Hydraulic Report

Fishers Canyon Apartments Channel Improvements El Paso County, Colorado

Prepared for:
Chad Ellington
CS 2005 Investments, LLC
1480 Humbolt Street
Denver, CO 80218

Prepared by:
Kimley-Horn and Associates, Inc.
2 North Nevada Avenue, Suite 900
Colorado Springs, CO 80903
(719) 453-0180

Project #: 196825001

PCD Filing No.: CDR246

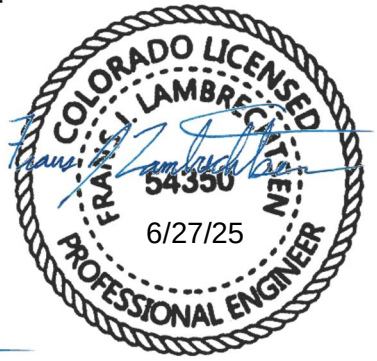
Prepared: June 27, 2025

Kimley»Horn

CERTIFICATION

DESIGN ENGINEER'S STATEMENT

The attached hydraulic report was prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said hydraulic report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of this report.



SIGNATURE (Affix Seal): _____ 6/27/25

Frans Lambrechtsen, P.E.
Colorado P.E. No. 54350 Date

OWNER/DEVELOPER'S STATEMENT

I, the developer, have read and will comply with all of the requirements specified in this Drainage Report and Plan.

CS 2005 Investment LLC
Developer Name

6-25-2025
Authorized Signature Date

Chad Ellington
Name

Principal
Title

1480 Humboldt Street, Denver, CO 80218
Address

EL PASO COUNTY

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____

Joshua Palmer, P.E. Date
County Engineer/ECM Administrator

Conditions:

TABLE OF CONTENTS

INTRODUCTION

PURPOSE AND SCOPE

The purpose of this Channel Design Report is to summarize the design of the channel improvements to an unnamed tributary of Fishers Canyon Creek and improvements to the main stem of Fishers Canyon Creek. The channel improvements are being made as a part of the Fishers Canyon Apartments ("the Project") multi-family residential project for Thompson Thrift and CS 2005 Investment LLC. Fishers Canyon Creek will be referred to as the "main stem" and the unnamed tributary of Fishers Canyon Creek will be referred to as "the tributary" throughout the report. The proposed channel improvements include two (2) grouted boulder drop structures and Type M Riprap channel lining along the tributary. The proposed channel improvements begin approximately 1,050 feet upstream of the confluence of the tributary with the main stem and end at the confluence with main stem. The Project is located within the jurisdictional limits of El Paso County ("the County"), in unincorporated Colorado Springs ("the City"). Therefore, the hydrologic and hydraulic design is based on the County's criteria which is described in further detail within the report.

LOCATION

The Project is located approximately 5 miles south of downtown Colorado Springs within Section 4, Township 15 South, Range 66 West of the 6th Principal Meridian, County of El Paso, State of Colorado ("the Site"). The Site is located on a parcel which is bounded by College View Estates Filing No. 1 on the west, South Academy Boulevard on the south, Venetucci Boulevard to the east, and several commercial lots along B Street to the north. A vicinity map has been provided in the **Appendix A** of this report.

The Site is currently owned by CS 2005 Investment LLC and will be rezoned and replatted through a partnership between Peak Development LLC and Thompson Thrift. The rezoning and replat efforts, otherwise known as the "onsite" development, are being submitted and coordinated separately with the County, and is considered a separate project under the County's Electronic Development Application Review Program (EDARP).

Relative to the regulatory floodplain, a portion of the proposed improvements are located inside a designated Zone AE Special Flood Hazard Area (SFHA) floodway and floodplain. The effective Flood Insurance Rate Map (FIRM) is panel number 08041C0743G with an effective date of December 7, 2018. A discussion of floodplain permitting will be discussed near the end of this report.

DESCRIPTION OF PROPERTY

The Site is approximately 64 acres consisting of undeveloped land with native vegetation and is classified as "Open Space" per Table 5-4 of the Drainage Criteria Manual of El Paso County. Vegetation within the site is characterized primarily by prairie grasses along with some area of scrub brush and a limited occurrence of hardwood trees directly adjacent to the tributary and main stem of Fishers Canyon Creek. The existing land use is undeveloped vacant land. There are no existing irrigation ditches on the Site.

The existing topography consists of slopes ranging from 1% to 33%, with slopes adjacent to creek near vertical where historic erosion and channel migration has occurred. The unnamed tributary

of Fishers Canyon Creek runs from the southwest corner of the site to the northern portion of the site, where it joins the Fishers Canyon Creek main stem in flowing from west to east across the Site.

PROJECT BACKGROUND

The Project is located within the Fishers Canyon Creek drainage basin. The most recent Drainage Basin Planning Study for the basin was completed by Muller Engineering Company in September 1991 (DBPS). The watershed is generally located in southwest central El Paso County near the unincorporated community of Stratmoor.

The watershed has some minor tributaries through the Stratmoor and Stratmoor Hills community and has an overall area of approximately 6.5 square miles where the basin confluences with Fountain Creek. The headwaters of the watershed are heavily developed suburban neighborhoods and commercial developments, with some undeveloped areas for parks, open space, and natural channels.

The DBPS identified drainage improvements within the project site. These improvements included grade control structures within the channel to help stabilize the channel invert as well as keeping the channel as natural as possible. Additional water quality improvements beyond the vertical channel stabilization included preemptive flattening of slopes to avoid sediment migration into the channel.

The recommended channel improvements in the DBPS included grouted boulder drop structures with channel armoring through the use of riprap, which is now referred to as constructed riffle drop structures; this also includes armoring at the toe of slopes. The DBPS, however, is vague on how and where the typical protection section is applied to the channel reaches. On the main stem of Fishers Canyon Creek, there is one grouted boulder drop structure downstream of the confluence with the Tributary. There are several more recommended drop structures on the Tributary with heights ranging from 4’ to 11’ tall. The recommended channel slope through the Main Stem and Tributary are 0.008 (ft/ft) and 0.012 (ft/ft) respectively.

EXISTING SUB-BASIN DESCRIPTIONS

The channel improvements are located in the bottom third of the Fishers Canyon Creek Basin. Main Stem flows come from the west portion of the watershed which make up the majority of the drainage area. Flow along the Main Stem generally flows from west to east as it makes its way beneath Interstate 25 to Fountain Creek. Tributary flows come from the south from the community college and upper portions of this subbasin from the south. Flow along the Tributary primarily flows in a northerly direction until it confluences with the main stem of Fishers Canyon Creek. Near the project site, the channels are characterized with shallow bedrock of mud rock or shale material with near vertical banks in most places. The DBPS describes this area as a “point [that] used to [have] a series of ponds the rest of the way to Interstate 25” where these dams were later breached and the channel meanders through these old structures. Both drainage areas are heavily developed with a mix of dense commercial and residential, with the occasional open space and park.

PROPOSED SUB-BASIN DESCRIPTIONS

For the channel improvements, the proposed subbasins will maintain historic flow patterns for the

main stem and tributary of Fishers Canyon Creek. The improvements will be influenced by off-site improvements from a development to the south along the Tributary. The off-site basins are considered a separate project but are being closely coordinated with that consultant team to determine the best outfall location to minimize impacts to the stream and maintain stability within the channel.

PREVIOUS REPORTS

The following is a complete list of the existing reports pertaining to the Fishers Canyon Apartments site.

1. Fishers Canyon Drainage Basin Planning Study Selected Plan Report (DBPS), prepared by Muller, September 1990.
2. Master Development Drainage Plan for South Academy Station, prepared by Classic Consulting Engineers & Surveyors, December 2007
3. Master Development Drainage Plan Amendment for South Academy Station, prepared by Classic Consulting Engineers & Surveyors, March 2011

DBPS DRAINAGE IMPROVEMENTS

The DBPS improvements recommended improvements along the main stem of Fishers Canyon Creek, near the proposed drop structure upstream of Venetucci Blvd, of one 4-foot drop structure designed for a discharge of 3,200 cfs, with a longitudinal slope upstream and downstream of 0.8%. The proposed channel section included a typical section with a multi-stage channel that included an access trail, floodplain bench, 3:1 slopes, and an armored rock low flow channel that extended 2.5’ up the side slopes of the low flow channel. The channel bottom width was 8-feet wide, with a 16-foot top width of the armored section.

The improvements along the Tributary channel included a proposed five (5) grouted boulder drop structures with heights of 11-feet, 6-feet, 5- feet, 4-feet, and 4-feet. The longitudinal slope through here was proposed to be 1.2%. The typical low flow channel included an armored rock low flow channel with rock extending 1.5-feet up the side slopes of the channel, with side slopes of 4:1, bottom width of 4-feet, and a top width of the armored section of 10-feet.

HYDROLOGY

The proposed channel design was modeled in HEC-RAS using flow rates based on the DBPS for the 100-year design storm. The 100-year flow rates from the DBPS are provided in Table 1 below.

Table 1. DBPS (1990) Flow Rates.

Design Point | Recurrence Interval	*100-year*
Fishers Canyon Creek Downstream of Confluence with Tributary	3,200 cfs
Fishers Canyon Creek Tributary	290 cfs

The effective Federal Emergency Management Agency (FEMA) hydraulic model was obtained from FEMA. This model only had flow rates for the main stem of Fishers Canyon Creek as the Tributary is an unmapped drainageway. A summary of the effective flow rates at the channel improvements upstream of Interstate 25 is provided in Table 2.

Table 2. Effective FEMA Flow Rates.

Design Point \ Recurrence Interval	*10-year*	*50-year*	*100-year*	*500-year*
Fishers Canyon Creek Downstream of Confluence with Tributary	1,420 cfs	2,590 cfs	3,090 cfs	4,800 cfs

HYDRAULIC ANALYSIS

The proposed channel improvements were modeled as two separate stream reaches. This was because of the importance to model the Tributary without the influence of the Fishers Canyon Creek main stem on the tributary. Doing this resulted in the most conservative design approach for the lower end of the Tributary channel. A HEC-RAS 1D model was made of the improvements based on the conceptual construction drawings submitted along with this design report. An existing conditions and proposed conditions model were created using topography collected form the United States Geological Survey (USGS) National Map Viewer of bare-earth Light Detection and Ranging (LiDAR) data gathered in 2018.

A topographic channel survey was completed by Barren Land, LLC in June 2024. The survey included the Venetucci Blvd bridge, 100-feet upstream and downstream of the proposed drop structure location on the mainstem of Fishers Canyon Creek, and from the confluence of the Tributary to Fishers Canyon Creek up to the Hampton S road and College View Dr to the south. The survey provided sufficient detail to create 1-foot contours to design the improvements from.

FISHERS CANYON CREEK

Existing

The model for the main stem of Fishers Canyon Creek was developed using the flows from the effective FEMA model described above. The hydraulic model extends approximately 1,000-feet upstream of the confluence with the Tributary and 300-feet downstream of the Venetucci Blvd bridge. The downstream boundary condition used is a normal depth boundary condition set to the slope of the channel which is approximately 0.011 (ft/ft).

The cross-sections were generated on a 100- to 200-foot spacing, with a cross-section located at the proposed drop crest and drop toe just upstream of Venetucci Blvd. Manning's n values for the model were generated from the effective FEMA model and based on engineering judgement, with values between 0.05 to 0.08 for the overbanks and 0.03 to 0.045 for the channel.

The Venetucci Blvd bridge is a 123-foot concrete structure spanning Fisher's Creek. According to a survey conducted by Kimley-Horn, the bridge offers a vertical clearance of approximately 15 feet between the channel bottom and the asphalt roadway. The section of Fisher's Creek that passes beneath the Venetucci Bridge is well-vegetated. The bridge has been included in the HEC-RAS model.

Proposed

The proposed model for the main stem was updated with the proposed channel grading. The Manning's n values were updated to reflect the proposed stabilization materials and anticipated revegetation along the channel banks.

FISHERS CANYON CREEK TRIBUTARY

Existing

The model for the Tributary to Fishers Canyon Creek was developed based flow rates from the DBPS. As this model is used for design purposes only, the downstream boundary condition used for the model was set to the channel slope of 0.026 (ft/ft) from the main stem downstream of the confluence. The model extends 1,200-feet upstream from the confluence with Fishers Canyon Creek.

The cross-section locations for the proposed hydraulic model are based on the drop crest and drop toe locations from the proposed alignment. This cross-section spacing was frequent enough between the primary drops, with cross-sections spaced between 100- to 200-feet. Some realignment of the stream centerline was necessary to safely fit a minimum of a 3:1 slope with the limited space of the Tributary channel. This will be discussed further in the channel improvement section below. Manning's n values similar to the effective FEMA model were considered and engineering judgement was applied to set overbank Manning's n values between 0.05 and 0.08, with values between 0.03 to 0.045 for the channel.

Proposed

The proposed model for the Tributary was updated to reflect the proposed channel improvements including the grouted boulder drop structure and riprap lining. The cross-sections in this model now reflect the channel realignment and reflect channel side slopes of no greater than 3:1. Manning's n values were updated as needed to represent the channel improvements and anticipated revegetation of the channel.

Backwater Effect from I-25

Reviewing the 100-year floodplain boundary it appeared that the culverts at I-25 (CDOT Structure ID I-17-IK) may cause a backwater effect and impact up to the Venetucci Blvd bridge. An alternative model to the model described above was made to analyze these impacts. The stream centerline for a HEC-RAS 1D model along with additional cross-sections up to the east side of I-25, were included in this model. It was also modeled in HEC-RAS 2D to compare results. The same flow rates for the above model for the 100-year was used for this analysis.

The culvert sizes were taken from the CDOT inspection form with the height of the structure listed as three (3) 10' Wide x 8' Rise reinforced concrete box culverts. The results of the updated hydraulic analysis demonstrated the backwater effect of I-25 ended downstream of the Venetucci bridge and would not impact the proposed improvements discussed in this report. A figure of the hydraulic analysis results are provided in Figure 1 below.

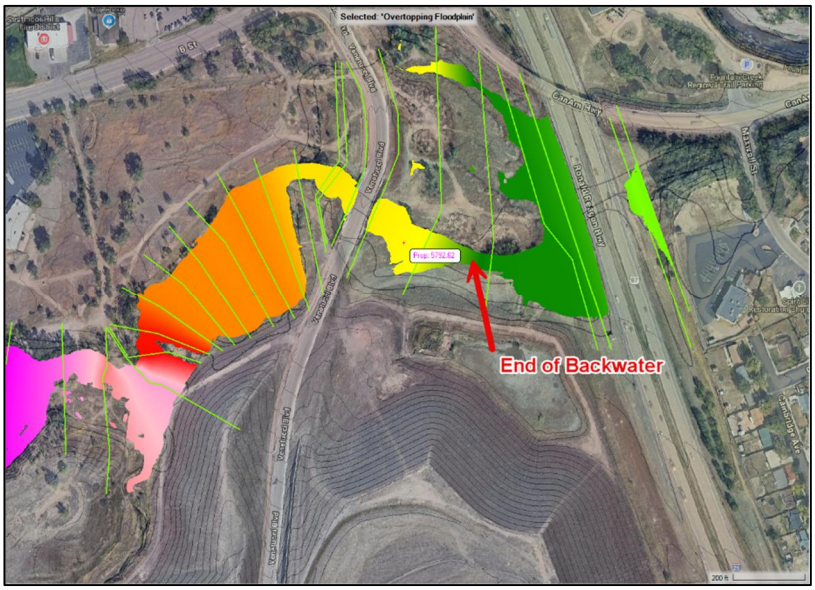


Figure 1. Hydraulic Results of Backwater Effect from I-25.

PROPOSED CHANNEL IMPROVEMENTS

The proposed channel improvements have been designed in accordance with El Paso County and Mile High Flood District criteria manuals. Areas where the criteria were unable to be met are outlined in detail below. Table 3 below is a summary of some of the applicable design criteria being used for this channel design. The maximum values for the tributary are at cross section locations where the channel is proposed to be armored and will therefore be stabilized. The maximum values for the main stem and tributary are only located on cross-sections within our defined work area.

Table 3. Channel Improvement Design Criteria.

Design Criteria	*Recommended Design Value*	*Maximum Design Value (Tributary)*	*Maximum Design Value (Main Stem)*
Maximum 100-year depth outside of bankfull channel	5 ft	2.8 ft	11.8 ft
Maximum 100-year velocity, main channel	5 ft/s	9 ft/s	12.35 ft/s
Froude No., 100-year, main channel	0.8	0.86	0.68
Maximum Shear Stress, 100-year, main channel	1.2 lb/sf	9.90 lb/sf	1.44 lb/sf
Minimum bankfull capacity of bankfull channel (based on future development conditions)	70% of 2-year discharge or 10% of 100-year discharge, whichever is greater	10% of 100-year discharge (29 cfs)	10% of 100-year discharge (338 cfs)
Maximum overbank side slope	4(H):1(V)	4(H):1(V)	4(H):1(V)
Maximum bankfull side slope	2.5(H):1(V)	3(H):1(V)	3(H):1(V)
Maximum drop structure height	4 ft	4 ft	4 ft

CHANNEL DESIGN

The channel design attempted to maintain a 4:1 side slope where possible, and a 3:1 slope where tie-in points would negatively impact adjacent slopes, maintenance roads, or access points. The proposed longitudinal slope of the Tributary channel was held between 4% to 0.6% outside of grouted boulder drop structure and riffles constructed with buried Type M void-filled riprap. The proposed longitudinal slope of the main channel was kept flatter, at less than 0.2%.

The proposed channel alignment on the Tributary approximates the existing centerline of the channel while providing benching in order to reduce velocity, shear, and Froude values as much as possible while not creating excessively steep side slope tie-ins. The maximum tie-in slopes have been set to 3:1 and do not impact adjacent infrastructure such as the existing maintenance access road on the east side of the Tributary.

DROP STRUCTURES

The proposed drop structures are a combination of grouted boulder drop structures and constructed riffles made of buried Type M void-filled riprap. The grouted boulder structure will consist of 3-ft diameter boulders grouted together for additional weight and resistance to erosion. The longitudinal slope of the drops will be no greater than a 4:1 slope with side slopes no steeper than 3:1. The grouted boulder drop structure will not have a height greater than 4-feet from drop crest to drop toe. One grouted boulder drop structure is proposed and it will have an edge wall with riprap along the edges of the drop structure.

A Lane's Creep seepage analysis was performed for each grouted boulder drop structure to set the embedment depth for the sheet pile cutoff wall; the cutoff depth may be updated in the future as geotechnical information becomes available to help understand the depth of bedrock. See **Appendix F** for the geotechnical report.

The geotechnical report discussed the presence of corrosive elements in the borings. To address this, the sheet pile cutoff walls will either be galvanized or converted to a concrete cutoff wall that uses epoxy coated rebar. Expansive soils were also found on the site. The drop structures are at the greatest risk of being affected. Since the soils have a constant source of water and will constantly be wet in the channel bottom, the drop structures will experience limited wetting and drying, significantly reducing the risk of expansive soils on these structures. The rest of the site will drain quickly enough due to 4:1 side slopes that infiltration of rain will be minimal.

Drop #1

This is a grouted boulder drop structure located on the main stem of Fishers Canyon Creek just upstream of Venetucci Blvd. The drop structure is slightly elevated above existing conditions to help create additional stabilization in the channel upstream of the drop. The proposed slope upstream of the drop structure is 0.10%, which is a little flatter than the minimum to promote additional aggradation above the proposed drop structure. Being elevated above the existing channel invert, the drop structure will allow the channel to backfill with sediment for a short distance, with 10-foot approach void-filled riprap of Type M design designed for the crest, with a sloped edge on the upstream end. The drop structure proposes a stilling basin for energy dissipation. Drop width was set based on the hydraulic modeling results where shear stresses and channel velocities were below design criteria for stable channels. The proposed work will not adversely affect the downstream bridge. In both the existing conditions and proposed conditions velocity upstream of the bridge was modeled to be 9.99 ft/s. Since the velocity does not change between existing and proposed conditions, this indicates that the proposed work will not impact the downstream bridge, see results for River Station 320 in **Appendix B.**

Drop #2

This drop is located just upstream of the confluence of the Tributary to Fishers Canyon Creek. Drop #2 was set here to increase the channel invert height quickly for the remainder of the channel upstream of the drops. The drop height is approximately 4-feet with drop structure width beyond the 100-year floodplain limit. The maximum limit for channel slope of 0.6% was used elevate the channel invert as much as possible. The drop structure proposes a stilling basin for energy dissipation.

