HYDRAULIC ANALYSIS REPORT FOR TEMESCAL VALLEY COMMERCE CENTER

Job Number 18602-B

October 29, 2020
Revised: September 24, 2021
Revised: September 29, 2022
Revised: May 2, 2024

RICK

HYDRAULIC ANALYSIS REPORT

FOR

TEMESCAL VALLEY COMMERCE CENTER

Job Number 18602-B

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TABLE OF CONTENTS

REVISION PAGED DATED MAY 2, 2024……..……..i
REVISION PAGED DATED SEPTEMBER 29, 2022……ii
REVISION PAGED DATED SEPTEMBER 24, 2021……...vi

1.0 INTRODUCTION 1
1.1 Topography 2
2.0 HYDRAULICS 4
2.1 Hydraulic Methodology and Criteria 4
2.2 Hydraulic Analysis of Coldwater Canyon Wash 4
2.3 Hydraulic Analysis of Temescal Wash 9
3.0 HYDRAULIC RESULTS 15
4.0 SEDIMENT TRANSPORT AND SCOUR ANALYSIS 21
4.1 Hydrology 21
4.2 Sediment Transport Plan Inputs 22
4.3 Scour Analysis 24
5.0 CONCLUSION 26

Tables

Table 1: Manning's n-Values……..…..…..6
Table 2: Summary of Temescal Wash Discharges……..….10
Table 3: Temescal Wash Existing Condition Model Cross Sections Summary……11
Table 4: Temescal Wash Proposed Condition Model Cross Sections Summary…….13
Table 5: Drop Structure Riprap Protection Locations……16
Table 6: Temescal Wash 100-yr WSE Comparison……..……18

Figures

Figure 1: Vicinity Map ..... …3

Appendices

Appendix A: Supplemental Documents

1. Excerpts of “Coldwater Canyon Wash Geomorphology Study,” prepared by JE Fuller, and dated October 2018
2. FEMA FIS Flow Rates
3. “Bridge Rehabilitation Assessment Dawson Canyon Road over Temescal Wash,” Prepared by Kleinfelder, and dated March 17, 2022

Appendix B: Coldwater Canyon Wash Hydraulics

Appendix C: Temescal Wash Hydraulics

Appendix D: Proposed Flood Extents Exhibit

Appendix E: Temescal Wash Sediment Transport Analysis Results

Appendix F: Comment Log

Appendix G: Zip File of Electronic Files

HYDRAULIC ANALYSIS REPORT

FOR

TEMESCAL VALLEY COMMERCE CENTER

REVISION PAGE

MAY 2, 2024

This report presents revisions to the September 29, 2022 report pursuant to comments received as part of the 4th plan check review by the Riverside County Flood Control and Water Conservation District and updates to the hydraulic models to be reflective of the design revisions, including the revised channel slope stabilization configuration of Temescal Wash and revisions to upstream limit of Coldwater Canyon Wash improvements. The relevant comments, along with responses from Rick Engineering Company, are included in Appendix F.

HYDRAULIC ANALYSIS REPORT

FOR

TEMESCAL VALLEY COMMERCE CENTER

REVISION PAGE

SEPTEMBER 29, 2022

This report presents revisions to the September 24, 2021 report pursuant to comments received as part of the 3rd plan check review by the Riverside County Flood Control and Water Conservation District. Itemized responses to comments received regarding the Hydraulic Design report are included below. Responses by Rick Engineering are shown below **in bold.**

Hydrology and Hydraulics Report

1. The hydrology for Coldwater Canyon Wash and thus peak discharges used for the design of the channel is obtained from the District and is acceptable.

   Noted.

2. Place channel bank stations at appropriate station of each cross section.

   Bank stations have been located at top of channel banks as requested.

3. Correct HEC_RAS input files so the River Stations on the plan and the profile, HEC-RAS, and the input files provided to the District match.

   Noted. River Stations have been coordinated with the plans.

4. Justify use and applicability of the most downstream station and its cross section in the hydraulic analysis.

   This cross section has been removed, the most downstream cross section is now the last cross section necessary to model the Dawson Road culvert system.

5. Justify modelling of ineffective flow areas within channel.

   Ineffective flow areas have been revised to appropriately account for the constrictions placed at the top of each drop structure.

6. Provide Hydrologic and Hydraulic study for 54-inch reinforced concrete pipe.

   Hydrologic and Hydraulic analyses have been provided in the report prepared by Rick Engineering and titled "Drainage Study for Temescal Valley Business Park (Offsite and Frontage Roads) Final Engineering" and dated September 29, 2022.

Coldwater Channel Plans

1. Revise Plans to meet District Drafting Manual standards. Please refer to RCFCD and WCD drafting manual available on the district website at Engineering Tools I Riverside County Flood Control & Water Conservation District (rcflood.org).

   This comment has been addressed in separate Comments Response Log.

2. Use latest General Notes which can be found on the districts website.

   This comment has been addressed in separate Comments Response Log.

3. Show District right of way plans.

   This comment has been addressed in separate Comments Response Log.

4. Provide maintenance access and necessary turnaround on both sides of the channel.

   This comment has been addressed in separate Comments Response Log.

5. Provide access and turnaround at the channel outlet downstream of the proposed Dawson Canyon Road.

   This comment has been addressed in separate Comments Response Log.

6. As currently shown, the left bank of the channel at the upstream end may not capture all of the Coldwater Canyon flows.

   This comment has been addressed in separate Comments Response Log.

7. It is not clear why the District access continues for nearly 1000 ft. upstream of the improvement on the right bank. Please provide justification or provide the access to within the reaches of the proposed channel improvement.

   This access has been removed.

8. Provide details on the interface between the natural channel and improved channel and justify the proposed interface between these elements.

   The interface between the natural channel and improved channel has been modeled in the provided HEC-RAS model.

9. Provide riprap design calculations and adequacy of the riprap for velocities greater than 18 fps.

   Velocities of just over 18 fps (less than 19 fps) are found in short sections within the drop structures. Based on Tractive Forces, and reference provided by RCFC, 2 ton riprap should be sufficient protection for these areas.

10. Provide design criteria and structural calculation for the proposed concrete reach of the channel.

    The concrete reach in question has been removed from channel design.

11. Comments contained herein are focused on the proposed channel improvement plans and associated reports only.

    Noted.

12. Comments regarding the Conditional Letter of Map Revision (CLOMR) submittal will be provided by the Floodplain Management Section (FPM) of the District since said submittal will be reviewed by the FPM section.

    Noted.

13. SP353 proposed to be developed on the south side of this project contemplates a channel for Coldwater Canyon Wash with an alignment different from this project. It is suggested the applicant coordinate with the Specific Plan proponents regarding channel alignment etc.

    Noted.

14. The proposed channel alignment may affect planned realignment of Temescal Canyon Road; it is recommended that the applicant coordinate with Riverside County Transportation Department to avoid any future conflict with the road realignment plan.

    Noted.

15. According to the soils report prepared by NorCal Engineering, fill ranging from 2 ft to 12 ft is placed on the site some of which may affect the channel design.

    Noted.

HYDRAULIC ANALYSIS REPORT

FOR

TEMESCAL VALLEY BUSINESS PARK

REVISION PAGE

SEPTEMBER 24, 2021

This report presents revisions to the October 29, 2020 report pursuant to comments received as part of the 2nd plan check review by the Riverside County Planning Department (DAC #2). Itemized responses to comments received regarding the Hydraulic Design report are included below. Responses by Rick Engineering are shown below **in bold.**

1. Future exhibits shall depict all proposed flood control and drainage facilities including watercourses, dams, retention basins, channels, storm drains, culverts, brow and slope drains with type, grades, dimensions, and easement or right-of-way widths clearly shown. Centerline curve radii and typical sections shall be shown for all open channel facilities. The exhibit shall depict all points of concentration where offsite runoff enters the site and points of discharge from the site, including the drainage area in acres and the one-percent annual chance (100-year) discharge at each point.

   Noted. The CCW channel is not anticipated to convey flows from the on-site development. Therefore Comment #1 from Flood Control is considered to apply to only the onsite preliminary drainage study by others.

   a. Exhibit A shows a proposed Channel bisecting the project site, along the east boundary of the developed area, to collect and convey flows from the Coldwater Canyon Wash to Temescal Wash. This development is dependent on an adequately designed flood control facility to collect and contain the 100-year storm event for Coldwater Canyon Wash. This channel must be designed to the District's standards.

   This comment is noted. The channel has been designed to the District's standards for future maintenance by the District. Design analysis of the proposed channel is presented by the report titled "Hydraulic Analysis Report for Temescal Valley Business Park", prepared by Rick Engineering Company.

   b. Exhibits for an "offsite plot plan" were submitted which included cross sections for Temescal Canyon Road, Dawson Canyon Road, and Coldwater Creek Channel. It is unclear who is building these improvements, and the timeline for their construction. Since the entire project site is impacted by the Coldwater Creek

floodplain, the Coldwater Creek Channel must be constructed prior to CUP 200044. Provide additional information on when the channel is being built and by who. Additional information will be required to determine how upstream flows will be collected, how flows will be discharged to Temescal Wash, and whether additional right of way is required for maintenance.

This comment is noted. Additional information will be included with the hydraulic design report for reference and the offsite exhibits have been updated for clarity.

2. The grading plans show fill proposed within the FEMA floodplain. The developer must submit a floodplain analysis of Temescal Creek to determine potential impacts of the development to the FEMA floodplain. The hydraulic model submitted will need to be updated to match the FEMA effective water surface elevations within 0.5' at the upstream and downstream limits per FEMA criteria. The updated Temescal Creek model may then be used as the downstream control for Coldwater Creek model, otherwise the FEMA effective model should be used as the control.

   This comment is noted. The project intends to submit and process a CLOMR/LOMR to correct the limits of the floodplain in relation to the proposed project.

3. The developer must submit a floodplain analysis to determine potential impacts of the development to the DWR floodplain.

   As no DWR floodplain is in the vicinity, this comment is understood to be in regards to Riverside County Ordinance 458. A floodplain analysis is included with the resubmittal in the form of the revised report titled "Hydraulic Analysis Report for Temescal Valley Business Park", prepared by Rick Engineering Company.

4. A hydraulic analysis report was submitted for Temescal Wash and Coldwater Creek.
   a. Regarding the hydraulics for Coldwater Creek Channel;
      i. Downstream control should be consistent with the water surface elevation of Temescal Creek. FEMA's effective water surface elevation in Temescal Creek is significantly different than the Temescal Creek hydraulic model submitted.

      The CCW model has be revised accordingly. Per communications with district staff, analysis of the coincident peak within Temescal Wash is considered appropriate to determine the starting WSE

      ii. The Manning's value for the invert is too low for an earthen bottomed channel.

      The manning's roughness value used to model the earthen bottom channel has been revised per correspondence with District staff.

iii. Supercritical flow is not acceptable on an earthen channel.

This comment is noted. The design approach within the report has been clarified, and is illustrated by the accompanying plans, to consist of subcritical non-erosive flow along the earthen bottom, with supercritical flow being limited to armored drop structures

iv. There appears to be a 20 foot drop just between station 1854 and 2050, with supercritical flow. The channel is shown to have an earthen bottom. Redesign or explain.

The revised report and accompanying plan include analysis and limits for armoring of drop structures.

v. Explain how upstream flows will be collected. The model shows an abrupt transition from natural to channelized.

As previously discussed with district staff, the upstream limits of the channel have been refined for the revised submittal, based on coordination with upstream stakeholders.

vi. The realigned Temescal Canyon Road is not shown on the model; verify it has been modeled correctly to account for the future bridge.

The revised hydraulic report includes a narrative that the future Temescal Canyon Road crossing will be designed by others in the future.

vii. Show how channel will discharge to Temescal Creek. The model shows work being done in Temescal creek, which will require permits.

This comment is noted. The CCW outfall into Temescal Wash is analyzed by the revised hydraulic analysis, and also depicted on the accompanying channel improvement plans.

5. A draft EIR was submitted for the Temescal Valley Business Park, It does not appear to discuss impacts of the construction of Coldwater Creek Channel, or associated modifications to Temescal Creek. This project cannot be built until the channel is constructed. Update the DEIR or provide information on when and by who the channel is being built.

This comment is noted

1.0 INTRODUCTION

This report presents hydraulic analyses of the proposed Coldwater Canyon Wash (CCW) channel and a portion of Temescal Wash in support of the proposed Temescal Valley Commerce Center project (herein referred to as “the project”). The project is a planned commercial development on approximately 50-acres. The project is located southeast of the intersection of Temescal Canyon Road and Dawson Canyon Road in the County of Riverside, CA. Refer to Figure 1.0 for a Vicinity Map of the project.

The reach of the Coldwater Canyon Wash covered by this study extends from the point of confluence of the proposed Coldwater Canyon Wash and Temescal Wash to approximately 3,500 linear feet upstream along the existing Coldwater Canyon Wash streambed. Coldwater Canyon Wash has been studied in detail previously by a report prepared for Riverside County Flood Control and Water Conservation District titled “Coldwater Canyon Wash Geomorphology Study,” prepared by JE Fuller, and dated October 2018. Excerpts of this report are included with Appendix A for reference. As identified in Section 4.2 of that report, private developments have previously proposed to realign Coldwater Canyon Wash away from Temescal Canyon Road, which can mitigate flood hazards in the project area. A new channel is proposed by this project to by-pass Coldwater Canyon Wash through the project site, resulting in a new point of confluence with Temescal Wash approximately 1,300 linear feet upstream along the Temescal Wash streambed. The point of the proposed outfall is generally restoring the historical outfall location of the CCW channel into Temescal Wash, as presented by Figure 32 of the above reference report.

The proposed re-alignment of Coldwater Canyon Wash channel is to include a total of five drop structures; four permanent riprap drop structures, and one concrete lined drop into the arch culvert at the Dawson Road South crossing. Also proposed are maintenance access roads at the top of slope on either side of the channel with ramps along the northerly bank of the channel providing access above and below of each drop structure to the channel bottom.

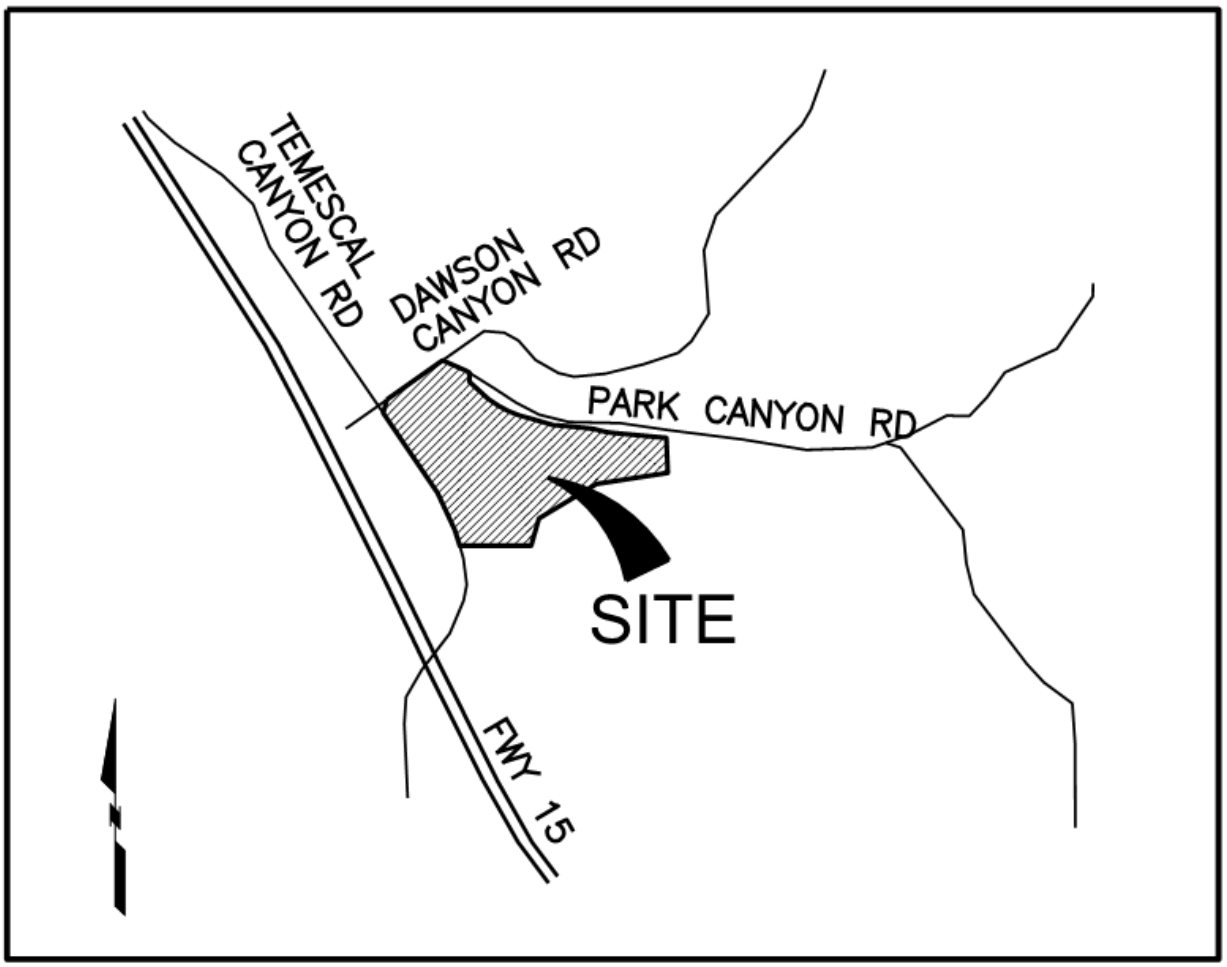
The reach of Temescal Wash covered by this study extends from approximately 2,050 linear feet downstream, and approximately 4,000 linear feet upstream to the point of confluence of the existing Coldwater Canyon Wash and Temescal Wash. The primary purpose of the hydraulic analysis is to assist in the design of the proposed channel by-passing Coldwater Canyon Wash and assess potential impacts to the water surface elevations and velocities within the Temescal Wash as a result of the new Coldwater Canyon Wash outfall. The study prepared and compared the results of the pre-project and post-project hydraulic capacity ("capacity run") hydraulic models for the specified reach of Temescal Wash and proposed Coldwater Canyon Wash channel.

This document includes a summary of the hydraulic analysis for the proposed re-alignment of Coldwater Canyon Wash, as well as approximately 4,000 linear feet of the affected portion of Temescal Wash.

1.1 Topography

The topographic information used to develop the hydraulic models within the Temescal Valley Business Park project is based project specific topography consisting of 1-foot contours on the NAVD88 vertical datum from a survey conducted by Rick Engineering Company, and available area topography consisting of 1-foot contours on the NAVD88 vertical datum from the USGS. Cross sections for this hydraulic analysis were created using this topography for existing and proposed conditions.

Figure 1: Vicinity Map



VICINITY MAP

NO SCALE

2.0 HYDRAULICS

2.1 Hydraulic Methodology and Criteria

The GeoHECRAS computer modeling software was used as a supplemental tool to help build the hydraulic model and the HEC-RAS v5.0.7 computer program was used (as the main engine) to execute the hydraulic calculations for both the Temescal Wash reach analyzed and proposed Coldwater Canyon Wash. The HEC-RAS software is intended for calculating water surface elevations (WSELs) for supercritical, subcritical and mixed flow regimes in natural or man-made channels. The effects of the various obstructions such as culverts may be considered in the computations.

For the Temescal Wash hydraulic analysis, Flood Insurance Study (FIS) Data has been obtained from the Federal Emergency Management Agency (FEMA) including data for Panel 1390 of 3805, Map Number 06065C1390G. The proposed hydraulic modeling performed as part of this hydraulic study is compared to a Duplicate Effective Model based on the Effective Model that was provided by FEMA on February 23, 2020 for Temescal Wash. The Temescal Wash Effective Model was based on the U.S. Army Corps of Engineers' HEC-2 program. The Effective Model, and thus the Duplicate Effective Model, extend further upstream and downstream, however the Existing Condition and Proposed Condition Models only include a portion of Temescal Wash related to this project and the related requested mapping revision.

2.2 Hydraulic Analysis of Coldwater Canyon Wash

Existing Condition and Project Phasing

In the existing condition Coldwater Canyon Wash (CCW) is routed to the west around the pad, formerly known as the Rinker Plant, parallel to Temescal Canyon Road. This diversion of the CCW channel was constructed in the early 1970's by others in conjunction with the development of the Rinker Plant. There are multiple driveways across the existing Coldwater Canyon Wash alignment as well as a dual box culvert underneath Dawson Canyon Road North where CCW is then conveyed north to the

confluence with Temescal Wash downstream of Dawson Canyon Road North. As studied by the JE Fuller report, this existing reach only has capacity for approximately 2,000 cfs which is approximately the 5-year storm event for Coldwater Canyon Wash. The JE Fuller report documents that split flow occurs during larger storm events with a portion of flow traveling north through the Rinker Plant to confluence with Temescal Wash upstream of Dawson Canyon Road North bridge, and a portion of flow also traveling west along Temescal Canyon Road to ultimately confluence with Temescal Wash downstream of the Dawson Canyon Road North bridge. The existing condition model generated by the JE Fuller Study has been utilized to calculate that with a total flow rate of 3,500 cfs within the CCW channel (coinciding with the 100-year flow event in Temescal Wash) the amount of split-flow through the Rinker Plant is approximately 960 cfs.

Future upstream improvements, including a proposed culvert crossing for Temescal Canyon Road across Coldwater Canyon Wash and associated upstream channel improvements are understood to be planned by others in the future.

Model Extents and Boundary Conditions

In effort to assist in the design of, and to determine the impacts of proposed Coldwater Canyon channel improvements of the Temescal Valley Commerce Center project, the HEC-RAS model extends approximately 2,500 linear feet upstream from the point of proposed outfall location to Temescal Wash, through the proposed project site and to the existing streambed just upstream of the project boundary.

Hydraulic analysis of the proposed realignment and arch culverts along Coldwater Canyon Wash is included with Appendix B. Hydrologic information for the reach is obtained from the report titled “Coldwater Canyon Wash Geomorphology Study,” prepared by JE Fuller, and dated September 2018. Relevant excerpts of this report are included in Appendix A for reference. A flowrate of 5,250 cfs was used for design purposes, though the peak flowrate is anticipated to be reduced to in the future pending the construction of an upstream regional infiltration/detention basin.

Manning's n Values

Manning's n-values for the model upstream of proposed improvements were based on visual observations which found moderate overgrowth with scattered brush and heavy weeds. Manning's n-values for the earthen lengths of the proposed portion of Coldwater Canyon Wash reflect a maintained condition of a vegetated state as directed by the Riverside County Flood Control and Water Control District (RCFC). Manning's n-values for riprap were obtained from Table 4.3: Manning's Values by Rock Class of the Hydraulic Design Manual for Riverside County Flood Control and Water Conservation District dated March 2024.

Table 1 below summarizes the n-values used in each condition within the Coldwater Canyon Wash channel improvements reach:

Table 1 – Modeled Manning's "n" Values

Condition	Velocity	Maintained
Location	**Manning's n**	**Manning's n**
Natural Channel Bottom upstream of Proposed Channel Improvements	0.050	0.050
Overbanks upstream of Channel Improvements	0.050	0.050
Vegetated Channel within Channel Improvements	0.025	0.030
Concrete Structures	0.018	0.018
¼ Ton Riprap	0.043	0.043
½ Ton Riprap	0.045	0.045
2 Ton Riprap	0.048	0.048

Ineffective Areas

Ineffective flow areas are modeled as result of the constrictions at the top of the proposed drop structures where the trapezoidal channel is contracting and then expanding. A contraction ratio of 2:1 was utilized while an expansion ration of 4:1 was utilized, in accordance with the HEC-RAS Hydraulic Reference Manual. As a result of the changing

channel dimensions, an area of the side slope on each side of the channel would not have conveyance. By modeling these areas as ineffective flow, the flow velocities upstream and downstream of the drop structures may be more accurately calculated.

Proposed Condition Model

The following model was created for design purposes which reflects the most recent design configuration and is intended to study the proposed conditions of the Coldwater Canyon Wash channel. For a direct comparison, the same cross-sections are calculated for each condition. Locations of "n" values were readjusted accordingly to meet the proposed extents of vegetation and riprap.

The upstream limits of the CCW channel realignment consists of a trapezoidal section armored with loose riprap. This upstream transition section provides a "hard point" for the CCW with lasting resistance to both lateral and vertical migration. The realigned CCW channel is then conveyed along the eastern perimeter of the site via a series of trapezoidal armored drop structures, providing both lateral and vertical stability to the channel. The proposed condition models incorporate five proposed drop structures. One drop structure is proposed to drop approximately 5 vertical feet and be concrete lined which ties into the culvert crossing at Dawson Road South. Three of the remaining four drop structures are proposed to drop approximately 5 or 7 feet, and the fourth is proposed to drop approximately 11 feet and all four are proposed to be armored with loose riprap. Between drop structures the proposed CCW channel is earthen bottom with non-erosive velocities. The earthen surfaces are anticipated to be maintained in a vegetated state, as directed by RCFC. Where space allows the side slopes of the earthen channel sections are vegetated with side slopes of 4:1. Upstream of the planned Temescal Canyon Road crossing, which is anticipated to be constructed by others in the future, the side slopes are 2:1 and armored by loose riprap. The realigned CCW will discharge to Temescal Wash upstream of Dawson Canyon Road Bridge, mimicking the historical outfall location of CCW, via a proposed culvert beneath Dawson Canyon Road South.

A map of the HEC-RAS cross-section locations is included in Appendix B. An executable copy of the HEC-RAS model is included as a separate attachment to this report. A discussion of the results may be found in the following section.

Proposed Condition Model – Velocity

The "n" values in this model reflect a minimally vegetated state of the channel, when flow velocities are anticipated to be the highest.

HEC-RAS Files:

The following HEC-RAS files reflect the Proposed Velocity Condition hydraulic model for Coldwater Canyon Wash channel:

	File:	**Title:**
Project:	18602B_Proposed_CCW.prj	18602B_Proposed_CCW
Plan:	18602B_Proposed_CCW.p29	CCW_Proposed_Velocity
Geometry:	18602B_Proposed_CCW.g26	CCW_Proposed_Velocity
Flow:	18602B_Proposed_CCW.f03	CCW

Proposed Condition Model – Maintained

The "n" values in this model reflect the anticipated long-term condition of the channel and the typical anticipated maintained vegetated condition.

HEC-RAS Files:

The following HEC-RAS files reflect the Proposed Maintained Condition hydraulic model for Coldwater Canyon Wash channel:

	File:	**Title:**
Project:	18602B_Proposed_CCW.prj	18602B_Proposed_CCW
Plan:	18602B_Proposed_CCW.p30	CCW_Proposed_Maintained
Geometry:	18602B_Proposed_CCW.g27	CCW_Proposed_Maintained
Flow:	18602B_Proposed_CCW.f03	CCW

Proposed Condition Model – Interim

An additional model has been included to reflect the "interim" condition where there is no Temescal Road crossing. The Proposed Condition Models – *Velocity* and *Maintained*, show the channel facility works in the ultimate constructed condition where the future Temescal Road crossing potentially exists. The Proposed Condition Model – *Interim*, shows the channel facility works in a fully constructed condition until the future Temescal Road crossing is constructed by others. The "n" values in this model reflect a minimally vegetated state of the channel, when flow velocities are anticipated to be the highest.

HEC-RAS Files:

The following HEC-RAS files reflect the Proposed "Interim" - Velocity Condition hydraulic model for Coldwater Canyon Wash channel:

	File:	**Title:**
Project:	18602B_Proposed_CCW.prj	18602B_Proposed_CCW
Plan:	18602B_Proposed_CCW.p02	CCW_Proposed_Velocity_Interim
Geometry:	18602B_Proposed_CCW.g03	CCW_Proposed_Velocity_Interim
Flow:	18602B_Proposed_CCW.f03	CCW

Discussion of the hydraulic results is included in Section 3 of this report.

2.3 Hydraulic Analysis of Temescal Wash

Model Extents and Boundary Conditions

An analysis of Temescal Wash was prepared to determine the impacts of proposed Coldwater Canyon channel improvements of the Temescal Valley Commerce Center project. The extents of the Temescal Wash Hydraulic analysis, utilizing HEC-RAS, extends from approximately 2,050 linear feet downstream, and approximately 4,000 linear feet upstream to the point of confluence of the existing Coldwater Canyon Wash and Temescal Wash.

The Hydrologic Data used to model Temescal Wash was taken from the Effective Model and FIS for Riverside County, CA, dated March 6, 2018. Table 10 of the FIS shows 100-year discharges for Temescal Wash at Magnolia Avenue as 22,000 cubic feet per second (cfs). No other storm event discharges are provided for Temescal Was upstream of Magnolia Avenue, which is located approximately seven miles downstream of the project area. The Effective Model includes more detailed flow rate changes throughout Temescal Wash, which was utilized for the hydraulic analyses. The hydrologic data is summarized in Table 1.

Table 2 – Summary of Temescal Wash Discharges from the Effective Model

Cross Section Flow Change Location	100-year Peak Discharges (cfs)
Effective Model Section 68448 (FIS Section AS)	19,400
Existing Model Section 69198	15,900
Existing Model Section 69733	13,220
Existing Model Section 73193	15,900

Flow rates for lesser storm events within the same reach of Temescal Wash have been estimated by the report titled “Hydraulic and Scour Studies for Two Bridges on Temescal Wash” by Chang Consultants, dated September 2014, and have been analyzed to determine the downstream water surface elevation for the proposed alignment of Coldwater Canyon Wash, based on an estimation of the coincident peaks of the two drainage areas per Table 7-3 of HEC-22.

Existing Condition Model

The Existing Condition Model was prepared in HEC-RAS based on the Corrected Effective Model. The Existing Condition Model removed cross sections that were either not effective or outside of the project area. No additional cross sections were added to the

Existing Condition Model, however cross section geometries have been updated based on existing condition topography. This included updating the modeling of the existing Dawson Canyon Road North Bridge (between Effective Cross Sections 69733 and 69773) based on the survey conducted by Rick Engineering Company. More specifically, the bridge location was changed, from between Cross Sections 69733 and 69773 to between Cross Sections 69773 and 69819, and the geometry of the bridge was updated. Additionally, the Effective FIS data models a split flow scenario at the Dawson Canyon Bridge crossing, in which 2,680 cubic feet per second (cfs) overtops the left channel bank and bypasses the bridge to the southeast at a low point of Dawson Canyon Road (i.e., a flow change reduction of 2,680 cfs at cross section 69733). The Existing Condition modeling determined that flow does not overtop the south bank, in the vicinity of the Dawson Canyon Road Crossing, and thus does not model a split flow analysis at Dawson Canyon Road (i.e., removed the flow change at cross section 69733). To account for the existing split flow condition through the Rinker plant, 960 cfs is added to the flowrate for section 69955. The changes incorporated into the Existing Condition are summarized in Table 3.

Table 3 – Existing Condition Model Cross Sections Summary

Cross Section[1]	Changes Incorporated Into Existing Model Cross Section Data
67548	Effective Model data
68448	Updated geometry based on existing topography
69198	"
69733	"
69773	Added a flow increase of 960 cfs to account for split-flow condition through the Rinker Plant. Removed flow change (previously showed a 2,680 cfs reduction)
Bridge	Updated bridge geometry and location based on survey (previously between cross sections 69733 and 69773)

69813	Updated geometry based on existing topography
69955	New cross section to accurately model changes in proposed geometry
70193	Updated geometry based on existing topography
70254	New cross section to accurately model changes in proposed geometry
70292	"
70579	"
70743	"
70973	New cross section to accurately model changes in proposed geometry
71060	"
71893	Effective Model data
72643	"
73193	"
73193	"

[1] Cross sections not shown on this table have been removed from the Existing Condition Model

Manning's N values for the Existing Condition Model are consistent with the Effective Model.

HEC-RAS Files:

The following HEC-RAS files reflect the Existing Condition hydraulic model for Temescal Wash:

	File:	**Title:**
Project:	18602A_TW_CLOMR.prj	18602A_TW_CLOMR
Plan:	18602A_TW_CLMOR.p05	Existing_Condition
Geometry:	18602A_TW_CLMOR .g06	Existing Condition
Flow:	18602A_TW_CLMOR .f07	Existing_Flow

Proposed Condition Model

The Proposed Condition Model was prepared in HEC-RAS to model the proposed grading and surface improvements at the proposed site, including slope stabilization along the left bank in the form of a soil cement slope with varying steepness, projecting to a calculated scour depth to provide resiliency against future lateral and vertical migration of Temescal Wash. Cross Sections 70193 and 70743 were updated with the proposed grading associated with the adjacent development and road improvements to create the Proposed Condition Model. Additionally, the project proposes a channel re-alignment of Coldwater Creek Wash, a tributary that outlets into Temescal Wash downstream of the Existing Dawson Canyon Road North bridge crossing in the existing condition. The modeling of this re-alignment included moving the full flow increase in Temescal Wash from Coldwater Creek Wash (3,500 cfs), located at Cross Section 68448 in the Existing Condition, to Cross Section 70743. The changes incorporated into the Proposed Condition are summarized in Table 4.

Table 4 – Proposed Condition Model Cross Sections Summary

Cross Section[1]	Changes Incorporated Into Proposed Model Cross Section Data
67548	Matches Existing Condition Model
68448	"
69198	"
69733	"
69773	"
Bridge	"
69813	"
69955	Incorporated proposed grading on southern bank
70193	"
70254	"
70292	"
70579	"
70743	Incorporated proposed grading on southern bank and flow increase of 3,500 cfs from Coldwater Creek Wash
70973	Incorporated proposed grading on southern bank
71060	"

71893	Matches Existing Condition Model
72643	“
73193	“

[1] Cross sections not shown on this table have been removed from the Proposed Condition Model

HEC-RAS Files:

The following HEC-RAS files reflect the Proposed Condition hydraulic model for Temescal Wash:

	File:	**Title:**
Project:	18602A_TW_CLOMR.prj	18602A_CoronaClay_EffectiveModel
Plan:	18602A_TW_CLOMR .p07	Proposed_Condition
Geometry:	18602A_TW_CLOMR .g07	Proposed Condition
Flow:	18602A_TW_CLOMR .f06	Proposed_Flow

3.0 HYDRAULIC RESULTS

As previously discussed, the hydraulic models were created in the GeoHECRAS modeling software and the HEC-RAS program was used to perform the hydraulic analyses. The hydraulic models were used to analyze hydraulic performance of the proposed Coldwater Canyon Wash channel and Temescal Wash. The resulting 100-year storm event model output may be found in Appendices B and C, respectively.

3.1 Coldwater Canyon Wash Hydraulic Results

Freeboard

The results of the 'Proposed Maintained Condition Model' indicate that there would not be flooding of adjacent properties and structures during a 100-year storm event. The maintenance road is not overtopped, and generally has more than a foot of freeboard.

Riprap Sizing

Tractive forces and velocities associated with the "velocity" and "maintained" runs were considered with respect to the minimum riprap size assigned to stabilize channel structures. In accordance with Section 8.3.4.4 of the Riverside County Hydraulic Design Manual, the design velocity across the proposed loose riprap drop structures is generally less than 20 feet per second. The loose riprap drop structures incorporate upstream concrete cutoff walls in accordance with Section 9.2.4.3 of the Riverside County Hydraulic Design Manual. Additional calculations for the performance of the loose proposed riprap drop structures is provided with Appendix B5 of this report. Table 5 below summarizes the riprap placement at drop structures. For comparison to the plans the stationing of the HEC-RAS cross-sections does not directly correspond to the stationing of the channel improvement plan set. A table comparing the RAS Sections to the improvement plan stationing is provided in Appendix B5.

Table 5 – Permanent Riprap Lined Drop Structure Riprap Protection Locations

Top of Drop	Toe of Drop	Vertical Drop	Start ¼ Ton	Start 2 Ton - u.s. drop	End 2 Ton - d.s. drop
Ras Station	Ras Station	(ft)	Ras Station	Ras Station	Ras Station
2429.62	2319.83	7	-	2429.62	2309.54
2149.31	2047.73	5	2204.54	2179.00	2028.41
1585.91	1361.60	11	1650.91	1585.91	1347.02
834.52	690.23	7	899.60	834.52	675.94

Lateral Storm Drain Design

The ultimate lateral storm drain structures proposed by the CCW plans are designed to connect the permanent on-site storm drain systems from adjacent development, including a 54” storm drain near the upper limits of proposed improvements and an 18” lateral near the lower limits of proposed channel improvements. Alterations of the profiles and diameters of the lateral storm drains subsequent to the writing of this report, or construction of additional lateral structures by future developments, are not anticipated to impact the results of hydraulic analysis presented by this report concerning the main channel. Calculations for the flow velocity, water surface profiles, and energy dissipater sizing associated with these laterals are provided in Appendix B5. The hydrology for the 54” and 18” storm drain pipes are referenced in two separate drainage reports respectively, “Drainage Study for Temescal Valley Commerce Center (Offsite and Frontage Roads)” prepared by Rick and dated May 2, 2024, and the onsite Preliminary Hydrology Study prepared by Thienes and dated March 1, 2024.

Downstream Impacts

Impacts to Temescal Wash by the proposed re-alignment of CCW are discussed by Section 3.2 of this report.

Upstream Impacts

The flow regime upstream of the proposed CCW improvements is erosive and may be subject to natural geomorphological changes over time. No significant changes to the flow regime of CCW upstream of the proposed improvements are anticipated. The upstream

armored transition structure provides a “hard point” for the CCW with lasting resistance to both lateral and vertical migration. The upstream limit of these CCW improvements are intended to allow for future upstream development by others along CCW, which may require additional channel stabilization analyses and measures.

Coldwater Canyon Wash Flood Hazard Zone

As documented by the Coldwater Canyon Wash Geomorphological Study by JE Fuller, the general trend of the existing CCW alignment through the project area is westward lateral migration (Table 14) as well as vertical scour (Table 15) over time. A long-term scour analysis for the proposed alignment of Coldwater Canyon Wash is not applicable since the proposed design along CCW includes fully armored sections where velocities are erosive in the form of loose riprap drop structures. These provide lasting resistance to both lateral and vertical migration.

For the development of the upstream design of the CCW improvements the “flood hazard zone” (FHZ) delineated by the JE Fuller Study along CCW was referenced, which represents the probable erosion and flood hazard based upon the overall geomorphic setting. The FHZ is very broad in the vicinity of the project, reflecting the anthropogenically realigned left bank of CCW as well as the historic channel alignment of the right bank. The existing FHZ is shown for reference with Appendix D. With the realignment of CCW the existing FHW was re-considered for this project. Because the proposed re-alignment for CCW consists of an engineered channel providing full conveyance for the design storm and flow velocities the downstream FHZ limit of the left bank is no longer applicable, as it was developed by projecting anticipated lateral migration from the undersized by-pass channel west of the Rinker Plant. This by-pass channel will be filled in with the proposed design in conjunction with the realignment of CCW. An approximate delineation of the proposed flood hazard zone is provided with the Exhibit in Appendix D. The revised limit was set using the 1974 left bank limit delineated by the JE Fuller Report, which governs the left bank FHZ upstream of the impacts by the Rinker Plant. This line intersects with the left bank of the proposed CCW armoring, and the limits of the District maintained channel are utilized for the left bank of the FHZ

extending downstream through the project area. The limits of the right bank of the FHZ were not modified upstream of the project, and still reflect the limits of the right banks of CCW from 1948 to 1966, prior to channelization for the Rinker Plant in the 1970's. In reality, the right bank EHZ will be closer to the limits of the District maintained channel with the proposed improvements. There is little concern of eastward flanking of the proposed channel since CCW has been migrating westward according to Table 14 of the JE Fuller Report. Furthermore, as previously stated, the upstream limit of the proposed CCW armoring provides vertical and lateral stability for the upstream earthen section.

3.2 Temescal Wash Hydraulic Results

A summary comparison of the Effective, Existing Condition, and Proposed Condition 100-year water surface elevations (WSE) are provided in Table 6 below.

Table 6– Temescal Wash 100-yr WSE Comparison; Existing (Effective) vs. Proposed

Cross Section	Effective WSE[1]	Existing Condition WSE[1]	Proposed Condition WSE[1]	Difference (Proposed – Existing)
67548	910.15	910.1	910.1	0.00
68448	916.88	911.03	911.03	0.00
69198	922.17	917.17	917.17	0.00
69733	927.69	920.30	922.03	1.73
69773	931.97	922.04	923.27	1.23
Bridge	-	-	-	-
69813	932.13	925.57	926.80	1.23
69955	-	926.60	927.98	1.38
70193	933.03	926.95	928.27	1.32
70254	-	927.61	928.96	1.35
70292	-	927.87	929.37	1.50
70579	-	928.66	929.93	1.27
70743 (Proposed CCW	933.76	929.17	930.41	1.24

Confluence)				
70973	-	931.16	931.93	0.77
71060	-	931.51	932.23	0.72
71893	937.34	938.03	938.03	0.00
72643	945.65	942.32	942.32	0.00
73193	947.01	946.87	946.87	0.00

[1] WSE = 100-year Water Surface Elevation
Water Surface Elevations are in reference to NAVD 88.

As shown in the table, multiple cross sections experience rises in water surface elevations when comparing the Existing Condition to the Proposed Condition. However, it should be noted that, other than Cross Section 71893, the Proposed Condition water surface elevations are still lower than the Effective water surface elevations. This is due to the updated channel geometry based on the Existing Condition channel topography. Additionally, although the Proposed Condition shows a rise at Cross Section 71893 when compared to the Effective water surface elevation, the revised floodplain mapping shows a general decrease in the floodplain and floodway extents.

The cross-sections included with Appendix C of the Hydraulic Study show the spatial distribution of velocities across the cross-sections. The highest velocities are calculated in the thalweg of the channel where there is an existing incised low-flow channel, and the flow depths are the greatest. Velocities along the side slopes are the channel are significantly less. In the proposed condition the higher velocities are calculated to remain confined to the thalweg of the channel as well as the outside of the curve of Temescal Wash along the southern bank.

Freeboard

There would not be flooding of Dawson Canyon Road South or the proposed onsite development during a 100-year storm event. Dawson Canyon Road South generally has more than 2 feet of freeboard.

Riprap Sizing

Tractive forces and velocities associated with design storm event were considered with respect to the minimum riprap size assigned to stabilize channel structures. Where rock slope protection cannot be directly placed at the design scour depth, launchable riprap is provided based on FHWA HEC-11, as calculated by Appendix E4.

Downstream Impacts

The proposed realignment of CCW is not anticipated to adversely affect bridge crossing of Dawson Canyon Road over Temescal wash. The hydraulic models indicate a 1.23 foot rise from the existing to proposed condition at the cross sections immediately upstream and downstream of the bridge. Although there is a rise in WSE, the proposed WSE will remain below the effective condition WSE. Negligible additional erosion is anticipated along the north bank of Temescal Wash within the area of modified flow regime from the realignment of Temescal Canyon Wash. Letters of permission from the affected property owners will be provided separately by ownership.

Upstream Impacts

The realignment of CCW results in a slight increase in WSE upstream of the proposed CCW confluence and a corresponding decrease in flow velocities. Although there is a rise in WSE, the proposed WSE will remain below the effective condition WSE. Letters of permission from the affected property owners will be provided separately by ownership.

4.0 SEDIMENT TRANSPORT AND SCOUR ANALYSIS

To assist in determining scour along Temescal Wash and in the vicinity of the Dawson Road *North* bridge as a result of adjusting the outfall location of Coldwater Canyon Wash, a 1D sediment transport analysis was performed using HEC-RAS 6.2. For comparative purposes, a 100-yr flood series hydrograph was developed to include 10-yr, 15-yr, 20-yr, 30-yr, 40-yr, 70-yr, and 100-yr storm events and modeled to determine the potential impacts to channel structures due to long-term sediment deposition and scour for the proposed conditions. The HEC-RAS Sediment Transport Analysis model simulates spatial and temporal changes in water surface elevation, sediment transport, and channel geometry.

4.1 Hydrology

As discussed previously, the Hydrologic Data used to model Temescal Wash was taken from the Effective Model and FIS for Riverside County, CA, dated March 6, 2018. Using standard logarithmic paper, the 100-year storm was used as a basis to derive the additional storm events included in the above mentioned storm series. Peak flow rates for the hydrographs used in the sediment transport analysis are listed below in Table 7.

Table 7 - Design Storm Peak Flow Rates

Upstream of Coldwater Canyon Wash		Downstream of Coldwater Canyon Wash	
24-Hour Peak Flow Rates		24-Hour Peak Flow Rates	
Storm Event	Peak Flow Rate (cfs)	Storm Event	Peak Flow Rate (cfs)
10-Year	2,500	10-Year	3,900
15-Year	3,800	15-Year	5,400
20-Year	4,600	20-Year	6,800
30-Year	6,800	30-Year	9,200
40-Year	8,400	40-Year	11,250
70-Year	12,800	70-Year	15,900
100-Year	15,900	100-Year	19,400

4.2 Sediment Transport Plan Inputs

As previously discussed, long-term sediment transport for Temescal Wash was determined using a sediment transport model in HEC-RAS with a composite series of storm events. The HEC-RAS Sediment Transport Analysis model simulates spatial and temporal changes in water surface elevation, sediment transport, and channel geometry..

Grain Size distribution data used for the model was obtained from a geologic explorations performed by TGR Geotechnical and summarized in letter reports “Geotechnical Engineering Data Report, Existing Bridge at Dawson Canyon Road and Temescal Canyon Wash, Temescal Valley, California,” dated September 4, 2021, and “Additional Soil Sampling and Gradation Test, Coldwater Creek Wash (CCW) Realignment,” dated August 10, 2023. At the location of the existing Dawson Canyon Road North Bridge, where there is existing riprap across the channel bottom, and additional riprap is proposed to reinforce the grade control structure, grain size distribution representative of the proposed riprap was assigned to the cross-sections within the bridge structure as a considered alternative.

HEC-RAS has a range of sediment transport modeling calculation methods to select from. Based on review of prior studies, the HEC-RAS technical manuals, and the sediment characteristics of the Temescal Wash, the Yang Transport function was the method utilized.

HEC-RAS allows the maximum depth of scour to be assigned as 0 feet for stabilized cross-sections with non-erodible bottoms. By setting a minimum net scour elevation at stabilized cross-sections, the sections may still calculate varying amounts of deposition and scour above the stabilized elevation while the model is processed.

The geometry file for the sediment transport analysis was simplified and processed as necessary to reduce errors during analysis. Cross-section points were filtered and interpolated as necessary to allow for an even distribution of points along the bottoms of the cross-sections, while minimizing the change to cross-sectional area.

The “n” values in the sediment transport model reflect anticipated condition of the Temescal Wash. These values are consistent with the n-values used for the hydraulic analysis presented by this report.

HEC-RAS Files:

The following HEC-RAS files reflect the Sediment Transport hydraulic model for the existing condition of Temescal Wash considering grade control at the Dawson Canyon Road North Bridge:

	File:	**Title:**
Project:	18602_TemescalWash_.prj	18602_TemescalWash_SedTransport
Plan:	TemescalWash.p01	Existing w_gradecontrol
Geometry:	TemescalWash.g06	Combined Sediment Geometry_Existing
Flow:	TemescalWash.q01	QuasiData
Sediment:	TemescalWash.s02	Sediment Data_GradeControl_TGR_Existing

The following HEC-RAS files reflect the Sediment Transport hydraulic model for the proposed condition of Temescal Wash considering grade control at the Dawson Canyon Road North Bridge:

	File:	**Title:**
Project:	18602_TemescalWash_.prj	18602_TemescalWash_SedTransport
Plan:	TemescalWash.p09	Proposed w_gradecontrol
Geometry:	TemescalWash.g04	Combined Sediment Geometry_Proposed
Flow:	TemescalWash.q02	Proposed QuasiData
Sediment*:*	TemescalWash.s01	Sediment Data_GradeControl_TGR

4.3 Scour Analysis

The objective of these calculations is to predict the maximum depth of total scour to provide appropriate protection for the channel structures and toe-down depths of slope revetment. For the purposes of this report, total scour has been considered as the sum of long-term scour and bedform scour. As presented by the table of calculations included with Appendix E1, long-term scour is calculated for cross-section, with consideration of grade control at the Dawson Canyon Road North Bridge. The time step yielding the greatest long-term scour depth for each cross section is selected and added to the calculated bedform scour depth. Bedform scour is associated with the creation of dunes and anti-dunes during high flow.

As presented by the table of calculations, the total amount of anticipated scour between Dawson Canyon Road North and the outfall of the realigned Coldwater Canyon Wash does not exceed 3.0 feet. At a minimum, the slope revetments should provide protection to the depth of greatest scour. To include a level of conservatism and implement feedback received from the RCFCD, a toe-down depth of 7 feet below the current channel thalweg has been assigned as the design scour depth for the proposed improvements along Temescal Wash.

Results and Findings of the Sediment Transport Analysis and Scour Recommendations

A bridge evaluation has been performed by Kleinfelder, Inc. to assess the Dawson Road North bridge over Temescal and summarized in a report titled, “Bridge Rehabilitation Assessment Dawson Canyon Road Over Temescal Wash” and dated March 17, 2022. This is provided for reference with Appendix A. Recommendations based on this analysis include providing additional riprap at bridge pier locations and removing debris at bridge piers.

5.0 CONCLUSION

This report presents hydraulic analyses for the proposed realignment and stabilization of Coldwater Creek Wash and affected reach of Temescal Wash in support of the Temescal Valley Commerce Center. The proposed development will be protected from the erosion hazard and flooding concerns by the proposed improvements.

Appendix A

Supplemental Documents

1. Excerpts of "Coldwater Canyon Wash Geomorphology Study," prepared by JE Fuller, and dated October 2018
2. FEMA FIS Flow Rates
3. "Bridge Rehabilitation Assessment Dawson Canyon Road over Temescal Wash," Prepared by Kleinfelder, and dated March 17, 2022

Appendix A1

Excerpts of "Coldwater Canyon Wash Geomorphology Study," prepared by JE Fuller, and dated October 2018

Coldwater Canyon Wash Geomorphology Study

Task 2/3 – Future Erosion and Equilibrium Assessment



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10-25-18

October 2018

prepared for |

Riverside County Flood Control and Water Conservation District

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Table of Contents

Executive Summary i

1 Introduction 1

1.1 Study Limits 1

1.2 Task Objectives 1

1.3 Reach Descriptions 2

1.4 Project Stationing 2

2 Geomorphic Assessment Review 5

2.1 Historical Overview 5

2.2 Task 1 Review 7

3 Hydrology 9

3.1 Previous Hydrology Analyses 10

3.2 Methodology 12

3.3 Results 14

3.4 2010 Event Hydrology 16

3.4.1 Trilogy Hydrology for 2010 Event 16

4 Sediment Distribution 20

4.1 Sediment Sampling 20

4.2 Armoring 24

4.3 Synthetic Historical Gradation 25

4.4 Sediment Gradation Reaches 28

5 Hydraulic and Sediment Transport Modeling 30

5.1 Model Development 30

5.1.1 Hydraulic Model 30

5.1.2 Sediment Transport Model 35

5.2 Model Results 38

5.2.1 Steady State Hydraulic Results 38

5.2.2 Sediment Transport Results 45

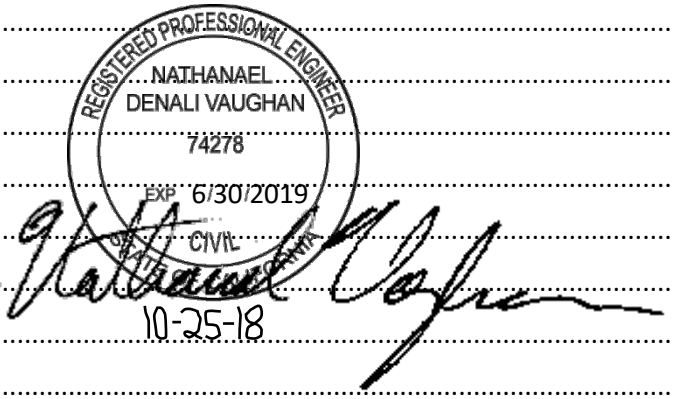
5.3 Model Validation 48

5.3.1 Hydraulic 48

5.3.2 Sediment 50

6 Future Erosion Assessment 52

6.1 Geomorphic Trend Analysis 52



6.1.1 Lateral change 52
6.1.2 Vertical Change 62
6.1.3 Temescal Wash 65
6.2 Geomorphic Channel Pattern Relationship 66
6.2.1 Methodology 66
6.2.2 Results 67
6.3 Channel Geometry Characteristics Analysis 70
6.3.1 Methodology 70
6.3.2 Results 73
6.3.3 Summary 75
6.4 Stable Bank Slope 79
6.5 Erosion Resistance Assessment 81
6.5.1 Vertical Erosion 81
6.5.2 Lateral Erosion 83
6.6 Flood Hazard Zones 85
6.7 Sediment Volume Comparisons 87
6.8 Sediment Continuity 88
6.8.1 Channel Response to Large Events 88
6.8.2 Long-term Channel Response 89
7 Equilibrium Assessment 92
7.1 Dominant Discharge 92
7.2 Equilibrium Slope 94
7.3 Sediment Continuity 96
7.4 Conclusion 97
8 Conclusions 98
8.1 Hydrology 98
8.2 Equilibrium Trends 98
8.3 Future Trends 99
8.3.1 Reach-by-Reach Summary 99
9 References 104

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List of Figures

Figure 1. Project study reach vicinity map 3
Figure 2. Project Control Stationing. 4
Figure 3. Contributing Watersheds 9
Figure 4. Recurrence Interval Hydrographs. 15
Figure 5. 2010 Event Hydrograph. 16
Figure 6. Debris Deposit at Upstream Headwall of Triology Culvert near Temescal Canyon Road 18
Figure 7. Google Earth Imagery Dated 3/10/2011 of Trilogy Channel 18
Figure 8. Google Earth Imagery Dated 3/10/2011 of Trilogy Confluence with Coldwater Canyon Wash 19
Figure 9. Sediment Sample Locations. 21
Figure 10. Armor layer downstream of Temescal Canyon Road. 25
Figure 11. Vertical degradation downstream of I-15. 25
Figure 12. Armor layer upstream of Squaw Mountain Road. 25
Figure 13. Grain Size Distributions for Current Study. 26
Figure 14. Sediment Gradation Reaches. 29
Figure 15. HEC-RAS Cross-Section Locations. 30
Figure 16. HEC-RAS Cross-Section Locations, cont. 31
Figure 17. HEC-RAS Cross-Section Locations, cont. 31
Figure 18. Downstream Lateral Weirs. 34
Figure 19. 50 Year Probable Storm Sequence. 36
Figure 20. Hydraulic Depth Results (Project Stationing). 38
Figure 21. Velocity Results (Project Stationing). 39
Figure 22. Top Width Results (Project Stationing). 39
Figure 23. HEC-RAS Lateral Structure Location 41
Figure 24. 100-year Flood Inundation Limits and Breakout Locations Near Hot Springs 41
Figure 25. 100-Year Flood Inundation at Glen Ivy Road. 42
Figure 26. 2-Year Flood Inundation at Glen Ivy Road. 43
Figure 27. Invert Change. 46
Figure 28. Sediment Throughput. 47
Figure 29. Hydraulic Model Validation Upstream of I-15. 49
Figure 30. Hydraulic Model Validation at Temescal Canyon Road. 49
Figure 31. HEC-RAS Sediment vs. Channel Topographic Difference 51
Figure 32. Channel Banks Spatial Summary. 53
Figure 33. Station Alignment and Reference Cross-Sections. 54
Figure 34. Left Bank Lateral Change (1948 – 2014). 55
Figure 35. Right Bank Lateral Change (1948 – 2014). 56
Figure 36. Selected Reach Left Bank Lateral Change (1948 – 2014). 57
Figure 37. Selected Reach Right Bank Lateral Change (1948 – 2014). 58
Figure 38. Longitudinal Profile for the Study Reach. 63
Figure 39 - Google Earth Imagery Dated 4/2014. 65
Figure 40. Stable Slope Projection 80
Figure 41. Required Armoring Size for 2010 Event 82
Figure 42. Depth to Armor for 2010 Event 82
Figure 43. Depth to Armor for Specified Flow Recurrences as a % of 2010 Event Depth to Armor 83

Figure 44. Bank Erosivity Hazard Index Results. 84
Figure 45. Volume Change between 2009 and 2015 along CCW (vertical extents limited to show detail where results are valid) 87
Figure 46. HEC-RAS Volume Change vs Observed Volume Change (vertical extents limited to show detail where results are valid) 88
Figure 47. 100-Year Sediment Transport Results. 89
Figure 48. 50 Year Sequence Invert Change. 90
Figure 49. 50 Year Sequence Cover Layer D_{50}. 91
Figure 50. Probability-Weighted Sediment Throughput. 93
Figure 51. Equilibrium Sediment Transport Results. 97
Figure 52. Study Reaches. 100
Figure 53. 2017 Single Event Erosion at Tom's Farms 102

List of Tables

Table 1. Hydrologic Modeling parameters. 12
Table 2. NOAA Atlas 14 Point Precipitation Depth. 13
Table 3. Peak Discharge Hydrology by Duration at Trilogy Confluence 14
Table 4. 6-Hour Peak Discharge 14
Table 5. Sediment Sample Grain Size Distribution – Bucket Samples. 22
Table 6. Sediment Sample Grain Size Distribution – Pebble Count Samples. 23
Table 7. Grain Size Distributions for Current Study. 27
Table 8. Sediment Gradation Reaches. 28
Table 9. Roughness Coefficients. 32
Table 10. Modeled Bridges and Culverts. 33
Table 11. Hydraulic Structure Performance. 40
Table 12. Downstream Lateral Weir Performance. 44
Table 13. Lateral Migration Change Summary. 59
Table 14. Average Annual Lateral Migration Distances by Reach. 62
Table 15. Vertical Change Trend Analysis Summary. 64
Table 16. Channel Pattern Analysis Results. 68
Table 17. Channel Pattern Analysis Results, cont. 69
Table 18. Channel Geometry Regime Equation Results. 76
Table 19. Equilibrium Slope Results. 96

Appendices

Appendix A – Digital Data Submittal

Appendix B – Flood Hazard Exhibit

5 HYDRAULIC AND SEDIMENT TRANSPORT MODELING

Numerical modeling of Coldwater Canyon Wash was performed to understand and quantify both the hydraulic performance of the wash as well as the geomorphic response of the wash to specific flow events. Hydraulic and sediment transport modeling was conducted using the Hydrologic Engineering Center River Analysis System (HEC-RAS) version 5.0.3 developed by the US Army Corps of Engineers. The results of these models were both directly used to assess CCW as well as aid in other analytical approaches used in this study.

5.1 MODEL DEVELOPMENT

The following sections below outline the development of the hydraulic and sediment transport model.

5.1.1 Hydraulic Model

Specific elements of the hydraulic model development are discussed below. As the hydraulic model was developed concurrently with the sediment transport model, sediment specific elements of the model are discussed in Section 5.1.2.

5.1.1.1 Cross-Section Alignment and Geometry

Alignment of cross-sections in HEC-RAS was based on aerial imagery, field reconnaissance, and elevation data. Care was taken in the alignment configuration to ensure that lower magnitude flows (10-year and less) were captured with the appropriate cross-section geometry; for sediment transport modeling minor changes in velocity and depth for more frequent events can substantially alter results. A total of 333 cross-sections were included in this model, and they were located approximately every 40 feet along the channel thalweg. Cross-section geometry was extracted from the 2015 and 2016 topographic datasets provided by the RCFCWCD. **Figure 15** through **Figure 17** below depict the location and orientation of the cross-sections used in the model.

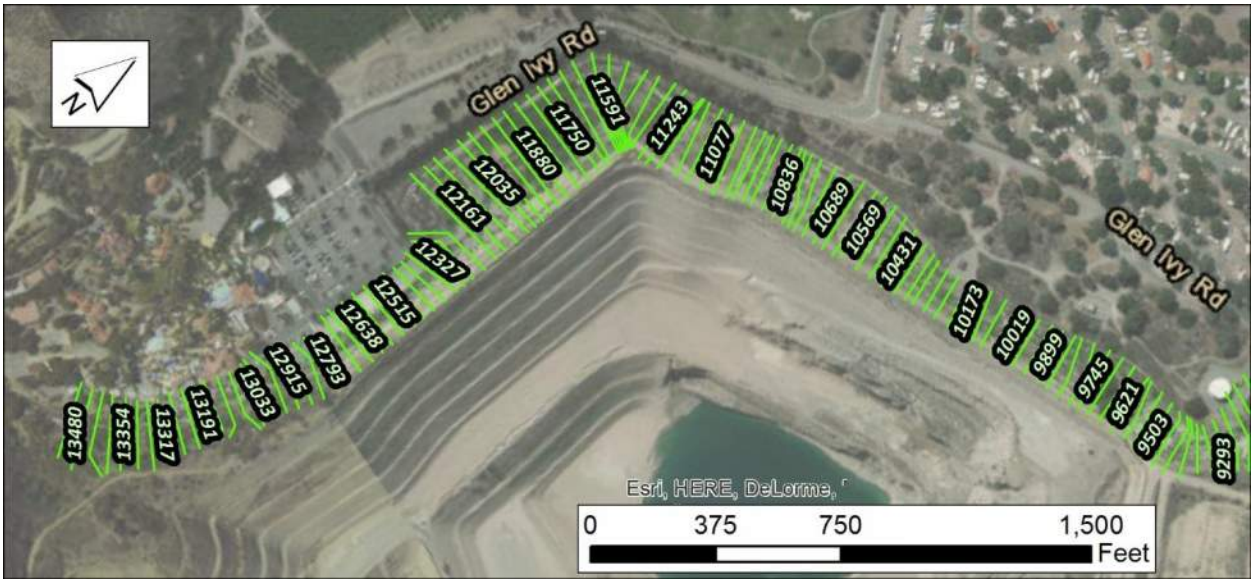


Figure 15. HEC-RAS Cross-Section Locations.



Figure 16. HEC-RAS Cross-Section Locations, cont.



Figure 17. HEC-RAS Cross-Section Locations, cont.

5.1.1.2 Hydraulic Roughness

Manning *n*-values were estimated for the left and right overbanks as well as the channel. **Table 9** below lists the values used on the model based on surface conditions. Land uses in the study reach were delineated manually using 2015 aerial mapping.

The channel bottom was mostly characterized as gravel with low to medium vegetation. The highly-vegetated reach downstream of I-15 was designated with a Dense Vegetation land use. Asphalt and concrete comprised the pavement land use. The fine-gravel land use was mostly found on roadway shoulders and parking lots. The grass/tree land used was primarily used to characterize overbank flow

areas, and the riprap land use was used to establish roughness in select areas where large riprap was present (e.g., I-15 grade control).

Table 9. Roughness Coefficients.

Land Use	*n*-value
Gravel – Low Vegetation	0.047
Gravel – Medium Vegetation	0.065
Smooth Gravel	0.032
Grass with Intermittent Trees	0.060
Dense Vegetation	0.090
Pavement	0.018
Riprap	0.074

Limited calibration data is available within the project corridor with which to calibrate n-values to actual flow events. The best available calibration data is associated with the December 2010 flood event; YouTube video from the event and site photos from Tom's Farms were the only calibration data available for use. Comparisons with these data sources indicated the Manning's values are appropriate for the discharge observed.

5.1.1.3 Inflow Hydrology

Recurrence interval peak discharge was used for the steady state hydrologic inflow (**Table 4**). Two inflow locations were included: the upstream boundary of the model (the outlet of Coldwater Canyon) and the outlet of the Trilogy development (RS 6402). The peak discharge for the 2010 event was computed using the spreadsheet model outlined above. A single inflow location was used at the upstream end of the model for this event.

5.1.1.4 Boundary Conditions

Both upstream and downstream boundary conditions utilized normal depth condition types. The upstream slope was measured as 0.049 ft/ft based on the topographic dataset, and the downstream boundary slope was set to 0.005 ft/ft.

5.1.1.5 Culverts and Bridges

Several bridges and culverts are present within the study reach, and they are listed below in **Table 10**. Field measurements were used to characterize the culvert dimensions and inverts. Record set as-builts from Caltrans were used to obtain the measurements for the Interstate-15 bridges. The Squaw Mountain bridge geometry was obtained from a District-provided scour analysis previously performed at this location.

The culverts were modeled in HEC-RAS using the bridge/culvert routine. Roadway profiles were established using the 2015 topographic dataset. The three bridges were modeled using a cross-section / lid approach. The sediment transport routine has known instability issues surrounding the pier hydraulics, and initial iterations of this modeling exercised exhibited significant and unrealistic oscillations in bed elevations near the piers. Following recommendations in the HEC-RAS User's Manual,

the bridges were replaced with cross-sections. The piers were modeled with station/elevation data, and the roadway was modeled with a lid.

Table 10. Modeled Bridges and Culverts.

Project Control Station	HEC-RAS Station	Description	Feature Type	HEC-RAS Structure Type
608	771	Dawson Canyon Road	Culvert (2 – 7' x 16' RCBC)	Culvert / Roadway
987	1206	Rinker Plant Entrance	Culvert (4 – 60" CMP)	Culvert / Roadway
4290	4784	I-15 Northbound	Bridge / Pier	Lidded Cross-section
4452	4961	I-15 Southbound	Bridge / Pier	Lidded Cross-section
6327	6896	Squaw Mountain Road	Bridge / Pier	Lidded Cross-section
8237	8925	Glen Ivy Road	Culvert (5 – 24" RCP)	Culvert / Roadway

5.1.1.6 Lateral Weirs

Initial iterations of hydraulic modeling suggested there was containment of the 100-year discharge for most of the study reach, and that no significant breakouts exist for the upstream portion of the reach. Downstream of I-15, and adjacent to the Rinker plant, the existing channel becomes narrower and shallower. Moving in the downstream direction, the channel begins to lose containment of the 100-year discharge at RAS Station 2487 along the right bank. **Figure 18** depicts the general flow paths outside of the main channel.

A lateral weir was applied in HEC-RAS to allow for flow to spill into the Rinker plant pad. The topography of the plant was examined to ensure that flow entering would not return to CCW, rather it would pond and eventually flow directly into Temescal Wash. This lateral weir extends approximately 1,900 feet and terminates downstream at Dawson Canyon Road. At that point, containment along the right bank is achieved for the downstream extent of the model. This is in part due to a higher bank elevation relative to the channel, but also because a significant volume of water is diverted into the Rinker plant pad prior to reaching this point.

The discharge in CCW also begins to lose containment on the left side of the wash starting around RAS Station 1359. Flow that crests the bank and roadway (Temescal Canyon Road) is limited, however, to one-dimensional flow as it is constrained further to the left by topographical features. This flow is further constrained by a building which consolidates flow at RAS Station 885. Based on the topography, flow on the roadway as well as all flow to the left at this longitudinal point would continue down the roadway and out of the model. Given the limitations of the one-dimensional model, this flow was not removed and was retained in the channel. A bank station was applied at the point in RS 885 where this break would occur to quantify the overestimated discharge. The 100-year discharge at this point is 3,307 cfs, and the discharge in the left overbank is 520 cfs. While this results in a 19% overestimation of flow downstream of RAS Station 885, the results for the 10-year flow indicate less than 1% of the flow is overestimated. This compromise is valid considering the primary effects of overestimation of flow

downstream will be sediment-related, and that sediment modeling is primarily focused on smaller events.

A second lateral weir was applied at RAS Station 600 to model the overflow along the left bank. The topography was examined to ensure that flow entering this overbank does not return to CCW. Flow exiting through this structure is routed toward Temescal Wash through an existing driving range.

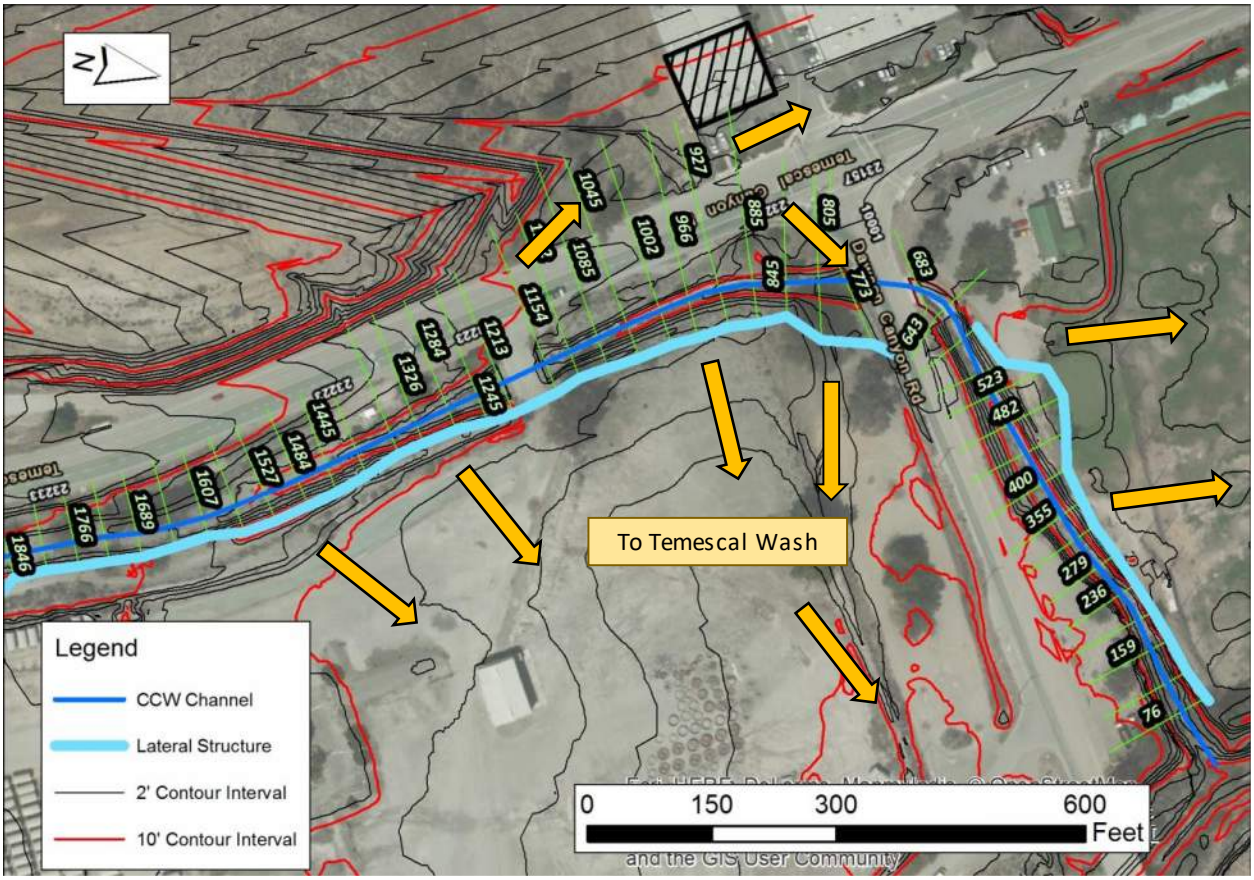


Figure 18. Downstream Lateral Weirs.

5.1.1.7 Levees and Ineffective Flow

The use of levees in this model were primarily limited to model structures that would retain or divert flow (e.g., flood walls). Two such walls (located between RAS Station 13561 and 13275 as well as between Ras Station 12677 and 12327), located near the Glen Ivy Hot Springs were included. For a FEMA floodplain study, additional levee features would need to be identified and modeled per FEMA guidelines.

Ineffective flow areas were applied throughout the model. The crossing of CCW over Glen Ivy Road and Temescal Canyon Road presented several challenges, as the flow pattern is highly two-dimensional both in flow direction as well as water surface elevation. Ineffective flows were assigned liberally in this area in order constrain flow to paths that were tracked longitudinally upstream to downstream, and this exercise was done for all recurrence intervals.

5.1.2 Sediment Transport Model

The most recent release of HEC-RAS introduced the ability to model sediment transport with unsteady hydraulics, in addition to the previously-available quasi-unsteady method. While the quasi-unsteady hydraulic approach does not conserve volume, it is more suited for situations where unsteady hydraulic modeling would likely yield numerical instability (e.g., steep slopes, high velocities, or high energy). Further, the HEC-1 modeling performed in this study included routing from the mouth of Coldwater Canyon to the confluence with the Trilogy development to allow for hydrologic flow attenuation through flow routing. The 6-hour 100-year results suggest minimal attenuation, as the peak discharge is reduced by only 1% (3,455 cfs to 3,425 cfs, which is well within the rounding error for planning purposes). Little attenuation is expected, as there is sufficient containment of the 100-year event in the main channel with the only exception at the intersection of Glen Ivy Road and Temescal Canyon Road. The full containment assumption, however, does not account for bank stability and erosion resistance. Given the lack of anticipated attenuation coupled with the high slope and low channel uniformity, quasi-unsteady hydraulic modeling was selected for use in the sediment transport modeling in this study.

5.1.2.1 Inflow Hydrology

The following hydrologic sequences were used in the sediment transport modeling task:

- 2-Year, 5-Year, 10-Year and 100-Year individual events
- 2-Year with extended peak discharge
- 50 year probable storm sequence
- 2010 storm event

The 2-, 5-, and 10-year events were modeled to computationally derive the dominant discharge, and the 100-year event was modeled to assess the response of the wash to a large, single flooding event. The analysis performed in **Section 7.1** indicates the 2-year hydrograph yielded the greatest amount of sediment transport "work". The peak of this event was then extended for a duration of 400 hours to provide a comparison for the equilibrium slope analysis performed in this study. The 50-year probable storm sequence represents a statistically probable series of events over a 50-year period. This sequence includes fifteen 2-year events, five 5-year events, three 10-year events, one 25-year event, and one 50-year event. The temporal distribution of these events was based on random sampling. Lastly, the 2010 storm event was modeled to provide comparison between model results and measurable changes in the channel geometry before and after the event.

Flood hydrographs were taken from the spreadsheet modeling (see Section 3.1) and discretized into 0.25 hour intervals while preserving the peak discharge of each hydrograph. The computational interval was set to 3.75 minutes for flows less than 100 cfs. For larger flows the computational interval was set to 0.9375 minutes to provide higher temporal resolution to the sediment transport computations.

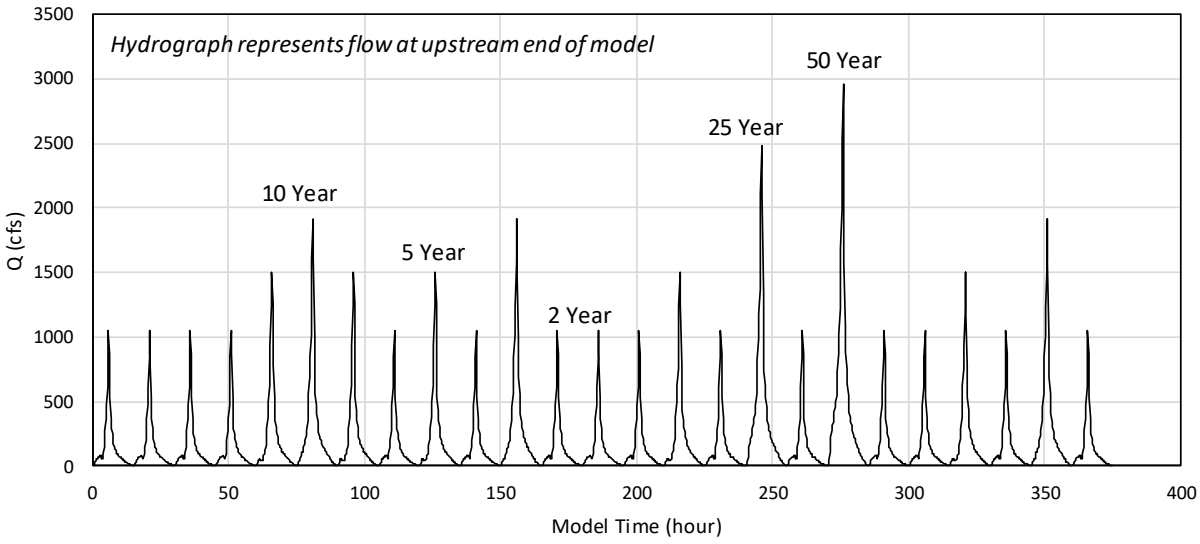


Figure 19. 50 Year Probable Storm Sequence.

5.1.2.2 Sediment Transport Potential/Function

In the context of HEC-RAS, sediment transport potential is the transportable mass of a particular grain class in response to hydraulic characteristics of a cross-section. HEC-RAS includes the option to select from eight transport functions. The HEC-RAS hydraulic reference manual provides descriptions of each transport function and the applicability of it to riverine systems based on sediment composition. Based on these descriptions, only four methods are applicable to Coldwater Canyon Wash (Laursen-Copeland, Meyer-Peter Müller, Yang, and Wilcock). A more comprehensive comparison of these four methods was made using the SAM Hydraulic Design Package developed by the US Army Corps of Engineers (Thomas et al., 2002). The software package SAMAID assess given hydraulic and sediment parameters and returns the first, second and third most applicable transport function. The criteria for determining the results are detailed in the supporting documentation of the software. Data representing average hydraulic and sediment data in Coldwater Canyon Wash (Velocity: 5 – 10 fps, Width: 100 – 300 feet, D_{50}: 18 – 44 mm, S: 0.025 ft/ft, Depth: 1 – 7 feet). Sensitivity to each parameter was tested, and it was found that the D_{50} was the driving force behind the selection of the optimal methodology. The highest rated transport function available in HEC-RAS is the Yang methodology, and this approach was used for the entirety of this study for both HEC-RAS sediment transport modeling as well as equilibrium slope analyses.

5.1.2.3 Sorting Methdology

Bed sorting routines in HEC-RAS tracks the distribution of the sediment gradation at each cross-section. The dynamic gradation is used to compute grain class-specific transport capacities as well as to simulate armoring processes which directly affect sediment supply. Armoring of the stream bed occurs when a coarser particle layer covers the full bed gradation or as finer, transportable sediment particles are preferentially removed from the bed material and larger material remains. Bed mixing algorithms divide the bed into horizontal layers, often an active and inactive layer. Three options are available for use in

HEC-RAS. The Thomas (Ex5) approach was selected for use in this study, as the other two approaches were developed for more specialized cases, including sand bed rivers (Copeland Ex7) and for use with the Wilcock and Crowe transport methodology (Active Layer). In addition, the Thomas approach has been shown to appropriately model armoring development, and it is the default method in HEC-6 and earlier version of HEC-RAS.

5.1.2.4 Fall Velocity

The fall velocity of a sediment particle controls how fast particles can drop out of the water column and deposit. Five algorithms for computing the sediment fall velocity are available for use in HEC-RAS. The Rubey method was selected as it has been shown to be adequate for silt, sand, and gravel grains. Further, the example hand calculations of the Yang transport method in the HEC-RAS Hydraulic Reference Manual include the Rubey approach for computing fall velocity.

5.1.2.5 Temperature

Sediment transport mechanics are sensitive to temperature, and a time series of temperature can be specified in the model. Given the general nature of this modeling approach (i.e., years as compared to hours), a temperature of 63°F was used and held constant throughout all simulations. This value represents the mean annual temperature of Corona, CA (Western Regional Climate Center 042031, www.wrcc.dri.edu) which is approximately 15 miles north of the project location.

5.1.2.6 Sediment Inflow

The sediment transport modeling exercise is primarily intended to inform on potential changes to the wash downstream of Glen Ivy Road, which is more than 4,000 ft downstream of the upper boundary of the model. The equilibrium load boundary condition was used to quantify the sediment inflow into the model, which directs HEC-RAS to compute the equilibrium transport capacity for each time step and grain class at the upstream-most cross-section. This was determined to be an appropriate estimate for sediment inflow given the large degree of hydraulic non-uniformity between the boundary condition and Glen Ivy Road.

5.1.2.7 Lateral Weir Considerations

Two lateral weirs are defined in the HEC-RAS geometry. In both cases, the overflow elevation is considerably higher than the channel invert, therefore higher than the zone of bed load transport. The flow weighted approach was selected to route sediment out of the main channel, however only grain classes finer than medium sand was diverted. Flow optimization to account for the feedbacks between flow diversion and water level was selected.

5.2 MODEL RESULTS

Results from the HEC-RAS modeling exercise includes longitudinal hydraulic properties of CCW, flooding inundation, as well as sediment transport results. This section outlines the significant results.

5.2.1 Steady State Hydraulic Results

The results of the hydraulic modeling indicate that the study reach is primarily dominated by subcritical flow, with the exception of a handful of distinct locations, most often occurring at drops. Starting at the upstream boundary, the flow is contained where it then enters the first infiltration basin. At this point, the flow spreads out laterally and the energy slope drops dramatically. Throughout this reach of infiltration basins there exists a pattern of slow, deep flow alternating with concentrated swift flow transitioning from one basin to the next. Flow is contained for the 100-year discharge throughout the infiltration basin reach. Upon exiting from this reach the flow widens and splits across Glen Ivy Road and Temescal Canyon Road. Downstream toward I-15 the flow is confined within the channel banks entirely. The flow gradually transitions into narrow and deeper flow as well as slightly swifter. Downstream of I-15 the depth increases significantly for the 100-year discharge, which is mostly due to the high degree of roughness imposed by the thick vegetation in this reach. Thereafter the 100-year depth gradually decreases as flow is lost to the left and right from lack of confinement.

5.2.1.1 Longitudinal hydraulic properties

Key hydraulic results by cross-section are shown below in **Figure 20** through **Figure 22**.

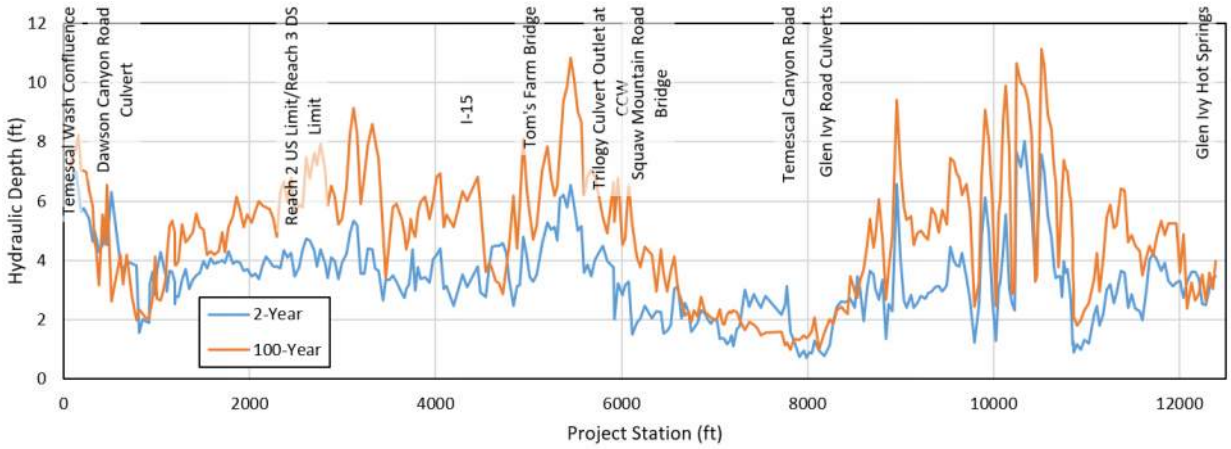


Figure 20. Hydraulic Depth Results (Project Stationing).

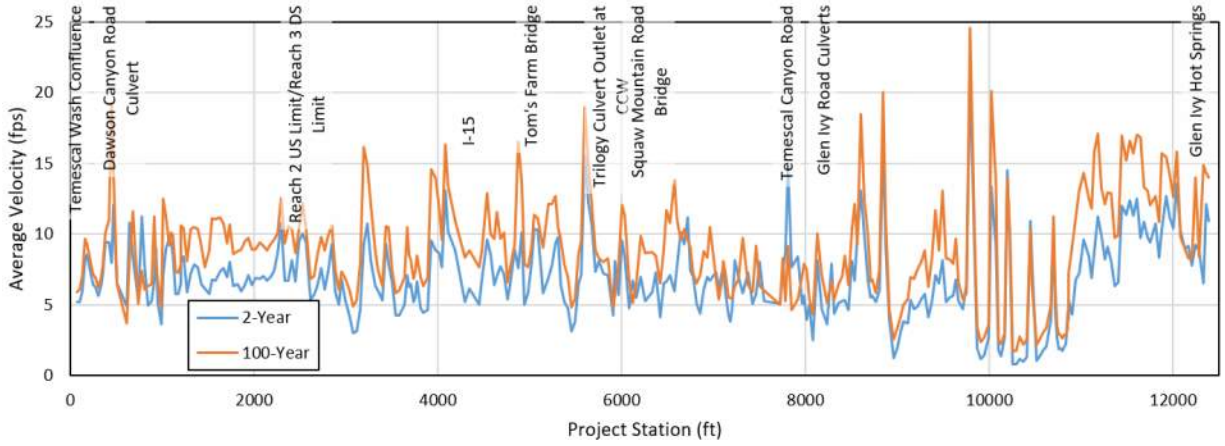


Figure 21. Velocity Results (Project Stationing).

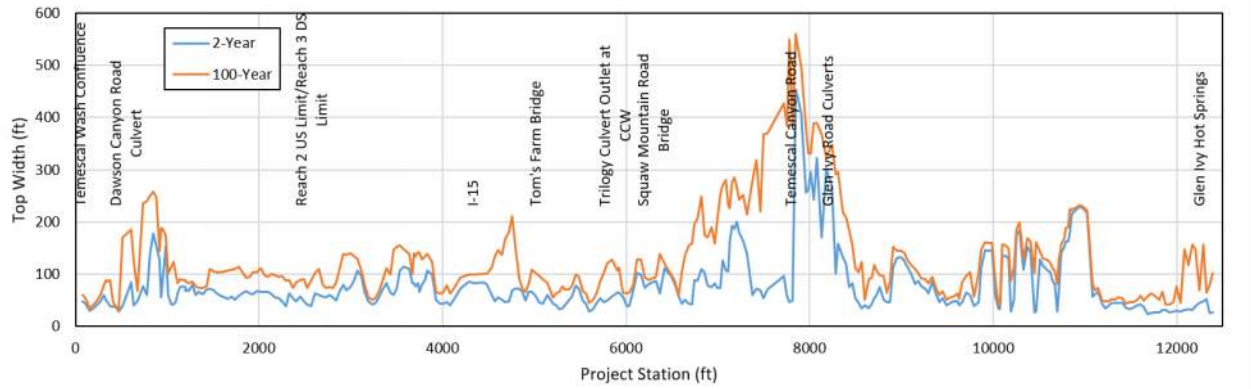


Figure 22. Top Width Results (Project Stationing).

5.2.1.2 Structure Performance

The six structures included in this modeled were assessed for their hydraulic performance. **Table 11** below lists the structures as well the flow rate through each. While the three bridges were not explicitly modeled as bridges in HEC-RAS, the water surface elevation results relative to the cross-section lid were used to assess whether or not capacity had been met. The results show substantial issues with regards to insufficient hydraulic capacity at the culvert locations.

The Glen Ivy Road culvert array has capacity to convey only 11% of the 2-year discharge. Based on this, this culvert was able to convey about a quarter of the peak flow caused by the 2010 event. The backwater caused flow to spill to the right which caused the inundation of the adjacent streets. The Rinker plant entrance culvert has a higher capacity, however it is still only able to convey 45% of the peak 2-year discharge (albeit the peak at this location is about 500 cfs higher than at Glen Ivy Road). The most downstream culvert, located at Dawson Canyon Road, is able to fully convey the 2-year discharge without overtopping, however the performance is insufficient for the 5-year discharge and greater events; only 69% of the 10-year discharge is conveyed by the culvert.

Table 11. Hydraulic Structure Performance.

		Structure Discharge (cfs) and Percentage of Inflow (%) Conveyed by Structure											
	Type	2-Year		5-Year		10-Year		25-Year		50-Year		100-Year	
Glen Ivy Road	RCP	120	*11%*	125	*8%*	128	*7%*	131	*5%*	134	*5%*	136	*4%*
Squaw Mountain Road	Bridge/Pier	1,052	*100%*	1,509	*100%*	1,917	*100%*	2,490	*100%*	2,963	*100%*	3,455	*100%*
I-15 Southbound	Bridge/Pier	1,595	*100%*	2,344	*100%*	2,957	*100%*	3,822	*100%*	4,526	*100%*	5,247	*100%*
I-15 Northbound	Bridge/Pier	1,595	*100%*	2,344	*100%*	2,957	*100%*	3,822	*100%*	4,526	*100%*	5,247	*100%*
Rinker plant entrance	CMP	715	*45%*	708	*30%*	733	*25%*	755	*20%*	768	*17%*	771	*15%*
Dawson Canyon Road	RCBC	1,595	*100%*	2,023	*86%*	2,032	*69%*	1,990	*52%*	1,902	*42%*	1,828	*35%*

5.2.1.3 Flood Inundation

The entirety of the 100-year discharge is confined to the main channel and overbanks for much of the study reach. The exceptions to this are discussed in this section.

Near Glen Ivy Hot Springs, the 100-year flow break out of the channel along the left bank in several locations. In the vicinity of the most expansive breakout location, a lateral structure was defined within the HEC-RAS model to determine the magnitude of discharge leaving the channel at this location; see **Figure 23** for a graphical depiction of the lateral structure location. For the 100-year discharge, approximately 320 cfs enters the Hot Springs property from the channel at this location. **Figure 24** shows the location of the wider breakout as well as two smaller breakout locations downstream. A wall, built along the interior edge of the Hot Springs maintenance road appears to intercept the middle of the three breakouts, however, engineering for the wall was not available for this study and the wall has not been assumed to suitable for flood protection. After exiting the channel, breakout flows are anticipated to travel through the Hot Springs property and down Glen Ivy Road.

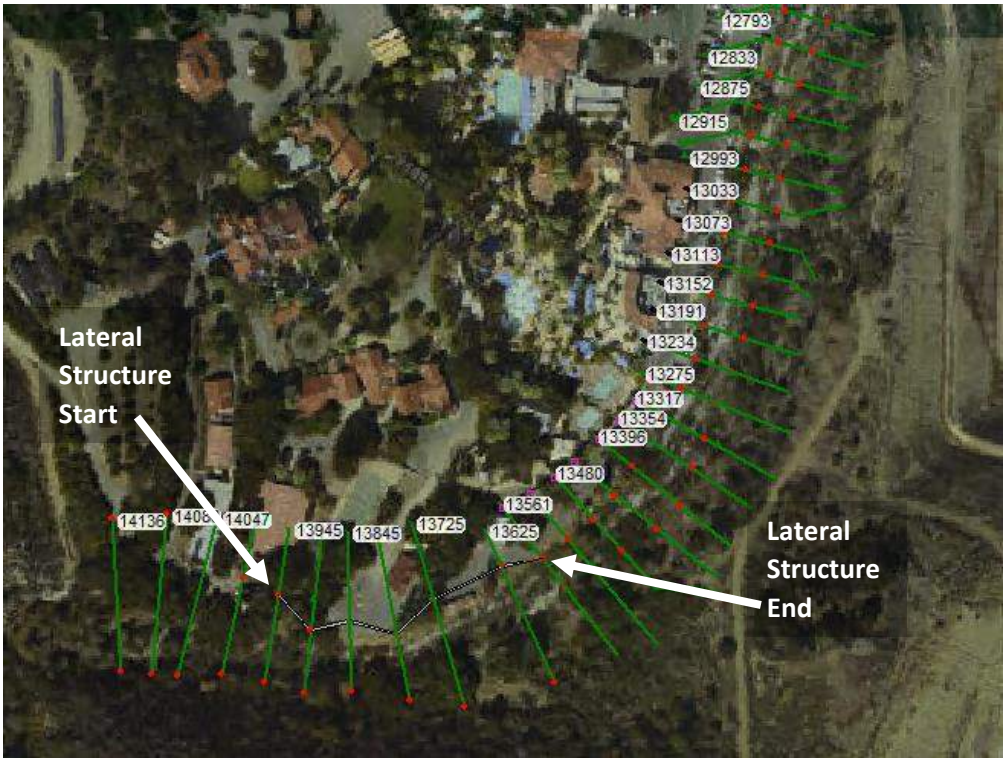


Figure 23. HEC-RAS Lateral Structure Location

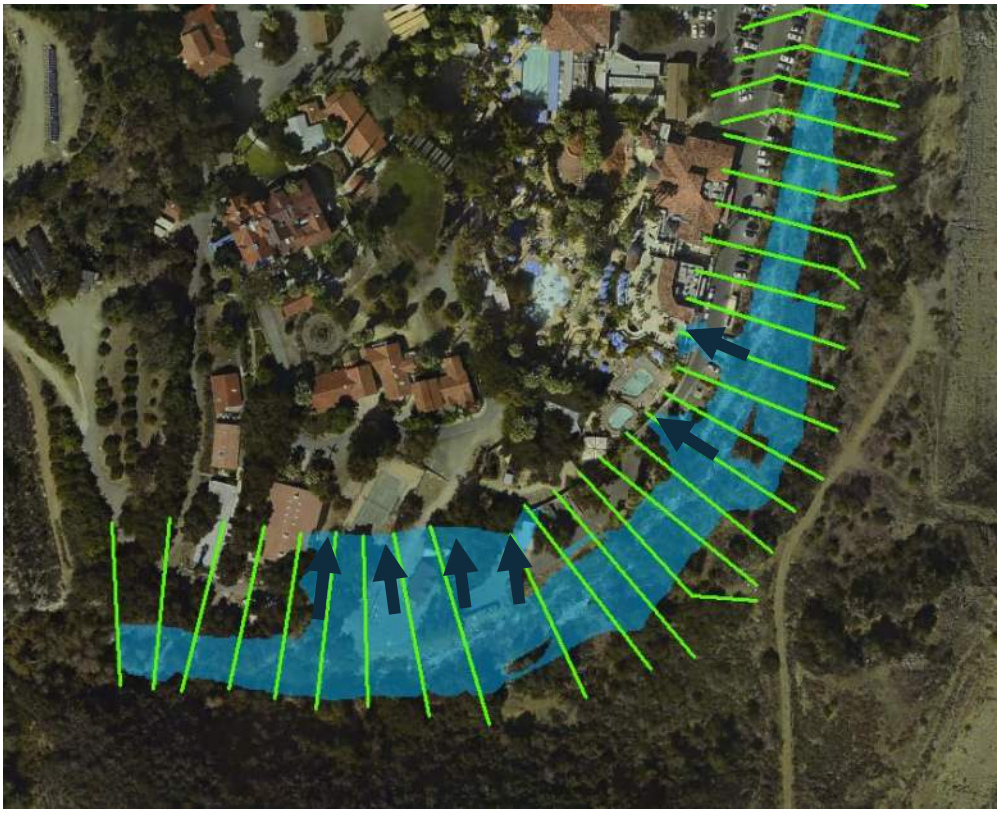


Figure 24. 100-year Flood Inundation Limits and Breakout Locations Near Hot Springs

As flow exits from the infiltration basins near Glen Ivy Road, flow becomes highly two dimensional (**Figure 25**). While there is a culvert under Glen Ivy Road, it is undersized for even the 2-year event and the vegetation-choked channel immediately upstream further reduces the efficacy of the culvert array. In addition, there is poor confinement of flow at the approach to this structure, and a large percentage of flow is routed around the eastern side of the structure toward Temescal Canyon Road where it then flows to the north along the road adjacent to an existing structure and then back into the channel approximately 250 feet north of Glen Ivy Road. Some flow remains in the channel downstream of the structure where it is directed to the same point in the channel as the roadway drainage, however during larger flood events (10-year and greater) flow in this area also spills to the left across open grassland. Historical channel landforms guide this flow to the north where it spills over Temescal Canyon Road and re-joins CCW approximately 500 feet downstream of the primary spillover point from the roadway into CCW. Ultimately, there is about a 1,500-foot-long corridor of CCW in this area where inadequate confinement exists for the 100-year event. The 2-year event routed through this reach also results in two-dimensional flow along Glen Ivy Road and Temescal Canyon Road (**Figure 26**). It can be concluded from this that both the undersized culvert at Glen Ivy Road as well as the lack of confinement upstream of the culvert promote excess flood inundation for even low flow events.

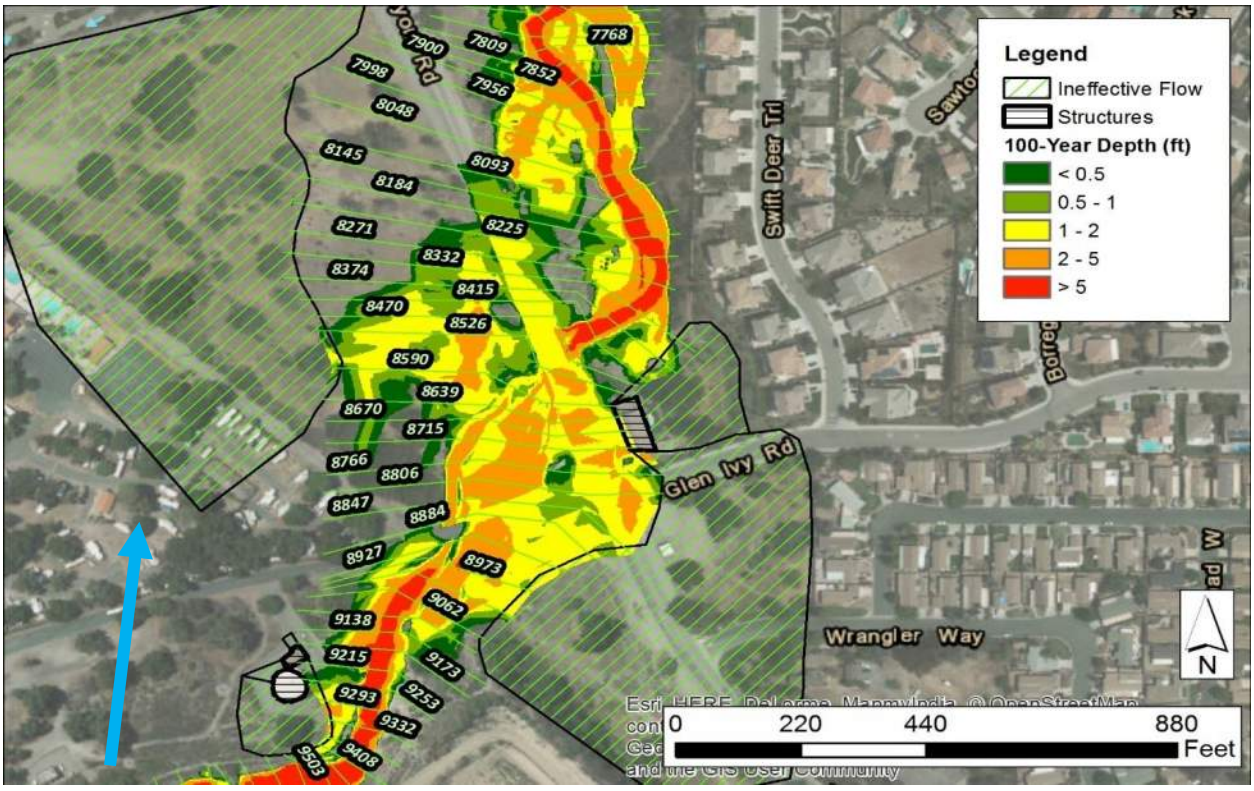


Figure 25. 100-Year Flood Inundation at Glen Ivy Road.

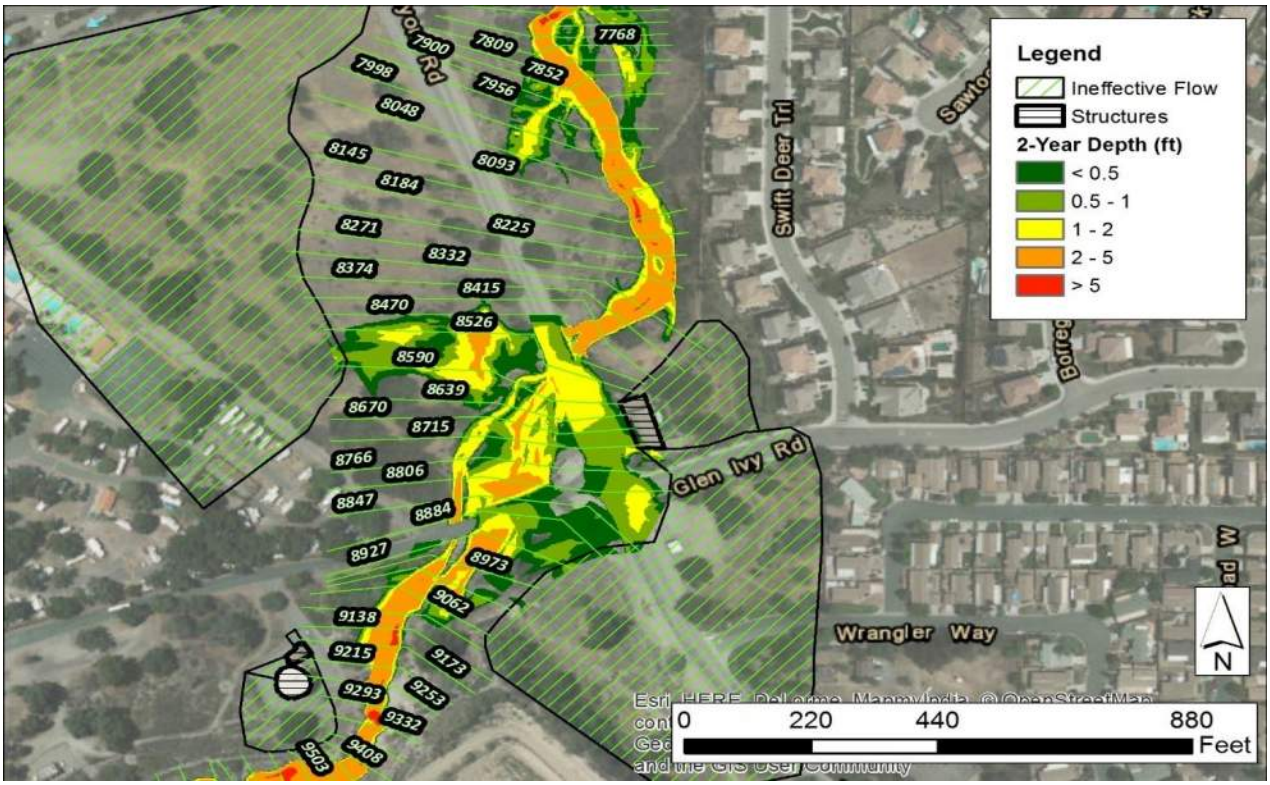


Figure 26. 2-Year Flood Inundation at Glen Ivy Road.

The third area of notable inundation is near the Rinker plant and Dawson Canyon Road. The lateral weir routine in HEC-RAS was used to estimate the amount of flow leaving the model due to lack of channel containment in the area. Two weirs were modeled, one being upstream of Dawson Canyon Road, and the other between the roadway crossing and Temescal Wash, since flow exits to the right upstream of the roadway and to the left downstream of the roadway. **Table 12** below lists the performance of each weir based on recurrence interval. Based on these results, the 2-year discharge has full containment throughout this reach. Approximately 19% (567 cfs) of the inflow to this reach from the 10-year event spills out into the Rinker plant, and an additional 3% (94 cfs) spills into the driving range downstream of Dawson Canyon Road. Nearly half of the entire inflow (2,362 cfs) for the 100-year event is diverted to the Rinker plant. This would likely inundate much of the plant given the relatively flat, graded slope of the plant. Taken together, the results presented in **Table 12** suggest that significant inundation outside of the channel would occur during even relatively minor flow events.

Table 12. Downstream Lateral Weir Performance.

	Upstream of Rinker Plant		Dawson Canyon Road		Temescal Wash	
	RS 2606		RS 773		RS 76	
Recurrence Interval	Q (cfs)	Remaining	Q (cfs)	Remaining	Q (cfs)	Remaining
2 - Year	1,595	100%	1,595	100%	1,595	100%
5 - Year	2,344	100%	2,145	92%	2,129	91%
10 - Year	2,957	100%	2,390	81%	2,296	78%
25 - Year	3,822	100%	2,649	69%	2,450	64%
50 - Year	4,526	100%	2,790	62%	2,523	56%
100 - Year	5,247	100%	2,885	55%	2,561	49%

6 FUTURE EROSION ASSESSMENT

6.1 GEOMORPHIC TREND ANALYSIS

6.1.1 Lateral change

Historical aerial photography from 1948 through 2014 were collected and rectified using ArcGIS software tools. CCW channel banks were identified in each set of photographs and used to create a spatial summary (**Figure 32**). A complete description of the spatial summary analysis and interpretation of the results are found in the *Task 1 – Field Reconnaissance and Geomorphic Assessment Report* (Task 1 Report) (separate volume).

A station alignment and a series of cross-sections were established to facilitate a quantitative assessment of the lateral change of CCW within the period of record. Since CCW has substantially changed laterally over time (primarily due to channelization), the station alignment was delineated so as to be applicable to all historical channel locations (thus does not follow the present channel alignment precisely). The cross-sections were delineated perpendicular to the station alignment at approximately 500-foot increments. **Figure 33** shows the station alignment and cross-sections in reference to the present-day CCW channel.

To quantify the lateral change over time, the distance from the station alignment to both the left and right channel banks were measured along each cross-section for all years of coverage (1948-2014). The distances were then subtracted for each consecutive year for both channel banks (example: 1952 left bank distance was subtracted from 1948 left bank distance resulting in the lateral distance change). This procedure was repeated for each consecutive year of coverage. The results were plotted using a bar graph to illustrate the magnitude of lateral change in the channel position over time.

Figure 34 and **Figure 35** illustrate the results for the entire study reach. The results show large changes in lateral position of the channel for both the left and right banks from cross-sections 0 to 3,000 and 9,000 to 10,500 between 1948 and 1980. These large lateral changes were the result of channelization and channel re-alignment projects that occurred during this period (see Task 1 Report). The goal of this analysis is to quantify the historical lateral change resulting from natural flooding processes. This was accomplished by examining the reaches of CCW that have been the least effected by human channelization and re-alignment and span from downstream of Glen Ivy Road (cross-section 8,500) to immediately downstream of Interstate 15 (cross-section 3,500). The left and right bank plots for the selected reaches are shown in **Figure 36** and **Figure 37**.

Table 13 lists the lateral change analysis for the selected reaches along with an interpretation of the results. The Cross-Section ID in **Table 13** refer to the Reference Cross-Sections in **Figure 33**. The table also includes notable flood events for CCW that occurred within the period of lateral change. A more detailed explanation of the source of the flood data can be found in the Task 1 Report.

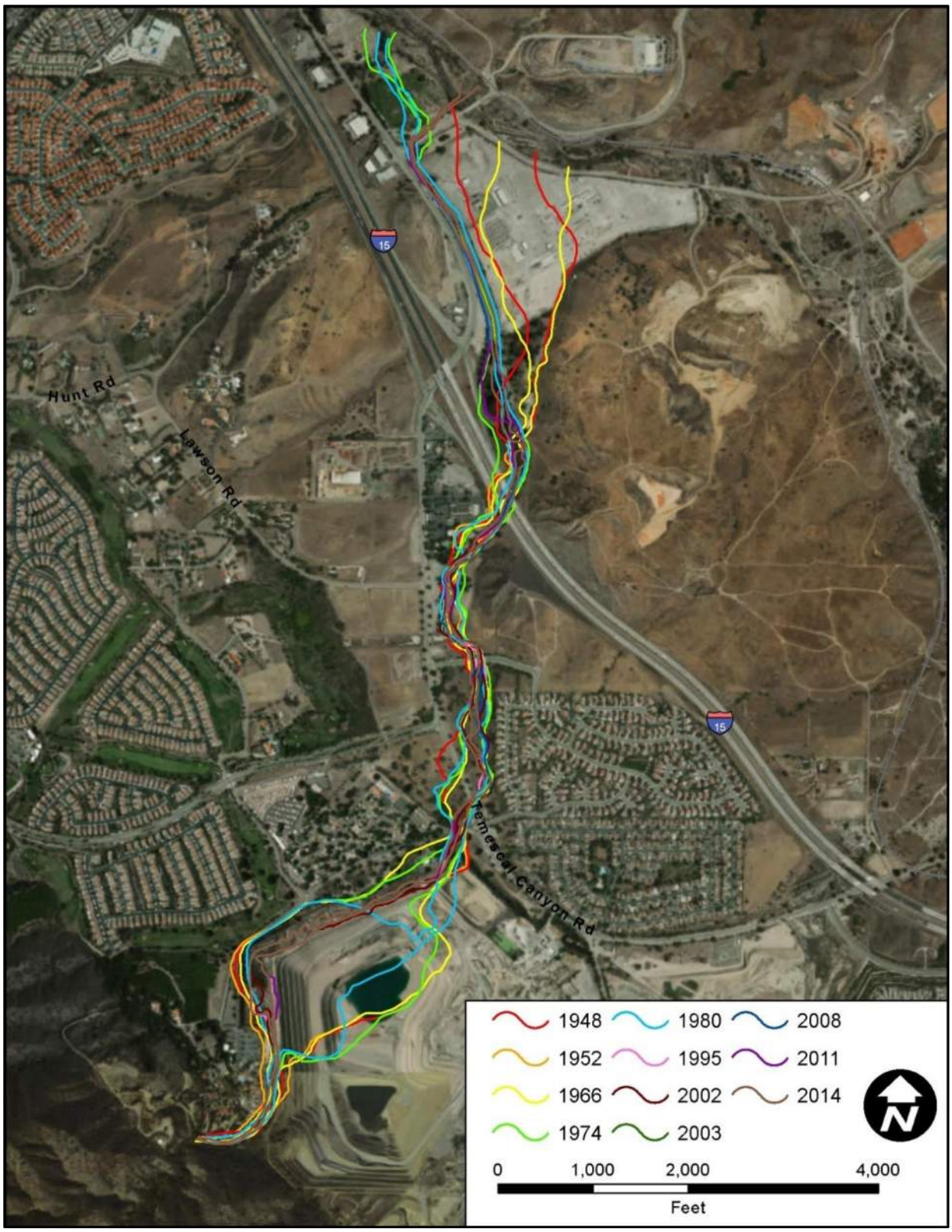


Figure 32. Channel Banks Spatial Summary.

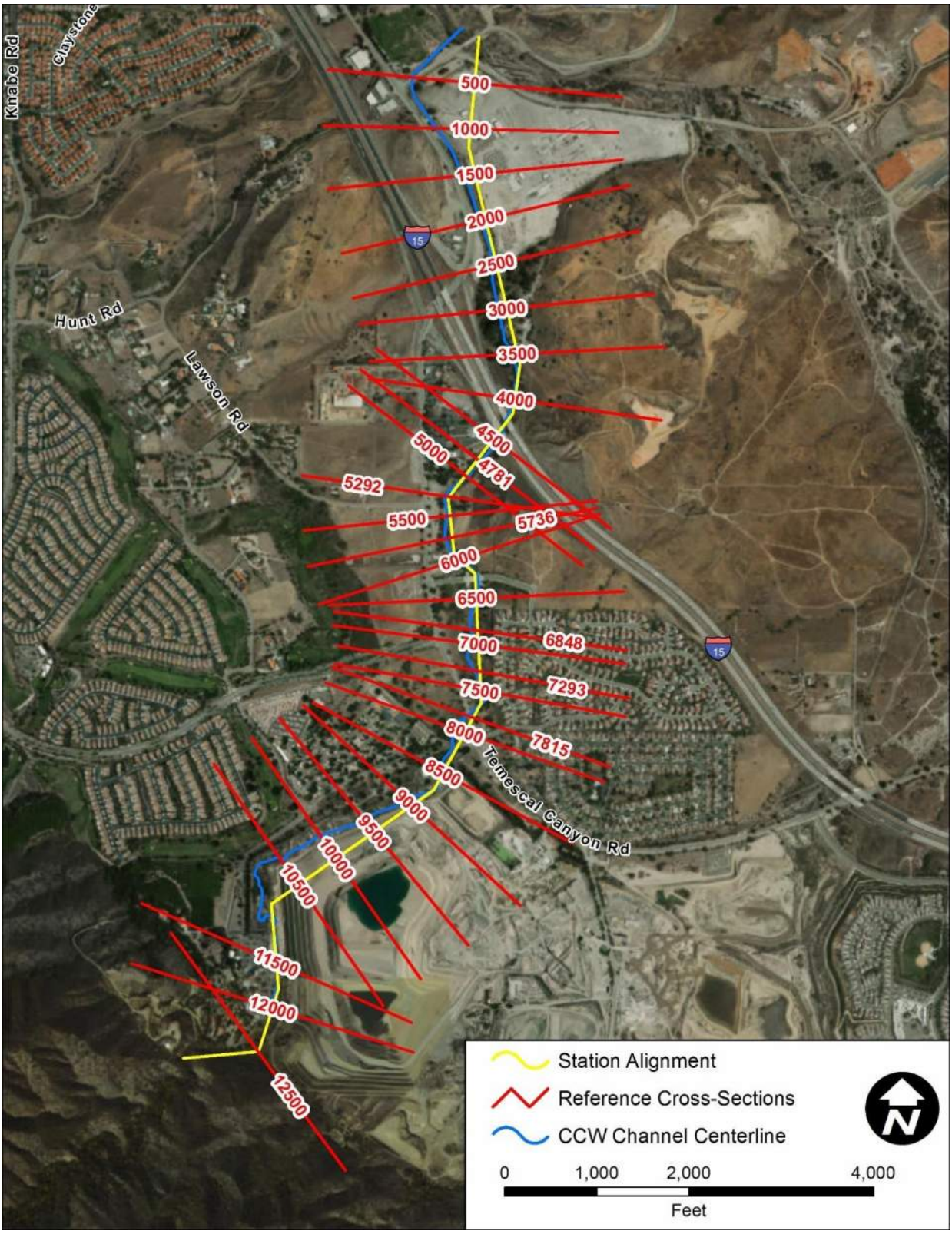


Figure 33. Station Alignment and Reference Cross-Sections.

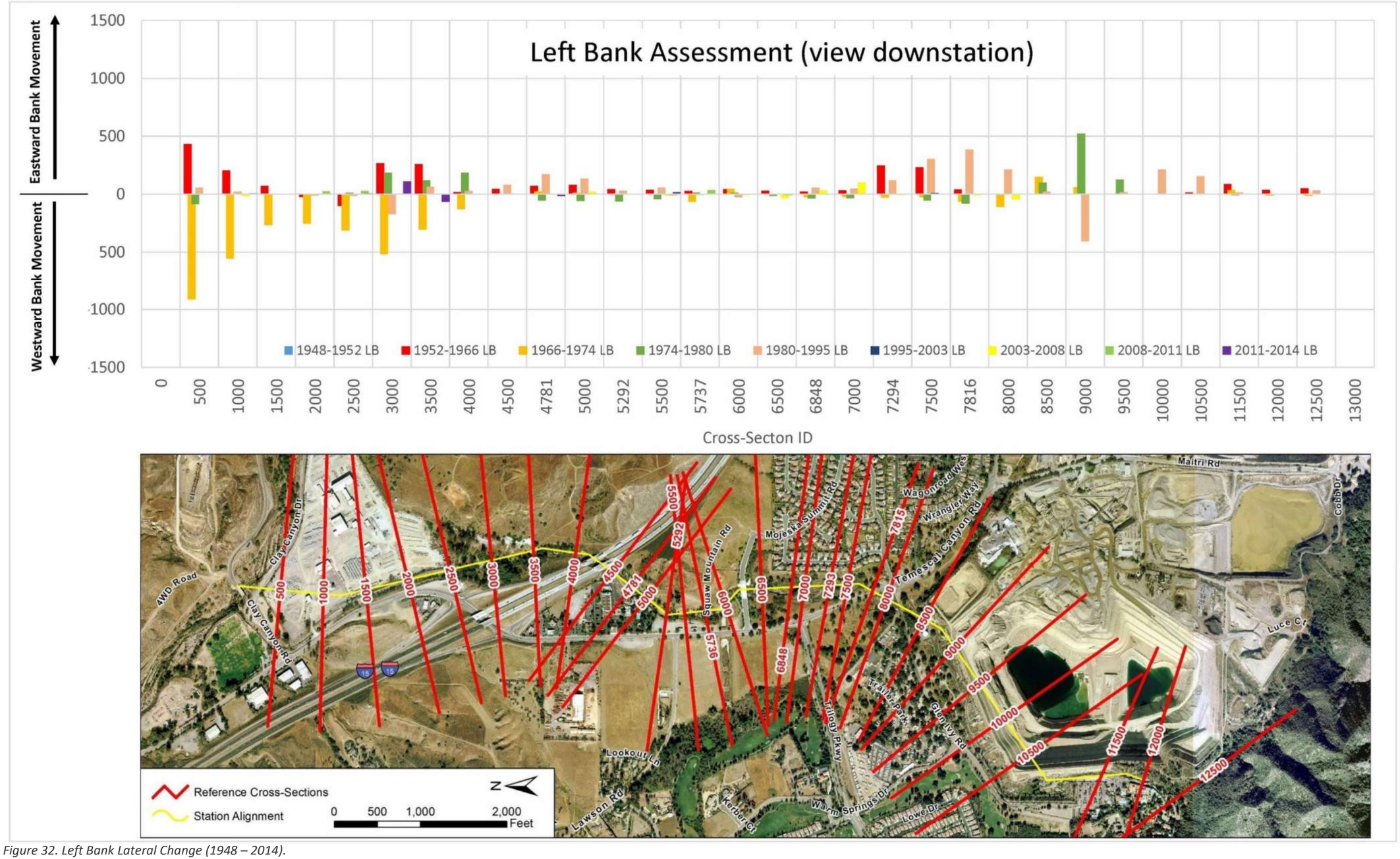


Figure 32. Left Bank Lateral Change (1948 – 2014).

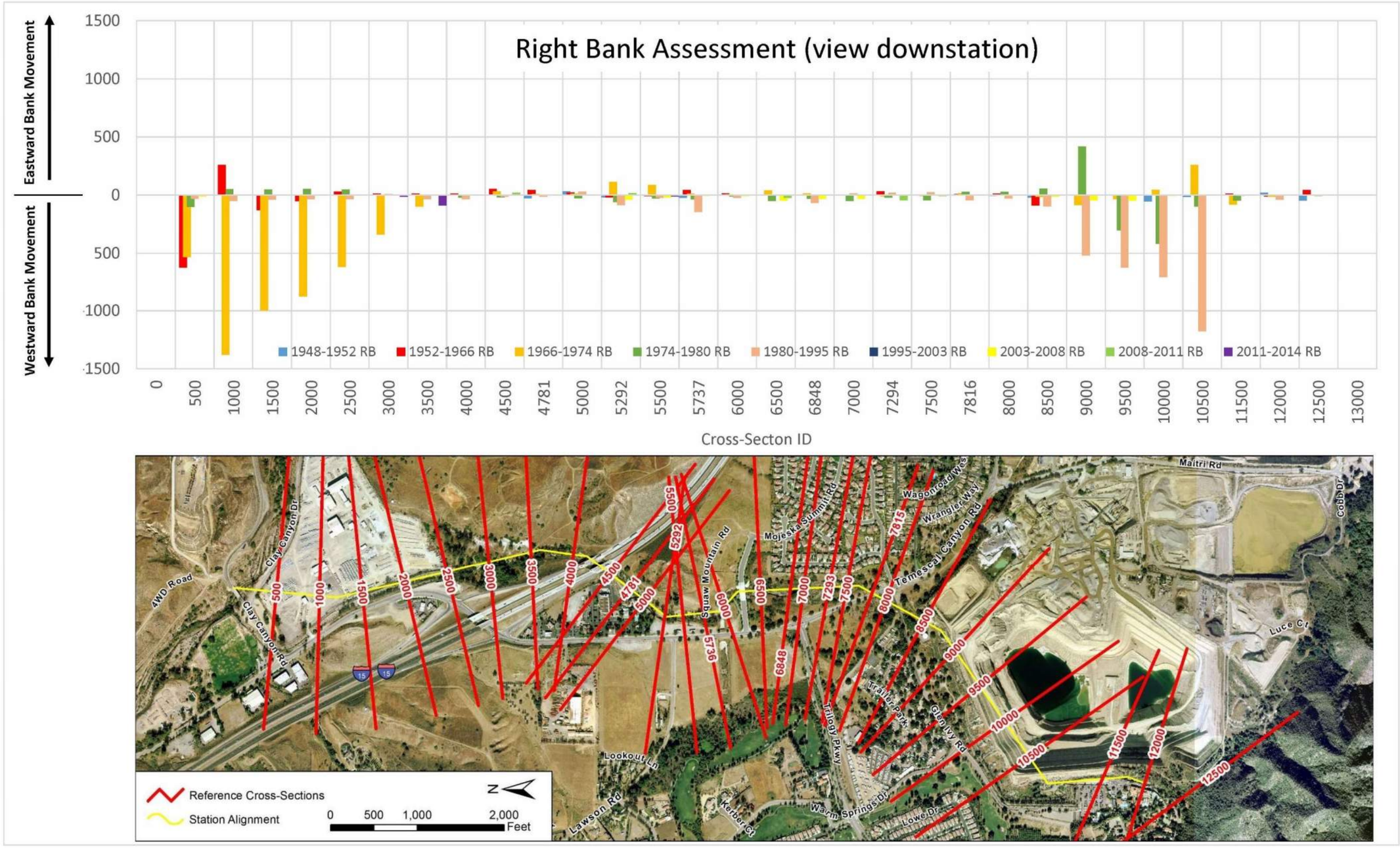


Figure 33. Right Bank Lateral Change (1948 – 2014).

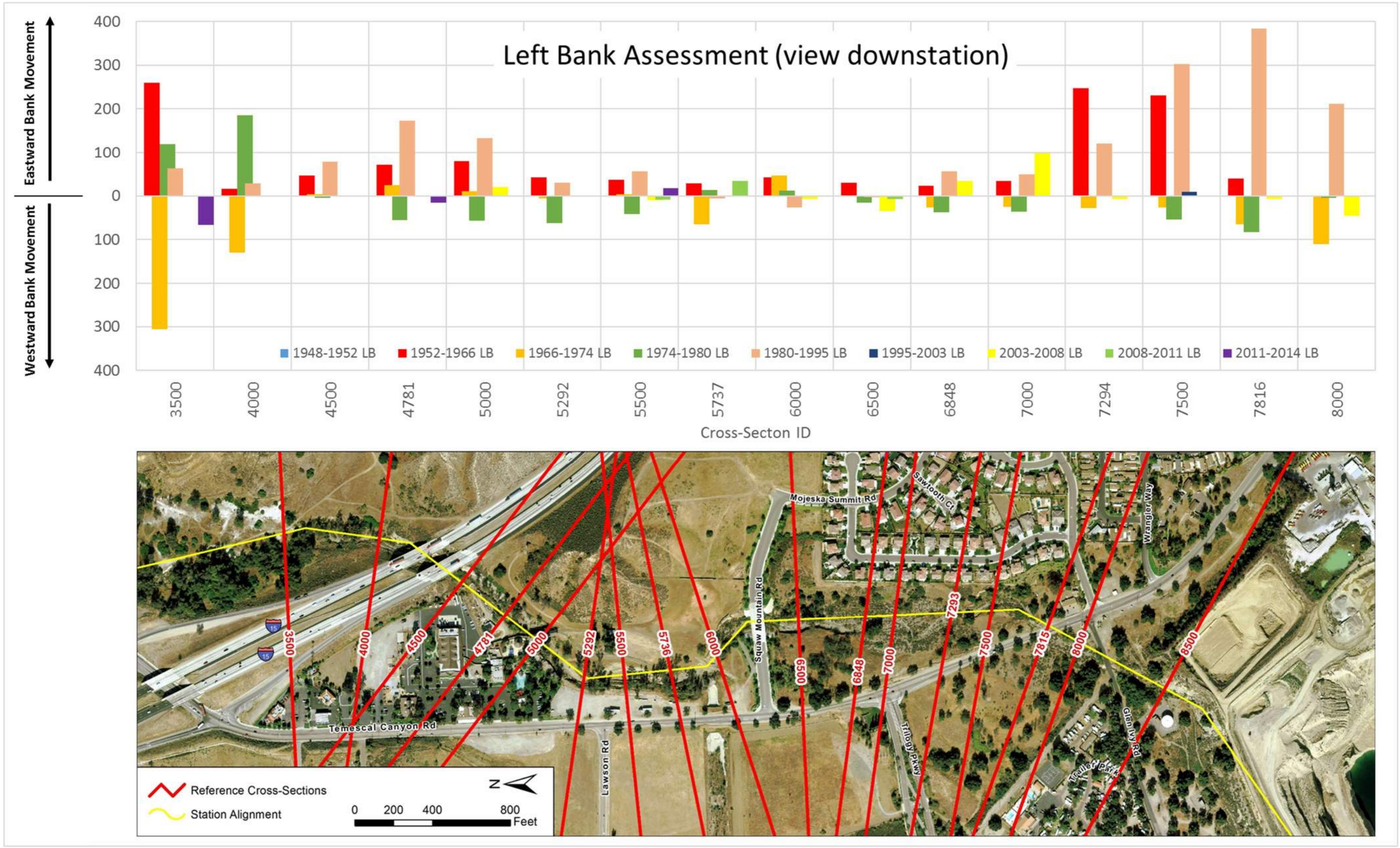


Figure 34. Selected Reach Left Bank Lateral Change (1948 – 2014).

