Appendix 5.5 (Continued)

Hydrology (Part 15 of 15)



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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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.

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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)

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

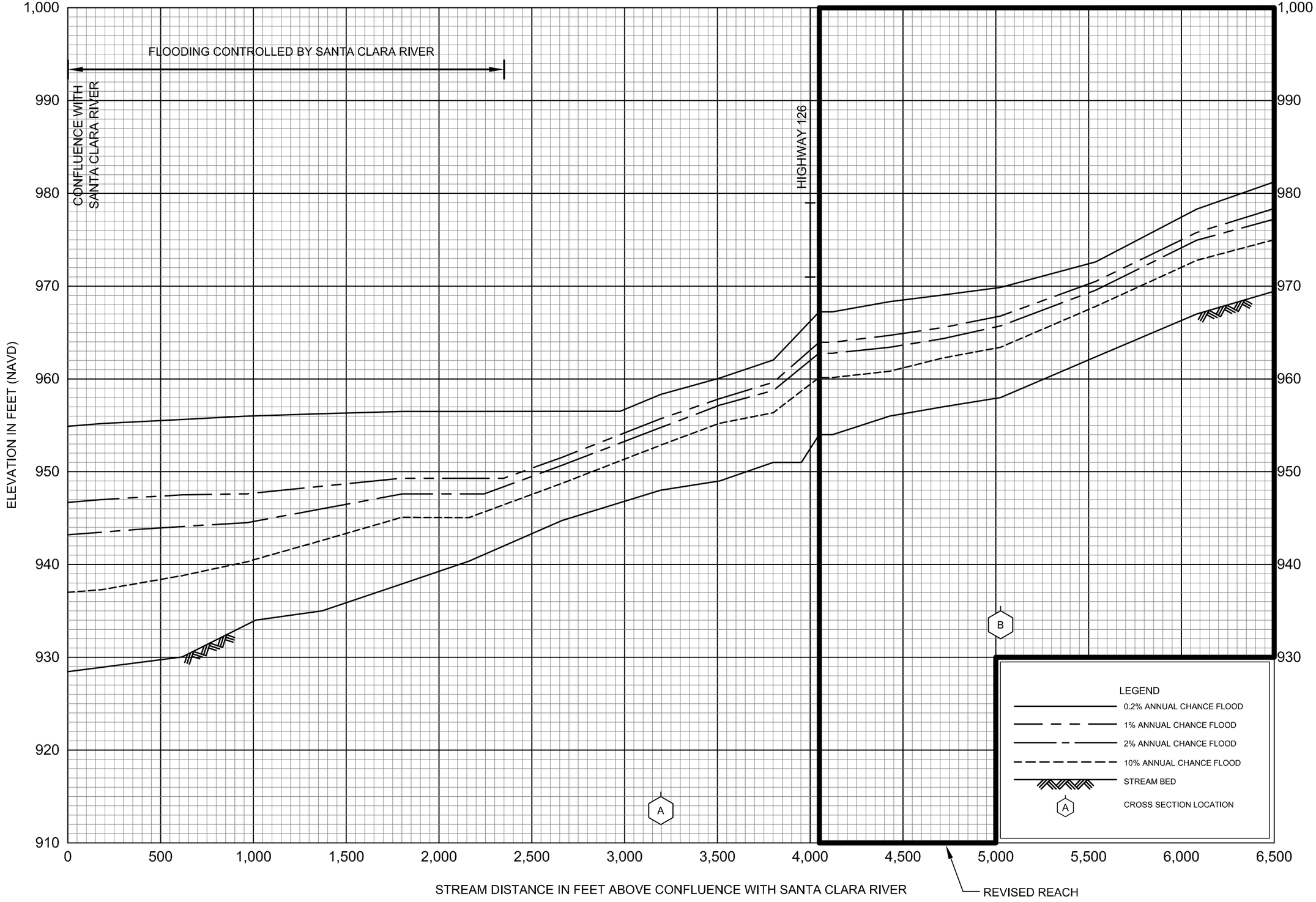
LOCAL NEWSPAPER

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

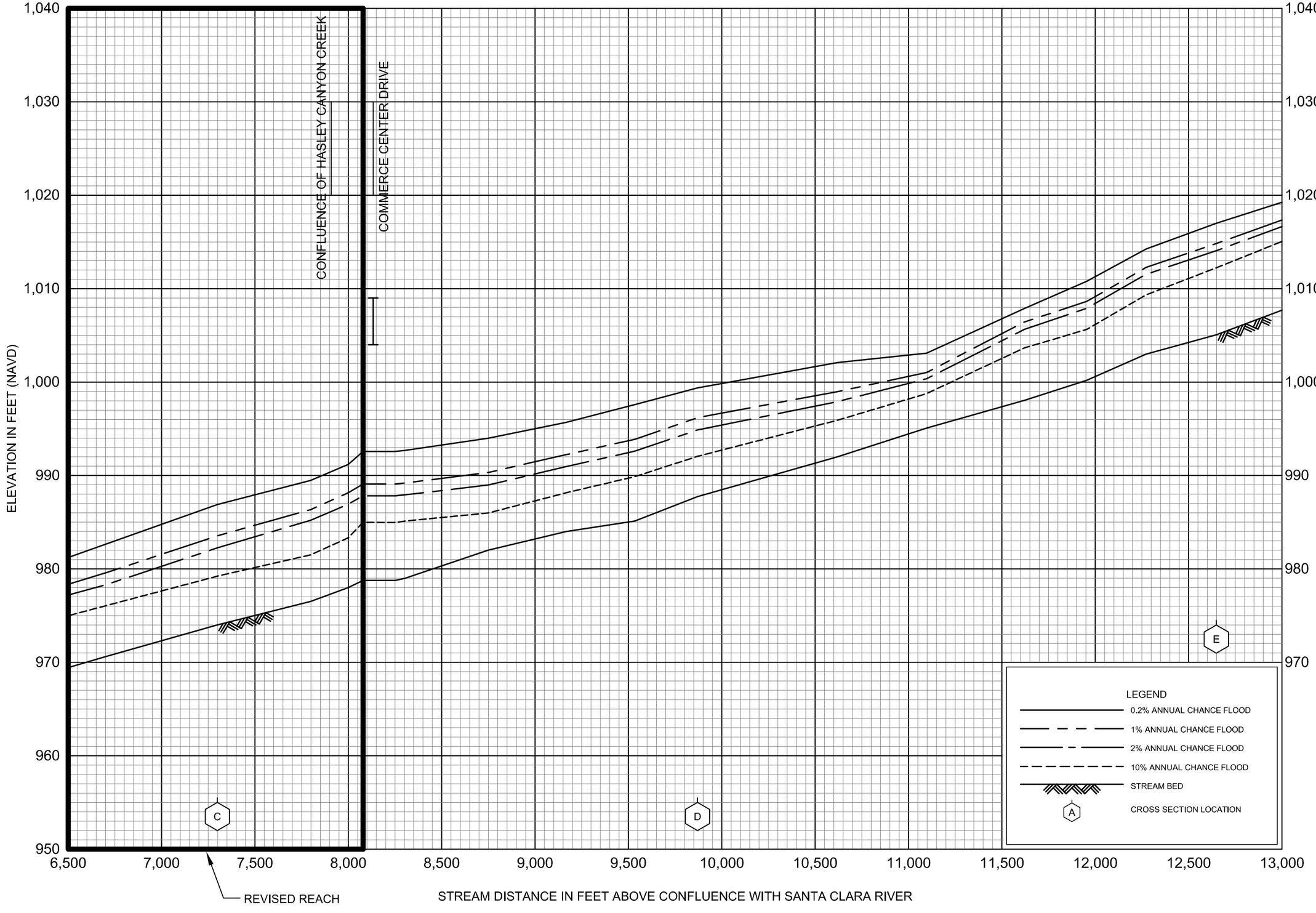
REVISED TO REFLECT LOMR
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

53P



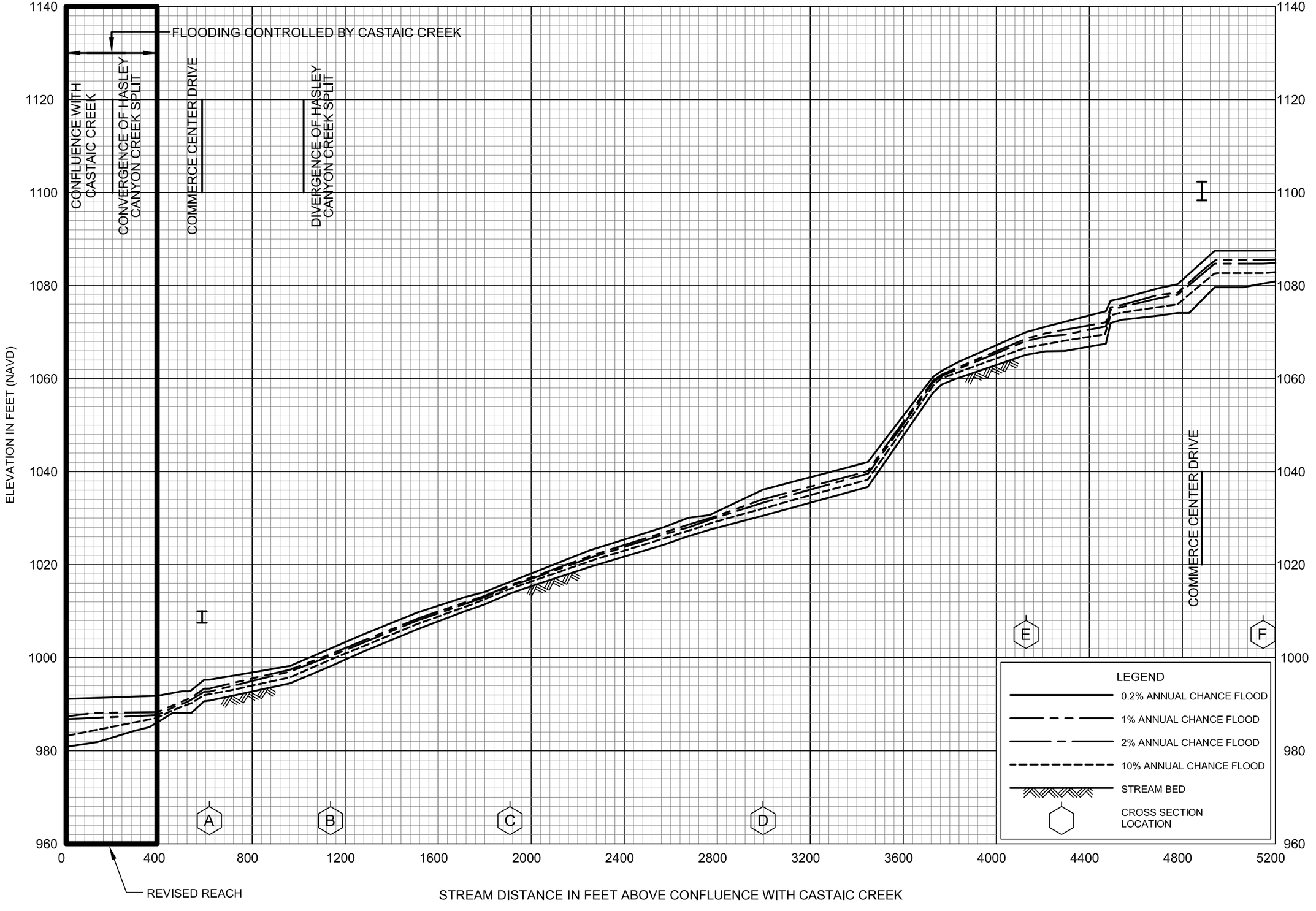
FLOOD PROFILES

REVISED TO REFLECT LOMR
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS



FLOOD PROFILES REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

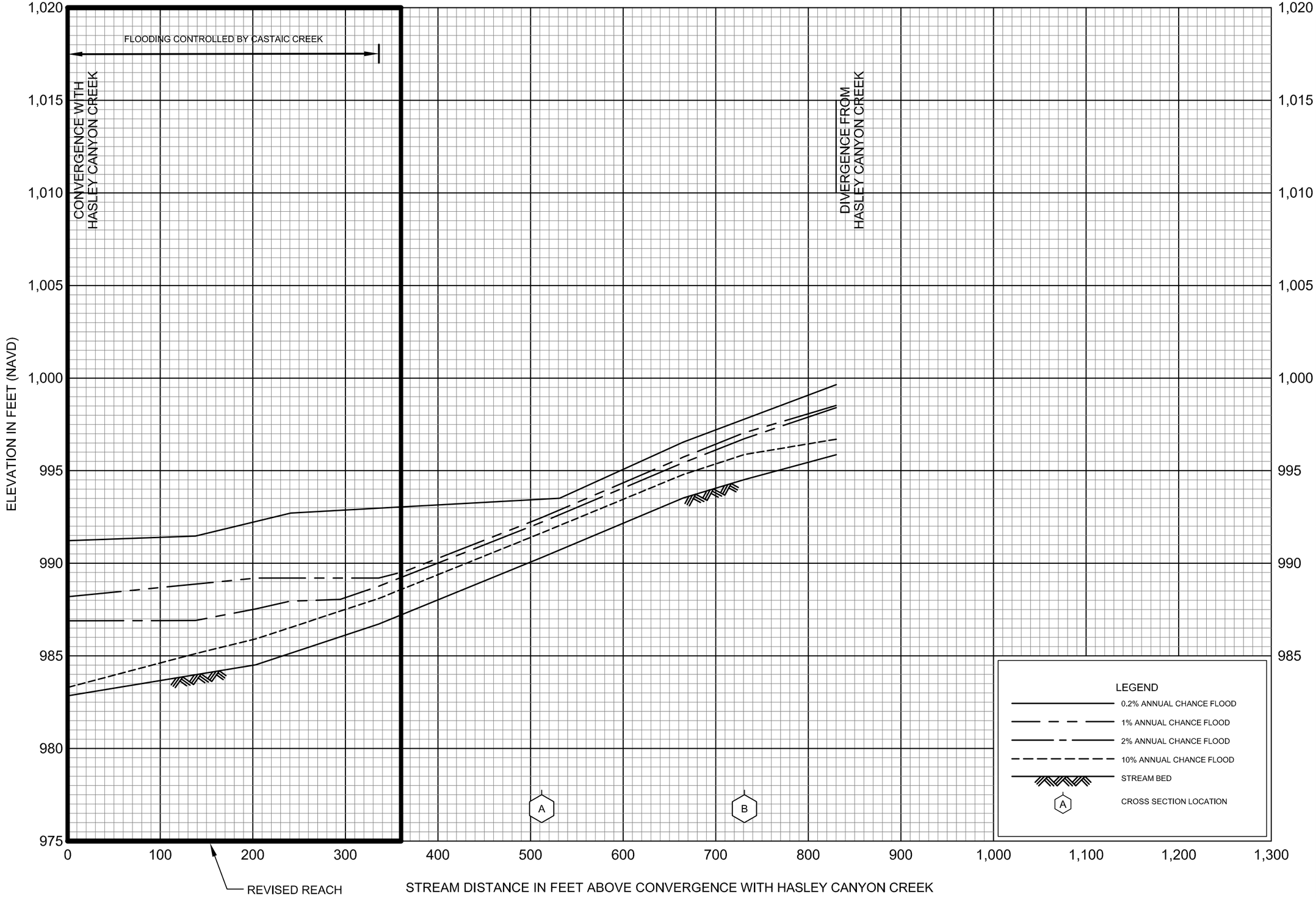
HASLEY CANYON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

96P



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

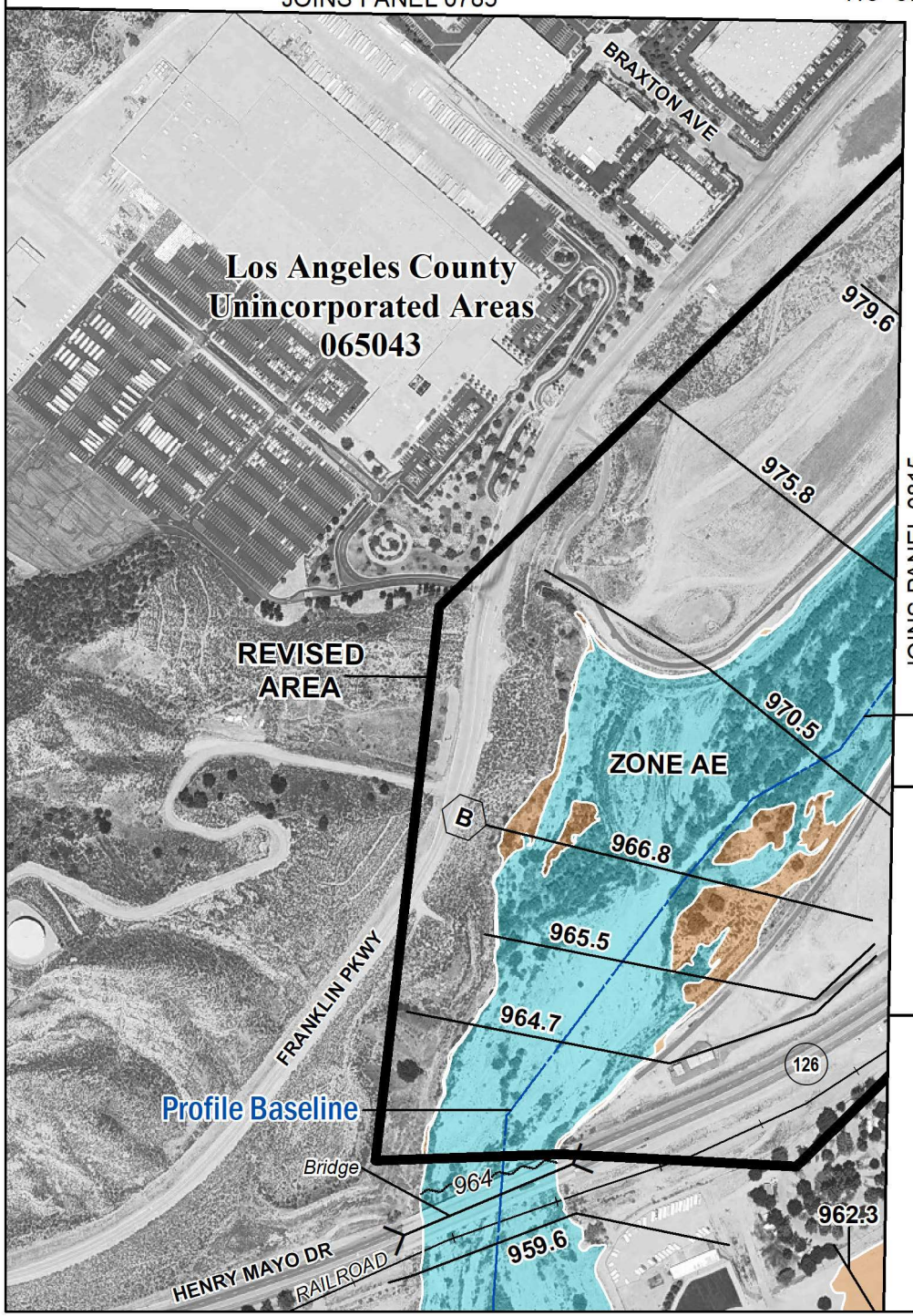
102P

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
	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
OTHER AREAS OF FLOOD HAZARD	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 = 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

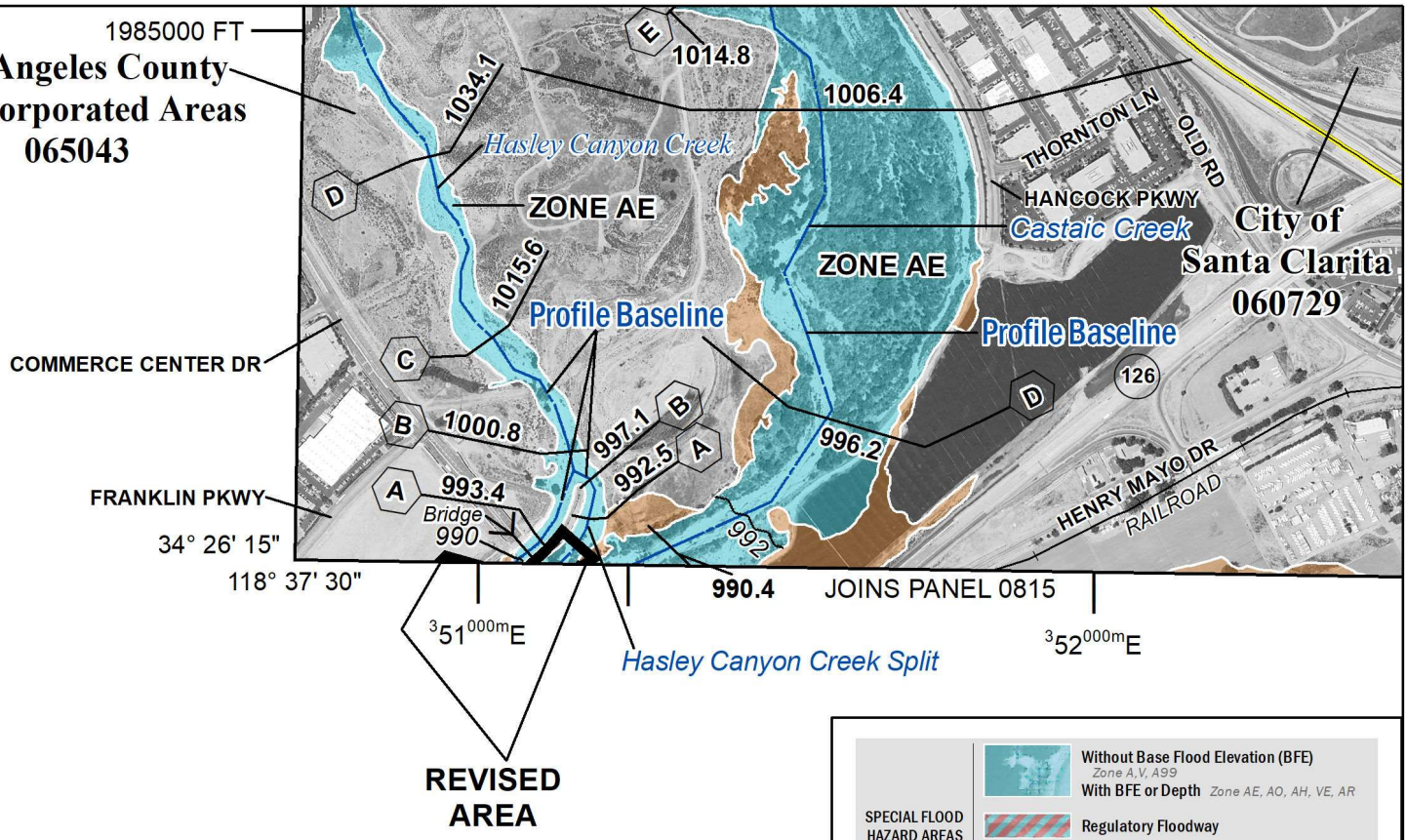
FEMA

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

FEMA

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

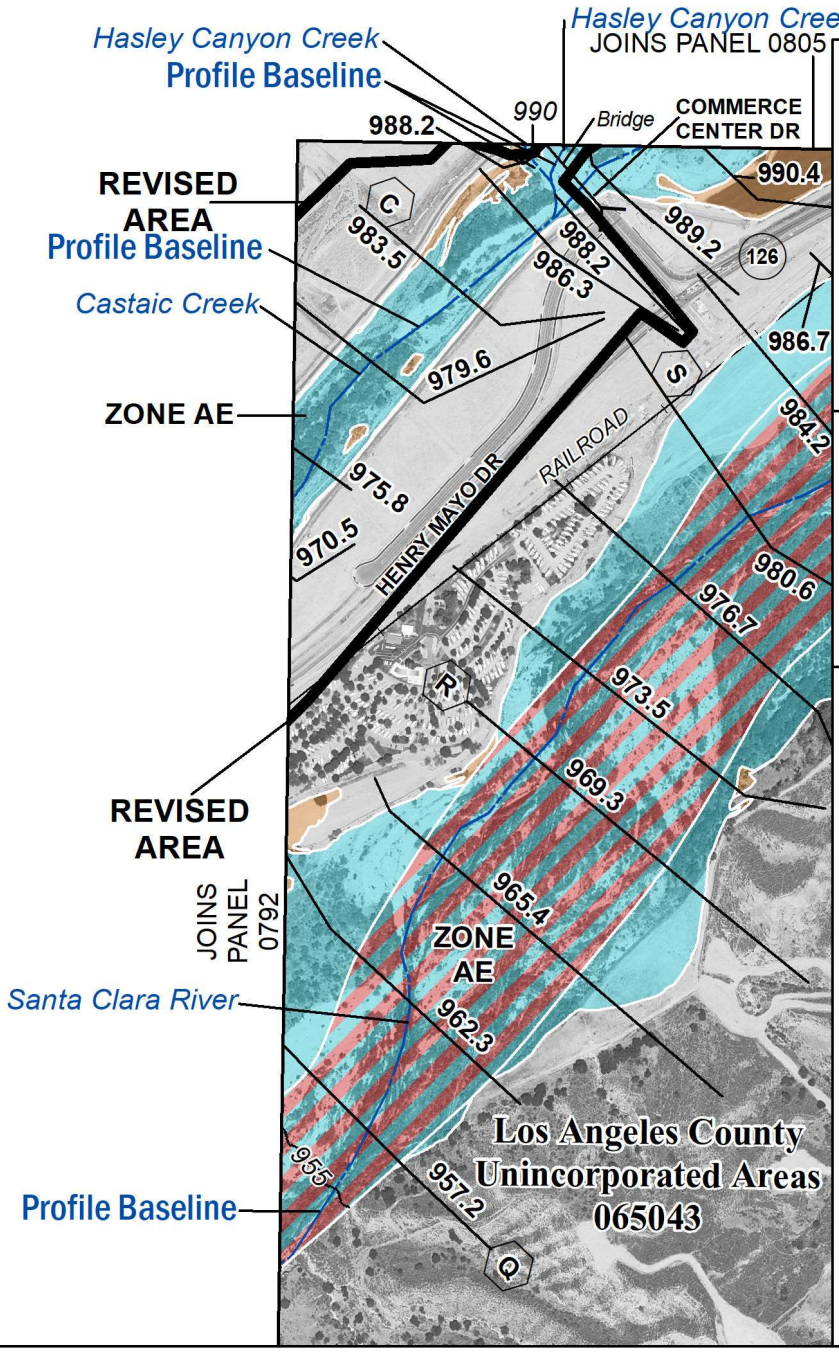
VERSION NUMBER
2.3.3.0

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

FEMA

National Flood Insurance Program

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

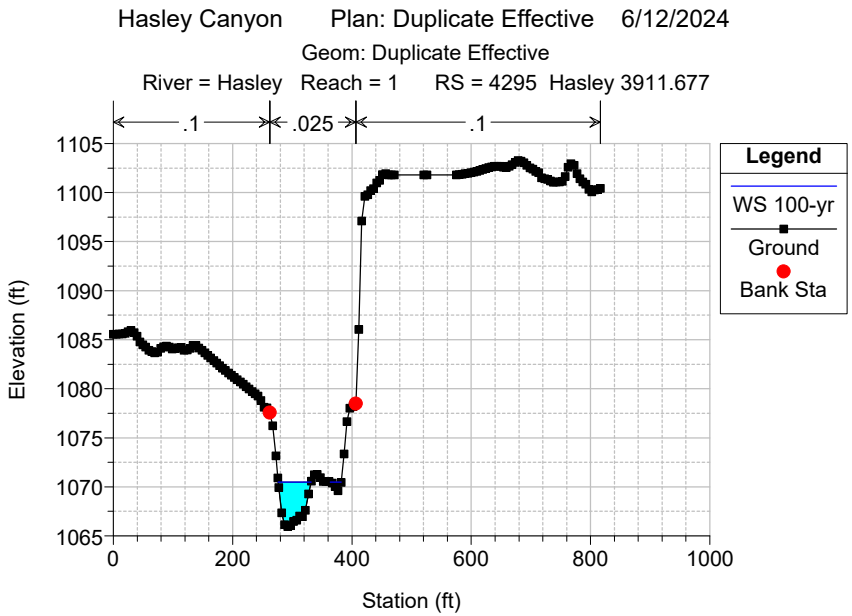
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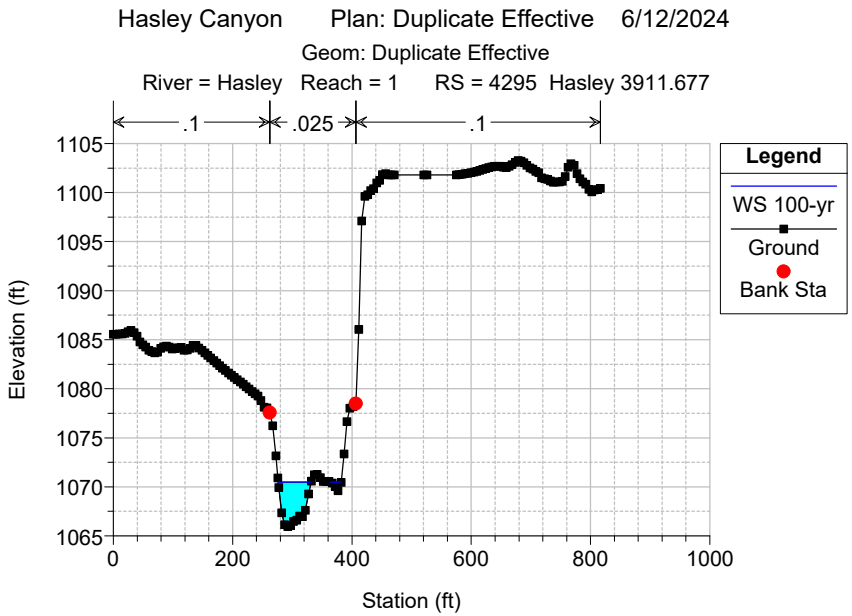
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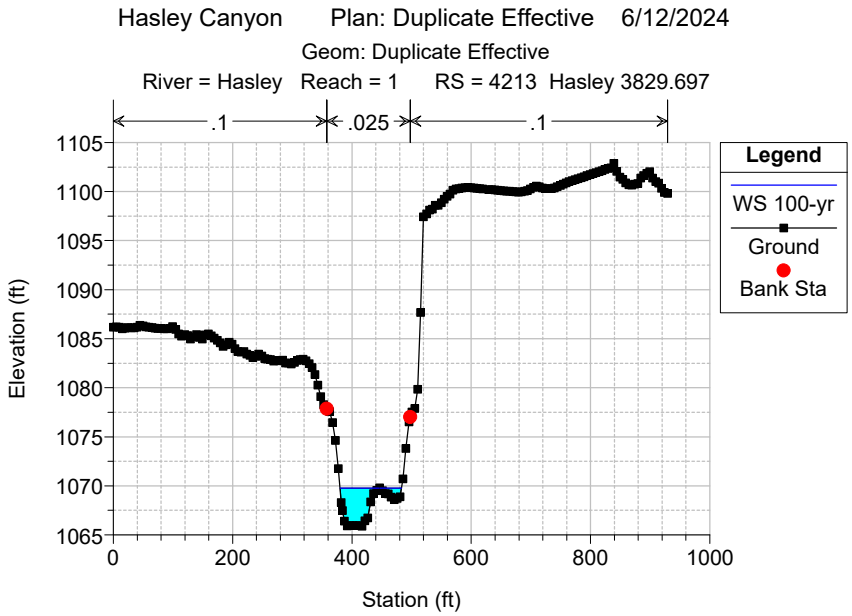
MAP REVISED
JUNE 2, 2021

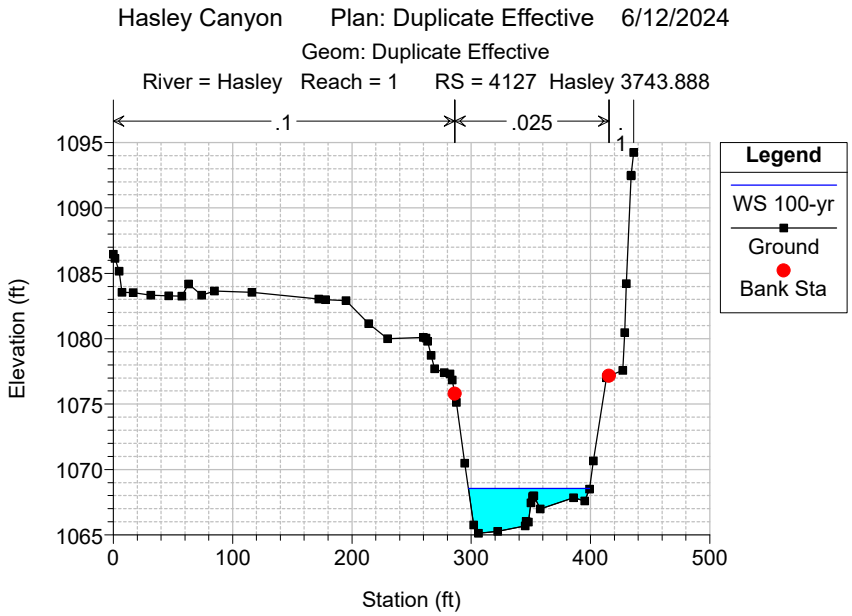


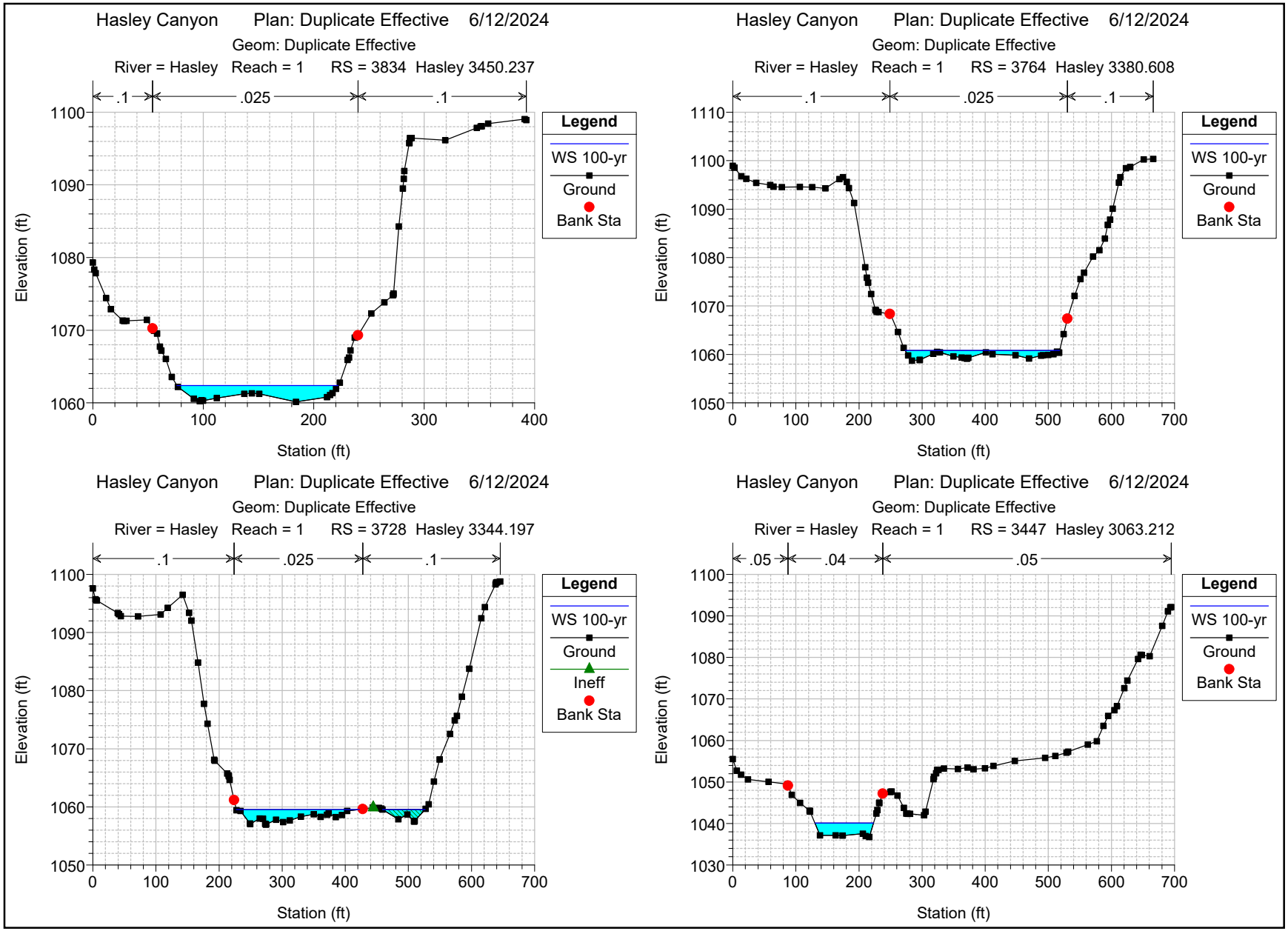
Appendix C – HEC-RAS Effective Results

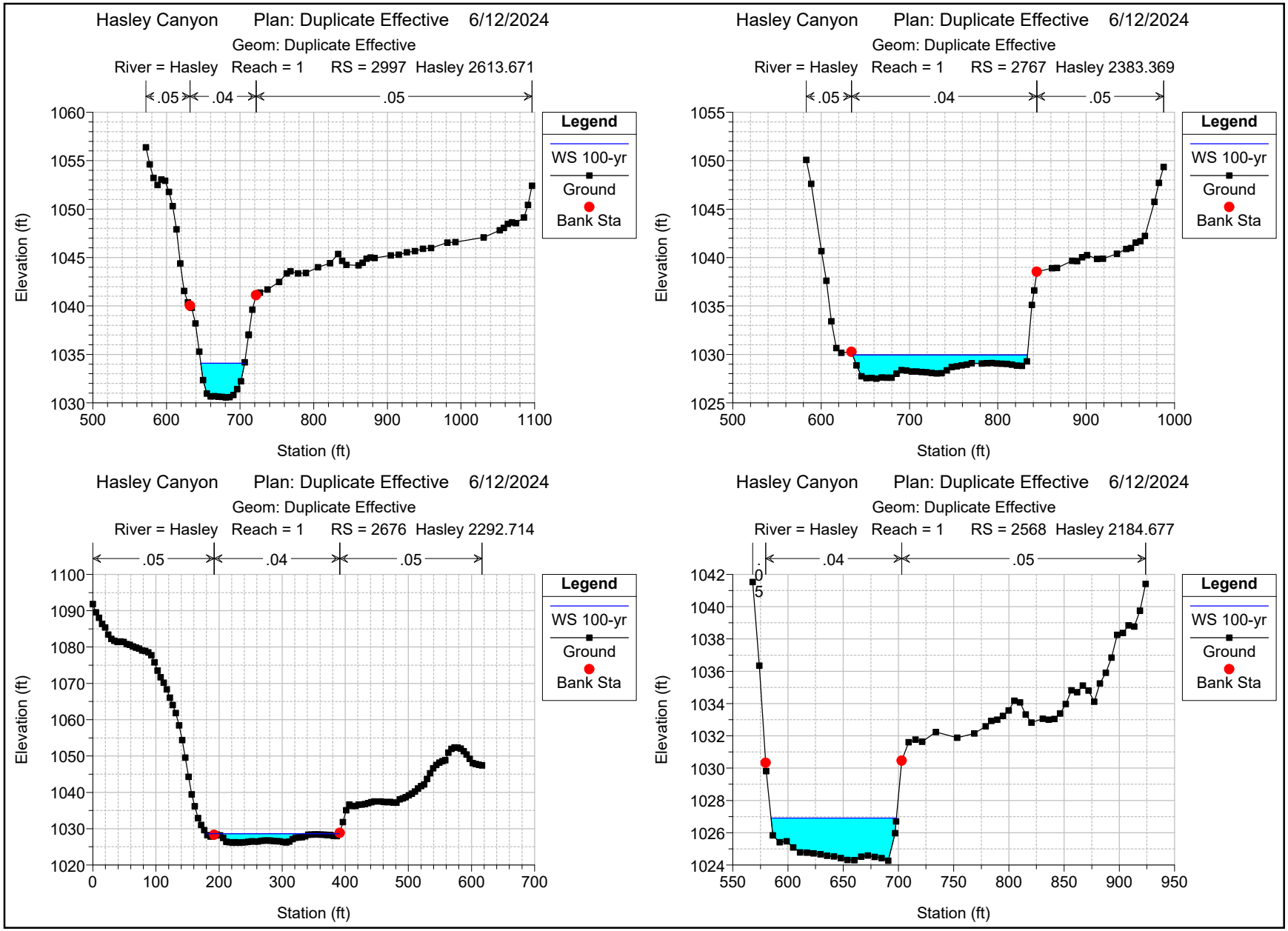

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 4295 Hasley 3911.677
.1
.025
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

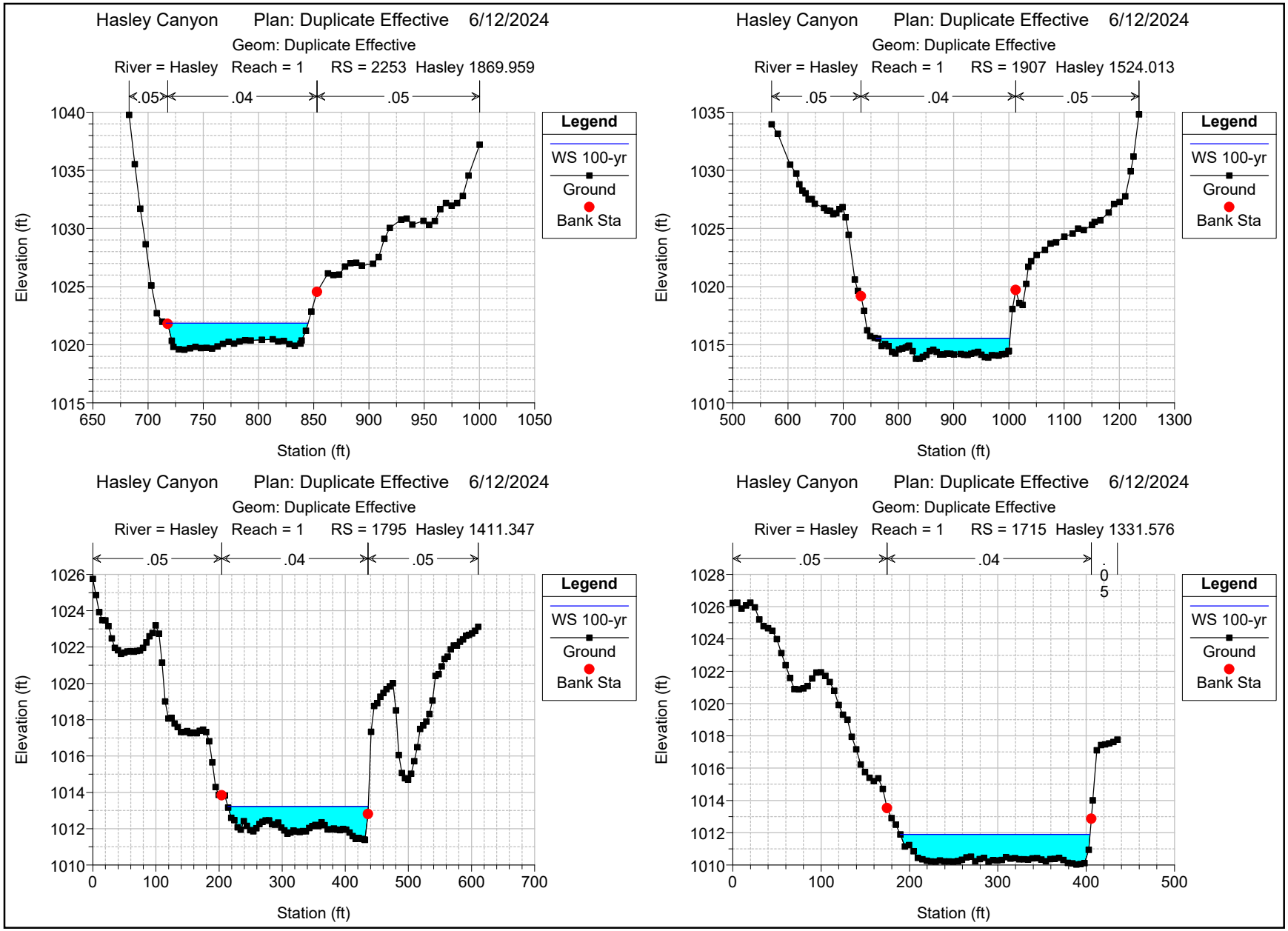

Hasley Canyon Plan: Duplicate Effective 6/12/2024
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Elevation (ft)
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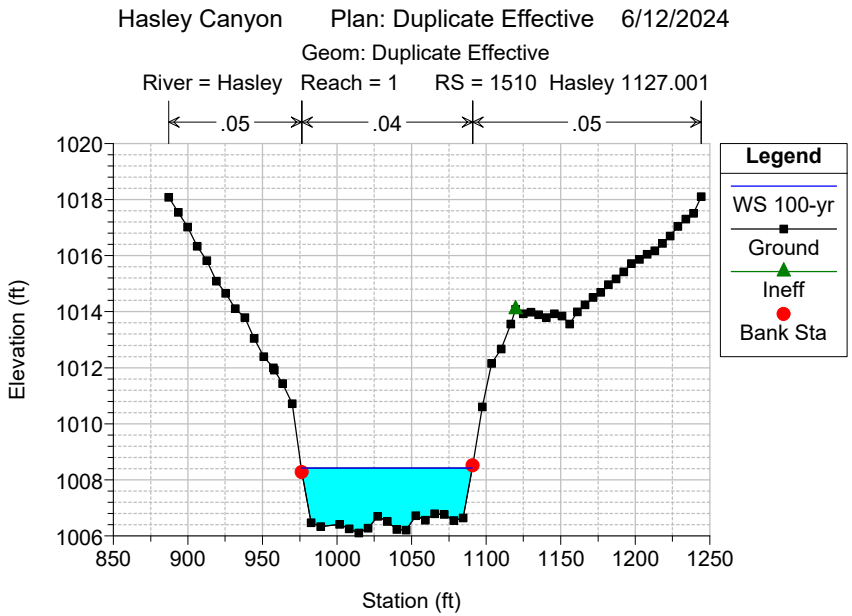

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Geom: Duplicate Effective
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

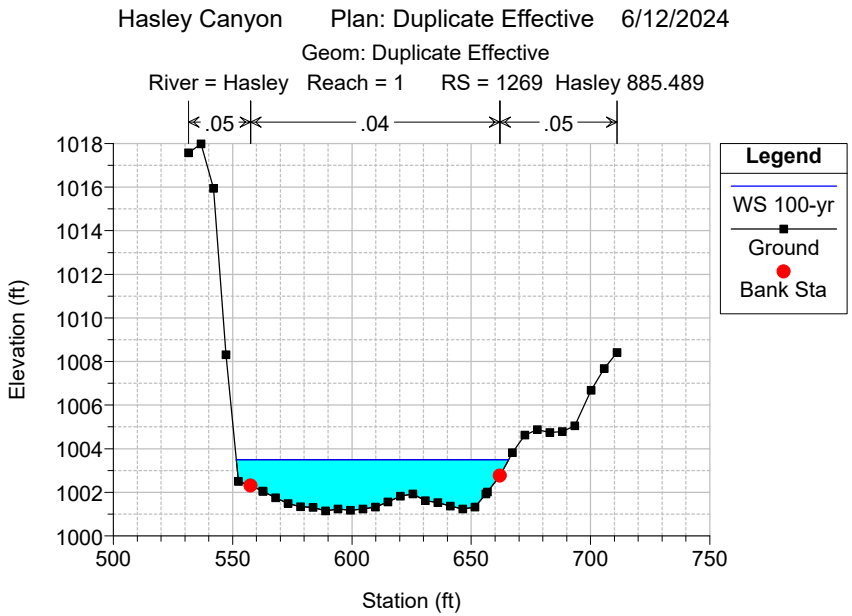

Hasley Canyon Plan: Duplicate Effective 6/12/2024
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
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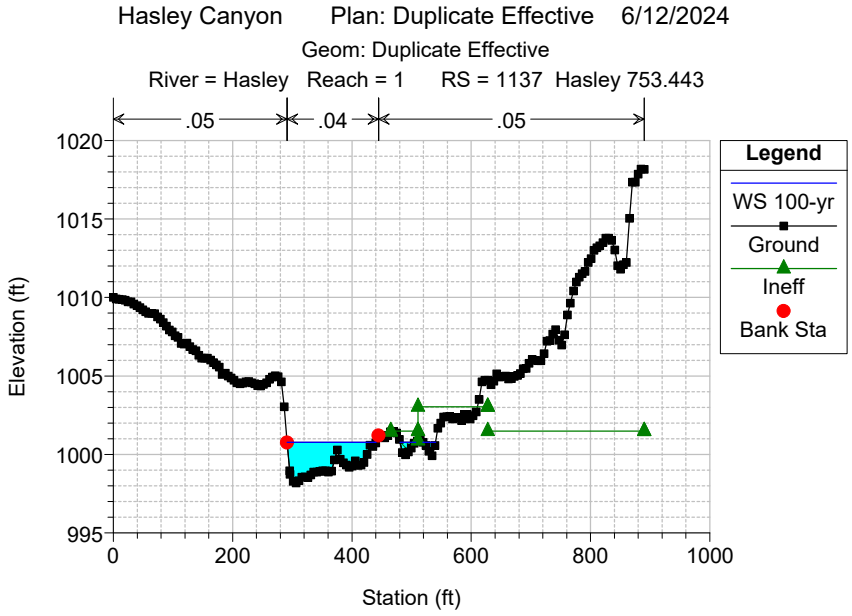

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
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Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 3764 Hasley 3380.608
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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
River = Hasley Reach = 1 RS = 3728 Hasley 3344.197
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
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Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

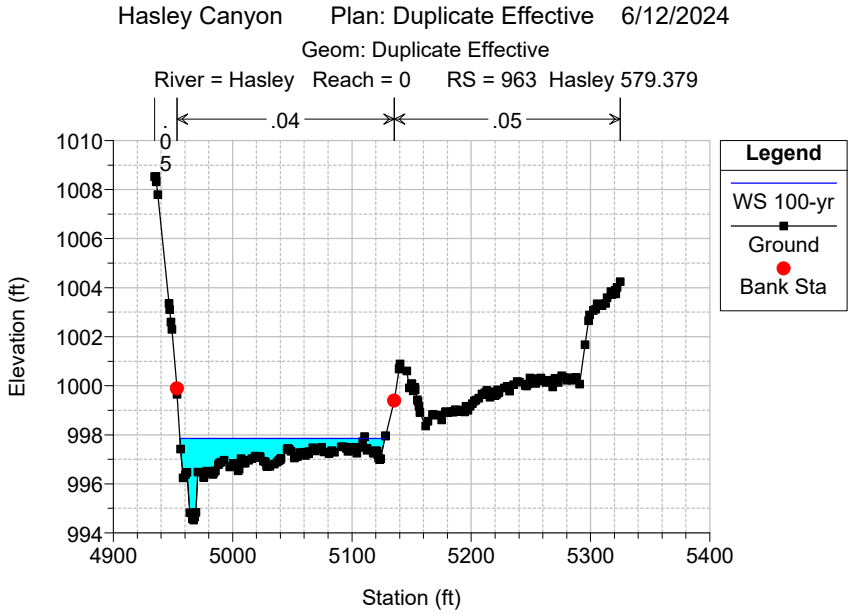

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Geom: Duplicate Effective
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 2767 Hasley 2383.369
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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
River = Hasley Reach = 1 RS = 2676 Hasley 2292.714
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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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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

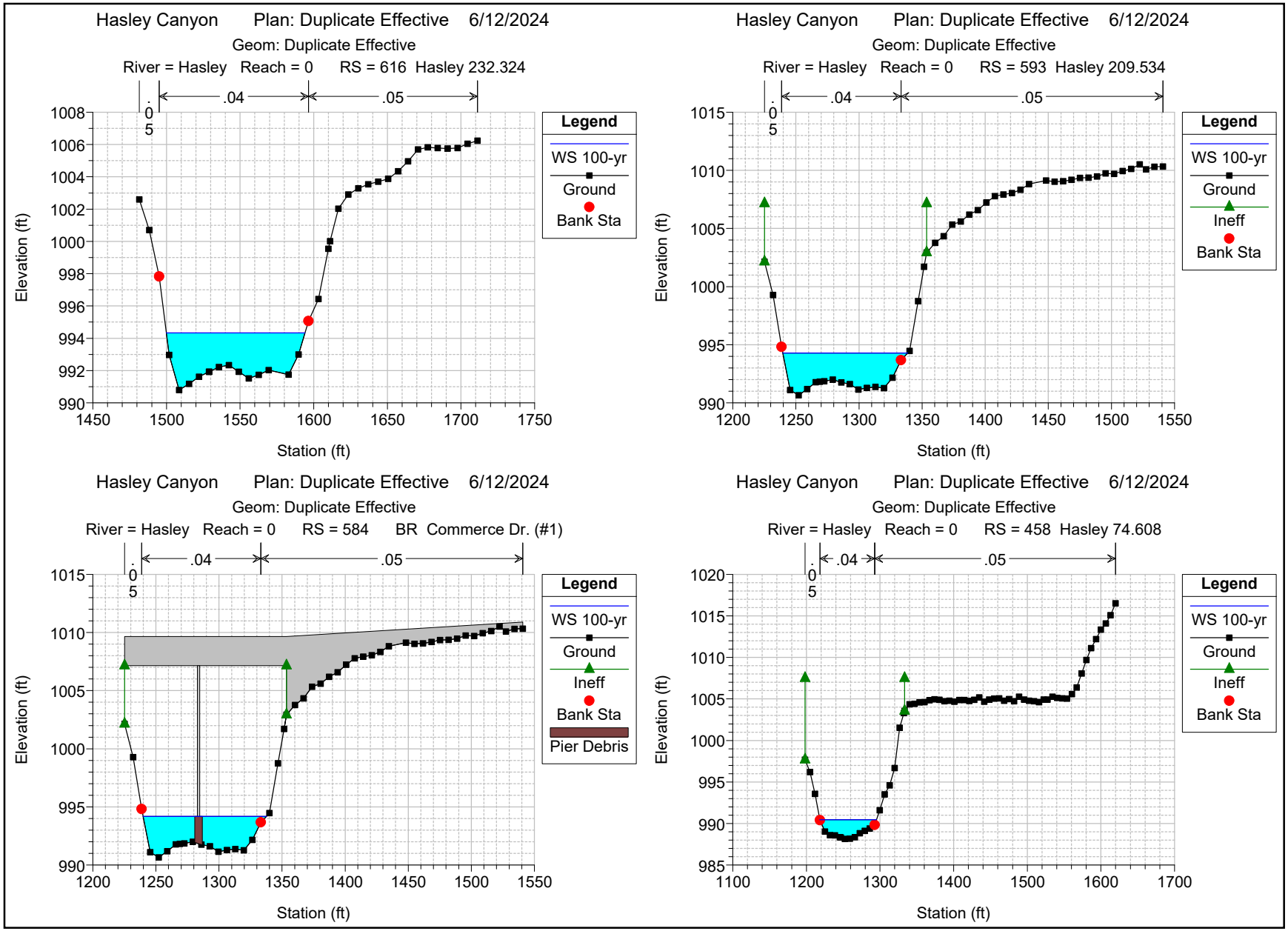

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.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 1907 Hasley 1524.013
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 1795 Hasley 1411.347
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 1715 Hasley 1331.576
.05
.04
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

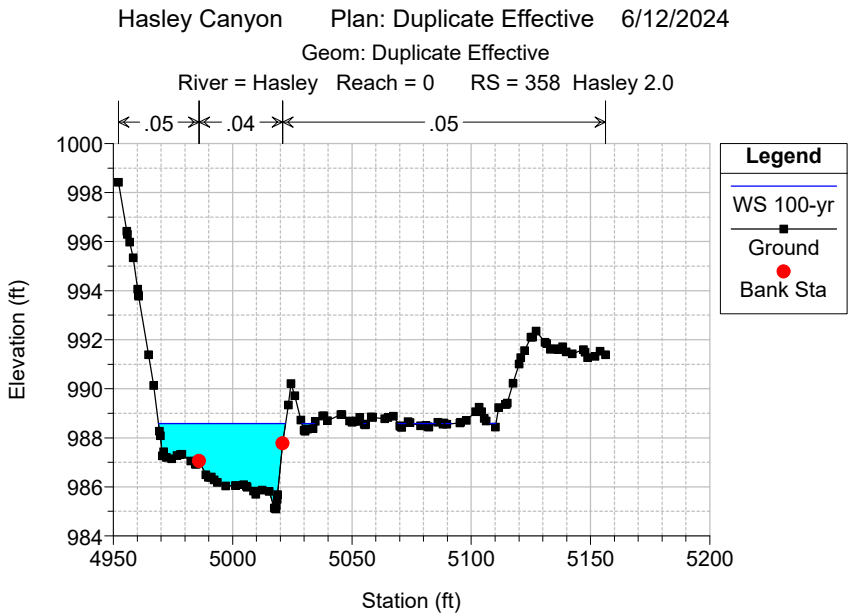

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 1510 Hasley 1127.001
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta

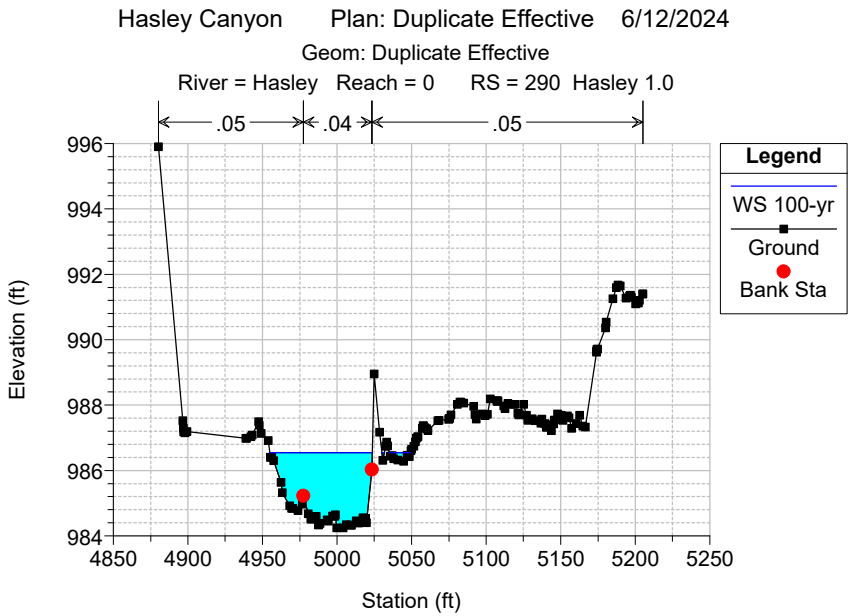

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 1269 Hasley 885.489
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

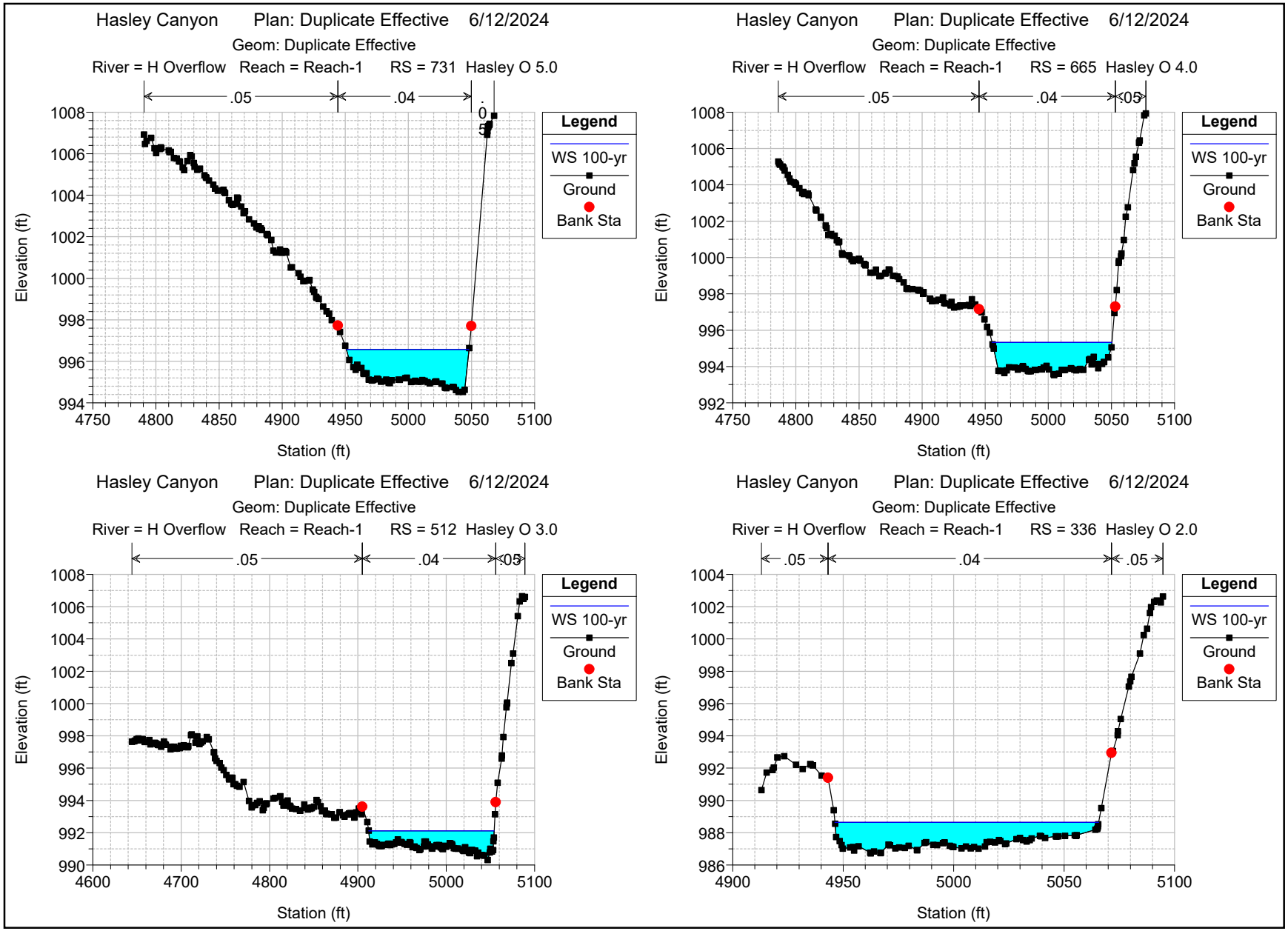

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 1 RS = 1137 Hasley 753.443
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta

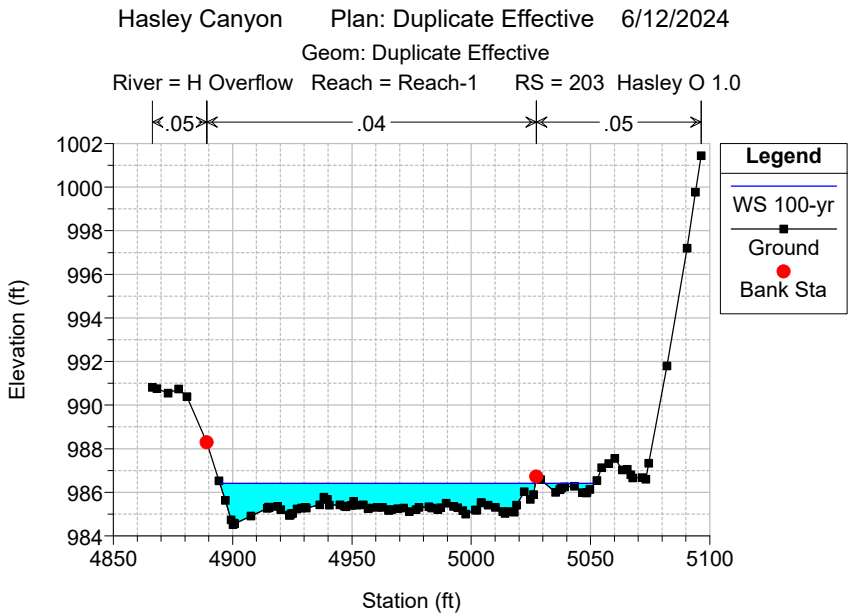

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 963 Hasley 579.379
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta


Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 616 Hasley 232.324
.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 = Hasley Reach = 0 RS = 593 Hasley 209.534
.05
.04
.05
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 584 BR Commerce Dr. (#1)
.05
.04
.05
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Pier Debris
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 458 Hasley 74.608
.05
.04
.05
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 358 Hasley 2.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta


Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = Hasley Reach = 0 RS = 290 Hasley 1.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

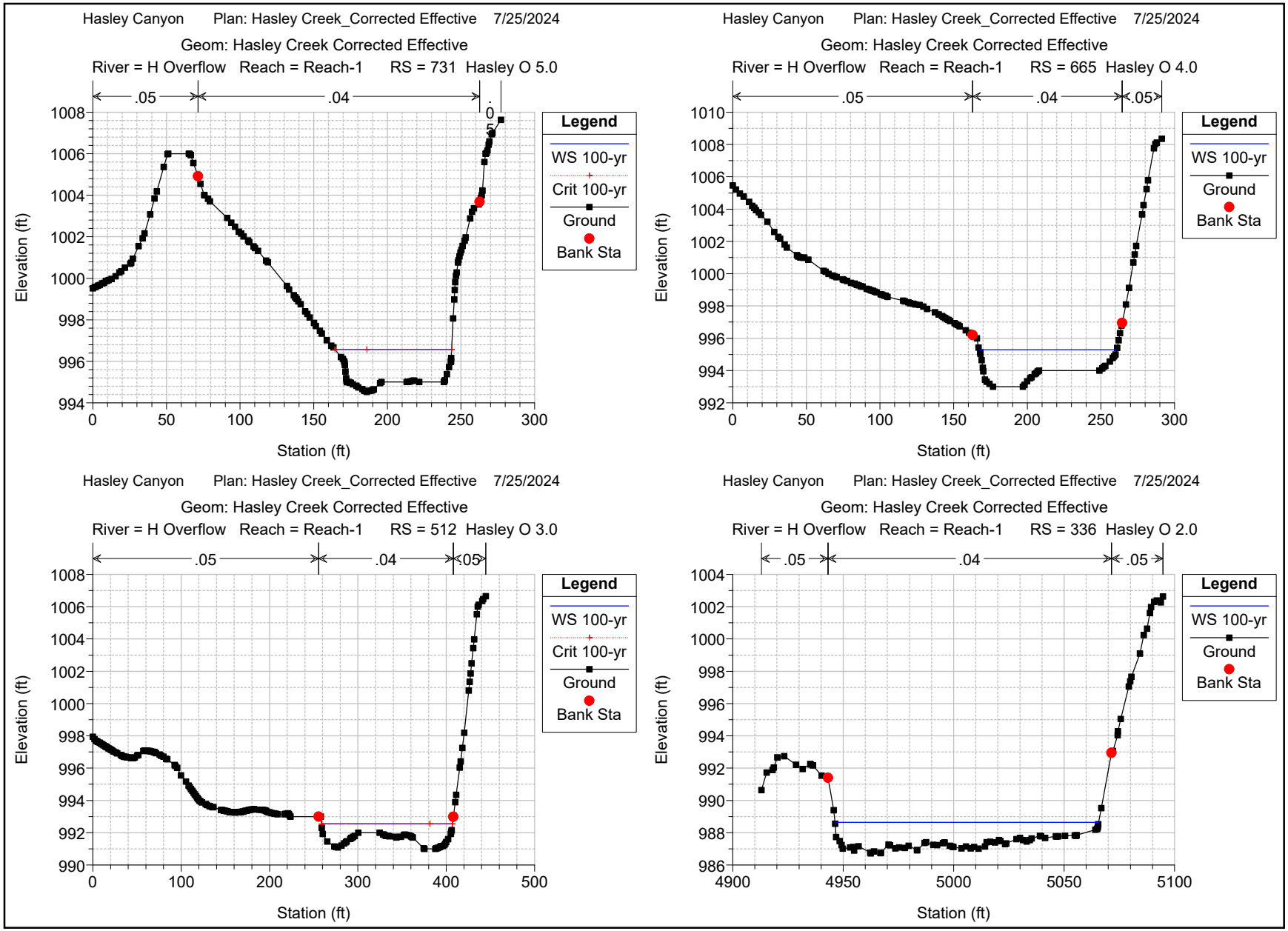

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 731 Hasley O 5.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 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)

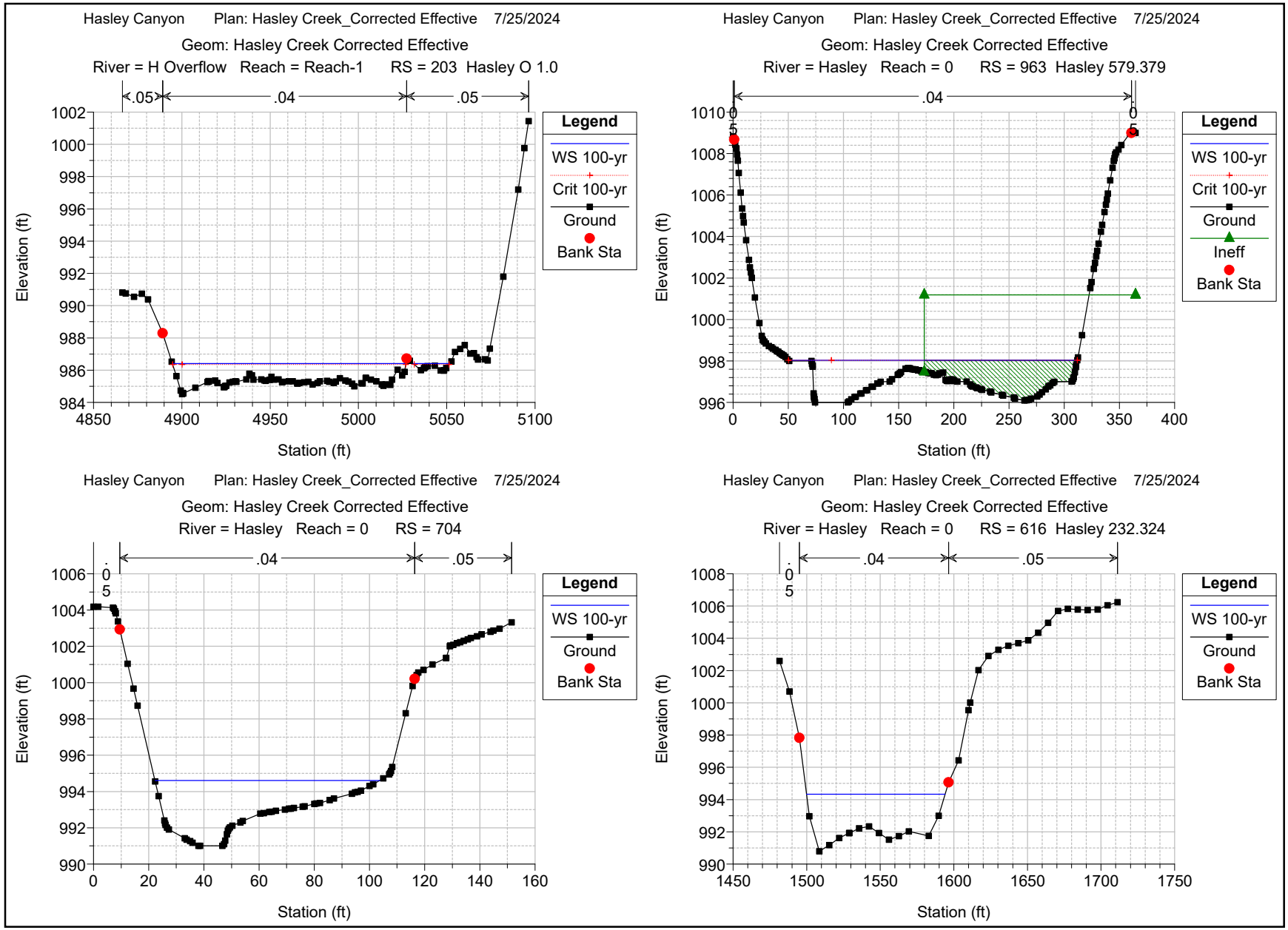

Hasley Canyon Plan: Duplicate Effective 6/12/2024
Geom: Duplicate Effective
River = H Overflow Reach = Reach-1 RS = 203 Hasley O 1.0
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1002
1000
998
996
994
992
990
988
986
984
4850
4900
4950
5000
5050
5100

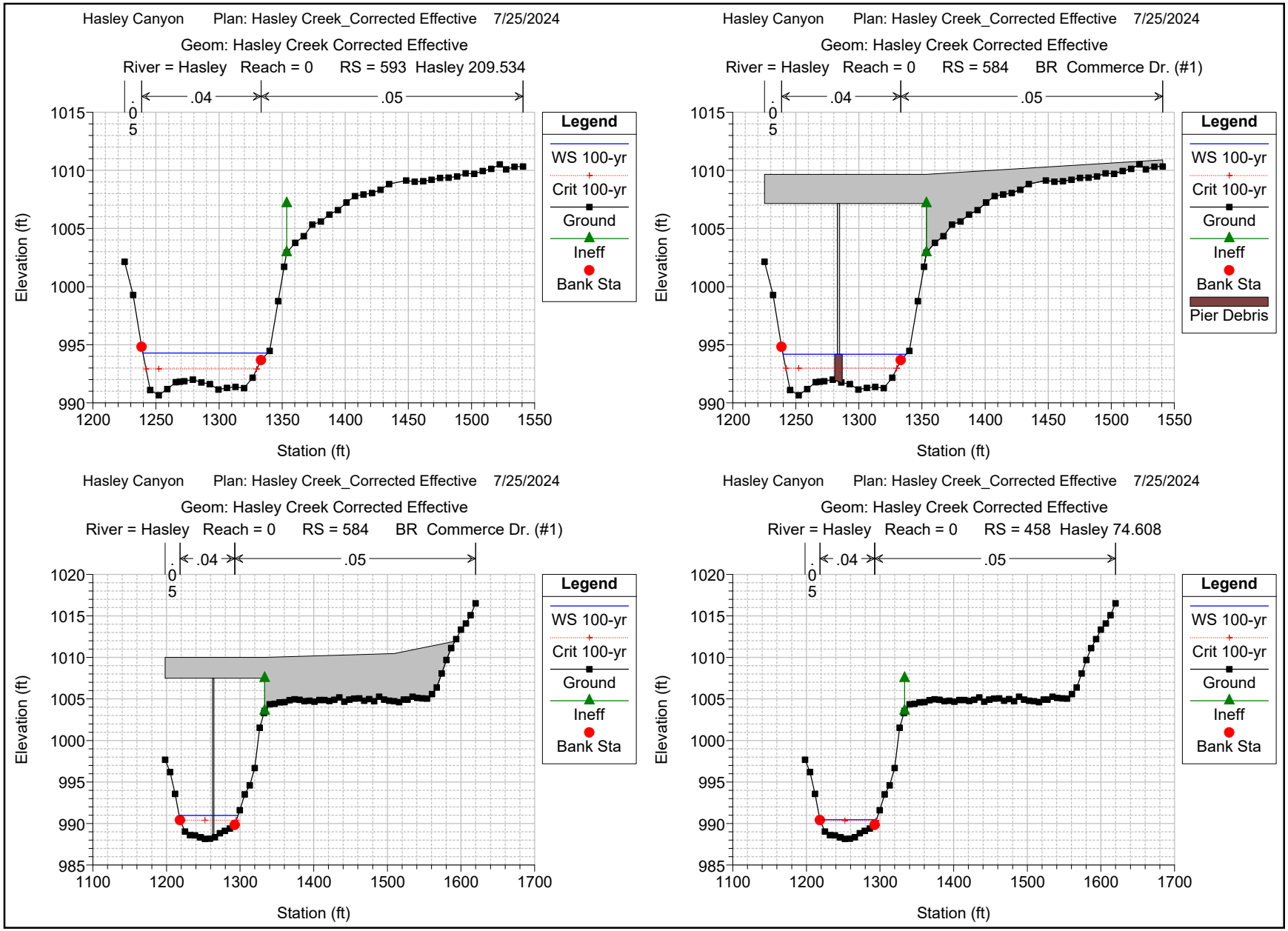
HEC-RAS Plan: Duplicate Effective Profile: 100-yr

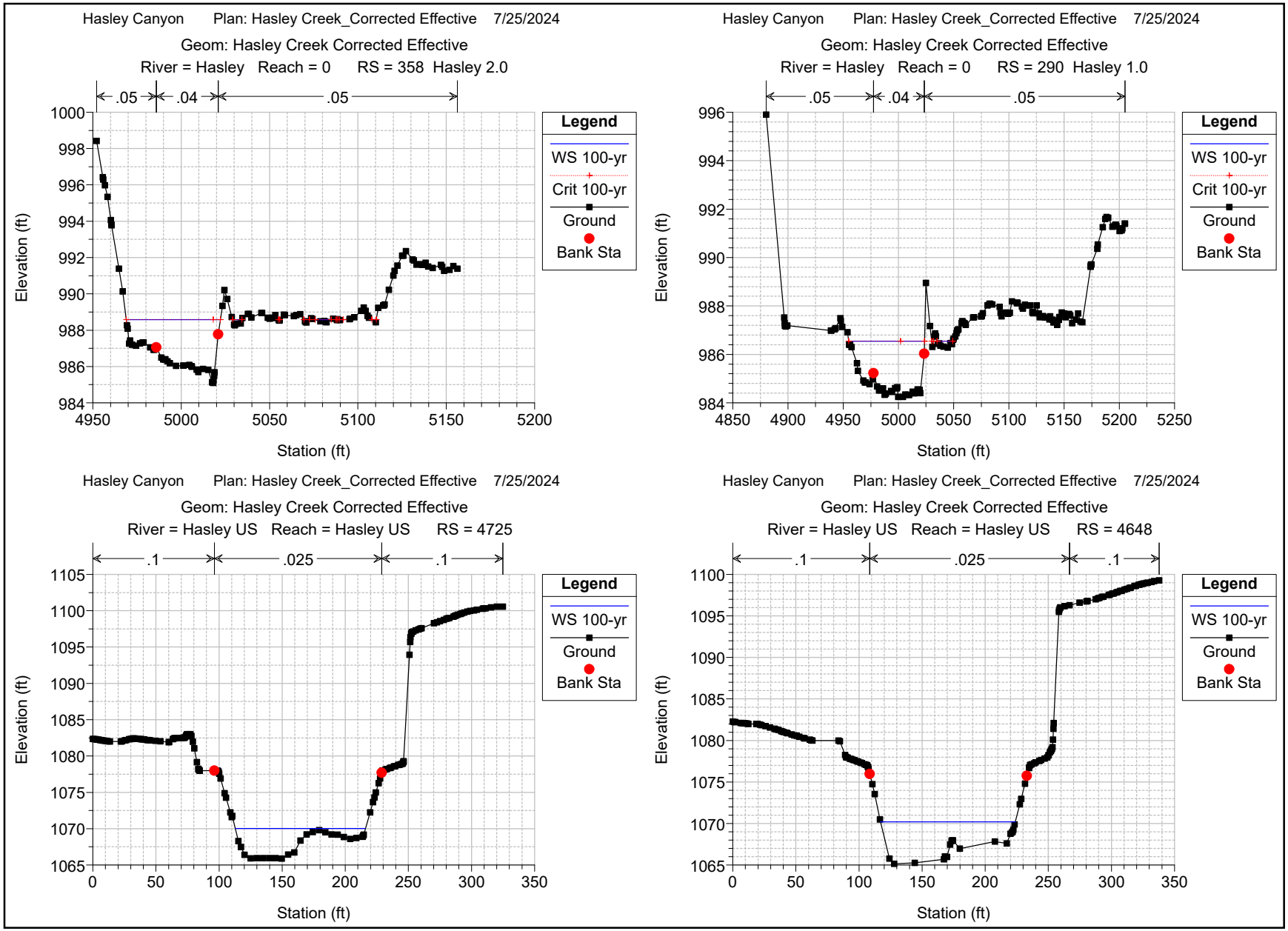
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hasley	1	4295 Hasley 3911.677	100-yr	1640.00	1065.95	1070.49	1070.49	1071.71	0.006639	8.86	185.17	73.31	0.98
Hasley	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

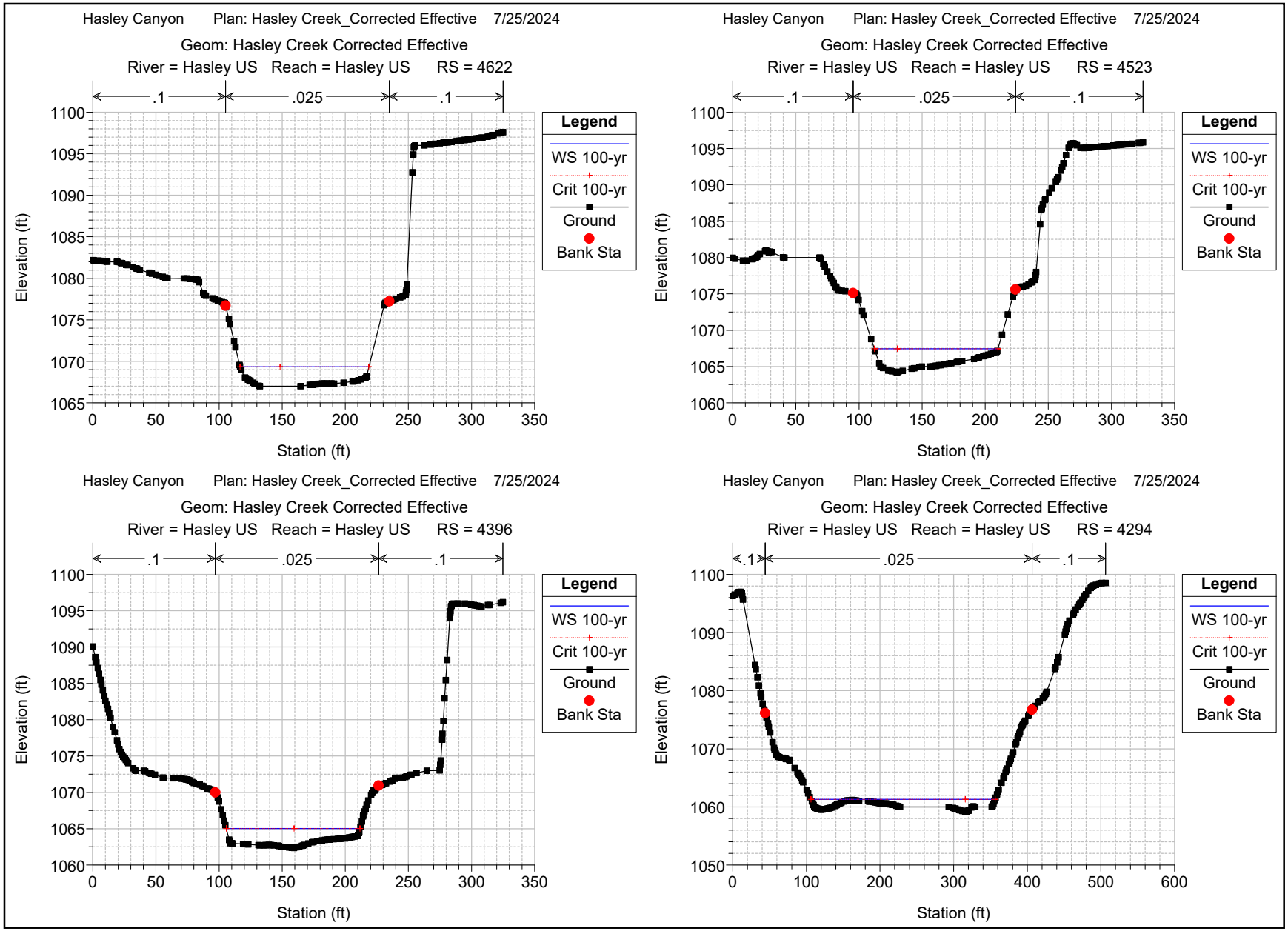
Appendix D – HEC-RAS Corrected Effective Condition Hydraulic Results

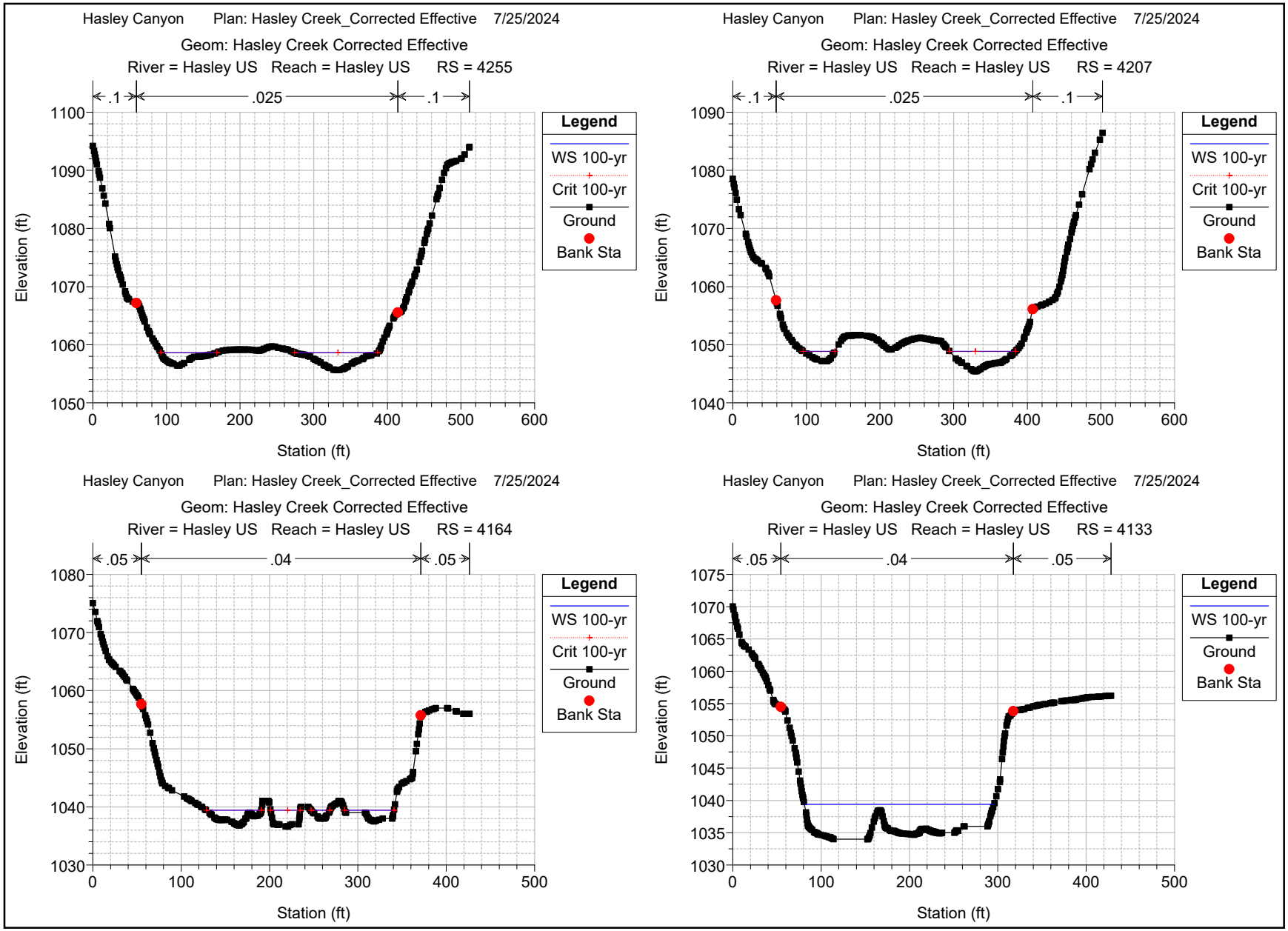

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 731 Hasley O 5.0
.05
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 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)

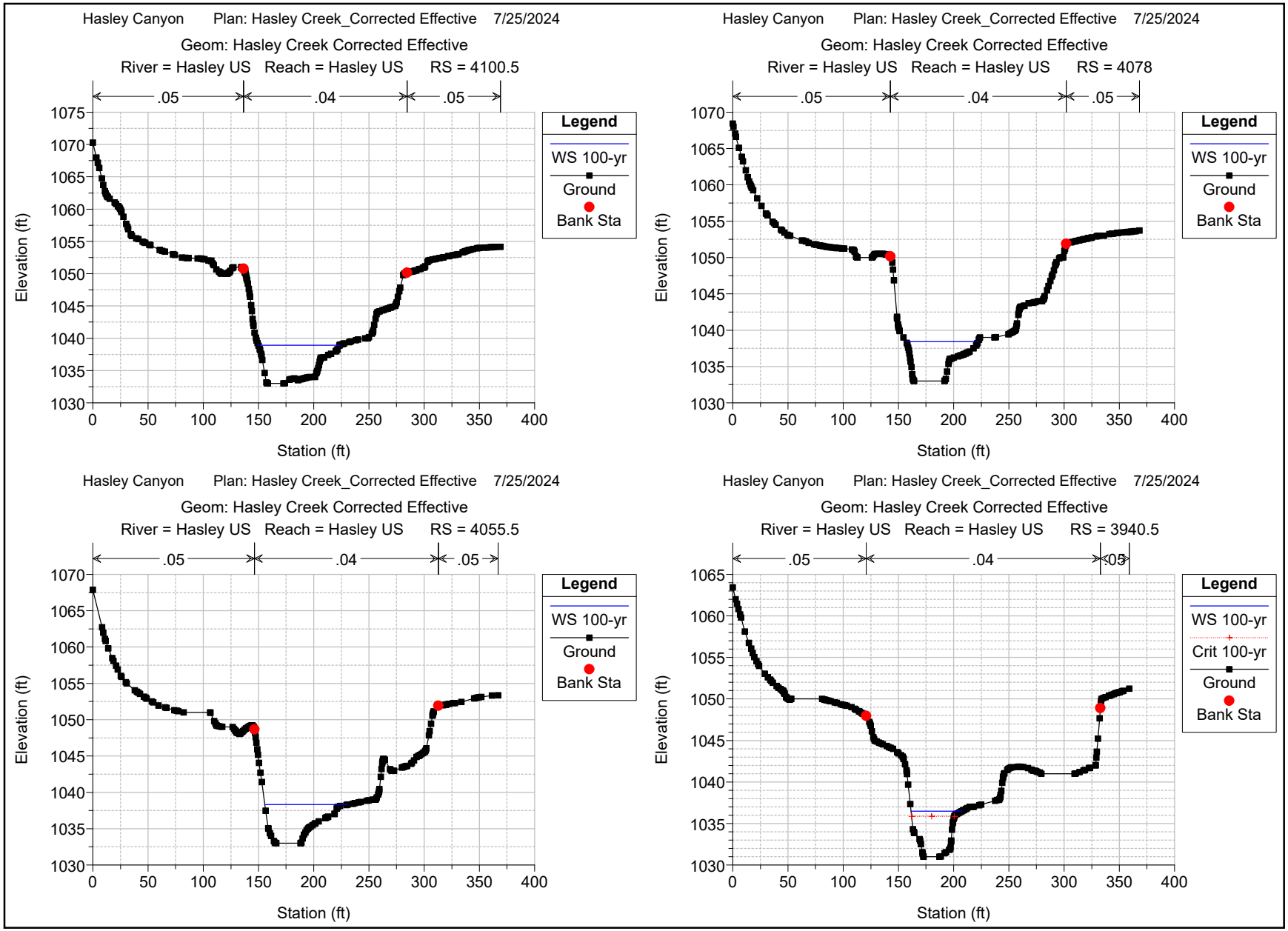

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = H Overflow Reach = Reach-1 RS = 203 Hasley O 1.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
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

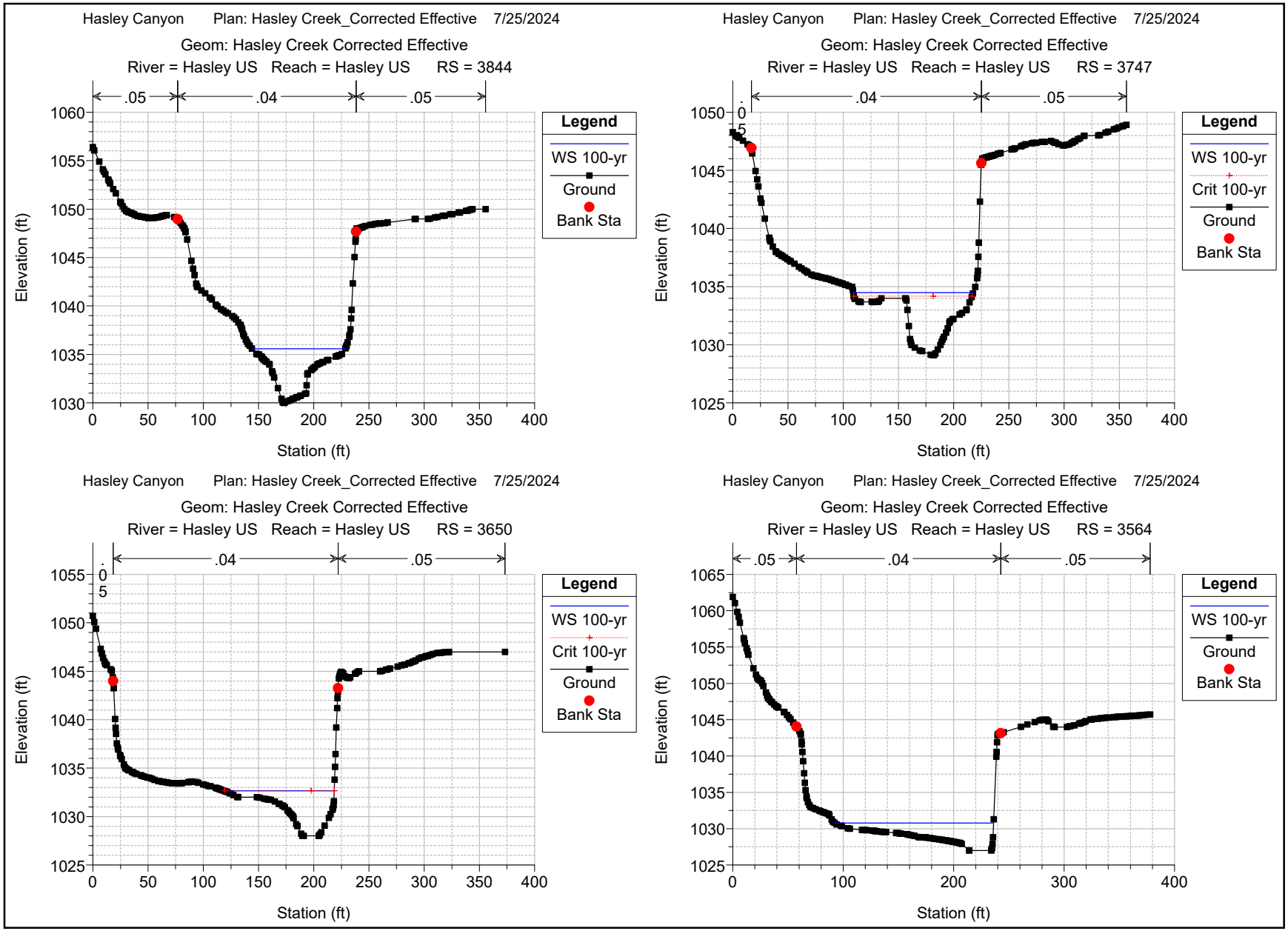

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 593 Hasley 209.534
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
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_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 584 BR Commerce Dr. (#1)
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

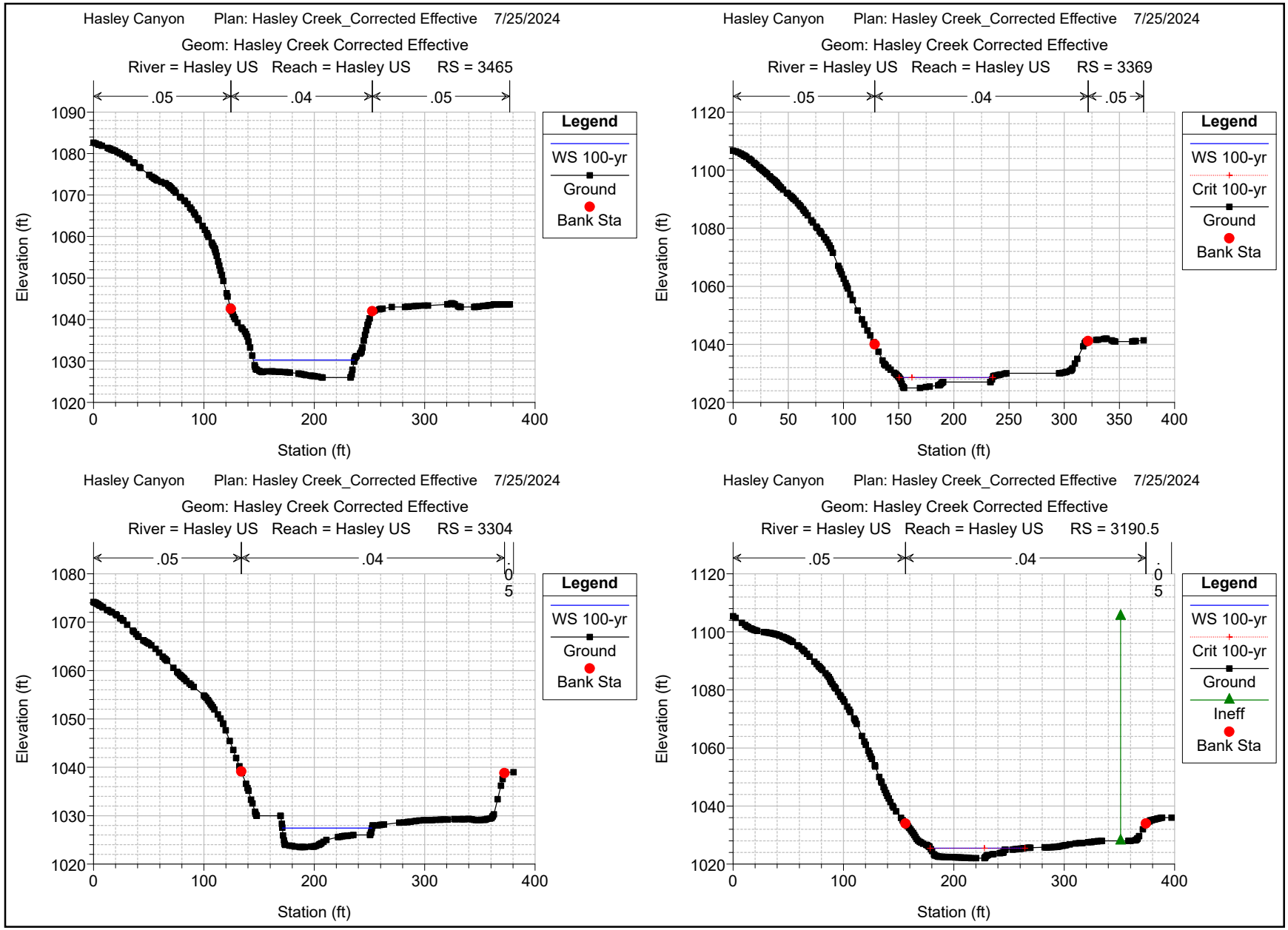

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley Reach = 0 RS = 358 Hasley 2.0
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: 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

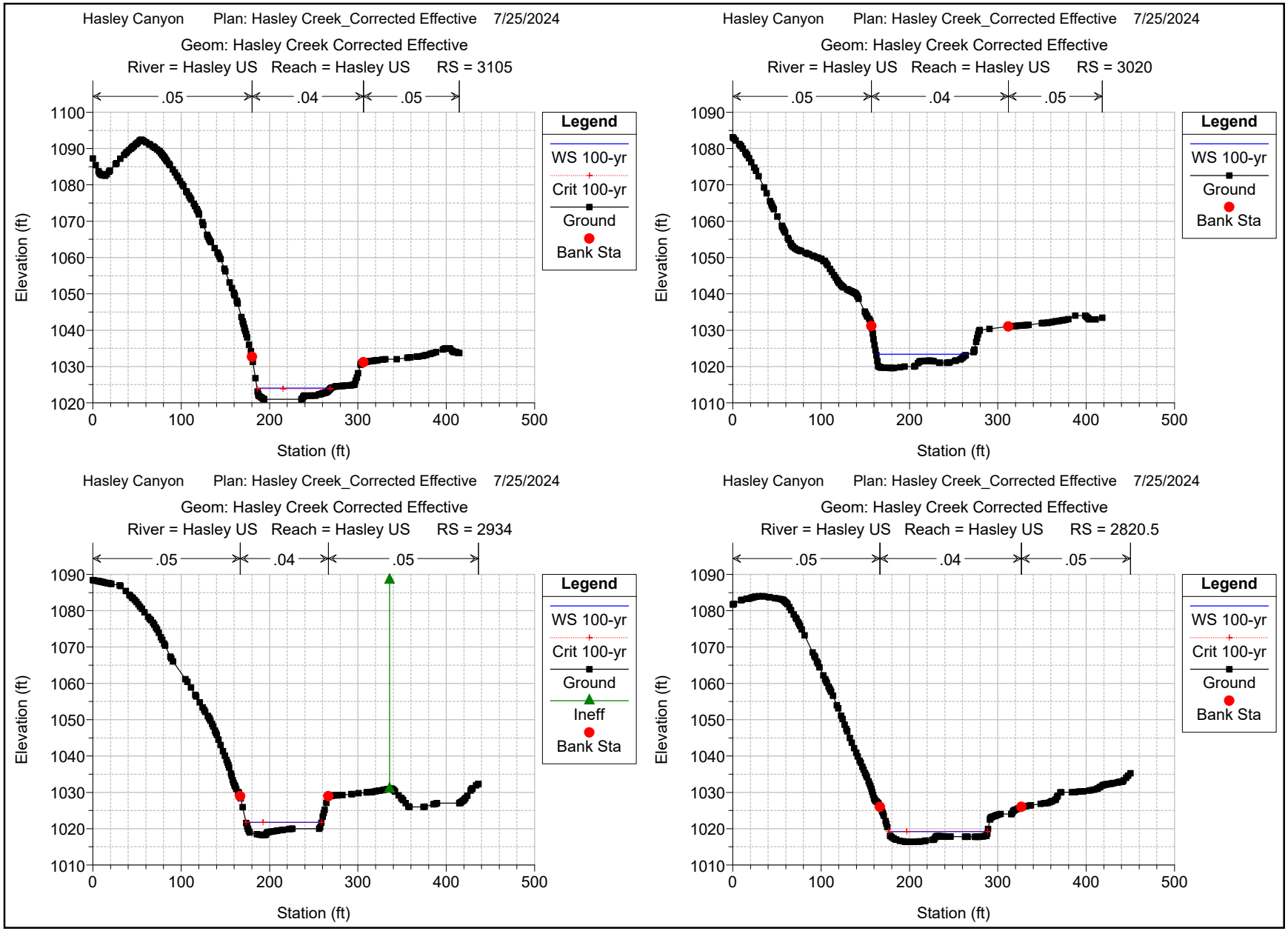

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4622
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: 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)

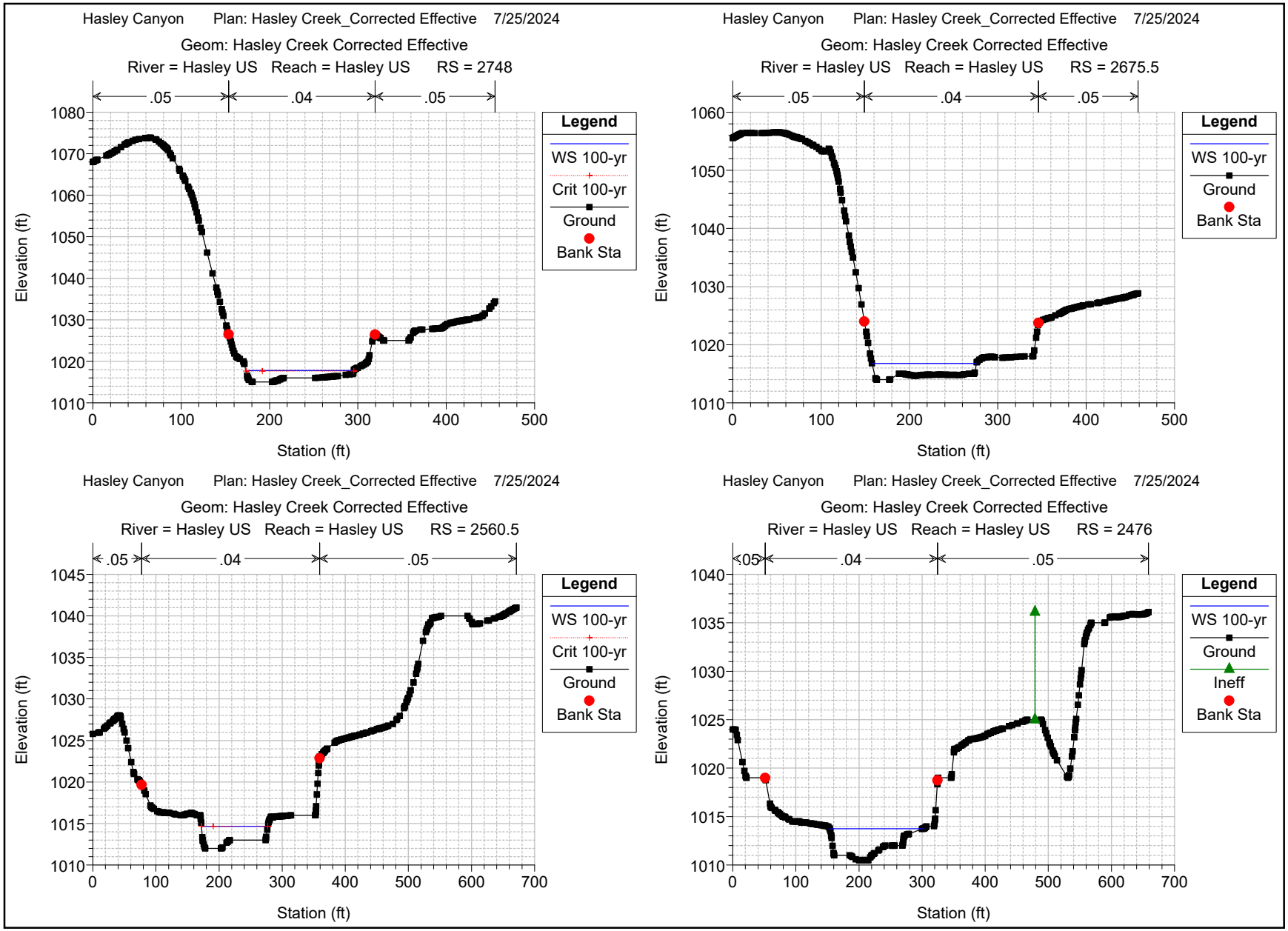

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4255
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: 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