Upstream Improvements

Upstream of Drop 2 the channel is proposed to be lined with Type M soil and void-filled riprap. This portion of the channel will utilize existing riprap within the channel to provide stability. The riprap will extend upstream to an existing riprap drop structure located at station 60+00. Riprap has been placed in all areas of the channel where velocities are above 5 ft/s, plus an additional foot above the corresponding elevation to add some contingency to the design. The riprap will only be exposed in the channel bottom, and will be buried below 6- to 9-inches of topsoil to revegetate the channel sides slopes. Channel sides slopes are 4:1 through this area where possible, while staying outside the sanitary sewer easement.

Upstream of the aerial sanitary sewer the left bank was unable to be laid back and maintain the maintenance access to the utility. Maintenance access to the aerial sanitary sewer will be maintained. Riprap is placed as described above in the channel to protect side slopes and armor the channel bottom.

MAINTENANCE

Maintenance access for the proposed channel improvements is provided by existing access on a maintenance road at the base of top of slope along the Tributary and from Venetucci Boulevard for the drop structure along the main stem. The maintenance road for the tributary can be accessed from Venetucci Boulevard near the recently constructed bridge.

Once construction of the proposed channel improvements are completed and accepted by the County, maintenance of the channel improvements (not the entire channel) will be the responsibility of El Paso County.

DRAINAGE FEES AND REIMBURSABLE COSTS

FEES

The project is within the Fishers Canyon Creek Basin, which is part of the El Paso County Drainage Basin Fee Program. This program is based on the total amount of impervious acres for the Site. As the channel improvements themselves are exempt from the impervious area calculations, the development project associated with these improvements will be required to pay the drainage basin fees.

IMPROVEMENTS AND REIMBURSABLE COSTS

The Fishers Canyon Creek Drainage Basin Planning Study identifies improvements that are eligible for reimbursement. Before and after construction of the reimbursable facilities is completed, procedures for Drainage Improvement Credits and Reimbursements outlined in Chapter 3 of the Drainage Criteria Manual will be in effect.

Information received from the County to escalate the DBPS reimbursable costs included annual percent changes in drainage basin fees from 1991 to 2025. The factors provided included

escalation in rates from 1991 to 1997, a flat rate (no increase) from 2002 to 2016, and rate increases up to 2025, resulting in an escalation rate for Fishers Canyon Creek basin of 1.779. *Table 4* below provides a summary of the applicable DBPS costs that are located on the property.

Costs for drop structures on the property were calculated from Figure IX-1 of the DBPS using drop heights from the selected plan. Other improvement costs could not easily be discerned with the available data in the DBPS and were reduced by 57% using a ratio of the channel length on the property of 3,000-feet compared to the total length of DBPS improvements of 7,000-feet. Costs for the tributary to Fishers Canyon Creek did not need to be reduced in that manner since the tributary improvements from the DBPS are wholly within the property boundary. Costs included the 5% contingency and 10% engineering of the subtotal of construction costs used in the DBPS.

Recommended improvement costs to stabilize the channel were developed by using 2024 unit costs from Mile High Flood District's Bid Tabs v.8.0 and recent contractor bids from Southeast Metro Stormwater Authority (SEMSWA) in Centennial, Colorado. Quantities were estimated based on measurements of length, width, and elevation using provided construction drawings. Costs included mobilization, survey, traffic and water control, erosion control, landscaping, drop structure, earthwork costs, and other costs to install the improvements. For a base comparison between the 1991 DBPS costs and the proposed 2025 costs, the 5% contingency and 10% engineering of the subtotal was used as well. See **Appendix D** for the detailed breakdown.

The primary differences between Kimley-Horn's recommended improvements and the DBPS improvements are increased channel lining on the tributary to armor the channel in areas where velocities are 5 ft/s or greater (852 CY in the DBPS versus the 1,745 CY based on the latest hydraulic modeling).

Table 4. DBPS Cost Comparison to Recommended Improvement Costs with 5% Contingency and 10% Engineering

DBPS Reach	DBPS Improvements (1991)	Escalated DBPS Improvements (2025)	Proposed Channel Stabilization (2025)
Fishers Canyon Creek	$ 123,900	$ 220,400	$ 213,600
Fishers Canyon Creek Tributary	$ 134,200	$ 238,750	$ 505,900
TOTAL	$ 258,100	$ 459,150	$ 717,500

Because Kimley-Horn does not control the cost of labor, materials, equipment or services furnished by others, methods of determining prices, or competitive bidding or market conditions, any opinions rendered as to costs, including but not limited to the costs of construction and materials, are made solely based on its judgment as a professional familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids or actual costs will not vary from its opinions of cost.

Qualified DBPS Costs

All of the improvements for this channel stabilization are qualified DBPS costs. The drop structure near Venetucci Blvd on Fishers Canyon Creek is proposed in the DBPS as well as the drop structures on Fishers Canyon Creek Tributary. The recommended 1-foot riffle drops are similar in function to the DBPS recommended channel armoring shown in typical cross-sections on the DBPS plan and profiles.

See **Appendix E** for the opinion of probable construction cost.

FLOODPLAIN PERMITTING

A few of the proposed improvements are located within the effective floodway and floodplain which triggers the need for a floodplain development permit. Code of Colorado Regulations for Floodplain Rules 408-1, Rule 12.G allows rises in the flood fringe as long as there is not a rise in the floodway. The design of the improvements does not cause a rise in the Floodway Base Flood Elevation of more than 0.00 feet, will not increase or decrease the BFE by more than 0.30 feet, and will not decrease the floodplain width more than 25-feet. A floodplain development permit will be coordinated with and applied for through the Pikes Peak Regional Building Department (PPRBD). A copy of the floodplain development permit and any correspondence with PPRBD will be provided as they are developed. The Floodway No-Rise analysis is provided in **Appendix H**.

ENVIRONMENTAL PERMITTING

Based on the current interpretation of the Clean Water Act Section 404, the project will have an impact of Waters of the United States (WOTUS) and jurisdictional wetlands. A 404 permit has been approved through the Albuquerque District of the United States Army Corps of Engineers (USACE) office and is included in **Appendix C**.

CONCLUSION

The Fishers Canyon Apartments development lies within the drainage basin of the Fishers Canyon Creek watershed. This report has been prepared in accordance with El Paso County stormwater criteria. It outlines the proposed channel improvements to stabilize the channel invert. The channel improvements are in general conformance with the DBPS.

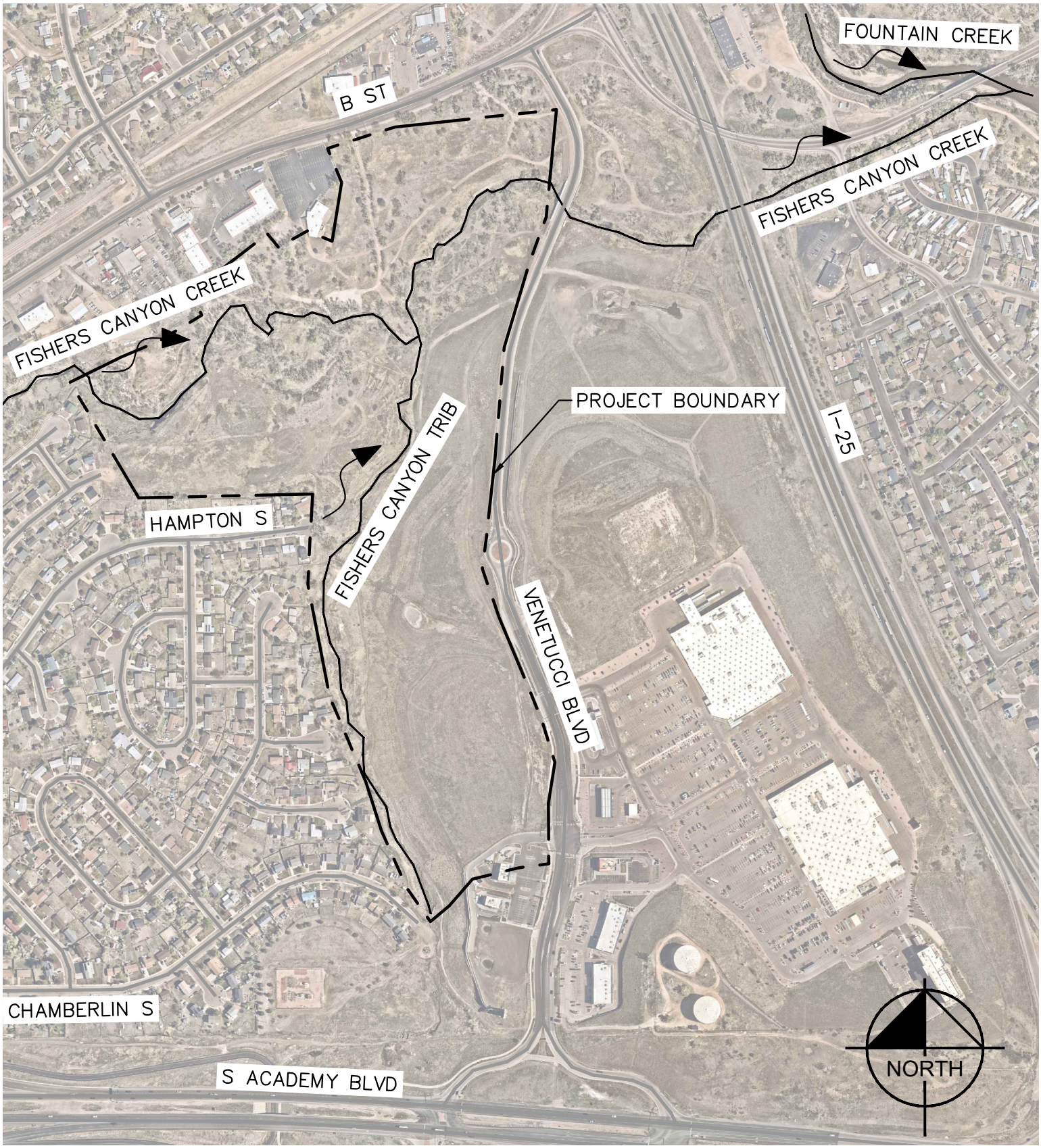
REFERENCES

1. City of Colorado Springs “Drainage Criteria Manual (DCM) Volume 1”, dated May 2014
2. El Paso County “Engineering Criteria Manual” Volumes 1 & 2, dated October 31, 2018
3. Urban Storm Drainage Criteria Manuals (USDCM), (Volumes 1, 2 and 3). September 2017.
4. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0743G, Effective Date December 7, 2018, prepared by the Federal Emergency Management Agency (FEMA).
5. Fishers Canyon Drainage Basin Planning Study Selected Plan Report (DBPS), prepared by Muller, September 1990.

APPENDIX

APPENDIX A: FIGURES

FISHERS CANYON CREEK



VICINITY MAP
1" = 500'

104°48'45.46"W 38°46'59.11"N

104°46'52.11"W 38°44'53.43"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR DRAFT FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **5/3/2024 11:25 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88

For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 500 feet 1:6,000

0 250 500 1,000 1,500 2,000 Feet

0 50 100 200 300 400 Meters

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PANEL 743 OF 1275

This panel contains:

COMMUNITY	NUMBER	PANEL
EL PASO COUNTY		
CITY OF COLORADO SPRINGS	080059	0743
FORT CARSON	080060	0743
MILITARY RESERVATION	08FED	0743

MAP NUMBER
08041C0743G
EFFECTIVE DATE
December 07, 2

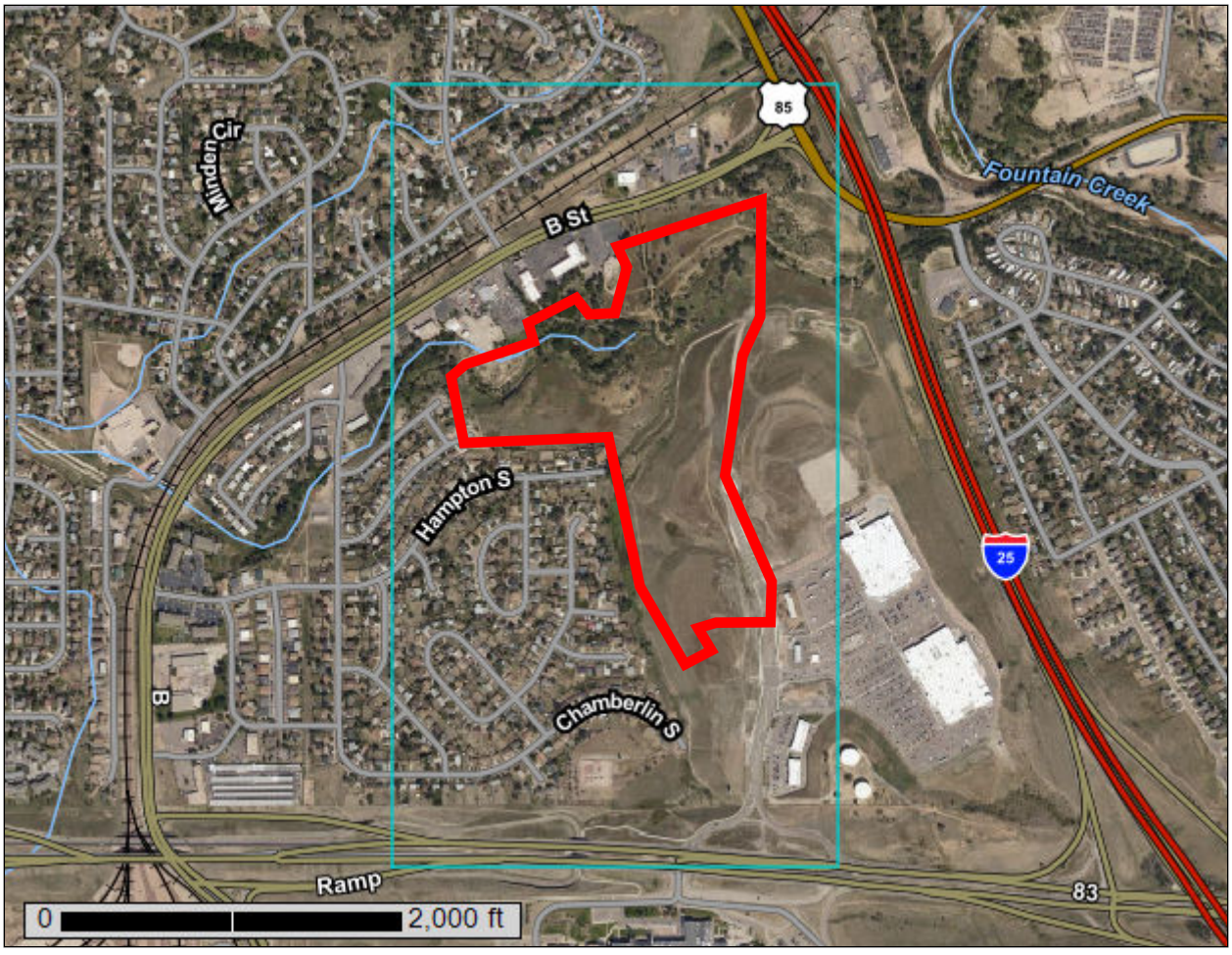
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado



May 6, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:8,150 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
47	Limon clay, 0 to 3 percent slopes	50.8	18.5%
59	Nunn clay loam, 0 to 3 percent slopes	17.0	6.2%
82	Schamber-Razor complex, 8 to 50 percent slopes	126.4	46.1%
111	Water	5.1	1.9%
127	Midway-Razor clay loams, dry, 1 to 18 percent slopes	74.8	27.3%
Totals for Area of Interest		**274.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

47—Limon clay, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 368p
Elevation: 5,200 to 6,200 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Limon, occasionally flooded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Limon, Occasionally Flooded

Setting

Landform: Flood plains, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from shale

Typical profile

A - 0 to 4 inches: clay
AC - 4 to 12 inches: silty clay
C - 12 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R069XY033CO - Salt Flat
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

59—Nunn clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3693
Elevation: 5,400 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Nunn and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nunn

Setting

Landform: Fans, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A - 0 to 12 inches: clay loam
Bt - 12 to 26 inches: clay loam
BC - 26 to 30 inches: clay loam
Bk - 30 to 58 inches: sandy clay loam
C - 58 to 72 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: C
Ecological site: R069XY042CO - Clayey Plains
Other vegetative classification: CLAYEY PLAINS (069AY042CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

82—Schamber-Razor complex, 8 to 50 percent slopes

Map Unit Setting

National map unit symbol: 369y
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Schamber and similar soils: 55 percent
Razor and similar soils: 43 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Schamber

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite and/or colluvium derived from granite and/or eolian deposits derived from granite

Typical profile

A - 0 to 5 inches: gravelly loam
AC - 5 to 15 inches: very gravelly loam
C - 15 to 60 inches: very gravelly sand

Properties and qualities

Slope: 8 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R069XY064CO - Gravel Breaks
Hydric soil rating: No

Description of Razor

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 3 inches: clay loam
Bw - 3 to 9 inches: clay loam
Bk - 9 to 31 inches: clay
Cr - 31 to 35 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R069XY047CO - Alkaline Plains
Other vegetative classification: ALKALINE PLAINS (069AY047CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

111—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

127—Midway-Razor clay loams, dry, 1 to 18 percent slopes

Map Unit Setting

National map unit symbol: 2t52f
Elevation: 3,700 to 6,400 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Midway, dry, and similar soils: 46 percent
Razor, dry, and similar soils: 44 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Midway, Dry

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Slope alluvium and/or residuum weathered from shale

Typical profile

A - 0 to 3 inches: clay loam
AC - 3 to 9 inches: clay
C - 9 to 16 inches: paragravelly clay
Cr - 16 to 79 inches: bedrock

Properties and qualities

Slope: 3 to 18 percent
Depth to restrictive feature: 11 to 20 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.00 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 7.9 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R069XY046CO - Shaly Plains
Hydric soil rating: No

Description of Razor, Dry

Setting

Landform: Pediments, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Slope alluvium and/or residuum weathered from shale

Typical profile

A - 0 to 4 inches: clay loam
Bw - 4 to 15 inches: silty clay
Bky - 15 to 30 inches: clay
Cr - 30 to 79 inches: bedrock

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: 20 to 39 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.00 to 0.21 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 7.9 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R069XY047CO - Alkaline Plains
Hydric soil rating: No

Minor Components

Manzanola

Percent of map unit: 9 percent
Landform: Fan remnants, hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY042CO - Clayey Plains
Other vegetative classification: Loamy Plains #6 (069XY006CO_2)
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX B: HYDROLOGY & HYDRAULICS