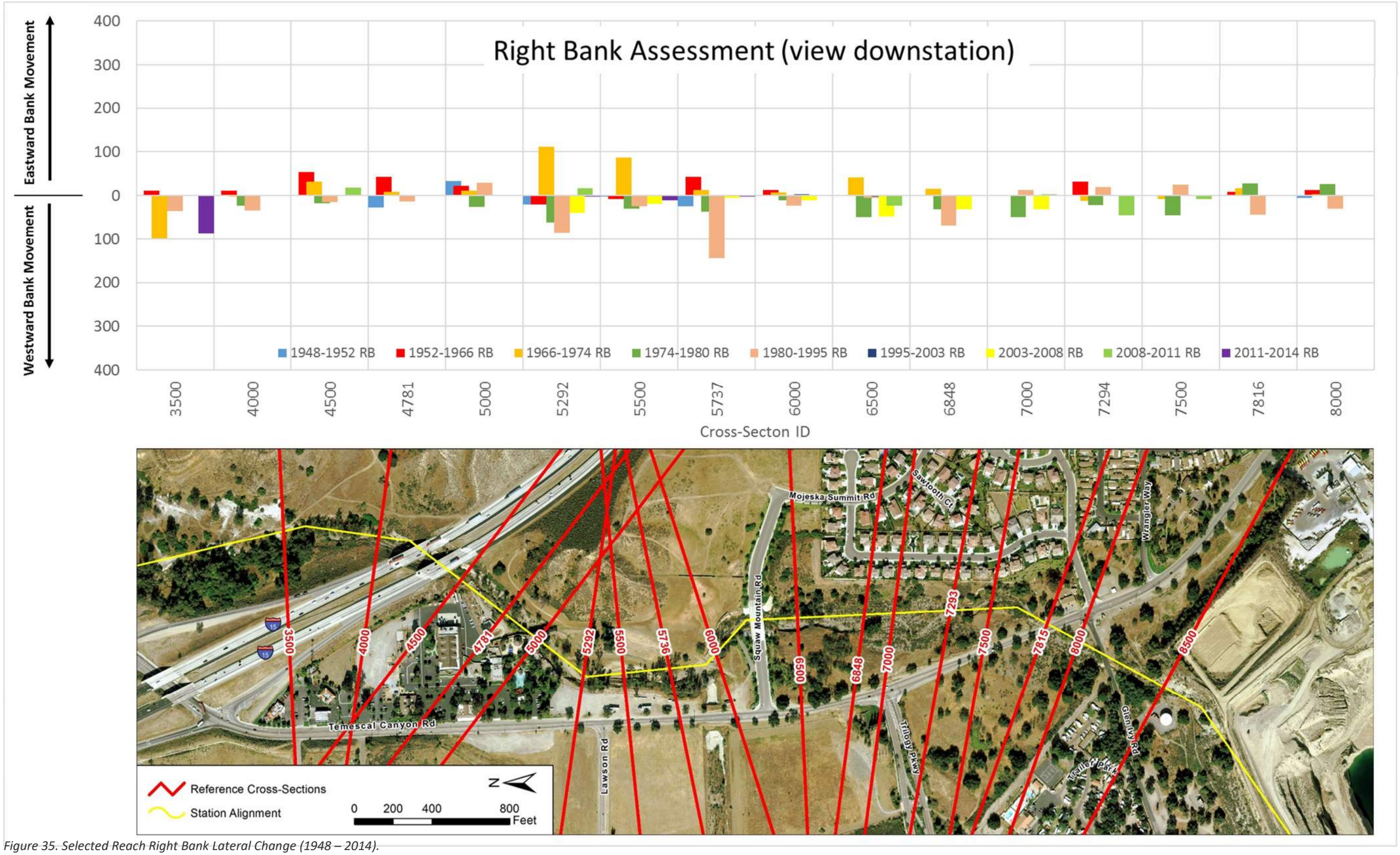


Figure 35. Selected Reach Right Bank Lateral Change (1948 – 2014).

Table 13. Lateral Migration Change Summary.

LEFT BANK ASSESSMENT					
Cross-Section ID (see Figure 33)	**Maximum Lateral Change (feet)**	**Period**	**Lateral Migration Direction**	**Notable Flood Events**	**Summary (Trends)**
8000	212	1980-1995	Eastward	1991, 1993, 1995	A general trend of eastward migration toward the high bluff downstream of Temescal Canyon Road occurred between 1948 and 1995. Since 1995 the channel has been laterally stable in this reach. Overall trend process: undetermined
7816	384	1980-1995	Eastward		
7500	303	1980-1995	Eastward		
7294	275	1952-1966	Eastward		
7000	99	2003-2008	Eastward	1991, 1993, 1995, 1997, 2005	This reach has experienced minor lateral migration, but overall has been relatively stable within the period of record. The reach has trended slightly eastward. Between 1974 and 1980 the channel migrated westward an average of 38 feet. Overall trend process: undetermined
6848	56	1980-1995	Eastward		
6500	35	2003-2008	Westward		
6000	46	1966-1974	Eastward		
5737	65	1966-1974	Westward		
5500	56	1980-1995	Eastward		
5292	62	1974-1980	Westward		
5000	133	1980-1995	Eastward	1991, 1993, 1995	This reach has experienced significant lateral change within the period of record. Between 1948 and 1966 the channel migrated eastward an average of 142 feet. Following the completion of the I-15 bridges, the channel downstream migrated westward between 130 and 300 feet, likely
4781	173	1980-1995	Eastward		
4500	78	1980-1995	Eastward		

4000	186	1974-1980	Eastward		in response to the bridges. Between 1974 and 1980 the channel migrated westward an average of 58 feet in the area adjacent to Tom's Farm. Overall trend process: anthropogenic
3500	307	1966-1974	Westward		
RIGHT BANK ASSESSMENT					
Cross-Section ID (see Figure 33)	**Maximum Lateral Change (feet)**	**Period**	**Lateral Migration Direction**	**Notable Flood Events**	**Interpretation (Trends)**
8000	30	1980-1995	Westward	1991, 1993, 1995	The right bank has experienced significantly less lateral change within the period of record as compared to the left bank. Both banks not experiencing the same magnitude of change indicates changes in channel width occurred along with lateral change. This reach experienced very minor lateral bank change, and the change was relatively consistent. The data indicates no definable trends occurred. Overall trend process: undetermined
7816	44	1980-1995	Westward		
7500	45	1974-1980	Westward		
7294	44	2008-2011	Westward		
7000	49	1974-1980	Westward		
6848	68	1980-1995	Westward		
6500	50	1974-1980	Westward		
6000	24	1980-1995	Westward	1991, 1993, 1995	This cross-section is located downstream of the Squaw Mountain Road bridge. The channel experienced the least lateral change at this location within the entire study area. Overall trend process: undetermined
5737	144	1980-1995	Westward	1991,	The area representing these cross-sections experienced the most lateral change of the right bank within the selected reach.

5500	87	1966-1974	Eastward	1993, 1995	Between 1966 and 1974 the bank migrated eastward away from the Tom's Farm property. Then beginning sometime before 1980 the bank migrated westward. Significant movement occurred between 1980-1995 (average of 115 feet). It's likely that Tom's Farm owners took corrective measures to slow the bank retreat. Only minor changes have occurred since 1995. Overall trend process: anthropogenic
5292	112	1966-1974	Eastward		
5000	33	1948-1952	Eastward	1991, 1993, 1995	This reach along Tom's Farm to immediately downstream of I-15 has been relatively stable. An eastward migration trend of the right bank up to 54 feet occurred prior to 1966. From 1980 to the present, the bank has been relatively stable but overall is trending slightly eastward. Overall trend process: anthropogenic
4781	43	1952-1966	Eastward		
4500	54	1952-1966	Eastward		
4000	34	1980-1995	Westward		
3500	99	1966-1974	Westward	*No records*	This is the "forested" reach downstream of I-15 but upstream of the Rinker Plant channelization. This reach experienced significant right bank westward movement between 1966 and 1974, then again recently between 2011 and 2014. The remaining time periods of record shows almost no lateral change. Overall trend process: anthropogenic

The data collected for this task was used to compute average annual change for CCW. Looking at the data in this way helps identify general trends that may be likely to continue into the future. **Table 14** lists the results.

Table 14. Average Annual Lateral Migration Distances by Reach.

Cross-Sections	Channel Bank	Average Migration Distance (feet) (1948-2014)	Reach Average Annual (1948-2014) Lateral Migration Rate (feet/year)	Reach Dominant Migration Direction
ALL	Left	44	0.7	Westward
ALL	Right	53	0.8	Westward
8500-12500	Left	29	0.4	Eastward
8500-12500	Right	76	1.2	Westward
3500-8000	Left	7	0.1	Eastward
3500-8000	Right	17	0.3	Westward
500-3000	Left	87	1.3	Westward
500-3000	Right	118	1.8	Westward

The highlighted rows in **Table 14** are for the selected reach described previously and shown in **Figure 36** and **Figure 37** which exclude the large magnitude lateral changes from man-made activities. Lateral movement in the other reaches is poorly correlated to natural processes. The highlighted values are most representative of expected future bank lateral migration rates assuming no major changes to the upstream watershed.

6.1.2 Vertical Change

A detailed analysis of the historical changes in the bed elevation of CCW was conducted as part of Task 1 and is described in the Task 1 Report. For this analysis, the bed elevation data was used to examine the project reaches to assess potential future trends. **Figure 38** is a plot of the channel bed elevation from topographic data spanning 1951 to 2015. The plots show a consistent trend of channel degradation (scour) since 1951. A detailed explanation for the likely causes of the channel degradation is included in the Task 1 Report. Note-there is an anomaly in the 2015 data that indicates the channel bed was depressed between stations 5100 and 5500 (immediately upstream of the Tom's Farm bridge). This phenomenon was not observed during 2016 field investigations and thus is concluded an issue with the mapping data. **Table** 15 lists a breakdown of the data by reach with average annual rates of change. Note: not all the mapping data sets cover the entire study reach. As such, the total vertical change for each reach was measured using the earliest and latest data sets available. The measurements were taken at the upstream and downstream limits of each reach.

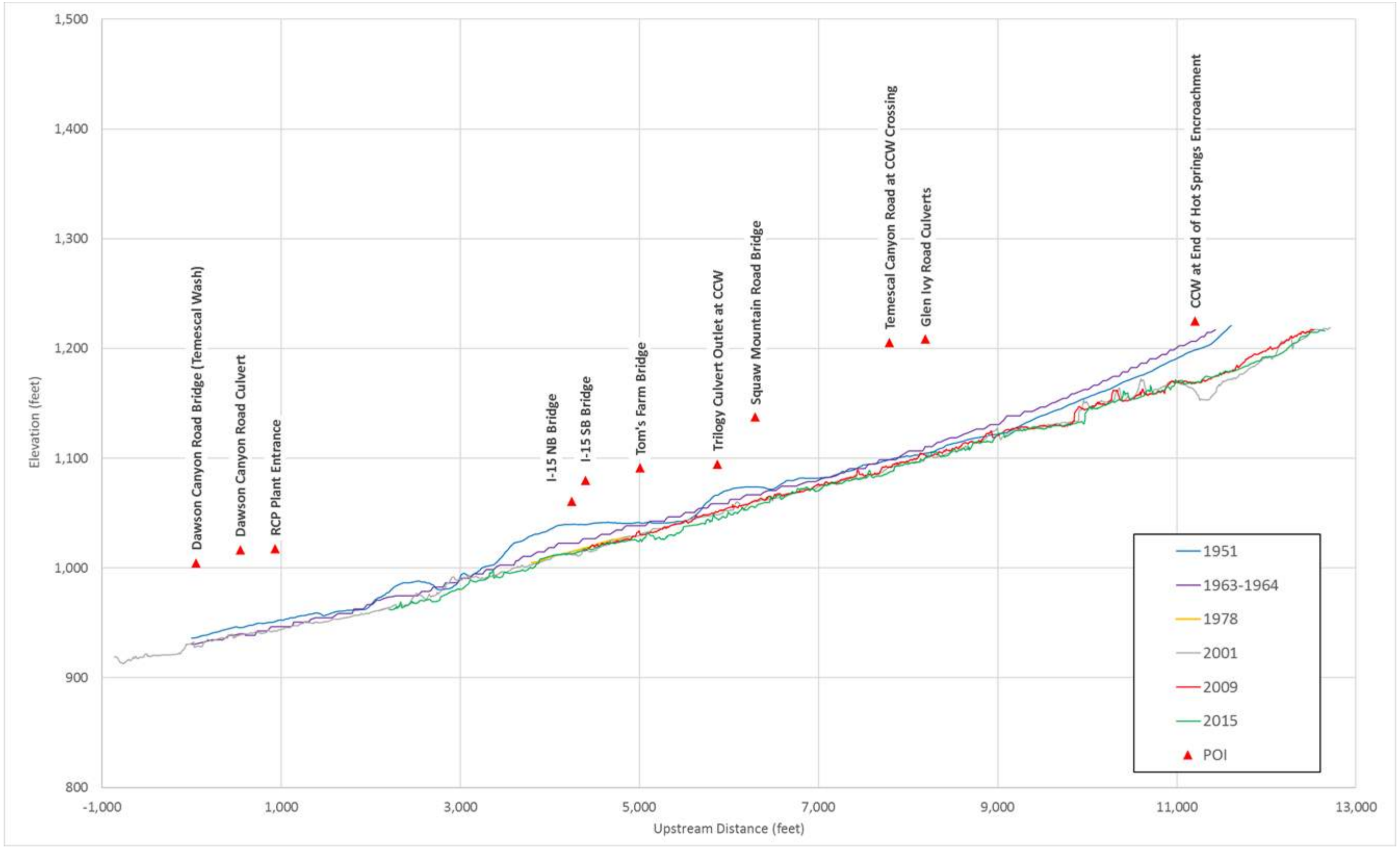


Figure 38. Longitudinal Profile for the Study Reach.

Table 15. Vertical Change Trend Analysis Summary.

Descriptive Reach	Upstream Limit Bed Elevation Change (feet)	Upstream Limit Mapping Years of Coverage	Downstream Limit Bed Elevation Change (feet)	Downstream Limit Mapping Years of Coverage	Reach Average Annual Change (feet/year)
8	N/A	1951-2015	-23.6	1951-2015	-0.4
7	4.4	1951-2015	3.8	1951-2015	0.1
6	3.8	1951-2015	-4.5	1951-2015	0.0
5	-4.5	1951-2015	-20.7	1951-2015	-0.2
4	-20.7	1951-2015	-27.7	1951-2015	-0.4
3	-27.7	1951-2015	-21.0	1951-2001	-0.4
2	-21.0	1988-2001	6.4	1951-2001	-0.7
1	6.4	1988-2001	-17.8	1951-2001	0.1
Overall Annual Rate of Change for Entire Study Reach					**-0.2**

The results in **Figure 38** indicate a consistent trend of channel degradation since at least 1951 at an average annual rate of 0.2 feet/year (2.4 inches/year). **Figure 38** also suggests that the magnitude of rate of change has decreased over time which suggests that the rates shown in **Table 15** may be somewhat higher that what should be expected in the future. An exception to this observation is the trend through Reach 4 (as shown on **Figure 1**) which shows a marked drop in bed elevation between 2009 and 2015. This difference may account for the greater annualized rate of vertical degradation than is seen in Reach 5. The 2009 to 2015 drop is also a drastic departure from the trend observed in Reach 4 between 2001 and 2009. The reason for this localized and recent change is mechanical removal of material from the channel bottom for the apparent purpose of grading the banks adjacent to the Tom's Farms railroad. **Figure 39**, Google Earth historic imagery dated 4/2014, shows a recent disturbance in the channel bottom and adjacent grading along the right (bottom of photo) bank, presumably to re-slope the channel banks following erosion and bank steepening from the 2010 storm event. A "pilot" excavation channel is evident near the Trilogy outlet structure riprap (left in photo) with a widened excavation evident downstream (right in photo).

In summary, based upon historical trends, CCW will continue to degrade at a system-wide average rate of approximately 0.2 feet/year assuming no major changes to the upstream watershed and without additional anthropogenic excavation.



Figure 39 - Google Earth Imagery Dated 4/2014.

6.1.3 Temescal Wash

The left bank of Temescal Wash in the vicinity of the CCW confluence was investigated to determine whether Temescal Wash historically experienced significant lateral changes effecting CCW. Between 1948 and 1966 the left bank of Temescal Wash experienced very little lateral change. At that time, the CCW confluence was located several thousand feet southeast of its present location (see Task 1 Report). The development of the Rinker Plant and corresponding construction of Park Canyon Drive in the early 1970s fixed the left bank of Temescal Wash. It was at that time that CCW was channelized adjacent to the Rinker Plant (see Task 1 Report). The historical analysis of Temescal Wash near the confluence of CCW indicated that lateral changes to Temescal Wash likely had little-to-no influence on the historical lateral changes of CCW.

6.2 GEOMORPHIC CHANNEL PATTERN RELATIONSHIP

Geomorphic relationships are useful for defining the appropriate conveyance conditions for a channel system given a sediment and hydrologic composition.

6.2.1 Methodology

The slope of a stream has a strong influence on the channel pattern for a given discharge. Numerous researchers have used empirical data, flume studies, and theoretical relationships to establish a threshold slope that separates braided and meandering stream patterns. The following four slope-discharge relationships were selected for evaluation of CCW:

- Lane Equation
- Ackers & Charlton Equation
- Leopold & Wolman Equation
- Henderson Equation

Lane Equations

Lane (1952) published empirical formulas to define the threshold slope for channel pattern, based on data from alluvial sand bed rivers. His equations leave an intermediate zone between the lines defined by the two slope equations where either pattern occurs. The Lane equations for channel pattern are:

$S_o > 0.010\ Q_m^{-0.25}$ (Braided channels)
$S_o < 0.001\ Q_m^{-0.25}$ (Meandering channels)
S_o = channel slope (ft/ft), and
Q_m = mean annual discharge (cfs)

Like many watersheds in the southwest, CCW has never had a stream flow gage within the watershed. As such, computing mean annual discharge directly is not possible. The mean annual discharge for CCW was estimated using the 2-year recurrence interval discharge as computed for this study (see **Section 3**). The mean annual discharge (Q_m) used in this analysis is 1,052 cfs upstream of the Trilogy Outlet Channel and 1,595 downstream of the Trilogy Outlet Channel.

Ackers & Charlton Equation

The Ackers and Charlton (1971) equations are based on data obtained from flume studies. The results generally agree with the results of the Lane equations.

$S_o > 0.0015\ Q_m$-0.12 (Straight channels)
$S_o < 0.0021\ Q_m$-0.12 (Meandering channels)
Where So = channel slope (ft./ft.), and
Q_m = mean annual discharge (cfs)

The data sources were the same as for the Lane equation.

Leopold & Wolman Equations

The Leopold and Wolman equations (1957) were developed using data from rivers with coarse bed material (D_{50} > ¼ inch).

$S_o > 0.06\ Q_{maf}^{-0.44}$ (Braided channels)
$S_o < 0.06\ Q_{maf}^{-0.44}$ (Meandering channels)
S_o = channel slope (ft/ft)
Q_{maf} = mean annual flood (cfs)

The equations are based on bankfull discharge, which Leopold and Wolman determined to be equal to the mean annual flood. The mean annual flood has a recurrence interval of about 2.33 years (ADWR, 1985). The 2-year discharge was used in this analysis as an approximation of the mean annual flood.

Henderson Equation

Henderson (1961) used Leopold's and Wolman's data, but added a variable describing the mean bed sediment diameter.

$S_o > 0.64\ D_{50}^{1.14}\ Q_{maf}^{-0.44}$ (Braided channels)
S_o = channel slope (ft/ft)
Q_{maf} = mean annual flood (cfs)
D_{50} = mean sediment diameter (ft)

Sediment diameter data were obtained from pebble counts and bulk sediment samples both collected in October 2016 (see **Section 4**).

6.2.2 Results

Application of the four channel pattern equations to the study area are shown in **Table 16**. The energy slope from the effective HEC-RAS model was used in lieu of the bed slope. Computation using the energy slope allows one to assess how the channel pattern might adjust to a discharge higher than the mean annual flood. Given the assumed flashy nature of floods on CCW, full channel pattern adjustment to higher discharges is not expected during a single flood.

Field observations suggest that the existing condition channel pattern of CCW is primarily straight due to man-made influences as discussed in detail in the Task 1 report. As shown in **Table 16**, all of the channel pattern equations predict a braided pattern, with most reaches predicting a strongly braided pattern. The "Observed" column in **Table 16** reflects field-observed conditions of the reach. Because CCW is predominantly a gravel/cobble dominated system, the Leopold and Wolman and Henderson equations are best conditioned for the wash type. Meandering systems are generally reflective of shallower slopes and higher sediment loads than non-meandering systems. Natural straight river systems are rare in alluvial environments like CCW, and if present, are usually reflective of human influence. If maintained, the observed straight and meandering pattern suggests that CCW is likely to experience changes to its overall slope; absent human intervention, a meandering plan form is anticipated. **Table 3** is segregated by sediment gradation reach as described in **Section 4**.

Table 16. Channel Pattern Analysis Results.

Coldwater Canyon Wash Geomorphology Study			
Channel Pattern Analysis Results			
Methodology - Channel Pattern			
Lane	**Leopold & Wolman**	**Henderson**	**Observed**
STATION 7850-12388 (SEDIMENT REACH G)			
100Yr			
B87	B81	B84	Straight
50Yr			
B87	B81	B84	Straight
10Yr			
B86	B82	B82	Straight
2Yr			
B88	B83	B84	Straight
STATION 6327-7812 (SEDIMENT REACH F)			
100Yr			
B100	B100	B100	Meandering
50Yr			
B100	B100	B100	Meandering
10Yr			
B100	B100	B100	Meandering
2Yr			
B100	B100	B100	Meandering
STATION 4481-6250 (SEDIMENT REACH E)			
100Yr			
B96	B96	B96	Meandering
50Yr			
B96	B96	B96	Meandering
10Yr			
B96	B96	B96	Meandering
2Yr			
B96	B96	B96	Meandering
STATION 4046-4452 (SEDIMENT REACH D)			
100Yr			
B100	B100	B100	Straight
50Yr			
B100	B100	B100	Straight
10Yr			
B100	B100	B100	Straight
2Yr			
B100	B100	B100	Straight

Notes: S = Straight, I = Intermediate, B = Braided, M = Meandering, H=Shoaled

1. The subscript number after the pattern code (S, I, B, M, H) indicates the percent of sections predicted for the given pattern, e.g. B87 = 87% braided.

Table 17. Channel Pattern Analysis Results, cont.

Coldwater Canyon Wash Geomorphology Study			
Channel Pattern Analysis Results			
Methodology - Channel Pattern			
Lane	**Leopold & Wolman**	**Henderson**	**Observed**
STATION 3708-4009 (SEDIMENT REACH C)			
100Yr			
B100	B100	B100	Straight
50Yr			
B100	B100	B100	Straight
10Yr			
B100	B100	B100	Straight
2Yr			
B100	B100	B100	Straight
STATION 2568-3686 (SEDIMENT REACH B)			
100Yr			
B100	B100	B100	Straight
50Yr			
B100	B100	B100	Straight
10Yr			
B100	B100	B100	Straight
2Yr			
B100	B100	B100	Straight
STATION 74-2568 (SEDIMENT REACH A)			
100Yr			
B100	B97	B100	Straight
50Yr			
B100	B97	B100	Straight
10Yr			
B99	B96	B100	Straight
2Yr			
B100	B97	B100	Straight

Notes: S = Straight, I = Intermediate, B = Braided, M = Meandering, H=Shoaled

1. The subscript number after the pattern code (S, I, B, M, H) indicates the percent of sections predicted for the given pattern, e.g. B87 = 87% braided.
2. Channel patterns are not reported for the bridge reaches due to the historical and expected future disturbance.

6.3 CHANNEL GEOMETRY CHARACTERISTICS ANALYSIS

Geomorphic relationships exist to describe physical characteristics of stable channels.

6.3.1 Methodology

Equations for stable channel geometry have been developed from streams that have been stable for long periods of time. These equations relate bankfull channel width, depth, and velocity to a specific discharge rate, such as the average annual flow, or in this case the 2-, 10-, 50-, and 100-year recurrence interval discharge estimates. Generally, these equations are applied to HEC-RAS hydraulic data within the defined bank stations (e.g. channel discharge (Q Channel), channel velocity (Vel Chnl), channel depth (Hydr Depth C), etc.). Several stable geometry equations were applied to CCW to assess the expected direction of future channel change.

Bray Equation #1

Bray (1979) developed equations for the geometry of alluvial gravel-bed rivers based on the 2-year discharge.

$$W = 2.38\ Q_2^{0.527}$$
$$d = 0.266\ Q_2^{0.33}$$
$$V_m = 8.0\ d^{0.6}\ S_o^{0.29}$$

W = surface flow width (ft)
Q_2 = 2-year discharge (cfs)
d = flow depth (ft)
V_m = mean channel velocity (ft/sec.)
S_o = channel slope (ft/ft)

Bray Equation #2

Bray later modified his channel geometry relationships (Hey et. al., 1982) for gravel-bed rivers to include bankfull discharge and the bed material size.

$$W = 2.08\ Q_{bf}^{0.528}\ D_{50}^{-0.07}$$
$$d = 0.256\ Q_{bf}^{0.331}\ D_{50}^{-0.025}$$
$$V_m = 1.87\ Q_{bf}^{0.14}\ D_{50}^{0.095}$$
$$S_o = 0.0965\ Q_{bf}^{-0.334}\ D_{50}^{0.586}$$

W = surface flow width (ft)
Q_{bf} = bankfull discharge (cfs) (2-year)
D_{50} = medium bed sediment diameter (ft)
d = flow depth (ft)
V_m = mean channel velocity (ft/sec.)
S_o = channel slope (ft/ft)

Hey Equation

Hey (1982) developed regime equations for gravel bed rivers in England that relate stable channel geometry to bankfull discharge and bedload transport rate.

$WP = 2.2\ Q_{bf}^{0.54}\ D_{50}^{-0.05}$
$R = 0.161\ Q_{bf}^{0.41}\ D_{50}^{-0.15}$
$d_{max} = 0.252\ Q_{bf}^{0.38}\ D_{50}^{-0.16}$
$S_o = 0.679\ Q_{bf}^{-0.53}\ Q_s^{-0.13}\ D_{50}^{0.97}$

WP = wetted perimeter (m)
Q_{bf} = bankfull discharge (m) (2-year)
D_{50} = median sediment diameter (m)
R = hydraulic radius (m)
d_{max} = maximum channel depth (m)
S_o = channel slope (m/m)
Q_s = bedload sediment discharge (m^3/s)

Lacey Equation

The Lacey equation (1929) was developed to describe the geometry of silt-laden canals in India. However, Bray reported (1979) that in gravel rivers in Canada, the Lacey equation was as accurate for predicting velocity as the Manning's equation.

$V = 0.8Q^{0.167}$

V = mean channel velocity (ft/sec.)
Q = discharge (cfs)

Parker Equation (Gravel Bed Rivers)

Parker (1979) examined gravel bed rivers to obtain his channel geometry equations. He found that, unlike the bed material in sand bed streams, the gravel and cobble bed material in coarse bedded streams is moved only during larger flows. He also noted that the banks of gravel bed streams tended to be more stable and straighter than streams with finer bed materials (MacBroom, 1981). Parker's equations use a dimensionless discharge parameter (Q*), as described below.

$W_{bf}\ 4.4\ Q^{*0.5}\ D_{50}$
$d = 0.253\ Q^{*0.415}\ D_{50}$
$S_e = 0.223\ Q^{*-0.410}$

W_{bf} = bankfull width, width at top of bank (ft)
$Q^* = Q / [((\rho_{s-1}/\rho)\ g\ D_{50})^{½})\ D_{50}^2]$ (dimensionless)
D_{50} = mean sediment diameter (ft)
d = average channel depth (ft)
S_e = energy slope (ft/ft)

Chang Equation

Chang's (1988) gravel bed equations for channel geometry support the FLUVIAL-12 sediment transport model, which attempts to simulate channel change from sediment continuity data using minimum stream power concepts. Chang provides equations for channel width, depth, and slope.

$$S_o = 0.000442\ D_{50}^{1.15} / Q_{bf}^{0.42}$$
$$W = [1.905 + 0.249(\ln(0.001065\ D_{50}^{1.15} / (S_o\ Q_{bf}^{0.42}))^2]\ Q_{bf}^{0.47}$$
$$d = [0.2077 + 0.0418(\ln(0.000442\ D_{50}^{1.15} / (S_o\ Q_{bf}^{0.42})))]\ Q_{bf}^{0.42}$$

S_o = channel slope (ft./ft.)
D50 = median sediment diameter (mm.)
Q_{bf} = bankfull discharge (cfs)
W = channel width (ft)
d = average channel depth (ft)

Kellerhalls (1967) Equations

Kellerhalls developed equations for the equilibrium channel width and depth in gravel bed rivers. The Kellerhalls equations use the dominant discharge, which is also referred to as the channel-forming or effective discharge.

$$W = 1.8\ Q_{dd}^{0.5}$$
$$d = 0.166\ Q_{dd}^{0.4}\ K_s^{-0.12}$$

W = channel width (ft)
Q_{dd} = dominant discharge (cfs)
d = average channel depth (ft)
K_s = Nikuradse's sand grain roughness coefficient (~D_{90})

AMAFCA Equations

The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) (1994) equations for width and equilibrium slope were developed from empirical and theoretical data for application to the arroyo systems of northern New Mexico.

$$W = 0.5\ F^{0.6}\ Fr^{-0.4}\ Q^{0.4}$$
$$S_o = 18.28\ n^2\ F^{0.133}\ Fr^{2.133}\ Q^{-0.133}$$

W = width of channel (ft)
F = width/depth ratio
Fr = main channel Froude number
Q = discharge (cfs)
S_o = channel slope (ft/ft)
n = Manning's n value for channel

BUREC Equation

The Bureau of Reclamation (Lane and Carlson, 1953) developed relationships that describe stable channel dimensions for canals cut into coarse grained alluvium.

$d_{max} = (Q_{bf}/2 \tan \phi)^{0.5}$
$A = 2\ d_{max}^2 / \tan \phi$
$V_m = 1/n\ (d_{max} \cos \phi / (0.5\ \pi\ (1 - \cos \phi))^{0.667}\ S_e^{0.5}$
$TW = d_{max}\ \pi / \tan \phi$

d_{max} = Maximum depth of flow (ft.)
Q_{bf} = Bankfull discharge (cfs)
ϕ = Angle of repose of bank material
V_m = mean flow velocity (ft./sec.)
N = Mannings' n value
S_e = Energy slope (ft./ft.)
TW = Top width of flow (ft.)

6.3.2 Results

The results of applying the regime equations to CCW are shown in **Table 18** (sorted by sediment gradation reach). The 2-, 10-, 50-, and 100-year discharges were substituted for the discharge variable used in the original regime equations to examine potential adjustments in channel geometry at each flow rate. Predicted values of widths, depths, slopes and velocities from the equations were compared to the values obtained from the project HEC-RAS model. The differences were interpreted as follows:

- Width. Where the predicted channel width is greater than the HEC-RAS modeled channel width, the channel is expected to erode its banks to achieve the greater width during future floods. Where the predicted channel width is less than the HEC-RAS modeled channel width, the channel is assumed to have low potential for lateral movement due to channel widening, and is likely to experience deposition along at least one of the banks at the flow rates considered. The analysis results indicate the predicted average channel width is greater than the HEC-RAS width for all reaches except the 2- and 10-year discharge for Stations 7850-12388 (Sediment Reach G; generally, Reach 7) and the 2-year discharge for Stations 6327-7812 (Sediment Reach F; generally Reach 5). This suggests that overall the channel is narrower than it would be naturally, and that future erosion of the channel banks is likely to occur.

- Depth. Where the predicted channel depth is greater than the HEC-RAS modeled channel depth, the channel is expected to erode its bed (scour) to achieve the equilibrium depth during future floods. Where predicted channel depth is less than the HEC-RAS modeled channel depth, the channel is expected to aggrade (deposit) to reach the equilibrium state. The analysis results indicate the predicted flow depths are consistently higher than the HEC-RAS depths. This suggests potential future channel bed scour. The sediment transport analysis indicates several reaches of CCW are subject to potential armoring for specific discharges. Should armoring of the bed occur, the mechanism of adjustment will likely be lateral erosion of the channel banks

rather than bed scour. It should be noted that local scour computations are more appropriate to quantify the scour potential during a flood event at structures such as bridges.

- Slope. Where the predicted slope is less than the existing slope, the channel is expected to decrease its slope (scour) to achieve a more stable form. Where predicted slope is greater than existing slope, the channel is expected to increase its slope (aggrade upstream) to reach equilibrium. The predicted slopes are consistently lower than the actual slope indicating potential future scour during flood events. Generally, an over-steepened slope results in higher channel velocities and higher stream power, which are conducive to channel degradation (scour). The predicted slopes are almost uniformly lower than the existing slopes by an order of magnitude, except for the slope predicted by the AMAFCA equation. Slope adjustment by an order of magnitude is not a reasonable expectation for CCW, unless major watershed changes occur. The long-term equilibrium slope analysis results (**Section 6.4**) more appropriately quantifies any potential future aggradation in this reach.

- Velocity. Where the predicted velocity is greater than the HEC-RAS modeled velocity, floods have the potential of being more erosive than predicted by the HEC-RAS model. The analysis results show the predicted velocities higher for all reaches and discharges. This indicates potentially higher, more erosive velocities that indicated by the HEC-RAS model, thus future scour is likely to occur.

The regime equations are used to predict potential changes in channel geometry given a single peak discharge value and existing condition geometry. The changes predicted by the regime equations should not be considered long-term or single-event predictions, but rather the expression of morphological changes under each specific flow regime; generally, large magnitude events do not possess sufficient flow duration to dictate channel morphology (see **Section 7.1** for an assessment of sediment transport work integrated over time for multiple recurrence intervals).

Additionally, geomorphic channel configuration in the CCW system appears to be dominated by the most recent event, particularly for small-magnitude events. As the system generally lacks conveyance for upper-regime flows (e.g. the 100-year discharge), overbank/overland flow is a major component of upper-regime conveyance and mimics former alluvial fan conveyance in this manner. While degradation has created adequate channel depth for conveyance of upper-regime flows through Reaches 3 and 4, the channel geometry is not geomorphically compatible with these discharges. Channel width in Reach 5 is nearly equal to the geomorphically stable channel width for the 2-year flow; this suggests that the reach is in a near-equilibrium channel width for relatively frequent events, such as the 2010 storm.

Generally, the equilibrium slope analysis performed as part of this study (**Section 6.4**) is a more appropriate measure of future long-term trends in channel slope than purely geomorphic slope indicators/calculations. This is partly due to the generalized nature of the geomorphic calculations and partly due to the increased resolution of sediment composition in the equilibrium slope calculations.

6.3.3 Summary

Both the channel pattern and channel geometry regime equations indicate CCW is generally not in equilibrium under existing conditions. The results suggest that future changes to both channel geometry (widening, scouring) and channel slope (scouring) should be expected for all reaches and most discharges.

Table 18. Channel Geometry Regime Equation Results.

Coldwater Canyon Wash Geomorphology Study																
Observed and Expected Channel Characteristics for Coldwater Canyon Wash																
Equation	**Channel Width (ft)**				**Flow Depth (ft)**				**Channel Slope (ft/ft)**				**Channel Velocity (ft/s)**			
	100Yr	**50Yr**	**10Yr**	**2Yr**	**100Yr**	**50Yr**	**10Yr**	**2Yr**	**100Yr**	**50Yr**	**10Yr**	**2Yr**	**100Yr**	**50Yr**	**10Yr**	**2Yr**
REACH G																
Bray - Equation #1	169	156	125	92	3.9	3.7	3.3	2.7	0.0022	0.0024	0.0027	0.0033	4.9	4.8	4.5	4.2
Bray - Equation #2	174	161	129	95	3.9	3.7	3.3	2.7	0.0018	0.0019	0.0022	0.0026	4.7	4.6	4.3	4.0
Hey	74	69	56	42	7.9	7.5	6.4	5.1	0.0031	0.0033	0.0039	0.0049	-	-	-	-
Ackers & Charlton (Channel Width) Lacey (Channel Velocity)	108	101	85	66	-	-	-	-	-	-	-	-	3.1	3.0	2.8	2.5
Parker	163	151	123	91	3.5	3.3	2.8	2.2	0.0019	0.0020	0.0024	0.0031	2.4	2.4	2.3	2.2
Chang	148	137	110	81	2.9	2.8	2.5	2.2	0.0008	0.0009	0.0011	0.0014	-	-	-	-
Kellerhals	103	95	77	58	4.3	4.0	3.4	2.7	0.0043	0.0045	0.0053	0.0067	7.4	7.3	7.0	6.6
AMAFCA	17	17	19	22	-	-	-	-	0.0245	0.0248	0.0260	0.0275	-	-	-	-
BUREC	55	52	45	36	14.7	13.9	11.9	9.6	0.0023	0.0026	0.0035	0.0055	8.3	8.0	7.3	6.4
Average	112	105	85	65	5.9	5.6	4.8	3.9	0.0051	0.0053	0.0059	0.0069	5.1	5.0	4.7	4.3
HEC-RAS Data	106	103	95	86	5.2	4.9	4.1	3.1	0.0276	0.0281	0.0295	0.0312	9.0	8.7	7.8	6.6
Expected Behavior	**Bank Erosion**	**Bank Erosion**	**Deposition**	**Deposition**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**
REACH F																
Bray - Equation #1	153	143	120	92	3.7	3.5	3.2	2.7	0.0024	0.0025	0.0028	0.0033	4.8	4.7	4.5	4.2
Bray - Equation #2	157	147	124	94	3.7	3.5	3.2	2.7	0.0019	0.0020	0.0022	0.0026	4.6	4.5	4.3	4.0
Hey	68	64	54	42	7.4	7.0	6.2	5.1	0.0033	0.0035	0.0040	0.0049	-	-	-	-
Ackers & Charlton (Channel Width) Lacey (Channel Velocity)	99	94	82	66	-	-	-	-	-	-	-	-	3.0	2.9	2.8	2.5
Parker	148	139	118	91	3.2	3.1	2.7	2.2	0.0021	0.0022	0.0025	0.0031	2.4	2.3	2.3	2.2
Chang	132	123	101	75	2.1	2.1	1.9	1.7	0.0009	0.0010	0.0011	0.0014	-	-	-	-
Kellerhals	93	88	74	58	4.0	3.8	3.3	2.7	0.0046	0.0048	0.0055	0.0067	7.2	7.2	6.9	6.6
AMAFCA	11	12	13	15	-	-	-	-	0.0208	0.0207	0.0211	0.0233	-	-	-	-
BUREC	43	41	36	29	11.4	11.0	9.7	7.9	0.0017	0.0018	0.0023	0.0034	8.8	8.5	7.9	7.2
Average	100	95	80	62	5.1	4.9	4.3	3.6	0.0047	0.0048	0.0052	0.0061	5.1	5.0	4.8	4.5
HEC-RAS Data	73	72	70	64	4.1	3.8	3.2	2.4	0.0230	0.0230	0.0237	0.0264	9.6	9.2	8.2	7.2
Expected Behavior	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Deposition**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**
REACH E																
Bray - Equation #1	206	191	153	111	4.5	4.3	3.7	3.0	0.0020	0.0021	0.0024	0.0029	5.2	5.1	4.8	4.4
Bray - Equation #2	212	197	158	114	4.5	4.3	3.7	3.0	0.0016	0.0017	0.0019	0.0023	5.0	4.9	4.6	4.2
Hey	90	83	68	50	9.2	8.7	7.4	5.9	0.0027	0.0028	0.0033	0.0042	-	-	-	-
Ackers & Charlton (Channel Width) Lacey (Channel Velocity)	126	119	99	77	-	-	-	-	-	-	-	-	3.3	3.2	3.0	2.7
Parker	197	183	148	109	4.1	3.8	3.2	2.5	0.0016	0.0017	0.0021	0.0026	2.5	2.5	2.4	2.3
Chang	163	149	116	81	3.1	3.0	2.7	2.3	0.0007	0.0008	0.0009	0.0012	-	-	-	-
Kellerhals	124	116	94	69	5.0	4.7	4.0	3.1	0.0037	0.0039	0.0046	0.0059	7.7	7.6	7.3	6.8
AMAFCA	8	8	9	10	-	-	-	-	0.0140	0.0141	0.0143	0.0149	-	-	-	-
BUREC	60	56	48	38	15.9	15.1	12.8	10.0	0.0015	0.0017	0.0023	0.0036	8.4	8.1	7.4	6.6
Average	132	123	99	73	6.6	6.3	5.4	4.3	0.0035	0.0036	0.0040	0.0047	5.3	5.2	4.9	4.5
HEC-RAS Data	73	72	70	64	4.1	3.8	3.2	2.4	0.0230	0.0230	0.0237	0.0264	9.6	9.2	8.2	7.2
Expected Behavior	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**

Table 18. Channel Geometry Regime Equation Results, cont.

Coldwater Canyon Wash Geomorphology Study																
Observed and Expected Channel Characteristics for Coldwater Canyon Wash																
Equation	**Channel Width (ft)**				**Flow Depth (ft)**				**Channel Slope (ft/ft)**				**Channel Velocity (ft/s)**			
	100Yr	**50Yr**	**10Yr**	**2Yr**	**100Yr**	**50Yr**	**10Yr**	**2Yr**	**100Yr**	**50Yr**	**10Yr**	**2Yr**	**100Yr**	**50Yr**	**10Yr**	**2Yr**
REACH D																
Bray - Equation #1	217	201	161	116	4.6	4.4	3.8	3.1	0.0019	0.0020	0.0023	0.0028	5.2	5.1	4.8	4.4
Bray - Equation #2	223	207	165	119	4.6	4.4	3.8	3.1	0.0015	0.0016	0.0018	0.0023	5.0	4.9	4.6	4.3
Hey	94	87	71	52	9.5	9.0	7.7	6.1	0.0025	0.0027	0.0032	0.0041	-	-	-	-
Ackers & Charlton (Channel Width) Lacey (Channel Velocity)	131	124	103	80	-	-	-	-	-	-	-	-	3.3	3.3	3.0	2.7
Parker	207	192	155	114	4.2	4.0	3.3	2.6	0.0016	0.0017	0.0020	0.0025	2.5	2.5	2.4	2.3
Chang	221	202	159	112	2.0	1.9	1.8	1.6	0.0007	0.0007	0.0009	0.0011	-	-	-	-
Kellerhals	130	121	98	72	5.2	4.9	4.1	3.2	0.0035	0.0037	0.0044	0.0056	7.8	7.6	7.3	6.9
AMAFCA	9	10	11	13	-	-	-	-	0.0284	0.0293	0.0319	0.0364	-	-	-	-
BUREC	58	55	46	37	15.5	14.6	12.4	9.8	0.0015	0.0017	0.0023	0.0037	9.5	9.2	8.5	7.5
Average	143	133	108	79	6.5	6.2	5.3	4.2	0.0052	0.0054	0.0061	0.0073	5.6	5.5	5.1	4.7
HEC-RAS Data	73	72	70	64	4.1	3.8	3.2	2.4	0.0230	0.0230	0.0237	0.0264	9.6	9.2	8.2	7.2
Expected Behavior	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**
REACH C																
Bray - Equation #1	217	201	161	116	4.6	4.4	3.8	3.1	0.0019	0.0020	0.0023	0.0028	5.2	5.1	4.8	4.4
Bray - Equation #2	223	207	165	119	4.6	4.4	3.8	3.1	0.0015	0.0016	0.0018	0.0023	5.0	4.9	4.6	4.3
Hey	94	87	71	52	9.5	9.0	7.7	6.1	0.0025	0.0027	0.0032	0.0041	-	-	-	-
Ackers & Charlton (Channel Width) Lacey (Channel Velocity)	131	124	103	80	-	-	-	-	-	-	-	-	3.3	3.3	3.0	2.7
Parker	207	192	155	114	4.2	4.0	3.3	2.6	0.0016	0.0017	0.0020	0.0025	2.5	2.5	2.4	2.3
Chang	196	178	135	92	2.4	2.4	2.2	2.0	0.0007	0.0007	0.0009	0.0011	-	-	-	-
Kellerhals	130	121	98	72	5.2	4.9	4.1	3.2	0.0035	0.0037	0.0044	0.0056	7.8	7.6	7.3	6.9
AMAFCA	11	11	11	12	-	-	-	-	0.0189	0.0190	0.0183	0.0181	-	-	-	-
BUREC	61	58	50	40	16.4	15.6	13.4	10.7	0.0020	0.0022	0.0030	0.0048	8.5	8.2	7.1	6.1
Average	141	131	106	77	6.7	6.4	5.5	4.4	0.0041	0.0042	0.0045	0.0052	5.4	5.3	4.9	4.4
HEC-RAS Data	73	72	70	64	4.1	3.8	3.2	2.4	0.0230	0.0230	0.0237	0.0264	9.6	9.2	8.2	7.2
Expected Behavior	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**

Table 18. Channel Geometry Regime Equation Results, cont.

Coldwater Canyon Wash Geomorphology Study																
Observed and Expected Channel Characteristics for Coldwater Canyon Wash																
REACH B																
Bray - Equation #1	217	201	161	116	4.6	4.4	3.8	3.1	0.0019	0.0020	0.0023	0.0028	5.2	5.1	4.8	4.4
Bray - Equation #2	223	207	165	119	4.6	4.4	3.8	3.1	0.0015	0.0016	0.0018	0.0023	5.0	4.9	4.6	4.3
Hey	94	87	71	52	9.5	9.0	7.7	6.1	0.0025	0.0027	0.0032	0.0041	-	-	-	-
Ackers & Charlton (Channel Width) Lacey (Channel Velocity)	131	124	103	80	-	-	-	-	-	-	-	-	3.3	3.3	3.0	2.7
Parker	207	192	155	114	4.2	4.0	3.3	2.6	0.0016	0.0017	0.0020	0.0025	2.5	2.5	2.4	2.3
Chang	194	178	138	97	2.6	2.5	2.3	2.0	0.0007	0.0007	0.0009	0.0011	-	-	-	-
Kellerhals	130	121	98	72	5.2	4.9	4.1	3.2	0.0035	0.0037	0.0044	0.0056	7.8	7.6	7.3	6.9
AMAFCA	10	10	11	12	-	-	-	-	0.0216	0.0220	0.0219	0.0236	-	-	-	-
BUREC	65	62	53	41	17.5	16.5	14.1	11.0	0.0015	0.0017	0.0024	0.0038	7.6	7.3	6.6	5.8
Average	141	131	106	78	6.9	6.5	5.6	4.4	0.0044	0.0045	0.0049	0.0057	5.3	5.1	4.8	4.4
HEC-RAS Data	73	72	70	64	4.1	3.8	3.2	2.4	0.0230	0.0230	0.0237	0.0264	9.6	9.2	8.2	7.2
Expected Behavior	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**
REACH A																
Bray - Equation #1	178	171	149	115	4.1	4.0	3.6	3.1	0.0022	0.0022	0.0024	0.0029	5.0	4.9	4.7	4.4
Bray - Equation #2	210	201	175	135	4.3	4.2	3.8	3.2	0.0006	0.0006	0.0006	0.0007	4.0	3.9	3.8	3.5
Hey	78	75	66	52	11.2	10.9	9.8	8.2	0.0005	0.0005	0.0005	0.0006	-	-	-	-
Ackers & Charlton (Channel Width) Lacey (Channel Velocity)	112	109	97	79	-	-	-	-	-	-	-	-	3.1	3.1	3.0	2.7
Parker	276	266	233	183	3.9	3.8	3.4	2.8	0.0003	0.0003	0.0003	0.0004	3.7	3.6	3.6	3.4
Chang	288	270	225	166	0.0	0.1	0.3	0.4	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Kellerhals	108	104	91	71	5.5	5.4	4.8	4.0	0.0008	0.0008	0.0009	0.0011	6.0	5.9	5.8	5.5
AMAFCA	7	7	7	8	-	-	-	-	0.0128	0.0118	0.0113	0.0115	-	-	-	-
BUREC	53	52	47	39	14.1	13.8	12.6	10.5	0.0003	0.0003	0.0004	0.0006	7.8	7.5	7.0	6.2
Average	146	140	121	94	6.2	6.0	5.5	4.6	0.0022	0.0021	0.0021	0.0022	4.9	4.8	4.6	4.3
HEC-RAS Data	73	72	70	64	4.1	3.8	3.2	2.4	0.0230	0.0230	0.0237	0.0264	9.6	9.2	8.2	7.2
Expected Behavior	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Bank Erosion**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**	**Scour**

6.4 STABLE BANK SLOPE

A stable bank analysis was performed to assess future bank erosion resulting from the geomorphic processes associated with establishing a vertical and lateral equilibrium. This analysis assumes that lateral erosion at the toe of the bank slope would not change moving forward, and that the bank slope extending upward from the toe erodes to form a stable slope. The results of this analysis provided lateral movement at the top of the bank relative to the existing top of bank. Existing bank slopes were determined by delineating the top and toe of both the right and left bank. Thereafter, stable bank slopes were projected from the toe of the banks. Stable bank slopes for coarse, non-cohesive material was bounded between bank slopes of 1.73:1 and 3.08:1 (Wolman and Brush, 1961). This range was based on an experimental study to evaluate channel morphology in coarse sand system, and is the result of many scenarios in which particle size, discharge, and longitudinal slope were varied. It was also stated in this study that particle shape can greatly affect the bank slope, both the upper and lower range stated in this study for average bank slope was used in this study.

The results indicate that the both the left and right banks are over-steepened and are likely to laterally erode with time, relative to the current top of bank. The steeper slope results (SS = 1.7:1) indicate several zones of likely bank retreat. The most prominent location is a 400’ vertical cut-bank that currently extends upstream from the Squaw Mountain Bridge along the left bank. The results from this analysis suggest future surficial lateral erosion distances between 20 and 60 feet as the cut bank erodes to a stable state. Other specific locations of possible bank retreat include just upstream of the Rinker plant, as well as the reach downstream of Dawson Canyon Road to Temescal Canyon Wash. Taking into consideration the results of both upper and lower limits of lateral movement, the most lateral movement is expected to be between just upstream of Squaw Mountain Road to I-15, just upstream of the Rinker plant, and downstream of Dawson Canyon Road. While the results do indicate possible lateral movement in the reach bounded by the proposed City of Corona infiltration basins, it is less certain that these banks will respond naturally, as these basins and banks are anthropogenic in origin.

From an adjacent development perspective, total bank retreat will be the sum of lateral movement at the toe of bank and application of a stable bank slope; the above analysis indicates that without additional movement at the toe of slope, expansion of the top of bank is anticipated.

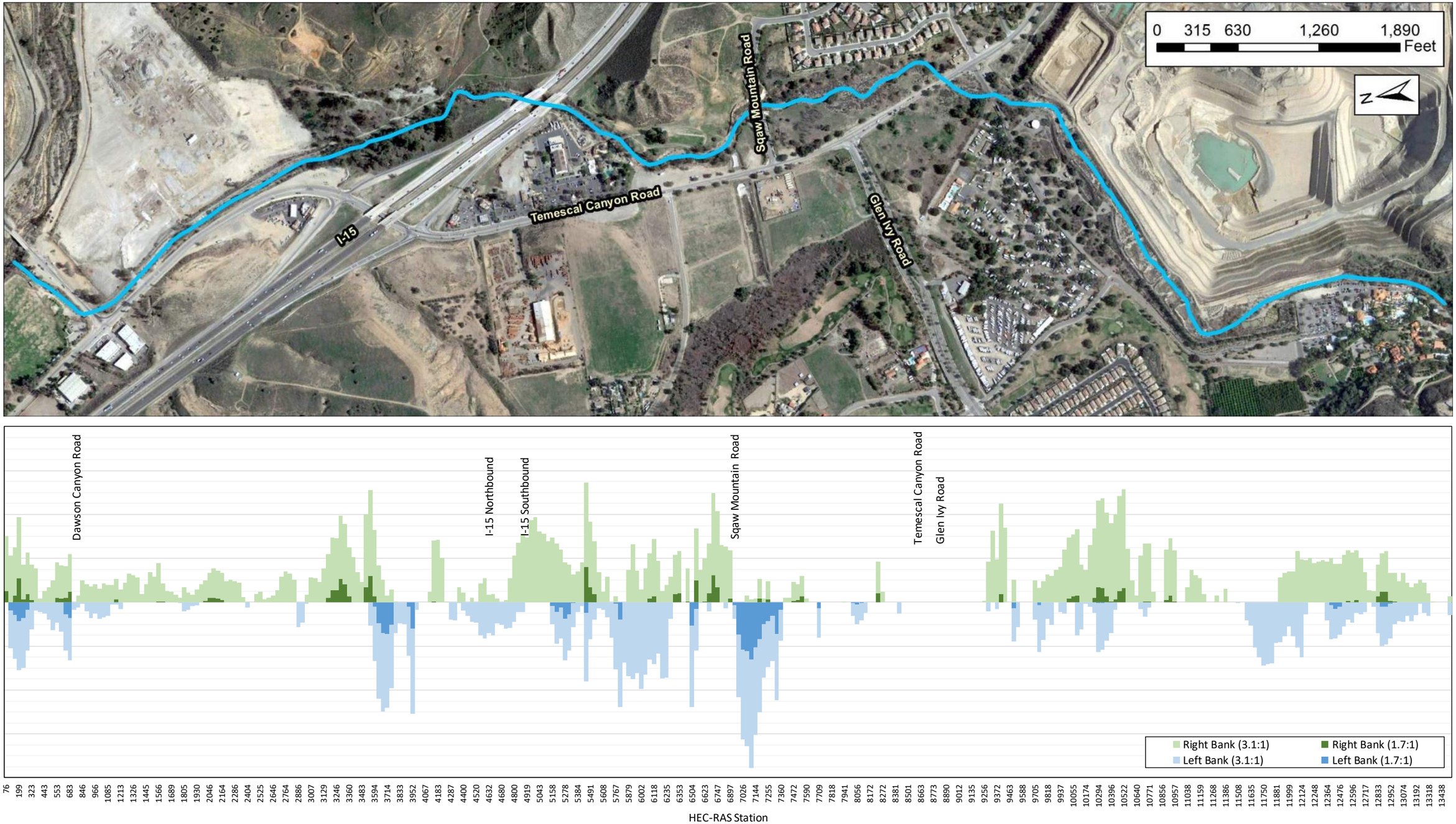


Figure 40. Stable Slope Projection

6.5 Erosion Resistance Assessment

The erosion resistance assessment is intended to assess the resistance to hydraulically induced erosion within the channel system.

6.5.1 Vertical Erosion

Vertical erosion was assessed using several methods. Equilibrium slope assessment was conducted with HEC-RAS long-duration simulation and with general reach-based equilibrium slope calculations. While HEC-RAS sediment transport modeling considered armor layer formation, it does not explicitly present the absolute depth to armor. Due to the presence of well sorted alluvium in the channel bed material, likely a result of the historical alluvial fan in the project reach, armoring was investigated as a potential vertical erosion limiting process. Depth to Armor calculations were performed following guidance in the Bureau of Reclamations "Computing Degradation and Local Scour" (Pemberton and Lara, 1984). Based upon BOR guidance and the sediment transport function selected in **Section 5.1.2.2**, armoring D_{50} calculations were performed with the Yang Equation and results from HEC-RAS steady-flow modeling (See **Section 5.1.1**). Per **Section 7.1**, the 2-year discharge was selected as the "dominant discharge" for the channel system and has been used as the comparative base for depth to armor calculations. Additionally, the HEC-RAS results for the December 2010 event were considered as a calibration data point as bounding topographic datasets were available for this event and it is the most recent, substantial event for which topographic data is available.

Armoring particle size analysis for the 2010 event correlate well with the armor layer results observed in the field and can be seen in **Figure 41**. Note that the calculations determine the minimum D_{50} necessary to support armoring for the given event, but the D50 of the material present is determined by historical events which deposited the non-transported sediment; as such, observed points should be larger than calculated sizes. Due to cross-sectional fluctuations in HEC-RAS modeling, a moving average of results is also depicted to mitigate extreme fluctuations associated with a single cross-section (such as near a vertical transition).

Depth to armor analysis was calculated by estimating the required armor layer thickness as 3 times the required armor layer D_{50}. With this information, the depth to armor was calculated by determining how much sediment must be removed at a given cross-section to leave only the armor layer of the indicated thickness. Existing armor layer depths were estimated equal to the D_{90} size of the material comprising the armor layer which appeared reasonable based upon field observations. In areas where a surficial armor layer has already developed, a composite method was used to calculate contributions to armoring for each layer. Depth to armor results in excess of 100 vertical feet were considered unreasonable and removed from the analysis; these results are typically the result of transitional data within HEC-RAS and are created by extremely high velocities in the model.

For the 2010 event, **Figure 42** indicates that the area between Temescal Canyon Road and the Squaw Mountain Road bridge has generally achieved armor depth; variation shown adjacent to Tom's Farms is a result of excavation of bed material within the channel between topographic collection dates.

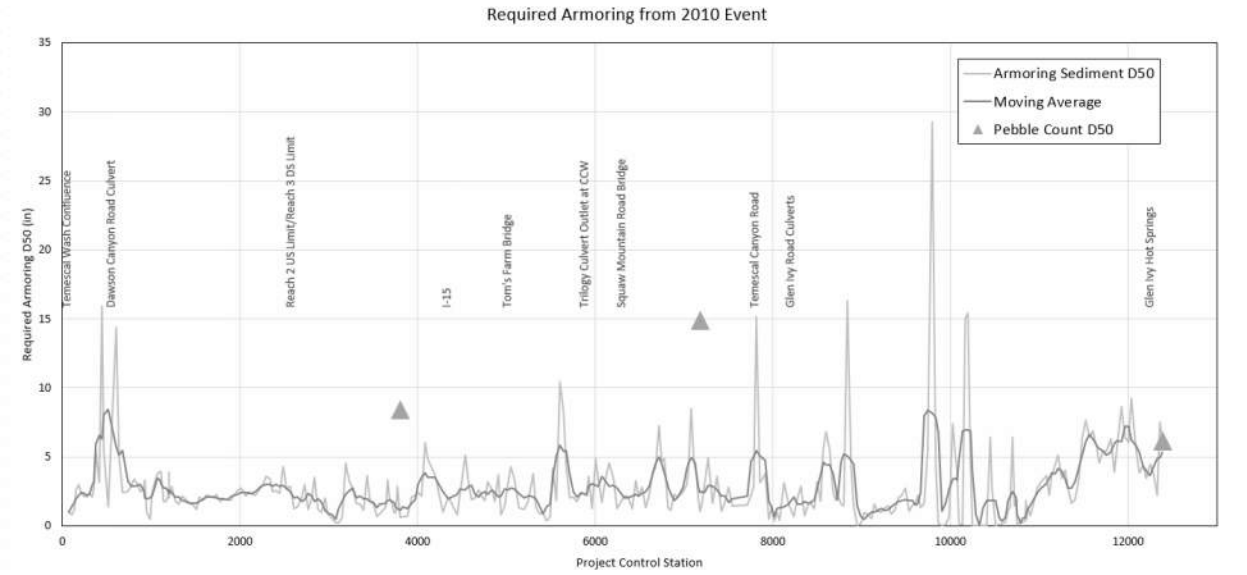


Figure 41. Required Armoring Size for 2010 Event

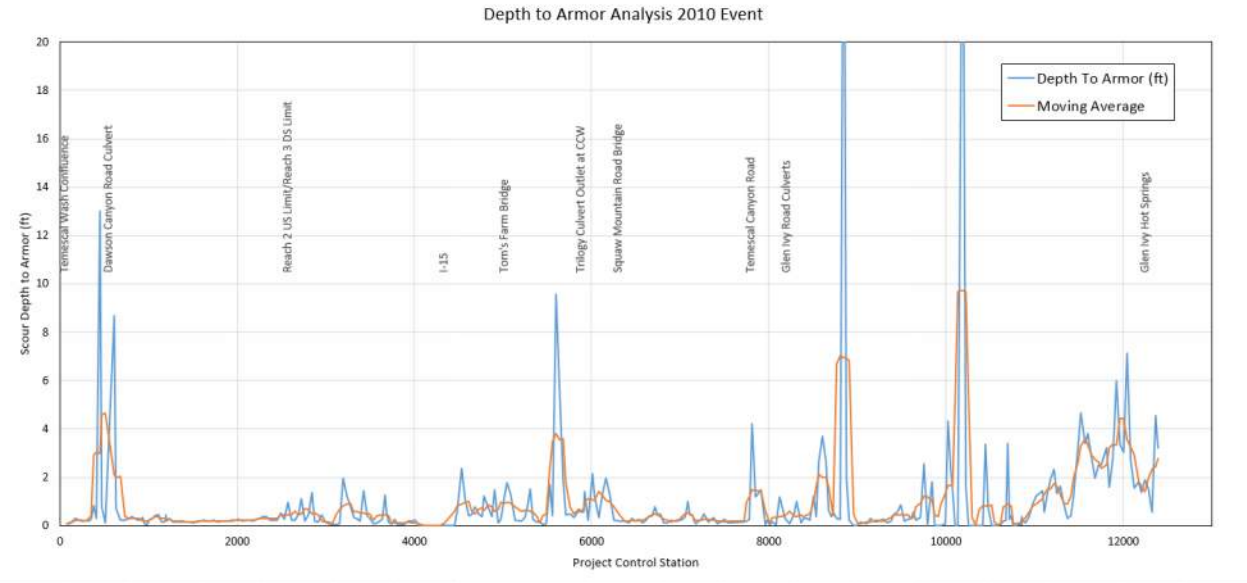


Figure 42. Depth to Armor for 2010 Event

Analysis of additional flow events suggests that CCW will continue a vertical scouring trend under larger magnitude flows as the nascent armoring layer currently present is not sufficient to prevent sediment transport for higher regime flows than experienced in 2010. **Figure 43** shows the calculated depth to armor for additional flow events relative to the 2010 event depth to armor. Values less than 100% are due to disallowed "spike" values of greater than 100 feet for depth to armor calculations.

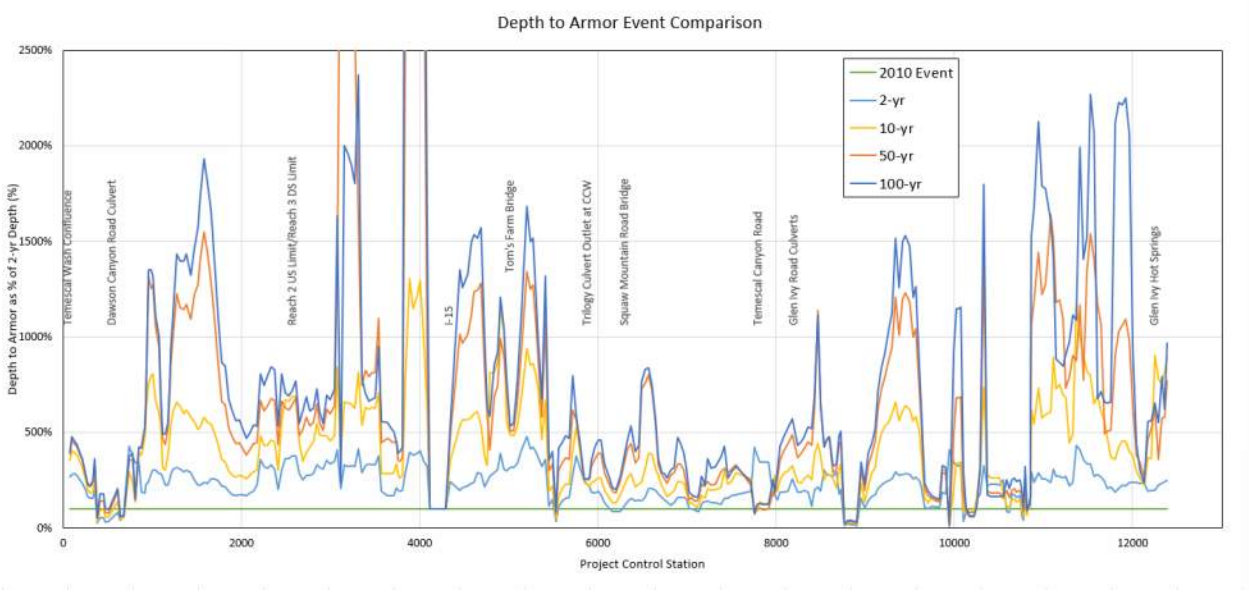
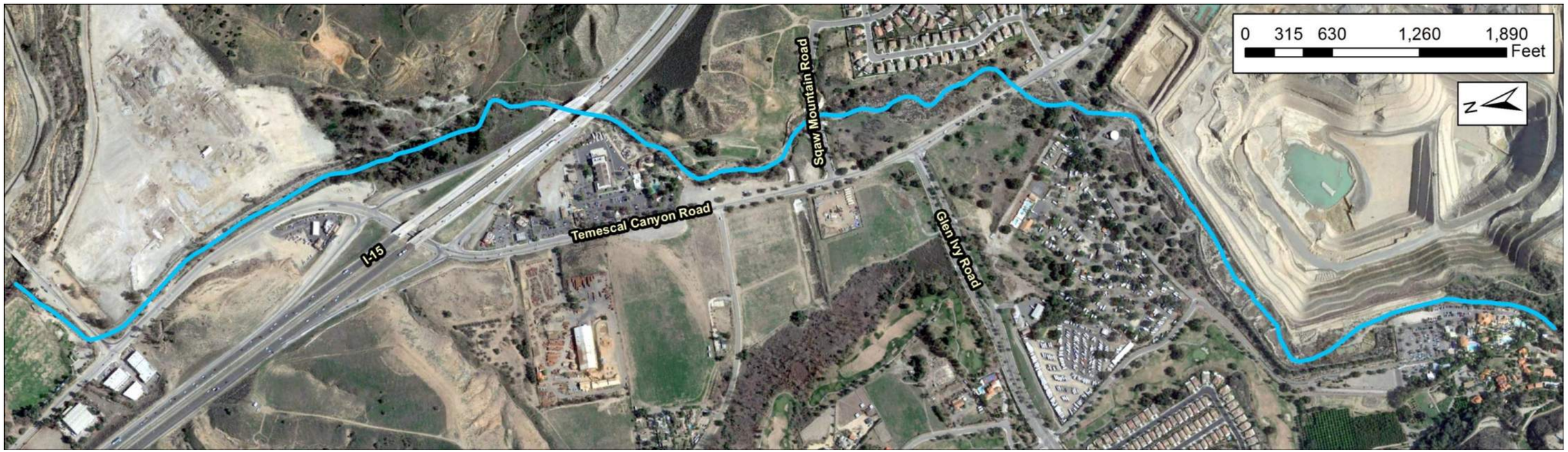


Figure 43. Depth to Armor for Specified Flow Recurrences as a % of 2010 Event Depth to Armor

6.5.2 Lateral Erosion

The Bank Erosion Hazard Index (BEHI) was developed to assess stream bank erosion condition and potential (Rosgen, 2001). It assigns point values to several aspects of bank condition, and it provides an overall score that can be used to qualitatively assess stream bank condition as well as identify zones of future bank erosion. The modified BEHI approach was used in the present analysis, as it omits the bank full indicators, which are difficult to identify in incised ephemeral washes. Four metrics are regarding stream bank condition are used: Ratio of root depth to bank height, root density, bank angle, and surface protection. The root depth and density factors were estimated based on the observed vegetation lining the banks. The surface protection factor was estimated in a similar manner, with attention also placed on other material that serves to provide bank protection (e.g., fallen limbs). The bank angle was measured using the 2015 topographic dataset provided by the RCFCWCD. Values for all four BEHI factors were assigned to each HEC-RAS cross-section.

The results, highlighted below on **Figure 44**, indicate that the entirety of the study area along Coldwater Canyon Wash exhibits moderate to very high potential for further bank erosion. The reaches of greatest potential include the infiltration basins adjacent to Chandler Aggregates, the segment between Squaw Mountain Road and I-15, the left bank just downstream of I-15, and approximately 800 feet upstream of Dawson Canyon Road downstream to Temescal Canyon Wash. The primary contributing factors to the high erosion potential, per the BEHI method, are the lack of vegetation along the channel banks. These results also indicate that the most stable banks are found adjacent to the Glen Ivy Hot Springs and the relatively undeveloped reach downstream of I-15.



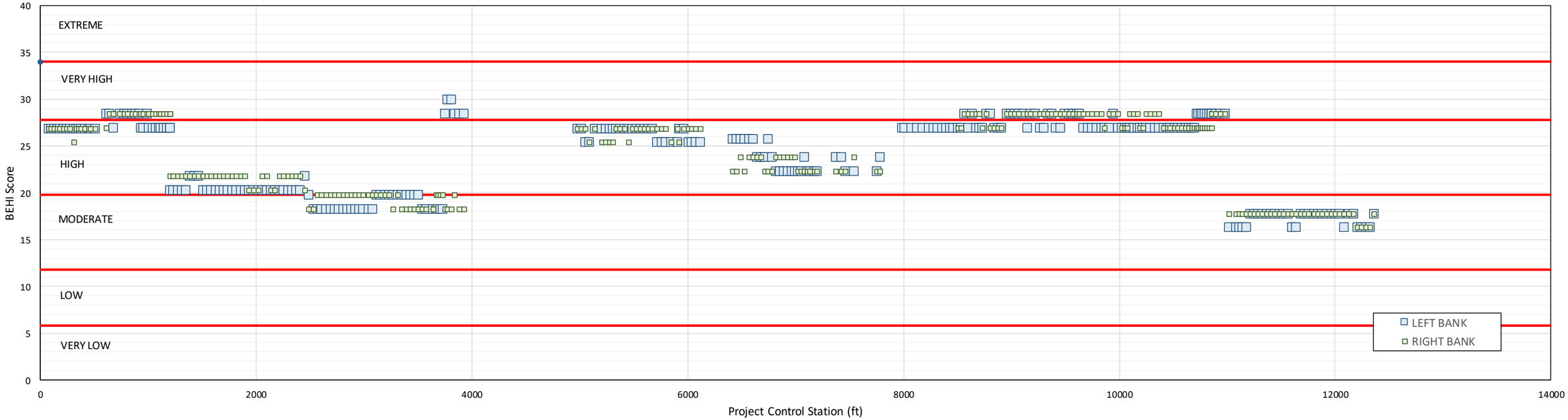


Figure 44. Bank Erosivity Hazard Index Results.

6.6 FLOOD HAZARD ZONES

Based upon the results in Sections 6.1 - 6.5, an estimate of the erosion hazard in the vicinity of CCW was made. Areas of likely erosion hazard are identified as being within an flood hazard zone (FHZ). A figure detailing erosion hazard boundaries may be found in **Appendix B**.

For CCW, FHZ boundaries are developed through a composite of the following analyses:

1. Riverine flooding inundation,
2. Historic channel sinuosity,
3. Stable bank slopes,
4. Bank erodibility, and
5. Geomorphically stable channel width.

While inundation results were used to develop the FHZ limits, the FHZ represents a different type of hazard mapping. Unlike floodplains which are associated with a specific storm event and return interval (e.g. 100-year floodplain), FHZs represent the probable erosion and flood hazard based upon overall geomorphic setting and are not associated with a specific or singular storm event. Additionally, the FHZ is associated with the CCW channel; additional offsite flooding sources may warrant consideration for areas outside of the CCW FHZ.

Flood hazard zones are acceptable as planning level and regulatory tools for erosion hazards and have been utilized by multiple counties in the Southwestern United States. Further assessment of the hazard zone may be considered should there be any significant manmade changes in the future including construction of bank protection or channel realignments.

As discussed in Section 5.2.1.3, adjacent to Glen Ivy Hot Springs, CCW has marginal capacity for the 100-year flow with several breakout points along the perimeter of the Hot Springs identified in the HEC-RAS modeling. Due to the distributed nature of these breakout locations and the potential for breakout flows to travel down Glen Ivy Road and exit the CCW corridor, the DWR flood awareness limits were utilized to capture the flood hazard extents from the upstream limit of study to the downstream limit of the Glen Ivy Hot Springs parking lot.

For this analysis, the Squaw Mountain Road bridge is assumed to be a lateral “hard point” with lasting resistance to lateral migration. Judgement in this regard is based upon the historical lateral stability of the crossing location based upon historical aerial imagery coupled with the current and pending engineered bank protection in the vicinity of the bridge. Vertical degradation of the channel downstream of the bridge poses a potential hazard, however mitigation has been assumed due to proposed improvements associated with potential transfer of the bridge to Riverside County.

Temescal Canyon Road and adjacent property between Squaw Mountain Road bridge and Glen Ivy Road are subject to broadly distributed, shallow flooding. Due to the distributed, shallow nature of this flooding, it has not been included in the FHZ as the hazard is not as acute as that of the riverine hazards associated with the CCW. Development in these areas should still account for the presence of these flow hazards.

At I-15, the Caltrans bridges are subject to a similar assumption of lateral stability, but lateral stability is assumed due to the ongoing maintenance and placement of engineered bank protection rather than a

static location in historical aerial imagery. Bank erosion has been observed at the right upstream edge of bank protection at I-15, but this erosion has yet to manifest as a critical threat to the bridge structures.

Immediately adjacent and upstream of the former Rinker plant, the channel has been realigned through development from its historic flow path. Along the left bank, adjacent to Temescal Canyon Road, FHZ limits are based upon potential for geomorphically appropriate widening and bank slope while the right bank is defined by historic channel alignments. This results in a very broad FHZ boundary.

A historical confluence point to the north of the historical Rinker plant extends the FHZ limit near Temescal Wash to the north. The former Rinker plant site is located within the limits of historical confluence points between Temescal Wash and CCW which contributes to the broad FHZ limits in the vicinity.

Flood hazard zone boundaries have little meaning near the Chandler Aggregates pit due to the ongoing nature and scale of the aggregate extraction there. Historic bank limits and present top-of-pit contours form the primary basis of FHZ delineation in this area.

6.7 Sediment Volume Comparisons

Between 2009 and 2015, only one major flow event was observed in Coldwater Canyon Wash. As the only substantial flow event between two aerial topography datasets, analyses were conducted to evaluate the reasonableness of project sediment transport modeling calibration and evaluate single-event channel changes in the context of the aerial topography datasets.

Earthwork quantities between the two topographic datasets were calculated using Bentley InRoads software by cutting cross-sections at 50 foot intervals along the length of CCW covered by both topographic datasets and volumes subsequently calculated using the end-area method. Due to extent limitations in the 2009 dataset, the comparative analysis extends from approximately 800 feet upstream of I-15 to Glen Ivy Hot Springs (Reaches 5-8). Cross-section lateral limits were established based upon the top of bank limits identified during Phase I of this study; bank limits for the 2009 and 2015 datasets were spatially unioned to create a composite boundary. Due to this method, results near Station 11000 are artificially high due to apparent bank construction activity associated with the Chandler Aggregates pit. Additionally, results from station 5500 to 6500 appear to have been biased by human activity in the wash which altered the channel geometry. **Figure 45** shows the observed/calculated cut and fill trends across the wash.

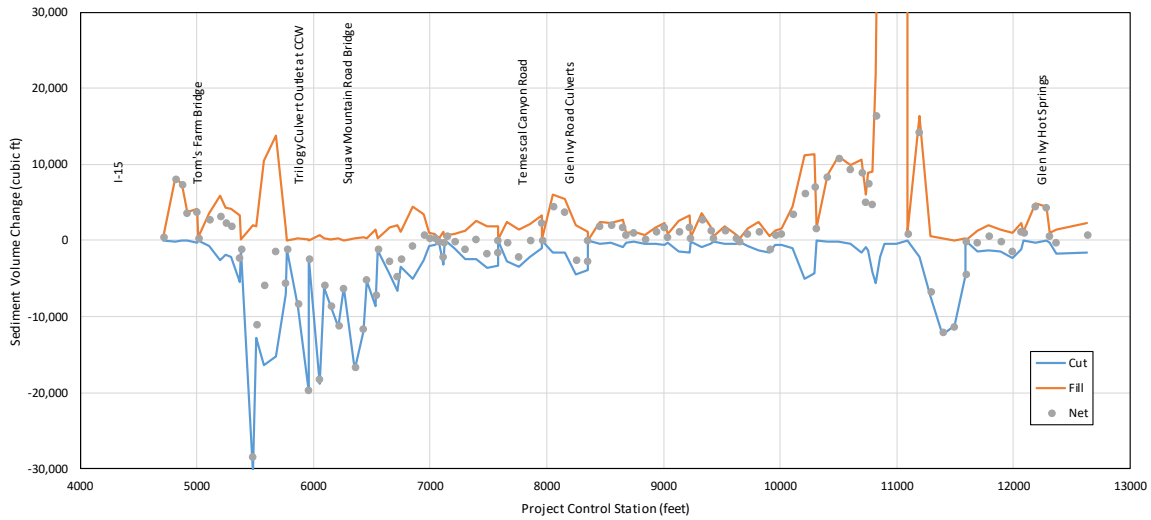


Figure 45. Volume Change between 2009 and 2015 along CCW (vertical extents limited to show detail where results are valid)

Comparing observed volumes to volumes calculated in HEC-RAS for the 2010 storm yielded mixed results per **Figure 46**. Multiple sources of error are possible within the HEC-RAS and topographic datasets, although the most significant factor is likely the error in the underlying data. In **Figure 31**, the calculated change in channel invert from HEC-RAS is largely within the error bars associated with the change in channel invert between the two topographic datasets. As such, HEC-RAS transport rates could not be directly verified with the available topographic data, but invert change magnitudes were well correlated.

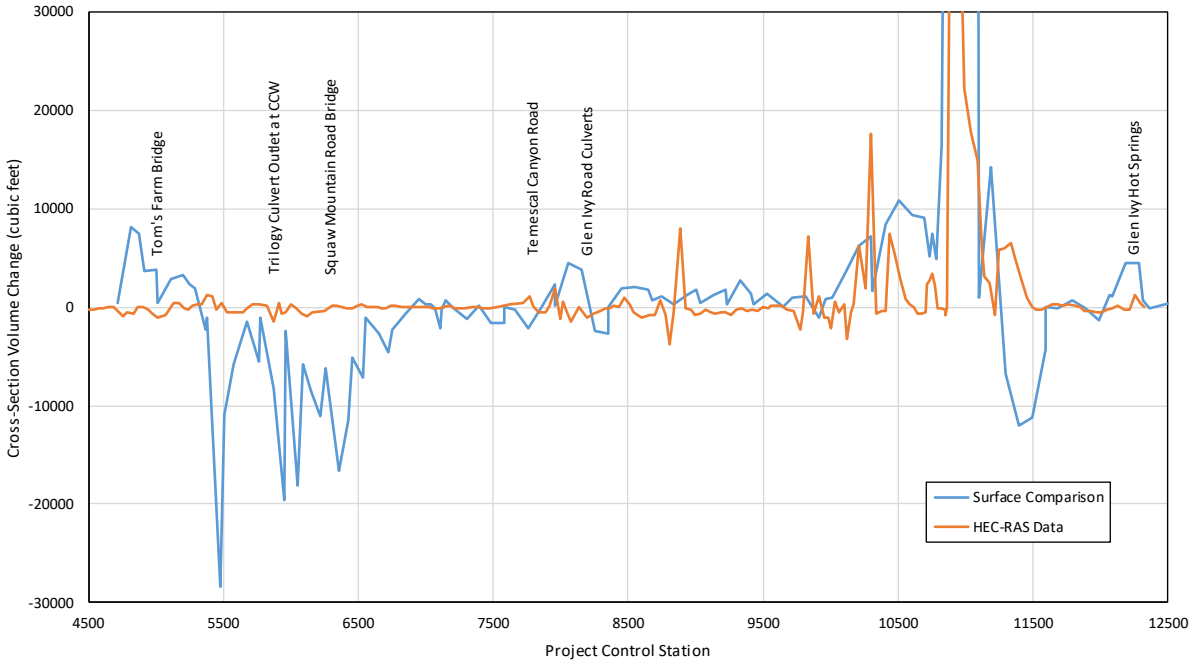


Figure 46. HEC-RAS Volume Change vs Observed Volume Change (vertical extents limited to show detail where results are valid)

6.8 Sediment Continuity

Sediment transport modeling was performed to assess the response of the channel to future hydrologic events. Both a singular large event as well as a series of smaller events were simulated, and the results are discussed in detail in this section.

6.8.1 Channel Response to Large Events

A single 100-year hydrograph was analyzed in the HEC-RAS model to quantify the response to high magnitude events. Both the invert change and sediment throughput are displayed below in **Figure 47**.

The channel invert change largely follows the same trend as seen in lower recurrence intervals (**Figure 27**) regarding patterns of scour and deposition. The overall magnitude of bed change is only marginally higher for the 100-year event. The sediment generated at the upstream boundary is substantially higher for the 100-year event (25,000 ton vs. 13,000 ton – 10-year). All recurrence intervals display a highly depositional trend throughout the infiltration basins which transitions into a fairly stable reach, and then a slightly degradational reach downstream of Squaw Mountain Road to Temescal Wash. The 100-year upstream depositional trend, however, extends just downstream Temescal Canyon Road, whereas lower recurrence intervals appear to have deposited most excess sediment approximately 2,000 feet upstream of Temescal Canyon Road. This finding suggests that large events would lead to significant sediment deposition at Glen Ivy road as well as at the intersection of Temescal Canyon Road and Glen Ivy Road.

Between Squaw Mountain Road and Temescal Canyon Road the vertical movement nearly mirrors the pattern seen in lower magnitude events. This suggests that the existing armor layer could withstand a single large event without significant vertical scour in this region. Continuing downstream the model results exhibit roughly the same pattern as seen in the 2- and 10-year results.

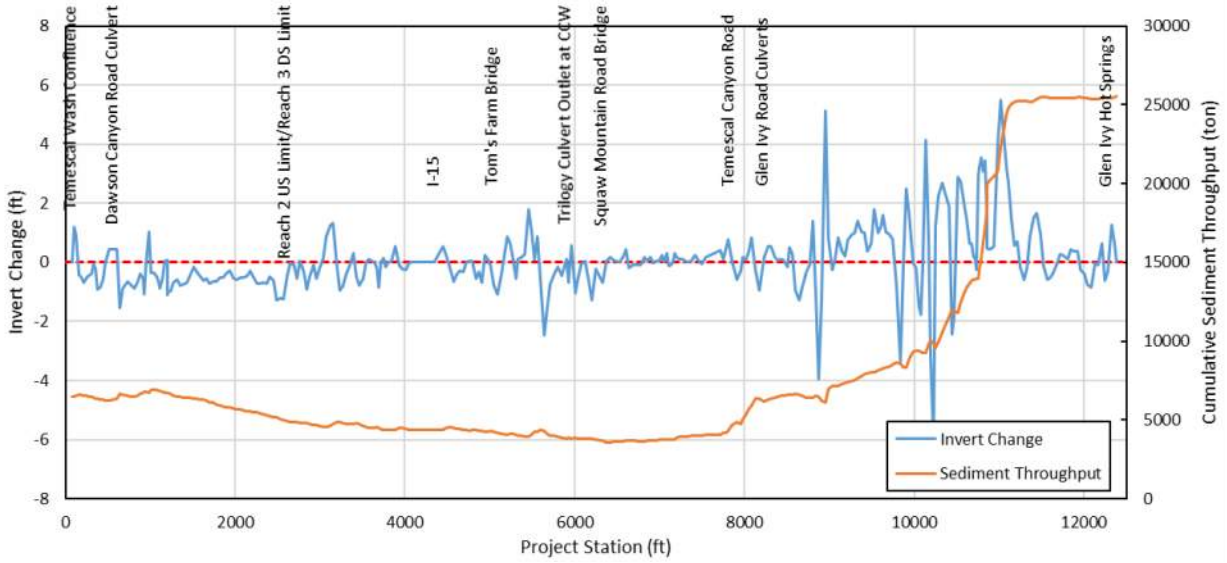


Figure 47. 100-Year Sediment Transport Results.

6.8.2 Long-term Channel Response

A series of events spanning a 50 year period were imposed in the HEC-RAS model in order to estimate a time frame in which expected results may occur. The sequence of hydrologic events represent a statistically probable series of 2-year through 50-year events, and the ordering of each event was randomized. **Figure 19** depicts the hydrograph used for this analysis.

The invert change for the 50 year modeling period is shown below in **Figure 48**. Significant deposition occurs within the infiltration basins, and based on the degree to which the invert rises it is possible that these basins would be filled in with sediment. The effect of the reduction in sediment can be seen through the two immediate zones of localized scour downstream. Thereafter the bed is relatively stable downstream to Squaw Mountain Road. An immediate zone of scouring occurs extending approximately 1,200 feet downstream. This abrupt change results from the specification of the armor layer upon initialization of HEC-RAS. The armor layer that was measured and used in HEC-RAS appears to be robust enough to withstand a long period of subsequent storm events. If this layer were not initially there then continued degradation in excess of 5 feet would likely occur, as evidenced in the plot below. The channel is mostly stable downstream from here until the next change in sediment gradation, which occurs around project station 2800. A linear invert change with respect to station can be seen, which is indicative of formation of an equilibrium slope in the reach.

The results from this analysis also highlighted the natural armoring process that occurs in CCW. **Figure 49** below depicts the D_{50} of the cover layer and the end of the 50 year simulation. Several zones of armoring were noted (circled in red), where the D_{50} approached the measured value in the existing armor layer. This finding substantiates the fact that armoring is an ongoing process in this wash, and it will serve to limit the amount of vertical degradation that can occur.

This result is not meant to be taken as a direct measure of what will happen over the next 50 years, as a series of both assumptions and model limitations are present in this analysis.

It is likely that the berms separating the infiltration basin cells would fail in time, as they appear to not be substantially reinforced, and breaching of these cells has already occurred. The mechanics surrounding the breaching of these berms falls outside the limitations of one dimensional sediment transport modeling, therefore it was assumed that these berms are fixed, and channel changes can only occur in the vertical direction.

Further, as mentioned earlier in this report, the field investigation revealed the presence of armoring, however this armor layer was not laterally consistent, and was focused in areas of noted, recent incision. Therefore, while the channel invert change may be dampened by the specified armor layer additional scouring would occur at more perched areas in the channel where armoring had not already occurred. Lastly, this analysis is highly sensitive to changes in sediment gradation, both in cover layer gradation as well as subsurface gradation. Therefore, conservative approaches should be taken when considering any design criteria.

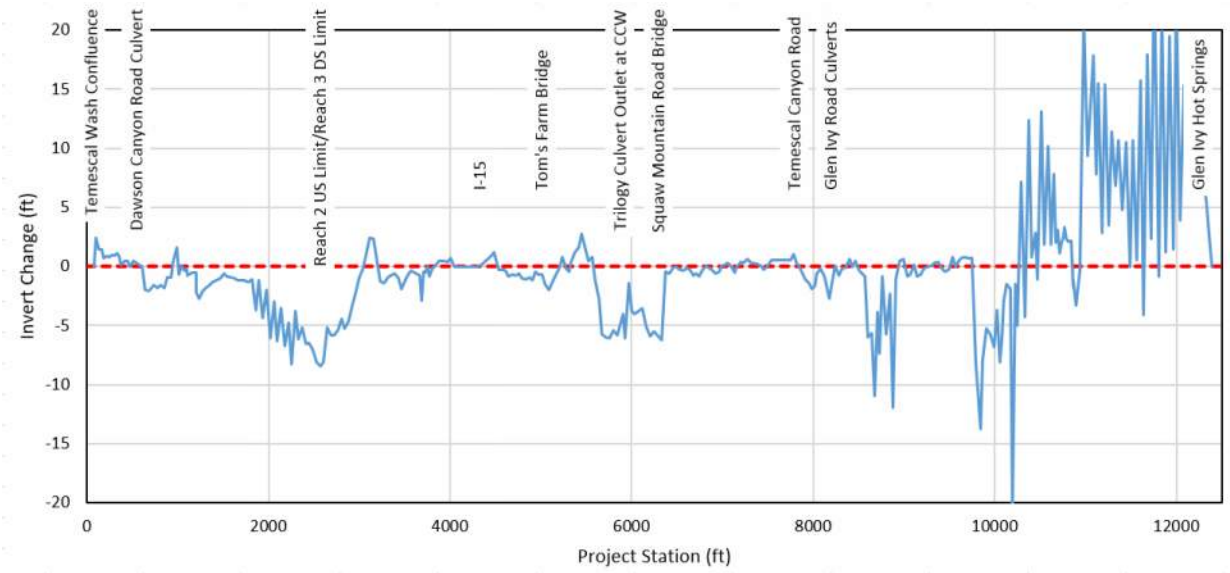


Figure 48. 50 Year Sequence Invert Change.

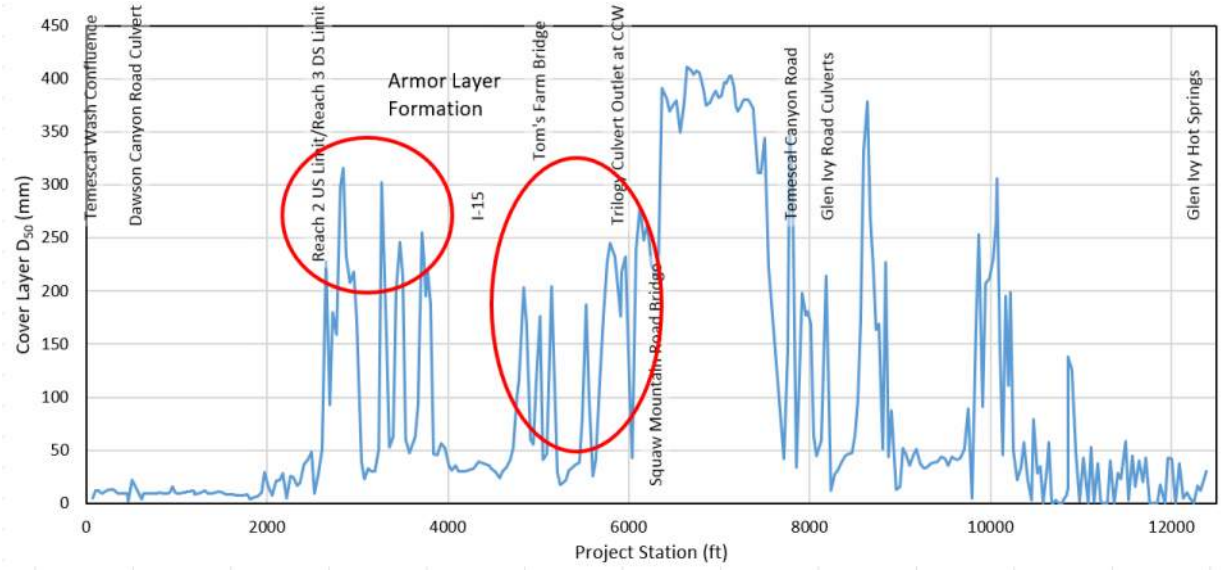
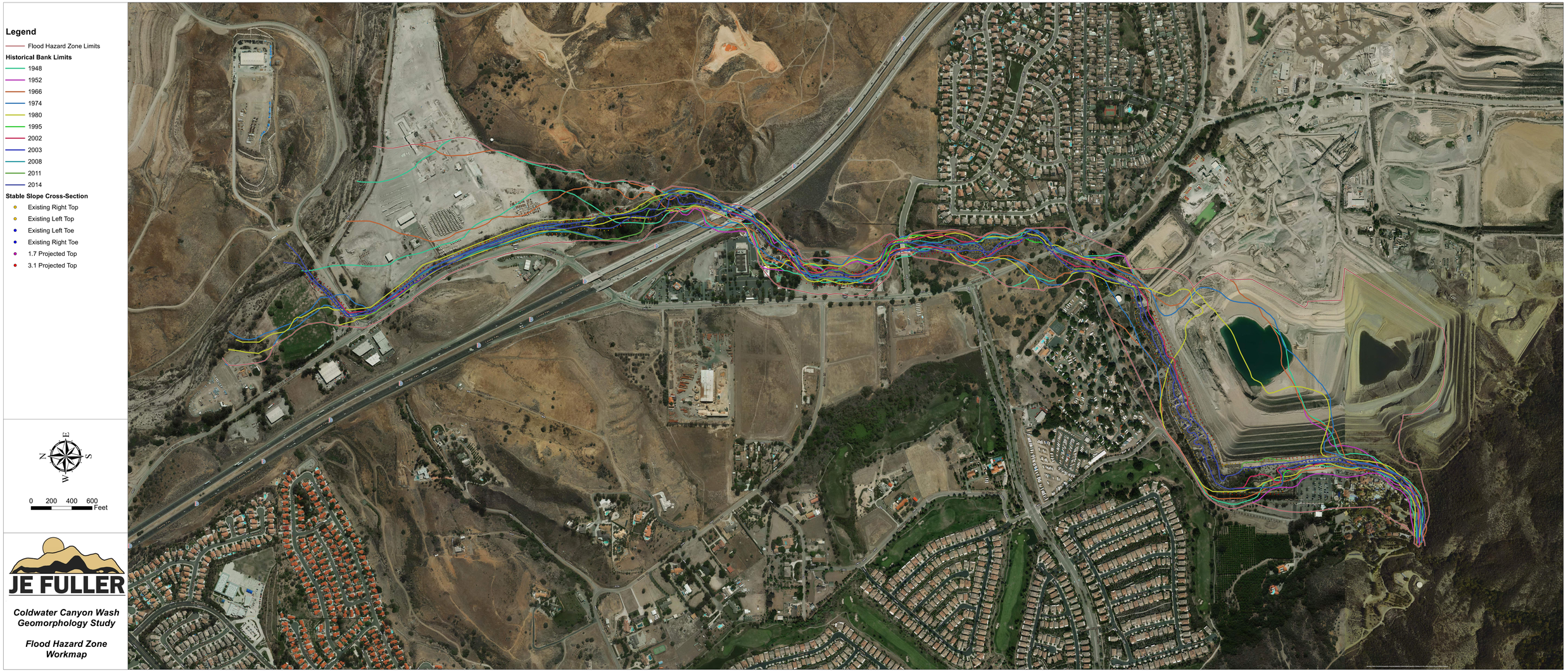


Figure 49. 50 Year Sequence Cover Layer D_{50}.


Legend
Flood Hazard Zone Limits
Historical Bank Limits
1948
1952
1966
1974
1980
1995
2002
2003
2008
2011
2014
Stable Slope Cross-Section
Existing Right Top
Existing Left Top
Existing Left Toe
Existing Right Toe
1.7 Projected Top
3.1 Projected Top
N
E
S
W
0 200 400 600
Feet
JE FULLER
Coldwater Canyon Wash
Geomorphology Study
Flood Hazard Zone
Workmap

Coldwater Canyon Wash Geomorphology Study

Task 4 – Recommended Management Measures



REGISTERED PROFESSIONAL ENGINEER
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EXP 6/30/2019
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STATE OF CALIFORNIA

10-25-18

October 2018

prepared for |

Riverside County Flood Control and Water Conservation District

JE FULLER

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Table of Contents

1 Introduction 4
1.1 Study Limits 4
1.2 Task Objectives 4
1.3 Reach Descriptions 4
1.4 Project Stationing 5
2 Geomorphic Assessment Review 8
2.1 Historical Overview 8
2.2 Task 1 Review 10
2.3 Task 2 Review 11
2.4 Task 3 Review 11
3 Improvement Periods 12
3.1 Near-Term 12
3.2 Pre-Pit Capture 13
3.3 Post-Pit Capture 14
4 CCW Corridor Management Activities 16
4.1 Proposed Public Agency Activities in the CCW Corridor 16
4.1.1 City of Corona Infiltration Basins 16
4.1.2 Riverside County Transportation Culvert at Temescal Canyon Road 16
4.1.3 RCFCWCD Basin 16
4.1.4 Squaw Mountain Road Bridge Scour Retrofit 16
4.1.5 Additional Monitoring and Maintenance 17
4.2 Proposed Private Development Activity 17
4.2.1 Reaches 1, 2, and 3: North of I-15 to Temescal Wash 17
4.2.2 Reaches 4,5 and 6: South of 1-15 to Glen Ivy Road 20
4.2.3 4.2.3 Reach 7: South of Glen Ivy Road to the mouth of CCW 20
5 Management and Regulatory Framework 23
5.1 Protection of Public Infrastructure 23
5.2 Flood Hazard Zone Adoption 23
5.3 Development Standards 23
6 References 25

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10-25-18



Figure 4 - Post-Pit Capture Scenario

Riverside County will require scour retrofit measures to be constructed. The scour retrofit plans have been drafted and are currently under County Transportation's review.

4.1.5 Additional Monitoring and Maintenance

While not presently at risk, several areas in public right-of-way are subject to possible future erosion hazards. Specifically, the slope adjacent to the Painted Hills community and the Trilogy Outfall will be subject to on-going monitoring and maintenance by the County.

While the slope at the Painted Hills community lacks engineered bank protection, a review of historical bank alignments (see previous reports for this study) indicates the right-bank position has not changed significantly during the period of review of this study. Should that condition change and active bank erosion is observed, RCFCWCD has acquired sufficient right-of-way to access the upstream section of slope and will place riprap to protect the slope if necessary.

The Trilogy Outfall, while showing no evidence of flows of significant magnitude, is subject to vertical degradation within CCW which may cause riprap at the outfall terminus to launch into CCW. Riverside County will monitor this condition and may apply additional rock as needed to stabilize the stone chute.

4.2 Proposed Private Development Activity

4.2.1 Reaches 1, 2, and 3: North of I-15 to Temescal Wash

The reaches downstream of I-15 are subject to private commercial development which, through the development process, will mitigate the flood hazards present in the reaches.

Specifically, the Serrano Commerce Center planning documents depict collecting CCW immediately downstream of I-15 along the wash's historic flow path through Reach 3 (Proactive Engineering Consultants, 2006). Near the downstream terminus of the development, a re-alignment of Temescal Canyon Road is proposed which would cross CCW. As stated in the planning documents, the channel is intended to be an earthen bottomed, steep-sided channel with bank protection, grade control structures, and maintenance access points. The stated intent is for the developer to transfer ownership and maintenance of the channel to RCFCWCD. Figure 5 shows the extent and location of proposed improvements.

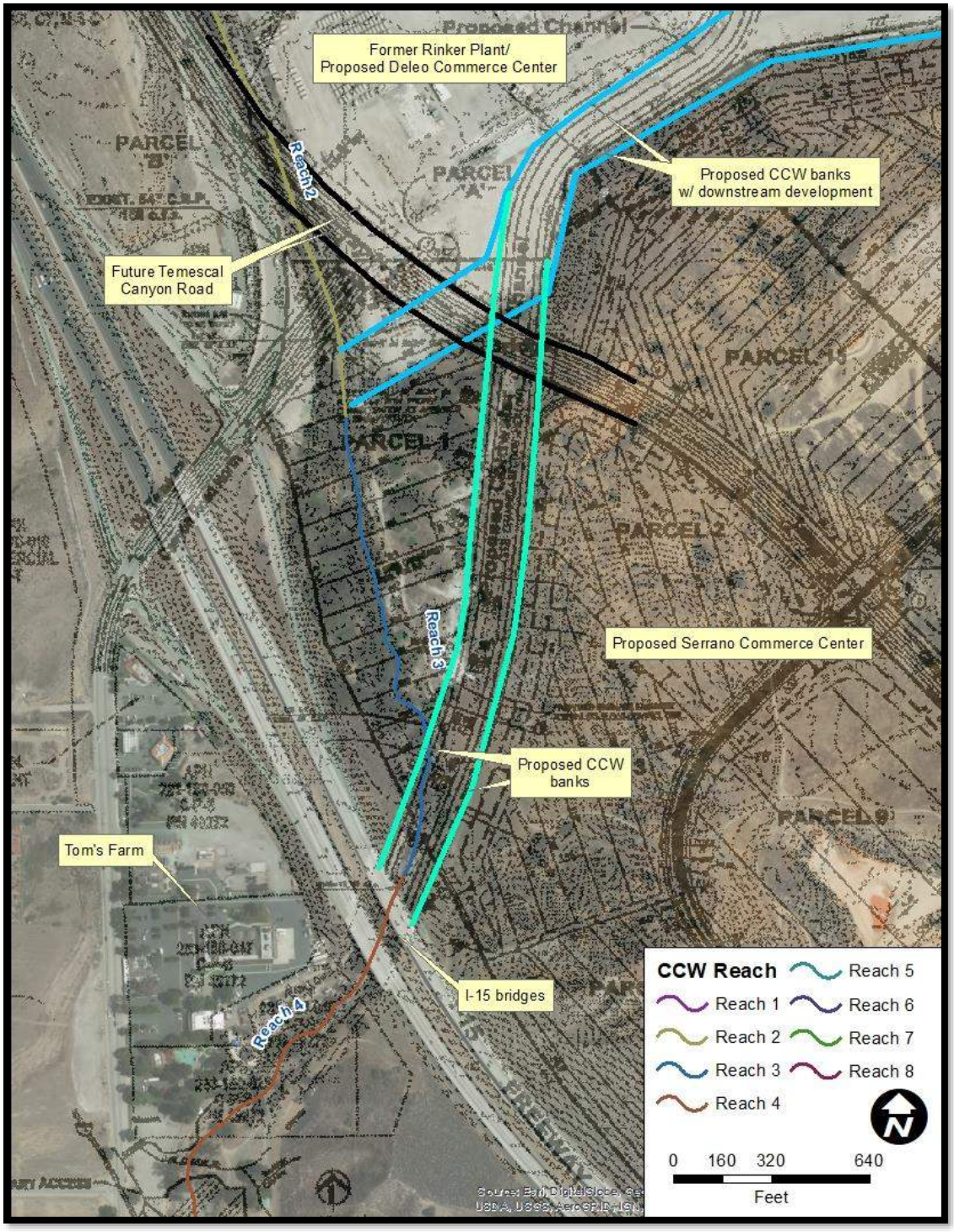


Figure 5 - CCW at Serrano Commerce Center

Immediately downstream of the Serrano Commerce Center, the Deleo Commerce Center has submitted a pre-application review (PAR) to RCFCWCD (Proactive Engineering Consultants West, Inc., 2017). The Deleo PAR documentation indicates an understanding of the possible upstream development and shows an interim routing of CCW with future re-alignment at the upstream end of the project "by others". The

Deleo PAR explicitly indicates grade control structures and bank slopes, but bank protection methods are not detailed. **Figure 6** shows the extent and location of the proposed improvements.

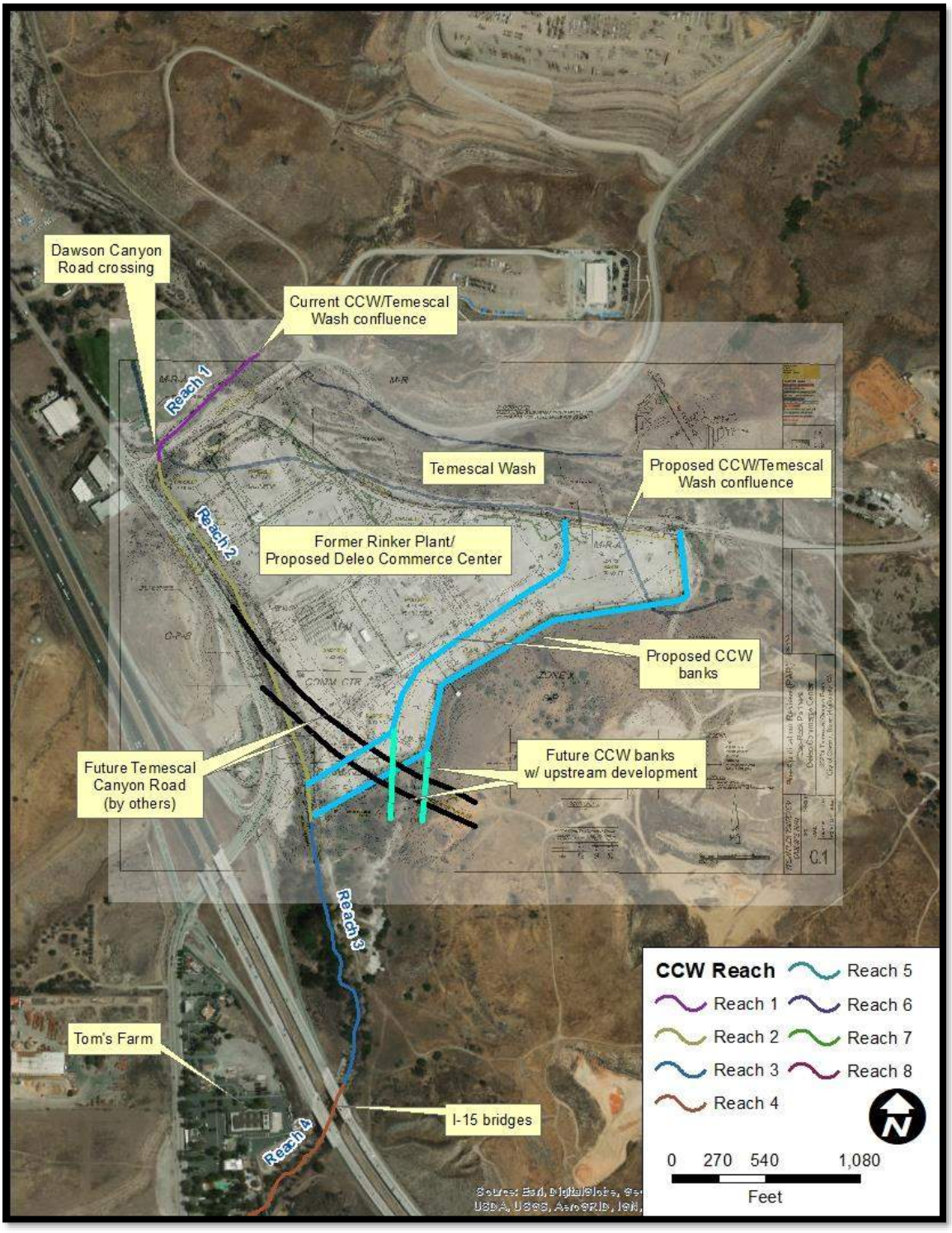


Figure 6 - CCW at Deleo Commerce Center

5 MANAGEMENT AND REGULATORY FRAMEWORK

Management measures and regulatory actions within the CCW corridor are intended to facilitate responsible development along the CCW corridor and within areas of identified flood hazard.

Management and regulatory measures for each period described in **Section 3** are described below.

5.1 PROTECTION OF PUBLIC INFRASTRUCTURE

Near-term improvements to public infrastructure elements have been described previously in Section 4.1, these measures meet RCFCWCD's goal to protect public infrastructure in the near-term period. Additional corridor-wide measures are described below.

5.2 FLOOD HAZARD ZONE ADOPTION

Currently, RCFCWCD has adopted the California Department of Water Resources (DWR) flood awareness zones for regulation of flood hazards. Within the CCW corridor, the DWR flood awareness delineation does not uniformly align with flood hazards as identified in this study. To better address current flood hazards, RCFCWCD will adopt the flood hazard zone (FHZ), as delineated by this study, in lieu of the DWR flood awareness zone. Use of the FHZ will require a revision to Ordinance 458 and a revision of the regulatory boundaries to supplant the CCW DWR zone with the FHZ while merging the FHZ with the DWR flood awareness zones associated with other watercourses, notably near Mayhew Canyon.

5.3 DEVELOPMENT STANDARDS

Generally, channel improvements on private property within CCW which are designed and constructed to RCFCWCD standards may be transferred to RCFCWCD for on-going maintenance activities. Due to RCFCWCD's future liability for maintenance and operation of these improvements, adherence to RCFCWCD's drainage standards is a vital element of any proposed channel improvements. Proposed improvements within the FHZ which do not adequately document mitigation of flood-related hazards will not be approved for construction. Ownership of improvements which are appropriate designed and built to mitigate the FHZ per RCFCWCD engineering standards may be transferred to RCFCWCD to operate and maintain the facilities.

Figure 9 depicts a typical section with specific elements required for acceptance by RCFCWCD. These specific elements are listed below. Generally, the values shown in **Figure 9** are not prescriptive, but are included to illustrate the type of detail expected for improvement plans.

1. Engineered bank revetment: While rock riprap is depicted in **Figure 9**, other forms of engineered bank protection maybe acceptable to RCFCWCD, RCFCWCD will not accept bank protection if continual ongoing maintenance is required, such as revetments which require irrigation. Vertically, bank revetment must extend above the 100-year water surface elevation and below the 100-year scour depth. Scour calculations should include long-term scour estimates based upon observed trends or engineering analysis.
2. Access roads and ramps: RCFCWCD requires access roads and ramps to allow for maintenance activities within the channel. RCFCWCD requires a minimum of 15' wide access roads on both sides of the channel.

3. Access control: Depicted as chain link fence in **Figure 9**, access control is required to limit unauthorized access or use of the channel facilities. Gates at connections to roadways may also be required.
4. Slope treatment: Depicted as a 1.5:1 cut slope and a 2:1 fill slope in **Figure 9**, portions of the CCW corridor have existing tall, over-steepened banks. Slopes may require slope stability analysis and appropriate engineered stabilization.

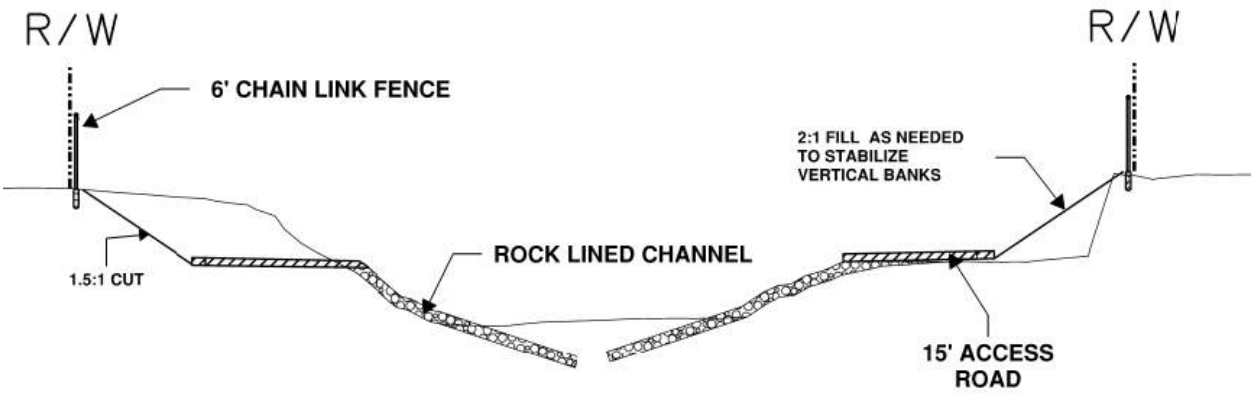


Figure 9 - RCFCWCD Example Cross-Section

Following are the additional parameters that shall also be considered:

- End-treatment at the upstream and downstream limits of proposed revetment where existing bank protection is not available for continuity of protection;
- Planimetric "flared" protection may be necessary to mitigate potential upstream channel migration.
- Transverse grade control structures may also be required to stabilize the channel invert.
- Considerations for lateral inflow locations should also be included.

6 REFERENCES

Brunner, Gary, 2016a. "HEC-RAS, River Analysis System Hydraulic Reference Manual". US Army Corps of Engineers. February, 2016.

Brunner, Gary, 2016b. "HEC-RAS, River Analysis System User's Manual Version 5.0". US Army Corps of Engineers. February, 2016.

Fuscoe, Williams, Lindregn & Short, 1989, Offsite Hydrology for Warm Springs Glen Development.

JLC Engineering and Consulting, Inc, 2012. Floodplain and Scour Analysis for Squaw Mountain Road. Prepared for Riverside County. November 29, 2012.

KCT Consultants, Inc., 2000. Reclamation Plan Chanlder's Palos Verdes Sand and Gravel Co. Inc. July, 2000.

KWC Engineers, 2016. Strategic Planning Summary Report for the Coldwater & Mayhew Canyons Water Recharge Master Plan Project. Prepared for City of Corona Department of Water and Power. June, 2016.

Proactive Engineering Consultants, 2006. Sereno Commerce Center General Plan Amendment. June 2006

Proactive Engineering Consultants West, Inc., 2017. Pre-Application Review (PAR) Cap-Rock Partners Deleo Commerce Center. May 4th, 2017. Excerpt.

Appendix A2
FEMA FIS Flow Rates

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 7



RIVERSIDE COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
Agua Caliente Band of Cahuilla Indian Reservation	060763	City of Lake Elsinore	060636
City of Banning	060246	City of Menifee	060176
City of Beaumont	060247	City of Moreno Valley	065074
City of Blythe	060248	City of Murrieta	060751
City of Calimesa	060740	City of Norco	060256
City of Canyon Lake	060753	City of Palm Desert	060629
City of Cathedral City	060704	City of Palm Springs	060257
City of Coachella	060249	City of Perris	060258
City of Corona	060250	City of Rancho Mirage	060259
City of Desert Hot Springs	060251	City of Riverside	060260
City of Eastvale	060155	City of San Jacinto	065056
City of Hemet	060253	City of Temecula	060742
City of Indian Wells	060254	City of Wildomar	060221
City of Indio	060255	Colorado River Indian Reservation	060069
City of Jurupa Valley	060286	Riverside County, Unincorporated Areas	060245
City of La Quinta	060709		

REVISED:

March 6, 2018

FLOOD INSURANCE STUDY NUMBER
06065CV002D

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	0.2% Annual Chance
Stetson Avenue Channel	At Hemet Storm Channel	2.5	500	*	850	1,100	2,600
Stetson Avenue Channel	At Palm Avenue	2.1	450	*	700	950	2,200
Stetson Avenue Channel	At State Street	1.9	400	*	650	850	2,000
Stetson Avenue Channel	At San Jacinto Street	1.3	300	*	490	650	1,500
Stovepipe Canyon Creek	At State Highway 71	1.3	150	*	460	750	1,700
Stream A	At 2S./5E.-29 NW. corner	0.6	440	*	620	740	970
Taylor Avenue Drain	At Cota Street	1.5	280	*	590	850	1,900
Taylor Avenue Drain	At Riverside Freeway	1.4	260	*	550	800	1,800
Taylor Avenue Drain	At Grand Boulevard	1.3	220	*	500	750	1,700
Taylor Avenue Drain	At Olive Avenue	0.9	160	*	370	550	1,200
Taylor Avenue Drain	At Citron Avenue	0.8	150	*	340	500	1,100
Taylor Avenue Drain	At Ontario Avenue	0.7	130	*	300	450	1,000
Temecula Creek	At mouth	370.0	7,500	*	27,000	36,000	58,000
Temescal Wash	Below confluence with Arlington Channel	170.9	2,345	*	14,500	29,000	69,150
Temescal Wash	Above confluence with Arlington Channel	*	1,970	*	12,180	24,000	58,090
Temescal Wash	At Magnolia Avenue	134.0	1,800	*	11,700	22,000	52,000
Tequesquite Arroyo	At Tequesquite Avenue	4.89 [12]	1,972	*	*	2,880	*

Appendix A3

"Bridge Rehabilitation Assessment Dawson Canyon Road over Temescal Wash," Prepared by Kleinfelder, and dated March 17, 2022

BRIDGE REHABILITATION ASSESSMENT

DAWSON CANYON ROAD OVER TEMESCAL WASH

Prepared for:

RICK ENGINEERING COMPANY

Prepared by:
Kleinfelder, Inc.
770 First Avenue, Suite 400
San Diego, CA 92101
Kleinfelder Job No. 20222889

March 17, 2022

TABLE OF CONTENTS

SECTION		PAGE
1.	SUMMARY	1
2.	DESCRIPTION OF STRUCTURE	1
3.	MEMBER SUMMARY	2
4.	SCOUR EVALUATION	3
5.	RECOMMENDATIONS	4
6.	PHOTOGRAPHS	5



1. SUMMARY

This report summarizes the findings and conclusions of a bridge rehabilitation assessment of the existing bridge located on Dawson Canyon Road over the Temescal Wash as shown in Figure 1. This assessment is intended to provide a preliminary scour evaluation of the bridge substructure.

The overall condition of the bridge superstructure is fair however, the creek channel depth has changed significantly since the construction of the bridge resulting in exposed portions of the substructure on the downstream side of the bridge. There is not an immediate stability concern for the structure. The preliminary hydraulic scour analysis of the bridge shows a likely general scour below the existing channel elevation of up to an additional 4.8 feet. This level of general scour will also not present any stability concern for the bridge. The local pier scour that may occur during a major storm event may expose some length of the piles themselves, countermeasures to mitigate this exposure are included for consideration.



Figure 1: Project Area Map

2. DESCRIPTION OF STRUCTURE

At the time of the site visit, the creek was completely dry, both on the upstream (south) side of the bridge and on the downstream (north) side of the bridge. The existing bridge was built in 1988 and is a continuous five-span cast-in-place reinforced concrete slab bridge. The substructure is skewed at 25-degrees from the bridge centerline to match the stream flow. The piers consist of reinforced concrete pier walls supported on a pile cap with a single row of concrete piles underneath. There is a 7-foot deep tremie concrete section under all pile caps surrounding the concrete piles. The abutments consist of reinforced concrete open-ended diaphragm beams supported on concrete piles. The elevation view and the plan view of the bridge are shown in Photo 1 and Figure 2 respectively.

The soil at the site consists of sandy gravel with small to large cobbles at the upstream side of the bridge and gravelly sand with small to large cobbles on the downstream side of the bridge. In front of the abutments, there are grouted rock slopes that act as riprap protection.



Photo 1: Elevation View of Bridge (Looking North)

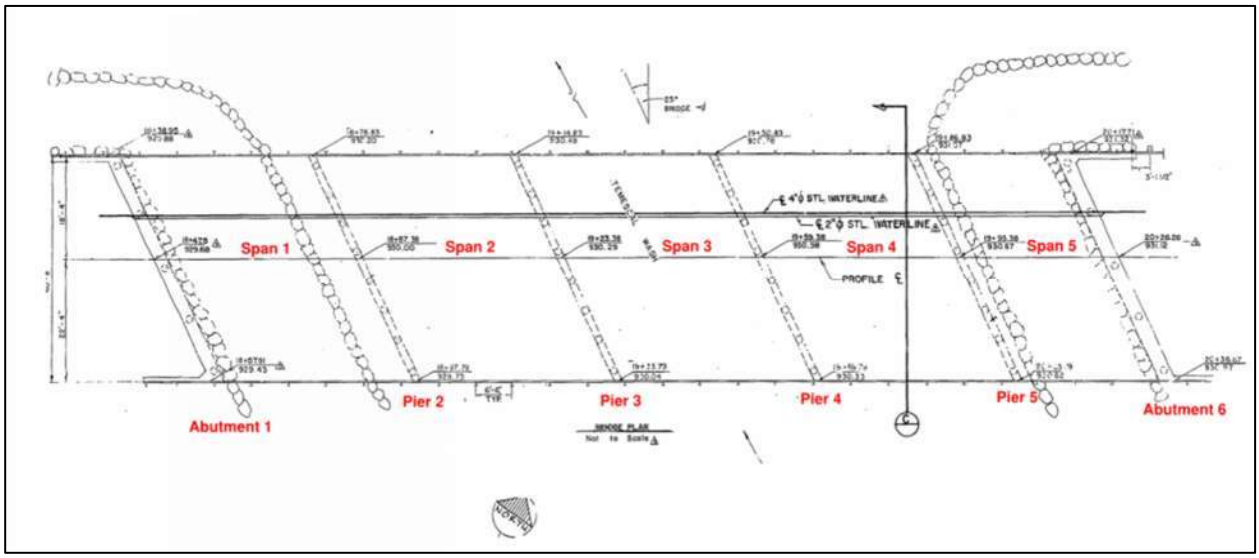


Figure 2: Plan View of Bridge

3. MEMBER SUMMARY

Per the as-builts shown in the appendix, the pier wall is 1’-4” long and 44’-10 3/8” wide. The depth of the pier wall varies at each pier. Under each pier wall, there is a pile cap that is 1’-9” deep, 2’-6” long and 45’-10 3/8” wide. The tremie concrete that is below the pile cap surrounding the piles, is 7’-0” deep

and has the same length and width as the pile cap. The tremie concrete has reinforcing making it continuous with the pile cap. At the piers, there is a total of 8 precast prestressed piles in a single row at a spacing of 5'-11 3/4" on center. The abutments are 2'-6" long and 44'-10 1/4" wide. Below the abutments, there is a total of five precast prestressed piles in a single row at a spacing of 10'-2 5/8" on center. The piles are approximately 29' deep, extending 22' +/- below the bottom of the tremie concrete.

The assumed design or allowable compressive strength of the pier and abutment concrete is 1,350 psi. The allowable strength of reinforcement is 30,000 psi. For the piles, the assumed concrete compressive strength is 5,000 psi.

The substructure is in overall fair condition. The primary area is the change in ground level and exposure of the pile caps and tremie concrete at depths far below the original construction line. The pier wall is in good condition with very minor hairline cracking due to temperature at the middle of all the pier walls. No concrete spalling was observed. The pile cap and tremie concrete are in fair condition. No concrete cracking was observed. On one of the piers, a debonded patch was observed on the tremie concrete that was formed by the original formwork. The patch did not show signs of spalled concrete or exposed rebar, so this spall does not affect the performance of the bridge. The abutment diaphragms are in good condition. No concrete cracking or spalling was observed. The condition of the piles was not observed because they are not visible.

The nature of this structure makes it very stable and resistant to changes from scour. The entire structure is one large, multi-pier frame with continuous wall piers. The piles are driven to a dense soil layer and likely do not rely on side skin friction to provide the gravity support of the bridge. Therefore, some losses of soil around the piles will not compromise the load carrying capacity of the piles. Additionally, the reinforced tremie course effectively locks in the tops of the piles eliminating the risk of the pile top to pier wall connection becoming a hinge point if it is exposed.

The primary stability risk to the bridge would occur if scour extended to a depth sufficient to remove the lateral support of the piles and lead to their buckling. While a detailed evaluation of the buckling length of the piles was not completed for this study, by observation, an exposed pile height of up 4 to 6 feet would still be stable.

4. SCOUR EVALUATION

By observation, the main channel passes through the locations of Piers 3 and 4. The pile caps including the tremie concrete are exposed at Piers 3 through 5 along the entire width of the pier walls.

At Pier 3, which has the deepest spot of scour, approximately 7'-10" of exposed height of the pile cap/tremie is visible at the far downstream edge. The average exposure of the tremie concrete along the full length of Pier 3 is approximately 2' on the east side and 0' on the west side. The bottom of the tremie is not visible. There is approximately 1'-0" of unexposed tremie concrete.

On the downstream edge of Pier 4, approximately 7'-1" of exposed height of the pile cap/tremie is visible. The average exposure of the tremie concrete along the full length of Pier 4 is approximately 2'-6" on the west side and less than 1' on the east side.

Across the whole length of Pier 5, approximately 3'-6" of exposed height of the pile cap/tremie is visible on the west side.

Due to the obstructions caused by the piers in the waterway, local scour is observed at Piers 3 and 4 at the downstream end. The average height difference of soil across the upstream and downstream end of Piers 3 and 4 is about 4'-0". Since Piers 3 through 5 have approximately 3'-6" of exposed height of the pile cap/tremie on the upstream side, contraction scour has occurred all across the stream flow area.

The total scour that has occurred at the piers is approximately 9 feet from 2002 to 2021 based on the ground location measured in 2002 and the ground location observed in 2021. For more details, see the channel cross section shown the bridge inspection report. The bridge inspection report from 2002 is attached as an appendix.

The recently completed scour analysis concludes that the likely maximum additional general scour that will occur at the bridge is on the order of 5'. General scour of this magnitude would expose nearly all of the tremie concrete on the main channel sides of Piers 3 and 4. However, given the nature of the structure, even with this level of exposed foundation, the bridge will be stable.

Pier scour that may occur during a flood may expose several feet of the piles themselves. As noted above some minimal pile exposure will not be a stability issue, however a detailed pile buckling analysis was not completed as part of this study. Additionally, exposed piles are generally avoided and can cause alarm even when a structural concern is not present.

At the upstream side of the bridge, debris buildup has occurred. A majority of the debris buildup is located at Pier 4.

5. RECOMMENDATION

Based on the scour evaluation above and review of past inspection reports the observed scour causes minimal foundation exposure. The bottom of the tremie concrete is not exposed and the piles are not visible. There is not a stability concern with the bridge under the current scour conditions or under the expected general scour that was determined through the recent analysis.

The existing riprap that has been placed is likely sufficient to minimize local scour pockets at the piers to depths less than the 6 feet or so necessary to initiate a pile buckling concern.

