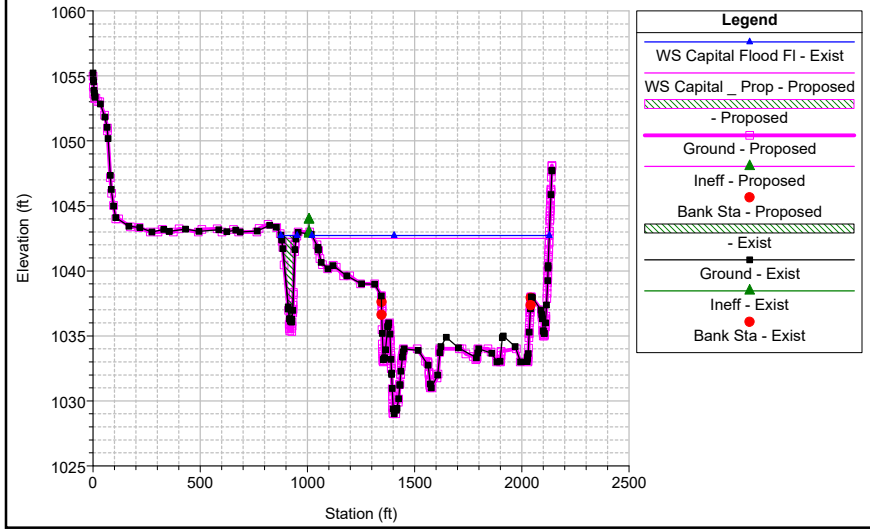
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 13371



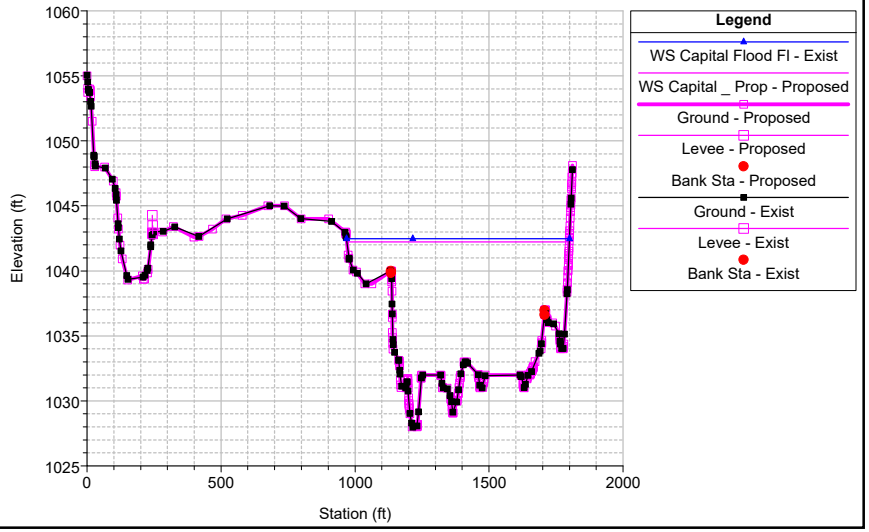
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 13141



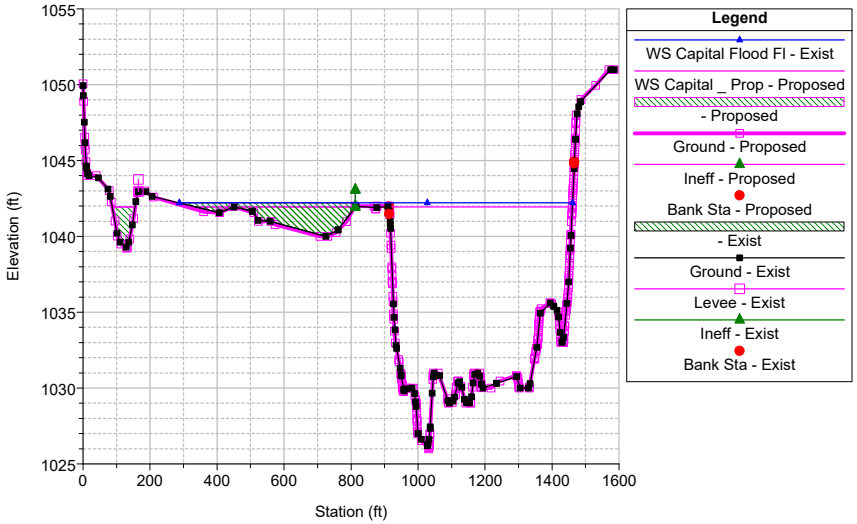
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12937



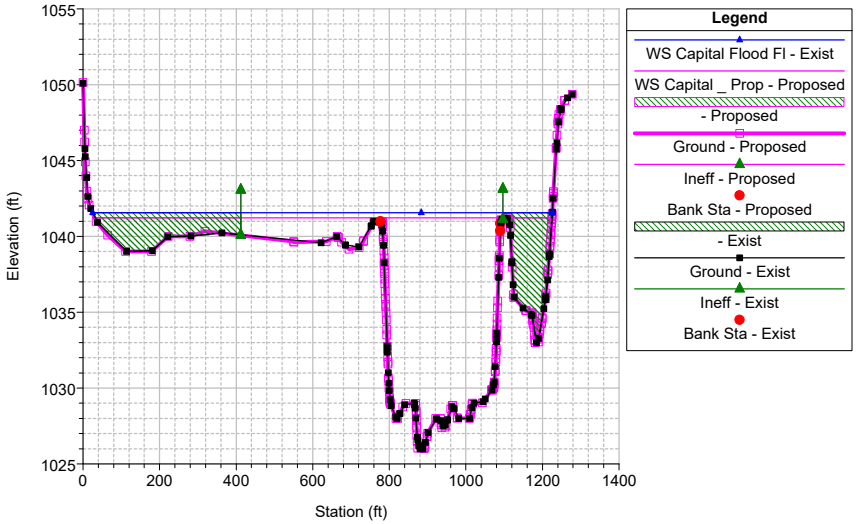
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12730



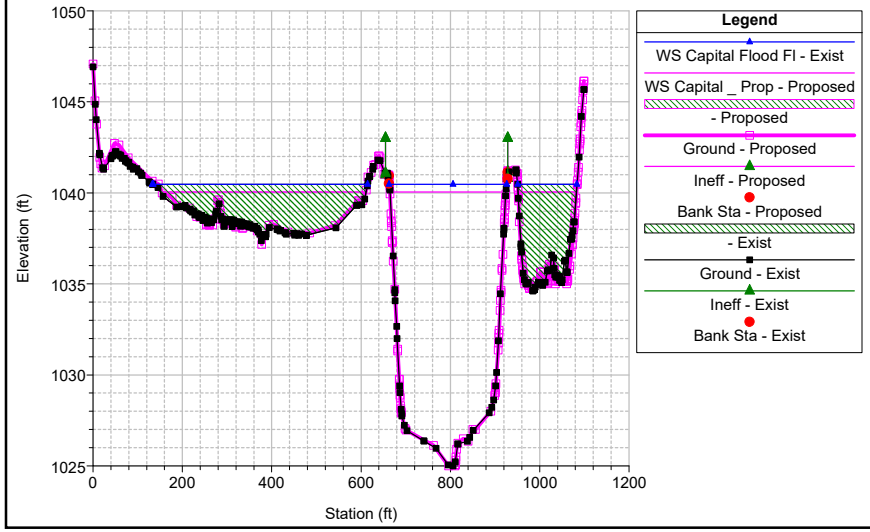
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12543



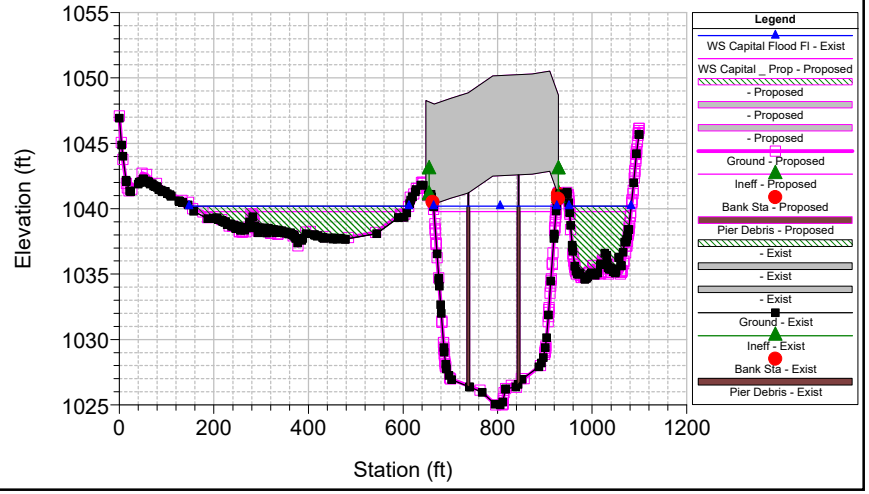
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12350



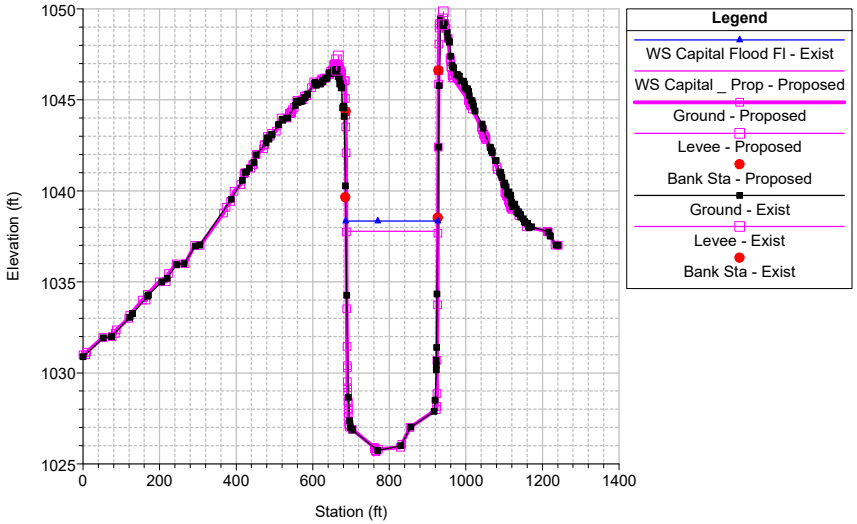
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12146



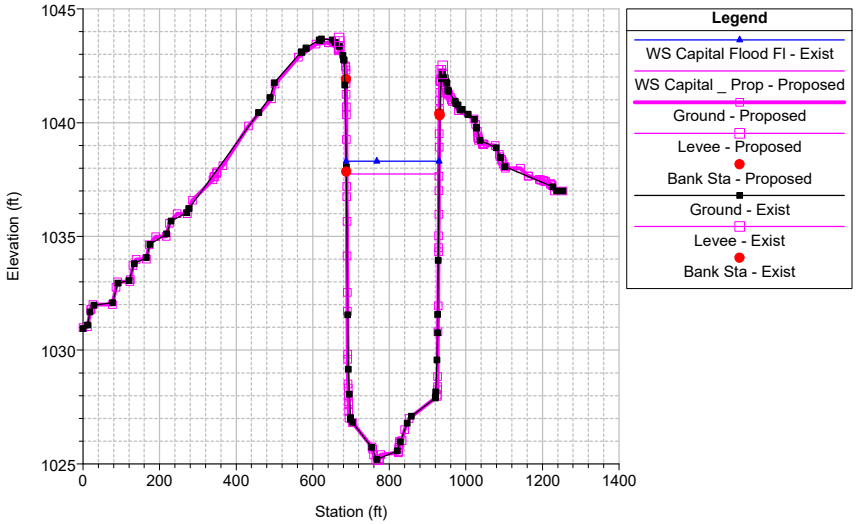
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 12059.65 BR I5 Bridge



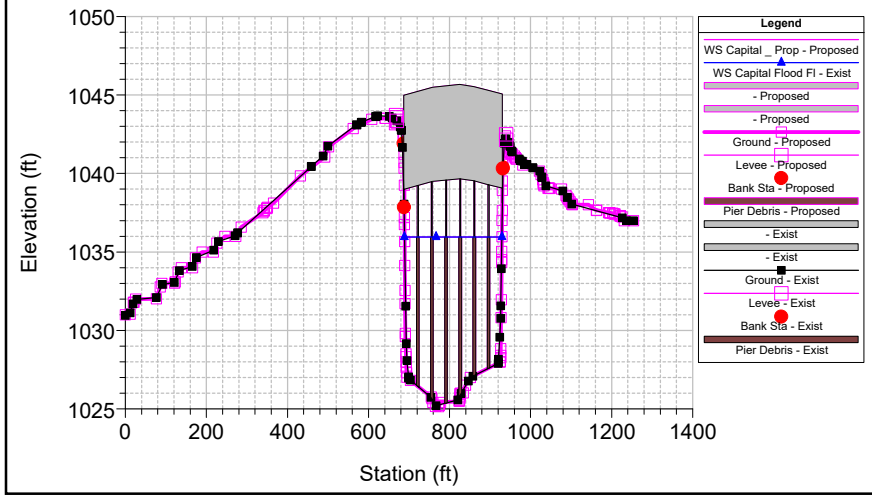
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11957.32



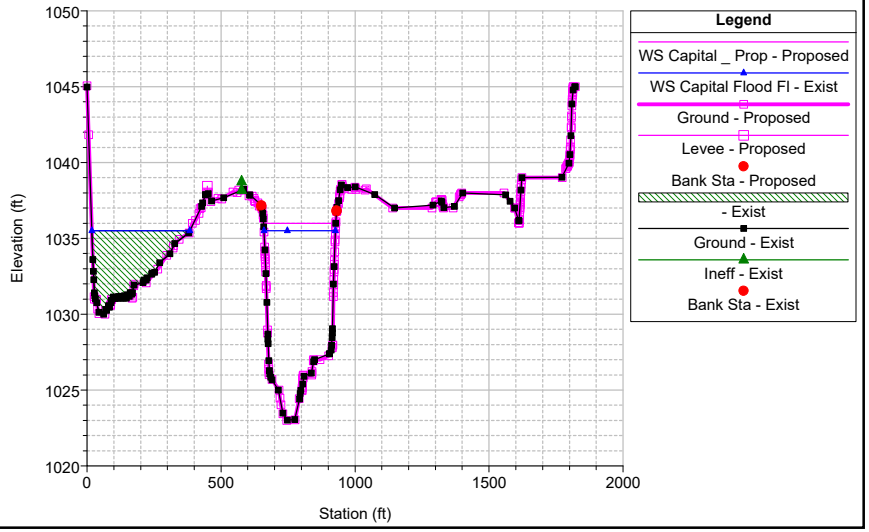
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11923



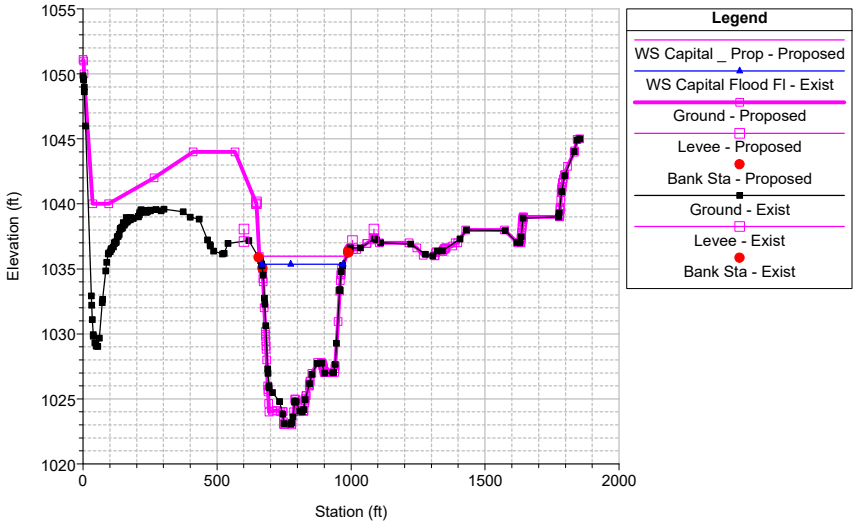
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11917.82 BR Old Road Bridge



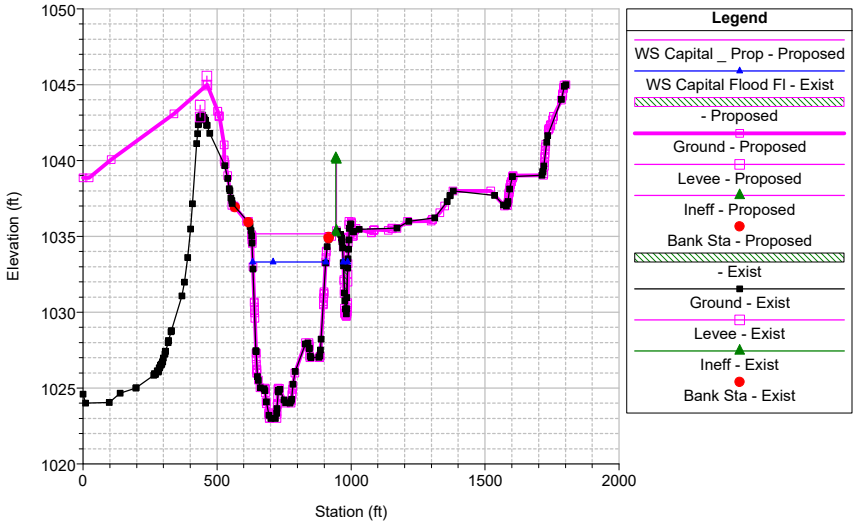
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11878.32



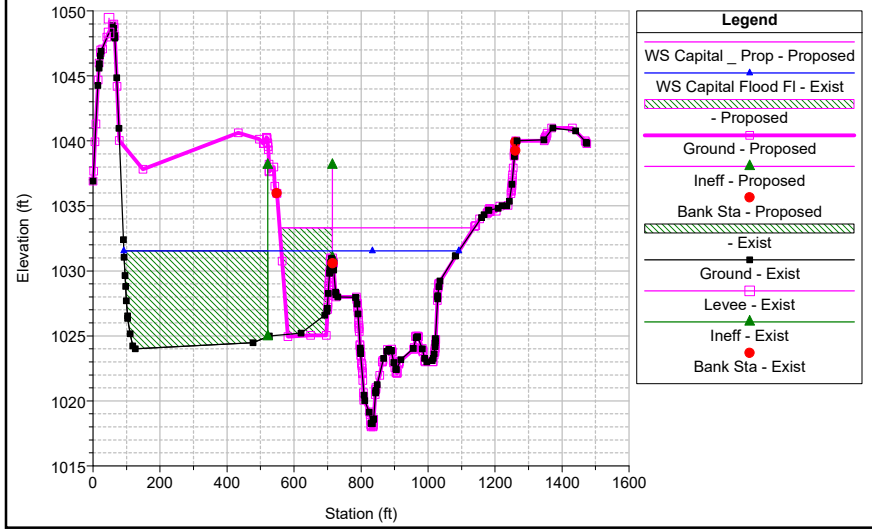
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11845.64



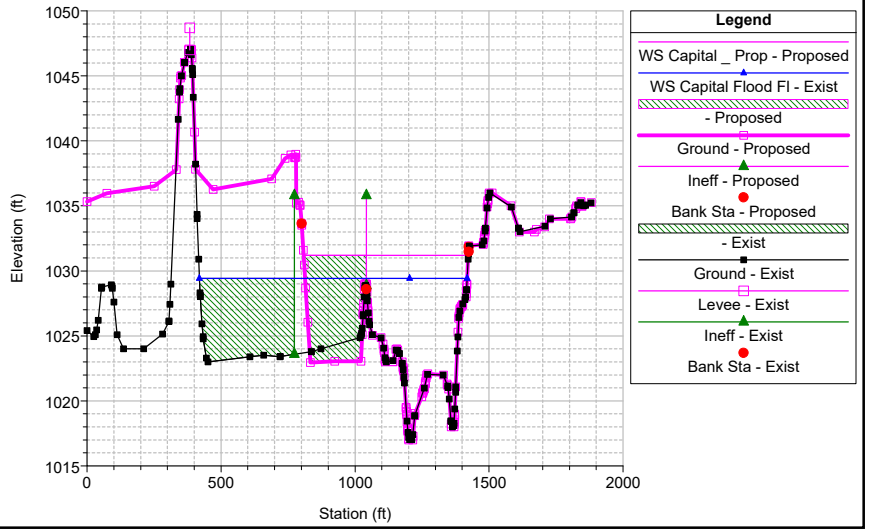
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11811.76



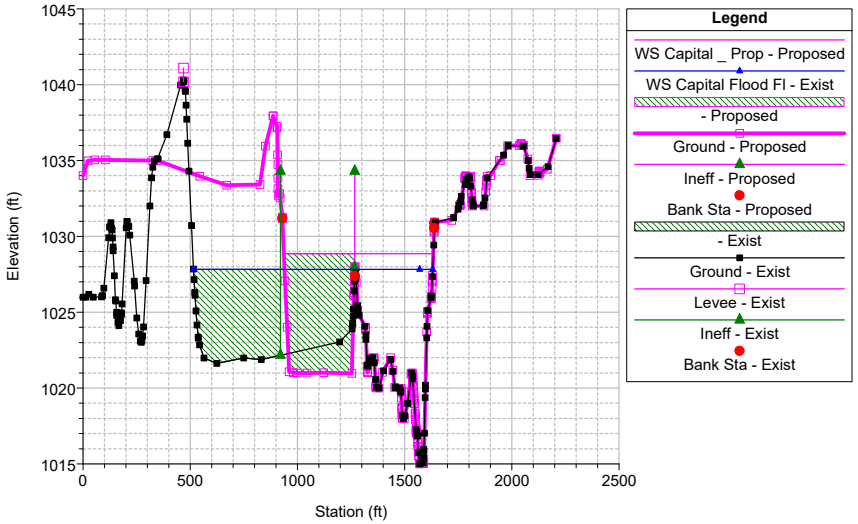
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11551.18



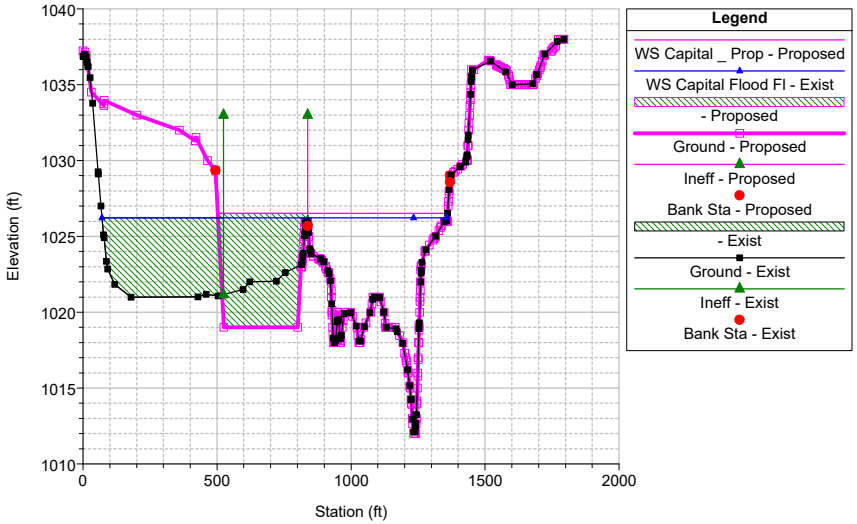
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 11242.98



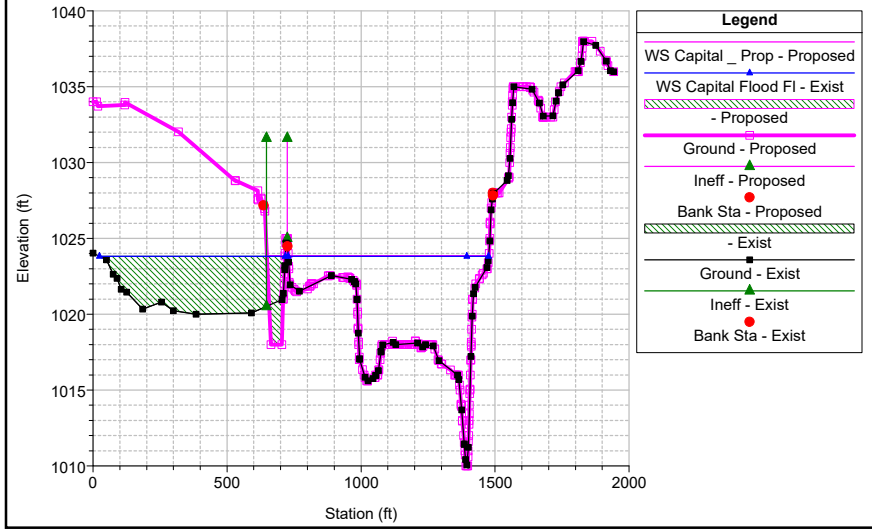
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10982.86



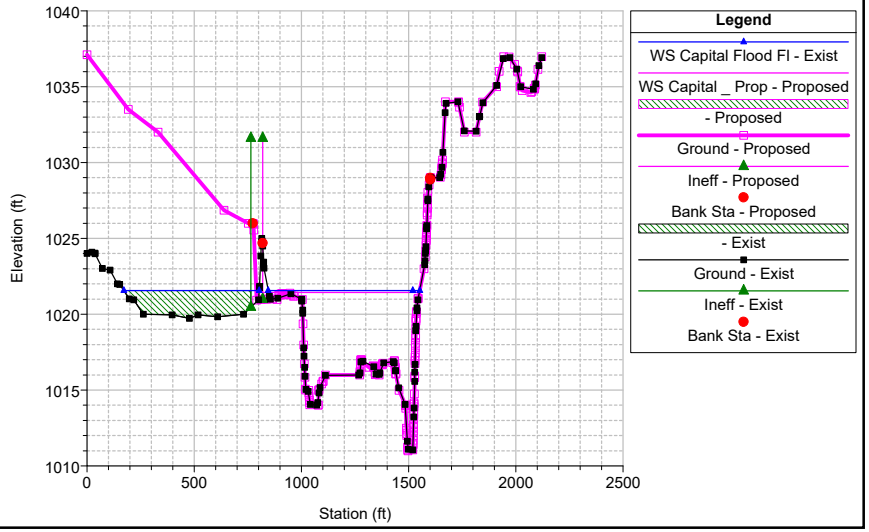
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10738.26



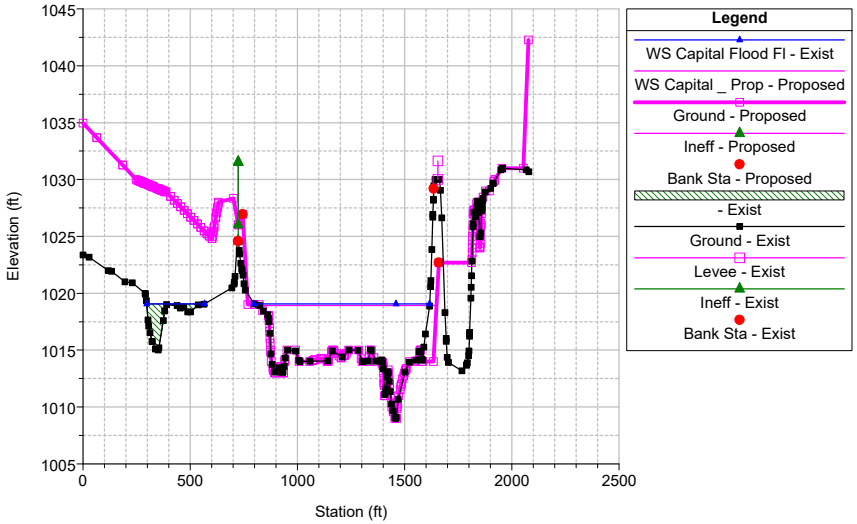
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10490.82



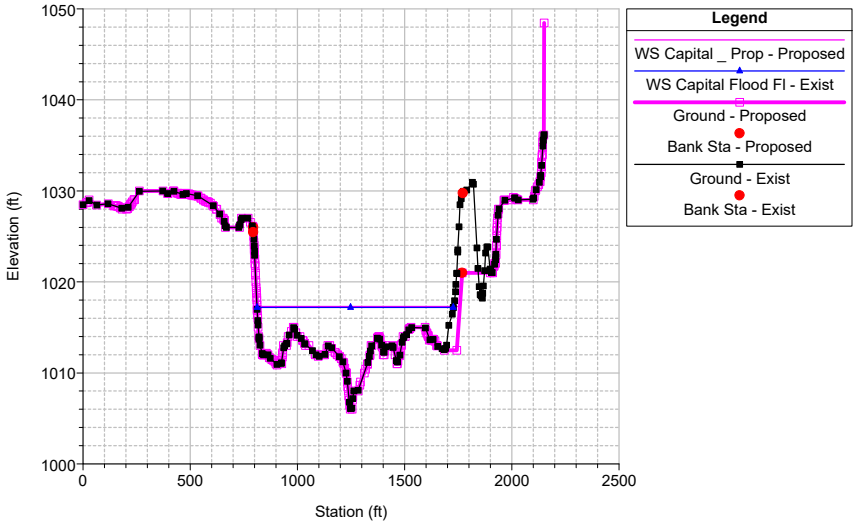
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10351.28



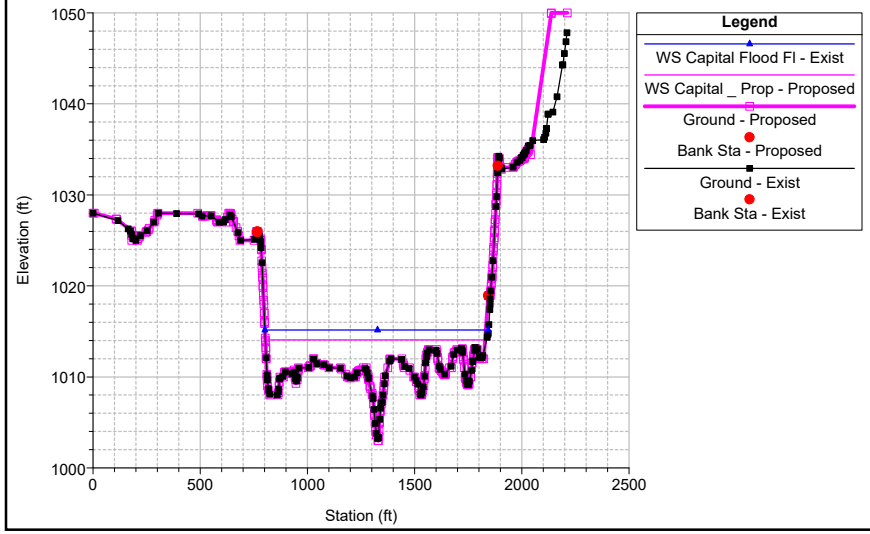
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 10141.82



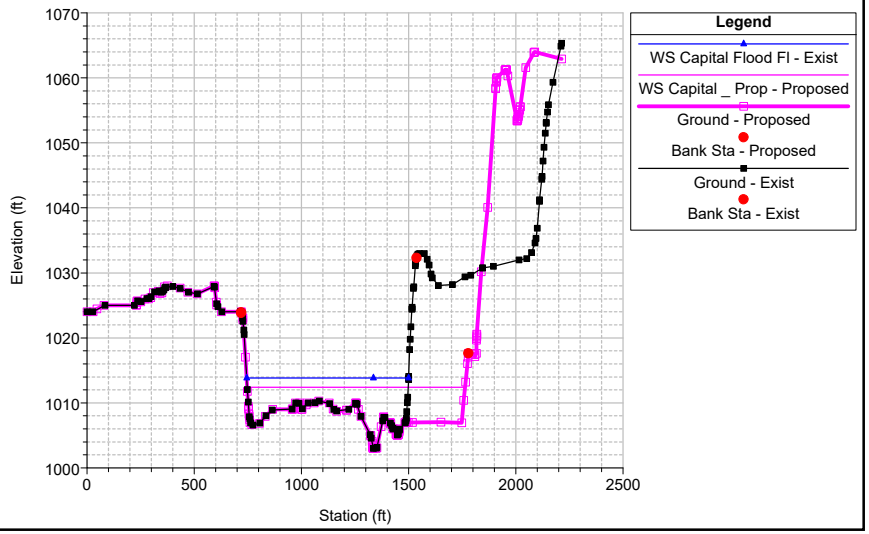
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9931.16



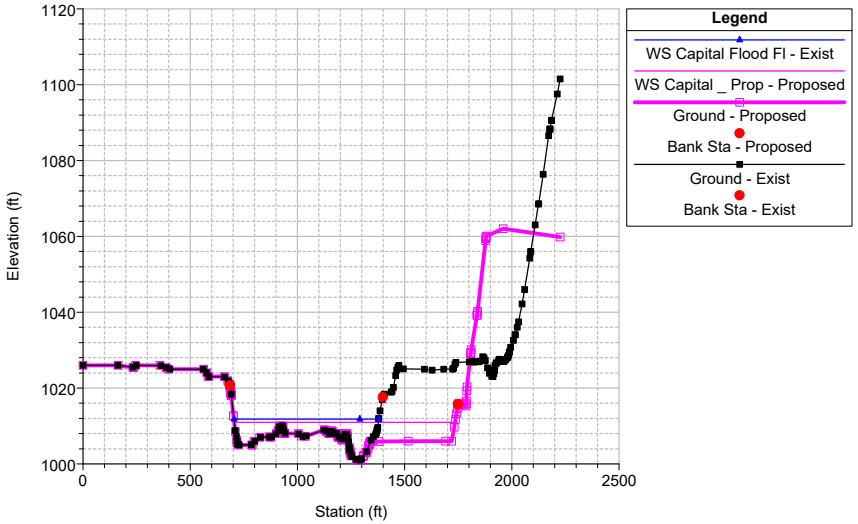
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9670.57



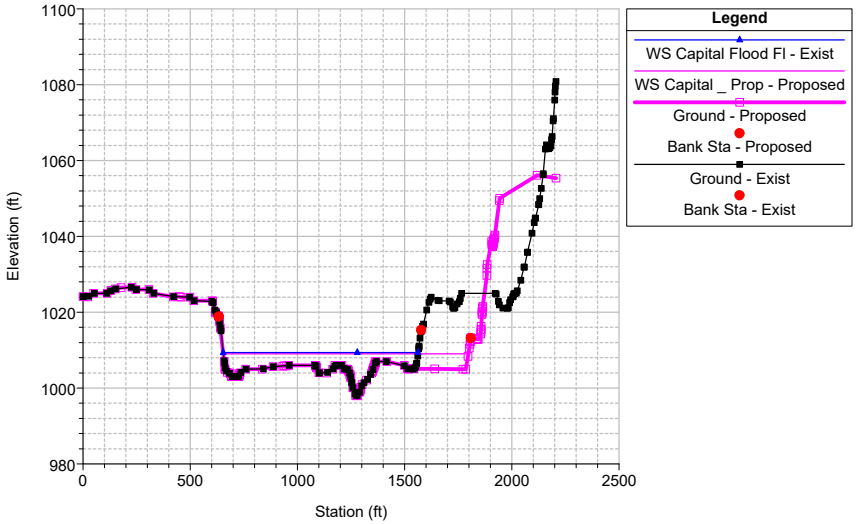
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9501.81



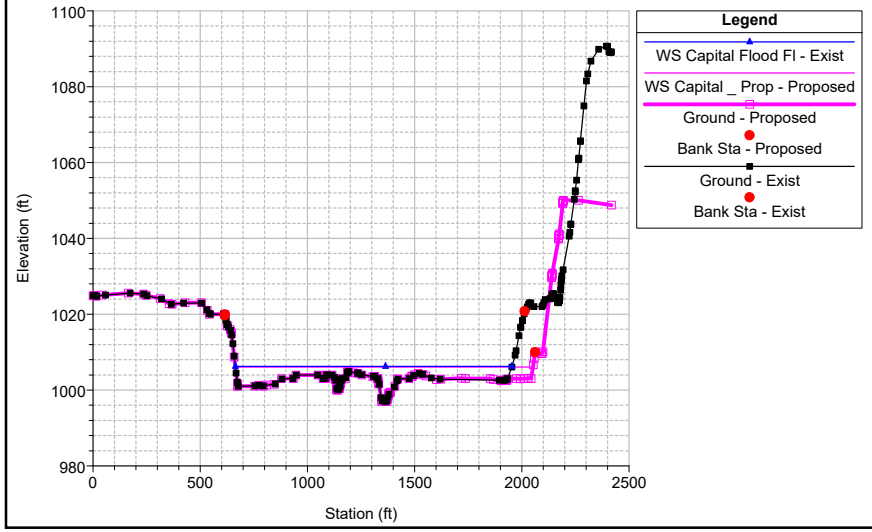
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9298.99



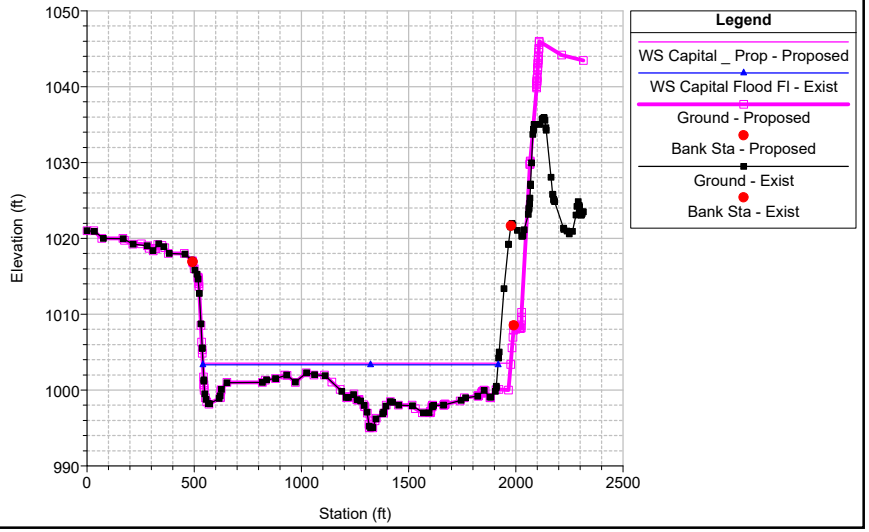
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 9042.81



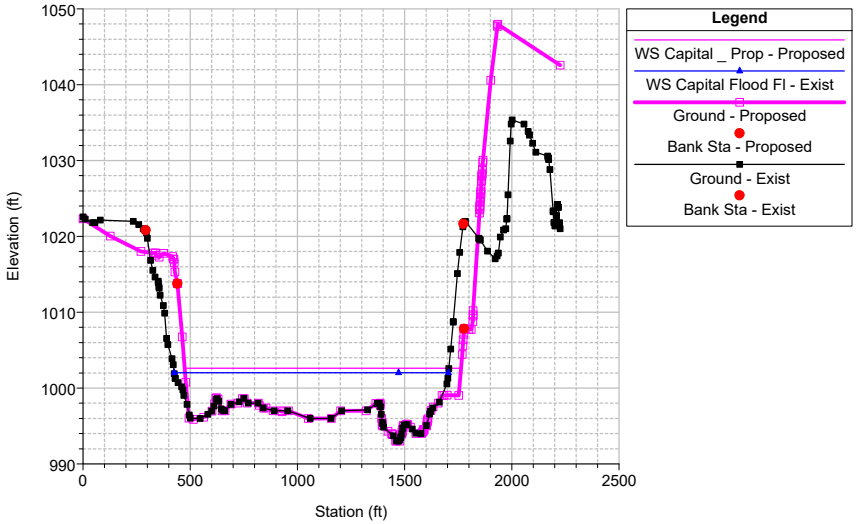
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 8724.84



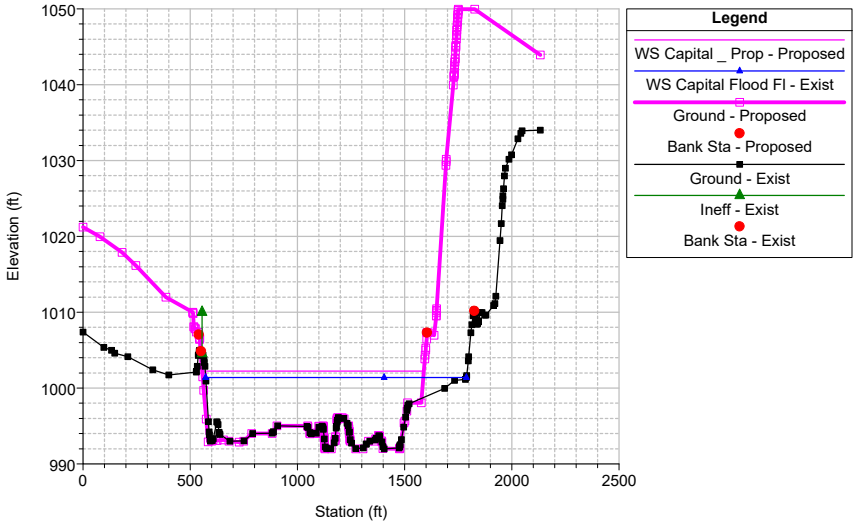
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 8396.13



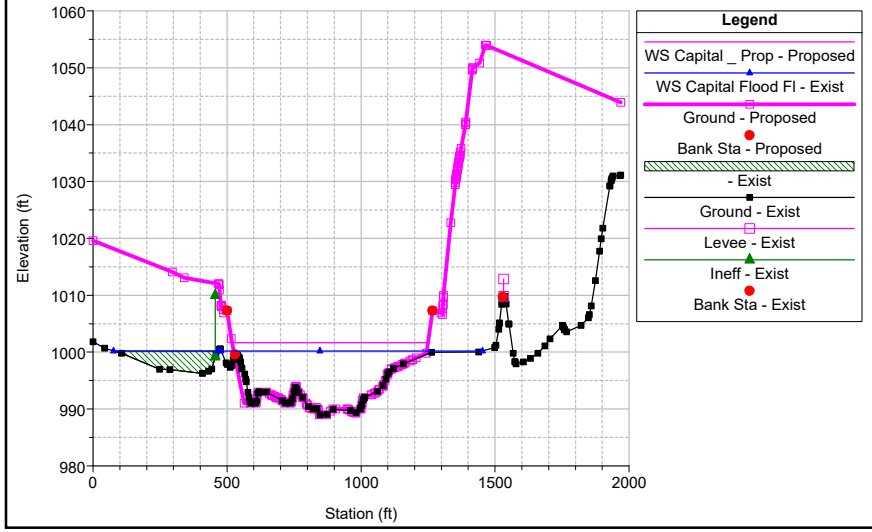
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 8049.79



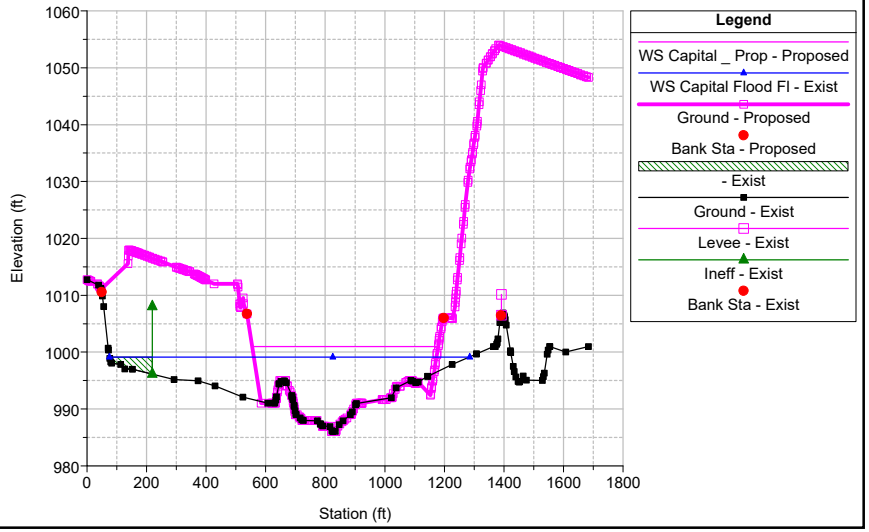
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 7688.71



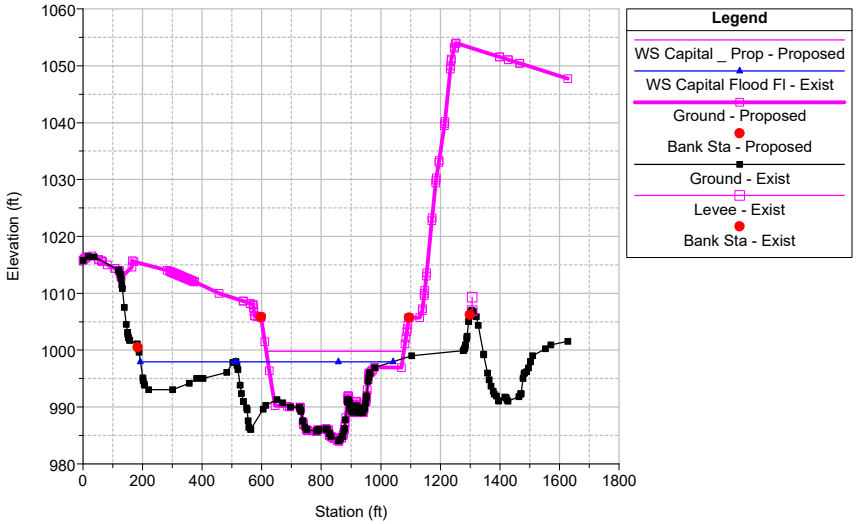
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 7326.46



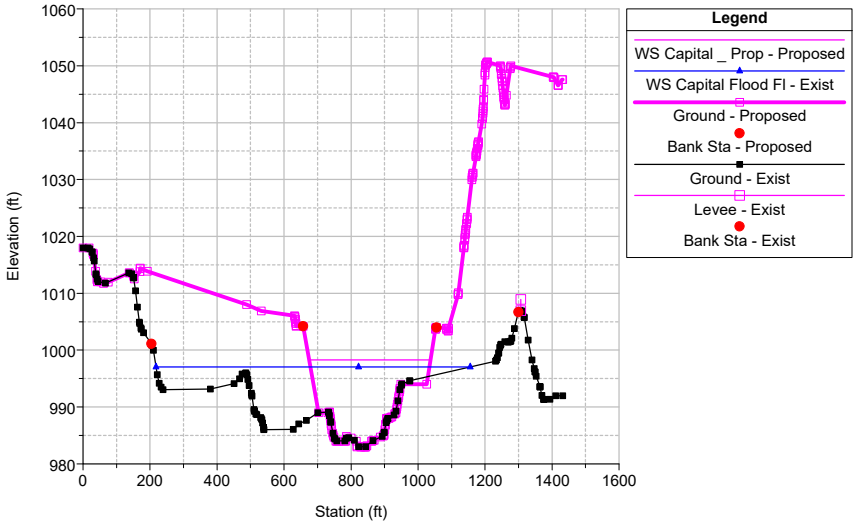
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6966.68



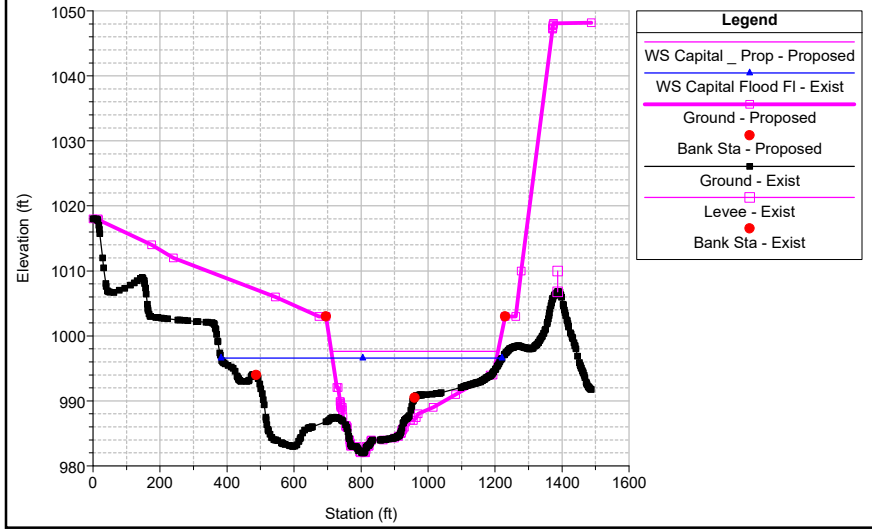
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6623.5



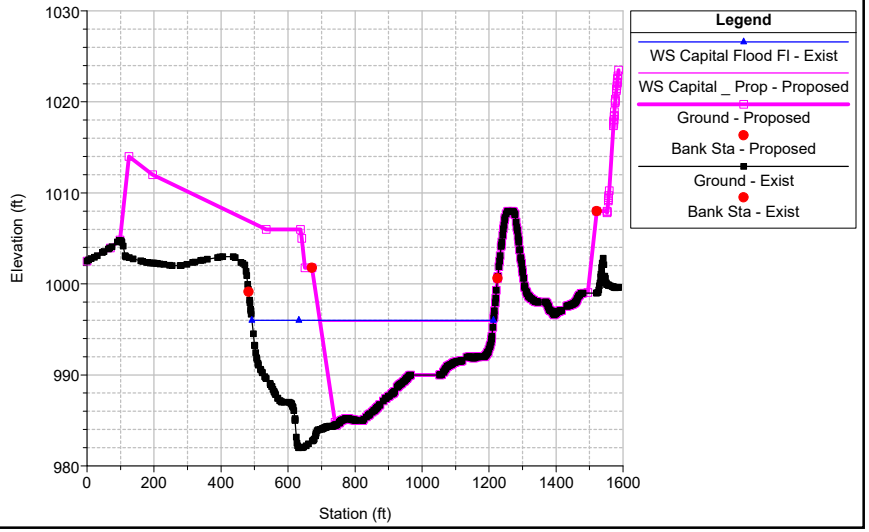
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6304.52



Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 6087.88



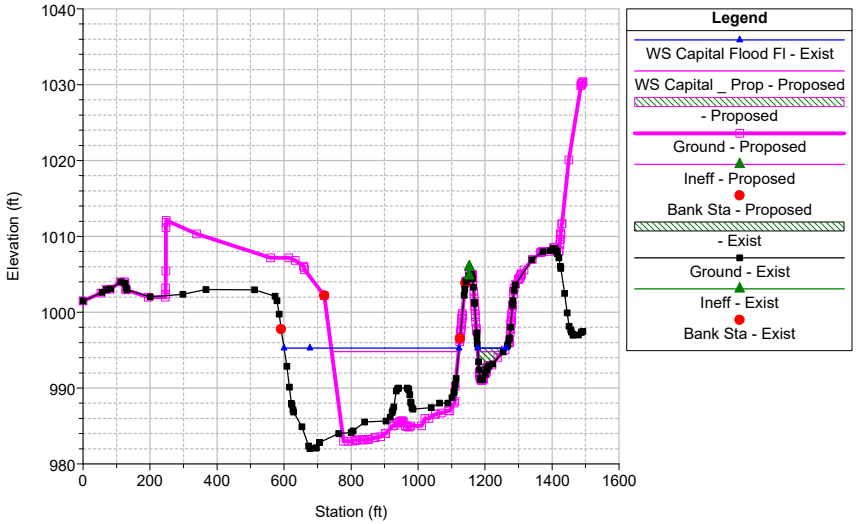
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5781.35



Castaic Creek FW Plan: 1) Exist 2) Proposed

Geom: Existing

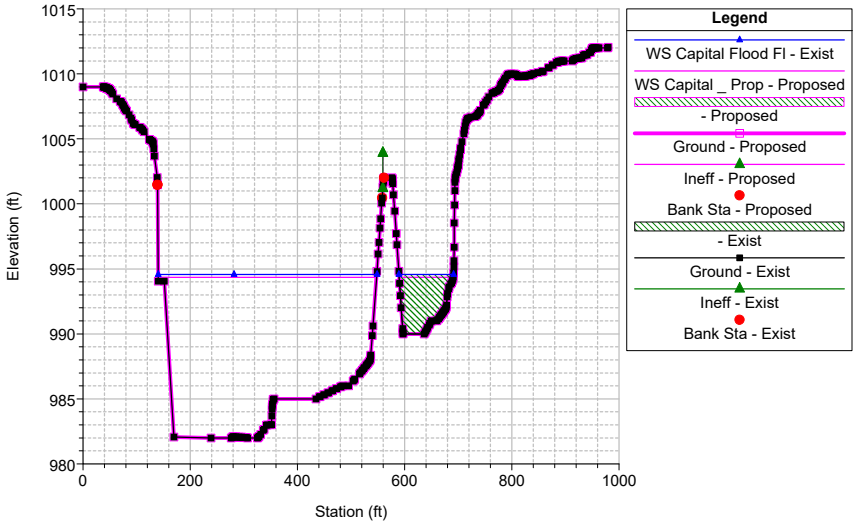
River = Castaic Creek Reach = Reach 1 RS = 5629.45



Castaic Creek FW Plan: 1) Exist 2) Proposed

Geom: Existing

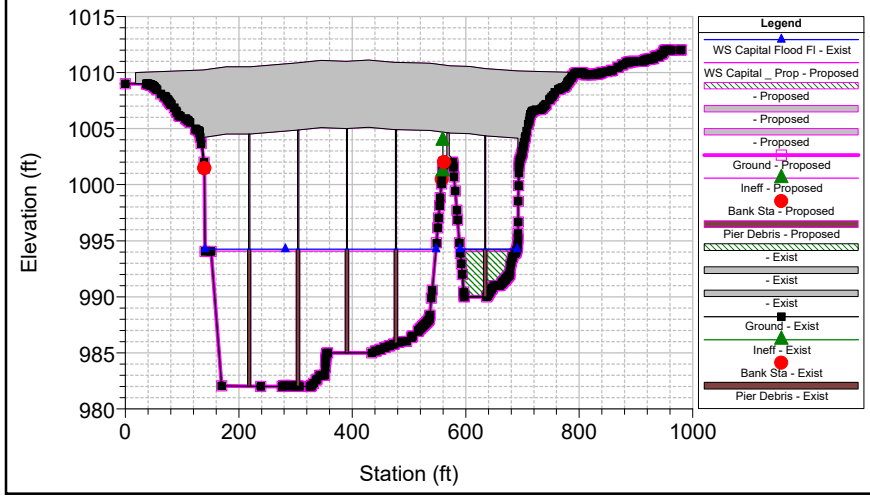
River = Castaic Creek Reach = Reach 1 RS = 5557.68



Castaic Creek FW Plan: 1) Exist 2) Proposed

Geom: Existing

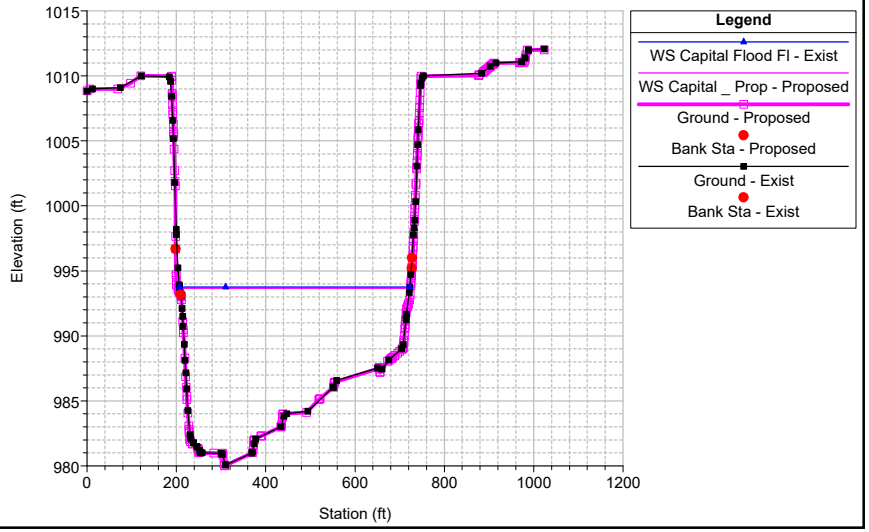
River = Castaic Creek Reach = Reach 1 RS = 5500 BR Commerce Center Drive Bridge



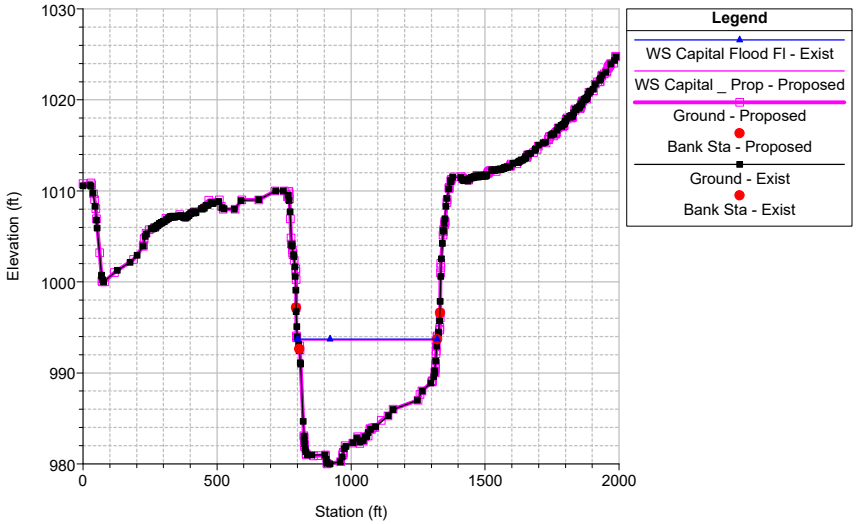
Castaic Creek FW Plan: 1) Exist 2) Proposed

Geom: Existing

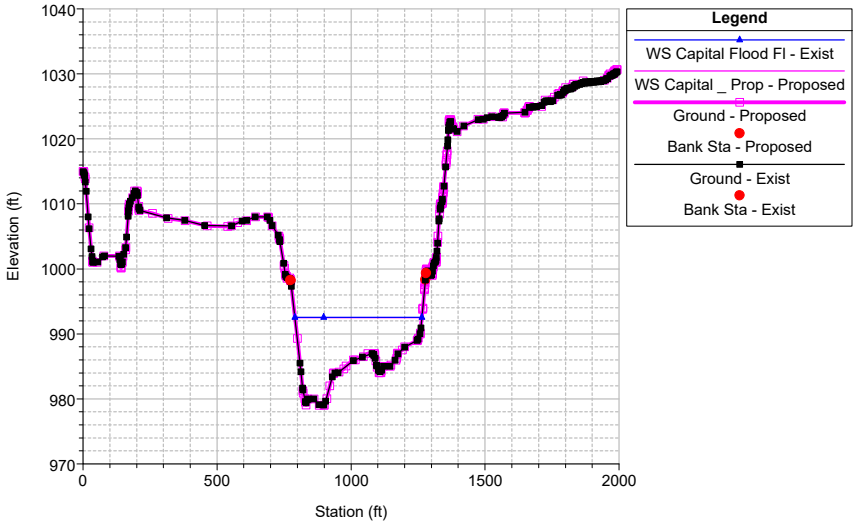
River = Castaic Creek Reach = Reach 1 RS = 5453.98



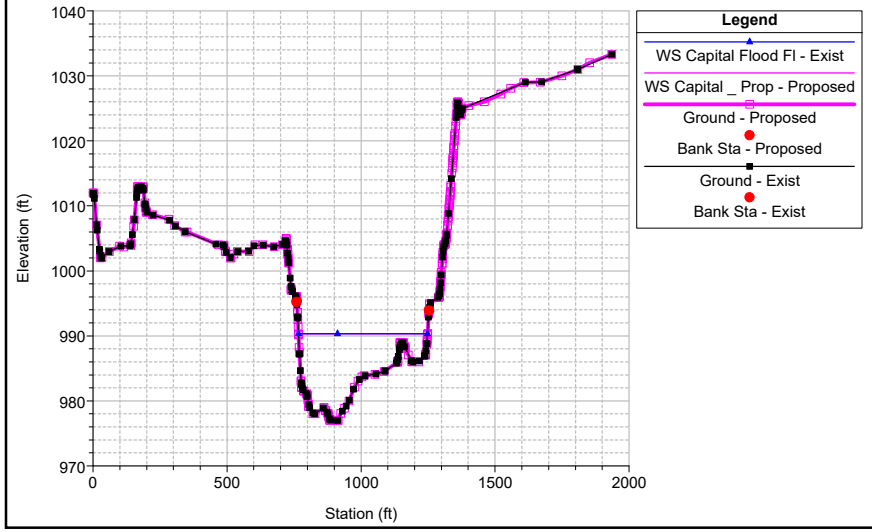
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5434.68



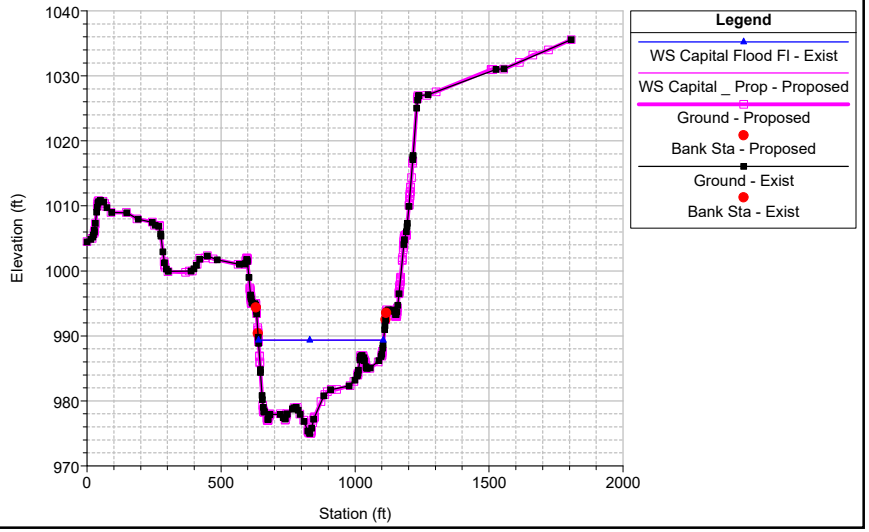
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5340.04



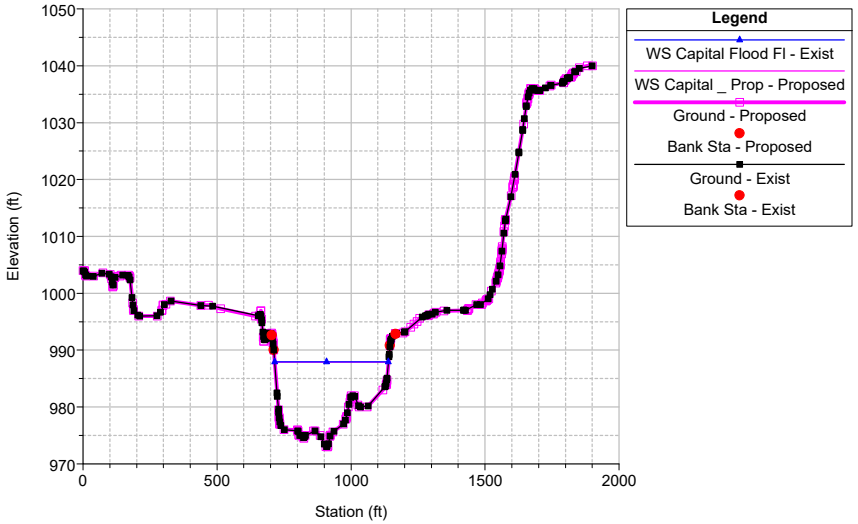
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 5060.55



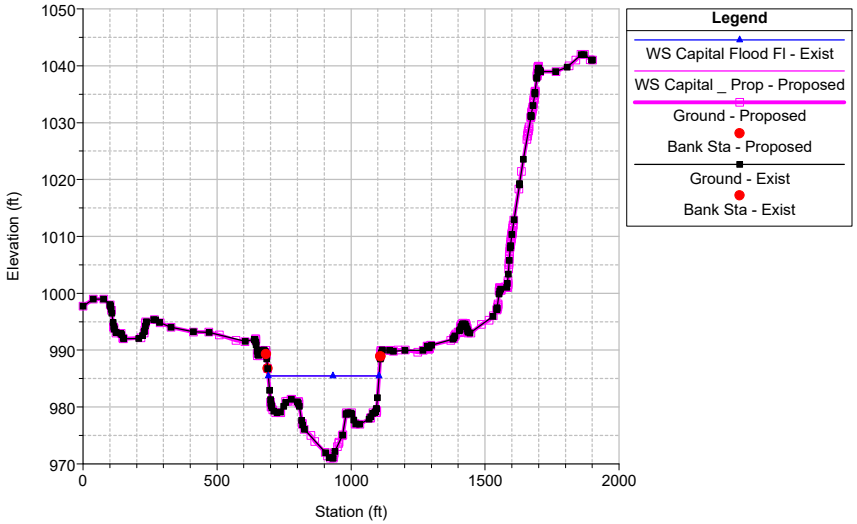
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 4899.94



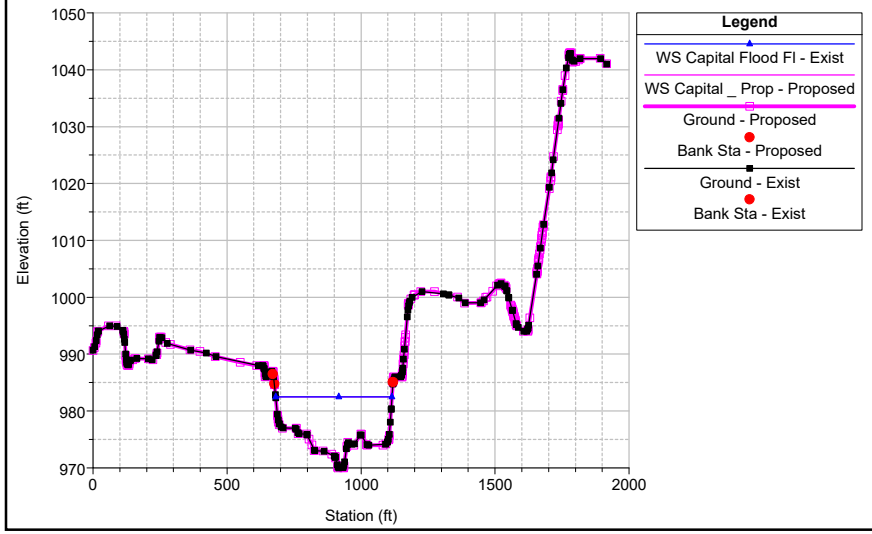
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 4571.63



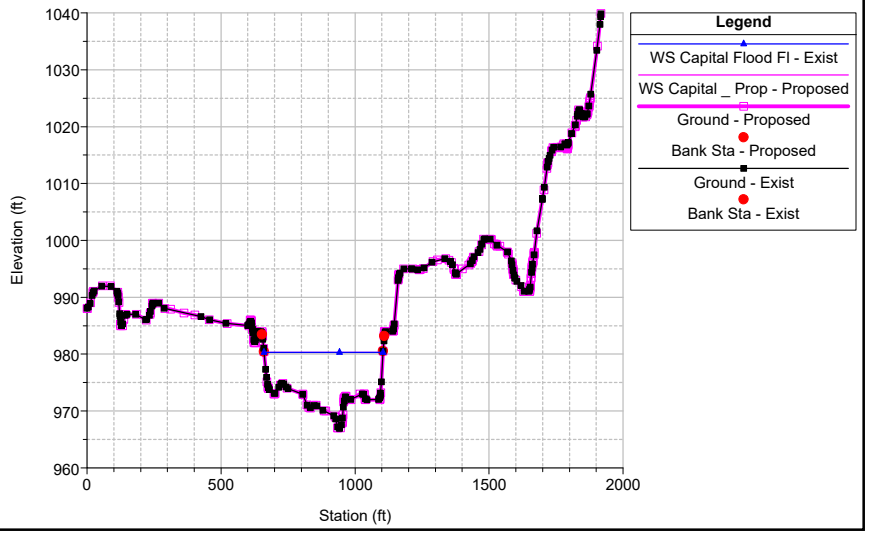
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 4220.87



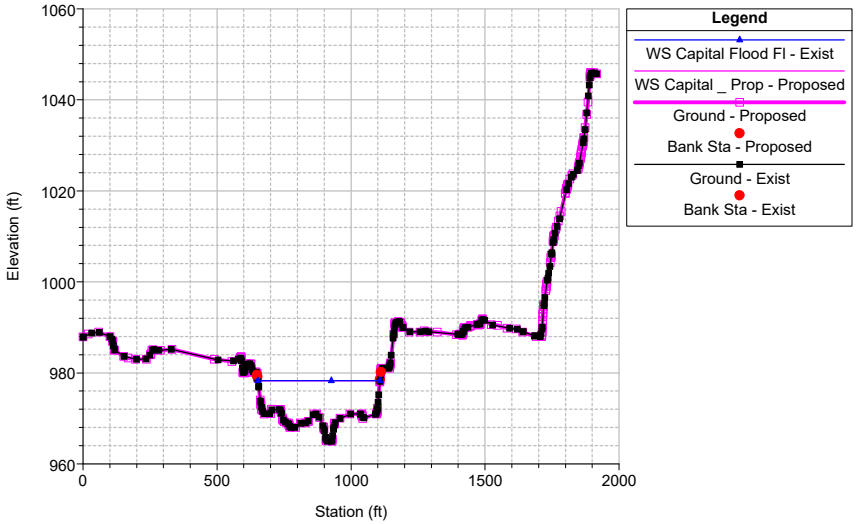
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 3865.39



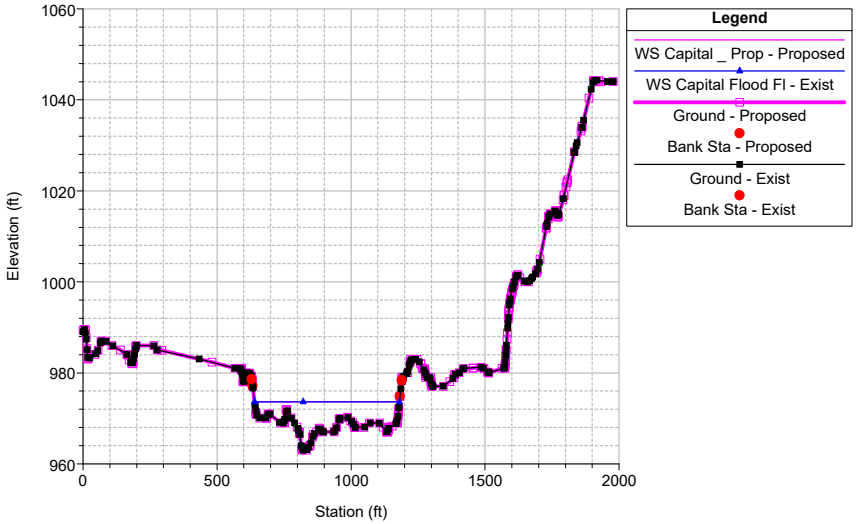
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 3579.81



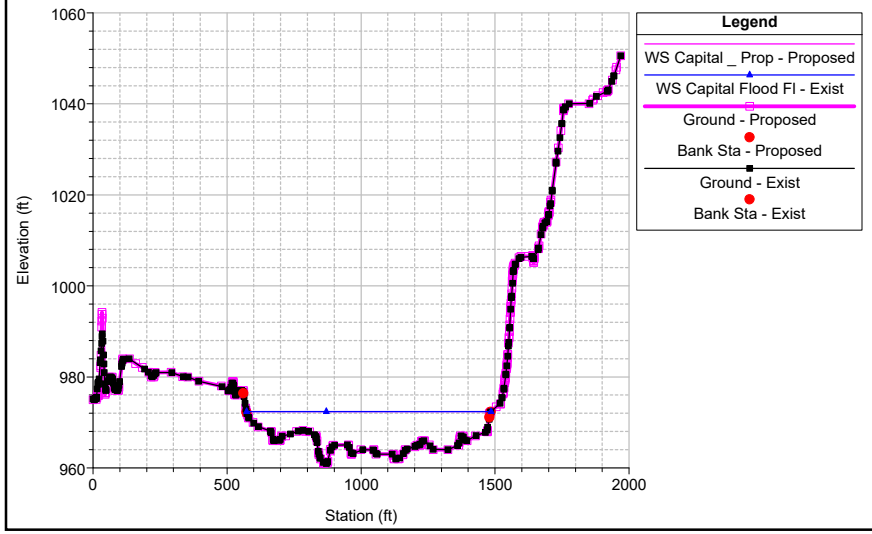
Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 3289.64



Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 2974.88



Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
River = Castaic Creek Reach = Reach 1 RS = 2627.11



Castaic Creek FW Plan: 1) Exist 2) Proposed
Geom: Existing
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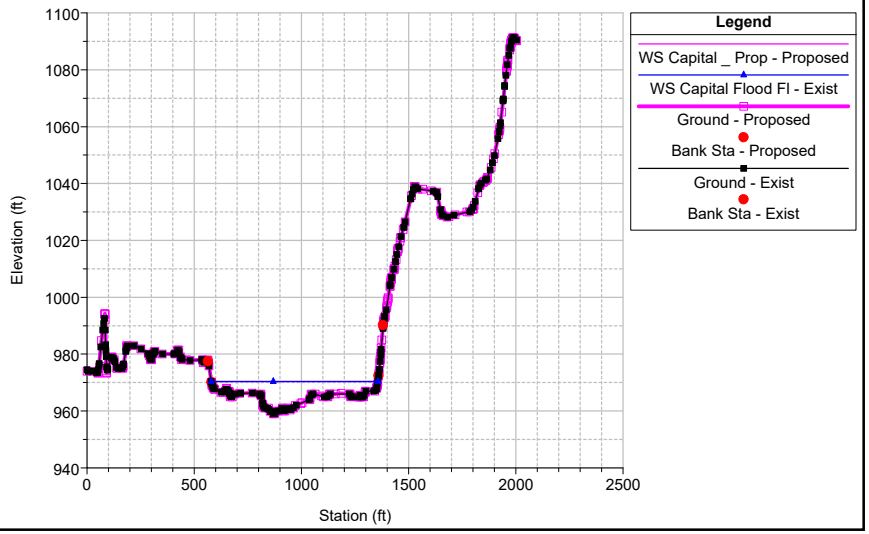
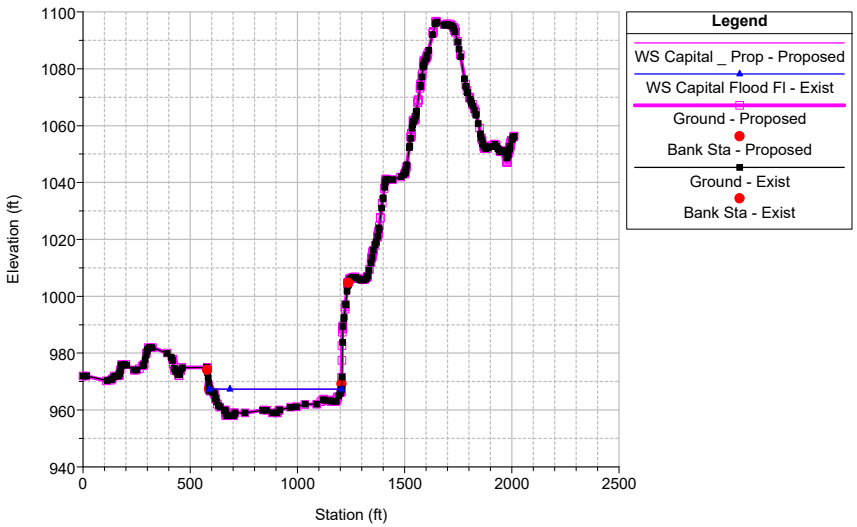


Castaic Creek FW Plan: 1) Exist 2) Proposed

Geom: Existing

River = Castaic Creek Reach = Reach 1 RS = 1981.79



Appendix 5.5h

Hasley Canyon Creek CLOMR

FEMA Application – Conditional Letter of Map Revision

Hasley Canyon Creek Soil Cement Bank Protection
Valencia Commerce Center TPM No. 18108
ESTU No. 2023000284

August 2024
(Revised May 2023)

Prepared For:

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PACE JN A535

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1 Introduction

Please find enclosed an application for a Conditional Letter of Map Revision (CLOMR) for the Hasley Canyon Creek Soil Cement Bank Protection Project along Hasley Canyon Creek. The project is located within the unincorporated area of Los Angeles County, three miles west of the City of Santa Clarita, as shown on the vicinity map in **Figure 1-1**. The study reach of Hasley Canyon Creek for this project extends approximately 5,000-ft, from approximately 600 feet downstream of the Commerce Center Drive Bridge over Hasley Canyon Creek to approximately 500 feet downstream of the Hasley Canyon Creek confluence with Castaic Creek. The project involves the implementation of soil cement bank protection improvements for the Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108. See **Figure 1-2** for a vicinity map of the project site locations and existing rip-rap and soil cement. The proposed project is located within a FEMA special flood hazard area (SFHA) Zone AE. The AE zone indicates base flood elevations have been established by a previous study.

The effective FEMA Flood Insurance Rate Map (FIRM) panels in the Hasley Canyon Creek study area are numbered 06037C0785G, 06037C0805G, and 06037C0815G and were all revised in June 2021. A subsequent Letter of Map Revision (LOMR) updated the FIRM's at the Hasley Canyon Creek and Castaic Creek confluence and downstream of Commerce Center Drive Bridge, effective October 15, 2021.

The present CLOMR application is in support of a request for the revision of FEMA Flood Insurance Rate Map (FIRM) panels 06037C0805G, as shown on the Effective FIRM panels provided in **Appendix B**. The Hasley Canyon Creek Soil Cement Bank Protection project incorporates more current 2013 topographic data to establish a new hydraulic analysis using HEC-RAS version 6.2.

1.1 Project Background and Description

The Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 will consist of buried soil cement bank protection, a proposed drop structure/stilling basin, two grade control structures, the Franklin Parkway Bridge over Hasley Canyon Creek, and modifications to the existing concrete/rip-rap lined berm (P.D. 2298 Unit III). A more detailed layout of the proposed soil cement bank protection and structures is shown on **Exhibit 1**. Design and analysis of these proposed improvements are described in detail in *Drainage Concept Report Volume III of V, Hasley Canyon Creek Bank Protection, EIMP No. 2019000489*, which was approved by LACPW in March 2022 (PACE, October 2021).

(1) **Proposed Soil Cement Bank Protection** – approximately 3,000 linear feet (LF) of buried soil cement along the east and west bank of Hasley Canyon Creek. At the upstream end, the bank protection along both the east and west banks will join with the existing concrete slope lining (PD 2262). At the downstream end, the proposed Hasley Canyon Creek "East" bank protection joins the proposed Castaic Creek "West" bank protection, and the Hasley Canyon Creek "West" bank protection joins the existing concrete/ rip-rap lining (PD 2298-Unit III).

(2) **Rock Chute and Stilling Basin** – At the upstream end of the proposed soil cement bank protection and existing concrete slope protection, a rock chute and stilling basin are required to convey flow over a ~20ft drop, to dissipate energy and provide erosion protection along the channel bottom.

(3) **Proposed "Franklin Parkway Bridge"** – The Franklin Parkway Bridge has a span of approximately 380 LF and will have two support piers.

(4) **Modified Flow Diversion Berm (PD 2298, Unit III, Linings B and C) at the Castaic Creek/ Hasley Canyon Creek Confluence** – An existing flow diversion berm will be modified in the proposed condition. The existing berm was designed to convey flows from Hasley Canyon Creek under Commerce Center Drive Bridge before joining with Castaic Creek flows downstream of the bridge. In the proposed condition, approximately 150 LF of the existing berm will be removed to allow flows from Hasley Canyon Creek to converge with Castaic Creek flows upstream of the Commerce Center Drive bridge.

P:\A535\6-GIS\Projects\HasleyCreek_CLOMR\A535_HasleyCreekCLOMR\A535_HasleyCreekCLOMR.aprx - Figure 1-1 Project Vicinity Map

VALENCIA COMMERCE CENTER
HASLEY CANYON CREEK CLOMR

PROJECT VICINITY MAP

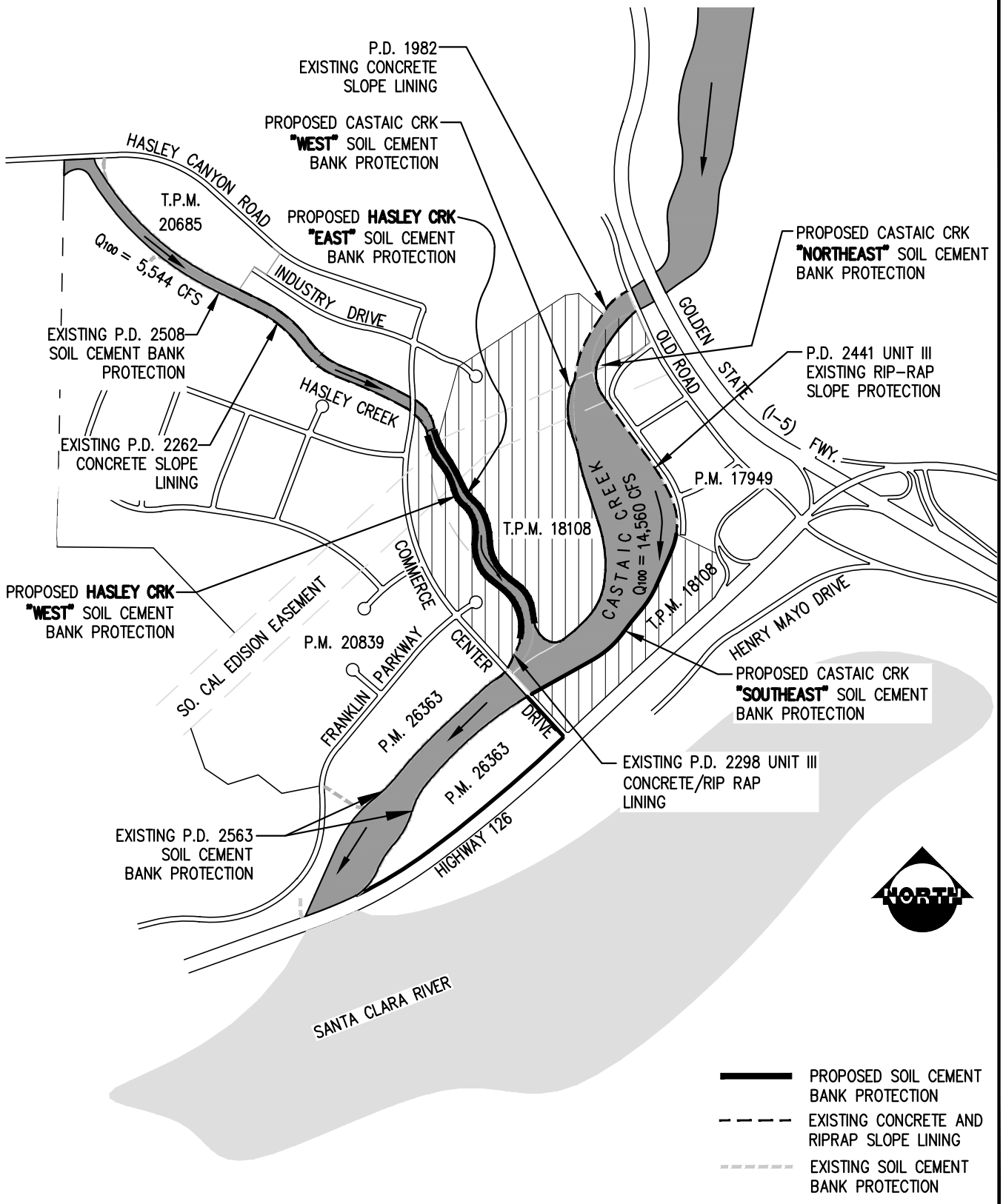
PACE Advanced Water Engineering

0 500 1,000 2,000 Feet

Date: 5/5/2023

Job Number: A535

Figure 1-1



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SCALE	N.T.S.
DESIGNED	EMR
DRAWN	BDP
CHECKED	JC
DATE	MARCH, 2023
JOB NO.	A535_84

HASLEY CREEK
SOIL CEMENT BANK PROTECTION
TPM @ 18108

INDEX MAP

FIGURE
1-2

P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-84_Figure1-2 Soil Cement Location.dwg By: erondig Date: Jul. 10, 2024 Time: 08:28 am

2 Model Background and Development

2.1 Hydrology

The project site is located within Hasley Canyon Creek watershed, which has a drainage area of approximately 7.3 square miles. Based on the Flood Insurance Study (FIS), dated June 2021, the flow rate for the 100 storm event is 1,640 cfs. **Table 2-1** below summarizes the design and FEMA flow rates for Hasley Canyon Creek within the study reach.

Table 2-1: Hasley Canyon Creek Design Hydrology

Storm Event/ Return Period	Design Flow (cfs)	Location
100 – Year	1,640(1)	At Confluence with Castaic Creek
100 – Year	820(2)	At Flow Diversion Berm, Flow is split evenly on the North and South Sides of the Berm

Notes:
(1) Source FEMA FIS for Los Angeles County and Incorporated Areas, June 2, 2021, see **Appendix B**.
(2) Source FEMA Effective Model for Hasley Canyon Creek, dated 2022

2.2 HEC-RAS Model Development

To fully analyze the study reach of Hasley Canyon Creek near the proposed project, a detailed hydraulic model was developed using the computer application program, HEC-RAS Version 6.2. The model extends from approximately 600 feet downstream of the Commerce Center Drive Bridge over Hasley Canyon Creek (XS 4725) to 40 feet downstream of the Commerce Center Drive Bridge over Castaic Creek, just downstream of the confluence of Hasley Canyon Creek with Castaic Creek. The total floodplain study reach is approximately 3,800 feet. PACE developed existing and proposed conditions HEC-RAS models for the study reach.

2.2.1 FEMA Effective Model

A physical map revision (PMR) was completed for the Hasley Canyon Creek project area in June 2021, which included the confluence of Hasley Canyon Creek with Castaic Creek. A request was made to FEMA for effective models for Hasley Canyon Creek and Castaic Creek based on the revision. The data received from FEMA included an effective model for Hasley Canyon Creek dated 2022, and an effective model for Castaic Creek dated 2021. The Hasley Canyon Creek effective model was used as a design basis for the existing condition and proposed condition tie-in's, discharge, and selection pf manning's n roughness values.

2.2.2 Model Preparation

Hydraulic modeling was performed using HEC-RAS, a computer modeling software developed by the U.S. Army Corps of Engineers (USACE). HEC-RAS is a rigid boundary hydraulic model that assumes the channel bed does not fluctuate, and develops a one-dimensional solution of the energy equation. To do this, energy losses are evaluated by friction through Manning's equation and contraction/expansion is based on the coefficient and change in velocity head. When bridges and confluences are present, the momentum equation or pressure flow/weir equation is used to manage these situations of rapidly varying water surface profile. Per FEMA requirements, the models were run with a subcritical flow regime.

2.2.2.1 FEMA Designations

The proposed project is located within SFHA Zone AE; a detailed hydraulic analysis has been previously performed and there are base flood elevation's (BFE's) provided by FEMA.

2.2.3 *Model Overview*

The following guidelines and assumptions were used to develop the various hydraulic analyses with the HEC-RAS model:

- Cross Section Spacing Intervals
- Cross Geometry Section Geometry
- Discharge
- Flow Regime
- Boundary Conditions
- Selection of Manning roughness – 'n' Values
- Bank Station Definition
- Ineffective Flow Areas
- Hydraulic Structure Data

2.2.3.1 Cross Section Spacing Intervals and Geometry

The corrected effective cross-section geometry is based on 2013 topographic data. This topography includes existing concrete slope lining (per P.D. 2262) at the upstream end of the study reach, existing Hasley Creek Concrete/ rip-rap lining (per P.D. 2298 Unit II) upstream of Commerce Center Drive, existing Castaic Creek soil cement bank protection (per P.D. 2563) downstream of Commerce Center Drive Bridge over Castaic Creek, and the existing flow diversion berm (per P.D. 2298 Unit III) between Hasley Creek and Castaic Creek. A HEC-RAS workmap showing the HEC-RAS cross sections and 2013 topographic contours is shown in **Exhibit 3**.

The proposed conditions cross-section geometry is based on the proposed Hasley Canyon Creek finished grade contours, which tie into the existing 2013 topographic data. The proposed finished grades consist of 3:1 side slopes on each bank, which then transition to a 2 percent slope until the proposed grading daylights with the existing grades near the center of the channel. The proposed cross-sections also include the proposed drop structure and stilling basin which connects the existing channel (per P.D. 2262) upstream of the project to the proposed project bank protection improvements, and extends from HEC-RAS cross-section 4396 to cross-section 4265. Finally, the proposed cross-section geometry includes shortening the flow diversion berm at the Commerce Center Drive Bridge between Hasley Creek and Castaic Creek. Note that some of the cross-section locations differ in the existing and proposed condition geometries, as cross sections were repositioned in the proposed conditions to span the proposed channel and to be oriented perpendicular to the flow direction.

Additional cross-sections are also included at the proposed drop structure and surrounding the proposed Franklin Parkway bridge. A proposed HEC-RAS work map showing the HEC-RAS cross-sections, proposed finished grade contours, and 2013 topographic contours is included in **Exhibit 3**. Note that interpolated cross-sections were used to refine results along the proposed drop structure and within the proposed stilling basin, which experience high energy loss and abrupt changes in water surface elevations, these are not included in **Exhibit 3**.

2.2.3.2 Discharge

The discharges used for the Hasley Canyon Creek analysis were obtained from the FEMA FIS (June 2021). A flow rate of 1,640 cfs was used for the entire study reach upstream of the confluence of Hasley Canyon Creek with Castaic Creek, as shown in **Table 2-1**. Per the FEMA effective model, the 1,640 cfs flow is split at the flow diversion berm, with half the flow (820 cfs) going on along the north side of the berm and the other half (820 cfs) going along the south side of the berm.

2.2.3.3 Hydraulic Flow Regime

The hydraulic analyses were performed in a "subcritical" flow regime. A "mixed" flow regime would more closely reflect the actual conditions that would naturally occur in the hydraulic system, but the intent of the floodplain hydraulic models is strictly for defining flood hazards per FEMA standards.

2.2.3.4 Topographic Data Source

The one-foot aerial topography from 2013 (covering this project's study reach of Castaic Creek and Hasley Canyon Creek) was used for the hydraulic analysis and floodplain delineation. This topography and all elevations are in North American Vertical Datum of 1988 (NAVD88).

2.2.3.5 Boundary Conditions

The boundary condition for the downstream study limit was taken as "normal depth slope" with slope equal to 0.0187 ft/ft. This boundary condition is the same as the boundary condition for the effective model. Note, the model is run in the subcritical flow regime, which does not require an upstream boundary condition.

2.2.3.6 Selection of the Manning's Roughness Value

The FEMA FIS report specifies manning's roughness for Hasley Canyon Creek as 0.020 - 0.040 within the channel and 0.050 - 0.1 for the overbanks. Manning's roughness values within the model were set to match those specified in the effective FEMA model for Hasley Canyon Creek.

2.2.3.7 Hydraulic Structures

The existing conditions hydraulic model includes the Commerce Center Drive Bridge over Castaic Creek (Bridge No. B3794) as well as the existing flow diversion berm (per P.D. 2298 Unit III). Geometry for the Commerce Center Drive Bridge over Castaic Creek was obtained from as-built plans provided in **Appendix F**. The FEMA effective model only includes the portion of Commerce Center Drive Bridge over the Hasley Canyon Creek side or north side of the flow diversion berm. The existing and proposed conditions models follow the same approach as the effective model for the Commerce Center Drive Bridge. The bridge modeled spans approximately 120ft from the north abutment of the bridge (Bridge Abutment 1) to the flow diversion berm (Pier 3) and includes a single pier (Pier 2), per Commerce Center Drive Bridge As-Builts. The bridge is situated between cross sections 593 and 458.

The proposed condition hydraulic model includes the existing Commerce Center Drive Bridge over Castaic Creek, the proposed Franklin Parkway Bridge, the proposed bank improvements, and the modified flow diversion berm. Franklin Parkway bridge is situated between proposed HEC-RAS cross-sections 2305.5 and HEC-RAS cross-section 2190.5, and is approximately 1,000 ft upstream of the Hasley Canyon Creek and Castaic Creek confluence. Franklin Parkway bridge contains two 6-ft wide bridge piers, a bridge span of approximately 300-ft, and a bridge deck 88-ft in width.

2.2.3.8 Ineffective Flow Areas

Ineffective flow markers are incorporated in the model to establish the portion of the channel at each cross section with effective flow. Overbank areas are considered ineffective flow areas until flows reach a specific elevation, after which the effective channel widens to accommodate the higher flows. In the existing condition model, ineffective flow is designated upstream of cross sections 963, with a contraction ration of 1:1, as the natural floodplain narrows going into the north side of the flow diversion berm. This is shown in the topographic workmap, **Exhibit 8**.

2.3 Summary of CLOMR HEC-RAS Models

In summary, the Hasley Canyon Creek CLOMR includes the following condition models:

(1) Duplicate Effective Model:

This represents the effective FEMA model, truncated to the study area, and run on the newest version of HEC-RAS (6.4.1).

(2) Corrected Effective Condition Model/ Pre-Project Condition:

Cross sections cut from 2013 topography and additional cross sections added to the effective model. This model does not include the proposed improvements.

(3) Proposed Condition Model

Cross sections cut from 2013 topography and additional cross sections added to the model with some locations changing to better suit the soil cement bank protection alignment. Cross section geometry includes proposed soil cement bank protection, Franklin Parkway bridge, and the modified flow diversion berm.

3 Sediment Transport Considerations

3.1 Introduction

Various analyses were performed to evaluate the fluvial characteristics and long-term stability of study area in the vicinity of the Lower Hasley Creek improvements as part of the *Drainage Concept Report Volume III of V, Hasley Canyon Creek Bank Protection, EIMP No. 2019000489* (Approved March 2022). The proposed soil cement bank protection, which will be installed on the east and west banks, will provide long-term erosion protection from vertical and lateral migration of the thalweg and flood protection for the adjacent proposed developments. The fluvial study evaluated the impacts from (1) fluvial modifications of the streambed from a single hypothetical storm event, or the general adjustment and (2) long-term changes in the floodplain fluvial operation, or the long term adjustment.

3.1.1 Types of Adjustment

Bed adjustment in feet quantify the fluvial modifications and long-term changes of the streambed. A positive adjustment indicates bed aggradation, while a negative adjustment indicates bed degradation. PACE considered several types of adjustment in this study including:

- *Long-Term Adjustment* which accounts for fluvial processes that occur over many rainy seasons and contribute to fluctuations in the creek's bed elevation.
- *General Adjustment* which accounts for scour that occurs during an individual storm event. Aggradation describes a situation in which the quantity of sediment that enters a given reach is higher than the quantity of sediment that exits the same reach, and degradation describes a situation in which sediment outflow exceeds inflow for a given reach.
- *Other Scour* is comprised of local scour, bend scour, low-flow incisement, and bed form height.

The total vertical adjustment (total scour) is the sum of the general adjustment, long-term adjustment, and other scour. The toe of the soil cement was designed to be at or below the maximum calculated total scour and is shown on the soil cement profiles in the "West" and "East" banks in **Exhibits 6 and 7**, respectively.

4 Proposed Hasley Canyon Creek Modifications and Improvements

The proposed improvements at Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 consist of soil cement bank protection along both banks of Hasley Canyon Creek, installation of a rock chute stilling basin and two grade control structures, construction of the proposed Franklin Parkway Bridge, and modifications to an existing diversion berm/ flow splitter. Below is a summary of the design of the proposed improvements.

4.1 Rock Chute and Stilling Basin

At the upstream termination/junction point of the proposed soil cement bank protection and the existing concrete slope protection, a rock chute and stilling basin are required to convey flow over the roughly 20-foot drop, to dissipate the energy and to provide erosion protection along the channel bottom. The crest of the rock chute is designed to tie in with the channel invert at the end of the existing concrete slope-lined channel (PD No. 2262). The chute and stilling basin will be rock lined along the bottom with exposed soil cement along the side slopes. The chute will be designed with a 3:1 (H:V) slope along the invert and 1.5:1 (H:V) side slopes for the exposed soil cement. The bottom width of the channel is approximately 85 feet at the crest of the chute and approximately 50 feet at the toe of the chute. The stilling basin will be level along the invert and will extend approximately 100 feet downstream. The end of the stilling basin will have a 2.5:1 (H:V) slope to tie in with the invert of the channel, and the end sill will extend roughly ten feet downstream. From this point, a sloped cut-off will be provided that will extend down to the toe of soil cement elevation at a 2:1 (H:V) slope. The proposed layout of the drop structure is shown in **Exhibit 4**.

4.2 Grade Control Structures

The proposed project also includes the construction of two grade control structures. The purpose of the grade control structures is to maintain the stability of the natural streambed by controlling head cutting and reducing long-term scour in the channel. One of the proposed grade control structures will be placed at HEC-RAS River Station 1804, approximately 675 ft upstream of the Hasley Canyon Creek and Castaic Creek confluence. The other proposed grade control structure will be placed between HEC-RAS River Stations 3190.5 and 3304, approximately 915 ft upstream of the proposed Franklin Parkway Bridge. Both grade control structures will be constructed of riprap, and the top of the structures will be set at the existing grade of the channel. The structures will be buried deep enough to prevent vertical erosion during peak flows from undermining the structure.

4.3 Franklin Parkway Bridge

The proposed project also includes the addition of the Franklin Parkway Bridge crossing over Hasley Creek. The Franklin Parkway Bridge is still in the conceptual design phase. The bridge is proposed to be located between HEC-RAS cross sections 2190.5 and 2305.5, approximately 1,000 ft upstream of the confluence of Castaic Creek and Hasley Canyon Creek. The bridge will have a proposed span of approximately 350 feet, a deck width of 88 feet, and two, six-foot support piers.

4.4 Modifications to the Existing Berm

The existing concrete and riprap lined berm (see Linings B and C on PD 2298, Unit III) is located at the confluence between Castaic Creek and Hasley Canyon Creek. The berm was designed to divert flows from Hasley Canyon Creek into Castaic Creek downstream of the Commerce Center Drive Bridge. However, a large storm in January 2005 caused flows to bifurcate the berm. This change caused the berm to become an obstruction to flows and increase chances of blockages to either flow path, into Castaic Creek, or under Commerce Center Drive.

In the proposed condition, the upstream portion of the flow diversion berm will be removed and lowered to the scour depth. This will remove the obstruction to the flow path of Hasley Canyon Creek and allow water

into Castaic Creek upstream of Commerce Center Drive Bridge. **Exhibit 5** depicts the proposed modifications to the existing flow diversion berm.

According to the as-built drawings, the existing flow diversion berm is approximately 500 feet in length and is 16-feet-wide as measured along the top of the berm. The berm consists of two linings. Lining B is a concrete lining that was installed along the Hasley Canyon Creek side of the berm. Lining C is comprised of mostly rip-rap and was placed along the side of the berm facing Castaic Creek. The as-built drawings (PD 2298, Unit III) for the flow diversion berm are provided in **Appendix G**. It should be noted that the elevations shown on PD 2298, Unit III are referenced to the NGVD 1929. A datum shift of +2.638 feet should be applied to convert NGVD 1929 elevations to NAVD 1988 elevations, as the HEC-RAS model datum is NAVD 88.

A portion of the upstream end of the existing flow diversion berm will be removed such that the modified flow diversion berm will be reduced to 150 feet in length upstream of Commerce Center Drive Bridge. Rip-rap will be placed at the upstream end of the berm. The portion of the flow diversion berm above the estimated scour elevations will be removed to eliminate the obstruction of flows from Hasley Creek entering Castaic Creek upstream of Commerce Center Drive Bridge.

4.5 Soil Cement Bank Protection

The proposed Lower Hasley Canyon Creek bank protection will consist of buried soil cement bank protection. The bank protection improvements will be located east of Commerce Center Drive, along the east and west banks of Hasley Canyon Creek. The proposed bank protection along the east and west banks of Hasley Canyon Creek will be approximately 3,000 linear feet and will protect the VCC Industrial Park Development from potential flooding and erosion. At the upstream end of Hasley Canyon Creek, the bank protection along both the east and west banks will join with the existing concrete slope lining (PD 2262). At the downstream end, the proposed Hasley Canyon Creek “East” bank protection joins the proposed Castaic Creek “West” bank protection, and the Hasley Canyon Creek “West” bank protection joins the existing concrete/ rip-rap lining (PD 2298-Unit III).

4.5.1 Design of Soil Cement Bank Protection

The “structural” segment of the proposed Lower Hasley Creek bank protection consists of LACPW standard buried soil cement to provide the appropriate level of freeboard and scour protection for all storm events up to the Capital Flood. The critical factors in determining the design of the bank protection were based on the following criteria:

1. Flood control stability and durability of bank protection.
2. Safety concerns regarding access to and from the channel in dry and wet conditions.
3. Bank protection maintenance considerations.
4. Environmental compatibility with the native area and resource enhancement concepts, and aesthetic considerations.
5. Constructability and cost of construction.

Soil cement bank protection is constructed as a monolithic and homogenous structure consisting of approximately 90% native soils and 10% cement. The typical section consists of 8-foot wide and 6 to 12-inch thick layers of soil cement. Each layer of soil cement is set back from the edge of the previous layer, at a 1.5:1 slope. The entire section varies in total height based on varying freeboard, flow depth and toe-down requirements.

The proposed soil cement bank protection addresses the above design criteria as follows:

1. Soil cement provides a stable riverbank protection material, in terms of both surface erosion and structural stability. Preliminary geotechnical analysis indicates that locally available native soils are considered acceptable for use in soil cement mix.

2. For the majority of the reach, soil cement bank protection will be completely buried with a variable backfill slope of 3:1 (H:V) or flatter. Near the upstream tie in to the existing concrete slope protection within the chute, the soil cement will be partially exposed.

4.6 Channel Freeboard Requirements

The proposed top of bank protection was designed to maintain a minimum 2.5 ft of freeboard based on LACPW design criteria. The LACPW design criteria is based on a Capital flood flow of 9,480 cfs and a manning's roughness coefficient of n = 0.085.

This CLOMR floodplain mapping analysis uses the 100-yr FEMA FIS flow rate of 1,640 cfs, which provides freeboard that exceeds the FEMA requirements. The freeboard height above the FEMA 100-year base flood elevation is summarized for the "West" and "East" banks in **Table 4-1** and **Table 4-2**, respectively.

Table 4-1: "West" Bank Soil Cement Bank Protection Freeboard Summary

HEC-RAS Cross Section	West Soil Cement Bank Station	Proposed Top of Bank Elevation [ft]	Proposed Condition 100-yr WSE [ft] (Q_{100} = 1,640 cfs)	Freeboard above 100-yr WSE [ft]
4396/End Top of Soil Cement, Join Existing Concrete Slope Lining, P.D. No. 2262	39+89.01	1071.1	1061.6	9.5
4300	39+27.91	1065.0	1042.2	22.8
4282	39+08.28	1063.0	1039.6	23.4
4276	38+65.51	1058.7	1039.7	19.0
4270	38+07.80	1053.0	1039.8	13.3
4265	37+97.72	1052.9	1039.6	13.3
4258	37+85.91	1052.8	1039.6	13.2
4157	37+09.64	1051.9	1039.7	12.3
4055.5	35+63.04	1050.3	1039.3	11.0
3940.5	34+77.22	1049.4	1038.0	11.4
3844	33+70.62	1047.5	1035.5	12.0
3747	32+79.01	1045.9	1034.2	11.7
3650	31+64.34	1043.9	1032.5	11.4
3554	30+37.39	1041.7	1030.5	11.2
3440.5	29+23.41	1039.7	1029.5	10.2
3372	28+60.84	1038.6	1028.5	10.1
3304	28+08.81	1037.7	1027.0	10.7
3190.5	27+01.61	1035.8	1025.7	10.1
3105	26+53.53	1035.0	1024.4	10.6
3020	25+83.13	1033.7	1024.0	9.8
2934	25+02.70	1032.3	1022.4	9.9
2820.5	23+87.44	1030.3	1019.1	11.2
2748	23+00.00	1028.8	1017.9	10.9
2675.5	21+95.89	1027.0	1016.7	10.3
2560.5	20+87.57	1025.1	1014.8	10.2
2476	19+64.82	1022.9	1014.1	8.9

HEC-RAS Cross Section	West Soil Cement Bank Station	Proposed Top of Bank Elevation [ft]	Proposed Condition 100-yr WSE [ft] (Q_{100} = 1,640 cfs)	Freeboard above 100-yr WSE [ft]
2391	18+61.46	1021.1	1012.4	8.7
2305.5	18+01.98	1020.1	1011.9	8.2
2190.5	16+83.64	1018.0	1008.9	9.0
2122	15+77.90	1016.1	1007.7	8.4
2054	15+24.32	1015.2	1005.9	9.2
1940.5	14+47.40	1013.8	1004.7	9.1
1872	13+93.42	1013.0	1003.1	9.9
1804	13+30.05	1012.1	1002.0	10.1
1689	12+13.58	1010.4	999.5	11.0
1584	11+45.70	1009.5	997.7	11.8
Begin West Bank Soil Cement Top, Join Existing Slope Lining (Per P.D. 2296 Unit III)	10+44.81	1008	-	-

Table 4-2: "East" Bank Soil Cement Bank Protection Freeboard

HEC-RAS Cross Section	East Soil Cement Bank Station	Proposed Top of Bank Elevation [ft]	Proposed Condition 100-yr WSE [ft] (Q_{100} = 1,640 cfs)	Freeboard above 100-yr WSE [ft]
End Top Soil Cement, Join Existing Concrete Slope Lining P.D. No. 2262	40+29.97	-	-	-
4396	39+91.02	1071.1	1061.6	9.4
4300	39+29.98	1065.0	1042.2	22.8
4282	39+11.65	1063.1	1039.6	23.5
4276	38+74.34	1059.4	1039.7	19.7
4270	38+43.10	1056.3	1039.8	16.5
4265	38+32.25	1055.2	1039.6	15.6
4258	38+20.42	1054.0	1039.6	14.4
4157	37+48.37	1051.5	1039.7	11.8
4055.5	36+60.38	1050.5	1039.3	11.2
3940.5	35+53.64	1049.3	1038.0	11.3
3844	34+26.58	1047.2	1035.5	11.6
3747	33+25.47	1045.5	1034.2	11.3
3650	32+40.49	1044.0	1032.5	11.5
3554	31+63.21	1042.7	1030.5	12.2
3440.5	30+45.90	1040.7	1029.5	11.2
3372	29+63.35	1039.3	1028.5	10.7
3304	28+84.58	1037.9	1027.0	10.9
3190.5	27+60.89	1035.8	1025.7	10.1
3105	26+56.85	1034.1	1024.4	9.7
3020	25+44.48	1032.1	1024.0	8.2
2934	24+53.29	1029.9	1022.4	7.5
2820.5	23+39.34	1027.1	1019.1	8.0
2748	22+82.85	1026.2	1017.9	8.3
2675.5	22+15.00	1025.0	1016.7	8.4

HEC-RAS Cross Section	East Soil Cement Bank Station	Proposed Top of Bank Elevation [ft]	Proposed Condition 100-yr WSE [ft] (Q_{100} = 1,640 cfs)	Freeboard above 100-yr WSE [ft]
2560.5	21+36.58	1023.8	1014.8	8.9
2476	20+70.49	1022.7	1014.1	8.6
2391	20+00.15	1021.5	1012.4	9.1
2305.5	19+14.24	1020.1	1011.9	8.2
2190.5	18+09.13	1018.4	1008.9	9.4
2122	17+41.40	1017.2	1007.7	9.5
2054	16+40.43	1015.6	1005.9	9.7
1940.5	15+36.82	1013.9	1004.7	9.2
1872	14+22.46	1012.0	1003.1	8.9
1804	13+50.46	1010.7	1002.0	8.8
1689	12+34.30	1008.8	999.5	9.3
1584	10+97.28	-	997.7	-
Begin Top Soil Cement, Join the proposed Castaic Creek Soil Cement Bank Protection	10+00.00	1006.8	-	-

The final top and toe of the proposed soil cement bank protection is shown in profile for the “West” and “East” banks on **Exhibit’s 6 and 7**, respectively.

4.7 Bank Protection Toe-Down Design Summary

The proposed toe of the soil cement bank protection was design based on the estimated scour depth within the Creek. Per LACPW Hydraulic Design criteria, a Manning’s roughness coefficient of n=0.025 was utilized to determine the maximum velocities within the study limits.

The types of scour analyzed include long-term scour, local scour, contraction scour, local scour at the bridge piers, bend scour, low-flow incisement, and bedform height.

5 Hydraulic Analysis Results

5.1 Baseline Corrected Effective Hydraulic Analysis

The main purpose of the corrected effective analysis (pre-project) is to serve as a basis of comparison for the proposed condition (post-project) analysis. A complete summary of the corrected effective hydraulic results is presented in **Appendix D**.

A comparison between the duplicate effective and corrected effective models is provided in **Table 5-1** to shown the changes in water surface elevation (WSEL) and velocity resulting from the updated topography. Note that the corrected effective model has additional sections not included in the duplicate effective model, see **Exhibit 2** for a comparison of the duplicate effective and corrected effective cross sections. See **Appendix C** for a complete summary of the duplicate effective HEC-RAS results.

Table 5-1: Flow Depth and Velocity Comparison for the Duplicate Effective and Corrected Effective (Q_{100} = 1,640/ 820 cfs)

Effective HEC-RAS Cross Section	Duplicate Effective		Corrected Effective HEC-RAS Cross Section	Corrected Effective		Difference [Corrected Effective - Duplicate Effective]	
	WSEL (ft)	Velocity (fps)		WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)
4295	1070.5	8.9					
4213	1069.8	8.1	4725	1070.0	7.2	0.3	-0.9
4127	1068.6	8.1	4648	1070.2	4.4	1.7	-3.7
			4622	1069.4	8.1		
			4523	1067.5	8.1		
			4396	1065.0	8.0		
3834	1062.4	7.2					
3764	1060.8	6.1	4294	1061.3	6.0	0.5	0.0
3728	1059.6	6.5	4255	1058.6	6.6	-0.9	0.1
			4207	1048.9	7.4		
			4164	1039.4	6.8		
			4133	1039.4	1.9		
			4100.5	1038.9	5.5		
			4078	1038.4	7.2		
			4055.5	1038.3	6.9		
3447	1040.1	6.5					
			3940.5	1036.5	9.4		
			3844	1035.6	7.8		
			3747	1034.5	6.9		
			3650	1032.7	8.1		
			3564	1030.8	5.9		
2997	1034.1	9.6					
			3465	1030.2	5.3		
			3369	1028.6	8.6		
2767	1029.9	5.6	3304	1027.4	7.9	-2.5	2.3
2676	1028.6	5.8					
			3190.5	1025.5	8.5		
2568	1026.9	6.8	3105	1024.0	8.1	-2.9	1.3
			3020	1023.4	6.3		
			2934	1021.8	8.5		
			2820.5	1019.2	7.9		
2253	1021.9	7.5					
			2748	1017.8	7.1		
			2675.5	1016.8	6.8		
			2560.5	1014.7	8.0		

Effective HEC-RAS Cross Section	Duplicate Effective		Corrected Effective HEC-RAS Cross Section	Corrected Effective		Difference [Corrected Effective - Duplicate Effective]	
	WSEL (ft)	Velocity (fps)		WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)
1907	1015.6	5.6	2476	1013.8	5.5	-1.8	0.0
			2391	1012.5	6.0		
1795	1013.2	6.3					
			2305	1010.7	6.3		
1715	1011.9	5.1					
			2190	1008.3	5.9		
			2122	1007.5	6.8		
1510	1008.4	7.7					
			2054	1006.3	7.8		
			1940	1004.6	5.9		
			1872	1003.4	7.0		
1269	1003.5	7.9					
			1804	1002.2	7.8		
1137	1000.8	7.1					
			1689	999.7	6.2		
North Side of Flow Diversion Berm[2]							
963	997.8	5.5	963	998.0	6.0	0.2	0.5
			704	994.6	5.3		
616	994.3	3.7	616	994.3	3.7	0.0	0.0
593	994.3	3.3	593	994.3	3.3	0.0	0.0
584	Commerce Center Drive Bridge						
458	990.5	6.6	458	990.5	6.6	0.0	0.0
358	988.6	8.2	358	988.6	8.2	0.0	0.0
290	986.6	7.6	290	986.6	7.6	0.0	0.0
South Side of Flow Diversion Berm[2]							
731	996.6	5.9	731	996.6	7.0	0.0	1.1
665	995.3	6.3	665	995.3	5.8	0.0	-0.6
512	992.1	5.8	512	992.6	5.7	0.4	-0.1
336	988.7	5.4	336	988.7	5.4	0.0	0.0
203	986.4	5.5	203	986.4	5.5	0.0	0.0

Note:
[1]Blank cells indicate locations where a HEC-RAS cross section is only included in one of the models, either duplicate effective or corrected effective.
[2]Flow is reduced from 1640 cfs to 820 cfs at the flow diversion berm (cross sections 963 and 731).

5.2 Proposed Condition Hydraulic Analysis

The proposed condition model differs from the corrected effective model in that the proposed condition model includes:

- the soil cement bank protection and accompanied re-grading of the channel
- the proposed Franklin Parkway Bridge
- modifications to the flow diversion berm
- the drop strucutre

A complete summary of the proposed condition hydraulic results is presented in **Appendix E**. **Table 5-2** provides a comparison of the water surface elevation and velocity results between the proposed condition and corrected effective models.

Table 5-2: Flow Depth and Velocity Comparison for Corrected Effective and Proposed Condition (Q_{100} = 1,640/820 cfs)

Corrected Effective HEC-RAS Cross Section	Corrected Effective		Proposed HEC-RAS Cross Section	Proposed Condition		Difference [Proposed – Corrected Effective]	
	WSEL (ft)	Velocity (fps)		WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)
4725	1070.0	7.2	4725	1070.1	6.9	0.1	-0.3
4648	1070.2	4.4	4648	1070.2	4.4	0.0	0.0
4622	1069.4	8.1	4622	1069.4	8.1	0.0	0.0
4523	1067.5	8.1	4523	1067.5	8.2	0.0	0.0
4396	1065.0	8.0	4396	1061.6	8.3	-3.4	0.3
4055.5	1038.3	6.9	4055.5	1039.3	4.6	1.0	-2.3
3940.5	1036.5	9.4	3940.5	1038.0	6.3	1.5	-3.1
3844	1035.6	7.8	3844	1035.5	7.0	0.0	-0.8
3747	1034.5	6.9	3747	1034.2	4.6	-0.3	-2.3
3650	1032.7	8.1	3650	1032.5	7.3	-0.1	-0.9
3564	1030.8	5.9	3554	1030.5	6.0	-0.3	0.1
3304	1027.4	7.9	3304	1027.0	5.9	-0.4	-2.0
3190.5	1025.5	8.5	3190.5	1025.7	3.9	0.2	-4.6
3105	1024.0	8.1	3105	1024.4	7.3	0.4	-0.8
3020	1023.4	6.3	3020	1024.0	4.4	0.6	-1.9
2934	1021.8	8.5	2934	1022.4	7.3	0.6	-1.2
2820.5	1019.2	7.9	2820.5	1019.1	7.1	-0.1	-0.8
2748	1017.8	7.1	2748	1017.9	5.8	0.1	-1.3
2675.5	1016.8	6.8	2675.5	1016.7	6.0	-0.1	-0.8
2560.5	1014.7	8.0	2560.5	1014.8	7.6	0.2	-0.4
2476	1013.8	5.5	2476	1014.1	4.1	0.3	-1.4
2391	1012.5	6.0	2391	1012.4	6.4	-0.1	0.3
2305	1010.7	6.3	2305.5	1011.9	3.1	1.2	-3.2
			2250	Proposed Franklin Parkway Bridge			
2190	1008.3	5.9	2190.5	1008.9	5.3	0.6	-0.7
2122	1007.5	6.8	2122	1007.7	5.1	0.3	-1.6
2054	1006.3	7.8	2054	1005.9	6.5	-0.3	-1.3
1940	1004.6	5.9	1940.5	1004.7	4.7	0.1	-1.3
1872	1003.4	7.0	1872	1003.1	6.8	-0.3	-0.2
1804	1002.2	7.8	1804	1002.0	5.5	-0.2	-2.2
1689	999.7	6.2	1689	999.5	6.1	-0.3	-0.1
North Side of Flow Diversion Berm[1]							
963	998.0	6.0					
704	994.6	5.3	704	994.6	5.4	0.0	0.0
616	994.3	3.7	616	994.3	3.7	0.0	0.0
593	994.3	3.3	593	994.3	3.3	0.0	0.0
584	Commerce Center Drive Bridge						
458	990.5	6.6	458	990.5	6.6	0.0	0.0
358	988.6	8.2	358	988.6	8.2	0.0	0.0
290	986.6	7.6	290	986.6	7.6	0.0	0.0
South Side of Flow Diversion Berm[1]							
731	996.6	7.0					
665	995.3	5.8					
336	988.7	5.4	336	988.7	5.4	0.0	0.0
203	986.4	5.5	203	986.4	5.5	0.0	0.0

Note:
[1]Blank cells indicate locations where a HEC-RAS cross section is only included in the corrected effective model
[2]Flow is reduced from 1640 cfs to 820 cfs at the flow diversion berm (cross sections 963 and 731 in the corrected effective condition and cross sections 704 and 336 in the proposed condition).
[3]Tie-in Located denoted in shaded cells.

Table 5-3 summarizes the tie-in analysis for the proposed floodplain modifications. The tie-in points, where the FIRM will be modified, are at locations where the revised floodplain is within 5% of the FEMA effective floodplain top width and the change in water surface elevation is 0.5 ft or less. See **Exhibit 2** for a comparison of the FEMA effective cross sections and the proposed condition cross sections.

Table 5-3: Tie-In Analysis for the Effective and Proposed Condition (Q_{100} = 1,640/820 cfs)

Effective HEC-RAS Cross Section	Effective WSEL (ft)	Effective Top-width (ft)	Proposed HEC-RAS Cross Section	Proposed WSEL (ft)	Proposed Top-width (ft)	Difference in WSEL [Proposed - Effective] (ft)	Top-width Within 5%? Yes or No
4213	**1069.8**	**101.5**	**4725**	**1070.1**	**103.5**	**0.3**	**YES**
4127	1068.6	101.5	4648	1070.2	106.9	1.7	NO
2767	1029.9	197.9	3304	1027.0	261.8	-2.9	NO
1907	1015.6	242.2	2476	1014.1	247.8	-1.5	YES
North Side of Flow Diversion Berm							
616	**994.3**	**94.1**	**616**	**994.3**	**94.1**	**0.0**	**YES**
593	994.3	99.0	593	994.3	99.0	0.0	YES
584	Commerce Center Drive Bridge						
458	990.5	76.9	458	990.5	76.9	0.0	YES
358	988.6	77.2	358	988.6	77.2	0.0	YES
290	986.6	84.6	290	986.6	84.6	0.0	YES
South Side of Flow Diversion Berm							
336	**988.7**	**119.4**	**336**	**988.7**	**119.4**	**0.0**	**YES**
203	986.4	153.0	203	986.4	153.0	0.0	YES

Notes:
[1] Bolded Cross Section with Red Outline indicate Tie-In locations with the effective floodplain.

5.3 Hydraulic Analysis Results and Floodplain Discussion

For the purpose of this CLOMR application, a detailed analysis of Hasley Creek from approximately 600 feet downstream of the Commerce Center Drive Bridge over Hasley Canyon Creek to approximately 40 feet downstream of the confluence of Hasley Canyon Creek with Castaic Creek is presented herein, including a hydraulic analysis of the Creek with proposed soil cement bank protection and the proposed Franklin Parkway Bridge.

According to the analysis, the proposed soil cement bank protection will cause the 100-yr floodplain to primarily widen at the location of the proposed bank protection. In addition, there are both increases and decreases in the 100-yr water surface elevations, with a maximum increase of 1.2 ft directly upstream of Commerce Center Drive Bridge over Castaic Creek. All increases above 0.5 ft are within the limits of the proposed soil cement bank protection and do not cause impacts to any offsite properties.

The topographic work map in **Exhibit 8** shows the floodplain limits resulting from the proposed bank protection improvements. Detailed HEC-RAS results can be found in **Appendices D and E**.

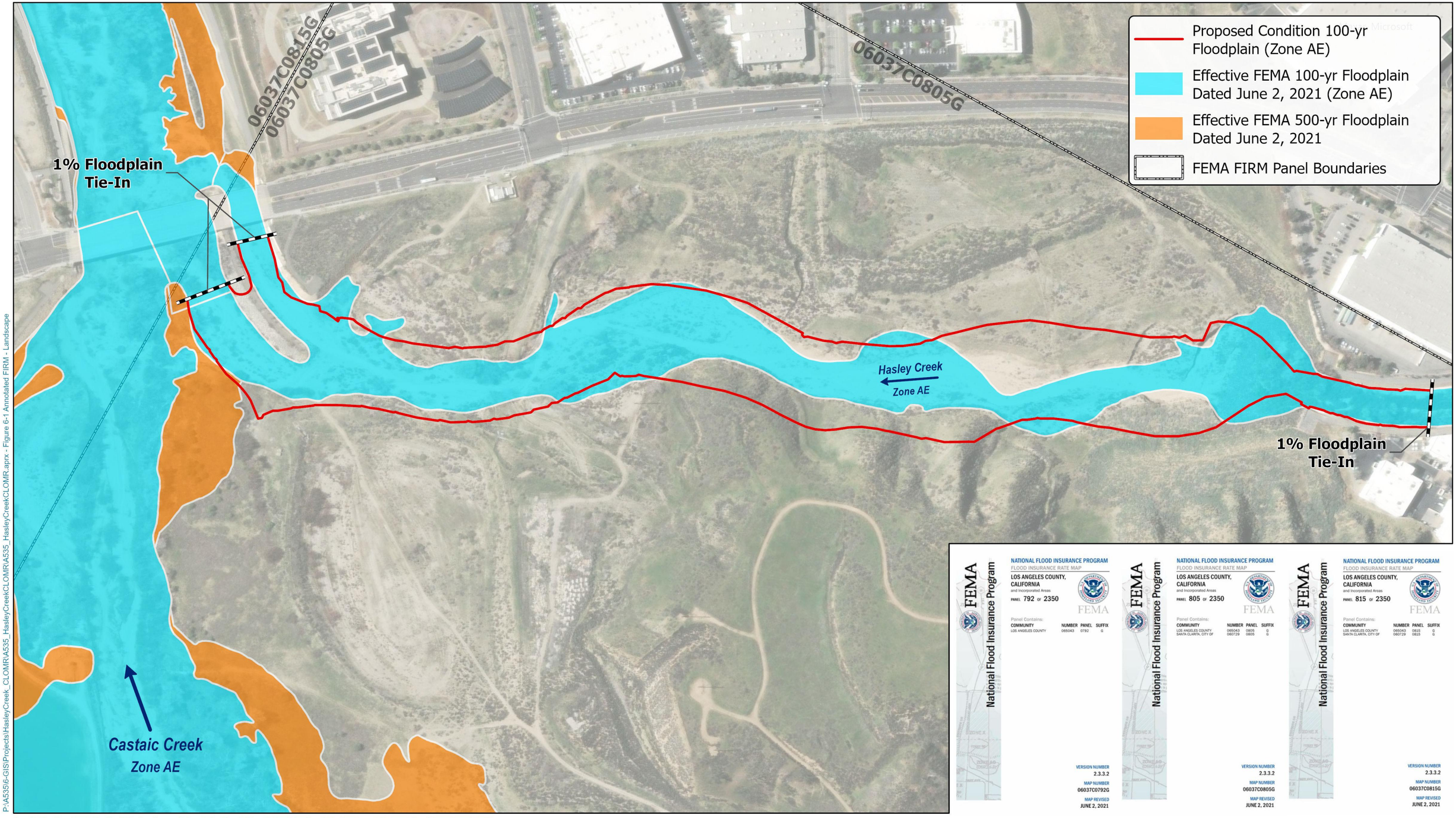
6 Conclusion

The proposed addition of the “West” and “East” soil cement bank protection at Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 results in changes in water surface elevations between the upstream (HEC-RAS XS 4396) and downstream limits (HEC-RAS XS 1061) of study. After a detailed evaluation, which included updated topographic data from 2013 and the inclusion of the proposed improvements, the final modeled floodplain results in a primarily widened 100-yr floodplain within the limits of the study.

The corrected effective 100-year floodplain is wide at the location of the proposed project due to the natural channel being unconstrained. The project results in a floodplain that is both narrower and wider than the corrected effective along the proposed bank protection. This results in water surface elevations that both increase and decrease at locations of narrowing and widening. The maximum increase in water surface elevation is just upstream of Commerce Center Drive Bridge over Castaic Creek, with an increase of 1.2 ft. The proposed soil cement bank protection meets FEMA minimum freeboard requirements.

The comparison analysis shows that the floodplain extents for the study reach tie-in to the FEMA Zone AE floodplain for 100-yr Base Flood Elevations (BFEs) within 0.5-ft or less. The upstream and downstream tie-in locations are at HEC-RAS river stations 4396 and 1061, respectively. These abide by FEMA guidelines for flood hazard analysis.

Based on the present application and enclosed analyses, we are requesting that FEMA provide a Conditional Letter of Map Revision for the proposed Soil Cement Bank Protection Project on Hasley Canyon Creek, affecting FIRM Panel 06037C0805G. The proposed condition 100-year floodplain and base flood elevations are shown on the Annotated FIRM in **Figure 6-1**.



VALENCIA COMMERCE CENTER
HASLEY CANYON CREEK CLOMR

ANNOTATED FIRM

PACE Advanced Water Engineering

0 125 250 500 Feet

Date: 7/25/2024

Job Number: A535

Figure 6-1

P:\A535\6-GIS\Projects\HasleyCreek_CLOMR\A535_HasleyCreekCLOMR\A535_HasleyCreekCLOMR.aprx - Figure 6-1 Annotated FIRM - Landscape

References

FEMA, Flood Insurance Study (FIS), Number 06037CV002F. June 2, 2021.

PACE, Drainage Concept Report, Volume III or V, Hasley Canyon Creek Bank Protection EIMP No. 2019000489. October 2021. (Approved by LACPW March 2022).

PACE, FEMA Application Conditional Letter of Map Revision, Castaic Creek Bank Protection for Valencia Commerce Center (From 1-5 Freeway to Commerce Center Drive). March 2023.

PACE, Hydraulic Analysis Technical Assessment Report for Engineered Earthen-Bottom Flood Control Channels Located Within the Santa Clara River Watershed and Antelope Valley Watershed. August 2017.

R.T. Franklin and Associates, Memo – Gradation Laboratory Test Results, Parcel Map 20685, March 27, 2003

PACE
Advanced Water Engineering

Exhibits

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

PARCEL MAP No. 20839

FRANKLIN PARKWAY

LIVINGSTON AVE

HARRISON PARKWAY

PROPERTY BOUNDARY

CASTAIC CREEK

EXISTING CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER P.D. NO. 2563

COMMERCE CENTER DRIVE

TENTATIVE
PARCEL MAP No. 18108
(GRADING PLAN BY OTHERS)

EXISTING HASLEY CREEK CONCRETE/RIPRAP LINING (PER P.D. 2298 UNIT III)

STA 10+50.89
BEGIN WEST BANK SOIL CEMENT
=TIE-IN EXISTING HASLEY CREEK LINING

EXISTING FLOW DIVERSION BERM PER PD 2298 UNIT III (LENGTH TO BE MODIFIED AS SHOWN)

PROPOSED GRADE CONTROL STRUCTURE #1

PROPOSED FRANKLIN PARKWAY BRIDGE

HASLEY CREEK
Q_{100} = 1,640 cfs

PROPOSED GRADE CONTROL STRUCTURE #2

PROPOSED DROP/STILLING BASIN STRUCTURE

STA 39+89.01
END WEST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

EXISTING CONCRETE SLOPE LINING PER P.D. 2262

CASTAIC CREEK

STA 10+00.00
BEGIN EAST BANK SOIL CEMENT
=STA 10+00 TIE-IN
TO CASTAIC CREEK WEST BANK

CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER DCR VOL. II OF V PREPARED BY PACE

STA 39+91.02
END EAST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

TENTATIVE
PARCEL MAP No. 18108
(GRADING PLAN BY OTHERS)

100 0 100 200
SCALE 1"=100'

NO	BY	DATE		DATE	APP.

JOB VALENCIA COMMERCE CENTER

HASLEY CANYON CREEK
CLOMR

LOS ANGELES COUNTY CA.

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.paceware.com

PREPARED
PROJECT ENGINEER
R.C.E. NO.
EXP.
DRAWN SCALE 1"=100'
DESIGNED
CHECKED DATE

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

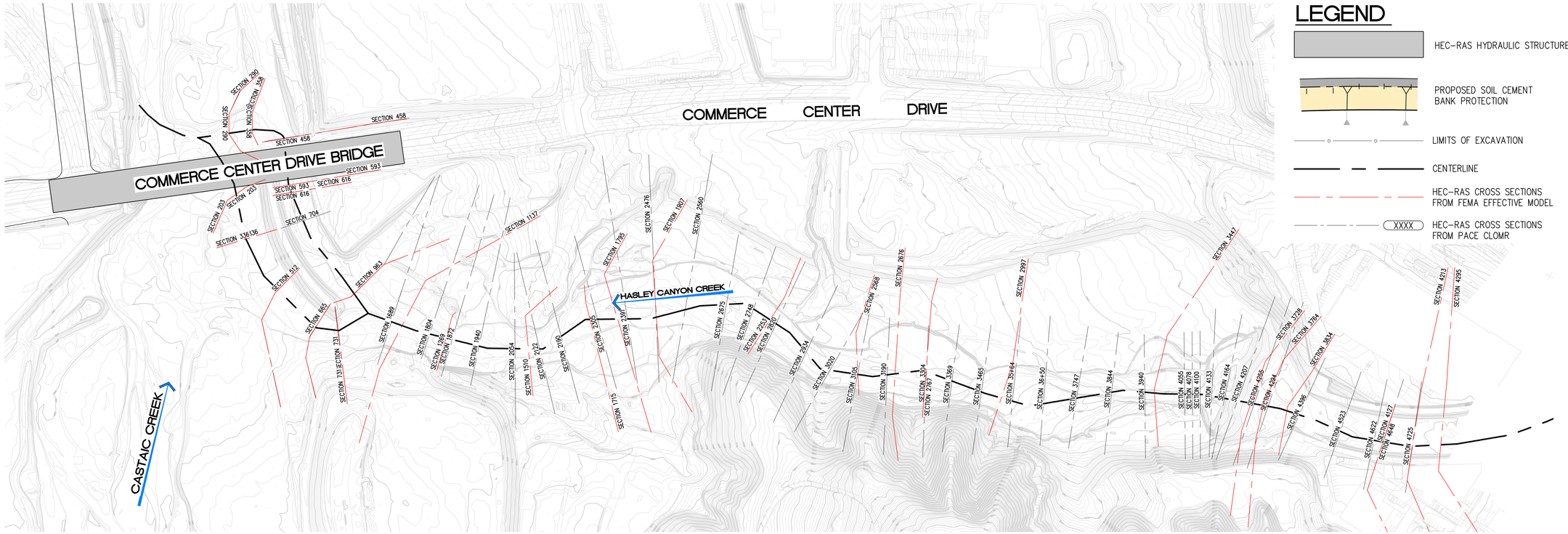
TITLE

HASLEY CANYON CREEK PROPOSED IMPROVEMENTS

EXHIBIT 1

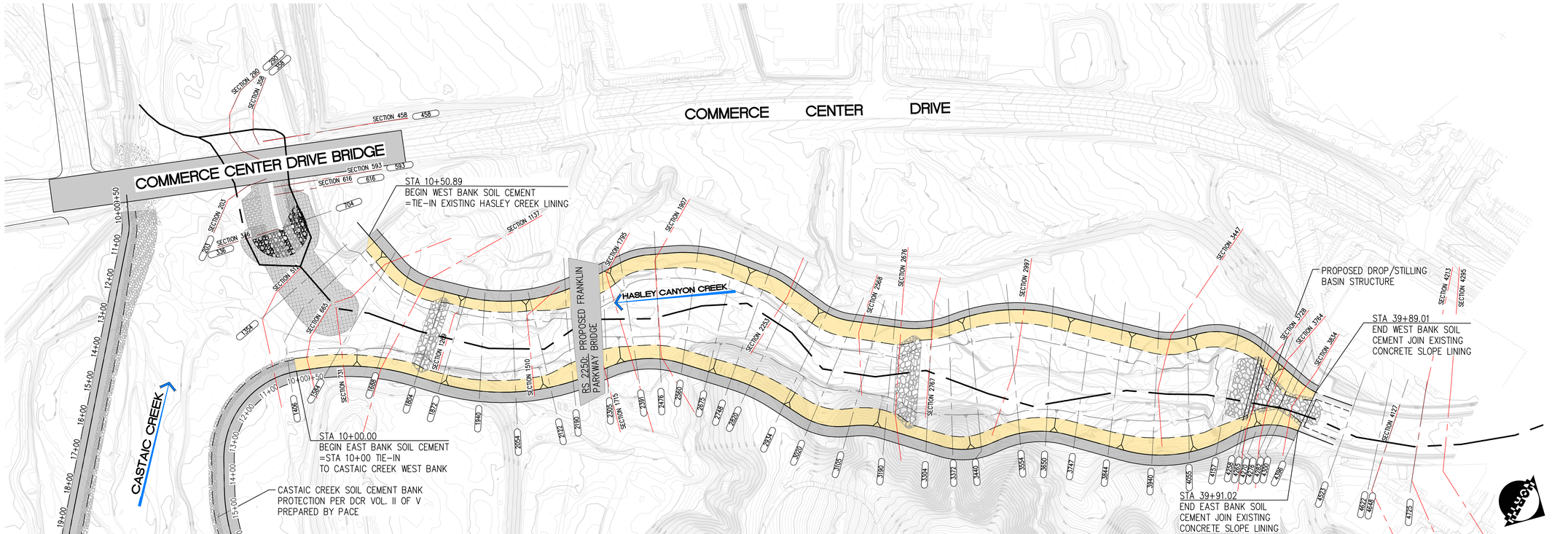
JOB NO. A535

P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-84_Exhibit-1-Hasley Canyon Creek Proposed Improvements.dwg — Tab: Layout By: eranda on Jun. 11, 2024 at 02:08 pm



EFFECTIVE vs CORRECTED EFFECTIVE HEC-RAS SECTIONS

SCALE 1"=150'



EFFECTIVE vs PROPOSED CONDITION HEC-RAS SECTIONS

SCALE 1"=150'

NO	BY	DATE	REVISIONS	DATE	APP.

REGISTERED PROFESSIONAL ENGINEER ★ JESSE CRUZ ★ No. 72249 ★ STATE OF CALIFORNIA ★ CIVIL

SCALE	1"=150'
DESIGNED	E.M.R.
DRAWN	M.M.T.
CHECKED	J.C.
DATE	03/2023
JOB NO.	A535

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

TITLE
HASLEY CANYON CREEK
CLOMR
HEC-RAS CROSS SECTION COMPARISON

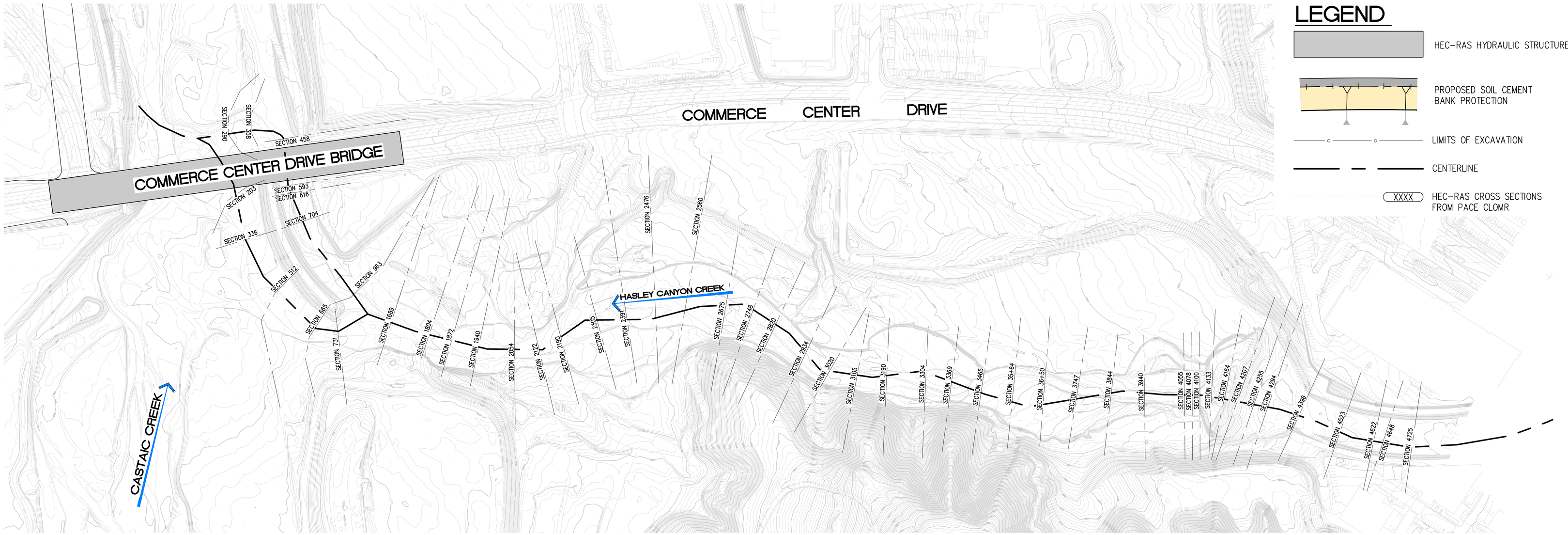
JOB
HASLEY CANYON CREEK
VALENCIA COMMERCE CENTER
Los Angeles County CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

EXHIBIT
2

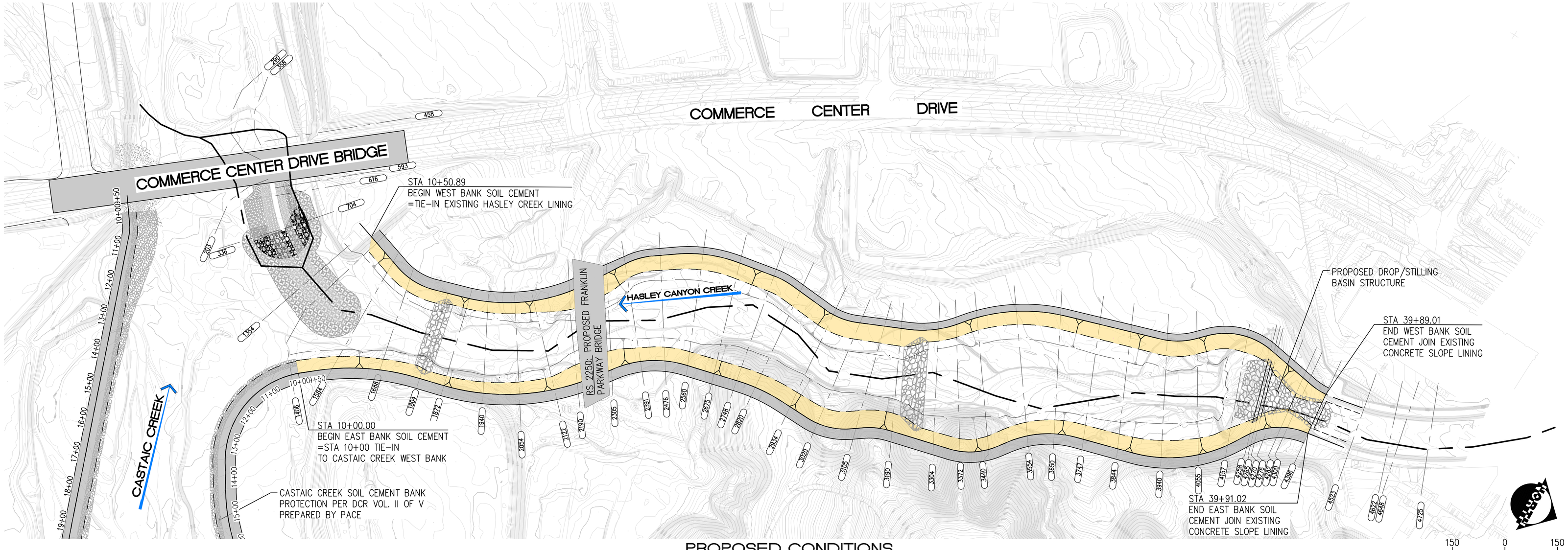
JOB NO. A535

P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-84_Exhibit-2 HEC-RAS Workmap\EXHbitProposed.dwg - Tab: 24x36 - by ersedig on 05/05/24 at 8:18:38 AM



CORRECTED EFFECTIVE CONDITIONS

SCALE 1"=150'



PROPOSED CONDITIONS

SCALE 1"=150'

NO	BY	DATE	REVISIONS	DATE	APP.

REGISTERED PROFESSIONAL ENGINEER ★ JOSE CRUZ ★ No. 72249 ★ STATE OF CALIFORNIA

SCALE	1"=150'
DESIGNED	E.M.R.
DRAWN	M.M.T.
CHECKED	J.C.
DATE	03/2023
JOB NO.	A535

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

TITLE
HASLEY CANYON CREEK CLOMR CORRECTED EFFECTIVE & PROPOSED HEC-RAS WORKMAP

JOB
HASLEY CANYON CREEK
VALENCIA COMMERCE CENTER
Los Angeles County CA

PACE
Advanced Water Engineering
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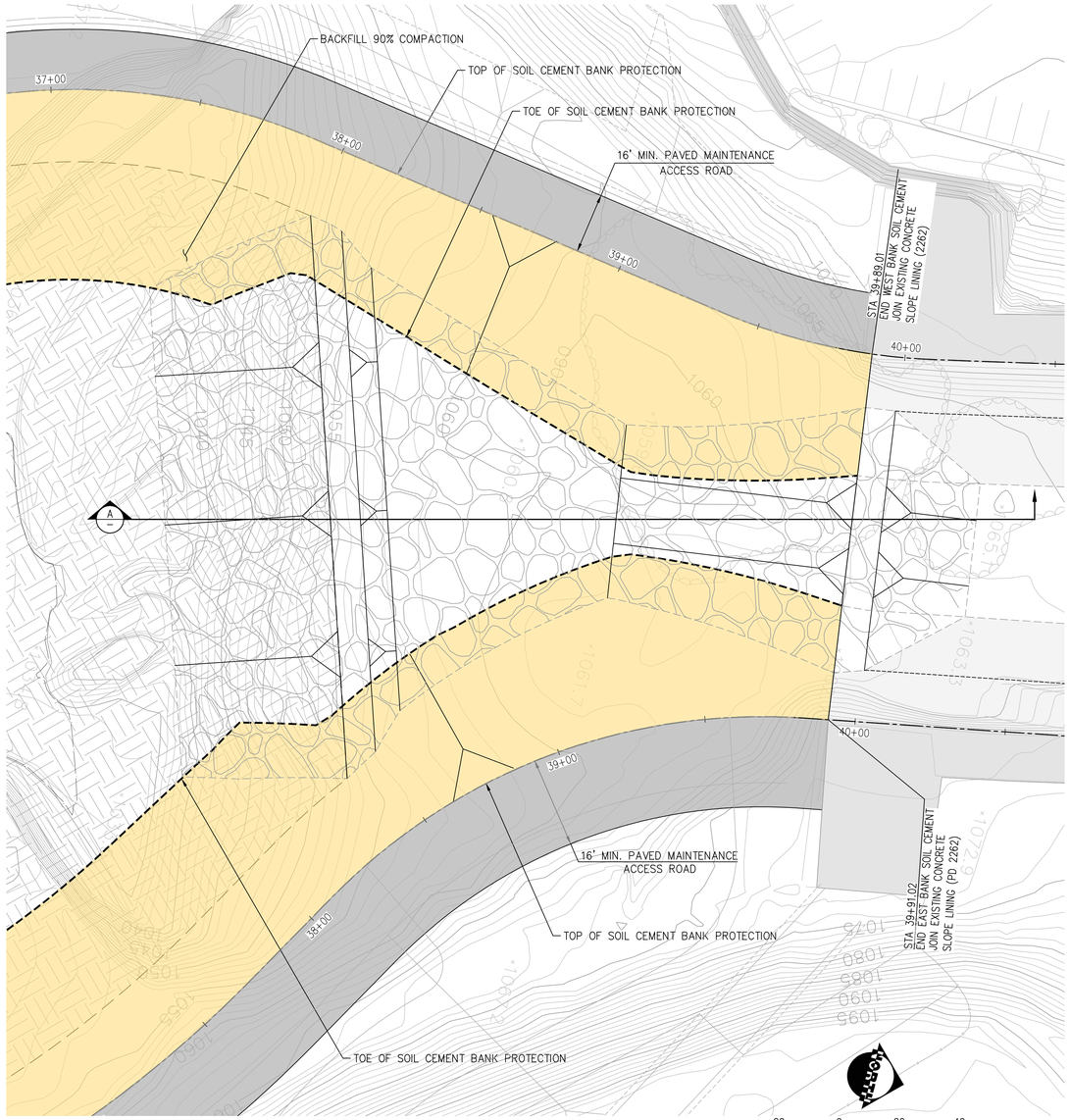
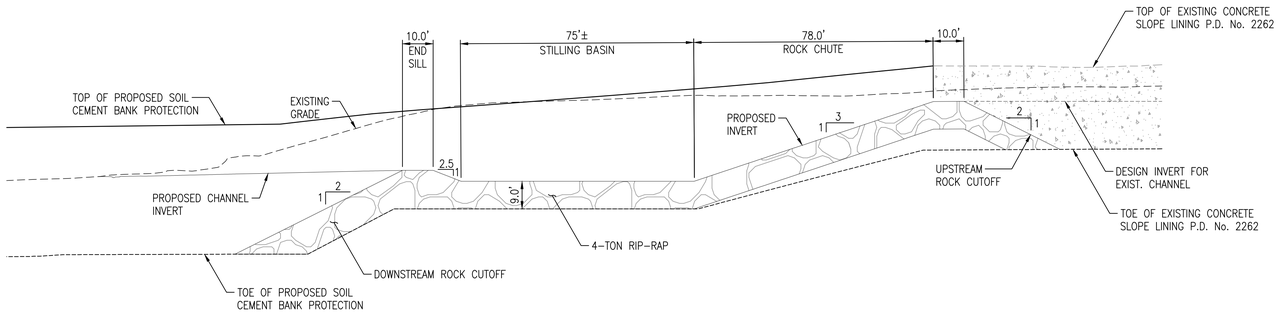
EXHIBIT 3

JOB NO. A535

P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-84_Exhibit-3 HEC-RAS Workmap Combined.dwg - Tab: 24x36 - by emedg on 08/05/24 at 8:23:56 AM



TYPICAL DROP STRUCTURE PLAN



DROP STRUCTURE SECTION 'A'

SCALE 1"=20'

NO	BY	DATE		DATE	APP.

JOB VALENCIA COMMERCE CENTER

HASLEY CANYON CREEK
CLOMR

LOS ANGELES COUNTY CA.

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P: (714) 481-7300 | www.pacewater.com

PREPARED	JOSE CRUZ
PROJECT ENGINEER R.C.E. No.	72249
EXP.	06/30/2022
DRAWN	BDP
SCALE	AS SHOWN
DESIGNED	JC
CHECKED	MEK
DATE	7/25/2024

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

TITLE

PROPOSED DROP STRUCTURE (AT UPSTREAM TERMINATION)

EXHIBIT 4

JOB NO. A535

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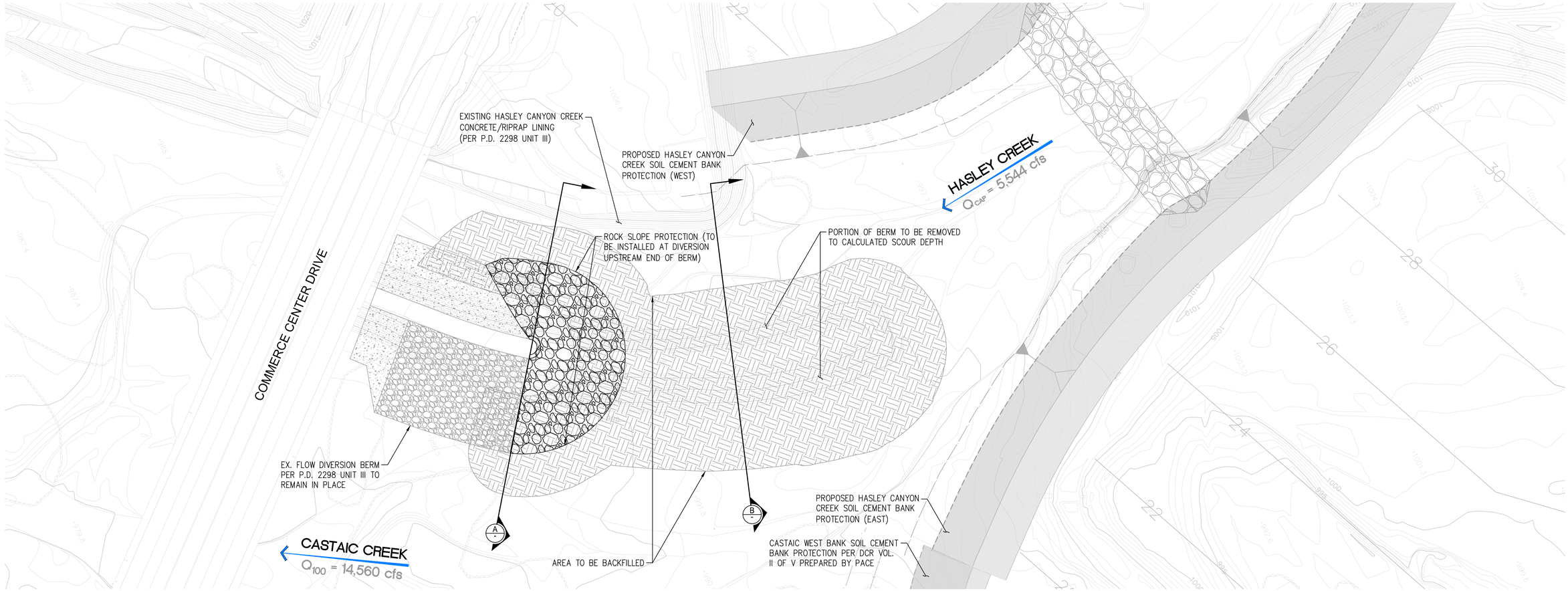
P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-84_Exhibit-4-Drop Structure.dwg — Tab: Layout By: erandig on Jul 25, 2024 at 10:31 am

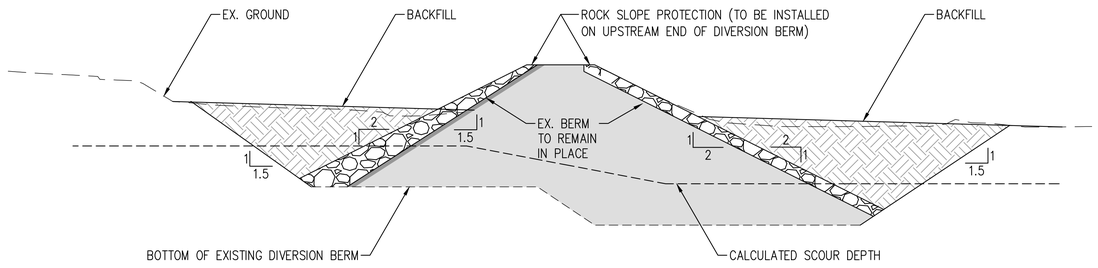


PLAN - MODIFIED DIVERSION BERM

NORTH

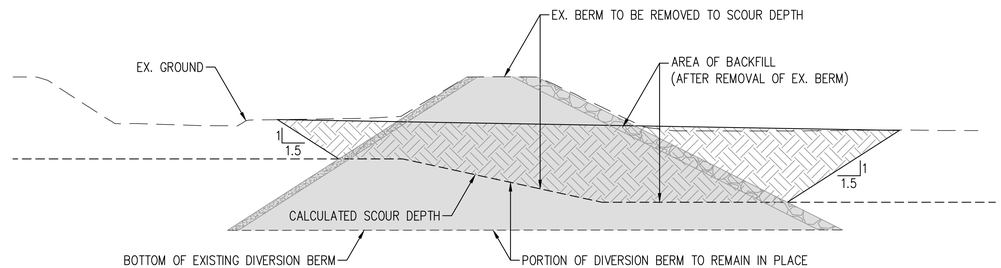
40 0 40 80

SCALE 1"=40'



SECTION A - PORTION OF DIVERSION BERM TO REMAIN

SCALE 1"=20'



SECTION B - PORTION OF DIVERSION BERM TO MODIFY

SCALE 1"=20'

NO	BY	DATE		DATE	APP.

JOB VALENCIA COMMERCE CENTER

HASLEY CANYON CREEK CLOMR

LOS ANGELES COUNTY CA.

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PREPARED	JOSE CRUZ
PROJECT ENGINEER	
R.C.E. NO.	72249
EXP.	06/30/2022
DRAWN	BDP
SCALE	AS SHOWN
DESIGNED	JC
CHECKED	EMR
DATE	7/19/2023

REGISTERED PROFESSIONAL ENGINEER
JOSE CRUZ
No. 72249
CIVIL
STATE OF CALIFORNIA

TITLE

PROPOSED MODIFICATION OF DIVERSION BERM

EXHIBIT 5

JOB NO. A535

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P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-84_Exhibit-5 Proposed Modication of Diversion Berm.dwg - Tab: Layout By: erandig on Jul. 25, 2024 at 10:29 am

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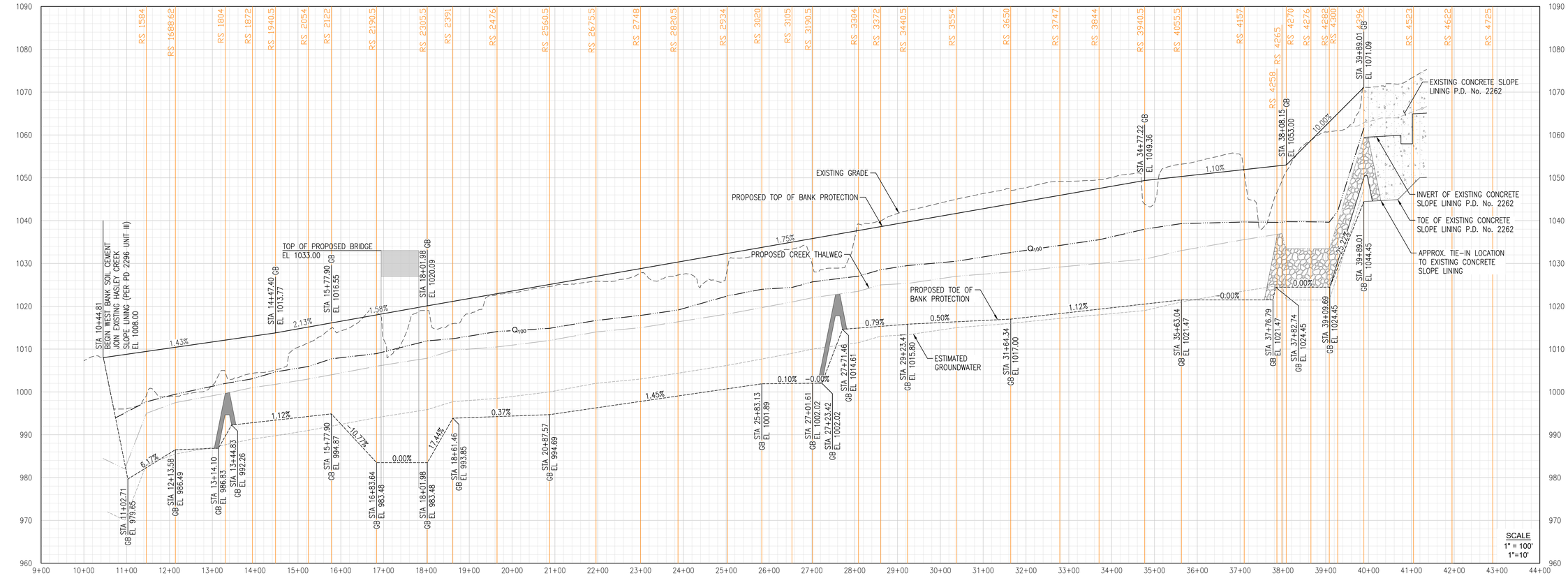
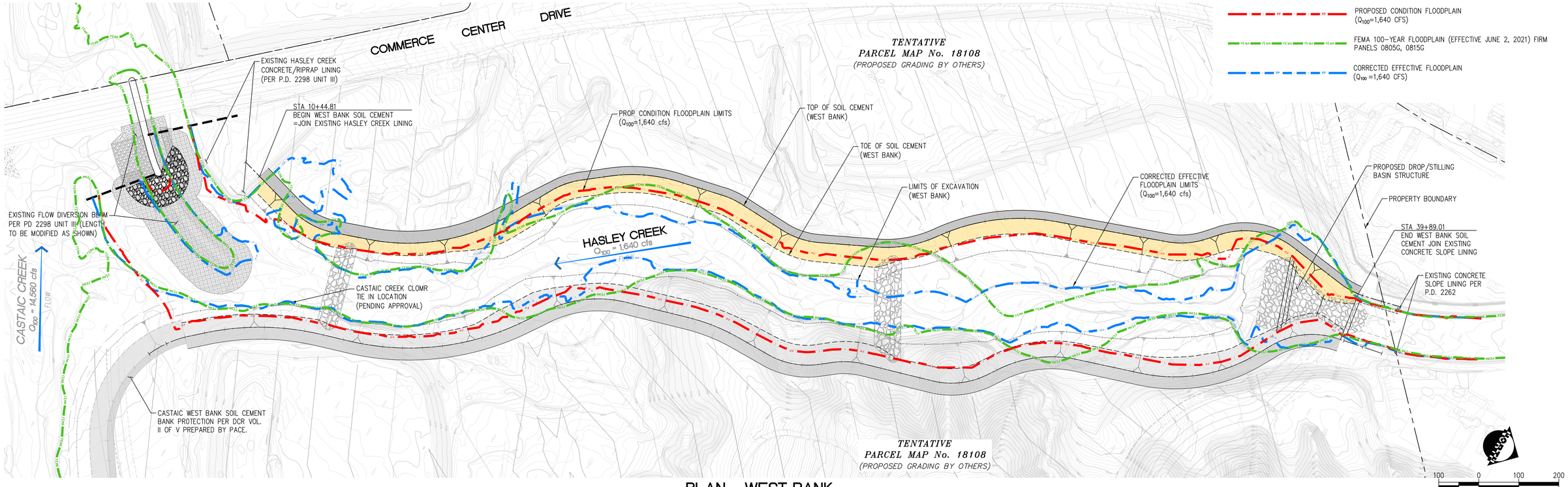


PROFILE - WEST BANK



LEGEND

- PROPOSED CONDITION FLOODPLAIN (Q_{100}=1,640 CFS)
- FEMA 100-YEAR FLOODPLAIN (EFFECTIVE JUNE 2, 2021) FIRM PANELS 0805G, 0815G
- CORRECTED EFFECTIVE FLOODPLAIN (Q_{100} =1,640 CFS)

PLAN - WEST BANK

NO	BY	DATE		DATE	APP.

JOB

HASLEY CANYON CREEK CLOMR

SOIL CEMENT BANK PROTECTION

TPM. #18108 DCR VOL. III OF V

LOS ANGELES COUNTY CA.

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

PREPARED	JOSE CRUZ
PROJECT ENGINEER	
R.C.E. No.	72249
EXP.	06/30/2022
DRAWN	BDP
SCALE	AS SHOWN
DESIGNED	JC
CHECKED	MEK
DATE	7/25/2024

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

TITLE

WEST BANK PROTECTION PLAN AND PROFILE

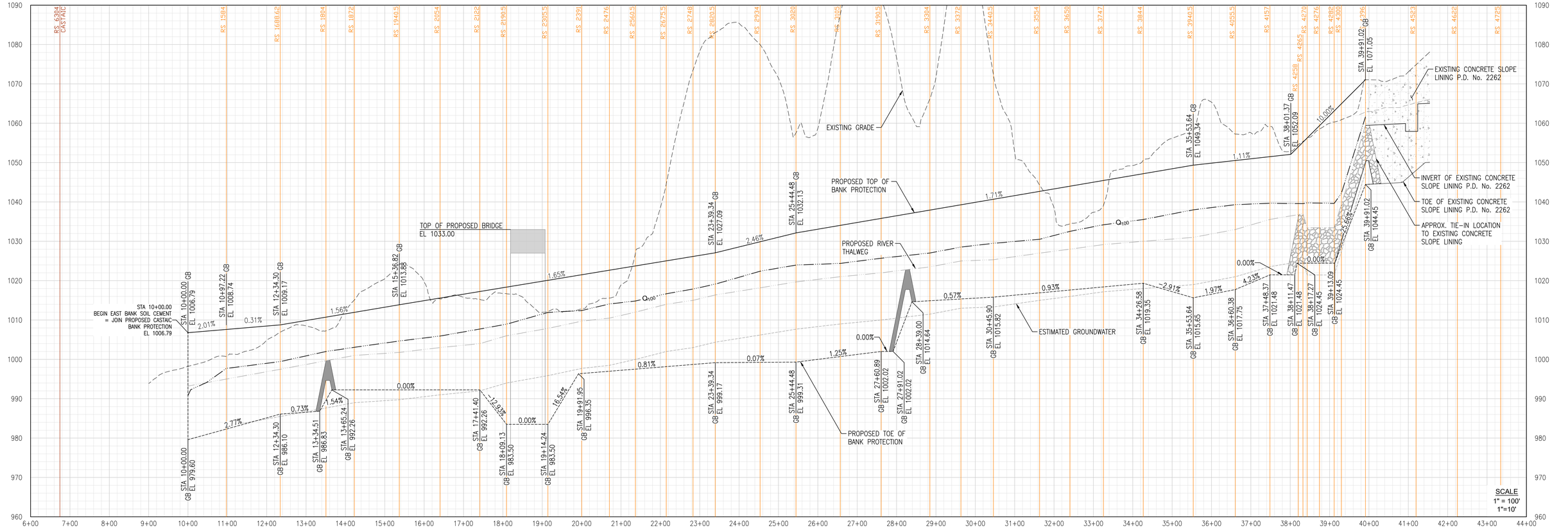
EIMP. 20190000489

EXHIBIT 6

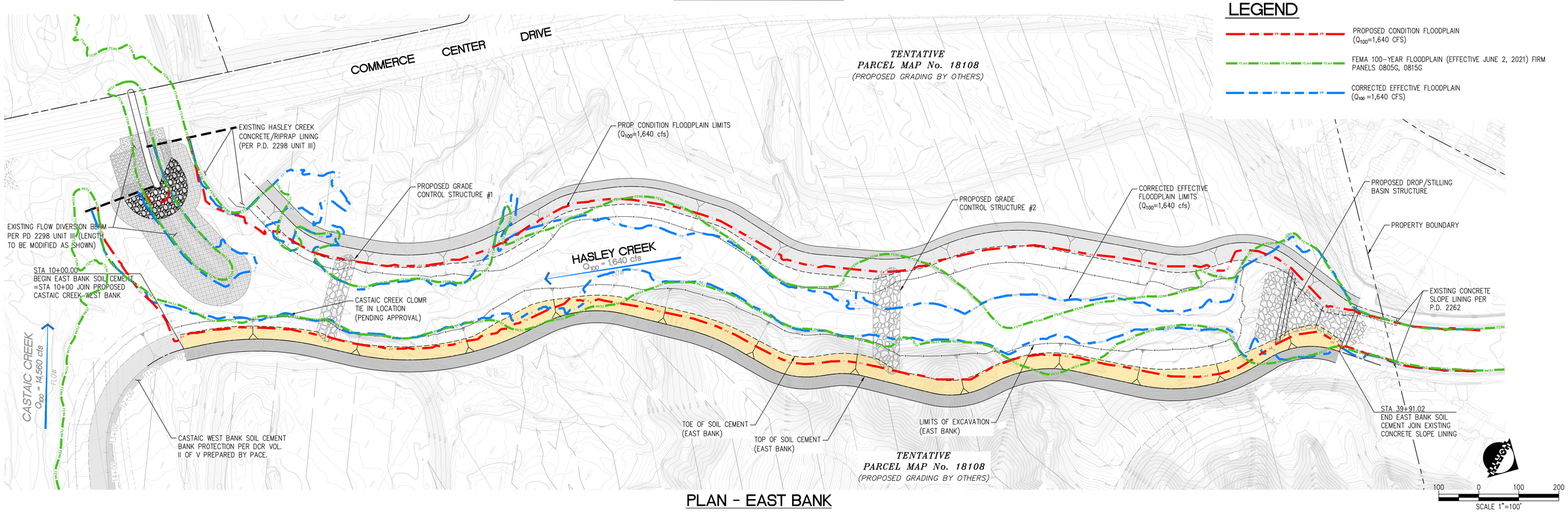
JOB NO. A535

P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-32-Exhibit 5 - West Bank Profile (Figure-08).dwg - Tab: Layout By: ernadig on Jul 25, 2024 at 10:23 am

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".



PROFILE - EAST BANK



LEGEND

- PROPOSED CONDITION FLOODPLAIN (Q_{100}=1,640 CFS)
- FEMA 100-YEAR FLOODPLAIN (EFFECTIVE JUNE 2, 2021) FIRM PANELS 0805G, 0815G
- CORRECTED EFFECTIVE FLOODPLAIN (Q_{100} =1,640 CFS)

PLAN - EAST BANK

NO	BY	DATE		DATE	APP.

JOB

HASLEY CANYON CREEK CLOMR

SOIL CEMENT BANK PROTECTION

TPM. #18108 DCR VOL. III OF V

LOS ANGELES COUNTY CA.

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Advanced Water Engineering
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P: (714) 481-7300 | www.pacewater.com

PREPARED	JOSE CRUZ
PROJECT ENGINEER R.C.E. NO.	72249
EXP.	06/30/2022
DRAWN	BDP
SCALE	AS SHOWN
DESIGNED	JC
CHECKED	MEK
DATE	7/25/2024

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 CIVIL STATE OF CALIFORNIA

TITLE

EAST BANK PROTECTION PLAN AND PROFILE

EIMP. 2019000489

EXHIBIT 7

JOB NO. A535

P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-32-Exhibit 6-East Bank Profile.dwg - Tab: Layout By: ersadig on Jul 25, 2024 at 10:26 am

LEGEND

- PROPOSED CONDITION FLOODPLAIN (Q_{100}=1,640 CFS)
- CORRECTED EFFECTIVE FLOODPLAIN (Q_{100}=1,640 CFS)
- EFFECTIVE FEMA 100-YR FLOODPLAIN DATED JUNE 2, 2021 (Q_{100}=1,640 CFS)
- XXXX PROPOSED CONDITIONS HEC-RAS SECTION
- INEFFECTIVE FLOW AREA

PARCEL MAP No. 20839

TENTATIVE PARCEL MAP No. 18108 (GRADING PLAN BY OTHERS)

TENTATIVE PARCEL MAP No. 18108 (GRADING PLAN BY OTHERS)

FRANKLIN PARKWAY

LIVINGSTON AVE

HARRISON PARKWAY

COMMERCE CENTER DRIVE

PROPERTY BOUNDARY

CASTAIC CREEK

EXISTING CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER P.D. NO. 2563

COMMERCE CENTER DRIVE BRIDGE

EXISTING HASLEY CREEK CONCRETE/RIPRAP LINING (PER P.D. 2298 UNIT III)

LIMIT OF REVISION

STA 10+50.89
BEGIN WEST BANK SOIL CEMENT
=TIE-IN EXISTING HASLEY CREEK LINING

EXISTING FLOW DIVERSION BERM PER PD 2298 UNIT III (LENGTH TO BE MODIFIED AS SHOWN)

HASLEY CREEK
Q = 1640 CFS

FRANKLIN PARKWAY BRIDGE

ADMINISTRATIVE FLOODPLAIN AND FLOODWAY ADJUSTMENT (WIDENING)

PROPOSED DROP/STILLING BASIN STRUCTURE

STA 39+89.01
END WEST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

EXISTING CONCRETE SLOPE LINING PER P.D. 2262

STA 39+91.02
END EAST BANK SOIL CEMENT JOIN EXISTING CONCRETE SLOPE LINING

STA 10+00.00
BEGIN EAST BANK SOIL CEMENT
=STA 10+00 TIE-IN
TO CASTAIC CREEK WEST BANK

CASTAIC CREEK SOIL CEMENT BANK PROTECTION PER DCR VOL. II OF V PREPARED BY PACE
ESTU No. 2001000012

NOTE

1. CONTOURS SHOWN ON THIS MAP ARE BASED ON AERIAL TOPOGRAPHY DATED OCT. 2013
2. ALL ELEVATIONS ARE SHOWN IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

100 0 100 200
SCALE 1"=100'

NO	BY	DATE	REVISIONS	DATE	APP.

REGISTERED PROFESSIONAL ENGINEER ★ JOSE CRUZ ★ No. 72249 ★ CIVIL ★ STATE OF CALIFORNIA

SCALE	1"=150'
DESIGNED	E.M.R.
DRAWN	M.M.T.
CHECKED	J.C.
DATE	03/2023
JOB NO.	A535

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TITLE
HASLEY CANYON CREEK CLOMR
TOPOGRAPHIC WORKMAP

JOB
HASLEY CANYON CREEK
VALENCIA COMMERCE CENTER
Los Angeles County CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.paceware.com

EXHIBIT 8

JOB NO. A535

P:\A535\Engineering\A535-84_Hasley Canyon Creek CLOMR\exhibits\A535-84_Exhibit-8 Topographic Workmap.dwg - Tab: 24x36 - by mendig on 07/25/24 at 3:29:03 PM

PACE
Advanced Water Engineering

Appendix A – MT-2 Forms

MT-2 Form 1: Overview and Concurrence

DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency

OVERVIEW & CONCURRENCE FORM

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472 , Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.
PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).
ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.
DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☒ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72). All CLOMRs require documentation of compliance with the Endangered Species Act. Refer to the Instructions for details.

☐ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72).

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
065043	Los Angeles County	CA	06037C	0792G	06/02/2021
065043	Los Angeles County	CA; CA	06037C	0805G; 0815G	06/02/2021

2. a. Flooding Source: Castaic Creek

b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH) ☐ Alluvial Fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Castaic Creek Bank Protection for Valencia Commerce Center (From The Old Road to Commerce Center Dri

4. FEMA zone designations (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

a. Effective: AE

b. Revised: AE

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change	☐ Improved Methodology/Data	☐ Regulatory Floodway Revision	☐ Base Map Changes
☐ Coastal Analysis	☐ Hydraulic Analysis	☐ Hydrologic Analysis	☒ Corrections
☐ Weir-Dam Changes	☐ Levee Certification	☐ Alluvial Fan Analysis	☐ Natural Changes
☒ New Topographic Data	☐ Other (Attach Description)		

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization	☐ Levee/Floodwall	☐ Bridge/Culvert	
☐ Dam	☐ Fill	☐ Other (Attach Description)	

6. ☒ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $ 6,500

☐ No, Attach Explanation

- **Please see the DHS-FEMA Web site at http://www.fema.gov/forms-documents-and-software/flood-map-related-fees for Fee Amounts and Exemptions.**

D. SIGNATURES

1. REQUESTOR'S SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Alex Herrell	Company: The Newhall Land and Farming Company	
Mailing Address:	Daytime Telephone: 661-255-4000	Fax No.:
25124 Springfield Court, Suite 300 Valencia, CA 91355	E-mail Address: alex.herrell@fivepoint.com	
	Date: 2/19/2023	

Signature of Requestor (required): Alex Herrell

2. COMMUNITY CONCURRENCE

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title:		
Mailing Address:	Community Name:	
	Daytime Telephone:	Fax No.:
	E-mail Address:	
Community Official's Signature (required):	Date:	

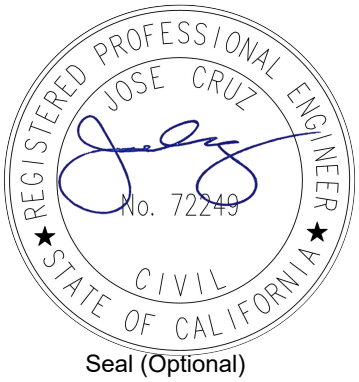
3. CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Jose Cruz	License No.: 72249	Expiration Date: 6/30/2024 6/30/2026
Company Name: PACE	Mailing Address: 17520 Newhope St. #200 Fountain Valley, CA 92708	
Telephone No.: (714) 481-7300 Fax No.: (714) 481-7299		
E-mail Address: jcruz@pacewater.com		
Signature:		Date: 2/14/2023

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if …
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☒ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans



Seal (Optional)

MT-2 Form 2: Riverine Hydrology and Hydraulics

PACE

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

RIVERINE HYDROLOGY & HYDRAULICS FORM (FORM 2)

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

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PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.
PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).
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DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

Flooding Source: Hasley Canyon Creek

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply):

☒ Not revised (skip to section B) ☐ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Precipitation/Runoff Model → Specify Model: _____ Duration: _____ Rainfall Amount: _____
☐ Statistical Analysis of Gage Records
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review. 4. HEC-RAS File Description**:

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☐ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevation (ft.) Effective	Water-Surface Elevation (ft.) Proposed/Revised
Downstream Limit*				
Upstream Limit*				

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: _____

☒ Steady State ☐ Unsteady State ☐ One-Dimensional ☐ Two-Dimentional

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4. HEC-RAS File Description**:

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Existing or Pre-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	

* For details, refer to the corresponding section of the instructions.
**See instructions for information about modeling other then HEC-RAS. ☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

Topographic Information: ☒ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Source: Kimley-Horn Date: 2013

Vertical Datum: North American Vertical Datum of 1988 (NAVD88) Spatial Projection: State Plane Zone 5

Accuracy: 1-ft aerial topography

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) or Special Flood Hazard Areas (SFHAs) increase compared to the effective BFEs? ☒ Yes ☐ No

   If Yes, please attach **proof of property owner notification**. Examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

   - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
   - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

3. Does the request involve the placement or proposed placement of fill? ☒ Yes ☐ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

4. Does the request involve the placement or proposed placement of fill? ☒ Yes ☐ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.

5. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

MT-2 Form 3: Riverine Structures

PACE

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

RIVERINE STRUCTURES FORM (FORM 3)

OMB Control Number: 1660-0016
Expiration: 1/31/2024

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Flooding Source: Hasley Canyon Creek

Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization:	complete Section B
Bridge/Culvert:	complete Section C
Dam:	complete Section D
Levee/Floodwall:	complete Section E
Sediment Transport:	complete Section F (if required)

Description Of Modeled Structure

1. Name of Structure: Hasley Cayon Creek "East" Bank Protection

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Along the East Bank of Hasley Canyon Creek

   Downstream Limit/Cross Section: 1689

   Upstream Limit/Cross Section: 4396

2. Name of Structure: Hasley Cayon Creek "West" Bank Protection

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Along the West Bank of Hasley Canyon Creek

   Downstream Limit/Cross Section: 1689

   Upstream Limit/Cross Section: 4396

3. Name of Structure: Franklin Parkway Bridge

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: ~950' Upstream of the Confluence with Castaic

   Downstream Limit/Cross Section: 2190

   Upstream Limit/Cross Section: 2305

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

B. CHANNELIZATION

Flooding Source: Hasley Canyon Creek

Name of Structure: Hasley Canyon Creek Soil Cement Bank Protection

1. Hydraulic Considerations

The channel was designated to carry 9,480 (cfs) and/or the Qcap - year flood

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☒ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☐ Outlet to channel ☒ At Drop Structures ☐ At Transitions

☐ Other locations (specify): _____

2. Channel Design Plans

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Accessory Structures

The channelization includes (check one):

☐ Levees [Attach Section E (Levee/Floodwall)] ☒ Drop structures ☐ Superelevated sections ☐ Energy dissipater

☐ Transitions in cross sectional geometry ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)] ☐ Weir

☐ Other (Describe): _____

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☒ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: Hasley Canyon Creek

Name of Structure: Franklin Parkway Bridge

1. This revision reflects (check one):

☒ Bridge/Culvert not modeled in the FIS

☐ Modified Bridge/Culvert previously modeled in the FIS

☐ Revised analysis of Bridge/Culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

☒ Dimensions (height, width, span, radius, length)
☐ Shape (culverts only)
☐ Material
☐ Beveling and Rounding
☐ Wink Wall Angle
☐ Skew Angle
☐ Distance between Cross Sections
☐ Erosion Protection
☒ Low Chord Elevations - Upstream and Downstream
☐ Top of Road Elevations - Upstream and Downstream
☐ Structure Invert Elevations - Upstream and Downstream
☐ Stream Invert Elevations - Upstream and Downstream
☒ Cross-Section Locations

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☒ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

D. DAM/BASIN

Flooding Source: _____

Name of Structure: _____

1. This request is for (check one): ☐ Existing Dam/Basin ☐ New Dam/Basin ☐ Modification of existing Dam/Basin

2. The Dam/Basin was designed by (check one): ☐ Federal Agency ☐ State Agency ☐ Private Organization

   ☐ Local Government Agency Name of the Agency or Organization: _____

3. The Dam was permitted as (check one): ☐ Federal Dam ☐ State Dam

   Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

   Permit or ID number _____ Permitting Agency or Organization _____

   a. ☐ Local Government Dam ☐ Private Dam

   Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

   Was the dam/basin designed using critical duration storm? (must account for the maximum volume of runoff)

   ☐ Yes, provide supporting documentation with your completed Form 2.