HEC-RAS DATA

Reach	River Sta	Q Total	Vel Chnl	Invert Slope	W.S. Elev	Max channel depth
		(cfs)	(ft/s)		(ft)	ft
Main	2364	3090	14.03	0.008	5814.27	4.01
Main	2180	3090	17.64	0.0199	5810.54	1.47
Main	1999	3090	5.61	-0.0001	5809.4	3.62
Main	1845	3090	3	0.0252	5809.46	4.15
Main	1680	3090	14.74	0.0012	5806.73	3.34
Main	1543	3090	14.88	0.0146	5805.66	1.92
Main	1357	3380	7.14	0.0177	5806.62	4.09
Main	1272	3380	15.2	0.0027	5804.2	3.26
Main	1200	3380	17.62	-0.0019	5802.7	1.22
Main	1117	3380	19.23	0.0148	5800.25	0.9
Main	1003	3380	9.7	0.0081	5801.63	2.35
Main	920	3380	11.71	-0.0127	5800.97	1.77
Main	831	3380	10.45	0.0164	5800.4	2.31
Main	736	3380	5.94	0.0102	5800.79	2.96
Main	637	3380	5.11	0.0253	5800.74	3
Main	532	3380	15.8	-0.034	5797.05	2.77
Main	436	3380	16	0.1879	5795.1	1.92
Main	423	3380	6.72	0.0266	5796.67	3.02
Main	320	3380	10.84	0.0159	5795.27	2.84
Main	214	3380	7.98	0.0026	5795.72	2.78
Main	110	3380	12.85		5794.31	2.11
Trib	1243	290	0.44	0.0214	5833.87	1.91
Trib	1160	290	4.63	0.0433	5831.48	1.3
Trib	1072	290	6.58	0.0703	5828.73	2.35
Trib	1007	290	11.1	0.0808	5824.08	1.96
Trib	954	290	5.28	0.0561	5820.62	4.23
Trib	911	290	7.15	-0.0121	5819.68	4.31
Trib	862	290	4.22	0.0605	5819.4	5.82
Trib	817	290	8.97	0.0109	5817.42	4.22
Trib	752	290	3.92	0.0039	5816.85	4.27
Trib	710	290	6.34	0.0243	5815.87	3.39
Trib	662	290	6.02	0.0404	5814.45	3.12
Trib	637	290	4.88	0.0152	5814.1	3.61
Trib	625	290	5.21	0.0078	5813.82	3.54
Trib	612	290	5.94	0.0393	5813.26	3.12
Trib	586	290	5.09	0.0201	5812.94	3.46
Trib	575	290	5.15	0.0054	5812.62	3.5
Trib	563	290	5.51	0.0383	5812.33	3.27
Trib	538	290	5.17	0.0137	5812.02	3.66
Trib	510	290	6.2	0.038	5810.97	3.09
Trib	484	290	5.57	0.0184	5810.46	3.37
Trib	473	290	5.83	0.0389	5810.01	3.2
Trib	449	290	4.6	0.0115	5809.77	3.71
Trib	412	290	5.84	0.0393	5808.75	3.16
Trib	386	290	4.63	0.0119	5808.47	3.72
Trib	363	290	4.28	0.0058	5808.13	3.72
Trib	345	290	4.92	0.008	5807.89	3.55
Trib	329	290	6.03	0.0382	5807.28	3.09
Trib	305	290	5.01	0.0102	5806.87	3.52
Trib	292	290	5.57	0.0354	5806.39	3.2
Trib	267	290	4.86	0.0131	5805.98	3.59
Trib	243	290	5.37	0.042	5805.32	3.29
Trib	217	290	4.44	0.0092	5805.1	3.89
Trib	174	290	4.64	0.0304	5804.34	3.53
Trib	157	290	4.03	0.014	5804.01	3.76
Trib	128	290	4.99	0.0246	5803.41	3.59
Trib	87	290	7.57	0.2051	5801.72	2.84
Trib	72	290	11.45	0.0181	5797.68	2.27
Trib	42	290	5.05	0.0056	5798.32	3.48
Trib	28	290	7.55	0.0971	5797.56	2.8
Trib	1	290	10.65		5793.18	1.22

NOTES:
If using data from 1D HEC RAS, use either SUPER or MIXED plans, do not use SUB

Plan Name	RIVER STATION	Gs	VELOCITY (FT/S)	depth	Fr	Fr<1?	LONG. CHANNEL SLOPE	d_{50} (calc)	d_{50} (selected)	RIPRAP DESIGNATION
Main	532	2.5	15.8	2.77	1.672974289	NO	-0.034	27.43676	18	TYPE H
Main	436 (Drop Structure - Bo	2.5	16	1.92	2.034892319	NO	0.1879	50.31423	18	TYPE H
Main	423	2.5	6.72	3.02	0.681456072	YES	0.0266	4.56577	6	TYPE VL
Main	320	2.5	10.84	2.84	1.133553902	NO	0.0159	9.97354	12	TYPE M
Main	214	2.5	7.98	2.78	0.843436823	YES	0.0026	2.920199	6	TYPE VL
Main	110	2.5	12.85	2.11	1.558956382	NO		0	6	TYPE VL
Trib	1243	2.5	0.44	1.91	0.056105836	YES	0.0214	0.018179	6	TYPE VL
Trib	1160	2.5	4.63	1.3	0.715618203	YES	0.0433	2.5579	6	TYPE VL
Trib	1072	2.5	6.58				0.0703	6.091614	6	TYPE VL
Trib	1007	2.5	11.1				0.0808	18.1753	18	TYPE H
Trib	954	2.5	5.28	4.23	0.452413758	YES	0.0561	3.632712	6	TYPE VL
Trib	911	2.5	7.15	4.31	0.60693121	YES	-0.0121	3.954348	6	TYPE VL
Trib	862	2.5	4.22	5.82	0.308264151	YES	0.0605	2.38088	6	TYPE VL
Trib	817	2.5	8.97	4.22	0.769499393	YES	0.0109	6.006558	6	TYPE VL
Trib	752	2.5	3.92	4.27	0.334306017	YES	0.0039	0.808816	6	TYPE VL
Trib	710	2.5	6.34	3.39	0.606822217	YES	0.0243	3.940945	6	TYPE VL
Trib	662	2.5	6.02	3.12	0.600608202	YES	0.0404	4.223557	6	TYPE VL
Trib	637	2.5	4.88	3.61	0.452624737	YES	0.0152	1.990592	6	TYPE VL
Trib	625	2.5	5.21	3.54	0.487986892	YES	0.0078	1.808437	6	TYPE VL
Trib	612	2.5	5.94	3.12	0.592626697	YES	0.0393	4.073635	6	TYPE VL
Trib	586	2.5	5.09	3.46	0.482227304	YES	0.0201	2.381431	6	TYPE VL
Trib	575	2.5	5.15	3.5	0.485115634	YES	0.0054	1.559352	6	TYPE VL
Trib	563	2.5	5.51	3.27	0.536969708	YES	0.0383	3.474614	6	TYPE VL
Trib	538	2.5	5.17	3.66	0.476235828	YES	0.0137	2.156661	6	TYPE VL
Trib	510	2.5	6.2	3.09	0.621562084	YES	0.038	4.387585	6	TYPE VL
Trib	484	2.5	5.57	3.37	0.534702616	YES	0.0184	2.767351	6	TYPE VL
Trib	473	2.5	5.83	3.2	0.574335459	YES	0.0389	3.910531	6	TYPE VL
Trib	449	2.5	4.6	3.71	0.420865127	YES	0.0115	1.608676	6	TYPE VL
Trib	412	2.5	5.84	3.16	0.578950416	YES	0.0393	3.93763	6	TYPE VL
Trib	386	2.5	4.63	3.72	0.423040148	YES	0.0119	1.648784	6	TYPE VL
Trib	363	2.5	4.28	3.72	0.391060871	YES	0.0058	1.103491	6	TYPE VL
Trib	345	2.5	4.92	3.55	0.460174968	YES	0.008	1.626659	6	TYPE VL
Trib	329	2.5	6.03	3.09	0.604519252	YES	0.0382	4.157688	6	TYPE VL
Trib	305	2.5	5.01	3.52	0.47058541	YES	0.0102	1.831957	6	TYPE VL
Trib	292	2.5	5.57	3.2	0.54872187	YES	0.0354	3.456903	6	TYPE VL
Trib	267	2.5	4.86	3.59	0.452023599	YES	0.0131	1.876984	6	TYPE VL
Trib	243	2.5	5.37	3.29	0.521733113	YES	0.042	3.405407	6	TYPE VL
Trib	217	2.5	4.44	3.89	0.396716472	YES	0.0092	1.389215	6	TYPE VL
Trib	174	2.5	4.64	3.53	0.435213834	YES	0.0304	2.277869	6	TYPE VL
Trib	157	2.5	4.03	3.76	0.366254684	YES	0.014	1.320108	6	TYPE VL
Trib	128	2.5	4.99	3.59	0.464114766	YES	0.0246	2.451516	6	TYPE VL
Trib	87	2.5	7.57	2.84	0.791605446	YES	0.2051	11.60315	12	TYPE M
Trib	72	2.5	11.45	2.27	1.33925915	NO	0.0181	11.62887	12	TYPE M
Trib	42	2.5	5.05	3.48	0.477060897	YES	0.0056	1.518037	6	TYPE VL
Trib	28	2.5	7.55	2.8	0.795133406	YES	0.0971	8.950848	9	TYPE L

OUTSIDE PROJECT AREA

8.1 Riprap Sizing

Procedures for sizing rock to be used in soil riprap, void-filled riprap, and riprap over bedding are the same.

8.1.1 Mild Slope Conditions

When subcritical flow conditions occur and/or slopes are mild (less than 2 percent), UDFCD recommends the following equation (Hughes, et al, 1983):

$$d_{50} \geq \left[\frac{VS^{0.17}}{4.5(G_s-1)^{0.66}}\right]^2 \qquad \text{Equation 8-11}$$

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

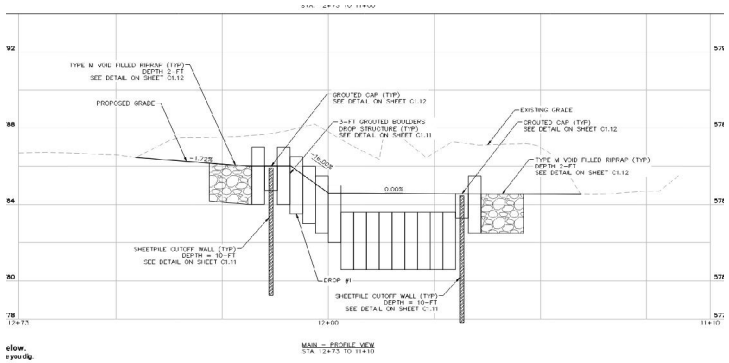
d_{50} = mean rock size (ft)

Gs = specific gravity of stone (minimum = 2.50, typically 2.5 to 2.7), Note: In this equation (Gs -1) considers the buoyancy of the water, in that the specific gravity of water is subtracted from the

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18
*D_{50} = MEAN ROCK SIZE			

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)

Plan Name	RIVER STATION	DROP #	Ss	VELOCITY (FT/S)	Slope along face of Drop	Rp (calc)	Boulder Classification
Main	532	DROP #1	2.55	15.8	0.04	6.845235	B36
Main	436	DROP #1	2.55	16	0.04	6.931884	B36
Main	423	DROP #1	2.55	6.72	0.04	2.911391	B24
Main	320	DROP #1	2.55	10.84	0.04	4.696351	B24
Trib	87	DROP #2	2.55	7.57	0.04	3.279647	B24
Trib	72	DROP #2	2.55	11.45	0.04	4.960629	B24
Trib	28	DROP #2	2.55	7.55	0.04	3.270983	B24



elow.
eyond).

Table 9-4. Boulder sizes for various rock sizing parameters

Rock Sizing Parameter, R_p	Grouted Boulders [1]
	Boulder Classification [2]

1. If the vertical distance from the drop toe to the drop crest is less than or equal to six feet, determine

3. Select minimum boulder sizes for the cross-section segments within and outside the low-flow channel cross-section from Table 9-4. If the boulder sizes for the low-flow channel and the overbank segments differ, UDFCD recommends using only the larger sized boulders throughout the entire structure. Mistakes during construction are more common when specifying multiple rock sizes within the same structure.

   output and the critical velocity can be taken from the section just upstream of the drop structure.

2. Calculate rock-sizing parameter, R_p (dimensionless), for both segments of the cross section (overbanks and in the low-flow channel):

$$R_p = \frac{VS^{0.17}}{(S_s - 1)^{0.66}} \qquad \text{Equation 9-7}$$

Where:

V = critical velocity, V_c (for drop structure heights up to six feet) or drawdown velocity at the toe of the drop (for drop height exceeding six feet)

S = slope along the face of the drop (ft/ft)

S_s = specific gravity of the rock (Assume 2.55 unless the quarry certifies a higher value.)

Note that for drop heights exceeding six feet, Equation 9-7 becomes iterative, since Manning's roughness coefficient is a function of the boulder size, from Equation 9-1 or 9-2.

Plan Name	RIVER STATION	DROP #	L_H	L_V	H_S	ΔH_S	C_W	MATERIAL	MATERIAL RATIO	Above material ratio value?
Main	423	DROP #1	19.67	93.23	5796.67	1.57	63.55839	Soft Clay	3	YES, Meets criteria
Main	436	DROP #1			5795.1			Soft Clay		
Trib	87	DROP #2	60	15.31	5801.02	2.08	16.97596	Soft Clay	3	YES, Meets criteria
Trib	72	DROP #2			5798.94			Soft Clay		

*use data from river stations at the crest and toe of the sheetpiles - lanes calcs only need o be done for sheet piles

The essential elements of Lane's method are as follows:

1. The weighted-creep distance through a cross section of a structure is the sum of the vertical creep distances, Lv (along contact surfaces steeper than 45 degrees), plus one-third of the horizontal creep distances, L_H (along contact surfaces less than 45 degrees).

2. The weighted-creep head ratio is defined as:

$$C_W = \frac{\left(\frac{L_H}{3} + L_V\right)}{H_S} \qquad \text{Equation 9-5}$$

Where:

C_W = creep ratio

H_S = differential head between analysis points (ft)

Table 9-3. Lane's weighted creep: Recommended minimum ratios

Material	Ratio
Very fine sand or silt	8.5
Fine sand	7.0
Medium sand	6.0
Coarse sand	5.0
Fine gravel	4.0
Medium gravel	3.0
Coarse gravel including cobbles	3.0
Boulders with some cobbles and gravel	3.0
Soft clay	3.0
Medium clay	2.0
Hard clay	1.8
Very hard clay or hardpan	1.6

Boring	Sample Depth (feet)	Surcharge (psf)	Swell Potential (%)	Swell Pressure (psf)	Moisture Content (%)	Soil Classification
B1	7 ½	750	**1.7**	3,200	24.7	CH
B2	2 ½	250	**4.4**	2,100	28.1	CH
B2	10	1,000	**0.3**	1,600	25.5	CH(Bedrock)

Based upon the swell test results, the native overburden soils and claystone bedrock encountered are classified as having a "low to high" potential for swell, therefore; mitigation for swell is recommended. In addition, if excessive drying and rewetting of these soils is allowed to occur, the risk of swell will increase. Proper drainage and good maintenance should be followed.

Approved
El Paso County
Planning Commission
This 16th day of July 19 91
Chairman
Secretary

MULLER

Fishers Canyon Drainage Basin Planning Study

FINAL DESIGN REPORT

Prepared For:
El Paso County
Department of Public Works

Prepared By:
Muller Engineering Company

September, 1991

SECTION V

HYDROLOGIC ANALYSIS

Methodology

Storm runoff hydrographs for the Fishers Canyon Basin were generated using the Soil Conservation Service Technical Release 20 Computer Program (TR-20). Use of the TR-20 model is in compliance with the El Paso County and City of Colorado Springs Drainage Criteria Manual (Criteria). Several sub-basins which did not require the generation of hydrographs for design purposes, and which were under 90 acres in area, were modelled using the Rational Method.

Hydrographs were developed for existing and future development conditions, with an initial storm recurrence interval of 10 years and a major storm recurrence interval of 100-years. Storms of both 2-hour and 24-hour rainfall duration were modelled, in accordance with the Criteria.

Previous Studies

The Fishers Canyon Basin was the subject of previous hydrologic analyses. Portions of the Fishers Canyon Basin were studied by Drexel, Barrell and Company for the Gates Land Company. The summary reports were entitled "Final Drainage Report for Portions of Broadmoor Bluffs and Cheyenne Meadows South at Cheyenne Mountain Ranch " (Cheyenne Mountain Ranch Report) and "FEMA Map Revision for Spring Run, Cheyenne Meadows Drainage Channel (Cheyenne Meadows Report). The Colorado Department of Highways recently performed a hydrologic analysis of the Fishers Canyon Basin to size a culvert under Interstate 25. More recently, Resource Consultants has investigated Fishers Canyon basin hydrology under contract to the Federal Emergency Management Agency (FEMA Report).

Basin information from the previous studies was checked for reasonableness and, where appropriate, was used in the current hydrologic analysis. Using existing information avoided unnecessary differences in basin modelling and facilitated the comparison of model results.

Sub-Basin Delineation

The Fishers Canyon Basin includes twenty-one sub-basins. Sub-basins and flow paths are indicated in Figure V-1. The sub-basins west of the City/County boundary were modelled as shown in the FEMA Report and the Cheyenne Mountain Ranch Report. The basin designation system used in the FEMA Report was utilized, and extended to include those sub-basins located east of the City/County boundary and south of Academy Boulevard.

Portions of the drainage basin within the City, which is primarily the Gates Land Company annexation, were not included in the detailed study area, as that area is not a part of the drainage fee system and are not reimbursed for drainage project construction. No evaluation was made of the adequacy of hydraulic structures within the City.

USGS quadrangle maps, in combination with basin maps from the Cheyenne Mountain Center Report, were used to verify the sub-basin boundaries of the FEMA Report. Additional sub-basins were delineated within El Paso County based on one-inch equals 200 feet, 2-foot contour interval mapping dated February 9, 1990.

Sub-basins 1 through 4D, 6A through 6D, and SH2 were modelled using TR-20. Runoff from sub-basins 5A through 5D, 6E, and 7A through 7C was calculated using the Rational Method.

Curr Reservoir, a large existing detention facility in the Fishers Canyon basin, was included in the TR-20 model. Stage/storage/discharge information was referenced from the FEMA report and verified using record drawings for Curr Reservoir. The future basin condition model included a diversion of historic flow rates from sub-basin 3A into Fort Carson, in accordance with the Cheyenne Mountain Ranch Report. This diversion is part of a future development plan by the Gates Land Company as approved by the City and Ft. Carson, and is not a part of this drainage basin master plan.

Land Use

Existing land use was determined using aerial photography of the basin dated November 10, 1989. The basin is currently about two thirds developed. At the time of this study approximately twenty percent of the total basin area, more or less, could expect to be developed in the immediate future. Future land use was estimated based on City and County zoning maps and land use planning information. Future land use information is shown in Figure V-2.

Soils Information

Soils types were identified using the SCS "Soil Survey of El Paso County Area, Colorado", dated 1981. Soils for the basin are categorized as loamy, but with significant percentages of clay in some areas. Substantial rock outcrops exist at the highest elevations up on the mountain side. In general, the steep upper sections of the basin are type "C" soils. The remainder of the basin falls in either the type B or type C category of soils. Soils information is shown in Figure V-2.

SCS Curve Numbers

SCS curve numbers representative of sub-basin land use and soils types were interpolated from Table 5-5 (24-hour storm) and Table 5-7 (2-hour storm) of the City/County Criteria. Curve number calculations and other TR-20 input data are shown in the technical appendix.

TABLE 5-5
RUNOFF CURVE NUMBERS
FOR HYDROLOGIC SOIL-COVER COMPLEXES
URBAN AND SUBURBAN CONDITIONS[1]
(For Antecedent Moisture Condition II)
(From: U.S. Department of Agriculture,
Soil Conservation Service, 1977)

NOTE: THIS TABLE TO BE USED FOR 24-HOUR STORM ONLY.

Land Use		Hydrologic Soil Group A	B	C	D
Open spaces, lawns, parks, golf courses, cemeteries, etc.					
Good condition: Grass cover on 75% or more of the area		39*	61	74	80
Fair condition: Grass cover on 50% to 75% of the area		49*	69	79	84
Commercial and business areas (85% impervious)		89*	92	94	95
Industrial districts (72% impervious)		81*	88	91	93
Residential:[2]					
Acres per Dwelling Unit	Average % impervious[3]				
1/8 acre or less	65	77*	85	90	92
1/4 acre	38	61*	75	83	87
1/3 acre	30	57*	72	81	86
1/2 acre	25	54*	70	80	85
1 acre	20	51*	68	79	84
Paved parking lots, roofs, driveways, etc.		98	98	98	98
Streets and roads:					
paved with curbs and storm sewers		98	98	98	98
gravel		76*	85	89	91
dirt		72*	82	87	89

[1] For a more detailed description of agricultural land use curve numbers, refer to in the National Engineering Handbook (U.S. Dept. of Agriculture, Soil Conservation Service, 1972).

[2] Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

[3] The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

* Not to be used wherever overlot grading or filling is to occur.