Detailed local scour analysis may show that the calculated scour causes moderate foundation exposure such that the piles are exposed. Therefore, the following scour countermeasures are recommended for consideration:

- Rock riprap at Piers
- Remove debris at Piers

6. PHOTOGRAPHS



Photo 2: Abutment 1 photo taken on upstream side of bridge looking west



Photo 3: Pier 2 photo taken on upstream side of bridge looking north



Photo 4: Abutment 1 photo taken on downstream side of bridge looking west



Photo 5: Pier 2 photo taken on downstream side of bridge looking south



Photo 6: Pier 3 photo taken on downstream side of bridge looking south

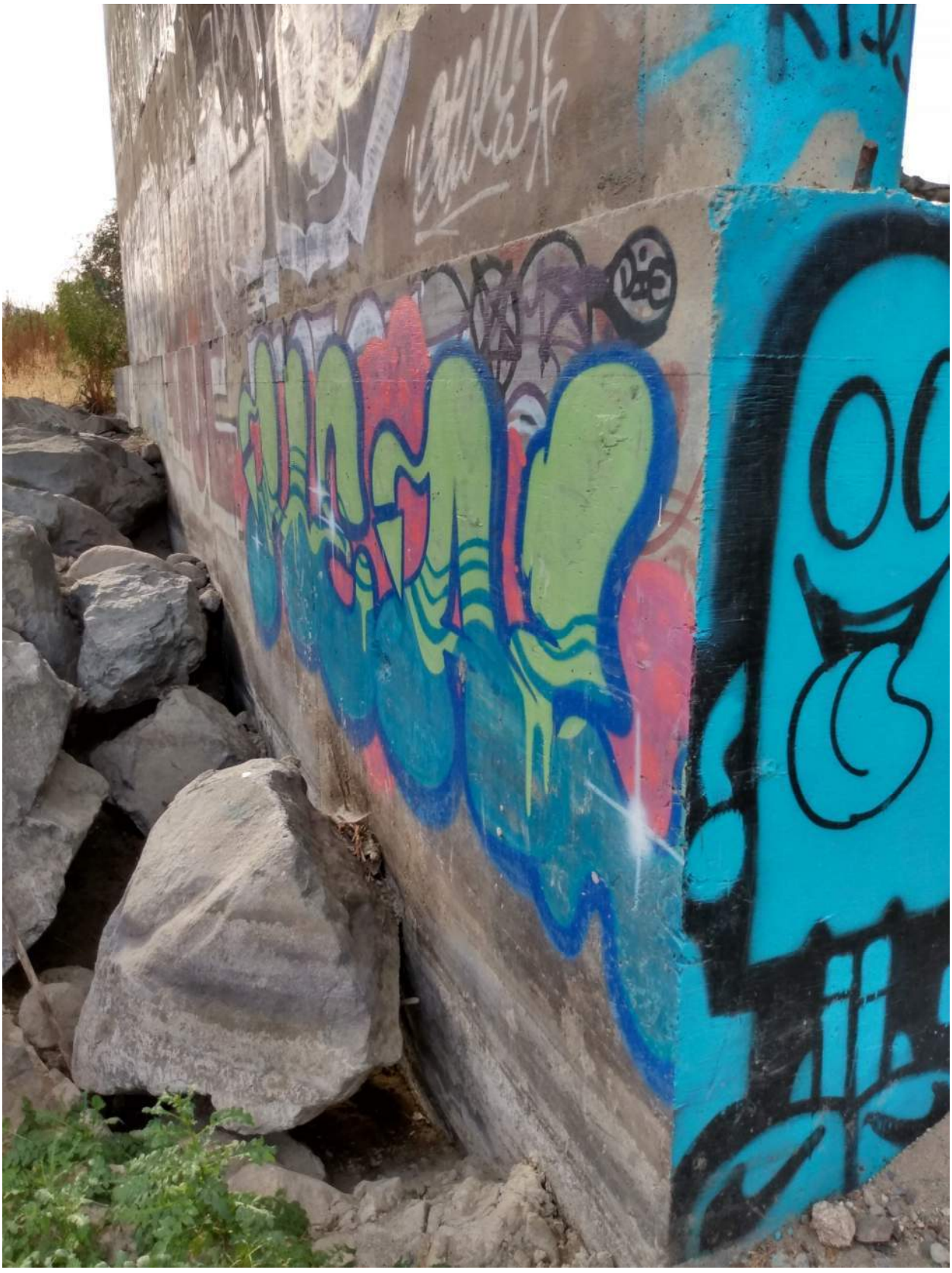


Photo 7: Pier 3 photo taken on downstream side of bridge looking south



Photo 8: Pier 3 photo taken on upstream side of bridge looking west



Photo 9: Pier 4 photo taken on upstream side of bridge looking north



Photo 10: Pier 4 photo taken on upstream side of bridge looking west



Photo 11: Pier 4 photo taken on downstream side of bridge looking west



Photo 12: Pier 5 photo taken on downstream side of bridge looking south



Photo 13: Pier 5 photo taken on upstream side of bridge looking west

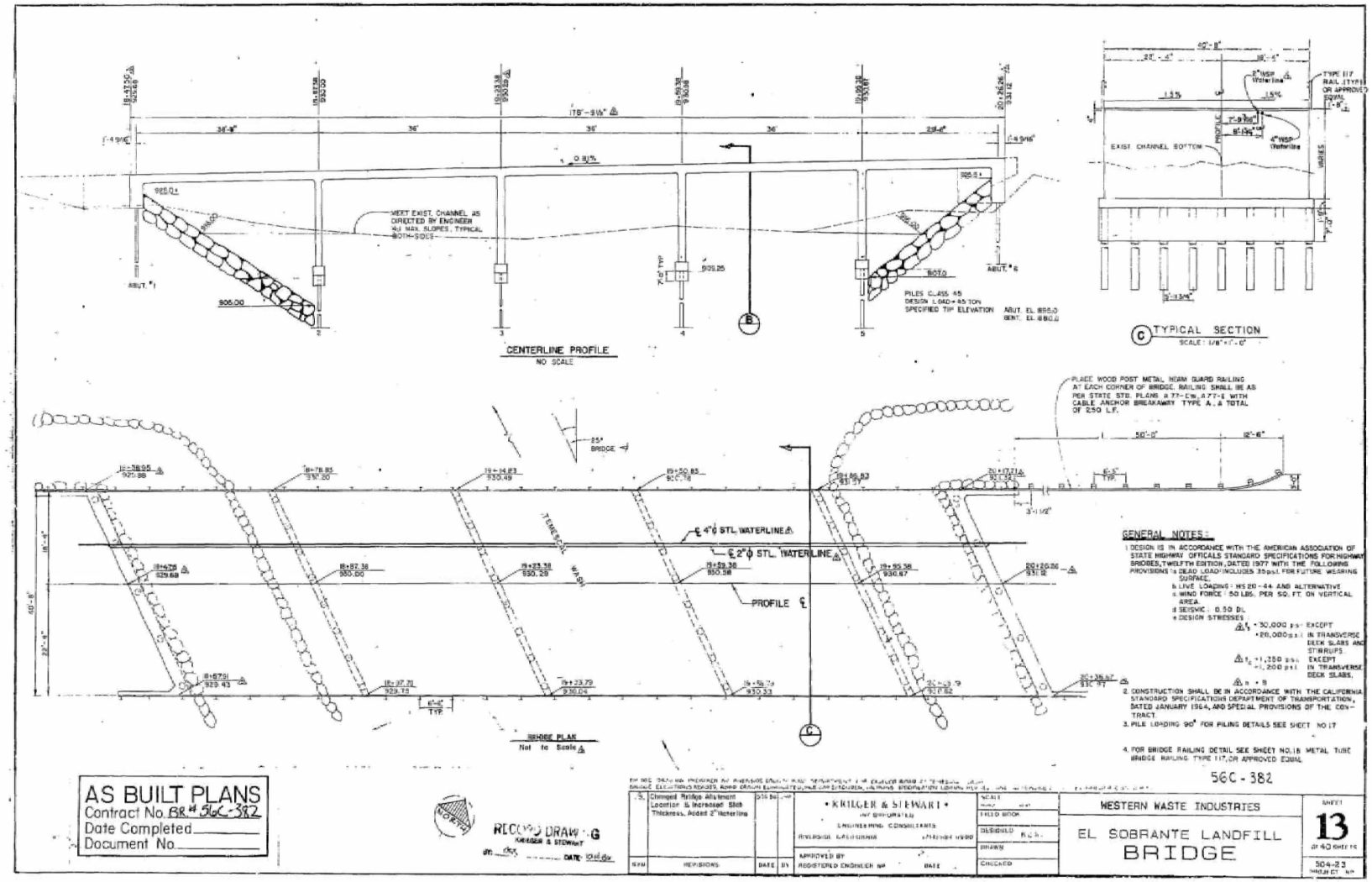


Photo 14: Abutment 6 photo taken on downstream side of bridge looking east



Photo 15: Elevation view taken on downstream side of bridge looking west

APPENDIX A: AS-BUILTS



GENERAL NOTES:

1. DESIGN IS IN ACCORDANCE WITH THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICALS STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, TWELFTH EDITION, DATED 1977 WITH THE FOLLOWING PROVISIONS
   a. DEAD LOAD INCLUDES 35 psf FOR FUTURE WEARING SURFACE.
   b. LIVE LOADING - HS 20 - 44 AND ALTERNATIVE
   c. WIND FORCE - 50 LBS. PER SQ. FT. ON VERTICAL AREA.
   d. SEISMIC - 0.50 DL
   e. DESIGN STRESSES
      f_c = 3000 psi EXCEPT = 2000 psi IN TRANSVERSE DECK SLABS AND STIRRUPS.
      f_v = 1,350 psi EXCEPT = 1,200 psi IN TRANSVERSE DECK SLABS.
      n = 8
2. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CALIFORNIA STANDARD SPECIFICATIONS DEPARTMENT OF TRANSPORTATION, DATED JANUARY 1964, AND SPECIAL PROVISIONS OF THE CONTRACT.
3. PILE LOADING 90 T FOR PILING DETAILS SEE SHEET NO 17
4. FOR BRIDGE RAILING DETAIL SEE SHEET NO.18 METAL TUBE BRIDGE RAILING TYPE 117, OR APPROVED EQUAL

56C-382

AS BUILT PLANS
Contract No. BR # 56C-382
Date Completed
Document No.

RECORD DRAWING
KRIEGER & STEWART
DATE: 10-10-94

NO.	REVISIONS	DATE	BY
5	Changed Bridge Alignment Location & Increased Slab Thickness, Added 2" Waterline	5/14/90	

KRIEGER & STEWART
INCORPORATED
ENGINEERING CONSULTANTS
RIVERSIDE, CALIFORNIA

APPROVED BY
REGISTERED ENGINEER

SCALE
FIELD BOOK
DESIGNED
DRAWN
CHECKED

WESTERN WASTE INDUSTRIES
EL SOBRANTE LANDFILL
BRIDGE

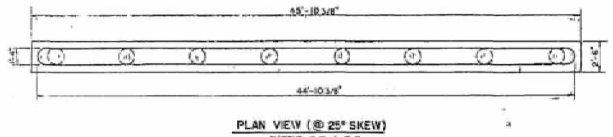
SHEET 13 OF 40 SHEETS
504-23
PROJECT NO.

894-B

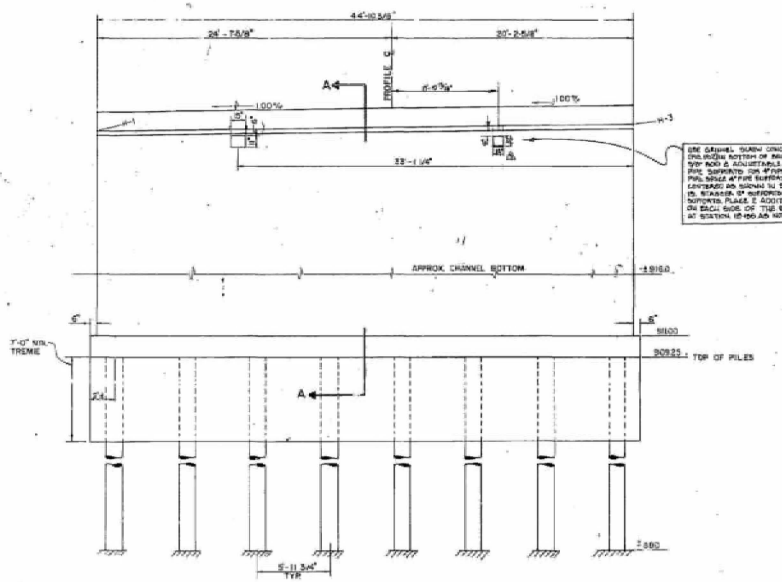
29X

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ATTACHED DOCUMENT THAT IS UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTION OF TRANSPORTATION.
2-8-90 Donald Blackwell
SUPERVISOR OF RECORDS SERVICES

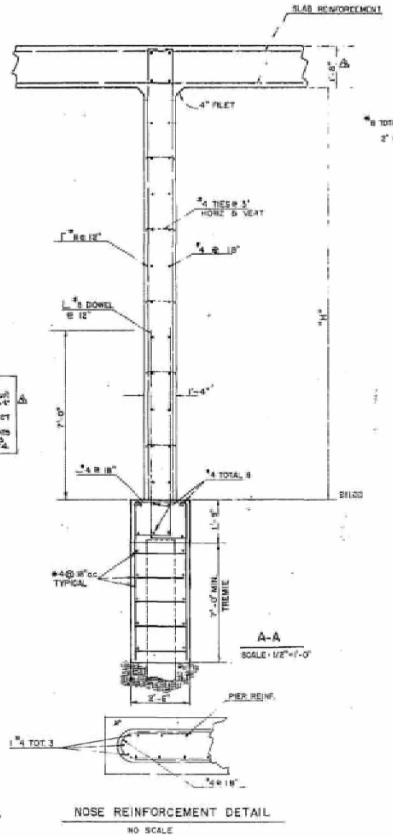
ClibPDF - www.fastio.com



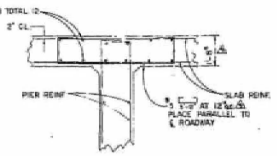
PLAN VIEW (@ 25° SKEW)
PIERS 2,3,4,&5
SCALE : 1/4" = 1'-0"



B ELEVATION VIEW
SCALE : 1/4" = 1'-0"



A-A
SCALE : 1/2" = 1'-0"



BENT DETAIL
SCALE 1/2" = 1'-0"

PIER #	HEIGHT H-1	H-2	H-3
2	17'08	17'53	
3	17'37	17'12	
4	17'66	18'1	
5	17'95	18'40	

NOSE REINFORCEMENT DETAIL
NO SCALE

560-382

AS BUILT PLANS
Contract No. BR# 56C-382
Date Completed
Document No.

RD DRAWING

NO.	REVISIONS	DATE	BY
5	Increased Slab Thickness Decreased Pier Heights.		

KRUGER & STEWART
INCORPORATED
ENGINEERING CONSULTANTS

APPROVED BY
REGISTERED ENGINEER — DATE

SCALE
FIELD BOOK
DESIGNED A.E.R.D.
DRAWN
CHECKED

WESTERN WASTE INDUSTRIES
EL SOBRANTE LANDFILL
BRIDGE

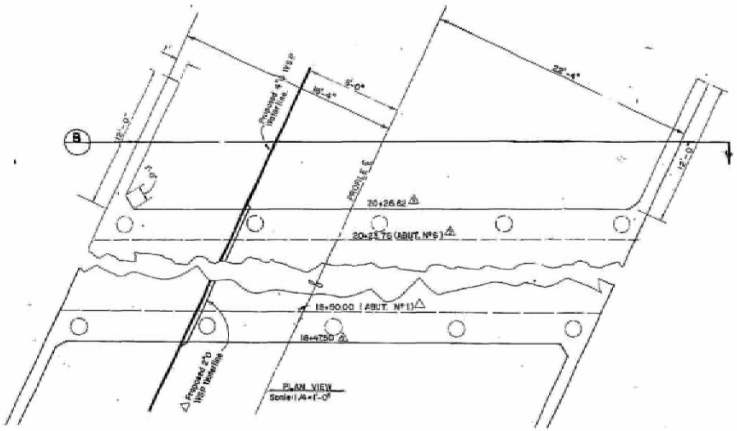
SHEET 14 OF 40 SHEETS
50A-23
PROJECT NO.

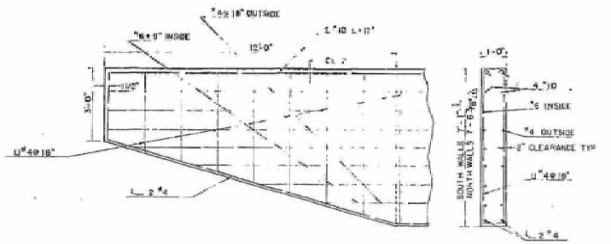
894-B

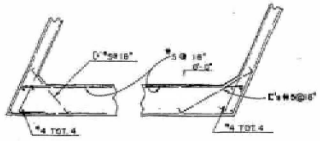
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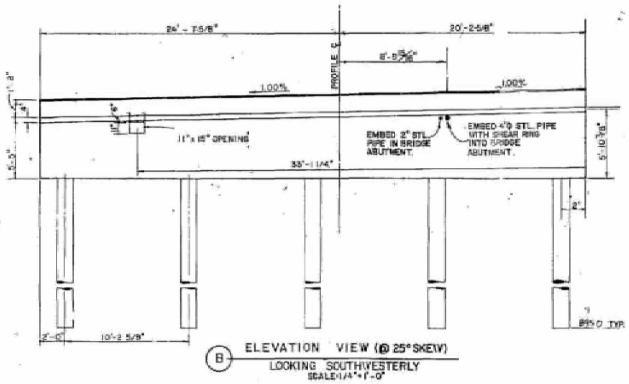
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.
2-8-90 Donald Blodgett
SUPERVISOR OF RECORDS FILM SERVICES

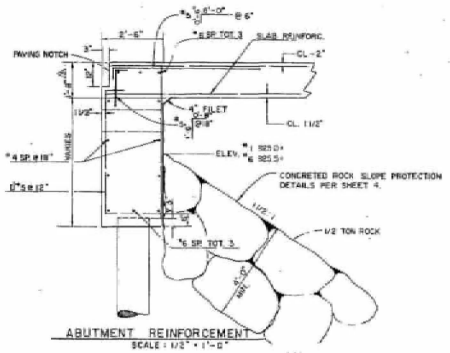
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560-382

AS BUILT PLANS
Contract No. 88 # 560-382
Date Completed
Document No.

1	Changed Bridge Abutment Dimensions, increased Bridge Slab Thickness.		
STM	REVISIONS	DATE	BY

KRIEGER & STEWART
INCORPORATED
ENGINEERING CONSULTANTS
RIVERSIDE, CALIFORNIA

DESIGNED A.C.H.D.
DRAWN
CHECKED

WESTERN WASTE INDUSTRIES
EL SOBRANTE LANDFILL
BRIDGE

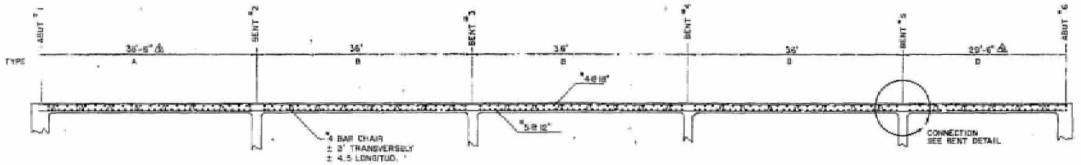
SHEET 15 OF 40 SHEETS
SD4-2.3

894-B

29X

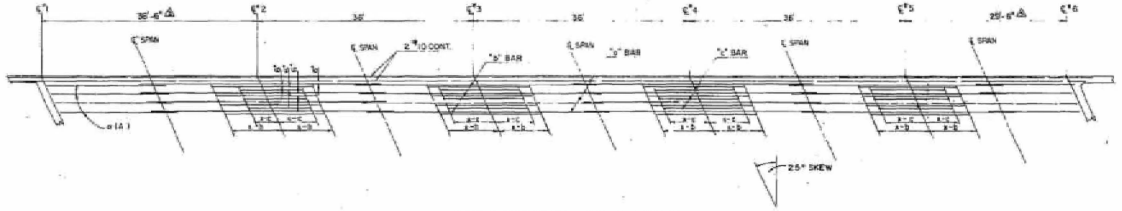
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDERWAY CITED ON AIR CONTROL ON THE DATE IN DOCUMENTS, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

3-8-90 [signature] SUPERVISOR OF MICROFILM SERVICES



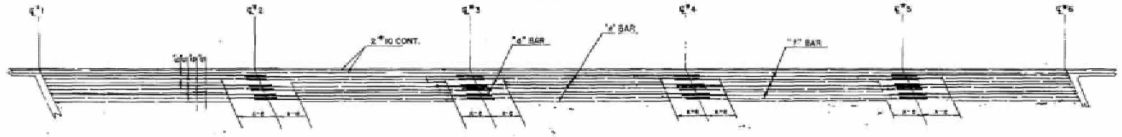
LONGITUDINAL SECTION

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



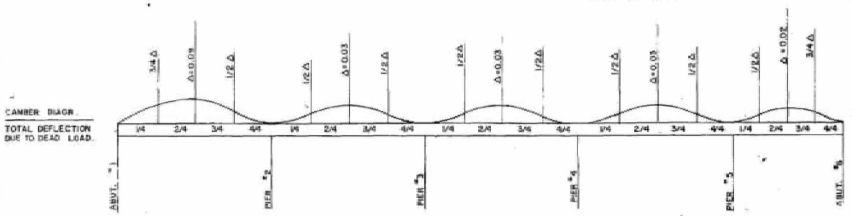
Δ REINFORCEMENT TOP OF SLAB

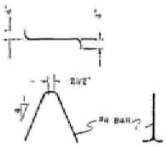
SCALE: 1/8" = 1'-0"



Δ REINFORCEMENT BOTTOM OF SLAB

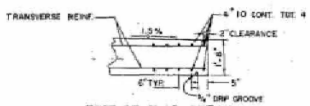
SCALE: 1/8" = 1'-0"





BAR CHAIR DETAIL

NO SCALE



EDGE OF SLAB DETAIL

SCALE: 1/2" = 1'-0"

REINFORCEMENT NOTES:

SPLICES IN TOP MAIN BARS TO BE LOCATED NEAR CENTER OF SPAN. SPLICES IN BOTTOM MAIN BARS TO BE LOCATED NEAR BENT. SPACING OF ALL TRANSVERSE BARS IS MEASURED ALONG ℄ ROADWAY SKEW OVER 25°. PLACE TRANSVERSE SLAB REINFORCEMENT PERPENDICULAR TO ℄ BRIDGE. SPACING OF ALL LONGITUDINAL BARS IS MEASURED PERPENDICULAR TO ℄ OF BRIDGE. PLACE LONGITUDINAL BARS PARALLEL TO BRIDGE ℄.

BAR SPLICE LENGTH									
BAR SIZES	4	5	6	7	8	9	10	11	
ALL BARS OVER 25°	23	28	34	39	40	68	76	85	
TOP BARS OVER 25°	23	28	34	53	60	77	97	120	

LENGTH OF SPAN			36'		
TYPE OF SPAN			A	B	D
REINFORCEMENT TOP SLAB	"A" BAR	SIZE	#10	#8	#8
		LENGTH	41'-3"	41'-3"	34'-9"
	"B" BAR	SIZE	#10	#8	#8
		LENGTH	39'-3"	39'-3"	32'-9"
	"C" BAR	SIZE	#10	#8	#8
		LENGTH	10'-3"	10'-3"	10'-3"
	"D" BAR	SIZE	#10	#10	#10
		LENGTH	10'-3"	10'-3"	10'-3"
	A-C		6"	6"	6"
REINFORCEMENT BOTTOM SL.	"E" BAR	SIZE	#11	#8	#8
		LENGTH	44'-3"	42'-3"	37'-3"
	"F" BAR	SIZE	#10	#8	#8
		LENGTH	13'-3"	8'-6"	8'-6"
	"G" BAR	SIZE	#11	#8	#8
		LENGTH	44'-3"	42'-3"	37'-3"
	A-E		6"	6"	6"
DISTANCE OF STEEL SP.			6" OR NOTED		
THICKNESS OF SLAB			20"		
D.L. DEFLECTION			0.09	0.03	0.02

560-382

AS BUILT PLANS
Contract No. BR #560-382
Date Completed
Document No.

CAMBER DIAGRAM

TOTAL DEFLECTION DUE TO DEAD LOAD

THE TOTAL DEFLECTION REACHED ABOUT 4 YEARS AFTER FALSEWORK REMOVAL.

3RD DRAWING
DRAWN BY KRIEGER & STEWART

Revised Steel Portion: Slab Thickness Changed To 1'-8"

KRIEGER & STEWART
INCORPORATED
ENGINEERING CONSULTANTS
RIVERSIDE, CALIFORNIA

APPROVED BY
REGISTERED ENGINEER NO. DATE

DESIGNED: A.G.R.J.
DRAWN
CHECKED

WESTERN WASTE INDUSTRIES

EL SOBRANTE LANDFILL
BRIDGE

SHEET 16

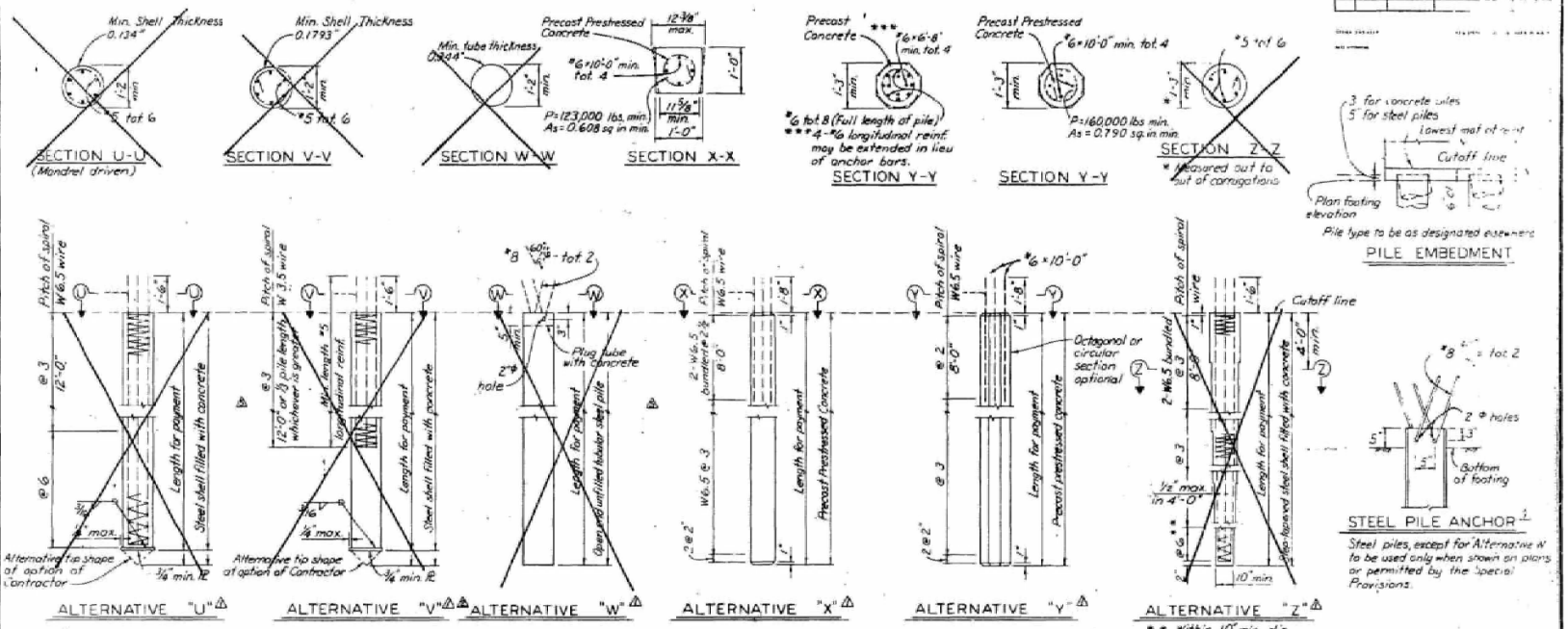
SCALE 1" = 1'-0"

894-B

29X

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT (WHEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA, PURSUANT TO AUTHORITY GIVEN BY THE DIRECTOR OF TRANSPORTATION.

DATE 2-8-90 Donald Blodgett
SUPERVISOR OF DRAFTING SERVICES



Notes

A 10" minimum diameter pipe extension (thickness = 0.1793" min.) may be used at the tip of Alternative "Z" when taper is 30° or more in length.

Pile reinforcement extending into a footing shall be hooked as required to provide clearance to top of footing.

Piles shall be extended only in accordance with details shown elsewhere in these plans.

Lapped splices in spiral pile reinforcement shall be lapped 80 wire diameters minimum. Spiral pile reinforcement at splices and at ends shall be terminated by a 135° hook with 6 inch tail hooked around a longitudinal bar or strand.

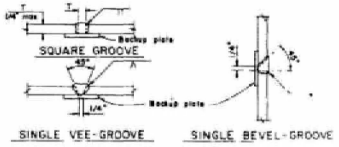
PRECAST PRESTRESSED PILES:

P = Prestressing Force @ anchorage

If section used is larger than the min. section shown, then "P" shall provide 860 psi. min.

As = Minimum Area of prestressing steel required.

Concrete Strength: f'_c @ 28 days = 6,000 psi. (Alternative "X")
5,000 psi. (Alternative "Y")
f'_{ci} @ transfer. = 4,000 psi.



PILE WELDING DETAIL - BUTT JOINTS

Notes
1 Single Vee-Groove and Square Groove permitted for all positions
2 Single Bevel Groove permitted for horizontal joints only

DESIGN LOADING = 45 TONS

AS BUILT PLANS
Contract No. 08R #56C-382
Date Completed
Document No.

SPECIAL DETAILS

56C-382

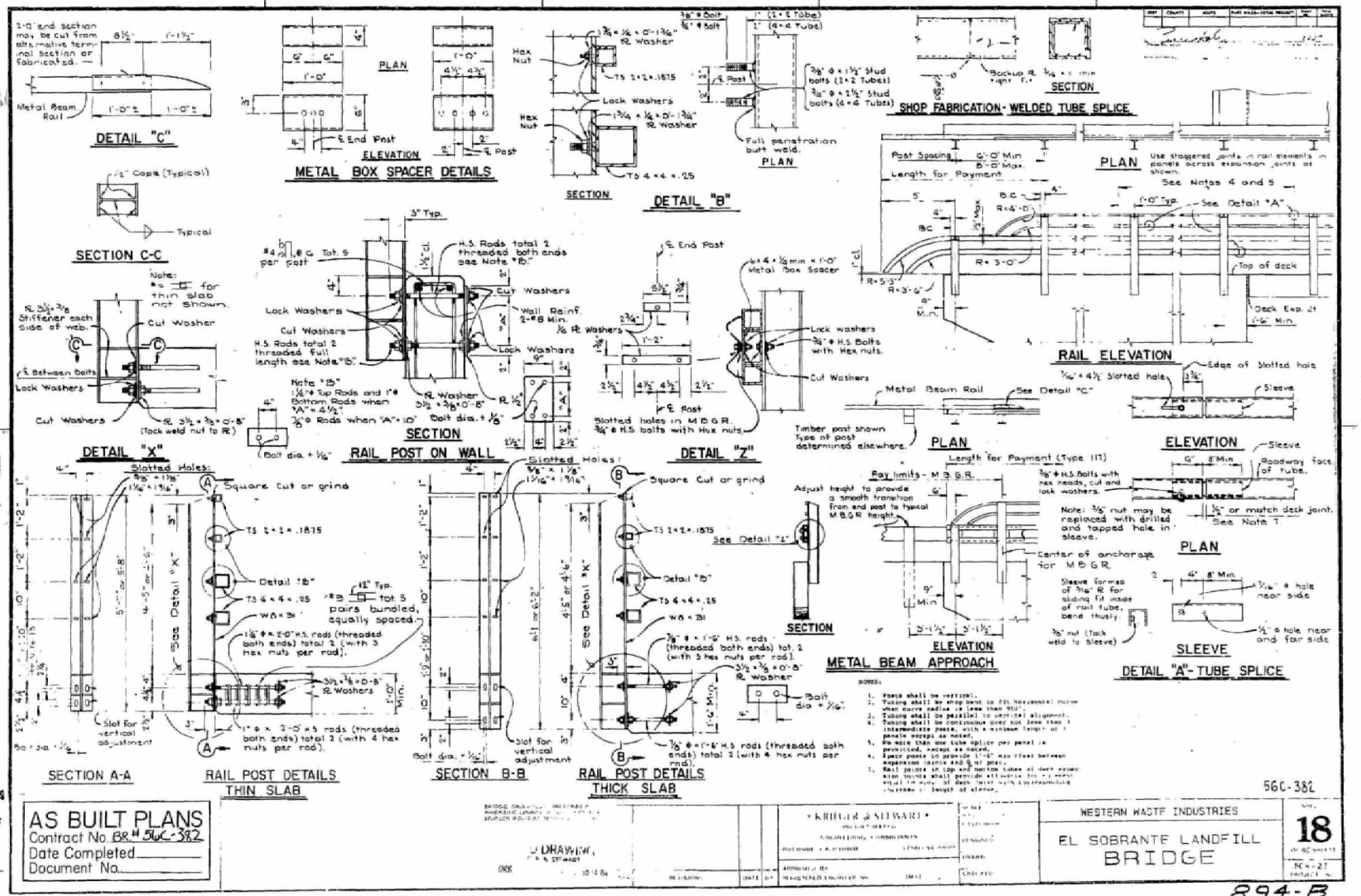
KRIEGER & STEWART
INCORPORATED
ENGINEERING CONSULTANTS
RIVERSIDE, CALIFORNIA

WESTERN WASTE INDUSTRIES
EL SOBRANTE LANDFILL
BRIDGE

SHEET 17

29X

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.
2-8-90 Donald Bergdoll
SUPERVISOR OF DRAWING SERVICES


DETAIL "C"
ELEVATION
METAL BOX SPACER DETAILS
PLAN
SECTION
DETAIL "B"
SECTION C-C
SHOP FABRICATION - WELDED TUBE SPLICE
PLAN
RAIL ELEVATION
DETAIL "X"
SECTION
RAIL POST ON WALL
DETAIL "Z"
PLAN
ELEVATION
SECTION
METAL BEAM APPROACH
SECTION A-A
RAIL POST DETAILS THIN SLAB
SECTION B-B
RAIL POST DETAILS THICK SLAB
SLEEVE
DETAIL "A" - TUBE SPLICE
NOTES:
560-382
AS BUILT PLANS
Contract No. BRH 560-382
Date Completed
Document No.
KRIEGER & STEWART
WESTERN WASTE INDUSTRIES
EL SOBRANTE LANDFILL
BRIDGE
18
29X
894-B

APPENDIX B: BRIDGE INSPECTION REPORT

California Department of Transportation
Division of Maintenance

Structure Maintenance and Investigations

BRIDGE

INSPECTION

RECORDS

INFORMATION

SYSTEM

The requested documents have been generated by BIRIS.

These documents are the property of the California Department of Transportation and should be handled in accordance with Deputy Directive 55 and the State Administrative Manual.

Records for “Confidential” bridges may only be released outside the Department of Transportation upon execution of a confidentiality agreement.

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 09/02/2020

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Modified: N/A
Length (m) : 54.5

Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC slab with RC pier walls and RC open end diaphragm abutments, all supported upon concrete piles. (7 ft deep tremie concrete under all pier footings).

Span Configuration : (W) 38.50 ft, 3 @ 36.00 ft, 29.50 ft (E)

SAFE LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: RF=1.86 =>60.3 metric tons Calculation Method: LOAD FACTOR
Operating Rating: RF=3.08 =>99.8 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 1.00 ft r, 40.00 ft, 1.00 ft r (S)

Total Width: 12.4 m Net Width: 12.2 m No. of Lanes: 2 Speed: 25 mph
Min. Vertical Clearance: Unimpaired Overlay Thickness: 0.0 inches
Rail Code: 1000

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

NOTICE

The bridge inspection condition assessment used for this inspection is based on the American Association of State Highway and Transportation Officials (AASHTO) Bridge Element Inspection Manual 2013 as defined in Moving Ahead for Progress in the 21st Century (MAP-21) federal law. The new element inspection methodology may result in changes to related condition and appraisal ratings on the bridge without significant physical changes at the bridge.

The element condition information contained in this report represents the current condition of the bridge based on the most recent routine and special inspections. Some of the notes presented below may be from an inspection that occurred prior to the date noted in this report. Refer to the Scope and Access section of this inspection report for a description of which portions of the bridge were inspected on this date.

INSPECTION COMMENTARY

SCOPE AND ACCESS

A complete routine inspection of all visible bridge elements was performed by walking on the shoulder/sidewalk of the deck in both directions, around the abutments and underneath both spans of the bridge and viewing the soffit and columns with binoculars. The bridge deck was inspected in accordance with SM&I procedures. At the time of inspection, there

INSPECTION COMMENTARY

was no water in the wash channel.

MISCELLANEOUS

Most vehicles utilizing the bridge are trash trucks.

DECK AND ROADWAY

DECK AND ROADWAY

Previous work recommendation of performing deck methacrylate has not been completed at the time of inspection.

SAFE LOAD CAPACITY

The load rating for this structure is being reviewed by SM&I Ratings Branch under Work Request No. 10302. An updated Load Rating Summary Sheet will be archived when this review is complete. The current rating is based on BDS computer output dated on 01/01/1988. A summary sheet based on the computer output was prepared by SM&I on 11/21/2010.

ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
38			**Slab-RC**	2	675	sq.m	34	100	541	0
	1080		**Delamination/Spall/Patched Area**	2	1		0	0	1	0
	1130		**Cracking (RC and Other)**	2	640		0	100	540	0

(38-1080)
The concrete deck exhibits 2 spalls (12 in. x 8 in. x 1 in.) on westbound lane, closer to the East end.

(38-1130)
There are deck map pattern cracks, 0.05 to 0.06 inches wide, spacing 9 to 18 inches.

210			**Pier Wall-RC**	2	56	m	56	0	0	0

(210)
There were no significant defects noted.

215			**Abutment-RC**	2	28	m	28	0	0	0

(215)
Except for typical hairline concrete cracks, there were no significant defects noted.

220			**Pile Cap/Footing-RC**	2	42	m	4	38	0	0
	6000		**Scour**	2	38		0	38	0	0

(220-6000)
The pile caps including the tremie portions are exposed at Bents 3 to 5 along the enire widths of pier walls. Per as built plans, the total depth is 8.5 feets. The exposed depths are 1.5 to 4.5 feet at Bent 3 eastern side, 2 to 3 feet at Bent 4 western side, and 1.5 to 2 feet at Bent 5 western side.

227			**Pile-RC**	2	1	ea.	1	0	0	0

(227)
The pile element is included to indicate the presence of piles on this structure. The piles were not

ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition St. 1	St. 2	St. 3	St. 4
exposed for visual inspection. No indication of pile distress was noted in any substructure element.										
256			**Slope Protection**	2	2	ea.	2	0	0	0
(256) There were no significant defects noted for the riprap rocks with slurry in front of abutments.										
330			**Railing-Metal**	2	124	m	124	0	0	0
(330) There were no significant defects noted.										

WORK RECOMMENDATIONS

RecDate: 11/03/2010
Action : Scour-Place Counterm
Work By: LOCAL AGENCY
Status : PROPOSED

EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:

Fill the exposure of Pierwalls 3 and 4 with boulders.

RecDate: 11/16/2006
Action : Deck-Methacrylate
Work By: LOCAL AGENCY
Status : PROPOSED

EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:

Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate resin.

Team Leader : Jessica Zhu

Report Author : Jessica Zhu

Inspected By : J.Zhu/P.Zhu



2/18/2021

Jessica Zhu (Registered Civil Engineer) (Date)

CC: Charlie Ineichen

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 03.59 SEC
(17) LONGITUDE 117 DEG 29 MIN 11.67 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- NONE CODE 0
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

*********** AGE AND SERVICE ***********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2800
(30) YEAR OF ADT 2018 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

*********** GEOMETRIC DATA ***********

(48) LENGTH OF MAXIMUM SPAN 11.7 M
(49) STRUCTURE LENGTH 54.5 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.2 M
(52) DECK WIDTH OUT TO OUT 12.4 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.2 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

*********** NAVIGATION DATA ***********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

********** SUFFICIENCY RATING = 48.0

PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 4
(59) SUPERSTRUCTURE 4
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 99.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 60.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 4
(68) DECK GEOMETRY 6
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4150
(115) YEAR OF FUTURE ADT 2041

********** INSPECTIONS **********

(90) INSPECTION DATE 09/20 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)



Photo No. 101
Roadway View Looking East



Photo No. 102
Elevation View Looking North



Photo No. 103
Underside View Looking North



Photo No. 104
Typical Deck Cracks



Photo No. 105
Exposed Pier Wall Footings



Photo No. 106
Exposed Pier Wall Footings



Photo No. 107
Exposed Pier Wall Footings



Photo No. 108
Debris At The Pier

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 09/22/2018

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Modified: N/A
Length (m) : 54.5
Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC slab with RC pier walls and RC open end diaphragm abutments, all supported upon concrete piles. (7 ft deep tremie concrete under all pier footings).

Span Configuration : (W) 38.5 ft, 3 @ 36.0 ft, 29.5 ft (E)

SAFE LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: RF=1.86 =>60.3 metric tons Calculation Method: LOAD FACTOR
Operating Rating: RF=3.08 =>99.8 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 1.0 ft r, 40.0 ft, 1.0 ft r (S)

Total Width: 12.4 m Net Width: 12.2 m No. of Lanes: 2 Speed: 25 mph
Min. Vertical Clearance: Unimpaired Overlay Thickness: 0.0 inches
Rail Code: 1000

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

NOTICE

The bridge inspection condition assessment used for this inspection is based on the American Association of State Highway and Transportation Officials (AASHTO) Bridge Element Inspection Manual 2013 as defined in Moving Ahead for Progress in the 21st Century (MAP-21) federal law. The new element inspection methodology may result in changes to related condition and appraisal ratings on the bridge without significant physical changes at the bridge.

The element condition information contained in this report represents the current condition of the bridge based on the most recent routine and special inspections. Some of the notes presented below may be from an inspection that occurred prior to the date noted in this report. Refer to the Scope and Access section of this inspection report for a description of which portions of the bridge were inspected on this date.

INSPECTION COMMENTARY

SCOPE AND ACCESS

A routine inspection was performed by Y. Chen and M. Monajemi. The conditions of RC slab surface and rails were inspected by walking along the areas close to rails. The conditions of abutment walls, riprap slope protection in front of abutments, RC slab soffit, pier walls and exposed pile caps were inspected by walking along each span under

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INSPECTION COMMENTARY

the bridge. At the time of inspection, there was no water in the wash channel.

REVISIONS

The concrete pile caps including the tremie portions at Bents 3 to 5 are exposed for inspection, add Element 220 in the Element Table.

MISCELLANEOUS

Most vehicles utilizing the bridge are trash trucks.

DECK AND ROADWAY

Previous work recommendation of performing deck methacrylate has not been completed at the time of inspection.

SAFE LOAD CAPACITY

The load rating for this structure is being reviewed by SM&I Ratings Branch. An updated Load Rating Summary Sheet will be archived when this review is complete. The current rating is based on BDS computer output dated on 01/01/1988. A summary sheet based on the computer output was prepared by SM&I on 11/21/2010.

ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
38			**Slab-RC**	2	675	sq.m	34	100	541	0
	1080		**Delamination/Spall/Patched Area**	2	1		0	0	1	0
	1130		**Cracking (RC and Other)**	2	640		0	100	540	0

(38-1080)
The concrete deck exhibits 2 spalls (12 in. x 8 in. x 1 in.) on westbound lane, closer to the East end.

(38-1130)
The concrete deck exhibits map pattern cracks, 0.05 to 0.06 inches wide, spacing 9 to 18 inches.

210			**Pier Wall-RC**	2	56	m	56	0	0	0

(210)
There were no significant defects noted.

215			**Abutment-RC**	2	28	m	28	0	0	0

(215)
Except for typical hairline concrete cracks, there were no significant defects noted.

220			**Pile Cap/Footing-RC**	2	42	m	4	38	0	0
	6000		**Scour**	2	38		0	38	0	0

(220-6000)
The pile caps including the tremie portions are exposed at Bents 3 to 5 along the enire widths of pier walls. Per as built plans, the total depth is 8.5 feets. The exposed depths are 1.5 to 4.5 feet at Bent 3 eastern side, 2 to 3 feet at Bent 4 western side, and 1.5 to 2 feet at Bent 5 western side.

227			**Pile-RC**	2	1	ea.	1	0	0	0

(227)

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ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
The pile element is included to indicate the presence of piles on this structure. The piles were not exposed for visual inspection. No indication of pile distress was noted in any substructure element.										
256			**Slope Protection**	2	2	ea.	2	0	0	0
(256) There were no significant defects noted for the riprap rocks with slurry in front of abutments.										
330			**Railing-Metal**	2	124	m	124	0	0	0
	515		**Steel Coating-Paint**	2	120	sq.m	120	0	0	0
(330) There were no significant defects noted.										
(330-515) There were no significant defects noted.										

WORK RECOMMENDATIONS

RecDate: 11/03/2010
Action : Scour-Place Counterm
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Fill the exposure of pierwalls #3 and #4 with boulders.

RecDate: 11/16/2006
Action : Deck-Methacrylate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate resin.

Team Leader : Young Chen

Report Author : Young Chen

Inspected By : Y.Chen/MM.Monajemi



11/8/2018

Young Chen (Registered Civil Engineer) (Date)

CC: Charlie Ineichen

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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 03.59 SEC
(17) LONGITUDE 117 DEG 29 MIN 11.67 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- NONE CODE 0
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2800
(30) YEAR OF ADT 2008 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.7 M
(49) STRUCTURE LENGTH 54.5 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.2 M
(52) DECK WIDTH OUT TO OUT 12.4 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.2 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 66.0
STATUS
HEALTH INDEX 54.0
PAINT CONDITION INDEX = 100.0

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 5
(59) SUPERSTRUCTURE 5
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 99.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 60.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 5
(68) DECK GEOMETRY 6
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4150
(115) YEAR OF FUTURE ADT 2036

********** INSPECTIONS **********

(90) INSPECTION DATE 09/18 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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Photo No. 1
ROADWAY VIEW LOOKING NORTHEAST



Photo No. 1
SIDE VIEW LOOKING NORTHWEST TOWARD SPANS 2 TO 4



Photo No. 1
SIDE VIEW TOWARD SPANS 1 TO 3, LOOKING WEST



Photo No. 1
SIDE VIEW TOWARD SPANS 4 AND 5, LOOKING NORTH



Photo No. 1
A MINOR SPALL ON THE TOP OF DECK NEAR NORTHERN ABUTMENT



Photo No. 1
TYPICAL DECK SURFACE CONDITION



Photo No. 1
EXPOSED FOOTING AT NORTHWESTERN END OF BENT 3



Photo No. 1
JOINT CONDITION ABOVE SOUTHERN ABUTMENT (ABUTMENT 1)



Photo No. 1
JOINT CONDITION ABOVE NORTHERN ABUTMENT (ABUTMENT 6)



Photo No. 1
UNDER VIEW TOWARD SOUTHERN ABUTMENT (ABUTMENT 1)



Photo No. 1
UNDER VIEW TOWARD BENT 2 (IN SPAN 2), LOOKING WEST



Photo No. 1
UNDER VIEW TOWARD SPAN 3, LOOKING WEST



Photo No. 1
UNDER VIEW TOWARD BENT 4 (IN SPAN 3), LOOKING NORTH



Photo No. 1
UNDER VIEW TOWARD BENT 5, LOOKING NORTH



Photo No. 1
UNDER VIEW TOWARD NORTHERN ABUTMENT (ABUTMENT 6), LOOKING NORTH

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 10/11/2016

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Modified: N/A
Length (m) : 54.6
Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (7 ft deep tremie concrete under all pier footings).

Span Configuration : (W) 37 ft, 3 @ 36 ft, 28 ft (E) c/c

SAFE LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: RF=1.86 =>60.3 metric tons Calculation Method: LOAD FACTOR
Operating Rating: RF=3.08 =>99.8 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.5 ft br, 40 ft, 0.5 ft br (S)

Total Width: 12.5 m Net Width: 12.3 m No. of Lanes: 2 Speed: 25 mph
Min. Vertical Clearance: Unimpaired AC Thickness: 0.0 Inches

Rail Code: 1000

Rail Type	Location	Length (ft)	Rail Modifications
Type 117	Right/Left	384	

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

NOTICE

The bridge inspection condition assessment used for this inspection is based on the American Association of State Highway and Transportation Officials (AASHTO) Bridge Element Inspection Manual 2013 as defined in Moving Ahead for Progress in the 21st Century (MAP-21) federal law. The new element inspection methodology may result in changes to related condition and appraisal ratings on the bridge without significant physical changes at the bridge.

The element condition information contained in this report represents the current condition of the bridge based on the most recent routine and special inspections. Some of the notes presented below may be from an inspection that occurred prior to the date noted in this report. Refer to the Scope and Access section of this inspection report for a description of which portions of the bridge were inspected on this date.

INSPECTION COMMENTARY

SCOPE AND ACCESS

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INSPECTION COMMENTARY

A complete inspection of all visible bridge elements was performed, with and without binoculars.

The channel was dry at the time of inspection. All elements have been inspected.

MISCELLANEOUS

Most of the vehicles utilizing the bridge are trash trucks.

DECK AND ROADWAY

The concrete deck exhibits map pattern cracks, 1.2 mm to 1.5 mm (0.05 inch - 0.06 inch) wide at 0.2 m to 0.3 m (9 inch - 1 ft).
Previous work recommendation of performing deck methacrylate has not been completed at the time of inspection.

SUBSTRUCTURE

Graffiti appears on all pier walls and abutment walls.

At pierwall #3, the footing is exposed 0.5 m to 1.33 m (1.5 ft - 4.5 ft) on the East side.
At pierwall #4, the footing is exposed 1.0 m (3 ft) on the West side only.
At pierwall #5, the footing is exposed 0 m to 0.7 m (2 ft) on the West side only.

SAFE LOAD CAPACITY

A Load Rating Summary Sheet dated 1/21/2010 is on file for this structure. While this report does not include a check of that analysis, it does verify that the structural conditions observed during this inspection are consistent with those assumed in that analysis. The current rating is based on the BDS computer output dated 1/1/1988.

WATERWAY

Pierwall #3 has a pile of debris at the upstream (southerly) nose, 2 m or 6.5 ft wide.
Pierwall #4 has a pile of debris at the upstream (southerly) nose, 2.5 m or 8 ft wide.
Pierwall #5 has a pile of debris at the upstream (southerly) nose, 2 m or 6.5 ft wide.

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ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
38			Slab-RC	2	660	sq.m	19	0	641	0
	1080		Delamination/Spall/Patched Area	2	1		0	0	1	0
	1130		Cracking (RC and Other)	2	640		0	0	640	0

(38-1080)
The concrete deck exhibits 2 spalls (0.3 m x 0.2 m x 0.03 m or 1 ft x 8 inch x 1 inch) on westbound lane, closer to the East end.

(38-1130)
The concrete deck exhibits map pattern cracks, 1.2 mm to 1.5 mm (0.05 inch - 0.06 inch) wide at 0.2 m to 0.3 m (9 inch - 1 ft).

210			Pier Wall-RC	2	56	m	18	38	0	0
	6000		Scour	2	38		0	38	0	0

(210-6000)
At pierwall #3, the footing is exposed 0.5 m to 1.33 m (1.5 ft - 4.5 ft) on the East side.
At pierwall #4, the footing is exposed 1.0 m (3 ft) on the West side only.
At pierwall #5, the footing is exposed 0 m to 0.7 m (2 ft) on the West side only.

215			Abutment-RC	2	28	m	28	0	0	0

(215)
There were no significant defects noted. Typical hairline concrete cracks present.

227			Pile-RC	2	1	ea.	1	0	0	0

(227)
The pile element is included to indicate the presence of piles on this structure. The piles were not exposed for visual inspection. No indication of pile distress was noted in any substructure element.

256			Slope Protection	2	2	ea.	2	0	0	0

(256)
Rip rap rock with slurry. There were no significant defects noted.

330			Railing-Metal	2	124	m	124	0	0	0
	515		Steel Coating-Paint	2	120	sq.m	120	0	0	0

(330)
There were no significant defects noted.

(330-515)
There were no significant defects noted.

WORK RECOMMENDATIONS

RecDate: 11/03/2010
Action : Sub-Scour Mitigate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Fill the exposure of pierwalls #3 and #4 with boulders.

RecDate: 11/16/2006
Action : Deck-Methacrylate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate.

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Team Leader : Kenneth Q. Vo

Report Author : Kenneth Q. Vo

Inspected By : KQ.Vo/H.Vu

03/09/2017

Kenneth Q. Vo (Registered Civil Engineer) (Date)



CC: Charlie Ineichen

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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 03.59 SEC
(17) LONGITUDE 117 DEG 29 MIN 11.67 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2744
(30) YEAR OF ADT 2007 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 48.0
STATUS STRUCTURALLY DEFICIENT
HEALTH INDEX 46.5
PAINT CONDITION INDEX = 100.0

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 4
(59) SUPERSTRUCTURE 4
(60) SUBSTRUCTURE 5
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 99.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 60.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 4
(68) DECK GEOMETRY 6
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2033

********** INSPECTIONS **********

(90) INSPECTION DATE 10/16 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 10/22/2014

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened: N/A
Length (m) : 54.6

Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

SAFE LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: RF=1.86 =>60.3 metric tons Calculation Method: LOAD FACTOR
Operating Rating: RF=3.08 =>99.8 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width: 12.5 m Net Width: 12.3 m No. of Lanes: 2 Speed: 25 mph
Min. Vertical Clearance: Unimpaired

Rail Code: 1000

Rail Type	Location	Length (ft)	Rail Modifications
Type 117	Right/Left	384	

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

NOTICE

The bridge inspection condition assessment used for this inspection is based on the American Association of State Highway and Transportation Officials (AASHTO) Bridge Element Inspection Manual 2013 as defined in Moving Ahead for Progress in the 21st Century (MAP-21) federal law. The new element inspection methodology may result in changes to related condition and appraisal ratings on the bridge without significant physical changes at the bridge.

The element condition information contained in this report represents the current condition of the bridge based on the most recent routine and special inspections. Some of the notes presented below may be from an inspection that occurred prior to the date noted in this report. Refer to the Scope and Access section of this inspection report for a description of which portions of the bridge were inspected on this date.

INSPECTION COMMENTARY

SCOPE AND ACCESS
Visual inspection was used.
The channel was dry at inspection time. All elements have been inspected.

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INSPECTION COMMENTARY

REVISIONS
One encroachment added.

MISCELLANEOUS
Most of the vehicles utilizing the bridge are trash trucks.

DECK AND ROADWAY
The a/c is depressed 20 mm at eastbound departure.

SAFE LOAD CAPACITY
A Load Rating Summary Sheet dated 1/21/2010 is on file for this structure. While this report does not include a check of that analysis, it does verify that the structural conditions observed during this inspection are consistent with those assumed in that analysis. The current rating is based on the BDS computer output dated 1/1/1988.

WATERWAY
Pierwall #3 has a pile of debris at the upstream (southerly) nose, 2 m wide.
Pierwall #4 has a pile of debris at the upstream (southerly) nose, 2.5 m wide.
Pierwall #5 has a pile of debris at the upstream (southerly) nose, 2 m wide.

ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
38			**Slab-RC**	2	660	sq.m	19	640	1	0
	1080		**Delamination/Spall/Patched Area**	2	1		0	0	1	0
	1130		**Cracking (RC and Other)**	2	640		0	640	0	0
(38-1080)										
The concrete deck exhibits 2 spalls (0.3 m x 0.2 m x 0.03 m and 0.25 m x 0.2 m x 0.03 m) at westbound lane, close to east end.										
(38-1130)										
The concrete deck exhibits map cracking, 1.2 mm to 1.5 mm wide at 0.2 m to 0.3 m.										
210			**Pier Wall-RC**	2	56	m	18	38	0	0
	6000		**Scour**	2	38		0	38	0	0
(210-6000)										
At pierwall #3, the footing is exposed 0.5 m to 1.33 m (east side). At pierwall #4, the footing is exposed 1.0 m (west side only). At pierwall #5, the footing is exposed 0 m to 0.7 m (west side only, 10 m along footing).										
215			**Abutment-RC**	2	28	m	28	0	0	0
(215)										
There were no significant defects noted.										
227			**Pile-RC**	2	1	ea.	1	0	0	0
(227)										
The pile element is included to indicate the presence of piles on this structure. The piles were not exposed for visual inspection. No indication of pile distress was noted in any substructure element.										
256			**Slope Protection**	2	2	ea.	2	0	0	0

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ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
(256)										
There were no significant defects noted.										
330			Railing-Metal	2	124	m	124	0	0	0
	515		Steel Coating-Paint	2	120	sq.m	120	0	0	0
(330)										
There were no significant defects noted.										
(330-515)										
There were no significant defects noted.										

WORK RECOMMENDATIONS

RecDate: 11/03/2010
Action : Deck-Misc.
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 1 YEAR
DistTarget:
EA:
Level the a/c at eastbound departure (20 mm).

RecDate: 11/03/2010
Action : Sub-Scour Mitigate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Fill the exposure of pierwalls #3 and #4 with boulders.

RecDate: 11/16/2006
Action : Deck-Methacrylate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate.

Team Leader : George T. Zorapapel

Report Author : George T. Zorapapel

Inspected By : GT.Zorapapel/M.Zolfaghar

11/12/14

George T. Zorapapel (Registered Civil Engineer) (Date)

CC: Charlie Ineichen



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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER 56C0382
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 06 SEC
(17) LONGITUDE 117 DEG 29 MIN 09 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2744
(30) YEAR OF ADT 2004 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 78.0
STATUS
HEALTH INDEX 72.6
PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 6
(59) SUPERSTRUCTURE 6
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 99.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 60.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 6
(68) DECK GEOMETRY 6
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2032

********** INSPECTIONS **********

(90) INSPECTION DATE 10/14 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 10/16/2012

Bridge Inspection Report

Inspection Type
Routine [X] FC Underwater Special Other

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened: N/A
Length (m) : 54.6
Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: RF=1.86 =>60.3 metric tons Calculation Method: LOAD FACTOR
Operating Rating: RF=3.08 =>99.8 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width: 12.5 m Net Width: 12.3 m No. of Lanes: 2 Speed: 25 mph
Min. Vertical Clearance: Unimpaired

Rail Code: 1000

Rail Type	Location	Length (ft)	Rail Modifications
Type 117	Right/Left	384	

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

INSPECTION COMMENTARY

CONDITION OF STRUCTURE
The a/c is depressed 20 mm at eastbound departure.
The concrete deck exhibits:
* map cracking of moderate size and severe density.
* 2 spalls (0.3 m x 0.2 m x 0.03 m and 0.25 m x 0.2 m x 0.03 m) at westbound lane, close to east end.

There are no cracks on the soffit.

SCOUR
At pierwall #3, the footing is exposed 0.5 m to 1.2 m (east side).
At pierwall #4, the footing is exposed 1.0 m (west side only).
Pierwall #3 has a pile of debris at the upstream (southerly) nose, 2 m wide.
Pierwall #4 has a pile of debris at the upstream (southerly) nose, 2.5 m wide.
Pierwall #5 has a pile of debris at the upstream (southerly) nose, 2 m wide.

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INSPECTION COMMENTARY

The new channel cross section indicates a 1.31 m degradation at Bent #3 and a 1.68 m degradation at Bent #4 (since 2/24/2002).

MISCELLANEOUS
Most of the vehicles utilizing the bridge are trash trucks.
The channel was dry at inspection time. All elements have been inspected.

ELEMENT INSPECTION RATINGS

Elem No.	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
38	Concrete Slab - Bare	2	660	sq.m.	660	0	0	0	0
210	Reinforced Conc Pier Wall	2	56	m.	56	0	0	0	0
215	Reinforced Conc Abutment	2	28	m.	28	0	0	0	0
227	Reinforced Conc Submerged Pile	2	42	ea.	42	0	0	0	0
256	Slope Protection	2	2	ea.	2	0	0	0	0
330	Metal Bridge Railing - coated or uncoated	2	124	m.	124	0	0	0	0
358	Deck Cracking	2	1	ea.	0	0	1	0	0
361	Scour	2	1	ea.	1	0	0	0	0

WORK RECOMMENDATIONS

RecDate: 11/03/2010 Action : Deck-Misc. Work By: LOCAL AGENCY Status : PROPOSED	EstCost: StrTarget: 1 YEAR DistTarget: EA:		Level the a/c at eastbound departure (20 mm).
RecDate: 11/03/2010 Action : Sub-Scour Mitigate Work By: LOCAL AGENCY Status : PROPOSED	EstCost: StrTarget: 2 YEARS DistTarget: EA:		Fill the exposure of pierwalls #3 and #4 with boulders.
RecDate: 11/16/2006 Action : Deck-Methacrylate Work By: LOCAL AGENCY Status : PROPOSED	EstCost: StrTarget: 2 YEARS DistTarget: EA:		Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate.

CHANNEL X-SECTION

Side : Upstream
X-Section Date: 10/16/2012
Measured From : Slab (0.51m thick) soffit

Location	Horiz(m)	Vert(m)	Comments
Face of abutment 1	0.00	0.87	
Bottom of slope	2.70	2.58	
Bent 2	11.70	4.49	
	16.70	4.52	
Bent 3	22.60	6.01	1.31 m degradation since 2/24/2002
Bent 4	33.80	6.38	1.68 m degradation since 2/24/2002
Bent 5	44.80	5.45	
Bottom of slope	46.62	4.89	
Face of abutment 6	53.50	1.60	

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Team Leader : George T. Zorapapel

Report Author : George T. Zorapapel

Inspected By : GT.Zorapapel/M.Zolfaghar

George T. Zorapapel (Registered Civil Engineer)

CC: Charlie Ineichen



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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 06 SEC
(17) LONGITUDE 117 DEG 29 MIN 09 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2744
(30) YEAR OF ADT 2003 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 77.0
STATUS
HEALTH INDEX 100.0
PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 5
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 99.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 60.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 7
(68) DECK GEOMETRY 6
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2032

********** INSPECTIONS **********

(90) INSPECTION DATE 10/12 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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Structure Maintenance & Investigations

Structure Rating Summary Sheet

Bridge Number: 56C0382
Facility Carried: DAWSON CANYON ROAD
Location: 0.2 MI. NE/O TEMESCAL CYN
City:

Bridge Name: TEMESCAL WASH

Structural Element Rated: Continuous five span CIP/RC deck slab

Rating Summary

DESIGN LOADING	Rating Factor	Metric Tonnes	Structure	Critical Location: Control Element	Load Action	Location
Inventory:	1.86	60.3	Span #5	Slab	Ultimate Moment	Pct #6
Operating:	3.08	99.8	Span #5	Slab	Ultimate Moment	Pct #6

LEGAL RATING		Posting U.S. Tons				
Type 3 (25T):	1.00	Legal	Span #5	Slab	Ultimate Moment	Pct #6
Type 3S2 (36T):	1.00	Legal	Span #5	Slab	Ultimate Moment	Pct #6
Type 3-3 (40T):	1.00	Legal	Span #5	Slab	Ultimate Moment	Pct #6

PERMIT RATING		Permit Rating			
5 Axle Truck :	1.88	P	Slab	Ultimate Moment	Bent #4
7 Axle Truck :	1.88	P	Slab	Ultimate Moment	Bent #4
9 Axle Truck :	1.88	P	Slab	Ultimate Moment	Bent #4
11 Axle Truck:	1.88	P	Slab	Ultimate Moment	Bent #4
13 Axle Truck:	1.88	P	Slab	Ultimate Moment	Bent #4

RELEVANT LOAD RATING INFORMATION

NOTES:

Fc=1.3 Ksi, Fy=60 Ksi

Overlay Used In Rating: 0

Rating Method: Load Factor (LF) Inventory (65) — Load Factor (LF) Operating (63)

Analysis Tool Used: BDS Frame Rate

Rating/File Location: Bridge Book

Control Rating By: DSMI — Rating Date: 01/01/1988

Rating Checked By: DSMI

Rating Type: Calculated

Summary Prepared By: George T. Zorapapel — Summary Date: 11/21/2010

REGISTERED PROFESSIONAL ENGINEER
George T. Zorapapel
No. 46916
06/30/2011
CIVIL
STATE OF CALIFORNIA

George T. Zorapapel - Registered Engineer

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DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 11/03/2010
Inspection Type

Bridge Inspection Report

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened: N/A
Length (m) : 54.6
Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: 60.3 metric tonnes Calculation Method: LOAD FACTOR
Operating Rating: 99.8 metric tonnes Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width: 12.5 m Net Width: 12.3 m No. of Lanes: 2
Rail Description: Type 117 metal. Rail Code : 1000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

CONDITION TEXT

REVISIONS
The inventory rating was modified from 32.6 metric tonnes to 60.3 metric tonnes.
The operating rating was modified from 53.5 metric tonnes to 99.8 metric tonnes.

CONDITION OF STRUCTURE
The a/c is depressed 20 mm at eastbound departure.
The concrete deck exhibits:
* map cracking of moderate size and severe density.
* 2 small spalls at westbound lane, close to east end.

There are no cracks on the soffit.

SCOUR
At pierwall #3, the footing is exposed 0.85 m to 2.4 m (east side).
At pierwall #4, the footing is exposed 0.5 m.

MISCELLANEOUS

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CONDITION TEXT

Most of the vehicles utilizing the bridge are trash trucks.
The channel was dry at inspection time. All elements have been inspected.

ELEMENT INSPECTION RATINGS

F#	Elem	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
101	38	Concrete Slab - Bare	2	660	sq.m.	660	0	0	0	0
101	210	Reinforced Conc Pier Wall	2	56	m.	56	0	0	0	0
101	215	Reinforced Conc Abutment	2	28	m.	28	0	0	0	0
101	227	Reinforced Conc Submerged Pile	2	42	ea.	42	0	0	0	0
101	256	Slope Protection	2	2	ea.	2	0	0	0	0
101	330	Metal Bridge Railing - coated or uncoated	2	124	m.	124	0	0	0	0
101	358	Deck Cracking	2	1	ea.	0	0	1	0	0
101	361	Scour	2	1	ea.	1	0	0	0	0

WORK RECOMMENDATIONS

RecDate: 11/03/2010
Action : Deck-Misc.
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 1 YEAR
DistTarget:
EA:
Level the a/c at eastbound departure (20 mm).

RecDate: 11/03/2010
Action : Sub-Scour Mitigate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Fill the exposure of pierwalls #3 and #4 with boulders.

RecDate: 11/16/2006
Action : Deck-Methacrylate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate.

Inspected By : GT.Zorapapel/M.Zolfaghar

George T. Zorapapel (Registered Civil Engineer)



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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 06 SEC
(17) LONGITUDE 117 DEG 29 MIN 09 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2744
(30) YEAR OF ADT 2003 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 77.0
STATUS
HEALTH INDEX 100.0
PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 5
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 99.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 60.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 7
(68) DECK GEOMETRY 6
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2028

********** INSPECTIONS **********

(90) INSPECTION DATE 11/10 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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Photo No. 1
Roadway View Looking West



Photo No. 1
Elevation View Looking North

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 11/04/2008

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
[x]	[ ]	[ ]	[ ]	[ ]

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened: N/A
Length (m) : 54.6
Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: 32.6 metric tons Calculation Method: LOAD FACTOR
Operating Rating: 53.5 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3 N/A Type 3S2 N/A Type 3-3 N/A

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width: 12.5 m Net Width: 12.3 m No. of Lanes: 2
Rail Description: Type 117 metal. Rail Code : 1000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

CONDITION TEXT

REVISIONS
Smart flag 361 was added (State 1).
Encroachments added: 2 pipes.
The year of ADT was modified to 2003 from 1991. The ADT was modified to 2,744 from 2,000.

CONDITION OF STRUCTURE
The concrete deck exhibits:
* map cracking of moderate size and severe density.
* 2 small spalls at westbound lane, close to east end.

There are no cracks on the soffit.

SCOUR
At pierwall #3, the footing is exposed 1.0 m.
At pierwall #4, the footing is exposed 0.3 m.
At pierwall #5, the north end of footing is exposed 0.6 m.

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CONDITION TEXT

MISCELLANEOUS
Most of the vehicles utilizing the bridge are trash trucks.
The channel was dry at inspection time. All elements have been inspected.

ELEMENT INSPECTION RATINGS

F#Elem	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
101 38	Concrete Slab - Bare	2	660	sq.m.	660	0	0	0	0
101 210	Reinforced Conc Pier Wall	2	56	m.	56	0	0	0	0
101 215	Reinforced Conc Abutment	2	28	m.	28	0	0	0	0
101 227	Reinforced Conc Submerged Pile	2	42	ea.	42	0	0	0	0
101 256	Slope Protection	2	2	ea.	2	0	0	0	0
101 330	Metal Bridge Railing - coated or uncoated	2	124	m.	124	0	0	0	0
101 358	Deck Cracking	2	1	ea.	0	0	1	0	0
101 361	Scour	2	1	ea.	1	0	0	0	0

WORK RECOMMENDATIONS

RecDate: 11/16/2006
Action : Deck-Methacrylate
Work By: LOCAL AGENCY
Status : PROPOSED

EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:

Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate.

Inspected By : GT.Zorapapel/H.

REGISTERED PROFESSIONAL ENGINEER
GEORGE T. ZORAPAPEL
No. C46916
EXP. 6/30/09
STATE OF CALIFORNIA

Registered Civil Engineer

CC: Charlie Ineichen

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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 06 SEC
(17) LONGITUDE 117 DEG 29 MIN 09 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL-
TYPE- CODE
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2744
(30) YEAR OF ADT 2003 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR 0.0 M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 77.0
STATUS
HEALTH INDEX 100.0
PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 5
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********** LOAD RATING AND POSTING ********** CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 53.5
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 32.6
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 7
(68) DECK GEOMETRY 6
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2028

********** INSPECTIONS **********

(90) INSPECTION DATE 11/08 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 11/16/2006

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened: N/A
Length (m) : 54.6
Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: 32.6 metric tons Calculation Method: LOAD FACTOR
Operating Rating: 53.5 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3 N/A Type 3S2 N/A Type 3-3 N/A

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width: 12.5 m Net Width: 12.3 m No. of Lanes: 2
Rail Description: Type 117 metal. Rail Code : 1000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

CONDITION TEXT

REVISIONS
The truck ADT was modified from 60% to 80%.

CONDITION OF STRUCTURE
The concrete deck exhibits:
* map cracking of moderate size and severe density.
* 2 small spalls at westbound lane, close to east end.

There are no cracks on the soffit.

SCOUR
At pierwall #4, the footing is exposed 0.3 m.
At pierwall #5, the north end of footing is exposed 0.6 m.

MISCELLANEOUS
Most of the vehicles utilizing the bridge are trash trucks.
The water in the channel (span 3 only) was 0.3 m deep at inspection time. All elements

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CONDITION TEXT

have been inspected.

ELEMENT INSPECTION RATINGS

F#	Elem	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
101	38	Concrete Slab - Bare	2	660	sq.m.	660	0	0	0	0
101	210	Reinforced Conc Pier Wall	2	56	m.	56	0	0	0	0
101	215	Reinforced Conc Abutment	2	28	m.	28	0	0	0	0
101	227	Reinforced Conc Submerged Pile	2	42	ea.	42	0	0	0	0
101	256	Slope Protection	2	2	ea.	2	0	0	0	0
101	330	Metal Bridge Railing - coated or uncoated	2	124	m.	124	0	0	0	0
101	358	Deck Cracking	2	1	ea.	0	0	1	0	0

WORK RECOMMENDATIONS

RecDate: 11/16/2006
Action : Deck-Methacrylat
Work By: LOCAL AGENCY
Status : PROPOSED

EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:

Clean the concrete deck and fill the cracks by coating the bridge deck with methacrylate.

Inspected By : G.Zorapapel / Huy Vu



Registered Civil Engineer

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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 06 SEC
(17) LONGITUDE 117 DEG 29 MIN 09 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL-
TYPE- CODE
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2000
(30) YEAR OF ADT 1991 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR 0.0 M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 77.0
STATUS
HEALTH INDEX 100.0
PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 5
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 53.5
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 32.6
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 7
(68) DECK GEOMETRY 7
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2018

********** INSPECTIONS **********

(90) INSPECTION DATE 11/06 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: DAWSON CANYON ROAD
Location : 0.2 MI. NE/O TEMESCAL CY
City :
Inspection Date : 11/08/2004

Bridge Inspection Report

Inspection Type

Routine	Group A	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened: N/A
Length (m) : 54.6

Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load: MS-18 OR HS-20
Inventory Rating: 32.6 metric tons Calculation Method: LOAD FACTOR
Operating Rating: 53.5 metric tons Calculation Method: LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3 N/A Type 3S2 N/A Type 3-3 N/A

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width: 12.5 m Net Width: 12.3 m No. of Lanes: 2
Rail Description: Type 117 metal. Rail Code : 1000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

CONDITION TEXT

CONDITION OF STRUCTURE
Unsealed cracks exist in the concrete deck which are of moderate size and density.

Otherwise, the structure is in good condition.

MISCELLANEOUS
Most of the vehicles utilizing the bridge are trash trucks.

ELEMENT INSPECTION RATINGS

#	lem	Element Description	nv	otal Units		Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01	38	Concrete Slab - Bare	2	660	sq.m.	660	0	0	0	0
01	210	Reinforced Conc Pier Wall	2	56	m.	56	0	0	0	0
01	215	Reinforced Conc Abutment	2	28	m.	28	0	0	0	0
01	227	Reinforced Conc Submerged Pile	2	42	ea.	42	0	0	0	0

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#	lem	Element Description	nv	otal Units		Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01	256	Slope Protection	2	2	ea.	2	0	0	0	0
01	330	Metal Bridge Railing - coated or uncoated	2	124	m.	124	0	0	0	0
01	358	Deck Cracking	2	1	ea.	0	0	1	0	0

WORK RECOMMENDATIONS - NONE

Inspected By : M. Ogata

M. Ogata

Registered Civil Engineer

CC: WLindsey



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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- DAWSON CANYON ROAD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 06 SEC
(17) LONGITUDE 117 DEG 29 MIN 09 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT CODE
TYPE- SLAB $_{2}$01
(44) STRUCTURE TYPE APPR:MATERIAL- CODE
TYPE-
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 2000
(30) YEAR OF ADT 1991 (109) TRUCK ADT 60 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0.0 M RIGHT 0.0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- NOT REQUIRED CODE 1
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR 0.0 M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 77.0
STATUS
HEALTH INDEX = 100.0
PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 5
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

******** LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS-18 OR HS-20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 53.5
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 32.6
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 7
(68) DECK GEOMETRY 7
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2018

********** INSPECTIONS **********

(90) INSPECTION DATE 11/04 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

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DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: EL SBRTE LNDFL RD
Location : 0.2 MI. NE/O TEMESCAL CYN
City :
Inspection Date : 11/05/2002

Bridge Inspection Report

Inspection Type

Routine	Group A	Underwater	Special	Other
X				

STRUCTURE NAME: TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened : N/A
Length (m) : 54.6
Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Structure Description: Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load : MS - 18 OR HS - 20
Inventory Rating : 32.6 metric tons Calculation Method : LOAD FACTOR
Operating Rating : 53.5 metric tons Calculation Method : LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3 N/A Type 3S2 N/A Type 3-3 N/A

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width : 12.5 m Net Width : 12.3 m No. of Lanes : 2
Rail Description : Type 117 metal. Rail Code : 1000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description : Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

CONDITION OF STRUCTURE

Unsealed cracks exist in the concrete deck which are of moderate size and density.

The structure is in good condition.

SCOUR

The top of the pile cap is no longer exposed at the most easterly pier.

MISCELLANEOUS

Most of the vehicles utilizing the bridge are trash trucks.

ELEMENT INSPECTION RATINGS

F# Elem No.	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01 38	Concrete Slab - Bare	2	660	sq.m.	660	0	0	0	0
01 210	Reinforced Conc Pier Wall	2	56	m.	56	0	0	0	0
01 215	Reinforced Conc Abutment	2	28	m.	28	0	0	0	0
01 227	Reinforced Conc Submerged Pile	2	42	ea.	42	0	0	0	0

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F# Elem No.	Element Description	Env	Total Units Qty		Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01 256	Slope Protection	2	2	ea.	2	0	0	0	0
01 330	Metal Bridge Railing - Uncoated	2	124	m.	124	0	0	0	0
01 358	Deck Cracking	2	1	ea.	0	0	1	0	
01 361	Scour	2	1	ea.	0	1	0	0	0

WORK RECOMMENDATIONS - NONE

Inspected By : M. Ogata

M. Ogata

Registered Civil Engineer



CC: TMRut
Riverside County
WLindsey

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STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **56C0382**
(5) INVENTORY ROUTE(ON/UNDER)- ON 140000000
(2) HIGHWAY AGENCY DISTRICT 08
(3) COUNTY CODE 065 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- TEMESCAL WASH
(7) FACILITY CARRIED- EL SBRTE LNDFL RD
(9) LOCATION- 0.2 MI. NE/O TEMESCAL CYN
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 47 MIN 06 SEC
(17) LONGITUDE 117 DEG 29 MIN 09 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- CONCRETE CONT
TYPE- SLAB CODE 201
(44) STRUCTURE TYPE APPR:MATERIAL-
TYPE- SLAB CODE
(45) NUMBER OF SPANS IN MAIN UNIT 5
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1988
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES: ON STRUCTURE 02 UNDER STRUCTURE
(29) AVERAGE DAILY TRAFFIC 2000
(30) YEAR OF ADT 1998 (109) TRUCK ADT 80 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 11.9 M
(49) STRUCTURE LENGTH 54.6 M
(50) CURB OR SIDEWALK: LEFT 0 M RIGHT 0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 12.3 M
(52) DECK WIDTH OUT TO OUT 12.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 9.8 M
(33) BRIDGE MEDIAN- CLOSED (NO BARRIER) 2
(34) SKEW 25 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 12.3 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0 M
(56) MIN LAT UNDERCLEAR LT 0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- NOT REQUIRED CODE 1
(39) NAVIGATION VERTICAL CLEARANCE 0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR 0 M
(40) NAVIGATION HORIZONTAL CLEARANCE 0 M

****

SUFFICIENCY RATING = 77.0
STATUS
HEALTH INDEX 100.0
PAINT CONDITION INDEX N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- LOCAL RURAL 09
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- COUNTY HIGHWAY AGENCY 02
(22) OWNER- COUNTY HIGHWAY AGENCY 02
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 5
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 6
(61) CHANNEL & CHANNEL PROTECTION 8
(62) CULVERTS N

******** LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- MS - 18 OR HS - 20 5
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 53.5
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 32.6
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 6
(68) DECK GEOMETRY 7
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 1000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2018

********** INSPECTIONS **********

(90) INSPECTION DATE 11/02 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO -1 MO A)
B) UNDERWATER INSP- NO -1 MO B)
C) OTHER SPECIAL INSP- NO -1 MO C)

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DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : **56C0382**
Facility Carried: **EL SBRTE LNDFL RD**
Location : **0.2 MI NE TEMESCAL CYN R**
City :
Inspection Date : **02/24/2002**

Inspection Type

Routine	Group A	Underwater	Special	Other
☐	☐	☐	☐	☒

Bridge Inspection Report

Name : TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened : N/A
Length (m) : 54.6

Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Description of Structure : Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load : MS - 18 OR HS - 20
Inventory Rating : 32.6 metric tons — Calculation Method : LOAD FACTOR
Operating Rating : 53.5 metric tons — Calculation Method : LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3 N/A english tons Type 3S2 N/A english tons Type 3-3 N/A english tons

DESCRIPTION ON STRUCTURE

Bridge width : (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width : 12.5 m — Net Width : 12.30 m — No. of Lanes : 2
Rail Description : Type 117 metal. — Rail Code : 1000
Min. Vertical Clearance : Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description : Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

HISTORY

On the 10/1/1996 inspection report, it was stated that a local scour has developed in the upstream end of the bridge, starting at about 7 m south of the south edge of the pier walls to about 2 m north of the south edge of the pier wall. Depth of the local scour was from about 2 m in the south end to about 0.6 m in the north end.

The structure has been given an Element Level Inspection 361 Code, Scour Smart Flag, Condition State of 2: "Scour exists at the bridge site and if left unchecked could adversely impact the structural integrity of the bridge."

REVISIONS

The National Bridge Inventory Item 113 Code has been revised from 6 to 5.

SCOUR

This report addresses hydraulic issues only. The structure's scour potential has been assessed in accordance with the Federal Highway Administration Technical Advisory T5140.23, "Evaluating Scour at Bridges". The National Bridge Inventory Item 113 Code, "Vulnerability to Scour", has been changed to 5: "Bridge foundations determined to be stable for assessed or calculated scour conditions; scour is determined to be within the limits of footings or piles by assessment, by calculations or by installation of properly designed countermeasures."

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OCT - 2 2002

Bridge No.: 56C0382 Location: 0.2 MI NE TEMESCAL CYN R Inspection Date: 24-FEB-2002

This evaluation is based on a field investigation and an office review of maintenance records and As-Built plans. A channel cross-section was measured along the upstream edge of deck during field reconnaissance and is attached for comparison purposes. There was no water flowing at the time of inspection. Some of the Rock Slope Protection at the slopes of both abutments has washed into the channel. Vegetation was observed both upstream and downstream of the structure. There were holes approximately 0.5 m on the upstream side of Piers 3 & 4. The Pier 5 footing was exposed approximately 0.6 m.

A comparison of cross-sectional data indicates the significant sign of degradation.

The result of the detailed review required a stability analysis. Therefore, Anthony Gugino (916-227-8866) of the Division of Structure & Maintenance - Ratings conducted a stability rating analysis based on the total predicted scour conditions. This analysis revealed the structure is not scour critical.

RECOMMENDATIONS

Scour and degradation should be monitored in regular intervals. If the bottom of the tremie footing becomes exposed, the Division of Structure & Maintenance-Ratings should be contacted.

Inspected By : Hubert Dang

Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
GERHARD PANUSCHKA
No. C052670
Exp. 12-31-02
CIVIL
STATE OF CALIFORNIA

CC : TMRut, Maintenance
Steve Jaques, Hydraulics
Gerhard Panuschka, Hydraulics
M. Ogata, ABME
Anthony Gugino, Ratings
Riverside County

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OCT - 2 2002

Bridge No.: 56C0382 Location: 0.2 MI NE TEMESCAL CYN R Inspection Date: 24-FEB-2002

CHANNEL X-SECTION

Side : Upstream X-Section Date : 24-FEB-02

Measured From : top of deck (0.5 m)

Location	Horiz(m)	Vert(m)	Comments
Abutment 1	0.00	1.11	Face of Abutment 1
	3.00	3.11	
	8.50	3.71	
Pier 2	11.70	5.01	Centerline of Pier 2
	18.60	4.81	
Pier 3	22.60	5.21	Centerline of Pier 3
	31.20	5.11	
Pier 4	33.80	5.21	Centerline of Pier 4
	39.70	5.61	
Pier 5	44.80	6.06	Centerline of Pier 5
	47.50	5.06	
	51.50	2.41	
Abutment 6	53.50	1.61	Face of Abutment 6

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OCT - 2 2002

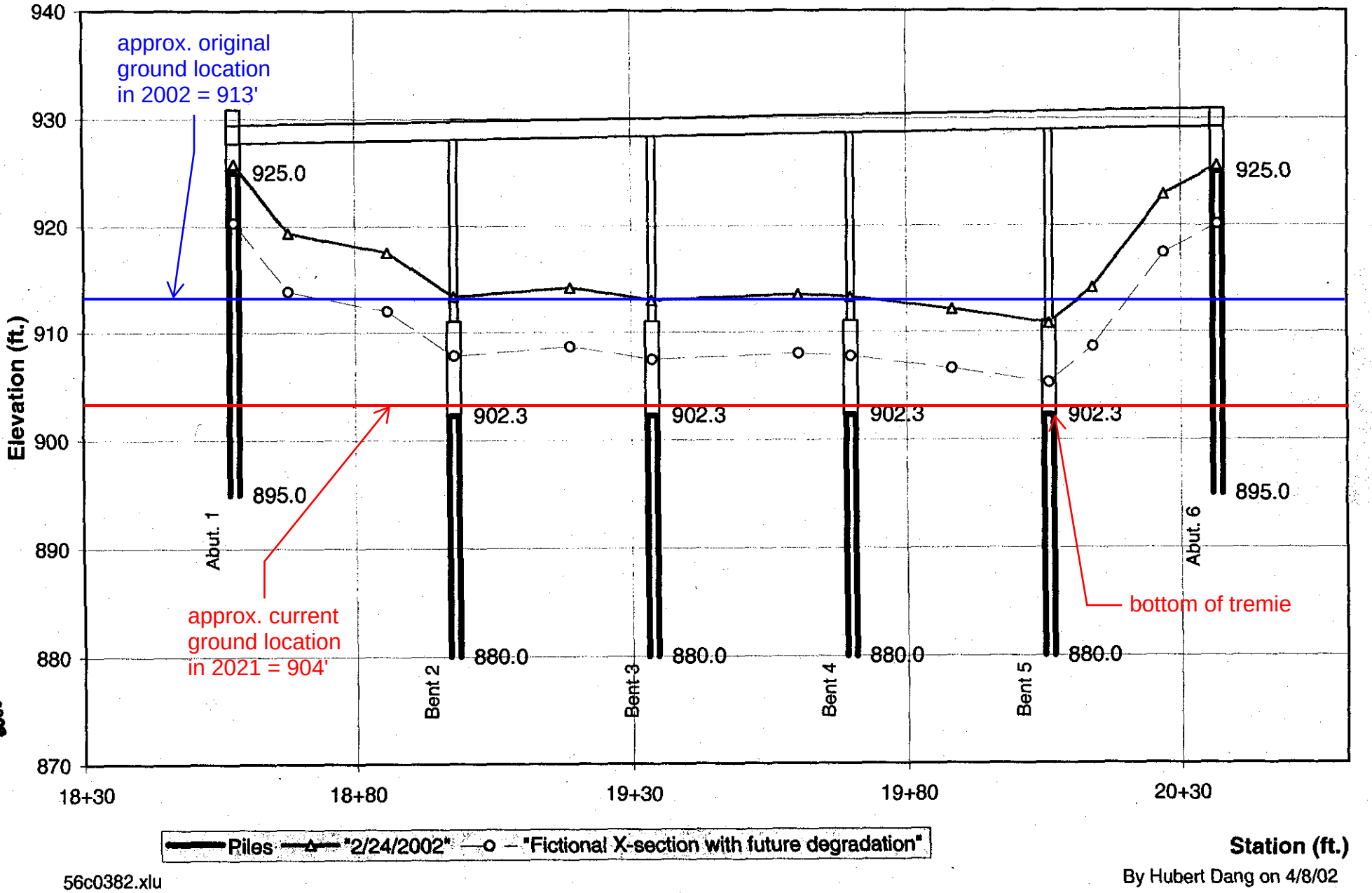
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CHANNEL CROSS SECTION

Bridge ID: 56c0382

Temescal Wash - Upstream

8-RIV-CR



OCT - 2 2002

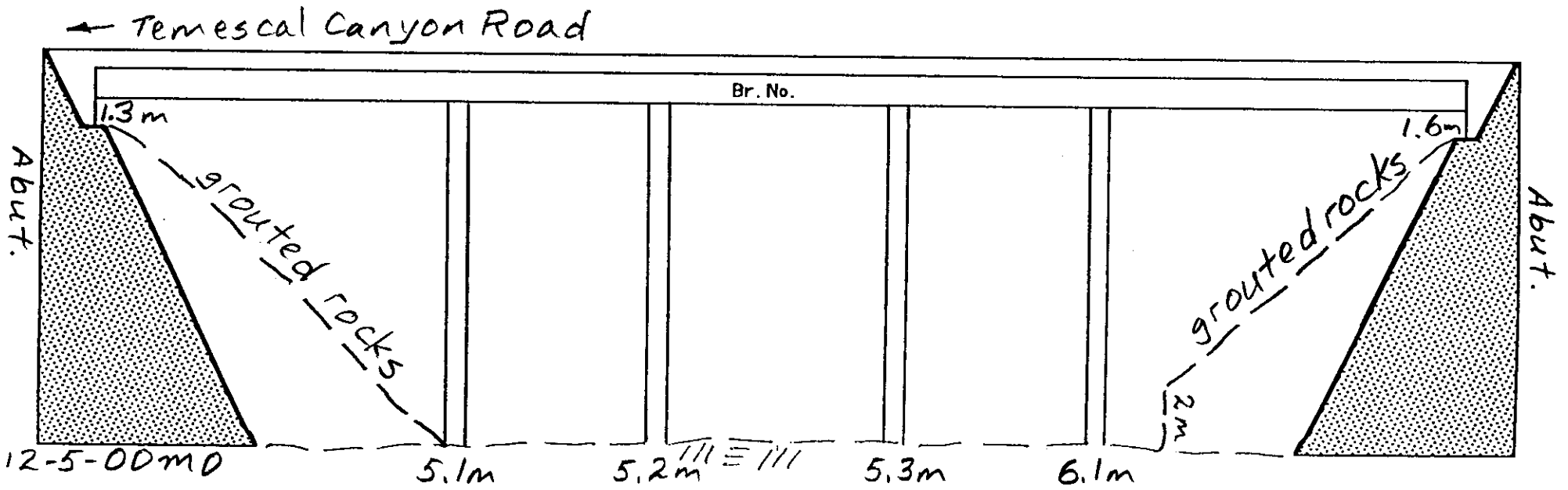
56c0382.xlu

By Hubert Dang on 4/8/02

Therefore, the total scour that has occurred from 2002 to 2021 is approx. 9' total.

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CHANNEL SECTION



Looking downstream(N) at south EOD.
Measured to top of concrete deck.

BR. NO. 56C-382
BR. NAME Temescal Wash
LOCATION 8-Riv-CR
Dist.-Co.-Rte.-PM-City
BY M. OGATA
DATE 12-5-00

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 56C0382
Facility Carried: EL SBRTE LNDFL RD
Location : 0.2 MI NE TEMESCAL CYN R
City :
Inspection Date : 05-DEC-00

Bridge Inspection Report

Inspection Type

Routine	Group A	Underwater	Special	Other
X				

Name : TEMESCAL WASH

CONSTRUCTION INFORMATION

Year Built : 1988
Year Widened : N/A
Length (m) : 54.6

Skew (degrees): 25
No. of Joints : 0
No. of Hinges : 0

Description of Structure : Continuous five span CIP/RC deck slab with RC pier walls and with RC open end diaphragm abutments, all supported upon concrete piles. (2.1 m deep tremie concrete under all pier footings).

Span Configuration : (W) 11.3 m, 3 @ 11.0 m, 8.5 m (E) c/c

LOAD CAPACITY AND RATINGS

Design Live Load : MS - 18 OR HS - 20
Inventory Rating : 32.6 metric tons — Calculation Method : LOAD FACTOR
Operating Rating : 53.5 metric tons — Calculation Method : LOAD FACTOR
Permit Rating : PPPPP
Posting Load : Type 3 N/A english tons Type 3S2 N/A english tons Type 3-3 N/A english tons

DESCRIPTION ON STRUCTURE

Bridge width : (N) 0.2 m br, 12.2 m, 0.2 m br (S)

Total Width : 12.5 m — Net Width : 12.30 m — No. of Lanes : 2
Rail Description : Type 117 metal. — Rail Code : 1000
Min. Vertical Clearance : Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description : Natural gravelly cobbled earth trapezoidal with grouted rock slopes through the site.

CONDITION OF STRUCTURE

The structure is in good condition.

SCOUR

The top of the pile cap is exposed at the most easterly pier.

ELEMENT LEVEL INSPECTION RATINGS

F#	Elem No.	Element Description	Env	Total Quantity	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01	38	Concrete Slab - Bare	2	660	sq.m.	660	0	0	0	0
01	210	Reinforced Conc Pier Wall	2	56	m.	56	0	0	0	
01	215	Reinforced Conc Abutment	2	28	m.	28	0	0	0	0
01	227	Reinforced Conc Submerged Pile	2	42	ea.	42	0	0	0	0
01	256	Slope Protection	2	2	ea.	2	0	0	0	0
01	330	Metal Bridge Railing - Uncoated	2	124	m.	124	0	0	0	
01	361	Scour	2	1	ea.	0	1	0	0	0

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Bridge No.: 56C0382 Location: 0.2 MI NE TEMESCAL CYN R Inspection Date: 05-DEC-00

WORK RECOMMENDATIONS

Backfill local scour and grade wash to ensure unobstructed flow of water under the bridge .

Item#	Rec. Date	Work By	Work Id.	Prog. Method	Cost
1	01-OCT-1996	County Agency	40382X96275X		

Inspected By : m. ogata

M. Ogata

Registered Civil Engineer



CC : TMRut
Riverside County
PRAskelson

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Bridge No.: 56C0382 Location: 0.2 MI NE TEMESCAL CYN R Inspection Date: 05-DEC-00

STRUCTURE INVENTORY AND APPRAISAL REPORT

IDENTIFICATION

(1)	STATE NAME - CALIFORNIA	069
(8)	STRUCTURE NUMBER	56C0382
(5)	INVENTORY ROUTE(ON/UNDER) - ON	1 40 00000N
(2)	HIGHWAY AGENCY DISTRICT	08
(3)	COUNTY CODE 065 (4) PLACE CODE	00000
(6)	FEATURE INTERSECTED - TEMESCAL WASH	
(7)	FACILITY CARRIED - EL SBRTE LNDFL RD	
(9)	LOCATION - 0.2 MI NE TEMESCAL CYN R	
(11)	MILEPOINT/KILOMETERPOINT	0
(12)	BASE HIGHWAY NETWORK - NOT ON NET	0
(13)	LRS INVENTORY ROUTE & SUBROUTE	
(16)	LATITUDE	33 DEG 47 MIN 06 SEC
(17)	LONGITUDE	117 DEG 29 MIN 09 SEC
(98)	BORDER BRIDGE STATE CODE % SHARE	%
(99)	BORDER BRIDGE STRUCTURE NUMBER	

STRUCTURE TYPE AND MATERIAL

(43)	STRUCTURE TYPE MAIN: MATERIAL - CONCRETE CONT	
	TYPE - SLAB CODE	2 01
(44)	STRUCTURE TYPE APPR: MATERIAL -	
	TYPE - CODE	
(45)	NUMBER OF SPANS IN MAIN UNIT	5
(46)	NUMBER OF APPROACH SPANS	0
(107)	DECK STRUCTURE TYPE CIP CONCRETE	CODE 1
(108)	WEARING SURFACE / PROTECTIVE SYSTEM:	
	A) TYPE OF WEARING SURFACE - CONCRETE	CODE 1
	B) TYPE OF MEMBRANE - NONE	CODE 0
	C) TYPE OF DECK PROTECTION - NONE	CODE 0

AGE AND SERVICE

(27)	YEAR BUILT	1988
(106)	YEAR RECONSTRUCTED	0000
(42)	TYPE OF SERVICE: ON - HIGHWAY	1
	UNDER - WATERWAY	5
(28)	LANES: ON STRUCTURE 02 UNDER STRUCTURE	
(29)	AVERAGE DAILY TRAFFIC	2000
(30)	YEAR OF ADT 1998 (109) TRUCK ADT	80%
(19)	BYPASS, DETOUR LENGTH	199 KM

GEOMETRIC DATA

(48)	LENGTH OF MAXIMUM SPAN	11.9 M
(49)	STRUCTURE LENGTH	54.6 M
(50)	CURB OR SIDEWALK: LEFT 0 M RIGHT	0 M
(51)	BRIDGE ROADWAY WIDTH CURB TO CURB	12.3 M
(52)	DECK WIDTH OUT TO OUT	12.5 M
(32)	APPROACH ROADWAY WIDTH (W/SHOULDERS)	9.8 M
(33)	BRIDGE MEDIAN - CLOSED (NO BARRIER)	2
(34)	SKEW 25 DEG (35) STRUCTURE FLARED	NO
(10)	INVENTORY ROUTE MIN VERT CLEAR	99.99 M
(47)	INVENTORY ROUTE TOTAL HORIZ CLEAR	12.3 M
(53)	MIN VERT CLEAR OVER BRIDGE RDWY	99.99 M
(54)	MIN VERT UNDERCLEAR REF - NOT H/RR	0 M
(55)	MIN LAT UNDERCLEAR RT REF - NOT H/RR	0 M
(56)	MIN LAT UNDERCLEAR LT	0 M

NAVIGATION DATA

(38)	NAVIGATION CONTROL - NOT APPLICABLE	CODE N
(111)	PIER PROTECTION - NOT REQUIRED	CODE 1
(39)	NAVIGATION VERTICAL CLEARANCE	0 M
(116)	VERT-LIFT BRIDGE NAV MIN VERT CLEAR	0 M
(40)	NAVIGATION HORIZONTAL CLEARANCE	0

SUFFICIENCY RATING = 78.0

STATUS =

HEALTH INDEX = 100

CLASSIFICATION

		CODE
(112)	NBIS BRIDGE LENGTH - YES	Y
(104)	HIGHWAY SYSTEM - NOT ON NHS	0
(26)	FUNCTIONAL CLASS - LOCAL RURAL	09
(100)	DEFENSE HIGHWAY - NOT STRAHNET	0
(101)	PARALLEL STRUCTURE - NONE EXISTS	N
(102)	DIRECTION OF TRAFFIC - 2 WAY	2
(103)	TEMPORARY STRUCTURE -	
(105)	FEDERAL LANDS HIGHWAY - NOT APPLICABLE	0
(110)	DESIGNATED NATIONAL NETWORK - NOT ON NET	0
(20)	TOLL - ON FREE ROAD	3
(21)	MAINTAIN - COUNTY HIGHWAY AGENCY	2
(22)	OWNER - COUNTY HIGHWAY AGENCY	2
(37)	HISTORICAL SIGNIFICANCE - NOT ELIGIBLE	5

CONDITION

		CODE
(58)	DECK	7
(59)	SUPERSTRUCTURE	7
(60)	SUBSTRUCTURE	6
(61)	CHANNEL & CHANNEL PROTECTION	8
(62)	CULVERTS	N

LOAD RATING AND POSTING

		CODE
(31)	DESIGN LOAD - MS - 18 OR HS - 20	5
(63)	OPERATING RATING METHOD - LOAD FACTOR	1
(64)	OPERATING RATING -	53.5
(65)	INVENTORY RATING METHOD - LOAD FACTOR	1
(66)	INVENTORY RATING -	32.6
(70)	BRIDGE POSTING - Equal to or above legal loads	5
(41)	STRUCTURE OPEN, POSTED OR CLOSED -	A
	DESCRIPTION - OPEN, NO RESTRICTION	

APPRAISAL

		CODE
(67)	STRUCTURAL EVALUATION	6
(68)	DECK GEOMETRY	7
(69)	UNDERCLEARANCES, VERTICAL & HORIZONTAL	N
(71)	WATER ADEQUACY	9
(72)	APPROACH ROADWAY ALIGNMENT	6
(36)	TRAFFIC SAFETY FEATURES	1000
(113)	SCOUR CRITICAL BRIDGES	6

PROPOSED IMPROVEMENTS

(75)	TYPE OF WORK -	CODE
(76)	LENGTH OF STRUCTURE IMPROVEMENT	M
(94)	BRIDGE IMPROVEMENT COST	
(95)	ROADWAY IMPROVEMENT COST	
(96)	TOTAL PROJECT COST	
(97)	YEAR OF IMPROVEMENT COST ESTIMATE	
(114)	FUTURE ADT	2500
(115)	YEAR OF FUTURE ADT	2010

INSPECTIONS

(90)	INSPECTION DATE 12/00	(91) FREQUENCY	24 MO
(92)	CRITICAL FEATURE INSPECTION:		(93) CFI DATE
	A) FRACTURE CRIT DETAIL - NO	-1 MO	A)
	B) UNDERWATER INSP - NO	-1 MO	B)
	C) OTHER SPECIAL INSP - NO	-1 MO	C)

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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES

SUPPLEMENTARY BRIDGE REPORT

DS-M19 (REV. 2/93)

Bridge Number 56C-382

Location 8 - Riv - CR
Dist.-Co.-Rte.-City

Date of Investigation October 1, 1996

TYPE OF INVESTIGATION/REPORT			
BIENNIAL	X	DAMAGE	
CATEGORY A		OTHER	
UNDERWATER		OFFICE	

Name **TEMESCAL WASH (El Sobrante Landfill Road, 0.2 mile northeast of Temescal Canyon Road)**

CONDITION RATINGS:
Element Level Inspection (ELI) form attached.

Channel & Channel Protection: 8

CONDITION OF STRUCTURE:

A local scour has developed in the upstream end of the bridge, starting at about 7 meters south of the south edge of the pier walls to about 2 meters north of the south edge of the pier walls. Depth of the local scour is from about 2 meters in the south end to about 0.60 m in the north end.

WORK RECOMMENDED:

Backfill local scour and grade wash to ensure unobstructed flow of water under the bridge.

ENCROACHMENT:

One 63 mm and one 125 mm steel pipe suspended under bridge slab about 4 meters from north edge.

M. Hadi Behrooj

By

G. P. Balinghasay

REGISTERED PROFESSIONAL ENGINEER
MOHAMMAD HADI BEHROOJ
No. C 41777
Exp. MAR 3 1 2000
CIVIL
STATE OF CALIFORNIA

GPB:cd
cc: TMRut
Riverside County

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Bridge No. 56C-382

Name TEMESCAL WASH (El Sobrante Landfill Road, 0.2 mile northeast of Temescal Canyon Road) **Location** 8-Riv-CR
Dist.-Co.-Rte.-City

SUMMARY OF ENCROACHMENTS

Permit No. and Permittee	Date	Description & Location on Bridge
	Prior to 10-1-96	1 - 63 mm and 1 - 125 mm steel pipe suspended under bridge slab about 4 meters from north edge.

HBD M 30

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********** STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **********

ELEMENT LEVEL INSPECTION-(ELI)

BRIDGE NUMBER: 56C0382 (1–8) | FRAME: 01 (9) | INSPECTION DATE: 100196 (11–16)

INFORMATION ONLY - NOT FOR UPDATE

SCOUR CRITICAL..... NO
GROUP A INVESTIGATION..... NO
FRACTURE CRITICAL..... NO
ELIGIBLE FOR RAIL UPGRADE.. NO
UNDERWATER INVESTIGATION... NO

DISTRICT 08
COUNTY RIV
ROUTE
POSTMILE
NAME

DEL	ELE #	ELEMENT DESCRIPTION	ENV	TOTAL QUANTITY	UNITS	QUANT CONDITION STATE 1	QUANT CONDITION STATE 2	QUANT CONDITION STATE 3	QUANT CONDITION STATE 4	QUANT CONDITION STATE 5
	38	CONCRETE SLAB - BARE	2	1	EA	1				
	210	REINFORCED CONCRETE PIER WALL	2	55	M	55				
	215	REINFORCED CONCRETE ABUTMENT	2	28	M	28				
	227	REINFORCED CONCRETE SUBMERGED PILE	2	42	EA	X				
	256	SLOPE PROTECTION	2	2	EA	2				
	330	METAL BRIDGE RAILING	2	125	M	125				
	361	SCOUR	2	1	EA		1			
18 19			22 23			28	33	38	43	48

10/08/96 56C SHAWN ZANGANEH

BY:

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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES

SUPPLEMENTARY BRIDGE REPORT

DS-M19 (REV. 2/93)

Bridge Number 56C-382

Location 8 - Riv - CR
Dist.-Co.-Rte.-City

Date of Investigation October 20, 1994

TYPE OF INVESTIGATION/REPORT			
BIENNIAL	X	DAMAGE	
CATEGORY A		OTHER	
UNDERWATER		OFFICE	

Name **TEMESCAL WASH (El Sobrante Landfill Road, 0.2 mile northeast of Temescal Canyon Road)**

CONDITION RATINGS:
Condition ratings of all bridge elements are shown on the PONTIS DATA FORM (Attachment A).

Channel & Channel Protection: 8

SCOUR CRITICAL:

The scour rating of A-3 is appropriate.

CONDITION OF STRUCTURE:

A. There are numerous transverse and longitudinal hairline crack in concrete bridge deck.

B. There is 600 mm to 900 mm (2' to 3') sediment accumulated at upstream channel.

With exception of above, the structure is in good condition.

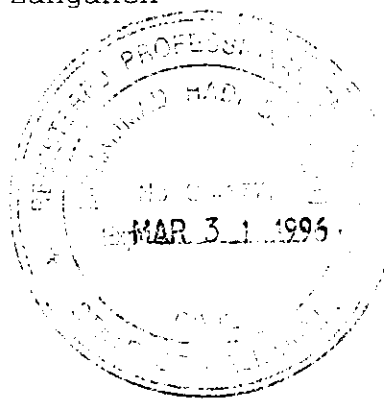
WORK RECOMMENDED:

Clean and seal hairline cracks by coating the entire deck with methacrylate.

M. H. Behrooj

By S. A. Zanganeh
S. A. Zanganeh

SAZ:cd
cc: CDHarris
Riverside County
WLindsey



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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

(ATTACHMENT A)

PONTIS DATA FORM - PIA

BRIDGE NUMBER	FRAME	INSPECTION DATE
56C0382	01	102094
1 – 8	9	11 – 16

INFORMATION ONLY - NOT FOR UPDATE

SCOUR CRITICAL	NO
CATEGORY A	NO
FRACTURE CRITICAL	NO
ELIGIBLE FOR RAIL UPGRADE	NO
UNDERWATER INSPECTION	NO

DISTRICT	08
COUNTY	RIV
ROUTE	
POSTMILE	
NAME	

DEL	ELE #	ELEMENT DESCRIPTION	ENV	TOTAL QUANTITY	UNITS	QUANT CONDITION STATE 1	QUANT CONDITION STATE 2	QUANT CONDITION STATE 3	QUANT CONDITION STATE 4	QUANT CONDITION STATE 5
	49	CONCRETE PIER WALL	2	55	M	55				
	51	CONCRETE ABUTMENT	2	28	M	28				
	101	METAL BRIDGE RAILING	2	125	M	125				
	138	CONCRETE SLAB - BARE	2	1	EA	1				
	202	DRIVEN CONC. FOUNDATION PILES	2	42	EA	X				
18	19		22	23		28	33	38	43	48

11/28/94

BY: Saz

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES

SUPPLEMENTARY BRIDGE REPORT

DS-M19 (REV. 8/92)

Bridge Number 56C-382

Location 8 - Riv- CR
Dist.-Co.-Rte.-City

Date of Investigation August 11, 1992

TYPE OF INVESTIGATION/REPORT			
BIENNIAL	X	DAMAGE	
CATEGORY A		OTHER	
UNDERWATER		OFFICE	

Name **TEMESCAL WASH (El Sobrante Landfill Road, 0.2 mile northeast of Temescal Canyon Road)**

CONDITION RATINGS:
Condition ratings of all bridge elements are shown on the PONTIS DATA FORM (Attachment A).

Channel & Channel Protection: 8

CONDITION OF STRUCTURE:

Condition of the structure is good.

Henry Ma

REGISTERED PROFESSIONAL ENGINEER
HENRY MA
No. C-36817
Exp. 6-30-96
CIVIL
STATE OF CALIFORNIA

HM:cd
cc: INagai (2)
County of Riverside

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PONTIS DATA FORM (PIA)

(ATTACHMENT A)

BRIDGE NUMBER	FRAME	INSPECTION DATE	INITIAL ASSESSMENT COMPLETE
56C0382	01	08-11-92	
1 8	9	11 13 15	17

DISTRICT 08
COUNTY RIV
ROUTE ***
POSTMILE *******
NAME

D E L	ELE #	ELEMENT DESCRIPTION	E N V	TOTAL QUANTITY	UNITS	QUANT CONDITION STATE 1	QUANT CONDITION STATE 2	QUANT CONDITION STATE 3	QUANT CONDITION STATE 4	QUANT CONDITION STATE 5
	49	CONCRETE PIER WALL; DRY	2	4	EA	4				
	051	CONCRETE ABUTMENT; DRY	2	2	EA	2				
	101	METAL BRIDGE RAILING	2	410	LF	410				
	138	CONCRETE SLAB - BARE	2	1	EA	1				
	202	DRIVEN CONC. FOUNDATION PILES	2	42	EA					
18	19		22	23		28	33	38	43	48

H. MA

BY: H.M.

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DEPARTMENT OF TRANSPORTATION

BRIDGE REPORT 15V51

DS-345R (REV. 1/91)

Bridge No. 56C - 382

Location 8 - Riv - CR
Dist Co Rte City

REVISED ORIGINAL REPORT

Date of Investigation February 1, 1991

Name TEMESCAL WASH (El Sobrante Landfill Road, 0.2 mile northeast of Temescal Canyon Road)

Lat. 33 °- 47.1'N **Long.** 117 °- 29.1'W

Custodian County of Riverside **Owner** County of Riverside

STRUCTURAL DATA AND HISTORY

Year Built 1988 **By** County of Riverside **Contract No.** Unknown

Designed by: Krieger & Stewart Inc. **Plans Avail. @** DOS

Description: Five span continuous CIP RC slab supported by RC pier walls and open end RC diaphragm abutments, all on concrete piles. (7' deep tremie concrete under all pier footings.)

Spans (W) 38', 3 @ 36', 30' (E)

Length 179' **NBIS Bridge Length** Yes **Skew** 25° Left

Number Of Intermediate Joints: **@Hinges** None **@Bents** None

Maximum Column/Pier Height: **(Less than 20')** X **(20'-29')** **(30' & Over)**

Design Live Load HS 20-44 & Alt. **Design Method** Unknown

DESCRIPTION - ON STRUCTURE

Bridge Width (S) 0.4'br, 40.2', 0.4'br (N)

Total Width 41' **Net Width** 40.2' **Lanes** 2 **Tracks** None

Median None **Rail Type** 117 1111

Vert. Clearance over deck Unimpaired **Appr. Rdwy. Width** 32'

Deck Type 1 **Wearing Surface/Prot. Sys.** 100 Concrete/None

Alignment Tangent

DESCRIPTION - UNDER STRUCTURE

Roadway Section None

Clearances: **Road:** **Vert.** **Horiz.Lt.** ; **Rt.**

Lanes **Tracks**

Facilities Crossed Temescal Wash

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Bridge No. 56C - 382
February 1, 1991

DESCRIPTION - HYDRAULICS

Channel Natural sandy channel with light vegetation

Navigable: Yes [ ] No [X] Clearances: Vert. Horiz.

Pier/Abutment Protection (For Navigation) [ ]

TRAFFIC INFORMATION	DECK	YEAR	UNDER	YEAR
Average Daily Traffic & Year :	2,000 est.	1991	N	
Average Daily Traffic (Future) :	2,500 est.	2010	N	
Average Daily Trucks (% OF ADT) :	80% est.		N	
Bypass Detour Length	99 miles		N	
Shell Route:	No		No	
Functional Classification :	09		N	

LOAD RATINGS: Inventory HS 37 Operating HS 61

Permit PPPPP Computation Method Load Factor

CONDITION RATINGS:

Deck [8] Superstructure [8] Substructure [8]

Channel & Channel Protection [8] Culvert [N] Widenable Yes

APPRAISAL RATINGS:

Waterway Adequacy [9] Approach Roadway Alignment [6]

Date of Revisions

CONDITION OF STRUCTURE:

Condition of the structure is good.

ENCROACHMENTS:

One 2 1/2" and one 5" steel pipe suspended under bridge slab about 12' from north edge.

Henry Ma

REGISTERED PROFESSIONAL ENGINEER
HENRY MA
No. C-36817
Exp. 6.30.92
CIVIL
STATE OF CALIFORNIA

HM:cd
cc: INagai (2)
County of Riverside

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DEPARTMENT OF TRANSPORTATION

BRIDGE REPORT

DS-M58 (REV. 1/81)

Bridge No. 56C-382

Other No.

P.U.C. No.

Location 8-Riv-CR
Dist - Co - Rte - PM - City

SEE REVISED ORIGINAL REPORT

Date of Investigation 2-16-89

Name TEMESCAL WASH (El Sobrante Landfill Road, 0.2 mile northeast of Temescal Canyon Road)

Lat. 33° 47.1'N Long. 117° 29.1' W

STRUCTURAL DATA AND HISTORY

Year Built 1988 By County of Riverside Contract No. Unknown

Date of Revisions

Designed by: B.D. [ ] Krieger & Stewart Inc. Plans Avail. @ B.D.

Description: 5 span continuous CIP/RC slab on RC pier walls and RC open end diaphragm abutments, all supported by concrete piles. (7' deep tremie under all pier footings).

Spans (W) 38.5', 3 @ 36', 29.5' (E)

Length 179' Skew 25° left Design LL HS 20-44 and alternative

Ratings: Inventory HS 20/Assigned Operating HS 33/Assigned Permit PPPPP/Assigned

DESCRIPTION – ON STRUCTURE (Shell Rte.: Yes [ ] No [X])

Bridge Width (S) 0.4'br, 40.2', 0.4'br (N)

Total Width 41' Lanes 2 Tracks N

Median None Rail Type Type 117 (1000)

Vert. Clearance over deck Unimpaired Appr. Rdwy. Width 32'

Wearing Surface None Deck Prot. Sys. None

Alignment Tangent

DESCRIPTION – UNDER STRUCTURE (Shell Rte.: Yes [ ] No [X])

Roadway Section None

Clearances: Vert. Horiz.; Lt. Rt.

Lanes Tracks Pumpplant: None [ ] See Br. No.

Facilities Crossed Temescal Wash

cc:

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DESCRIPTION – HYDRAULICS

Channel Unimproved sandy wash. GRSP under bridge abutments.

Navigable: Yes [ ] No [X] **Clearances:** Vert. ..... Horiz. .....

MAINTENANCE

Custodian County of Riverside **Owner** County of Riverside

ORIGINAL CONDITION RATING		ORIGINAL APPRAISAL	
Deck	8	Overall	8
Superstructure	8	Deck Geometry	8
Substructure & Pipes	8	Underclearances Vert.	N
Channel & Channel Protection	8	Horiz.	N
Retaining Walls	N	Safe Load Capacity	9
Approach Rdwy. Alignment	6	Waterway Adequacy	8
Estimated Remaining Life	50	Approach Rdwy. Alignment	6

Widenable? Yes [X] **No** [ ] **Conditional** [ ]

Action Required: Yes [ ] No [X]

Average Daily Traffic & Year 1,000 (Estimated 1989)

Posting Required: None [X] Load [ ] Speed [ ]

Bypass Detour Length 99 (none available)

Seismic Retrofit Not applicable.

CONDITION OF STRUCTURE:

The structure is new and is in good condition.

LOAD CAPACITY:

The ratings shown were assigned based on known factors (i.e., volume of traffic, year built, design live load, etc.) and condition of the structure.

ENCROACHMENT:

1-2½" GSP and 1-5" welded steel pipe suspended under bridge slab about 12' from north edge.

Henry Ma

REGISTERED PROFESSIONAL ENGINEER
HENRY MA
No. C-36817
Exp. 6-30-92
CIVIL
STATE OF CALIFORNIA

HM:ms
cc: INagai (2)
County of Riverside (2)

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ACCOUNT: TAI -- BDS-VERSION 3.00 333 02 08/25/88 08:11:11 1

DIVISION OF STRUCTURES --- CALTRANS

BRIDGE IDENTIFICATION	POST MILE	RATING WIDTH	RATING COMMENT	STRUCTURE TYPE	YEAR OF ORIGINAL CONSTRUCTION
8 56C-382	.0	40.67 .0		CSC	88

	RATING FACTOR	PT	SPAN	ULT MOM CAP TOP IN COM	ULT MOM CAP BOT IN COM	POS HS20 MOMENT	NEG HS20 MOMENT	POS GEN MOMENT	NEG GEN MOMENT	DEAD LOAD MOMENT	SECONDARY MOMENT
INV	1.86	6	5	4930.8	0.0	1025.7	-280.5	1192.7	-324.8	630.8	0.0
OPER	3.08	6	5	4930.8	0.0	1025.7	-280.5	1192.7	-324.8	630.8	0.0
GEN DUMP	1.88	0	4	0.0	4911.6	187.7	-817.6	213.8	-1462.2	-1031.0	0.0

THE NUMBER OF AXLES ON THE TRUCK THAT CAUSES THE SPECIAL RATING FACTOR IS 13.

FC = 1.30 FY = 60.