   ☐ No, provide a written explanation and justification for not using the critical duration storm.

5. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

   If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why debris/sediment analysis was not considered?

6. Does the Base Flood Elevation behind the dam/basin or downstream of the dam/basin change? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

	Stillwater Elevation Behind the Dam/Basin	
FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)		
50-year (2%)		
100-year (1%)		
500-year (0.2%)		
Normal Pool Elevation		

7. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

1. System Elements

   a. This Levee/Floodwall analysis is based on (check one): ☐ Upgrading of an existing levee/floodwall system ☐ A newly constructed levee/floodwall system ☐ Reanalysis of an existing levee/floodwall system

   b. Levee elements and locations are (check one):

   ☐ Earthen embankment, dike, berm, etc Stationed _____ to _____

   ☐ Structured floodwall Stationed _____ to _____

   ☐ Other (describe): _____ Stationed _____ to _____

E. LEVEE/FLOODWALL (CONTINUED)

c. Structural Type (check one): ☐ Monolithic cast-in place reinforced concrete ☐ Reinforced concrete masonry block ☐ Sheet piling ☐ Other (describe): _____

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency? _____

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers: _____
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
3. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
4. A layout detail for the embankment protection measures. Sheet Numbers: _____
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, Floodwall structure, closure structures, and pump stations. Sheet Numbers: _____

2. Freeboard

a. The minimum freeboard provided above the BFE is:

_____

Riverine

3.0 feet or more at the downstream end and throughout	☐ Yes	☐ No
3.5 feet or more at the upstream end	☐ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☐ Yes	☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

3. Closures

a. Openings through the levee system (check one): ☐ Exists ☐ Does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

E. LEVEE/FLOODWALL (CONTINUED)

4. Embarkment Protection

a. The maximum levee slope land side is: _____

b. The maximum levee slope flood side is: _____

c. The range of velocities along the levee during the base flood is: _____ (min) to _____ (max)

d. Embankment material is protected by (describe what kind): _____

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive Stress
Attach referrences

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								

(Extend table on an added sheet as needed and reference each entry)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embarkment and Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:

☐ Overall height: STA:_____ , height _____ ft.

☐ Limiting foundation soil strength:

Strength ϕ = _____ degrees, c = _____ psf

Slope: SS = _____ (h) to _____ (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

c. Summary of stability analysis results: _____

E. LEVEE/FLOODWALL (CONTINUED)

5. Embarkment and Foundation Stability (continued)

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No
If Yes, describe methodology used:

e. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

h. The duration of the base flood hydrograph against the embankment is _____ hours.

Attach engineering analysis to support construction plans.

6. Floodwall and Foundation Stability

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding ☐ If not, explain: _____

c. Loading included in the analyses were: ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

☐ Surcharge-Slope @ _____, ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

☐ 1%-annual-chance significant wave height: _____ ft.

☐ 1%-annual-chance significant wave period: _____ sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

E. LEVEE/FLOODWALL (CONTINUED)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin?

b. The computed settlement range is _____ ft. to _____ ft.

c. Settlement of the levee crest is determined to be primarily from : ☐ Foundation consolidation

☐ Embankment compression ☐ Other (Describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Drainage to pressure conduit: _____ acres

Drainage to ponding area: _____ acres

b. Relationship Established:

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

Gravity flow (Interior Watershed)	☐ Yes	☐ No
Common storm (River Watershed)	☐ Yes	☐ No
Historical ponding probability	☐ Yes	☐ No
Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection.
☐ Yes ☐ No If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is : _____ cfs

h. The length of levee system used to drive this seepage rate in item g: _____ ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants: _____ For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric; are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)
Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem

Hydrocompaction ☐ is ☐ is not a problem

Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure? ☐ Yes ☐ No

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No

If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why sediment transport was not considered.

10. Operational Plan and Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations? ☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations? ☐ Yes ☐ No

If the answer is No to any of the above, please attach supporting documentation.

E. LEVEE/FLOODWALL (CONTINUED)

11. Maintenance Plan

Please attach a copy of the fomal maintenance plan for the levee/floodwall

12. Operational and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

CERTIFICATION OF THE LEVEE DOCUMENTATION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.10(e) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: _____ License No.: _____ Expiration Date: _____

Company Name: Telephone No.: _____ Fax No.: _____

Signature: _____ Date: _____ E-mail Address: _____

CERTIFICATION OF THE LEVEE DOCUMENTATION

Flooding Source: Hasley Canyon Creek

Name of Structure: Hasley Canyon Creek Soil Cement Bank Protection

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume _____ acres-feet

Debris load associated with the base flood discharge: Volume _____ acres-feet

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: SAM

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition: Following LA County Hydrology and Sedimentation Manual and a Continuity Analysis using SAM

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport: _____

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

PACE
Advanced Water Engineering

Appendix B – Relevant Effective FEMA Data

FEMA FIS: Hasley Canyon Creek Flow Rates

PACE

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 9

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
AGOURA HILLS, CITY OF	065072	COMMERCE, CITY OF	060110
ALHAMBRA, CITY OF*	060095	COMPTON, CITY OF	060111
ARCADIA, CITY OF*	065014	COVINA, CITY OF*	065024
ARTESIA, CITY OF*	060097	CUDAHY, CITY OF	060657
AVALON, CITY OF	060098	CULVER CITY, CITY OF	060114
AZUSA, CITY OF	065015	DIAMOND BAR, CITY OF	060741
BALDWIN PARK, CITY OF*	060100	DOWNEY, CITY OF	060645
BELL, CITY OF*	060101	DUARTE, CITY OF*	065026
BELL GARDENS, CITY OF	060656	EL MONTE, CITY OF*	060658
BELLFLOWER, CITY OF	060102	EL SEGUNDO, CITY OF	060118
BEVERLY HILLS, CITY OF*	060655	GARDENA, CITY OF	060119
BRADBURY, CITY OF*	065017	GLENDALE, CITY OF	065030
BURBANK, CITY OF	065018	GLENDORA, CITY OF*	065031
CALABASAS, CITY OF	060749	HAWAIIAN GARDENS, CITY OF*	065032
CARSON, CITY OF	060107	HAWTHORNE, CITY OF*	060123
CERRITOS, CITY OF	060108	HERMOSA BEACH, CITY OF	060124
CLAREMONT, CITY OF*	060109	HIDDEN HILLS, CITY OF	060125

*No Special Flood Hazard Areas Identified

REVISED: June 2, 2021

FLOOD INSURANCE STUDY NUMBER
06037CV002F
Version Number 2.3.3.2

FEMA

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
HUNTINGTON PARK, CITY OF*	060126	PICO RIVERA, CITY OF	060148
INDUSTRY, CITY OF*	065035	POMONA, CITY OF*	060149
INGLEWOOD, CITY OF*	065036	RANCHO PALOS VERDES, CITY OF	060464
IRWINDALE, CITY OF*	060129	REDONDO BEACH, CITY OF	060150
LA CANADA FLINTRIDGE, CITY OF*	060669	ROLLING HILLS, CITY OF*	060151
LA HABRA HEIGHTS, CITY OF*	060701	ROLLING HILLS ESTATES, CITY OF*	065054
LA MIRADA, CITY OF	060131	ROSEMEAD, CITY OF*	060153
LA PUENTE*, CITY OF	065039	SAN DIMAS, CITY OF	060154
LA VERNE, CITY OF	060133	SAN FERNANDO, CITY OF	060628
LAKEWOOD, CITY OF	060130	SAN GABRIEL, CITY OF*	065055
LANCASTER, CITY OF	060672	SAN MARINO, CITY OF*	065057
LAWNDALE, CITY OF*	060134	SANTA CLARITA, CITY OF	060729
LOMITA, CITY OF*	060135	SANTA FE SPRINGS, CITY OF	060158
LONG BEACH, CITY OF	060136	SANTA MONICA, CITY OF	060159
LOS ANGELES, CITY OF	060137	SIERRA MADRE, CITY OF*	065059
LOS ANGELES COUNTY UNINCORPORATED AREAS	065043	SIGNAL HILL, CITY OF*	060161
LYNWOOD, CITY OF	060635	SOUTH EL MONTE, CITY OF*	060162
MALIBU, CITY OF	060745	SOUTH GATE, CITY OF	060163
MANHATTAN BEACH, CITY OF	060138	SOUTH PASADENA, CITY OF*	065061
MAYWOOD, CITY OF*	060651	TEMPLE CITY, CITY OF*	060653
MONROVIA, CITY OF*	065046	TORRANCE, CITY OF	060165
MONTEBELLO, CITY OF	060141	VERNON, CITY OF*	060166
MONTEREY PARK, CITY OF*	065047	WALNUT, CITY OF*	065069
NORWALK, CITY OF	060652	WEST COVINA, CITY OF	060666
PALMDALE, CITY OF	060144	WEST HOLLYWOOD, CITY OF*	060720
PALOS VERDES ESTATES, CITY OF	060145	WESTLAKE VILLAGE, CITY OF	060744
PARAMOUNT, CITY OF	065049	WHITTIER, CITY OF	060169
PASADENA, CITY OF*	065050		

*No Special Flood Hazard Areas Identified

REVISED: June 2, 2021

FEMA

FLOOD INSURANCE STUDY NUMBER

06037CV002F

Version Number 2.3.3.2

Table 10: Summary of Discharges, continued

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Harbor District Shallow Flooding	Denker Avenue, vicinity of 204th Street	0.3	60	*	130	170	*	260
Haskell Canyon	At confluence with Bouquet Canyon Creek	9.8	730	*	2,240	3,320	*	7,360
Hasley Canyon Creek	Approximately 1,150 feet downstream of Halsey Canyon Road	7.3	*	*	*	5,544	*	10,163
Hasley Canyon Creek	Approximately 550 feet downstream ofRomero Canyon Road	5.9	*	*	*	4,523	*	8,292
Hasley Canyon Creek	Approximately 600 feet downstream of Romero Canyon Road	*	220	*	680	1,006	*	2,230
Hasley Canyon Creek	Approximately 0.2 miles downstream of Hasley Canyon Road	*	330	*	1,010	1,503	*	3,330
Hasley Canyon Creek	At confluence with Castaic Creek	*	360	*	1,110	1,640	*	3,640
Hollywood Shallow Flooding	Third Street at Kenmore Avenue	3.4	800	*	1,800	2,300	*	3,500
Hollywood Shallow Flooding	South of Hollywood Freeway, vicinity of Kenmore Avenue	3.2	830	*	1,800	2,300	*	3,700
Hollywood Shallow Flooding	Santa Monica Boulevard, vicinity of Mariposa Avenue	2.8	940	*	2,100	2,700	*	4,200
Hollywood Shallow Flooding	Madison Avenue at Monroe Street	0.5	160	*	350	440	*	690
Hyde Park Shallow Flooding	South of Southwest Drive, vicinity of Van Ness Avenue	4.2	730	*	1,600	2,100	*	3,200
Hyde Park Shallow Flooding	Wilton Place, vicinity of Gage Avenue	3.3	770	*	1,600	1,900	*	3,000

FEMA Flood Insurance Rate Map Panels

MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 4 NORTH, RANGE 17 WEST AND TOWNSHIP 5 NORTH, RANGE 17 WEST

Los Angeles County
Unincorporated Areas
065043

ZONE A
ZONE AE
ZONE AO (DEPTH 3')

0.2%-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE

1%-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE

LIMIT OF STUDY

Note: Terrain is too steep to map all cross sections. Refer to profile for Water Surface Elevations.

Santa Felicia Canyon Creek
Romero Canyon Creek
Hasley Canyon Creek
Sloan Canyon Creek
San Martinez Chiquito Canyon

ROMERO CANYON RD
ROMERO-SLOAN CUTOFF
SLOAN CANYON RD
SLOAN CANYON RD
LARIOS RANCH DR
ARROYO OAK LN
GILMOUR ST
AYALA RD
HASLEY CANYON RD
BURLWOOD DR
DESERT SHADOW RD
BYFIELD RD
OAK CREEK RD
HAWKSET ST
COIT RD
REMINGTON RD
MADLOY ST
APARRI AVE
ROMERO CANYON RD
ANVIK ST
SHARP RD
HIDDEN VALLEY CT
VALLEY GLEN CT
SAGECREST WAY
RIDGEWAY CT
SAN MARTINEZ RD
LOMA VERDE MOUNTAINWAY
PARADISE RD
JUSTAMERE AVE
AMHURST DR
VERDALE AVE
DELWOOD ST
BORTON ST
ELLIS PL
KENWOOD AVE
OAKWOOD AVE
VAL VERDE RD
RAINBOW DR
DEL VALLE RD
EUCLID AVE
KENNINGSTON RD
TRELLIS RD
LEXINGTON DR
SAN MARTINEZ RD
HILL ST
PARKER AVE
SHERIDAN RD
COOLIDGE AVE
SILVER ST
LEA WALK
LOMITA DR
KERNEY
CROMWELL AVE
ELK AVE
SILVER ST
HUNSTOCK ST
DRIVER AVE
CENTRAL AVE
DUBOIS ST
WINDSOR RD
MADISON WAY
LINCOLN AVE
VAN BUREN ST
MADISON ST
HARDING AVE
WILSON ST
CHIQUITO CANYON RD
JACKSON ST
ROOSEVELT AVE
SLEEPY CREEK LN
RUPERT LN
TERRAZA CT
SORRENTO PL
CANNES PL
SAINT TROPEZ PL
HILLCREST PKWY
BASSET DR
CAPALLERO DR
TERRACINA PL
MADRID PL
BARCELONA PL
MALLORCA PL
SAN REMO PL
BARCELONA RD
ROYAL RD
WINDY WAY
BRANCH RD
GELDING RD
GREEN HILL DR
THE OLD RD
STALLION PL
BOBCAT WAY
SLOAN CANYON RD
CHUCKER CT
OAKHORN AVE
HIPSHOT DR
CAM DEL VALLE
SLOAN CANYON RD
PARKER RD
ARROW POINT DR
VACA ST
PARKER RD
APPLEWOOD LN
DELL CT
MEADOWGRASS DR
QUAIL VALLEY RD
FOREST MEADOW PL
HEATHER LN
CLOVERLEAF PL
GREENWOOD PL
COUNTRYSIDE LN
RIVERDALE PL
CHERRY DR
Villa Canyon Creek
BONSAI CT
APPALACHIAN
BERYL PL
KNOLL CT
ARROYO CT
PARK VISTA DR
SHASTA CT
BRYCE DR
FOOTHILL RD
WHITNEY DR
KAREN CT
VINEYARD LN
CLOVER CT
LUPINE ST
STAR CYN PL
CASCADE RD
JUNE CT
ROSE CT
FAUST DR
YOSEMITE DR
HAYWARD DR
HAMLET WAY
BRIDLEWOOD DR
BANCROFT PL
CASHMERE PL
BERKSHIRE PL
CAMBRIDGE AVE
SOMERSET CT
GIBRALTAR LN
SPRINGVALE LN
PICADILLY PL
ALTON WAY
CASTLEBURY PL
INDUSTRY DR
HASLEY CANYON RD
WITHERSPOON PKWY
AVE PERRY
AVE WILLIAMS
AVE SHERMAN
AVE PAINE
LIVINGSTON AVE
COMMERCE CENTER DR
HARRISON PKWY

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T. 4 N.

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FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*

OTHER AREAS
- NO SCREEN — Areas of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert or Storm Sewer
- Levee, Dike or Floodwall

OTHER FEATURES
- 18.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation (BFE)
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

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SCALE

N

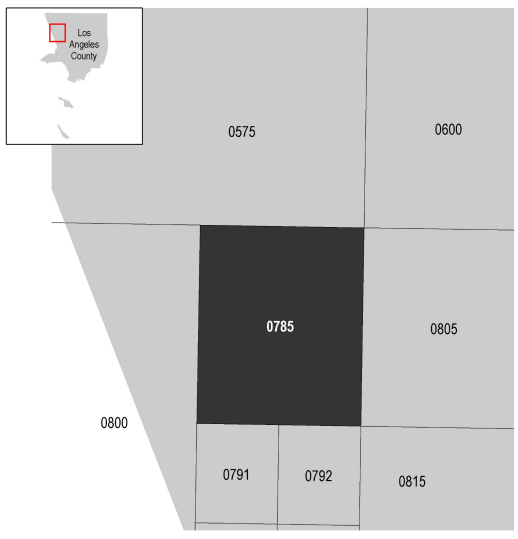
Map Projection:
Universal Transverse Mercator Zone 11N; North American Datum 1983;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 feet

0 250 500 1,000 meters

PANEL LOCATOR



National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 785 OF 2350

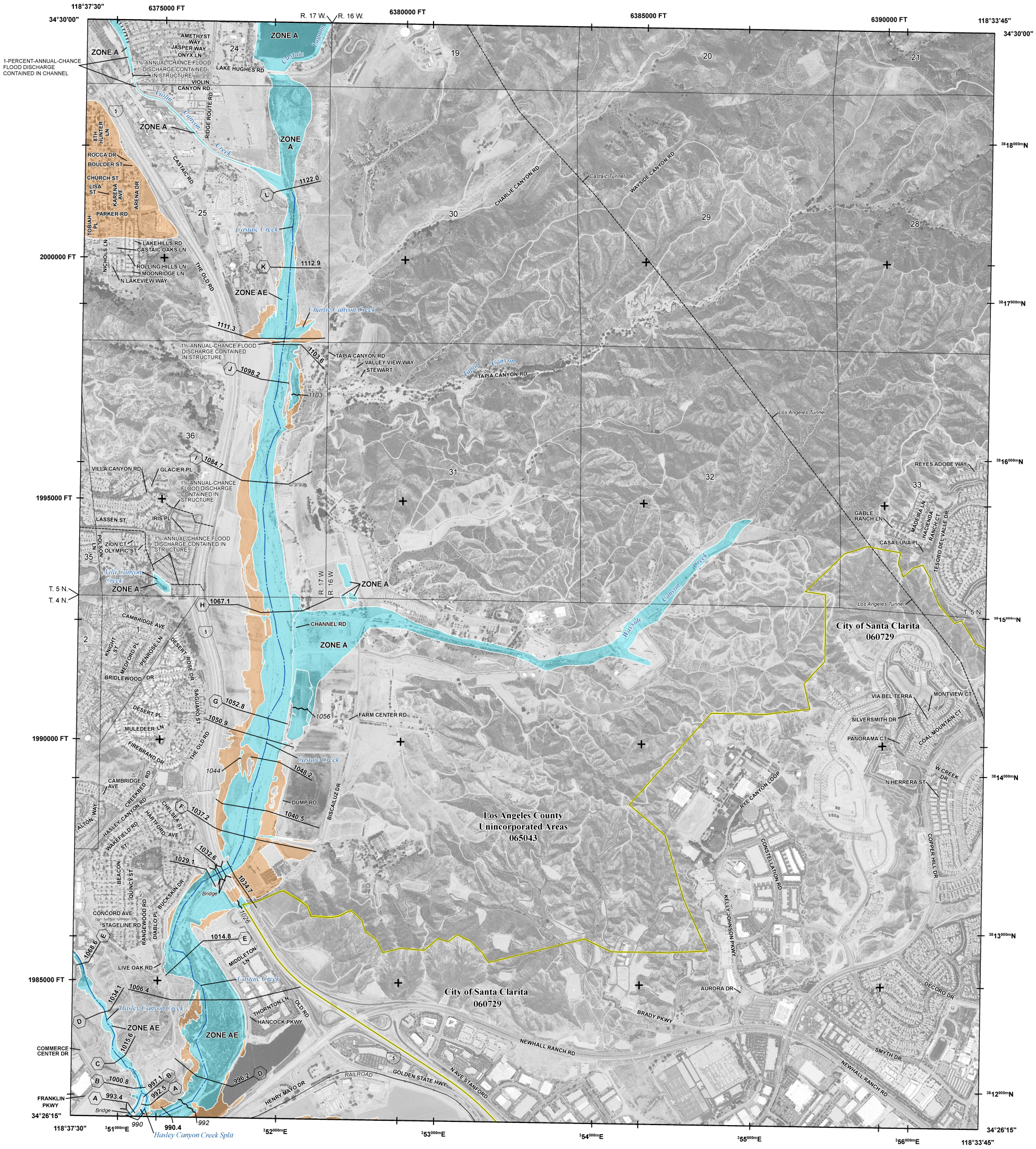
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0785	G

VERSION NUMBER
2.3.3.2

MAP NUMBER
06037C0785G

MAP REVISED
JUNE 2, 2021


ZONE A
ZONE AE
1-PERCENT-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE
Castaic Creek
Violin Canyon Creek
Charlie Canyon Creek
Tapia Canyon
Vila Canyon Creek
Hasley Canyon Creek
Hasley Canyon Creek Split
Waysde Canyon Creek
Castaic Tunnel
Los Angeles Tunnel
Bridge
LAKE HUGHES RD
VIOLIN CANYON RD
RIDGE ROUTE RD
CASTAIC RD
CHURCH ST
PARKER RD
LAKEHILLS RD
CASTAIC OAKS LN
ROLLING HILLS LN
MOONRIDGE LN
N LAKEVIEW WAY
THE OLD RD
TAPIA CANYON RD
VALLEY VIEW WAY
STEWART
CHARLIE CANYON RD
WAYSIDE CANYON RD
VILLA CANYON RD
GLACIER PL
LASSEN ST
IRIS PL
ZION CT
OLYMPIC ST
CHANNEL RD
FARM CENTER RD
DUMP RD
BRIDLEWOOD DR
DESERT PL
MULEDEER LN
FIREBRAND DR
CAMBRIDGE AVE
CREEBED RD
HASLEY CANYON RD
WAKEFIELD RD
HARTFORD AVE
CHELSEA ST
CONCORD AVE
STAGELINE RD
LIVE OAK RD
MIDDLETON LN
THORNTON LN
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COMMERCE CENTER DR
FRANKLIN PKWY
HENRY MAYO DR
RAILROAD
GOLDEN STATE HWY
N AVE STANFORD
NEWHALL RANCH RD
BRADY PKWY
AURORA DR
KELLY JOHNSON PKWY
CONSTELLATION RD
RYE CANYON LOOP
DECORO DR
SMYTH DR
COPPER HILL DR
W CREEK DR
N HERRERA ST
SILVERSMITH DR
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VIA BEL TERRA
MONTVIEW CT
COAL MOUNTAIN CT
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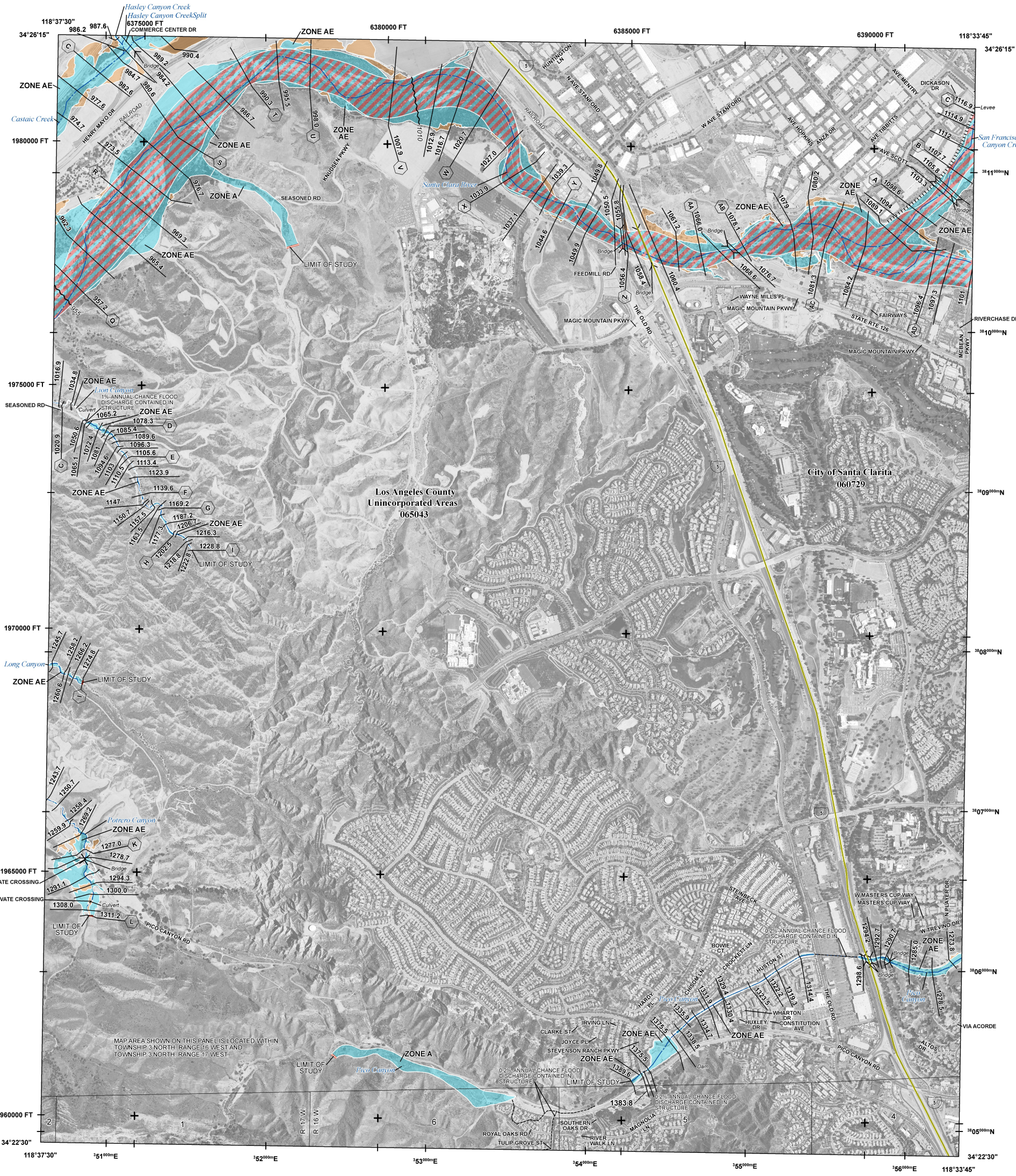

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	With BFE or Depth *Zone AE, AO, AH, VE, AR*
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OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes *Zone X*
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	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

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SCALE

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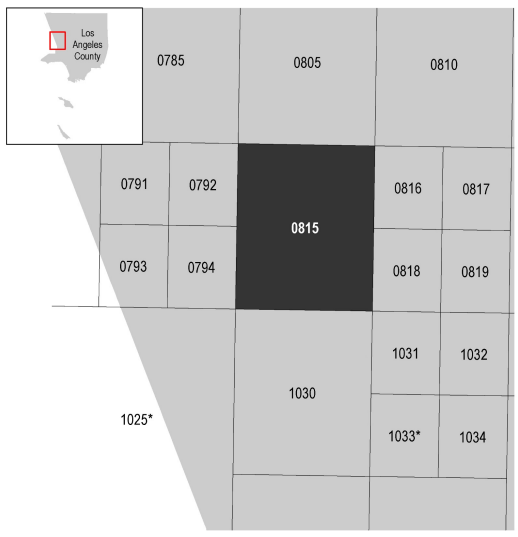
Map Projection:
Universal Transverse Mercator Zone 11N; North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 feet

0 250 500 1,000 meters

PANEL LOCATOR



*PANEL NOT PRINTED

FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 815 OF 2350

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0815	G
SANTA CLARITA, CITY OF	060729	0815	G

VERSION NUMBER
2.3.3.2

MAP NUMBER
06037C0815G

MAP REVISED
JUNE 2, 2021

FEMA LOMR: Castaic Creek Soil Cement Bank Protection
October 2021

PACE

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Los Angeles County California (Unincorporated Areas)	NO PROJECT	1D HYDRAULIC ANALYSIS UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 065043		
IDENTIFIER	Castaic Creek Soil Cement Bank Protection PM 26363	APPROXIMATE LATITUDE & LONGITUDE: 34.434, -118.626 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 06037C0792G DATE: June 2, 2021 TYPE: FIRM NO.: 06037C0805G DATE: June 2, 2021 TYPE: FIRM NO.: 06037C0815G DATE: June 2, 2021	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: June 02, 2021 PROFILE(S): 53P, 54P, 96P AND 102P

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

FLOODING SOURCE(S) & REVISED REACH(ES) See Page 2 for Additional Flooding Sources

Castaic Creek - from just upstream of Highway 126 to just downstream of Commerce Centre Drive.

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Castaic Creek	BFEs*	BFEs	YES	YES
	Zone AE	Zone AE	YES	YES
	Zone AE	Zone X(shaded)	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

FLOODING SOURCE(S) & REVISED REACH(ES)

Hasley Canyon Creek - from its confluence to approximately 400 feet upstream of the confluence with Castaic Creek.
Hasley Canyon Creek Split - From its convergence to approximately 360 upstream of convergence with Hasley Canyon Creek.

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Hasley Canyon Creek	BFEs* Zone AE	BFEs Zone AE	YES YES	YES YES
Hasley Canyon Creek Split	BFEs* Zone AE	BFEs Zone AE	YES YES	YES YES

* BFEs - Base Flood Elevations

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

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Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

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Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Kathryn Lipiecki
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607-4052
(510) 627-7211

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below, and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/bfe_status/bfe_main.asp

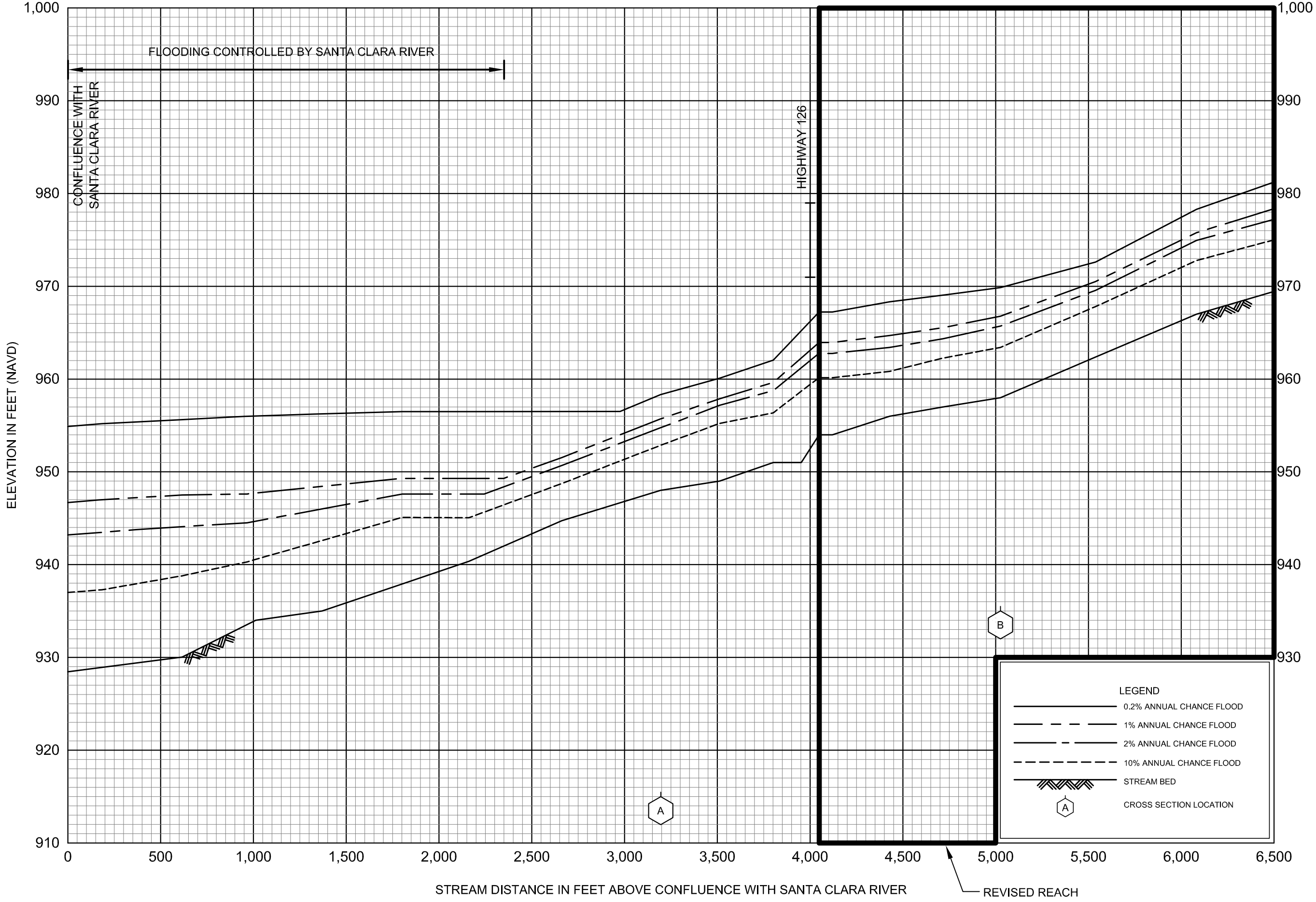
LOCAL NEWSPAPER

Name: *Los Angeles Daily News*
Dates: June 10, 2021 and June 17, 2021

Within 90 days of the second publication in the local newspaper, any interested party may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



FLOOD PROFILES

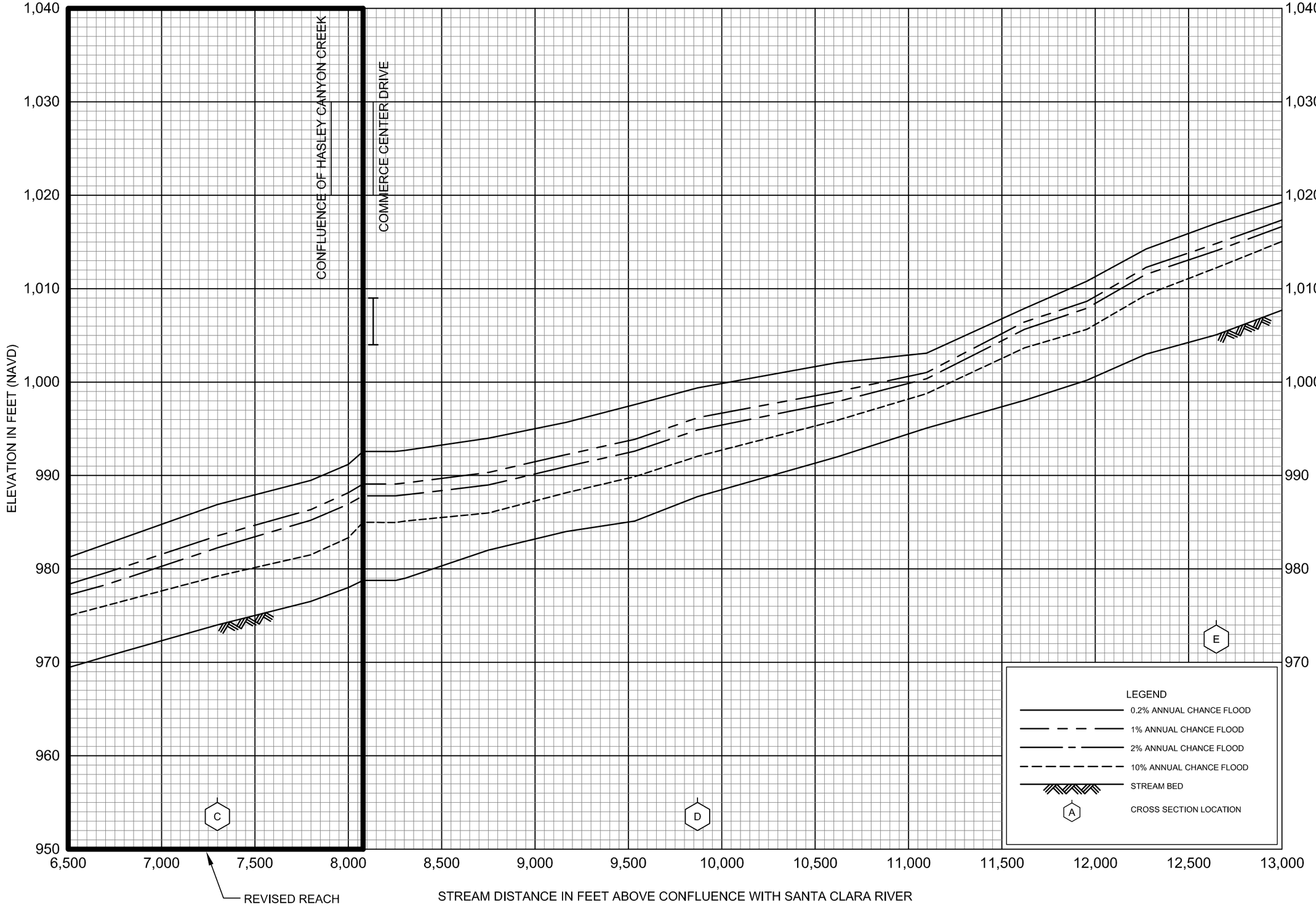
REVISED TO REFLECT LOMR
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

53P



FLOOD PROFILES

REVISED TO REFLECT LOMR

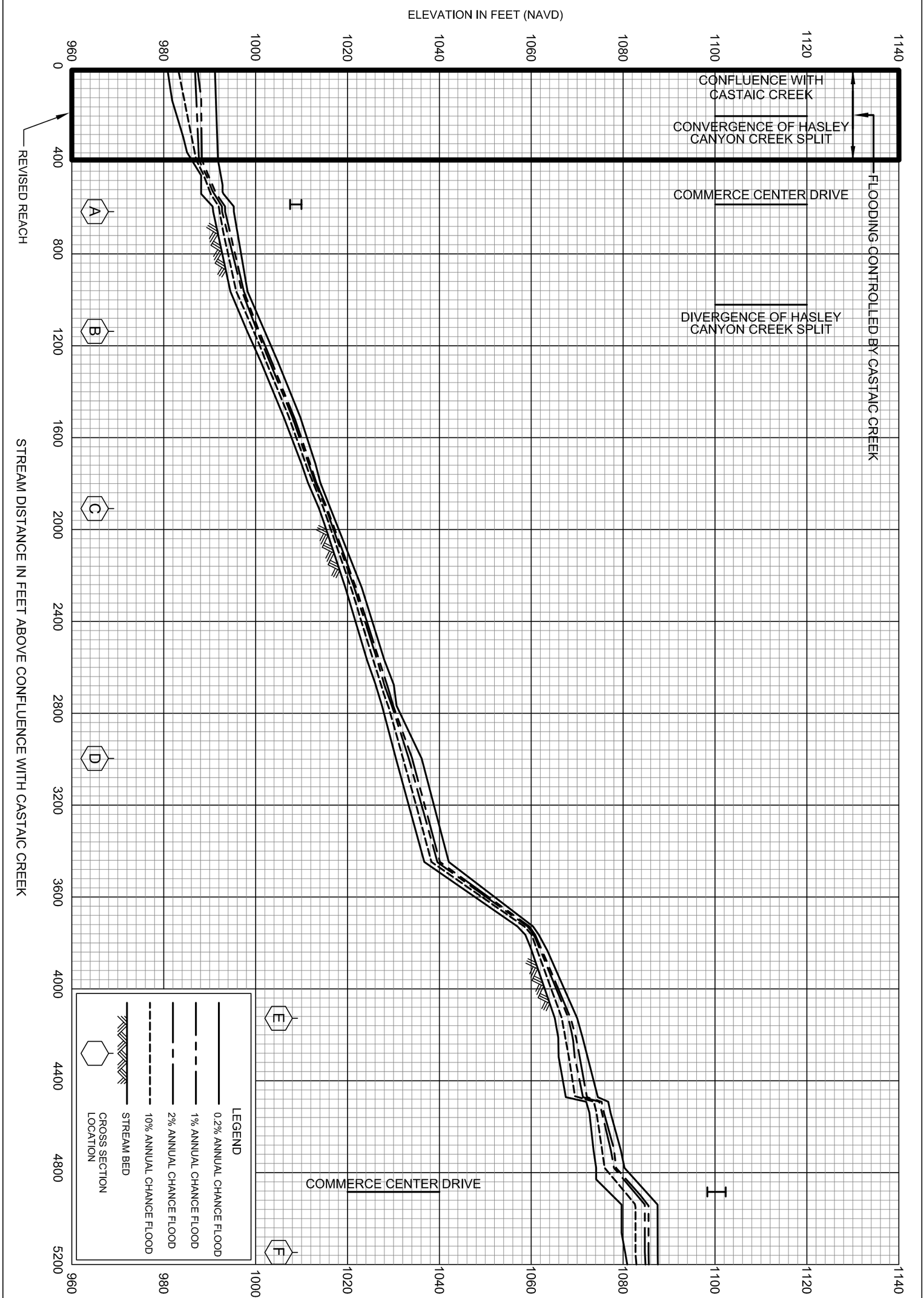
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



96P

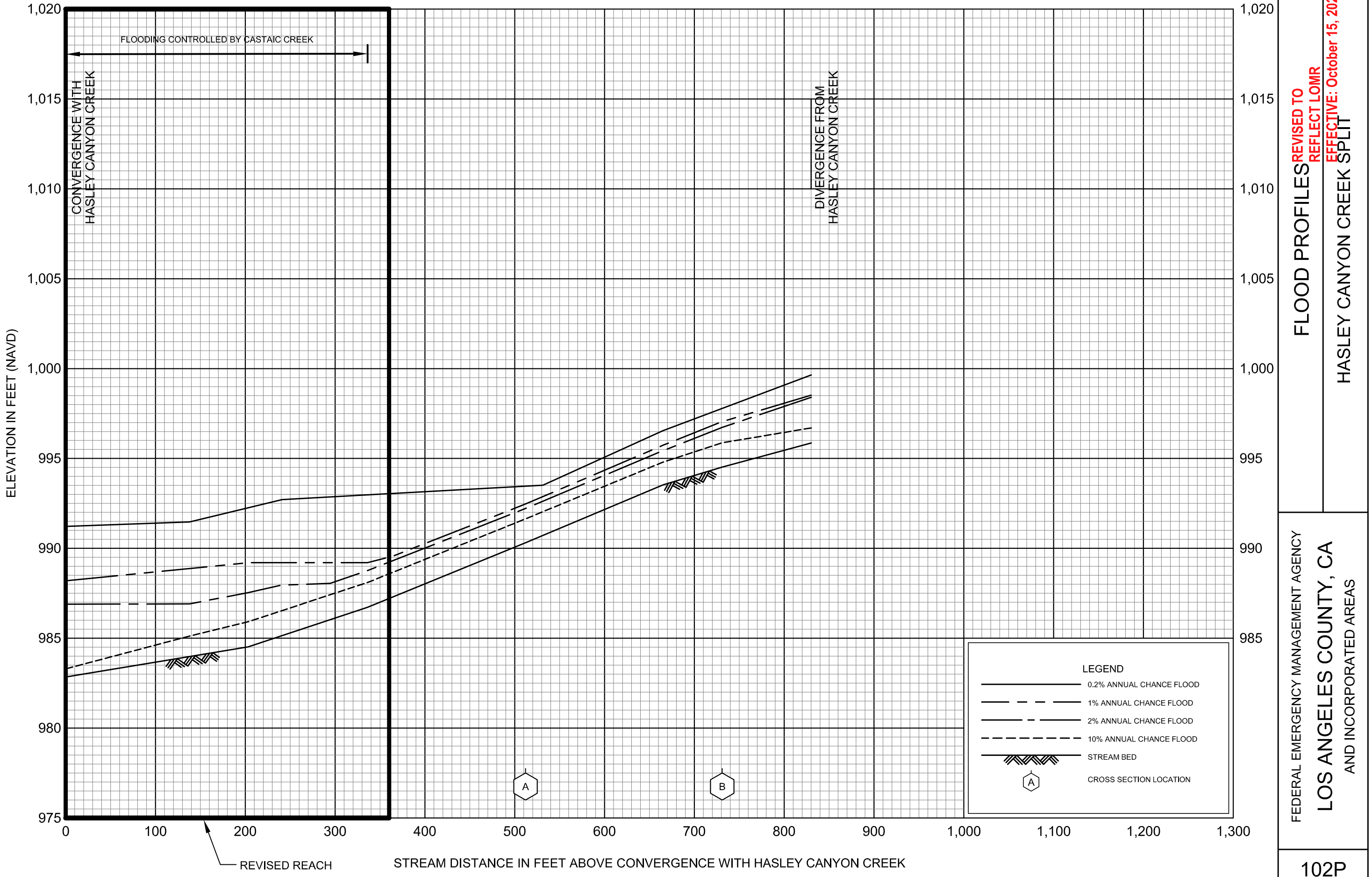
FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

FLOOD PROFILES REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

HASLEY CANYON CREEK



FLOOD PROFILES

REVISED TO REFLECT LOMR

EFFECTIVE: October 15, 2021

HASLEY CANYON CREEK SPLIT

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

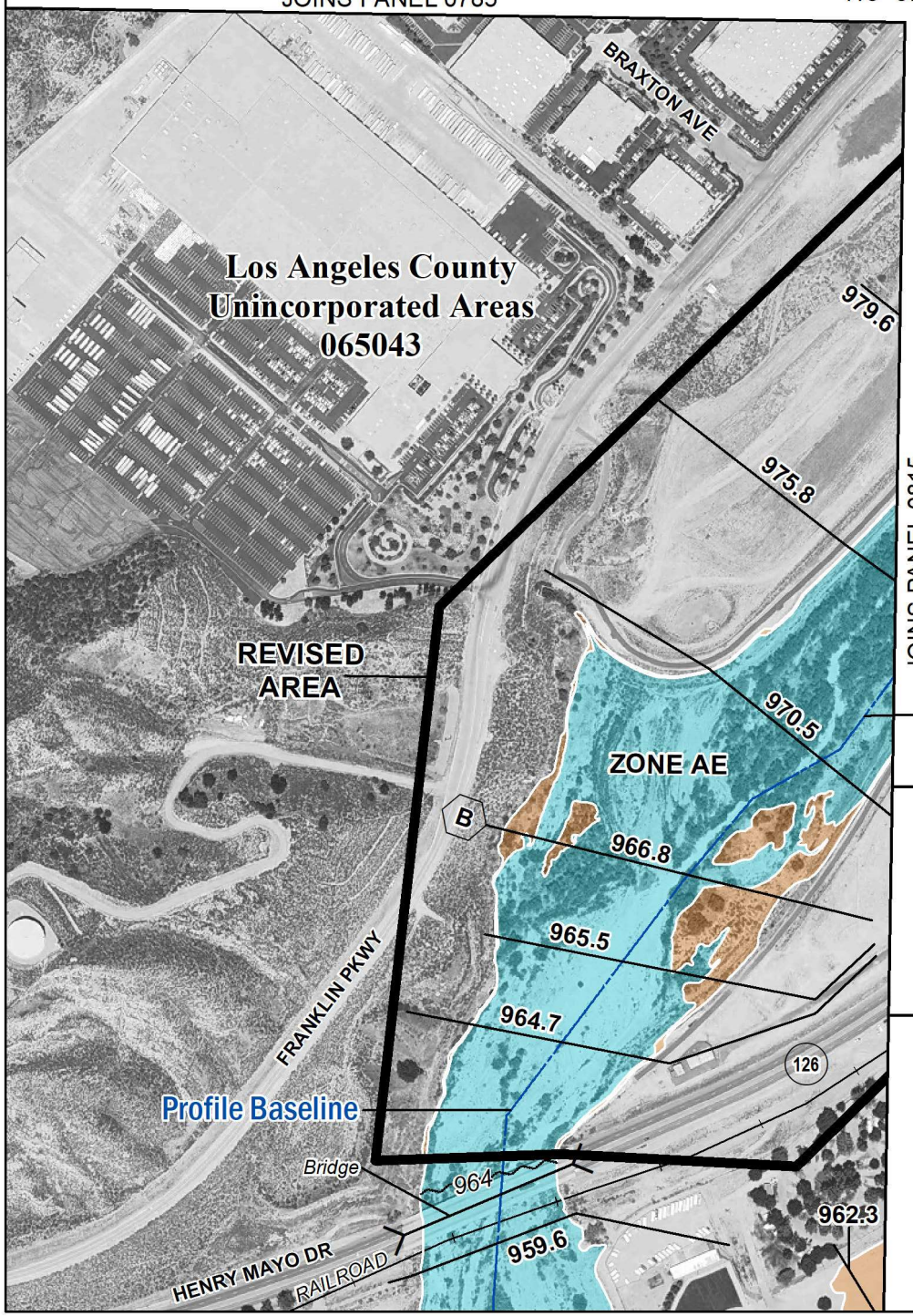
102P

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 4 NORTH, RANGE 17 WEST.

JOINS PANEL 0785

118° 37' 30"

34° 26' 15"



SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*

OTHER AREAS

- Area of Undetermined Flood Hazard *Zone D*

SCALE

N

Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 792 OF 1075

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0792	G

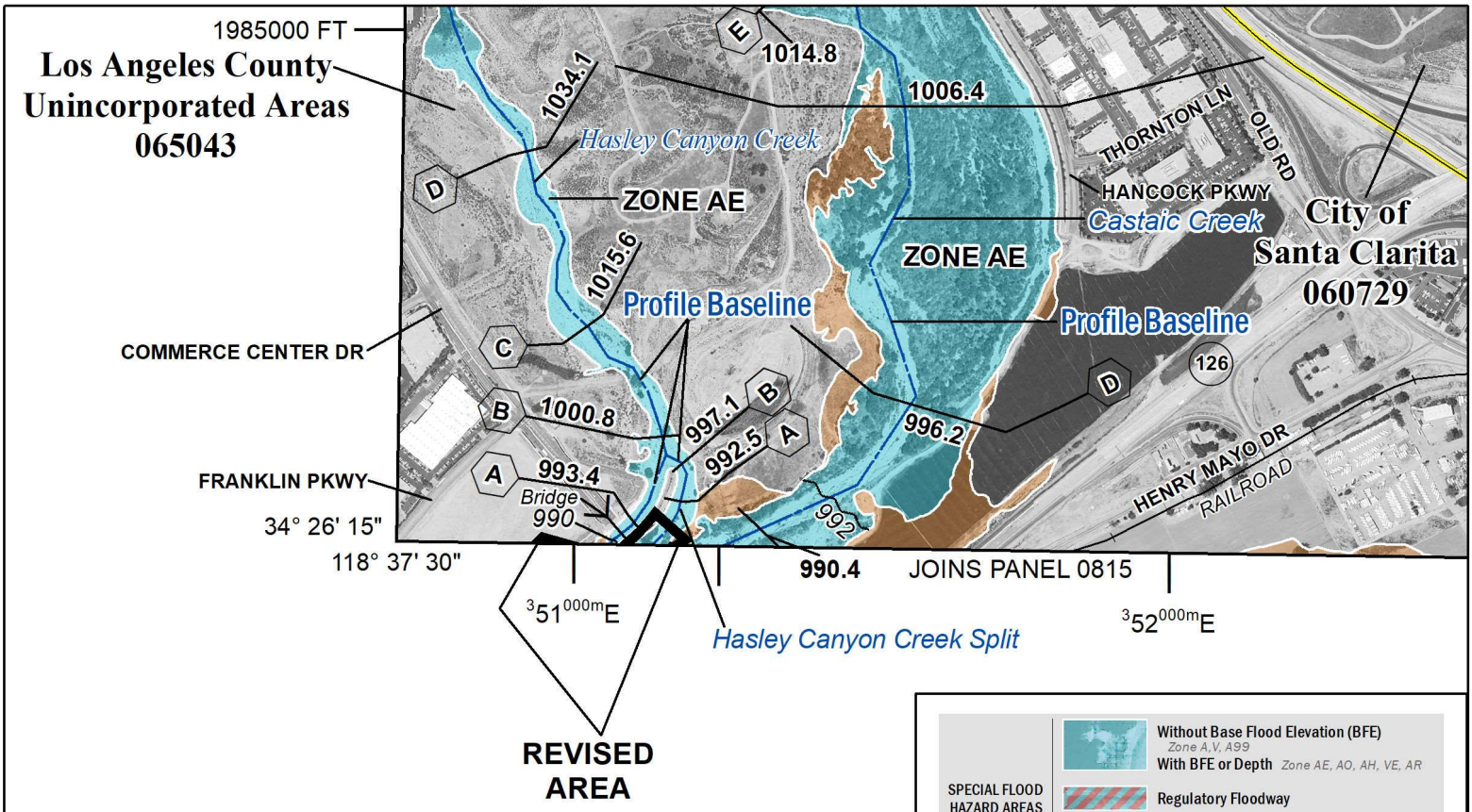
FEMA

REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

VERSION NUMBER
2.3.3.0

MAP NUMBER
06037C0792G

MAP REVISED
JUNE 2, 2021



SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A,V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X

OTHER AREAS
- Area of Undetermined Flood Hazard Zone D

SCALE

N

Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0	500	1,000	2,000 Feet
0	150	300	600 Meters

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 805 OF 1075

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0805	G
SANTA CLARITA, CITY OF	060729	0805	G

REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

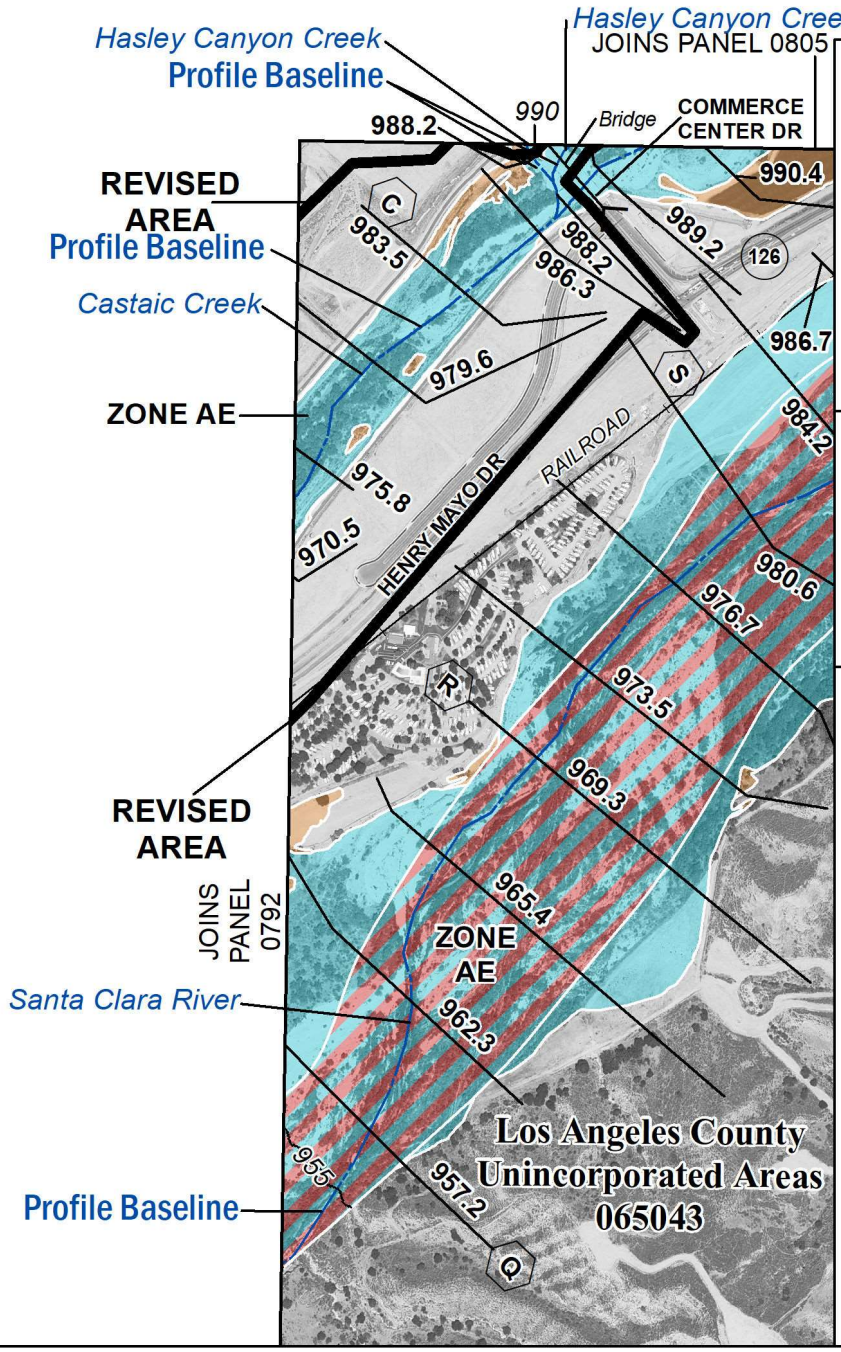
VERSION NUMBER
2.3.3.0

MAP NUMBER
06037C0805G

MAP REVISED
JUNE 2, 2021

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 5 NORTH, RANGE 17 WEST AND TOWNSHIP 5 NORTH, RANGE 16 WEST AND TOWNSHIP 4 NORTH, RANGE 17 WEST AND TOWNSHIP 4 NORTH, RANGE 16 WEST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 3 NORTH, RANGE 16 WEST AND TOWNSHIP 3 NORTH, RANGE 17 WEST.



SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A,V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X

OTHER AREAS
- Area of Undetermined Flood Hazard Zone D

SCALE

Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88

N

1 inch = 1,000 feet 1:12,000

0 500 1,000 2,000 Feet

0 150 300 600 Meters

National Flood Insurance Program

FEMA

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 815 OF 1075

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0815	G
SANTA CLARITA, CITY OF	060729	0815	G

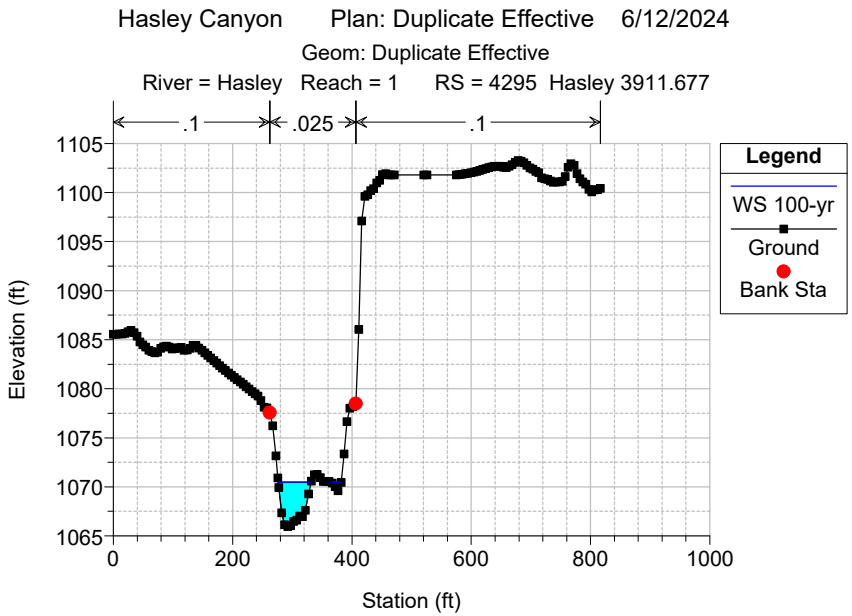
REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

VERSION NUMBER
2.3.3.0

MAP NUMBER
06037C0815G

MAP REVISED
JUNE 2, 2021

Appendix C – HEC-RAS Effective Results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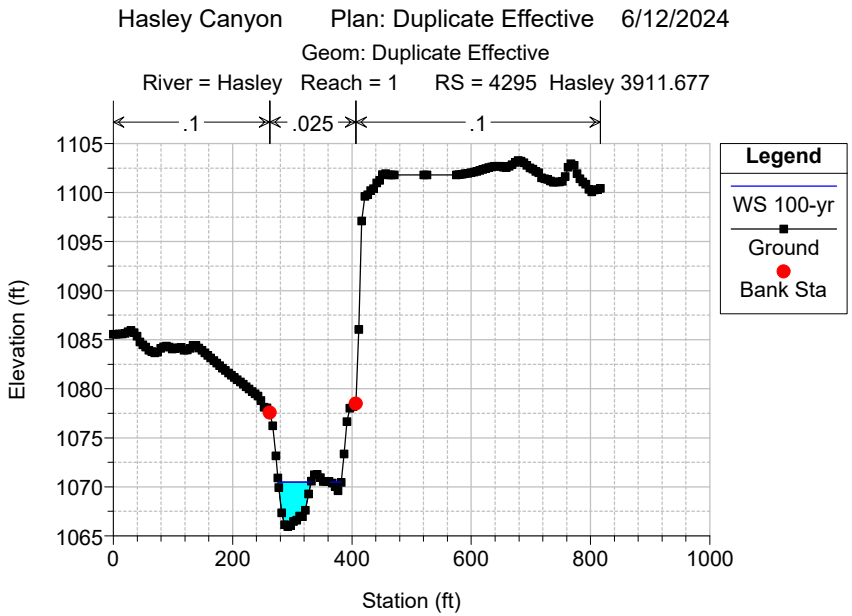
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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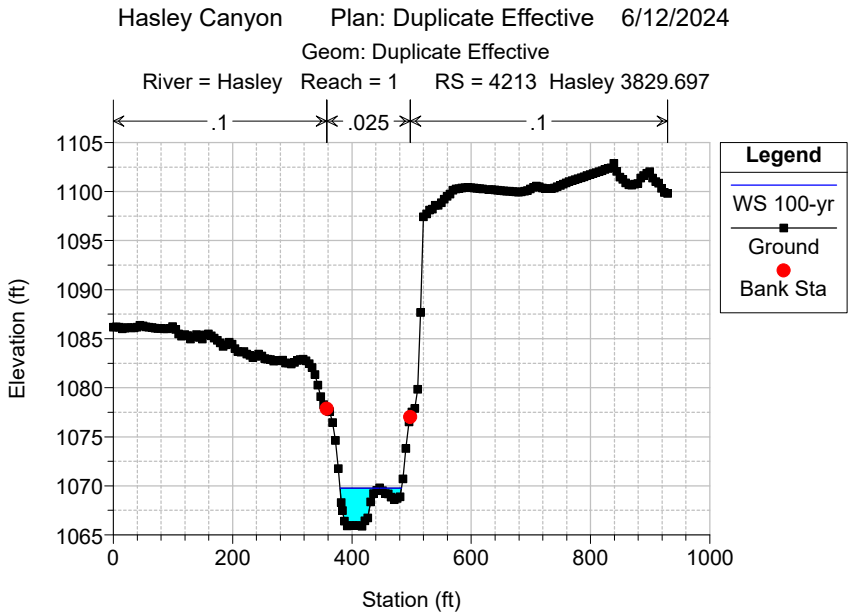
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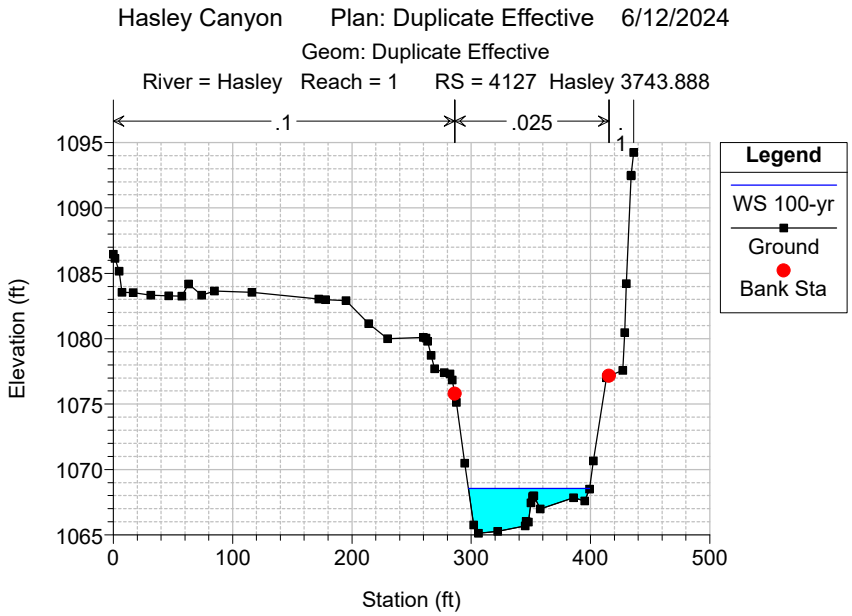
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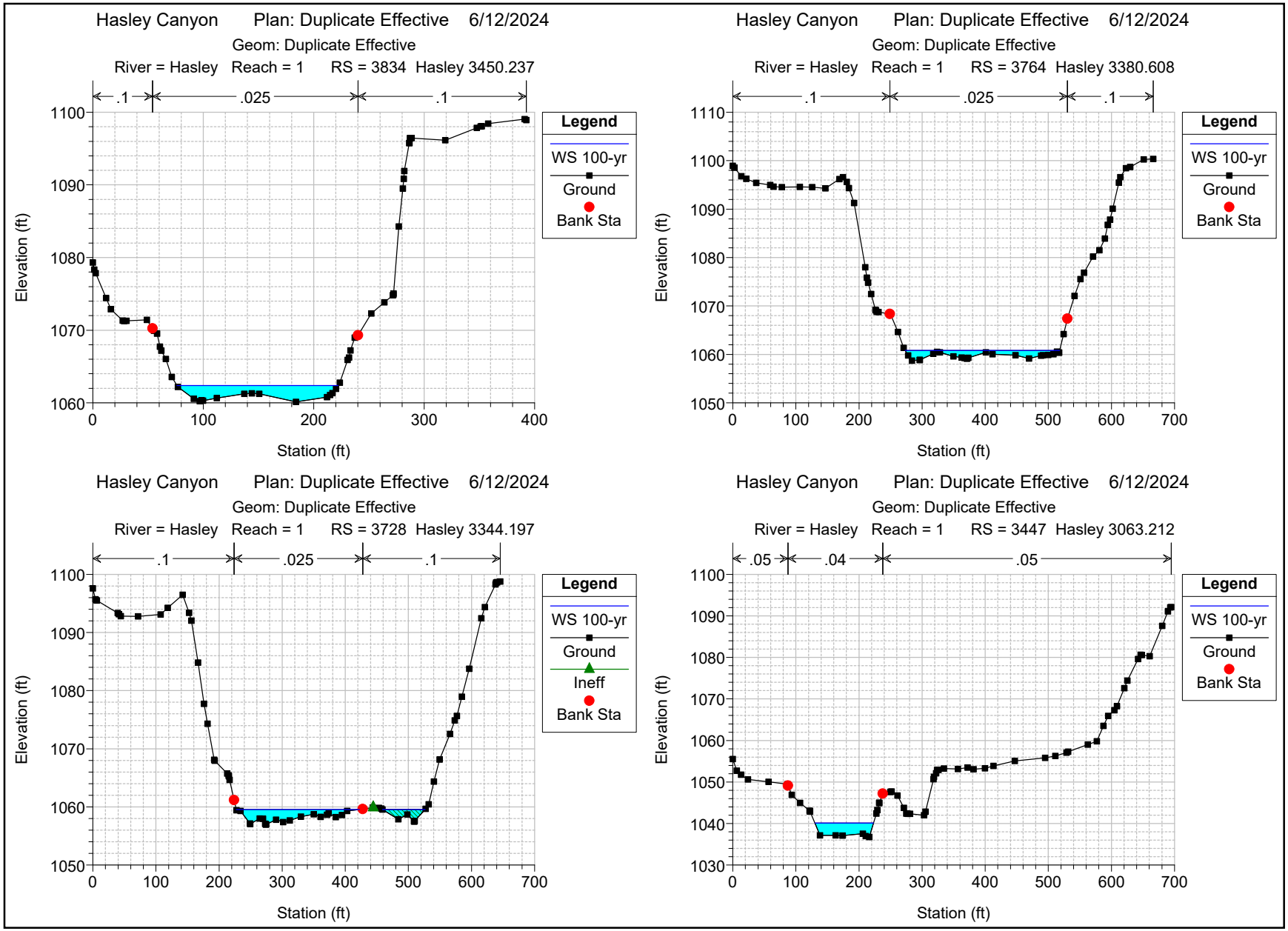
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Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
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WS 100-yr
Ground
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WS 100-yr
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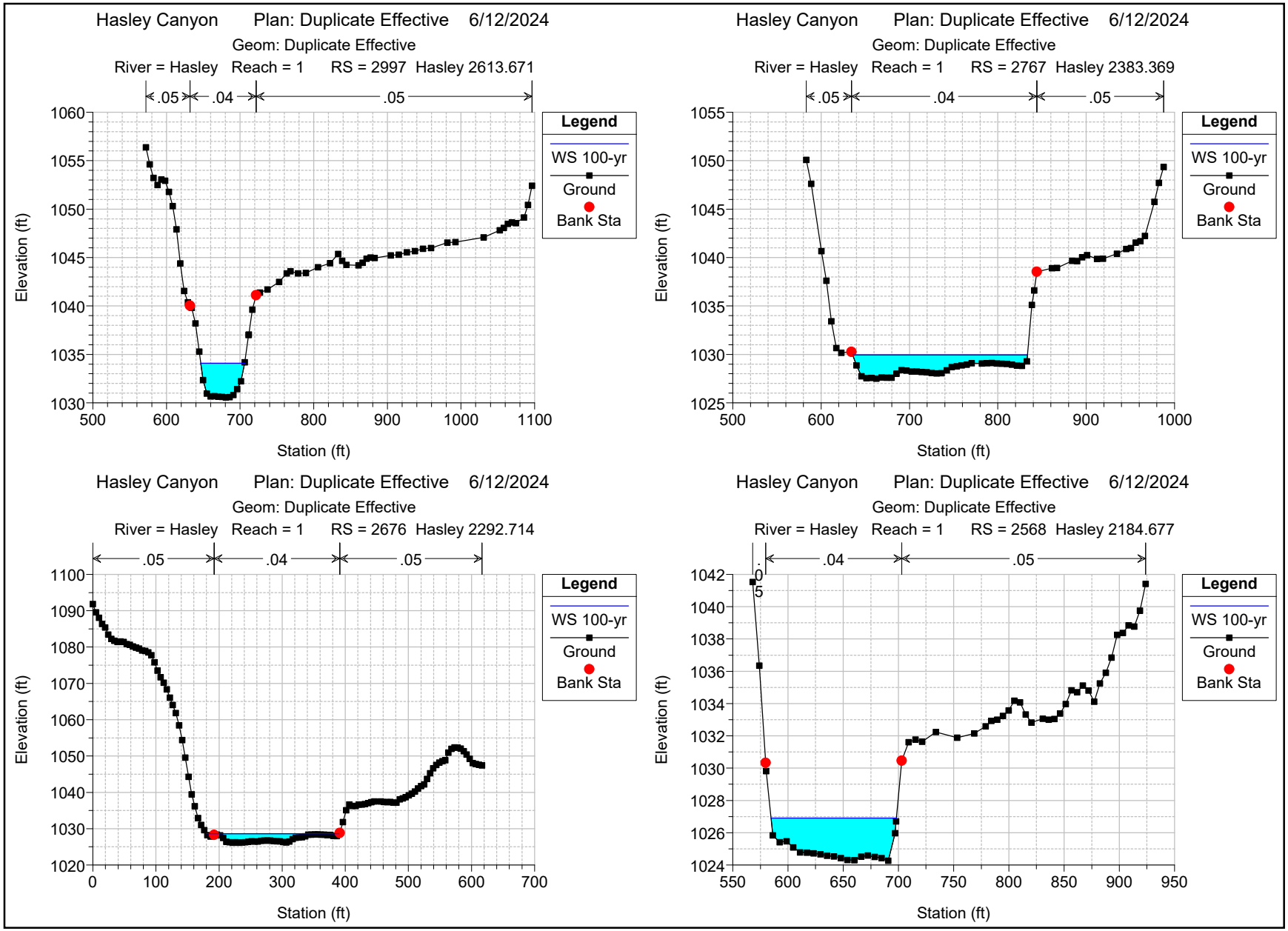
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
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Legend
WS 100-yr
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
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Geom: Duplicate Effective
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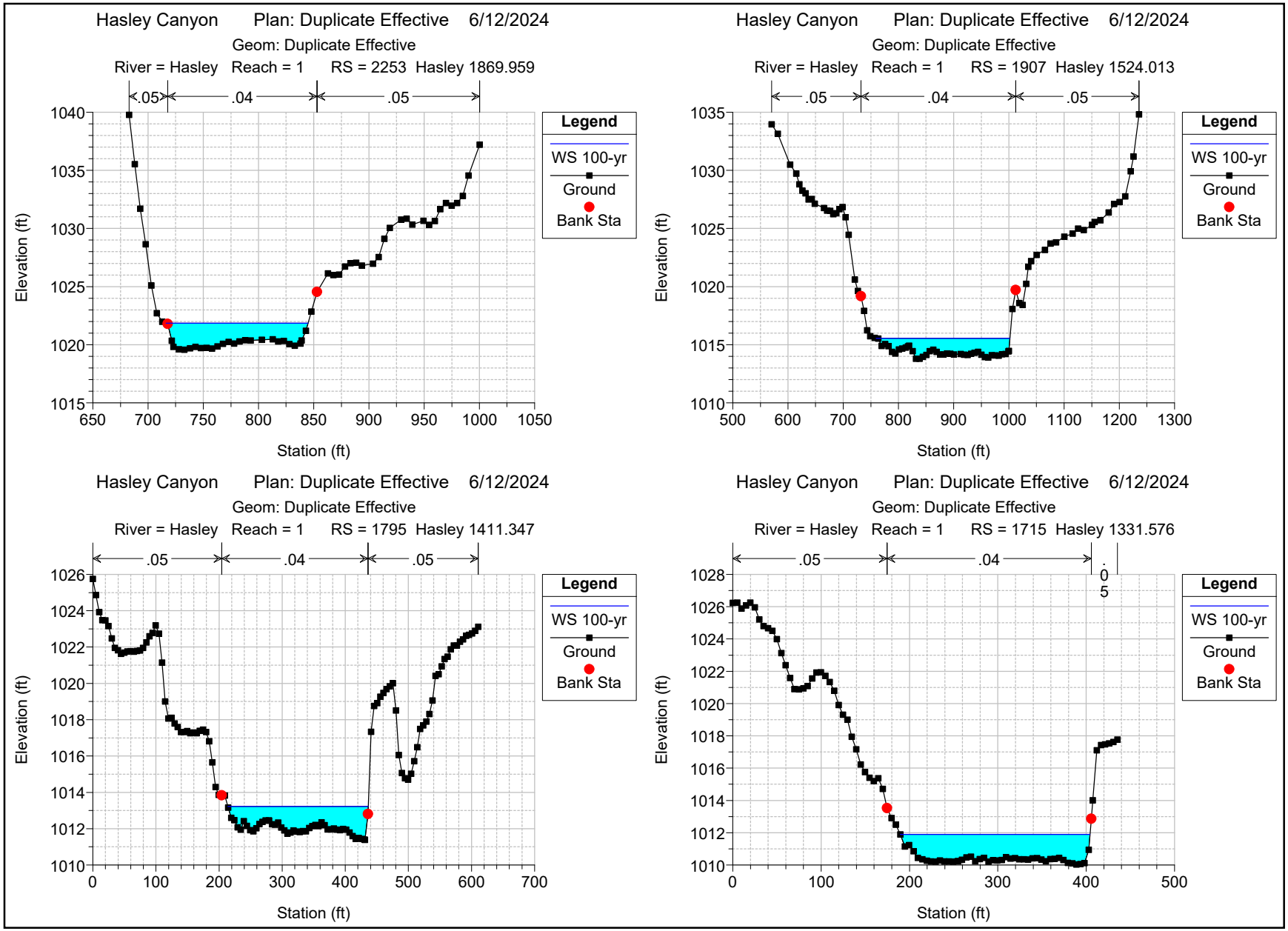
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
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Station (ft)
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WS 100-yr
Ground
Bank Sta
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
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Geom: Duplicate Effective
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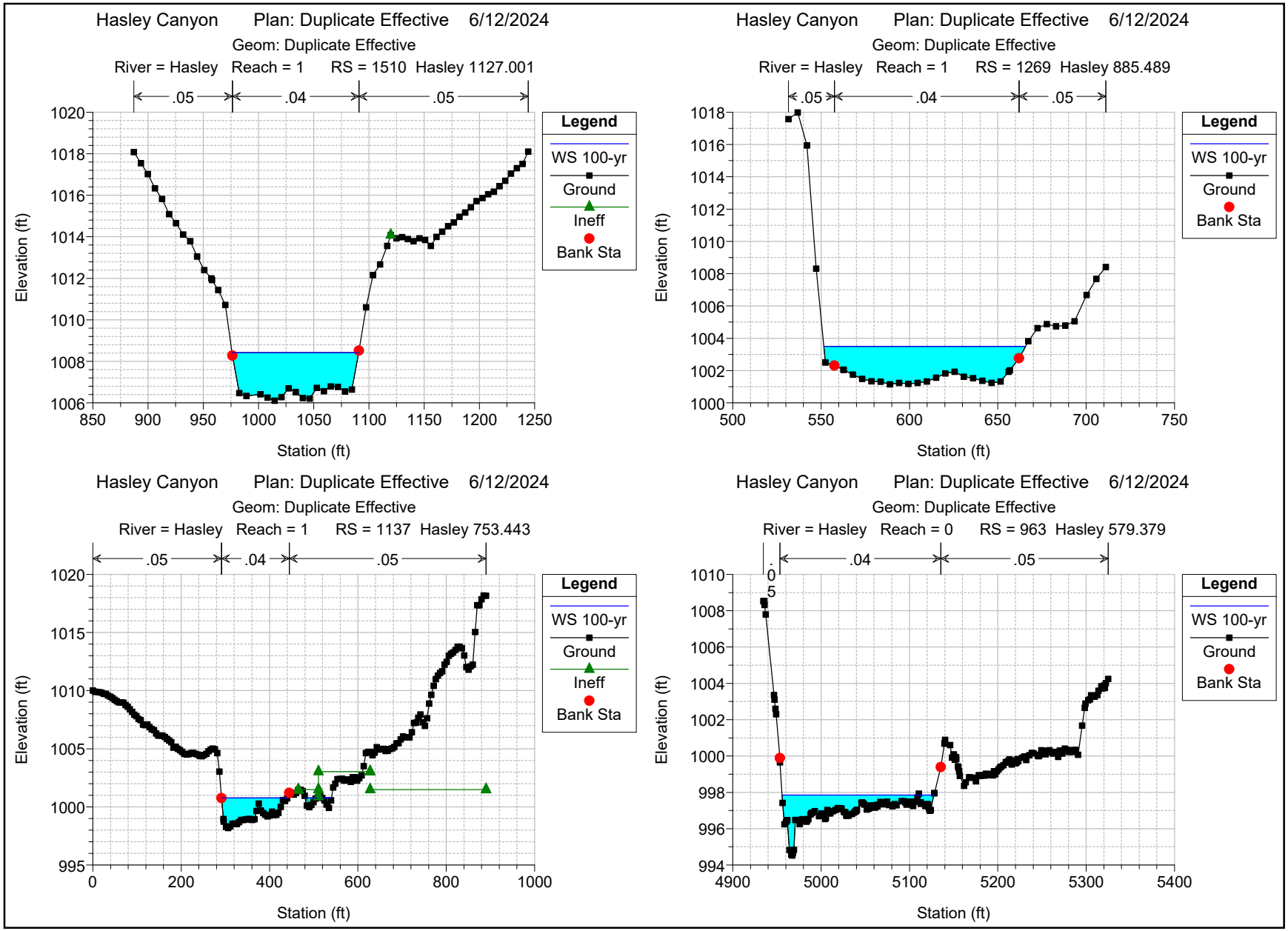
Legend
WS 100-yr
Ground
Bank Sta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Bank Sta
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Duplicate Effective 6/12/2024
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
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Bank Sta
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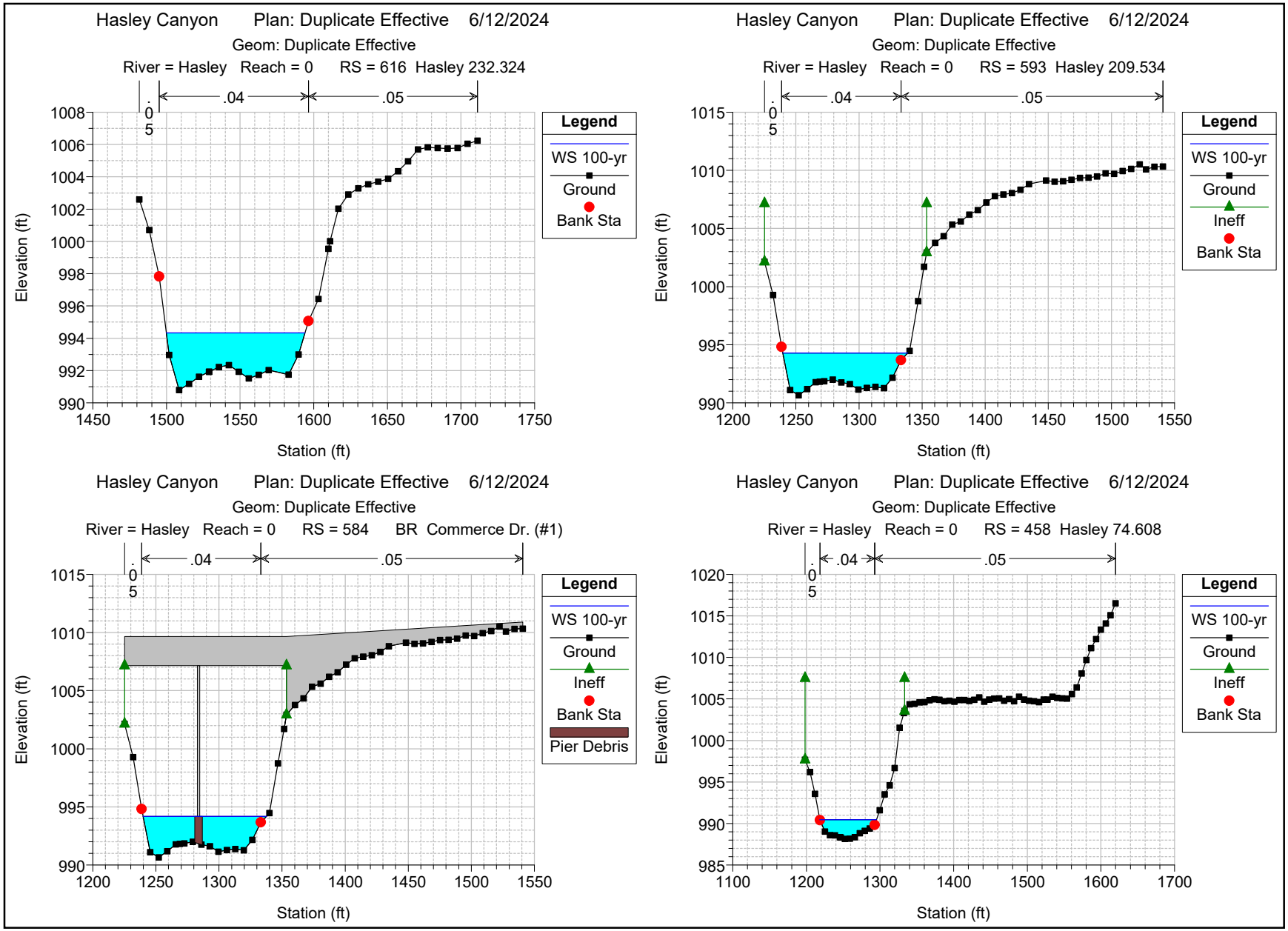
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
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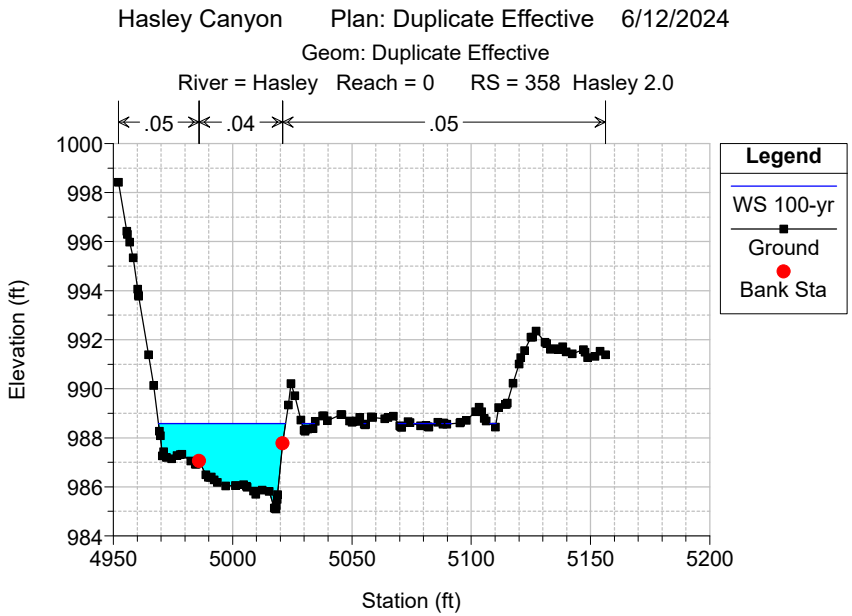
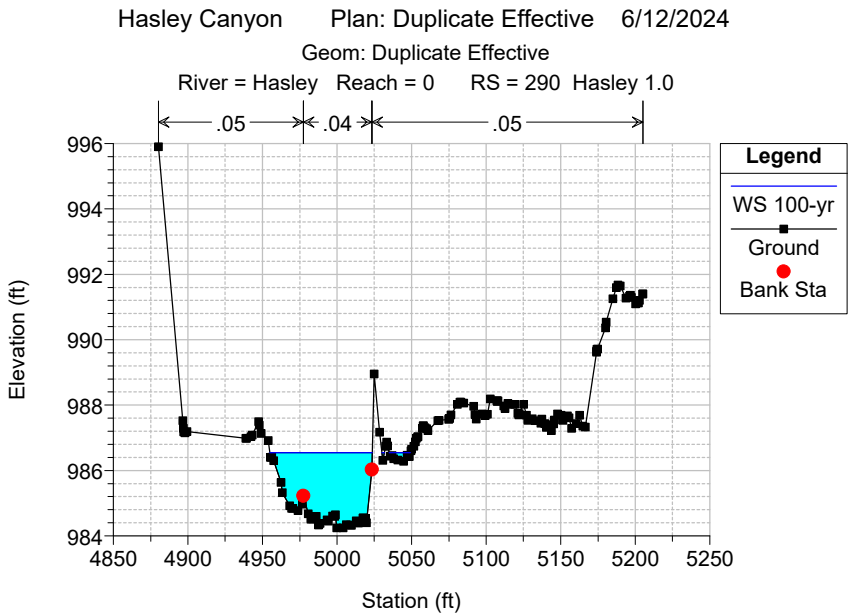
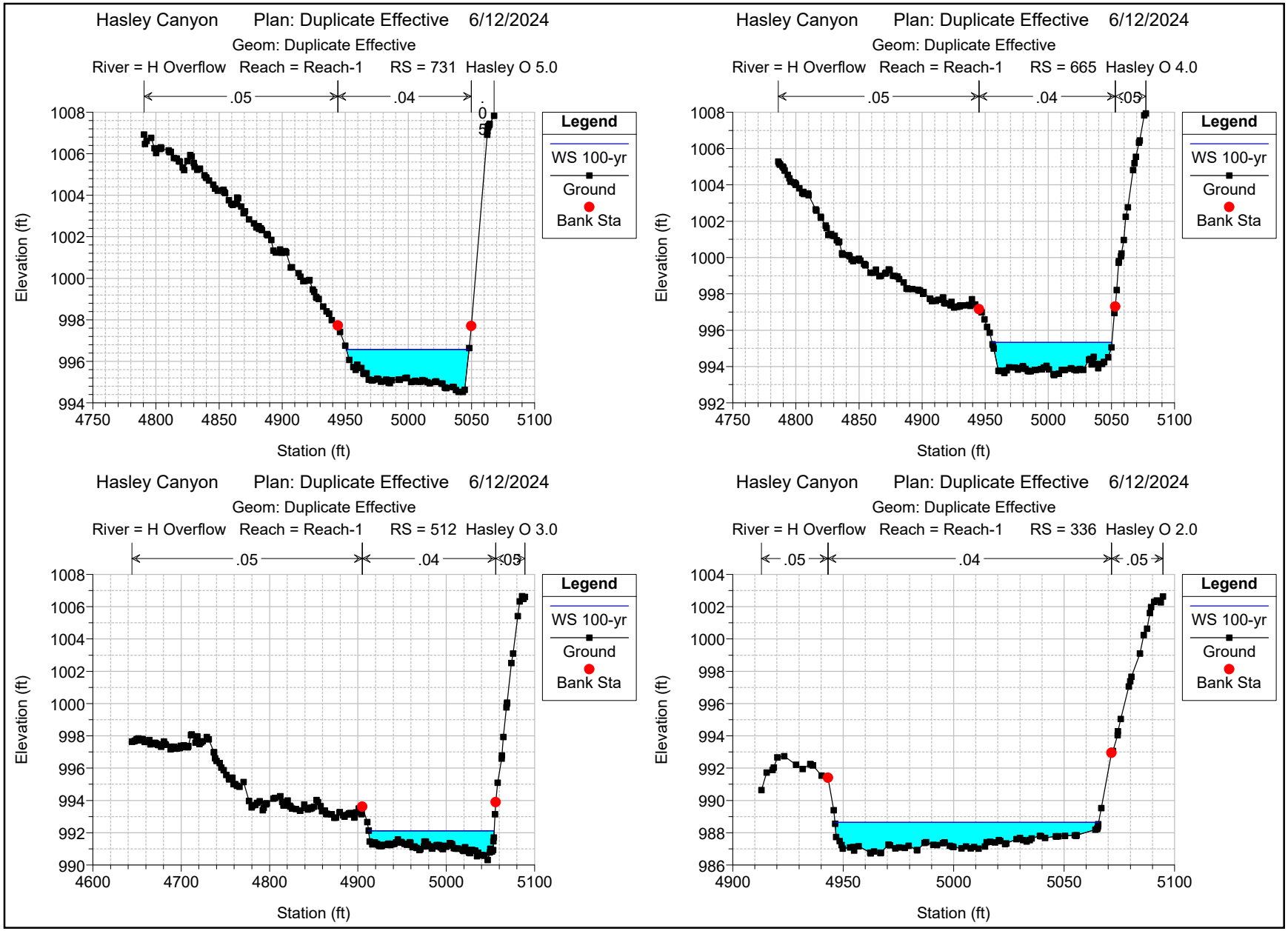
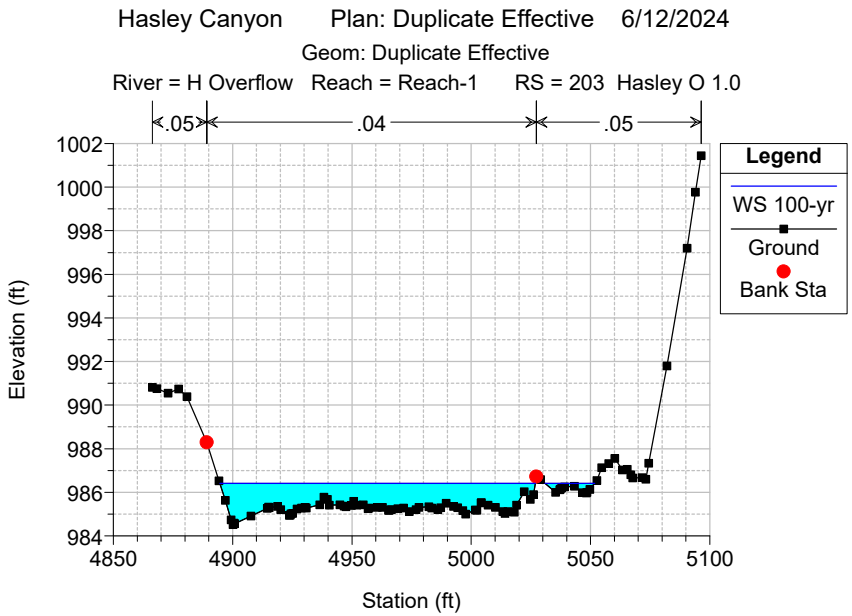
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 584 BR Commerce Dr. (#1)
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Pier Debris
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 458 Hasley 74.608
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta


Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 358 Hasley 2.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1000
998
996
994
992
990
988
986
984
4950
5000
5050
5100
5150
5200


Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 290 Hasley 1.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
996
994
992
990
988
986
984
4850
4900
4950
5000
5050
5100
5150
5200
5250


Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 731 Hasley O 5.0
.05
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 665 Hasley O 4.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 512 Hasley O 3.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 336 Hasley O 2.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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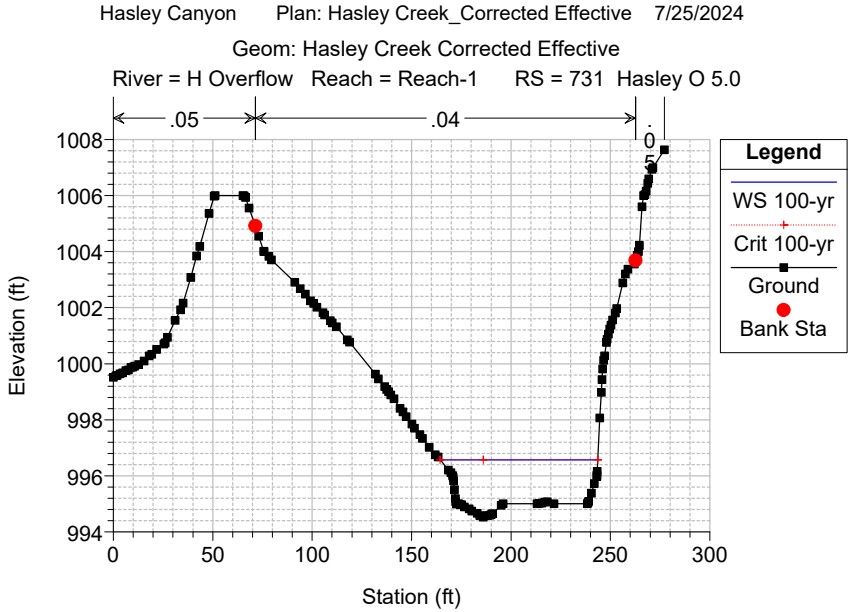
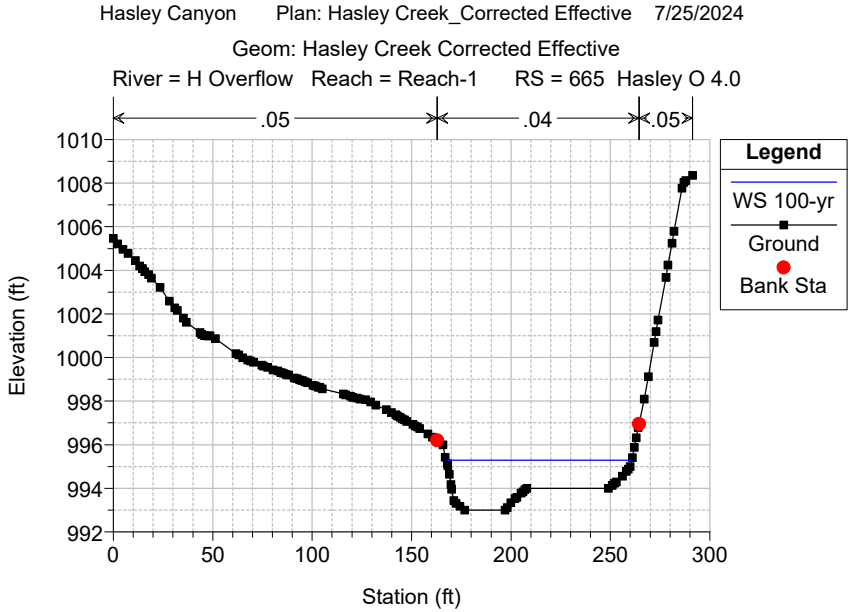
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 203 Hasley O 1.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1002
1000
998
996
994
992
990
988
986
984
4850
4900
4950
5000
5050
5100

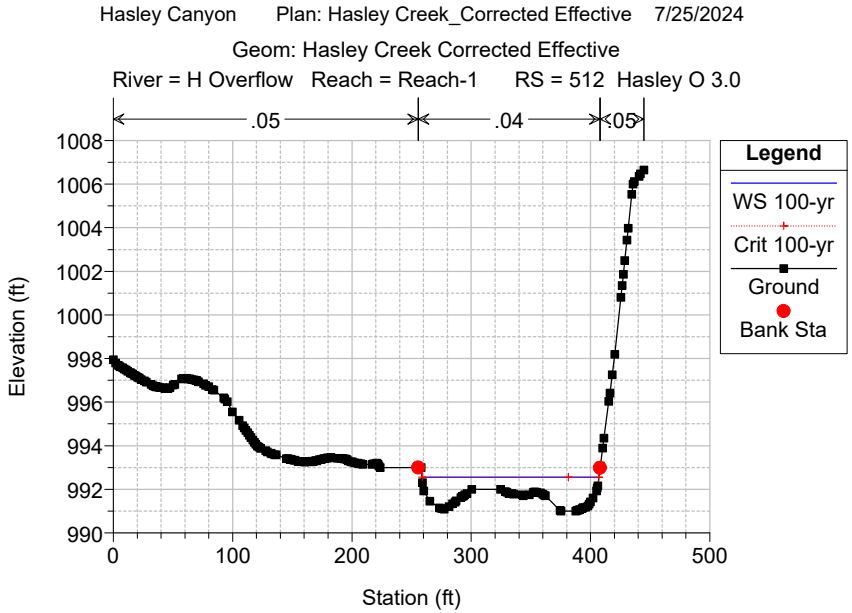
HEC-RAS Plan: Duplicate Effective Profile: 100-yr

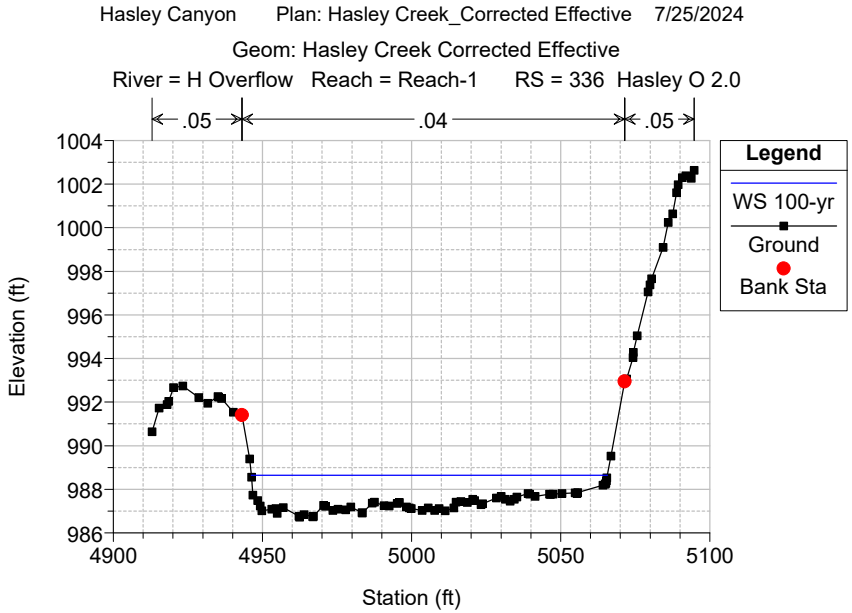
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hasley	1	4295 Hasley 3911.677	100-yr	1640.00	1065.95	1070.49	1070.49	1071.71	0.006639	8.86	185.17	73.31	0.98
Hasley	1	4213 Hasley 3829.697	100-yr	1640.00	1065.89	1069.77	1069.77	1070.78	0.007498	8.09	202.80	101.54	1.01
Hasley	1	4127 Hasley 3743.888	100-yr	1640.00	1065.13	1068.55	1068.55	1069.56	0.007425	8.06	203.55	101.48	1.00
Hasley	1	3834 Hasley 3450.237	100-yr	1640.00	1060.14	1062.40	1062.40	1063.20	0.008047	7.18	228.55	146.07	1.01
Hasley	1	3764 Hasley 3380.608	100-yr	1640.00	1058.71	1060.84	1060.84	1061.42	0.009241	6.09	269.47	244.63	1.02
Hasley	1	3728 Hasley 3344.197	100-yr	1640.00	1056.98	1059.56	1059.56	1060.21	0.008407	6.48	253.24	262.78	1.00
Hasley	1	3447 Hasley 3063.212	100-yr	1640.00	1036.71	1040.11	1039.49	1040.77	0.008347	6.53	251.28	92.85	0.70
Hasley	1	2997 Hasley 2613.671	100-yr	1640.00	1030.56	1034.09	1034.09	1035.52	0.016828	9.60	170.77	59.60	1.00
Hasley	1	2767 Hasley 2383.369	100-yr	1640.00	1027.50	1029.94	1029.73	1030.42	0.013579	5.61	292.56	197.93	0.81
Hasley	1	2676 Hasley 2292.714	100-yr	1640.00	1026.13	1028.60	1028.46	1029.12	0.015143	5.77	287.79	210.16	0.85
Hasley	1	2568 Hasley 2184.677	100-yr	1640.00	1024.26	1026.90	1026.63	1027.62	0.012419	6.80	241.05	113.52	0.82
Hasley	1	2253 Hasley 1869.959	100-yr	1640.00	1019.57	1021.85	1021.85	1022.73	0.019870	7.50	218.76	128.59	1.01
Hasley	1	1907 Hasley 1524.013	100-yr	1640.00	1013.79	1015.56	1015.44	1016.04	0.017371	5.57	294.41	242.13	0.89
Hasley	1	1795 Hasley 1411.347	100-yr	1640.00	1011.38	1013.22	1013.22	1013.82	0.022626	6.24	262.77	222.53	1.01
Hasley	1	1715 Hasley 1331.576	100-yr	1640.00	1010.03	1011.89	1011.60	1012.30	0.010915	5.08	322.55	214.61	0.73
Hasley	1	1510 Hasley 1127.001	100-yr	1640.00	1006.10	1008.42	1008.42	1009.35	0.019085	7.73	212.31	114.76	1.00
Hasley	1	1269 Hasley 885.489	100-yr	1640.00	1001.15	1003.50	1003.50	1004.46	0.018522	7.90	211.82	114.25	1.00
Hasley	1	1137 Hasley 753.443	100-yr	1640.00	998.19	1000.78	1000.78	1001.56	0.020292	7.08	231.70	196.31	1.00
Hasley	0	963	100-yr	820.00	994.52	997.85	997.85	998.31	0.025279	5.41	151.59	170.72	1.01
Hasley	0	616 Hasley 232.324	100-yr	820.00	990.79	994.33	993.22	994.54	0.003128	3.67	223.52	94.10	0.42
Hasley	0	593 Hasley 209.534	100-yr	820.00	990.66	994.29	992.92	994.46	0.002194	3.30	249.54	98.95	0.36
Hasley	0	584		Bridge									
Hasley	0	458 Hasley 74.608	100-yr	820.00	988.13	990.47	990.34	991.13	0.015566	6.55	125.86	76.91	0.89
Hasley	0	358	100-yr	820.00	985.09	988.58	988.58	989.53	0.015103	8.21	112.87	77.24	0.92
Hasley	0	290	100-yr	820.00	984.24	986.55	986.55	987.35	0.016727	7.60	121.90	84.64	0.94
H Overflow	Reach-1	731	100-yr	820.00	994.52	996.57	996.42	997.10	0.015516	5.87	139.80	97.24	0.86
H Overflow	Reach-1	665	100-yr	820.00	993.53	995.33	995.28	995.95	0.019330	6.32	129.70	95.05	0.95
H Overflow	Reach-1	512	100-yr	820.00	990.31	992.11	992.11	992.63	0.024241	5.76	142.34	142.09	1.01
H Overflow	Reach-1	336	100-yr	820.00	986.72	988.65	988.49	989.09	0.015087	5.35	153.16	119.42	0.83
H Overflow	Reach-1	203	100-yr	820.00	984.52	986.41	986.35	986.87	0.018710	5.47	153.58	152.99	0.91

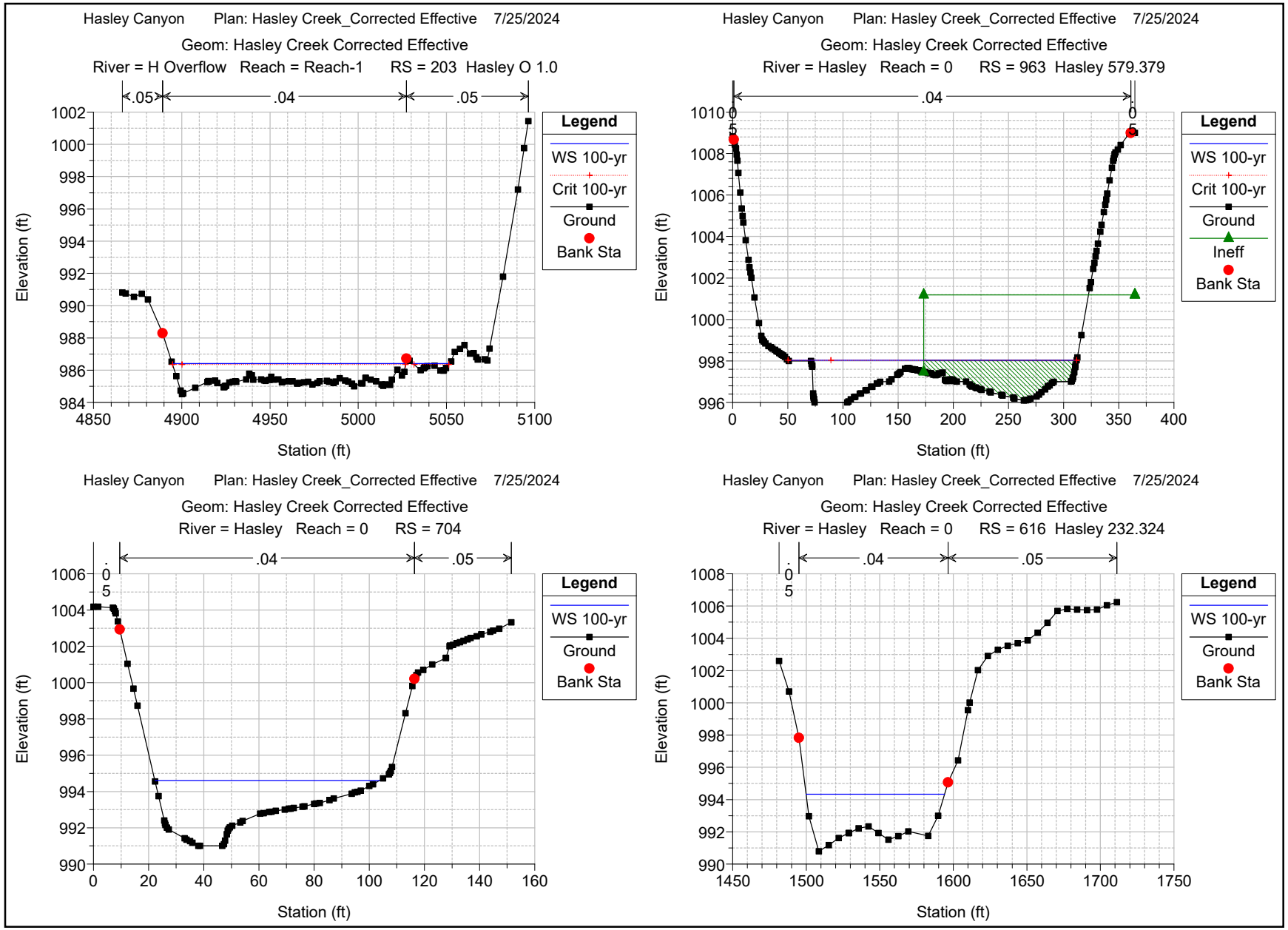
Appendix D – HEC-RAS Corrected Effective Condition Hydraulic Results

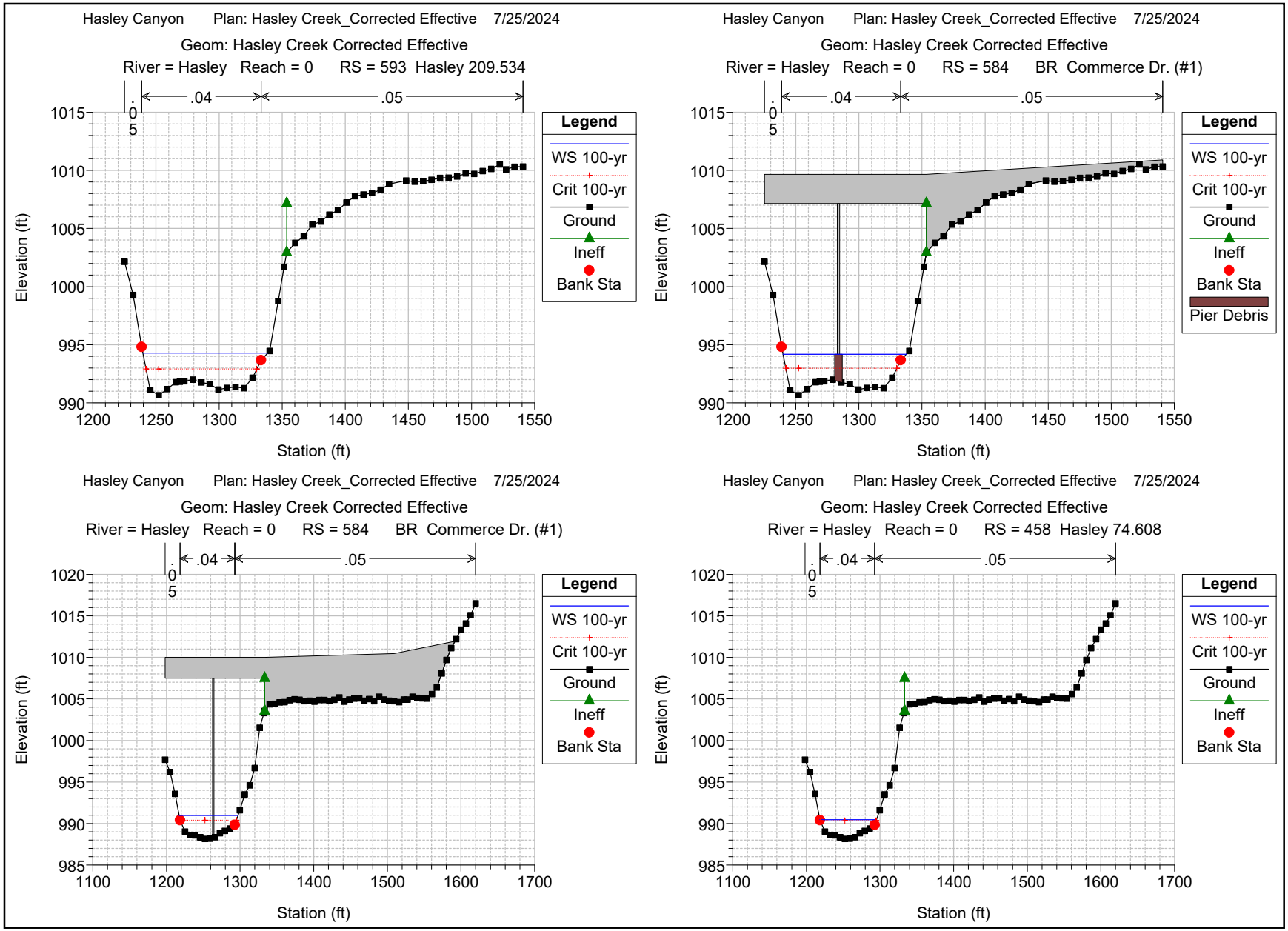

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 731 Hasley O 5.0
.05
.04
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 665 Hasley O 4.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 512 Hasley O 3.0
.05
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 336 Hasley O 2.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 203 Hasley O 1.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 963 Hasley 579.379
.04
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 704
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 616 Hasley 232.324
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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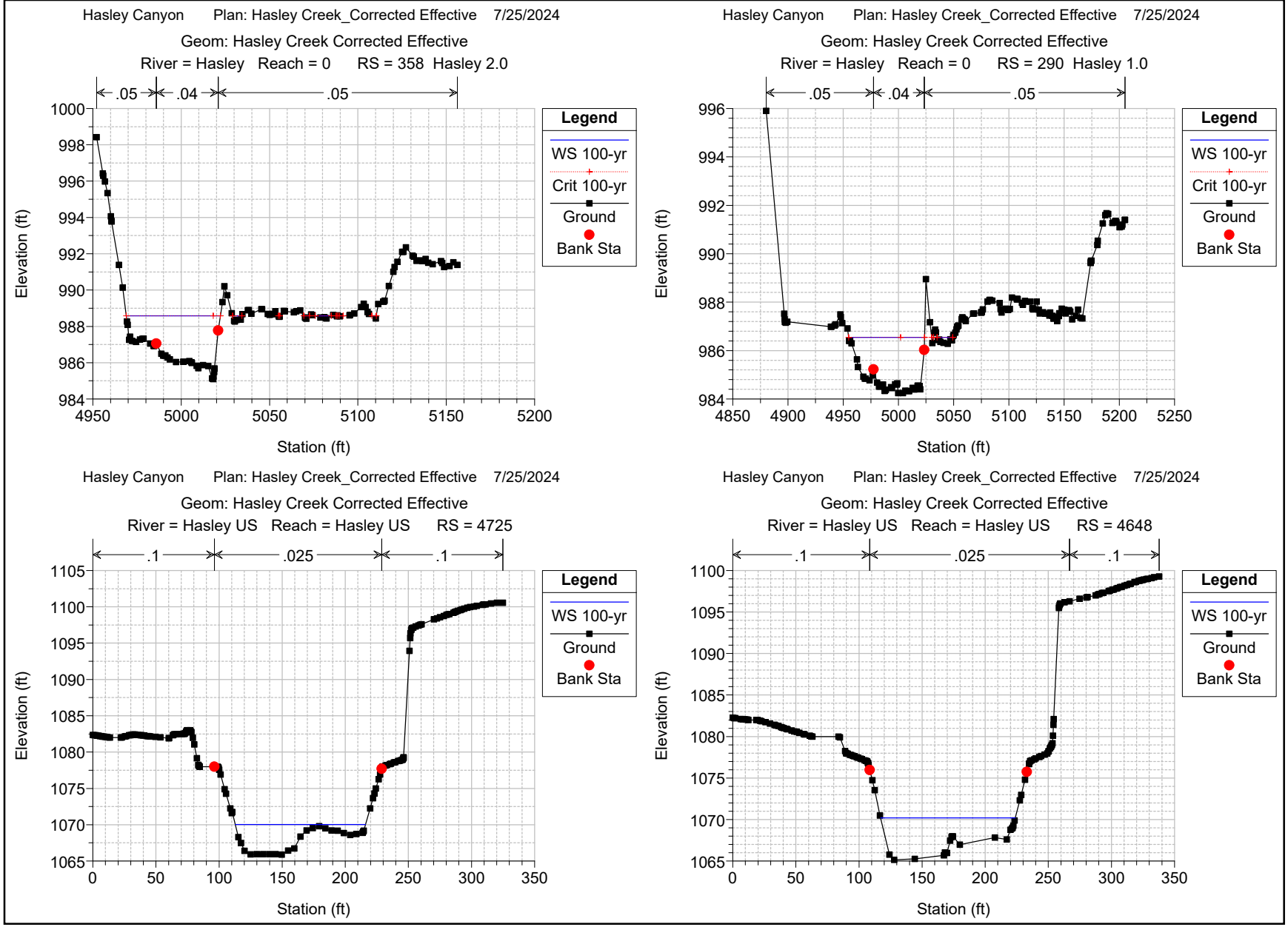
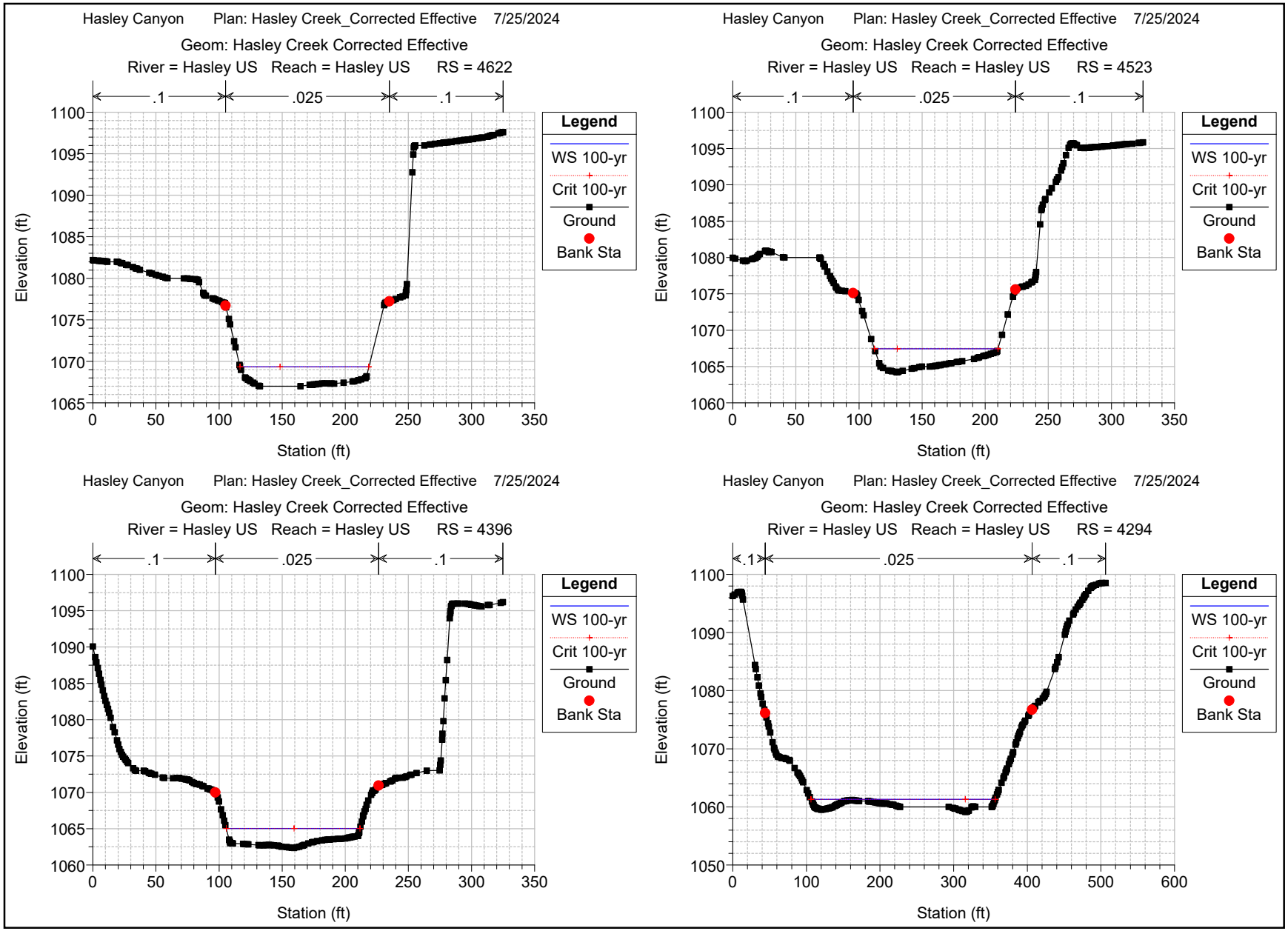
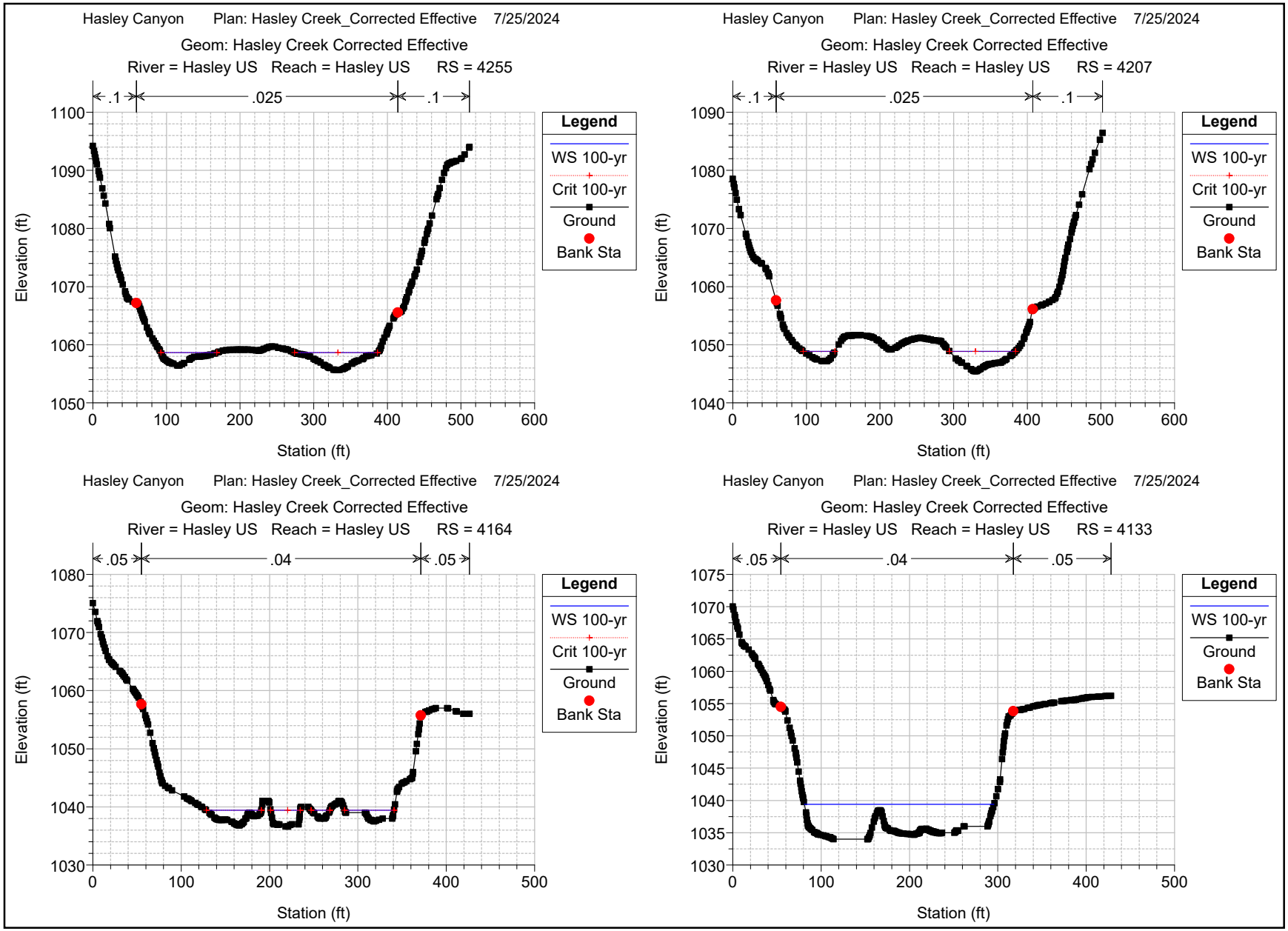
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 593 Hasley 209.534
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 584 BR Commerce Dr. (#1)
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Pier Debris
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 584 BR Commerce Dr. (#1)
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 458 Hasley 74.608
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 358 Hasley 2.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 290 Hasley 1.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4725
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4648
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4622
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4523
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4396
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4294
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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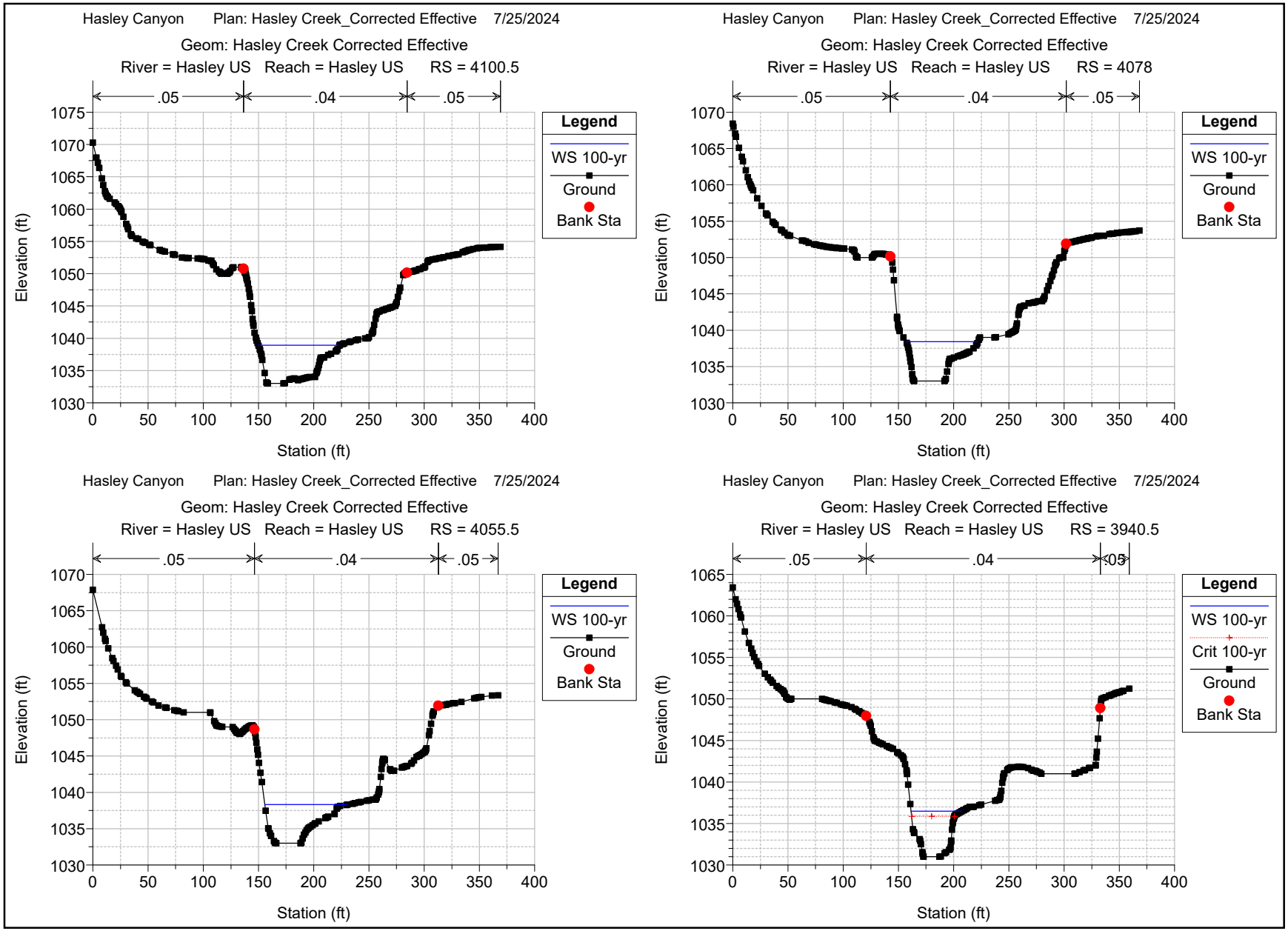
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4255
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4207
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4164
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4133
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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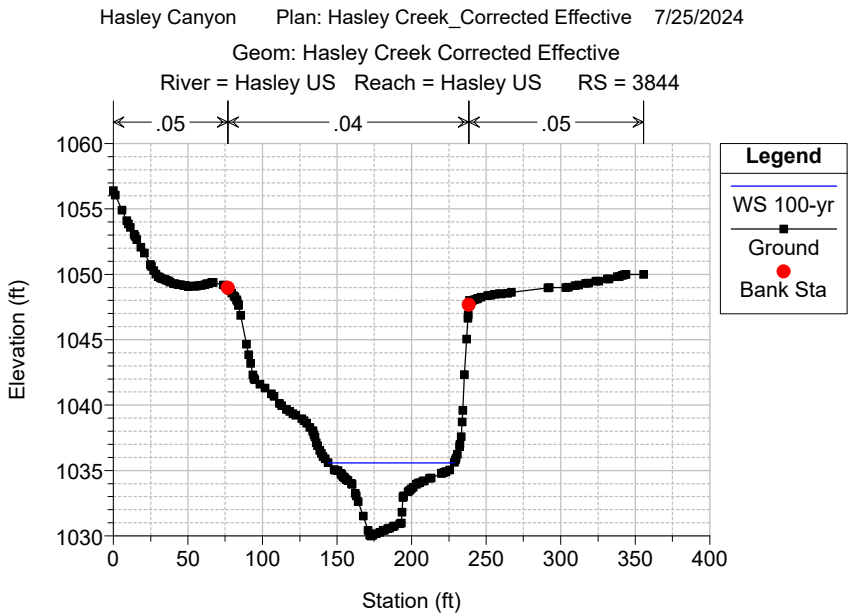
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4100.5
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4078
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4055.5
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3940.5
.05
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Corrected Effective
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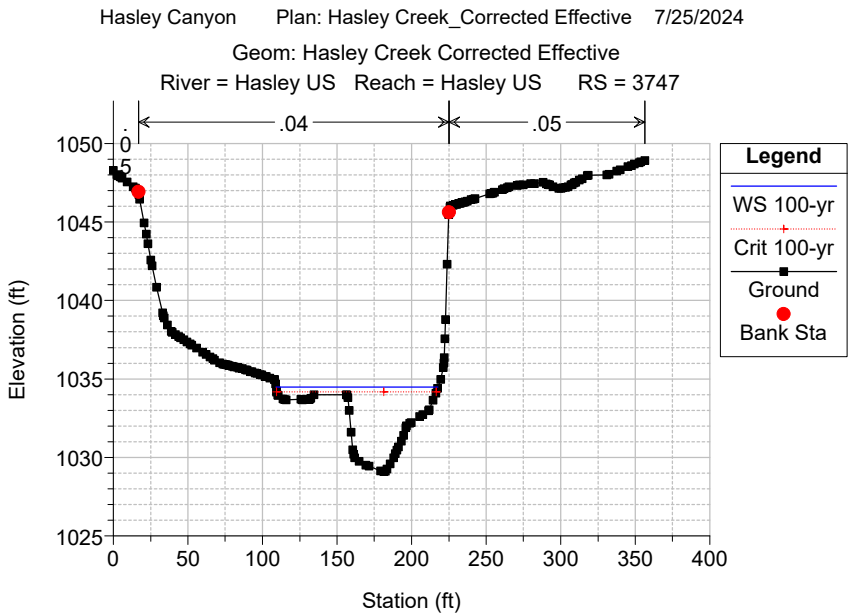
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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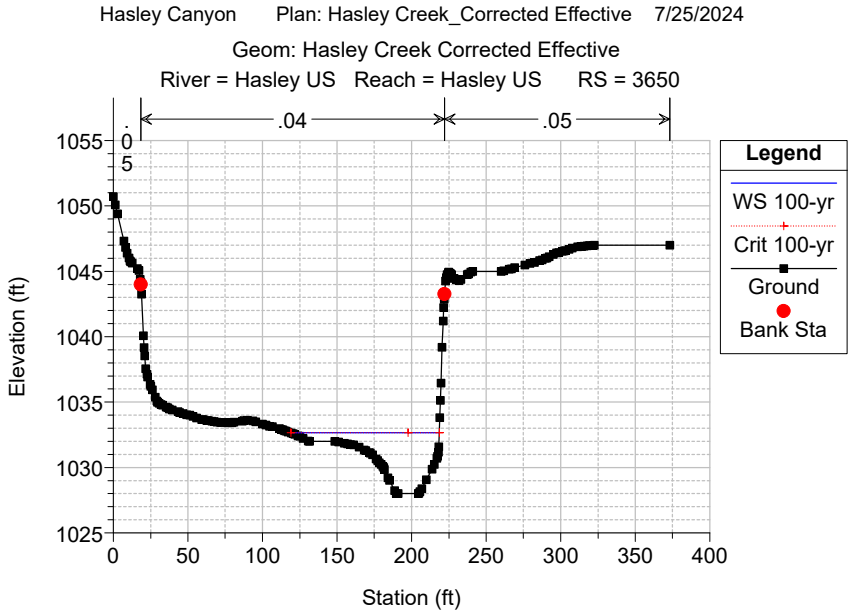
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3747
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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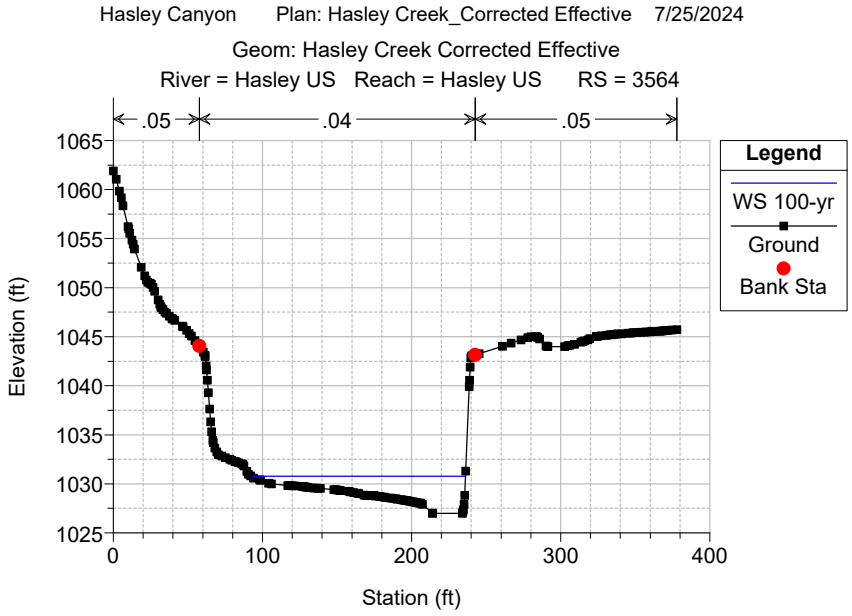
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3650
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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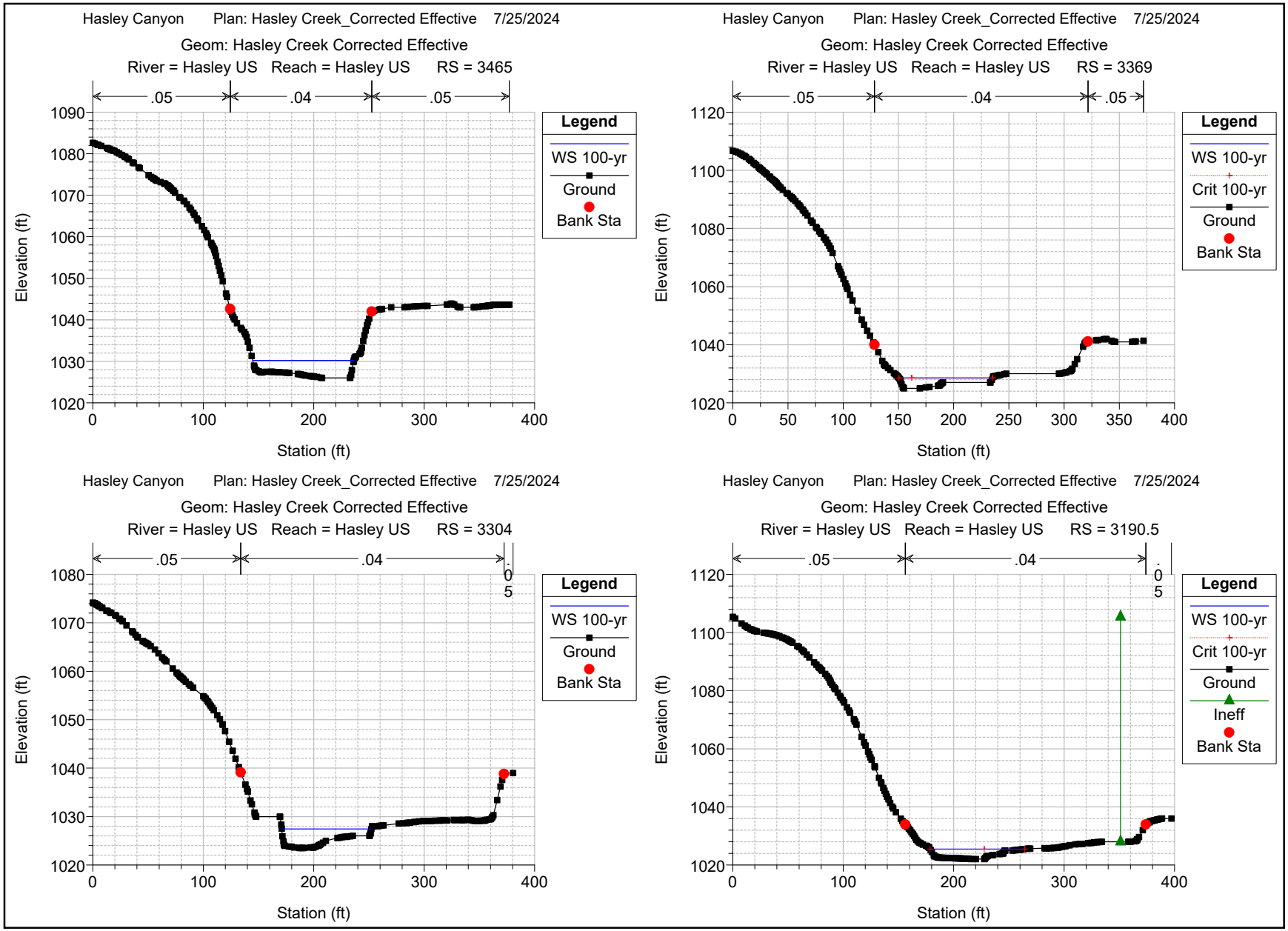
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3564
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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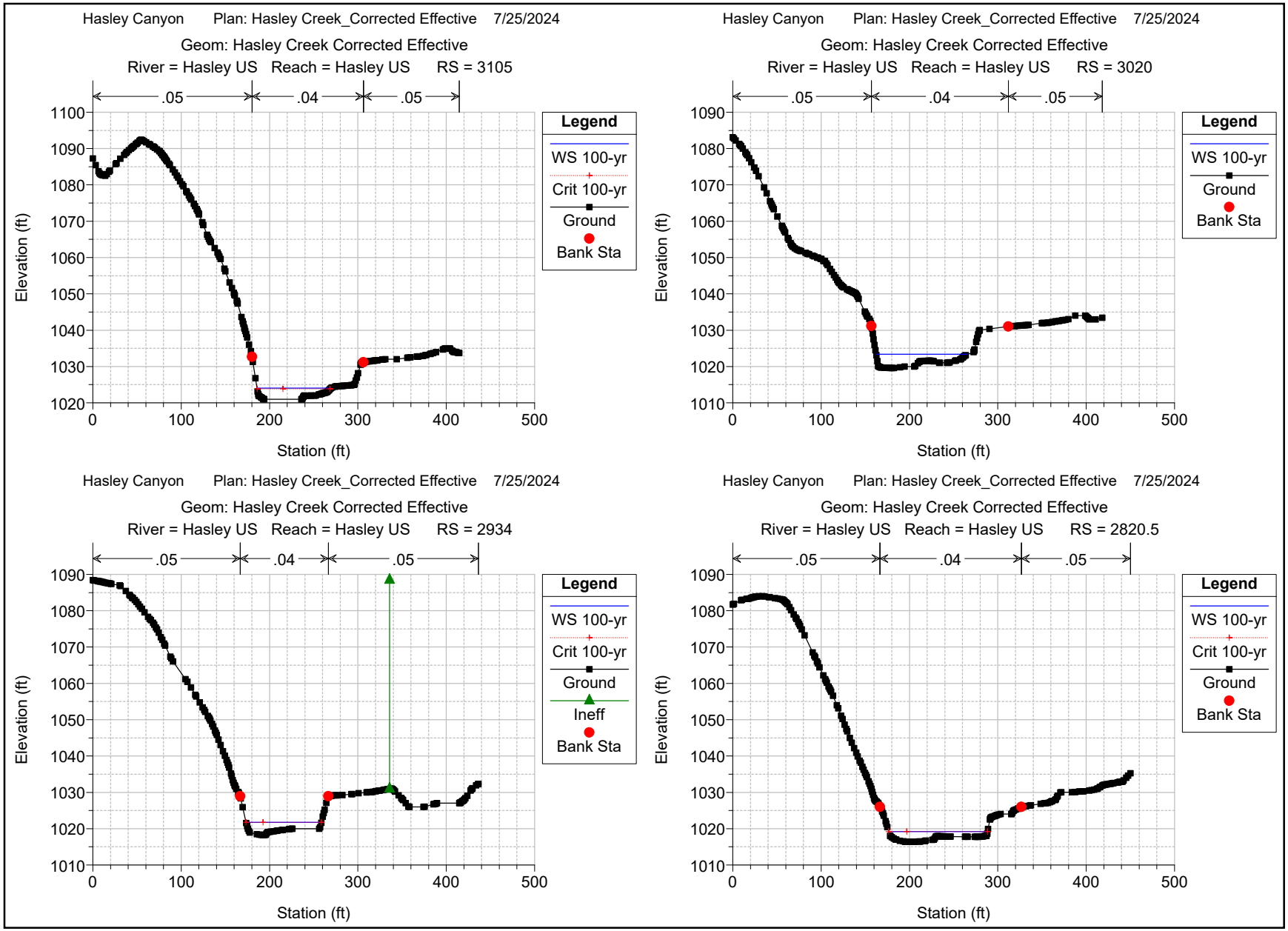
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3465
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3369
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3304
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3190.5
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta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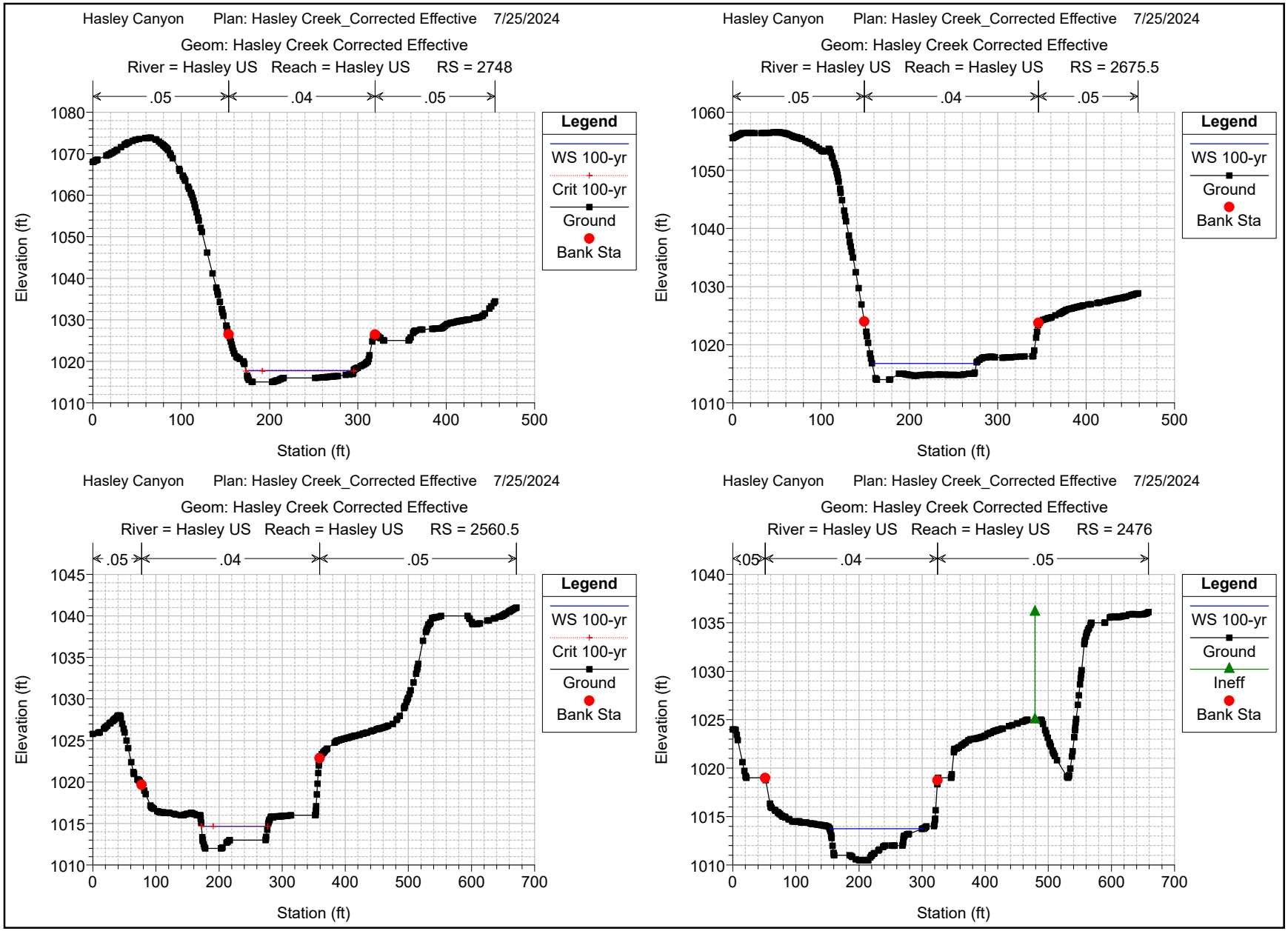
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3105
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3020
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2934
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2820.5
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta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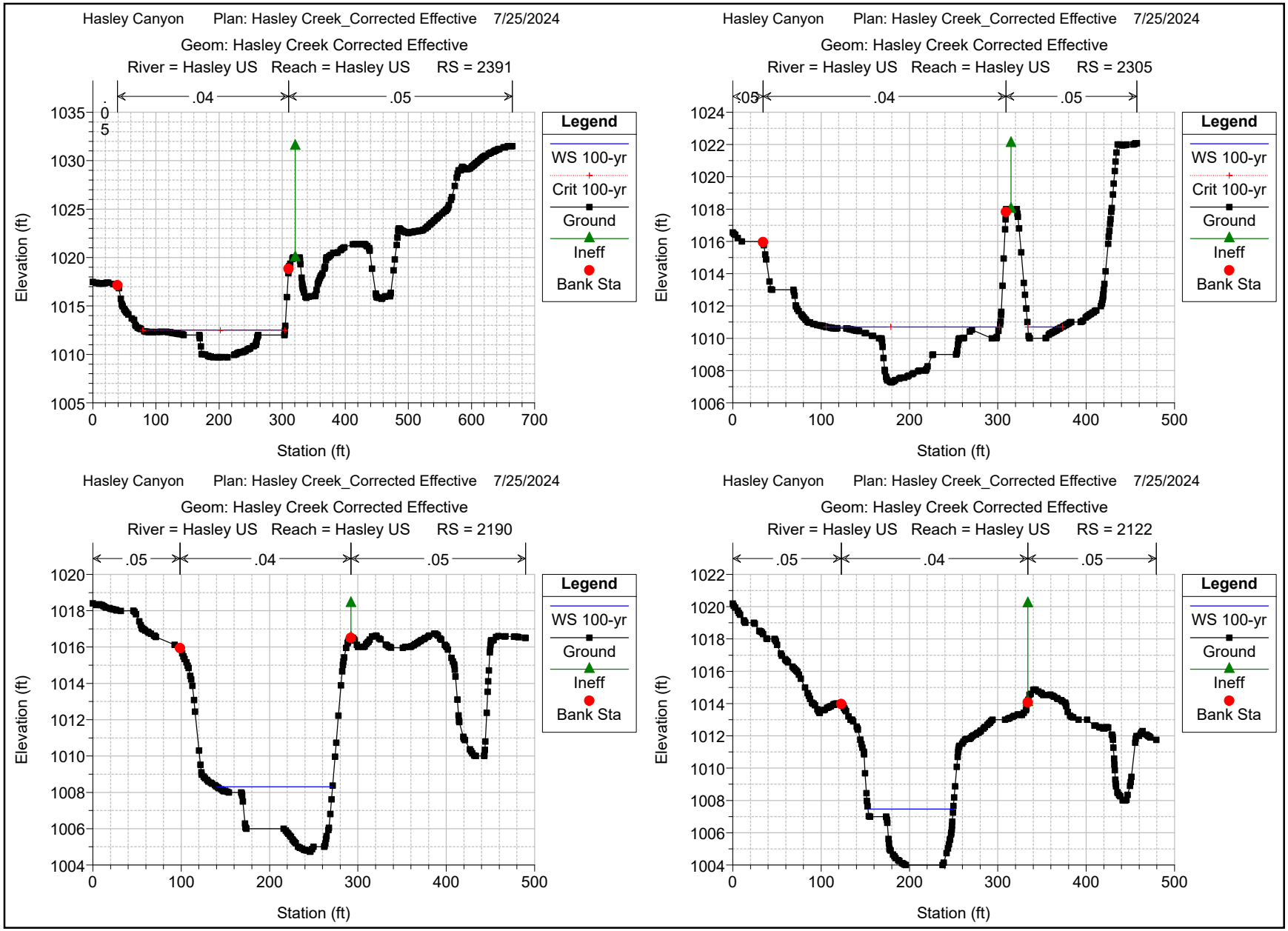
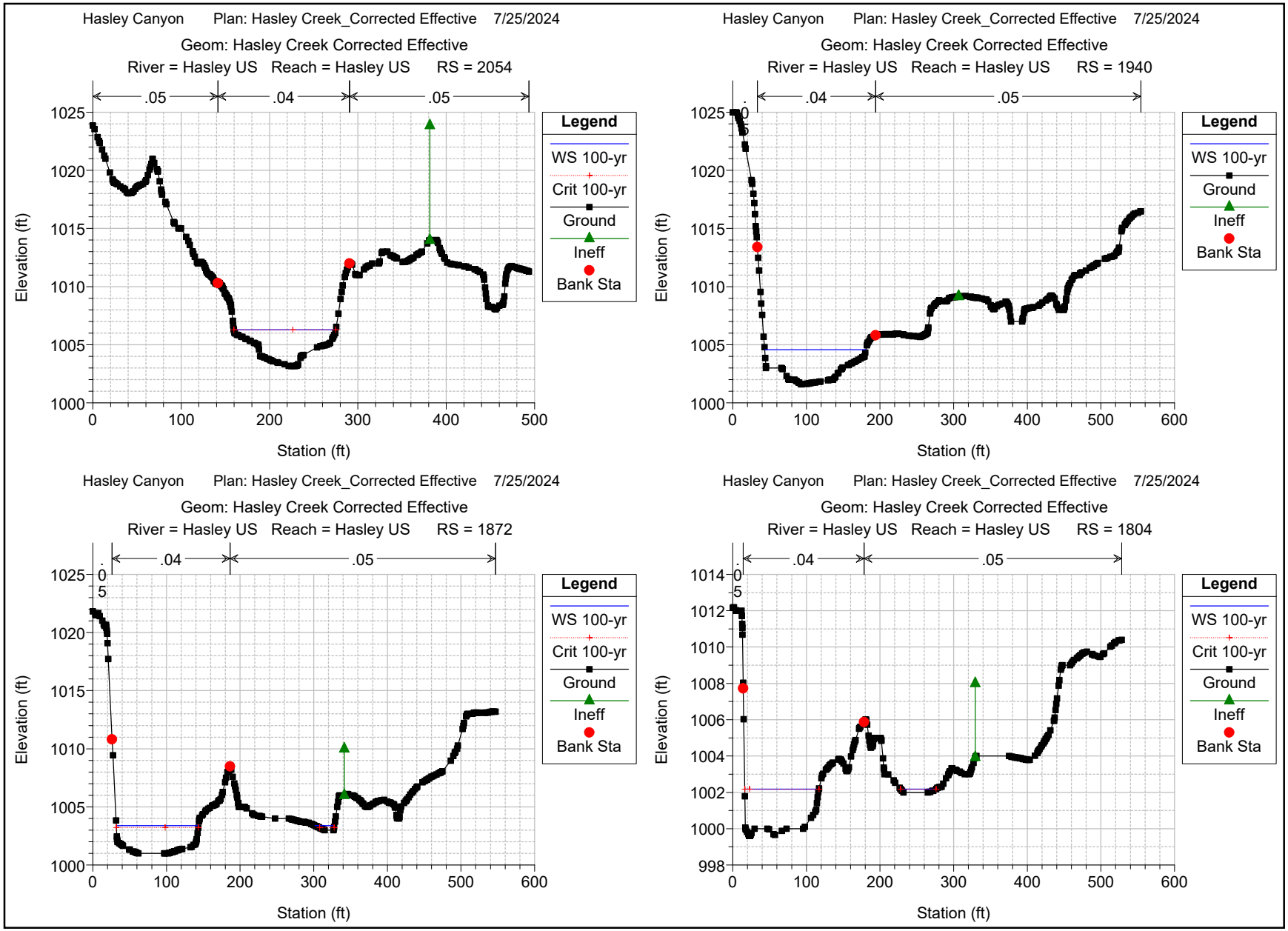
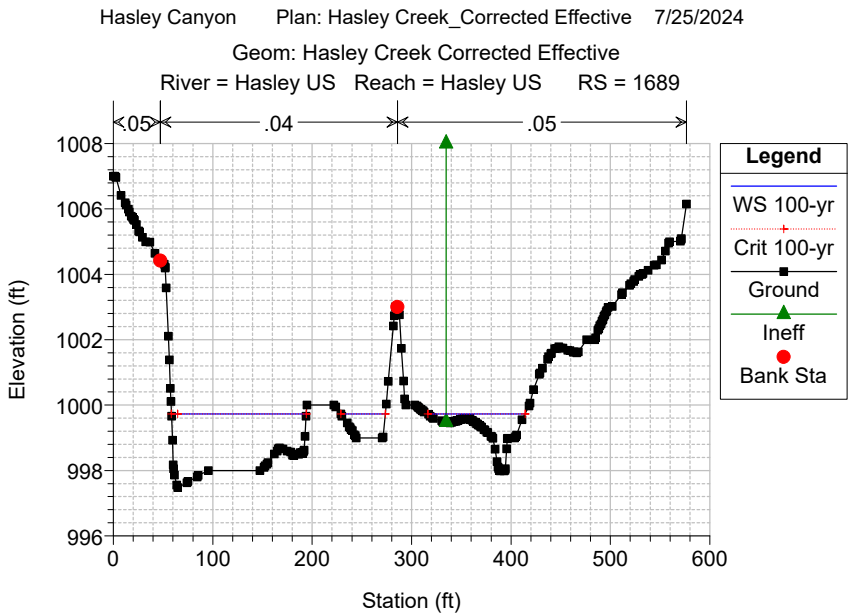
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2748
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2675.5
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2560.5
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2476
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2391
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2305
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2190
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2122
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 2054
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 1940
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 1872
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 1804
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 1689
.05
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1008
1006
1004
1002
1000
998
996
0
100
200
300
400
500
600

HEC-RAS Plan: Corr. Eff. Profile: 100-yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hasley US	Hasley US	4725	100-yr	1640.00	1065.89	1070.02		1070.82	0.005162	7.18	228.47	103.20	0.85
Hasley US	Hasley US	4648	100-yr	1640.00	1065.13	1070.20		1070.50	0.001062	4.39	373.43	106.76	0.41
Hasley US	Hasley US	4622	100-yr	1640.00	1067.00	1069.35	1069.35	1070.36	0.007406	8.07	203.28	101.98	1.01
Hasley US	Hasley US	4523	100-yr	1640.00	1064.22	1067.45	1067.45	1068.48	0.007245	8.14	201.43	97.88	1.00
Hasley US	Hasley US	4396	100-yr	1640.00	1062.35	1065.02	1065.02	1066.01	0.007534	7.98	205.62	106.04	1.01
Hasley US	Hasley US	4294	100-yr	1640.00	1059.14	1061.29	1061.29	1061.86	0.009262	6.04	271.67	250.04	1.02
Hasley US	Hasley US	4255	100-yr	1640.00	1055.65	1058.64	1058.64	1059.32	0.008562	6.60	248.42	188.45	1.01
Hasley US	Hasley US	4207	100-yr	1640.00	1045.43	1048.86	1048.86	1049.71	0.007728	7.36	222.88	132.83	1.00
Hasley US	Hasley US	4164	100-yr	1640.00	1036.62	1039.41	1039.41	1040.13	0.022254	6.81	240.73	173.07	1.02
Hasley US	Hasley US	4133	100-yr	1640.00	1034.00	1039.40		1039.46	0.000391	1.86	881.56	214.67	0.16
Hasley US	Hasley US	4100.5	100-yr	1640.00	1033.00	1038.92		1039.38	0.003506	5.46	300.24	73.59	0.48
Hasley US	Hasley US	4078	100-yr	1640.00	1033.00	1038.43		1039.24	0.007559	7.20	227.83	65.22	0.68
Hasley US	Hasley US	4055.5	100-yr	1640.00	1033.00	1038.30		1039.04	0.007637	6.88	238.36	74.91	0.68
Hasley US	Hasley US	3940.5	100-yr	1640.00	1031.00	1036.50	1035.86	1037.88	0.012159	9.42	174.01	46.15	0.86
Hasley US	Hasley US	3844	100-yr	1640.00	1030.01	1035.58		1036.51	0.013287	7.78	210.93	84.18	0.87
Hasley US	Hasley US	3747	100-yr	1640.00	1029.10	1034.48	1034.18	1035.21	0.012247	6.86	239.03	108.64	0.82
Hasley US	Hasley US	3650	100-yr	1640.00	1028.00	1032.65	1032.65	1033.68	0.019078	8.12	201.91	99.55	1.01
Hasley US	Hasley US	3564	100-yr	1640.00	1027.00	1030.79		1031.33	0.010628	5.88	278.83	143.89	0.74
Hasley US	Hasley US	3465	100-yr	1640.00	1026.00	1030.20		1030.64	0.004249	5.32	308.10	91.54	0.51
Hasley US	Hasley US	3369	100-yr	1640.00	1025.00	1028.59	1028.59	1029.73	0.018436	8.55	191.86	84.83	1.00
Hasley US	Hasley US	3304	100-yr	1640.00	1023.50	1027.42		1028.39	0.013337	7.88	208.22	81.17	0.87
Hasley US	Hasley US	3190.5	100-yr	1640.00	1022.00	1025.49	1025.49	1026.61	0.018055	8.49	193.23	85.86	1.00
Hasley US	Hasley US	3105	100-yr	1640.00	1021.00	1024.02	1023.87	1025.05	0.014957	8.11	202.27	83.42	0.92
Hasley US	Hasley US	3020	100-yr	1640.00	1019.56	1023.36		1023.96	0.008436	6.25	262.41	103.74	0.69
Hasley US	Hasley US	2934	100-yr	1640.00	1018.19	1021.77	1021.77	1022.91	0.018379	8.54	192.09	85.34	1.00
Hasley US	Hasley US	2820.5	100-yr	1640.00	1016.37	1019.21	1019.21	1020.17	0.019661	7.85	208.97	111.85	1.01
Hasley US	Hasley US	2748	100-yr	1640.00	1015.00	1017.79	1017.67	1018.58	0.015886	7.11	230.75	122.28	0.91
Hasley US	Hasley US	2675.5	100-yr	1640.00	1014.00	1016.79		1017.51	0.013051	6.79	241.68	118.11	0.84
Hasley US	Hasley US	2560.5	100-yr	1640.00	1012.00	1014.67	1014.67	1015.66	0.019303	7.99	205.18	105.26	1.01
Hasley US	Hasley US	2476	100-yr	1640.00	1010.49	1013.75		1014.23	0.008894	5.54	295.94	147.92	0.69
Hasley US	Hasley US	2391	100-yr	1640.00	1009.70	1012.52	1012.50	1013.08	0.020590	6.02	272.26	225.84	0.97
Hasley US	Hasley US	2305	100-yr	1640.00	1007.27	1010.70	1010.70	1011.30	0.020625	6.30	271.58	235.14	0.98
Hasley US	Hasley US	2190	100-yr	1640.00	1004.73	1008.30		1008.85	0.009484	5.93	276.66	130.73	0.72
Hasley US	Hasley US	2122	100-yr	1640.00	1004.00	1007.47		1008.18	0.009809	6.75	243.06	96.53	0.75
Hasley US	Hasley US	2054	100-yr	1640.00	1003.17	1006.27	1006.27	1007.21	0.019662	7.77	211.12	115.44	1.01
Hasley US	Hasley US	1940	100-yr	1640.00	1001.59	1004.56		1005.10	0.009940	5.90	277.98	137.49	0.73
Hasley US	Hasley US	1872	100-yr	1640.00	1000.99	1003.39	1003.21	1004.15	0.013452	6.99	240.38	138.08	0.85
Hasley US	Hasley US	1804	100-yr	1640.00	999.61	1002.18	1002.18	1003.11	0.016728	7.76	217.79	149.19	0.95
Hasley US	Hasley US	1689	100-yr	1640.00	997.48	999.73	999.73	1000.29	0.018660	6.20	292.81	278.00	0.94
Hasley	0	963	100-yr	820.00	996.00	998.03	998.03	998.60	0.023410	6.04	135.73	261.70	1.01
Hasley	0	704	100-yr	820.00	991.00	994.61		995.05	0.008894	5.32	154.22	81.41	0.68
Hasley	0	616 Hasley 232.324	100-yr	820.00	990.79	994.33		994.54	0.003128	3.67	223.53	94.10	0.42
Hasley	0	593 Hasley 209.534	100-yr	820.00	990.66	994.29	992.91	994.46	0.002194	3.30	249.54	98.95	0.36
Hasley	0	584		Bridge									
Hasley	0	458 Hasley 74.608	100-yr	820.00	988.13	990.47	990.33	991.13	0.015566	6.55	125.86	76.91	0.89
Hasley	0	358	100-yr	820.00	985.09	988.58	988.58	989.53	0.015103	8.21	112.87	77.24	0.92
Hasley	0	290	100-yr	820.00	984.24	986.55	986.55	987.35	0.016727	7.60	121.90	84.64	0.94
H Overflow	Reach-1	731	100-yr	820.00	994.52	996.57	996.57	997.32	0.020897	6.96	117.90	79.27	1.01
H Overflow	Reach-1	665	100-yr	820.00	993.00	995.29		995.80	0.013771	5.76	142.46	93.29	0.82
H Overflow	Reach-1	512	100-yr	820.00	991.00	992.56	992.56	993.06	0.024288	5.68	144.35	148.14	1.01
H Overflow	Reach-1	336	100-yr	820.00	986.72	988.65		989.09	0.015087	5.35	153.16	119.42	0.83
H Overflow	Reach-1	203	100-yr	820.00	984.52	986.41	986.35	986.87	0.018710	5.47	153.58	152.99	0.91

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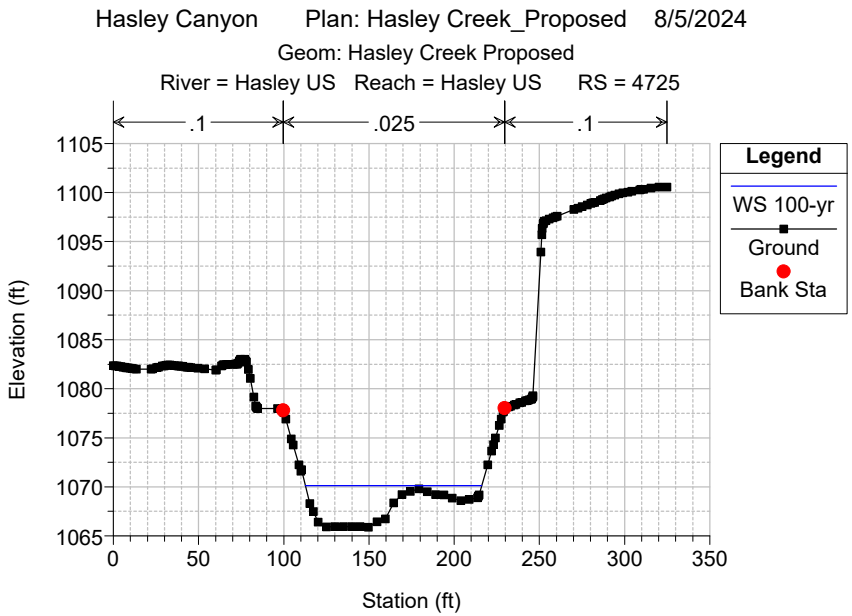
Appendix E – HEC-RAS Proposed Condition Hydraulic Results