TABLE 5-7
RUNOFF CURVE NUMBERS
FOR HYDROLOGIC SOIL-COVER COMPLEXES
URBAN AND SUBURBAN CONDITIONS[1]
(For Antecedent Moisture Condition III)
(From: U.S. Department of Agriculture,
Soil Conservation Service, 1977)

NOTE: THIS TABLE TO BE USED FOR 24-HOUR STORM ONLY.

Land Use		Hydrologic Soil Group			
		A	B	C	D
Open spaces, lawns, parks, golf courses, cemeteries, etc.					
	Good condition: Grass cover on 75% or more of the area	59*	78	88	91
	Fair condition: Grass cover on 50% to 75% of the area	69*	84	91	93
Commercial and business areas (85% impervious)		96*	97	98	98
Industrial districts (72% impervious)		92*	95	97	98
Residential:[2]					
Acres per Dwelling Unit	Average % impervious[3]				
1/8 acre or less	65	89*	94	96	97
1/4 acre	38	78*	88	93	95
1/3 acre	30	75*	86	92	94
1/2 acre	25	73*	85	91	94
1 acre	20	70*	84	91	93
Paved parking lots, roofs, driveways, etc.		99	99	99	99
Streets and roads:					
paved with curbs and storm sewers		99	99	99	99
gravel		89*	94	96	97
dirt		86*	92	95	96

[1] For a more detailed description of agricultural land use curve numbers, refer to in the National Engineering Handbook (U.S. Dept. of Agriculture, Soil Conservation Service, 1972).

[2] Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

[3] The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

* Not to be used wherever overlot grading or filling is to occur.

Rainfall

Ten-year and 100-year recurrence interval hyetographs were developed for 2-hour and 24-hour storm durations. Figures 5-4a to 5-4e of the Criteria were used to derive the following rainfall depths:

	2-Hour		24-Hour	
	10-year	100-year	10-year	100-year
Rainfall Depth, inches	2.06	3.05	3.20	4.50

Estimates of Peak Discharge

Table V-1 provides a comparison between 100-year existing condition flow rates estimated in the FEMA Report and existing and future development condition flow rates estimated in the current study. The flow rates in Table 2 are generated from the 2-hour storm, which in all cases creates higher peaks than the 24-hour storm. Peak flow rates are indicated at Design Points shown on Figure V-1.

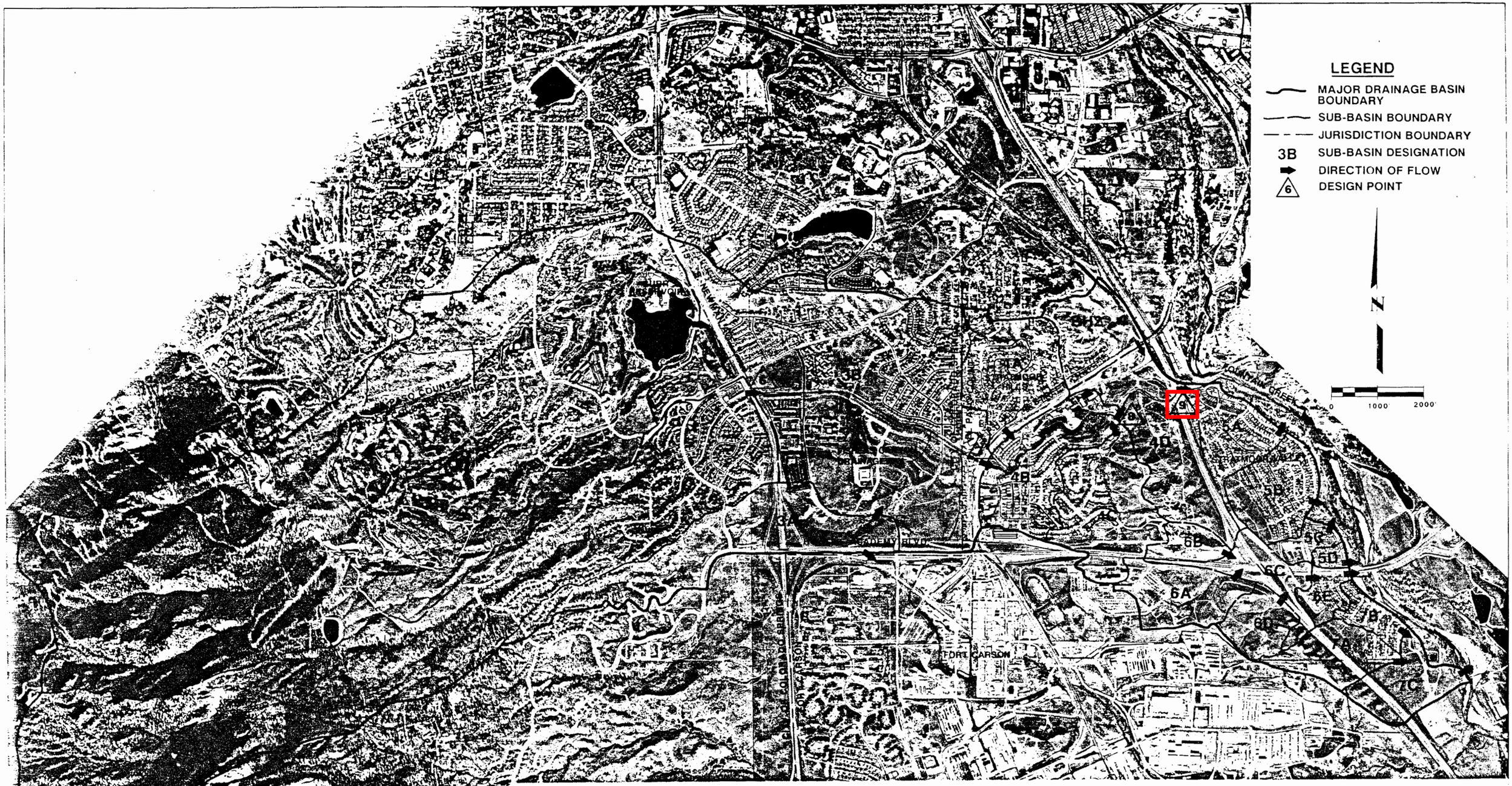
TABLE V-1
FISHERS CANYON BASIN 100-YEAR PEAK FLOW COMPARISON
(all flows in cfs)

Design Point	FEMA Report (Existing Conditions)	Current Study (Existing Conditions)	Current Study (Future Conditions)
6	1,640	1,640	1,640
7	2,490	2,690	2,590
8	2,870	3,000	3,020
9	3,090	3,090	3,170

Design Point 7 represents the Fishers Canyon drainageway at the City/County boundary. The peak flow estimated at Design Point 7 in the current study is slightly greater than the flow estimated in the FEMA Report. The difference in peak flow is attributed to the inclusion of Sub-basin 3A in the current study, but not in the FEMA Report. The future condition flow rate is lower than the

existing condition flow at Design Point 7 due to the planned diversion of "historic" flows from Sub-basin 3A into Fort Carson, in accordance with the Cheyenne Mountain Ranch Report for the Gates Land Company. At present, the culvert under Highway 83, which is necessary to divert historic flows into Fort Carson, has not been constructed. Therefore the existing condition case does not reflect the diversion. Design Point 9 represents the Fishers Canyon drainageway at Interstate 25. The FEMA Report and the current study correlate well at Design Point 9, with each analysis predicting a 100-year peak flow of 3090 cfs for existing development conditions.

Design peak discharges for storm sewer systems are shown on Figure VIII-1 through VIII-4. These discharges have been calculated at each inlet using the Rational method.



Project No.: 8933
Date: Dec. 1991

AERIAL PHOTOGRAPHY BY: ANALYTICAL SURVEYS, INC.
DATE FLOWN: 11/10/89

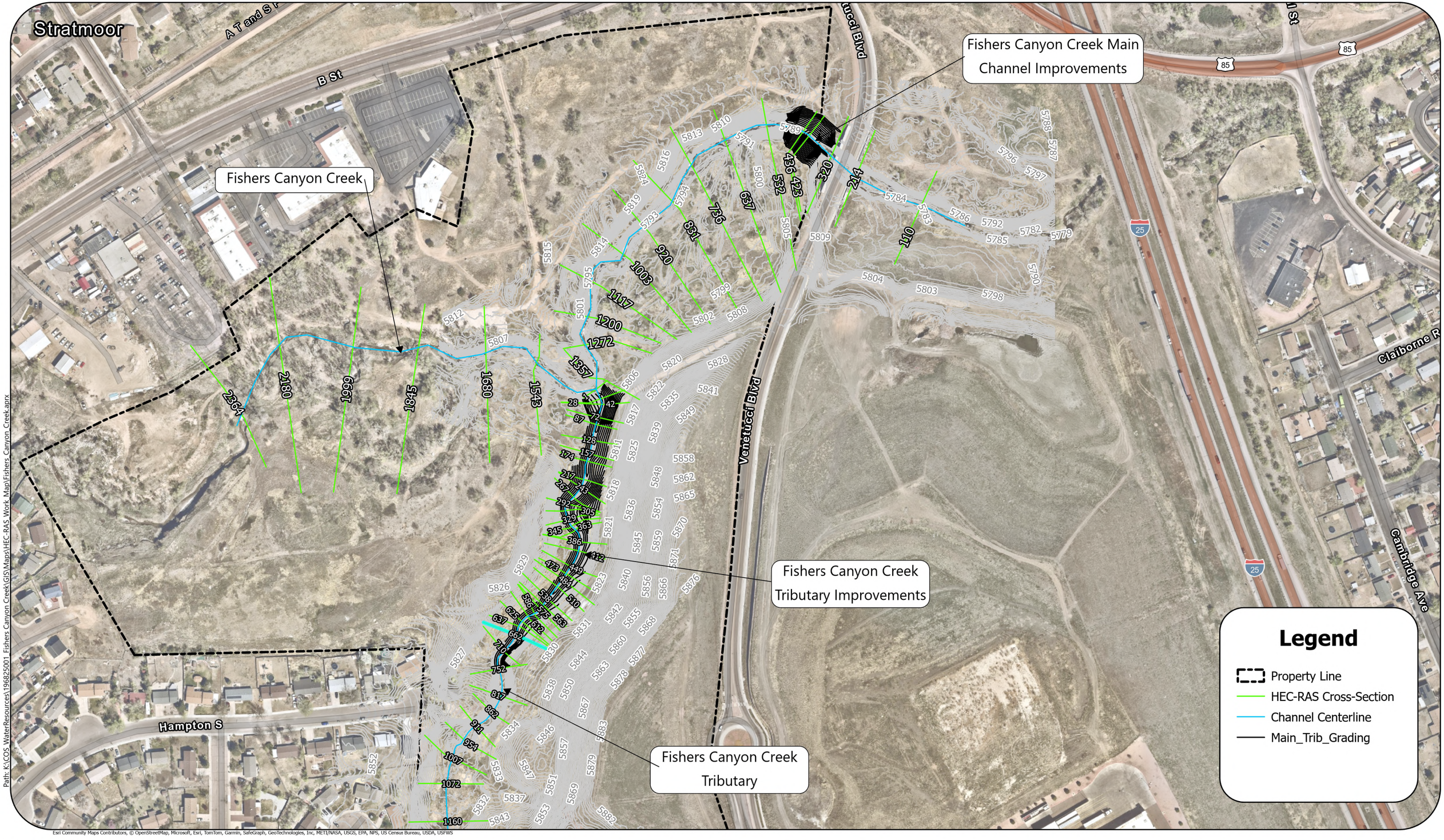
MULLER ENGINEERING COMPANY, INC.
CONSULTING ENGINEERS
[illegible] SOUTH WADSWORTH BOULEVARD SUITE 500
LAKEWOOD COLORADO 80226-3118
(303) 937-[illegible]

EL PASO COUNTY
DEPARTMENT OF PUBLIC WORKS
3170 CENTURY STREET
COLORADO SPRINGS, COLORADO 80907
(719) 520-6460

FISHERS CANYON
DRAINAGE BASIN PLANNING STUDY

SUB-BASIN MAP

FIGURE
V-1



Path: K:\COS_WaterResources\196825001_Fishers_Canyon_Creek\GIS\Maps\HEC-RAS_Work_Map\Fishers_Canyon_Creek.aprx

Kimley»Horn
2 North Nevada, Suite 900
Colorado Springs, CO 80903
TEL: 719.453.0180
www.kimley-horn.com

N

0 100 200 400 Feet

Fishers Canyon Creek Channel Improvements

Floodplain Work Map

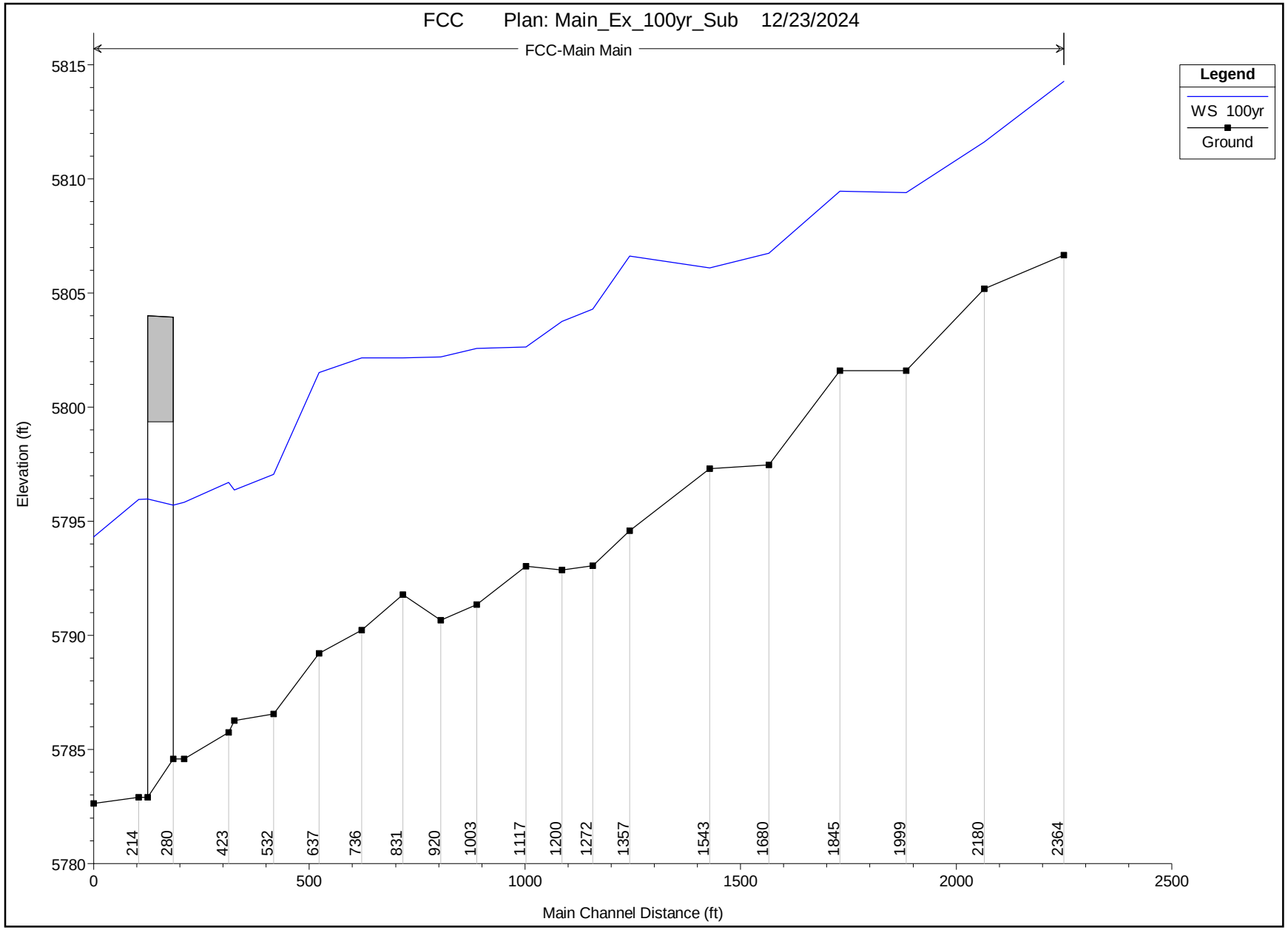
EXISTING CONDITION RESULTS

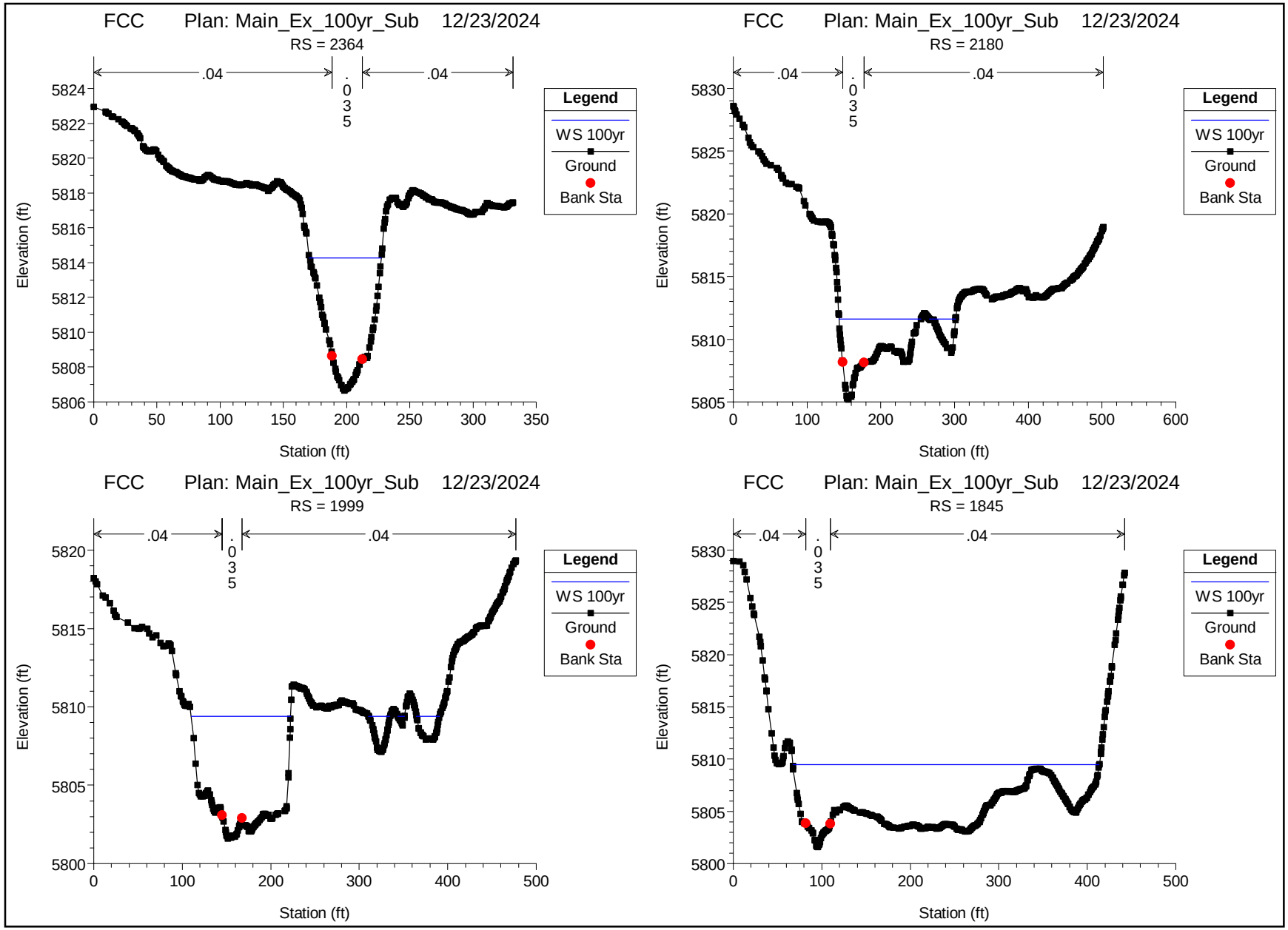
HEC-RAS Plan: Main_Ex_100yr_Sub River: FCC-Main Reach: Main Profile: 100yr