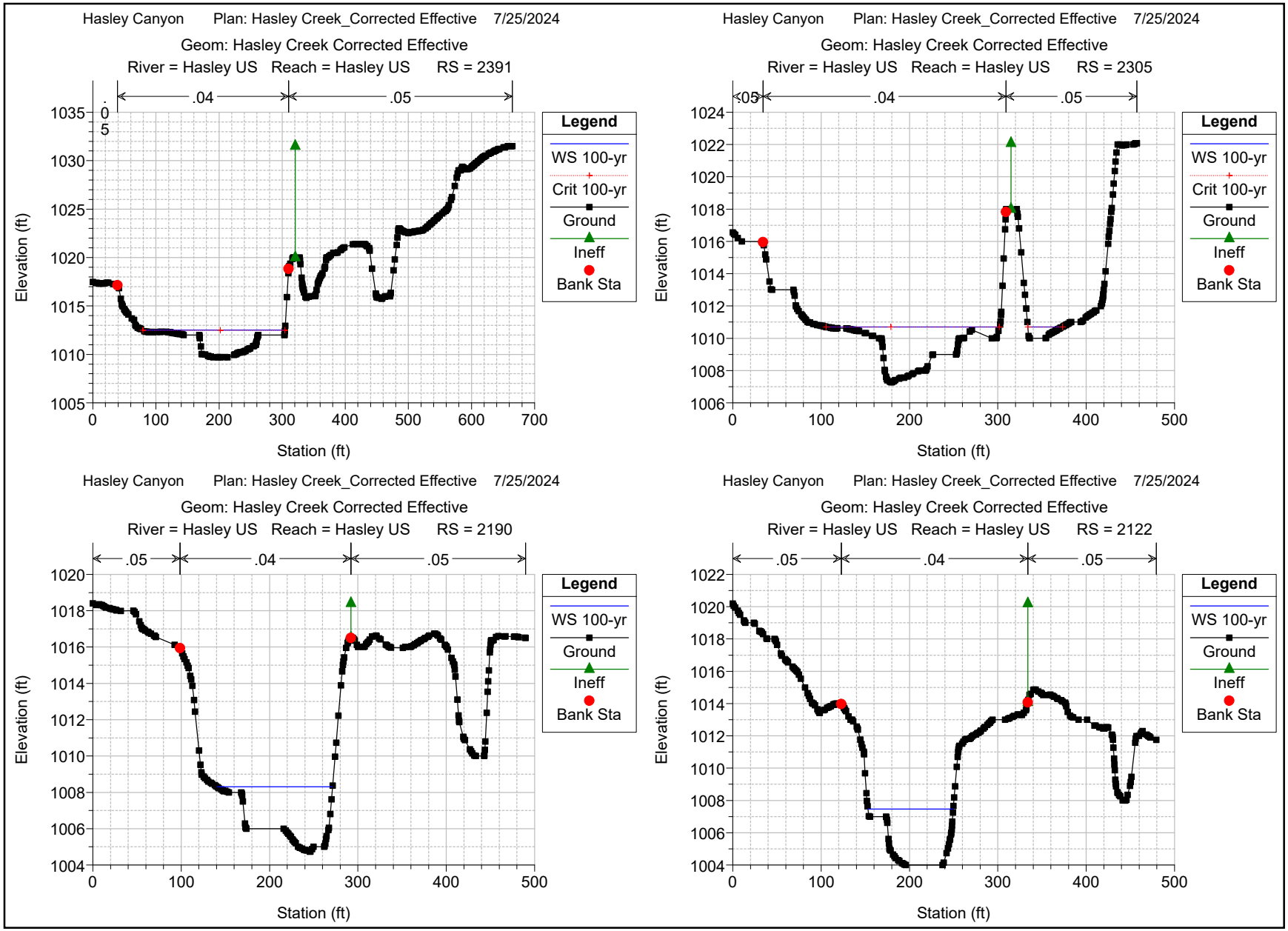

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 4100.5
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek 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)

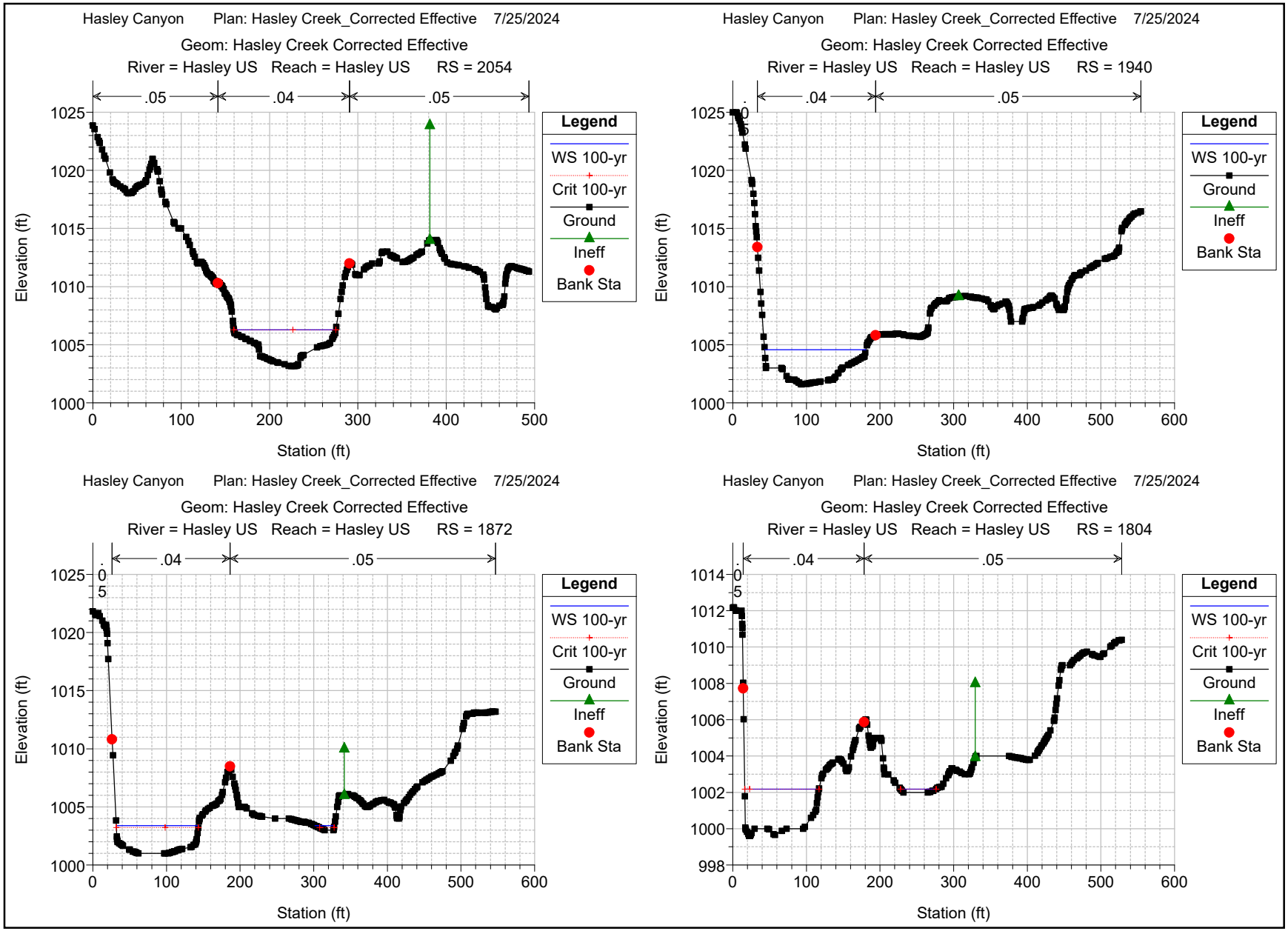

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3844
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3747
.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 = Hasley US Reach = Hasley US RS = 3650
.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 = Hasley US Reach = Hasley US RS = 3564
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

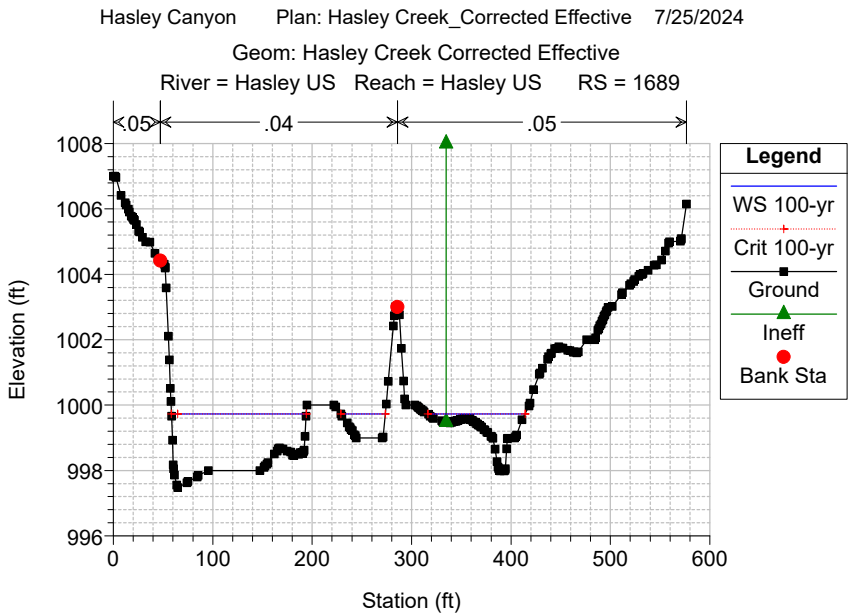

Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3465
.05
.04
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
Geom: Hasley Creek Corrected Effective
River = Hasley US Reach = Hasley US RS = 3369
.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 = Hasley US Reach = Hasley US RS = 3304
.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 = 3190.5
.05
.04
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Ineff
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 = 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


Hasley Canyon Plan: Hasley Creek_Corrected Effective 7/25/2024
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

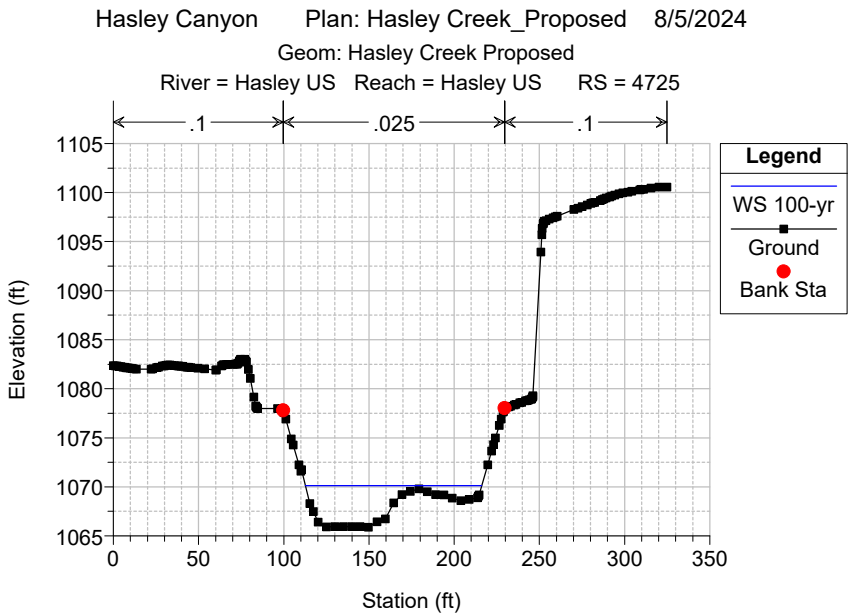
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hasley US	Hasley US	4725	100-yr	1640.00	1065.89	1070.02		1070.82	0.005162	7.18	228.47	103.20	0.85
Hasley US	Hasley 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

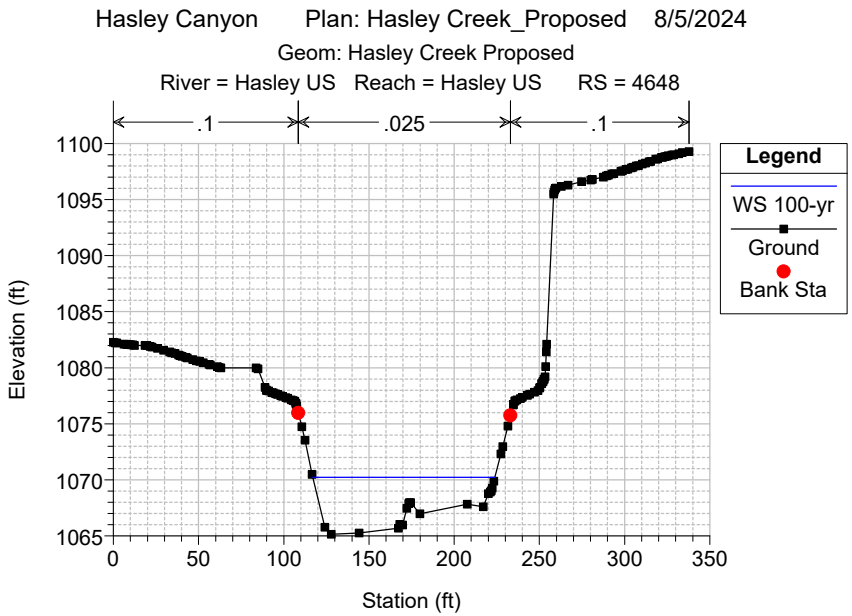
PACE
Advanced Water Engineering

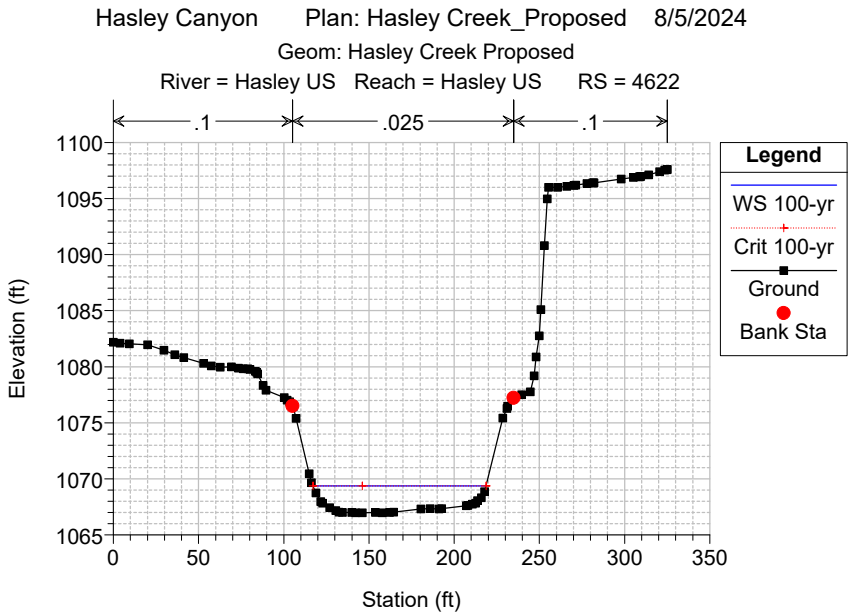
Appendix E – HEC-RAS Proposed Condition Hydraulic Results

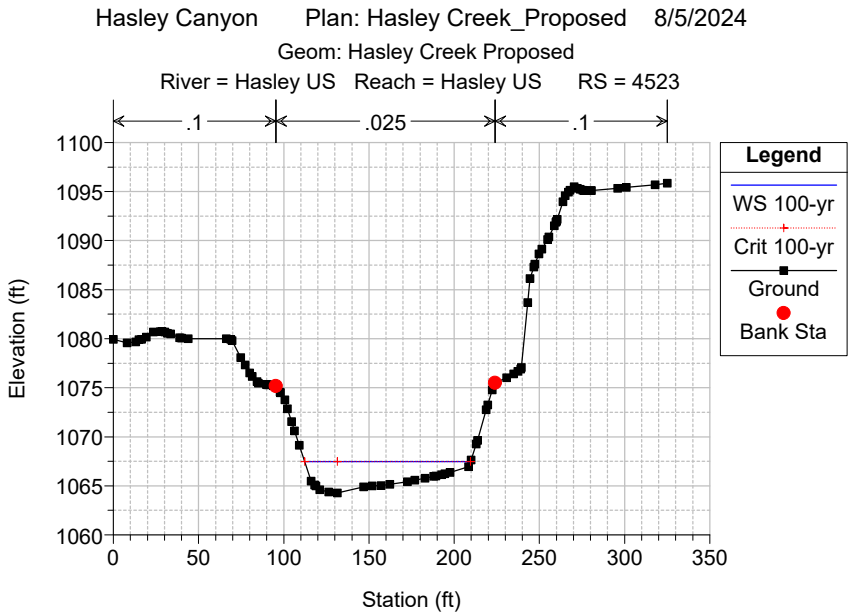
HEC-RAS Plan: Proposed Profile: 100-yr

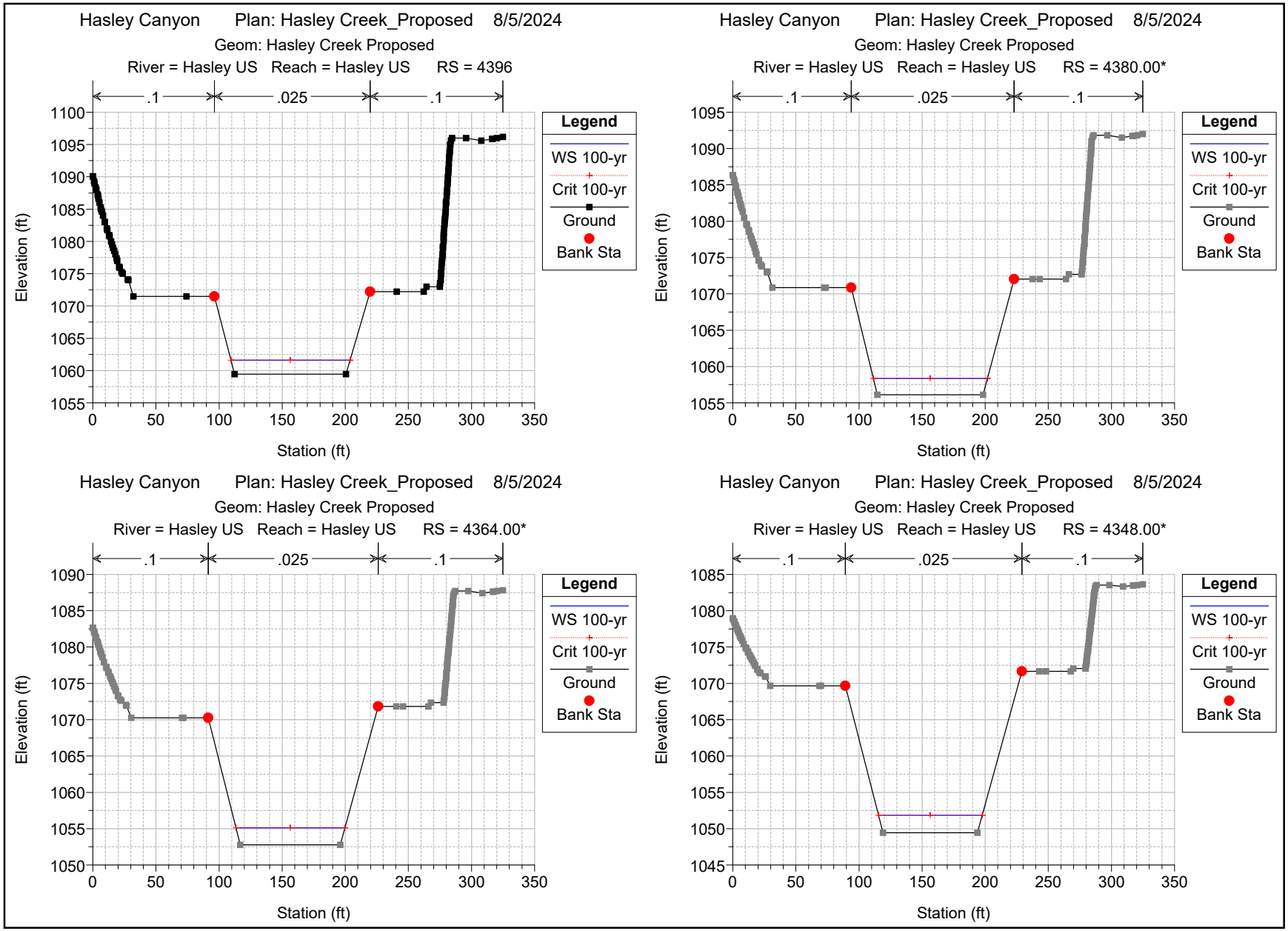
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hasley US	Hasley US	4725	100-yr	1640.00	1065.89	1070.11		1070.85	0.004514	6.89	238.17	103.49	0.80
Hasley US	Hasley 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

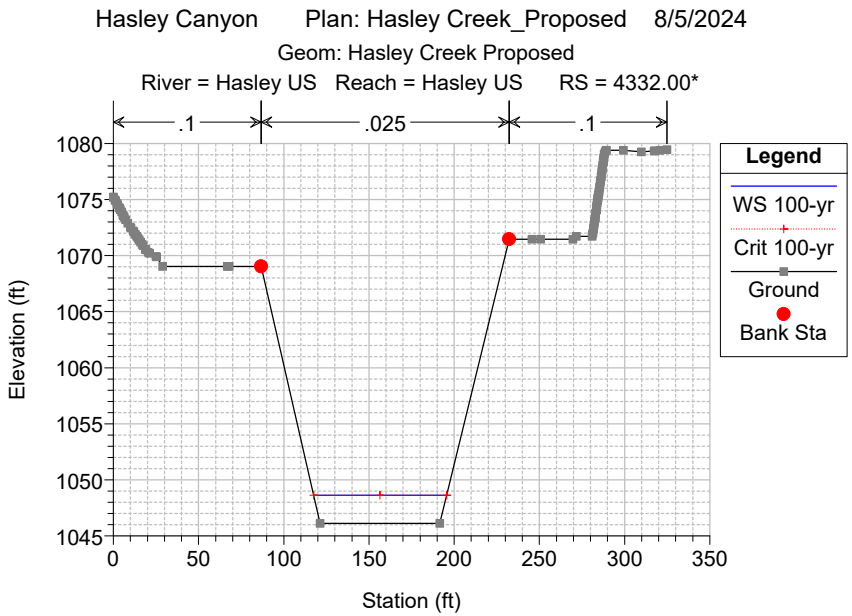

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4725
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

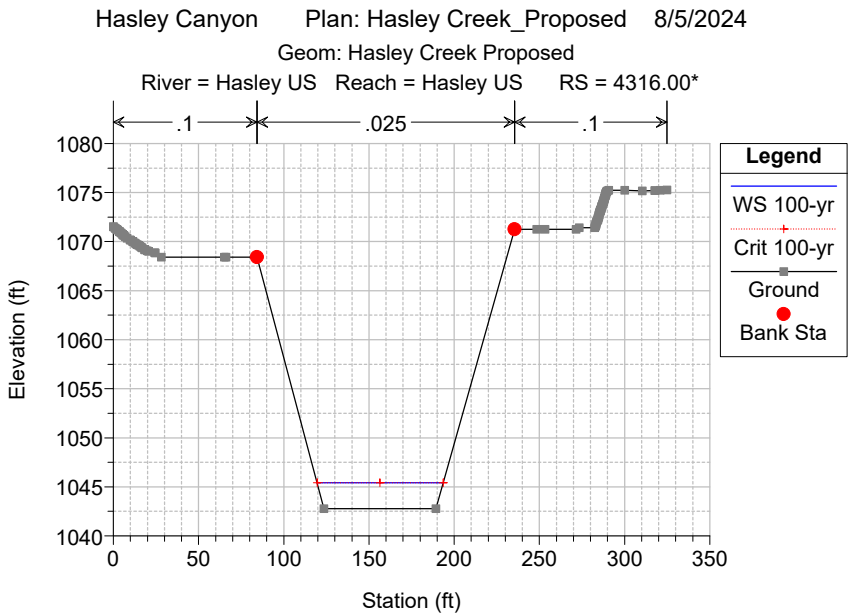

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4648
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

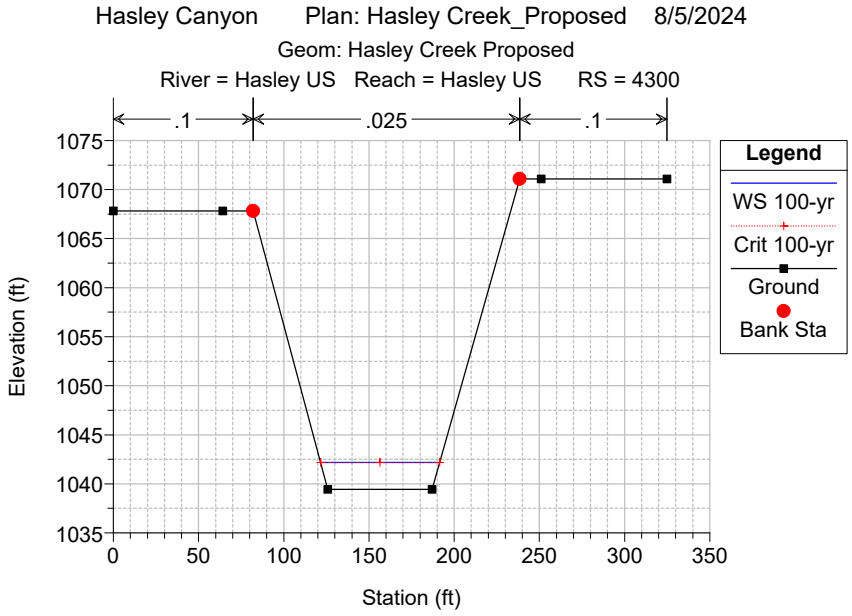

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4622
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

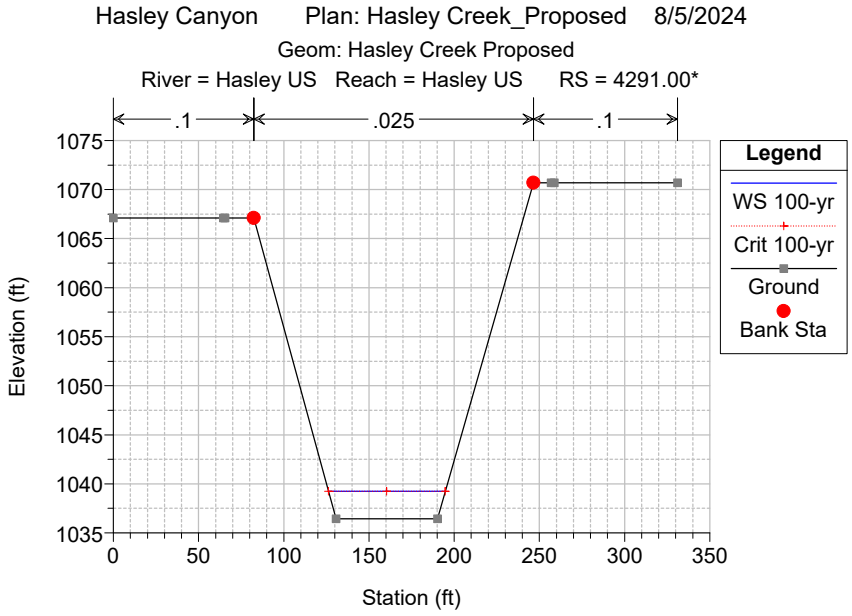

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4523
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

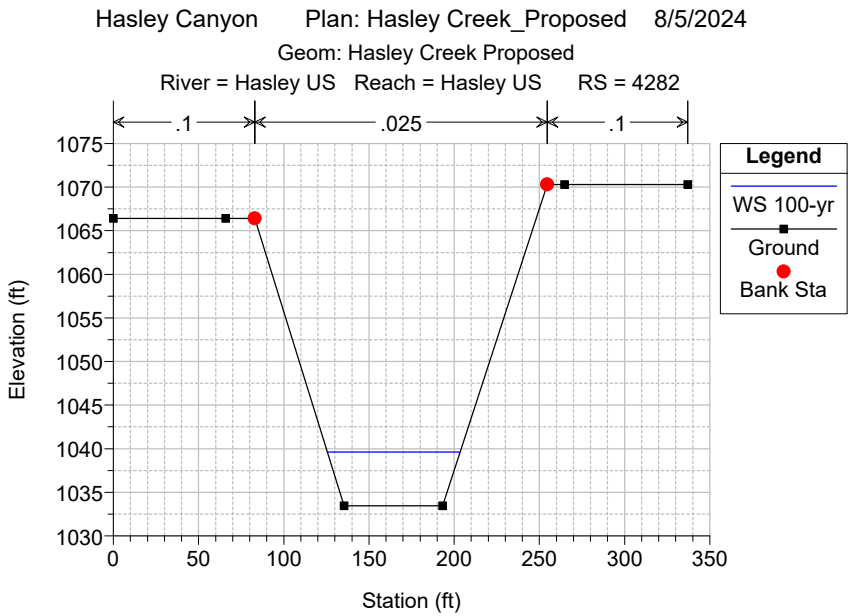

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4396
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley 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*
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta

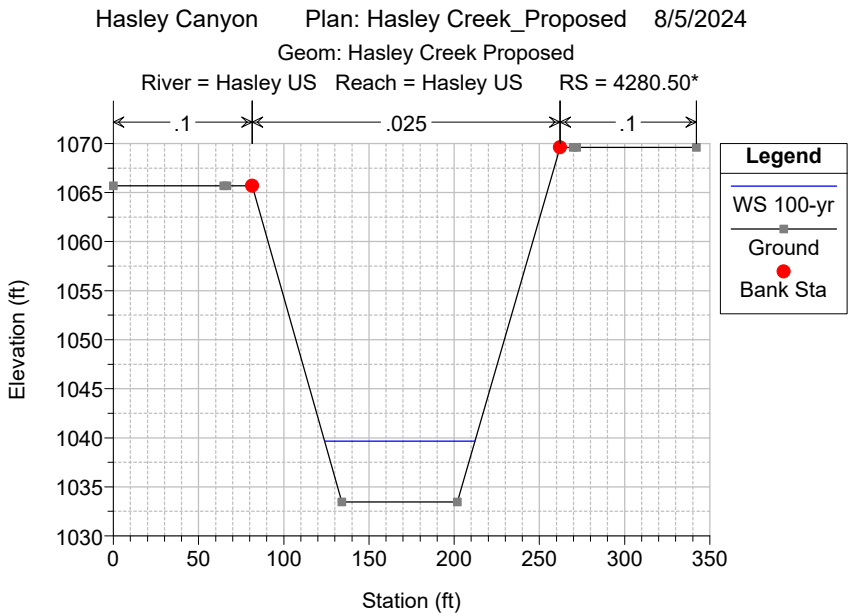

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4332.00*
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

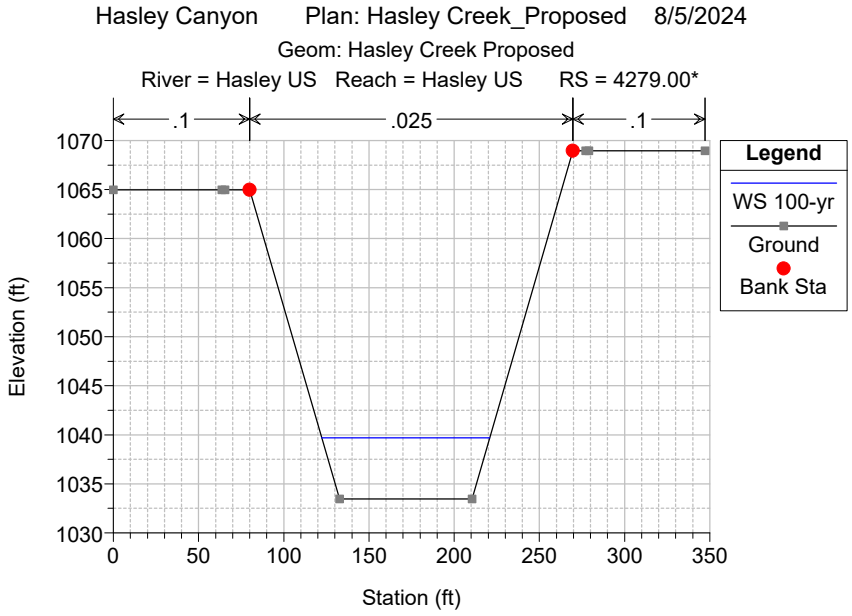

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4316.00*
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

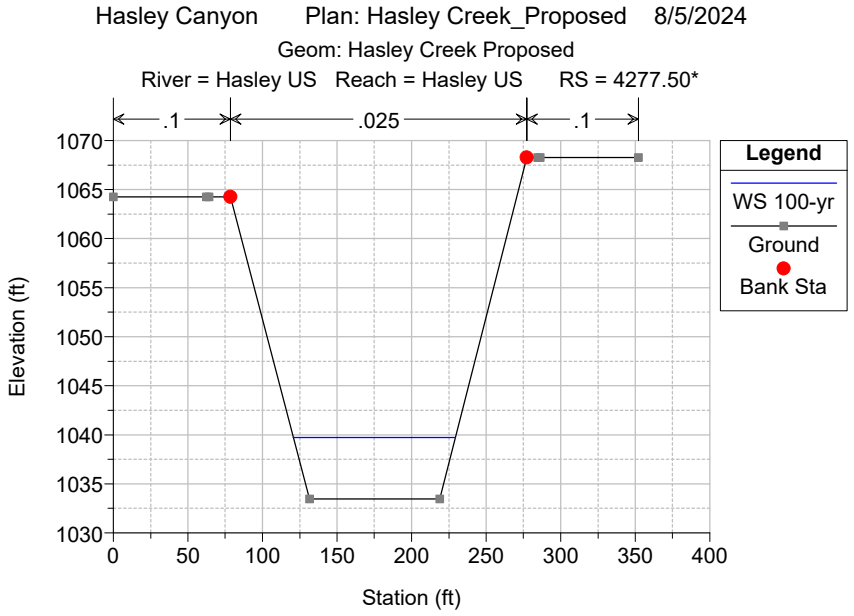

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4300
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

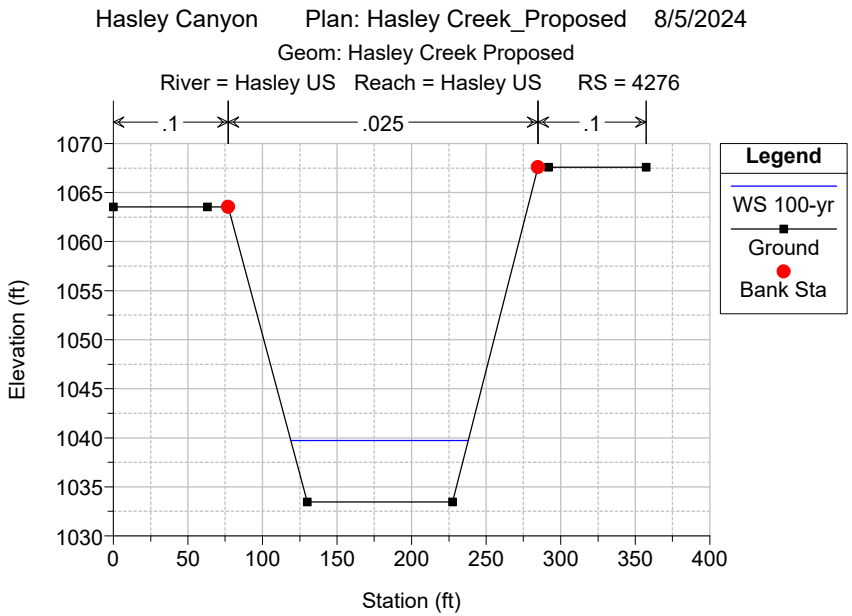

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4291.00*
.1
.025
.1
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

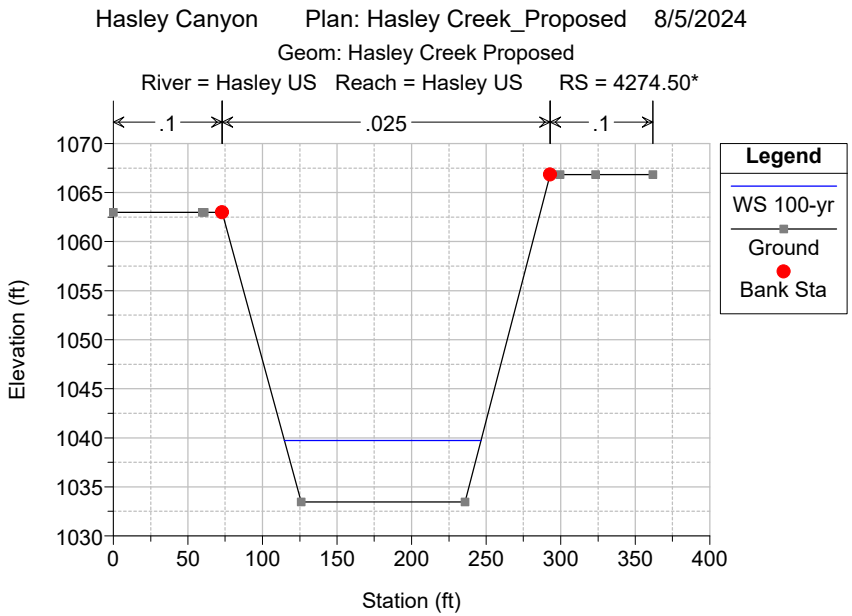

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4282
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

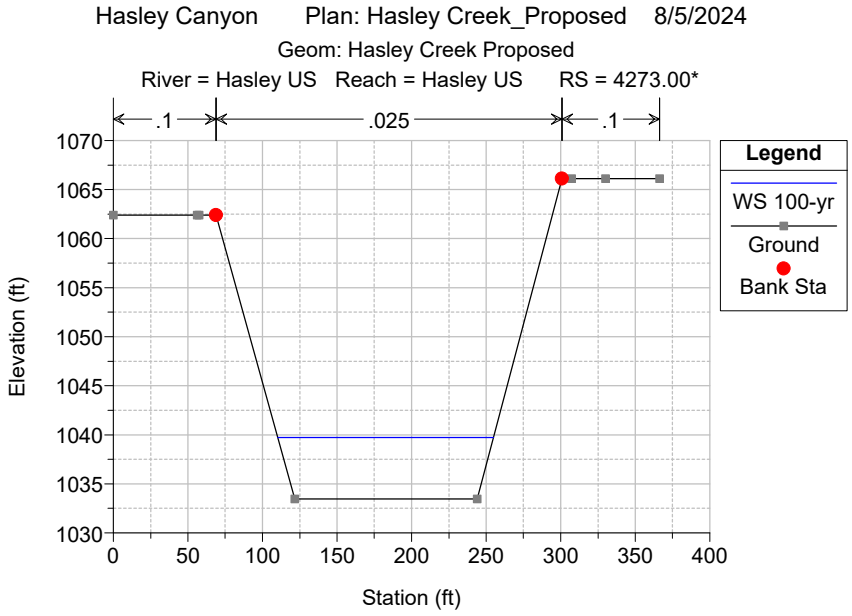

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4280.50*
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

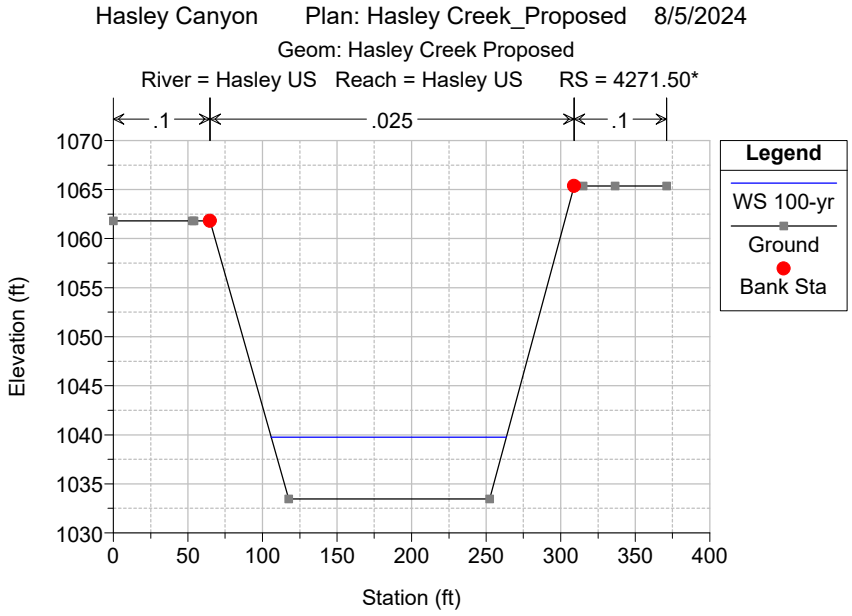

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4279.00*
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

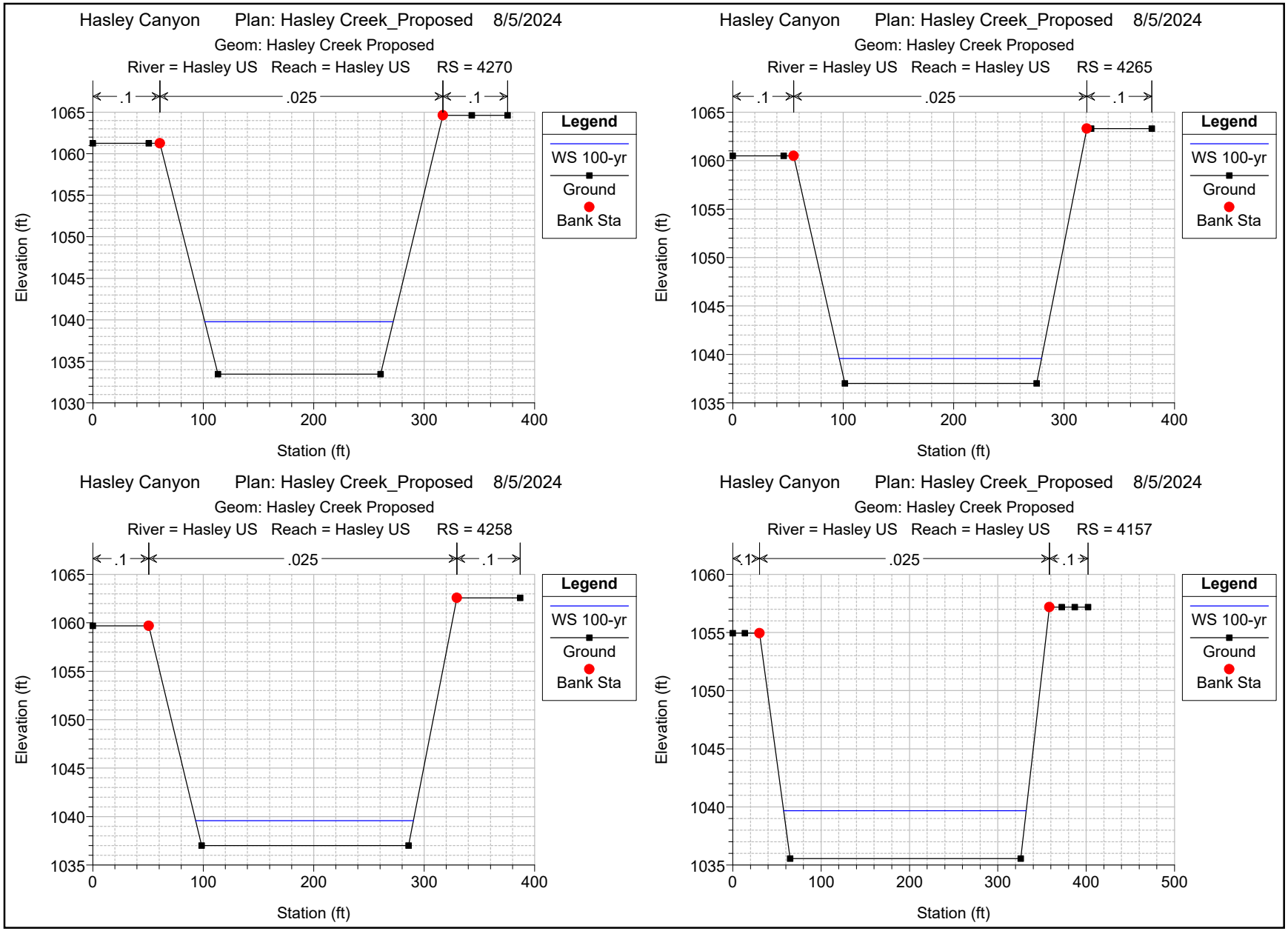

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4277.50*
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

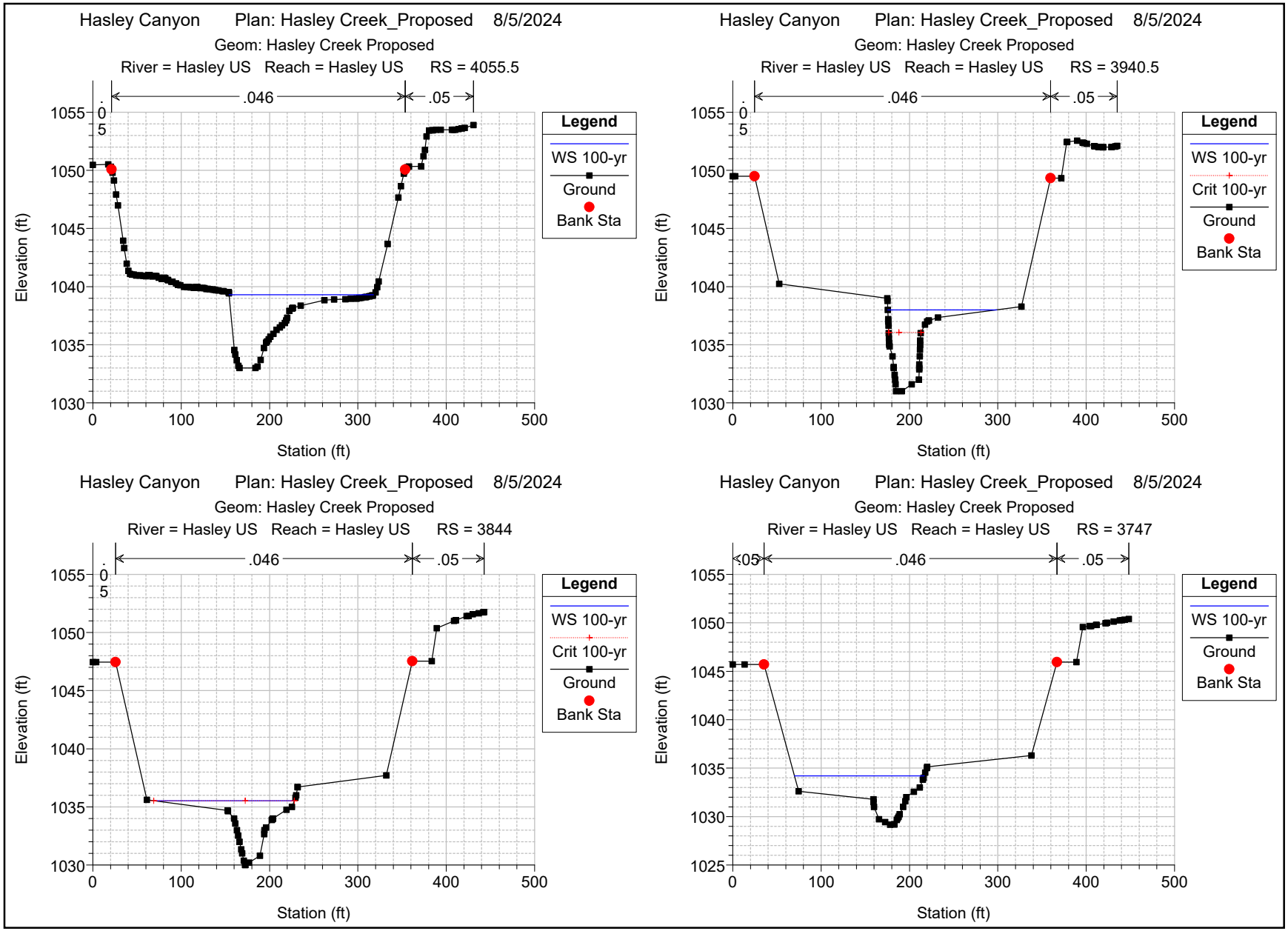

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4276
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

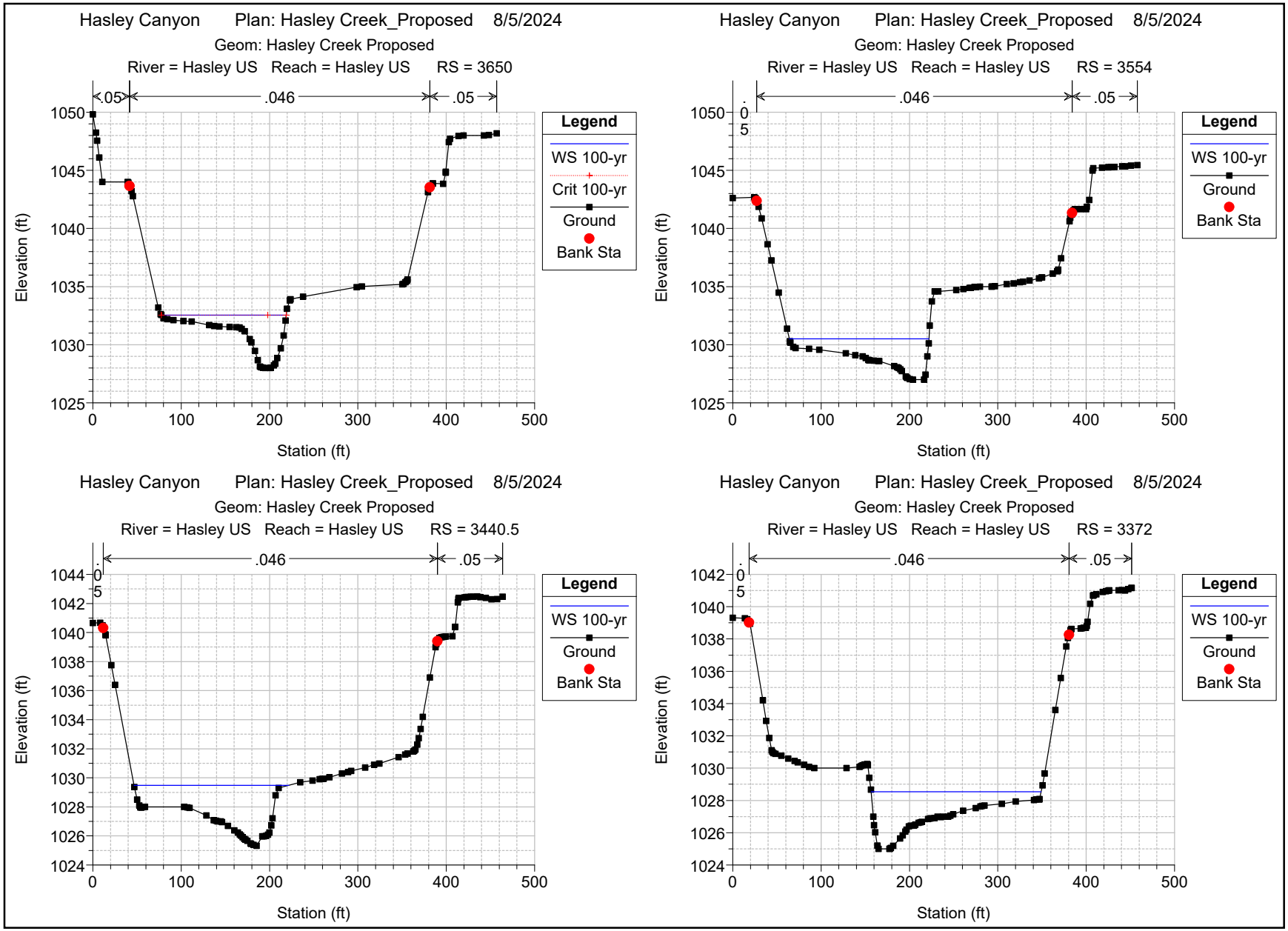

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4274.50*
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

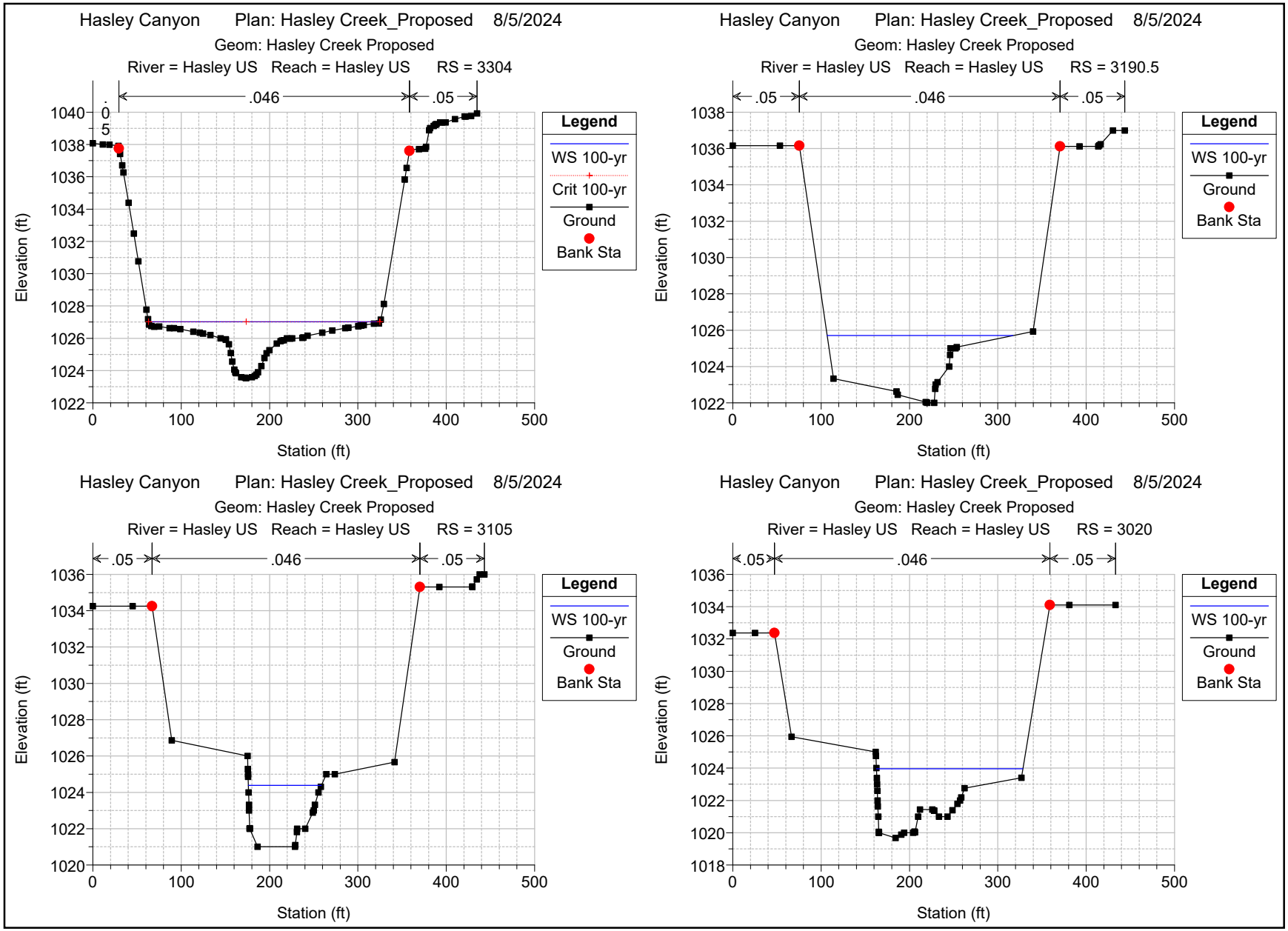

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4273.00*
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

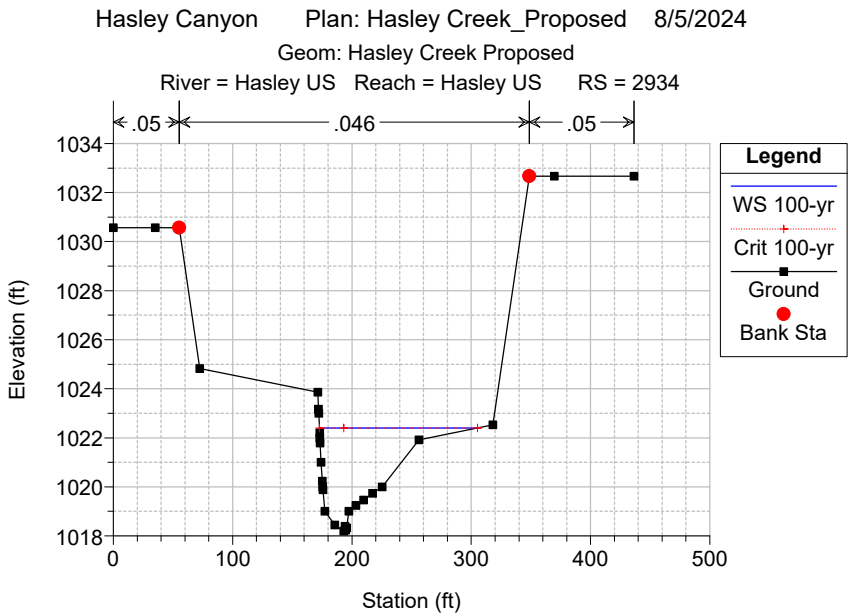

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4271.50*
.1
.025
.1
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

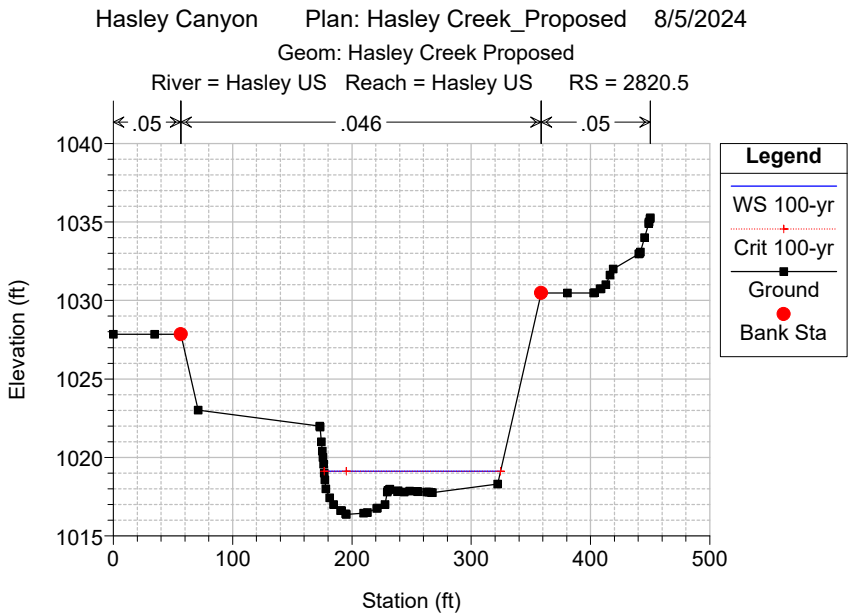

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4270
.1
.025
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = 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)

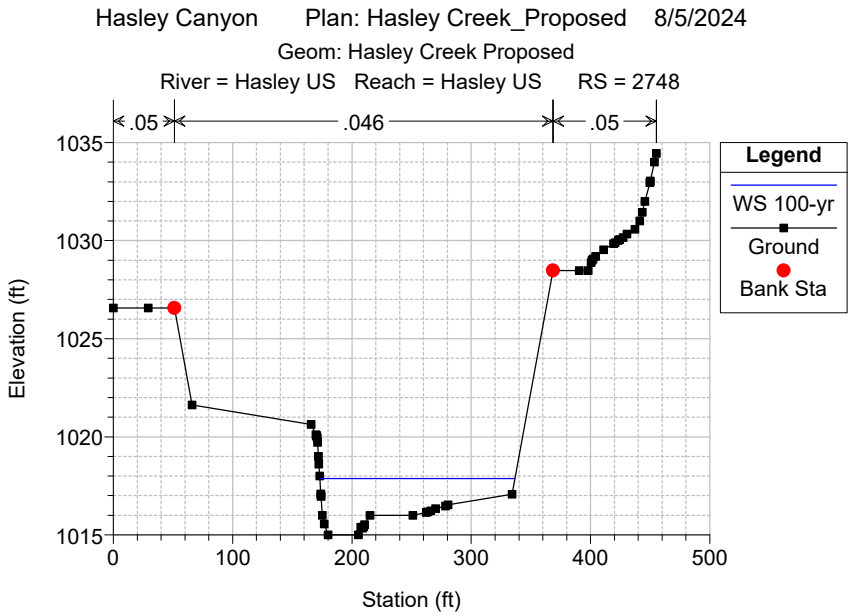

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 4055.5
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3940.5
.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 = 3844
.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 = 3747
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

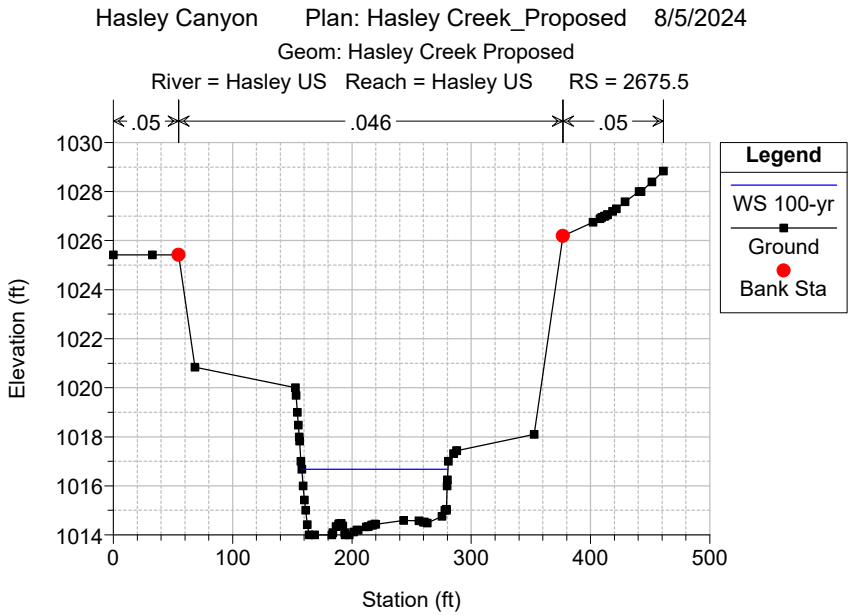

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3650
.05
.046
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley 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)

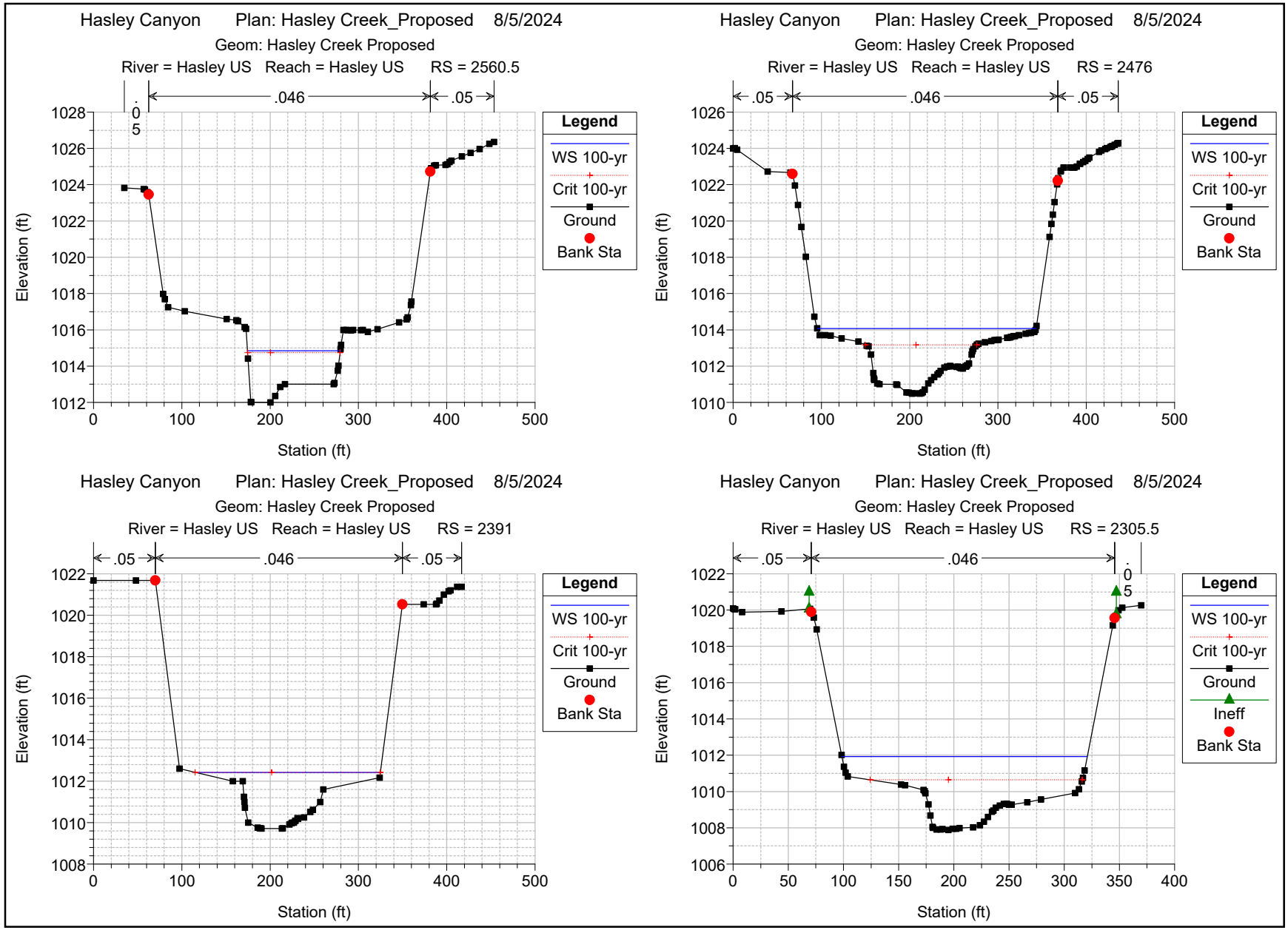

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3304
.05
.046
.05
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 3190.5
.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 = 3105
.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 = 3020
.05
.046
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

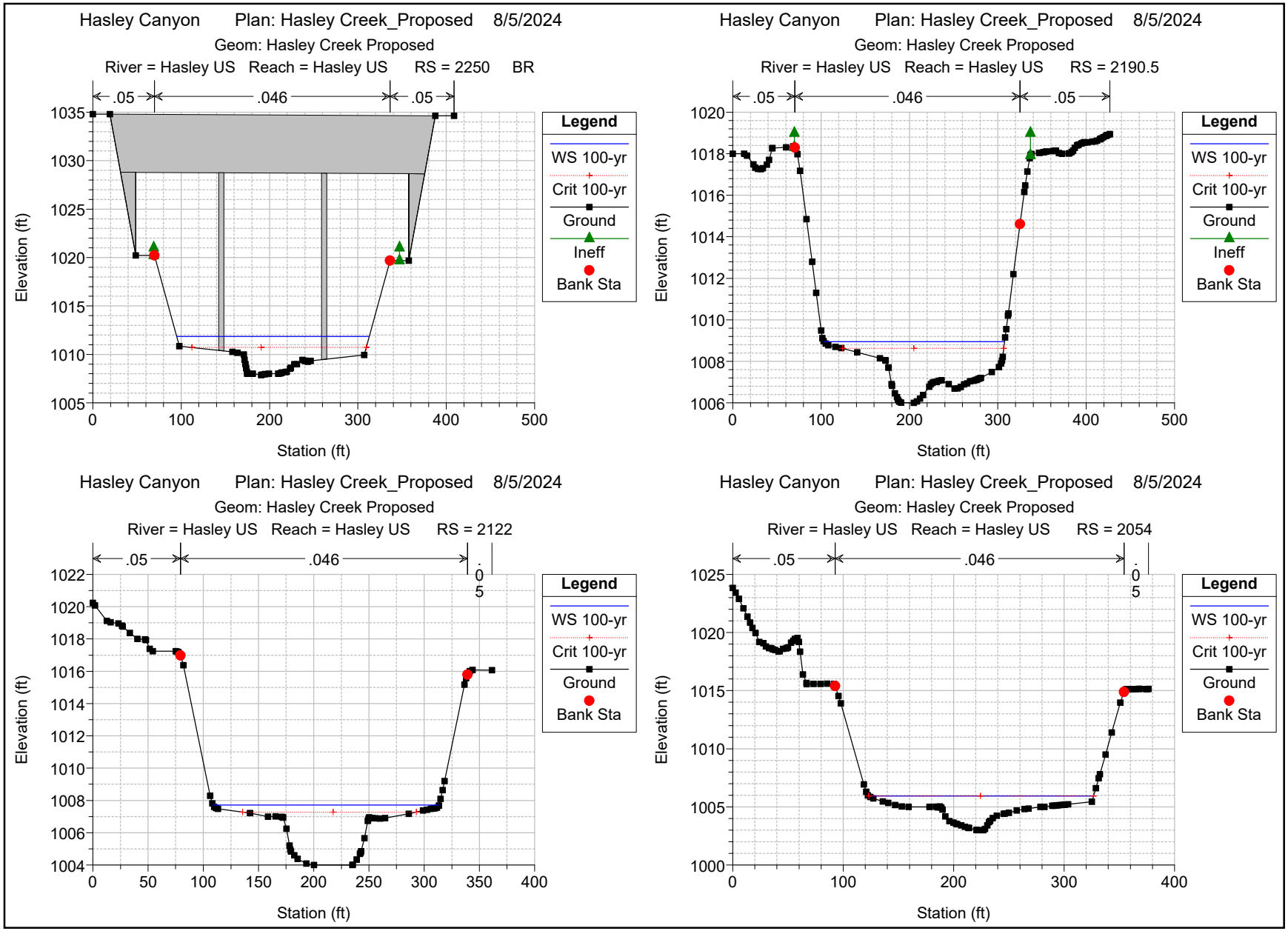

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2934
.05
.046
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta

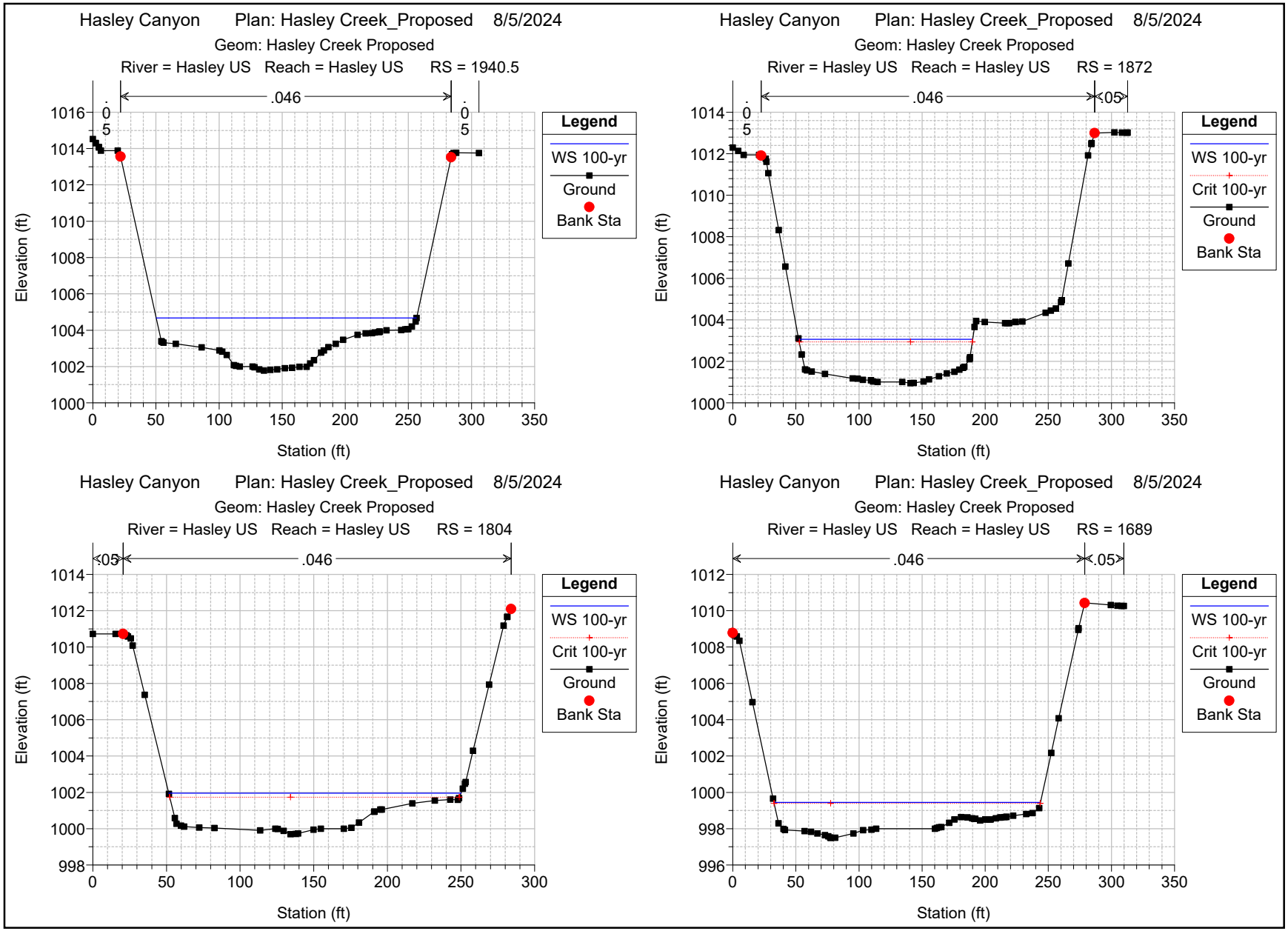

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2820.5
.05
.046
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta

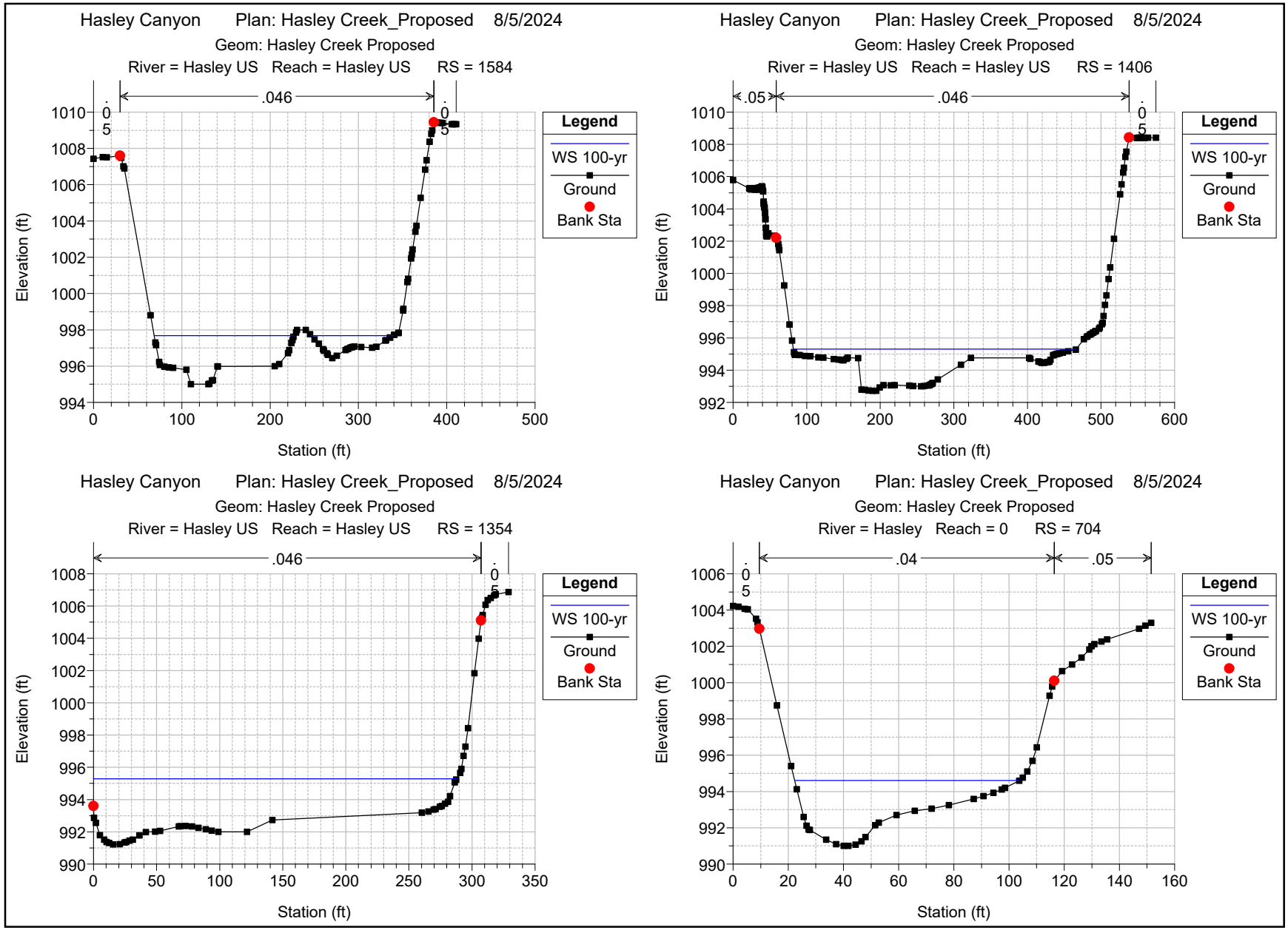

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2748
.05
.046
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

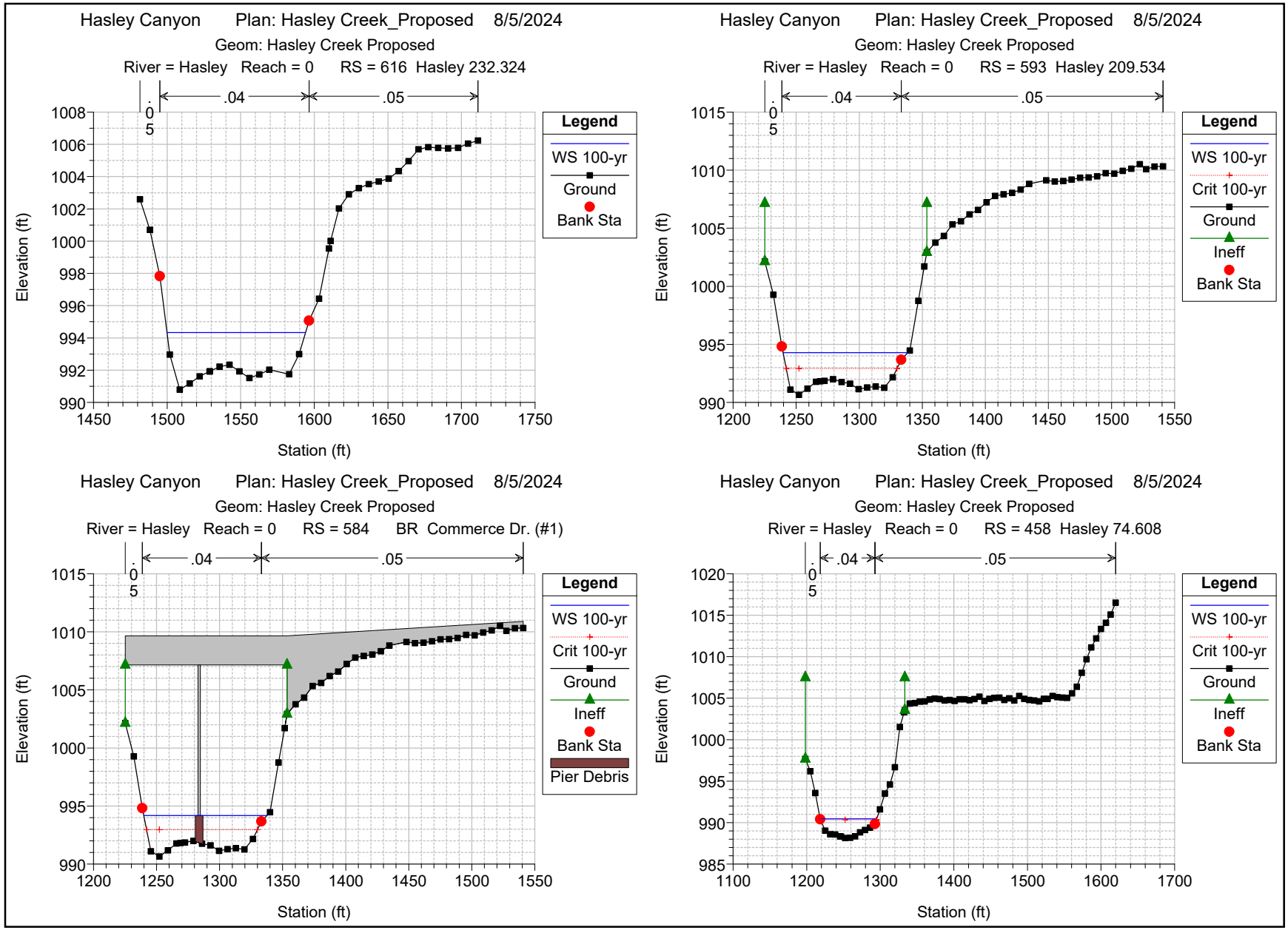

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2675.5
.05
.046
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta

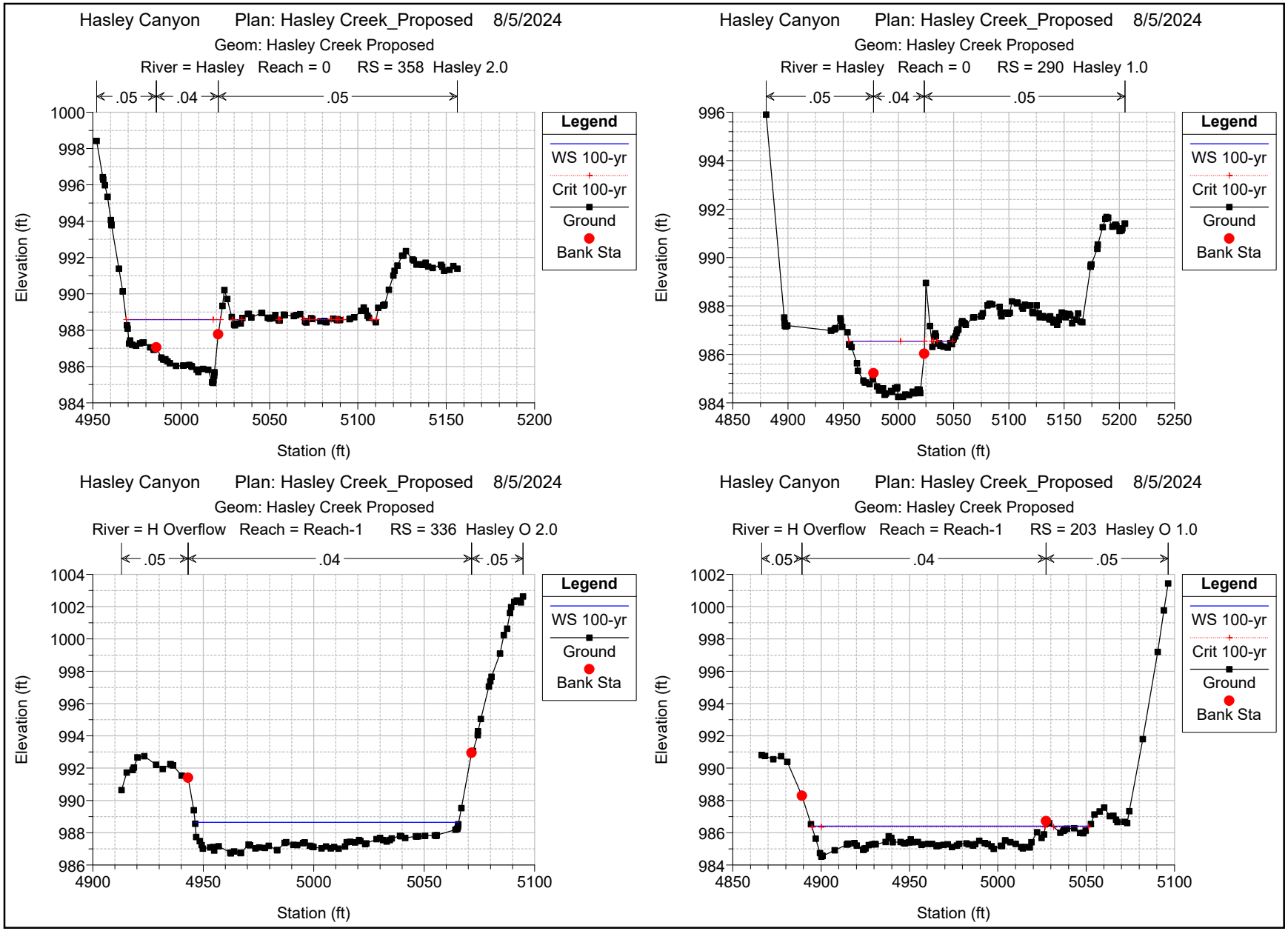

Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2560.5
.05
.046
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley US Reach = Hasley US RS = 2476
.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 = 2391
.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 = 2305.5
.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 = 2250 BR
.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 = 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
.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 = 1940.5
.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 = 1872
.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 = 1804
.05
.046
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 = 1689
.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 = 1584
.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 = 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)


Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
Geom: Hasley Creek Proposed
River = Hasley Reach = 0 RS = 616 Hasley 232.324
.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
.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 = 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_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
Hasley Canyon Plan: Hasley Creek_Proposed 8/5/2024
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

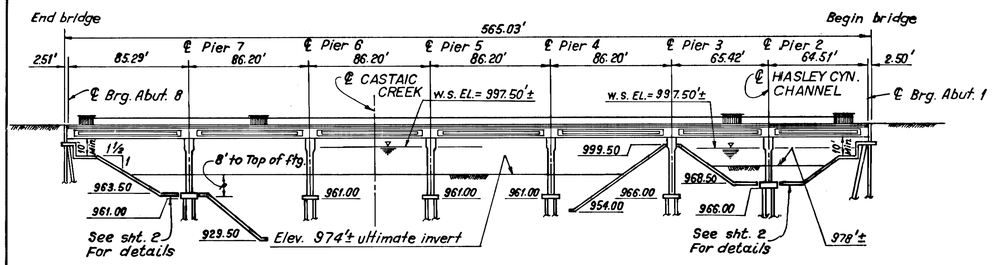
PLANS FOR BRIDGE

ON

COMMERCE CENTER DRIVE

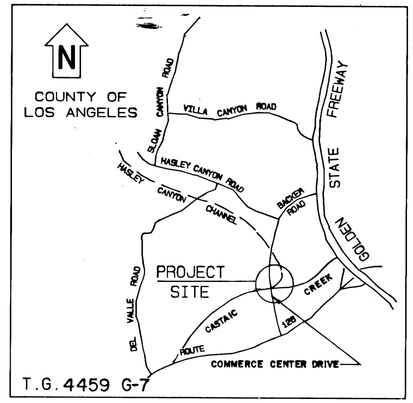
OVER

CASTAIC CREEK



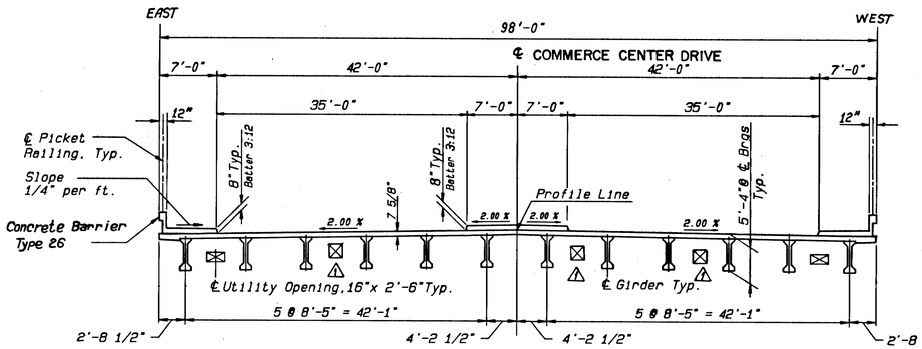
ELEVATION

Scale : 1"= 50'



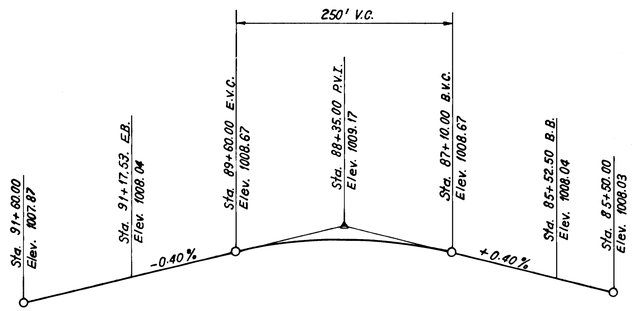
PROJECT LOCATION

No Scale



TYPICAL SECTION

Scale : 1" = 10'



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

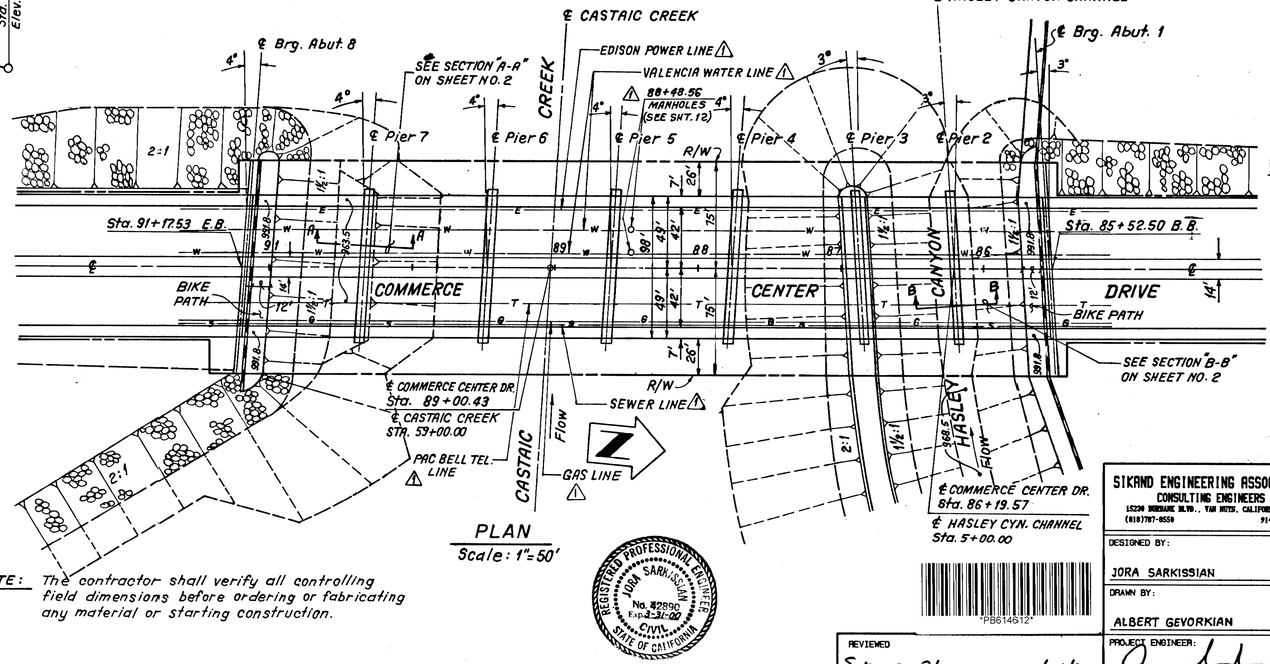
The Following Los Angeles County Department of Public Works Standard Plans, Latest Editon, are Part of These Contract Drawings.

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



PLAN

Scale: 1"=50'

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

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, RDBM 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. Hemmasee 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: MARK W. PESTRELLA DIRECTOR OF PUBLIC WORKS BY: 11-25-97 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'

COMMERCE CENTER DRIVE

CASTAIC CREEK

HASLEY CREEK

ROUTE 126

STREET IMPROVEMENTS PER P.M. NO. 22261

STORM DRAIN PER P.D. 2298 (UNIT II)

STA. 86+19.57 ℄ COMMERCE CTR. DR.
STA. 5+00.00 ℄ HASLEY CREEK

STA. 89+00.43 ℄ COMMERCE CTR. DR.
STA. 59+00.00 ℄ CASTAIC CREEK

RIP-RAP SLOPE PROTECTION (TYP.) SEE DETAIL "B" HEREON

SEE SECTION "A-A" HEREON

SEE SECTION "B-B" HEREON

FUTURE LINING

℄ PIER 7 ℄ PIER 6 ℄ PIER 5 ℄ PIER 4 ℄ PIER 3 ℄ PIER 2

1000.0 TOP OF LINING

TOP ELEV. 1000.0

TOP OF SLOPE

BIKE PATH

CURB LINE

℄ OF STREET

R/W

S.D.

963.5

961.00

966.00

997.00

2.146%

0.41%

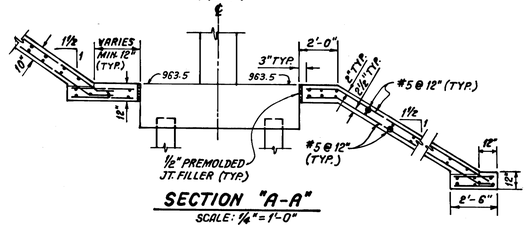
0.30%

0.50%

0.40%

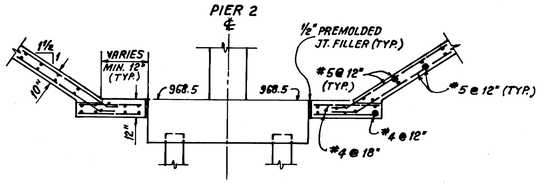
5.0%

PIER 7

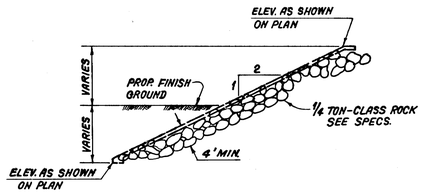


SECTION "A-A"
SCALE: ¼"= 1'-0"

PIER 2



SECTION "B-B"
SCALE: ¼"= 1'-0"



DETAIL "B"
NOT TO SCALE

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

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.

REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 32890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614611"

REVISIONS | CHECKED | DRAWN

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
(818)787-8558

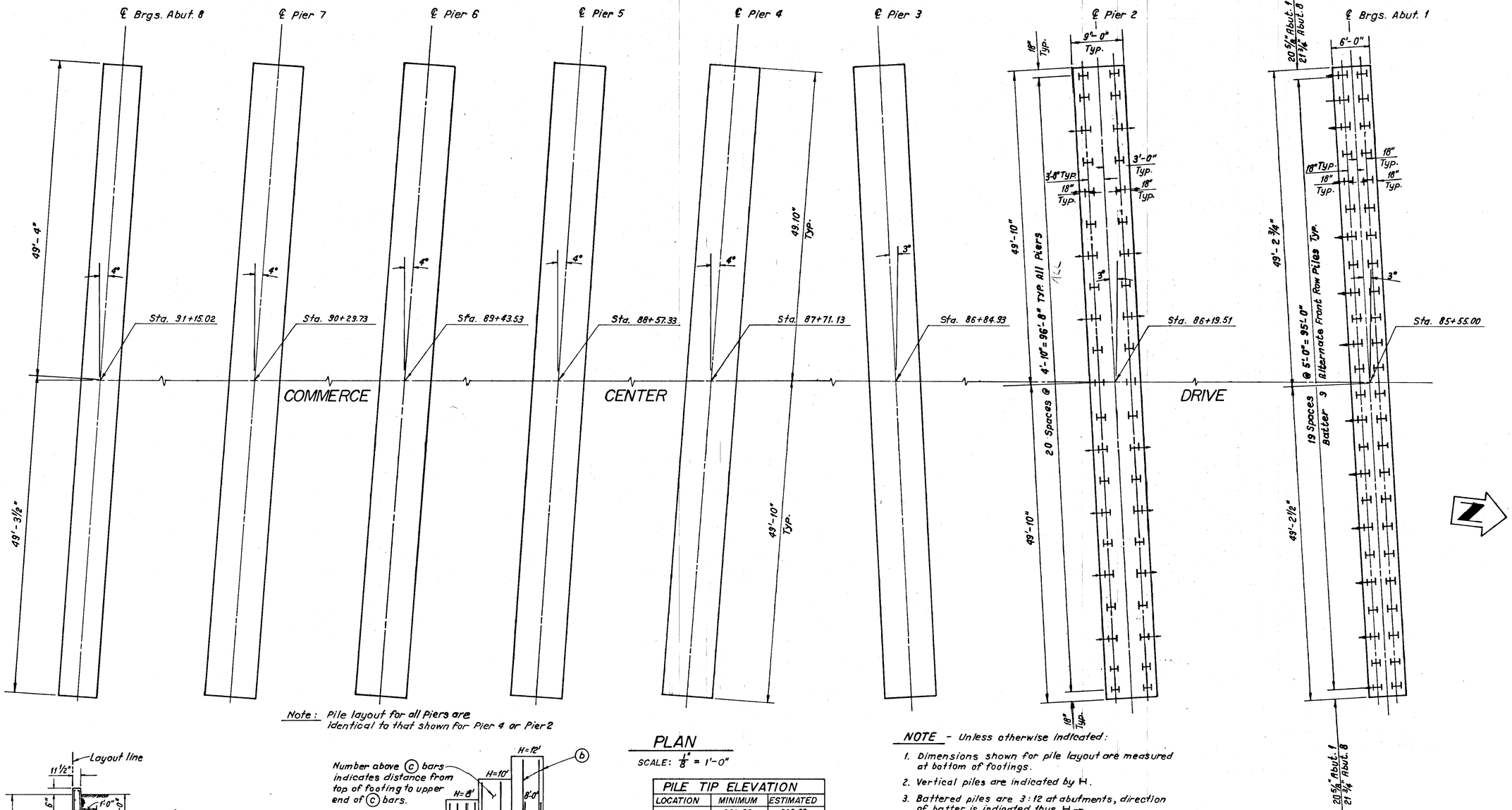
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

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

COMMERCE CENTER DRIVE OVER CASTAIC CREEK
TOPOGRAPHY

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

BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 2 OF: 15
DWG. NO.: 614611



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

PLAN

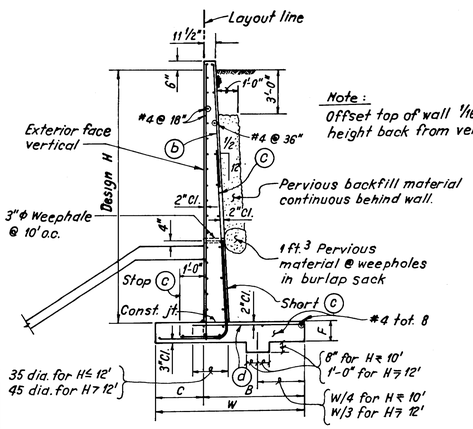
SCALE: 1/8" = 1'-0"

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

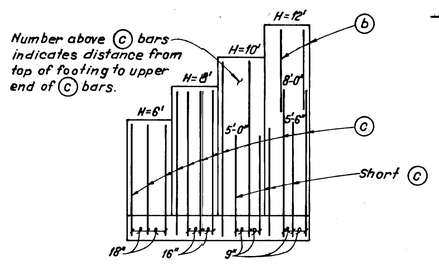
Note: Pile layout for Abut. 8 is identical but opposite hand to that shown for Abut. 1



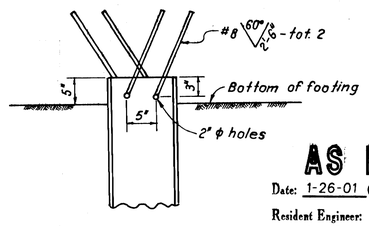
Note: Offset top of wall 1/16" per ft. of height back from vertical.

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"
(b)	—	—	—	#4@18"
©	#5@18"	#5@16"	#5@9"	#6@9"
(d)	#5@18"	#4@16"	#4@9"	#5@9"



STEEL PILE ANCHOR

NO SCALE

AS BUILT

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

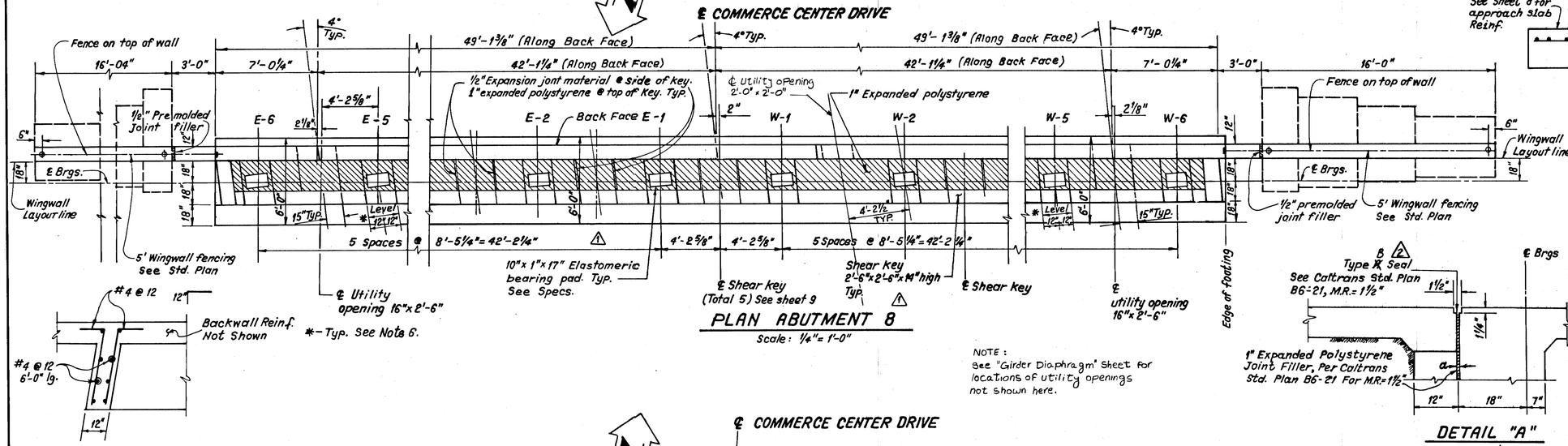
Resident Engineer: Zoven Abrahamian

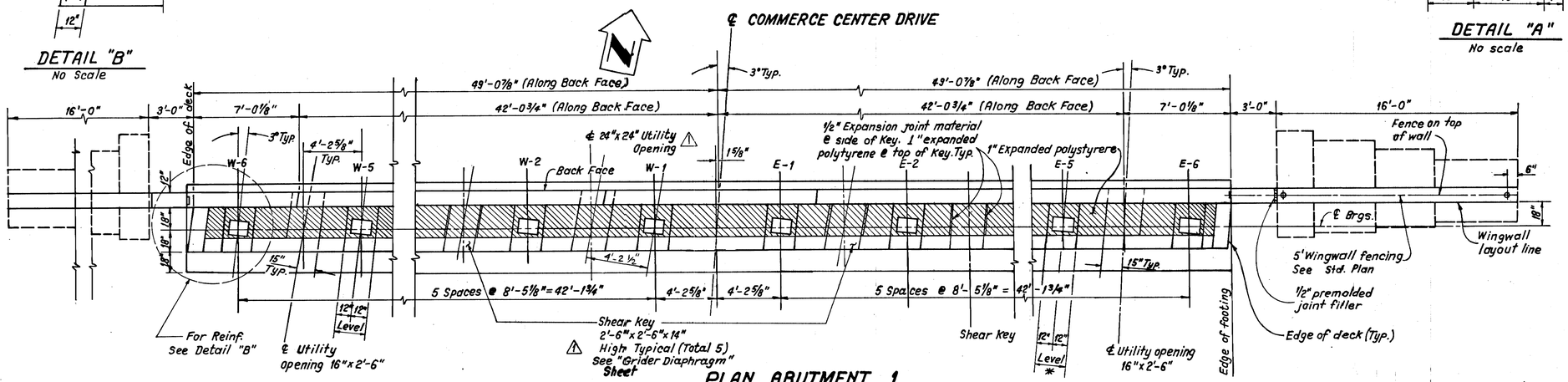
No Changes

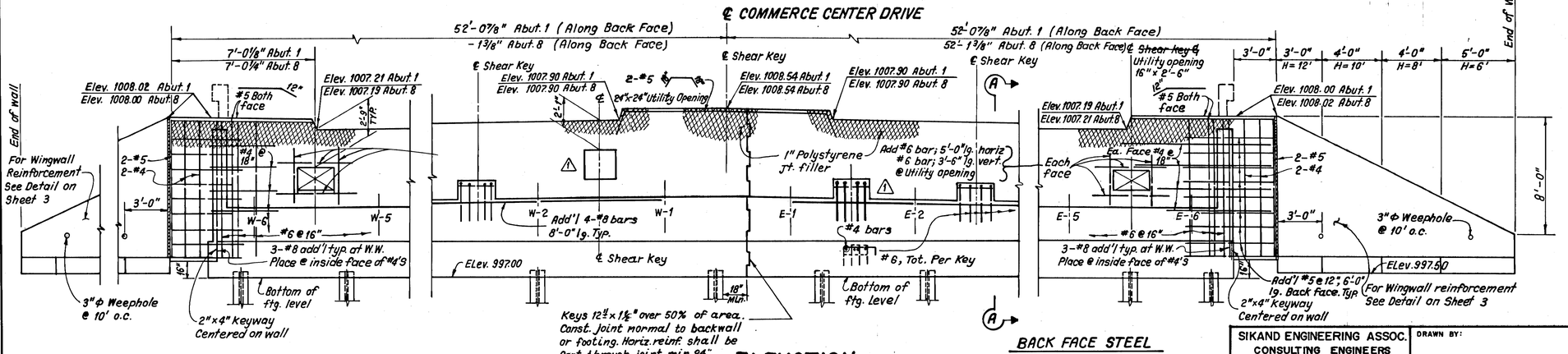
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 45289 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411 (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 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.

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

2 JOINT TYPE SEALS CHANGED TO TYPE "B" SEAL

AS BUILT

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

Resident Engineer: Zaven Abrahamian

REVISIONS	CHECKED	DRAWN
1 ADDED ABUTMENT UTILITY OPENING & REVISED SHEAR KEY LOCATIONS.		

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

DESIGNED BY: JORA SARKISSIAN

DRAWN BY: ALBERT GEVORKIAN

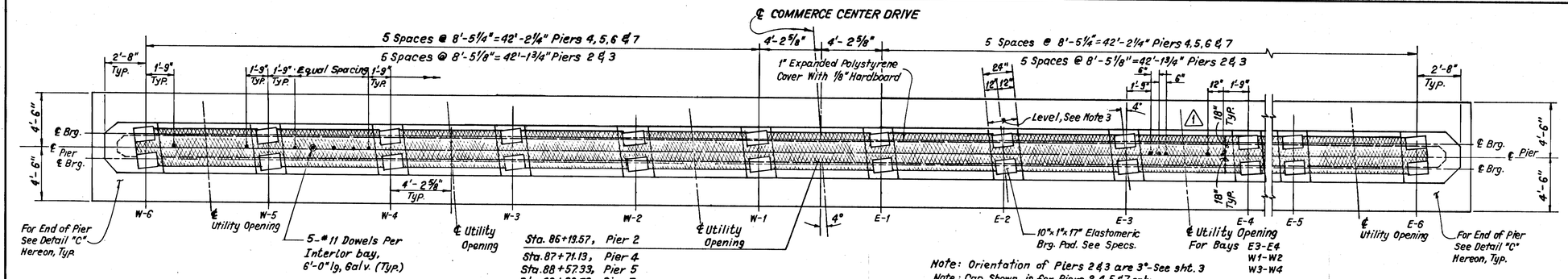
PROJECT ENGINEER: JORA SARKISSIAN

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

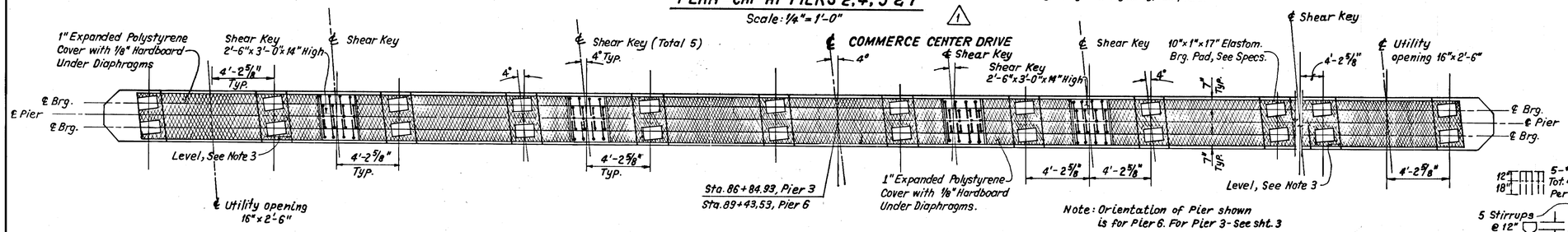
BRIDGE NO.: 3794
PROJECT NO.:
SHT.: 4 OF: 15
DWG. NO.: 614609



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.