HEC-RAS Plan: Proposed Profile: 100-yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hasley US	Hasley US	4725	100-yr	1640.00	1065.89	1070.11		1070.85	0.004514	6.89	238.17	103.49	0.80
Hasley US	Hasley US	4648	100-yr	1640.00	1065.13	1070.23		1070.52	0.001034	4.36	376.55	106.86	0.41
Hasley US	Hasley US	4622	100-yr	1640.00	1066.97	1069.38	1069.38	1070.39	0.007371	8.07	203.21	101.65	1.01
Hasley US	Hasley US	4523	100-yr	1640.00	1064.28	1067.46	1067.46	1068.50	0.007243	8.16	201.01	97.40	1.00
Hasley US	Hasley US	4396	100-yr	1640.00	1059.45	1061.62	1061.62	1062.68	0.007336	8.27	198.33	94.42	1.01
Hasley US	Hasley US	4380.00*	100-yr	1640.00	1056.12	1058.37	1058.37	1059.46	0.007269	8.39	195.47	90.37	1.01
Hasley US	Hasley US	4364.00*	100-yr	1640.00	1052.78	1055.11	1055.11	1056.23	0.007191	8.52	192.56	86.26	1.00
Hasley US	Hasley US	4348.00*	100-yr	1640.00	1049.45	1051.87	1051.87	1053.03	0.007127	8.66	189.43	82.14	1.01
Hasley US	Hasley US	4332.00*	100-yr	1640.00	1046.12	1048.64	1048.64	1049.84	0.007040	8.80	186.37	78.04	1.00
Hasley US	Hasley US	4316.00*	100-yr	1640.00	1042.78	1045.40	1045.40	1046.65	0.006992	8.97	182.88	73.93	1.01
Hasley US	Hasley US	4300	100-yr	1640.00	1039.45	1042.19	1042.19	1043.49	0.006909	9.13	179.57	69.86	1.00
Hasley US	Hasley US	4291.00*	100-yr	1640.00	1036.45	1039.23	1039.23	1040.55	0.006913	9.21	178.16	68.49	1.01
Hasley US	Hasley US	4282	100-yr	1640.00	1033.45	1039.63		1039.87	0.000486	3.91	419.87	78.02	0.30
Hasley US	Hasley US	4280.50*	100-yr	1640.00	1033.45	1039.67		1039.84	0.000351	3.38	485.07	88.30	0.25
Hasley US	Hasley US	4279.00*	100-yr	1640.00	1033.45	1039.69		1039.83	0.000267	2.98	549.75	98.53	0.22
Hasley US	Hasley US	4277.50*	100-yr	1640.00	1033.45	1039.71		1039.82	0.000209	2.67	614.09	108.75	0.20
Hasley US	Hasley US	4276	100-yr	1640.00	1033.45	1039.72		1039.81	0.000169	2.42	678.34	118.99	0.18
Hasley US	Hasley US	4274.50*	100-yr	1640.00	1033.45	1039.73		1039.80	0.000132	2.16	759.16	131.87	0.16
Hasley US	Hasley US	4273.00*	100-yr	1640.00	1033.45	1039.74		1039.80	0.000107	1.95	839.81	144.76	0.14
Hasley US	Hasley US	4271.50*	100-yr	1640.00	1033.45	1039.75		1039.79	0.000088	1.78	920.45	157.67	0.13
Hasley US	Hasley US	4270	100-yr	1640.00	1033.45	1039.75		1039.79	0.000074	1.64	1001.05	170.59	0.12
Hasley US	Hasley US	4265	100-yr	1640.00	1037.00	1039.58		1039.77	0.001068	3.57	459.55	183.17	0.40
Hasley US	Hasley US	4258	100-yr	1640.00	1037.00	1039.59		1039.76	0.000906	3.30	497.01	197.15	0.37
Hasley US	Hasley US	4157	100-yr	1640.00	1035.56	1039.67		1039.70	0.000100	1.49	1099.26	274.51	0.13
Hasley US	Hasley US	4055.5	100-yr	1640.00	1033.00	1039.30		1039.63	0.007352	4.61	355.86	163.47	0.55
Hasley US	Hasley US	3940.5	100-yr	1640.00	1031.00	1038.00	1036.06	1038.63	0.015139	6.33	258.99	123.28	0.77
Hasley US	Hasley US	3844	100-yr	1640.00	1030.00	1035.53	1035.53	1036.29	0.027807	6.96	235.76	159.28	1.01
Hasley US	Hasley US	3747	100-yr	1640.00	1029.17	1034.20		1034.52	0.006079	4.55	360.10	146.84	0.51
Hasley US	Hasley US	3650	100-yr	1640.00	1028.00	1032.54	1032.54	1033.37	0.027371	7.27	225.67	141.15	1.01
Hasley US	Hasley US	3554	100-yr	1640.00	1027.00	1030.51		1031.06	0.016551	5.97	274.52	158.01	0.80
Hasley US	Hasley US	3440.5	100-yr	1640.00	1025.32	1029.49		1029.80	0.007086	4.45	368.59	175.31	0.54
Hasley US	Hasley US	3372	100-yr	1640.00	1025.00	1028.53		1029.02	0.017357	5.61	292.41	192.34	0.80
Hasley US	Hasley US	3304	100-yr	1640.00	1023.53	1027.03	1027.03	1027.57	0.031395	5.93	276.52	261.76	1.02
Hasley US	Hasley US	3190.5	100-yr	1640.00	1022.00	1025.70		1025.94	0.005901	3.92	418.85	210.25	0.49
Hasley US	Hasley US	3105	100-yr	1640.00	1021.00	1024.39		1025.23	0.014068	7.33	223.59	82.68	0.79
Hasley US	Hasley US	3020	100-yr	1640.00	1019.68	1023.96		1024.26	0.006399	4.39	373.21	165.83	0.52
Hasley US	Hasley US	2934	100-yr	1640.00	1018.19	1022.40	1022.40	1023.24	0.025926	7.33	223.80	132.35	0.99
Hasley US	Hasley US	2820.5	100-yr	1640.00	1016.37	1019.12	1019.11	1019.89	0.026209	7.05	232.75	147.98	0.99
Hasley US	Hasley US	2748	100-yr	1640.00	1015.00	1017.87		1018.39	0.015645	5.80	282.87	163.51	0.78
Hasley US	Hasley US	2675.5	100-yr	1640.00	1014.00	1016.67		1017.23	0.011875	5.97	274.48	122.59	0.70
Hasley US	Hasley US	2560.5	100-yr	1640.00	1012.00	1014.84	1014.74	1015.74	0.021462	7.59	216.12	105.21	0.93
Hasley US	Hasley US	2476	100-yr	1640.00	1010.48	1014.08	1013.17	1014.34	0.008728	4.13	397.23	247.76	0.57
Hasley US	Hasley US	2391	100-yr	1640.00	1009.71	1012.42	1012.42	1013.05	0.029384	6.35	258.28	209.82	1.01
Hasley US	Hasley US	2305.5	100-yr	1640.00	1007.88	1011.92	1010.64	1012.07	0.002942	3.11	527.25	222.20	0.36
Hasley US	Hasley US	2250		Bridge									
Hasley US	Hasley US	2190.5	100-yr	1640.00	1006.00	1008.94	1008.62	1009.37	0.015211	5.27	311.25	204.27	0.75
Hasley US	Hasley US	2122	100-yr	1640.00	1004.00	1007.72	1007.28	1008.13	0.013937	5.13	319.91	204.52	0.72
Hasley US	Hasley US	2054	100-yr	1640.00	1003.00	1005.93	1005.93	1006.59	0.030107	6.48	253.12	203.35	1.02
Hasley US	Hasley US	1940.5	100-yr	1640.00	1001.77	1004.67		1005.00	0.010130	4.65	352.89	206.15	0.63
Hasley US	Hasley US	1872	100-yr	1640.00	1000.95	1003.06	1002.93	1003.77	0.020676	6.76	242.67	137.85	0.90
Hasley US	Hasley US	1804	100-yr	1640.00	999.70	1001.96	1001.73	1002.43	0.017094	5.52	297.15	198.58	0.80
Hasley US	Hasley US	1689	100-yr	1640.00	997.49	999.45	999.39	1000.02	0.025615	6.08	269.70	211.15	0.95
Hasley US	Hasley US	1584	100-yr	1640.00	995.00	997.69		998.04	0.014804	4.81	341.05	251.54	0.73
Hasley US	Hasley US	1406	100-yr	1640.00	992.72	995.30		995.54	0.013027	3.91	419.75	384.27	0.66
Hasley US	Hasley US	1354	100-yr	1640.00	991.22	995.28		995.35	0.001115	2.09	784.10	287.86	0.22
Hasley	0	704	100-yr	820.00	991.00	994.61		995.05	0.009050	5.35	153.36	81.51	0.69
Hasley	0	616 Hasley 232.324	100-yr	820.00	990.79	994.33		994.54	0.003128	3.67	223.52	94.10	0.42
Hasley	0	593 Hasley 209.534	100-yr	820.00	990.66	994.29	992.92	994.46	0.002194	3.30	249.54	98.95	0.36
Hasley	0	584		Bridge									
Hasley	0	458 Hasley 74.608	100-yr	820.00	988.13	990.47	990.34	991.13	0.015566	6.55	125.86	76.91	0.89
Hasley	0	358	100-yr	820.00	985.09	988.58	988.58	989.53	0.015103	8.21	112.87	77.24	0.92
Hasley	0	290	100-yr	820.00	984.24	986.55	986.55	987.35	0.016727	7.60	121.90	84.64	0.94
H Overflow	Reach-1	336	100-yr	820.00	986.72	988.65		989.09	0.015087	5.35	153.16	119.42	0.83
H Overflow	Reach-1	203	100-yr	820.00	984.52	986.41	986.35	986.87	0.018710	5.47	153.58	152.99	0.91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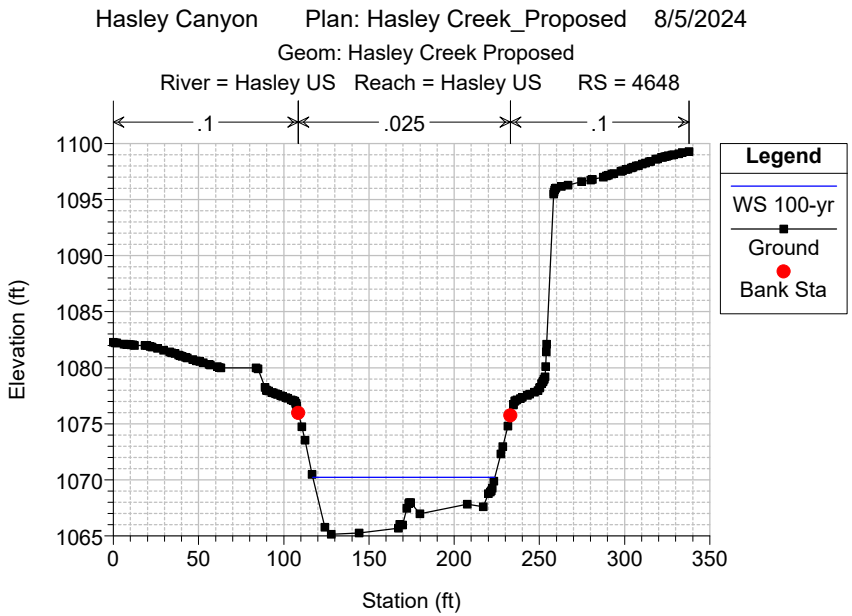
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4725
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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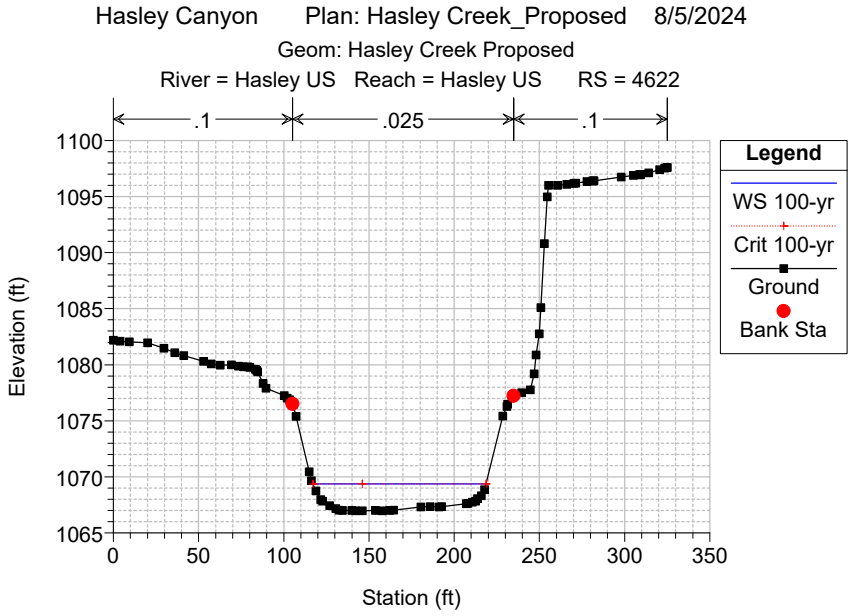
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4622
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.025
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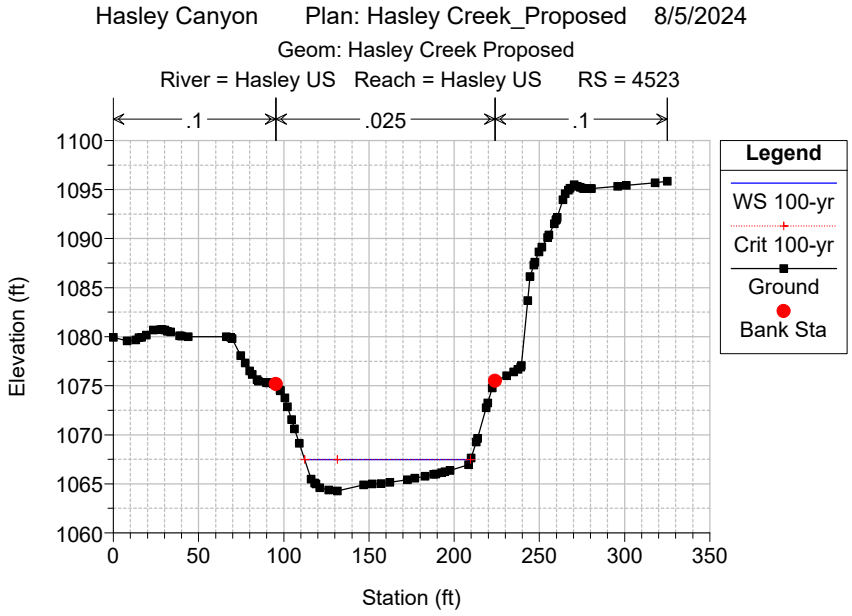
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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River = Hasley US Reach = Hasley US RS = 4523
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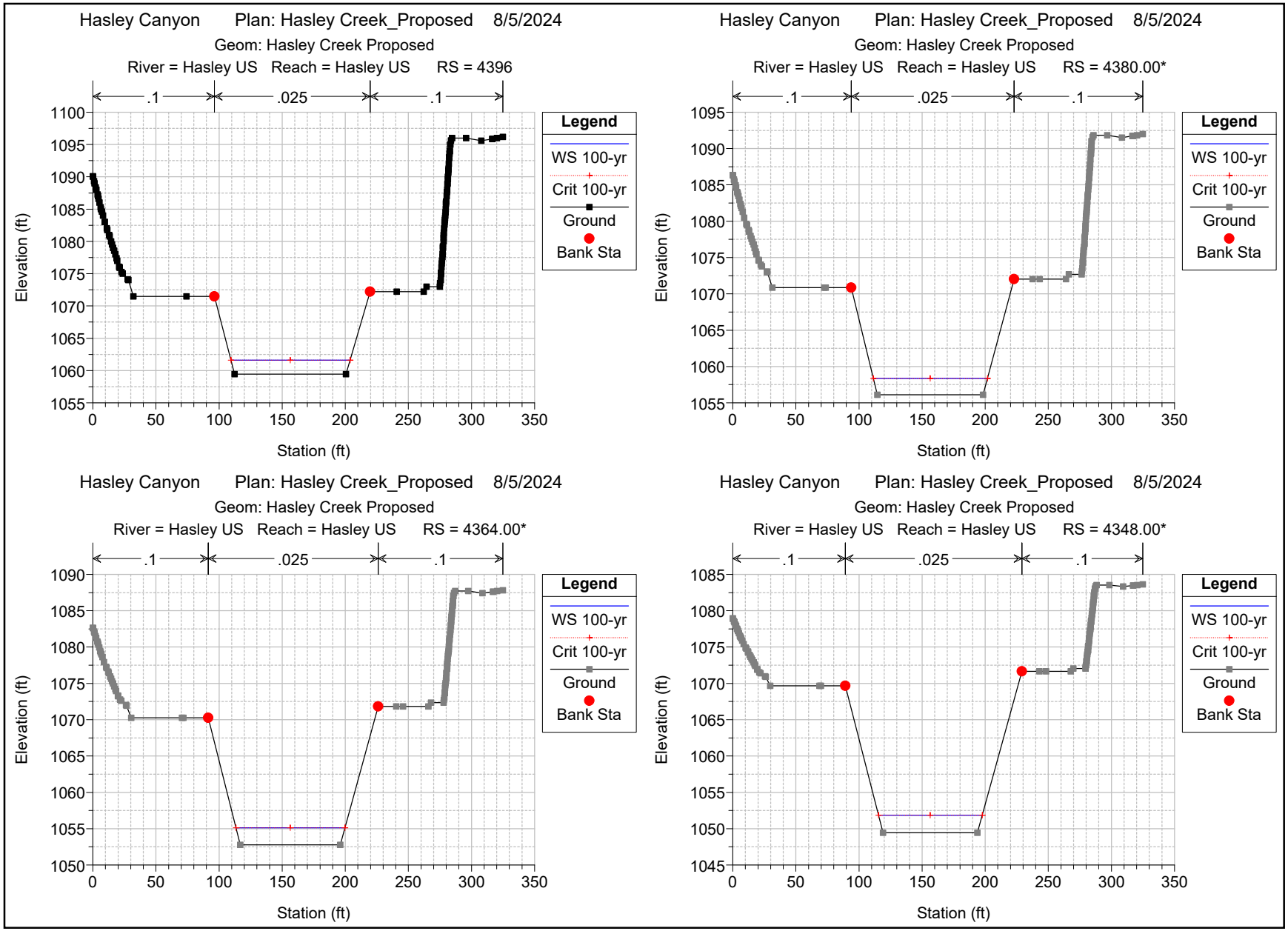
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4396
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4380.00*
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4364.00*
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4348.00*
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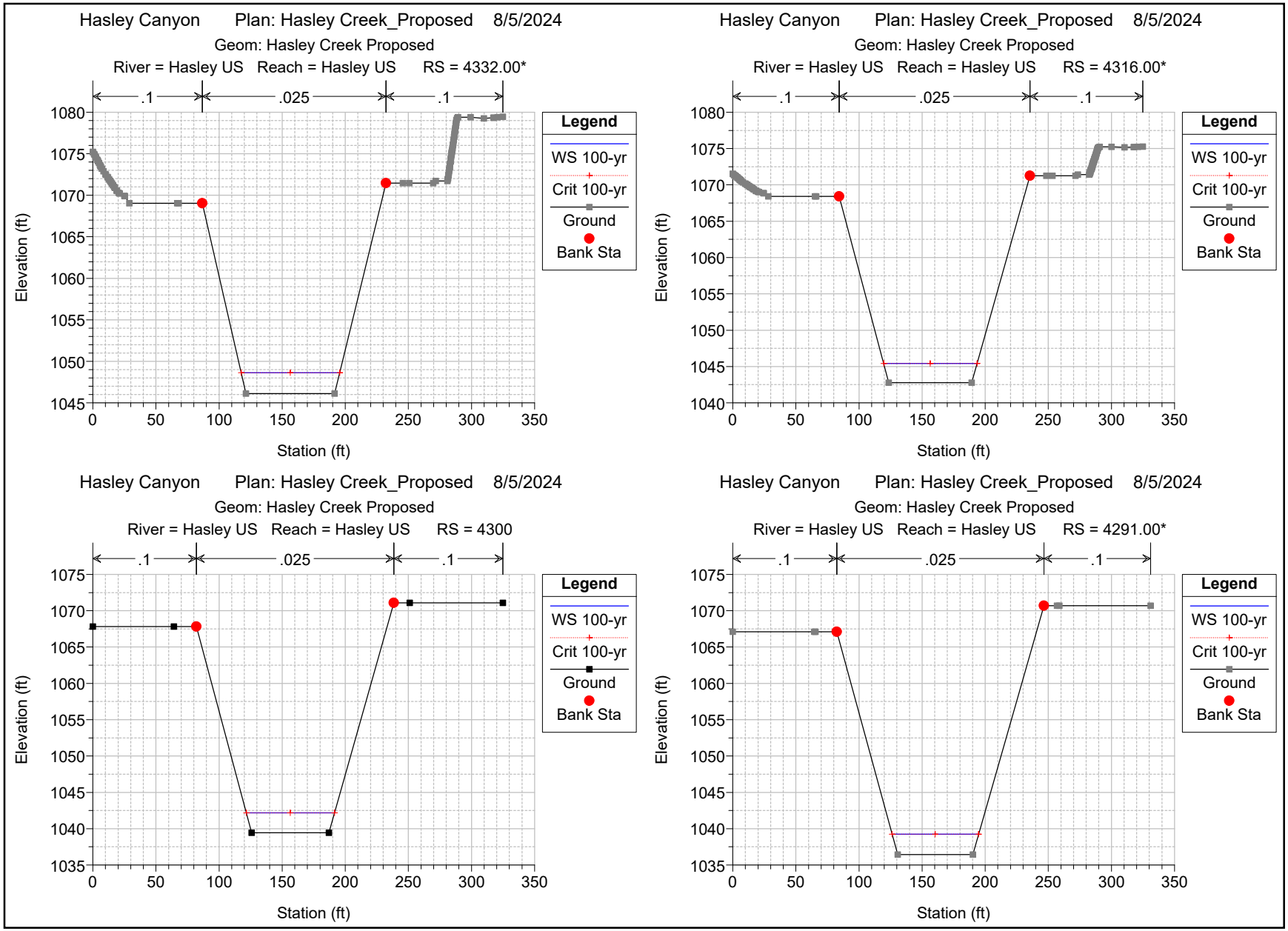
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta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Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4332.00*
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.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4316.00*
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4300
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4291.00*
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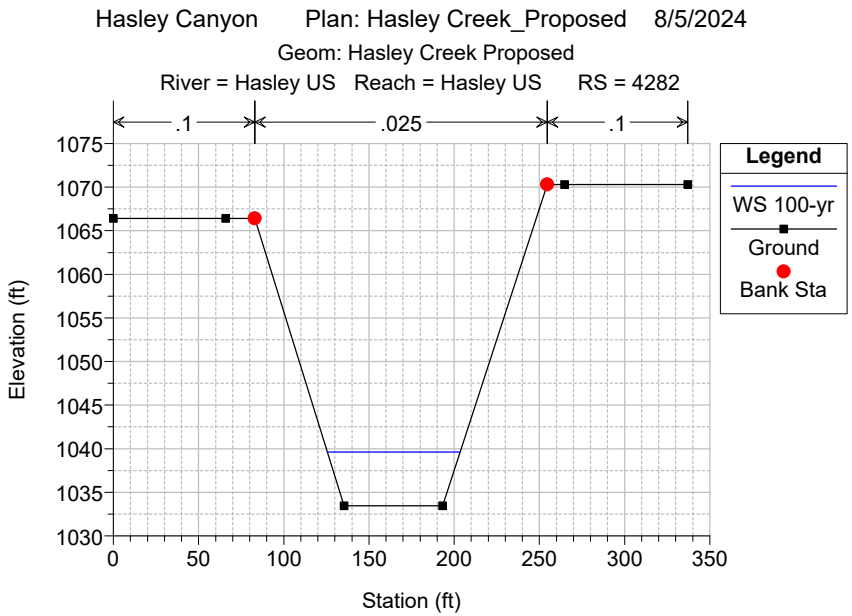
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta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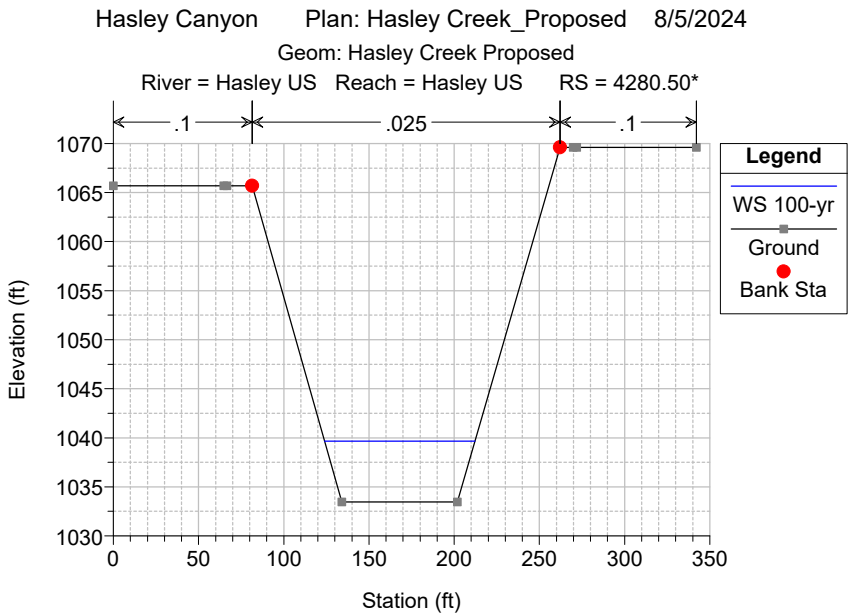
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4282
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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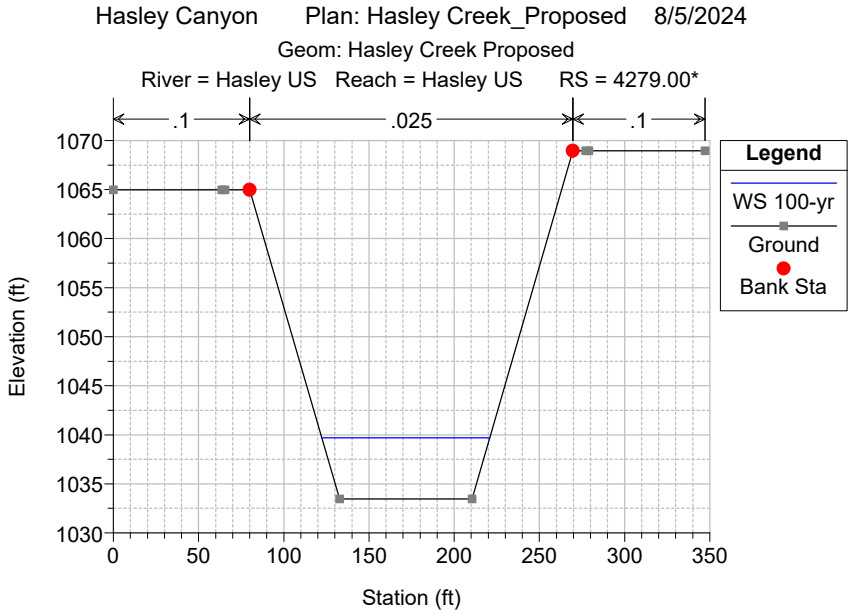
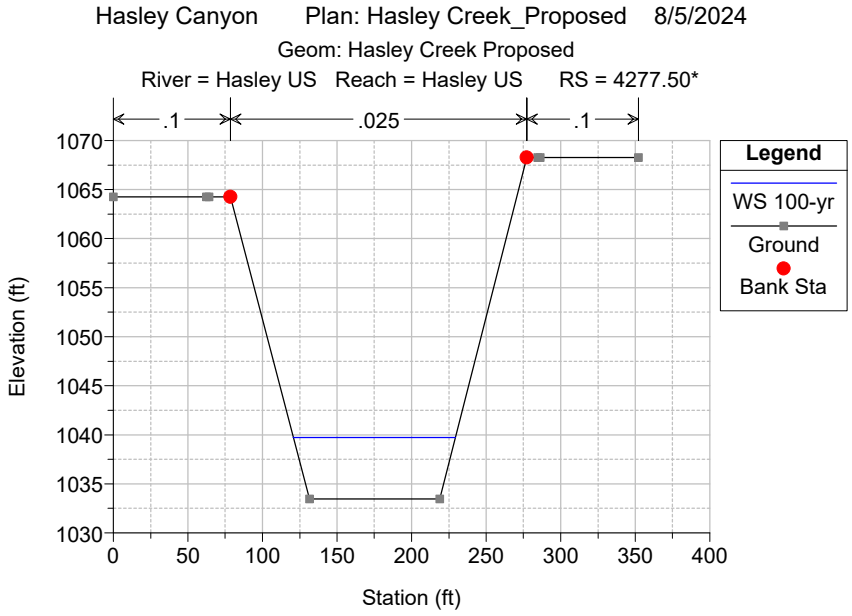
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4280.50*
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4279.00*
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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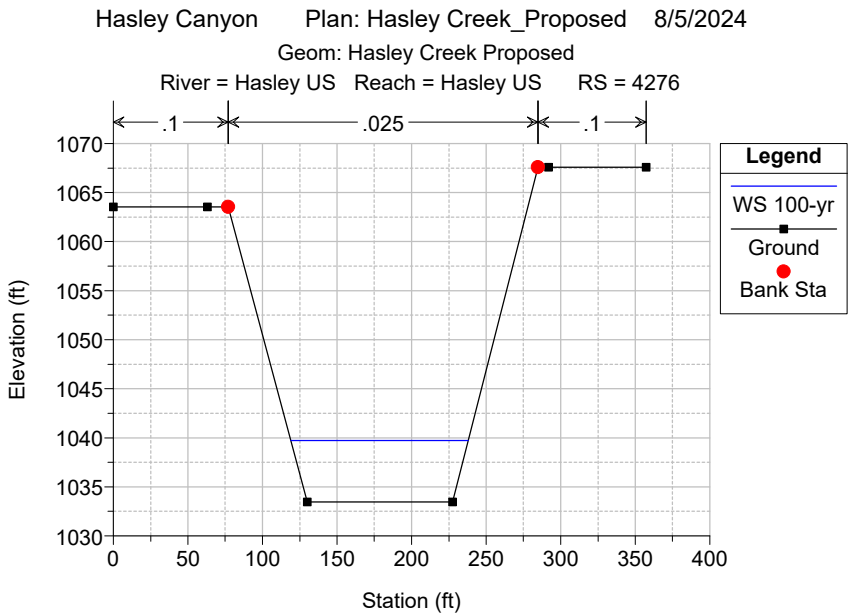
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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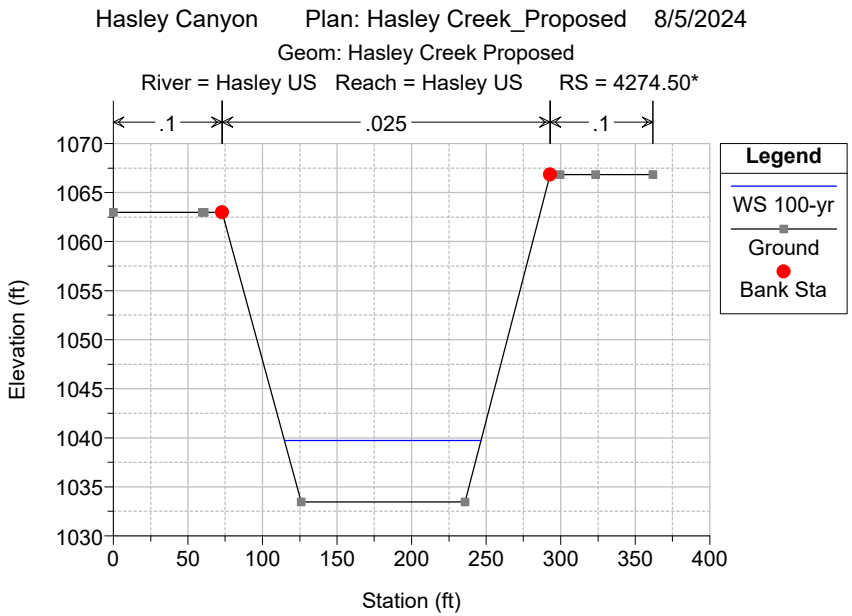
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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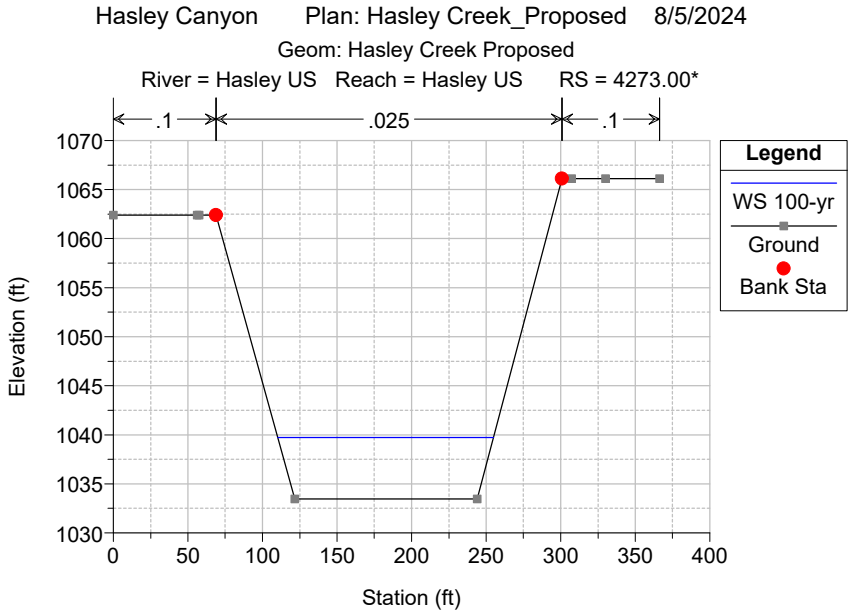
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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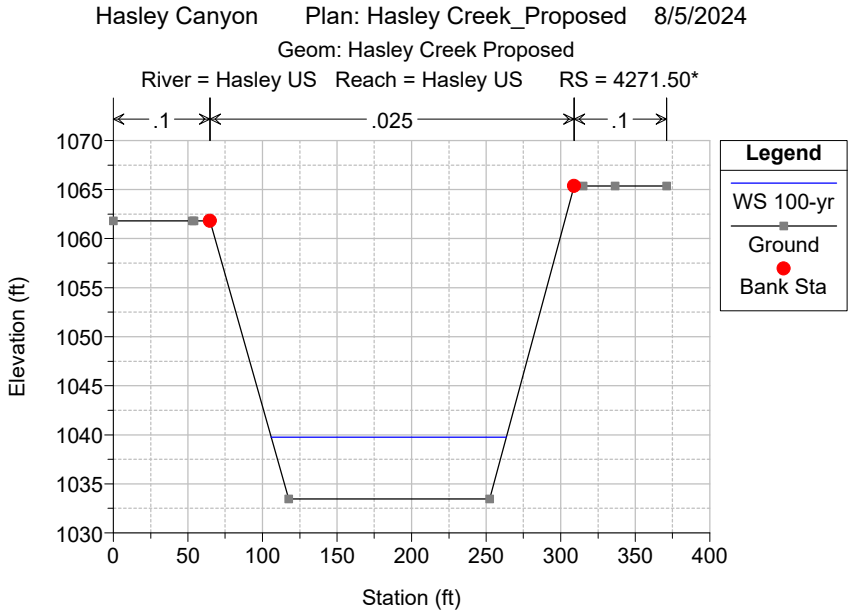
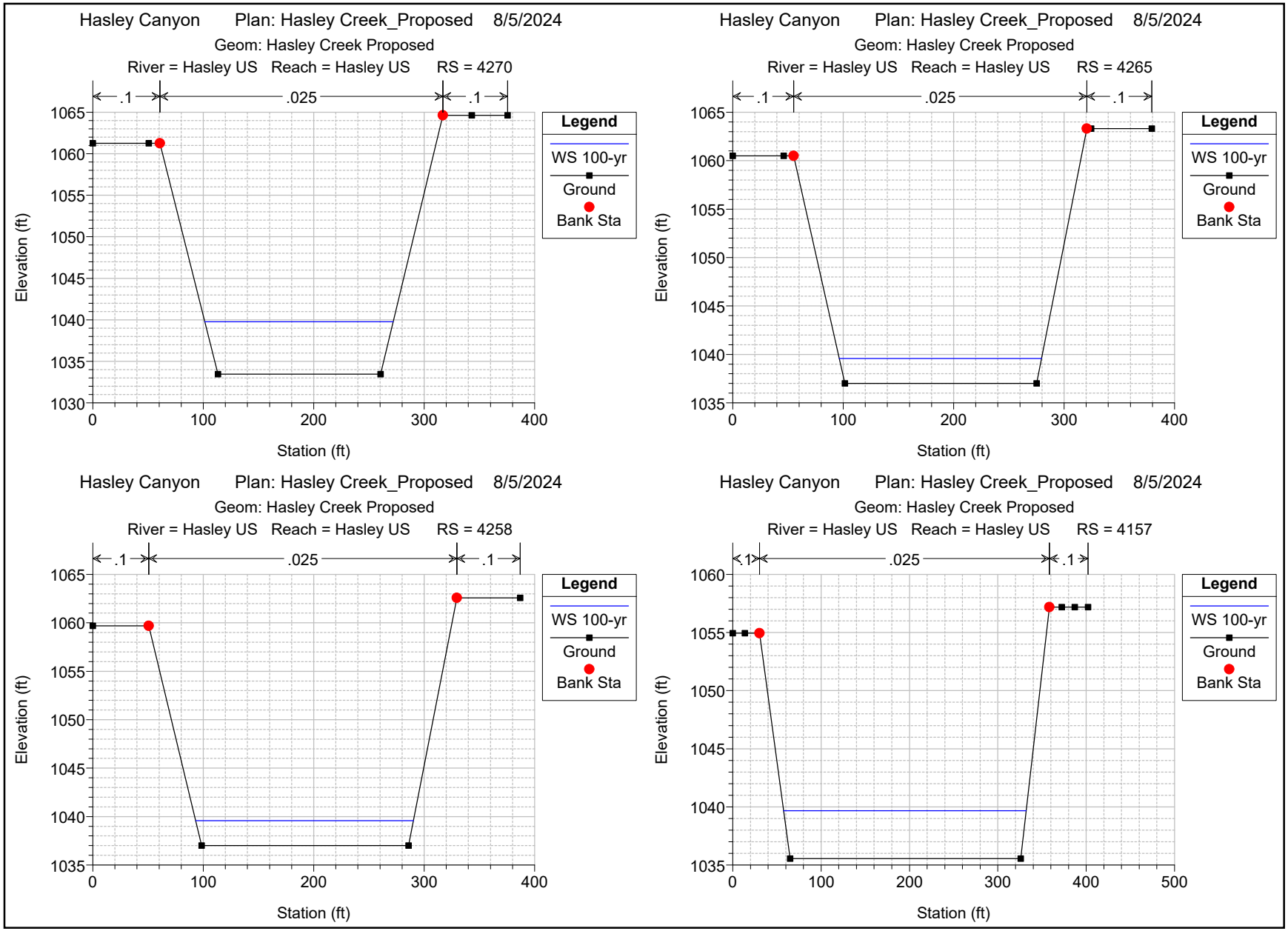
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4273.00*
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4271.50*
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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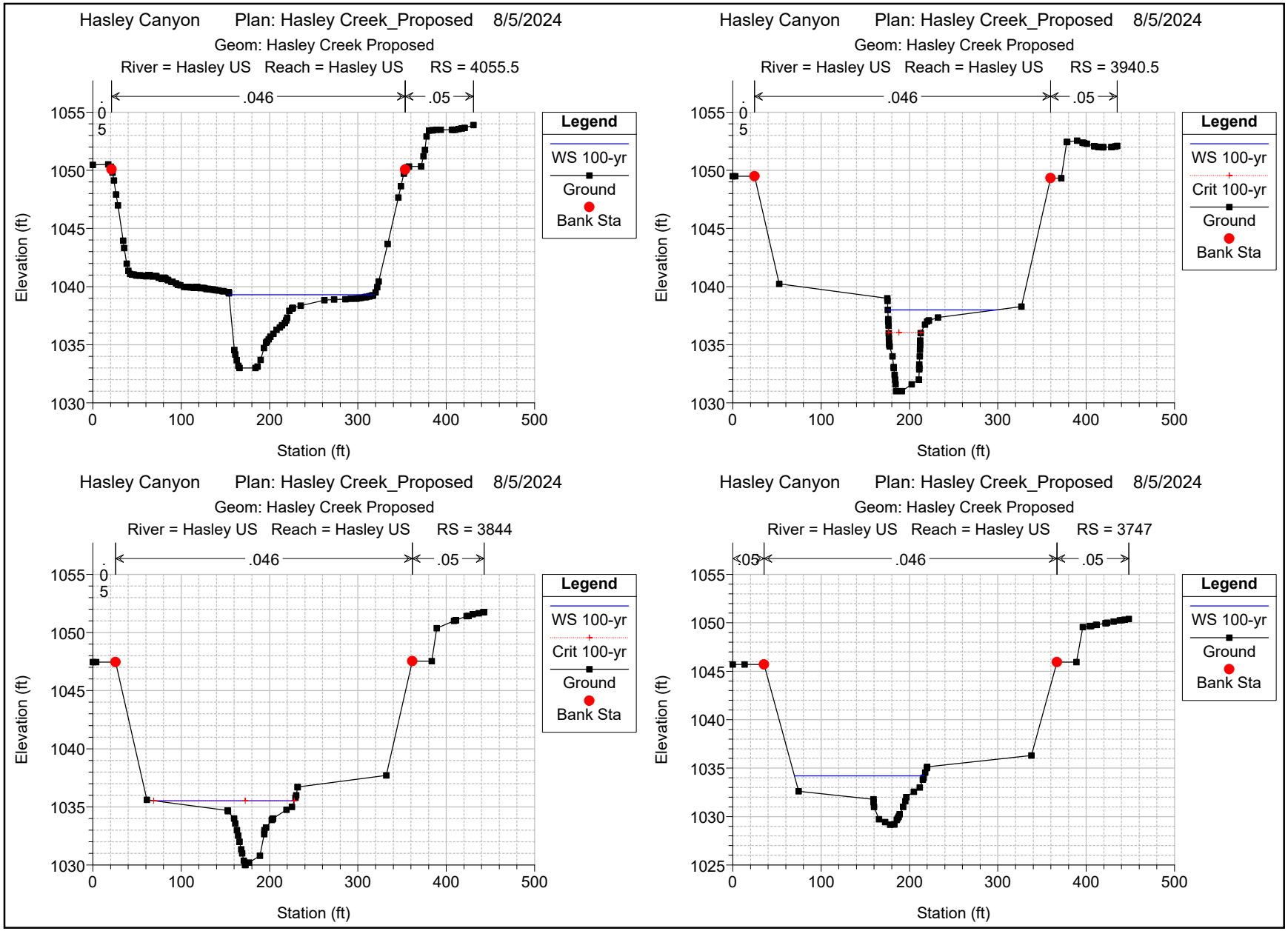
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4265
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4258
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4157
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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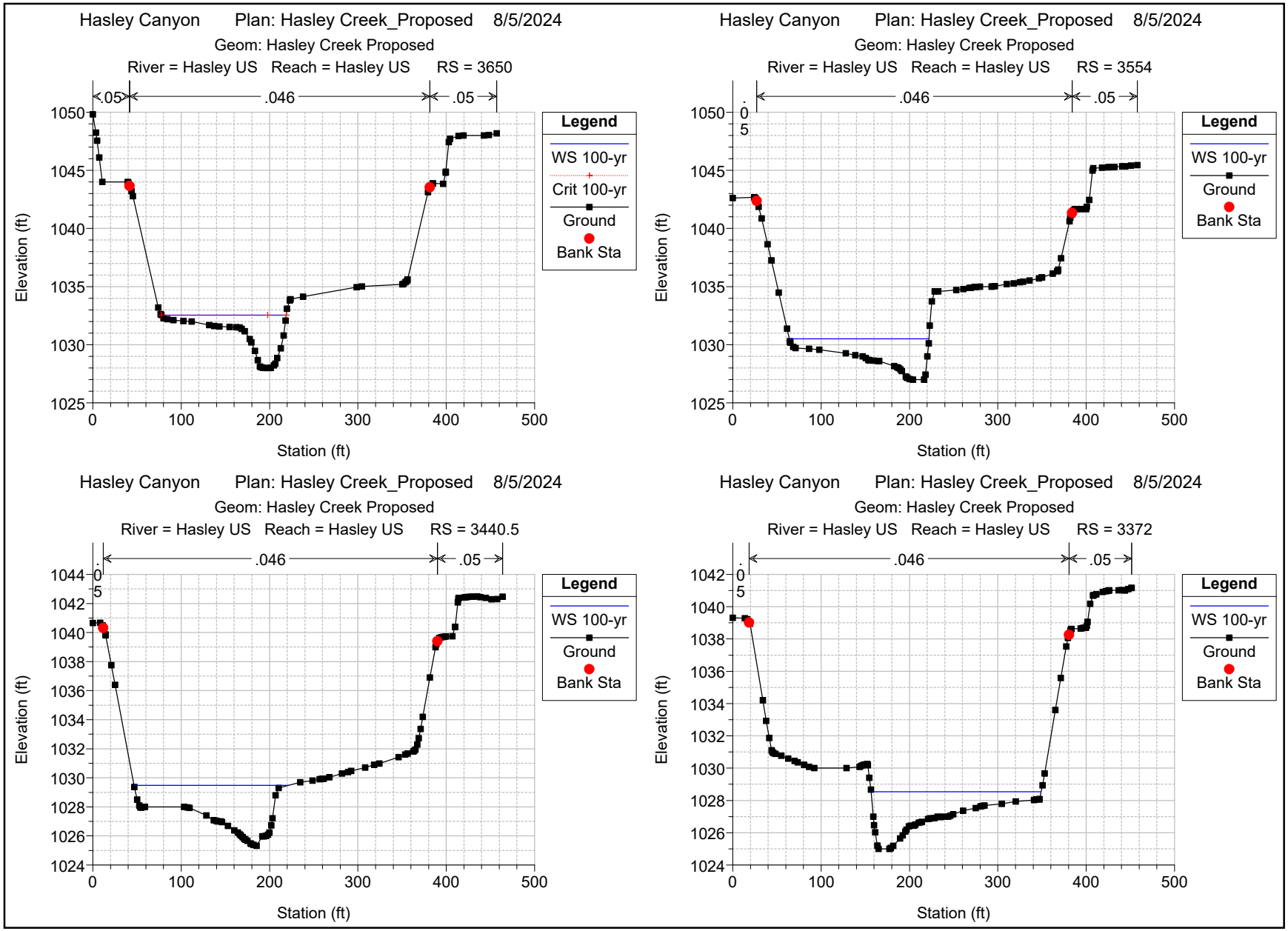
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4055.5
.046
.05
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3940.5
.046
.05
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3844
.046
.05
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3747
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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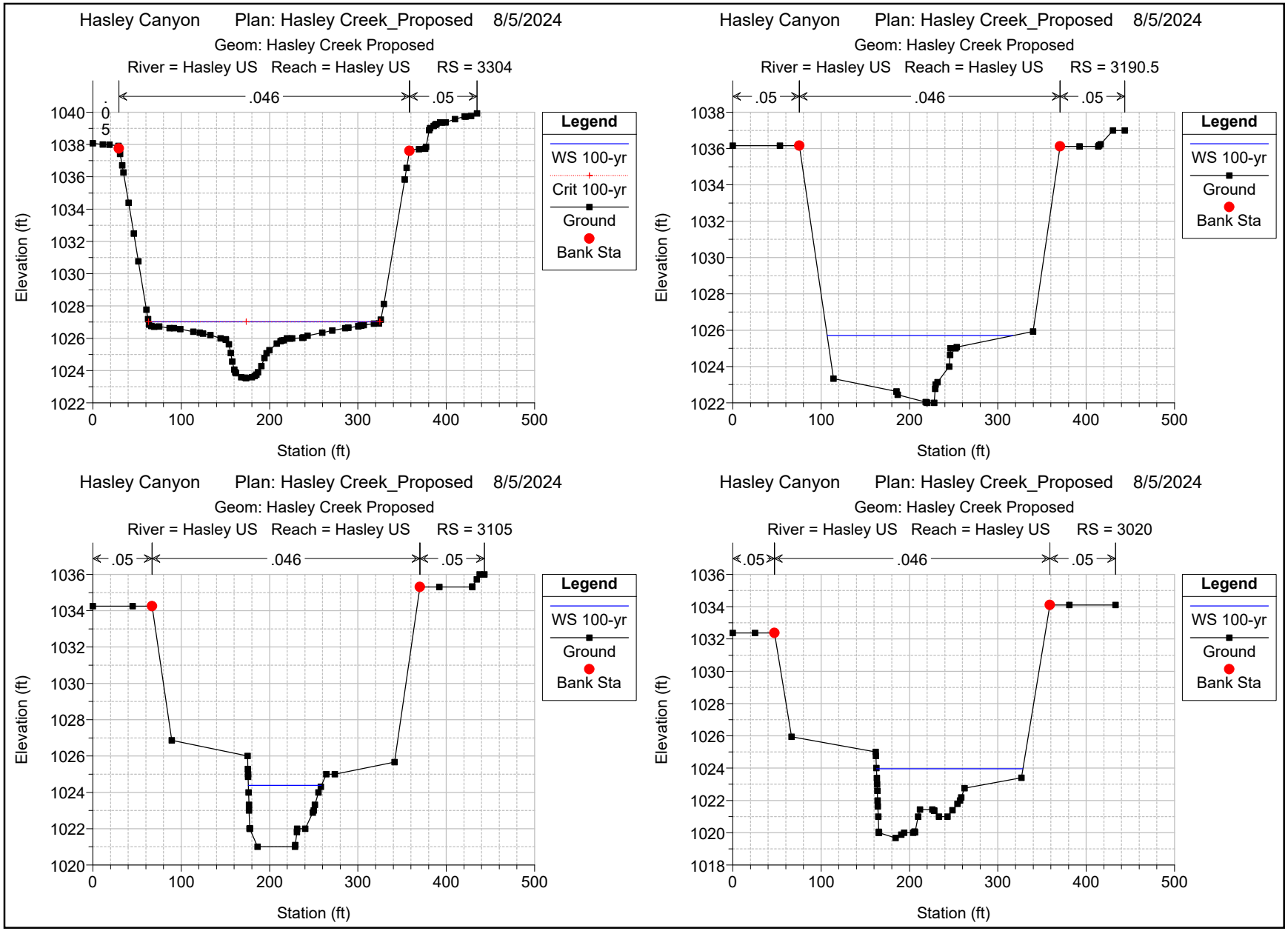
.05
.046
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3554
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3440.5
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3372
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3304
.05
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.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3190.5
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Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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Geom: Hasley Creek Proposed
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Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
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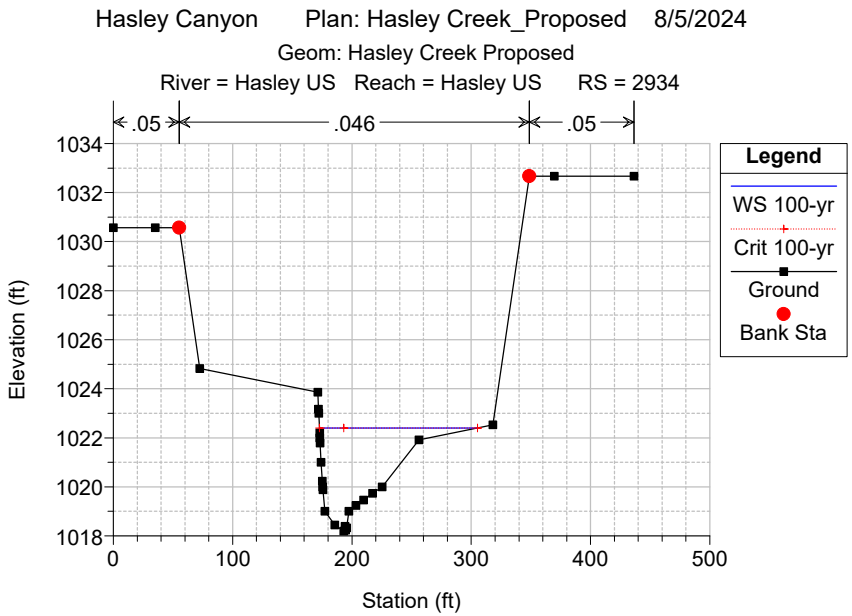
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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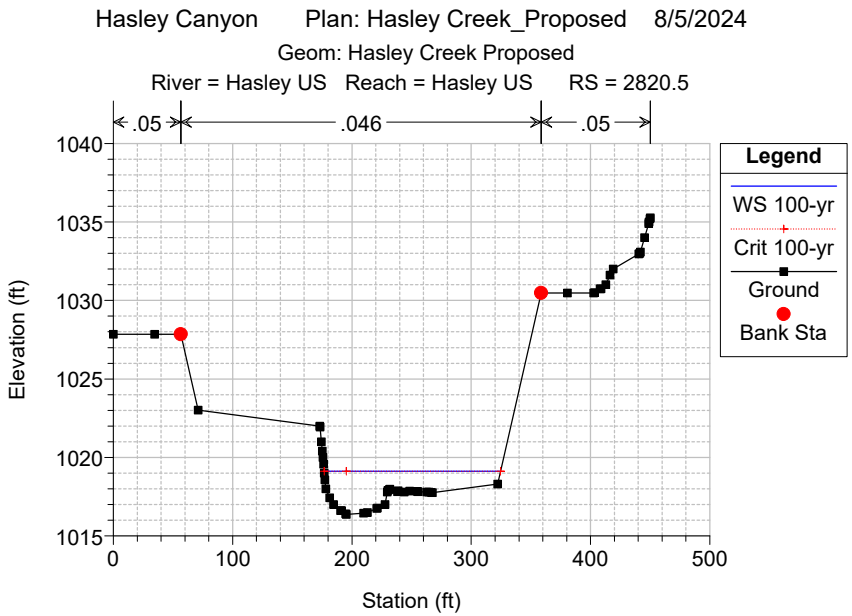
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta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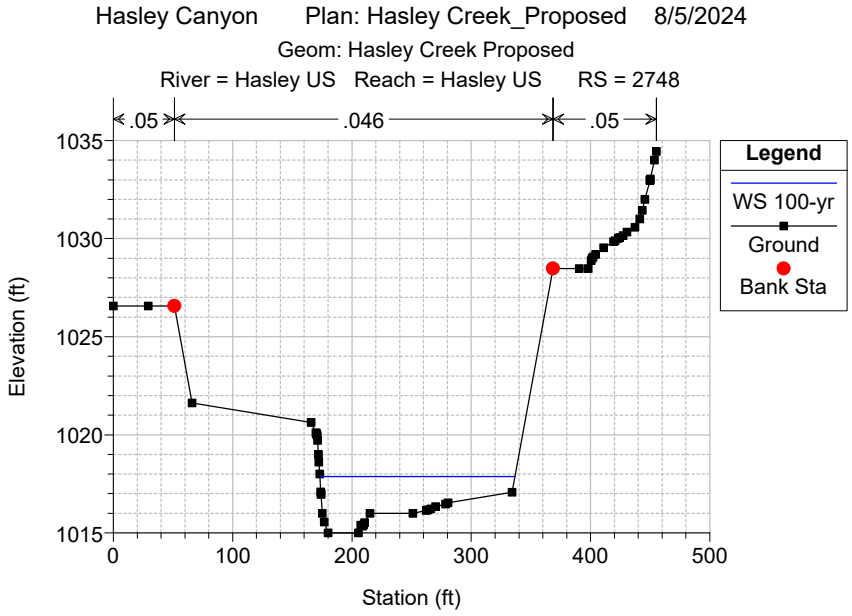
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta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Geom: Hasley Creek Proposed
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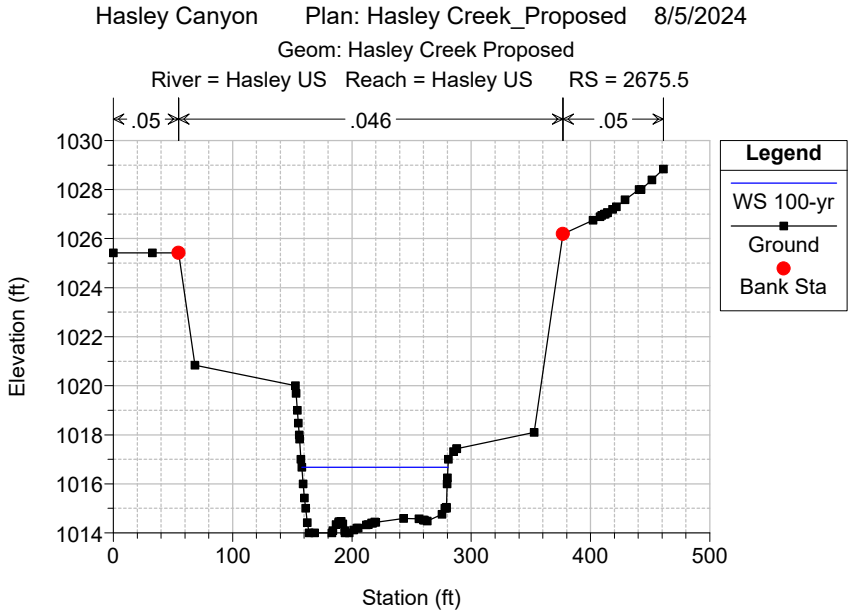
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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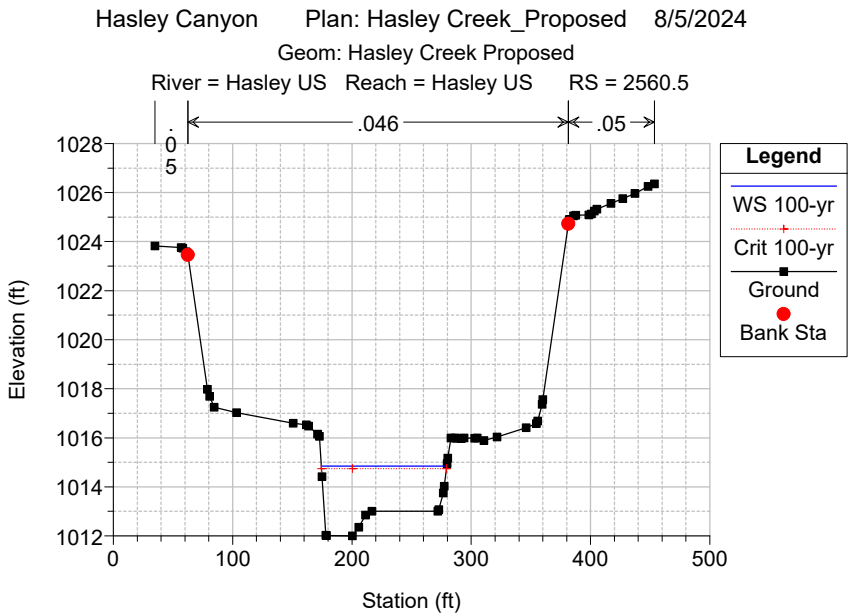
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta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Geom: Hasley Creek Proposed
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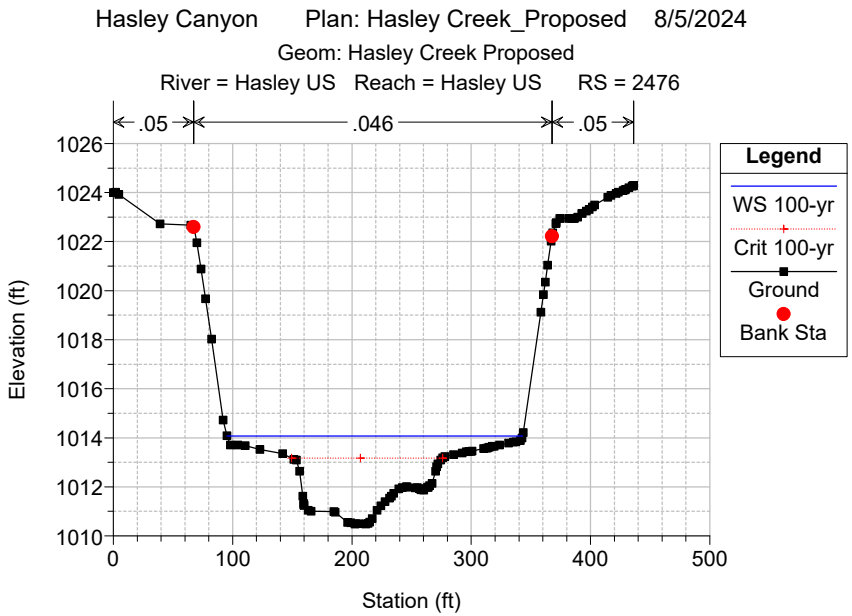
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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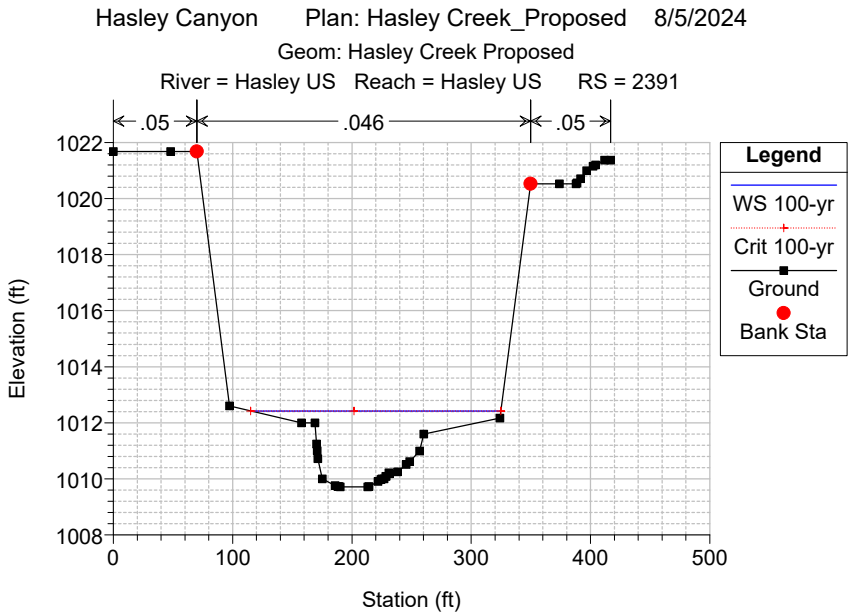
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Crit 100-yr
Ground
Bank Sta
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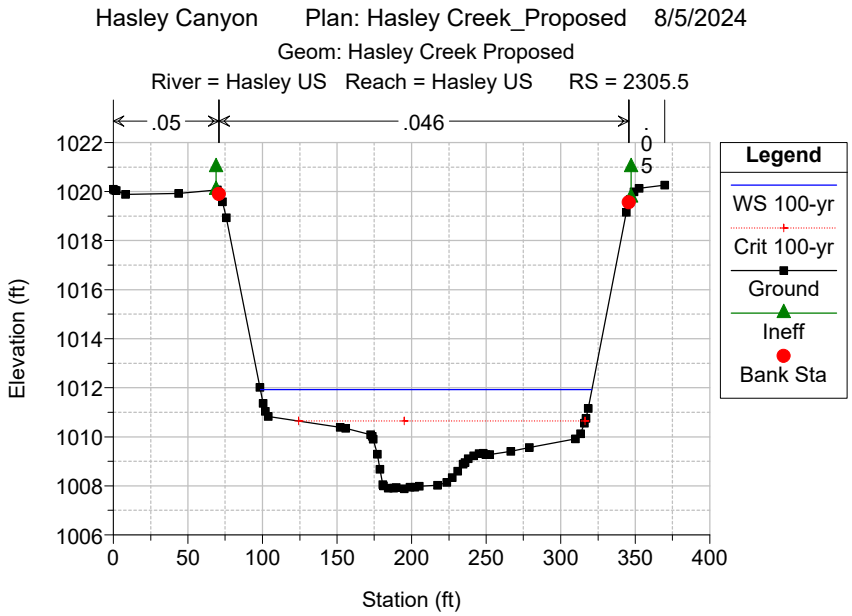
Station (ft)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River = Hasley US Reach = Hasley US RS = 2305.5
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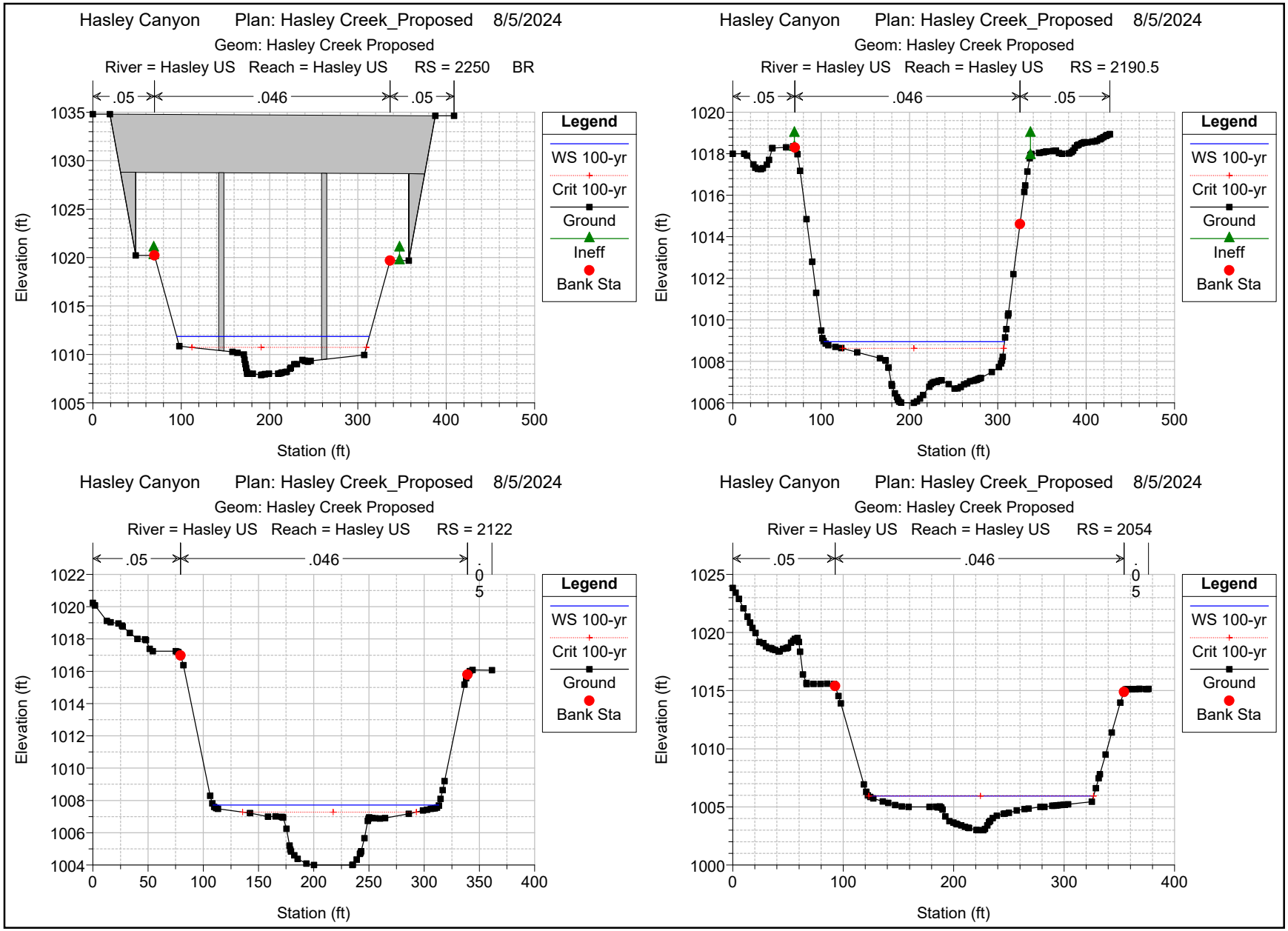
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2190.5
.05
.046
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2122
.05
.046
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2054
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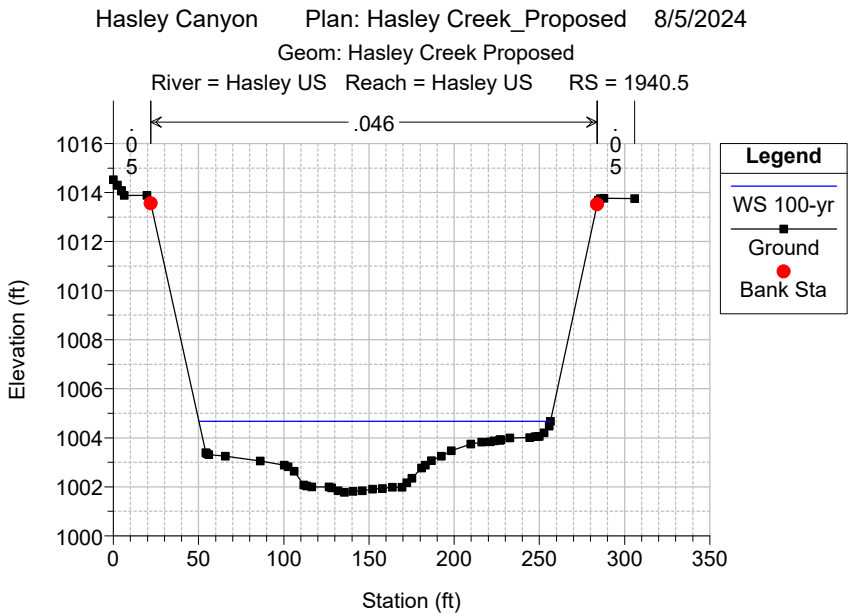
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta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Geom: Hasley Creek Proposed
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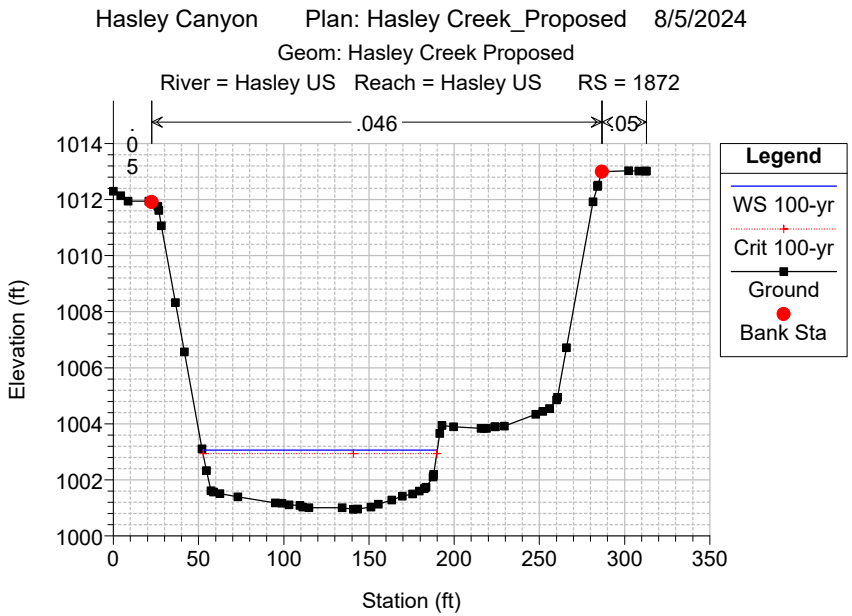
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 1872
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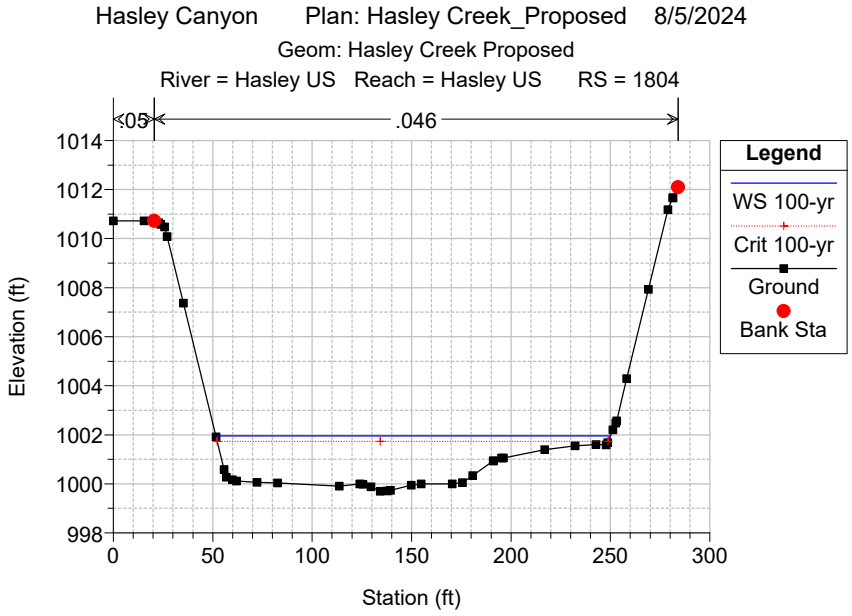
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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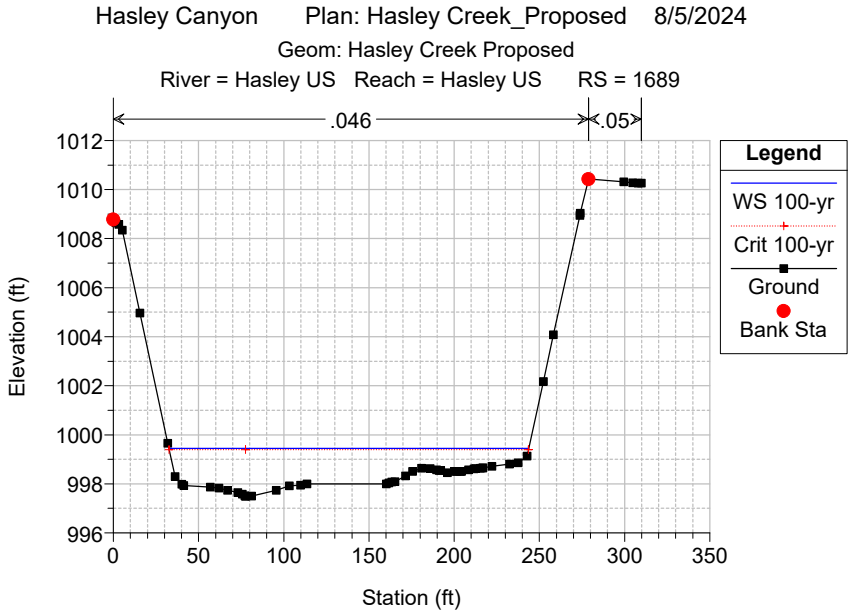
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 1689
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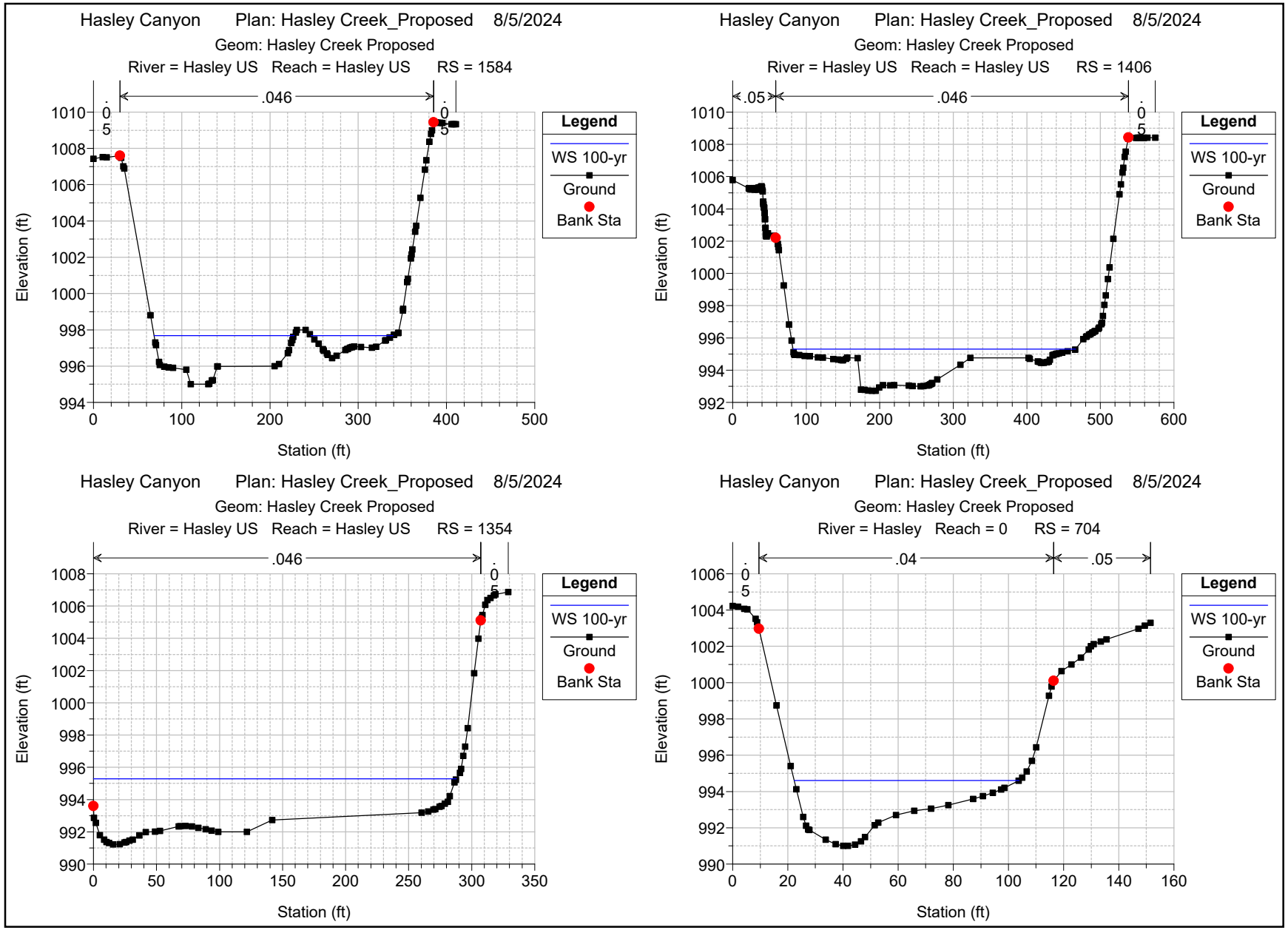
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 1584
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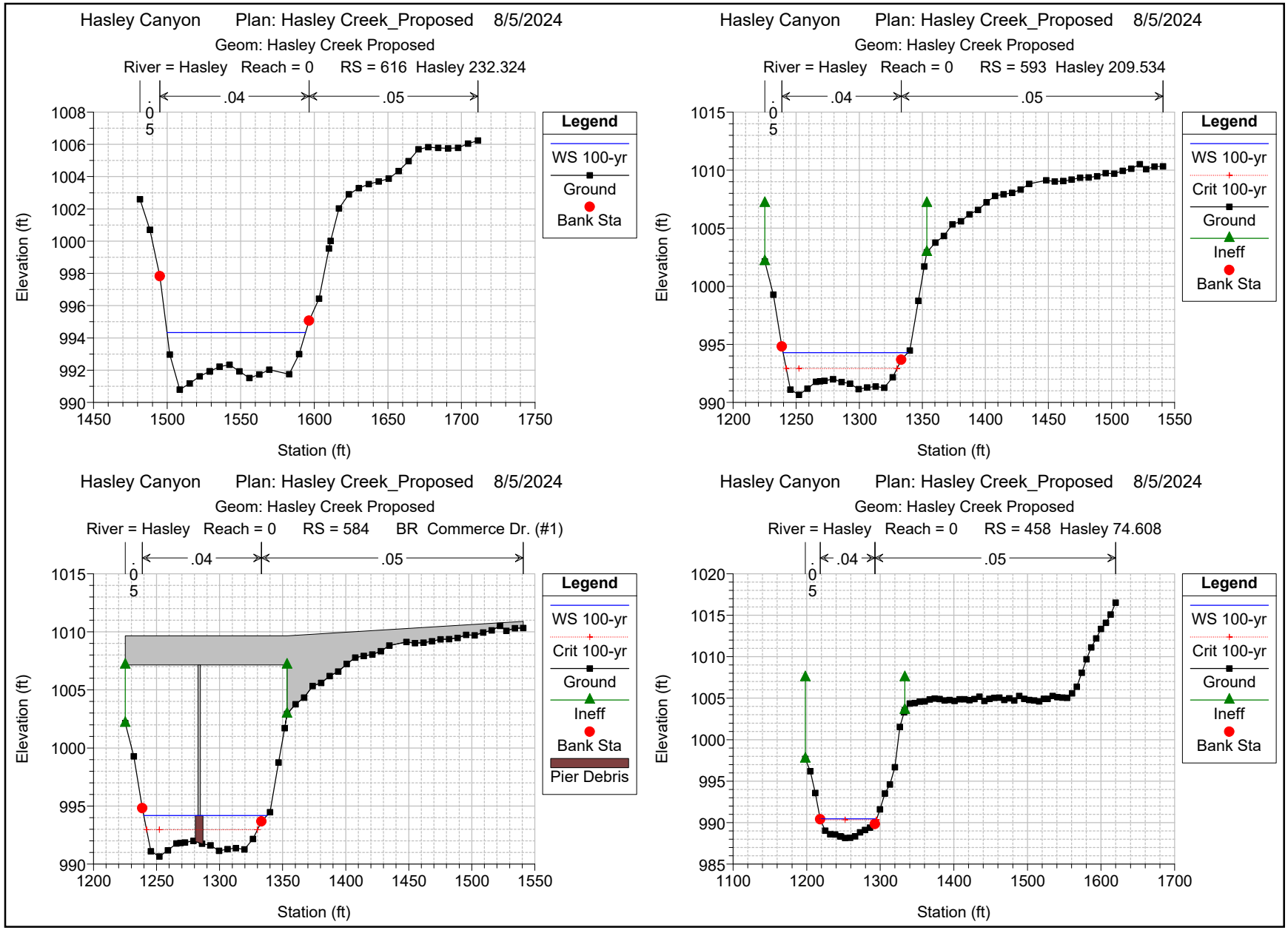
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 1406
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 1354
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley Reach = 0 RS = 704
.04
.05
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
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.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley Reach = 0 RS = 593 Hasley 209.534
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley Reach = 0 RS = 584 BR Commerce Dr. (#1)
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Pier Debris
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley Reach = 0 RS = 458 Hasley 74.608
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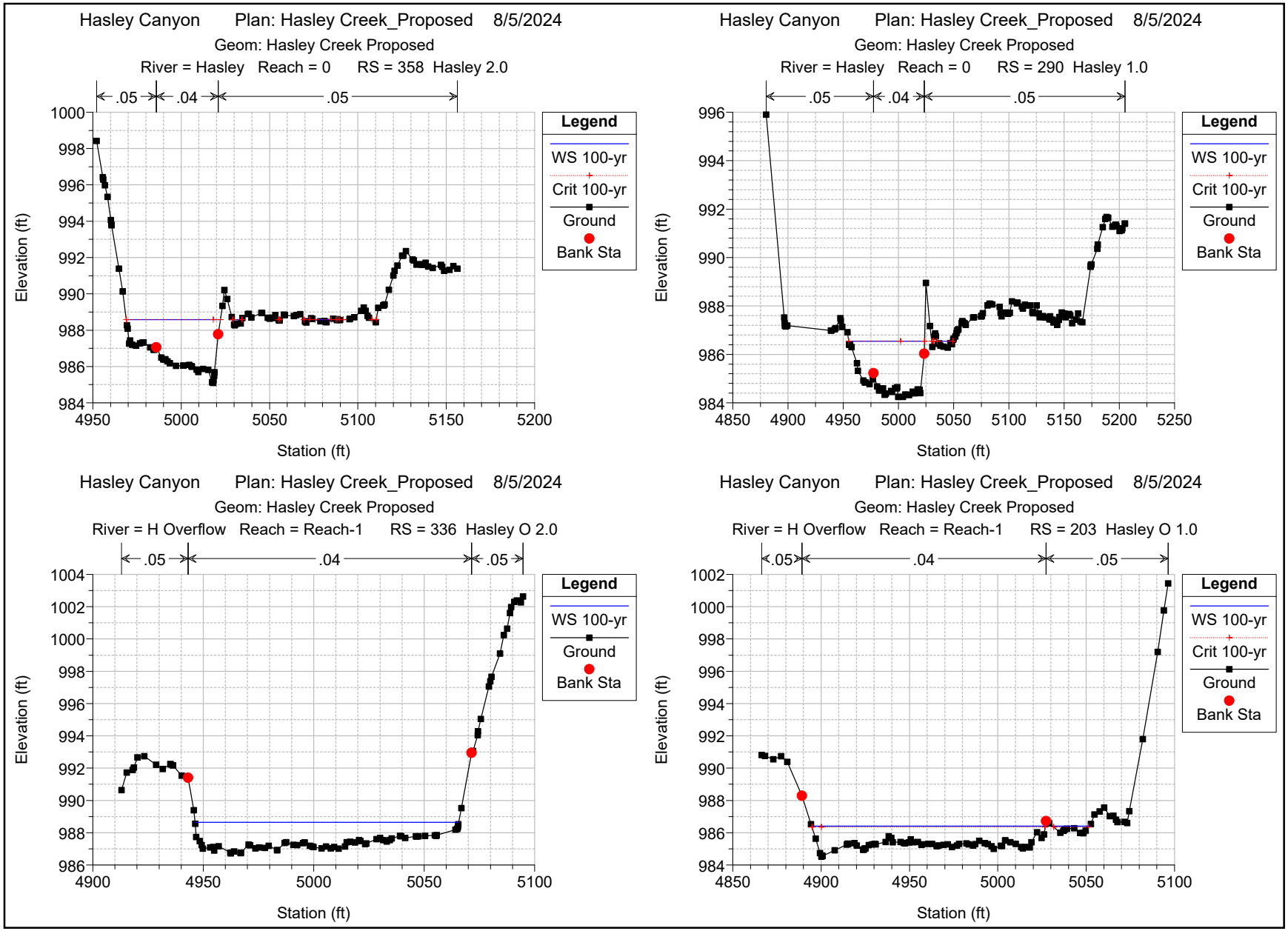
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Geom: Hasley Creek Proposed
River = Hasley Reach = 0 RS = 358 Hasley 2.0
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley Reach = 0 RS = 290 Hasley 1.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
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Geom: Hasley Creek Proposed
River = H Overflow Reach = Reach-1 RS = 336 Hasley O 2.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = H Overflow Reach = Reach-1 RS = 203 Hasley O 1.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta

PACE
Advanced Water Engineering

Appendix F – As-Built Drawings-Commerce Center Drive

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

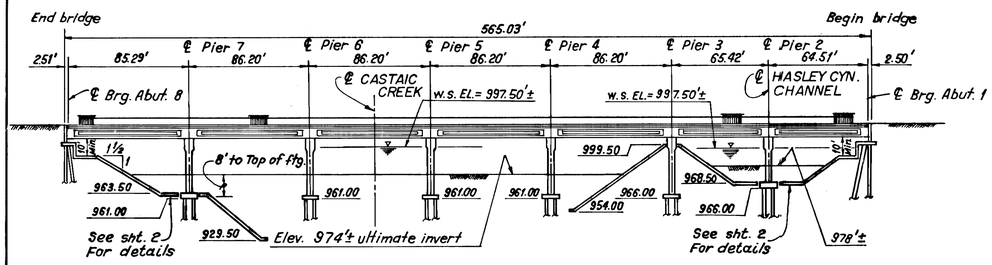
PLANS FOR BRIDGE

ON

COMMERCE CENTER DRIVE

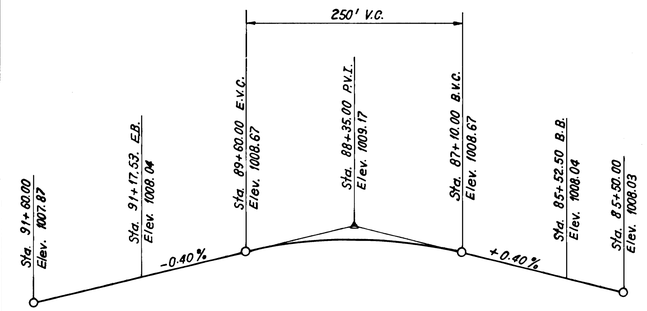
OVER

CASTAIC CREEK



ELEVATION

Scale : 1"= 50'



PROFILE

No Scale

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

INDEX TO STANDARD PLANS

The Following State of California Department of Transportation Standard Plans, Dated July 1992, Are a Part of These Contract Drawings.

A 62-C -------Limits of Payment for Excavation and Backfill-Bridge
AT7-D -------Guard Rail Flares
AT7-F -------Miscellaneous Guard Rail Details
B2-5 -------Pile Details-Class 45 and Class 70
B6-21 -------Joint Seals
B7-5 -------Deck Drains
B11-54 -------Concrete Barrier Type 26
B0-5 ------- Deck Construction Joint

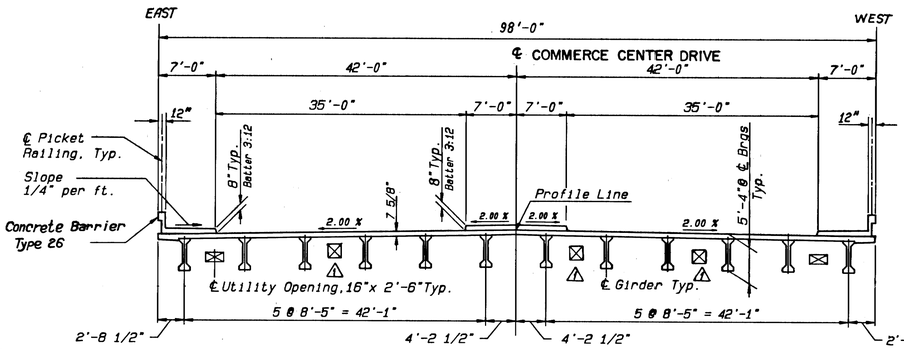
The Following Los Angeles County Department of Public Works Standard Plans, Latest Editon, are Part of These Contract Drawings.

6102-------Picket Railing

AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

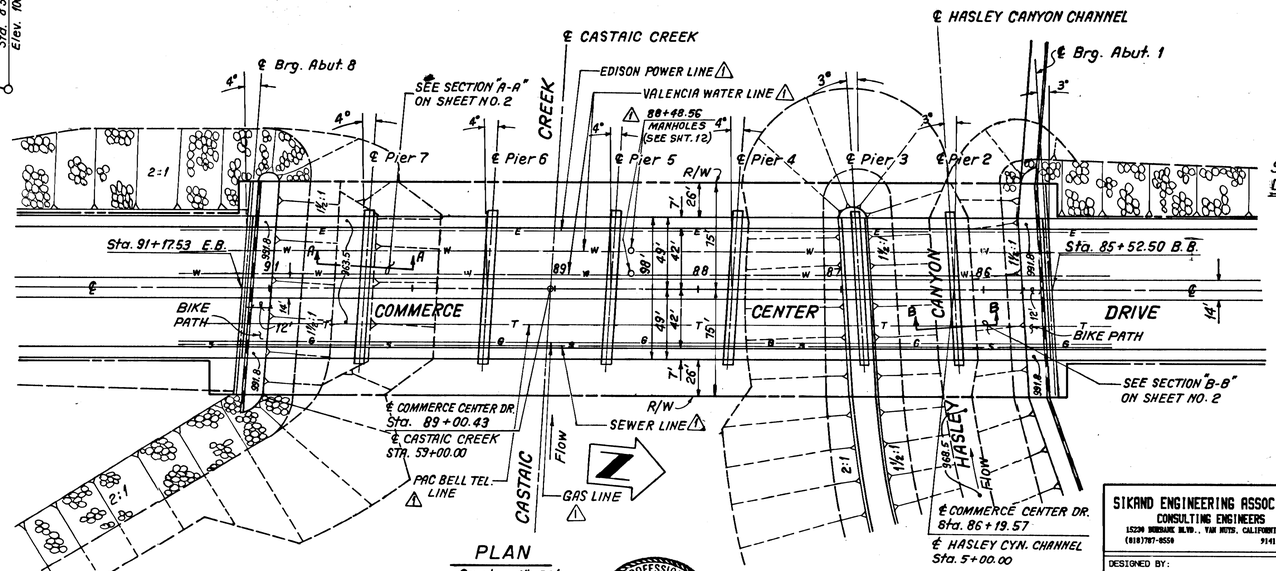
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 1994 EDITION

460-0---------Pull Boxes
465-0---------Conduit Expansion Details



TYPICAL SECTION

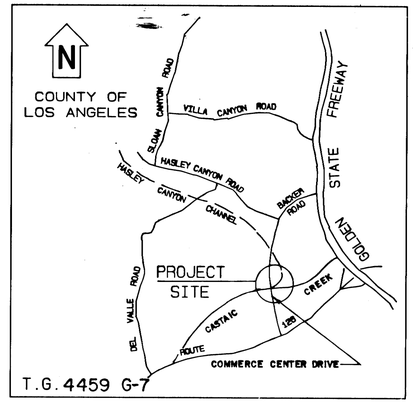
Scale : 1" = 10'



PLAN

Scale: 1"=50'

NOTE: The contractor shall verify all controlling field dimensions before ordering or fabricating any material or starting construction.



PROJECT LOCATION

No Scale

INDEX	
SHEET	TITLE
1	TITLE SHEET
2	TOPOGRAPHY
3	PILE LAYOUT & WINGWALL DETAILS
4	ABUTMENTS
5	PIERS
6-8	PRESTRESSED GIRDER DETAILS
9	GIRDER DIAPHRAGMS
10-11	DECK DETAIL SHEETS
12	MISCELLANEOUS DETAILS
13-15	LOG OF TEST BORINGS

SPECIFICATIONS

DESIGN: Load Factor Design
Bridge Design Specifications (1989 A.A.S.H.T.O. with Interims and Caltrans Supplements)
Design Loading:
Dead Load: Includes 35 psf for future wearing surface
Live Load: HS20-44 and P13 overload
Seismic Load: Peak Rock Acceleration 0.60g., Depth to Alluvium 80'-150 ft.
Design Stresses: Reinforced Concrete: fy = 60,000 psi
f'c = 3,250 psi
n = 9
Transverse deck slab
fs = 20,000 psi
fc = 1,200 psi
n = 10
Prestressed Concrete: See "Prestressing Notes"
Structural Steel (A36): fy = 36,000 psi
Design Soil Pressure (net): 3,000 psf
Pile Design Load: Abuts 45 ton, Piers 70 ton

CONSTRUCTION:
Standard Specifications for Public Works Construction (1994) W/Current Supplements

DATUM:
NEWHALL 1983, ROBM TAG IN CB 4 FT N BCR 70 FT N & 32 FT E CL INT OLD ROAD & HASLEY CANYON ROAD OFF RAMP EL.1065.685 CL 3976

REVIEWED
Steve M. Hemmegger 11/24/97
STRUCTURAL SECTION DATE

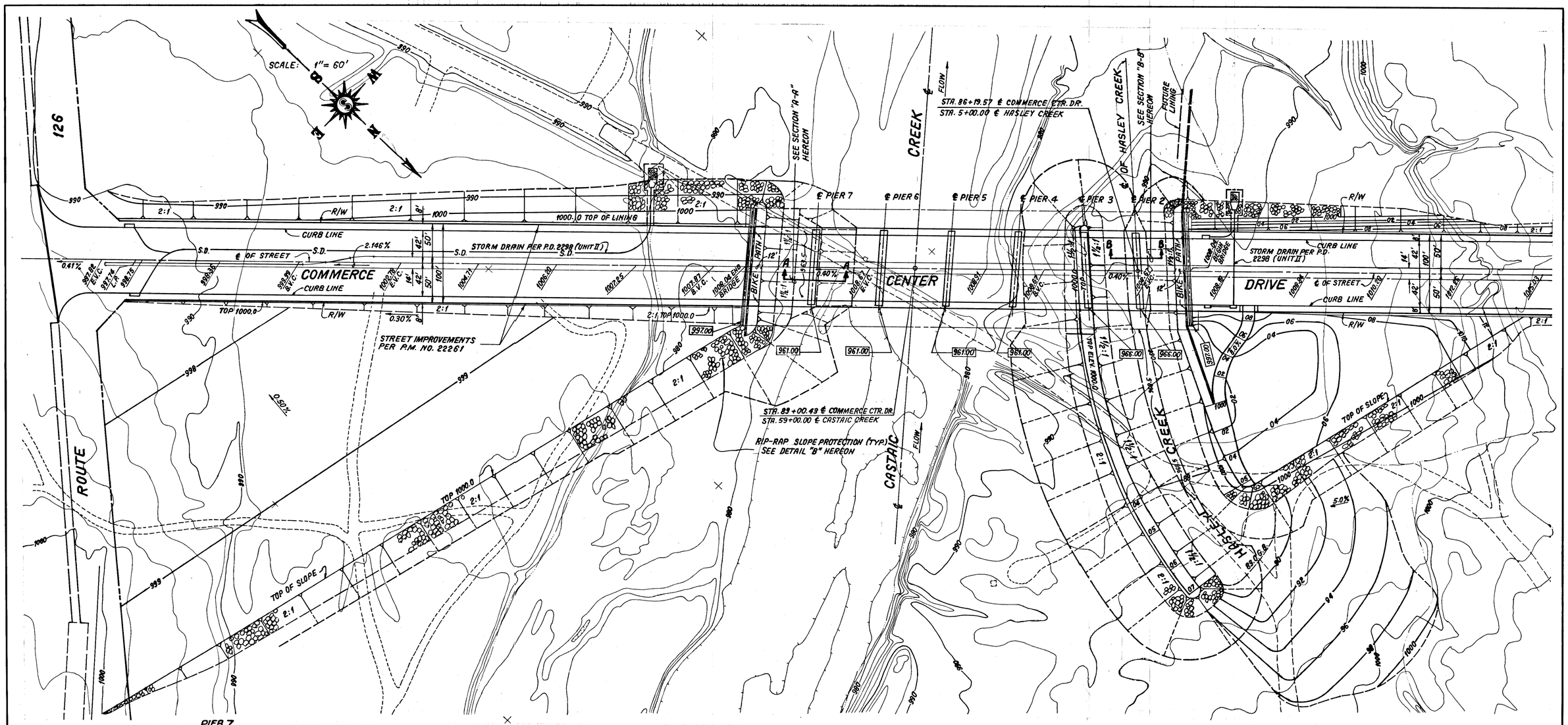
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614612"

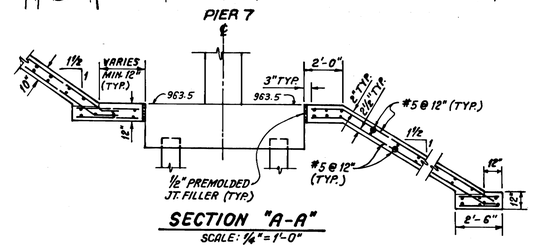
SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA (818)787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	TITLE SHEET
PROJECT ENGINEER: JORA SARKISSIAN	SUBMITTED: 11/24/97 CONSTRUCTION SECTION DIVISION DATE
	APPROVED: 11-25-97 DIRECTOR OF PUBLIC WORKS COUNTY DIRECTOR DATE
	BRIDGE NO.: 3794 PROJECT NO.:
	SHT.: 1 OF: 15 DWG. NO.: 614612

1020-252-20

DRAWN	CHECKED	REVISIONS	⚠ ADDED MANHOLES, UTILITY OPENINGS AND UTILITY LINES.



SCALE: 1"= 60'



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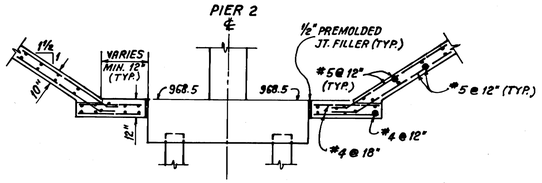

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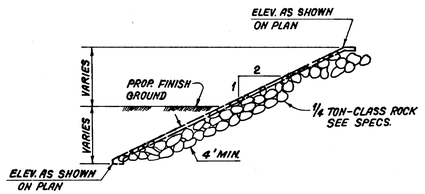


DETAIL "B"
NOT TO SCALE

NOTE: UNLESS OTHERWISE INDICATED:

1. EXISTING TOPOGRAPHY SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR.
2. FOR RELOCATION OR REMOVAL OF EXISTING UTILITIES; SEE SPECS.
3. ☐ INDICATES BOTTOM OF FOOTING ELEVATION.
4. SLOPE PAVING MAY BE PORTLAND CEMENT CONCRETE OR AIR-BLOWN MORTAR. SEE SPECS.
5. FOR GUARD RAIL DETAILS, SEE CALTRANS STD. PLAN A77-D, TYPE I FLARE AND A77-F, A77-E. FOR ANCHORAGE TO BRIDGE SIDEWALK, SEE STD. B11-54. TYP.
6. FOR SITE AND EMBANKMENT PREPARATION, SEE SPECS.
7. FOR TYPICAL SLOPE PAVING DETAILS SEE "MISCELLANEOUS DETAILS" ON SHEET NO. 12
8. LINING AND BIKE PATH TO BE CONSTRUCTED PER P.D. NO. 2298 (UNIT III)

NOTE:

CONTRACTOR'S ATTENTION IS DIRECTED TO THE PRESENCE OF GROUND WATER AT ELEVATION OF 2 TO 4 FEET BELOW THE RIVER BED GRADE. CONTRACTOR WILL BE REQUIRED TO PROVIDE ALL NECESSARY DEWATERING FACILITIES TO ADEQUATELY DEWATER BELOW THE SOFFIT OF PIER FOOTING OR BOTTOM OF THE FOOTING OF THE SLOPE PAVING PRIOR TO THE PLACEMENT OF ANY REINFORCEMENT AND STRUCTURAL OR AIR BLOWN CONCRETE. DEWATERING SHALL CONTINUE UNTIL THE STRENGTH OF STRUCTURAL OR AIR BLOWN CONCRETE BELOW THE WATER TABLE HAS REACHED THE STRENGTH OF 2000 P.S.I.

AS BUILT

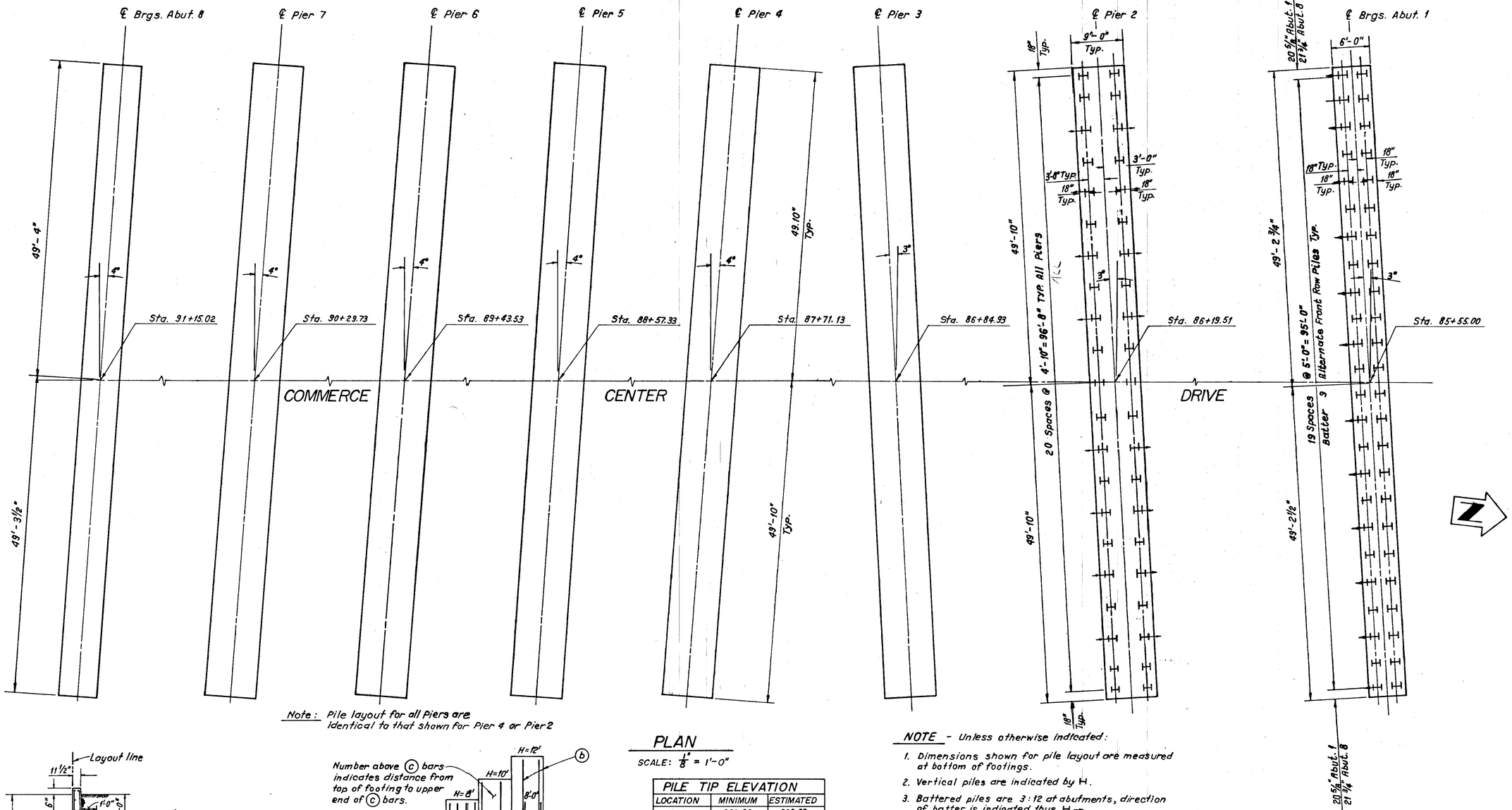
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614611"

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 16230 BURBANK BLVD., VAN NUYS, CALIFORNIA (818)787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	TOPOGRAPHY
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 3794 PROJECT NO.: SHT.: 2 OF: 15 DWG. NO.: 614611

REVISIONS | CHECKED | DRAWN



Note: Pile layout for all Piers are identical to that shown for Pier 4 or Pier 2

Note: Pile layout for Abut. 8 is identical but opposite hand to that shown for Abut. 1

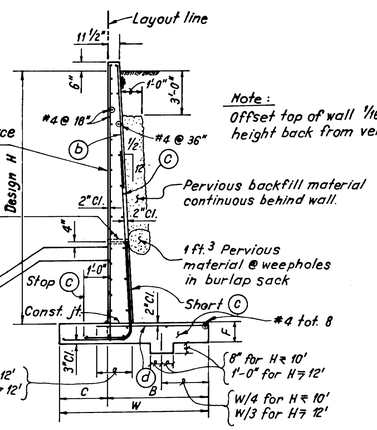
PLAN

SCALE: 1/8" = 1'-0"

PILE TIP ELEVATION		
LOCATION	MINIMUM	ESTIMATED
ABUT 1	960.00	960.00
ABUT 8	950.00	950.00
PIER 2 & 3	926.00	926.00
PIERS 4,5,6,7	922.00	922.00

NOTE - Unless otherwise indicated:

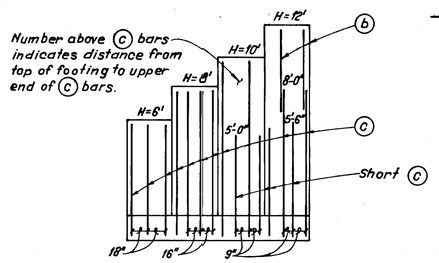
1. Dimensions shown for pile layout are measured at bottom of footings.
2. Vertical piles are indicated by H.
3. Battered piles are 3:12 at abutments, direction of batter is indicated thus H→.
4. Lugs for steel pile shall be ¾" x 5" plates cut to fit. Welded to each side of web and shall be placed as directed by the Engineer. See Specs.
5. Estimated pile tip elevations as shown on this sheet shall be used for bidding purposes.
6. For pile driving, See Specs.
7. For pile details See Caltrans Std. Plan B2-5.
8. All piles are HP 12x53, with
   - Abuts. 40 ton capacity
   - Piers 70 ton capacity



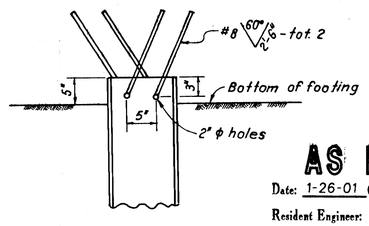
Note: Offset top of wall 1/16" per ft. of height back from vertical.

TYPICAL WINGWALL DETAILS

NO SCALE



Design H	6'	8'	10'	12'
W	4'-2"	5'-2"	6'-2"	7'-2"
C	1'-4"	1'-8"	2'-0"	2'-4"
B	2'-10"	3'-6"	4'-2"	4'-10"
F	1'-2"	1'-2"	1'-2"	1'-2"
ⓑ	—	—	—	#4@18"
©	#5@18"	#5@16"	#5@9"	#6@9"
ⓓ	#5@18"	#4@16"	#4@9"	#5@9"



STEEL PILE ANCHOR

NO SCALE

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zoven Abrahamian

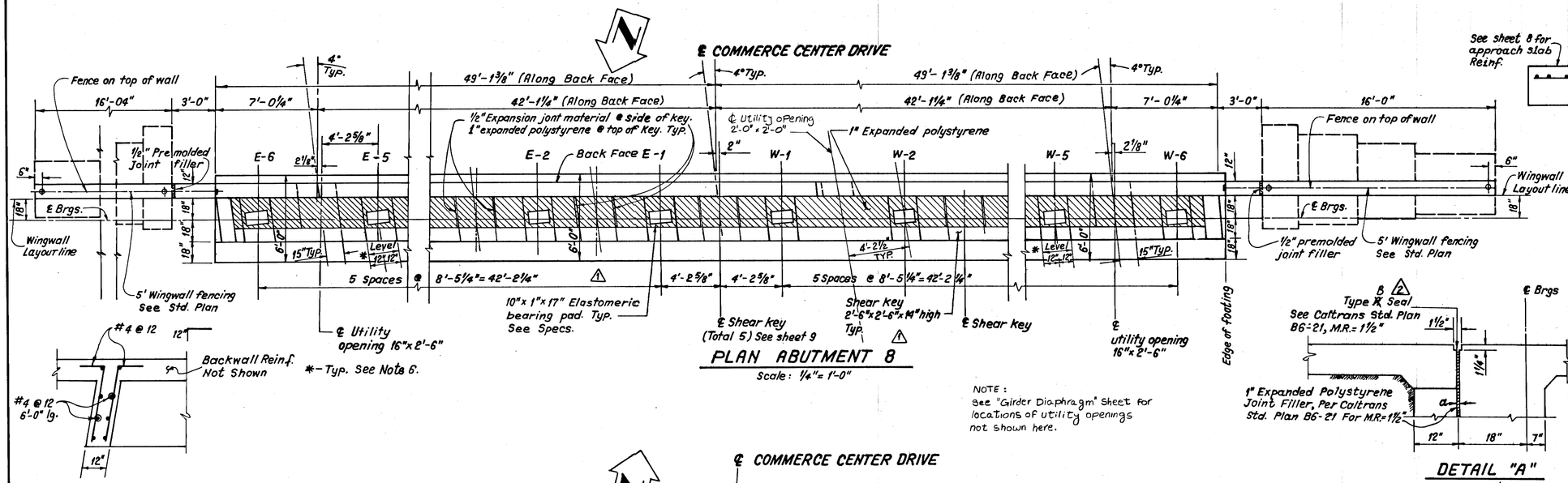
No Changes

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 45289 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614610"

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411 (818)787-8558	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN DRAWN BY: ALBERT GEVORKIAN PROJECT ENGINEER: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK PILE LAYOUT & WINGWALL DETAILS REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE BRIDGE NO.: 3794 PROJECT NO.: SHT.: 3 OF: 15 DWG. NO.: 614610

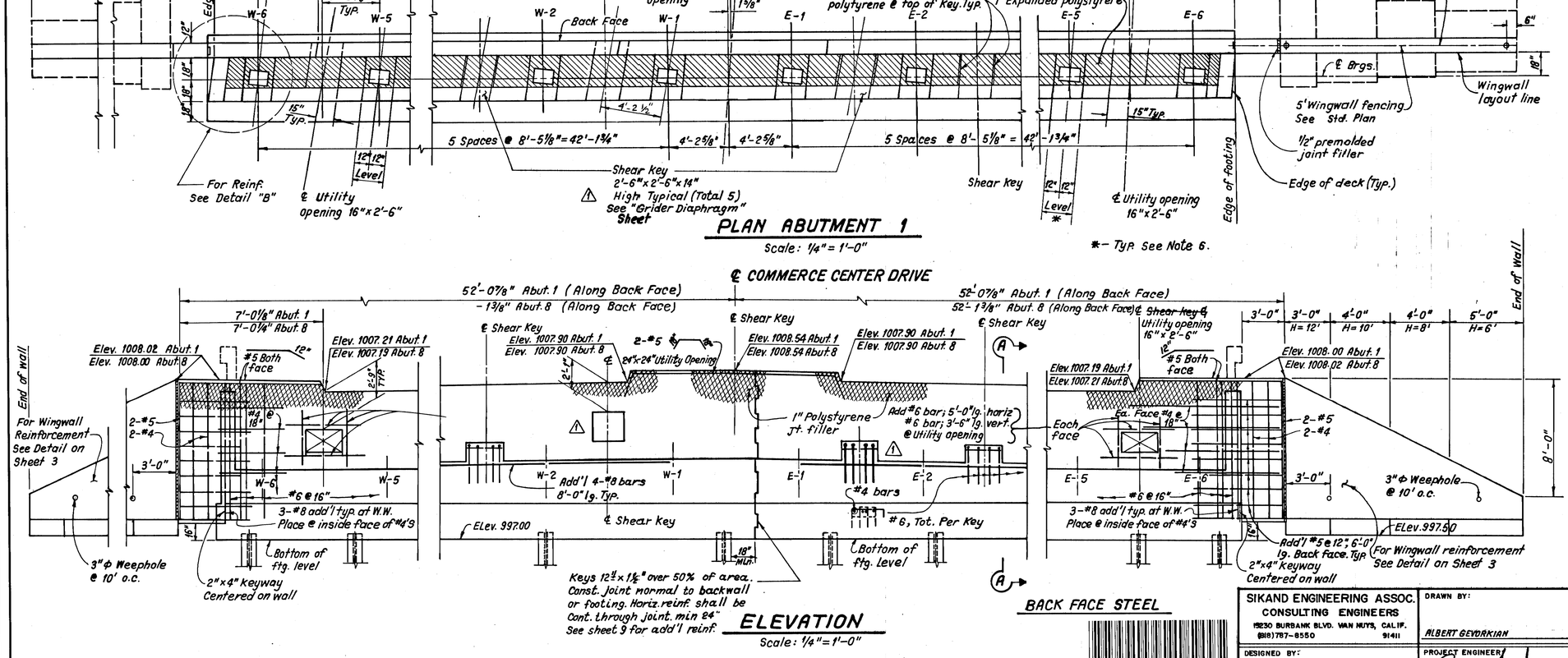
REVISIONS | CHECKED | DRAWN



BEARING SEAT ELEVATION		
GIRDER	ABUTMENT 1	ABUTMENT 8
E-1	1002.56	1002.56
E-2	1002.39	1002.39
E-3	1002.22	1002.21
E-4	1002.04	1002.04
E-5	1001.87	1001.87
E-6	1001.70	1001.70
W-1	1002.56	1002.56
W-2	1002.39	1002.39
W-3	1002.22	1002.23
W-4	1002.06	1002.06
W-5	1001.89	1001.89
W-6	1001.72	1001.72

NOTE - Unless otherwise indicated:

1. Elevation shown is for back face of abutments and wing walls.
2. Bearing seat elevations are top of concrete and are Located at the intersection of ℄ bearing and ℄ girder.
3. Reinforcing steel shall have 2" cover in walls and 3" cover in footings.
4. Premolded joint filler should be fastened with 8 d galvanized nails @ 12"o.c. staggered.
5. Reinforcing steel shall be continuous through construction joints.
6. Bearing seats shall be parallel to roadway grade and level perpendicular to ℄ girder.



ADDED ABUTMENT UTILITY OPENING & REVISED SHEAR KEY LOCATIONS. ⚠

JOINT TYPE SEALS CHANGED TO TYPE "B" SEAL ② AS BUILT
Date 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 9-31-00 CIVIL STATE OF CALIFORNIA

REVISIONS	CHECKED	DRAWN

SIKAND ENGINEERING ASSOC.
CONSULTING ENGINEERS
15230 BURBANK BLVD. VAN NUYS, CALIF. 91411
(818)787-8550

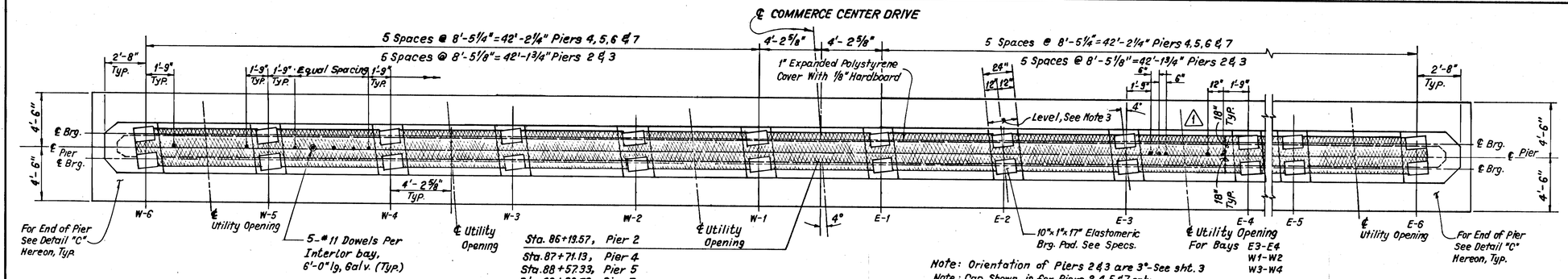
DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE OVER CASTAIC CREEK
ABUTMENTS

REVIEWED
Steve Mikrogeorgis 11/24/97
STRUCTURAL SECTION DATE

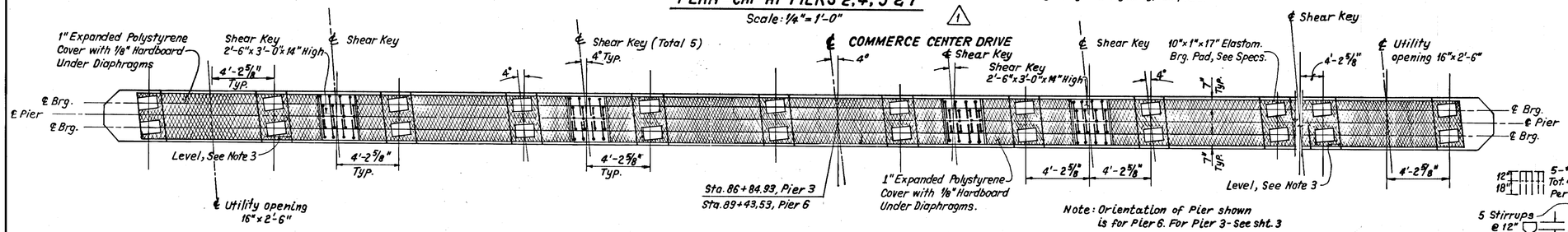
BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 4 OF: 15
DWG. NO.: 614609



PLAN - CAP AT PIERS 2,4,5 & 7

Scale: ¼"=1'-0"

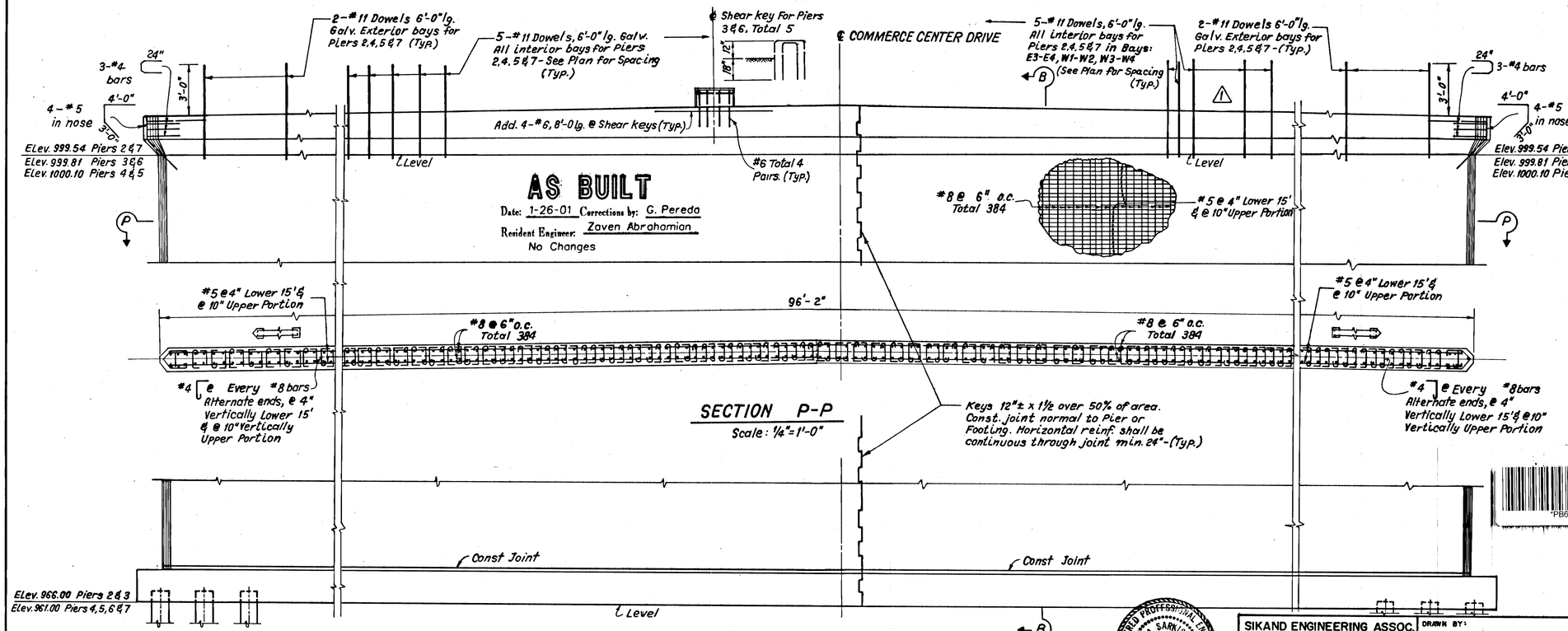
Note: Orientation of Piers 2 & 3 are 3°-See sht. 3
Note: Cap Shown is for Piers 2,4,5 & 7 only. Stem footing and girder layout typ. all piers.



Note: Orientation of Pier shown is for Pier 6. For Pier 3-See sht. 3

PLAN - CAP AT PIERS 3 & 6

Scale: ¼"=1'-0"



AS BUILT
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

SECTION P-P

Scale: ¼"=1'-0"

ELEVATION

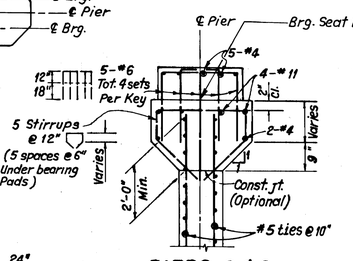
Scale: ¼"=1'-0"

NOTE: Reinforcement Shown is Typ. for both faces of Pier.

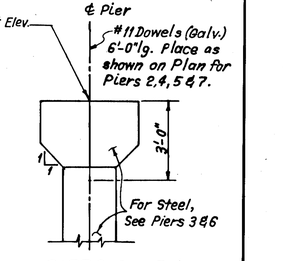
BEARING SEAT ELEVATION						
GIRDER	PIER 2	PIER 3	PIER 4	PIER 5	PIER 6	PIER 7
E-1	1002.81	1003.07	1003.37	1003.42	1003.23	1002.90
E-2	1002.64	1002.89	1003.20	1003.25	1003.07	1002.73
E-3	1002.47	1002.73	1003.03	1003.08	1002.90	1002.55
E-4	1002.29	1002.55	1002.86	1002.91	1002.72	1002.38
E-5	1002.12	1002.38	1002.69	1002.74	1002.55	1002.21
E-6	1001.95	1002.21	1002.52	1002.57	1002.38	1002.04
W-1	1002.81	1003.07	1003.36	1003.42	1003.24	1002.90
W-2	1002.64	1002.90	1003.19	1003.25	1003.07	1002.73
W-3	1002.47	1002.73	1003.02	1003.08	1002.91	1002.57
W-4	1002.31	1002.56	1002.85	1002.91	1002.74	1002.40
W-5	1002.14	1002.40	1002.68	1002.74	1002.57	1002.23
W-6	1001.97	1002.23	1002.51	1002.57	1002.40	1002.06

NOTE: Unless otherwise indicated:

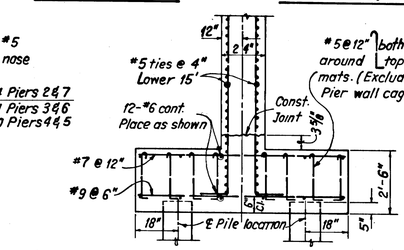
1. Elevations shown in table are at ℄ of pier. See Sect. B-B.
2. Reinforcing steel shall have 2" cover in cap and 3" cover in walls and footing.
3. Finish bearing seats parallel to roadway grade and level transverse to girders.
4. See Sheet 3 for pile layout.



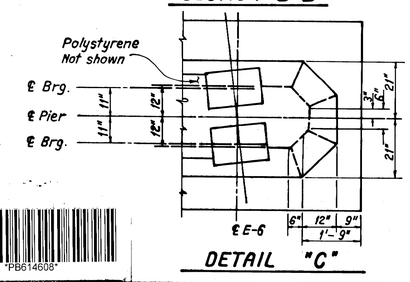
PIERS 3 & 6



PIERS 2,4,5 & 7



SECTION B-B



DETAIL "C"

PB614608

REVISED SHEAR KEY LOCATIONS AT PIERS & DOWEL SPACING AT UTILITY OPENINGS.

REVISIONS	CHECKED	DRAWN
△		

SIKAND ENGINEERING ASSOC.
CONSULTING ENGINEERS
15230 BURBANK BLVD. VAN NUYS, CALIF.
(818) 787-8550 91411

DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

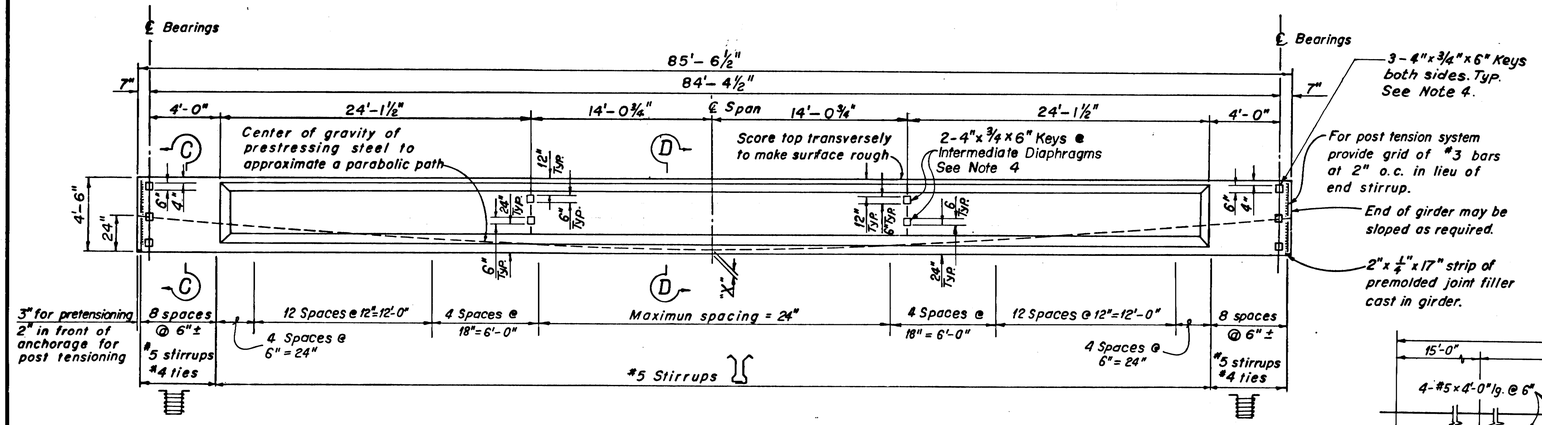
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42690 Exp. 3-31-00 Civil STATE OF CALIFORNIA

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK
PIERS

REVIEWED
Steve M. Hennessey 11/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 5 OF: 15
DWG. NO.: 614608



GIRDER ELEVATION FOR PIER 4 TO ABUT. 8

No Scale

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

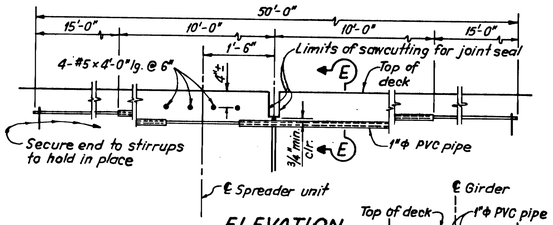
No Changes

NOTE:

1. Girder length shown is for finished girder. Allowance shall be made for elastic shortening.
2. For dowels cast in girder, see Sht.
3. Extend #4 & #6 longitudinal reinforcing 8" post end of girder at Pier
4. Omit keys on exterior face of girder
5. Ends of girder shall be marked for span location.
6. Contractor shall submit shop drawings indicating location and size of holes for dowel through girders.

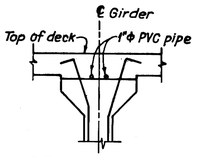
CLEARANCES FOR POST TENSIONED UNITS

1. Units may be bundled vertically in groups of 3 max.
2. Horizontal clearance between units equal to 2 1/2" min.
3. Vertical clearance between bundled units equal to 3" min.
4. Any deviation shall be approved by the Engineer.



ELEVATION

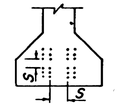
No Scale



SECTION E-E

No Scale

CLEARANCES FOR PRETENSIONED STRANDS



1. Strands may be bundled in groups consisting of 3 vertically and 2 horizontally, and separated at the ends.
2. The minimum distance "S" between groups or individual strands is 1½" for ⅜" strands, 1¾" for ½" strands and 2" for ½" strands.
3. "S" is measured between centers of adjacent strands.
4. Any deviation shall be approved by the Engineer.

GIRDER PRESTRESSING NOTES FOR PIER 4 TO ABUT. 8

"X"	DESIGN STRESSES	Post tension	Pretension
4" 8"	P = Working force, lbs	615,000 700,000	675,000 765,000
	Concrete strength, psi	f'c = 5,000 f'ci = 4,900	f'c = 5,000 f'ci = 4,900

CONCRETE STRENGTH:

f'ci is at time of initial stressing. (Force transfer to conc.) f'c is at 28 days.

WORKING FORCE:

The force remaining per girder after all losses.

CABLE PATH:

Where impractical to obtain cable path shown with a proposed prestressing system, it may vary within limits from 4" to 8" at ℄ girder and from 22" to 26" at the end of the girder subject to the approval of the Engineer. See Specs.

LOSSES:

The stress loss in prestressing steel due to shrinkage, creep, and sequence stressing shall be assumed to be;

pretension steel: 42,000 psi.
post tension steel: 32,000 psi.

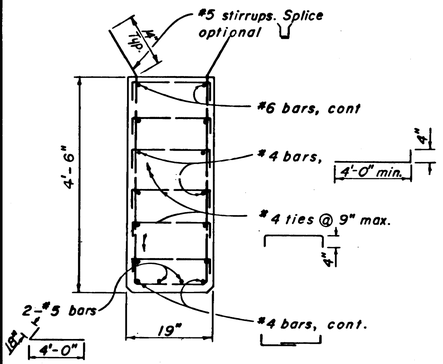
Provision shall be made for any other losses peculiar to the system of prestressing used.

GIRDER DEFLECTIONS: (PRE-TENSION) FOR "X"=4"

Time	Condition		Deflection
Initial	Prestress + D.L.Girder		- 1 3/8"
	Prestress + D.L.Girder		- 2 1/4"
3 months	D.L. Slab	½ pt.	+ 1 5/8"
		¼ pt.	+ 1 1/8"
	Prestress + D.L. Girder + D.L. Slab		- 5/8"
Final	Prestress + D.L. Girder + D.L. Slab		- 3/4"

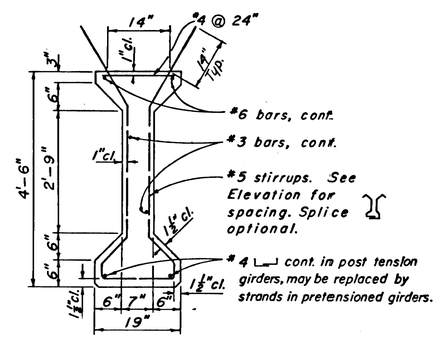
A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

* Includes other dead loads.



SECTION C-C

No Scale



SECTION D-D

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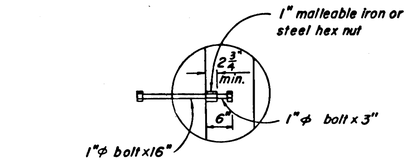
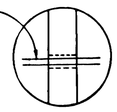


ALTERNATE INSERT ASSEMBLY

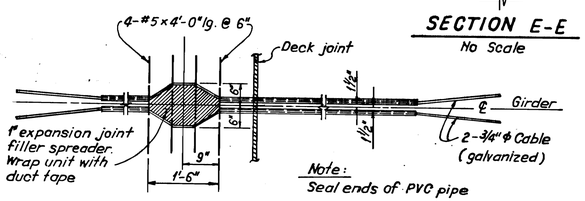
No Scale

"6 dowel 6'-0" long. Place through 1" holes formed in girder. Holes need not be grouted



ALTERNATE DOWEL ASSEMBLY

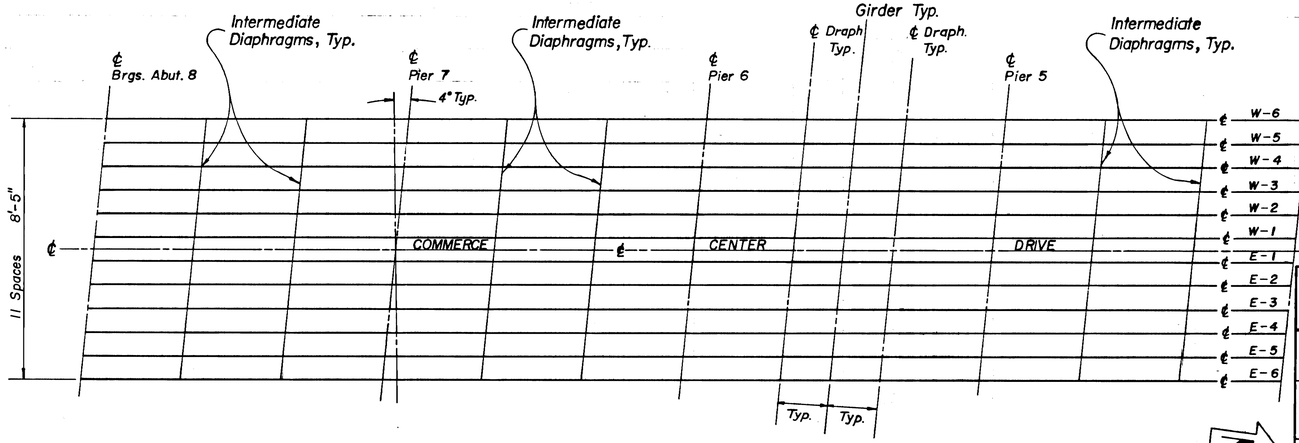
No Scale



Note: Seal ends of PVC pipe

RESTRAINER UNIT DETAIL

No Scale



TYPICAL GIRDER FRAMING PLAN

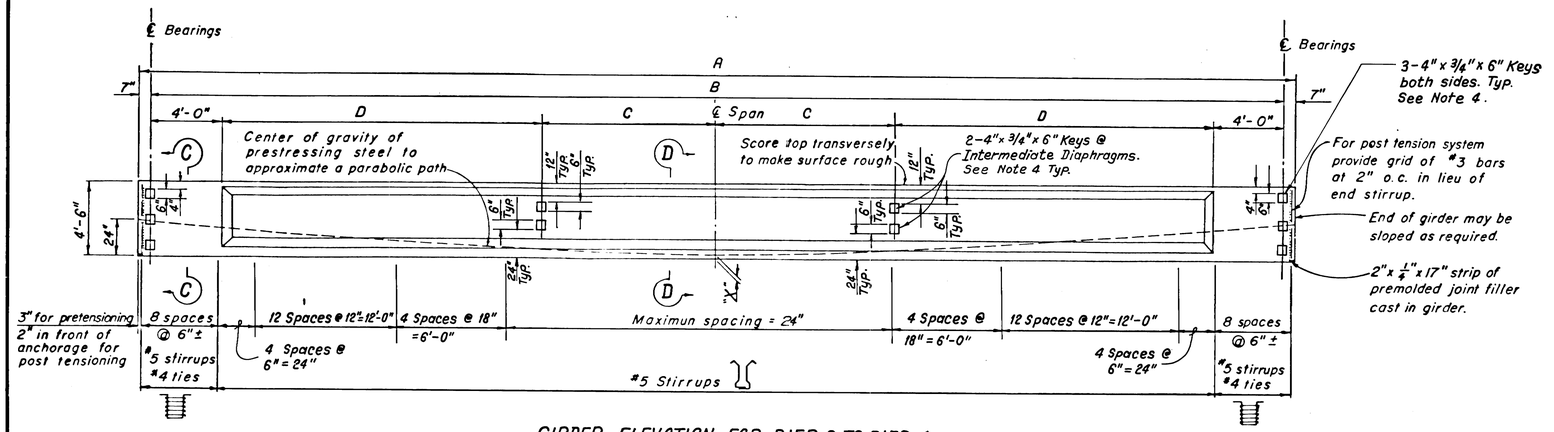
No Scale

PB614607

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	PRESTRESSED GIRDER DETAILS NO. 1
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hamasaki 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO. 3794 JOB NO. SHT. 6 OF 15 DWG. NO. 614607

K-E ALBANENE® LA 4358



GIRDER ELEVATION FOR PIER 3 TO PIER 4

No Scale

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

PRESTRESSING FORCES FOR SPAN 3-4

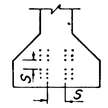
GIRDERS E-2, E-3, E-4, E-5 & E-6			
"X"	DESIGN STRESSES	POST TENSION	PRETENSION
4"	P = WORKING FORCE, lbs	670,000	750,000
8"		765,000	850,00
	CONCRETE STRENGTH, psi	f'c = 5,500	f'c = 5,500
		f'ci = 5,100	f'ci = 4,900

GIRDERS E-1, W-1, W-2, W-3, W-4, W-5 & W-6			
"X"	DESIGN STRESSES	POST TENSION	PRETENSION
4"	P = WORKING FORCE, lbs.	615,000	675,000
8"		700,000	765,000
	CONCRETE STRENGTH, psi	f'c = 5,000	f'c = 5,000
		f'ci = 4,900	f'ci = 4,900

GIRDER DIMENSIONS FOR SPAN 3-4

LOC.	A	B	C	D
W-6	79'-10½"	78'-8½"	13'-1¼"	22'-2¾"
W-5	80'-10⅞"	79'-8⅞"	13'-3½"	22'-7"
W-4	81'-11⅛"	80'-9¼"	13'-5½"	22'-11⅞"
W-3	82'-11½"	81'-9½"	13'-7⅝"	23'-3⅛"
W-2	83'-11⅞"	82'-9⅞"	13'-9⅝"	23'-7⅛"
W-1	85'-0¼"	83'-10¼"	13'-11¾"	23'-11⅜"
E-1	86'-0½"	84'-10½"	14'-1¾"	24'-3½"
E-2	87'-0⅞"	85'-10⅞"	14'-3⅞"	24'-7⅝"
E-3	88'-1¼"	86'-11¼"	14'-5⅞"	24'-11¾"
E-4	89'-1⅝"	87'-11⅝"	14'-7⅞"	25'-3⅞"
E-5	90'-2"	89'-0"	14'-10"	25'-8"
E-6	91'-2¼"	90'-0¼"	15'-0"	26'-0⅛"

CLEARANCES FOR PRETENSIONED STRANDS



1. Strands may be bundled in groups consisting of 3 vertically and 2 horizontally, and separated at the ends.
2. The minimum distance "S" between groups or individual strands is 1½" for ⅜" strands, 1¾" for ½" strands and 2" for ⅝" strands.
3. "S" is measured between centers of adjacent strands.
4. Any deviation shall be approved by the Engineer.

PRESTRESSING NOTES FOR SPAN 3-4

"X"	DESIGN STRESSES	Post tension	Pretension
	P = Working force, lbs		
	Concrete strength, psi	f'c = / f'ci =	f'c = / f'ci =

CONCRETE STRENGTH :

f'_{ci} is at time of initial stressing. (Force transfer to conc)
f'_c is at 28 days.

WORKING FORCE :

The force remaining per girder after all losses.

CABLE PATH :

Where impractical to obtain cable path shown with a proposed prestressing system, it may vary within limits from 4" to 8" at ℄ girder and from 22" to 26" at the end of the girder subject to the approval of the Engineer. See Specs.

LOSSES :

The stress loss in prestressing steel due to shrinkage, creep, and sequence stressing shall be assumed to be;

pretension steel: 42,000 psi.
post tension steel: 32,000 psi.

Provision shall be made for any other losses peculiar to the system of prestressing used.

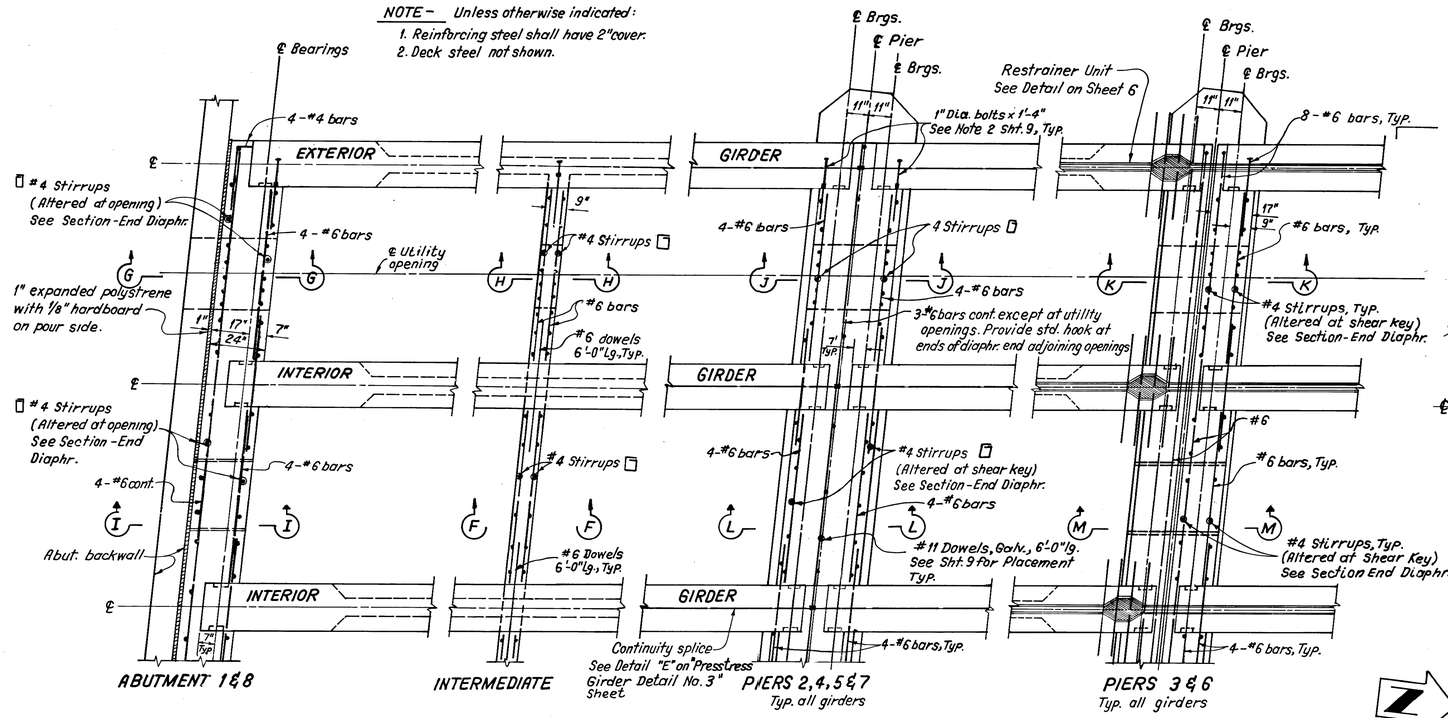
GIRDER DEFLECTIONS: (PRE-TENSION) FOR "X" = 4"

Time	Condition		Deflection
Initial	Prestress † D.L. Girder		- 1¾
3 months	Prestress † D.L. Girder		- 2¼
	D.L. Slab	½ pt.	+ 1½
		¼ pt.	+ 1⅛
	Prestress † D.L. Girder † D.L. Slab		- ¾
Final	Prestress † D.L. Girder † ⅔ D.L. Slab		- ⅞

A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

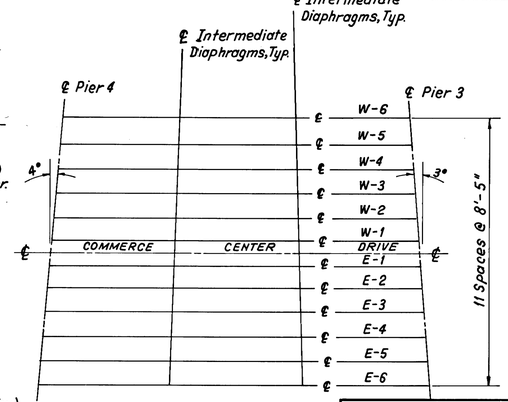
* Includes other dead loads.

NOTE - Unless otherwise indicated:
1. Reinforcing steel shall have 2" cover.
2. Deck steel not shown.



DIAPHRAGM PLAN

Scale: 3/8" = 1'-0"



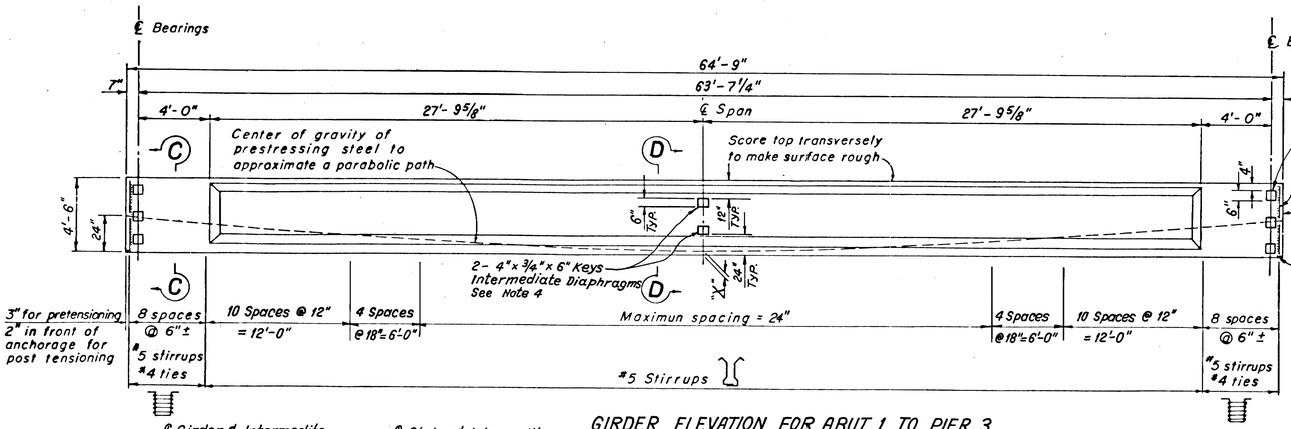
TYPICAL GIRDER FRAMING PLAN FOR SPAN 3-4

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42860 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	PRESTRESSED GIRDER DETAILS NO. 2
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO. 3794 JOB NO.
	SHT. 7 OF 15 DWG. NO. 614606

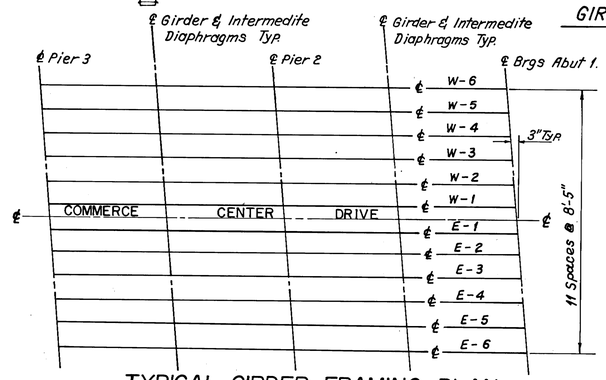
REVISIONS | CHECKED | DRAWN

K-E ALBUQUERQUE LA 4358



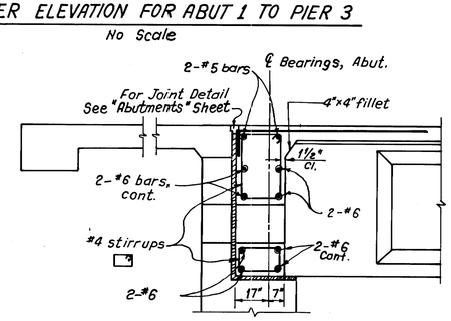
GIRDER ELEVATION FOR ABUT 1 TO PIER 3

No Scale



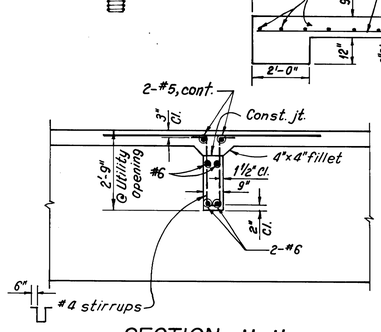
TYPICAL GIRDER FRAMING PLAN

No Scale



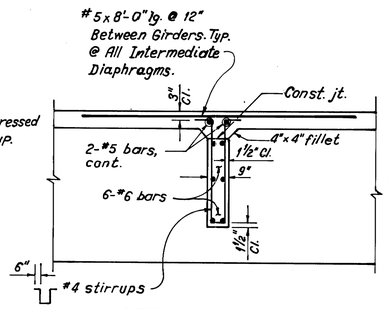
SECTION G-G

Scale: 3/8"=1'-0"



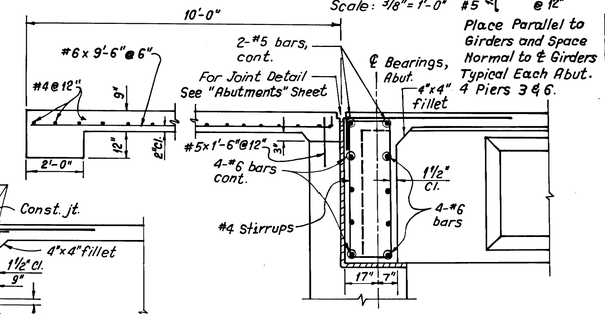
SECTION H-H

Scale: 3/8"=1'-0"



SECTION F-F

Scale: 3/8"=1'-0"



SECTION I-I

Scale: 3/8"=1'-0"

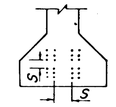
AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

CLEARANCES FOR PRETENSIONED STRANDS



1. Strands may be bundled in groups consisting of 3 vertically and 2 horizontally, and separated at the ends.
2. The minimum distance "S" between groups or individual strands is 1½" for ⅜" strands, 1¾" for 7/16" strands and 2" for ½" strands.
3. "S" is measured between centers of adjacent strands.
4. Any deviation shall be approved by the Engineer.

GIRDER PRESTRESSING NOTES FOR ABUT 1 TO PIER 3

"X"	DESIGN STRESSES	Post tension	Pretension
4"	P = Working force, lbs	370,000	390,000
8"		420,000	445,000
	Concrete strength, psi	f'c = 5,000	f'c = 5,000
		f'ci = 4,000	f'ci = 4,000

CONCRETE STRENGTH:

f'ci is at time of initial stressing. (force transfer to conc)
f'c is at 28 days.

WORKING FORCE:

The force remaining per girder after all losses.

CABLE PATH:

Where impractical to obtain cable path shown with a proposed prestressing system, it may vary within limits from 4" to 8" at ℄ girder and from 22" to 26" at the end of the girder subject to the approval of the Engineer. See Specs.

LOSSES:

The stress loss in prestressing steel due to shrinkage, creep, and sequence stressing shall be assumed to be;

pretension steel: 42,000 psi.
post tension steel: 32,000 psi.

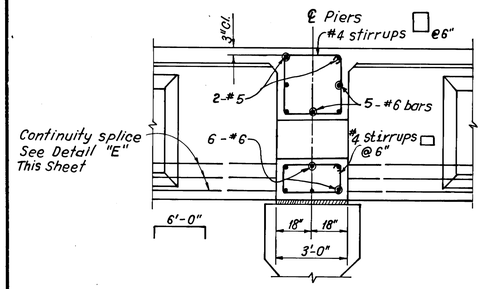
Provision shall be made for any other losses peculiar to the system of prestressing used.

GIRDER DEFLECTIONS: (PRE-TENSION) FOR "X"=4"

Time	Condition		Deflection
Initial	Prestress + D.L.Girder		- 5/8"
3 months	Prestress + D.L.Girder		- 3/4"
	D.L.Slab	½ pt.	+ ½"
		¼ pt.	+ 3/8"
	Prestress + D.L.Girder + D.L.Slab		- 5/8"
Final	Prestress + D.L.Girder + *D.L.Slab		-1/4"

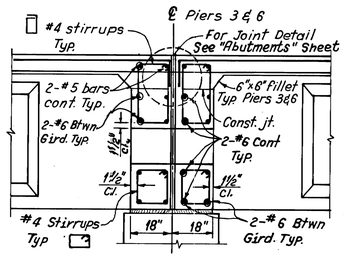
A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

* Includes other dead loads.



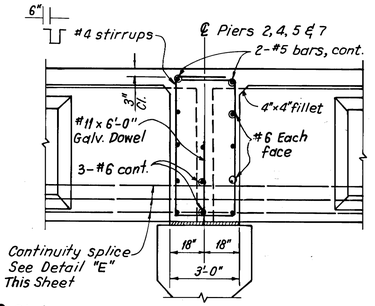
SECTION J-J

Scale: 3/8"=1'-0"



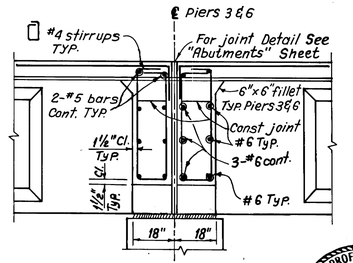
SECTION K-K

Scale: 3/8"=1'-0"



SECTION L-L

Scale: 3/8"=1'-0"



SECTION M-M

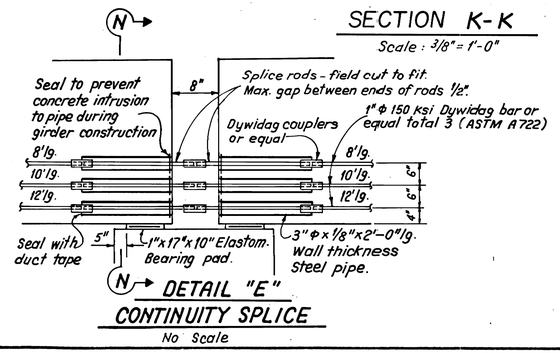
Scale: 3/8"=1'-0"

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 18280 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

NOTE: Contractor may propose alternative continuity splice assembly, subject to approval by the Engineer.

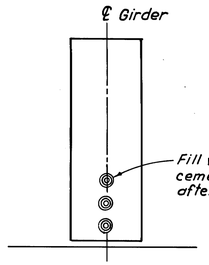
Pipes and rods to be securely wedged and braced in place to prevent displacement during girder concrete pour.

All threads to be oriented correctly.



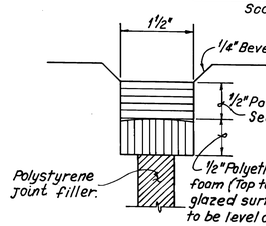
DETAIL "E" CONTINUITY SPLICE

No Scale



SECTION N-N

No Scale



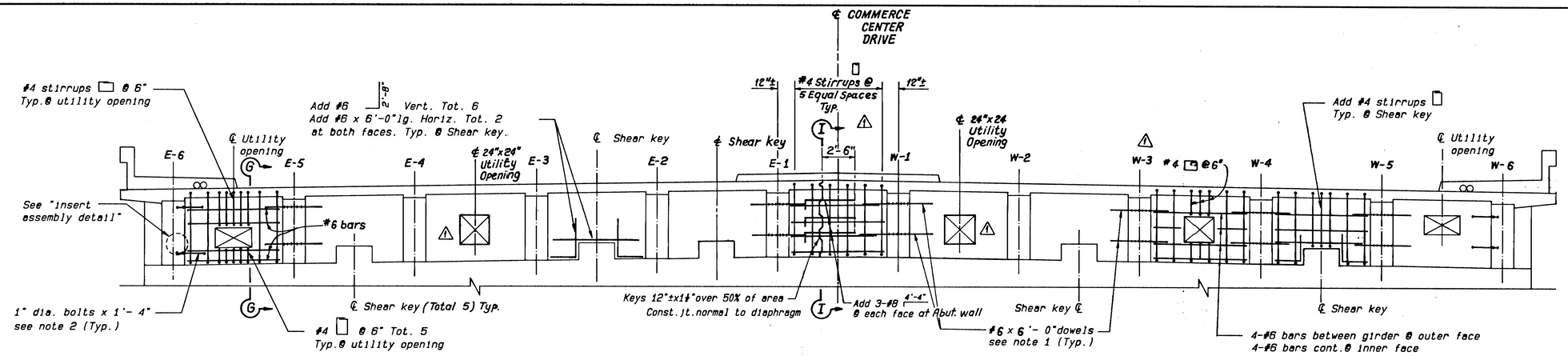
TYPE A SEAL

Full Scale

"PB614605"

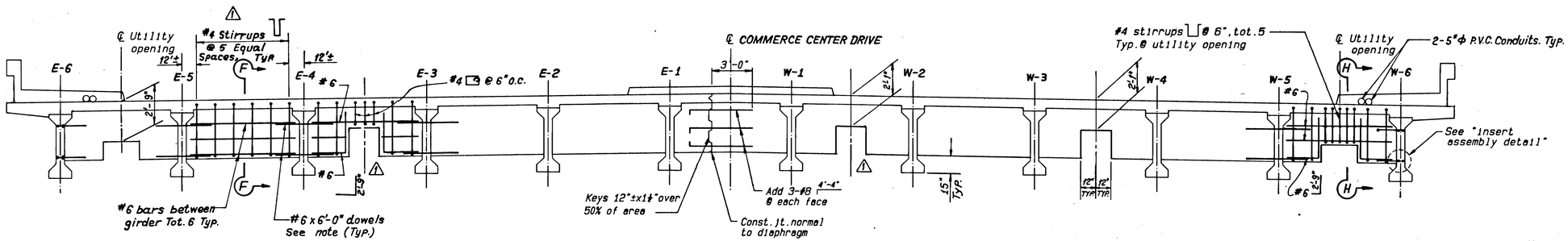
SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 9141	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	PRESTRESSED GIRDER DETAILS NO. 3
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED: Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO. 3794 JOB NO. SHT. 8 OF 15 DWG. NO. 614605

K-E



NORMAL SECTION - END DIAPHRAGM AT ABUT. 1 & 8

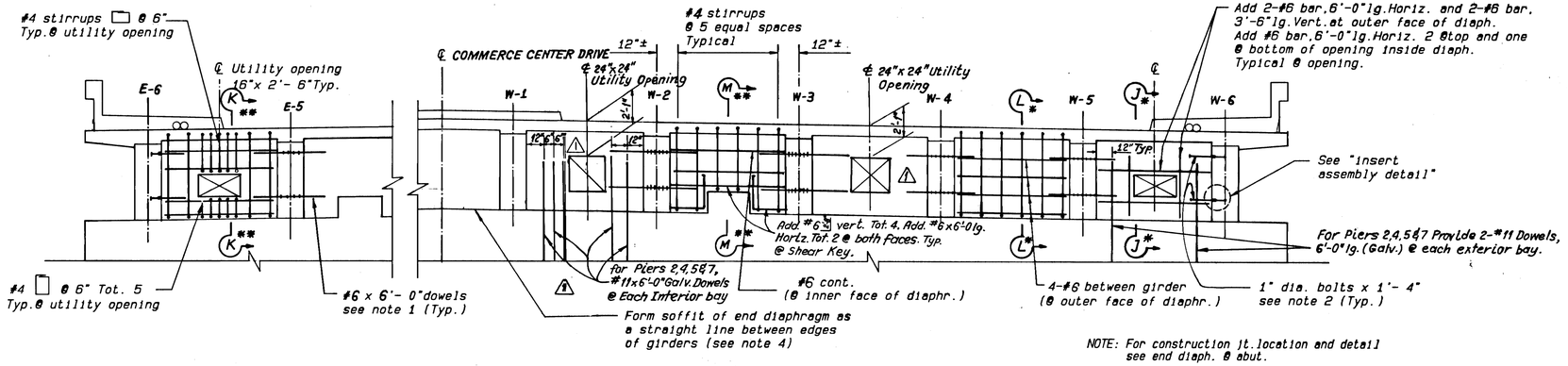
Scale : 1/4" = 1'- 0"



NORMAL SECTION - INTERMEDIATE DIAPHRAGM

Scale : 1/4" = 1'-0"

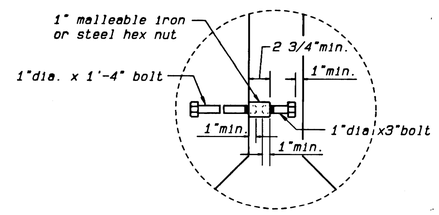
Note: For Joint Seal on Sidewalk at Abut. 1, Pier 3, Pier 6 and Abut. 8, See Caltrans Std. Plan B6-21.



NOTE: For construction jt. location and detail see end diaph. @ abut.

NORMAL SECTION - END DIAPHRAGM AT PIER

Scale : 1/4"= 1'-0"



INSERT ASSEMBLY DETAIL

No Scale

* @ Piers 2,4,5 & 7

** @ Piers 3 & 6

NOTES :

1. #6 x 6'-0" dowels placed through 1 1/2" dia. hole formed in girder, when diaphragms are continuous. Hole need not be grouted.
2. 1"dia. bolts x 1'-4" with insert assemblies when diaphragms are discontinuous. Bolts required for exterior girder.
3. Intermediate and end diaphragms are to be placed 5 days before placing deck.
4. This note certifies forming so as to prevent spalling problems of thin unreinforced concrete under girders.

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

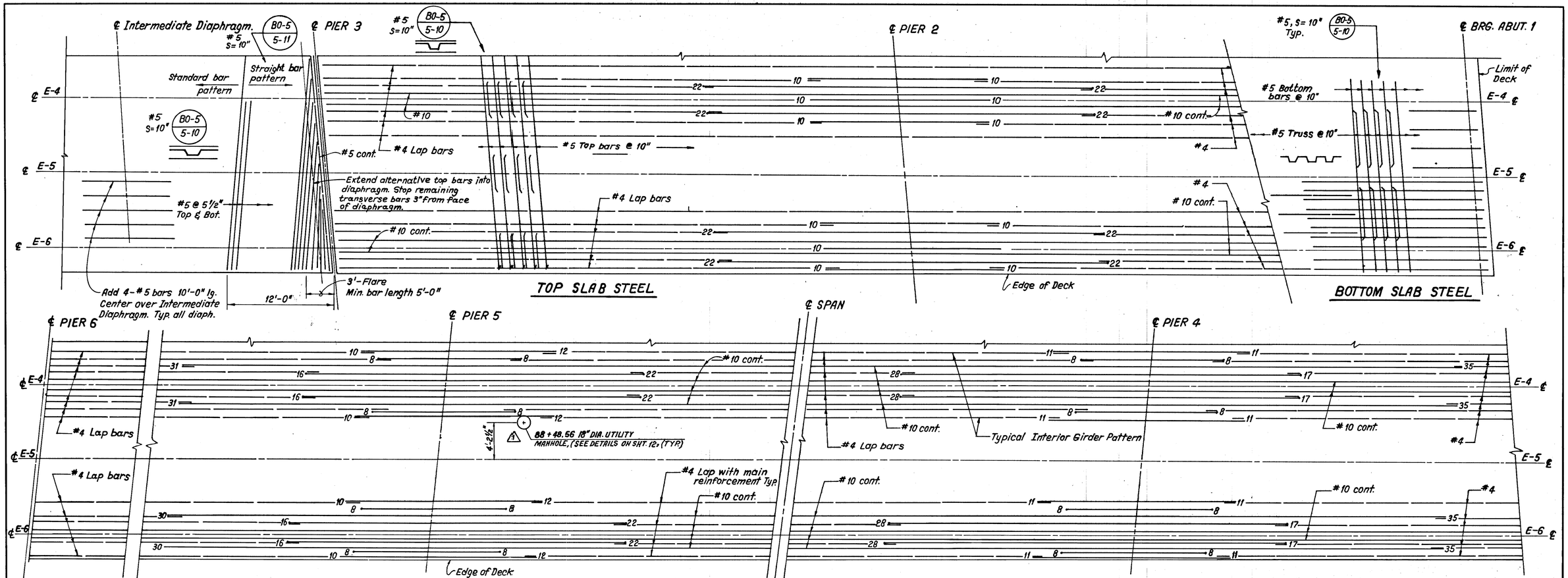
Resident Engineer: Zaven Abrahamian

No Changes

REGISTERED PROFESSIONAL ENGINEER — JORA SARKISSIAN — No. 52890 Exp. 3-31-98 — CIVIL — STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411 (818)787-8558	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	GIRDER DIAPHRAGMS
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 53794 PROJECT NO.: SHT.: 9 OF: 15 DWG. NO.: 614604

DRAWN	CHECKED	REVISIONS	⚠ ADDED UTILITY OPENING MODIFIED DOWEL SPACING OF UTILITY OPENING.



AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

NOTE - Unless otherwise indicated:

1. Grade 60 reinforcing steel shall be spliced as follows:
   a. Only one-half of the bars may be spliced within the required lap length.
   b. Minimum lap splices for No. 6 and smaller bars shall be 32 d No. 7, 8 and bars shall be 45 d and No. 10 and 11 bars shall be 60 d.
   c. Splice lengths shall be determined by the diameter, d of the smaller bar joined.
2. Type "A", "B" and "C" bar splices shall be staggered and identical splices of the same type bar shall be spaced at least 3'-0" apart.
3. Reinforcing steel shall have 2" cover.
4. Deck truss bends shall be 45°.
5. Premolded joint filler shall be fastened with 8d galvanized nails at 12" o.c. staggered.
6. For additional notes and details, see sheet No. 9.
7. All bars # 10. Unless otherwise noted.

Note: Splices for # 10 cont. bars shall be located 25' min. from ℄ piers.

Note: Numbers at ends of # 10 bars indicate distance from ℄ pier.

DECK PLAN

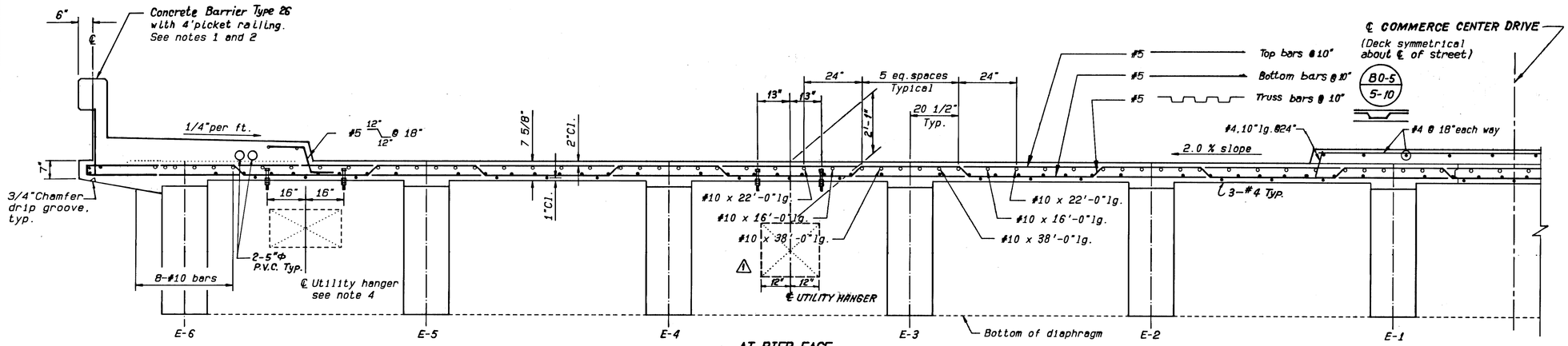
Scale: 3/16" = 1'-0"

SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550 91411	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	DECK DETAIL SHEET 1
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M Hennegar 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 3794 PROJECT NO.:
	SHT.: 10 OF: 15 DWG. NO.: 614603

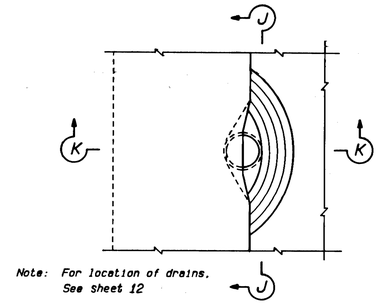
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614603"

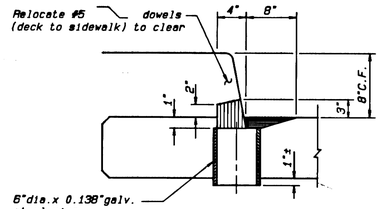
ADDED UTILITY MANHOLE LOCATION. | REVISIONS | CHECKED | DRAWN



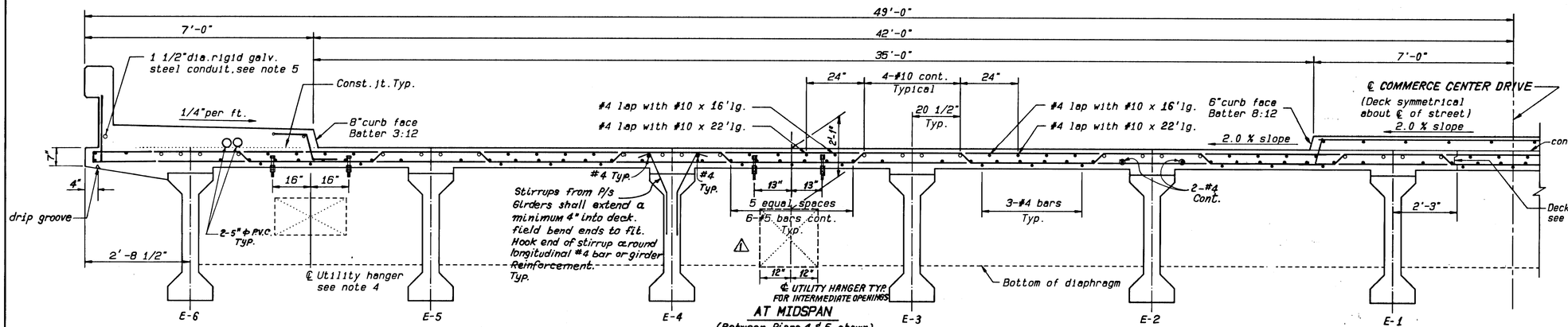
AT PIER FACE
(Pier 5 shown)



DECK DRAIN DETAIL
No Scale

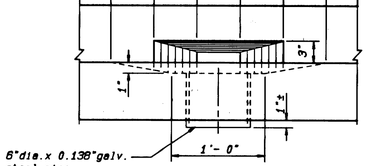


SECTION K-K
No Scale

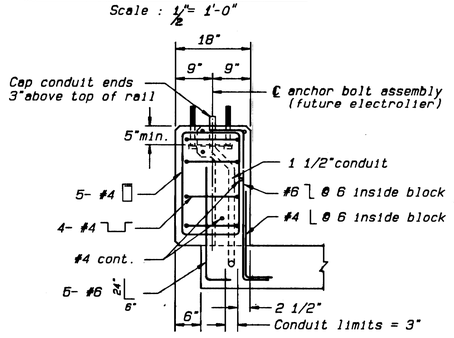


AT MIDSPAN
(Between Piers 4 & 5 shown)

TYPICAL CROSS SECTION
Scale : 1/2"= 1'-0"

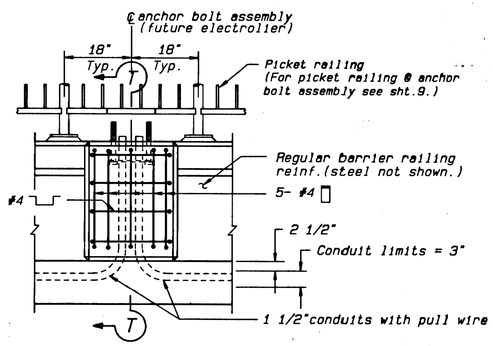


SECTION J-J
No Scale

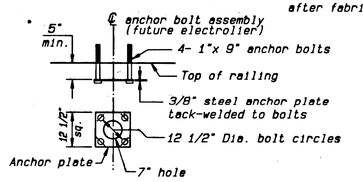


SECTION T-T

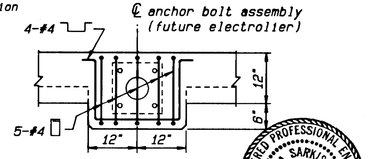
NOTE: Galvanize anchor bolt assembly after fabrication



ELEVATION



BASE DETAILS



PLAN

ANCHOR BOLT ASSEMBLY DETAILS
No Scale

NOTE – Unless otherwise indicated:

1. For Concrete Barrier Type 26, See Caltrans Std. Plan B11-54
2. For 4' picket railing, see L.A.C.D.P.W. Std. Plan 6102-0.
3. Where standard barrier railing expansion joints interfere with picket railing post spacing, joints may be relocated 9"from ℄ post.
4. Utility hangers shall consist of 1"dia.x 9"lg.bolts in pairs @ 10'±. Embed 5"in concrete. Bolt 1"-8UNC-2, thread 6". Furnish 2 nuts per bolt. All parts to be galvanized. See specs.
5. Provide 1 1/2"dia.rigid galvanized steel conduit with pull wire as shown on this plan. Provide expansion fittings at sidewalk joints and abutment per A.P.W.A. Std. Plan 465-0 in Specs.
6. For #5 pull box, see A.P.W.A. Std. Plan 460-0
7. For deck constr.jt, see CALTRANS std.plan B 0-5, bridge detail 5-2.

AS BUILT
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

DRAWN	CHECKED	REVISIONS	⚠ ADDED UTILITY HANGER AND OPENING LOCATIONS.

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
16236 BURBANK BLVD., VAN NUYS, CALIFORNIA 91413
(818)787-8550

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

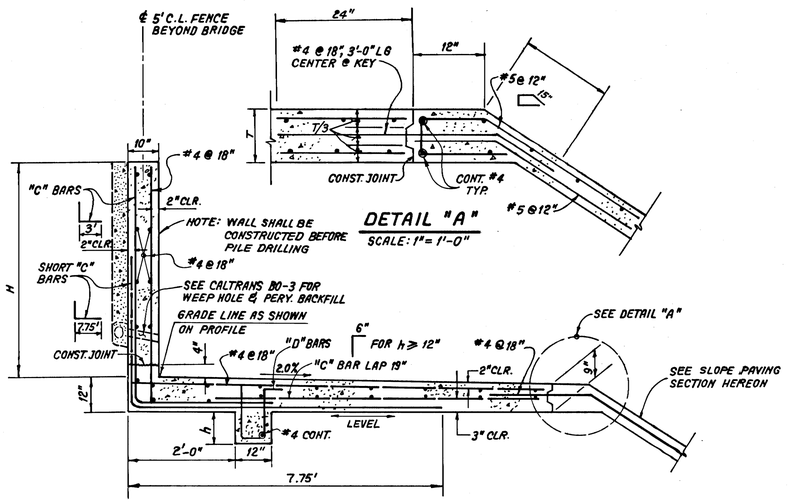
COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK
DECK DETAIL SHEET 2

REVIEWED
Steve M. Hennessey 11/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 11 OF: 15
DWG. NO.: 614602

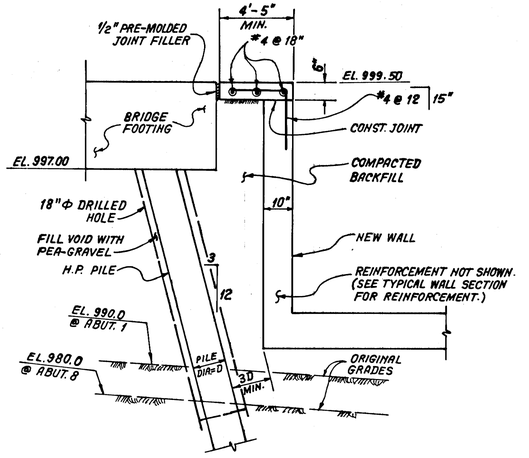
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 32890 Exp. 2-31-00 CIVIL STATE OF CALIFORNIA

PB614602



DETAIL "A"
SCALE: 1" = 1'-0"

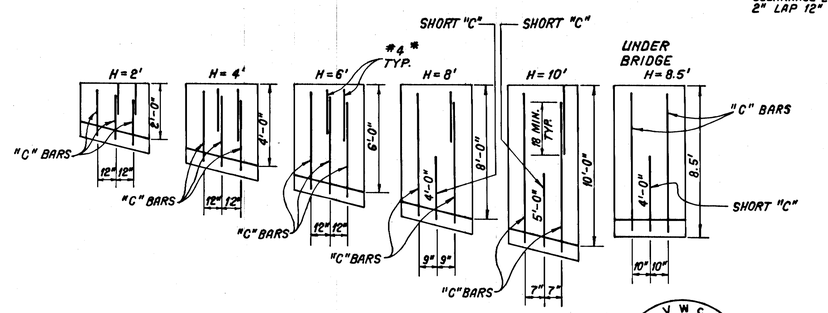
TYPICAL WALL SECTION
SCALE: 1/2" = 1'-0"



CAP CLOSURE UNDER BRIDGE
SCALE: 1/2" = 1'-0"

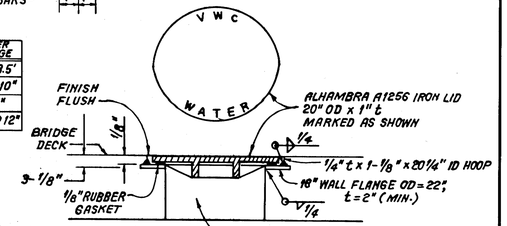
FIGURES AT TOP OF "C" BARS INDICATES DISTANCE FROM TOP OF FOOTING TO UPPER END OF "C" BARS

* * #4 EXTENSION BARS. PROVIDE WHENEVER CLEARANCE EXCEEDS 2" LAP 12"



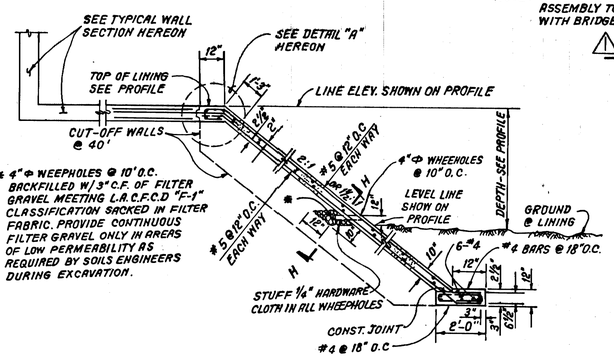
WALL REINFORCING BEYOND BRIDGE					
DESIGN H	2'	4'	6'	8'	10'
"C" BARS	#4 @ 12"	#4 @ 12"	#4 @ 12"	#5 @ 9"	#6 @ 7"
KEY DEPTH	-0-	6"	12"	18"	27"
"D" BARS	—	—	#4 @ 18"	#4 @ 12"	#5 @ 12"

UNDER BRIDGE
H=8.5'
#6 @ 10"
27"
#5 @ 12"



NOTE: SLEEVE AND FLANGE INSERT ASSEMBLY TO BE CAST INTEGRALLY WITH BRIDGE DECK.

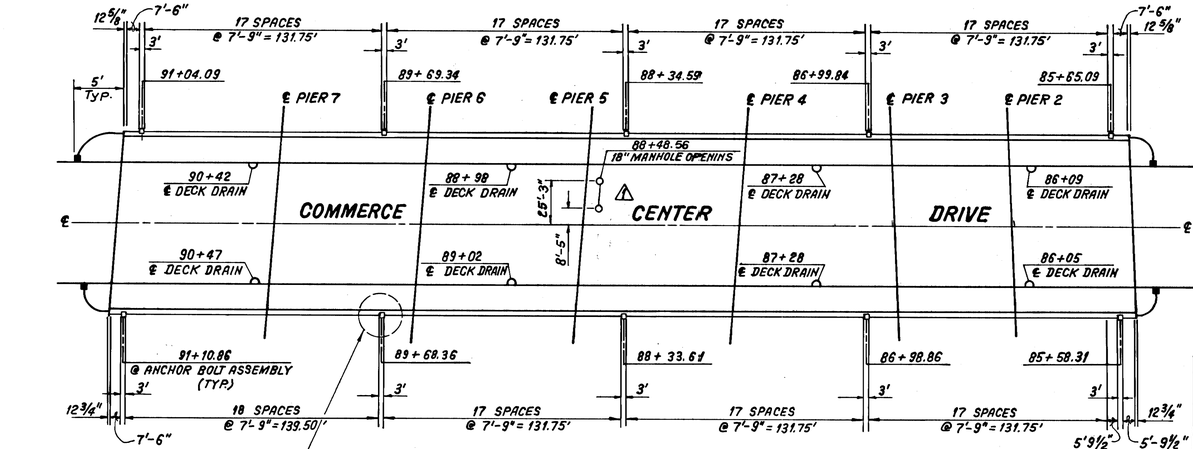
⚠ MANWAY DETAIL
NOT TO SCALE



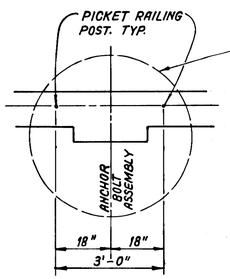
* 4"Φ WEEPHOLES @ 10' O.C. BACKFILLED W/ 3/4" C.F. OF FILTER GRAVEL MEETING L.A.C.F.C.D "F-1" CLASSIFICATION SACKED IN FILTER FABRIC. PROVIDE CONTINUOUS FILTER GRAVEL ONLY IN AREAS OF LOW PERMEABILITY AS REQUIRED BY SOILS ENGINEERS DURING EXCAVATION.

SECTION H-H EXPANSION JOINT
CUT-OFF WALL

NOTE: EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



DECK DRAIN LOCATIONS AND PICKET RAILING POST SPACING
SCALE: 1" = 40'

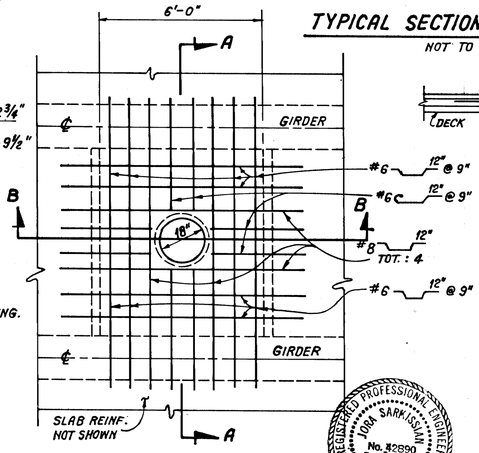


NOTE:

JOINTS SHALL BE PROVIDED IN THE BARRIER RAILINGS AT ABUT. 1, PIER 3, PIER 6 AND ABUT. 8 FOR EXPANSION AND CONTRACTION.
1/2" VERTICAL JOINTS SHALL BE PROVIDED IN THE BARRIER RAILINGS AT PIERS 2,4,5 AND 7.

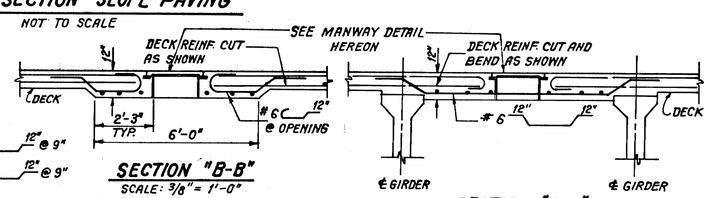
WALL CONSTRUCTION SEQUENCE

1. REMOVE 5' OF EXISTING SOIL.
2. CONSTRUCT AND COMPACT EMBANKMENT TO BOTTOM OF WALL FOOTING.
3. CONSTRUCT WALL.
4. CONSTRUCT AND COMPACT EMBANKMENT TO 6" ABOVE BOTTOM OF ABUTMENT FOOTING.
5. EXCAVATE TO BOTTOM OF ABUTMENT FOOTING 1 WEEK AFTER COMPLETION OF COMPACTED FILL PLACEMENT.
6. PRE-DRILL FOR PILES TO ORIGINAL GROUND LEVELS AND DRIVE PILES.
7. FILL VOID WITH PEA-GRAVEL AND CONSTRUCT ABUTMENT FOOTING.
8. CONTRACTOR MAY SUBMIT ALTERNATE CONSTRUCTION SEQUENCE FOR APPROVAL BY ENGINEER.



⚠ PLAN
SCALE: 3/8" = 1'-0"

TYPICAL SECTION - SLOPE PAVING
NOT TO SCALE



SECTION "B-B"
SCALE: 3/8" = 1'-0"

SECTION "A-A"
SCALE: 3/8" = 1'-0"

⚠ DECK REINFORCEMENT AT UTILITY OPENING
SCALE: 3/8" = 1'-0"

AS BUILT
Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42690 Exp. 2-31-02 CIVIL STATE OF CALIFORNIA

⚠ REVISIONS	CHECKED	DRAWN
ADDED DECK REINFORCEMENT FOR UTILITY OPENING AND ADDED LOCATION OF MANHOLES.		