IF THE REPORTED ULTIMATE MOMENT CAPACITY IS 0, IT WAS DETERMINED NOT TO BE CRITICAL

(EL SOBRANTE LANDFILL)
TEMESCAL WASH

NO OVERLAY

SPLIT AXLES

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DIVISION OF STRUCTURES --- CALTRANS

BRIDGE IDENTIFICATION	POST MILE	RATING WIDTH	RATING COMMENT	STRUCTURE TYPE	YEAR OF ORIGINAL CONSTRUCTION
8 56C382	.0	40.67 .0		CSC	98

INFLUENCE LINE FOR CRITICAL INVENTORY RATING POINT SPAN 5 10TH POINT 6

MEM NO	LEFT	.1	.2	.3	.4	.5	.6	.7	.8	.9	RIGHT
3	0.0	0.061	0.132	0.204	0.268	0.315	0.337	0.325	0.271	0.165	0.0
4	0.0	-0.227	-0.491	-0.758	-0.996	-1.173	-1.256	-1.213	-1.011	-0.617	0.0
5	0.0	0.690	1.534	2.516	3.619	4.824	6.116	4.527	2.989	1.486	0.0

THE CRITICAL OPERATING RATING POINT IS THE SAME AS THE CRITICAL INVENTORY RATING POINT

INFLUENCE LINE FOR CRITICAL SPECIAL RATING POINT SPAN 4 10TH POINT 0

2	0.0	0.160	0.339	0.517	0.673	0.788	0.839	0.806	0.669	0.407	0.0
3	0.0	-0.557	-1.201	-1.853	-2.434	-2.864	-3.066	-2.959	-2.466	-1.506	0.0
4	0.0	-1.496	-2.448	-2.935	-3.035	-2.830	-2.399	-1.820	-1.175	-0.541	0.0
5	0.0	0.328	0.553	0.686	0.737	0.720	0.645	0.524	0.369	0.190	0.0

(EL SOBRANTE LANDFILL)
TEMESCAL WASH

NO OVERLAY

SPLIT AXLES

END OF RATE SUBSYSTEM

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Appendix B

Coldwater Canyon Wash Hydraulics

1. Hydraulic Workmap for Coldwater Canyon Wash
2. Maintained Condition Hydraulic Results (Profile, Cross Sections, & Summary Table)
3. Velocity Condition Hydraulic Results (Profile, Cross Sections, & Summary Table)
4. Interim Condition Hydraulic Results (Profile, Cross Sections, & Summary Table)
5. Supplemental Calculations

Appendix B1

Hydraulic Workmap for Coldwater Canyon Wash

LEGEND:

- HEC-RAS CROSS SECTION
- 920.653 CROSS SECTION ID
- TEMESCAL WASH CENTER LINE
- INEFFECTIVE FLOW AREA
- PROPOSED RIP-RAP PAD
- PROPOSED VEGETATED SLOPE
- HEC-RAS 100 YEAR FLOOD EXTENTS BOUNDARY

SOURCE OF TOPOGRAPHY:
USGS TOPOGRAPHY (NAVD 88)
AERIAL IMAGERY DATED 2004

N

200 100 0 200 400 600

GRAPHIC SCALE 1"= 200'

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-18602-A

HYDRAULIC WORKMAP FOR COLDWATER CANYON WASH AT TEMESCAL VALLEY COMMERCE CENTER (POST-PROJECT MAINTAINED CONDITION)

Date: October 2022
J-18602-B Revised: May 2024

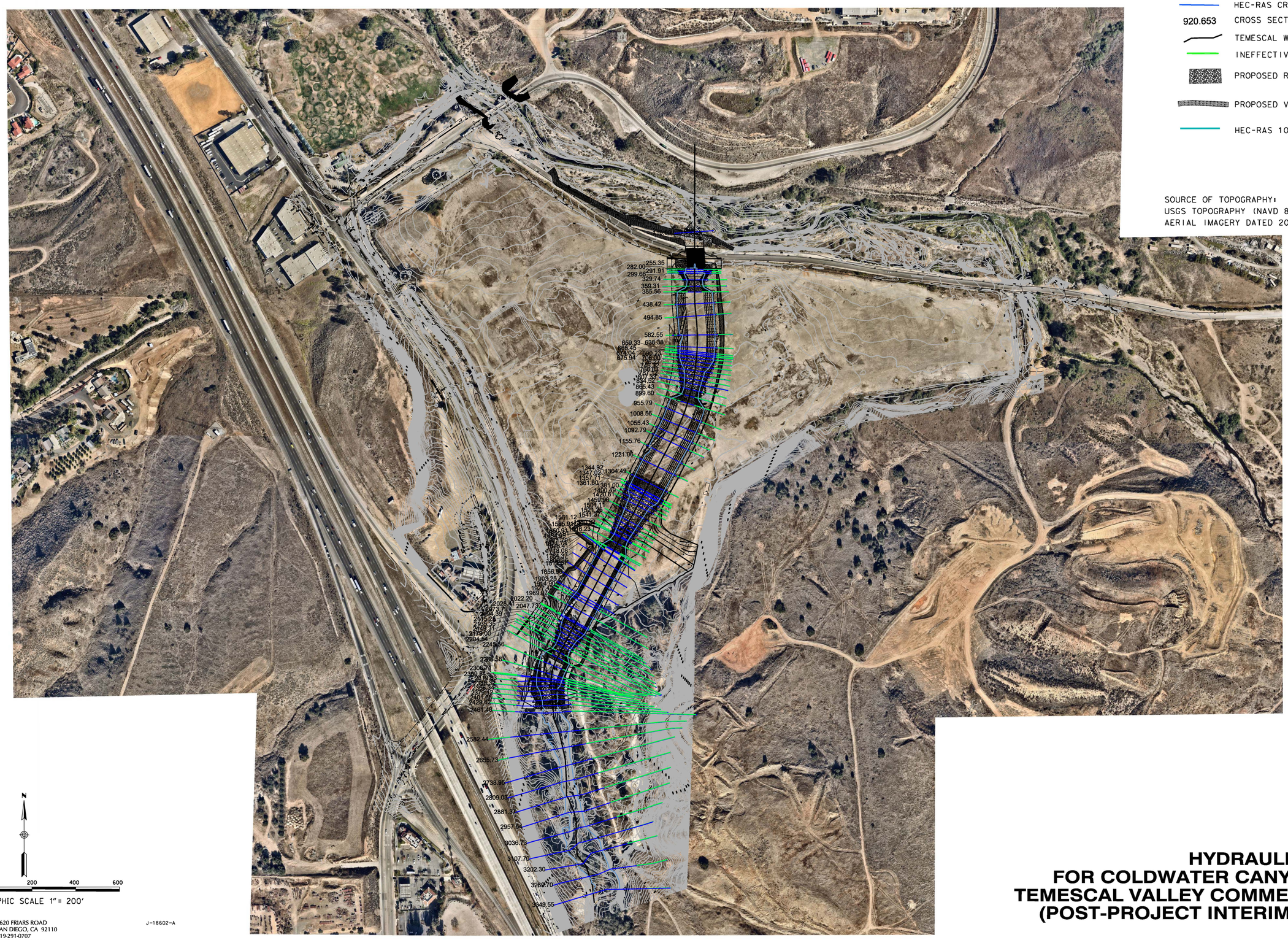
NOT FOR CONSTRUCTION - EXHIBIT FOR HYDRAULIC STUDY ONLY

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LEGEND:

- HEC-RAS CROSS SECTION
- 920.653 CROSS SECTION ID
- TEMESCAL WASH CENTER LINE
- INEFFECTIVE FLOW AREA
- PROPOSED RIP-RAP PAD
- PROPOSED VEGETATED SLOPE
- HEC-RAS 100 YEAR FLOOD EXTENTS BOUNDARY

SOURCE OF TOPOGRAPHY:
USGS TOPOGRAPHY (NAVD 88)
AERIAL IMAGERY DATED 2004



GRAPHIC SCALE 1" = 200'

RICK ENGINEERING COMPANY
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5620 FRIARS ROAD
SAN DIEGO, CA 92110
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(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-18602-A

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HYDRAULIC WORKMAP FOR COLDWATER CANYON WASH AT TEMESCAL VALLEY COMMERCE CENTER (POST-PROJECT INTERIM CONDITION)

Date: October 2022
J-18602-B Revised: May 2024

NOT FOR CONSTRUCTION - EXHIBIT FOR HYDRAULIC STUDY ONLY

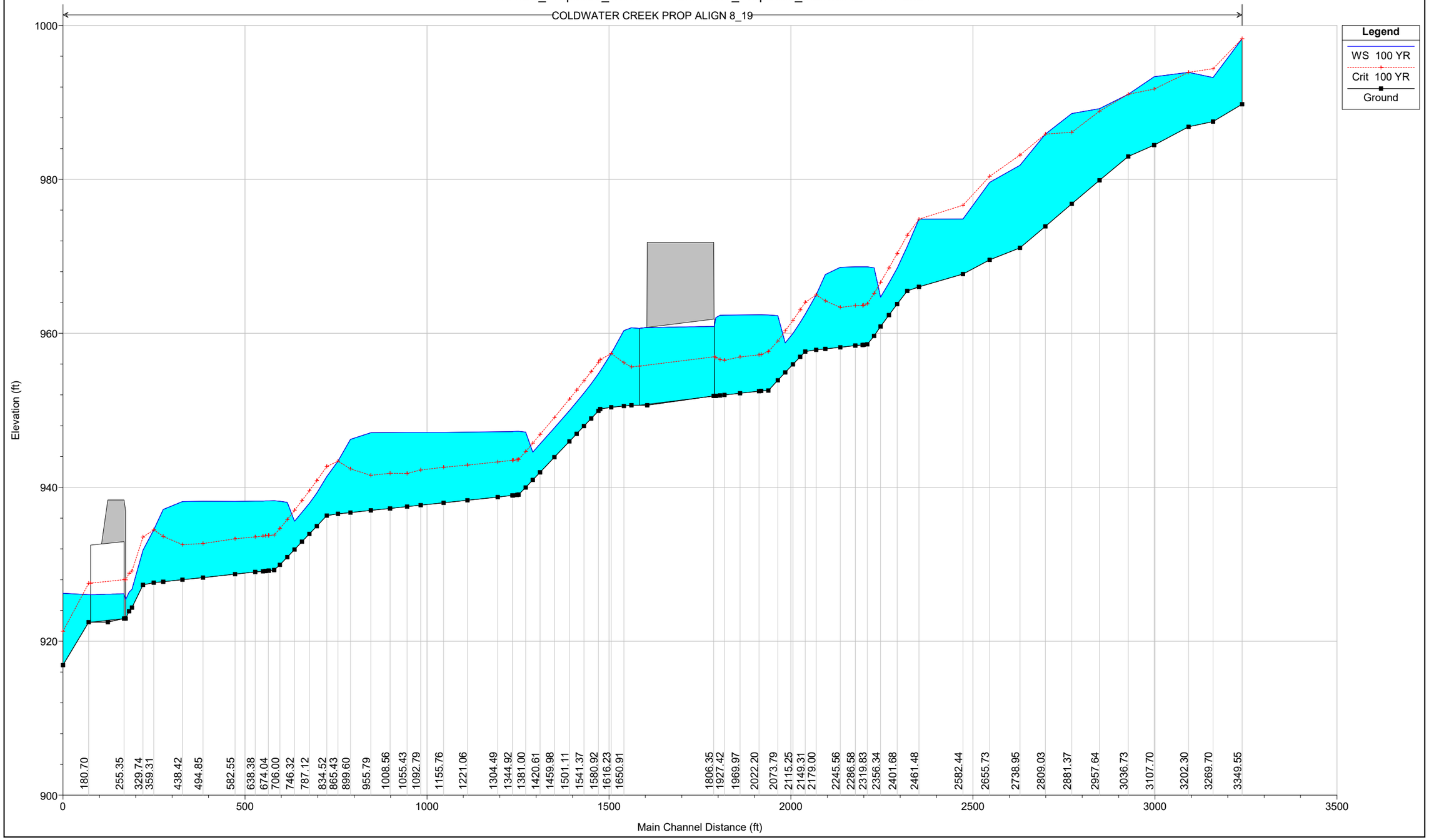
Appendix B2

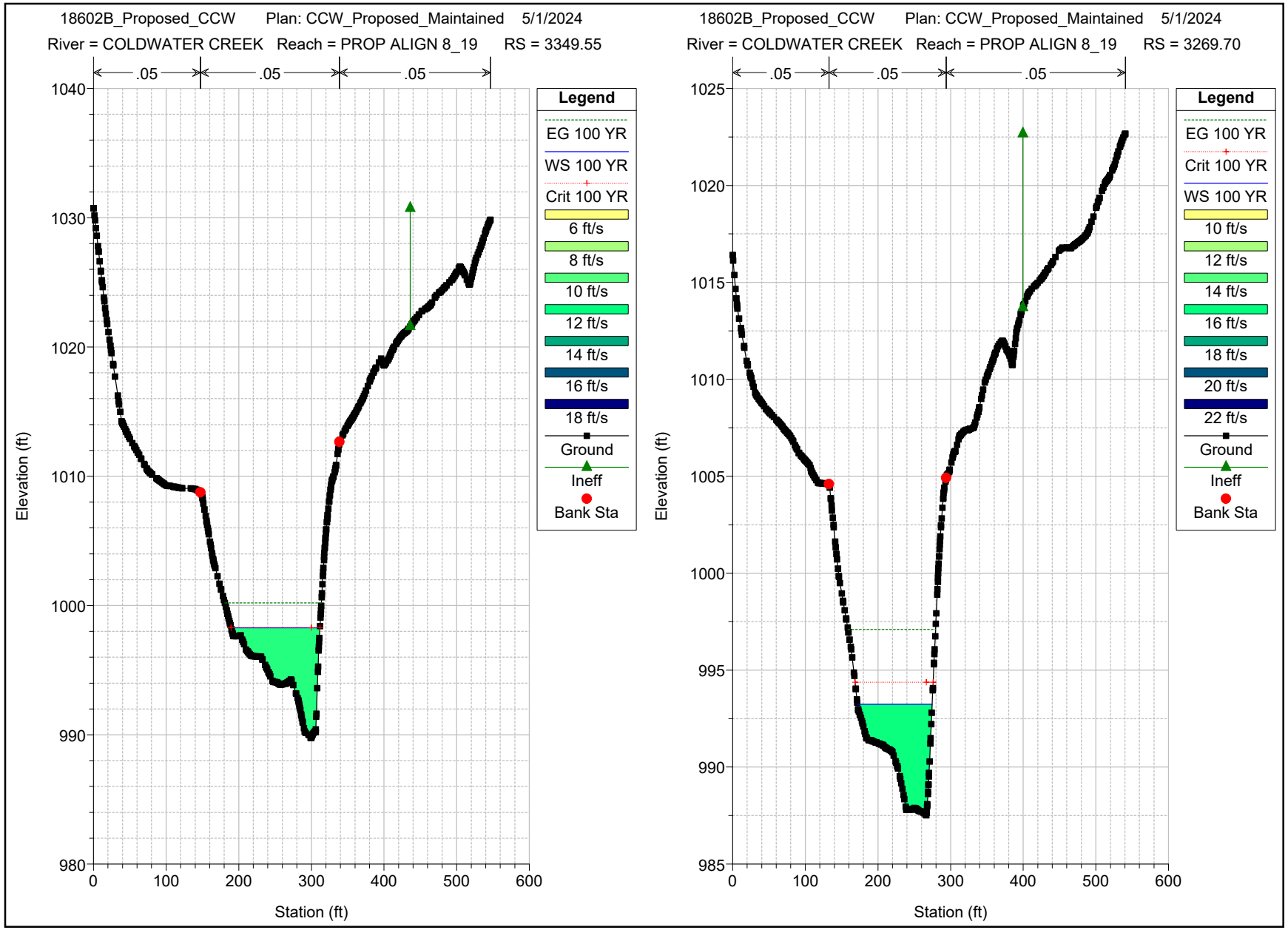
Maintained Condition Hydraulic Results

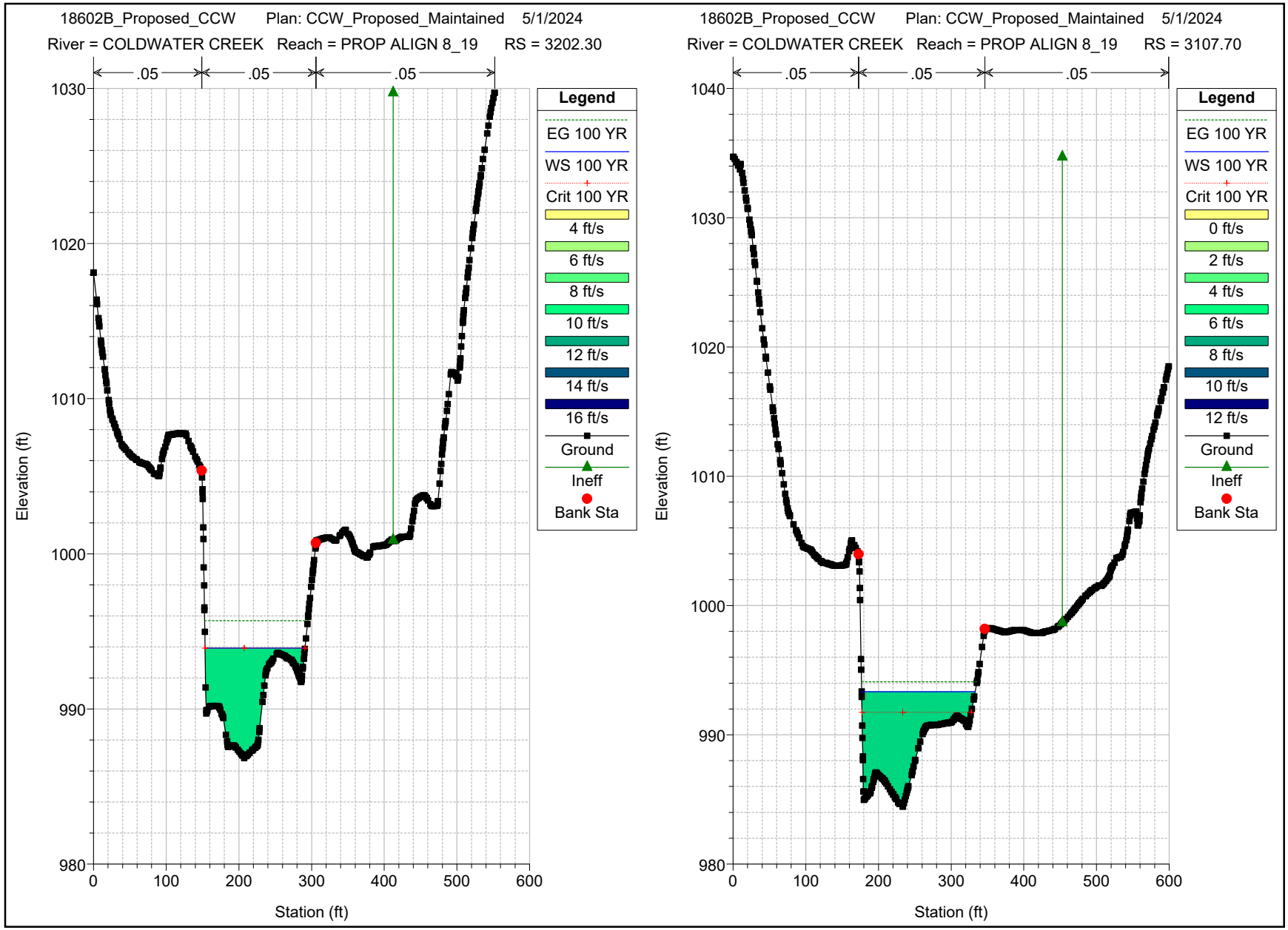
- Profile
- Cross Sections
- Summary Table

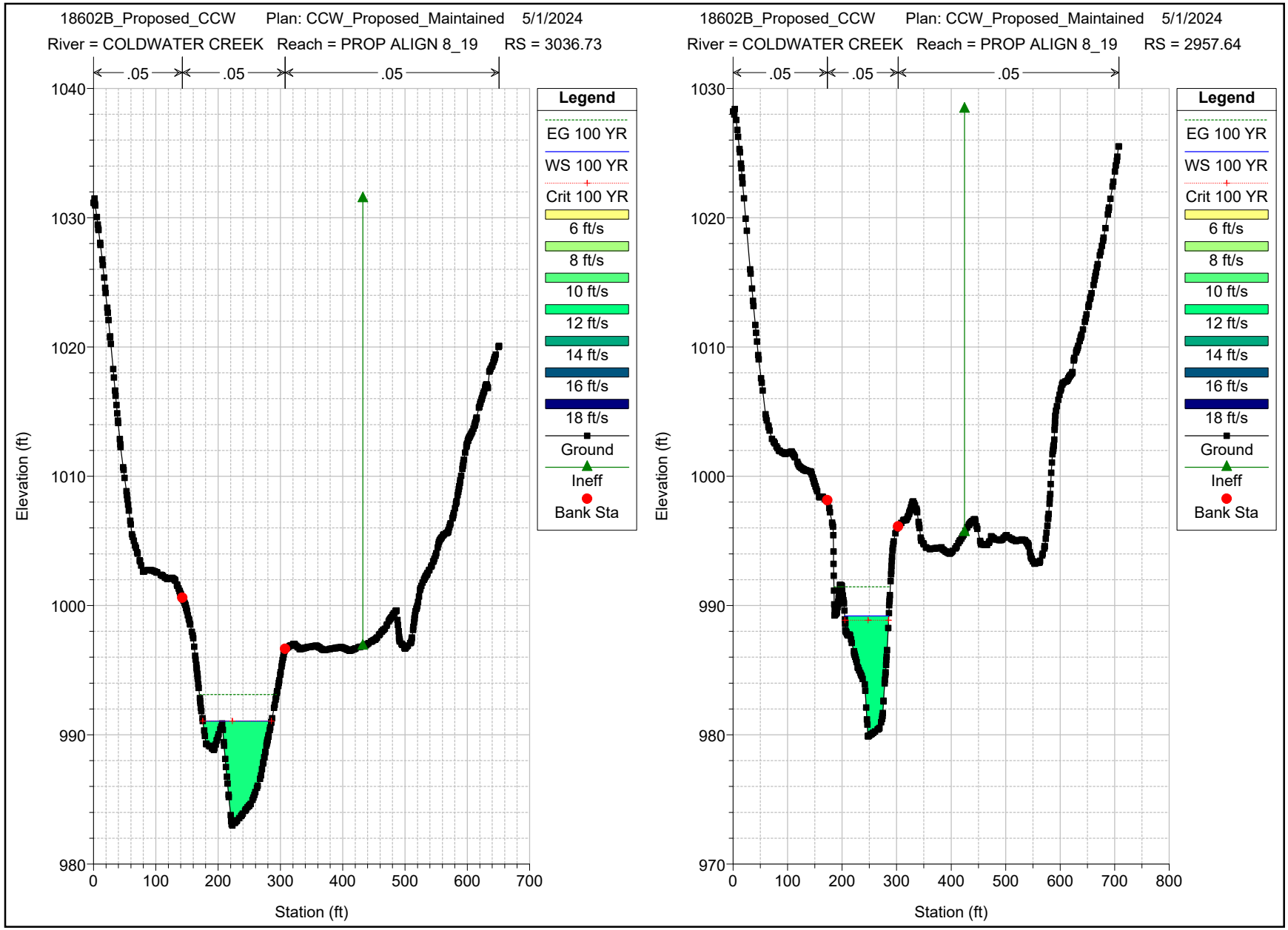
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024

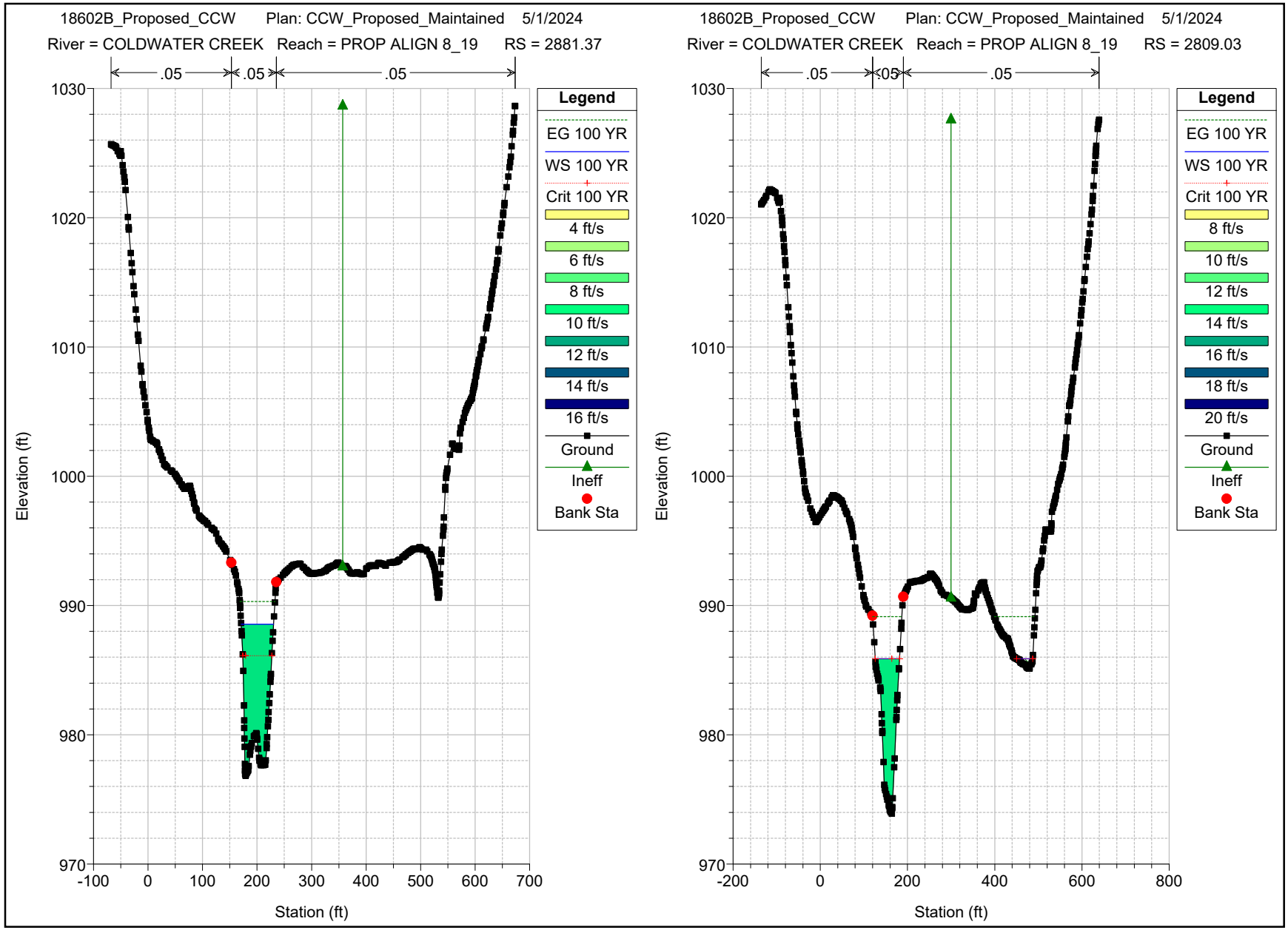
COLDWATER CREEK PROP ALIGN 8_19

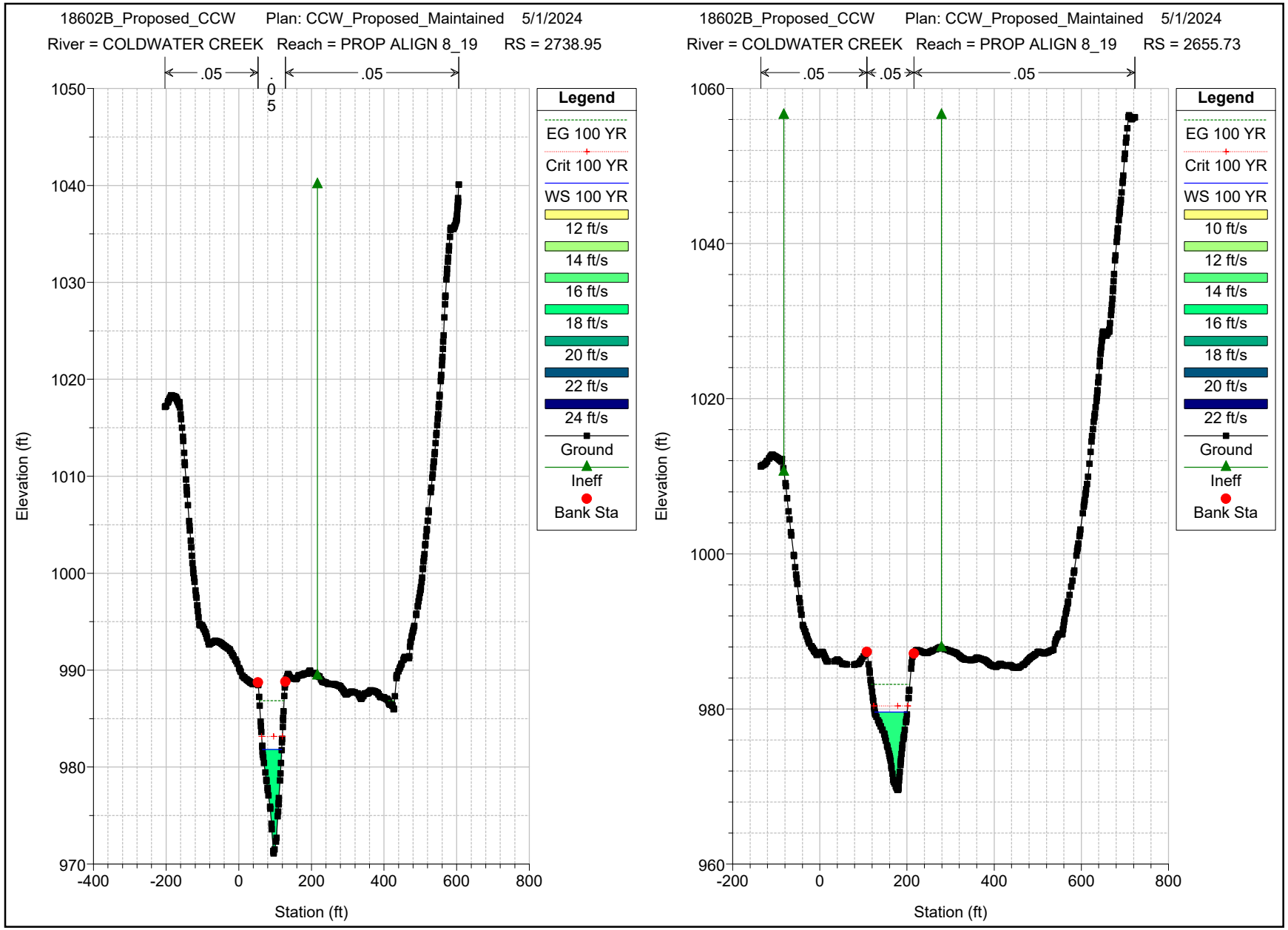


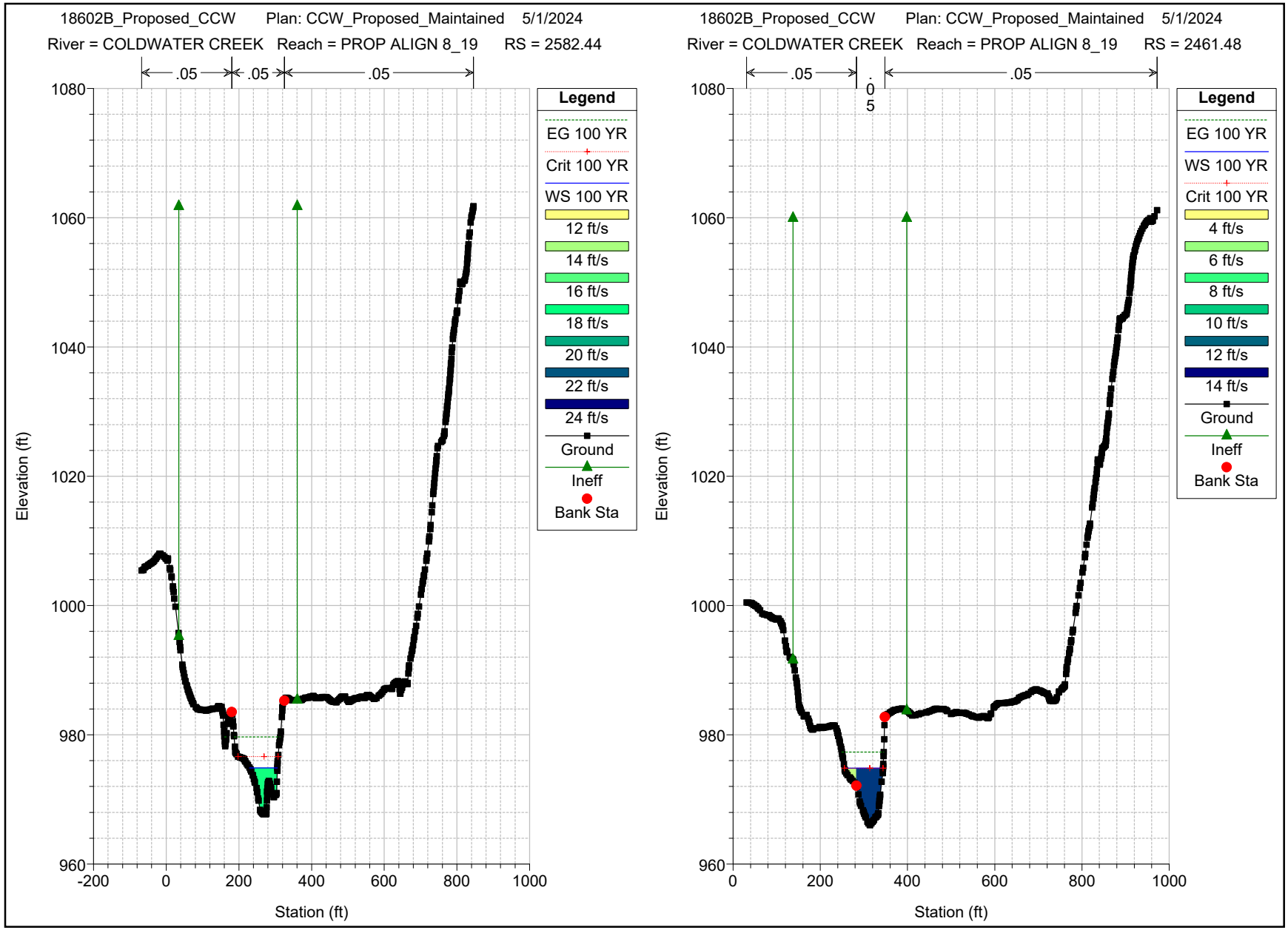

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3349.55
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3269.70
.05
.05
.05
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

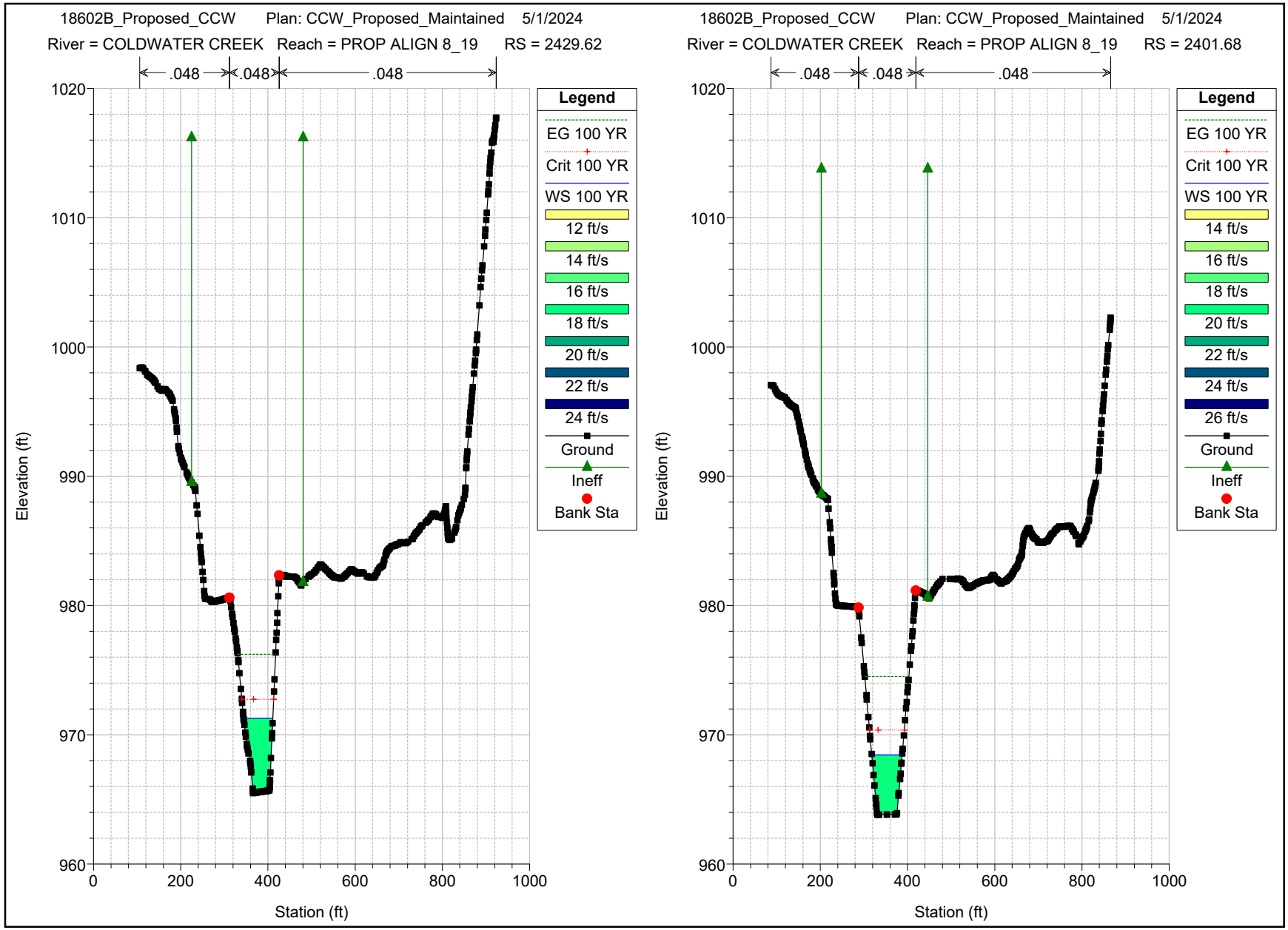

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River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3202.30
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3107.70
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

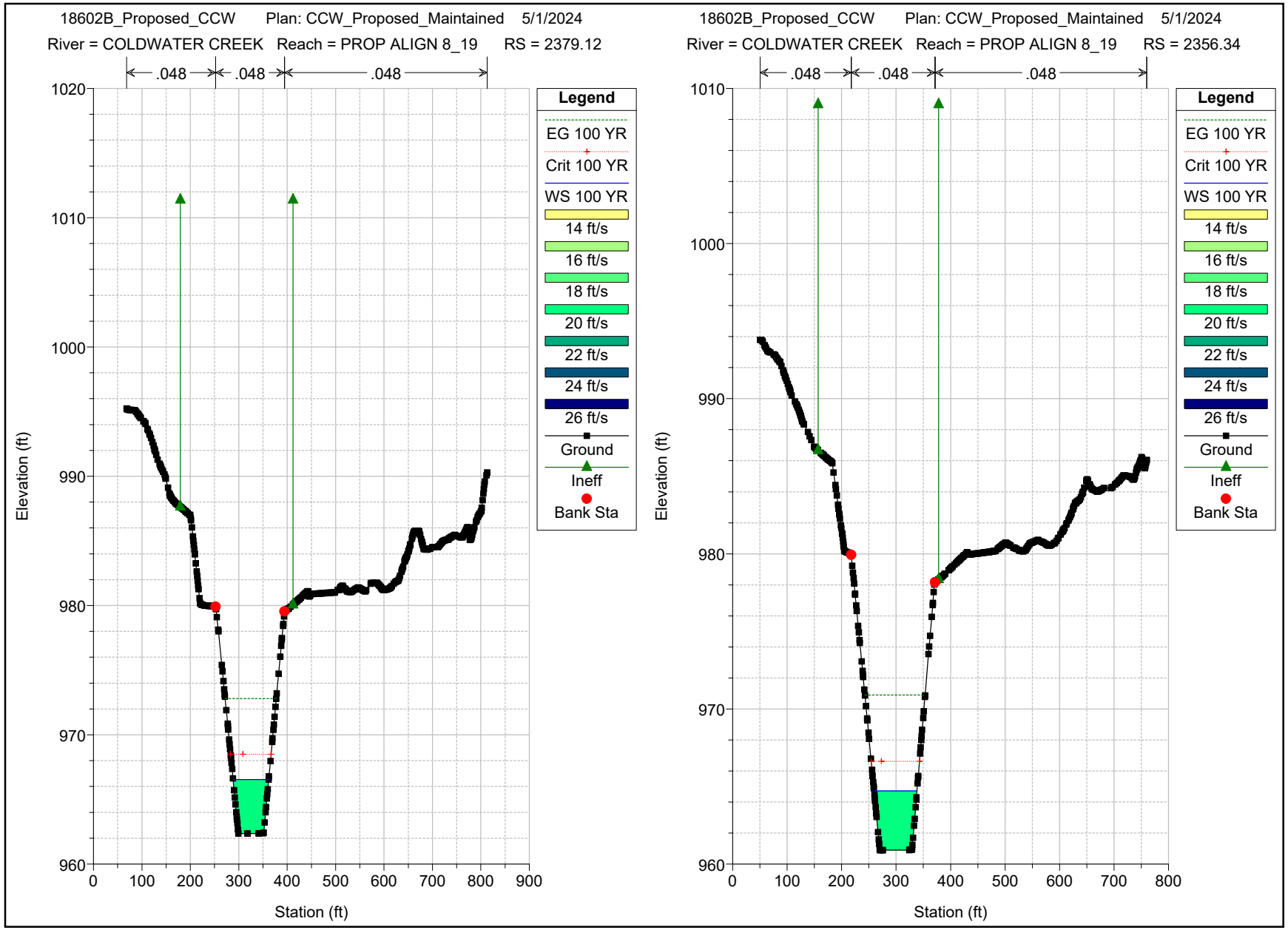

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3036.73
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2957.64
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

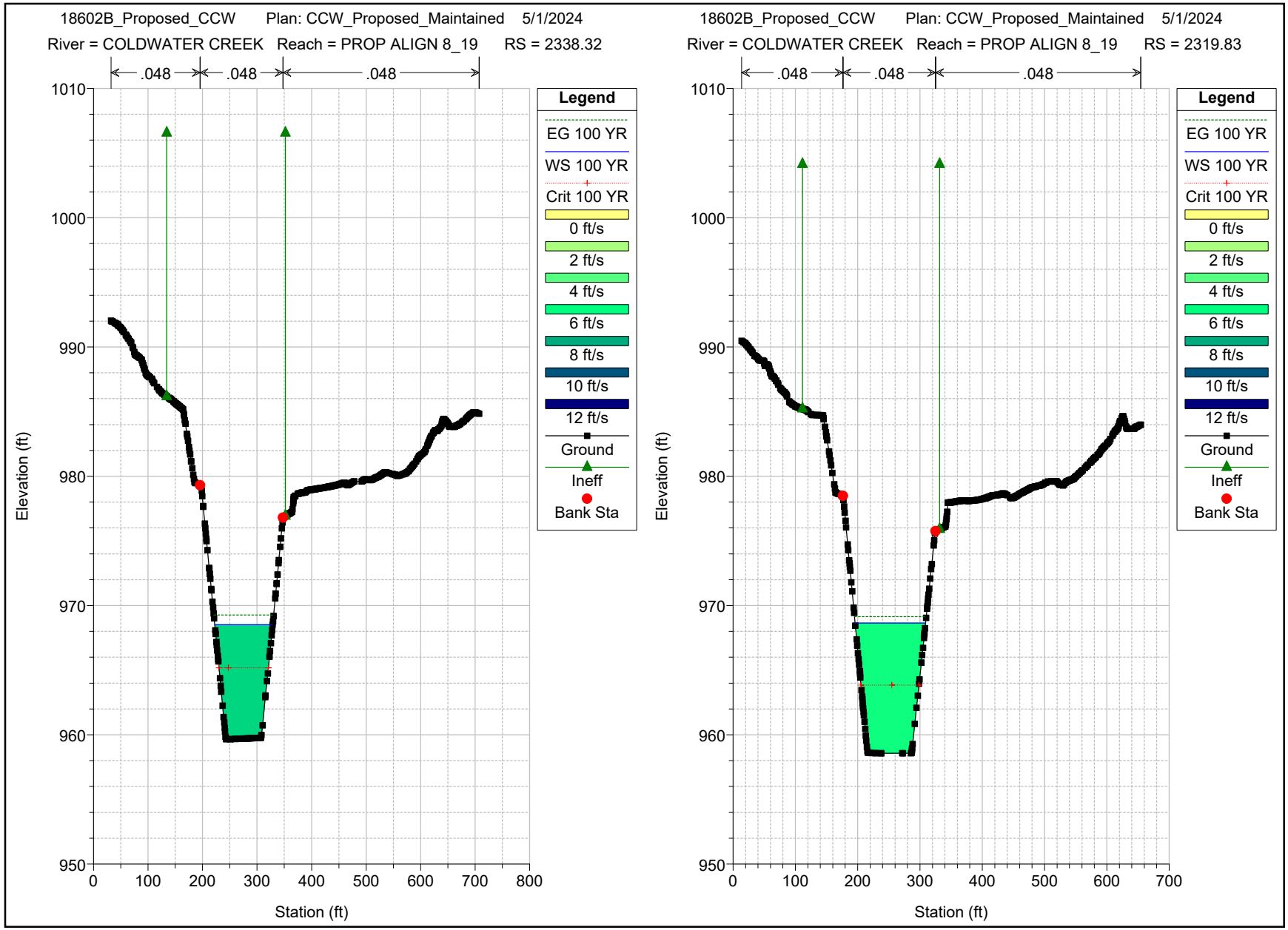

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2881.37
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2809.03
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

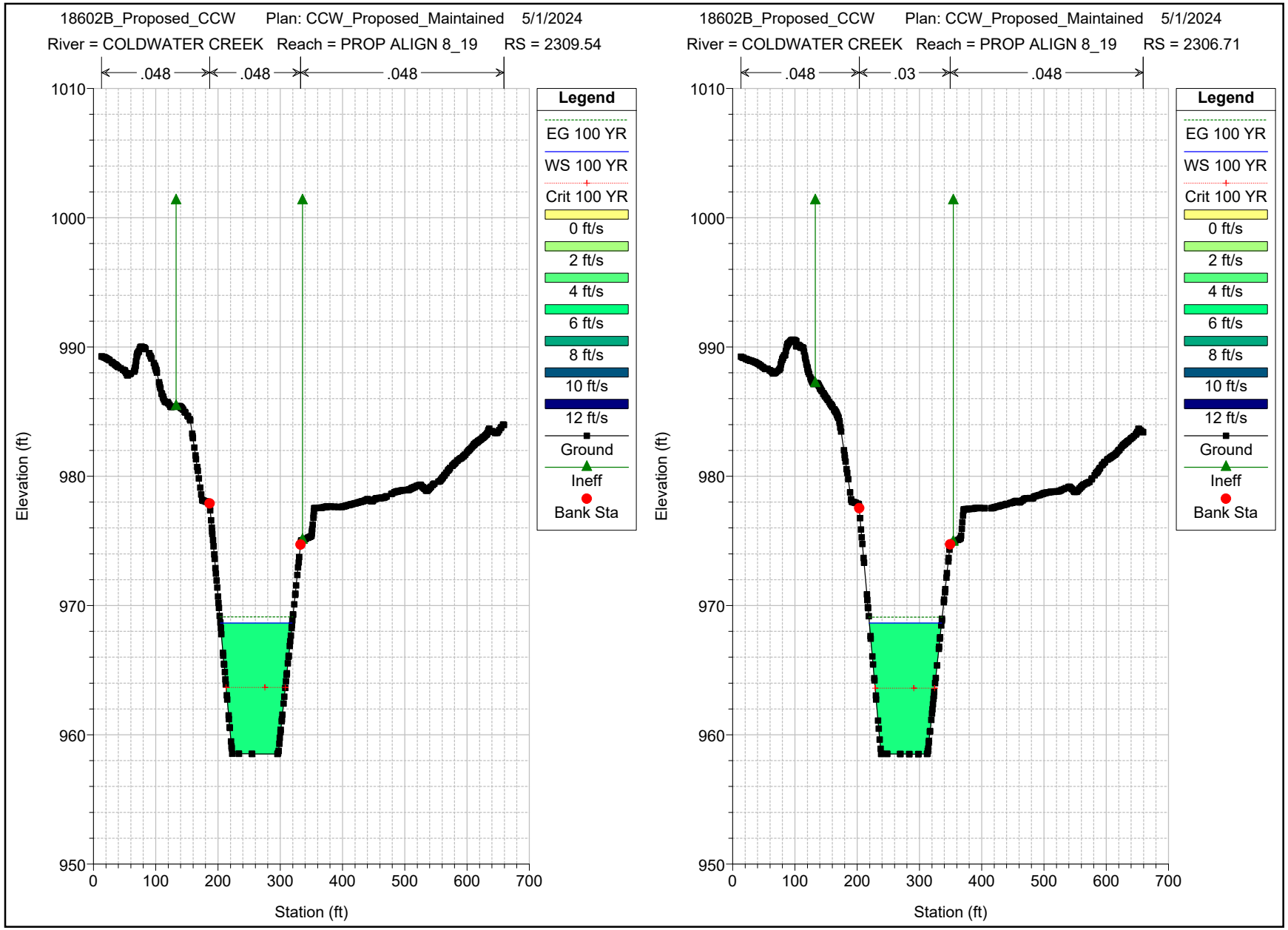

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River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2738.95
.05
.05
.05
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2655.73
.05
.05
.05
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

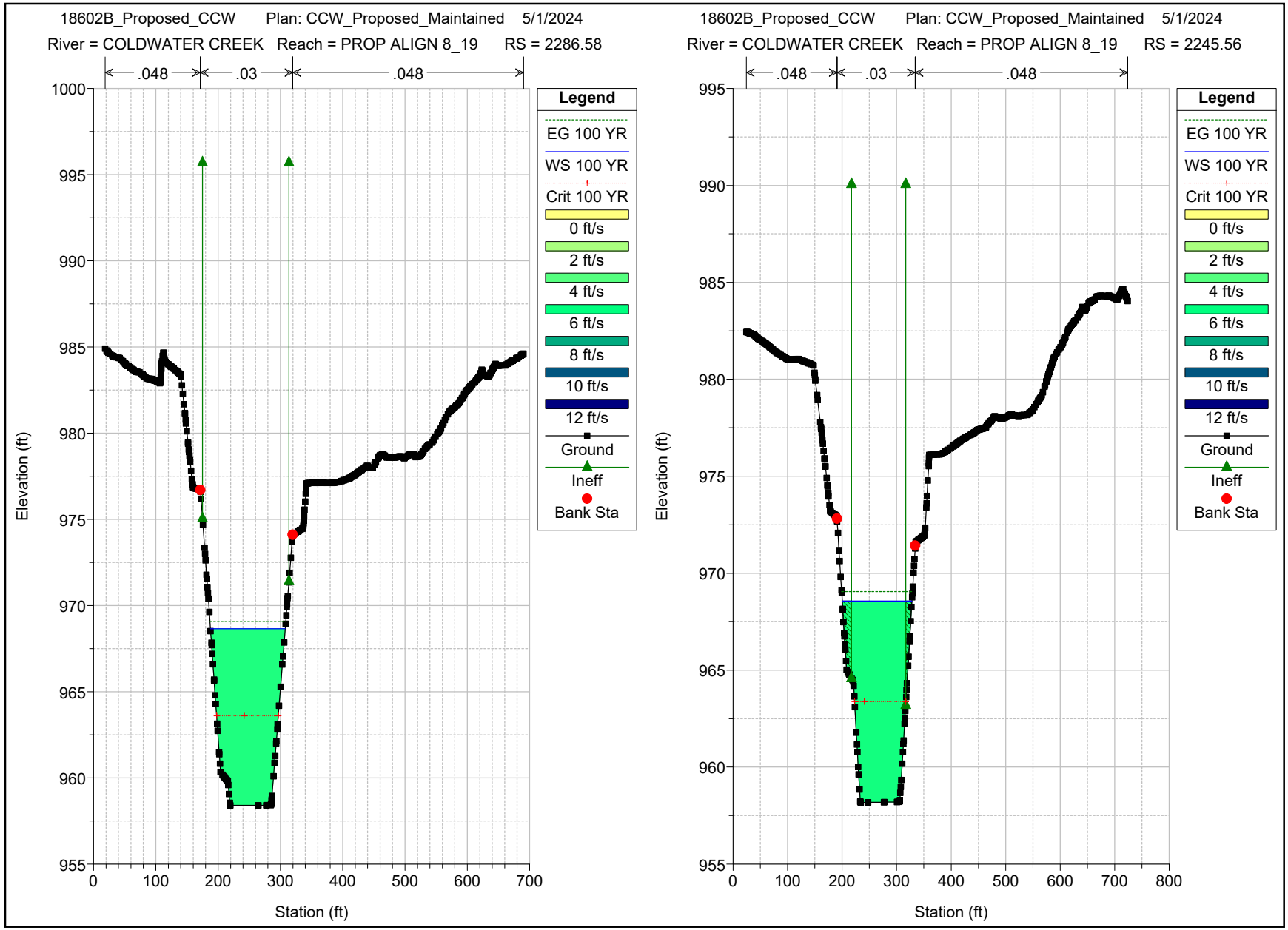

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River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2582.44
.05
.05
.05
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2461.48
.05
.05
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

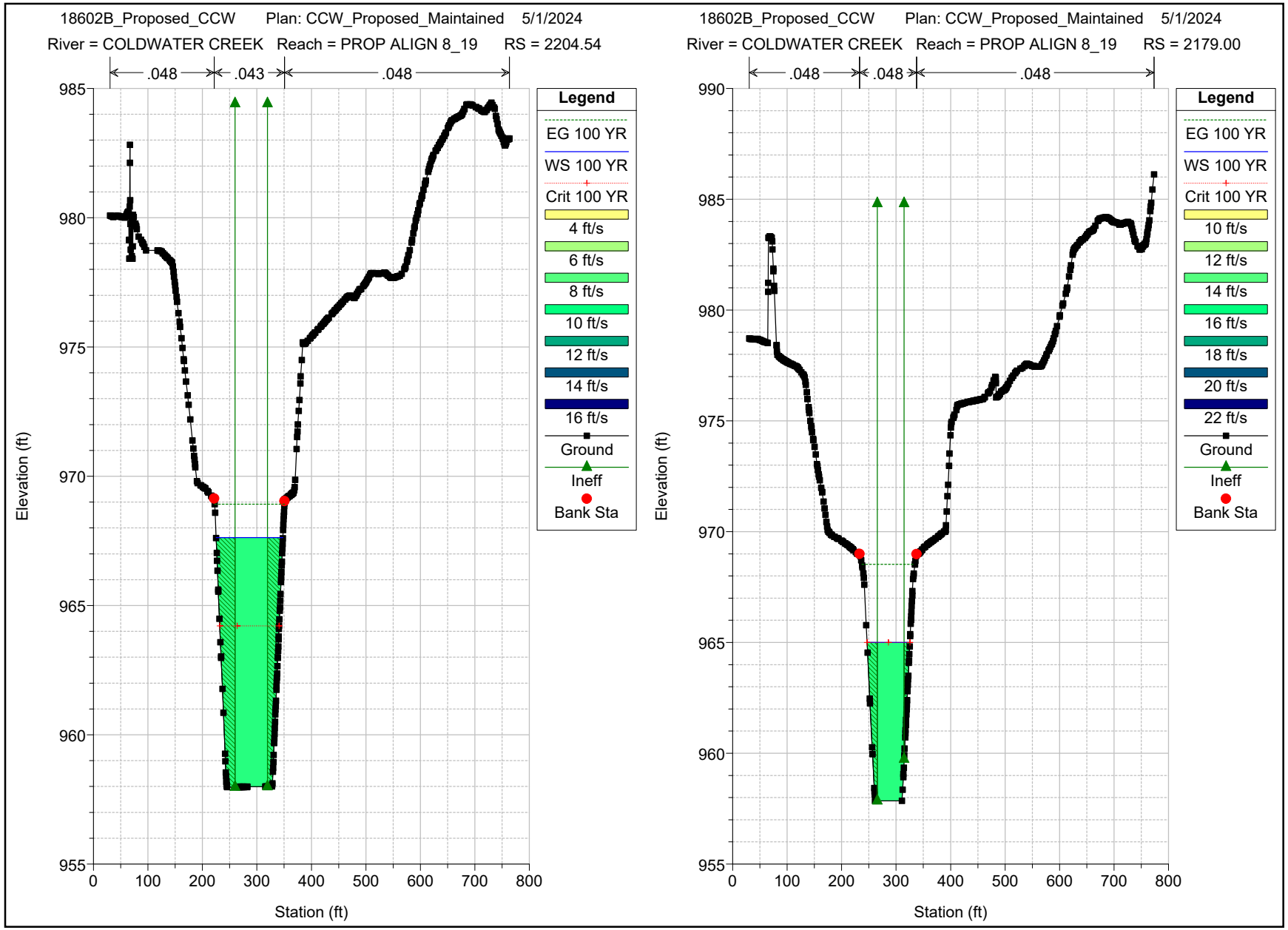

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.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2401.68
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

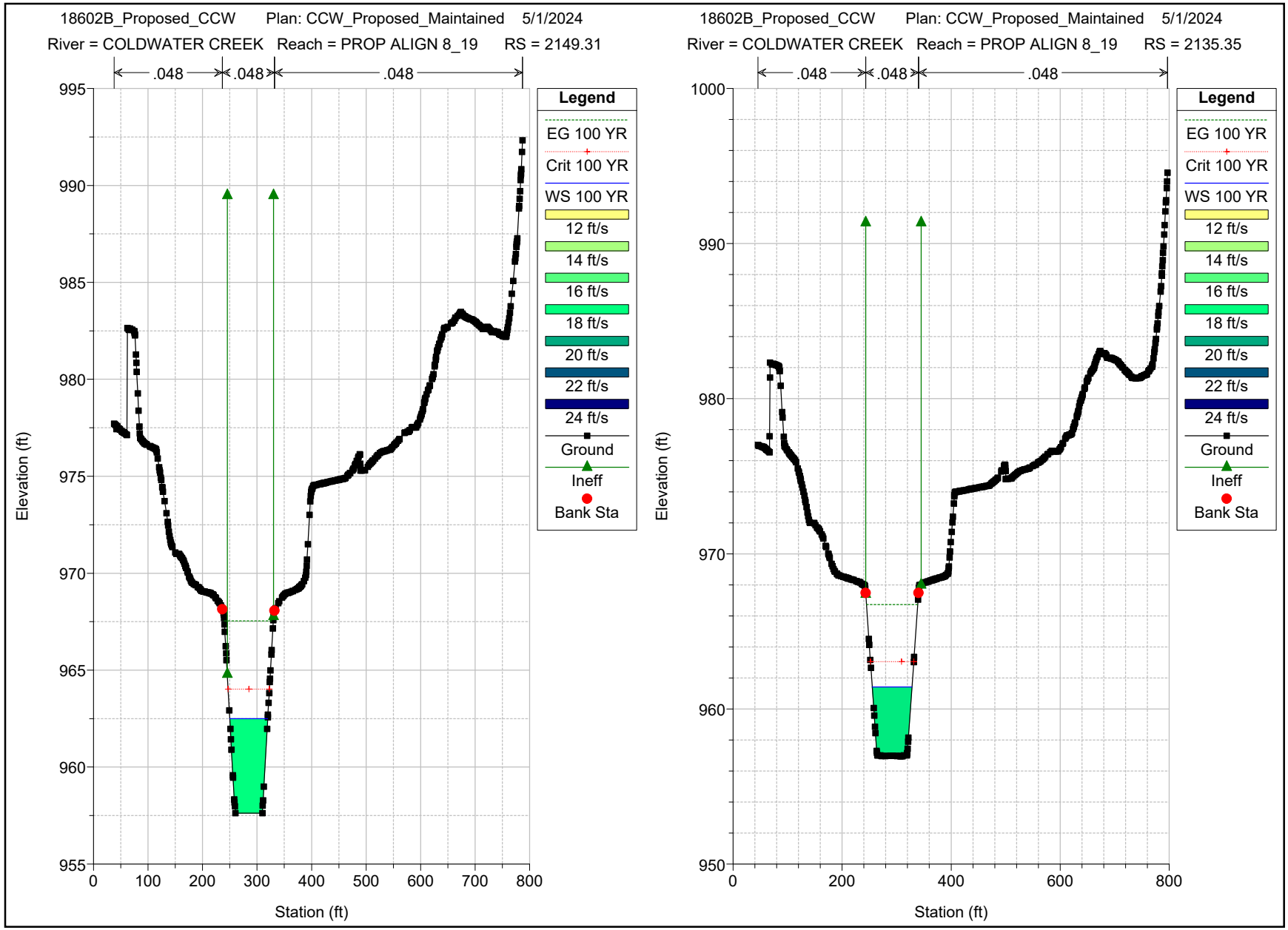

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2379.12
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2356.34
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

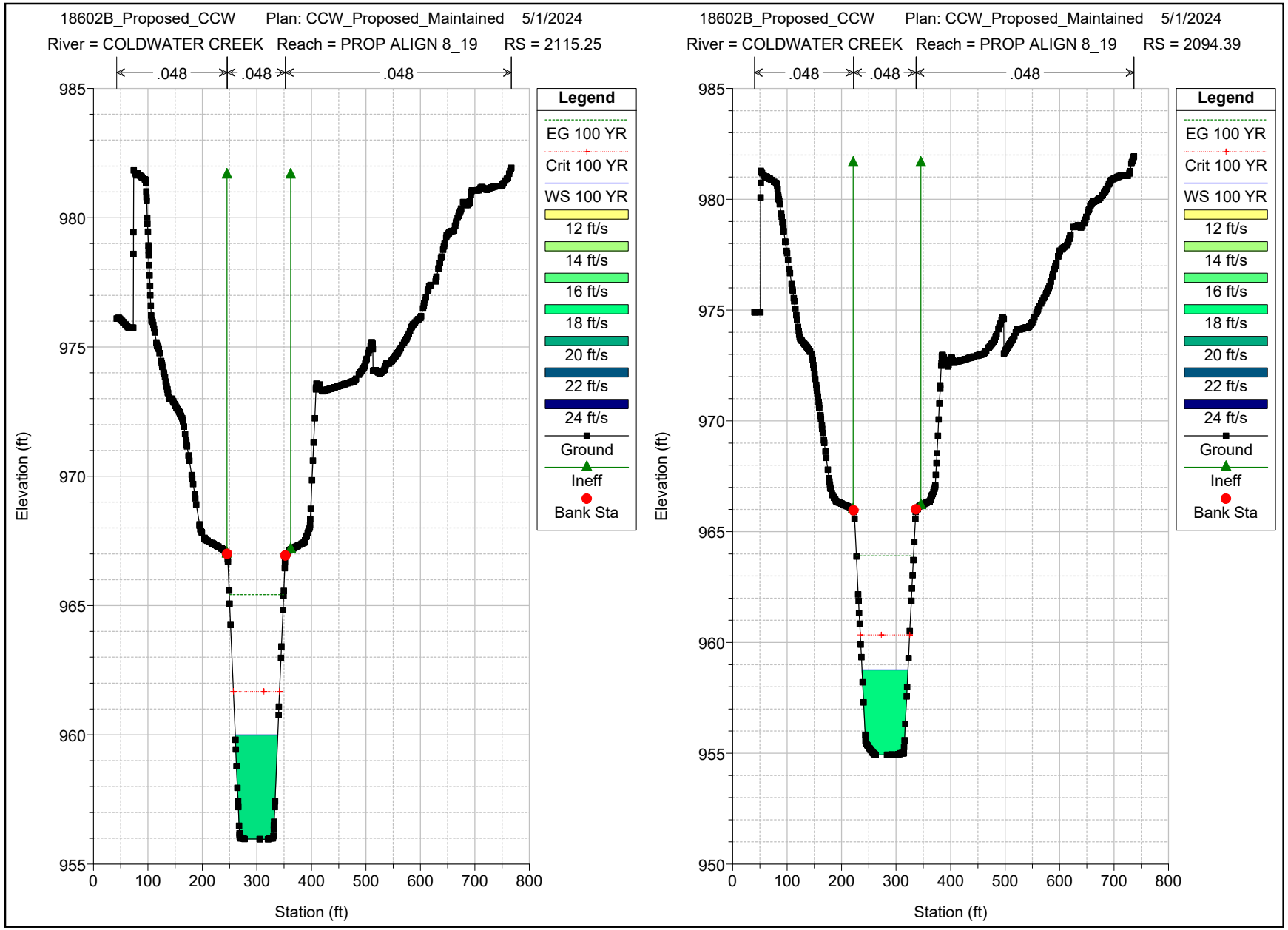

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2338.32
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2319.83
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

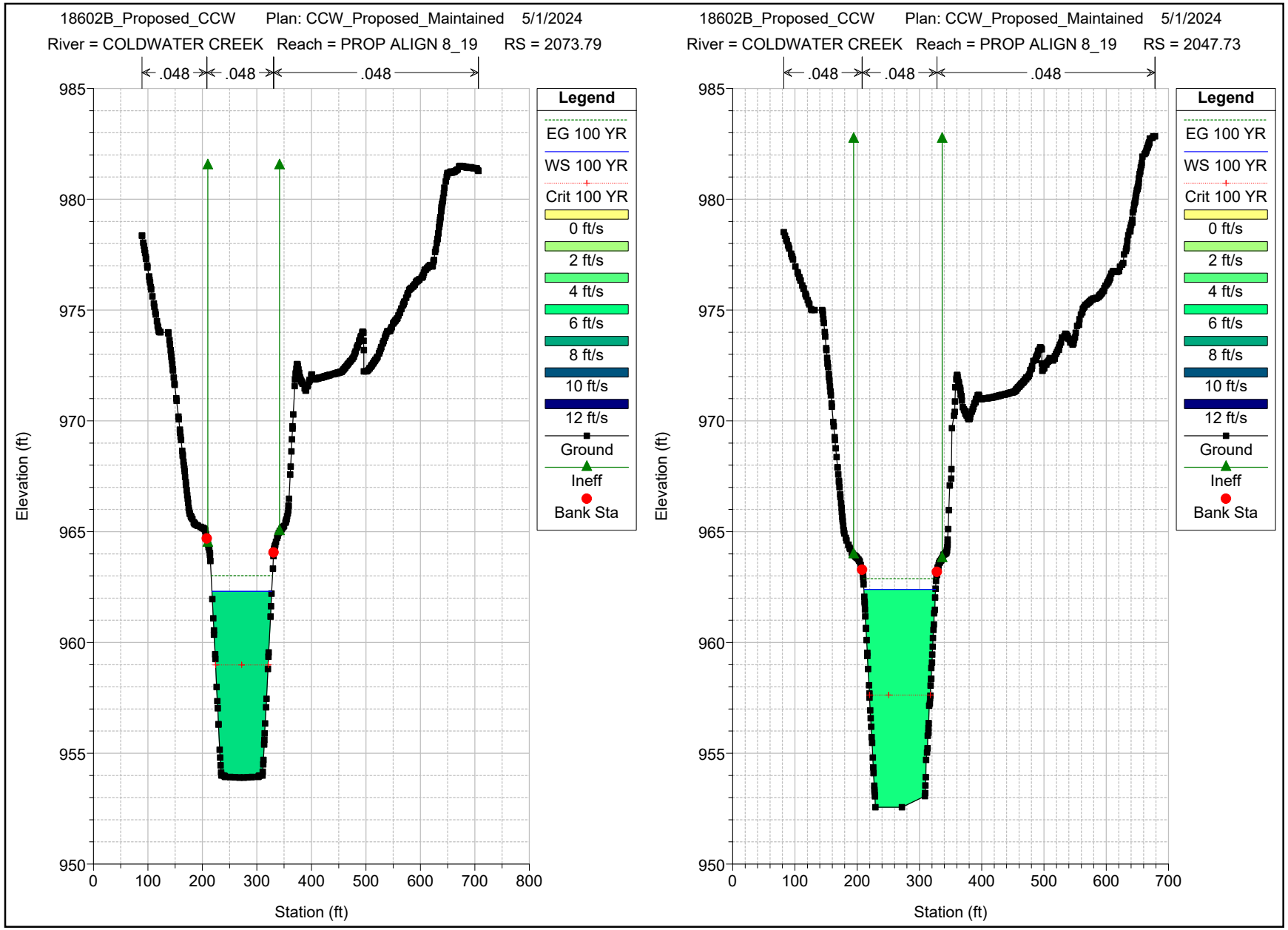

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2309.54
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2306.71
.048
.03
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

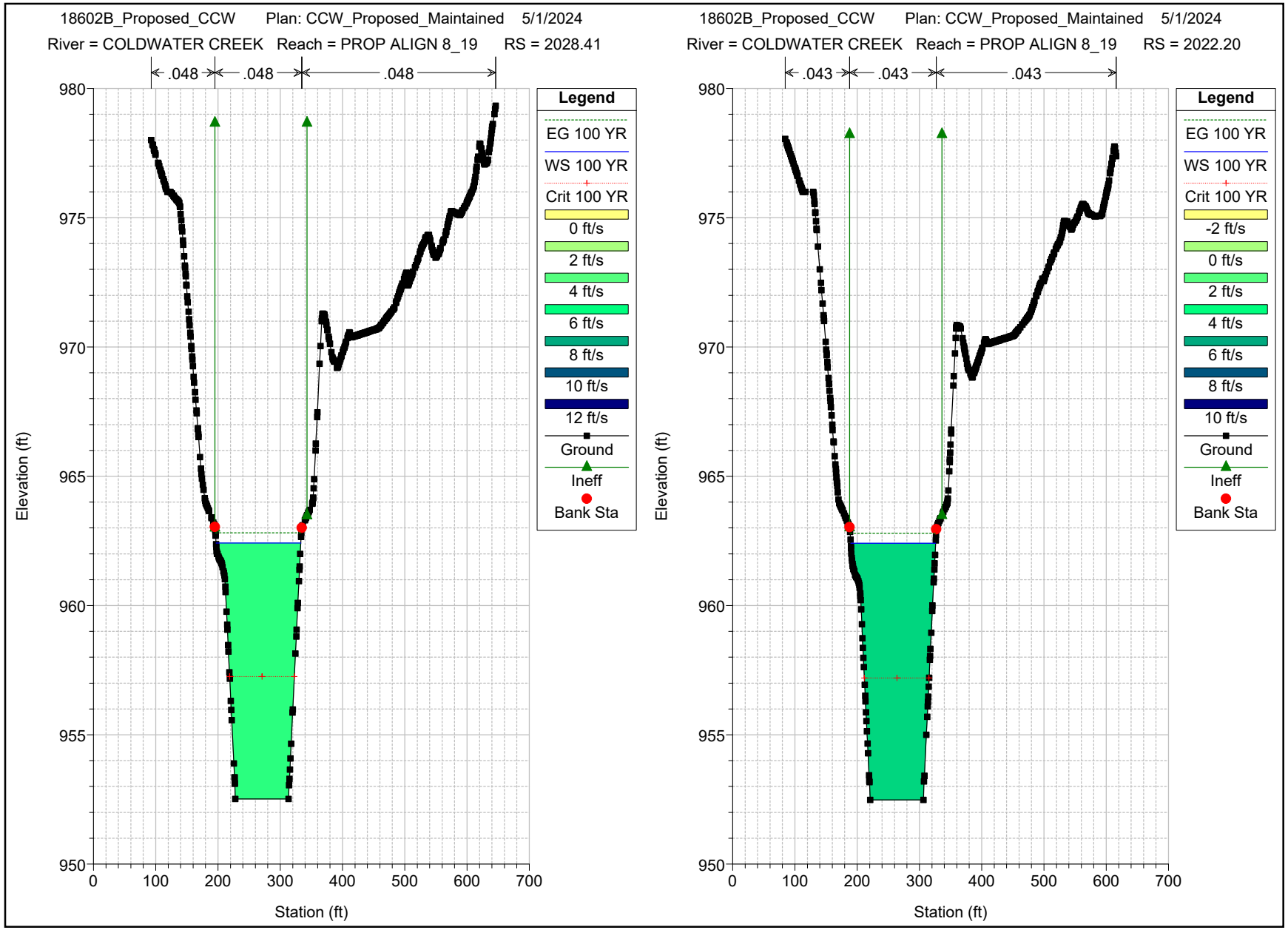

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2286.58
.048
.03
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2245.56
.048
.03
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

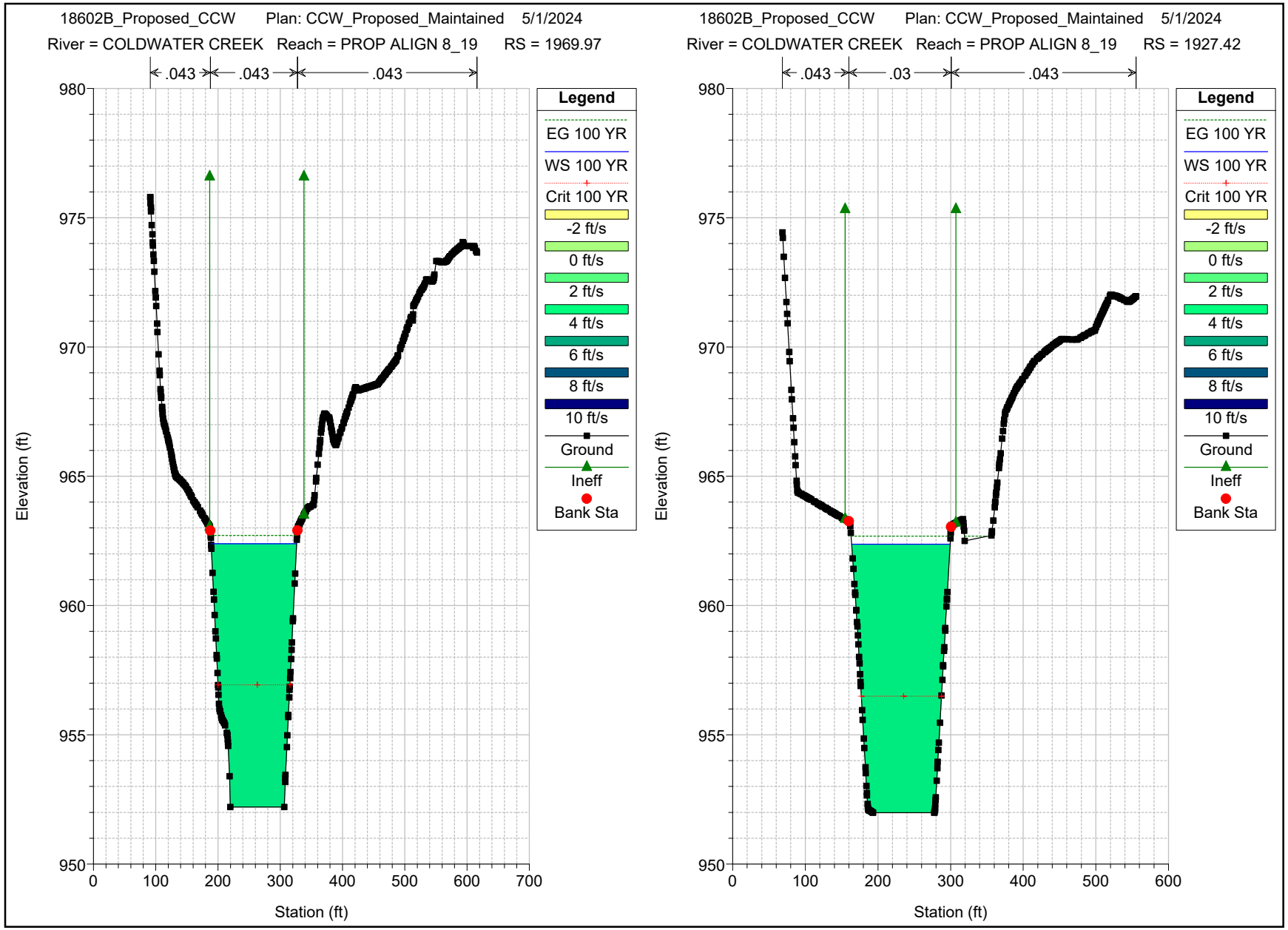

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2204.54
.048
.043
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2179.00
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta

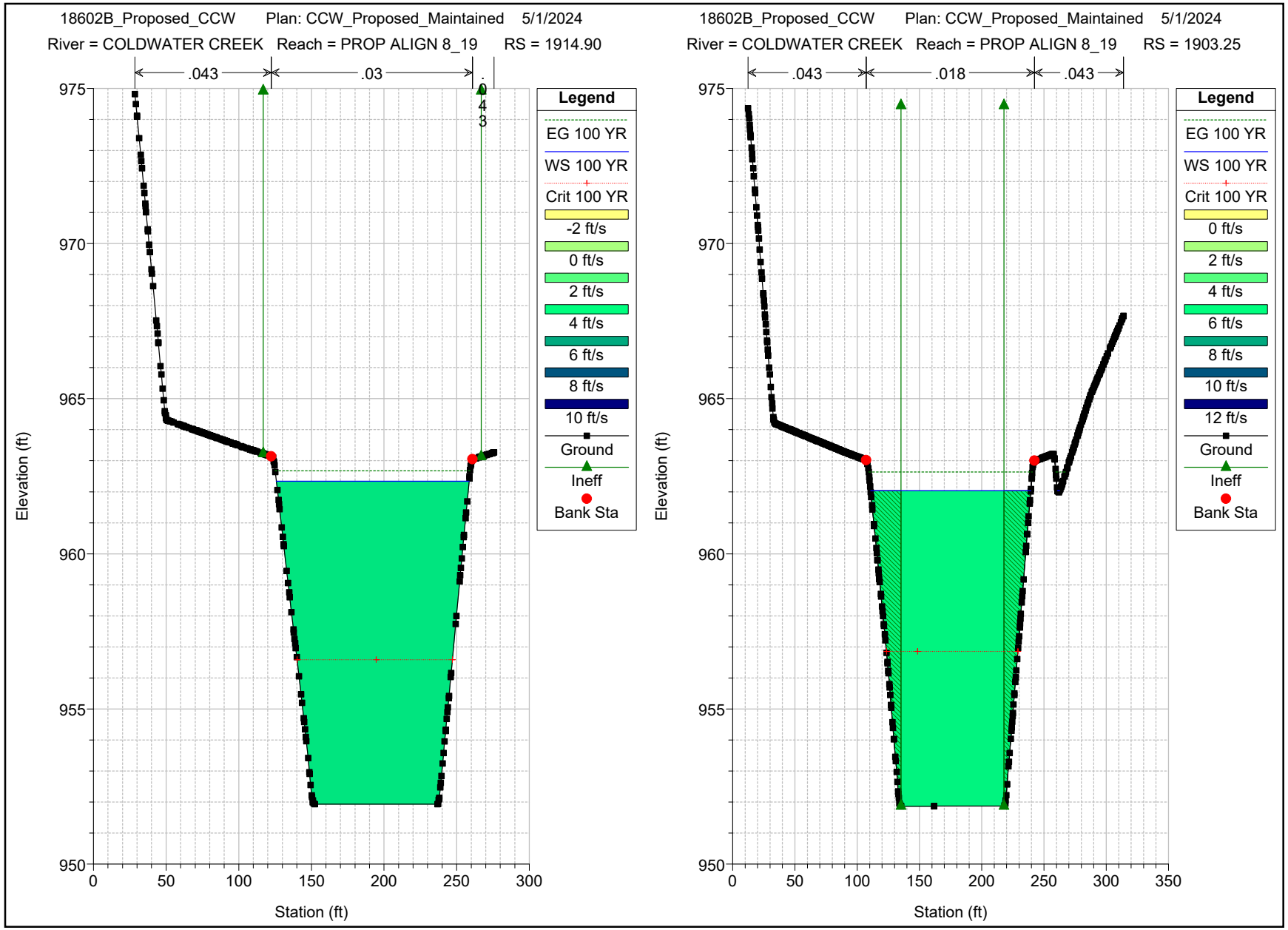

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2149.31
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2135.35
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

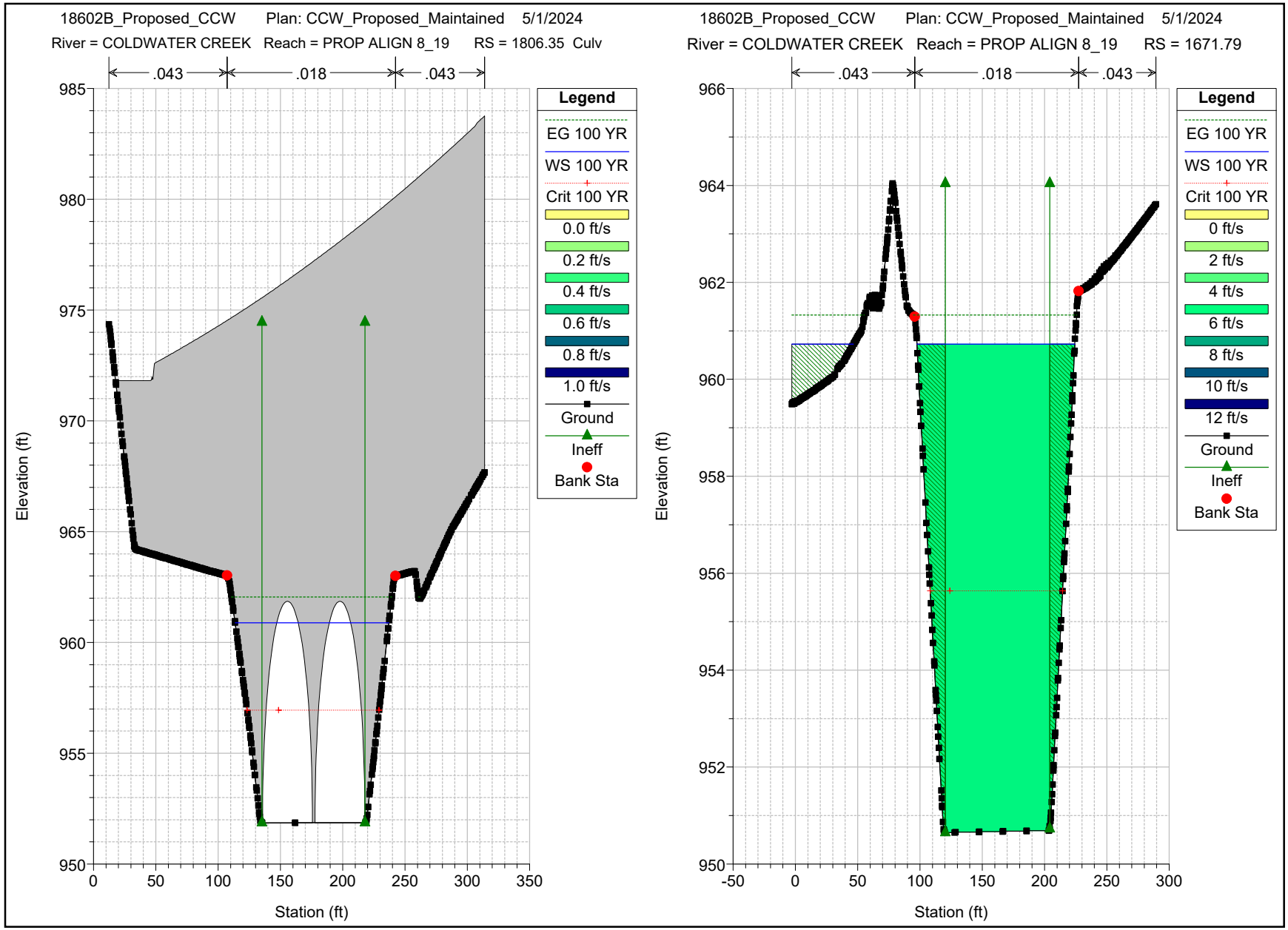

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2115.25
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2094.39
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

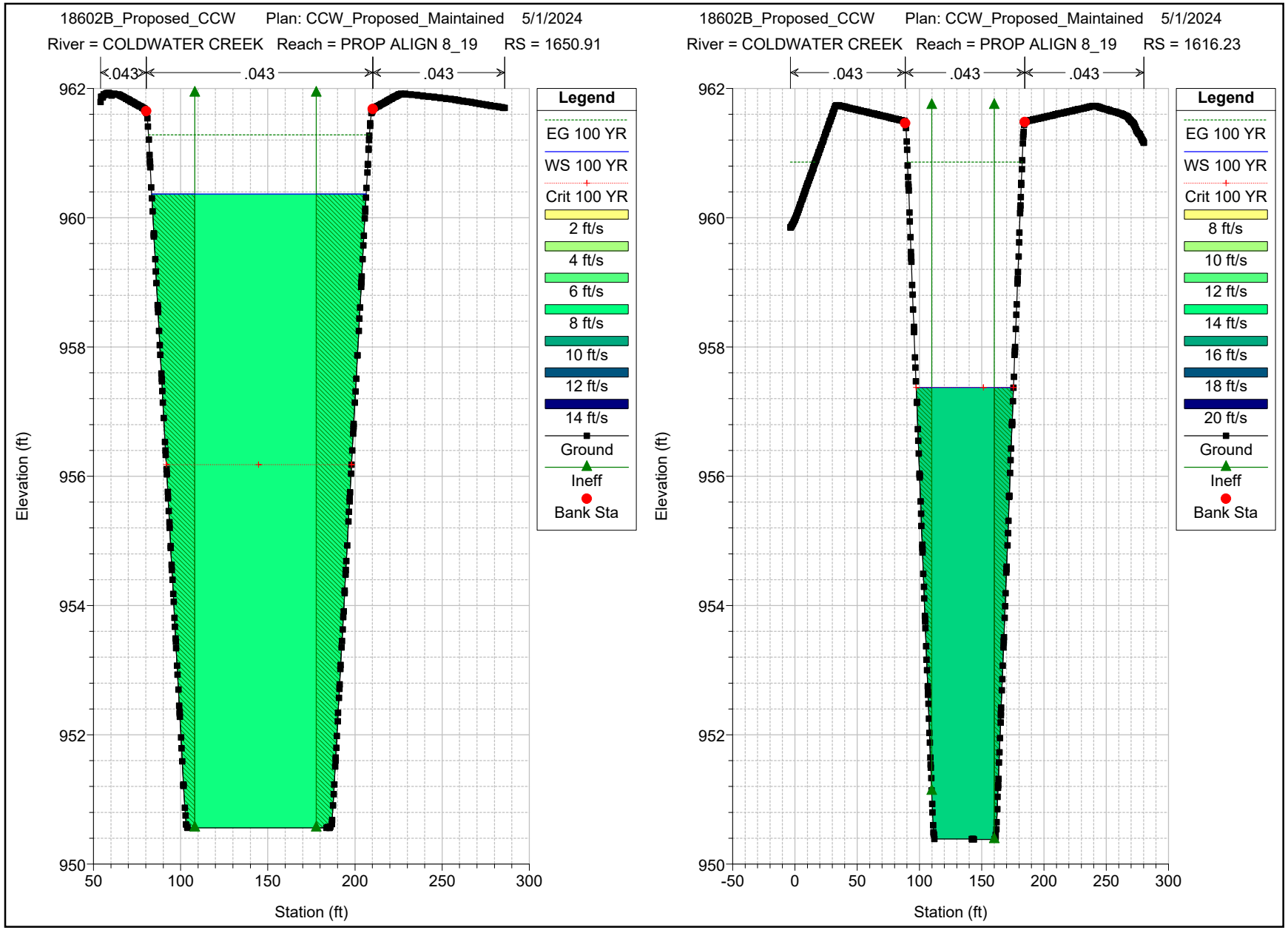

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2073.79
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2047.73
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

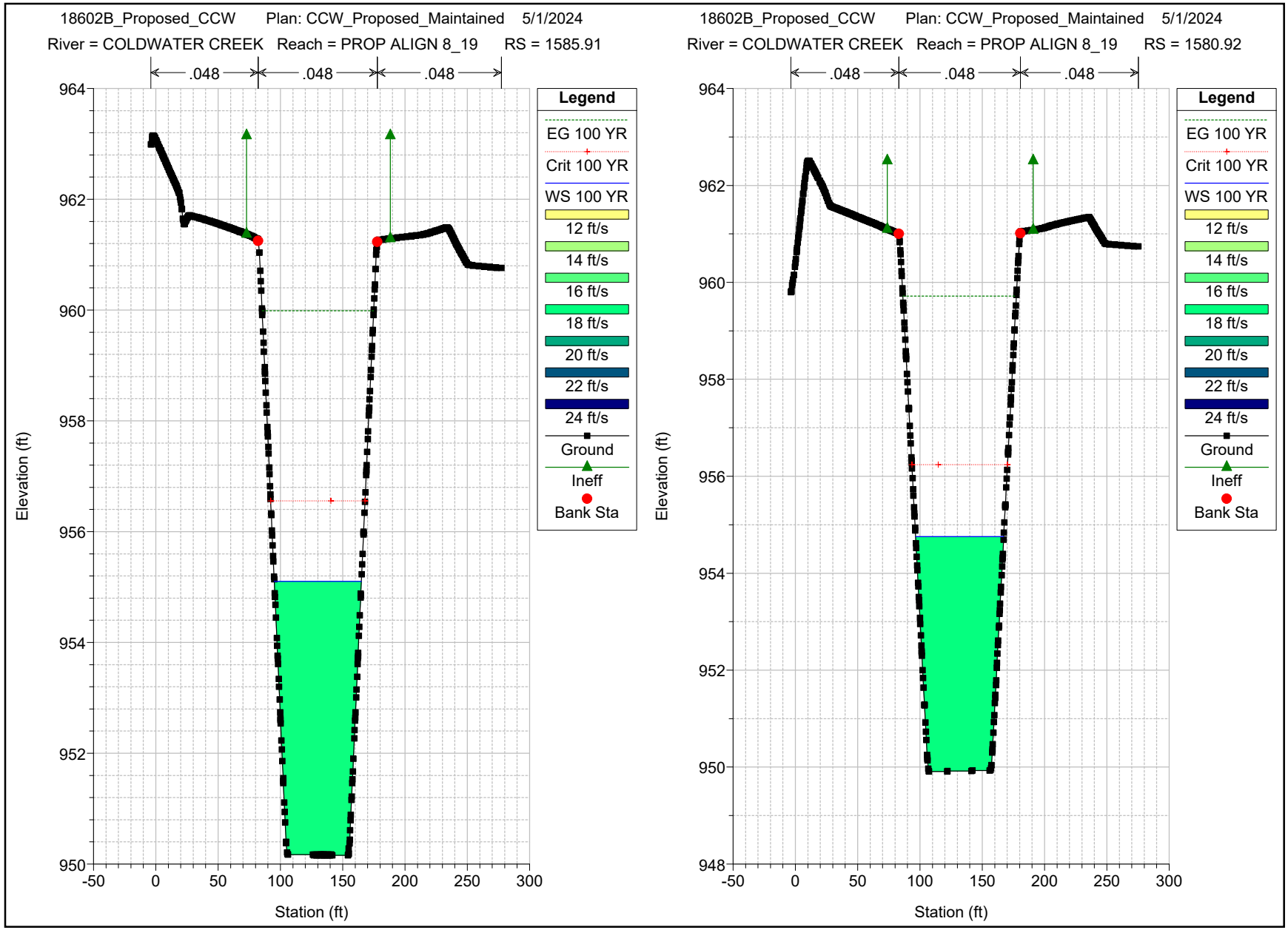

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2028.41
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2022.20
.043
.043
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

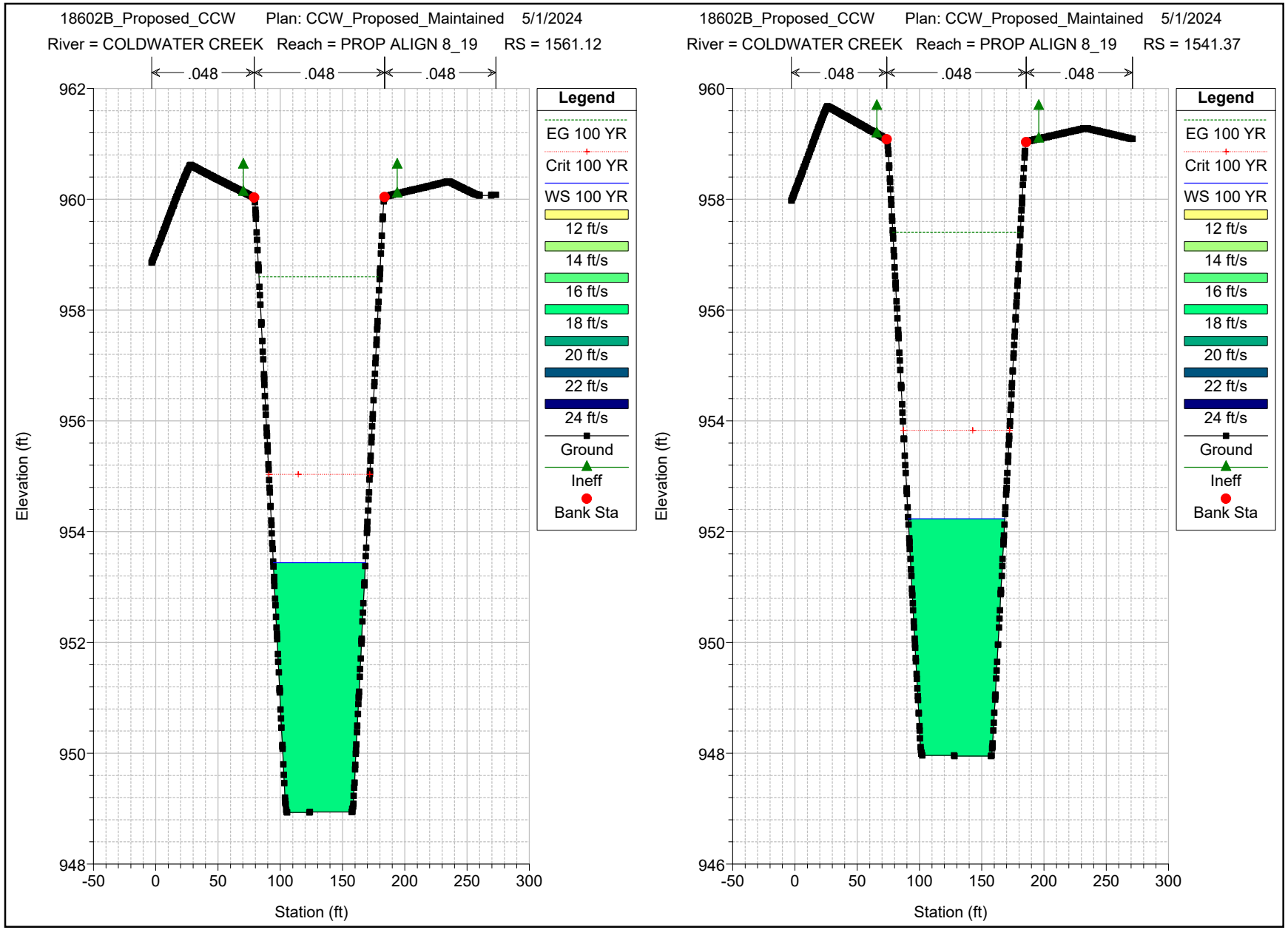

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1969.97
.043
.043
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1927.42
.043
.03
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

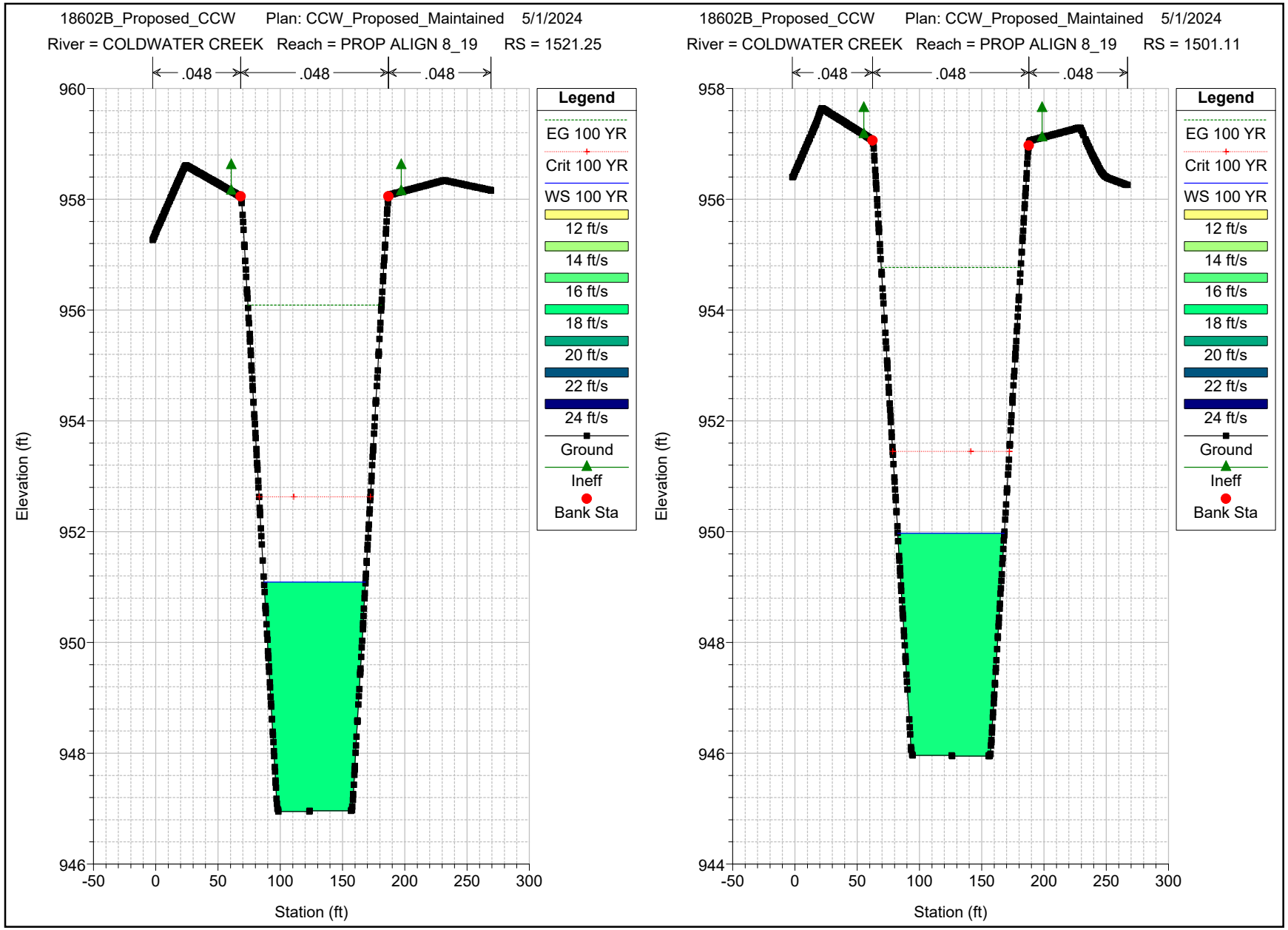

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1914.90
.043
.03
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1903.25
.043
.018
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

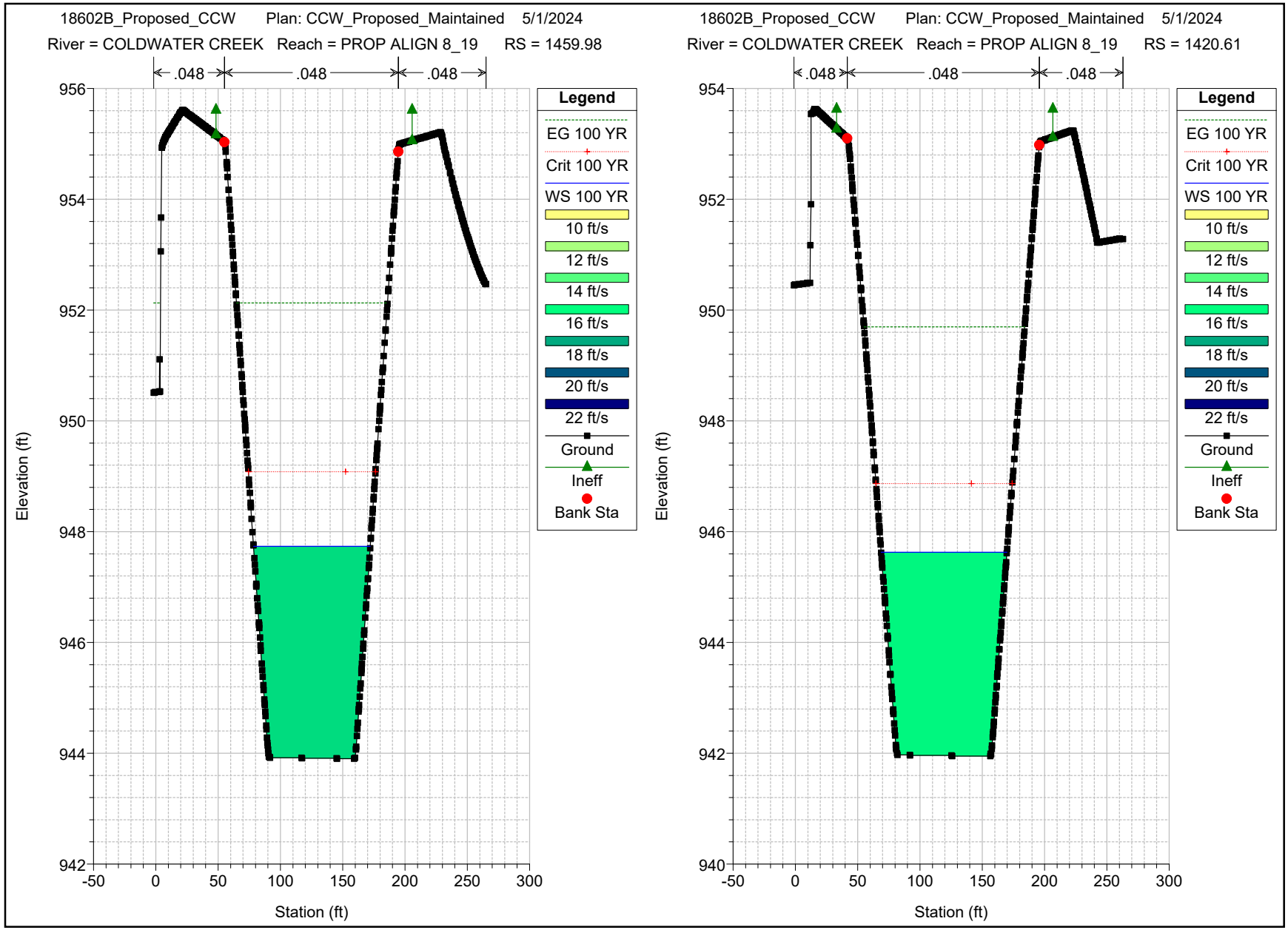

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1806.35 Culv
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1671.79
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

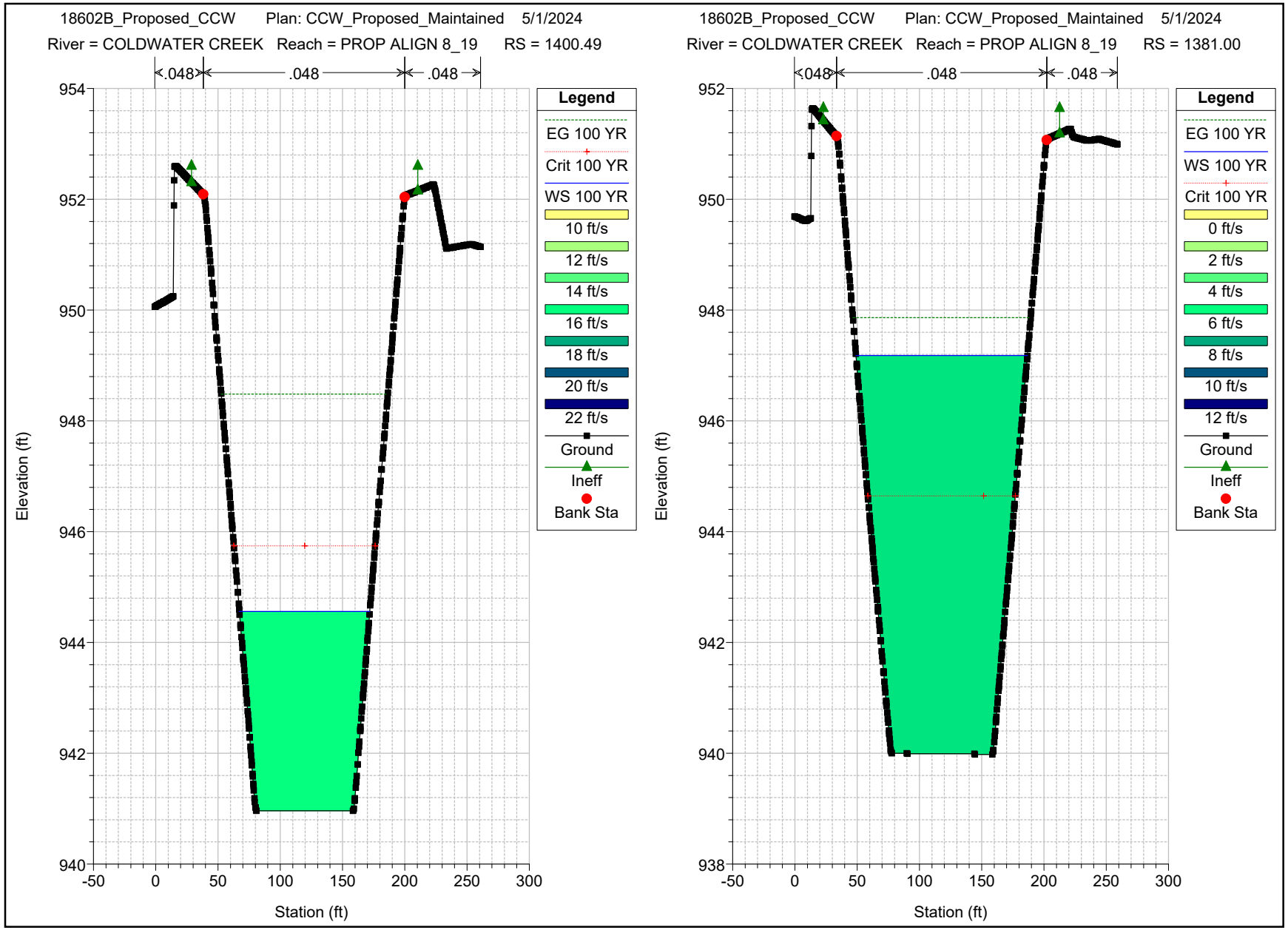

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1650.91
.043
.043
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1616.23
.043
.043
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

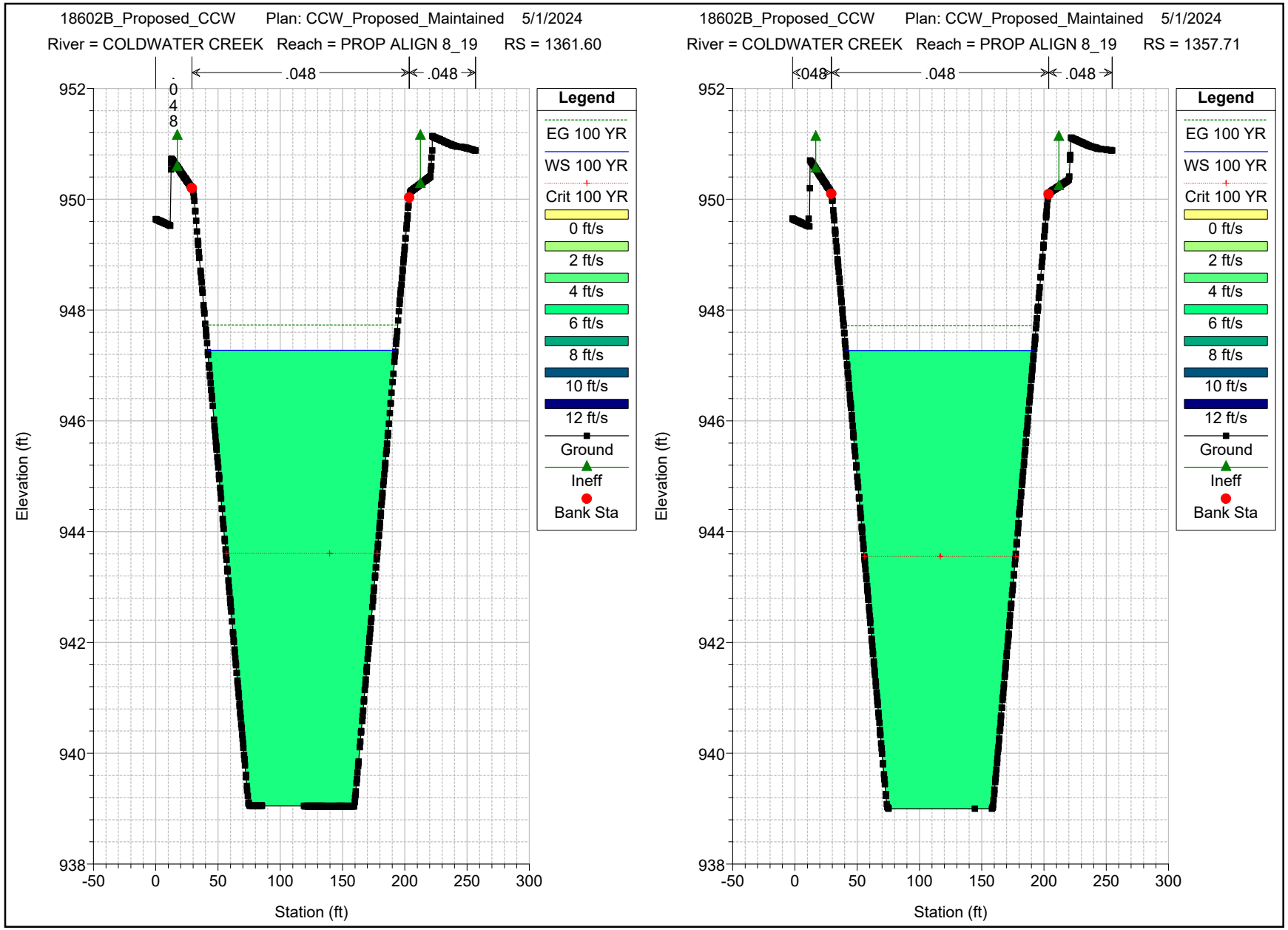

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1585.91
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1580.92
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

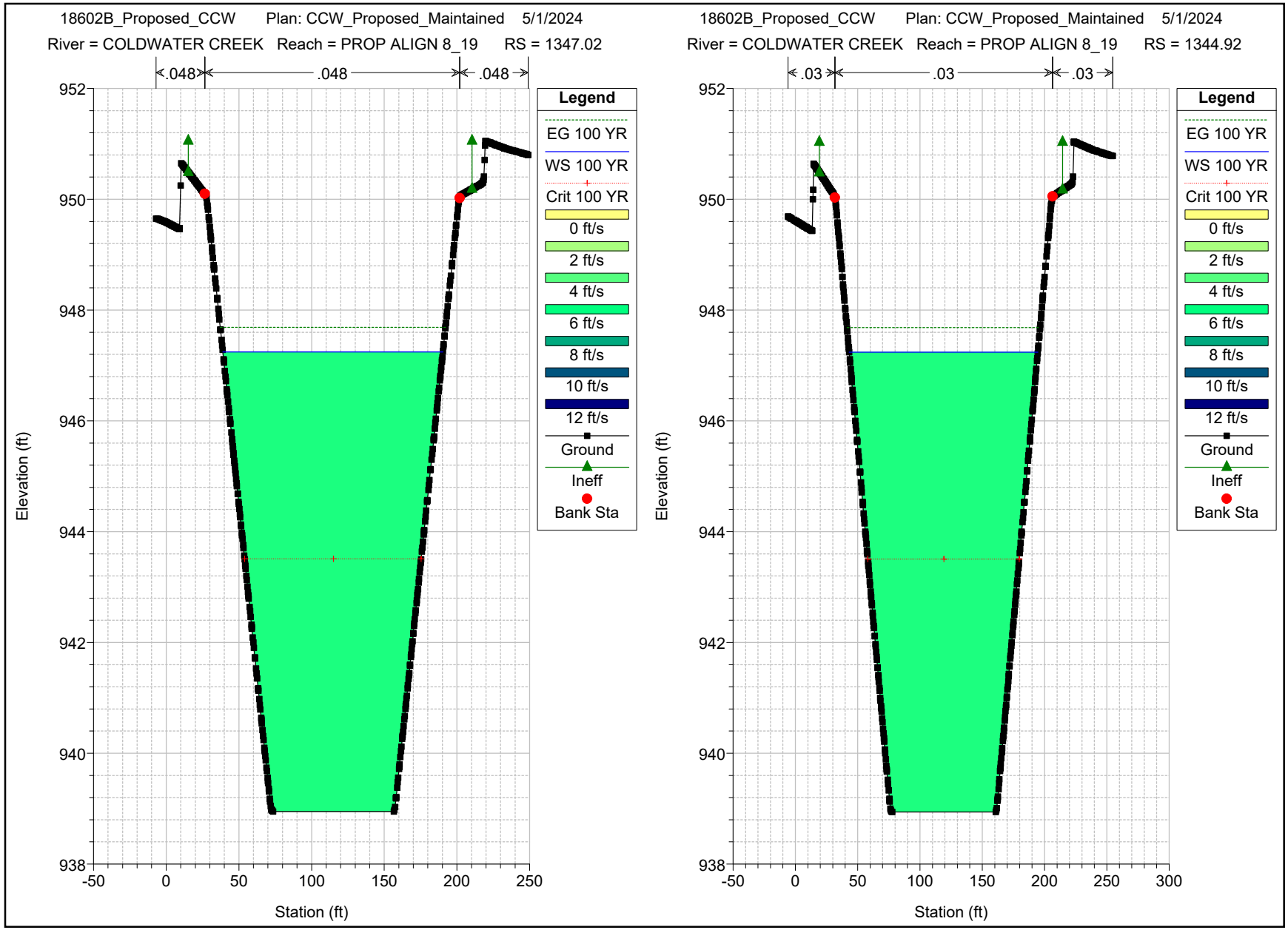

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1561.12
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1541.37
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

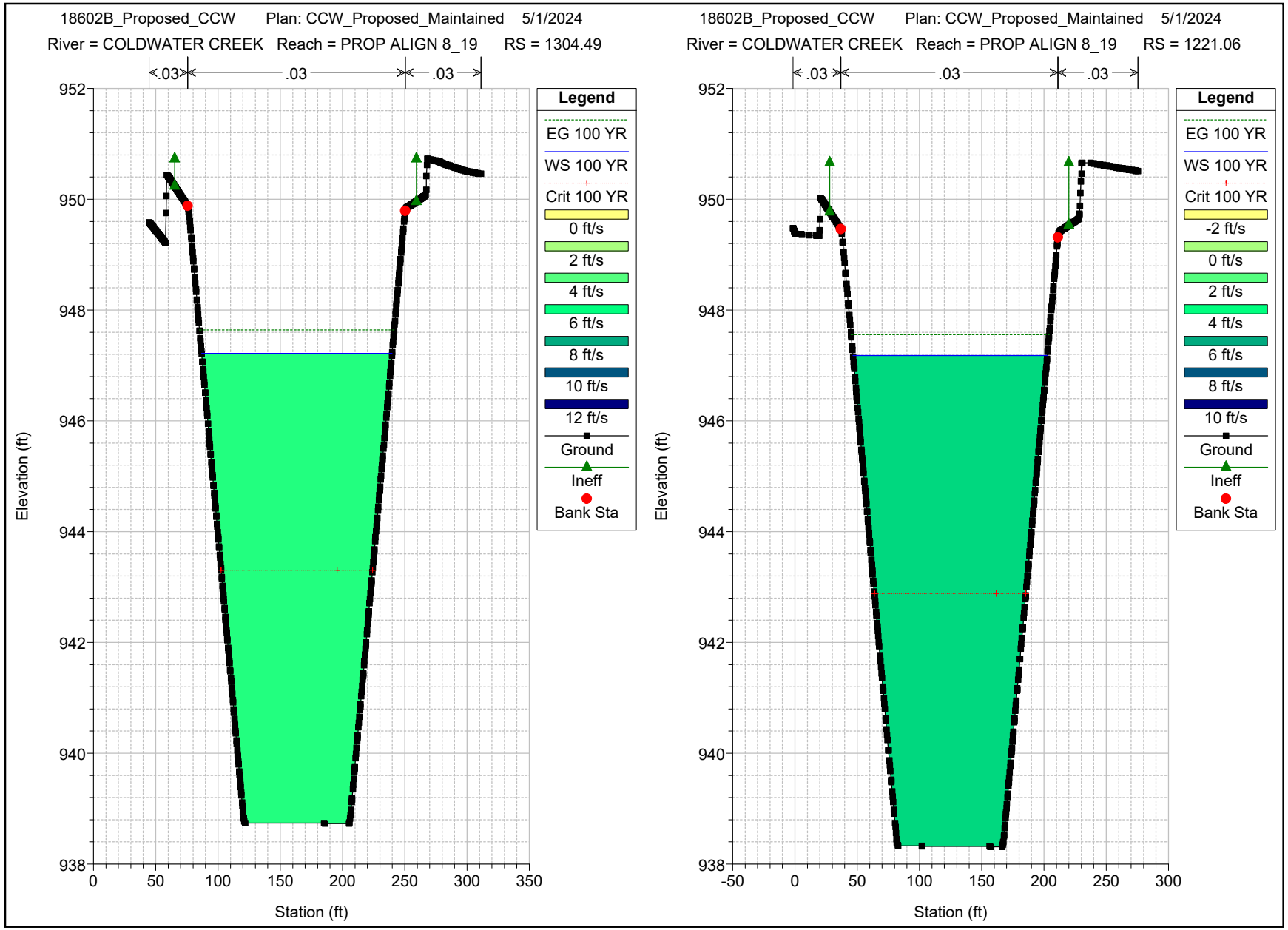

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1521.25
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1501.11
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

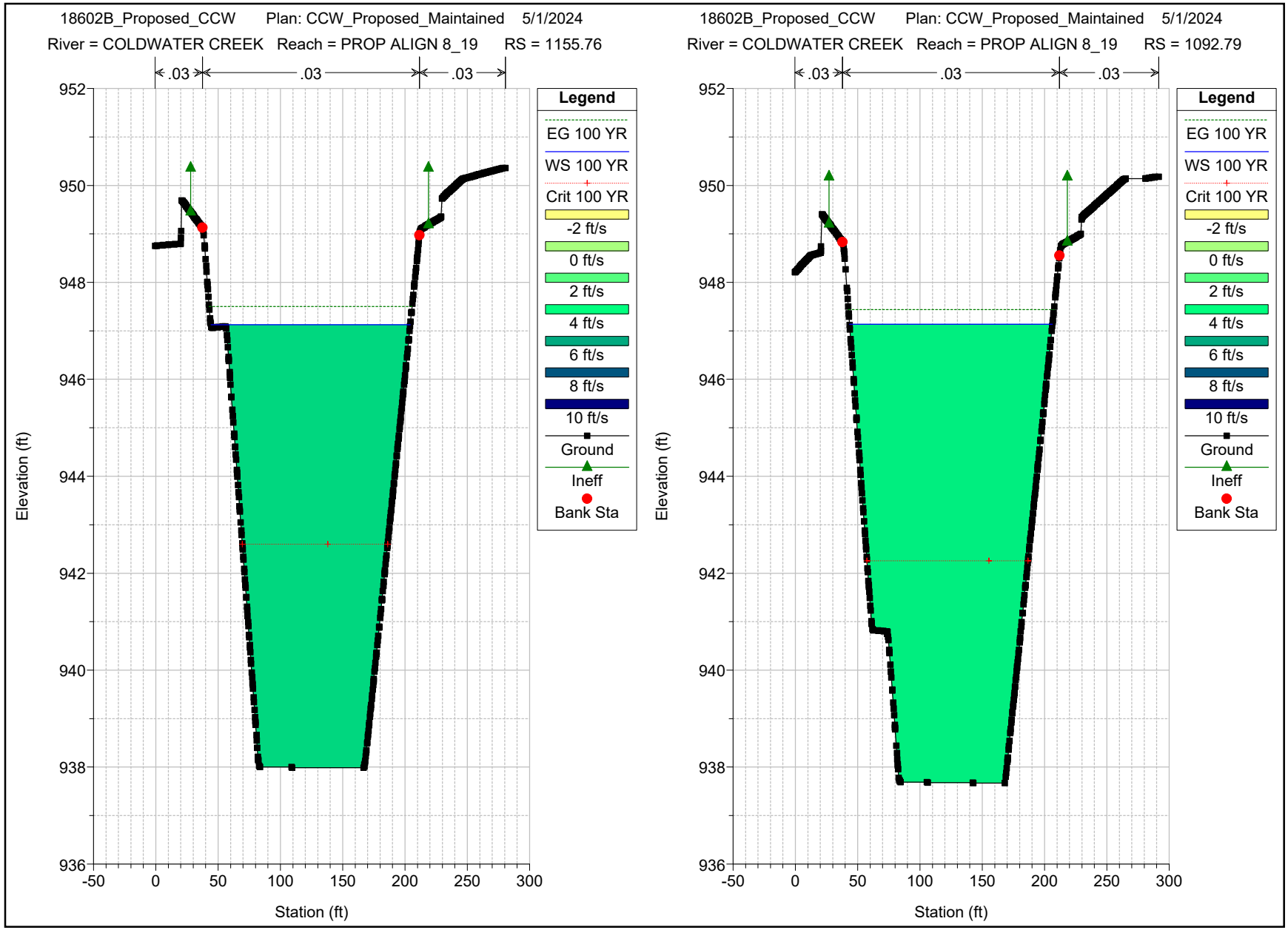

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1459.98
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1420.61
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

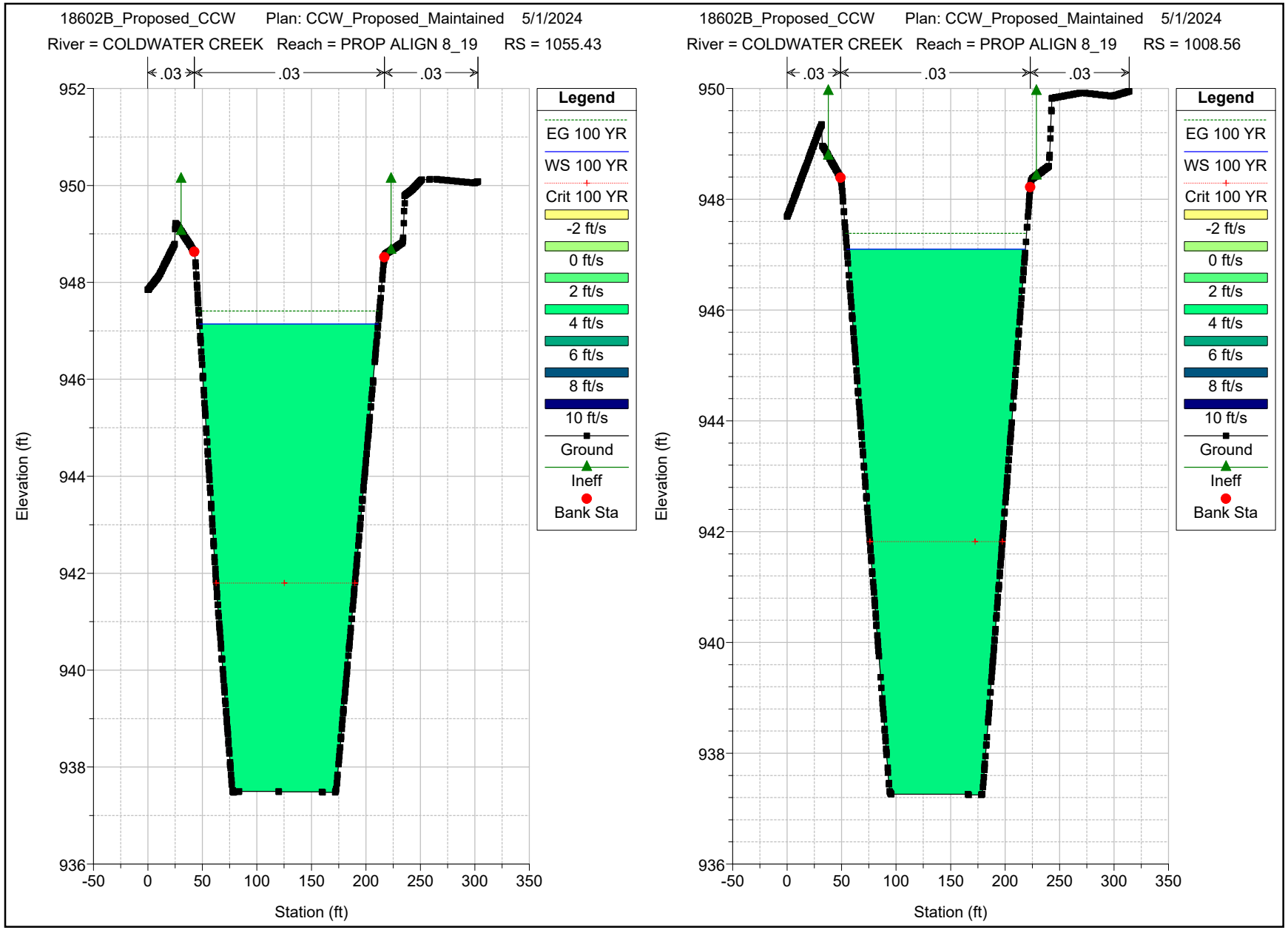

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1400.49
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1381.00
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

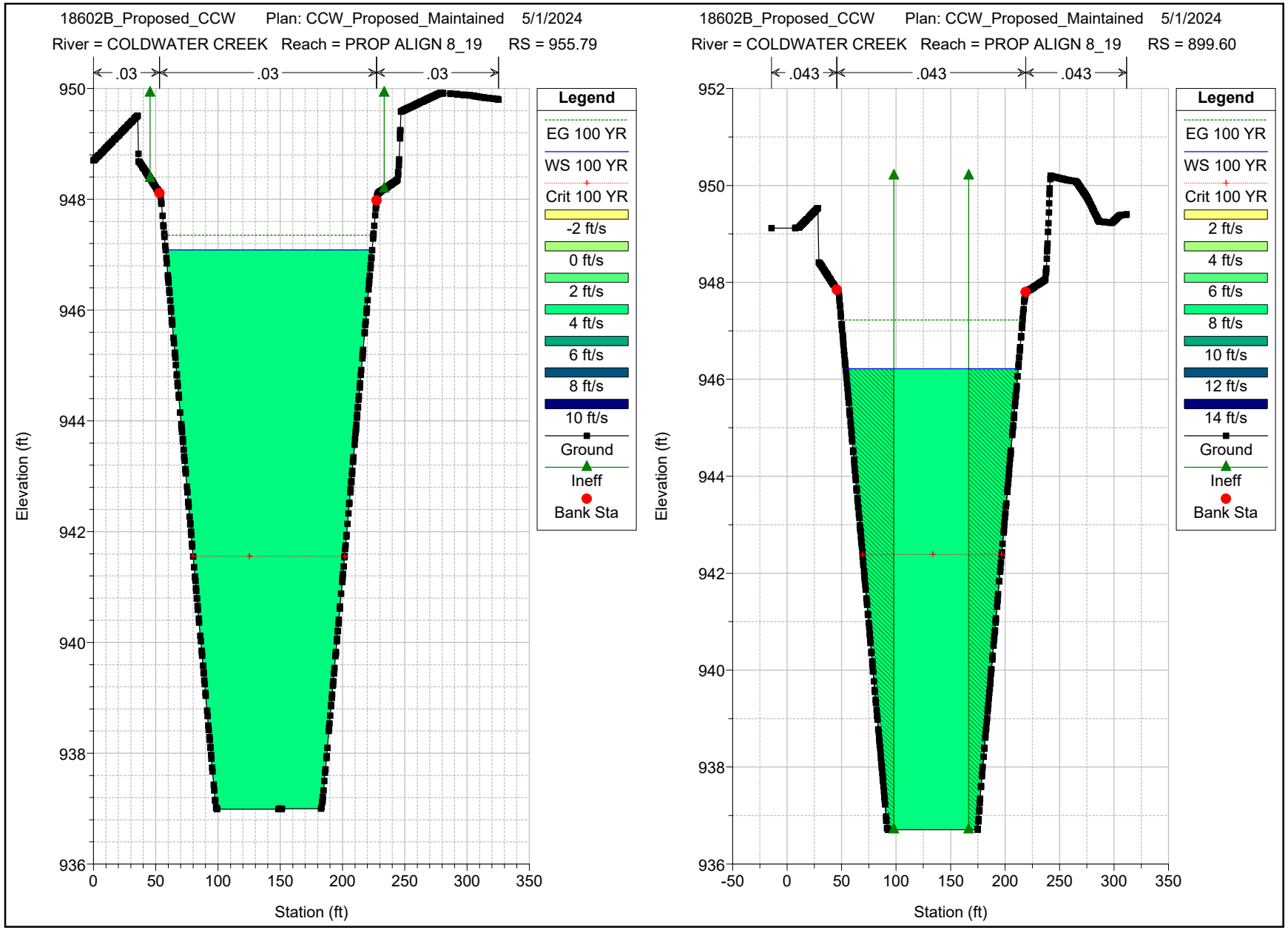

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1361.60
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
952
950
948
946
944
942
940
938
-50
0
50
100
150
200
250
300
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1357.71
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

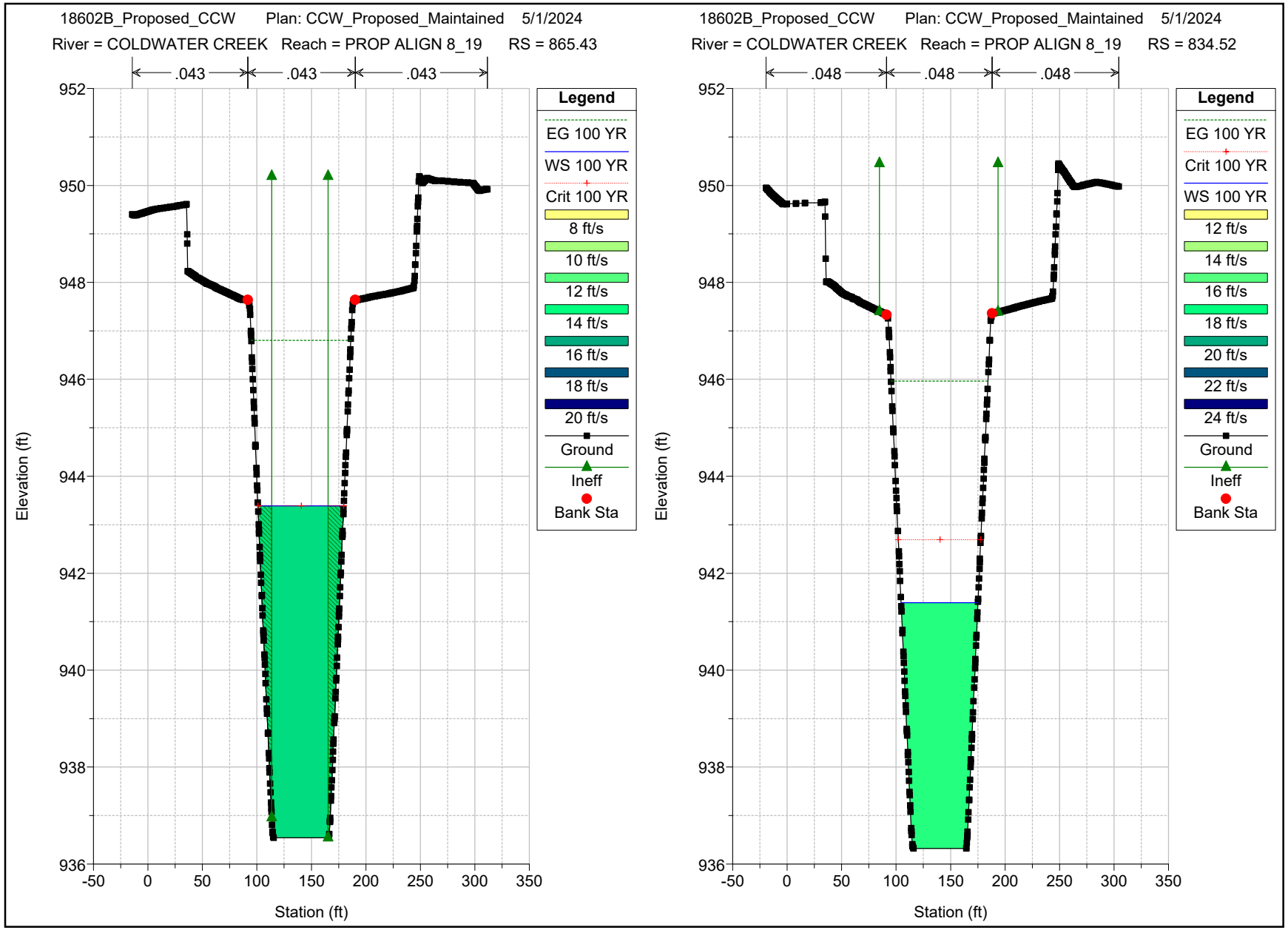

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1347.02
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1344.92
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