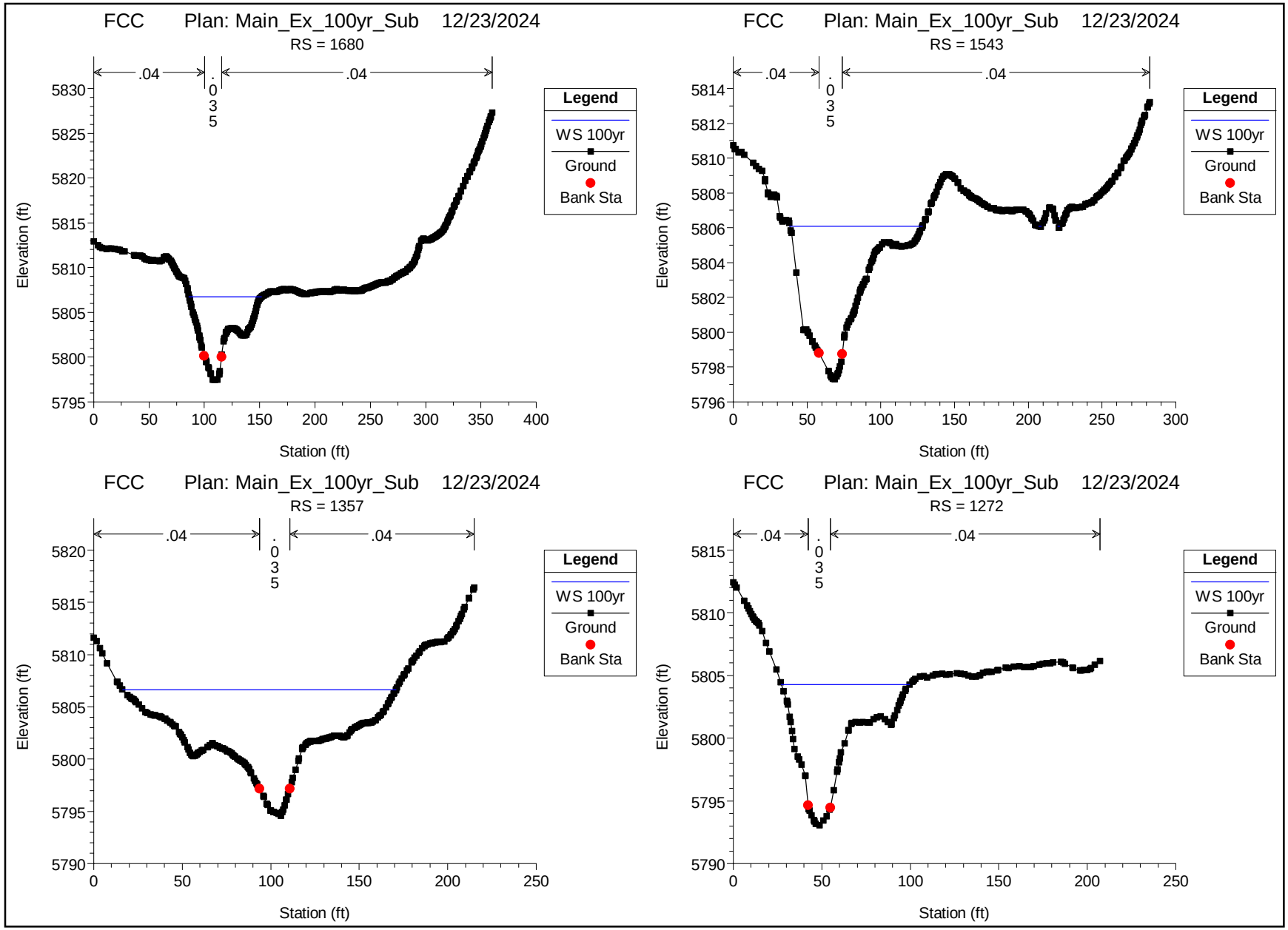
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Main	2364	100yr	3090.00	5806.66	5814.27	5814.27	5816.76	0.008557	14.03	272.12	56.77	0.94	2.44
Main	2180	100yr	3090.00	5805.19	5811.61	5811.61	5812.94	0.009389	11.44	386.41	146.26	0.92	1.51
Main	1999	100yr	3090.00	5801.59	5809.40		5809.70	0.001244	5.61	737.86	170.19	0.36	0.33
Main	1845	100yr	3090.00	5801.60	5809.46		5809.53	0.000411	3.00	1500.18	346.35	0.21	0.11
Main	1680	100yr	3090.00	5797.46	5806.73	5806.73	5809.12	0.007936	14.74	295.90	65.26	0.90	2.10
Main	1543	100yr	3090.00	5797.30	5806.10	5806.10	5807.98	0.006275	13.43	346.57	92.82	0.83	1.41
Main	1357	100yr	3380.00	5794.58	5806.63		5807.05	0.001239	7.13	783.00	154.36	0.38	0.38
Main	1272	100yr	3380.00	5793.06	5804.29	5804.29	5806.66	0.005677	15.13	351.84	72.45	0.82	1.58
Main	1200	100yr	3380.00	5792.87	5803.71	5803.71	5805.73	0.003680	11.70	577.71	199.11	0.64	0.65
Main	1117	100yr	3380.00	5793.03	5802.63		5803.31	0.002382	8.89	723.52	246.05	0.52	0.43
Main	1003	100yr	3380.00	5791.34	5802.57	5801.17	5803.03	0.001421	7.49	814.73	239.17	0.40	0.35
Main	920	100yr	3380.00	5790.66	5802.19	5801.00	5802.86	0.002254	9.08	681.96	274.47	0.50	0.50
Main	831	100yr	3380.00	5791.78	5802.16	5800.11	5802.65	0.001464	7.30	707.25	288.15	0.41	0.46
Main	736	100yr	3380.00	5790.22	5802.16	5798.85	5802.50	0.000850	6.09	867.73	357.90	0.32	0.29
Main	637	100yr	3380.00	5789.21	5801.51	5797.56	5802.34	0.001533	8.06	556.80	341.11	0.43	0.52
Main	532	100yr	3380.00	5786.56	5797.05	5797.05	5800.48	0.007715	15.80	257.30	41.63	0.90	2.59
Main	436	100yr	3380.00	5786.26	5796.36		5797.80	0.011155	9.93	354.02	53.71	0.59	4.06
Main	423	100yr	3380.00	5785.75	5796.71		5797.54	0.003806	6.14	480.08	62.39	0.35	1.62
Main	320	100yr	3380.00	5784.59	5795.83	5792.74	5797.17	0.002479	9.99	435.26	83.79	0.54	0.75
Main	280		Bridge										
Main	214	100yr	3380.00	5782.91	5795.95	5790.73	5796.57	0.001374	8.06	599.09	86.08	0.40	0.54
Main	110	100yr	3380.00	5782.64	5794.31	5794.31	5796.01	0.004645	12.85	434.34	123.07	0.71	0.98

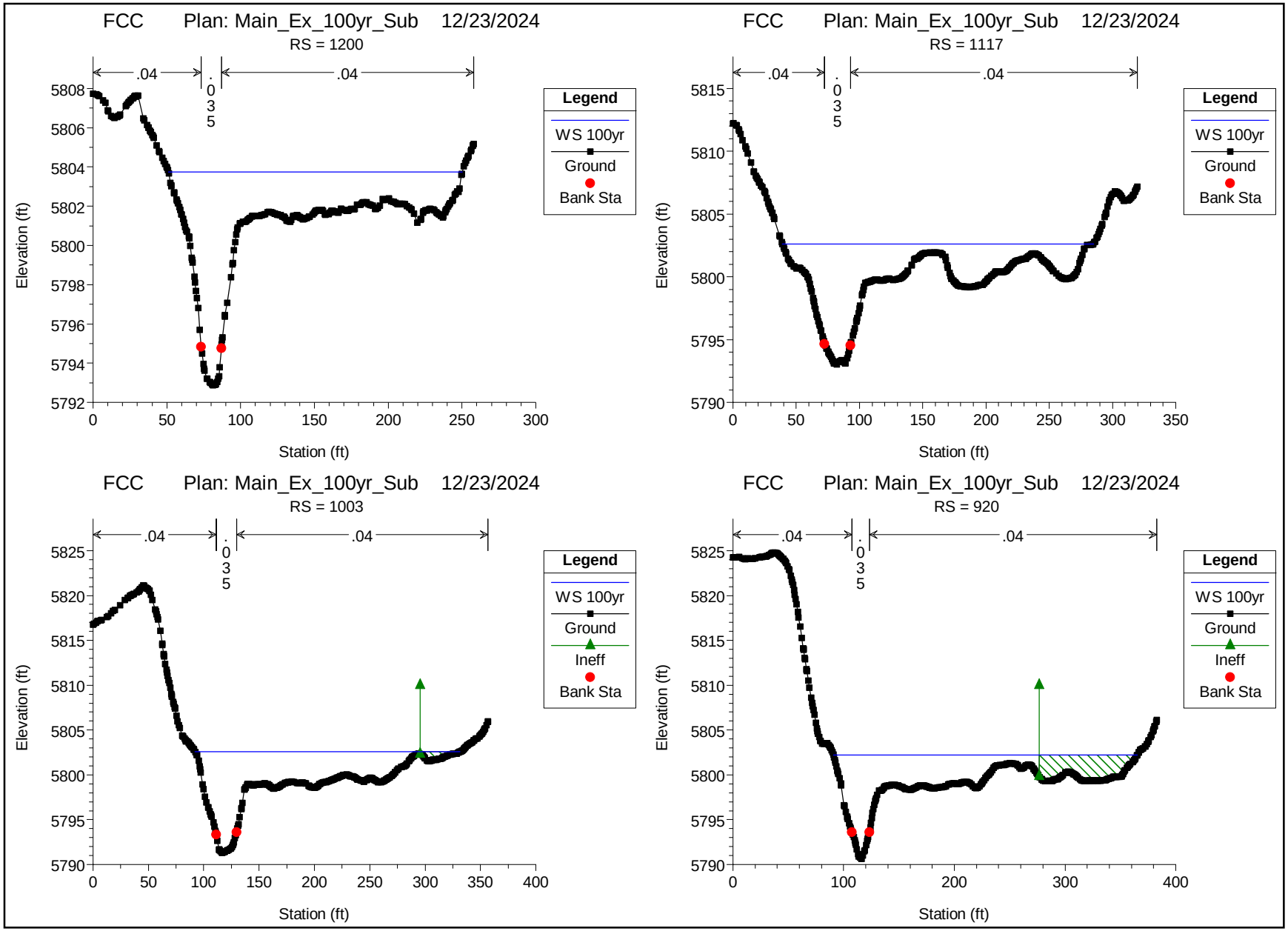
OUTSIDE PROJECT AREA

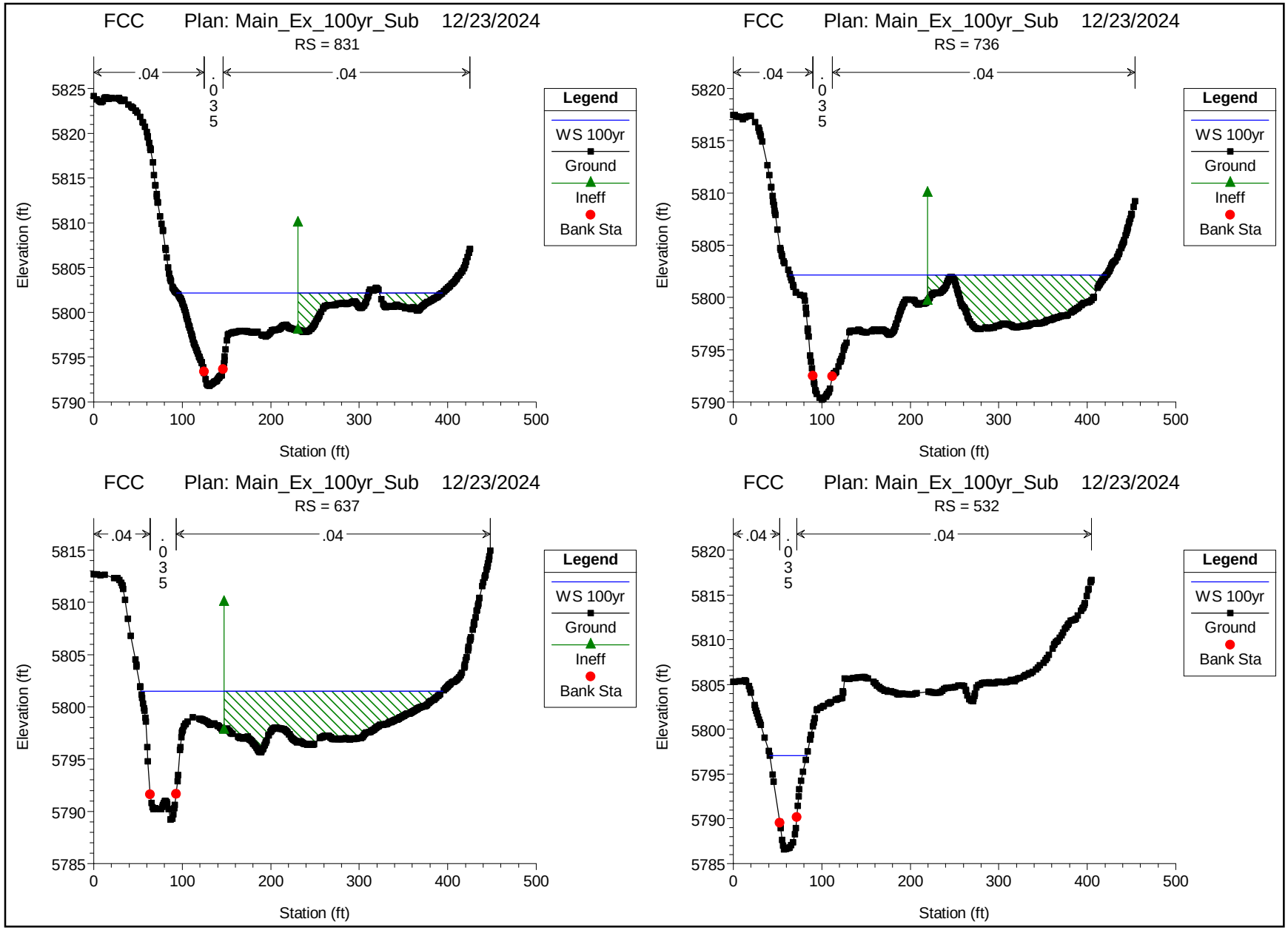
OUTSIDE PROJECT AREA

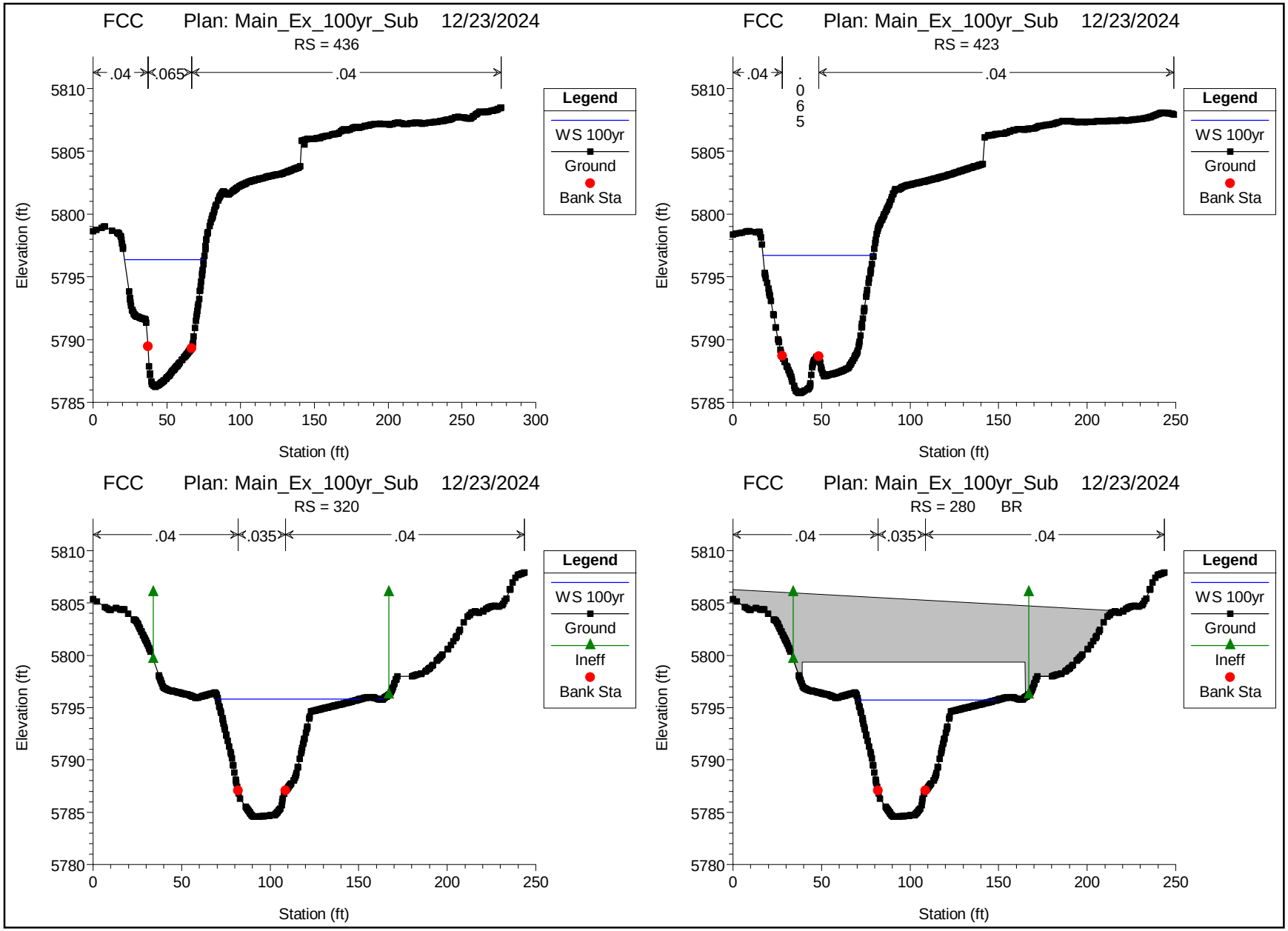

FCC Plan: Main_Ex_100yr_Sub 12/23/2024
FCC-Main Main
Legend
WS 100yr
Ground
Elevation (ft)
Main Channel Distance (ft)
5780
5785
5790
5795
5800
5805
5810
5815
0
500
1000
1500
2000
2500
214
280
423
532
637
736
831
920
1003
1117
1200
1272
1357
1543
1680
1845
1999
2180
2364

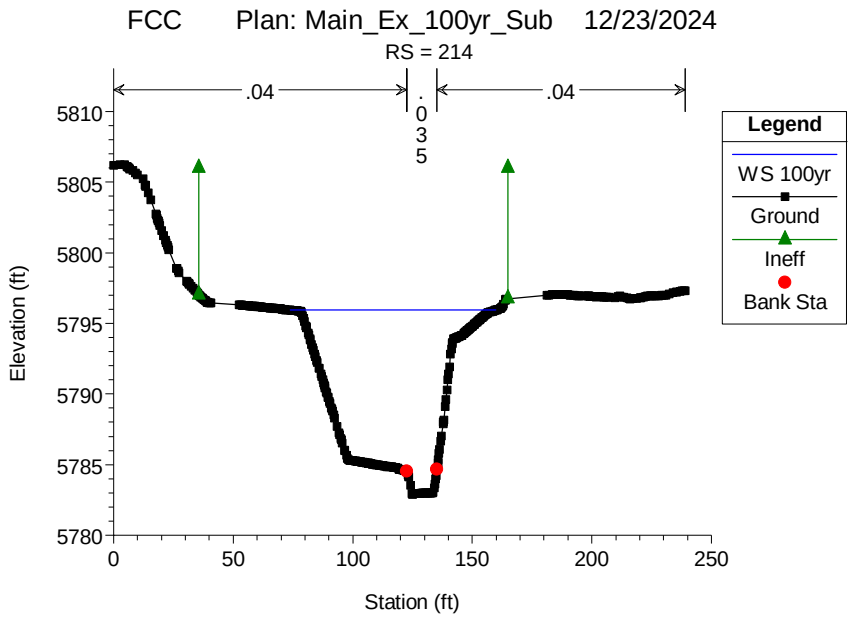

FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 2364
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 2180
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1999
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1845
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