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 MINNEHAHA BLVD., VAN NUYS, CALIFORNIA 91411 (818)787-6550	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN DRAWN BY: ALBERT GEVORKIAN PROJECT ENGINEER: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK MISCELLANEOUS DETAILS REVIEWED Steve M. Hennessee 11/24/17 STRUCTURAL SECTION DATE BRIDGE NO.: 3794 PROJECT NO.: SHT.: 12 OF: 15 DWG. NO.: 614601

"P86146011"

LOG OF BORING 89-025-F6 — BORING NO. WB-F1

SAMPLE DEPTH | BLOWS | PENE. FOOT | MOISTURE | COMPRESSION* | DRY DENSITY | WATER CONTENT** | DEPTH IN FEET | DESCRIPTION

SURFACE CONDITION: Northern side of Castaic Creek.

ELEVATION: 979

DEPTH IN FEET		DESCRIPTION
0	SP	SAND: Light brownish gray, slightly silty, gravelly, fine to very coarse
	SP/GP	SAND/GRAVEL: Change to tan, very gravelly, (mostly less than 1/2 inch) no silt
5		
10		
15		Gravel increase in size to mostly 1/2 to 1 inch, no cobbles
20		
25		
30		Average size of gravel 1/4 to 2 inches, sand alternating fine to medium with fine to very coarse in 6 to 48 inch layers
35		
40		3 inch silt layer

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
15	30/10"	13			124	
20	54+					
30	50+					

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
40	71+					
60	73+					
80	60+					

LOG OF BORING 89-025-F6 — BORING NO. WB-F1 (Cont'd)

DEPTH IN FEET		DESCRIPTION
40		Some cobbles 40 to 42 feet
45	SP	Decrease in gravel content
50	ML / SP/GP	SILT: Gray-brown SAND: Tan, very gravelly, fine to very coarse, occurs as 6 to 48 inch alternating layers of fine to medium at the top of each layer and grading down into very gravelly, medium to very coarse
55		
60		
65		
70		
75		
80		End of boring at 80 feet Water at 12 feet - no caving

LOG OF BORING 89-025-F6 — BORING NO. WB-F2

SAMPLE DEPTH | BLOWS | PENE. FOOT | MOISTURE | COMPRESSION* | DRY DENSITY | WATER CONTENT** | DEPTH IN FEET | DESCRIPTION

SURFACE CONDITION: Center of concrete batch plant access road

ELEVATION: 981

DEPTH IN FEET		DESCRIPTION
0	Af	FILL: 3/4 inch gravel cap with gravelly sand base
	SP	SAND: Light gray, gravelly, fine to very coarse, pebbles at 6 and 16 feet
5		
10		
15		
20	ML/CL	SILT/CLAY: Medium gray-brown, very clayey silt
25	SP	SAND: Light tan, gravelly, fine to coarse gravel, mostly less than 1 inch size
30	SP/GP	SAND/GRAVEL: Grades to very gravelly, fine to very coarse
35		
40	ML / SP/GP	SILT: Medium brown SAND: Tan, very gravelly, fine to very coarse

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
15	30	15			111	
20	38+					
30	48+					

LOG OF BORING 89-025-F6 — BORING NO. WB-F2 (Cont'd)

SAMPLE DEPTH | BLOWS | PENE. FOOT | MOISTURE | COMPRESSION* | DRY DENSITY | WATER CONTENT** | DEPTH IN FEET | DESCRIPTION

DEPTH IN FEET		DESCRIPTION
40		
45		
50		
55		
60	SP	SAND: Change to gravelly fine to medium, abundant mica
65		SAND: Tan, some fine gravel, abundant mica, fine to medium
70		Grades to gravelly
75	SP/GP	Grades to very gravelly, mostly less than 1/2 inch size
80	GP/SP	GRAVEL: Very sandy, mostly to 1/2 inch size and maximum of 1 inch Coarse gravel in sampler End of boring at 80 feet Water at 13 feet

SAMPLE DEPTH	BLOWS	PENE. FOOT	MOISTURE	COMPRESSION*	DRY DENSITY	WATER CONTENT**
40	73+					
60	71+					
80	130+					

* Percent
** Pounds per cubic foot
\+ SPT

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

REGISTERED PROFESSIONAL ENGINEER — JORA SARKISSIAN — No. 42890 Exp. 3-31-02 — CIVIL — STATE OF CALIFORNIA

REVISIONS | CHECKED | DRAWN

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

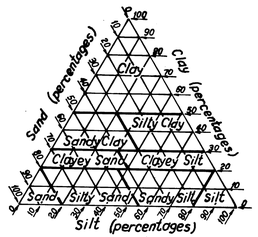


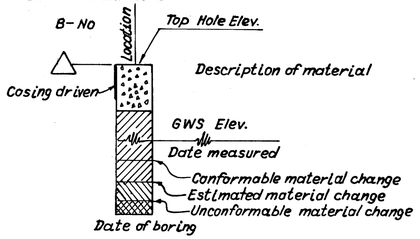
Diagram showing the basis for estimates of grade size distribution used in determination of class names.
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, via, "gravelly sand." The terms "coorse", "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

LEGEND OF EARTH MATERIALS

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

LEGEND OF BORING OPERATIONS

- Plan of any boring
- Rotary boring (wet)
- Auger boring (dry)
- Closed bottom bucker
- Test pit



SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
15239 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411
(818)787-8550

DESIGNED BY: JORA SARKISSIAN

DRAWN BY: ALBERT GEVORKIAN

PROJECT ENGINEER: JORA SARKISSIAN

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK

LOG OF TEST BORINGS SHT. 1

REVIEWED: Steve M. Hennessee 11/24/97
STRUCTURAL SECTION — DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 13 OF: 15
DWG. NO.: 614600

PB614600

LOG OF BORING 89-025-F6 — BORING NO. WB-F3

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
5		13		5.4		118	
15		23+					
25		100+					
35		63+					

DEPTH	IN FEET	DESCRIPTION
0		SURFACE CONDITION: Plowed field, proposed bridge abutment
		ELEVATION: 990
	SM	SAND: Light grayish brown, very silty, gravelly, fine to very coarse gap graded
	SP	Grades to no silt
5		
	SP/GP	Grades to very gravelly
10		
	SP	Change to less gravel
15		
20		
	SP/GP	Increase in 1/2 to 1 inch size gravel content
25		2 inches of 3/4 inch gravel recovered in sampler
30		
35	GP/SP	Increase in gravel content, size mostly less than 2 inches
40		Some caving at 38 to 40 feet depth

LOG OF BORING 89-025-F6 — BORING NO. WB-F3 (Cont'd)

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
		50	68+				
		65	106+				

DEPTH	IN FEET	DESCRIPTION
40		Some coarse gravel 40 to 46 feet
45		
	SP/GP	SAND/GRAVEL: Increase in fine to medium sand
50		Some coarse gravel
	GP/SP	GRAVEL/SAND: Increase in gravel, some cobbles
55		6 inch silt layer
60	SP	SAND: Change to gravelly, fine to coarse
65		End of boring at 65 feet Water at 21 feet - Caving at 38 to 40 feet
70		
75		
80		

LOG OF BORING 89-025-F6 — BORING NO. WB-F4

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
5		35		8		122	
15		59+					
25		39+					
35		51+					

DEPTH	IN FEET	DESCRIPTION
0		SURFACE CONDITION: Edge of plowed field, southern abutment of Backer Road Bridge over Castaic Creek
		ELEVATION: 986
	SM	SAND: Light brown to tan, silty, some gravel, fine to coarse gap graded
	SP	No silt, change to gravelly
5		
	SP/GP	SAND/GRAVEL: Change to very gravelly
10		
15		Sampler contained 2 inches of 1/2 to 3/4 inch size gravel, bit plugged by 2 inch gravel
20		
	SP	Change to less gravel
25		
30		Gravel confined to a few thin sandy gravel layers
35		
40		

LOG OF BORING 89-025-F6 — BORING NO. WB-F4 (Cont'd)

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT	DRY DEN	WASH
		45	82+				
		65	106+				

DEPTH	IN FEET	DESCRIPTION
40		
	SP/GP	SAND/GRAVEL: Grades to very gravelly
	SP	SAND: Change to gravel in thin layers separated by 1 to 4 foot layers of fine to coarse sand
45		
50		Change to some disseminated gravel
55		
	SP/GP	SAND/GRAVEL: Grading more gravel
60	SP	SAND: Less gravel
	SP/GP	SAND/GRAVEL: Change to very gravelly
	ML	SILT: Grayish-brown
	SP/GP	SAND: Tan, very gravelly, fine to very coarse
65		End of boring at 65 feet Water at 18 feet - no caving
70		
75		
80		

* Percent
** Pounds per cubic foot
\+ SPT

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

REVISIONS | CHECKED | DRAWN

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
16230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91406
(818)787-8550

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

DESIGNED BY: JORA SARKISSIAN

DRAWN BY: ALBERT GEVORKIAN

PROJECT ENGINEER: JORA SARKISSIAN

COMMERCE CENTER DRIVE OVER CASTAIC CREEK

LOG OF TEST BORINGS SHT. 2

REVIEWED

Steve M. Hennessee 11/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 14 OF: 15
DWG. NO.: 614599

LOG OF BORING 89-025-F6 BORING NO. WB-F5

SAMPLE	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY UNIT**	WET UNIT**	DEPTH	IN FEET	DESCRIPTION
										SURFACE CONDITION: Located in center of road ELEVATION: 980
									0	
									Af	FILL: Road surfaced with 3/4 inch gravel, base is locally derived sand and gravel
									SP	SAND: Tan, gravelly, fine to very coarse, graded layers 1 to 4 feet thick
									5	
									10	
									15	
									20	

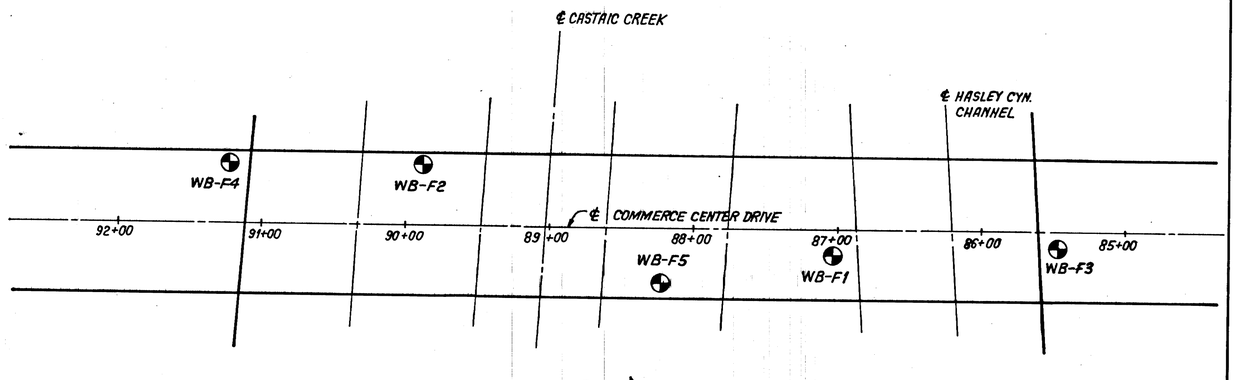
LOG OF BORING 89-025-F6 BORING NO. WB-F5

SAMPLE	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY UNIT**	WET UNIT**	DEPTH	IN FEET	DESCRIPTION
									40	Grades to gravelly
									45	
									ML	SILT: Medium brown
									SP	SAND: Tan, gravelly, fine to very coarse, weakly graded layers to 4 feet
									50	
									55	
60		64+							60	End of boring at 60 feet Water at 12 feet - no caving

LOG OF BORING 89-025-F6 BORING NO. WB-F5 (Cont'd)

SAMPLE	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY UNIT**	WET UNIT**	DEPTH	IN FEET	DESCRIPTION
20		30		12		115			20	
									ML	SILT: Reddish brown, clayey silt
									25	
									SP	SAND: Tan, gravelly to very gravelly, fine to very coarse in graded 1 to 5 foot layers
30		56+							30	
									35	
									GP/SP	GRAVEL/SAND: Change to cobbley, fine to medium
40		53+							SP 40	SAND: Change to minor gravel

* Percent
** Pounds per cubic foot
\+ SPT



APPROXIMATE LOCATION OF BORINGS
SCALE: 1"=50'

GEOTECHNICAL INVESTIGATION
CONDUCTED BY

R.T. FRANKIAN AND ASSOCIATES
234 SOUTH BUENA VISTA STREET
P.O. BOX 7762
BURBANK, CALIFORNIA 91510-7762

AS BUILT

Date: 1-26-01 Corrections by: G. Pereda
Resident Engineer: Zaven Abrahamian
No Changes

PB614598

REVISIONS | DRAWN | CHECKED

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
15250 VENTURA BLVD., VAN NUYS, CALIFORNIA
(818)787-8550 91411

DESIGNED BY: JORA SARKISSIAN
DRAWN BY: ALBERT GEVORKIAN
PROJECT ENGINEER: JORA SARKISSIAN

REGISTERED PROFESSIONAL ENGINEER — JORA SARKISSIAN — No. 42890 Exp. 3-31-00 — CIVIL — STATE OF CALIFORNIA

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK

LOG OF TEST BORINGS SHT. 3

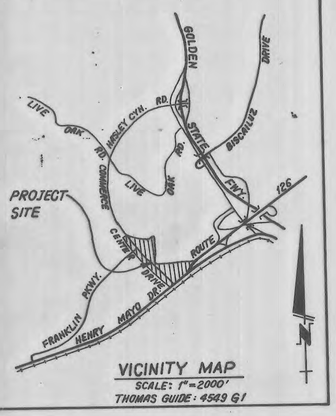
REVIEWED
Steve M. Hennessee 1/24/97
STRUCTURAL SECTION DATE

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 15 OF: 15
DWG. NO.: 614598

PACE
Advanced Water Engineering

Appendix G – As-Built Drawings Flow Diversion Berm

STORM DRAIN PLANS IN
D.S. No.485 P.D. No.2298 (UNIT III)



VICINITY MAP
SCALE: 1"=2000'
THOMAS GUIDE: 4549 G1

NPDES NOTES

ATTACHMENT A

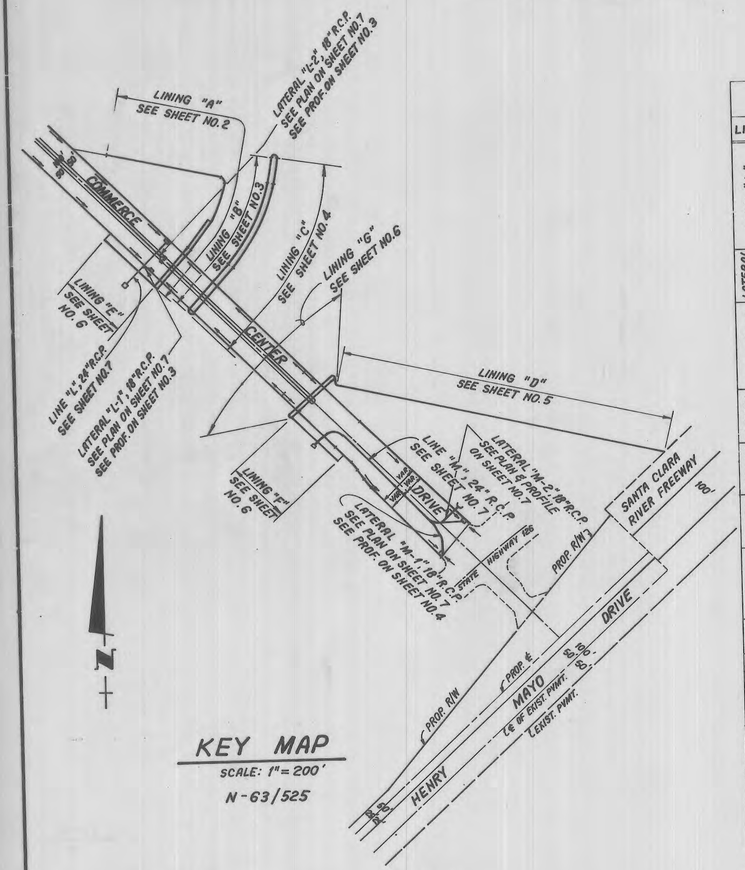
BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES*

The following is intended as an attachment for construction and grading plans and represent the minimum standards of good housekeeping which must be implemented on all construction sites regardless of size.

- ☐ Eroded sediments and other pollutants must be retained on site and may not be transported from the site via sheetflow, swales, area drains, natural drainage courses or wind.
- ☐ Stockpiles of earth and other construction related materials must be protected from being transported from the site by the forces of wind or water.
- ☐ Fuels, oils, solvents and other toxic materials must be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protected from the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system.
- ☐ Excess or waste concrete may not be washed into the public way or any other drainage system. Provisions shall be made to retain concrete wastes on site until they can be disposed of as solid waste.
- ☐ Trash and construction related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.
- ☐ Sediments and other materials may not be tracked from the site by vehicle traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental depositions must be swept up immediately and may not be washed down by rain or other means.
- ☐ Any slopes with disturbed soils or denuded of vegetation must be stabilized so as to inhibit erosion by wind and water.
- ☐ Other_____

B. The following BMPs as outlined in, but not limited to, the Best Management Practice Handbook, California Stormwater Quality Task Force, Sacramento, California, 1993, or the latest revised edition, may apply during construction (additional measures may be required if deemed appropriate by County):

CA001 - DEWATERING OPERATIONS
CA002 - PAVING OPERATIONS
CA003 - STRUCTURE CONSTRUCTION AND PAINTING
CA010 - MATERIAL DELIVERY AND STORAGE
CA012 - SPILL PREVENTION AND CONTROL
CA020 - SOLID WASTE MANAGEMENT
CA021 - HAZARDOUS WASTE MANAGEMENT
CA023 - CONCRETE WASTE MANAGEMENT
CA030 - VEHICLE AND EQUIPMENT CLEANING
CA031 - VEHICLE AND EQUIPMENT FUELING
CA032 - VEHICLE AND EQUIPMENT MAINTENANCE
CA040 - EMPLOYEE/SUBCONTRACTOR TRAINING
ESC01 - SCHEDULING
ESC02 - PRESERVATION OF EXISTING VEGETATION
ESC10 - SEEDING AND PLANTING
ESC11 - MULCHING
ESC20 - GEOTEXTILES AND MATS
ESC21 - DUST CONTROLS
ESC22 - TEMPORARY STREAM CROSSING
ESC23 - CONSTRUCTION ROAD STABILIZATION
ESC24 - STABILIZED CONSTRUCTION ENTRANCE
ESC30 - EARTH DIKE
ESC31 - TEMPORARY DRAINS AND SWALES
ESC32 - SLOPE DRAIN
ESC40 - OUTLET PROTECTION
ESC41 - CHECK DAMS
ESC50 - SILT FENCE
ESC51 - STRAW BALE BARRIERS
ESC52 - SAND BAG BARRIER
ESC53 - BRUSH OR ROCK FILTER
ESC54 - STORM DRAIN INLET PROTECTION



KEY MAP
SCALE: 1"=200'
N-63/525

HYDRAULIC ELEMENTS

LINE	STATION	Q_{50} IN C.F.S	SECTION	S.F.	VELOCITY IN FT./SEC.	DEPTH IN FEET
LINE "L"	5+14.00 TO 5+35.00	12.0	24"R.C.P	0.3225	12.7	0.61
	5+35.00 TO 5+50.00	6.0	24"R.C.P	0.3225	16.8	0.70
	5+50.00 TO 6+37.00	6.0	24"R.C.P	0.0100	5.9	0.89
LATERAL "L-1"	1+02.00 TO 1+35.60	6.0	18" R.C.P	0.1601	15.5	0.95
LINE "M"	4+98.50 TO 5+37.08	10.0	24" R.C.P	0.0020	3.18	9.00'
	5+37.08 TO 9+33.42	10.0	24" R.C.P	0.0020	3.18	7.17'
	9+33.42 TO 10+44.18	5.0	24" R.C.P	0.0004	1.75	4.76'
LATERAL "M-1"	1+02.00 TO 2+01.91	5.0	18" R.C.P	0.0023	2.83	4.51
LATERAL "M-2"	1+01.41 TO 1+34.59	NGL.	18" R.C.P	—	—	—
LATERAL "L-2"	1+01.00 TO 1+22.75	NGL.	18" R.C.P	—	—	—
CASTAIC CREEK	BEGINNING TO END OF LININGS C,D,F & G	50.700	NATURAL CHANNEL WITH 1½:1 SIDE SLOPES	0.0188	10.81	14.9
HASLEY CYN. CREEK	BEGINNING TO END OF LINING E		NATURAL CHANNEL WITH 1½:1 SIDE SLOPES			
	BEGINNING TO STA 10+50.00	50.700		0.0188	10.81	14.9
	LININGS A & B	9.700	NATURAL CHANNEL WITH 1½:1 SIDE SLOPES			
	STA. 10+50.00 TO END OF LININGS A & B			0.0272	6.89	4.4

NGL.- NEGLIGIBLE

NO.	REVISION	REVISED BY	APPROVED BY	DATE

BENCH MARK CL 3976
LACRD BM
RDBM TAG IN C.B. 4 FT. N. B.C.R. TO FT. N.
AND 32 FT. E. CL INT. OLD ROAD AND
HASLEY CYN. ROAD OFF-RAMP

NEWHALL QUAD (1983) ELEV. 1065.685

GENERAL NOTES(Cont'd)

21. ALL BACKFILL AND FILLS OUTSIDE OF STREET RIGHT OF WAY SHALL BE COMPACTED TO 90% OF MAXIMUM DENSITY AS DETERMINED BY A.S.T.M. SOIL COMPACTION TEST D1557-78 METHOD "D" UNLESS OTHERWISE SPECIFIED. THIS SHALL BE CERTIFIED BY A GEOTECHNICAL ENGINEER. THE CERTIFICATION SHALL BE SUBMITTED TO THE DIRECTOR OF PUBLIC WORKS PRIOR TO ACCEPTANCE OF WORK BY THE COUNTY.

22. ALL BACKFILL AND FILLS WITHIN STREET RIGHT OF WAY SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 306-1.3.4 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED AND INSPECTED BY THE DEPARTMENT. CONTRACTOR SHALL NOTIFY THE INSPECTOR AT LEAST 24 HOURS IN ADVANCE FOR SOIL TESTING AS REQUIRED BY THE INSPECTOR.

23. PIPE BEDDING SHALL BE:
IN ACCORDANCE WITH LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS STANDARD DRAWING NO 3092 UNLESS OTHERWISE NOTED. THE BEDDING MATERIAL PLACED FROM THE BOTTOM OF THE PIPE TO 1 FOOT OVER THE TOP OF THE PIPE SHALL BE SAND, CRUSHED AGGREGATE, OR NATIVE FREE-DRAINING GRANULAR MATERIAL AND SHALL HAVE A SAND EQUIVALENT OF 20 OR GREATER.

24. PIPE SHALL BE EMBEDDED 5 INCHES INTO ALL STRUCTURES INCLUDING INLET AND OUTLET HEADWALLS, UNLESS OTHERWISE SPECIFIED.

25. UNLESS OTHERWISE SPECIFIED IN THE PROFILE ON THESE PLANS, THE PIPE SHALL BE MANUFACTURED WITH A MINIMUM CONCRETE COVER OVER THE STEEL IN THE INVERT OF 0.75 INCHES FOR R.C.P. UP TO 96 INCHES IN DIAMETER AND 1.25 INCHES FOR PIPE GREATER THAN 96 INCHES IN DIAMETER.

26. ALL CATCH BASINS WITHIN THE DEDICATED STREET RIGHTS-OF-WAY SHALL BE CONSTRUCTED PER THE STREET PLANS.

27. THE CONTRACTOR SHALL PROVIDE TO THE SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS A SYSTEM FOR CONTRIBUTORY DRAINAGE TO BE OPERABLE AT ALL TIMES UNTIL THIS STORM DRAIN SYSTEM IS ACCEPTED FOR MAINTENANCE. THIS MAY HAVE TO BE DESIGNED BY A CIVIL ENGINEER.

28. ALL REFERENCES ON THIS PLAN TO THE COUNTY ENGINEER, ROAD DEPARTMENT, OR FLOOD CONTROL DISTRICT SHALL APPLY TO THE APPROPRIATE ELEMENTS OF THE DEPARTMENT OF PUBLIC WORKS.

29. EXISTING UTILITIES SHALL BE MAINTAINED IN PLACE BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.

30. WHERE THE UTILITIES ARE INDICATED ON THE DRAWINGS TO BE SUPPORTED, SAID SUPPORTS SHALL BE IN ACCORDANCE WITH STANDARD PLANS FOR CONSTRUCTION NO. 224, UNLESS OTHERWISE INDICATED.

31. ALL OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES SHALL BE SEALED WITH 8 INCHES OF BRICK AND MORTAR OR 6 INCHES OF CONCRETE, UNLESS OTHERWISE SHOWN.

32. MANHOLES NO.1,2,3, AND 4, SHALL USE THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION NO. 630 FOR THE "FRAME AND COVER" AND NO 635 FOR THE "STANDARD DROP STEP".

33. THIS STORM DRAIN WILL NOT BE ACCEPTED FOR MAINTENANCE UNTIL THE STREETS HAVE BEEN PAVED. MANHOLES BROUGHT TO GRADE AND THE SYSTEM CLEANED TO SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS.

34. THE LATEST REVISED STANDARD PLAN OR DRAWING SHALL BE USED UNLES OTHERWISE SPECIFICALLY NOTED.

35. A NPDES PERMIT FROM THE REGIONAL WATER QUALITY CONTROL BOARD IS REQUIRED BEFORE ANY DISCHARGE OF NON-STORM WATER INTO THE STORM DRAIN IS ALLOWED.

LIST OF STANDARDS

	L.A.C.D.P.W.	A.P.W.A.
1. M.H. NO.1	PER	(321-0)
2. CURB OPENING CATCH BASIN	PER	300-0
3. STANDARD M.H. SHAFT	PER	(324-0)
4. M.H. FRAME AND COVER	PER	630-0
5. STEEL STEP	PER	635-0
6. C.B. MANHOLE FRAME AND COVER	PER	312-0
7. C.B. REINFORCEMENT	PER	309-0
8. MONOLITHIC C.B. CONNECTION	PER	308-0
9. C.B. FACE PLATE ASSEMBLY		
10. AND PROTECTION BAR	PER	310-0
11. FRAME AND GRATING FOR C.B.	PER	311-0
12. LOCAL DEPRESSION AT C.B.	PER	313-0
13. J.S. NO.2	PER	(331-0)
14. CHAIN LINK FENCE AND GATES	PER	600-0
15. PIPE BEDDING	PER	3092-0
16. SAFETY REQUIREMENTS	PER	6008-0
17. CONCRETE COLLAR	PER	380-1

GENERAL NOTES:

1. A PERMIT SHALL BE OBTAINED AND A DEPOSIT PAID TO THE DEPARTMENT OF PUBLIC WORKS AT THE PERMIT COUNTER, 900 SOUTH FREMONT AVENUE 8-TH FLOOR, ALHAMBRA AT LEAST 72 HOURS PRIOR TO STARTING WORK UNDER THIS CONTRACT. COPIES OF ALL OTHER REQUIRED PERMITS, SUCH AS FLOOD CONTROL DISTRICT AND ROAD EXCAVATION, MUST BE FILED WITH THE PERMIT APPLICATION.
2. WHEN WORK IS WITHIN A CONTRACT CITY, THE CONTRACTOR MUST CONTACT THE DIRECTOR OF PUBLIC WORKS OF THAT CITY TO DETERMINE THE LOCATION TO PAY THE INSPECTION DEPOSIT.
3. THE CONTRACTOR SHALL CONTACT THE DISTRICT OFFICE LISTED AT THE "APPLICATION FOR STORM DRAIN CONSTRUCTION INSPECTION FORM 1" TO ARRANGE FOR AN ACCEPTABLE CONSTRUCTION START DATE.
4. APPROVAL OF THIS PLAN BY THE COUNTY OF LOS ANGELES DOES NOT CONSTITUTE A REPRESENTATION TO THE ACCURACY OF THE LOCATION, OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THIS NOTE APPLIES TO ALL SHEETS.
5. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION". INCLUDING SUPPLEMENTS AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE DIRECTOR OF PUBLIC WORKS.
6. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 7-10.4.1 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION IN REGARD TO SAFETY ORDERS AND SHALL CONFORM TO THE "MINIMUM PUBLIC SAFETY REQUIREMENTS" AS SHOWN IN LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS STD. 6008-0.
7. ELEVATIONS ARE IN FEET ABOVE U.S.C. & G.S. MEAN SEA LEVEL DATUM OF 1929, UNLESS OTHERWISE INDICATED.
8. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAVE BEEN PLACED, INSPECTED AND APPROVED.
9. ALL STRUCTURAL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH AN ULTIMATE 28 DAY COMPRESSIVE STRENGTH OF 4000 p.s.i. UNLESS OTHERWISE NOTED.
10. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES (OR RADIAL) TO THE CONDUIT CENTER LINE EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
11. ALL STEEL ADJACENT TO FACE OF CONCRETE SHALL HAVE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
12. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL, PER A.S.T.M. A-615-GRADE 60.
13. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE "MANUAL OF STANDARD PRACTICE".
14. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER LINE OF STEEL UNLESS OTHERWISE NOTED.
15. ALL STEEL THAT IS TO BE CONTINUOUS SHALL HAVE A MINIMUN LAP OF 30 BAR DIAMETERS OR 18" WHICHEVER IS GREATER.
16. ALL CONSTRUCTION JOINTS IN THE FOOTING OF SLABS AND WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
17. ALL EXPOSED EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
18. UNLESS OTHERWISE SHOWN, CONCRETE DIMENSIONS SHALL BE MEASURED VERTICALLY OR HORIZONTALLY AND AND PARALLEL OR AT RIGHT ANGLES (OR RADIAL) TO THE CENTER LINE OF CONSTRUCTION.
19. CONCRETE BACKFILL IS REQUIRED WHEN THE THE PIPE HAS LESS THAN ONE FOOT OF COVER. THE CONCRETE BACKFILL SHALL CONSIST OF 1:3:5 MIX, PORTLAND CEMENT CONCRETE POURED FROM WALL TO WALL OF TRENCH AND FROM BOTTOM OF TRENCH TO A MINIMUM OF 4 INCHES OVER THE TOP OF THE PIPE.
20. ALL PIPES SHALL BE PLACED IN TRENCH IN NATURAL GROUND AND/OR COMPACTED FILL. THE GROUND LEVEL BEFORE THE TRENCHING SHALL BE AT LEAST 3 FEET ABOVE THE TOP OF THE PIPE ELEVATION, OR AT FINISH SURFACE ELEVATION, WHICHEVER IS LESS. ALL BACKFILLS IN EASEMENTS SHALL BE COMPACTED TO THE DENSITY REQUIRED BY THE GRADING PLAN.

RIPRAP NOTES

1. ROCKS FOR GROUTED RIPRAP SHALL BE GOOD QUALITY RIVER RUN ROCK. THE SMALLEST DIMENSIONS SHALL EXCEED 6 INCHES AND THE LARGEST DIMENSION SHALL NOT EXCEED 24 INCHES. THE LARGEST DIMENSION SHALL NOT EXCEED 4 TIMES THE SMALLEST DIMENSION.
2. THERE SHALL BE A GROUT BED OF AT LEAST 2 INCHES BENEATH THE FIRST LAYER OF ROCK. ALL THE VOIDS BETWEEN THE ROCKS SHALL BE FILLED WITH GROUT. MAXIMUM SPACING BETWEEN ROCKS SHALL BE 2 INCHES.
3. SURFACE ROCKS SHALL BE IMBEDDED FROM 1/2 TO 2/3 OF THEIR MAXIMUM DIMENSION.

NOTE: CONCRETE MAY BE SUBSTITUTED FOR THE GROUT.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED CIVIL ENGINEER No. 42690 _____ DATE _____

Exp. 12-31-98 — REGISTERED CIVIL ENGINEER — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — JOHN SAARKISSIAN — No. 42690 Exp. 3-31-98 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
SIGNATURE: _____ R.C.E. NO 42690

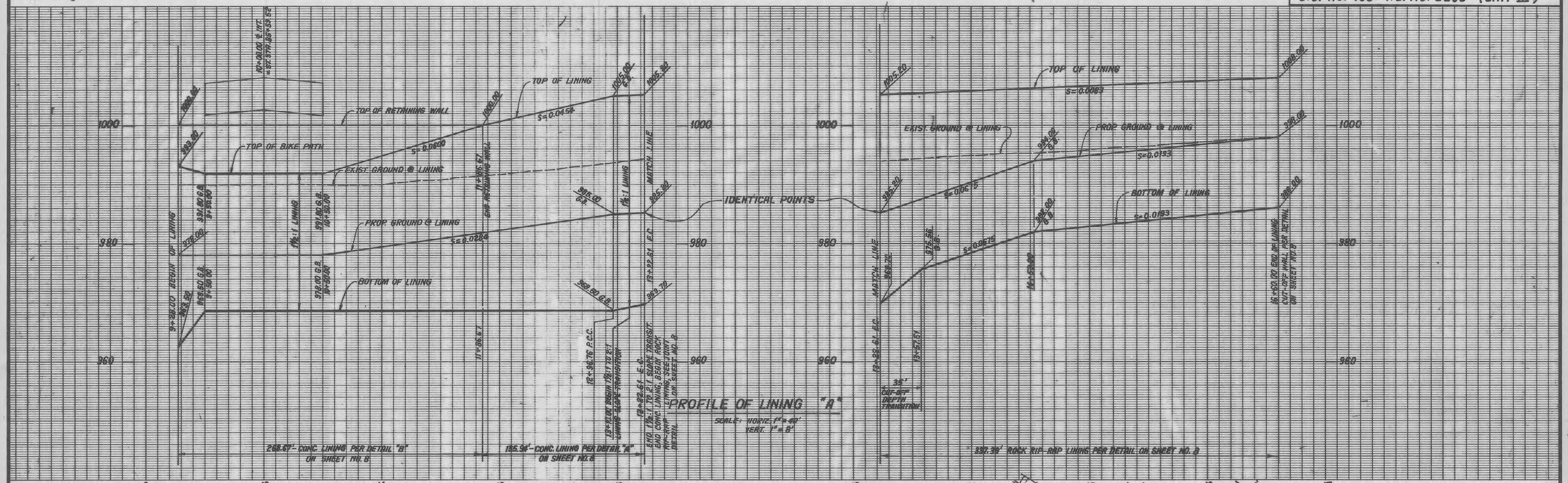
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

LAND DEVELOPMENT DIVISION
APPROVED BY: Ronald D. Anderson for ASSISTANT DEPUTY DIRECTOR DATE: 4-13-98
CHECKED BY: _____ R.C.E. NO 45691 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

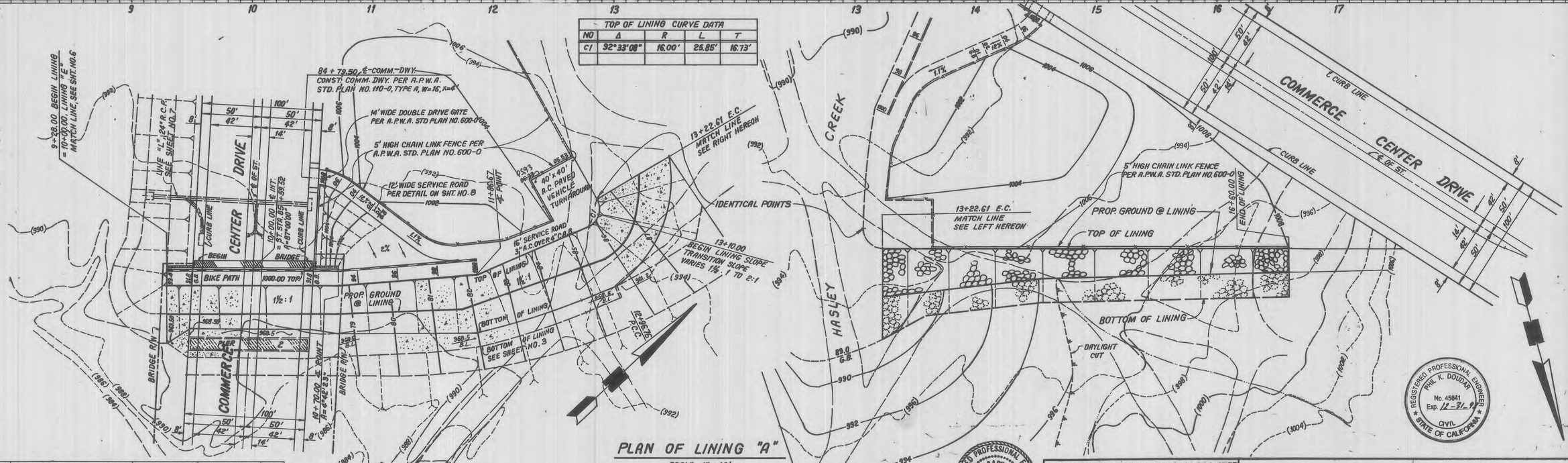
SHT 1 OF 9 SHTS

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO	Δ	R	L	T
C1	92°33'08"	16.00'	25.85'	16.73'



PLAN OF LINING "A"
SCALE: 1"=40'

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOUDAR
No. 45641
Exp. 12-31-99
CIVIL
STATE OF CALIFORNIA

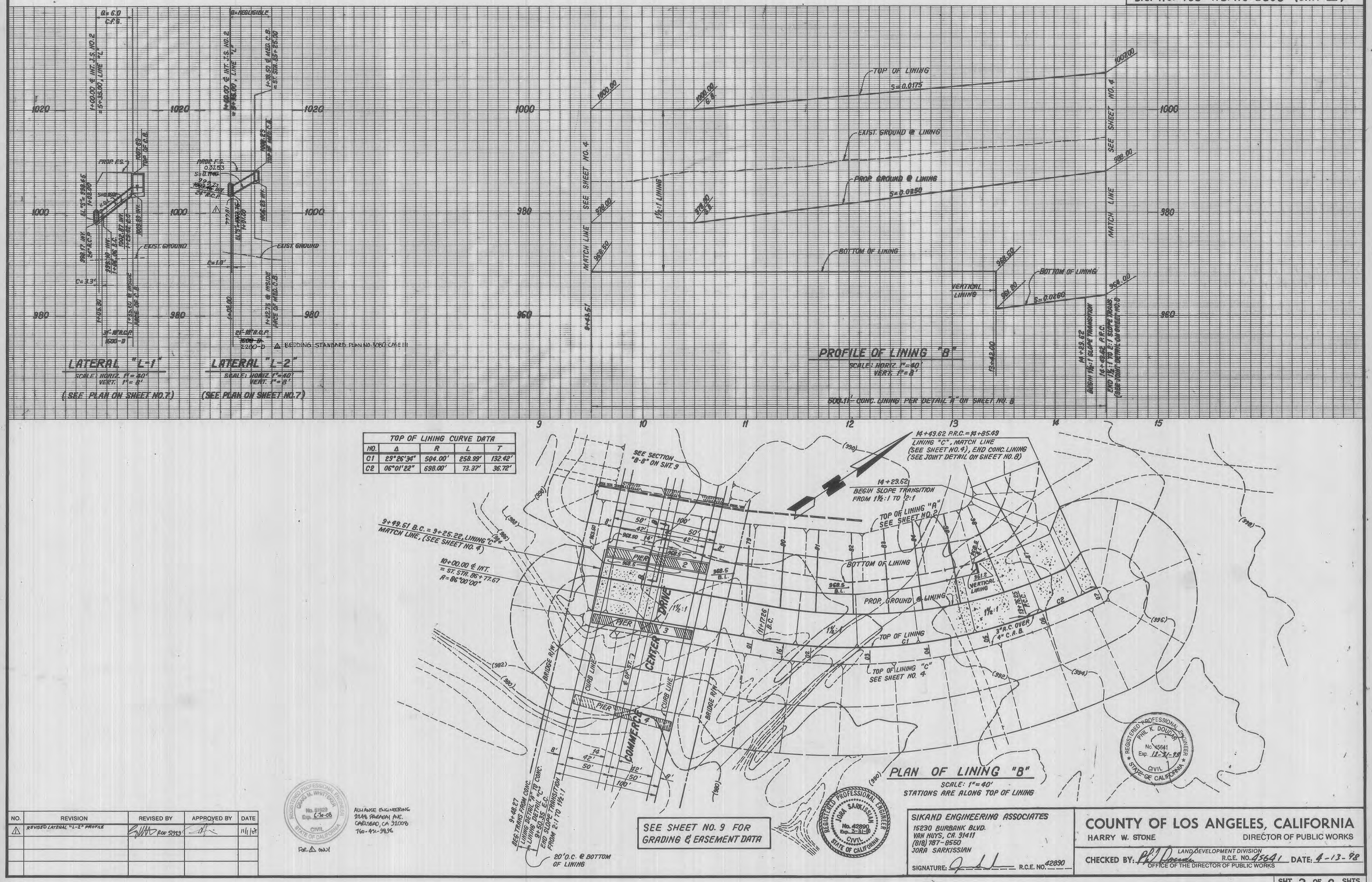
REGISTERED PROFESSIONAL ENGINEER
JORA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 43341 DATE: 4-18-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 2 OF 9 SHTS

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO.	Δ	R	L	T
C1	29°26'34"	504.00'	258.99'	132.42'
C2	06°01'22"	698.00'	73.37'	36.72'

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	REVISED LATERAL "L-2" PROFILE	[signature] RCE 51929	[signature]	11/1/97

REGISTERED PROFESSIONAL ENGINEER CHAD M. WHITTEKER No. 51929 Exp. 6-30-08 CIVIL STATE OF CALIFORNIA

ALLIANCE ENGINEERING
2248 PARADAY AVE.
CARLSBAD, CA 92008
760-431-9896

FOR △ ONLY

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER PHIL K. DOUDAR No. 45641 Exp. 12-31-98 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: [signature] R.C.E. NO. 42890

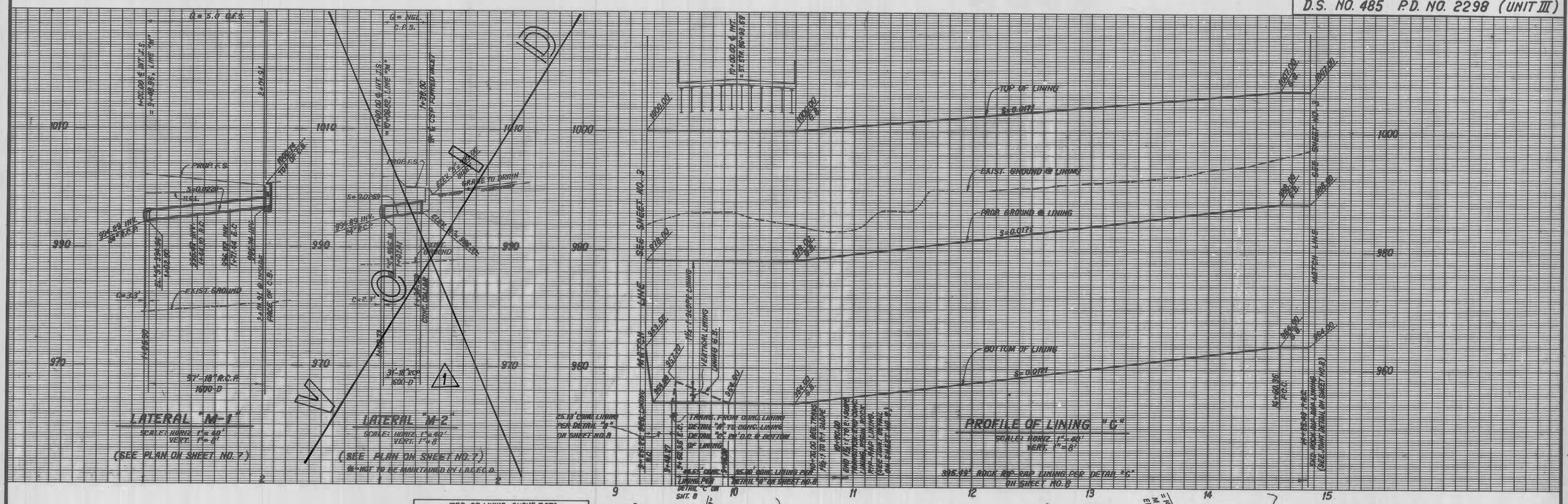
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
CHECKED BY: [signature] R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 3 OF 9 SHTS

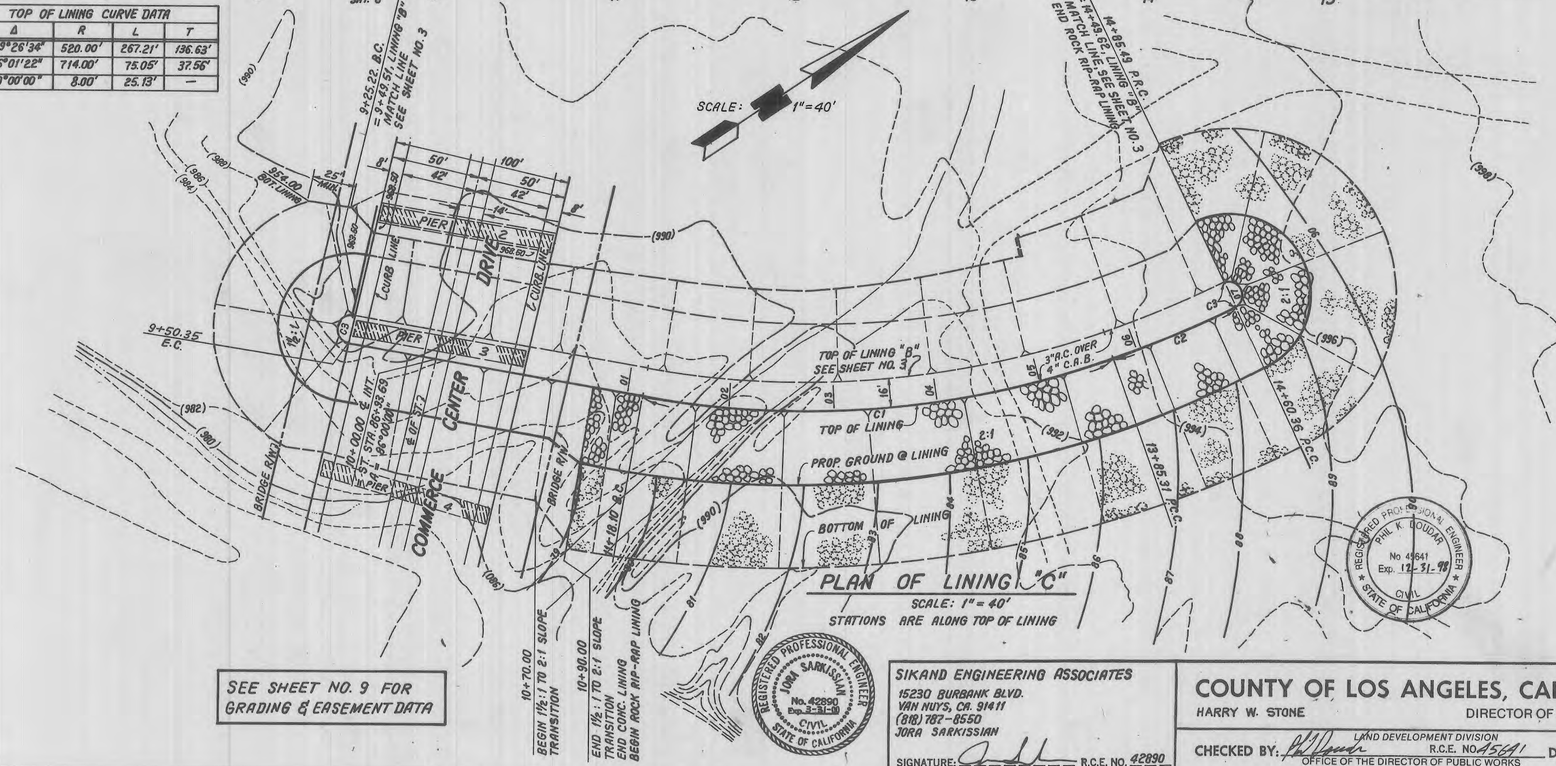
W.O. 1020-252-A

GM Jr (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO.	Δ	R	L	T
C1	29°26'34"	520.00'	267.21'	136.63'
C2	06°01'22"	714.00'	75.05'	37.56'
C3	180°00'00"	8.00'	25.13'	—



NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	VOIDED LAT. "M-2" PROFILE.	42890		7/1/99

REGISTERED PROFESSIONAL ENGINEER
LINA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOUDAR
No 45641
Exp. 12-31-98
CIVIL
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SIKAND ENGINEERING ASSOCIATES
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(818) 782-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO. 42890

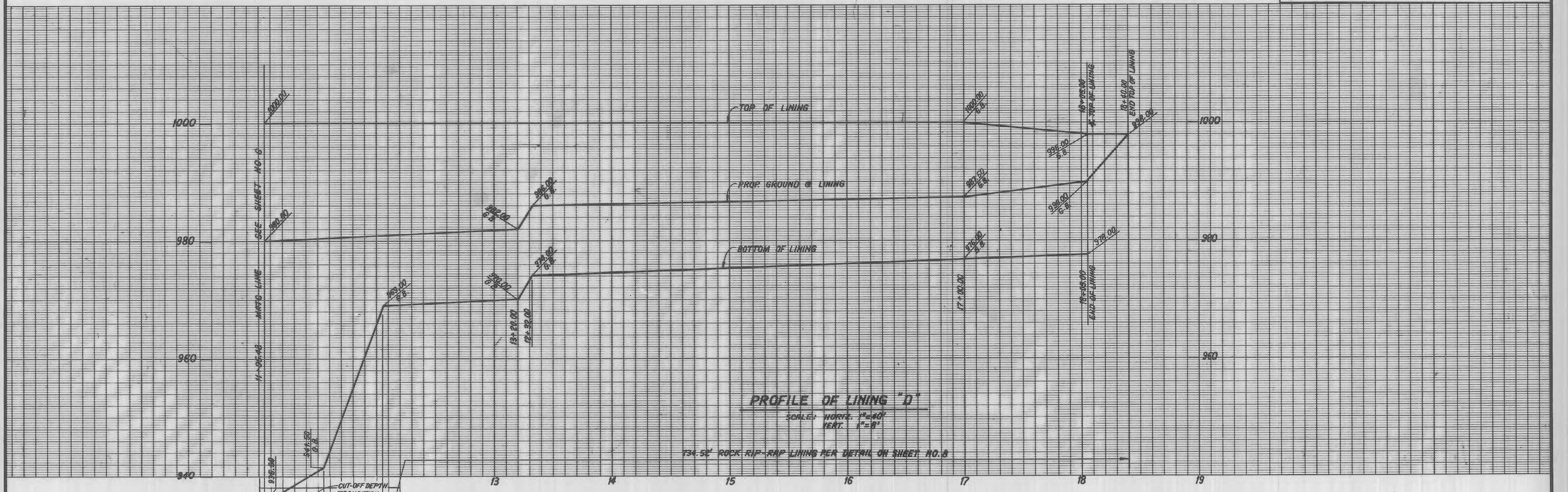
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE
DIRECTOR OF PUBLIC WORKS
CHECKED BY: LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 4 OF 9 SHTS

G.M. Jr. (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



PROFILE OF LINING "D"

SCALE: HORIZ. 1"=40'
VERT. 1"=8'

PLAN OF LINING "D"

SCALE: 1"= 40'

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
JORA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOLGAR
No. 45641
Exp. 12-31-98
CIVIL
STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
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JORA SARKISSIAN
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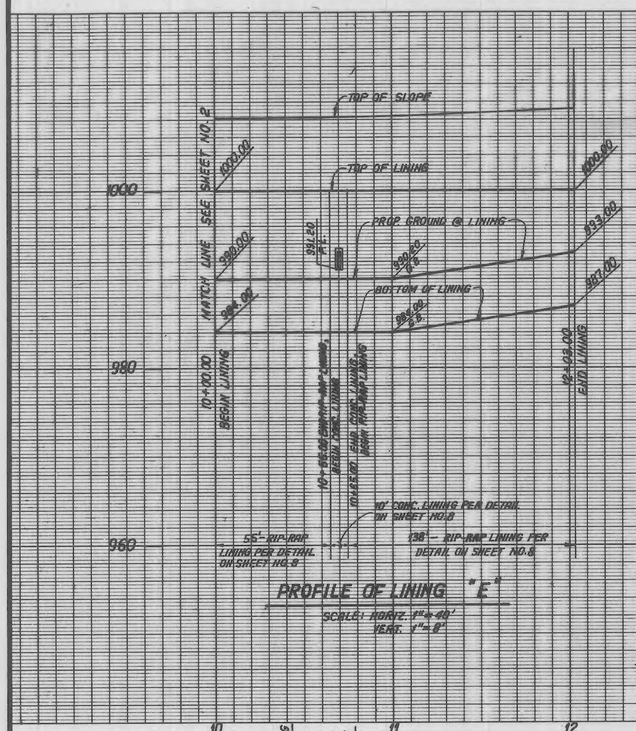
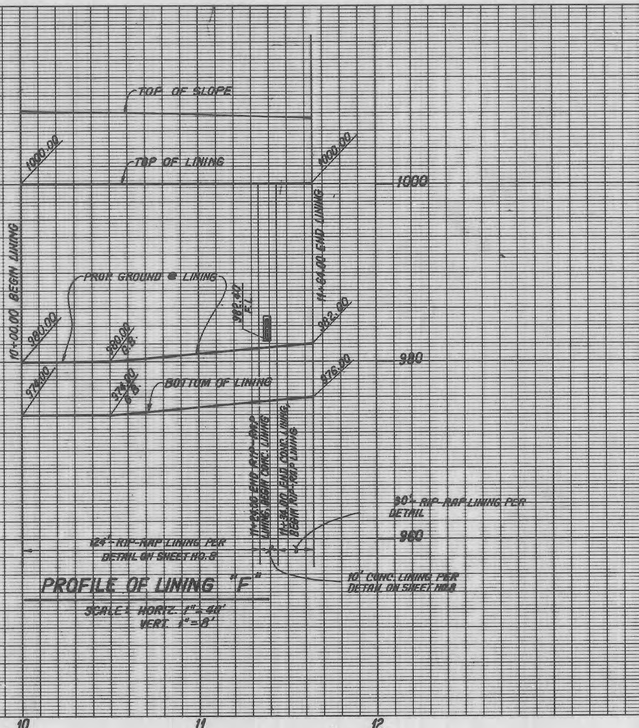
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION
R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

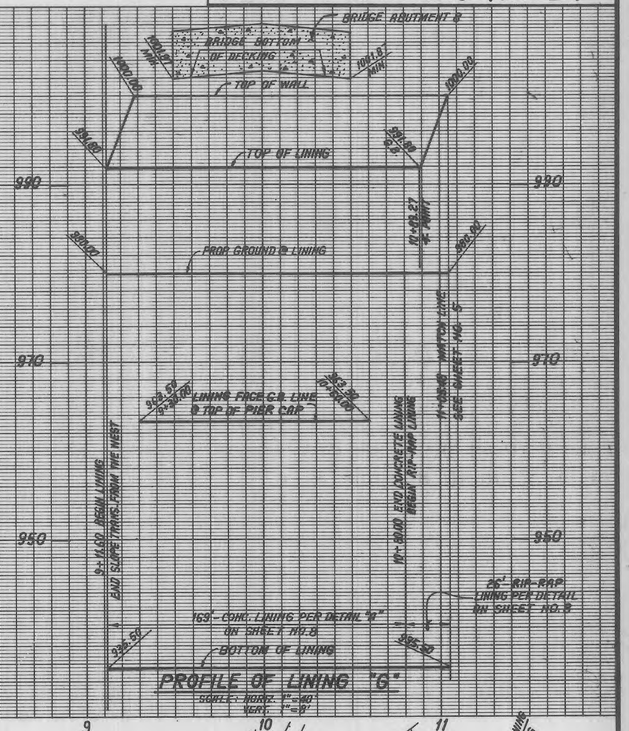
SHT 5 OF 9 SHTS

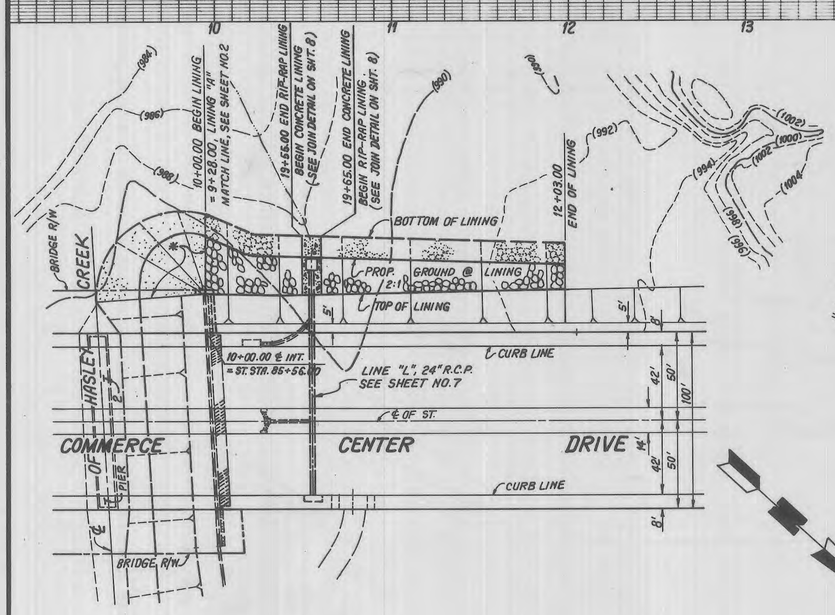
W.O. 1020-252-A

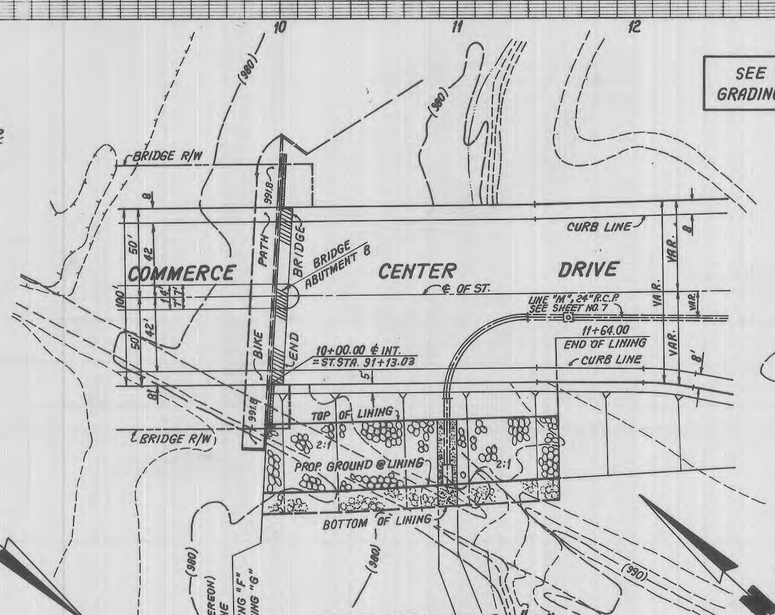
STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)

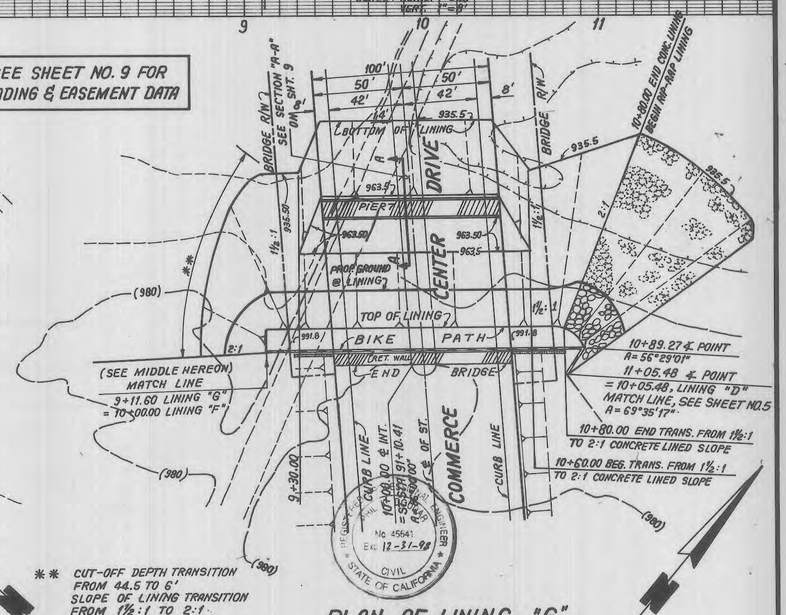












NO.	REVISION	REVISED BY	APPROVED BY	DATE

* CUT-OFF DEPTH TRANSITION FROM 18' TO 6' SLOPE OF LINING TRANSITION FROM 1½:1 TO 2:1 CONCRETE LINING.

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

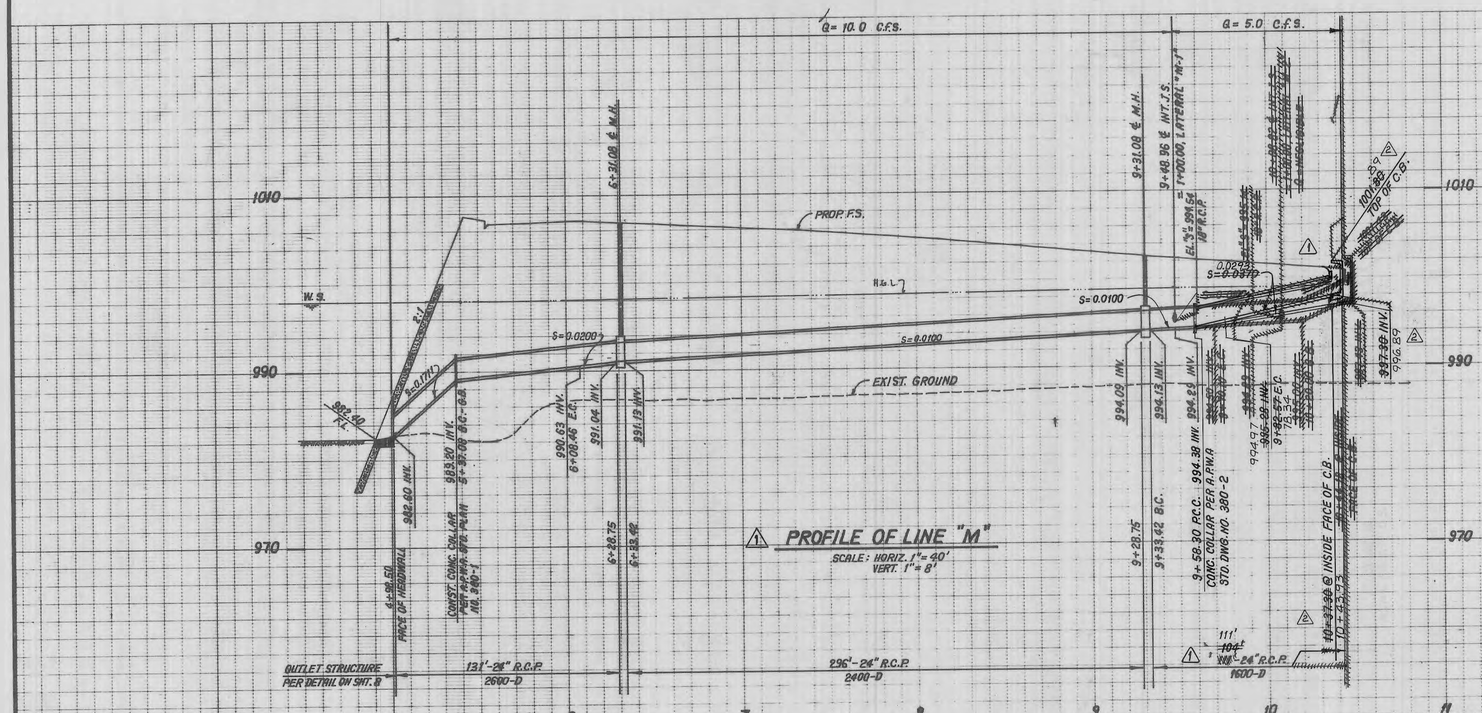
REGISTERED CIVIL ENGINEER No. 45641 EXP. 12-31-98 CIVIL STATE OF CALIFORNIA

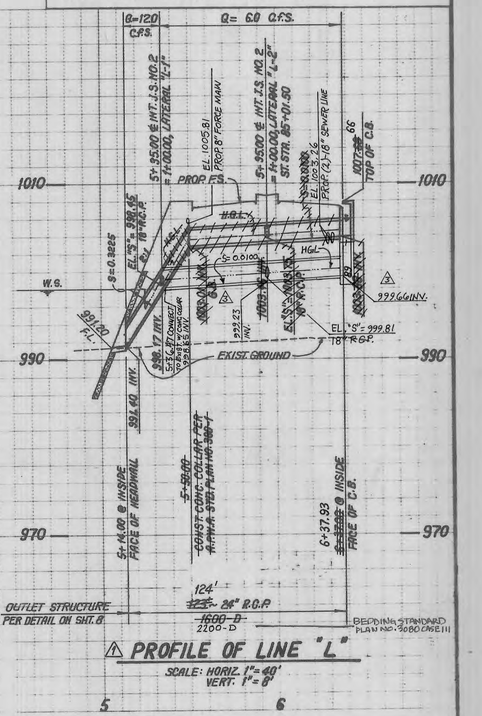
SHT 6 OF 9 SHTS

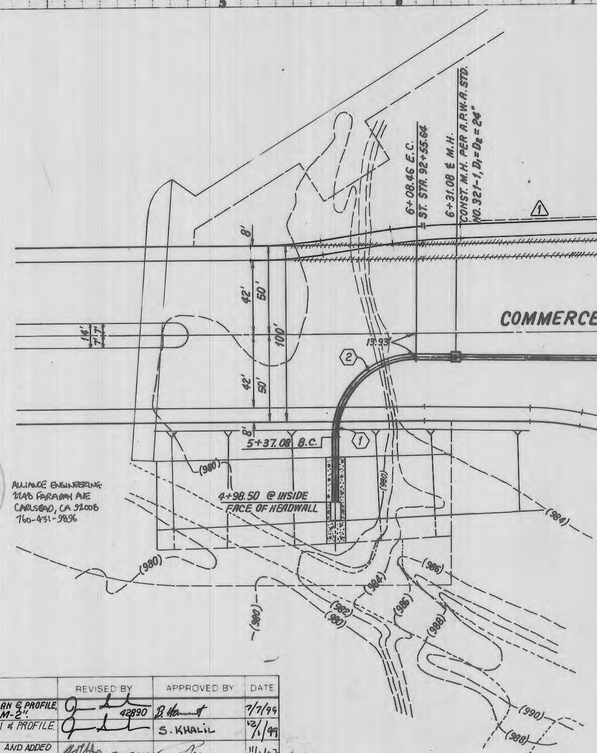
W.O. 1020-252-A

G M Jr (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

STORM DRAIN PLANS IN D.S. 485 P.D. NO. 2298 (UNIT III)



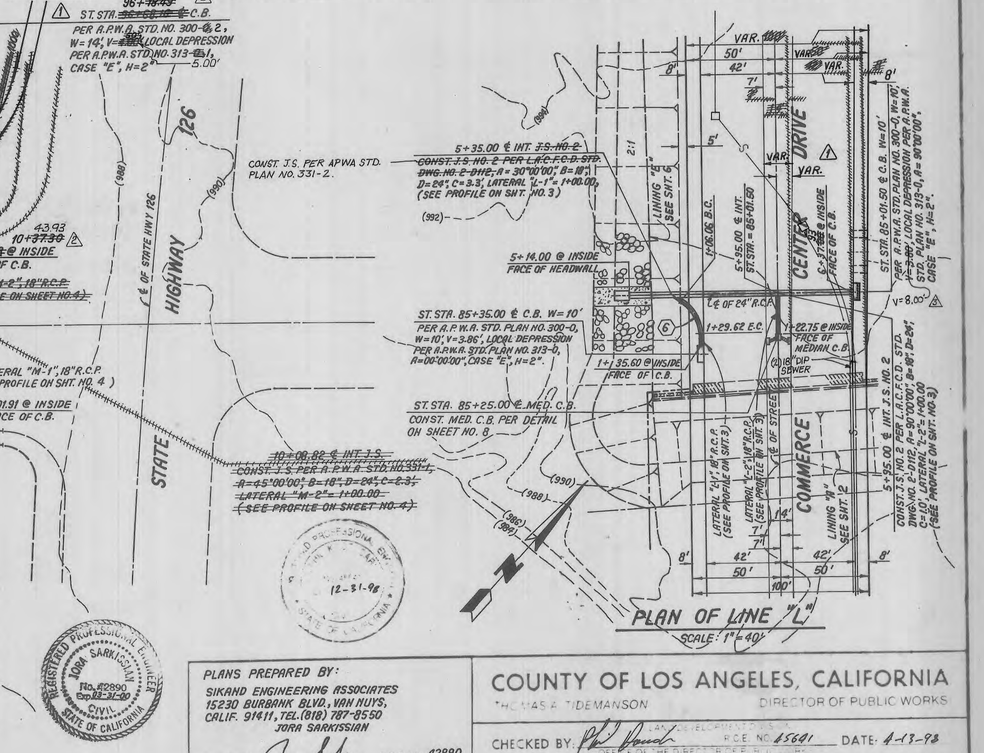




℄ STORM DRAIN CURVE DATA				
	Δ	R	L	T
1	23° 34' 49"	45.00'	18.52'	9.39'
2	67° 18' 32"	45.00'	52.86'	29.96'
3	19° 46' 50"	45.00'	15.54'	7.85'
~~4~~	~~26° 55' 36"~~	~~45.00'~~	~~21.15'~~	~~10.77~~
5	34° 48' 32"	45.00'	27.34'	14.11'
6	60° 00' 00"	22.50'	23.56'	12.99'
7	11° 54' 13"	45.00'	9.34'	4.69'
~~8~~	~~61° 47' 52"~~	~~22.50'~~	~~24.27'~~	~~13.47~~
1/2	51° 02' 11"		20.04'	10.74'

PLAN OF LINE "M"
SCALE: 1"=40'

~~⚠ NOT TO BE MAINTAINED BY L.A.C.F.C.D.~~



PLAN OF LINE "L"
SCALE: 1"=40'

NO	REVISION	REVISED BY	APPROVED BY	DATE
⚠1	REVISED LINE "L" & "M" PLAN & PROFILE ELIMINATED LATERAL "M-2"	42890		7/7/99
⚠2	REVISED LINE "M" PLAN & PROFILE	S. KHALIL		12/1/99
⚠3	REVISED LINE "L" PROFILE AND ADDED PROPOSED (2)-18" SEWER CROSSING	RCE 51913		11/1/07

PLANS PREPARED BY:
SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD., VAN NUYS, CALIF. 91411, TEL. (818) 787-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO 42890

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 12-31-00 CIVIL STATE OF CALIFORNIA

12-31-98

COUNTY OF LOS ANGELES, CALIFORNIA
"HOMAS A. TIDEMANSON DIRECTOR OF PUBLIC WORKS
CHECKED BY: ... ASSISTANT DEPUTY DIRECTOR OF LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 7 OF 9 SHTS

W O K89-2

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)

STRUCTURAL NOTES

GENERAL:

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER OF BAR AND SHALL BE TWO INCHES UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.1.
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.3
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENING.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
8. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELLED.
9. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
10. LONGITUDINAL STEEL SHALL BE LAPPED 20 BAR DIAMETERS AT SPLICES. TRANSVERSE STEEL SHALL BE LAPPED 30 BAR DIAMAETERS AT SPLICES.
11. LONGITUDINAL STEEL SHALL BE CONTINOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
12. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
13. UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS, TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS.; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON THE OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN FOR THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
14. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
15. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 20 BAR DIAMETERS IN LENGTH.
16. IN ALL SECTIONS LAP C AND C2 BARS. THE VERTICAL LENGTH OF C AND C2 BARS HAS BEEN CALCULATED FOR A FOUR INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 30 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
17. CONCRETE QUANTITITES ARE BASED ON A SIX-BY-SIX INCH FILLET AND THE STEEL QUANTITITES DO NOT INCLUDE ANY OPTIONAL SPLICES.
18. IF WALL THICKNESS IS SIX INCHES PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
19. THE DESIGN OF BOX SECTIONS IDENTIFIED BY A NUMERICAL VALUE IS BASED ON A WIDTH OF TRENCH EQUAL TO THE OUTSIDE WIDTH OF THE CONDUIT PLUS THREE FEET. WHEN THE COVER IS EQUAL TO 10 FEET OR LESS THE TRENCH WIDTH IS UNRESTRICTED. WHEN THE COVER IS GREATER THAN 10 FEET AND THE TRENCH WIDTH IS GREATER THAN THE OUTSIDE WIDTH OF THE CONDUIT PLUS 3 FEET FOR A DISTANCE IN EXCESS OF 10 FEET AN ALTERNATE SECTION SHALL BE USED AS INDICATED BELOW
   A. WHEN THE DEPTH OF COVER IS LESS THAN 18 FEET, SECTIONS WITH THE SUFFIX "B" SHALL BE USED.
   B. WHEN THE DEPTH OF COVER IS GREATER THAN 18 FEET AND:
      1. THE TRENCH WIDTH IS LESS THAN THE OUTSIDE WIDTH OF THE CONDUIT PLUS 6 FEET, SECTIONS WITH SUFFIX "A" SHALL BE USED.
      2. THE TRENCH WIDTH IS GREATER THAN THE OUTSIDE WIDTH OF CONDUIT PLUS 6 FEET, SECTIONS WITH THE SUFFIX "A" SHALL BE USED

R. C. RECTANGULAR CHANNEL

1. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF INLETS.
2. TRANSVERSE JOINTS SHALL BE PLACED AT THE JUNCTION OF RECTANGULAR OPEN CHANNEL SECTIONS WITH CLOSED CONDUIT SECTIONS. THE JOINT SHALL NOT BE KEYED AND SHALL HAVE A THREE-EIGHTS-INCH LAYER OF EXPANSION JOINT MATERIAL IN WALLS AND INVERT
3. ALL RECTANGULAR OPEN CHANNEL WALLS SHALL BE FENCED IN ACCORDANCE WITH APWA STANDARD DRAWING 600-O EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
4. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, IN CURVED SECTIONS, THE MAXIMUM SPACING OF BARS SHALL NOT EXCEED THAT SHOWN ON THE TYPICAL SECTIONS. STEEL SHALL BE PLACED RADIALLY FROM THE MAXIMUM SPACING.
5. AT THE BEGINNING AND ENDING OF ALL POURS, A COMPLETE CURTAIN OF REINFORCEMENT COMPOSED OF B1, B4, AND B7 BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
6. LONGITUDINAL STEEL SHALL TERMINATE TWO INCHES FROM TRANSVERSE CONSTRUCTION JOINTS.

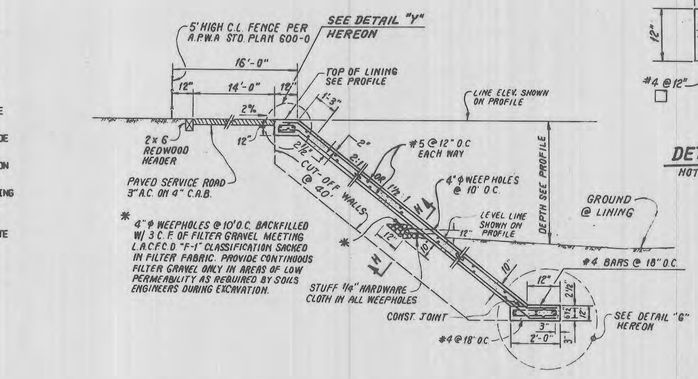
STRUCTURAL DESIGN CRITERIA

LIVE LOAD
H_{20} - S16-44 unless otherwise noted

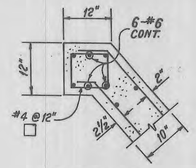
DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 37 p.s.f. per foot of depth
Internal water pressure: 62.4 p.s.f. per foot of depth
Weight of concrete: 150 p.c.f.

ALLOWABLE STRESSES
fc' = 4000 p.s.i. at 28 days
fc = 1800 p.s.i.
fs = 24000
n = 8
shear and bond stresses per A.C.I. 318-63

NO	REVISION	REVISED BY	APPROVED BY	DATE



CONCRETE LINING DETAIL "A"
NOT TO SCALE



DETAIL "Y"
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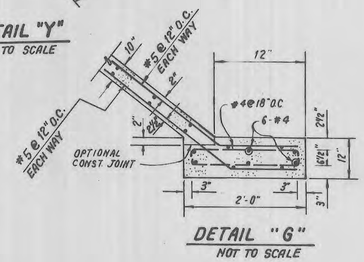

DETAIL "G"
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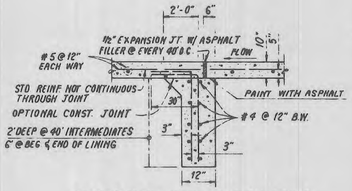
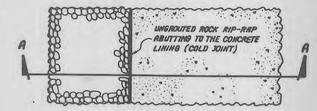
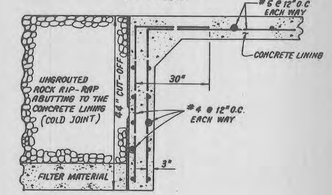


SECTION "H-H" EXPANSION JOINT
CUT-OFF WALL

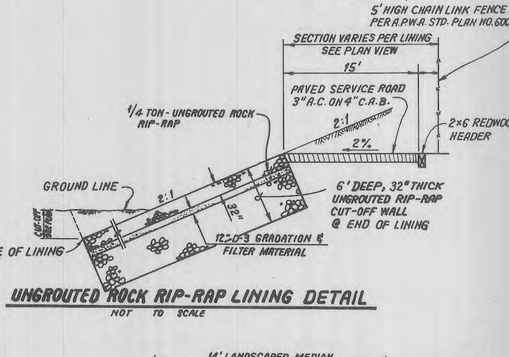
NOTE EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



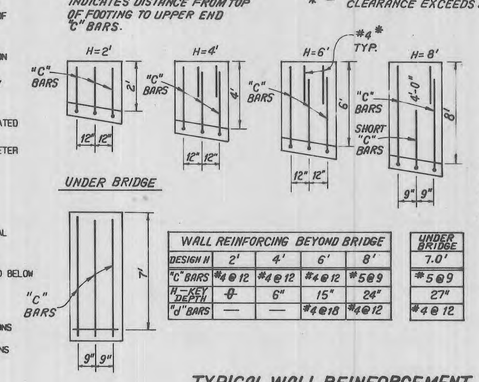
CONCRETE LINING-UNGROUTED ROCK RIP-RAP JOIN DETAIL
NOT TO SCALE



SECTION "A-A"
NOT TO SCALE

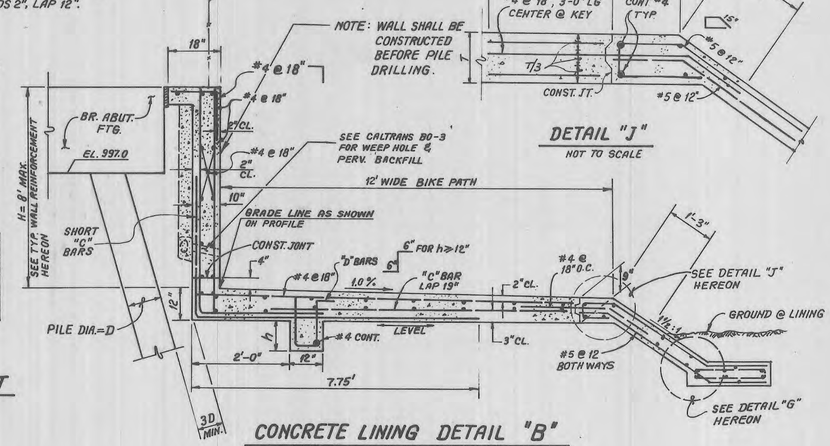


UNGROUTED ROCK RIP-RAP LINING DETAIL
NOT TO SCALE

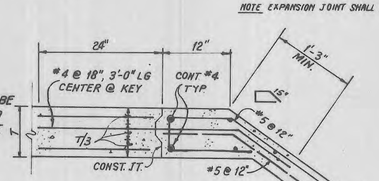


WALL REINFORCING BEYOND BRIDGE					UNDER BRIDGE
DESIGN H	2'	4'	6'	8'	7.0'
"C" BARS	#4@12	#4@12	#4@12	#5@9	#5@9
"H" SEE DEPTH	-0-	6"	15"	24"	27"
"J" BARS	—	—	#4@18	#4@12	#4@12

TYPICAL WALL REINFORCEMENT
NOT TO SCALE

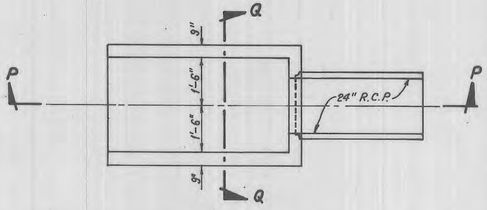


CONCRETE LINING DETAIL "B"
NOT TO SCALE



DETAIL "J"
NOT TO SCALE

SECTION P-P
NOT TO SCALE



OUTLET STRUCTURE DETAIL FOR LINES "L" & "M"
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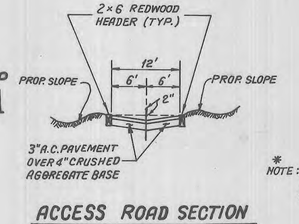
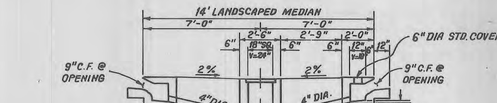


ACCESS ROAD SECTION
NOT TO SCALE

CONCRETE LINING DETAIL "C"
NOT TO SCALE

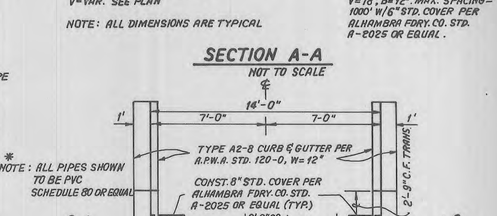
OUTLET STRUCTURES ARE INTO CONCRETE LINING SECTION SEE SHEET NO.6

CUT-OFF WALL DETAIL
NOT TO SCALE



NOTE: ALL DIMENSIONS ARE TYPICAL

SECTION A-A
NOT TO SCALE



NOT TO BE MAINTAINED BY L.A.C.F.C.D.

MEDIAN CATCH BASIN DETAIL
NOT TO SCALE

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN

SIGNATURE: _____ R.C.E. NO. 42890

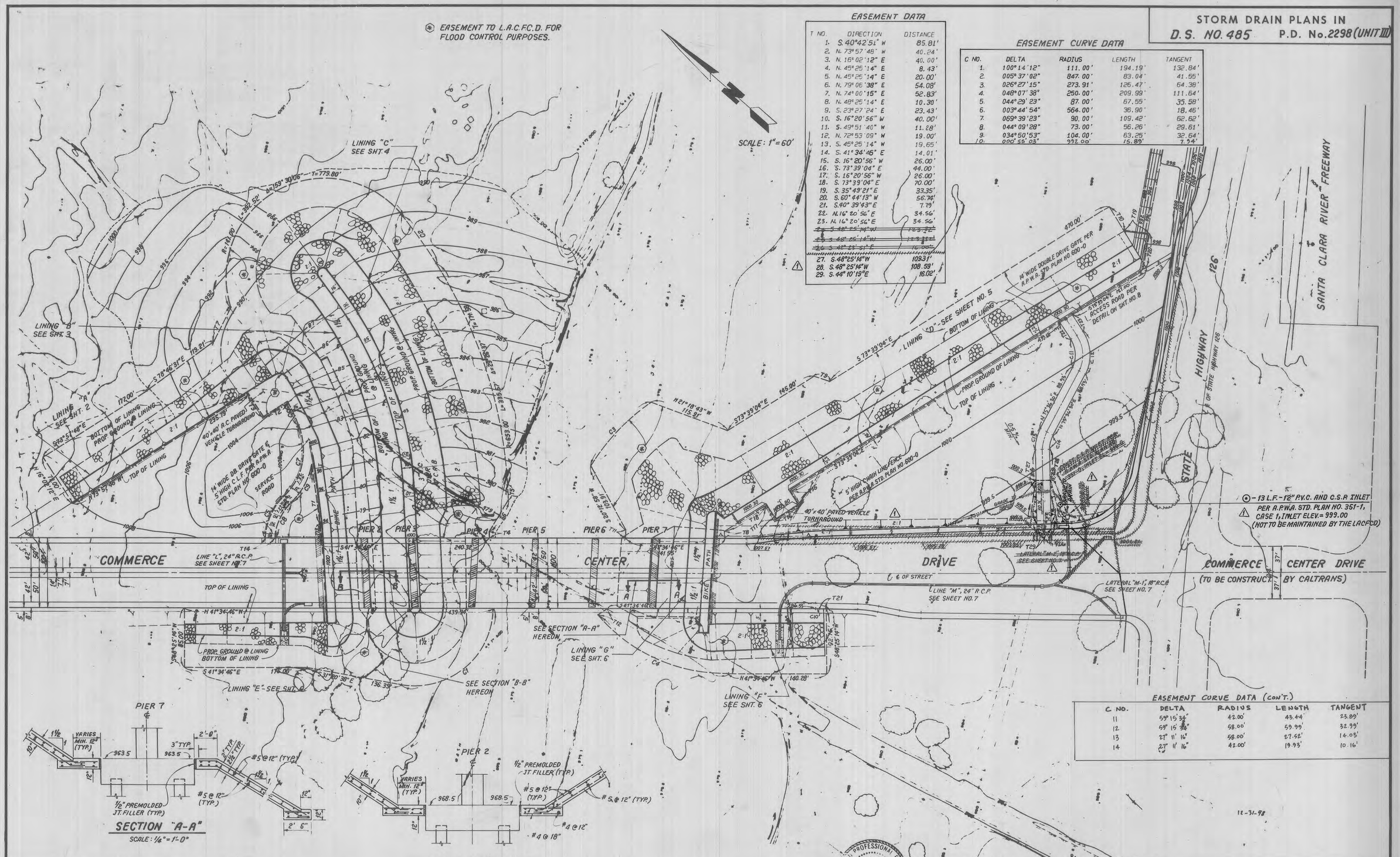
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 8 OF 9 SHTS

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. No. 2298 (UNIT III)



EASEMENT DATA

T NO.	DIRECTION	DISTANCE
1.	S. 40°42'51" W	85.81'
2.	N. 73°57'48" W	40.24'
3.	N. 16°02'12" E	40.00'
4.	N. 45°25'14" E	8.43'
5.	N. 45°25'14" E	20.00'
6.	N. 79°06'38" E	54.08'
7.	N. 74°00'15" E	52.83'
8.	N. 48°25'14" E	10.30'
9.	S. 23°27'24" E	23.43'
10.	S. 16°20'56" W	40.00'
11.	S. 49°51'40" W	11.28'
12.	N. 72°53'09" W	19.00'
13.	S. 45°25'14" W	19.65'
14.	S. 41°34'46" E	14.01'
15.	S. 16°20'56" W	26.00'
16.	S. 73°39'04" E	44.00'
17.	S. 16°20'56" W	26.00'
18.	S. 73°39'04" E	70.00'
19.	S. 35°49'21" E	33.35'
20.	S. 60°44'13" W	56.74'
21.	S. 40°39'43" E	7.79'
22.	N. 16°20'56" E	34.56'
23.	N. 16°20'56" E	34.56'
~~24.~~	~~S. 48°25'14" W~~	~~163.32'~~
~~25.~~	~~S. 48°25'14" W~~	~~123.32'~~
~~26.~~	~~S. 42°25'51" E~~	~~16.00'~~
27.	S. 48°25'14" W	109.31'
28.	S. 48°25'14" W	108.59'
29.	S. 44°10'19" E	16.02'

EASEMENT CURVE DATA

C NO.	DELTA	RADIUS	LENGTH	TANGENT
1.	100°14'12"	111.00'	194.19'	132.84'
2.	005°37'02"	847.00'	83.04'	41.55'
3.	026°27'15"	273.91'	126.47'	64.38'
4.	048°07'38"	250.00'	209.99'	111.64'
5.	044°29'23"	87.00'	67.55'	35.58'
6.	003°44'54"	564.00'	36.90'	18.46'
7.	069°39'23"	90.00'	109.42'	62.62'
8.	044°09'28"	73.00'	56.26'	29.61'
9.	034°50'53"	104.00'	63.25'	32.64'
10.	000°55'03"	992.00'	15.89'	7.94'

EASEMENT CURVE DATA (CON'T.)

C NO.	DELTA	RADIUS	LENGTH	TANGENT
11	59° 15' 34"	42.00'	43.44'	23.89'
12	59° 15' 34"	58.00'	59.99'	32.99'
13	27° 11' 16"	58.00'	27.52'	14.03'
14	27° 11' 16"	42.00'	19.93'	10.16'

SECTION "A-A"

SCALE: 1/4" = 1'-0"

SECTION "B-B"

SCALE: 1/4" = 1'-0"

NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	REVISED EASEMENT DATA. REVISED N'LY CURB LOC. @ C.C.D. & HWY. 126 & GRADING.	42890	B. Hammett	7/3/99

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 9-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
CHECKED BY: R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 9 OF 9 SHTS

W.O. 1020-252-A

Appendix H – ESA Documentation

Documentation of ESA Compliance

The VCC Project for which a CLOMR is sought involves federal permitting by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. The VCC Project, including the area subject to the requested CLOMR, lies within the Valencia Commerce Center development area covered by Corps Permit No. 89-00419-AOA ("Corps Permit"). The Corps Permit, as amended by letter dated March 3, 2003, authorized the discharge of fill material to waters of the United States for the construction and maintenance of flood control, bank stabilization, site drainage facilities and bridges associated with the Valencia Commerce Center development.

In compliance with Section 7 of the ESA, the Corps initiated formal consultation with the U.S. Fish and Wildlife Service regarding the effects of issuing the Corps Permit. The Service issued Biological Opinion No. 1-8-02-F-43 ("Biological Opinion," **attached**), analyzing the effects of the proposed activities on the federally listed arroyo toad and unarmored threespine stickleback. The Biological Opinion concluded that the activities authorized by the Corps Permit would not jeopardize the continued existence of the arroyo toad or unarmored stickleback, and it authorized incidental take of those species associated with the Valencia Commerce Center development. The Biological Opinion also concurred with the Corps' determination that the activities were not likely to adversely affect the federally listed least Bell's vireo.

The Corps Permit expired before all authorized activities were completed. In order to complete the current portion of the Valencia Commerce Center development, Newhall expects to seek additional authorization from the Corps. The Corps will comply with the ESA in connection with any new permit action, including conducting any additional consultation required by ESA Section 7.

Attachment: Biological Opinion No. 1-8-02-F-43

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

RECEIVED
DEC 18 2002
REGULATORY BRANCH
VENTURA FIELD OFFICE

In Reply, refer to: 2002-6.3

December 17, 2002

David J. Castanon, Chief
North Coast Section, Regulatory Branch
Ventura Field Office, Army Corps of Engineers
2151 Alessandro Drive, Suite 110
Ventura, California 93001

Subject: Biological Opinion for the Castaic Creek Bank Protection, Valencia Commerce Center, Los Angeles County, California (No. 89-00419-AOA)(1-8-02-F-43)

Dear Mr. Castanon:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Army Corps of Engineers (Corps) authorization of the Valencia Company to construct flood control and site drainage facilities associated with the Valencia Commerce Center and its effects on the federally endangered arroyo toad (*Bufo californicus*), and the federally endangered unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). You also requested formal consultation on the effects of the action on critical habitat for the arroyo toad. Because of the recent vacature of this critical habitat (see Status of the Species section below), our consultation does not address the effects of the action on critical habitat. Unarmored threespine stickleback are known to occur downstream at the Castaic Creek and Santa Clara River confluence. Your January 7, 2002, request for the initiation of formal consultation was received on January 9, 2002.

The Corps has determined that the project is not likely to adversely affect the federally endangered least Bell's vireo (*Vireo bellii pusillus*), and has not included the species in its request for formal consultation. The Corps reached this conclusion because focused surveys for breeding least Bell's vireos would be conducted immediately prior to construction and each year during the breeding season for the duration of the project, and if nests are found, construction would be set back a minimum of 500 feet from nest sites (Aaron Allen, Corps, pers. comm. 2002). The Service concurs with the Corps' determination that this species is not likely to be adversely affected by the authorization of the 404 permit. Consequently, the least Bell's vireo will not be discussed further in this biological opinion.

This biological opinion is based on information provided in the biological evaluation prepared by URS Corporation (URS 2002) for the Corps; other project information provided by the Corps, including the results of a focused survey for arroyo toads in Castaic Creek (Impact Sciences 2001a); a letter to the Corps from Valencia Company (Mark Subbotin *in litt.* 2002a); and information in our files. A complete administrative record of this consultation is on file at the Ventura Fish and Wildlife Office.

CONSULTATION HISTORY

Your original request for formal consultation included only the arroyo toad. The unarmored threespine stickleback was not included at the time because we believed the species was not present in Castaic or Hasley creeks. Since the original request for formal consultation was sent, new information has been made available to us. Specifically, installation of bank protection may require dewatering operations in which groundwater is collected and discharged downstream of the work area. The amount of discharged water may create sufficient flow during dewatering operations to form continuous flowing channel from the work site to Castaic Creek or the Santa Clara River. The unarmored threespine stickleback is known to occur in the Santa Clara River and may move upstream into Castaic Creek when flows are present.

Because of this new information, the Corps determined that the proposed construction activities and dewatering operations may affect the unarmored threespine stickleback and amended its request for formal consultation to include the species on May 10, 2002. In a telephone conversation with the Corps on May 15, 2002, we requested a 30-day extension on the consultation period in light of this new information, staffing shortages, workload, and high priority projects. The Corps agreed to the extension via telephone on May 15, 2002.

We provided your office a draft of this biological opinion on August 2, 2002. We received your comments by facsimile on August 15, 2002. This final biological opinion incorporates and addresses those comments, where applicable.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

In January 2002, the Corps initiated formal consultation with the Service on the Corps' authorization of the Valencia Company to complete one project of three separate proposed actions. The Corps has authorized, through a general permit under section 404 of the Clean Water Act, three actions by the Valencia Company intended to provide comprehensive flood protection for upland development along Castaic Creek, which are listed below:

1. Discharge of fill into 4.0 acres of an ephemeral streambed to construct an underground stormdrain for a regional mail facility of the U.S. Postal Service. The drainage was filled and the post office was completed in 1991. Because this component of the 404 permit has been completed, it will not be addressed again in this biological opinion.

2. Construction of a flood control channel within Hasley Canyon with concrete sides and an 80-foot-wide earthen bottom. The middle section of Hasley Creek was lined with concrete in 1991 by the Valencia Company. Because this component of the 404 permit has been completed, it will not be addressed again in this biological opinion. The lower portion of Hasley Creek will be completed in 2002 through 2005 and will be addressed in this biological opinion.

3. Installation of bank protection along both sides of Castaic Creek from Highway 5 to Route 126. Two types of bank protection are proposed: (1) soil cement, and (2) gunite or concrete lining. Most of the proposed 19,400 feet of channel lining would be soil cement. This component of the of the 404 permit will be addressed in this biological opinion.

Valencia Company has proposed a form of bank protection method which is being used in the Natural River Management Plan (NRMP) on the Santa Clara River under a separate 404 permit issued in 1998. This bank protection method consists of soil cement including a mixture of situ soils, Portland cement, and water that are compacted to form hardened material. The soil cement is placed in stacks and buried along the banks of a creek or river. Valencia Company anticipates that bank protection installation would be completed from 2002 through 2005. Maps and aerial photographs depicting the location, aerial extent, and various components of the proposed action may be found in the biological evaluation (URS 2002).

The proposed flood protection was to be in addition to approximately 2,000 linear feet of existing ungrouted riprap bank protection located at the north end of the project site and at the Commerce Center Bridge. The Valencia Company proposes to install approximately 19,400 feet of bank protection along Castaic and Hasley creeks over a period of four years. In addition to construction activities, the Valencia Company also proposed methods and criteria for maintenance activities in the project area.

The Valencia Company proposes construction of five temporary road crossings over Castaic and Hasley creeks in order to accomplish the installation of bank protection. Earth-moving equipment would cross the streambed as soils are moved for the project. An elevated crossing fitted with culverts would be installed in order to avoid contact between equipment and surface flows. The creek bed within the roadway corridor would be lined with plastic sheeting to prevent mixing of upland soils with streambed alluvium. The footprint of the roads would be approximately 90 feet wide and 400 feet long. Reinforced concrete pipe or steel culvert would be installed within the existing scour channels to permit any surface flows to continue downstream unimpeded. The top of the roadway would be approximately 75 to 80 feet wide and elevated to 6 to 8 feet above the streambed. K-rail would be installed along the upstream boundary of the roadway to prevent any high flows from eroding the roadway. The roadway would connect to existing dirt access roads on each side of the creek.

Hasley Creek

The Valencia Company proposes to relocate a portion of Hasley Creek to an upland area west of the existing natural channel to best fit development plans for the commerce center (A. Allen, pers. comm. 2002). The Hasley Creek work site parallels Commerce Center Drive and extends in a southern direction. The channel lining would consist of 2,700 feet of double-sided soil cement that would connect to the existing downstream structure that now drains to Castaic Creek. Relocating lower Hasley Creek would eliminate approximately a 2,700 linear foot reach of existing creek bed, approximately 2.10 acres. This area would be filled with soils excavated from the proposed drainage channel. The new lower drainage channel would contain approximately 6.80 acres of alluvial soft-bottom channel and 14 drop basins located approximately 225 feet apart constructed of riprap grouted with cement. The new drainage channel would tie in with the existing alluvial soft-bottom channel lining and the northern abutment of the Commerce Center Bridge.

Bank Protection

The Valencia Company proposes to employ two forms of bank protection over most of the project area: 1) soil cement or riprap for the length of Hasley Creek and Castaic Creek, consisting of a single row of soil cement; and 2) a single row of ungrouted riprap, with concrete tie-ins at structures. The portions of the bank protection above the Castaic Creek which are covered with soil will be revegetated with native plantings and irrigated.

Bank protection installation would occur in a 1.7 mile stretch of Castaic Creek from the Old Road bridge downstream to Route 126 and the downstream portion of Hasley Creek near its confluence with Castaic Creek. In general, for Castaic Creek, the alignment of buried bank protection would follow the existing banks with some encroachment into the creek in certain locations. In other areas the bank stabilization would be installed in upland areas, as described in the letter report from Valencia Company to the Corps (Subbotin, *in litt.* 2002a). Parameters used in designing flood protection for this action are governed by the Capital Flood event as defined by the County of Los Angeles Department of Public Works.

Approximately 19,400 linear feet of bank would be modified through placement of the buried bank protection. Installation of soil cement bank protection requires excavation of a flat-bottom trench to an engineered scour depth for a Capital Flood event. The width of the trench bottom is designed to fit construction equipment. The sides of the trench would slope outward at an approximate 1 to 1 ratio. Once soil cement installation is completed, the trench is then backfilled and graded to match existing creek bed contours at locations where creek bed intrusion has occurred. A 16-foot-wide maintenance road at the outer limit of upland impacts would parallel the open space above the buried bank protection. To install the bank protection, the trenches are excavated below the creek bottom where ground water may be encountered. In this situation, the ground water must be removed during construction. Ground water in the construction area

would be drawn down through a series of shallow dewatering wells strategically placed in close proximity to the excavated trenches. The collected water would be discharged downstream of the work area.

The area to be affected by installation of bank protection consists of 135.0 acres of wetland habitat. In a letter to the Corps, Valencia Company asserts that placement of bank protection in upland areas construes a net gain of 16.4 acres in creek bed acreage resulting in a total wetland habitat area of 151.4 acres; however, the Service disagrees and will only consider the areas of loss in terms of excavation for buried bank protection and placement of ungrouted riprap. The biological function of creek bed created from upland areas is of little value, until a natural hydrologic regime and native vegetation are established.

The Corps has included in its previously authorized 404 permit to Valencia Company several special conditions to reduce potential impacts to the arroyo toad and unarmored threespine stickleback within the project area. These conditions include:

1. Low-growing dry wash vegetation will be allowed to establish naturally within bottom of Hasley Creek to compensate for the loss of dry wash habitat along the unnamed drainage. There will be no clearing of any native riparian vegetation that establishes itself within the creek channel unless it grows excessively dense so as to impede water flow. Any vegetative clearing that is necessary within 100 feet of the confluence with Castaic Creek will be done by hand only.

2. The Valencia Company will record in deed the Castaic Creek corridor as a conservation easement for the purpose of retaining and enhancing fish and wildlife values in perpetuity. Copies of these deed restrictions will be furnished to the Corps, the Service, and the California Department of Fish and Game (CDFG). The amount of area of the conservation easement is approximately 146 acres and will be given to the Center for Natural Land Management (M. Subbotin, pers. comm. 2002b).

3. The Valencia Company will require through project conditions, covenants and restrictions, any industrial user which handles toxic or hazardous substances within the Valencia Commerce Center, to build an on-site self-containment system in accordance with applicable local, state, and federal laws that will prevent these substances from accidentally entering Hasley or Castaic creeks. This measure will minimize the potential of contaminating the unarmored threespine stickleback, arroyo toad, and least Bell's vireo habitats in the event of an accident. The construction and operation of these self-containment systems will be verified by the Corps personnel making inspections of the channel each year for the duration of the construction period.

4. Parking lots in the Valencia Commerce Center will have a drainage system to divert non-storm flows to an oil and grease trap that will separate such contaminants before the runoff is diverted to Hasley or Castaic creeks. These parking lot runoff control systems

will be verified by Corps personnel while making annual inspections of the channels for the duration of the construction period.

5. Maintenance vegetative clearing is permitted only in the upper portion of Hasley Creek, and only for emergency repair work to structures within the channel and bank lining. Under such conditions, clearing of vegetation should be kept to a minimum, and the Valencia Company will perform remedial replacement of damaged vegetation (especially from the construction of access roads if they are necessary) immediately upon completion. A general maintenance plan for the subject project was developed in September 1998 and revised in March 2002 (Aquatic Consulting Services 2002). This plan which was signed by the Los Angeles County Department of Public Works and approved by the Corps and the CDFG.

6. Installation of the channel lining and storm drain system will occur during the period of April 1 to November 1 to avoid winter runoff. Erosion and sediment control measures will be established prior to all construction activities in any water course on the project site. In the event that the contractors are not able to finish the construction in this time window, the permittee will inform the Corps in advance of November 1 in writing, and request permission for a one or two month time extension.

7. Bank protection that allows for growth of native herbaceous vegetation will be used along the sides of Castaic Creek as indicated in Appendix A of the biological evaluation. Final construction plans for any phase of the project must be approved by the Corps in coordination with the Service.

8. The new lining along Castaic Creek will be seeded with native herbaceous vegetation and initially irrigated after installation to encourage the development of low-growing riparian growth.

9. The aerial extent and duration of construction activities along Castaic Creek will be minimized as much as possible. Construction zones for the installation of bank protection and haul routes will be flagged and staked in the field to minimize intrusion and disturbance of existing vegetation. All marshaling and equipment storage areas will be located outside of the channel. The staked boundaries of the impact zone will be verified by the Corps prior to the commencement of construction.

10. The Valencia Company will replace all living and dead willow and cottonwood trees that have a diameter at breast height of 6 inches or more, at a ratio of 1.5 new trees for each tree lost. These trees will not be any smaller than those out of five gallon containers, and preferably a mixture of large sizes. Replacement plants will be placed in augered holes in portions of the Castaic Creek channel that appear to have suitable environmental conditions for such trees to establish naturally.

Prior to construction in Castaic Creek, a formal mitigation plan will be submitted to the Corps for review and approval in coordination with the Service. This plan will include the numbers of different species of trees to be planted, the sizes, and locations of planting. The plan will also describe maintenance of the planted area with regard to irrigation (as needed) and weed eradication. These replacement trees will be monitored for five years following completion of the construction phase of the channel, to ensure their successful establishment.

Survey and re-vegetation plan monitoring documents will be submitted to the Corps and the Service in the form of annual reports in December of each year. These will be reviewed and amended as necessary to ensure success. All failed plantings will be replaced. If the agencies determine that restoration has not been successful, the program will be re-assessed, irrigation introduced if necessary, and restoration efforts will continue on a year-to-year basis until success has been demonstrated.

In the event of significant flood flows which wipe out much of the existing and newly planted vegetation within the five year monitoring and maintenance period, the Valencia Company will initiate a site visit with staff from the Corps and the Service to assess damages and re-evaluate the need for further revegetation efforts in the selected mitigation sites.

11. Emergency repair of the channel lining or bridges across Castaic or Hasley creeks will occur as needed. Any sensitive riparian habitat in the vicinity will be staked in advance to minimize the area of adverse impacts to vegetation. Routine maintenance in the form of vegetative clearing within and along Castaic Creek will not occur in vegetated or mitigation areas. All riparian vegetation disturbed by maintenance and repair will be replaced at a ratio of 1 to 1.

12. Excavation of mounds of tailings from past sand and gravel mining operations within the creek may occur, but any trees and shrubs removed in the process that are greater than 6 inches at breast height will be replaced on site at a 1.5 to 1 ratio.

13. A weed eradication and control program will be established as part of the restoration efforts and implemented on a regular basis during the five year restoration period. During monitoring efforts, a crew will examine all disturbed portions, as a result of this project, within Castaic Creek and remove stands of *Arundo donax*, *Tamarisk*, castor bean, and tree tobacco by hand and topical application of approved herbicides.

14. Landscaping along the top of the bank protection will use native drought tolerant plants.

In a letter to the Corps dated May 10, 2002, the Valencia Company proposed several additional measures to reduce the potential impacts to the unarmored threespine stickleback from this project. These measures include:

1. Service-approved biologists will place fish blocking nets across the dewatering discharge at its confluence with non-project flows (flood flows or dam releases) in Castaic Creek or the Santa Clara River in such a manner as to prevent the movement of unarmored threespine stickleback up the channel of flowing water from dewatering operations. During a telephone conversation on July 11, 2002, between Chris Dellith of my staff and Aaron Allen of the Corps, we agreed that Service personnel as stated by Valencia Company, would be changed to Service-approved biologists. A plan to place the blocking nets will be provided to the Service for approval 30 days prior to implementation. In the event that the net fails, the Service will be immediately notified and will conduct a site inspection with the Valencia Companies qualified biologist to determine if fish have moved up the dewatering channel, and methods for rescue or ramping down the discharge to allow fish to escape.

2. Prior to initiating construction of bank stabilization or temporary road crossings, all construction sites and access roads within the river bed, as well as all creek bed areas within 300 feet of the construction site and access road, will be inspected by a Service-approved biologist for the presence of the unarmored threespine stickleback, arroyo chub, Santa Ana sucker, arroyo toad, two-striped garter snake, and southwestern pond turtle. The Corps and the CDFG will be notified of the inspection and will have the option of attending. If either agency is not represented, the biologist will file a written report of the inspection with the agency not in attendance within 15 days of the survey and no sooner than 30 days prior to any construction work in the creek bed.

3. Construction work areas and access roads will be cleared of the species listed in (2) above immediately before the prescribed work is to be carried out, immediately before any equipment is moved into or through the stream or habitat areas, and immediately before diverting any stream water. The removal of such species will be conducted by a Service-approved biologist using procedures approved by the Corps and the Service. Species will be relocated to nearby suitable habitat areas. A plan to relocate these species will be submitted to the Corps and the Service for review and approval no later than 30 days prior to construction. Under no circumstances will the arroyo toads or unarmored threespine stickleback be collected or relocated, unless Service-approved biologists implement this measure.

4. All stream flows traversing a construction site or temporary road crossing will be diverted around the site and under access roads using a temporary culvert or crossings that allow fish passage. A temporary diversion channel will be constructed using the least damaging method possible, such as blading a narrow pilot channel through open sandy creek bottom. The removal of wetland and riparian vegetation to construct the channel will be avoided to the greatest extent feasible. The temporary channel will be connected to a natural channel downstream of the construction site prior to diverting the stream. The integrity of the channel and diversion will be maintained throughout the construction period. The original stream channel alignment will be restored after construction,

provided suitable conditions are present at the work site after construction. A temporary stream diversion plan will be submitted to the Corps and the Service for individual project approvals.

5. A Service-approved biologist will be present when any stream diversion takes place, and will patrol the areas both within, upstream, and downstream of the work area to rescue any species stranded by the diversion of the stream water. Species that are collected will be relocated to suitable areas downstream of the work area.

STATUS OF THE SPECIES

Arroyo Toad

The Service listed the arroyo toad as endangered on December 16, 1994 (59 *Federal Register* 63264). A recovery plan for the species has been published (Service 1999). Critical habitat for the arroyo toad was designated on February 7, 2001 (66 *Federal Register* 9414). On October 30, 2002, the United States District Court for the District of Columbia set aside the designation and ordered the Service to publish a new final rule with respect to the designation of critical habitat for the arroyo toad by July 30, 2004 (*Building Industry Legal Defense Foundation, et al., v. Gale Norton, Secretary of the Interior, et al., and Center for Biological Diversity, Inc. and Defenders of Wildlife, Inc.* Civil Action No. 01-2311 (JDB) (U.S. District Court, District of Columbia)).

The arroyo toad is a small, dark-spotted toad of the family Bufonidae. The parotid glands, located on the top of the head, are oval-shaped and widely separated. A light or pale area or stripe is usually present on these glands and on top of the eyes. The arroyo toad's underside is buff-colored and usually without spots (Stebbins 1985). Recently metamorphosed individuals typically blend in with stream side substrates.

Optimal breeding habitat consists of low-gradient sections of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces. Arroyo toads breed and deposit egg masses in the shallow, sandy pools of these streams, which are usually bordered by sand-gravel flood-terraces. Stream order, elevation, and flood plain width appear to be important factors in determining habitat capability (Sweet 1992, Barto 1999, Griffin 1999). High stream order (*i.e.*, 3rd to 6th order), low elevation (particularly below 3,000 feet), and wide flood plains seem to be positively correlated with arroyo toad population size. However, small arroyo toad populations are found along 1st and 2nd order streams at elevations up to 4,600 feet.

Outside of the breeding season, arroyo toads are essentially terrestrial and are known to use a variety of upland habitats including, but not limited to, sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grassland (Holland 1995, Griffin *et al.* 1999).

Arroyo toad tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms. They do not forage on macroscopic vegetation (Sweet 1992, Jennings and Hayes 1994).

Juvenile arroyo toads feed on ants almost exclusively (Service 1999). By the time they reach 0.7 to 0.9 inch in length, they consume more beetles, along with the ants (Sweet 1992, Service 1999). Adult arroyo toads probably consume a wide variety of insects and arthropods including ants, beetles, spiders, larvae, caterpillars, and others.

Breeding typically occurs from February to July on streams with persistent water (Griffin *et al.* 1999). Female arroyo toads must feed for a minimum of approximately two months to develop the fat reserves needed to produce a clutch of eggs. Eggs are deposited and larvae develop in shallow pools with minimal current and little or no emergent vegetation. The substrate in these pools is generally sand or fine gravel overlain with silt. The eggs hatch in 4 to 5 days and the tadpoles are essentially immobile for an additional 5 to 6 days. They then begin to disperse from the pool margin into the surrounding shallow water, where they spend an average of 10 weeks. After metamorphosis (June and July), the juvenile arroyo toads remain on the bordering gravel bars until the pool dries out (usually from 8 to 12 weeks depending on the site and rainfall). Most individuals become sexually mature by the following spring (Sweet 1992).

Individuals of this species have been observed moving approximately 1 mile within a stream reach and 0.6 mile away from the stream, into native upland habitats (Sweet 1992, Holland 1995) or agricultural areas (Griffin *et al.* 1999). Movement distances may be regulated by topography and channel morphology. Griffin (1999) reported a female arroyo toad traveling more than 948 feet perpendicular from a stream and Holland (1998) found arroyo toads 0.7 mile from a water course. At Little Rock Creek, on the desert slopes of the San Gabriel Mountains, arroyo toads were found up to approximately 120 feet from the active channel; they burrowed closer to the active stream channel as the time after the last spring rain increased (Ramirez 2000). Arroyo toads are critically dependent on upland terraces and the marginal zones between stream channels and upland terraces during the non-breeding season, especially during periods of inactivity, generally late fall and winter (Sweet 1992).

Arroyo toads have disappeared from approximately 75 percent of the previously occupied habitat in California. They were known historically to occur in coastal drainages in southern California from San Luis Obispo County to San Diego County and in Baja California, Mexico. In Orange and San Diego counties, the species occurred from estuaries to the headwaters of many drainages. In 1996, arroyo toads were discovered on Fort Hunter Liggett, Monterey County. This discovery constituted a northern range expansion for the species. Populations of this species also occur on the desert slopes of both the San Gabriel Mountains (in Little Rock Creek in Los Angeles County) and the San Bernardino Mountains (in the Mojave River and in its tributaries, Little Horsethief and Deep creeks, in San Bernardino County). Arroyo toads now survive primarily in the headwaters of coastal streams as small isolated populations, having been extirpated from much of their historic habitat.

Flood control projects, agriculture, off-highway vehicle use, urbanization, and campgrounds reduced many arroyo toad populations in size or caused their extirpation due to extensive habitat loss from 1920 to 1980 (Service 1999). The loss of habitat, coupled with habitat modifications

due to the manipulation of water levels in many central and southern California streams and rivers, and predation from introduced aquatic species, caused arroyo toads to disappear from a large portion of their previously occupied habitat in California (Jennings and Hayes 1994). Currently, the major threats to arroyo toad populations are from stream alteration, introduction of exotic species, urban and rural development, mining, recreation, grazing, drought, wildfire, and large flood events.

The recovery plan for the arroyo toad divides its range into the northern, southern, and desert recovery units (Service 1999). The recovery plan recommends that the arroyo toad be reclassified as a threatened species when management plans have been developed and implemented to secure the genetic and phenotypic variation of the species in each recovery unit; this goal would be accomplished by conserving the necessary riparian and upland habitats on federally managed lands. Delisting would be pursued when 15 additional self-sustaining populations of arroyo toads are known to exist, including those that occur on lands that are not managed by Federal agencies.

Unarmored threespine stickleback

Unarmored threespine sticklebacks are small fish (up to 2.36 inches) inhabiting slow moving reaches or quiet water microhabitats of streams and rivers. Favorable habitats usually are shaded by dense and abundant vegetation but in more open reaches algal mats or barriers may provide refuge for the species. Unarmored threespine sticklebacks feed primarily on benthic insects, small crustaceans, and snails, and to a lesser degree, on flat worms, nematodes, and terrestrial insects. Unarmored threespine sticklebacks reproduce throughout the year with a minimum of breeding activity occurring from October to January. Reproduction occurs in areas with adequate aquatic vegetation and gentle flow of water where males establish and vigorously defend territories. The male builds a nest of fine plant debris and algal strands and courts all females that enter his territory; a single nest may contain the eggs of several females. Following spawning, the male defends the nest and, after approximately six days, the newly hatched fry. Unarmored threespine sticklebacks are believed to live for only one year (Service 1985).

Unarmored threespine sticklebacks historically were distributed throughout southern California but are now restricted to the upper Santa Clara River and its tributaries in Los Angeles and Ventura counties, Cañada Honda and San Antonio creeks on Vandenberg Air Force Base, Shay Creek (tributary to Baldwin Lake) in San Bernardino County, and San Felipe Creek in San Diego County. The population in Cañada Honda Creek is a transplanted population, as is the small population that may persist in San Felipe Creek.

The unarmored threespine stickleback was listed as endangered in 1970 (35 *Federal Register* 16047) primarily due to competition with or predation by non-native fish, loss of habitat through urbanization and channelization, and introgression with other subspecies of sticklebacks. Critical habitat for the unarmored threespine stickleback was proposed in 1980 for two reaches of the Santa Clara River, and single reaches of both San Francisquito Creek and San Antonio Creek;

designation of critical habitat remains pending (45 *Federal Register* 76012). The recovery plan for the unarmored threespine stickleback (Service 1985) provides additional information on the biology of the species, reasons for its decline, areas of essential habitat, and the actions needed for recovery of the species. The unarmored threespine stickleback is a fully protected species under California law. See California Fish and Game Code, Section 5515 (b)(9).

ENVIRONMENTAL BASELINE

The implementing regulations for section 7(a)(2) define the action area of a consultation as the area that may be directly or indirectly affected by the proposed action (50 Code of Federal Regulations 402.02). Given the topography of the area, the alterations of the flood plain caused by previous human activities, the ecology of the arroyo toad and unarmored threespine stickleback, and the potential effects of the proposed action, we are considering the action area for this biological opinion to generally be the area of the flood plain, creek bed including the stream channel, and the reach of Castaic Creek from Interstate 5 downstream to its confluence with the Santa Clara River. The unarmored threespine stickleback can periodically occur in Castaic Creek during winter storm events and releases from Castaic Lake. Additionally, unarmored threespine stickleback are known to occur downstream of the project site at the confluence with the Santa Clara River. These areas will be directly and indirectly affected by construction and installation of the bank protection.

In average rainfall years, parts of Castaic Creek are dry by mid-summer and remain dry until winter rains recharge the alluvium. Flows in the project area are influenced by the water releases from Castaic Lake approximately three miles upstream of the project area. When water is released from Castaic Lake, the project area supports a single and sometimes two small channels that range from shallow and open to relatively deep and heavily shaded. The main plant communities in the project area are cottonwood-willow riparian scrub, cottonwood forest and chaparral. Riparian vegetation at the project site is dominated by willows (*Salix* spp.), mulefat (*Baccharis salicifolia*) and Fremont cottonwood (*Populus fremontii*). Giant reed and tamarisk are also found in the riparian area at the project site, but are not the dominant species. Willow riparian scrub is found along the banks and bottom of the creek channel and is often subjected to scour during winter storm events. In areas where the active channel is wide, riparian vegetation is sparse or absent and areas of sand, gravel, and cobble are present. Nearly all of the uplands outside the stream banks are either developed or are heavily disturbed through agricultural or pre-grading activities.

Interstate 5 is immediately upstream of the Castaic Creek project site and the surrounding area is rapidly urbanizing. The area immediately surrounding the project site is moderately industrialized with some residential housing tracts and agricultural land.

Hasley Creek runs parallel with the east side of Commerce Center Drive. The Hasley Creek portion of the project begins approximately 900 feet south of where Commerce Center Drive crosses the previously lined Hasley Creek and continues to its confluence with Castaic Creek.

Vegetation occurring within the lower Hasley Creek project site consists of mulefat scrub and non-native grassland. Mulefat scrub and dry open floodplain is found within the drainage itself. The non-native grassland is found on the upland field next to the drainage. One coast live oak (*Quercus agrifolia)* and one cottonwood (*Populus fremontii*) exist within the proposed lower Hasley Creek project site. Hasley Creek has an approximately 20 year old Arizona-type crossing fitted with 12 inch and 16 inch PVC pipelines. The Arizona type crossing is located approximately 600 feet north of the confluence with Castaic Creek.

Arroyo toad

Surveys for the arroyo toad according to Service protocols were conducted from April to June 2001 along the project reach. No arroyo toads, tadpoles, or egg masses were observed in the project reach during the field surveys. However, suitable habitat does exist within the project reach, as well as, suitable habitat located downstream of the highway 126 overpass within Castaic Creek. The downstream suitable habitat has been surveyed for arroyo toads as part of the NRMP which also resulted in no arroyo toads, tadpoles, or egg mass observations (Impact Sciences 2001b). The presence of the arroyo toad has been documented in the Santa Clara River in locations from Castaic Junction upstream to the bridge at Bouquet Canyon (Courtois 2000; Sandburg 2001a and 2001b). Six arroyo toad tadpoles were reported within the NRMP area of the River between the I-5 bridge and Castaic Junction in 2000 (Courtois 2000). Upon further investigation, we found a report in the California Natural Diversity Data Base from 1994 of one individual arroyo toad captured and released upstream of the I-5 bridge over the River. The possibility exists that arroyo toads occurring within the Santa Clara River could colonize the project area via the downstream portion of Castaic Creek. As a result of this possibility, arroyo toads maybe killed or injured by the project activities and are therefore included as a covered species in this biological opinion. Suitable habitat does not exist for the arroyo toad within the Hasley Creek portion of the project area and therefore, those effects will not be addressed in this biological opinion.

Arroyo toads have been recorded at the following locations within the project vicinity; both above and immediately below the Castaic Lake Reservoir on Angeles National Forest and Los Angeles Department of Water and Power land within Castaic Creek; on upper San Francisquito Creek; and within the Santa Clara River adjacent to the Castaic Junction site. We consider the project area to be essential as a dispersal corridor for arroyo toads between upper Castaic Creek and the Santa Clara River.

Unarmored threespine stickleback

Surface flow in Castaic Creek is dependent on water releases from Castaic Lake. Because of the lack of surface flow and intermittent release of water from Castaic Lake, no surveys for unarmored threespine stickleback were conducted. However, unarmored threespine stickleback are known to occur downstream at the confluence with the Santa Clara River and have been observed in Castaic Creek as a result of dewatering operations for construction of the Commerce Center Drive Bridge (C. Dellith, Service, pers. obs.1999).

EFFECTS OF THE ACTION

Arroyo toads

Arroyo toads could be killed or injured, either on the ground surface or in their burrows, by vehicles associated with bank protection installation, repair, and maintenance. Trench excavation and placement of fill for temporary access roads could injure or kill arroyo toads by crushing them at the surface or within their burrows. Foot traffic by workers associated with the construction activities, biological surveys, and restoration activities could kill or injure arroyo toads. Revegetation activities involving the use of augers to dig holes for plantings could kill arroyo toads within burrows. Excavation of mounds of tailings from past sand and gravel mining operations may also kill or injure arroyo toads located in burrows. The potential for arroyo toads to be killed or injured during these activities would be greatest within riparian habitats when workers are concentrated in those areas, or at night along roads and sandy areas when arroyo toads are either actively foraging or moving to or away from Castaic Creek.

Construction activities, such as removal of riparian vegetation and movement of construction equipment in the riparian zone, could affect arroyo toads and their habitat. The project will result in a permanent loss of approximately 12.2 acres of riparian habitat. The permanent habitat loss is from construction and related activities. Approximately 8.3 acres of riparian habitat will be temporarily affected by the project activities. Loss of riparian habitat would diminish available burrowing and foraging habitat for arroyo toads.

Project-related dust, noise, and activity near habitat occupied by arroyo toads could disturb individuals to the extent that foraging and burrowing behavior could be altered. If construction activities are scheduled to occur during nighttime hours, more arroyo toads are likely to be affected due to the nocturnal behavior of this species. Although the site is not expected to be fully restored for several years following construction activities, restoration of the site and removal of invasive, exotic vegetation, as proposed by Valencia Company, would help minimize the long-term effects of the project on the arroyo toad as related to habitat degradation.

When heavy equipment is used in proximity to aquatic habitats, the potential exists that these sensitive areas may be destroyed or degraded. The direct placement of material or runoff of sediments generated by the project into aquatic habitats can result in the loss of habitat values through filling or in the degradation of water quality. Arroyo toads are likely to be particularly sensitive to both direct filling of streams and sedimentation; the shallow pools this species requires for breeding can be destroyed by the addition of relatively small amounts of material, either by direct filling or by the alteration of the sandy and gravelly substrata that the arroyo toad requires. Arroyo toads may also be particularly vulnerable to the release of toxic materials because they generally use aquatic habitats with low flows; under such environmental conditions, toxins may be more concentrated and lethal. Additionally, the slow flows associated with breeding pools may increase the likelihood that fine sediments carried into the pools would remain there smothering eggs and tadpoles. Measures proposed by the Valencia Company to

reduce sedimentation effects include Best Management Practices such as those described in the NRMP (Corps and CDFG 1998). Permanent effects would include loss of riparian habitat due to bank protection placement and soil compaction on the bank protection structure itself.

Runoff from areas where concrete is being used could cause increases in water pH. Substantial increases would kill all life stages of the arroyo toad for some distance downstream of the release; a release of such materials resulted in mortalities of California red-legged frogs and arroyo toads in Mono Creek in the Los Padres National Forest in the early 1990s. The rate of water flow and amount of released material would affect the distance over which the pH would be altered. Because such effects could extend far beyond the actual work area, the number of arroyo toads that may be killed could be substantial. Equipment storage, fueling, and staging areas would be located on upland sites a minimum of 100 feet away from the nearest surface flow; this measure would reduce the potential for arroyo toad mortality and reduce the likelihood that toxic materials would inadvertently reach aquatic habitat.

Employees of Valencia Company and other personnel associated with the project could travel outside of areas where work is occurring; such activities, particularly with vehicles, could kill or injure arroyo toads and damage their habitat. Flagging of the construction areas may help reduce intrusions. Careless workers could release toxic materials, leave garbage that would attract predators of the arroyo toad, or conduct activities outside of designated areas. Valencia Company has proposed to limit construction activities in the creek bed, and define and mark the limits of project disturbance. These measures should be effective in reducing direct mortality or injury of arroyo toads during bank protection installation.

Creek surface flows in the construction area would not be impeded; water flows would be diverted or placed into culverts in the construction area. Because surface flow diversion equipment or culverts are set in place after all arroyo toads have metamorphosed, the likelihood of arroyo toad eggs mass destruction or tadpole deaths would be reduced.

Biologists working in different areas and with different species may transmit diseases. In some cases, these introduced diseases have had catastrophic effects on amphibian populations. Some evidence exists that other environmental stresses, such as the chytrid fungus introduction into San Francisquito Creek, may exacerbate the effects of diseases on amphibians (Rick Farris, Service, pers. comm. 2002).

Arroyo toads in various life stages could be affected by trampling while the site is being accessed, or by installation of fencing material. Impacts to arroyo toad egg masses and tadpoles would be most severe if fencing were installed through breeding pools. The Corps and Valencia Company propose to survey the construction area, including breeding pools, and monitor construction activities in order to avoid arroyo toad egg masses and tadpoles to help reduce the likelihood of arroyo toad deaths.

Following the construction of bank protection, the affected reach of the creek will lack streamside vegetation. This may allow invasive, exotic vegetation to establish and become dominant in the project area, reducing habitat for the arroyo toad. To prevent the spread of exotic vegetation in the project site, the Valencia Company will remove exotic vegetation from the project area during grubbing operations, and monitor and control infestations of exotic vegetation infestation in the project area during the planned restoration and re-vegetation of the riparian habitat.

Summary

In general we expect the number of arroyo toads, tadpoles, or eggs killed or injured to be low. Mortality or injury could vary, depending on weather conditions and the amount of surface flow in Castaic Creek. If more water is present which could provide better habitat for arroyo toads, then the likelihood of effects to arroyo toads could increase. During and after years when rainfall is favorable for breeding, additional arroyo toads may move into the project area.

Ground-disturbing activities, revegetation activities, mound tailings excavation, the removal of exotic vegetation, and surveys or monitoring may cause injury and mortality of arroyo toads. We expect the project will temporarily affect 8.3 acres of arroyo toad habitat and permanently affect 12.2 acres of arroyo toad habitat. Overall, because no arroyo toads have been observed in the project area, we expect that few arroyo toads are likely to be killed or injured by project activities.

Unarmored threespine stickleback

Valencia Company indicates that, depending on the amount of precipitation from the previous winter storm season and the associated elevation of the groundwater in the project area, construction of soil cement bank protection could require substantial dewatering activities. With ongoing and substantial dewatering activities, the discharged nuisance water could connect with the Santa Clara River, allowing unarmored threespine stickleback to migrate upstream into Castaic Creek. In the event that blocking nets as proposed by Valencia Company fail and individual unarmored threespine sticklebacks move into the project area, the proposed construction activities could affect the species.

If blocking nets fail, individual unarmored threespine sticklebacks that enter the project area may be injured or crushed by excavation and construction equipment, construction debris or worker foot traffic during construction activities. The noise and ground vibrations from the operation of heavy equipment during construction activities may disturb unarmored threespine sticklebacks and cause individuals to disperse and possibly be driven into areas where they would be more susceptible to injury or mortality due to predation, vehicular or foot traffic, or falling debris. The dewatering and diversion of water from the project area could result in the direct mortality of unarmored threespine sticklebacks from dessication or crushing. The use of blocking nets, as proposed by the Valencia Company, would lessen the chance for unarmored threespine sticklebacks to enter the project area.

Furthermore, with the termination of the above dewatering activities, unarmored threespine stickleback could become stranded in Castaic Creek as the flow recedes. Percolation rates in Castaic Creek may exceed flow rates stranding unarmored threespine sticklebacks in receding pools and channels once dewatering activities have been terminated. Valencia Company proposes to gradually step-down water discharges once dewatering is no longer needed and monitor for any unarmored threespine stickleback. Service-approved biologists will capture stranded unarmored threespine stickleback and relocate them to a predetermined downstream site.

Disturbance of unarmored threespine sticklebacks would occur while capturing and transporting individuals to suitable habitat. Individuals may also be injured or killed in a seine net should it be used improperly, such as if fish remained trapped in the net or out of water for too long. Mortality following translocation may occur given the uncertainty of the survival of unarmored threespine sticklebacks in unfamiliar sites or from injuries and stress related handling and transportation. These effects would be reduced by the following actions that Valencia Company proposes: clearly marking the boundaries of the work areas, removing unarmored threespine sticklebacks from project areas to suitable habitat out of harm's way immediately prior to any construction activities, rescuing any stranded individuals, and by employing only experienced biologists to capture and handle the species.

Project-related material releases onto channel substrate or into water would result in effects to water quality that may be hazardous to unarmored threespine sticklebacks. Debris falling into the river may also degrade water quality. As proposed by the Valencia Company, the implementation of measures to control pollution, such as refueling at designated areas and containment of spilled substances, would reduce these effects.

Employees of the Valencia Company and other personnel associated with the project could travel outside of areas where work is occurring; such activities, particularly with vehicles, could kill or injure unarmored threespine stickleback. Careless workers could release toxic materials, leave garbage and food-related items that would attract predators of the unarmored threespine stickleback, or conduct construction related activities outside of designated areas. Flagging of the construction areas may help reduce intrusions.

To reduce the likelihood that all of the preceding impacts would occur, the Corps and Valencia Company have proposed to educate workers regarding the presence of the arroyo toad and unarmored threespine stickleback and the importance of keeping work sites clear of trash and remaining within authorized work areas (A. Allen, pers. comm. 2002). Such education programs, when used during other projects that could affect listed species, have been effective in preventing loss and degradation of habitat and loss of individuals.

Summary

Under normal conditions, as determined by controlled water releases from Castaic Lake Reservoir, unarmored threespine stickleback would not occur in Castaic Creek. However, sufficient surface flows from dewatering of the project site could connect at the confluence with

the Santa Clara River allowing unarmored threespine stickleback to swim upstream into the project site. Termination of dewatering operations and stream diversion activities may leave unarmored threespine stickleback stranded in receding stream water and could likely result in mortality or injury of some individuals.

Repeated capturing of unarmored threespine sticklebacks would likely result in mortality or injury of at least some individuals. Even under the worst case scenario, that is, the mortality of a few unarmored threespine sticklebacks from construction activities or seining and handling, the overall population status of the species in the watershed would not be substantially altered by the proposed action.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The habitat and home range of arroyo toads vary in accordance with water flows and individuals may be found throughout the uplands within Castaic Creek. Consequently, the construction of the industrial complexes could effect the population of arroyo toads that could possibly occur in the Commerce Center project area. Upland areas immediately adjacent to the project site will be developed into industrial and commercial uses. The development will include light industrial, manufacturing, research and development, warehouses and distributors. The loss of upland habitat could reduce area needed by arroyo toads for foraging and dispersal.

CONCLUSION

After reviewing the current status of the arroyo toad and unarmored threespine stickleback, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the Castaic Creek bank stabilization project, as proposed, is not likely to jeopardize the continued existence of either of these species. We have reached this conclusion for the following reasons:

1. The number of arroyo toads and unarmored threespine stickleback that could be affected by the Castaic Creek bank stabilization projects is small in relation to the overall distribution of the species. Surveys of the area did not detect arroyo toads or unarmored threespine stickleback within the project site and we do not believe those that could be affected would constitute a substantial portion of the entire species' population to where it would interfere with the species' survival and recovery.

2. The applicant has proposed measures to minimize and avoid some of the adverse effects to the species, including monitoring the project are for arroyo toads or unarmored

threespine sticklebacks by Service-approved biologists; providing procedures for relocating listed species out of harm's way, and restoration of temporary disturbance areas.

3. The applicant has proposed measures to restore disturbed habitats.

4. Blocking nets installed by the applicant should prevent unarmored threespine stickleback from entering project related flows that may contact non-project flows in Castaic Creek or the Santa Clara River. Therefore, the number of individual unarmored threespine sticklebacks expected to be affected is small.

The Incidental Take Statement accompanying this Biological Opinion exempts from the take prohibitions of the Act, take of the unarmored threespine stickleback and arroyo toad carried out in accordance with the terms and conditions of the Incidental Take Statement. It does not address the restrictions or requirements of other applicable laws.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the Valencia Company, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the Valencia Company to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the effect of incidental take, the Corps and Valencia Company must report to the Service the progress of the action and its effect on the species as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Arroyo toad

The Service anticipates incidental take of the arroyo toad will be difficult to detect for the following reasons: (1) the numbers of individuals that could be present is unclear; (2) the arroyo toad is generally difficult to detect due to its cryptic coloration and small body size; (3) finding a dead or impaired specimen is unlikely; and (4) losses may be masked by seasonal fluctuations in numbers or other causes (*e.g.*, low rainfall years, changes in hydrology unrelated to the projects). However, the following level of take of this species can be anticipated by loss of habitat, temporary construction effects, cumulative effects, changes in hydrology and water quality, and indirect effects:

> If arroyo toads have colonized the project area and are present during project activities then all arroyo toads found in the project areas may be subject to take in the form of capture during relocation efforts. An indeterminate number of arroyo toads may be directly killed or injured by construction activities (*e.g.*, placement of bank stabilization materials, heavy equipment movement in the streambed, etc.) along Castaic Creek. Based on the nature of the proposed activities and the protective measures proposed by the applicant, and the likely low abundance of individuals of the species, we anticipate that few arroyo toads will be killed or injured.
>
> If more than one (1) adult, juvenile (metamorph), or larval arroyo toad is killed or injured or if any egg masses are disturbed during implementation of the project along Castaic Creek, regardless of cause, the Corps shall contact our office immediately so we can review the project activities to determine if additional protective measures are needed. Project activities may continue during this review period, provided that all protective measures proposed by the Corps and the terms and conditions of this biological opinion have been and continue to be implemented. No take of arroyo toads is anticipated in Hasley Canyon, as no arroyo toads are expected to be present based upon the lack of suitable habitat.

Unarmored threespine stickleback

No take of unarmored threespine stickleback would occur if the minimization measures proposed by the Corps and Valencia Company are effective. However, if unarmored threespine stickleback are able to breach blocking nets and access the project area, then some level of take is anticipated. Also, if unarmored threespine sticklebacks have entered the project area and are present during dewatering activities then all unarmored threespine sticklebacks found in the project produced flows may be subject to take in the form of capture during relocation efforts. The actual number of unarmored threespine sticklebacks that may be taken cannot be accurately predicted because of their small size and varying abundance in a given location. Because we are unable to anticipate with a great deal of certainty the number that may be killed or injured, the Corps shall contact the Service if more than one (1) unarmored threespine stickleback is killed or injured; the cause of death or injury shall be determined by the authorized biologist. Provided

that the protective measures proposed by the Corps and the terms and conditions of this biological opinion are being fully implemented, construction activities need not cease while the cause of death is being determined. Once the cause of death or injury has been determined, the Service and Corps shall decide whether any additional protective measures are required to address the cause of the loss of the unarmored threespine stickleback.

Take of arroyo toads and unarmored threespine sticklebacks are only exempted within the areas considered to be the action area as defined in the project description section of this biological opinion.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the arroyo toad and unarmored threespine stickleback:

1. Only Service-approved personnel may handle arroyo toads and unarmored threespine stickleback and only in an appropriate manner and for the minimum time necessary.

2. The Corps shall require that all activities that include diversion or dewatering, including restoration of flows after construction, shall be monitored by an approved biologist to locate and transfer to a safe area any arroyo toads, as well as unarmored threespine stickleback imperiled by the action.

3. The Corps shall require Valencia Company to confine all work to defined areas through barriers and education of workers. The education program shall include information on all relevant aspects of the measures intended to protect the arroyo toad and unarmored threespine stickleback.

4. The Corps shall ensure plans relating to the inadvertent release of hazardous materials are in place prior to the onset of ground-disturbing activities.

5. The Corps shall ensure that protective measures for the arroyo toad and unarmored threespine stickleback are consistently implemented.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Corps must ensure that Valencia Company complies with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

   a. Only qualified personnel authorized under the auspices of this biological opinion shall handle arroyo toads and unarmored threespine stickleback. The Corps or Valencia Company shall submit the credentials of biologists who they wish to handle arroyo toads and unarmored threespine stickleback to the Service, for its review and written approval, at least 15 days prior to the onset of the activities which they may be authorized to conduct.

   b. When capturing and removing arroyo toads and unarmored threespine stickleback from work sites, the Service-approved biologist shall minimize the amount of time that animals are held in captivity. During this time, they shall be maintained in a manner that does not expose them to temperatures or any other environmental conditions that could cause injury or undue stress.

   c. To avoid transferring disease or pathogens between aquatic habitats during the course of surveys and handling of arroyo toads, the Service-approved biologist shall follow the Declining Amphibian Population Task Force's Code of Practice. A copy of this Code of Practice is enclosed. You may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care shall be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

   d. With the exception of monitoring geared directly for arroyo toads, biological, hydrological, and other monitoring shall not be conducted within or adjacent to arroyo toad breeding pools or in areas where metamorph arroyo toads are abundant. The determination of abundance of metamorphs shall be made by the Service-approved biologist. The primary criterion to be used in determining if work in a given area must be delayed is whether the monitoring activities are likely to result in mortality of one metamorph. If the Service-approved biologist makes this determination and mortality cannot be avoided through the implementation of site- and instance-specific measures, the monitoring activity shall be delayed until such time when metamorphs are no longer abundant; alternatively, the monitoring shall be moved to another site. When in doubt regarding (1) whether metamorphs should be considered abundant; or, (2) whether the site- and instance-specific protective measures will protect metamorphs, the Service-approved biologist shall contact the Ventura Fish and Wildlife Office and Corps for guidance. Telephone contact may be used to expedite resolution of the issue.

   e. Arroyo toads and unarmored threespine stickleback shall be removed from the project area within and around all areas where construction or related activities occur. The procedures proposed by Valencia Company, as modified by these

terms and conditions, shall be implemented during the installation of channel lining. The breeding pools within project area shall be inspected during the arroyo toad breeding season for egg masses. If egg masses are found, then pools shall be flagged for avoidance until metamorphs have dispersed.

2. The following terms and conditions implement reasonable and prudent measure 2:

   a. The service-approved biologist shall assist project personnel in selecting the point(s) at which diversion and dewatering would disrupt the least amount of stream flow necessary to achieve project goals.

   b. The approved biologist shall be on site when dewatering is terminated in the event that arroyo toad tadpoles or unarmored threespine stickleback could become stranded during this activity.

3. The following terms and conditions implement reasonable and prudent measure 3:

   a. The service-approved biologist, in conjunction with Valencia Company and any contractors, shall determine the boundaries of work, storage, access, and staging sites. Habitat to be disturbed shall be restricted to the minimum necessary to accomplish the bank protection construction, given topography, project needs, and safety considerations.

   b. The boundary of work, storage, access, and staging sites shall be clearly marked by flagging or temporary fencing. Vehicles and all construction activities shall remain within the well-defined construction area, designated access roads, and staging areas.

   c. Intrusion by unauthorized vehicles into the creek bed and outside of construction limits shall be prohibited, with control exercised by an on-site foreman. Access routes to the construction area outside of work hours shall be blocked with physical barriers, such as chain-link fencing, concrete blocks or large equipment.

   d. A Service-approved biologist(s) shall conduct a training session for all project personnel prior to the onset of any ground-disturbing activities within the action area. At a minimum, the training shall include a description of the arroyo toad and unarmored threespine stickleback and their habitats; the general provisions of the Endangered Species Act; the necessity for adhering to the provisions of the Act; the penalties associated with violating the provisions of the Act; the specific measures that are being implemented to conserve the arroyo toad during construction; and the boundaries within which the specific actions may be accomplished. The program shall also cover the restrictions and guidelines that must be followed by all construction personnel to reduce or avoid effects on these species during project implementation.

4. The following term and condition implements reasonable and prudent measure 4:

   Prior to the onset of any ground-disturbing activity from the proposed action within or adjacent to arroyo toad or unarmored threespine stickleback habitat, the Corps shall review Valencia Company's plans to prevent the inadvertent spills of hazardous materials and to remediate any such spill that may occur. These plans shall specifically discuss the implications of spills in habitat of the arroyo toad and unarmored threespine stickleback and include methods to remediate these spills in the least damaging manner.

5. The following terms and conditions implement reasonable and prudent measure 5:

   a. The Service-approved biologist(s) shall have the authority to stop specific work activities until appropriate corrective measures are taken when unintended effects to arroyo toads or unarmored threespine sticklebacks occur. If an arroyo toad or an unarmored threespine stickleback is observed within a designated work area and cannot be avoided, all work shall stop until the animal leaves the work area or until it is captured and relocated by a Service-approved biologist to outside of the work area to avoid injury or mortality.

   b. If Valencia Company does not implement the protective measures for the arroyo toad or unarmored threespine stickleback, the Corps shall suspend work on that particular phase of Castaic/Hasley Creek channel lining project until such time that the Valencia Company is again in full compliance.

REPORTING REQUIREMENTS

The Corps shall provide a written annual report to the Service by January 31 of each year that this biological opinion is in effect. The report shall document the number of arroyo toads and unarmored threespine stickleback killed or injured by project activities. The report shall also provide a summary of the previous year's activities and their effects on the arroyo toad and unarmored threespine stickleback.

The report shall contain information on the following: (1) the type of activities that occurred in the action area (*e.g.*, construction activities, monitoring); (2) the location of these activities; (3) a description of the habitat in which these activities occurred; (4) the number of arroyo toads and unarmored threespine sticklebacks affected; (5) steps taken to avoid or minimize effects; (6) the number of arroyo toads and unarmored threespine sticklebacks relocated (as defined in the reasonable and prudent measures); (7) the locations from which arroyo toads and unarmored threespine sticklebacks were moved and to which they were relocated; (8) the status of removal activities for exotic vegetation; (9) the results of any surveys conducted for the arroyo toad and unarmored threespine stickleback in the previous year; (10) an analysis of the effectiveness of the monitoring plan and action levels and recommendations for any changes to the plan and action levels; and (11) any other pertinent information. The first report will be due the first January after the initiation of ground-disturbing activities.

DISPOSITION OF DEAD OR INJURED SPECIMENS

Upon locating a dead or injured arroyo toad or unarmored threespine stickleback, initial notification must be made in writing to the Service's Division of Law Enforcement in Torrance, California (370 Amapola Avenue, Suite 114, Torrance, California 90501) and by telephone and writing to the Ventura Fish and Wildlife Office in Ventura, California, (2493 Portola Road, Suite B, Ventura, California 93003, (805) 644-1766) within three working days of the finding. The report shall include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Care shall be taken in handling dead specimens to preserve biological material in the best possible state for later analysis. Should any injured arroyo toads or unarmored threespine stickleback survive, the Service shall be contacted regarding their final disposition. The remains of arroyo toads or unarmored threespine stickleback shall be placed with the University of California at Santa Barbara [Contact: Mark Holmgren, University of California at Santa Barbara, EEMB Department, Santa Barbara, California, 93106, (805) 893-4098]. Arrangements regarding proper disposition of potential museum specimens shall be made with the University of California by the Corps or Valencia Company prior to implementation of any actions.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species, to help implement recovery plans, or to develop information.

1. The Corps should evaluate the effects of water withdrawals or surface flow diversions on the moisture content of stream side banks to determine whether burrowing arroyo toads may be affected.

2. The Corps should conduct studies to increase our understanding of the population dynamics of the arroyo toad and unarmored threespine stickleback in this area. Such studies could include radio-tagging of adult arroyo toads and full surveys of this reach of the Castaic Creek during the breeding season. This type of research and the data obtained could greatly assist the Corps and Valencia Company in future consultations within arroyo toad habitat.

3. Valencia company should pursue additional vegetation enhancement, exotic plant removal, and African clawed frog control opportunities in the Castaic Creek corridor to further the recovery of the arroyo toad and unarmored threespine stickleback.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the Corps proposed Castaic Creek Channel Lining project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Chris Dellith of my staff at (805) 644-1766.

Sincerely,

Carl T. Benz
Assistant Field Supervisor
South Coast/Deserts

Enclosure

cc: Betty Courtney, California Department of Fish and Game

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The Declining Amphibian Populations Task Force Fieldwork Code of Practice

1. Remove mud, snails, algae, and other debris from nets, traps, boots, vehicle tires, and all other surfaces. Rinse cleaned items with sterilized (*e.g.*, boiled or treated) water before leaving each study site.

2. Scrub boots, nets, traps, and other types of equipment used in the aquatic environment with 70 percent ethanol solution or a bleach solution of one-half to one cup of bleach in one gallon of water and rinse clean with sterilized water between study sites. Avoid cleaning equipment in the immediate vicinity of a pond, wetland, or riparian area.

3. In remote locations, clean all equipment with 70 percent ethanol or a bleach solution, and rinse with sterile water upon return to the lab or a "base camp." Elsewhere, when laundry facilities are available, remove nets from poles and wash (in a protective mesh laundry bag) with bleach on a "delicate" cycle.

4. When working at sites with known or suspected disease problems, or when sampling populations of rare or isolated species, wear disposable gloves and change them between handling each animal. Dedicate separate sets of nets, boots, traps, and other equipment to each site being visited. Clean and store them separately at the end of each field day.

5. Safely dispose of used cleaning materials and fluids. Do not dispose of cleaning materials and fluids in or near ponds, wetland, and riparian areas; if necessary, return them to the lab for proper disposal. Safely dispose of used disposable gloves in sealed bags.

6. When amphibians are collected, ensure the separation of animals from different sites and take great care to avoid indirect contact *(e.g.*, via handling or reuse of containers) between them or with other captive animals. Do not expose animals to unsterilized vegetation or soils which have been taken from other sites. Always use disinfected and disposable husbandry equipment.

7. If a dead amphibian is found, place it in a sealable plastic bag and refrigerate (do not freeze). If any captured live amphibians appear unhealthy, retain each animal in a separate plastic container that allows air circulation and provides a moist environment from a damp sponge or sphagnum moss. For each collection of live or dead animals, record the date and time collected, location of collection, name of collector, condition of animal upon collection, and any other relevant environmental conditions observed at the time of collection. Immediately contact the Ventura Fish and Wildlife Office at (805) 644-1766 for further instructions.

The Fieldwork Code of Practice has been produced by the Declining Amphibian Populations Task Force with valuable assistance from Begona Arano, Andrew Cunningham, Tom Langton, Jamie Reaser, and Stan Sessions.

For further information on this Code, or on the Declining Amphibian Populations Task Force, contact John Wilkinson, Biology Department, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.
E-mail: DAPTF@open.ac.uk
Fax: +44 (0) 1908-654167

Appendix 5.5i

Castaic Creek CLOMR

FEMA Application – Conditional Letter of Map Revision

Castaic Creek Bank Protection for Valencia Commerce Center (From I-5 Freeway to Commerce Center Drive) ESTU No. 2023000144

June 2024
July 2023 (Revised)
May 2023 (Revised)
March 2023 (Revised)

Prepared For:

FIVEPOINT

FivePoint Communities, LLC
25124 Springfield Court
Valencia, CA 91335

Prepared By:

PACE
Advanced Water Engineering

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Contact Person:

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PACE JN A535

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F. ESA Documentation
G. As-Built Drawings for Flow Diversion Berm (P.D. 2298, Unit III)

1 Introduction

Please find enclosed an application for a Conditional Letter of Map Revision (CLOMR) for the Soil Cement Bank Protection Project along Castaic Creek. The project is located within the unincorporated area of Los Angeles County, three miles west of the City of Santa Clarita, as shown on the vicinity map in Figure 1-1. The study reach of Castaic Creek for this project extends from downstream of Commerce Center Drive to upstream of the Old Road bridge and I-5 bridges, and is approximately 12,500 feet in length. The project involves the implementation of soil cement channel improvements for the Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108. The proposed project is located in special flood hazard area Zone AE. The AE zone indicates base flood elevations have been established by a previous study.

The effective FEMA Flood Insurance Rate Map (FIRM) panels at the Castaic Creek study reach were updated as part of a Physical Map Revision (PMR) in June 2021. A subsequent Letter of Map Revision (LOMR) updated the FIRM panels downstream of Commerce Center Drive Bridge to Highway 126 on October 12, 2021.

The present CLOMR application is in support of a request for the revision of FEMA Flood Insurance Rate Map (FIRM) panels 06037C0805G, 06037C0815G, and 06037C0792G, as shown on the Effective FIRM in Figure 1-2. The Castaic Creek Soil Cement Bank Protection Project incorporates more current 2013 topographic data as the basis for the updated hydraulic analysis using HEC-RAS version 6.2.

1.1 Project Background and Description

The Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 requires bank protection along Castaic Creek. The proposed improvements along Castaic Creek consist of approximately 8,400 lineal feet (LF) of soil cement bank protection broken up into three segments.

(1) Proposed **"West"** Soil Cement Bank Protection - an approximately 4,000-LF section of soil cement bank protection on the west bank beginning near the confluence of Castaic Creek and Hasley Creek and extending to the existing concrete slope lining (PD No. 1982) adjacent to Live Oak Road

(2) Proposed **"Southeast"** Soil Cement Bank Protection – an approximately 3,000-LF section of soil cement bank protection on the east bank that will extend from Commerce Center Drive (CCD) Bridge to the existing rip-rap slope protection (PD No. 2441)

(3) Proposed **"Northeast"** Soil Cement Bank Protection – an approximately 1,400-LF section of soil cement bank protection on the east bank, that begins at the northern end of the existing rip-rap slope protection (PD No. 2441) to the Old Road Bridge

Figure 1-3 details the extents of the proposed bank improvement in addition to the existing bank protection along Castaic Creek. The soil cement bank protection will provide scour and flood protection up to the Los Angeles County 50-year Capital Storm Event (Capital Flood or Q_{cap}). The soil cement bank protection section will be constructed 8 feet wide with 6- to 12- inch thick layers of soil cement at a 1.5 H : 1 V slope. Installation of the proposed soil cement bank protection will involve backfill grading. In addition, there will be some minor channel regrading along a portion of the "West" soil cement bank protection between HEC-RAS cross sections 11620.14 to 11272 to lower portions of an existing topographic feature which will result in a widened floodplain.

P:\A535\6-GIS\Projects\CastaicCreek_CLOMR\CastaicCreek_CLOMR.aprx - Figure 1-1 Project Vicinity Map

VALENCIA COMMERCE CENTER
CASTAIC CREEK CLOMR

PROJECT VICINITY MAP

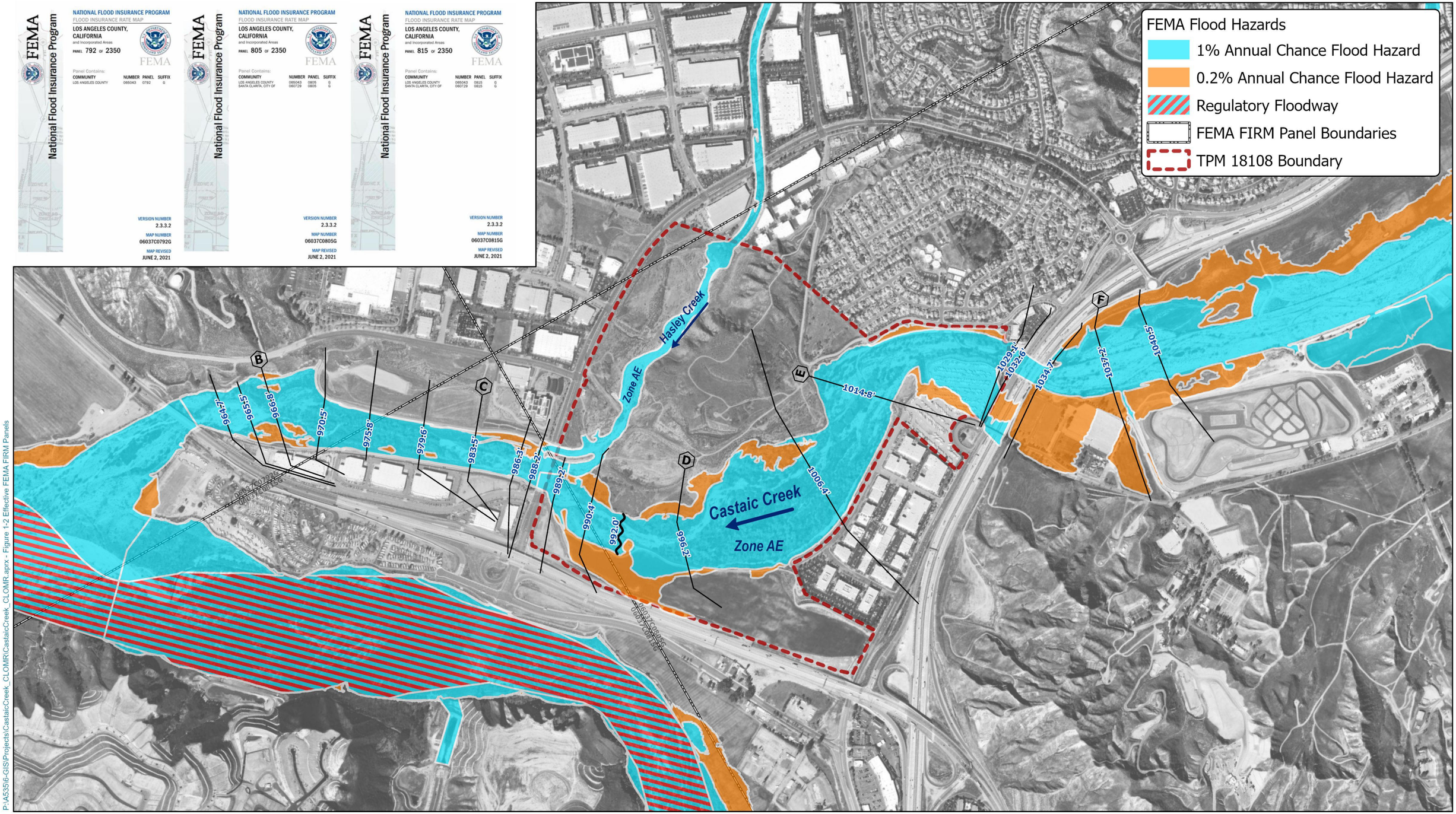
PACE Advanced Water Engineering

0 750 1,500 3,000 Feet

Date: 3/10/2023

Job Number: A535

Figure 1-1



P:\A535\6-GIS\Projects\CastaicCreek_CLOMR\CastaicCreek_CLOMR.aprx - Figure 1-2 Effective FEMA FIRM Panels

VALENCIA COMMERCE CENTER
CASTAIC CREEK CLOMR

EFFECTIVE FEMA FIRM PANELS

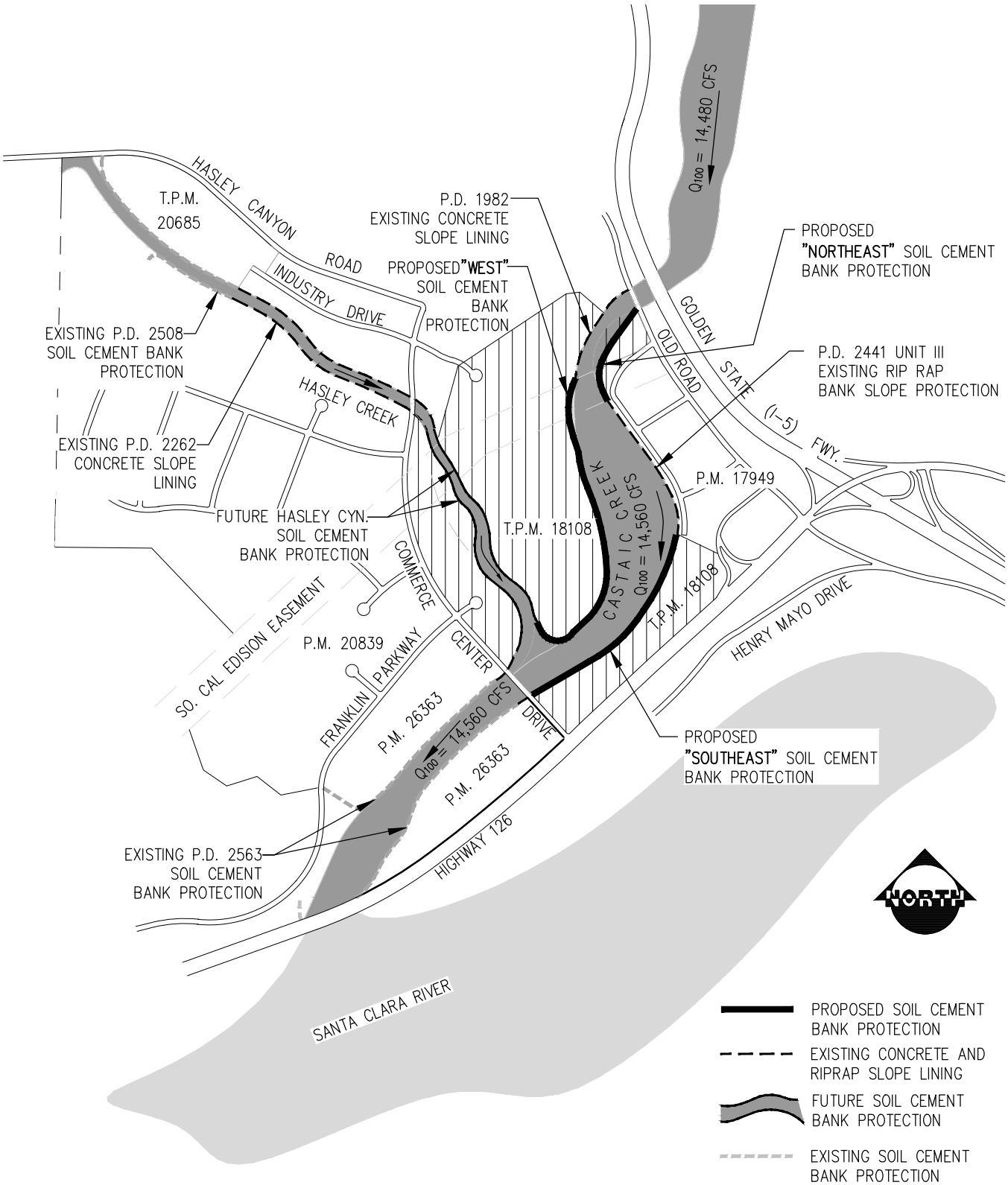
PACE Advanced Water Engineering

0 500 1,000 2,000 Feet

Date: 9/13/2023

Job Number: A535

Figure 1-2



PACE
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SCALE	N.T.S.
DESIGNED	E.M.R.
DRAWN	B.D.P.
CHECKED	J.C.
DATE	FEB, 2023
JOB NO.	A535

CASTAIC CREEK
SOIL CEMENT BANK PROTECTION
TPM # 18108

PROPOSED SOIL CEMENT LOCATION MAP

FIGURE 1-3

P:\A535\Engineering\A535-73_Castaic Creek CLOMR\exhibits\A535.73-Figure-1.3.dwg By: erandig Date: Mar. 08, 2023 Time: 04:28 pm

2 Model Background and Development

2.1 Hydrology

The project site is located within Castaic Creek watershed, which has a drainage area of approximately 16.8 square miles. Based on the Flood Insurance Study (FIS), dated June 2021, the flow rates for the 100 storm event are 14,480 cfs upstream of the Golden State Freeway (I-5) Bridge, a flow rate of 14,560 downstream of the Old Road Bridge, and a flow rate of 11,805 approximately 2,100 feet upstream of the confluence with Charlie Canyon. Table 2-1 below summarizes the design and FEMA flows rates for Castaic Creek within the study reach.

Table 2-1: Design Hydrology

Storm Event/ Return Period	Design Flow (cfs)[(1)]	Location
100 – Year	14,130	Approximately 0.9 miles upstream of Golden State Freeway
100 – Year	14,480	At Golden State Freeway
100 – Year	14,560	At confluence with Santa Clara River
500 – Year	31,340	Approximately 0.9 miles upstream of Golden State Freeway
500 – Year	32,120	At Golden State Freeway
500 – Year	32,290	At confluence with Santa Clara River

Notes:
(1) Source FEMA FIS for Los Angeles County and Incorporated Areas, June 2, 2021

2.2 HEC-RAS Model Development

To fully analyze the study reach of Castaic Creek near the proposed project, a detailed hydraulic model was developed using the computer application program, HEC-RAS Version 6.2. PACE obtained the effective model for Castaic Creek from FEMA that incorporated the most recent map revisions from the LOMR dated October 2021. PACE used a truncated version of the effective model for the present analysis that includes the corrected effective/ updated existing and proposed condition models. The PACE model extends from upstream of the Highway 126 Bridge (XS 4427.71) to approximately 1,800 feet upstream of the Old Road and I-5 Bridges (XS 16960.02), for a total floodplain study reach length of approximately 12,500 feet.

Three HEC-RAS models were studied as part of the analysis: (1) Duplicate Effective Hydraulic Model, (2) Corrected Effective Model/ Updated Existing Conditions Model, and (3) Proposed Conditions Model

2.2.1 Model Preparation

Hydraulic modeling was performed using HEC-RAS, a computer modeling software developed by the U.S. Army Corps of Engineers (USACE). HEC-RAS is a rigid boundary hydraulic model that assumes the channel bed does not fluctuate, and develops a one-dimensional solution of the energy equation. To do this, energy losses are evaluated by friction through Manning's equation and contraction/expansion is based on the coefficient and change in velocity head. When bridges and confluences are present, the momentum equation or pressure flow/weir equation is used to manage these situations of rapidly varying water surface profile. Per FEMA requirements, the model was run with a subcritical flow regime.

2.2.1.1 FEMA Designations

The proposed project is located within SFHA Zone AE; a detailed hydraulic analysis has been previously performed and there are BFE's provided by FEMA. FEMA supplied the current effective model and hydrologic and hydraulic data to PACE.

2.2.2 *Model Overview*

The following guidelines and assumptions were used to develop the various hydraulic analyses with the HEC-RAS model:

- Cross Section Spacing Intervals
- Cross Geometry Section Geometry
- Discharge
- Flow Regime
- Boundary Conditions
- Selection of Manning roughness – 'n' Values
- Bank Station Definition
- Ineffective Flow Areas
- Hydraulic Structure Data – Bridge

2.2.2.1 *Cross Section Spacing Intervals and Geometry*

The cross section location and spacing were developed using the effective FEMA model for Castaic Creek. These cross sections are generally spaced approximately 350 to 550 feet apart, as shown in the HEC-RAS Workmap in Figure 2-1. The cross sections from the supplied effective HEC-RAS model were elongated at XS 12271.99 and XS 11954.94 in the current analysis to capture the proposed "West" bank protection.

The corrected effective cross sections were cut from 2013 topographic data of Castaic Creek. For the proposed project conditions, the cross-section data was altered to match the design plans for the proposed soil cement bank protection.

2.2.2.2 *Discharge*

The discharges used for the Castaic Creek analysis were obtained from the FEMA FIS and applied in accordance with the effective FEMA model from 2021. Although the FIS study specifies more detailed flows, the flows in the FEMA model were chosen as they are more conservative. Table 2-2 below shows a summary of all storm event flowrates.

Table 2-2: Summary of Storm Event Flow Rates

HEC-RAS Cross Section	HEC-RAS Section Location Description	100-yr Storm Event	500-yr Storm Event
16960.02	Approximately 1,800ft Upstream of the Old Road Bridge and I-5 Bridges	14,480	32,120
14991.85	In-Between the Old Road Bridge and I-5 Bridges	14,560	32,290

2.2.2.3 *Hydraulic Flow Regime*

The hydraulic analyses were performed in a "subcritical" flow regime. A "mixed" flow regime would more closely reflect the actual conditions that would naturally occur in the hydraulic system, but the intent of the floodplain hydraulic models is strictly for defining flood hazards per FEMA standards. It should be noted, however, that in observing the results from the "subcritical" flow regime and the "mixed" flow regime runs, the water surface elevations and velocities did not change.

2.2.2.4 *Topographic Data Source*

The five-foot aerial topography from 2013 (covering this project's study reach of Castaic Creek) was available through PACE's consultant Kimley-Horn. This topography and all elevations are in North American Vertical Datum of 1983 (NAVD83).

2.2.2.5 Boundary Conditions

In order to tie into the existing FEMA floodplains, the boundary conditions for the 100-yr and 500-yr flow profiles were set to the known water surface elevation from the effective model, and summarized in the table below.

Table 2-3: Known Water Surface Elevation (WSE) Boundary Conditions

Storm Event	Boundary Condition Location*	HEC-RAS Cross Section	Known WSE from 2021 LOMR
100 – yr	U/S	16960.02	1043.7
	D/S	4427.711	964.7
500 – yr	U/S	16960.02	1045.15
	D/S	4427.711	968.33

* U/S indicates Upstream and D/S indicates Downstream

For all other flow profiles analyzed the upstream and downstream boundary conditions were taken as a "normal depth slope" or slope-area method, which is determined from the natural downstream slope of the existing streambed. The selection of the boundary conditions in the model is not that critical for this study since the upstream and downstream limits of the model are a significant distance away from the proposed soil cement bank protection.

2.2.2.6 Selection of the Manning's Roughness Value

The FEMA FIS report specifies manning's roughness for Castaic Creek as 0.046 - 0.050 within the channel and 0.045 - 0.070 for the overbanks. Manning's roughness values within the model were set to match those specified in the effective FEMA model for Castaic Creek.

2.2.2.7 Bridge Modeling

The Energy, Momentum, and Yarnell methods were used to calculate the hydraulics of the bridges for the HEC-RAS low flow computations. The model was set to use the highest energy answer. For high flow computations the pressure/ and or weir equations were used. These methods match those used for bridges in the provided effective FEMA model.

The internal bridge geometry provided for Commerce Center drive in the FEMA duplicate effective model was found to be incorrect. The bridge was shifted significantly towards the West bank of the channel and no longer within the downstream internal bridge cross section. This created a reduction in conveyance area through the bridge which impacts the water surface elevations upstream and downstream of the bridge. The internal bridge geometry was adjusted to the proper location in the corrected effective/ updated existing condition and proposed condition models. A comparison between the FEMA internal bridge geometry and updated corrected effective geometry for the Commerce Center Drive Bridge is presented in Appendix C.

2.2.2.8 Ineffective Flow Areas

Ineffective flow markers are incorporated in the model to establish the portion of the channel in each cross section with effective flow. Overbank areas are considered ineffective flow areas until flows reach a specific elevation, after which the effective channel widens to accommodate the higher flows. Ineffective flow markers were set to match those specified in the effective FEMA model. In the corrected effective model, additional flow markers were used downstream of the Old Road bridge to specify the area of abrupt expansion on both sides of the channel.

2.3 Castaic Creek and Hasley Canyon Creek Confluence Modeling Approach

The confluence of Castaic Creek with Hasley Canyon Creek was modeled according to the FEMA FIS and effective models. The effective model shows that the discharge for the reach of Castaic Creek extending from the Old Road Bridge and I-5 Bridges to the Santa Clara river is 14,560 cfs (see Section 2.2.2.2). This specified discharge takes into account the flow from Hasley Canyon Creek. Applying this flow rate upstream of the confluence ensures that the widest floodplain is produced at the confluence. Like Castaic Creek, the

Hasley Canyon Creek CLOMR (ESTU No. 2023000284/ CASE# 23-09-0839R, approval pending) is modeled according to the FEMA FIS and effective model. Flow is modeled on both sides of the flow diversion berm to produce the widest floodplain for Hasley Canyon Creek as it confluences with Castaic Creek.

2.4 Summary of CLOMR HEC-RAS Models

In summary, the Castaic Creek CLOMR includes the following condition models:

(1) Duplicate Effective Hydraulic Model:

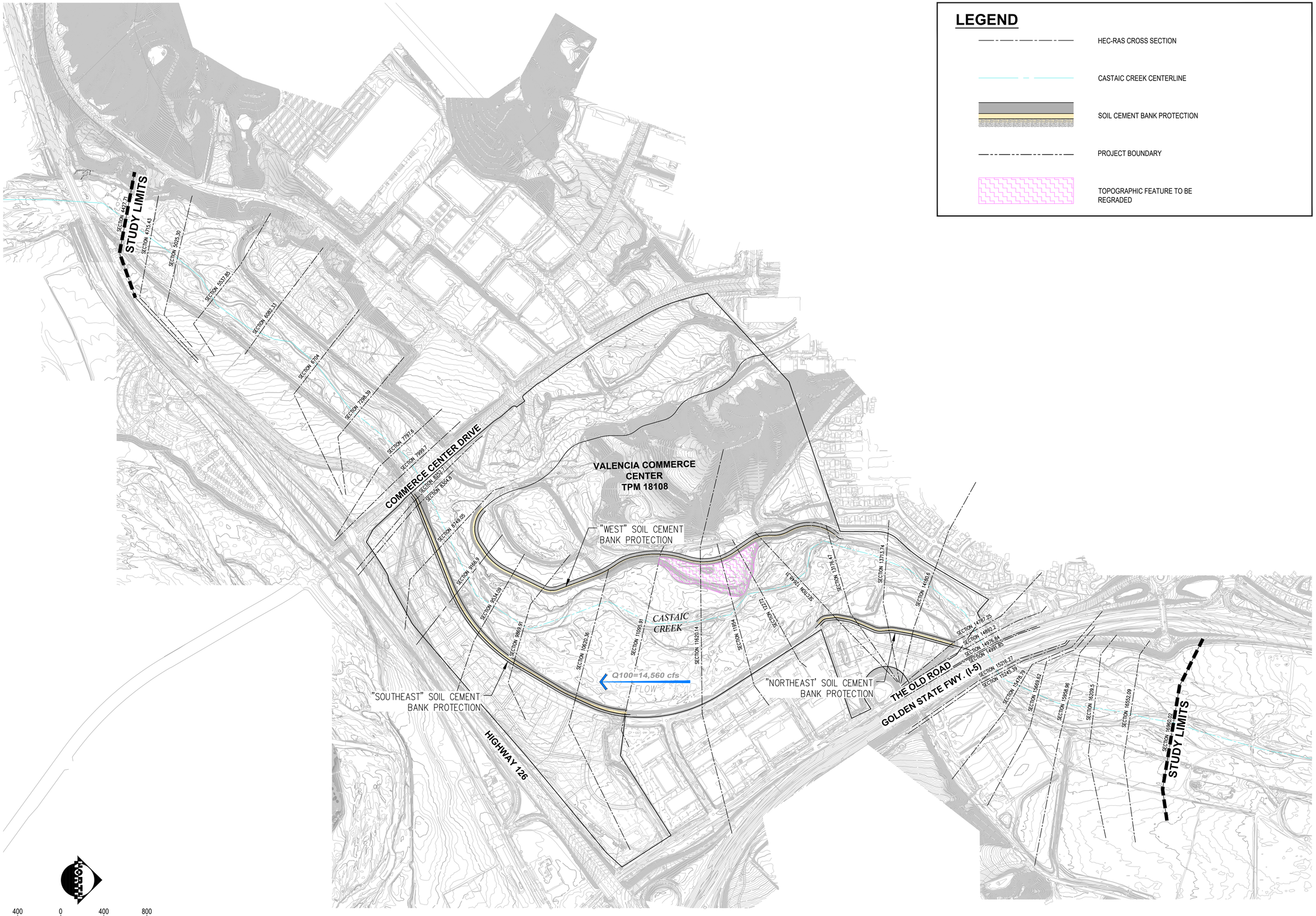
FEMA defined model truncated to study area of interest. Note, the internal bridge geometry at Commerce Center Drive was found to be incorrect within this model.

(2) Corrected Effective Model/ Updated Existing Conditions Model:

Cross sections cut from 2013 topography with tie-in to the current effective model using known water surface elevations as the boundary conditions. The internal bridge geometry at Commerce Center drive was corrected. This model does not include the proposed soil cement bank protection.

(3) Proposed Conditions Model

Cross sections cut from 2013 topography with tie-in to the current effective model using known water surface elevations as the boundary conditions. The internal bridge geometry at Commerce Center drive was corrected. Includes the proposed “West,” “Northeast,” and “Southeast” soil cement bank protection.



NO	BY	DATE	REVISIONS	DATE	APP.

REGISTERED PROFESSIONAL ENGINEER
JOSE CRUZ
No. 72249
Exp. 06-30-22
CIVIL
STATE OF CALIFORNIA

PREPARED BY
JOSE CRUZ
PROJECT ENGINEER
R.C.E. NO. -- #XXXX
EXP. XX/XX/XX
DRAWN MMT
SCALE
DESIGNED EMR
CHECKED JC
DATE 02/09/23

TITLE
CASTAIC CREEK
CLOMR
HEC-RAS WORKMAP

JOB
CASTAIC CREEK
VALENCIA COMMERCE CENTER
Los Angeles County CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

FIGURE
4-1

JOB NO. A535

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3 Proposed Soil Cement Bank Protection

The proposed channel improvements at Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 consist of soil cement bank protection combined with launch stone rip-rap along both banks of Castaic Creek. Below is a summary of the soil cement bank protection design.

3.1 Bank Protection Description

The proposed soil cement bank protection will be constructed in three segments, "West," "Northeast," and "Southeast." The bank protection proposed for the west bank will be constructed as a continuous section beginning near the confluence of Castaic Creek and Hasley Creek and extending roughly 4,000 LF upstream, where it will join the existing concrete slope lining (PD No. 1982) adjacent to Live Oak Road. The bank protection proposed for the east bank will be constructed in two separate sections due to an existing rip-rap slope protection (PD No. 2441-Unit II) located adjacent to Hancock Parkway. The southeast section of the proposed bank protection will be approximately 3,000 LF and will extend from the Commerce Center Drive (CCD) Bridge to the existing rip-rap slope protection (PD No. 2441). The northeast section of the proposed soil cement bank protection will be around 1,400 LF and extends from the existing rip-rap slope protection (PD No. 2441) to the Old Road Bridge.

As part of the installation of the proposed bank protection, the Castaic Creek channel will be regraded to remove a topographic feature along the "West" soil cement bank protection. The area to be regraded is shown in Figure 2-1. The channel in the vicinity of HEC-RAS Cross section (XS) 14787.25 to XS 12648.31, approximately 1,000 feet downstream of the Old Road Bridge and XS 12648.31 to XS 11095.91, approximately 2,650 feet downstream of the Old Road Bridge will be graded to lower portions of an existing topographic feature which will result in a widened floodplain.

3.2 Bank Protection Design

The proposed bank protection will consist of a standard soil cement section to provide scour and freeboard flood control protection for all storm events up to the Capital Flood. The critical factors in determining the design of the bank protection were based on the following criteria:

1. Flood control stability and durability of bank protection.
2. Safety concerns regarding access to and from the channel in dry and wet conditions.
3. Bank protection maintenance considerations.
4. Environmental compatibility with the native area and resource enhancement concepts, and aesthetic considerations.
5. Constructability and cost of construction.

Soil cement bank protection is constructed as a monolithic and homogenous structure consisting of approximately 90% native soils and 10% cement. The typical section consists of 8-foot wide and 6- to 12-inch thick layers of soil cement. Each layer of soil cement is set back from the edge of the previous layer, at a 1.5 H : 1 V slope. The entire section varies in total height based on varying freeboard, flow depth and toe-down requirements.