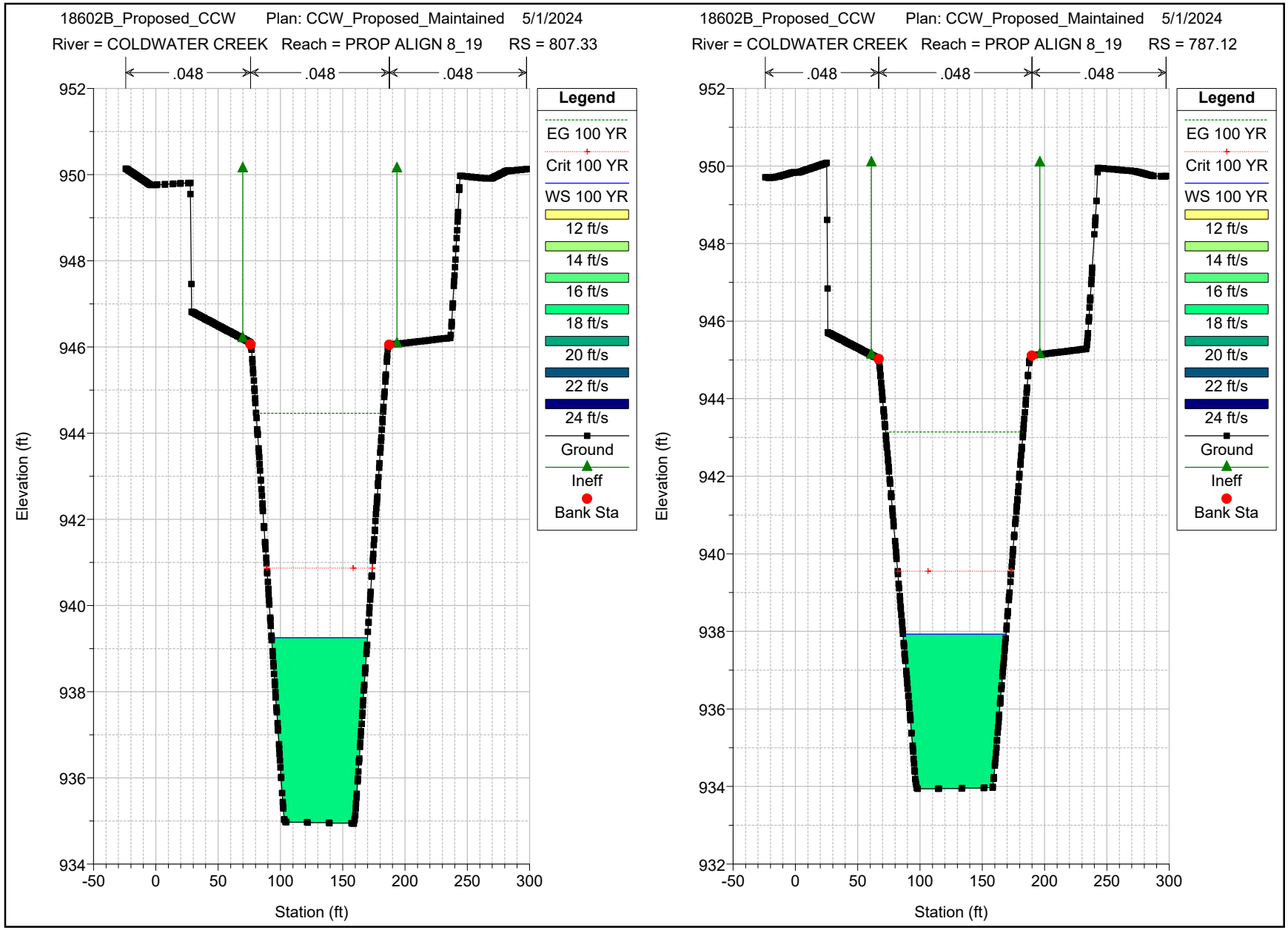

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1304.49
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
952
950
948
946
944
942
940
938
0
50
100
150
200
250
300
350
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1221.06
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
952
950
948
946
944
942
940
938
-50
0
50
100
150
200
250
300

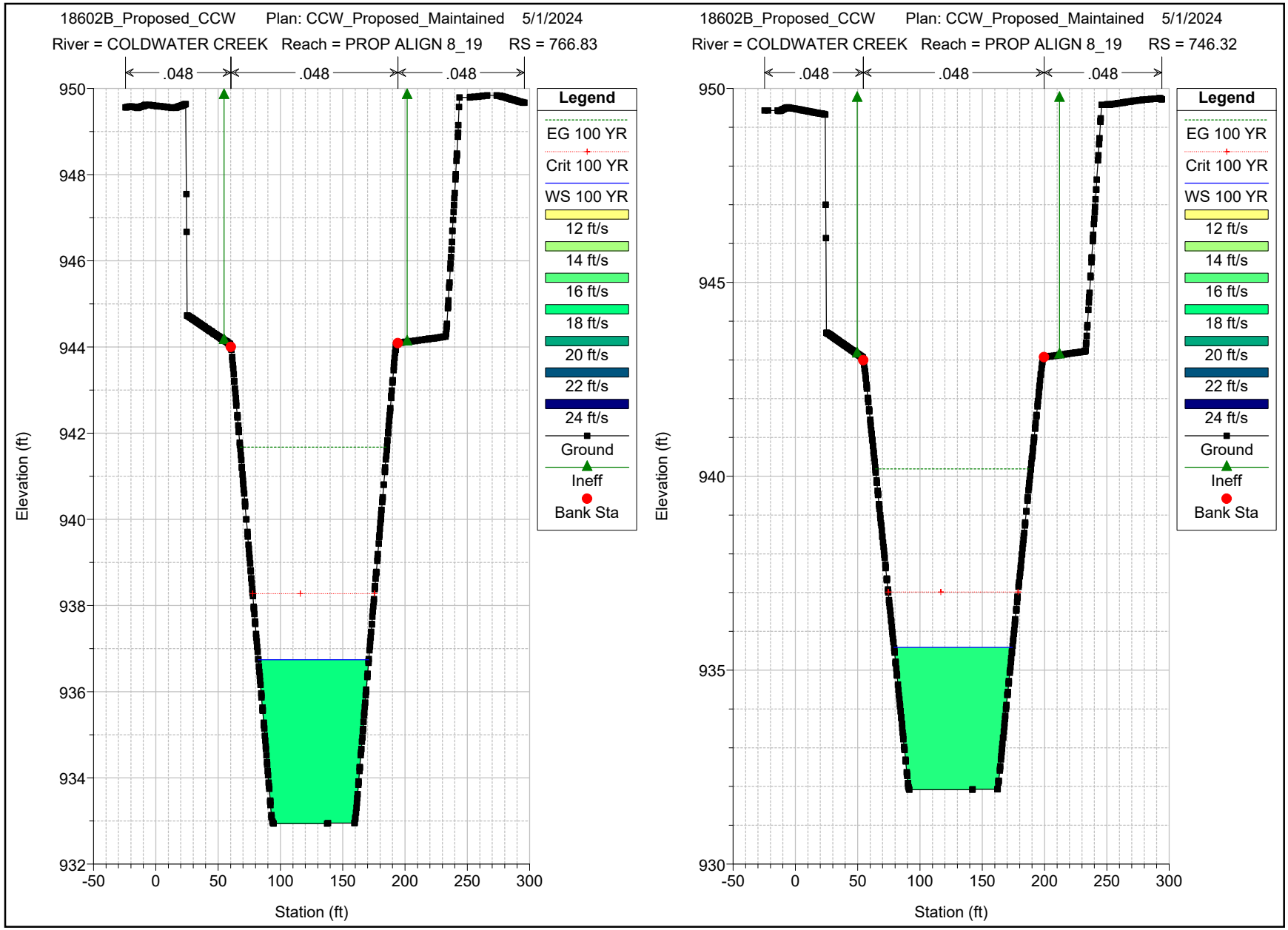

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1155.76
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
952
950
948
946
944
942
940
938
936
-50
0
50
100
150
200
250
300
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1092.79
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
952
950
948
946
944
942
940
938
936
-50
0
50
100
150
200
250
300

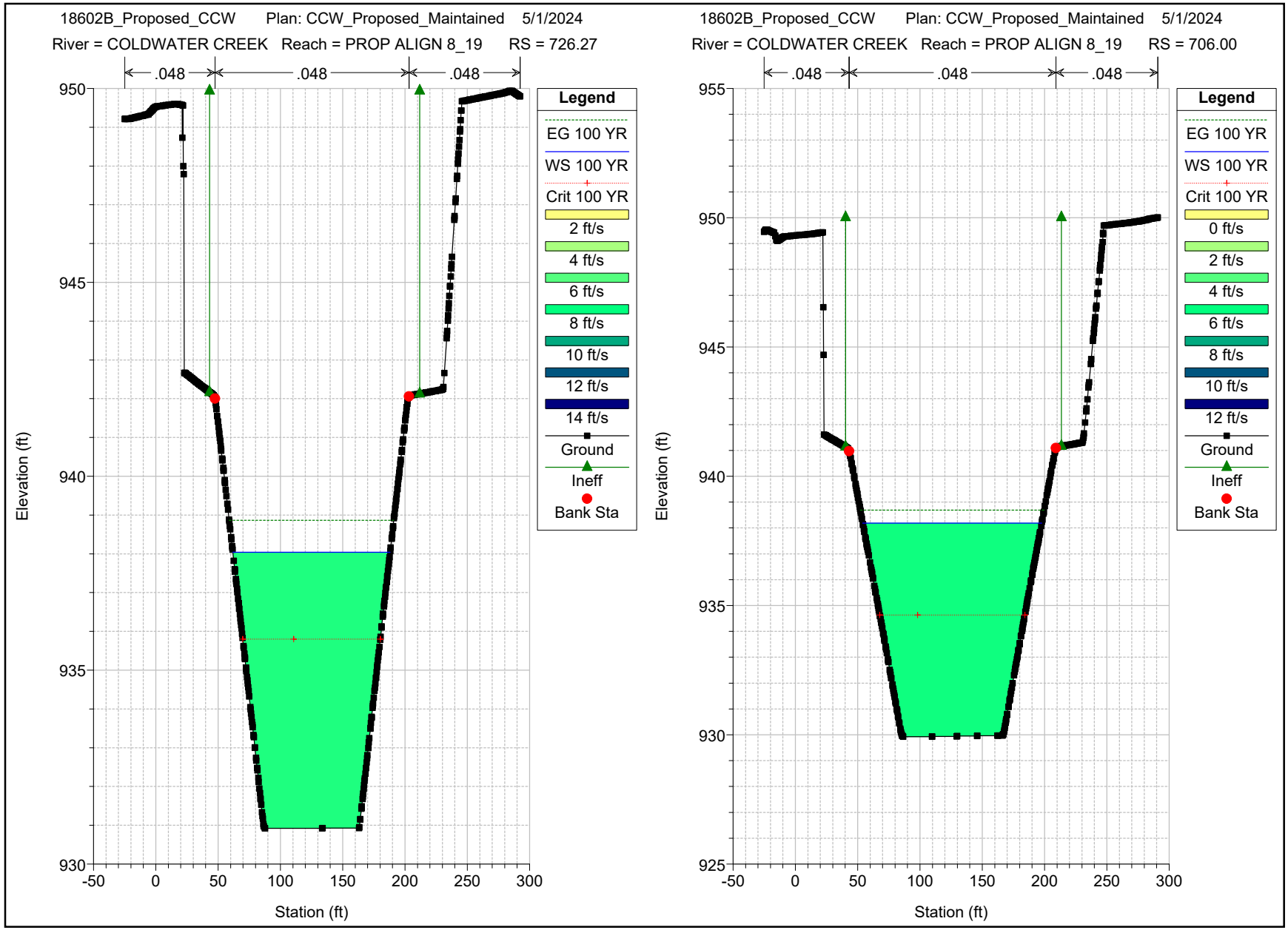

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1055.43
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1008.56
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

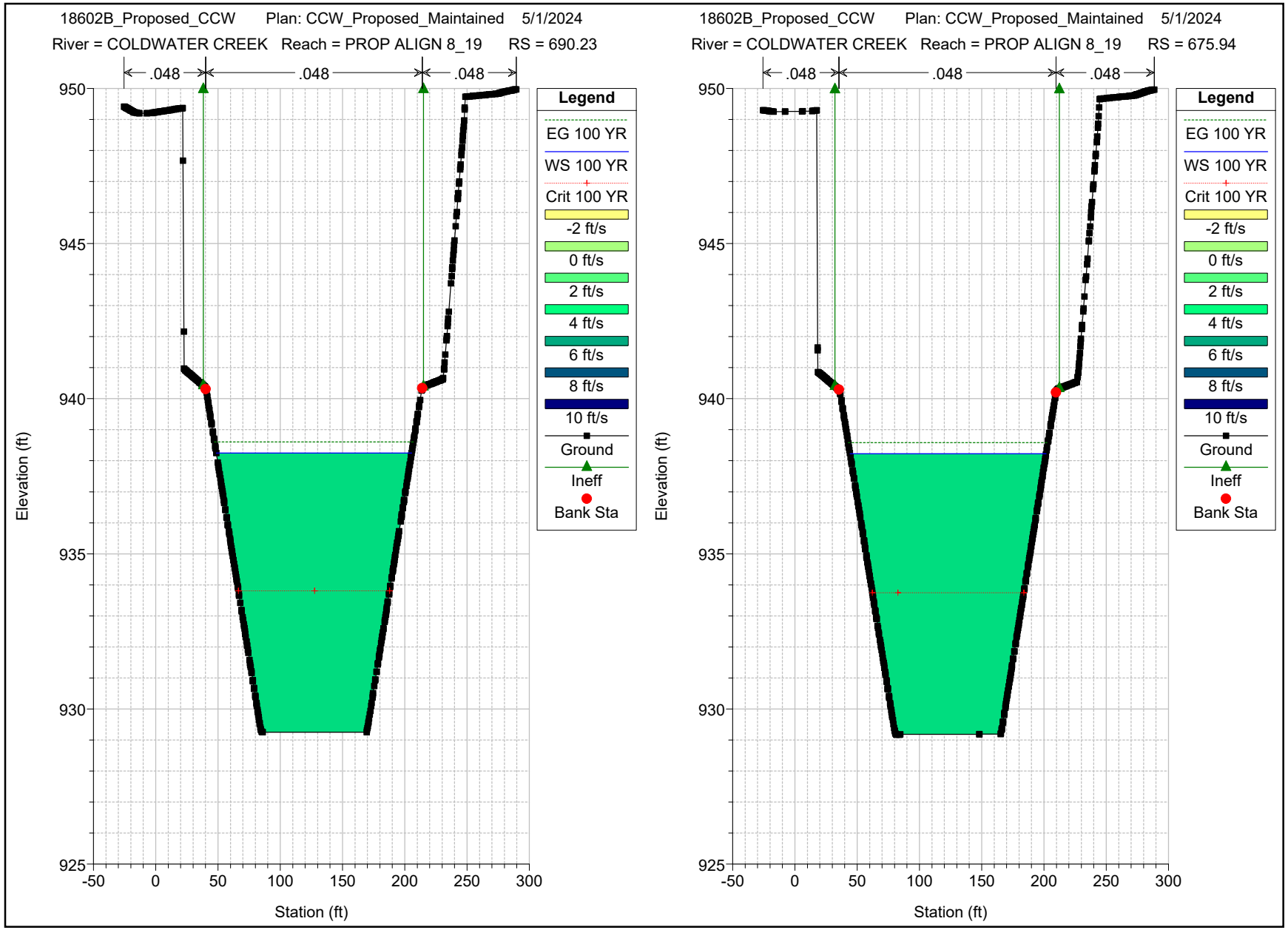

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 955.79
.03
.03
.03
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 899.60
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta

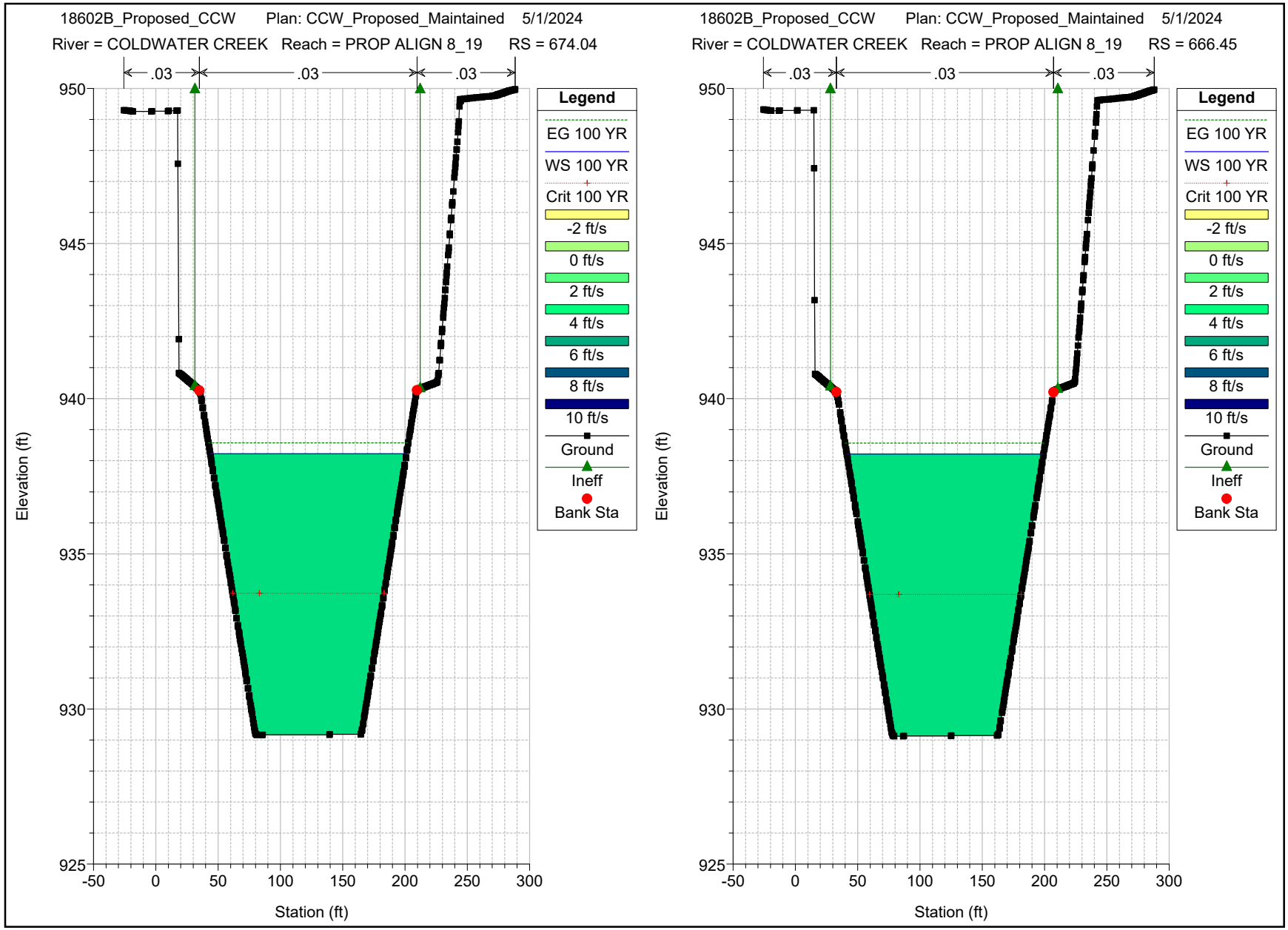

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 865.43
.043
.043
.043
Elevation (ft)
952
950
948
946
944
942
940
938
936
-50
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 834.52
.048
.048
.048
Elevation (ft)
952
950
948
946
944
942
940
938
936
-50
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta

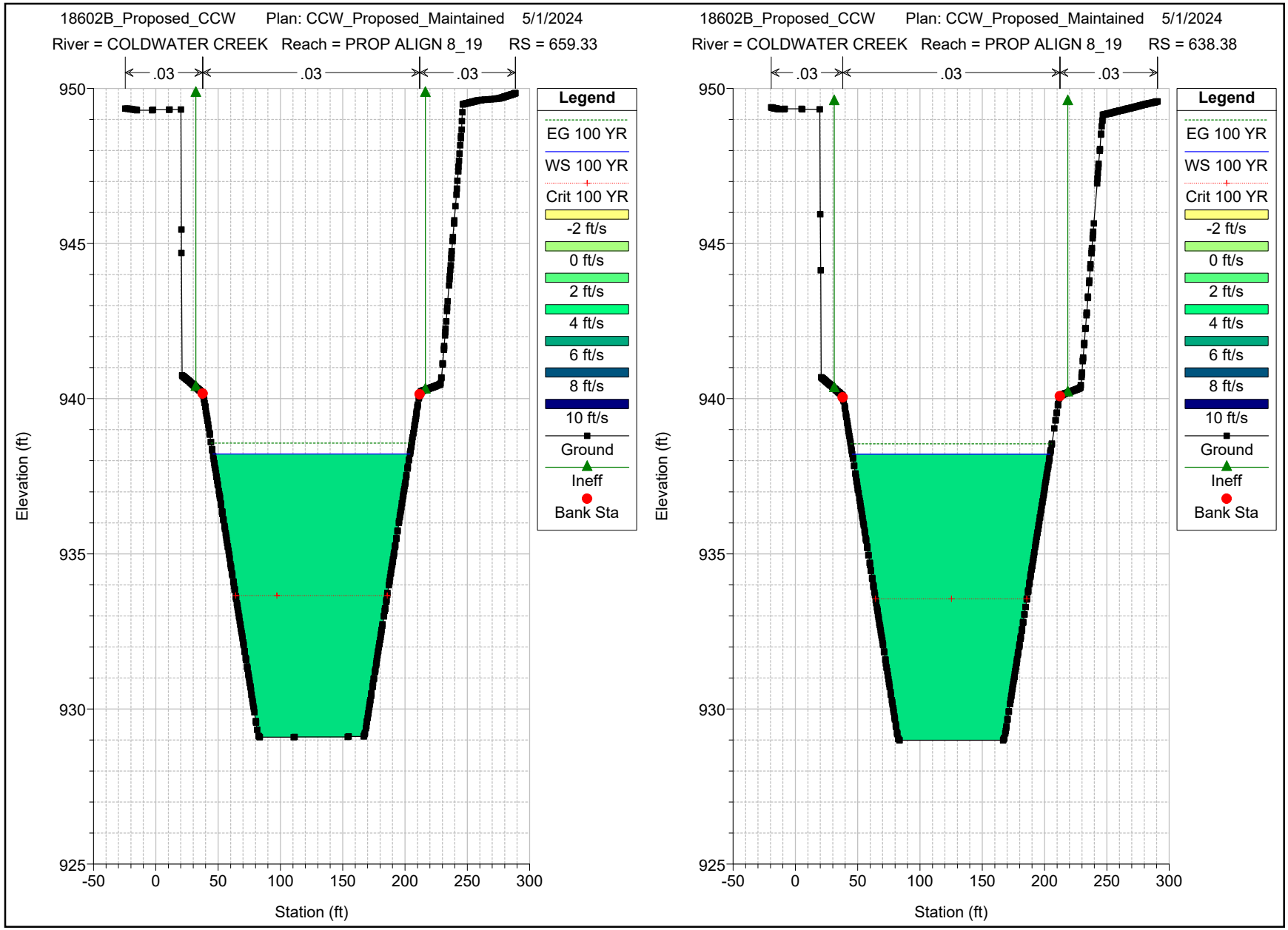

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 807.33
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 787.12
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

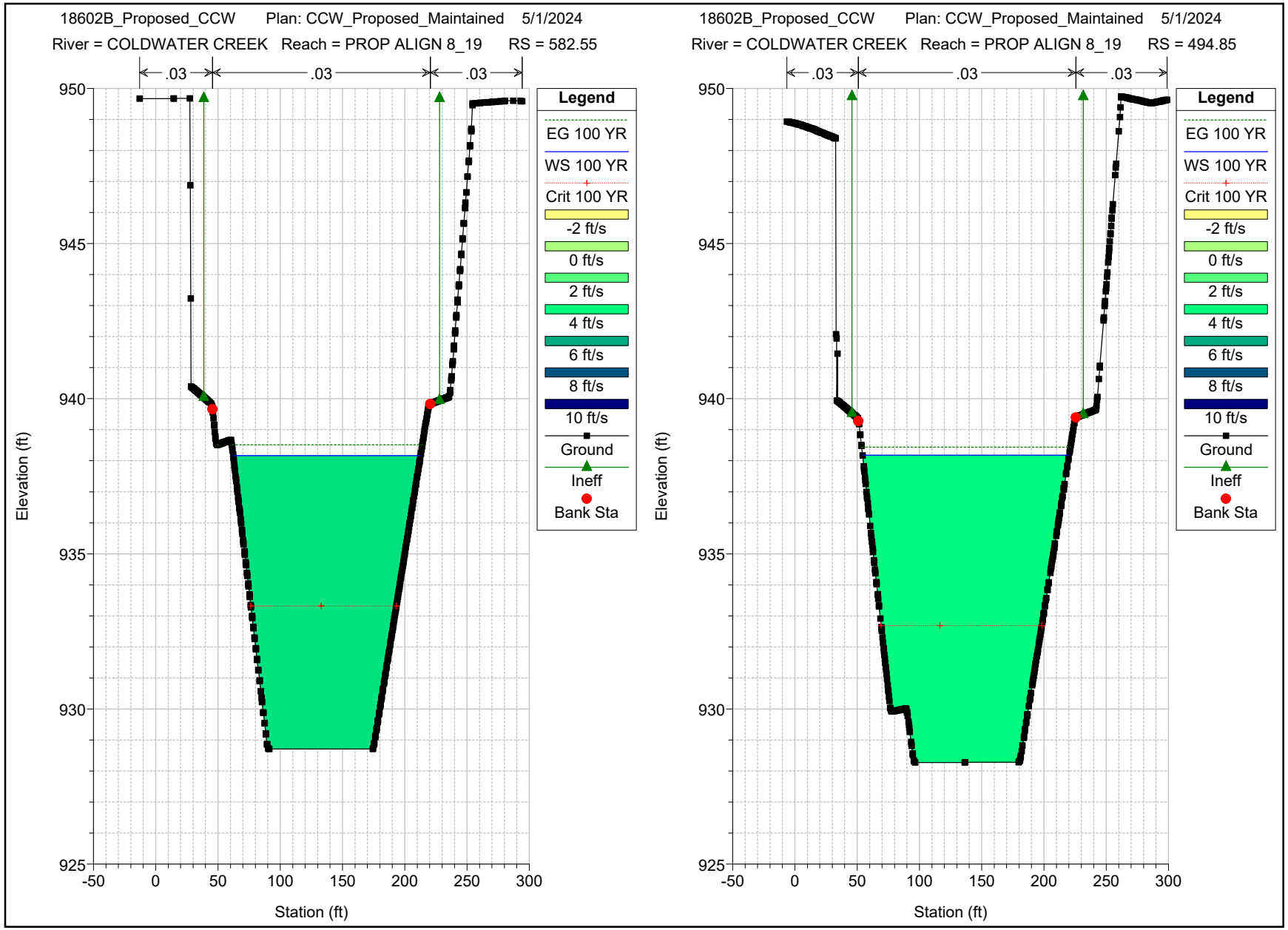

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 766.83
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 746.32
.048
.048
.048
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

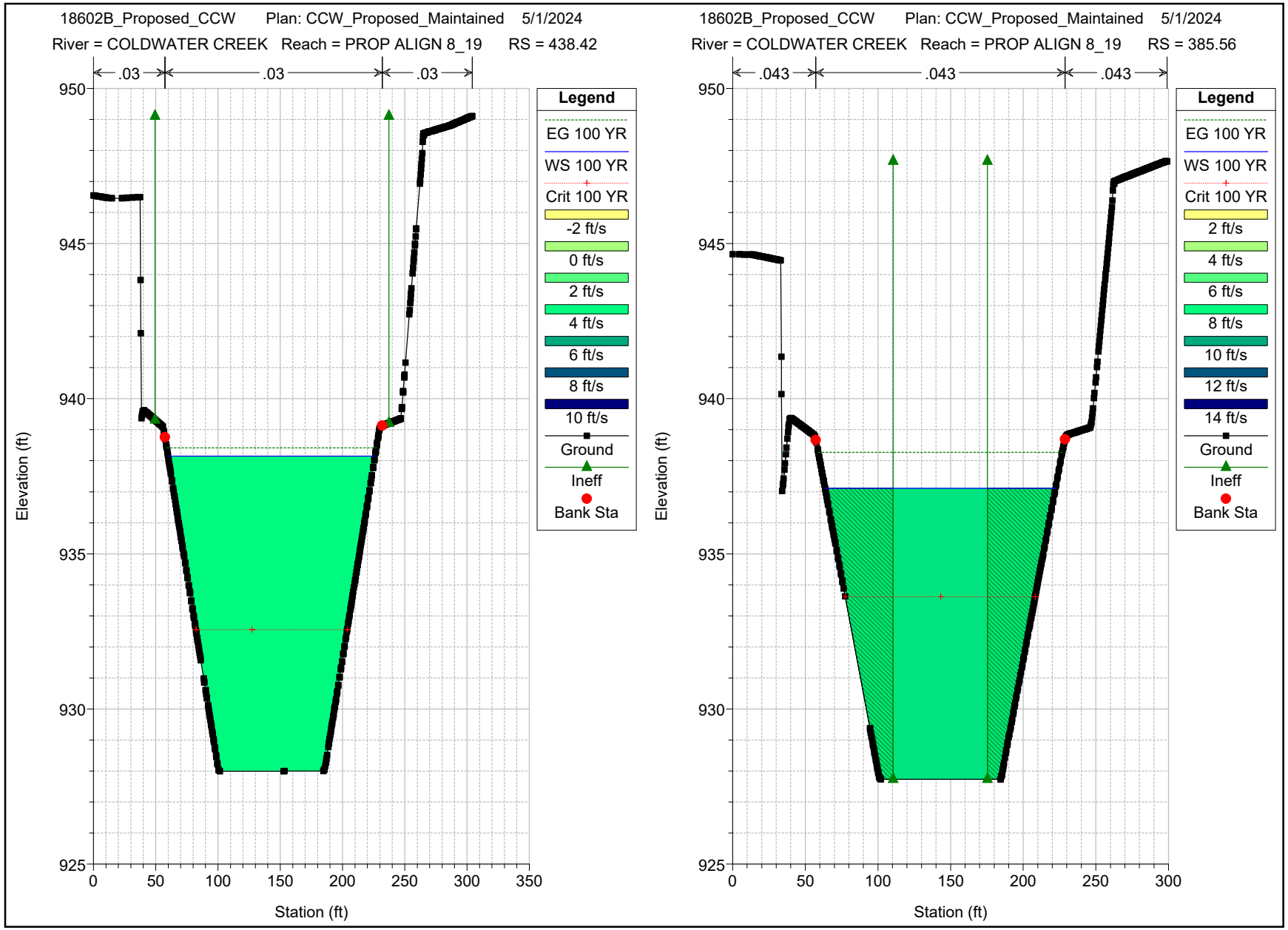

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 726.27
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 706.00
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

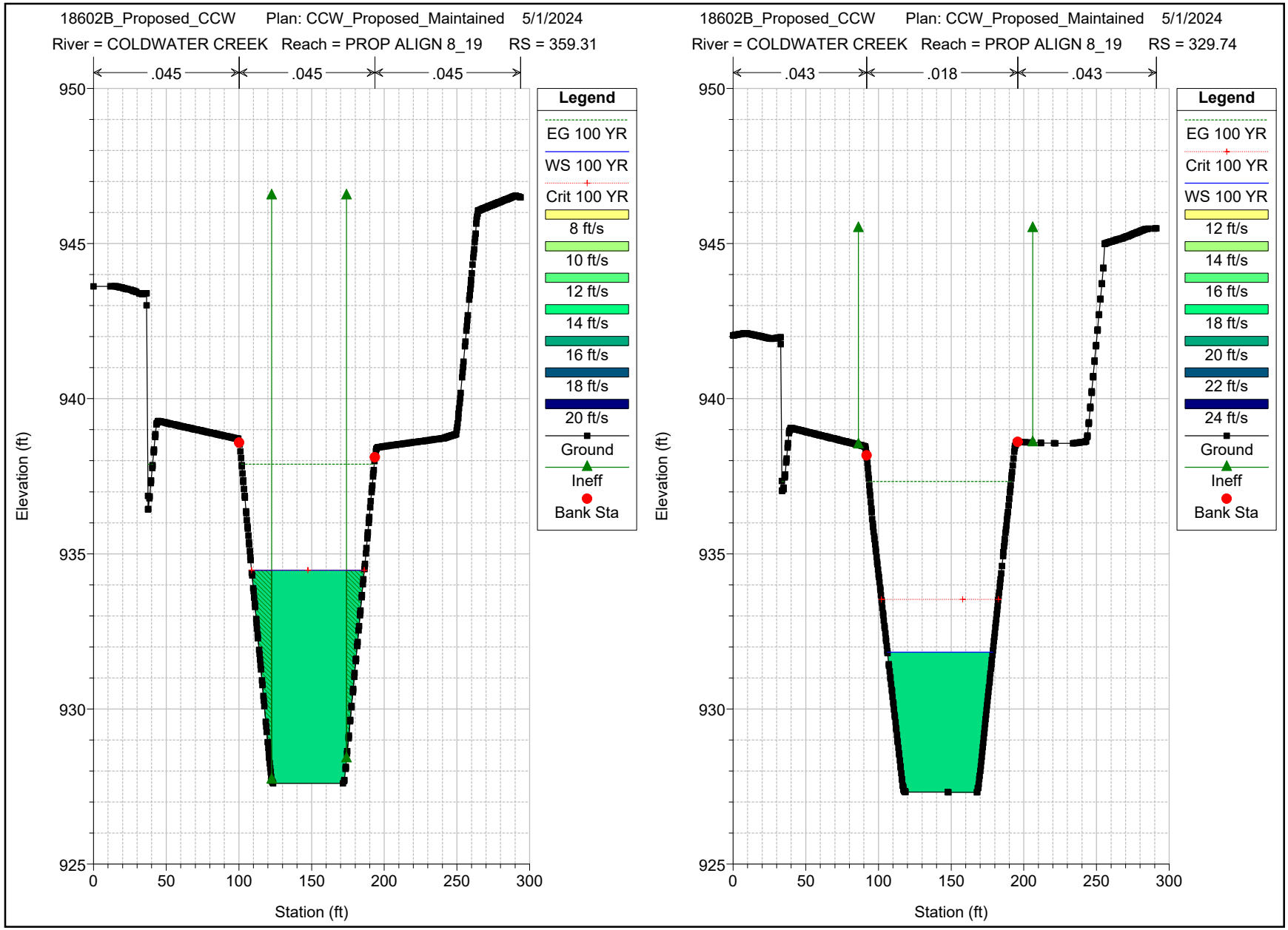

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 690.23
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 675.94
.048
.048
.048
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

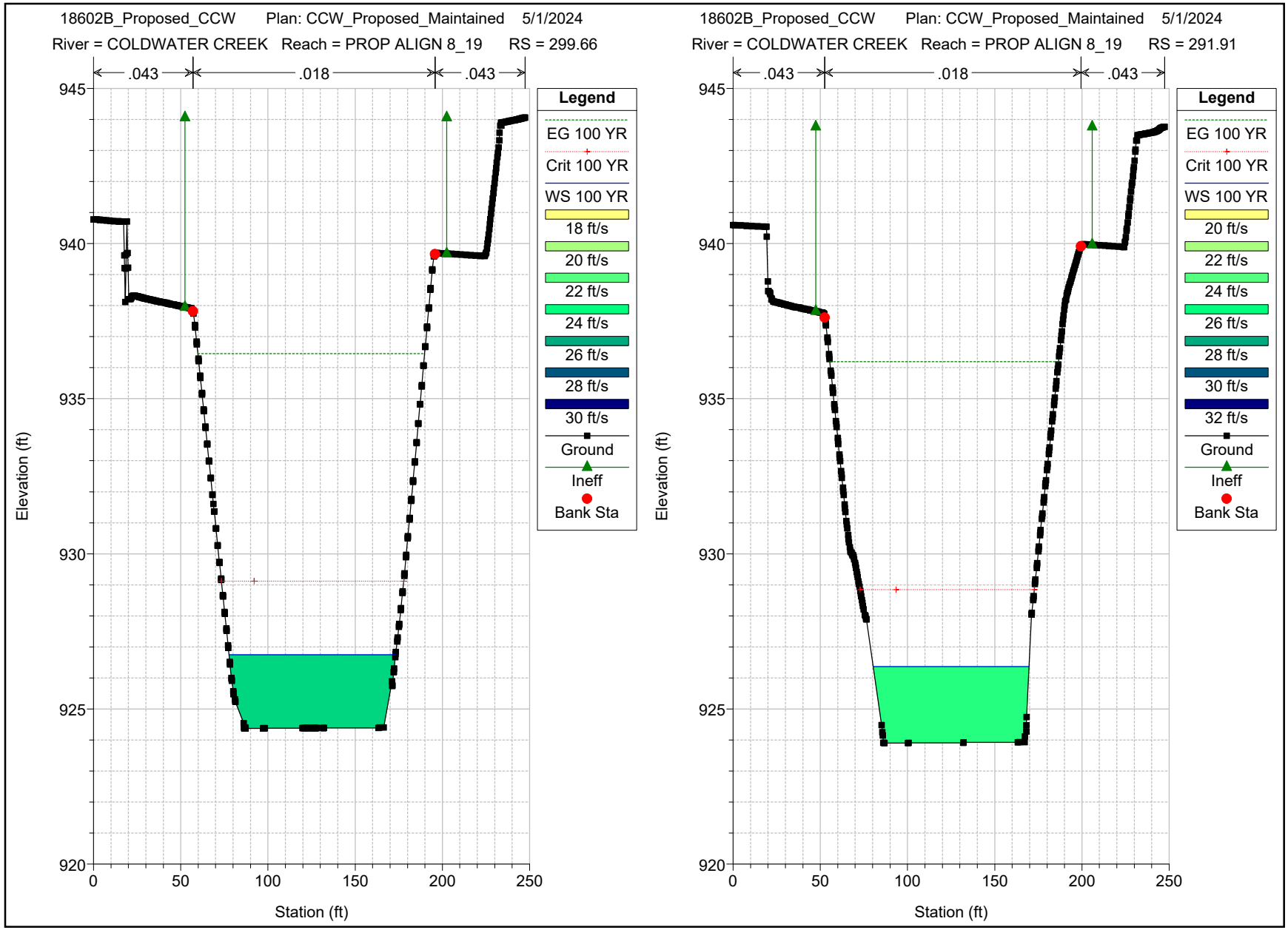

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 674.04
.03
.03
.03
950
945
940
935
930
925
Elevation (ft)
-50
0
50
100
150
200
250
300
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 666.45
.03
.03
.03
950
945
940
935
930
925
Elevation (ft)
-50
0
50
100
150
200
250
300
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

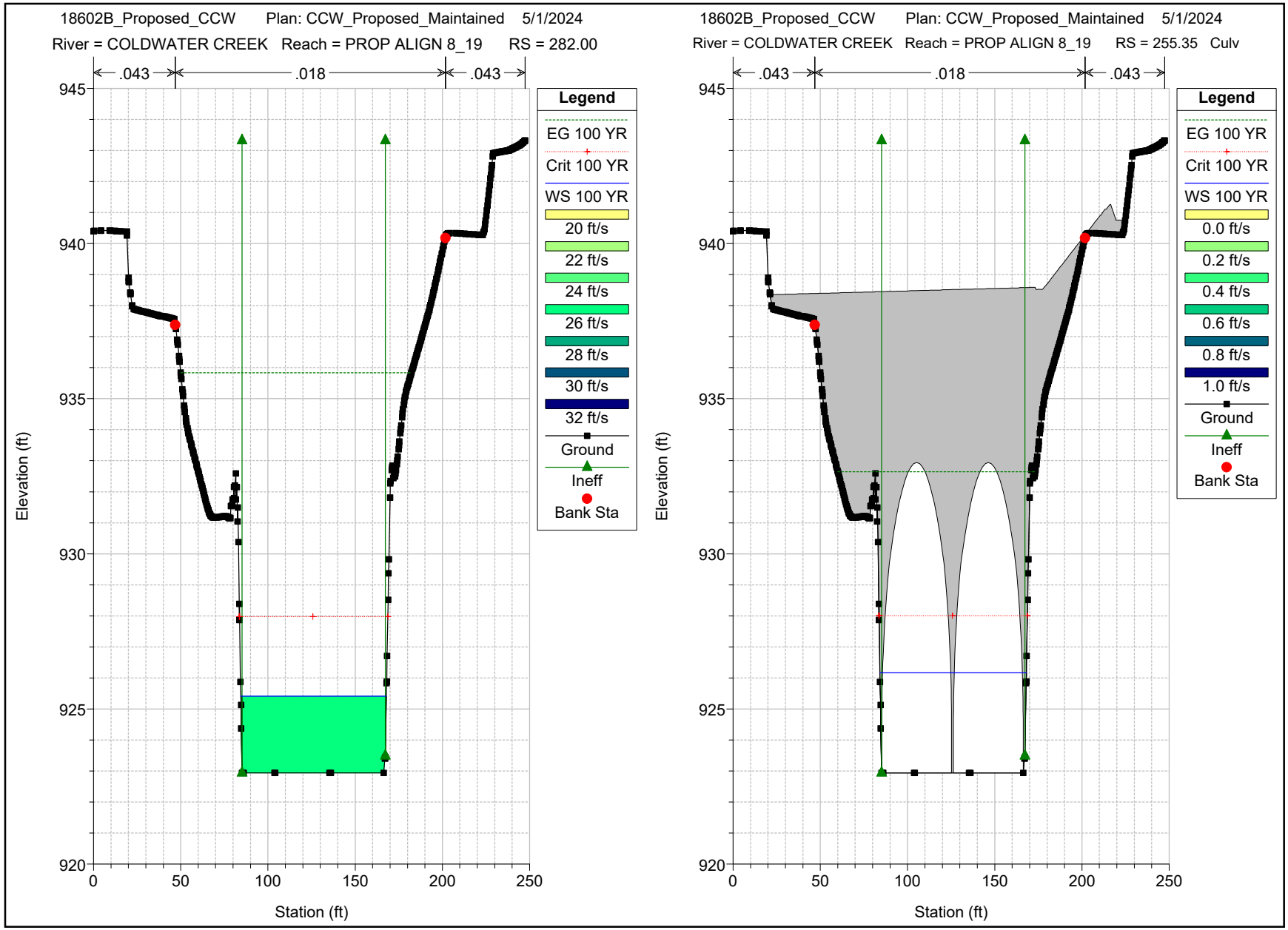

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 659.33
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
950
945
940
935
930
925
-50
0
50
100
150
200
250
300
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 638.38
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
950
945
940
935
930
925
-50
0
50
100
150
200
250
300
Station (ft)

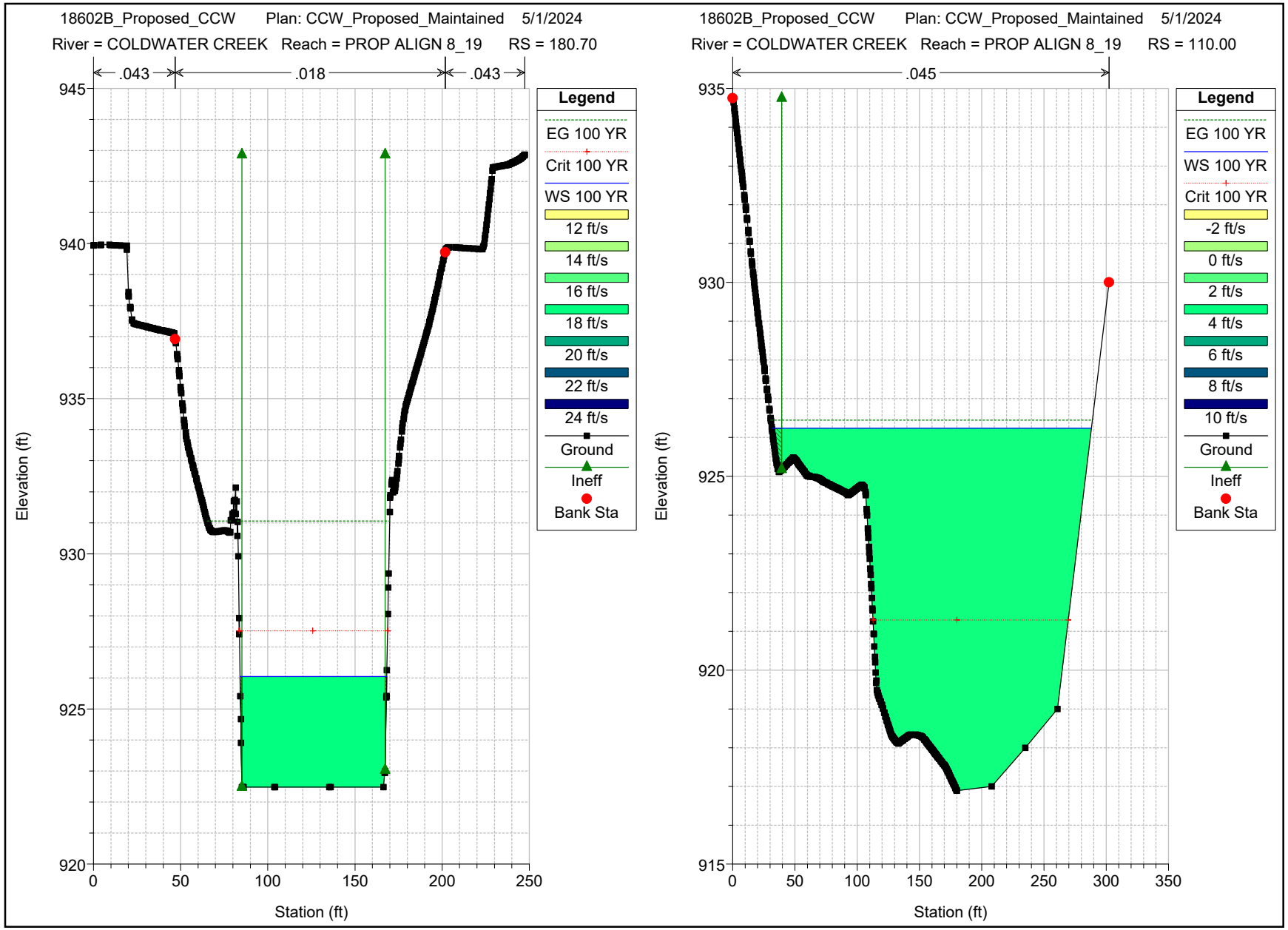

18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 582.55
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
950
945
940
935
930
925
-50
0
50
100
150
200
250
300
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 494.85
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
950
945
940
935
930
925
-50
0
50
100
150
200
250
300
Station (ft)


18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 438.42
.03
.03
.03
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 385.56
.043
.043
.043
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 359.31
.045
.045
.045
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 329.74
.043
.018
.043
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 299.66
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 291.91
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
32 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 282.00
.043
.018
.043
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
32 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 255.35 Culv
.043
.018
.043
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 180.70
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Maintained 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 110.00
.045
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

HEC-RAS Plan: 18602_Proposed_Maintained River: COLDWATER CREEK Reach: PROP ALIGN 8_19 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)	
PROP ALIGN 8_19	3349.55	100 YR	5250.00	989.76	998.27	998.27	1000.20	0.024462	11.13	471.70	122.32	1.00
PROP ALIGN 8_19	3269.70	100 YR	5250.00	987.52	993.24	994.37	997.10	0.060446	15.76	333.08	102.74	1.54
PROP ALIGN 8_19	3202.30	100 YR	5250.00	986.84	993.91	993.91	995.70	0.024943	10.71	490.12	137.34	1.00
PROP ALIGN 8_19	3107.70	100 YR	5250.00	984.45	993.34	991.73	994.10	0.007264	6.99	750.65	156.20	0.56
PROP ALIGN 8_19	3036.73	100 YR	5250.00	982.98	991.06	991.06	993.12	0.023527	11.52	455.68	110.32	1.00
PROP ALIGN 8_19	2957.64	100 YR	5250.00	979.88	989.20	988.86	991.44	0.018517	12.01	437.29	80.92	0.91
PROP ALIGN 8_19	2881.37	100 YR	5250.00	976.83	988.55	986.11	990.31	0.009620	10.64	493.54	59.51	0.65
PROP ALIGN 8_19	2809.03	100 YR	5250.00	973.90	985.88	985.88	989.13	0.022769	14.46	363.07	92.62	1.00
PROP ALIGN 8_19	2738.95	100 YR	5250.00	971.11	981.82	983.16	986.84	0.042056	17.97	292.08	52.86	1.35
PROP ALIGN 8_19	2655.73	100 YR	5250.00	969.54	979.61	980.39	983.18	0.035764	15.15	346.61	74.73	1.24
PROP ALIGN 8_19	2582.44	100 YR	5250.00	967.70	974.87	976.65	979.66	0.062255	17.57	298.85	76.27	1.56
PROP ALIGN 8_19	2461.48	100 YR	5250.00	966.04	974.84	974.84	977.33	0.016919	12.91	432.91	88.59	0.90
PROP ALIGN 8_19	2429.62	100 YR	5250.00	965.50	971.28	972.75	976.23	0.048787	17.85	294.15	67.07	1.50
PROP ALIGN 8_19	2401.68	100 YR	5250.00	963.81	968.45	970.37	974.50	0.070221	19.73	266.04	69.62	1.78
PROP ALIGN 8_19	2379.12	100 YR	5250.00	962.36	966.53	968.49	972.80	0.079539	20.08	261.44	73.40	1.88
PROP ALIGN 8_19	2356.34	100 YR	5250.00	960.89	964.71	966.63	970.90	0.085210	19.95	263.14	78.80	1.92
PROP ALIGN 8_19	2338.32	100 YR	5250.00	959.66	968.52	965.19	969.27	0.003862	6.95	754.87	106.26	0.46
PROP ALIGN 8_19	2319.83	100 YR	5250.00	958.57	968.64	963.84	969.14	0.002139	5.67	925.86	112.95	0.35
PROP ALIGN 8_19	2309.54	100 YR	5250.00	958.52	968.65	963.67	969.11	0.001964	5.48	958.00	115.31	0.34
PROP ALIGN 8_19	2306.71	100 YR	5250.00	958.50	968.65	963.61	969.11	0.000749	5.43	967.53	116.08	0.33
PROP ALIGN 8_19	2286.58	100 YR	5250.00	958.40	968.65	963.59	969.09	0.000713	5.28	993.67	119.98	0.32
PROP ALIGN 8_19	2245.56	100 YR	5250.00	958.18	968.57	963.37	969.05	0.000650	5.57	942.62	127.90	0.32
PROP ALIGN 8_19	2204.54	100 YR	5250.00	957.98	967.63	964.21	968.92	0.003384	9.11	576.47	122.61	0.52
PROP ALIGN 8_19	2179.00	100 YR	5250.00	957.85	964.99	964.99	968.53	0.017680	15.08	348.16	78.64	1.00
PROP ALIGN 8_19	2149.31	100 YR	5250.00	957.63	962.50	964.02	967.54	0.052351	18.01	291.55	69.67	1.55
PROP ALIGN 8_19	2135.35	100 YR	5250.00	956.95	961.41	963.06	966.73	0.060326	18.49	284.00	72.88	1.65
PROP ALIGN 8_19	2115.25	100 YR	5250.00	955.96	959.99	961.68	965.42	0.068183	18.70	280.81	78.02	1.74
PROP ALIGN 8_19	2094.39	100 YR	5250.00	954.93	958.76	960.34	963.91	0.068918	18.21	288.38	84.38	1.74
PROP ALIGN 8_19	2073.79	100 YR	5250.00	953.90	962.30	958.99	963.01	0.003657	6.75	777.56	109.65	0.45
PROP ALIGN 8_19	2047.73	100 YR	5250.00	952.56	962.39	957.63	962.87	0.002106	5.57	941.82	115.06	0.34
PROP ALIGN 8_19	2028.41	100 YR	5250.00	952.52	962.42	957.25	962.81	0.001813	5.02	1045.25	135.99	0.32
PROP ALIGN 8_19	2022.20	100 YR	5250.00	952.48	962.41	957.19	962.80	0.001413	4.98	1055.14	136.15	0.32
PROP ALIGN 8_19	1969.97	100 YR	5250.00	952.21	962.39	956.93	962.71	0.001068	4.56	1152.41	137.33	0.28
PROP ALIGN 8_19	1927.42	100 YR	5250.00	951.99	962.37	956.49	962.68	0.000477	4.47	1175.54	135.42	0.27
PROP ALIGN 8_19	1914.90	100 YR	5250.00	951.93	962.34	956.59	962.67	0.000514	4.61	1139.49	132.66	0.28
PROP ALIGN 8_19	1903.25	100 YR	5250.00	951.86	962.03	956.86	962.64	0.000261	6.25	839.68	130.25	0.35
PROP ALIGN 8_19	1806.35		Culvert									
PROP ALIGN 8_19	1671.79	100 YR	5250.00	950.65	960.72	955.64	961.33	0.000263	6.23	842.77	176.12	0.35
PROP ALIGN 8_19	1650.91	100 YR	5250.00	950.56	960.37	956.18	961.28	0.002352	7.68	683.74	123.03	0.43
PROP ALIGN 8_19	1616.23	100 YR	5250.00	950.38	957.37	957.37	960.86	0.014162	14.98	350.43	78.15	1.00
PROP ALIGN 8_19	1585.91	100 YR	5250.00	950.16	955.10	956.56	959.99	0.049981	17.73	296.14	69.89	1.52
PROP ALIGN 8_19	1580.92	100 YR	5250.00	949.91	954.75	956.24	959.72	0.051963	17.88	293.70	70.66	1.55
PROP ALIGN 8_19	1561.12	100 YR	5250.00	948.93	953.44	955.03	958.60	0.058554	18.23	288.05	73.98	1.63
PROP ALIGN 8_19	1541.37	100 YR	5250.00	947.95	952.23	953.83	957.40	0.062236	18.24	287.75	77.56	1.67
PROP ALIGN 8_19	1521.25	100 YR	5250.00	946.95	951.09	952.63	956.09	0.062551	17.94	292.67	81.47	1.67
PROP ALIGN 8_19	1501.11	100 YR	5250.00	945.95	949.97	951.45	954.77	0.062151	17.57	298.73	85.55	1.66
PROP ALIGN 8_19	1459.98	100 YR	5250.00	943.90	947.73	949.08	952.13	0.060274	16.82	312.13	93.62	1.62
PROP ALIGN 8_19	1420.61	100 YR	5250.00	941.95	945.63	946.87	949.70	0.058342	16.18	324.45	100.88	1.59
PROP ALIGN 8_19	1400.49	100 YR	5250.00	940.96	944.56	945.74	948.49	0.057669	15.89	330.37	104.73	1.58
PROP ALIGN 8_19	1381.00	100 YR	5250.00	939.98	947.18	944.65	947.86	0.004541	6.64	791.20	137.64	0.49
PROP ALIGN 8_19	1361.60	100 YR	5250.00	939.04	947.27	943.61	947.73	0.002604	5.41	969.64	150.76	0.38
PROP ALIGN 8_19	1357.71	100 YR	5250.00	939.00	947.27	943.55	947.72	0.002556	5.38	975.94	151.11	0.37
PROP ALIGN 8_19	1347.02	100 YR	5250.00	938.95	947.24	943.51	947.69	0.002526	5.36	979.92	151.33	0.37
PROP ALIGN 8_19	1344.92	100 YR	5250.00	938.94	947.24	943.50	947.68	0.000984	5.35	981.09	151.44	0.37
PROP ALIGN 8_19	1304.49	100 YR	5250.00	938.73	947.22	943.30	947.64	0.000908	5.20	1008.97	152.92	0.36
PROP ALIGN 8_19	1221.06	100 YR	5250.00	938.31	947.18	942.88	947.56	0.000773	4.92	1067.76	156.01	0.33
PROP ALIGN 8_19	1155.76	100 YR	5250.00	937.99	947.12	942.60	947.50	0.000813	4.94	1063.26	159.95	0.34
PROP ALIGN 8_19	1092.79	100 YR	5250.00	937.67	947.14	942.25	947.44	0.000567	4.40	1192.96	162.81	0.29
PROP ALIGN 8_19	1055.43	100 YR	5250.00	937.48	947.14	941.80	947.41	0.000481	4.17	1257.58	164.08	0.27
PROP ALIGN 8_19	1008.56	100 YR	5250.00	937.25	947.10	941.82	947.38	0.000523	4.29	1224.11	163.76	0.28
PROP ALIGN 8_19	955.79	100 YR	5250.00	936.99	947.08	941.55	947.35	0.000476	4.15	1265.39	165.78	0.26
PROP ALIGN 8_19	899.60	100 YR	5250.00	936.71	946.22	942.39	947.23	0.002693	8.05	652.29	158.40	0.46
PROP ALIGN 8_19	865.43	100 YR	5250.00	936.54	943.39	943.39	946.81	0.014207	14.83	353.98	78.75	1.00
PROP ALIGN 8_19	834.52	100 YR	5250.00	936.32	941.39	942.69	945.96	0.045273	17.15	306.12	70.53	1.45
PROP ALIGN 8_19	807.33	100 YR	5250.00	934.94	939.25	940.87	944.46	0.062376	18.31	286.78	76.99	1.67
PROP ALIGN 8_19	787.12	100 YR	5250.00	933.94	937.93	939.55	943.14	0.068225	18.32	286.61	82.63	1.73
PROP ALIGN 8_19	766.83	100 YR	5250.00	932.94	936.74	938.28	941.67	0.067994	17.81	294.71	88.62	1.72
PROP ALIGN 8_19	746.32	100 YR	5250.00	931.92	935.59	937.01	940.19	0.066279	17.21	305.07	95.03	1.69
PROP ALIGN 8_19	726.27	100 YR	5250.00	930.92	938.04	935.80	938.86	0.005551	7.29	720.27	126.20	0.54
PROP ALIGN 8_19	706.00	100 YR	5250.00	929.93	938.19	934.63	938.69	0.002855	5.67	925.54	143.60	0.39
PROP ALIGN 8_19	690.23	100 YR	5250.00	929.25	938.25	933.81	938.61	0.001871	4.83	1088.06	156.87	0.32
PROP ALIGN 8_19	675.94	100 YR	5250.00	929.17	938.22	933.74	938.58	0.001833	4.79	1096.42	157.45	0.32
PROP ALIGN 8_19	674.04	100 YR	5250.00	929.16	938.22	933.73	938.58	0.000714	4.78	1097.80	157.55	0.32
PROP ALIGN 8_19	666.45	100 YR	5250.00	929.12	938.22	933.69	938.57	0.000702	4.75	1104.31	157.95	0.32
PROP ALIGN 8_19	659.33	100 YR	5250.00	929.09	938.22	933.65	938.57	0.000693	4.73	1109.21	158.16	0.32
PROP ALIGN 8_19	638.38	100 YR	5250.00	928.99	938.21	933.55	938.55	0.000667	4.67	1123.55	158.76	0.31
PROP ALIGN 8_19	582.55	100 YR	5250.00	928.71	938.17	933.32	938.51	0.000644	4.72	1112.93	150.39	0.31
PROP ALIGN 8_19	494.85	100 YR	5250.00	928.27	938.18	932.69	938.44	0.000448	4.07	1290.57	165.93	0.26
PROP ALIGN 8_19	438.42	100 YR	5250.00	927.99	938.15	932.55	938.41	0.000465	4.11	1275.92	166.27	0.26

HEC-RAS Plan: 18602_Proposed_Maintained River: COLDWATER CREEK Reach: PROP ALIGN 8_19 Profile: 100 YR (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PROP ALIGN 8_19	385.56	100 YR	5250.00	927.73	937.11	933.62	938.27	0.003151	8.63	608.34	158.87	0.50
PROP ALIGN 8_19	359.31	100 YR	5250.00	927.60	934.47	934.47	937.89	0.015542	14.83	354.09	77.52	1.00
PROP ALIGN 8_19	329.74	100 YR	5250.00	927.31	931.83	933.53	937.33	0.008887	18.81	279.13	72.41	1.69
PROP ALIGN 8_19	299.66	100 YR	5250.00	924.37	926.74	929.12	936.45	0.032474	24.99	210.07	95.47	2.97
PROP ALIGN 8_19	291.91	100 YR	5250.00	923.90	926.37	928.84	936.19	0.030663	25.15	208.78	89.27	2.90
PROP ALIGN 8_19	282.00	100 YR	5250.00	922.94	925.41	927.98	935.83	0.029613	25.90	202.72	83.42	2.91
PROP ALIGN 8_19	255.35		Culvert									
PROP ALIGN 8_19	180.70	100 YR	5250.00	922.48	926.04	927.52	931.05	0.008744	17.96	292.30	84.25	1.68
PROP ALIGN 8_19	110.00	100 YR	5250.00	916.89	926.24	921.30	926.45	0.001183	3.64	1442.03	256.56	0.27

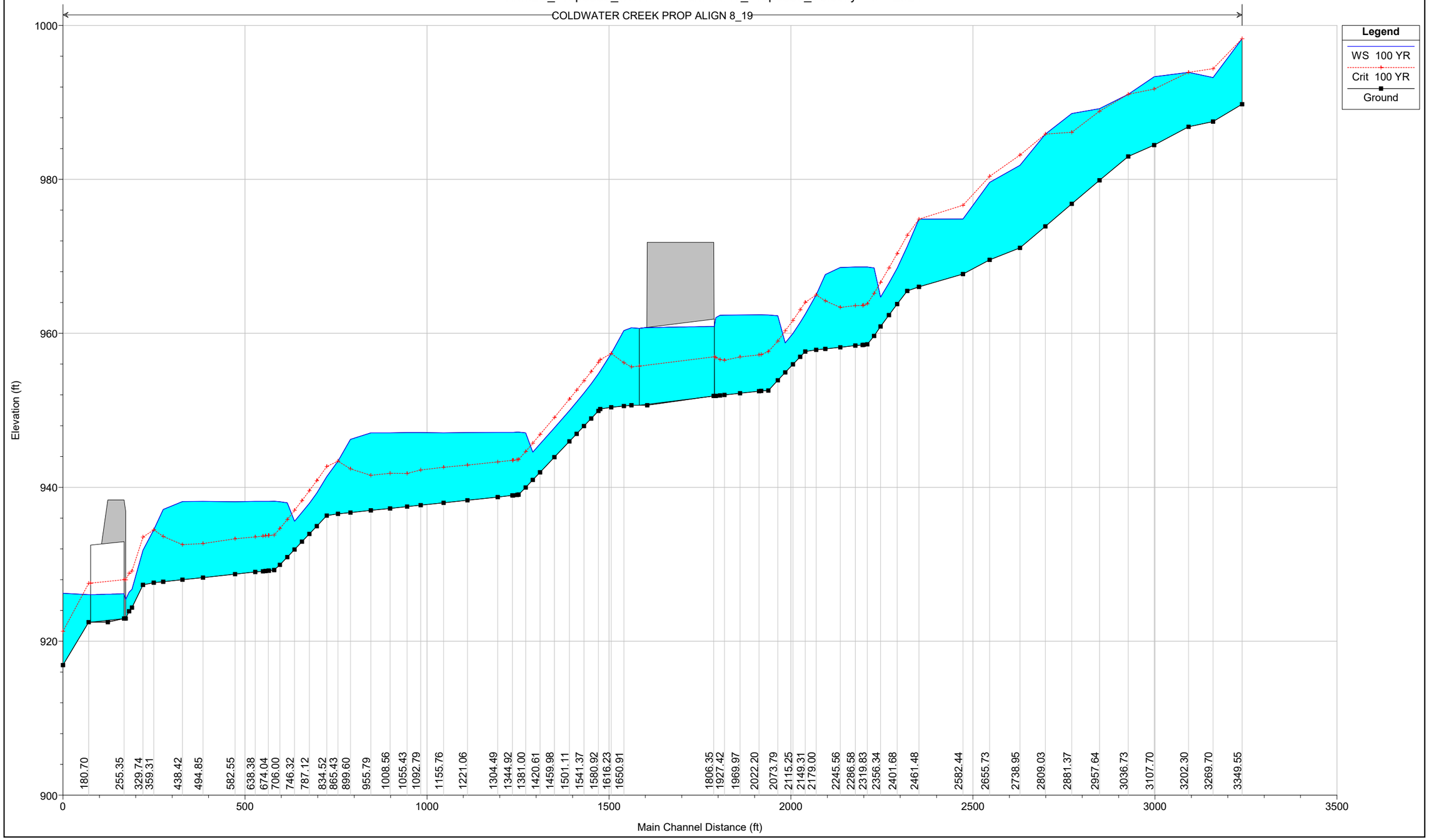
Appendix B3

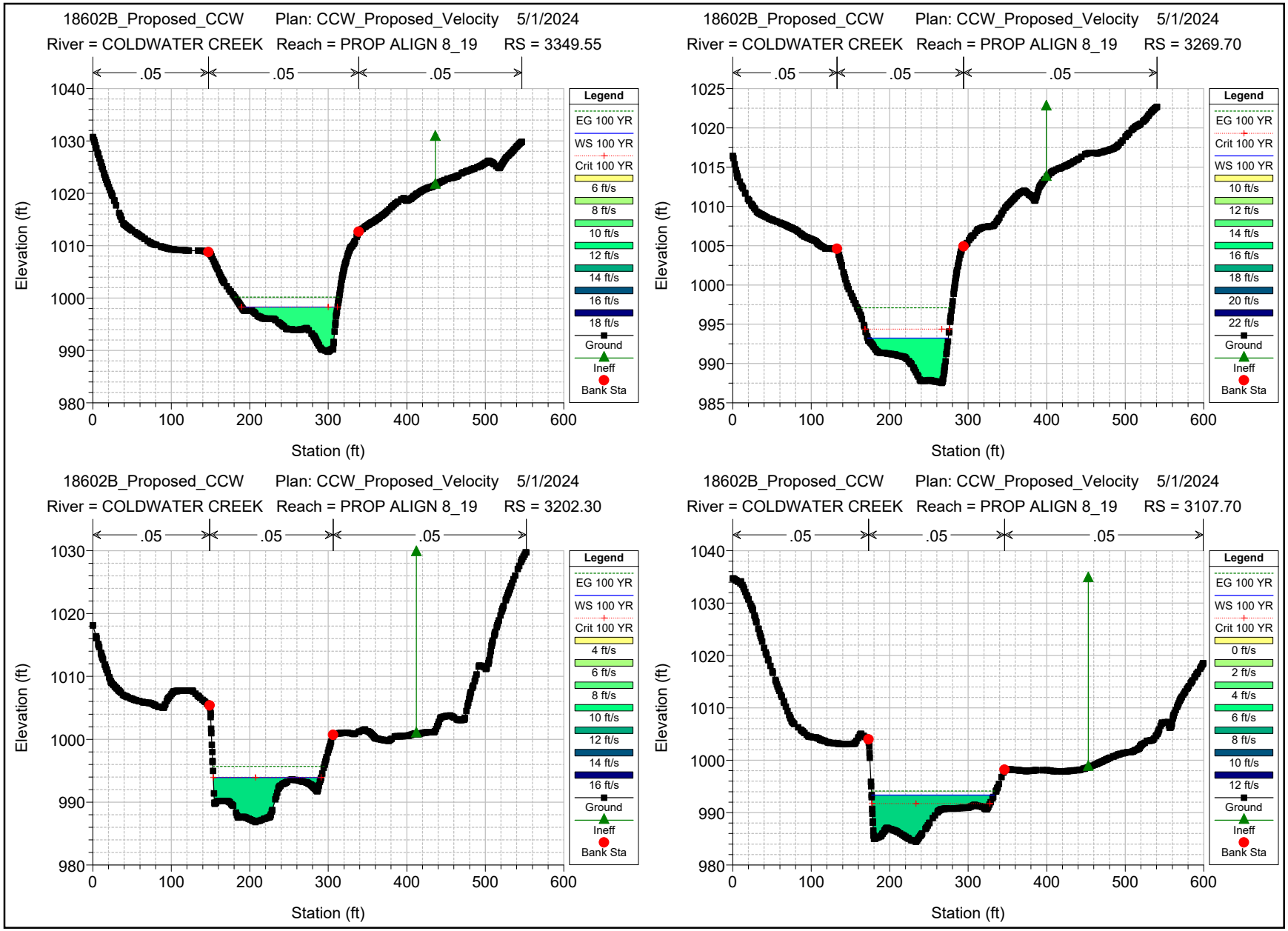
Velocity Condition Hydraulic Results

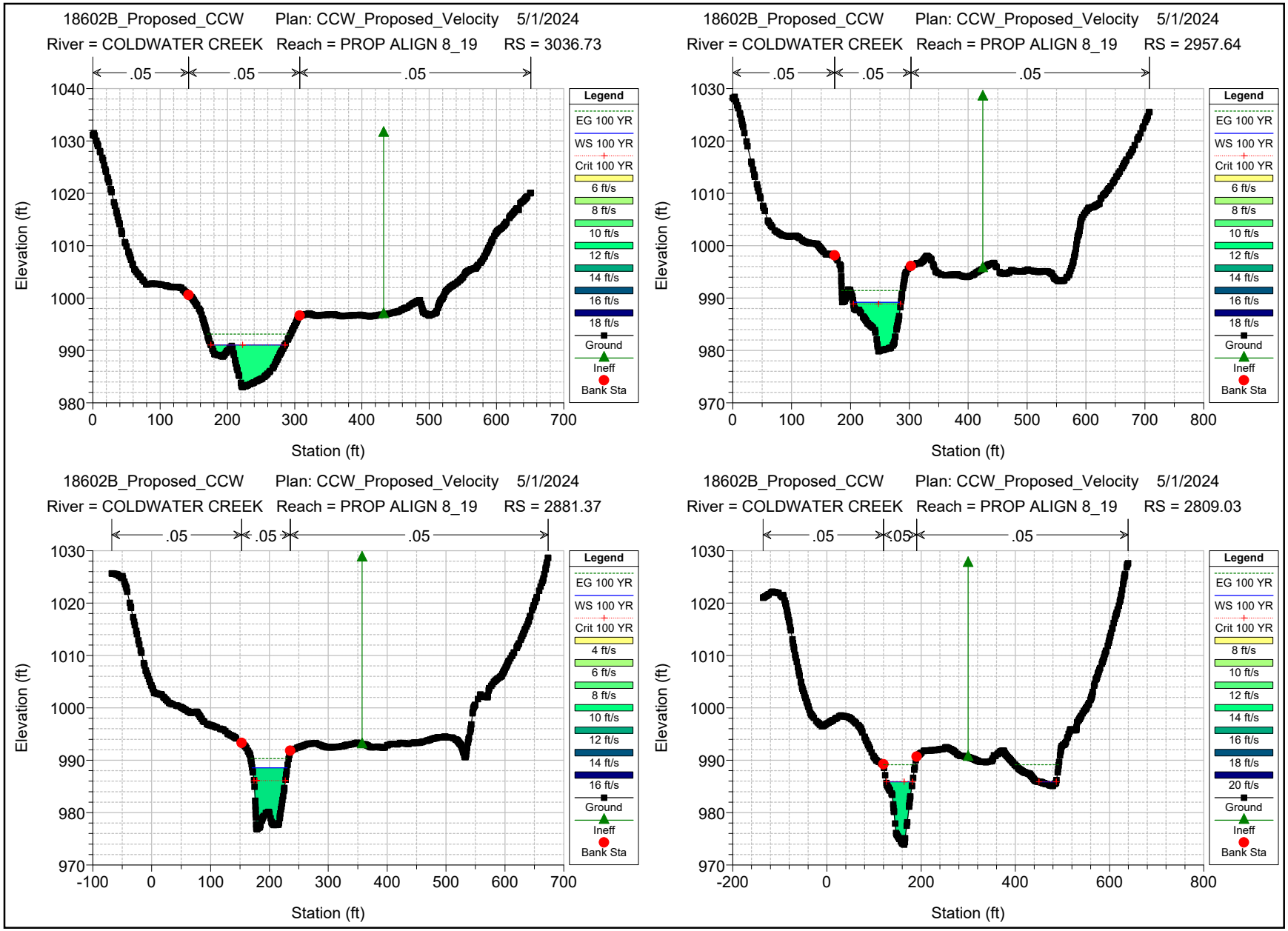
- Profile
- Cross Sections
- Summary Table

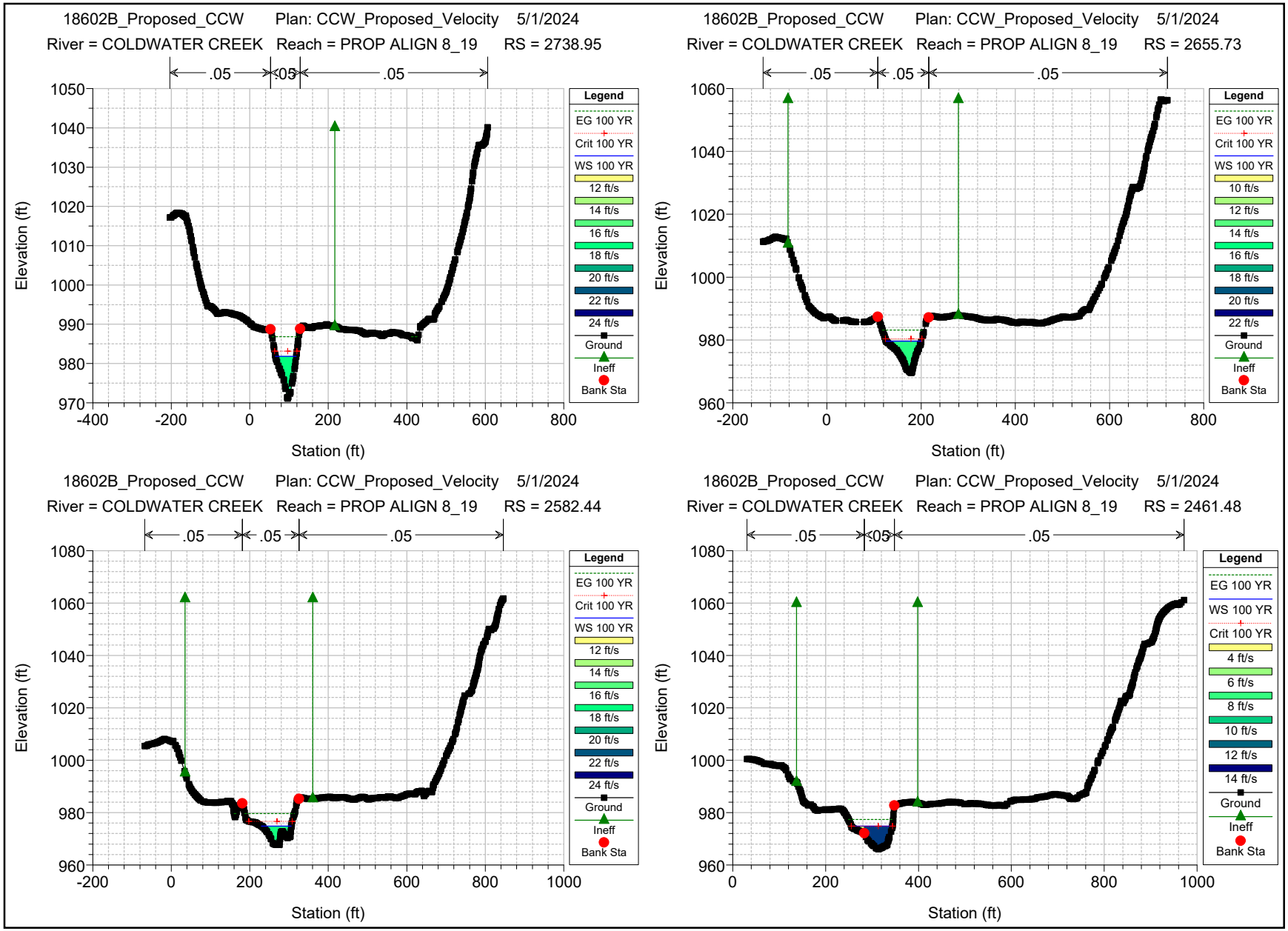
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024

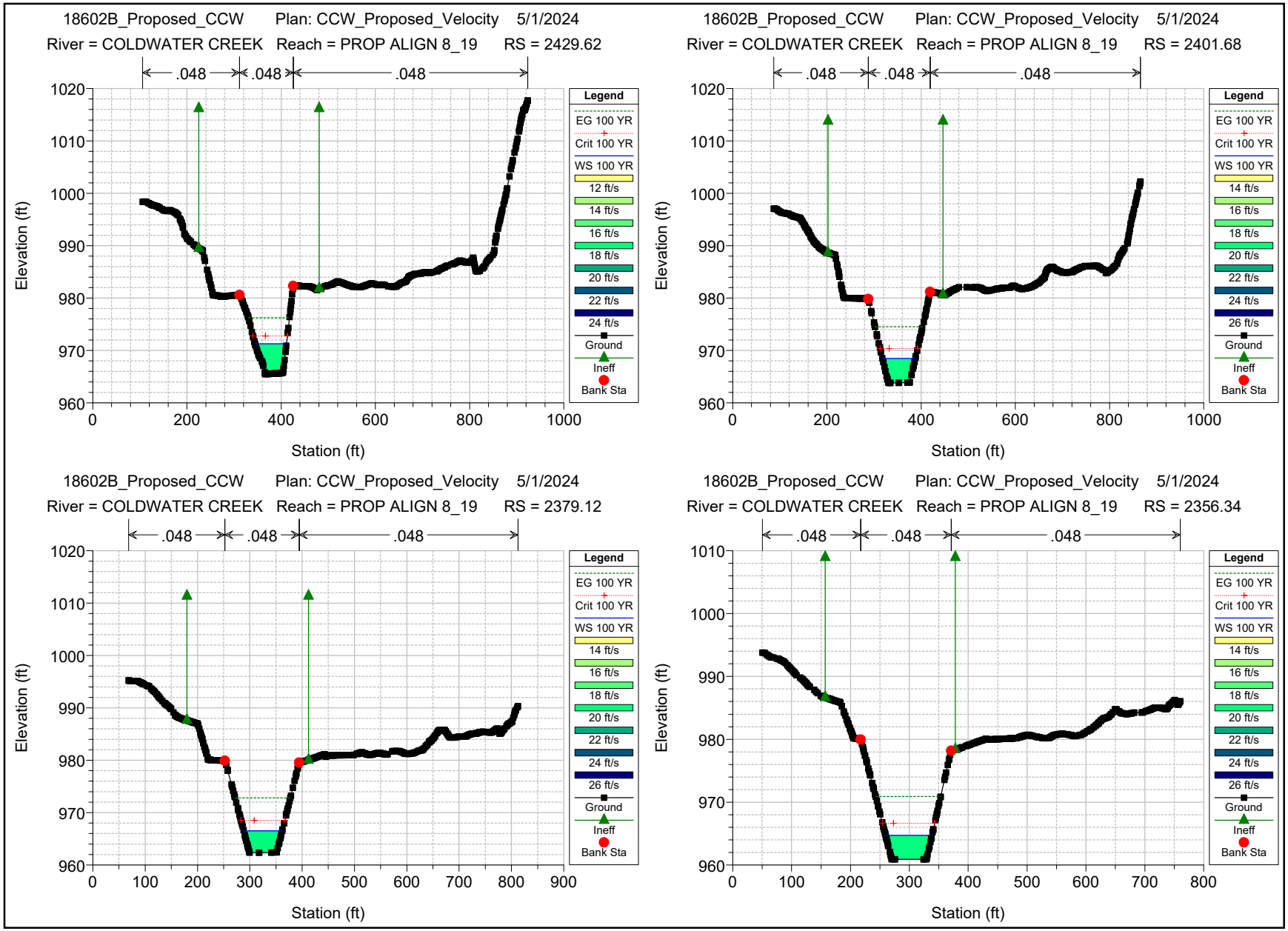
COLDWATER CREEK PROP ALIGN 8_19

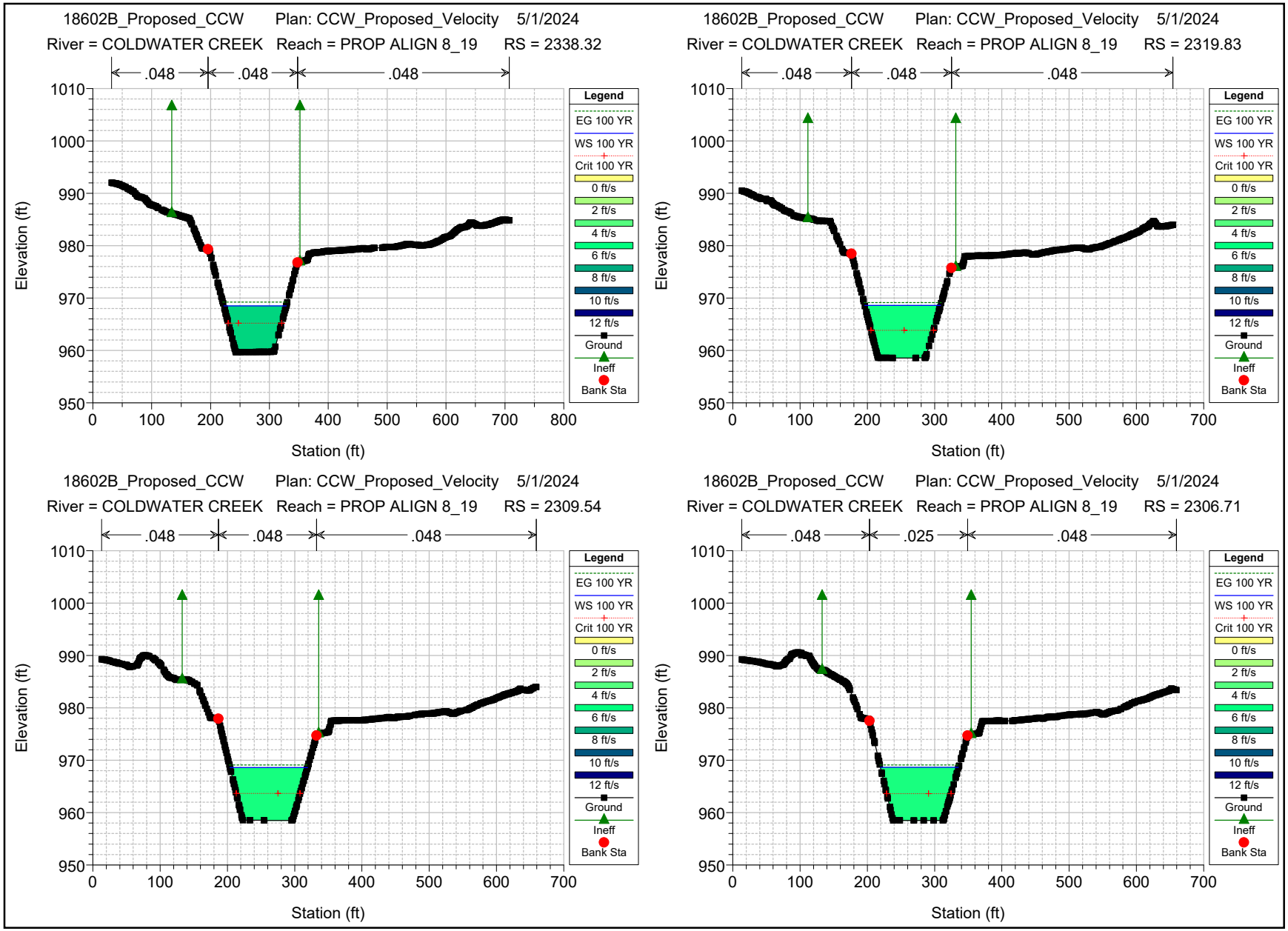


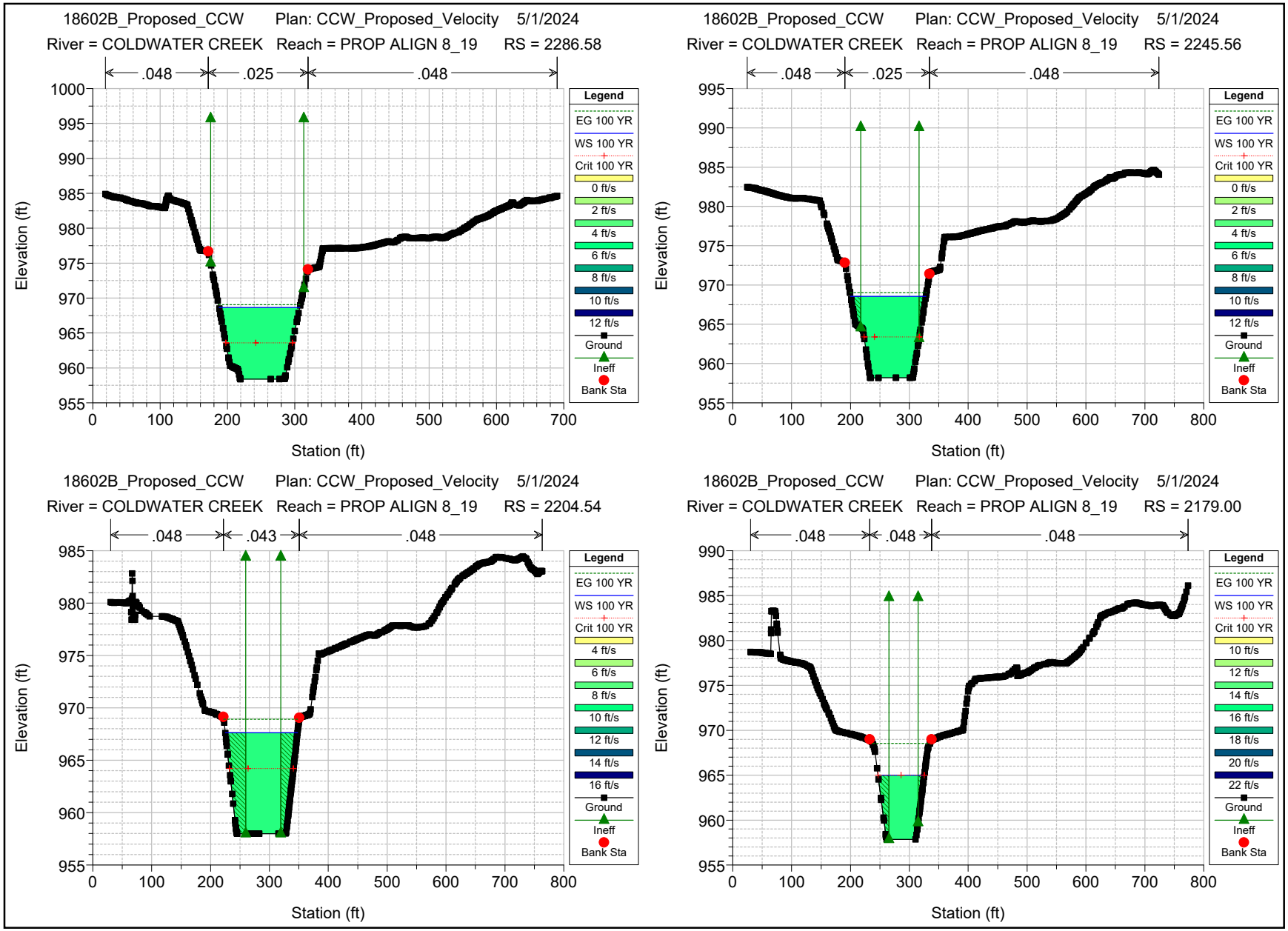

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3349.55
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3269.70
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3202.30
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3107.70
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Ineff
Bank Sta

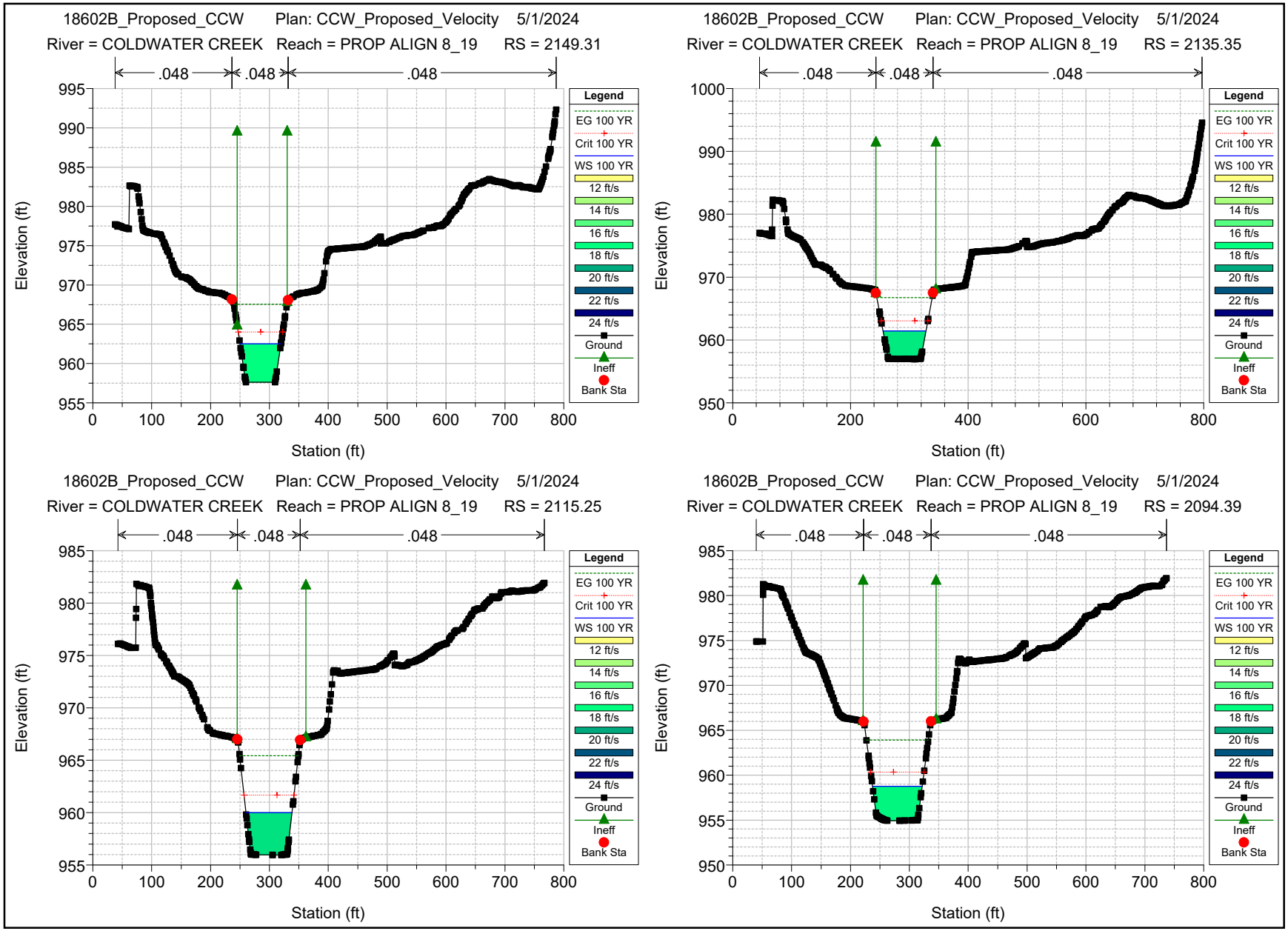

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3036.73
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2957.64
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2881.37
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2809.03
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta

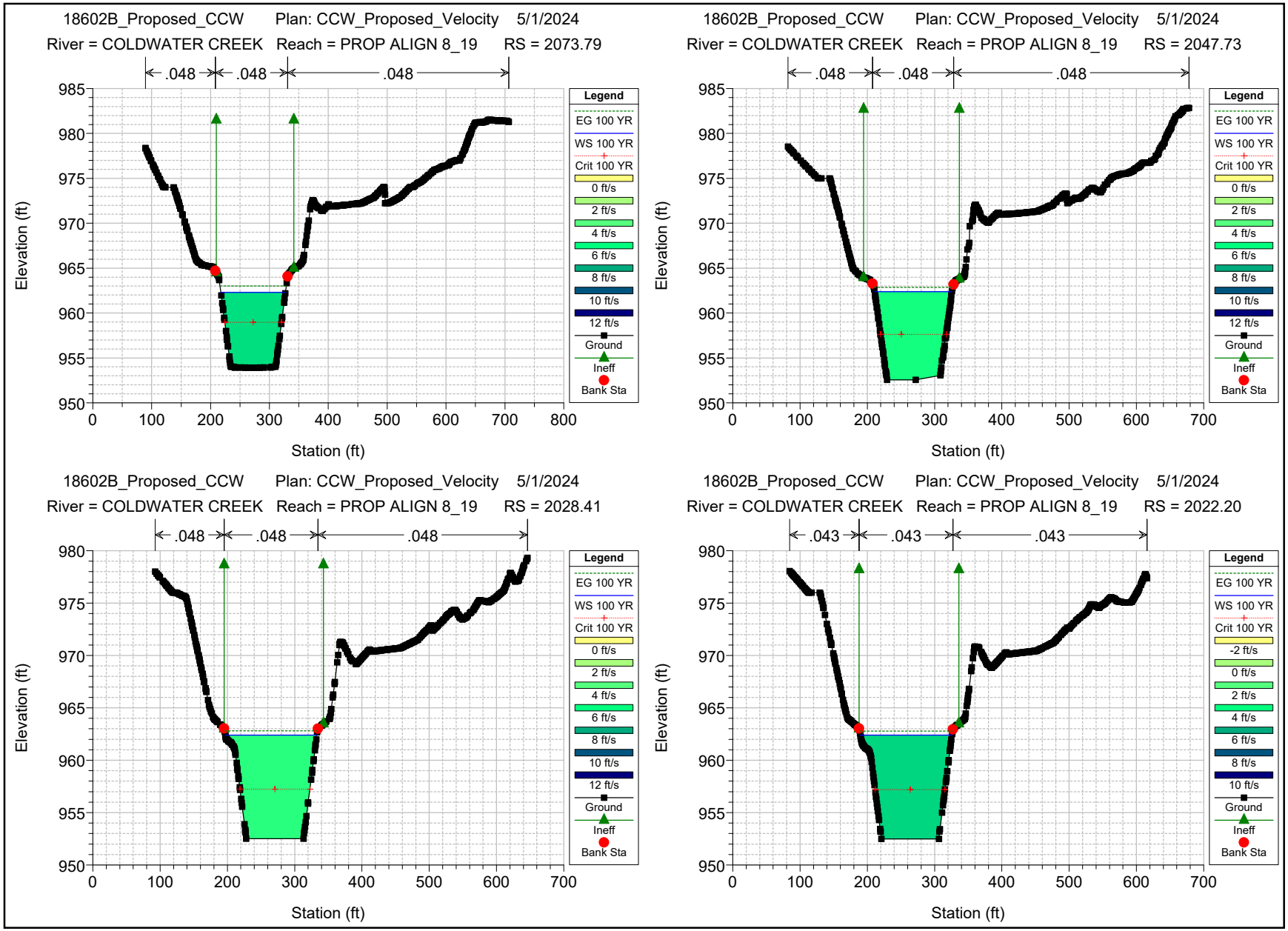

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2738.95
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2655.73
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2582.44
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2461.48
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta

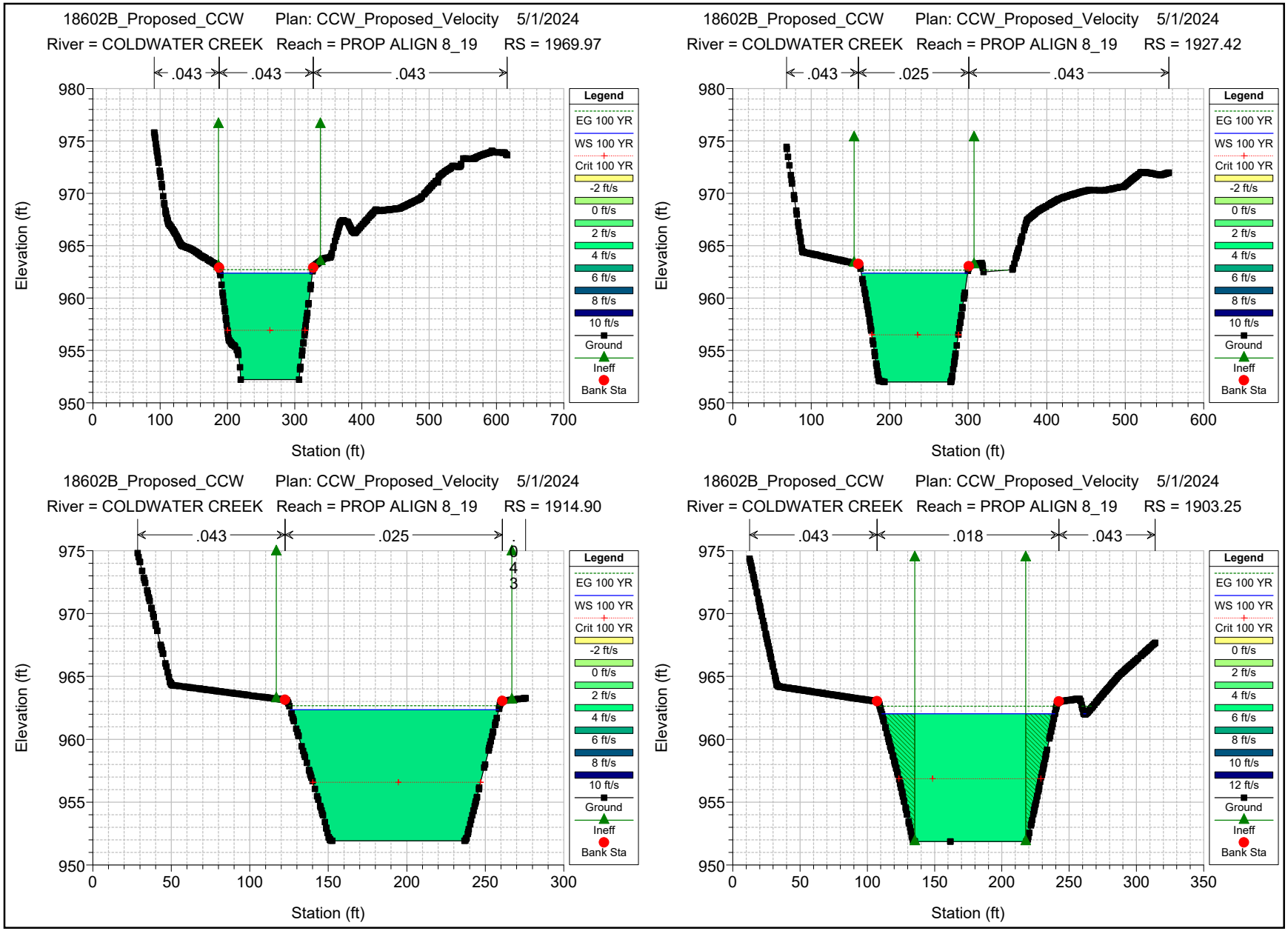

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2429.62
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2401.68
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2379.12
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2356.34
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta

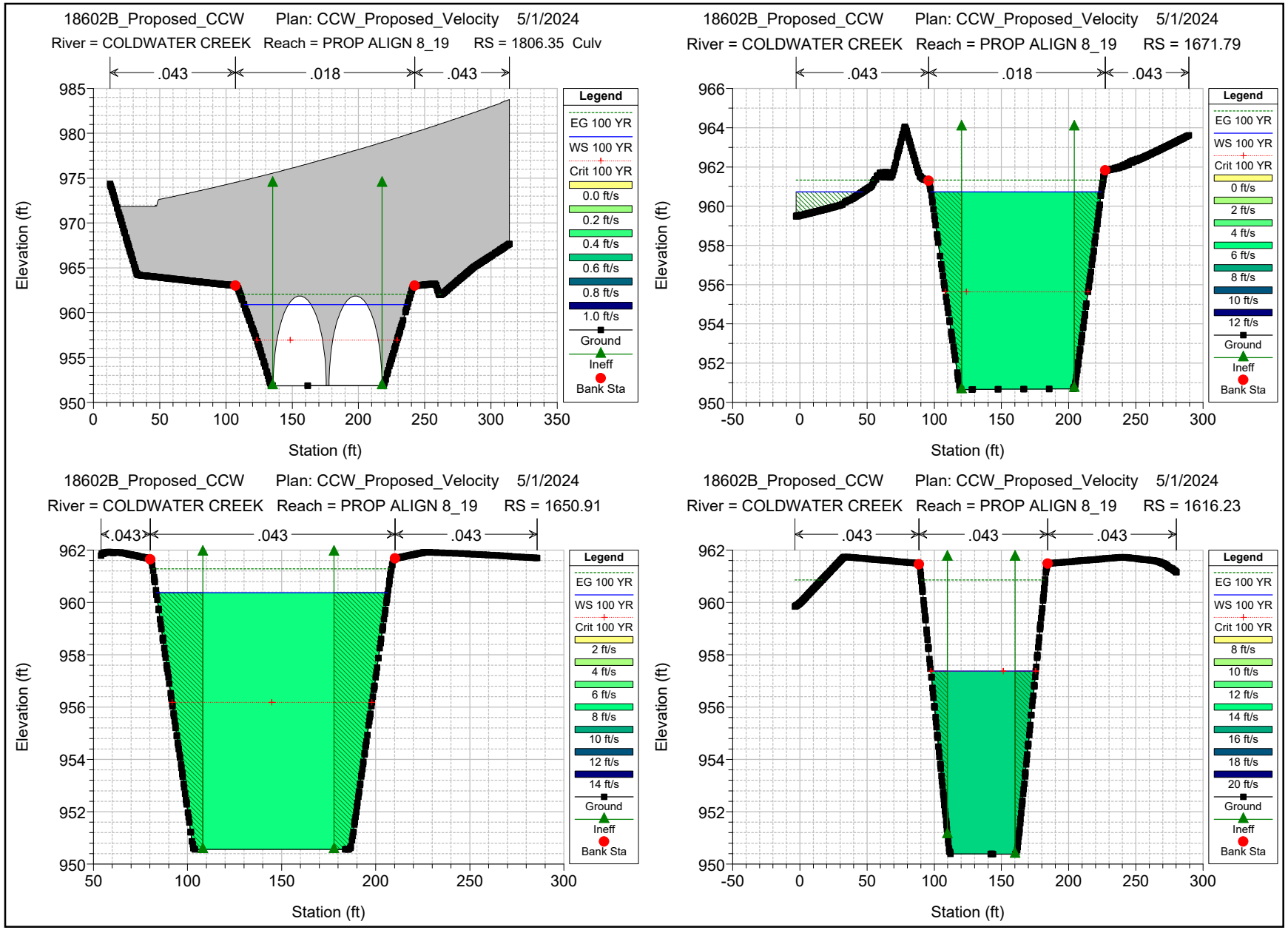

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2338.32
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2319.83
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2309.54
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2306.71
.048
.025
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

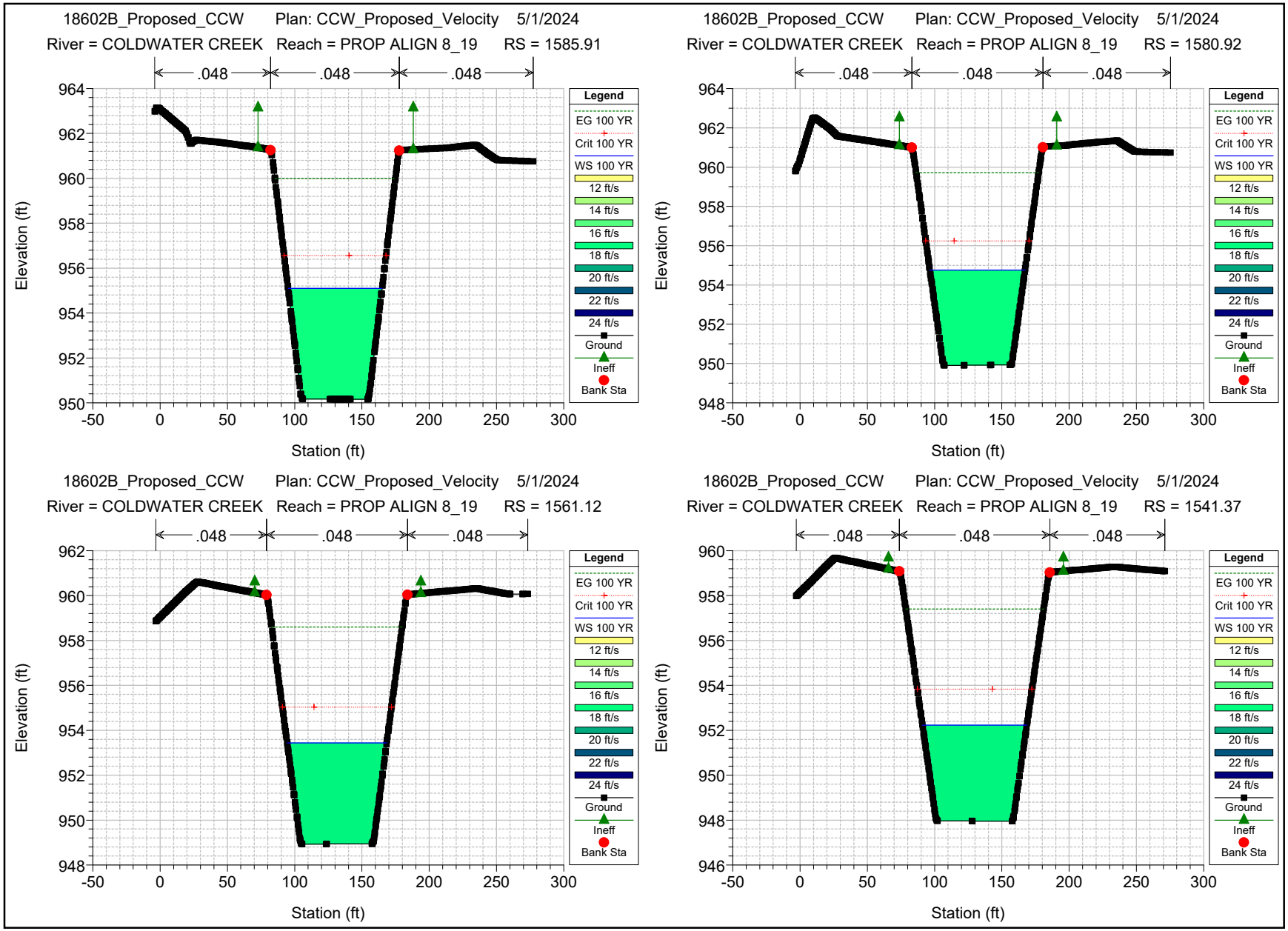

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2286.58
.048
.025
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2245.56
.048
.025
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2204.54
.048
.043
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2179.00
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta

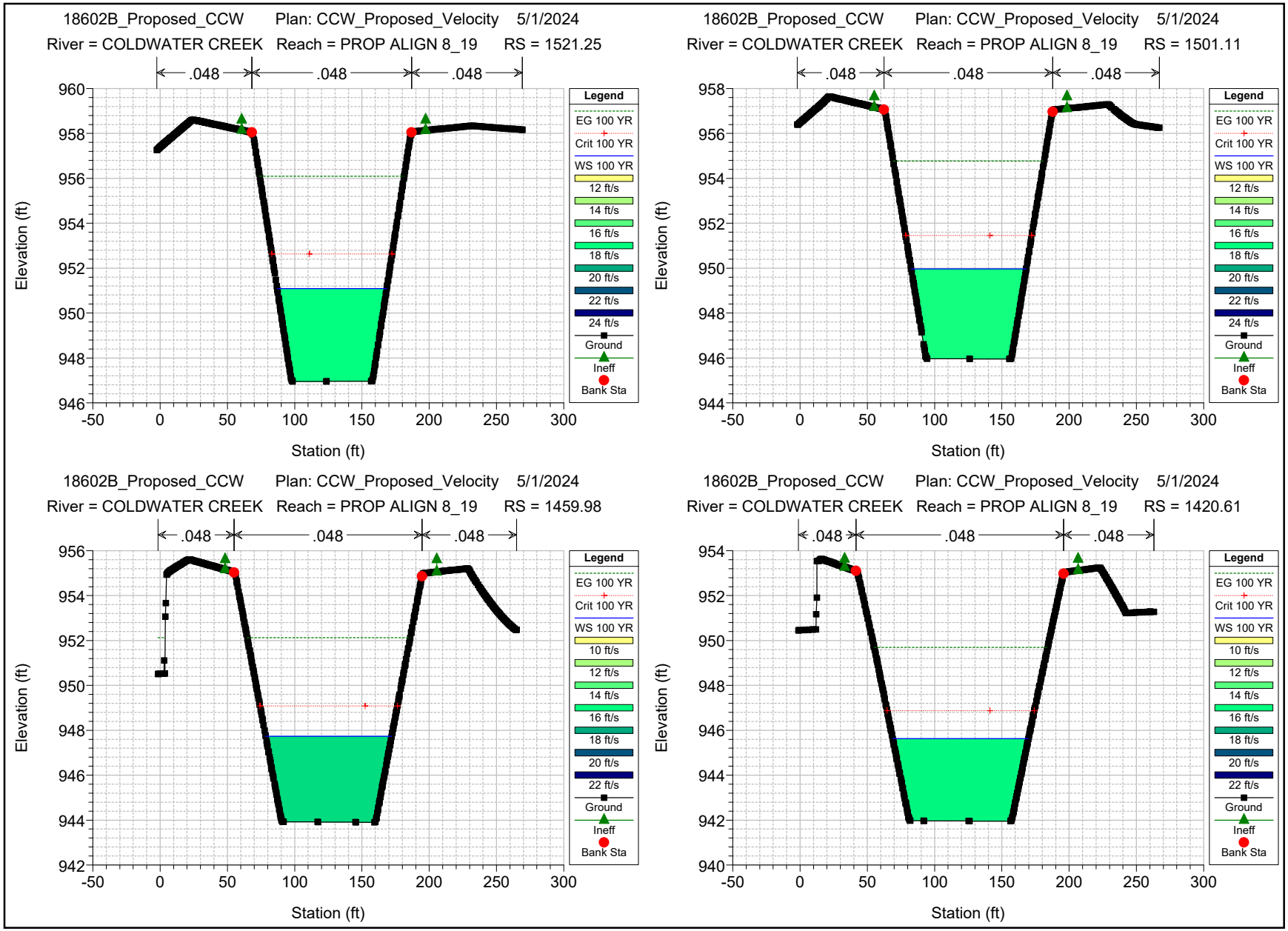

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2149.31
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2135.35
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2115.25
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2094.39

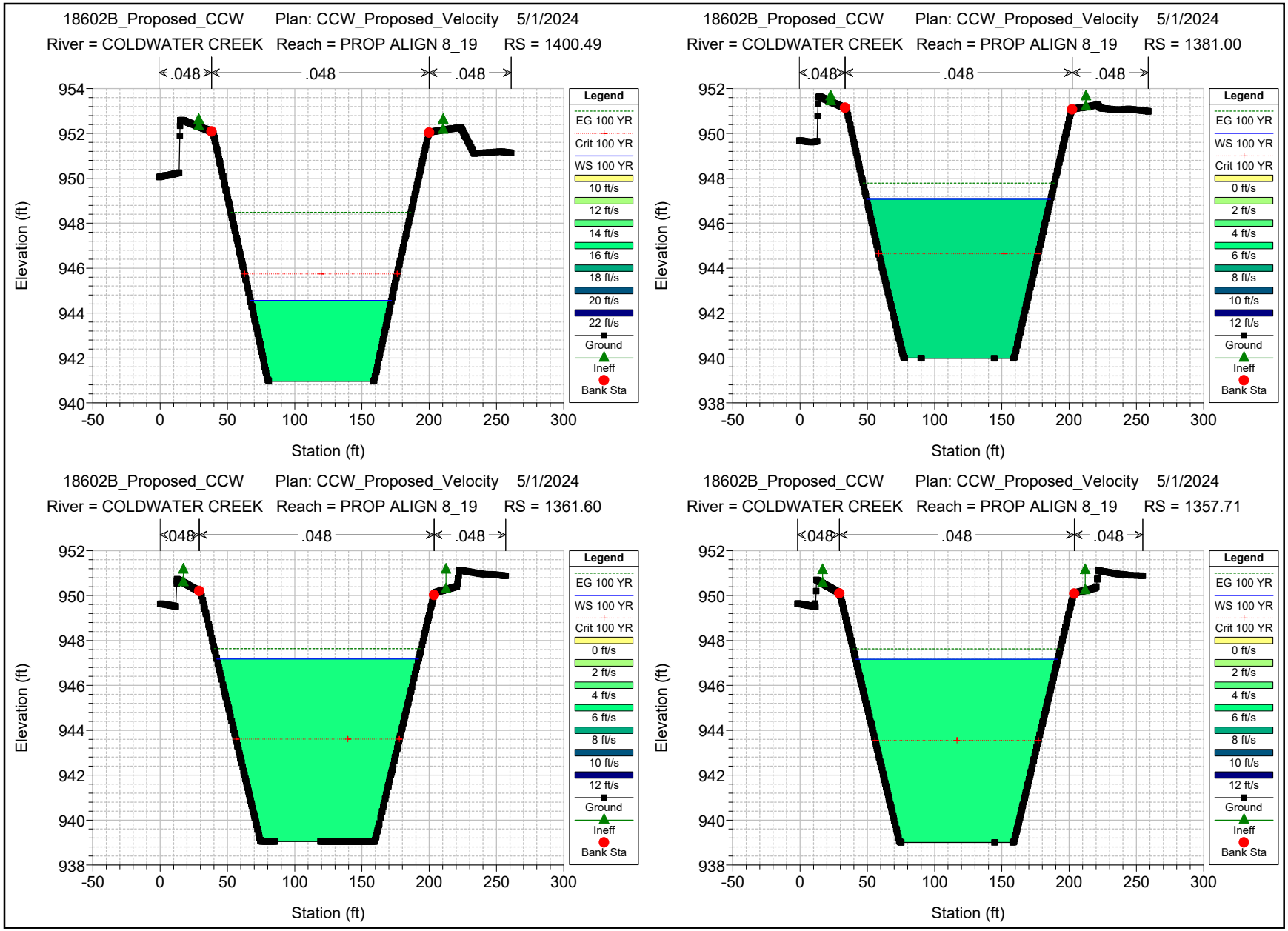

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2073.79
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2047.73
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2028.41
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2022.20
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

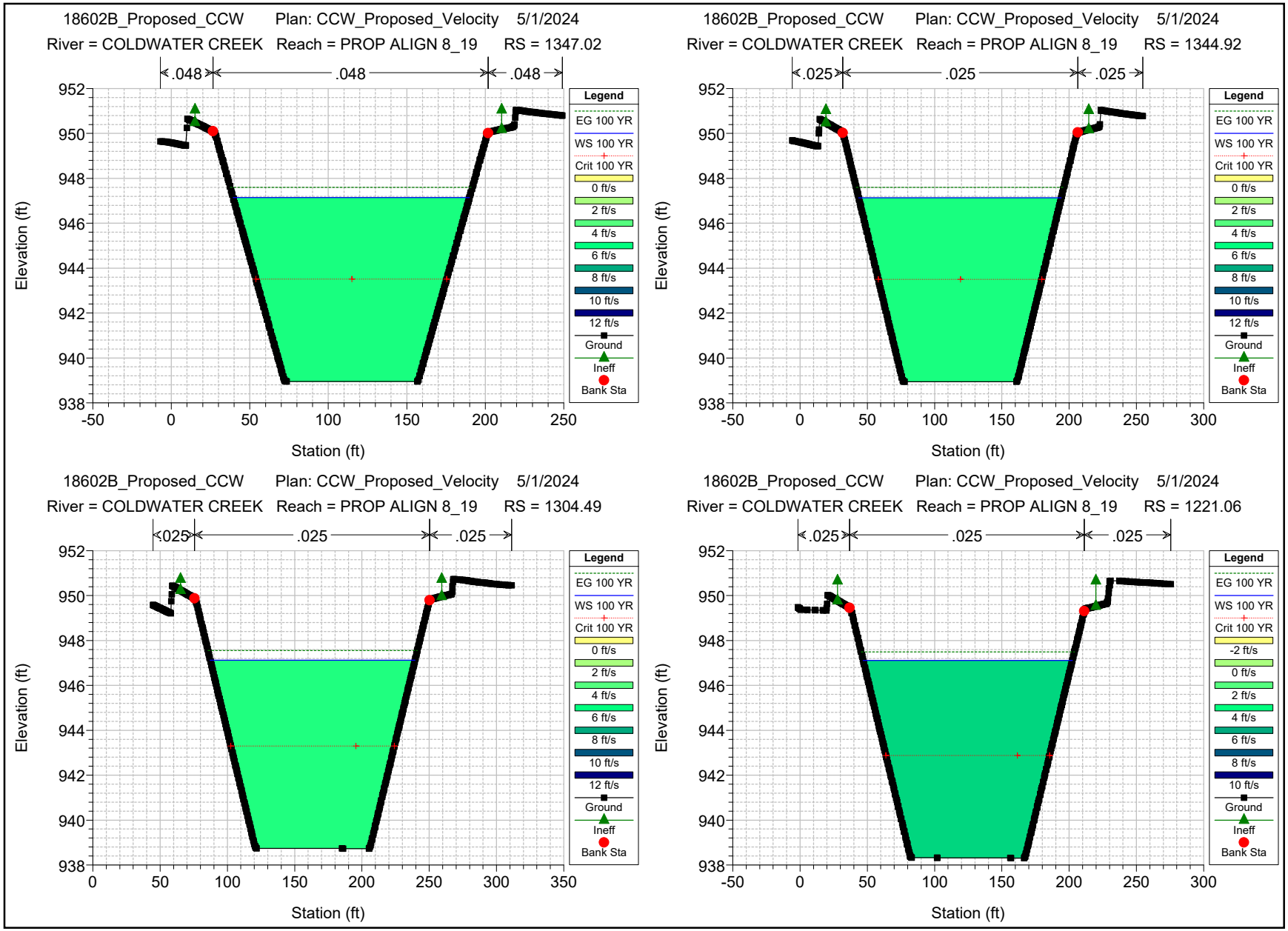

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1969.97
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1927.42
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1914.90
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1903.25
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

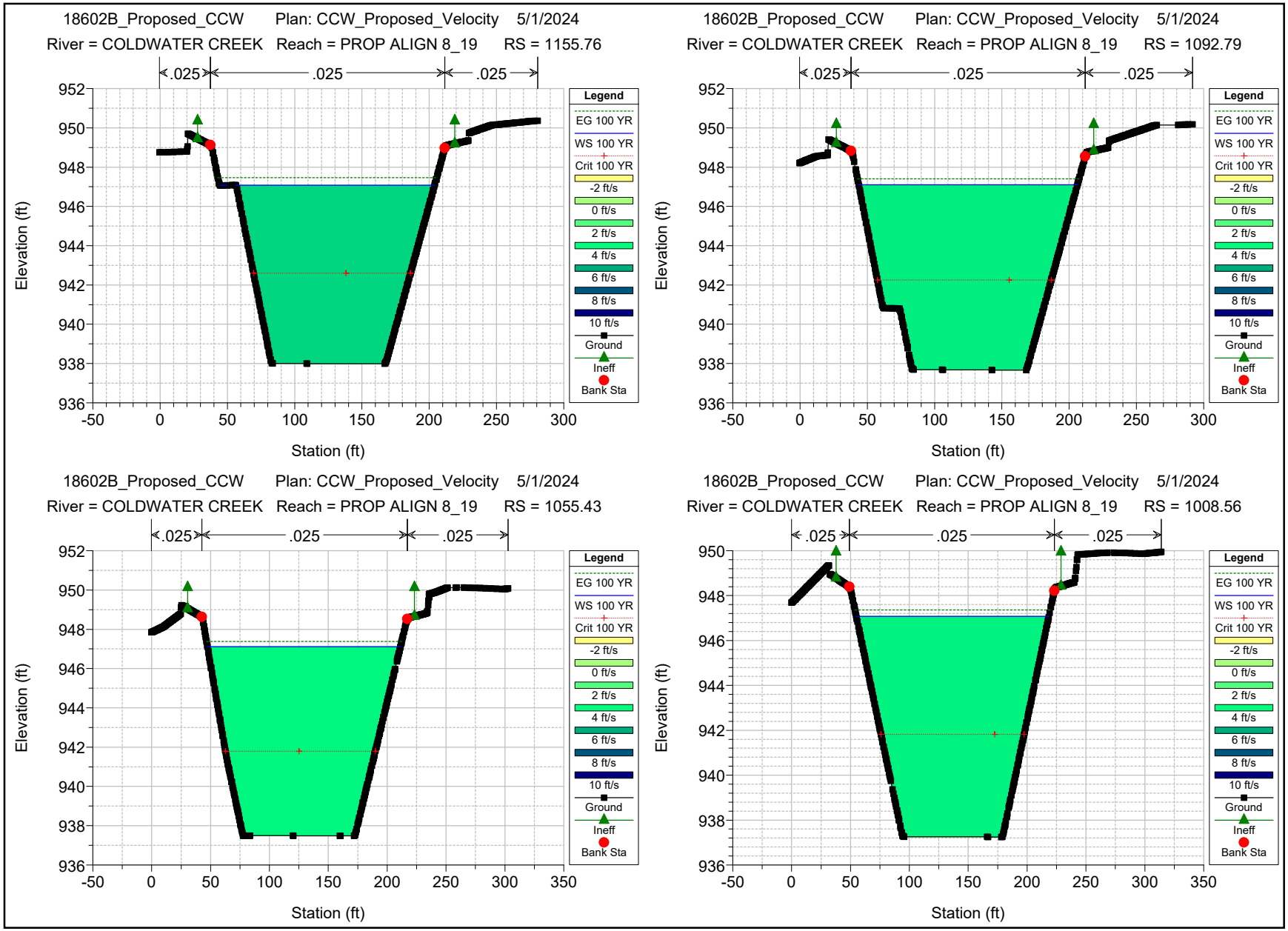

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1806.35 Culv
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1671.79
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1650.91
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1616.23
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta

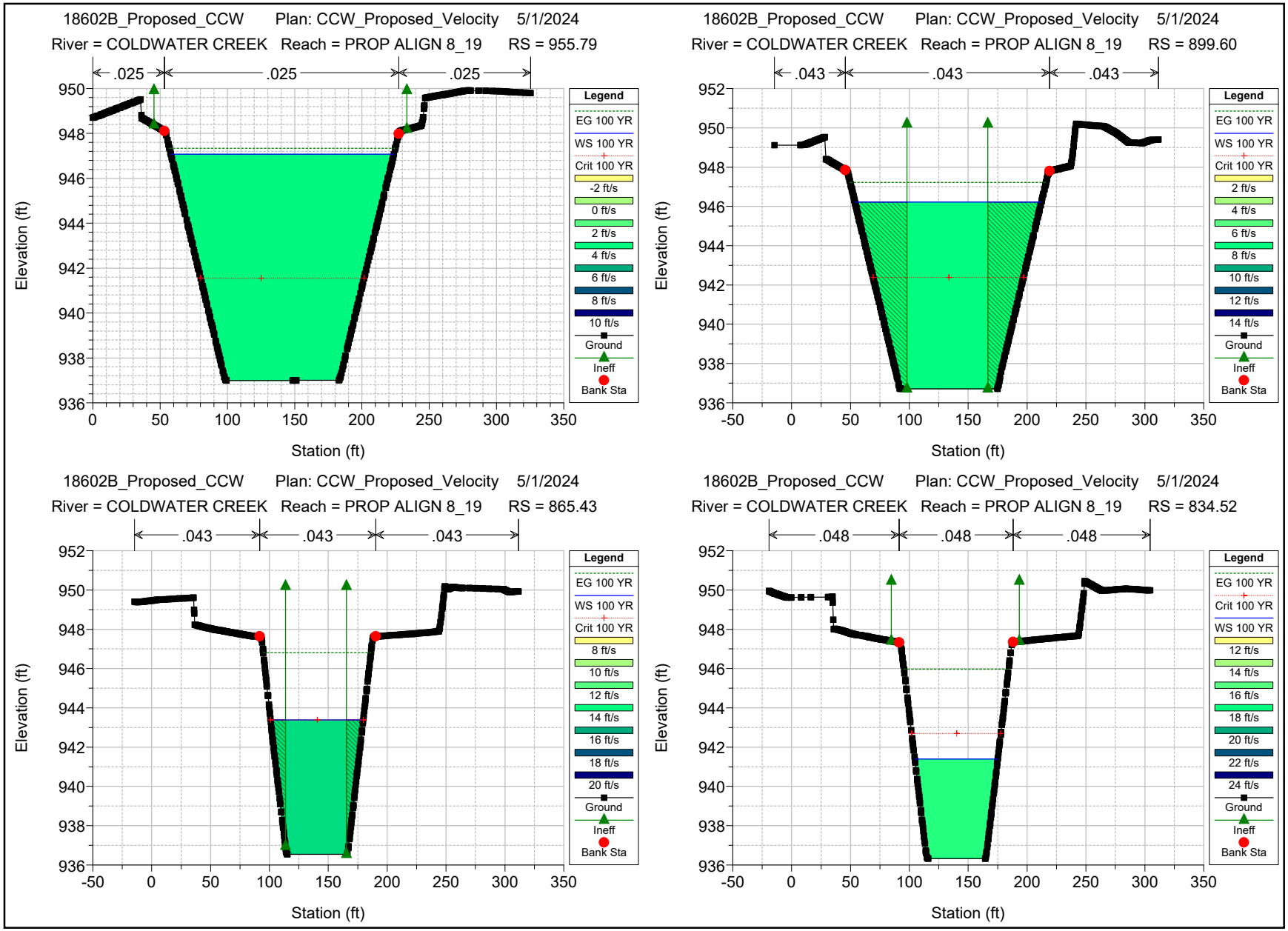

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1585.91
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1580.92
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1561.12
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1541.37
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta