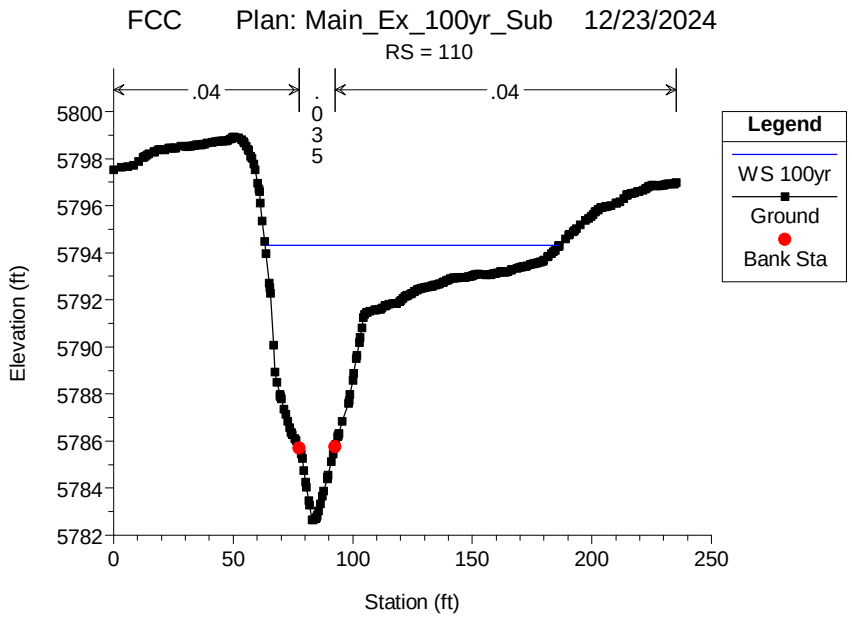

FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1680
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1543
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1357
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1272
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta


FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1200
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1117
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 1003
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 920
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 831
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 736
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 637
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 532
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 436
.04
.065
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 423
.04
.065
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 320
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 280 BR
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 214
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
5810
5805
5800
5795
5790
5785
5780
0
50
100
150
200
250

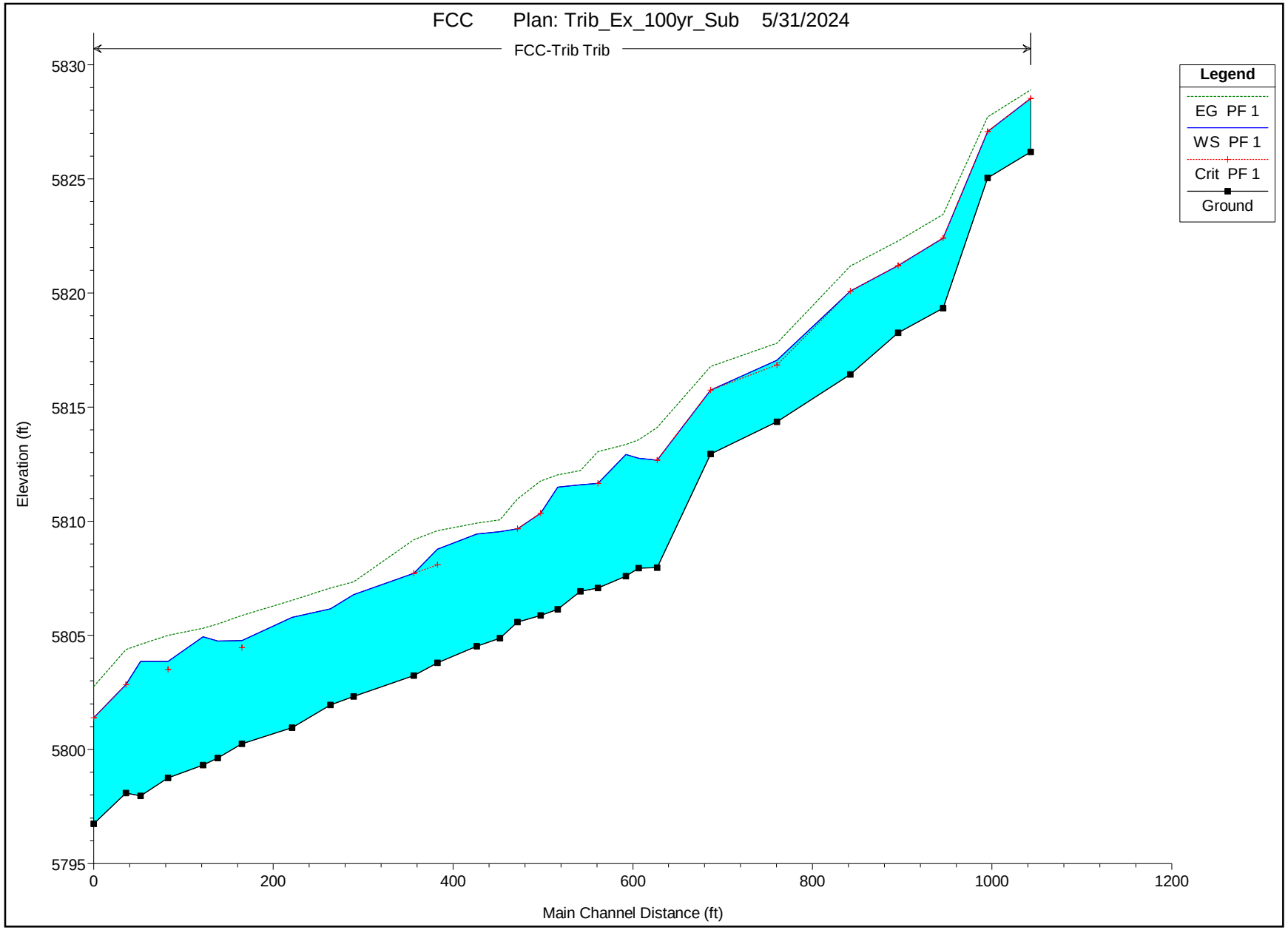

FCC Plan: Main_Ex_100yr_Sub 12/23/2024
RS = 110
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
5800
5798
5796
5794
5792
5790
5788
5786
5784
5782
0
50
100
150
200
250

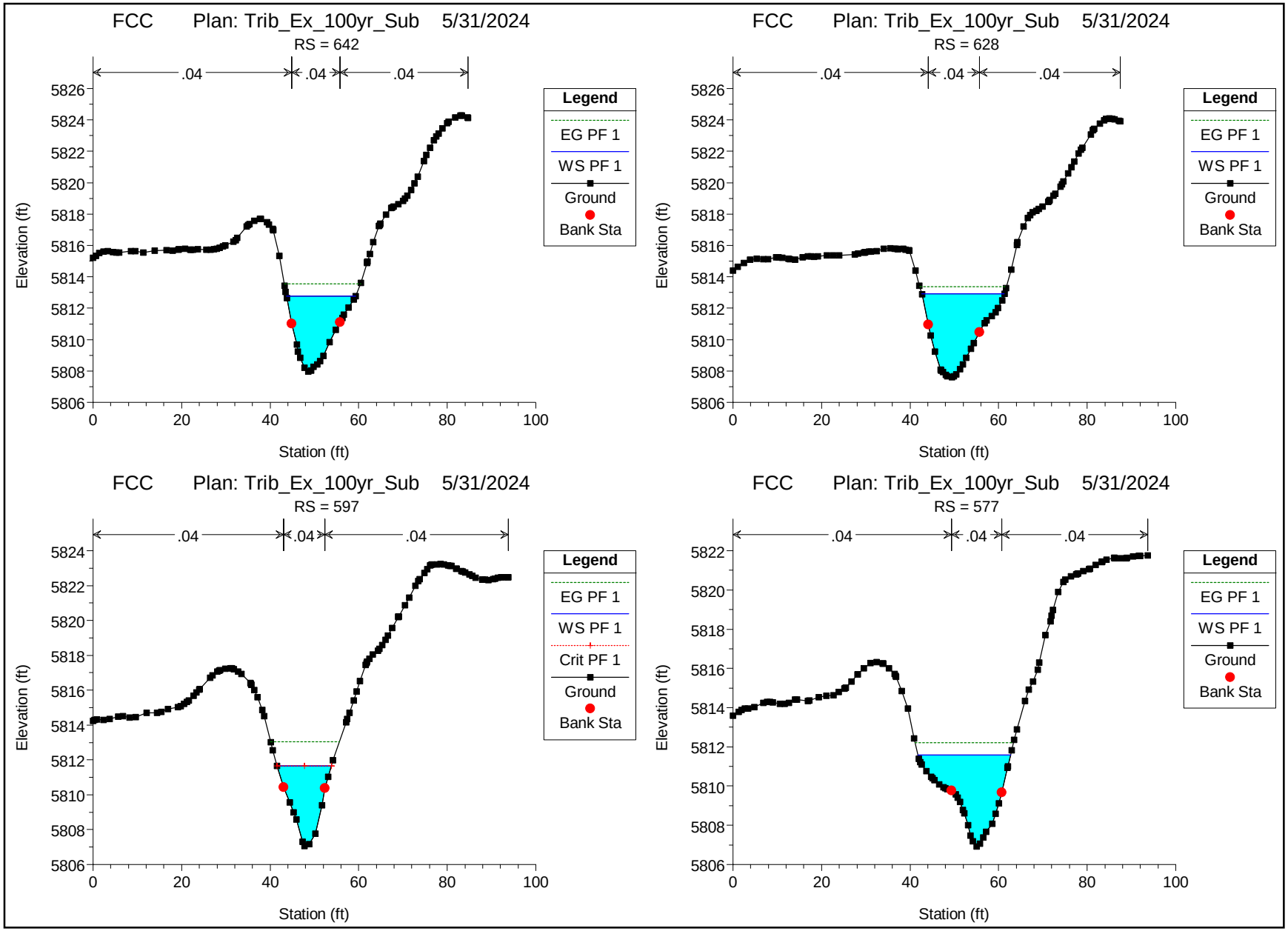
EXISTING CONDITION RESULTS

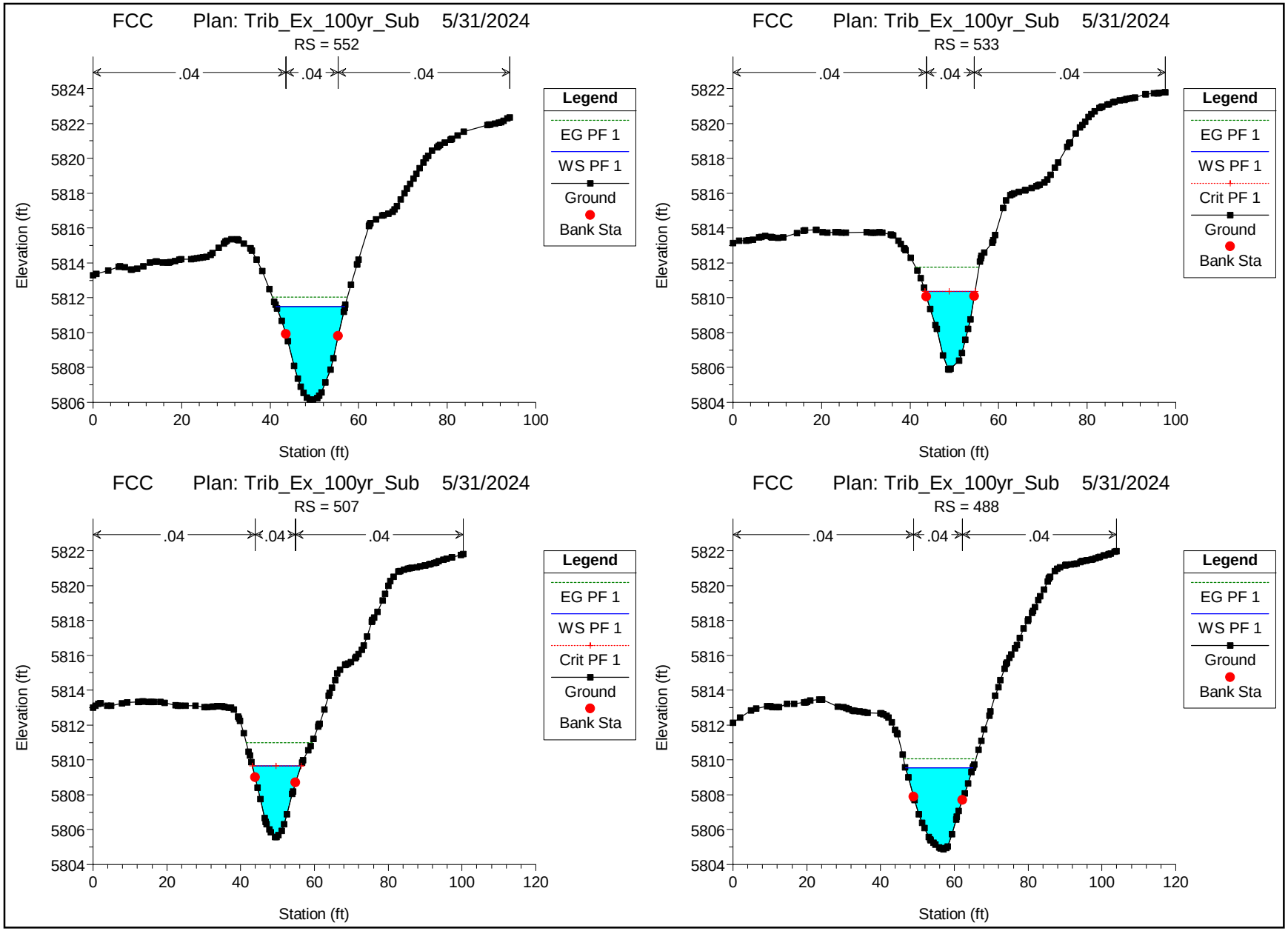
HEC-RAS Plan: Trib_Ex_100yr_Sub River: FCC-Trib Reach: Trib Profile: PF 1

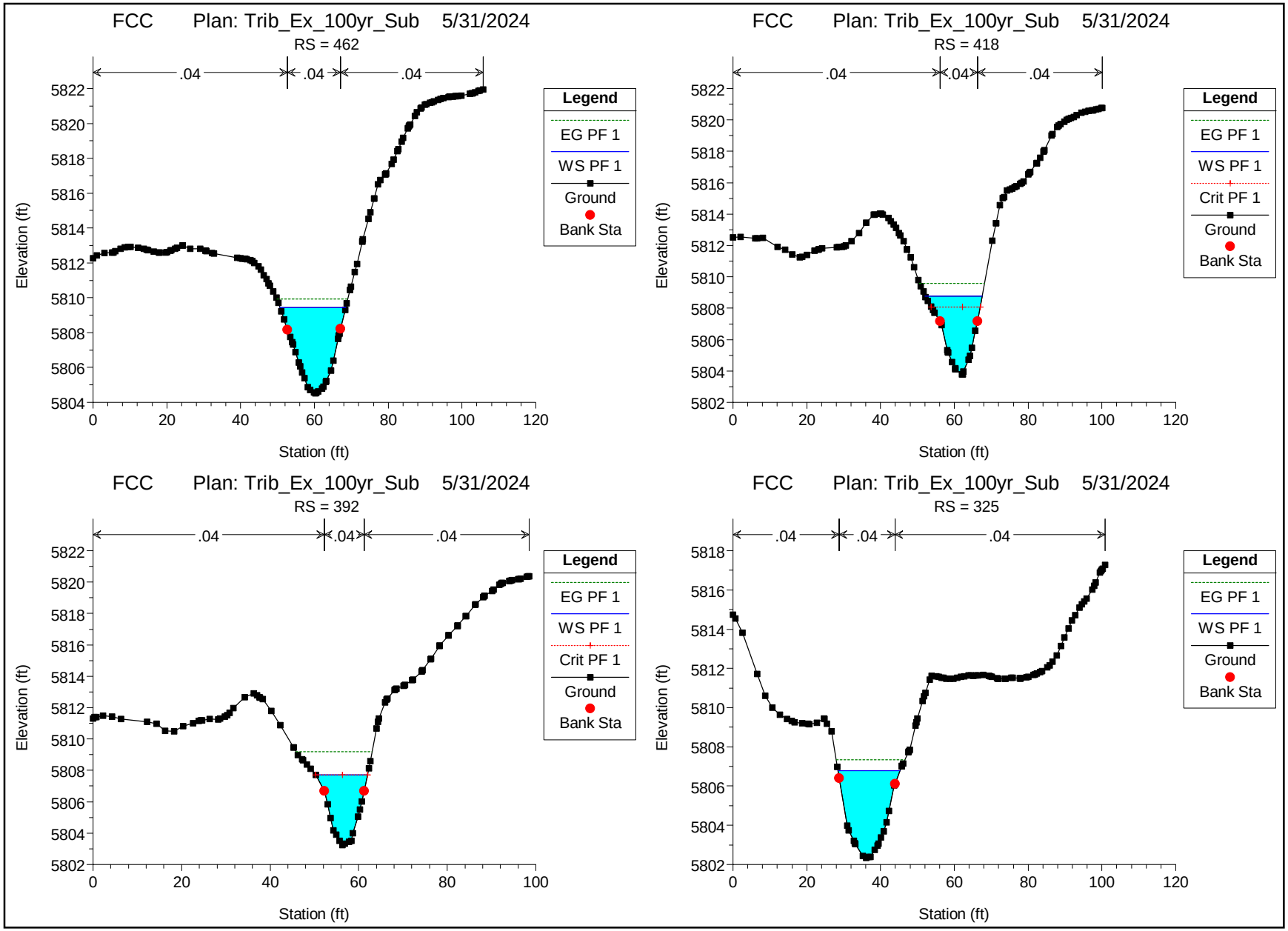
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Trib	1079	PF 1	290.00	5826.18	5828.52	5828.52	5828.91	0.011909	6.07	68.39	76.92	0.78	0.66
Trib	1031	PF 1	290.00	5825.05	5827.[illegible]	[illegible]	[illegible]	0.017087	7.16	50.31	48.46	0.94	1.10
Trib	981	PF 1	290.00	5819.33	5822.41	5822.41	5823.45	0.016122	8.41	37.10	18.75	0.94	1.85
Trib	931	PF 1	290.00	5818.25	5821.20	5821.20	5822.27	0.017982	8.38	35.70	17.56	0.97	2.08
Trib	878	PF 1	290.00	5816.43	5820.08	5820.08	5821.19	0.016988	8.58	35.38	16.98	0.95	2.01
Trib	796	PF 1	290.00	5814.35	5817.06	5816.85	5817.81	0.011744	7.20	44.14	23.15	0.82	1.34
Trib	722	PF 1	290.00	5812.94	5815.75	5815.75	5816.78	0.015626	8.45	37.77	19.34	0.94	1.78
Trib	663	PF 1	290.00	5807.97	5812.67	5812.67	5814.10	0.020331	9.68	30.99	12.02	0.95	2.52
Trib	642	PF 1	290.00	5807.95	5812.76		5813.56	0.008883	7.27	42.31	15.56	0.68	1.25
Trib	628	PF 1	290.00	5807.60	5812.93		5813.37	0.004036	5.52	57.44	18.64	0.48	0.65
Trib	597	PF 1	290.00	5807.07	5811.65	5811.65	5813.04	0.019250	9.53	31.63	12.32	0.94	2.42
Trib	577	PF 1	290.00	5806.92	5811.59		5812.22	0.007514	6.64	49.11	20.95	0.64	0.98
Trib	552	PF 1	290.00	5806.15	5811.50		5812.03	0.005043	5.90	51.18	15.57	0.51	0.83
Trib	533	PF 1	290.00	5805.87	5810.36	5810.36	5811.76	0.023354	9.50	30.58	11.32	1.00	3.00
Trib	507	PF 1	290.00	5805.59	5809.67	5809.67	5810.98	0.019358	9.22	32.13	13.21	0.97	2.45
Trib	488	PF 1	290.00	5804.87	5809.54		5810.07	0.005284	5.88	52.04	18.24	0.55	0.82
Trib	462	PF 1	290.00	5804.52	5809.43		5809.92	0.005124	5.62	53.01	17.82	0.53	0.82
Trib	418	PF 1	290.00	5803.79	5808.78	5808.08	5809.59	0.009111	7.37	42.11	15.49	0.67	1.26
Trib	392	PF 1	290.00	5803.24	5807.72	5807.72	5809.19	0.020534	9.77	30.71	11.76	0.95	2.56
Trib	325	PF 1	290.00	5802.33	5806.78		5807.35	0.007071	6.07	48.18	16.77	0.60	1.09
Trib	299	PF 1	290.00	5801.94	5806.15		5807.07	0.014060	7.68	37.78	13.29	0.80	2.02
Trib	256	PF 1	290.00	5800.95	5805.79		5806.53	0.009231	6.94	42.86	16.10	0.67	1.27
Trib	200	PF 1	290.00	5800.24	5804.77	5804.46	5805.87	0.014252	8.44	35.53	13.59	0.83	1.89
Trib	174	PF 1	290.00	5799.62	5804.76		5805.50	0.007069	7.04	44.16	13.95	0.61	1.09
Trib	157	PF 1	290.00	5799.31	5804.94		5805.31	0.003345	5.31	66.82	26.36	0.44	0.48
Trib	118	PF 1	290.00	5798.76	5803.85	5803.50	5805.00	0.012574	8.81	35.78	12.48	0.79	1.73
Trib	88	PF 1	290.00	5797.96	5803.85		5804.61	0.006701	7.21	44.48	13.09	0.58	1.03
Trib	71	PF 1	290.00	5798.10	5802.83	5802.83	5804.37	0.017335	10.31	31.67	12.08	0.91	2.14
Trib	35	PF 1	290.00	5796.75	5801.39	5801.39	5802.76	0.018902	9.51	31.97	12.76	0.94	2.34