The proposed soil cement bank protection addresses the above design criteria as follows:

1. Soil cement provides a stable riverbank protection material, in terms of both surface erosion and structural stability. Preliminary geotechnical analyses indicate that locally available native soils are considered acceptable for use in soil cement.
2. The soil cement bank protection will be completely buried with a 3:1 slope soil backfill. Due to transitions from proposed soil cement bank protection (buried condition) to existing concrete and rip-rap bank protection (exposed conditions), some soil cement areas will be exposed.

3.3 Launch Stone Protection

Launch stone (rip-rap apron) will be utilized in conjunction with soil cement to provide the necessary level of flood and erosion protection for the VCC project site because future groundwater levels could be higher than the toe of the proposed bank protection. Launch stone provides an alternative to traditional river bank protection construction in cases where the presence of high groundwater may prevent soil cement from being installed to the required cut off depth without dewatering. An apron of launch stone will be placed adjacent to the face of soil cement bank and is designed to replace the volume of soil cement not placed due to high groundwater encountered during construction.

The configuration of the launch stone apron is constrained both vertically and horizontally. Vertically, it is preferable to have the launch stone installed in a buried condition, and horizontally, the launch stone apron must minimize, if not avoid, encroachment of jurisdictional boundaries set by the United States Army Corps of Engineers (ACOE) and the California Department of Fish and Wildlife (CDFW). A constant height (thickness) of nine feet was selected for the launch stone rip-rap apron. This height allows the apron to be buried while minimizing, and in some cases completely avoiding, encroachment of jurisdictional boundaries within the creek. A typical soil cement cross section with launch stone is detailed in Figure 3-1.

3.4 Channel Freeboard Requirements

The proposed top of bank protection was designed to maintain a minimum 2.5 ft of freeboard based on LADPW design criteria, which assumes a design Capital flood flow of 31,100 cfs. The manning's roughness coefficient utilized to determine the Capital Flood water surface elevations was n=0.085. The freeboard provided by the proposed bank protection far exceeds the FEMA requirements. Refer to Table 3-1, 3-2, and 3-3 for freeboard above the 100-year base flood elevation.

Table 3-1: West Bank Soil Cement Bank Protection Freeboard

FEMA HEC-RAS Cross Section	West Soil Cement Bank Station	Top of Bank (ft)	Proposed Condition FEMA 100-YR WSE (ft)	Freeboard above 100-yr WSE (ft)
Begin Soil Cement Top, Join Future Lower Hasley Toe of Soil Cement Bank Protection at Sta. 10+00		1002.63		
9166.90	14+80.08	1004.69	994.5	10.2
9534.09	17+84.36	1005.80	995.5	10.3
9869.91	20+95.6	1006.73	996.6	10.1
10620.36	27+44.73	1007.61	998.8	8.8
11095.91	32+57.50	1009.93	1000.8	9.1
11620.14	36+36.97	1013.64	1006.3	7.3
11954.00	38+31.19	1015.54	1008.6	7.0
12272.00	40+10.00	1017.29	1011.3	6.0
12648.31	42+44.13	1019.15	1014.2	4.9
13176.47	48+98.92	1024.05	1019.0	5.1
End Soil Cement Top, Join Existing Concrete Slope Lining at Sta. 50+00.57		1024.82		

Table 3-2: Southeast Bank Soil Cement Bank Protection Freeboard

FEMA HEC-RAS Cross Section	Southeast Soil Cement Bank Station	Top of Bank (ft)	Proposed Condition FEMA 100-YR WSE (ft)	Freeboard above 100-yr WSE (ft)
Begin Soil Cement Top, Join Existing Concrete Lining at Commerce Center Drive Bridge Abutment at Sta. 9+98.72		994.10		
8252.66	10+47.55	996.54	991.9	4.7
8304.80	11+01.09	999.22	991.8	7.4
8749.05	15+64.31	1003.62	993.6	10.0
9166.90	20+11.77	1005.64	994.5	11.1
9534.09	24+21.01	1006.29	995.5	10.8
9869.91	28+53.70	1006.90	996.6	10.3
10620.36	35+14.74	1008.84	998.8	10.0
11095.91	40+00.06	1018.51	1000.8	17.7
End Soil Cement Top, Join Existing Rip-Rap Lining at Sta. 40+20.00		1019.00		

Table 3-3: Northeast Bank Soil Cement Bank Protection Freeboard

FEMA HEC-RAS Cross Section	Northeast Soil Cement Bank Station	Top of Bank (ft)	Proposed Condition FEMA 100-YR WSE (ft)	Freeboard above 100-yr WSE (ft)
Begin Soil Cement Top, Join Existing Rip-Rap Bank protection at Sta. 10+00		1026.94		
12648.31	11+71.18	1026.00	1014.2	11.8
13176.47	13+81.32	1026.45	1019.0	7.5
13713.74	16+91.59	1032.52	1022.2	10.3
14180.6	19+12.06	1035.37	1025.6	9.8
14787.25	22+82.8	1038.81	1030.0	8.8
14892.2	24+22.06	1039.61	1032.1	7.5
End Soil Cement Top, Join Existing Rock Slope Protection for Old Road Bridge Abutment at Sta. 24+51.87		1039.61		

3.5 Bank Protection Toe-Down Design Summary

Per LACPW Hydraulic Design criteria, a Manning's roughness coefficient of n=0.025 was utilized to determine the maximum velocities within the study limits. The designed toe-down depths are consistent with the LACFCD requirements and are based on the maximum velocities within each reach. The appropriate roughness value for the subject channel reach is in the range of 0.030-0.060 based on FEMA FIS. The hydraulic analysis performed for the design is based on the Q_{cap} or Capital Flood storm event which assumes a burned and bulked watershed.

Exhibits detailing the profiles for the "West," "Northeast," and "Southeast" bank protection can be found in Figure 3-2, Figure 3-3, and Figure 3-4, respectively.

3.6 Modifications to the Existing Berm at the Castaic Creek and Hasley Canyon Creek Confluence

A portion of the existing concrete and riprap lined berm (see Linings B and C on PD 2298, Unit III) located at the Castaic Creek and Hasley Canyon Creek confluence will be modified to allow flow to be conveyed through a larger opening of the Commerce Center Drive Bridge and minimize the amount of sediment buildup at the western portion of the bridge.

According to the as-built drawings, the existing flow diversion berm is approximately 500 feet in length and is 16-feet-wide as measured along the top of the berm. The berm consists of two linings. Lining B is a concrete lining that was installed along the Hasley Canyon Creek side of the berm. Lining C is comprised of mostly rip-rap and was placed along the side of the berm facing Castaic Creek. The as-built drawings (PD 2298, Unit III) for the flow diversion berm are provided in Appendix G. It should be noted that the elevations shown on PD 2298, Unit III are referenced to the NGVD 1929. A datum shift of +2.638 feet should be applied to convert NGVD 1929 elevations to NAVD 1988 elevations.

A portion of the upstream end of this existing flow diversion berm will be removed such that the modified flow diversion berm will be 150 feet in length upstream of Commerce Center Drive Bridge. Rip-rap will be placed at the upstream end of the berm. The portion of the flow diversion berm above the estimated scour elevations will be removed. Figure 3-5 shows how the flow diversion berm will be modified.

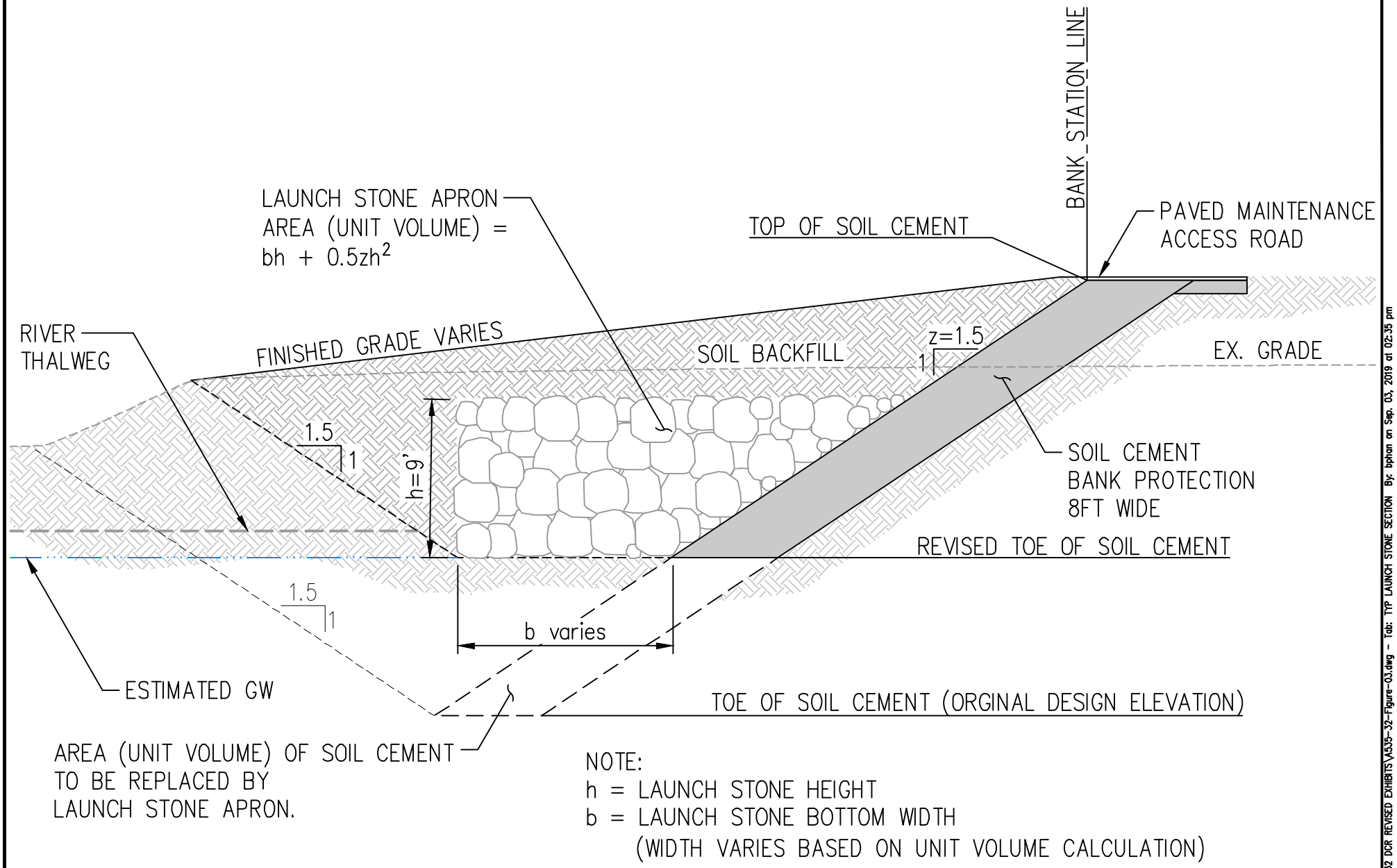


FIGURE 3-1

SOIL CEMENT / LAUNCH STONE BANK PROTECTION TYPICAL SECTION

P:\A535\Engineering\GlobalExhibits\A535-32 DCR REVISED EXHIBITS\A535-32-Figure-03.dwg - Tab: TYP LAUNCH STONE SECTION By: bphan on Sep. 03, 2019 at 02:35 pm

4 Sediment Transport Considerations

A Fluvial Study was completed for Castaic Creek in January 2006, and approved by LACPW in April 2006, to assess creek bed impacts from potential modifications of fluvial operation from the proposed TPM. No. 18108 development. The study provides a comprehensive assessment of short-term and long-term bed adjustments based on the level of information available. The Fluvial Study describes the following: (1) general adjustment, (2) long term adjustment, (3) other scour, (4) study reach gradation, (5) SAM modeling and analysis, and (6) total scour potential for the purpose of determining soil cement bank protection toe-down and freeboard.

4.1 Types of Adjustments

Modifications to the Castaic Creek System are measured as bed adjustment in feet. Types of adjustments included in the fluvial study include general, long-term, and other scour adjustments. General adjustment consists of scour that occurs in an individual discharge event and may be considered as the difference between sediment inflow and outflow. For example, aggradation describes a situation where sediment inflow is higher than sediment outflow for the same reach. In contrast, if sediment outflow exceeds inflow for a given reach, degradation in the form of scour will occur. Long-term adjustment consists of fluvial process that occur over many rainy seasons and contribute to fluctuation of bed elevation of a river or creek. Other scour types include local scour, bend scour, low-flow incisement, and bedform formation.

4.2 Summary of Fluvial Analyses

The fluvial study analyzed the individual degradational components of eight subreaches of Castaic Creek. The locations of each subreach are shown in Figure 4-1. The relevant subreaches and their results are summarized below.

Subreach SRA1: SAM numerical calculations predict 2.4 feet of degradation in this reach, while long-term aggradation is expected based on the analysis of SRA2. No long-term data is presently available for SRA1. The expected aggradation is a result of the bed recovering from gravel mining. Aggradation is expected to be approximately 0.7 feet. Other scour is dominated in this subreach by scouring at the Interstate 5 Bridge and Old Road Bridge piers. Toe-down and freeboard calculations on the outside of the curve of the reach may be impacted by the bend in this portion of the Creek. Aggradation is set to the Los Angeles County Flood Control District Design Manual (LACFCDDM) depth of 2.5 feet for most sections because the total aggradation predicted by LACFCDDM is greater than that predicted by Los Angeles County Department of Public Works Hydrology and Sedimentation Manual (LACH&SM).

Subreach SRA2: SAM calculations estimate degradation of 1.5 feet, and long-term analysis has shown aggradation of 0.7 feet as the bed recovers from historic gravel mining. Some local bend scour can be found in this subreach. When it is present, bend scour will dominate the total toe-down value. Aggradation is set to the LACFCDDM depth of 2.5 feet for all sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

Subreach SRA3: SAM estimates 0.3 feet of aggradation in this reach. Long-term historic analysis predicts aggradation of 0.6 feet. Section 8050 in this subreach shows approximately no change in cross-section between 2004 and 2005 suggesting armoring. The presence of historical gravel mining is prominent in 8050 whereby a deep, wide gravel pit is evident in the historic data, and the 1999 section also appears to be recovering from the mining activity. Local scour is expected to be significant in this reach because of the presence of a major bend in the Creek's path. Aggradation is set to the LACFCDDM depth of 2.5 feet for all sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

Subreach SRA4: SAM numerical calculations predict 1.9 feet of aggradation in this reach, while long-term degradation is expected to be 1.3 feet. Other scour is dominated in this subreach by scouring at Commerce Center Bridge piers. Outside of the curve of the reach will also be impacted by the bend in this portion of

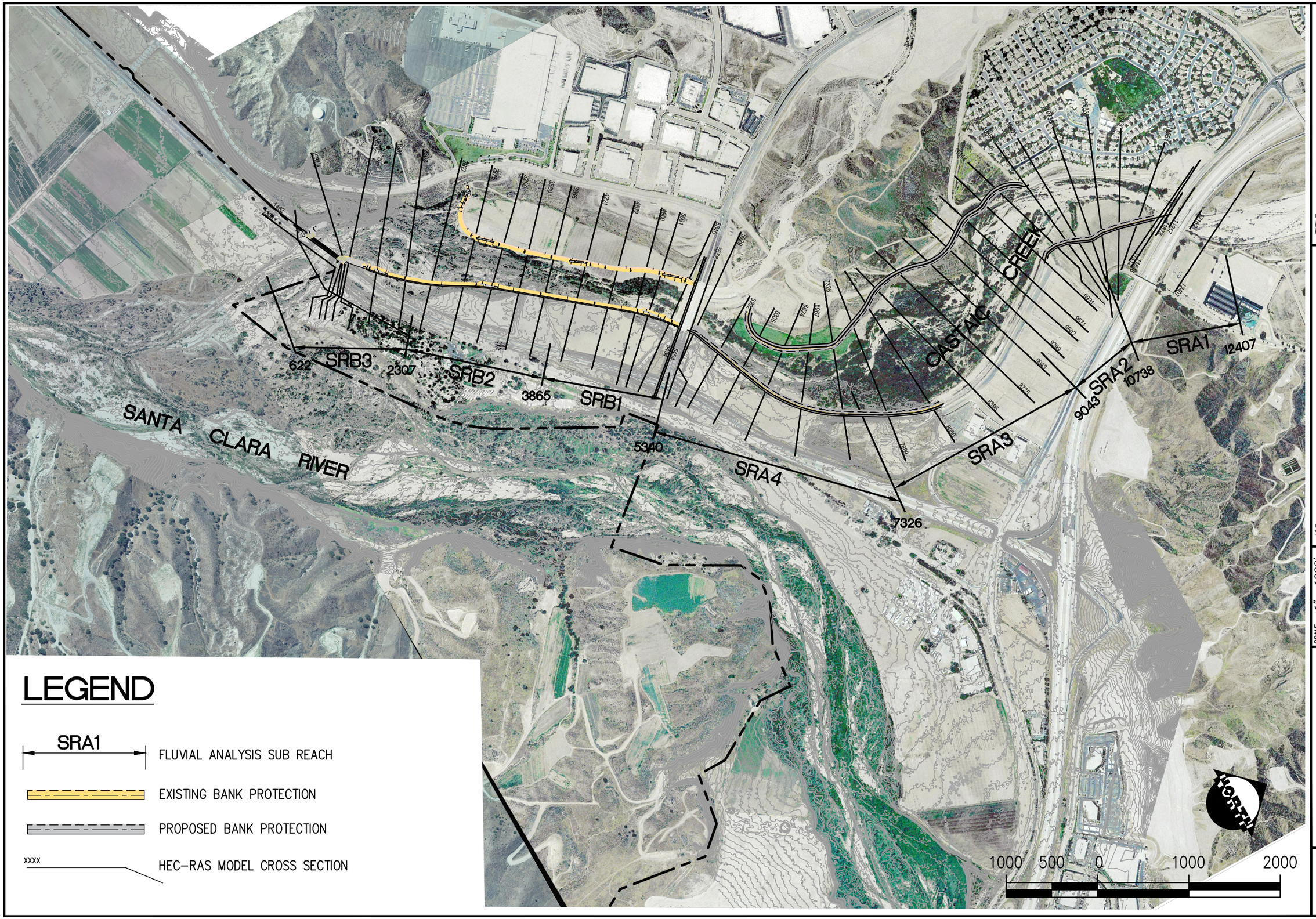
the Creek. The small change in average bed height between 2004 and 2005 suggests the bed is at or approaching the armoring depth below which no additional degradation will occur without a change in sediment inflow characteristics or a change in hydrology. Aggradation in this subreach exceeds three feet at every section and the large general adjustment dominates the components. Hasley Creek confluences in this subreach. The result of the confluence is an increase in discharge. Additionally, some sediment delivery from the Hasley Canyon Creek watershed may occur. This may explain some downstream aggradation observed in SRB3.

Subreach SRB1: SAM calculations estimate degradation of 3.3 feet, and long-term analysis has shown degradation of 2.1 feet. Minor amounts of local scour can be found in most of this subreach as most of it is quite straight. Aggradation is set to the LACFCDDM depth of 2.5 feet for most sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

Subreach SRB2: SAM estimates degradation of 1.0 feet of degradation in this reach. Long-term historic analysis predicts degradation of 2.7 and 0.8 feet in sections 2975 and 2627, respectively. Section 2975 considers agricultural fill, while 2627 does not. Historic sections show continuous degradation since the construction of the Dam. The thalweg depths in both 1999 and 2004 are lower than in 2005 despite the continued degradation into 2005. Little local scour can be found in this subreach as it is quite straight. Aggradation is set to the LACFCDDM depth of 2.5 feet for all sections because the total aggradation predicted by LACFCDDM is greater than that predicted by LACH&SM.

4.3 Proposed Soil Cement Bank Protection Sediment Transport Considerations

The proposed soil cement bank protection is intended to provide long-term erosion protection from lateral migration of the bank and flood protection for the adjacent proposed development areas. The proposed bank protection was designed based on current LA County Hydraulic Design Criteria. The soil Cement bank protection was designed for flood protection up to the Q_{cap} (31,100 cfs) flood event, which far exceeds the FEMA 100-yr flood (14,560 cfs).



TITLE

HEC-RAS CROSS SECTION LOCATION MAP

JOB

CASTAIC CREEK FLUVIAL STUDY

LOS ANGELES COUNTY CA

SCALE	1"= 1000'
DESIGNED	EMR
DRAWN	DP
CHECKED	J.C.
DATE	02/27/23
JOB NO.	8065E

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
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FIGURE

4-1

P:\A535\Engineering\A535-73_Castaic Creek CLOMR\exhibits\8197 Castaic Creek-Fluvial Study.dwg - Tab: Layout1 By: erandig on Feb. 27, 2023 at 10:09 am
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Dimscale = 1; LTscale = 0.375; PSltscale = 1; Acad Ver. = 23.0s (LMS Tech); Viewtdn = 1

5 Hydraulic Analysis Results

5.1 Baseline Corrected Effective Condition Hydraulic Analysis

The main purpose of the baseline corrected effective or updated existing condition analysis (pre-project) is to serve as a basis of comparison for the proposed condition (post-project) analysis. A complete summary of the corrected effective hydraulic results is presented in Appendix D.

A comparison between the duplicate effective and corrected effective/ updated existing conditions models is provided in Table 5-1 to show the changes in water surface elevation (WSEL) and velocity resulting from the updated topography and corrections to the effective model.

Table 5-1: Flow Depth and Velocity Comparison for the Duplicate Effective and Corrected Effective/ Updated Existing Condition (Q_{100} = 14,480/14,560)

HEC-RAS Cross Section	Duplicate Effective		Corrected Effective/ Updated Existing Condition		Difference [Corrected Effective - Duplicate Effective]	
	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)
16960.02	1043.7	7.7	1043.6	7.4	-0.1	-0.2
16552.09	1040.5	6.5	1040.8	5.8	0.3	-0.7
16209.5	1038.3	5.6	1038.9	5.7	0.6	0.1
15958.96	1037.2	5.0	1037.7	5.1	0.5	0.1
15669.62	1036.4	5.0	1036.8	5.0	0.4	0.0
15478.79	1036.0	4.8	1036.3	5.2	0.3	0.4
15245.39	1034.7	7.8	1034.7	8.8	-0.1	1.0
15216.27	1034.5	8.0	1034.6	7.9	0.1	-0.1
15100	**Golden State Freeway (I-5) Bridge**					
14991.85	1032.6	8.3	1033.0	7.8	0.4	-0.4
14976.84	1032.5	8.3	1032.9	7.9	0.4	-0.5
14900	**Old Road Bridge**					
14892.2	1031.6	8.6	1032.3	7.7	0.7	-0.9
14787.25	1029.1	11.9	1029.7	12.1	0.5	0.2
14180.6	1025.9	7.0	1026.5	6.2	0.6	-0.7
13713.74	1022.8	8.5	1022.9	8.9	0.1	0.4
13176.47	1018.6	6.5	1018.7	6.3	0.1	-0.2
12648.31	1014.8	5.6	1014.8	5.9	0.0	0.3
12272	1012.3	5.9	1012.1	5.9	-0.2	0.0
11954	1008.6	8.3	1008.6	7.8	0.0	-0.5
11620.14	1006.4	5.0	1006.3	5.0	-0.2	0.0
11095.91	1001.0	7.7	1000.6	7.4	-0.4	-0.3
10620.36	999.0	3.5	998.9	3.4	-0.1	-0.1
9869.91	996.2	8.7	996.4	6.0	0.2	-2.7
9534.09	993.9	8.5	994.6	6.5	0.7	-2.0
9166.9	992.3	7.5	993.4	5.5	1.1	-2.0
8749.05	990.6	7.7	992.6	4.5	2.0	-3.1
8304.8	989.7	5.5	991.9	4.4	2.2	-1.1
8252.66	989.6	5.1	991.8	4.4	2.2	-0.7
8000	**Commerce Center Drive Bridge**					
7999.7	988.2	5.9	989.4	5.3	1.2	-0.6
7797.6	986.4	7.7	986.7	10.5	0.4	2.8
7298.39	983.6	6.0	983.8	6.6	0.2	0.6
6704	979.6	8.1	980.0	7.8	0.4	-0.2

HEC-RAS Cross Section	Duplicate Effective		Corrected Effective/ Updated Existing Condition		Difference [Corrected Effective - Duplicate Effective]	
	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)
6082.33	975.8	6.6	975.7	6.8	-0.1	0.3
5537.85	970.5	9.0	971.2	7.2	0.6	-1.8
5025.3	966.8	6.8	967.3	5.9	0.5	-0.9
4715.43	965.5	5.6	965.8	5.5	0.3	-0.1
4427.71	964.7	4.9	964.7	5.6	0.0	0.7

Differences between the duplicate effective model and corrected effective model are mostly a result of updated topographic data. In addition, due to the significant "shift" in the internal bridge geometry in the effective model, there are notable increases in water surface elevations and decreases in velocity in the vicinity of the Commerce Center Drive Bridge for the corrected effective model.

5.2 Proposed Condition Hydraulic Analysis

The proposed condition model differs from the corrected effective condition model in that the proposed condition model includes the proposed project improvement which encompasses the soil cement bank protection and the portions of the creek along the bank to be regraded. A complete summary of the proposed condition hydraulic results is presented in Appendix E.

Table 5-2 provides HEC-RAS water surface elevation and velocity results for the two conditions and the differences that arise from a comparison.

Table 5-2: Flow Depth and Velocity Comparison for the Corrected Effective Condition and Proposed Conditions (Q_{100} = 14,480/14,560)

HEC-RAS Cross Section	Corrected Effective/ Updated Existing Condition		Proposed Condition		Difference [Proposed – Corrected Effective]	
	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)
16960.02	1043.6	7.4	1043.6	7.4	0.0	0.0
16552.09	1040.8	5.8	1040.8	5.8	0.0	0.0
16209.5	1038.9	5.7	1038.9	5.7	0.0	0.0
15958.96	1037.7	5.1	1037.7	5.1	0.0	0.0
15669.62	1036.8	5.0	1036.8	5.0	0.0	0.0
15478.79	1036.3	5.2	1036.3	5.2	0.0	0.0
15245.39	1034.7	8.8	1034.6	8.8	0.0	0.0
15216.27	1034.6	7.9	1034.6	7.9	0.0	0.0
15100	Golden State Freeway (I-5) Bridge					
14991.85	1033.0	7.8	1032.9	7.9	-0.1	0.1
14976.84	1032.9	7.9	1032.8	8.0	-0.1	0.1
14900	Old Road Bridge					
14892.2	1032.3	7.7	1032.1	7.8	-0.1	0.2
14787.25	1029.7	12.1	1030.0	11.2	0.3	-0.8
14180.6	1026.5	6.2	1025.6	7.1	-0.9	0.9
13713.74	1022.9	8.9	1022.2	7.4	-0.7	-1.6
13176.47	1018.7	6.3	1019.0	5.9	0.3	-0.5
12648.31	1014.8	5.9	1014.2	7.3	-0.6	1.4
12272	1012.1	5.9	1011.3	4.9	-0.8	-0.9
11954	1008.6	7.8	1008.6	6.3	0.0	-1.5
11620.14	1006.3	5.0	1006.3	4.6	0.1	-0.4
11095.91	1000.6	7.4	1000.8	7.4	0.2	0.0
10620.36	998.9	3.4	998.8	3.3	0.0	0.0

HEC-RAS Cross Section	Corrected Effective/ Updated Existing Condition		Proposed Condition		Difference [Proposed – Corrected Effective]	
	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)	WSEL (ft)	Velocity (fps)
9869.91	996.4	6.0	996.6	5.3	0.2	-0.7
9534.09	994.6	6.5	995.5	5.1	0.9	-1.4
9166.9	993.4	5.5	994.5	5.3	1.2	-0.2
8749.05	992.6	4.5	993.6	5.1	1.0	0.6
8304.8	991.9	4.4	991.8	6.8	0.0	2.4
8252.66	991.8	4.4	991.9	4.8	0.1	0.5
8000	**Commerce Center Drive Bridge**					
7999.7	989.4	5.3	989.4	5.3	0.0	0.0
7797.6	986.7	10.5	986.7	10.5	0.0	0.0
7298.39	983.8	6.6	983.7	6.6	0.0	0.0
6704	980.0	7.8	980.0	7.8	0.0	0.0
6082.33	975.7	6.8	975.7	6.8	0.0	0.0
5537.85	971.2	7.2	971.2	7.2	0.0	0.0
5025.3	967.3	5.9	967.3	5.9	0.0	0.0
4715.43	965.8	5.5	965.8	5.5	0.0	0.0
4427.71	964.7	5.6	964.7	5.6	0.0	0.0

**Gray highlighted rows indicate river stations with proposed soil cement bank protection*

According to the analysis, the proposed soil cement bank protection will cause the 100-yr floodplain to both narrow and widen at the location of the bank protection. In addition, there are both increases and decreases in the 100-yr water surface elevations, with a maximum increase of 1.2 ft directly upstream of Commerce Center Drive Bridge. All increases in water surface elevation are within the project limits and do not create any impacts to off-site properties.

5.3 Tie-In Analysis

Table 5-3 summarizes the tie-in analysis for the proposed floodplain modifications. The tie-in points, where the FIRM will be modified, are at locations where the revised floodplain is within 5% of the FEMA floodplain and the change in water surface elevation is less than 0.5 ft.

Table 5-3: Top Width Comparison for the Effective FEMA Floodplain and Proposed Condition Floodplain (Q_{100} = 14,480/14,560)

Section	Effective BFE (ft) [1]	Proposed WSEL (ft) [2]	Delta (ft) [2]-[1]	Effective Top-width (ft)	Proposed Top-width (ft)	Within 5%? Yes or No
15478.79	1036.0	1036.3	0.3	584.6	649.2	No
15245.39	1034.7	1034.6	-0.1	413.4	325.9	No
15216.27	1034.5	1034.6	0.1	494.9	497.3	Yes
15100	**Golden State Freeway (I-5) Bridge**					
14991.85	1032.6	1032.9	0.3	394.5	398.9	Yes
14976.84	**1032.5**	**1032.8**	**0.3**	**451.5**	**458.0**	**Yes**
14900	**Old Road Bridge**					
14892.2	1031.6	1032.1	0.5	681.7	689.3	Yes
14787.25	1029.1	1030.0	0.8	787.0	283.7	No
14180.6	1025.9	1025.6	-0.3	978.8	547.9	No
13713.74	1022.8	1022.2	-0.6	807.7	685.8	No
13176.47	1018.6	1019.0	0.4	633.0	685.7	No
12648.31	1014.8	1014.2	-0.6	908.8	841.5	No
12272	1012.3	1011.3	-0.9	686.7	959.8	No
11954	1008.6	1008.6	0.0	655.7	1026.8	No

Section	Effective BFE (ft) [1]	Proposed WSEL (ft) [2]	Delta (ft) [2]-[1]	Effective Top-width (ft)	Proposed Top-width (ft)	Within 5%? Yes or No
11620.14	1006.4	1006.3	-0.1	839.7	1058.2	No
11095.91	1001.0	1000.8	-0.2	1066.5	1184.3	No
10620.36	999.0	998.8	-0.1	1065.8	1130.3	No
9869.91	996.2	996.6	0.4	647.5	686.4	No
9534.09	993.9	995.5	1.6	803.7	561.5	No
9166.9	992.3	994.5	2.3	577.2	411.0	No
8749.05	990.6	993.6	3.0	492.2	485.7	Yes
8304.8	989.7	991.8	2.1	514.5	385.7	No
8252.66	989.6	991.9	2.3	453.3	464.8	Yes
8000	Commerce Center Drive Bridge					
7999.7	988.2	989.4	1.2	485.7	462.5	Yes
7797.6	986.4	986.7	0.3	462.3	322.2	No
7298.39	983.6	983.7	0.2	424.7	402.8	No
6704	979.6	980.0	0.4	370.0	415.1	No
6082.33	**975.8**	**975.7**	**-0.1**	**455.6**	**445.4**	**Yes**
5537.85	970.5	971.2	0.7	523.3	551.4	No
5025.3	966.8	967.3	0.5	657.4	721.5	No
4715.43	965.5	965.8	0.3	621.3	623.2	Yes
4427.71	964.7	964.7	0.0	528.3	503.4	Yes

**Gray highlighted rows indicate river stations with proposed soil cement bank protection and Tie-in locations are boxed in red*
*** Between HEC-RAS sections 6082.33 and 7797.6, the Post-Project water surface elevation (WSE) was obtained from the corrected effective model. Between HEC-RAS sections 7999.7 and 14976.8 the Post-Project WSE was obtained from the proposed condition model.*

It is important to note that changes in WSEL between the effective and proposed water surface elevations and top-width directly upstream and downstream of the Commerce Center Drive bridge are effected by the shifted internal bridge geometry. There are no proposed improvements located downstream of the Commerce Center Drive Bridge so only the correction to the bridge geometry causes the changes in water surface elevations and top-width in the downstream reach of the creek. This pushes the tie-in point farther downstream of the bridge in order to meet the tie-in criteria specified as top width being within 5% of the effective FEMA floodplain and the change in water surface elevation being less than 0.5 ft.

In summary, downstream, the proposed condition model ties in to the effective model at cross section 6082.33. And, upstream, the proposed condition ties directly into the effective model at cross section 14976.84.

Figure 5-1 shows the floodplain limits resulting from the proposed bank protection. Detailed HEC-RAS results can be found in Appendices C and D.

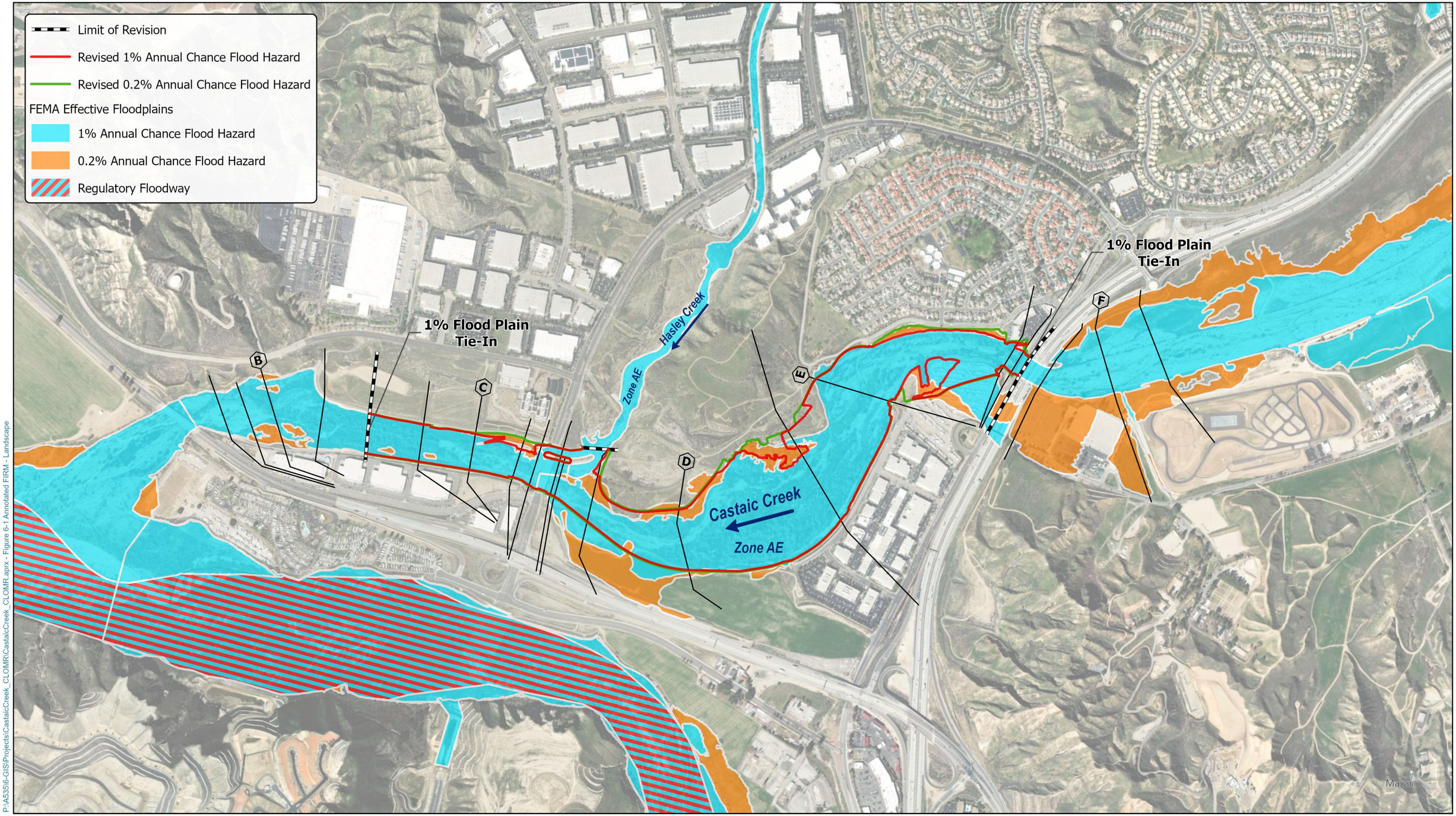
6 Conclusions

The proposed addition of the “West,” “Northeast,” and “Southeast” soil cement bank protection at Valencia Commerce Center (VCC) Industrial Park Development in Tentative Parcel Map (TPM) No. 18108 results in changes in water surface elevations between the upstream (HEC-RAS XS 16960.02) and downstream limits (HEC-RAS XS 4427.71) of study. After a detailed evaluation, which included updated topographic data from 2013 and the inclusion of the proposed soil cement channel bank protection modifications, the final modeled floodplain results in a primarily narrowed 100-yr floodplain within the limits of the study.

The corrected effective / updated existing 100-year floodplain is wide at the location of the proposed project due to the natural channel being unconstrained. The project results in a floodplain that is both narrower and wider than the updated existing condition along the proposed bank protection. This results in water surface elevations that both increase and decrease at locations of narrowing and widening. The maximum increase in water surface elevation is just upstream of Commerce Center Drive Bridge, with an increase of 1.2 ft. All impacts to water surface elevations are limited to inside the proposed project boundary. The proposed soil cement bank protection meets FEMA minimum freeboard requirements.

The comparison analysis shows that the floodplain extents for the study reach tie-in to the FEMA Zone AE floodplain for 100-yr Base Flood Elevations (BFEs) within 0.5-ft or less. The upstream and downstream tie-in locations are at HEC-RAS river stations 14976.84 and 6082.33, respectively. These abide by FEMA guidelines for flood hazard analysis.

Based on the present application and enclosed analyses, we are requesting that FEMA provide a Conditional Letter of Map Revision for the proposed Soil Cement Bank Protection Project on Castaic Creek, affecting FIRM Panels 06037C0805G, 06037C0815G, and 06037C0792G. The proposed condition 100-year floodplain and base flood elevations are shown on the Annotated FIRM in Figure 6-1.



P:\A5356-GIS\Projects\CastaicCreek_CLOMR\CastaicCreek_CLOMR.aprx - Figure 6-1 Annotated FIRM - Landscape

VALENCIA COMMERCE CENTER
CASTAIC CREEK CLOMR

ANNOTATED FIRM

PACE Advanced Water Engineering

0 500 1,000 2,000 Feet

Date: 1/11/2024

Job Number: A535

Figure 6-1

7 References

PACE, Castaic Creek Fluvial Study. November 2005.

PACE, Drainage Concept Report, Volume II or V, Castaic Creek Bank Protection ESTU No. 2001000012. September 2019.

PACE, Drainage Concept Report, Volume III or V, Hasley Canyon Creek Bank Protection EIMP No. 2019000489. October 2021.

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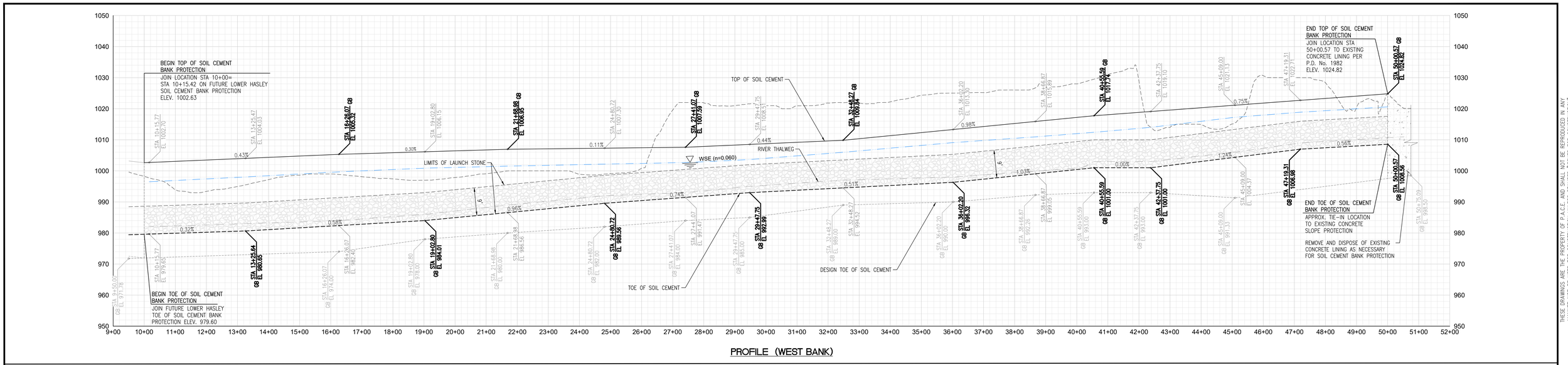
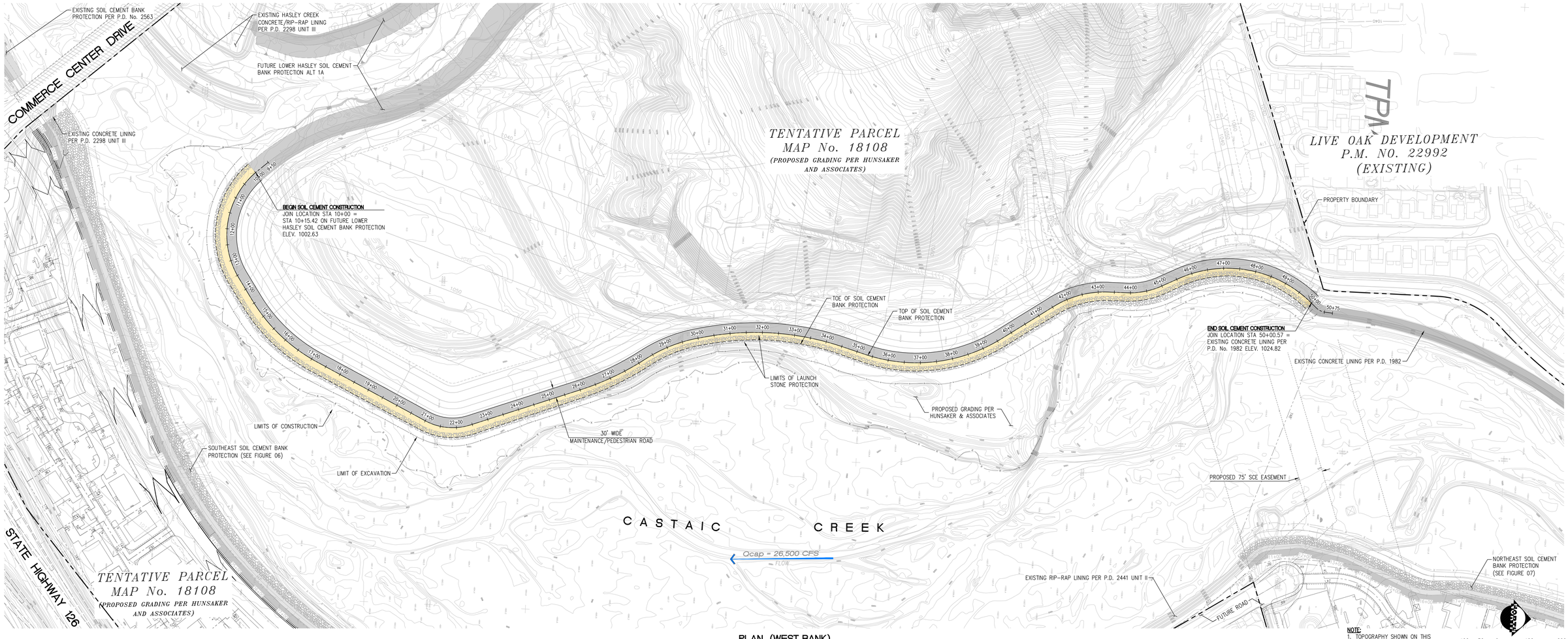
Exhibits



PROFILE (WEST BANK)



PLAN (WEST BANK)

NOTE:
1. TOPOGRAPHY SHOWN ON THIS MAP IS BASED ON AERIAL TOPO DATED OCT. 2013

NO	BY	DATE		DATE	APP.

JOB

DRAINAGE CONCEPT REPORT
VOLUME II OF V
CASTAIC CREEK SOIL CEMENT BANK PROTECTION
FOR T.P.M. NO. 18108

LOS ANGELES COUNTY CA.

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
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PREPARED BY JOSE CRUZ
PROJECT ENGINEER
R.C.E. NO. 72249
EXP. 06/30/20
DRAWN BDP
SCALE AS SHOWN
DESIGNED JC
CHECKED JC
DATE Sep, 2019

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 Exp. 06-30-20 CIVIL STATE OF CALIFORNIA

TITLE

WEST BANK SOIL CEMENT BANK PROTECTION PLAN & PROFILE

FIGURE 3-2

JOB NO. A535

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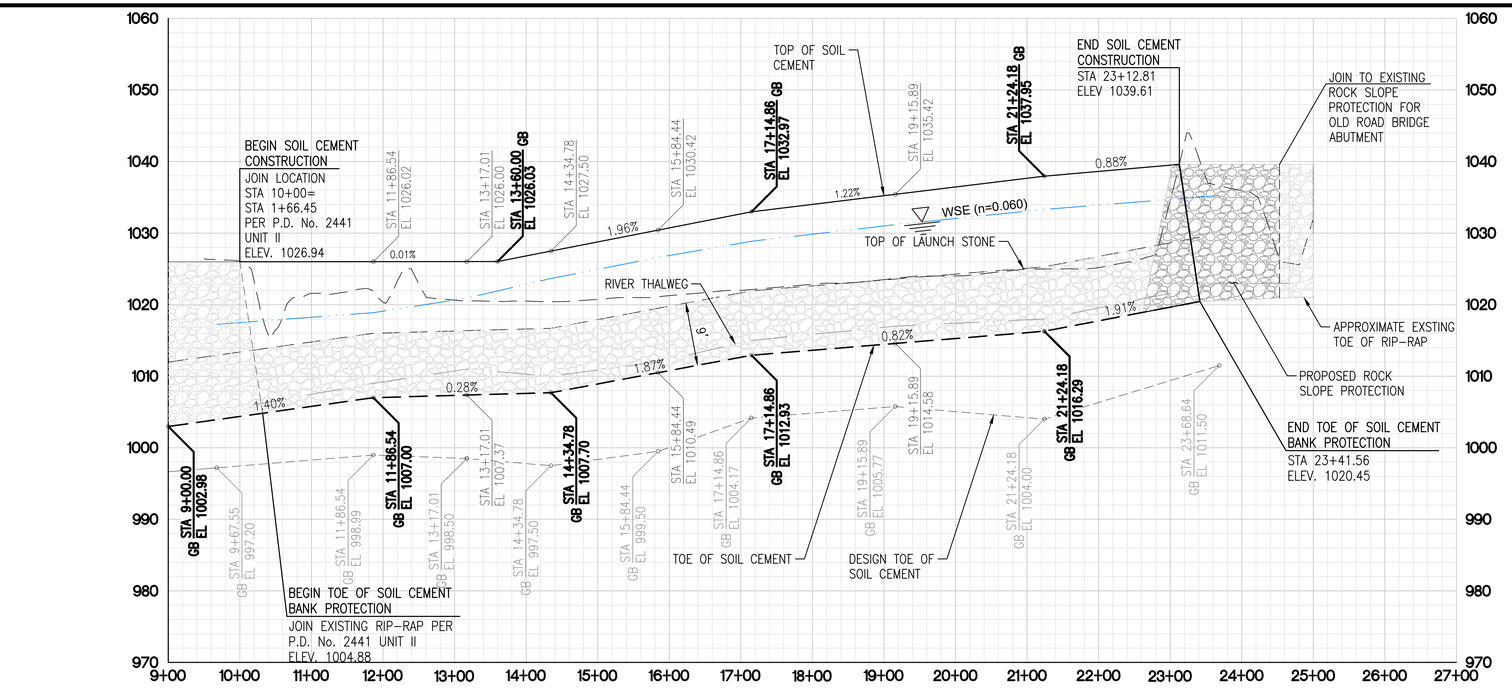
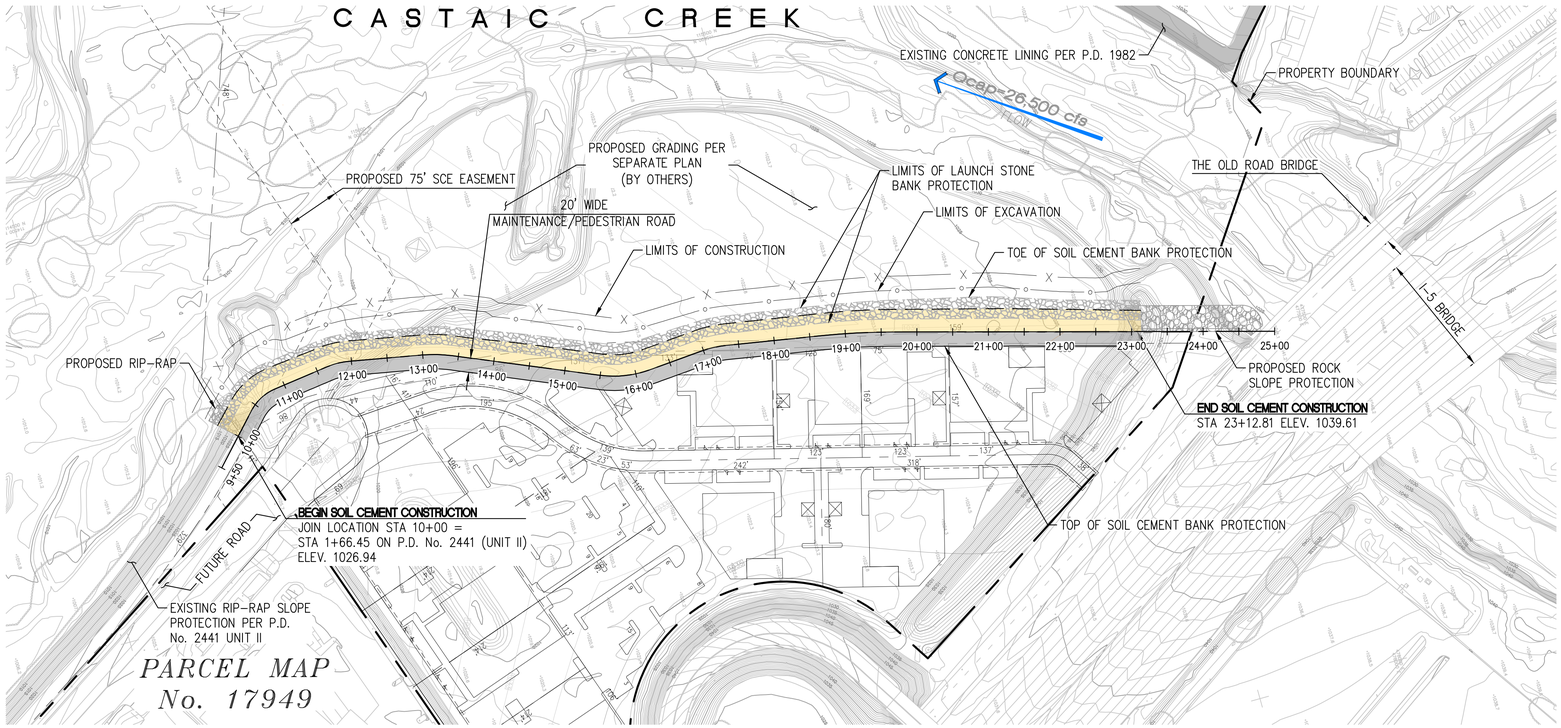


PROFILE (NORTHEAST BANK)



PLAN (NORTHEAST BANK)

NOTE:
1. TOPOGRAPHY SHOWN ON THIS MAP IS BASED ON AERIAL TOPO DATED OCT. 2013

NORTH

100 50 0 100 200

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1					
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DRAINAGE CONCEPT REPORT VOLUME II OF V

CASTAIC CREEK SOIL CEMENT BANK PROTECTION FOR T.P.M. NO. 18108

LOS ANGELES CO CA

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PROJECT ENGINEER R.C.E. NO.	— — 72249
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DRAWN	BDP
SCALE	AS SHOWN
DESIGNED	JC
CHECKED	JC
DATE	Sep, 2019

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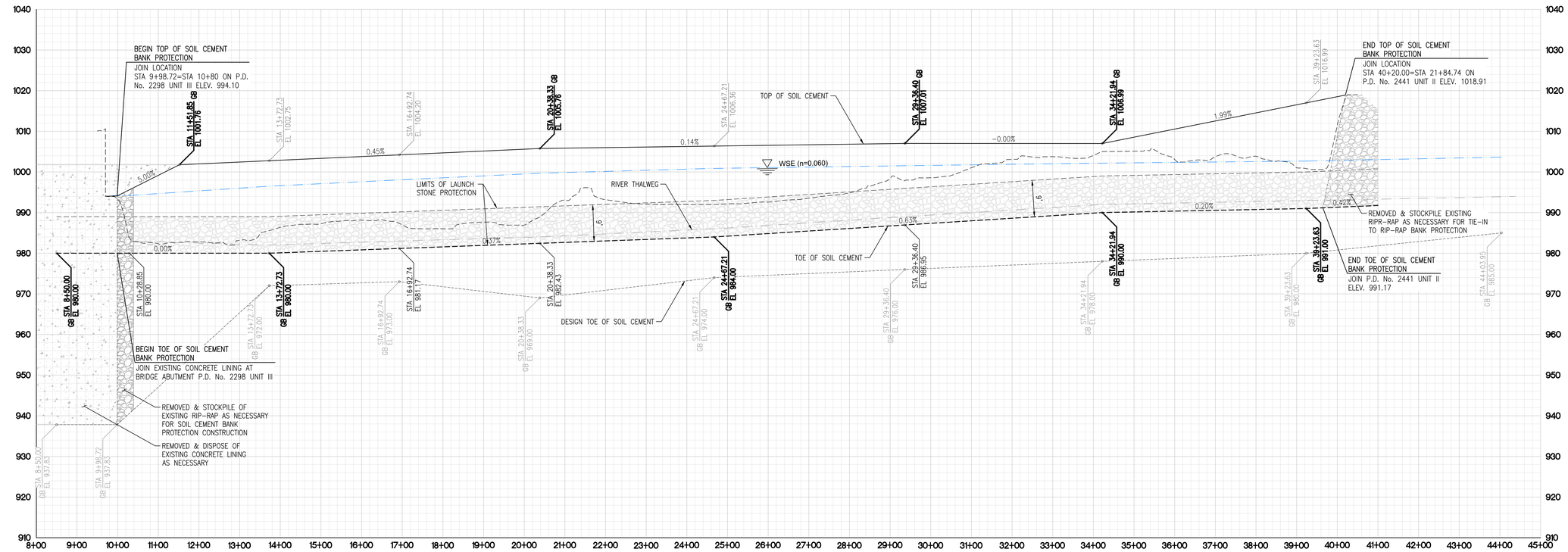
TITLE

NORTHEAST BANK SOIL CEMENT BANK PROTECTION PLAN & PROFILE

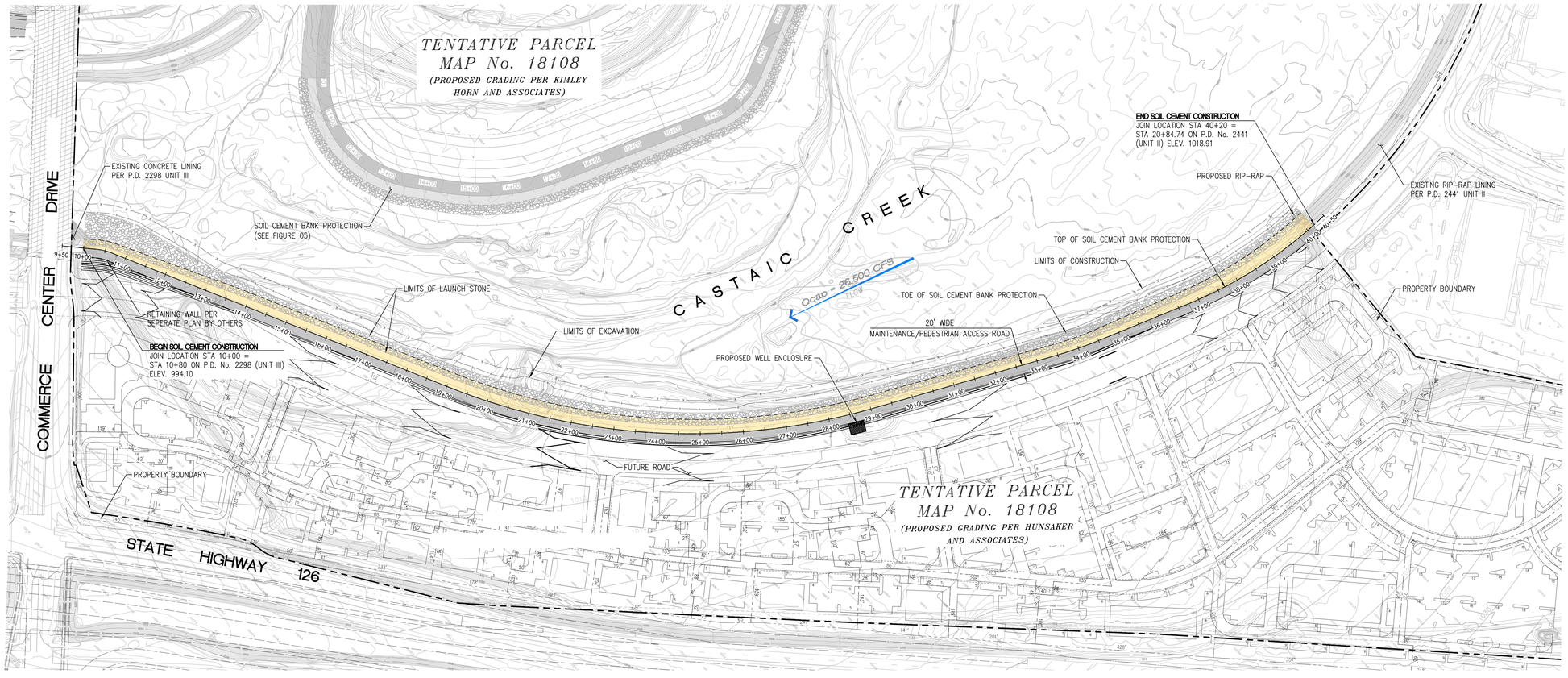
SHEET 3-3

JOB NO. A535

P:\A535\Engineering\A535-73_Castaic Creek CLOMR\exhibits\A535-22-Figure-3.3_NORTHEAST.dwg - Tab: Layout1 By: erandig on Mar 09, 2023 at 02:15 pm



PROFILE (SOUTHEAST BANK)



PLAN (SOUTHEAST BANK)

NOTE
1. TOPOGRAPHY SHOWN ON THIS MAP IS BASED ON AERIAL TOPO DATED OCT. 2013

100 50 0 100 200

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1					
2					
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DRAINAGE CONCEPT REPORT
VOLUME II OF V
CASTAIC CREEK SOIL CEMENT BANK PROTECTION
FOR T.P.M. NO. 18108

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DRAWN	BDP
SCALE	
DESIGNED	JC
CHECKED	JC
DATE	Sep, 2019

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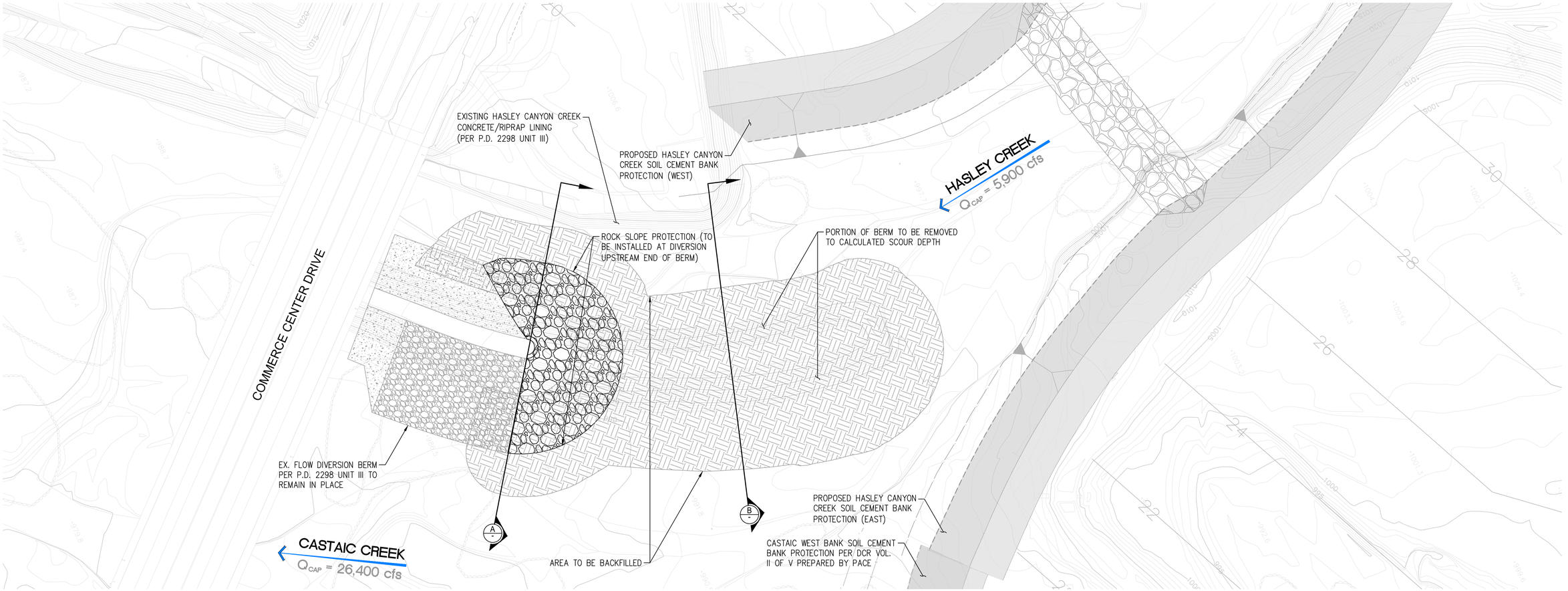
TITLE

SOUTHEAST BANK SOIL CEMENT BANK PROTECTION PLAN & PROFILE

FIGURE 3-4

JOB NO. A535

P:\A535\Engineering\A535-73_Castaic Creek CLOMR\exhibits\A535-22-Figure 3-4_SOUTHEAST.dwg - Tab: Layout - by emadig on 03/09/23 at 10:30:25 AM

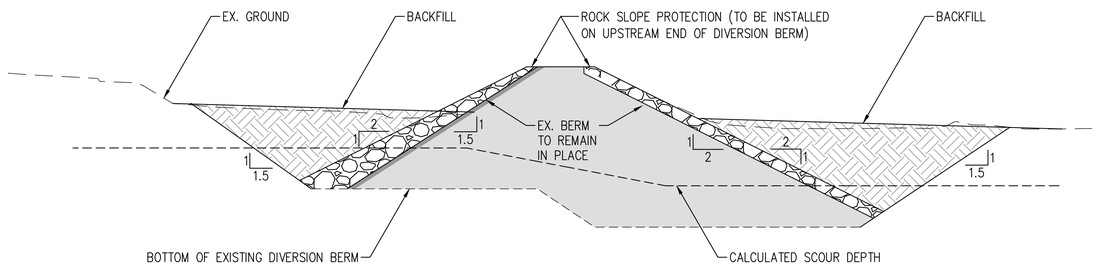


PLAN - MODIFIED DIVERSION BERM

NORTH

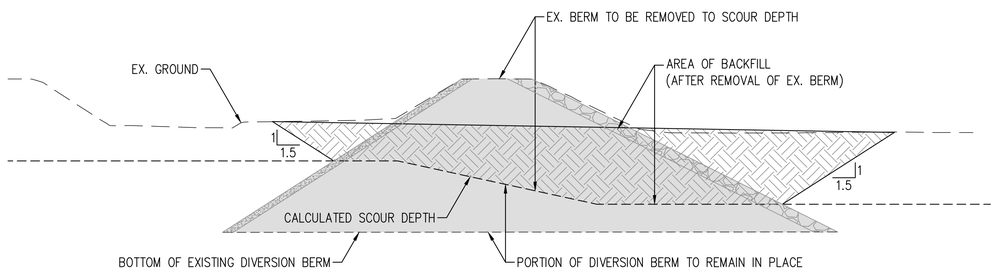
40 0 40 80

SCALE 1"=40'



SECTION A - PORTION OF DIVERSION BERM TO REMAIN

SCALE 1"=20'



SECTION B - PORTION OF DIVERSION BERM TO MODIFY

SCALE 1"=20'

NO	BY	DATE		DATE	APP.
1					
2					
3					
4					
5					

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CASTAIC CREEK CLOMR

LOS ANGELES COUNTY CA.

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PREPARED	JOSE CRUZ
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SCALE	AS SHOWN
DESIGNED	JC
CHECKED	EMR
DATE	3/15/2023

REGISTERED PROFESSIONAL ENGINEER
JOSE CRUZ
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Exp. 06-30-22
CIVIL
STATE OF CALIFORNIA

TITLE

PROPOSED MODIFICATION OF DIVERSION BERM

FIGURE

3-5

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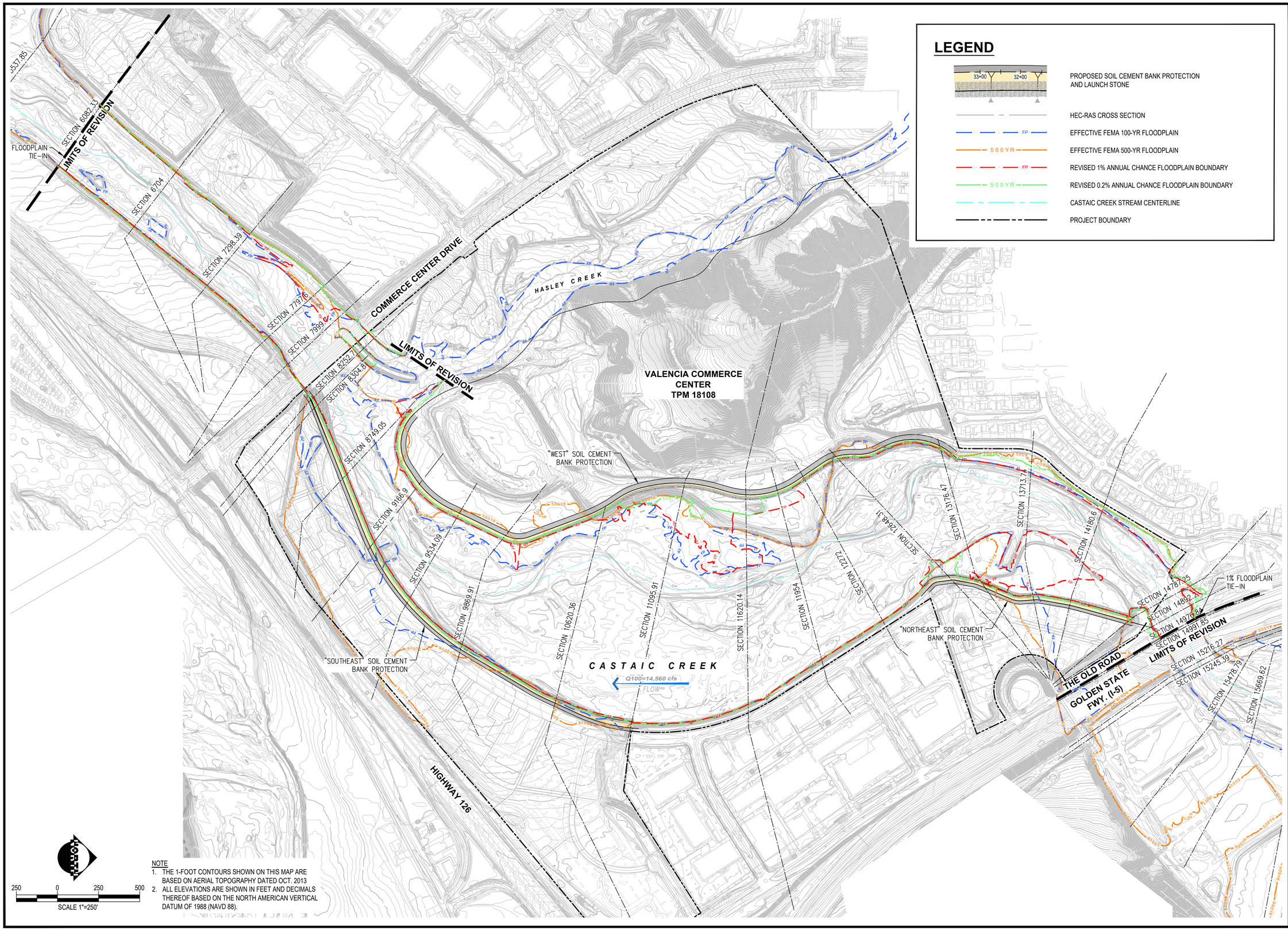
P:\A535\Engineering\A535-73_Castaic Creek CLOMR\exhibits\A535-22-Figure-3.5_Proposed Modification of Diversion Berm.dwg -- Tab: Layout By: eramdg on Mar. 15, 2023 at 01:41 pm



NOTE
1. THE 1-FOOT CONTOURS SHOWN ON THIS MAP ARE BASED ON AERIAL TOPOGRAPHY DATED OCT. 2013
2. ALL ELEVATIONS ARE SHOWN IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

NO	BY	DATE	REVISIONS	DATE	APP.

REGISTERED PROFESSIONAL ENGINEER JOSE CRUZ No. 72249 Exp. 06-30-22 CIVIL STATE OF CALIFORNIA

PREPARED BY JOSE CRUZ
PROJECT ENGINEER
R.C.E. NO. -- # 72249
EXP. 6/30/24
DRAWN M.M.T.
SCALE 1"=300'
DESIGNED E.M.R.
CHECKED J.C.
DATE 02/20/23

TITLE
CASTAIC CREEK
CLOMR
TOPOGRAPHIC WORKMAP

JOB
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VALENCIA COMMERCE CENTER
Los Angeles County CA

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SHEET
5.1

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Appendix A – MT-2 Forms

MT-2 Form 1: Overview and Concurrence

DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency

OVERVIEW & CONCURRENCE FORM

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472 , Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.
PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).
ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.
DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☒ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72). All CLOMRs require documentation of compliance with the Endangered Species Act. Refer to the Instructions for details.

☐ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72).

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
065043	Los Angeles County	CA	06037C	0792G	06/02/2021
065043	Los Angeles County	CA; CA	06037C	0805G; 0815G	06/02/2021

2. a. Flooding Source: Castaic Creek

b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH) ☐ Alluvial Fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Castaic Creek Bank Protection for Valencia Commerce Center (From The Old Road to Commerce Center Dri

4. FEMA zone designations (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

a. Effective: AE

b. Revised: AE

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change	☐ Improved Methodology/Data	☐ Regulatory Floodway Revision	☐ Base Map Changes
☐ Coastal Analysis	☐ Hydraulic Analysis	☐ Hydrologic Analysis	☒ Corrections
☐ Weir-Dam Changes	☐ Levee Certification	☐ Alluvial Fan Analysis	☐ Natural Changes
☒ New Topographic Data	☐ Other (Attach Description)		

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization	☐ Levee/Floodwall	☐ Bridge/Culvert	
☐ Dam	☐ Fill	☐ Other (Attach Description)	

6. ☒ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $ 6,500

☐ No, Attach Explanation

- **Please see the DHS-FEMA Web site at http://www.fema.gov/forms-documents-and-software/flood-map-related-fees for Fee Amounts and Exemptions.**

D. SIGNATURES

1. REQUESTOR'S SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Alex Herrell	Company: The Newhall Land and Farming Company	
Mailing Address: 25124 Springfield Court, Suite 300 Valencia, CA 91355	Daytime Telephone: 661-255-4000	Fax No.:
	E-mail Address: alex.herrell@fivepoint.com	
	Date: 2/19/2023	

Signature of Requestor (required): Alex Herrell

2. COMMUNITY CONCURRENCE

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title:		
Mailing Address:	Community Name:	
	Daytime Telephone:	Fax No.:
	E-mail Address:	
Community Official's Signature (required):	Date:	

3. CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Jose Cruz		License No.: 72249	Expiration Date: 6/30/2024
Company Name: PACE		Mailing Address: 17520 Newhope St. #200 Fountain Valley, CA 92708	
Telephone No.: (714) 481-7300	Fax No.: (714) 481-7299		
E-mail Address: jcruz@pacewater.com			
Signature:		Date: 2/14/2023	

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if …
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☒ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

MT-2 Form 2: Riverine Hydrology and Hydraulics

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

RIVERINE HYDROLOGY & HYDRAULICS FORM (FORM 2)

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472 , Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.
PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).
ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.
DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

Flooding Source: Castaic Creek

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply):

☒ Not revised (skip to section B) ☐ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Precipitation/Runoff Model → Specify Model: _____ Duration: _____ Rainfall Amount: _____

☐ Statistical Analysis of Gage Records

☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review. 4. HEC-RAS File Description**:

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☒ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevation (ft.)	
			Effective	Proposed/Revised
Downstream Limit*	tream of Commerce Cente	6082.33	975.8	975.7
Upstream Limit*	stream of the Old Road Brc	14976.84	1032.5	1032.8

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: HEC-RAS

☒ Steady State ☐ Unsteady State ☐ One-Dimensional ☐ Two-Dimentional

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4. HEC-RAS File Description**:

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
	Castaic FEMA	FEMA			
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
	Castaic Creek Existing	Updated Existing			
Existing or Pre-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
	astaic Creek Propose	Proposed			
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	

* For details, refer to the corresponding section of the instructions.
**See instructions for information about modeling other then HEC-RAS. ☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

Topographic Information: ☒ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Source: Kimely-Horm | Date: 2013

Vertical Datum: NAVD 83 | Spatial Projection: California State Plane Zone 5

Accuracy: five-foot aerial topography

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) or Special Flood Hazard Areas (SFHAs) increase compared to the effective BFEs? ☒ Yes ☐ No

   If Yes, please attach **proof of property owner notification**. Examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

   - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
   - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

3. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

4. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.

5. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

MT-2 Form 3: Riverine Structures

DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency

RIVERINE STRUCTURES FORM (FORM 3)

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

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DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

Flooding Source: Castaic Creek

Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization:	complete Section B
Bridge/Culvert:	complete Section C
Dam:	complete Section D
Levee/Floodwall:	complete Section E
Sediment Transport:	complete Section F (if required)

Description Of Modeled Structure

1. Name of Structure: Southeast Soil Cement Bank Protection

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Between Commerce Center Drive and I-5

   Downstream Limit/Cross Section: 8252.66

   Upstream Limit/Cross Section: 11095.91

2. Name of Structure: West Soil Cement Bank Protection

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Between Commerce Center Drive and I-5

   Downstream Limit/Cross Section: 8759.05

   Upstream Limit/Cross Section: 13176.47

3. Name of Structure: Northeast Soil Cement Bank Protection

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Between Commerce Center Drive and I-5

   Downstream Limit/Cross Section: 12648.31

   Upstream Limit/Cross Section: 14787.25

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

B. CHANNELIZATION

Flooding Source: Castaic Creek

Name of Structure: Soil Cement Bank Protection

1. Hydraulic Considerations

The channel was designated to carry 26,500 (cfs) and/or the Qcap - year flood

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☐ Outlet to channel ☐ At Drop Structures ☐ At Transitions

☐ Other locations (specify): _____

2. Channel Design Plans

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Accessory Structures

The channelization includes (check one):

☐ Levees [Attach Section E (Levee/Floodwall)] ☐ Drop structures ☐ Superelevated sections ☐ Energy dissipater

☐ Transitions in cross sectional geometry ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)] ☐ Weir

☐ Other (Describe): _____

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☒ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: _____

Name of Structure: _____

1. This revision reflects (check one):

☐ Bridge/Culvert not modeled in the FIS

☐ Modified Bridge/Culvert previously modeled in the FIS

☐ Revised analysis of Bridge/Culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): _____

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

☐ Dimensions (height, width, span, radius, length)
☐ Shape (culverts only)
☐ Material
☐ Beveling and Rounding
☐ Wink Wall Angle
☐ Skew Angle
☐ Distance between Cross Sections
☐ Erosion Protection
☐ Low Chord Elevations - Upstream and Downstream
☐ Top of Road Elevations - Upstream and Downstream
☐ Structure Invert Elevations - Upstream and Downstream
☐ Stream Invert Elevations - Upstream and Downstream
☐ Cross-Section Locations

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☐ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

D. DAM/BASIN

Flooding Source: _____

Name of Structure: _____

1. This request is for (check one): ☐ Existing Dam/Basin ☐ New Dam/Basin ☐ Modification of existing Dam/Basin

2. The Dam/Basin was designed by (check one): ☐ Federal Agency ☐ State Agency ☐ Private Organization

   ☐ Local Government Agency Name of the Agency or Organization: _____

3. The Dam was permitted as (check one): ☐ Federal Dam ☐ State Dam

   Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

   Permit or ID number _____ Permitting Agency or Organization _____

   a. ☐ Local Government Dam ☐ Private Dam

   Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

   Was the dam/basin designed using critical duration storm? (must account for the maximum volume of runoff)

   ☐ Yes, provide supporting documentation with your completed Form 2.

   ☐ No, provide a written explanation and justification for not using the critical duration storm.

5. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

   If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why debris/sediment analysis was not considered?

6. Does the Base Flood Elevation behind the dam/basin or downstream of the dam/basin change? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

	Stillwater Elevation Behind the Dam/Basin	
FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)		
50-year (2%)		
100-year (1%)		
500-year (0.2%)		
Normal Pool Elevation		

7. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

1. System Elements

   a. This Levee/Floodwall analysis is based on (check one): ☐ Upgrading of an existing levee/floodwall system ☐ A newly constructed levee/floodwall system ☐ Reanalysis of an existing levee/floodwall system

   b. Levee elements and locations are (check one):

   ☐ Earthen embankment, dike, berm, etc Stationed _____ to _____

   ☐ Structured floodwall Stationed _____ to _____

   ☐ Other (describe): _____ Stationed _____ to _____

E. LEVEE/FLOODWALL (CONTINUED)

c. Structural Type (check one): ☐ Monolithic cast-in place reinforced concrete ☐ Reinforced concrete masonry block ☐ Sheet piling ☐ Other (describe): _____

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency? _____

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers: _____
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
3. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
4. A layout detail for the embankment protection measures. Sheet Numbers: _____
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, Floodwall structure, closure structures, and pump stations. Sheet Numbers: _____

2. Freeboard

a. The minimum freeboard provided above the BFE is:

_____

Riverine

3.0 feet or more at the downstream end and throughout	☐ Yes	☐ No
3.5 feet or more at the upstream end	☐ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☐ Yes	☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

3. Closures

a. Openings through the levee system (check one): ☐ Exists ☐ Does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

E. LEVEE/FLOODWALL (CONTINUED)

4. Embarkment Protection

a. The maximum levee slope land side is: _____

b. The maximum levee slope flood side is: _____

c. The range of velocities along the levee during the base flood is: _____ (min) to _____ (max)

d. Embankment material is protected by (describe what kind): _____

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive Stress
Attach referrences

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								

(Extend table on an added sheet as needed and reference each entry)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embarkment and Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:

☐ Overall height: STA:_____ , height _____ ft.

☐ Limiting foundation soil strength:

Strength ϕ = _____ degrees, c = _____ psf

Slope: SS = _____ (h) to _____ (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

c. Summary of stability analysis results: _____

E. LEVEE/FLOODWALL (CONTINUED)

5. Embarkment and Foundation Stability (continued)

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No
If Yes, describe methodology used:

e. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

h. The duration of the base flood hydrograph against the embankment is _____ hours.

Attach engineering analysis to support construction plans.

6. Floodwall and Foundation Stability

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding ☐ If not, explain: _____

c. Loading included in the analyses were: ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

☐ Surcharge-Slope @ _____, ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

☐ 1%-annual-chance significant wave height: _____ ft.

☐ 1%-annual-chance significant wave period: _____ sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

E. LEVEE/FLOODWALL (CONTINUED)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin?

b. The computed settlement range is _____ ft. to _____ ft.

c. Settlement of the levee crest is determined to be primarily from : ☐ Foundation consolidation

☐ Embankment compression ☐ Other (Describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Drainage to pressure conduit: _____ acres

Drainage to ponding area: _____ acres

b. Relationship Established:

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

Gravity flow (Interior Watershed)	☐ Yes	☐ No
Common storm (River Watershed)	☐ Yes	☐ No
Historical ponding probability	☐ Yes	☐ No
Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection.
☐ Yes ☐ No If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is : _____ cfs

h. The length of levee system used to drive this seepage rate in item g: _____ ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants: _____ For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric; are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)
Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem

Hydrocompaction ☐ is ☐ is not a problem

Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure? ☐ Yes ☐ No

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No

If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why sediment transport was not considered.

10. Operational Plan and Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations? ☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations? ☐ Yes ☐ No

If the answer is No to any of the above, please attach supporting documentation.

E. LEVEE/FLOODWALL (CONTINUED)

11. Maintenance Plan

Please attach a copy of the fomal maintenance plan for the levee/floodwall

12. Operational and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

CERTIFICATION OF THE LEVEE DOCUMENTATION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.10(e) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: _____ License No.: _____ Expiration Date: _____

Company Name: Telephone No.: _____ Fax No.: _____

Signature: _____ Date: _____ E-mail Address: _____

CERTIFICATION OF THE LEVEE DOCUMENTATION

Flooding Source: Castaic Creek

Name of Structure: Soil Cement Bank Protection

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume _____ acres-feet

Debris load associated with the base flood discharge: Volume _____ acres-feet

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: SAM

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition: HEC-6

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport: _____

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

PACE
Advanced Water Engineering

Appendix B – Relevant Effective FEMA Data

FEMA FIS: Castaic Creek Flow Profiles

PACE

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 5 OF 9

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
AGOURA HILLS, CITY OF	065072	COMMERCE, CITY OF	060110
ALHAMBRA, CITY OF*	060095	COMPTON, CITY OF	060111
ARCADIA, CITY OF*	065014	COVINA, CITY OF*	065024
ARTESIA, CITY OF*	060097	CUDAHY, CITY OF	060657
AVALON, CITY OF	060098	CULVER CITY, CITY OF	060114
AZUSA, CITY OF	065015	DIAMOND BAR, CITY OF	060741
BALDWIN PARK, CITY OF*	060100	DOWNEY, CITY OF	060645
BELL, CITY OF*	060101	DUARTE, CITY OF*	065026
BELL GARDENS, CITY OF	060656	EL MONTE, CITY OF*	060658
BELLFLOWER, CITY OF	060102	EL SEGUNDO, CITY OF	060118
BEVERLY HILLS, CITY OF*	060655	GARDENA, CITY OF	060119
BRADBURY, CITY OF*	065017	GLENDALE, CITY OF	065030
BURBANK, CITY OF	065018	GLENDORA, CITY OF*	065031
CALABASAS, CITY OF	060749	HAWAIIAN GARDENS, CITY OF*	065032
CARSON, CITY OF	060107	HAWTHORNE, CITY OF*	060123
CERRITOS, CITY OF	060108	HERMOSA BEACH, CITY OF	060124
CLAREMONT, CITY OF*	060109	HIDDEN HILLS, CITY OF	060125

*No Special Flood Hazard Areas Identified

REVISED: June 2, 2021

FLOOD INSURANCE STUDY NUMBER
06037CV005F
Version Number 2.3.3.2

FEMA

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
HUNTINGTON PARK, CITY OF*	060126	PICO RIVERA, CITY OF	060148
INDUSTRY, CITY OF*	065035	POMONA, CITY OF*	060149
INGLEWOOD, CITY OF*	065036	RANCHO PALOS VERDES, CITY OF	060464
IRWINDALE, CITY OF*	060129	REDONDO BEACH, CITY OF	060150
LA CANADA FLINTRIDGE, CITY OF*	060669	ROLLING HILLS, CITY OF*	060151
LA HABRA HEIGHTS, CITY OF*	060701	ROLLING HILLS ESTATES, CITY OF*	065054
LA MIRADA, CITY OF	060131	ROSEMEAD, CITY OF*	060153
LA PUENTE*, CITY OF	065039	SAN DIMAS, CITY OF	060154
LA VERNE, CITY OF	060133	SAN FERNANDO, CITY OF	060628
LAKEWOOD, CITY OF	060130	SAN GABRIEL, CITY OF*	065055
LANCASTER, CITY OF	060672	SAN MARINO, CITY OF*	065057
LAWNDALE, CITY OF*	060134	SANTA CLARITA, CITY OF	060729
LOMITA, CITY OF*	060135	SANTA FE SPRINGS, CITY OF	060158
LONG BEACH, CITY OF	060136	SANTA MONICA, CITY OF	060159
LOS ANGELES, CITY OF	060137	SIERRA MADRE, CITY OF*	065059
LOS ANGELES COUNTY UNINCORPORATED AREAS	065043	SIGNAL HILL, CITY OF*	060161
LYNWOOD, CITY OF	060635	SOUTH EL MONTE, CITY OF*	060162
MALIBU, CITY OF	060745	SOUTH GATE, CITY OF	060163
MANHATTAN BEACH, CITY OF	060138	SOUTH PASADENA, CITY OF*	065061
MAYWOOD, CITY OF*	060651	TEMPLE CITY, CITY OF*	060653
MONROVIA, CITY OF*	065046	TORRANCE, CITY OF	060165
MONTEBELLO, CITY OF	060141	VERNON, CITY OF*	060166
MONTEREY PARK, CITY OF*	065047	WALNUT, CITY OF*	065069
NORWALK, CITY OF	060652	WEST COVINA, CITY OF	060666
PALMDALE, CITY OF	060144	WEST HOLLYWOOD, CITY OF*	060720
PALOS VERDES ESTATES, CITY OF	060145	WESTLAKE VILLAGE, CITY OF	060744
PARAMOUNT, CITY OF	065049	WHITTIER, CITY OF	060169
PASADENA, CITY OF*	065050		

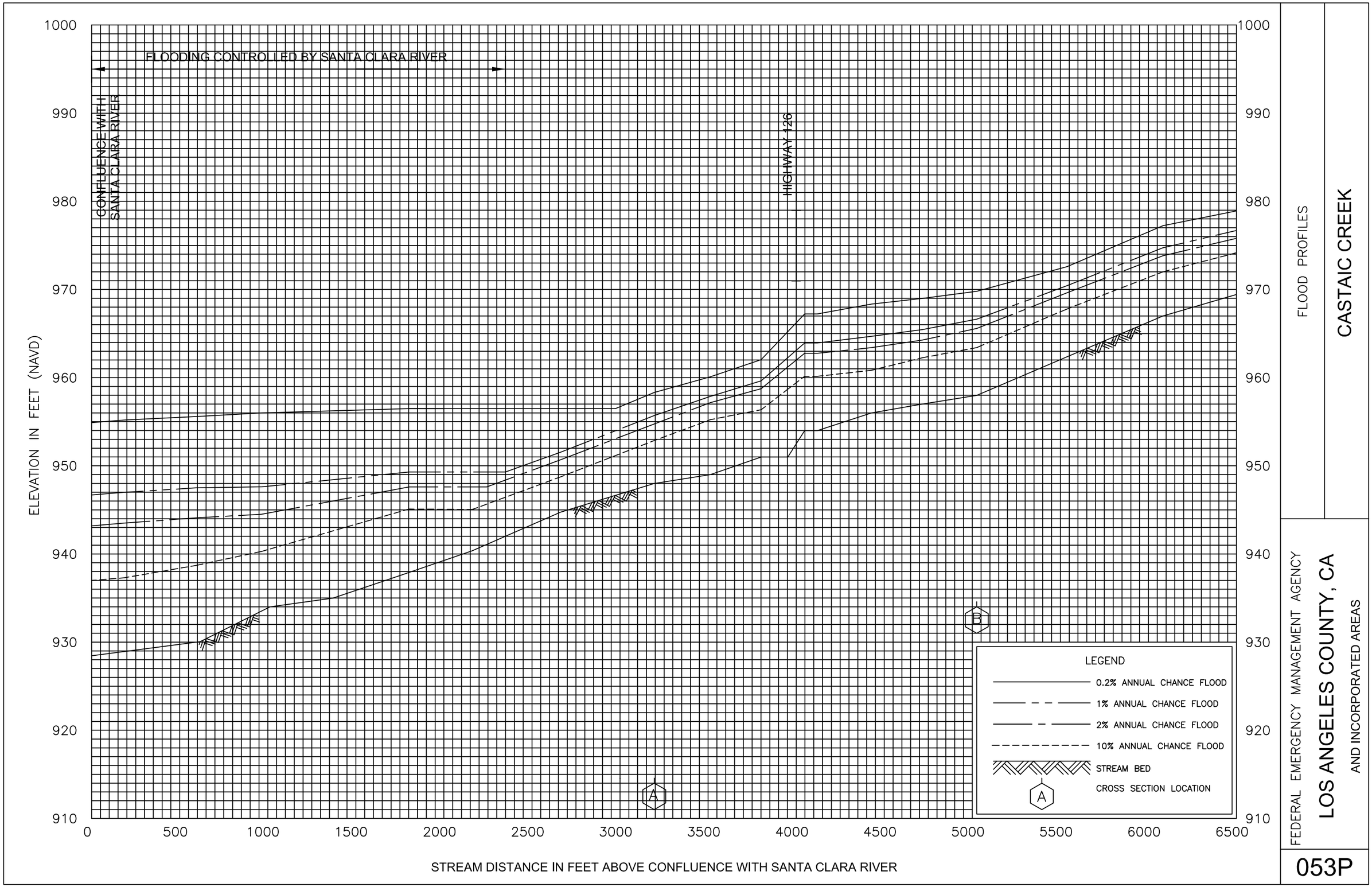
*No Special Flood Hazard Areas Identified

REVISED: June 2, 2021

FLOOD INSURANCE STUDY NUMBER

06037CV005F

Version Number 2.3.3.2



FLOOD PROFILES

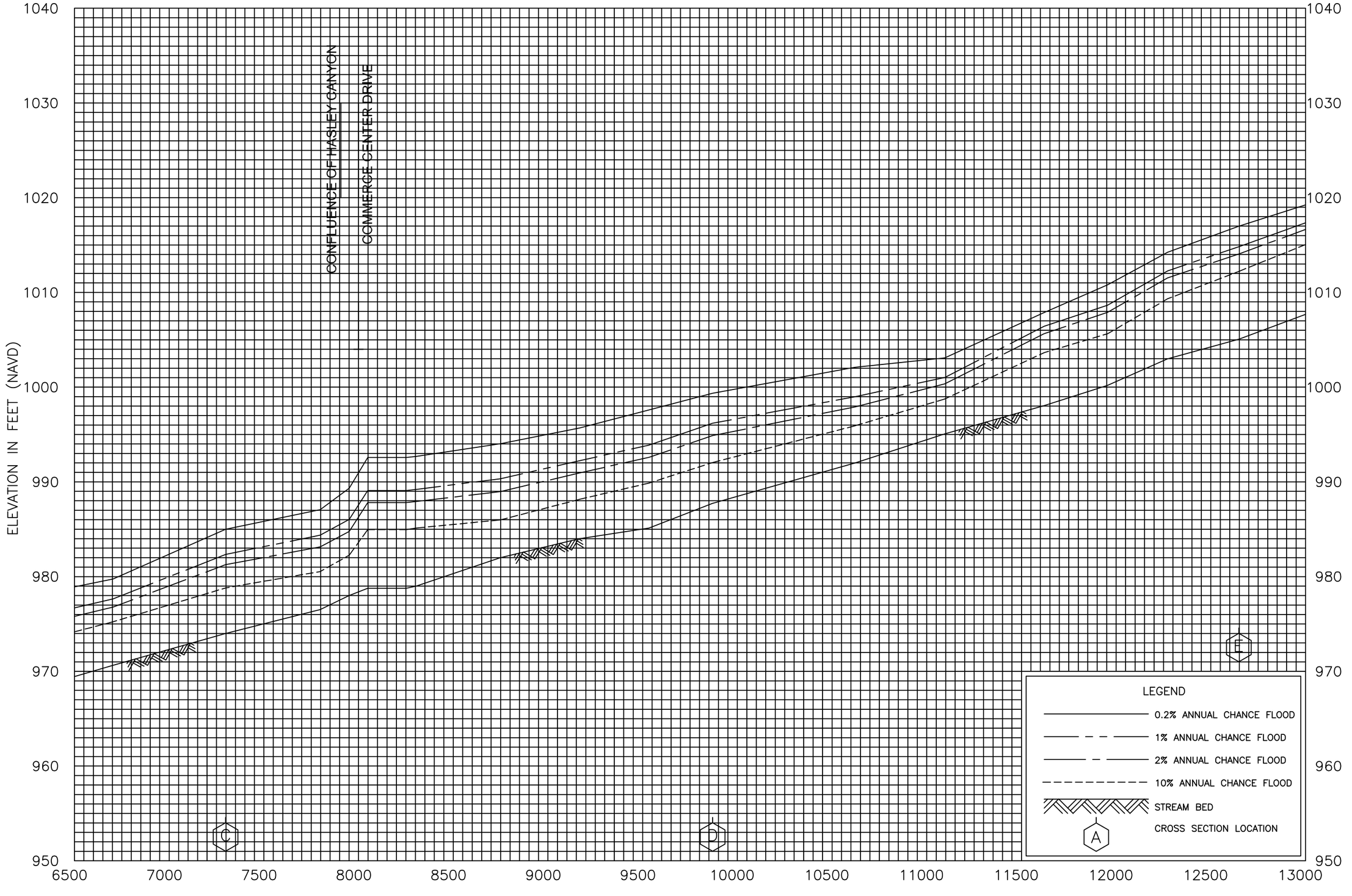
CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

053P



FLOOD PROFILES

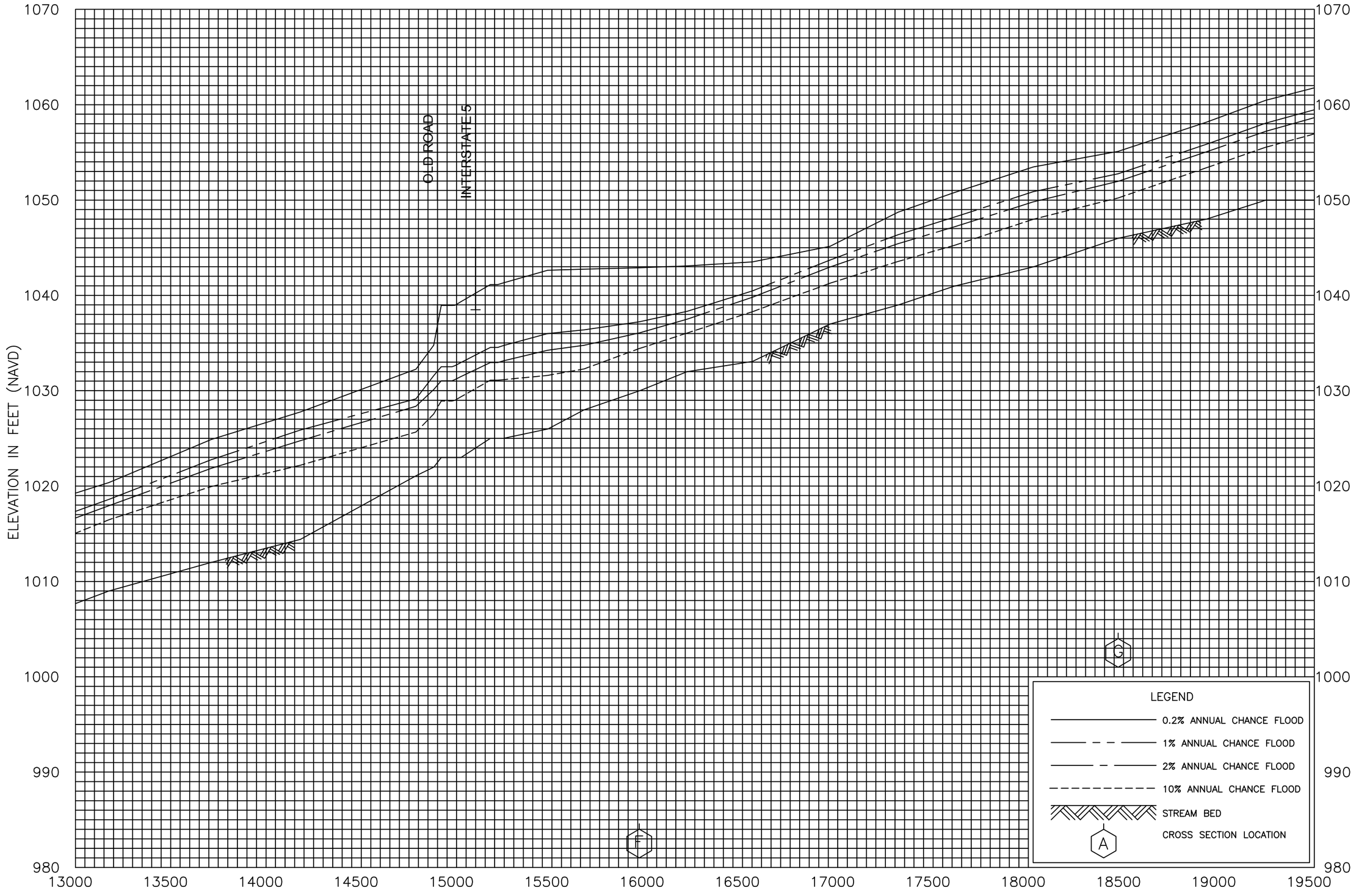
CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

054P



FLOOD PROFILES

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

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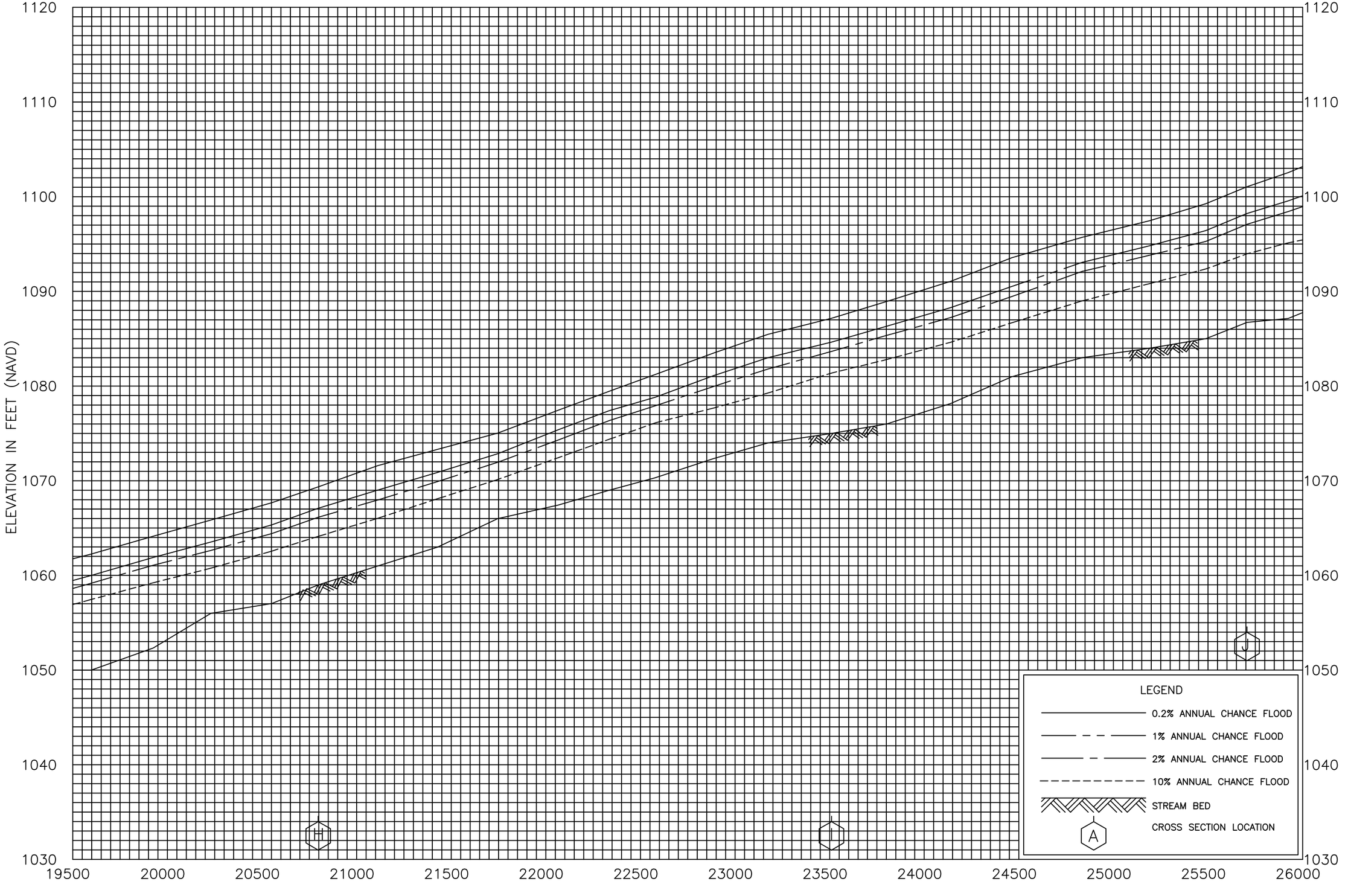


FLOOD PROFILES

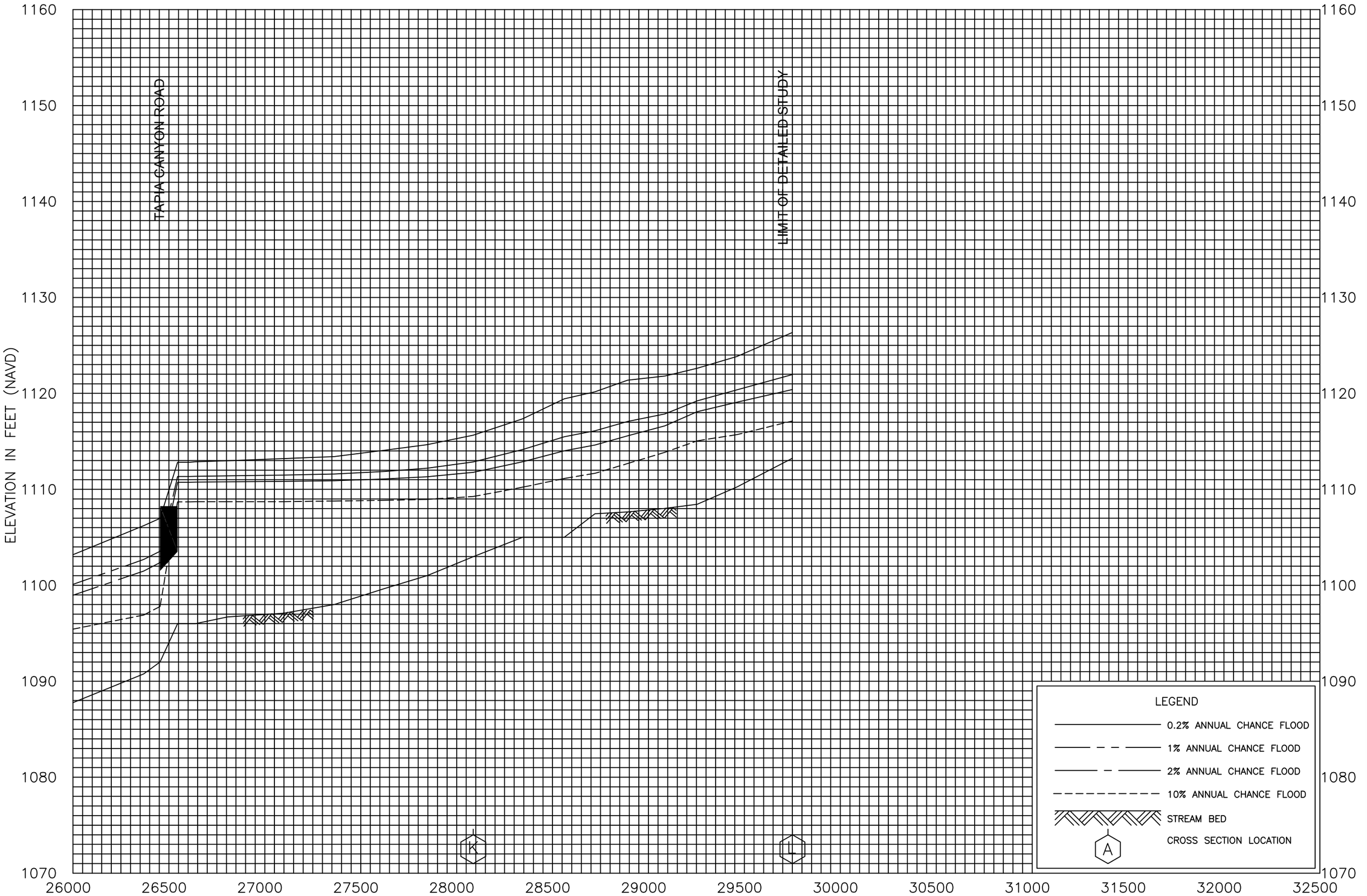
CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

056P



FLOOD PROFILES

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

057P

FEMA FIS: Castaic Creek Flowrates

PACE

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 9

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
AGOURA HILLS, CITY OF	065072	COMMERCE, CITY OF	060110
ALHAMBRA, CITY OF*	060095	COMPTON, CITY OF	060111
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AZUSA, CITY OF	065015	DIAMOND BAR, CITY OF	060741
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BELL, CITY OF*	060101	DUARTE, CITY OF*	065026
BELL GARDENS, CITY OF	060656	EL MONTE, CITY OF*	060658
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BEVERLY HILLS, CITY OF*	060655	GARDENA, CITY OF	060119
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CARSON, CITY OF	060107	HAWTHORNE, CITY OF*	060123
CERRITOS, CITY OF	060108	HERMOSA BEACH, CITY OF	060124
CLAREMONT, CITY OF*	060109	HIDDEN HILLS, CITY OF	060125

*No Special Flood Hazard Areas Identified

REVISED: June 2, 2021

FLOOD INSURANCE STUDY NUMBER
06037CV002F
Version Number 2.3.3.2

FEMA

Table 10: Summary of Discharges, continued

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Castaic Creek	At Santa Clara River Confluence (Pump Capacity)	203	17,950	*	33,490	41,260	*	58,270
Castaic Creek	At confluence with Santa Clara River	*	3,220	6,330	9,830	14,560	*	32,290
Castaic Creek	At Golden State Freeway	*	3,200	6,300	9,770	14,480	*	32,120
Castaic Creek	Approximately 0.9 miles upstream of Golden State Freeway	*	3,120	6,150	9,540	14,130	*	31,340
Castaic Creek	At Castaic Road	*	2,610	5,150	7,990	11,830	*	26,240
Castaic Creek	Approximately 2,100 feet upstream of Confluence with Charlie Canyon	16.8	*	*	*	11,805	*	22,326
Century City Shallow Flooding	Northwest of Santa Monica Boulevard and Avenue of the Stars	0.5	400	*	590	700	*	900
Chatsworth Shallow Flooding	Vicinity of Variel Avenue and Chatsworth Street	13.4	2,100	*	4,700	6,000	*	9,300
Chatsworth Shallow Flooding	Vicinity of Santa Susana Pass Road and Santa Susana Avenue	1.5	450	*	990	1,300	*	2,000
Chatsworth Shallow Flooding	Vicinity of Chatsworth Street and Corbin Avenue	0.9	220	*	480	610	*	960
Chatsworth Shallow Flooding	Vicinity of Canoga Avenue and Devonshire Street	0.8	230	*	510	650	*	1,000
Chatsworth Shallow Flooding	Vicinity of Valley Circle Boulevard and Lassen Street	0.8	220	*	480	600	*	950

FEMA LOMR: Castaic Creek Soil Cement Bank Protection

PACE

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Los Angeles County California (Unincorporated Areas)	NO PROJECT	1D HYDRAULIC ANALYSIS UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 065043		
IDENTIFIER	Castaic Creek Soil Cement Bank Protection PM 26363	APPROXIMATE LATITUDE & LONGITUDE: 34.434, -118.626 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 06037C0792G DATE: June 2, 2021 TYPE: FIRM NO.: 06037C0805G DATE: June 2, 2021 TYPE: FIRM NO.: 06037C0815G DATE: June 2, 2021	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: June 02, 2021 PROFILE(S): 53P, 54P, 96P AND 102P

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

FLOODING SOURCE(S) & REVISED REACH(ES) See Page 2 for Additional Flooding Sources

Castaic Creek - from just upstream of Highway 126 to just downstream of Commerce Centre Drive.

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Castaic Creek	BFEs*	BFEs	YES	YES
	Zone AE	Zone AE	YES	YES
	Zone AE	Zone X(shaded)	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

FLOODING SOURCE(S) & REVISED REACH(ES)

Hasley Canyon Creek - from its confluence to approximately 400 feet upstream of the confluence with Castaic Creek.
Hasley Canyon Creek Split - From its convergence to approximately 360 upstream of convergence with Hasley Canyon Creek.

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Hasley Canyon Creek	BFEs* Zone AE	BFEs Zone AE	YES YES	YES YES
Hasley Canyon Creek Split	BFEs* Zone AE	BFEs Zone AE	YES YES	YES YES

* BFEs - Base Flood Elevations

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

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Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

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Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Kathryn Lipiecki
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607-4052
(510) 627-7211

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below, and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/bfe_status/bfe_main.asp

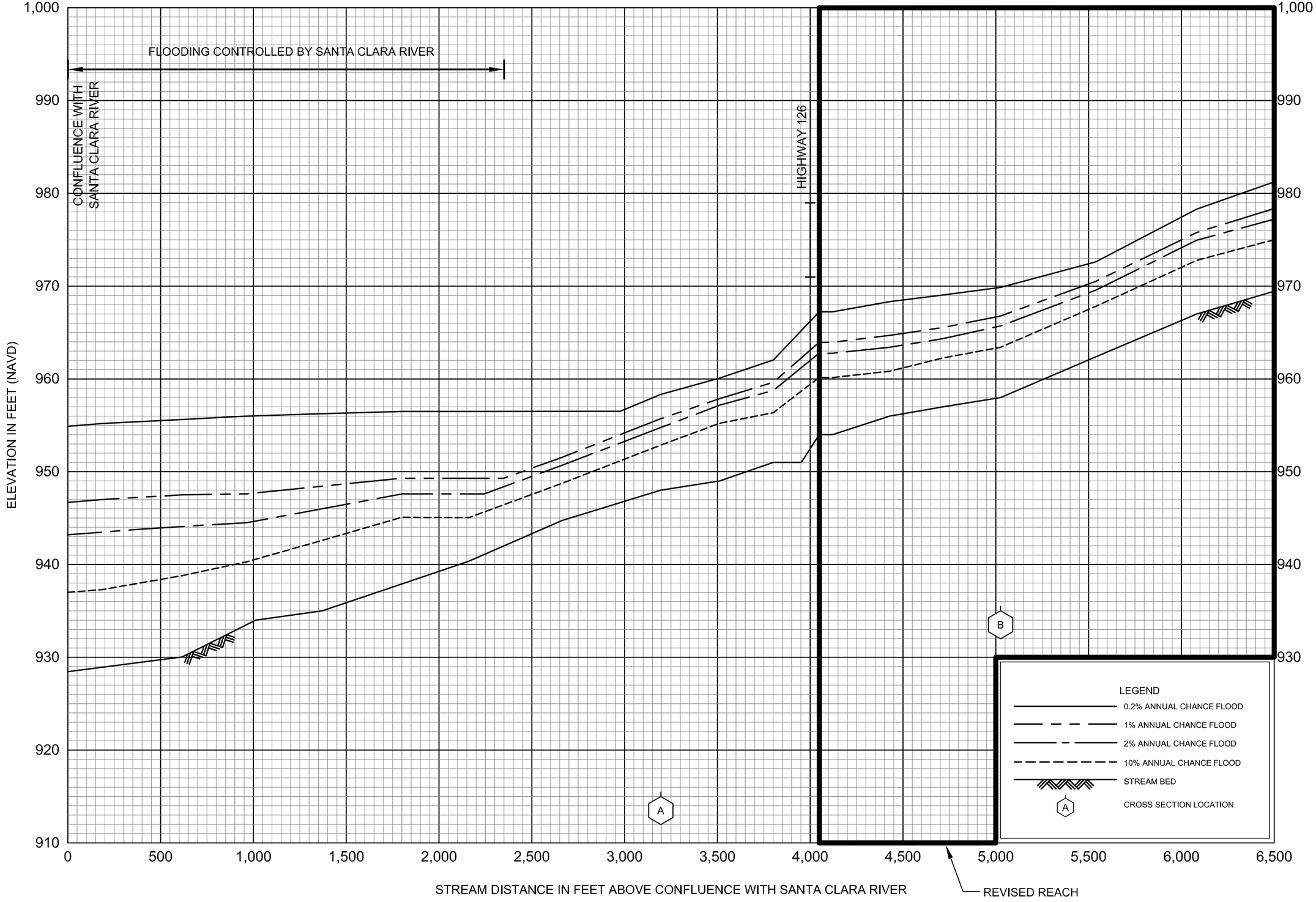
LOCAL NEWSPAPER

Name: *Los Angeles Daily News*
Dates: June 10, 2021 and June 17, 2021

Within 90 days of the second publication in the local newspaper, any interested party may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



FLOOD PROFILES

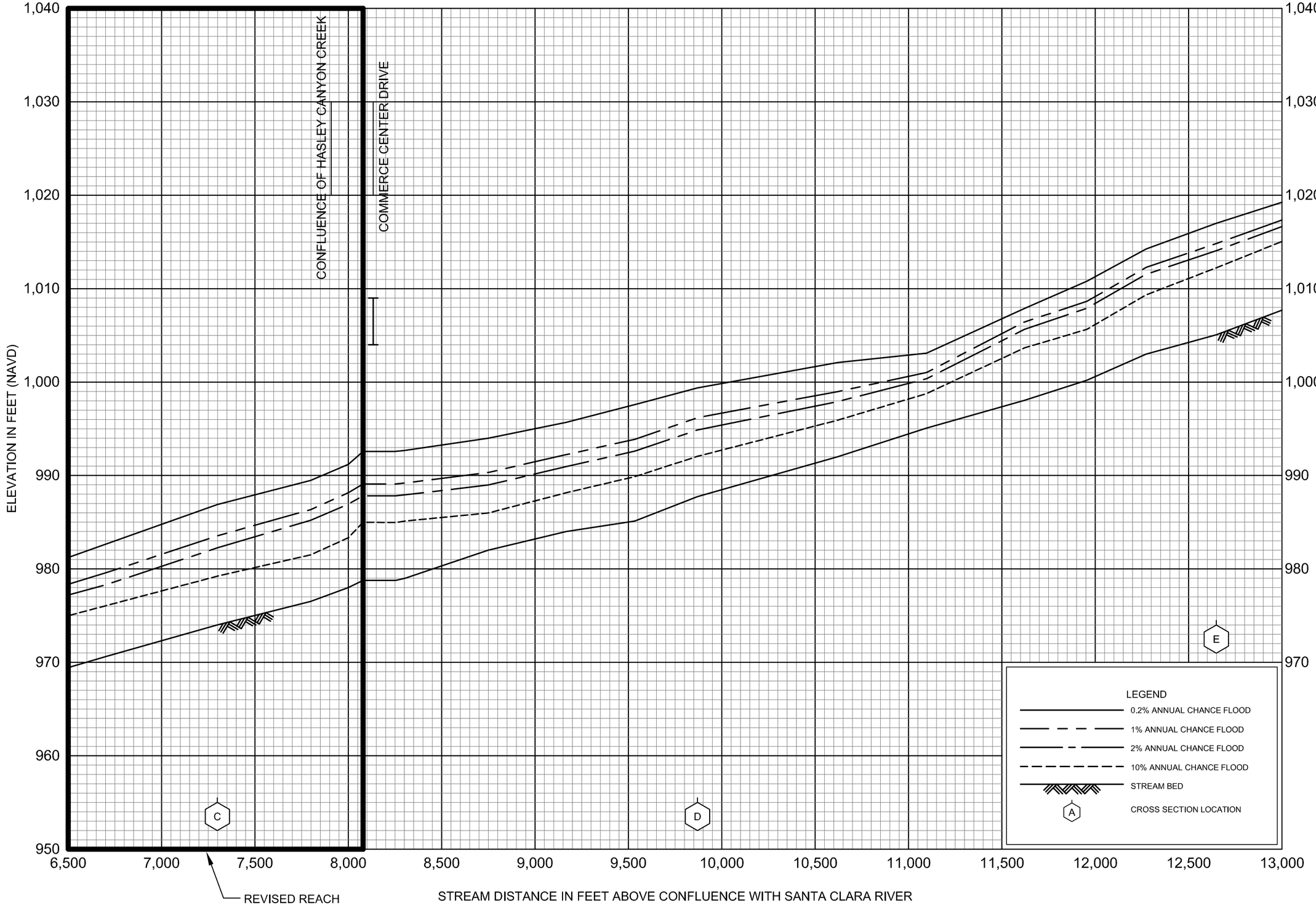
REVISED TO REFLECT LOMR
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

53P



FLOOD PROFILES

REVISED TO REFLECT LOMR

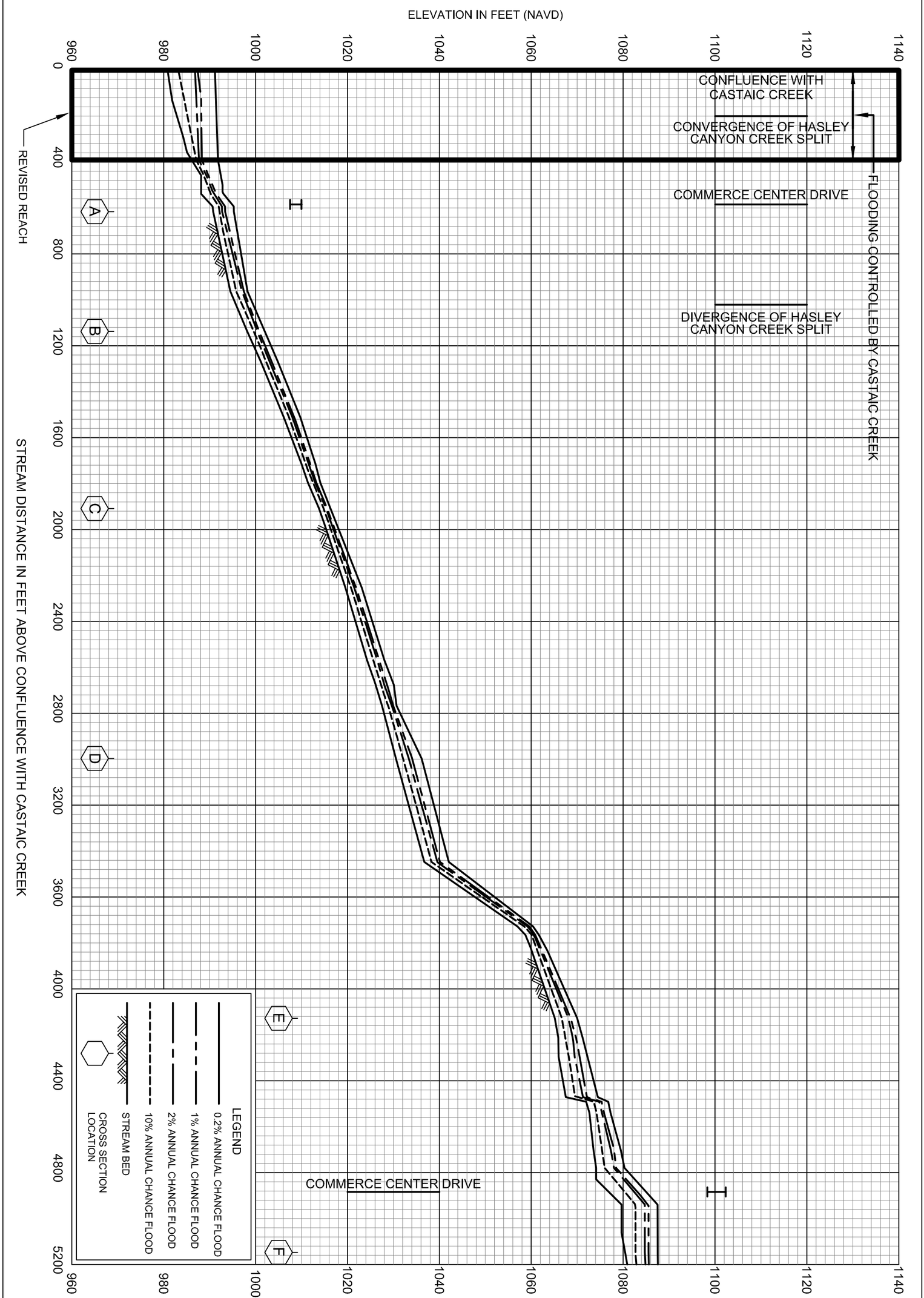
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



96P

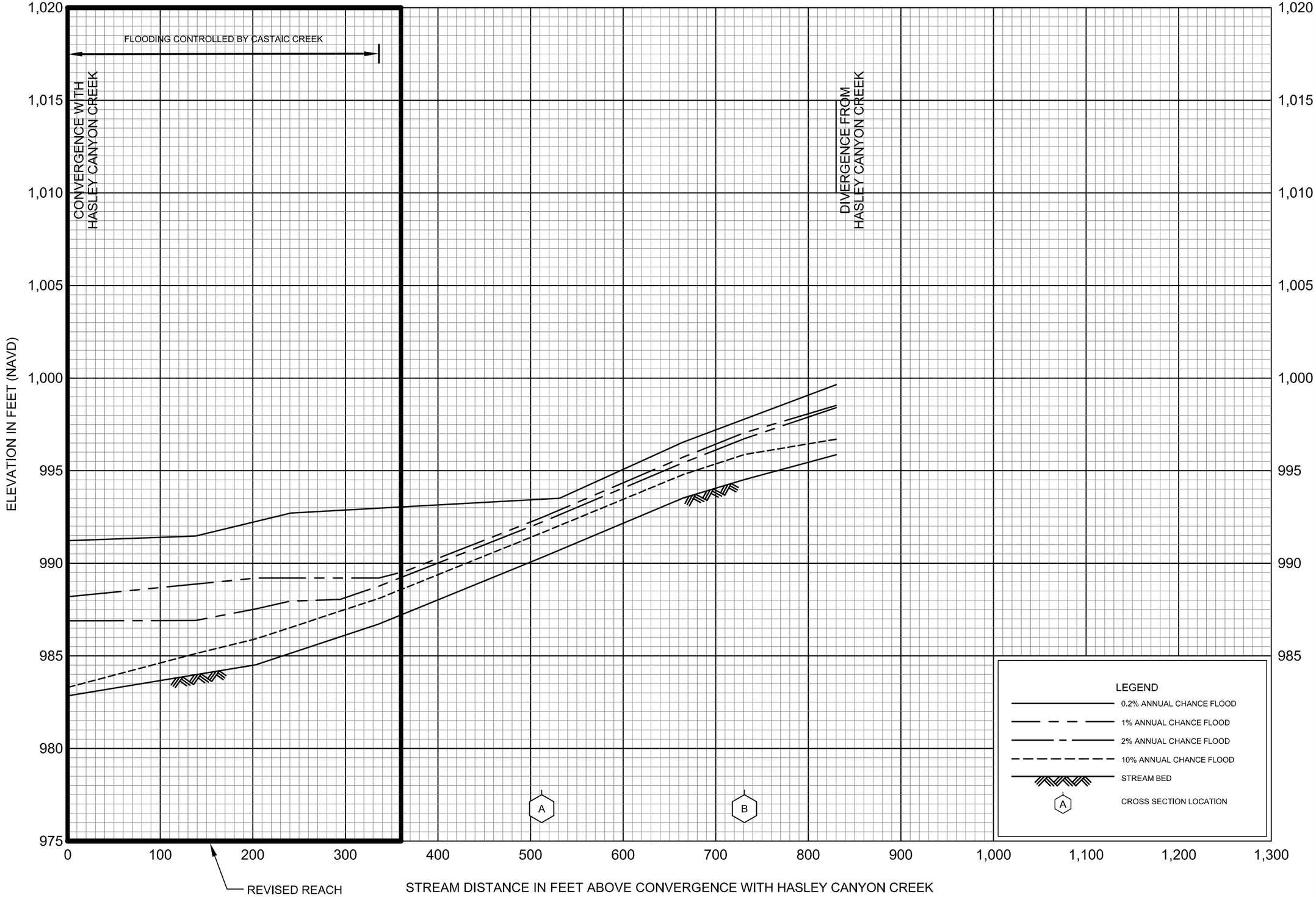
FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

FLOOD PROFILES REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

HASLEY CANYON CREEK



FLOOD PROFILES

REVISED TO REFLECT LOMR

EFFECTIVE: October 15, 2021

HASLEY CANYON CREEK SPLIT

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

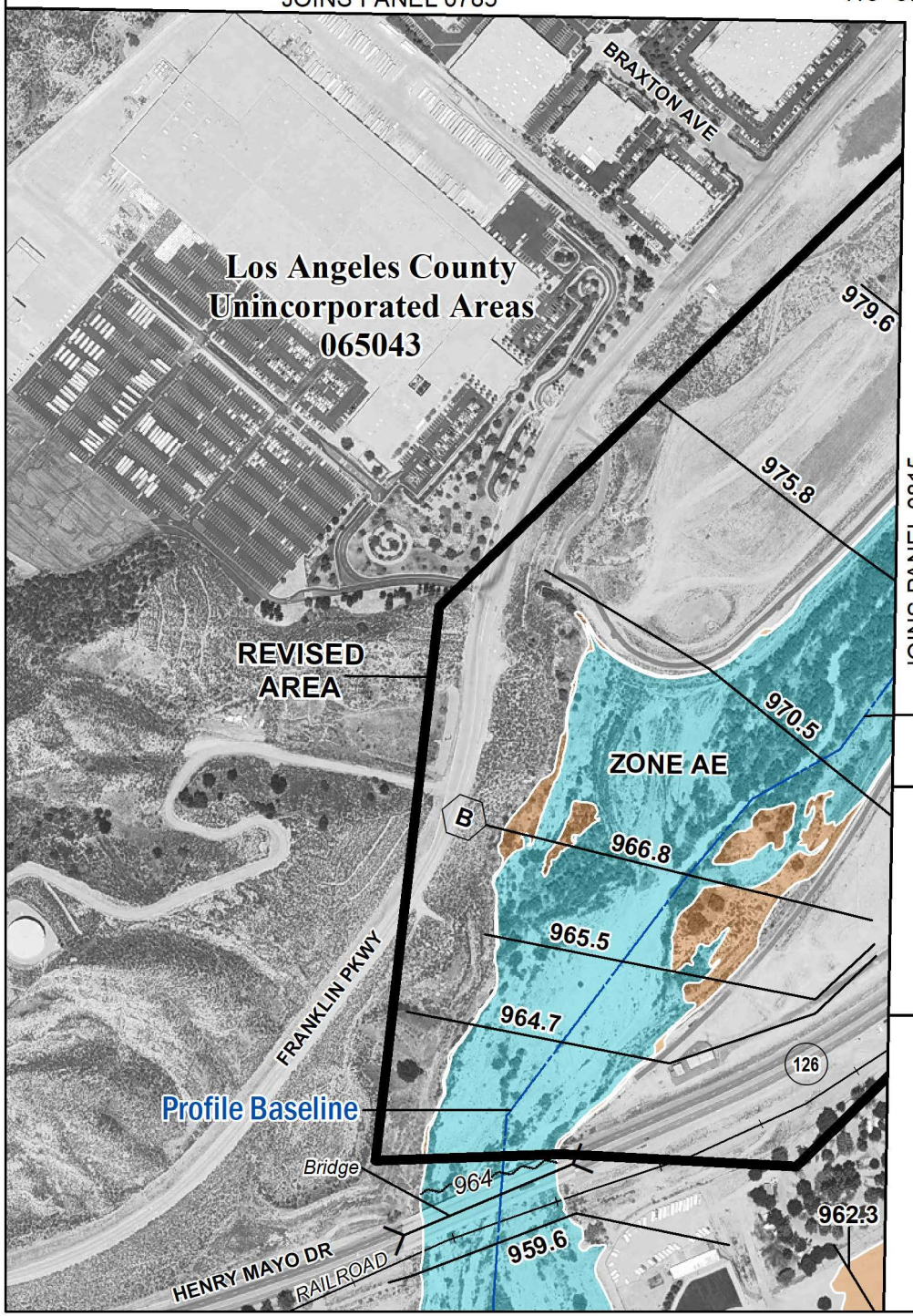
102P

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 4 NORTH, RANGE 17 WEST.

JOINS PANEL 0785

118° 37' 30"

34° 26' 15"



SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*

OTHER AREAS

- Area of Undetermined Flood Hazard *Zone D*

SCALE

N

Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 792 OF 1075

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0792	G

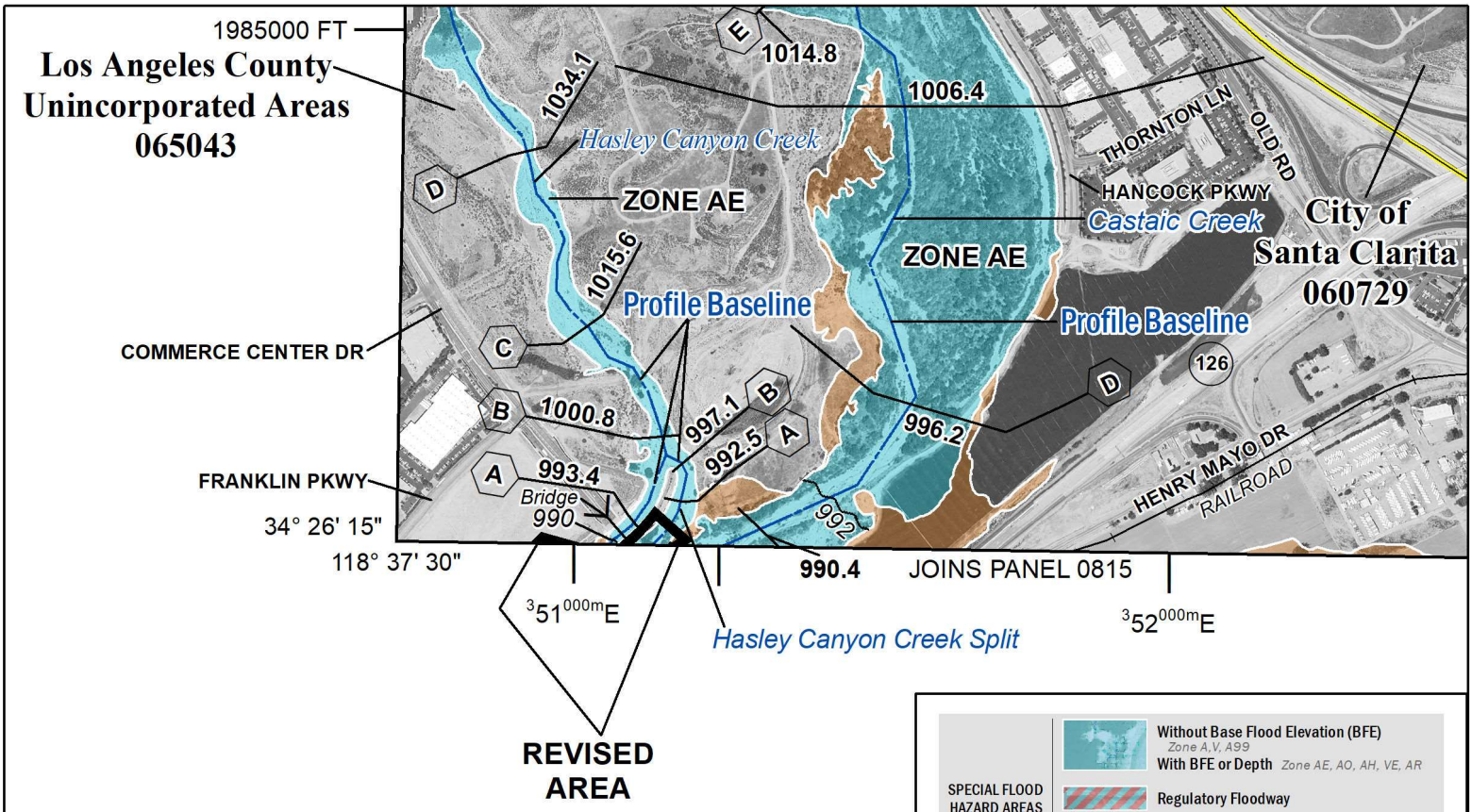
FEMA

REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

VERSION NUMBER
2.3.3.0

MAP NUMBER
06037C0792G

MAP REVISED
JUNE 2, 2021



SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A,V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X

OTHER AREAS
- Area of Undetermined Flood Hazard Zone D

SCALE

N

Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0	500	1,000	2,000 Feet
0	150	300	600 Meters

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 805 OF 1075

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0805	G
SANTA CLARITA, CITY OF	060729	0805	G

REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

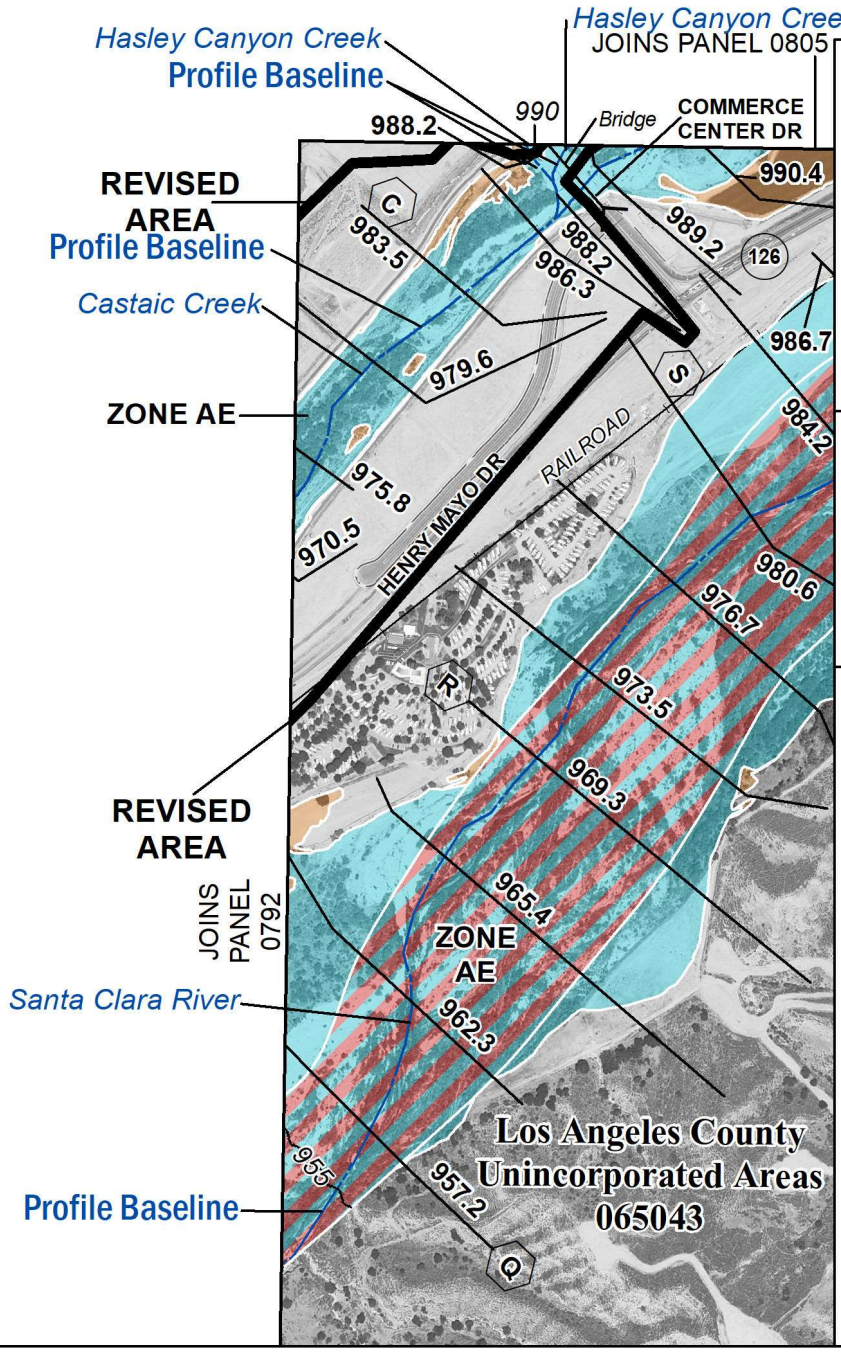
VERSION NUMBER
2.3.3.0

MAP NUMBER
06037C0805G

MAP REVISED
JUNE 2, 2021

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 5 NORTH, RANGE 17 WEST AND TOWNSHIP 5 NORTH, RANGE 16 WEST AND TOWNSHIP 4 NORTH, RANGE 17 WEST AND TOWNSHIP 4 NORTH, RANGE 16 WEST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 3 NORTH, RANGE 16 WEST AND TOWNSHIP 3 NORTH, RANGE 17 WEST.



SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A,V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X

OTHER AREAS
- Area of Undetermined Flood Hazard Zone D

SCALE

Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88

N

1 inch = 1,000 feet 1:12,000

0 500 1,000 2,000 Feet

0 150 300 600 Meters

National Flood Insurance Program

FEMA

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 815 OF 1075

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0815	G
SANTA CLARITA, CITY OF	060729	0815	G

REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

VERSION NUMBER
2.3.3.0

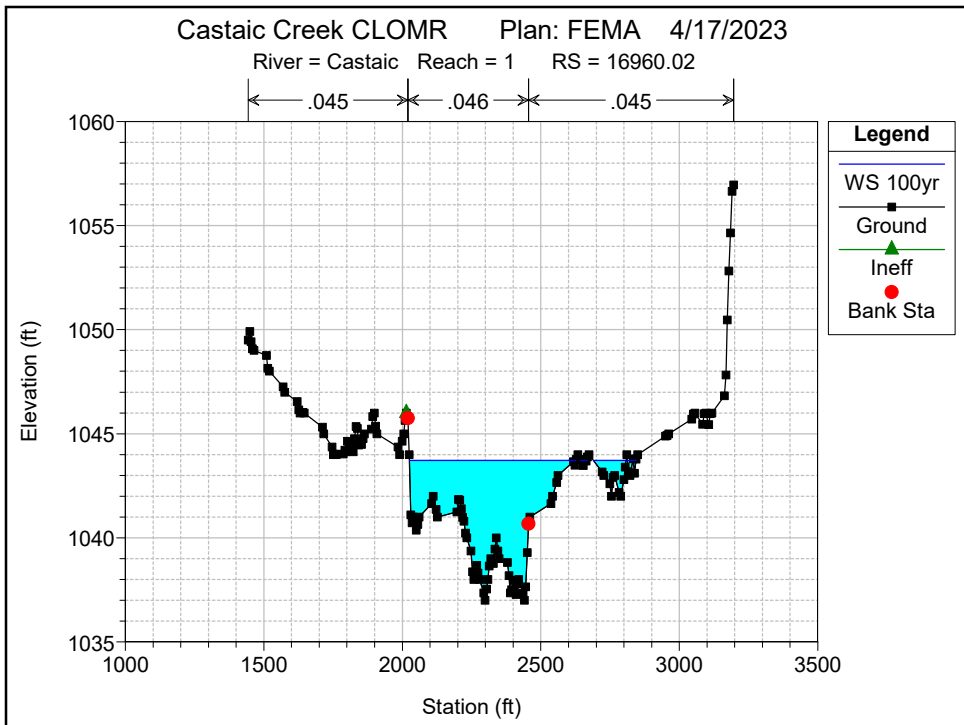
MAP NUMBER
06037C0815G

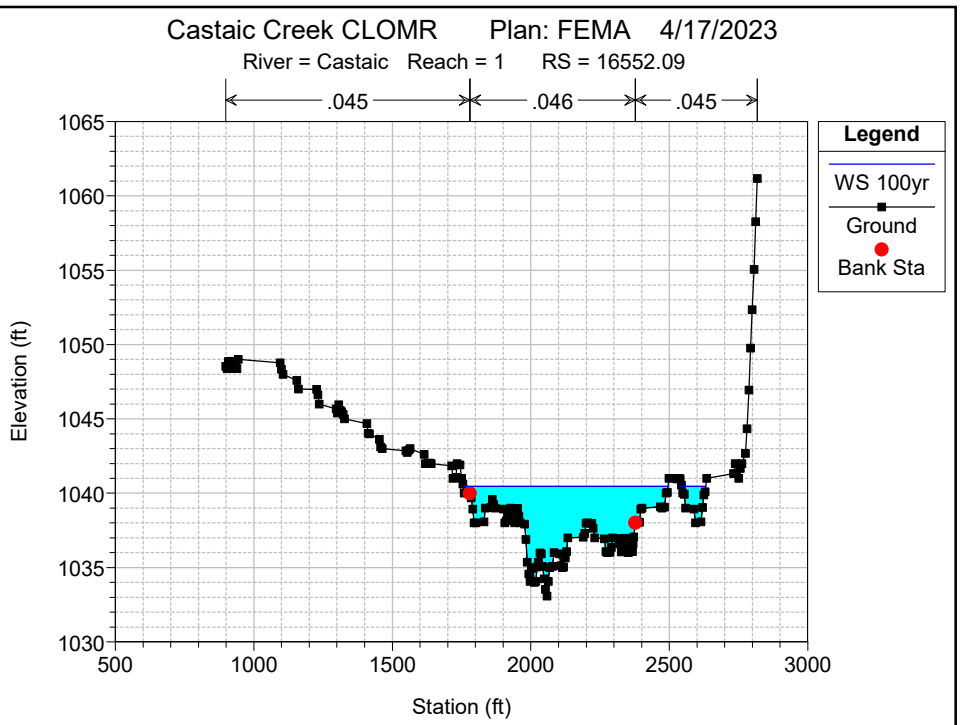
MAP REVISED
JUNE 2, 2021

Appendix C – HEC-RAS Duplicate Effective FEMA Results

HEC-RAS Plan: FEMA River: Castaic Reach: 1 Profile: 100yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	16960.02	100yr	14480.00	1037.00	1043.71	1043.00	1044.56	0.008994	7.67	2078.54	764.16	0.68
1	16552.09	100yr	14480.00	1033.07	1040.46		1041.08	0.007690	6.45	2379.47	826.87	0.61
1	16209.5	100yr	14480.00	1032.00	1038.32		1038.80	0.005727	5.55	2615.72	816.07	0.53
1	15958.96	100yr	14480.00	1030.00	1037.23	1035.50	1037.62	0.003804	4.99	2903.74	793.77	0.44
1	15669.62	100yr	14480.00	1028.00	1036.38	1033.76	1036.75	0.002421	4.95	3037.27	678.01	0.37
1	15478.79	100yr	14480.00	1026.00	1035.99	1032.49	1036.34	0.001884	4.81	3055.77	584.55	0.33
1	15245.39	100yr	14480.00	1025.00	1034.73	1031.90	1035.66	0.004069	7.77	1863.76	413.35	0.50
1	15216.27	100yr	14480.00	1025.00	1034.53	1031.84	1035.53	0.004381	8.00	1809.86	494.93	0.52
1	15100		Bridge									
1	14991.85	100yr	14560.00	1023.00	1032.62	1030.35	1033.68	0.005138	8.25	1765.60	394.48	0.56
1	14976.84	100yr	14560.00	1023.00	1032.51	1030.42	1033.59	0.005526	8.34	1746.41	451.50	0.57
1	14900		Bridge									
1	14892.2	100yr	14560.00	1022.00	1031.57	1029.74	1032.70	0.006340	8.55	1703.71	681.73	0.61
1	14787.25	100yr	14560.00	1021.09	1029.14	1029.14	1031.32	0.019015	11.85	1228.88	787.00	1.00
1	14180.6	100yr	14560.00	1014.41	1025.87	1023.81	1026.52	0.003803	6.95	2679.43	978.82	0.48
1	13713.74	100yr	14560.00	1012.00	1022.77	1021.75	1023.87	0.009255	8.52	1844.91	808.03	0.70
1	13176.47	100yr	14560.00	1009.00	1018.61		1019.27	0.007612	6.51	2235.80	632.96	0.61
1	12648.31	100yr	14560.00	1005.06	1014.83		1015.31	0.007221	5.54	2625.94	908.86	0.58
1	12271.99	100yr	14560.00	1003.00	1012.27		1012.81	0.006099	5.89	2471.78	686.67	0.55
1	11954.94	100yr	14560.00	1000.20	1008.64		1009.70	0.017476	8.24	1766.75	656.01	0.89
1	11620.14	100yr	14560.00	998.05	1006.42	1004.77	1006.81	0.004603	5.00	2913.16	838.91	0.47
1	11095.91	100yr	14560.00	995.07	1001.05	1001.05	1001.95	0.026296	7.64	1906.25	1077.14	1.01
1	10620.36	100yr	14560.00	992.00	998.98		999.16	0.001827	3.45	4223.77	1065.81	0.31
1	9869.909	100yr	14560.00	987.74	996.19		997.05	0.005057	8.71	2603.19	647.45	0.56
1	9534.089	100yr	14560.00	985.13	993.89		994.79	0.005199	8.46	2611.48	803.69	0.57
1	9166.896	100yr	14560.00	984.00	992.27		992.99	0.003933	7.48	2495.23	577.16	0.49
1	8749.054	100yr	14560.00	982.00	990.59		991.33	0.003938	7.65	2529.87	492.16	0.50
1	8304.799	100yr	14560.00	979.00	989.70		990.14	0.001732	5.46	3055.13	514.49	0.34
1	8252.659	100yr	14560.00	978.78	989.62	986.27	990.02	0.002110	5.07	2872.68	453.26	0.35
1	8000		Bridge									
1	7999.701	100yr	14560.00	978.00	988.15		988.69	0.004502	5.88	2476.06	485.73	0.46
1	7797.603	100yr	14560.00	976.53	986.35		987.26	0.010232	7.68	1897.55	462.27	0.67
1	7298.389	100yr	14560.00	974.00	983.54		984.11	0.004058	6.03	2417.68	424.68	0.44
1	6704	100yr	14560.00	970.64	979.62	978.06	980.62	0.008929	8.04	1810.51	370.60	0.64
1	6082.33	100yr	14560.00	967.00	975.75		976.43	0.005063	6.58	2214.34	455.49	0.52
1	5537.854	100yr	14560.00	962.37	970.56	970.28	971.79	0.016686	8.90	1636.93	525.88	0.89
1	5025.303	100yr	14560.00	958.00	966.69		967.40	0.004869	6.89	2335.35	654.03	0.52
1	4715.427	100yr	14560.00	957.00	965.11		965.70	0.005978	6.17	2358.16	602.73	0.55
1	4427.711	100yr	14560.00	956.00	963.30	961.90	963.97	0.006004	6.56	2221.05	520.41	0.56


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 16960.02
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1060
1055
1050
1045
1040
1035
1000
1500
2000
2500
3000
3500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River = Castaic Reach = 1 RS = 16552.09
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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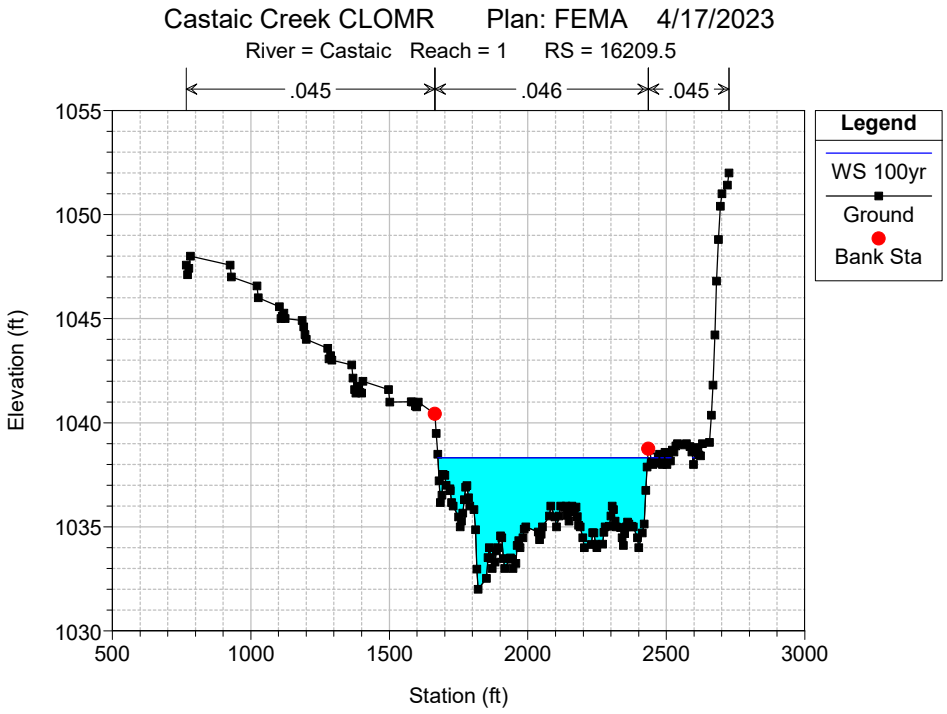
1060
1055
1050
1045
1040
1035
1030
500
1000
1500
2000
2500
3000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River = Castaic Reach = 1 RS = 16209.5
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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1050
1045
1040
1035
1030
500
1000
1500
2000
2500
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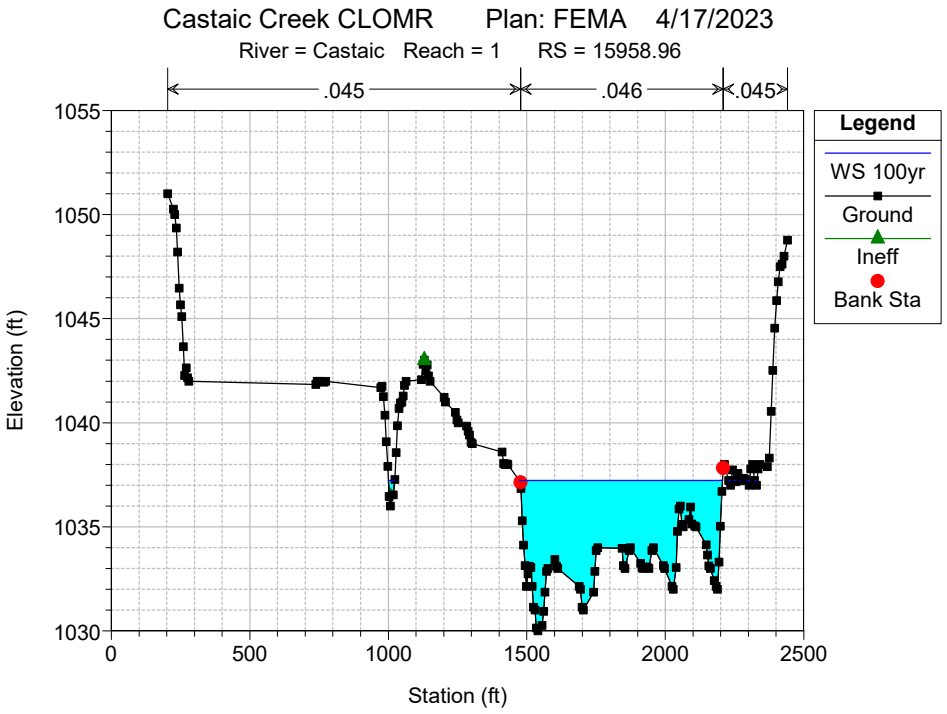
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River = Castaic Reach = 1 RS = 15958.96
.045
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.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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1050
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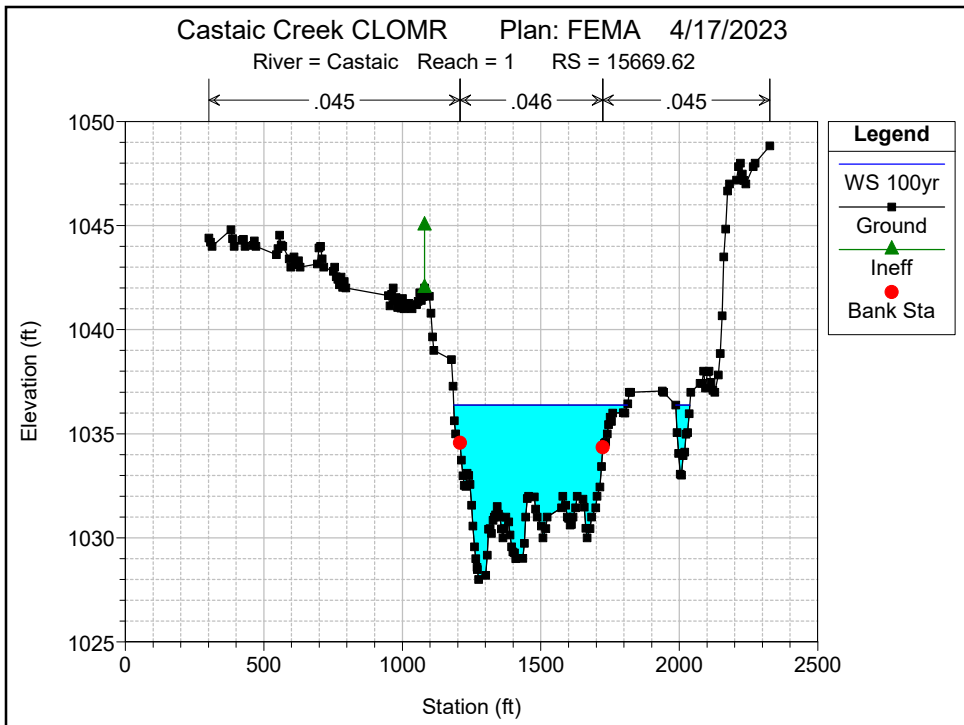
1040
1035
1030
0
500
1000
1500
2000
2500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.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
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Station (ft)
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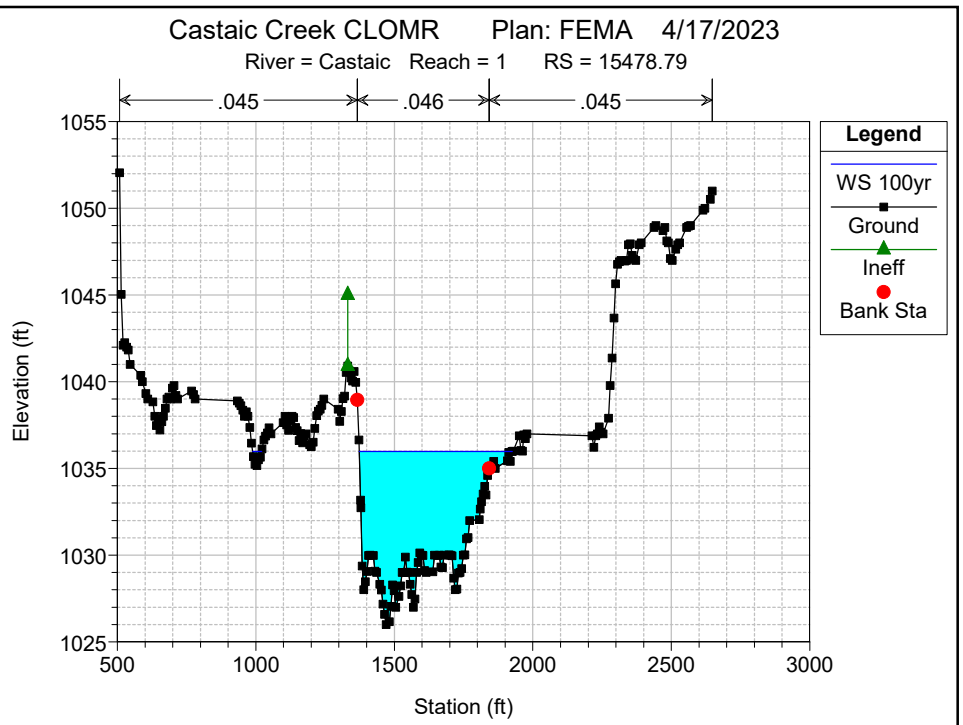
1030
1025
0
500
1000
1500
2000
2500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.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
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Station (ft)
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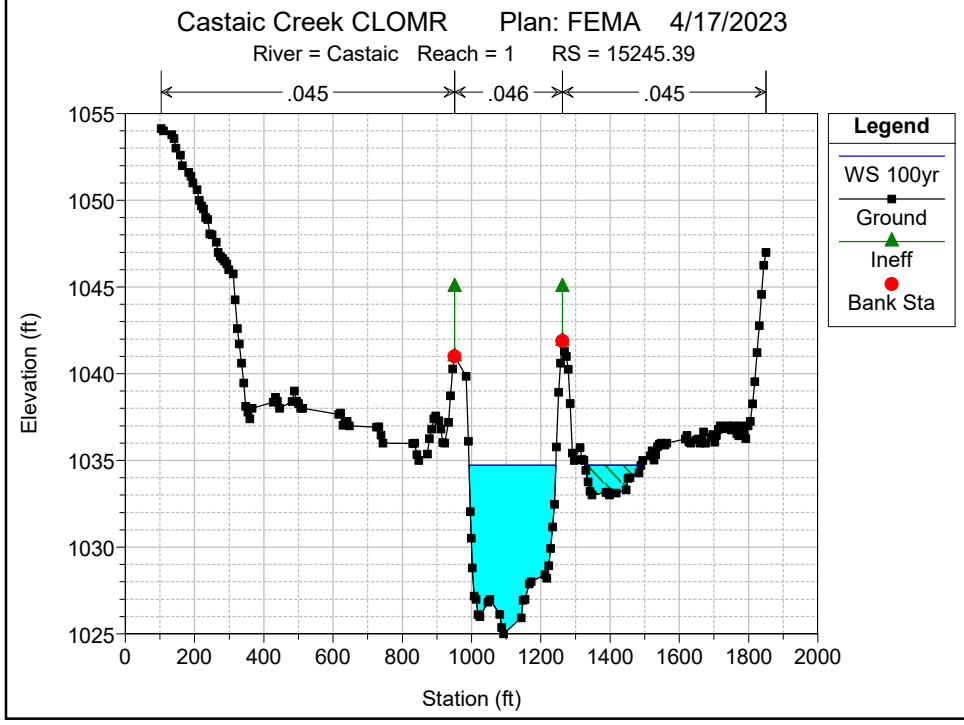
1030
1025
500
1000
1500
2000
2500
3000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.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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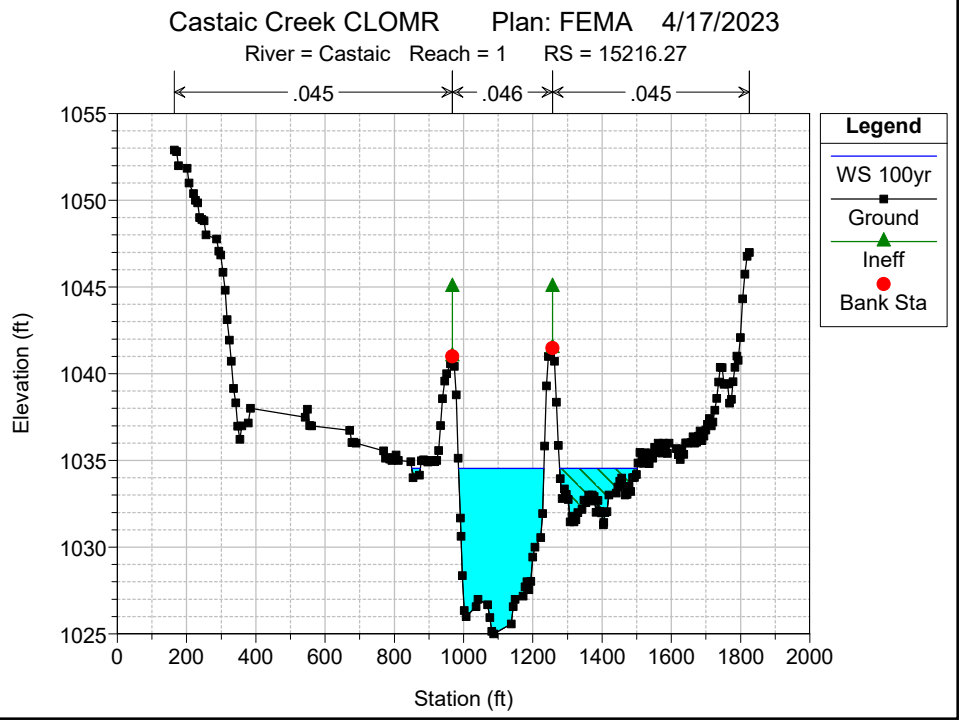
1600
1800
2000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River = Castaic Reach = 1 RS = 15216.27
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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1800
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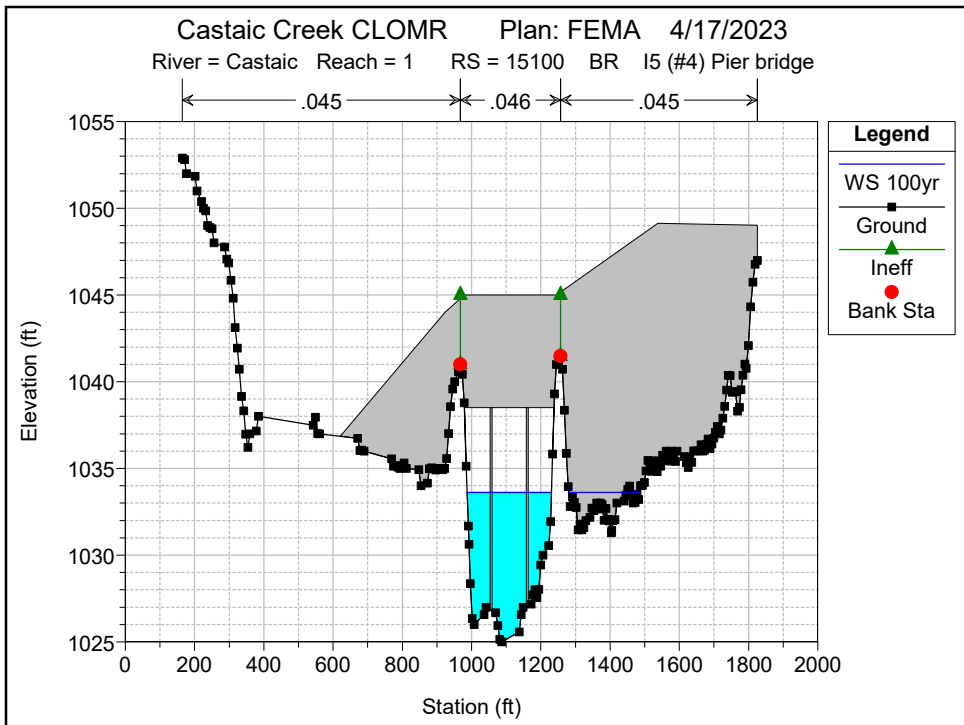
Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 15100 BR I5 (#4) Pier bridge
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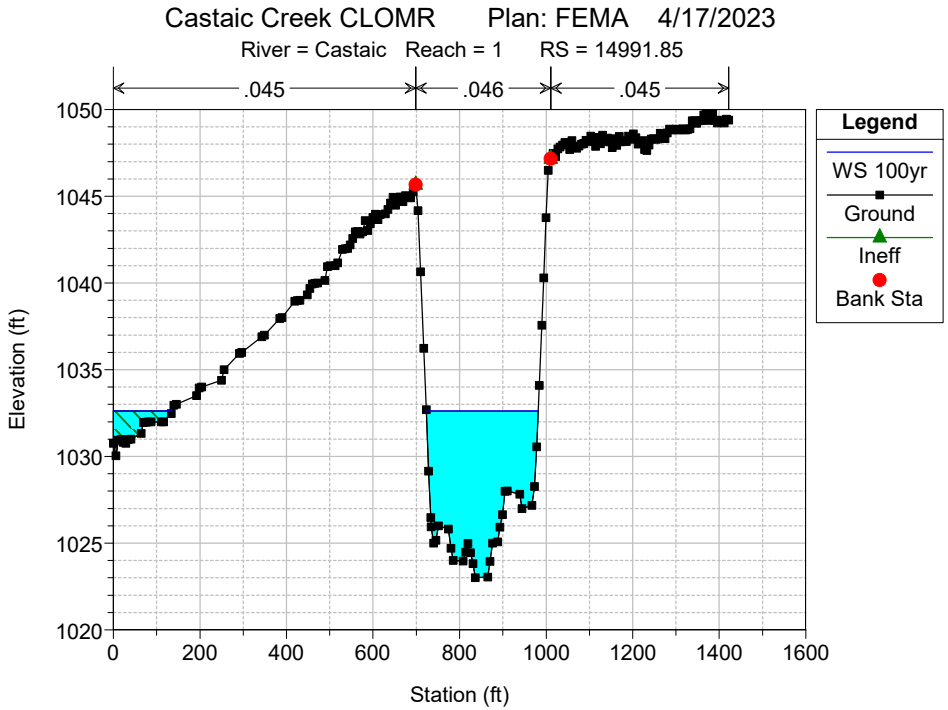
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14991.85
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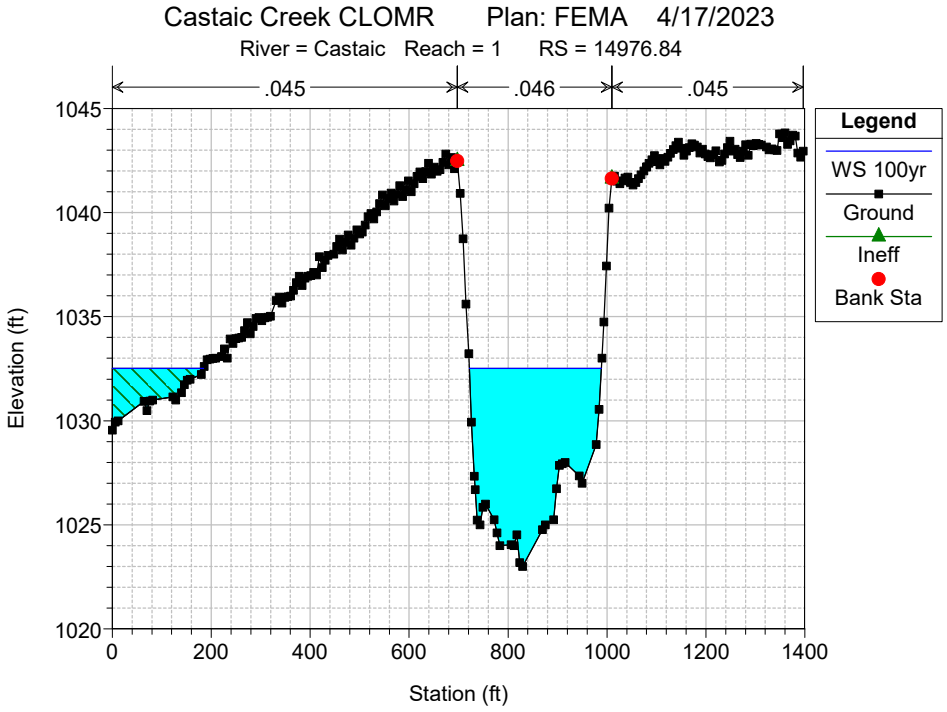
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14976.84
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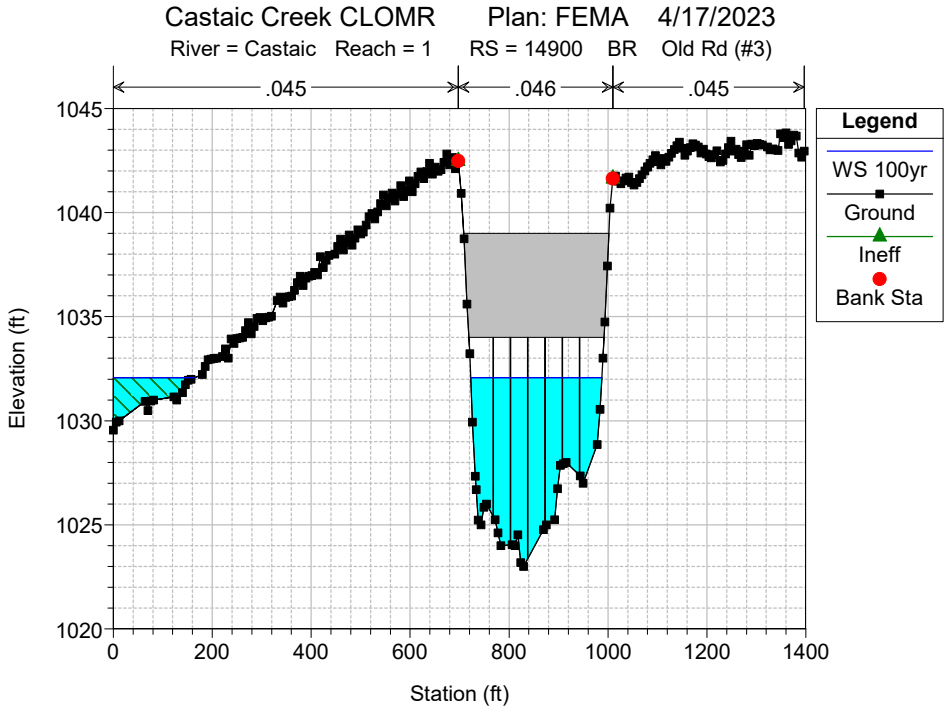
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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River = Castaic Reach = 1 RS = 14900 BR Old Rd (#3)
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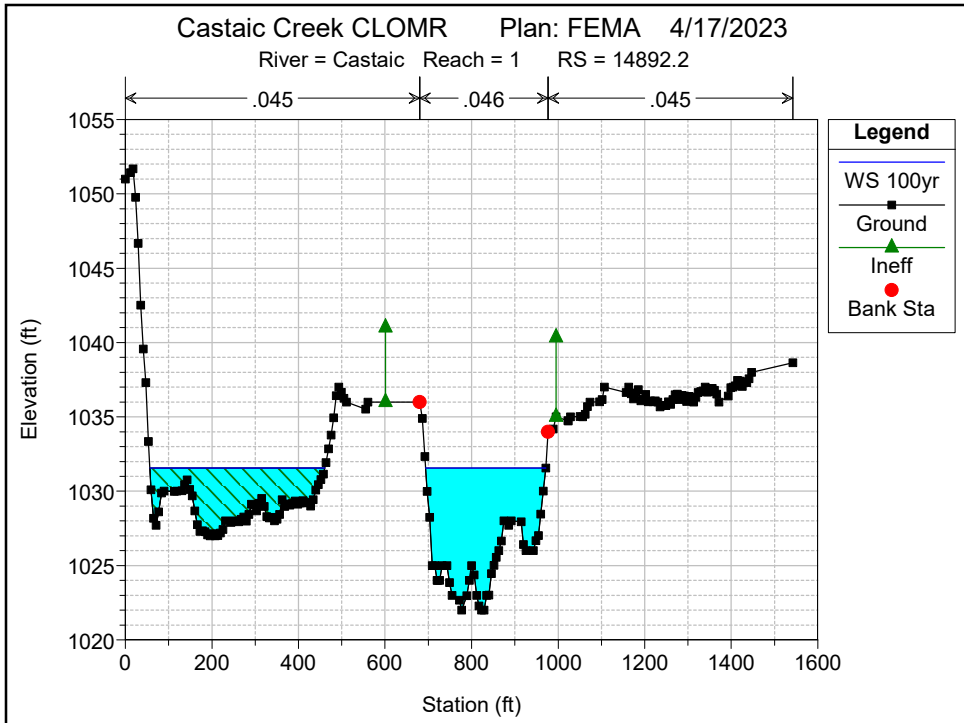
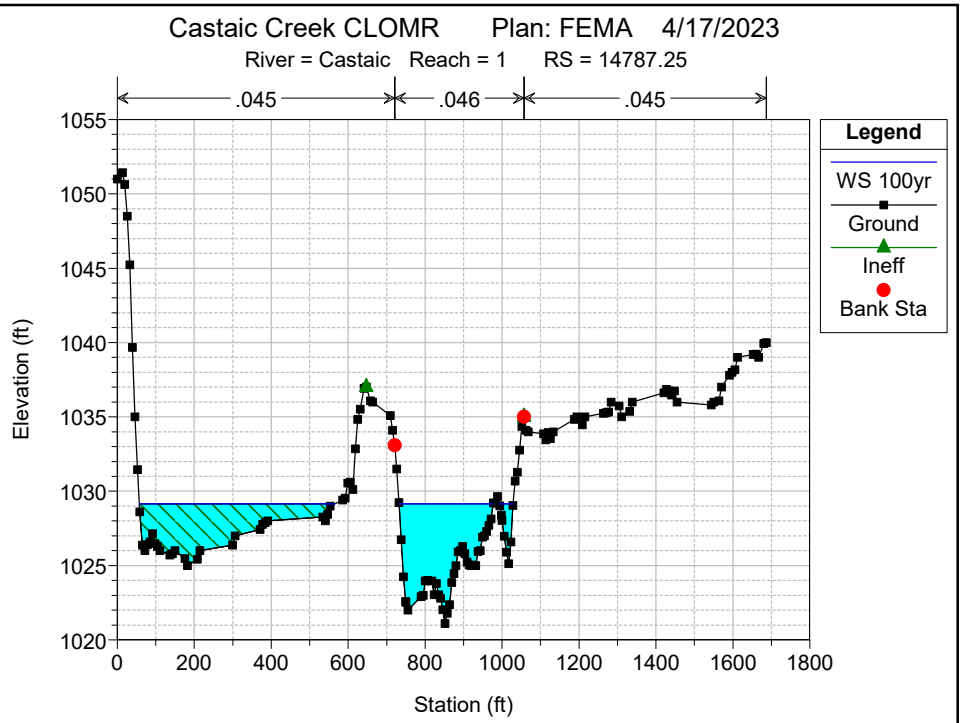
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14892.2
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14787.25
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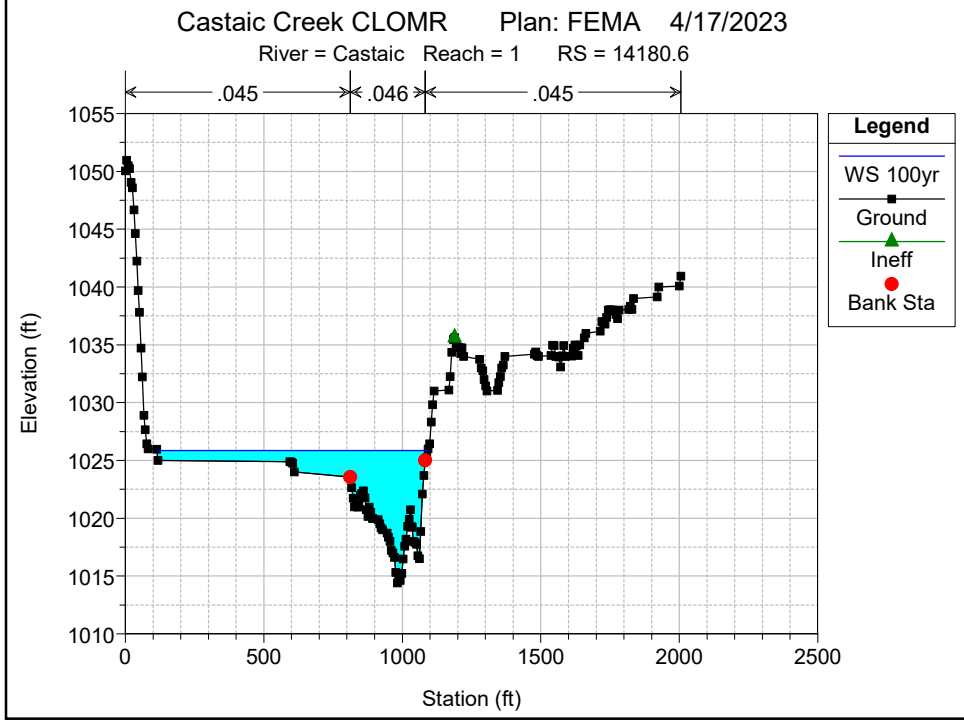
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14180.6
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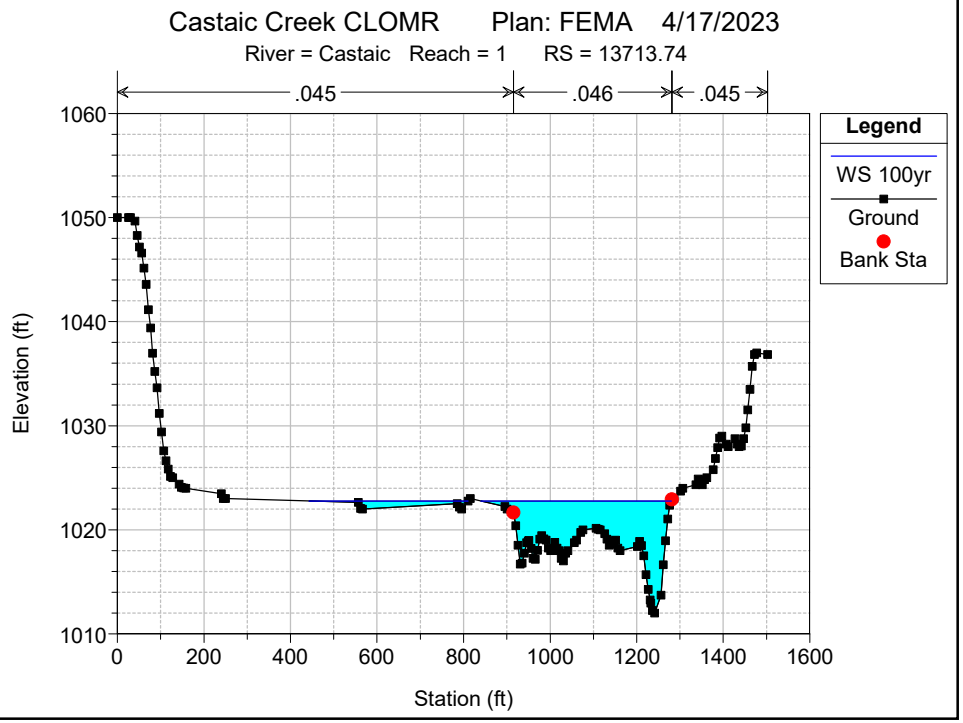
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 13713.74
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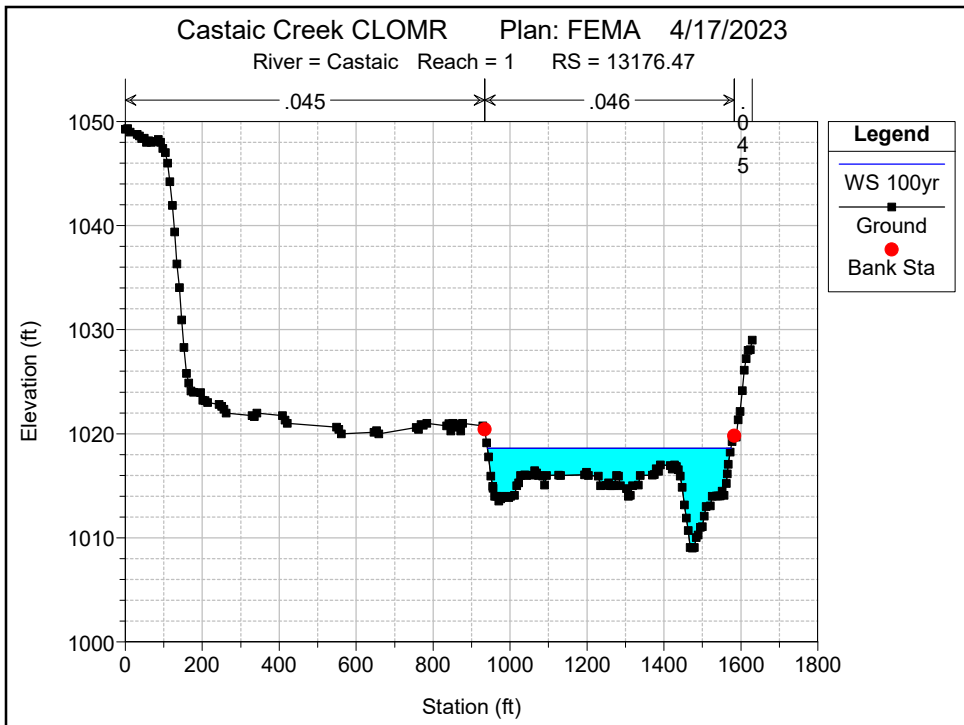
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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River = Castaic Reach = 1 RS = 13176.47
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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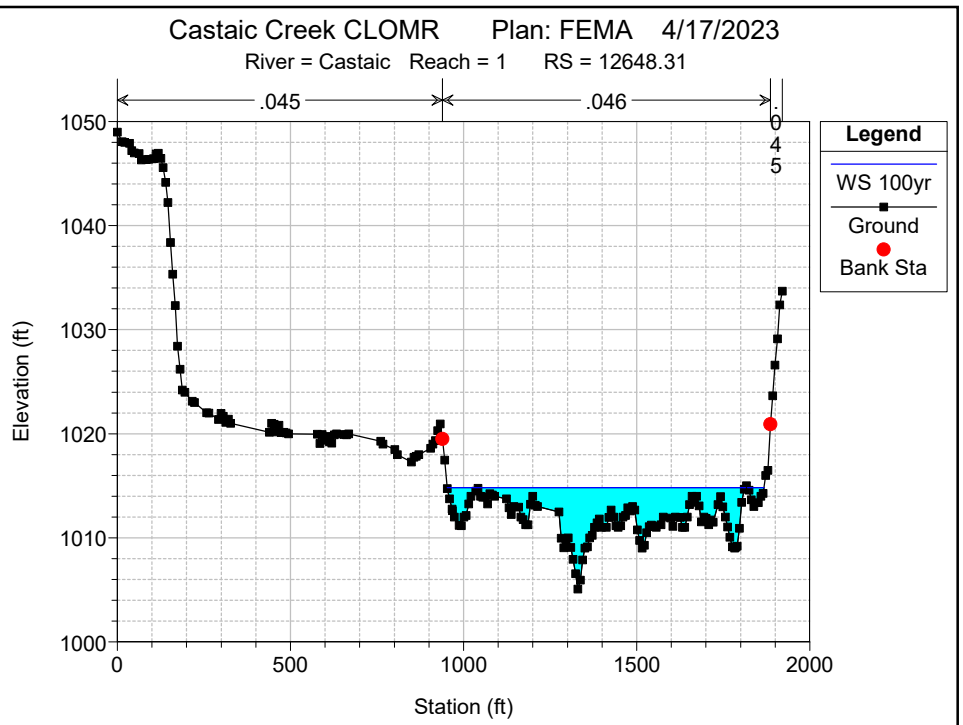
1040
1030
1020
1010
1000
0
200
400
600
800
1000
1200
1400
1600
1800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.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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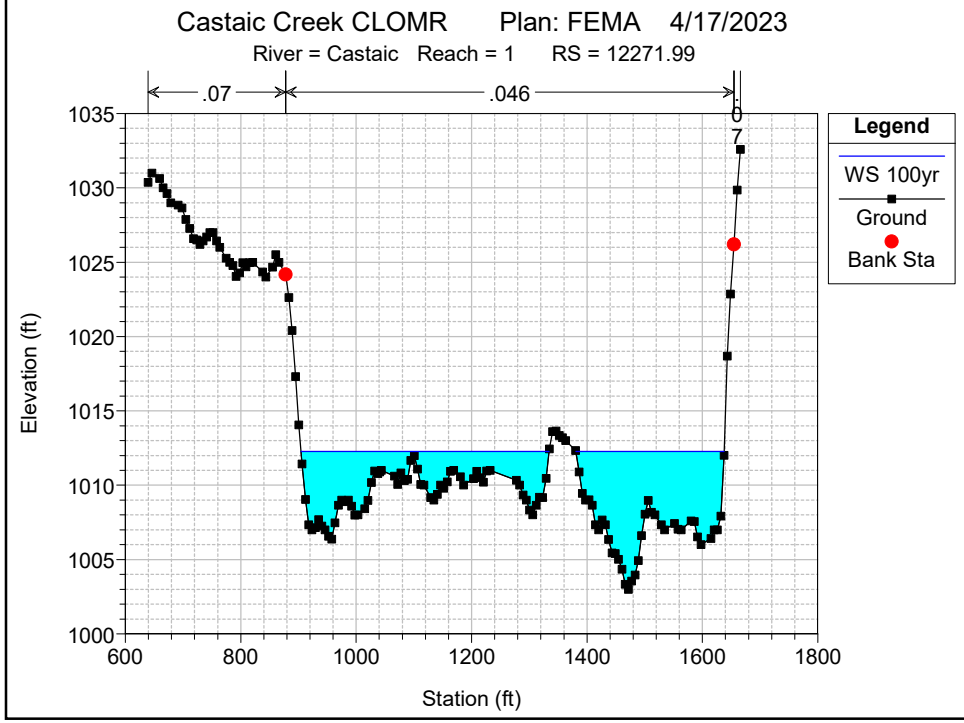
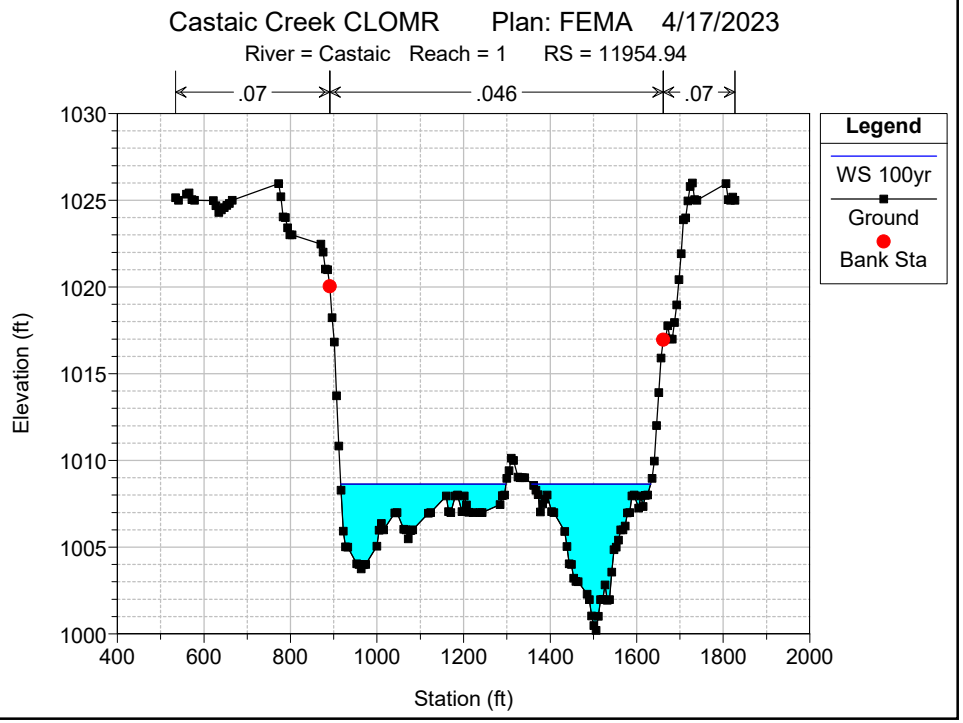
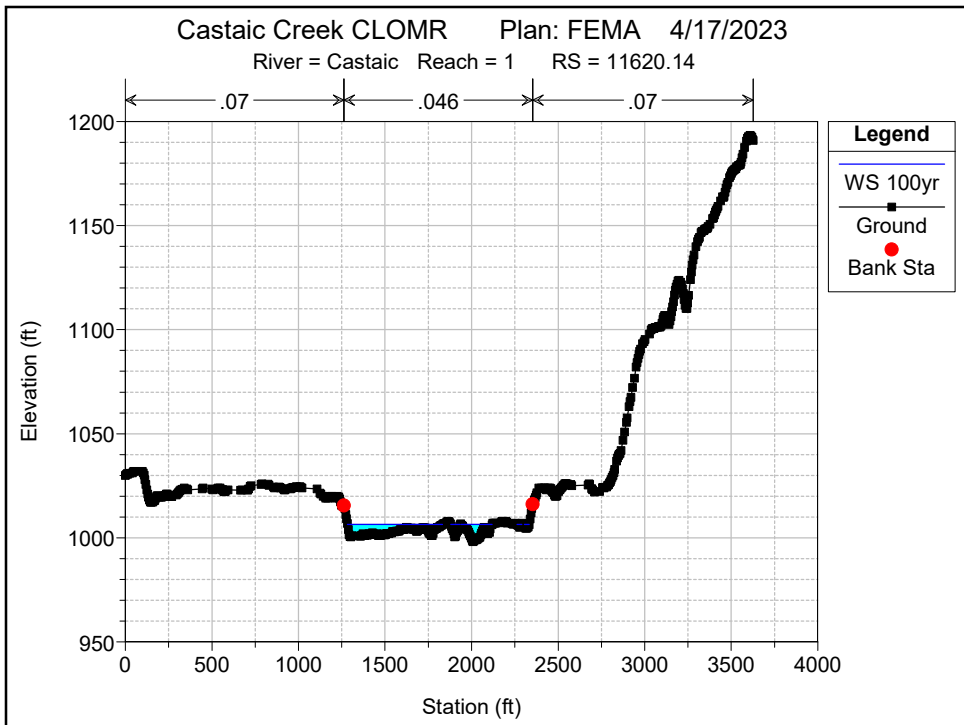
1040
1030
1020
1010
1000
0
500
1000
1500
2000