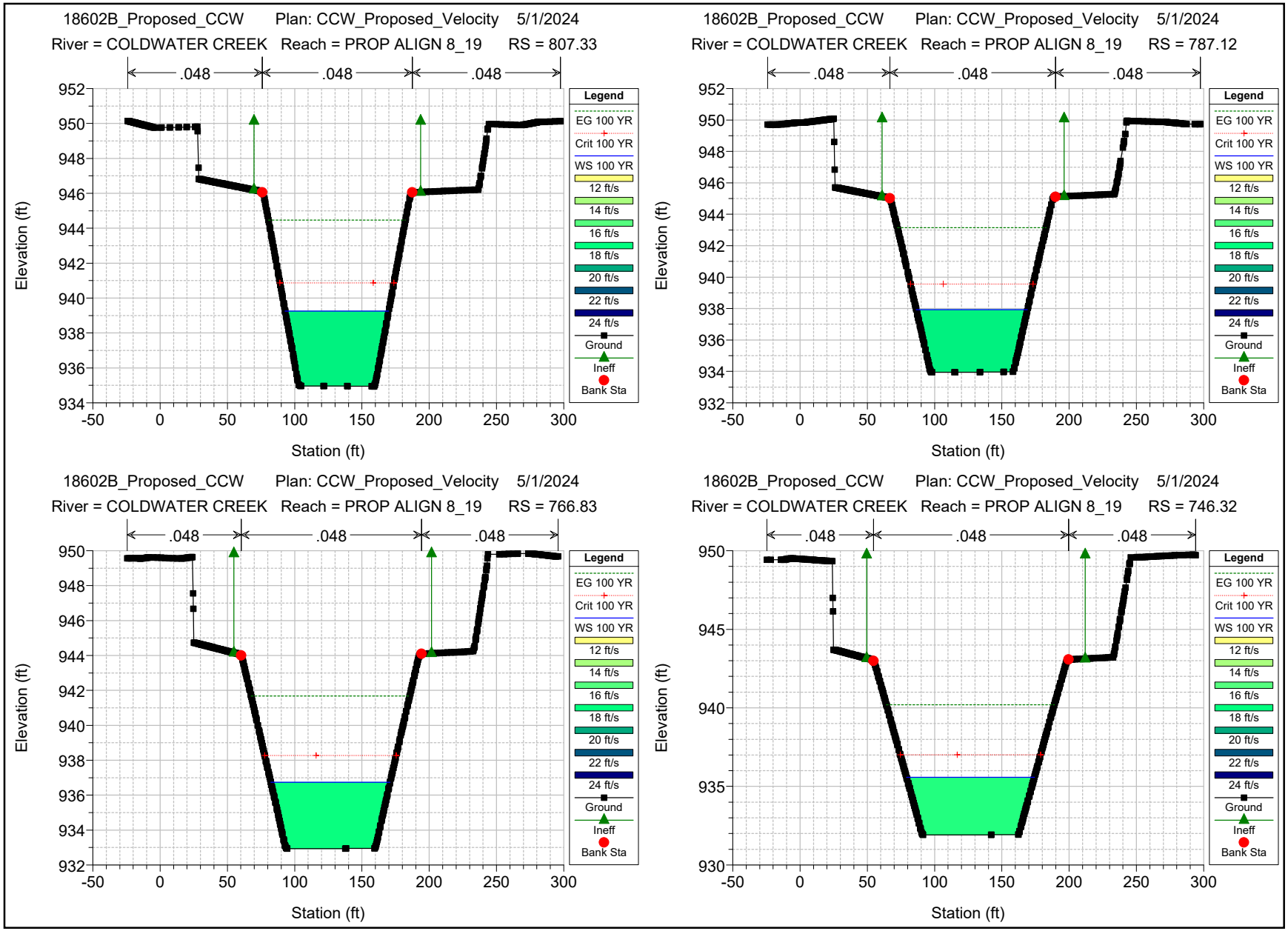

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1521.25
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1501.11
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1459.98
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1420.61
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta

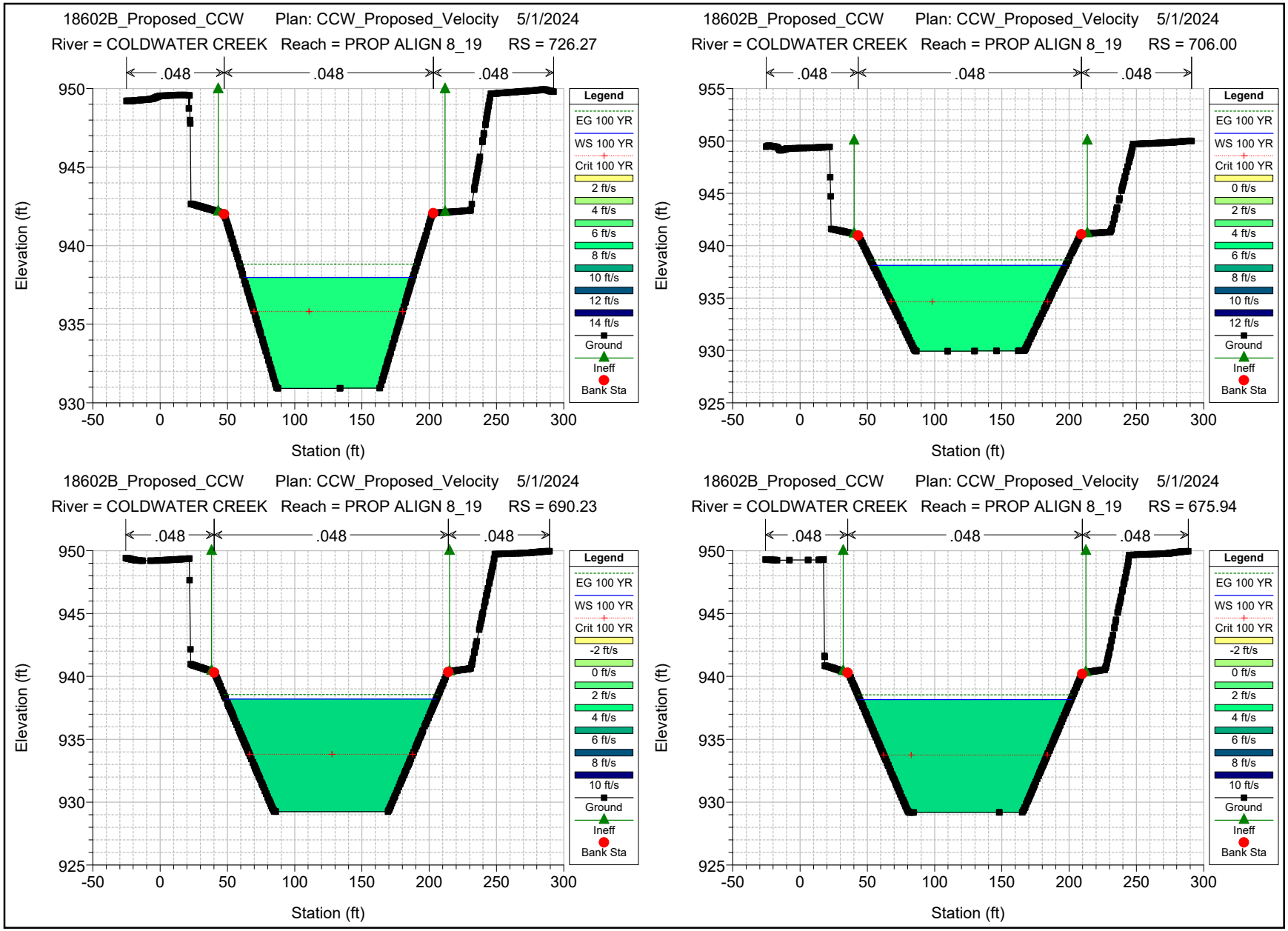

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1400.49
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1381.00
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1361.60
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1357.71
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

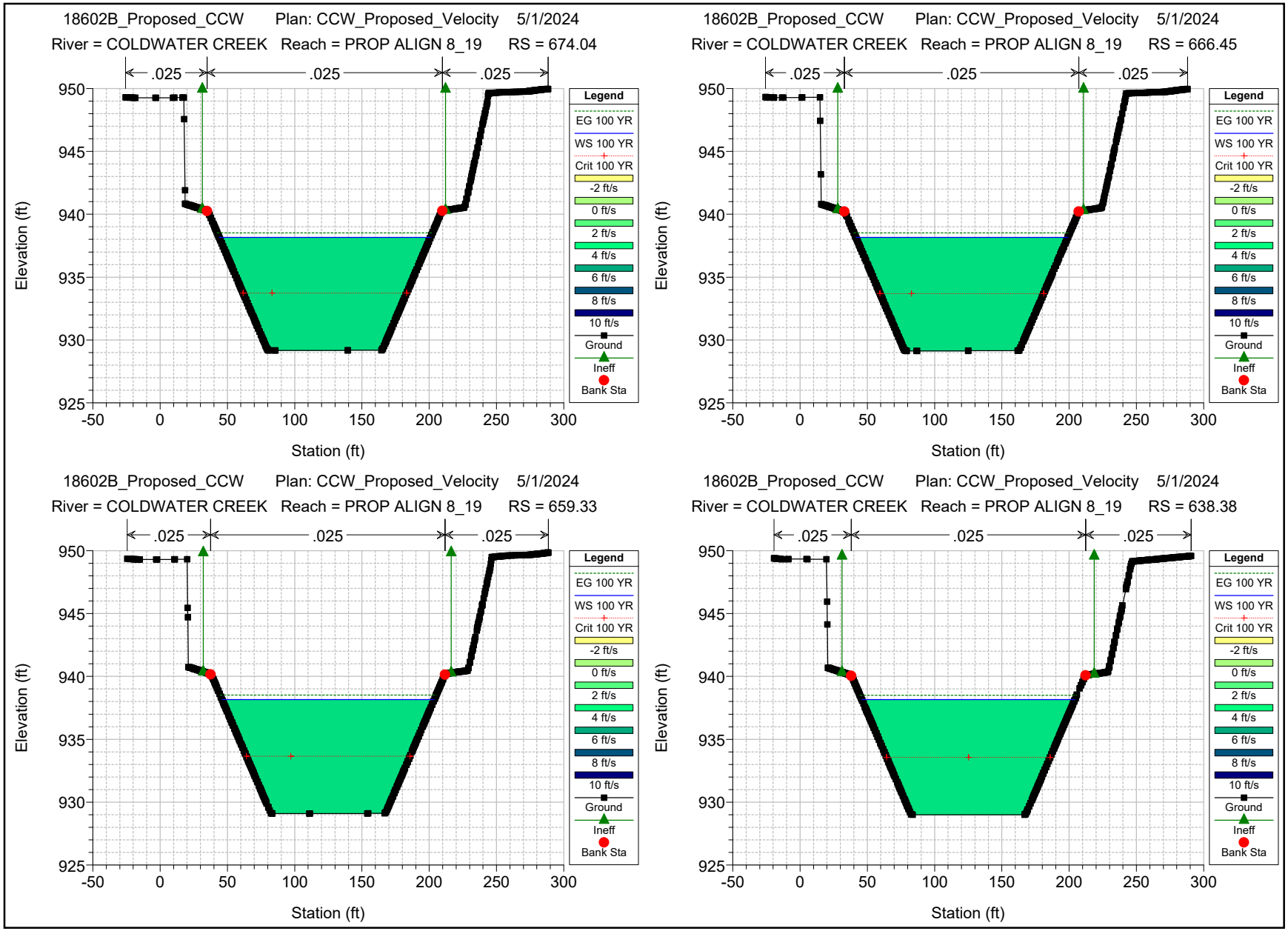

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1347.02
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1344.92
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1304.49
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1221.06
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

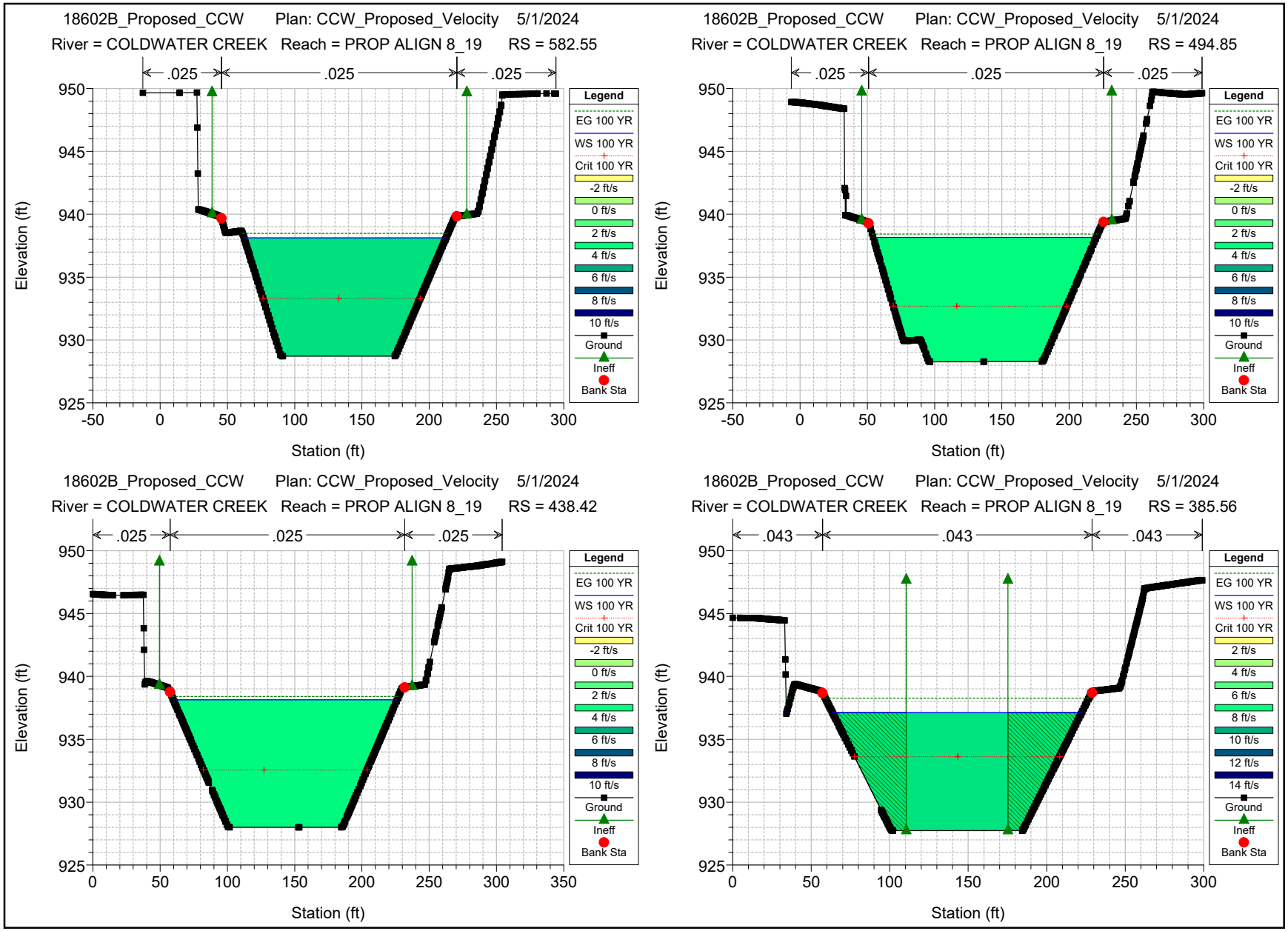

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1155.76
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1092.79
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1055.43
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1008.56
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

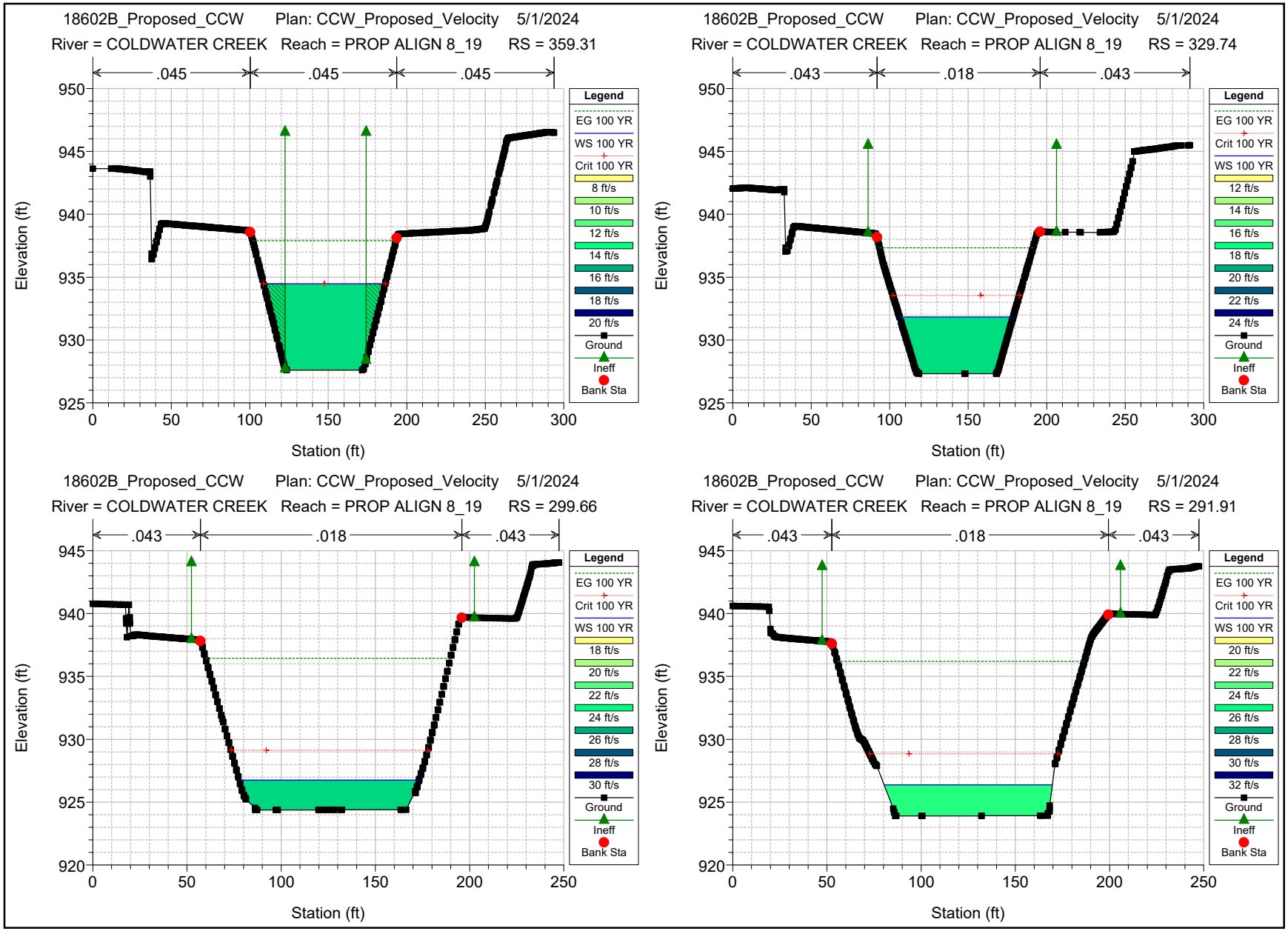

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 955.79
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 899.60
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 865.43
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 834.52
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta

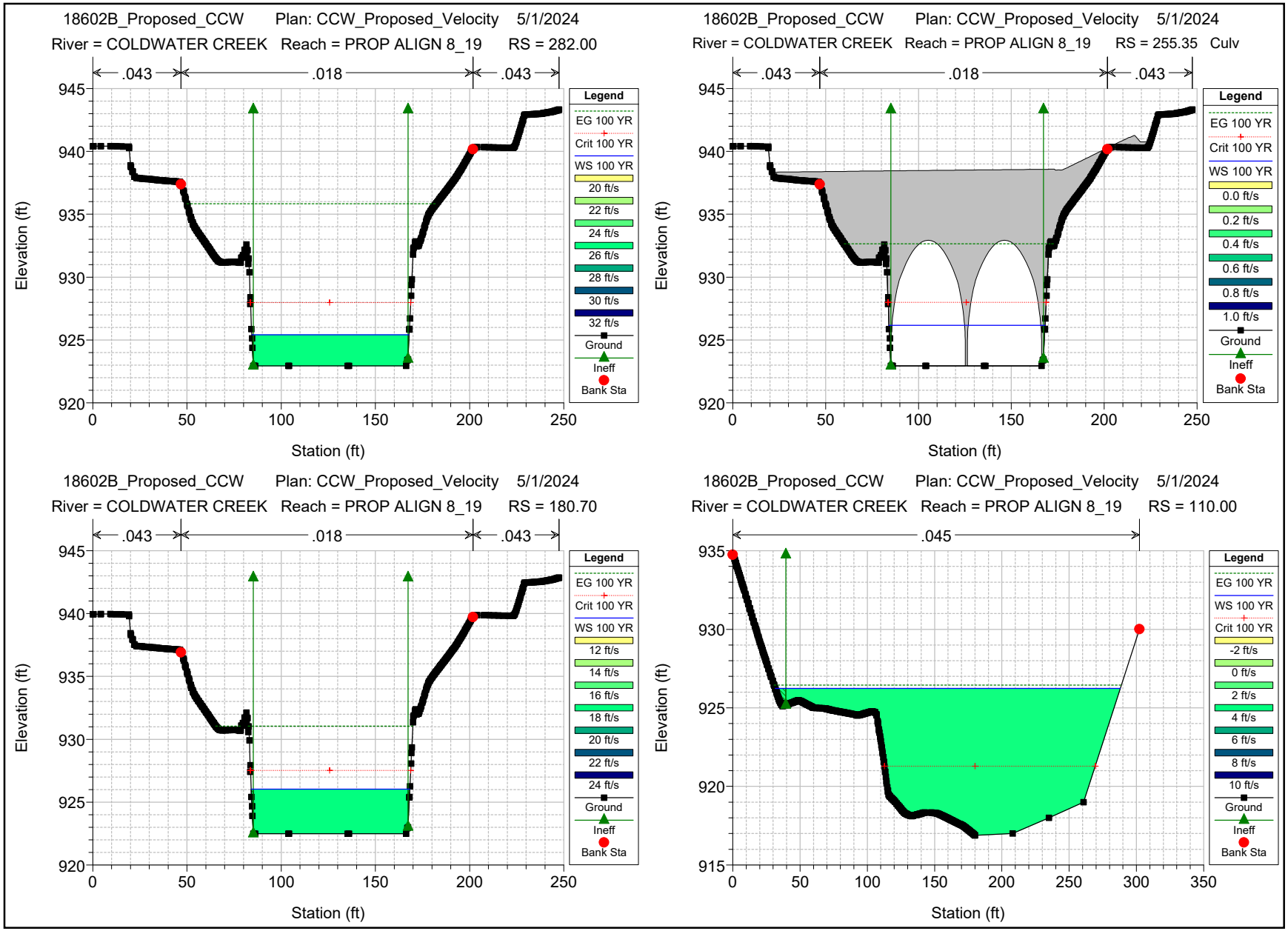

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 807.33
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 787.12
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 766.83
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 746.32


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 726.27
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 706.00
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 690.23
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 675.94
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 674.04
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 666.45
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 659.33
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 638.38
.025
.025
.025
Elevation (ft)
Station (ft)
950
945
940
935
930
925
-50
0
50
100
150
200
250
300
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 582.55
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 494.85
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 438.42
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 385.56
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 359.31
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 329.74
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 299.66
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 291.91
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
32 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 282.00
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
32 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 255.35 Culv
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 180.70
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 110.00
.045
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

HEC-RAS Plan: CCW_Proposed_Velocity River: COLDWATER CREEK Reach: PROP ALIGN 8_19 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)	
PROP ALIGN 8_19	3349.55	100 YR	5250.00	989.76	998.27	998.27	1000.20	0.024462	11.13	471.70	122.32	1.00
PROP ALIGN 8_19	3269.70	100 YR	5250.00	987.52	993.24	994.37	997.10	0.060446	15.76	333.08	102.74	1.54
PROP ALIGN 8_19	3202.30	100 YR	5250.00	986.84	993.91	993.91	995.70	0.024943	10.71	490.12	137.34	1.00
PROP ALIGN 8_19	3107.70	100 YR	5250.00	984.45	993.34	991.73	994.10	0.007264	6.99	750.65	156.20	0.56
PROP ALIGN 8_19	3036.73	100 YR	5250.00	982.98	991.06	991.06	993.12	0.023527	11.52	455.68	110.32	1.00
PROP ALIGN 8_19	2957.64	100 YR	5250.00	979.88	989.20	988.86	991.44	0.018517	12.01	437.29	80.92	0.91
PROP ALIGN 8_19	2881.37	100 YR	5250.00	976.83	988.55	986.11	990.31	0.009620	10.64	493.54	59.51	0.65
PROP ALIGN 8_19	2809.03	100 YR	5250.00	973.90	985.88	985.88	989.13	0.022769	14.46	363.07	92.62	1.00
PROP ALIGN 8_19	2738.95	100 YR	5250.00	971.11	981.82	983.16	986.84	0.042056	17.97	292.08	52.86	1.35
PROP ALIGN 8_19	2655.73	100 YR	5250.00	969.54	979.61	980.39	983.18	0.035764	15.15	346.61	74.73	1.24
PROP ALIGN 8_19	2582.44	100 YR	5250.00	967.70	974.87	976.65	979.66	0.062255	17.57	298.85	76.27	1.56
PROP ALIGN 8_19	2461.48	100 YR	5250.00	966.04	974.84	974.84	977.33	0.016919	12.91	432.91	88.59	0.90
PROP ALIGN 8_19	2429.62	100 YR	5250.00	965.50	971.28	972.75	976.23	0.048787	17.85	294.15	67.07	1.50
PROP ALIGN 8_19	2401.68	100 YR	5250.00	963.81	968.45	970.37	974.50	0.070221	19.73	266.04	69.62	1.78
PROP ALIGN 8_19	2379.12	100 YR	5250.00	962.36	966.53	968.49	972.80	0.079539	20.08	261.44	73.40	1.88
PROP ALIGN 8_19	2356.34	100 YR	5250.00	960.89	964.71	966.63	970.90	0.085210	19.95	263.14	78.80	1.92
PROP ALIGN 8_19	2338.32	100 YR	5250.00	959.66	968.49	965.19	969.25	0.003910	6.98	751.71	106.12	0.46
PROP ALIGN 8_19	2319.83	100 YR	5250.00	958.57	968.62	963.84	969.12	0.002161	5.69	922.68	112.83	0.35
PROP ALIGN 8_19	2309.54	100 YR	5250.00	958.52	968.62	963.67	969.09	0.001983	5.50	954.74	115.20	0.34
PROP ALIGN 8_19	2306.71	100 YR	5250.00	958.50	968.62	963.61	969.08	0.000525	5.44	964.34	115.96	0.33
PROP ALIGN 8_19	2286.58	100 YR	5250.00	958.40	968.63	963.59	969.07	0.000499	5.30	990.96	119.88	0.32
PROP ALIGN 8_19	2245.56	100 YR	5250.00	958.18	968.56	963.37	969.04	0.000453	5.58	941.32	127.84	0.32
PROP ALIGN 8_19	2204.54	100 YR	5250.00	957.98	967.63	964.21	968.92	0.003384	9.11	576.47	122.61	0.52
PROP ALIGN 8_19	2179.00	100 YR	5250.00	957.85	964.99	964.99	968.53	0.017680	15.08	348.16	78.64	1.00
PROP ALIGN 8_19	2149.31	100 YR	5250.00	957.63	962.50	964.02	967.54	0.052351	18.01	291.55	69.67	1.55
PROP ALIGN 8_19	2135.35	100 YR	5250.00	956.95	961.41	963.06	966.73	0.060326	18.49	284.00	72.88	1.65
PROP ALIGN 8_19	2115.25	100 YR	5250.00	955.96	959.99	961.68	965.42	0.068183	18.70	280.81	78.02	1.74
PROP ALIGN 8_19	2094.39	100 YR	5250.00	954.93	958.76	960.34	963.91	0.068918	18.21	288.38	84.38	1.74
PROP ALIGN 8_19	2073.79	100 YR	5250.00	953.90	962.29	958.99	963.00	0.003670	6.76	776.59	109.62	0.45
PROP ALIGN 8_19	2047.73	100 YR	5250.00	952.56	962.38	957.63	962.86	0.002113	5.58	940.83	115.02	0.34
PROP ALIGN 8_19	2028.41	100 YR	5250.00	952.52	962.41	957.25	962.80	0.001819	5.03	1044.08	135.96	0.32
PROP ALIGN 8_19	2022.20	100 YR	5250.00	952.48	962.40	957.19	962.79	0.001417	4.98	1053.96	136.11	0.32
PROP ALIGN 8_19	1969.97	100 YR	5250.00	952.21	962.38	956.93	962.70	0.001071	4.56	1151.18	137.29	0.28
PROP ALIGN 8_19	1927.42	100 YR	5250.00	951.99	962.37	956.49	962.68	0.000331	4.47	1175.17	135.41	0.27
PROP ALIGN 8_19	1914.90	100 YR	5250.00	951.93	962.34	956.59	962.67	0.000357	4.61	1139.40	132.66	0.28
PROP ALIGN 8_19	1903.25	100 YR	5250.00	951.86	962.03	956.86	962.64	0.000261	6.25	839.68	130.25	0.35
PROP ALIGN 8_19	1806.35		Culvert									
PROP ALIGN 8_19	1671.79	100 YR	5250.00	950.65	960.72	955.64	961.33	0.000263	6.23	842.77	176.12	0.35
PROP ALIGN 8_19	1650.91	100 YR	5250.00	950.56	960.37	956.18	961.28	0.002352	7.68	683.74	123.03	0.43
PROP ALIGN 8_19	1616.23	100 YR	5250.00	950.38	957.37	957.37	960.86	0.014162	14.98	350.43	78.15	1.00
PROP ALIGN 8_19	1585.91	100 YR	5250.00	950.16	955.10	956.56	959.99	0.049981	17.73	296.14	69.89	1.52
PROP ALIGN 8_19	1580.92	100 YR	5250.00	949.91	954.75	956.24	959.72	0.051963	17.88	293.70	70.66	1.55
PROP ALIGN 8_19	1561.12	100 YR	5250.00	948.93	953.44	955.03	958.60	0.058554	18.23	288.05	73.98	1.63
PROP ALIGN 8_19	1541.37	100 YR	5250.00	947.95	952.23	953.83	957.40	0.062236	18.24	287.75	77.56	1.67
PROP ALIGN 8_19	1521.25	100 YR	5250.00	946.95	951.09	952.63	956.09	0.062551	17.94	292.67	81.47	1.67
PROP ALIGN 8_19	1501.11	100 YR	5250.00	945.95	949.97	951.45	954.77	0.062151	17.57	298.73	85.55	1.66
PROP ALIGN 8_19	1459.98	100 YR	5250.00	943.90	947.73	949.08	952.13	0.060274	16.82	312.13	93.62	1.62
PROP ALIGN 8_19	1420.61	100 YR	5250.00	941.95	945.63	946.87	949.70	0.058342	16.18	324.45	100.88	1.59
PROP ALIGN 8_19	1400.49	100 YR	5250.00	940.96	944.56	945.74	948.49	0.057669	15.89	330.37	104.73	1.58
PROP ALIGN 8_19	1381.00	100 YR	5250.00	939.98	947.07	944.65	947.78	0.004793	6.76	776.56	136.81	0.50
PROP ALIGN 8_19	1361.60	100 YR	5250.00	939.04	947.17	943.61	947.64	0.002726	5.50	954.27	149.96	0.38
PROP ALIGN 8_19	1357.71	100 YR	5250.00	939.00	947.16	943.55	947.63	0.002676	5.47	960.49	150.30	0.38
PROP ALIGN 8_19	1347.02	100 YR	5250.00	938.95	947.14	943.51	947.60	0.002647	5.44	964.25	150.53	0.38
PROP ALIGN 8_19	1344.92	100 YR	5250.00	938.94	947.14	943.50	947.60	0.000715	5.44	965.50	150.61	0.38
PROP ALIGN 8_19	1304.49	100 YR	5250.00	938.73	947.13	943.30	947.56	0.000656	5.28	995.10	152.19	0.36
PROP ALIGN 8_19	1221.06	100 YR	5250.00	938.31	947.11	942.88	947.49	0.000552	4.97	1057.11	155.46	0.34
PROP ALIGN 8_19	1155.76	100 YR	5250.00	937.99	947.07	942.60	947.46	0.000545	4.97	1055.28	152.72	0.33
PROP ALIGN 8_19	1092.79	100 YR	5250.00	937.67	947.10	942.25	947.41	0.000399	4.42	1187.22	162.56	0.29
PROP ALIGN 8_19	1055.43	100 YR	5250.00	937.48	947.11	941.80	947.38	0.000337	4.19	1252.83	163.89	0.27
PROP ALIGN 8_19	1008.56	100 YR	5250.00	937.25	947.08	941.82	947.36	0.000366	4.30	1220.58	163.59	0.28
PROP ALIGN 8_19	955.79	100 YR	5250.00	936.99	947.07	941.55	947.34	0.000332	4.16	1263.22	165.67	0.27
PROP ALIGN 8_19	899.60	100 YR	5250.00	936.71	946.22	942.39	947.23	0.002693	8.05	652.29	158.40	0.46
PROP ALIGN 8_19	865.43	100 YR	5250.00	936.54	943.39	943.39	946.81	0.014207	14.83	353.98	78.75	1.00
PROP ALIGN 8_19	834.52	100 YR	5250.00	936.32	941.39	942.69	945.96	0.045273	17.15	306.12	70.53	1.45
PROP ALIGN 8_19	807.33	100 YR	5250.00	934.94	939.25	940.87	944.46	0.062376	18.31	286.78	76.99	1.67
PROP ALIGN 8_19	787.12	100 YR	5250.00	933.94	937.93	939.55	943.14	0.068225	18.32	286.61	82.63	1.73
PROP ALIGN 8_19	766.83	100 YR	5250.00	932.94	936.74	938.28	941.67	0.067994	17.81	294.71	88.62	1.72
PROP ALIGN 8_19	746.32	100 YR	5250.00	931.92	935.59	937.01	940.19	0.066279	17.21	305.07	95.03	1.69
PROP ALIGN 8_19	726.27	100 YR	5250.00	930.92	937.98	935.80	938.82	0.005729	7.37	712.45	125.76	0.55
PROP ALIGN 8_19	706.00	100 YR	5250.00	929.93	938.13	934.63	938.64	0.002930	5.72	917.23	143.16	0.40
PROP ALIGN 8_19	690.23	100 YR	5250.00	929.25	938.19	933.81	938.56	0.001916	4.86	1079.17	156.41	0.33
PROP ALIGN 8_19	675.94	100 YR	5250.00	929.17	938.17	933.74	938.53	0.001877	4.83	1087.41	156.99	0.32
PROP ALIGN 8_19	674.04	100 YR	5250.00	929.16	938.17	933.73	938.53	0.000507	4.82	1088.86	157.09	0.32
PROP ALIGN 8_19	666.45	100 YR	5250.00	929.12	938.17	933.69	938.52	0.000499	4.79	1095.63	157.50	0.32
PROP ALIGN 8_19	659.33	100 YR	5250.00	929.09	938.16	933.65	938.52	0.000492	4.77	1100.77	157.73	0.32
PROP ALIGN 8_19	638.38	100 YR	5250.00	928.99	938.16	933.55	938.50	0.000473	4.71	1115.81	158.37	0.31
PROP ALIGN 8_19	582.55	100 YR	5250.00	928.71	938.13	933.32	938.48	0.000454	4.74	1107.42	150.14	0.31
PROP ALIGN 8_19	494.85	100 YR	5250.00	928.27	938.16	932.69	938.42	0.000314	4.08	1287.02	165.79	0.26
PROP ALIGN 8_19	438.42	100 YR	5250.00	927.99	938.14	932.55	938.40	0.000325	4.12	1273.76	166.17	0.26

HEC-RAS Plan: CCW_Proposed_Velocity River: COLDWATER CREEK Reach: PROP ALIGN 8_19 Profile: 100 YR (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PROP ALIGN 8_19	385.56	100 YR	5250.00	927.73	937.11	933.62	938.27	0.003151	8.63	608.34	158.87	0.50
PROP ALIGN 8_19	359.31	100 YR	5250.00	927.60	934.47	934.47	937.89	0.015542	14.83	354.09	77.52	1.00
PROP ALIGN 8_19	329.74	100 YR	5250.00	927.31	931.83	933.53	937.33	0.008887	18.81	279.13	72.41	1.69
PROP ALIGN 8_19	299.66	100 YR	5250.00	924.37	926.74	929.12	936.45	0.032474	24.99	210.07	95.47	2.97
PROP ALIGN 8_19	291.91	100 YR	5250.00	923.90	926.37	928.84	936.19	0.030663	25.15	208.78	89.27	2.90
PROP ALIGN 8_19	282.00	100 YR	5250.00	922.94	925.41	927.98	935.83	0.029613	25.90	202.72	83.42	2.91
PROP ALIGN 8_19	255.35		Culvert									
PROP ALIGN 8_19	180.70	100 YR	5250.00	922.48	926.04	927.52	931.05	0.008744	17.96	292.30	84.25	1.68
PROP ALIGN 8_19	110.00	100 YR	5250.00	916.89	926.24	921.30	926.45	0.001183	3.64	1442.03	256.56	0.27

Appendix B4

Interim Condition Hydraulic Results

- Profile
- Cross Sections
- Summary Table

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024

COLDWATER CREEK PROP ALIGN 8_19

Legend

WS 100 YR

Crit 100 YR

Ground

Elevation (ft)

1000

980

960

940

920

900

0

500

1000

1500

2000

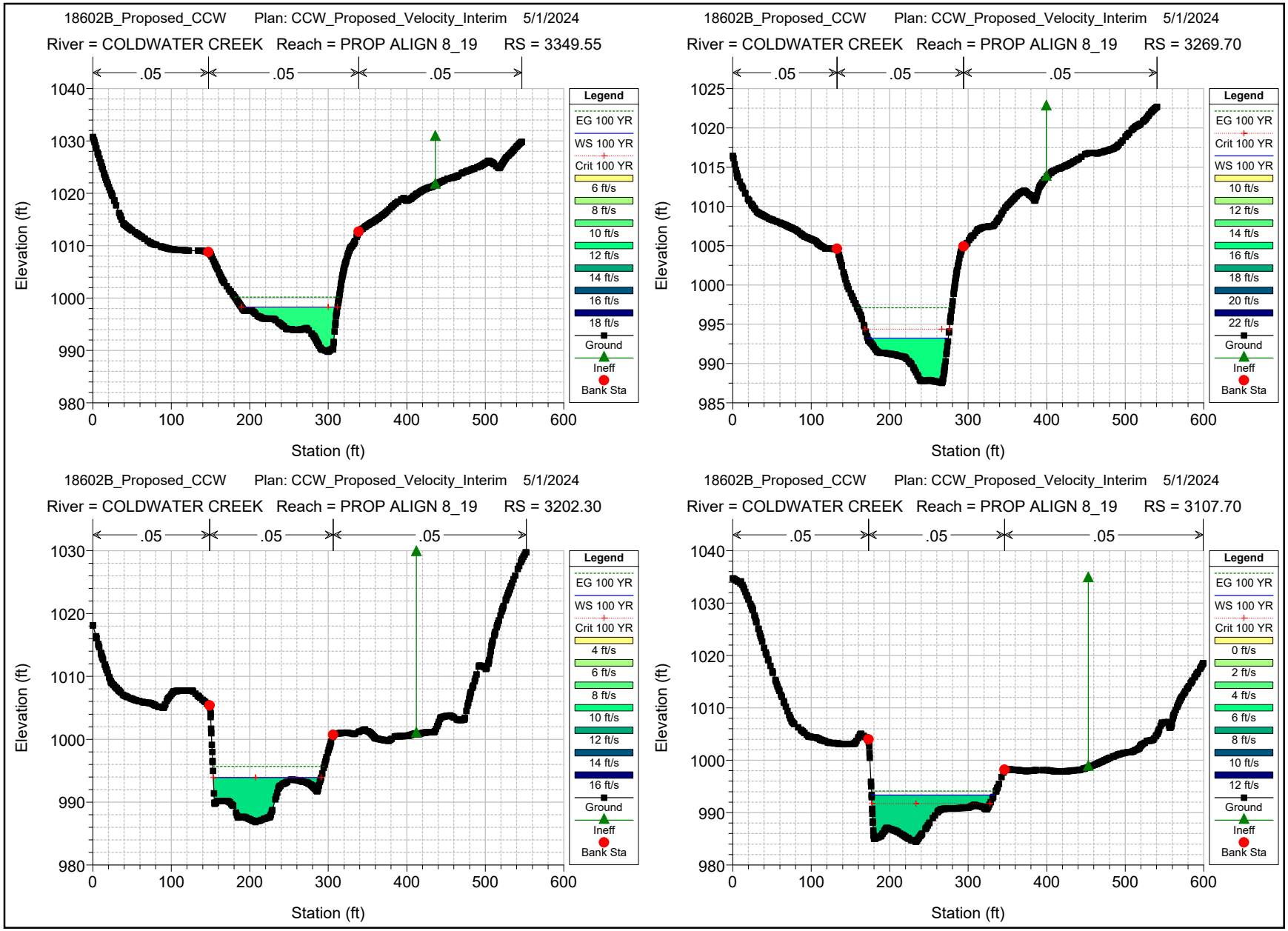
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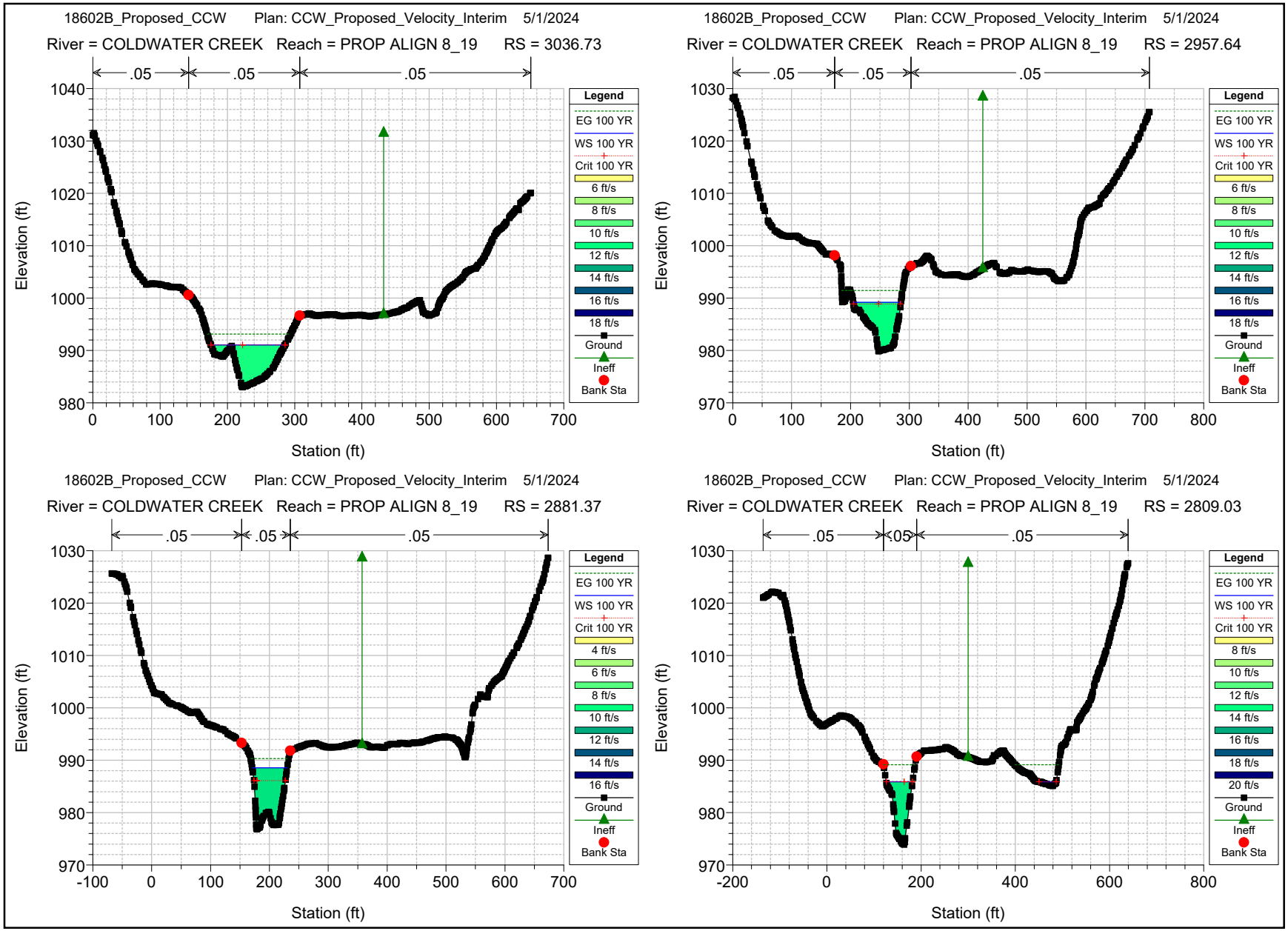
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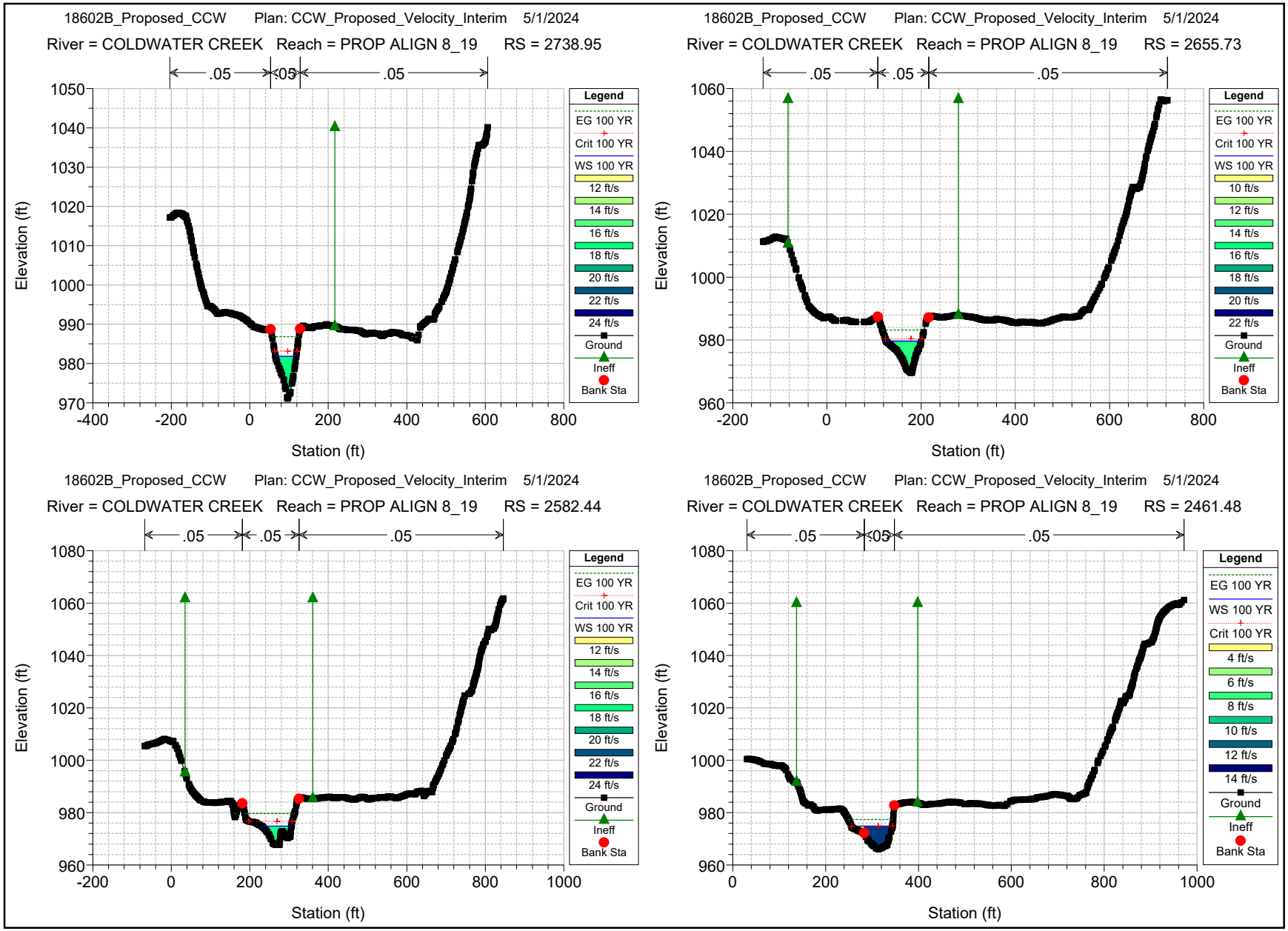
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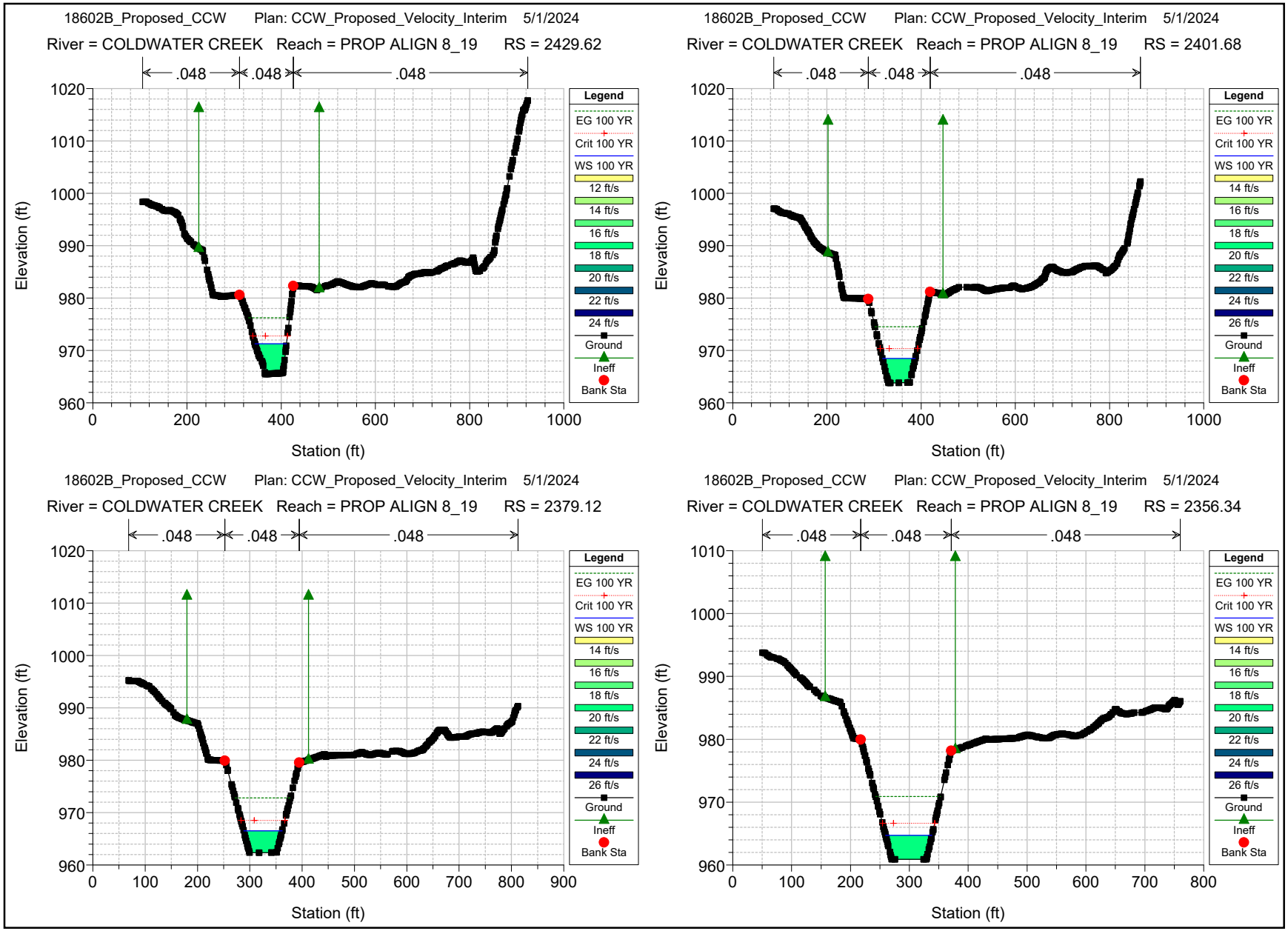
Main Channel Distance (ft)

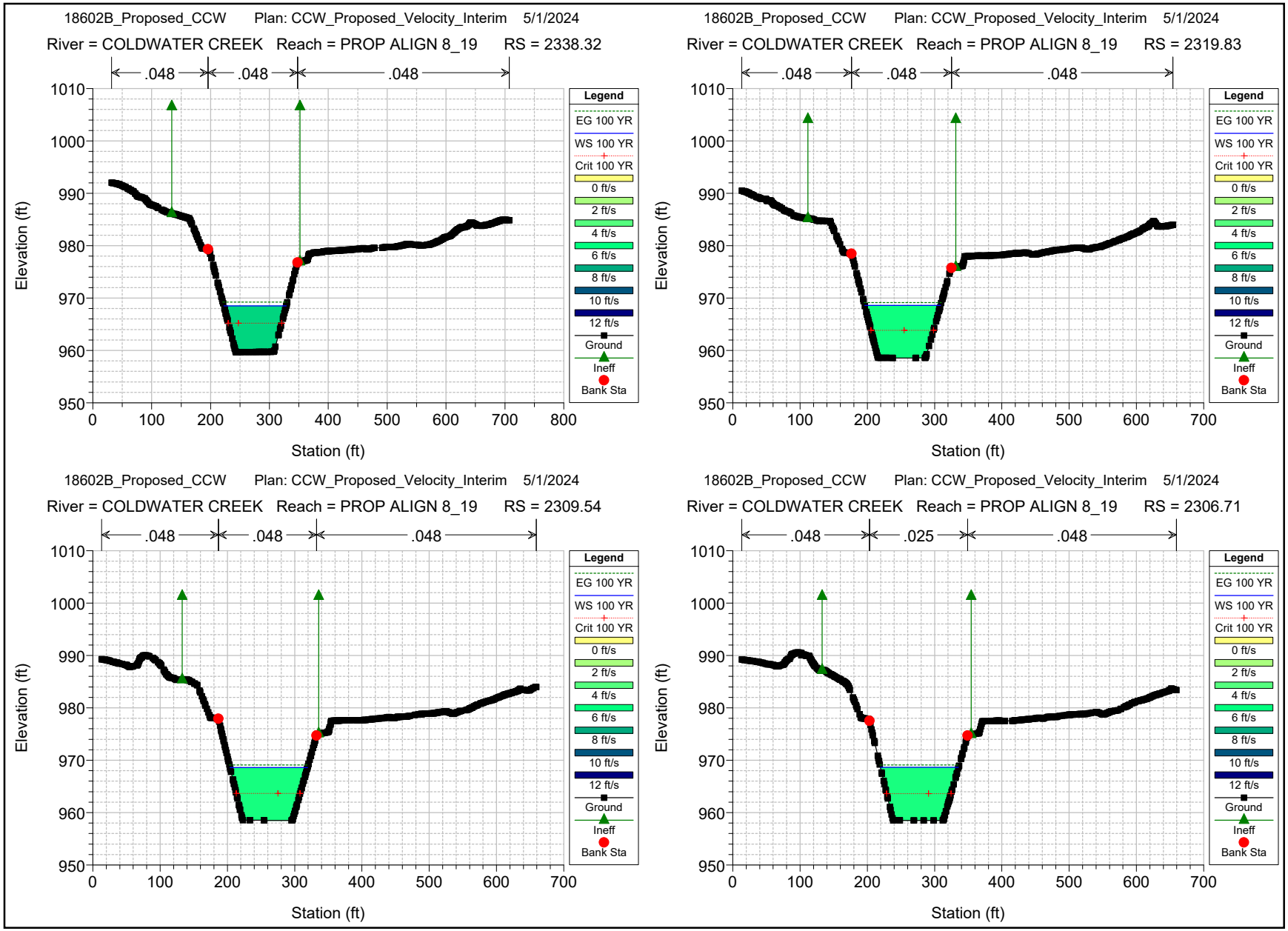
180.70 255.35 329.74 359.31 438.42 494.85 582.55 638.38 674.04 706.00 746.32 787.12 834.52 865.43 899.60 955.79 1008.56 1055.43 1092.79 1155.76 1221.06 1304.49 1344.92 1381.00 1420.61 1459.98 1501.11 1541.37 1580.92 1616.23 1650.91 1718.08 1764.37 1810.67 1856.96 1903.25 1969.97 2022.20 2073.79 2115.25 2149.31 2179.00 2245.56 2286.58 2319.83 2356.34 2401.68 2461.48 2582.44 2655.73 2738.95 2809.03 2881.37 2957.64 3036.73 3107.70 3202.30 3269.70 3349.55

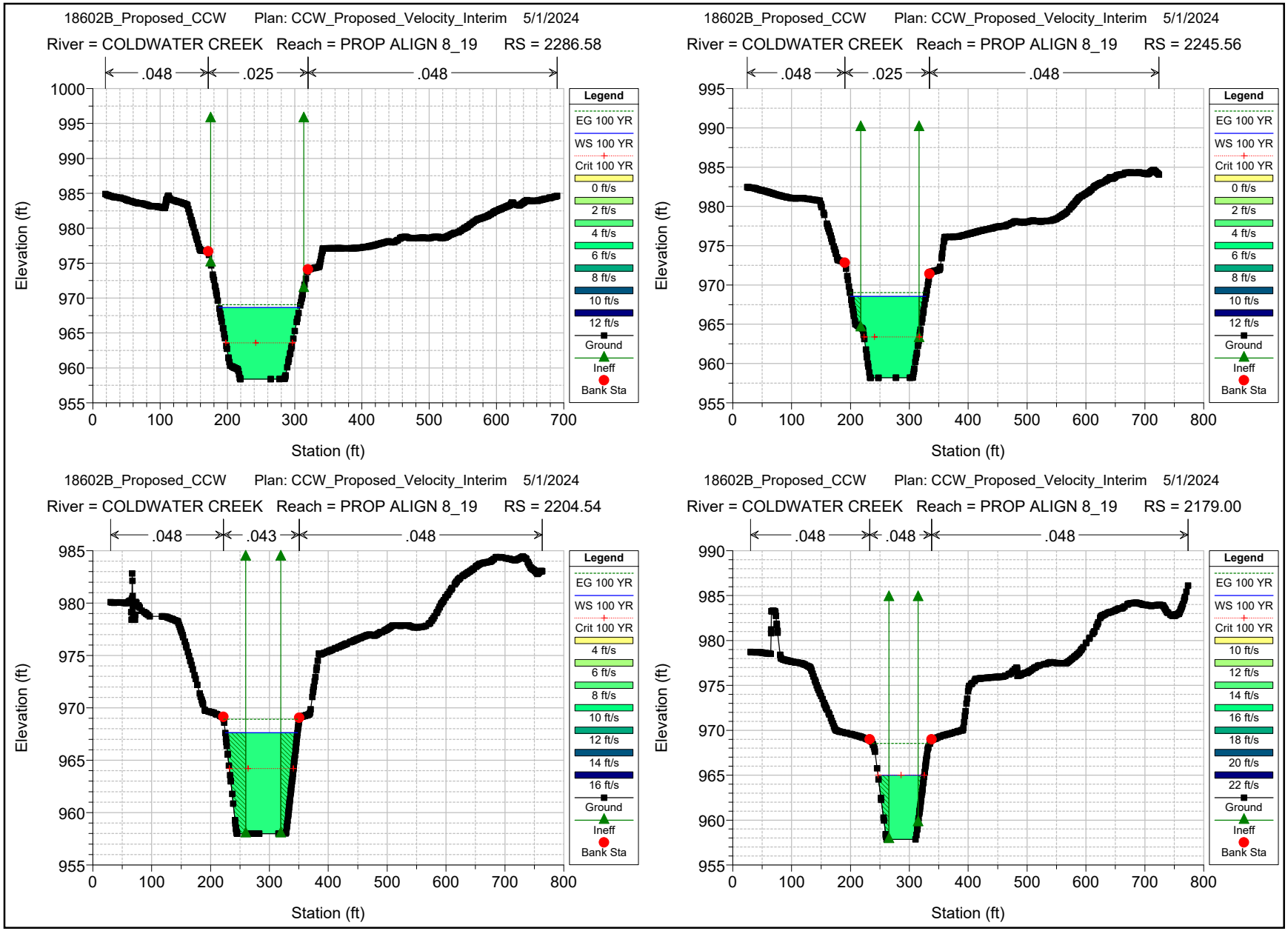

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3349.55
.05 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3269.70
.05 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3202.30
.05 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3107.70
.05 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

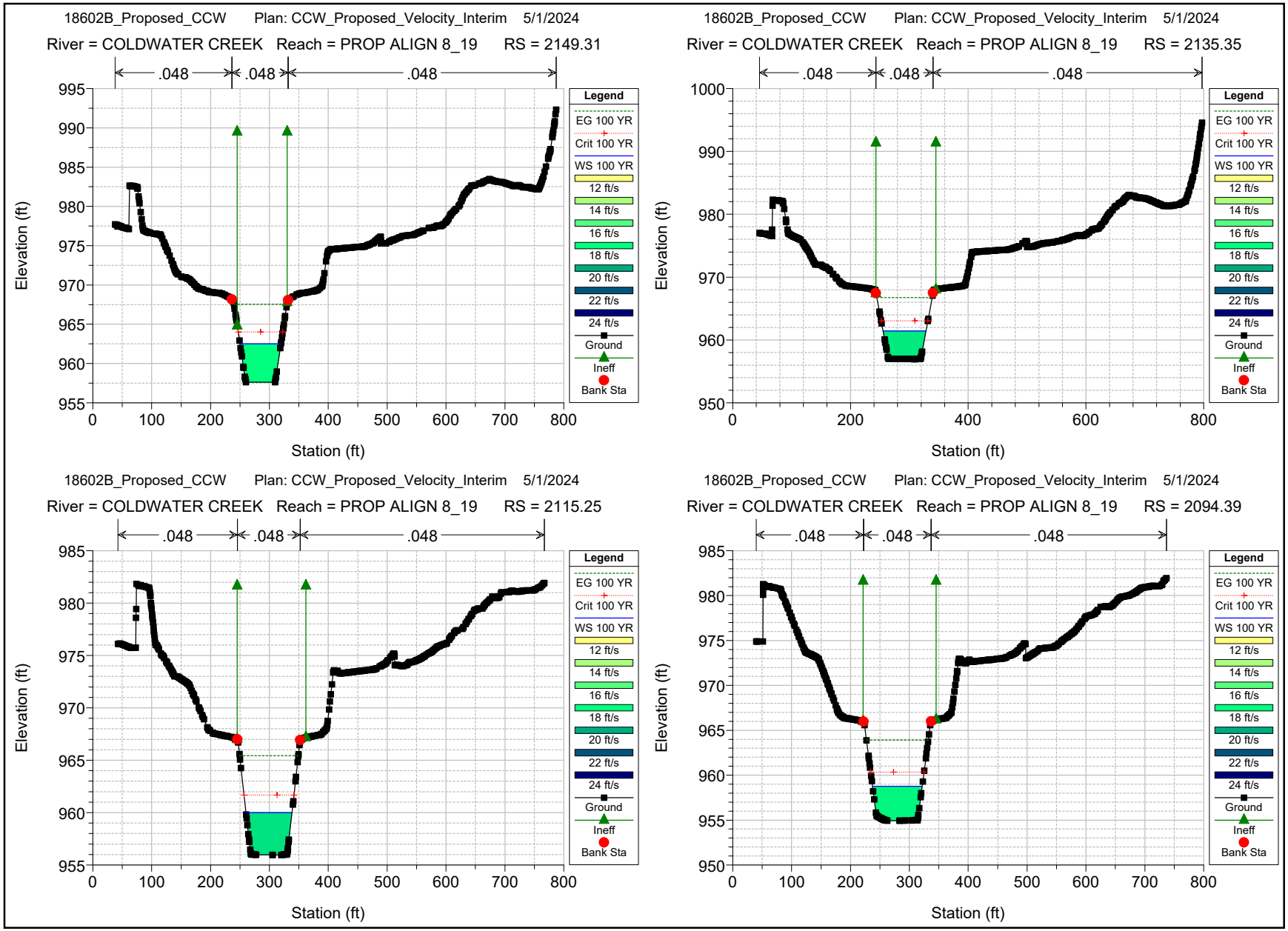

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 3036.73
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Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2957.64
.05 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2881.37
.05 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2809.03
.05 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta

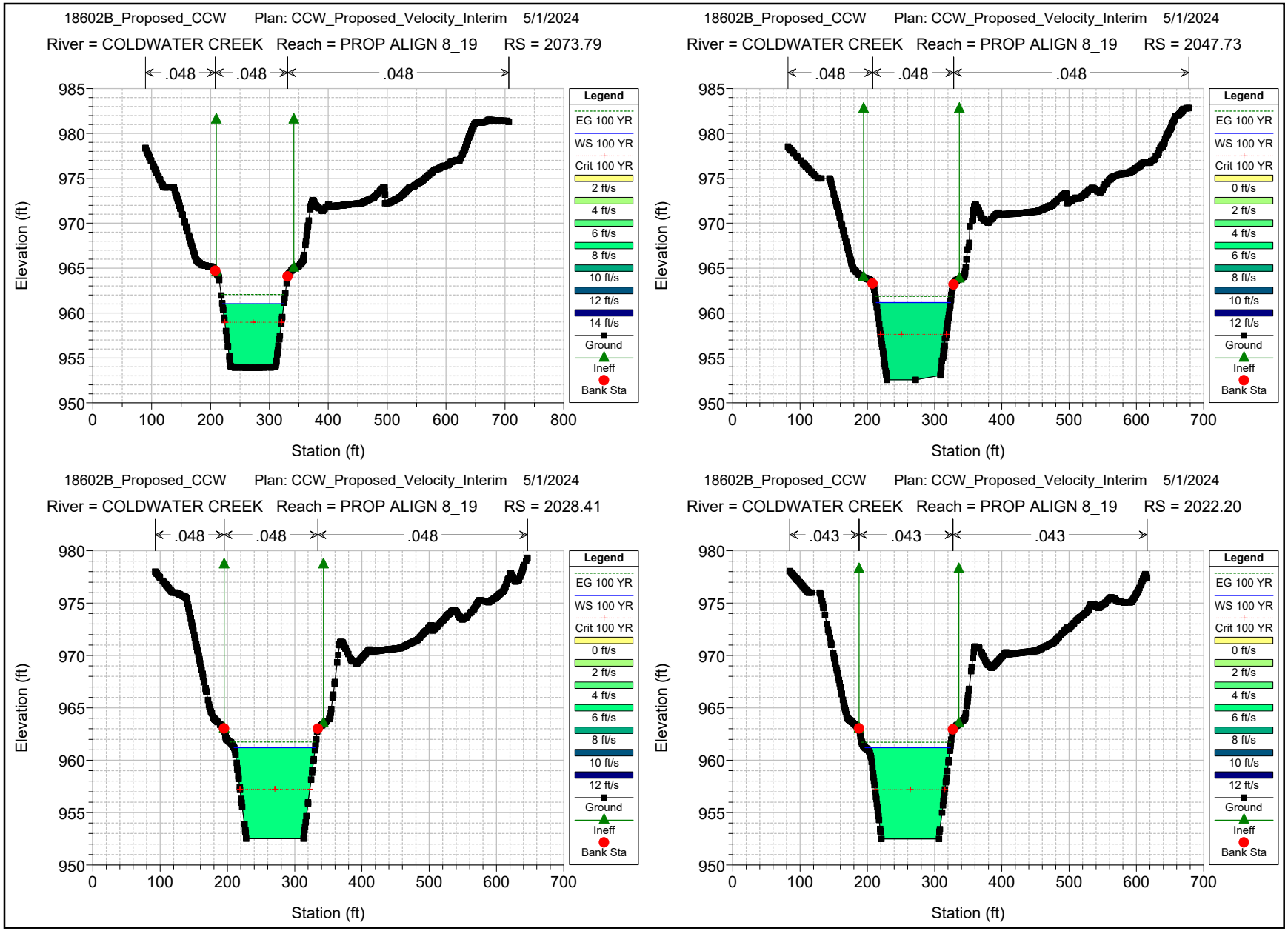

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2738.95
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.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2655.73
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2582.44
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2461.48
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta

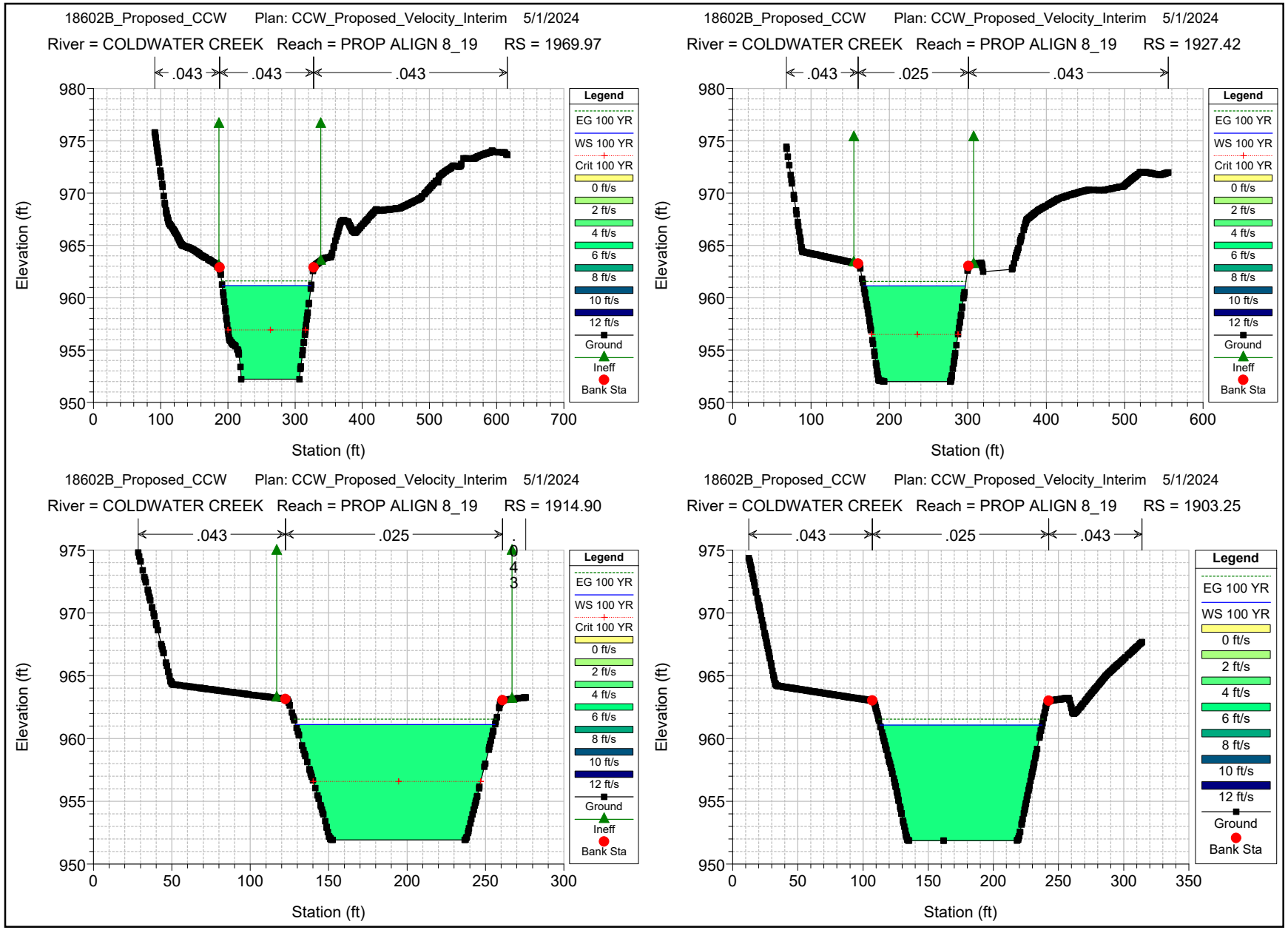

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River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2429.62
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.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2401.68
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2379.12
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2356.34
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
14 ft/s
16 ft/s
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20 ft/s
22 ft/s
24 ft/s
26 ft/s
Ground
Ineff
Bank Sta

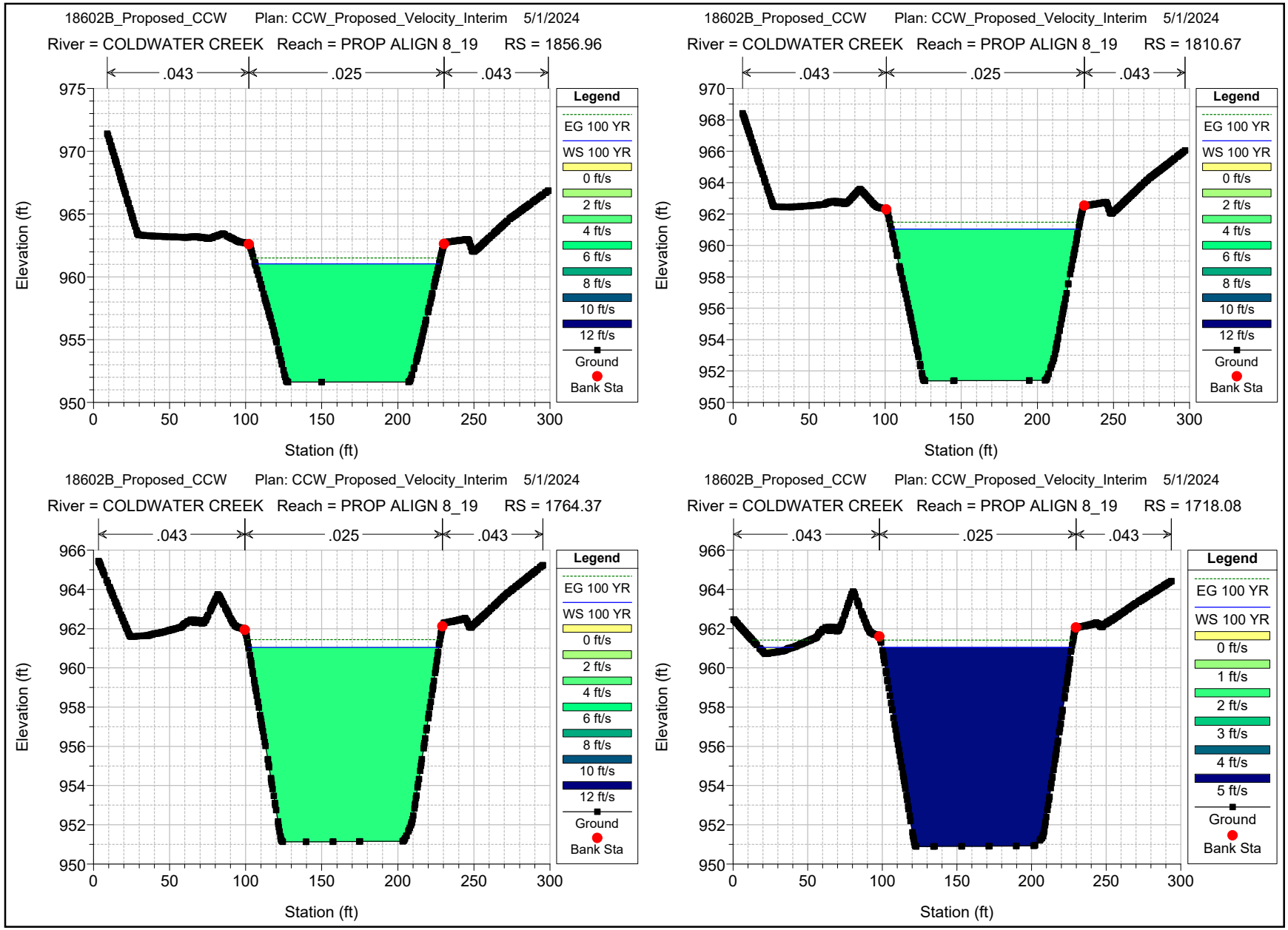

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2338.32
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2319.83
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2309.54
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2306.71
.048
.025
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

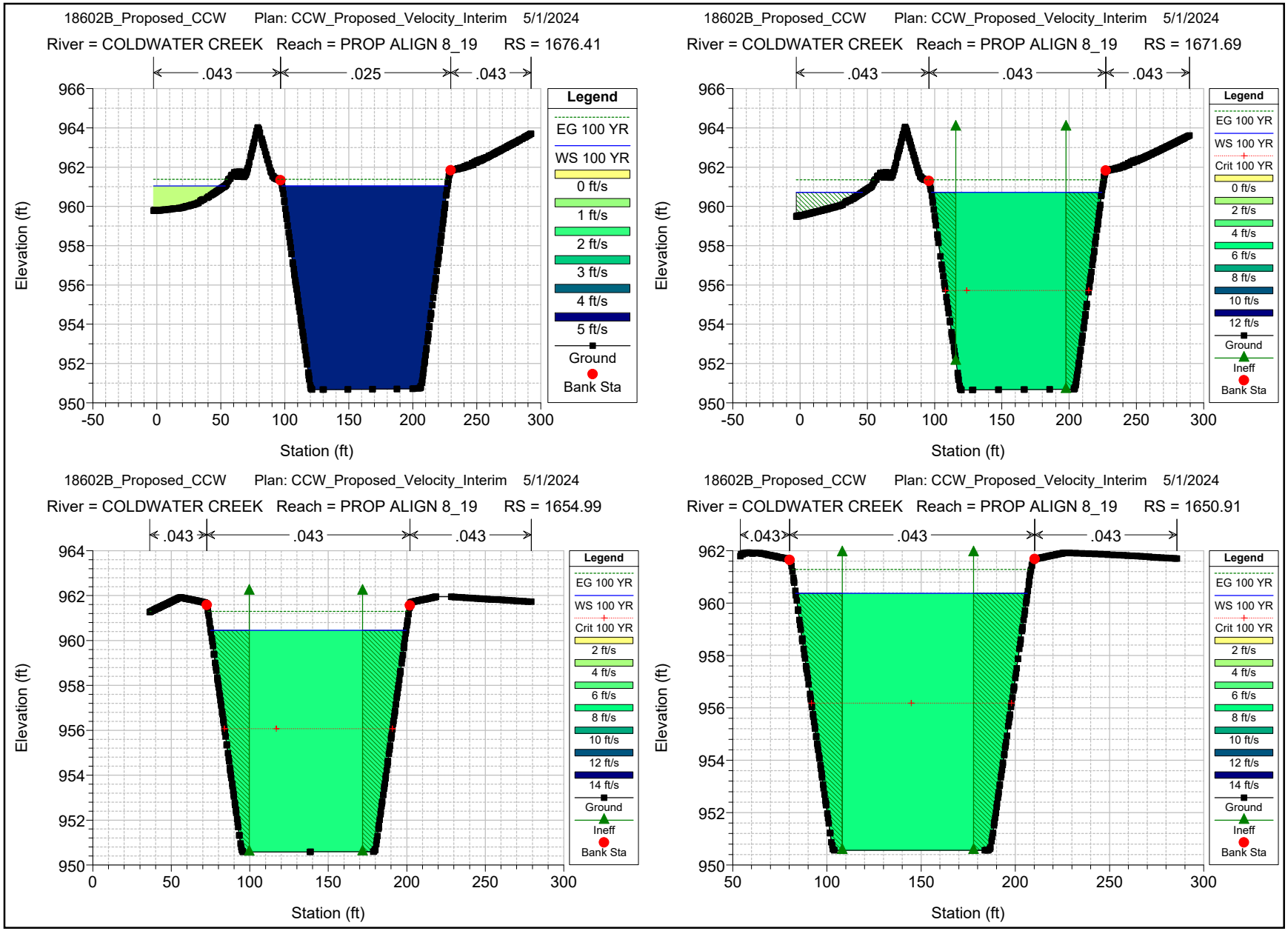

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2286.58
.048
.025
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2245.56
.048
.025
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2204.54
.048
.043
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2179.00
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta

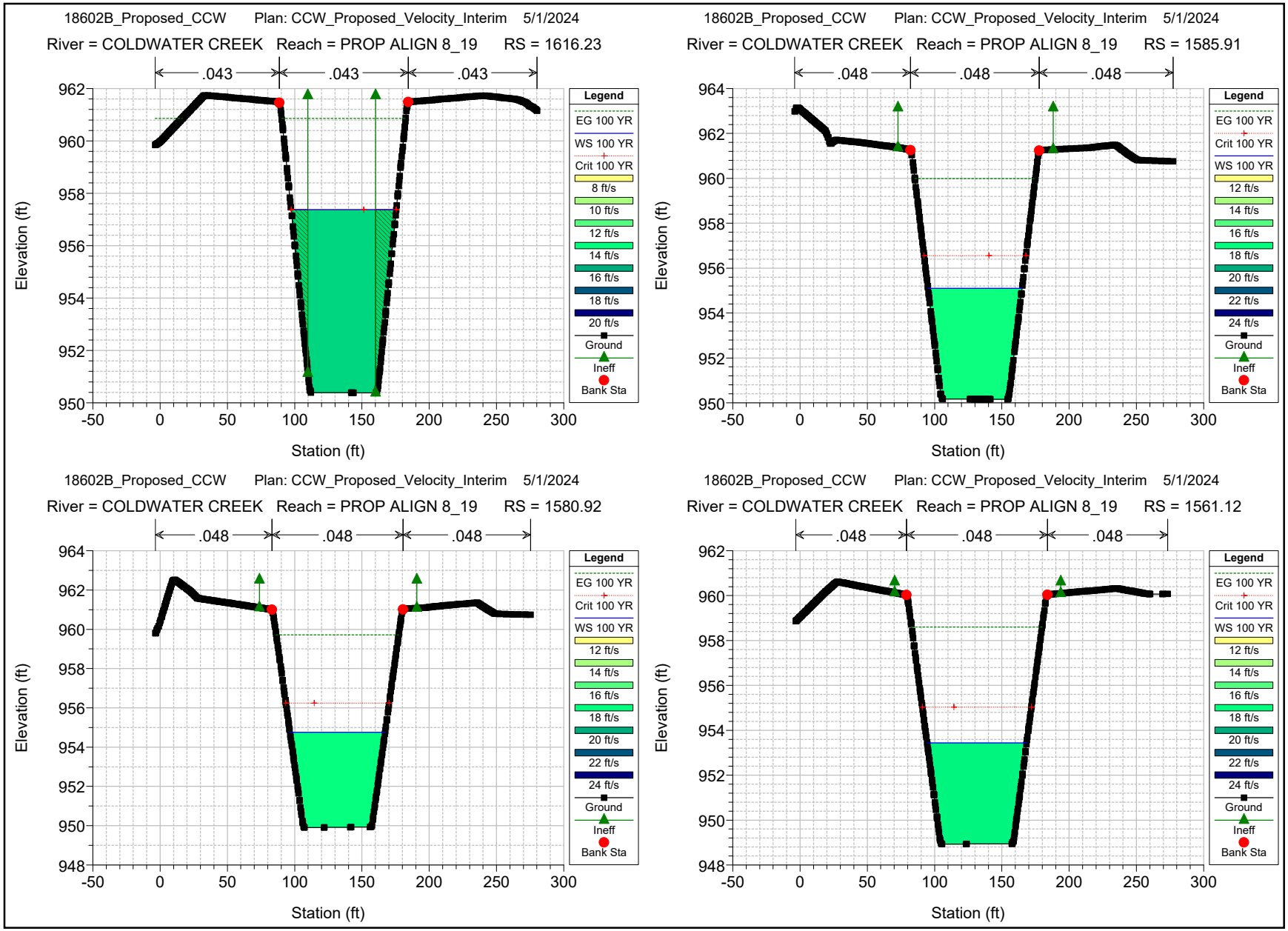

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2149.31
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2135.35
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2115.25
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2094.39

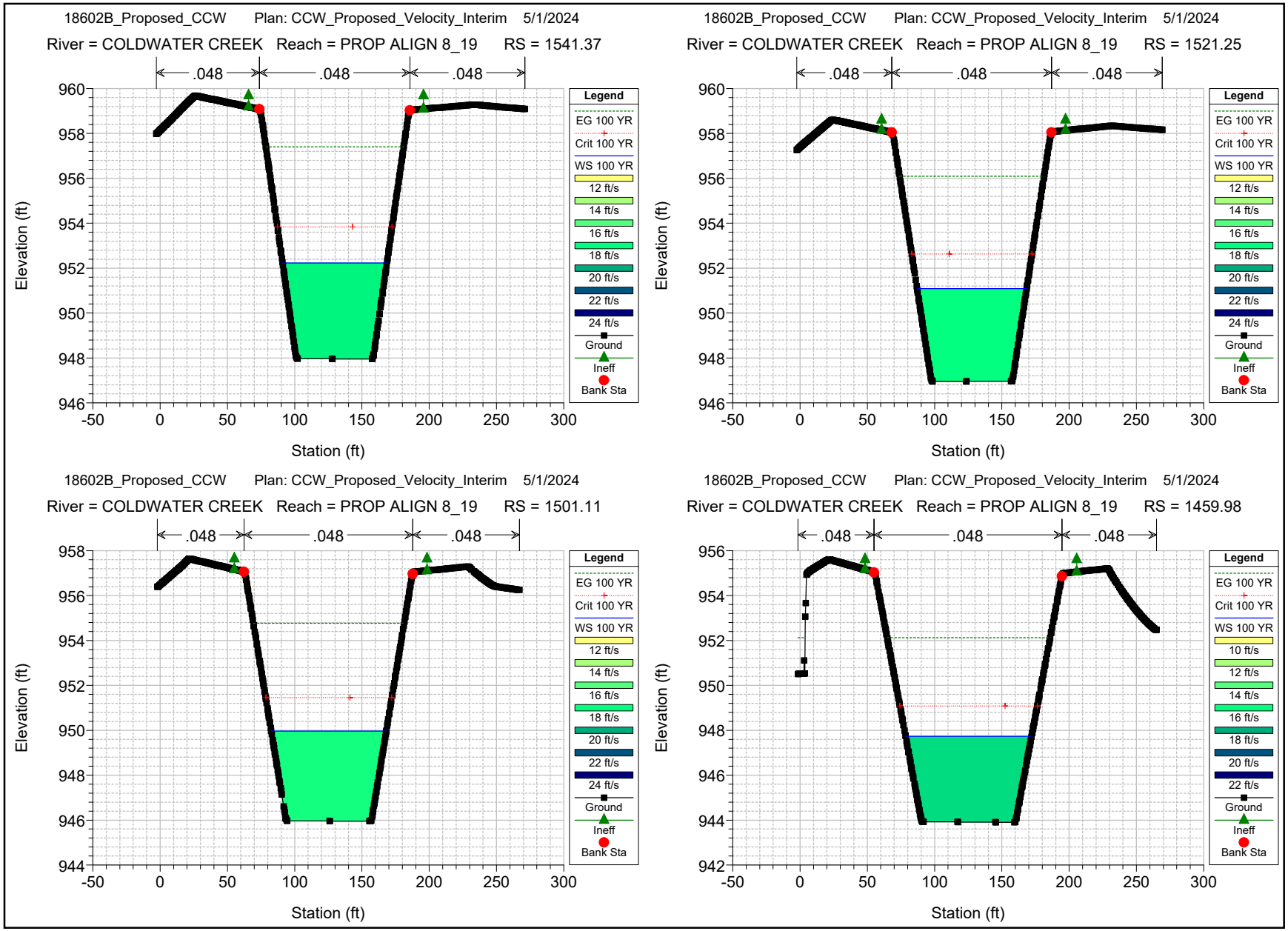

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2073.79
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2047.73
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2028.41
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 2022.20
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

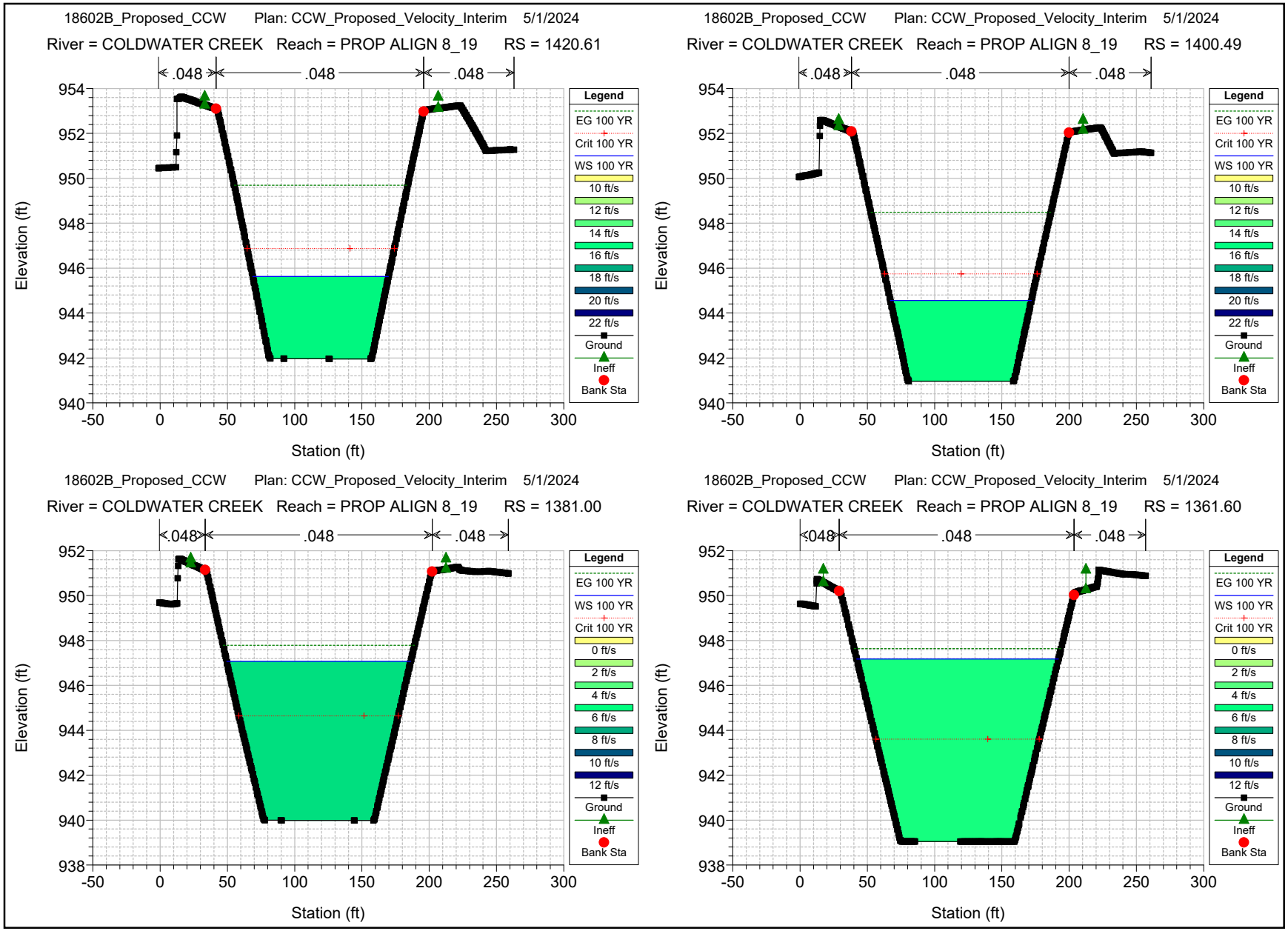

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1969.97
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1927.42
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1914.90
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1903.25
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

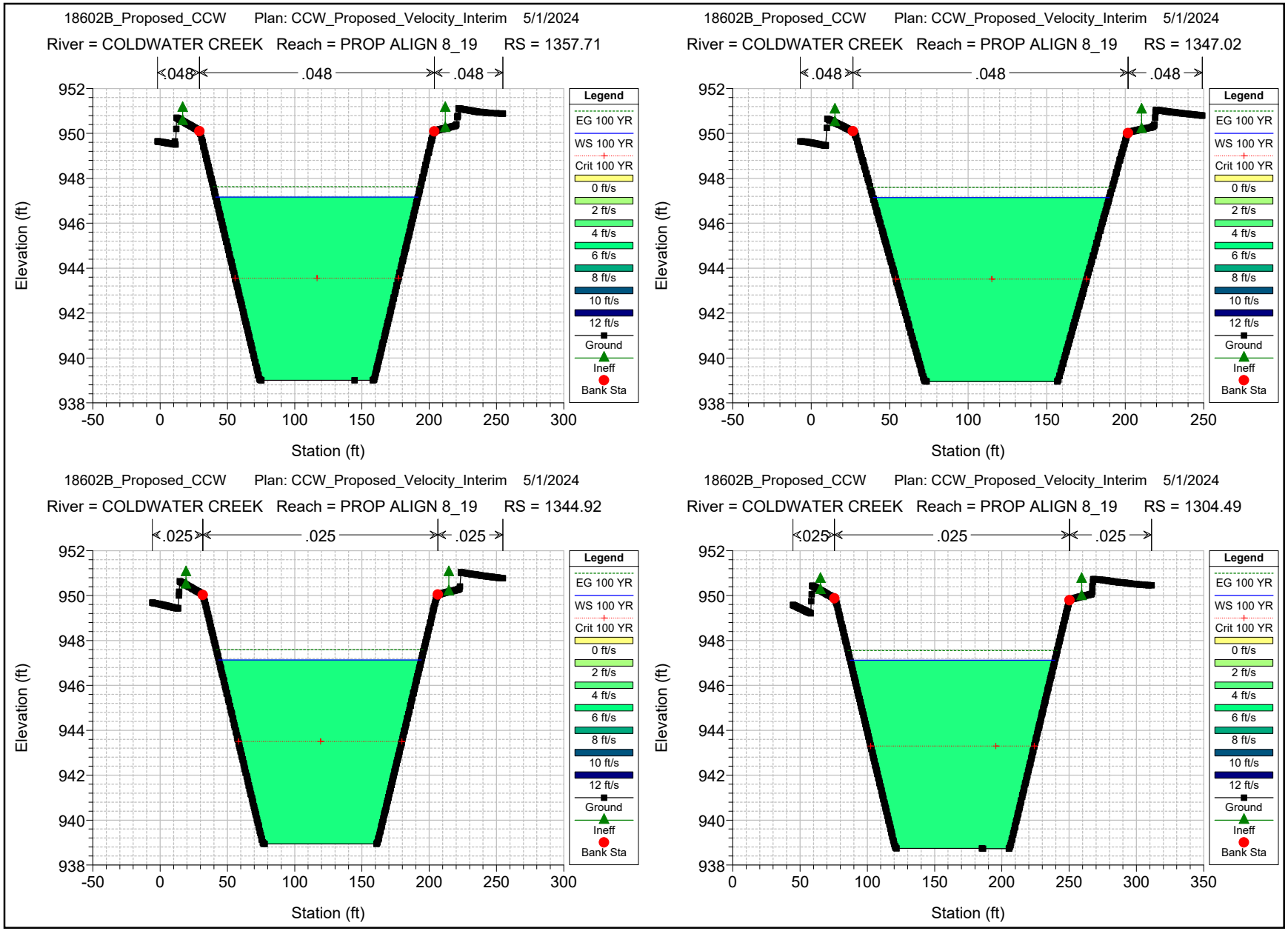

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1856.96
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1810.67
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1764.37
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1718.08
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

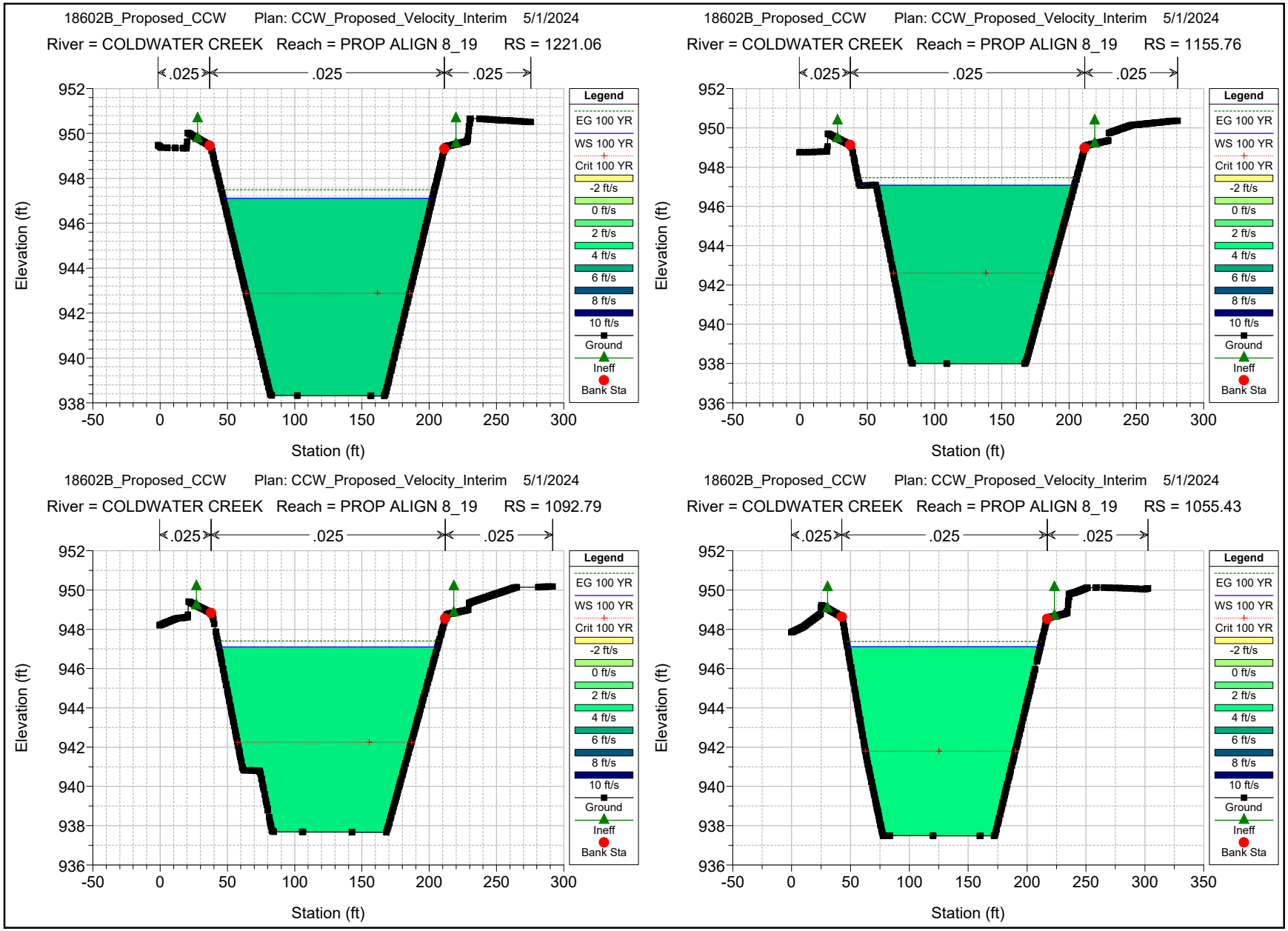

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1676.41
.043
.025
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1671.69
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1654.99
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1650.91
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta

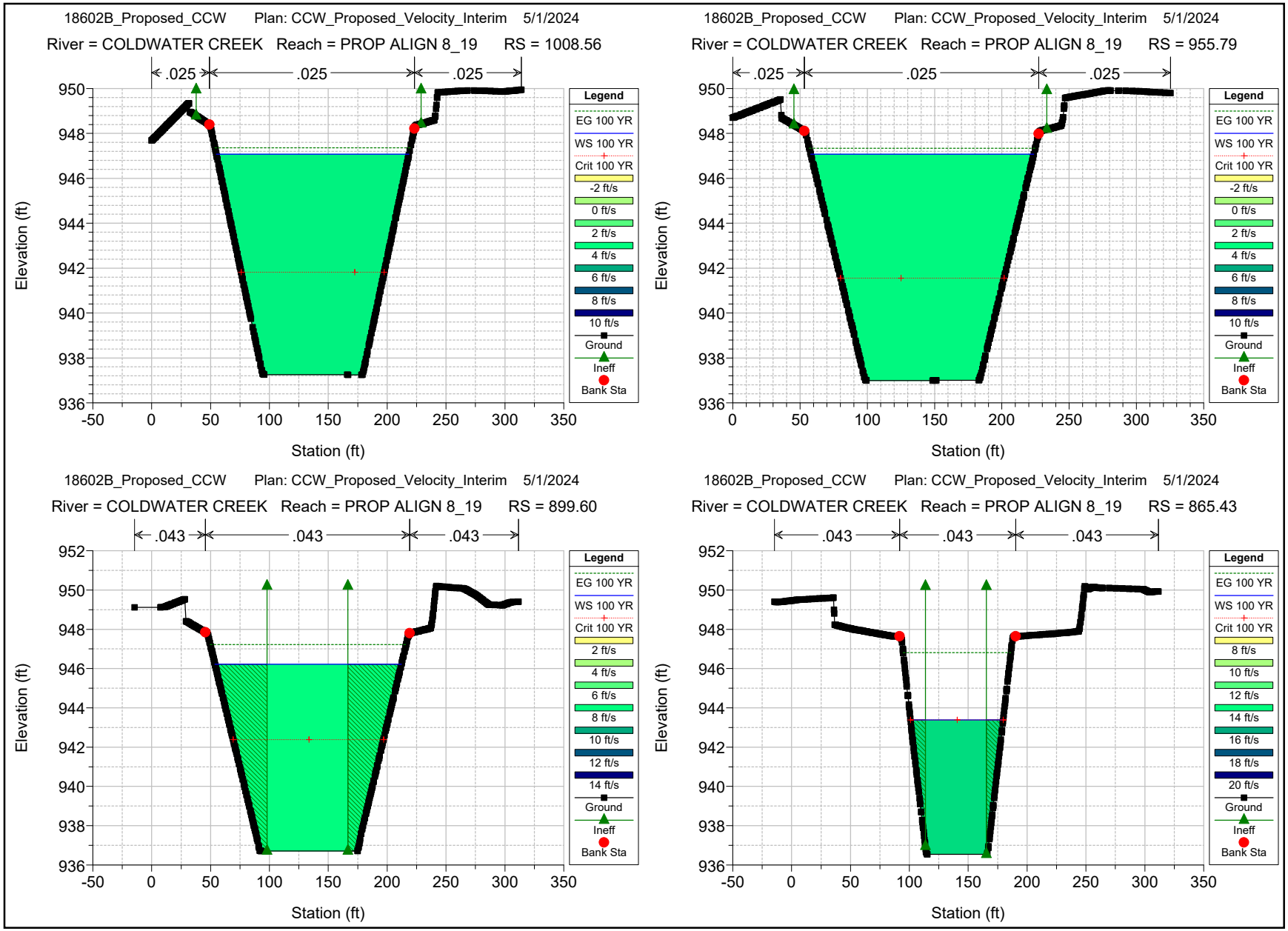

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1616.23
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1585.91
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1580.92
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1561.12
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta

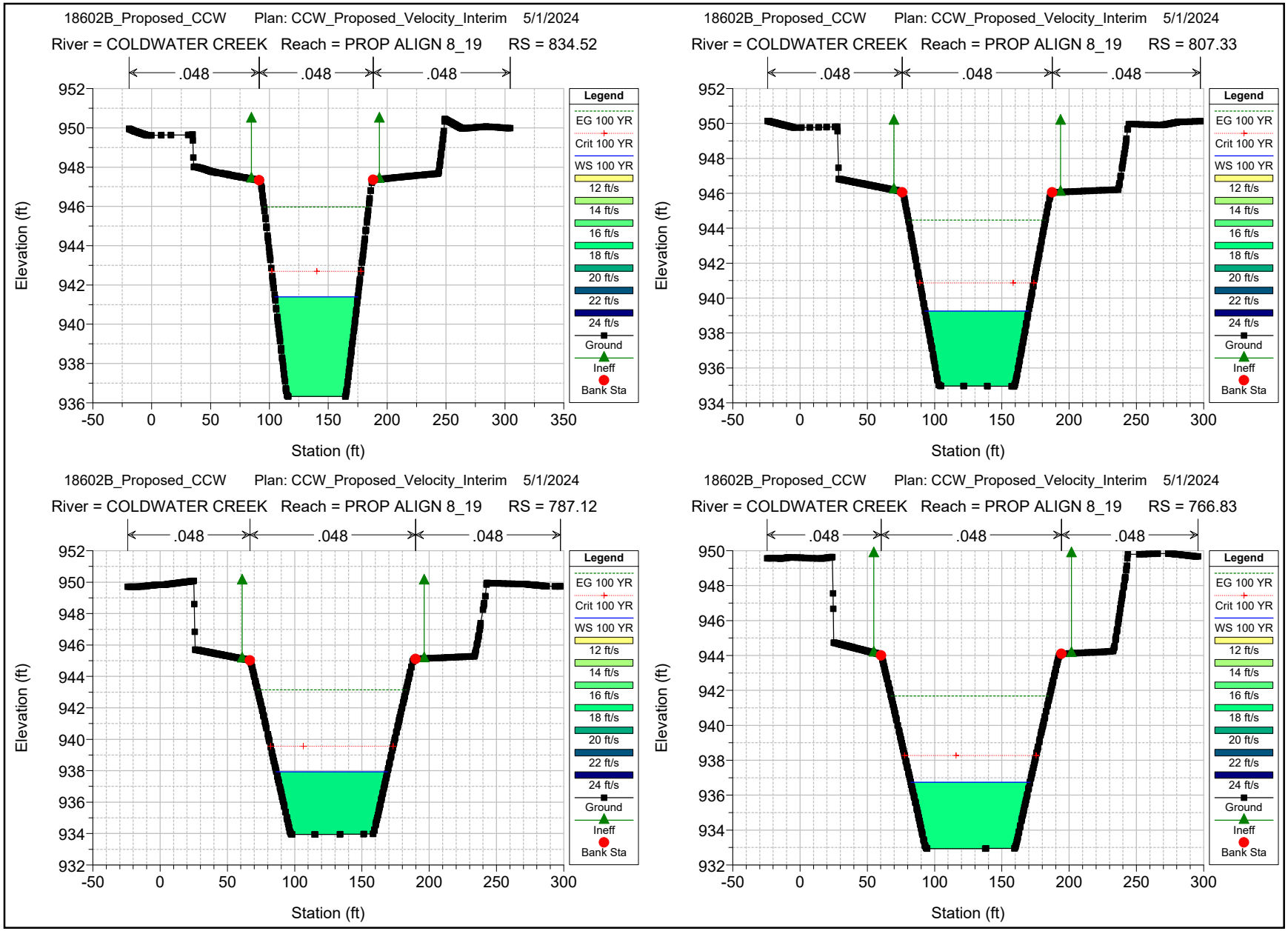

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1541.37
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1521.25
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1501.11
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1459.98
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta

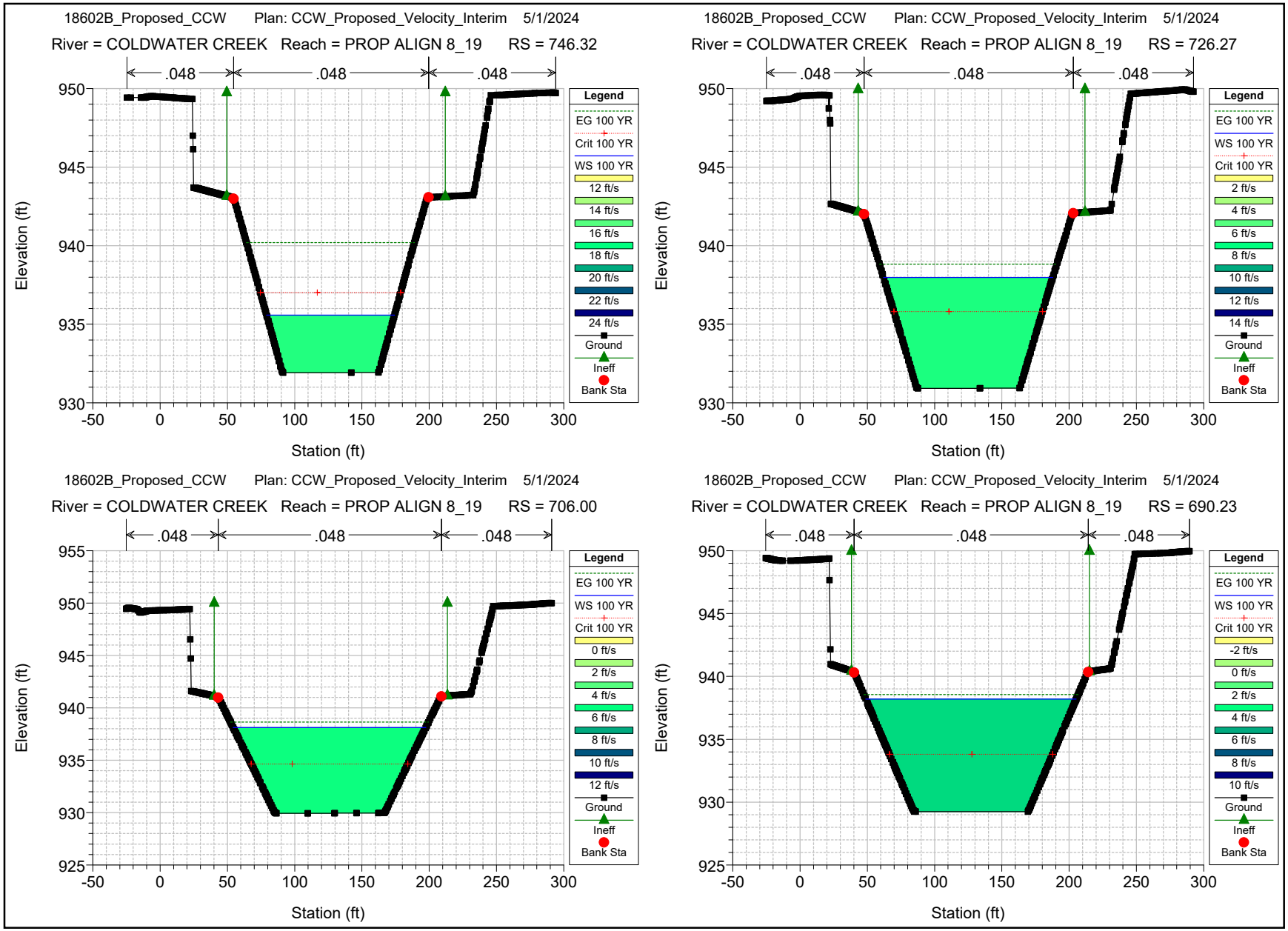

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1420.61
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1400.49
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1381.00
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1361.60
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

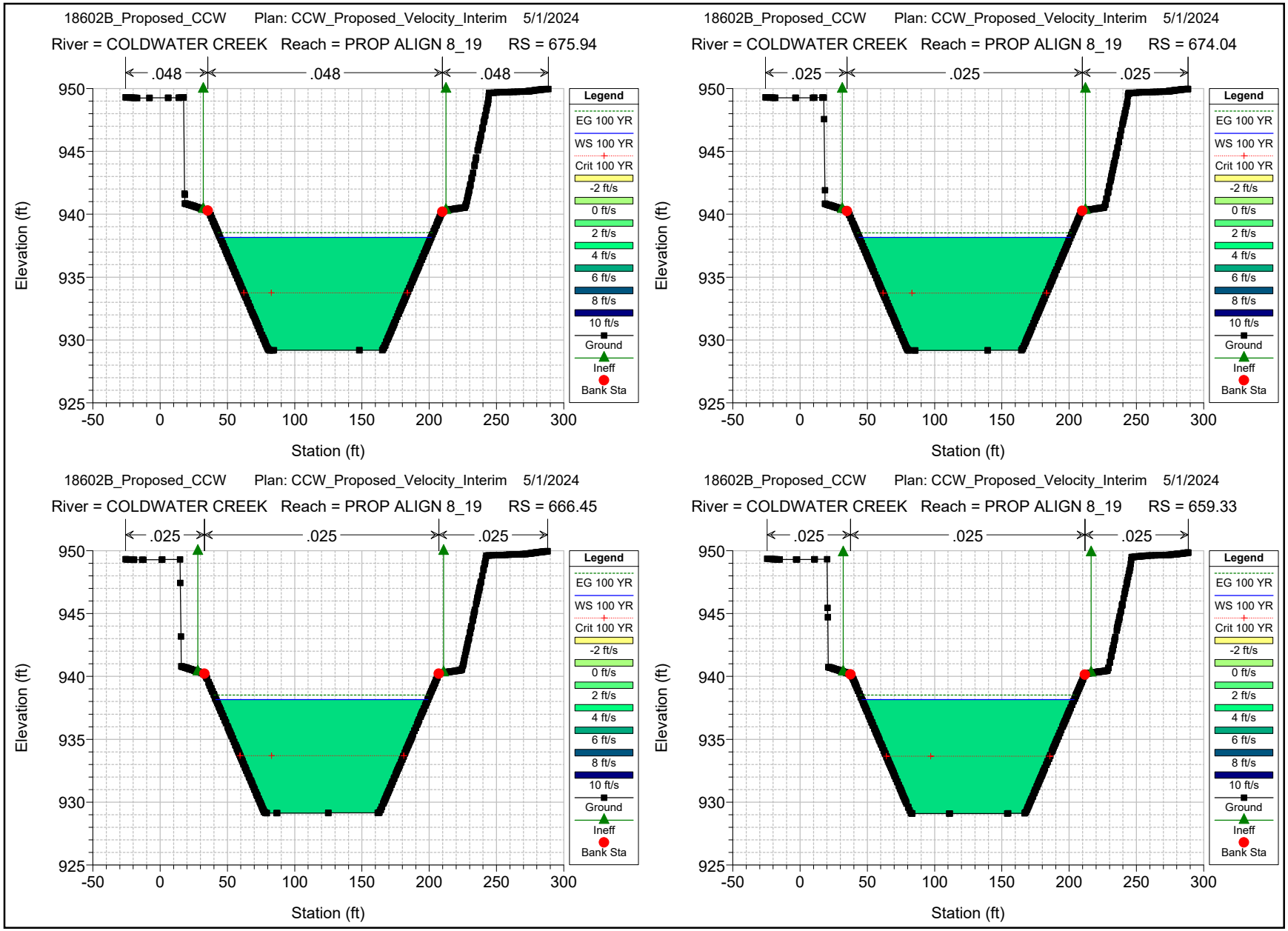

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1357.71
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1347.02
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1344.92
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1304.49
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

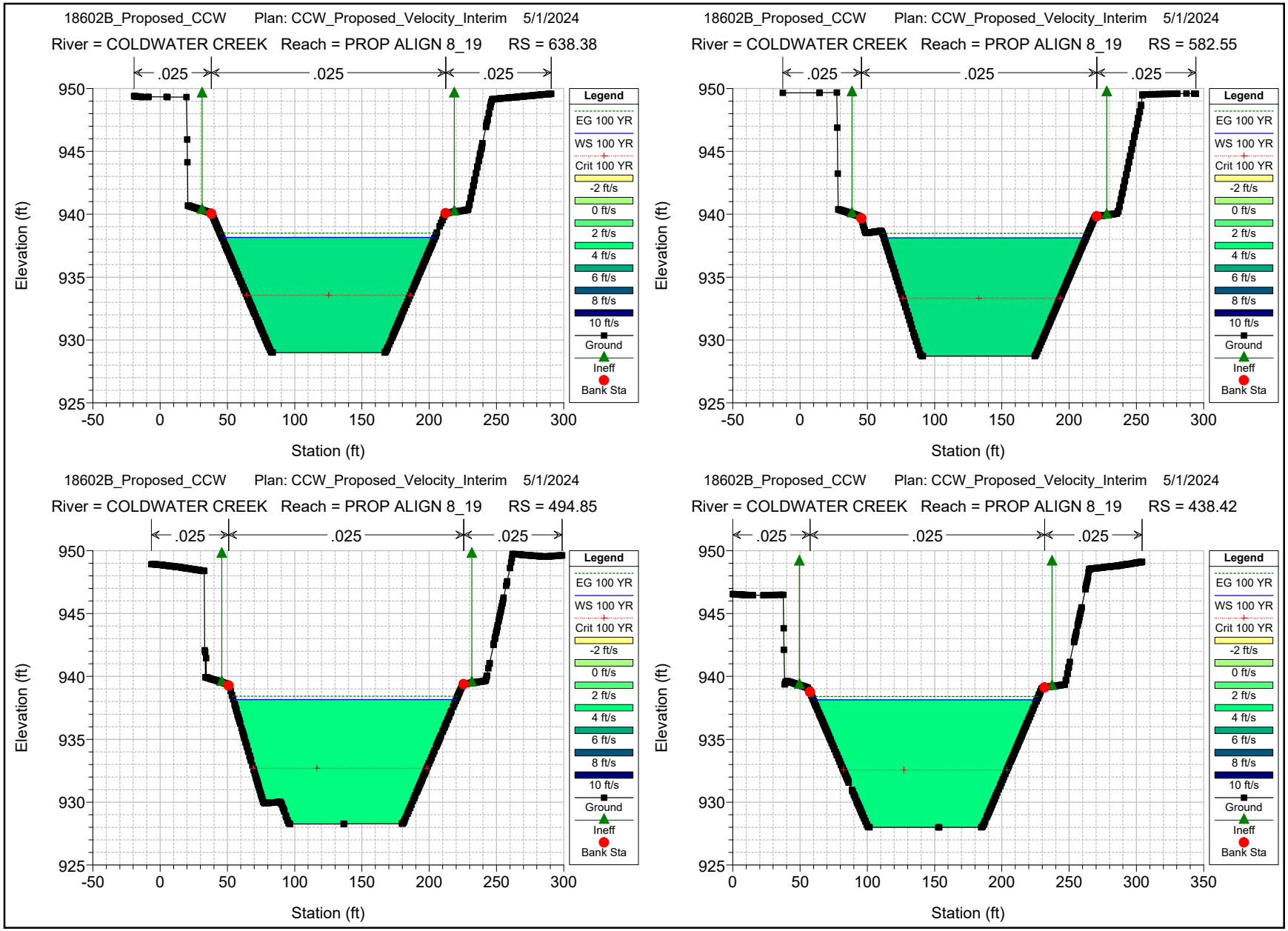

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1221.06
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1155.76
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1092.79
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1055.43

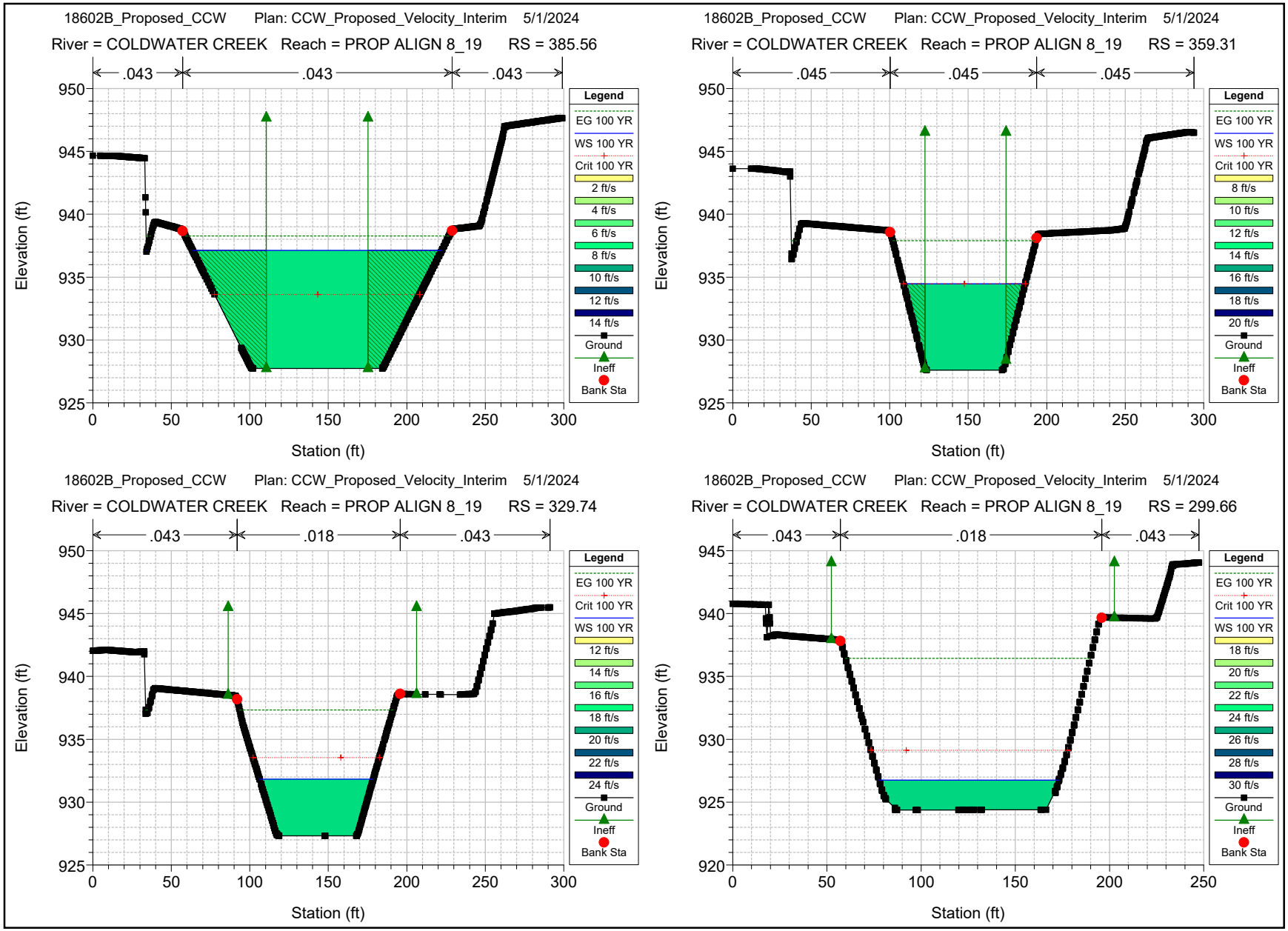

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 1008.56
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 955.79
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 899.60
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 865.43
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta

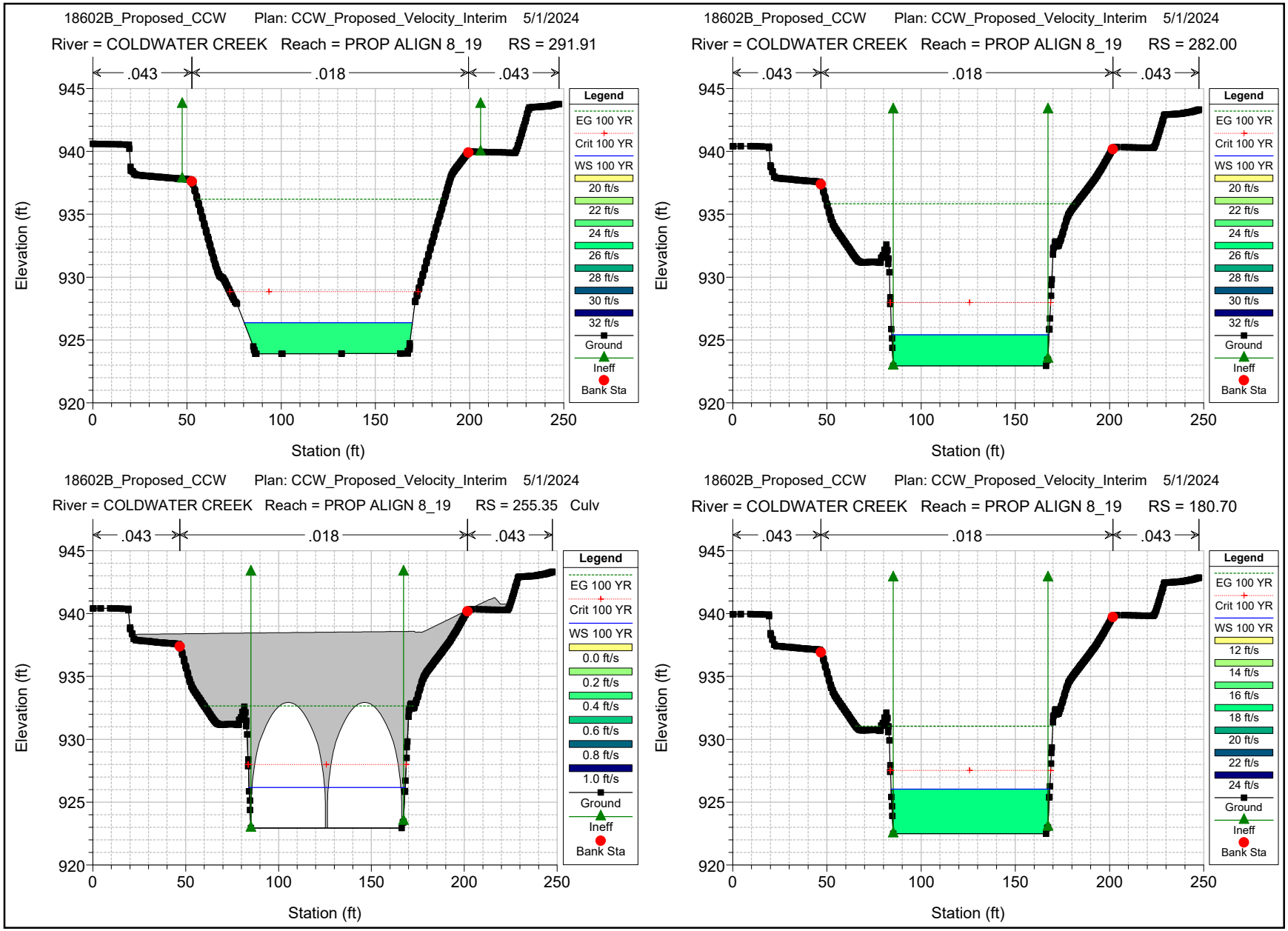

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 834.52
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 807.33
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 787.12
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 766.83
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta