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

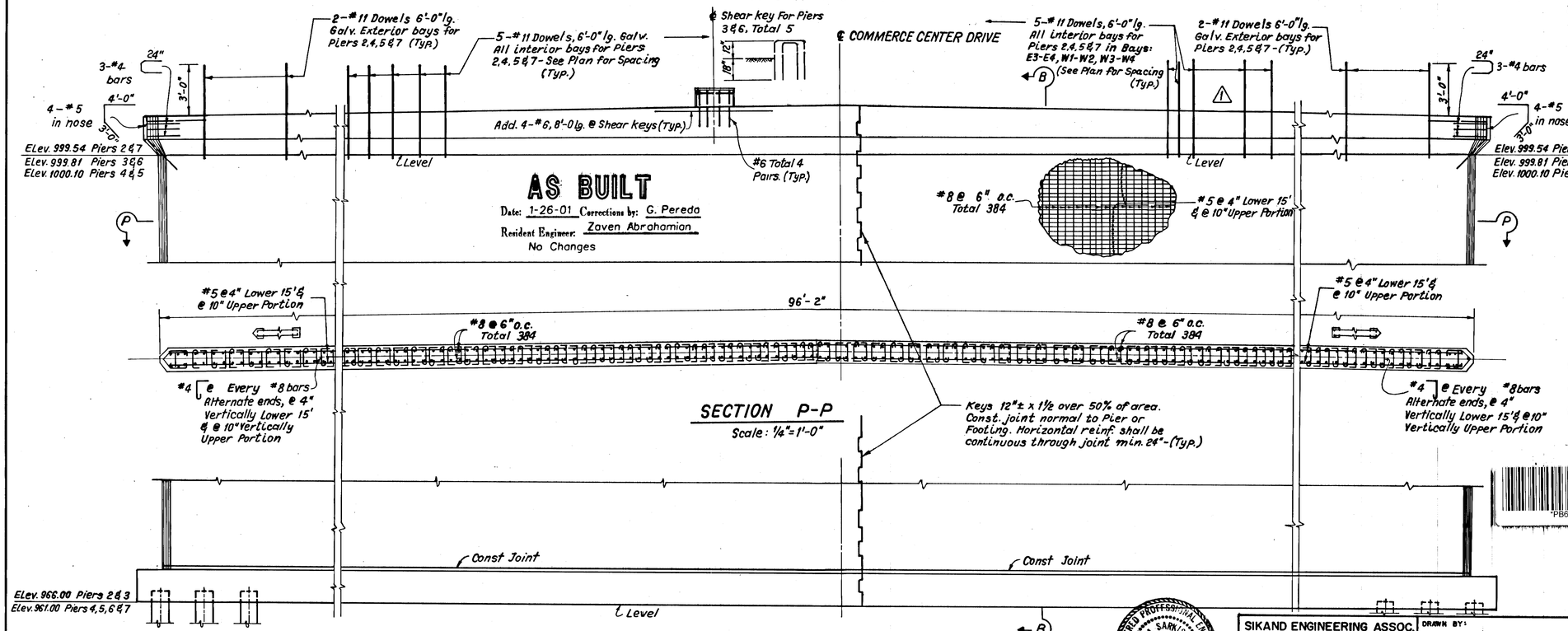
Scale: ¼"=1'-0"



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

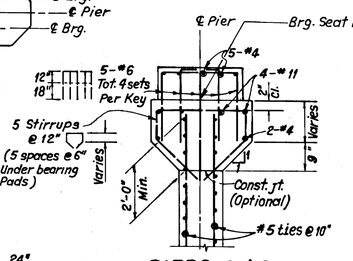
Scale: ¼"=1'-0"

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

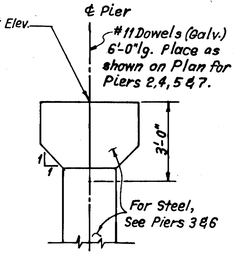
BEARING SEAT ELEVATION						
GIRDER	PIER 2	PIER 3	PIER 4	PIER 5	PIER 6	PIER 7
E-1	1002.81	1003.07	1003.37	1003.42	1003.23	1002.90
E-2	1002.64	1002.89	1003.20	1003.25	1003.07	1002.73
E-3	1002.47	1002.73	1003.03	1003.08	1002.90	1002.55
E-4	1002.29	1002.55	1002.86	1002.91	1002.72	1002.38
E-5	1002.12	1002.38	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:

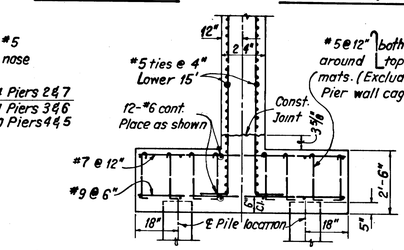
1. Elevations shown in table are at ℄ of pier. See Sect. B-B.
2. Reinforcing steel shall have 2" cover in cap and 3" cover in walls and footing.
3. Finish bearing seats parallel to roadway grade and level transverse to girders.
4. See Sheet 3 for pile layout.



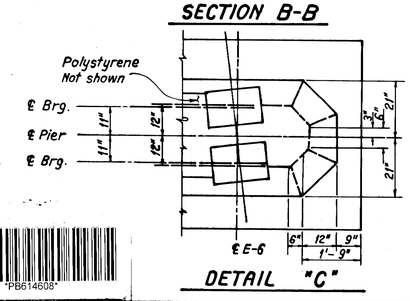
PIERS 3 & 6



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
△		

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK
PIERS

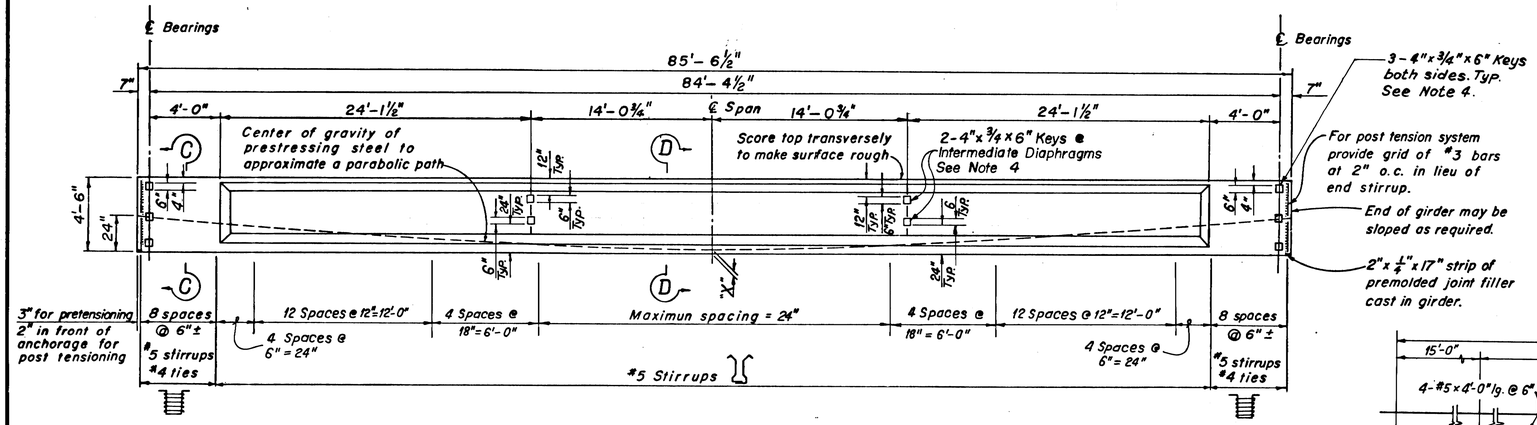
REVIEWED
Steve M. Hennessey 11/24/97
STRUCTURAL SECTION DATE

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

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

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



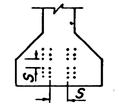
GIRDER ELEVATION FOR PIER 4 TO ABUT. 8

No Scale

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.

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.

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.

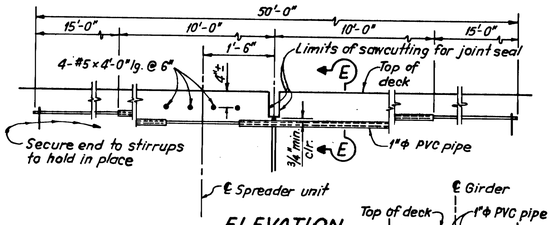
Provision shall be made for any other losses peculiar to the system of prestressing used.

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

Time	Condition		Deflection
Initial	Prestress + D.L.Girder		- 1 3/8"
	Prestress + D.L.Girder		- 2 ¼"
3 months	D.L. Slab	½ pt.	+ 1 5/8"
		¼ pt.	+ 1 1/8"
	Prestress + D.L. Girder + D.L. Slab		- ⅝"
Final	Prestress + D.L. Girder + SD.L. Slab		- ¾"

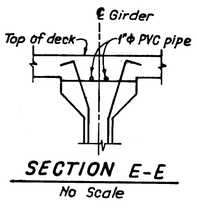
A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

* Includes other dead loads.



ELEVATION

No Scale



SECTION E-E

No Scale

AS BUILT

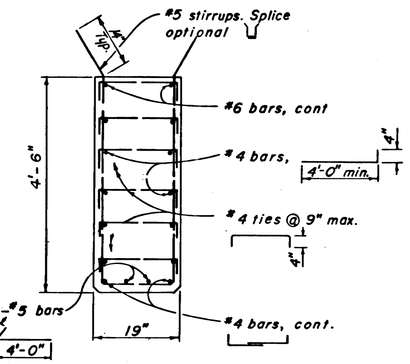
Date: 1-26-01 Corrections by: G. Pereda

Resident Engineer: Zaven Abrahamian

No Changes

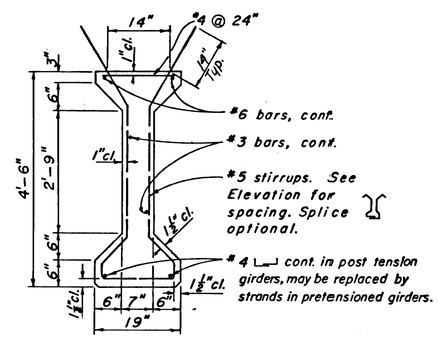
NOTE:

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.



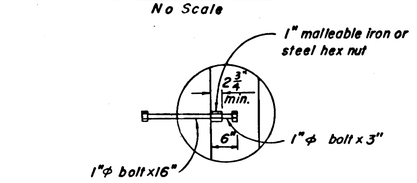
SECTION C-C

No Scale



SECTION D-D

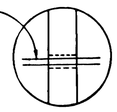
No Scale



ALTERNATE INSERT ASSEMBLY

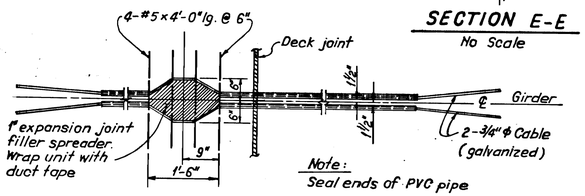
No Scale

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



ALTERNATE DOWEL ASSEMBLY

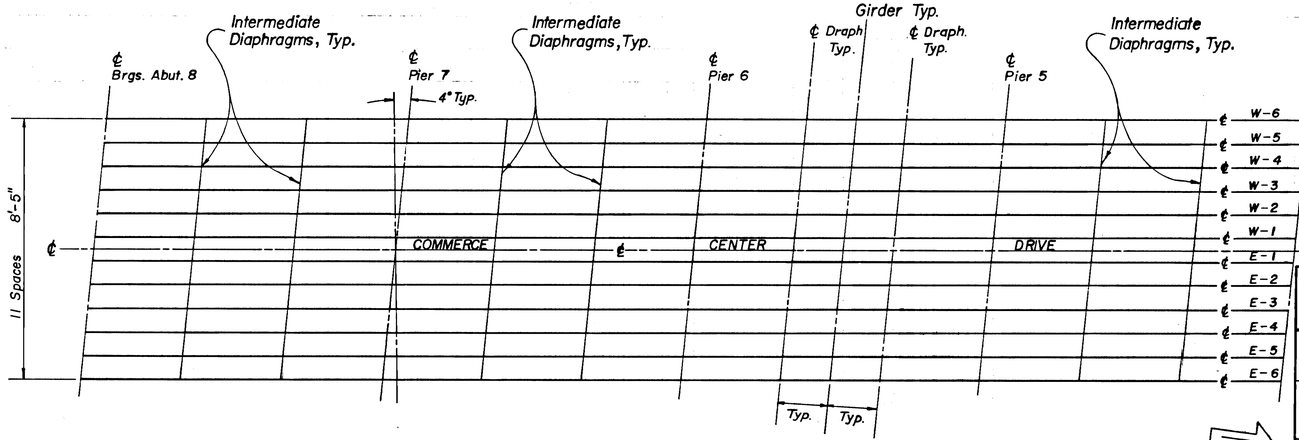
No Scale



Note: Seal ends of PVC pipe

RESTRAINER UNIT DETAIL

No Scale



TYPICAL GIRDER FRAMING PLAN

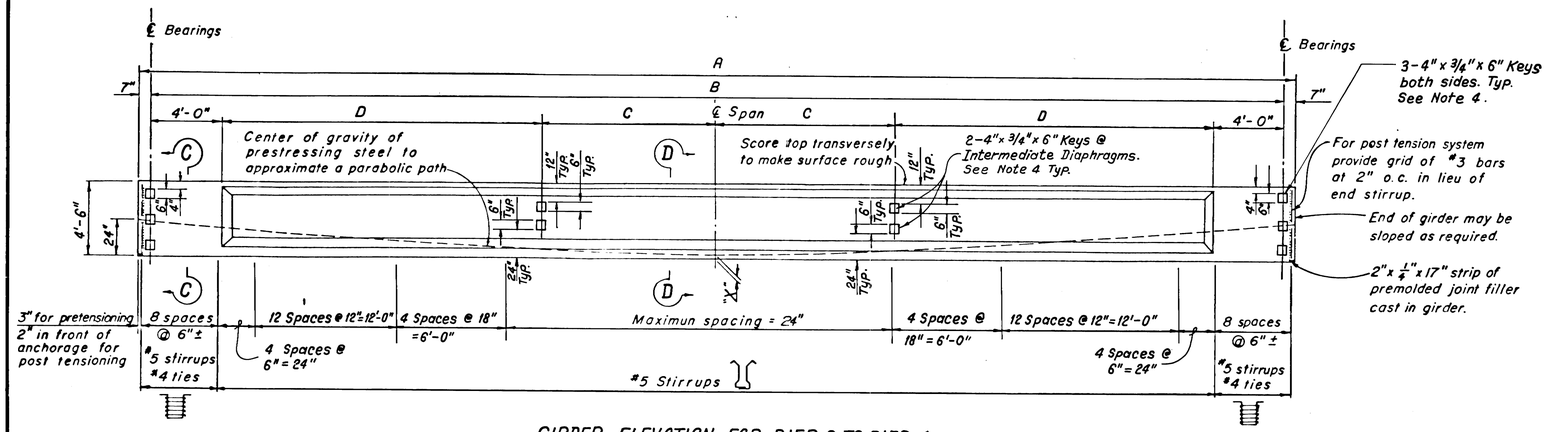
No Scale

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. Hamasaee 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

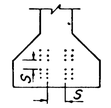
GIRDERS E-2, E-3, E-4, E-5 & E-6			
"X"	DESIGN STRESSES	POST TENSION	PRETENSION
4"	P=WORKING FORCE, lbs	670,000	750,000
8"		765,000	850,00
	CONCRETE STRENGTH, psi	f'c= 5,500	f'c= 5,500
		f'ci= 5,100	f'ci=4,900

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'-0⅛"	83'-10⅛"	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'-1⅛"	86'-11⅛"	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 ½" 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.

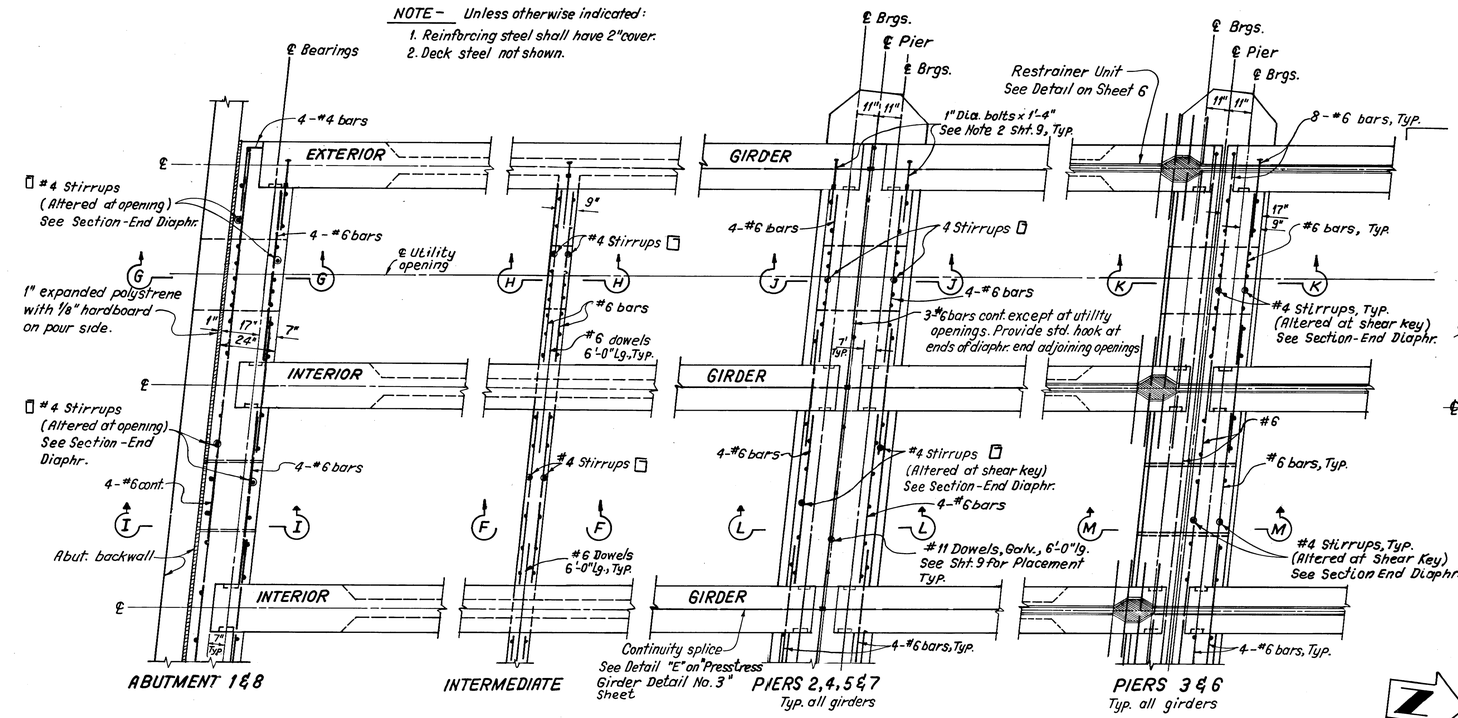
Provision shall be made for any other losses peculiar to the system of prestressing used.

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 † ⅝ D.L. Slab		- ⅞

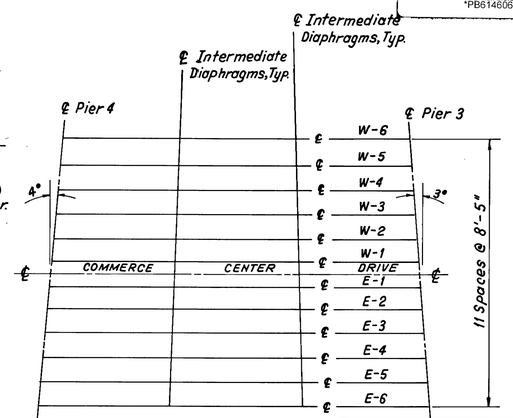
A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

* Includes other dead loads.



DIAPHRAGM PLAN

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



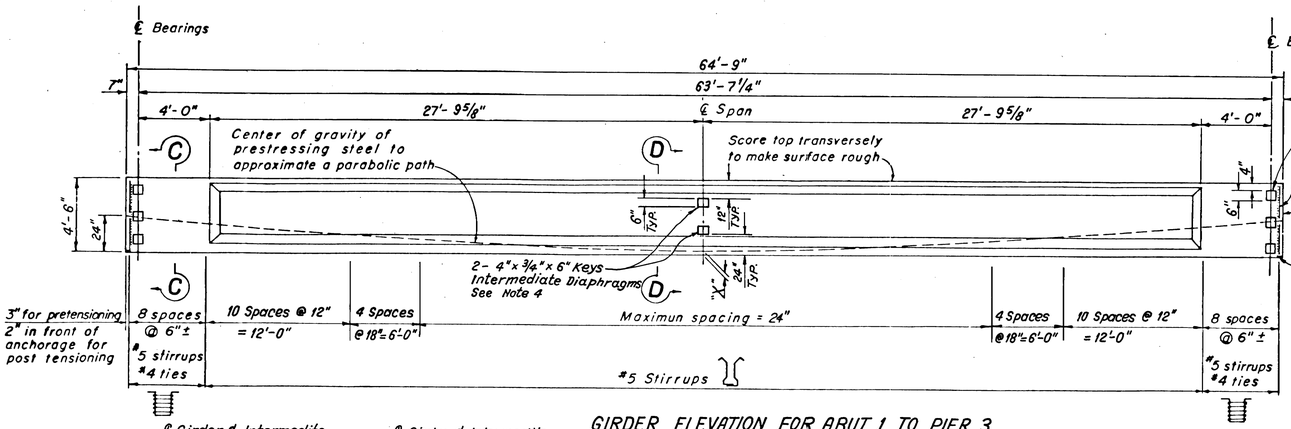
TYPICAL GIRDER FRAMING PLAN FOR SPAN 3-4

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

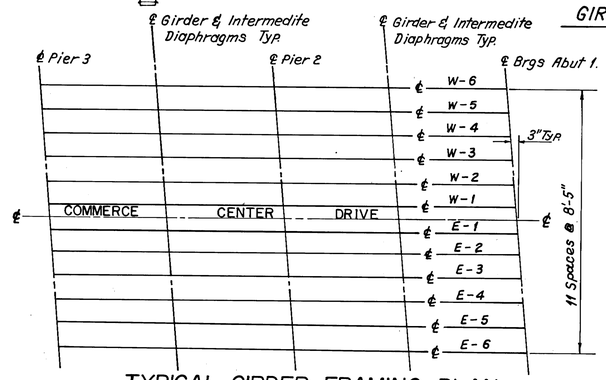
REVISIONS | CHECKED | DRAWN

K-E ALBUQUERQUE LA 4338



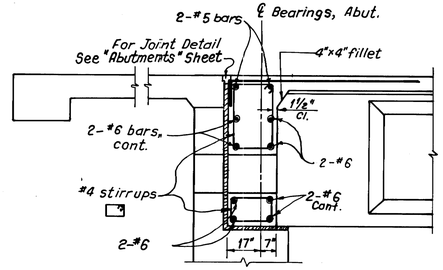
GIRDER ELEVATION FOR ABUT 1 TO PIER 3

No Scale



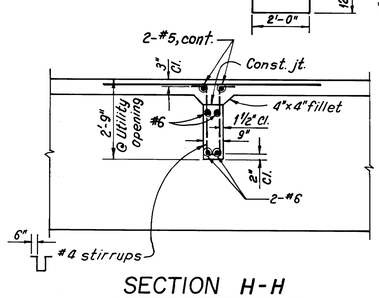
TYPICAL GIRDER FRAMING PLAN

No Scale



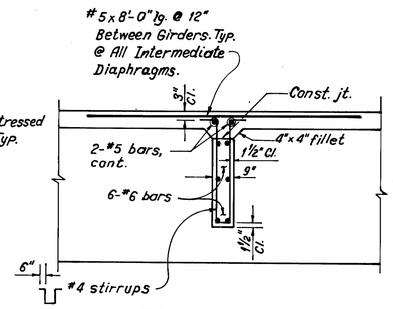
SECTION G-G

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



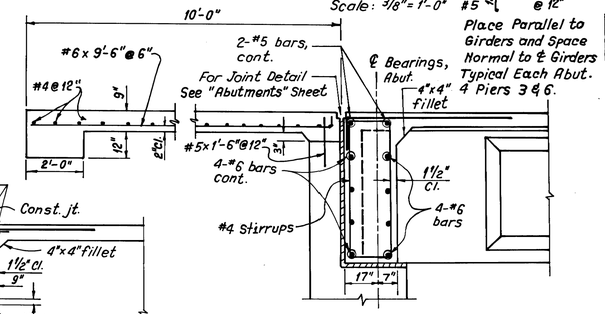
SECTION H-H

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



SECTION F-F

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



SECTION I-I

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

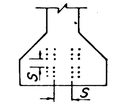
AS BUILT

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.

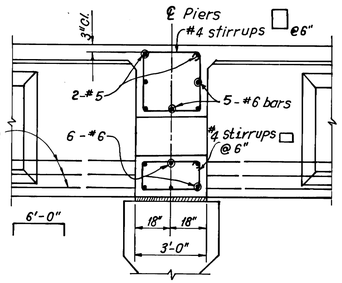
Provision shall be made for any other losses peculiar to the system of prestressing used.

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

Time	Condition		Deflection
Initial	Prestress † D.L.Girder		- 5/8"
3 months	Prestress † D.L.Girder		- ¾"
	D.L.Slab	½ pt.	+ ½"
		¼ pt.	+ ⅜"
	Prestress † D.L.Girder † D.L.Slab		- 5/8"
Final	Prestress † D.L.Girder † ½ D.L.Slab		-¼"

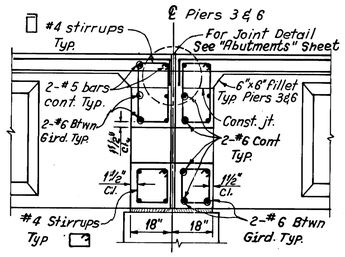
A minus(-) sign indicates upward deflection. Deflections measured at ℄ Span and are based on the assumption that the deck will not be placed on precast girders until 3 months after prestressing. Final deflection is assumed to occur 4 years after initial prestressing.

* Includes other dead loads.



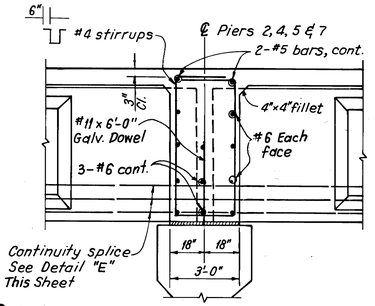
SECTION J-J

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



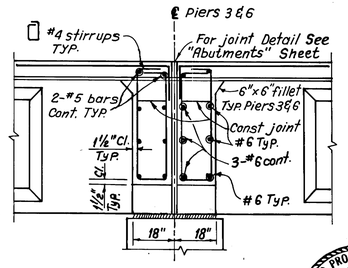
SECTION K-K

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



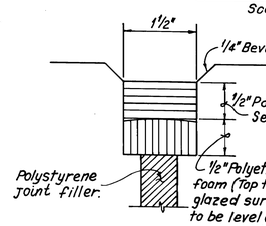
SECTION L-L

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



SECTION M-M

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



TYPE A SEAL

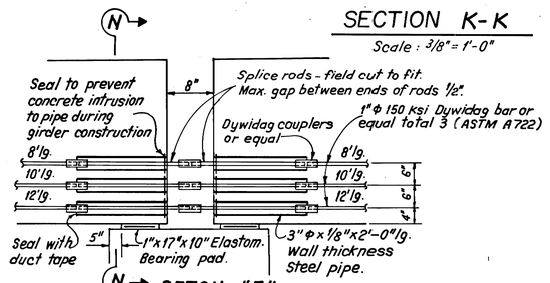
Full Scale



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

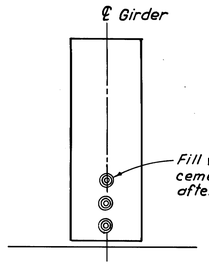
Pipes and rods to be securely wedged and braced in place to prevent displacement during girder concrete pour.

All threads to be oriented correctly.



CONTINUITY SPLICE

No Scale



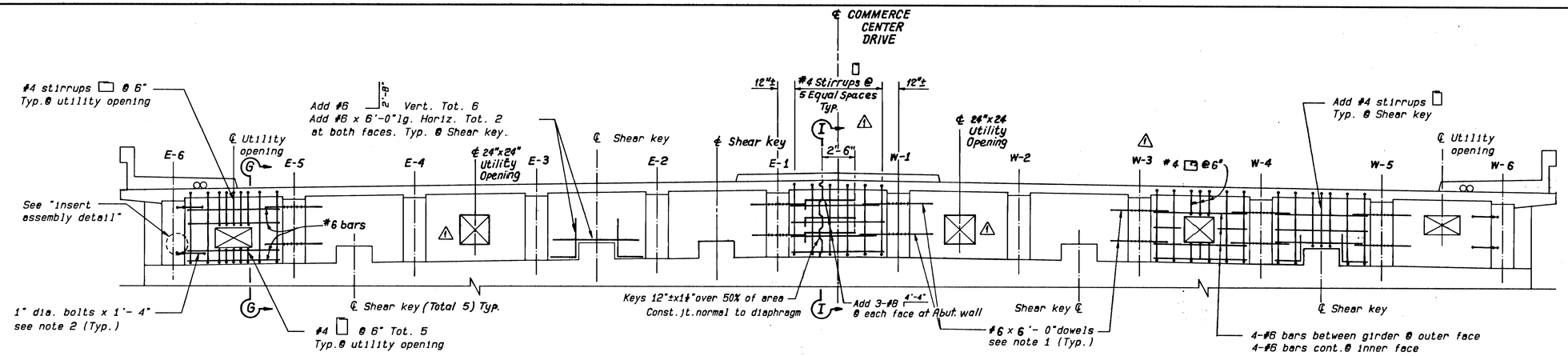
SECTION N-N

No Scale



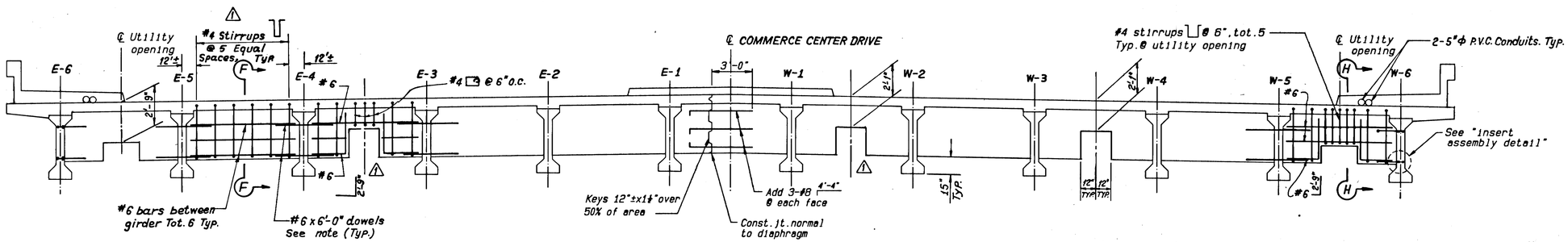
SIKAND ENGINEERING ASSOC. CONSULTING ENGINEERS 15230 BURBANK BLVD. VAN NUYS, CALIF. (818) 787-8550	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY: JORA SARKISSIAN	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	PRESTRESSED GIRDER DETAILS 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

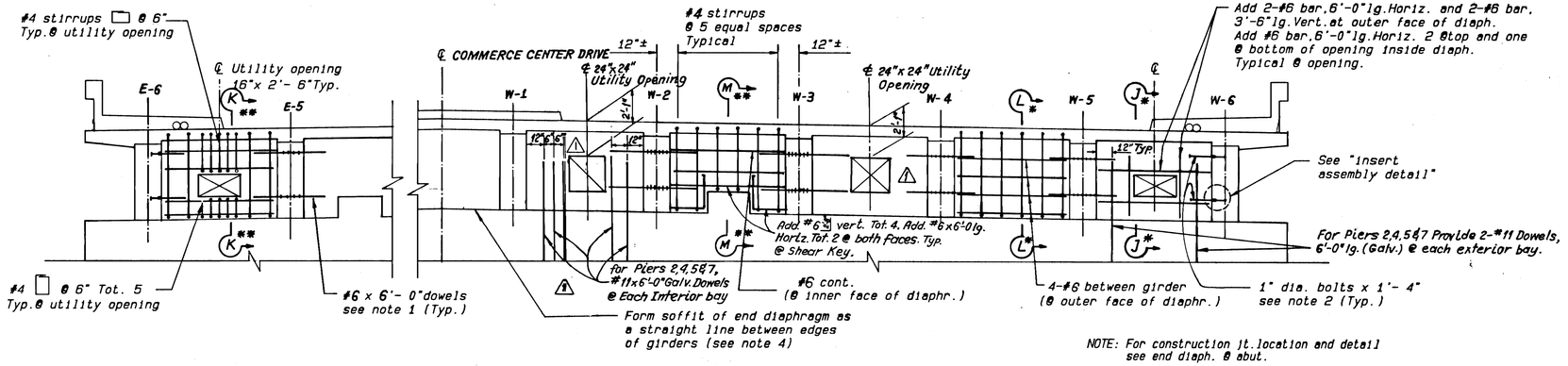
Scale : 1/4" = 1'- 0"



NORMAL SECTION - INTERMEDIATE DIAPHRAGM

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

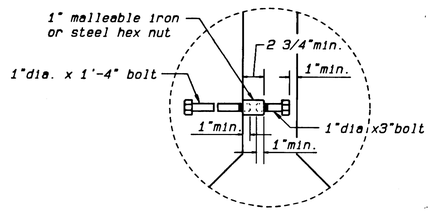
Note: For Joint Seal on Sidewalk at Abut. 1, Pier 3, Pier 6 and Abut. 8, See Caltrans Std. Plan B6-21.



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

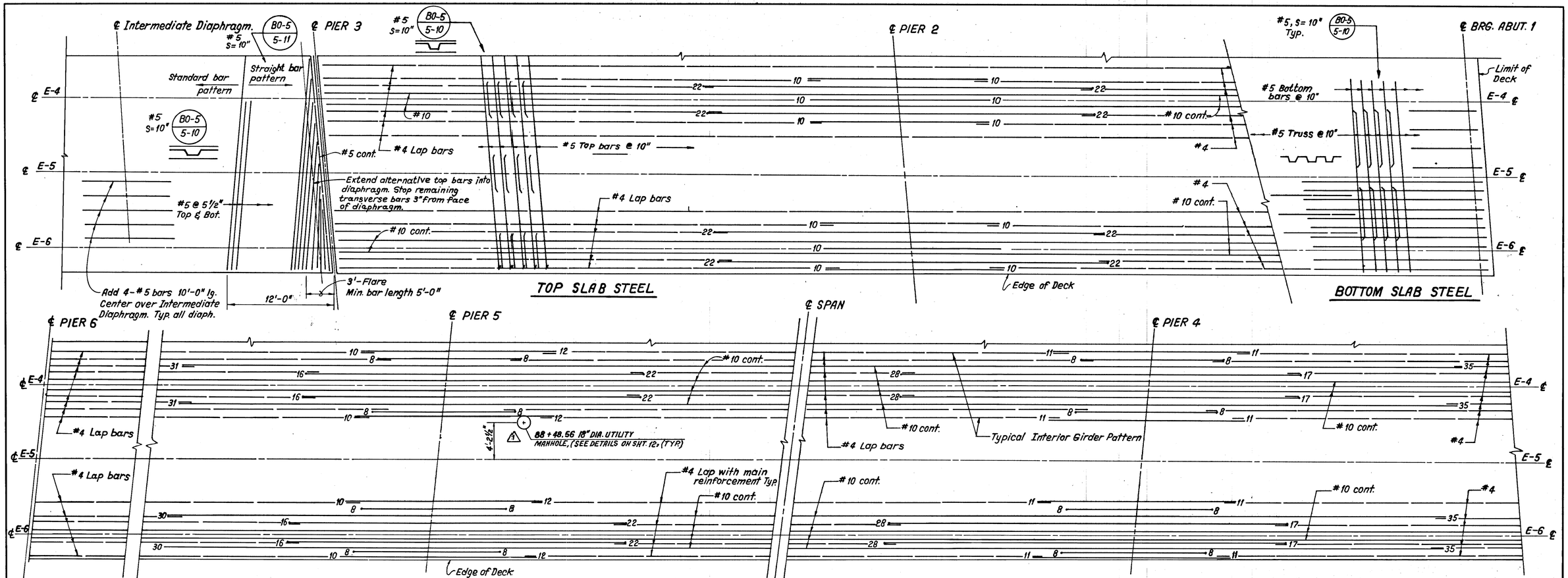
Resident Engineer: Zaven Abrahamian

No Changes

REGISTERED PROFESSIONAL ENGINEER — JORA SARKISSIAN — No. 52896 Exp. 3-31-98 — CIVIL — STATE OF CALIFORNIA

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA (818)787-8558 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	GIRDER DIAPHRAGMS
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 3794 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

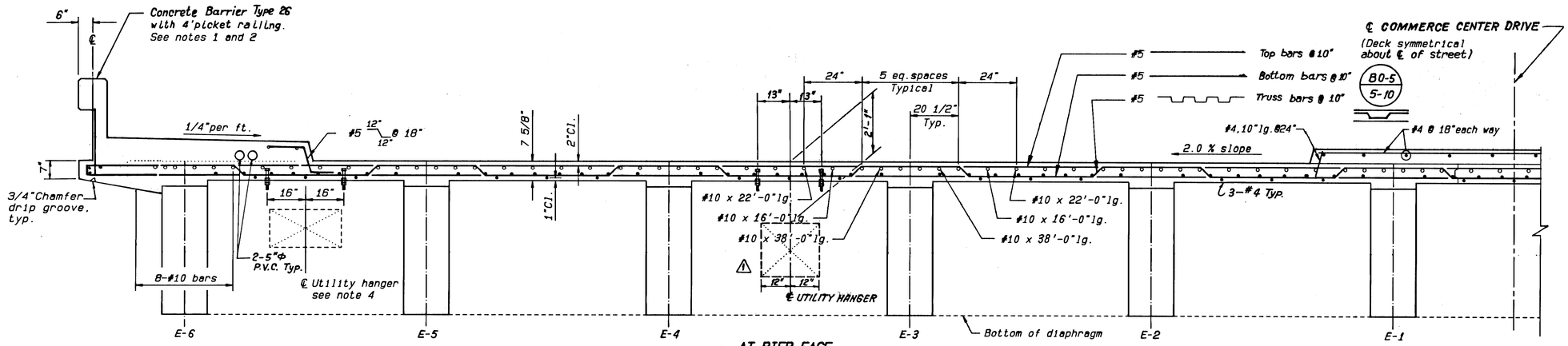
Scale: 3/16" = 1'-0"

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

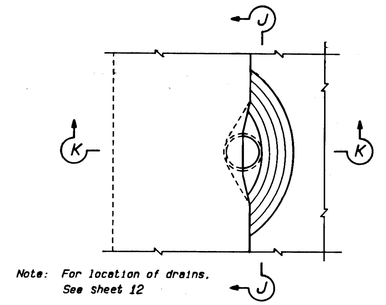
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 42890 Exp. 3-31-00 CIVIL STATE OF CALIFORNIA

"PB614603"

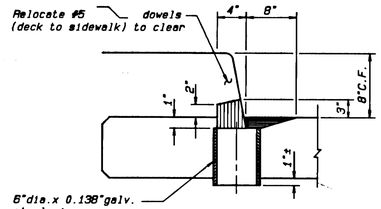
DRAWN | CHECKED | REVISIONS | ⚠ ADDED UTILITY MANHOLE LOCATION.



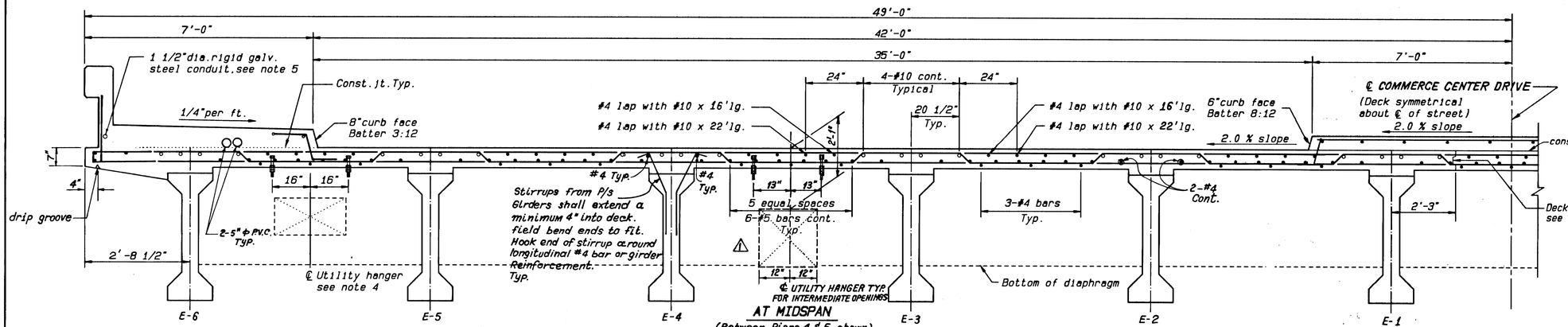
AT PIER FACE
(Pier 5 shown)



DECK DRAIN DETAIL
No Scale

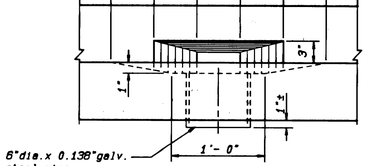


SECTION K-K
No Scale

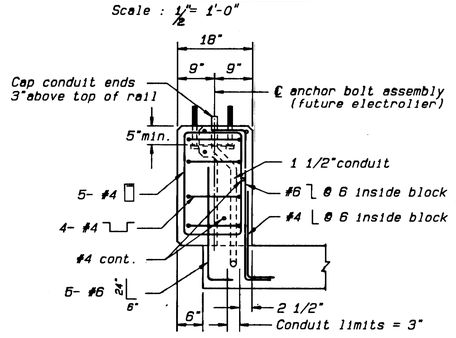


AT MIDSPAN
(Between Piers 4 & 5 shown)

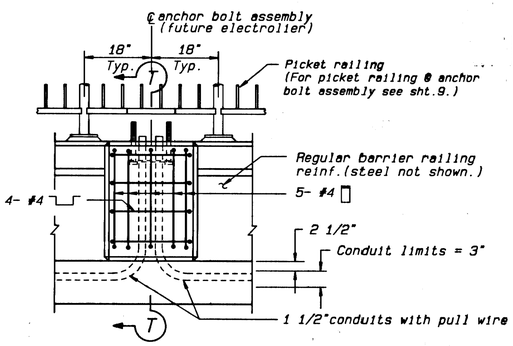
TYPICAL CROSS SECTION
Scale : 1/2"= 1'-0"



SECTION J-J
No Scale

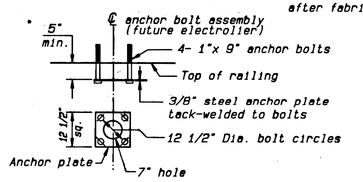


SECTION T-T

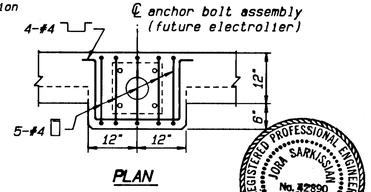


ELEVATION

NOTE: Galvanize anchor bolt assembly after fabrication



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

REVISIONS	CHECKED	DRAWN
⚠ ADDED UTILITY HANGER AND OPENING LOCATIONS.		

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
16236 BURBANK BLVD., VAN NUYS, CALIFORNIA
(818)787-8550 91411

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

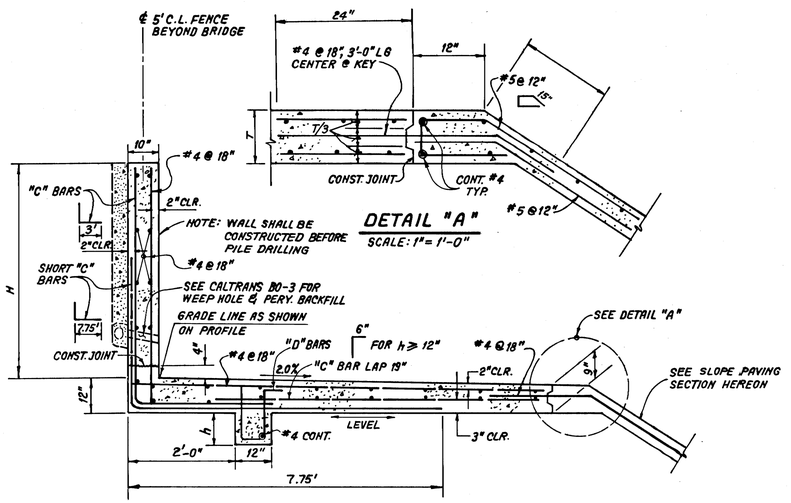
REGISTERED PROFESSIONAL ENGINEER JORA SARKISSIAN No. 32890 Exp. 2-31-00 CIVIL STATE OF CALIFORNIA

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
STRUCTURES SECTION

COMMERCE CENTER DRIVE
OVER
CASTAIC CREEK
DECK DETAIL SHEET 2

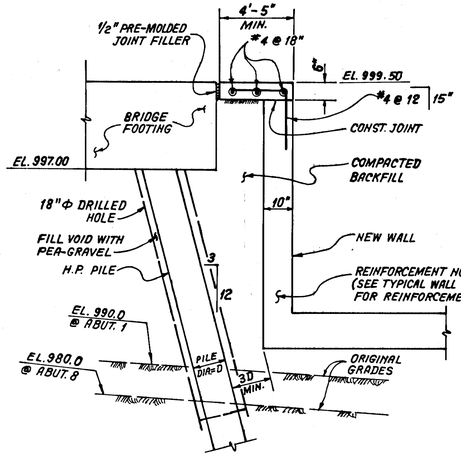
REVIEWED
Steve M. Hennessey 11/24/97
STRUCTURAL SECTION DATE

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



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

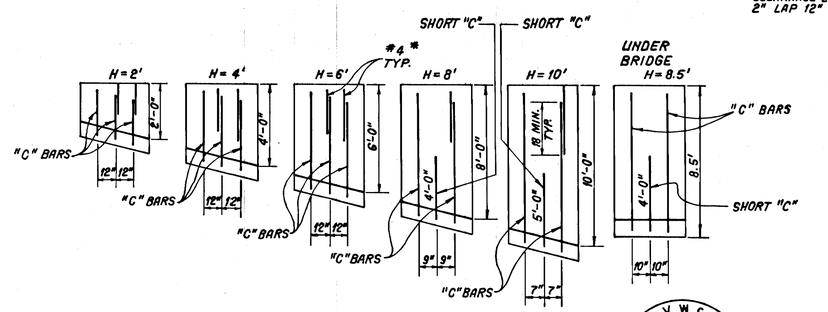
TYPICAL WALL SECTION
SCALE: 1/2" = 1'-0"



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

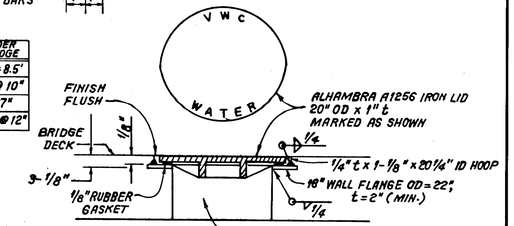
FIGURES AT TOP OF "C" BARS INDICATES DISTANCE FROM TOP OF FOOTING TO UPPER END OF "C" BARS

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



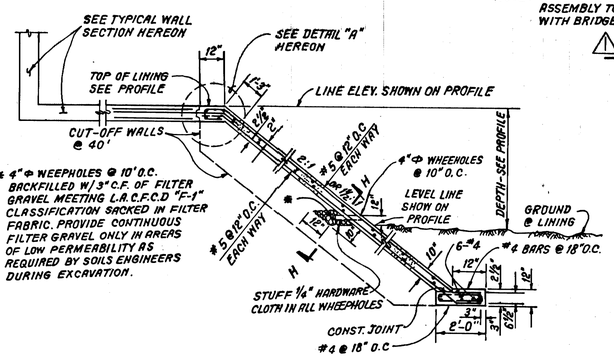
WALL REINFORCING BEYOND BRIDGE					
DESIGN H	2'	4'	6'	8'	10'
"C" BARS	#4 @ 12"	#4 @ 12"	#4 @ 12"	#5 @ 9"	#6 @ 7"
KEY DEPTH	-0-	6"	12"	18"	27"
"D" BARS	—	—	#4 @ 18"	#4 @ 12"	#5 @ 12"

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

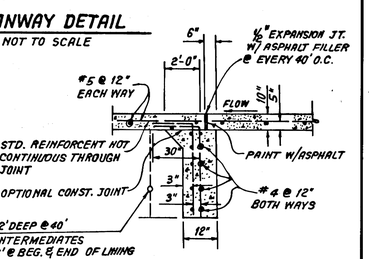


NOTE: SLEEVE AND FLANGE INSERT ASSEMBLY TO BE CAST INTEGRALLY WITH BRIDGE DECK.

⚠ MANWAY DETAIL
NOT TO SCALE

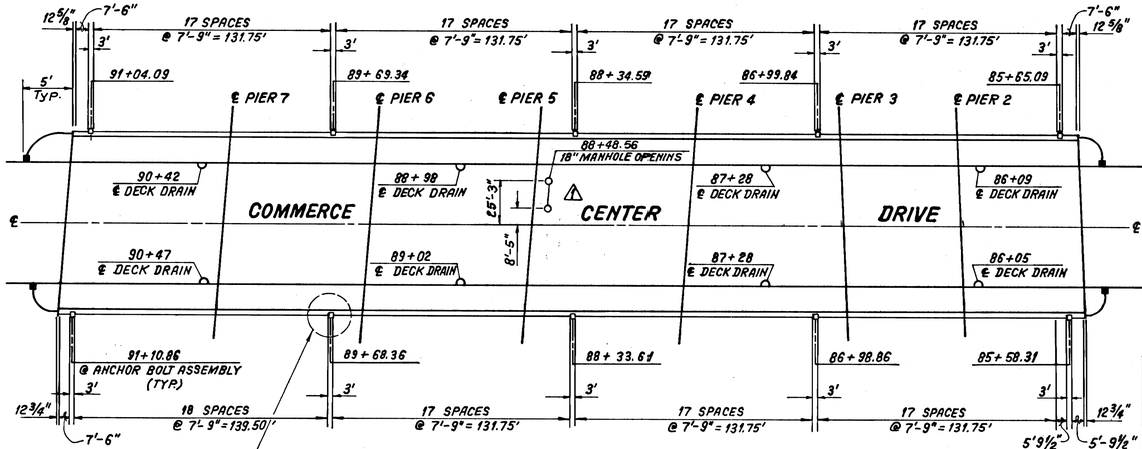


* 4"℄ WEEPHOLES @ 10'0.C. BACKFILLED W/ 3/8" C.F. OF FILTER GRAVEL MEETING L.A.C.F.C.D "F-1" CLASSIFICATION SACKED IN FILTER FABRIC. PROVIDE CONTINUOUS FILTER GRAVEL ONLY IN AREAS OF LOW PERMEABILITY AS REQUIRED BY SOILS ENGINEERS DURING EXCAVATION.

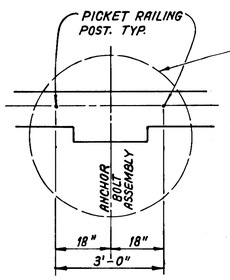


SECTION H-H EXPANSION JOINT
CUT-OFF WALL

NOTE: EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



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



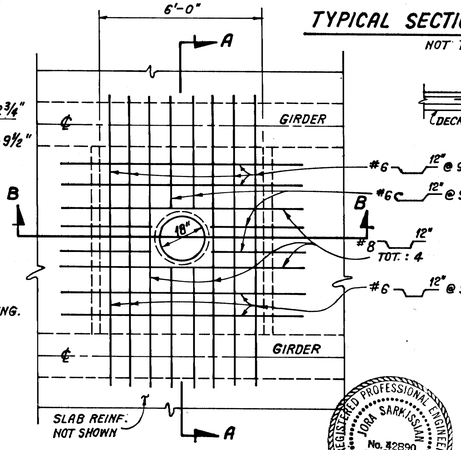
NOTE:

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

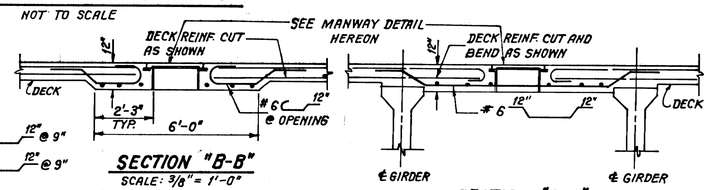
1. REMOVE 5' OF EXISTING SOIL.
2. CONSTRUCT AND COMPACT EMBANKMENT TO BOTTOM OF WALL FOOTING.
3. CONSTRUCT WALL.
4. CONSTRUCT AND COMPACT EMBANKMENT TO 6" ABOVE BOTTOM OF ABUTMENT FOOTING.
5. EXCAVATE TO BOTTOM OF ABUTMENT FOOTING 1 WEEK AFTER COMPLETION OF COMPACTED FILL PLACEMENT.
6. PRE-DRILL FOR 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.

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



⚠ 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"

⚠ ADDED DECK REINFORCEMENT FOR MANWAY OPENING AND ADDED LOCATION OF MANHOLES.

REVISIONS | CHECKED | DRAWN

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

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 MINNAMAR 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 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 NO.	DEPTH	BLOWS	PENETRATION RESISTANCE PCF	MOISTURE CONTENT*	CONSISTENCY DRY DENSITY PCF	WEIGHT**	DEPTH IN FEET	DESCRIPTION
							0	SURFACE CONDITION: Northern side of Castaic Creek. ELEVATION: 979
							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	
15		30/10"		13	124		15	
20		54+					20	Gravel increase in size to mostly 1/2 to 1 inch, no cobbles
30		50+					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	3 inch silt layer
							40	

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

SAMPLE NO.	DEPTH	BLOWS	PENETRATION RESISTANCE PCF	MOISTURE CONTENT*	CONSISTENCY DRY DENSITY PCF	WEIGHT**	DEPTH IN FEET	DESCRIPTION
	40	71+					40	Some cobbles 40 to 42 feet
							SP 45	Decrease in gravel content
							ML	SILT: Gray-brown
							SP/GP 50	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	73+					60	
							65	
							70	
							75	
	80	60+					80	End of boring at 80 feet Water at 12 feet - no caving

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

SAMPLE NO.	DEPTH	BLOWS	PENETRATION RESISTANCE PCF	MOISTURE CONTENT*	CONSISTENCY DRY DENSITY PCF	WEIGHT**	DEPTH IN FEET	DESCRIPTION
							0	SURFACE CONDITION: Center of concrete batch plant access road ELEVATION: 981
							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	
	15	30	15		111		15	
	20	38+					20	
							ML/CL	SILT/CLAY: Medium gray-brown, very clayey silt
							SP 25	SAND: Light tan, gravelly, fine to coarse gravel, mostly less than 1 inch size
							SP/GP 30	SAND/GRAVEL: Grades to very gravelly, fine to very coarse
	30	48+					35	
							ML	SILT: Medium brown
							SP/GP	SAND: Tan, very gravelly, fine to very coarse
							40	

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

SAMPLE NO.	DEPTH	BLOWS	PENETRATION RESISTANCE PCF	MOISTURE CONTENT*	CONSISTENCY DRY DENSITY PCF	WEIGHT**	DEPTH IN FEET	DESCRIPTION
	40	73+					40	
							45	
							SP 50	SAND: Change to gravelly fine to medium, abundant mica
	60	71+					60	SAND: Tan, some fine gravel, abundant mica, fine to medium
							65	
							70	Grades to gravelly
							SP/GP 75	Grades to very gravelly, mostly less than 1/2 inch size
							GP/SP	GRAVEL: Very sandy, mostly to 1/2 inch size and maximum of 1 inch
	80	130+					80	Coarse gravel in sampler End of boring at 80 feet Water at 13 feet

* 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

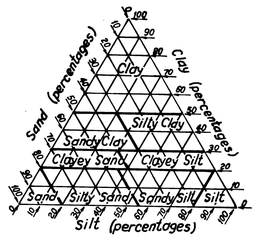


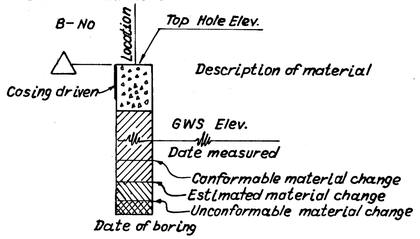
Diagram showing the basis for estimates of grade size distribution used in determination of class names.
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, via, "gravelly sand." The terms "coorse", "medium" and "fine" when used to describe sand, silt and gravel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



PB614600

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15239 BERDARE BLVD., VAN NUYS, CALIFORNIA 91411 (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. 1
REVIEWED: Steve M Wenmoore 11/24/97 STRUCTURAL SECTION DATE	BRIDGE NO.: 3794 PROJECT NO.: SHT.: 13 OF: 15 DWG. NO.: 614600

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

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY DEN*	WET DEN**	DEPTH	IN FEET	DESCRIPTION
										SURFACE CONDITION: Plowed field, proposed bridge abutment
										ELEVATION: 990
								0		
									SM	SAND: Light grayish brown, very silty, gravelly, fine to very coarse gap graded
									SP	Grades to no silt
5	13		5.4		118			5		
									SP/GP	Grades to very gravelly
								10		
									SP	Change to less gravel
15	23+							15		
								20		
									SP/GP	Increase in 1/2 to 1 inch size gravel content
25	100+							25		2 inches of 3/4 inch gravel recovered in sampler
								30		
35	63+							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*	WET DEN**	DEPTH	IN FEET	DESCRIPTION
								40		Some coarse gravel 40 to 46 feet
								45		
									SP/GP	SAND/GRAVEL: Increase in fine to medium sand
		50	68+					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	106+					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*	WET DEN**	DEPTH	IN FEET	DESCRIPTION
										SURFACE CONDITION: Edge of plowed field, southern abutment of Backer Road Bridge over Castaic Creek
										ELEVATION: 986
								0		
									SM	SAND: Light brown to tan, silty, some gravel, fine to coarse gap graded
									SP	No silt, change to gravelly
5	35		8		122			5		
									SP/GP	SAND/GRAVEL: Change to very gravelly
								10		
15	59+							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	39+							25		Gravel confined to a few thin sandy gravel layers
								30		
35	51+							35		
								40		

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

SAMPLER	DEPTH	BLOWS	PCF	MOISTURE	CONTENT*	DRY DEN*	WET DEN**	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	82+							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
65	106+							65	SP/GP	SAND: Tan, very gravelly, fine to very coarse
										End of boring at 65 feet Water at 18 feet - no caving
								70		
								75		
								80		

AS BUILT

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

Resident Engineer: Zaven Abrahamian

No Changes

* Percent
** Pounds per cubic foot
\+ SPT

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

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	COMMERCE CENTER DRIVE OVER CASTAIC CREEK
DRAWN BY: ALBERT GEVORKIAN	LOG OF TEST BORINGS SHT. 2
PROJECT ENGINEER: JORA SARKISSIAN	REVIEWED: Steve M. Hennessee 11/24/97 STRUCTURAL SECTION DATE
	BRIDGE NO.: 3794 PROJECT NO.: SHT.: 14 OF: 15 DWG. NO.: 614599

"PB614599"

REVISIONS | CHECKED | DRAWN

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

SAMPLE DEPTH	BLOWS PER FOOT	MOISTURE CONTENT *	DRY UNIT WT **	WASH DEPTH	IN FEET	DESCRIPTION
					0	SURFACE CONDITION: Located in center of road ELEVATION: 980
					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	

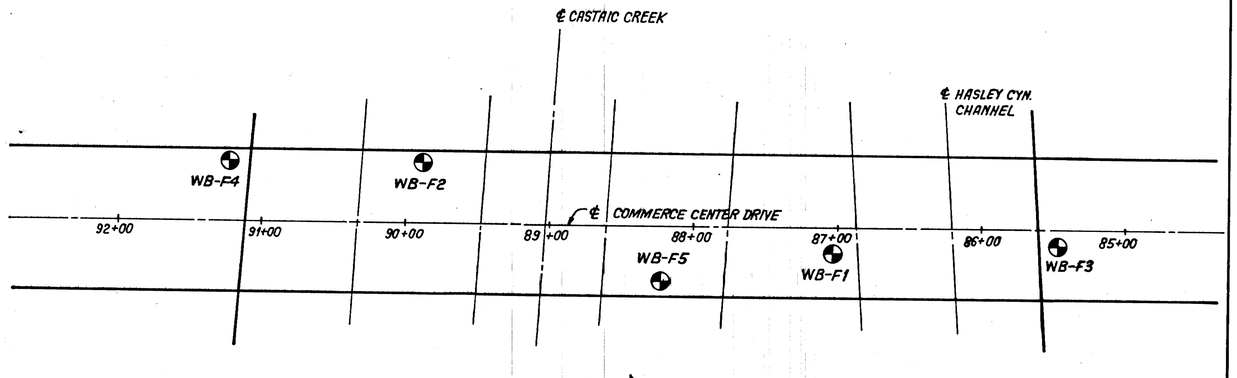
LOG OF BORING 89-025-F6 BORING NO. WB-F5

SAMPLE DEPTH	BLOWS PER FOOT	MOISTURE CONTENT *	DRY UNIT WT **	WASH 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 PER FOOT	MOISTURE CONTENT *	DRY UNIT WT **	WASH DEPTH	IN FEET	DESCRIPTION
20	30	12	115		20	
					ML 25	SILT: Reddish brown, clayey silt
					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 | CHECKED | DRAWN

SIKAND ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
15230 BURBANK 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

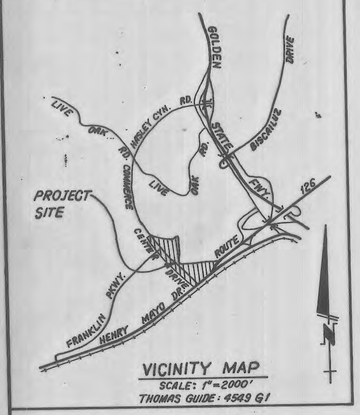
REVIEWED
Steve M. Hennessee 1/24/97
STRUCTURAL SECTION DATE

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

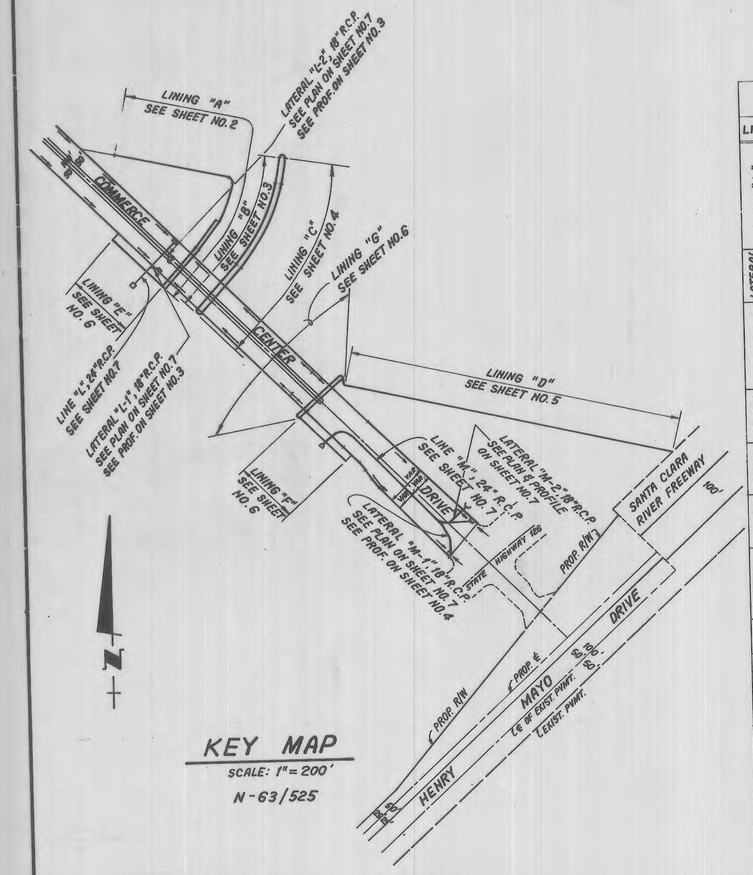
PACE
Advanced Water Engineering

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



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

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

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	0.0272	6.89	4.4
	STA. 10+50.00 TO END OF LININGS A & B					

NGL.- NEGLIGIBLE

BENCH MARK CL 3976
LACRD BM
ROBM 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.

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 _____

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

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER JOHN SAARKISSIAN No. 42690 Exp. 3-31-99 CIVIL STATE OF CALIFORNIA

Exp. 12-31-98 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)

PROFILE OF LINING "A"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'

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

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

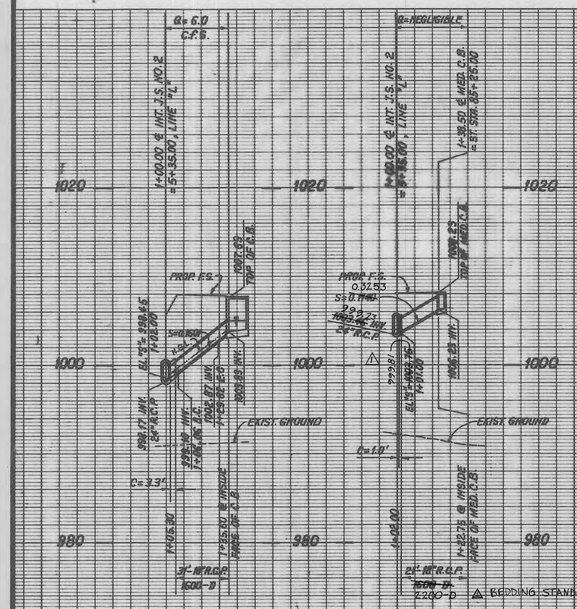
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 23391 DATE: 4-18-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 2 OF 9 SHTS

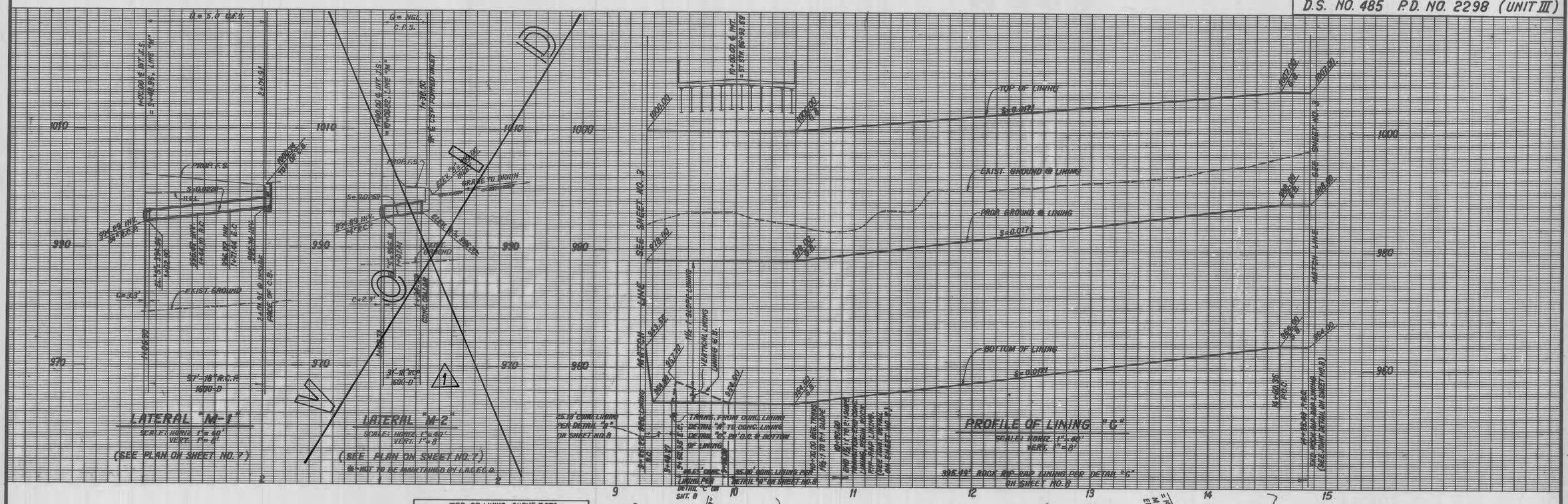
W.O. 1020-252-A

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

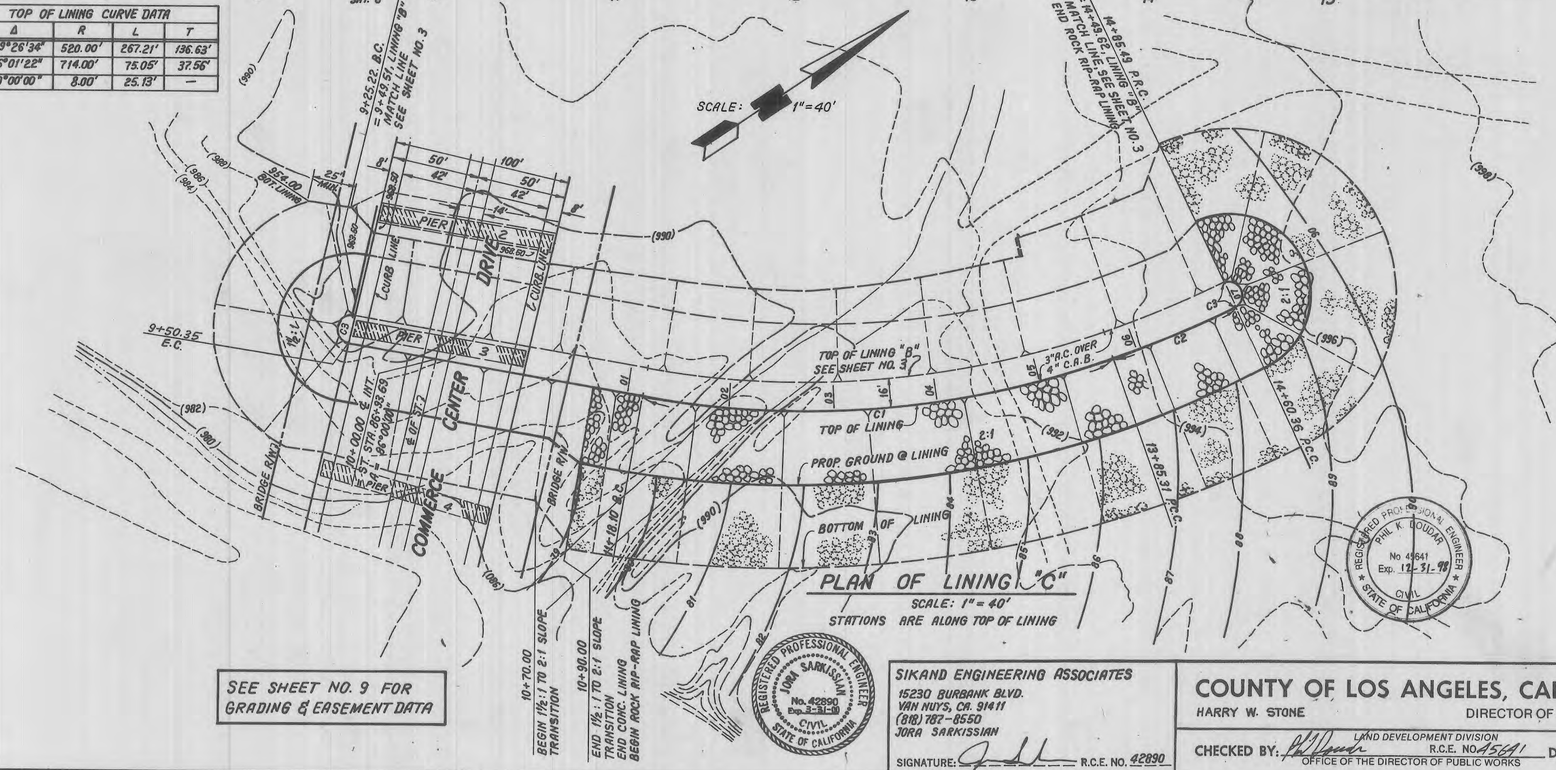
STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)


Q= 6.0 C.F.S.
Q=NEGLIGIBLE
1+00.00 ℄ INT. J.S. NO. 2
= S1°35'00" E, LINE "L"
1+35.00 ℄ INT. J.S. NO. 2, LINE "L"
= S1°35'00" E
A=35.59
R=1425.00
1+35.59 ℄ REC. C.B.
=21+39.35=25.00
PROP. F.G.
EL. 1006.69
EL. 998.65
1+08.20
SHLROP
EXIST. GROUND
PROP. F.G.
0.02.55
S=0.1961
223.27
HGHT. 1.79
24" R.C.P.
EL. 1005.23 INT.
EL. 1004.62
1+08.20
EL. 1003.89 INT.
1+08.20
998.17 INT.
1+08.20
24" R.C.P.
1+08.20
998.17 INT.
1+08.20
24" R.C.P.
1+08.20
1+08.20
1+08.20

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'	—



SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

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

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

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

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 782-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

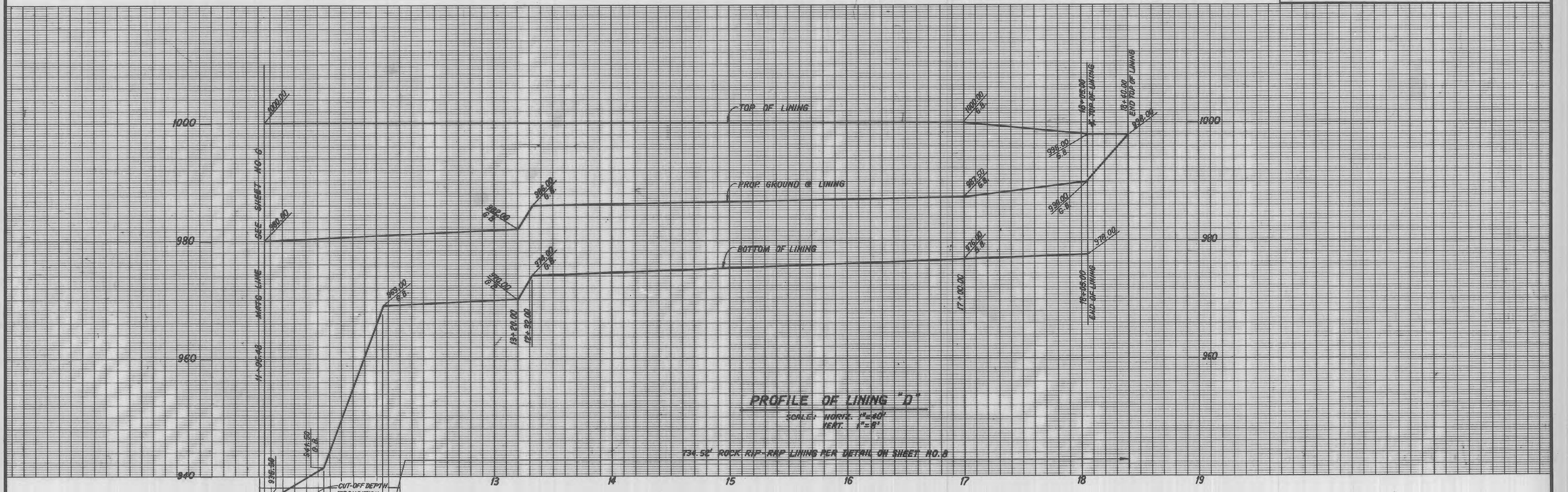
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE
DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

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)



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

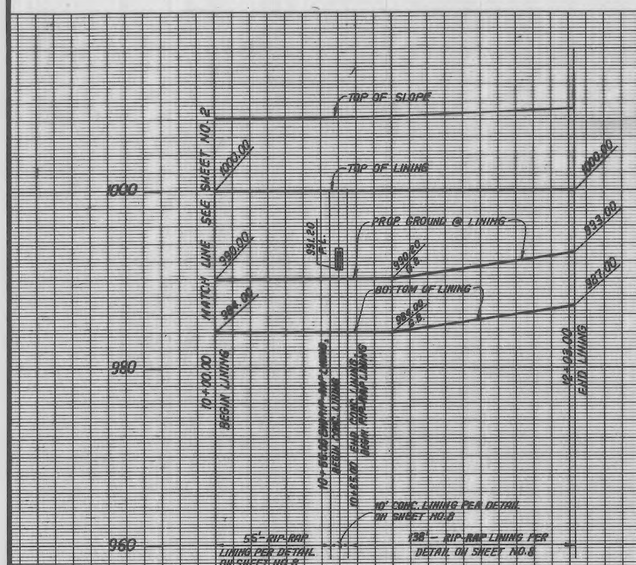
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION
R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 5 OF 9 SHTS

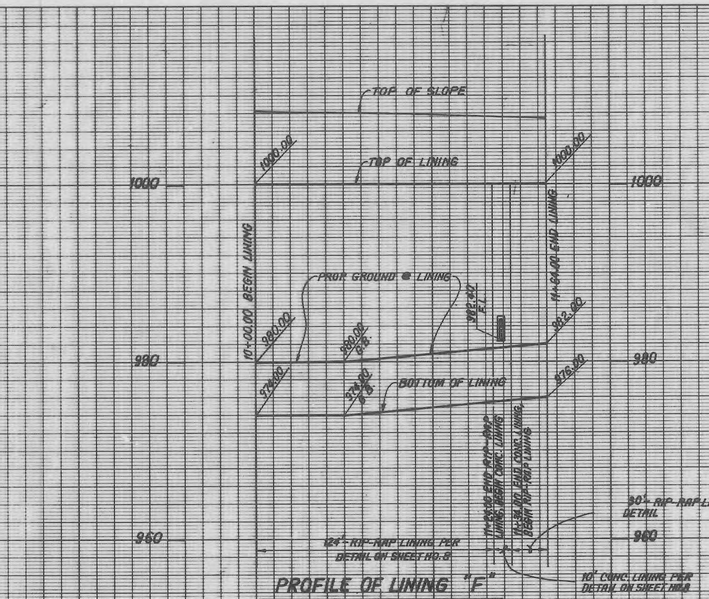
W.O. 1020-252-A

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

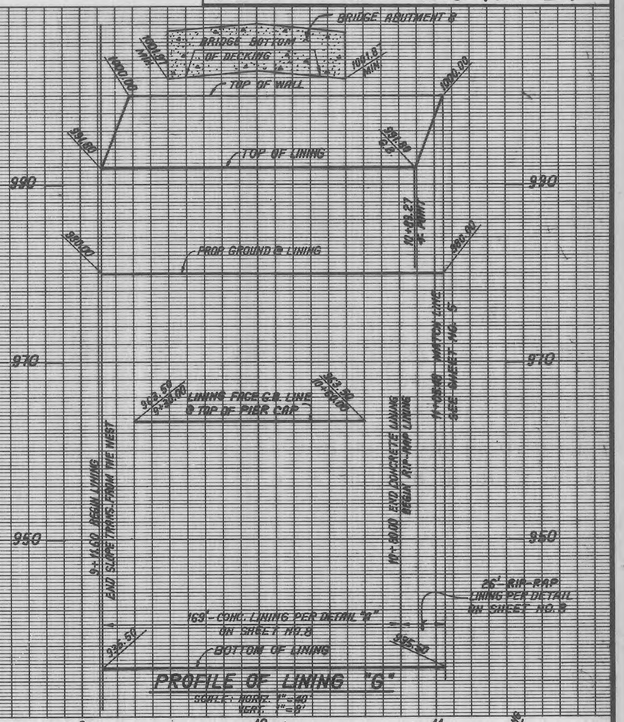
STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



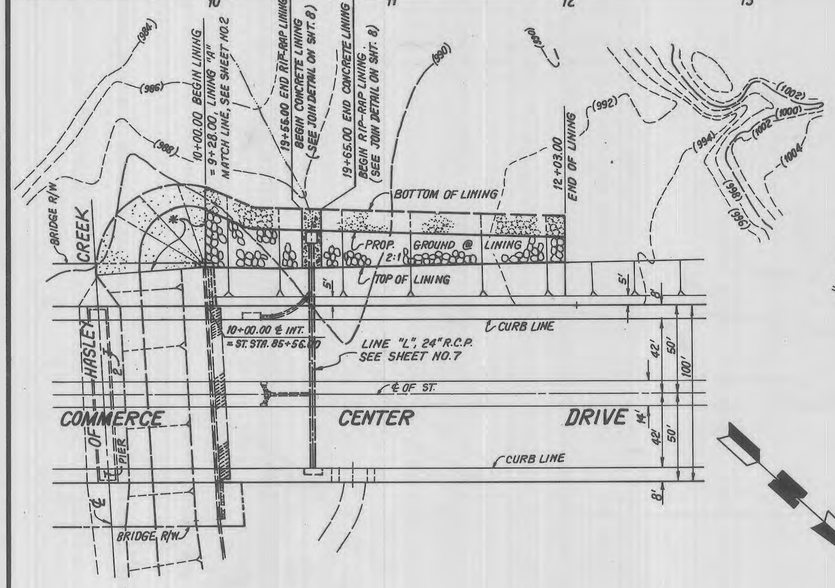
PROFILE OF LINING "E"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'



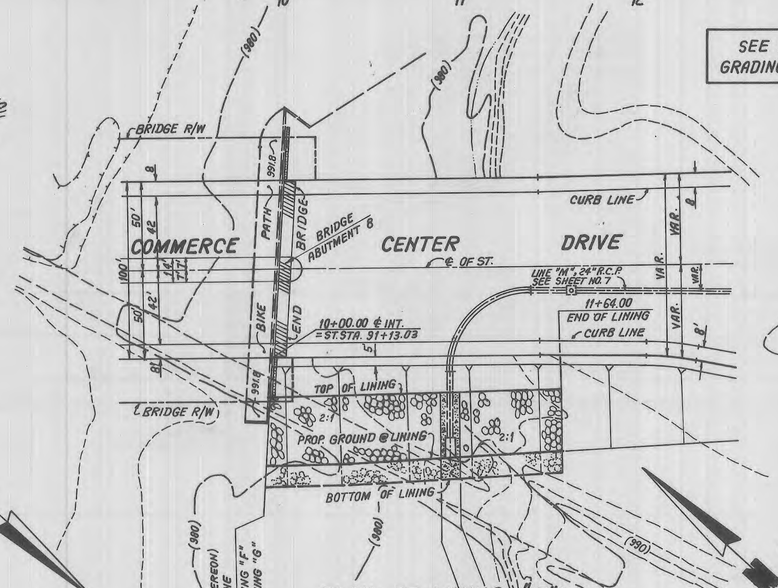
PROFILE OF LINING "F"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'



PROFILE OF LINING "G"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'



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

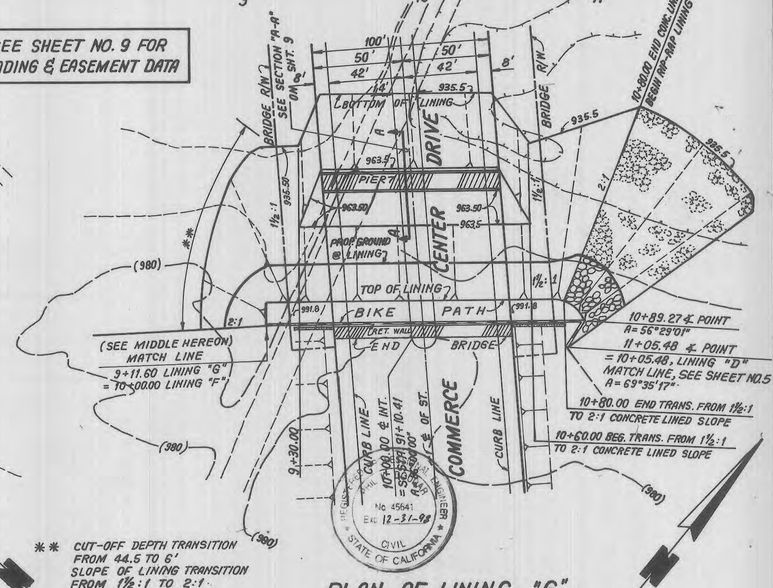


PLAN OF LINING "F"
SCALE: 1"=40'

10+96.00 END RIP-RAP LINING
BEGIN CONCRETE LINING
(SEE JOIN DETAIL ON SHT. 8)

11+06.00 END CONCRETE LINING
BEGIN RIP-RAP LINING
(SEE JOIN DETAL ON SHT. 8)

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA



** CUT-OFF DEPTH TRANSITION FROM 44.5 TO 6'
SLOPE OF LINING TRANSITION FROM 1½:1 TO 2:1

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

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

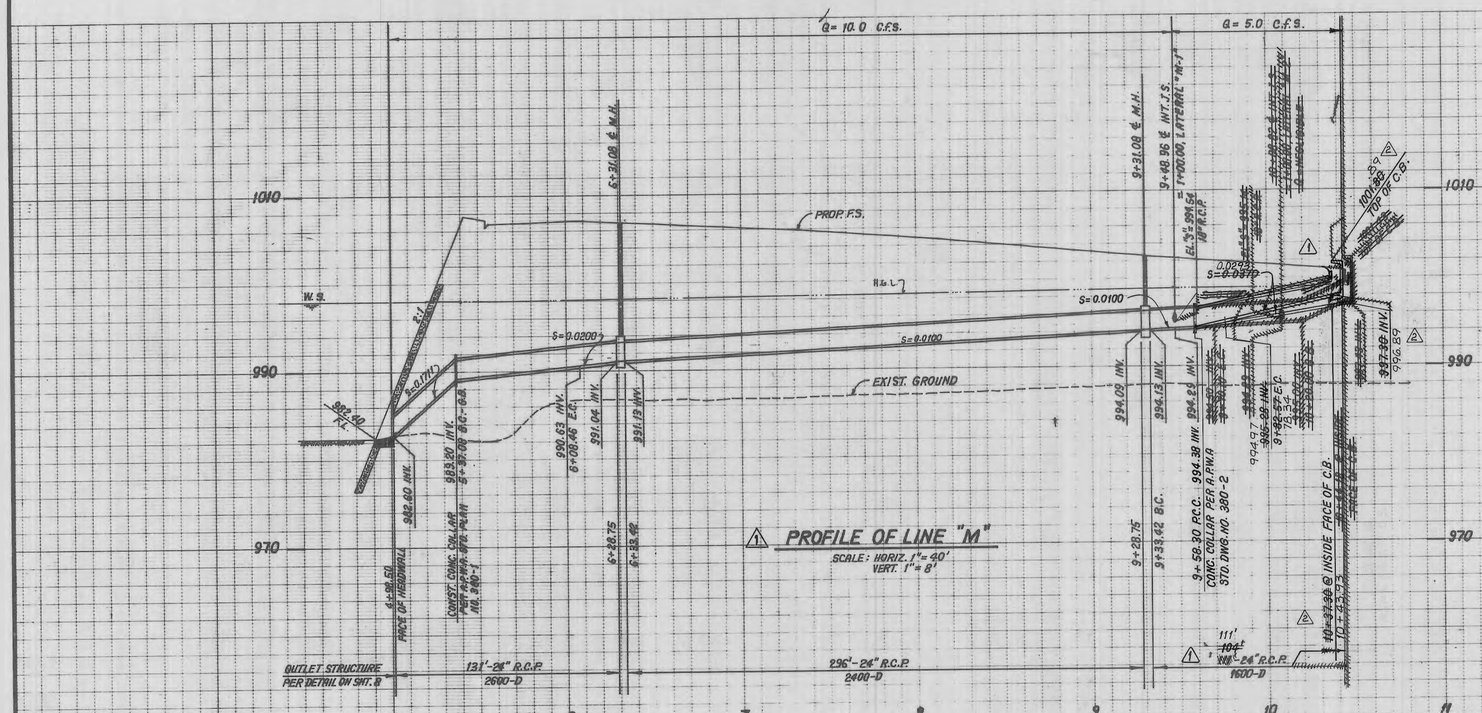
REGISTERED CIVIL ENGINEER No. 45641 Exp. 12-31-98 CIVIL STATE OF CALIFORNIA

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)


Q= 10.0 C.F.S.
Q= 5.0 C.F.S.
PROP. F.S.
EXIST. GROUND
W.S.
H.G.L.
S=0.0100
S=0.0200
S=0.0117
S=0.0379
1010
990
970
6+31.08 ℄ M.H.
9+31.08 ℄ M.H.
9+42.96 ℄ INT. J.S.
1+00.00, LATERAL "L-1"
EL. 995.61 (TOP OF C.B.)
EL. 994.61 (INV. IN)
EL. 991.61 (INV. OUT)
EL. 994.09 INV.
EL. 994.13 INV.
EL. 994.89 INV.
EL. 994.38 INV.
EL. 997.38 INV.
EL. 996.89
9+33.42 B.C.
9+28.75
6+28.75
6+35.42
6+00.63 INV.
6+08.46 E.C.
6+35.08 B.C.-6.8
EL. 990.63 INV.
EL. 991.04 INV.
EL. 991.19 INV.
EL. 983.20 INV.
EL. 982.60 INV.
852.60 L.F.
4-6.00 I.D.
FACE OF HEADWALL
CONST. CONC. COLLAR PER A.P.W.A. STD. PLAN NO. 380-1
PROFILE OF LINE "M"
SCALE: HORIZ. 1"= 40'
VERT. 1"= 8'
OUTLET STRUCTURE PER DETAIL ON SHT. 8
131'-24" R.C.P. 2600-D
296'-24" R.C.P. 2400-D
111'
104'
24" R.C.P. 1600-D
9+58.30 P.C.C.
CONC. COLLAR PER A.P.W.A. STD. DWG. NO. 380-2
9+49.96 ℄ INT. J.S.
9+48.96 ℄ INT. J.S.
1+00.00, LATERAL "L-1"
EL. 995.61 (TOP OF C.B.)
EL. 994.61 (INV. IN)
EL. 991.61 (INV. OUT)
EL. 997.38 INV.
EL. 996.89
10+31.08 @ INSIDE FACE OF C.B.
10+37.39
101.39
TOP OF C.B.
0.0293
S=0.0379
9+97.97
9+85.98 INV.
9+84.98 INV.
9+84.98 E.C.
9+73.54 B.C.
9+32.57 E.C.
18.34'
9+32.57 E.C.
18.97'
9+44.10 B.C.
1+71.44 E.C.
LATERAL "M-1", 18" R.C.P. (SEE PROFILE ON SHT. NO. 4)
2+01.91 @ INSIDE FACE OF C.B.
18" R.C.P.
25.07
96+18.49
ST. STA. 96+86.96 ℄ C.B.
PER A.P.W.A. STD. NO. 300-0, W=14'
LOCAL DEPRESSION PER A.P.W.A. STD. NO. 313-0, CASE "E", H=2"
5.00'
ST. STA. 96+86.96 ℄ C.B.
PER A.P.W.A. STD. NO. 300-0, W=14', V=4.00'
CONST. J.S. PER A.P.W.A. STD. NO. 331-0, A=30°00'00", B=8', D=8", C=3.3', LATERAL "M-1"=1+00.00 (SEE PROFILE ON SHEET NO. 4)
9+58.30 P.C.C. CONCRETE COLLAR PER A.P.W.A. STD. PLAN NO. 330-2
LOCAL DEPRESSION PER A.P.W.A. STD. NO. 313-0 CASE "E", H=2"
9+48.96 ℄ INT. J.S.
CONST. J.S. PER A.P.W.A. STD. NO. 331-0, A=30°00'00", B=8', D=8", C=3.3', LATERAL "M-1"=1+00.00 (SEE PROFILE ON SHEET NO. 4)
9+31.08 ℄ M.H.
CONST. M.H. PER A.P.W.A. STD. PLAN NO. 321-1, D1=D2=24"
13 L.F.-12" R.C.C. AND C.S.P. INLET PER A.P.W.A. STD. PLAN NO. 351-1, CASE 1, INLET ELEV. = 999.00 (NOT TO BE MAINTAINED BY THE LACFCD)
0.5% MIN.
999.3
999.5
GRADE TO DRAIN
SCALE: 1"=40'
ST. STA. 95+82.00 ℄ OF COMM. DWY PER A.P.W.A. STD. PLAN NO. 110-0, W=20', R=4'
COMMERCE CENTER DRIVE
℄ OF STREET
℄ OF 24" R.C.P.
18" R.C.P.
LATERAL "M-2", 18" R.C.P. (SEE PROFILE ON SHEET NO. 4)
LATERAL "M-1", 18" R.C.P. (SEE PROFILE ON SHEET NO. 4)
℄ OF STATE HWY 126
HIGHWAY
STATE
CONST. J.S. PER APWA STD. PLAN NO. 331-2.
10+08.82 ℄ INT. J.S.
CONST. J.S. PER A.P.W.A. STD. NO. 331-1, A=45°00'00", B=18", D=24", C=2.3', LATERAL "M-2"=1+00.00 (SEE PROFILE ON SHEET NO. 4)
5+37.08 B.C.
4+98.50 @ INSIDE FACE OF HEADWALL
ALLIANCE ENGINEERING 1140 FARADAY AVE CARLSBAD, CA 92008 760-431-3936
FOR ⚠2 ONLY
PLAN OF LINE "M"
SCALE: 1"=40'
NOT TO BE MAINTAINED BY L.A.C.F.C.D.
5+35.00 ℄ INT. J.S. NO. 2
CONST. J.S. NO. 2 PER L.A.C.F.C.D. STD. DWG. NO. 2-D12, R=30°00'00", B=18', D=24", C=3.3', LATERAL "L-1"=1+00.00 (SEE PROFILE ON SHT. NO. 3)
5+14.00 @ INSIDE FACE OF HEADWALL
ST. STA. 85+35.00 ℄ C.B. W=10'
PER A.P.W.A. STD. PLAN NO. 300-0, W=10', V=3.86', LOCAL DEPRESSION PER A.P.W.A. STD. PLAN NO. 313-0, R=00°00'00", CASE "E", H=2".
ST. STA. 85+25.00 ℄ MED. C.B.
CONST. MED. C.B. PER DETAIL ON SHEET NO. 8
1+29.62 E.C.
1+35.60 @ INSIDE FACE OF C.B.
(12" DIP SEWER)
CENTER DRIVE
COMMERCE
VAR.
50'
42'
8'
7'
5'
LINING "A" SEE SHT. 2
LATERAL "M-1", 18" R.C.P. (SEE PROFILE ON SHT. 3)
LATERAL "L-2", 24" R.C.P. (SEE PROFILE ON SHT. 3)
℄ OF 24" R.C.P.
℄ OF STREET
ST. STA. 85+01.50 ℄ C.B. W=10'
PER A.P.W.A. STD. PLAN NO. 300-0, W=10', V=8.00'
LOCAL DEPRESSION PER A.P.W.A. STD. PLAN NO. 313-0, CASE "E", H=2".
5+95.00 ℄ INT. J.S. NO. 2
CONST. J.S. NO. 2 PER L.A.C.F.C.D. STD. DWG. NO. 2-D12, R=30°00'00", B=18', D=24", C=3.3', LATERAL "L-2"=1+00.00 (SEE PROFILE ON SHT. NO. 3)
PLAN OF LINE "L"
SCALE: 1"=40'
6-120 C.F.S.
Q= 6.0 C.F.S.
5+35.00 ℄ INT. J.S. NO. 2 = 1+00.00, LATERAL "L-2"
EL. 1005.81 PROP. 8" FORCE MAIN
5+95.00 ℄ INT. J.S. NO. 2 = 1+00.00, LATERAL "L-2" ST. STA. 85+01.50
EL. 1003.36 EXIST. 24"x16" SEWER LINE
100' OF C.B.
PROP. F.S.
H.G.L.
S=0.0100
S=0.3225
EL. 998.45 (TOP OF C.B.)
EL. 997.45 INV. IN
EL. 997.66 INV.
EL. 999.81 (TOP OF C.B.)
EL. 997.81 INV.
EL. 997.81 INV.
EL. 997.66 INV.
EL. 997.61 INV.
EL. 997.61 INV.
EL. 997.61

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 QUANTITIES 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.

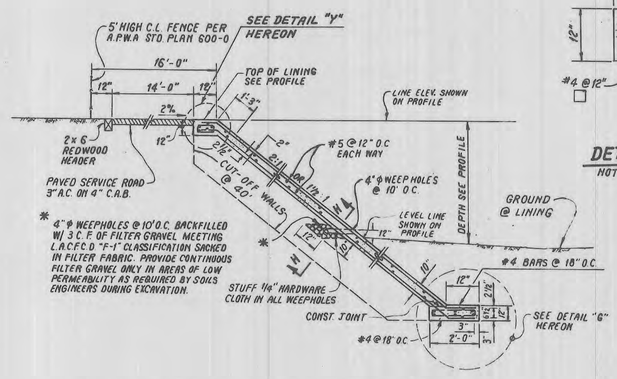
STRUCTURAL DESIGN CRITERIA

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

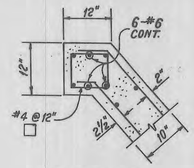
DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 37 p.s.f. per foot of depth
Internal water pressure: 62.4 p.s.f. per foot of depth
Weight of concrete: 150 p.c.f.

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

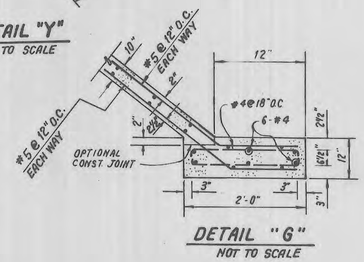
NO	REVISION	REVISED BY	APPROVED BY	DATE



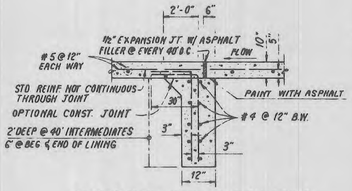
CONCRETE LINING DETAIL "A"
NOT TO SCALE



DETAIL "Y"
NOT TO SCALE



DETAIL "G"
NOT TO SCALE

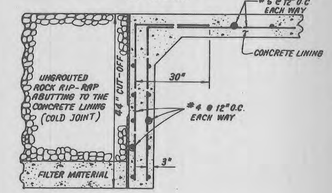


SECTION "H-H" EXPANSION JOINT
CUT-OFF WALL

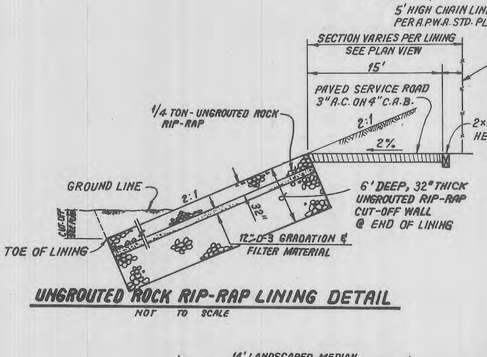
NOTE EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



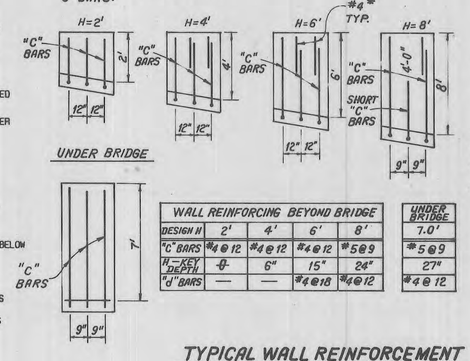
⚠ CONCRETE LINING-UNGROUTED ROCK RIP-RAP JOIN DETAIL
NOT TO SCALE



⚠ SECTION "A-A"
NOT TO SCALE



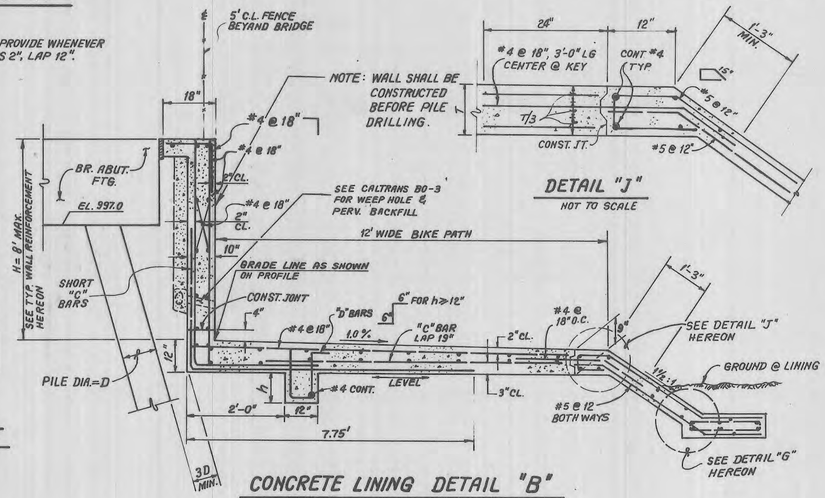
UNGROUTED ROCK RIP-RAP LINING DETAIL
NOT TO SCALE



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

UNDER BRIDGE
7.0'
#5@9
27"
#4@12

TYPICAL WALL REINFORCEMENT
NOT TO SCALE



CONCRETE LINING DETAIL "B"
NOT TO SCALE

DETAIL "J"
NOT TO SCALE



CONST. MOD. C.B. PER A.P.W.A. STD. PLAN 304-1 OR EQUAL, V=VAR. SEE PLAN

CONST. MOD. C.B. PER A.P.W.A. STD. PLAN 300-1 (TYP.), W= 12'¢ V= 18", B= 12". MAX. SPACING= 1000' W/6" STD. COVER PER ALHAMBRA FDRY. CO. STD. A-2025 OR EQUAL.

NOTE: ALL DIMENSIONS ARE TYPICAL

SECTION A-A
NOT TO SCALE

* NOTE: ALL PIPES SHOWN TO BE PVC SCHEDULE 80 OR EQUAL

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

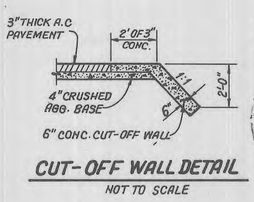
MEDIAN CATCH BASIN DETAIL
NOT TO SCALE



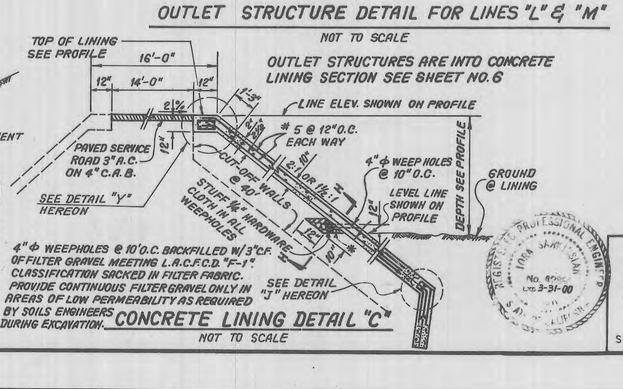
SECTION Q-Q
NOT TO SCALE

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

ACCESS ROAD SECTION
NOT TO SCALE

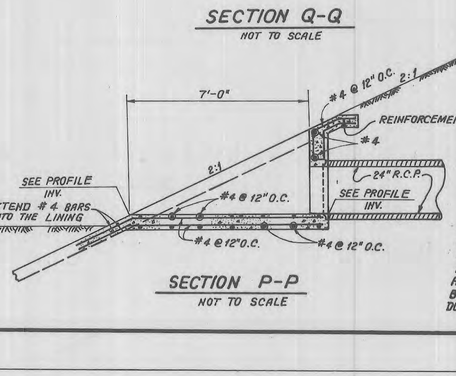


CUT-OFF WALL DETAIL
NOT TO SCALE



CONCRETE LINING DETAIL "C"
NOT TO SCALE

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



SECTION P-P
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 TO L.A.C.F.C.D. FOR FLOOD CONTROL PURPOSES.