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 12271.99
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1035
1030
1025
1020
1015
1010
1005
1000
600
800
1000
1200
1400
1600
1800


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 11954.94
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1030
1025
1020
1015
1010
1005
1000
400
600
800
1000
1200
1400
1600
1800
2000


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 11620.14
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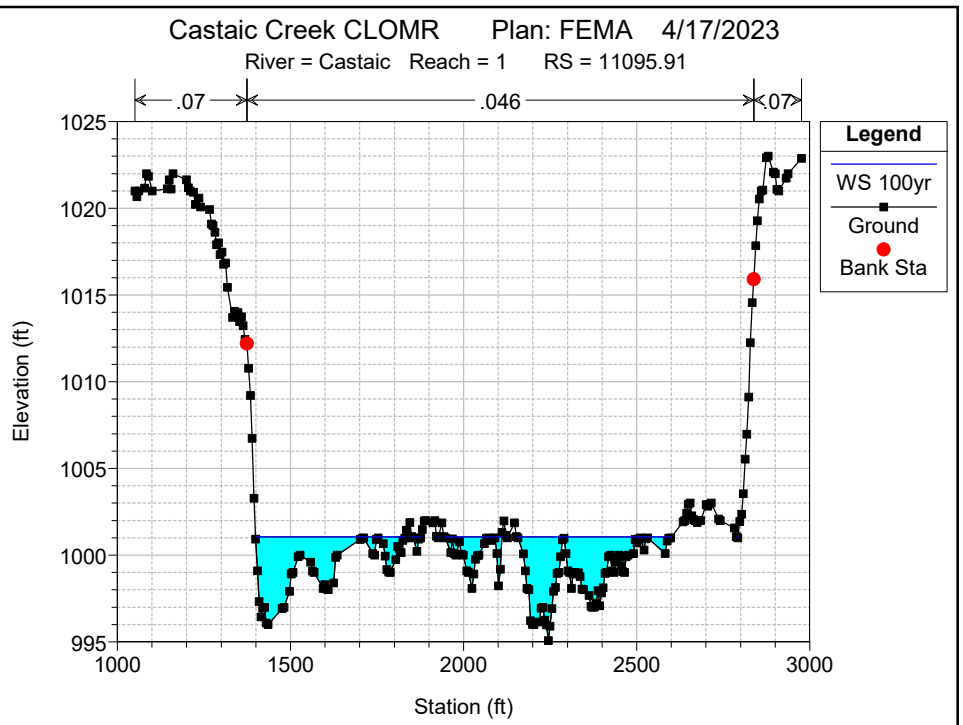
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
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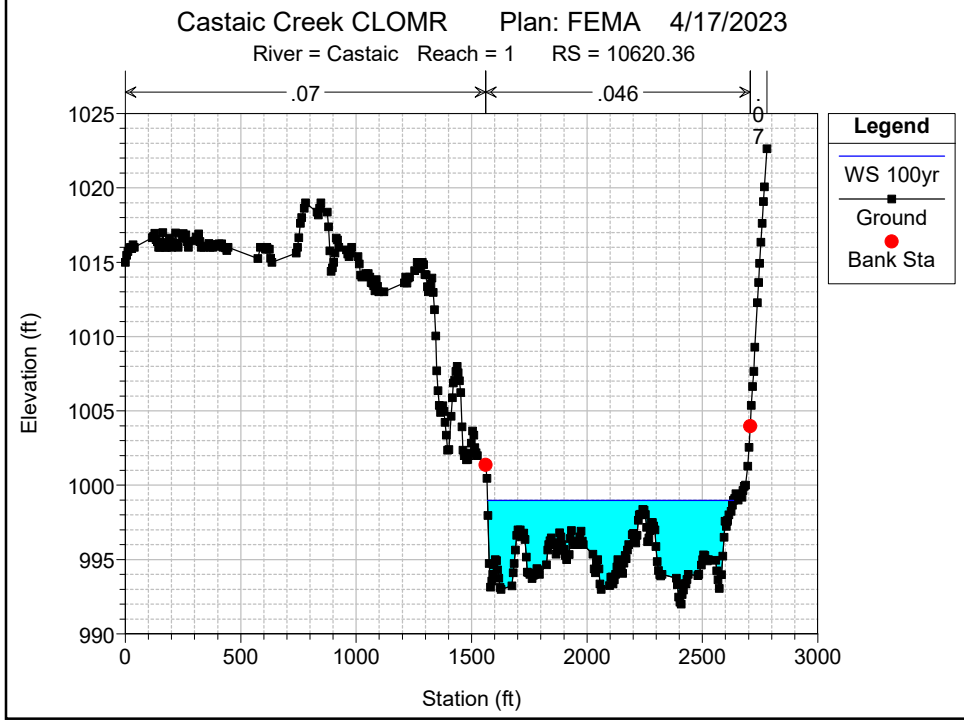
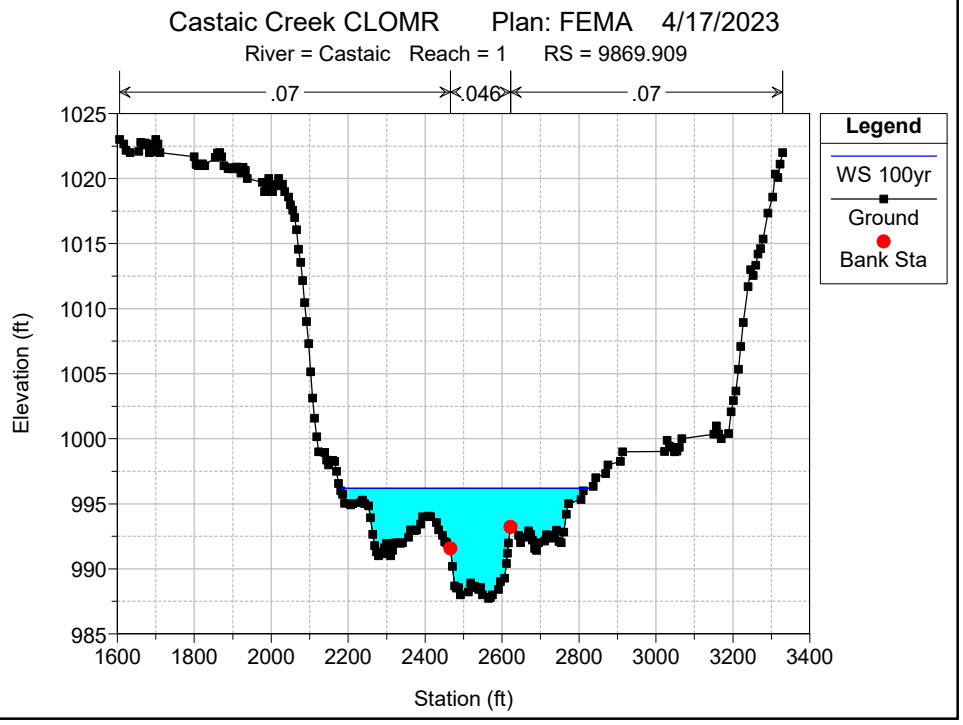
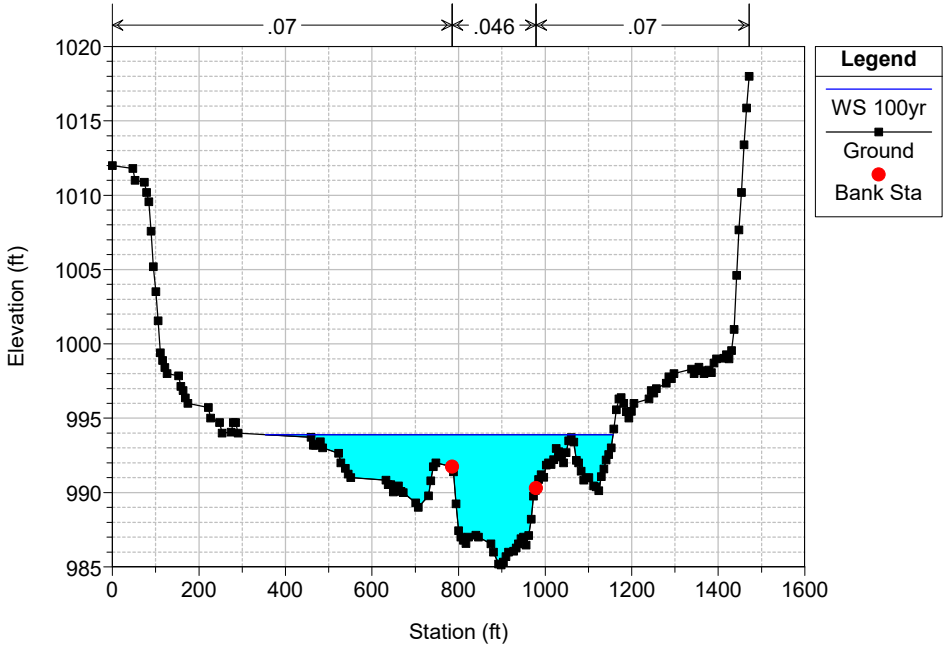
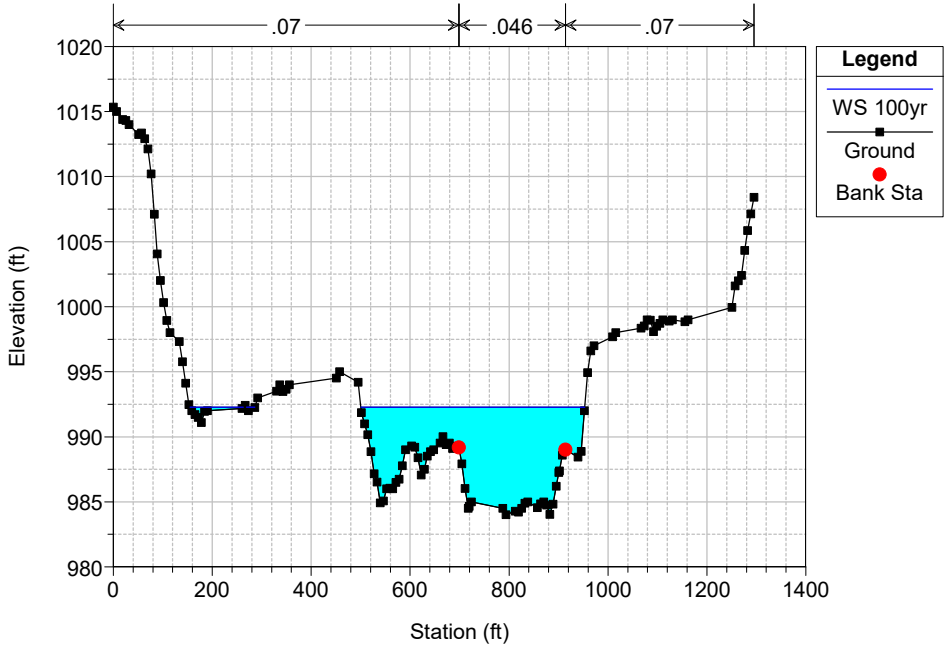
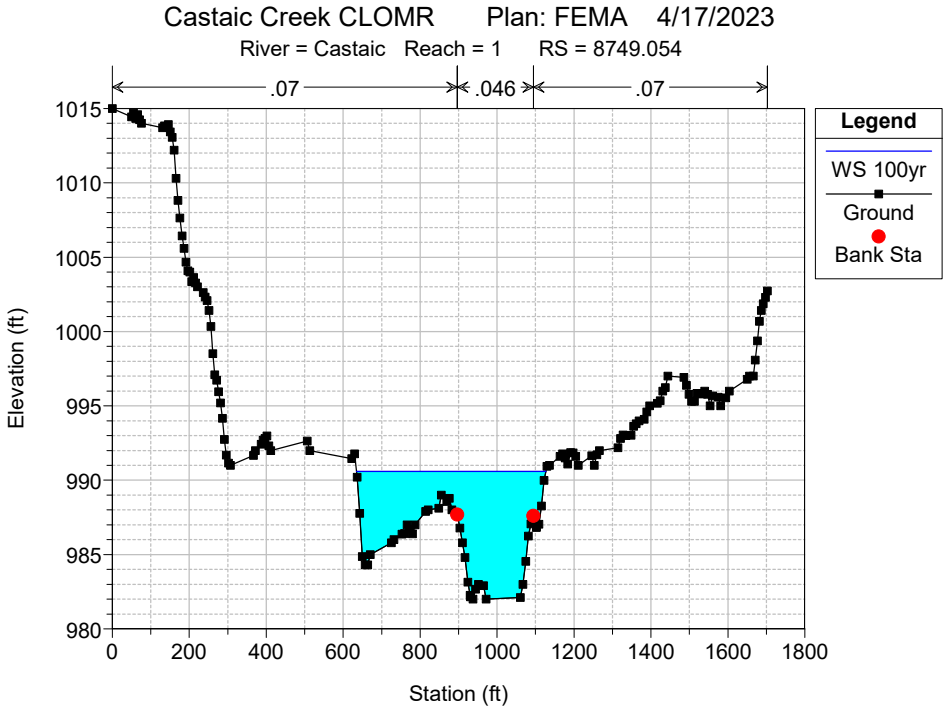
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

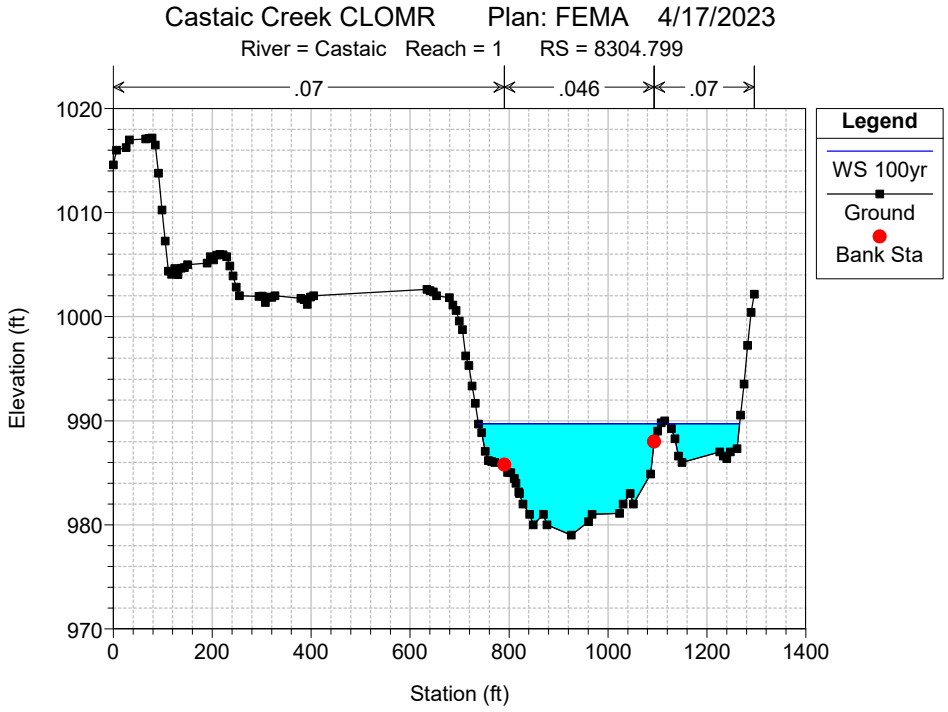

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 10620.36
.07
.046
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

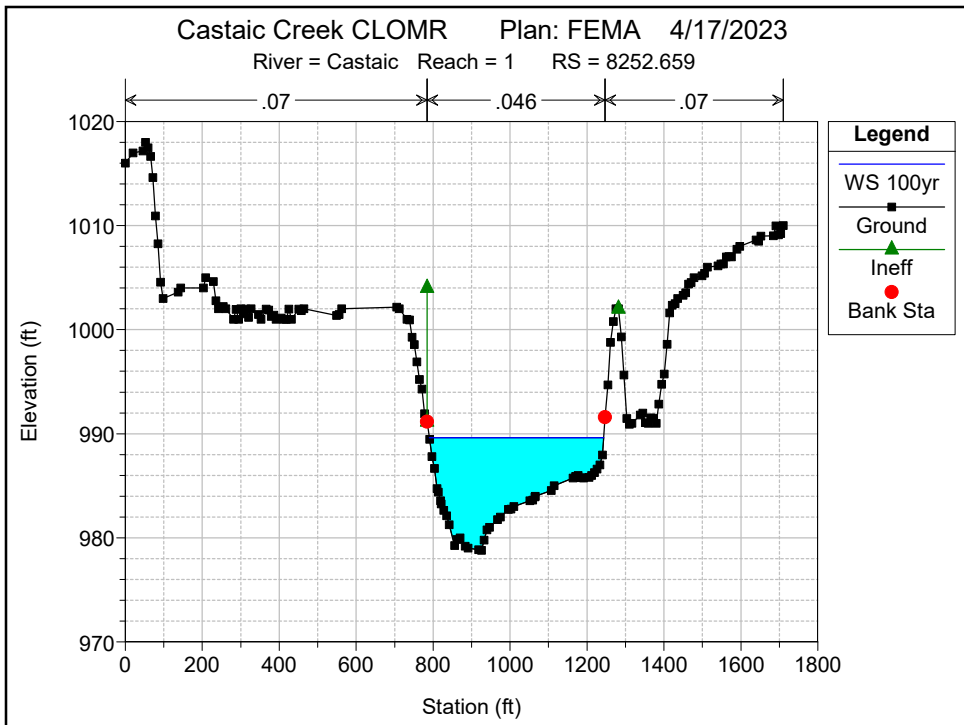

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 9869.909
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

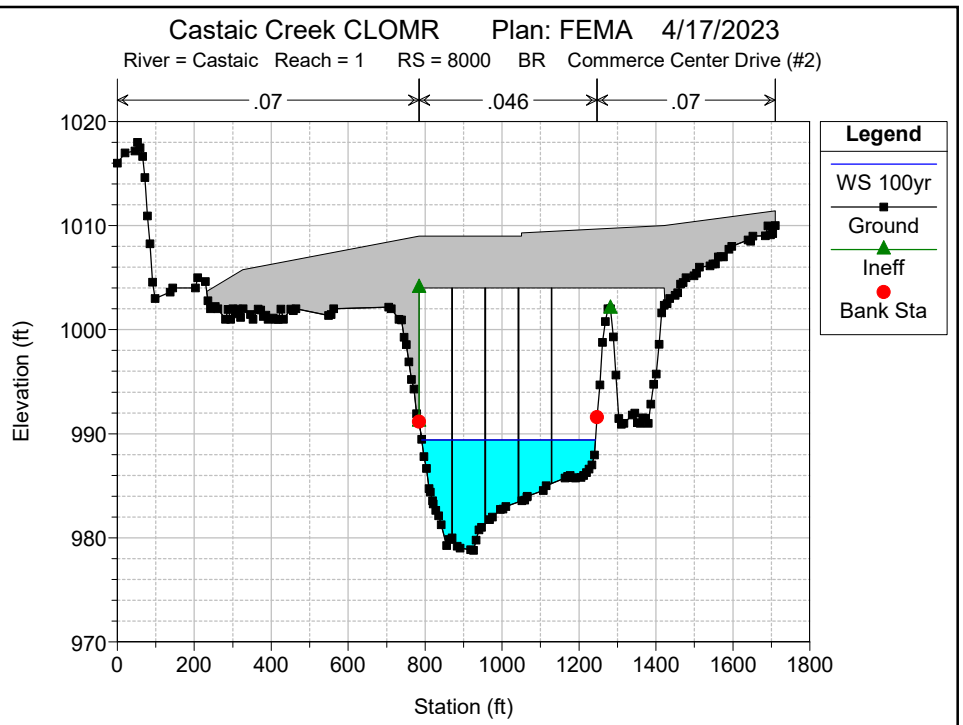

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 9534.089
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

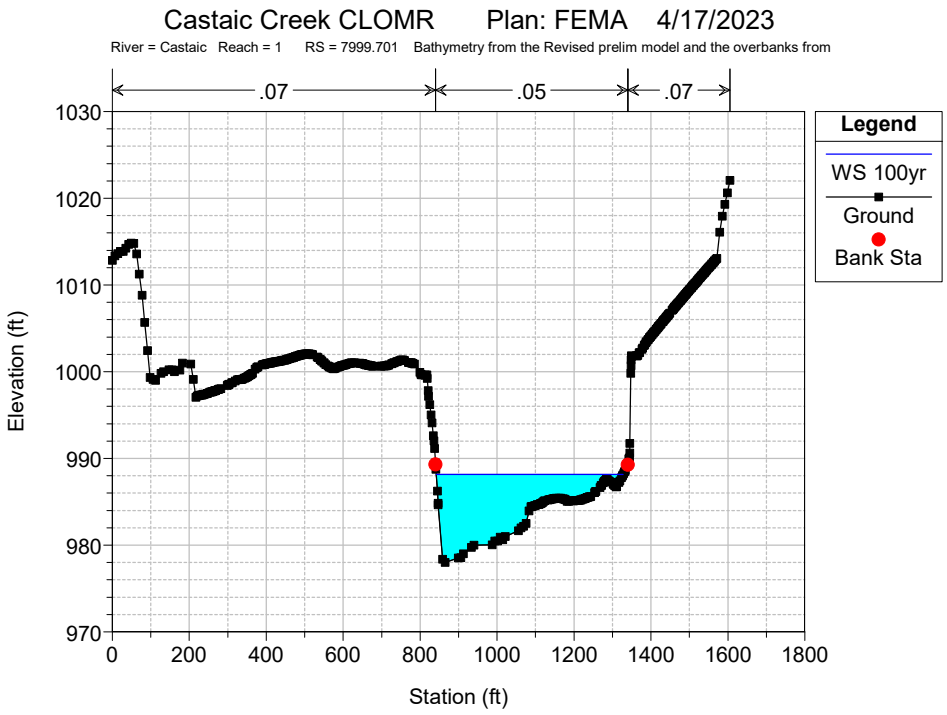

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 9166.896
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

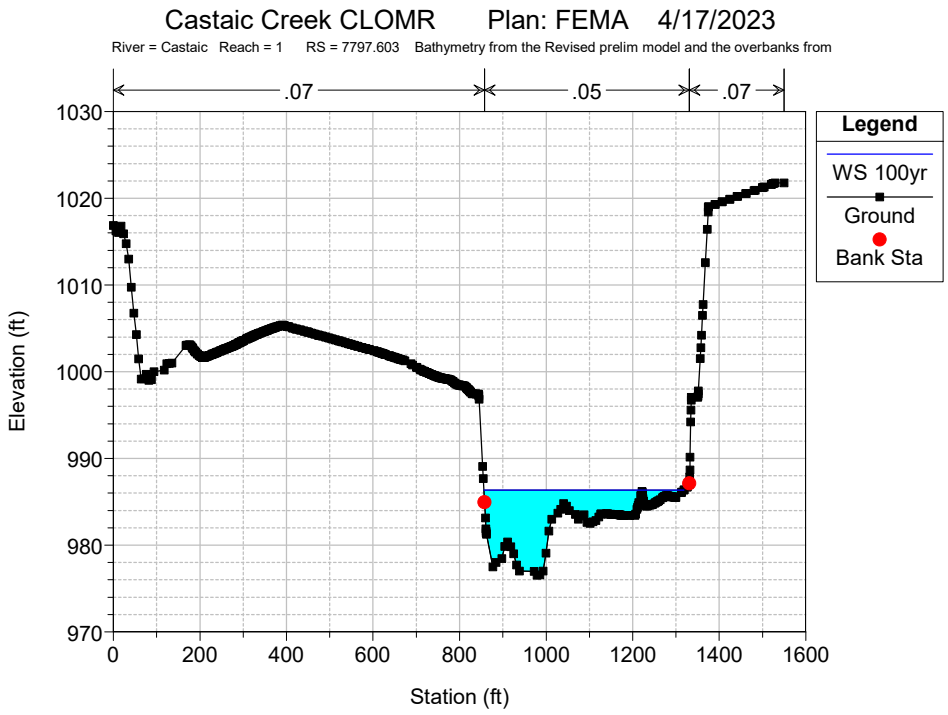

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8749.054
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

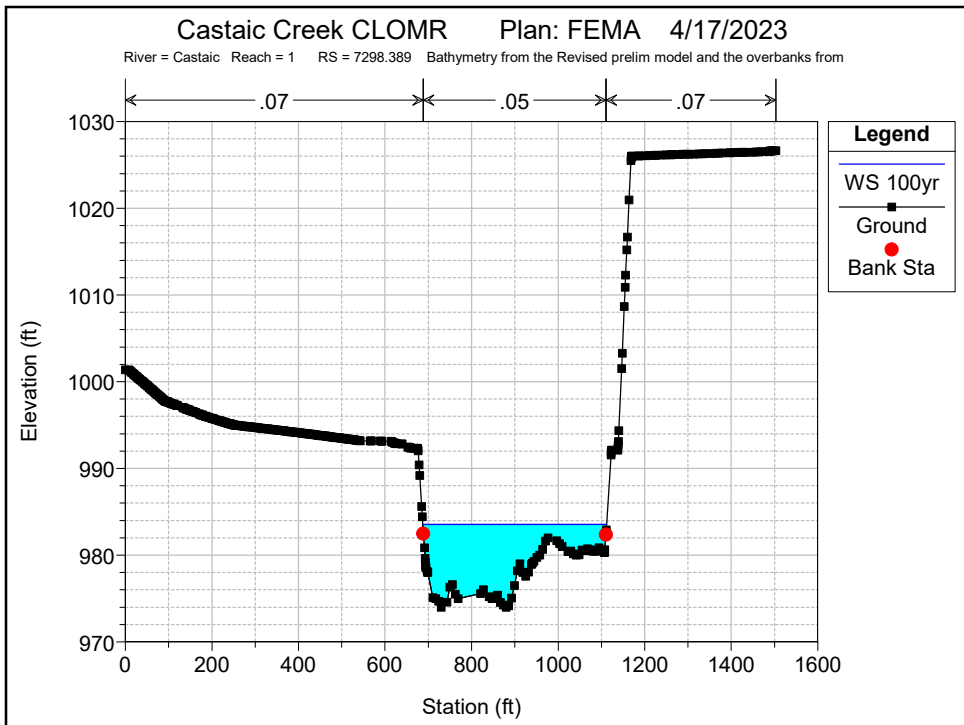

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8304.799
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

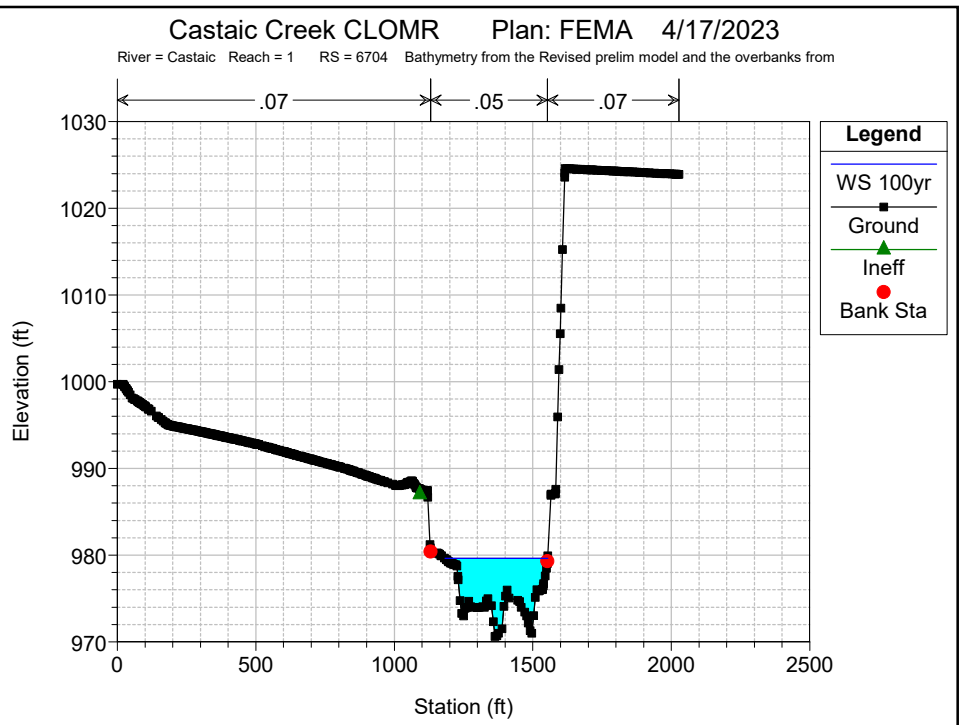

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8252.659
.07
.046
.07
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

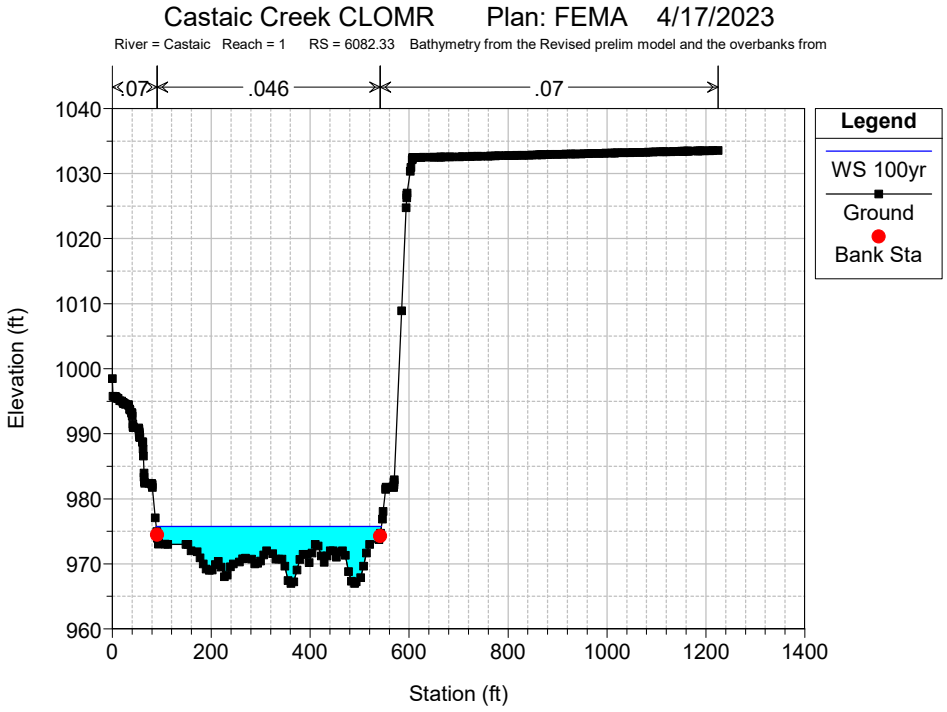

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8000 BR Commerce Center Drive (#2)
.07
.046
.07
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

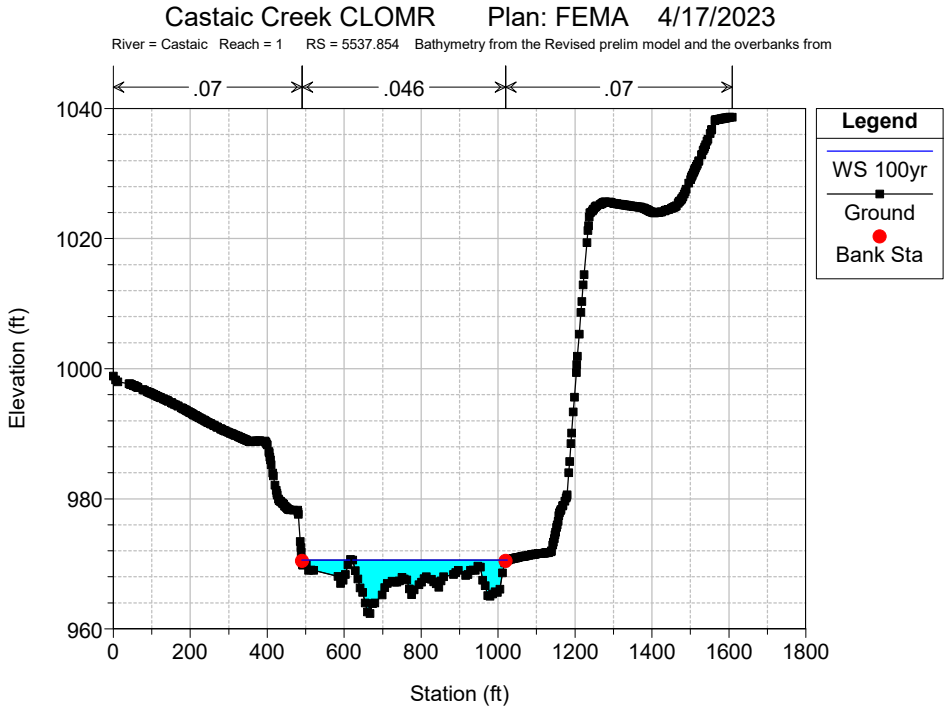

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 7999.701 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

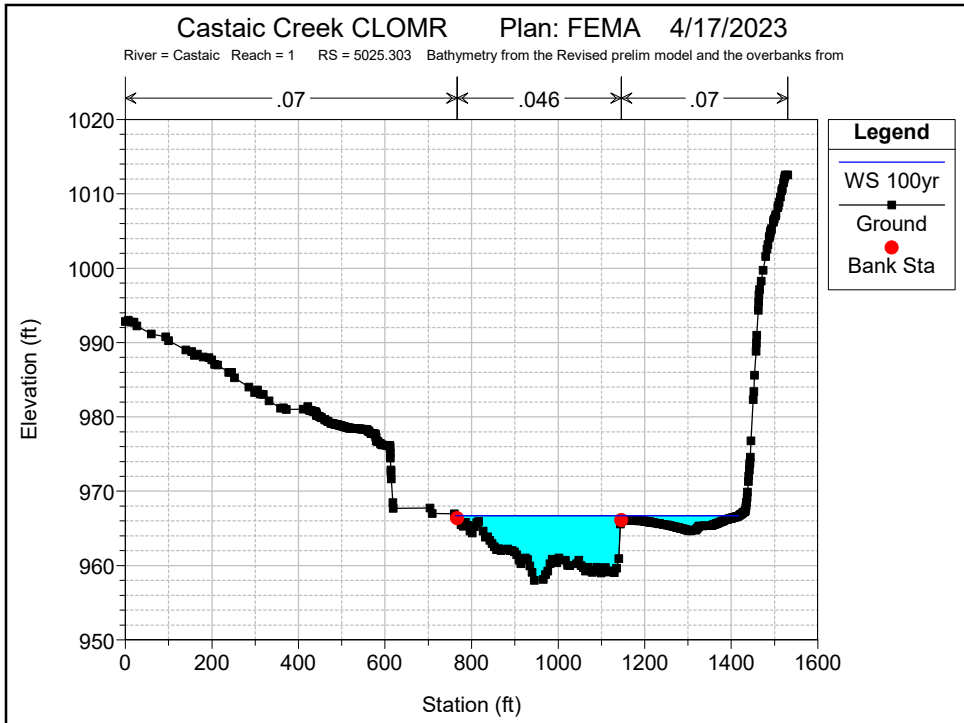

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 7797.603 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

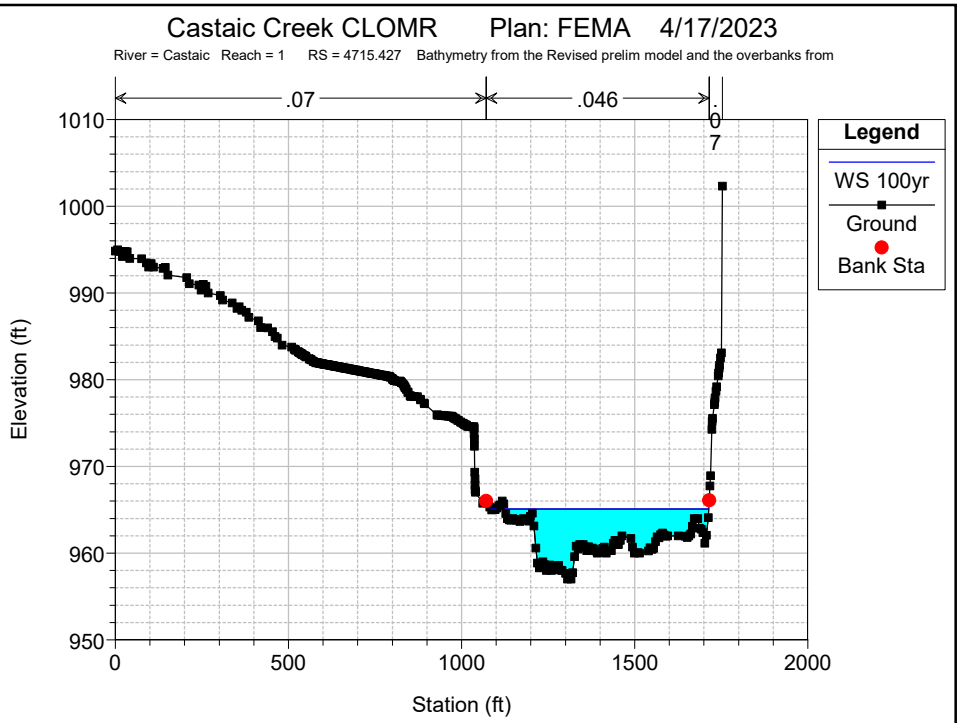

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 7298.389 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

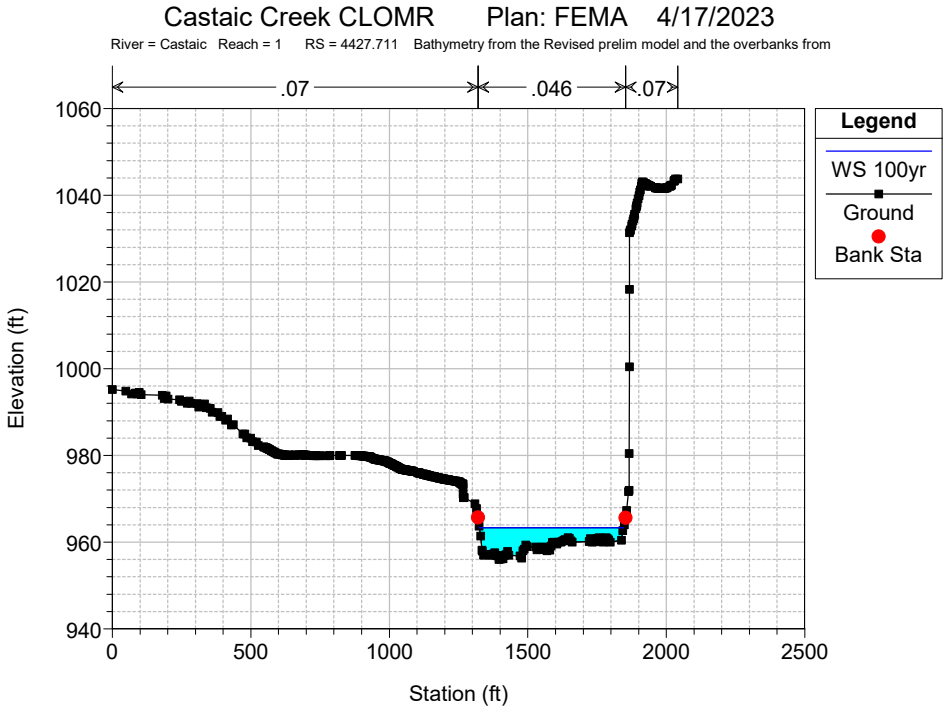

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 6704 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 6082.33 Bathymetry from the Revised prelim model and the overbanks from
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 5537.854 Bathymetry from the Revised prelim model and the overbanks from
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 5025.303 Bathymetry from the Revised prelim model and the overbanks from
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1020
1010
1000
990
980
970
960
950
0
200
400
600
800
1000
1200
1400
1600

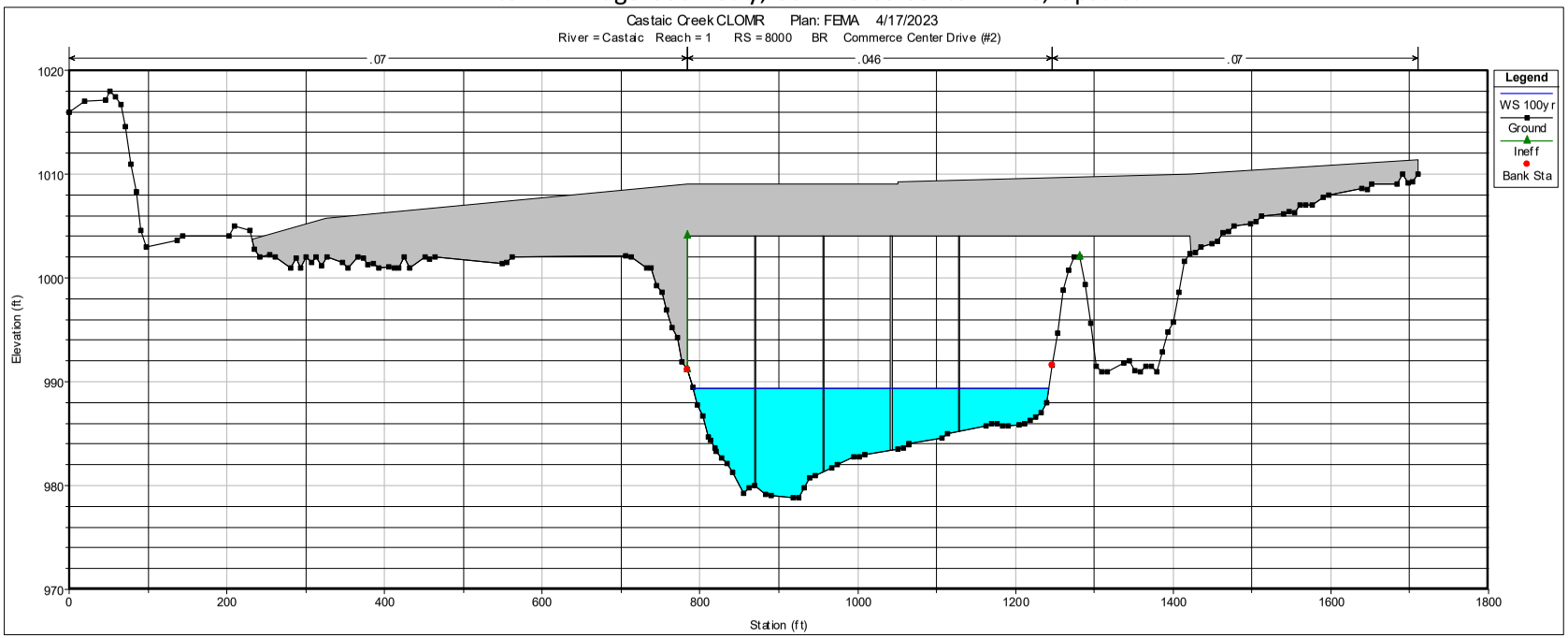

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 4715.427 Bathymetry from the Revised prelim model and the overbanks from
.07
.046
0
7
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1010
1000
990
980
970
960
950
0
500
1000
1500
2000


Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 4427.711 Bathymetry from the Revised prelim model and the overbanks from
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1060
1040
1020
1000
980
960
940
0
500
1000
1500
2000
2500

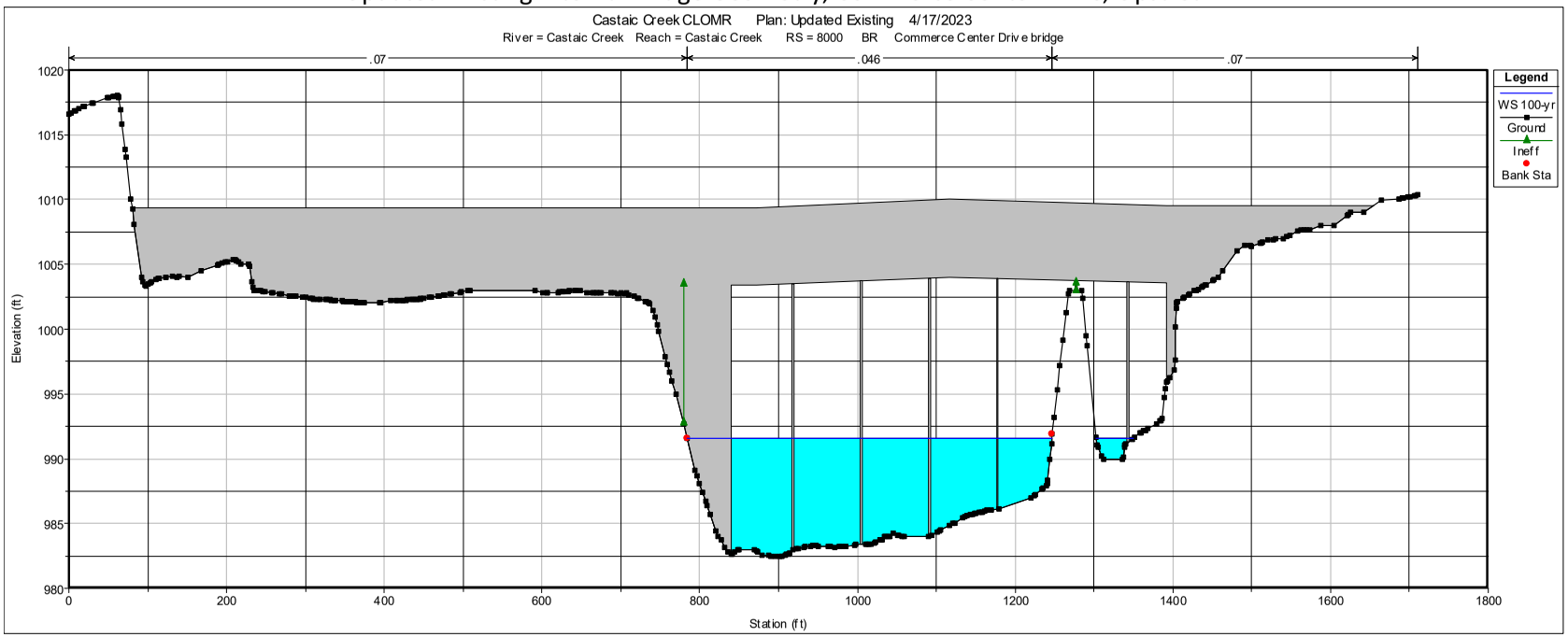
Commerce Center Drive Bridge HEC-RAS Internal Bridge Cross Sections Comparison, Effective vs. Corrected Effective/ Existing

PACE

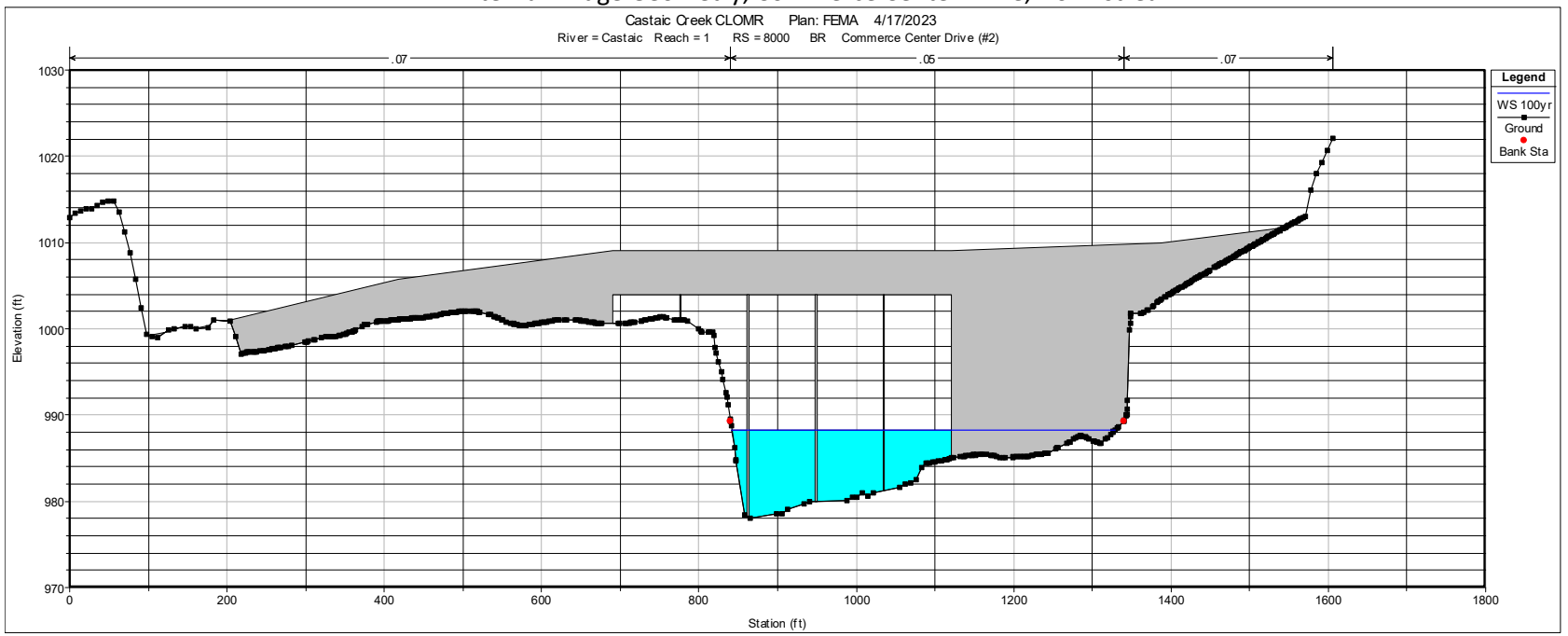
FEMA Internal Bridge Geometry, Commerce Center Drive, Upstream



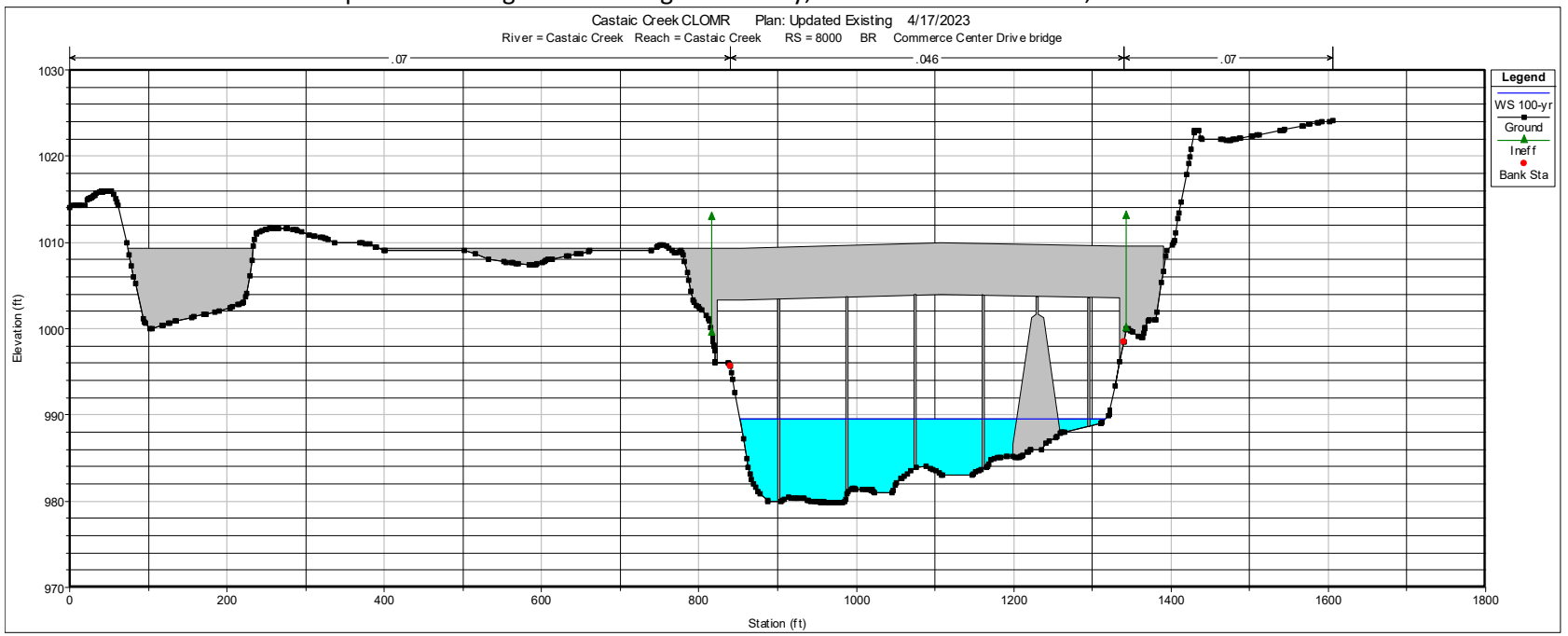
Updated Existing Internal Bridge Geometry, Commerce Center Drive, Upstream



FEMA Internal Bridge Geometry, Commerce Center Drive, Downstream



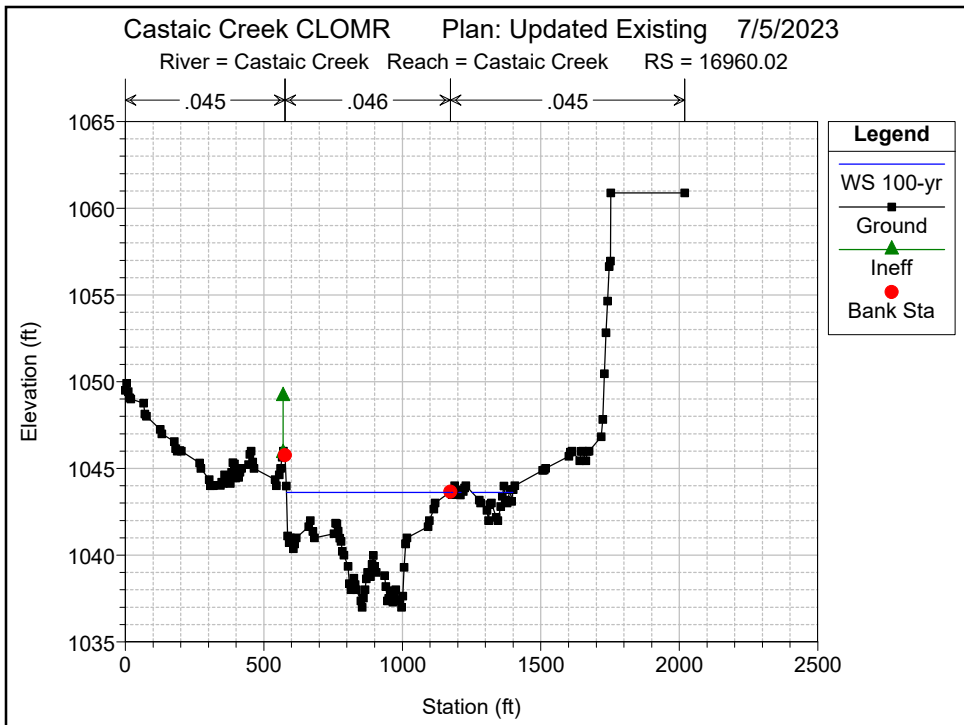
Updated Existing Internal Bridge Geometry, Commerce Center Drive, Downstream

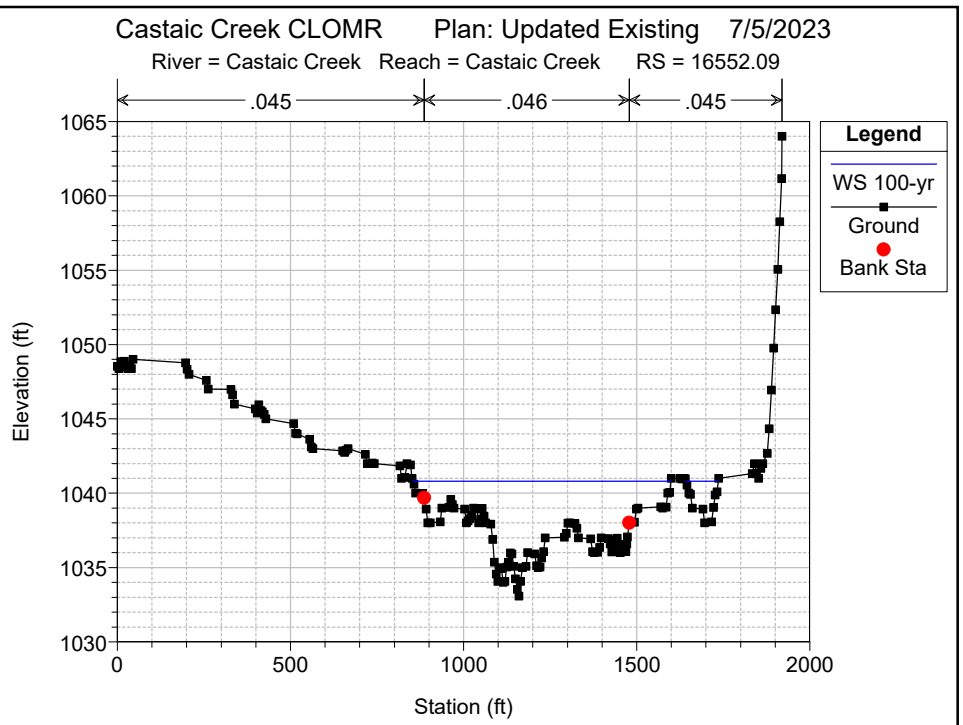


Appendix D - HEC-RAS Corrected Effective Condition Hydraulic Results

HEC-RAS Plan: Updated Existing River: Castaic Creek Reach: Castaic Creek Profile: 100-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Castaic Creek	16960.02	100-yr	14480.00	1037.00	1043.62	1042.90	1044.46	0.011051	7.43	2010.39	742.09	0.73
Castaic Creek	16552.09	100-yr	14480.00	1033.07	1040.81		1041.30	0.005369	5.77	2670.59	838.53	0.52
Castaic Creek	16209.5	100-yr	14480.00	1031.00	1038.90		1039.40	0.005881	5.67	2572.10	755.70	0.54
Castaic Creek	15958.96	100-yr	14480.00	1029.00	1037.73	1036.15	1038.14	0.004142	5.13	2839.35	759.14	0.46
Castaic Creek	15669.62	100-yr	14480.00	1027.00	1036.77	1034.09	1037.15	0.002850	4.98	2914.56	608.83	0.40
Castaic Creek	15478.79	100-yr	14480.00	1026.00	1036.28	1032.77	1036.69	0.002034	5.18	2846.15	650.04	0.35
Castaic Creek	15245.39	100-yr	14480.00	1025.00	1034.67	1032.55	1035.87	0.005791	8.78	1648.71	326.66	0.59
Castaic Creek	15216.27	100-yr	14480.00	1025.00	1034.64	1031.85	1035.61	0.004177	7.88	1837.13	498.01	0.51
Castaic Creek	15100		Bridge									
Castaic Creek	14991.85	100-yr	14560.00	1023.00	1032.99	1030.35	1033.94	0.004342	7.82	1860.96	404.26	0.52
Castaic Creek	14976.84	100-yr	14560.00	1023.00	1032.91	1030.42	1033.87	0.004577	7.86	1852.80	459.87	0.53
Castaic Creek	14900		Bridge									
Castaic Creek	14892.2	100-yr	14560.00	1022.00	1032.25	1029.73	1033.17	0.004517	7.68	1895.66	691.08	0.52
Castaic Creek	14787.25	100-yr	14560.00	1022.00	1029.66	1029.66	1031.92	0.018726	12.05	1207.81	614.46	1.00
Castaic Creek	14180.6	100-yr	14560.00	1016.00	1026.46	1024.80	1027.00	0.003837	6.24	2603.72	986.19	0.47
Castaic Creek	13713.74	100-yr	14560.00	1011.00	1022.91	1022.65	1024.09	0.011722	8.92	1786.44	897.84	0.77
Castaic Creek	13176.47	100-yr	14560.00	1010.00	1018.67	1017.54	1019.29	0.006794	6.32	2304.87	625.64	0.58
Castaic Creek	12648.31	100-yr	14560.00	1006.00	1014.79		1015.32	0.008257	5.86	2485.45	877.27	0.61
Castaic Creek	12271.99	100-yr	14560.00	1003.00	1012.09		1012.62	0.006323	5.86	2483.28	715.34	0.55
Castaic Creek	11954.94	100-yr	14560.00	1000.01	1008.61	1008.32	1009.55	0.016185	7.77	1874.46	719.27	0.85
Castaic Creek	11620.14	100-yr	14560.00	998.00	1006.25	1004.67	1006.63	0.004966	4.96	2933.43	904.89	0.49
Castaic Creek	11095.91	100-yr	14560.00	995.00	1000.62	1000.62	1001.48	0.027022	7.42	1963.54	1187.97	1.02
Castaic Creek	10620.36	100-yr	14560.00	993.00	998.85		999.03	0.001687	3.36	4332.54	1072.87	0.29
Castaic Creek	9869.909	100-yr	14560.00	988.00	996.42		996.97	0.004993	5.98	2511.13	725.91	0.51
Castaic Creek	9534.089	100-yr	14560.00	985.00	994.60		995.19	0.004595	6.48	2642.21	673.76	0.50
Castaic Creek	9166.896	100-yr	14560.00	984.00	993.37		993.83	0.002791	5.49	2665.61	525.80	0.40
Castaic Creek	8749.054	100-yr	14560.00	982.00	992.60		992.92	0.001605	4.52	3340.84	730.72	0.31
Castaic Creek	8304.799	100-yr	14560.00	982.00	991.89		992.19	0.001664	4.41	3297.98	534.85	0.31
Castaic Creek	8252.659	100-yr	14560.00	982.43	991.82	987.54	992.11	0.001309	4.35	3344.11	516.55	0.29
Castaic Creek	8000		Bridge									
Castaic Creek	7999.701	100-yr	14560.00	979.81	989.38	985.90	989.81	0.002481	5.27	2760.82	462.81	0.38
Castaic Creek	7797.603	100-yr	14560.00	978.00	986.70	986.30	988.41	0.015212	10.50	1386.81	322.06	0.89
Castaic Creek	7298.389	100-yr	14560.00	974.00	983.75		984.42	0.004328	6.58	2212.01	402.85	0.50
Castaic Creek	6704	100-yr	14560.00	971.00	980.02	978.73	980.97	0.008033	7.83	1859.52	415.17	0.65
Castaic Creek	6082.33	100-yr	14560.00	966.00	975.70		976.41	0.006536	6.80	2142.25	445.44	0.55
Castaic Creek	5537.854	100-yr	14560.00	963.00	971.16	970.23	971.97	0.010470	7.20	2021.46	551.10	0.66
Castaic Creek	5025.303	100-yr	14560.00	960.00	967.31		967.84	0.006174	5.86	2519.55	722.37	0.52
Castaic Creek	4715.427	100-yr	14560.00	958.00	965.80		966.27	0.004162	5.47	2662.12	623.23	0.47
Castaic Creek	4427.711	100-yr	14560.00	957.00	964.70	962.43	965.19	0.003395	5.60	2597.75	503.45	0.44


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 16960.02
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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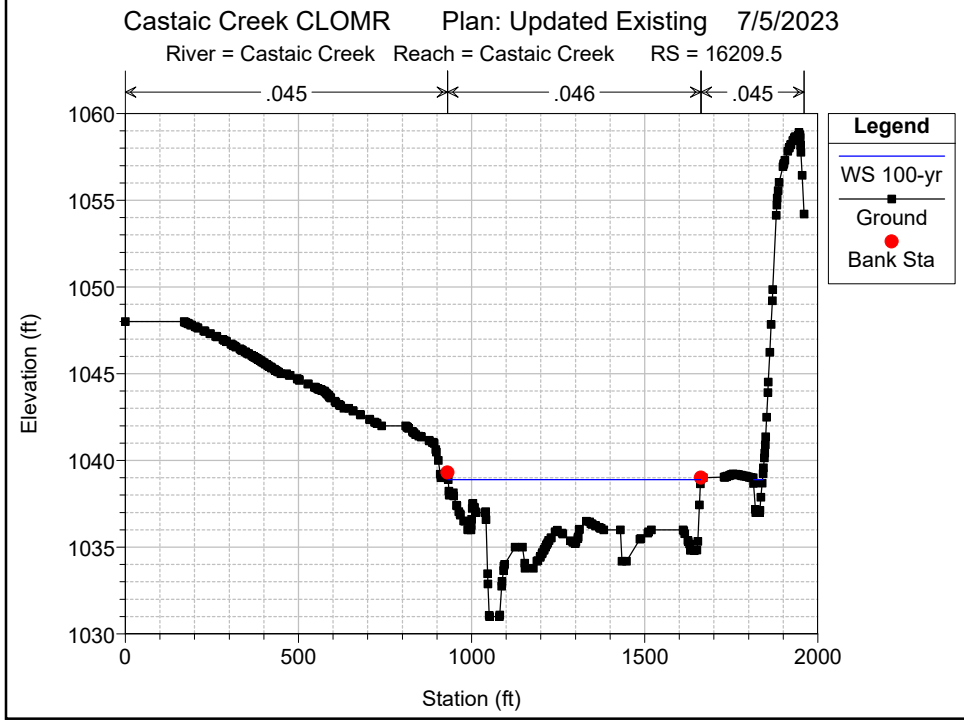
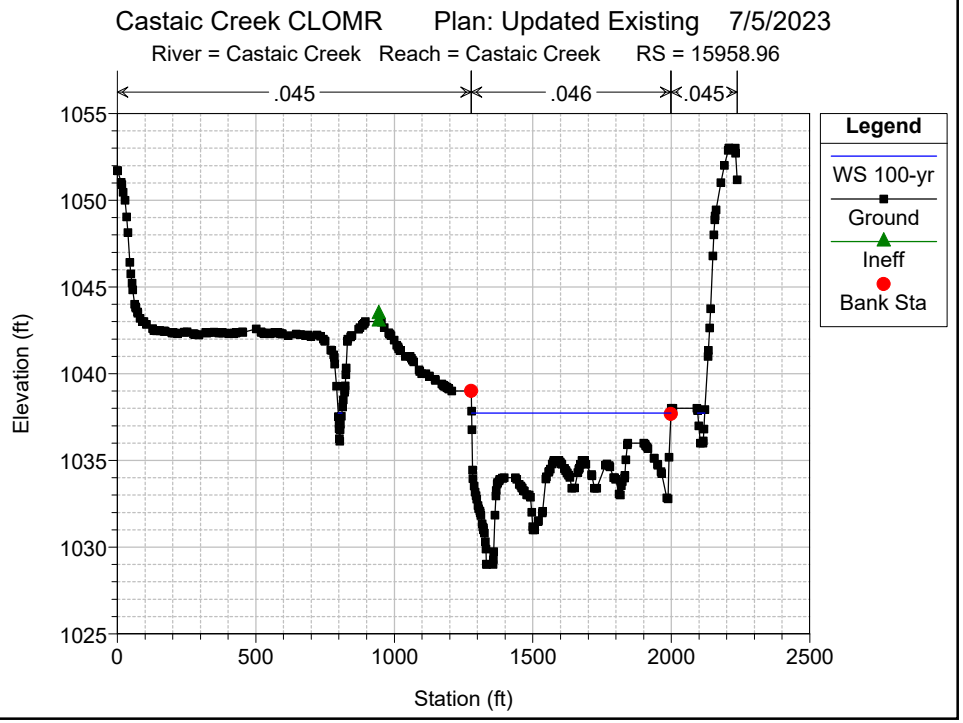
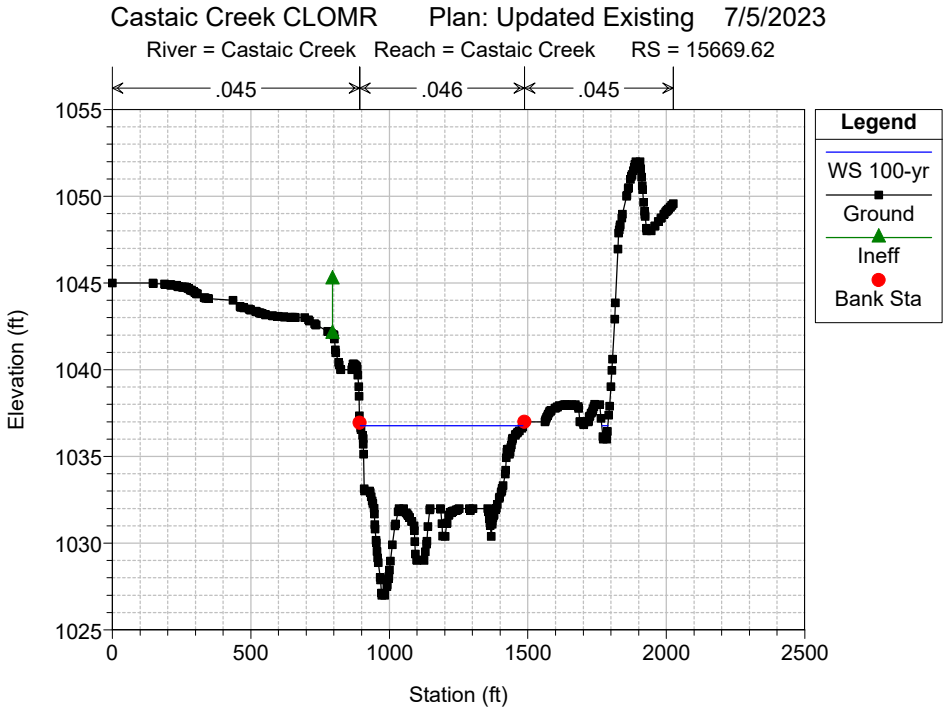
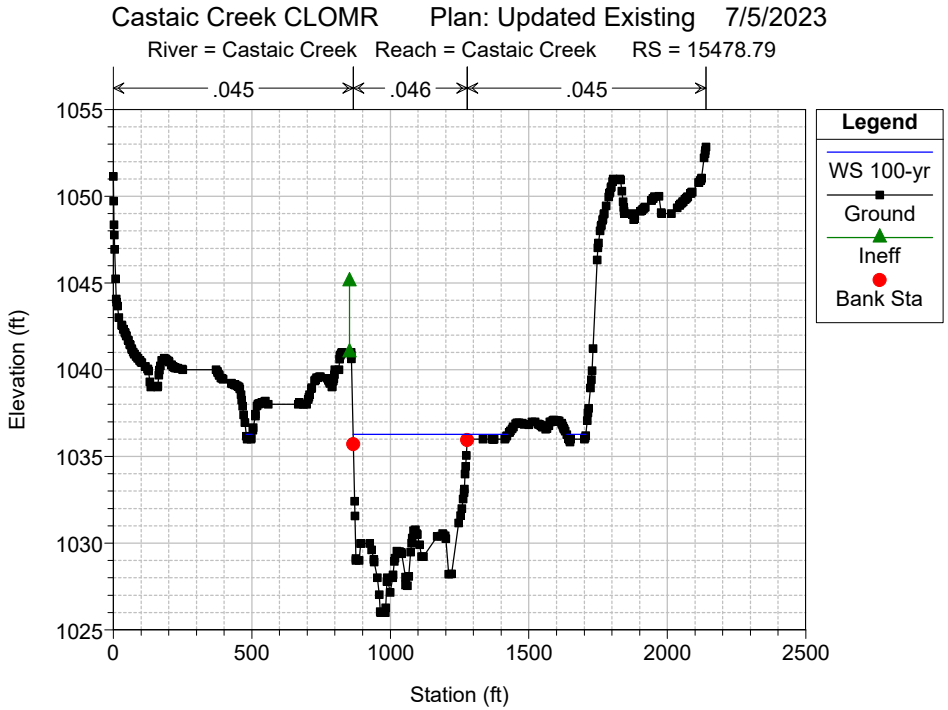
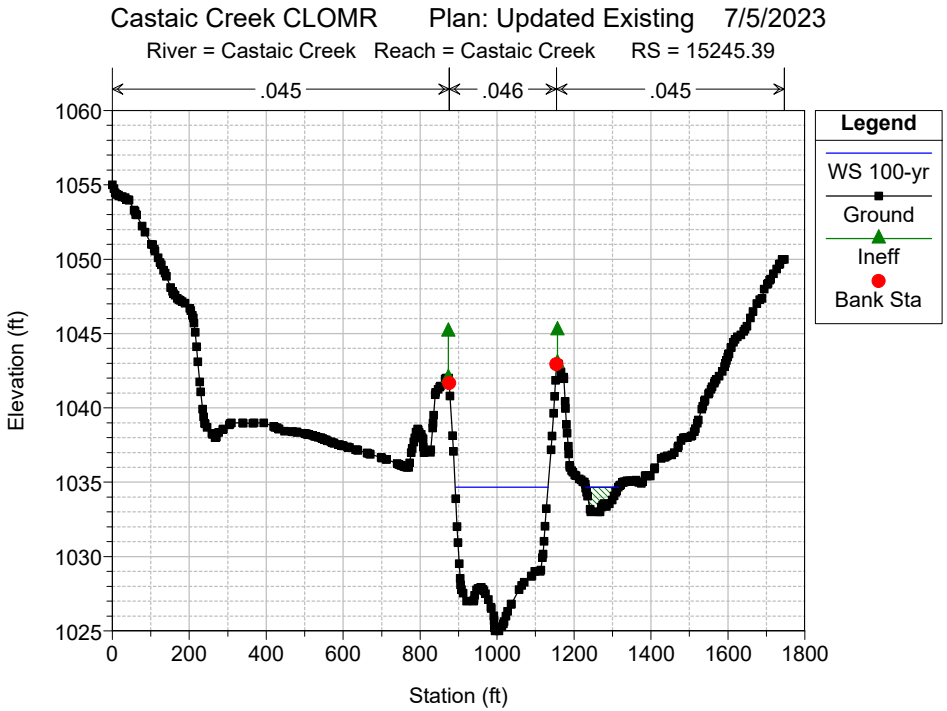
River = Castaic Creek Reach = Castaic Creek RS = 16552.09
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

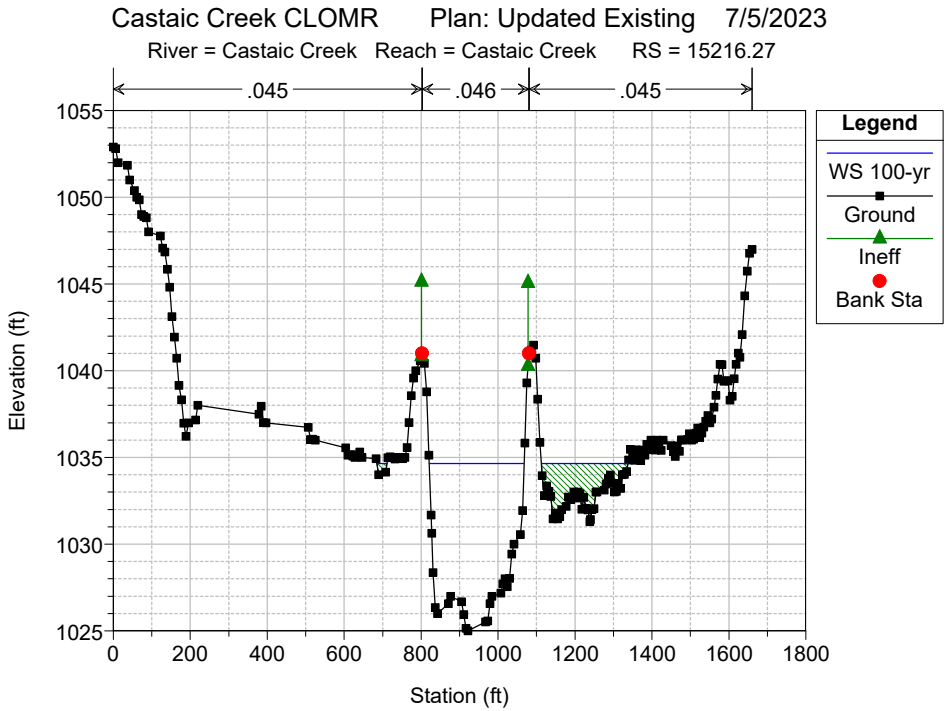

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 16209.5
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

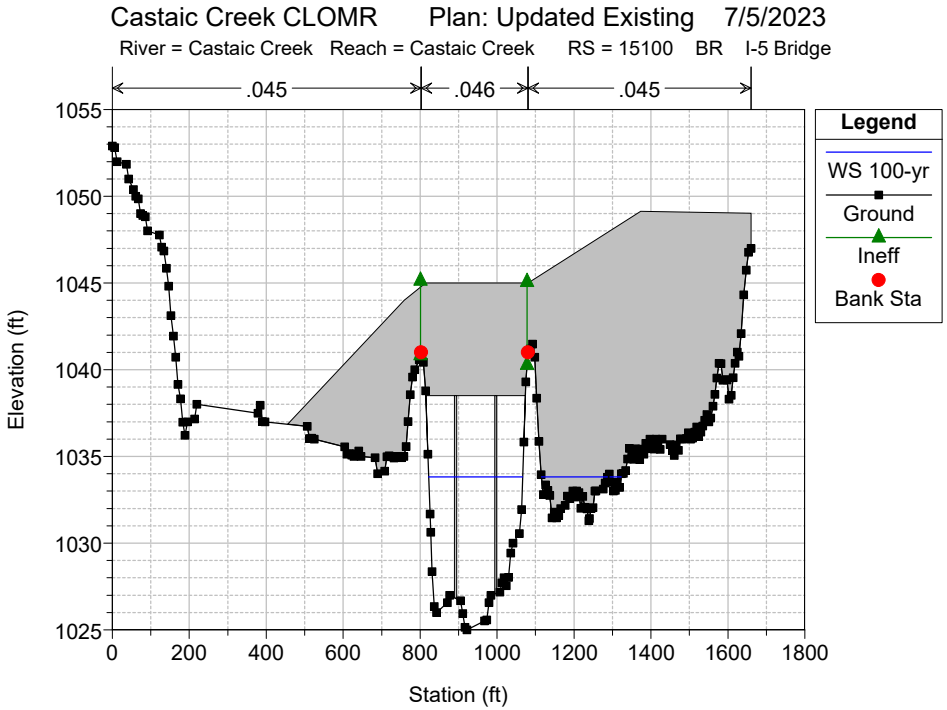

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15958.96
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

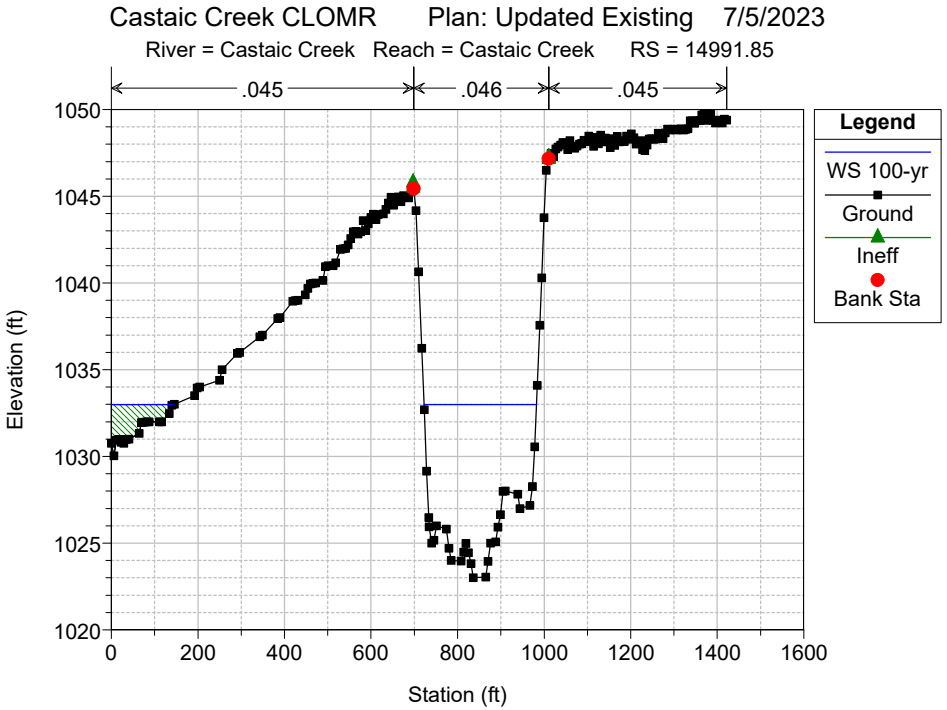

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15669.62
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

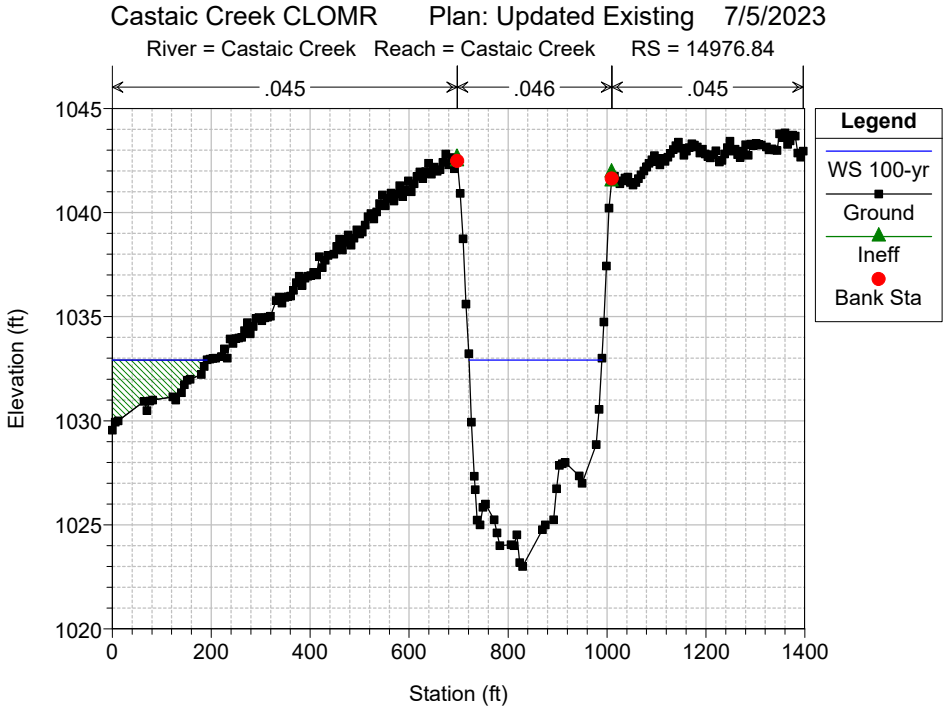

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15478.79
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

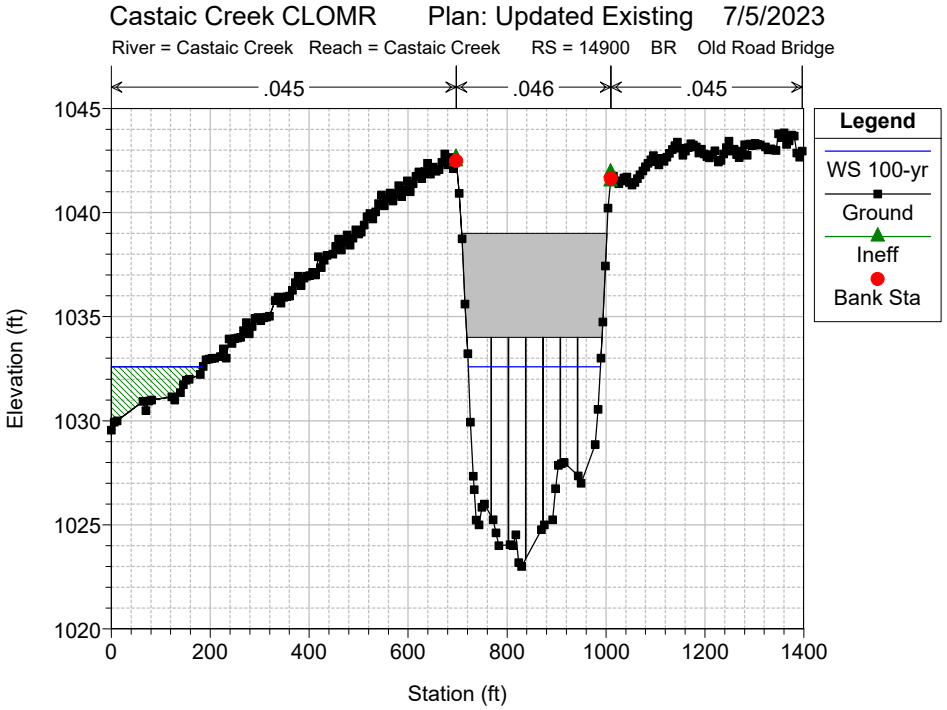

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15245.39
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

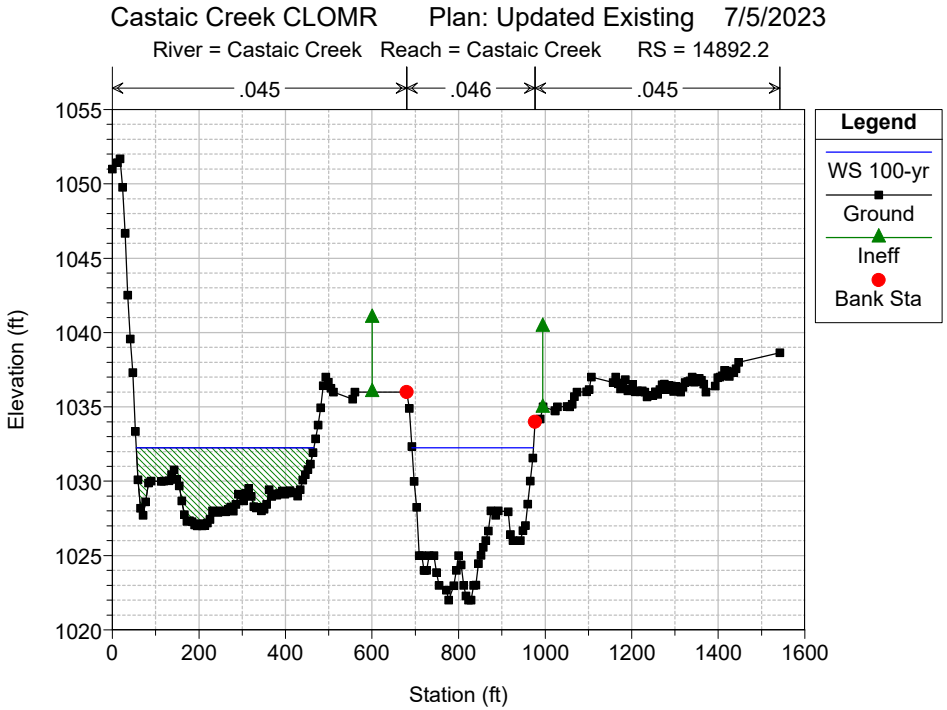

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15216.27
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

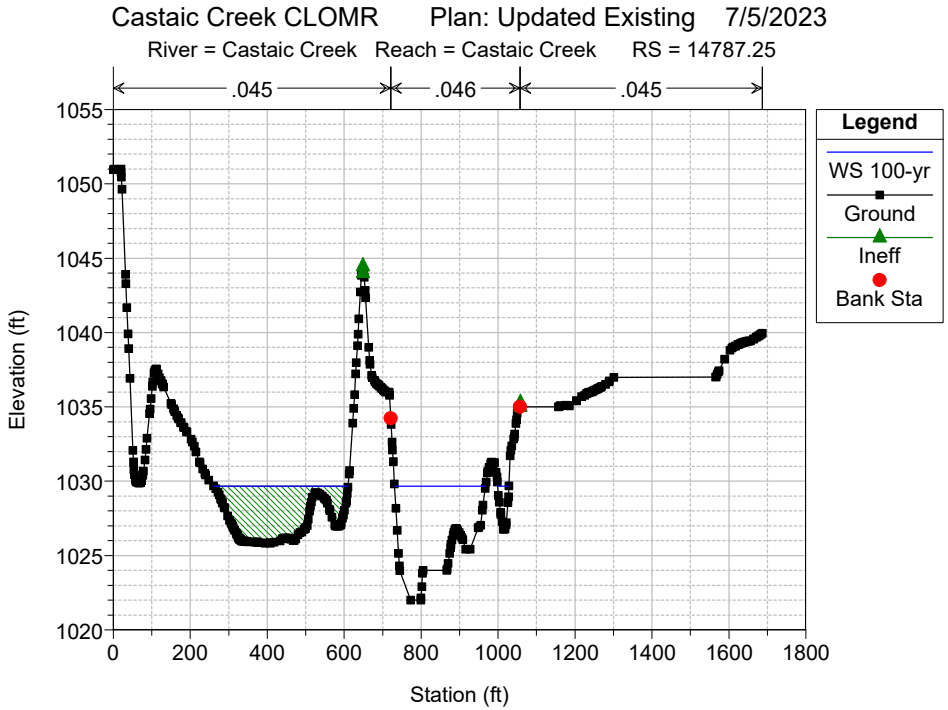

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15100 BR I-5 Bridge
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

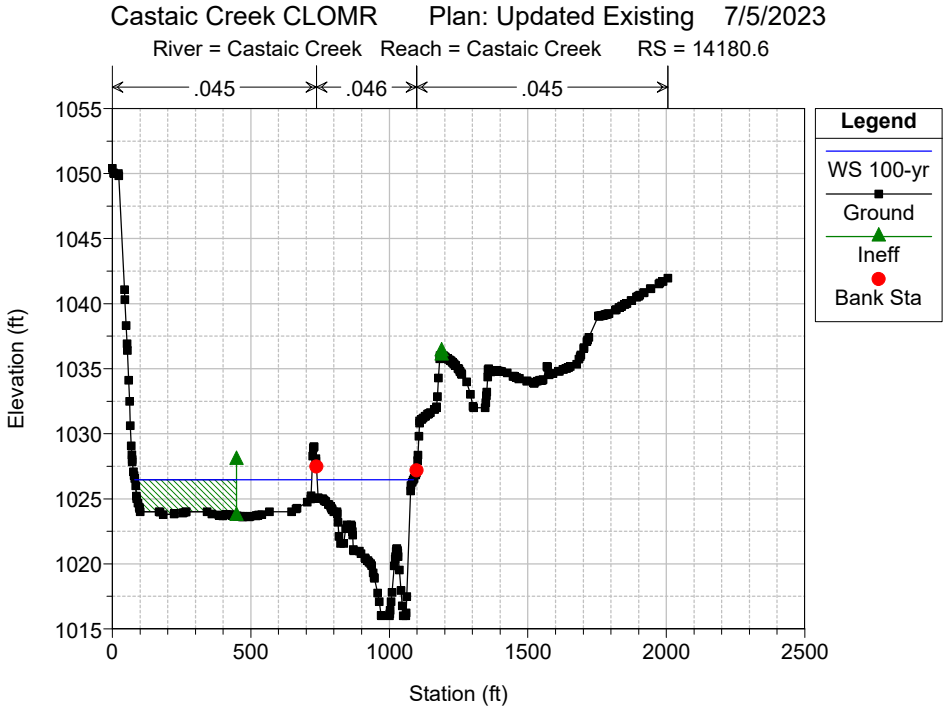

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14991.85
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

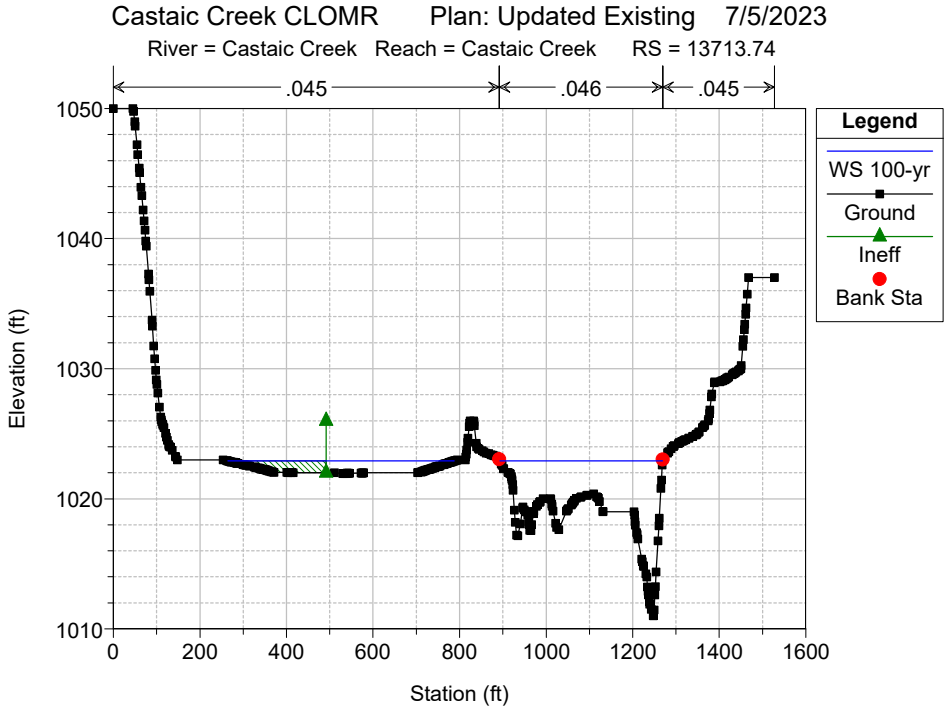

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14976.84
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14900 BR Old Road Bridge
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14892.2
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14787.25
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14180.6
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 13713.74
.045
.046
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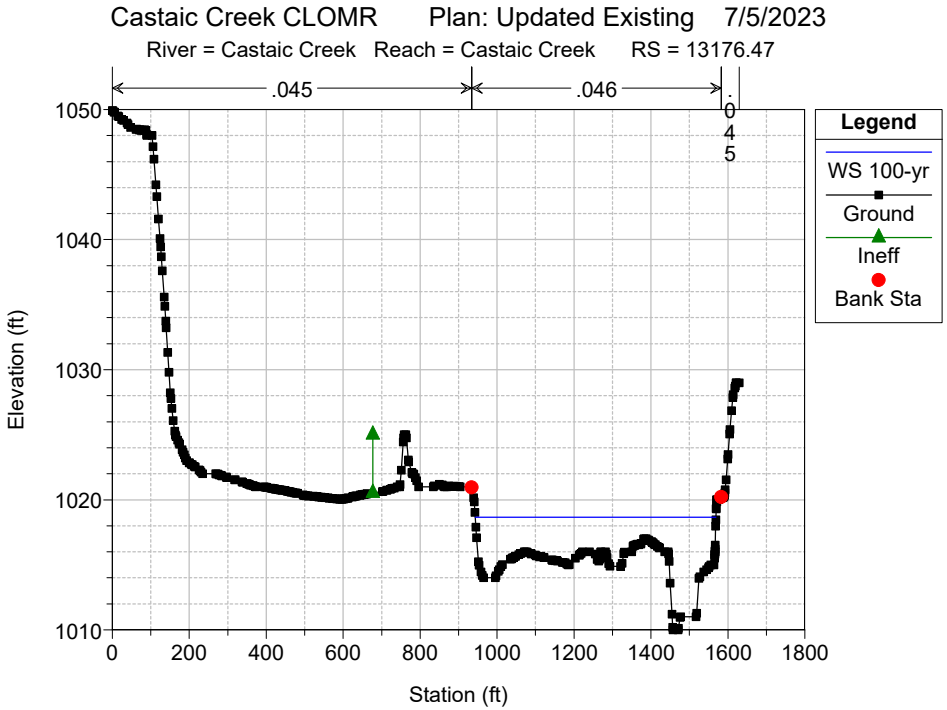
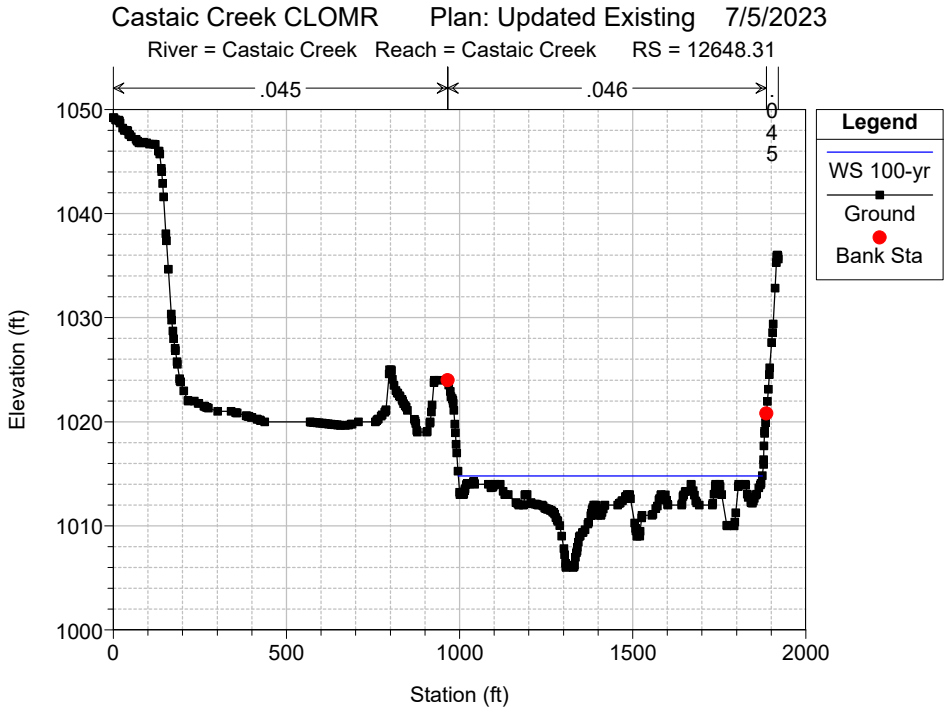
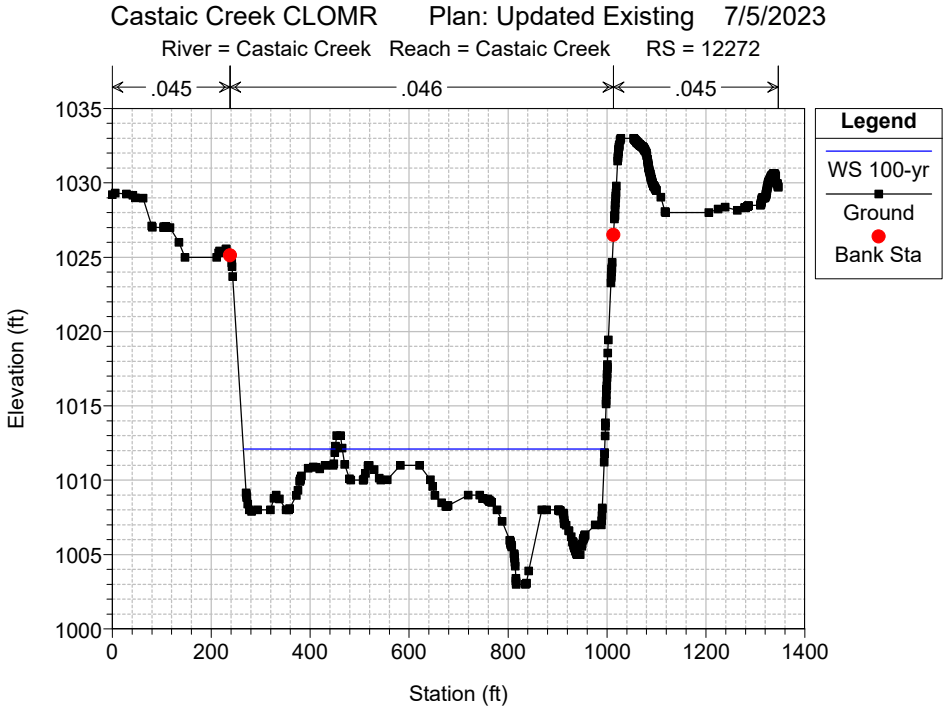
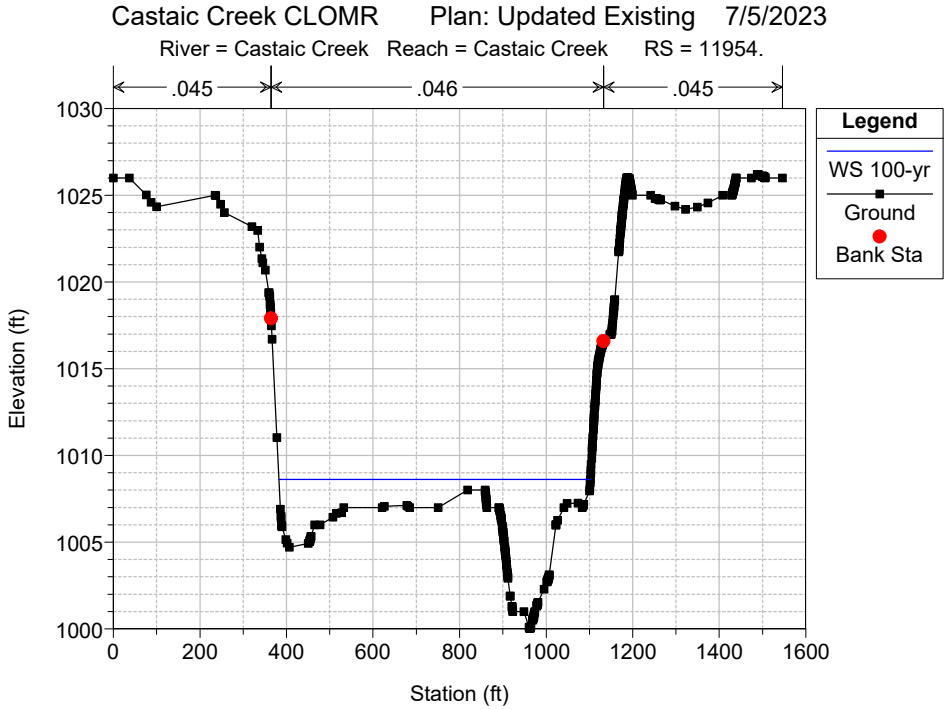
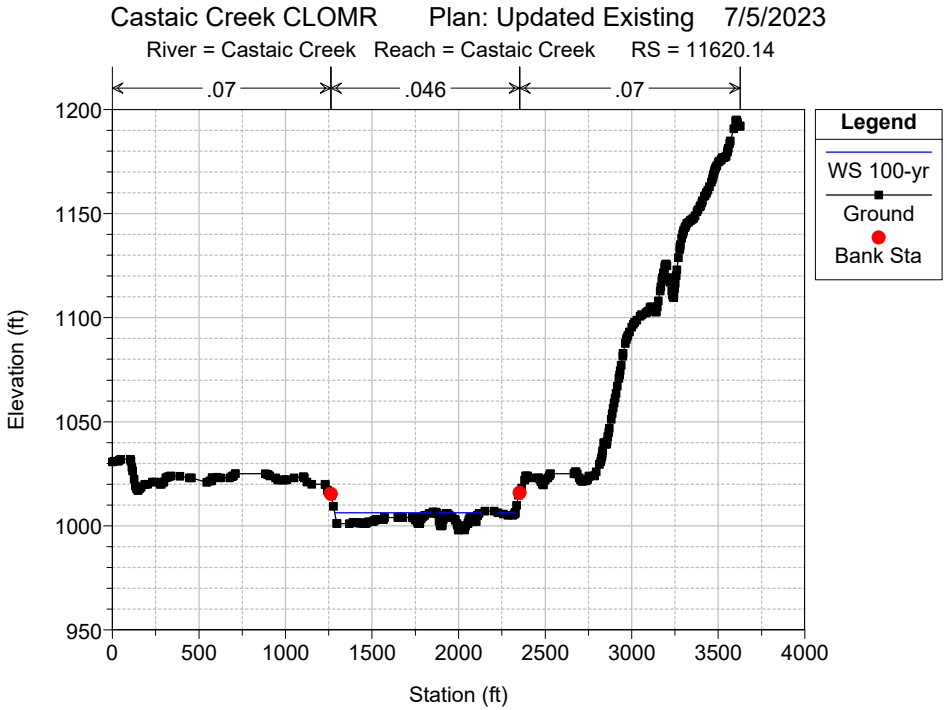
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

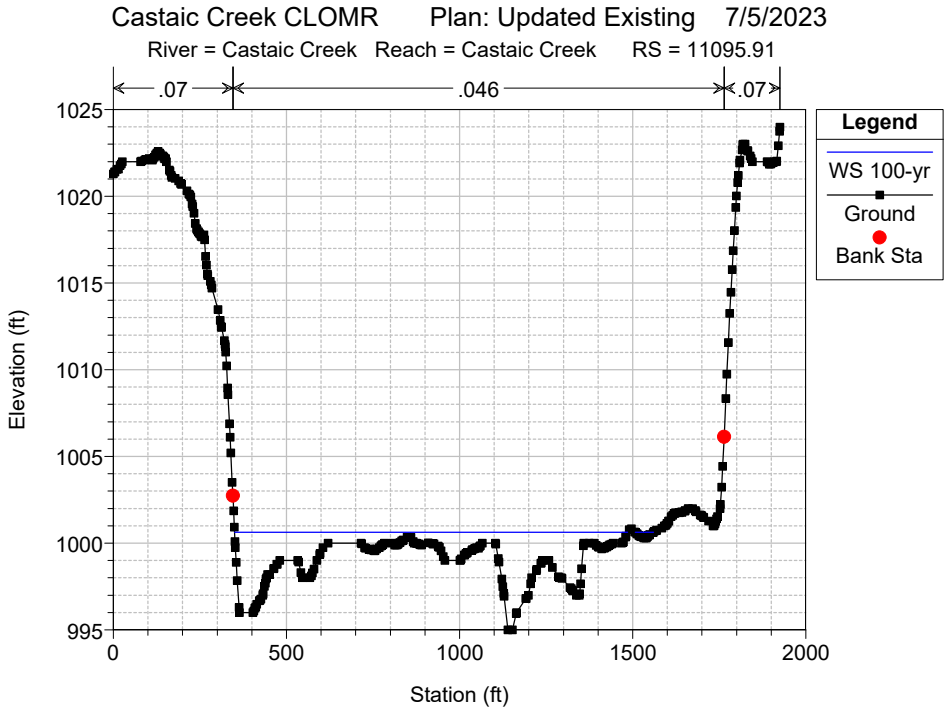

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 13176.47
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

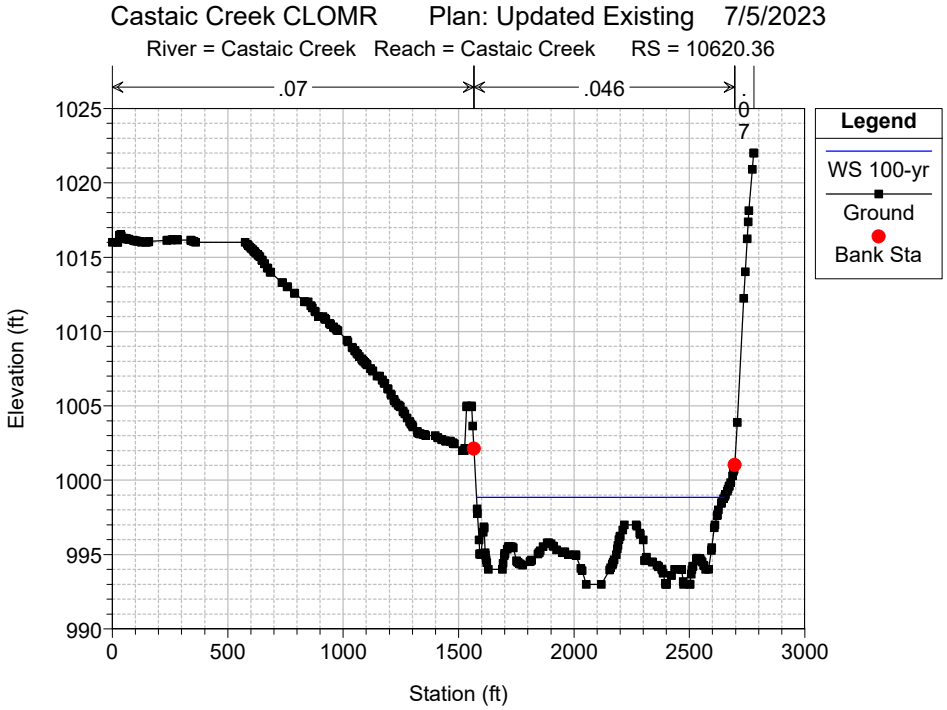

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 12648.31
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 12272
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 11954.
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 11620.14
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 11095.91
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 10620.36
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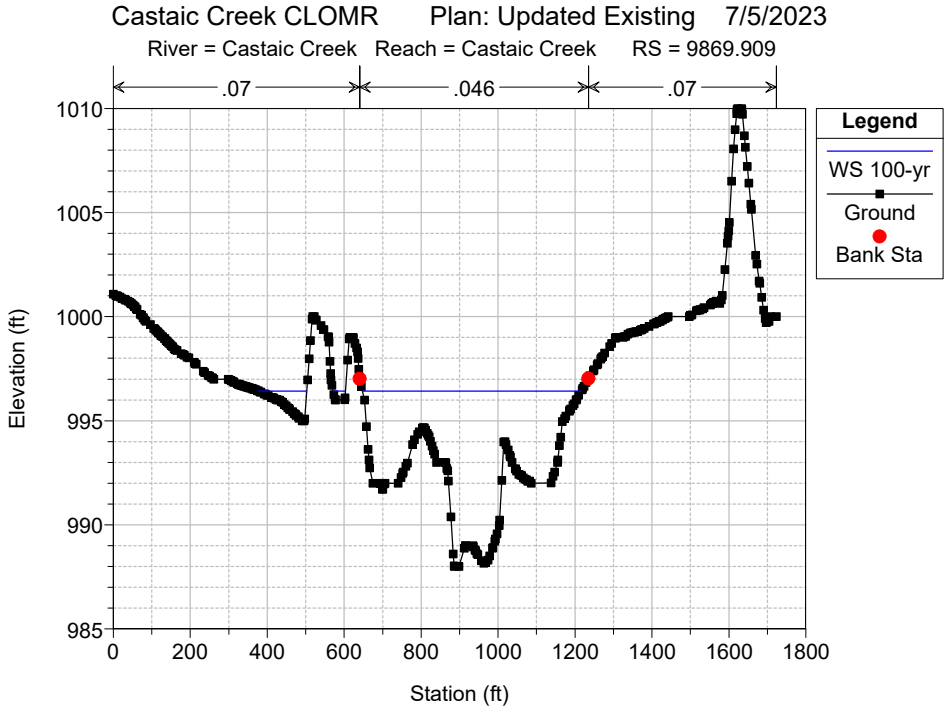
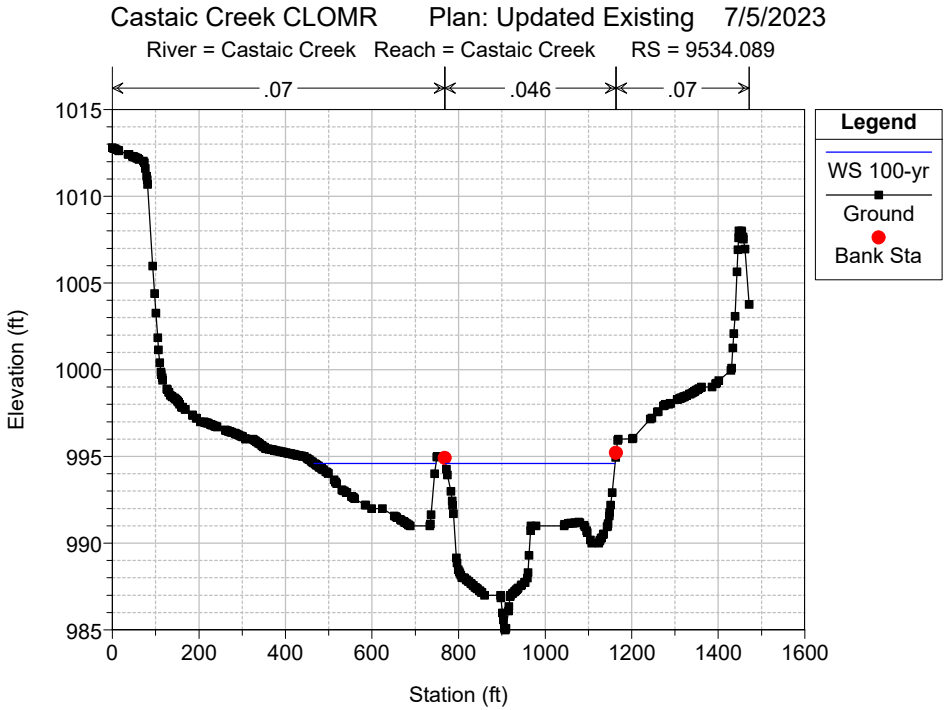
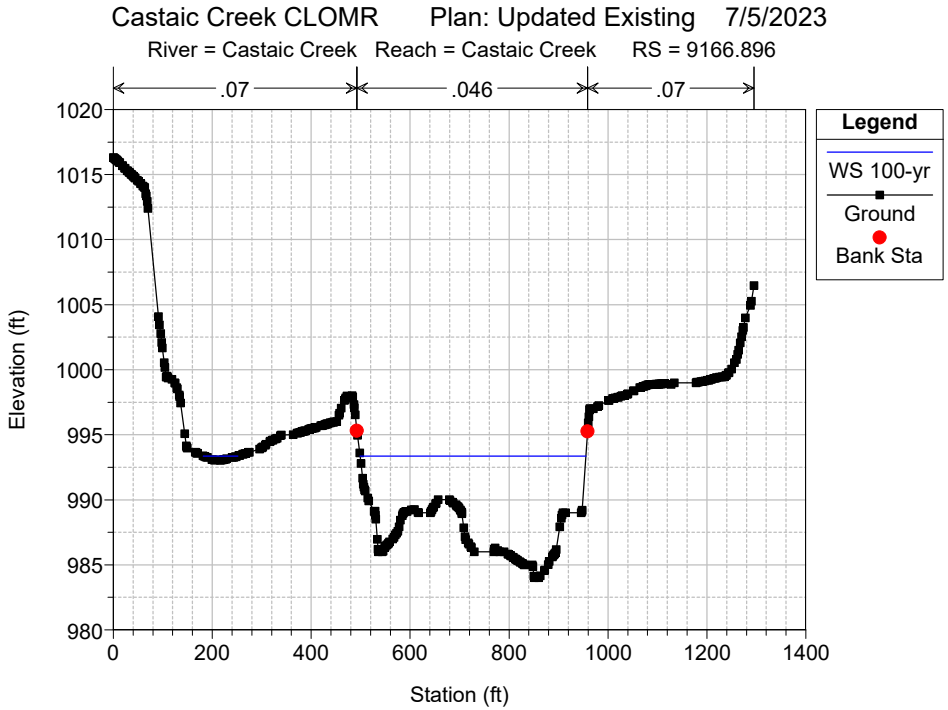
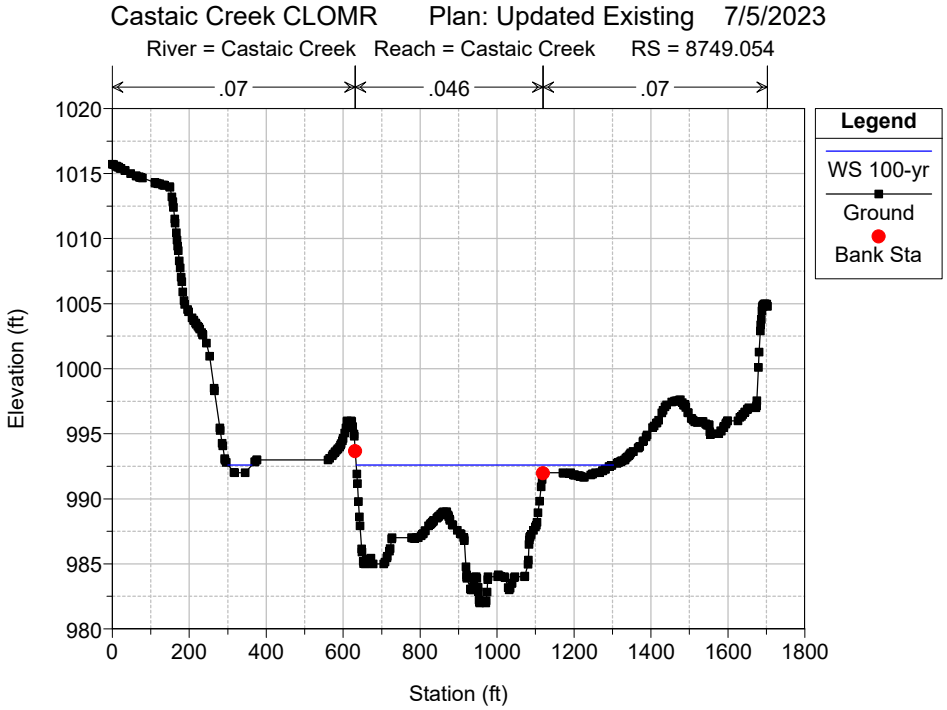
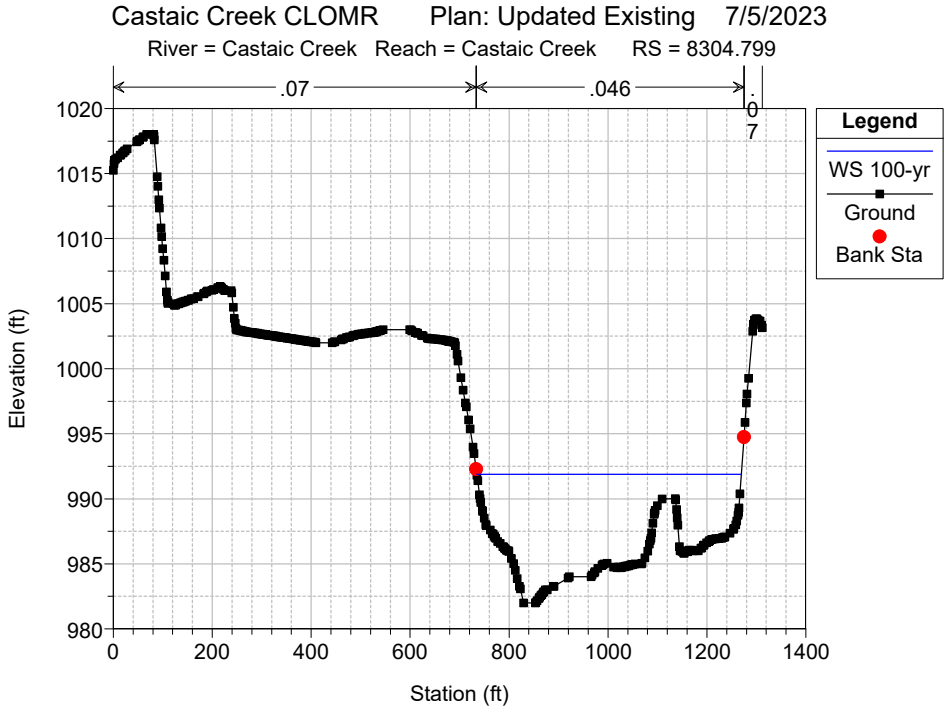
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

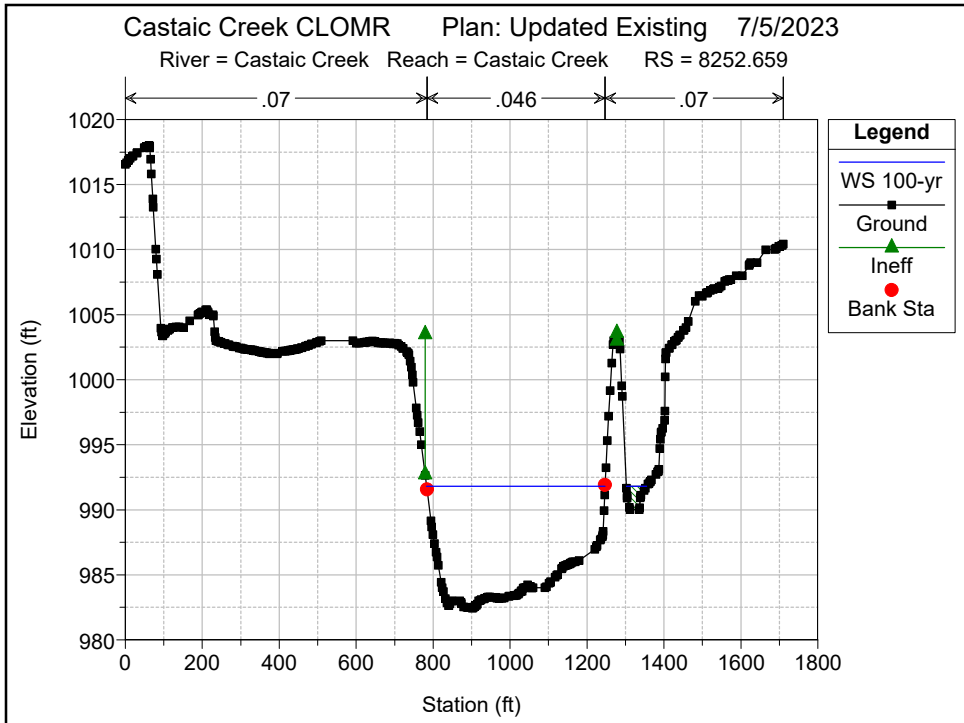

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 9869.909
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

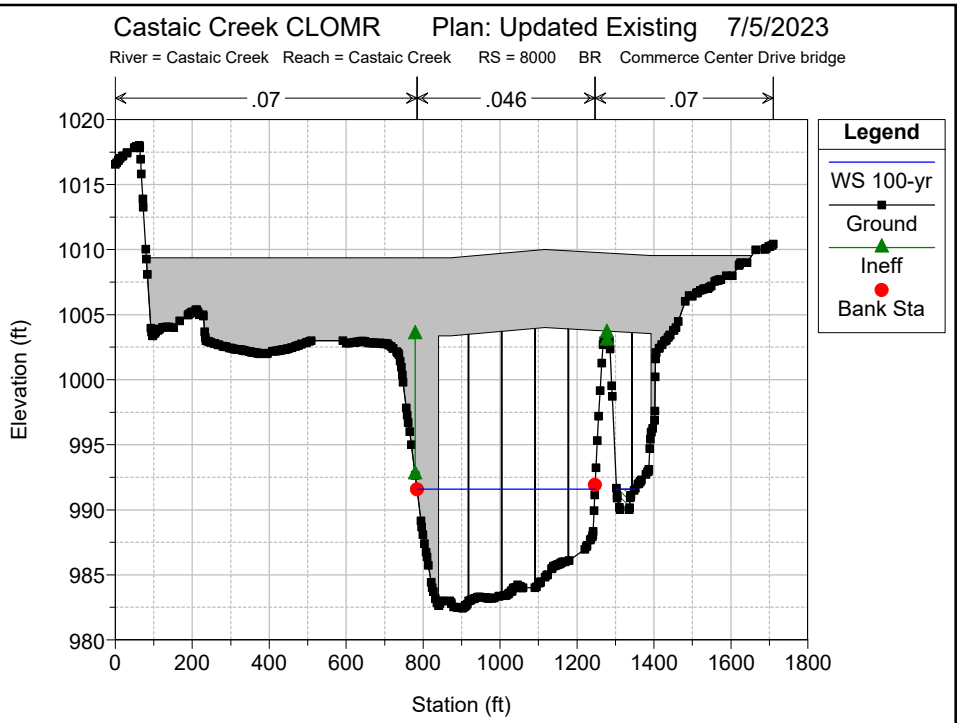

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 9534.089
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 9166.896
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8749.054
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8304.799
.07
.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8252.659
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8000 BR Commerce Center Drive bridge
.07
.046
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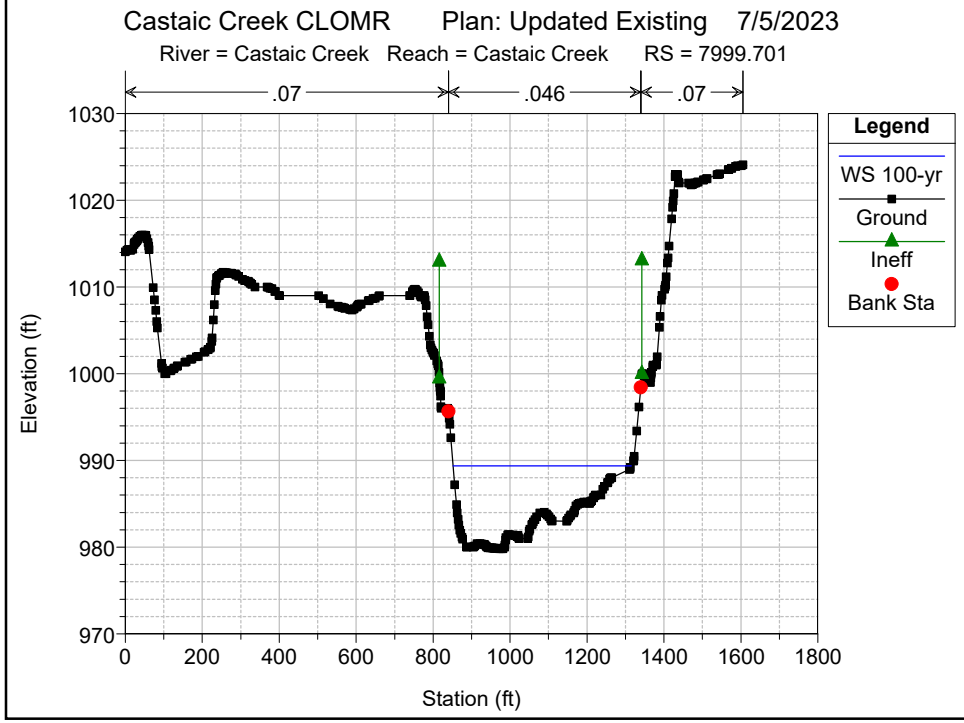
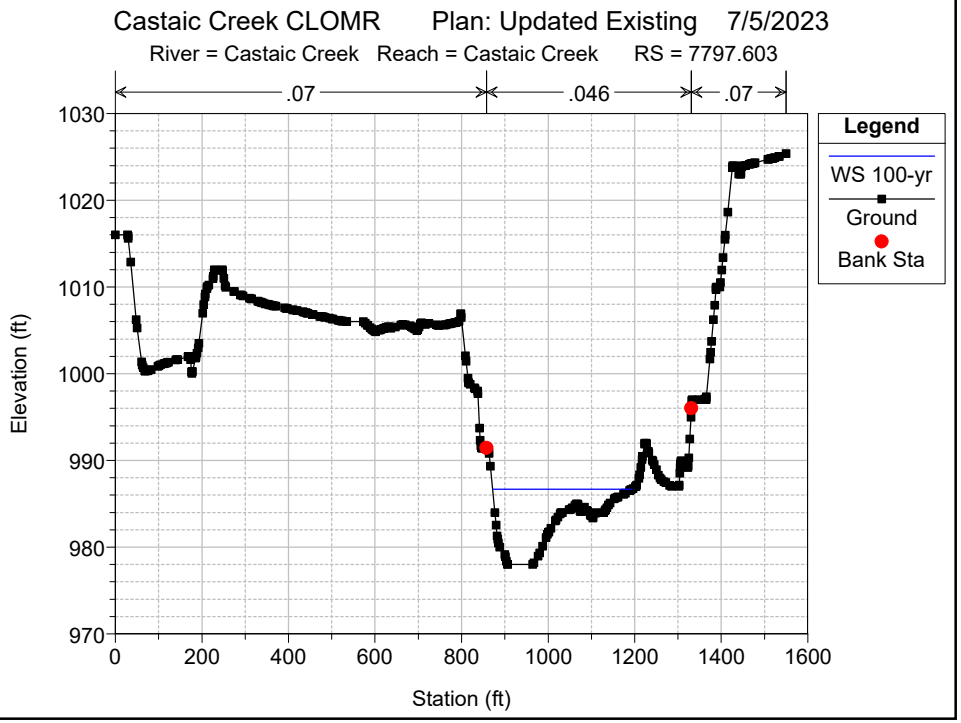
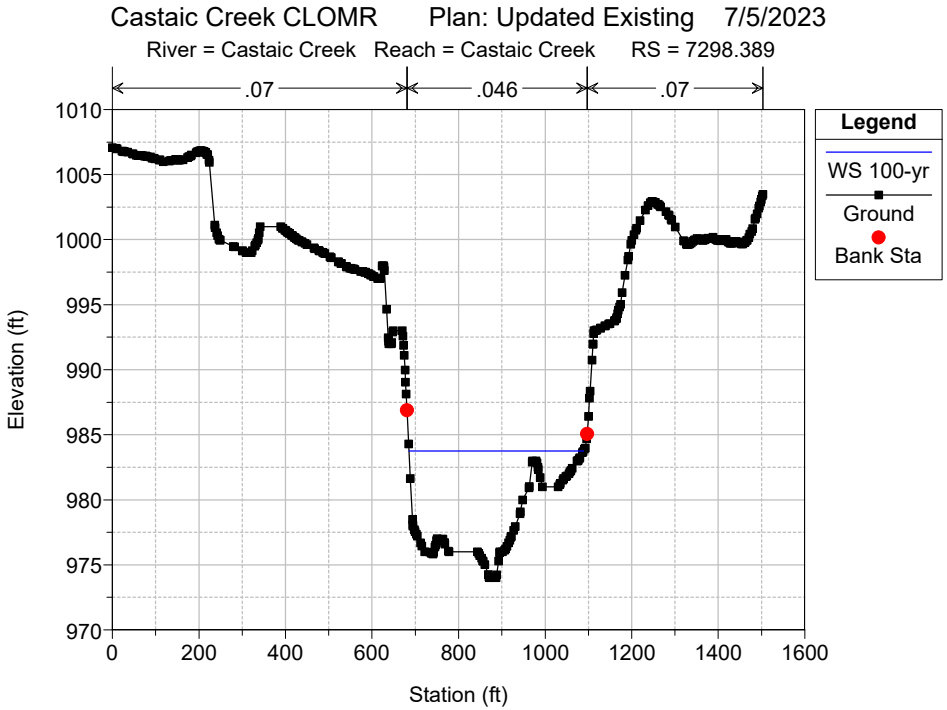
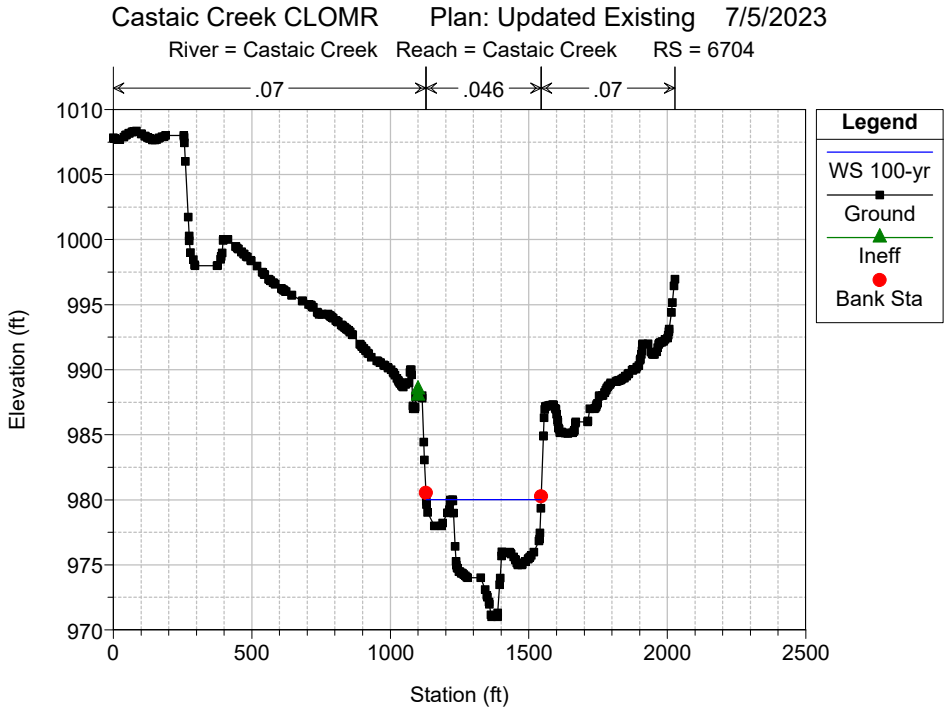
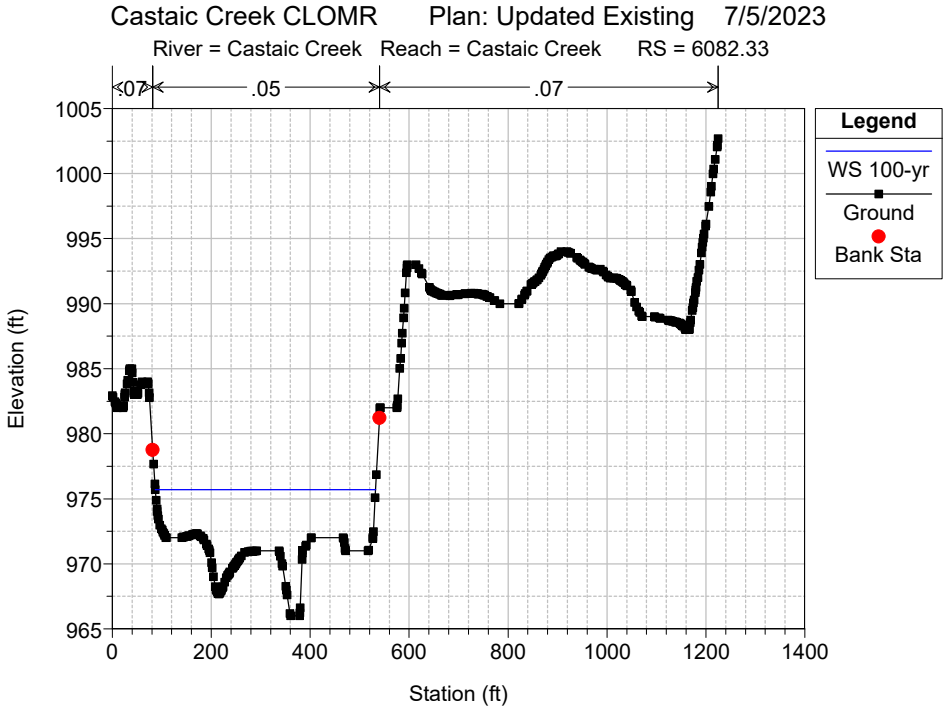
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 7999.701
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 7797.603
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 7298.389
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 6704
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 6082.33
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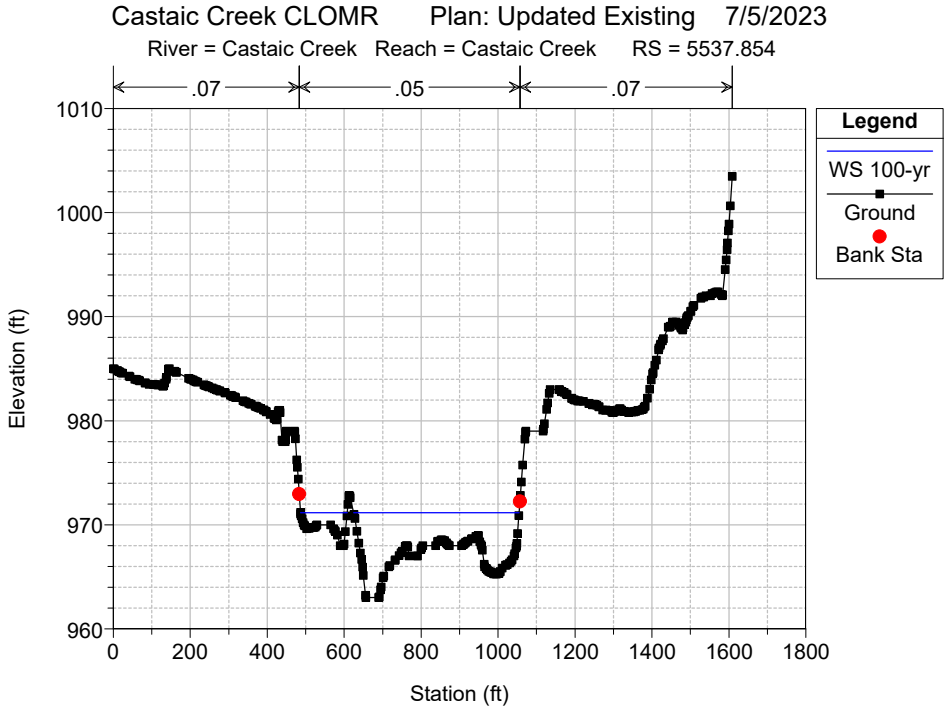
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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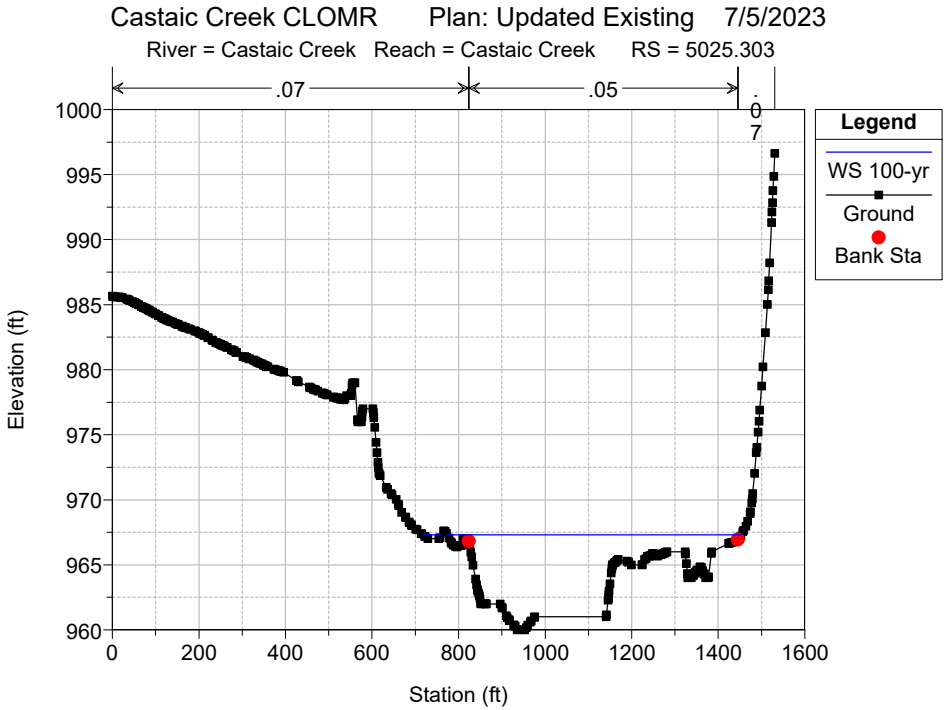
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
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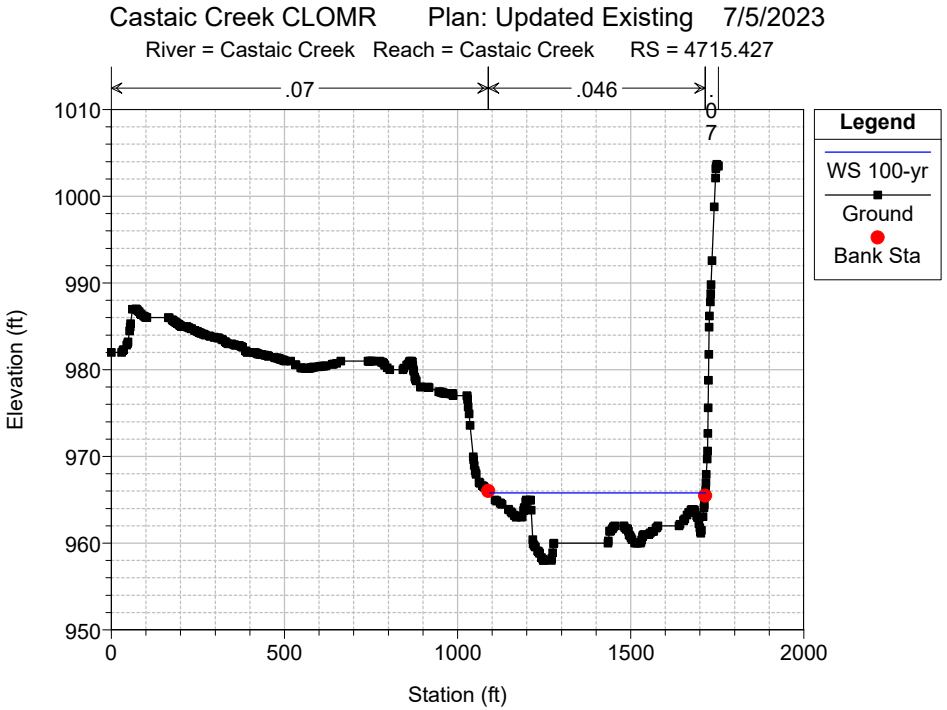
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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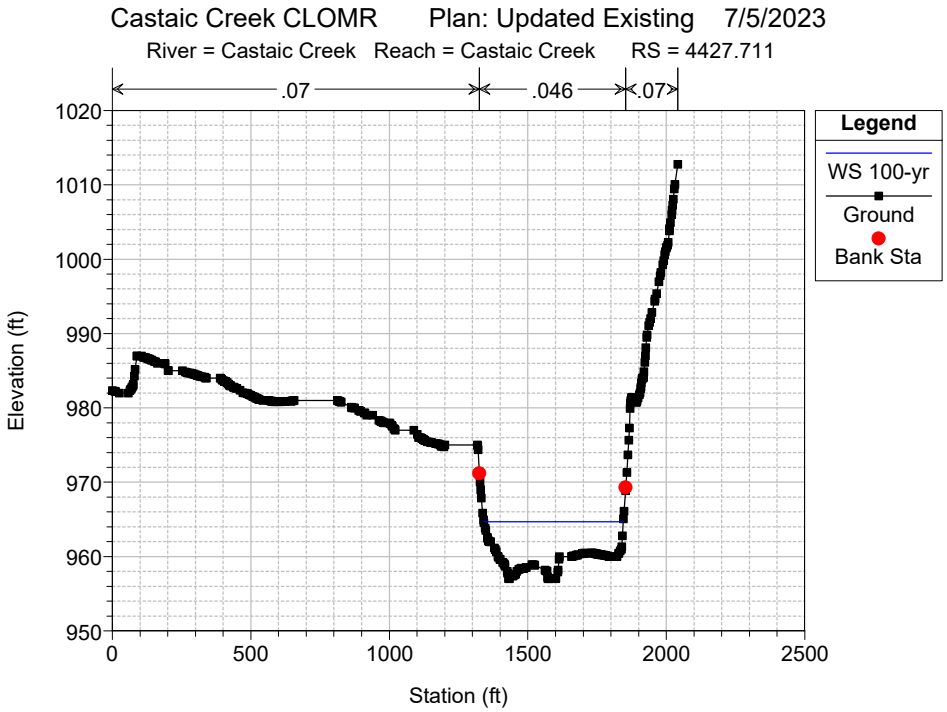
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

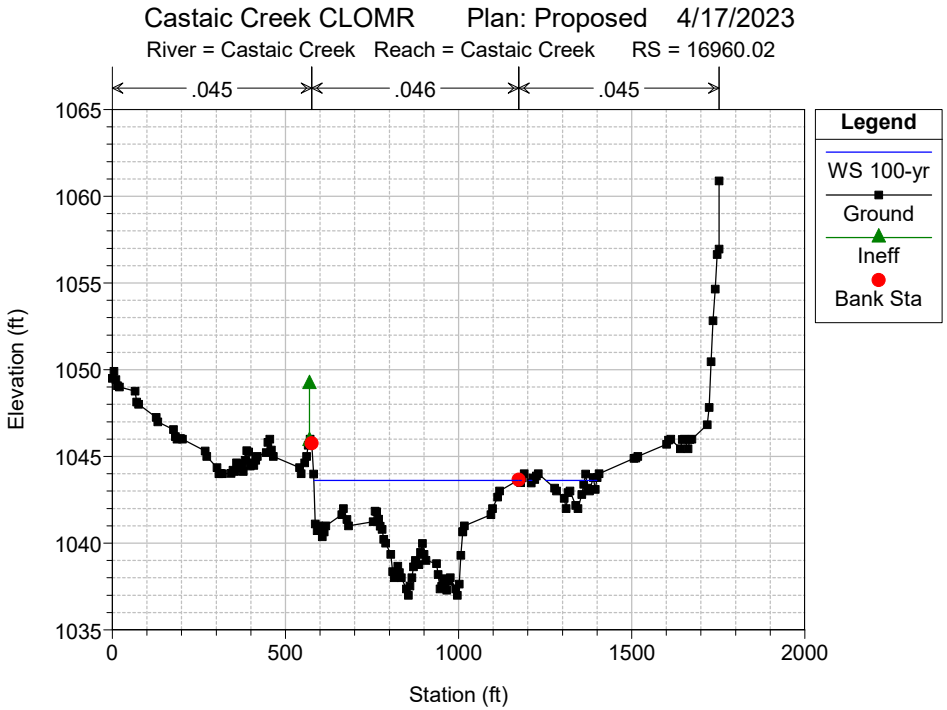

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 4427.711
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