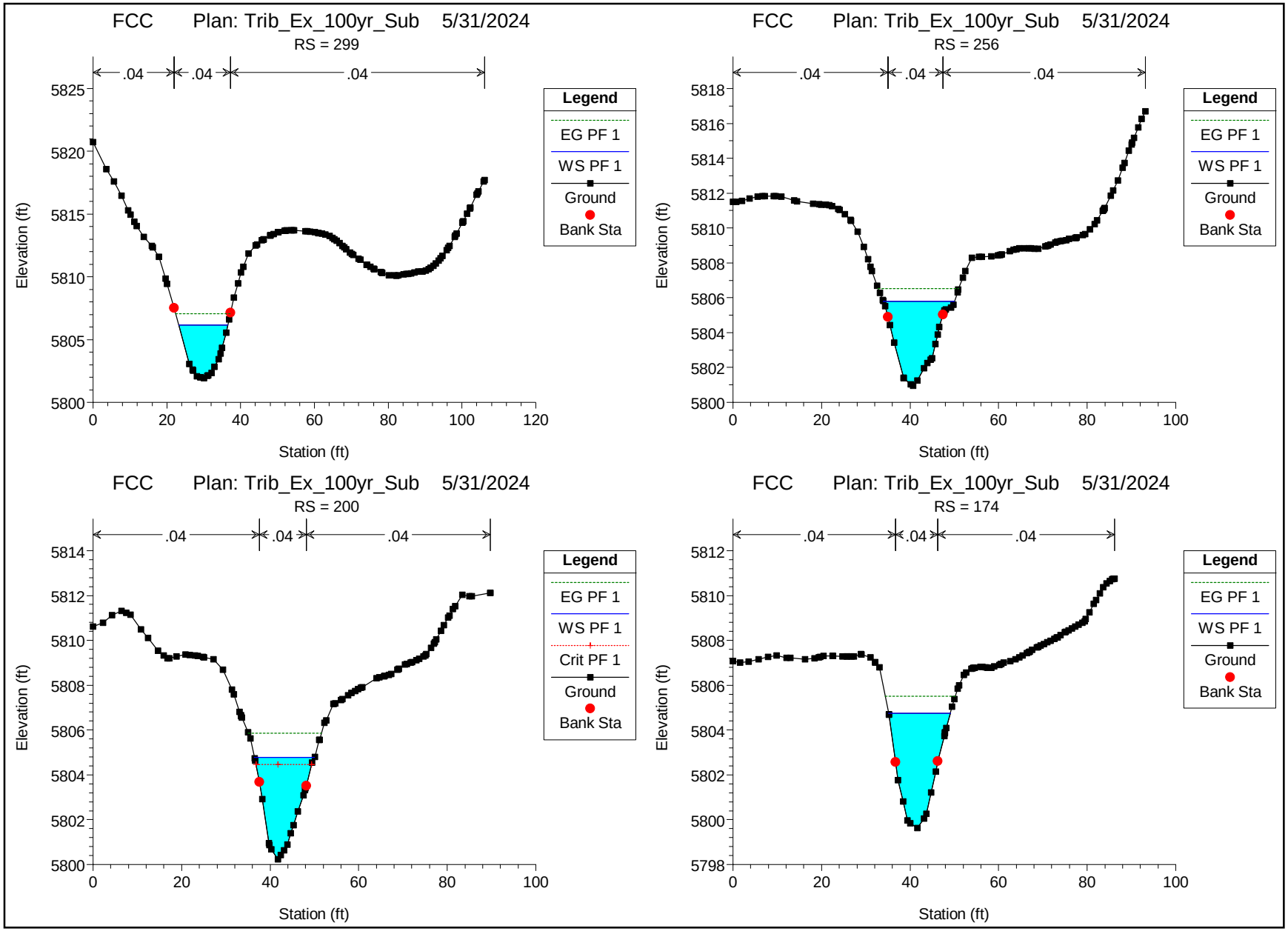
OUTSIDE PROJECT AREA

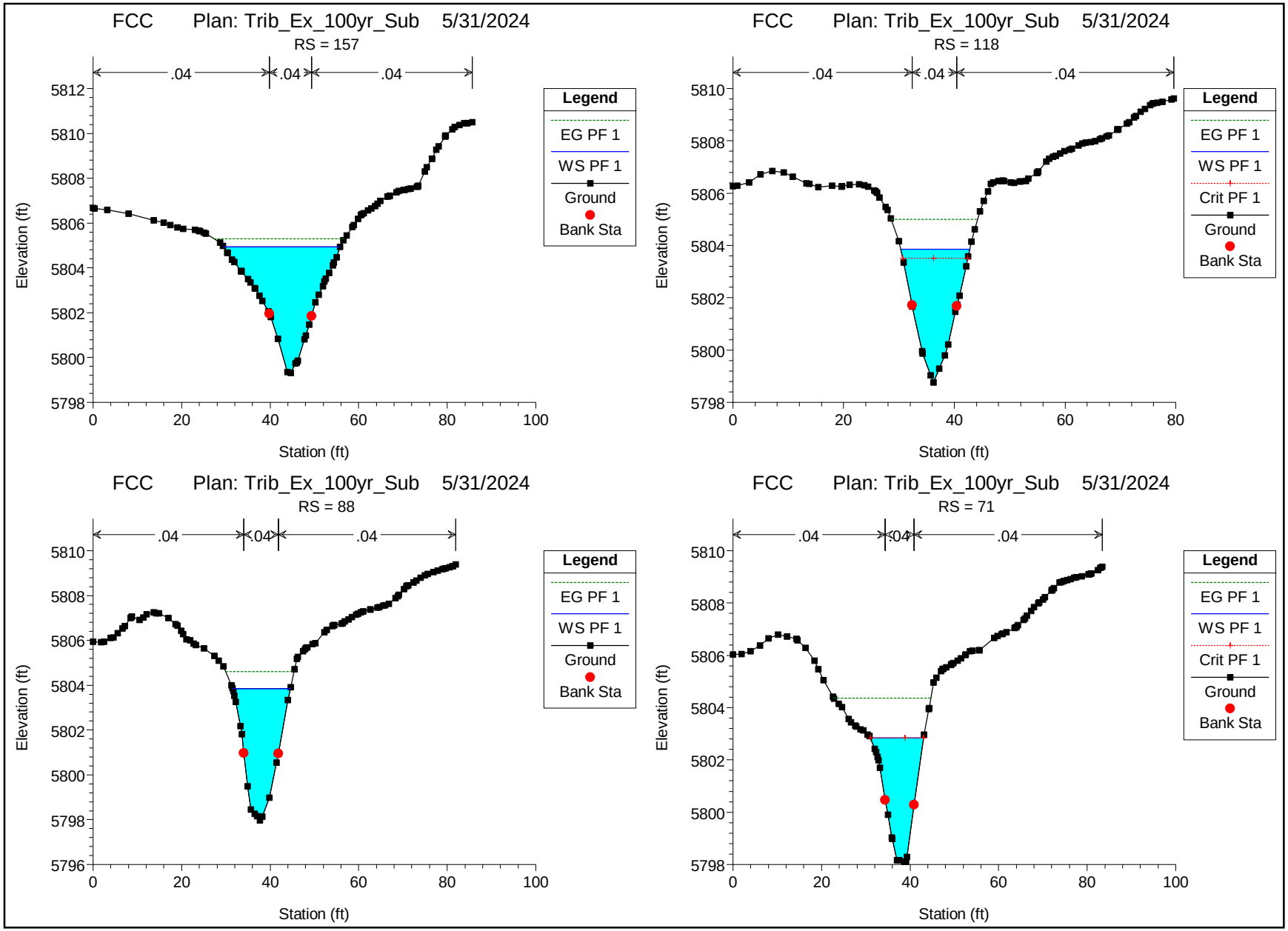

FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
FCC-Trib Trib
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
5830
5825
5820
5815
5810
5805
5800
5795
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

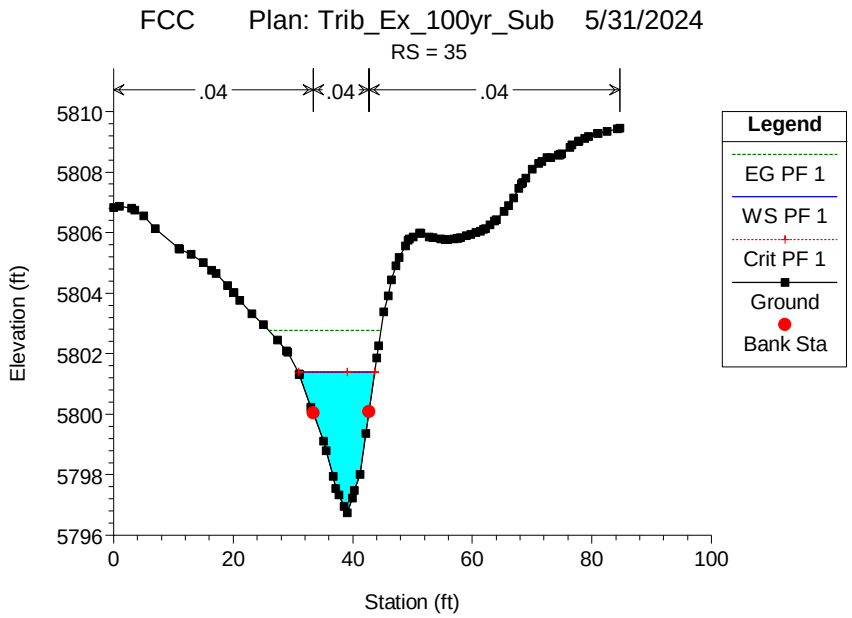

FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 642
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 628
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 597
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 577
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 552
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 533
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 507
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 488
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 462
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 418
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 392
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 325
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 299
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 256
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 200
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 174
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta


FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 157
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 118
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 88
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 71
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


FCC Plan: Trib_Ex_100yr_Sub 5/31/2024
RS = 35
.04
.04
.04
Elevation (ft)
5810
5808
5806
5804
5802
5800
5798
5796
0
20
40
60
80
100
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

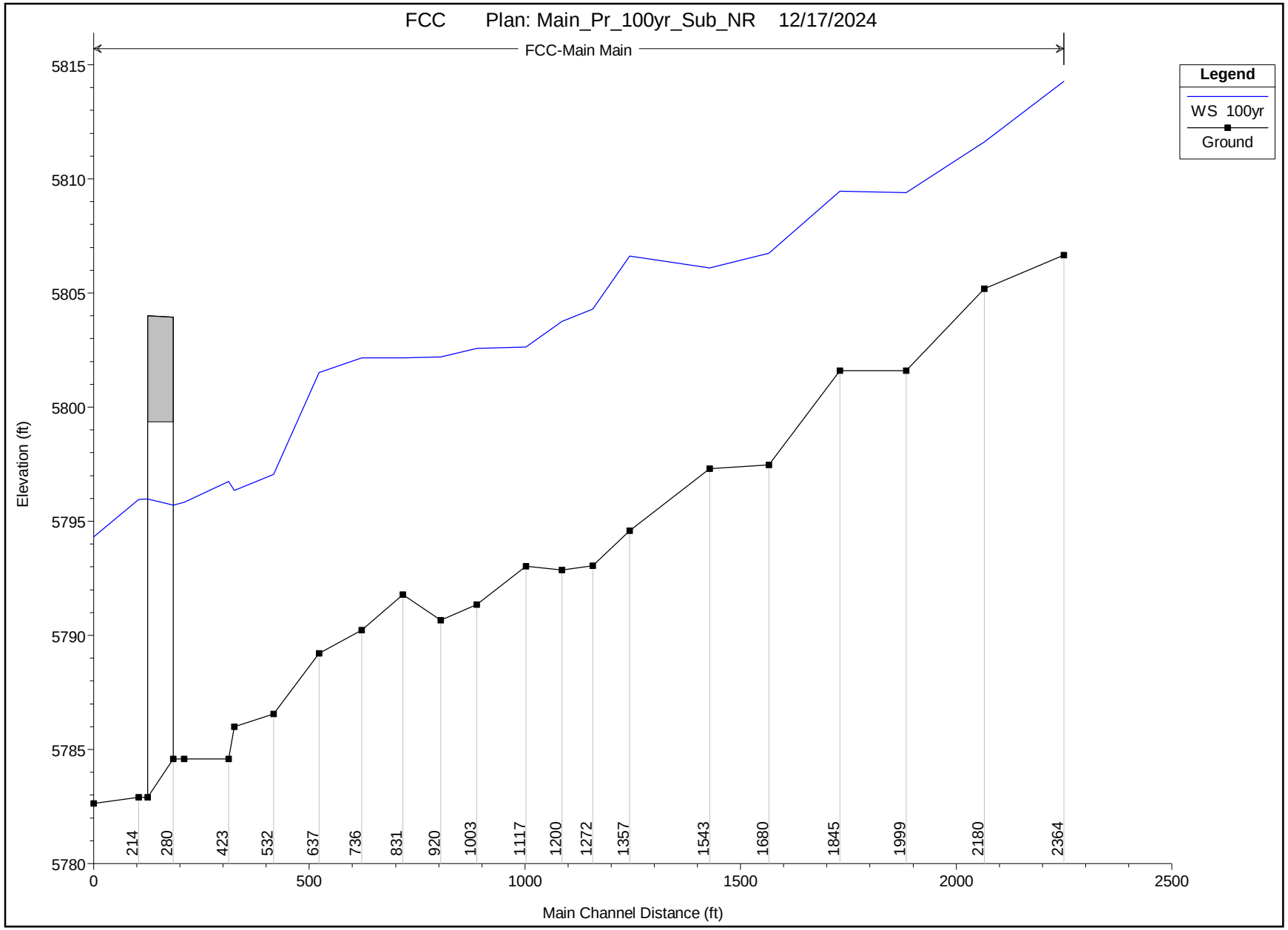
PROPOSED CONDITION RESULTS

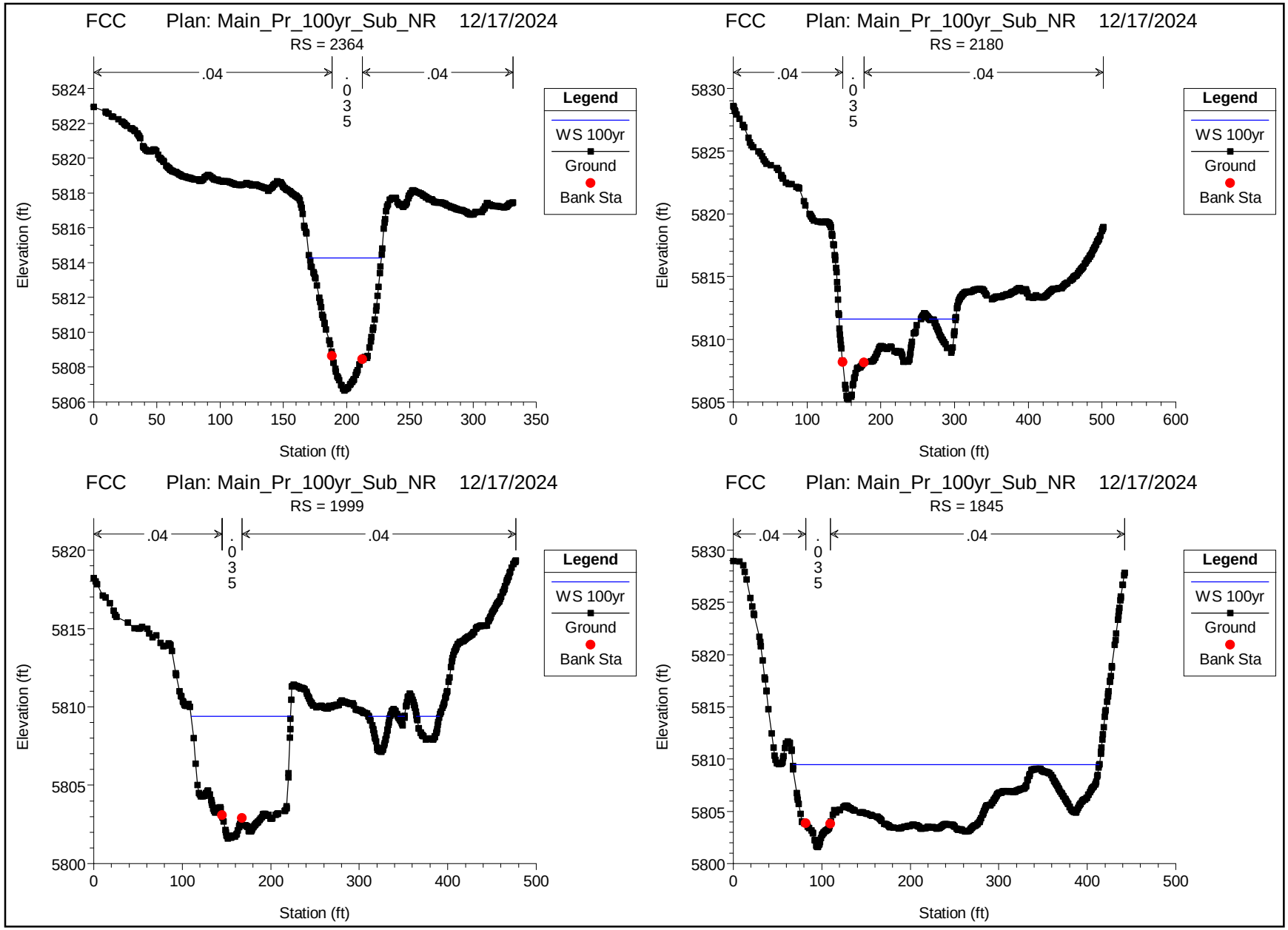
HEC-RAS Plan: PR_NR River: FCC-Main Reach: Main Profile: 100yr