SCALE: 1"=60'

EASEMENT DATA

T NO.	DIRECTION	DISTANCE
1.	S. 40°42'51" W	85.81'
2.	N. 73°57'46" 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~~	~~113.32'~~
~~26.~~	~~S. 48°25'31" E~~	~~76.00'~~
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'	14.05'
14	27°11'16"	42.00'	19.93'	10.16'

⊙ - 13 L.F. - 12" P.V.C. AND C.S.P. INLET PER A.P.W.A. STD. PLAN NO. 351-1, CASE 1, INLET ELEV. = 999.00 (NOT TO BE MAINTAINED BY THE LACFCD)

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. Hamat	3/5/99

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

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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

Pacific Advanced Civil Engineering, Inc.
17520 Newhope Street, Suite 200
Fountain Valley, CA 92708
714-481-7300



Contact Person:

Jose Cruz, MS, PE
Emily Randig, MS, EIT

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

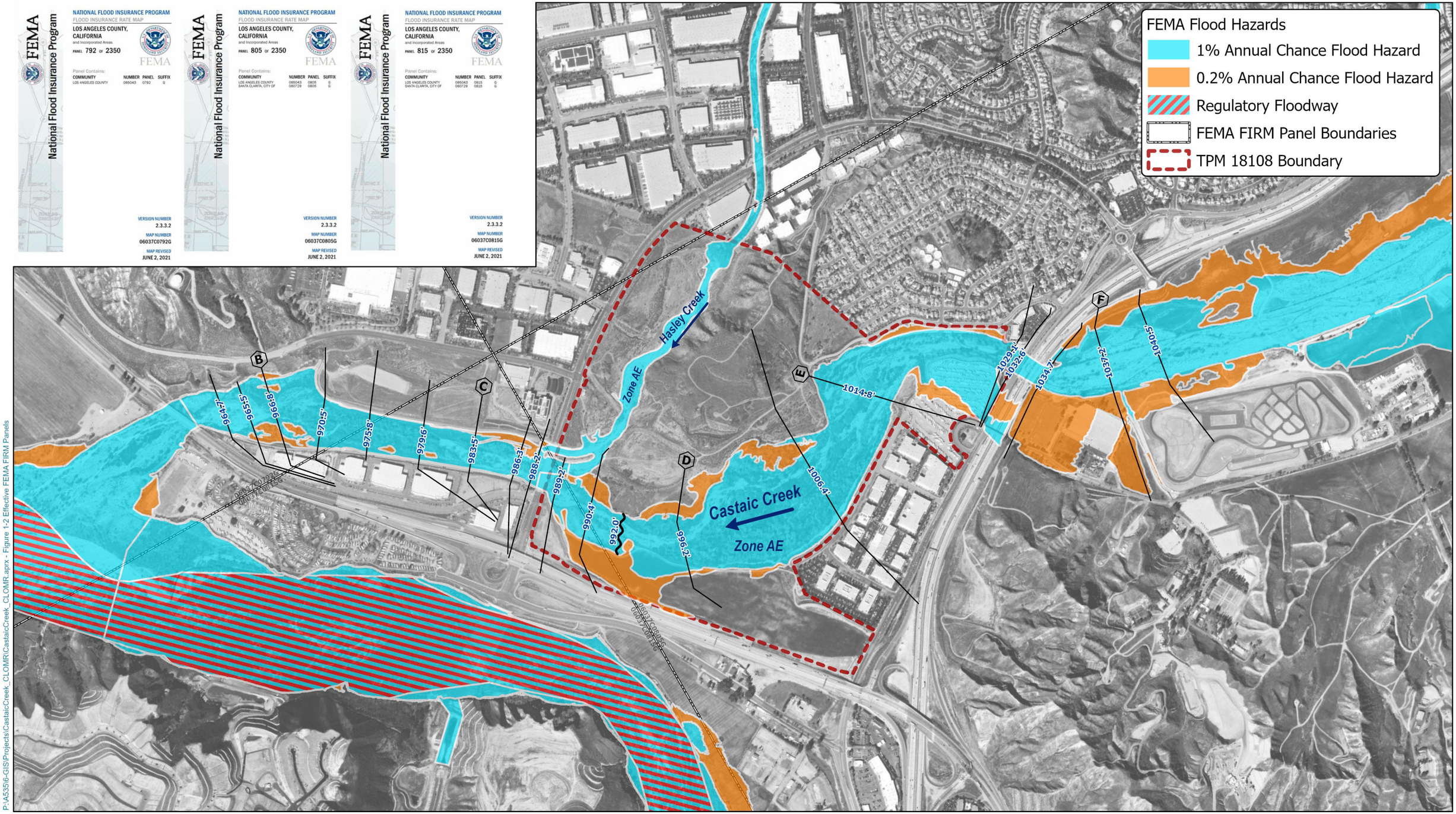
PACE Advanced Water Engineering

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

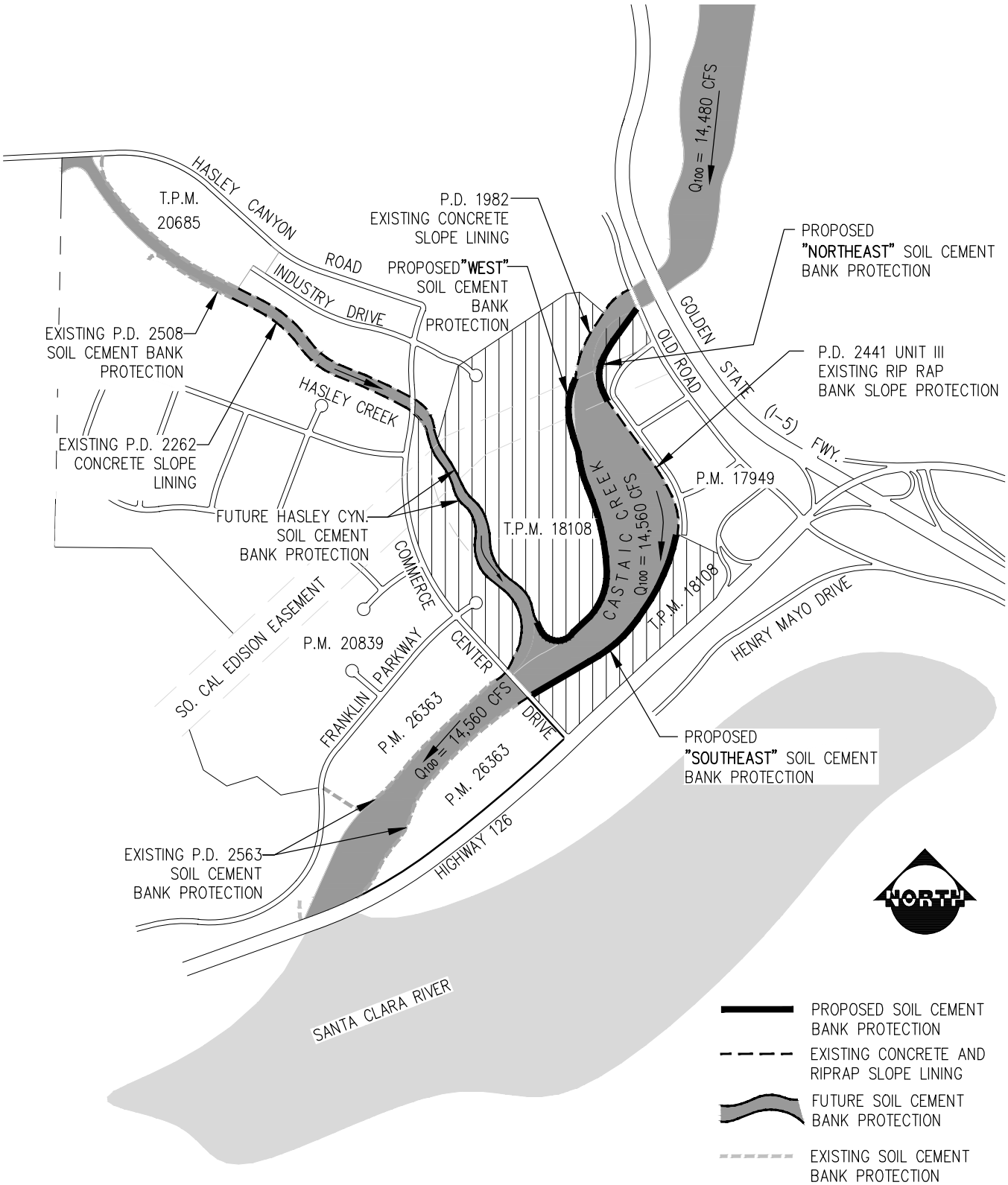
PACE Advanced Water Engineering

0 500 1,000 2,000 Feet

Date: 9/13/2023

Job Number: A535

Figure 1-2



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

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.

LEGEND

- HEC-RAS CROSS SECTION
- CASTAIC CREEK CENTERLINE
- SOIL CEMENT BANK PROTECTION
- PROJECT BOUNDARY
- TOPOGRAPHIC FEATURE TO BE REGRADED

STUDY LIMITS
SECTION 4827.2
SECTION 4715.43
SECTION 5025.39
SECTION 5537.85
SECTION 6086.33
SECTION 6704
SECTION 7298.39
SECTION 7797.6
SECTION 7999.7
SECTION 8529.2
SECTION 8564.8
SECTION 8748.05
SECTION 9186.9
SECTION 9534.89
SECTION 9869.91
SECTION 10620.36
SECTION 11005.91
SECTION 11620.14
SECTION 12541.1
SECTION 12972
SECTION 13718.47
SECTION 13713.74
SECTION 14180.6
SECTION 14787.25
SECTION 14892.2
SECTION 14976.84
SECTION 14997.85
SECTION 15216.27
SECTION 15245.39
SECTION 15418.79
SECTION 15669.62
SECTION 15958.96
SECTION 16206.5
SECTION 16552.09
SECTION 16697.02
STUDY LIMITS

COMMERCE CENTER DRIVE

VALENCIA COMMERCE CENTER
TPM 18108

"WEST" SOIL CEMENT BANK PROTECTION

CASTAIC CREEK

Q100=14,560 cfs
FLOW

"SOUTHEAST" SOIL CEMENT BANK PROTECTION

"NORTHEAST" SOIL CEMENT BANK PROTECTION

HIGHWAY 126

THE OLD ROAD

GOLDEN STATE FWY. (I-5)

400 0 400 800
SCALE 1"=400'

NO	BY	DATE	REVISIONS	DATE	APP.

PROFESSIONAL ENGINEER ★ REGISTERED ★ JOSE CRUZ ★ No. 72308 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

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
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

Xrefs: A535-73-Upper Castaic West Soil Cement_SP.dwg; A535_LowerCastaicCreekLining_20230126_SP.dwg; A535-73-Lower Castaic Southeast Soil Cement_SP.dwg; A535-73-FEMA-500_100-FP Limits_SP.dwg; A535-73_CastaicCreekCenterline_20230209.dwg; A535-22-PR-MAPBASE-HCC_SP.dwg; A535-73-EX TOPO - VCC (OCT 2013) GRD_SP.dwg; A535-73-FEMA Cross Sections_SP.dwg; A535-73-Lower Castaic Southeast Soil Cement_SP.dwg; A535_LotsSite_20230126_SP.dwg; A535_RGBase_HCC_East(WCCD_20230126_SP.dwg; A535_RGBase_HCC_East(WCCD_20230126_SP.dwg; A535-73-EX TOPO - VCC (OCT 2013) GRD_SP.dwg; A535-73-FEMA Cross Sections_SP.dwg
Dimscale = 1; LTscale = 1; PSltscale = 1; ACAD Ver. = 23.0s (LMS Tech); Vtentain = 1

P:\A535\Engineering\A535-73_Castaic Creek CLOMR\workmaps\A535-73-Figure 2-1_HEC-RAS Workmap.dwg - Tab: 24x36 - by mandig on 09/27/23 at 2:52:59 PM

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.

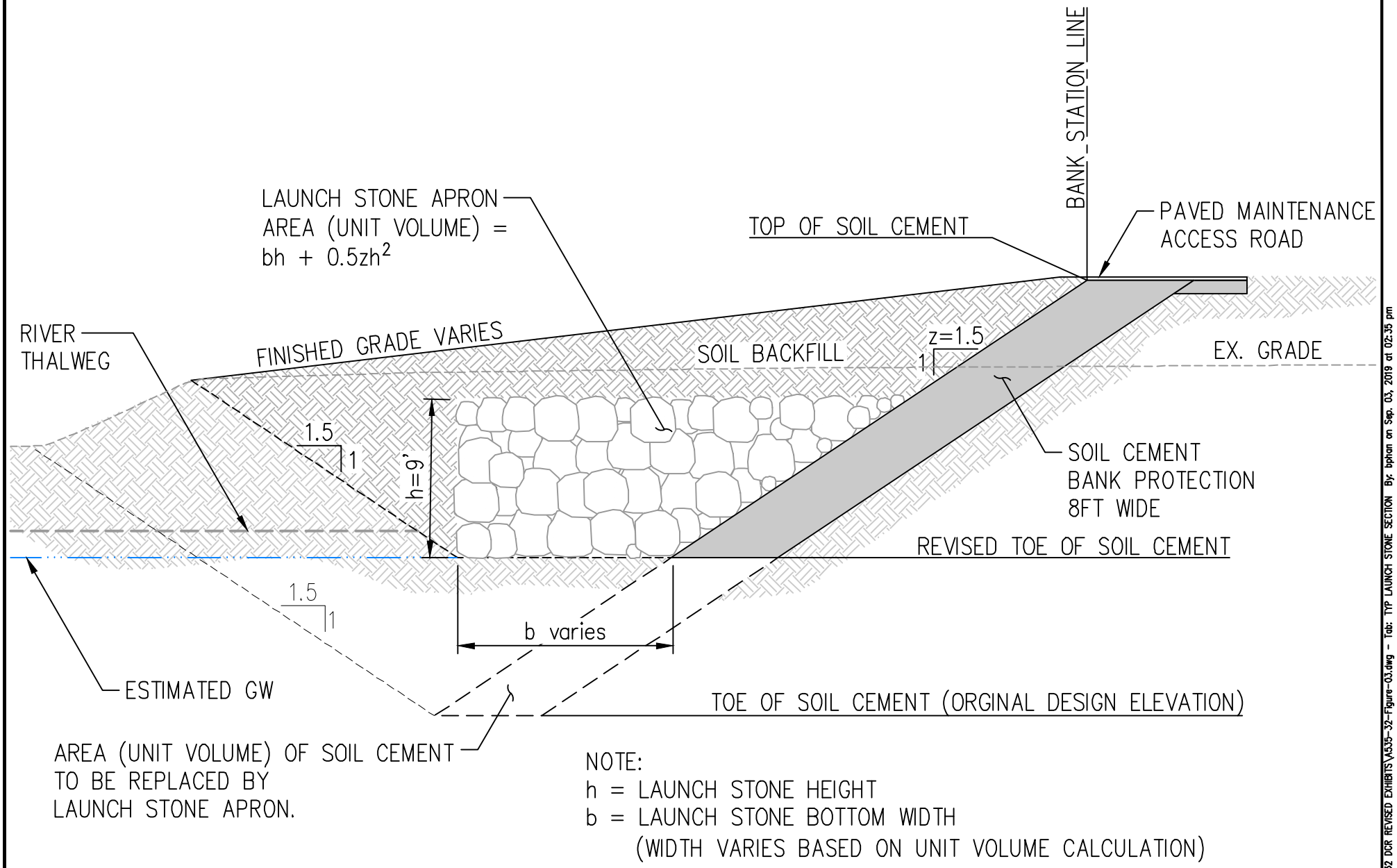


FIGURE 3-1

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

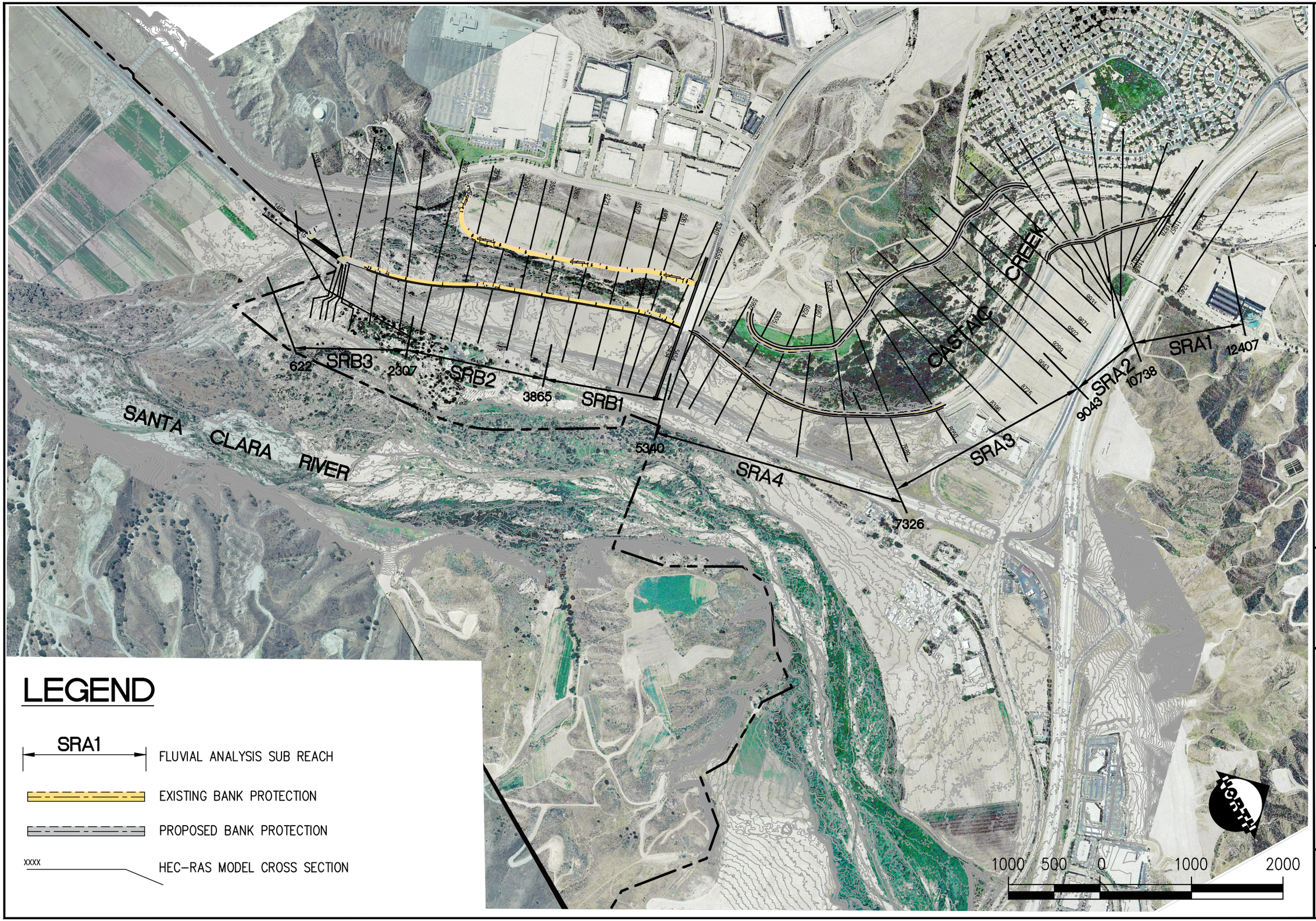
the Creek. The small change in average bed height between 2004 and 2005 suggests the bed is at or approaching the armoring depth below which no additional degradation will occur without a change in sediment inflow characteristics or a change in hydrology. Aggradation in this subreach exceeds three feet 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
PH (714) 481-7300 FAX (714) 481-7299

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
Xrefs: 7841E-Plong_Bridge.dwg; 7841-PSIRV.dwg; P-bank protection_REV.dwg; 7142-Lining.dwg; 7142-Flood.Resource.dwg; 7142-river-sections1.dwg; NR-cdfg_2004.dwg; 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.
Dimscale = 1; LTscale = 0.375; PSltscale = 1; Acad Ver. = 23.0s (LMS Tech); Viewtoln = 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.

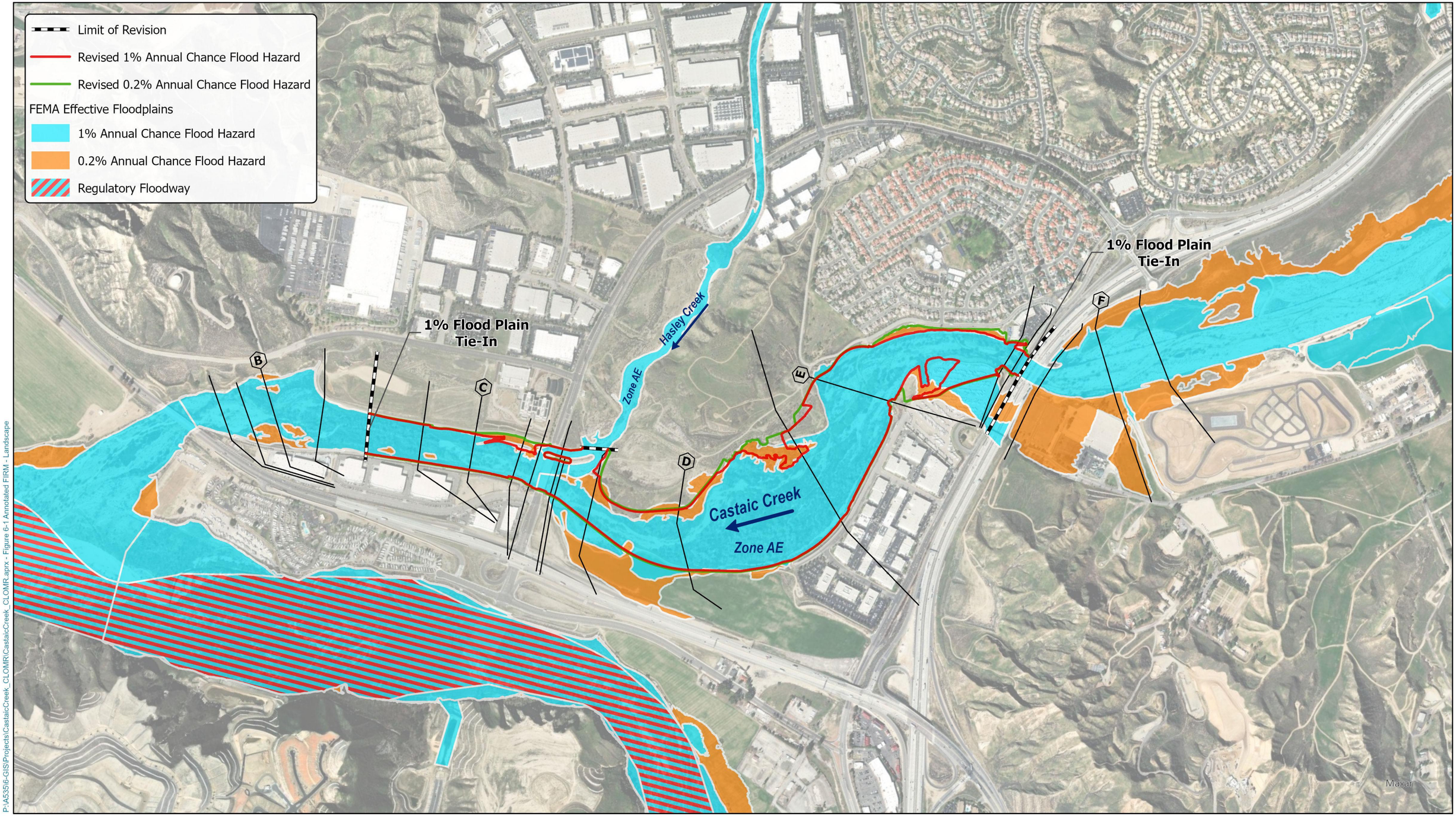
6 Conclusions

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:\A535\6-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

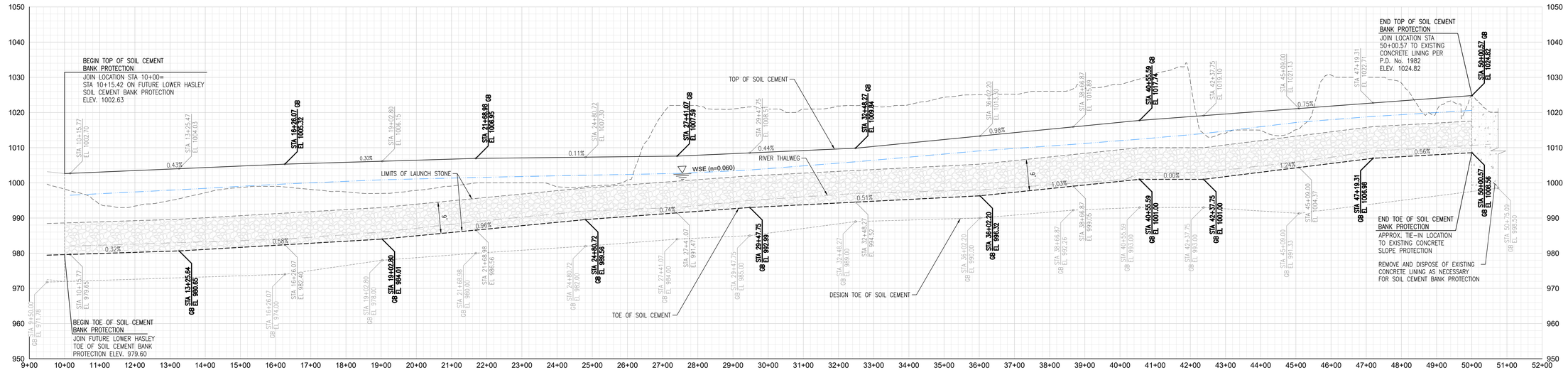
PACE, Castaic Creek Fluvial Study. November 2005.

PACE, Drainage Concept Report, Volume II or V, Castaic Creek Bank Protection ESTU No. 2001000012. September 2019.

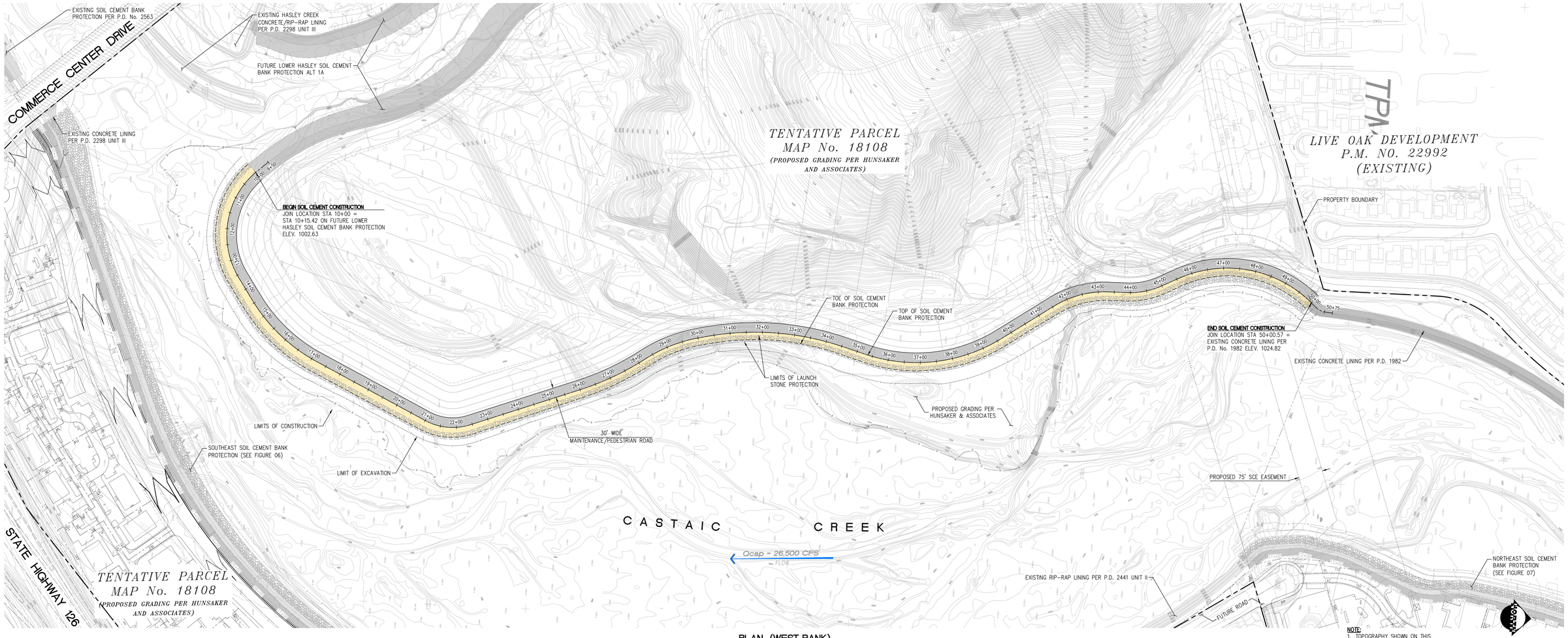
PACE, Drainage Concept Report, Volume III or V, Hasley Canyon Creek Bank Protection EIMP No. 2019000489. October 2021.

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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.

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P: (714) 481-7300 | www.pacewater.com

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

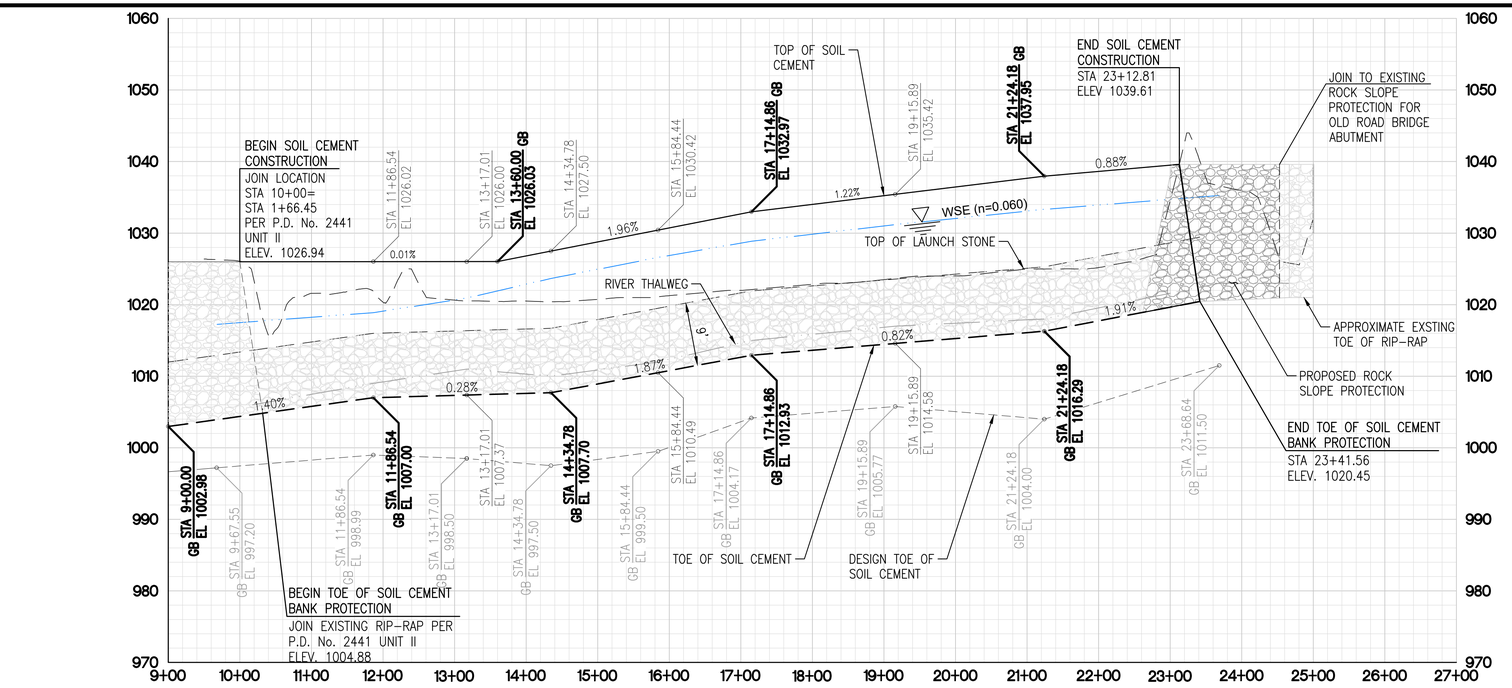
WEST BANK SOIL CEMENT BANK PROTECTION PLAN & PROFILE

FIGURE 3-2

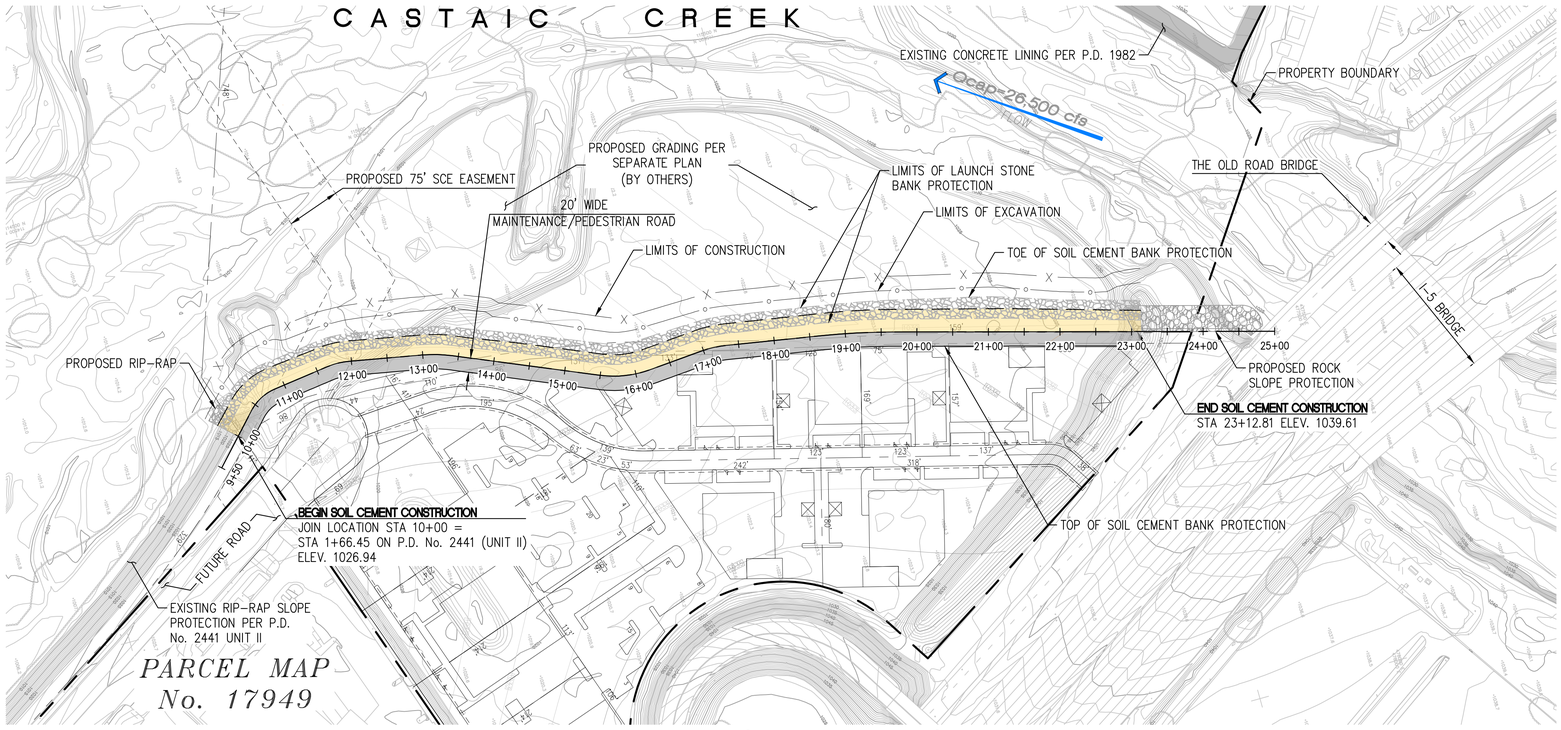
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P:\A535\Engineering\A535-73_Castaic Creek CSBP\Exhibits\A535-22-Figure-3-2_WEST.dwg By: ernesty Date: Mar 09, 2023 Time: 02:39 pm



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					
2					
3					
4					
5					

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CASTAIC CREEK SOIL CEMENT BANK PROTECTION FOR T.P.M. NO. 18108
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P: (714) 481-7300 | www.pacewater.com

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DRAWN: BDP
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DESIGNED: JC
CHECKED: JC
DATE: Sep, 2019

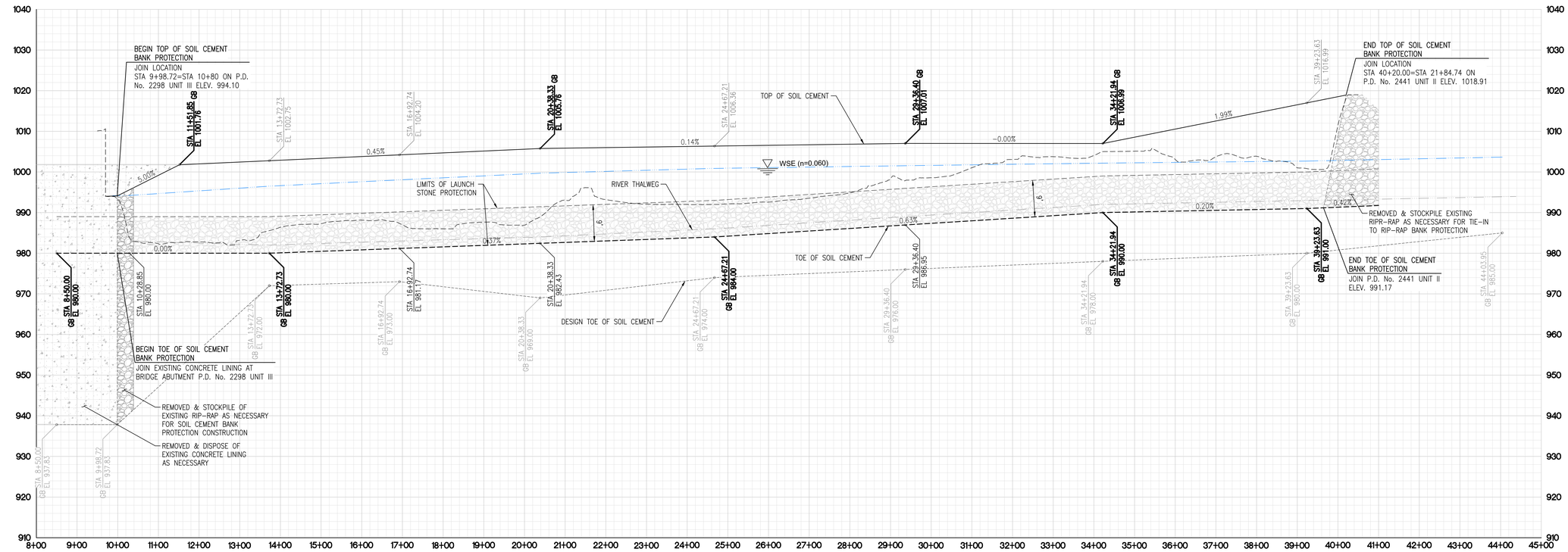
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TITLE
NORTHEAST BANK SOIL CEMENT BANK PROTECTION PLAN & PROFILE

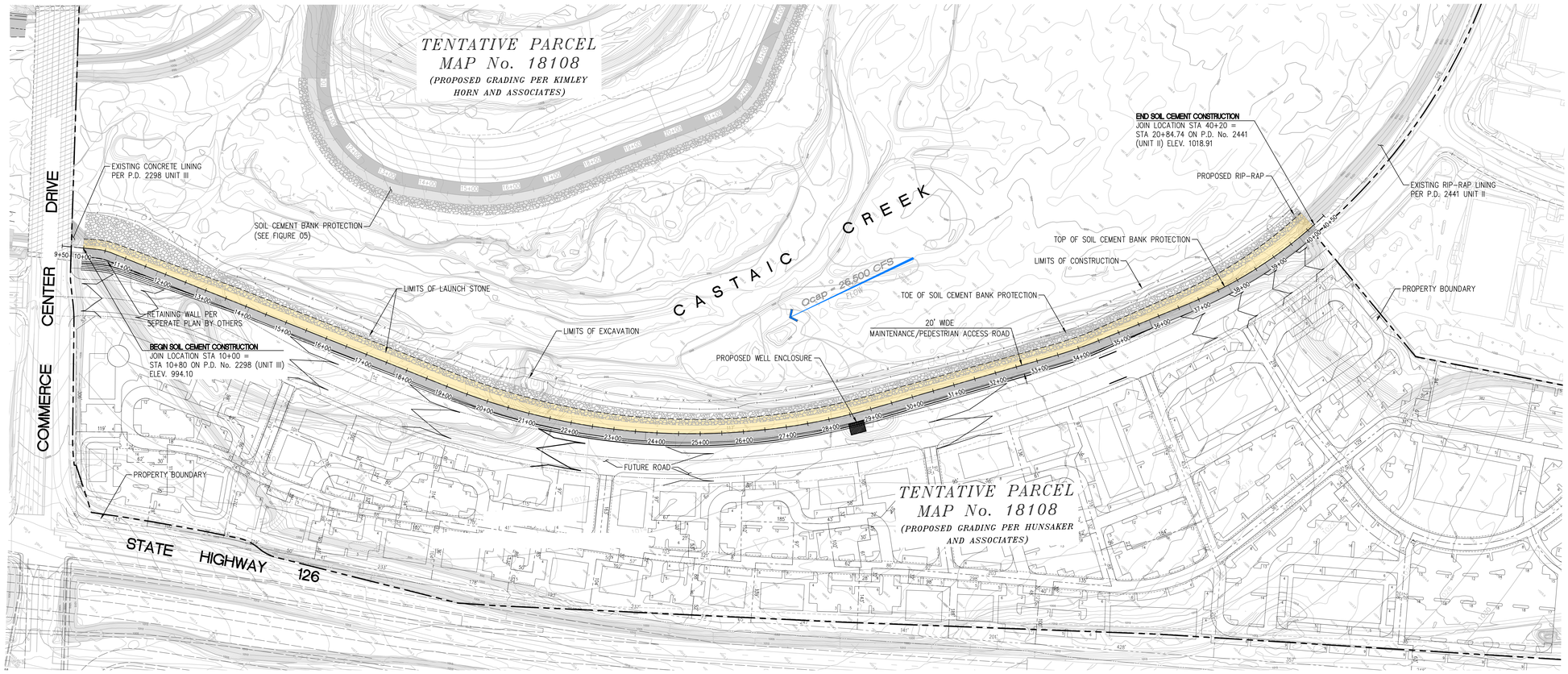
SHEET 3-3

JOB NO. A535

P:\A535\Engineering\A535-73_Castaic Creek CLMP\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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2					
3					
4					
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	PROJECT ENGINEER
R.C.E. NO.	72249
EXP.	06/30/20
DRAWN	BDP
SCALE	
DESIGNED	JC
CHECKED	JC
DATE	Sep, 2019

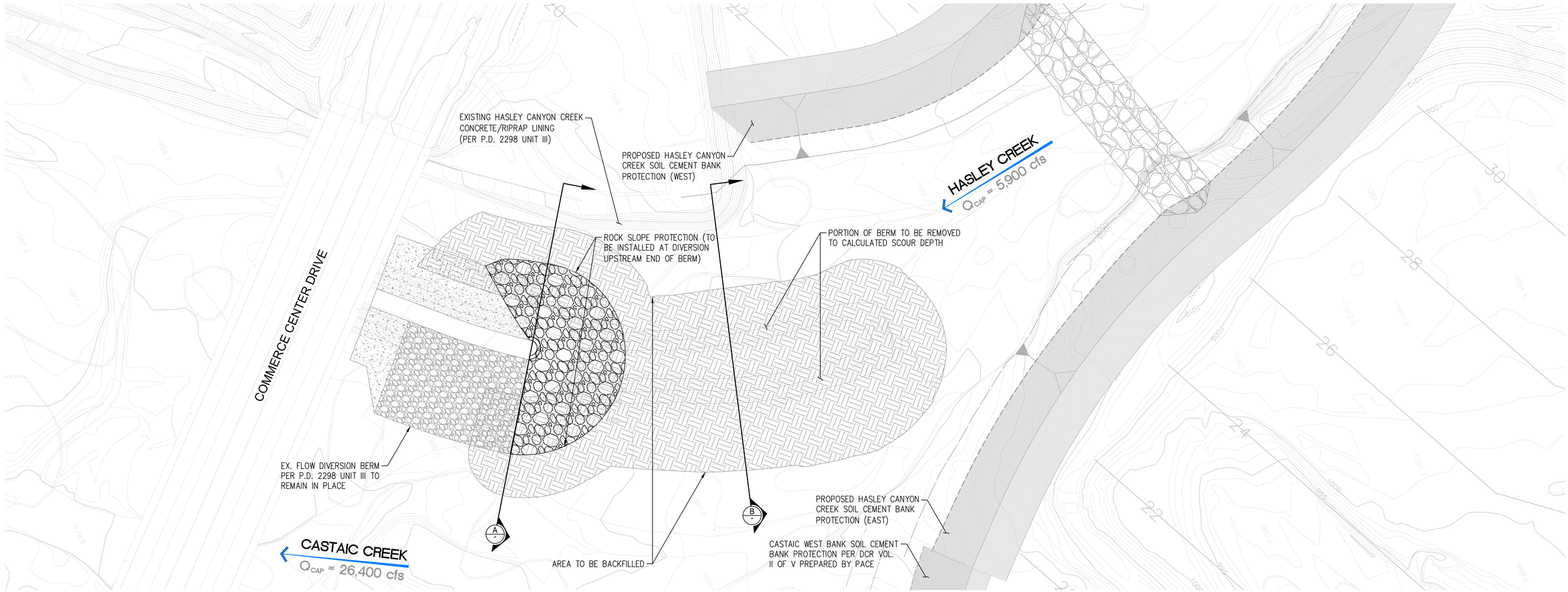
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TITLE
SOUTHEAST BANK SOIL CEMENT BANK PROTECTION PLAN & PROFILE

FIGURE 3-4

JOB NO. A535

P:\A535\Engineering\A535-71_Castaic Creek CLOMR\exhibits\A535-22-Figure 3-4_SOUTHEAST.dwg - Tab: Layout - by emadig on 03/09/23 at 10:30:25 AM

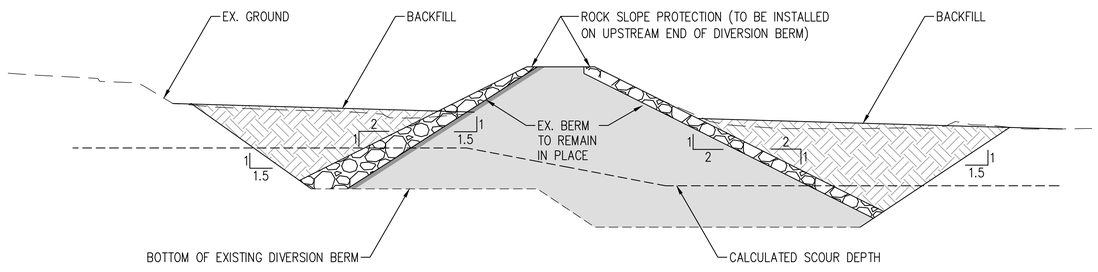


PLAN - MODIFIED DIVERSION BERM

NORTH

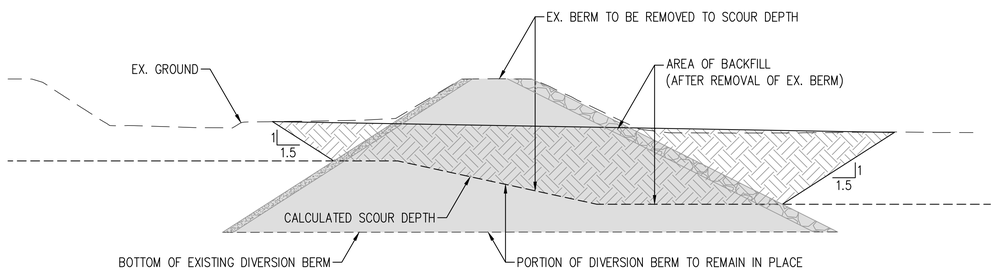
40 0 40 80

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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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	3/15/2023

REGISTERED PROFESSIONAL ENGINEER
JOSE CRUZ
No. 72249
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

LEGEND

- PROPOSED SOIL CEMENT BANK PROTECTION AND LAUNCH STONE
- HEC-RAS CROSS SECTION
- EFFECTIVE FEMA 100-YR FLOODPLAIN
- EFFECTIVE FEMA 500-YR FLOODPLAIN
- REVISED 1% ANNUAL CHANCE FLOODPLAIN BOUNDARY
- REVISED 0.2% ANNUAL CHANCE FLOODPLAIN BOUNDARY
- CASTAIC CREEK STREAM CENTERLINE
- PROJECT BOUNDARY

VALENCIA COMMERCE CENTER
TPM 18108

CASTAIC CREEK

HASLEY CREEK

COMMERCE CENTER DRIVE

LIMITS OF REVISION

FLOODPLAIN TIE–IN

"WEST" SOIL CEMENT BANK PROTECTION

"SOUTHEAST" SOIL CEMENT BANK PROTECTION

"NORTHEAST" SOIL CEMENT BANK PROTECTION

1% FLOODPLAIN TIE–IN

THE OLD ROAD

GOLDEN STATE FWY. (I-5)

HIGHWAY 126

Q100=14,560 cfs

FLOW

SECTION 5537.85
SECTION 6982.13
SECTION 6704
SECTION 7298.39
SECTION 7797.6
SECTION 7999.6
SECTION 8252.7
SECTION 8304.8
SECTION 8749.05
SECTION 9166.9
SECTION 9534.09
SECTION 9869.91
SECTION 10620.36
SECTION 11095.91
SECTION 11620.14
SECTION 11954
SECTION 12272
SECTION 12648.31
SECTION 13176.47
SECTION 13713.74
SECTION 14180.6
SECTION 14478.05
SECTION 14852.1
SECTION 14978.84
SECTION 14991.85
SECTION 15216.27
SECTION 15245.39
SECTION 15478.79
SECTION 15669.62

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).

250 0 250 500
SCALE 1"=250'

NO	BY	DATE	REVISIONS	DATE	APP.

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

PREPARED BY
JOSE CRUZ
PROJECT ENGINEER
R.C.E. NO. # 72249
EXP. 06/30/24

DRAWN M.M.T.
DESIGNED E.M.R.
CHECKED J.C.
SCALE 1"=300'
DATE 02/20/23

TITLE
CASTAIC CREEK
CLOMR
TOPOGRAPHIC WORKMAP

JOB
CASTAIC CREEK
VALENCIA COMMERCE CENTER
Los Angeles County CA

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SHEET
5.1

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P:\ASSE\Engineering\A535-73_Castaic Creek CLOMR\exhibits\A535-73-Figure 5.1_Topographic Workmap_MergedASE.dwg - Tab: 24x36 - by emedg on 11/28/23 at 3:46:48 PM

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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).
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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).

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

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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: 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.

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Advanced Water Engineering

Appendix B – Relevant Effective FEMA Data

FEMA FIS: Castaic Creek Flow Profiles

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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		

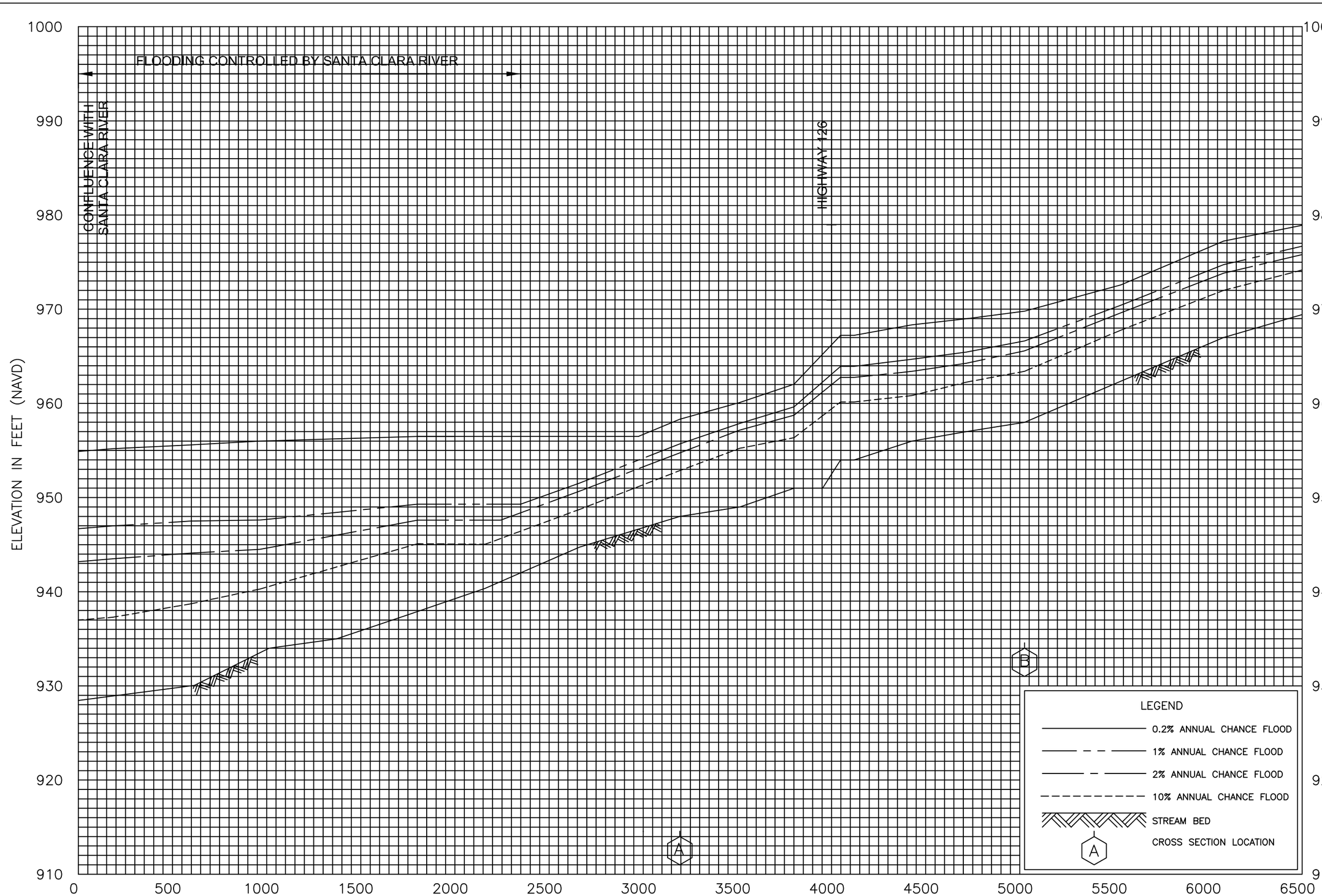
*No Special Flood Hazard Areas Identified

REVISED: June 2, 2021

FLOOD INSURANCE STUDY NUMBER

06037CV005F

Version Number 2.3.3.2



FLOOD PROFILES

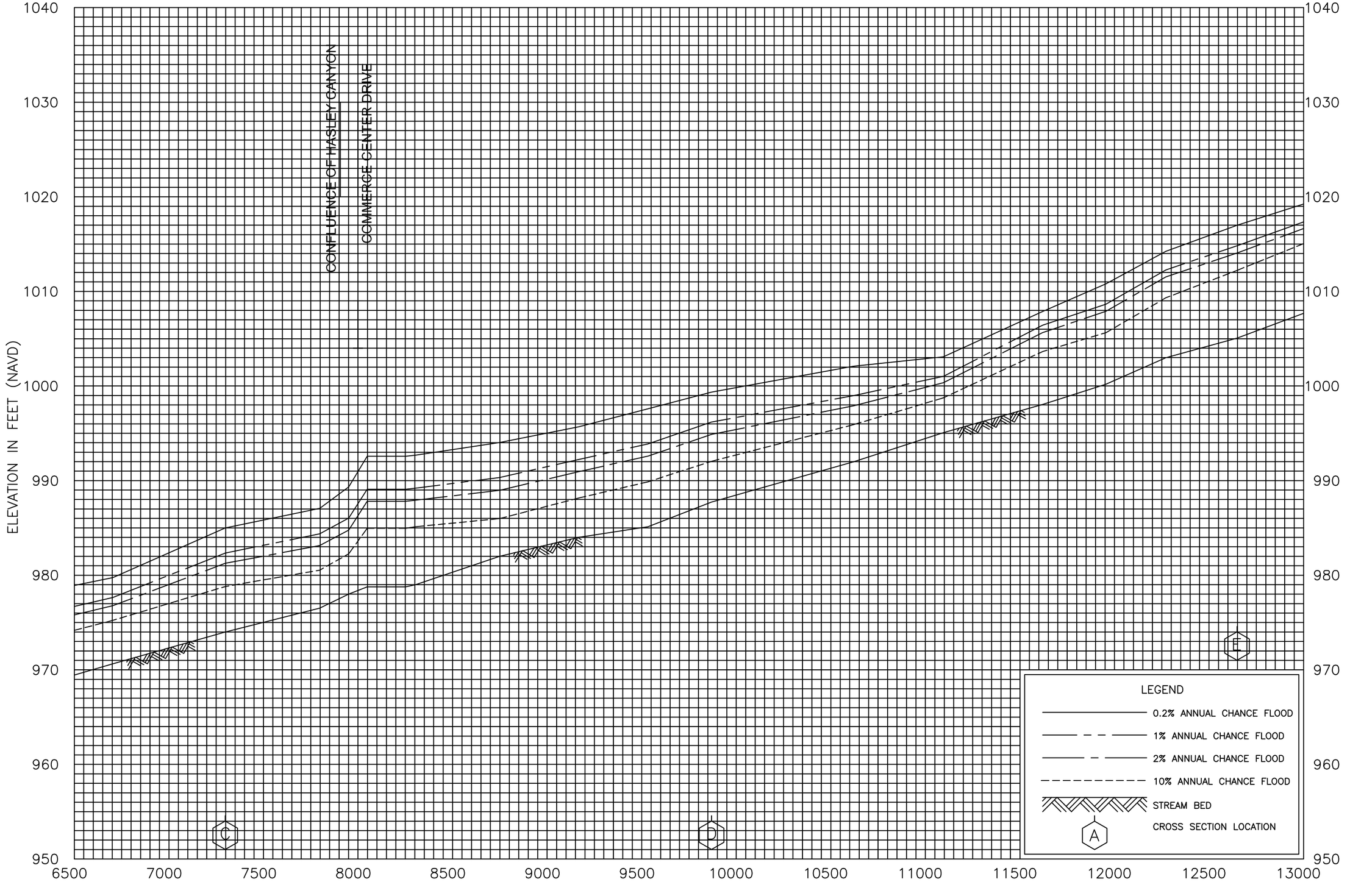
CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

053P



FLOOD PROFILES

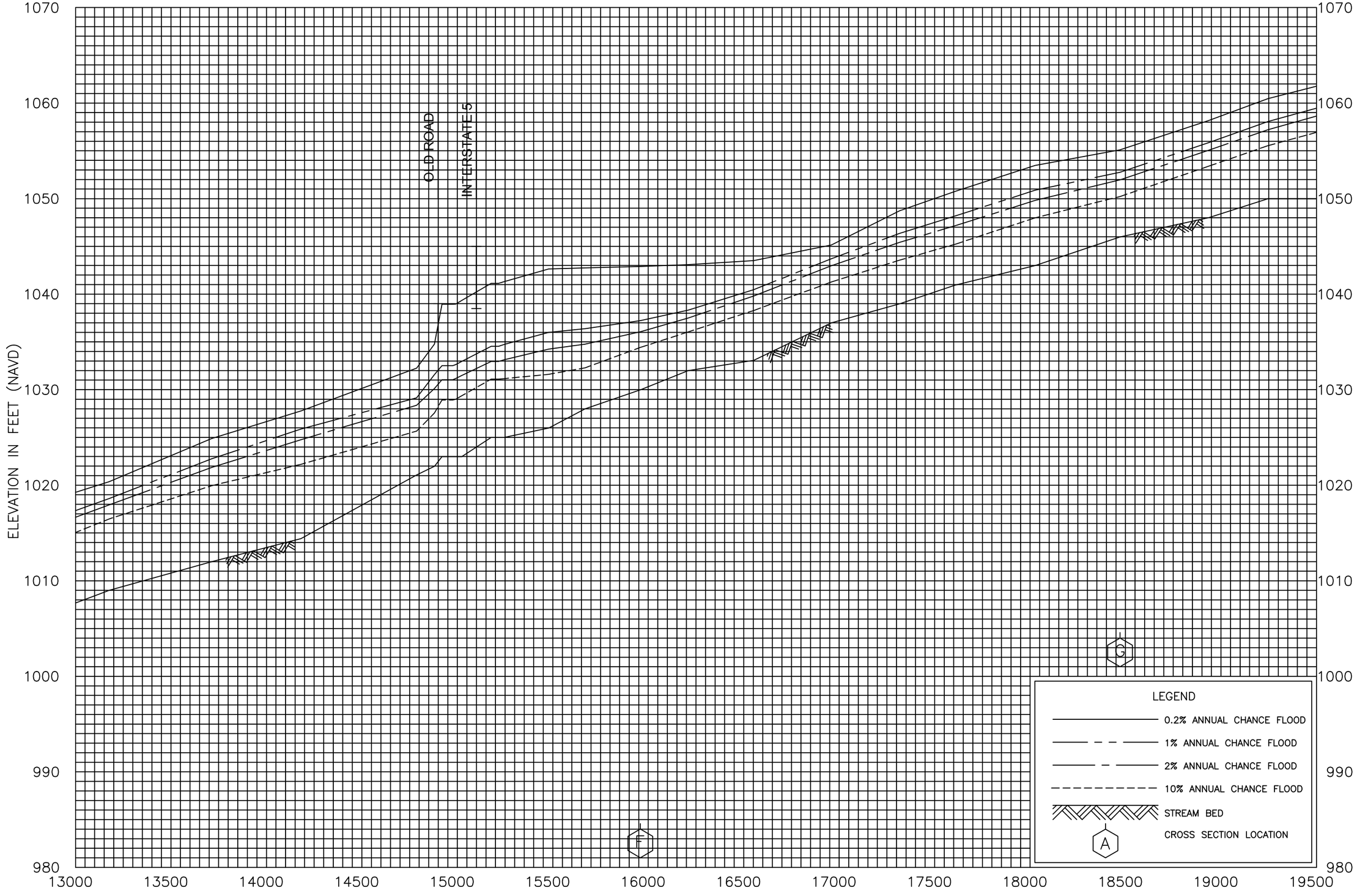
CASTAIC CREEK

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

055P

ELEVATION IN FEET (NAVD)

1120
1110
1100
1090
1080
1070
1060
1050
1040
1030

19500 20000 20500 21000 21500 22000 22500 23000 23500 24000 24500 25000 25500 26000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SANTA CLARA RIVER

H
I
J

LEGEND

- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

FLOOD PROFILES

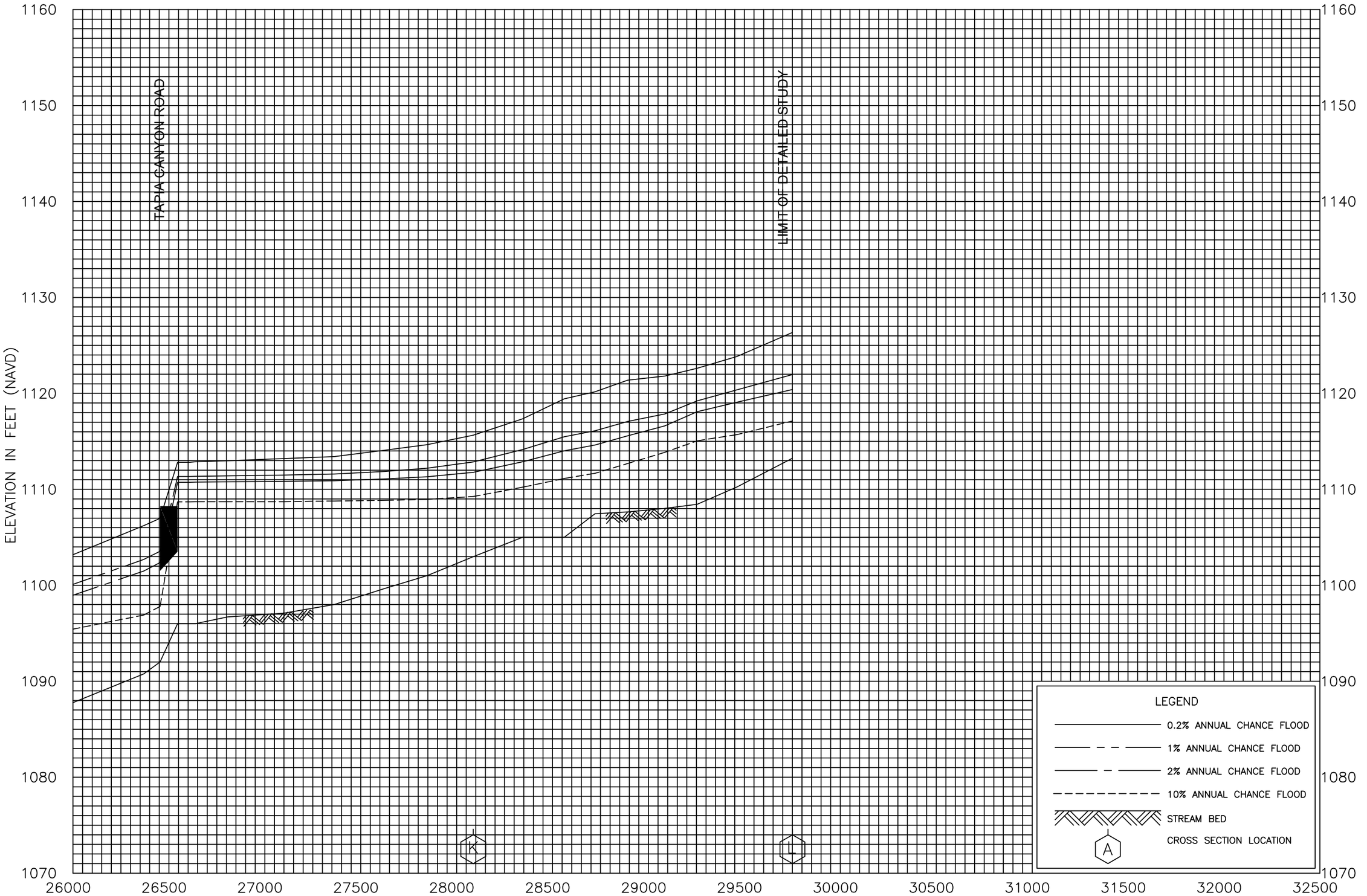
CASTAIC CREEK

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
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

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.

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)

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.

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)

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

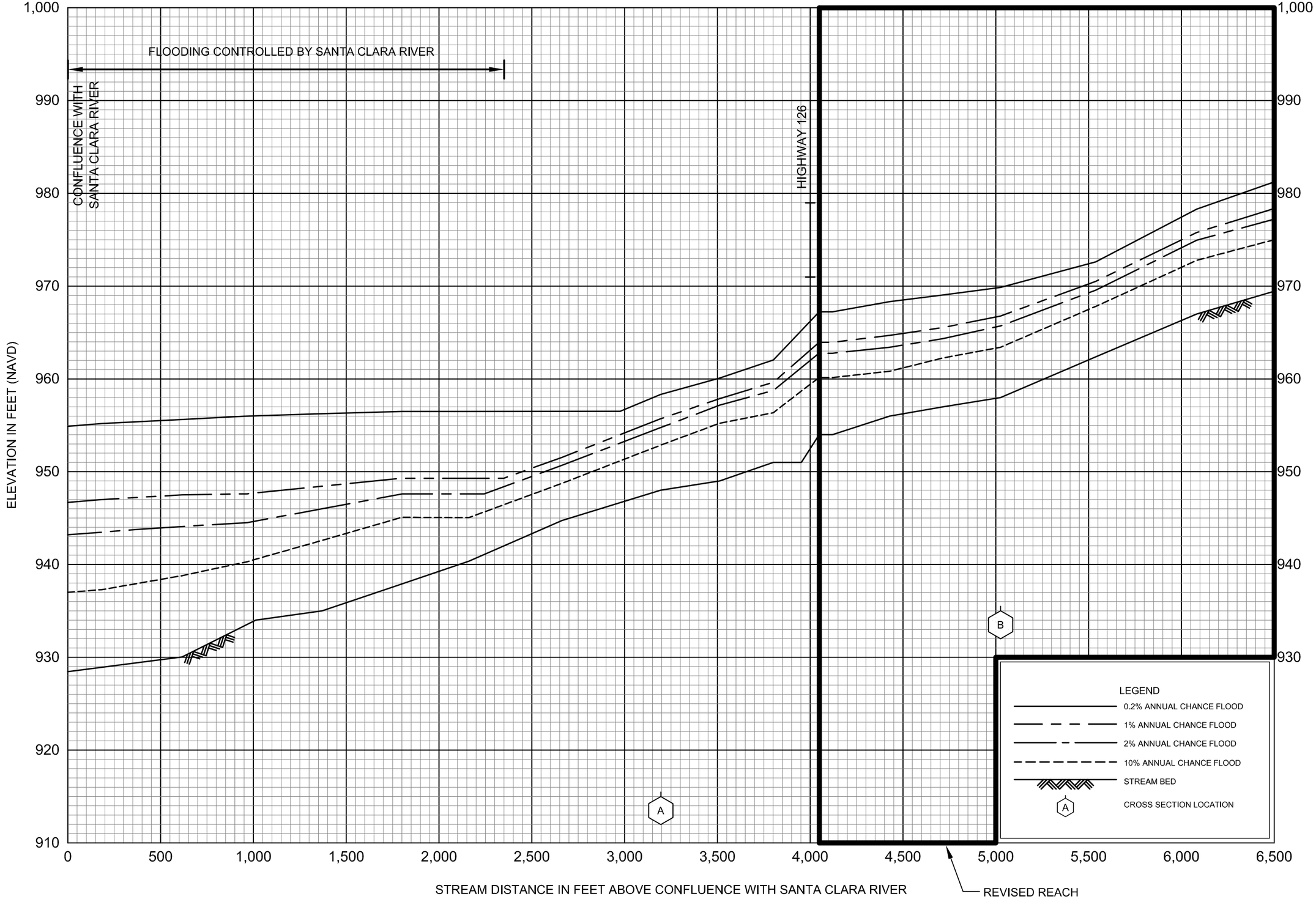
LOCAL NEWSPAPER

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

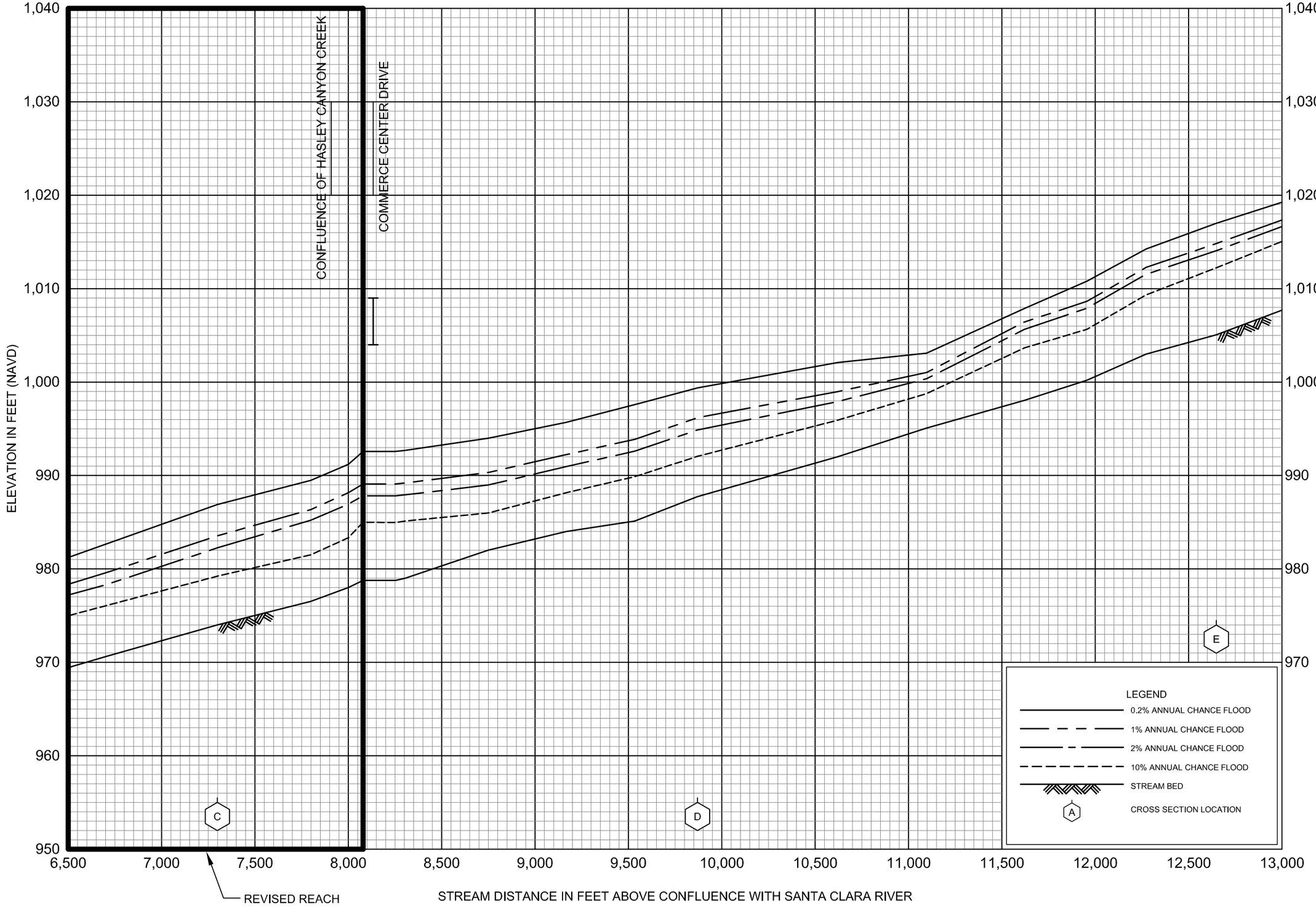
REVISED TO REFLECT LOMR
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

53P



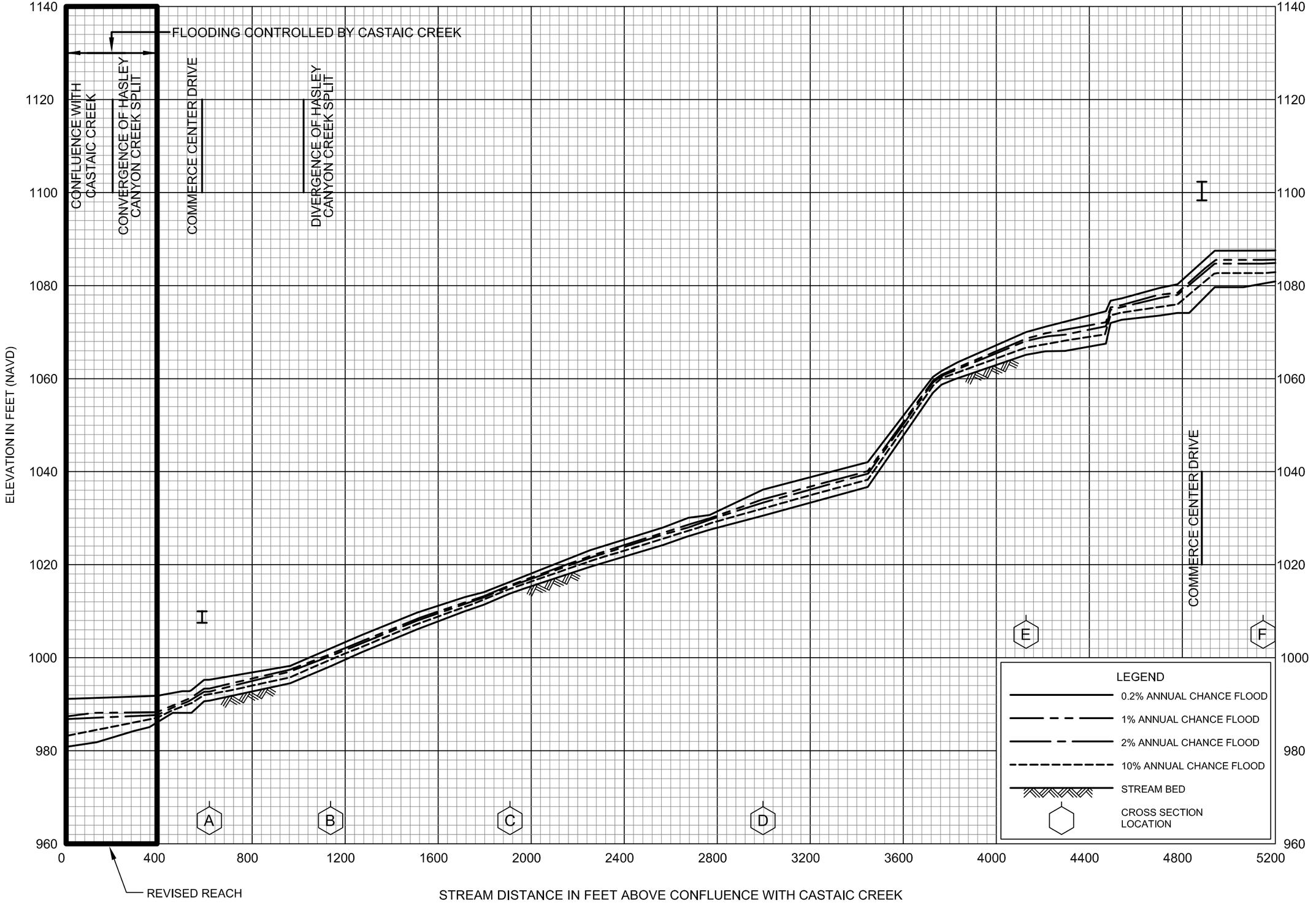
FLOOD PROFILES

REVISED TO REFLECT LOMR
EFFECTIVE: October 15, 2021

CASTAIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS



FLOOD PROFILES REVISED TO REFLECT LOMR EFFECTIVE: October 15, 2021

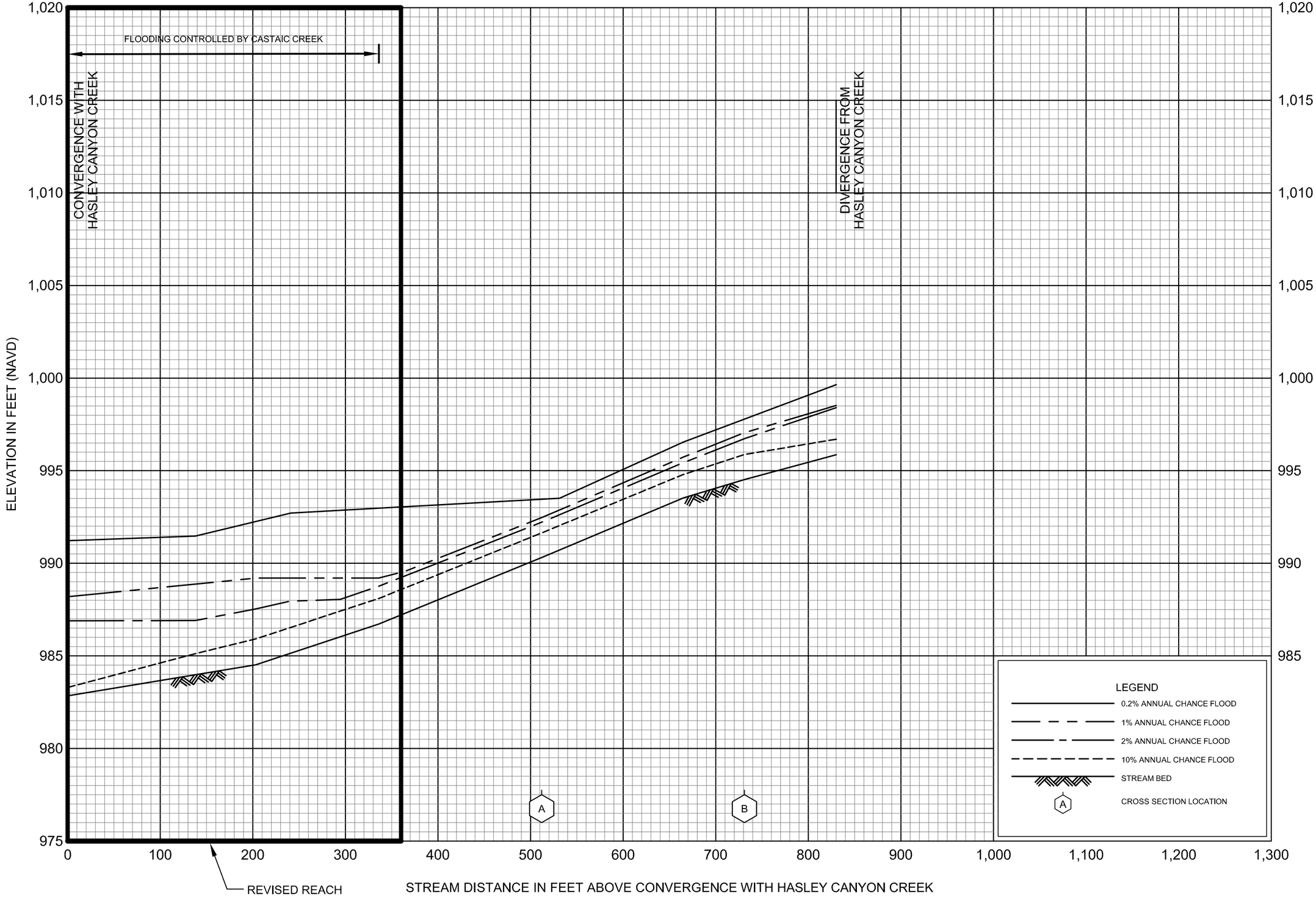
HASLEY CANYON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

96P



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

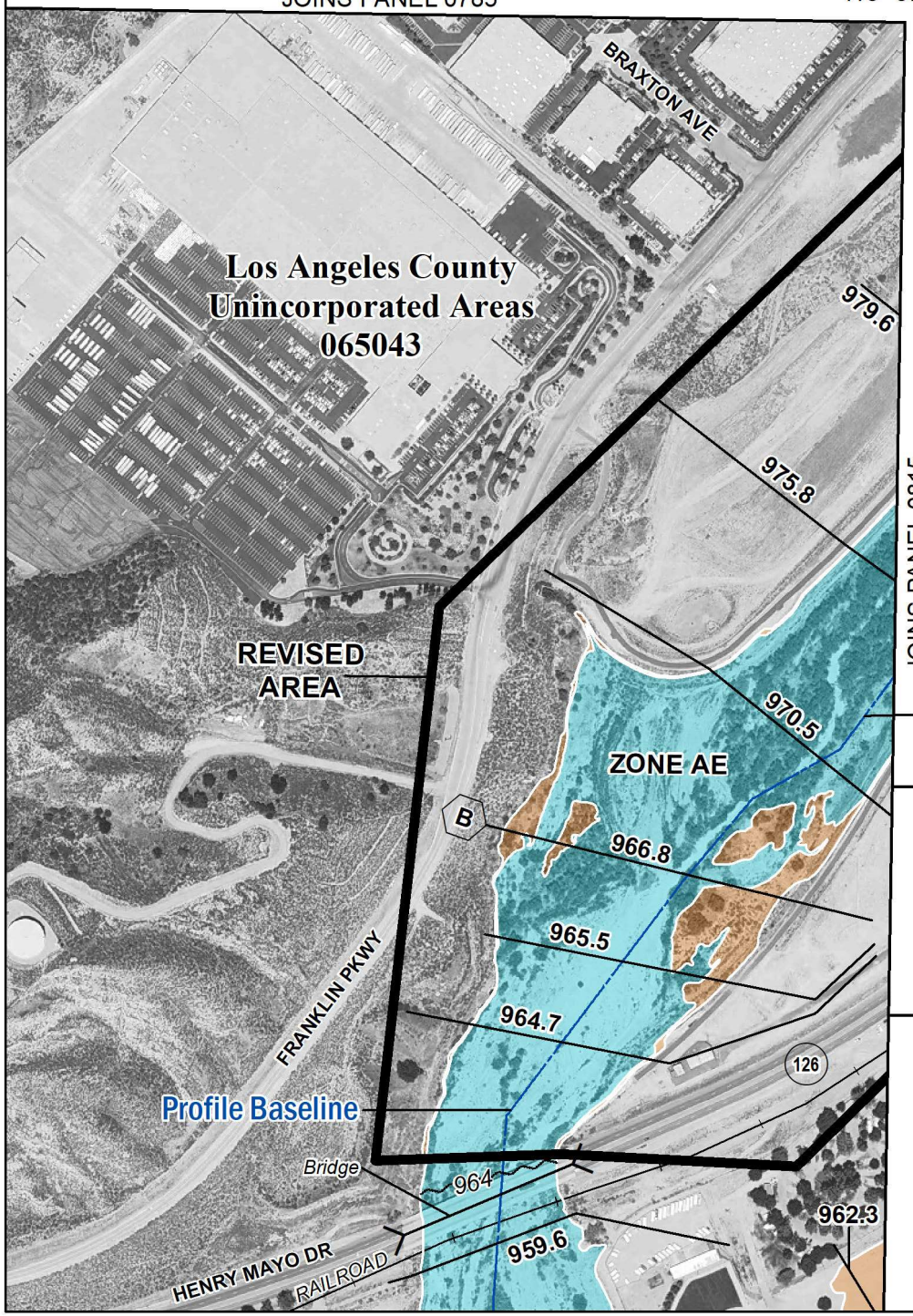
102P

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
	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
OTHER AREAS OF FLOOD HAZARD	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 = 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

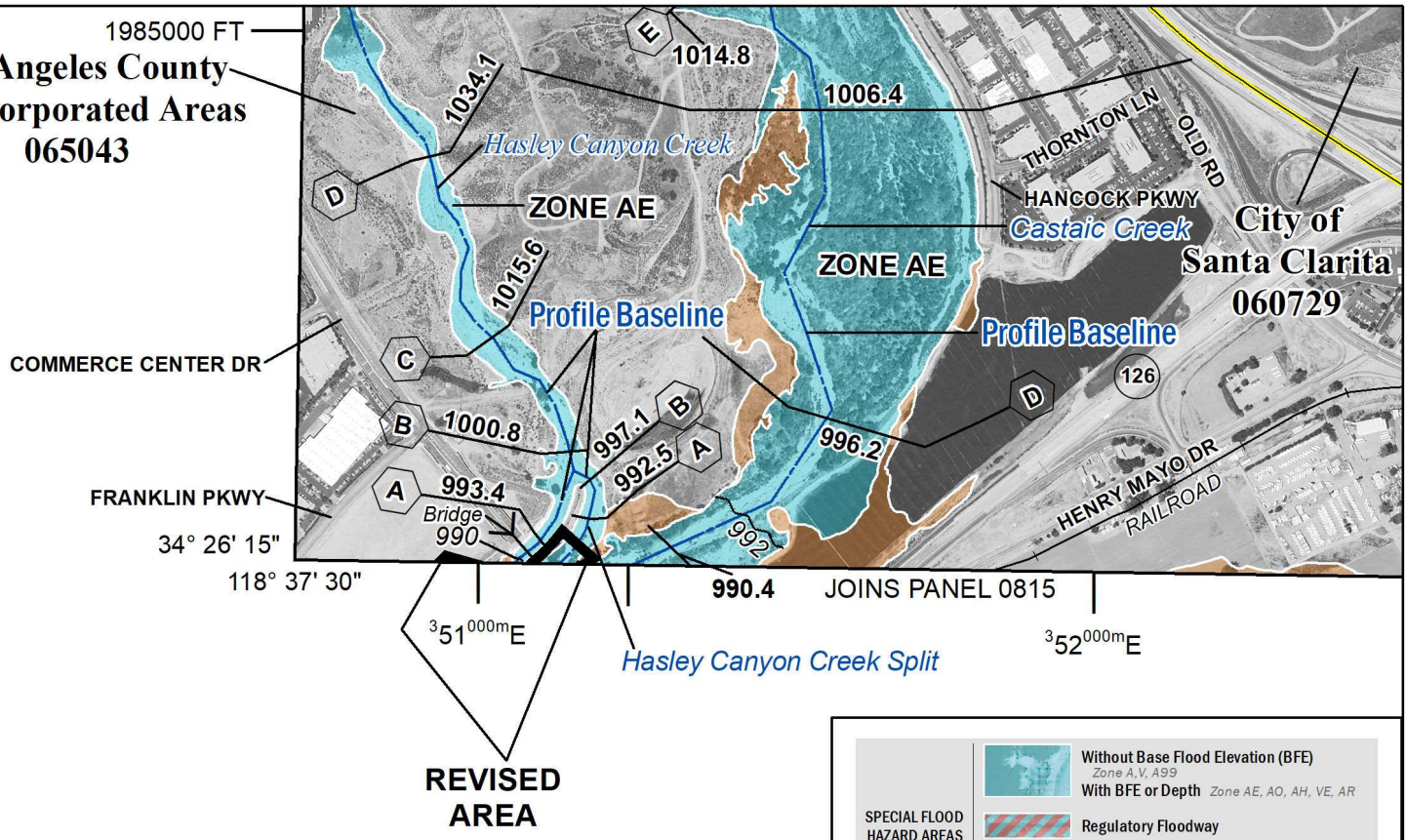
FEMA

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

FEMA

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

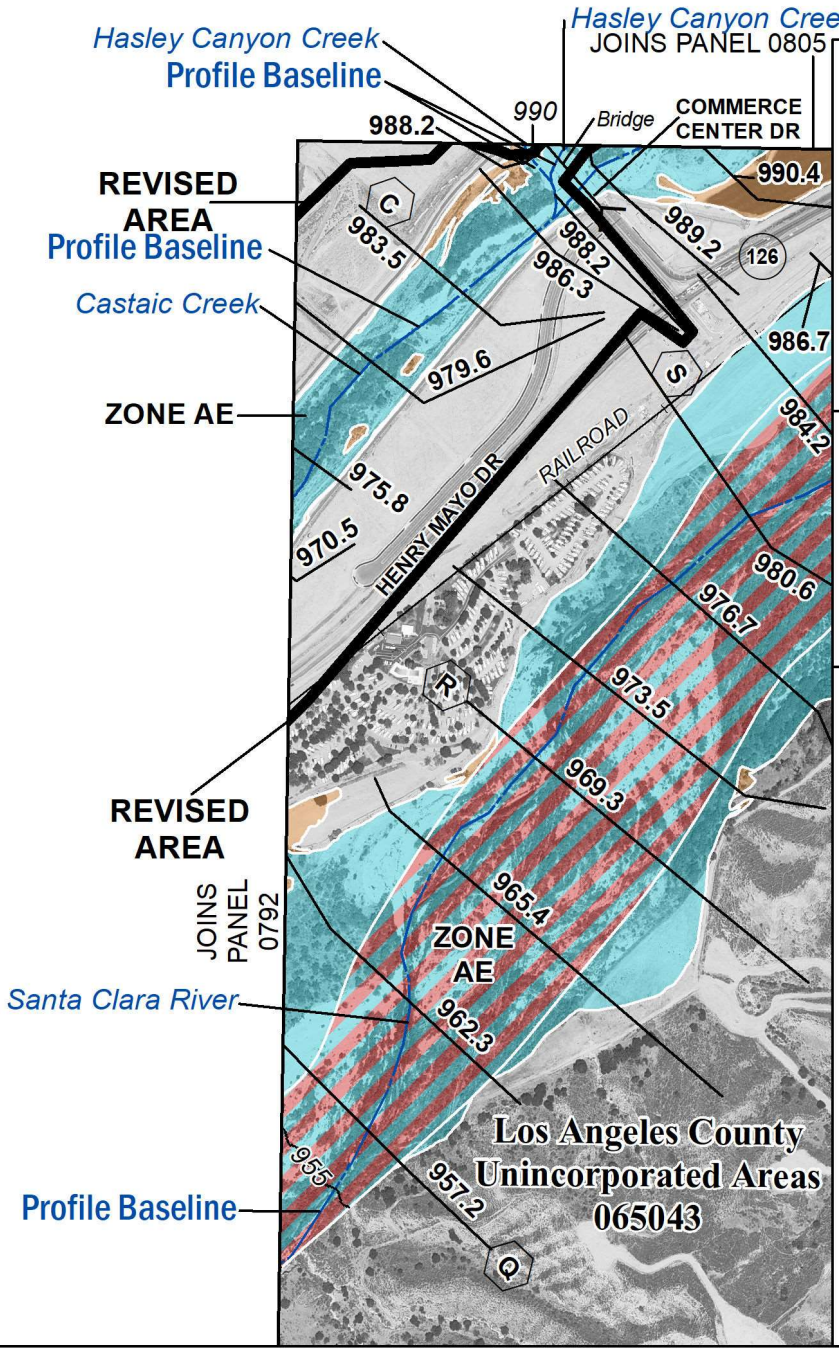
VERSION NUMBER
2.3.3.0

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

FEMA

National Flood Insurance Program

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

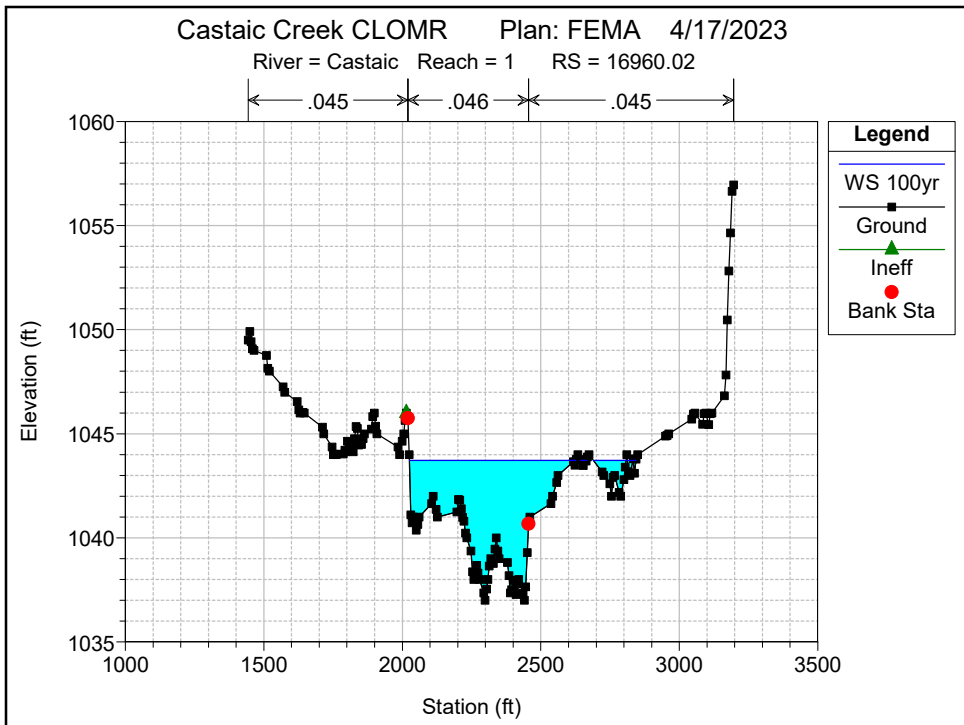
MAP REVISED
JUNE 2, 2021

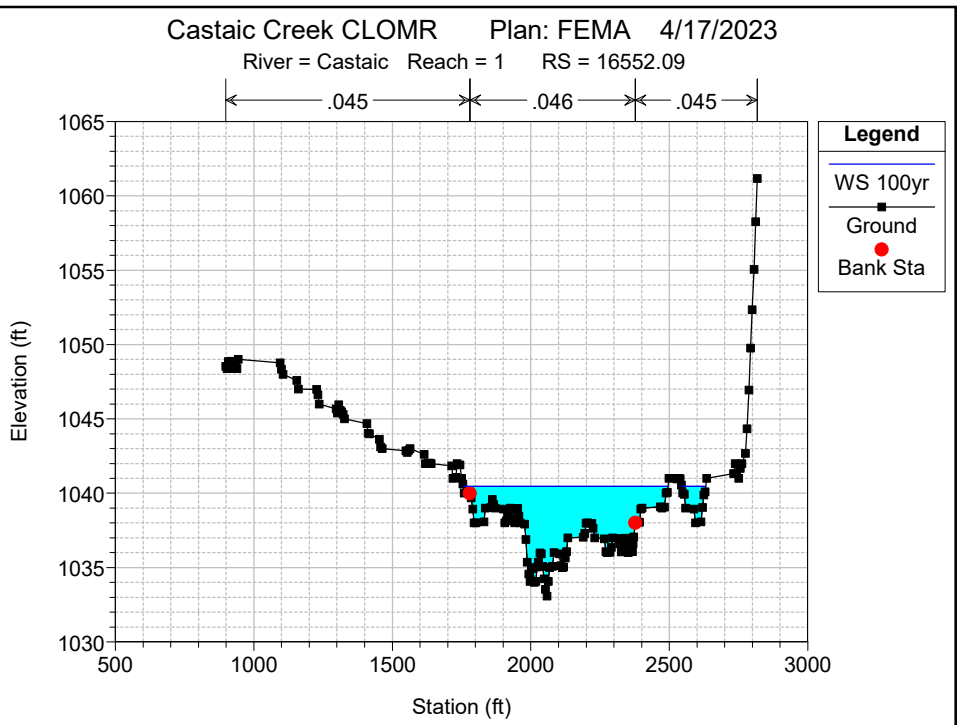


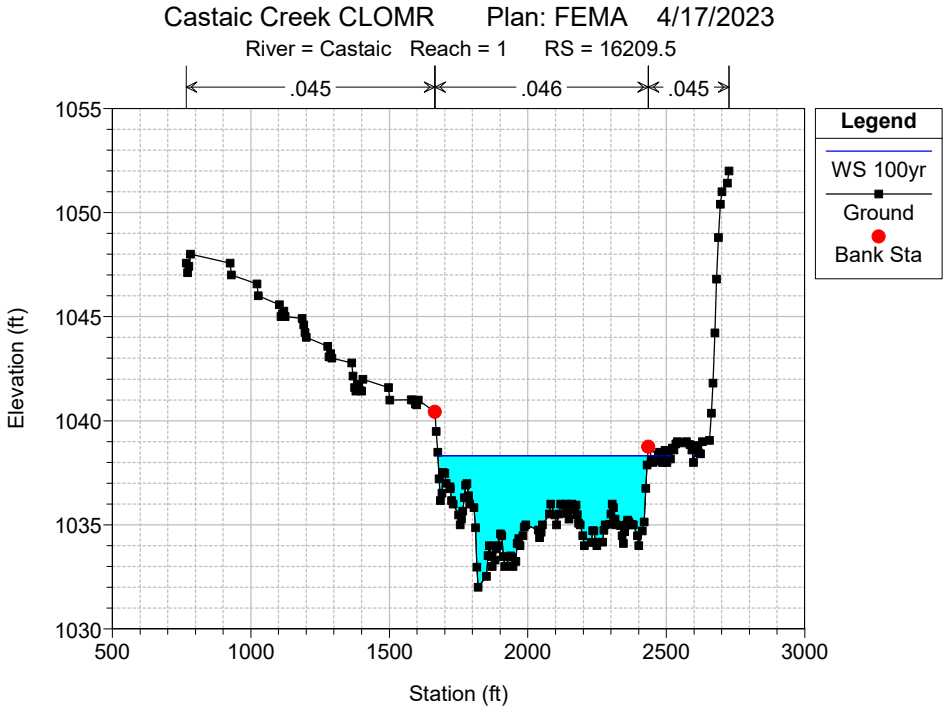
Appendix C – HEC-RAS Duplicate Effective FEMA Results

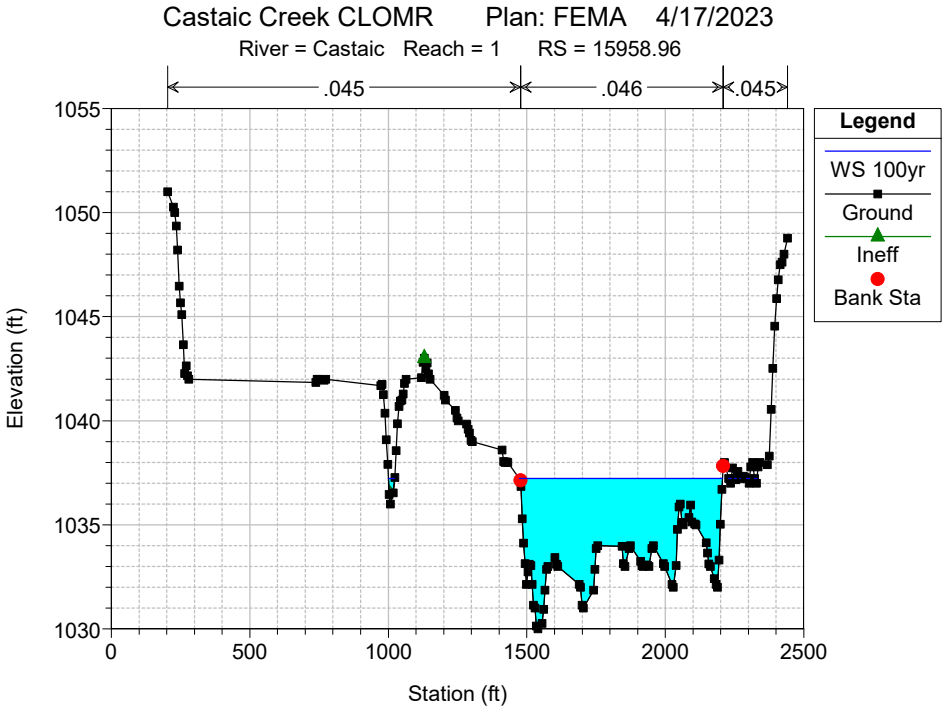
HEC-RAS Plan: FEMA River: Castaic Reach: 1 Profile: 100yr

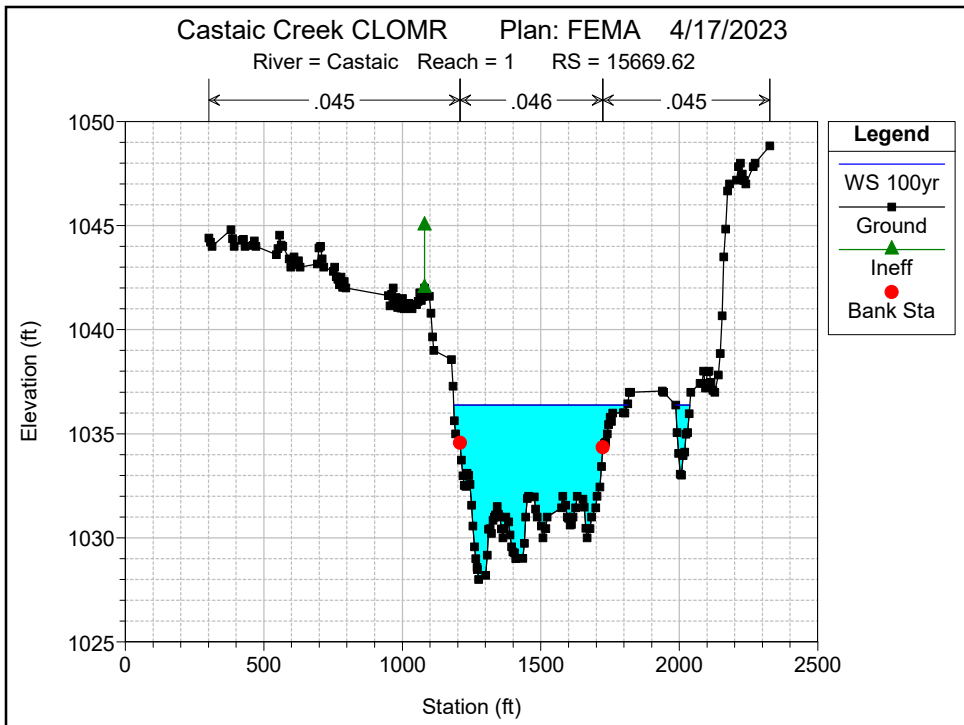
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	16960.02	100yr	14480.00	1037.00	1043.71	1043.00	1044.56	0.008994	7.67	2078.54	764.16	0.68
1	16552.09	100yr	14480.00	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

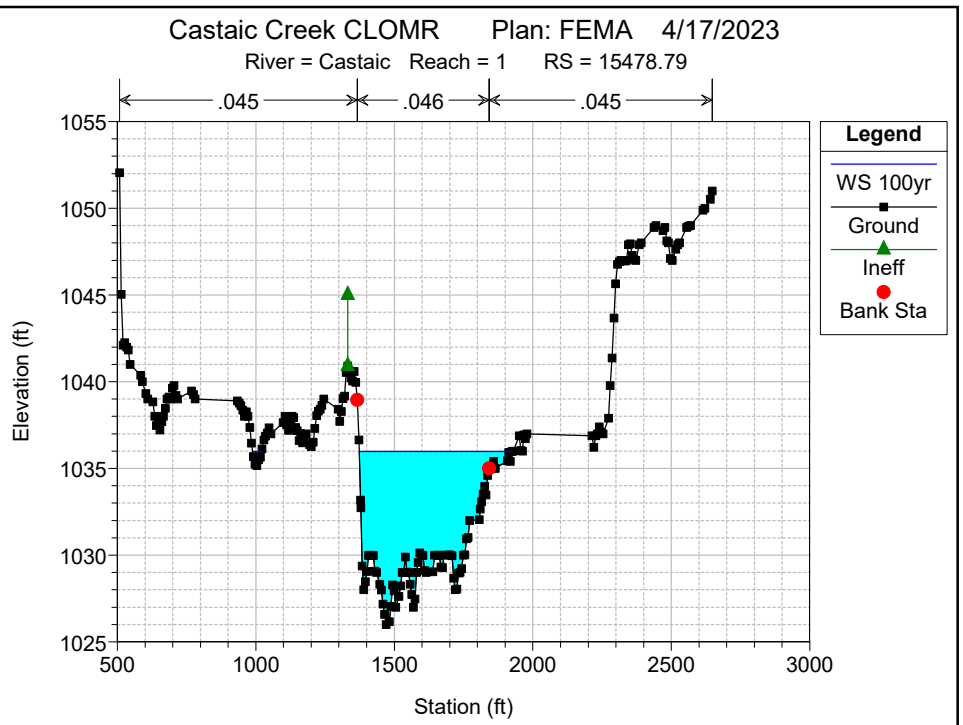

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 16960.02
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1060
1055
1050
1045
1040
1035
1000
1500
2000
2500
3000
3500

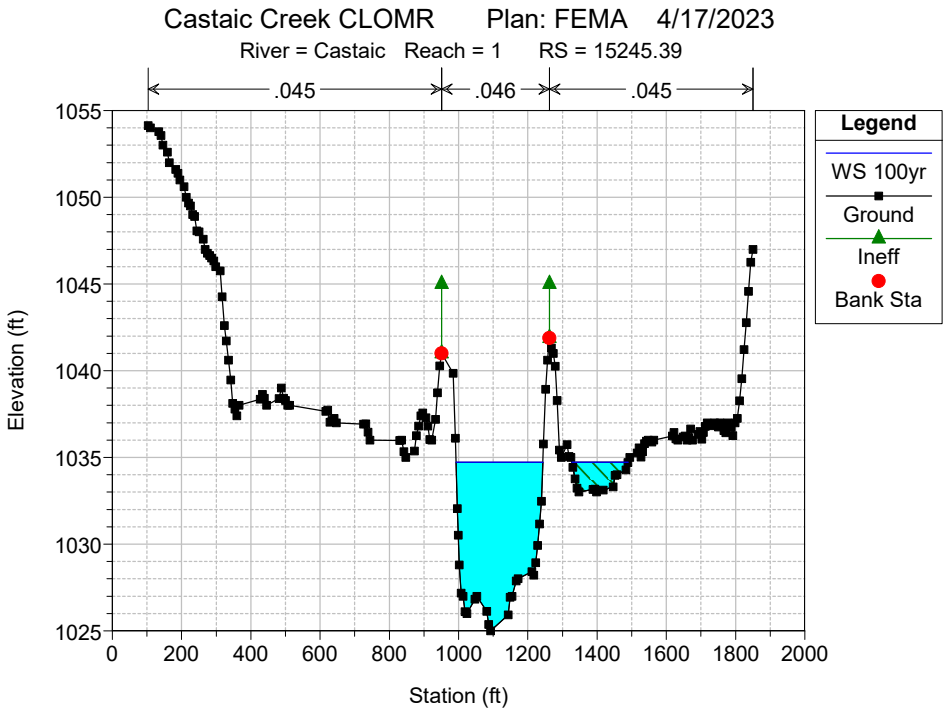

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 16552.09
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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1050
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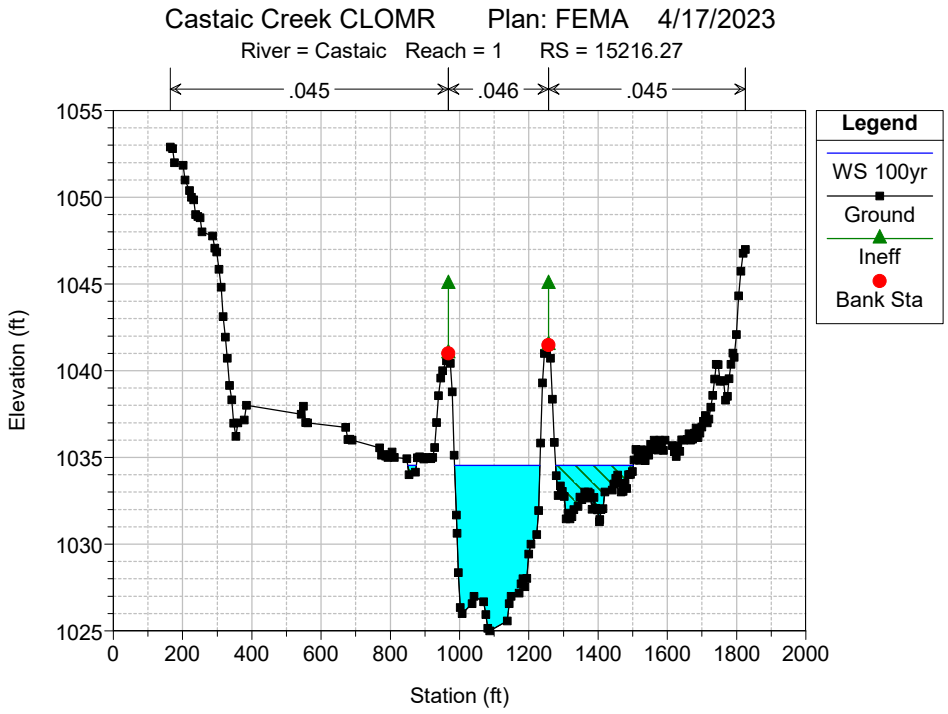