PACE
Advanced Water Engineering

Appendix E – HEC-RAS Proposed Condition Hydraulic Results

HEC-RAS Plan: Proposed River: Castaic Creek Reach: Castaic Creek Profile: 100-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Castaic Creek	16960.02	100-yr	14480.00	1037.00	1043.62	1042.90	1044.46	0.011050	7.43	2010.48	742.13	0.73
Castaic Creek	16552.09	100-yr	14480.00	1033.07	1040.81		1041.30	0.005370	5.77	2670.48	838.53	0.52
Castaic Creek	16209.5	100-yr	14480.00	1031.00	1038.90		1039.40	0.005880	5.67	2572.28	755.71	0.54
Castaic Creek	15958.96	100-yr	14480.00	1029.00	1037.74	1036.15	1038.14	0.004138	5.13	2840.26	759.17	0.46
Castaic Creek	15669.62	100-yr	14480.00	1027.00	1036.77	1034.09	1037.15	0.002845	4.98	2916.12	608.96	0.40
Castaic Creek	15478.79	100-yr	14480.00	1026.00	1036.27	1032.82	1036.69	0.002077	5.21	2826.36	649.15	0.35
Castaic Creek	15245.39	100-yr	14480.00	1025.00	1034.64	1032.55	1035.85	0.005862	8.82	1642.29	325.87	0.60
Castaic Creek	15216.27	100-yr	14480.00	1025.00	1034.62	1031.84	1035.59	0.004226	7.91	1830.42	497.25	0.51
Castaic Creek	15100		Bridge									
Castaic Creek	14991.85	100-yr	14560.00	1023.00	1032.91	1030.35	1033.88	0.004505	7.91	1839.68	398.86	0.52
Castaic Creek	14976.84	100-yr	14560.00	1023.00	1032.82	1030.42	1033.81	0.004767	7.96	1829.32	457.98	0.54
Castaic Creek	14900		Bridge									
Castaic Creek	14892.2	100-yr	14560.00	1022.00	1032.12	1029.73	1033.08	0.004813	7.84	1858.06	689.33	0.54
Castaic Creek	14787.25	100-yr	14560.00	1022.02	1029.98	1029.64	1031.95	0.015178	11.24	1295.20	283.68	0.90
Castaic Creek	14180.6	100-yr	14560.00	1016.00	1025.59	1024.36	1026.30	0.005964	7.14	2217.99	547.88	0.57
Castaic Creek	13713.74	100-yr	14560.00	1011.00	1022.20		1022.95	0.009724	7.35	2122.26	685.84	0.69
Castaic Creek	13176.47	100-yr	14560.00	1010.00	1018.98		1019.52	0.005229	5.87	2492.84	685.69	0.52
Castaic Creek	12648.31	100-yr	14560.00	1006.00	1014.21		1015.03	0.015903	7.25	2008.25	841.53	0.83
Castaic Creek	12272	100-yr	14560.00	1003.00	1011.34		1011.71	0.005228	4.93	2953.61	959.76	0.50
Castaic Creek	11954	100-yr	14560.00	1000.00	1008.59		1009.21	0.012935	6.30	2310.80	1026.82	0.74
Castaic Creek	11620.14	100-yr	14560.00	998.00	1006.34	1004.64	1006.67	0.004732	4.60	3167.24	1058.18	0.47
Castaic Creek	11095.91	100-yr	14560.00	995.00	1000.81	1000.81	1001.67	0.027149	7.44	1957.97	1184.33	1.02
Castaic Creek	10620.36	100-yr	14560.00	993.00	998.83		999.00	0.001749	3.33	4377.25	1130.27	0.30
Castaic Creek	9869.909	100-yr	14560.00	988.00	996.61		997.04	0.004216	5.28	2755.90	686.35	0.46
Castaic Creek	9534.089	100-yr	14560.00	985.00	995.49		995.89	0.002787	5.05	2881.78	561.53	0.39
Castaic Creek	9166.896	100-yr	14560.00	984.00	994.54		994.98	0.002207	5.33	2729.71	411.01	0.36
Castaic Creek	8749.054	100-yr	14560.00	982.00	993.61		994.01	0.002376	5.10	2852.59	485.70	0.37
Castaic Creek	8304.799	100-yr	14560.00	983.74	991.84		992.56	0.004529	6.79	2145.44	385.67	0.51
Castaic Creek	8252.659	100-yr	14560.00	982.44	991.89	987.82	992.25	0.001597	4.84	3006.10	464.83	0.32
Castaic Creek	8000		Bridge									
Castaic Creek	7999.701	100-yr	14560.00	979.79	989.36	985.89	989.80	0.002498	5.29	2754.15	462.47	0.38
Castaic Creek	7797.603	100-yr	14560.00	978.00	986.69	986.28	988.39	0.015111	10.48	1389.77	322.16	0.89
Castaic Creek	7298.389	100-yr	14560.00	974.00	983.74		984.42	0.004331	6.58	2211.62	402.84	0.50
Castaic Creek	6704	100-yr	14560.00	971.00	980.02	978.73	980.97	0.008006	7.82	1861.38	415.14	0.65
Castaic Creek	6082.33	100-yr	14560.00	966.00	975.68		976.40	0.006581	6.81	2137.93	445.41	0.55
Castaic Creek	5537.854	100-yr	14560.00	963.00	971.17	970.22	971.97	0.010343	7.17	2029.35	551.40	0.66
Castaic Creek	5025.303	100-yr	14560.00	960.00	967.31		967.85	0.006228	5.87	2510.31	721.51	0.52
Castaic Creek	4715.427	100-yr	14560.00	958.00	965.80		966.27	0.004152	5.46	2664.66	623.20	0.47
Castaic Creek	4427.711	100-yr	14560.00	957.00	964.70	962.42	965.19	0.003392	5.60	2598.48	503.41	0.43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.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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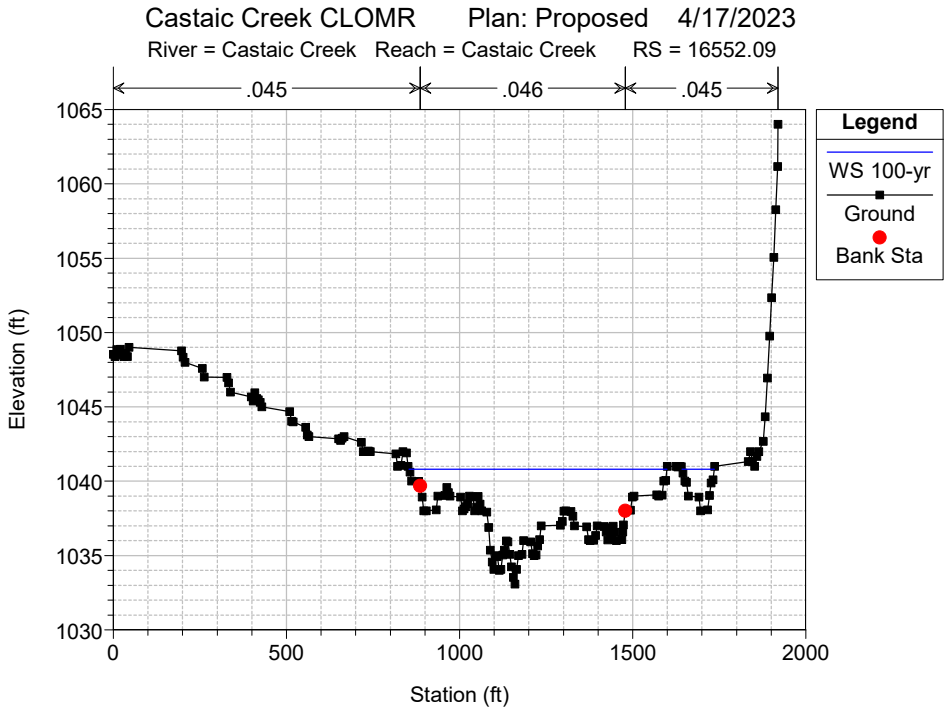
1060
1055
1050
1045
1040
1035
0
500
1000
1500
2000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.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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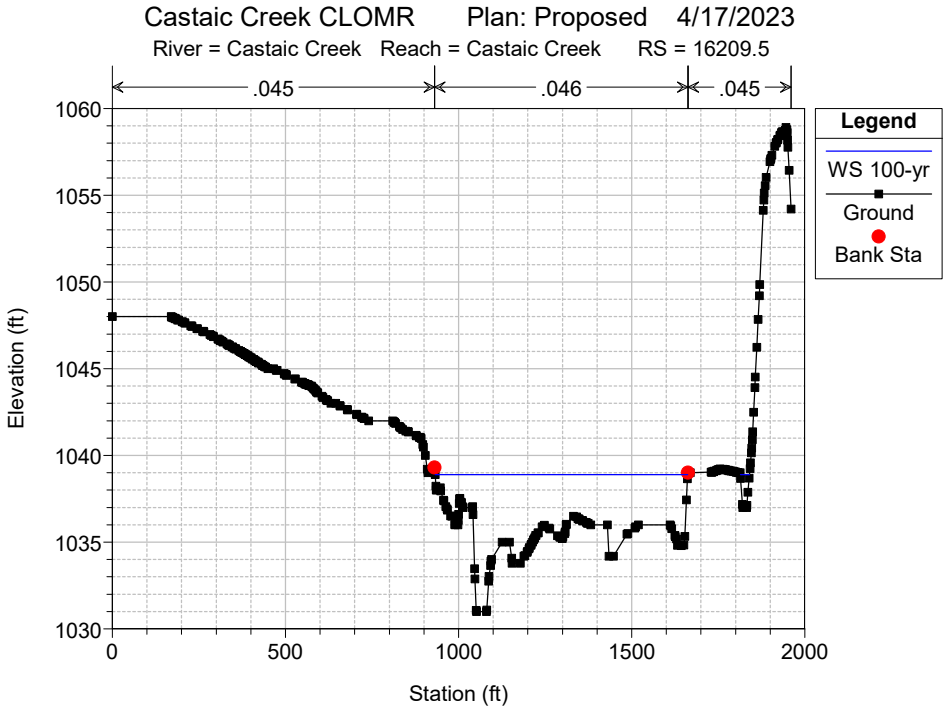
1060
1055
1050
1045
1040
1035
1030
0
500
1000
1500
2000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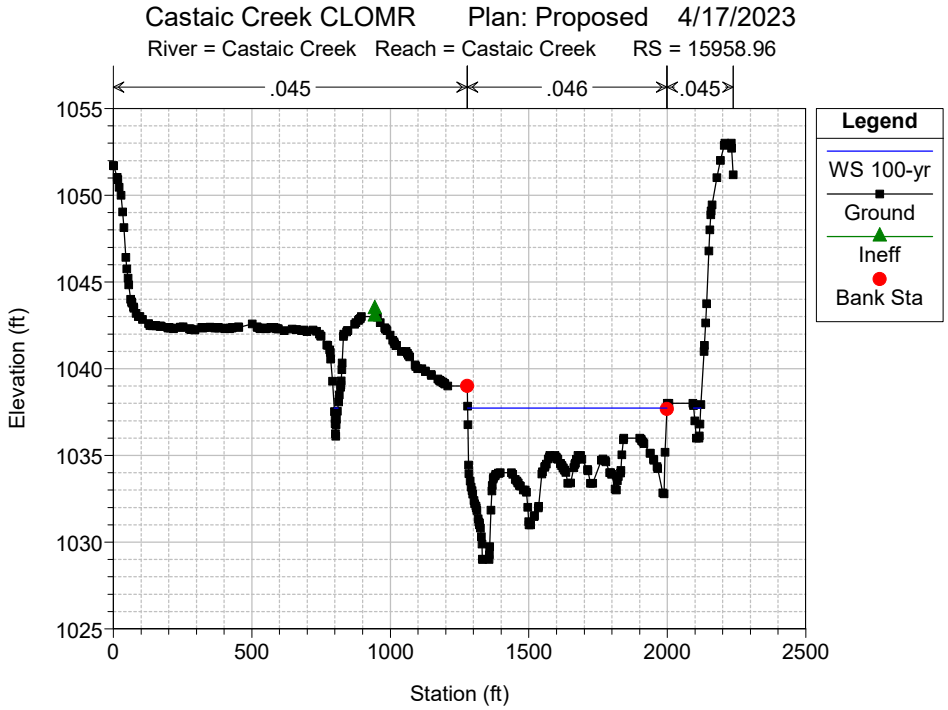
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1060
1055
1050
1045
1040
1035
1030
0
500
1000
1500
2000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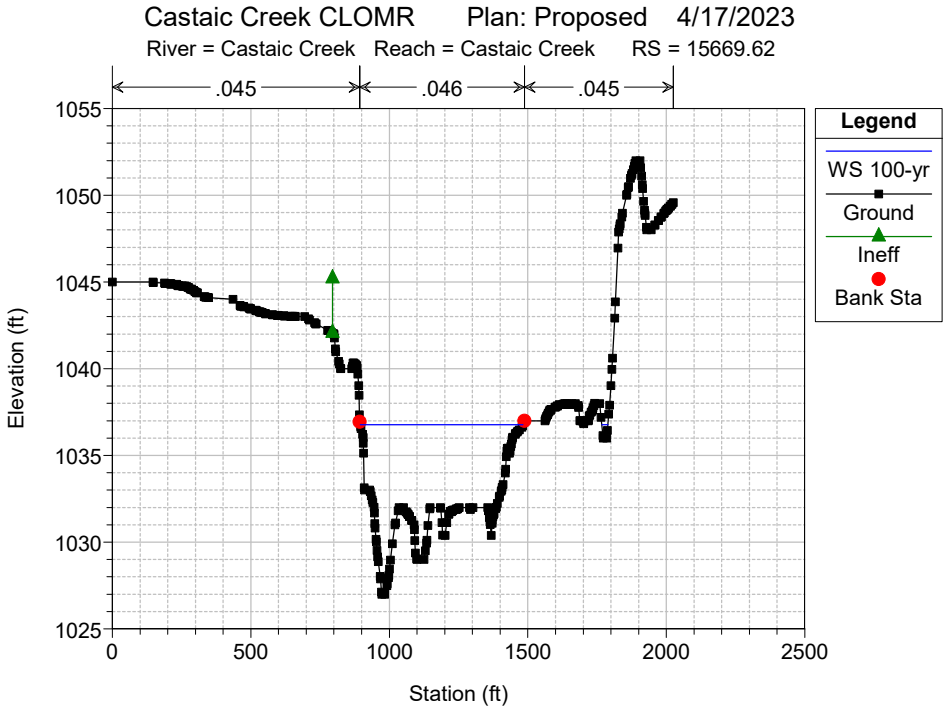
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1055
1050
1045
1040
1035
1030
1025
0
500
1000
1500
2000
2500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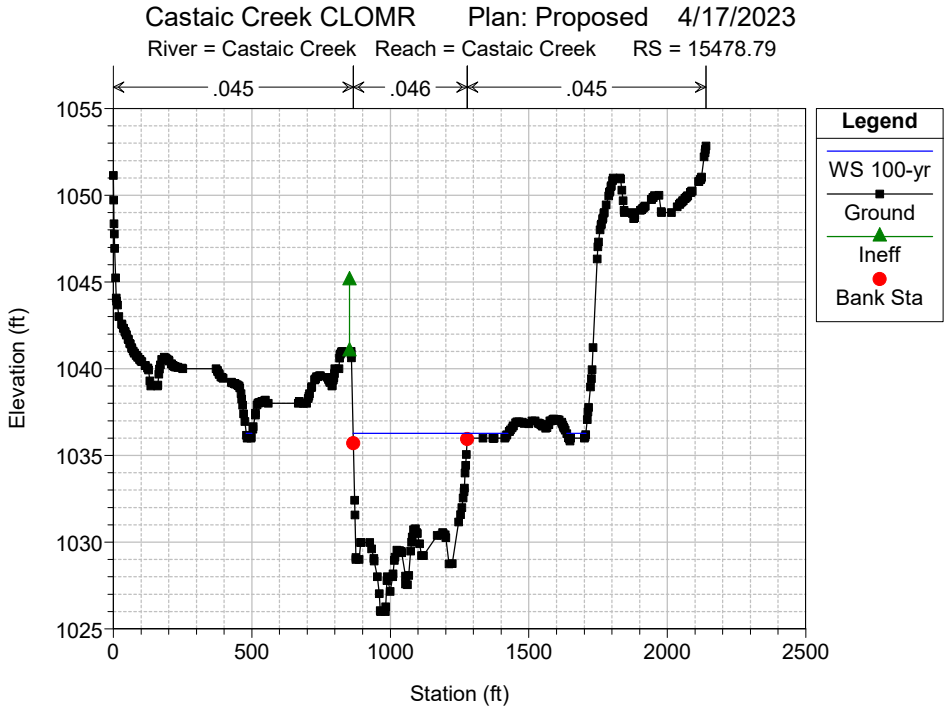
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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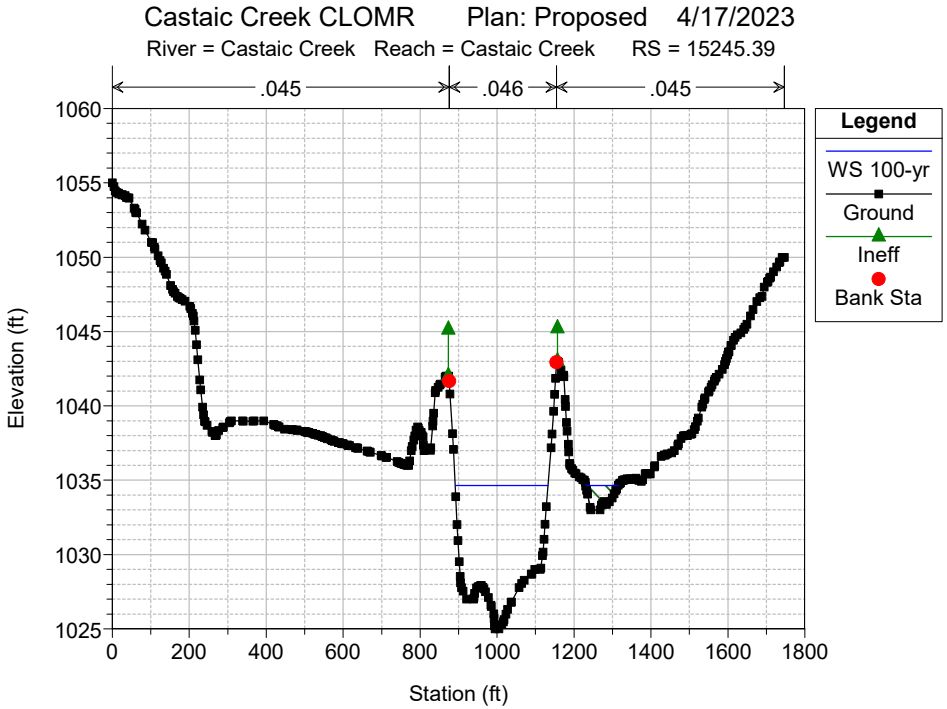
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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River = Castaic Creek Reach = Castaic Creek RS = 15245.39
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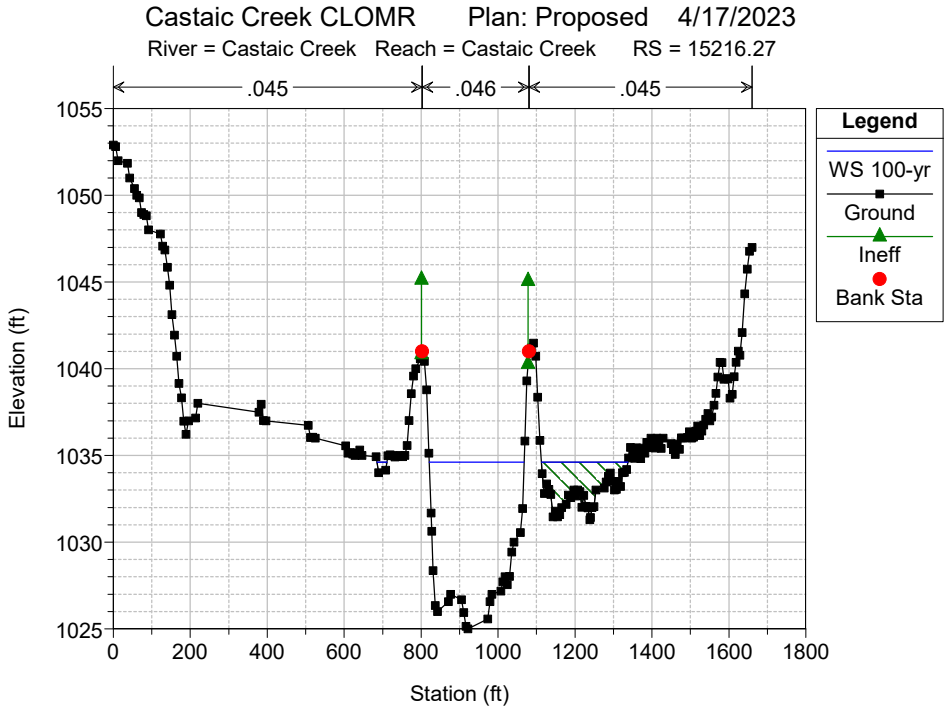
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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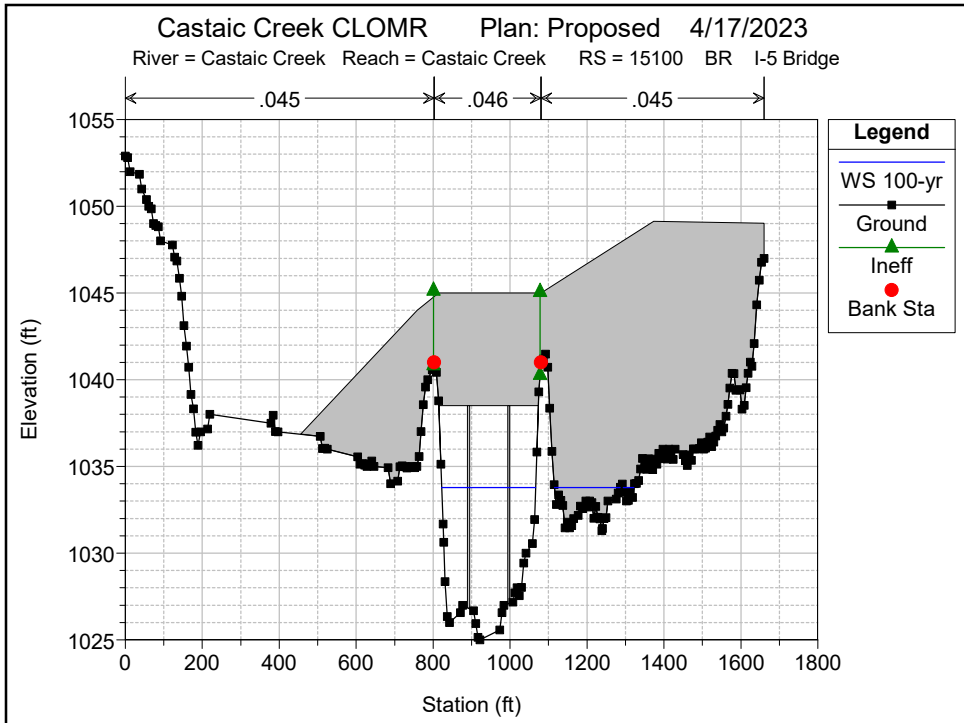
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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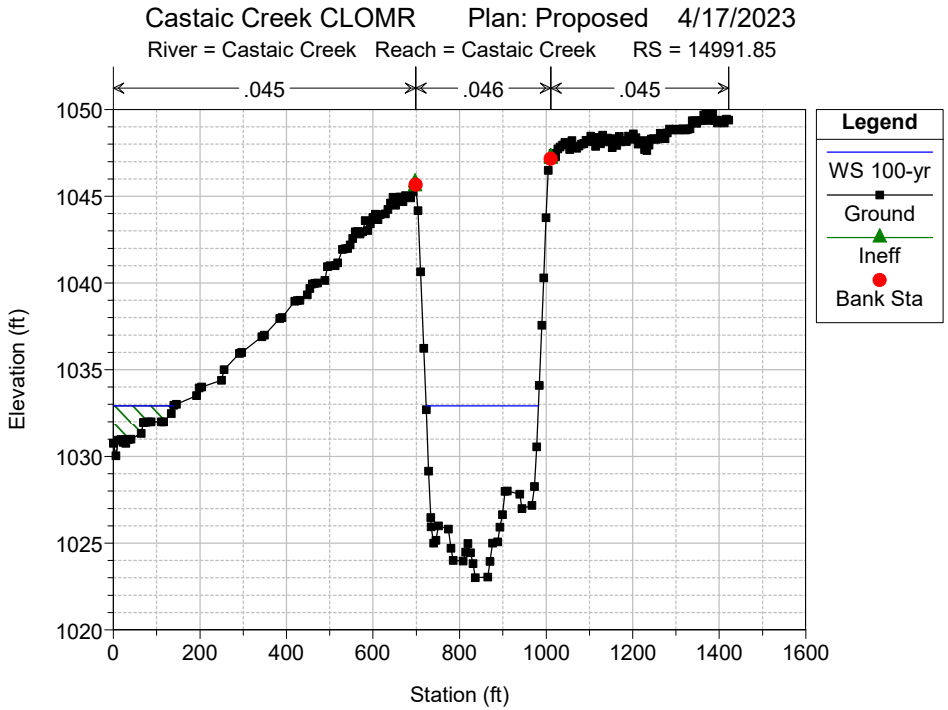
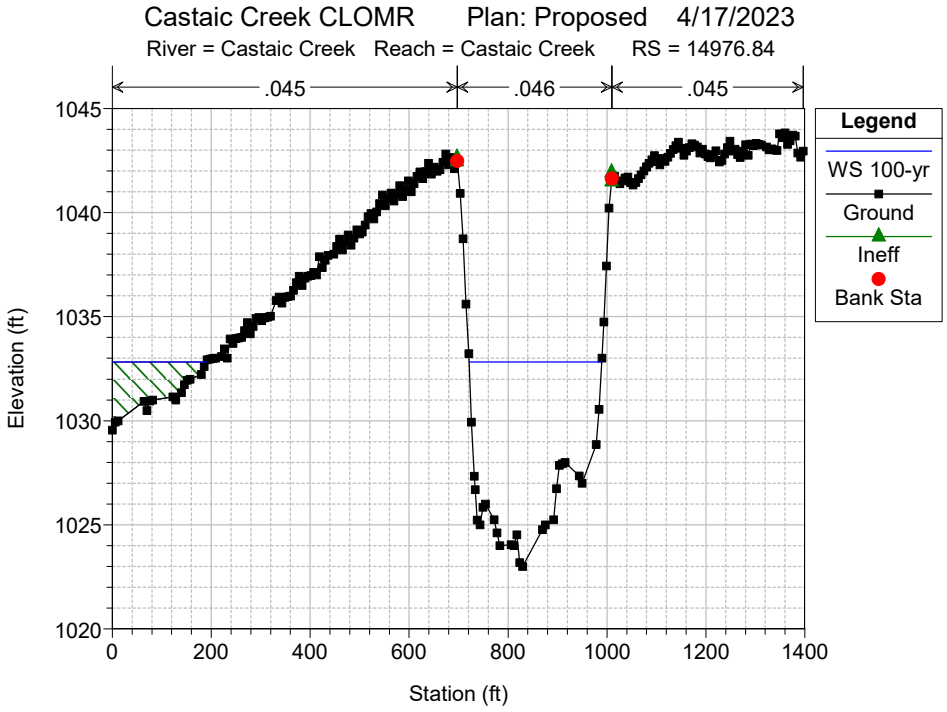
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 14991.85
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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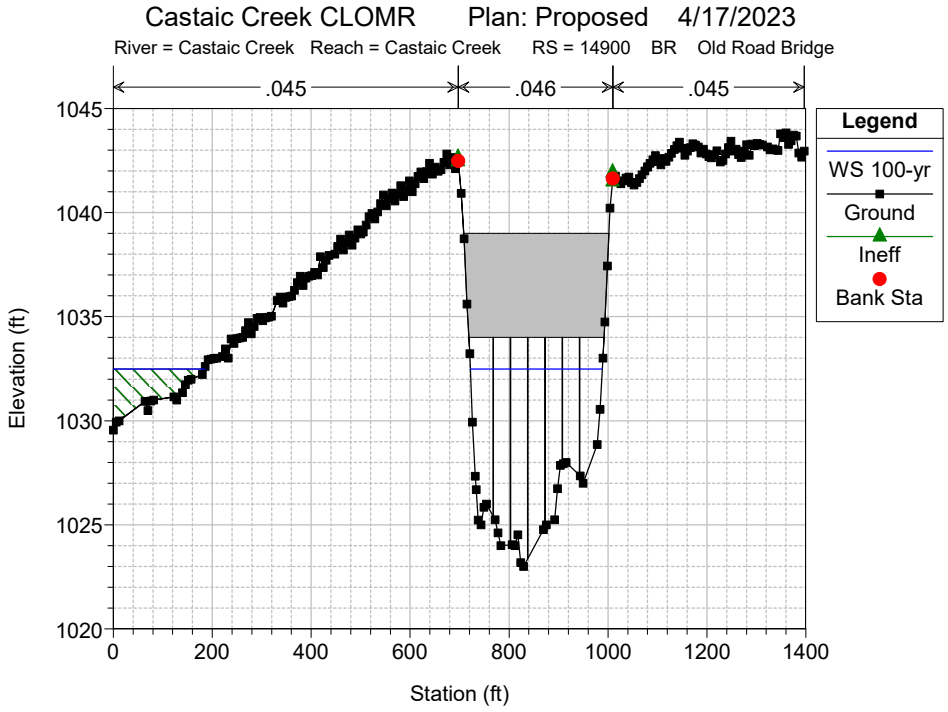
River = Castaic Creek Reach = Castaic Creek RS = 14976.84
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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River = Castaic Creek Reach = Castaic Creek RS = 14900 BR Old Road Bridge
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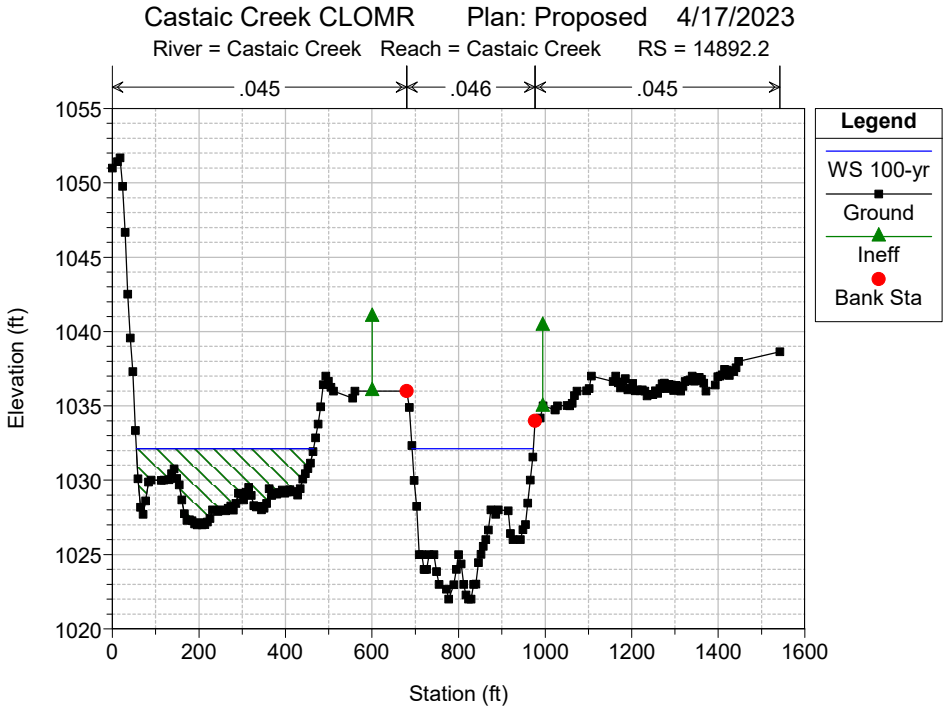
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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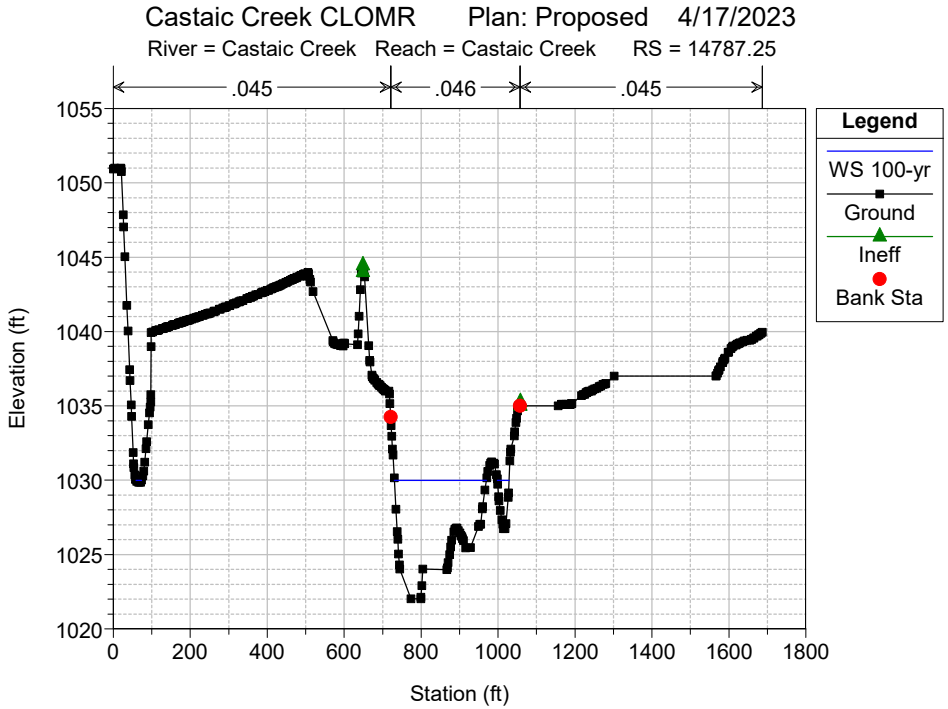
River = Castaic Creek Reach = Castaic Creek RS = 14892.2
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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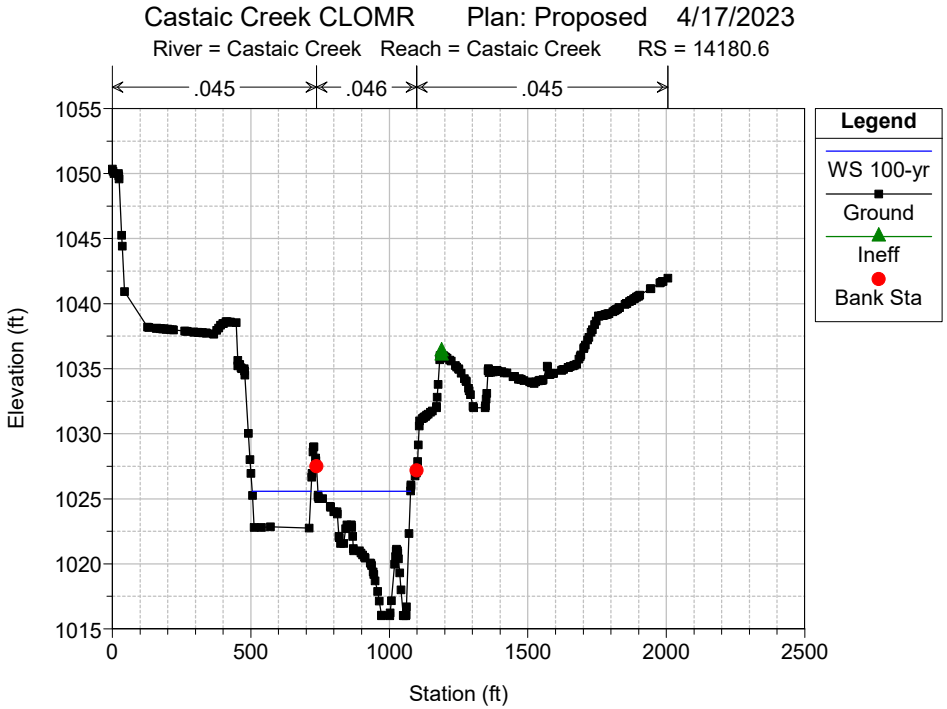
River = Castaic Creek Reach = Castaic Creek RS = 14787.25
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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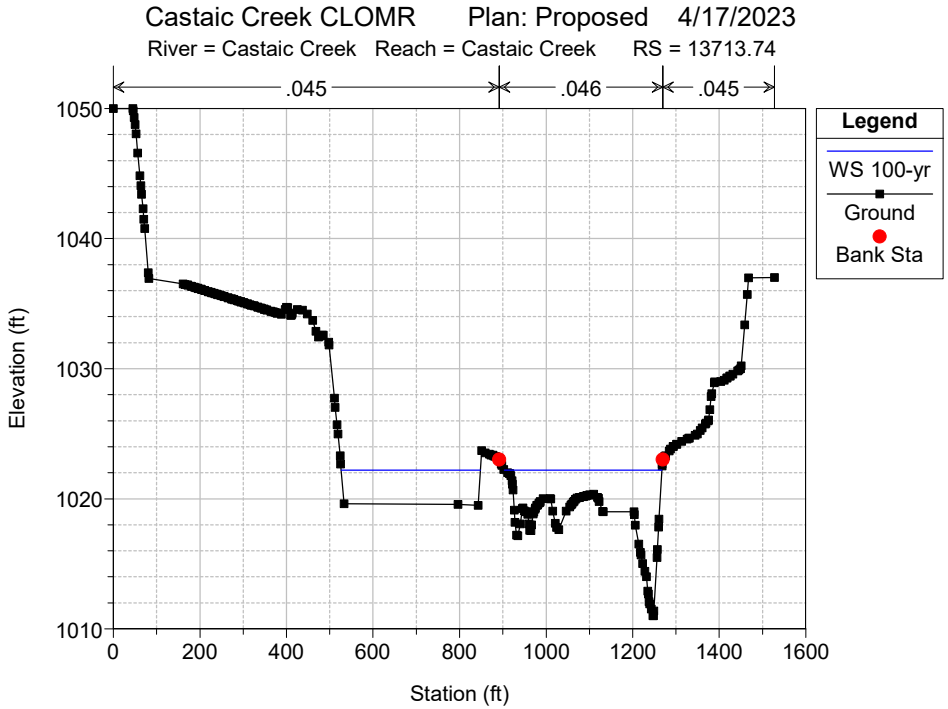
River = Castaic Creek Reach = Castaic Creek RS = 14180.6
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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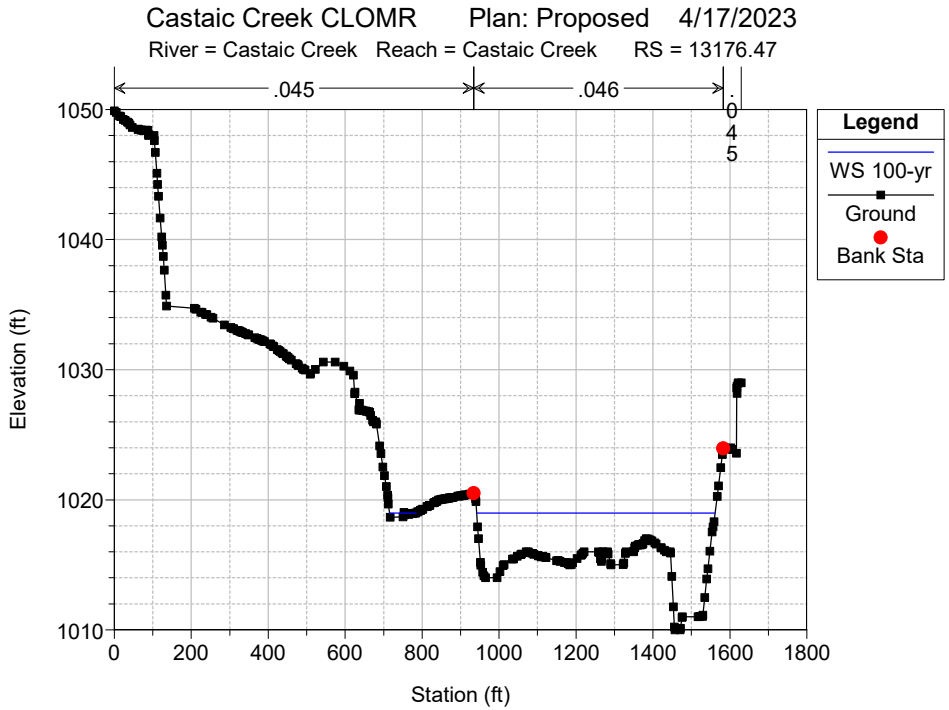
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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1030
1020
1010
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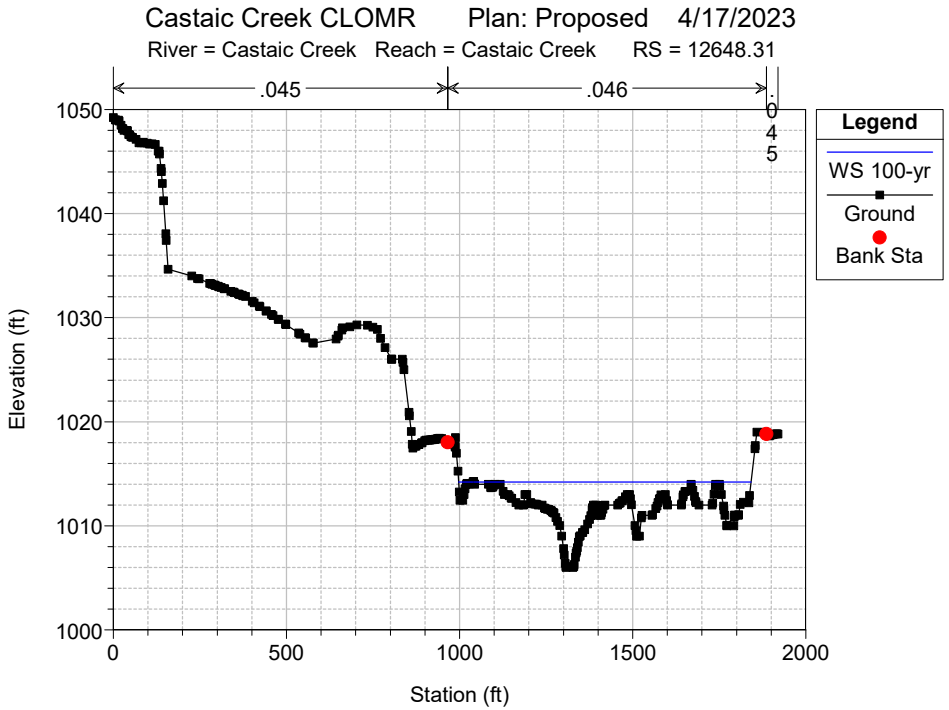
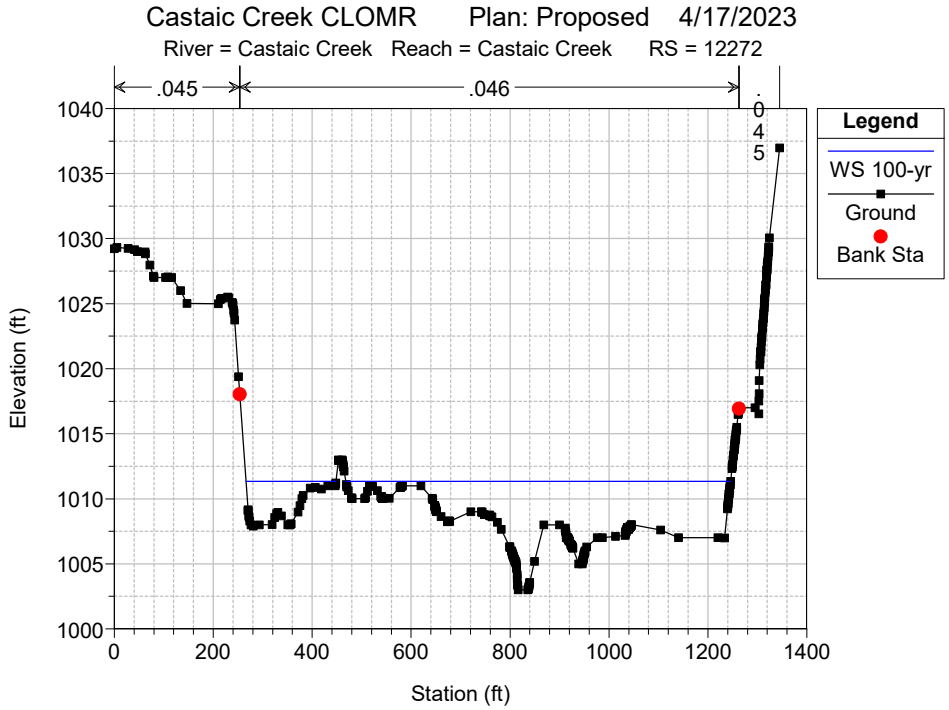
200
400
600
800
1000
1200
1400
1600
1800


Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 12648.31
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1050
1040
1030
1020
1010
1000
0
500
1000
1500
2000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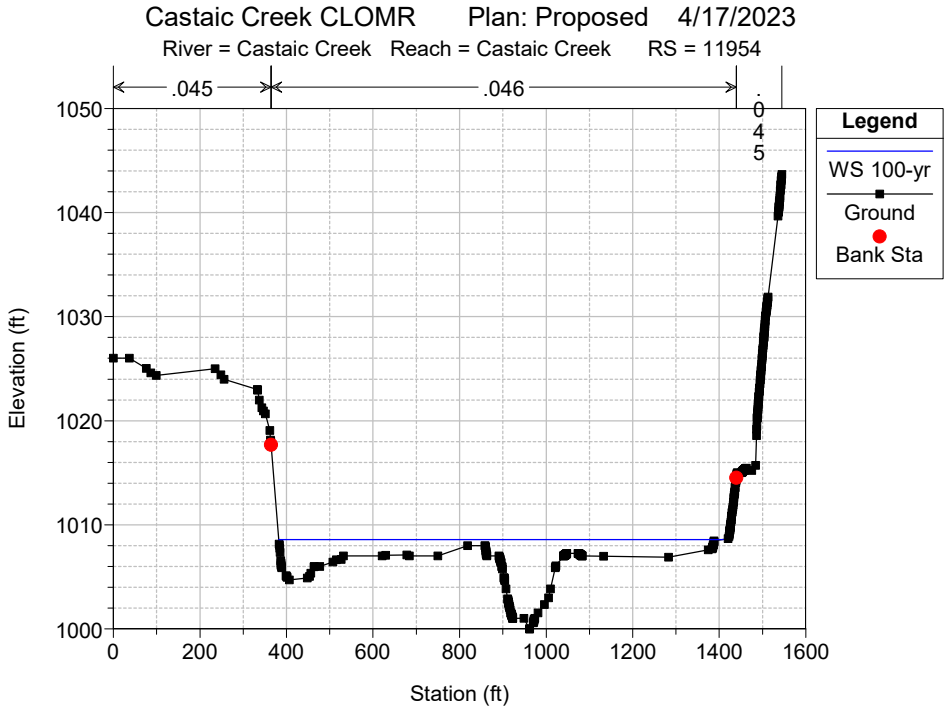
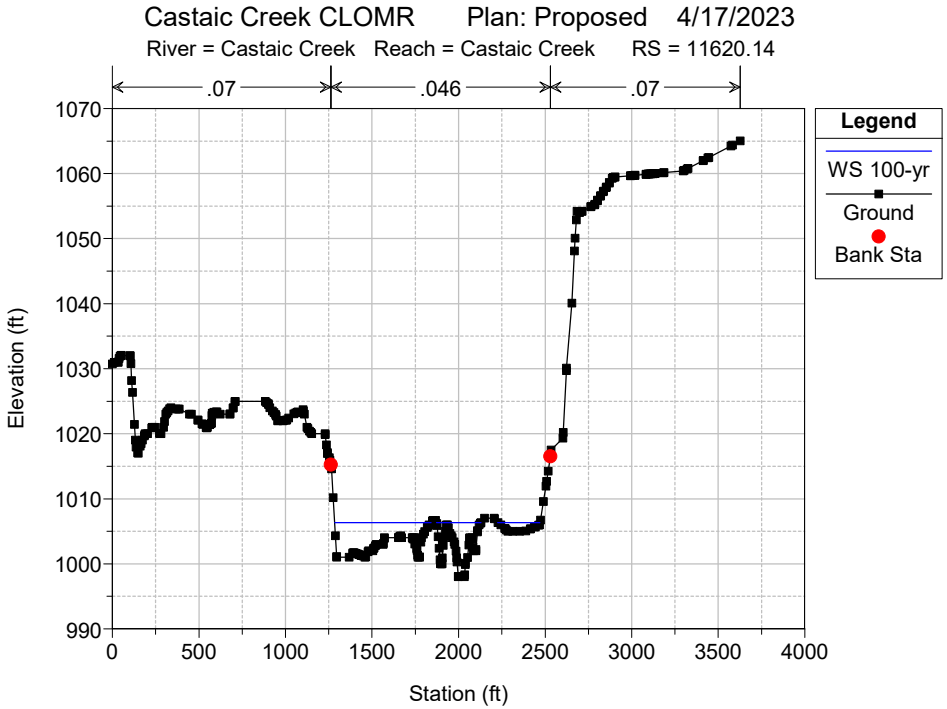
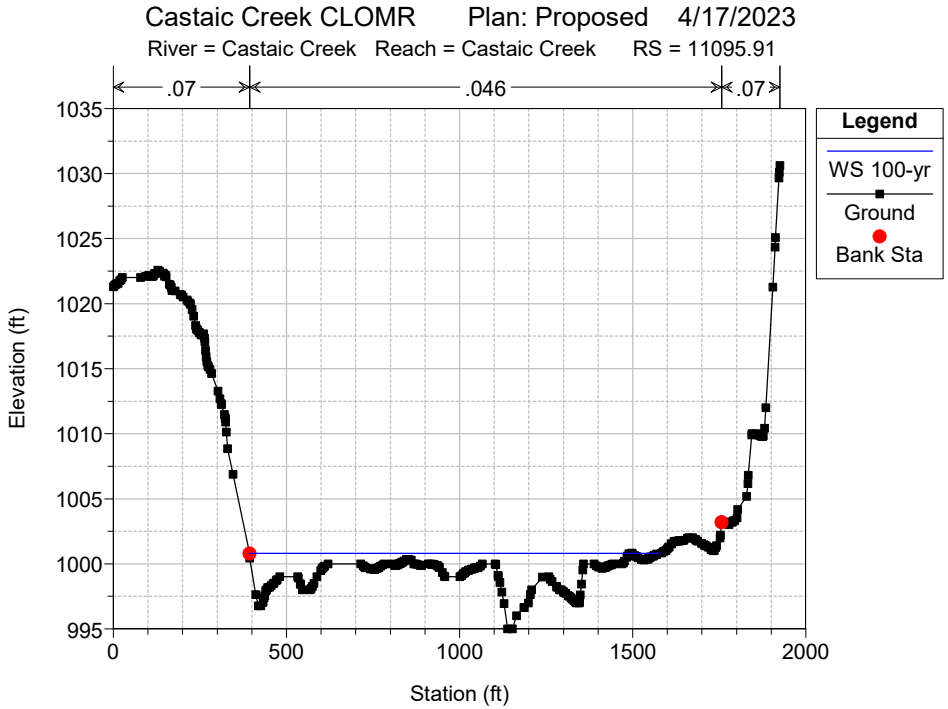
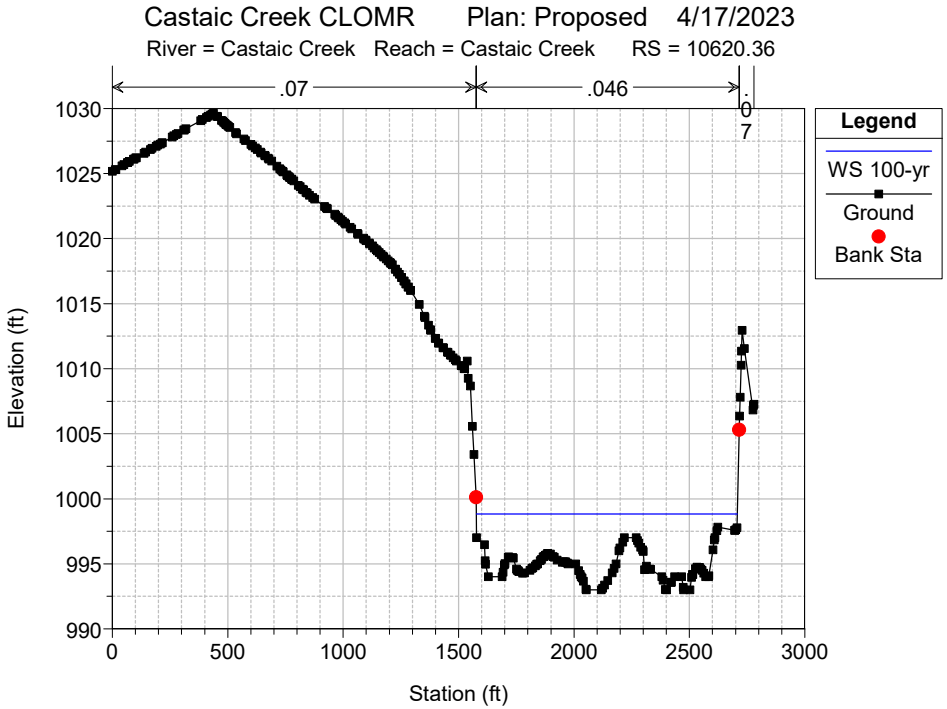
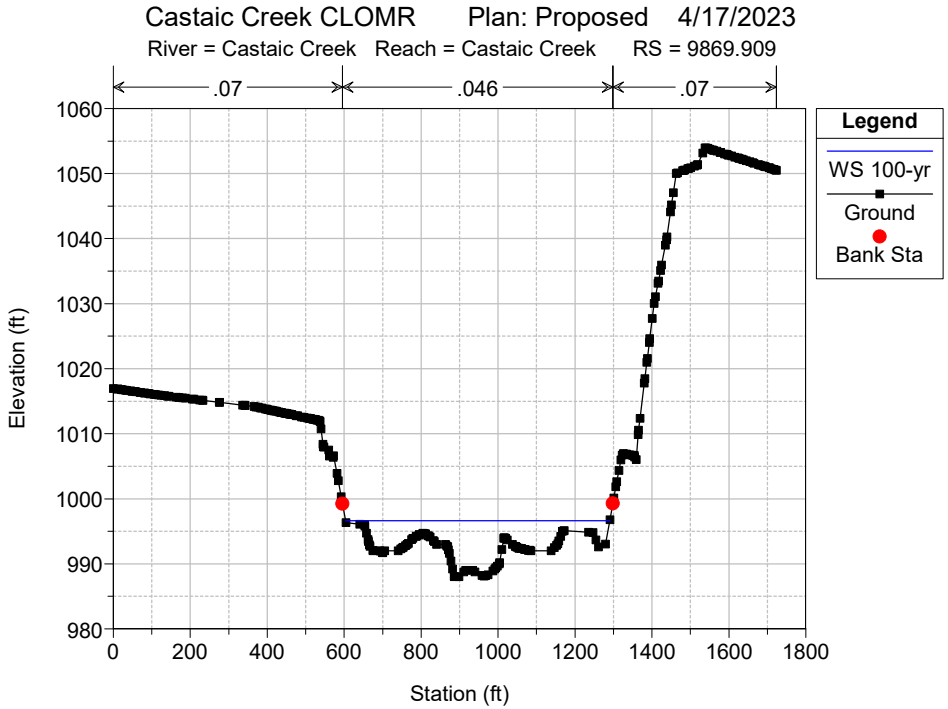
River = Castaic Creek Reach = Castaic Creek RS = 12272
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1040
1035
1030
1025
1020
1015
1010
1005
1000
0
200
400
600
800
1000
1200
1400

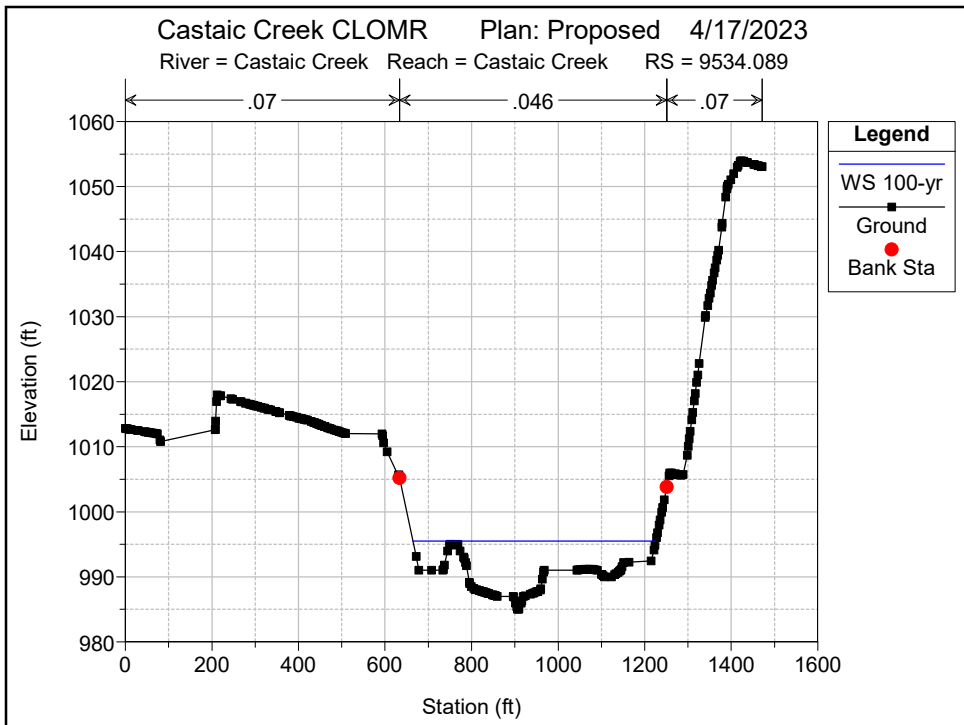

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 11954
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1050
1040
1030
1020
1010
1000
0
200
400
600
800
1000
1200
1400
1600

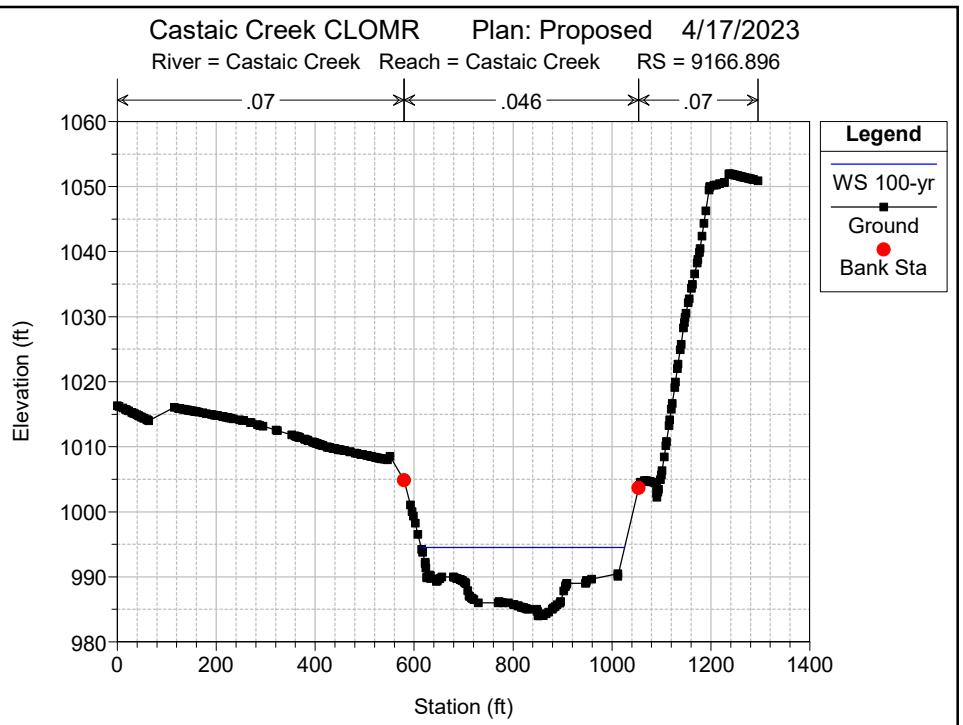

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 11620.14
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

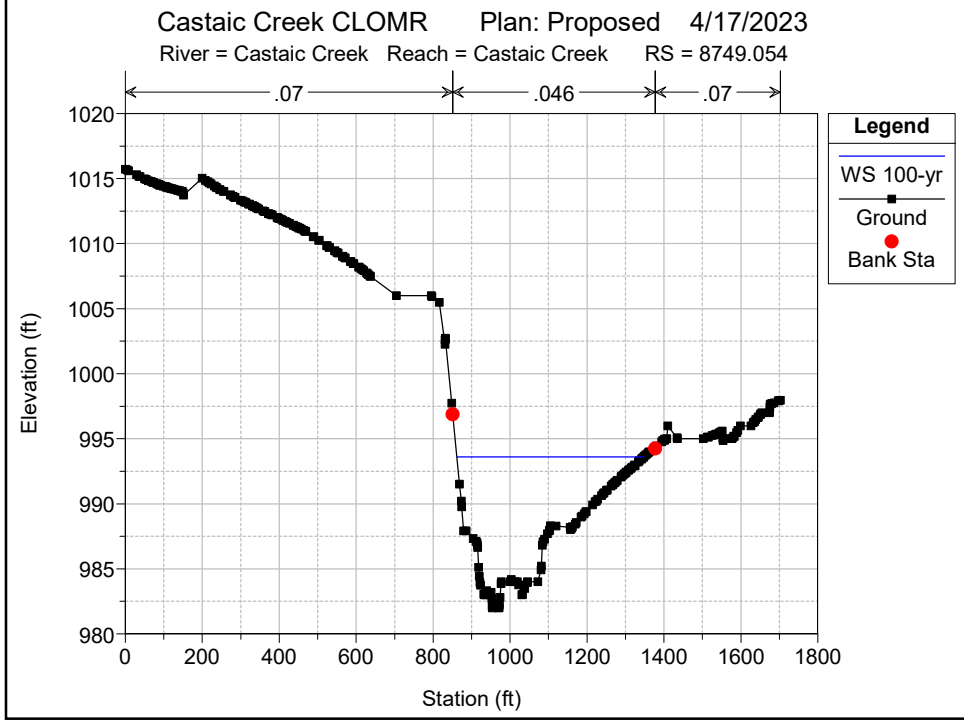

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 11095.91
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

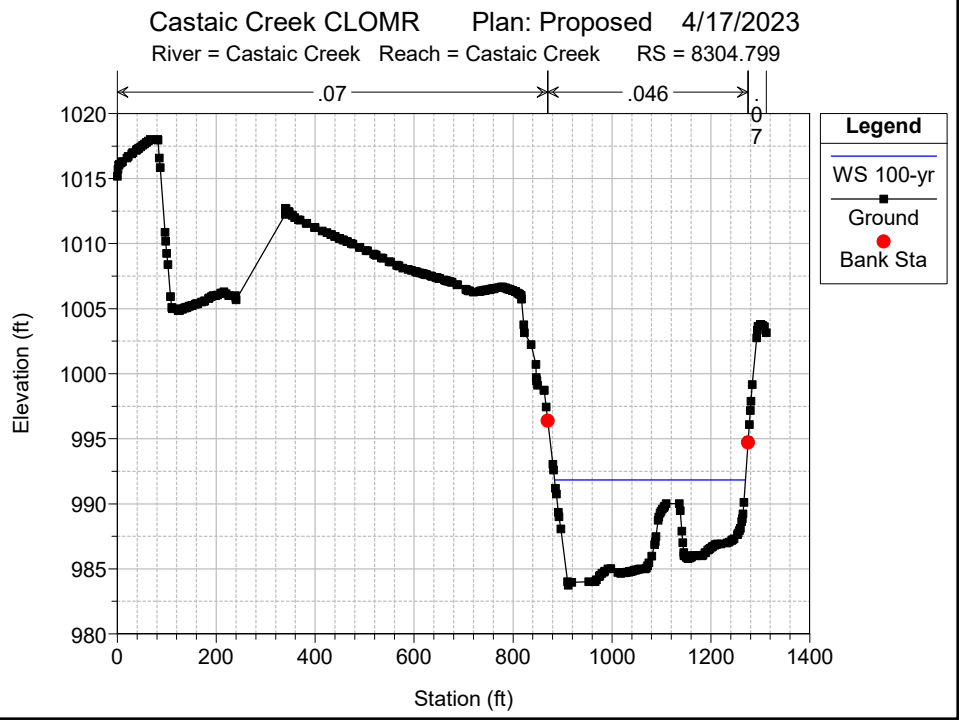

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 10620.36
.07
.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

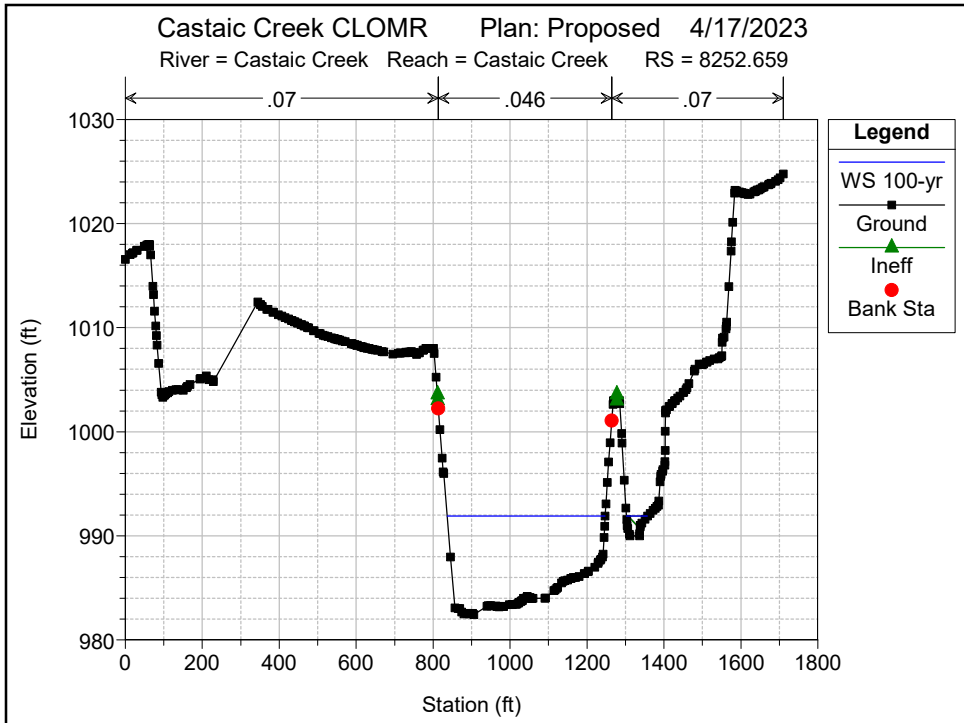

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 9869.909
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

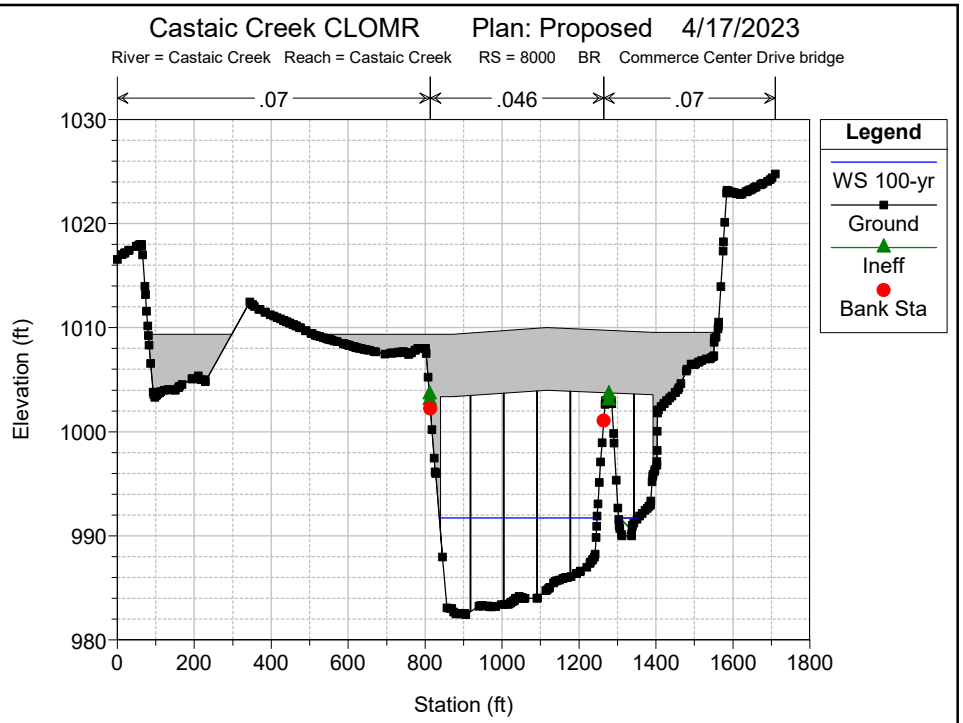

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 9534.089
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

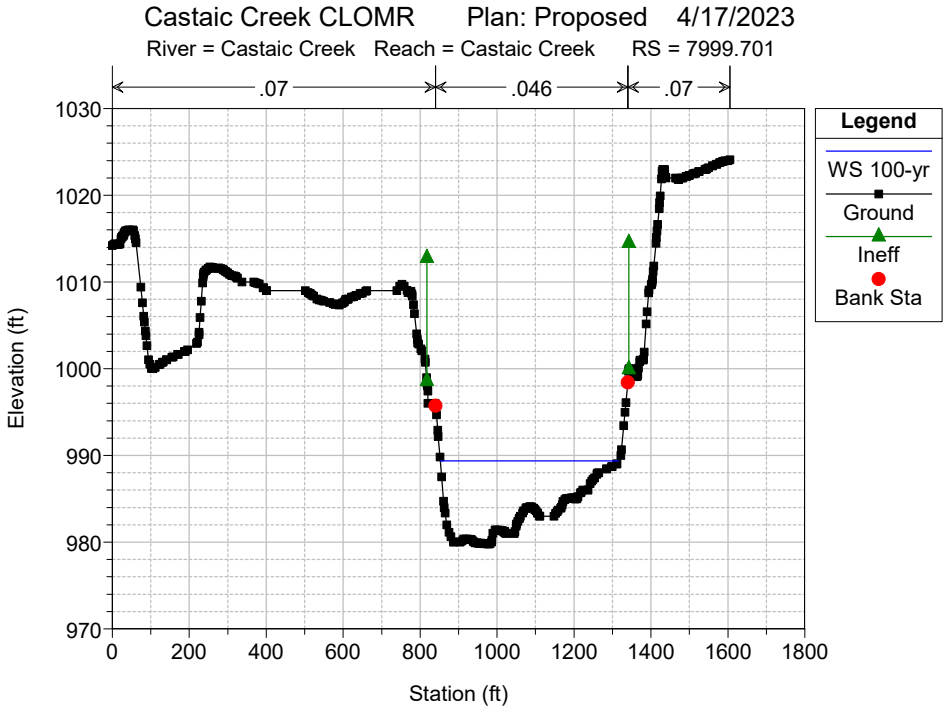

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 9166.896
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

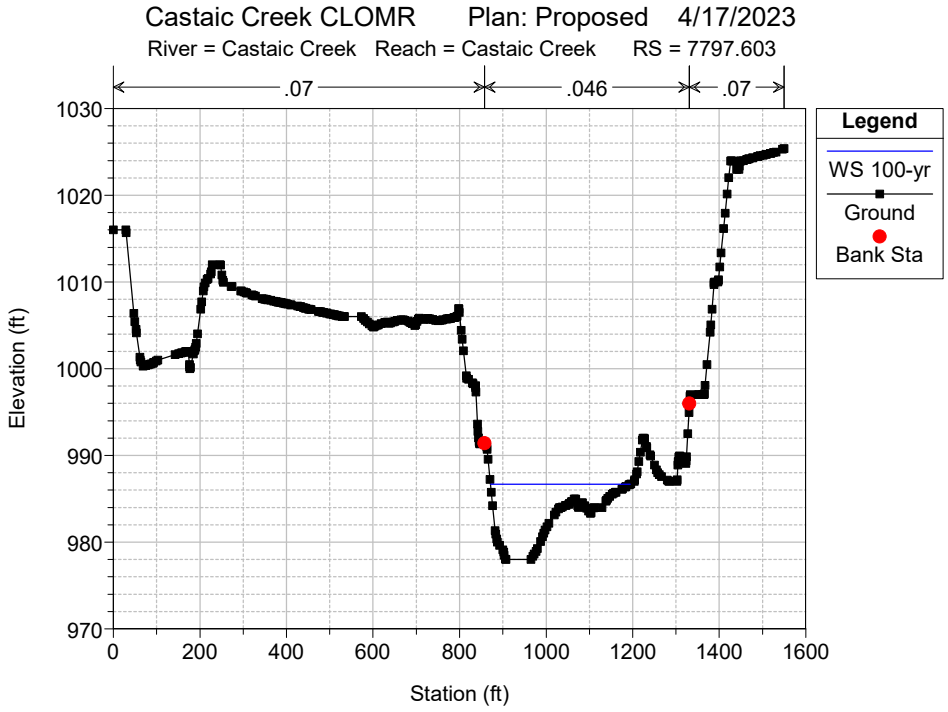

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8749.054
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

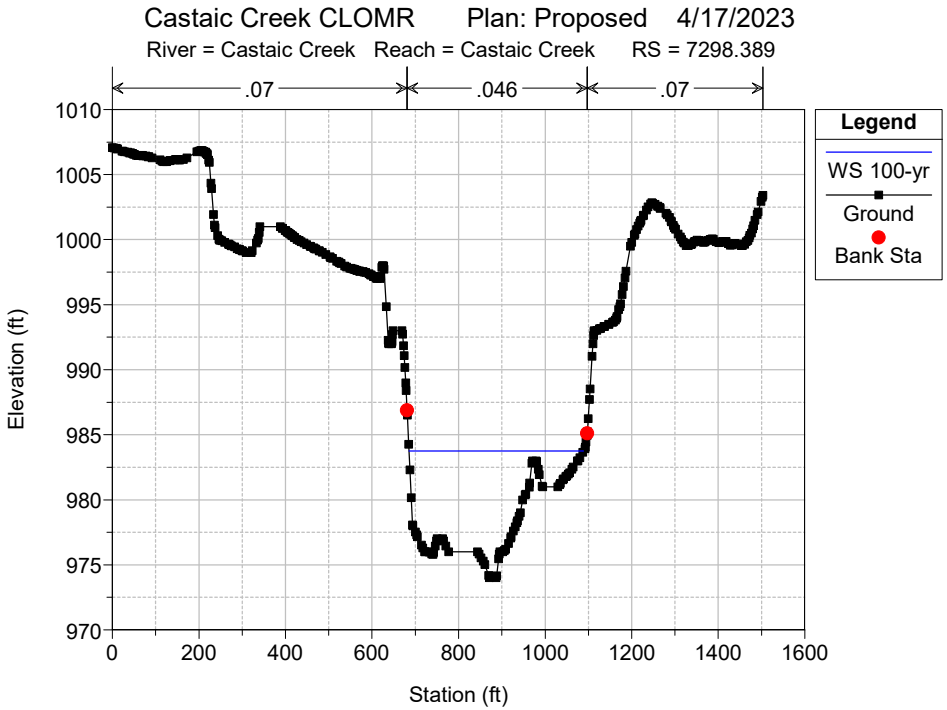

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8304.799
.07
.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

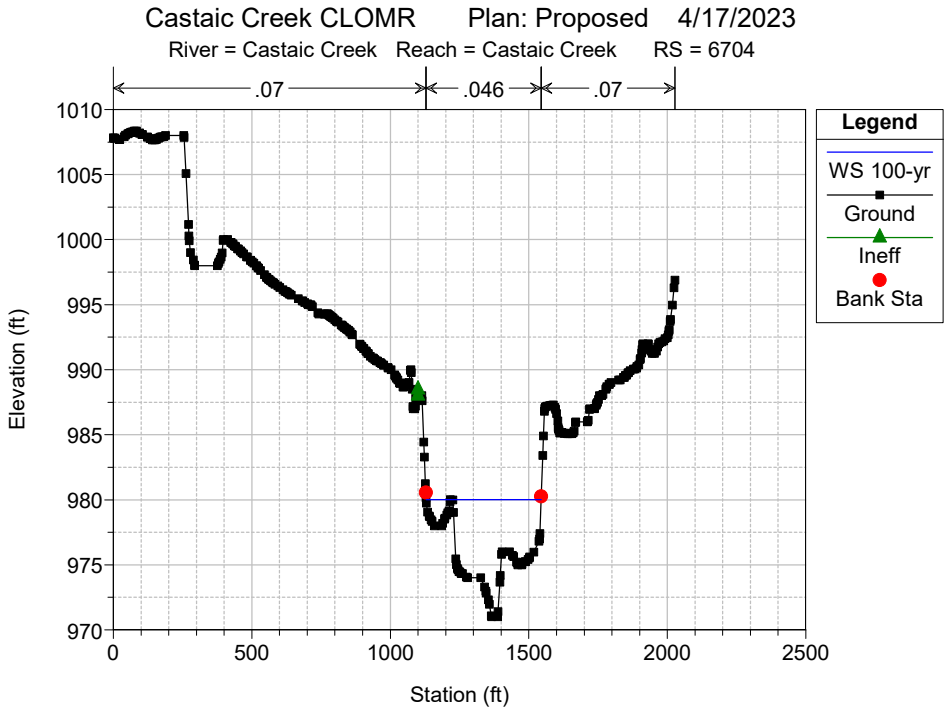

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8252.659
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

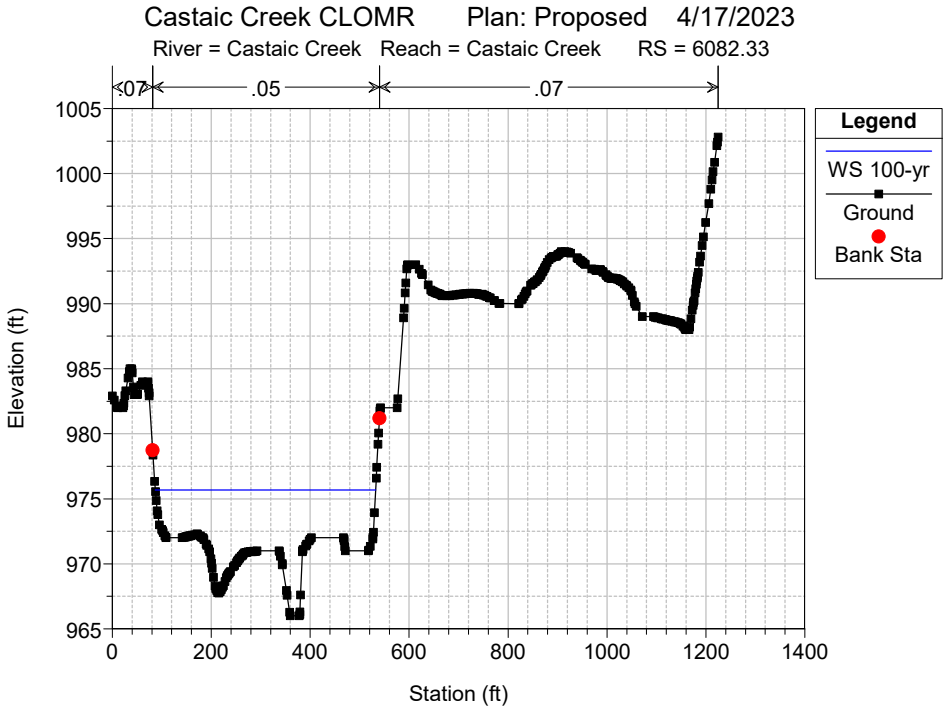

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8000 BR Commerce Center Drive bridge
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

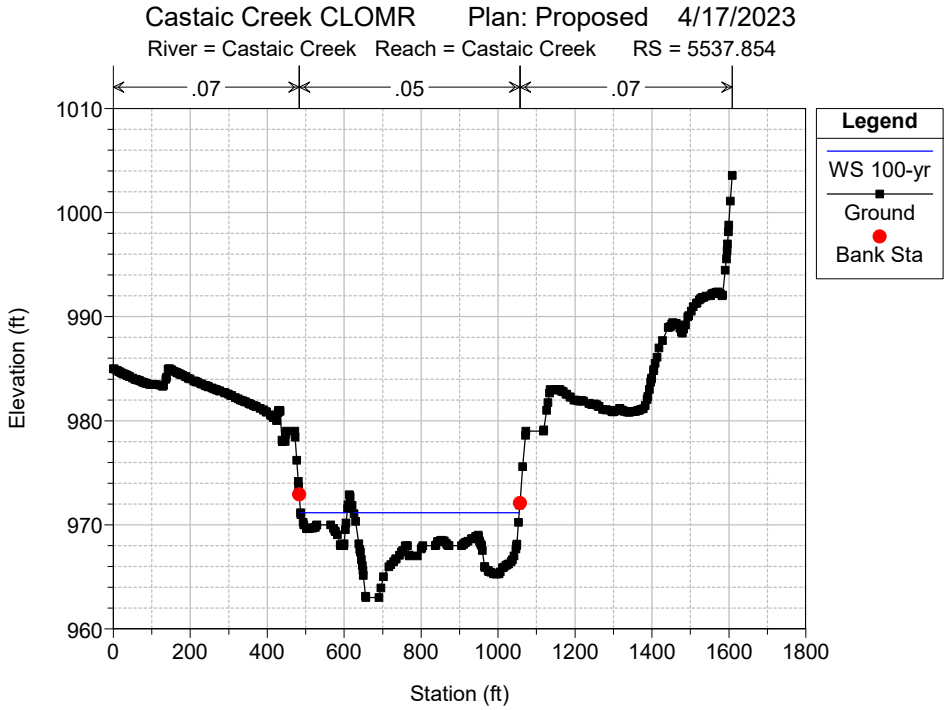

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 7999.701
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

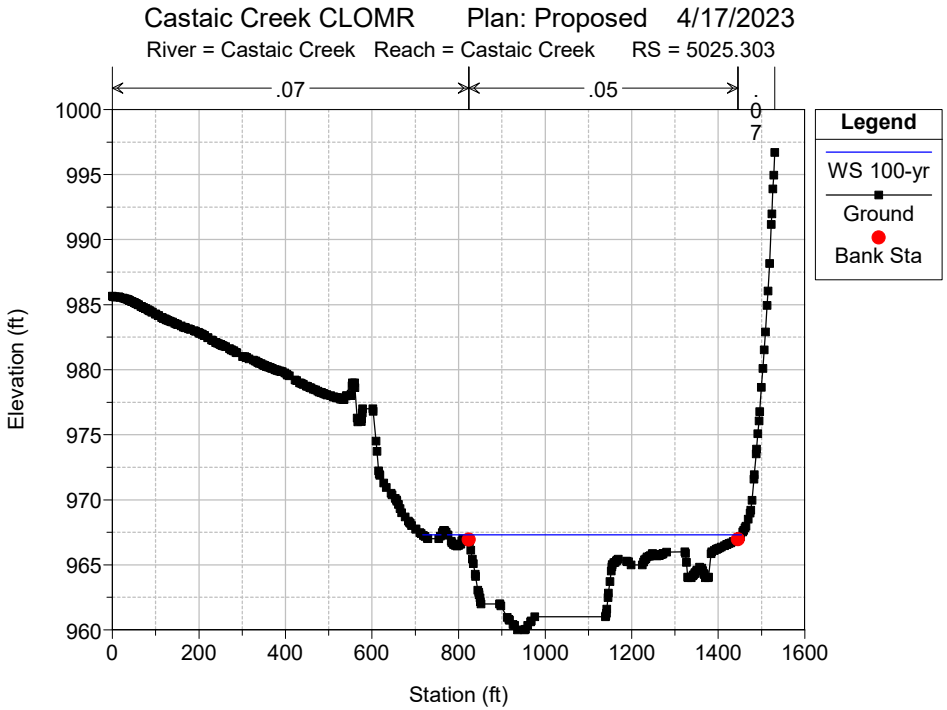

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 7797.603
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

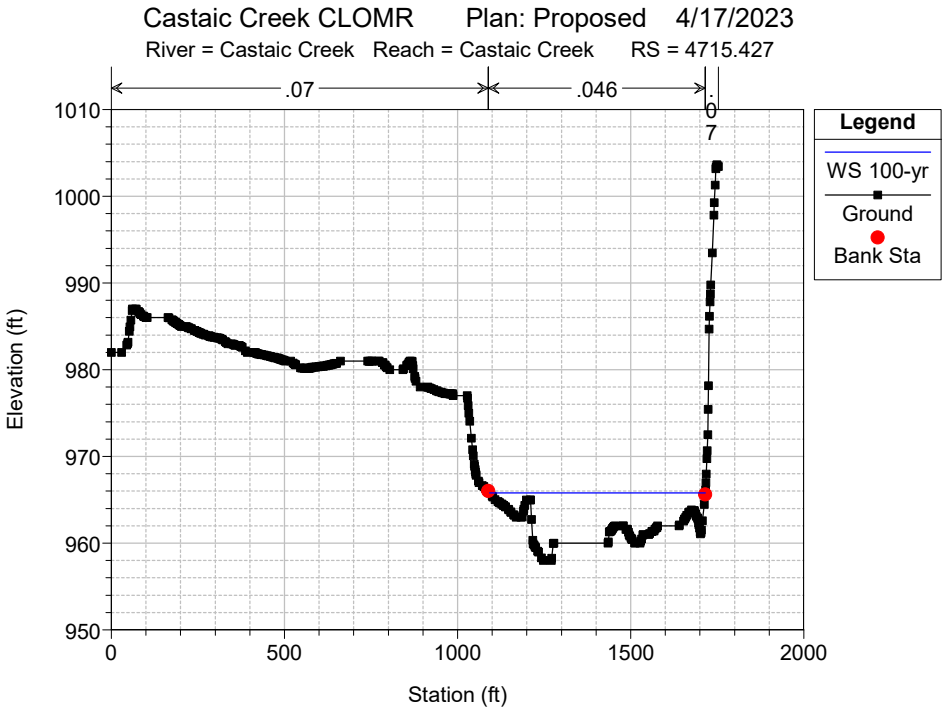

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 7298.389
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

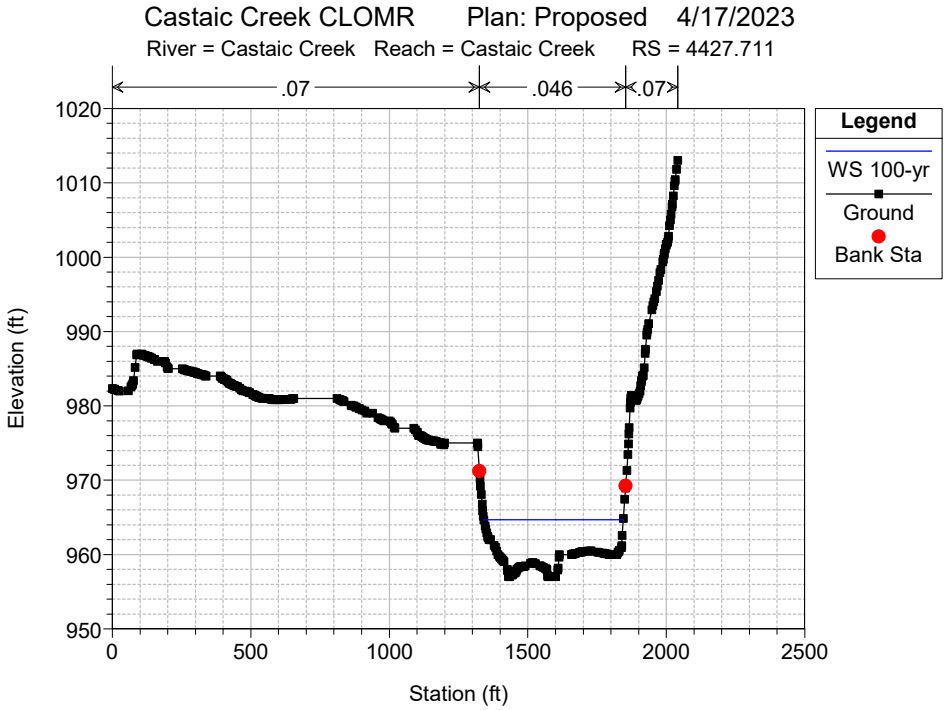

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 6704
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 6082.33
.07
.05
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 5537.854
.07
.05
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 5025.303
.07
.05
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1000
995
990
985
980
975
970
965
960
0
200
400
600
800
1000
1200
1400
1600


Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 4715.427
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1010
1000
990
980
970
960
950
0
500
1000
1500
2000


Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 4427.711
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1020
1010
1000
990
980
970
960
950
0
500
1000
1500
2000
2500

PACE
Advanced Water Engineering

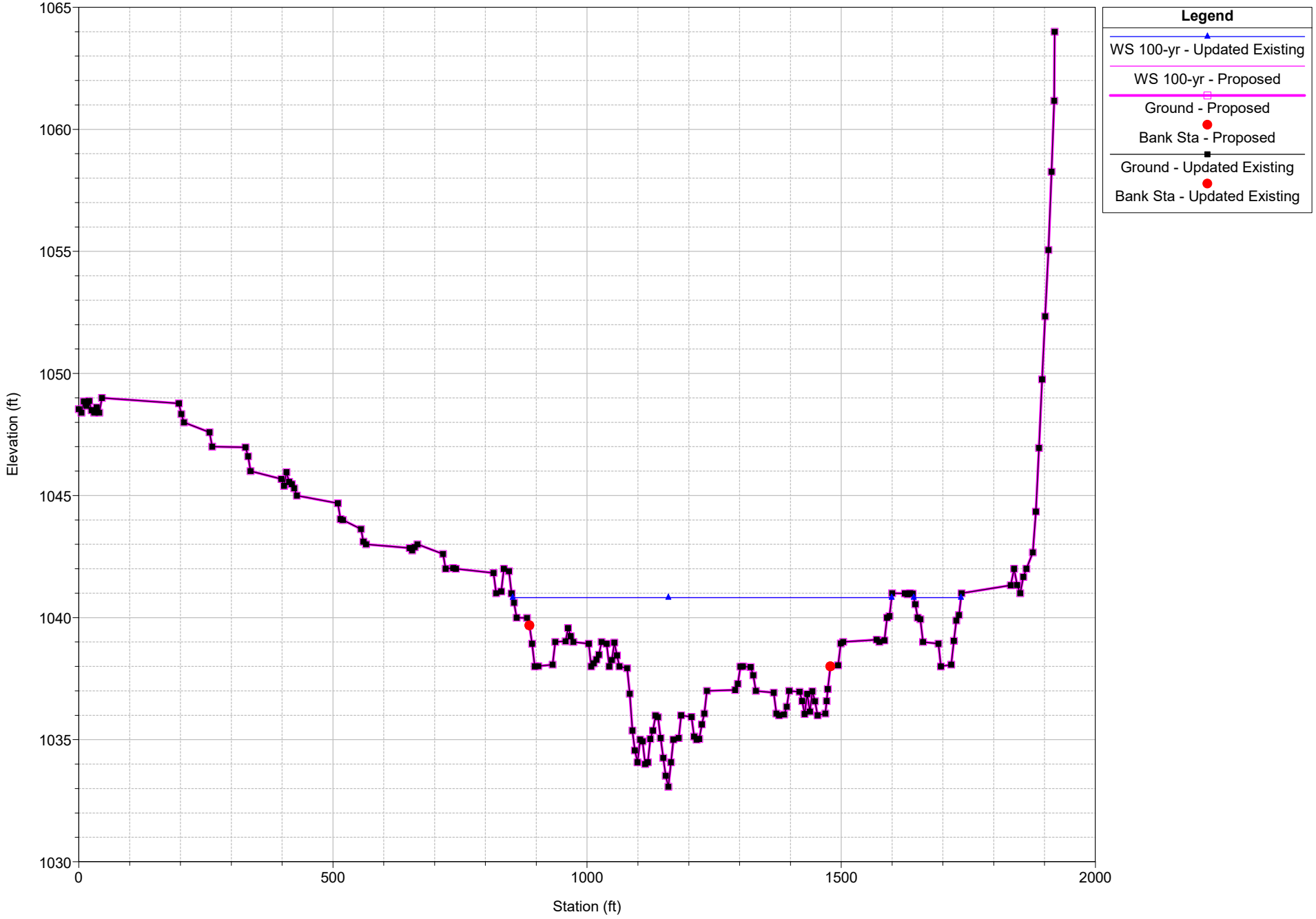
Geometry Comparison: Updated Existing vs. Proposed Condition

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 16960.02

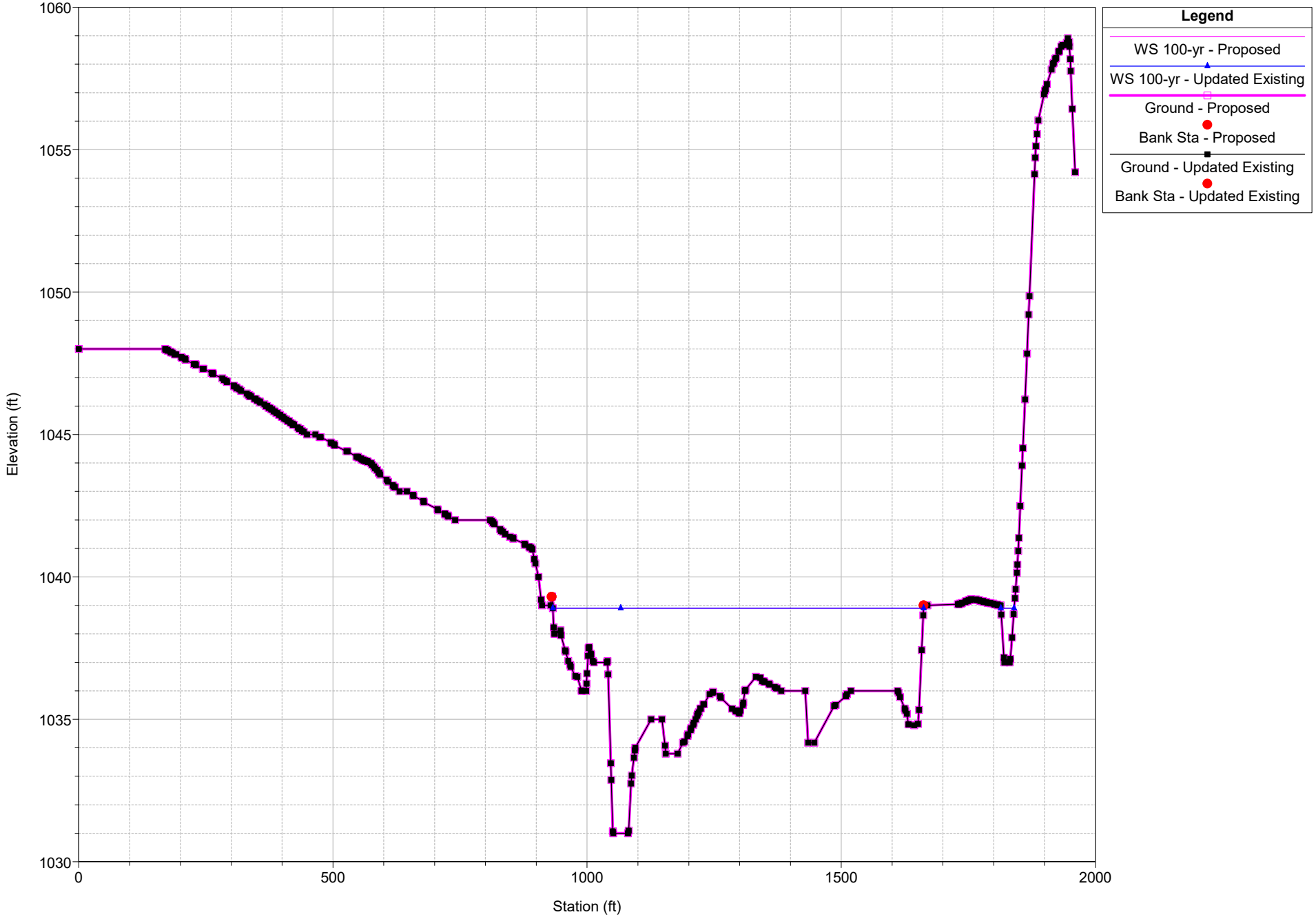
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 16552.09



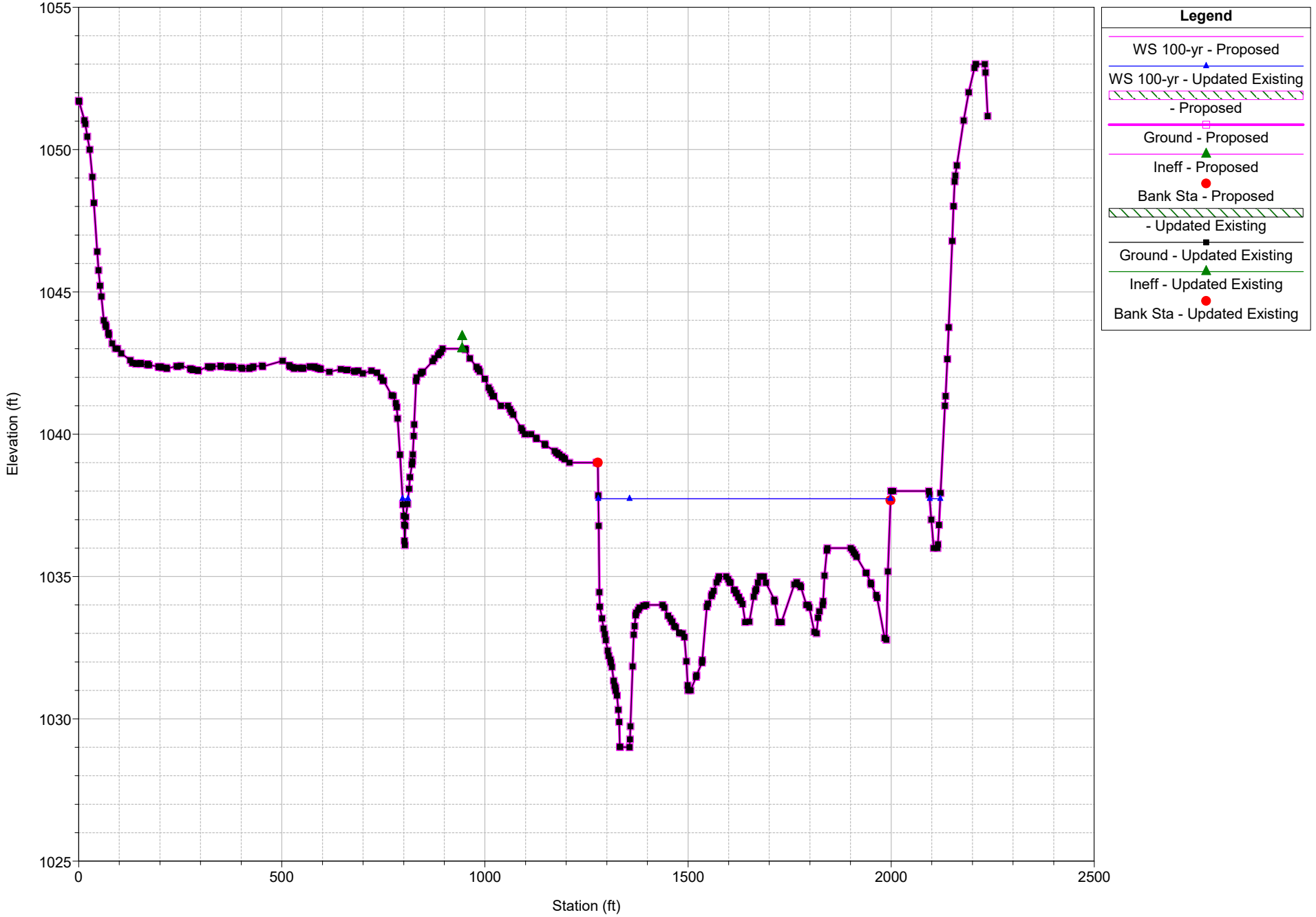
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 16209.5



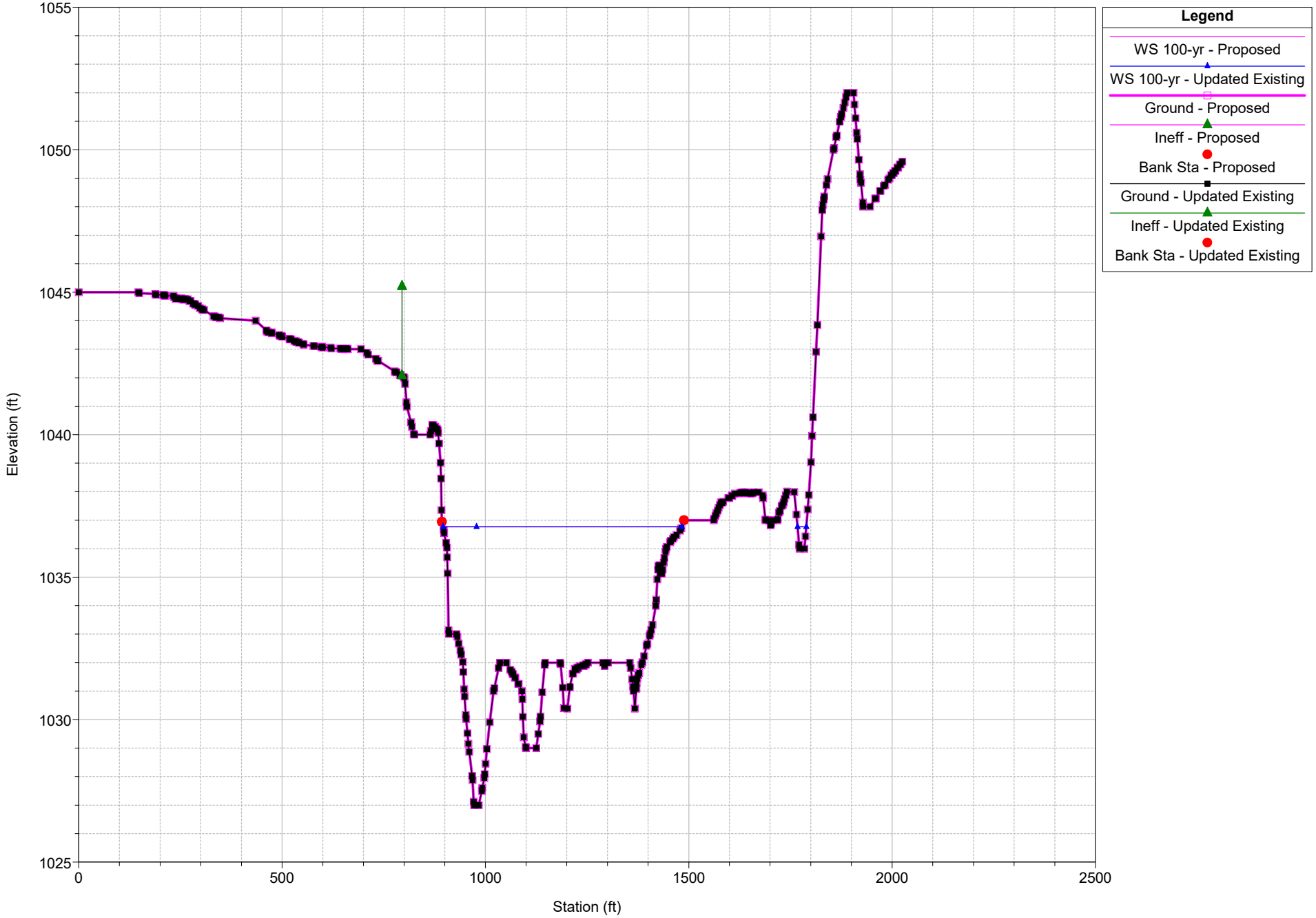
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

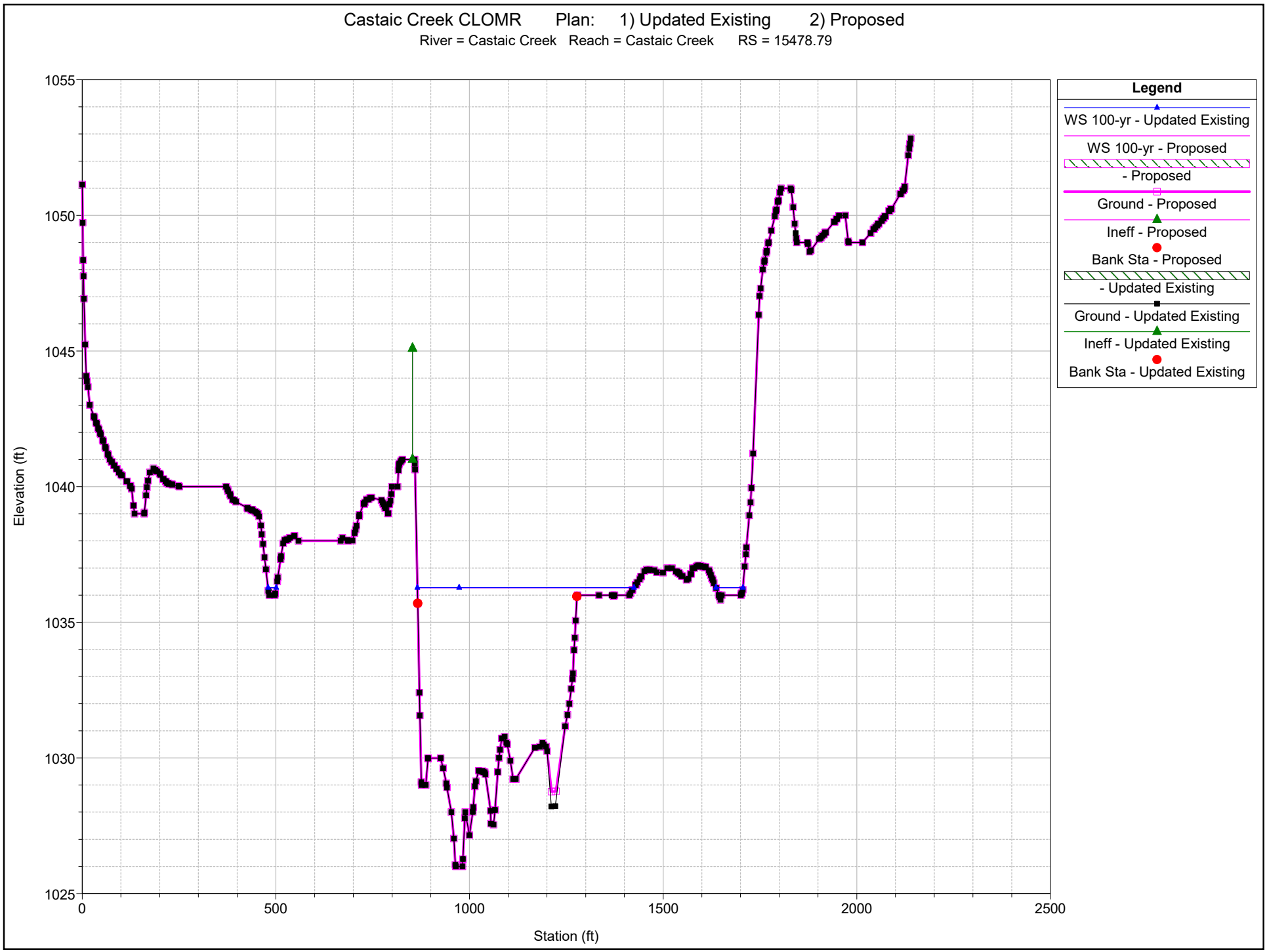
River = Castaic Creek Reach = Castaic Creek RS = 15958.96



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

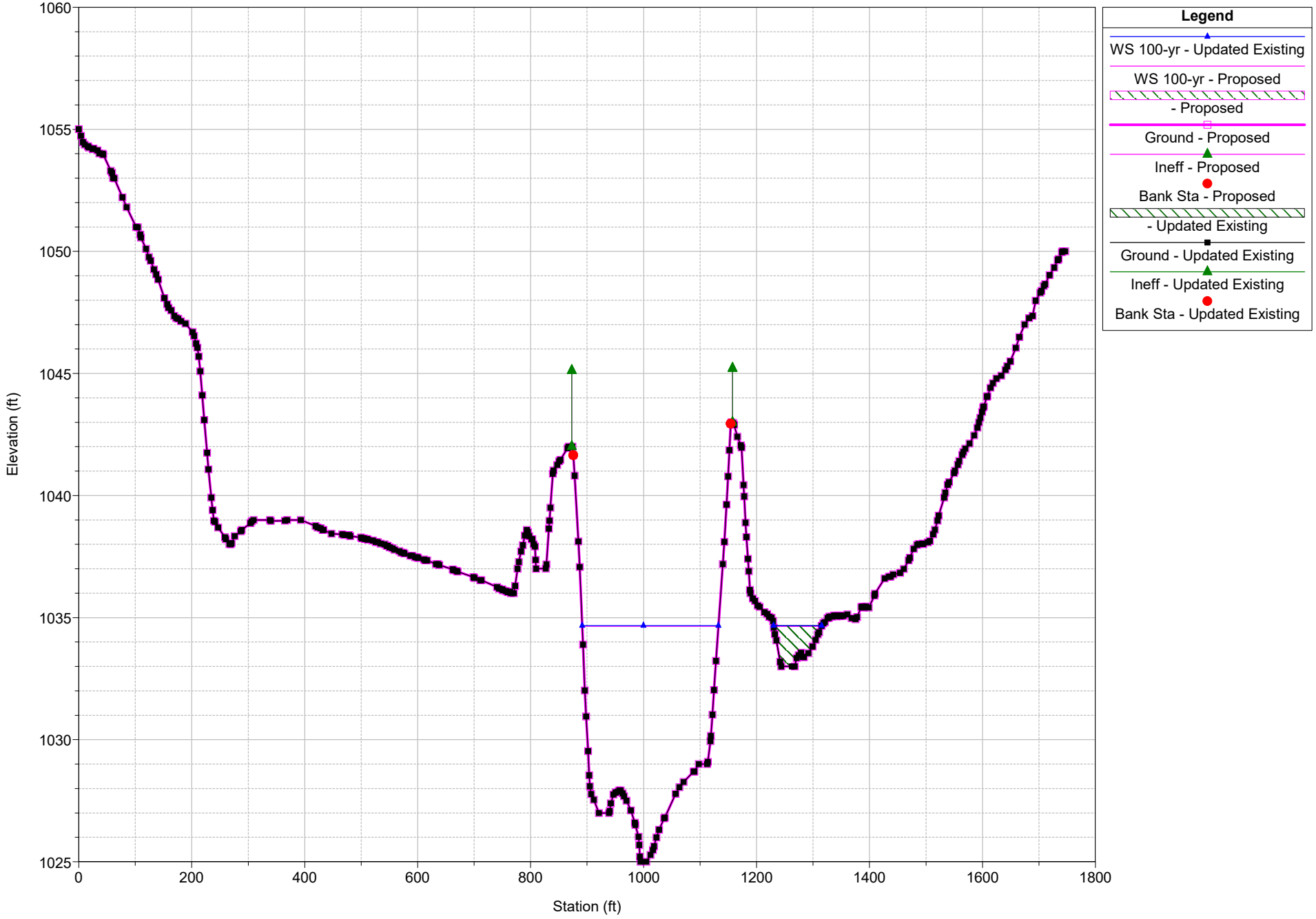
River = Castaic Creek Reach = Castaic Creek RS = 15669.62




Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 15478.79
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- Updated Existing
Ground - Updated Existing
Ineff - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
1055
1050
1045
1040
1035
1030
1025
0
500
1000
1500
2000
2500
Station (ft)

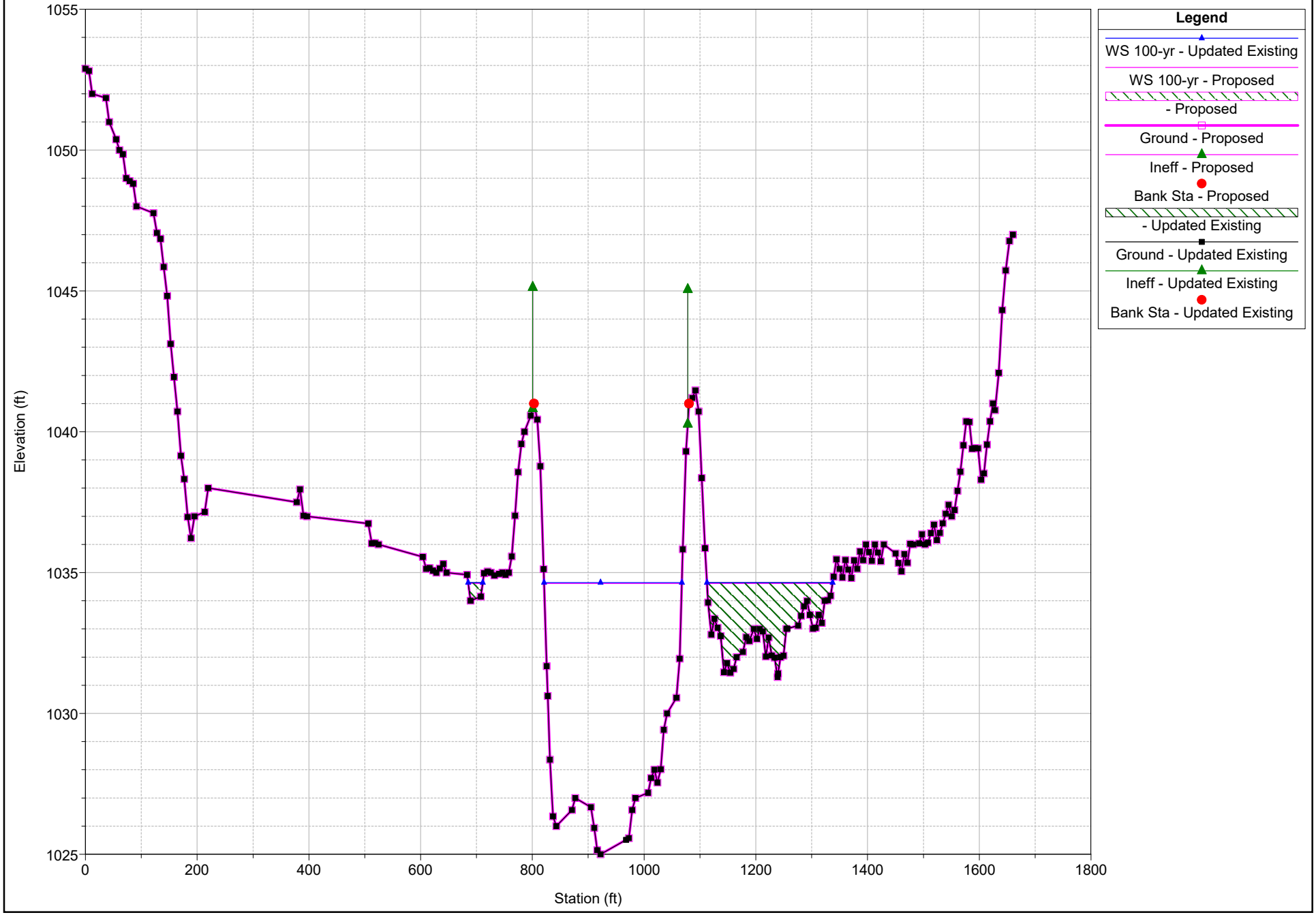
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 15245.39



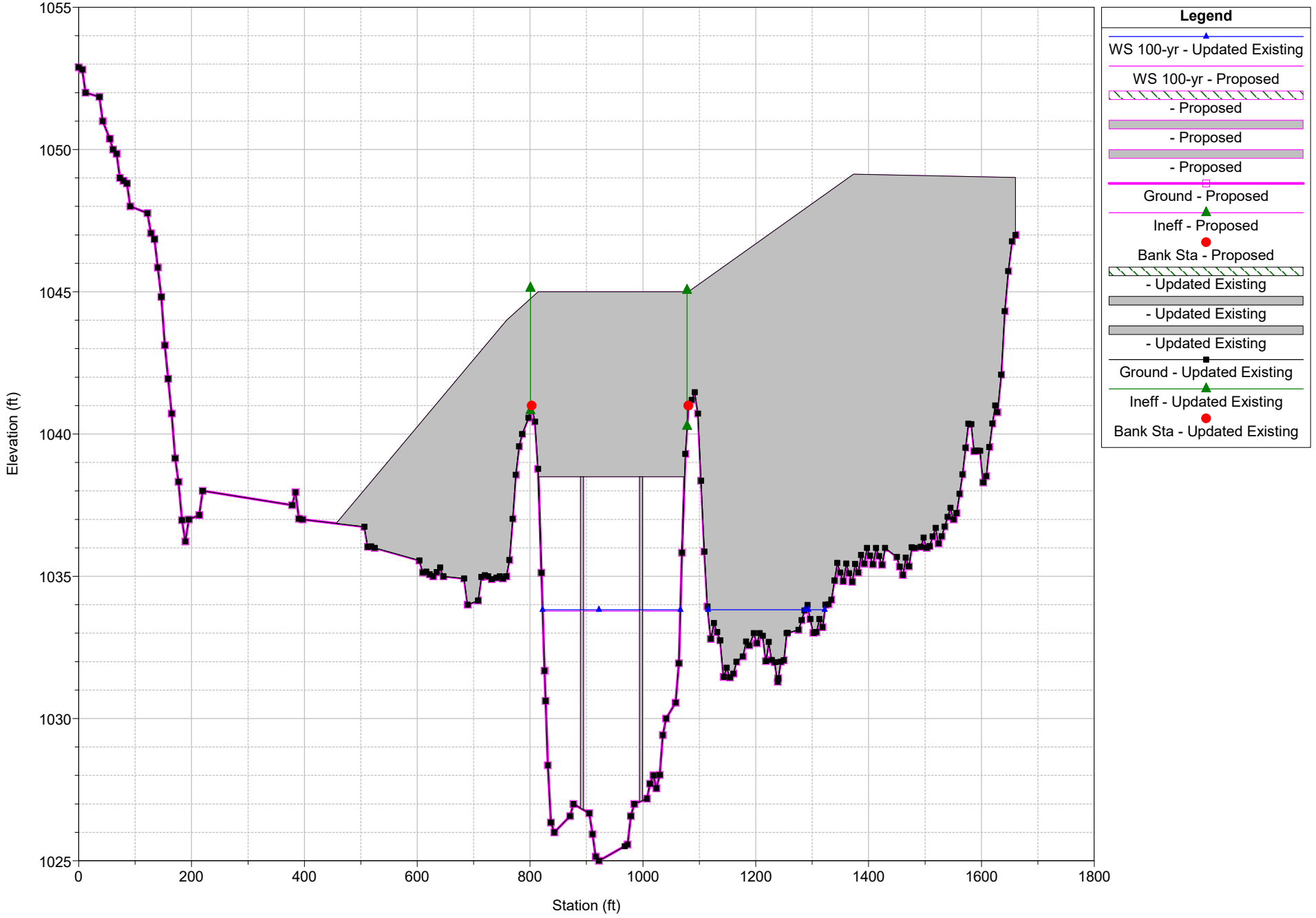
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 15216.27



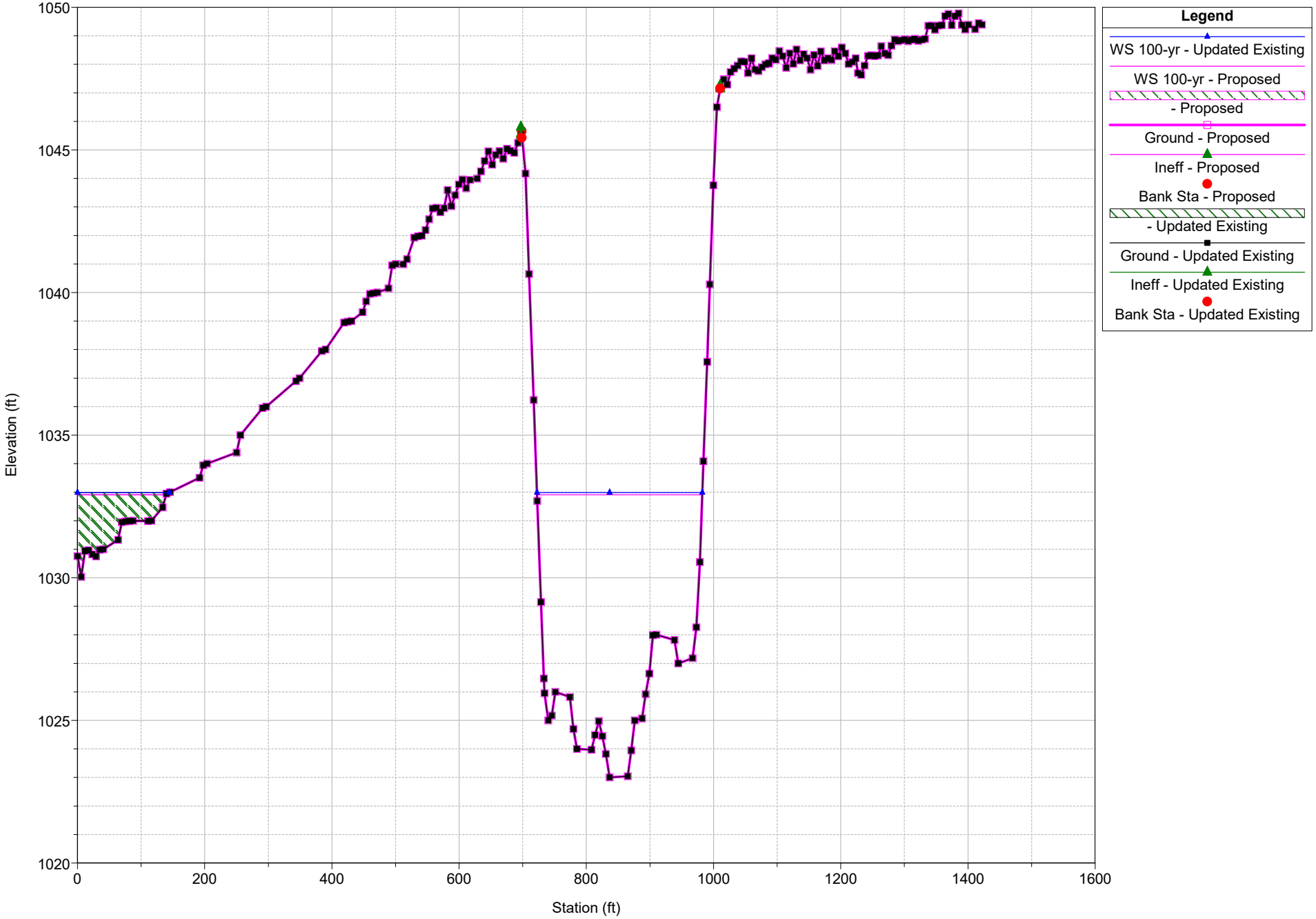
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

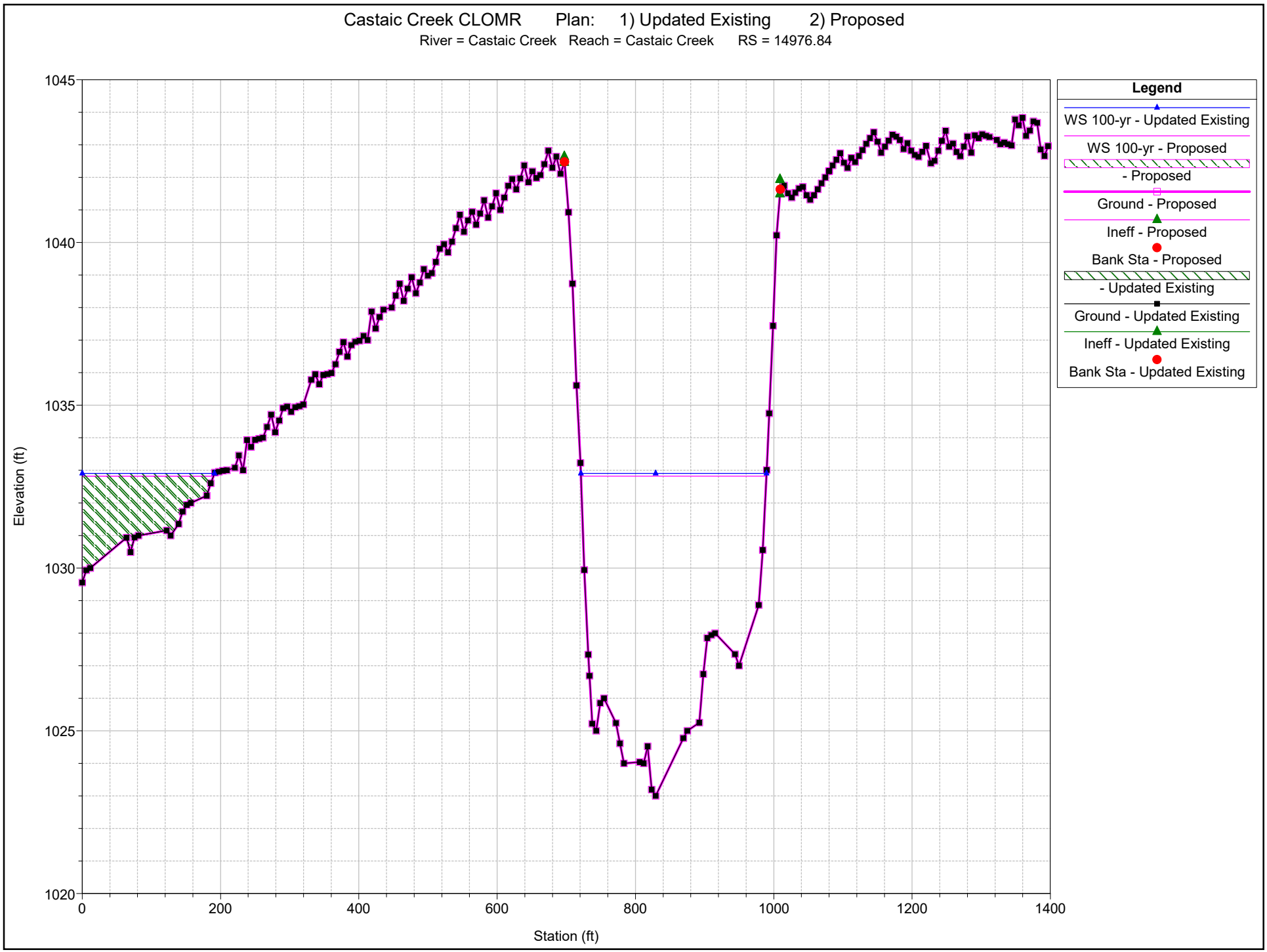
River = Castaic Creek Reach = Castaic Creek RS = 15100 BR I-5 Bridge



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

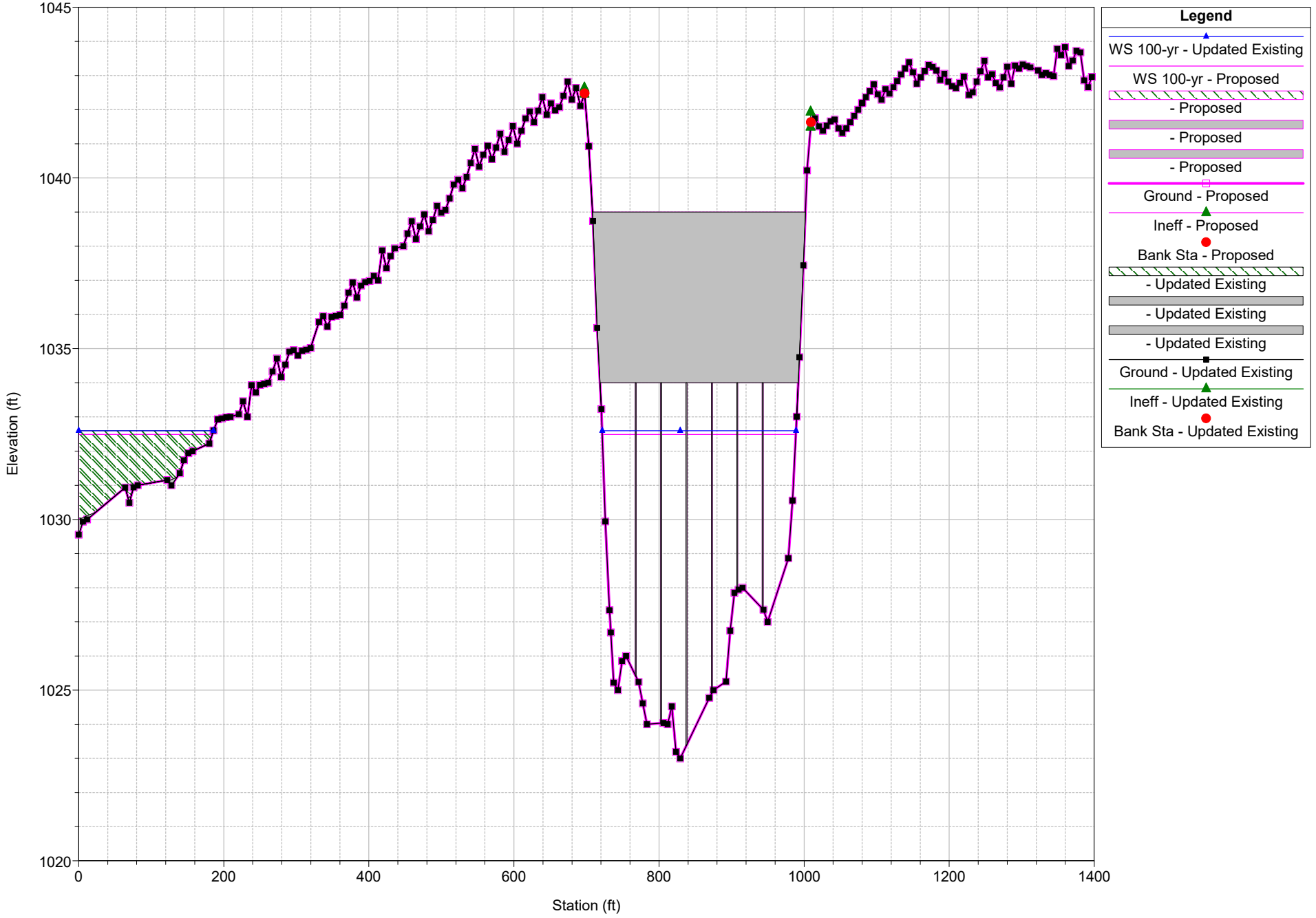
River = Castaic Creek Reach = Castaic Creek RS = 14991.85




Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 14976.84
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- Updated Existing
Ground - Updated Existing
Ineff - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
1045
1040
1035
1030
1025
1020
0
200
400
600
800
1000
1200
1400
Station (ft)

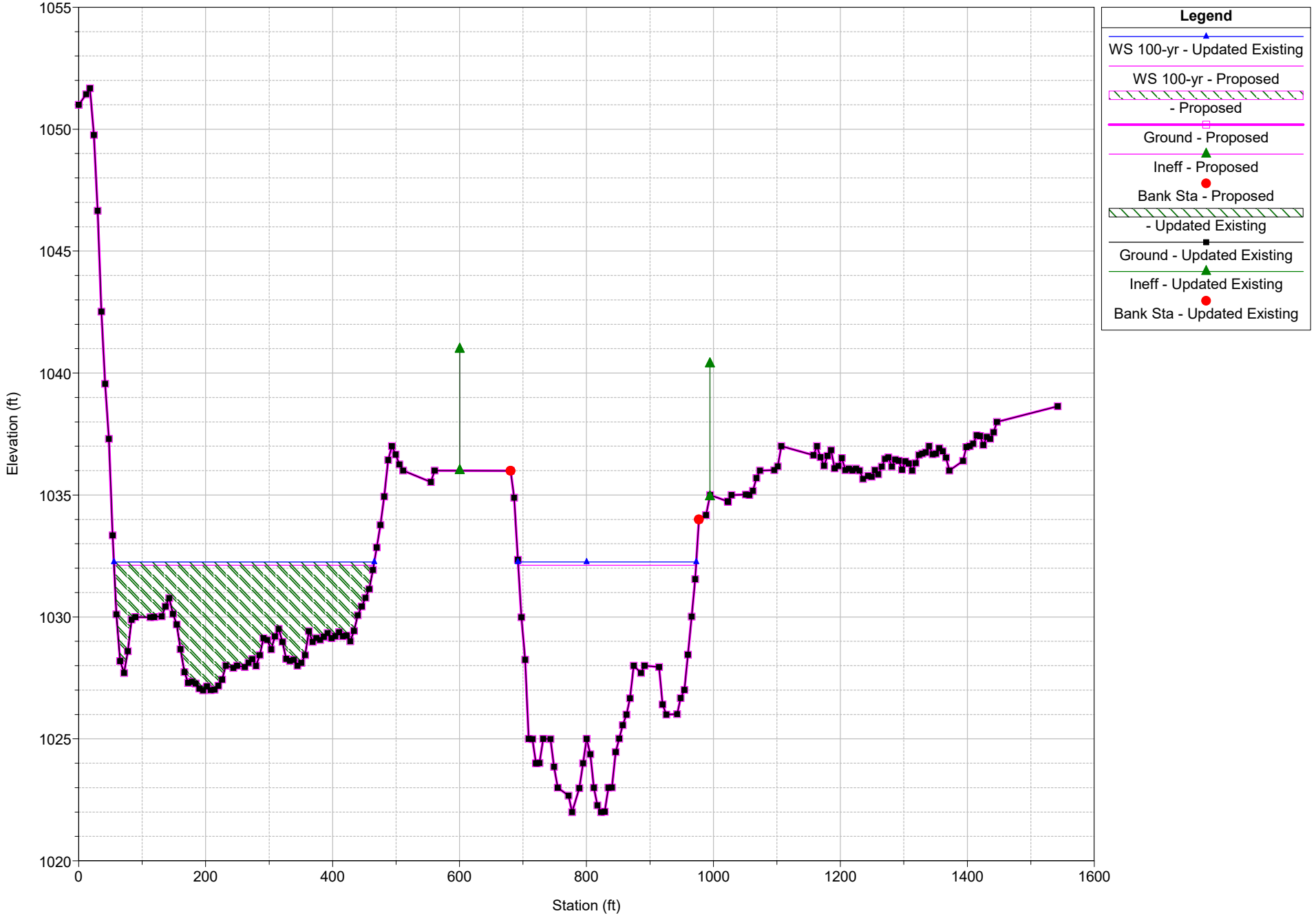
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 14900 BR Old Road Bridge



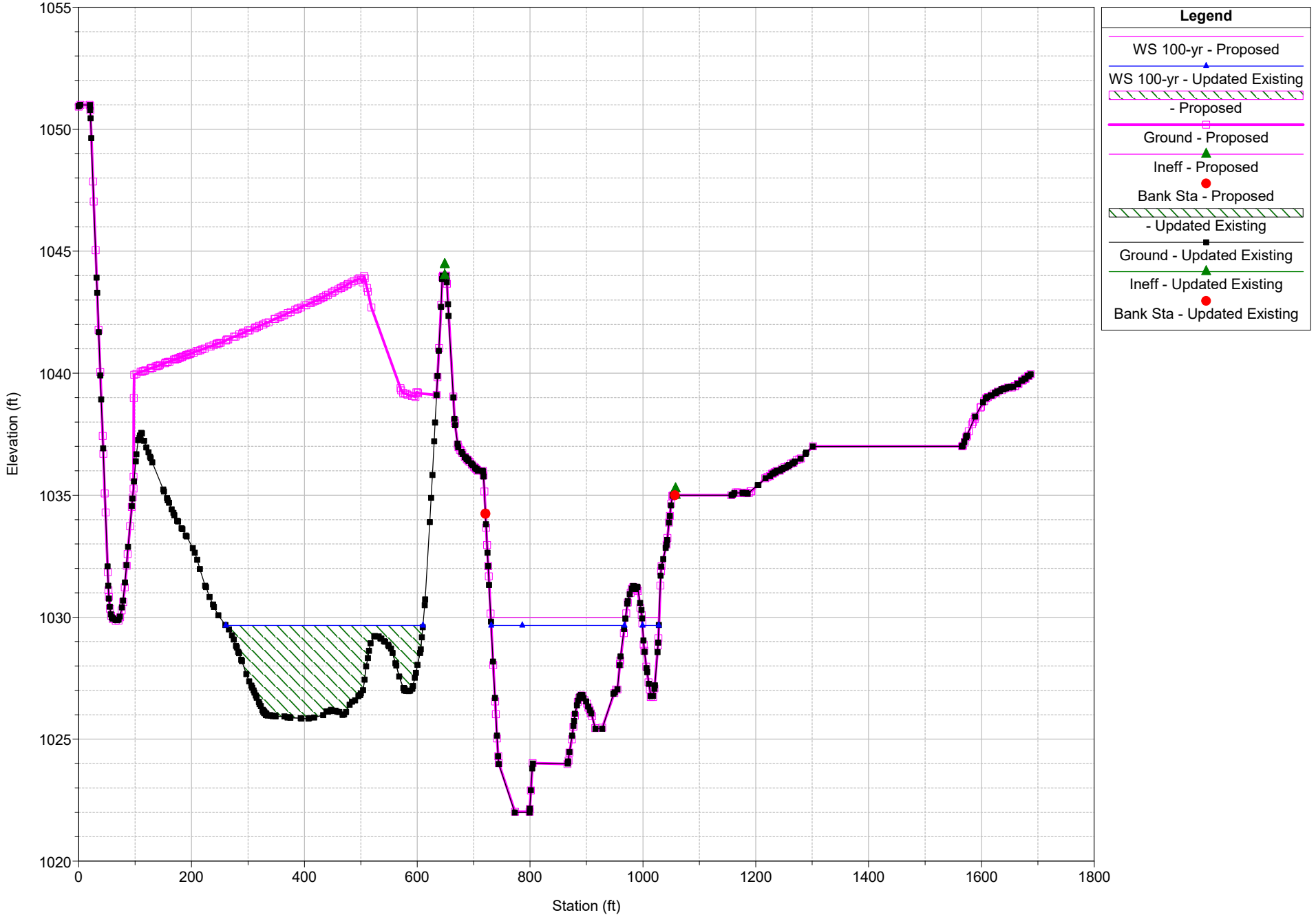
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 14892.2



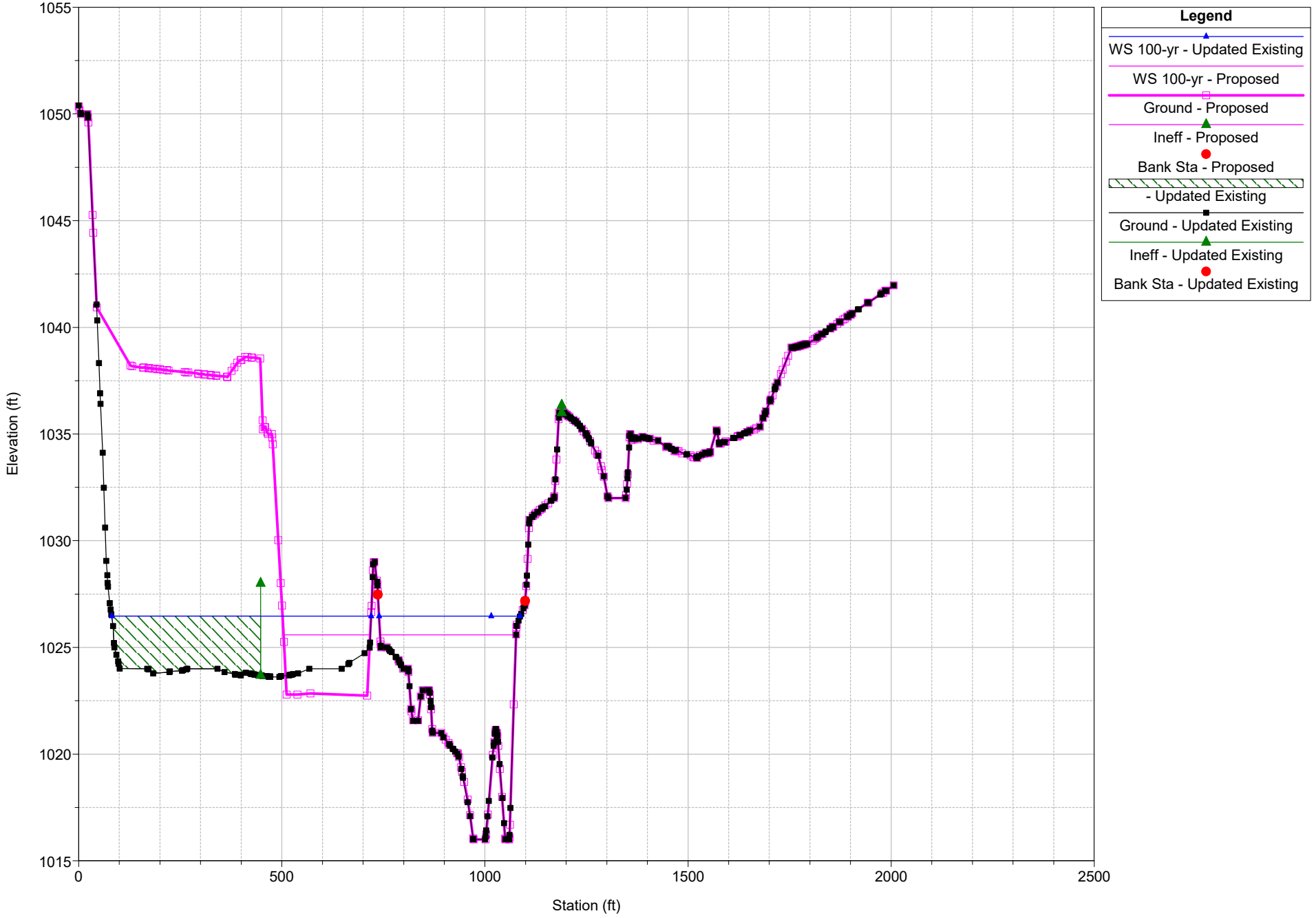
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

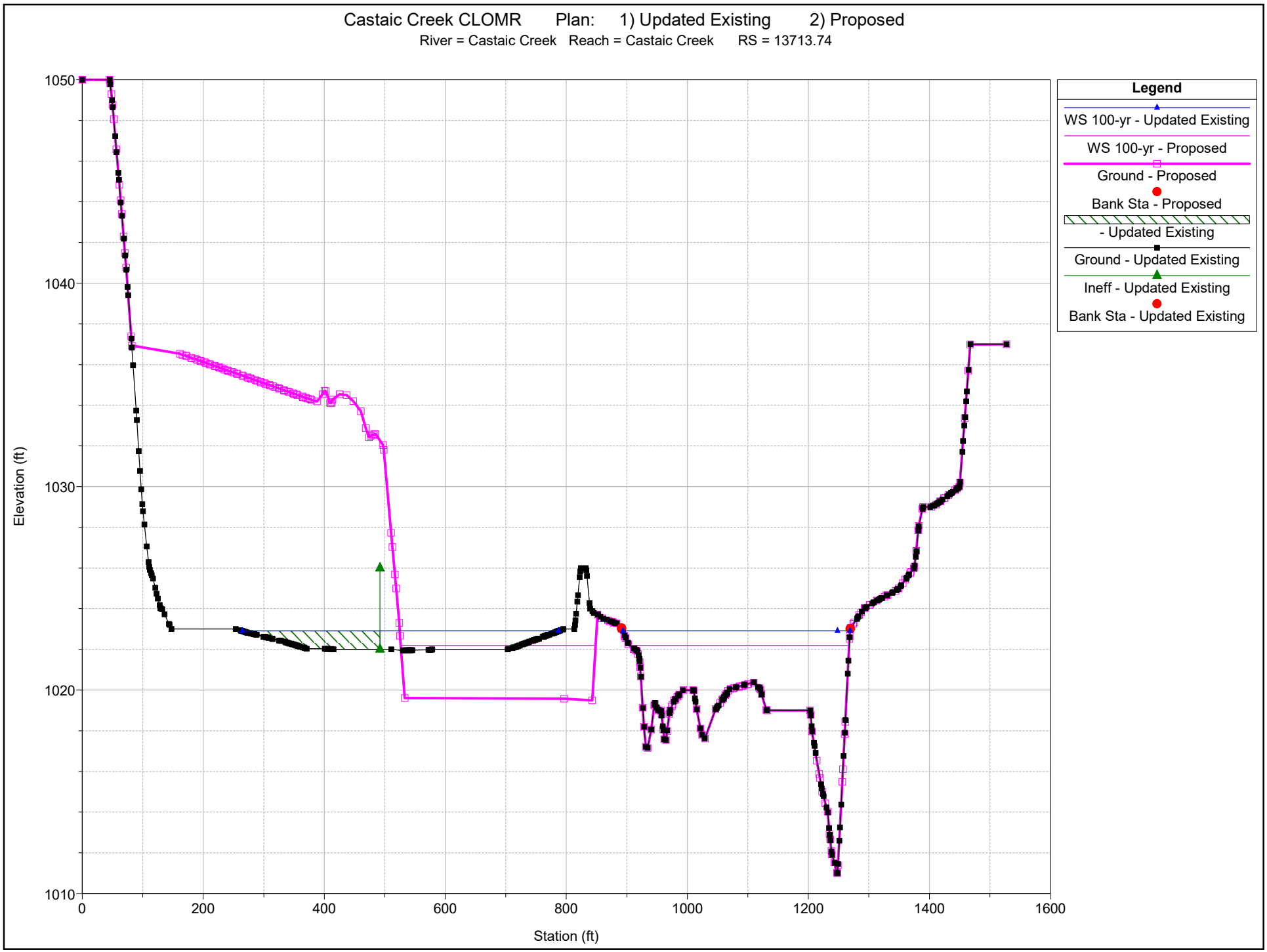
River = Castaic Creek Reach = Castaic Creek RS = 14787.25



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

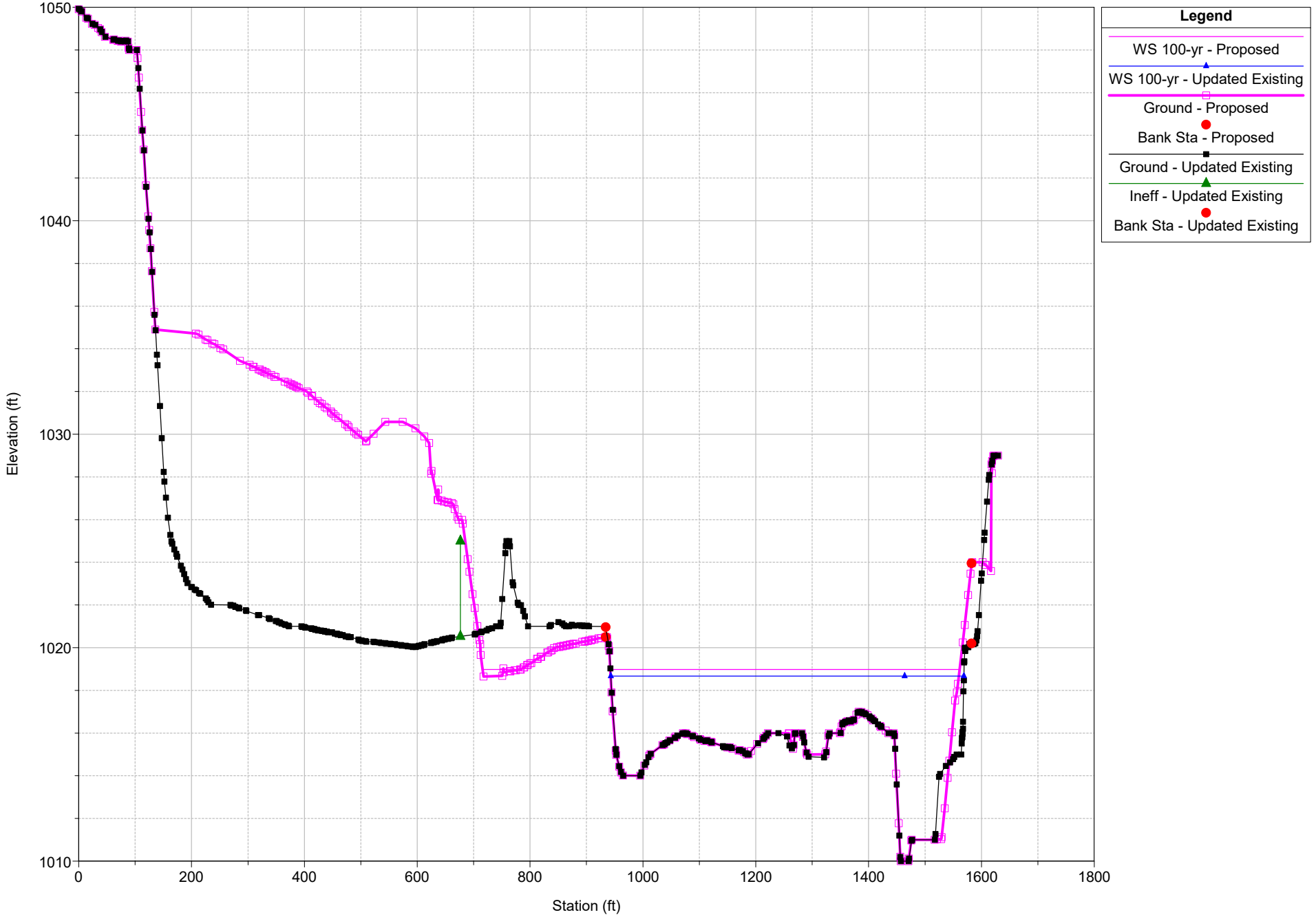
River = Castaic Creek Reach = Castaic Creek RS = 14180.6




Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 13713.74
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
Ground - Proposed
Bank Sta - Proposed
- Updated Existing
Ground - Updated Existing
Ineff - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
1050
1040
1030
1020
1010
0
200
400
600
800
1000
1200
1400
1600
Station (ft)

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 13176.47



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

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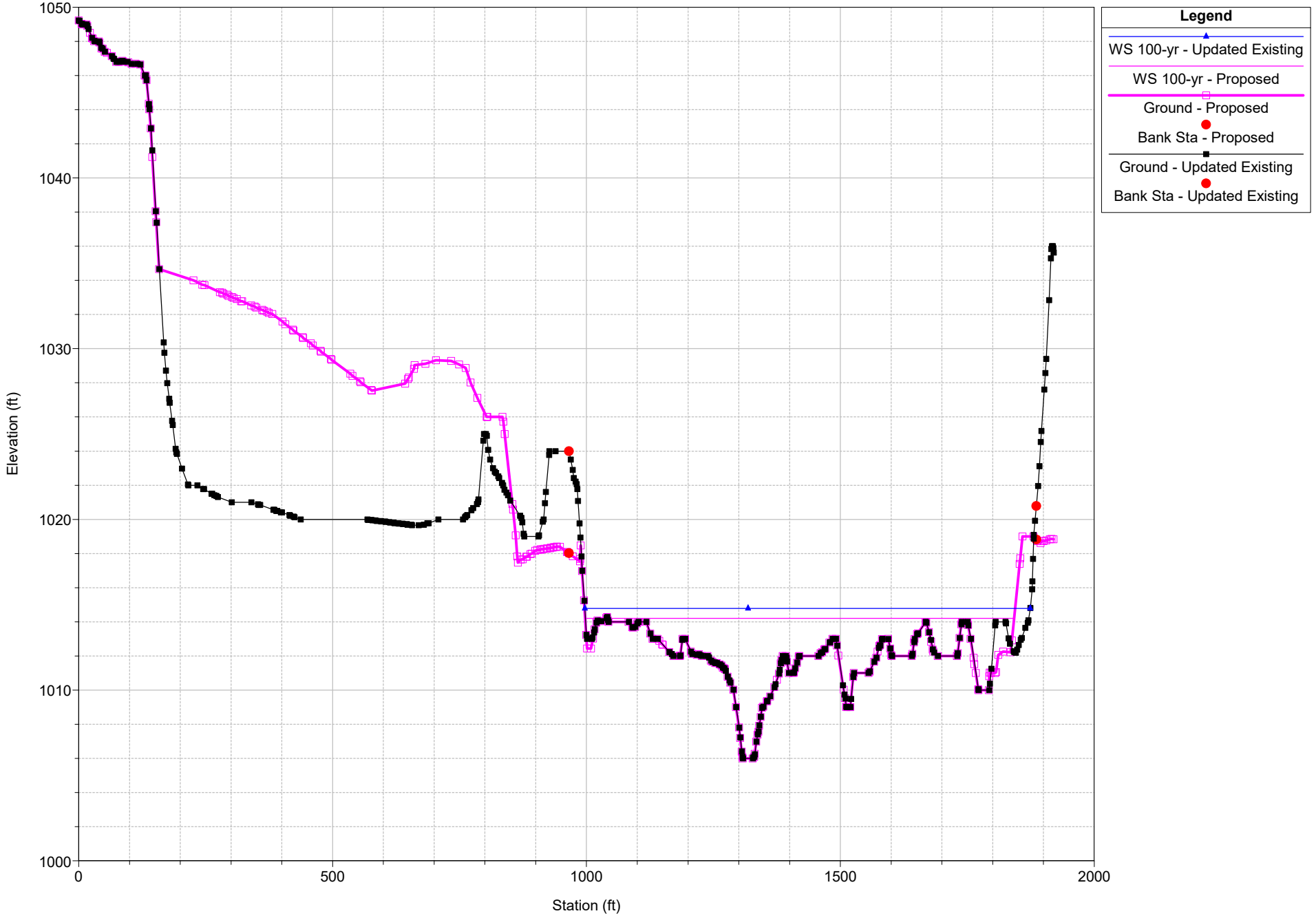
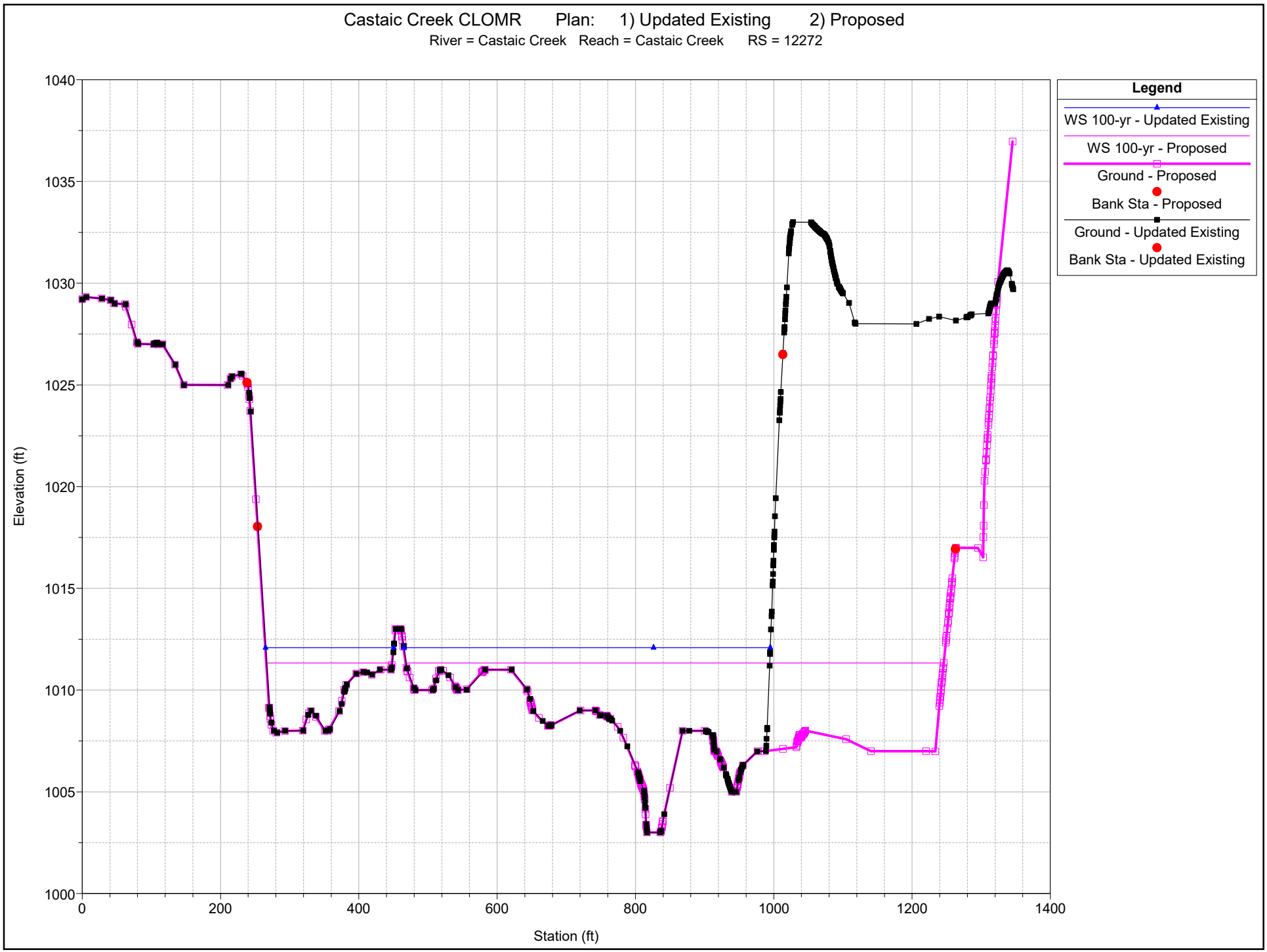
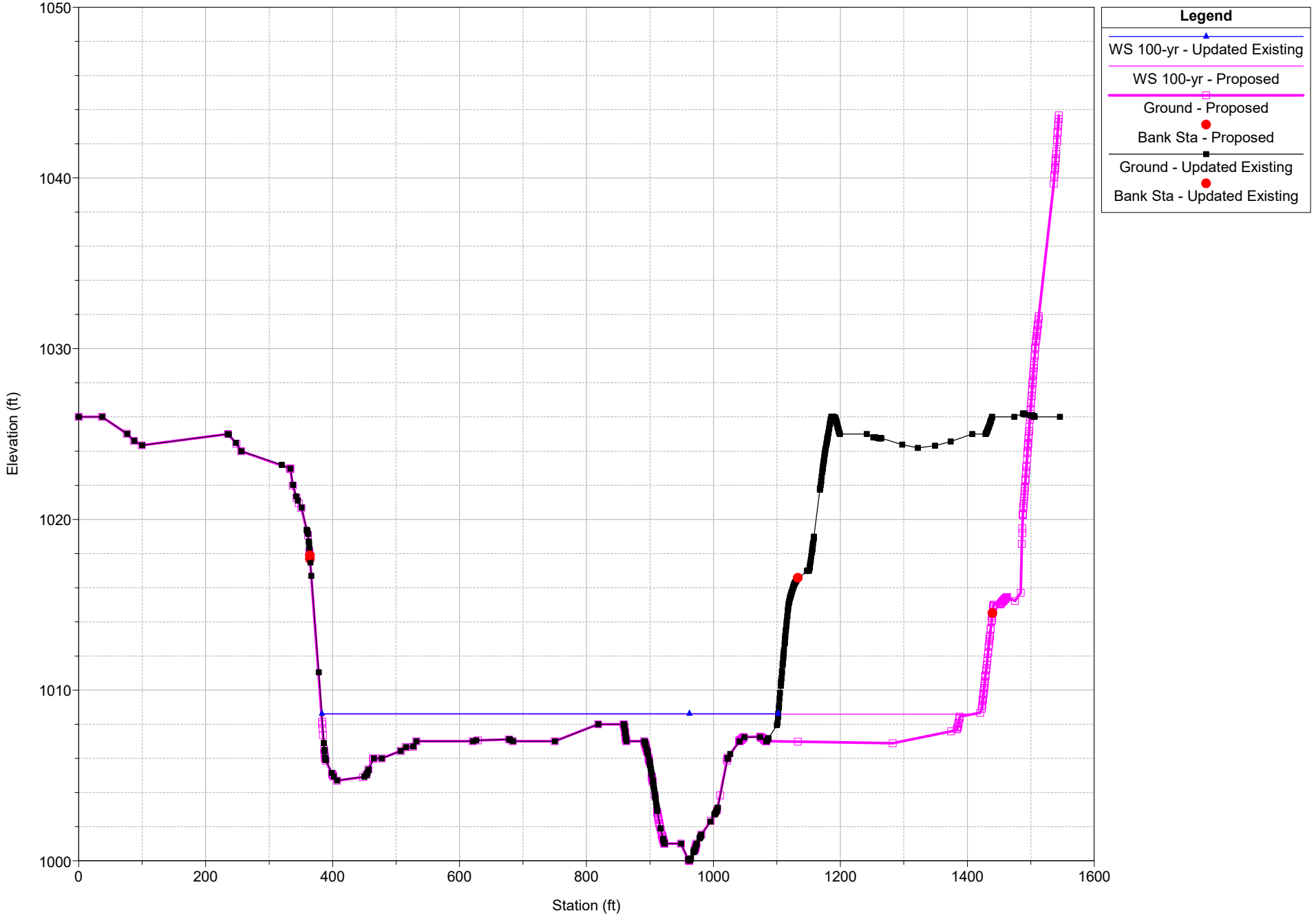



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 12272
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1040
1035
1030
1025
1020
1015
1010
1005
1000
0
200
400
600
800
1000
1200
1400

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 11954.



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

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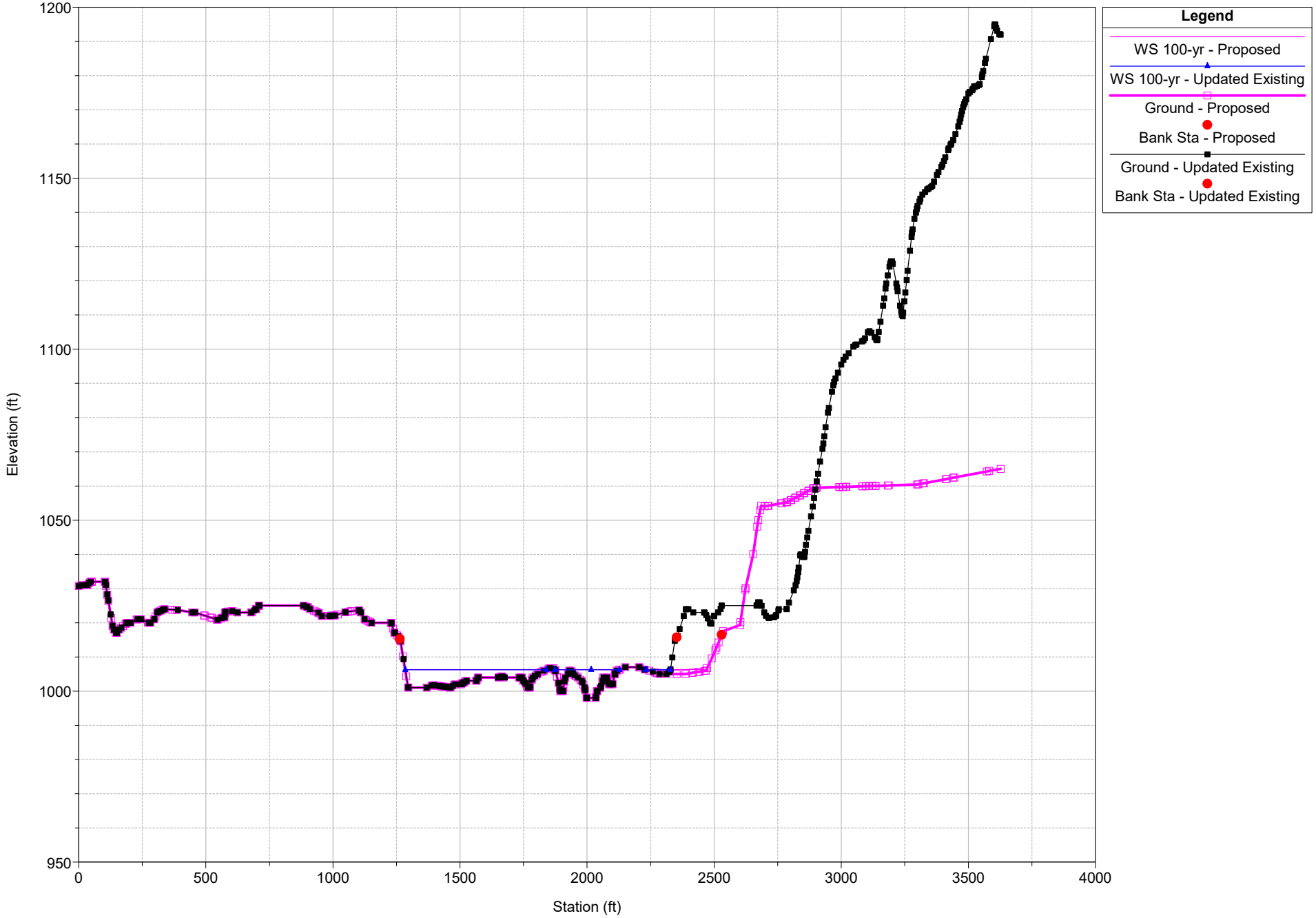

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

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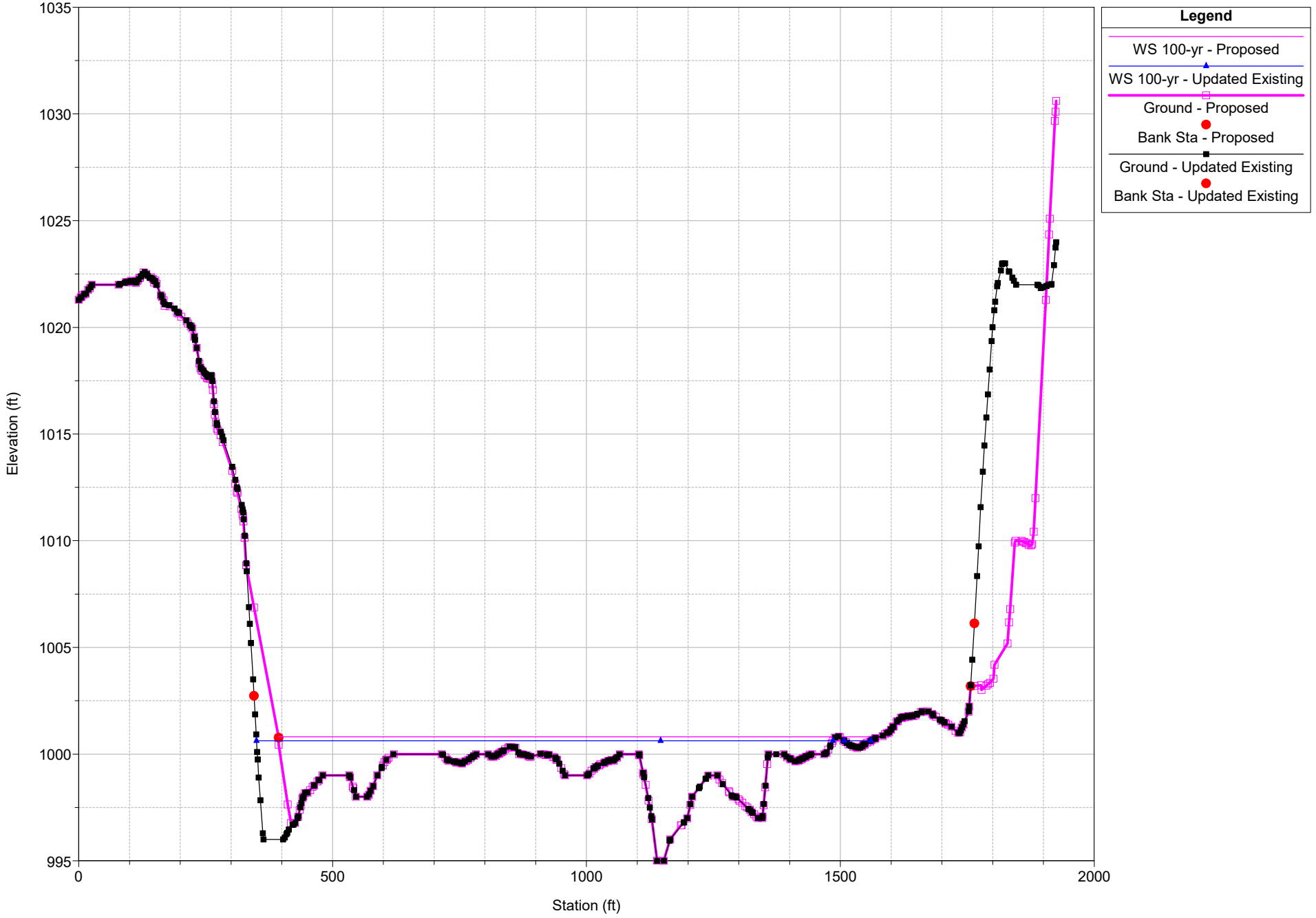

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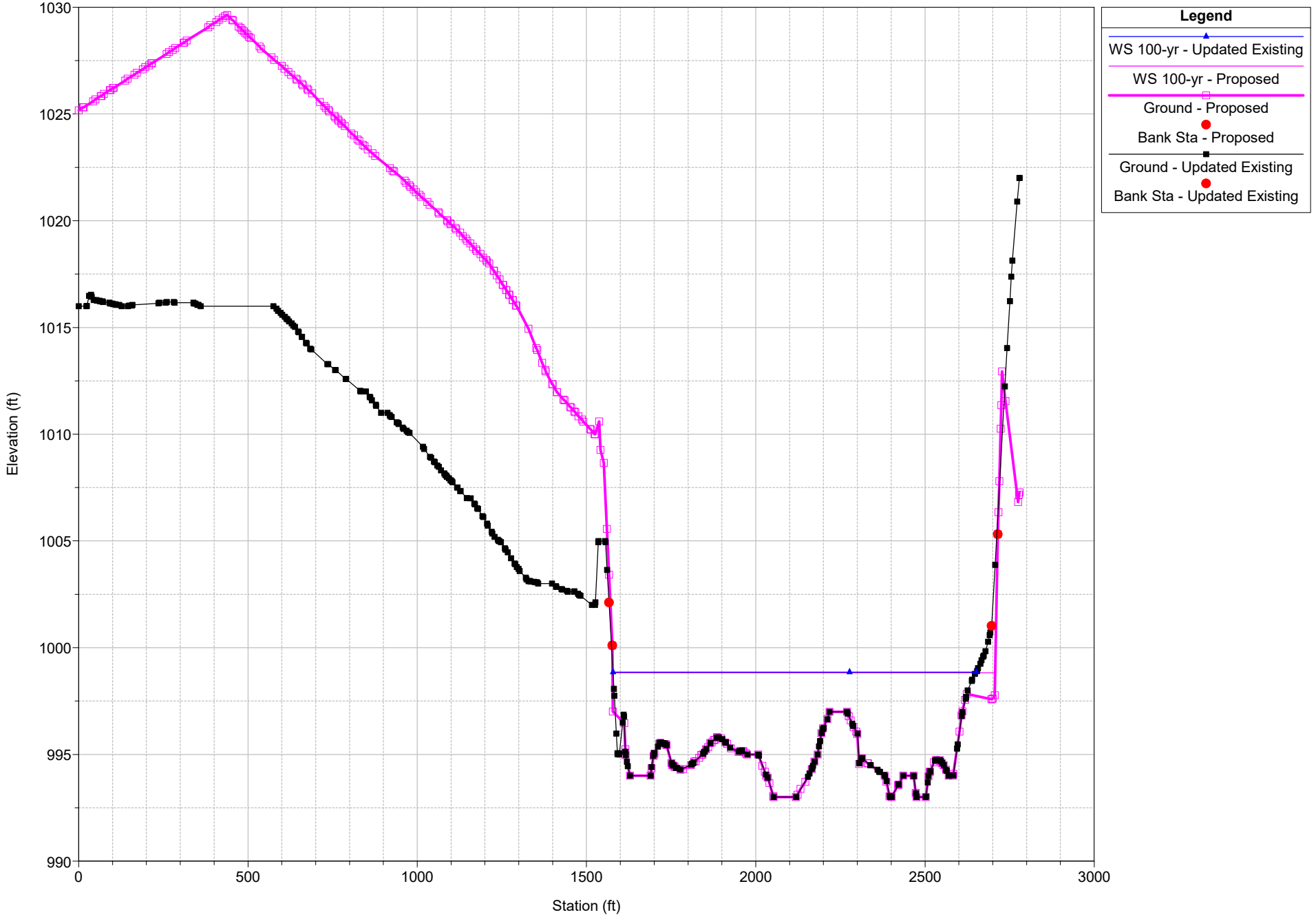

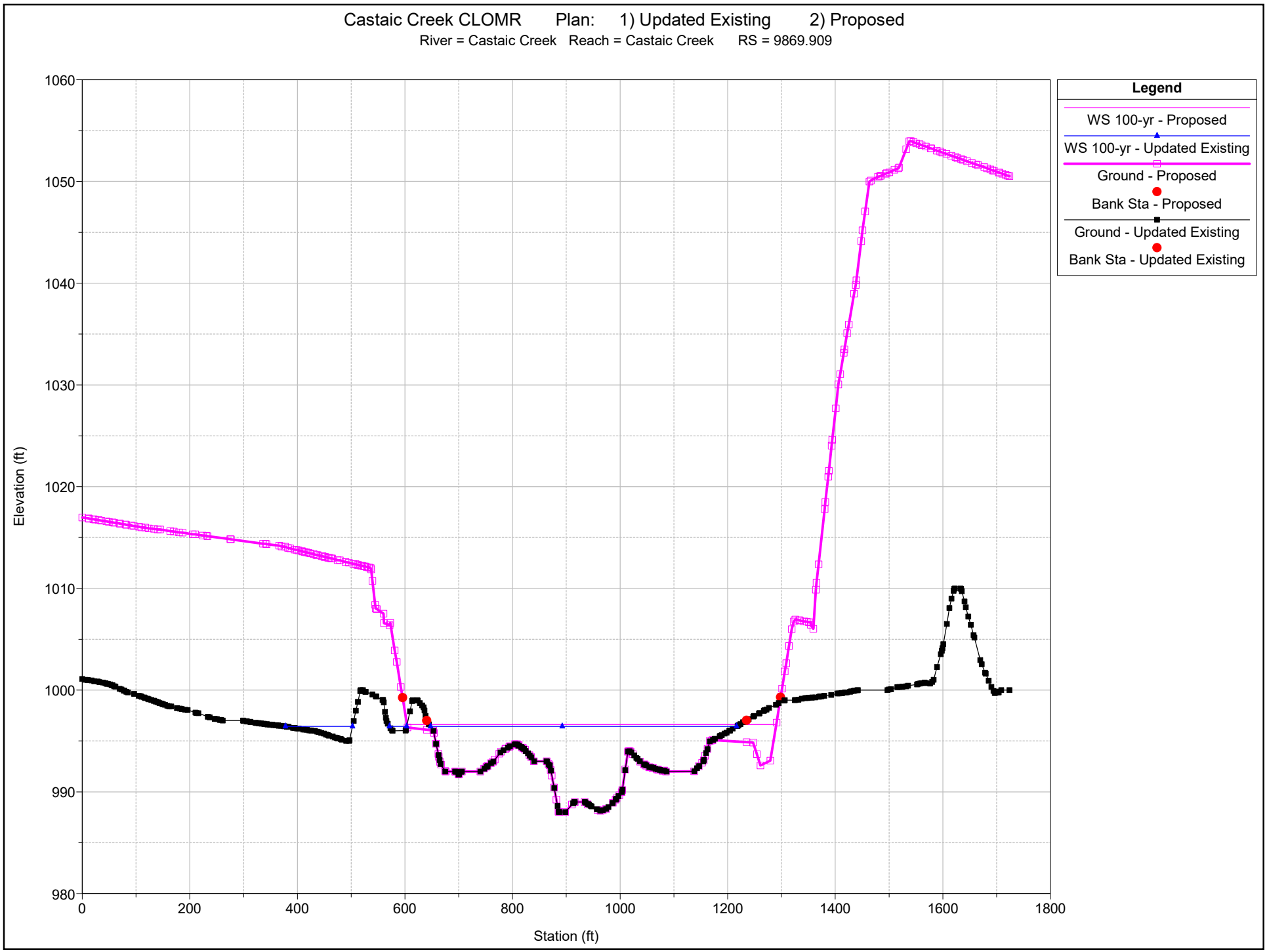
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River = Castaic Creek Reach = Castaic Creek RS = 9869.909
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1060
1050
1040
1030
1020
1010
1000
990
980
0
200
400
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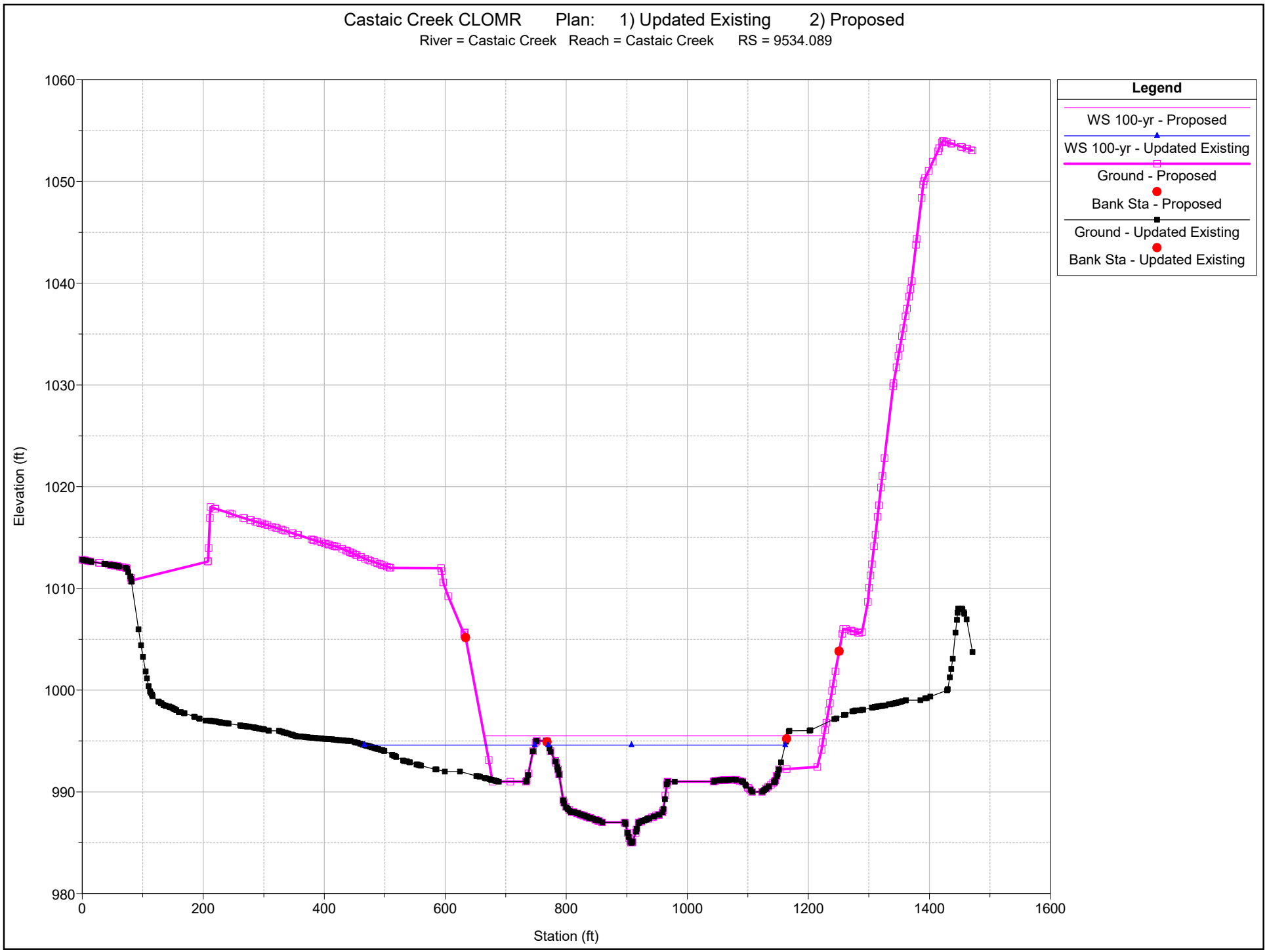
1000
1200
1400
1600
1800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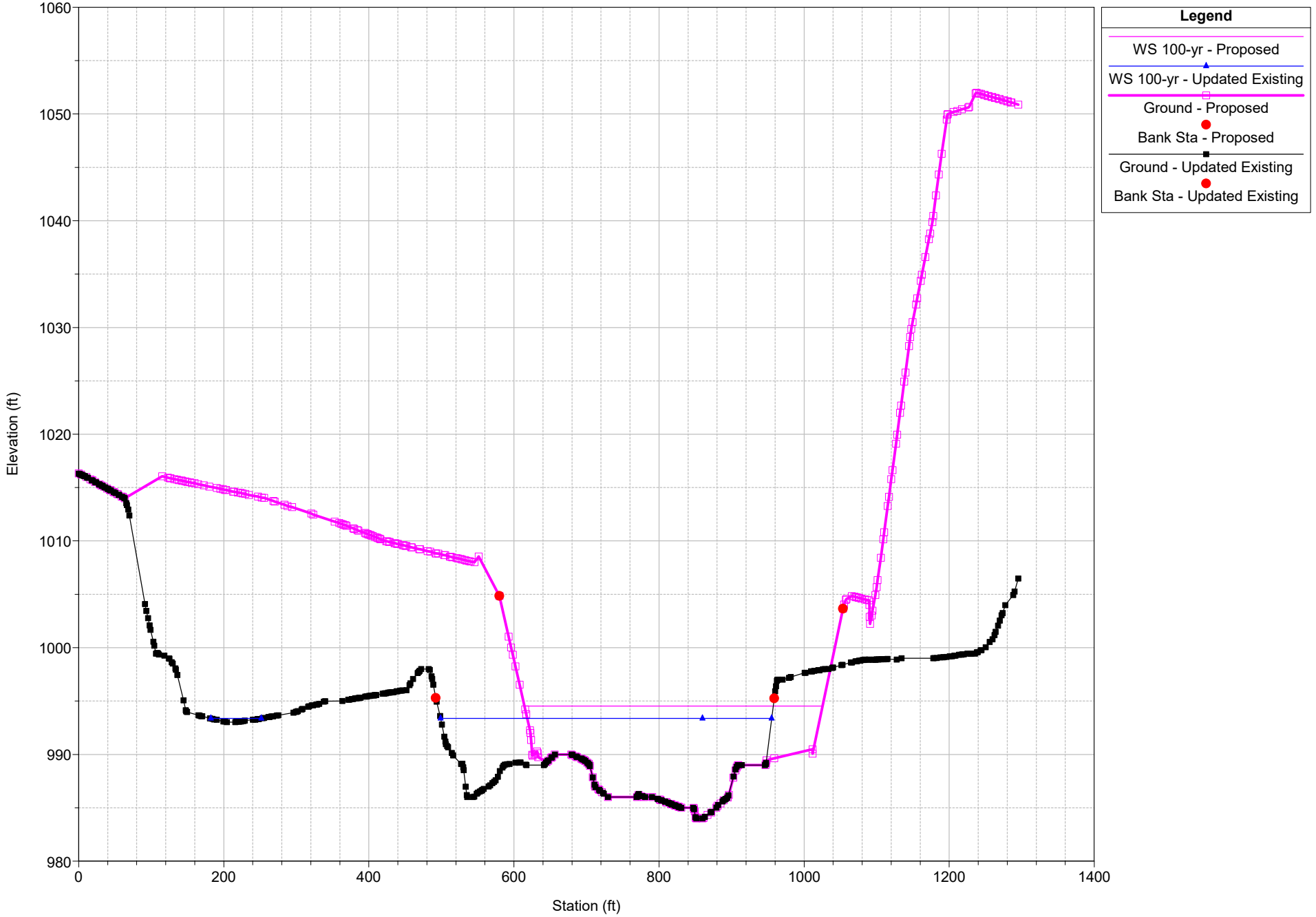
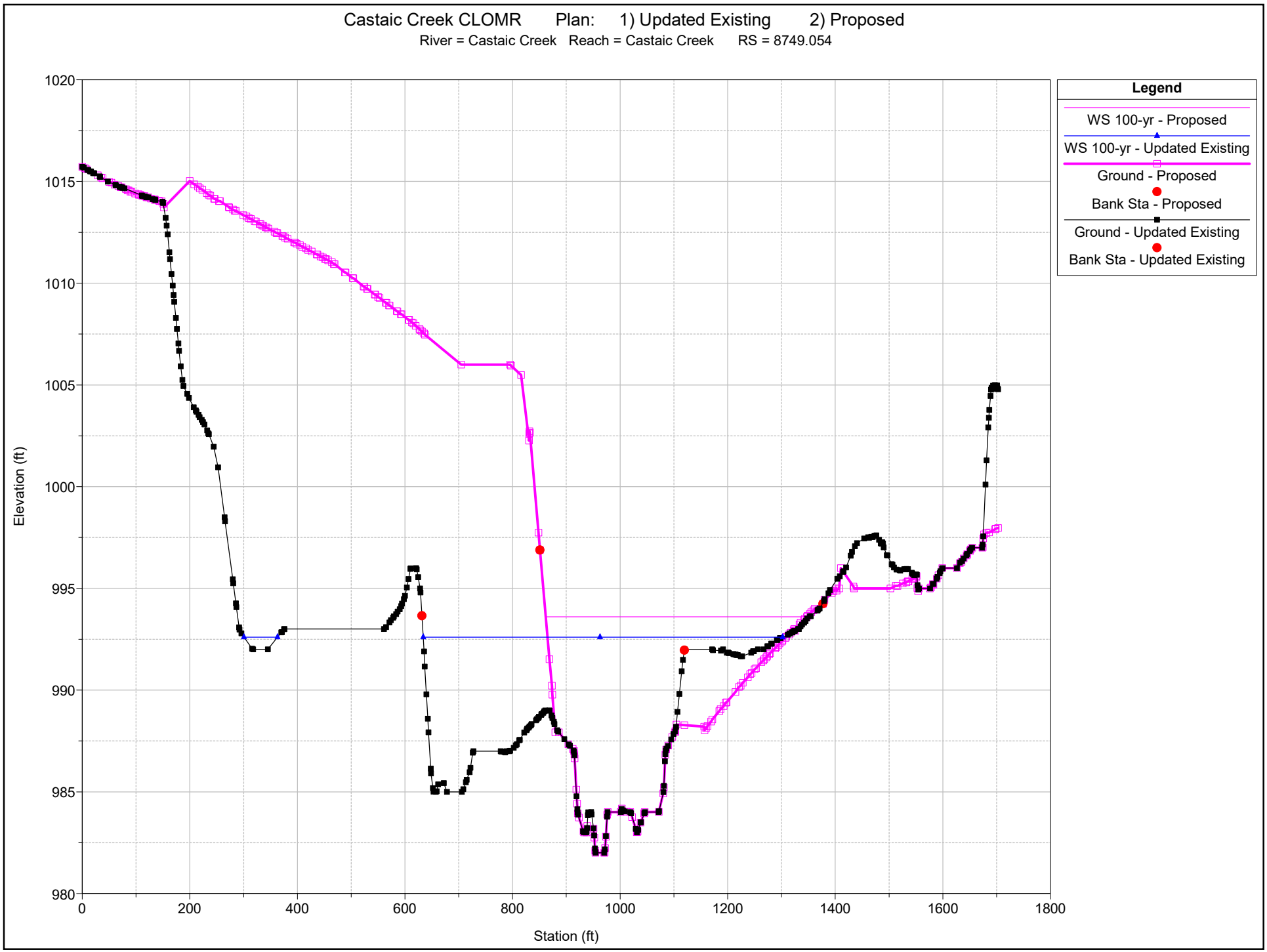
River = Castaic Creek Reach = Castaic Creek RS = 9534.089
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1060
1050
1040
1030
1020
1010
1000
990
980
0
200
400
600
800
1000
1200
1400
1600

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 9166.896

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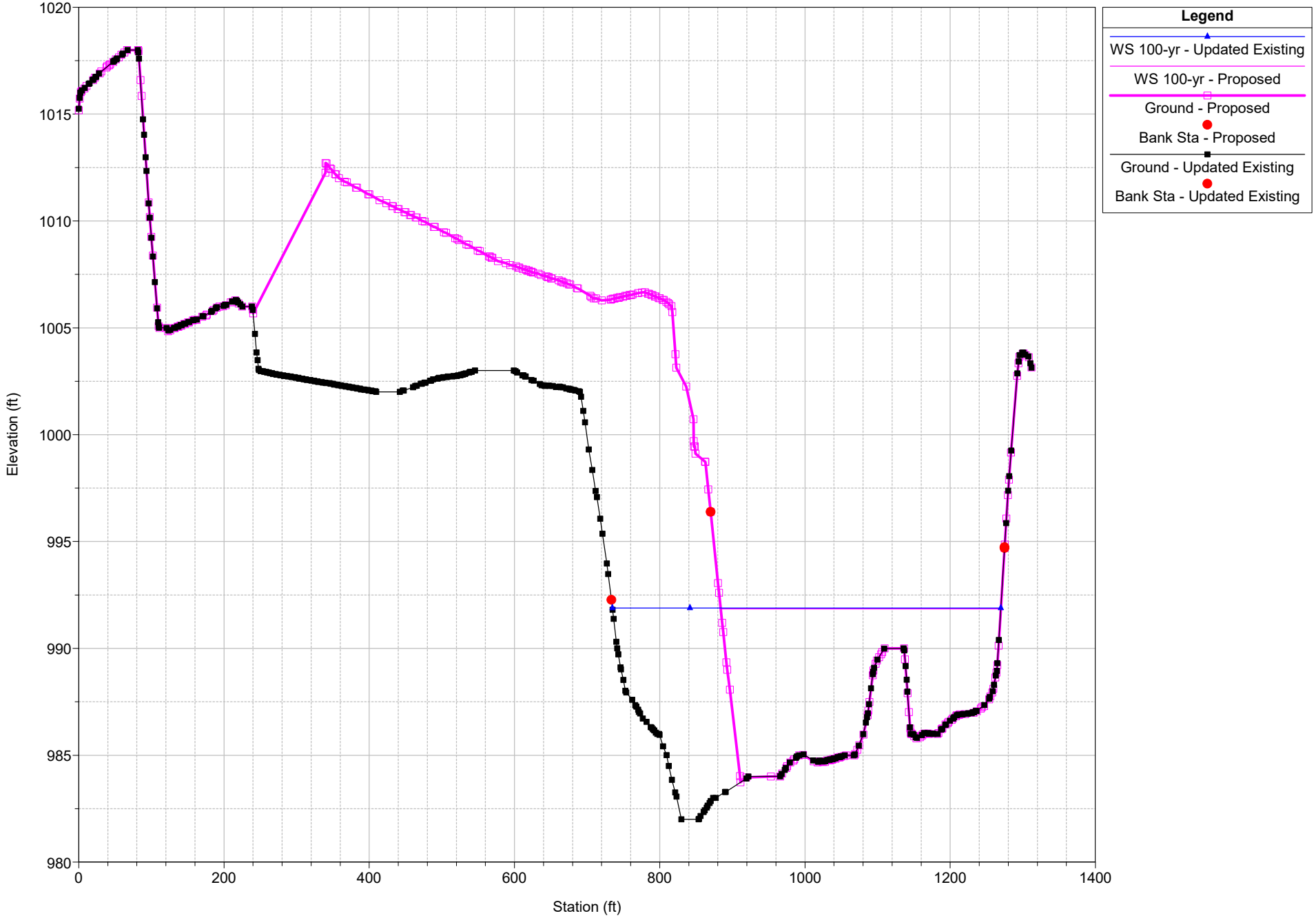
River = Castaic Creek Reach = Castaic Creek RS = 8749.054
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1020
1015
1010
1005
1000
995
990
985
980
0
200
400
600
800
1000
1200
1400
1600
1800