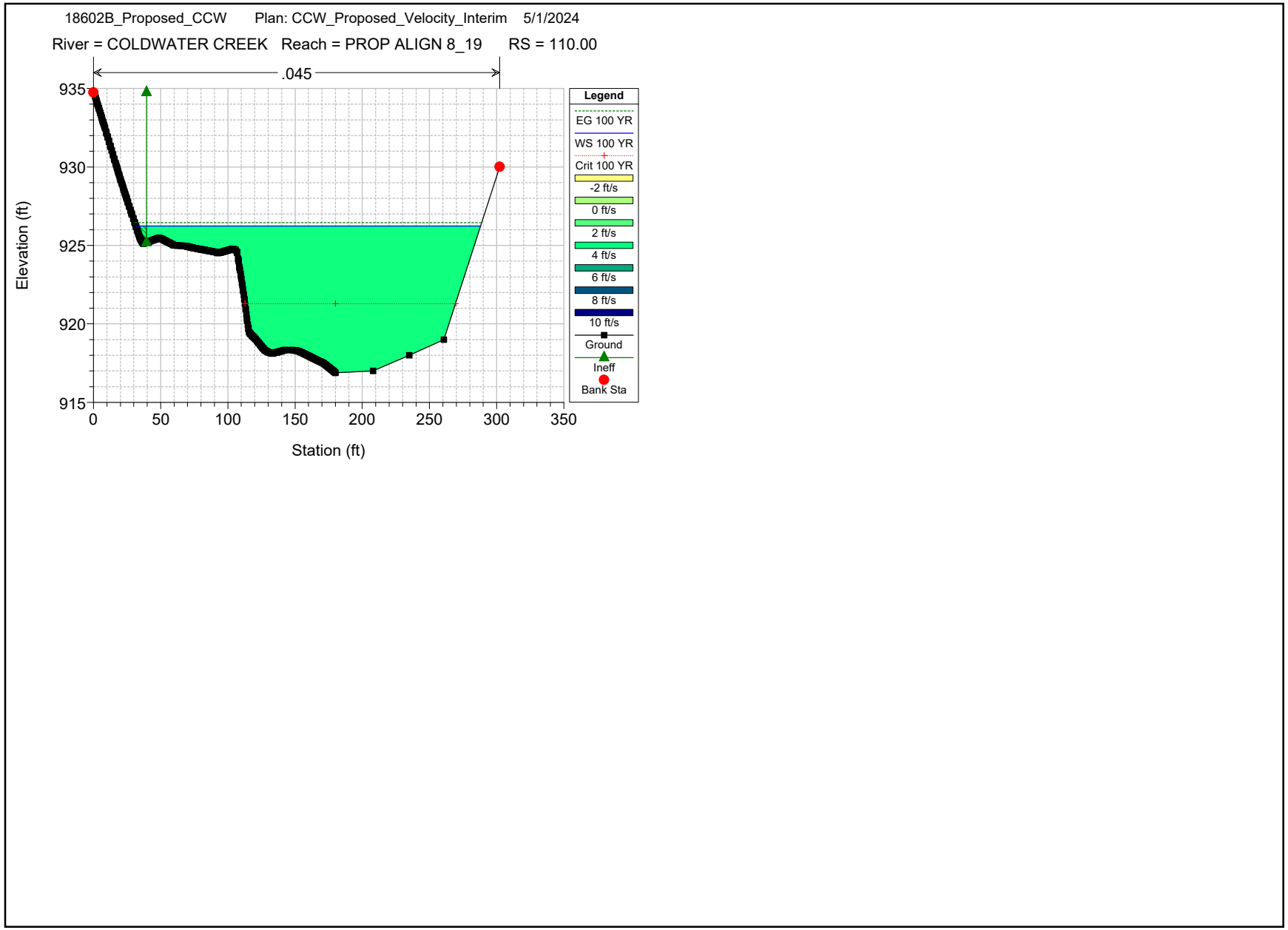

18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 746.32
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 726.27
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 706.00
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 690.23
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 675.94
.048
.048
.048
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 674.04
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 666.45
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 659.33
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 638.38
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 582.55
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 494.85
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 438.42


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 385.56
.043
.043
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 359.31
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 329.74
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 299.66
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
18 ft/s
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
Ground
Ineff
Bank Sta


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 291.91
.043
.018
.043
Elevation (ft)
Station (ft)
Legend
EG 100 YR
Crit 100 YR
WS 100 YR
20 ft/s
22 ft/s
24 ft/s
26 ft/s
28 ft/s
30 ft/s
32 ft/s
Ground
Ineff
Bank Sta
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 282.00
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 255.35 Culv
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 180.70
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s


18602B_Proposed_CCW Plan: CCW_Proposed_Velocity_Interim 5/1/2024
River = COLDWATER CREEK Reach = PROP ALIGN 8_19 RS = 110.00
.045
Elevation (ft)
935
930
925
920
915
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

HEC-RAS Plan: Prop_Vel_Interim River: COLDWATER CREEK Reach: PROP ALIGN 8_19 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)	
PROP ALIGN 8_19	3349.55	100 YR	5250.00	989.76	998.27	998.27	1000.20	0.024503	11.14	471.45	122.31	1.00
PROP ALIGN 8_19	3269.70	100 YR	5250.00	987.52	993.24	994.37	997.10	0.060385	15.76	333.19	102.75	1.54
PROP ALIGN 8_19	3202.30	100 YR	5250.00	986.84	993.91	993.91	995.70	0.024943	10.71	490.12	137.34	1.00
PROP ALIGN 8_19	3107.70	100 YR	5250.00	984.45	993.34	991.73	994.10	0.007264	6.99	750.65	156.20	0.56
PROP ALIGN 8_19	3036.73	100 YR	5250.00	982.98	991.06	991.06	993.12	0.023527	11.52	455.68	110.32	1.00
PROP ALIGN 8_19	2957.64	100 YR	5250.00	979.88	989.20	988.86	991.44	0.018517	12.01	437.29	80.92	0.91
PROP ALIGN 8_19	2881.37	100 YR	5250.00	976.83	988.55	986.11	990.31	0.009620	10.64	493.54	59.51	0.65
PROP ALIGN 8_19	2809.03	100 YR	5250.00	973.90	985.88	985.88	989.13	0.022769	14.46	363.07	92.62	1.00
PROP ALIGN 8_19	2738.95	100 YR	5250.00	971.11	981.82	983.16	986.84	0.042056	17.97	292.08	52.86	1.35
PROP ALIGN 8_19	2655.73	100 YR	5250.00	969.54	979.61	980.39	983.18	0.035764	15.15	346.61	74.73	1.24
PROP ALIGN 8_19	2582.44	100 YR	5250.00	967.70	974.87	976.65	979.66	0.062255	17.57	298.85	76.27	1.56
PROP ALIGN 8_19	2461.48	100 YR	5250.00	966.04	974.84	974.84	977.33	0.016919	12.91	432.91	88.59	0.90
PROP ALIGN 8_19	2429.62	100 YR	5250.00	965.50	971.28	972.75	976.23	0.048787	17.85	294.15	67.07	1.50
PROP ALIGN 8_19	2401.68	100 YR	5250.00	963.81	968.45	970.37	974.50	0.070221	19.73	266.04	69.62	1.78
PROP ALIGN 8_19	2379.12	100 YR	5250.00	962.36	966.53	968.49	972.80	0.079539	20.08	261.44	73.40	1.88
PROP ALIGN 8_19	2356.34	100 YR	5250.00	960.89	964.71	966.63	970.90	0.085210	19.95	263.14	78.80	1.92
PROP ALIGN 8_19	2338.32	100 YR	5250.00	959.66	968.49	965.19	969.25	0.003910	6.98	751.71	106.12	0.46
PROP ALIGN 8_19	2319.83	100 YR	5250.00	958.57	968.62	963.84	969.12	0.002161	5.69	922.68	112.83	0.35
PROP ALIGN 8_19	2309.54	100 YR	5250.00	958.52	968.62	963.67	969.09	0.001983	5.50	954.74	115.20	0.34
PROP ALIGN 8_19	2306.71	100 YR	5250.00	958.50	968.62	963.61	969.08	0.000525	5.44	964.34	115.96	0.33
PROP ALIGN 8_19	2286.58	100 YR	5250.00	958.40	968.63	963.59	969.07	0.000499	5.30	990.96	119.88	0.32
PROP ALIGN 8_19	2245.56	100 YR	5250.00	958.18	968.56	963.37	969.04	0.000453	5.58	941.32	127.84	0.32
PROP ALIGN 8_19	2204.54	100 YR	5250.00	957.98	967.63	964.21	968.92	0.003384	9.11	576.47	122.61	0.52
PROP ALIGN 8_19	2179.00	100 YR	5250.00	957.85	964.99	964.99	968.53	0.017680	15.08	348.16	78.64	1.00
PROP ALIGN 8_19	2149.31	100 YR	5250.00	957.63	962.50	964.02	967.54	0.052351	18.01	291.55	69.67	1.55
PROP ALIGN 8_19	2135.35	100 YR	5250.00	956.95	961.41	963.06	966.73	0.060326	18.49	284.00	72.88	1.65
PROP ALIGN 8_19	2115.25	100 YR	5250.00	955.96	959.99	961.68	965.42	0.068183	18.70	280.81	78.02	1.74
PROP ALIGN 8_19	2094.39	100 YR	5250.00	954.93	958.76	960.34	963.91	0.068918	18.21	288.38	84.38	1.74
PROP ALIGN 8_19	2073.79	100 YR	5250.00	953.90	961.03	958.99	962.07	0.006492	8.19	641.25	104.57	0.58
PROP ALIGN 8_19	2047.73	100 YR	5250.00	952.56	961.18	957.63	961.84	0.003344	6.52	805.21	110.50	0.43
PROP ALIGN 8_19	2028.41	100 YR	5250.00	952.52	961.20	957.25	961.75	0.002653	5.91	888.92	120.56	0.38
PROP ALIGN 8_19	2022.20	100 YR	5250.00	952.48	961.19	957.19	961.73	0.002231	5.88	893.49	126.68	0.39
PROP ALIGN 8_19	1969.97	100 YR	5250.00	952.21	961.16	956.93	961.60	0.001701	5.32	986.21	132.33	0.34
PROP ALIGN 8_19	1927.42	100 YR	5250.00	951.99	961.14	956.49	961.56	0.000515	5.19	1011.91	129.91	0.33
PROP ALIGN 8_19	1914.90	100 YR	5250.00	951.93	961.10	956.59	961.54	0.000560	5.37	977.72	127.08	0.34
PROP ALIGN 8_19	1903.25	100 YR	5250.00	951.86	961.07		961.54	0.000581	5.47	959.01	124.28	0.35
PROP ALIGN 8_19	1856.96	100 YR	5250.00	951.62	961.04		961.51	0.000575	5.51	952.22	121.00	0.35
PROP ALIGN 8_19	1810.67	100 YR	5250.00	951.38	961.04		961.47	0.000515	5.30	991.11	123.01	0.33
PROP ALIGN 8_19	1764.37	100 YR	5250.00	951.13	961.04		961.44	0.000459	5.09	1032.40	124.97	0.31
PROP ALIGN 8_19	1718.08	100 YR	5250.00	950.89	961.04		961.41	0.000410	4.88	1079.57	149.71	0.30
PROP ALIGN 8_19	1676.41	100 YR	5250.00	950.67	961.05		961.38	0.000367	4.67	1165.34	185.37	0.28
PROP ALIGN 8_19	1671.69	100 YR	5250.00	950.65	960.71	955.72	961.35	0.001598	6.40	819.89	175.91	0.36
PROP ALIGN 8_19	1654.99	100 YR	5250.00	950.58	960.45	956.08	961.30	0.002155	7.38	711.42	124.53	0.41
PROP ALIGN 8_19	1650.91	100 YR	5250.00	950.56	960.37	956.18	961.28	0.002352	7.68	683.74	123.03	0.43
PROP ALIGN 8_19	1616.23	100 YR	5250.00	950.38	957.37	957.37	960.86	0.014162	14.98	350.43	78.15	1.00
PROP ALIGN 8_19	1585.91	100 YR	5250.00	950.16	955.10	956.56	959.99	0.049981	17.73	296.14	69.89	1.52
PROP ALIGN 8_19	1580.92	100 YR	5250.00	949.91	954.75	956.24	959.72	0.051963	17.88	293.70	70.66	1.55
PROP ALIGN 8_19	1561.12	100 YR	5250.00	948.93	953.44	955.03	958.60	0.058554	18.23	288.05	73.98	1.63
PROP ALIGN 8_19	1541.37	100 YR	5250.00	947.95	952.23	953.83	957.40	0.062236	18.24	287.75	77.56	1.67
PROP ALIGN 8_19	1521.25	100 YR	5250.00	946.95	951.09	952.63	956.09	0.062551	17.94	292.67	81.47	1.67
PROP ALIGN 8_19	1501.11	100 YR	5250.00	945.95	949.97	951.45	954.77	0.062151	17.57	298.73	85.55	1.66
PROP ALIGN 8_19	1459.98	100 YR	5250.00	943.90	947.73	949.08	952.13	0.060274	16.82	312.13	93.62	1.62
PROP ALIGN 8_19	1420.61	100 YR	5250.00	941.95	945.63	946.87	949.70	0.058342	16.18	324.45	100.88	1.59
PROP ALIGN 8_19	1400.49	100 YR	5250.00	940.96	944.56	945.74	948.49	0.057669	15.89	330.37	104.73	1.58
PROP ALIGN 8_19	1381.00	100 YR	5250.00	939.98	947.07	944.65	947.78	0.004793	6.76	776.56	136.81	0.50
PROP ALIGN 8_19	1361.60	100 YR	5250.00	939.04	947.17	943.61	947.64	0.002726	5.50	954.27	149.96	0.38
PROP ALIGN 8_19	1357.71	100 YR	5250.00	939.00	947.16	943.55	947.63	0.002676	5.47	960.49	150.30	0.38
PROP ALIGN 8_19	1347.02	100 YR	5250.00	938.95	947.14	943.51	947.60	0.002647	5.44	964.25	150.53	0.38
PROP ALIGN 8_19	1344.92	100 YR	5250.00	938.94	947.14	943.50	947.60	0.000715	5.44	965.50	150.61	0.38
PROP ALIGN 8_19	1304.49	100 YR	5250.00	938.73	947.13	943.30	947.56	0.000656	5.28	995.10	152.19	0.36
PROP ALIGN 8_19	1221.06	100 YR	5250.00	938.31	947.11	942.88	947.49	0.000552	4.97	1057.11	155.46	0.34
PROP ALIGN 8_19	1155.76	100 YR	5250.00	937.99	947.07	942.60	947.46	0.000545	4.97	1055.28	152.72	0.33
PROP ALIGN 8_19	1092.79	100 YR	5250.00	937.67	947.10	942.25	947.41	0.000399	4.42	1187.22	162.56	0.29
PROP ALIGN 8_19	1055.43	100 YR	5250.00	937.48	947.11	941.80	947.38	0.000337	4.19	1252.83	163.89	0.27
PROP ALIGN 8_19	1008.56	100 YR	5250.00	937.25	947.08	941.82	947.36	0.000366	4.30	1220.58	163.59	0.28
PROP ALIGN 8_19	955.79	100 YR	5250.00	936.99	947.07	941.55	947.34	0.000332	4.16	1263.22	165.67	0.27
PROP ALIGN 8_19	899.60	100 YR	5250.00	936.71	946.22	942.39	947.23	0.002693	8.05	652.29	158.40	0.46
PROP ALIGN 8_19	865.43	100 YR	5250.00	936.54	943.39	943.39	946.81	0.014207	14.83	353.98	78.75	1.00
PROP ALIGN 8_19	834.52	100 YR	5250.00	936.32	941.39	942.69	945.96	0.045273	17.15	306.12	70.53	1.45
PROP ALIGN 8_19	807.33	100 YR	5250.00	934.94	939.25	940.87	944.46	0.062376	18.31	286.78	76.99	1.67
PROP ALIGN 8_19	787.12	100 YR	5250.00	933.94	937.93	939.55	943.14	0.068225	18.32	286.61	82.63	1.73
PROP ALIGN 8_19	766.83	100 YR	5250.00	932.94	936.74	938.28	941.67	0.067994	17.81	294.71	88.62	1.72
PROP ALIGN 8_19	746.32	100 YR	5250.00	931.92	935.59	937.01	940.19	0.066279	17.21	305.07	95.03	1.69
PROP ALIGN 8_19	726.27	100 YR	5250.00	930.92	937.98	935.80	938.82	0.005729	7.37	712.45	125.76	0.55
PROP ALIGN 8_19	706.00	100 YR	5250.00	929.93	938.13	934.63	938.64	0.002930	5.72	917.23	143.16	0.40
PROP ALIGN 8_19	690.23	100 YR	5250.00	929.25	938.19	933.81	938.56	0.001916	4.86	1079.17	156.41	0.33
PROP ALIGN 8_19	675.94	100 YR	5250.00	929.17	938.17	933.74	938.53	0.001877	4.83	1087.41	156.99	0.32
PROP ALIGN 8_19	674.04	100 YR	5250.00	929.16	938.17	933.73	938.53	0.000507	4.82	1088.86	157.09	0.32
PROP ALIGN 8_19	666.45	100 YR	5250.00	929.12	938.17	933.69	938.52	0.000499	4.79	1095.63	157.50	0.32

HEC-RAS Plan: Prop_Vel_Interim River: COLDWATER CREEK Reach: PROP ALIGN 8_19 Profile: 100 YR (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PROP ALIGN 8_19	659.33	100 YR	5250.00	929.09	938.16	933.65	938.52	0.000492	4.77	1100.77	157.73	0.32
PROP ALIGN 8_19	638.38	100 YR	5250.00	928.99	938.16	933.55	938.50	0.000473	4.71	1115.81	158.37	0.31
PROP ALIGN 8_19	582.55	100 YR	5250.00	928.71	938.13	933.32	938.48	0.000454	4.74	1107.42	150.14	0.31
PROP ALIGN 8_19	494.85	100 YR	5250.00	928.27	938.16	932.69	938.42	0.000314	4.08	1287.02	165.79	0.26
PROP ALIGN 8_19	438.42	100 YR	5250.00	927.99	938.14	932.55	938.40	0.000325	4.12	1273.76	166.17	0.26
PROP ALIGN 8_19	385.56	100 YR	5250.00	927.73	937.11	933.62	938.27	0.003151	8.63	608.34	158.87	0.50
PROP ALIGN 8_19	359.31	100 YR	5250.00	927.60	934.47	934.47	937.89	0.015542	14.83	354.09	77.52	1.00
PROP ALIGN 8_19	329.74	100 YR	5250.00	927.31	931.83	933.53	937.33	0.008887	18.81	279.13	72.41	1.69
PROP ALIGN 8_19	299.66	100 YR	5250.00	924.37	926.74	929.12	936.45	0.032474	24.99	210.07	95.47	2.97
PROP ALIGN 8_19	291.91	100 YR	5250.00	923.90	926.37	928.84	936.19	0.030663	25.15	208.78	89.27	2.90
PROP ALIGN 8_19	282.00	100 YR	5250.00	922.94	925.41	927.98	935.83	0.029613	25.90	202.72	83.42	2.91
PROP ALIGN 8_19	255.35		Culvert									
PROP ALIGN 8_19	180.70	100 YR	5250.00	922.48	926.04	927.52	931.05	0.008744	17.96	292.30	84.25	1.68
PROP ALIGN 8_19	110.00	100 YR	5250.00	916.89	926.24	921.30	926.45	0.001183	3.64	1442.03	256.56	0.27

Appendix B5

Supplemental Calculations

9.2.4.2 Loose Rock

The loose angular riprap d_{50} equations for the sloped drop structure at different slope ranges have been developed by Robinson, et al. (1998). As indicated by Robinson, et al. (1998), an appropriate safety factor should be applied when using these equations. With a safety factor of 1.5, the loose angular riprap median size equations are simplified from Robinson, et al. (1998). The specific weight for rock drop sizing equation development is 162 lb/ft^3. It is a weighted-average value of the riprap D_{50} for the 38 experiments published in Robinson, et al. (1998). So, the specific weight of riprap should be at least 162 lb/ft^3 in the following equations.

$$d_{50} = 2.12q^{0.529}S_o^{0.794} \qquad 0.02<S_o<0.10 \qquad (9.1)$$

$$d_{50} = 0.69q^{0.529}S_o^{0.307} \qquad 0.1\leq S_o\leq 0.4 \qquad (9.2)$$

where:

d_{50} = the median diameter (ft)
q = unit discharge (cfs/ft), (discharge divided by the width where the width is defined as the wetted area divided by the flow depth. For the purposes of this equation, the actual flow depth calculated on the face of the slope of the drop structure should be used. For approximation, the flow depth can be estimated from the Manning's equation based normal depth or the maximum flow depth from HEC-RAS).
S_0 = longitudinal slope of the face of the drop structure (ft/ft)

River Sta	834.52	
Q	5250	cfs
Wetted Area	306.12	sf
Flow Depth	5.07	ft
Width	*60.4*	*ft*
q	*87.0*	*cfs/ft*
S	0.05	ft/ft

Eqn (9.1) d_50= 2.09 ft

Specified Rock Material:
2 Ton (Class IX) Riprap w/ d_50 of 3.1 feet ***OK***

9.2.4.6 Downstream of Drop Structure

The loose riprap d_{50} for channel bed protection downstream of a drop structure is:

$$d_{50} = 0.0372V_a^2\left(\frac{\gamma_w}{\gamma_s-\gamma_w}\right) \qquad (9.3)$$

where:

d_{50} = the median diameter (ft)
V_a = average velocity (ft/s)
γ_S = specific weight of stone (lb/ft^3)
γ_W = specific weight of water (lb/ft^3)

This equation is also a simplified Isbash equation with C=0.86 and 0.0 degrees of bank angle.

stone specific weight	162	lb/ft^3
water specific weight	62.4	lb/ft^3
V_a	8	ft/s

Eqn (9.3) d_50= 1.49 ft

Specified Rock Material:
2 Ton (Class IX) Riprap w/ d_50 of 3.1 feet ***OK***

Table 4.3: Manning's Value by Rock Class

Nominal RSP class by median particle diameter [a]		Nominal median particle weight [b] W_{50}	Median Stone Diameter [c] d_{50}		Manning n
Class	Diameter (inches)		Inches	Feet	ungrouted[d]
V	18	1/4 ton	18.8	1.6	0.043
VI	21	3/8 ton	22.0	1.8	0.044
VII	24	1/2 ton	25.3	2.1	0.045
VIII	30	1 ton	31.5	2.6	0.046
IX	36	2 ton	37.8	3.1	0.048
X	42	3 ton	44.3	3.7	0.049
XI	46	4 ton	48.4	4.0	0.050

(a) Class I -VIII is based upon Caltrans Method B Placement, which allows dumping of the rock and spreading by mechanical equipment. Local surface irregularities shall not vary from the planned grade by more than 1 foot, measured perpendicular to the slope. Class VI-XI may require special placement, see Caltrans (2016) or Greenbook for more information. (b) per Caltrans (2018). (c) Assumes specific weight of 165 lb/ft3. The designer shall take care to apply a unit weight that is applicable to the type of riprap specified for the project and adjust their calculations when necessary. (d) Based on Manning-Strickler relationship (Chang, 1988).

LOOSE RIPRAP SIZING BACKUP FOR DROP #2 (PLAN STA ~18+00)

EQUATIONS REFERENCING SECTION 9.2.4 OF RIVERSIDE COUNTY HYDRAULIC DESIGN MANUAL (MARCH 2024)

9.2.4.2 Loose Rock

The loose angular riprap d_{50} equations for the sloped drop structure at different slope ranges have been developed by Robinson, et al. (1998). As indicated by Robinson, et al. (1998), an appropriate safety factor should be applied when using these equations. With a safety factor of 1.5, the loose angular riprap median size equations are simplified from Robinson, et al. (1998). The specific weight for rock drop sizing equation development is 162 lb/ft^3. It is a weighted-average value of the riprap D_{50} for the 38 experiments published in Robinson, et al. (1998). So, the specific weight of riprap should be at least 162 lb/ft^3 in the following equations.

$$d_{50} = 2.12q^{0.529}S_o^{0.794} \qquad 0.02<S_o<0.10 \qquad (9.1)$$

$$d_{50} = 0.69q^{0.529}S_o^{0.307} \qquad 0.1\leq S_o\leq 0.4 \qquad (9.2)$$

where:

d_{50} = the median diameter (ft)
q = unit discharge (cfs/ft), (discharge divided by the width where the width is defined as the wetted area divided by the flow depth. For the purposes of this equation, the actual flow depth calculated on the face of the slope of the drop structure should be used. For approximation, the flow depth can be estimated from the Manning's equation based normal depth or the maximum flow depth from HEC-RAS).
S_0 = longitudinal slope of the face of the drop structure (ft/ft)

River Sta	1585.91	
Q	5250	cfs
Wetted Area	296.14	sf
Flow Depth	4.94	ft
Width	*59.9*	*ft*
q	*87.6*	*cfs/ft*
S	0.05	ft/ft

Eqn (9.1) d_50= 2.09 ft

Specified Rock Material:
2 Ton (Class IX) Riprap w/ d_50 of 3.1 feet ***OK***

9.2.4.6 Downstream of Drop Structure

The loose riprap d_{50} for channel bed protection downstream of a drop structure is:

$$d_{50} = 0.0372V_a^2\left(\frac{\gamma_w}{\gamma_s-\gamma_w}\right) \qquad (9.3)$$

where:

d_{50} = the median diameter (ft)
V_a = average velocity (ft/s)
γ_S = specific weight of stone (lb/ft^3)
γ_W = specific weight of water (lb/ft^3)

This equation is also a simplified Isbash equation with C=0.86 and 0.0 degrees of bank angle.

stone specific weight	162	lb/ft^3
water specific weight	62.4	lb/ft^3
V_a	7	ft/s

Eqn (9.3) d_50= 1.14 ft

Specified Rock Material:
1/4 Ton (Class V) Riprap w/ d_50 of 1.6 feet ***OK***

Table 4.3: Manning's Value by Rock Class

Nominal RSP class by median particle diameter [a]		Nominal median particle weight [b] W_{50}	Median Stone Diameter [c] d_{50}		Manning n
Class	Diameter (inches)		Inches	Feet	ungrouted[d]
V	18	1/4 ton	18.8	1.6	0.043
VI	21	3/8 ton	22.0	1.8	0.044
VII	24	1/2 ton	25.3	2.1	0.045
VIII	30	1 ton	31.5	2.6	0.046
IX	36	2 ton	37.8	3.1	0.048
X	42	3 ton	44.3	3.7	0.049
XI	46	4 ton	48.4	4.0	0.050

(a) Class I -VIII is based upon Caltrans Method B Placement, which allows dumping of the rock and spreading by mechanical equipment. Local surface irregularities shall not vary from the planned grade by more than 1 foot, measured perpendicular to the slope. Class VI-XI may require special placement, see Caltrans (2016) or Greenbook for more information. (b) per Caltrans (2018). (c) Assumes specific weight of 165 lb/ft3. The designer shall take care to apply a unit weight that is applicable to the type of riprap specified for the project and adjust their calculations when necessary. (d) Based on Manning-Strickler relationship (Chang, 1988).

LOOSE RIPRAP SIZING BACKUP FOR DROP #3 (PLAN STA ~25+00)

EQUATIONS REFERENCING SECTION 9.2.4 OF RIVERSIDE COUNTY HYDRAULIC DESIGN MANUAL (MARCH 2024)

9.2.4.2 Loose Rock

The loose angular riprap d_{50} equations for the sloped drop structure at different slope ranges have been developed by Robinson, et al. (1998). As indicated by Robinson, et al. (1998), an appropriate safety factor should be applied when using these equations. With a safety factor of 1.5, the loose angular riprap median size equations are simplified from Robinson, et al. (1998). The specific weight for rock drop sizing equation development is 162 lb/ft^3. It is a weighted-average value of the riprap D_{50} for the 38 experiments published in Robinson, et al. (1998). So, the specific weight of riprap should be at least 162 lb/ft^3 in the following equations.

$$d_{50} = 2.12q^{0.529}S_o^{0.794} \qquad 0.02<S_o<0.10 \qquad (9.1)$$

$$d_{50} = 0.69q^{0.529}S_o^{0.307} \qquad 0.1\leq S_o\leq 0.4 \qquad (9.2)$$

where:

d_{50} = the median diameter (ft)
q = unit discharge (cfs/ft), (discharge divided by the width where the width is defined as the wetted area divided by the flow depth. For the purposes of this equation, the actual flow depth calculated on the face of the slope of the drop structure should be used. For approximation, the flow depth can be estimated from the Manning's equation based normal depth or the maximum flow depth from HEC-RAS).
S_0 = longitudinal slope of the face of the drop structure (ft/ft)

River Sta	2179	
Q	5250	cfs
Wetted Area	348.16	sf
Flow Depth	7.14	ft
Width	*48.8*	*ft*
q	*107.7*	*cfs/ft*
S	0.05	ft/ft

Eqn (9.1) d_50= 2.34 ft

Specified Rock Material:
2 Ton (Class IX) Riprap w/ d_50 of 3.1 feet ***OK***

9.2.4.6 Downstream of Drop Structure

The loose riprap d_{50} for channel bed protection downstream of a drop structure is:

$$d_{50} = 0.0372V_a^2\left(\frac{\gamma_w}{\gamma_s-\gamma_w}\right) \qquad (9.3)$$

where:

d_{50} = the median diameter (ft)
V_a = average velocity (ft/s)
γ_S = specific weight of stone (lb/ft^3)
γ_W = specific weight of water (lb/ft^3)

This equation is also a simplified Isbash equation with C=0.86 and 0.0 degrees of bank angle.

stone specific weight	162	lb/ft^3
water specific weight	62.4	lb/ft^3
V_a	8	ft/s

Eqn (9.3) d_50= 1.49 ft

Specified Rock Material:
2 Ton (Class IX) Riprap w/ d_50 of 3.1 feet ***OK***

Table 4.3: Manning's Value by Rock Class

Nominal RSP class by median particle diameter [a]		Nominal median particle weight [b] W_{50}	Median Stone Diameter [c] d_{50}		Manning n
Class	Diameter (inches)		Inches	Feet	ungrouted[d]
V	18	1/4 ton	18.8	1.6	0.043
VI	21	3/8 ton	22.0	1.8	0.044
VII	24	1/2 ton	25.3	2.1	0.045
VIII	30	1 ton	31.5	2.6	0.046
IX	36	2 ton	37.8	3.1	0.048
X	42	3 ton	44.3	3.7	0.049
XI	46	4 ton	48.4	4.0	0.050

(a) Class I -VIII is based upon Caltrans Method B Placement, which allows dumping of the rock and spreading by mechanical equipment. Local surface irregularities shall not vary from the planned grade by more than 1 foot, measured perpendicular to the slope. Class VI-XI may require special placement, see Caltrans (2016) or Greenbook for more information. (b) per Caltrans (2018). (c) Assumes specific weight of 165 lb/ft3. The designer shall take care to apply a unit weight that is applicable to the type of riprap specified for the project and adjust their calculations when necessary. (d) Based on Manning-Strickler relationship (Chang, 1988).

LOOSE RIPRAP SIZING BACKUP FOR DROP #4 (PLAN STA ~31+00)

EQUATIONS REFERENCING SECTION 9.2.4 OF RIVERSIDE COUNTY HYDRAULIC DESIGN MANUAL (MARCH 2024)

9.2.4.2 Loose Rock

The loose angular riprap d_{50} equations for the sloped drop structure at different slope ranges have been developed by Robinson, et al. (1998). As indicated by Robinson, et al. (1998), an appropriate safety factor should be applied when using these equations. With a safety factor of 1.5, the loose angular riprap median size equations are simplified from Robinson, et al. (1998). The specific weight for rock drop sizing equation development is 162 lb/ft^3. It is a weighted-average value of the riprap D_{50} for the 38 experiments published in Robinson, et al. (1998). So, the specific weight of riprap should be at least 162 lb/ft^3 in the following equations.

$$d_{50} = 2.12q^{0.529}S_o^{0.794} \qquad 0.02<S_o<0.10 \qquad (9.1)$$

$$d_{50} = 0.69q^{0.529}S_o^{0.307} \qquad 0.1\leq S_o\leq 0.4 \qquad (9.2)$$

where:

d_{50} = the median diameter (ft)
q = unit discharge (cfs/ft), (discharge divided by the width where the width is defined as the wetted area divided by the flow depth. For the purposes of this equation, the actual flow depth calculated on the face of the slope of the drop structure should be used. For approximation, the flow depth can be estimated from the Manning's equation based normal depth or the maximum flow depth from HEC-RAS).
S_0 = longitudinal slope of the face of the drop structure (ft/ft)

River Sta	2461.48	
Q	5250	cfs
Wetted Area	432.91	sf
Flow Depth	8.8	ft
Width	*49.2*	*ft*
q	*106.7*	*cfs/ft*
S	0.0646	ft/ft

Eqn (9.1) d_50= 2.85 ft

Specified Rock Material:
2 Ton (Class IX) Riprap w/ d_50 of 3.1 feet ***OK***

9.2.4.6 Downstream of Drop Structure

The loose riprap d_{50} for channel bed protection downstream of a drop structure is:

$$d_{50} = 0.0372V_a^2\left(\frac{\gamma_w}{\gamma_s-\gamma_w}\right) \qquad (9.3)$$

where:

d_{50} = the median diameter (ft)
V_a = average velocity (ft/s)
γ_S = specific weight of stone (lb/ft^3)
γ_W = specific weight of water (lb/ft^3)

This equation is also a simplified Isbash equation with C=0.86 and 0.0 degrees of bank angle.

stone specific weight	162	lb/ft^3
water specific weight	62.4	lb/ft^3
V_a	10	ft/s

Eqn (9.3) d_50= 2.33 ft

Specified Rock Material:
2 Ton (Class IX) Riprap w/ d_50 of 3.1 feet ***OK***

Table 4.3: Manning's Value by Rock Class

Nominal RSP class by median particle diameter [a]		Nominal median particle weight [b] W_{50}	Median Stone Diameter [c] d_{50}		Manning n
Class	Diameter (inches)		Inches	Feet	ungrouted[d]
V	18	1/4 ton	18.8	1.6	0.043
VI	21	3/8 ton	22.0	1.8	0.044
VII	24	1/2 ton	25.3	2.1	0.045
VIII	30	1 ton	31.5	2.6	0.046
IX	36	2 ton	37.8	3.1	0.048
X	42	3 ton	44.3	3.7	0.049
XI	46	4 ton	48.4	4.0	0.050

(a) Class I -VIII is based upon Caltrans Method B Placement, which allows dumping of the rock and spreading by mechanical equipment. Local surface irregularities shall not vary from the planned grade by more than 1 foot, measured perpendicular to the slope. Class VI-XI may require special placement, see Caltrans (2016) or Greenbook for more information. (b) per Caltrans (2018). (c) Assumes specific weight of 165 lb/ft3. The designer shall take care to apply a unit weight that is applicable to the type of riprap specified for the project and adjust their calculations when necessary. (d) Based on Manning-Strickler relationship (Chang, 1988).

LOOSE RIPRAP SIZING BACKUP FOR DROP #5 (PLAN STA ~34+00)

EQUATIONS REFERENCING SECTION 9.2.4 OF RIVERSIDE COUNTY HYDRAULIC DESIGN MANUAL (MARCH 2024)

JN 18602B
5/2/2024

Proposed Coldwater Canyon Wash HEC-RAS to Channel Improvement Plans Cross Section Comparison Table

Cross Sections at the Dawson Road South Culvert and at the top and toe of rock drop structures have been compared in the table below.

Hec-Ras Cross Section	Channel Improvement Plan Station
180.7	1191.08
255.35	1283.06
329.74	1339.06
690.23	1700.31
834.52	1842.9
1361.6	2370.29
1585.91	2494.36
2047.73	3055.91
2149.31	3157.83
2319.83	3329.91
2429.62	3450.13

Appendix B6

Offsite Storm Drain Pipe Hydraulics

Lateral Temescal Road System 2 54" Offsite (TEMSystm2.WSW)

Summary Information

Hydrologic Information: Q_{100} of 188.8 cfs

Hydrologic Source: Hydrologic Node #218 as calculated by the report titled "Drainage Study for Temescal Valley Commerce Center (Offsite and Frontage Roads) Final Engineering" prepared by Rick and dated, May 2, 2024.

Energy Dissipation: This storm drain pipe outfall is located on a sideslope that has been armored as a part of the proposed channel improvements and does not require additional energy dissipation.

Lateral CCW Connection From Onsite System (CCW_CONN.WSW)

Summary Information

Hydrologic Information: Q_{100} of 9.4 cfs

Hydrologic Source: Preliminary Hydrology Study prepared by Thienes and dated, March 1, 2024. This report was prepared by others for the onsite hydrologic analysis of the Temescal Valley Commerce Center.

Energy Dissipation: An energy dissipation analysis has been performed for this storm drain outfall and a rip rap pad 4.5' wide by 10' long consisting of ¼ tn. rip rap has been proposed. The calculation results have been included in this appendix.

```
T1 18602B TVBP FRONTAGE ROADS
         0
T2 100-YR HYDRAULICS, CAPACITY RUN

T3 TEMESCAL ROAD SYSTEM 2 54" OFFSITE

SO   1022.360 953.590  1                            958.090

R    1041.710 954.180  1      .013                                .000    .000 0

R    1174.080 958.200  1      .013                                .000    .000 0

JX   1178.080 958.300  1      .013    0.000          000.000         00.0
-35.478
R    1362.080 968.520  1      .013                                .000    .000 0

JX   1366.080 968.620  1      .013    0.000          000.000         00.0
000.000
R    1448.380 970.470  1      .013                                .000    .000 0

WE   1448.380 970.470  1      .500                                .000    .000 0

SH   1448.380 970.470  1                            970.470

CD   1  4   1    .000   4.500     .000  .000  .000   .00

Q           188.800   .0
```

Program Package Serial Number: 7077

WATER SURFACE PROFILE LISTING Date: 3-13-2024 Time: 4:53:12

18602B TVBP FRONTAGE ROADS
100-YR HYDRAULICS, CAPACITY RUN
TEMESCAL ROAD SYSTEM 2 54" OFFSITE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1022.360	953.590	2.466	956.056	188.80	21.16	6.95	963.01	.00	3.96	4.48	4.500	.000	.00	1 .0
19.350	.0305					.0270	.52	2.47	2.64	2.38	.013	.00	.00	PIPE
1041.710	954.180	2.476	956.656	188.80	21.05	6.88	963.54	.00	3.96	4.48	4.500	.000	.00	1 .0
54.595	.0304					.0261	1.43	2.48	2.62	2.38	.013	.00	.00	PIPE
1096.305	955.838	2.517	958.355	188.80	20.63	6.61	964.96	.00	3.96	4.47	4.500	.000	.00	1 .0
77.775	.0304					.0239	1.86	2.52	2.54	2.38	.013	.00	.00	PIPE
1174.080	958.200	2.618	960.818	188.80	19.67	6.01	966.82	4.50	3.96	4.44	4.500	.000	.00	1 .0
JUNCT STR	.0250					.0325	.13	4.50	2.36		.013	.00	.00	PIPE
1178.080	958.300	2.159	960.459	188.80	25.02	9.72	970.18	.00	3.96	4.50	4.500	.000	.00	1 .0
23.827	.0555					.0414	.99	2.16	3.40	2.00	.013	.00	.00	PIPE
1201.907	959.623	2.192	961.815	188.80	24.54	9.35	971.17	.00	3.96	4.50	4.500	.000	.00	1 .0
43.411	.0555					.0379	1.64	2.19	3.31	2.00	.013	.00	.00	PIPE
1245.318	962.035	2.275	964.310	188.80	23.40	8.50	972.81	.00	3.96	4.50	4.500	.000	.00	1 .0
30.873	.0555					.0334	1.03	2.28	3.08	2.00	.013	.00	.00	PIPE
1276.191	963.749	2.363	966.113	188.80	22.31	7.73	973.84	.00	3.96	4.49	4.500	.000	.00	1 .0
23.368	.0555					.0294	.69	2.36	2.87	2.00	.013	.00	.00	PIPE
1299.559	965.047	2.455	967.502	188.80	21.27	7.03	974.53	.00	3.96	4.48	4.500	.000	.00	1 .0
18.310	.0555					.0260	.48	2.46	2.66	2.00	.013	.00	.00	PIPE

18602B TVBP FRONTAGE ROADS
100-YR HYDRAULICS, CAPACITY RUN
TEMESCAL ROAD SYSTEM 2 54" OFFSITE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1317.869	966.064	2.552	968.617	188.80	20.28	6.39	975.00	.00	3.96	4.46	4.500	.000	.00	1 .0
14.677	.0555					.0229	.34	2.55	2.47	2.00	.013	.00	.00	PIPE
1332.546	966.880	2.654	969.534	188.80	19.34	5.81	975.34	.00	3.96	4.43	4.500	.000	.00	1 .0
11.907	.0555					.0203	.24	2.65	2.29	2.00	.013	.00	.00	PIPE
1344.454	967.541	2.762	970.303	188.80	18.44	5.28	975.58	.00	3.96	4.38	4.500	.000	.00	1 .0
9.711	.0555					.0180	.17	2.76	2.13	2.00	.013	.00	.00	PIPE
1354.164	968.080	2.877	970.957	188.80	17.58	4.80	975.76	.00	3.96	4.32	4.500	.000	.00	1 .0
7.916	.0555					.0159	.13	2.88	1.97	2.00	.013	.00	.00	PIPE
1362.080	968.520	3.000	971.520	188.80	16.76	4.36	975.88	.00	3.96	4.24	4.500	.000	.00	1 .0
JUNCT STR	.0250					.0149	.06	3.00	1.81		.013	.00	.00	PIPE
1366.080	968.620	3.018	971.638	188.80	16.65	4.30	975.94	.00	3.96	4.23	4.500	.000	.00	1 .0
19.621	.0225					.0143	.28	3.02	1.79	2.62	.013	.00	.00	PIPE
1385.701	969.061	3.096	972.157	188.80	16.18	4.06	976.22	.00	3.96	4.17	4.500	.000	.00	1 .0
24.478	.0225					.0130	.32	3.10	1.70	2.62	.013	.00	.00	PIPE
1410.180	969.611	3.234	972.845	188.80	15.43	3.70	976.54	.00	3.96	4.05	4.500	.000	.00	1 .0
17.066	.0225					.0116	.20	3.23	1.56	2.62	.013	.00	.00	PIPE
1427.246	969.995	3.385	973.380	188.80	14.71	3.36	976.74	.00	3.96	3.89	4.500	.000	.00	1 .0
11.599	.0225					.0105	.12	3.39	1.43	2.62	.013	.00	.00	PIPE