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 16209.5
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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1050
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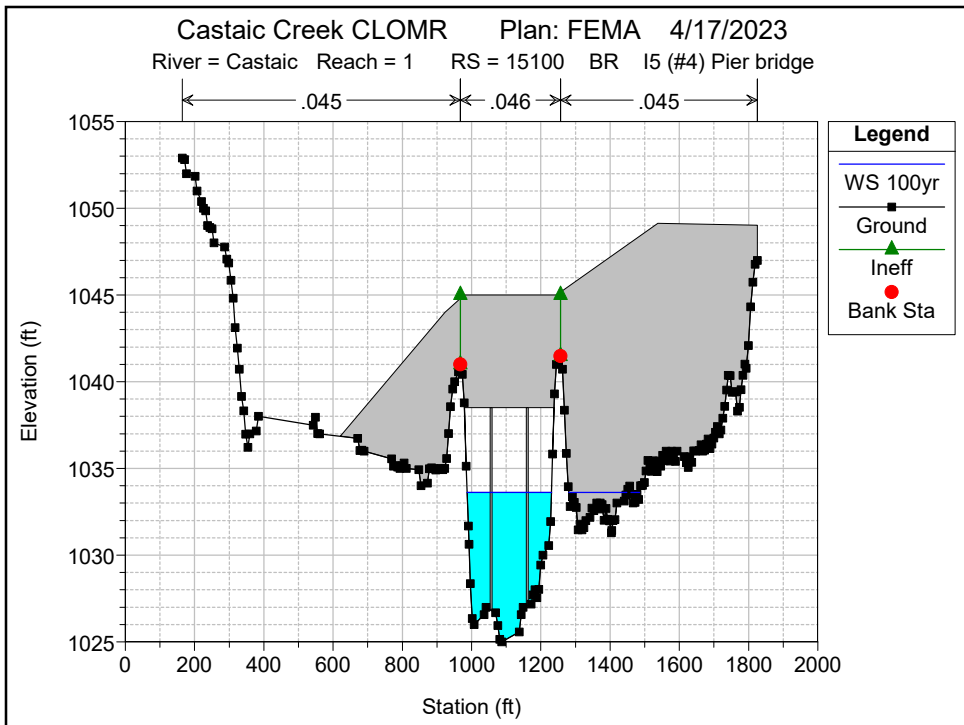

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 15958.96
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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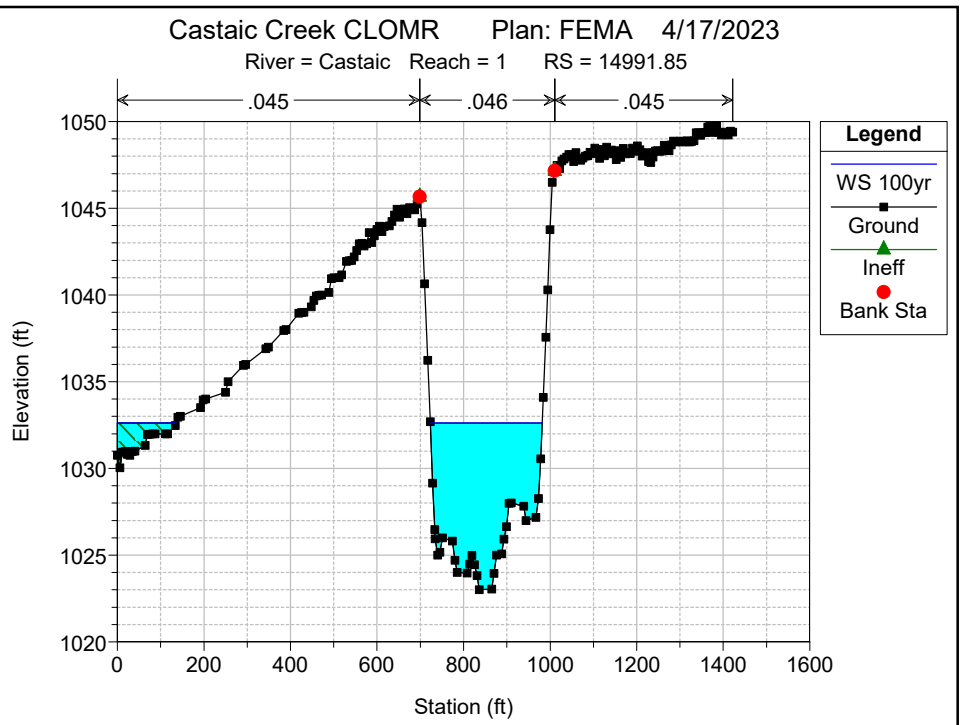

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 15669.62
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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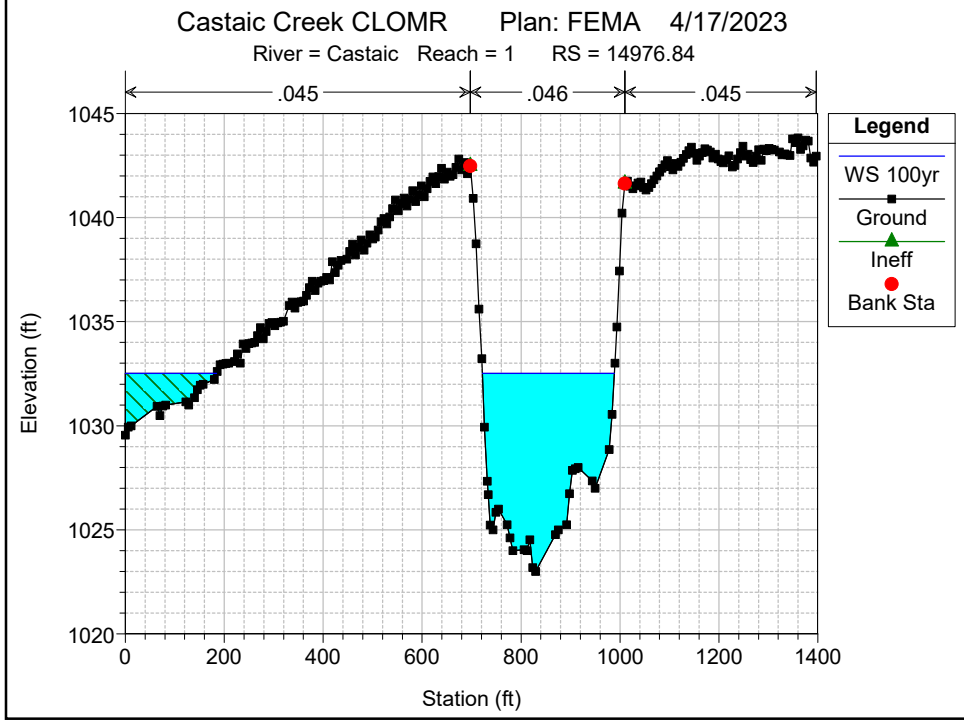

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 15478.79
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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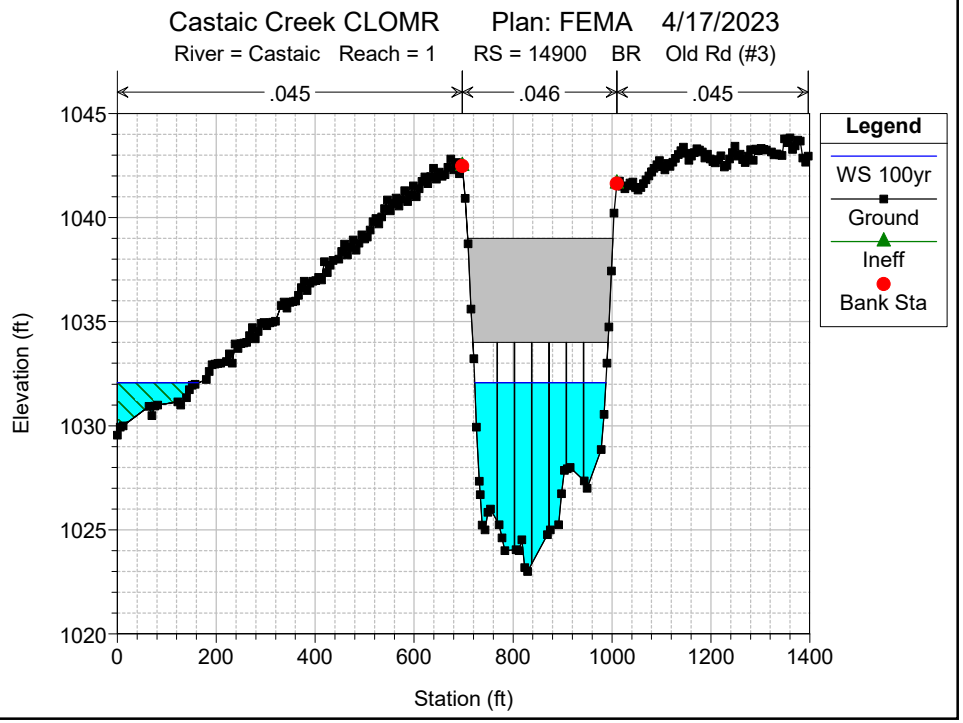

Castaic Creek CLOMR Plan: FEMA 4/17/2023
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WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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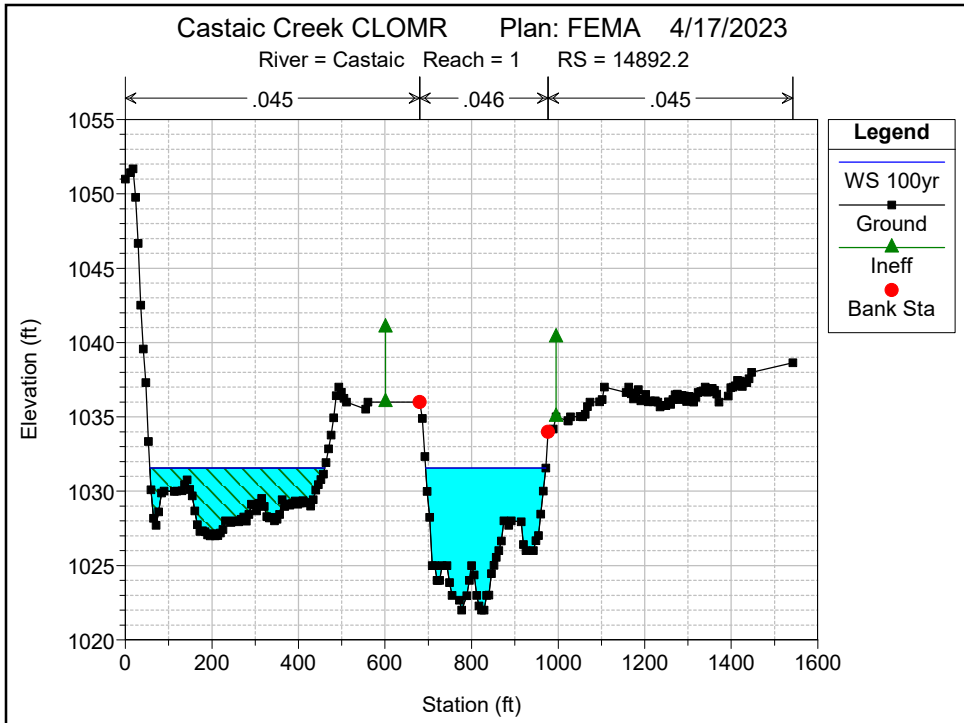

Castaic Creek CLOMR Plan: FEMA 4/17/2023
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.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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2000

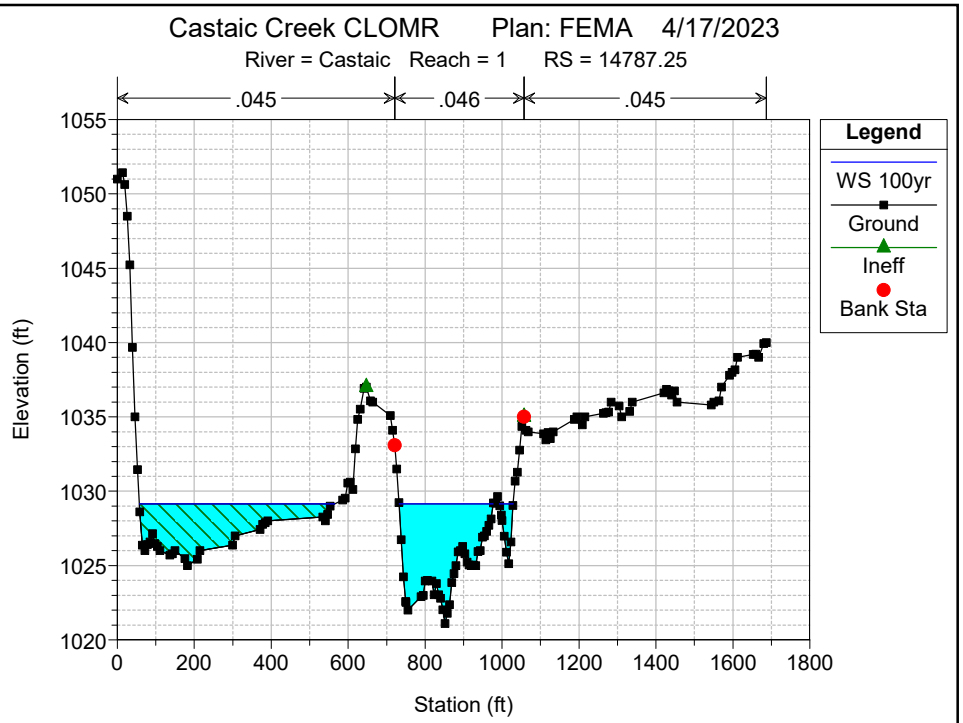

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 15100 BR I5 (#4) Pier bridge
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

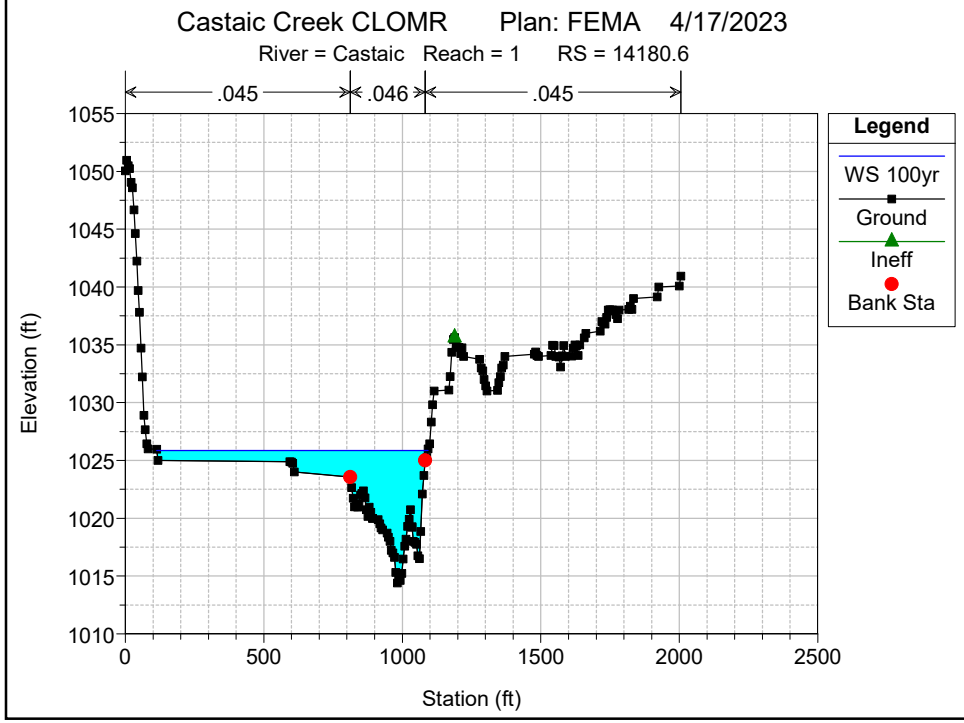

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14991.85
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

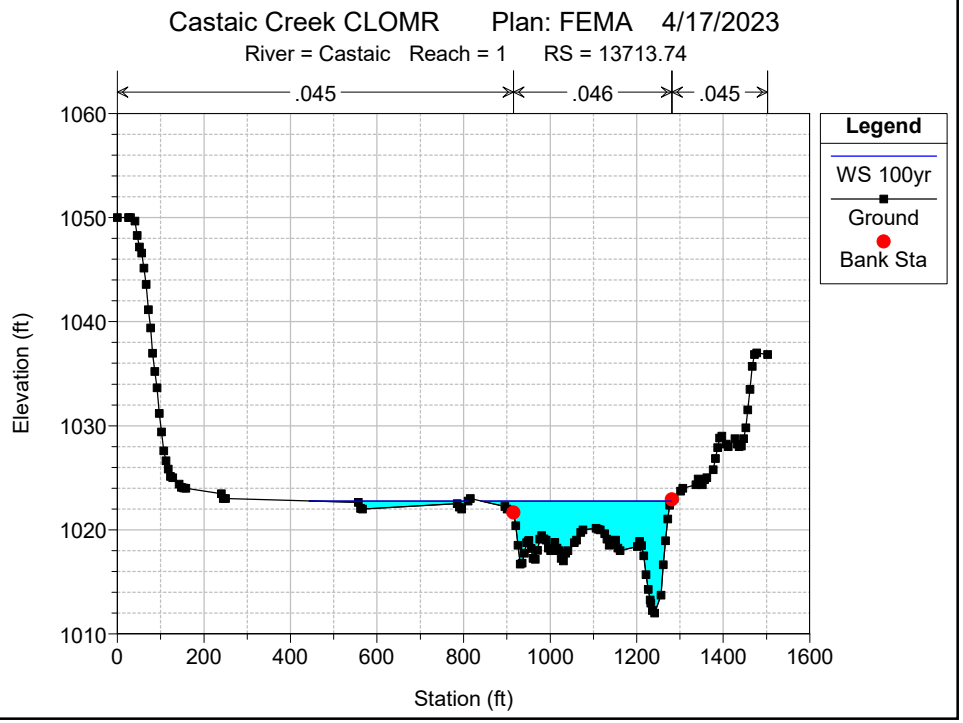

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14976.84
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

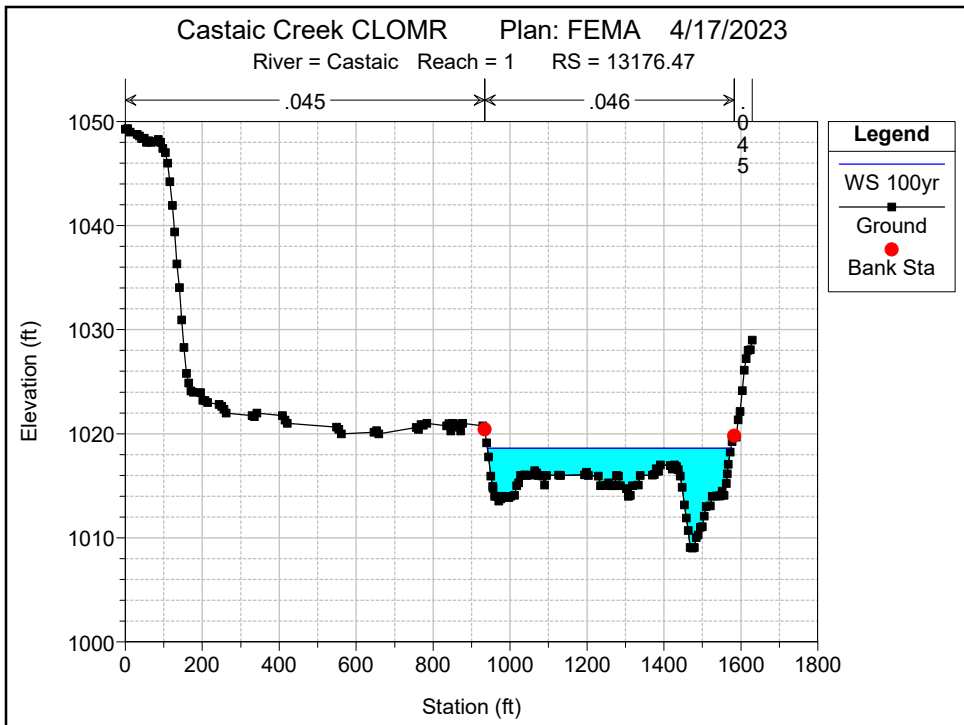

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14900 BR Old Rd (#3)
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

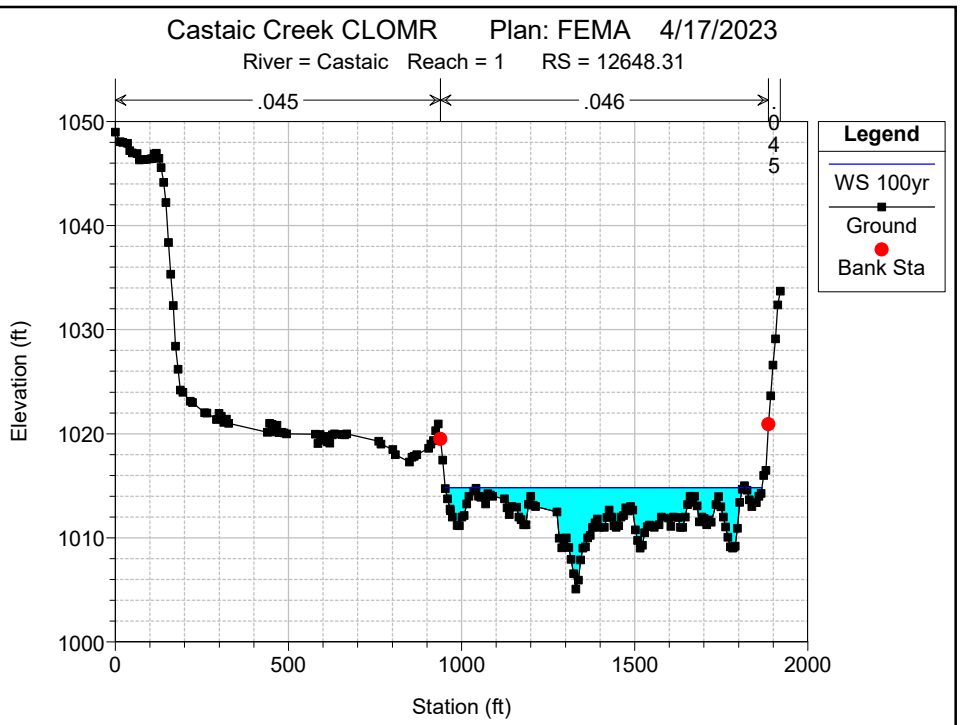

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14892.2
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

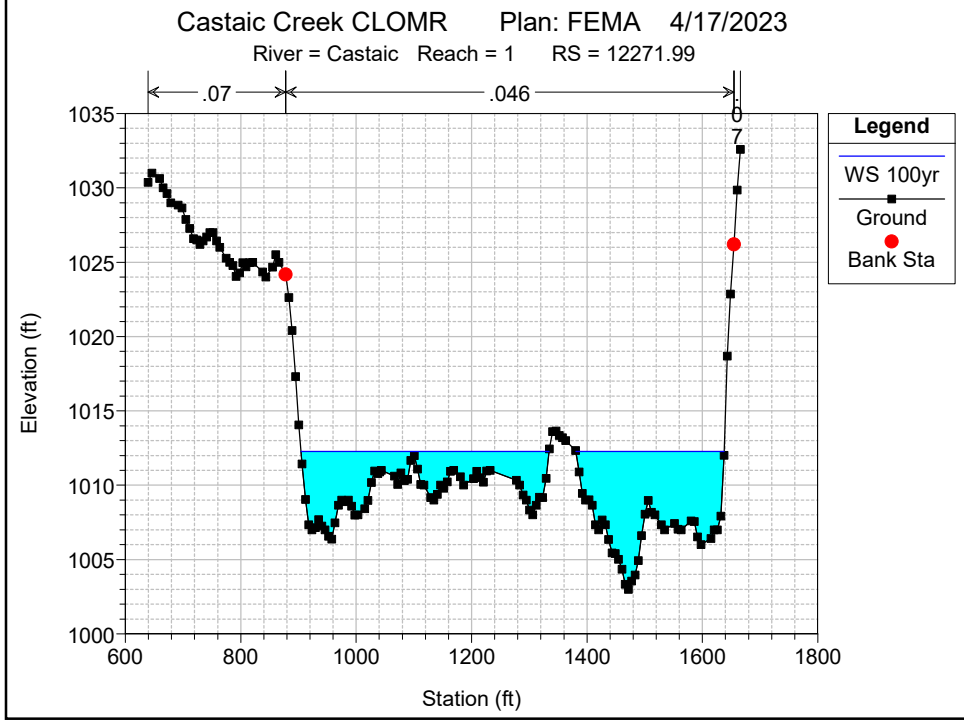

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14787.25
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

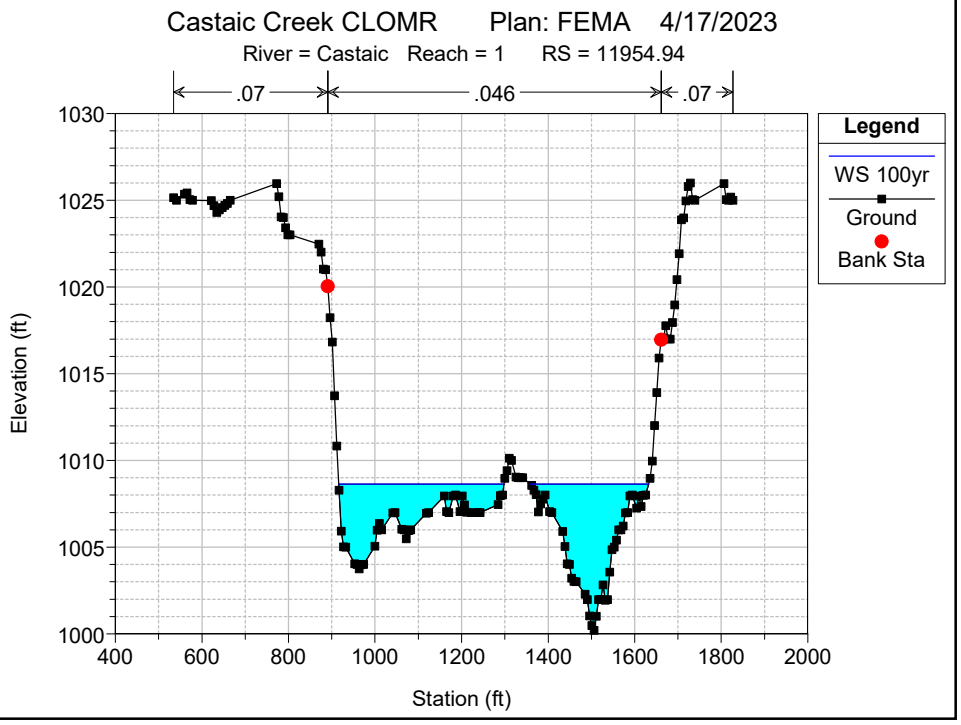

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 14180.6
.045
.046
.045
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

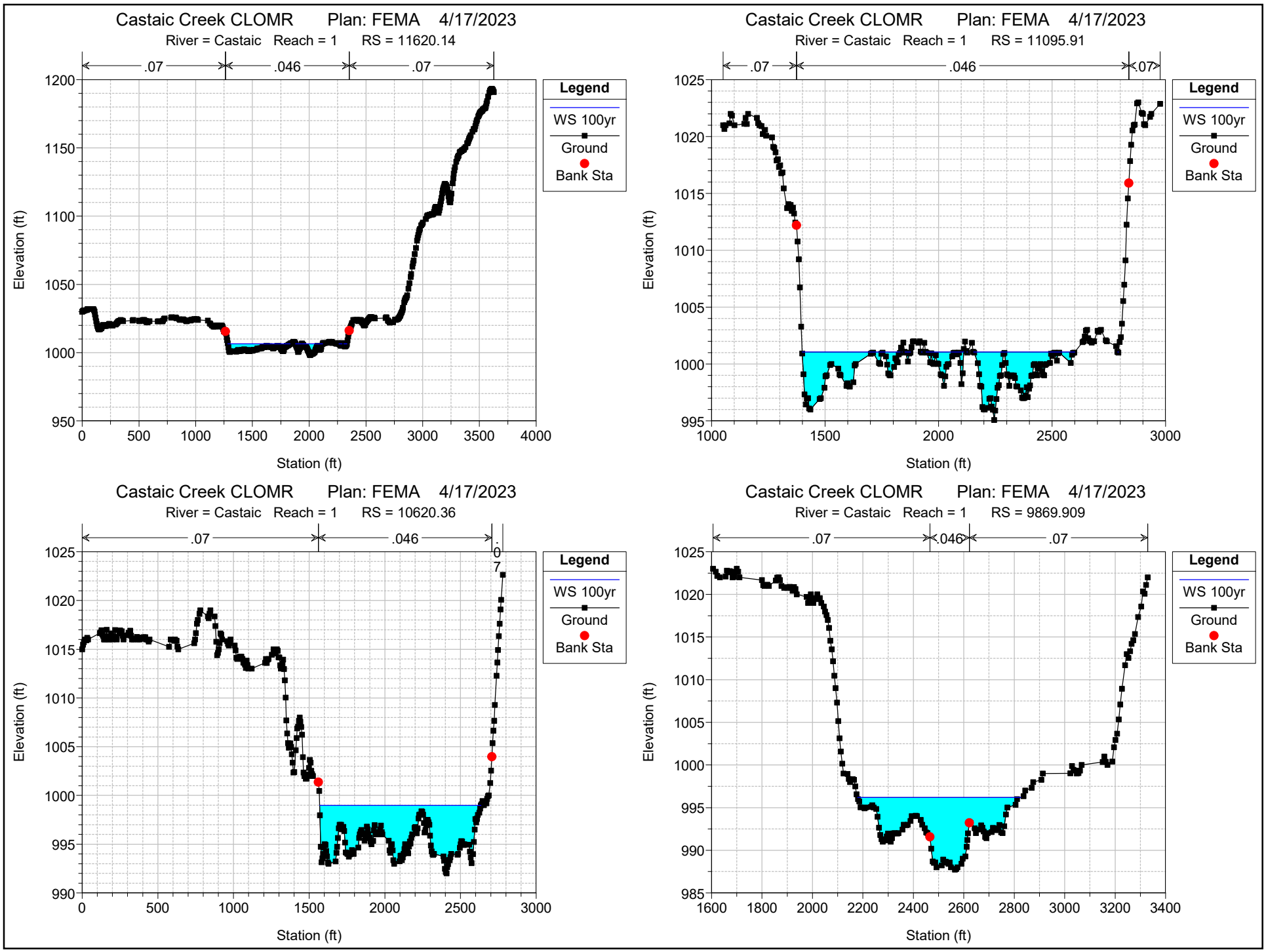

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 13713.74
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

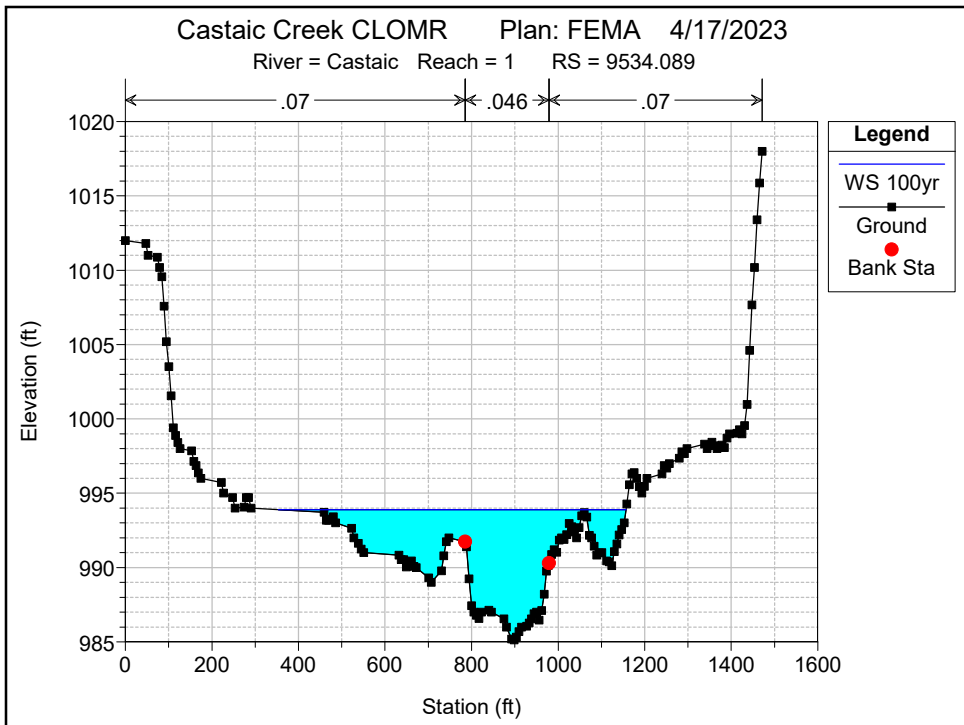

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 13176.47
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1050
1040
1030
1020
1010
1000
0
200
400
600
800
1000
1200
1400
1600
1800

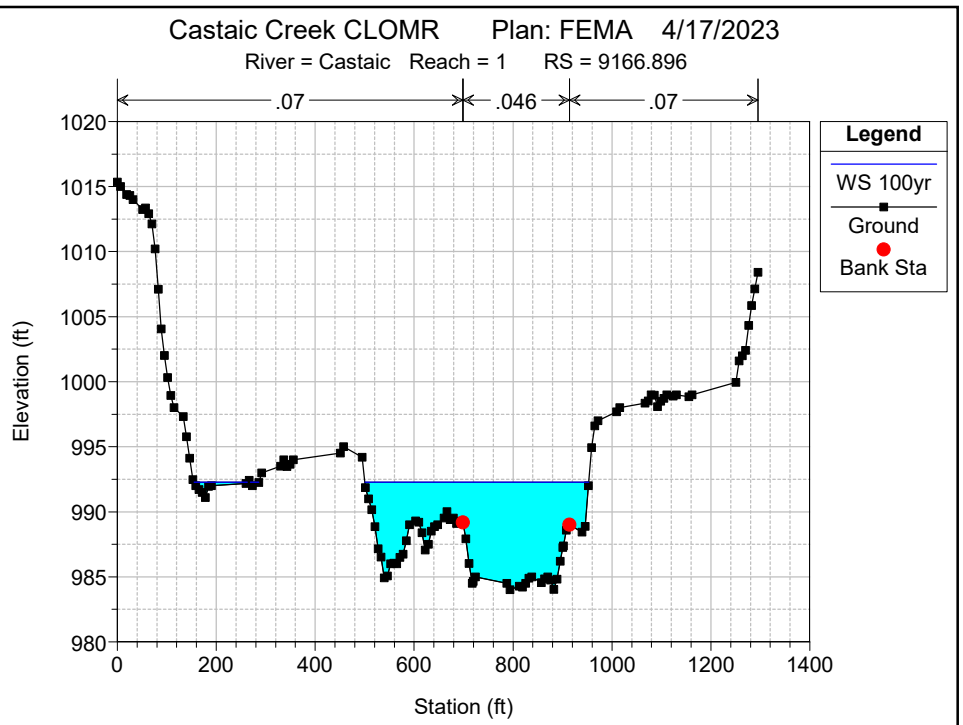

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 12648.31
.045
.046
.045
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1050
1040
1030
1020
1010
1000
0
500
1000
1500
2000

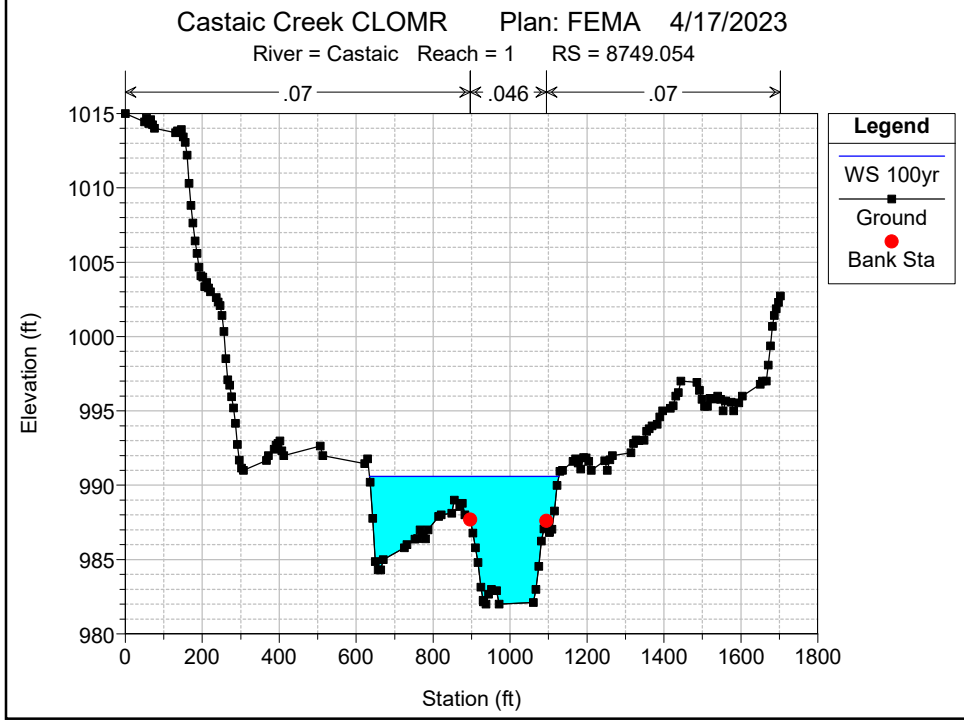

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 12271.99
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1035
1030
1025
1020
1015
1010
1005
1000
600
800
1000
1200
1400
1600
1800

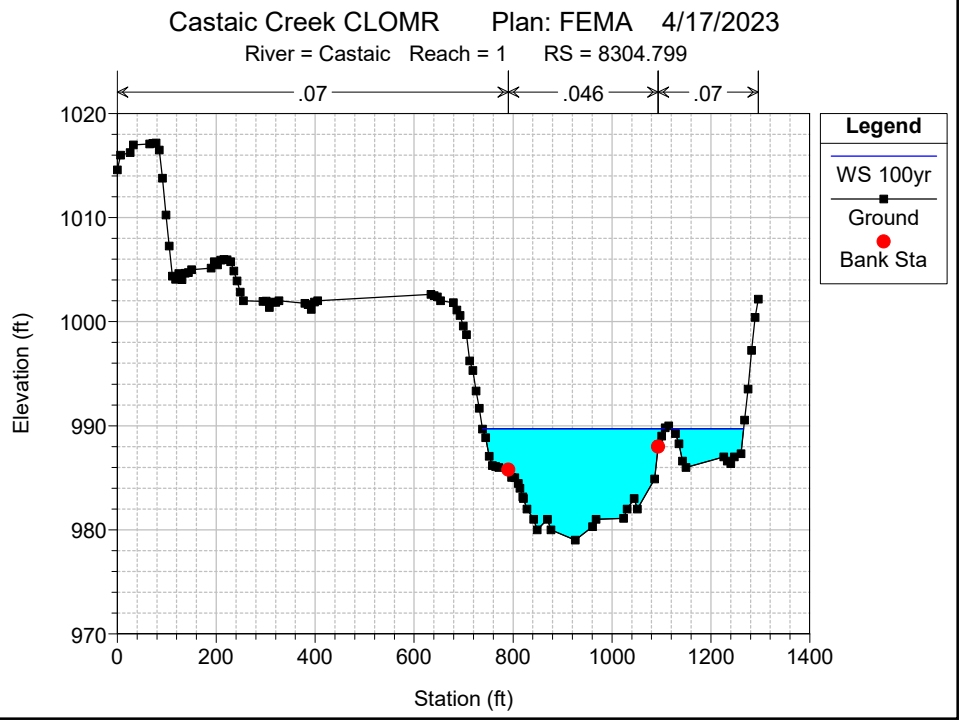

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 11954.94
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1030
1025
1020
1015
1010
1005
1000
400
600
800
1000
1200
1400
1600
1800
2000

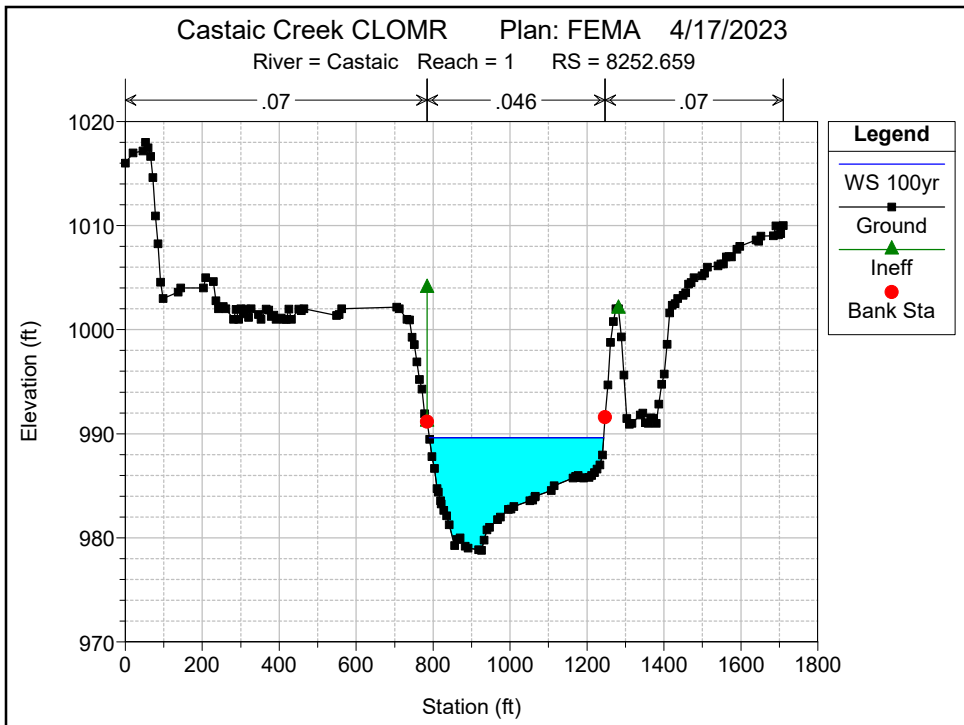

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 11620.14
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 11095.91
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (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)

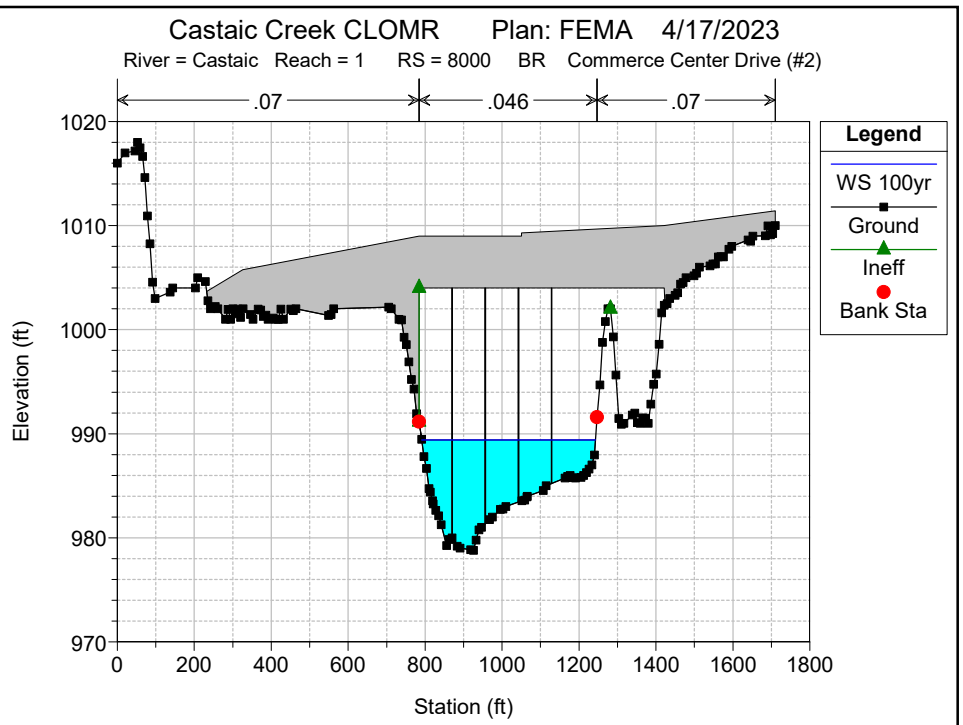

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 9534.089
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

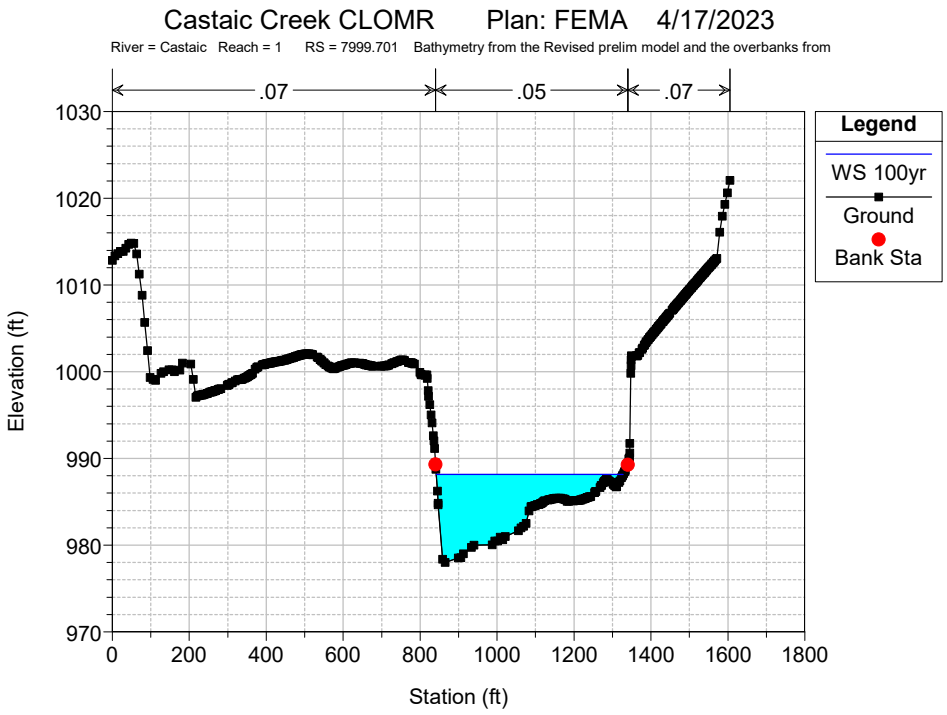

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 9166.896
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

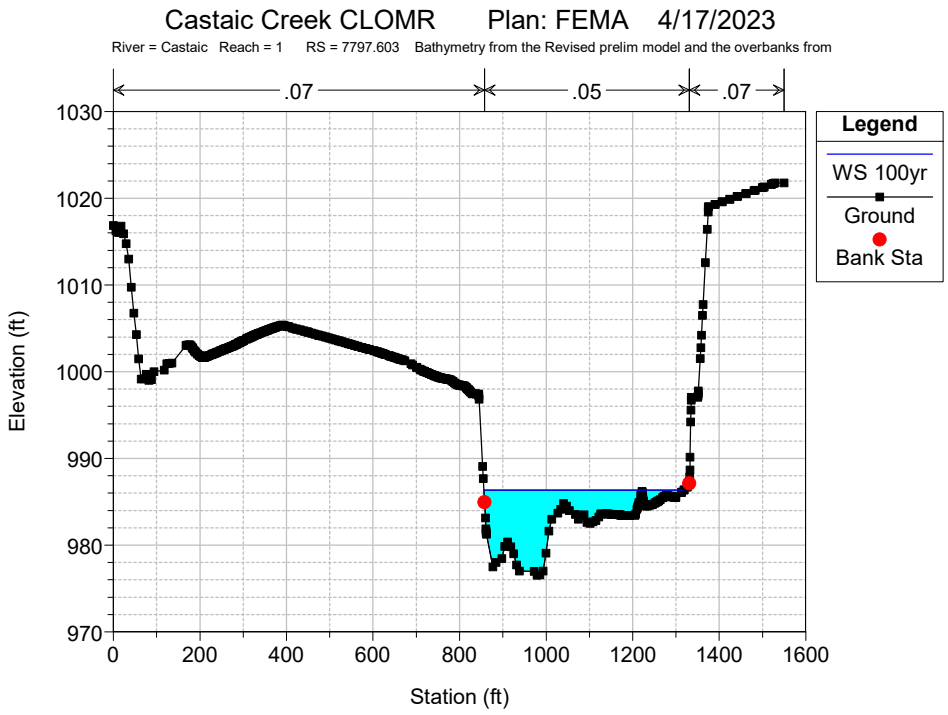

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8749.054
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

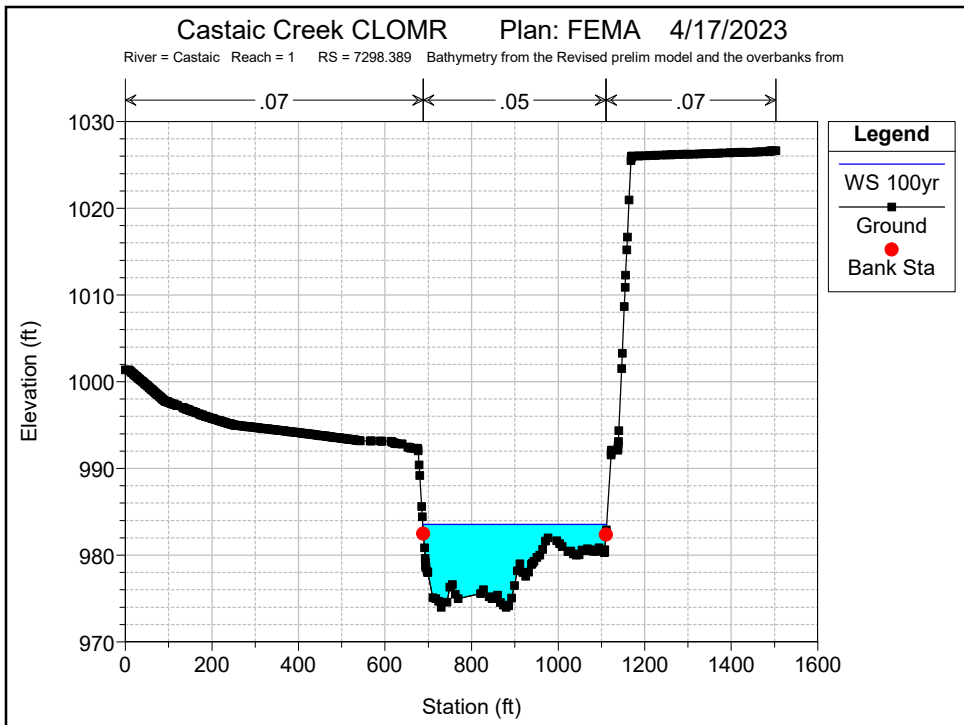

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8304.799
.07
.046
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

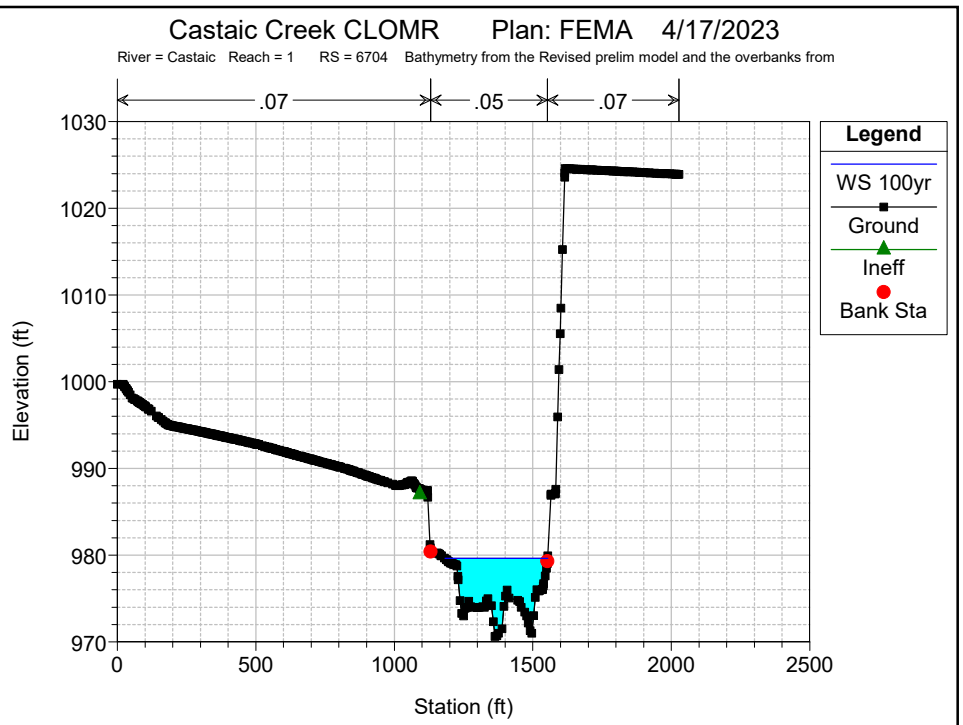

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8252.659
.07
.046
.07
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

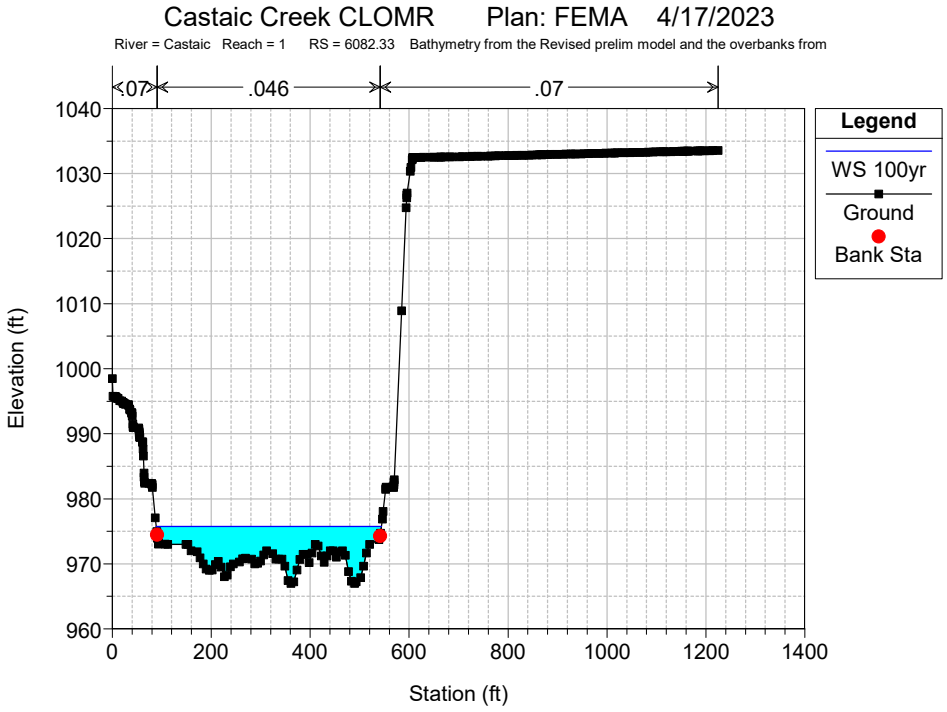

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 8000 BR Commerce Center Drive (#2)
.07
.046
.07
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

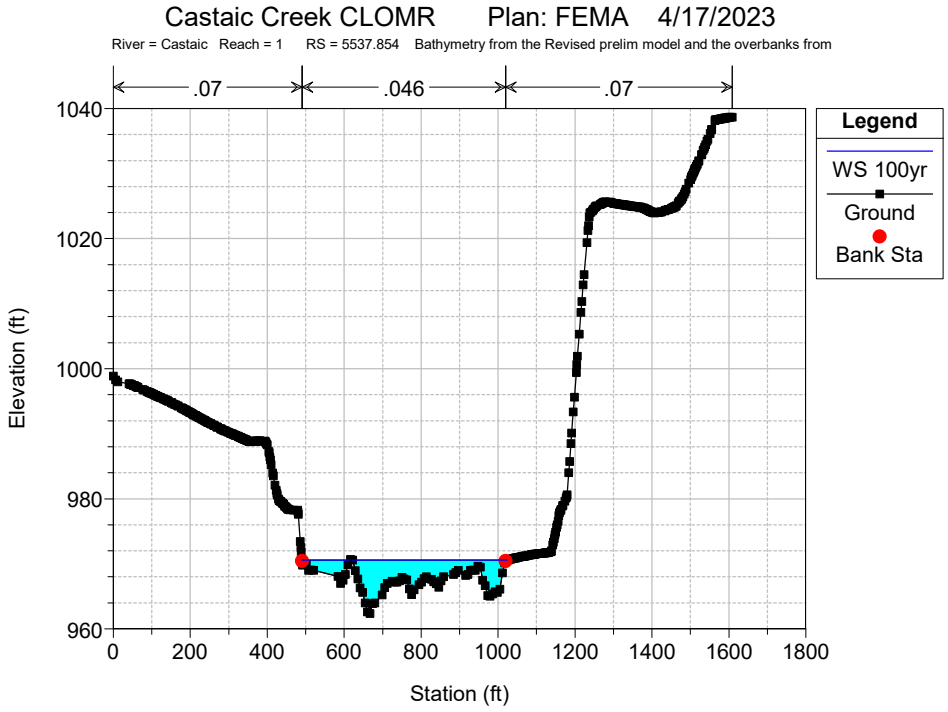

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 7999.701 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

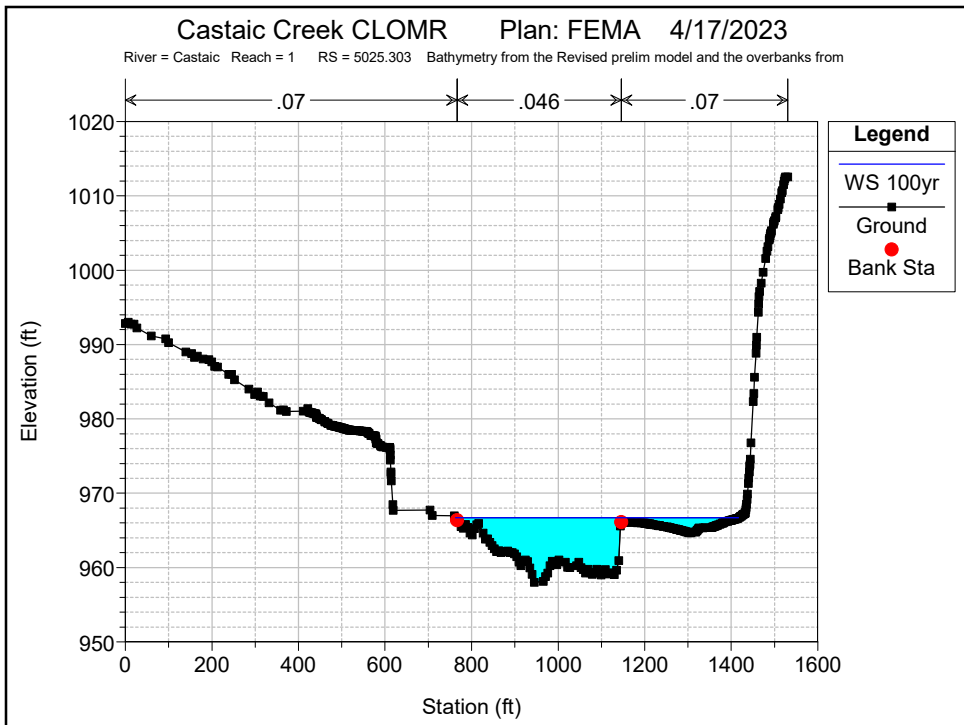

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 7797.603 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

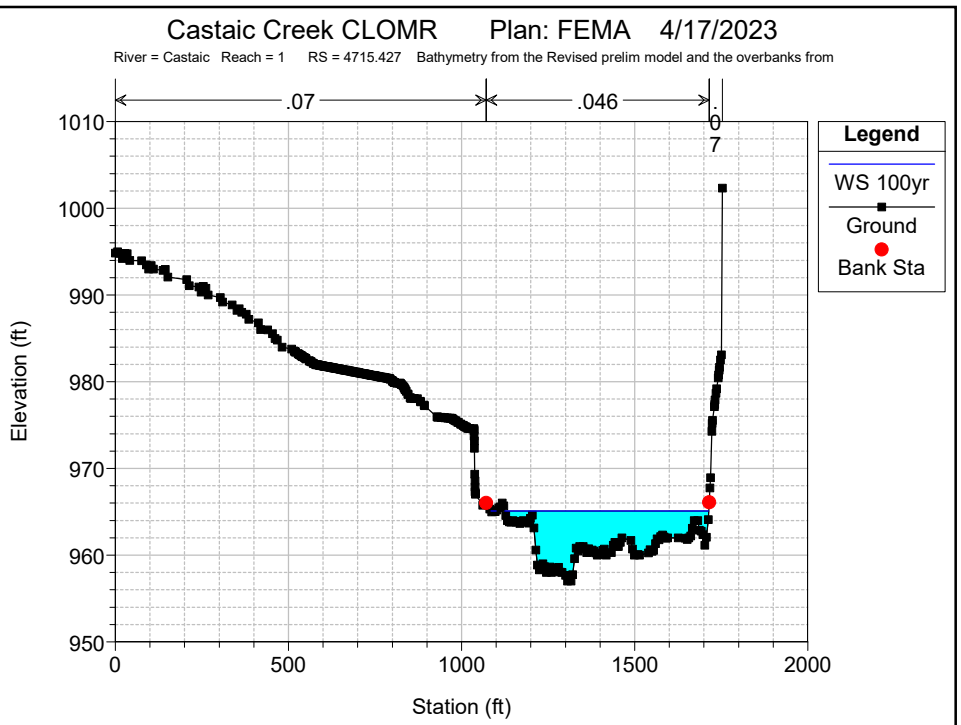

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 7298.389 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

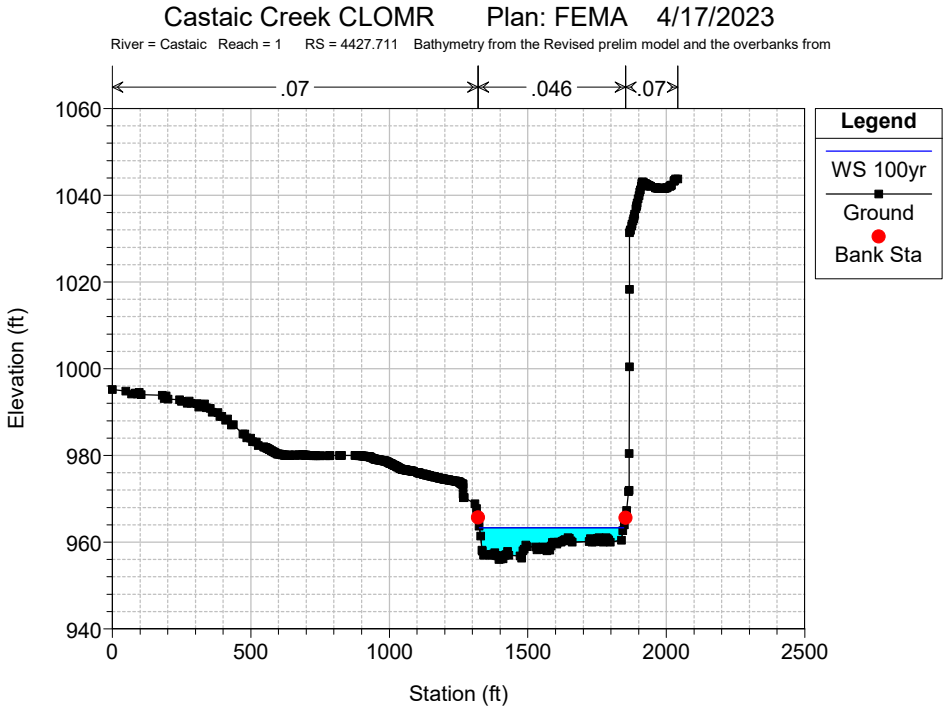

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 6704 Bathymetry from the Revised prelim model and the overbanks from
.07
.05
.07
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


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

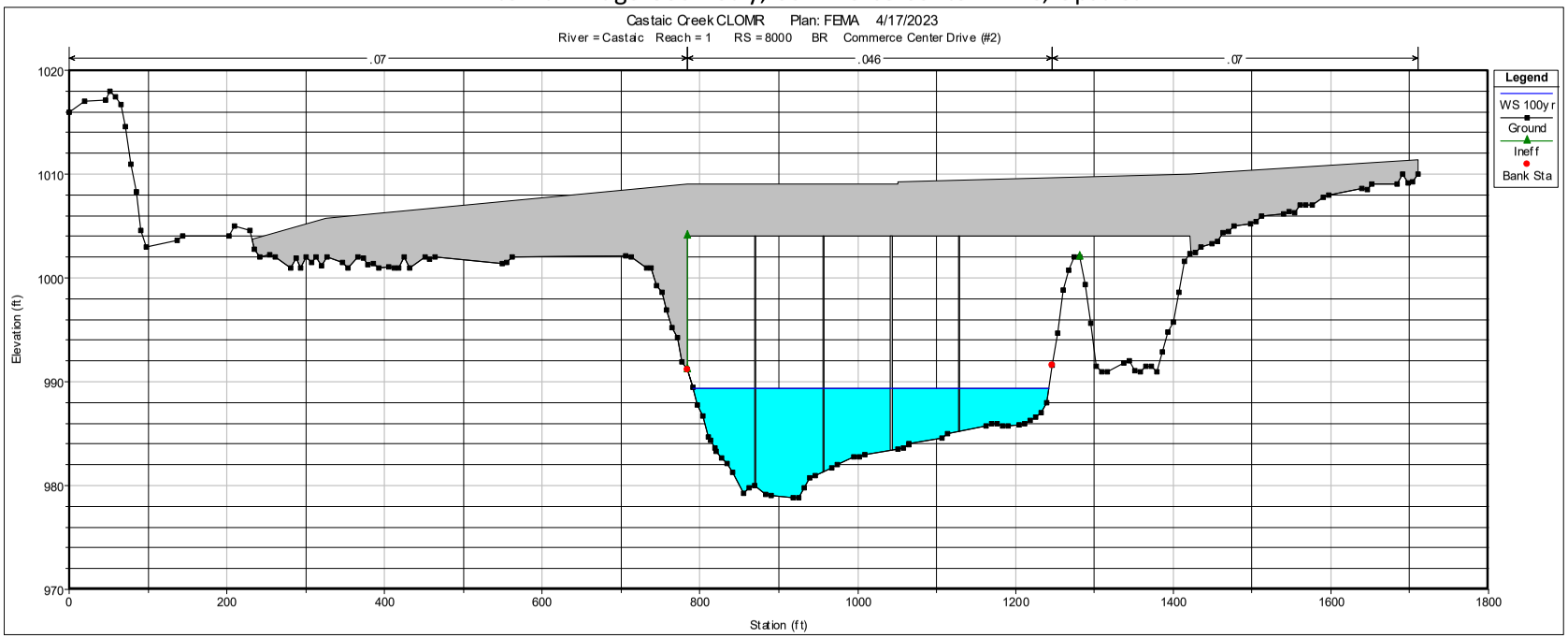

Castaic Creek CLOMR Plan: FEMA 4/17/2023
River = Castaic Reach = 1 RS = 4715.427 Bathymetry from the Revised prelim model and the overbanks from
.07
.046
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1010
1000
990
980
970
960
950
0
500
1000
1500
2000


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

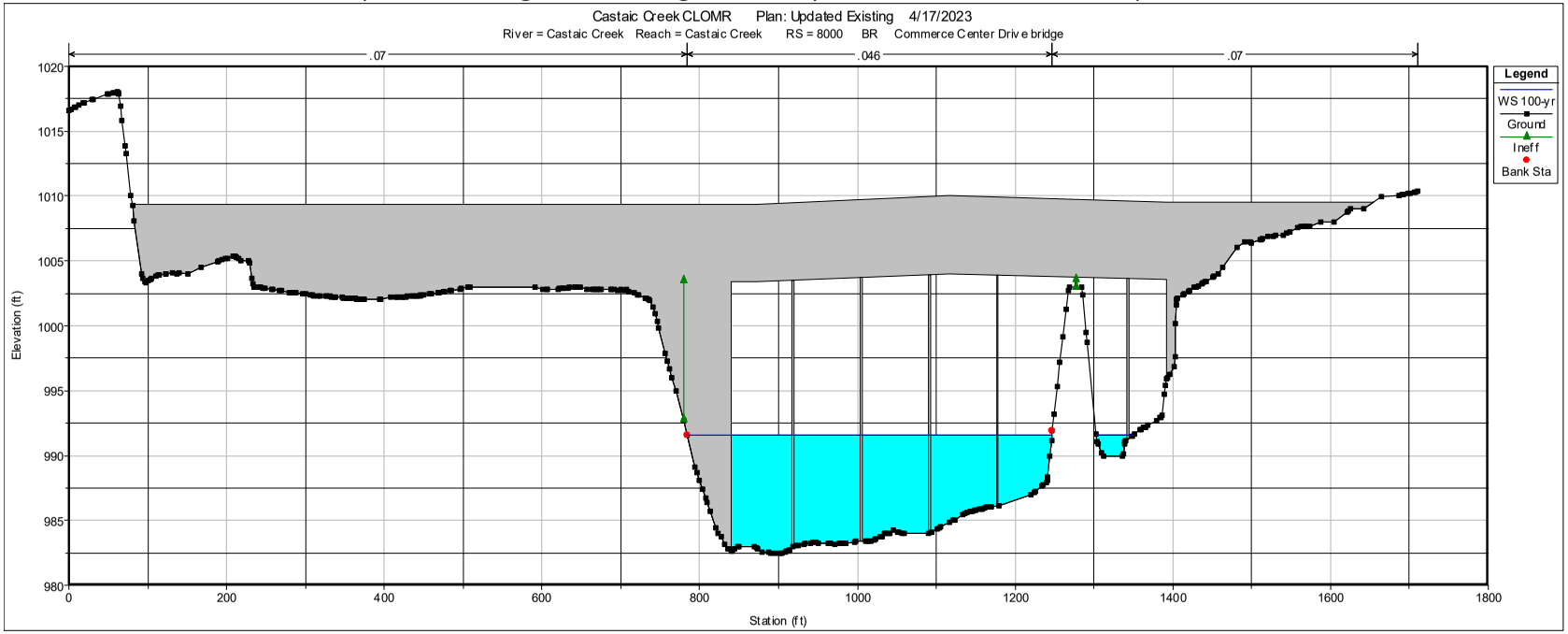
Commerce Center Drive Bridge HEC-RAS Internal Bridge Cross Sections Comparison, Effective vs. Corrected Effective/ Existing

PACE

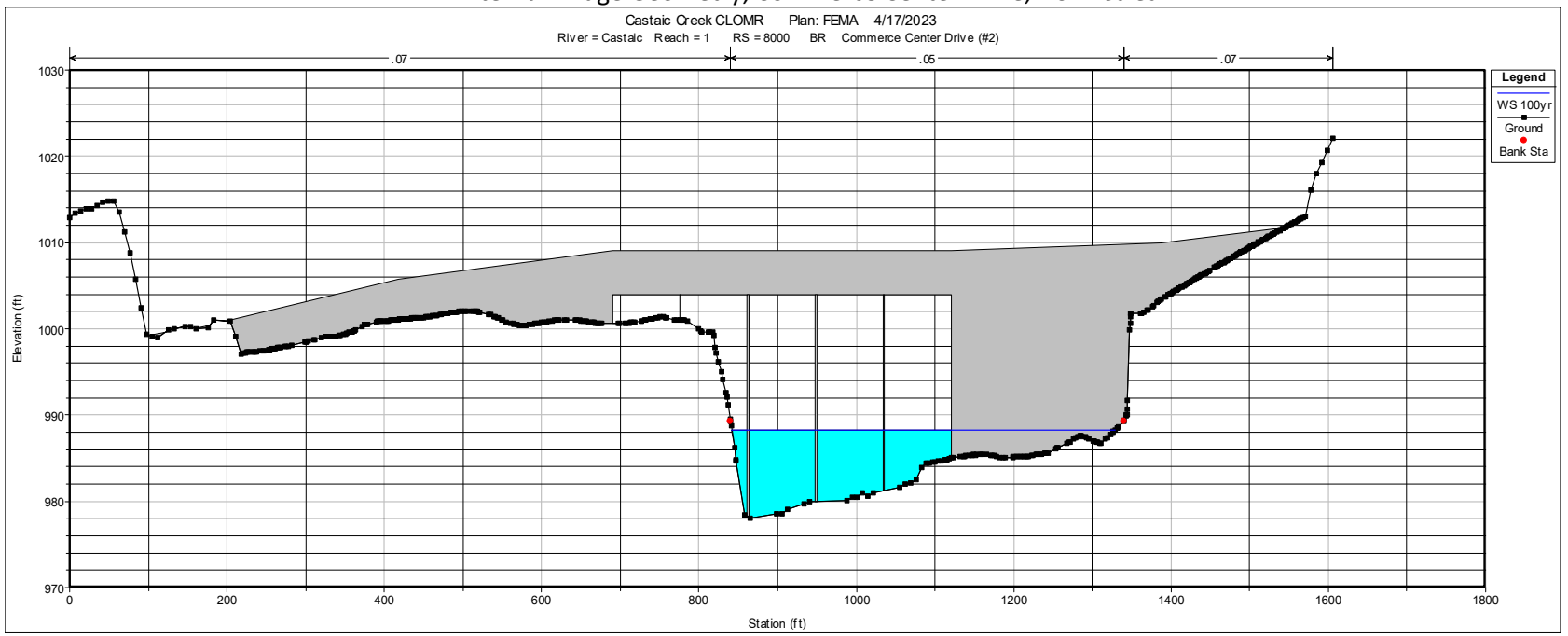
FEMA Internal Bridge Geometry, Commerce Center Drive, Upstream



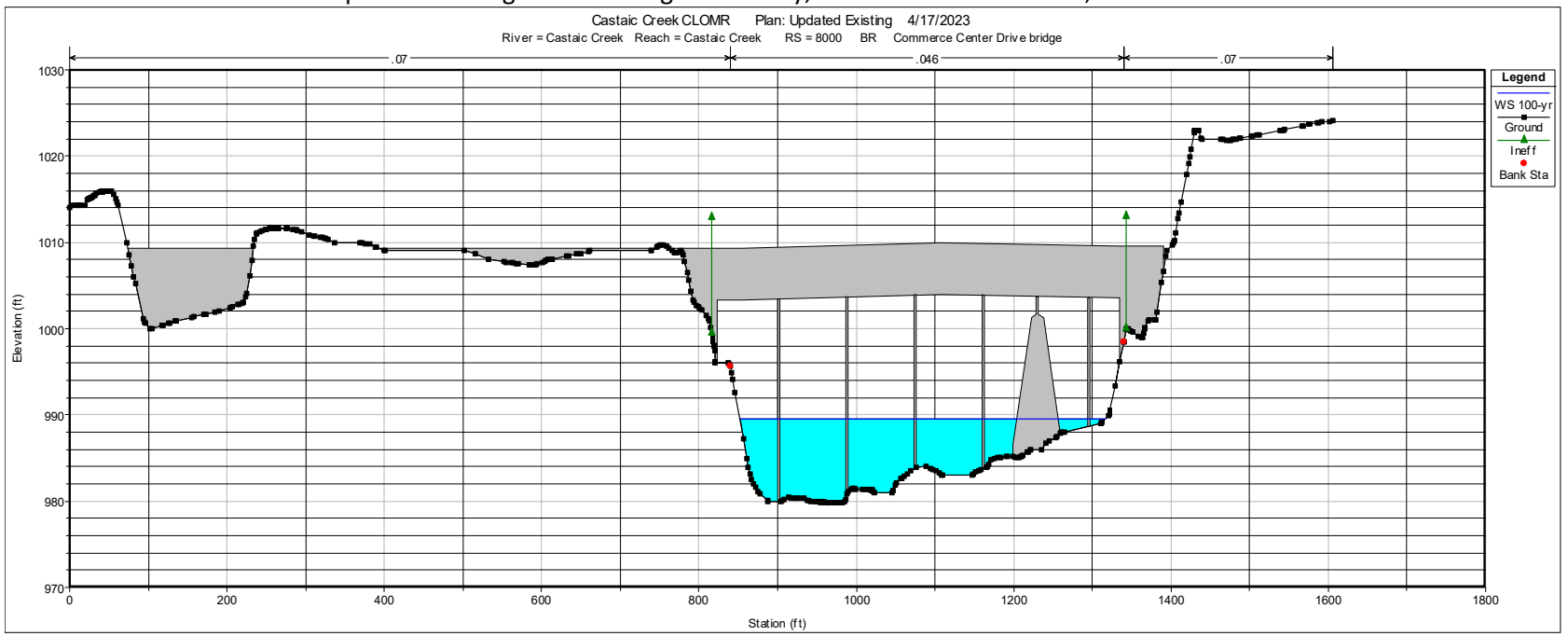
Updated Existing Internal Bridge Geometry, Commerce Center Drive, Upstream



FEMA Internal Bridge Geometry, Commerce Center Drive, Downstream



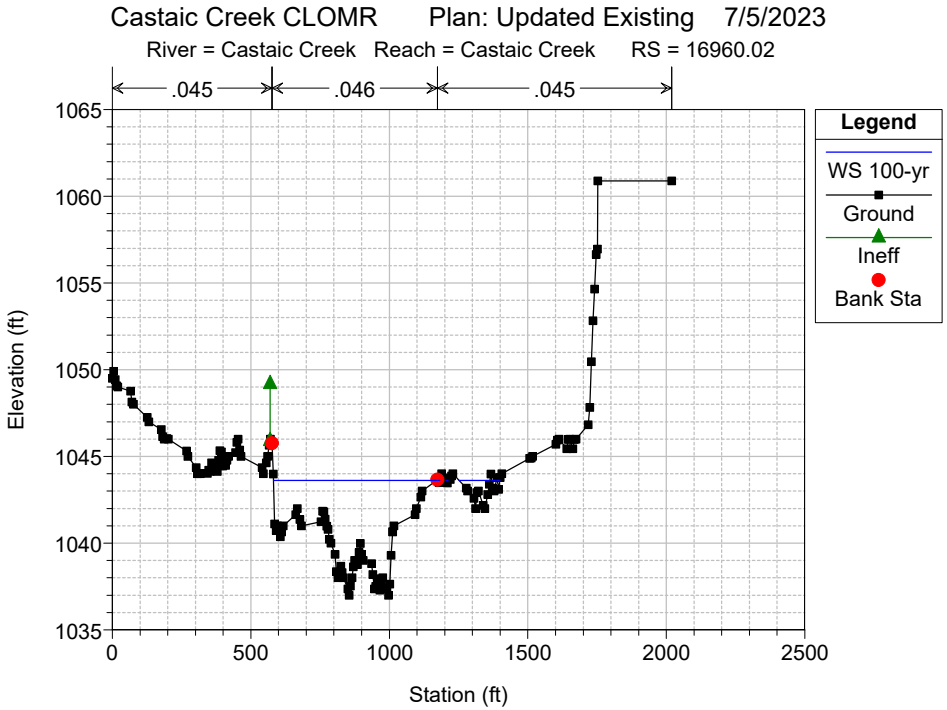
Updated Existing Internal Bridge Geometry, Commerce Center Drive, Downstream

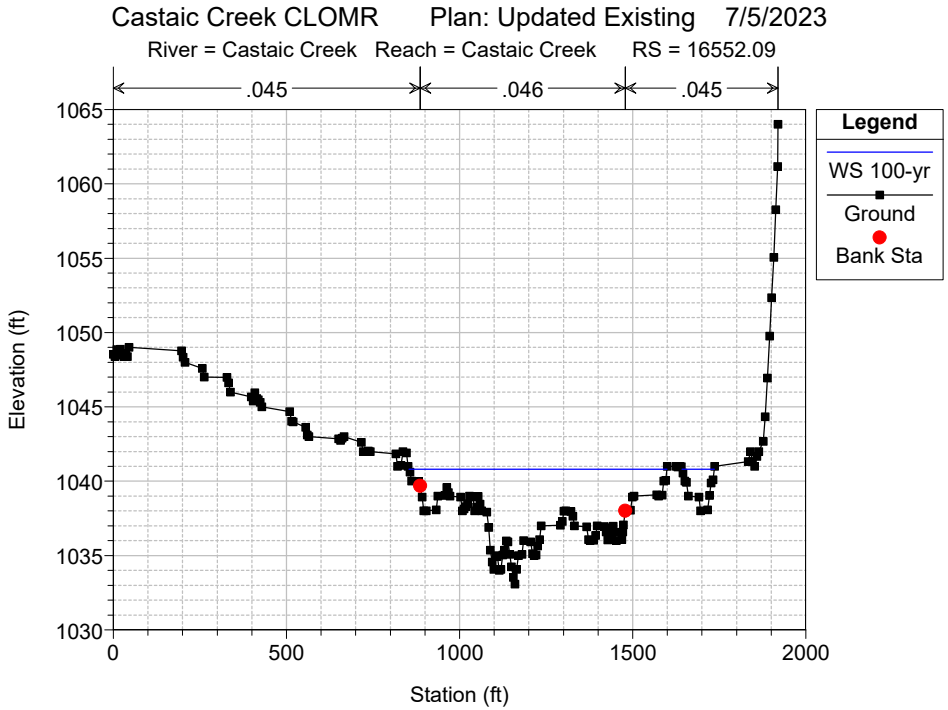


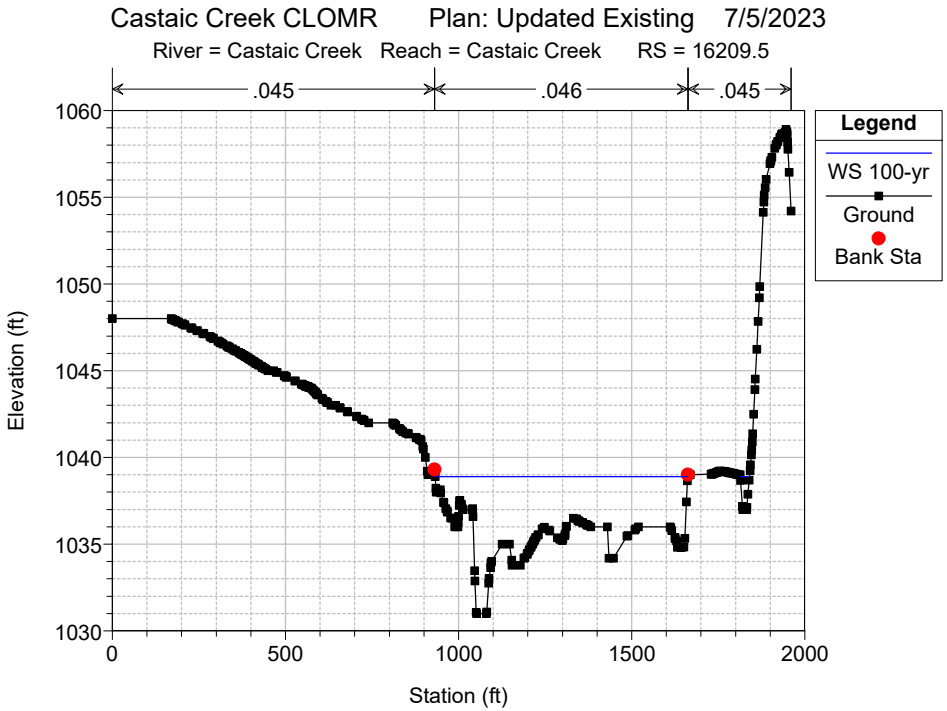
Appendix D - HEC-RAS Corrected Effective Condition Hydraulic Results

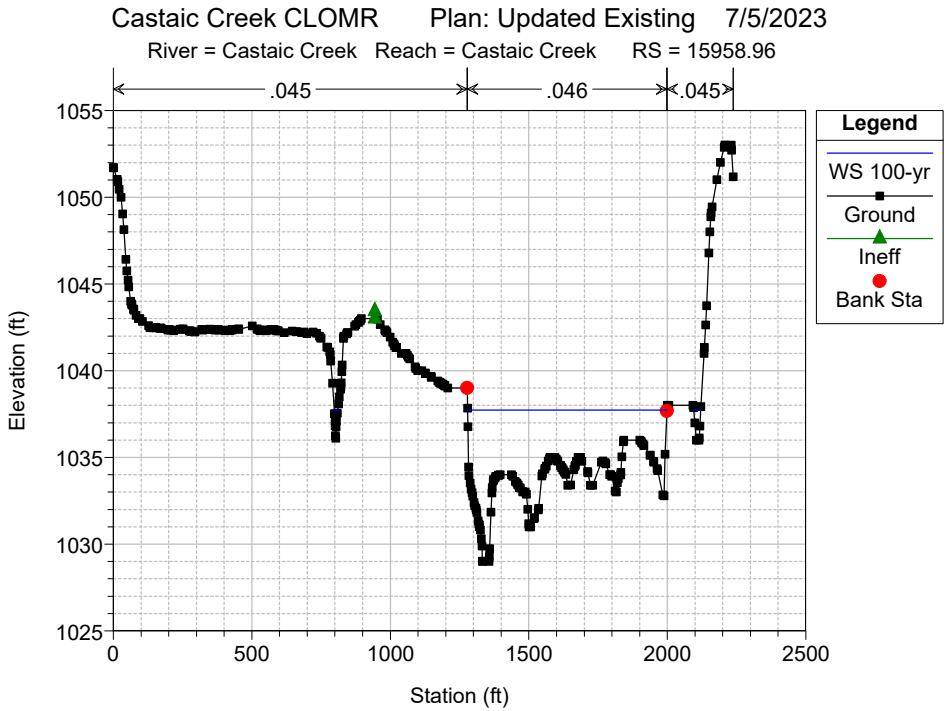
HEC-RAS Plan: Updated Existing River: Castaic Creek Reach: Castaic Creek Profile: 100-yr

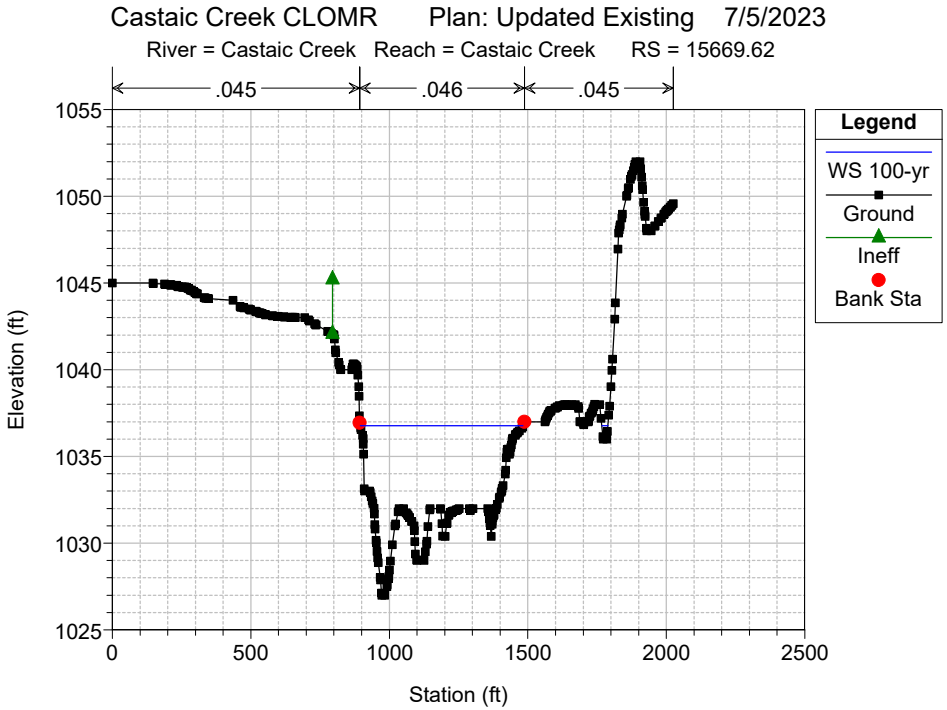
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Castaic Creek	16960.02	100-yr	14480.00	1037.00	1043.62	1042.90	1044.46	0.011051	7.43	2010.39	742.09	0.73
Castaic Creek	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

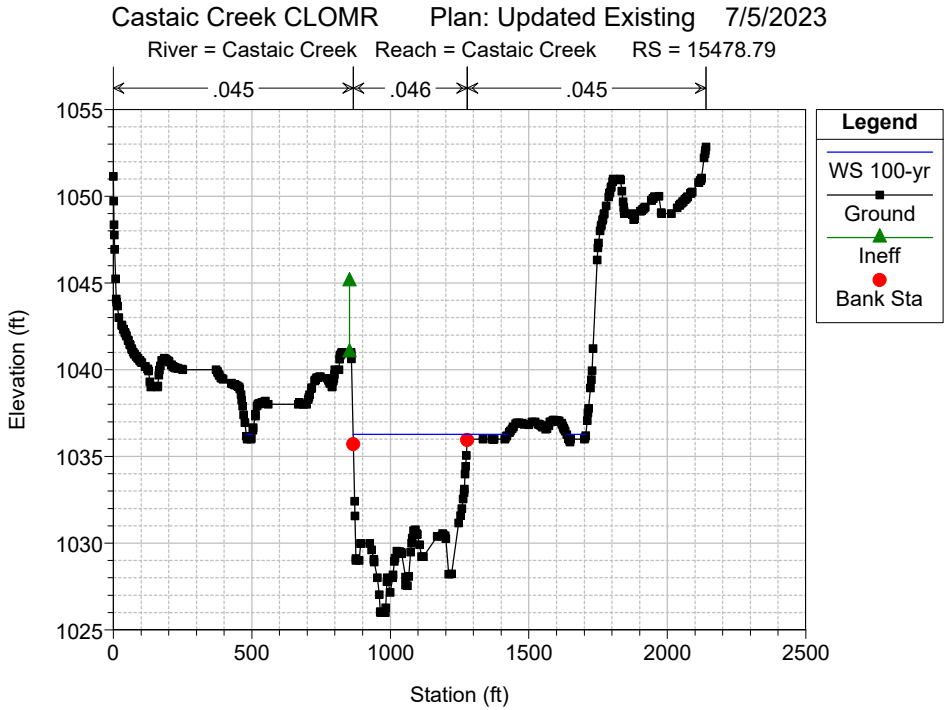

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 16960.02
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

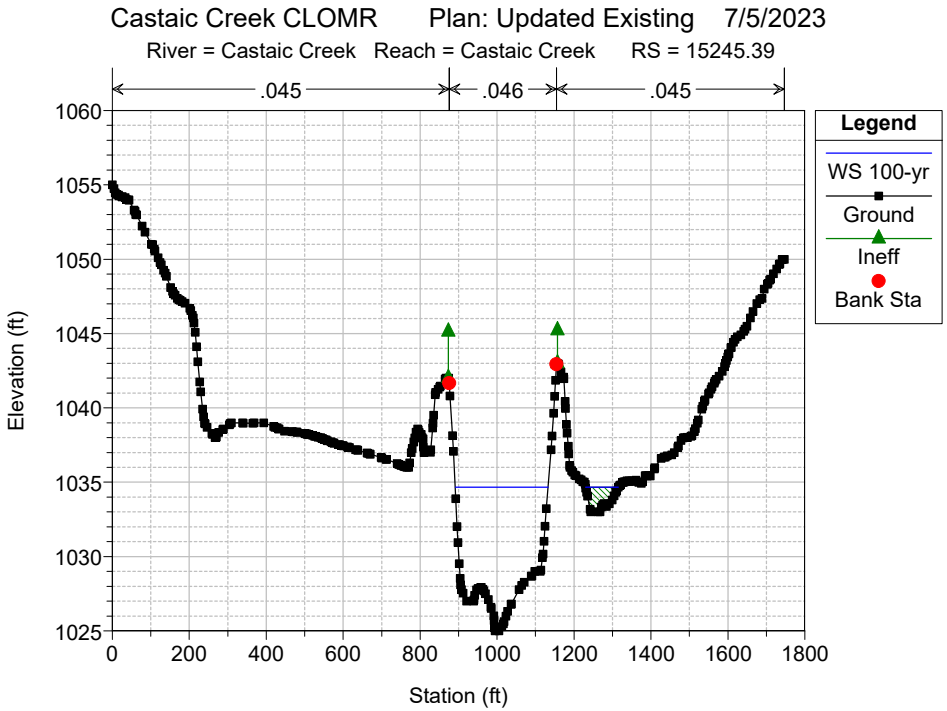

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 16552.09
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

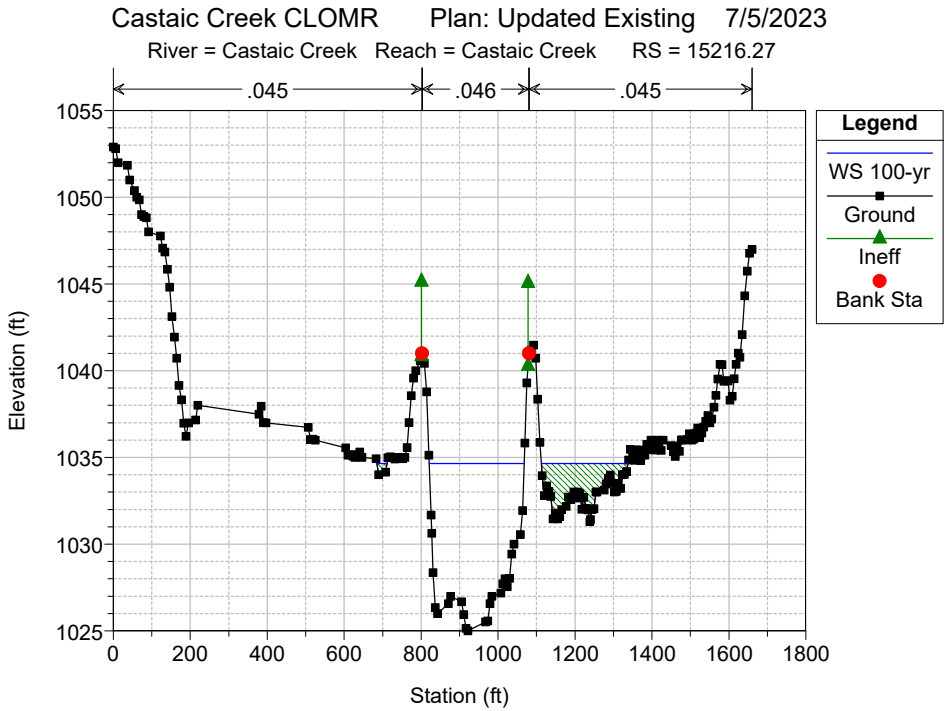

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 16209.5
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

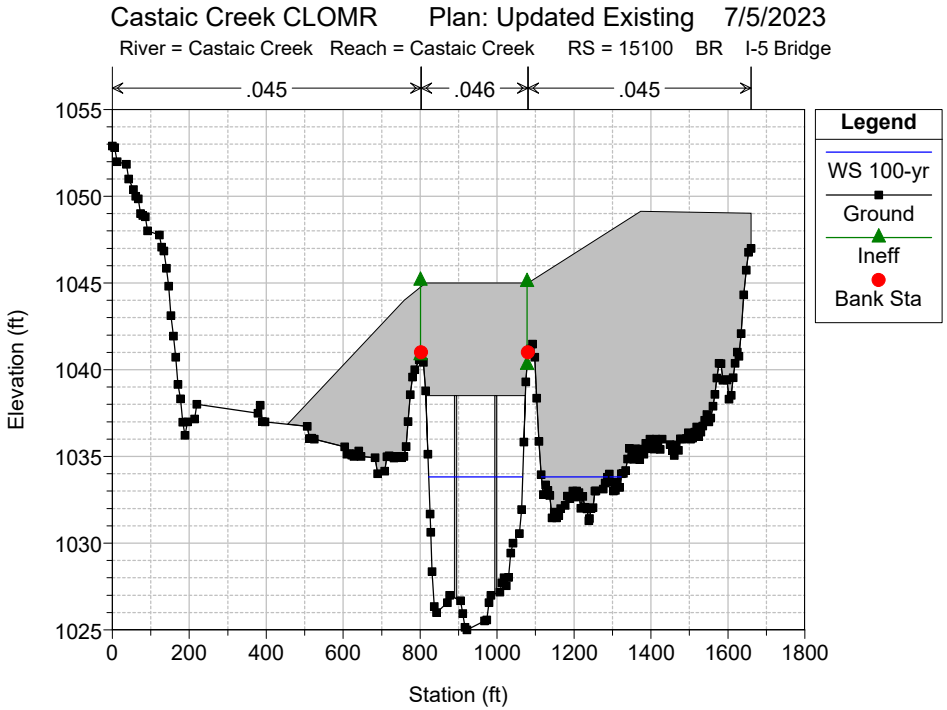

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15958.96
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

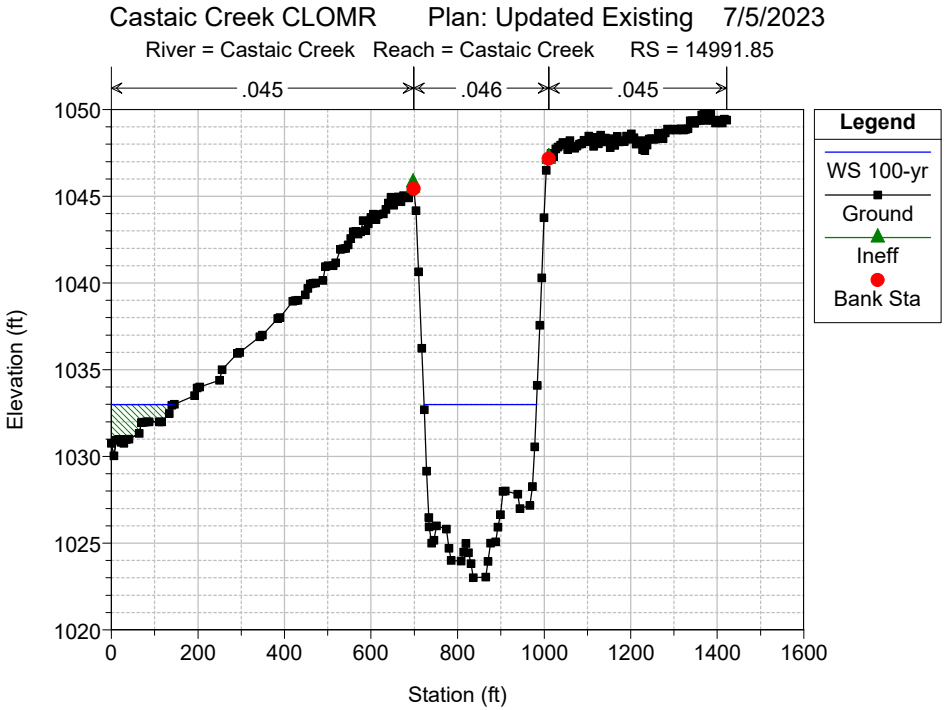

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15669.62
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

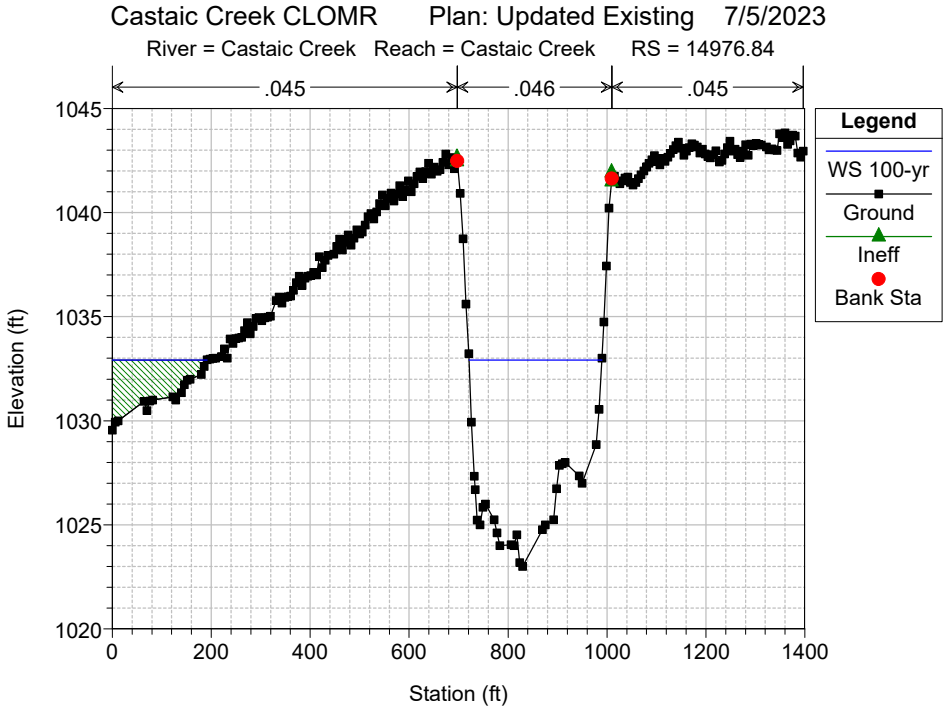

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15478.79
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

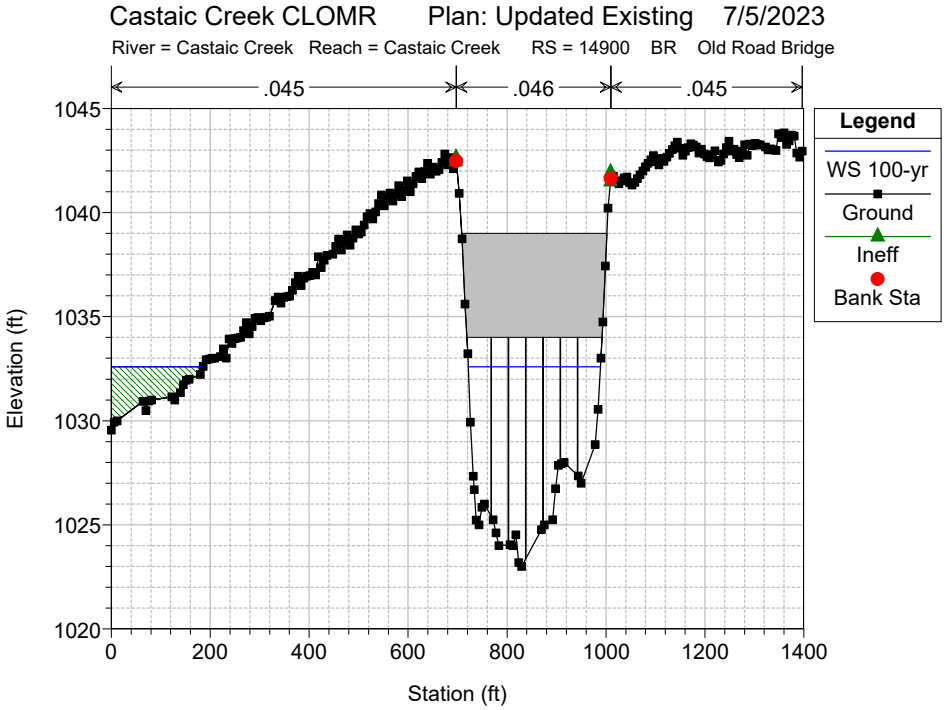

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15245.39
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

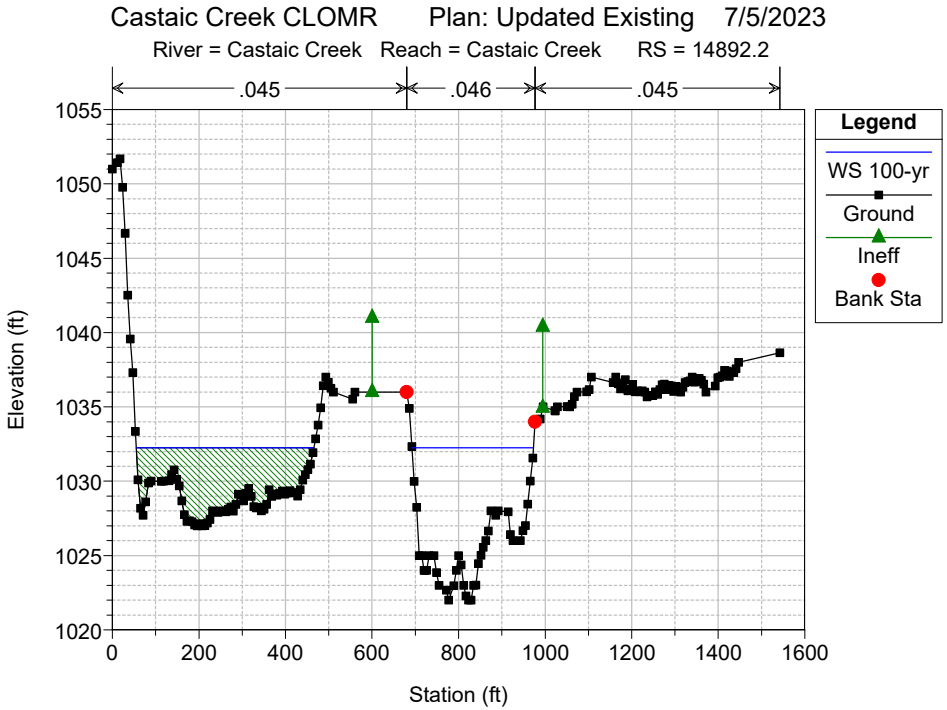

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15216.27
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

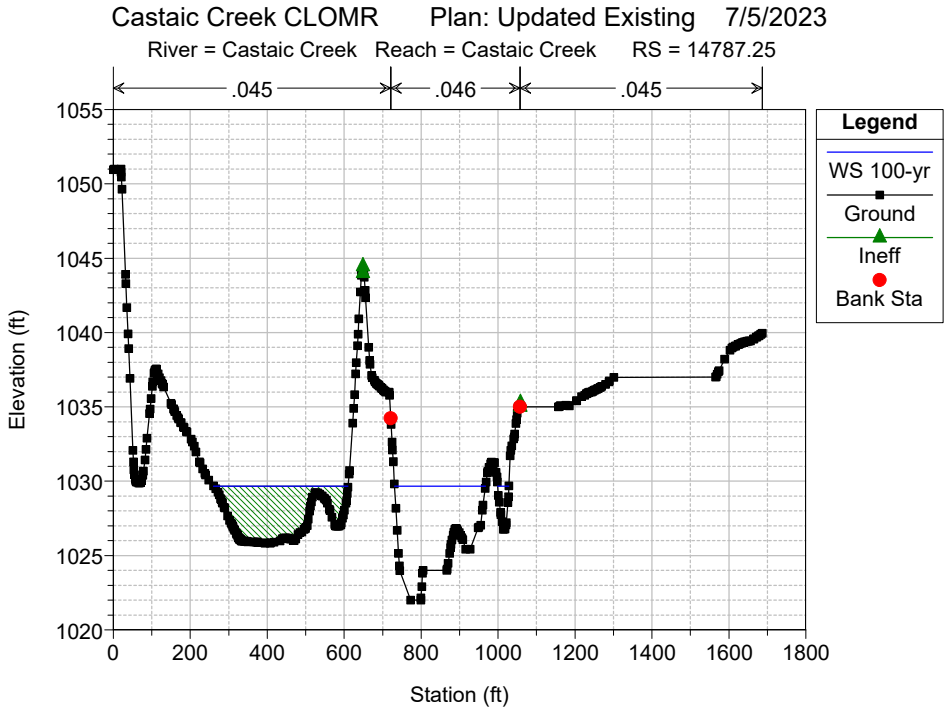

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 15100 BR I-5 Bridge
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