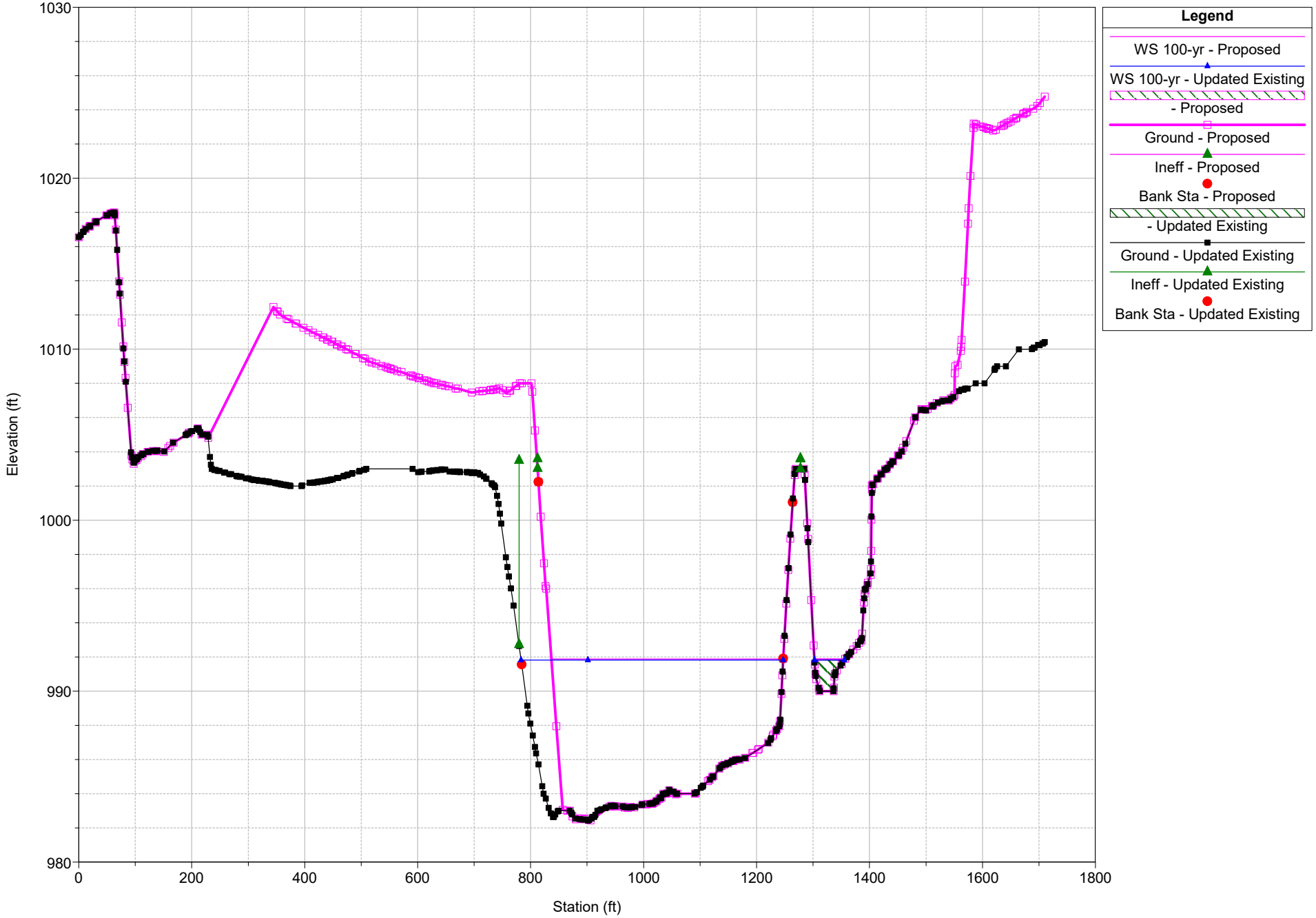
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 8304.799



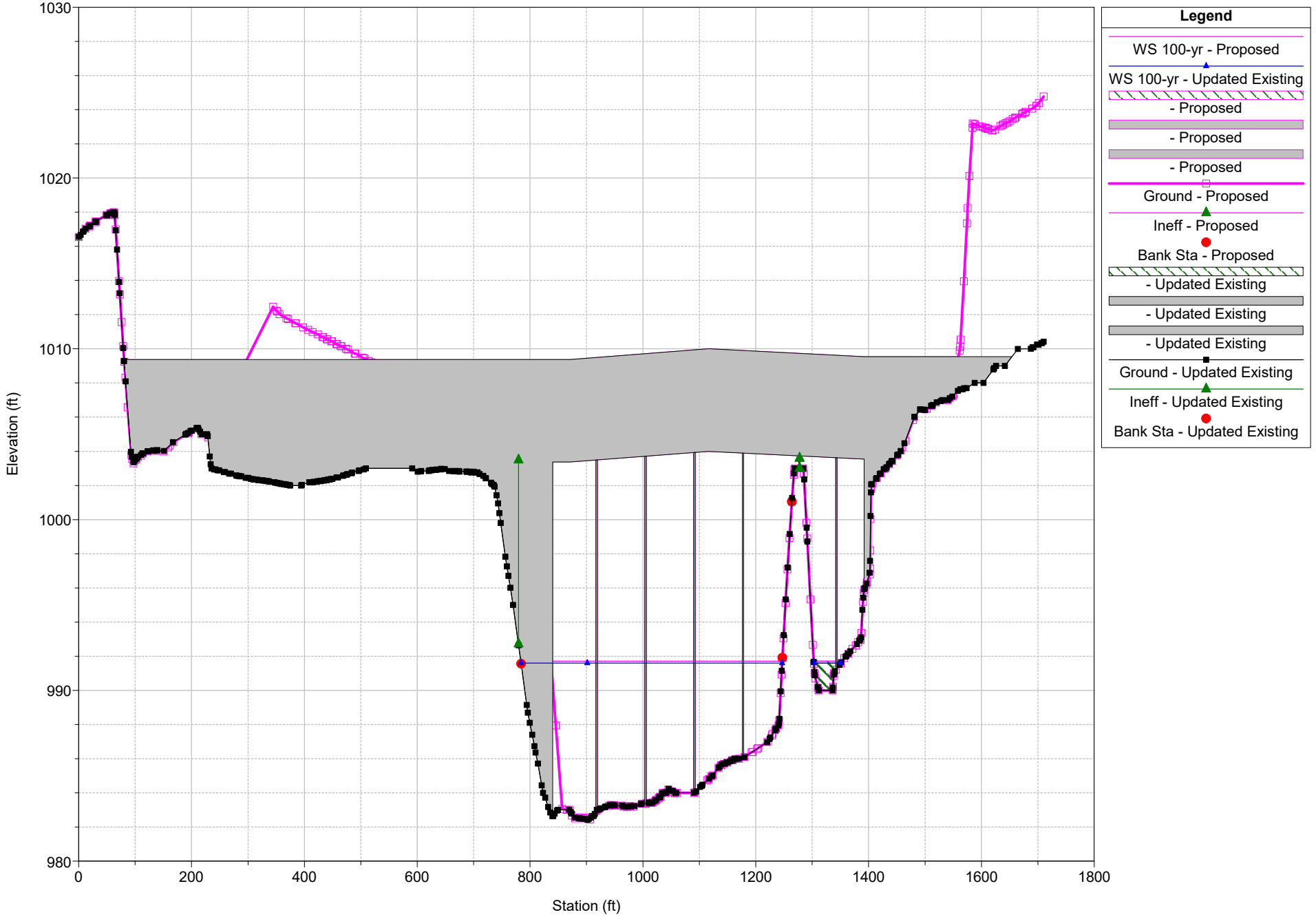
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

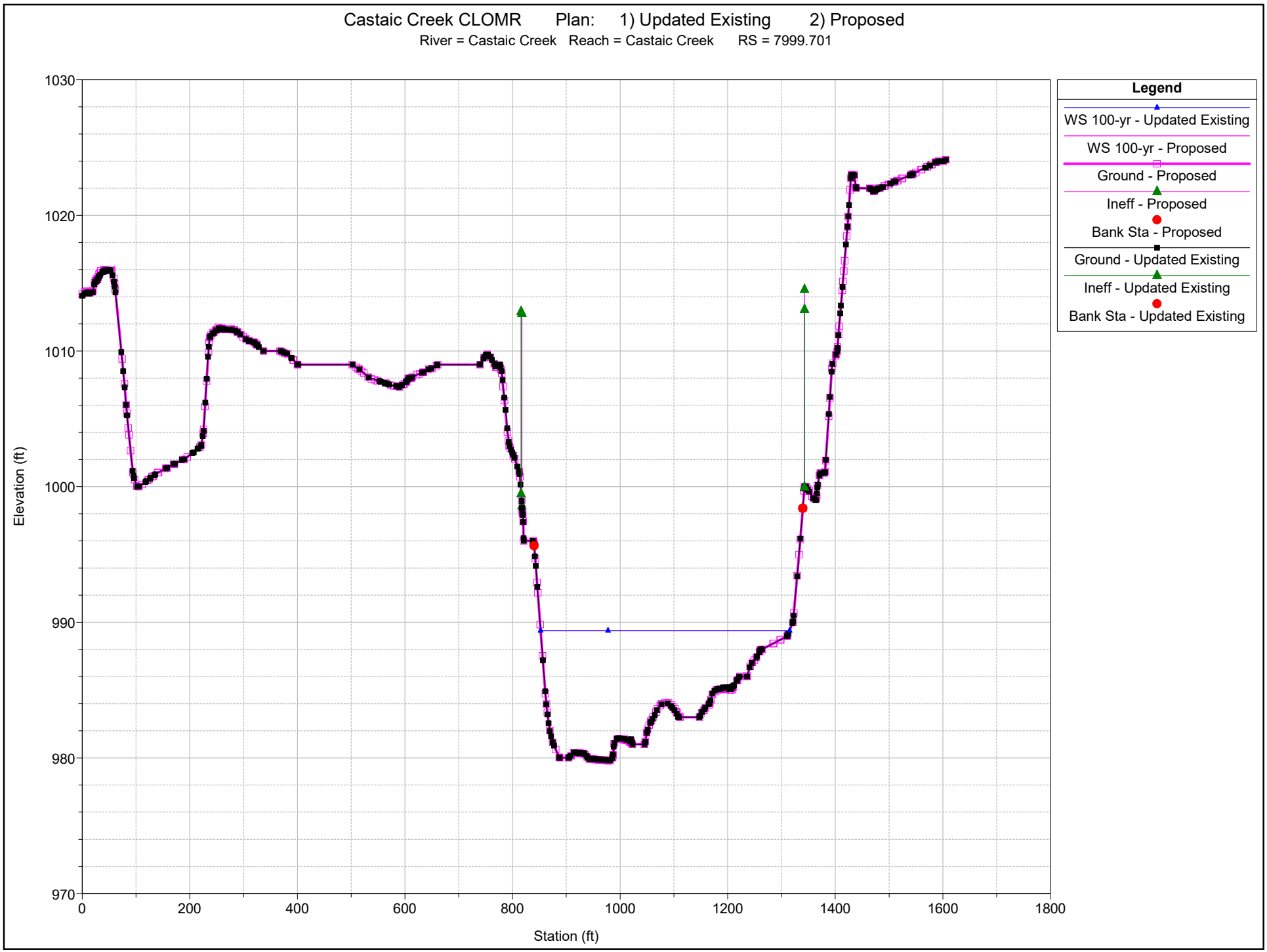
River = Castaic Creek Reach = Castaic Creek RS = 8252.659



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 8000 BR Commerce Center Drive bridge

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River = Castaic Creek Reach = Castaic Creek RS = 7999.701
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Ineff - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
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1020
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1000
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200
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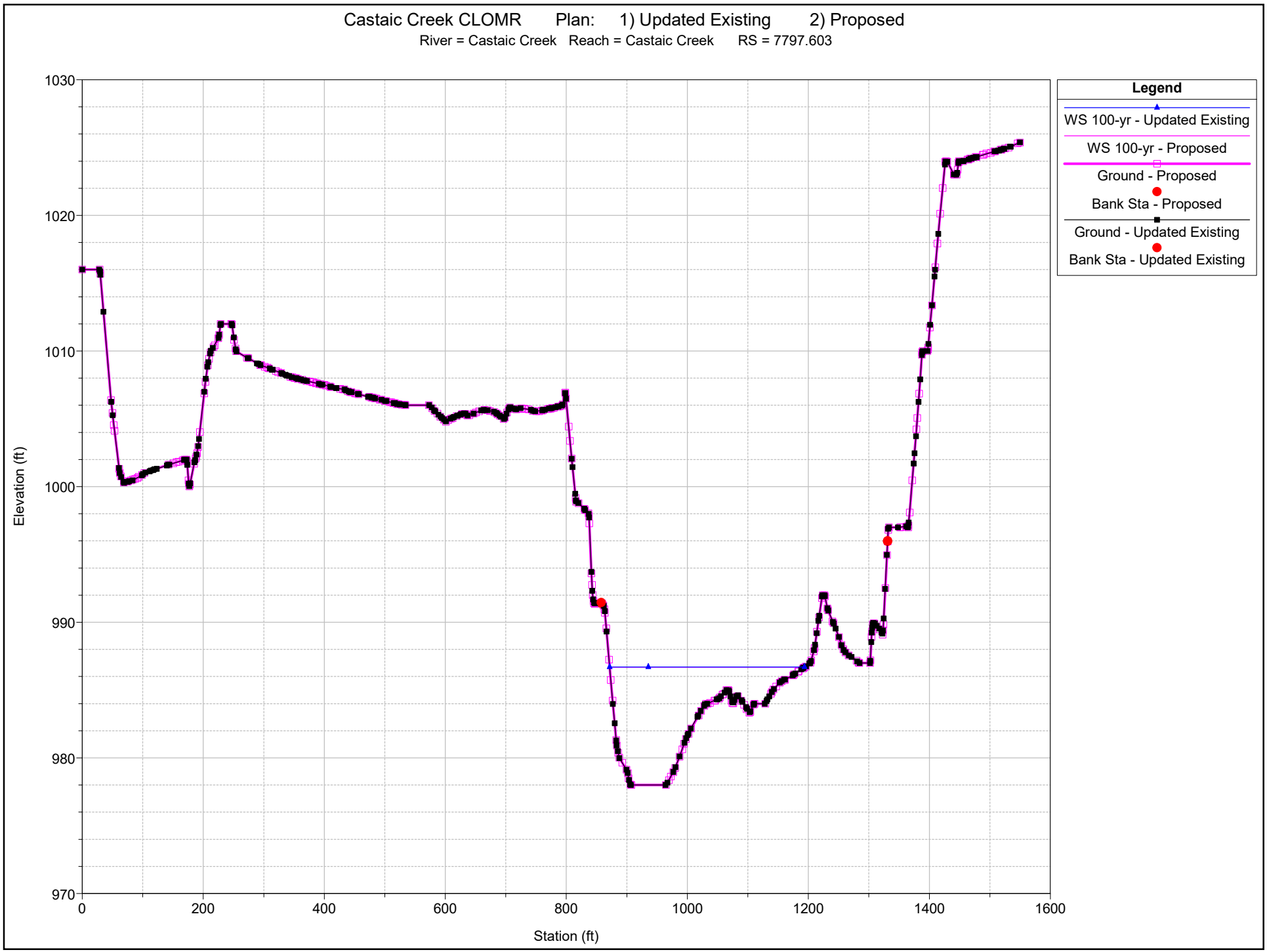
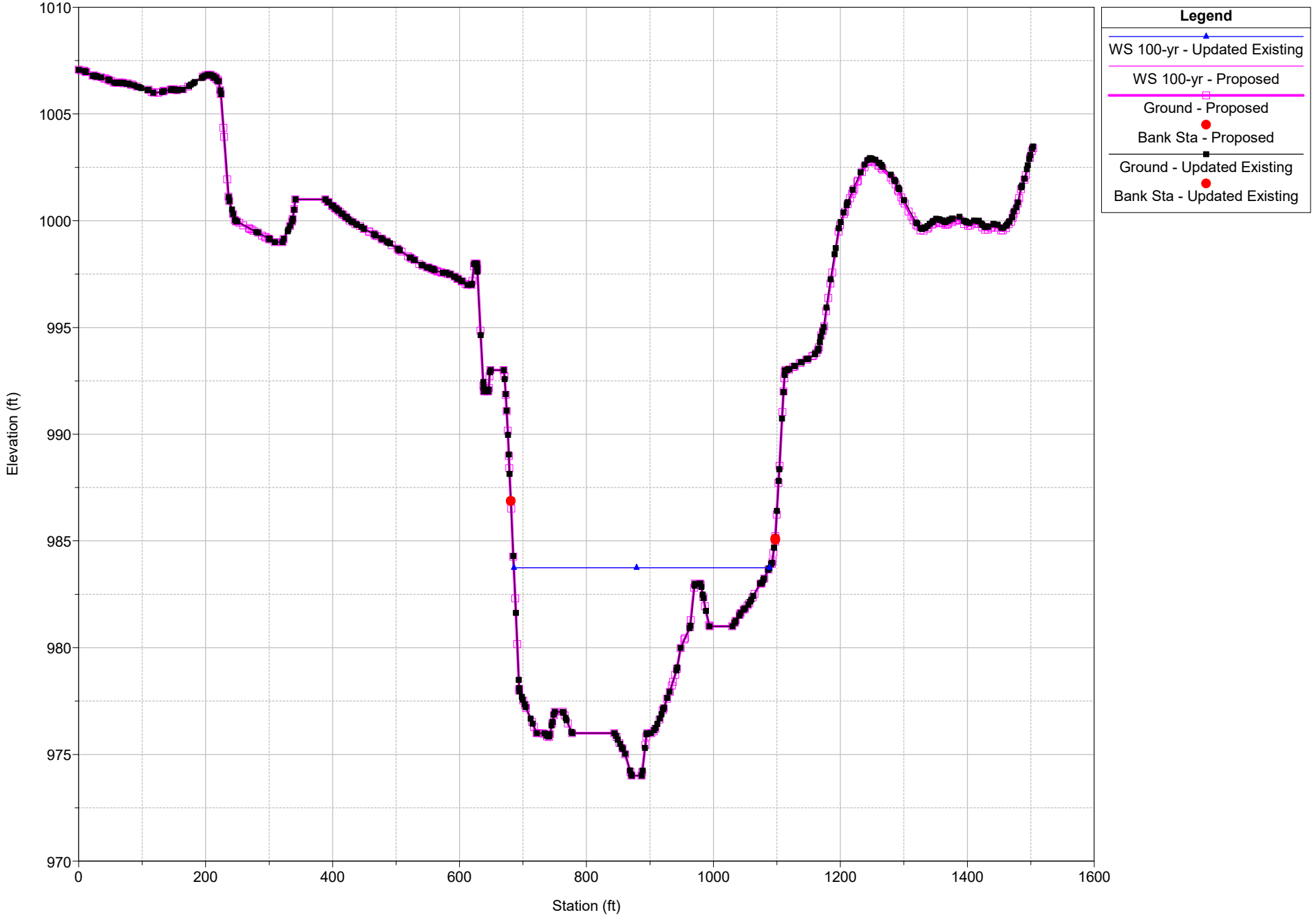
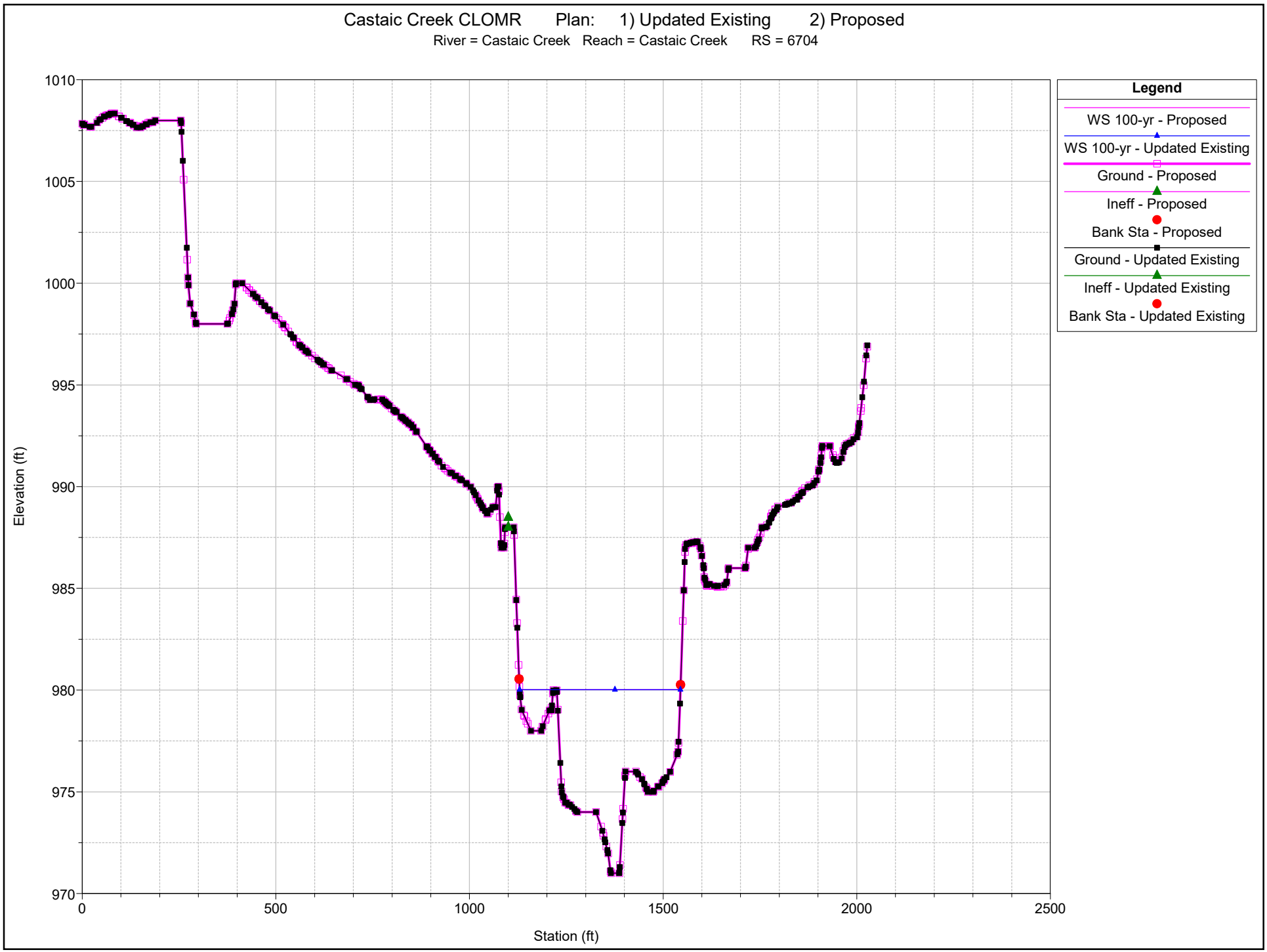
1200
1400
1600
1800
Station (ft)


Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 7797.603
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1030
1020
1010
1000
990
980
970
0
200
400
600
800
1000
1200
1400
1600

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 7298.389

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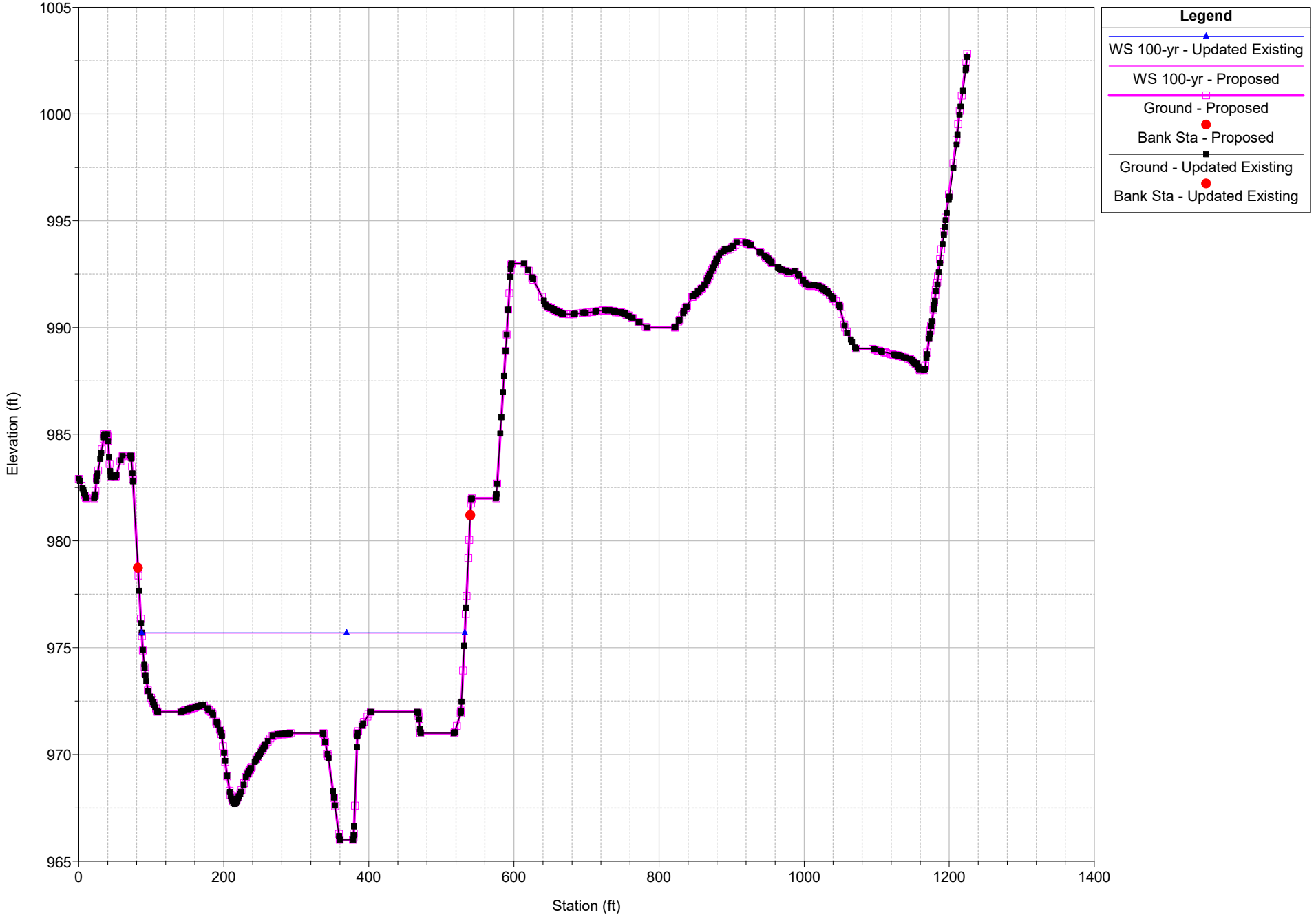
River = Castaic Creek Reach = Castaic Creek RS = 6704
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Ineff - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
1010
1005
1000
995
990
985
980
975
970
0
500
1000
1500
2000
2500
Station (ft)

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 6082.33



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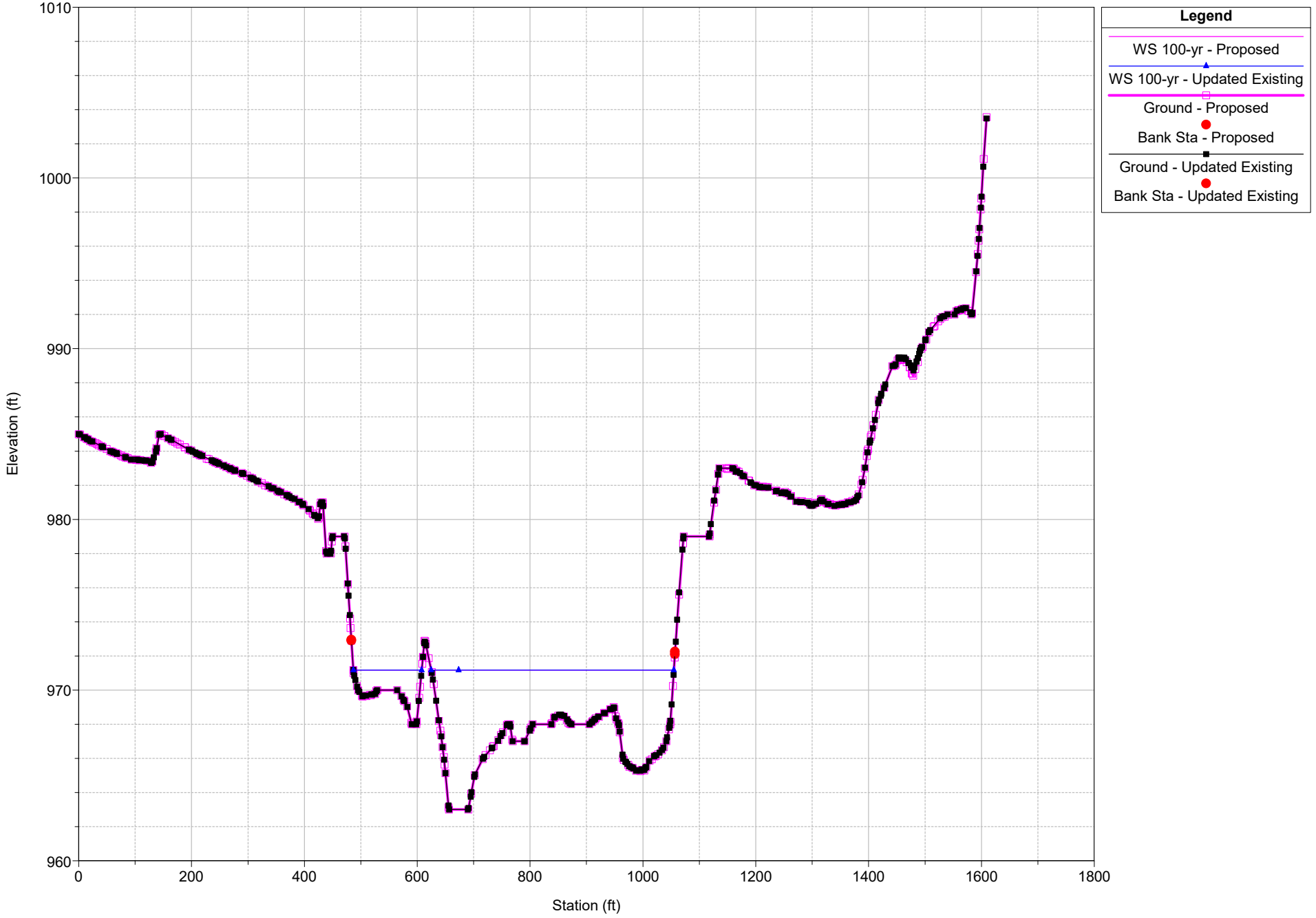
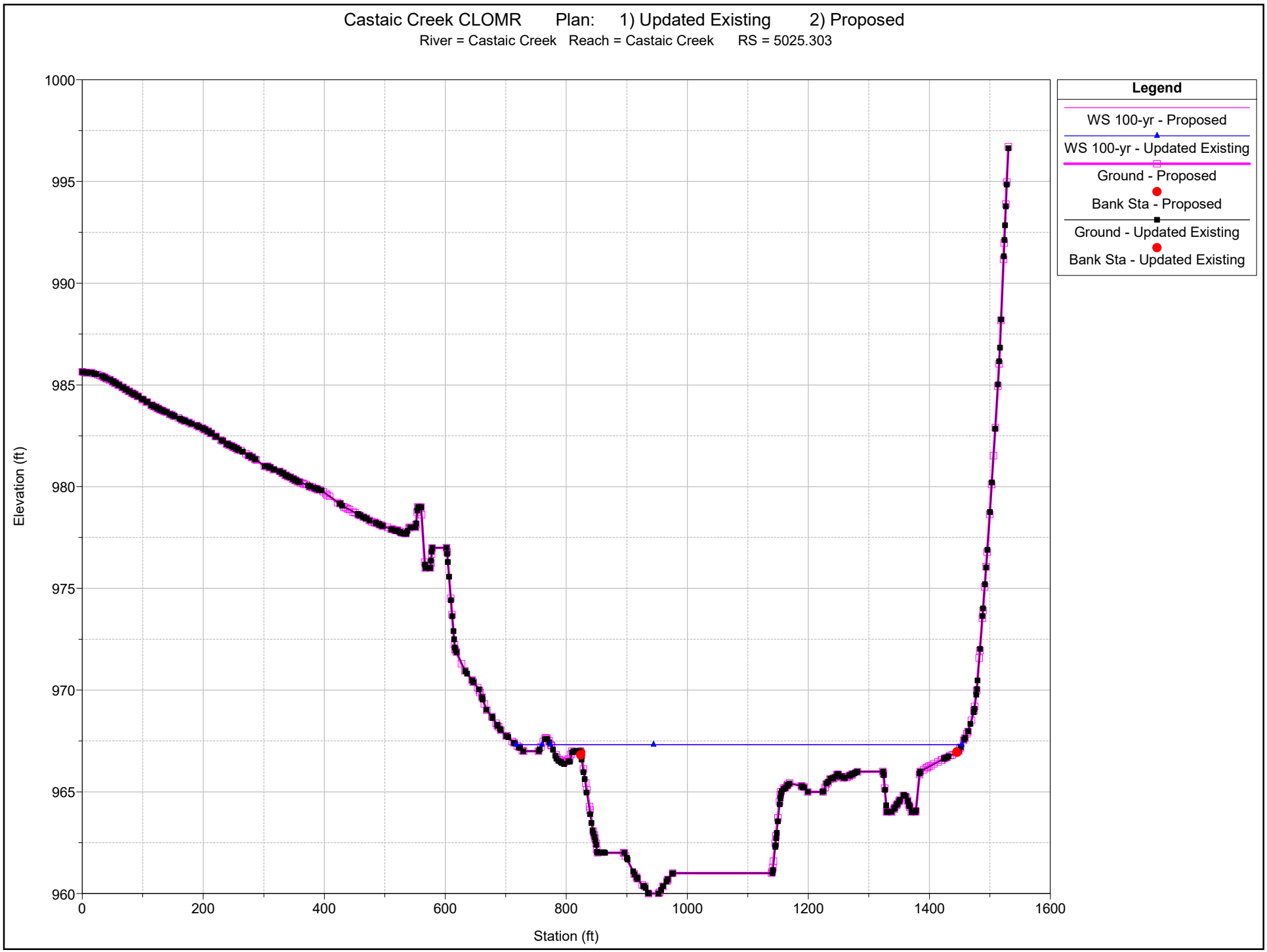
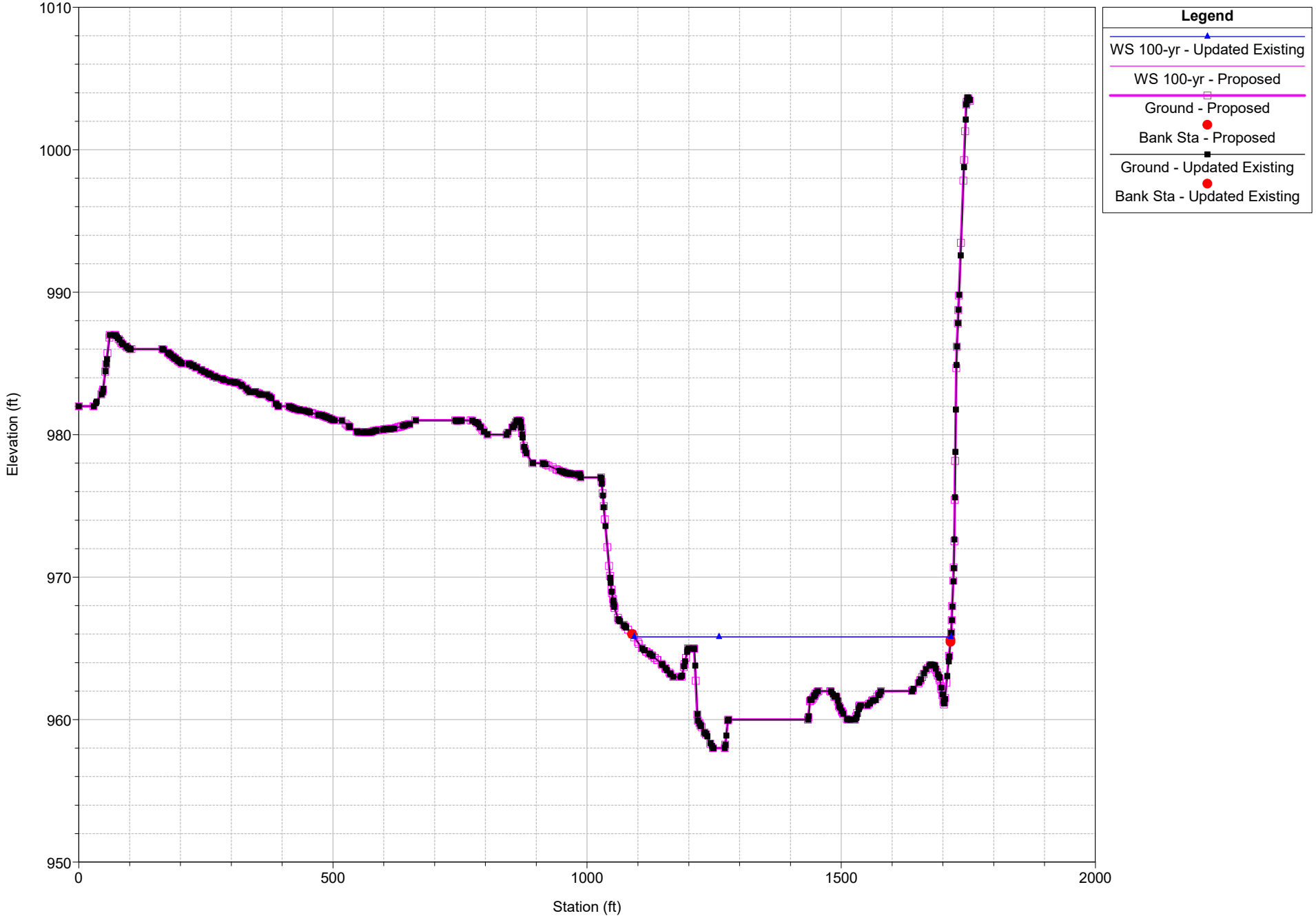
River = Castaic Creek Reach = Castaic Creek RS = 5537.854




Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 5025.303
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1000
995
990
985
980
975
970
965
960
0
200
400
600
800
1000
1200
1400
1600

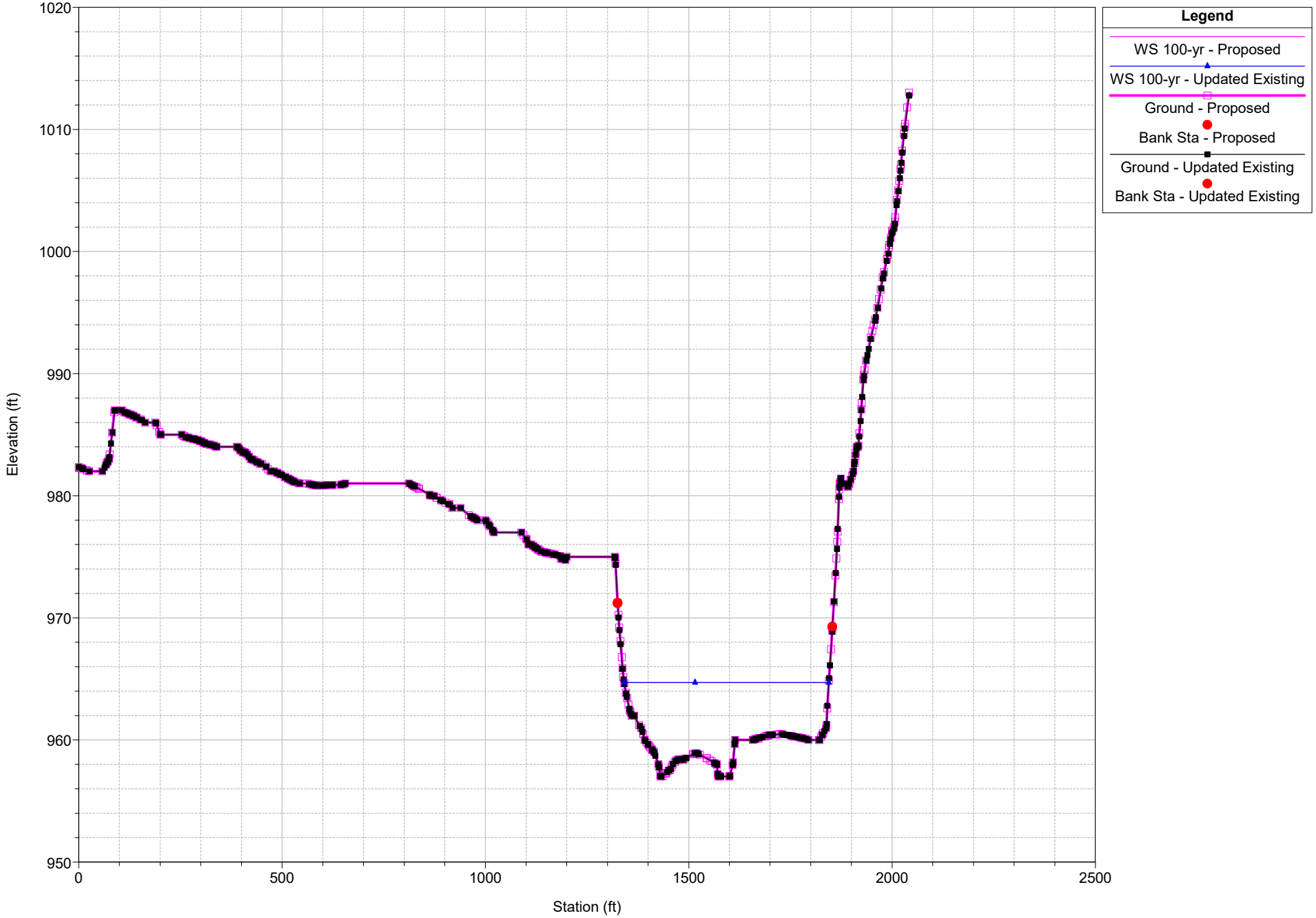
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 4715.427



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 4427.711



PACE
Advanced Water Engineering

Appendix F – ESA Documentation

Documentation of ESA Compliance

The VCC Project for which a CLOMR is sought involves federal permitting by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. The VCC Project, including the area subject to the requested CLOMR, lies within the Valencia Commerce Center development area covered by Corps Permit No. 89-00419-AOA ("Corps Permit"). The Corps Permit, as amended by letter dated March 3, 2003, authorized the discharge of fill material to waters of the United States for the construction and maintenance of flood control, bank stabilization, site drainage facilities and bridges associated with the Valencia Commerce Center development.

In compliance with Section 7 of the ESA, the Corps initiated formal consultation with the U.S. Fish and Wildlife Service regarding the effects of issuing the Corps Permit. The Service issued Biological Opinion No. 1-8-02-F-43 ("Biological Opinion," **attached**), analyzing the effects of the proposed activities on the federally listed arroyo toad and unarmored threespine stickleback. The Biological Opinion concluded that the activities authorized by the Corps Permit would not jeopardize the continued existence of the arroyo toad or unarmored stickleback, and it authorized incidental take of those species associated with the Valencia Commerce Center development. The Biological Opinion also concurred with the Corps' determination that the activities were not likely to adversely affect the federally listed least Bell's vireo.

The Corps Permit expired before all authorized activities were completed. In order to complete the current portion of the Valencia Commerce Center development, Newhall expects to seek additional authorization from the Corps. The Corps will comply with the ESA in connection with any new permit action, including conducting any additional consultation required by ESA Section 7.

Attachment: Biological Opinion No. 1-8-02-F-43

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

RECEIVED
DEC 18 2002
REGULATORY BRANCH
VENTURA FIELD OFFICE

In Reply, refer to: 2002-6.3

December 17, 2002

David J. Castanon, Chief
North Coast Section, Regulatory Branch
Ventura Field Office, Army Corps of Engineers
2151 Alessandro Drive, Suite 110
Ventura, California 93001

Subject: Biological Opinion for the Castaic Creek Bank Protection, Valencia Commerce Center, Los Angeles County, California (No. 89-00419-AOA)(1-8-02-F-43)

Dear Mr. Castanon:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Army Corps of Engineers (Corps) authorization of the Valencia Company to construct flood control and site drainage facilities associated with the Valencia Commerce Center and its effects on the federally endangered arroyo toad (*Bufo californicus*), and the federally endangered unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). You also requested formal consultation on the effects of the action on critical habitat for the arroyo toad. Because of the recent vacature of this critical habitat (see Status of the Species section below), our consultation does not address the effects of the action on critical habitat. Unarmored threespine stickleback are known to occur downstream at the Castaic Creek and Santa Clara River confluence. Your January 7, 2002, request for the initiation of formal consultation was received on January 9, 2002.

The Corps has determined that the project is not likely to adversely affect the federally endangered least Bell's vireo (*Vireo bellii pusillus*), and has not included the species in its request for formal consultation. The Corps reached this conclusion because focused surveys for breeding least Bell's vireos would be conducted immediately prior to construction and each year during the breeding season for the duration of the project, and if nests are found, construction would be set back a minimum of 500 feet from nest sites (Aaron Allen, Corps, pers. comm. 2002). The Service concurs with the Corps' determination that this species is not likely to be adversely affected by the authorization of the 404 permit. Consequently, the least Bell's vireo will not be discussed further in this biological opinion.

This biological opinion is based on information provided in the biological evaluation prepared by URS Corporation (URS 2002) for the Corps; other project information provided by the Corps, including the results of a focused survey for arroyo toads in Castaic Creek (Impact Sciences 2001a); a letter to the Corps from Valencia Company (Mark Subbotin *in litt.* 2002a); and information in our files. A complete administrative record of this consultation is on file at the Ventura Fish and Wildlife Office.

CONSULTATION HISTORY

Your original request for formal consultation included only the arroyo toad. The unarmored threespine stickleback was not included at the time because we believed the species was not present in Castaic or Hasley creeks. Since the original request for formal consultation was sent, new information has been made available to us. Specifically, installation of bank protection may require dewatering operations in which groundwater is collected and discharged downstream of the work area. The amount of discharged water may create sufficient flow during dewatering operations to form continuous flowing channel from the work site to Castaic Creek or the Santa Clara River. The unarmored threespine stickleback is known to occur in the Santa Clara River and may move upstream into Castaic Creek when flows are present.

Because of this new information, the Corps determined that the proposed construction activities and dewatering operations may affect the unarmored threespine stickleback and amended its request for formal consultation to include the species on May 10, 2002. In a telephone conversation with the Corps on May 15, 2002, we requested a 30-day extension on the consultation period in light of this new information, staffing shortages, workload, and high priority projects. The Corps agreed to the extension via telephone on May 15, 2002.

We provided your office a draft of this biological opinion on August 2, 2002. We received your comments by facsimile on August 15, 2002. This final biological opinion incorporates and addresses those comments, where applicable.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

In January 2002, the Corps initiated formal consultation with the Service on the Corps' authorization of the Valencia Company to complete one project of three separate proposed actions. The Corps has authorized, through a general permit under section 404 of the Clean Water Act, three actions by the Valencia Company intended to provide comprehensive flood protection for upland development along Castaic Creek, which are listed below:

1. Discharge of fill into 4.0 acres of an ephemeral streambed to construct an underground stormdrain for a regional mail facility of the U.S. Postal Service. The drainage was filled and the post office was completed in 1991. Because this component of the 404 permit has been completed, it will not be addressed again in this biological opinion.

2. Construction of a flood control channel within Hasley Canyon with concrete sides and an 80-foot-wide earthen bottom. The middle section of Hasley Creek was lined with concrete in 1991 by the Valencia Company. Because this component of the 404 permit has been completed, it will not be addressed again in this biological opinion. The lower portion of Hasley Creek will be completed in 2002 through 2005 and will be addressed in this biological opinion.

3. Installation of bank protection along both sides of Castaic Creek from Highway 5 to Route 126. Two types of bank protection are proposed: (1) soil cement, and (2) gunite or concrete lining. Most of the proposed 19,400 feet of channel lining would be soil cement. This component of the of the 404 permit will be addressed in this biological opinion.

Valencia Company has proposed a form of bank protection method which is being used in the Natural River Management Plan (NRMP) on the Santa Clara River under a separate 404 permit issued in 1998. This bank protection method consists of soil cement including a mixture of situ soils, Portland cement, and water that are compacted to form hardened material. The soil cement is placed in stacks and buried along the banks of a creek or river. Valencia Company anticipates that bank protection installation would be completed from 2002 through 2005. Maps and aerial photographs depicting the location, aerial extent, and various components of the proposed action may be found in the biological evaluation (URS 2002).

The proposed flood protection was to be in addition to approximately 2,000 linear feet of existing ungrouted riprap bank protection located at the north end of the project site and at the Commerce Center Bridge. The Valencia Company proposes to install approximately 19,400 feet of bank protection along Castaic and Hasley creeks over a period of four years. In addition to construction activities, the Valencia Company also proposed methods and criteria for maintenance activities in the project area.

The Valencia Company proposes construction of five temporary road crossings over Castaic and Hasley creeks in order to accomplish the installation of bank protection. Earth-moving equipment would cross the streambed as soils are moved for the project. An elevated crossing fitted with culverts would be installed in order to avoid contact between equipment and surface flows. The creek bed within the roadway corridor would be lined with plastic sheeting to prevent mixing of upland soils with streambed alluvium. The footprint of the roads would be approximately 90 feet wide and 400 feet long. Reinforced concrete pipe or steel culvert would be installed within the existing scour channels to permit any surface flows to continue downstream unimpeded. The top of the roadway would be approximately 75 to 80 feet wide and elevated to 6 to 8 feet above the streambed. K-rail would be installed along the upstream boundary of the roadway to prevent any high flows from eroding the roadway. The roadway would connect to existing dirt access roads on each side of the creek.

Hasley Creek

The Valencia Company proposes to relocate a portion of Hasley Creek to an upland area west of the existing natural channel to best fit development plans for the commerce center (A. Allen, pers. comm. 2002). The Hasley Creek work site parallels Commerce Center Drive and extends in a southern direction. The channel lining would consist of 2,700 feet of double-sided soil cement that would connect to the existing downstream structure that now drains to Castaic Creek. Relocating lower Hasley Creek would eliminate approximately a 2,700 linear foot reach of existing creek bed, approximately 2.10 acres. This area would be filled with soils excavated from the proposed drainage channel. The new lower drainage channel would contain approximately 6.80 acres of alluvial soft-bottom channel and 14 drop basins located approximately 225 feet apart constructed of riprap grouted with cement. The new drainage channel would tie in with the existing alluvial soft-bottom channel lining and the northern abutment of the Commerce Center Bridge.

Bank Protection

The Valencia Company proposes to employ two forms of bank protection over most of the project area: 1) soil cement or riprap for the length of Hasley Creek and Castaic Creek, consisting of a single row of soil cement; and 2) a single row of ungrouted riprap, with concrete tie-ins at structures. The portions of the bank protection above the Castaic Creek which are covered with soil will be revegetated with native plantings and irrigated.

Bank protection installation would occur in a 1.7 mile stretch of Castaic Creek from the Old Road bridge downstream to Route 126 and the downstream portion of Hasley Creek near its confluence with Castaic Creek. In general, for Castaic Creek, the alignment of buried bank protection would follow the existing banks with some encroachment into the creek in certain locations. In other areas the bank stabilization would be installed in upland areas, as described in the letter report from Valencia Company to the Corps (Subbotin, *in litt.* 2002a). Parameters used in designing flood protection for this action are governed by the Capital Flood event as defined by the County of Los Angeles Department of Public Works.

Approximately 19,400 linear feet of bank would be modified through placement of the buried bank protection. Installation of soil cement bank protection requires excavation of a flat-bottom trench to an engineered scour depth for a Capital Flood event. The width of the trench bottom is designed to fit construction equipment. The sides of the trench would slope outward at an approximate 1 to 1 ratio. Once soil cement installation is completed, the trench is then backfilled and graded to match existing creek bed contours at locations where creek bed intrusion has occurred. A 16-foot-wide maintenance road at the outer limit of upland impacts would parallel the open space above the buried bank protection. To install the bank protection, the trenches are excavated below the creek bottom where ground water may be encountered. In this situation, the ground water must be removed during construction. Ground water in the construction area

would be drawn down through a series of shallow dewatering wells strategically placed in close proximity to the excavated trenches. The collected water would be discharged downstream of the work area.

The area to be affected by installation of bank protection consists of 135.0 acres of wetland habitat. In a letter to the Corps, Valencia Company asserts that placement of bank protection in upland areas construes a net gain of 16.4 acres in creek bed acreage resulting in a total wetland habitat area of 151.4 acres; however, the Service disagrees and will only consider the areas of loss in terms of excavation for buried bank protection and placement of ungrouted riprap. The biological function of creek bed created from upland areas is of little value, until a natural hydrologic regime and native vegetation are established.

The Corps has included in its previously authorized 404 permit to Valencia Company several special conditions to reduce potential impacts to the arroyo toad and unarmored threespine stickleback within the project area. These conditions include:

1. Low-growing dry wash vegetation will be allowed to establish naturally within bottom of Hasley Creek to compensate for the loss of dry wash habitat along the unnamed drainage. There will be no clearing of any native riparian vegetation that establishes itself within the creek channel unless it grows excessively dense so as to impede water flow. Any vegetative clearing that is necessary within 100 feet of the confluence with Castaic Creek will be done by hand only.

2. The Valencia Company will record in deed the Castaic Creek corridor as a conservation easement for the purpose of retaining and enhancing fish and wildlife values in perpetuity. Copies of these deed restrictions will be furnished to the Corps, the Service, and the California Department of Fish and Game (CDFG). The amount of area of the conservation easement is approximately 146 acres and will be given to the Center for Natural Land Management (M. Subbotin, pers. comm. 2002b).

3. The Valencia Company will require through project conditions, covenants and restrictions, any industrial user which handles toxic or hazardous substances within the Valencia Commerce Center, to build an on-site self-containment system in accordance with applicable local, state, and federal laws that will prevent these substances from accidentally entering Hasley or Castaic creeks. This measure will minimize the potential of contaminating the unarmored threespine stickleback, arroyo toad, and least Bell's vireo habitats in the event of an accident. The construction and operation of these self-containment systems will be verified by the Corps personnel making inspections of the channel each year for the duration of the construction period.

4. Parking lots in the Valencia Commerce Center will have a drainage system to divert non-storm flows to an oil and grease trap that will separate such contaminants before the runoff is diverted to Hasley or Castaic creeks. These parking lot runoff control systems

will be verified by Corps personnel while making annual inspections of the channels for the duration of the construction period.

5. Maintenance vegetative clearing is permitted only in the upper portion of Hasley Creek, and only for emergency repair work to structures within the channel and bank lining. Under such conditions, clearing of vegetation should be kept to a minimum, and the Valencia Company will perform remedial replacement of damaged vegetation (especially from the construction of access roads if they are necessary) immediately upon completion. A general maintenance plan for the subject project was developed in September 1998 and revised in March 2002 (Aquatic Consulting Services 2002). This plan which was signed by the Los Angeles County Department of Public Works and approved by the Corps and the CDFG.

6. Installation of the channel lining and storm drain system will occur during the period of April 1 to November 1 to avoid winter runoff. Erosion and sediment control measures will be established prior to all construction activities in any water course on the project site. In the event that the contractors are not able to finish the construction in this time window, the permittee will inform the Corps in advance of November 1 in writing, and request permission for a one or two month time extension.

7. Bank protection that allows for growth of native herbaceous vegetation will be used along the sides of Castaic Creek as indicated in Appendix A of the biological evaluation. Final construction plans for any phase of the project must be approved by the Corps in coordination with the Service.

8. The new lining along Castaic Creek will be seeded with native herbaceous vegetation and initially irrigated after installation to encourage the development of low-growing riparian growth.

9. The aerial extent and duration of construction activities along Castaic Creek will be minimized as much as possible. Construction zones for the installation of bank protection and haul routes will be flagged and staked in the field to minimize intrusion and disturbance of existing vegetation. All marshaling and equipment storage areas will be located outside of the channel. The staked boundaries of the impact zone will be verified by the Corps prior to the commencement of construction.

10. The Valencia Company will replace all living and dead willow and cottonwood trees that have a diameter at breast height of 6 inches or more, at a ratio of 1.5 new trees for each tree lost. These trees will not be any smaller than those out of five gallon containers, and preferably a mixture of large sizes. Replacement plants will be placed in augered holes in portions of the Castaic Creek channel that appear to have suitable environmental conditions for such trees to establish naturally.

Prior to construction in Castaic Creek, a formal mitigation plan will be submitted to the Corps for review and approval in coordination with the Service. This plan will include the numbers of different species of trees to be planted, the sizes, and locations of planting. The plan will also describe maintenance of the planted area with regard to irrigation (as needed) and weed eradication. These replacement trees will be monitored for five years following completion of the construction phase of the channel, to ensure their successful establishment.

Survey and re-vegetation plan monitoring documents will be submitted to the Corps and the Service in the form of annual reports in December of each year. These will be reviewed and amended as necessary to ensure success. All failed plantings will be replaced. If the agencies determine that restoration has not been successful, the program will be re-assessed, irrigation introduced if necessary, and restoration efforts will continue on a year-to-year basis until success has been demonstrated.

In the event of significant flood flows which wipe out much of the existing and newly planted vegetation within the five year monitoring and maintenance period, the Valencia Company will initiate a site visit with staff from the Corps and the Service to assess damages and re-evaluate the need for further revegetation efforts in the selected mitigation sites.

11. Emergency repair of the channel lining or bridges across Castaic or Hasley creeks will occur as needed. Any sensitive riparian habitat in the vicinity will be staked in advance to minimize the area of adverse impacts to vegetation. Routine maintenance in the form of vegetative clearing within and along Castaic Creek will not occur in vegetated or mitigation areas. All riparian vegetation disturbed by maintenance and repair will be replaced at a ratio of 1 to 1.

12. Excavation of mounds of tailings from past sand and gravel mining operations within the creek may occur, but any trees and shrubs removed in the process that are greater than 6 inches at breast height will be replaced on site at a 1.5 to 1 ratio.

13. A weed eradication and control program will be established as part of the restoration efforts and implemented on a regular basis during the five year restoration period. During monitoring efforts, a crew will examine all disturbed portions, as a result of this project, within Castaic Creek and remove stands of *Arundo donax*, *Tamarisk*, castor bean, and tree tobacco by hand and topical application of approved herbicides.

14. Landscaping along the top of the bank protection will use native drought tolerant plants.

In a letter to the Corps dated May 10, 2002, the Valencia Company proposed several additional measures to reduce the potential impacts to the unarmored threespine stickleback from this project. These measures include:

1. Service-approved biologists will place fish blocking nets across the dewatering discharge at its confluence with non-project flows (flood flows or dam releases) in Castaic Creek or the Santa Clara River in such a manner as to prevent the movement of unarmored threespine stickleback up the channel of flowing water from dewatering operations. During a telephone conversation on July 11, 2002, between Chris Dellith of my staff and Aaron Allen of the Corps, we agreed that Service personnel as stated by Valencia Company, would be changed to Service-approved biologists. A plan to place the blocking nets will be provided to the Service for approval 30 days prior to implementation. In the event that the net fails, the Service will be immediately notified and will conduct a site inspection with the Valencia Companies qualified biologist to determine if fish have moved up the dewatering channel, and methods for rescue or ramping down the discharge to allow fish to escape.

2. Prior to initiating construction of bank stabilization or temporary road crossings, all construction sites and access roads within the river bed, as well as all creek bed areas within 300 feet of the construction site and access road, will be inspected by a Service-approved biologist for the presence of the unarmored threespine stickleback, arroyo chub, Santa Ana sucker, arroyo toad, two-striped garter snake, and southwestern pond turtle. The Corps and the CDFG will be notified of the inspection and will have the option of attending. If either agency is not represented, the biologist will file a written report of the inspection with the agency not in attendance within 15 days of the survey and no sooner than 30 days prior to any construction work in the creek bed.

3. Construction work areas and access roads will be cleared of the species listed in (2) above immediately before the prescribed work is to be carried out, immediately before any equipment is moved into or through the stream or habitat areas, and immediately before diverting any stream water. The removal of such species will be conducted by a Service-approved biologist using procedures approved by the Corps and the Service. Species will be relocated to nearby suitable habitat areas. A plan to relocate these species will be submitted to the Corps and the Service for review and approval no later than 30 days prior to construction. Under no circumstances will the arroyo toads or unarmored threespine stickleback be collected or relocated, unless Service-approved biologists implement this measure.

4. All stream flows traversing a construction site or temporary road crossing will be diverted around the site and under access roads using a temporary culvert or crossings that allow fish passage. A temporary diversion channel will be constructed using the least damaging method possible, such as blading a narrow pilot channel through open sandy creek bottom. The removal of wetland and riparian vegetation to construct the channel will be avoided to the greatest extent feasible. The temporary channel will be connected to a natural channel downstream of the construction site prior to diverting the stream. The integrity of the channel and diversion will be maintained throughout the construction period. The original stream channel alignment will be restored after construction,

provided suitable conditions are present at the work site after construction. A temporary stream diversion plan will be submitted to the Corps and the Service for individual project approvals.

5. A Service-approved biologist will be present when any stream diversion takes place, and will patrol the areas both within, upstream, and downstream of the work area to rescue any species stranded by the diversion of the stream water. Species that are collected will be relocated to suitable areas downstream of the work area.

STATUS OF THE SPECIES

Arroyo Toad

The Service listed the arroyo toad as endangered on December 16, 1994 (59 *Federal Register* 63264). A recovery plan for the species has been published (Service 1999). Critical habitat for the arroyo toad was designated on February 7, 2001 (66 *Federal Register* 9414). On October 30, 2002, the United States District Court for the District of Columbia set aside the designation and ordered the Service to publish a new final rule with respect to the designation of critical habitat for the arroyo toad by July 30, 2004 (*Building Industry Legal Defense Foundation, et al., v. Gale Norton, Secretary of the Interior, et al., and Center for Biological Diversity, Inc. and Defenders of Wildlife, Inc.* Civil Action No. 01-2311 (JDB) (U.S. District Court, District of Columbia)).

The arroyo toad is a small, dark-spotted toad of the family Bufonidae. The parotid glands, located on the top of the head, are oval-shaped and widely separated. A light or pale area or stripe is usually present on these glands and on top of the eyes. The arroyo toad's underside is buff-colored and usually without spots (Stebbins 1985). Recently metamorphosed individuals typically blend in with stream side substrates.

Optimal breeding habitat consists of low-gradient sections of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces. Arroyo toads breed and deposit egg masses in the shallow, sandy pools of these streams, which are usually bordered by sand-gravel flood-terraces. Stream order, elevation, and flood plain width appear to be important factors in determining habitat capability (Sweet 1992, Barto 1999, Griffin 1999). High stream order (*i.e.*, 3rd to 6th order), low elevation (particularly below 3,000 feet), and wide flood plains seem to be positively correlated with arroyo toad population size. However, small arroyo toad populations are found along 1st and 2nd order streams at elevations up to 4,600 feet.

Outside of the breeding season, arroyo toads are essentially terrestrial and are known to use a variety of upland habitats including, but not limited to, sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grassland (Holland 1995, Griffin *et al.* 1999).

Arroyo toad tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms. They do not forage on macroscopic vegetation (Sweet 1992, Jennings and Hayes 1994).

Juvenile arroyo toads feed on ants almost exclusively (Service 1999). By the time they reach 0.7 to 0.9 inch in length, they consume more beetles, along with the ants (Sweet 1992, Service 1999). Adult arroyo toads probably consume a wide variety of insects and arthropods including ants, beetles, spiders, larvae, caterpillars, and others.

Breeding typically occurs from February to July on streams with persistent water (Griffin *et al.* 1999). Female arroyo toads must feed for a minimum of approximately two months to develop the fat reserves needed to produce a clutch of eggs. Eggs are deposited and larvae develop in shallow pools with minimal current and little or no emergent vegetation. The substrate in these pools is generally sand or fine gravel overlain with silt. The eggs hatch in 4 to 5 days and the tadpoles are essentially immobile for an additional 5 to 6 days. They then begin to disperse from the pool margin into the surrounding shallow water, where they spend an average of 10 weeks. After metamorphosis (June and July), the juvenile arroyo toads remain on the bordering gravel bars until the pool dries out (usually from 8 to 12 weeks depending on the site and rainfall). Most individuals become sexually mature by the following spring (Sweet 1992).

Individuals of this species have been observed moving approximately 1 mile within a stream reach and 0.6 mile away from the stream, into native upland habitats (Sweet 1992, Holland 1995) or agricultural areas (Griffin *et al.* 1999). Movement distances may be regulated by topography and channel morphology. Griffin (1999) reported a female arroyo toad traveling more than 948 feet perpendicular from a stream and Holland (1998) found arroyo toads 0.7 mile from a water course. At Little Rock Creek, on the desert slopes of the San Gabriel Mountains, arroyo toads were found up to approximately 120 feet from the active channel; they burrowed closer to the active stream channel as the time after the last spring rain increased (Ramirez 2000). Arroyo toads are critically dependent on upland terraces and the marginal zones between stream channels and upland terraces during the non-breeding season, especially during periods of inactivity, generally late fall and winter (Sweet 1992).

Arroyo toads have disappeared from approximately 75 percent of the previously occupied habitat in California. They were known historically to occur in coastal drainages in southern California from San Luis Obispo County to San Diego County and in Baja California, Mexico. In Orange and San Diego counties, the species occurred from estuaries to the headwaters of many drainages. In 1996, arroyo toads were discovered on Fort Hunter Liggett, Monterey County. This discovery constituted a northern range expansion for the species. Populations of this species also occur on the desert slopes of both the San Gabriel Mountains (in Little Rock Creek in Los Angeles County) and the San Bernardino Mountains (in the Mojave River and in its tributaries, Little Horsethief and Deep creeks, in San Bernardino County). Arroyo toads now survive primarily in the headwaters of coastal streams as small isolated populations, having been extirpated from much of their historic habitat.

Flood control projects, agriculture, off-highway vehicle use, urbanization, and campgrounds reduced many arroyo toad populations in size or caused their extirpation due to extensive habitat loss from 1920 to 1980 (Service 1999). The loss of habitat, coupled with habitat modifications

due to the manipulation of water levels in many central and southern California streams and rivers, and predation from introduced aquatic species, caused arroyo toads to disappear from a large portion of their previously occupied habitat in California (Jennings and Hayes 1994). Currently, the major threats to arroyo toad populations are from stream alteration, introduction of exotic species, urban and rural development, mining, recreation, grazing, drought, wildfire, and large flood events.

The recovery plan for the arroyo toad divides its range into the northern, southern, and desert recovery units (Service 1999). The recovery plan recommends that the arroyo toad be reclassified as a threatened species when management plans have been developed and implemented to secure the genetic and phenotypic variation of the species in each recovery unit; this goal would be accomplished by conserving the necessary riparian and upland habitats on federally managed lands. Delisting would be pursued when 15 additional self-sustaining populations of arroyo toads are known to exist, including those that occur on lands that are not managed by Federal agencies.

Unarmored threespine stickleback

Unarmored threespine sticklebacks are small fish (up to 2.36 inches) inhabiting slow moving reaches or quiet water microhabitats of streams and rivers. Favorable habitats usually are shaded by dense and abundant vegetation but in more open reaches algal mats or barriers may provide refuge for the species. Unarmored threespine sticklebacks feed primarily on benthic insects, small crustaceans, and snails, and to a lesser degree, on flat worms, nematodes, and terrestrial insects. Unarmored threespine sticklebacks reproduce throughout the year with a minimum of breeding activity occurring from October to January. Reproduction occurs in areas with adequate aquatic vegetation and gentle flow of water where males establish and vigorously defend territories. The male builds a nest of fine plant debris and algal strands and courts all females that enter his territory; a single nest may contain the eggs of several females. Following spawning, the male defends the nest and, after approximately six days, the newly hatched fry. Unarmored threespine sticklebacks are believed to live for only one year (Service 1985).

Unarmored threespine sticklebacks historically were distributed throughout southern California but are now restricted to the upper Santa Clara River and its tributaries in Los Angeles and Ventura counties, Cañada Honda and San Antonio creeks on Vandenberg Air Force Base, Shay Creek (tributary to Baldwin Lake) in San Bernardino County, and San Felipe Creek in San Diego County. The population in Cañada Honda Creek is a transplanted population, as is the small population that may persist in San Felipe Creek.

The unarmored threespine stickleback was listed as endangered in 1970 (35 *Federal Register* 16047) primarily due to competition with or predation by non-native fish, loss of habitat through urbanization and channelization, and introgression with other subspecies of sticklebacks. Critical habitat for the unarmored threespine stickleback was proposed in 1980 for two reaches of the Santa Clara River, and single reaches of both San Francisquito Creek and San Antonio Creek;

designation of critical habitat remains pending (45 *Federal Register* 76012). The recovery plan for the unarmored threespine stickleback (Service 1985) provides additional information on the biology of the species, reasons for its decline, areas of essential habitat, and the actions needed for recovery of the species. The unarmored threespine stickleback is a fully protected species under California law. See California Fish and Game Code, Section 5515 (b)(9).

ENVIRONMENTAL BASELINE

The implementing regulations for section 7(a)(2) define the action area of a consultation as the area that may be directly or indirectly affected by the proposed action (50 Code of Federal Regulations 402.02). Given the topography of the area, the alterations of the flood plain caused by previous human activities, the ecology of the arroyo toad and unarmored threespine stickleback, and the potential effects of the proposed action, we are considering the action area for this biological opinion to generally be the area of the flood plain, creek bed including the stream channel, and the reach of Castaic Creek from Interstate 5 downstream to its confluence with the Santa Clara River. The unarmored threespine stickleback can periodically occur in Castaic Creek during winter storm events and releases from Castaic Lake. Additionally, unarmored threespine stickleback are known to occur downstream of the project site at the confluence with the Santa Clara River. These areas will be directly and indirectly affected by construction and installation of the bank protection.

In average rainfall years, parts of Castaic Creek are dry by mid-summer and remain dry until winter rains recharge the alluvium. Flows in the project area are influenced by the water releases from Castaic Lake approximately three miles upstream of the project area. When water is released from Castaic Lake, the project area supports a single and sometimes two small channels that range from shallow and open to relatively deep and heavily shaded. The main plant communities in the project area are cottonwood-willow riparian scrub, cottonwood forest and chaparral. Riparian vegetation at the project site is dominated by willows (*Salix* spp.), mulefat (*Baccharis salicifolia*) and Fremont cottonwood (*Populus fremontii*). Giant reed and tamarisk are also found in the riparian area at the project site, but are not the dominant species. Willow riparian scrub is found along the banks and bottom of the creek channel and is often subjected to scour during winter storm events. In areas where the active channel is wide, riparian vegetation is sparse or absent and areas of sand, gravel, and cobble are present. Nearly all of the uplands outside the stream banks are either developed or are heavily disturbed through agricultural or pre-grading activities.

Interstate 5 is immediately upstream of the Castaic Creek project site and the surrounding area is rapidly urbanizing. The area immediately surrounding the project site is moderately industrialized with some residential housing tracts and agricultural land.

Hasley Creek runs parallel with the east side of Commerce Center Drive. The Hasley Creek portion of the project begins approximately 900 feet south of where Commerce Center Drive crosses the previously lined Hasley Creek and continues to its confluence with Castaic Creek.

Vegetation occurring within the lower Hasley Creek project site consists of mulefat scrub and non-native grassland. Mulefat scrub and dry open floodplain is found within the drainage itself. The non-native grassland is found on the upland field next to the drainage. One coast live oak (*Quercus agrifolia)* and one cottonwood (*Populus fremontii*) exist within the proposed lower Hasley Creek project site. Hasley Creek has an approximately 20 year old Arizona-type crossing fitted with 12 inch and 16 inch PVC pipelines. The Arizona type crossing is located approximately 600 feet north of the confluence with Castaic Creek.

Arroyo toad

Surveys for the arroyo toad according to Service protocols were conducted from April to June 2001 along the project reach. No arroyo toads, tadpoles, or egg masses were observed in the project reach during the field surveys. However, suitable habitat does exist within the project reach, as well as, suitable habitat located downstream of the highway 126 overpass within Castaic Creek. The downstream suitable habitat has been surveyed for arroyo toads as part of the NRMP which also resulted in no arroyo toads, tadpoles, or egg mass observations (Impact Sciences 2001b). The presence of the arroyo toad has been documented in the Santa Clara River in locations from Castaic Junction upstream to the bridge at Bouquet Canyon (Courtois 2000; Sandburg 2001a and 2001b). Six arroyo toad tadpoles were reported within the NRMP area of the River between the I-5 bridge and Castaic Junction in 2000 (Courtois 2000). Upon further investigation, we found a report in the California Natural Diversity Data Base from 1994 of one individual arroyo toad captured and released upstream of the I-5 bridge over the River. The possibility exists that arroyo toads occurring within the Santa Clara River could colonize the project area via the downstream portion of Castaic Creek. As a result of this possibility, arroyo toads maybe killed or injured by the project activities and are therefore included as a covered species in this biological opinion. Suitable habitat does not exist for the arroyo toad within the Hasley Creek portion of the project area and therefore, those effects will not be addressed in this biological opinion.

Arroyo toads have been recorded at the following locations within the project vicinity; both above and immediately below the Castaic Lake Reservoir on Angeles National Forest and Los Angeles Department of Water and Power land within Castaic Creek; on upper San Francisquito Creek; and within the Santa Clara River adjacent to the Castaic Junction site. We consider the project area to be essential as a dispersal corridor for arroyo toads between upper Castaic Creek and the Santa Clara River.

Unarmored threespine stickleback

Surface flow in Castaic Creek is dependent on water releases from Castaic Lake. Because of the lack of surface flow and intermittent release of water from Castaic Lake, no surveys for unarmored threespine stickleback were conducted. However, unarmored threespine stickleback are known to occur downstream at the confluence with the Santa Clara River and have been observed in Castaic Creek as a result of dewatering operations for construction of the Commerce Center Drive Bridge (C. Dellith, Service, pers. obs.1999).

EFFECTS OF THE ACTION

Arroyo toads

Arroyo toads could be killed or injured, either on the ground surface or in their burrows, by vehicles associated with bank protection installation, repair, and maintenance. Trench excavation and placement of fill for temporary access roads could injure or kill arroyo toads by crushing them at the surface or within their burrows. Foot traffic by workers associated with the construction activities, biological surveys, and restoration activities could kill or injure arroyo toads. Revegetation activities involving the use of augers to dig holes for plantings could kill arroyo toads within burrows. Excavation of mounds of tailings from past sand and gravel mining operations may also kill or injure arroyo toads located in burrows. The potential for arroyo toads to be killed or injured during these activities would be greatest within riparian habitats when workers are concentrated in those areas, or at night along roads and sandy areas when arroyo toads are either actively foraging or moving to or away from Castaic Creek.

Construction activities, such as removal of riparian vegetation and movement of construction equipment in the riparian zone, could affect arroyo toads and their habitat. The project will result in a permanent loss of approximately 12.2 acres of riparian habitat. The permanent habitat loss is from construction and related activities. Approximately 8.3 acres of riparian habitat will be temporarily affected by the project activities. Loss of riparian habitat would diminish available burrowing and foraging habitat for arroyo toads.

Project-related dust, noise, and activity near habitat occupied by arroyo toads could disturb individuals to the extent that foraging and burrowing behavior could be altered. If construction activities are scheduled to occur during nighttime hours, more arroyo toads are likely to be affected due to the nocturnal behavior of this species. Although the site is not expected to be fully restored for several years following construction activities, restoration of the site and removal of invasive, exotic vegetation, as proposed by Valencia Company, would help minimize the long-term effects of the project on the arroyo toad as related to habitat degradation.

When heavy equipment is used in proximity to aquatic habitats, the potential exists that these sensitive areas may be destroyed or degraded. The direct placement of material or runoff of sediments generated by the project into aquatic habitats can result in the loss of habitat values through filling or in the degradation of water quality. Arroyo toads are likely to be particularly sensitive to both direct filling of streams and sedimentation; the shallow pools this species requires for breeding can be destroyed by the addition of relatively small amounts of material, either by direct filling or by the alteration of the sandy and gravelly substrata that the arroyo toad requires. Arroyo toads may also be particularly vulnerable to the release of toxic materials because they generally use aquatic habitats with low flows; under such environmental conditions, toxins may be more concentrated and lethal. Additionally, the slow flows associated with breeding pools may increase the likelihood that fine sediments carried into the pools would remain there smothering eggs and tadpoles. Measures proposed by the Valencia Company to

reduce sedimentation effects include Best Management Practices such as those described in the NRMP (Corps and CDFG 1998). Permanent effects would include loss of riparian habitat due to bank protection placement and soil compaction on the bank protection structure itself.

Runoff from areas where concrete is being used could cause increases in water pH. Substantial increases would kill all life stages of the arroyo toad for some distance downstream of the release; a release of such materials resulted in mortalities of California red-legged frogs and arroyo toads in Mono Creek in the Los Padres National Forest in the early 1990s. The rate of water flow and amount of released material would affect the distance over which the pH would be altered. Because such effects could extend far beyond the actual work area, the number of arroyo toads that may be killed could be substantial. Equipment storage, fueling, and staging areas would be located on upland sites a minimum of 100 feet away from the nearest surface flow; this measure would reduce the potential for arroyo toad mortality and reduce the likelihood that toxic materials would inadvertently reach aquatic habitat.

Employees of Valencia Company and other personnel associated with the project could travel outside of areas where work is occurring; such activities, particularly with vehicles, could kill or injure arroyo toads and damage their habitat. Flagging of the construction areas may help reduce intrusions. Careless workers could release toxic materials, leave garbage that would attract predators of the arroyo toad, or conduct activities outside of designated areas. Valencia Company has proposed to limit construction activities in the creek bed, and define and mark the limits of project disturbance. These measures should be effective in reducing direct mortality or injury of arroyo toads during bank protection installation.

Creek surface flows in the construction area would not be impeded; water flows would be diverted or placed into culverts in the construction area. Because surface flow diversion equipment or culverts are set in place after all arroyo toads have metamorphosed, the likelihood of arroyo toad eggs mass destruction or tadpole deaths would be reduced.

Biologists working in different areas and with different species may transmit diseases. In some cases, these introduced diseases have had catastrophic effects on amphibian populations. Some evidence exists that other environmental stresses, such as the chytrid fungus introduction into San Francisquito Creek, may exacerbate the effects of diseases on amphibians (Rick Farris, Service, pers. comm. 2002).

Arroyo toads in various life stages could be affected by trampling while the site is being accessed, or by installation of fencing material. Impacts to arroyo toad egg masses and tadpoles would be most severe if fencing were installed through breeding pools. The Corps and Valencia Company propose to survey the construction area, including breeding pools, and monitor construction activities in order to avoid arroyo toad egg masses and tadpoles to help reduce the likelihood of arroyo toad deaths.

Following the construction of bank protection, the affected reach of the creek will lack streamside vegetation. This may allow invasive, exotic vegetation to establish and become dominant in the project area, reducing habitat for the arroyo toad. To prevent the spread of exotic vegetation in the project site, the Valencia Company will remove exotic vegetation from the project area during grubbing operations, and monitor and control infestations of exotic vegetation infestation in the project area during the planned restoration and re-vegetation of the riparian habitat.

Summary

In general we expect the number of arroyo toads, tadpoles, or eggs killed or injured to be low. Mortality or injury could vary, depending on weather conditions and the amount of surface flow in Castaic Creek. If more water is present which could provide better habitat for arroyo toads, then the likelihood of effects to arroyo toads could increase. During and after years when rainfall is favorable for breeding, additional arroyo toads may move into the project area.

Ground-disturbing activities, revegetation activities, mound tailings excavation, the removal of exotic vegetation, and surveys or monitoring may cause injury and mortality of arroyo toads. We expect the project will temporarily affect 8.3 acres of arroyo toad habitat and permanently affect 12.2 acres of arroyo toad habitat. Overall, because no arroyo toads have been observed in the project area, we expect that few arroyo toads are likely to be killed or injured by project activities.

Unarmored threespine stickleback

Valencia Company indicates that, depending on the amount of precipitation from the previous winter storm season and the associated elevation of the groundwater in the project area, construction of soil cement bank protection could require substantial dewatering activities. With ongoing and substantial dewatering activities, the discharged nuisance water could connect with the Santa Clara River, allowing unarmored threespine stickleback to migrate upstream into Castaic Creek. In the event that blocking nets as proposed by Valencia Company fail and individual unarmored threespine sticklebacks move into the project area, the proposed construction activities could affect the species.

If blocking nets fail, individual unarmored threespine sticklebacks that enter the project area may be injured or crushed by excavation and construction equipment, construction debris or worker foot traffic during construction activities. The noise and ground vibrations from the operation of heavy equipment during construction activities may disturb unarmored threespine sticklebacks and cause individuals to disperse and possibly be driven into areas where they would be more susceptible to injury or mortality due to predation, vehicular or foot traffic, or falling debris. The dewatering and diversion of water from the project area could result in the direct mortality of unarmored threespine sticklebacks from dessication or crushing. The use of blocking nets, as proposed by the Valencia Company, would lessen the chance for unarmored threespine sticklebacks to enter the project area.

Furthermore, with the termination of the above dewatering activities, unarmored threespine stickleback could become stranded in Castaic Creek as the flow recedes. Percolation rates in Castaic Creek may exceed flow rates stranding unarmored threespine sticklebacks in receding pools and channels once dewatering activities have been terminated. Valencia Company proposes to gradually step-down water discharges once dewatering is no longer needed and monitor for any unarmored threespine stickleback. Service-approved biologists will capture stranded unarmored threespine stickleback and relocate them to a predetermined downstream site.

Disturbance of unarmored threespine sticklebacks would occur while capturing and transporting individuals to suitable habitat. Individuals may also be injured or killed in a seine net should it be used improperly, such as if fish remained trapped in the net or out of water for too long. Mortality following translocation may occur given the uncertainty of the survival of unarmored threespine sticklebacks in unfamiliar sites or from injuries and stress related handling and transportation. These effects would be reduced by the following actions that Valencia Company proposes: clearly marking the boundaries of the work areas, removing unarmored threespine sticklebacks from project areas to suitable habitat out of harm's way immediately prior to any construction activities, rescuing any stranded individuals, and by employing only experienced biologists to capture and handle the species.

Project-related material releases onto channel substrate or into water would result in effects to water quality that may be hazardous to unarmored threespine sticklebacks. Debris falling into the river may also degrade water quality. As proposed by the Valencia Company, the implementation of measures to control pollution, such as refueling at designated areas and containment of spilled substances, would reduce these effects.

Employees of the Valencia Company and other personnel associated with the project could travel outside of areas where work is occurring; such activities, particularly with vehicles, could kill or injure unarmored threespine stickleback. Careless workers could release toxic materials, leave garbage and food-related items that would attract predators of the unarmored threespine stickleback, or conduct construction related activities outside of designated areas. Flagging of the construction areas may help reduce intrusions.

To reduce the likelihood that all of the preceding impacts would occur, the Corps and Valencia Company have proposed to educate workers regarding the presence of the arroyo toad and unarmored threespine stickleback and the importance of keeping work sites clear of trash and remaining within authorized work areas (A. Allen, pers. comm. 2002). Such education programs, when used during other projects that could affect listed species, have been effective in preventing loss and degradation of habitat and loss of individuals.

Summary

Under normal conditions, as determined by controlled water releases from Castaic Lake Reservoir, unarmored threespine stickleback would not occur in Castaic Creek. However, sufficient surface flows from dewatering of the project site could connect at the confluence with

the Santa Clara River allowing unarmored threespine stickleback to swim upstream into the project site. Termination of dewatering operations and stream diversion activities may leave unarmored threespine stickleback stranded in receding stream water and could likely result in mortality or injury of some individuals.

Repeated capturing of unarmored threespine sticklebacks would likely result in mortality or injury of at least some individuals. Even under the worst case scenario, that is, the mortality of a few unarmored threespine sticklebacks from construction activities or seining and handling, the overall population status of the species in the watershed would not be substantially altered by the proposed action.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The habitat and home range of arroyo toads vary in accordance with water flows and individuals may be found throughout the uplands within Castaic Creek. Consequently, the construction of the industrial complexes could effect the population of arroyo toads that could possibly occur in the Commerce Center project area. Upland areas immediately adjacent to the project site will be developed into industrial and commercial uses. The development will include light industrial, manufacturing, research and development, warehouses and distributors. The loss of upland habitat could reduce area needed by arroyo toads for foraging and dispersal.

CONCLUSION

After reviewing the current status of the arroyo toad and unarmored threespine stickleback, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the Castaic Creek bank stabilization project, as proposed, is not likely to jeopardize the continued existence of either of these species. We have reached this conclusion for the following reasons:

1. The number of arroyo toads and unarmored threespine stickleback that could be affected by the Castaic Creek bank stabilization projects is small in relation to the overall distribution of the species. Surveys of the area did not detect arroyo toads or unarmored threespine stickleback within the project site and we do not believe those that could be affected would constitute a substantial portion of the entire species' population to where it would interfere with the species' survival and recovery.

2. The applicant has proposed measures to minimize and avoid some of the adverse effects to the species, including monitoring the project are for arroyo toads or unarmored

threespine sticklebacks by Service-approved biologists; providing procedures for relocating listed species out of harm's way, and restoration of temporary disturbance areas.

3. The applicant has proposed measures to restore disturbed habitats.

4. Blocking nets installed by the applicant should prevent unarmored threespine stickleback from entering project related flows that may contact non-project flows in Castaic Creek or the Santa Clara River. Therefore, the number of individual unarmored threespine sticklebacks expected to be affected is small.

The Incidental Take Statement accompanying this Biological Opinion exempts from the take prohibitions of the Act, take of the unarmored threespine stickleback and arroyo toad carried out in accordance with the terms and conditions of the Incidental Take Statement. It does not address the restrictions or requirements of other applicable laws.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the Valencia Company, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the Valencia Company to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the effect of incidental take, the Corps and Valencia Company must report to the Service the progress of the action and its effect on the species as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Arroyo toad

The Service anticipates incidental take of the arroyo toad will be difficult to detect for the following reasons: (1) the numbers of individuals that could be present is unclear; (2) the arroyo toad is generally difficult to detect due to its cryptic coloration and small body size; (3) finding a dead or impaired specimen is unlikely; and (4) losses may be masked by seasonal fluctuations in numbers or other causes (*e.g.*, low rainfall years, changes in hydrology unrelated to the projects). However, the following level of take of this species can be anticipated by loss of habitat, temporary construction effects, cumulative effects, changes in hydrology and water quality, and indirect effects:

> If arroyo toads have colonized the project area and are present during project activities then all arroyo toads found in the project areas may be subject to take in the form of capture during relocation efforts. An indeterminate number of arroyo toads may be directly killed or injured by construction activities (*e.g.*, placement of bank stabilization materials, heavy equipment movement in the streambed, etc.) along Castaic Creek. Based on the nature of the proposed activities and the protective measures proposed by the applicant, and the likely low abundance of individuals of the species, we anticipate that few arroyo toads will be killed or injured.
>
> If more than one (1) adult, juvenile (metamorph), or larval arroyo toad is killed or injured or if any egg masses are disturbed during implementation of the project along Castaic Creek, regardless of cause, the Corps shall contact our office immediately so we can review the project activities to determine if additional protective measures are needed. Project activities may continue during this review period, provided that all protective measures proposed by the Corps and the terms and conditions of this biological opinion have been and continue to be implemented. No take of arroyo toads is anticipated in Hasley Canyon, as no arroyo toads are expected to be present based upon the lack of suitable habitat.

Unarmored threespine stickleback

No take of unarmored threespine stickleback would occur if the minimization measures proposed by the Corps and Valencia Company are effective. However, if unarmored threespine stickleback are able to breach blocking nets and access the project area, then some level of take is anticipated. Also, if unarmored threespine sticklebacks have entered the project area and are present during dewatering activities then all unarmored threespine sticklebacks found in the project produced flows may be subject to take in the form of capture during relocation efforts. The actual number of unarmored threespine sticklebacks that may be taken cannot be accurately predicted because of their small size and varying abundance in a given location. Because we are unable to anticipate with a great deal of certainty the number that may be killed or injured, the Corps shall contact the Service if more than one (1) unarmored threespine stickleback is killed or injured; the cause of death or injury shall be determined by the authorized biologist. Provided

that the protective measures proposed by the Corps and the terms and conditions of this biological opinion are being fully implemented, construction activities need not cease while the cause of death is being determined. Once the cause of death or injury has been determined, the Service and Corps shall decide whether any additional protective measures are required to address the cause of the loss of the unarmored threespine stickleback.

Take of arroyo toads and unarmored threespine sticklebacks are only exempted within the areas considered to be the action area as defined in the project description section of this biological opinion.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the arroyo toad and unarmored threespine stickleback:

1. Only Service-approved personnel may handle arroyo toads and unarmored threespine stickleback and only in an appropriate manner and for the minimum time necessary.

2. The Corps shall require that all activities that include diversion or dewatering, including restoration of flows after construction, shall be monitored by an approved biologist to locate and transfer to a safe area any arroyo toads, as well as unarmored threespine stickleback imperiled by the action.

3. The Corps shall require Valencia Company to confine all work to defined areas through barriers and education of workers. The education program shall include information on all relevant aspects of the measures intended to protect the arroyo toad and unarmored threespine stickleback.

4. The Corps shall ensure plans relating to the inadvertent release of hazardous materials are in place prior to the onset of ground-disturbing activities.

5. The Corps shall ensure that protective measures for the arroyo toad and unarmored threespine stickleback are consistently implemented.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Corps must ensure that Valencia Company complies with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

   a. Only qualified personnel authorized under the auspices of this biological opinion shall handle arroyo toads and unarmored threespine stickleback. The Corps or Valencia Company shall submit the credentials of biologists who they wish to handle arroyo toads and unarmored threespine stickleback to the Service, for its review and written approval, at least 15 days prior to the onset of the activities which they may be authorized to conduct.

   b. When capturing and removing arroyo toads and unarmored threespine stickleback from work sites, the Service-approved biologist shall minimize the amount of time that animals are held in captivity. During this time, they shall be maintained in a manner that does not expose them to temperatures or any other environmental conditions that could cause injury or undue stress.

   c. To avoid transferring disease or pathogens between aquatic habitats during the course of surveys and handling of arroyo toads, the Service-approved biologist shall follow the Declining Amphibian Population Task Force's Code of Practice. A copy of this Code of Practice is enclosed. You may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care shall be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

   d. With the exception of monitoring geared directly for arroyo toads, biological, hydrological, and other monitoring shall not be conducted within or adjacent to arroyo toad breeding pools or in areas where metamorph arroyo toads are abundant. The determination of abundance of metamorphs shall be made by the Service-approved biologist. The primary criterion to be used in determining if work in a given area must be delayed is whether the monitoring activities are likely to result in mortality of one metamorph. If the Service-approved biologist makes this determination and mortality cannot be avoided through the implementation of site- and instance-specific measures, the monitoring activity shall be delayed until such time when metamorphs are no longer abundant; alternatively, the monitoring shall be moved to another site. When in doubt regarding (1) whether metamorphs should be considered abundant; or, (2) whether the site- and instance-specific protective measures will protect metamorphs, the Service-approved biologist shall contact the Ventura Fish and Wildlife Office and Corps for guidance. Telephone contact may be used to expedite resolution of the issue.

   e. Arroyo toads and unarmored threespine stickleback shall be removed from the project area within and around all areas where construction or related activities occur. The procedures proposed by Valencia Company, as modified by these

terms and conditions, shall be implemented during the installation of channel lining. The breeding pools within project area shall be inspected during the arroyo toad breeding season for egg masses. If egg masses are found, then pools shall be flagged for avoidance until metamorphs have dispersed.

2. The following terms and conditions implement reasonable and prudent measure 2:

   a. The service-approved biologist shall assist project personnel in selecting the point(s) at which diversion and dewatering would disrupt the least amount of stream flow necessary to achieve project goals.

   b. The approved biologist shall be on site when dewatering is terminated in the event that arroyo toad tadpoles or unarmored threespine stickleback could become stranded during this activity.

3. The following terms and conditions implement reasonable and prudent measure 3:

   a. The service-approved biologist, in conjunction with Valencia Company and any contractors, shall determine the boundaries of work, storage, access, and staging sites. Habitat to be disturbed shall be restricted to the minimum necessary to accomplish the bank protection construction, given topography, project needs, and safety considerations.

   b. The boundary of work, storage, access, and staging sites shall be clearly marked by flagging or temporary fencing. Vehicles and all construction activities shall remain within the well-defined construction area, designated access roads, and staging areas.

   c. Intrusion by unauthorized vehicles into the creek bed and outside of construction limits shall be prohibited, with control exercised by an on-site foreman. Access routes to the construction area outside of work hours shall be blocked with physical barriers, such as chain-link fencing, concrete blocks or large equipment.

   d. A Service-approved biologist(s) shall conduct a training session for all project personnel prior to the onset of any ground-disturbing activities within the action area. At a minimum, the training shall include a description of the arroyo toad and unarmored threespine stickleback and their habitats; the general provisions of the Endangered Species Act; the necessity for adhering to the provisions of the Act; the penalties associated with violating the provisions of the Act; the specific measures that are being implemented to conserve the arroyo toad during construction; and the boundaries within which the specific actions may be accomplished. The program shall also cover the restrictions and guidelines that must be followed by all construction personnel to reduce or avoid effects on these species during project implementation.

4. The following term and condition implements reasonable and prudent measure 4:

   Prior to the onset of any ground-disturbing activity from the proposed action within or adjacent to arroyo toad or unarmored threespine stickleback habitat, the Corps shall review Valencia Company's plans to prevent the inadvertent spills of hazardous materials and to remediate any such spill that may occur. These plans shall specifically discuss the implications of spills in habitat of the arroyo toad and unarmored threespine stickleback and include methods to remediate these spills in the least damaging manner.

5. The following terms and conditions implement reasonable and prudent measure 5:

   a. The Service-approved biologist(s) shall have the authority to stop specific work activities until appropriate corrective measures are taken when unintended effects to arroyo toads or unarmored threespine sticklebacks occur. If an arroyo toad or an unarmored threespine stickleback is observed within a designated work area and cannot be avoided, all work shall stop until the animal leaves the work area or until it is captured and relocated by a Service-approved biologist to outside of the work area to avoid injury or mortality.

   b. If Valencia Company does not implement the protective measures for the arroyo toad or unarmored threespine stickleback, the Corps shall suspend work on that particular phase of Castaic/Hasley Creek channel lining project until such time that the Valencia Company is again in full compliance.

REPORTING REQUIREMENTS

The Corps shall provide a written annual report to the Service by January 31 of each year that this biological opinion is in effect. The report shall document the number of arroyo toads and unarmored threespine stickleback killed or injured by project activities. The report shall also provide a summary of the previous year's activities and their effects on the arroyo toad and unarmored threespine stickleback.

The report shall contain information on the following: (1) the type of activities that occurred in the action area (*e.g.*, construction activities, monitoring); (2) the location of these activities; (3) a description of the habitat in which these activities occurred; (4) the number of arroyo toads and unarmored threespine sticklebacks affected; (5) steps taken to avoid or minimize effects; (6) the number of arroyo toads and unarmored threespine sticklebacks relocated (as defined in the reasonable and prudent measures); (7) the locations from which arroyo toads and unarmored threespine sticklebacks were moved and to which they were relocated; (8) the status of removal activities for exotic vegetation; (9) the results of any surveys conducted for the arroyo toad and unarmored threespine stickleback in the previous year; (10) an analysis of the effectiveness of the monitoring plan and action levels and recommendations for any changes to the plan and action levels; and (11) any other pertinent information. The first report will be due the first January after the initiation of ground-disturbing activities.

DISPOSITION OF DEAD OR INJURED SPECIMENS

Upon locating a dead or injured arroyo toad or unarmored threespine stickleback, initial notification must be made in writing to the Service's Division of Law Enforcement in Torrance, California (370 Amapola Avenue, Suite 114, Torrance, California 90501) and by telephone and writing to the Ventura Fish and Wildlife Office in Ventura, California, (2493 Portola Road, Suite B, Ventura, California 93003, (805) 644-1766) within three working days of the finding. The report shall include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Care shall be taken in handling dead specimens to preserve biological material in the best possible state for later analysis. Should any injured arroyo toads or unarmored threespine stickleback survive, the Service shall be contacted regarding their final disposition. The remains of arroyo toads or unarmored threespine stickleback shall be placed with the University of California at Santa Barbara [Contact: Mark Holmgren, University of California at Santa Barbara, EEMB Department, Santa Barbara, California, 93106, (805) 893-4098]. Arrangements regarding proper disposition of potential museum specimens shall be made with the University of California by the Corps or Valencia Company prior to implementation of any actions.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species, to help implement recovery plans, or to develop information.

1. The Corps should evaluate the effects of water withdrawals or surface flow diversions on the moisture content of stream side banks to determine whether burrowing arroyo toads may be affected.

2. The Corps should conduct studies to increase our understanding of the population dynamics of the arroyo toad and unarmored threespine stickleback in this area. Such studies could include radio-tagging of adult arroyo toads and full surveys of this reach of the Castaic Creek during the breeding season. This type of research and the data obtained could greatly assist the Corps and Valencia Company in future consultations within arroyo toad habitat.

3. Valencia company should pursue additional vegetation enhancement, exotic plant removal, and African clawed frog control opportunities in the Castaic Creek corridor to further the recovery of the arroyo toad and unarmored threespine stickleback.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the Corps proposed Castaic Creek Channel Lining project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Chris Dellith of my staff at (805) 644-1766.

Sincerely,

Carl T. Benz
Assistant Field Supervisor
South Coast/Deserts

Enclosure

cc: Betty Courtney, California Department of Fish and Game

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The Declining Amphibian Populations Task Force Fieldwork Code of Practice

1. Remove mud, snails, algae, and other debris from nets, traps, boots, vehicle tires, and all other surfaces. Rinse cleaned items with sterilized (*e.g.*, boiled or treated) water before leaving each study site.

2. Scrub boots, nets, traps, and other types of equipment used in the aquatic environment with 70 percent ethanol solution or a bleach solution of one-half to one cup of bleach in one gallon of water and rinse clean with sterilized water between study sites. Avoid cleaning equipment in the immediate vicinity of a pond, wetland, or riparian area.

3. In remote locations, clean all equipment with 70 percent ethanol or a bleach solution, and rinse with sterile water upon return to the lab or a "base camp." Elsewhere, when laundry facilities are available, remove nets from poles and wash (in a protective mesh laundry bag) with bleach on a "delicate" cycle.

4. When working at sites with known or suspected disease problems, or when sampling populations of rare or isolated species, wear disposable gloves and change them between handling each animal. Dedicate separate sets of nets, boots, traps, and other equipment to each site being visited. Clean and store them separately at the end of each field day.

5. Safely dispose of used cleaning materials and fluids. Do not dispose of cleaning materials and fluids in or near ponds, wetland, and riparian areas; if necessary, return them to the lab for proper disposal. Safely dispose of used disposable gloves in sealed bags.

6. When amphibians are collected, ensure the separation of animals from different sites and take great care to avoid indirect contact *(e.g.*, via handling or reuse of containers) between them or with other captive animals. Do not expose animals to unsterilized vegetation or soils which have been taken from other sites. Always use disinfected and disposable husbandry equipment.

7. If a dead amphibian is found, place it in a sealable plastic bag and refrigerate (do not freeze). If any captured live amphibians appear unhealthy, retain each animal in a separate plastic container that allows air circulation and provides a moist environment from a damp sponge or sphagnum moss. For each collection of live or dead animals, record the date and time collected, location of collection, name of collector, condition of animal upon collection, and any other relevant environmental conditions observed at the time of collection. Immediately contact the Ventura Fish and Wildlife Office at (805) 644-1766 for further instructions.

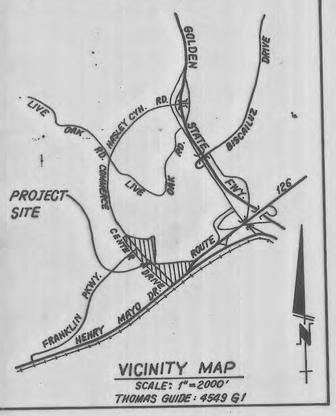
The Fieldwork Code of Practice has been produced by the Declining Amphibian Populations Task Force with valuable assistance from Begona Arano, Andrew Cunningham, Tom Langton, Jamie Reaser, and Stan Sessions.

For further information on this Code, or on the Declining Amphibian Populations Task Force, contact John Wilkinson, Biology Department, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.
E-mail: DAPTF@open.ac.uk
Fax: +44 (0) 1908-654167

PACE
Advanced Water Engineering

Appendix G – As-built Drawings for Flow Diversion Berm (P.D. 2298, Unit III)

STORM DRAIN PLANS IN
D.S. No.485 P.D. No.2298 (UNIT III)



VICINITY MAP
SCALE: 1"=2000'
THOMAS GUIDE: 4549 G1

NPDES NOTES

ATTACHMENT A

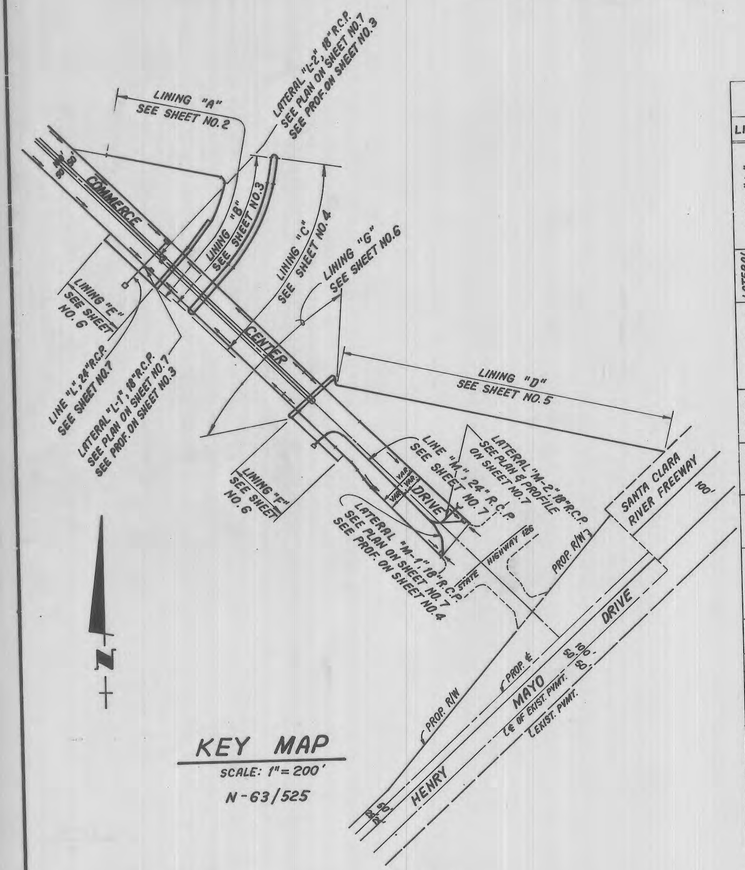
BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES*

The following is intended as an attachment for construction and grading plans and represent the minimum standards of good housekeeping which must be implemented on all construction sites regardless of size.

- ☐ Eroded sediments and other pollutants must be retained on site and may not be transported from the site via sheetflow, swales, area drains, natural drainage courses or wind.
- ☐ Stockpiles of earth and other construction related materials must be protected from being transported from the site by the forces of wind or water.
- ☐ Fuels, oils, solvents and other toxic materials must be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protected from the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system.
- ☐ Excess or waste concrete may not be washed into the public way or any other drainage system. Provisions shall be made to retain concrete wastes on site until they can be disposed of as solid waste.
- ☐ Trash and construction related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.
- ☐ Sediments and other materials may not be tracked from the site by vehicle traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental depositions must be swept up immediately and may not be washed down by rain or other means.
- ☐ Any slopes with disturbed soils or denuded of vegetation must be stabilized so as to inhibit erosion by wind and water.
- ☐ Other_____

B. The following BMPs as outlined in, but not limited to, the Best Management Practice Handbook, California Stormwater Quality Task Force, Sacramento, California, 1993, or the latest revised edition, may apply during construction (additional measures may be required if deemed appropriate by County):

CA001 - DEWATERING OPERATIONS
CA002 - PAVING OPERATIONS
CA003 - STRUCTURE CONSTRUCTION AND PAINTING
CA010 - MATERIAL DELIVERY AND STORAGE
CA012 - SPILL PREVENTION AND CONTROL
CA020 - SOLID WASTE MANAGEMENT
CA021 - HAZARDOUS WASTE MANAGEMENT
CA023 - CONCRETE WASTE MANAGEMENT
CA030 - VEHICLE AND EQUIPMENT CLEANING
CA031 - VEHICLE AND EQUIPMENT FUELING
CA032 - VEHICLE AND EQUIPMENT MAINTENANCE
CA040 - EMPLOYEE/SUBCONTRACTOR TRAINING
ESC01 - SCHEDULING
ESC02 - PRESERVATION OF EXISTING VEGETATION
ESC10 - SEEDING AND PLANTING
ESC11 - MULCHING
ESC20 - GEOTEXTILES AND MATS
ESC21 - DUST CONTROLS
ESC22 - TEMPORARY STREAM CROSSING
ESC23 - CONSTRUCTION ROAD STABILIZATION
ESC24 - STABILIZED CONSTRUCTION ENTRANCE
ESC30 - EARTH DIKE
ESC31 - TEMPORARY DRAINS AND SWALES
ESC32 - SLOPE DRAIN
ESC40 - OUTLET PROTECTION
ESC41 - CHECK DAMS
ESC50 - SILT FENCE
ESC51 - STRAW BALE BARRIERS
ESC52 - SAND BAG BARRIER
ESC53 - BRUSH OR ROCK FILTER
ESC54 - STORM DRAIN INLET PROTECTION



KEY MAP
SCALE: 1"=200'
N-63/525

HYDRAULIC ELEMENTS

LINE	STATION	Q_{50} IN C.F.S	SECTION	S.F.	VELOCITY IN FT./SEC.	DEPTH IN FEET
LINE "L"	5+14.00 TO 5+35.00	12.0	24"R.C.P	0.3225	12.7	0.61
	5+35.00 TO 5+50.00	6.0	24"R.C.P	0.3225	16.8	0.70
	5+50.00 TO 6+37.00	6.0	24"R.C.P	0.0100	5.9	0.89
LATERAL "L-1"	1+02.00 TO 1+35.60	6.0	18" R.C.P	0.1601	15.5	0.95
LINE "M"	4+98.50 TO 5+37.08	10.0	24" R.C.P	0.0020	3.18	9.00'
	5+37.08 TO 9+33.42	10.0	24" R.C.P	0.0020	3.18	7.17'
	9+33.42 TO 10+44.18	5.0	24" R.C.P	0.0004	1.75	4.76'
LATERAL "M-1"	1+02.00 TO 2+01.91	5.0	18" R.C.P	0.0023	2.83	4.51
LATERAL "M-2"	1+01.41 TO 1+34.59	NGL.	18" R.C.P	—	—	—
LATERAL "L-2"	1+01.00 TO 1+22.75	NGL.	18" R.C.P	—	—	—
CASTAIC CREEK	BEGINNING TO END OF LININGS C,D,F & G	50.700	NATURAL CHANNEL WITH 1½:1 SIDE SLOPES	0.0188	10.81	14.9
HASLEY CYN. CREEK	BEGINNING TO END OF LINING E		NATURAL CHANNEL WITH 1½:1 SIDE SLOPES			
	BEGINNING TO STA 10+50.00	50.700		0.0188	10.81	14.9
	LININGS A & B	9.700	NATURAL CHANNEL WITH 1½:1 SIDE SLOPES			
	STA. 10+50.00 TO END OF LININGS A & B			0.0272	6.89	4.4

NGL.- NEGLIGIBLE

NO.	REVISION	REVISED BY	APPROVED BY	DATE

BENCH MARK CL 3976
LACRD BM
RDBM TAG IN C.B. 4 FT. N. B.C.R. TO FT. N.
AND 32 FT. E. CL INT. OLD ROAD AND
HASLEY CYN. ROAD OFF-RAMP

NEWHALL QUAD (1983) ELEV. 1065.685

GENERAL NOTES(Cont'd)

21. ALL BACKFILL AND FILLS OUTSIDE OF STREET RIGHT OF WAY SHALL BE COMPACTED TO 90% OF MAXIMUM DENSITY AS DETERMINED BY A.S.T.M. SOIL COMPACTION TEST D1557-78 METHOD "D" UNLESS OTHERWISE SPECIFIED. THIS SHALL BE CERTIFIED BY A GEOTECHNICAL ENGINEER. THE CERTIFICATION SHALL BE SUBMITTED TO THE DIRECTOR OF PUBLIC WORKS PRIOR TO ACCEPTANCE OF WORK BY THE COUNTY.

22. ALL BACKFILL AND FILLS WITHIN STREET RIGHT OF WAY SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 306-1.3.4 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED AND INSPECTED BY THE DEPARTMENT. CONTRACTOR SHALL NOTIFY THE INSPECTOR AT LEAST 24 HOURS IN ADVANCE FOR SOIL TESTING AS REQUIRED BY THE INSPECTOR.

23. PIPE BEDDING SHALL BE:
IN ACCORDANCE WITH LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS STANDARD DRAWING NO 3092 UNLESS OTHERWISE NOTED. THE BEDDING MATERIAL PLACED FROM THE BOTTOM OF THE PIPE TO 1 FOOT OVER THE TOP OF THE PIPE SHALL BE SAND, CRUSHED AGGREGATE, OR NATIVE FREE-DRAINING GRANULAR MATERIAL AND SHALL HAVE A SAND EQUIVALENT OF 20 OR GREATER.

24. PIPE SHALL BE EMBEDDED 5 INCHES INTO ALL STRUCTURES INCLUDING INLET AND OUTLET HEADWALLS, UNLESS OTHERWISE SPECIFIED.

25. UNLESS OTHERWISE SPECIFIED IN THE PROFILE ON THESE PLANS, THE PIPE SHALL BE MANUFACTURED WITH A MINIMUM CONCRETE COVER OVER THE STEEL IN THE INVERT OF 0.75 INCHES FOR R.C.P. UP TO 96 INCHES IN DIAMETER AND 1.25 INCHES FOR PIPE GREATER THAN 96 INCHES IN DIAMETER.

26. ALL CATCH BASINS WITHIN THE DEDICATED STREET RIGHTS-OF-WAY SHALL BE CONSTRUCTED PER THE STREET PLANS.

27. THE CONTRACTOR SHALL PROVIDE TO THE SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS A SYSTEM FOR CONTRIBUTORY DRAINAGE TO BE OPERABLE AT ALL TIMES UNTIL THIS STORM DRAIN SYSTEM IS ACCEPTED FOR MAINTENANCE. THIS MAY HAVE TO BE DESIGNED BY A CIVIL ENGINEER.

28. ALL REFERENCES ON THIS PLAN TO THE COUNTY ENGINEER, ROAD DEPARTMENT, OR FLOOD CONTROL DISTRICT SHALL APPLY TO THE APPROPRIATE ELEMENTS OF THE DEPARTMENT OF PUBLIC WORKS.

29. EXISTING UTILITIES SHALL BE MAINTAINED IN PLACE BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.

30. WHERE THE UTILITIES ARE INDICATED ON THE DRAWINGS TO BE SUPPORTED, SAID SUPPORTS SHALL BE IN ACCORDANCE WITH STANDARD PLANS FOR CONSTRUCTION NO. 224, UNLESS OTHERWISE INDICATED.

31. ALL OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES SHALL BE SEALED WITH 8 INCHES OF BRICK AND MORTAR OR 6 INCHES OF CONCRETE, UNLESS OTHERWISE SHOWN.

32. MANHOLES NO.1,2,3, AND 4, SHALL USE THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION NO. 630 FOR THE "FRAME AND COVER" AND NO 635 FOR THE "STANDARD DROP STEP".

33. THIS STORM DRAIN WILL NOT BE ACCEPTED FOR MAINTENANCE UNTIL THE STREETS HAVE BEEN PAVED. MANHOLES BROUGHT TO GRADE AND THE SYSTEM CLEANED TO SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS.

34. THE LATEST REVISED STANDARD PLAN OR DRAWING SHALL BE USED UNLES OTHERWISE SPECIFICALLY NOTED.

35. A NPDES PERMIT FROM THE REGIONAL WATER QUALITY CONTROL BOARD IS REQUIRED BEFORE ANY DISCHARGE OF NON-STORM WATER INTO THE STORM DRAIN IS ALLOWED.

LIST OF STANDARDS

	L.A.C.D.P.W.	A.P.W.A.
1. M.H. NO.1	PER	(321-0)
2. CURB OPENING CATCH BASIN	PER	300-0
3. STANDARD M.H. SHAFT	PER	(324-0)
4. M.H. FRAME AND COVER	PER	630-0
5. STEEL STEP	PER	635-0
6. C.B. MANHOLE FRAME AND COVER	PER	312-0
7. C.B. REINFORCEMENT	PER	309-0
8. MONOLITHIC C.B. CONNECTION	PER	308-0
9. C.B. FACE PLATE ASSEMBLY		
10. AND PROTECTION BAR	PER	310-0
11. FRAME AND GRATING FOR C.B.	PER	311-0
12. LOCAL DEPRESSION AT C.B.	PER	313-0
13. J.S. NO.2	PER	(331-0)
14. CHAIN LINK FENCE AND GATES	PER	600-0
15. PIPE BEDDING	PER	3092-0
16. SAFETY REQUIREMENTS	PER	6008-0
17. CONCRETE COLLAR	PER	380-1

GENERAL NOTES:

1. A PERMIT SHALL BE OBTAINED AND A DEPOSIT PAID TO THE DEPARTMENT OF PUBLIC WORKS AT THE PERMIT COUNTER, 900 SOUTH FREMONT AVENUE 8-TH FLOOR, ALHAMBRA AT LEAST 72 HOURS PRIOR TO STARTING WORK UNDER THIS CONTRACT. COPIES OF ALL OTHER REQUIRED PERMITS, SUCH AS FLOOD CONTROL DISTRICT AND ROAD EXCAVATION, MUST BE FILED WITH THE PERMIT APPLICATION.
2. WHEN WORK IS WITHIN A CONTRACT CITY, THE CONTRACTOR MUST CONTACT THE DIRECTOR OF PUBLIC WORKS OF THAT CITY TO DETERMINE THE LOCATION TO PAY THE INSPECTION DEPOSIT.
3. THE CONTRACTOR SHALL CONTACT THE DISTRICT OFFICE LISTED AT THE "APPLICATION FOR STORM DRAIN CONSTRUCTION INSPECTION FORM 1" TO ARRANGE FOR AN ACCEPTABLE CONSTRUCTION START DATE.
4. APPROVAL OF THIS PLAN BY THE COUNTY OF LOS ANGELES DOES NOT CONSTITUTE A REPRESENTATION TO THE ACCURACY OF THE LOCATION, OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THIS NOTE APPLIES TO ALL SHEETS.
5. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION". INCLUDING SUPPLEMENTS AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE DIRECTOR OF PUBLIC WORKS.
6. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 7-10.4.1 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION IN REGARD TO SAFETY ORDERS AND SHALL CONFORM TO THE "MINIMUM PUBLIC SAFETY REQUIREMENTS" AS SHOWN IN LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS STD. 6008-0.
7. ELEVATIONS ARE IN FEET ABOVE U.S.C. & G.S. MEAN SEA LEVEL DATUM OF 1929, UNLESS OTHERWISE INDICATED.
8. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAVE BEEN PLACED, INSPECTED AND APPROVED.
9. ALL STRUCTURAL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH AN ULTIMATE 28 DAY COMPRESSIVE STRENGTH OF 4000 p.s.i. UNLESS OTHERWISE NOTED.
10. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES (OR RADIAL) TO THE CONDUIT CENTER LINE EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
11. ALL STEEL ADJACENT TO FACE OF CONCRETE SHALL HAVE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
12. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL, PER A.S.T.M. A-615-GRADE 60.
13. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE "MANUAL OF STANDARD PRACTICE".
14. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER LINE OF STEEL UNLESS OTHERWISE NOTED.
15. ALL STEEL THAT IS TO BE CONTINUOUS SHALL HAVE A MINIMUN LAP OF 30 BAR DIAMETERS OR 18" WHICHEVER IS GREATER.
16. ALL CONSTRUCTION JOINTS IN THE FOOTING OF SLABS AND WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
17. ALL EXPOSED EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
18. UNLESS OTHERWISE SHOWN, CONCRETE DIMENSIONS SHALL BE MEASURED VERTICALLY OR HORIZONTALLY AND AND PARALLEL OR AT RIGHT ANGLES (OR RADIAL) TO THE CENTER LINE OF CONSTRUCTION.
19. CONCRETE BACKFILL IS REQUIRED WHEN THE THE PIPE HAS LESS THAN ONE FOOT OF COVER. THE CONCRETE BACKFILL SHALL CONSIST OF 1:3:5 MIX, PORTLAND CEMENT CONCRETE POURED FROM WALL TO WALL OF TRENCH AND FROM BOTTOM OF TRENCH TO A MINIMUM OF 4 INCHES OVER THE TOP OF THE PIPE.
20. ALL PIPES SHALL BE PLACED IN TRENCH IN NATURAL GROUND AND/OR COMPACTED FILL. THE GROUND LEVEL BEFORE THE TRENCHING SHALL BE AT LEAST 3 FEET ABOVE THE TOP OF THE PIPE ELEVATION, OR AT FINISH SURFACE ELEVATION, WHICHEVER IS LESS. ALL BACKFILLS IN EASEMENTS SHALL BE COMPACTED TO THE DENSITY REQUIRED BY THE GRADING PLAN.

RIPRAP NOTES

1. ROCKS FOR GROUTED RIPRAP SHALL BE GOOD QUALITY RIVER RUN ROCK. THE SMALLEST DIMENSIONS SHALL EXCEED 6 INCHES AND THE LARGEST DIMENSION SHALL NOT EXCEED 24 INCHES. THE LARGEST DIMENSION SHALL NOT EXCEED 4 TIMES THE SMALLEST DIMENSION.
2. THERE SHALL BE A GROUT BED OF AT LEAST 2 INCHES BENEATH THE FIRST LAYER OF ROCK. ALL THE VOIDS BETWEEN THE ROCKS SHALL BE FILLED WITH GROUT. MAXIMUM SPACING BETWEEN ROCKS SHALL BE 2 INCHES.
3. SURFACE ROCKS SHALL BE IMBEDDED FROM 1/2 TO 2/3 OF THEIR MAXIMUM DIMENSION.

NOTE: CONCRETE MAY BE SUBSTITUTED FOR THE GROUT.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED CIVIL ENGINEER No. 42690 _____ DATE _____

Exp. 12-31-98 — REGISTERED CIVIL ENGINEER — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — JOHN SAARKISSIAN — No. 42690 Exp. 3-31-98 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
SIGNATURE: _____ R.C.E. NO 42690

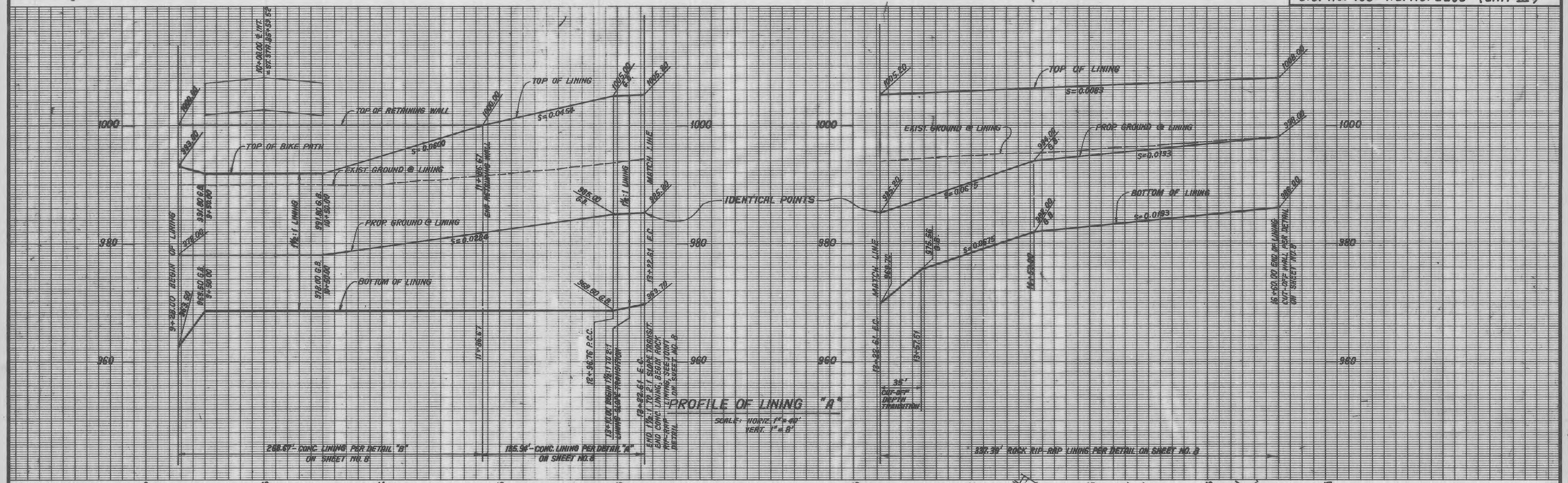
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

LAND DEVELOPMENT DIVISION
APPROVED BY: Ronald D. Anderson for ASSISTANT DEPUTY DIRECTOR DATE: 4-13-98
CHECKED BY: _____ R.C.E. NO 45691 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

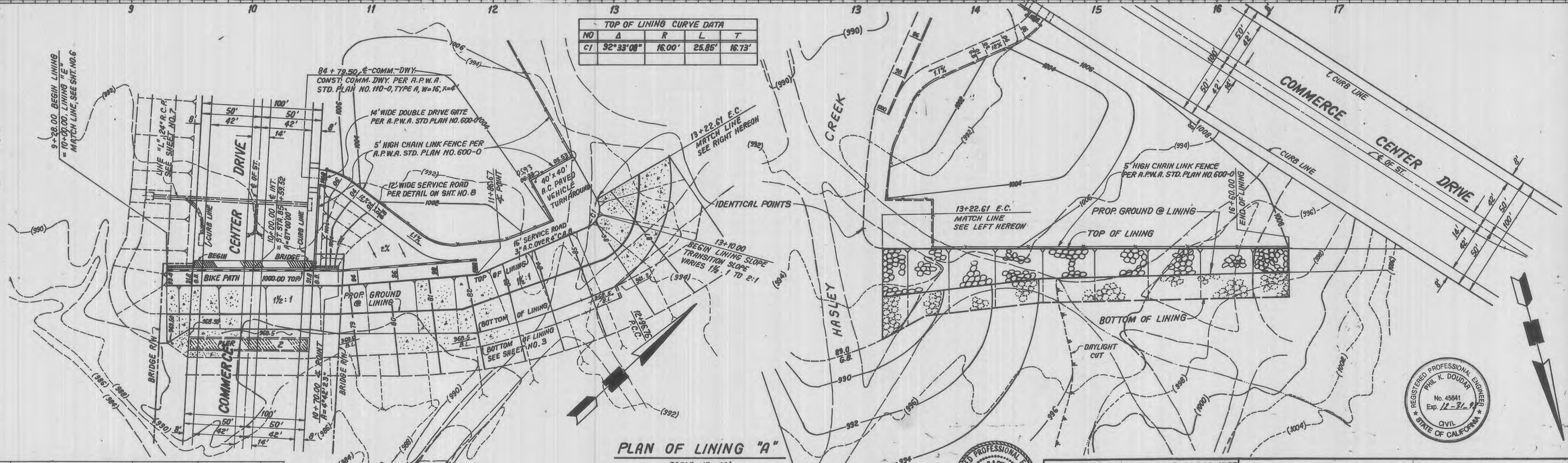
SHT 1 OF 9 SHTS

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO	Δ	R	L	T
C1	92°33'08"	16.00'	25.85'	16.73'



PLAN OF LINING "A"
SCALE: 1"=40'

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOUDAR
No. 45641
Exp. 12-31-99
CIVIL
STATE OF CALIFORNIA

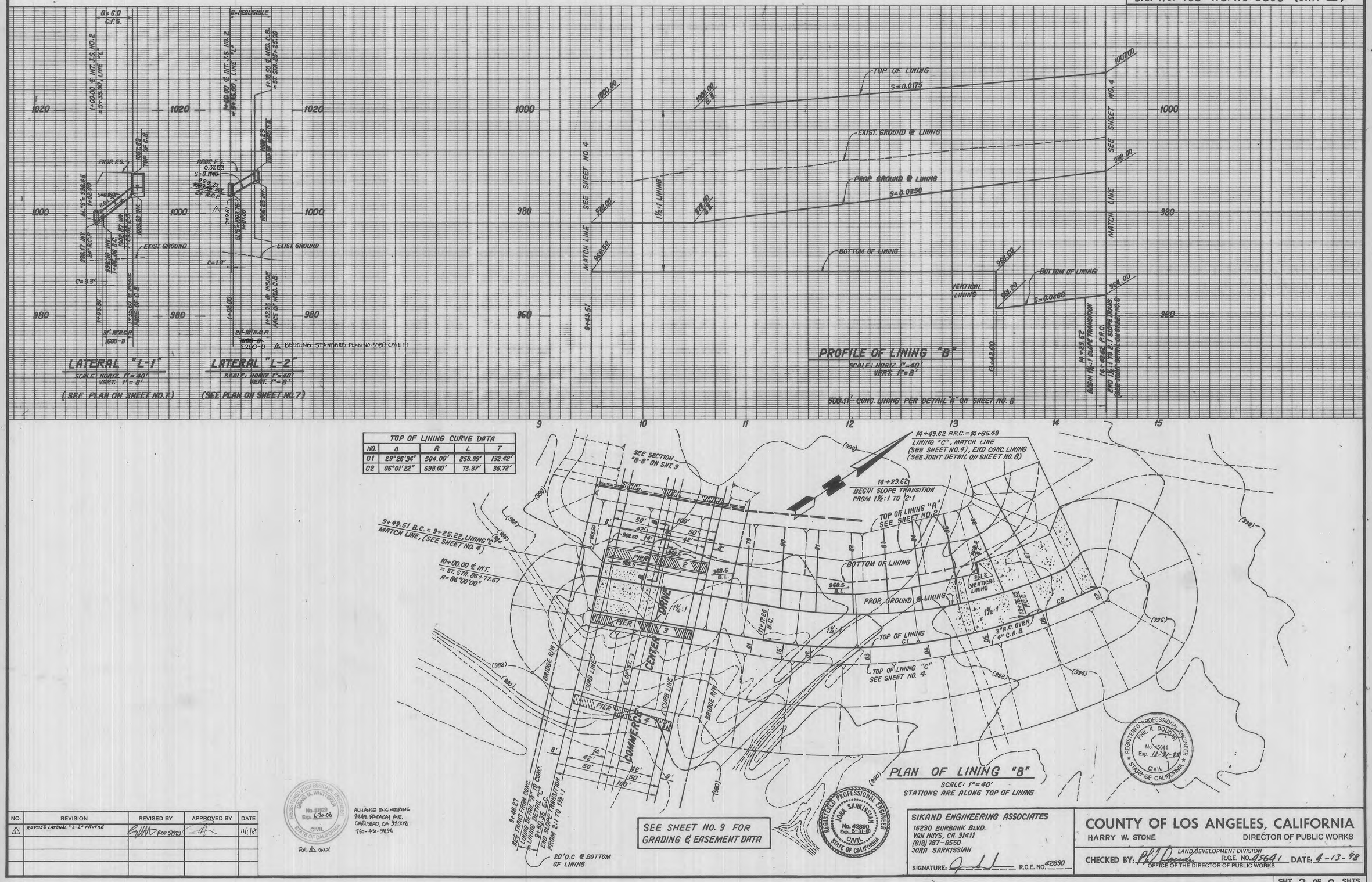
REGISTERED PROFESSIONAL ENGINEER
JORA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 43341 DATE: 4-18-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 2 OF 9 SHTS

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO.	Δ	R	L	T
C1	29°26'34"	504.00'	258.99'	132.42'
C2	06°01'22"	698.00'	73.37'	36.72'

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	REVISED LATERAL "L-2" PROFILE	[signature] RCE 51929	[signature]	11/1/97

REGISTERED PROFESSIONAL ENGINEER CRAIG M. WHITTEKER No. 51929 Exp. 6-30-08 CIVIL STATE OF CALIFORNIA

ALLIANCE ENGINEERING
2248 PARADAY AVE.
CARLSBAD, CA 92008
760-431-9896

FOR △ ONLY

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER PHIL K. DOUDAR No. 45641 Exp. 12-31-98 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: [signature] R.C.E. NO. 42890

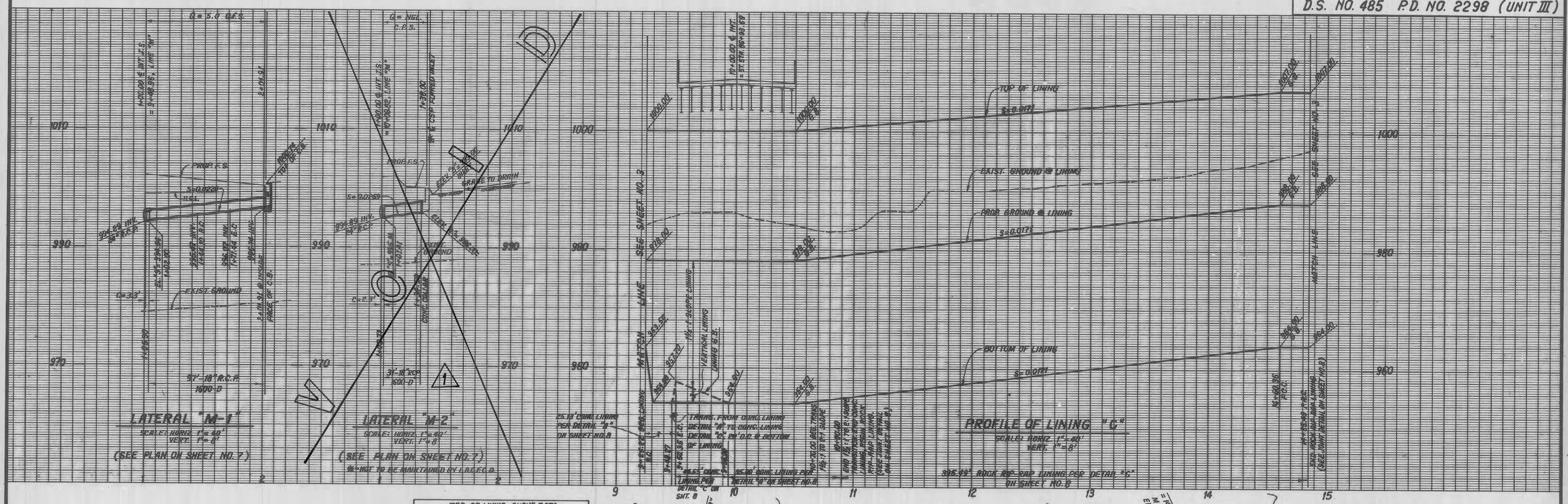
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
CHECKED BY: [signature] R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 3 OF 9 SHTS

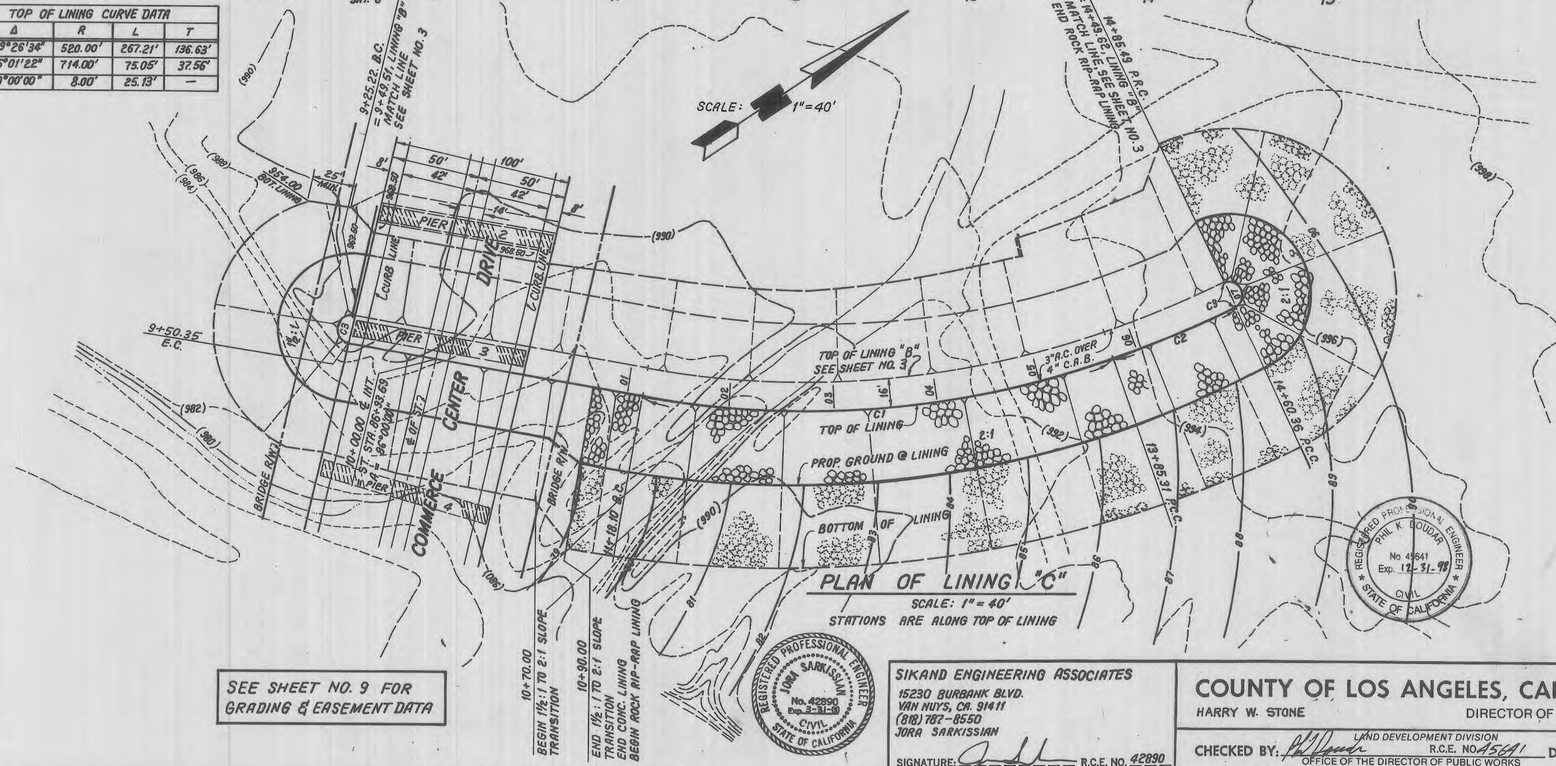
W.O. 1020-252-A

GM Jr (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



TOP OF LINING CURVE DATA				
NO.	Δ	R	L	T
C1	29°26'34"	520.00'	267.21'	136.63'
C2	06°01'22"	714.00'	75.05'	37.56'
C3	180°00'00"	8.00'	25.13'	—



NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	VOIDED LAT. "M-2" PROFILE.	42890		7/1/99

REGISTERED PROFESSIONAL ENGINEER
LINA SARKISSIAN
No. 42890
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
PHIL K. DOUDAR
No 45641
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JORA SARKISSIAN
SIGNATURE: R.C.E. NO. 42890

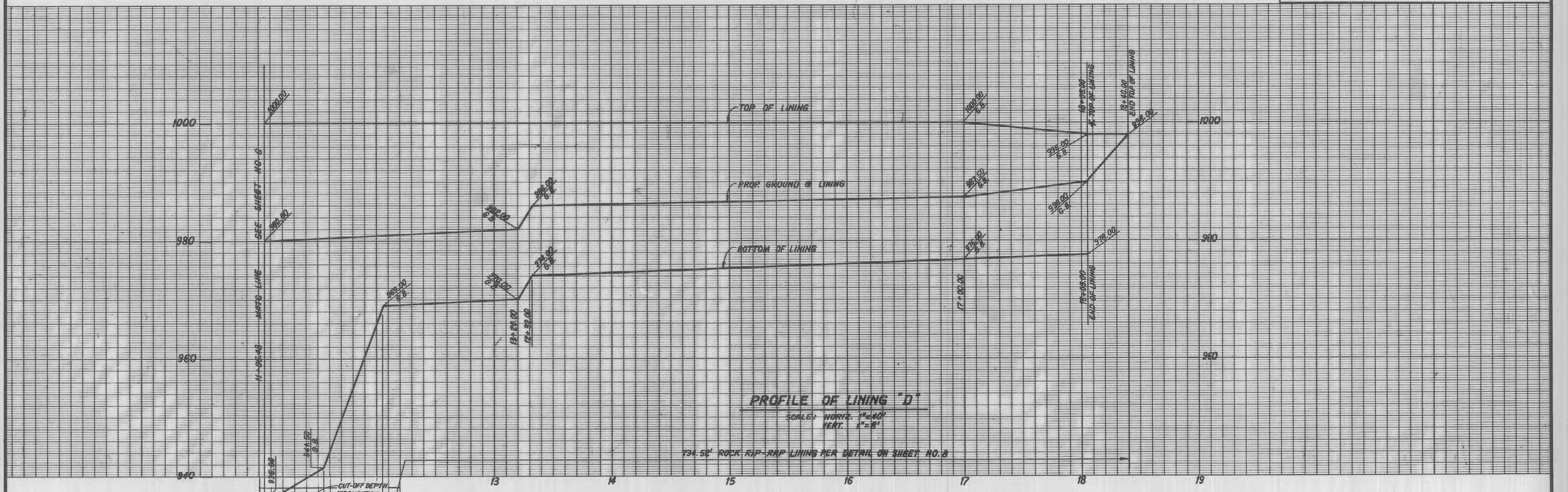
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE
DIRECTOR OF PUBLIC WORKS
CHECKED BY: LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 4 OF 9 SHTS

G.M. Jr. (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



PROFILE OF LINING "D"

SCALE: HORIZ. 1"=40'
VERT. 1"=8'

PLAN OF LINING "D"

SCALE: 1"= 40'

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
JORA SARKISSIAN
No. 42890
Exp. 3-31-00
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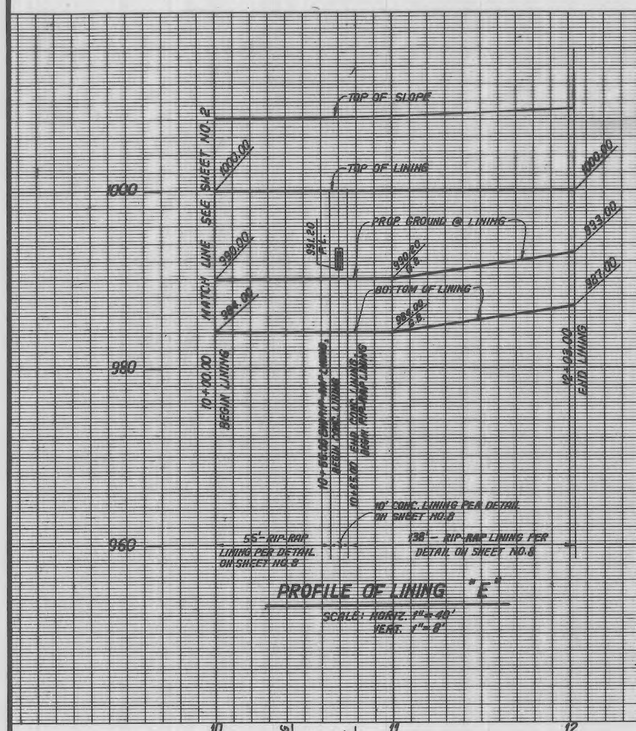
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

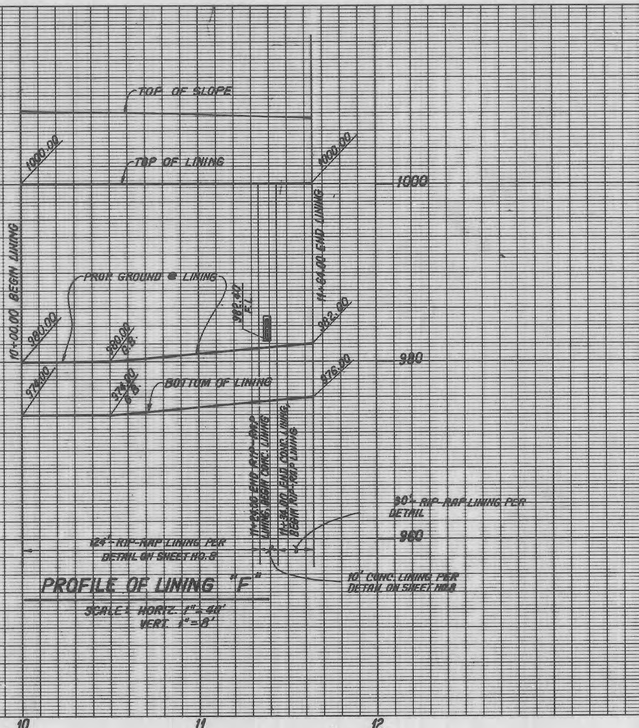
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION
R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

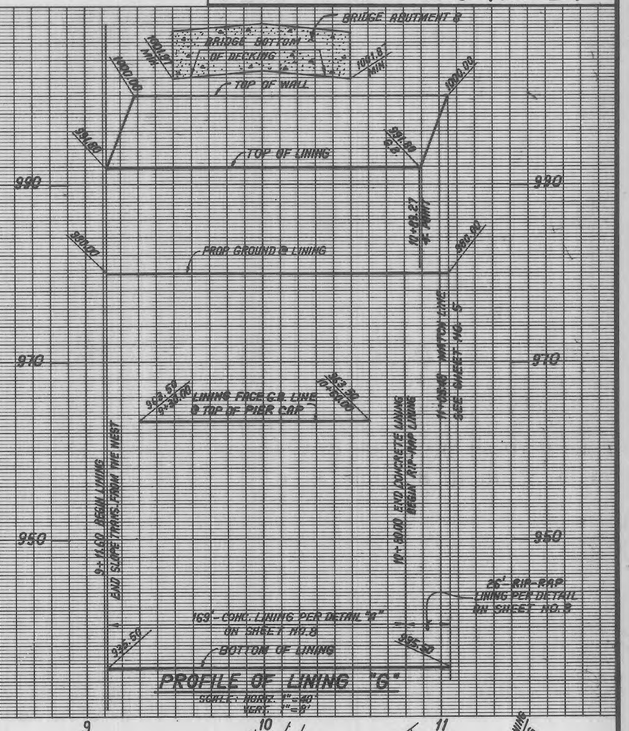
SHT 5 OF 9 SHTS

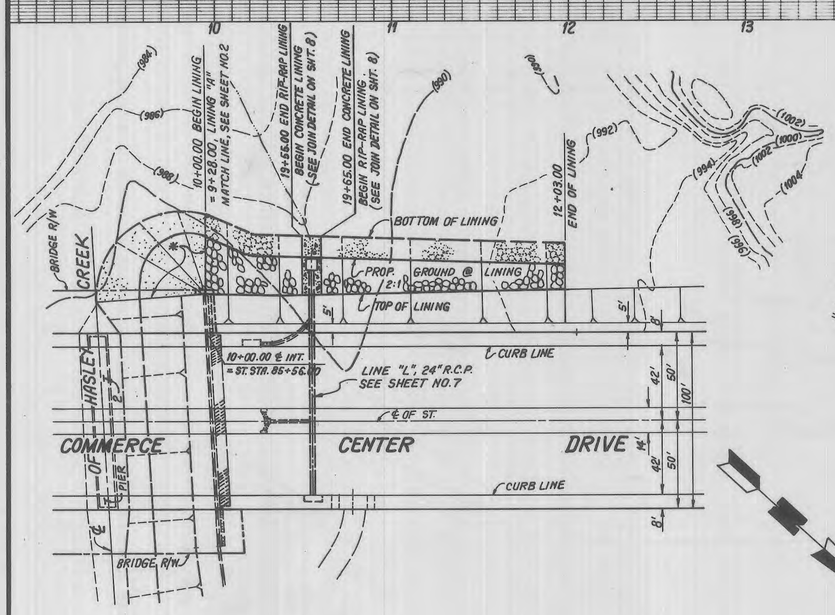
W.O. 1020-252-A

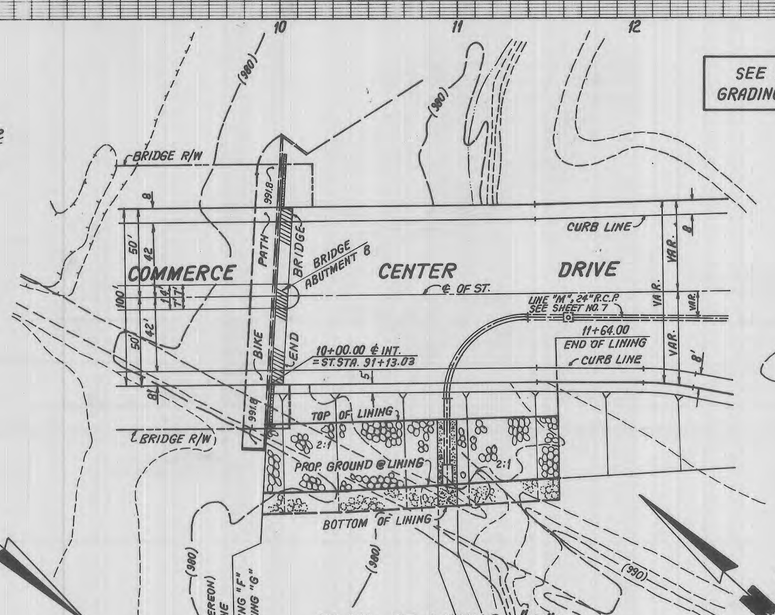
STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)

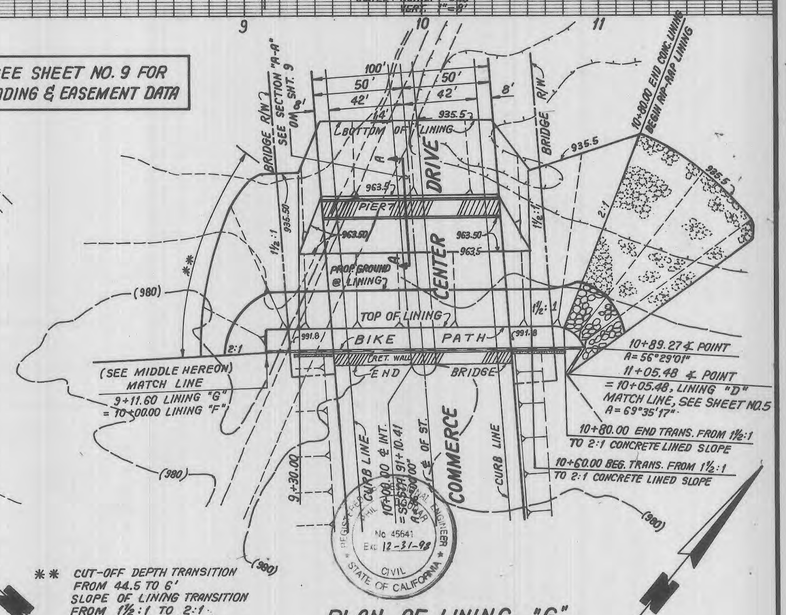












NO.	REVISION	REVISED BY	APPROVED BY	DATE

* CUT-OFF DEPTH TRANSITION FROM 18' TO 6' SLOPE OF LINING TRANSITION FROM 1½:1 TO 2:1 CONCRETE LINING.

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD
VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

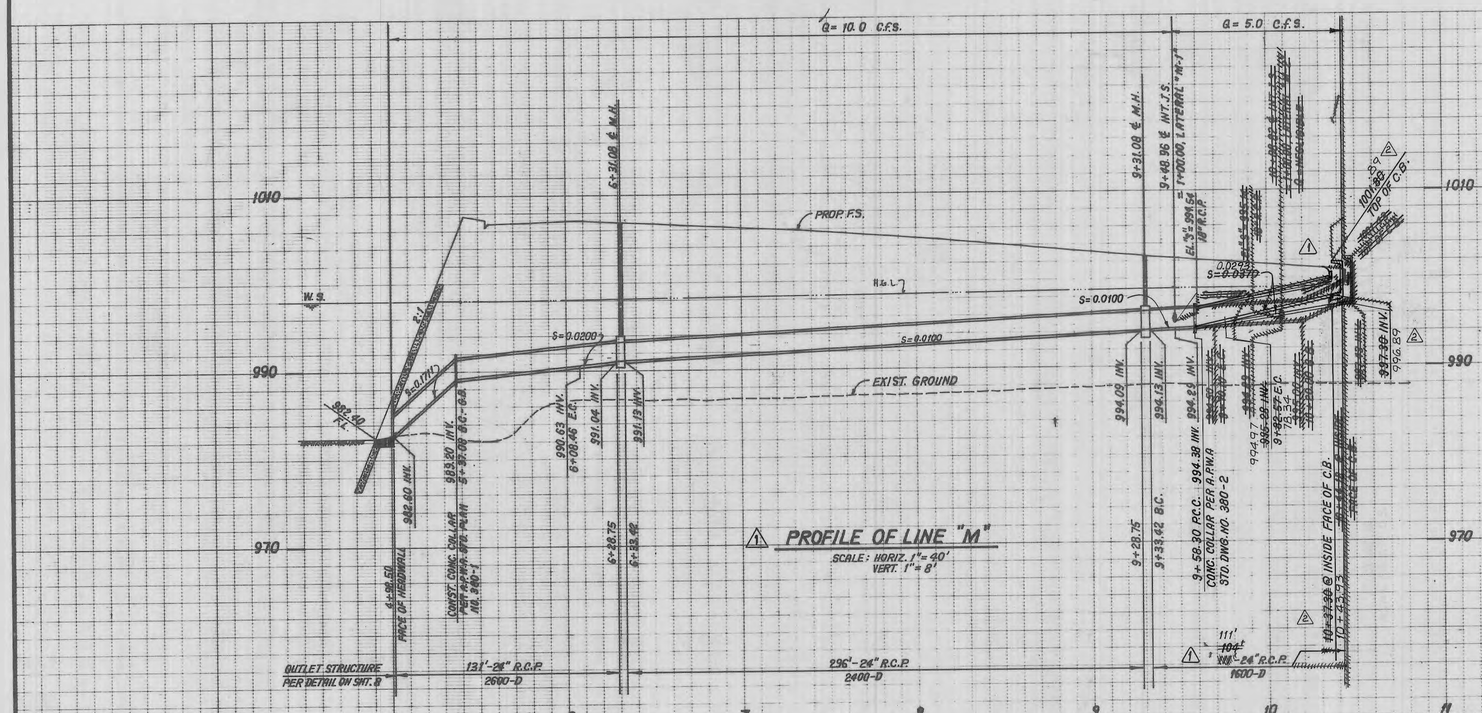
REGISTERED CIVIL ENGINEER No. 45641 EXP. 12-31-98 CIVIL STATE OF CALIFORNIA

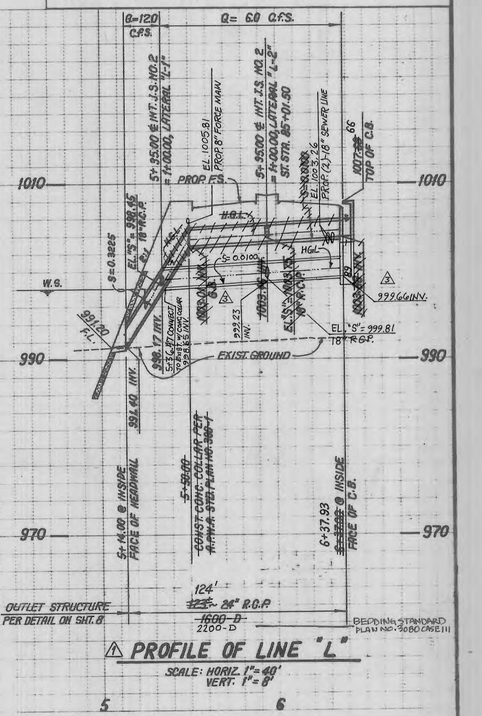
SHT 6 OF 9 SHTS

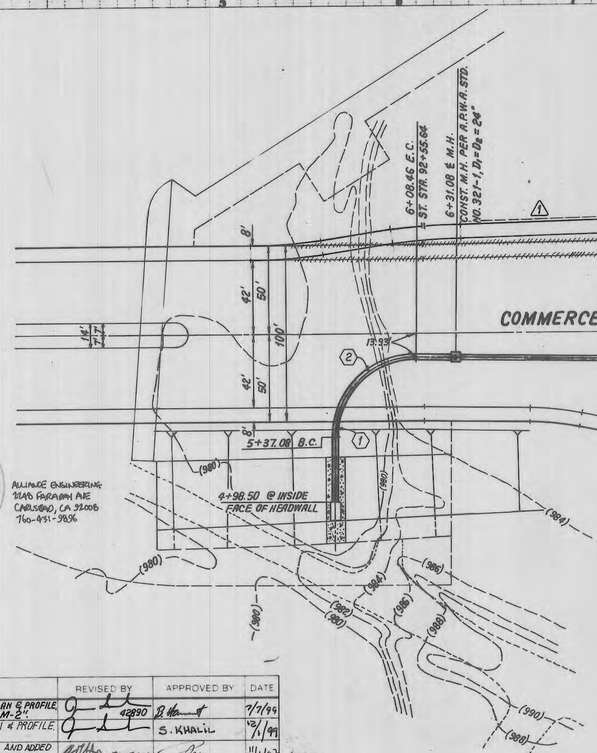
W.O. 1020-252-A

G M Jr (213) 699-8440 P.D. SHEET NO. 2 DATE 6-85

STORM DRAIN PLANS IN D.S. 485 P.D. NO. 2298 (UNIT III)



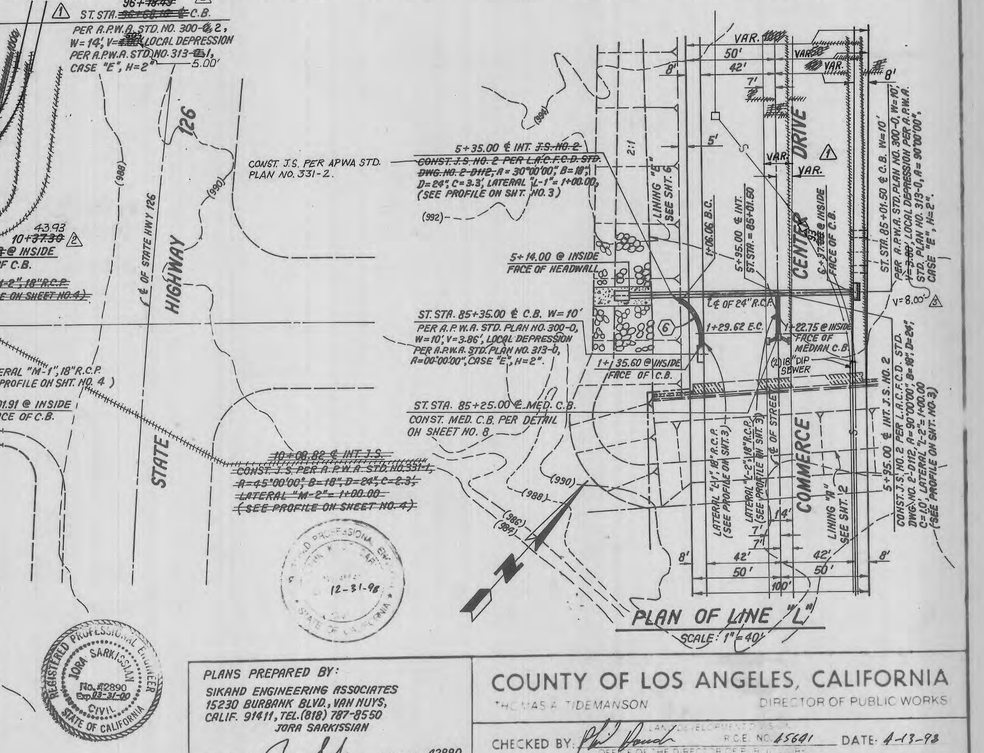




℄ STORM DRAIN CURVE DATA				
	Δ	R	L	T
1	23° 34' 49"	45.00'	18.52'	9.39'
2	67° 18' 32"	45.00'	52.86'	29.96'
3	19° 46' 50"	45.00'	15.54'	7.85'
~~4~~	~~26° 55' 36"~~	~~45.00'~~	~~21.15'~~	~~10.77~~
5	34° 48' 32"	45.00'	27.34'	14.11'
6	60° 00' 00"	22.50'	23.56'	12.99'
7	11° 54' 13"	45.00'	9.34'	4.69'
~~8~~	~~61° 47' 52"~~	~~22.50'~~	~~24.27'~~	~~13.47~~
1/2	51° 02' 11"		20.04'	10.74'

PLAN OF LINE "M"
SCALE: 1"=40'

~~⚠ NOT TO BE MAINTAINED BY L.A.C.F.C.D.~~



PLAN OF LINE "L"
SCALE: 1"=40'

NO	REVISION	REVISED BY	APPROVED BY	DATE
⚠1	REVISED LINE "L" & "M" PLAN & PROFILE ELIMINATED LATERAL "M-2"	42890		7/7/99
⚠2	REVISED LINE "M" PLAN & PROFILE	S. KHALIL		12/1/99
⚠3	REVISED LINE "L" PROFILE AND ADDED PROPOSED (2)-18" SEWER CROSSING	RCE 51913		11/1/07

PLANS PREPARED BY:
SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD., VAN NUYS, CALIF. 91411, TEL. (818) 787-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO 42890

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 12-31-00 CIVIL STATE OF CALIFORNIA

12-31-98

COUNTY OF LOS ANGELES, CALIFORNIA
"HOMAS A. TIDEMANSON DIRECTOR OF PUBLIC WORKS
CHECKED BY: ... ASSISTANT DEPUTY DIRECTOR OF LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 7 OF 9 SHTS

W O K89-2

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)

STRUCTURAL NOTES

GENERAL:

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER OF BAR AND SHALL BE TWO INCHES UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.1.
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.3
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENING.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
8. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELLED.
9. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
10. LONGITUDINAL STEEL SHALL BE LAPPED 20 BAR DIAMETERS AT SPLICES. TRANSVERSE STEEL SHALL BE LAPPED 30 BAR DIAMAETERS AT SPLICES.
11. LONGITUDINAL STEEL SHALL BE CONTINOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
12. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
13. UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS, TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS.; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON THE OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN FOR THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
14. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
15. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 20 BAR DIAMETERS IN LENGTH.
16. IN ALL SECTIONS LAP C AND C2 BARS. THE VERTICAL LENGTH OF C AND C2 BARS HAS BEEN CALCULATED FOR A FOUR INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 30 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
17. CONCRETE QUANTITITES ARE BASED ON A SIX-BY-SIX INCH FILLET AND THE STEEL QUANTITITES DO NOT INCLUDE ANY OPTIONAL SPLICES.
18. IF WALL THICKNESS IS SIX INCHES PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
19. THE DESIGN OF BOX SECTIONS IDENTIFIED BY A NUMERICAL VALUE IS BASED ON A WIDTH OF TRENCH EQUAL TO THE OUTSIDE WIDTH OF THE CONDUIT PLUS THREE FEET. WHEN THE COVER IS EQUAL TO 10 FEET OR LESS THE TRENCH WIDTH IS UNRESTRICTED. WHEN THE COVER IS GREATER THAN 10 FEET AND THE TRENCH WIDTH IS GREATER THAN THE OUTSIDE WIDTH OF THE CONDUIT PLUS 3 FEET FOR A DISTANCE IN EXCESS OF 10 FEET AN ALTERNATE SECTION SHALL BE USED AS INDICATED BELOW
   A. WHEN THE DEPTH OF COVER IS LESS THAN 18 FEET, SECTIONS WITH THE SUFFIX "B" SHALL BE USED.
   B. WHEN THE DEPTH OF COVER IS GREATER THAN 18 FEET AND:
      1. THE TRENCH WIDTH IS LESS THAN THE OUTSIDE WIDTH OF THE CONDUIT PLUS 6 FEET, SECTIONS WITH SUFFIX "A" SHALL BE USED.
      2. THE TRENCH WIDTH IS GREATER THAN THE OUTSIDE WIDTH OF CONDUIT PLUS 6 FEET, SECTIONS WITH THE SUFFIX "A" SHALL BE USED

R. C. RECTANGULAR CHANNEL

1. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF INLETS.
2. TRANSVERSE JOINTS SHALL BE PLACED AT THE JUNCTION OF RECTANGULAR OPEN CHANNEL SECTIONS WITH CLOSED CONDUIT SECTIONS. THE JOINT SHALL NOT BE KEYED AND SHALL HAVE A THREE-EIGHTS-INCH LAYER OF EXPANSION JOINT MATERIAL IN WALLS AND INVERT
3. ALL RECTANGULAR OPEN CHANNEL WALLS SHALL BE FENCED IN ACCORDANCE WITH APWA STANDARD DRAWING 600-O EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
4. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, IN CURVED SECTIONS, THE MAXIMUM SPACING OF BARS SHALL NOT EXCEED THAT SHOWN ON THE TYPICAL SECTIONS. STEEL SHALL BE PLACED RADIALLY FROM THE MAXIMUM SPACING.
5. AT THE BEGINNING AND ENDING OF ALL POURS, A COMPLETE CURTAIN OF REINFORCEMENT COMPOSED OF B1, B4, AND B7 BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
6. LONGITUDINAL STEEL SHALL TERMINATE TWO INCHES FROM TRANSVERSE CONSTRUCTION JOINTS.

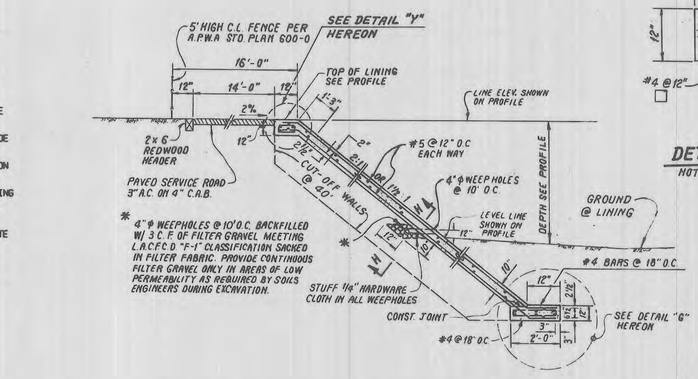
STRUCTURAL DESIGN CRITERIA

LIVE LOAD
H_{20} - S16-44 unless otherwise noted

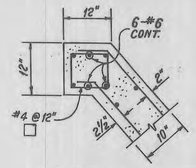
DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 37 p.s.f. per foot of depth
Internal water pressure: 62.4 p.s.f. per foot of depth
Weight of concrete: 150 p.c.f.

ALLOWABLE STRESSES
fc' = 4000 p.s.i. at 28 days
fc = 1800 p.s.i.
fs = 24000
n = 8
shear and bond stresses per A.C.I. 318-63

NO	REVISION	REVISED BY	APPROVED BY	DATE



CONCRETE LINING DETAIL "A"
NOT TO SCALE



DETAIL "Y"
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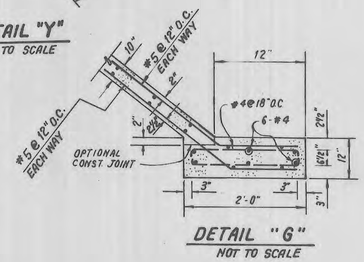

DETAIL "G"
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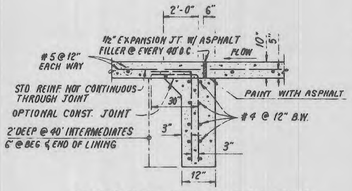
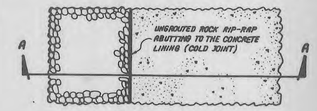
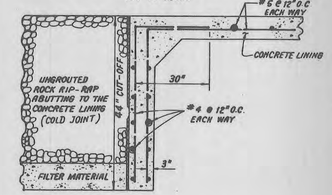


SECTION "H-H" EXPANSION JOINT
CUT-OFF WALL

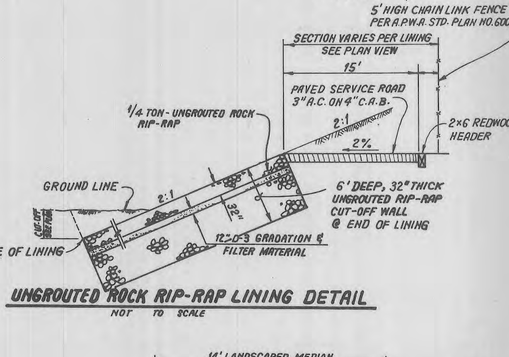
NOTE EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



CONCRETE LINING-UNGROUTED ROCK RIP-RAP JOIN DETAIL
NOT TO SCALE



SECTION "A-A"
NOT TO SCALE



UNGROUTED ROCK RIP-RAP LINING DETAIL
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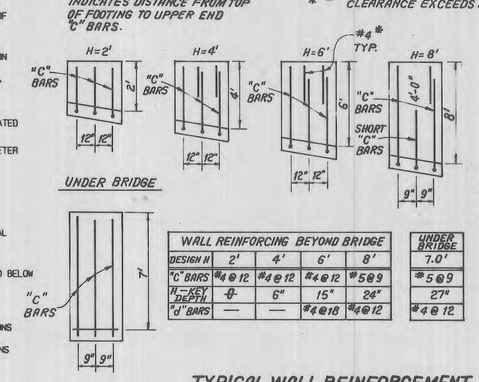
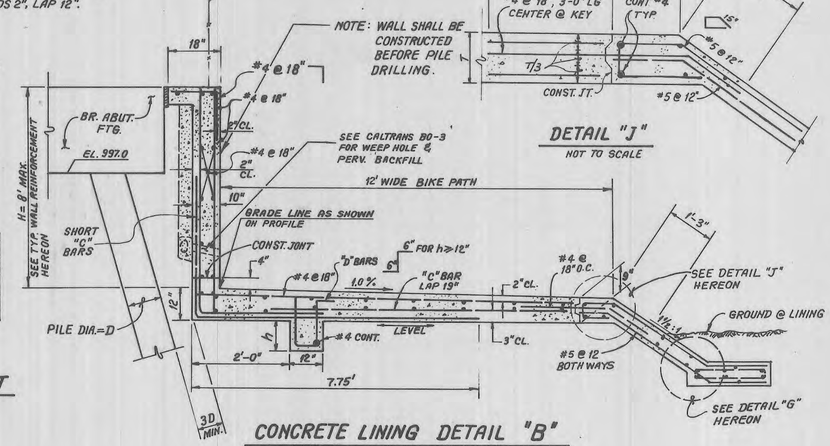
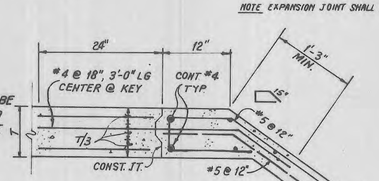


WALL REINFORCING BEYOND BRIDGE					UNDER BRIDGE
DESIGN H	2'	4'	6'	8'	7.0'
"C" BARS	#4@12	#4@12	#4@12	#5@9	#5@9
"H" SEE DEPTH	-0-	6"	15"	24"	27"
"J" BARS	—	—	#4@18	#4@12	#4@12

TYPICAL WALL REINFORCEMENT
NOT TO SCALE

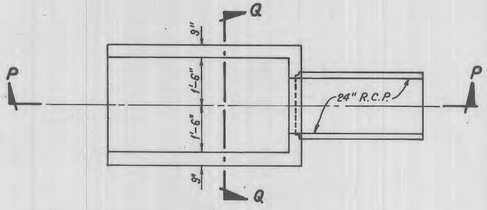


CONCRETE LINING DETAIL "B"
NOT TO SCALE



DETAIL "J"
NOT TO SCALE

SECTION P-P
NOT TO SCALE



OUTLET STRUCTURE DETAIL FOR LINES "L" & "M"
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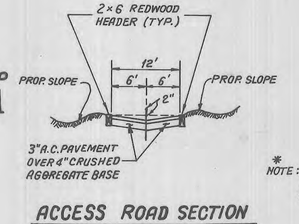
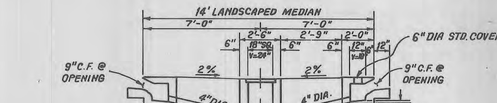


ACCESS ROAD SECTION
NOT TO SCALE

CONCRETE LINING DETAIL "C"
NOT TO SCALE

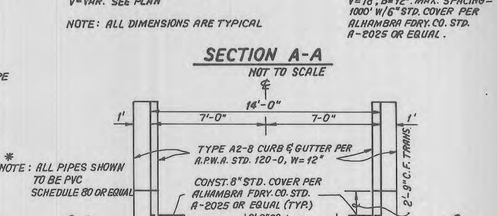
OUTLET STRUCTURES ARE INTO CONCRETE LINING SECTION SEE SHEET NO.6

CUT-OFF WALL DETAIL
NOT TO SCALE



NOTE: ALL DIMENSIONS ARE TYPICAL

SECTION A-A
NOT TO SCALE



NOT TO BE MAINTAINED BY L.A.C.F.C.D.

MEDIAN CATCH BASIN DETAIL
NOT TO SCALE

SIKAND ENGINEERING ASSOCIATES
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VAN NUYS, CA. 91411
(818) 787-8550
JORA SARKISSIAN

SIGNATURE: _____ R.C.E. NO. 42890

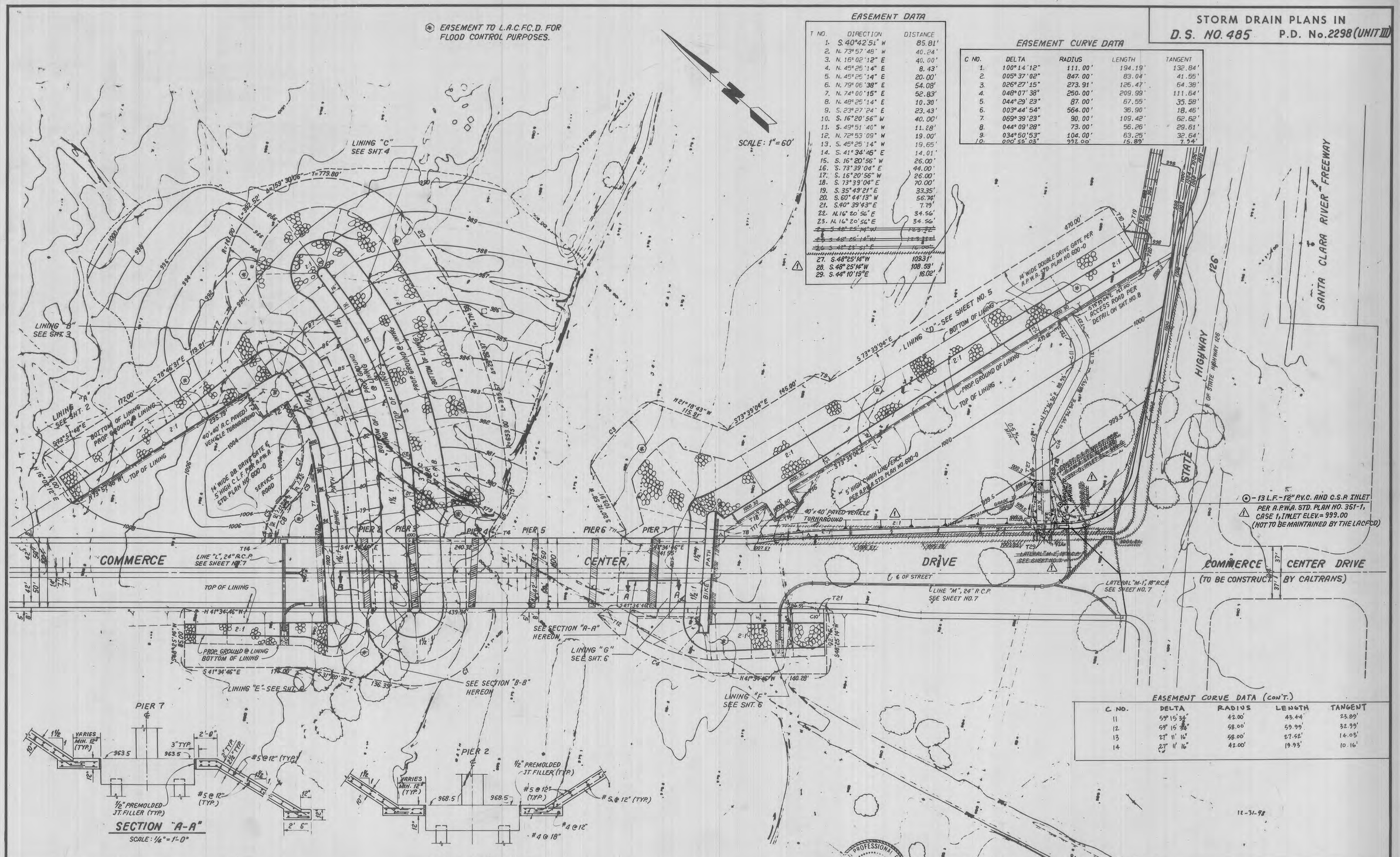
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS

CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 8 OF 9 SHTS

W.O. 1020-252-A

STORM DRAIN PLANS IN
D.S. NO. 485 P.D. No. 2298 (UNIT III)



EASEMENT DATA

T NO.	DIRECTION	DISTANCE
1.	S. 40°42'51" W	85.81'
2.	N. 73°57'48" W	40.24'
3.	N. 16°02'12" E	40.00'
4.	N. 45°25'14" E	8.43'
5.	N. 45°25'14" E	20.00'
6.	N. 79°06'38" E	54.08'
7.	N. 74°00'15" E	52.83'
8.	N. 48°25'14" E	10.30'
9.	S. 23°27'24" E	23.43'
10.	S. 16°20'56" W	40.00'
11.	S. 49°51'40" W	11.28'
12.	N. 72°53'09" W	19.00'
13.	S. 45°25'14" W	19.65'
14.	S. 41°34'46" E	14.01'
15.	S. 16°20'56" W	26.00'
16.	S. 73°39'04" E	44.00'
17.	S. 16°20'56" W	26.00'
18.	S. 73°39'04" E	70.00'
19.	S. 35°49'21" E	33.35'
20.	S. 60°44'13" W	56.74'
21.	S. 40°39'43" E	7.79'
22.	N. 16°20'56" E	34.56'
23.	N. 16°20'56" E	34.56'
~~24.~~	~~S. 48°25'14" W~~	~~163.32'~~
~~25.~~	~~S. 48°25'14" W~~	~~123.32'~~
~~26.~~	~~S. 42°25'51" E~~	~~16.00'~~
27.	S. 48°25'14" W	109.31'
28.	S. 48°25'14" W	108.59'
29.	S. 44°10'19" E	16.02'

EASEMENT CURVE DATA

C NO.	DELTA	RADIUS	LENGTH	TANGENT
1.	100°14'12"	111.00'	194.19'	132.84'
2.	005°37'02"	847.00'	83.04'	41.55'
3.	026°27'15"	273.91'	126.47'	64.38'
4.	048°07'38"	250.00'	209.99'	111.64'
5.	044°29'23"	87.00'	67.55'	35.58'
6.	003°44'54"	564.00'	36.90'	18.46'
7.	069°39'23"	90.00'	109.42'	62.62'
8.	044°09'28"	73.00'	56.26'	29.61'
9.	034°50'53"	104.00'	63.25'	32.64'
10.	000°55'03"	992.00'	15.89'	7.94'

EASEMENT CURVE DATA (CON'T.)

C NO.	DELTA	RADIUS	LENGTH	TANGENT
11	59° 15' 34"	42.00'	43.44'	23.89'
12	59° 15' 34"	58.00'	59.99'	32.99'
13	27° 11' 16"	58.00'	27.52'	14.03'
14	27° 11' 16"	42.00'	19.93'	10.16'

SECTION "A-A"

SCALE: 1/4" = 1'-0"

SECTION "B-B"

SCALE: 1/4" = 1'-0"

NO.	REVISION	REVISED BY	APPROVED BY	DATE
1	REVISED EASEMENT DATA. REVISED N'LY CURB LOC. @ C.C.D. & HWY. 126 & GRADING.	42890	B. Hammett	7/3/99

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 9-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES
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VAN NUYS, CA 91411
(818) 787-8550
JORA SARKISSIAN
SIGNATURE: R.C.E. NO. 42890

COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
CHECKED BY: R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 9 OF 9 SHTS

W.O. 1020-252-A