Program Package Serial Number: 7077

WATER SURFACE PROFILE LISTING Date: 3-13-2024 Time: 4:53:12

18602B TVBP FRONTAGE ROADS
100-YR HYDRAULICS, CAPACITY RUN
TEMESCAL ROAD SYSTEM 2 54" OFFSITE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1438.845	970.256	3.551	973.807	188.80	14.02	3.05	976.86	.00	3.96	3.67	4.500	.000	.00	1 .0
7.040	.0225					.0095	.07	3.55	1.29	2.62	.013	.00	.00	PIPE
1445.885	970.414	3.737	974.151	188.80	13.37	2.78	976.93	.00	3.96	3.38	4.500	.000	.00	1 .0
2.495	.0225					.0087	.02	3.74	1.15	2.62	.013	.00	.00	PIPE
1448.380	970.470	3.956	974.426	188.80	12.75	2.52	976.95	.00	3.96	2.93	4.500	.000	.00	1 .0
WALL	ENTRANCE													
1448.380	970.470	4.443	974.913	188.80	11.90	2.20	977.11	.00	3.96	1.01	4.500	.000	.00	0 .0

```
T1 18602B TVBP FRONTAGE ROADS                                                    0

T2 100-YR HYDRAULICS, CAPACITY RUN
T3 CCW CONNECTION FROM ONSITE SYSTEM

SO   1008.000 928.860  1                          930.360
R    1020.670 928.980  1      .013                              .000    .000 0
R    1060.690 929.390  1      .013                              .000    .000 0
JX   1064.690 929.490  1      .013    0.000          000.000     00.0         .000
R    1112.280 933.400  1      .013                              .000    .000 0
WE   1112.280 933.400  1      .500                              .000    .000 0
SH   1112.280 933.400  1                          933.400
CD   1  4   1    .000   1.500     .000  .000  .000   .00
Q             9.400   .0
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Program Package Serial Number: 7077

WATER SURFACE PROFILE LISTING Date: 4-29-2024 Time:10:13:18

18602B TVBP FRONTAGE ROADS
100-YR HYDRAULICS, CAPACITY RUN
CCW CONNECTION FROM ONSITE SYSTEM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1008.000	928.860	.858	929.718	9.40	8.99	1.26	930.97	.00	1.18	1.48	1.500	.000	.00	1 .0
5.531	.0095					.0215	.12	.86	1.89	1.13	.013	.00	.00	PIPE
1013.531	928.912	.834	929.746	9.40	9.30	1.34	931.09	.00	1.18	1.49	1.500	.000	.00	1 .0
7.139	.0095					.0240	.17	.83	1.99	1.13	.013	.00	.00	PIPE
1020.670	928.980	.803	929.783	9.40	9.76	1.48	931.26	.00	1.18	1.50	1.500	.000	.00	1 .0
5.578	.0102					.0268	.15	.80	2.14	1.10	.013	.00	.00	PIPE
1026.248	929.037	.779	929.816	9.40	10.13	1.59	931.41	.00	1.18	1.50	1.500	.000	.00	1 .0
6.592	.0102					.0300	.20	.78	2.27	1.10	.013	.00	.00	PIPE
1032.841	929.105	.750	929.855	9.40	10.63	1.75	931.61	.00	1.18	1.50	1.500	.000	.00	1 .0
6.219	.0102					.0341	.21	.75	2.44	1.10	.013	.00	.00	PIPE
1039.059	929.168	.723	929.891	9.40	11.15	1.93	931.82	.00	1.18	1.50	1.500	.000	.00	1 .0
5.822	.0102					.0387	.23	.72	2.62	1.10	.013	.00	.00	PIPE
1044.881	929.228	.696	929.924	9.40	11.69	2.12	932.05	.00	1.18	1.50	1.500	.000	.00	1 .0
5.540	.0102					.0440	.24	.70	2.81	1.10	.013	.00	.00	PIPE
1050.422	929.285	.671	929.956	9.40	12.26	2.33	932.29	.00	1.18	1.49	1.500	.000	.00	1 .0
5.255	.0102					.0501	.26	.67	3.01	1.10	.013	.00	.00	PIPE
1055.677	929.339	.647	929.986	9.40	12.86	2.57	932.55	.00	1.18	1.49	1.500	.000	.00	1 .0
5.013	.0102					.0571	.29	.65	3.23	1.10	.013	.00	.00	PIPE

18602B TVBP FRONTAGE ROADS
100-YR HYDRAULICS, CAPACITY RUN
CCW CONNECTION FROM ONSITE SYSTEM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1060.690	929.390	.625	930.015	9.40	13.49	2.82	932.84	.00	1.18	1.48	1.500	.000	.00	1 .0
JUNCT STR	.0250					.0633	.25	.62	3.46		.013	.00	.00	PIPE
1064.690	929.490	.612	930.102	9.40	13.88	2.99	933.09	.00	1.18	1.47	1.500	.000	.00	1 .0
8.411	.0822					.0631	.53	.61	3.61	.58	.013	.00	.00	PIPE
1073.101	930.181	.625	930.806	9.40	13.47	2.82	933.62	.00	1.18	1.48	1.500	.000	.00	1 .0
9.223	.0822					.0569	.52	.63	3.46	.58	.013	.00	.00	PIPE
1082.324	930.939	.648	931.587	9.40	12.85	2.56	934.15	.00	1.18	1.49	1.500	.000	.00	1 .0
6.490	.0822					.0500	.32	.65	3.23	.58	.013	.00	.00	PIPE
1088.814	931.472	.672	932.144	9.40	12.25	2.33	934.47	.00	1.18	1.49	1.500	.000	.00	1 .0
4.883	.0822					.0439	.21	.67	3.01	.58	.013	.00	.00	PIPE
1093.697	931.873	.697	932.570	9.40	11.68	2.12	934.69	.00	1.18	1.50	1.500	.000	.00	1 .0
3.824	.0822					.0386	.15	.70	2.81	.58	.013	.00	.00	PIPE
1097.521	932.187	.723	932.910	9.40	11.13	1.92	934.84	.00	1.18	1.50	1.500	.000	.00	1 .0
3.052	.0822					.0340	.10	.72	2.61	.58	.013	.00	.00	PIPE
1100.573	932.438	.751	933.189	9.40	10.62	1.75	934.94	.00	1.18	1.50	1.500	.000	.00	1 .0
2.492	.0822					.0300	.07	.75	2.43	.58	.013	.00	.00	PIPE
1103.065	932.643	.780	933.423	9.40	10.12	1.59	935.01	.00	1.18	1.50	1.500	.000	.00	1 .0
2.056	.0822					.0264	.05	.78	2.27	.58	.013	.00	.00	PIPE

18602B TVBP FRONTAGE ROADS
100-YR HYDRAULICS, CAPACITY RUN
CCW CONNECTION FROM ONSITE SYSTEM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1105.120	932.812	.810	933.622	9.40	9.65	1.45	935.07	.00	1.18	1.50	1.500	.000	.00	1 .0
1.690	.0822					.0233	.04	.81	2.11	.58	.013	.00	.00	PIPE
1106.810	932.951	.842	933.793	9.40	9.20	1.31	935.11	.00	1.18	1.49	1.500	.000	.00	1 .0
1.405	.0822					.0206	.03	.84	1.96	.58	.013	.00	.00	PIPE
1108.214	933.066	.875	933.941	9.40	8.77	1.20	935.14	.00	1.18	1.48	1.500	.000	.00	1 .0
1.135	.0822					.0182	.02	.88	1.82	.58	.013	.00	.00	PIPE
1109.350	933.159	.911	934.070	9.40	8.37	1.09	935.16	.00	1.18	1.46	1.500	.000	.00	1 .0
.920	.0822					.0161	.01	.91	1.68	.58	.013	.00	.00	PIPE
1110.270	933.235	.949	934.184	9.40	7.98	.99	935.17	.00	1.18	1.45	1.500	.000	.00	1 .0
.734	.0822					.0143	.01	.95	1.56	.58	.013	.00	.00	PIPE
1111.004	933.295	.989	934.284	9.40	7.60	.90	935.18	.00	1.18	1.42	1.500	.000	.00	1 .0
.556	.0822					.0127	.01	.99	1.44	.58	.013	.00	.00	PIPE
1111.560	933.341	1.032	934.373	9.40	7.25	.82	935.19	.00	1.18	1.39	1.500	.000	.00	1 .0
.398	.0822					.0113	.00	1.03	1.32	.58	.013	.00	.00	PIPE
1111.958	933.374	1.078	934.452	9.40	6.91	.74	935.19	.00	1.18	1.35	1.500	.000	.00	1 .0
.242	.0822					.0101	.00	1.08	1.21	.58	.013	.00	.00	PIPE
1112.200	933.393	1.128	934.522	9.40	6.59	.67	935.20	.00	1.18	1.30	1.500	.000	.00	1 .0
.080	.0822					.0091	.00	1.13	1.11	.58	.013	.00	.00	PIPE

Program Package Serial Number: 7077

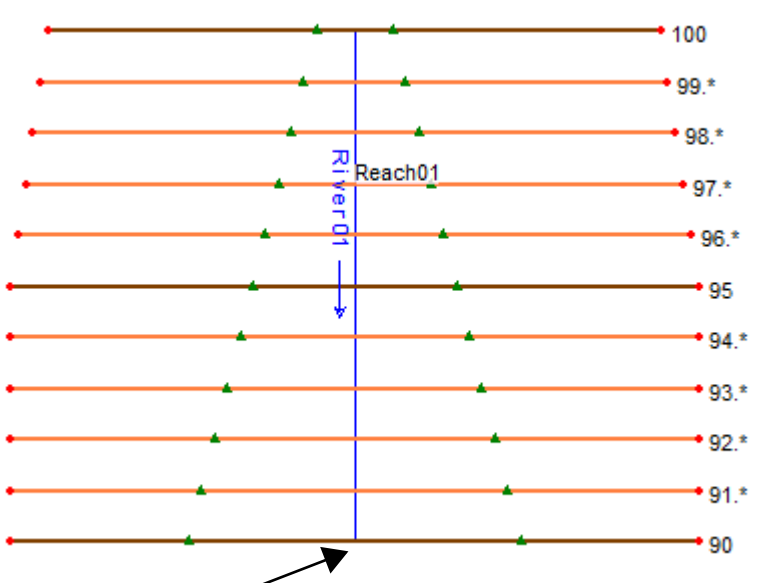
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18602B TVBP FRONTAGE ROADS
100-YR HYDRAULICS, CAPACITY RUN
CCW CONNECTION FROM ONSITE SYSTEM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1112.280	933.400	1.185	934.585	9.40	6.28	.61	935.20	.00	1.18	1.22	1.500	.000	.00	1 .0
WALL	ENTRANCE													
1112.280	933.400	1.413	934.813	9.40	5.45	.46	935.27	.00	1.18	.70	1.500	.000	.00	0 .0

TEMECAL VALLEY COMMERCE CENTER
J-18602-B

Line A Outfall
24" RCP



1/4 Ton Riprap for 10 linear feet.

Q_{100} = 9.4 cfs
$V_{100\ (Pipe\ Exit)}$ = 9.0 fps
$V_{100\ (Riprap\ Exit)}$ = 1.9 fps

¼ Ton Riprap for 4.5'W * 10'L * 2.7'T from outlet of 24" RCP. Filter blanket material per soils engineers' specifications.

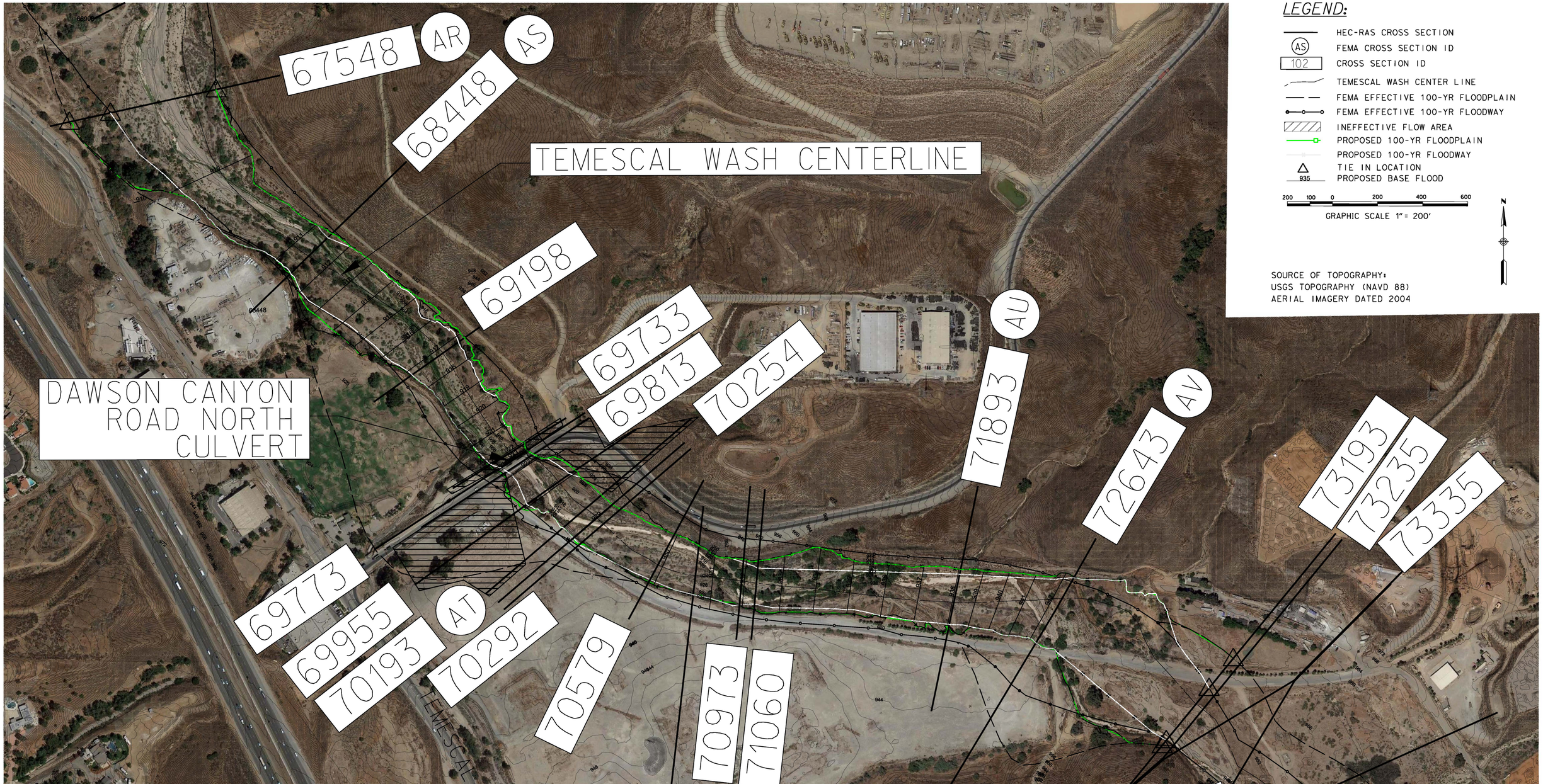
Appendix C

Temescal Wash Hydraulics

1. Hydraulic Workmaps for Temescal Wash
2. Summary Table
3. Profile
4. Cross-Sections

Appendix C1

Hydraulic Workmaps for Temescal Wash



LEGEND:

- HEC-RAS CROSS SECTION
- (AS) FEMA CROSS SECTION ID
- 102 CROSS SECTION ID
- TEMESCAL WASH CENTER LINE
- FEMA EFFECTIVE 100-YR FLOODPLAIN
- FEMA EFFECTIVE 100-YR FLOODWAY
- INEFFECTIVE FLOW AREA
- PROPOSED 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODWAY
- 935 TIE IN LOCATION PROPOSED BASE FLOOD

200 100 0 200 400 600

GRAPHIC SCALE 1" = 200'

N

SOURCE OF TOPOGRAPHY:
USGS TOPOGRAPHY (NAVD 88)
AERIAL IMAGERY DATED 2004

SEAL ENGINEER

PREPARED UNDER THE DIRECTION OF:

BRENDAN HASTIE R.C.E. NO. 65809

DATE: _____ REGISTRATION EXPIRES 9-23

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J-18602-A

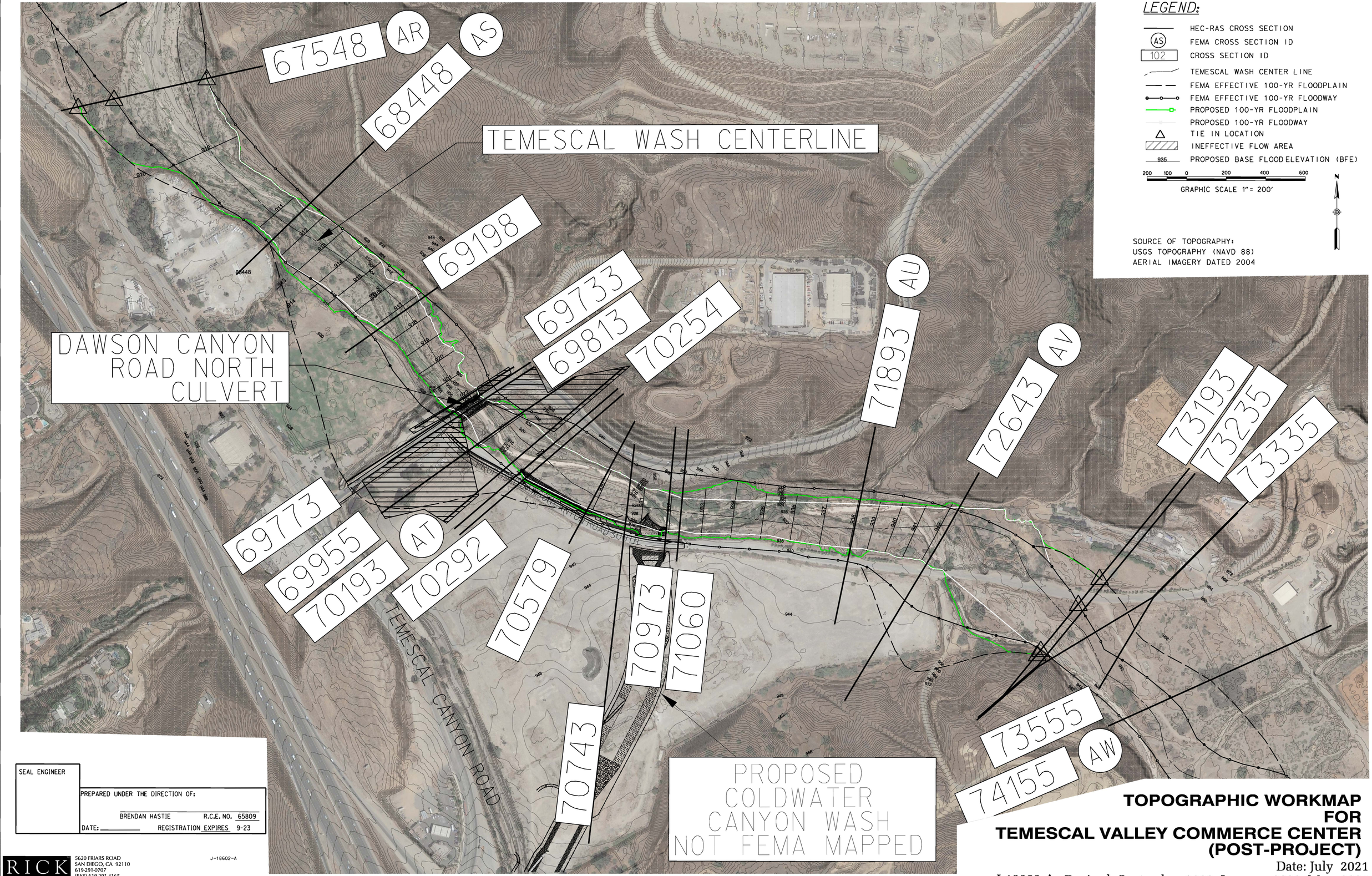
TOPOGRAPHIC WORKMAP FOR TEMESCAL VALLEY COMMERCE CENTER (PRE-PROJECT)

Date: July 2021

J-18602-A Revised: September 2022, Januray 2023, May 2024

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LEGEND:

- HEC-RAS CROSS SECTION
- (AS) FEMA CROSS SECTION ID
- 102 CROSS SECTION ID
- TEMESCAL WASH CENTER LINE
- FEMA EFFECTIVE 100-YR FLOODPLAIN
- FEMA EFFECTIVE 100-YR FLOODWAY
- PROPOSED 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODWAY
- TIE IN LOCATION
- INEFFECTIVE FLOW AREA
- 935 PROPOSED BASE FLOOD ELEVATION (BFE)

200 100 0 200 400 600

GRAPHIC SCALE 1" = 200'

N

SOURCE OF TOPOGRAPHY:
USGS TOPOGRAPHY (NAVD 88)
AERIAL IMAGERY DATED 2004

SEAL ENGINEER

PREPARED UNDER THE DIRECTION OF:

BRENDAN HASTIE R.C.E. NO. 65809

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J-18602-A

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TOPOGRAPHIC WORKMAP FOR TEMESCAL VALLEY COMMERCE CENTER (POST-PROJECT)

Date: July 2021

J-18602-A Revised: September 2022, Januray 2023, May 2024

NOT FOR CONSTRUCTION - EXHIBIT FOR HYDRAULIC STUDY ONLY

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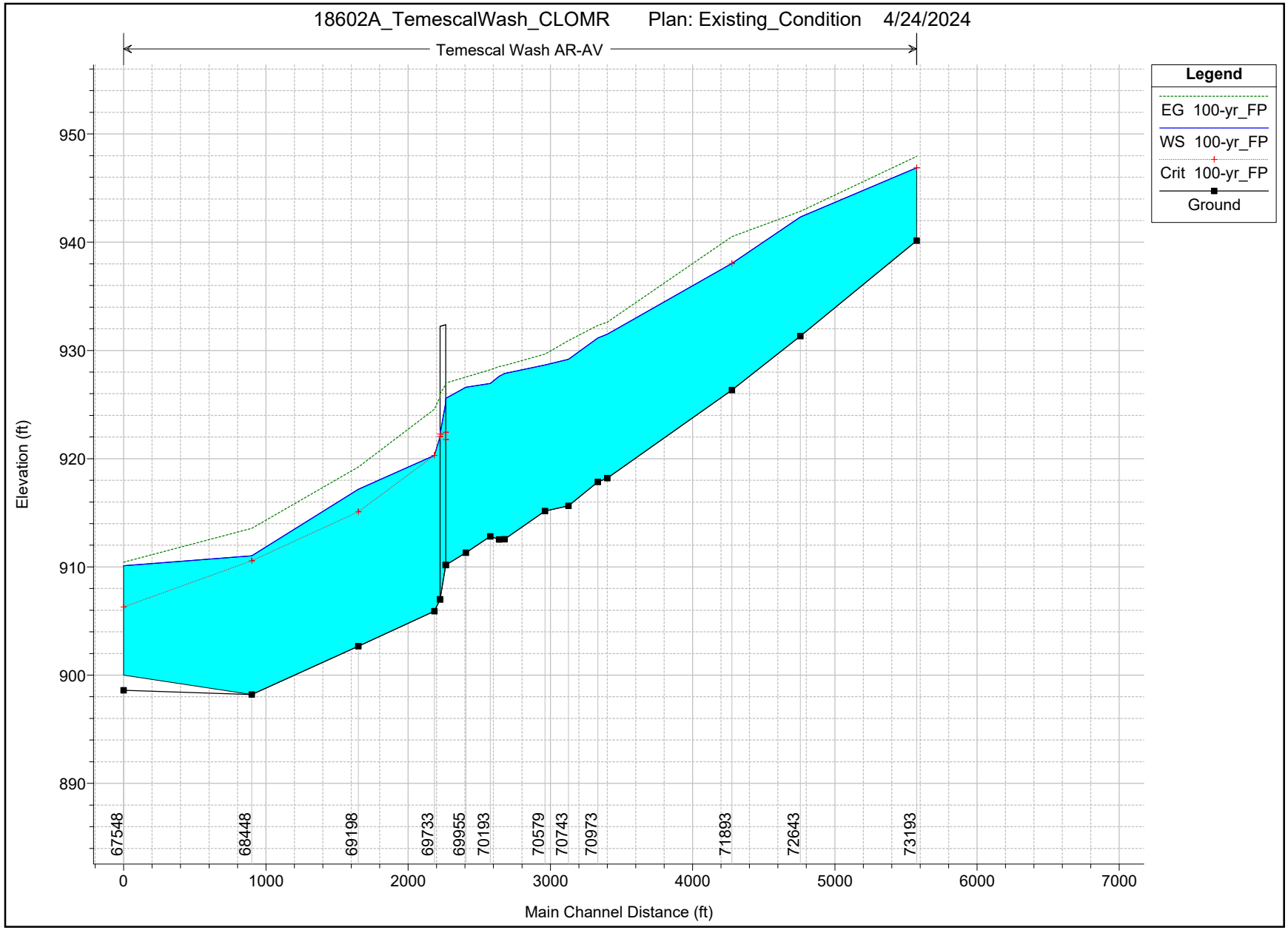
Appendix C1

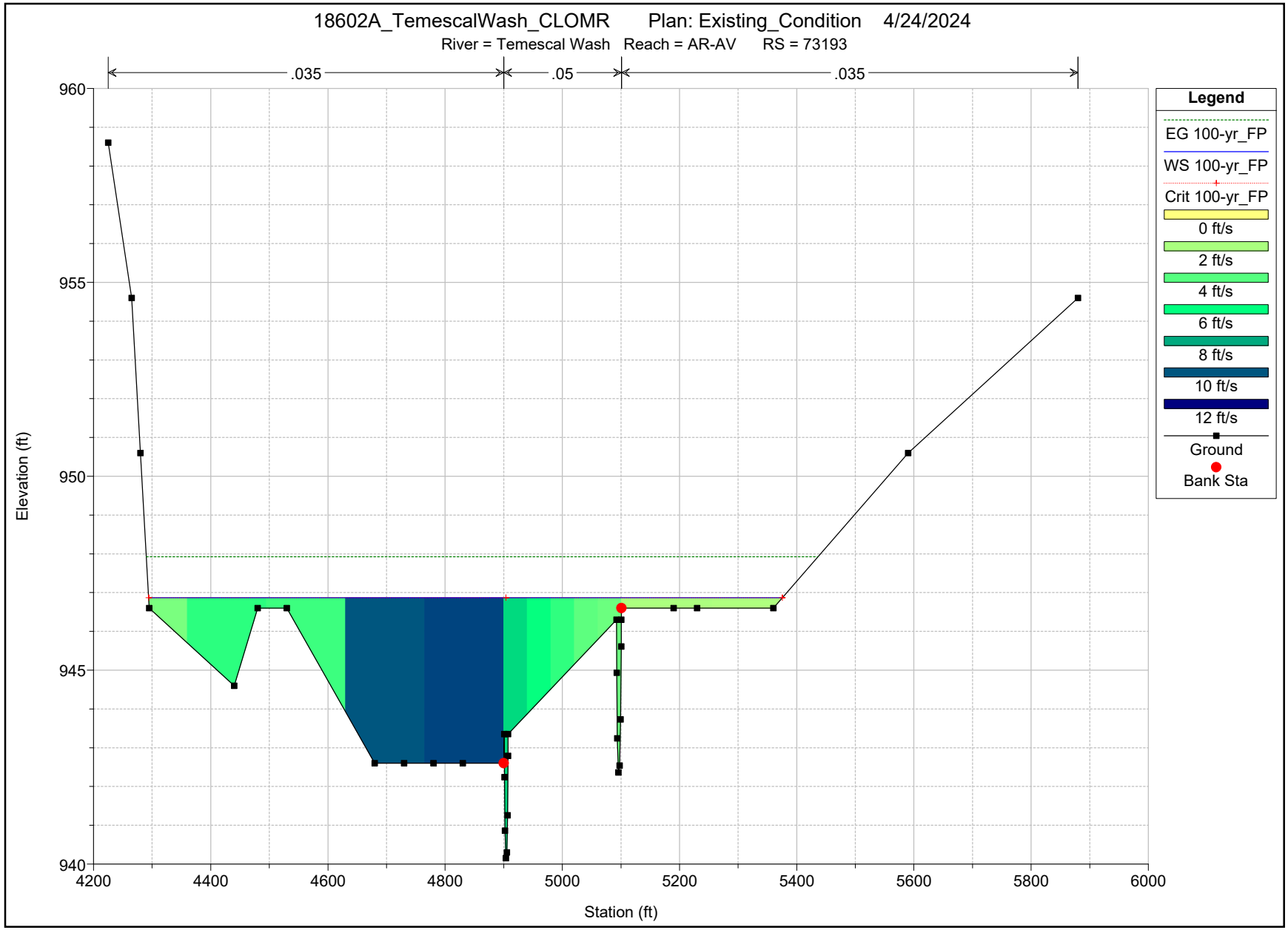
Existing Condition Hydraulic Results

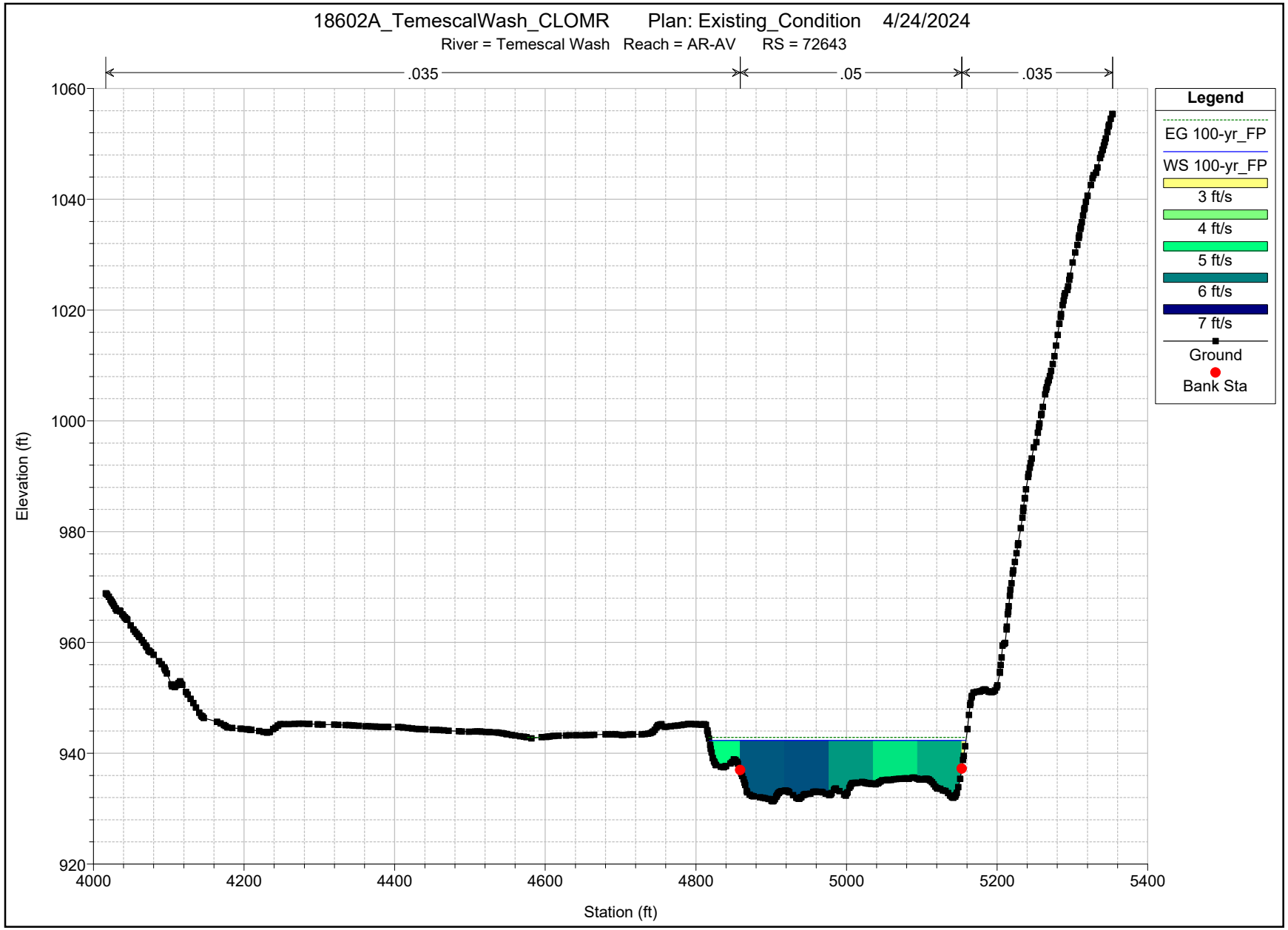
- Summary Table
- Profile
- Cross-Sections

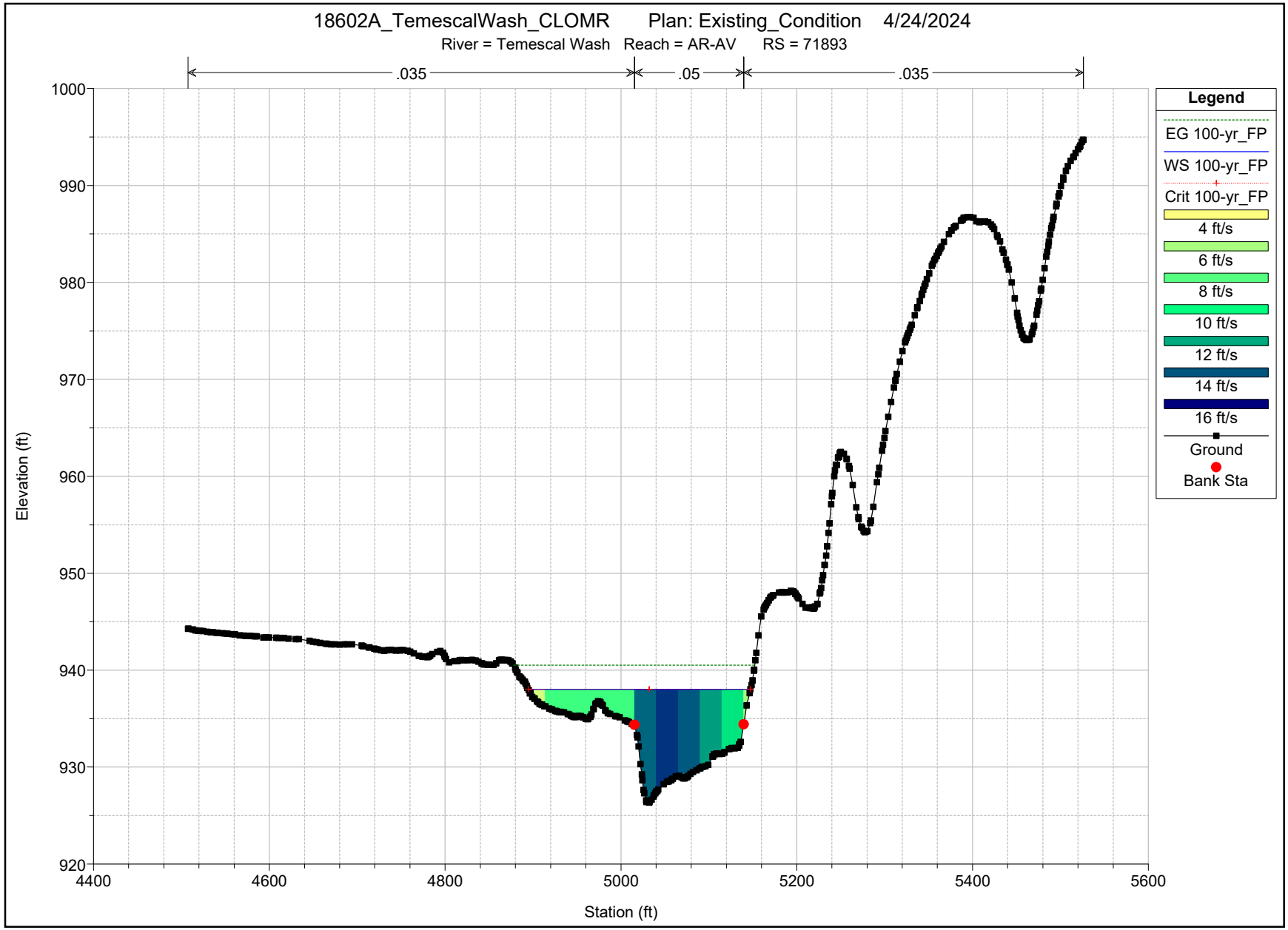
HEC-RAS Plan: Existing River: Temescal Wash Reach: AR-AV Profile: 100-yr_FP

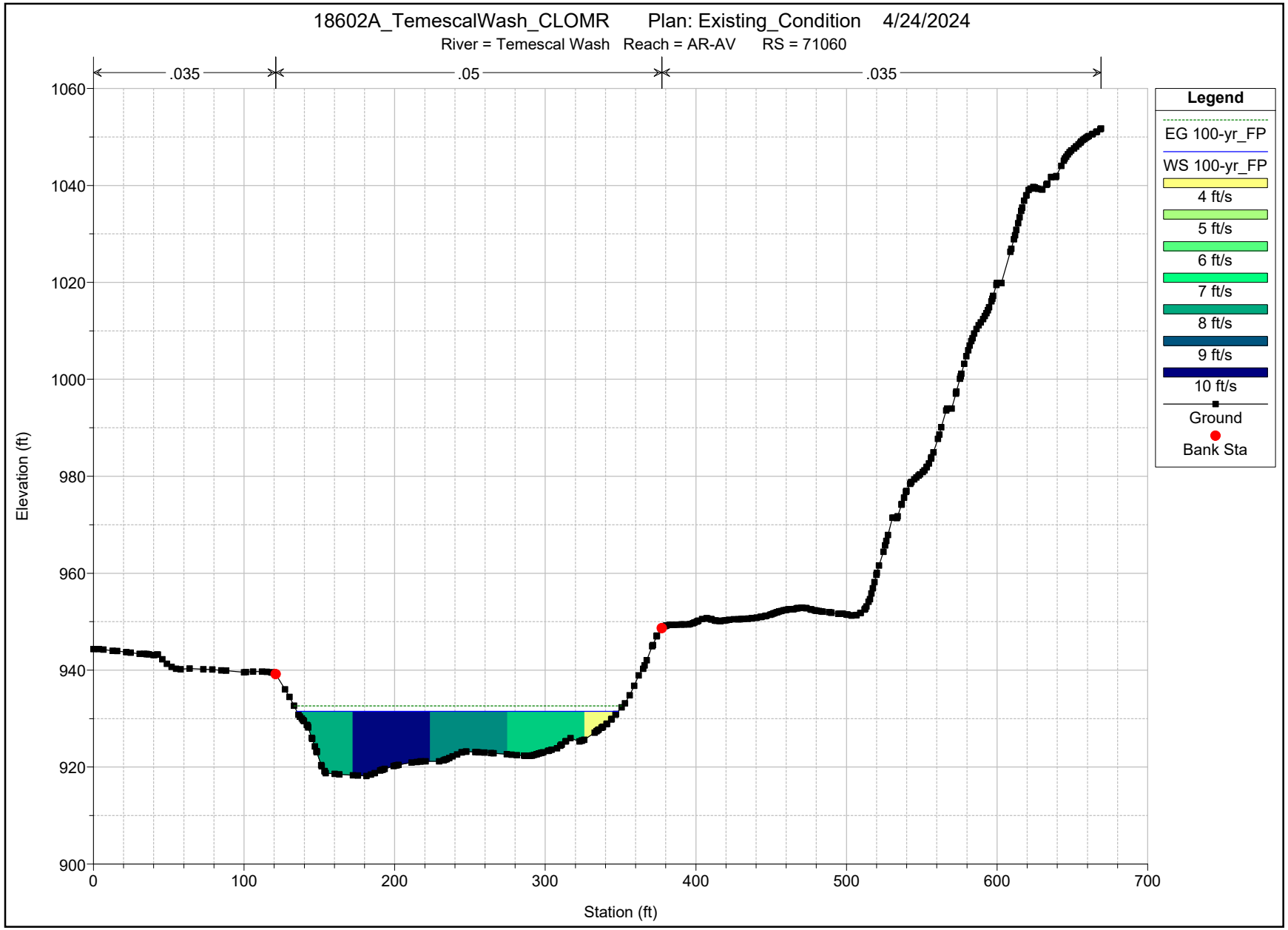
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
AR-AV	73193	100-yr_FP	15900.00	940.15	946.87	946.87	947.93	0.012254	5.48	2049.37	1081.48	0.65
AR-AV	72643	100-yr_FP	15900.00	931.32	942.32		942.86	0.002276	5.92	2718.64	340.60	0.36
AR-AV	71893	100-yr_FP	15900.00	926.34	938.03	938.03	940.52	0.012503	13.27	1310.11	252.82	0.82
AR-AV	71060	100-yr_FP	15900.00	918.19	931.51		932.62	0.004614	8.46	1879.58	213.45	0.50
AR-AV	70973	100-yr_FP	15900.00	917.84	931.16		932.31	0.004576	8.60	1849.23	202.46	0.50
AR-AV	70743	100-yr_FP	15900.00	915.63	929.17		930.92	0.009764	10.60	1499.52	211.38	0.70
AR-AV	70579	100-yr_FP	15900.00	915.16	928.66		929.65	0.004438	7.98	1991.58	238.72	0.49
AR-AV	70292	100-yr_FP	15900.00	912.55	927.87		928.62	0.002630	6.93	2293.10	227.78	0.39
AR-AV	70254	100-yr_FP	15900.00	912.53	927.61		928.50	0.003331	7.55	2106.12	219.87	0.43
AR-AV	70193	100-yr_FP	15900.00	912.81	926.95		928.23	0.004016	9.30	1766.27	211.32	0.49
AR-AV	69955	100-yr_FP	15900.00	911.32	926.60		927.55	0.002906	7.98	2075.63	265.37	0.42
AR-AV	69813	100-yr_FP	15900.00	910.17	925.57	921.77	927.00	0.004452	9.80	1672.24	173.41	0.51
AR-AV	69793		Bridge									
AR-AV	69773	100-yr_FP	15900.00	906.99	922.04	922.04	925.72	0.018823	15.40	1033.73	143.25	1.00
AR-AV	69733	100-yr_FP	15900.00	905.90	920.30	920.30	924.56	0.002373	19.04	1231.23	149.61	0.95
AR-AV	69198	100-yr_FP	19400.00	902.66	917.17	915.09	919.22	0.006676	12.54	1748.62	254.79	0.64
AR-AV	68448	100-yr_FP	19400.00	898.21	911.03	910.56	913.56	0.008774	13.29	1558.83	249.78	0.72
AR-AV	67548	100-yr_FP	19400.00	900.00	910.10	906.31	910.43	0.001216	3.32	4561.87	727.77	0.24

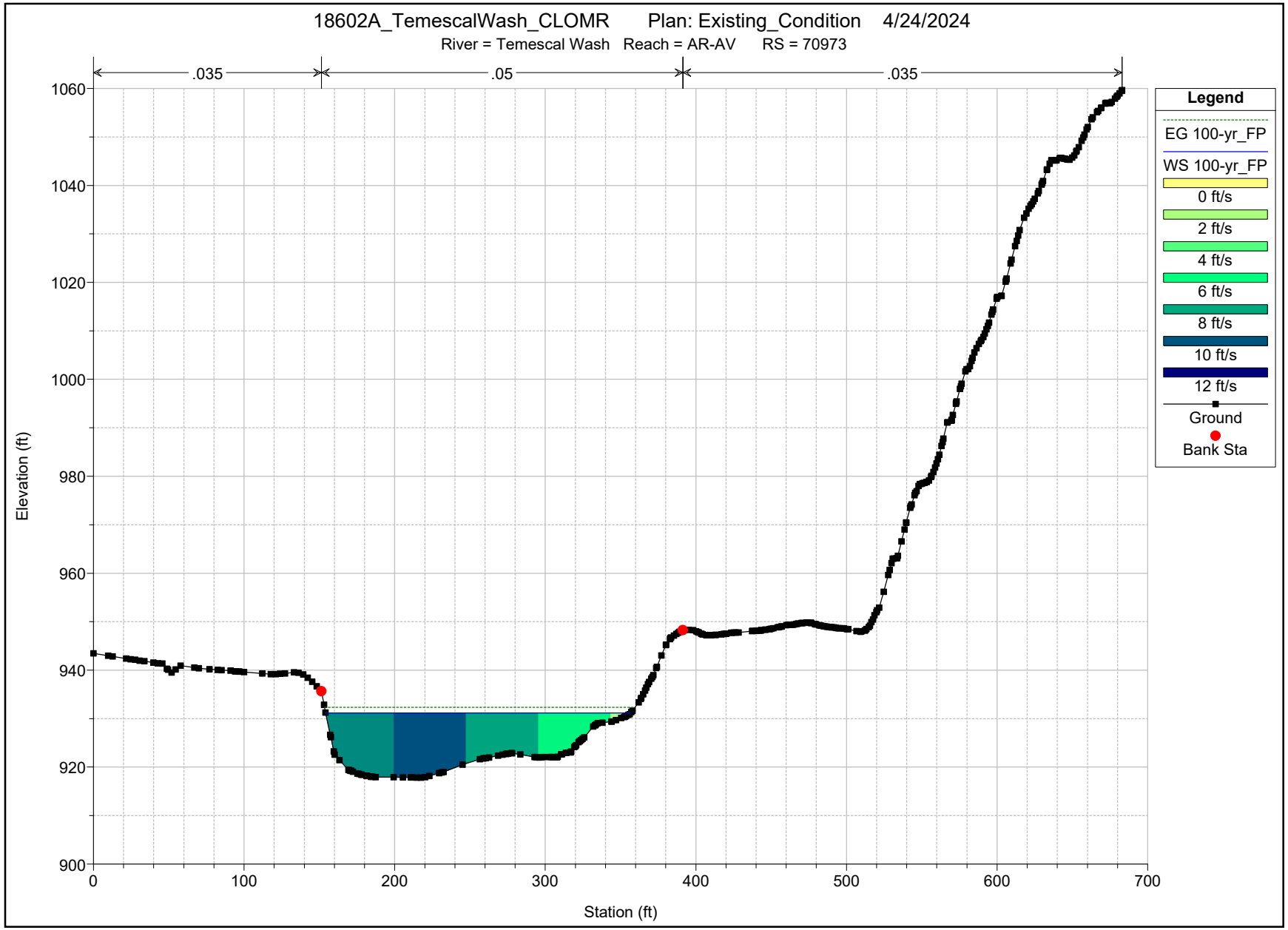

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
Temescal Wash AR-AV
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
Ground
Elevation (ft)
950
940
930
920
910
900
890
67548
68448
69198
69733
69955
70193
70579
70743
70973
71893
72643
73193
0
1000
2000
3000
4000
5000
6000
7000
Main Channel Distance (ft)

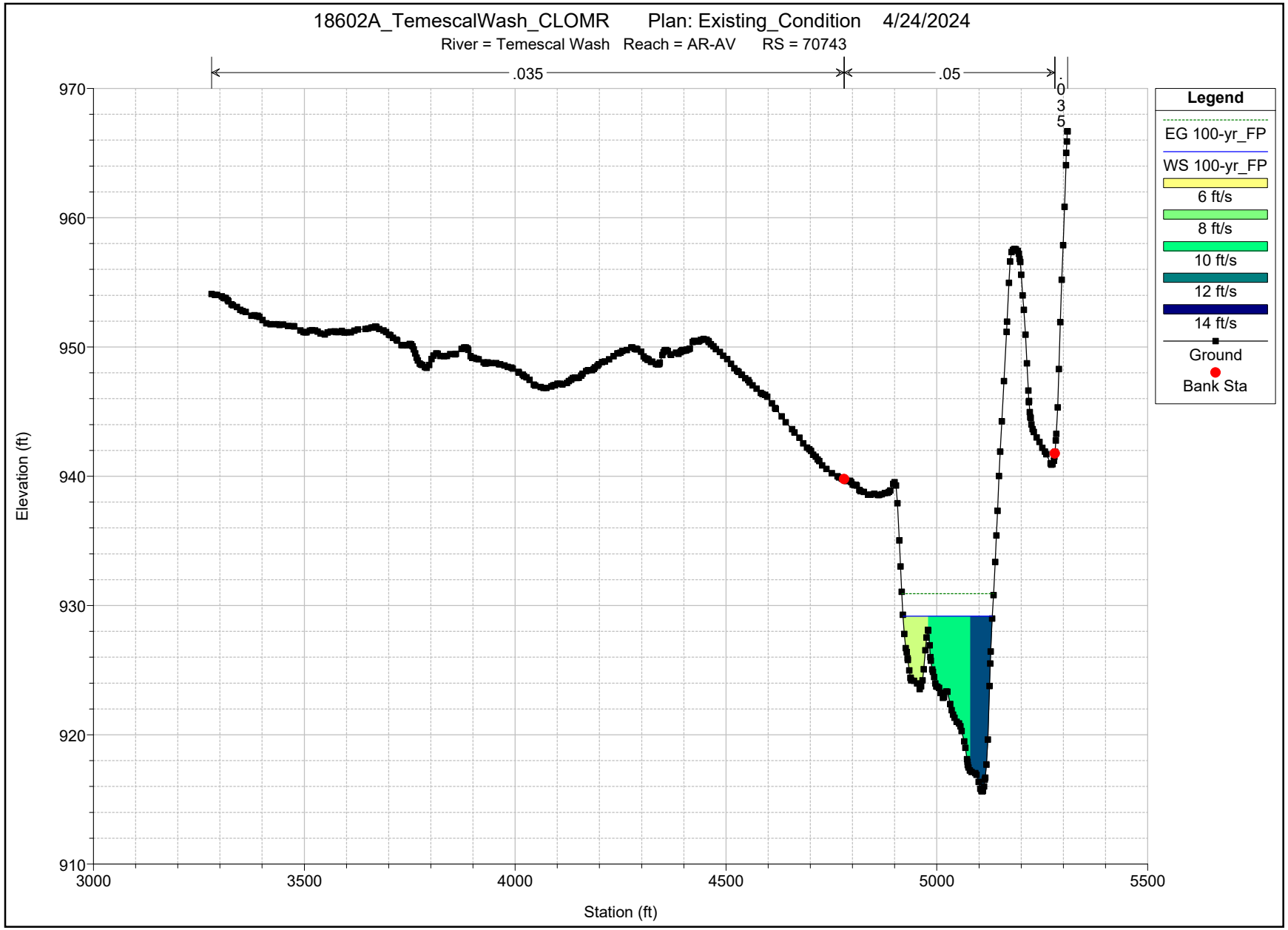

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 73193
.035
.05
.035
960
955
950
945
940
Elevation (ft)
4200
4400
4600
4800
5000
5200
5400
5600
5800
6000
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

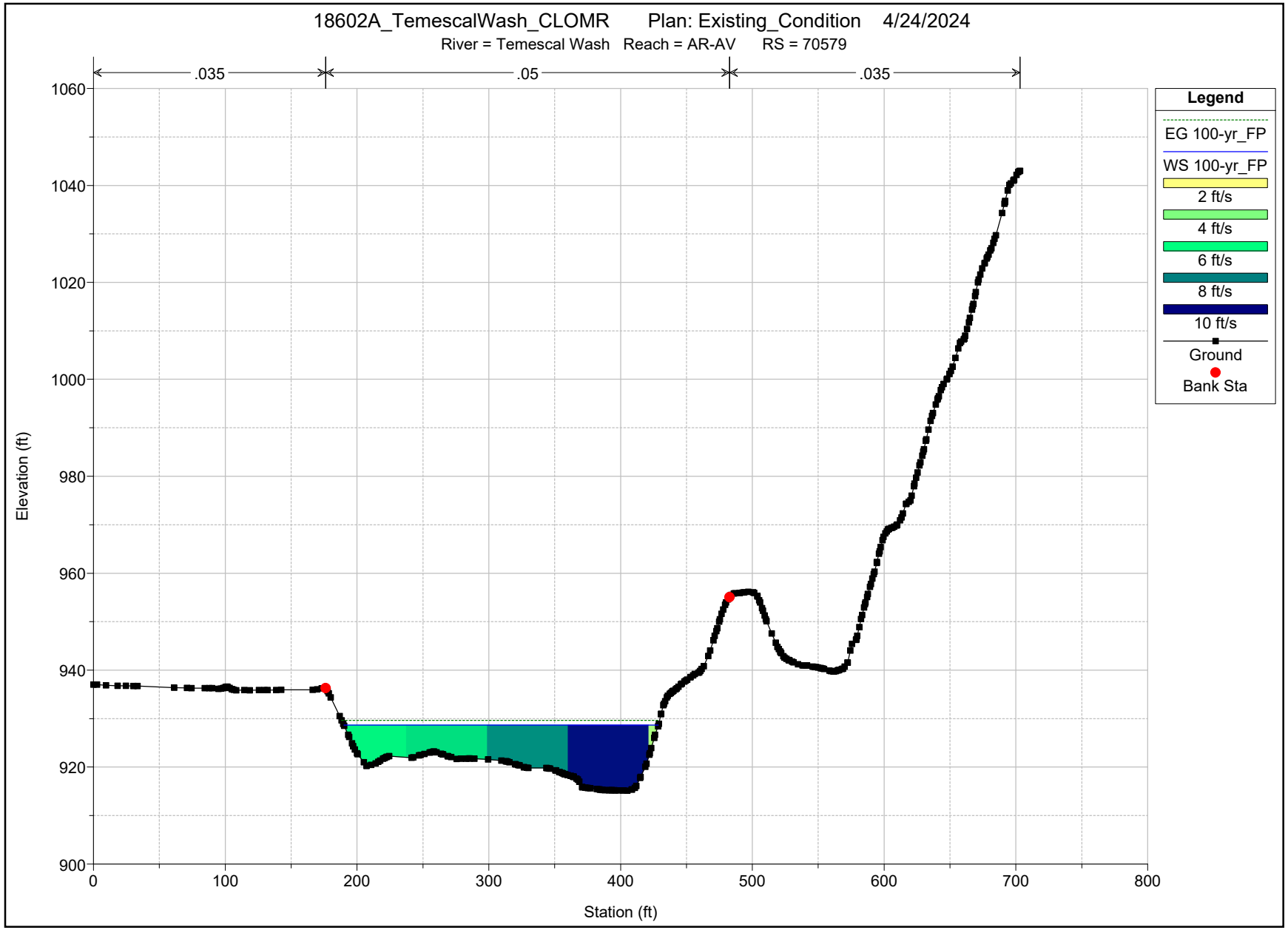

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 72643
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta
Elevation (ft)
1060
1040
1020
1000
980
960
940
920
4000
4200
4400
4600
4800
5000
5200
5400
Station (ft)

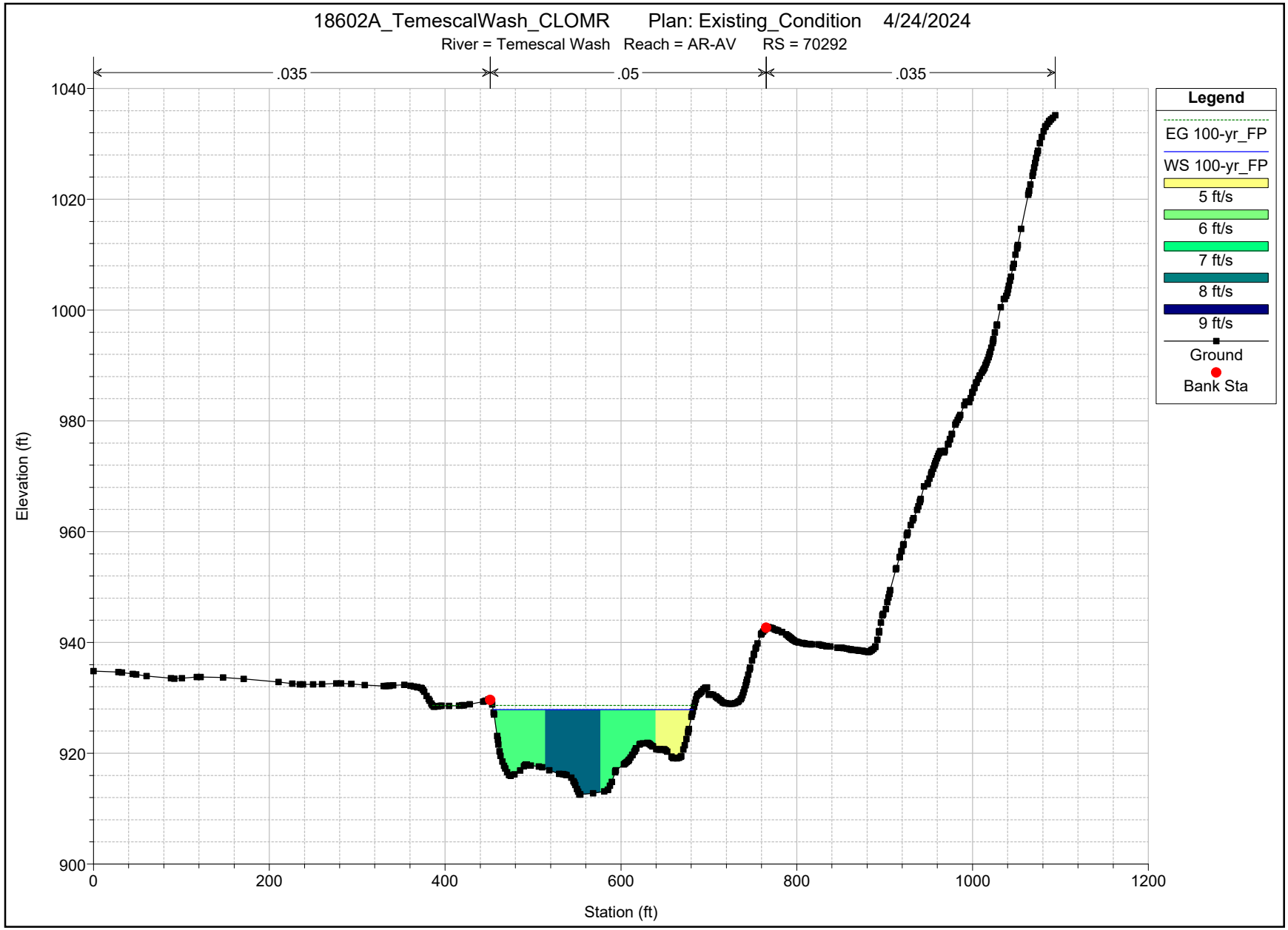

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 71893
.035
.05
.035
Elevation (ft)
1000
990
980
970
960
950
940
930
920
4400
4600
4800
5000
5200
5400
5600
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

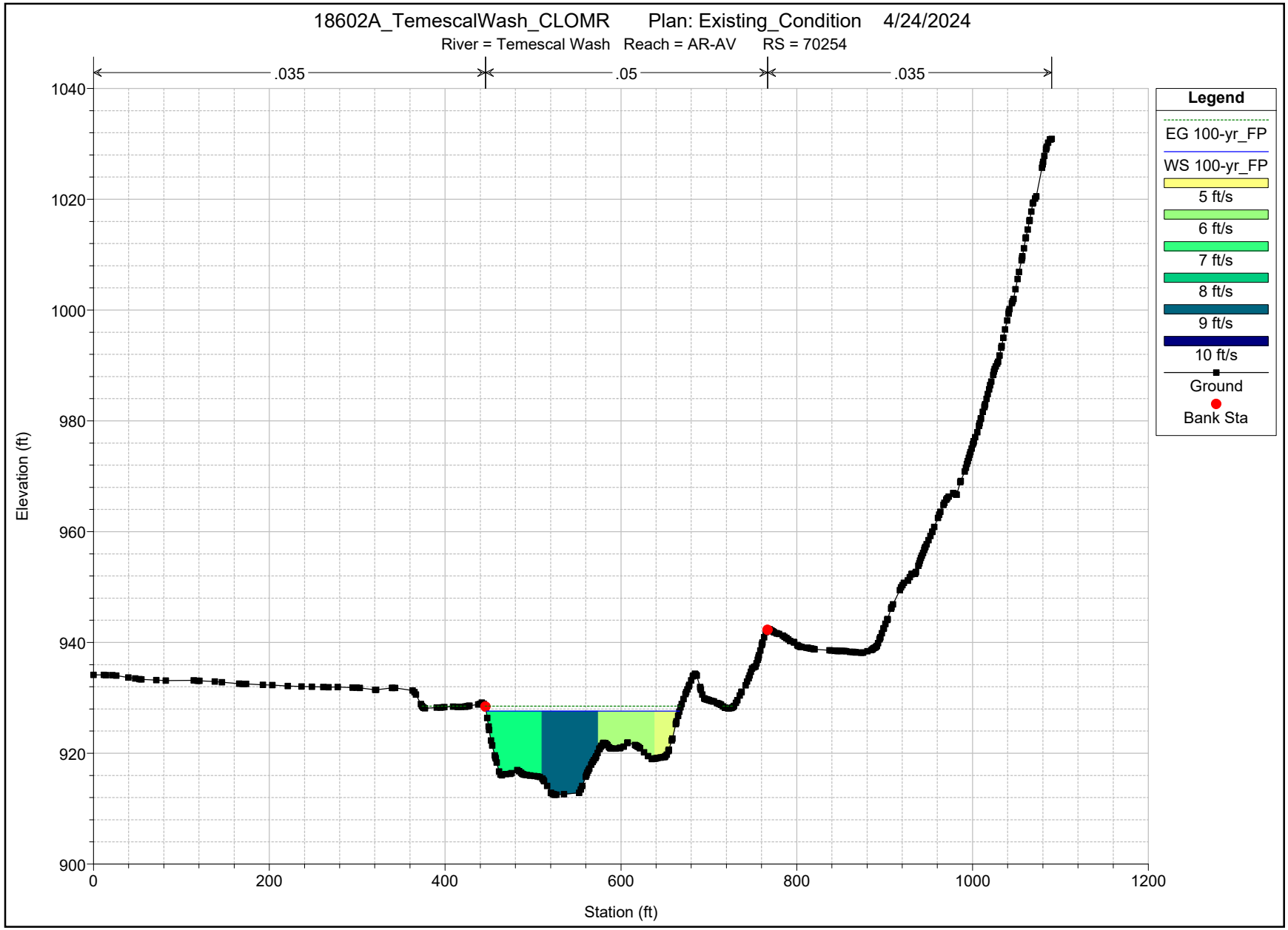

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 71060
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
1060
1040
1020
1000
980
960
940
920
900
0
100
200
300
400
500
600
700

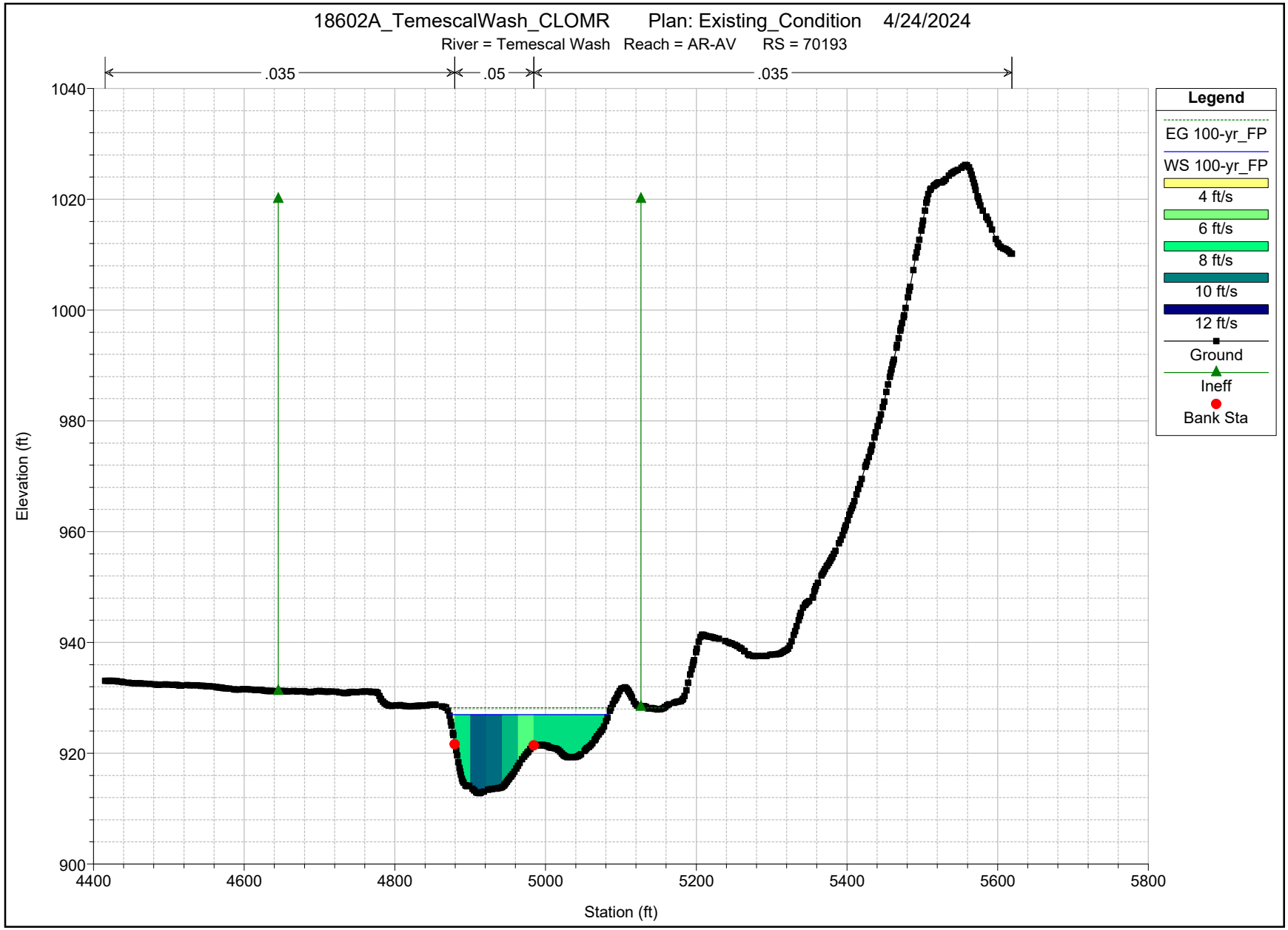

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70973
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
Elevation (ft)
1060
1040
1020
1000
980
960
940
920
900
0
100
200
300
400
500
600
700
Station (ft)

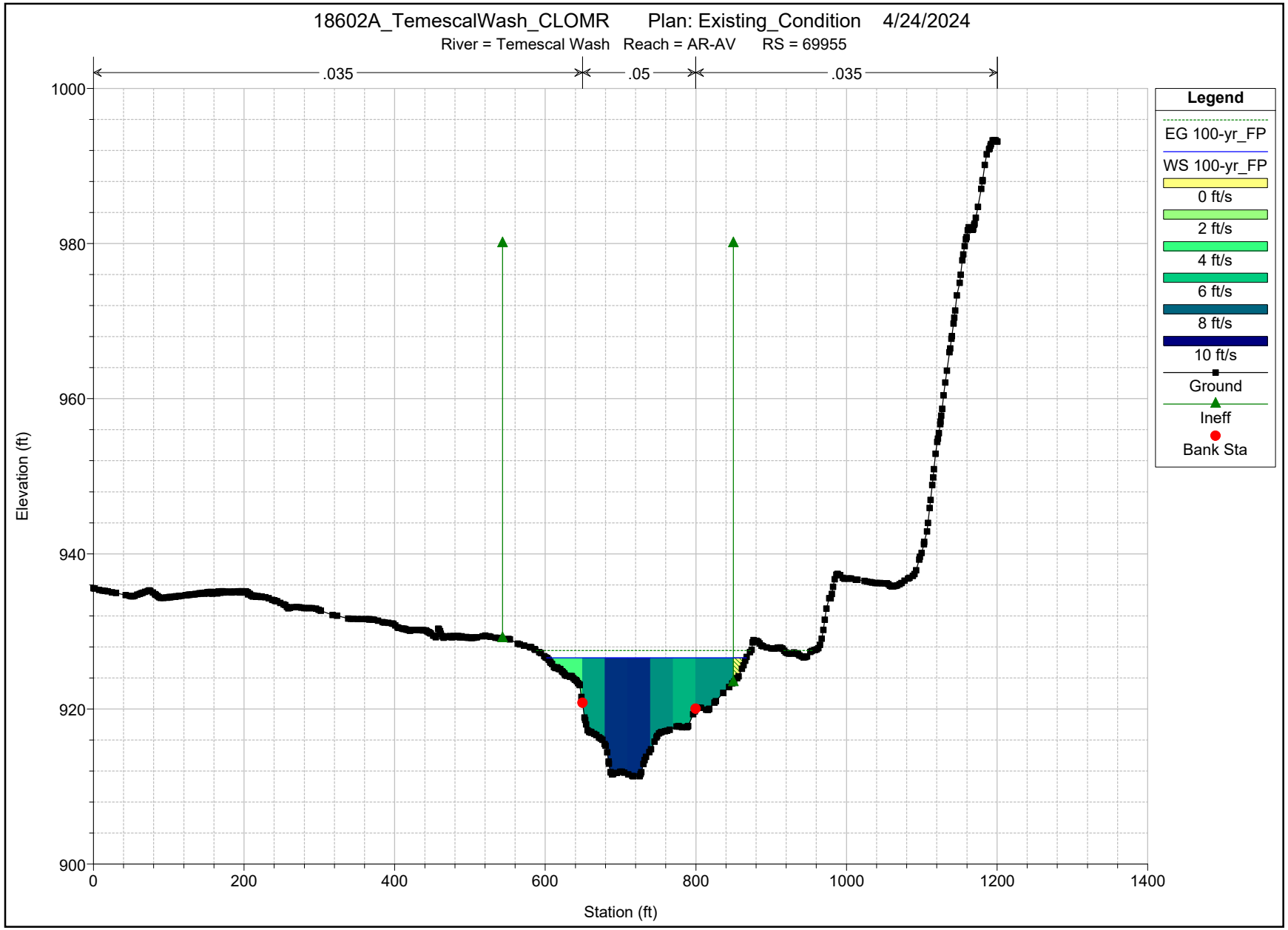

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70743
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta
Elevation (ft)
970
960
950
940
930
920
910
3000
3500
4000
4500
5000
5500
Station (ft)

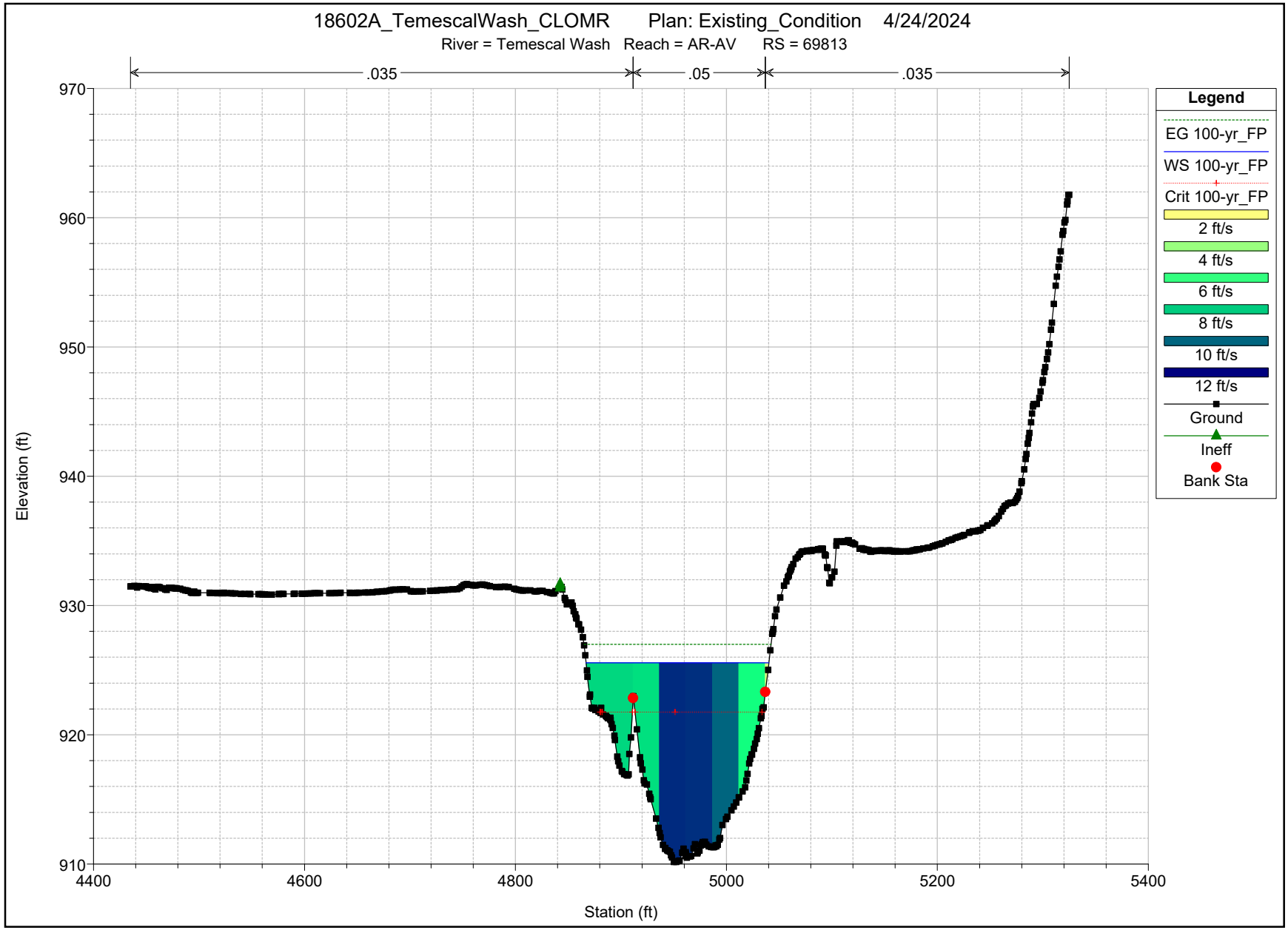

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70579
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
1060
1040
1020
1000
980
960
940
920
900
0
100
200
300
400
500
600
700
800

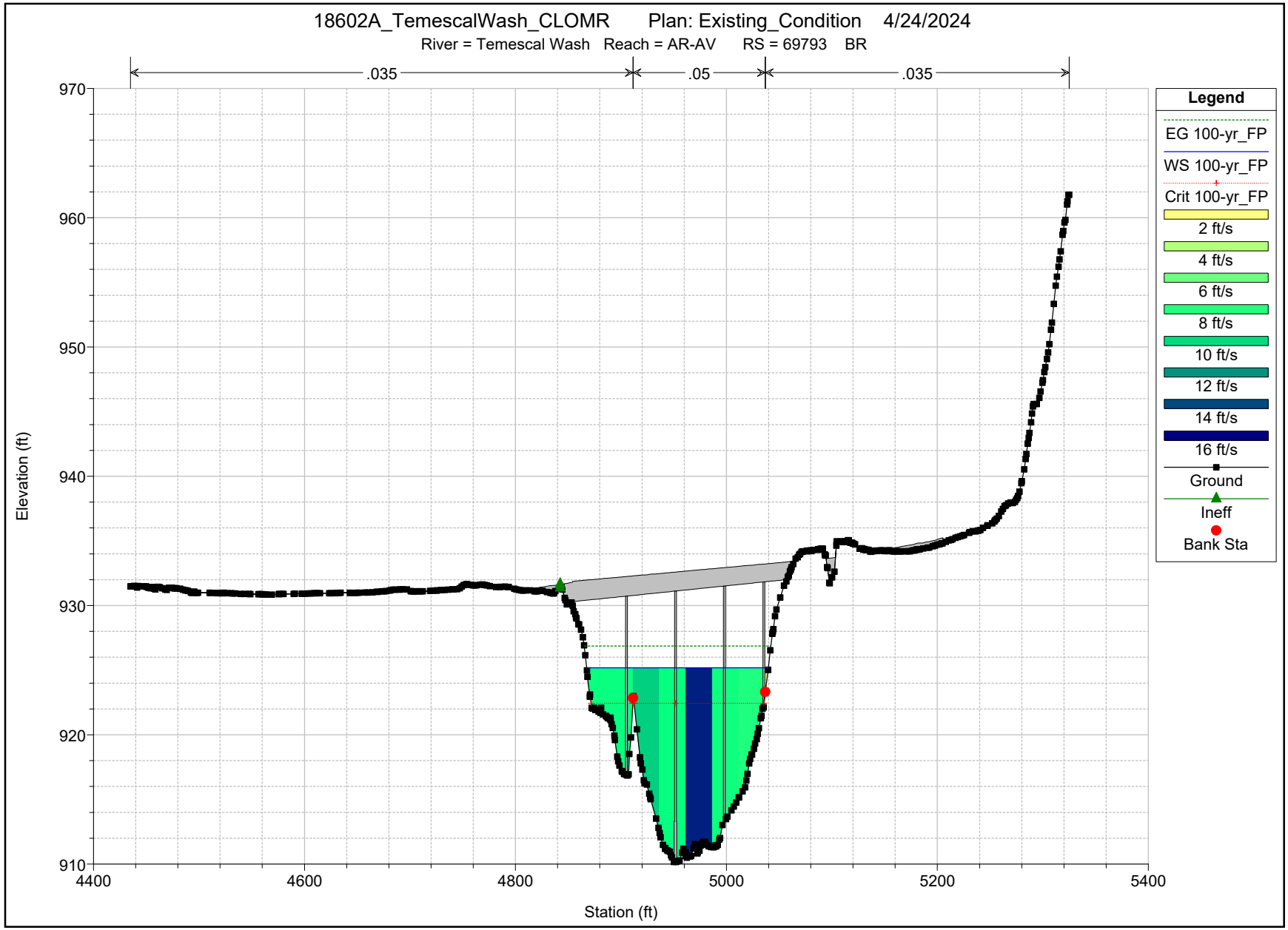

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70292
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
1040
1020
1000
980
960
940
920
900
0
200
400
600
800
1000
1200

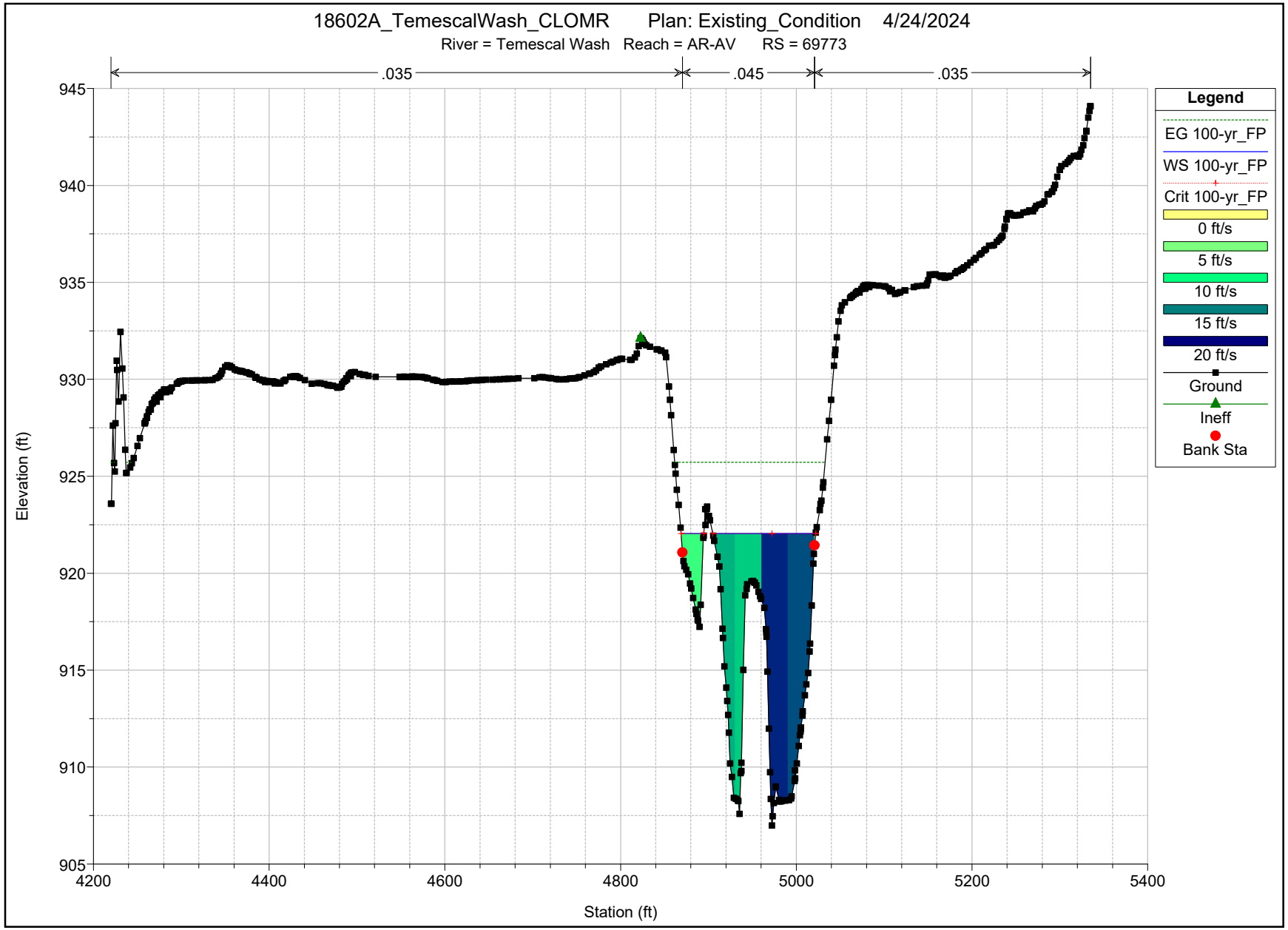

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70254
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
1040
1020
1000
980
960
940
920
900
0
200
400
600
800
1000
1200

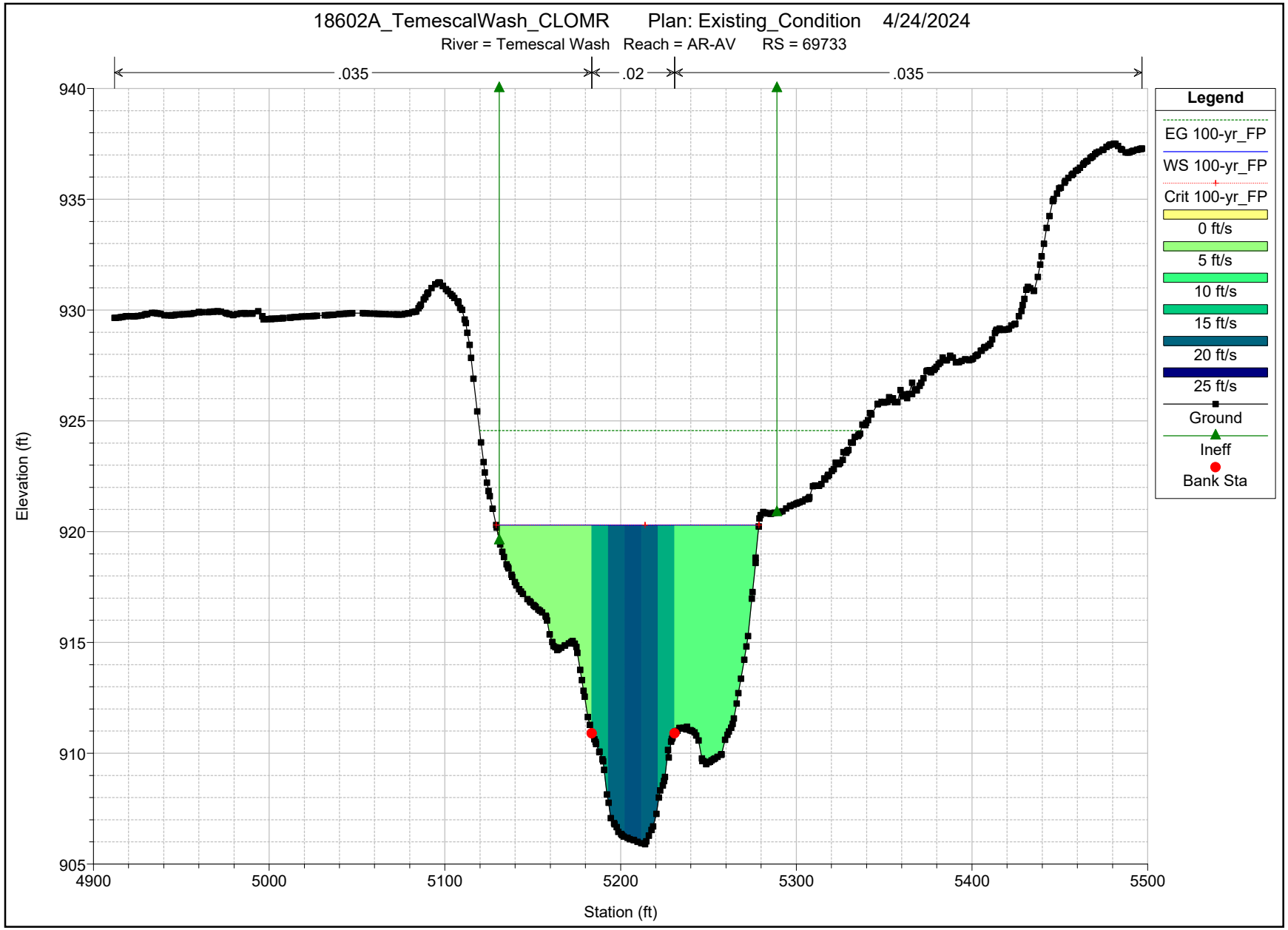

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70193
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
1040
1020
1000
980
960
940
920
900
4400
4600
4800
5000
5200
5400
5600
5800
Station (ft)

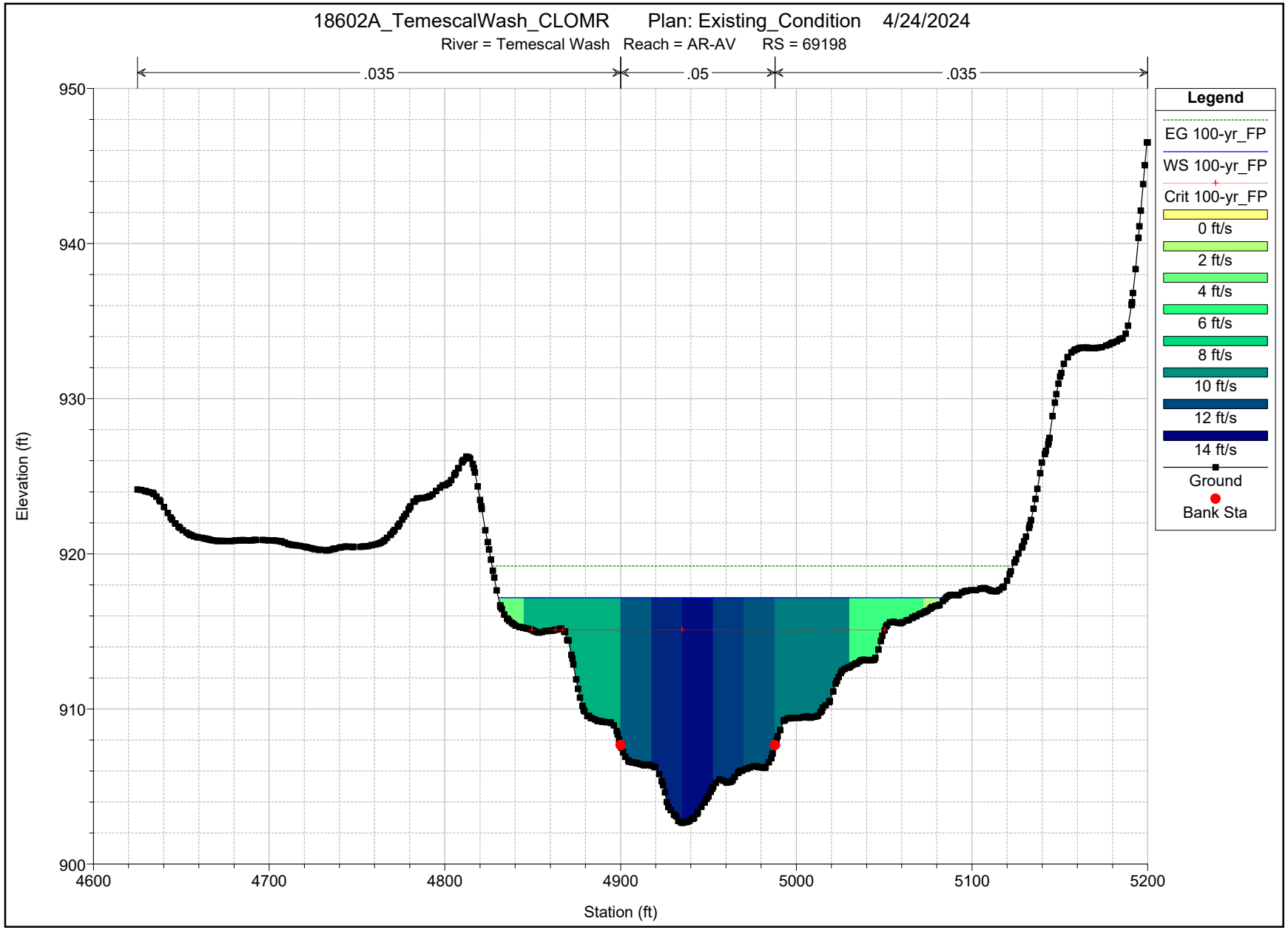

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69955
.035
.05
.035
1000
980
960
940
920
900
Elevation (ft)
0
200
400
600
800
1000
1200
1400
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

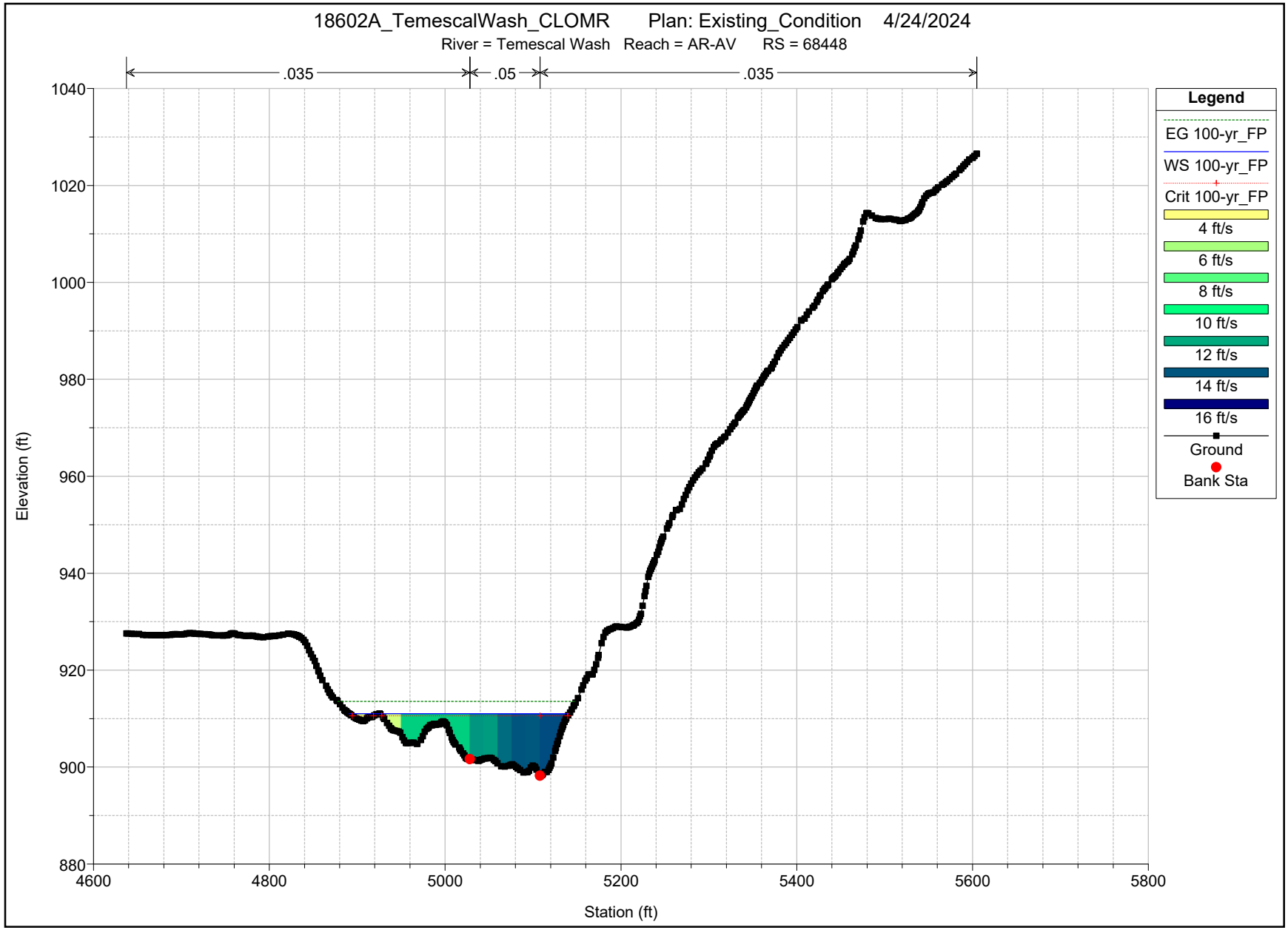

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69813
.035
.05
.035
970
960
950
940
930
920
910
Elevation (ft)
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

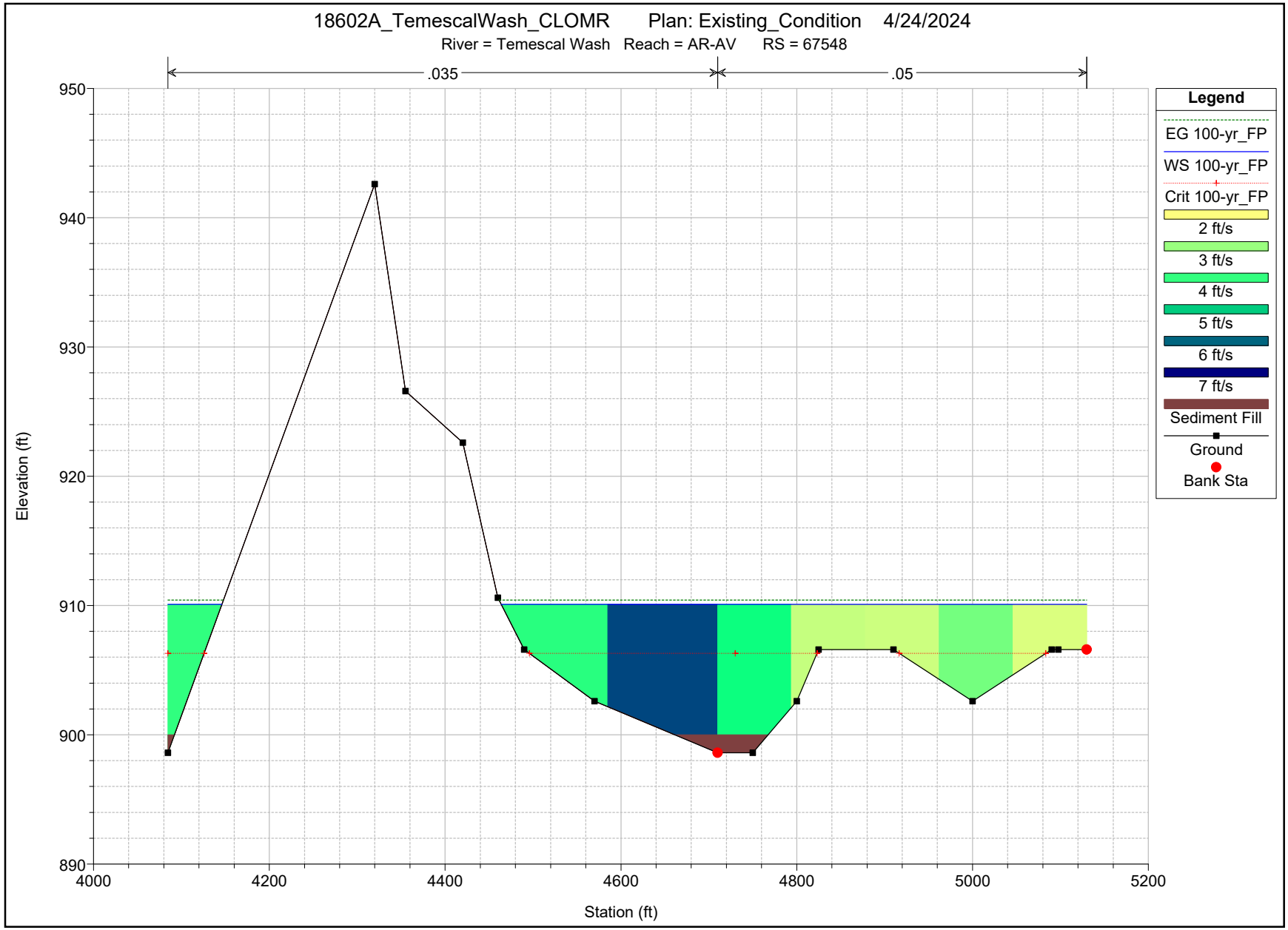

18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69793 BR
.035
.05
.035
970
960
950
940
930
920
910
Elevation (ft)
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta


18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69773
.035
.045
.035
Elevation (ft)
945
940
935
930
925
920
915
910
905
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Ineff
Bank Sta


18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69733
.035
.02
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
25 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
940
935
930
925
920
915
910
905
4900
5000
5100
5200
5300
5400
5500
Station (ft)


18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69198
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta
Elevation (ft)
950
940
930
920
910
900
4600
4700
4800
4900
5000
5100
5200
Station (ft)


18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 68448
.035
.05
.035
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta
Elevation (ft)
1040
1020
1000
980
960
940
920
900
880
4600
4800
5000
5200
5400
5600
5800
Station (ft)


18602A_TemescalWash_CLOMR Plan: Existing_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 67548
.035
.05
Elevation (ft)
950
940
930
920
910
900
890
4000
4200
4400
4600
4800
5000
5200
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Sediment Fill
Ground
Bank Sta

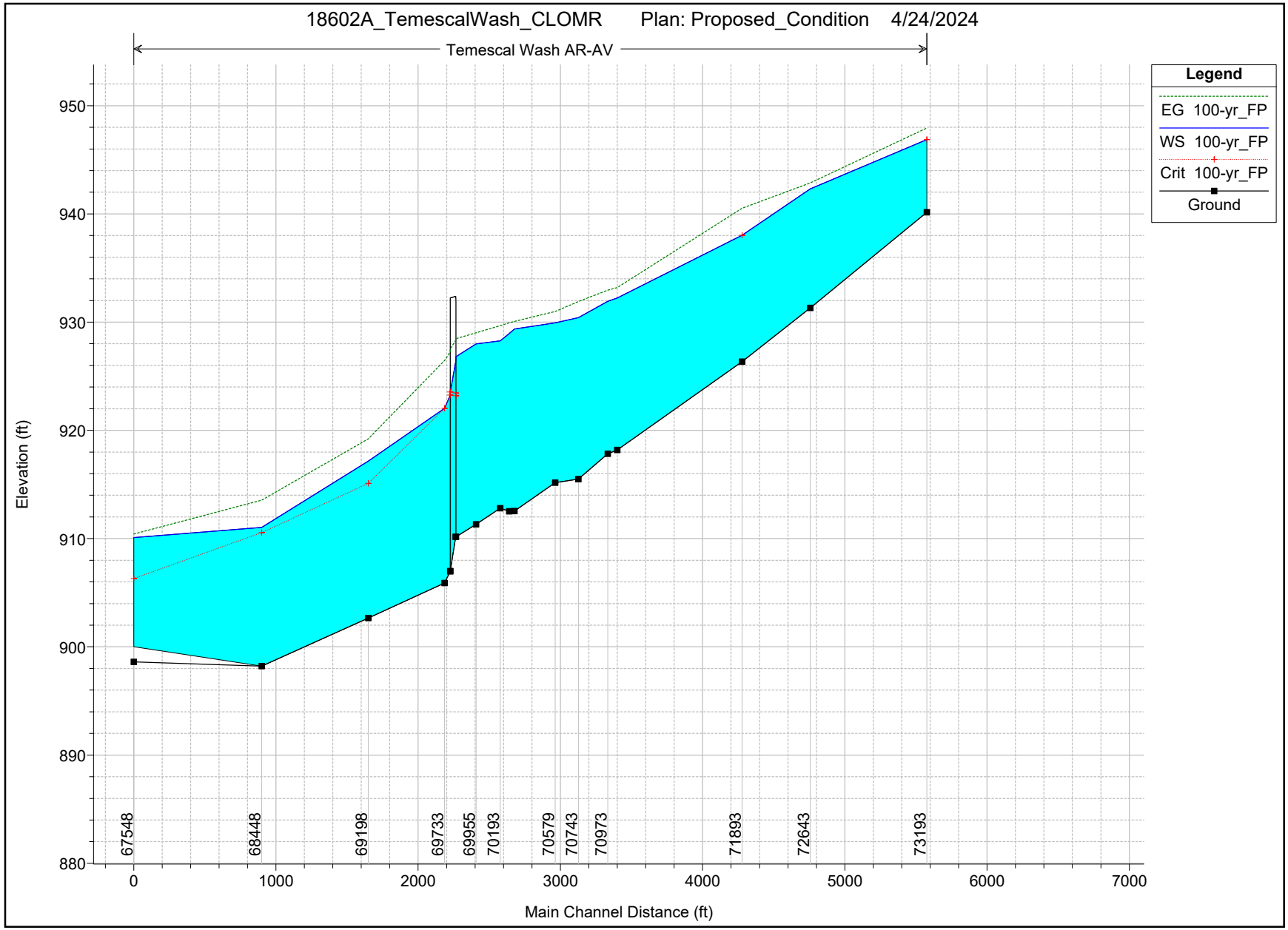
Appendix C2

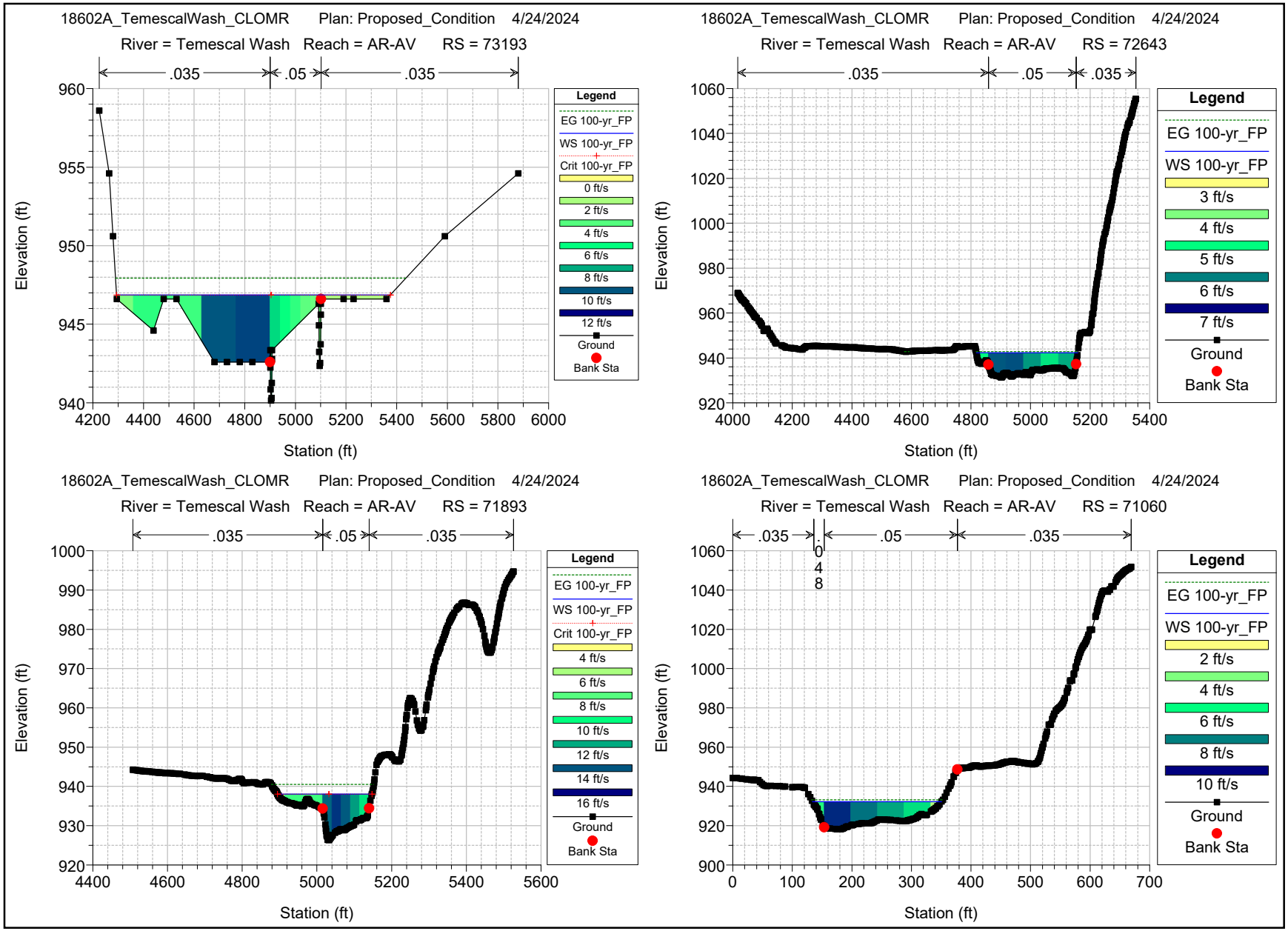
Proposed Condition Hydraulic Results

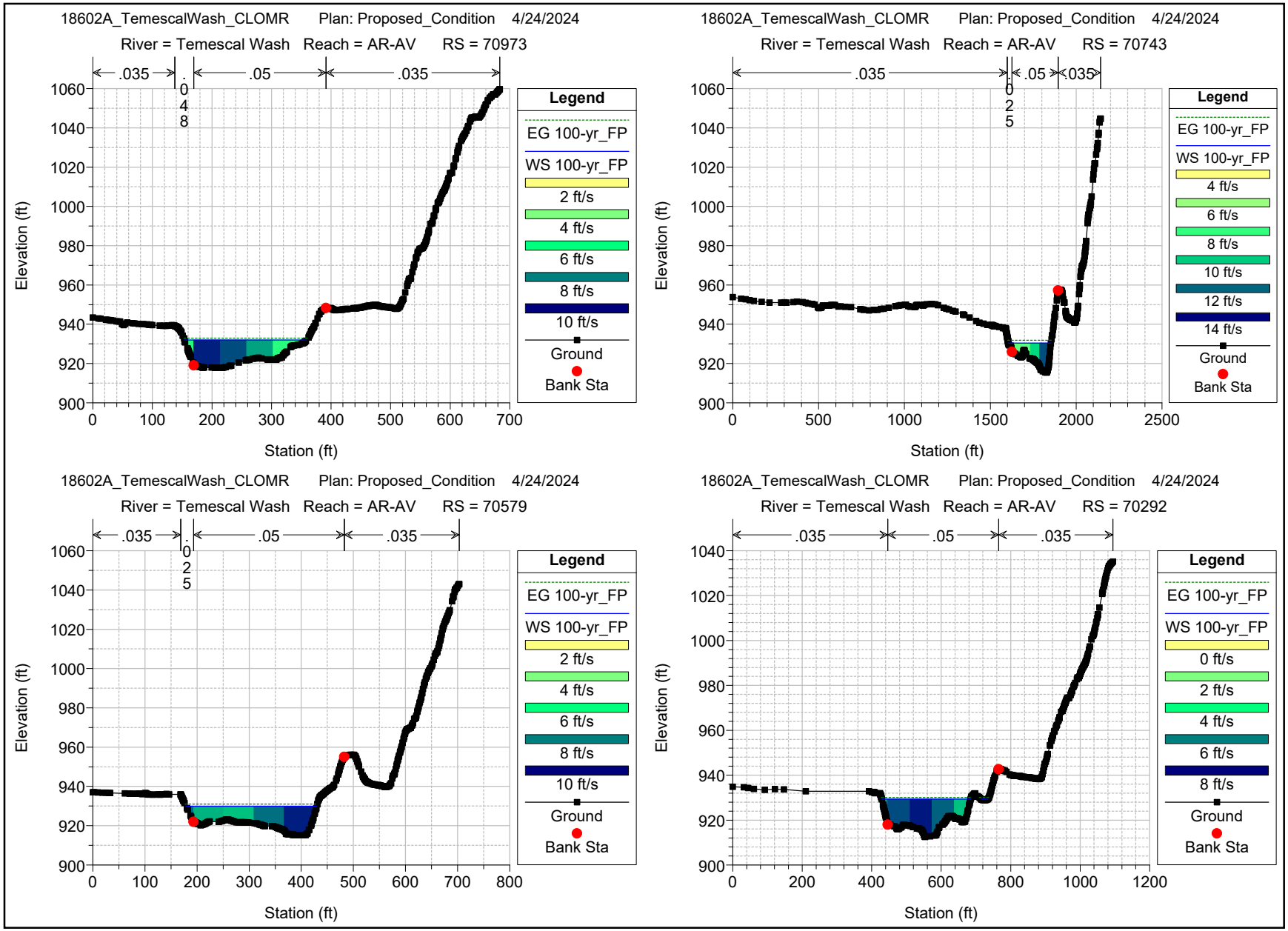
- Summary Table
- Profile
- Cross-Sections

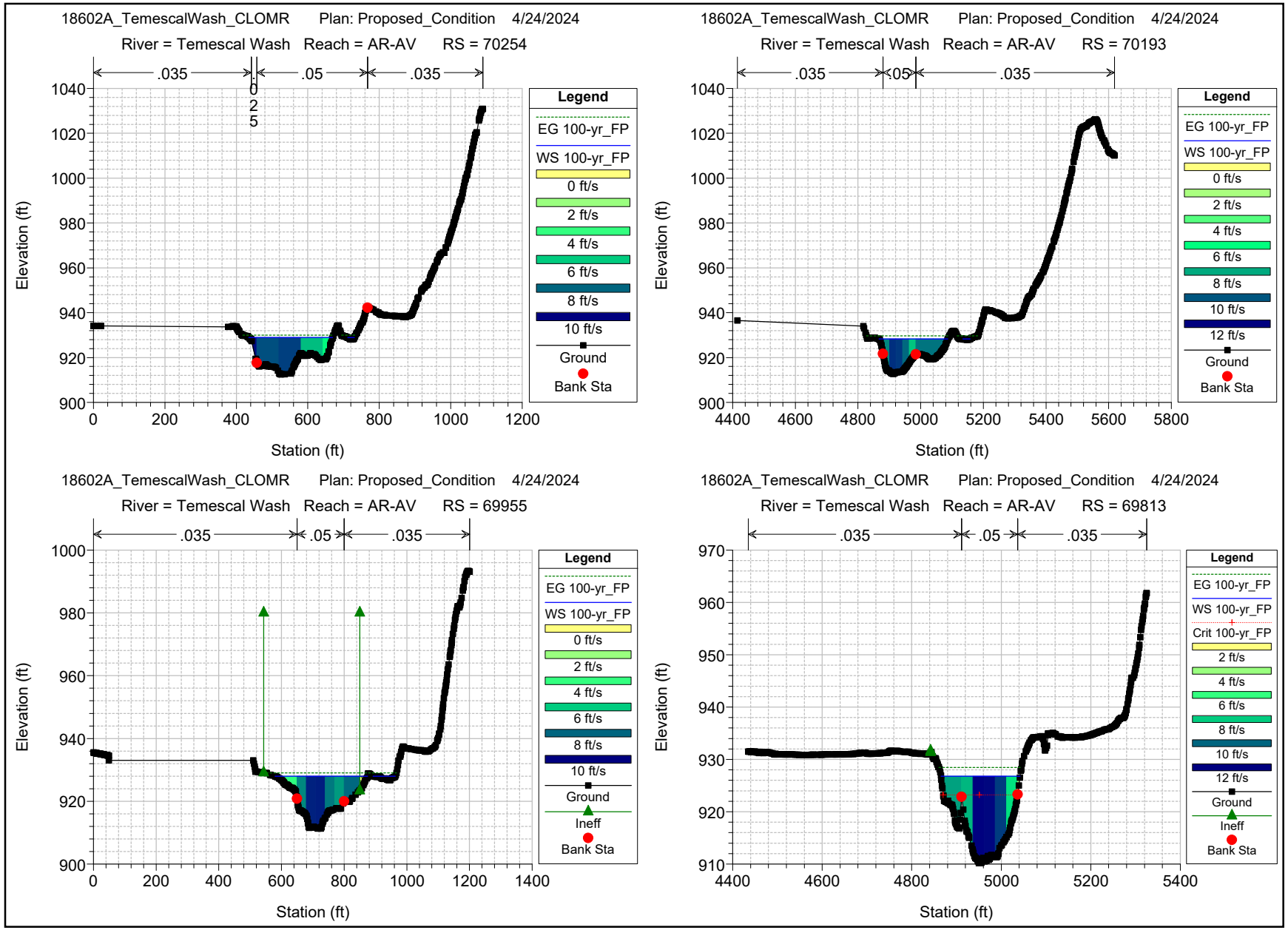
HEC-RAS Plan: Proposed River: Temescal Wash Reach: AR-AV Profile: 100-yr_FP

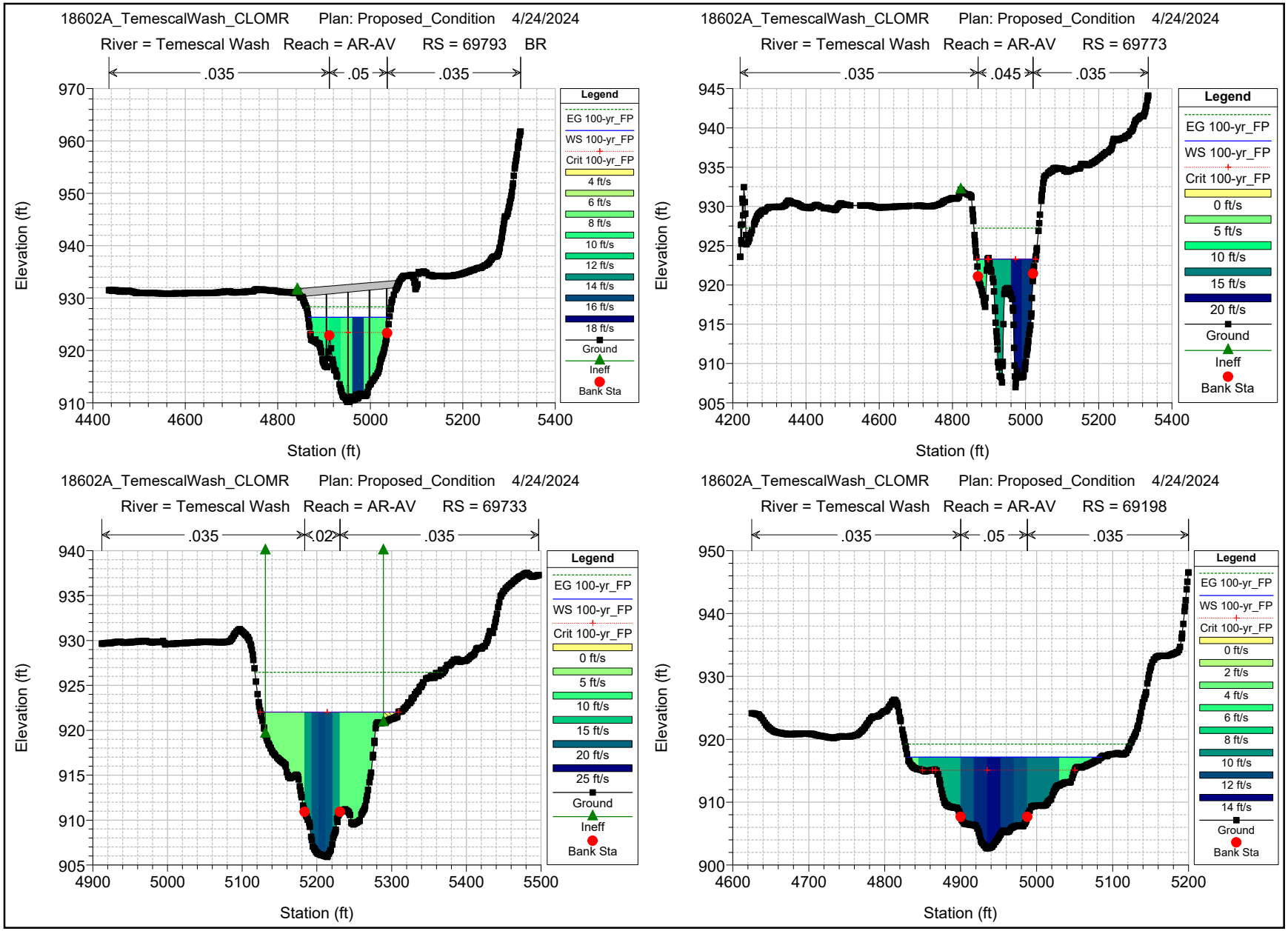
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
AR-AV	73193	100-yr_FP	15900.00	940.15	946.87	946.87	947.93	0.012254	5.48	2049.37	1081.48	0.65
AR-AV	72643	100-yr_FP	15900.00	931.32	942.32		942.86	0.002276	5.92	2718.64	340.60	0.36
AR-AV	71893	100-yr_FP	15900.00	926.34	938.03	938.03	940.52	0.012503	13.27	1310.11	252.82	0.82
AR-AV	71060	100-yr_FP	15900.00	918.19	932.23		933.20	0.003472	7.95	2035.82	216.63	0.45
AR-AV	70973	100-yr_FP	15900.00	917.84	931.93		932.95	0.003605	8.18	1977.02	204.85	0.46
AR-AV	70743	100-yr_FP	19400.00	915.50	930.41		931.90	0.006459	9.83	1985.42	248.50	0.59
AR-AV	70579	100-yr_FP	19400.00	915.16	929.93		930.97	0.003737	8.17	2371.78	250.93	0.46
AR-AV	70292	100-yr_FP	19400.00	912.55	929.37		930.06	0.002193	6.73	2896.59	274.98	0.36
AR-AV	70254	100-yr_FP	19400.00	912.53	928.96		929.94	0.003224	7.82	2455.36	253.50	0.43
AR-AV	70193	100-yr_FP	19400.00	912.81	928.27		929.67	0.003765	9.69	2053.59	243.24	0.48
AR-AV	69955	100-yr_FP	19400.00	911.32	927.98		929.02	0.002725	8.34	2431.13	366.20	0.41
AR-AV	69813	100-yr_FP	19400.00	910.17	926.80	923.20	928.47	0.004515	10.56	1888.80	176.83	0.52
AR-AV	69793		Bridge									
AR-AV	69773	100-yr_FP	19400.00	906.99	923.27	923.27	927.24	0.017828	16.00	1219.02	159.04	0.99
AR-AV	69733	100-yr_FP	19400.00	905.90	922.03	922.03	926.46	0.002146	19.73	1499.19	184.95	0.92
AR-AV	69198	100-yr_FP	19400.00	902.66	917.17	915.09	919.22	0.006676	12.54	1748.62	254.79	0.64
AR-AV	68448	100-yr_FP	19400.00	898.21	911.03	910.56	913.56	0.008774	13.29	1558.83	249.78	0.72
AR-AV	67548	100-yr_FP	19400.00	900.00	910.10	906.31	910.43	0.001216	3.32	4561.87	727.77	0.24

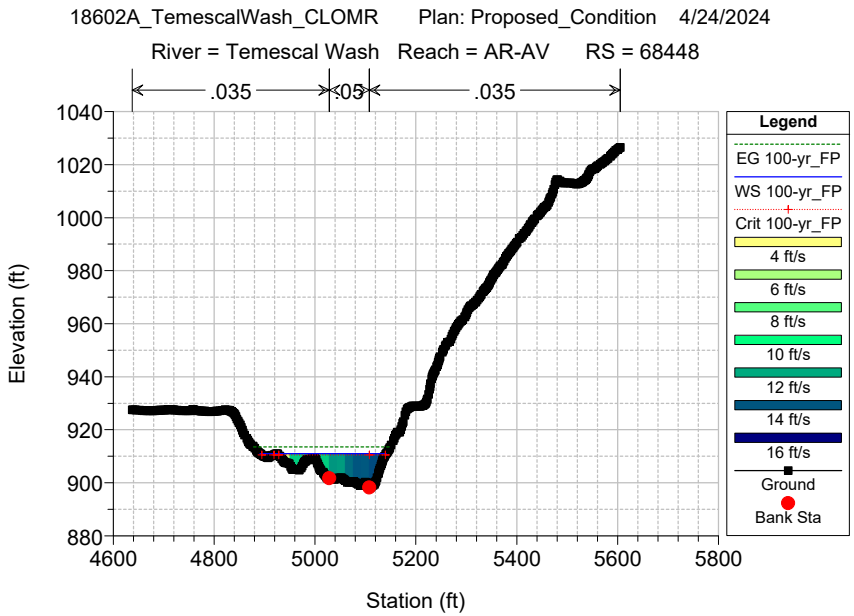

18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
Temescal Wash AR-AV
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
Ground
Elevation (ft)
950
940
930
920
910
900
890
880
0
1000
2000
3000
4000
5000
6000
7000
Main Channel Distance (ft)
67548
68448
69198
69733
69955
70193
70579
70743
70973
71893
72643
73193

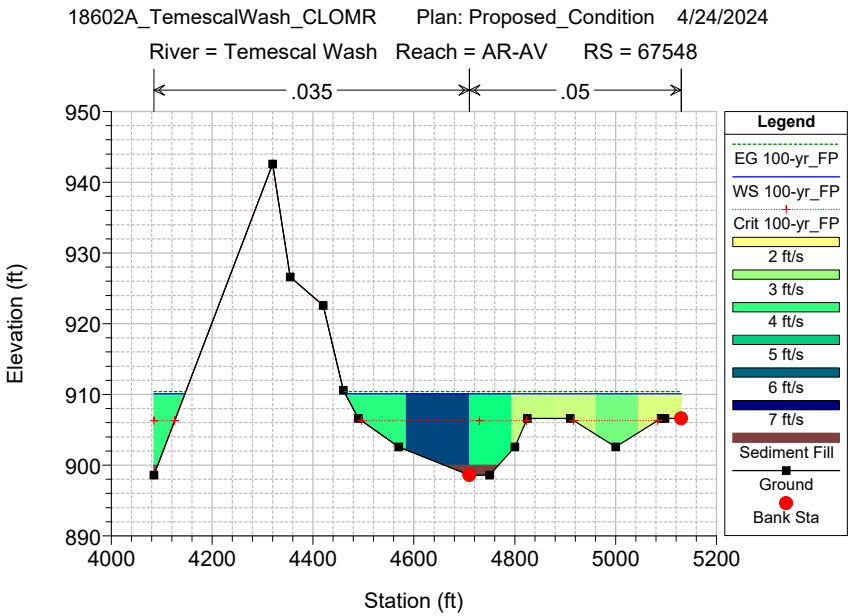

18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 73193
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 72643
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 71893
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 71060
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta


18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70973
.035
.048
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70743
.035
.025
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70579
.035
.025
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70292
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta


18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70254
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 70193
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69955
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69813
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta


18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69793 BR
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69773
.035
.045
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Ineff
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69733
.035
.02
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
25 ft/s
Ground
Ineff
Bank Sta
18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 69198
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta


18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 68448
.035
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta


18602A_TemescalWash_CLOMR Plan: Proposed_Condition 4/24/2024
River = Temescal Wash Reach = AR-AV RS = 67548
.035
.05
Elevation (ft)
Station (ft)
Legend
EG 100-yr_FP
WS 100-yr_FP
Crit 100-yr_FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Sediment Fill
Ground
Bank Sta

Appendix D

Proposed Flood Extents Exhibit

NOTES

1. ELECTRONIC SHAPEFILES OF PROPOSED FLOOD EXTENTS ARE AVAILABLE WITH APPENDIX G OF THE HYDRAULIC REPORT.

DAWSON ROAD NORTH

DAWSON ROAD SOUTH

TEMESCAL ROAD

N

200 100 0 200 400 600

GRAPHIC SCALE 1" = 200'

LEGEND:

- PROPOSED TEMESCAL WASH FLOOD EXTENTS
- PROPOSED COLDWATER CREEK WASH FLOOD EXTENTS
- FEMA 100-YEAR FLOODPLAIN (TEMESCAL WASH)
- EXISTING FLOOD HAZARD ZONE LIMITS
- APPROXIMATE PROPOSED FLOOD HAZARD ZONE LIMITS

FLOOD EXTENTS STUDY MAP FOR TEMESCAL VALLEY COMMERCE CENTER (POST-PROJECT)

Date: January 4, 2021
Revised: September 24, 2021
Revised: September 29, 2022
Revised: May 2, 2024

J-18602-A

RICK ENGINEERING COMPANY
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J-18602A

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NOT FOR CONSTRUCTION - EXHIBIT FOR HYDRAULIC ANALYSIS REPORT ONLY

Appendix E

Temescal Wash Sediment Transport Analysis Results

1. Tabulated Results
2. Simulated Channel Bed Profile
3. Sediment Transport Workmap
4. Supplemental Calculations

Temescal Wash Scour Analysis Results (feet)

Sed. Transport Results; Proposed w/ 1/2 Ton Grade Control

	xs	Initial Thalweg	Min. Scour Elevation	Max Deposition Elevation	Max Scour Depth	Max Deposition Depth	Bedform Scour Depth[1]	Max Total Scour
	73194	951.72	951.72	951.72	0.00	0.00	0.43	-0.43
	73193.8	952.86	952.39	952.86	-0.47	0.00	0.59	-1.05
	73193.7	951.51	951.39	951.76	-0.12	0.25	0.24	-0.36
	73193.5	950.85	949.12	950.85	-1.73	0.00	0.25	-1.98
	73193.3	948.85	946.62	948.91	-2.23	0.06	0.34	-2.57
	73193.2	947.48	944.48	947.48	-3.00	0.00	0.68	-3.69
	72491	943.10	940.93	943.10	-2.17	0.00	1.60	-3.77
	72218	938.14	938.14	942.98	0.00	4.84	0.15	-0.15
	72080	942.05	940.02	942.05	-2.03	0.00	0.41	-2.44
	71922.5	-	-	-	-	-	-	-
	71986	932.00	926.92	932.00	-5.08	0.00	2.21	-7.29
	71973	930.82	930.82	932.00	0.00	1.18	0.24	-0.24
	71946	930.65	929.74	930.67	-0.91	0.02	0.46	-1.37
	71924	930.11	928.87	930.11	-1.24	0.00	0.76	-2.00
Upstream XS AU ----->	71893	926.34	924.49	926.34	-1.85	0.00	1.05	-2.91
	71394	922.18	921.45	922.22	-0.73	0.04	1.75	-2.48
	71135	918.97	918.94	919.65	-0.03	0.68	1.14	-1.17
	71060	918.19	918.01	919.13	-0.18	0.94	0.84	-1.02
	70973	917.84	917.81	919.12	-0.03	1.28	0.90	-0.92
Approximate Proposed CCW ----->	70743	915.50	915.16	916.00	-0.34	0.50	1.42	-1.76
	70579	915.16	914.18	915.16	-0.98	0.00	1.00	-1.98
	70292	912.55	912.36	912.80	-0.19	0.25	0.67	-0.86
	70254	912.53	912.14	912.60	-0.39	0.07	0.96	-1.35
	70193	912.39	911.45	912.44	-0.94	0.05	1.25	-2.19
	69955	911.32	910.24	911.33	-1.08	0.01	1.04	-2.12
Dawson Road North ------->	69813	910.55	910.49	910.81	-0.06	0.26	3.30	-3.35
Bridge ------->	-	-	-	-	-	-	-	-
	69773	906.99	906.77	907.32	-0.22	0.33	2.23	-2.45
	69733	905.90	898.88	905.90	-7.02	0.00	1.83	-8.84
	69440	904.78	897.41	904.78	-7.37	0.00	3.07	-10.45
	69198	902.66	897.13	902.70	-5.53	0.04	1.22	-6.74
	68819	900.39	895.22	900.40	-5.17	0.01	1.40	-6.57
	68448	898.15	894.41	898.15	-3.74	0.00	1.95	-5.69
	67957	894.20	893.26	894.24	-0.94	0.04	2.00	-2.94
	67548	890.88	890.73	890.92	-0.15	0.04	0.71	-0.87

Note 1: (Kennedy 1963) Bedform scour depth below original bed = ½ of antidune height from crest to trough calculated per propc

Appendix E1

Tabulated Results

Temescal Wash Scour Analysis Results (feet)

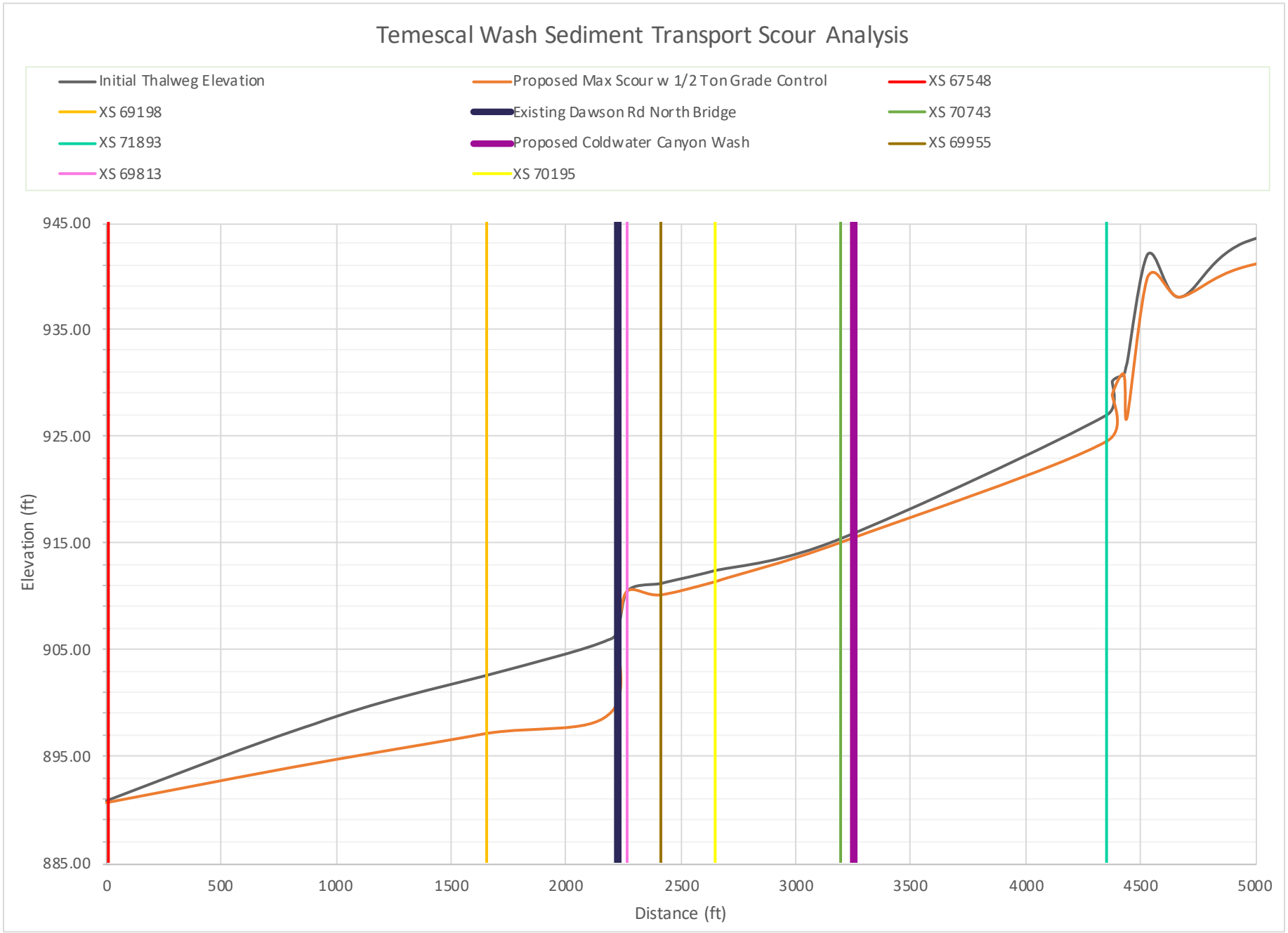
Sed. Transport Results; Proposed w/ 1/2 Ton Grade Control

	xs	Initial Thalweg	Min. Scour Elevation	Max Deposition Elevation	Max Scour Depth	Max Deposition Depth	Bedform Scour Depth[1]	Max Total Scour
	73194	951.72	951.72	951.72	0.00	0.00	0.43	-0.43
	73193.8	952.86	952.39	952.86	-0.47	0.00	0.59	-1.05
	73193.7	951.51	951.39	951.76	-0.12	0.25	0.24	-0.36
	73193.5	950.85	949.12	950.85	-1.73	0.00	0.25	-1.98
	73193.3	948.85	946.62	948.91	-2.23	0.06	0.34	-2.57
	73193.2	947.48	944.48	947.48	-3.00	0.00	0.68	-3.69
	72491	943.10	940.93	943.10	-2.17	0.00	1.60	-3.77
	72218	938.14	938.14	942.98	0.00	4.84	0.15	-0.15
	72080	942.05	940.02	942.05	-2.03	0.00	0.41	-2.44
	71922.5	-	-	-	-	-	-	-
	71986	932.00	926.92	932.00	-5.08	0.00	2.21	-7.29
	71973	930.82	930.82	932.00	0.00	1.18	0.24	-0.24
	71946	930.65	929.74	930.67	-0.91	0.02	0.46	-1.37
	71924	930.11	928.87	930.11	-1.24	0.00	0.76	-2.00
Upstream XS AU ----->	71893	926.34	924.49	926.34	-1.85	0.00	1.05	-2.91
	71394	922.18	921.45	922.22	-0.73	0.04	1.75	-2.48
	71135	918.97	918.94	919.65	-0.03	0.68	1.14	-1.17
	71060	918.19	918.01	919.13	-0.18	0.94	0.84	-1.02
	70973	917.84	917.81	919.12	-0.03	1.28	0.90	-0.92
Approximate Proposed CCW ----->	70743	915.50	915.16	916.00	-0.34	0.50	1.42	-1.76
	70579	915.16	914.18	915.16	-0.98	0.00	1.00	-1.98
	70292	912.55	912.36	912.80	-0.19	0.25	0.67	-0.86
	70254	912.53	912.14	912.60	-0.39	0.07	0.96	-1.35
	70193	912.39	911.45	912.44	-0.94	0.05	1.25	-2.19
	69955	911.32	910.24	911.33	-1.08	0.01	1.04	-2.12
Dawson Road North ------->	69813	910.55	910.49	910.81	-0.06	0.26	3.30	-3.35
Bridge ------->	-	-	-	-	-	-	-	-
	69773	906.99	906.77	907.32	-0.22	0.33	2.23	-2.45
	69733	905.90	898.88	905.90	-7.02	0.00	1.83	-8.84
	69440	904.78	897.41	904.78	-7.37	0.00	3.07	-10.45
	69198	902.66	897.13	902.70	-5.53	0.04	1.22	-6.74
	68819	900.39	895.22	900.40	-5.17	0.01	1.40	-6.57
	68448	898.15	894.41	898.15	-3.74	0.00	1.95	-5.69
	67957	894.20	893.26	894.24	-0.94	0.04	2.00	-2.94
	67548	890.88	890.73	890.92	-0.15	0.04	0.71	-0.87

Note 1: (Kennedy 1963) Bedform scour depth below original bed = ½ of antidune height from crest to trough calculated per propc

Appendix E2

Simulated Channel Bed Profile


Temescal Wash Sediment Transport Scour Analysis
Initial Thalweg Elevation
Proposed Max Scour w 1/2 Ton Grade Control
XS 67548
XS 69198
Existing Dawson Rd North Bridge
XS 70743
XS 71893
Proposed Coldwater Canyon Wash
XS 69955
XS 69813
XS 70195
945.00
935.00
925.00
915.00
905.00
895.00
885.00
Elevation (ft)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Distance (ft)

Appendix E3

Sediment Transport Workmap

67548
67957
68448
68819
69198
69440
69733
69773
69955
70193
70292
70579
70973
71135
71394
71973
71946
71986
72491
73193.2
73193.3
73193.5
73193.8
73194
70743
Test Pit 3
Test Pit 5
S-1
S-2
S-3
S-4
S-5
Two Bridge S-2

Legend

- Proposed Improvements
- XSections
- River
- Banks
- Existing Riprap
- Roads
- USGS_5ft_Clip
- Test Pit Location

RICK ENGINEERING COMPANY

0 250 500 1,000 Feet

N

Date of Exhibit: 5/1/2024

Temescal Wash
Sediment Transport Map
JN-18602B

Appendix E4

Supplemental Calculations

RICK ENGINEERING COMPANY™
5620 Friars Road
San Diego, CA 92110-2596
Tel: (619) 291-0707
Fax: (619) 291-4165

Date 5/1/2023
Job No. 18602
Page
Done By JK
Checked By CVM

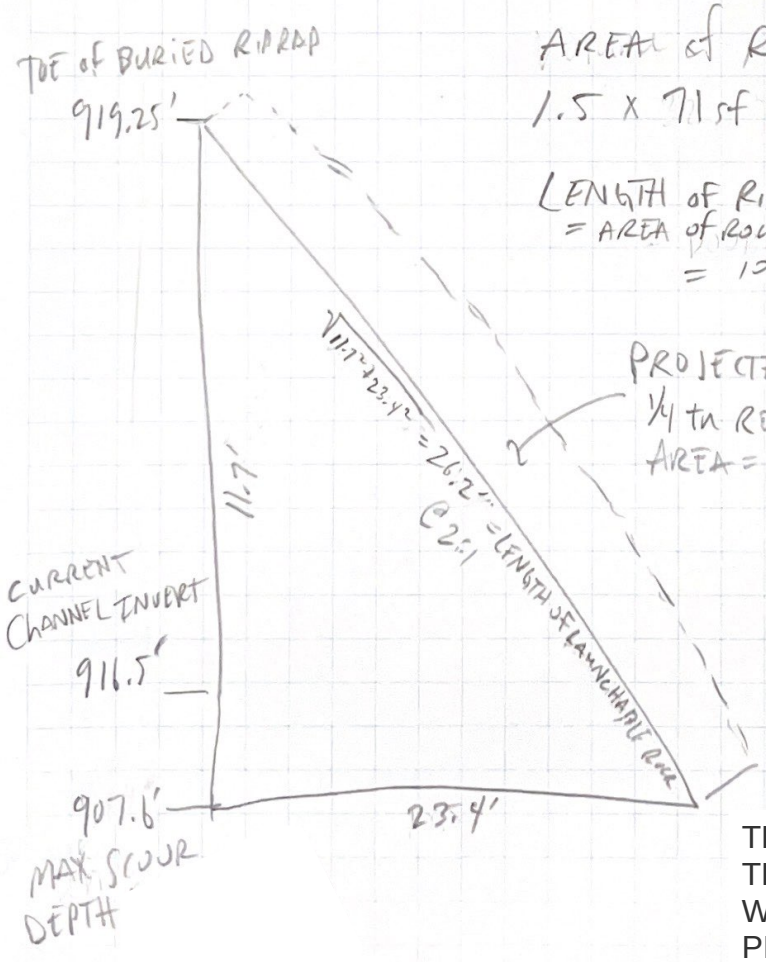
Top of Rip Rap = 922'

Toe of Rip Rap = 919.25'

1/4 TON Rip Rap Thickness = 2.75'

~ Approximate Channel Invert = 916.5'

DESIGN SCOUR DEPTH W/ FOS = 8.9'



AREA of Rock Required = 1.5 tims (PER HEC11 FIG 22)
1.5 x 71 sf = 107 sf

LENGTH of RIP RAP SECTION
= AREA of ROCK REQUIRED ÷ DOUBLE THICKNESS of RIP RAP
= 107 ÷ 5.5 = 19.5'

PROJECTED LAUNCHED 1/4 tn ROCK WITH T=2.7'
AREA = 71 SF

MINIMUM LENGTH of DOUBLE THICKNESS RIP RAP = 19.5'

THIS MIN. LENGTH OF DOUBLE THICKNESS RIPRAP WILL BE PROVIDED WITH THE REVISED FINAL DESIGN PLANS TO PROVIDE LAUNCHABLE ROCK AT THE CCW OUTFALL BEYOND THE DESIGN SCOUR DEPTH.

Appendix F

Comment Log

Temescal Valley Commerce Center Offsite Improvements
COMMENT/RESPONSE LOG

PROJECT:			**Temescal Valley Commerce Center Offsite Improvements**							DATE OF SUBMITTAL: 10/04/2022							
REVIEW DOCUMENT:			**2nd Submittal - RCFC**							DATE COMMENTS RETURNED: 11/07/2022							
REFERENCE				**COMMENT**						**RESPONSE**							
				Comment Codes: **M**=Mandatory Response; **S**=Suggested Correction; **Q**=Question; **G**=General Comment; **R**=Resubmit with Revised Info						Response Codes: **A**=Agree, will revise; **D**=Disagree, see explanation; **F**=Follow up required; **G**=General Response							
Mstr Cmt #	Cmt #	Dwg/Sec	Page/Sht #	Code	Comment Description	By/ Org	Agency	Date		Code	Response	By/ Org	Agency/ Company	Date	Verified By	Date	
Coldwater Creek Wash Realignment Plans																	
1	1	Title sheet	1	**M**	Show test pit (TP) on index map	MDegaga	LAN	11/7/2022		**A**	Index Map has been revised	HR	RICK	11/22/2022	DN	5/1/24	
2	2	Title sheet	1	**M**	Remove unnecessary lines and or screen out by using different line styles and weights on index map	MDegaga	LAN	11/7/2022		**A**	To be revised.	HR	RICK	11/22/2022	DN	5/1/24	
3	3	Title sheet	1	**M**	Provide alignment data for that portion of work at the confluence of Temescal Wash and Coldwater Canyon Wash	MDegaga	LAN	11/7/2022		**A**	Alignment data has been provided for Coldwater Creek Wash and the alignment for Dawson Canyon Road has been provided for the slope stabilization work.	HR	RICK	11/22/2022	DN	5/1/24	
4	4	Title sheet	1	**M**	Provide egress and ingress to all maintenance access	MDegaga	LAN	11/7/2022		**A**	Access has been provided to Coldwater Creek Wash Channel and to the outfall off of Dawson Canyon Road.	HR	RICK	11/22/2022	DN	5/1/24	
5	5	Plan & profile	3	**Q**	Guardrails? Parapet wall?	MDegaga	LAN	11/7/2022		**G**	Barrier and Parapet wall have been provided.	HR	RICK	11/22/2022	DN	5/1/24	
6	6	Plan & profile	3	**M**	At 25 fps, at the mouth of the bridge, having rock protection is unacceptable	MDegaga	LAN	11/7/2022		**A**	This is to be concrete lined; channel bottom and slopes. A cut off wall is proposed at the interface between the proposed rip rap at both ends of the headwall.	HR	RICK	11/22/2022	DN	5/1/24	
7	7	Plan & profile	3	**M**	Show type of armoring for side slope	MDegaga	LAN	11/7/2022		**G**	Rip Rap will line both sides of the channel as shown in plan view. It is not appropriate to show this in the profile view.	HR	RICK	11/22/2022	DN	5/1/24	
8	8	Plan & profile	3	**Q**	HGL below invert?	MDegaga	LAN	11/7/2022		**G**	HGL to be revised.	HR	RICK	11/22/2022			
9	9	Plan & profile	3	**Q**	Is this a grade break?	MDegaga	LAN	11/7/2022		**G**	Yes, this is a grade break. A callout has been added to the profile.	HR	RICK	11/22/2022	DN	5/1/24	
10	10	Plan & profile	3	**G**	Low flow can easily undermine the rock	MDegaga	LAN	11/7/2022		**G**	The location of a cutoff wall at station 13+39.06 is intended to prevent the creation of a preferential flow path by low flows under the riprap armoring and underlying filter blanket material.	CM	RICK	12/22/2022	DN	5/1/24	
11	11	Plan & profile	3	**M**	Not enough armoring. the soil under the riprap would easily be eroded from both Temescal Wash and Coldwater Canyon.	MDegaga	LAN	11/7/2022		**D**	Filter blanket material is to be placed beneath the riprap pad to prevent erosion of the underlying soil. The proposed rip rap pad is placed at a double thickness to allow for "sacrificial rock" for eventual repositioning of the Temescal Wash channel bank downstream of the concrete cutoff wall at station 11+50.52. This design approach is taken because of the environmental limits that prevent the placement of additional riprap closer to the flowline of Temescal Wash. It should be noted that the 1/4 ton riprap is sized to withstand the tractive forces calculated for Temescal Wash, and a backwater condition is anticipated to exist from the WSE in Temescal Wash during any significant discharge from CCW.	CM	RICK	12/22/2022	DN	5/1/24	
12	12	Plan & profile	3	**M**	Provide detail for this confluence with line data, armoring etc.	MDegaga	LAN	11/7/2022		**G**	See updated plans. Outfall access ramp has changed location based on discussion with RCFC.	HR	RICK	11/22/2022	DN	5/1/24	
13	13	Plan & profile	3	**M**	Explain these lines? Show any grading within Temescal Wash	MDegaga	LAN	11/7/2022		**G**	Lines are the environmental jurisdictional limits. Plans have been revised to only show these limits on sheet 11 for clarity.	HR	RICK	11/22/2022	DN	5/1/24	
14	14	Plan & profile	3	**M**	Provide typical section for this area	MDegaga	LAN	11/7/2022		**A**	Typical section has been provided on the structural sheets.	HR	RICK	11/22/2022	DN	5/1/24	
15			3	**M**	5 or 6?	MDegaga	LAN	11/7/2022		**A**	Construction note 5 to be added to side slopes.	HR	RICK	11/22/2022	DN	5/1/24	
16	15	Plan & profile	3	**G**	Contour does not seem to catch grade, check all	MDegaga	LAN	11/7/2022		**G**	The grading of the left bank of channel to match onsite grading and not the existing contours. On site grading will be added to the plans once complete.	HR	RICK	11/22/2022	DN	5/1/24	
17	16	Plan & profile	3	**M**	Provide a staging area adjacent to Dawson Canyon Road S.	MDegaga	LAN	11/7/2022		**G**	Access along Dawson Canyon Road South has been agreed upon with the District. A turn around area is being provided on the onsite development with an easement. See revised plans.	HR	RICK	11/22/2022	DN	5/1/24	
18	17	Plan & profile	3	**Q**	What does this (Project/Environmental limits) mean?	MDegaga	LAN	11/7/2022		**G**	The project/environmental limits indicate overall project impact due to grading and temporary construction access. This boundary was determined by the overall project grading impact, construction work zone, and avoidance of any environmentally sensitive areas.	HR	RICK	11/22/2022	DN	5/1/24	
19	18	Plan & profile	3	**G**	The plan looks too busy, having these points on a separate sheet might help.	MDegaga	LAN	11/7/2022		**G**	Detail sheets have been added to each drop structure to improve clarity on the plan and profile sheets.	HR	RICK	11/22/2022	DN	5/1/24	
20	19	Plan & profile	3	**G**	RCFC & WCD attribute standard drawings to agency	MDegaga	LAN	11/7/2022		**G**	Construction notes revised to indicate RCFC & WCD.	HR	RICK	11/22/2022	DN	5/1/24	
21	20	Plan & profile	4	**G**	Soil sample to 12 feet. May need to provide additional information	MDegaga	LAN	11/7/2022		**G**	Based on discussion with the Geotech, the cave-in that occurred here was minor and likely due to groundwater entering the pit. Additionally, previous borings were completed near this location showing possible bedrock at 10 feet. This was documented in a Geotechnical Investigation report by NorCal Engineering in 2017. See provided report.	HR	RICK	11/22/2022	DN	5/1/24	
22	21	Plan & profile	4	**M**	Show how grading ties to existing	MDegaga	LAN	11/7/2022		**G**	A new detail will be added to show the grading at this location.	HR	RICK	11/22/2022	DN	5/1/24	

Temescal Valley Commerce Center Offsite Improvements
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23	22	Plan & profile	4	**G**	Ground water within 12 ft, minor cave in	MDegaga	LAN	11/7/2022		**G**	Based on discussion with the Geotech, the cave-in that occurred here was minor and likely due to groundwater entering the pit. Additionally, previous borings were completed near this location showing possible bedrock at 10 feet. This was documented in a Geotechnical Investigation report by NorCal Engineering in 2017. See provided report.	HR	RICK	11/22/2022	DN	5/1/24
24	23	Plan & profile	4	**M**	Impossible to make turn with a planned median within Temescal Canyon Road	MDegaga	LAN	11/7/2022		**A**	Noted. Driveway location connecting to access road to be revised to accommodate vehicle turning and the access road has been realigned to be perpendicular at the entrance.	HR	RICK	11/22/2022	DN	5/1/24
25	24	Plan & profile	5	**M**	need a turnaround	MDegaga	LAN	11/7/2022		**G**	A turn around area is being provided just upstream of this location.	HR	RICK	11/22/2022	DN	5/1/24
26	25	Plan & profile	5	**M**	provide access ramp on the right side of the channel	MDegaga	LAN	11/7/2022		**D**	Per previous coordination with RCFC, no access ramps will be provided on the right side of the channel due to the environmental limitations of the conservation area. This was agreed upon with RCFC prior to proceeding with the 2nd submittal that access ramps only on the left side are acceptable but turn arounds are being provided on both sides.	HR	RICK	11/22/2022	DN	5/1/24
27	26	Plan & profile	5	**M**	Easement for this OHE need to be clarified	MDegaga	LAN	11/7/2022		**A**	Existing easements to be shown on plans.	HR	RICK	11/22/2022		
28	27	Plan & profile	5	**M**	Elevation of riprap	MDegaga	LAN	11/7/2022		**G**	Depth indicated on plan view in construction notes.	HR	RICK	11/22/2022	DN	5/1/24
29	28	Plan & profile	5	**Q**	final grading contour?	MDegaga	LAN	11/7/2022		**A**	Yes, this contour is a final grading contour. Proposed contours to be shown more clearly on plans for clarity.	HR	RICK	11/22/2022	DN	5/1/24
30	29	Plan & profile	5	**M**	provide cutoff wall.	MDegaga	LAN	11/7/2022		**G**	A cutoff wall has been provided.	HR	RICK	11/22/2022	DN	5/1/24
31	30	Plan & profile	5	**M**	this is made up of undocumented fill up to 10 ft? Need verification that the armoring has competent bedding material and also the bedding material is good without being armored.	MDegaga	LAN	11/7/2022		**G**	Previous borings were completed near this location showing possible bedrock at 10 feet. This was documented in a Geotechnical Investigation report by NorCal Engineering in 2017. See provided report.	HR	RICK	11/22/2022	DN	5/1/24
32	31	Plan & profile	5	**M**	Cloud around construction note 13	MDegaga	LAN	11/7/2022		**G**	Chainlink fence is provided on either side of the access ramp to prevent unwarranted access.	HR	RICK	11/22/2022	DN	5/1/24
33	32	Plan & profile	5	**S**	If District to maintain facility provide easement	MDegaga	LAN	11/7/2022		**A**	Easement to be provided in final mapping.	HR	RICK	11/22/2022	DN	5/1/24
34	33	Plan & profile	5	**M**	District has to have access to end of channel including turnaround. move fence to include channel and right of way and provide turnaround	MDegaga	LAN	11/7/2022		**G**	The fence will be moved to the end of the proposed channel limits. The area room and flat area is provided to allow for a turn around at the end of the channel limits.	HR	RICK	11/22/2022	DN	5/1/24
35	34	Plan & profile	5	**Q**	exactly what does this mean? no touch area? no maintenance? remove if there is no relevance to the channel maintenance	MDegaga	LAN	11/7/2022		**A**	These lines have been removed from plan and profile sheets. The lines were intended to document agency regulatory limits, but this is being taken care of with the environmental document.	HR	RICK	11/22/2022	DN	5/1/24
36	35	Plan & profile	5	**M**	this is a weak link in the channel. there is a potential for storm water to flank the left side of the channel. tie channel bank to high ground, make the channel wide enough so that there is no flow restriction.	MDegaga	LAN	11/7/2022		**F**	The grading has been revised to widen the intercept area. The upstream limit of the interim channel improvements presented with this plan set are set to the existing width of the channel. The hydraulic calculations indicate that flow is fully contained within the armored banks.	CM	RICK	5/2/2024		
37	36	Plan & profile	5	**M**	potential head cutting and thus significant erosion to the channel bank and bed	MDegaga	LAN	11/7/2022		**F**	The grading has been revised to widen the intercept area and a cutoff wall has been added. The hydraulic calculations indicate that flow is fully contained within the armored banks and that the armored banks will be stable for the design flow rate.	CM	RICK	5/2/2024		
38	37	Plan & profile	5	**M**	orient access ramp to face downstream	MDegaga	LAN	11/7/2022		**D**	Per prior discussion with RCFC, the access ramp here is a temporary condition due to the project constraints. There is not enough room to provide a downstream facing access ramp without significantly impacting the environmental impact limits. This access ramp will be reconstructed in the future to face downstream once the ultimate condition is constructed by Serrano.	HR	RICK	11/22/2022	DN	5/1/24
39	38	Plan & profile	5	**Q**	explain what interim/ultimate mean?	MDegaga	LAN	11/7/2022		**G**	The ultimate condition is the completion of the channel and overcrossing extension of Temescal Canyon Road to the Serrano property. The interim condition is the portion of the channel just upstream of the limit line as shown on the plans. This portion of the channel will be reconstructed with the Serrano project.	HR	RICK	11/22/2022	DN	5/1/24

Temescal Valley Commerce Center Offsite Improvements
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40	39	Plan & profile	5	**G**	grading does not seem to daylight	MDegaga	LAN	11/7/2022	**A**	Only major contours are being shown for the side slope grading for clarity. Plans will be edited to only show majors everywhere along the channel to avoid confusion.	HR	RICK	11/22/2022	DN	5/1/24
41	40	Plan & profile	5	**M**	too busy, screen out non plan related lines, use light wt or style lines.	MDegaga	LAN	11/7/2022	**A**	Revised.	HR	RICK	11/22/2022	DN	5/1/24
42	41	Plan & profile	5	**M**	follow drafting standards to show hydraulic data	MDegaga	LAN	11/7/2022	**A**	Hydraulic data and slope callouts to be revised per RCFC drafting standards.	HR	RICK	11/22/2022	DN	5/1/24
43	42	Plan & profile	5	**G**	this is too sharp to make a turn into the access road	MDegaga	LAN	11/7/2022	**A**	Noted. Driveway location connecting to access road to be revised to accommodate vehicle turning and the access road has been realigned to be perpendicular at the entrance.	HR	RICK	11/22/2022	DN	5/1/24
44	43	Plan & profile	5	**M**	need to include this area as part of District Right of way.	MDegaga	LAN	11/7/2022	**G**	Right of way will be included at this location.	HR	RICK	11/22/2022	DN	5/1/24
45	44	Plan & profile	5	**M**	show District R/W limits	MDegaga	LAN	11/7/2022	**G**	Revised.	HR	RICK	11/22/2022	DN	5/1/24
46	45	Plan & profile	5	**G**	this sheet is too busy to even review. Please follow drafting standards.	MDegaga	LAN	11/7/2022	**G**	Revised.	HR	RICK	11/22/2022	DN	5/1/24
47	46	Channel Sections	6	**Q**	is there a toe down	MDegaga	LAN	11/7/2022	**G**	The proposed rip rap will be embedded into the channel as shown on standard drawing CH325. An additional callout has been added to reference the standard for toe down.	HR	RICK	11/22/2022	DN	5/1/24
48	47	Outfall Detail	7	**M**	provide a section along this line	MDegaga	LAN	11/7/2022	**G**	This is along the centerline of the channel and is therefore shown on the plan and profile sheet 3.	HR	RICK	11/22/2022	DN	5/1/24
49	48	Outfall Detail	7	**M**	Confusing, please show clearly which lines represent CDFW and grading limits. While it is OK to show such lines, it should clearly indicate the limits of District's maintenance plan.	MDegaga	LAN	11/7/2022	**A**	Revised.	HR	RICK	11/22/2022	DN	5/1/24
50	49	Outfall Detail	7	**M**	this area is subject to erosion from Temescal Wash. need adequate protection measure for the access road	MDegaga	LAN	11/7/2022	**G**	See updated plans. Outfall access ramp has changed location based on discussion with RCFC. The slope is stabilized with soil cement as recommended by RCFC.	HR	RICK	11/22/2022	DN	5/1/24
51	50	Outfall Detail	7	**M**	this whole area is subject to frequent flows from Temescal Wash, which would undermine all of the bridge, maintenance pad and ramp etc.	MDegaga	LAN	11/7/2022	**G**	See updated plans. Outfall access ramp has changed location based on discussion with RCFC. The slope is stabilized with soil cement as recommended by RCFC.	HR	RICK	11/22/2022	DN	5/1/24
52	51	Outfall Detail	7	**M**	provide staging area for loading and unloading maintenance vehicle	MDegaga	LAN	11/7/2022	**D**	Based on discussions with the RCFC and Proficiency Capital, a loading/unloading area will be provided on the commerce center site. Additionally, a pull off area is being provided along Dawson Canyon Road. See updated plans.	HR	RICK	11/22/2022	DN	5/1/24
53	52	Outfall Detail	7	**M**	District needs access at the bottom for the entire improved area to be able to restore any failure.	MDegaga	LAN	11/7/2022	**G**	See updated plans. Outfall access ramp has changed location based on discussion with RCFC. Easement has been provided as is feasible to meet the environmental restrictions on this project.	HR	RICK	11/22/2022	DN	5/1/24
54	53	Access Ramp Detail	8	**Q**	Where is this? show this on plan and profile sheet	MDegaga	LAN	11/7/2022	**G**	Access ramp connection does not fit on plan and profile sheet in its entirety. The plan sheet 4 references this detail. Detail sheet will be revised to include station equations between CCW and Temescal Canyon Road, and contours will be revised to show grading more clearly.	HR	RICK	11/22/2022	DN	5/1/24
55	54	Access Ramp Detail	8	**G**	with the median in the way, this is no good access.	MDegaga	LAN	11/7/2022	**A**	Noted. Driveway location connecting to access road to be revised to accommodate vehicle turning and the access road has been realigned to be perpendicular at the entrance.	HR	RICK	11/22/2022	DN	5/1/24
56	55	Access Ramp Detail	9	**G**	the information on this sheet is useless without proper references/land marks etc. no grading shown etc. How does a heavy maintenance vehicle turn and drive into the access	MDegaga	LAN	11/7/2022	**G**	Access ramp connection does not fit on plan and profile sheet. The plan sheet 5 references this detail. Detail sheet will be revised to include station equations between CCW and Old Temescal Canyon Road, and contours will be revised to show grading more clearly. Driveway location connecting to access road to be revised to accommodate vehicle turning and the access road has been realigned to be perpendicular at the entrance.	HR	RICK	11/22/2022	DN	5/1/24
57	56	Storm Drain Profiles	10	**M**	need plans for this. If District to maintain, provide easement etc.	MDegaga	LAN	11/7/2022	**G**	Easement to be shown on plans. Plan for this storm drain system is shown on sheet 5 of the plan set.	HR	RICK	11/22/2022	DN	5/1/24
58	57	Storm Drain Profiles	10	**Q**	what exactly is this? provide info.	MDegaga	LAN	11/7/2022	**G**	Rock slope protection per junctions structure standard JS233 as called out on the storm drain profile.	HR	RICK	11/22/2022	DN	5/1/24
59	58	Maintenance Areas	11	**M**	This armoring has to be maintained. and needs to be clearly show maintenance limit	MDegaga	LAN	11/7/2022	**G**	See updated plans. Outfall access ramp has changed location based on discussion with RCFC. Easement has been provided as is feasible to meet the environmental restrictions on this project.	HR	RICK	11/22/2022	DN	5/1/24
60	59	Maintenance Areas	11	**M**	no to culvert and headwall maintenance	MDegaga	LAN	11/7/2022	**F**	The culvert and headwall are needed because it is a part of the Coldwater Creek Channel and is not part of the roadway improvements specifically. Will need agreement between RCFC and RCTD as to who will maintain this.	HR	RICK	11/22/2022	DN	5/1/24

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61	60	Maintenance Areas	11	**G**	this access road is useless without an egress and ingress	MDegaga	LAN	11/7/2022	**G**	Noted. Ingress and egress are shown on the roadway plans for Temescal Canyon Phase 2 and will be shown on these plans screened back.	HR	RICK	11/22/2022	DN	5/1/24
62	61	Maintenance Areas	11	**M**	need a staging area for a lowboy or similar, both sides of the channel	MDegaga	LAN	11/7/2022	**G**	Insufficient room to be able to provide staging are at adjacent to the onsite development. A staging area is being provided along Dawson Canyon Road (south) at the channel outfall per previous coordination with RCFC. Additionally, a turn around area is being provided within the commerce center which was agreed upon with RCFC.	HR	RICK	11/22/2022	DN	5/1/24
63	62	Maintenance Areas	11	**M**	show these areas as they relate to maintenance, no touch, no encroachment	MDegaga	LAN	11/7/2022	**A**	Updated based off of revised outfall access.The construction details show the environmental limits that cannot be encroached into.	HR	RICK	11/22/2022	DN	5/1/24
64	63	Maintenance Areas	11	**Q**	this stub appears to be for future bridge., how does the maintenance access interface with the bridge?	MDegaga	LAN	11/7/2022	**G**	This has been discussed at length during previous coordination meetings with RCFC. The adjacent Serrano project will be responsible for this.	HR	RICK	11/22/2022	DN	5/1/24
65	64	Maintenance Areas	11	**M**	specify if there is any maintenance restriction.	MDegaga	LAN	11/7/2022	**A**	Plan note has been updated to include restrictions due to access and environmental constraints.	HR	RICK	11/22/2022	DN	5/1/24
66	65	Structural Plans	12	**Q**	Perris, CA??	MDegaga	LAN	11/7/2022	**G**	Structural plans to be revised by subconsultant.	HR	RICK	11/22/2022		
67	66	Structural Plans	12	**G**	this is Dawson Canyon Road crossing over CW Canyon Channel	MDegaga	LAN	11/7/2022	**D**	Headwall per channel improvements. The construction of this will be completed with the overall Coldwater Creek Channel Improvements.	HR	RICK	11/22/2022		
68	67	Structural Plans	13	**Q**	Perris, CA??	MDegaga	LAN	11/7/2022	**G**	Structural plans to be revised by subconsultant.	HR	RICK	11/22/2022		
69	68	Structural Plans	13	**Q**	What is this???	MDegaga	LAN	11/7/2022	**G**	Structural plans to be revised by subconsultant.	HR	RICK	11/22/2022		
70	69	Structural Plans	13	**Q**	Flow direction?	MDegaga	LAN	11/7/2022	**G**	Structural plans to be revised by subconsultant.	HR	RICK	11/22/2022		
71	70	Structural Plans	14	**M**	headwall needs to be tapered out.	MDegaga	LAN	11/7/2022	**G**	the headwall at this location does not taper out. Please see plan and profile sheet 3.	HR	RICK	11/22/2022		
72	71	Structural Plans	15	**M**	Remove RCFC block	MDegaga	LAN	11/7/2022	**F**	Need clarification on who will be maintaining the headwall and culvert.	HR	RICK	11/22/2022		
73	72	Structural Plans	16	**M**	Remove RCFC block	MDegaga	LAN	11/7/2022	**F**	Need clarification on who will be maintaining the headwall and culvert.	HR	RICK	11/22/2022		
74	73	Structural Plans	17	**M**	Remove RCFC block	MDegaga	LAN	11/7/2022	**F**	Need clarification on who will be maintaining the headwall and culvert.	HR	RICK	11/22/2022		
Hydraulic Analysis Report for Temescal Valley Commerce Center															
75	1	Cover Sheet	1	**M**	Address redlines within	MDegaga	LAN	11/7/2022	**A**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
76	2	Cover Sheet	1	**M**	Justify use of ineffective flow areas within channel	MDegaga	LAN	11/7/2022	**A**	Discussion regarding ineffective flow areas assigned at the drop constrictions has been provided with the revised report in Section 2.2.	CM	RICK	12/21/2022	CM	5/2/2024
77	3	Cover Sheet	1	**M**	Justify use of the proposed rock slope protection sizes	MDegaga	LAN	11/7/2022	**A**	Backup has been provided with the revised Hydraulic Report.	JR	RICK	12/19/2022	CM	5/2/2024
78	4	Cover Sheet	1	**M**	Provide analysis for Temescal Wash to show impacts to Coldwater Canyon Wash or vice versa	MDegaga	LAN	11/7/2022	**F**	The findings of this analysis are presented in Sections 3.1 & 3.2 of the revised Hydraulic Design Report	CM	RICK	12/21/2022	CM	5/2/2024
79	5	Introduction	9	**M**	clarify this statement, the study for Temescal wash needs to run sufficiently downstream	MDegaga	LAN	11/7/2022	**A**	Text will be clarified	JR	RICK	12/19/2022	CM	5/2/2024
80	6	Hydraulics	11	**M**	Add "South"	MDegaga	LAN	11/7/2022	**A**	Noted. Clarification will be made pertaining to Dawson Rd. North vs. South	JR	RICK	12/19/2022	CM	5/2/2024
81	7	Hydraulics	11	**M**	Add "North". It is very important to distinguish these two crossings. make correction throughout the entire document	MDegaga	LAN	11/7/2022	**A**	Noted. Clarification will be made pertaining to Dawson Rd. North vs. South	JR	RICK	12/19/2022	CM	5/2/2024
82	8	Hydraulics	11	**G**	perhaps this needs to have a sub-heading about Temescal Wash (?)	MDegaga	LAN	11/7/2022	**A**	Text will be revised to clearly distinguish between Temescal Wash and CCW	JR	RICK	12/19/2022	CM	5/2/2024
83	9	Hydraulics	12	**M**	perhaps, describing the channel type and armoring would help the reader understand what maintained condition mean	MDegaga	LAN	11/7/2022	**A**	Addition language will be added for clarity	JR	RICK	12/19/2022	CM	5/2/2024
84	10	Hydraulics	12	**Q**	this and the last statement in the las paragraph are confusing. Is the intent of this submittal to support the design of the channel?	MDegaga	LAN	11/7/2022	**A**	This text will be revised for clarity	JR	RICK	12/19/2022	CM	5/2/2024
85	11	Hydraulics	13	**G**	there are vegetated reaches, according to the plans	MDegaga	LAN	11/7/2022	**A**	This text will be revised for clarity	CM	RICK	12/21/2022	CM	5/2/2024
86	12	Hydraulics	13	**Q**	what type of vegetation?	MDegaga	LAN	11/7/2022	**F**	The n-values assigned by Table 1 for vegetation within the channel improvements have been used per direction from District staff, specifically Deborah De Chambeau via email dated 3/16/2021.	CM	RICK	12/21/2022	CM	5/2/2024
87	13	Hydraulics	13	**G**	n values are high	MDegaga	LAN	11/7/2022	**D**	The n-values assigned for riprap are consistent with the Riverside County Hydraulic Design Manual Table 4.3.	JR	RICK	12/21/2022	CM	5/2/2024
88	14	Hydraulics	13	**M**	Revise n value to "0.015"	MDegaga	LAN	11/7/2022	**D**	The n-values assigned for concrete structures is consistent with n-values used for other channel projects that have been processed and approved through the District.	CM	RICK	12/22/2022	CM	5/2/2024

Temescal Valley Commerce Center Offsite Improvements
COMMENT/RESPONSE LOG

PROJECT:	**Temescal Valley Commerce Center Offsite Improvements**						DATE OF SUBMITTAL: 10/04/2022								
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Mstr Cmt #	Cmt #	Dwg/Sec	Page/Sht #	Code	Comment Description	By/ Org	Agency	Date	Code	Response	By/ Org	Agency/ Company	Date	Verified By	Date
89	14	Hydraulics	13	**G**	this section is confusing. according to the plan and previous section, there appear to be vegetated section s of the channel; compare that with the highlighted portion of this section and reconcile	MDegaga	LAN	11/7/2022	**A**	This text will be revised for clarity	JR	RICK	12/23/2022	CM	5/2/2024
90	15	Hydraulics	14	**G**	it is not clear what is meant to be interim. road crossing or not, the facility shall be constructed to ultimate condition, unless there are plans for the crossing.	MDegaga	LAN	11/7/2022	**F**	"Interim" reflects that in the future the channel is to include a Temescal Rd crossing. The design includes working models for two future scenarios; one with a Temescal Rd crossing, and one without a Temescal Rd. crossing. Both scenarios have been included per as requested. Text has been revised for clarity.	CM	RICK	12/23/2022	CM	5/2/2024
91	16	Hydraulics	15	**Q**	from?	MDegaga	LAN	11/7/2022	**A**	Text will be clarified	JR	RICK	12/19/2022	CM	5/2/2024
92	17	Hydraulics	15	**M**	revise this whole paragraph to provide a good explanation. This is an analysis of Temescal Wash to determine impacts of the CCW improvements on Temescal wash. The extent of Temescal Wash hydraulic analysis goes from ... to...	MDegaga	LAN	11/7/2022	**A**	Text will be clarified	JR	RICK	12/19/2022	CM	5/2/2024
93	18	Hydraulics	16	**G**	There is a proposed Dawson Canyon Road South Bridge over CCW and the existing Dawson Canyon Road North bridge over Temescal Wash. Need to be clear which one we are discussing here and elsewhere.	MDegaga	LAN	11/7/2022	**A**	Noted. Clarification will be made pertaining to Dawson Rd. North vs. South	JR	RICK	12/19/2022	CM	5/2/2024
94	19	Hydraulics	16	**Q**	was this an error in the previous model? if so, state so	MDegaga	LAN	11/7/2022	**A**	There was not an error per say, the paragraph and following Table describes how the sections were updated to reflect survey data. Text has been clarified	CM	RICK	12/23/2022	CM	5/2/2024
95	20	Hydraulics	16	**Q**	left or right bank, looking downstream?	MDegaga	LAN	11/7/2022	**A**	Text will be clarified to reflect left bank looking downstream	CM	RICK	12/23/2022	CM	5/2/2024
96	21	Hydraulics	17	**Q**	was this a typo? in the previous model?	MDegaga	LAN	11/7/2022	**G**	The cross section identifications are unchanged from the effective model, and will be checked/updated for the table in question.	CM	RICK	12/23/2022	CM	5/2/2024
97	22	Hydraulics	18	**M**	state the proposed improvements and be specific about the site	MDegaga	LAN	11/7/2022	**A**	More detail will be added for clarity	JR	RICK	12/19/2022	CM	5/2/2024
98	23	Hydraulics	18	**Q**	which Dawson Canyon Bridge?	MDegaga	LAN	11/7/2022	**A**	Noted. Clarification will be made pertaining to Dawson Rd. North vs. South	JR	RICK	12/19/2022	CM	5/2/2024
99	24	Hydraulics	18	**G**	"Summarized in summarized…" Typo	MDegaga	LAN	11/7/2022	**A**	Noted. To be revised	JR	RICK	12/19/2022	CM	5/2/2024
100	25	Hydraulics Results	20	**M**	Please provide backup for such guidance	MDegaga	LAN	11/7/2022	**A**	Text will be clarified	CM	RICK	12/21/2022	CM	5/2/2024
101	26	Hydraulics Results	20	**M**	Use channel plan stations in the RAS analysis	MDegaga	LAN	11/7/2022	**A**	As the centerline used for the improvement plan and profile does not exactly match the hydraulic centerline. A table has been provided instead to correlate the RAS river stations to the channel plan stationing.	CM	RICK	12/21/2022	CM	5/2/2024
102	27	Hydraulics Results	20	**G**	this paragraph does not clearly state what was done. The intent may be to explain that HECRAS was used for the proposed improvement of CCW and also to determine the impacts of said improvements on Temescal Wash.	MDegaga	LAN	11/7/2022	**A**	Text will be clarified	CM	RICK	12/21/2022	CM	5/2/2024
103	28	Hydraulics Results	21	**G**	this is the reach where the proposed improvement comes in and needs to be highlighted. In addition, the sections are so far apart, that the analysis does not provide impact of the improvement or does not provide any indication of potential scour etc.	MDegaga	LAN	11/7/2022	**G**	Additional Cross sections will be added to show impacts to Temescal Wash, and the table has been revised to note the proposed confluence point of CCW. Scour is presented in a later section.	CM	RICK	12/21/2022	CM	5/2/2024
104	29	Hydraulics Results	21	**G**	Regardless of this statement, there is an increase in WSE as a result of the proposed improvement in those sections	MDegaga	LAN	11/7/2022	**G**	Noted.	JR	RICK	12/19/2022	CM	5/2/2024
105	30	Hydraulics Results	21	**G**	this is all Temescal Wash.	MDegaga	LAN	11/7/2022	**G**	Report text revised for clarity	JR	RICK	12/19/2022	CM	5/2/2024
106	31	Sediment Transport and Scour Analysis	22	**G**	the scour analysis shall be made for the entire Coldwater Canyon Wash	MDegaga	LAN	11/7/2022	**D**	Sediment Transport Analysis is not necessary for the proposed CCW channel as the channel will be armored where erosive and includes grade control structures within the project reach. Discussion to this point has been included with Section 3.1 of the revised Hydraulic Design Rpeort	CM	RICK	12/21/2022	CM	5/2/2024
107	32	Sediment Transport and Scour Analysis	22	**Q**	Can we have this as a reference in the appendix? approved by District?	MDegaga	LAN	11/7/2022	**G**	The sediment transport results will be included as an appendix for review with this report and hydraulic package.	CM	RICK	12/21/2022	CM	5/2/2024
108	33	Sediment Transport and Scour Analysis	22	**Q**	Which Dawson Canyon Bridge?	MDegaga	LAN	11/7/2022	**A**	Noted. Clarification will be made pertaining to Dawson Rd. North vs. South	CM	RICK	12/21/2022	CM	5/2/2024
109	34	Sediment Transport and Scour Analysis	23	**M**	please include the Kleinfelder study herein. was this document peer reviewed and final or still a draft document? what was the basis of analysis? did it consider full 100 yr flow within Temescal Wash flow in the analysis?	MDegaga	LAN	11/7/2022	**F**	The Kleinfelder study has been included with Appendix A of the Hydraulic design report for reference. It has been included with the EIR application documents and peer reviewed by the design team. The basis of design is the structural configuration of the bridge and scour that has occurred to date within the channel.	CM	RICK	12/22/2022	CM	5/2/2024
110	35	Conclusion	24	**M**	this statement is not a conclusion, rather it is a statement of purpose of the study. Study's conclusion and recommendations thereof need to be discussed here.	MDegaga	LAN	11/7/2022	**A**	Conclusion statement to be revised.	JR	RICK	12/19/2022	CM	5/2/2024
111	36	HEC-RAS Capacity Condition Results	57	**Q**	What does capacity condition mean?	MDegaga	LAN	11/7/2022	**A**	Will be revised for clarity.	CM	RICK	12/22/2022	CM	5/2/2024
112	37	HEC-RAS Capacity Condition Results	57	**M**	HEC-RAS River stations sections shall be same as Plan stations alternatively, provide a column of Plan Station within this table.	MDegaga	LAN	11/7/2022	**A**	Noted. Information to cross-reference the RAS stations with the plan stations will be provided with the revised hydraulic design report.	CM	RICK	12/22/2022	CM	5/2/2024

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REVIEW DOCUMENT:	**2nd Submittal - RCFC**	DATE COMMENTS RETURNED: 11/07/2022

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113	38	HEC-RAS Capacity Condition Results	59	**M**	Use a project identifier...CCW at CUP 200044 or similar. Corona Clay is not a project identifier .	MDegaga	LAN	11/7/2022	**A**	Project name to be revised	JR	RICK	12/19/2022	CM	5/2/2024
114	39	HEC-RAS Capacity Condition Results	60	**M**	Need cross section station to be displayed	MDegaga	LAN	11/7/2022	**A**	Outputs to be revised to show xs names	JR	RICK	12/19/2022	CM	5/2/2024
115	40	HEC-RAS Capacity Condition Results	65	**Q**	why ineffective flow area?	MDegaga	LAN	11/7/2022	**G**	Ineffective flow areas are modeling the constriction at the top of the drop. See Discussion of Section 2.2 of the revised Hydraulic Design Report. See response to comment #4 of the Comment Letter - Hydrology and Hydraulics Report: Coldwater Canyon Wash	CM	RICK	12/22/2022	CM	5/2/2024
116	41	HEC-RAS Capacity Condition Results	135	**M**	justify the use of ineffective flow area within channel banks.	MDegaga	LAN	11/7/2022	**A**	Ineffective flow areas are modeling the constriction at the top of the drop. See Discussion of Section 2.2 of the revised Hydraulic Design Report. See response to comment #4 of the Comment Letter - Hydrology and Hydraulics Report: Coldwater Canyon Wash	CM	RICK	12/22/2022	CM	5/2/2024
117	42	HEC-RAS Capacity Condition Results	137	**M**	this section need to be corrected. Half a channel a conveyance is not acceptable	MDegaga	LAN	11/7/2022	**A**	See response to comment #3 of the Comment Letter - Hydrology and Hydraulics Report: Coldwater Canyon Wash	CM	RICK	12/22/2022	CM	5/2/2024
118	43	Appendix C	139	**M**	This is the general location of the Dawson Canyon Road S. Bridge. Any study to demonstrate impacts to Temescal Wash should include a few sections here	MDegaga	LAN	11/7/2022	**A**	Additional hydraulic cross-sections have been added	CM	RICK	12/22/2022	CM	5/2/2024
119	44	Appendix C	141	**Q**	Temescal Wash?	MDegaga	LAN	11/7/2022	**A**	Project name to be revised	JR	RICK	12/19/2022	CM	5/2/2024
Street Improvement Plans Temescal Valley Business Park Plans															
120	1	Street Improvement Plans	1	**M**	Address comments within	MDegaga	LAN	11/7/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
121	2	Street Improvement Plans	7	**M**	Provide guard rail	MDegaga	LAN	11/7/2022	**A**	Guardrail has been added where feasible.	HR	RICK	11/22/2022	DN	5/1/24
122	3	Street Improvement Plans	7	**M**	Separate plan. See Cold Water Canyon Wash Plans	MDegaga	LAN	11/7/2022	**A**	Street improvement note revised.	HR	RICK	11/22/2022	DN	5/1/24
Biological Resources Technical Report - Temescal Valley Commerce Center Project Site															
123	1		6	**G**	Cloud around section 3.4	MDegaga	LAN	11/7/2022	**F**	Need clarification on what this comment is referencing	RRamirez	Cadre	12/21/2022		
124	2	Introduction	22	**Q**	Realigning Coldwater Canyon Creek? Wash?	ACarver	LAN	11/7/2022	**G**	Coldwater Canyon Creek is being realigned as indicated on all graphics and text.	RRamirez	Cadre	12/21/2022		
125	3	Introduction	22	**M**	vegetation communities	ACarver	LAN	11/7/2022	**G**	As stated in the report "Natural community names and hierarchical structure follows the CDFW “List of California Terrestrial Natural Communities” and/or Holland (1986) classification systems, which have been refined and augmented where appropriate to better characterize the habitat types observed onsite when not addressed by the MSHCP classification system." The vegetation communities classification presented in the report has been reviewed by both the Riverside County Environmental Programs Division (EPD) and MSHCP Regional Conservation Authority (RCA) both of which did not have comment regarding the classification of vegetation onsite. Recommend that the RCFC coordinate with Riverside County EPD to present comment as unified front.	RRamirez	Cadre	12/21/2022		
126	4	Existing Environmental Setting	33	**G**	"Ornamental and Native" trees is an odd combination to use to categorize a vegetation community.	ACarver	LAN	11/7/2022	**G**	See response to comment 3	RRamirez	Cadre	12/21/2022		
127	5	Existing Environmental Setting	44	**Q**	Ditch or swale?	ACarver	LAN	11/7/2022	**G**	Swale	RRamirez	Cadre	12/21/2022		
128	6	Regional and Regulatory Setting	80	**Q**	This paragraph mitigates temp impacts at a 1:1 ration; however, beginning on page 62 (and repeated in the DBESP and Consistency Analysis) the actual ration is 2:1. Could this be a typo?	ACarver	LAN	11/7/2022	**G**	All mitigation assessments and ratios updated including Biological Resources Technical Report, MSHCP Consistency Analysis and DBESP resubmitted to the County of Riverside EPD on December 19 2022.	RRamirez	Cadre	12/21/2022		
129	7	Regional and Regulatory Setting	90	**M**	This needs to be updated per U.S. District Court for the District of Arizona’s August 30, 2021, order vacating and remanding the Navigable Waters Protection Rule in the case of Pascua Yaqui Tribe v. U.S. Environmental Protection Agency.	ACarver	LAN	11/7/2022	**A**	The discussion of federal jurisdiction pursuant to the Clean Water Act (CWA) inadvertently referenced the Navigable Waters Protection Rule. The Biological Resources Technical Report has been revised to include the pre-2015 CWA definition of waters of the U.S., which is the de-facto standard used by the Corps until such time that the further guidance/rulings are released by the Biden administration and/or the U.S. Supreme Court in Sackett v. EPA.	TBomkamp	GLA	12/22/2022		

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130	8	Regional and Regulatory Setting	95	**G**	This is not FGC, this is 14 CCR 1.72, and unrelated to Section 1600-1617 FGC.	ACarver	LAN	11/7/2022	**G**	Noted	TBomkamp	GLA			
131	9	Regional and Regulatory Setting	95	**G**	This is how CDFW defines a stream.	ACarver	LAN	11/7/2022	**G**	Noted	RRamirez	Cadre	12/21/2022		
132	10	Environmental Impacts	103		CDFW takes jurisdiction of a broader area than does USACE, but their jurisdiction does not exceed it.	ACarver	LAN	11/7/2022	**G**	Noted	RRamirez	Cadre	12/21/2022		
133	11	Environmental Impacts	106	**M**	This will require an Individual Permit.	ACarver	LAN	11/7/2022	**A**	An individual permit application was submitted to the Corps in March 2022. The application will be updated to reflect project design changes since the March 2022 submittal.	TBomkamp	GLA	12/22/2022		
134	12	Mitigation & Avoidance Measures	110	**M**	This agency has been CDFW for almost 10 years. Boilerplate text should be updated.	ACarver	LAN	11/7/2022	**A**	Agreed as noted on page iii Glossary of the Biological Resources Technical Report. However CDFW still references Section 3500-3863 as Fish and Game Codes. The following CDFW link and reference is provided for the RCFC to update their references https://fgc.ca.gov/regulations/current	RRamirez	Cadre	12/21/2022		
135	13	Jurisdictional Delineation	240	**Q**	Permanent, temporary, or both?	ACarver	LAN	11/7/2022	**A**	All impact assessments have been updated including Biological Resources Technical Report, MSHCP Consistency Analysis and DBESP resubmitted to the County of Riverside EPD on December 19 2022.	RRamirez	Cadre	12/21/2022		
136	14	Jurisdictional Delineation	241	**R**	This section of the document should be updated prior to submission to reflect the U.S. District Court for the District of Arizona's August 30, 2021, order vacating and remanding the Navigable Waters Protection Rule in the case of Pascua Yaqui Tribe v. U.S. Environmental Protection Agency.	ACarver	LAN	11/7/2022	**A**	The discussion of federal jurisdiction pursuant to the Clean Water Act (CWA) inadvertently referenced the Navigable Waters Protection Rule. The Jurisdictional Delineation Report has been revised to include the pre-2015 CWA definition of waters of the U.S., which is the de-facto standard used by the Corps until such time that the further guidance/rulings are released by the Biden administration and/or the U.S. Supreme Court in Sackett v. EPA.	TBomkamp	GLA	12/22/2022		
137	15	Jurisdictional Delineation	242	**R**	This section of the document should be updated prior to submission to reflect the U.S. District Court for the District of Arizona's August 30, 2021, order vacating and remanding the Navigable Waters Protection Rule in the case of Pascua Yaqui Tribe v. U.S. Environmental Protection Agency.	ACarver	LAN	11/7/2022	**A**	The discussion of federal jurisdiction pursuant to the Clean Water Act (CWA) inadvertently referenced the Navigable Waters Protection Rule. The Jurisdictional Delineation Report has been revised to include the pre-2015 CWA definition of waters of the U.S., which is the de-facto standard used by the Corps until such time that the further guidance/rulings are released by the Biden administration and/or the U.S. Supreme Court in Sackett v. EPA.	TBomkamp	GLA	12/22/2022		
138	16	Jurisdictional Delineation	246	**G**	This is not FGC, nor is it a CDFW definition. It's 14 CCR 1.72, and unrelated to CDFW and/or Section 1600-1617. Common mistake.	ACarver	LAN	11/7/2022	**G**	Noted	TBomkamp	GLA	12/22/2022		
Comment Letter - General															
139	1	General	General	**G**	This review is being made concurrent with the entitlement process for the project. Some of the requirements/comments stated herein may change upon a formal issuance of conditions of approval by Riverside County.	MDegaga	LAN	11/7/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
140	2	General	General	**G**	Comments contained herein are focused on the proposed channel improvement plans and associated reports only.	MDegaga	LAN	11/7/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
141	3	General	General	**G**	The Street plans associated with Dawson Canyon Road North are not reviewed.	MDegaga	LAN	11/7/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
Comment Letter - Hydrology and Hydraulics Report: Coldwater Canyon Wash															
142	1			**M**	Address redline comments within report	MDegaga	LAN	11/4/2022	**A**	Redline comments have been addressed per the responses above.	JR	RICK	11/16/2022	CM	5/2/2024
143	2			**M**	The hydrology for Coldwater Canyon and thus the peak discharges used for the design of the channel is obtained from the District and is acceptable.	MDegaga	LAN	11/4/2022	**A**	Noted.	JR	RICK	11/16/2022	CM	5/2/2024
144	3			**M**	Place Channel bank stations at appropriate station of each cross section. (2nd request)	MDegaga	LAN	11/4/2022	**F**	Bank Stations were placed at the top of channel as previously requested by the first review. This had been noted in the response letter at the beginning of this report	JR	RICK	11/16/2022	CM	5/2/2024
145	4			**M**	HEC-RAS river stations need to match with the Station on the plans, alternatively, a table showing such information shall be provided. (2nd request).	MDegaga	LAN	11/4/2022	**A**	As the centerline used for the improvement plan and profile does not exactly match the hydraulic centerline. A table has been provided instead to correlate the RAS river stations to the channel plan stationing.	JR	RICK	11/16/2022	CM	5/2/2024
146	5			**M**	Justify use of the cross section (half a section) for the most downstream station in the hydraulic analysis (2nd request)	MDegaga	LAN	11/4/2022	**A**	The cross section geometry will be revised to show a full cross section. It should be noted that the water surface elevation within the downstream most section is a boundary condition of the corresponding WSE of Temescal Wash.	JR/CM	RICK	11/16/2022	CM	5/2/2024
147	6			**M**	Justify modeling of ineffective flow areas within the channel. (2nd request)	MDegaga	LAN	11/4/2022	**F**	The ineffective flow areas are modeled as result of the constrictions at the top of the drop structures. This has been noted in the response letter at the beginning of this report to address the comment from the first submittal. A discussion has been added to Section 2.2 of the Hydraulic Report to serve as explanation.	JR/CM	RICK	11/16/2022	CM	5/2/2024

Temescal Valley Commerce Center Offsite Improvements
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148	7			**M**	The HEC-RAS results show that almost all river stations have warnings; please resolve such warnings.	MDegaga	LAN	11/4/2022		**D**	These warnings are where there is a change in surface interface occurs (rip-rap to natural channel etc.), where the constriction points change flow characteristics, and where flows travels down the drop structures. We have reviewed these warnings and they do not indicate errors in the results or model.	JR/CM	RICK	11/16/2022	CM	5/2/2024		
149	8			**M**	Provide hydrologic and hydraulic study for the 54-in reinforced concrete pipe.	MDegaga	LAN	11/4/2022		**A**	These analyses are included in the offsite drainage study. This information can be included in this revised report.	JR	RICK	11/16/2022				
150	9			**M**	The report shall include a section detailing the proposed side slope and armoring are adequate to protect the channel against potential erosion.	MDegaga	LAN	11/4/2022		**A**	Discussion to this effect has been added to Sections 3.1 & 3.2 of the Hydraulic Report	JR	RICK	11/16/2022	CM	5/2/2024		
151	10			**M**	Provide adequate toe down for those reaches of the channel where the side slopes are armored.	MDegaga	LAN	11/4/2022		**A**	Toe down protection will be provided on the plans where the side slopes are armored and the channel bottom is not.	JR/CM	RICK	11/16/2022	CM	5/2/2024		
152	11			**M**	Provide basis of design for the drop structures	MDegaga	LAN	11/4/2022		**A**	Calculations have been included to support basis of design for the drop structures. See discussion with Section 3.1 of the hydraulic Design Report.	JR	RICK	11/16/2022	CM	5/2/2024		
Comment Letter - Hydrology and Hydraulics Report: Temescal Wash																		
153	1			**G**	While some of the submitted information may be useful for the purposes of obtaining a Letter of Map Revision (LOMR) from the Federal Emergency Management Agency (FEMA) for Temescal Wash, the hydraulics does not show impacts of the improvement to Temescal Wash at the confluence of Temescal Wash and the proposed Coldwater Canyon Wash Channel	MDegaga	LAN	11/4/2022		**F**	Additional cross-sections have been added and discussion of impacts to Temescal Wash are included in the revised report.	CM	RICK	12/22/2022	CM	5/2/2024		
154	2			**G**	The submitted hydraulics does not show the impacts of the improvement at Dawson Canyon Road North	MDegaga	LAN	11/4/2022		**D**	The cross sections from the effective model on the upstream and downstream side of Dawson Canyon Rd North allow a direct comparison between the hydraulic flow regimes of the existing and proposed condition, and are directly compared by the tabular output included with Appendix C of the Hydraulic Design Report	CM	RICK	12/22/2022	CM	5/2/2024		
Comment Letter - Coldwater Canyon Wash Channel Plans																		
155	1			**G**	Revise plans to meet District Drafting Manual standards. "Please refer to RCFCD & WCD drafting manual. It is available on District website at rcflood.org (2nd request)	MDegaga	LAN	11/4/2022		**G**	Plans have been revised.	HR	RICK	11/22/2022	DN	5/1/24		
156	2			**G**	Address redline comments in the plans.	MDegaga	LAN	11/4/2022		**A**	Redline comments to be addressed.	HR	RICK	11/22/2022	DN	5/1/24		
157	3			**G**	Include only information necessary for channel construction and District right of way; other information shall be screened out by using different line weight and styles.	MDegaga	LAN	11/4/2022		**A**	Plans to be revised.	HR	RICK	11/22/2022	DN	5/1/24		
158	4			**M**	Show district right of way (2nd request)	MDegaga	LAN	11/4/2022		**A**	District R/W and easement limits are called out on the plan view.	HR	RICK	11/22/2022	DN	5/1/24		
159	5			**M**	Please provide plans for the proposed Temescal Road as it needs to be reviewed as part of the plan since its design may affect District Maintenance access and ramps etc.	MDegaga	LAN	11/4/2022		**G**	Temescal Canyon Road plans have been provided.	HR	RICK	11/22/2022	DN	5/1/24		
160	6			**M**	Provide adequate maintenance access and necessary turnaround on both sides of the channel (2nd request)	MDegaga	LAN	11/4/2022		**G**	Per previous coordination with RCFC, no access ramps will be provided on the right side of the channel due to the environmental limitations of the conservation area. This was agreed upon with RCFC prior to proceeding with the 2nd submittal that access ramps only on the left side are acceptable but turn arounds are being provided on both sides.	HR	RICK	11/22/2022	DN	5/1/24		
161	7			**M**	Provide adequate staging area for loading and unloading District maintenance vehicles. In addition, provide adequate turning radius for maintenance vehicles at all access points	MDegaga	LAN	11/4/2022		**G**	Based on discussions with the RCFC and Proficiency Capital, a loading/unloading area will be provided on the commerce center site. Additionally, a pull off area is being provided along Dawson Canyon Road. See updated plans.	HR	RICK	11/22/2022	DN	5/1/24		
162	8			**M**	All access ramps shall be designed facing downstream	MDegaga	LAN	11/4/2022		**D**	Per prior discussion with RCFC, the access ramp here is a temporary condition due to the project constraints. There is not enough room to provide a downstream facing access ramp without significantly impacting the environmental impact limits. This access ramp will be reconstructed in the future to face downstream once the ultimate condition is constructed by Serrano.	HR	RICK	11/22/2022	DN	5/1/24		
163	9			**M**	As currently shown, the left bank of the channel at the upstream end may be flanked by Coldwater Canyon Wash flows, redesign to capture all flows. (2nd request)	MDegaga	LAN	11/4/2022		**F**	The grading has been revised to widen the intercept area and a cutoff wall has been added. The hydraulic calculations indicate that flow is fully contained within the armored banks and that the armored banks will be stable for the design flow rate. Discussion has been added to Section 3.1 of the Hydraulci Report in response to this concern.	CM	RICK	12/22/2022	CM	5/2/2024		
164	10			**M**	Provide details on the interface between the natural channel and improved channel.	MDegaga	LAN	11/4/2022		**A**	A cutoff wall has been provided.	HR	RICK	11/22/2022	DN	5/1/24		
165	11			**M**	Please provide the basis of design of the channel and drop structures by including a sediment transport model or equivalent analysis.	MDegaga	LAN	11/4/2022		**F**	Refer to CCW comment #11.	JR	RICK	11/16/2022	CM	5/2/2024		
166	12			**M**	Flows may undermine the channel bed at the upstream end of riprap installations, provide mitigation measures such as cutoff walls or equivalent	MDegaga	LAN	11/4/2022		**A**	A cutoff wall has been provided.	HR	RICK	11/22/2022	DN	5/1/24		
167	13			**M**	Provide rip-rap design calculations to show the riprap design is adequate. This may include a sediment transport model	MDegaga	LAN	11/4/2022		**A**	Refer to CCW comment #11.	CM	RICK	12/21/2022	CM	5/2/2024		
168	14			**M**	Provide toe down or show that there is no need for a toe down.	MDegaga	LAN	11/4/2022		**A**	Plans have been revised to show a toe down for the rip rap. Additionally, a callout has been added to the typical cross section to reference the applicable standard drawing.	HR	RICK	11/22/2022	DN	5/1/24		

PROJECT:	**Temescal Valley Commerce Center Offsite Improvements**	DATE OF SUBMITTAL: 10/04/2022
REVIEW DOCUMENT:	**2nd Submittal - RCFC**	DATE COMMENTS RETURNED: 11/07/2022

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Mstr Cmt #	Cmt #	Dwg/Sec	Page/Sht #	Code	Comment Description	By/ Org	Agency	Date	Code	Response	By/ Org	Agency/ Company	Date	Verified By	Date
169	15			**M**	With the approach velocity of 25fps at the mouth of the arched culvert, rock slope protection is unacceptable since such velocity can undermine the fill around the arch culvert. Provide adequate alternative armoring to withstand such velocity.	MDegaga	LAN	11/4/2022	**A**	The design includes a concrete channel bottom through the section of higher velocities. Concrete lining has been added to the channel side slopes.	JR	RICK	11/16/2022		
170	16			**M**	Provide proof that the Riverside County Transportation Department would accept the proposed arched culvert.	MDegaga	LAN	11/4/2022	**G**	A type selection report has been provided to the County and returned to address comments. The revised type selection report has been resubmitted to the County with this submittal package.	HR	RICK	11/22/2022	ND	5/1/24
171	17			**M**	Provide appropriate toe depth supported by calculation and show on the plans, including on sections.	MDegaga	LAN	11/4/2022	**A**	Toe down protection will be provided on the plans where the side slopes are armored and the channel bottom is not.	CM	RICK	12/21/2022	CM	5/2/2024
172	18			**M**	Provide plan and profile for the proposed 54-inch RCP	MDegaga	LAN	11/4/2022	**A**	A plan and profile has been provided at the last submittal on sheets 5 and 10.	HR	RICK	11/22/2022	DN	5/1/24
173	19			**M**	Identify the maintenance entity for said storm drain, if District maintain, provided adequate storm drain easement and access to the easement.	MDegaga	LAN	11/4/2022	**G**	Pipes shown to be constructed per this plan are to be maintained by the District Adequate access and easements have been provided.	HR	RICK	11/22/2022	DN	5/1/24
174	20			**M**	All District maintenance access and/or ramp shall have sufficient egress and ingress	MDegaga	LAN	11/4/2022	**A**	Access has been provided to Coldwater Creek Wash Channel and to the outfall off of Dawson Canyon Road.	HR	RICK	11/22/2022	DN	5/1/24
175	21			**M**	It appears Temescal Canyon Road bridge would be constructed across Coldwater Canyon Wash, however, there is no provision how the District would have a continuous access road along the channel after the bridge is constructed. Please provide maintenance access with that in mind.	MDegaga	LAN	11/4/2022	**F**	The ultimate condition is the completion of the channel and overcrossing extension of Temescal Canyon Road to the Serrano property. The interim condition is the portion of the channel just upstream of the limit line as shown on the plans. This portion of the channel will be reconstructed with the Serrano project.	HR	RICK	11/22/2022	DN	5/1/24
176	22			**M**	Please provide plans for the future Temescal Canyon Road as it relates to the channel.	MDegaga	LAN	11/4/2022	**G**	Temescal Canyon Road plans to be provided for next review.	HR	RICK	11/22/2022	DN	5/1/24
177	23			**M**	Provide access at the bottom of the armoring along Temescal Wash at the confluence of Temescal Wash and Coldwater Canyon Wash	MDegaga	LAN	11/4/2022	**A**	See updated plans. Outfall access ramp has changed location based on discussion with RCFC.	HR	RICK	11/22/2022	DN	5/1/24
178	24			**M**	Provide line data for all work along the confluence of Temescal Wash and Coldwater Canyon Channel confluence	MDegaga	LAN	11/4/2022	**A**	See updated plans. Line data has been provided for work within Temescal Wash	HR	RICK	11/22/2022	DN	5/1/24
179	25			**M**	Temescal Wash meanders and flows directly against Coldwater Canyon Wash Channel at the confluence; this condition could cause erosion of the improvement at said location. Please provide analysis that supports the adequacy of proposed armoring of left bank of Temescal Wash at the confluence	MDegaga	LAN	11/4/2022	**A**	This analysis is included and discussed by Section 3.1 of the revised hydraulic design report	JR	RICK	11/16/2022	CM	5/2/2024
180	26			**M**	Show the maintenance limits at said confluence clearly	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
Comment Letter - Street Improvement Plans															
181	1			**M**	Our review of the street plan is limited to Dawson Canyon Road South only. Show guardrail at the crossing on both sides of the crossing at Dawson Canyon Road South. Consult with Riverside County Transportation Department for the appropriate type of guardrail.	MDegaga	LAN	11/4/2022	**G**	Barrier and Parapet wall have been provided.	HR	RICK	11/22/2022	DN	5/1/24
182	2			**M**	Provide parapet wall or similar safety structure on top of the crossing.	MDegaga	LAN	11/4/2022	**G**	Barrier and Parapet wall have been provided.	HR	RICK	11/22/2022	DN	5/1/24
183	3			**M**	Show the proposed arched culvert bridge sections and details on the street improvement plan for Dawson Canyon Road South.	MDegaga	LAN	11/4/2022	**D**	The intent is for the construction of the culvert to be per the CCW plan set. County will need to make a final determination on who will be maintaining this.	ND	RICK	4/30/2024	DN	5/1/24
184	4			**M**	Show the maintenance limits at said confluence clearly	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
Comment Letter - Environmental Clearance															
185	1	General	General	**G**	Provided herewith is the review of the Environmental documents previously submitted. Please address comments within.	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
186	2	General	General	**M**	Provide a copy of all applicable environmental regulatory permits (i.e., 404, 401, 1602, BO/take permits) for the construction and maintenance of the project. Provide a copy of the application packages submitted to the California Department of Fish and Wildlife and the Army Corps of Engineers to verify the project submitted with the applications matches the project shown on the final design plans. Any regulatory permits must not preclude the District's ability to maintain the facility and indicate that the permit includes all future maintenance of the facility to ensure the conveyance capacity of the facility. Unless approved in writing by the District's Chief of Operations and Maintenance, there shall be no mitigation, conservation areas/easements, or regulatory permit restrictions within the channel areas subject to District maintenance activities.	MDegaga	LAN	11/4/2022	**G**	Noted. Project is working on obtaining permits and required environmental approvals.	HR	RICK	11/22/2022	DN	5/1/24
Comment Letter - Construction Inspection/Facility Acceptance															
187	1	General	General	**G**	Inspection and maintenance of the drainage system to be constructed with this project must be performed by either the District or RCTD.	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24

PROJECT:	**Temescal Valley Commerce Center Offsite Improvements**	DATE OF SUBMITTAL: 10/04/2022
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188	2	General	General	**M**	If the District is willing to maintain the proposed drainage system, it must be designed to District standards. Three items must be accomplished prior to starting construction of the drainage facility: 1) the engineer (owner) shall submit to the District the preliminary title reports, plat and legal descriptions for all right of way to be conveyed to the District and secure that right of way to the satisfaction of the District; 2) an agreement with the District must be executed which establishes the terms and conditions of inspection, operation and maintenance; and 3) plans for the facility must be signed by the District's General Manager-Chief Engineer. The plans cannot be signed prior to execution of the agreement. An application for Cooperative Agreement must be submitted, via the plan checker, to Ann Marie Rolle of the District's Contract Services Section. The agreement application shall note the project number, location, briefly describe the system (sizes and lengths) and include half sized reduced plans and an exhibit that shows the proposed alignment. Note that design changes after submitting the agreement application, or submitting an incomplete application, (i.e. lacking a finalized project description, authorized signatories, legal plats and descriptions, etc.) may cause delays in preparing the agreement. Please also note that the completed application will not be placed into the queue for Contract Services until the District plan checker has determined that the plans have reached 60% and no significant changes to the plans are anticipated. All right of way transfer issues must be coordinated with Ami Urista of the District's Plan Check Section who.	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
189	3	General	General	**M**	Prior to scheduling a pre-construction meeting and issuance of the notice to proceed with construction of drainage facilities that the District would assume ultimate maintenance responsibility, the following seven items must be provided to Ann Marie Rolle of the District's Contract Services Section: a.Construction inspection fees b.Confirmation of bond acceptance by the bond holder c.Approved liability insurance certificate listing District as additional insured d.Workers' compensation insurance certificate e.Contractor designation and construction schedule f.Proper 20-day notice-of-intent to start construction g.Confined space procedure.	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
190	4	General	General	**M**	It should be noted that the comments herein are based on plans, reports, and/or data submitted, which may be lacking information, or be incorrect, incomplete or otherwise deficient. Additional comments may be expected after these materials have been resubmitted and further review has taken place. All comments, either written in red or contained in this letter, must be addressed or mutually resolved by the engineer and the plan checker prior to resubmittal. Failure to do so may result in future submittals being returned to the engineer with no further action taken.	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
191	5	General	General	**M**	A link is provided to the engineer to access digital redlines of the submitted materials for corrections. The resubmittal should be date stamped by the engineer; hard copy plans shall be folded to 9"x12" with the title block showing and returned to the District office. A digital copy of said plans shall be submitted. To help with the next review, we request a response letter prepared by the engineer of work addressing the above comments following the same numeric order of this letter. In addition, we request that the engineer of work return the previous redlined materials with the next submittal. We are available to meet and discuss comments and should you need to contact me, call 951.505.2337 or Ruddy Argueta at 951.955.1239.	MDegaga	LAN	11/4/2022	**G**	Noted.	HR	RICK	11/22/2022	DN	5/1/24
Floodplain Management															
192	1			**M**	The cross sections shown in the CLOMR report and Hydraulic Analysis Report differ from the hydraulic model we received. Both reports show a floodway analysis and a bridge with piers, but the provided model does not. The model's file name is also different, leading us to believe we received an outdated model. The reports mention the HEC-RAS project title as 18602A, and the cross sections shown in the report say (18602A) but the model received never shows the "-A" at the end. Please send the latest versions of the Hydraulic Model, CLOMR Report, Hydraulic Analysis Report, and Plans so that we may continue our review.	Raymond Gomez	RCFCD	12/8/2022	**A**	The incorrect model was transmitted for review. The correct model has been provided for review with email correspondence dated March 2023.	JR	RICK	1/5/2023	CM	5/2/2024
193	2			**M**	The Topographic Workmap is confusing and could be more colorized. The line types could also be changed because some lines are difficult to distinguish. The floodway and floodplain can be outlined in color or filled with color. The contour lines are barely visible, and blend in with the imagery (see orange lines circled below). There are blue lines on the map but no blue markings on the legend. We believe these are water surface elevations (WSE). Some of these WSE lines overlap in the Topographic Workmap. Please show the WSEs at the modeled cross sections only. Please revise the Topographic Workmap to improve clarity and readability by changing line type, color, and fill options. (Note: It is possible to add a table showing each cross-section station and WSE and place that table over the map and just add station labels for each cross section).	Raymond Gomez	RCFCD	12/8/2022	**A**	The topographic workmap has been updated to clearly show topography lines, proposed floodway and floodplain, BFEs. It has been provided with the revised CLOMR report for review.	JR	RICK	1/5/2023	CM	5/2/2024

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194	3			**M**	The Temescal Wash HEC-RAS Stationing is not consistent with the CLOMR report, Topographic Workmap, or effective FEMA stationing. The Temescal Wash model starts at station 10+00 but should start around station 67,548. The stationing not matching makes comparison difficult. A table showing equivalent stations could be used or the stationing could be changed. Either way, the provided model does not contain the same number of cross sections as the images shown in the reports and Workmap. The provided model for Temescal Wash has 14 cross sections but the reports, annotated FIRM, Workmap, and tables show or mention 12 cross sections. Please ensure consistency across the hydraulic model, hydraulic analysis report, and CLOMR report. The consistency will allow easy comparison of the proposed hydraulics.	Raymond Gomez	RCFCD	12/8/2022	**A**	The incorrect model was transmitted for review. The correct model has been provided for review with email correspondence dated March 2023.	JR	RICK	1/5/2023	CM	5/2/2024
195	4			**M**	The Cross Section images in the CLOMR report don't have names for the River, Reach, and the Plan name is confusing as well. The Title says, "Effective Model" but the Plan says, "Proposed Condition". Additionally, the redlines on the Hydraulic Analysis Report from Riverside County Transportation mention changing the HEC-RAS project name because Corona Clay is not a good project name and does not distinguish between Temescal Wash and Coldwater Creek Wash. We agree with this comment. Please change the HEC-RAS file names, project names, plan names, to make more sense and update the images in the CLOMR Report and Hydraulic Analysis Report to aid in organization in clarity of the report.	Raymond Gomez	RCFCD	12/8/2022	**A**	The HEC-RAS model has been revised accordingly. The project title has been changed to "18602A_TemescalWash_CLOMR", river name has been changed to "Temescal Wash", and reach name has been changed to "AR-AV".	JR	RICK	1/5/2023	CM	5/2/2024
196	5			**M**	MT-2 Form 2 Page 2, Section B -1. The information is lacking. There should be a description for the reach limits and the Cross Sections listed do not match the annotated FIRM revision limits. According to the annotated FIRM on page (307) in the CLOMR Report, the limits should be: Downstream Limit: xxx' downstream of effective cross section AR Upstream Limit: xxx' upstream of effective cross section AV. Please update Section B-1.	Raymond Gomez	RCFCD	12/8/2022	**A**	MT-2 Form 2 Page 2, Section B-1 has been updated per comment instruction with the revised CLOMR report.	JR	RICK	1/5/2023	CM	5/2/2024
197	6			**M**	MT-2 Form 2 Page 3, Section D -1. We believe the Base Flood Elevations were increased in the proposed conditions model so the first question should be checked "Yes". Please mark "Yes" on question 1, as you are increasing the BFEs for Temescal Wash.	Raymond Gomez	RCFCD	12/8/2022	**A**	This comment has been incorporated.	JR	RICK	1/5/2023	CM	5/2/2024
Comment Letter - General															

Appendix G

Zip File of Electronic Files

1. Executable copy of Coldwater Canyon Wash HEC-RAS Model
2. Executable copy of Temescal Wash HEC-RAS Model
3. Executable copy of Temescal Wash Sediment Transport HEC-RAS Model
4. Proposed CCW Floodplain (shapefile)
5. Proposed CCW Flood Hazard Zone (shapefile)
6. Proposed Temescal Wash Floodplain (shapefile)