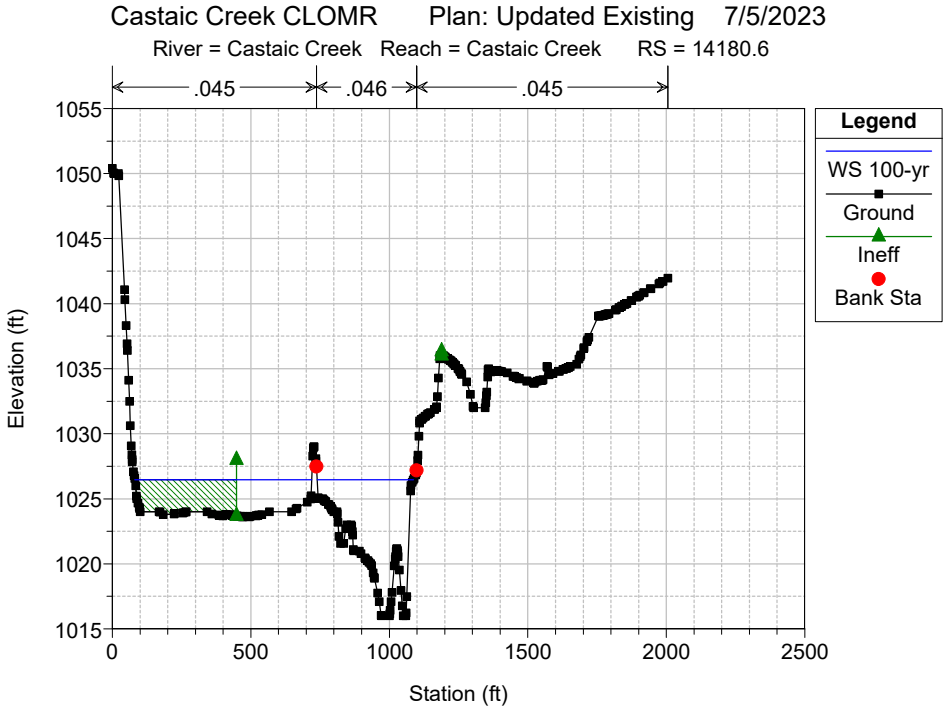

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14991.85
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

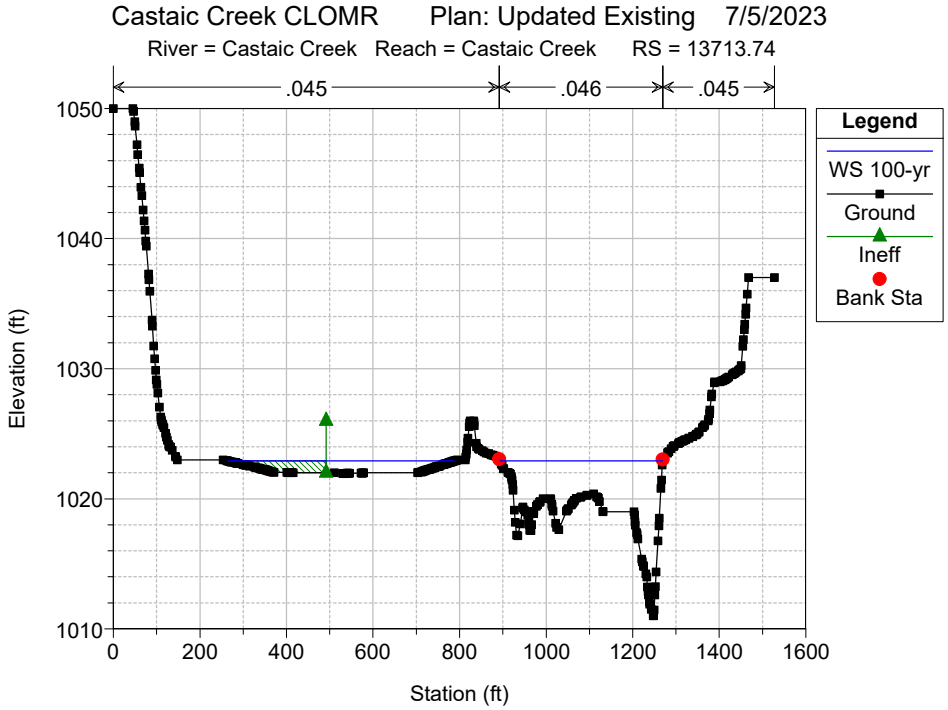

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14976.84
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

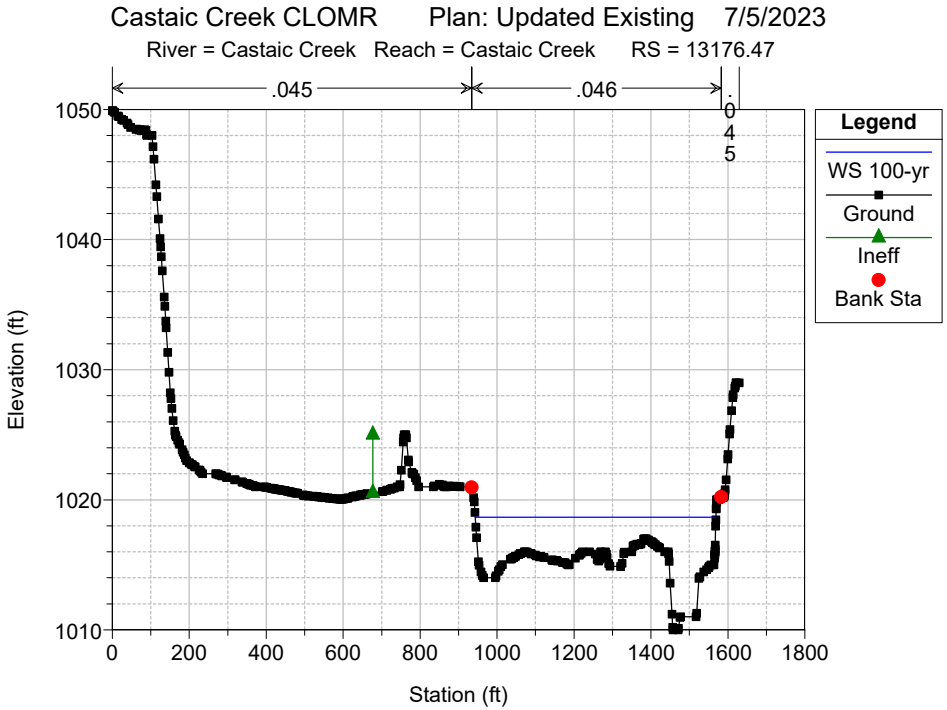

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14900 BR Old Road Bridge
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

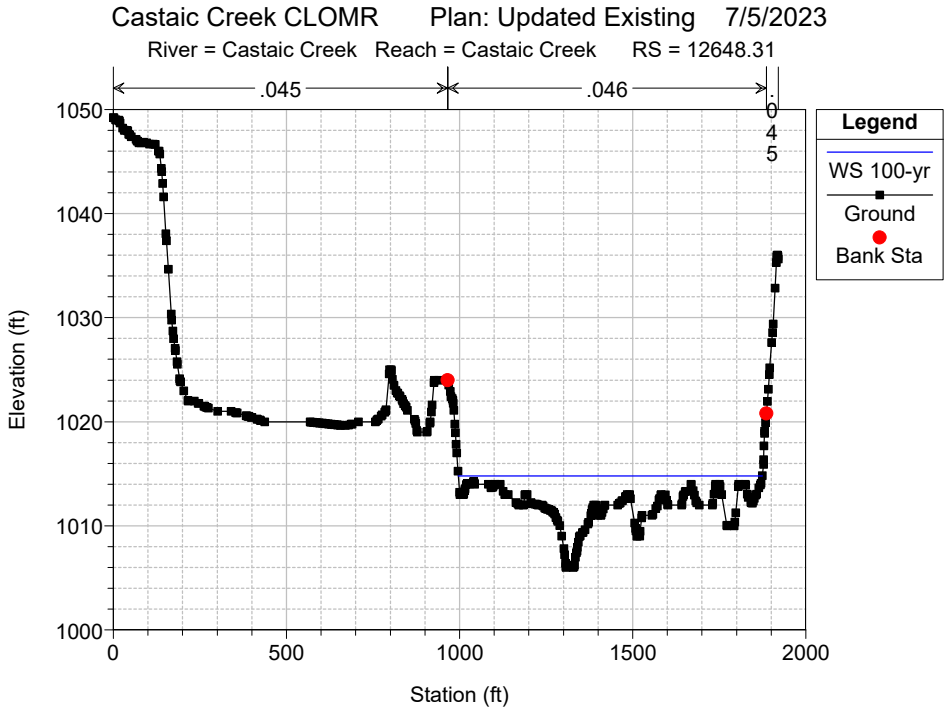

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14892.2
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

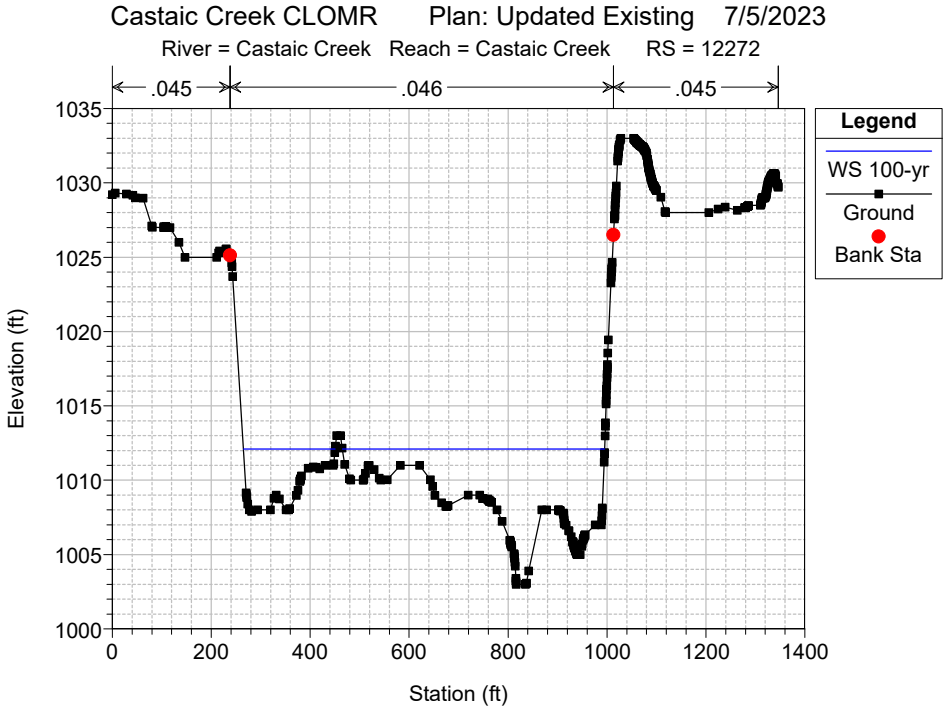

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14787.25
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

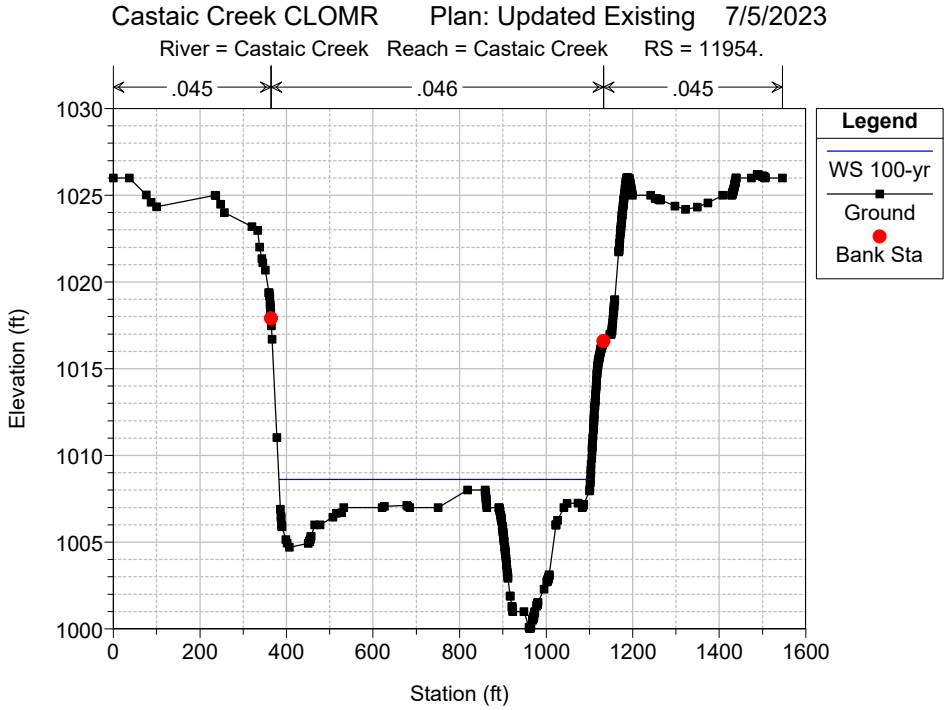

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 14180.6
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

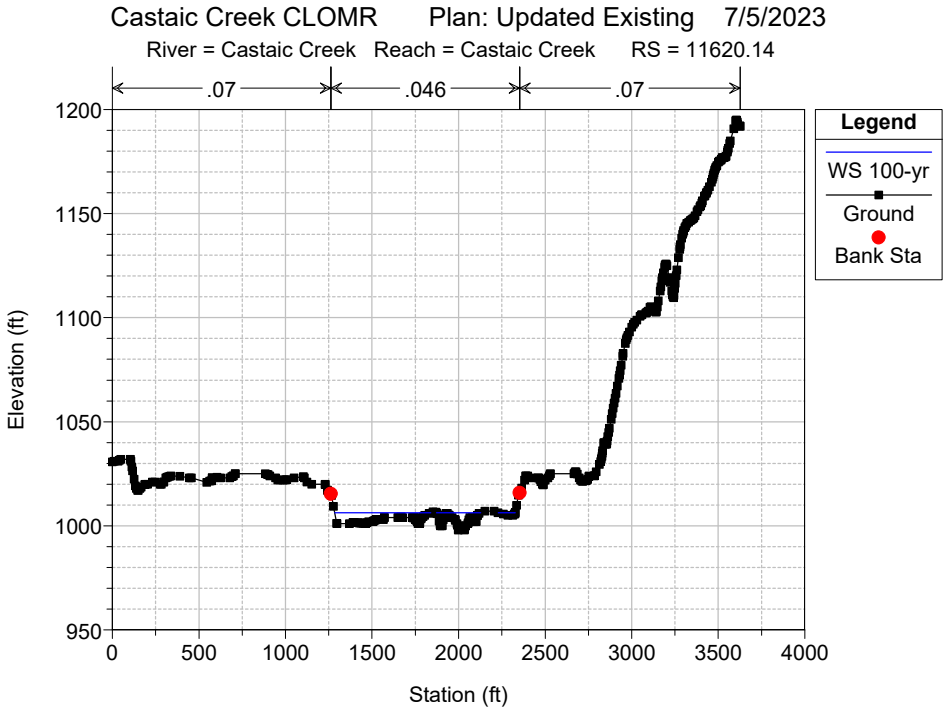

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 13713.74
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

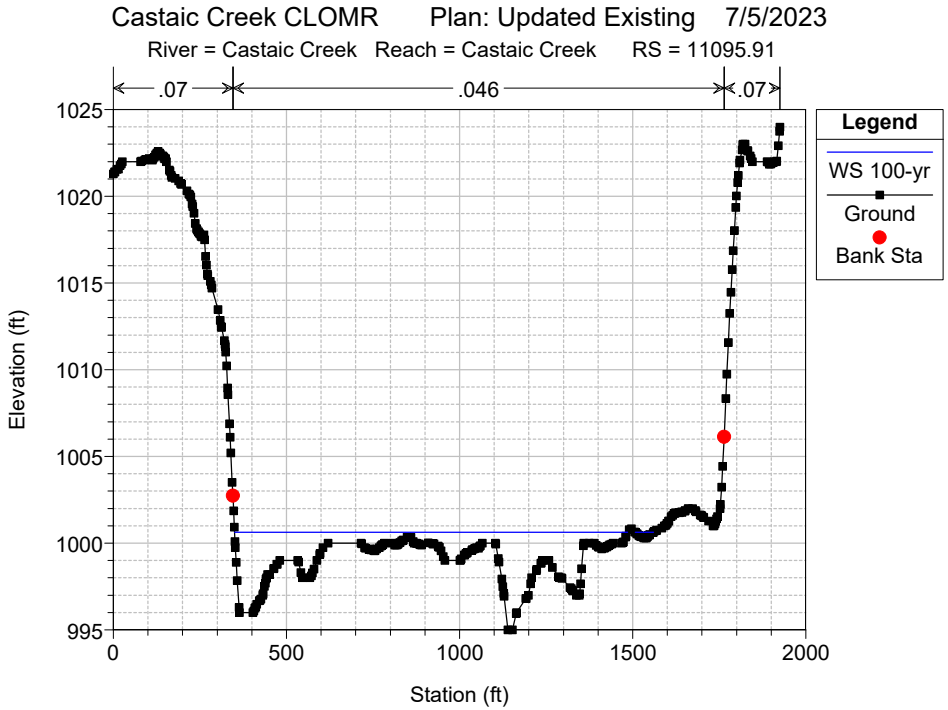

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 13176.47
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

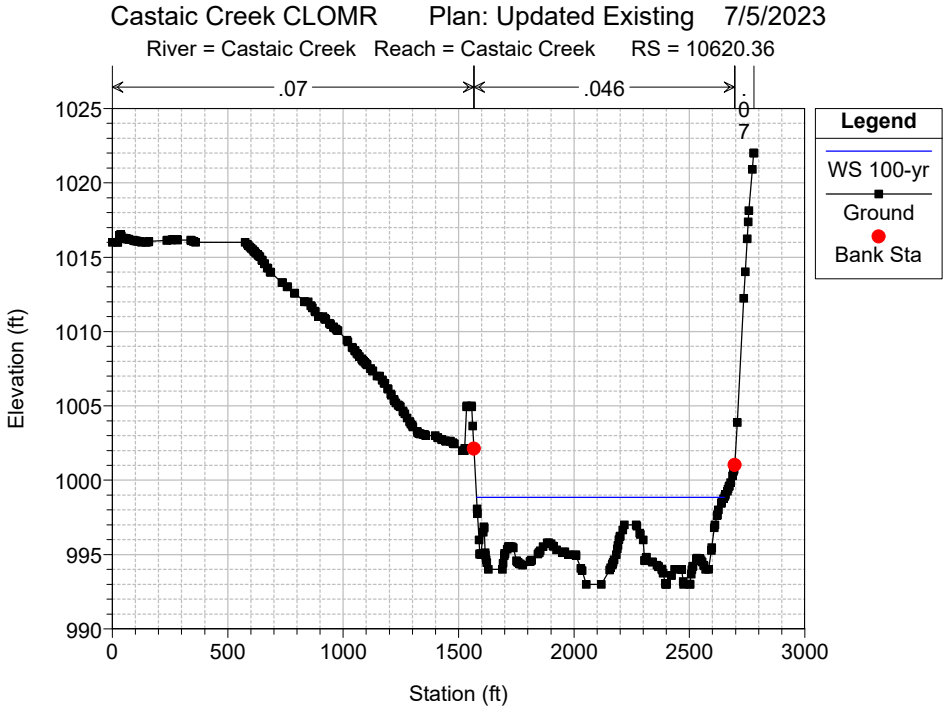

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 12648.31
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

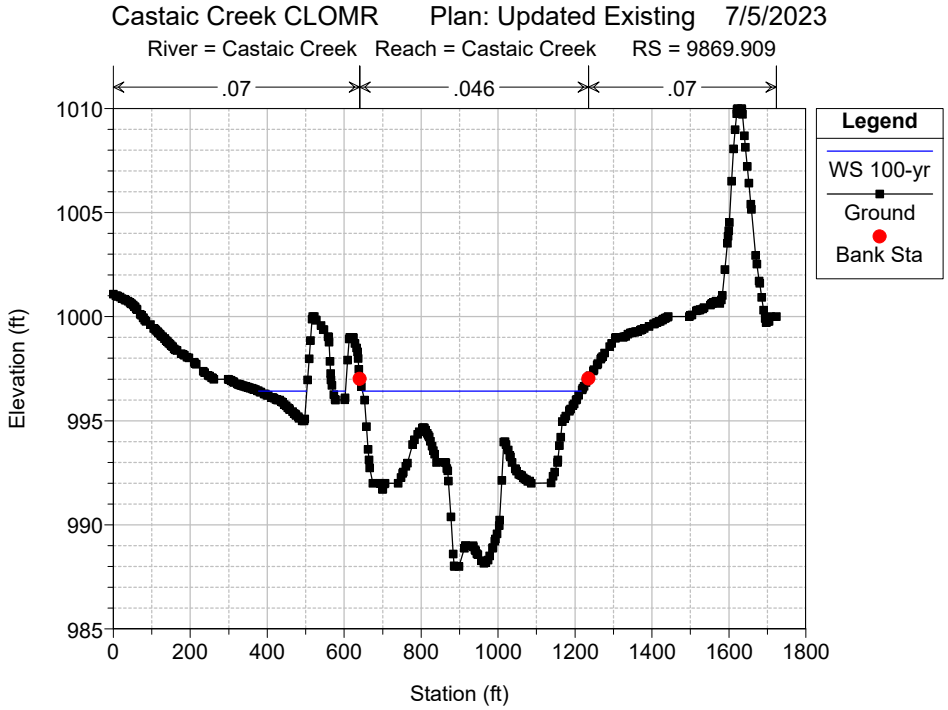

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 12272
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

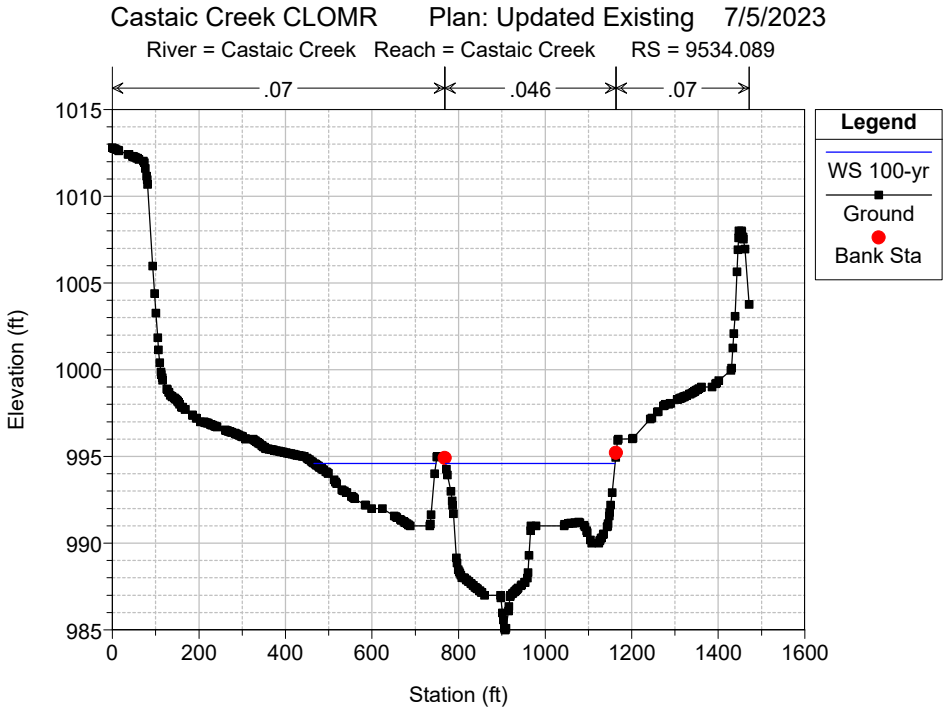

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 11954.
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

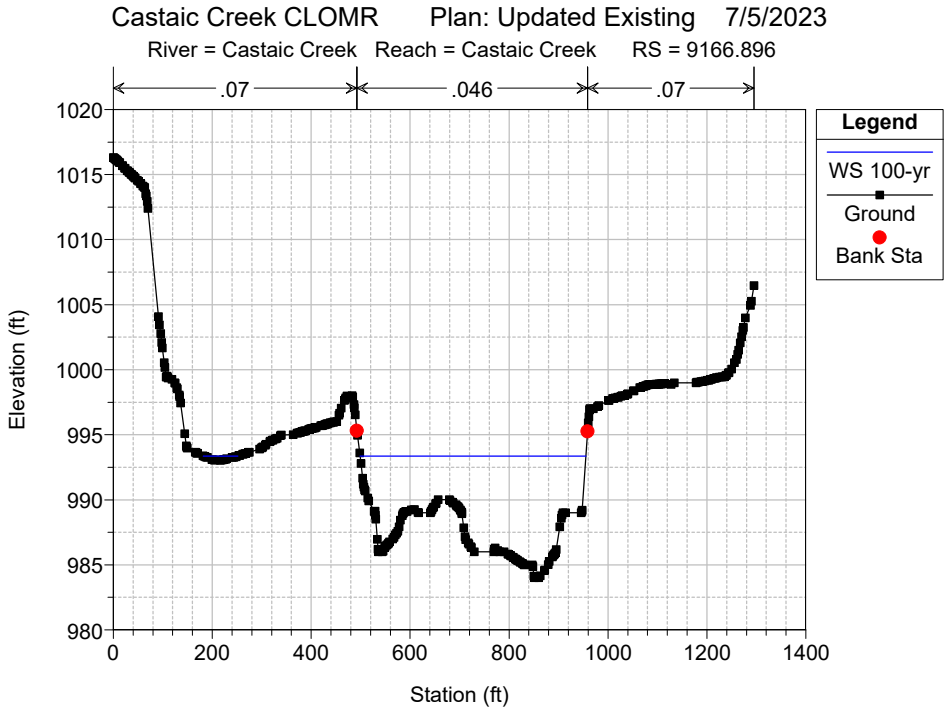

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 11620.14
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

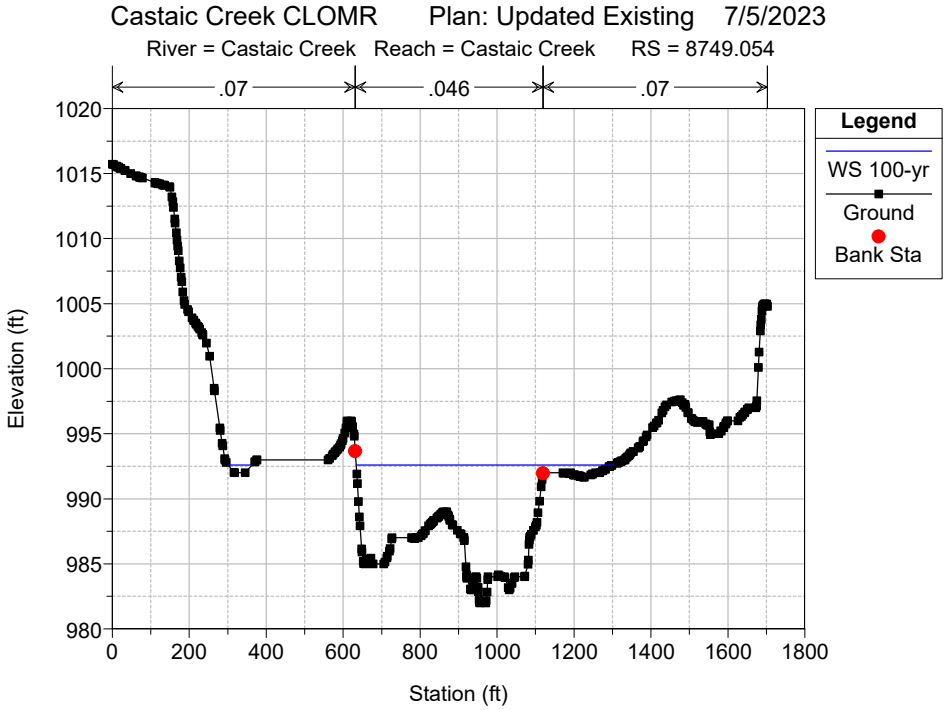

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 11095.91
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

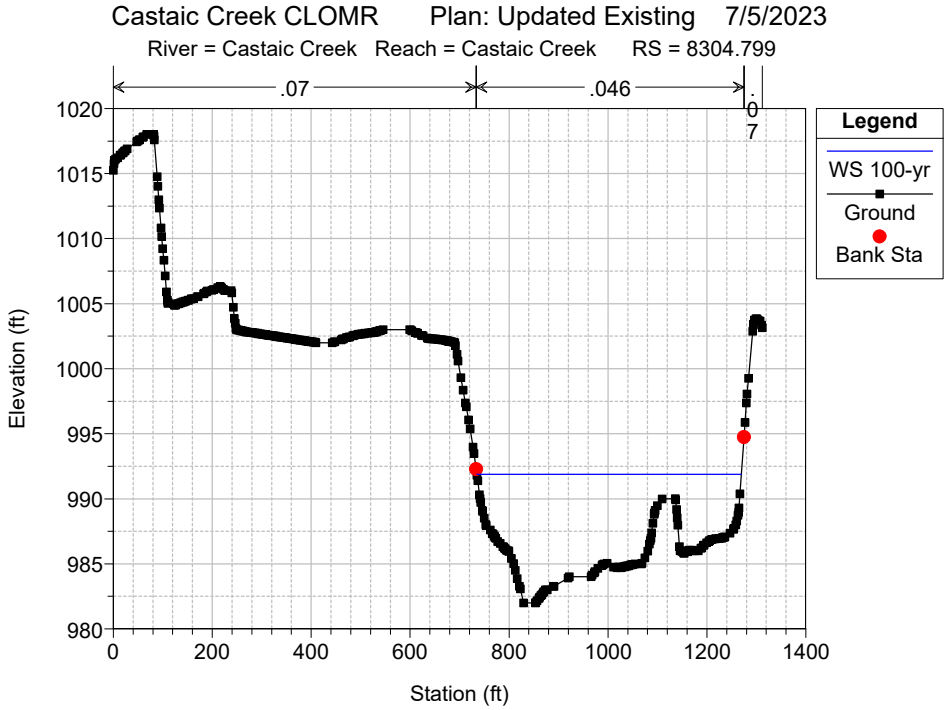

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 10620.36
.07
.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

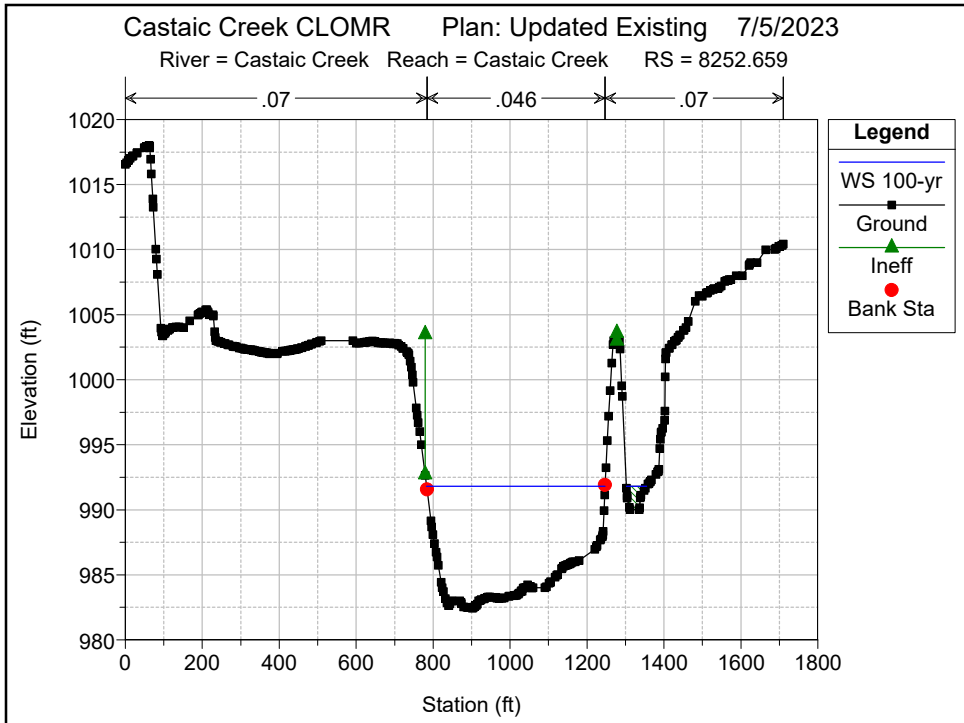

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 9869.909
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

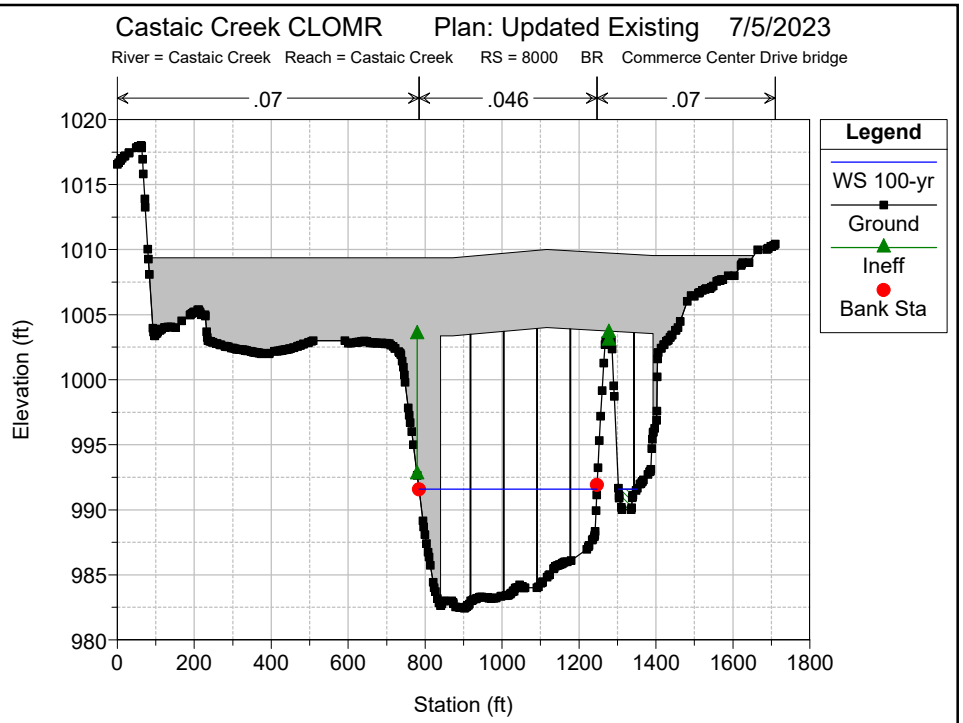

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 9534.089
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

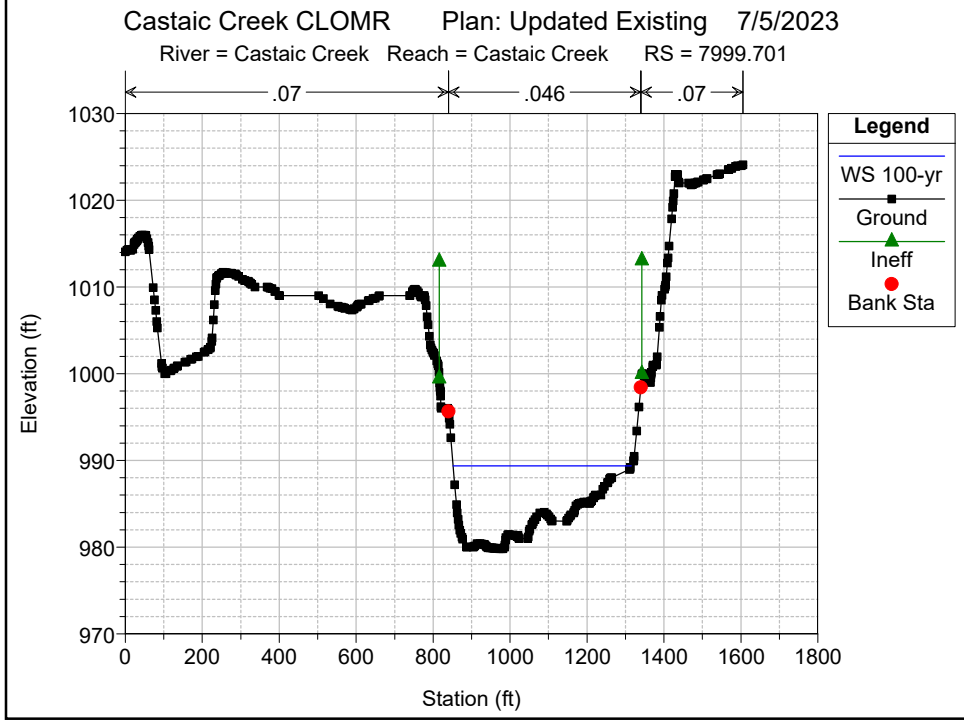

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 9166.896
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

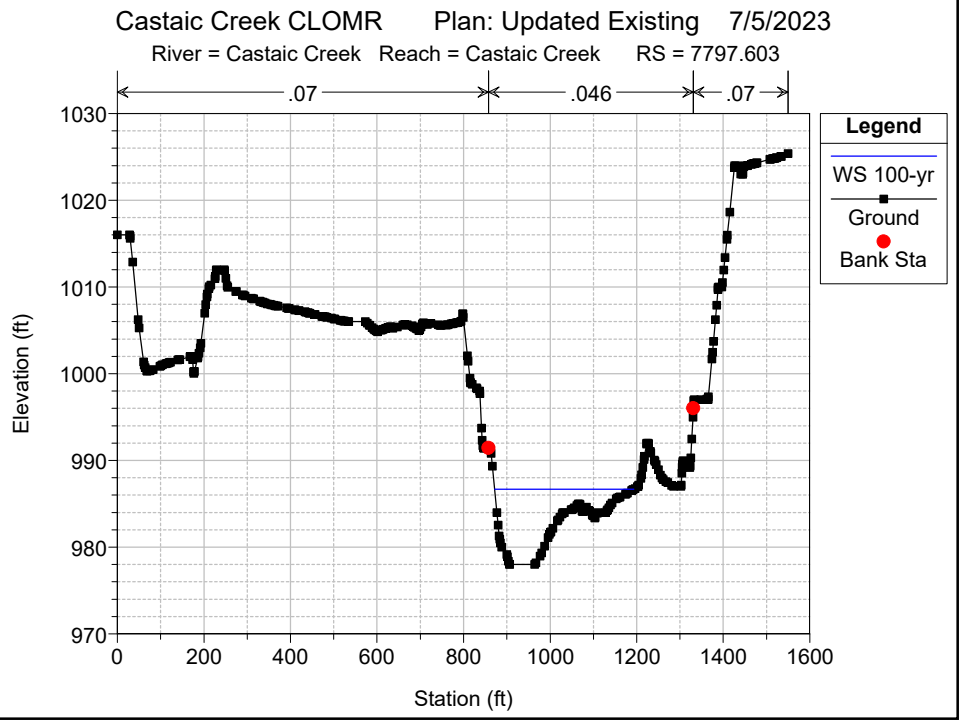

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8749.054
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

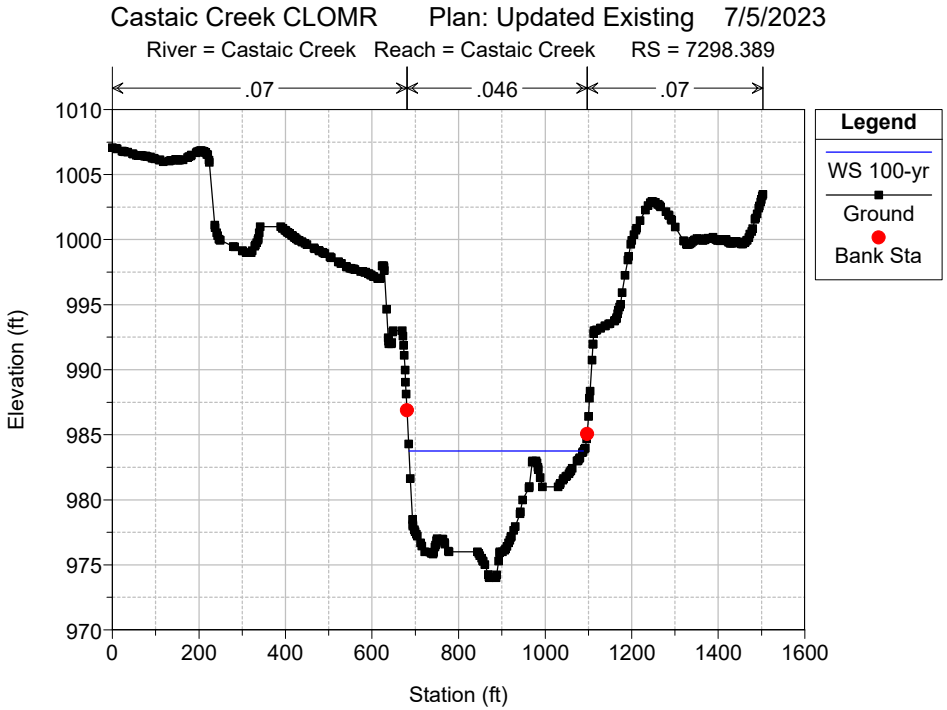

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8304.799
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.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

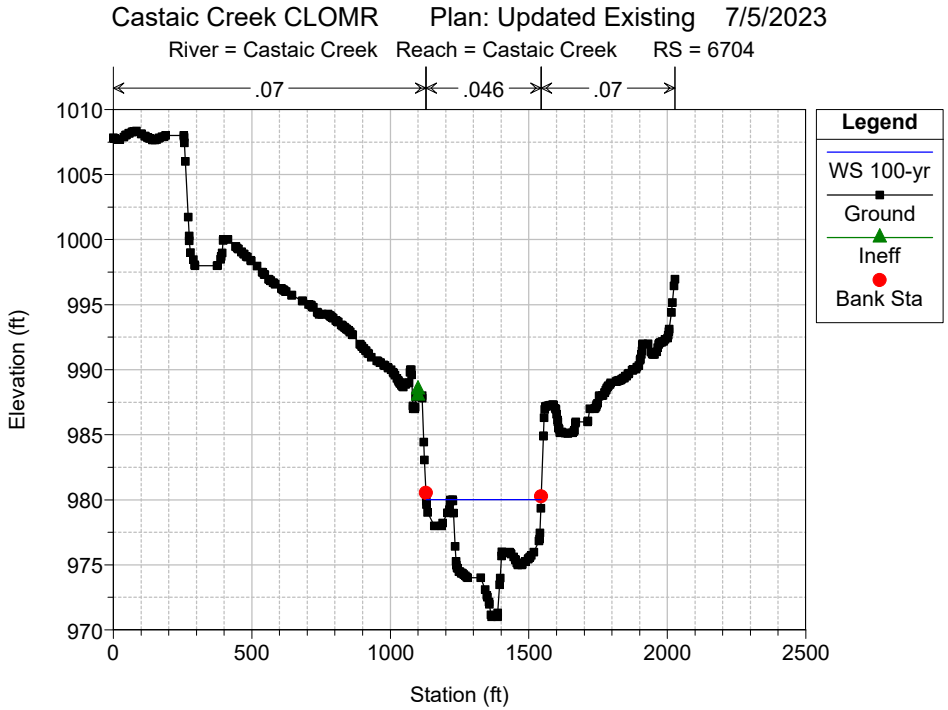

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8252.659
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

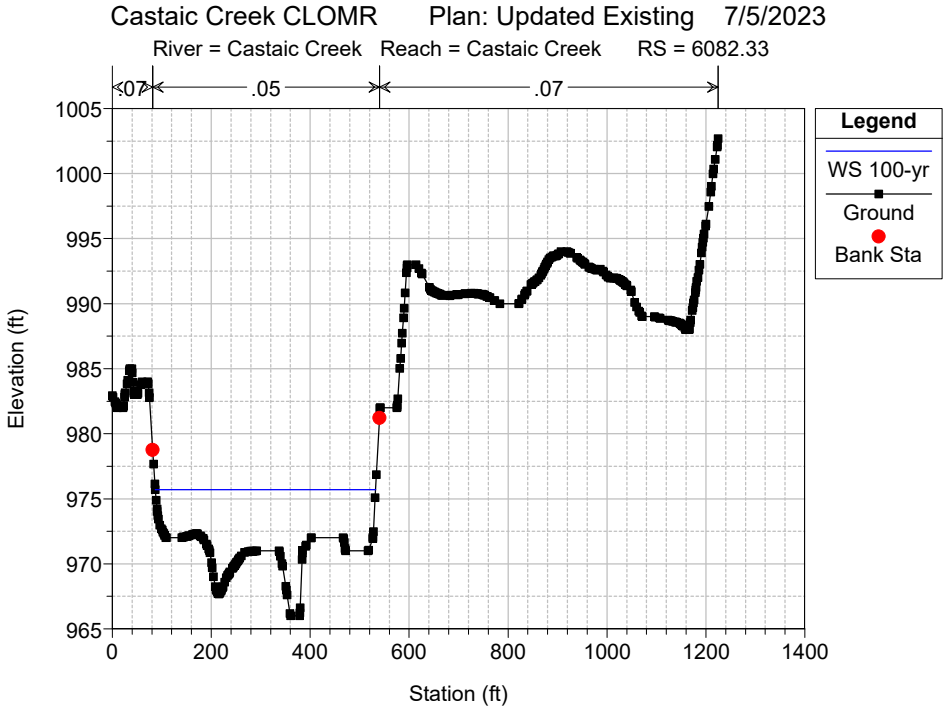

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 8000 BR Commerce Center Drive bridge
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

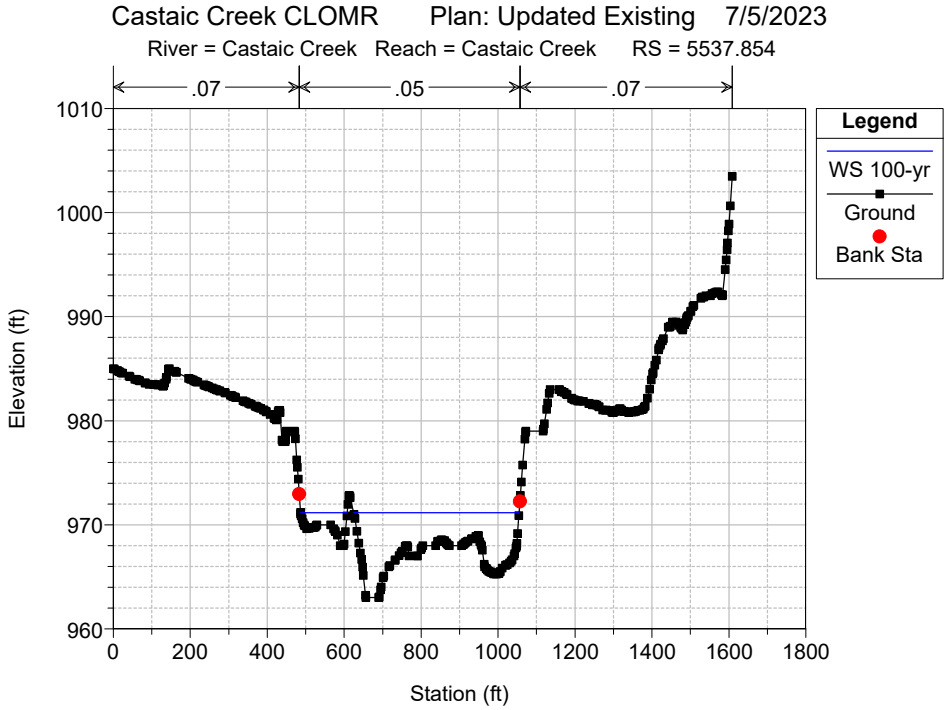

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 7999.701
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

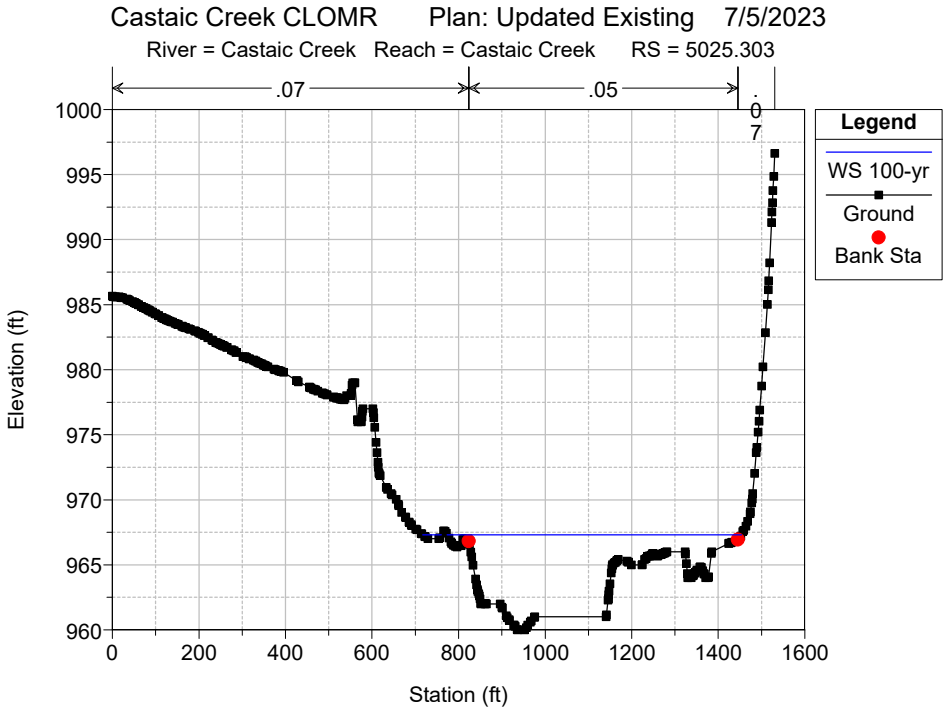

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 7797.603
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

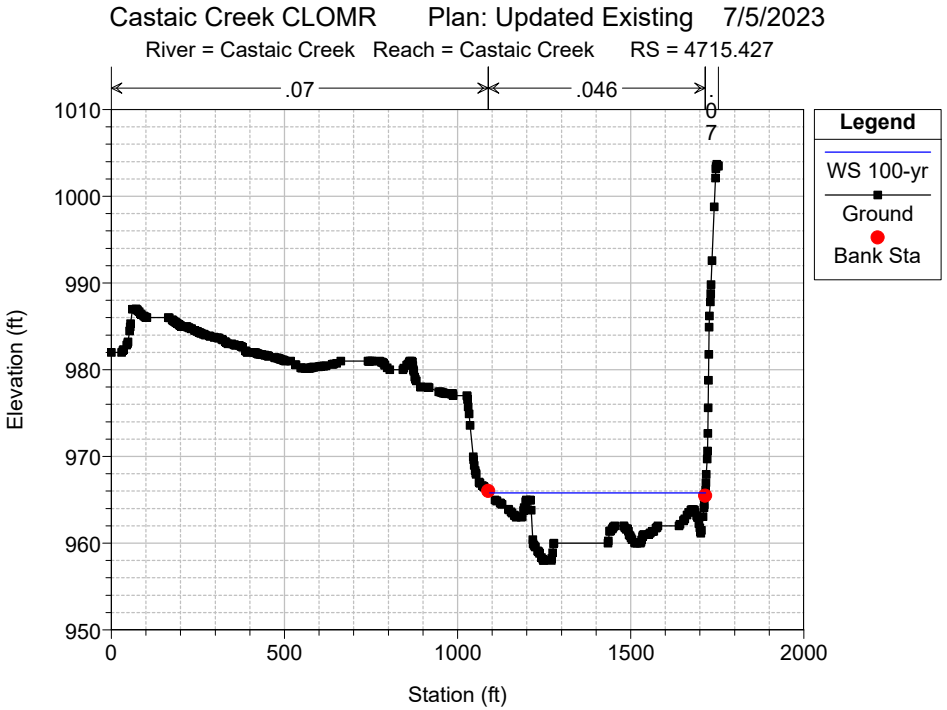

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 7298.389
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

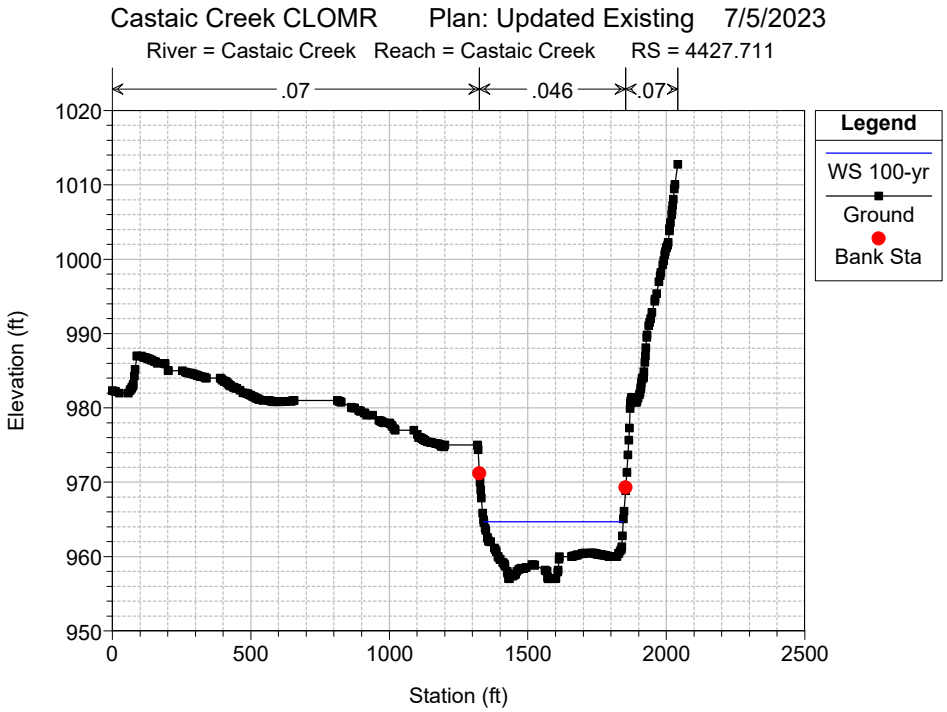

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 6704
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 6082.33
.07
.05
.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 = 5537.854
.07
.05
.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 = 5025.303
.07
.05
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

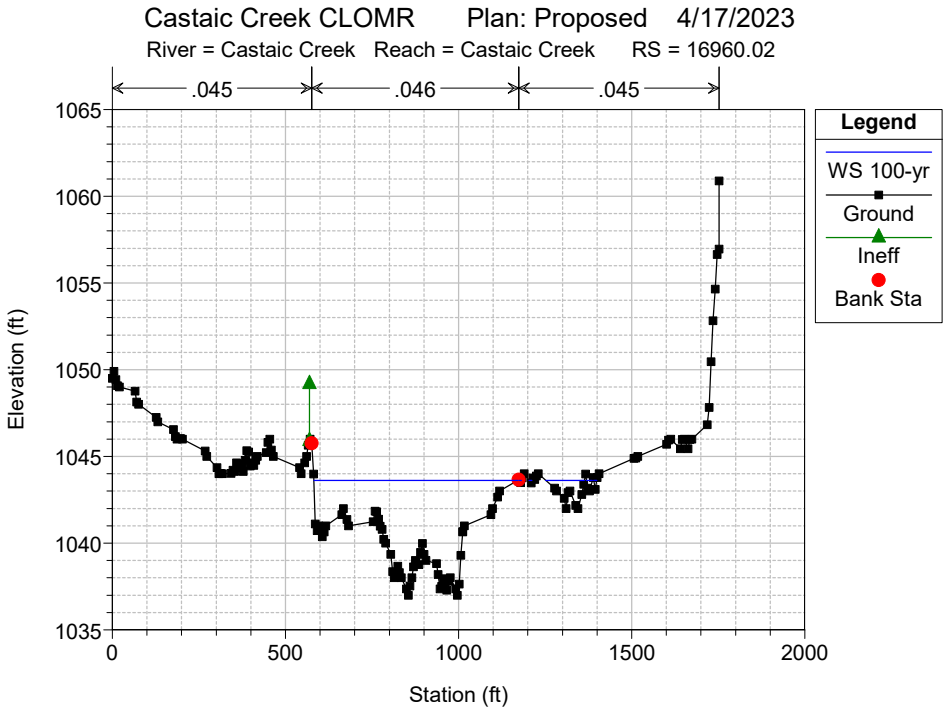

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 4715.427
.07
.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

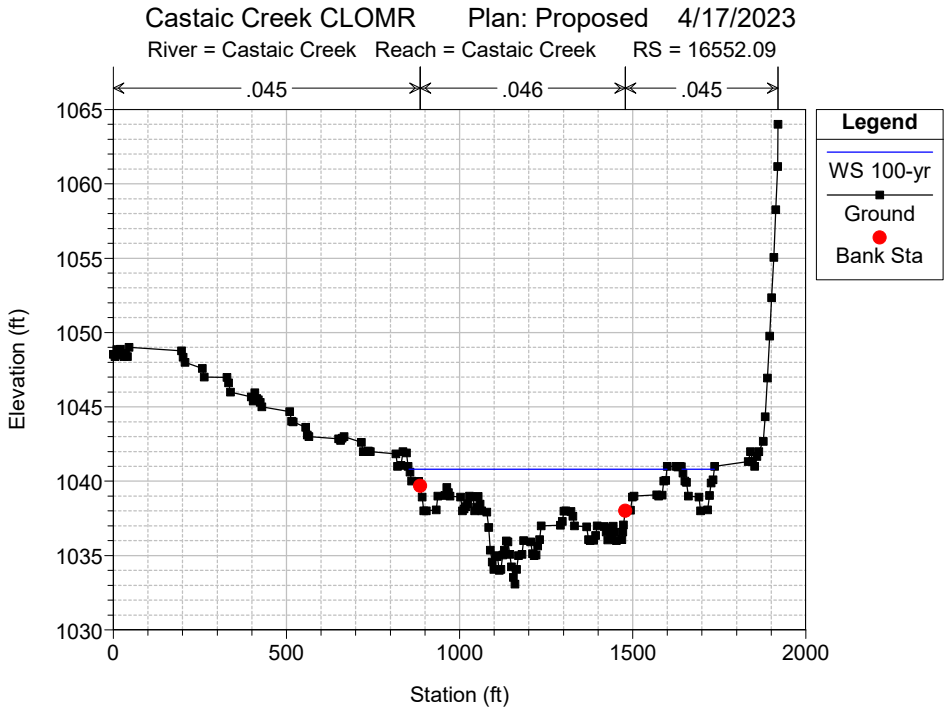

Castaic Creek CLOMR Plan: Updated Existing 7/5/2023
River = Castaic Creek Reach = Castaic Creek RS = 4427.711
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

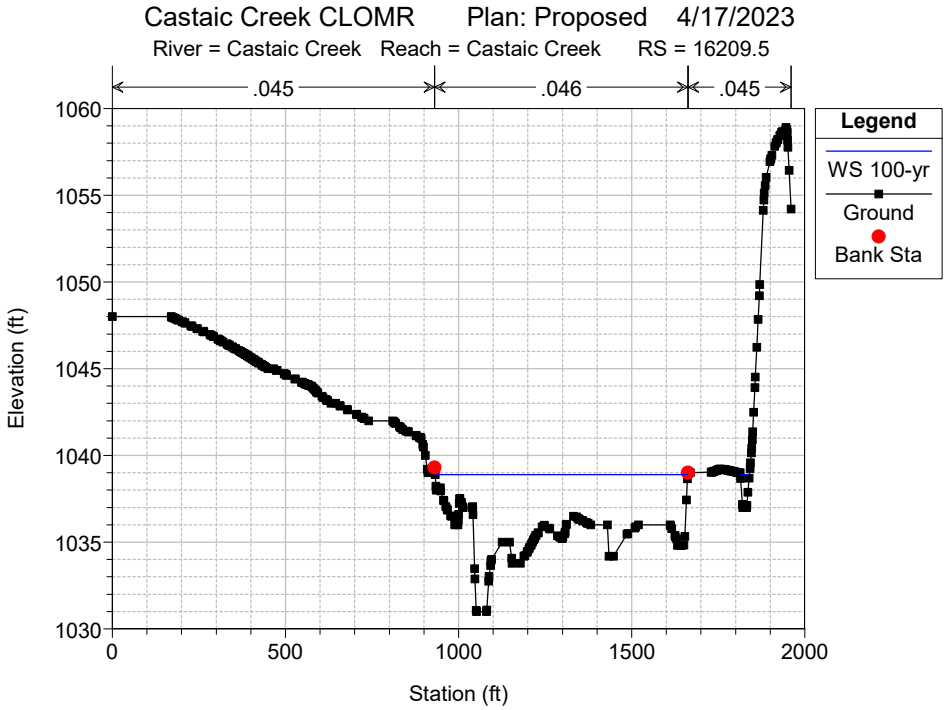
Appendix E – HEC-RAS Proposed Condition Hydraulic Results

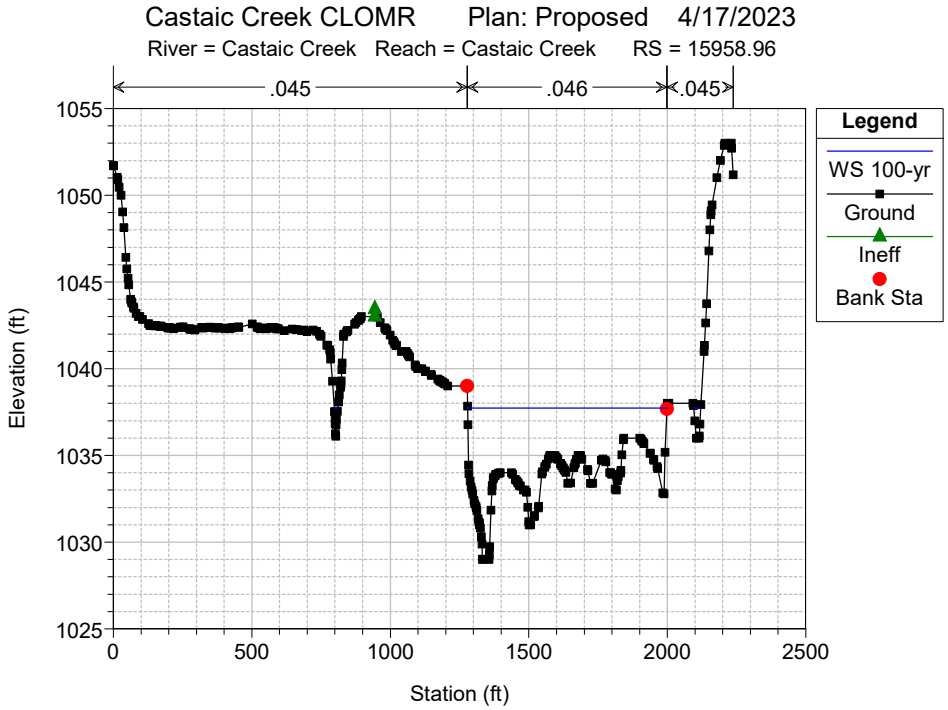
HEC-RAS Plan: Proposed River: Castaic Creek Reach: Castaic Creek Profile: 100-yr

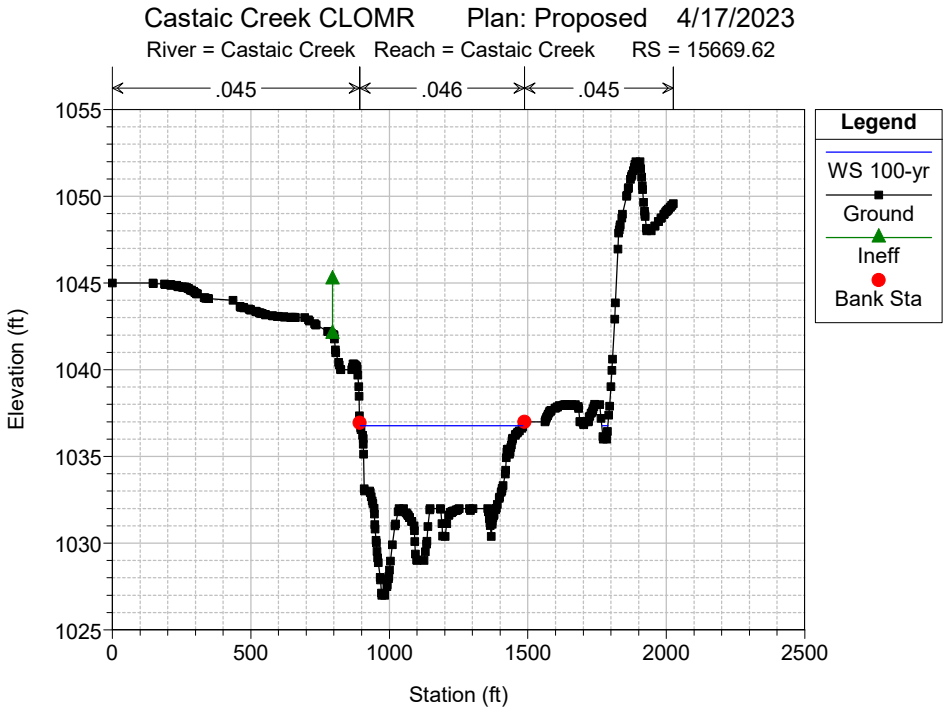
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Castaic Creek	16960.02	100-yr	14480.00	1037.00	1043.62	1042.90	1044.46	0.011050	7.43	2010.48	742.13	0.73
Castaic Creek	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

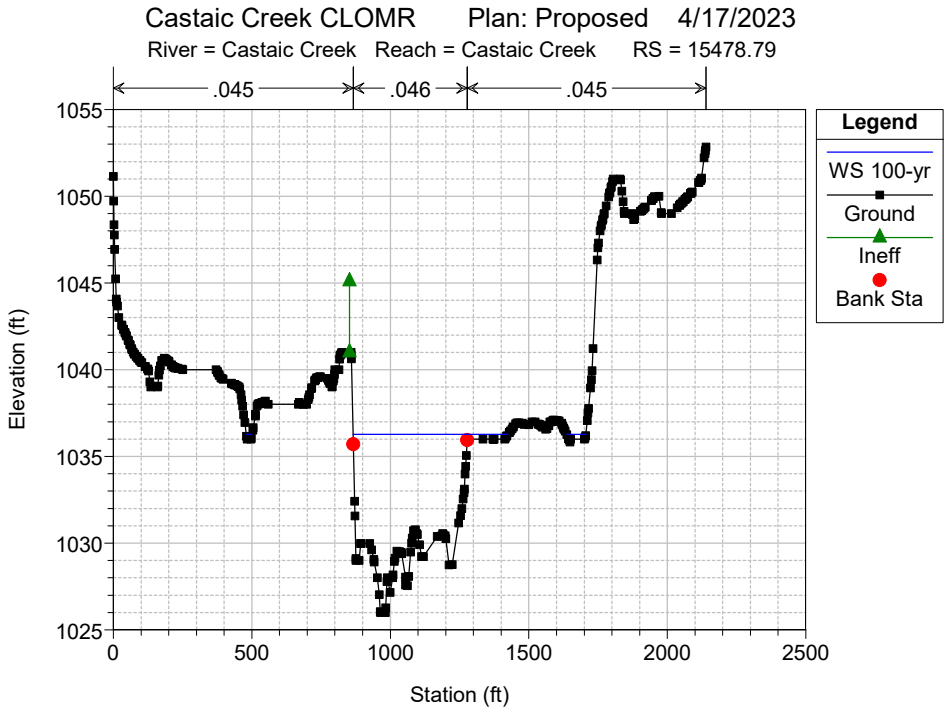

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 16960.02
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1065
1060
1055
1050
1045
1040
1035
0
500
1000
1500
2000

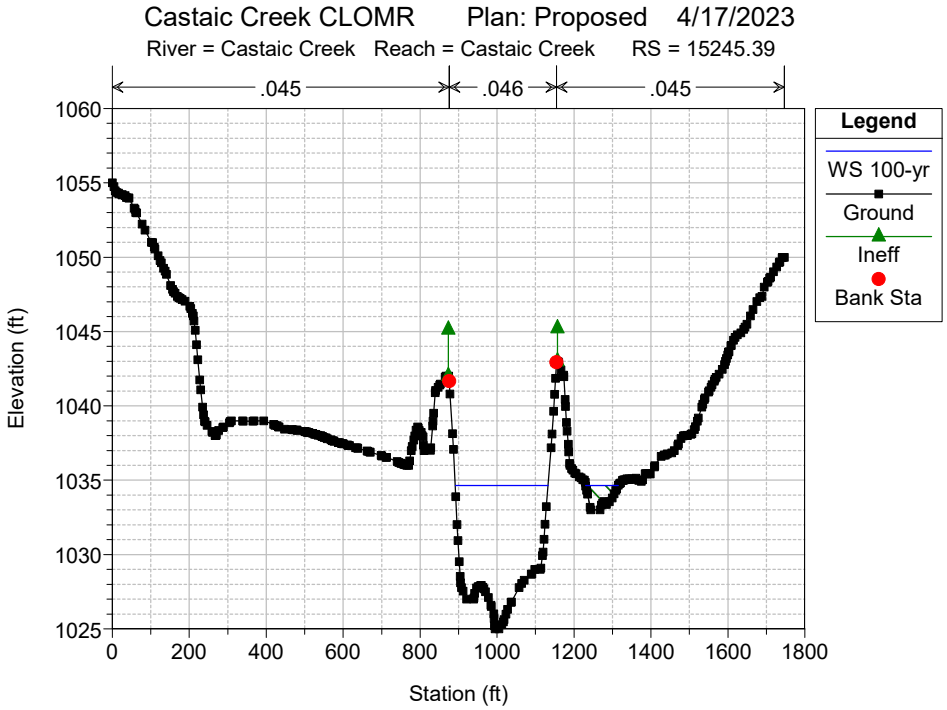

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 16552.09
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1065
1060
1055
1050
1045
1040
1035
1030
0
500
1000
1500
2000

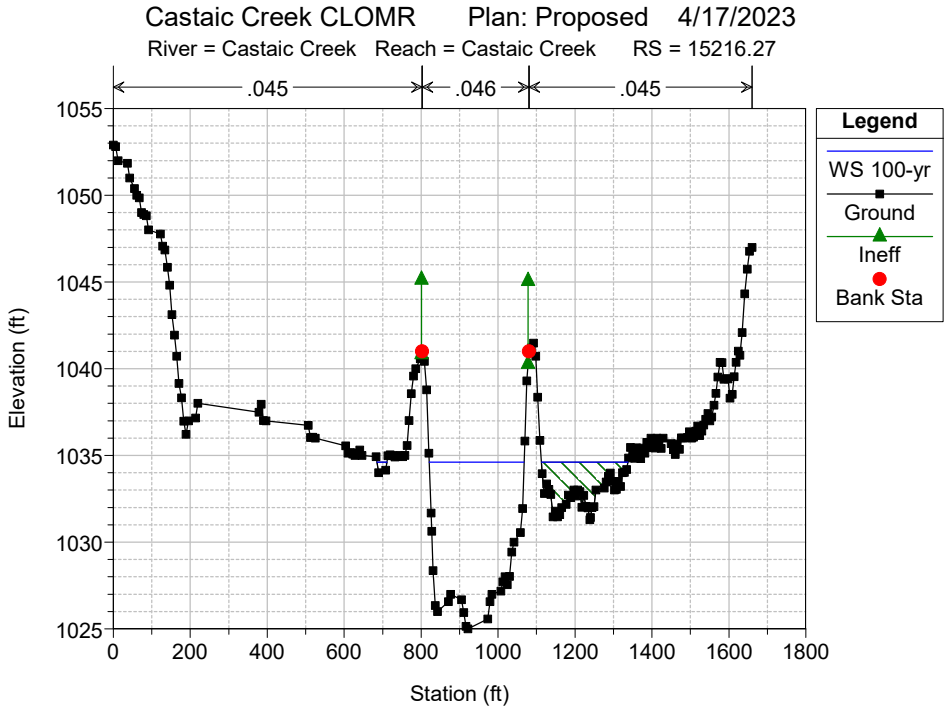

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 16209.5
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1060
1055
1050
1045
1040
1035
1030
0
500
1000
1500
2000

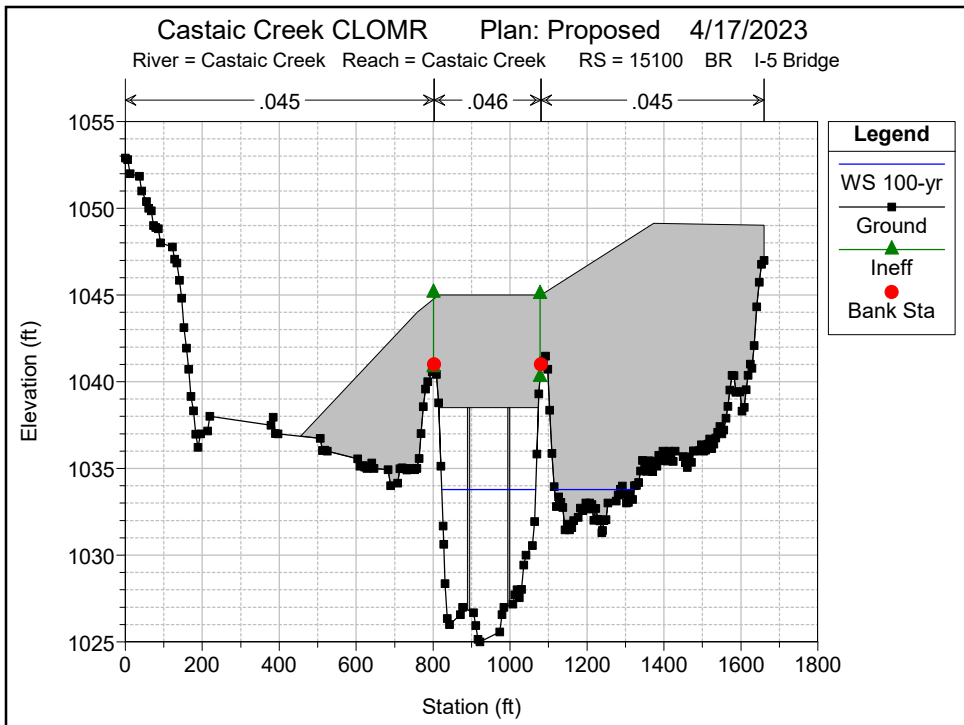

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 15958.96
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1055
1050
1045
1040
1035
1030
1025
0
500
1000
1500
2000
2500

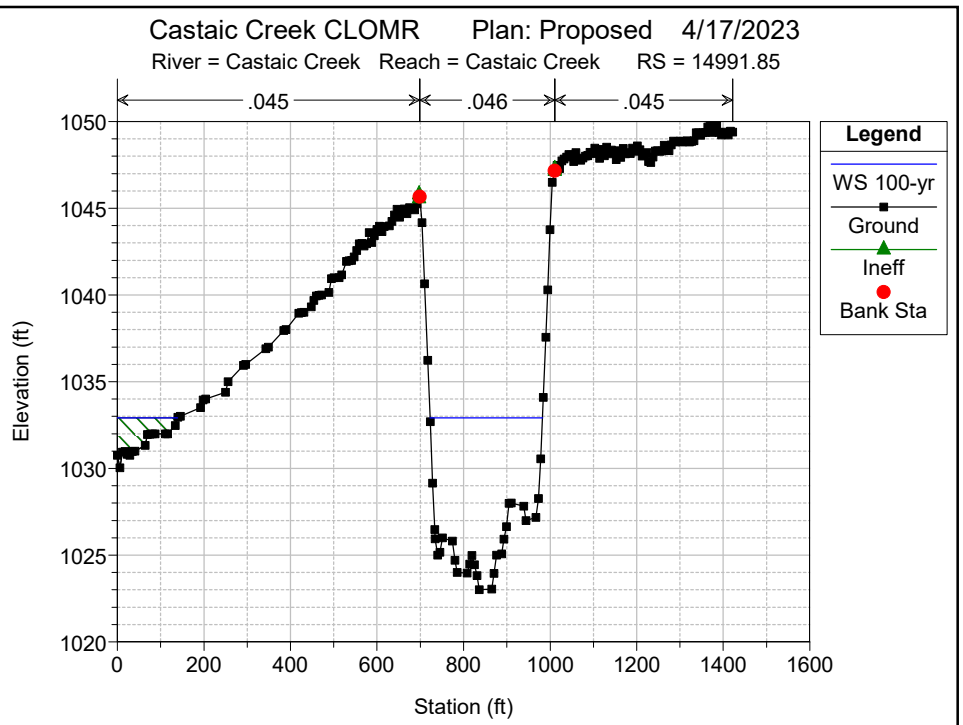

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 15669.62
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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1050
1045
1040
1035
1030
1025
0
500
1000
1500
2000
2500

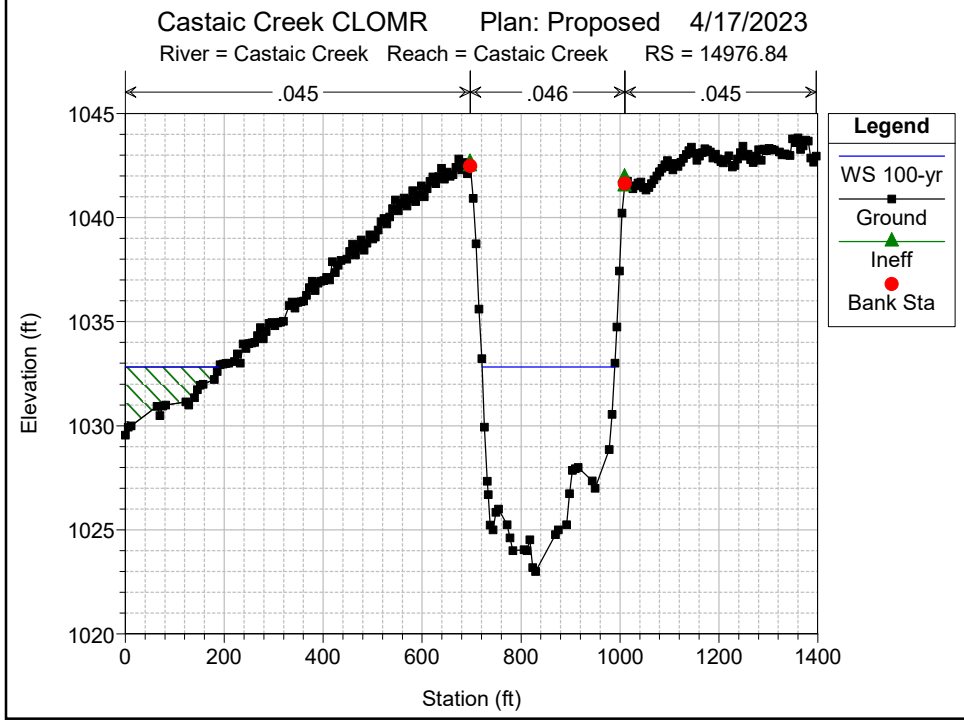

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 15478.79
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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1045
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1030
1025
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500
1000
1500
2000
2500

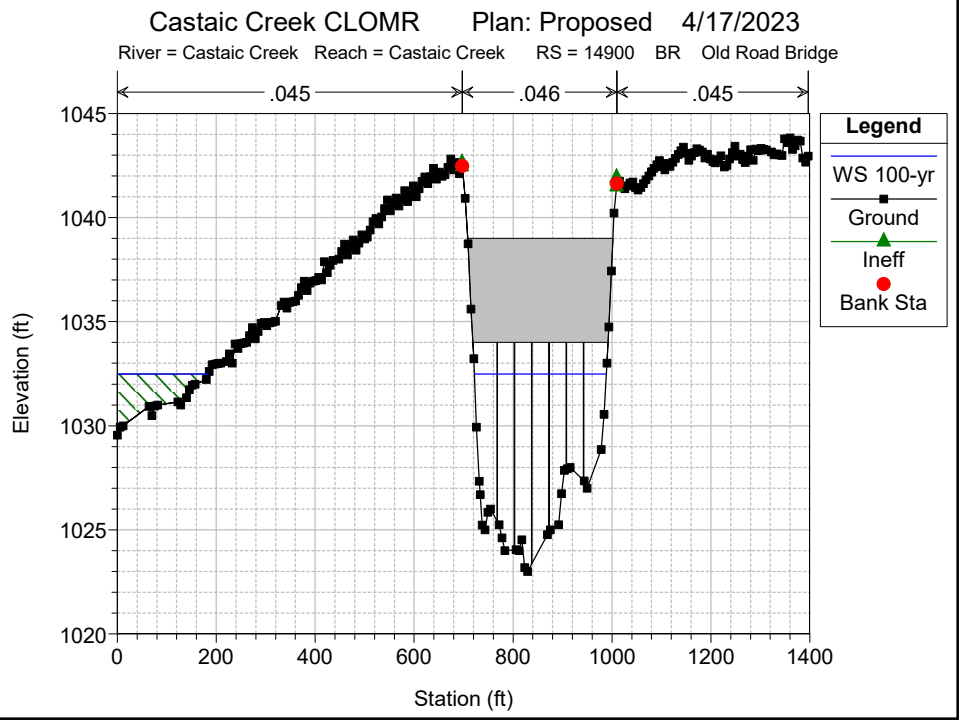

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 15245.39
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1060
1055
1050
1045
1040
1035
1030
1025
0
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400
600
800
1000
1200
1400
1600
1800

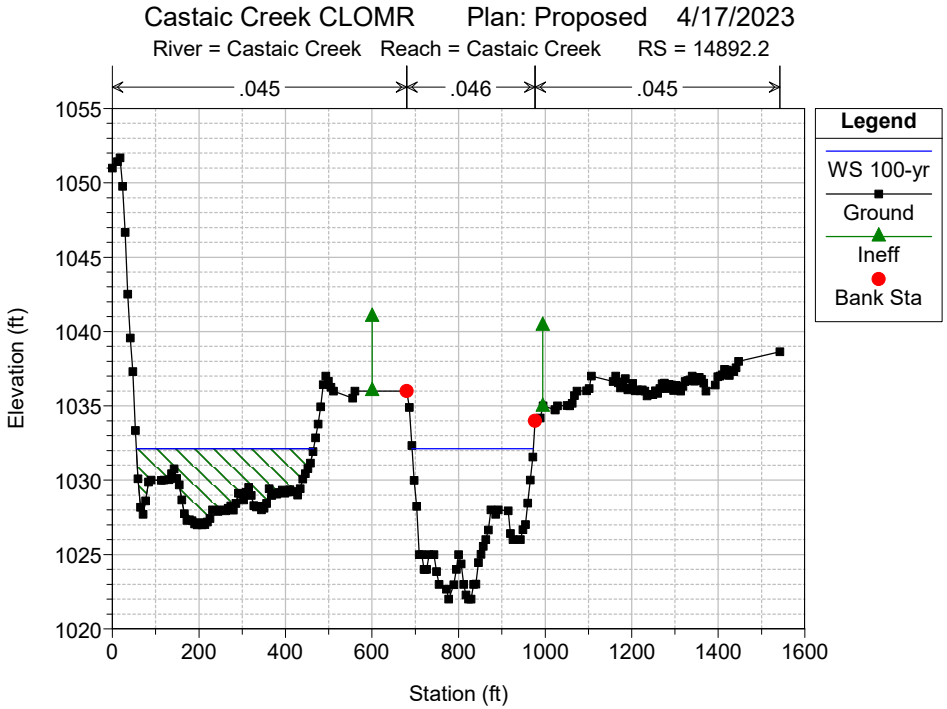

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 15216.27
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1055
1050
1045
1040
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1025
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200
400
600
800
1000
1200
1400
1600
1800

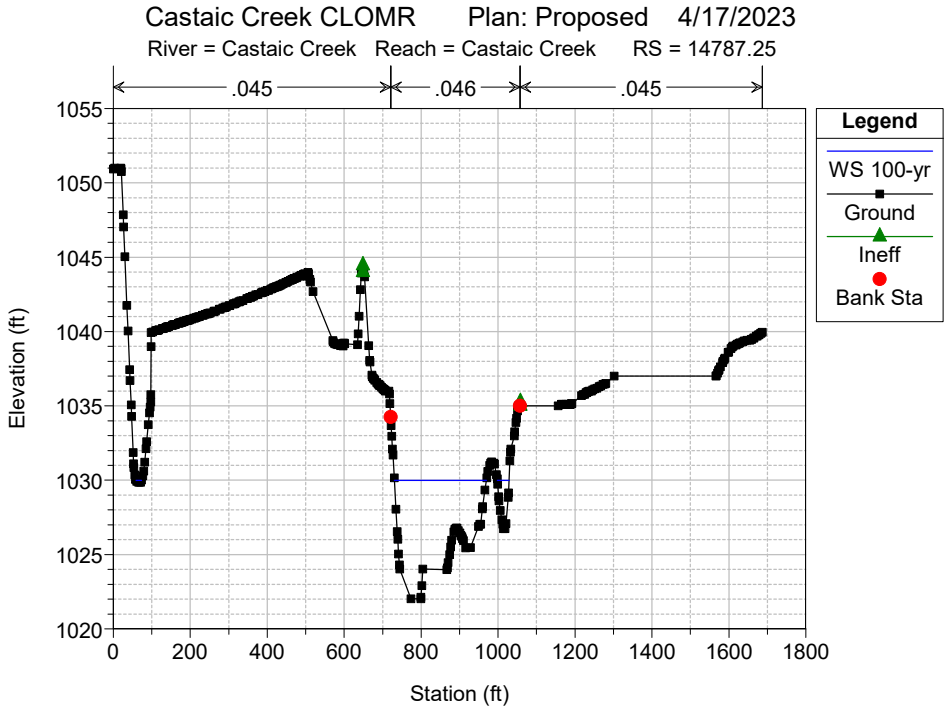

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 15100 BR I-5 Bridge
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

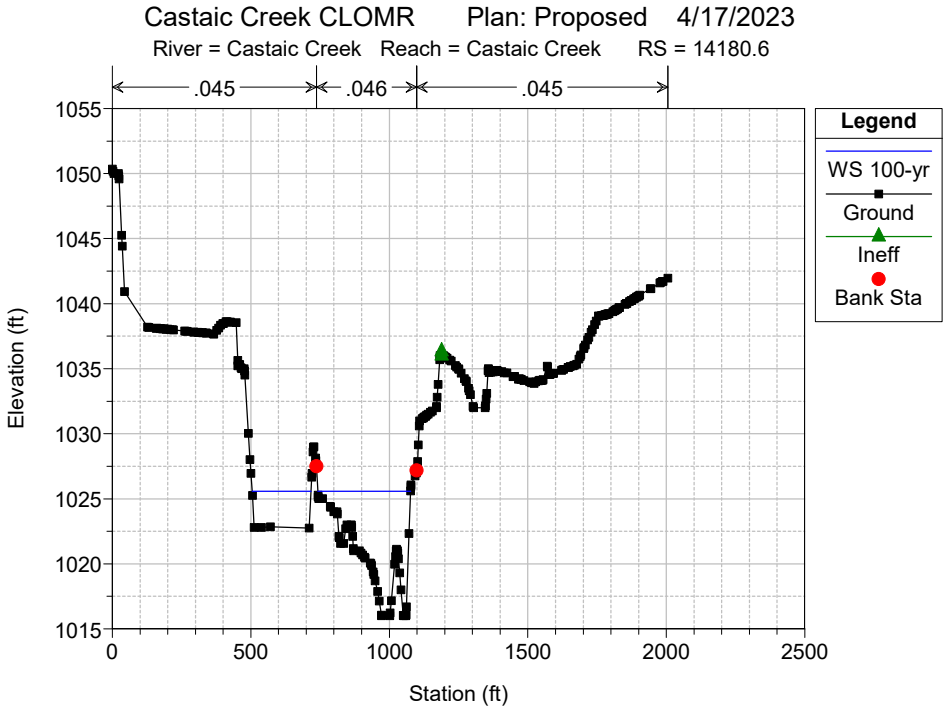

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 14991.85
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

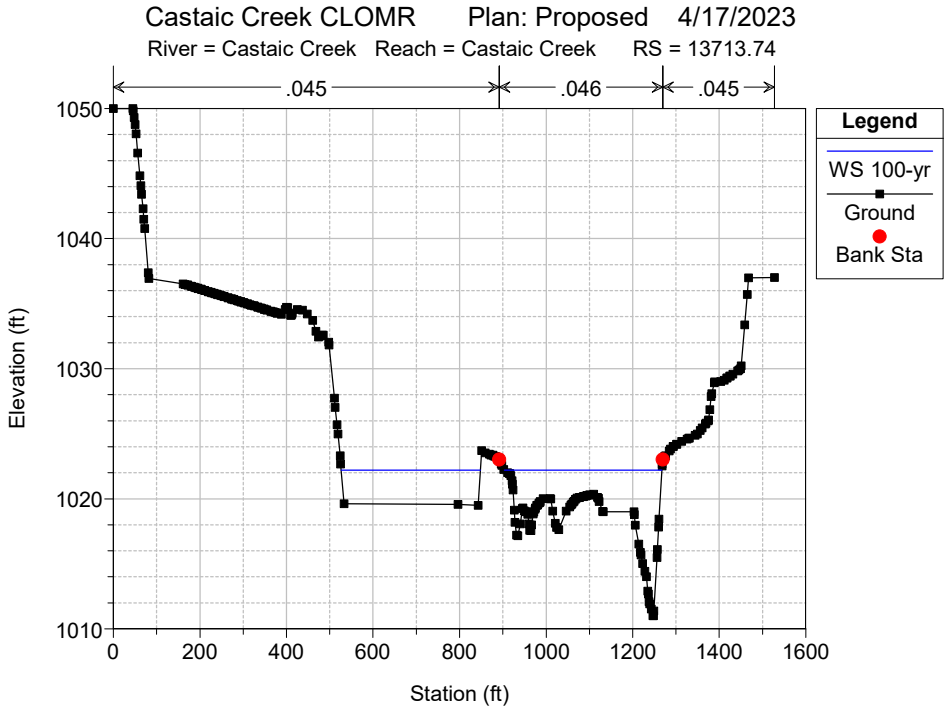

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 14976.84
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

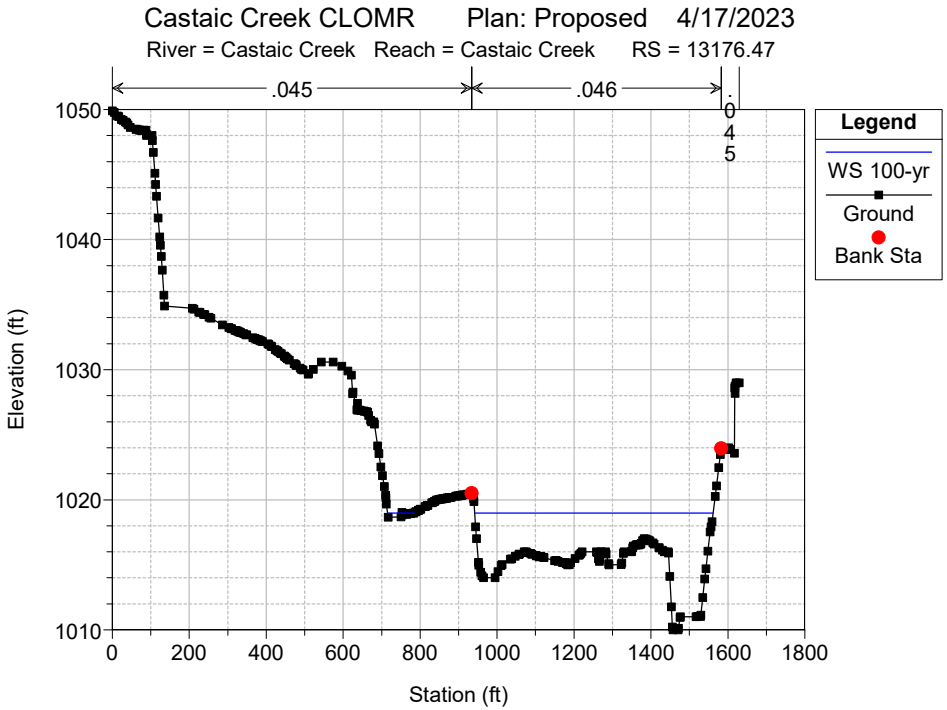

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 14900 BR Old Road Bridge
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

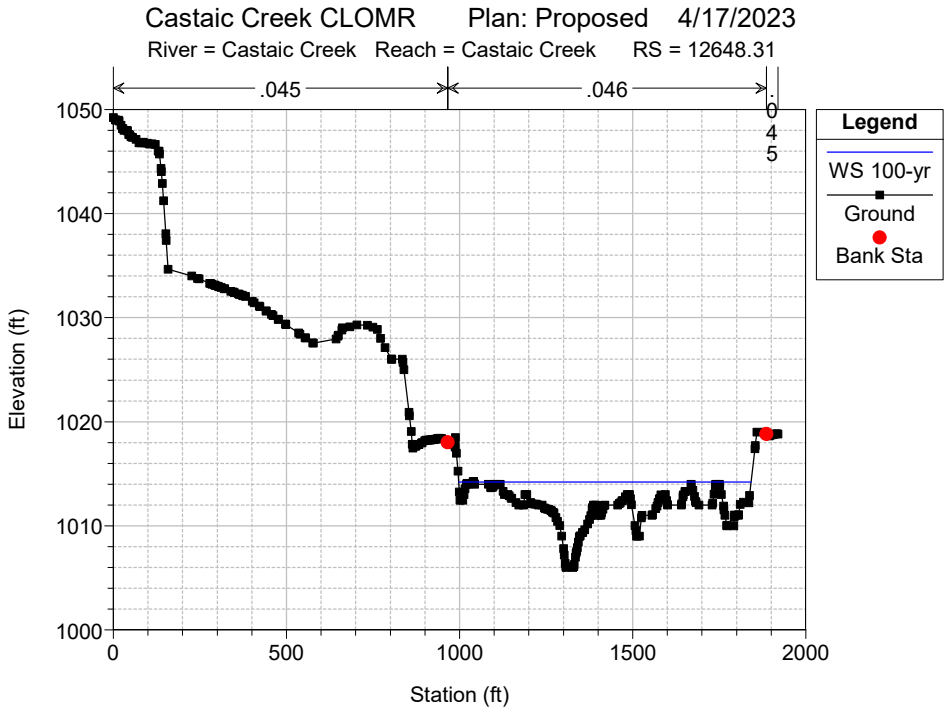

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 14892.2
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

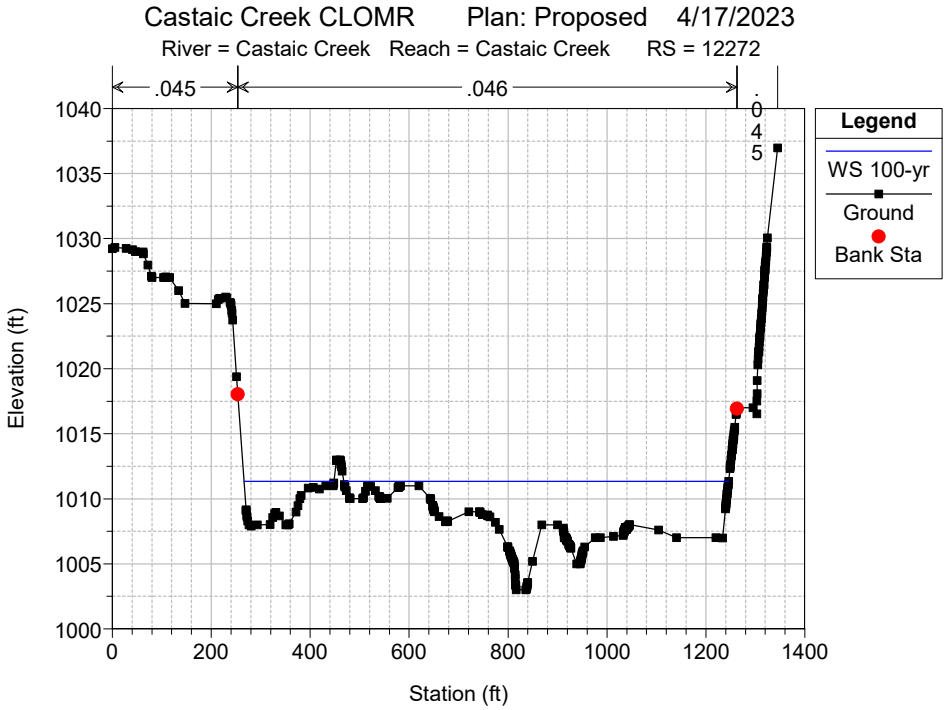

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 14787.25
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

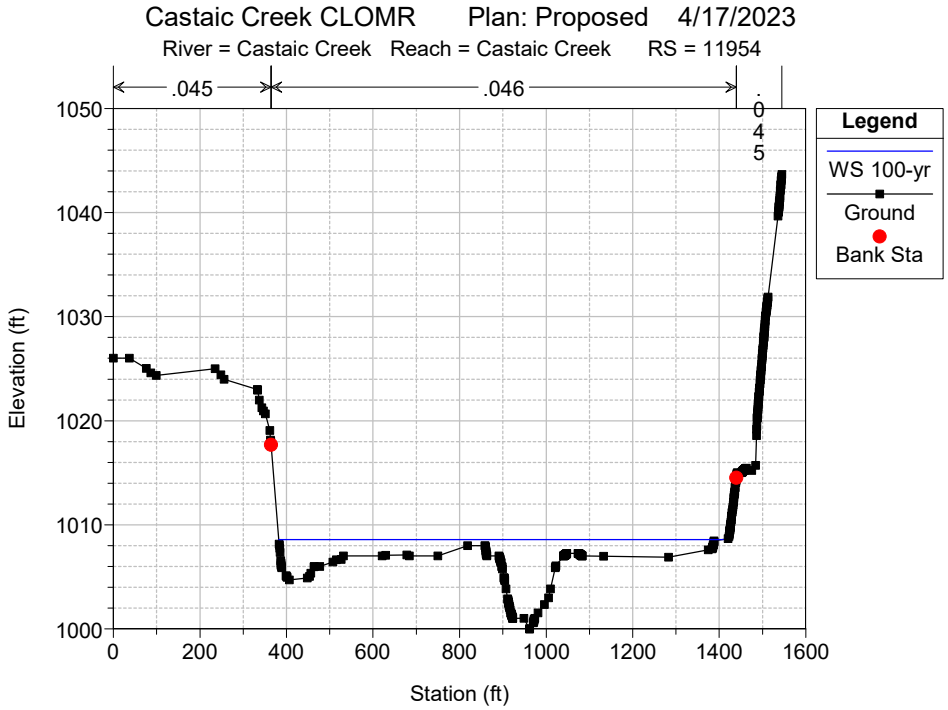

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 14180.6
.045
.046
.045
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

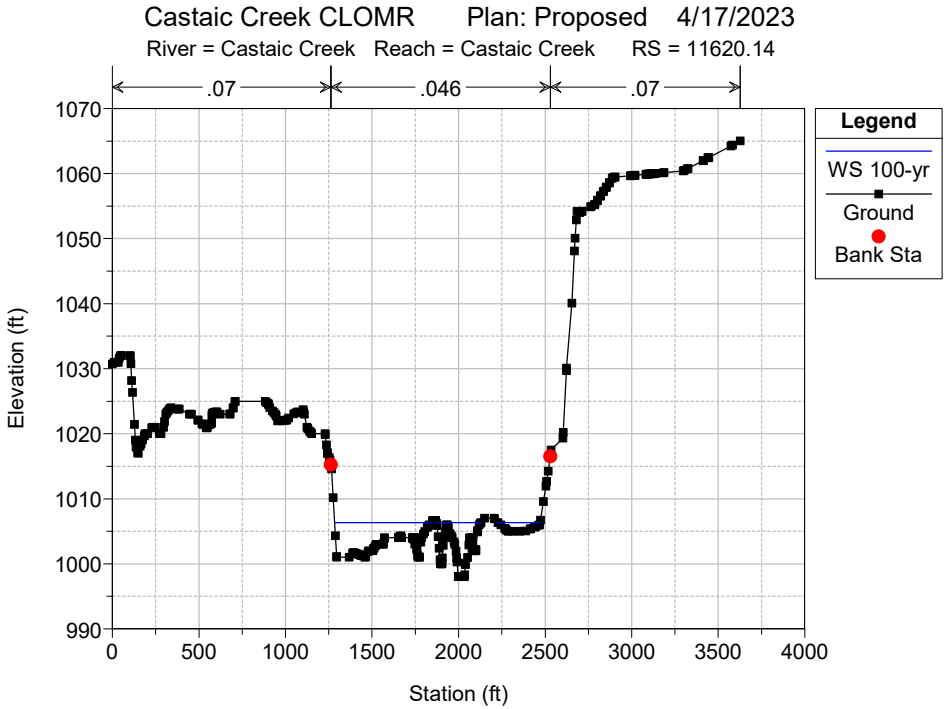

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 13713.74
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

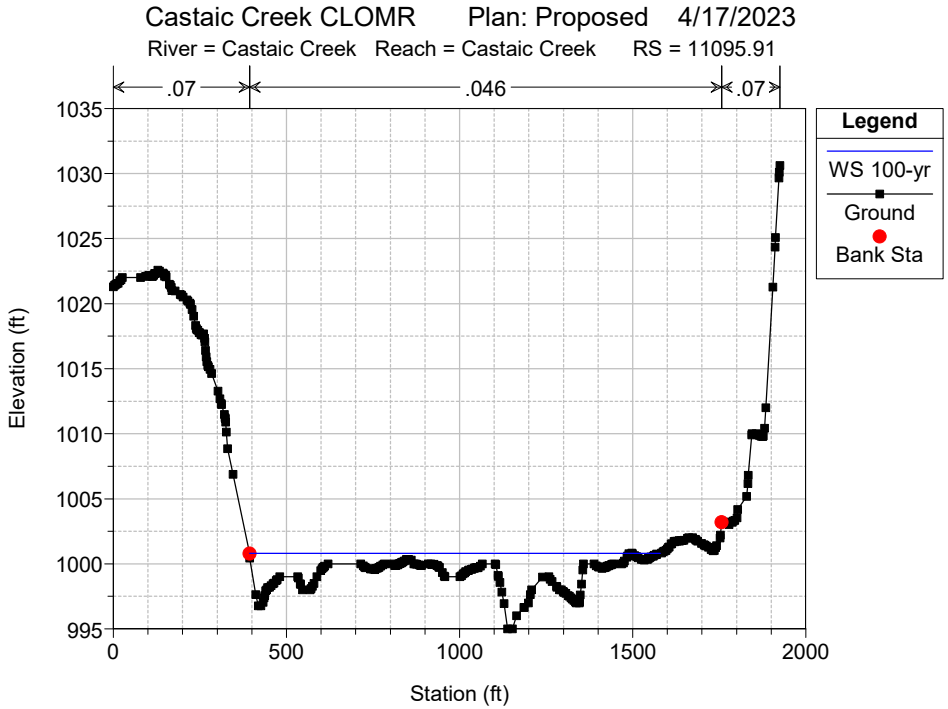

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 13176.47
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1050
1040
1030
1020
1010
0
200
400
600
800
1000
1200
1400
1600
1800

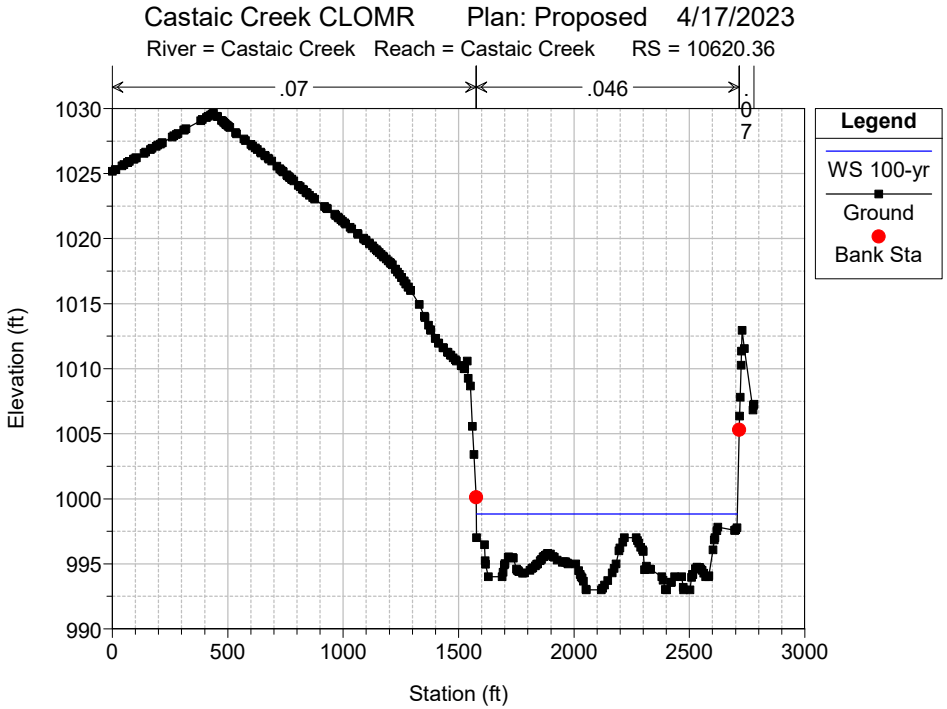

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 12648.31
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1050
1040
1030
1020
1010
1000
0
500
1000
1500
2000

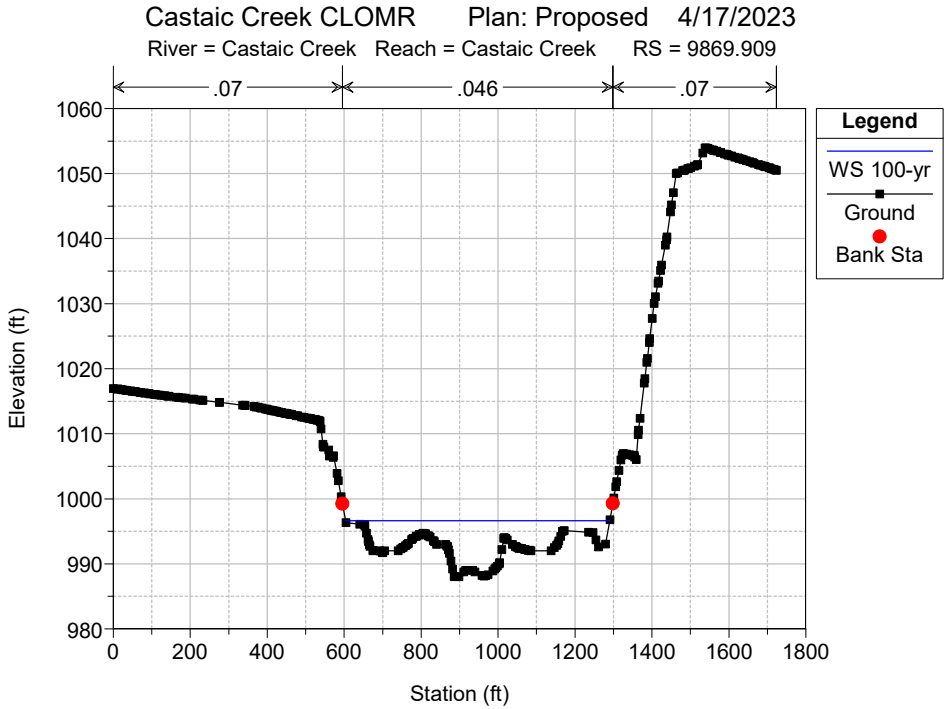

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 12272
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1040
1035
1030
1025
1020
1015
1010
1005
1000
0
200
400
600
800
1000
1200
1400

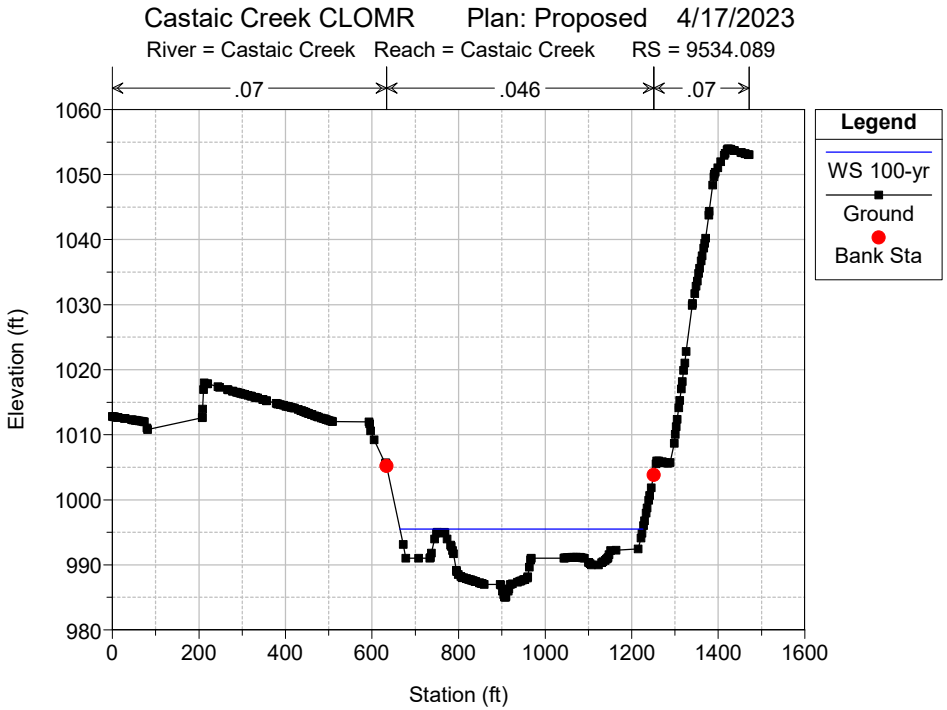

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 11954
.045
.046
.045
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1050
1040
1030
1020
1010
1000
0
200
400
600
800
1000
1200
1400
1600

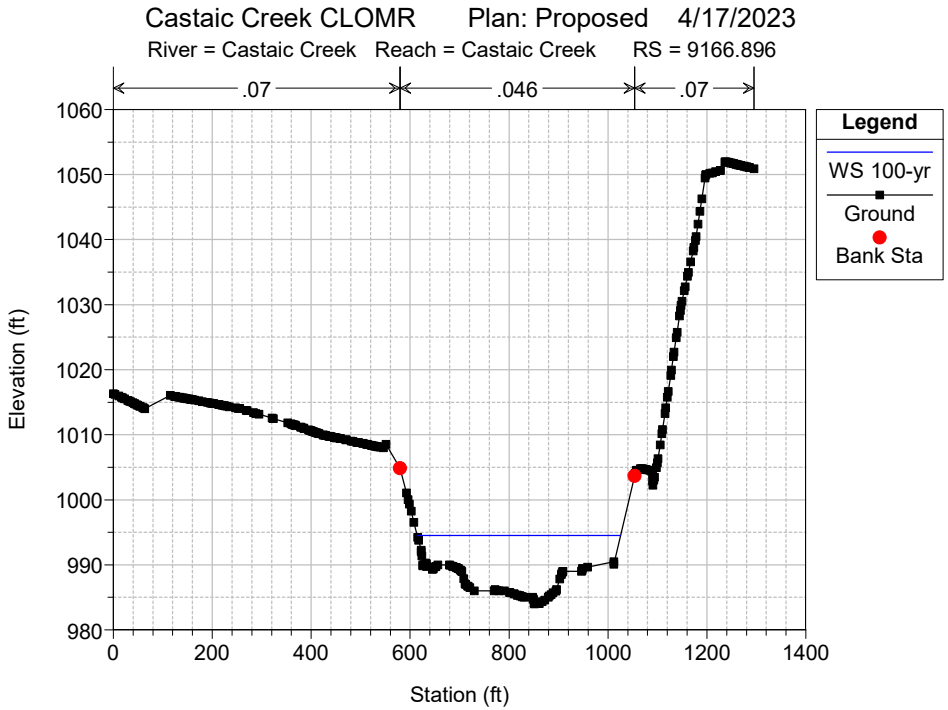

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 11620.14
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

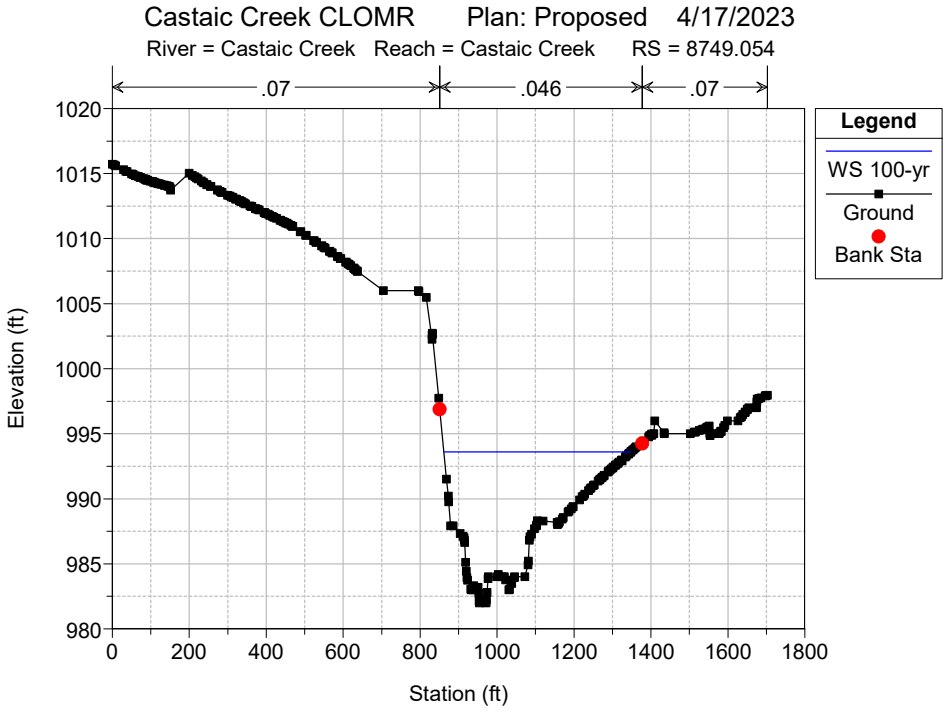

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 11095.91
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

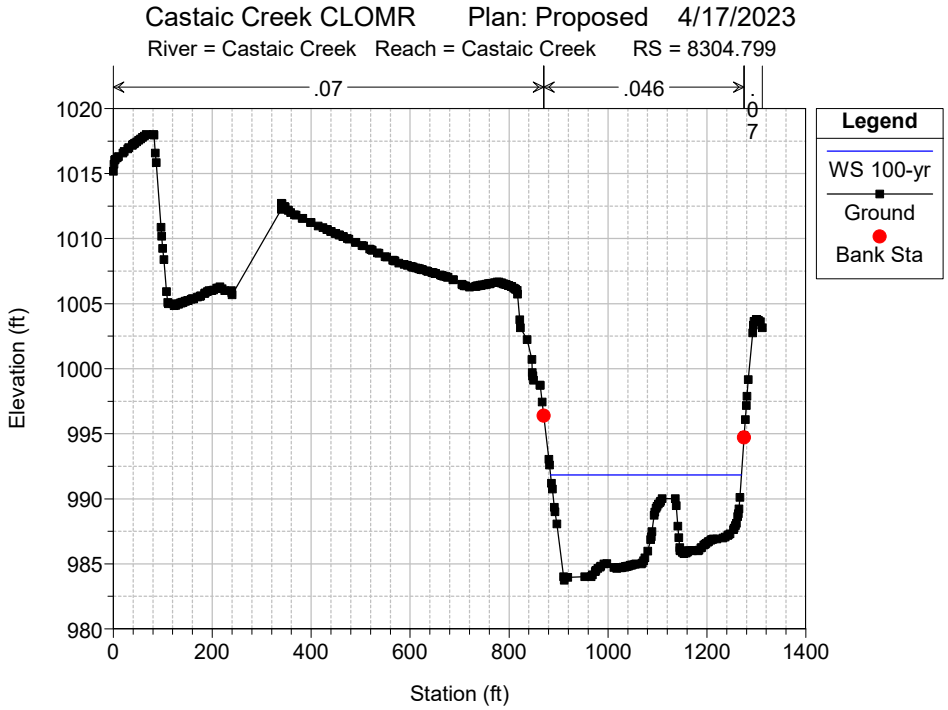

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 10620.36
.07
.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

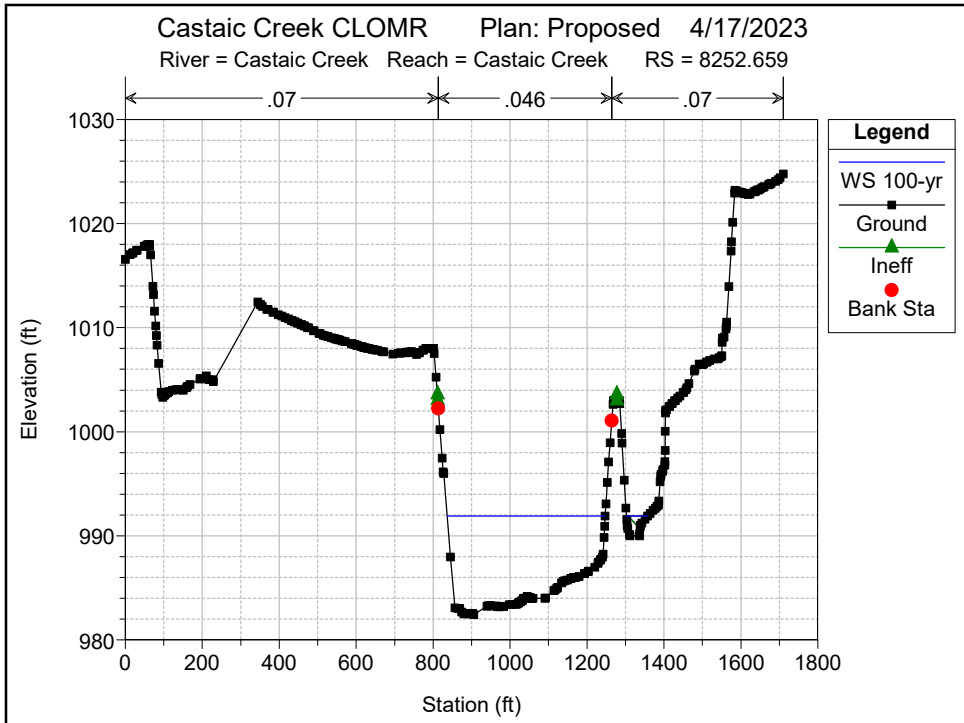

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 9869.909
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

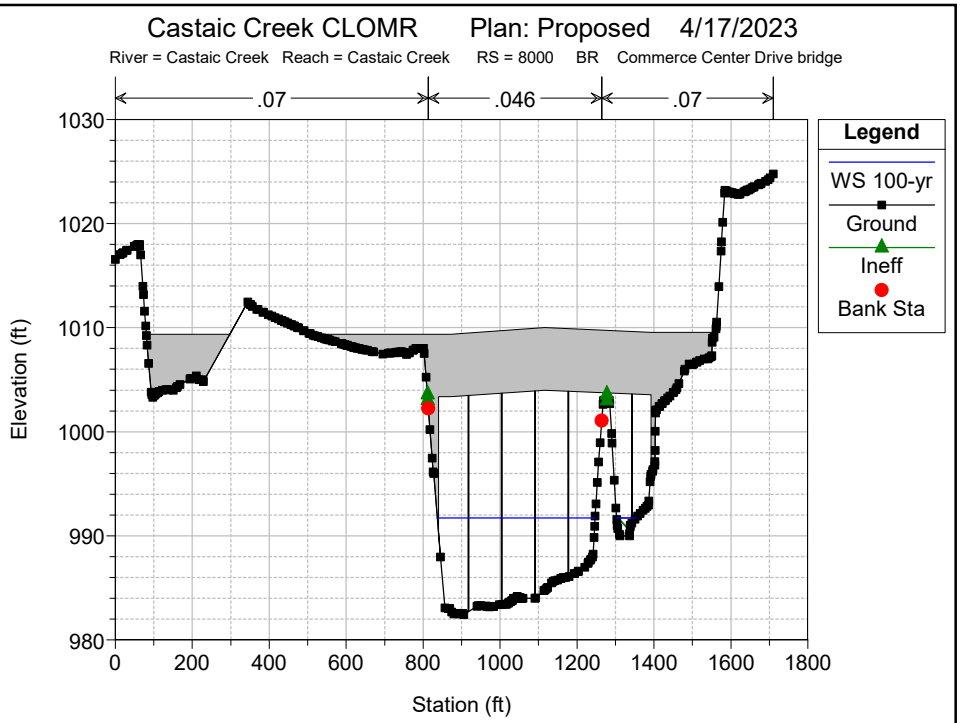

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 9534.089
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

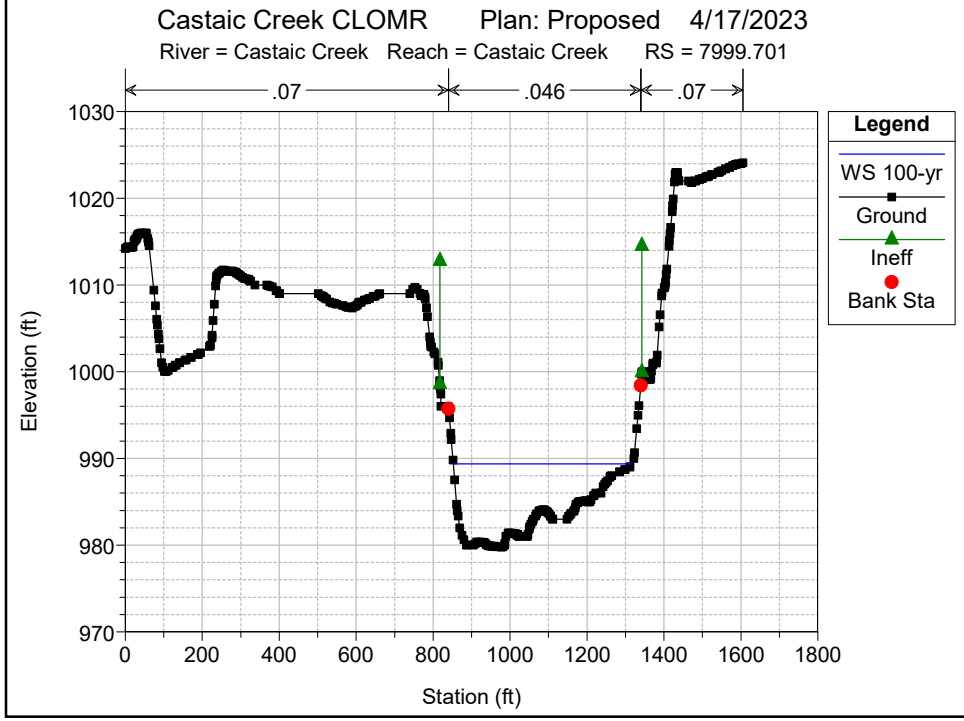

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 9166.896
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

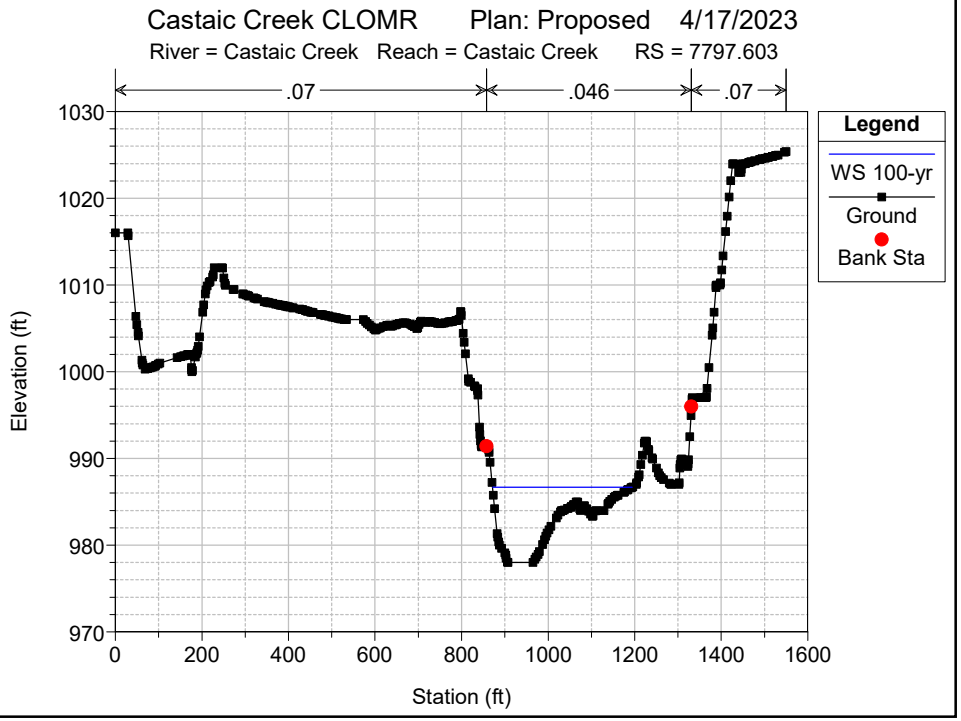

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8749.054
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

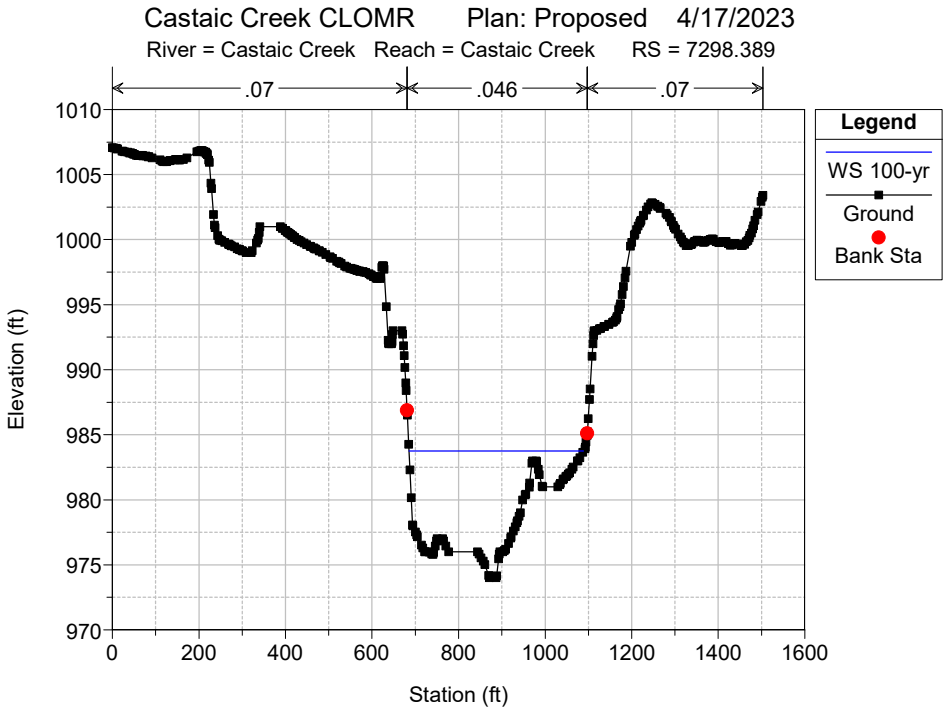

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8304.799
.07
.046
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

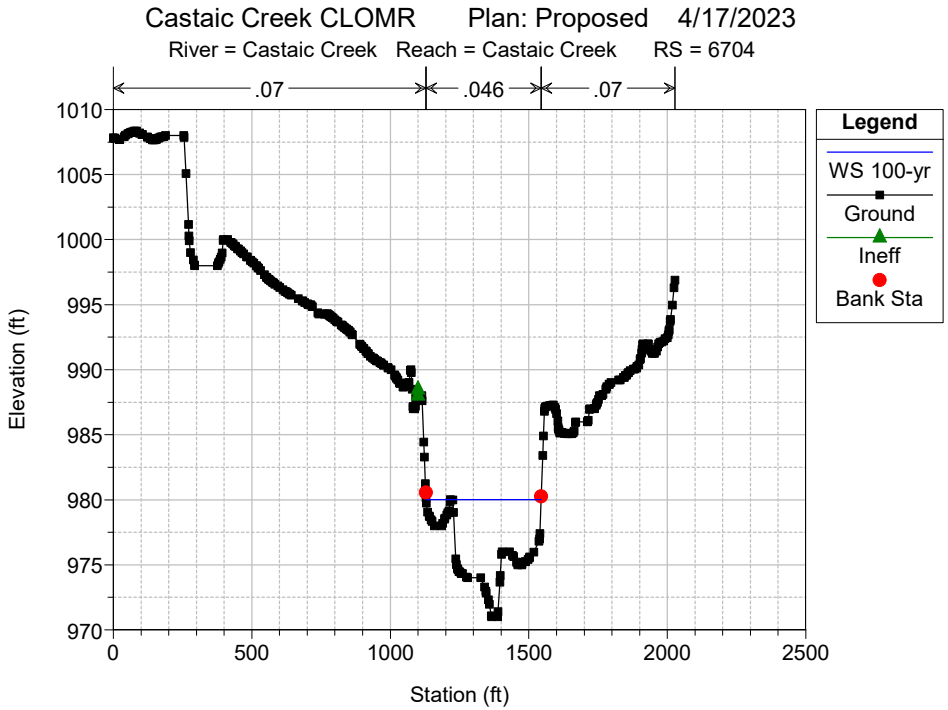

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8252.659
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

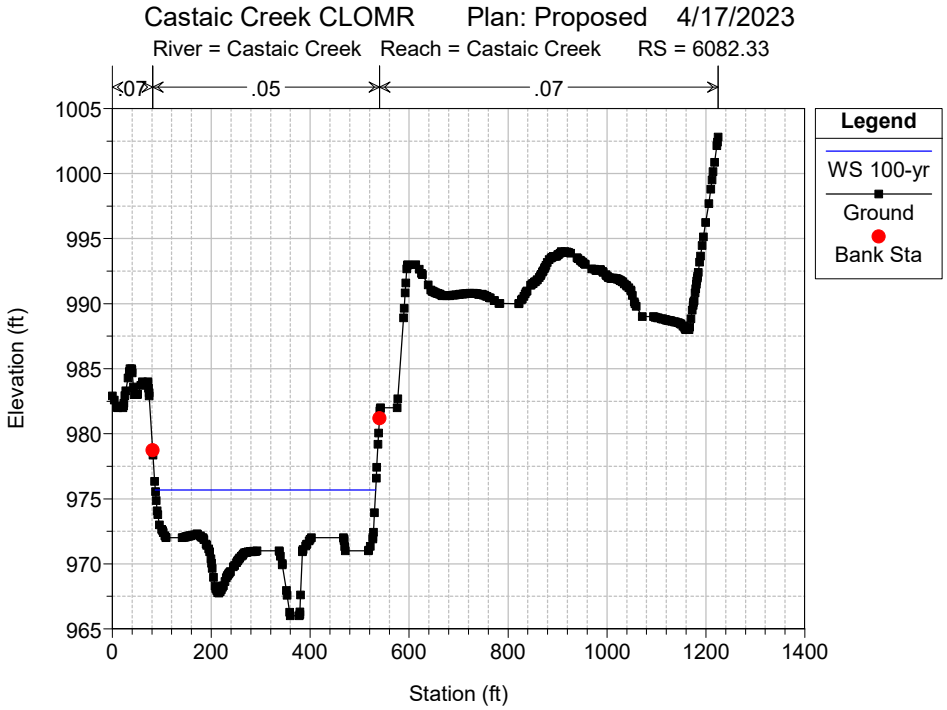

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 8000 BR Commerce Center Drive bridge
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

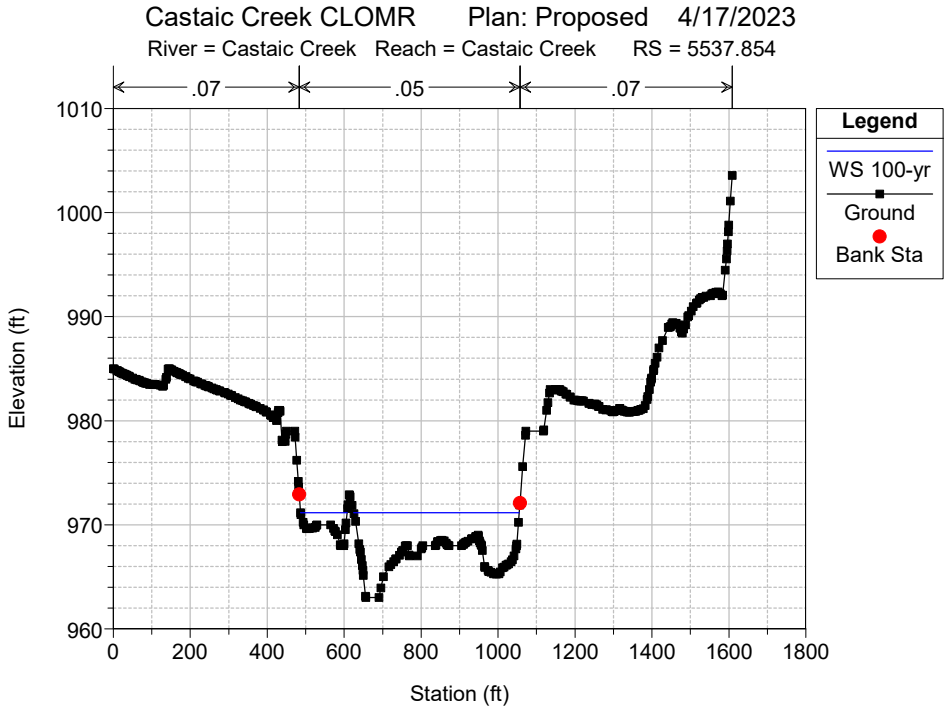

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 7999.701
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

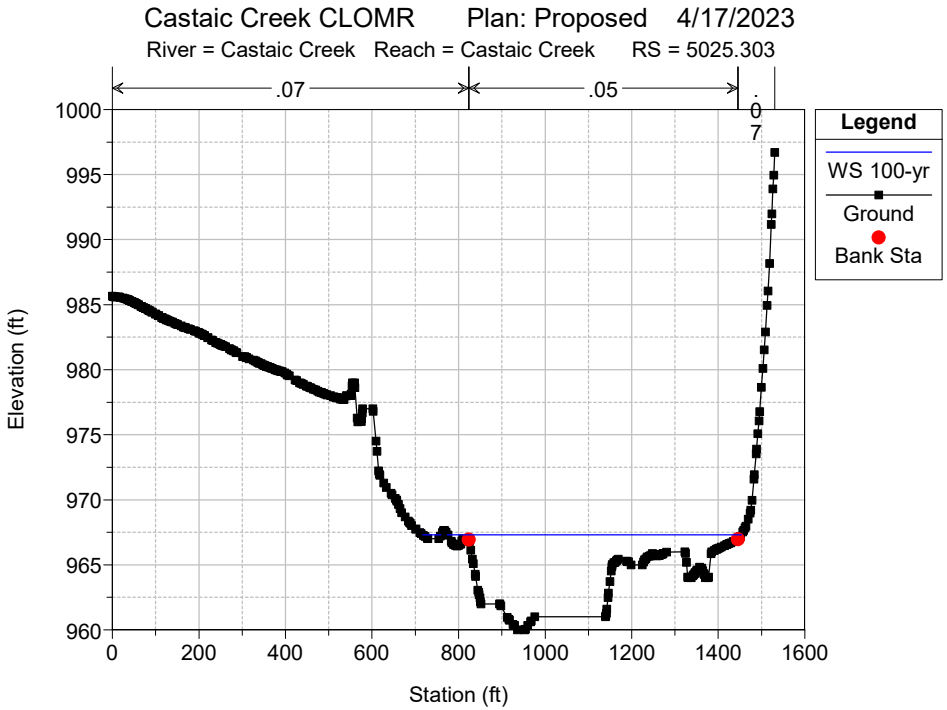

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 7797.603
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

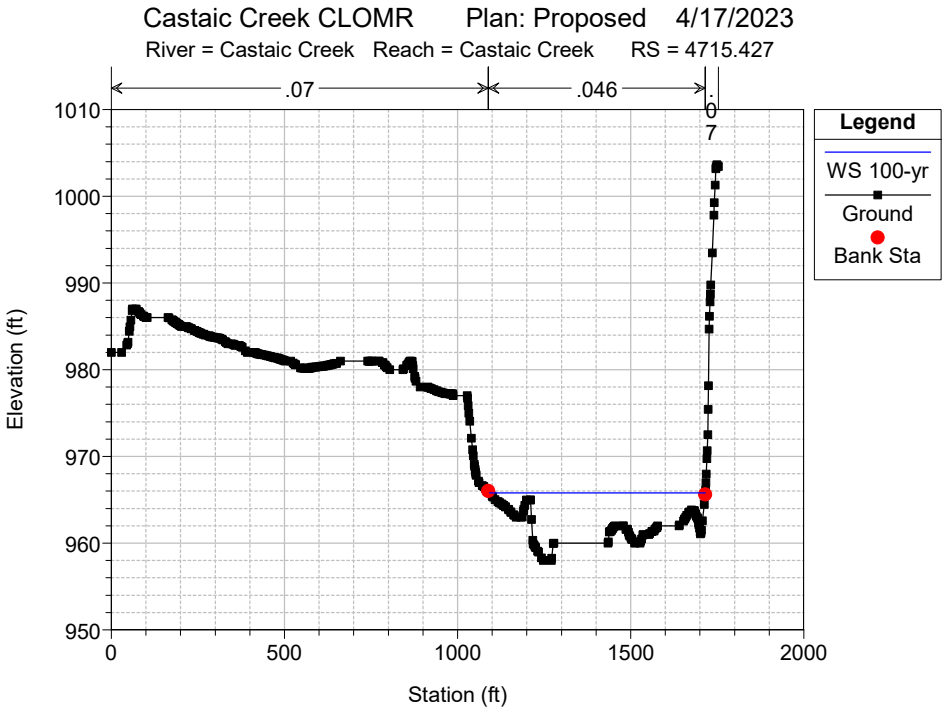

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 7298.389
.07
.046
.07
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

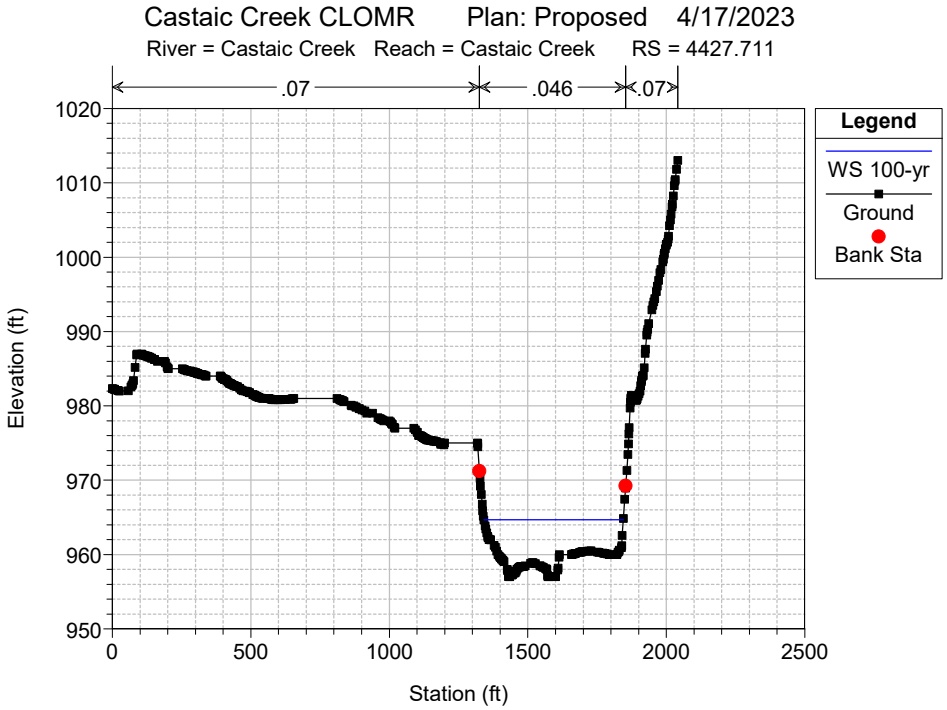

Castaic Creek CLOMR Plan: Proposed 4/17/2023
River = Castaic Creek Reach = Castaic Creek RS = 6704
.07
.046
.07
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


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

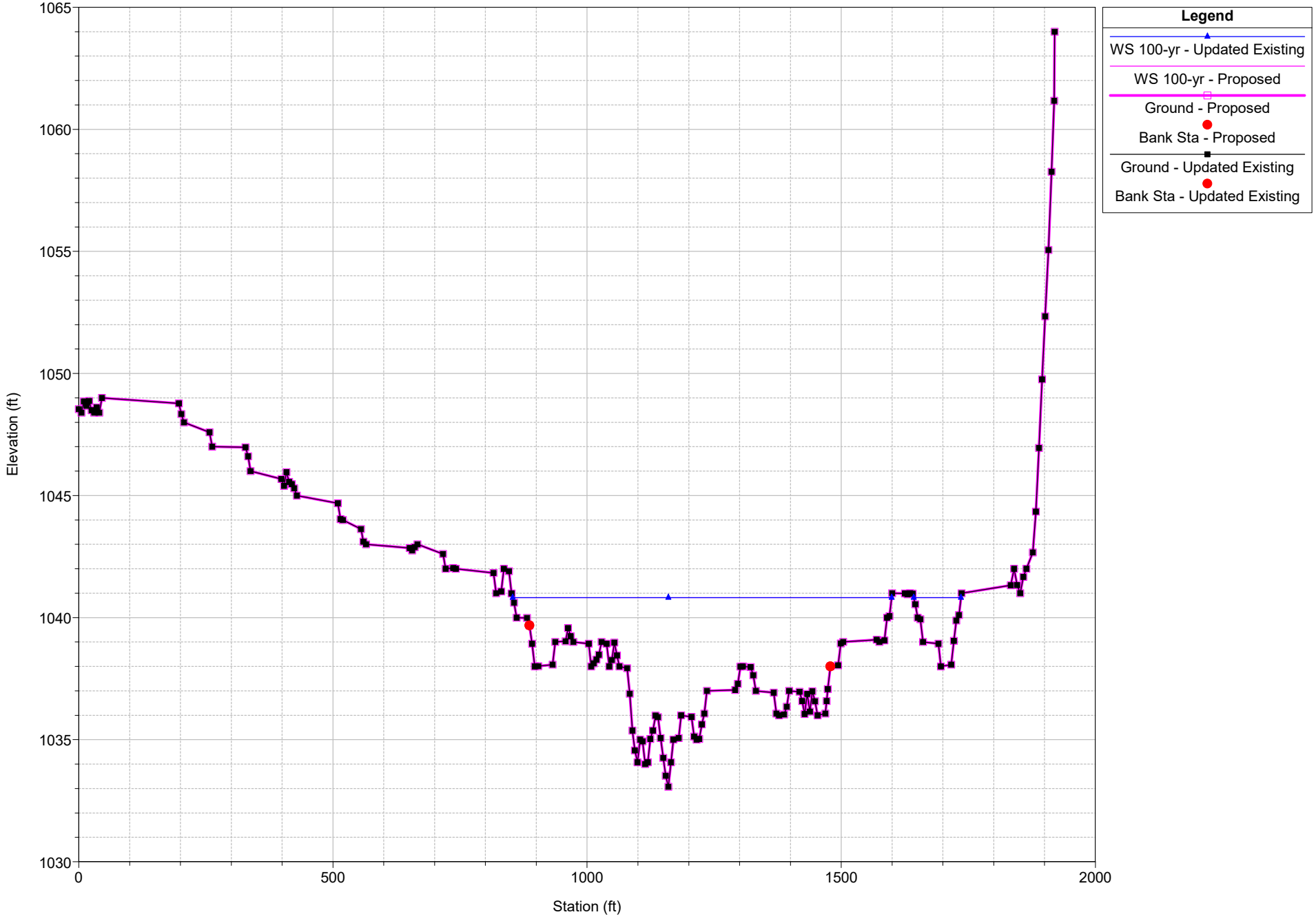
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 16960.02



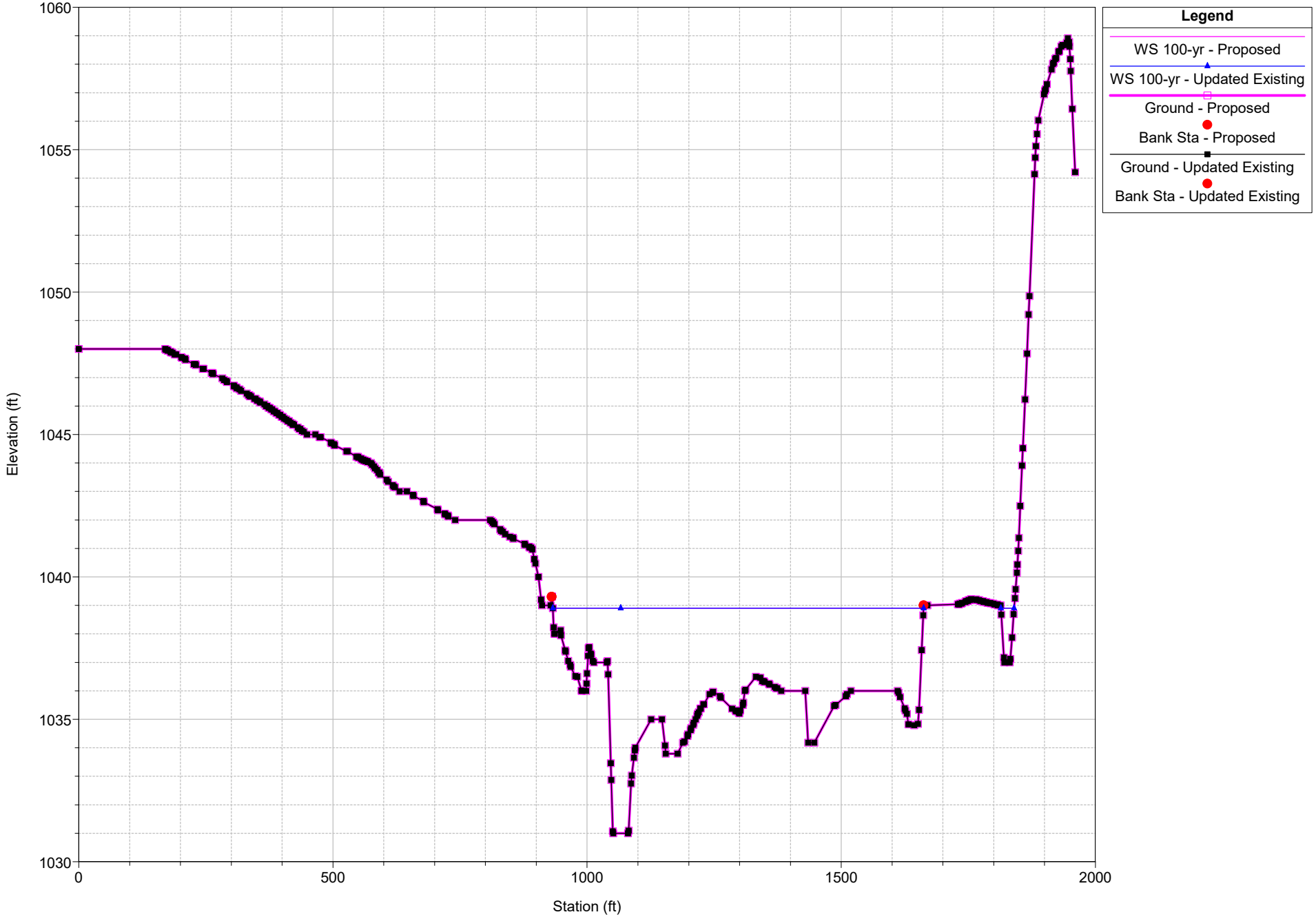
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

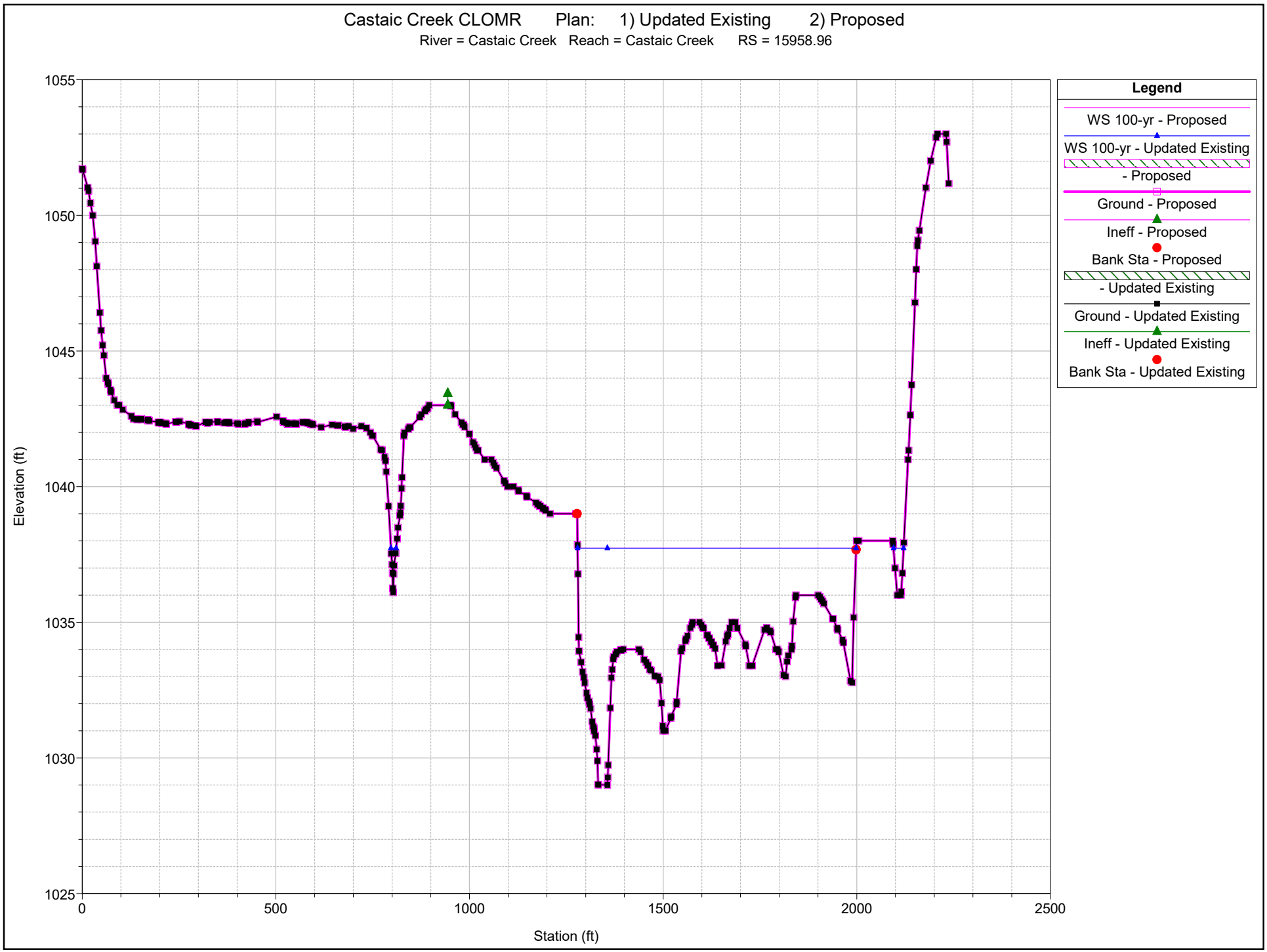
River = Castaic Creek Reach = Castaic Creek RS = 16552.09



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

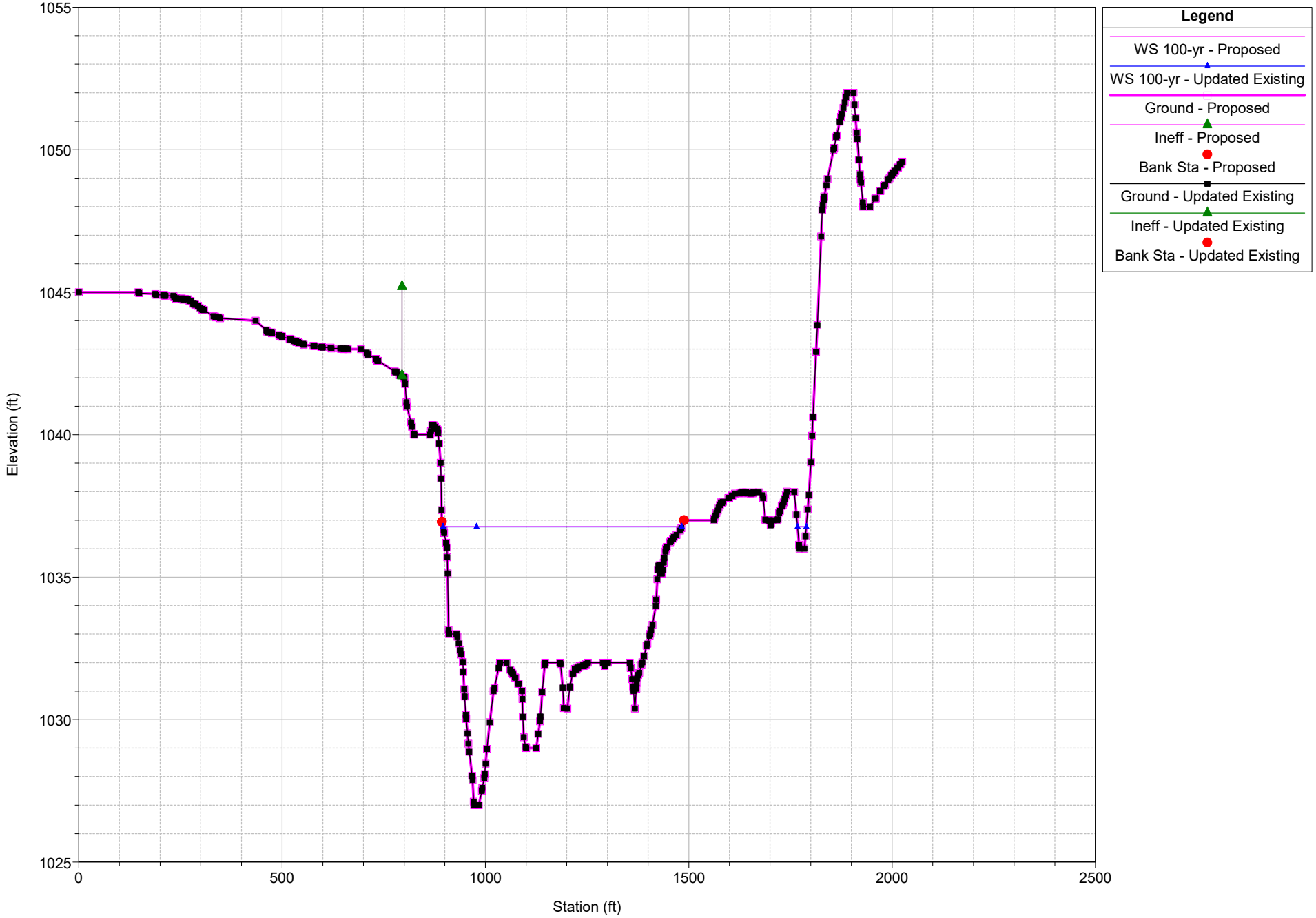
River = Castaic Creek Reach = Castaic Creek RS = 16209.5

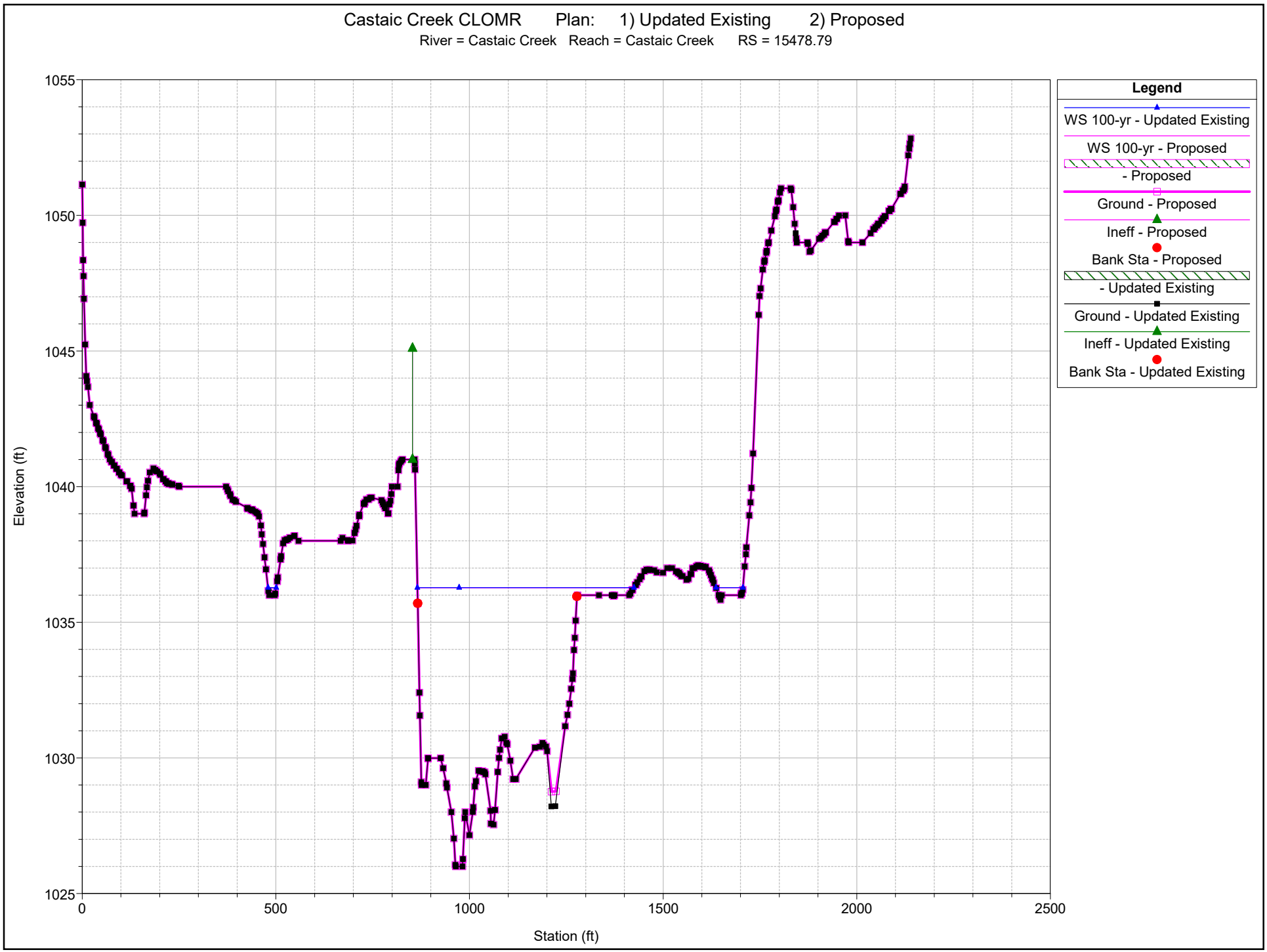



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 15958.96
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- Updated Existing
Ground - Updated Existing
Ineff - Updated Existing
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

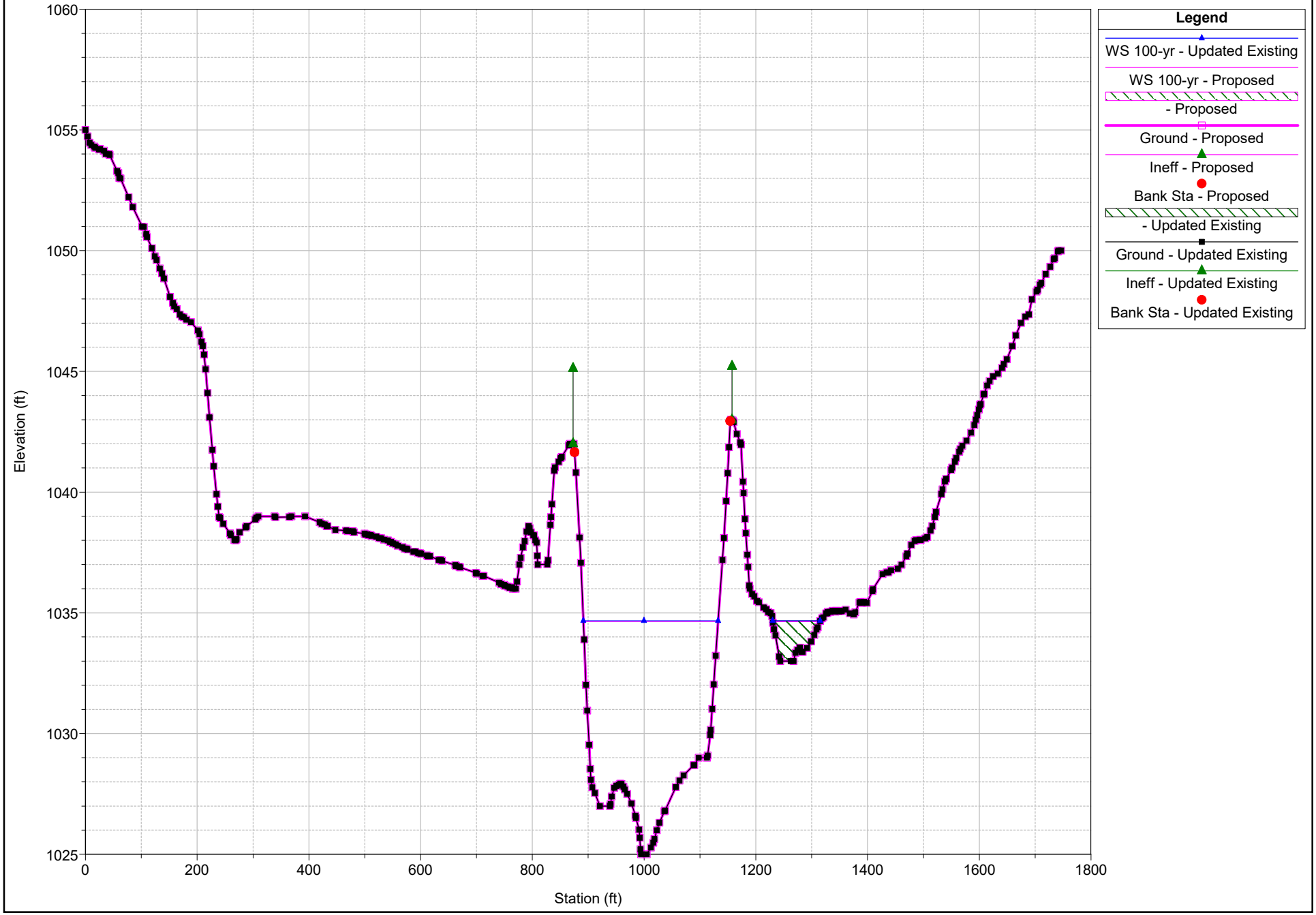
River = Castaic Creek Reach = Castaic Creek RS = 15669.62




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)

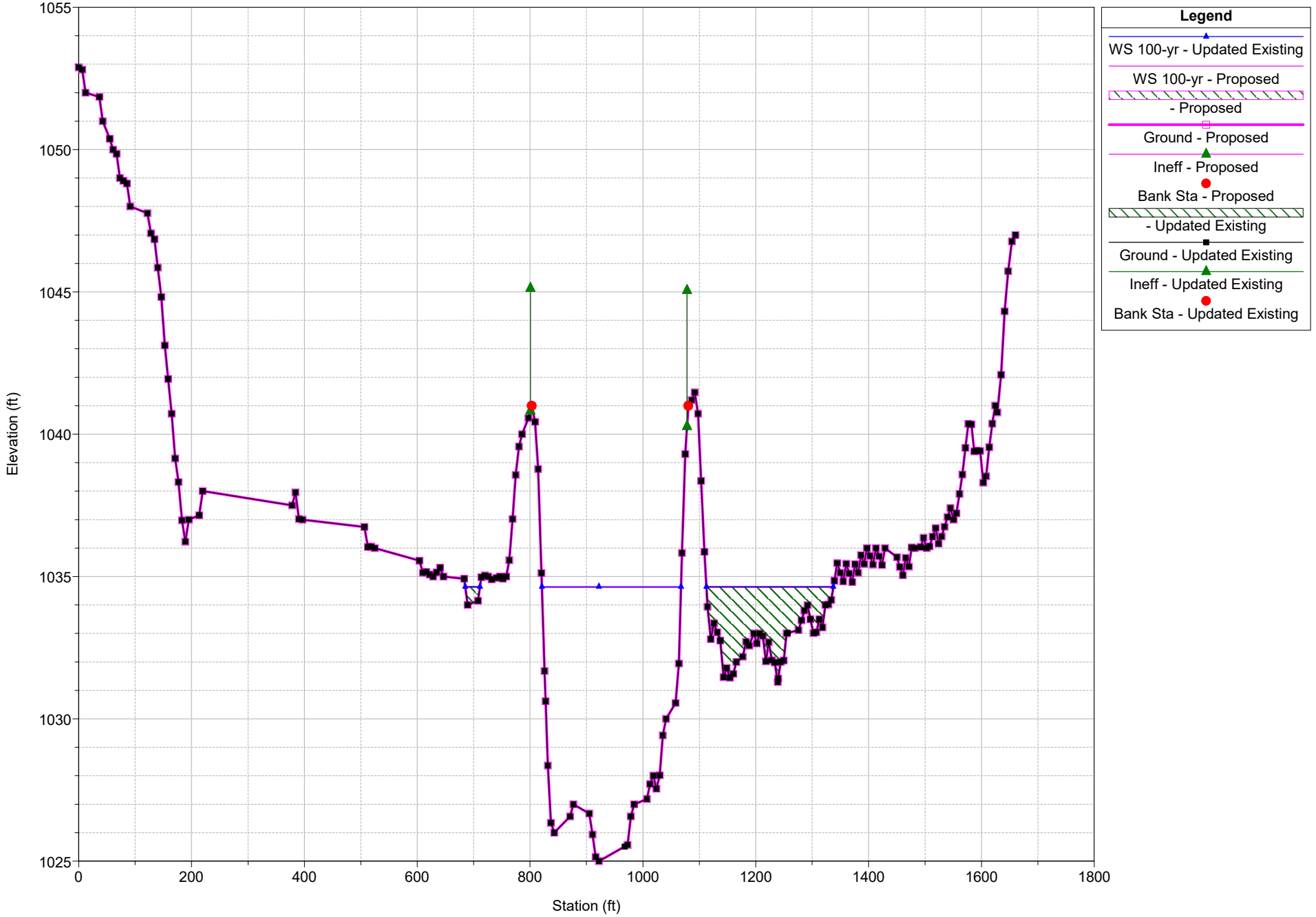
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 15245.39



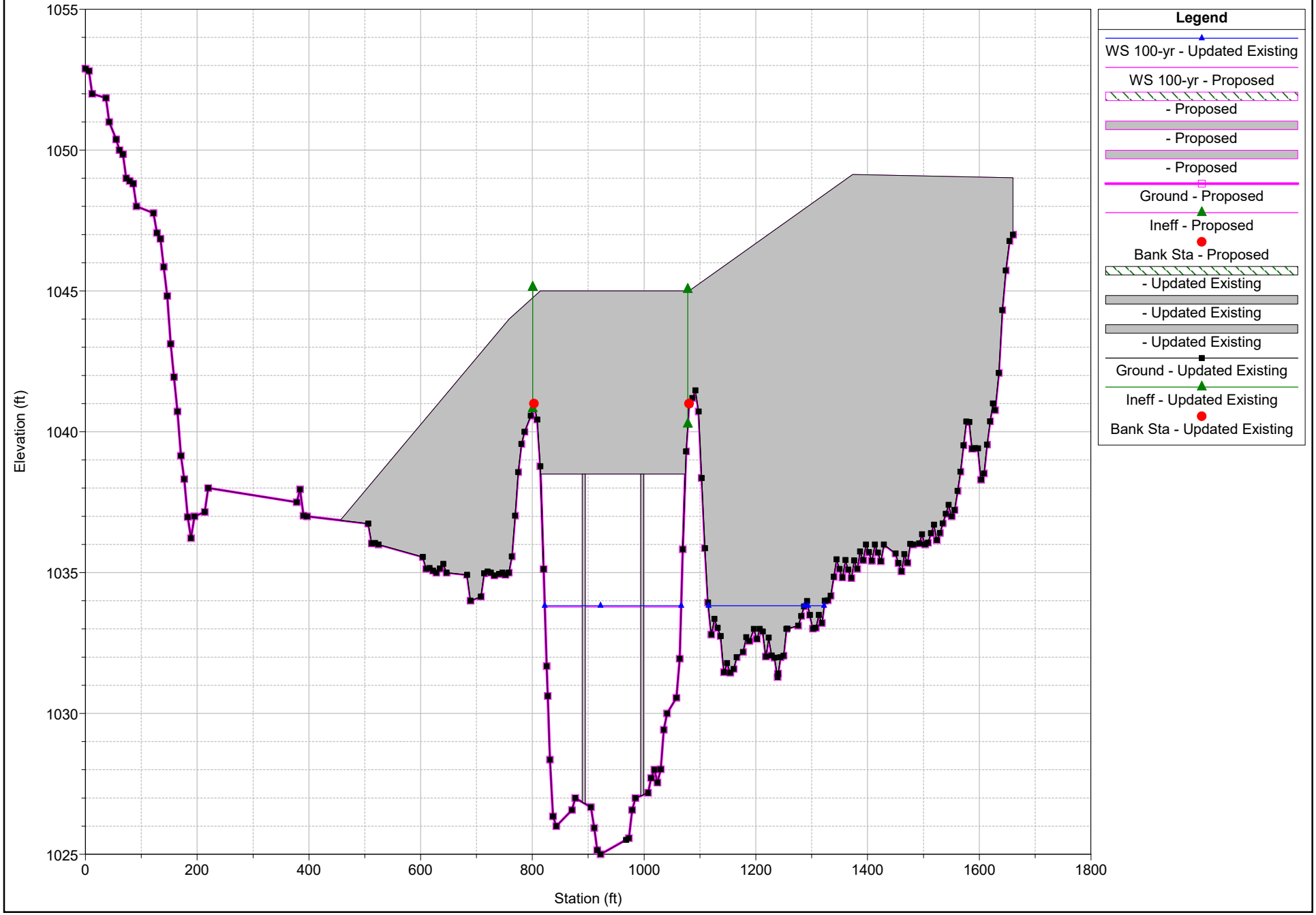
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

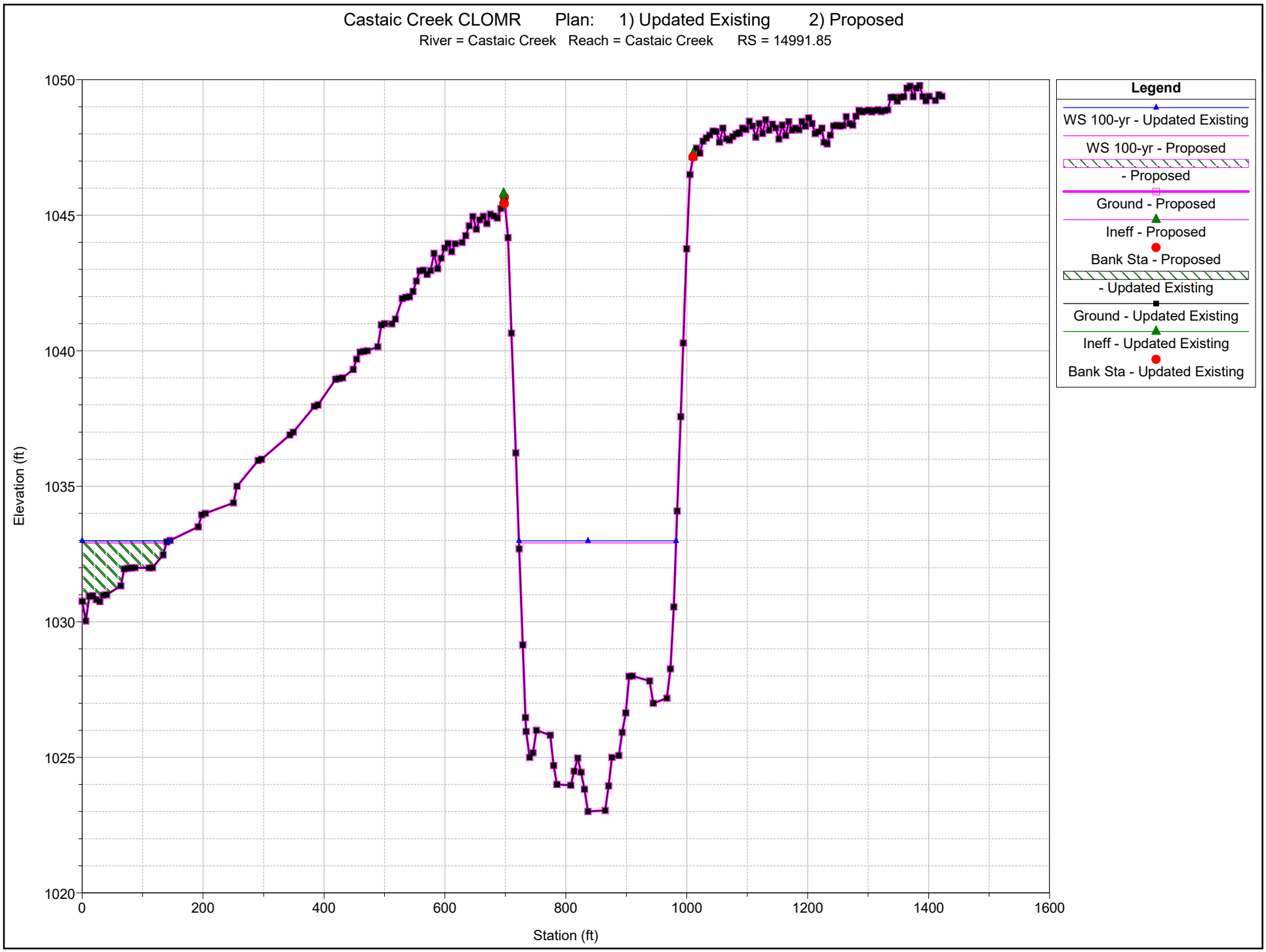
River = Castaic Creek Reach = Castaic Creek RS = 15216.27

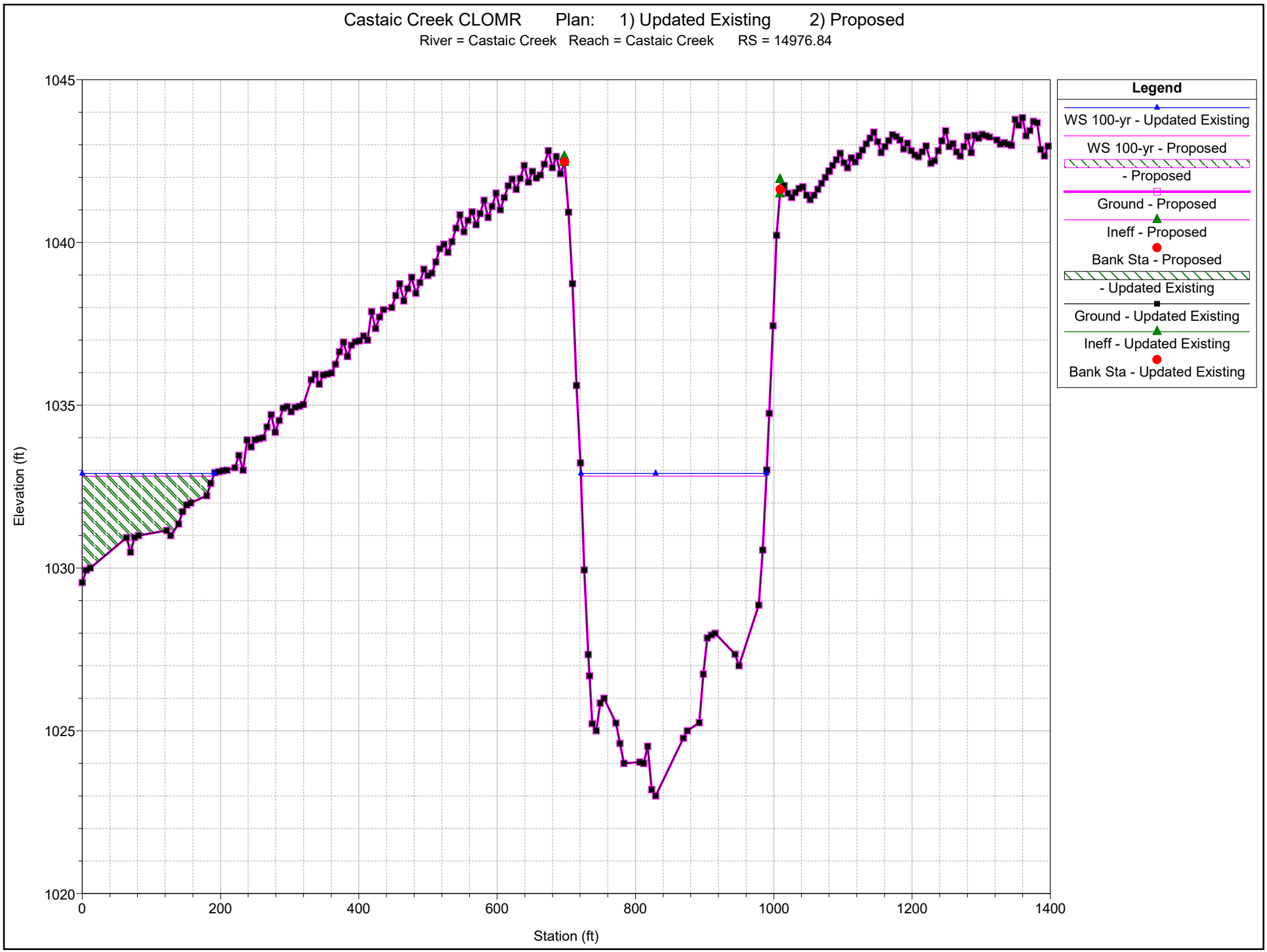


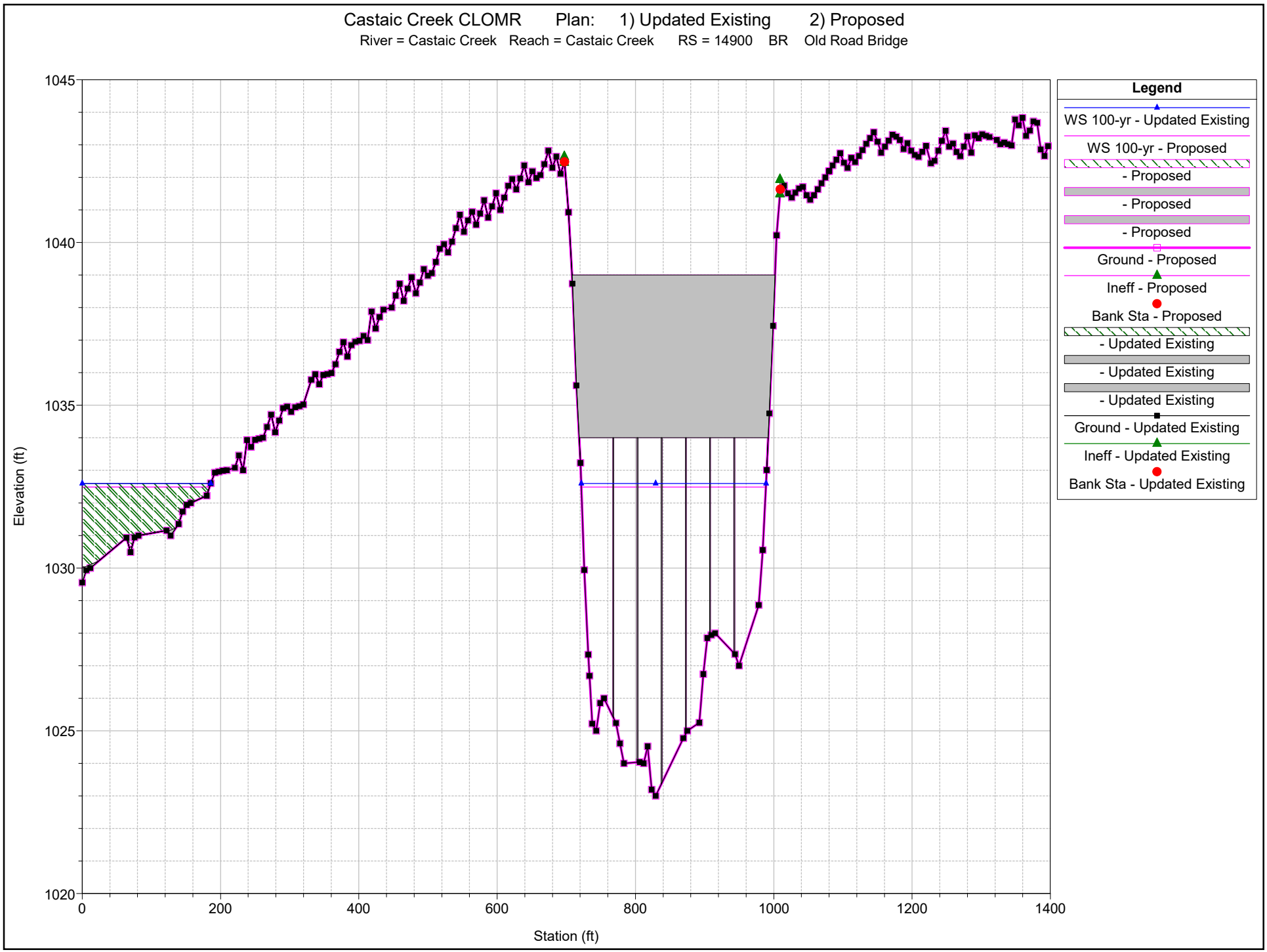
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 15100 BR I-5 Bridge



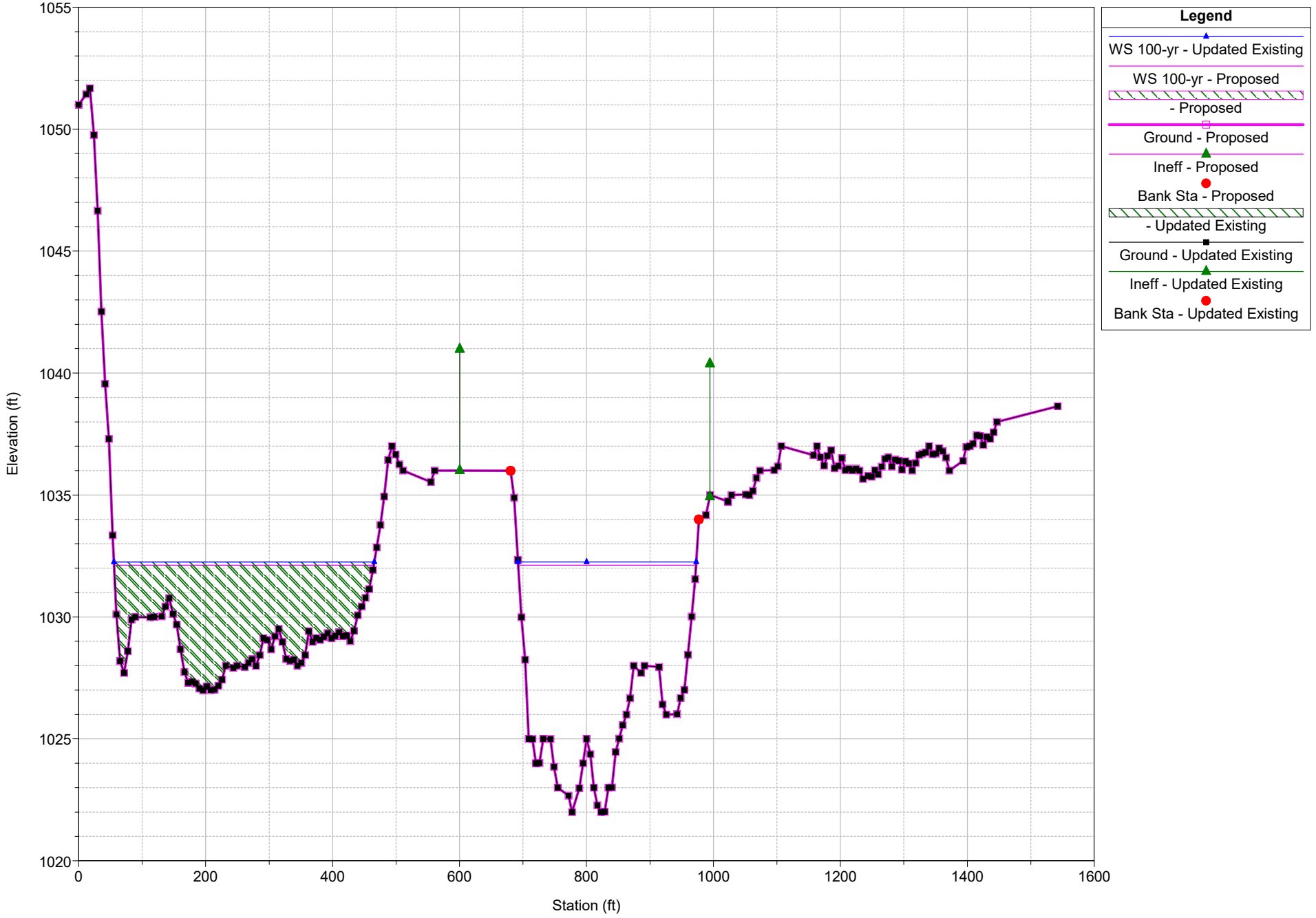

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 14991.85
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- Updated Existing
Ground - Updated Existing
Ineff - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
1050
1045
1040
1035
1030
1025
1020
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 = 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
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
- Proposed
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- Updated Existing
- Updated Existing
- 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)

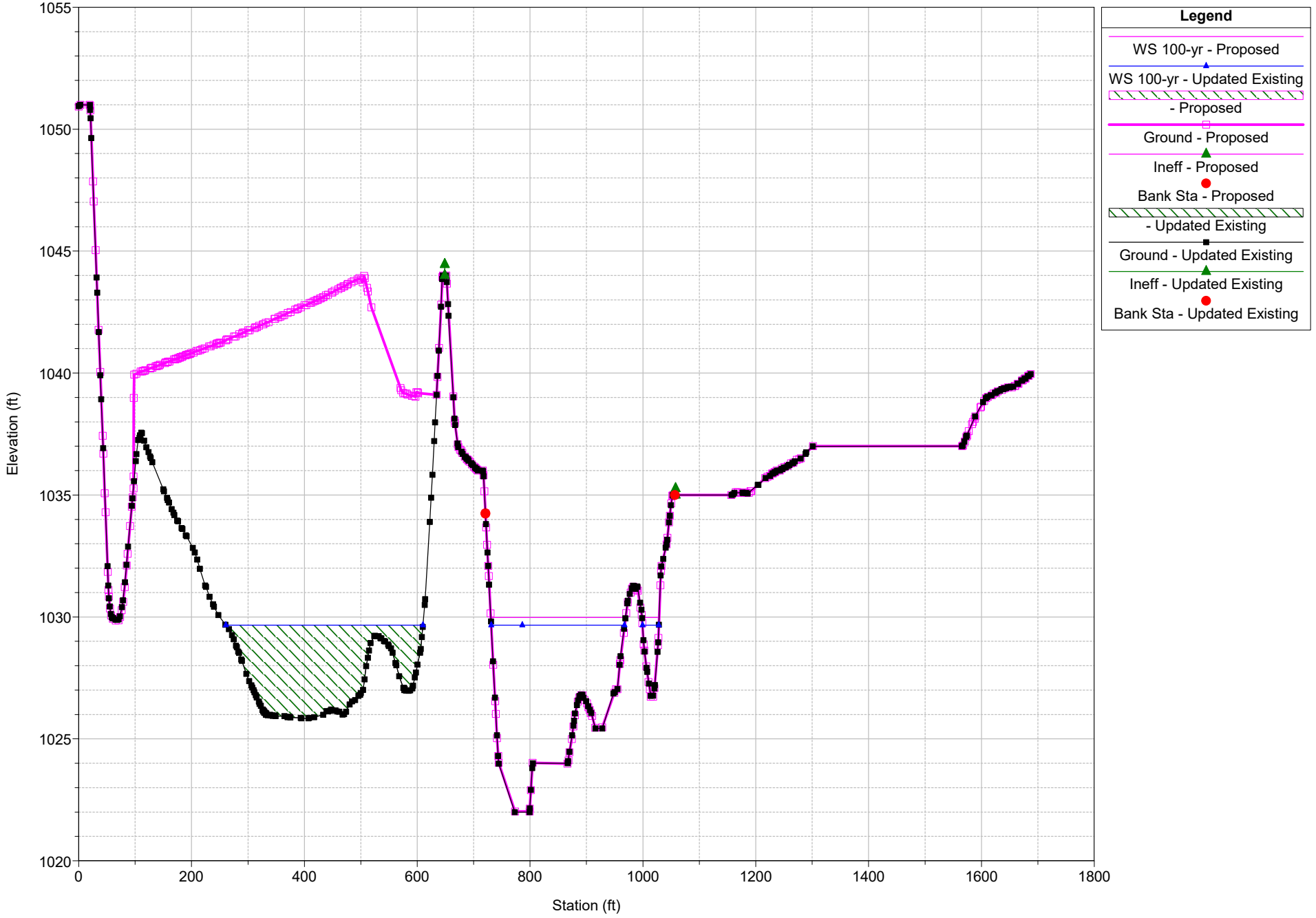
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 14892.2



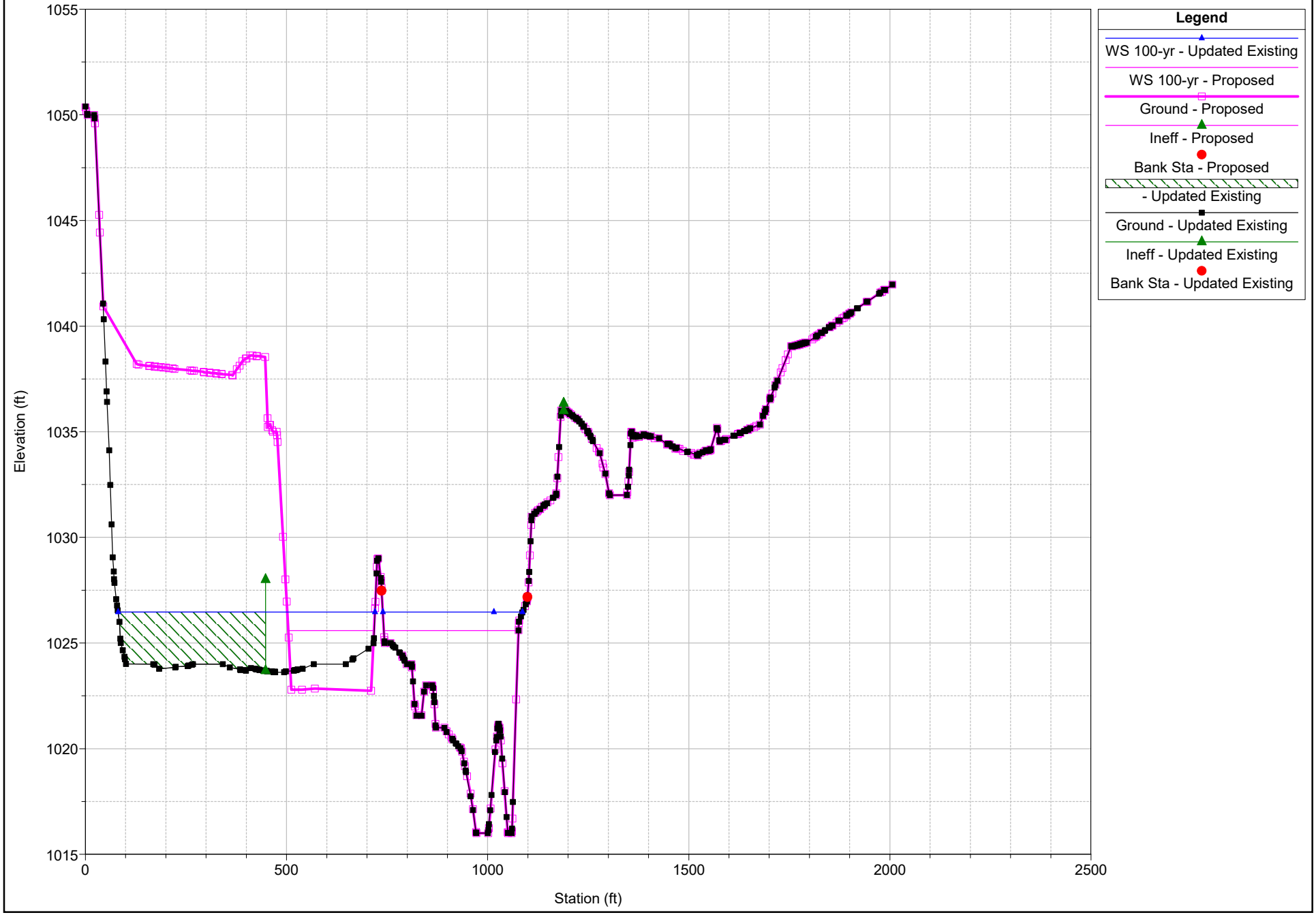
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

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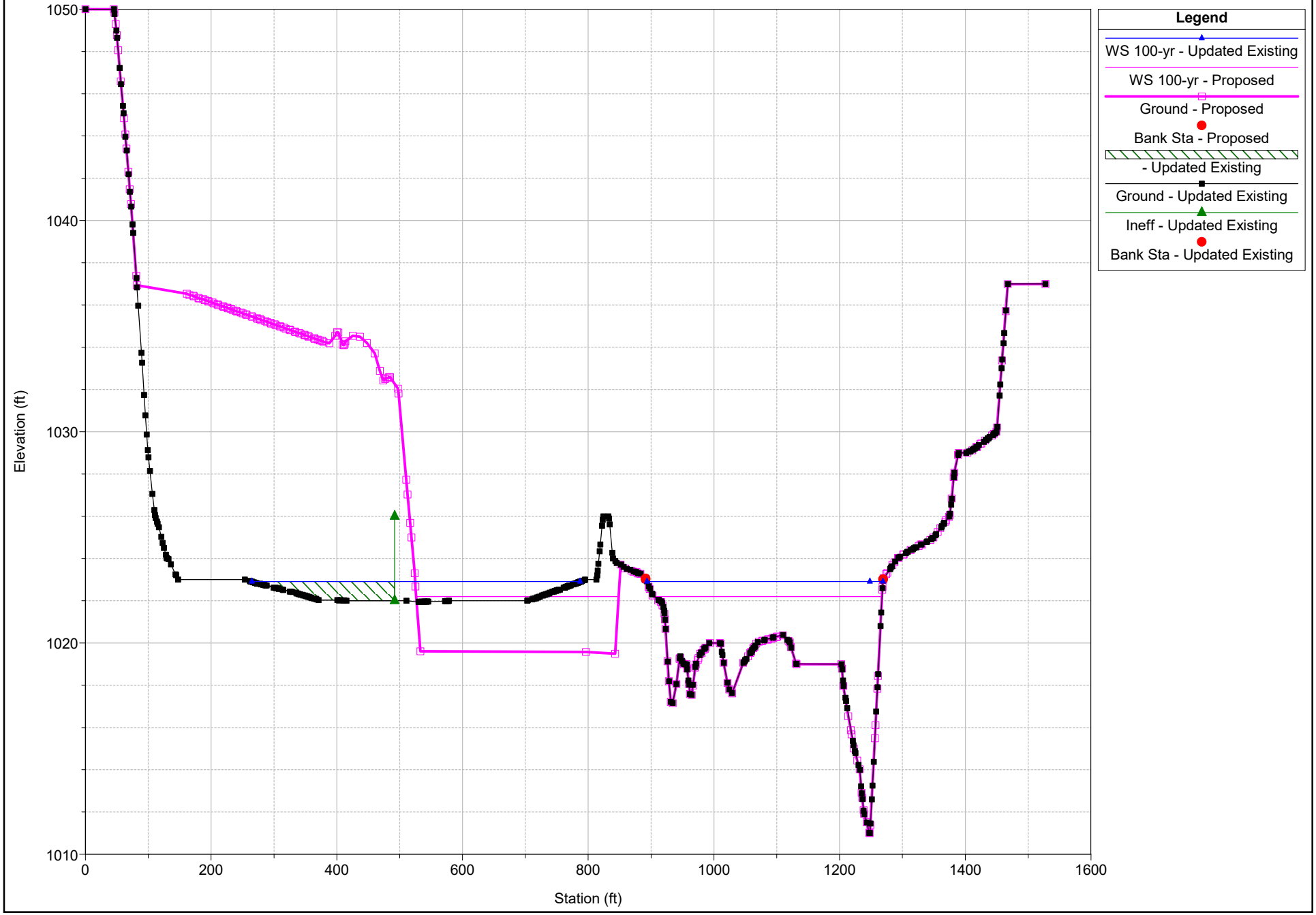
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 14180.6



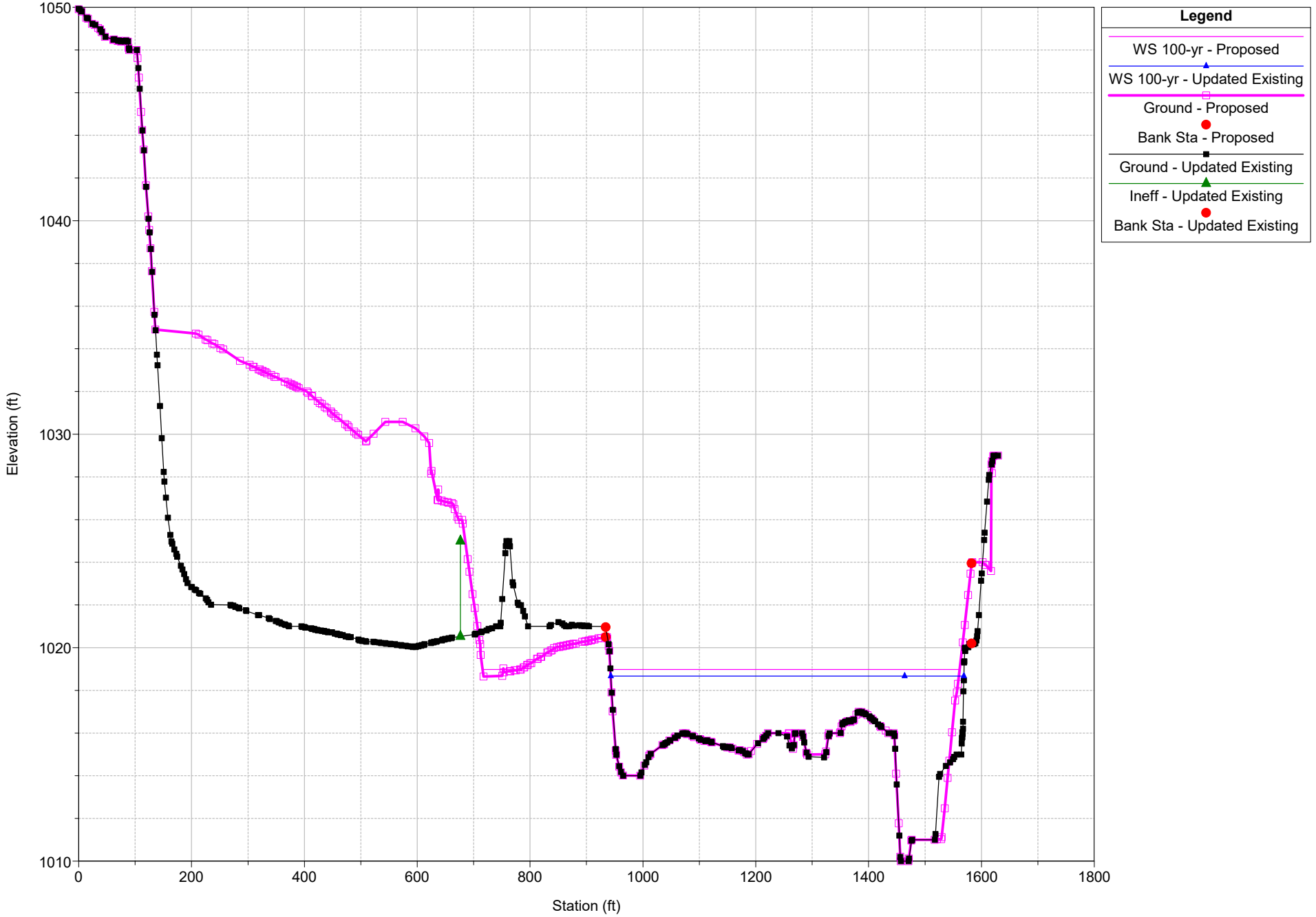
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 13713.74



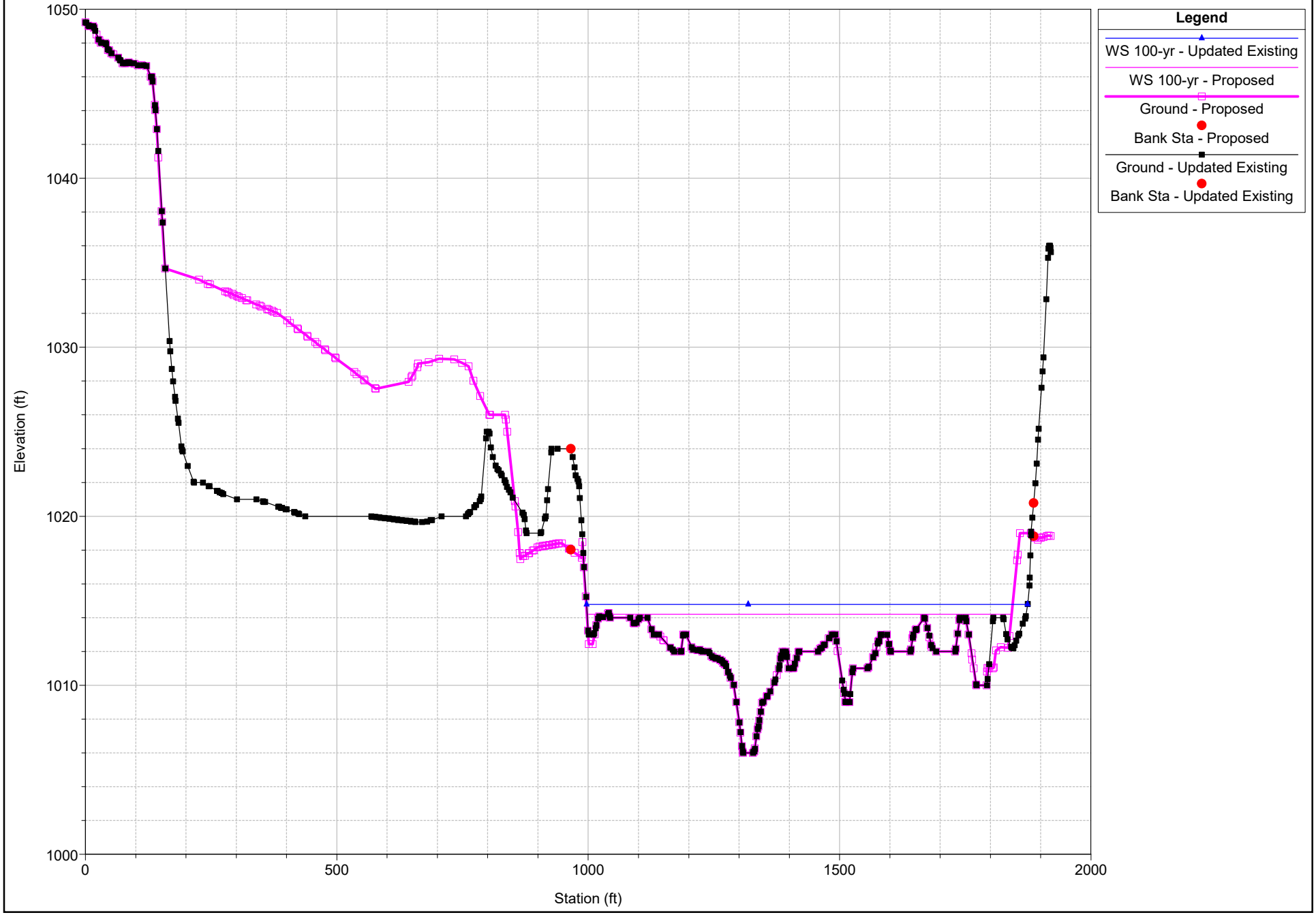
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 13176.47



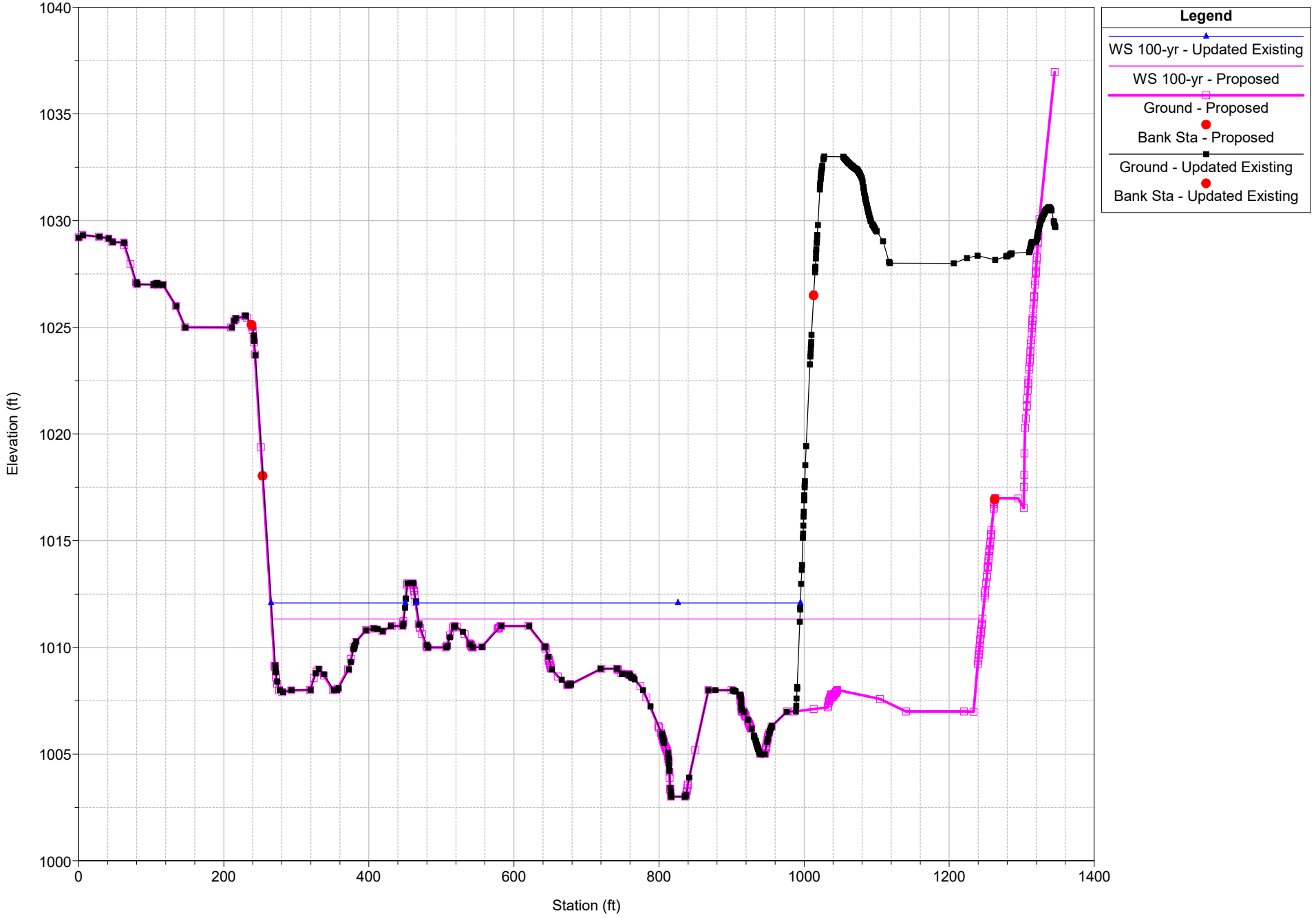
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

River = Castaic Creek Reach = Castaic Creek RS = 12648.31



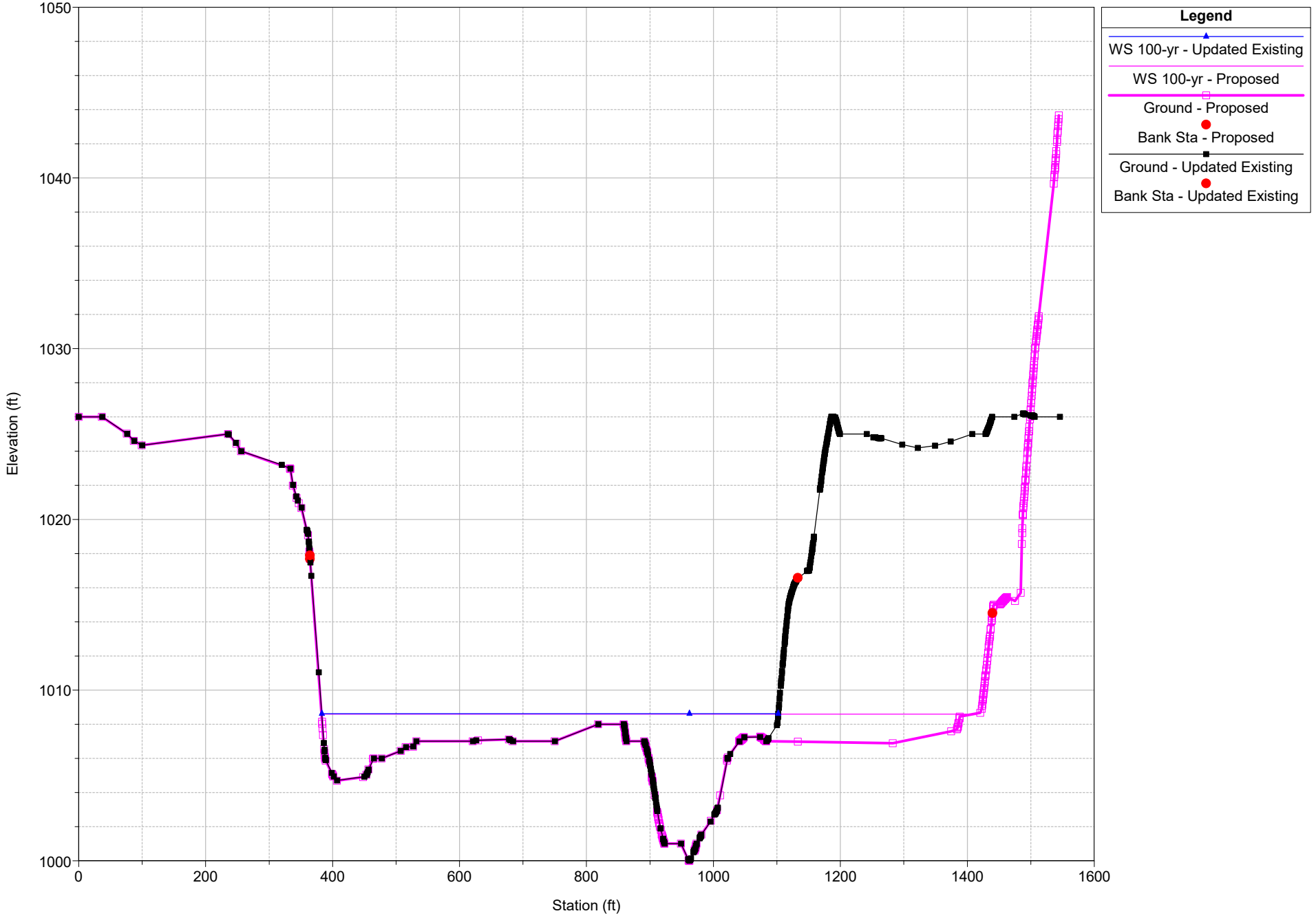
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

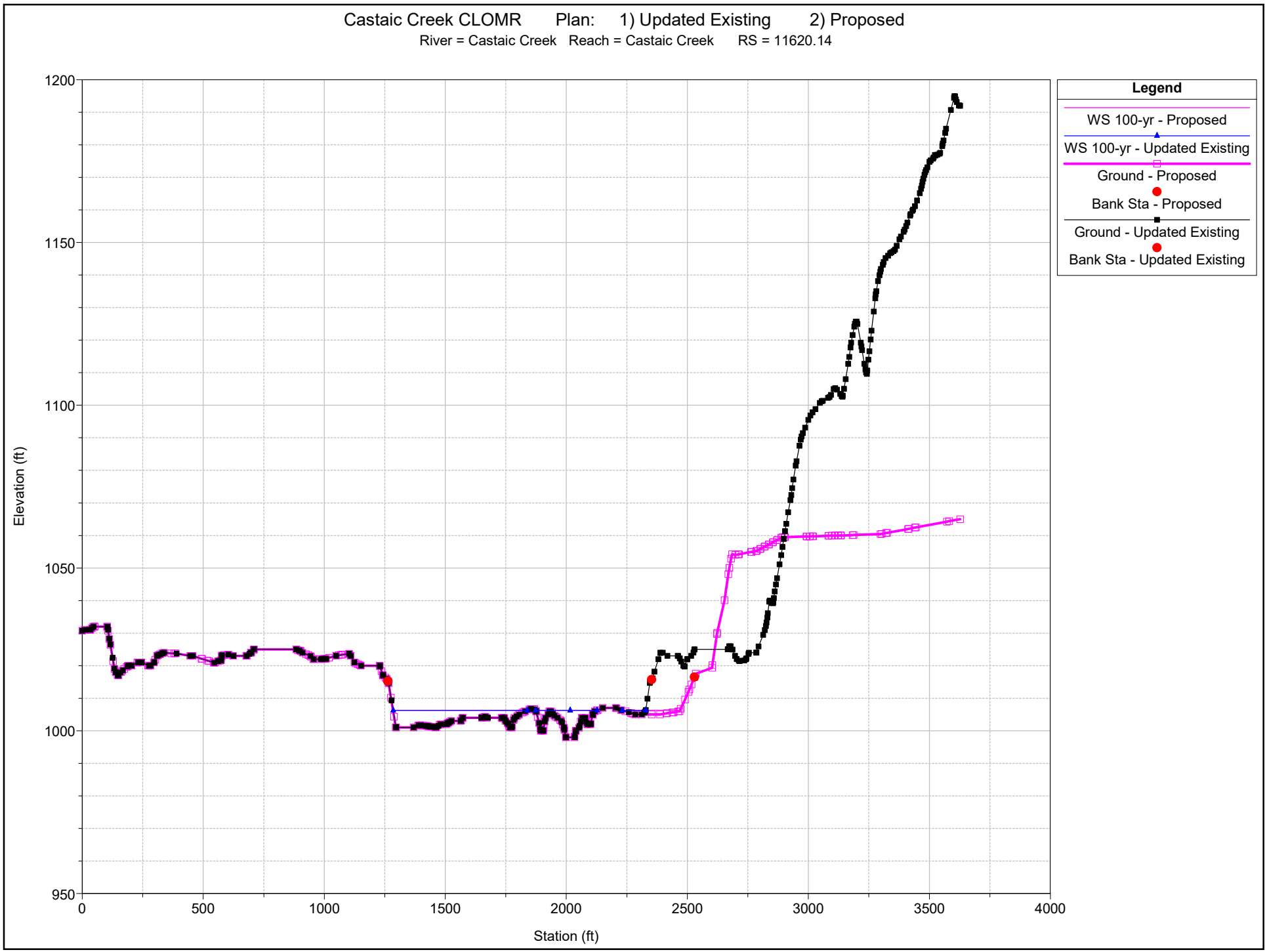
River = Castaic Creek Reach = Castaic Creek RS = 12272

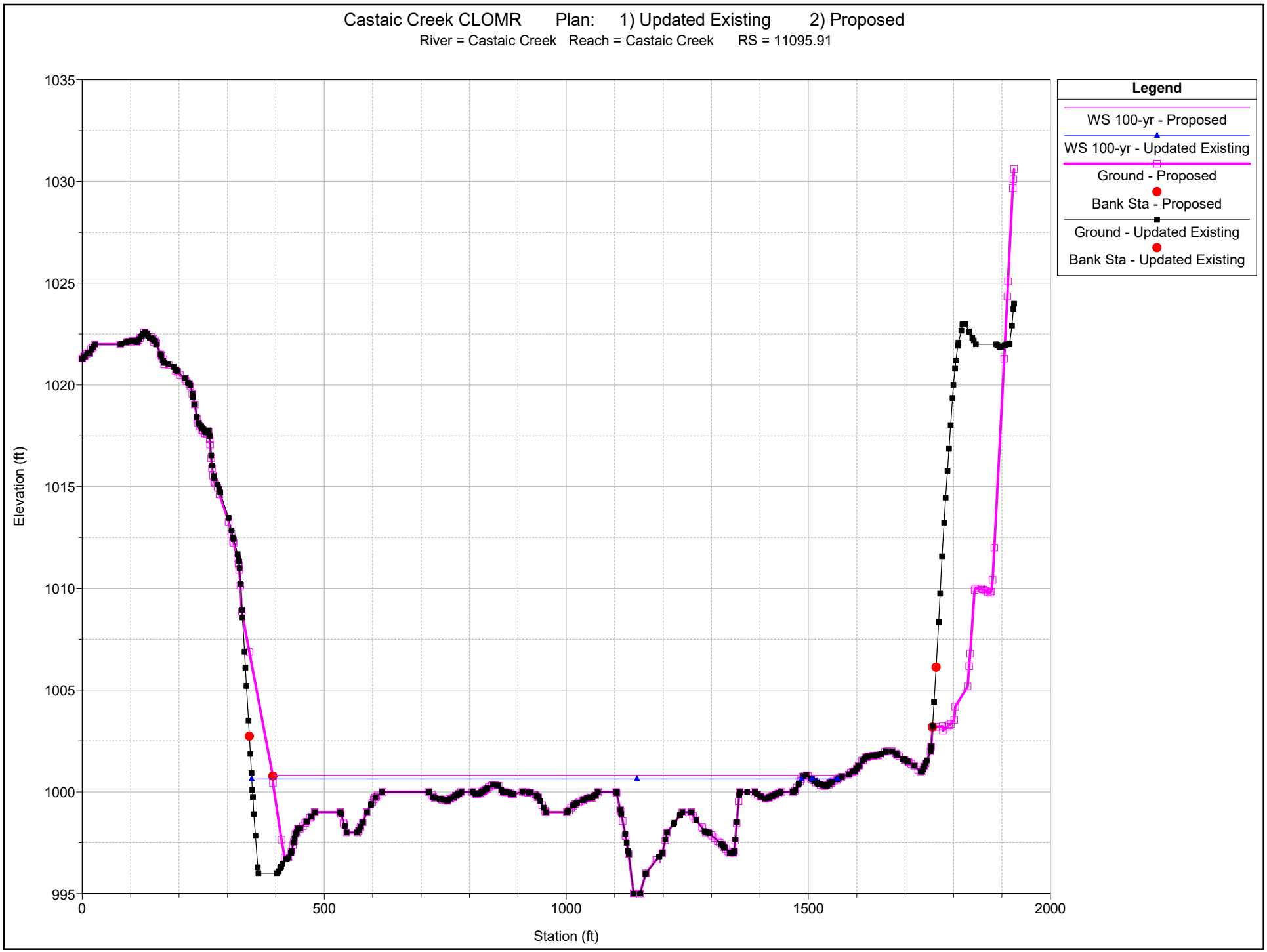


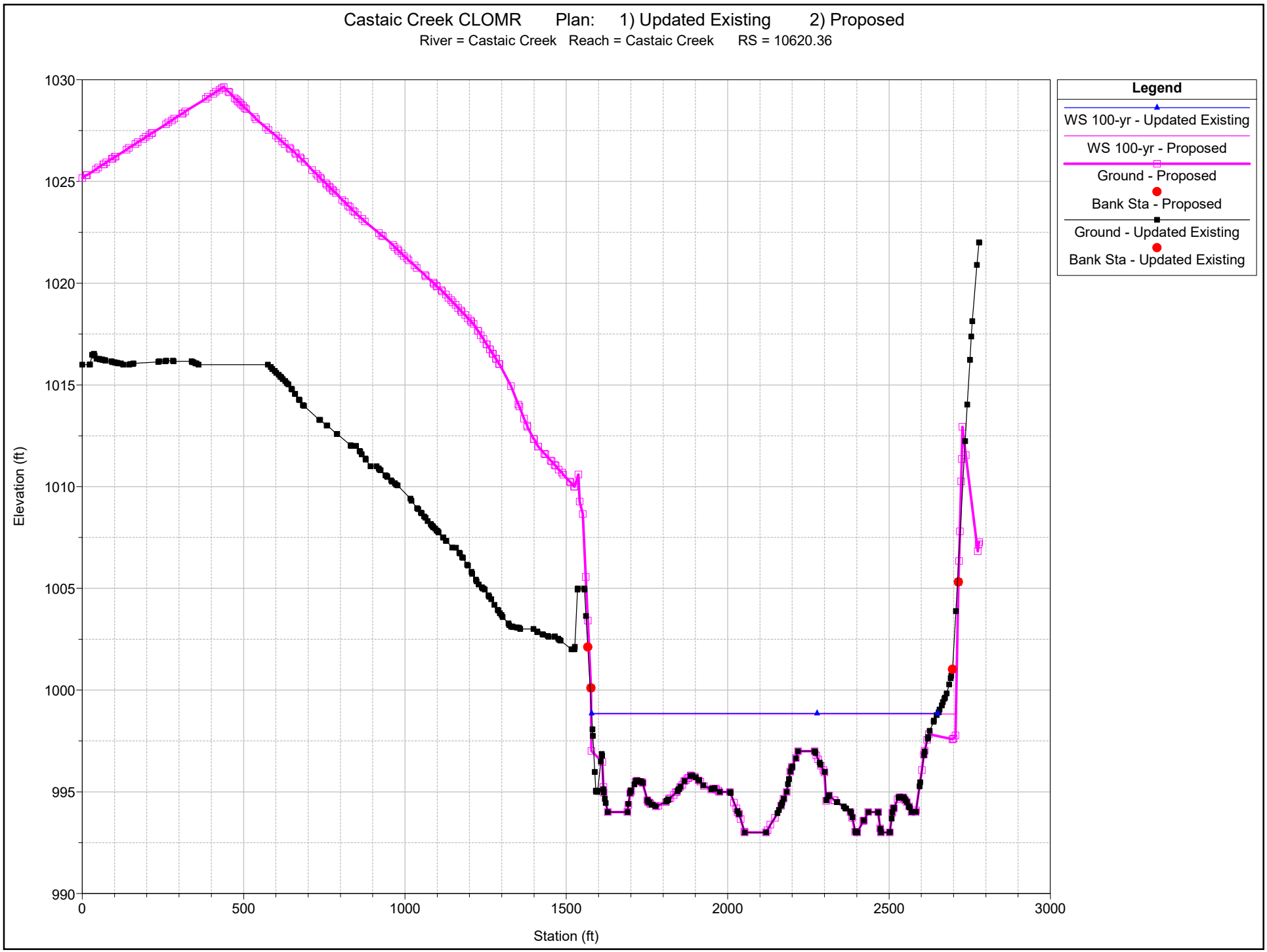
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

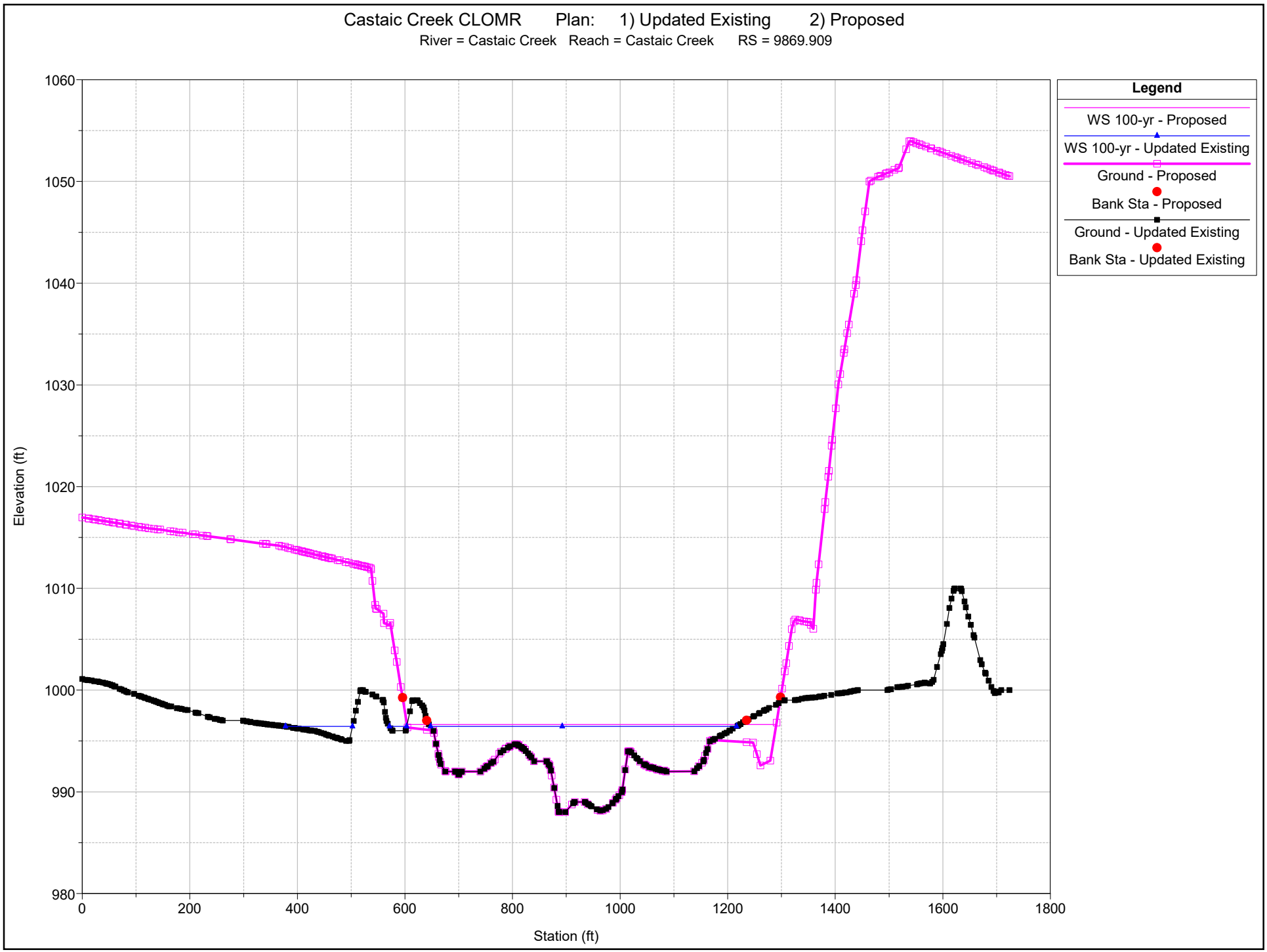
River = Castaic Creek Reach = Castaic Creek RS = 11954.

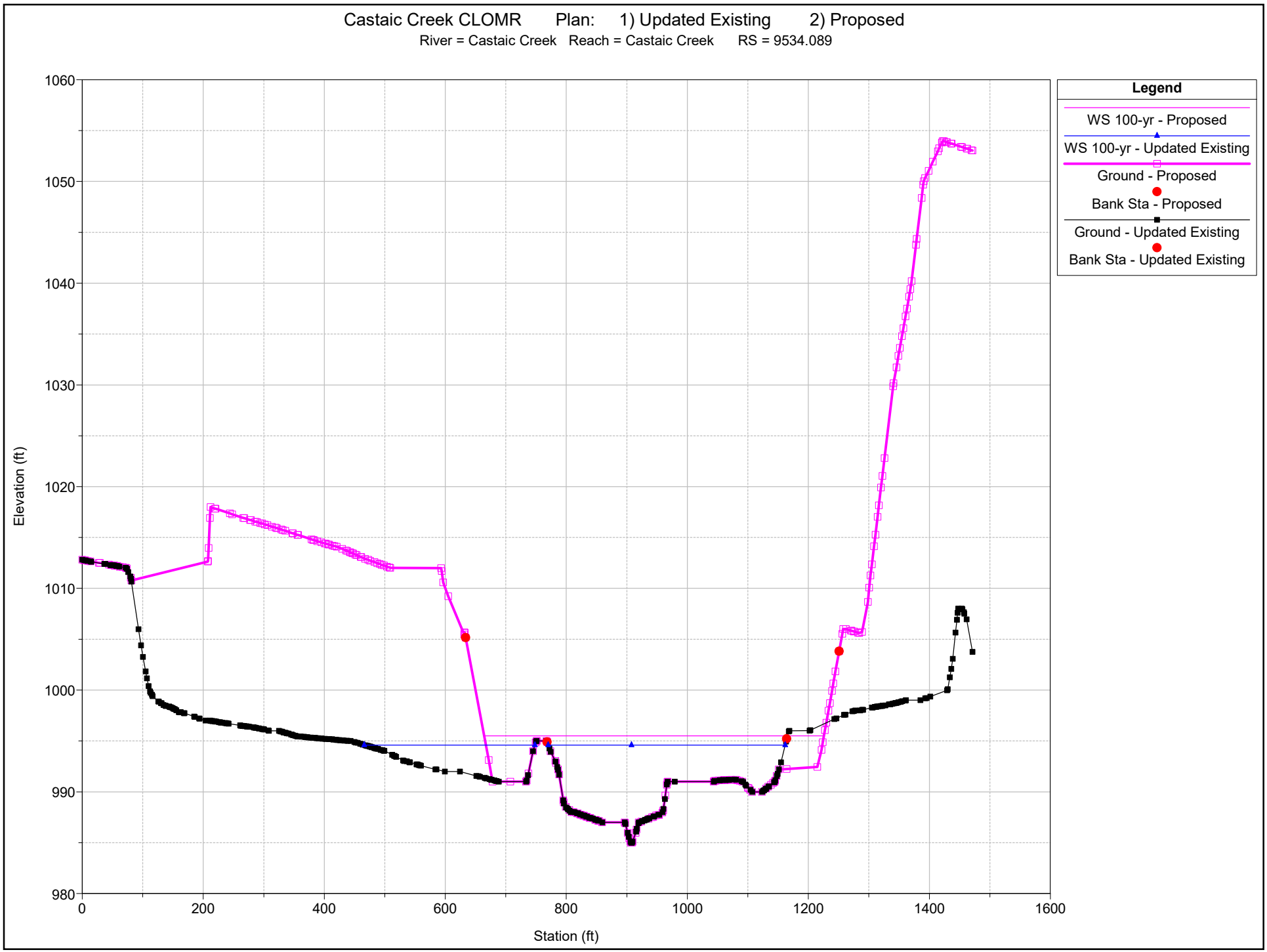


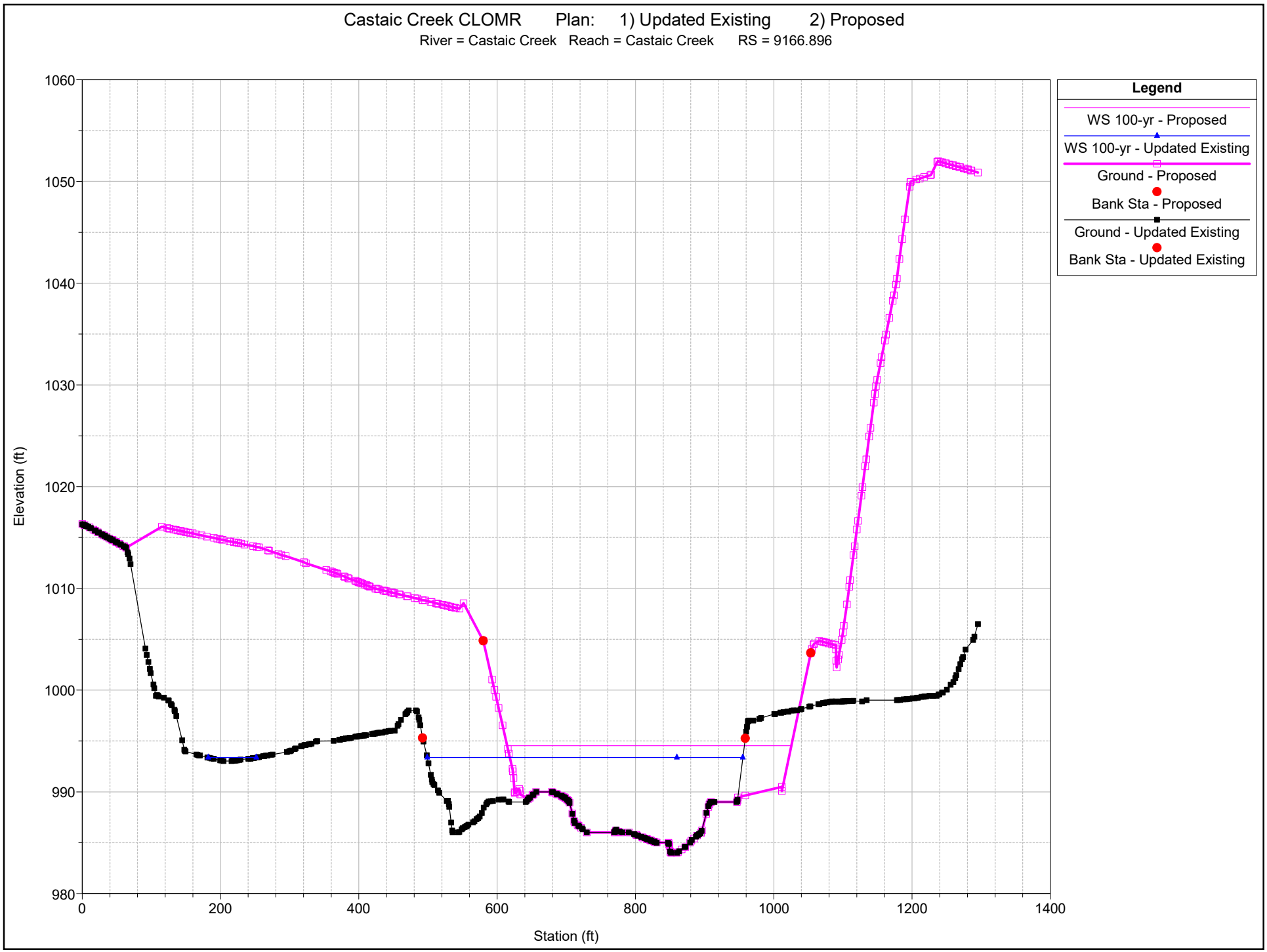

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 11620.14
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1200
1150
1100
1050
1000
950
0
500
1000
1500
2000
2500
3000
3500
4000

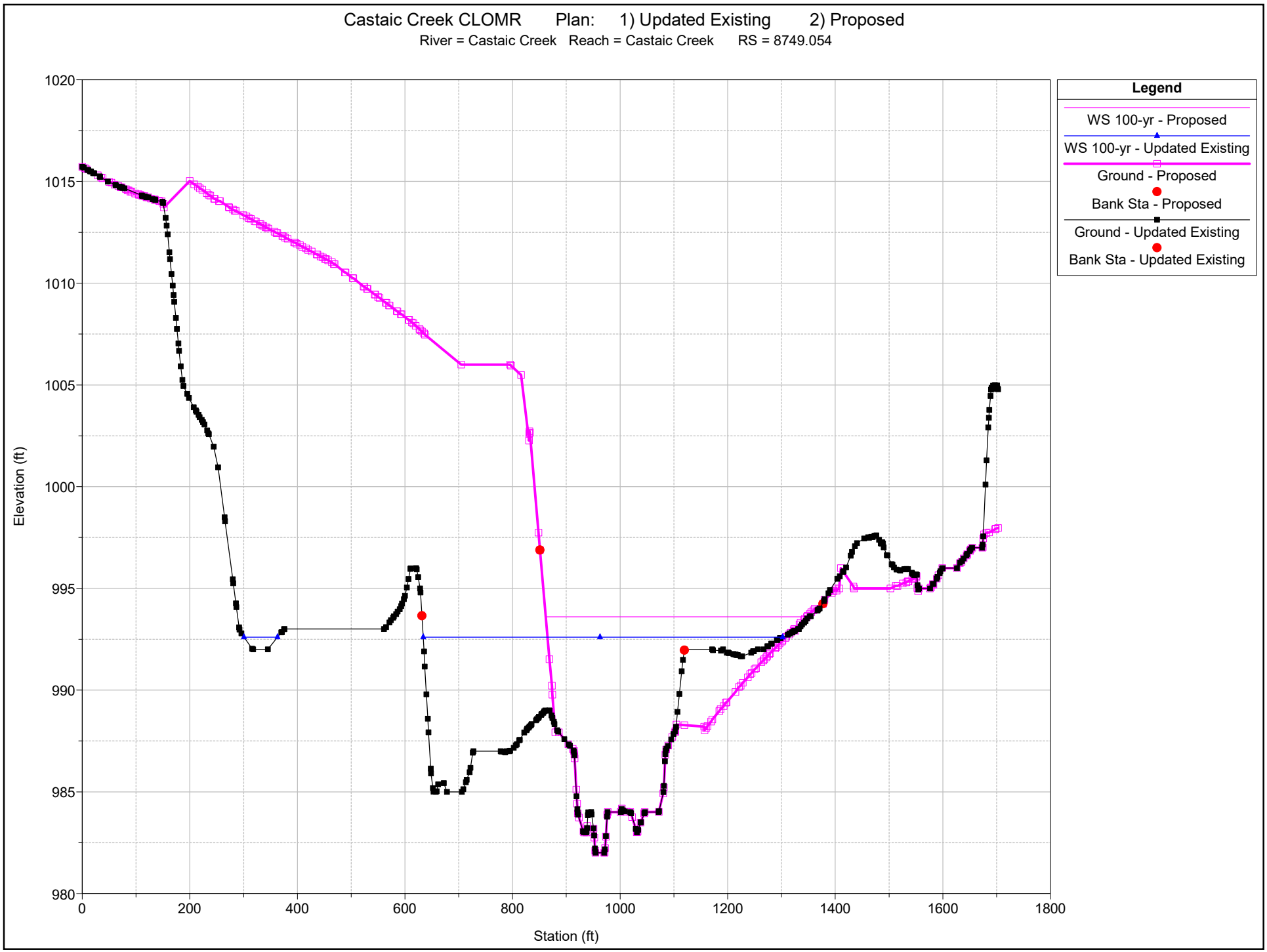

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 11095.91
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
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500
1000
1500
2000
Station (ft)

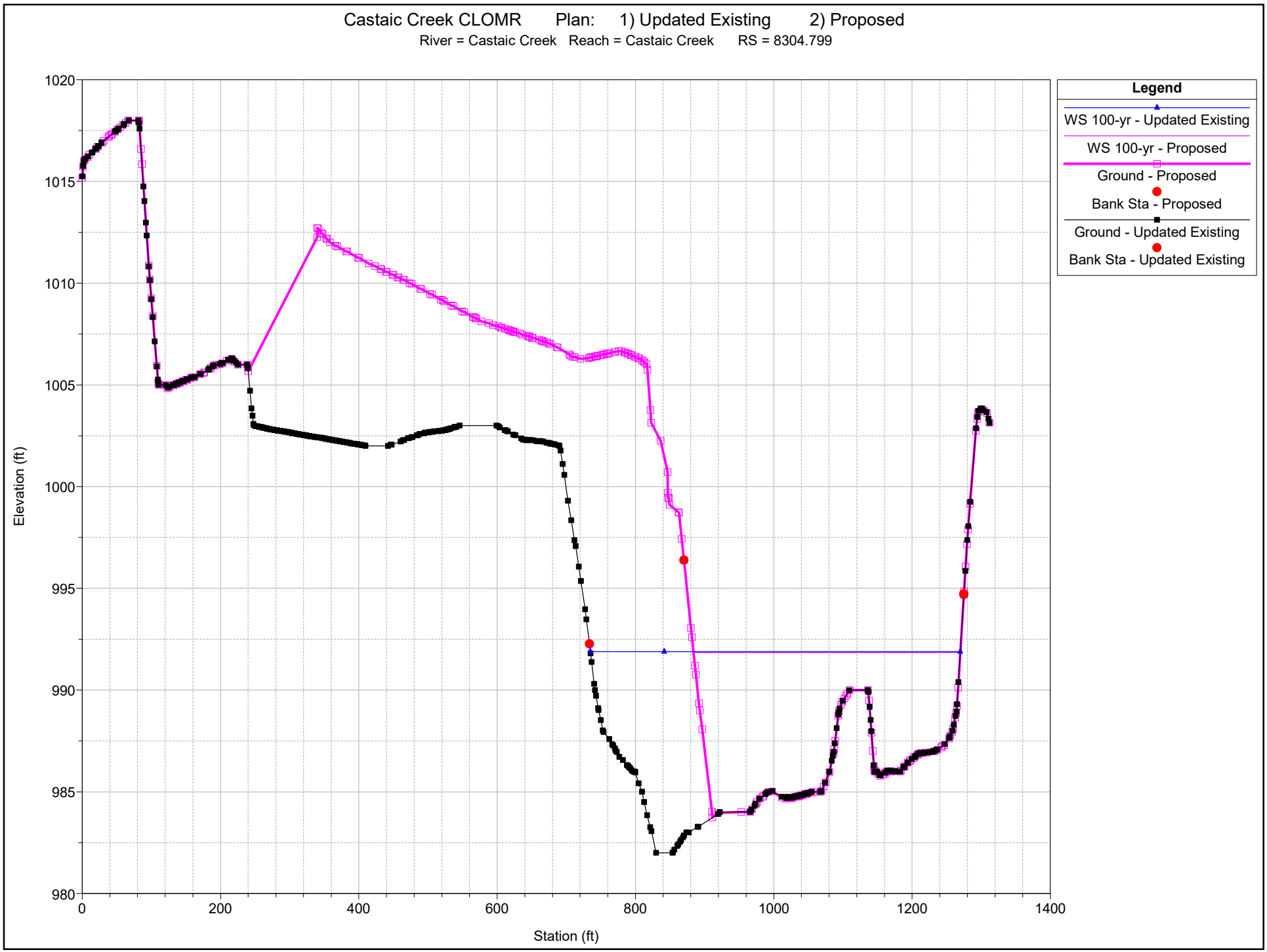

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 10620.36
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
1030
1025
1020
1015
1010
1005
1000
995
990
0
500
1000
1500
2000
2500
3000
Station (ft)


Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
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
600
800
1000
1200
1400
1600
1800


Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
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)
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1600

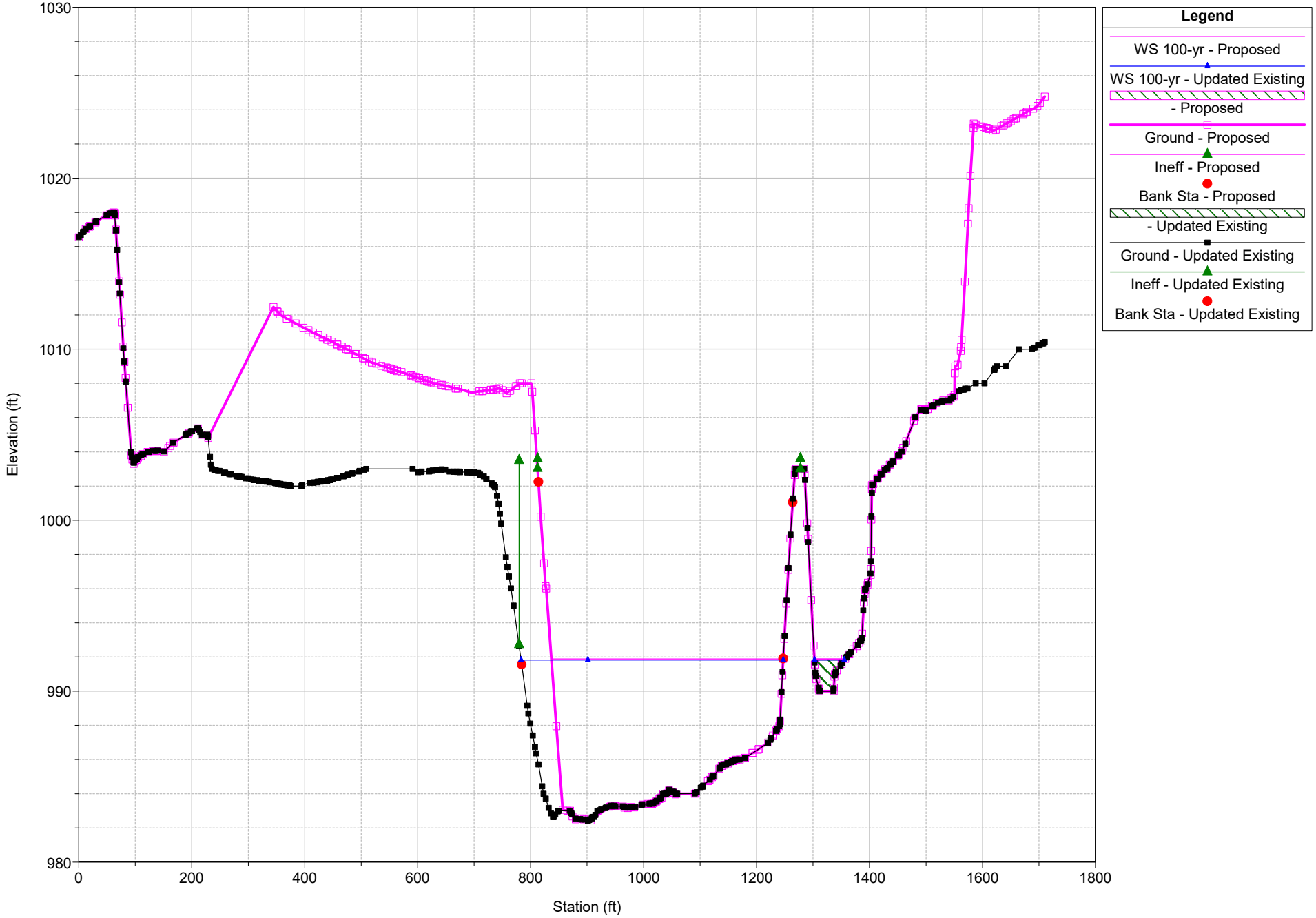

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 9166.896
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1060
1050
1040
1030
1020
1010
1000
990
980
0
200
400
600
800
1000
1200
1400


Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
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
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)
1020
1015
1010
1005
1000
995
990
985
980
0
200
400
600
800
1000
1200
1400

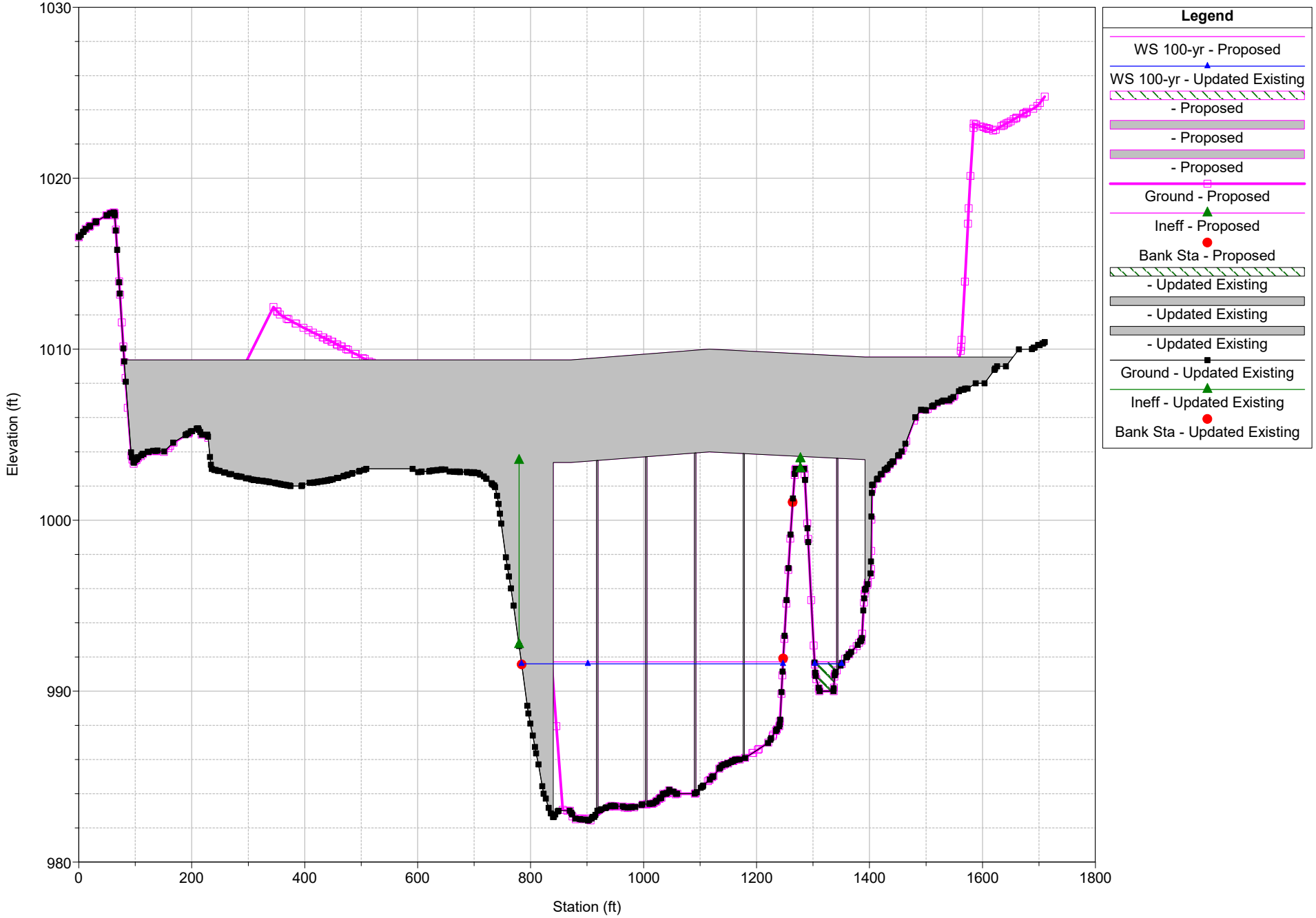
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River = Castaic Creek Reach = Castaic Creek RS = 8252.659



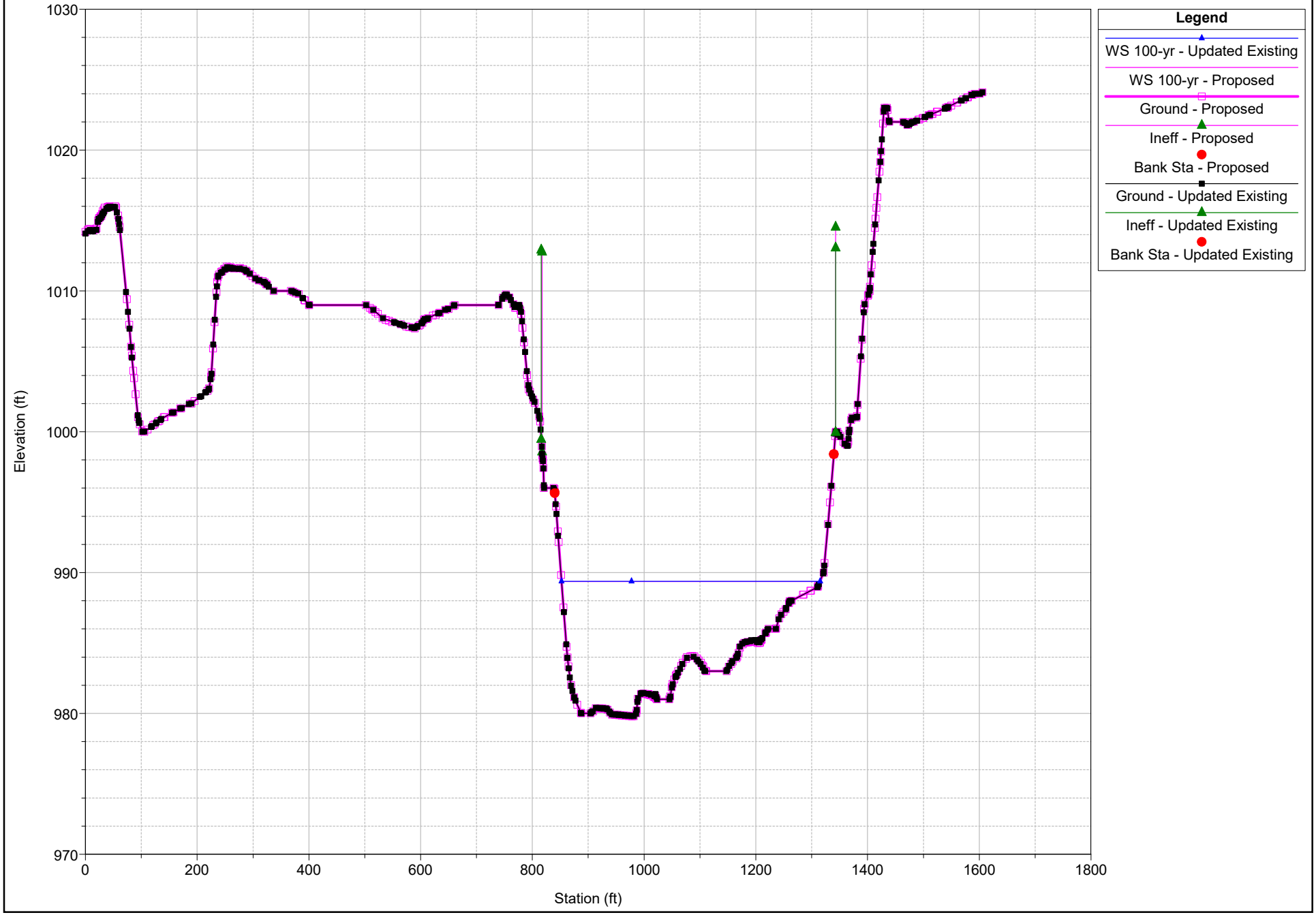
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

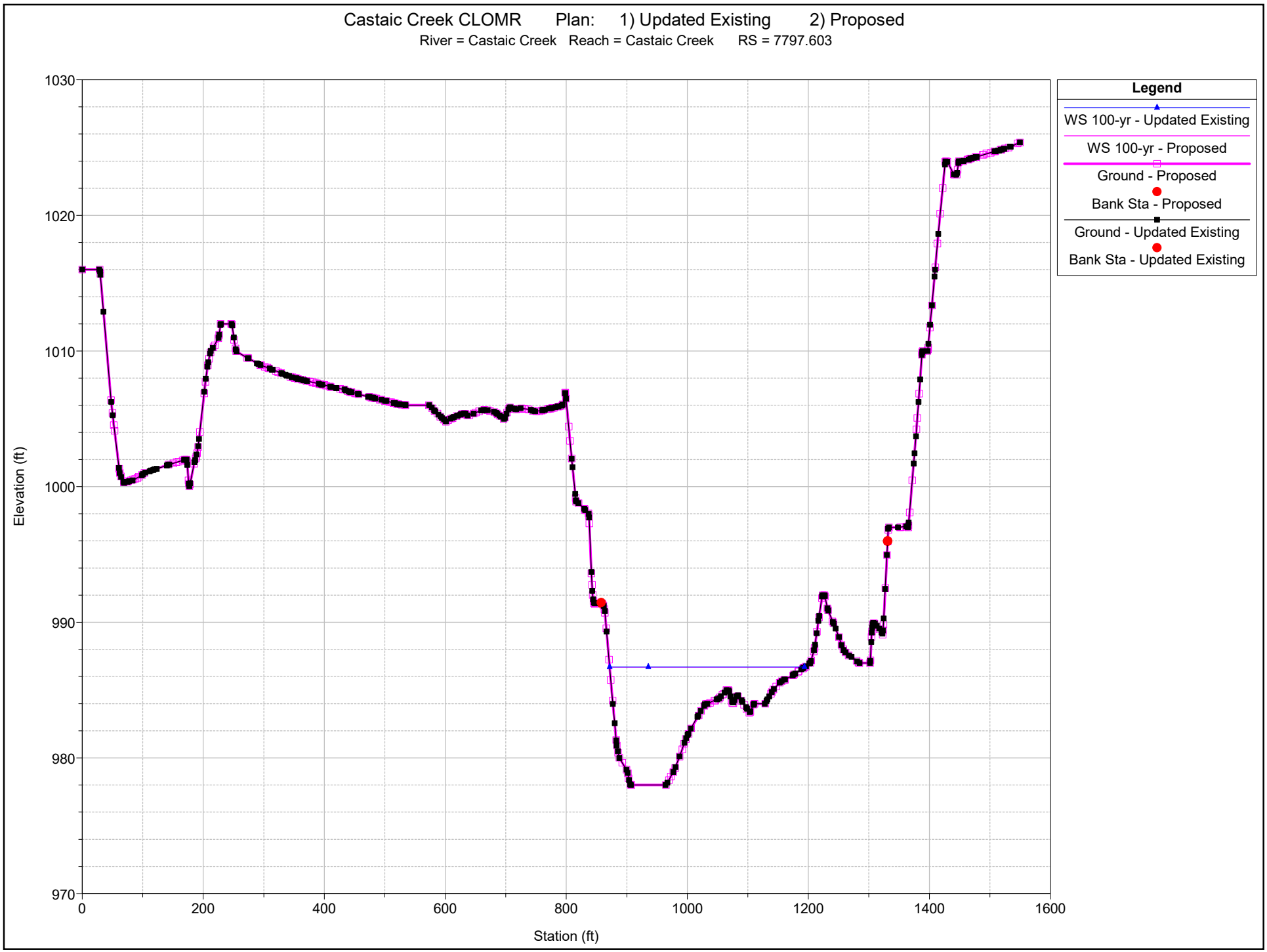
River = Castaic Creek Reach = Castaic Creek RS = 8000 BR Commerce Center Drive bridge



Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

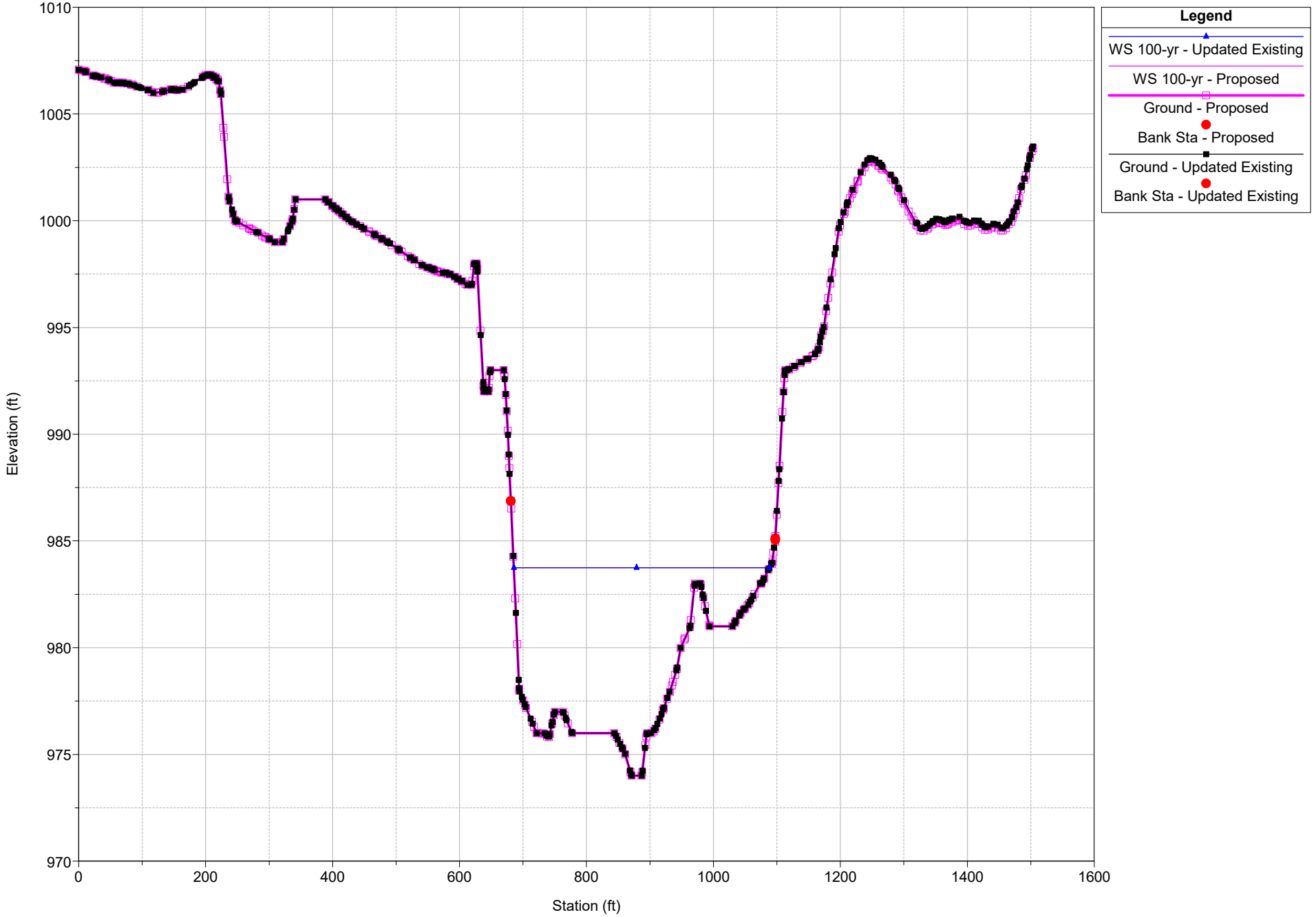
River = Castaic Creek Reach = Castaic Creek RS = 7999.701

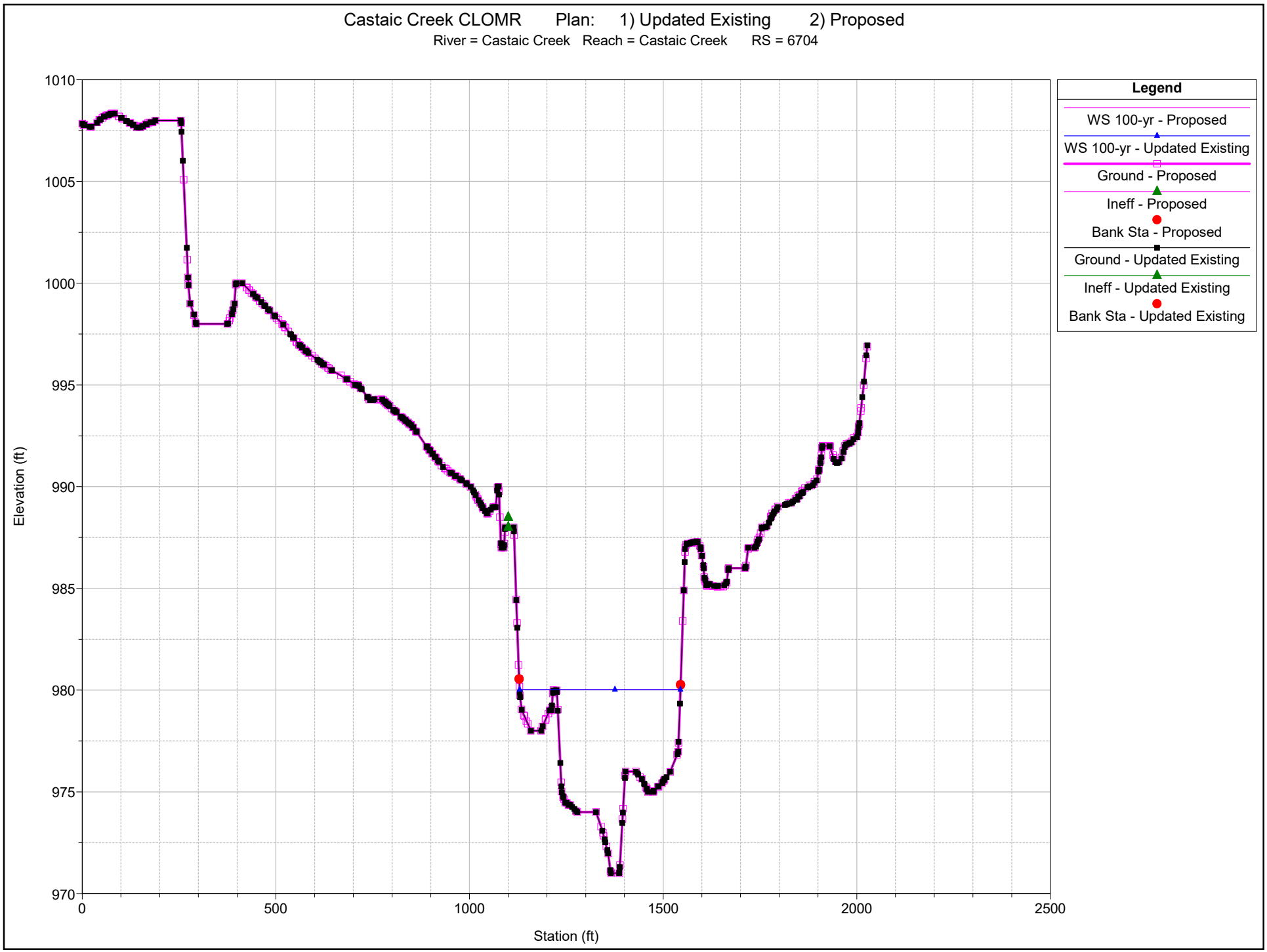


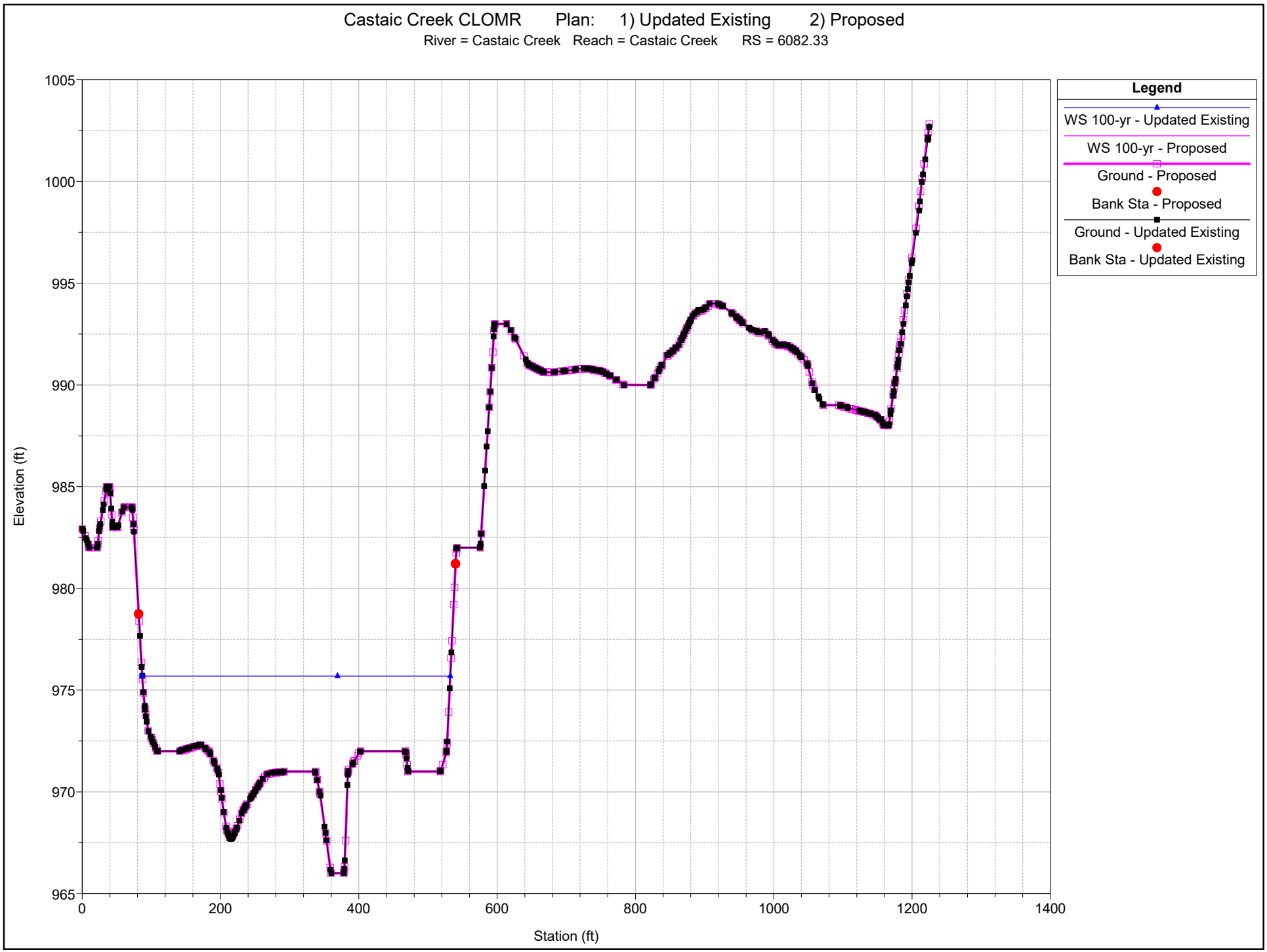

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River = Castaic Creek Reach = Castaic Creek RS = 7797.603
Legend
WS 100-yr - Updated Existing
WS 100-yr - Proposed
Ground - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Bank Sta - Updated Existing
Elevation (ft)
Station (ft)
1030
1020
1010
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

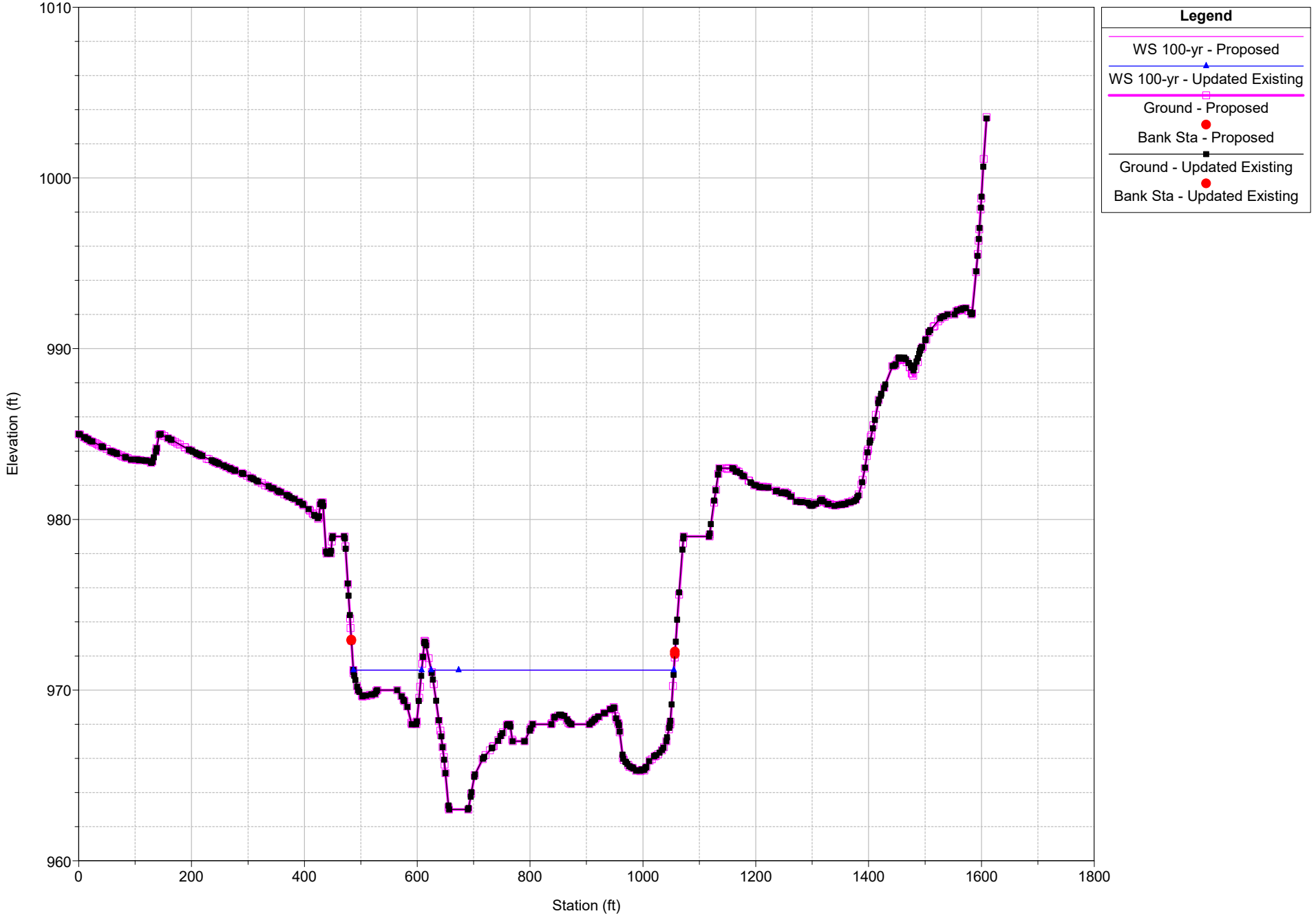


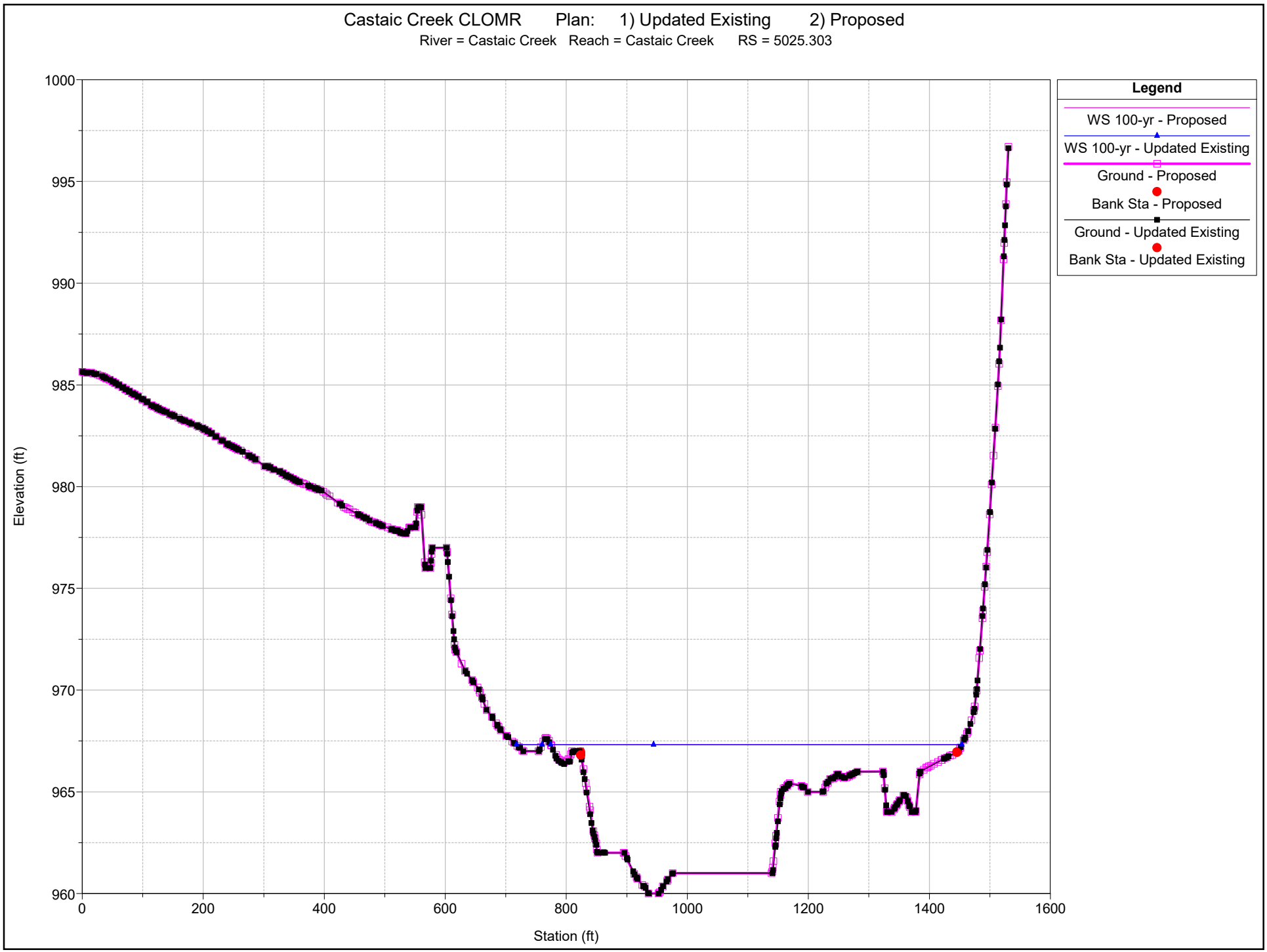

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed
River = Castaic Creek Reach = Castaic Creek RS = 6704
Legend
WS 100-yr - Proposed
WS 100-yr - Updated Existing
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
Ground - Updated Existing
Ineff - Updated Existing
Bank Sta - Updated Existing
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
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)
1005
1000
995
990
985
980
975
970
965
0
200
400
600
800
1000
1200
1400

Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

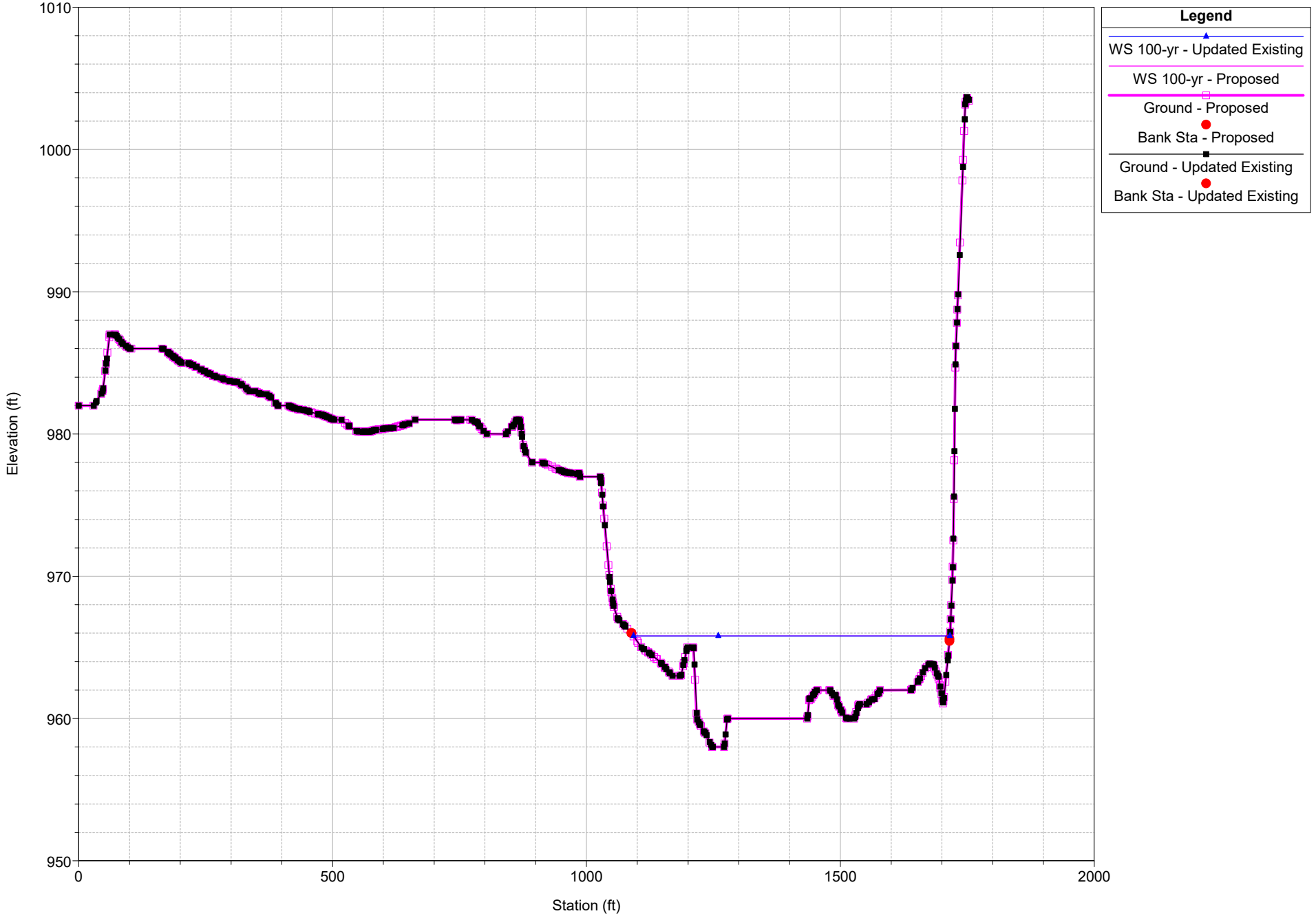
River = Castaic Creek Reach = Castaic Creek RS = 5537.854




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
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200
400
600
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1400
1600

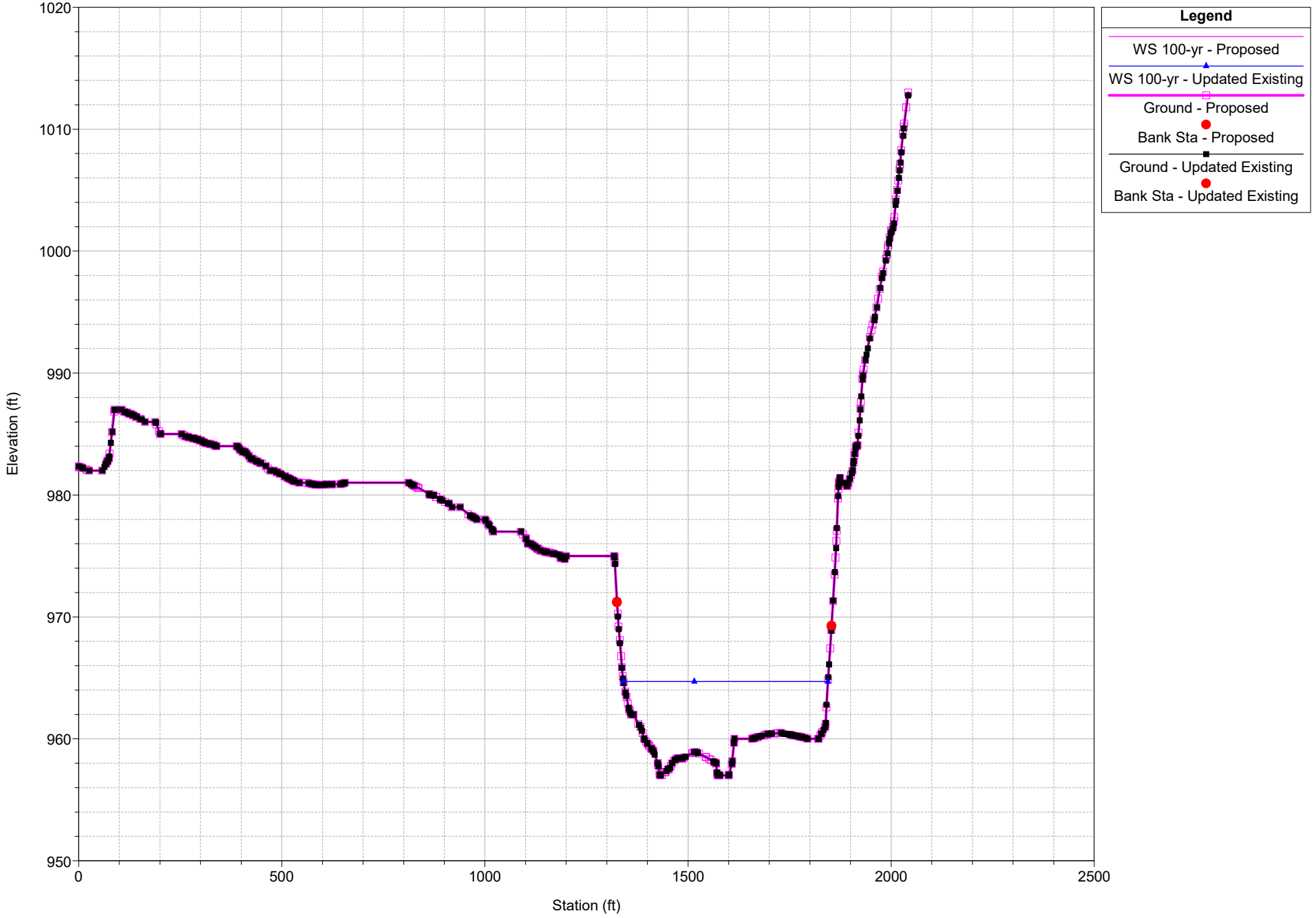
Castaic Creek CLOMR Plan: 1) Updated Existing 2) Proposed

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.

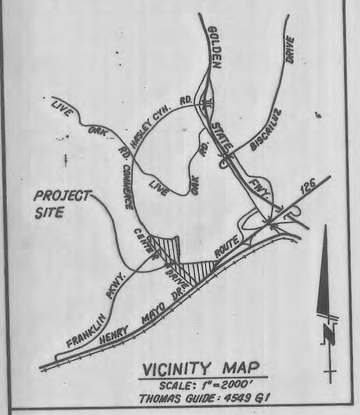
The Fieldwork Code of Practice has been produced by the Declining Amphibian Populations Task Force with valuable assistance from Begona Arano, Andrew Cunningham, Tom Langton, Jamie Reaser, and Stan Sessions.

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

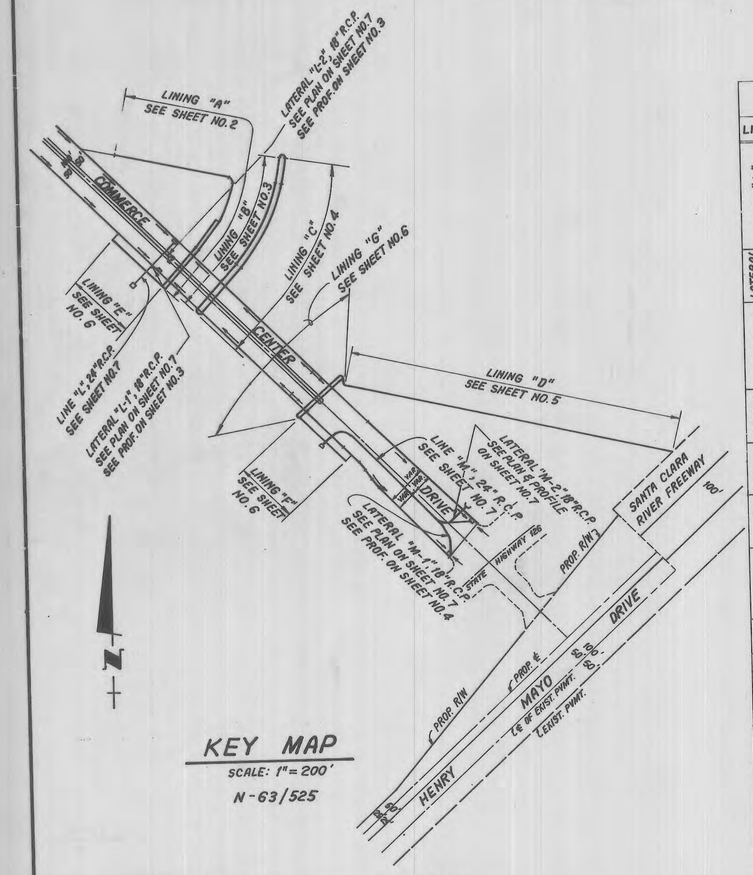
PACE
Advanced Water Engineering

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



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

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

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	0.0272	6.89	4.4
	STA. 10+50.00 TO END OF LININGS A & B					

NGL.- NEGLIGIBLE

BENCH MARK CL 3976
LACRD BM
ROBM 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.

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 _____

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

NO.	REVISION	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER JOHN SAARKISSIAN No. 42690 Exp. 3-31-99 CIVIL STATE OF CALIFORNIA

Exp. 12-31-98 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)

PROFILE OF LINING "A"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'

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

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

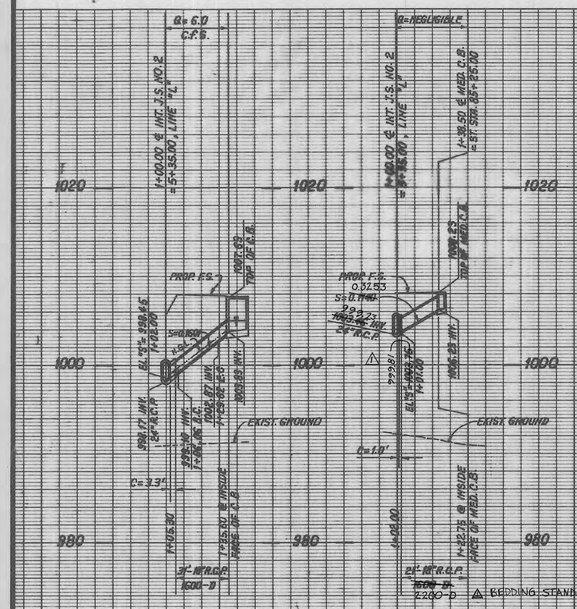
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 23391 DATE: 4-18-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 2 OF 9 SHTS

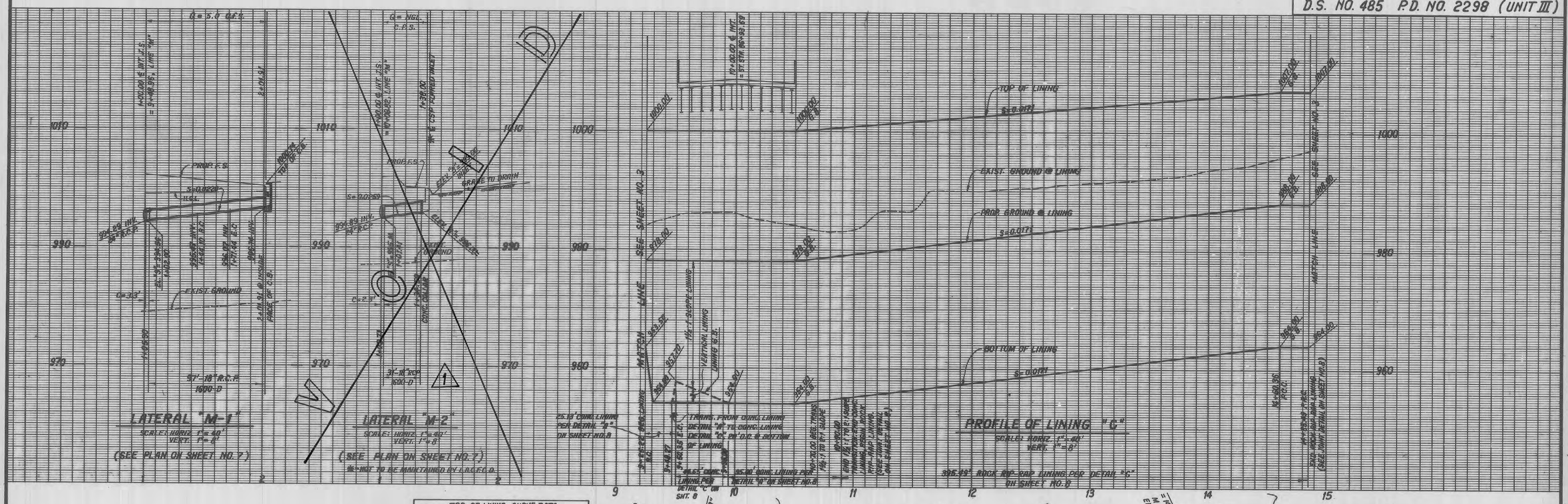
W.O. 1020-252-A

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

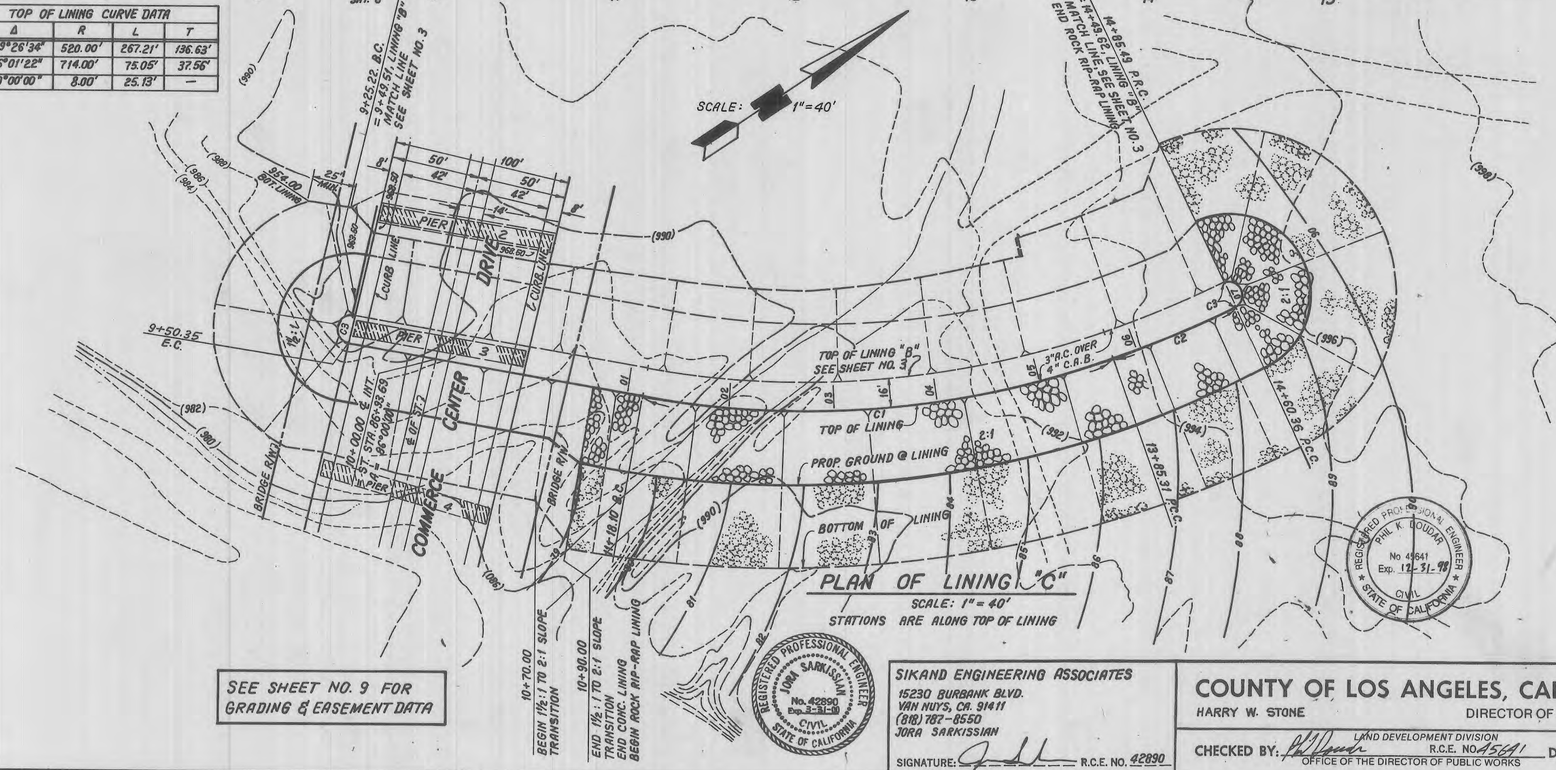
STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)


Q= 6.0 C.F.S.
Q=NEGLIGIBLE
1+00.00 ℄ INT. J.S. NO. 2
= S1°35'00" E, LINE "L"
1+35.00 ℄ INT. J.S. NO. 2, LINE "L"
= S1°35'00" E
A=35.59
R=1425.00
1+35.59 ℄ REC. C.B.
=21+39.35=25.00
PROP. F.G.
EL. 1006.69
EL. 998.65
1+08.20
SHLROP
EXIST. GROUND
PROP. F.G.
0.02.55
S=0.1961
223.27
HGHT. 1.79
24" R.C.P.
EL. 1005.23 INT.
EL. 1004.62
1+08.20
EL. 1003.89 INT.
1+08.20
998.17 INT.
1+08.20
24" R.C.P.
1+08.20
998.17 INT.
1+08.20
24" R.C.P.
1+08.20
1+08.20
1+08.20

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'	—



SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA

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

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

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

SIKAND ENGINEERING ASSOCIATES
15230 BURBANK BLVD.
VAN NUYS, CA. 91411
(818) 782-8550
JORA SARKISSIAN
SIGNATURE: _____ R.C.E. NO. 42890

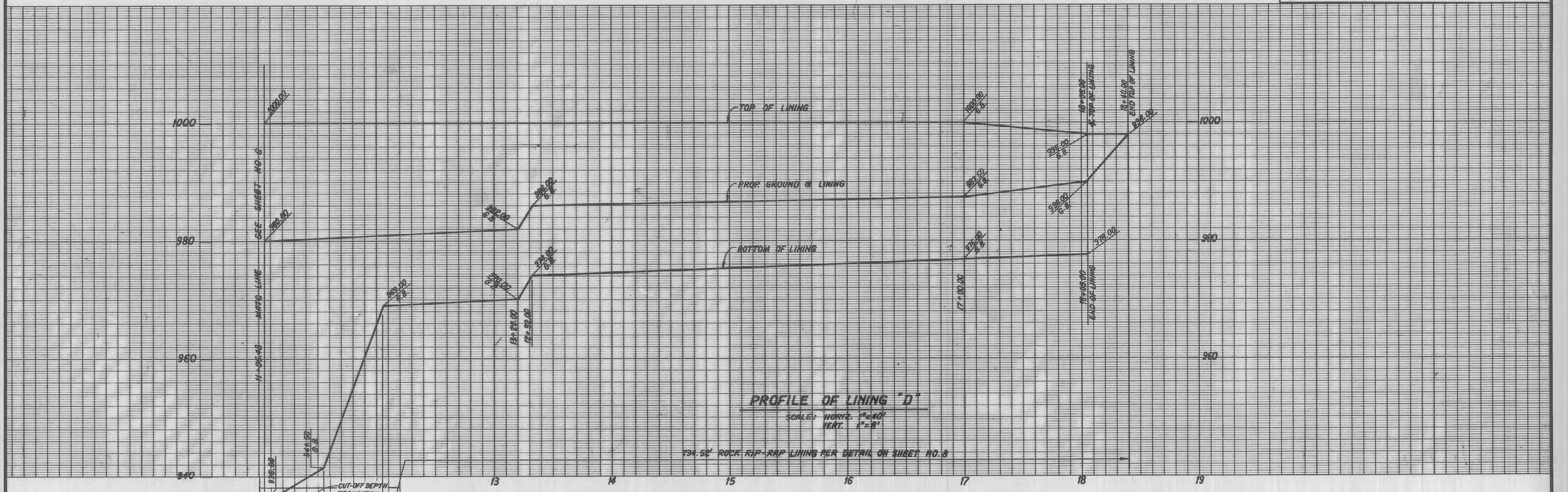
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE
DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

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)



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

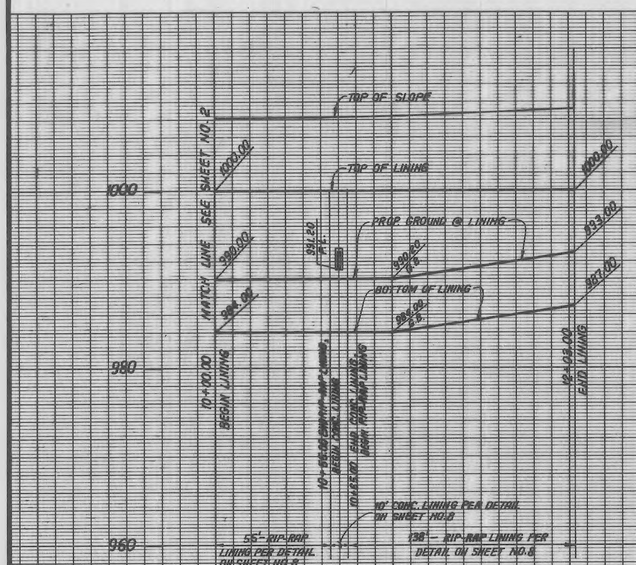
COUNTY OF LOS ANGELES, CALIFORNIA
HARRY W. STONE — DIRECTOR OF PUBLIC WORKS
CHECKED BY: _____ LAND DEVELOPMENT DIVISION
R.C.E. NO. 45641 DATE: 4-13-98
OFFICE OF THE DIRECTOR OF PUBLIC WORKS

SHT 5 OF 9 SHTS

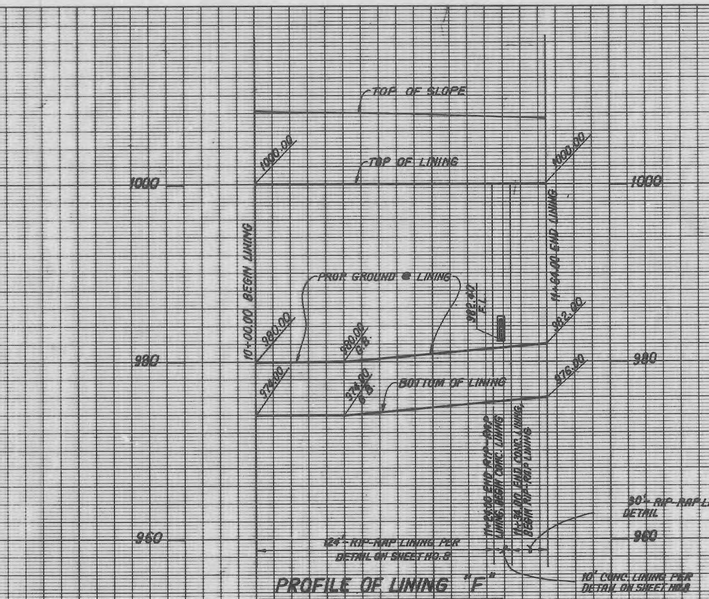
W.O. 1020-252-A

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

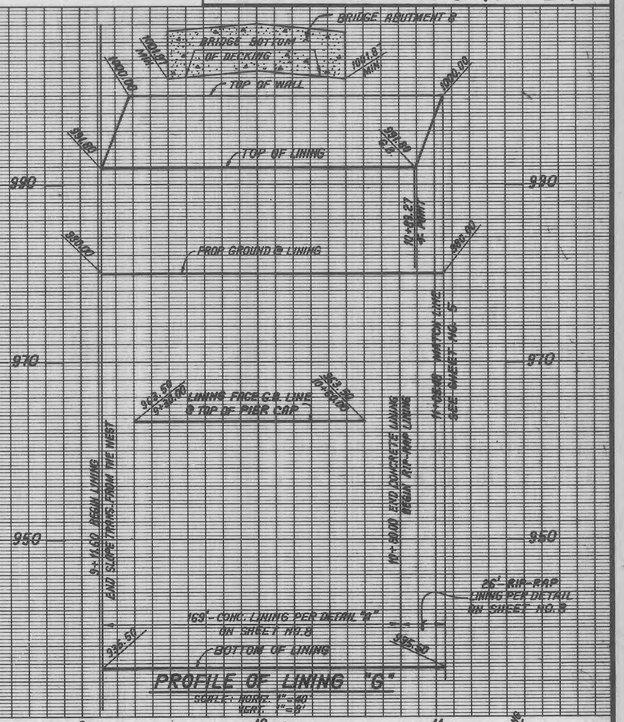
STORM DRAIN PLANS IN
D.S. NO. 485 P.D. NO. 2298 (UNIT III)



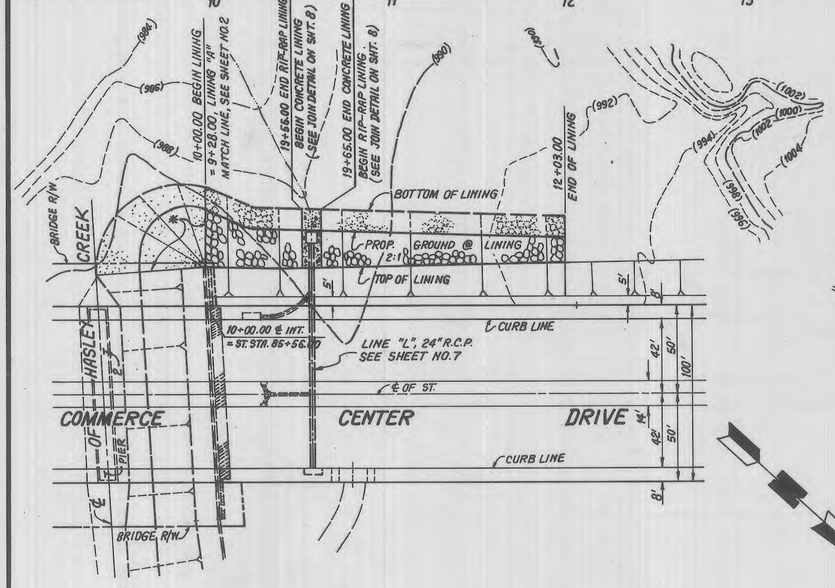
PROFILE OF LINING "E"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'



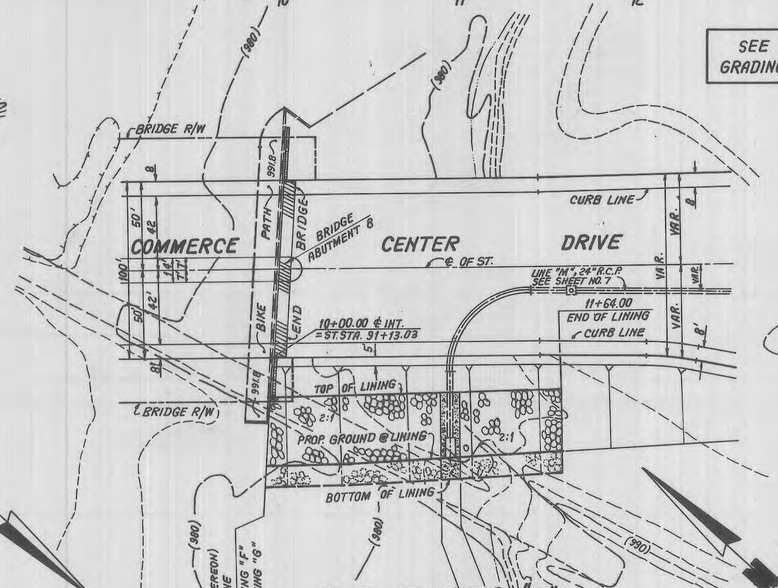
PROFILE OF LINING "F"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'



PROFILE OF LINING "G"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'



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

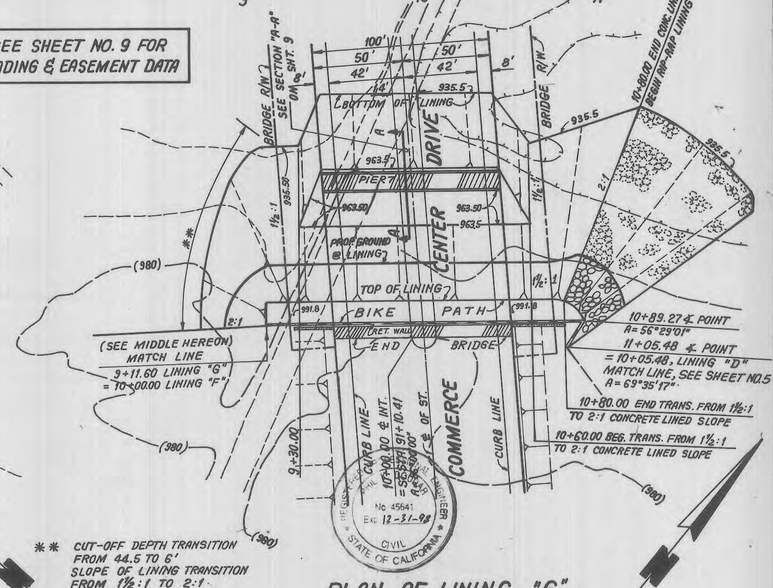


PLAN OF LINING "F"
SCALE: 1"=40'

10+96.00 END RIP-RAP LINING
BEGIN CONCRETE LINING
(SEE JOIN DETAIL ON SHT. 8)

11+06.00 END CONCRETE LINING
BEGIN RIP-RAP LINING
(SEE JOIN DETAL ON SHT. 8)

SEE SHEET NO. 9 FOR GRADING & EASEMENT DATA



** CUT-OFF DEPTH TRANSITION FROM 44.5 TO 6'
SLOPE OF LINING TRANSITION FROM 1½:1 TO 2:1

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

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

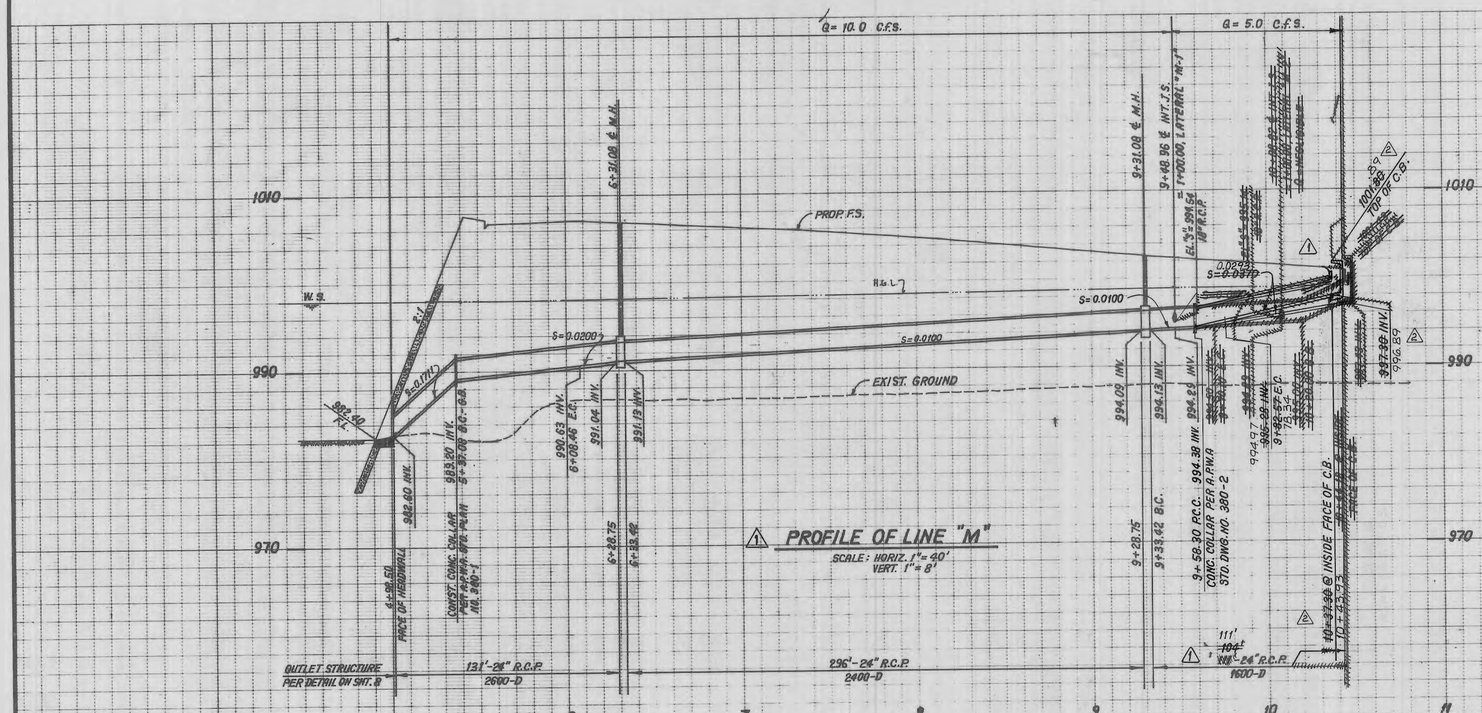
REGISTERED CIVIL ENGINEER No. 45641 Exp. 12-31-98 CIVIL STATE OF CALIFORNIA

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				
⬡	△	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'

NO	REVISION	REVISED BY	APPROVED BY	DATE
⚠1	REVISED LINE "L" & "M" PLAN & PROFILE ELIMINATED LATERAL "M-2"	R.C.E. 42890	R.C.E. 42890	7/7/99
⚠2	REVISED LINE "M" PLAN & PROFILE	S. KHALIL	S. KHALIL	12/1/99
⚠3	REVISED LINE "L" PROFILE AND ADDED PROPOSED (2)-18" SEWER CROSSING	R.C.E. 51013		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

COUNTY OF LOS ANGELES, CALIFORNIA
"HOMAS A. TIDEMANSON DIRECTOR OF PUBLIC WORKS
CHECKED BY: R.C.E. NO. 45641 DATE: 4-13-98

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 QUANTITIES 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.

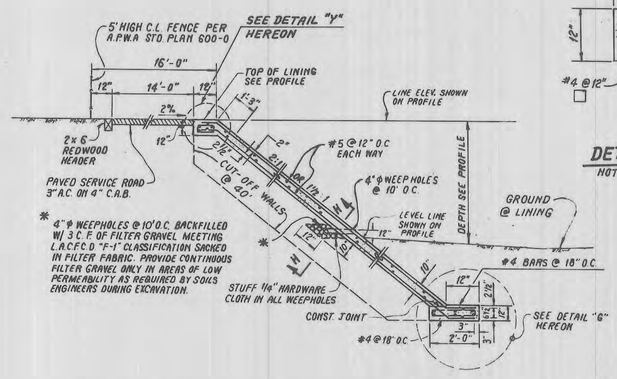
STRUCTURAL DESIGN CRITERIA

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

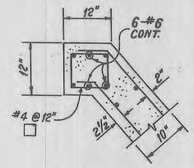
DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 37 p.s.f. per foot of depth
Internal water pressure: 62.4 p.s.f. per foot of depth
Weight of concrete: 150 p.c.f.

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

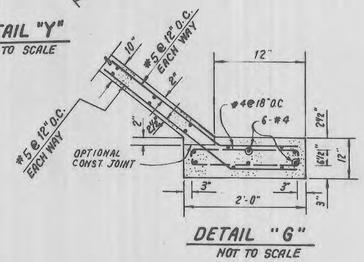
NO	REVISION	REVISED BY	APPROVED BY	DATE



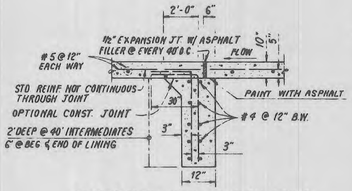
CONCRETE LINING DETAIL "A"
NOT TO SCALE



DETAIL "Y"
NOT TO SCALE



DETAIL "G"
NOT TO SCALE

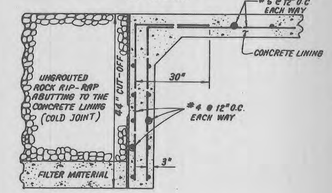


SECTION "H-H" EXPANSION JOINT
CUT-OFF WALL

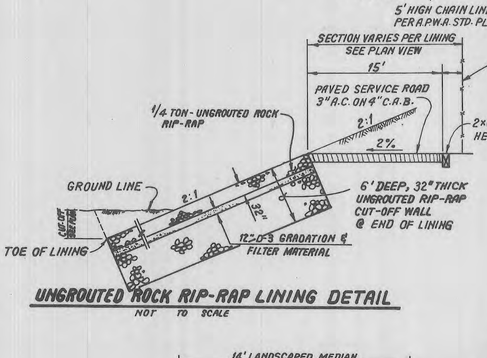
NOTE EXPANSION JOINT SHALL BE SPACED @ 40' INTERVALS



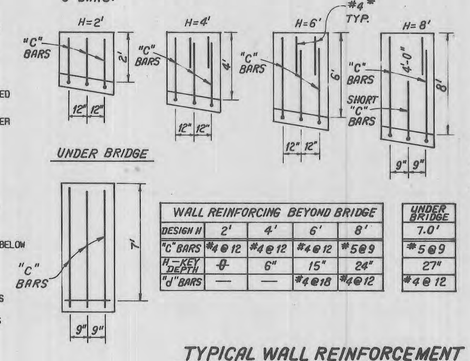
⚠ CONCRETE LINING-UNGROUTED ROCK RIP-RAP JOIN DETAIL
NOT TO SCALE



⚠ SECTION "A-A"
NOT TO SCALE



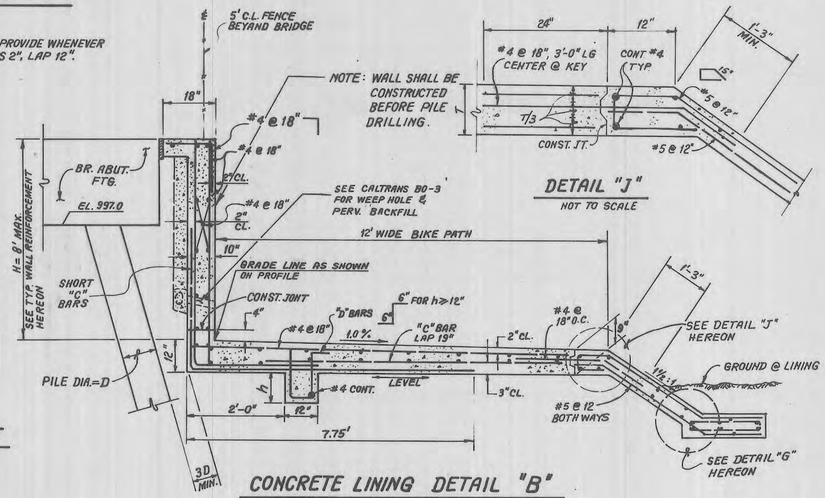
UNGROUTED ROCK RIP-RAP LINING DETAIL
NOT TO SCALE



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

UNDER BRIDGE
7.0'
#5@9
27"
#4@12

TYPICAL WALL REINFORCEMENT
NOT TO SCALE



CONCRETE LINING DETAIL "B"
NOT TO SCALE

DETAIL "J"
NOT TO SCALE



CONST. MOD. C.B. PER A.P.W.A. STD. PLAN 304-1 OR EQUAL, V=VAR. SEE PLAN

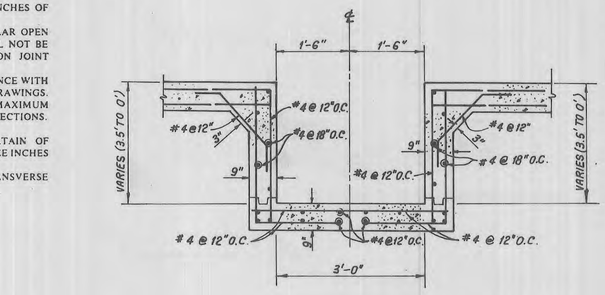
CONST. MOD. C.B. PER A.P.W.A. STD. PLAN 300-1 (TYP.), W= 12' & V= 18', B= 12". MAX. SPACING= 1000' W/6" STD. COVER PER ALHAMBRA FDRY. CO. STD. A-2025 OR EQUAL.

NOTE: ALL DIMENSIONS ARE TYPICAL

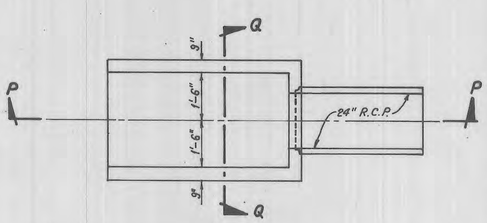
SECTION A-A
NOT TO SCALE

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

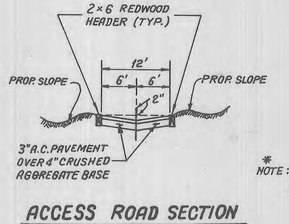
MEDIAN CATCH BASIN DETAIL
NOT TO SCALE



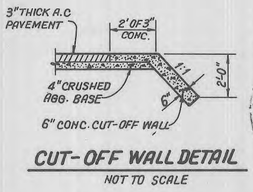
SECTION Q-Q
NOT TO SCALE



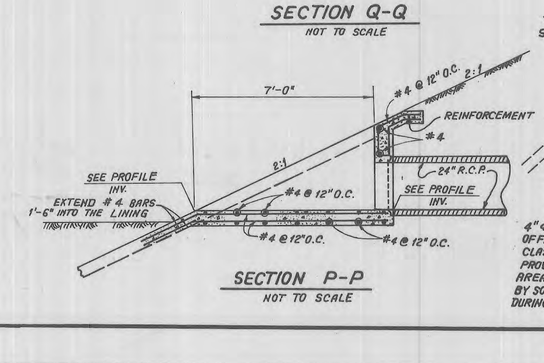
OUTLET STRUCTURE DETAIL FOR LINES "L" & "M"
NOT TO SCALE



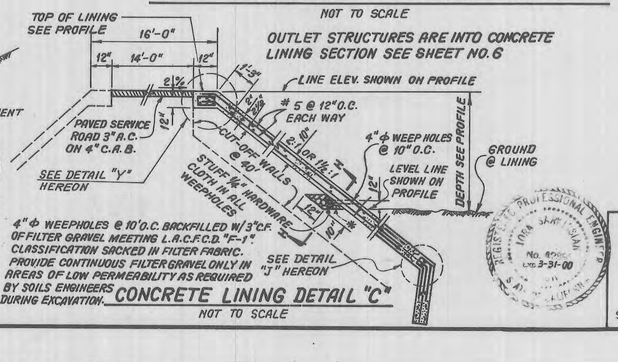
ACCESS ROAD SECTION
NOT TO SCALE



CUT-OFF WALL DETAIL
NOT TO SCALE



SECTION P-P
NOT TO SCALE



CONCRETE LINING DETAIL "C"
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

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

* EASEMENT TO L.A.C.F.C.D. FOR FLOOD CONTROL PURPOSES.

SCALE: 1"=60'

EASEMENT DATA

T NO.	DIRECTION	DISTANCE
1.	S. 40°42'51" W	85.81'
2.	N. 73°57'46" 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~~	~~113.32'~~
~~26.~~	~~S. 48°25'31" E~~	~~76.00'~~
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'	14.05'
14	27°11'16"	42.00'	19.93'	10.16'

⊙ - 13 L.F. - 12" P.V.C. AND C.S.P. INLET PER A.P.W.A. STD. PLAN NO. 351-1, CASE 1, INLET ELEV. = 999.00 (NOT TO BE MAINTAINED BY THE LACFCD)

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. Hamat	3/5/99

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
CHECKED BY: _____ LAND DEVELOPMENT DIVISION 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

GM JP (213) 699-8440 F.D. SHEET NO. 3 DATE 6-15-