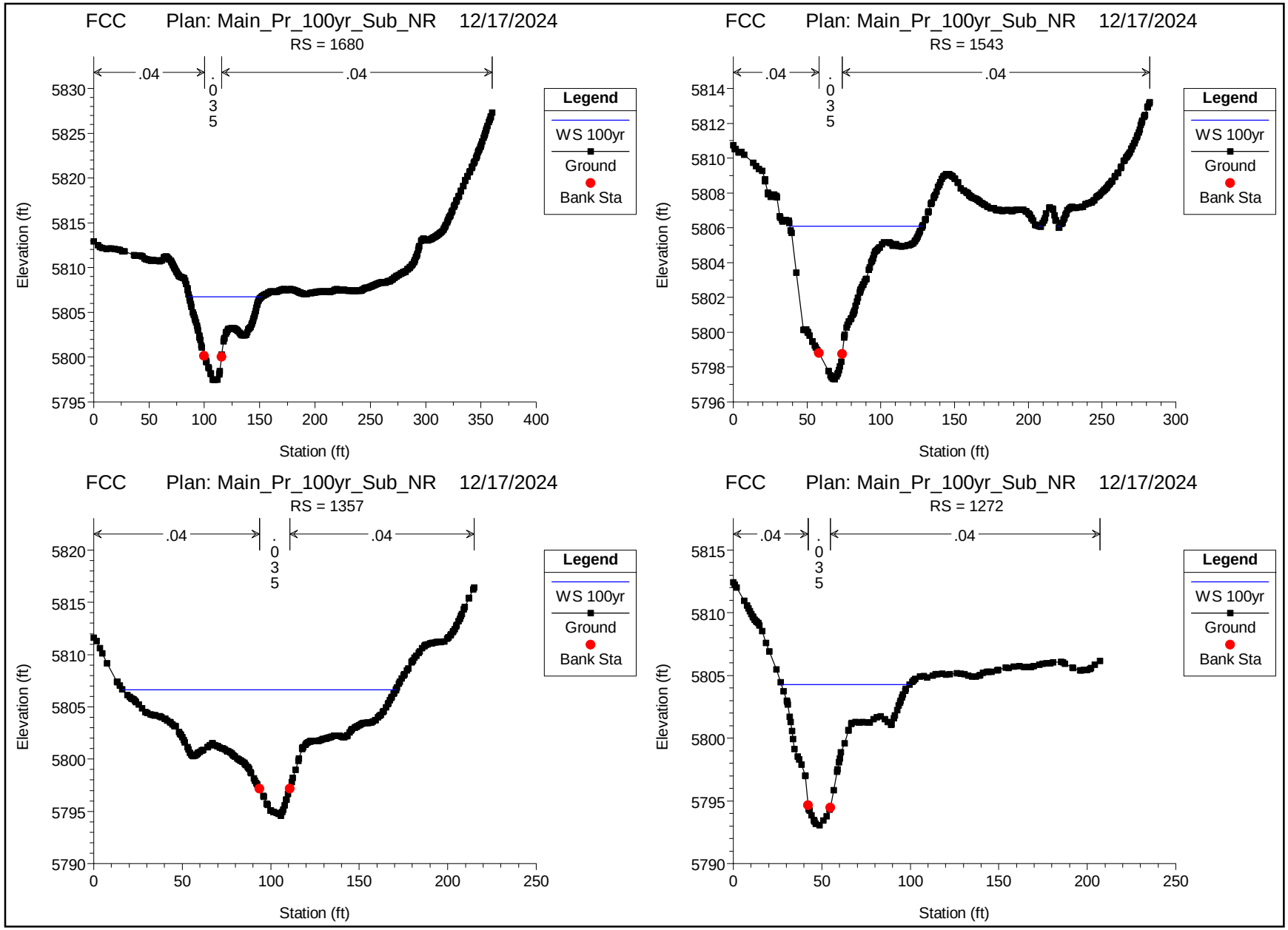
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Main	2364	100yr	3090.00	5806.66	5814.27	5814.27	5816.76	0.008557	14.03	272.12	56.77	0.94	2.44
Main	2180	100yr	3090.00	5805.19	5811.61	5811.61	5812.94	0.009389	11.44	386.41	146.26	0.92	1.51
Main	1999	100yr	3090.00	5801.59	5809.40		5809.70	0.001244	5.61	737.86	170.19	0.36	0.33
Main	1845	100yr	3090.00	5801.60	5809.46		5809.53	0.000411	3.00	1500.18	346.35	0.21	0.11
Main	1680	100yr	3090.00	5797.46	5806.73	5806.73	5809.12	0.007936	14.74	295.90	65.26	0.90	2.10
Main	1543	100yr	3090.00	5797.30	5806.10	5806.10	5807.98	0.006275	13.43	346.57	92.82	0.83	1.41
Main	1357	100yr	3380.00	5794.58	5806.63		5807.05	0.001239	7.13	783.00	154.36	0.38	0.38
Main	1272	100yr	3380.00	5793.06	5804.29	5804.29	5806.66	0.005677	15.13	351.84	72.45	0.82	1.58
Main	1200	100yr	3380.00	5792.87	5803.75	5803.75	5804.92	0.003680	11.70	577.71	199.11	0.64	0.65
Main	1117	100yr	3380.00	5793.03	5802.63		5803.31	0.002382	8.89	723.52	246.05	0.52	0.43
Main	1003	100yr	3380.00	5791.34	5802.57	5801.17	5803.03	0.001421	7.49	814.73	239.17	0.40	0.35
Main	920	100yr	3380.00	5790.66	5802.19	5801.00	5802.86	0.002254	9.08	681.96	274.47	0.50	0.50
Main	831	100yr	3380.00	5791.78	5802.16	5800.11	5802.65	0.001464	7.30	707.25	288.15	0.41	0.46
Main	736	100yr	3380.00	5790.22	5802.16		5802.50	0.000850	6.09	867.73	357.90	0.32	0.29
Main	637	100yr	3380.00	5789.21	5801.51	5797.56	5802.34	0.001533	8.06	556.80	341.11	0.43	0.52
Main	532	100yr	3380.00	5786.56	5797.05	5797.05	5800.48	0.007717	15.80	257.28	41.63	0.90	2.59
Main	436	100yr	3380.00	5786.00	5796.35		5797.67	0.003837	12.35	407.67	63.43	0.68	1.44
Main	423	100yr	3380.00	5784.59	5796.75		5797.45	0.001723	9.25	554.55	73.60	0.47	0.76
Main	320	100yr	3380.00	5784.59	5795.83	5792.74	5797.17	0.002479	9.99	435.26	83.79	0.54	0.75
Main	280		Bridge										
Main	214	100yr	3380.00	5782.91	5795.95	5790.73	5796.57	0.001374	8.06	599.09	86.08	0.40	0.54
Main	110	100yr	3380.00	5782.64	5794.31	5794.31	5796.01	0.004645	12.85	434.34	123.07	0.71	0.98

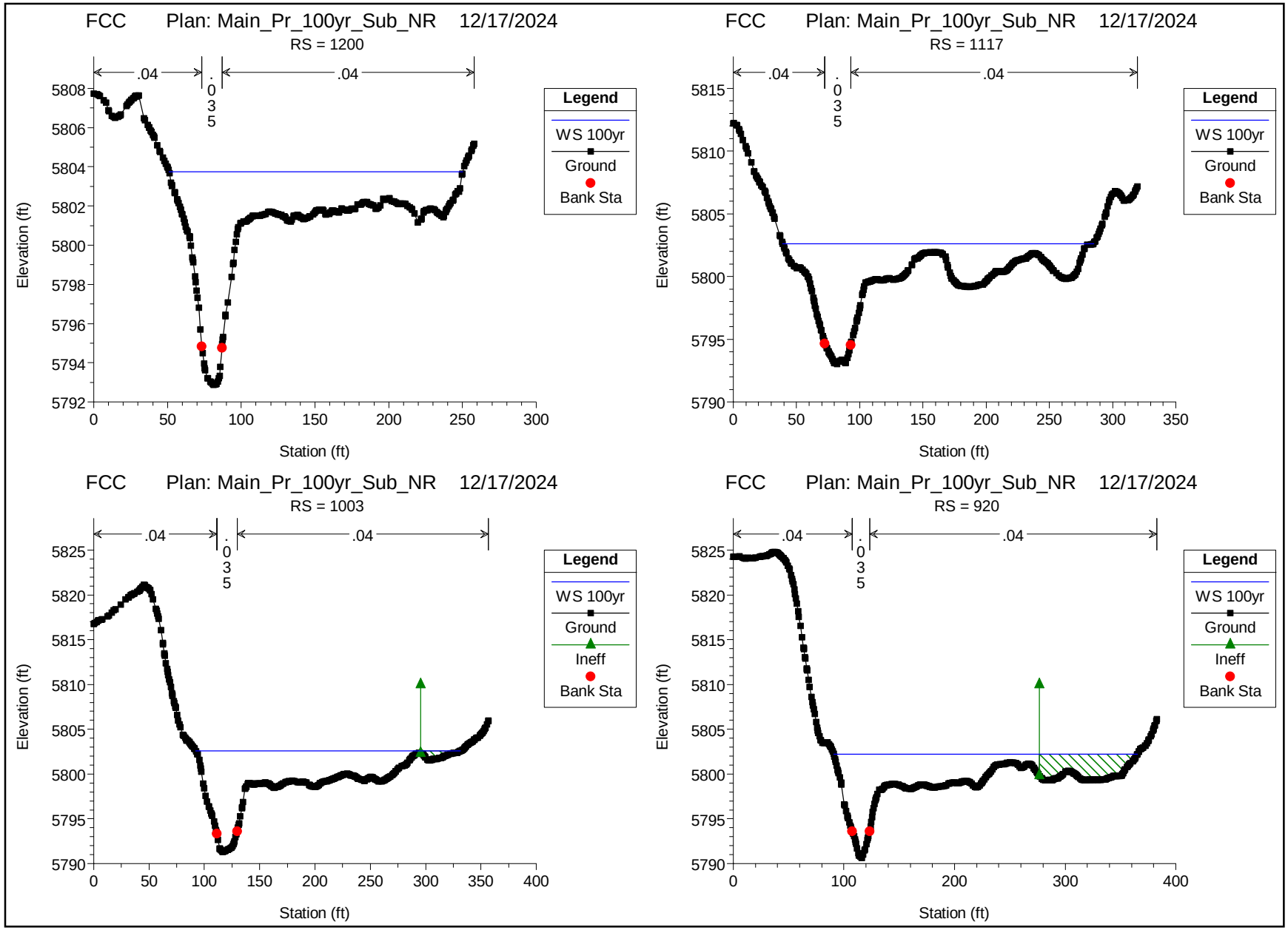
OUTSIDE PROJECT AREA

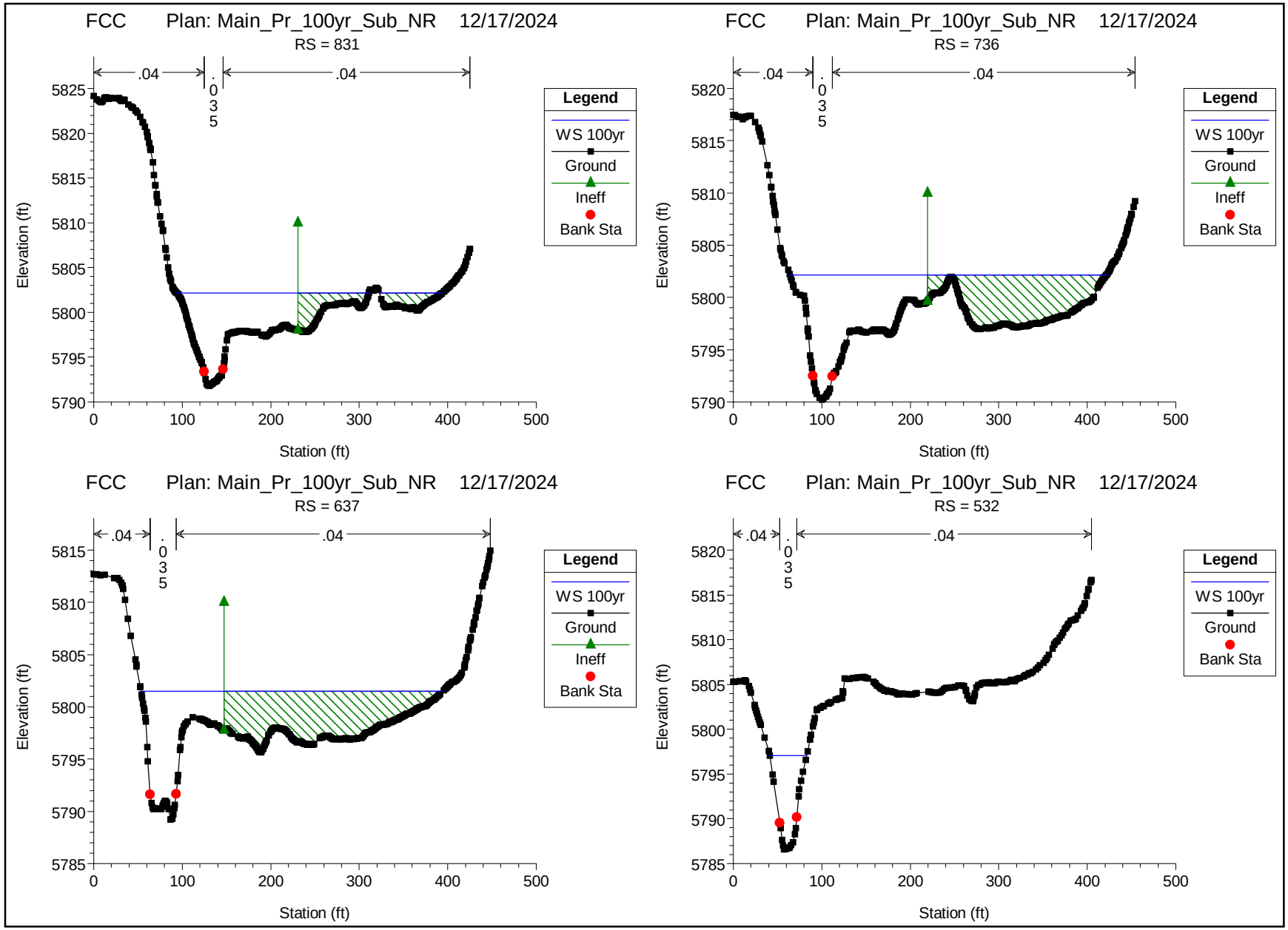
OUTSIDE PROJECT AREA

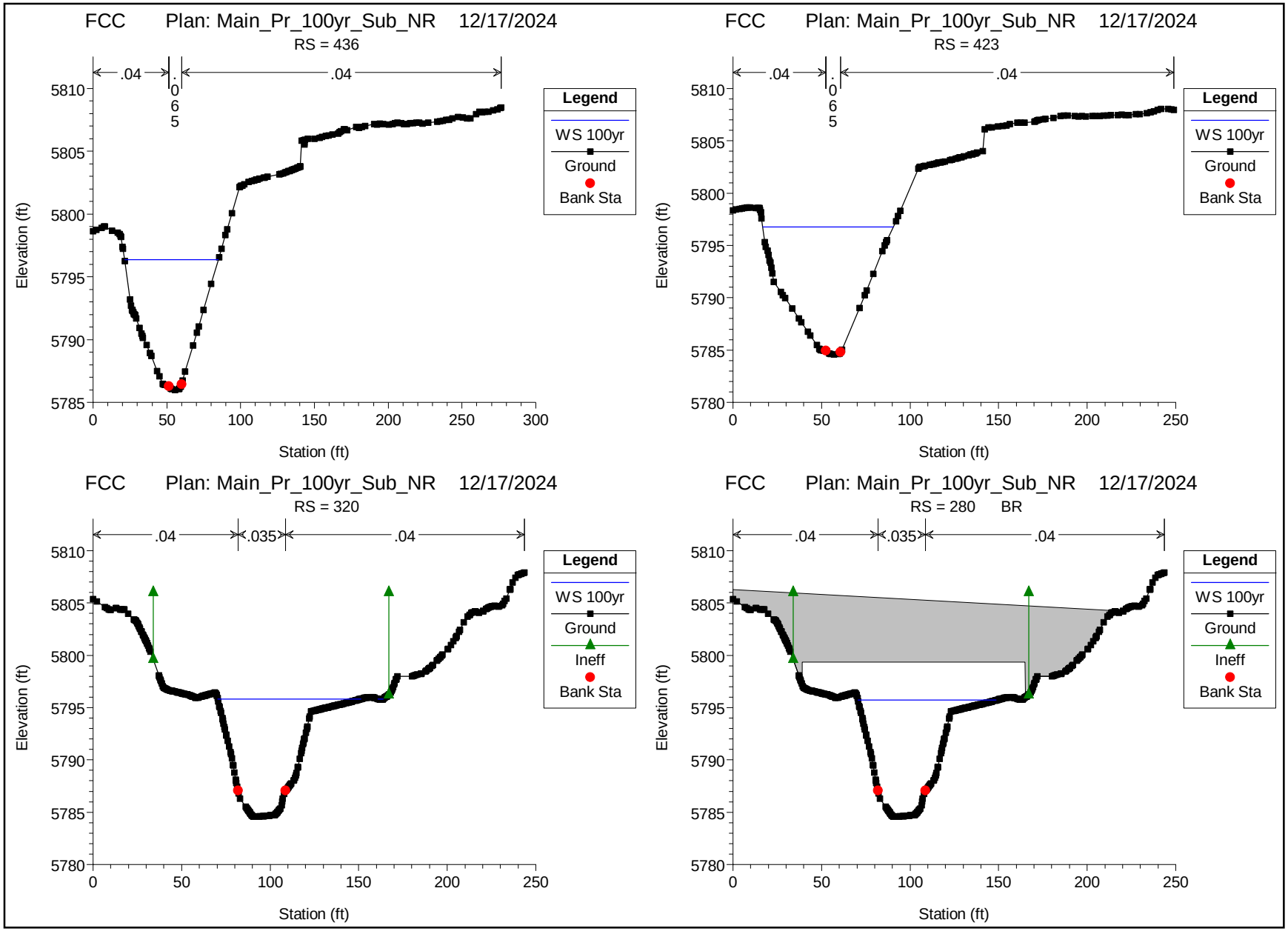

FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
FCC-Main Main
Legend
WS 100yr
Ground
Elevation (ft)
Main Channel Distance (ft)
5780
5785
5790
5795
5800
5805
5810
5815
0
500
1000
1500
2000
2500
214
280
423
532
637
736
831
920
1003
1117
1200
1272
1357
1543
1680
1845
1999
2180
2364

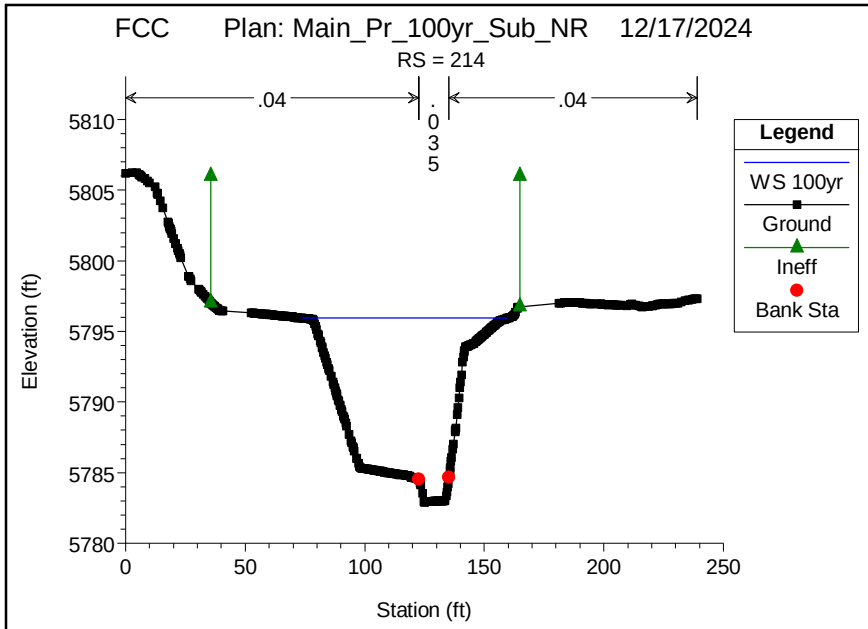

FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 2364
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 2180
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1999
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1845
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

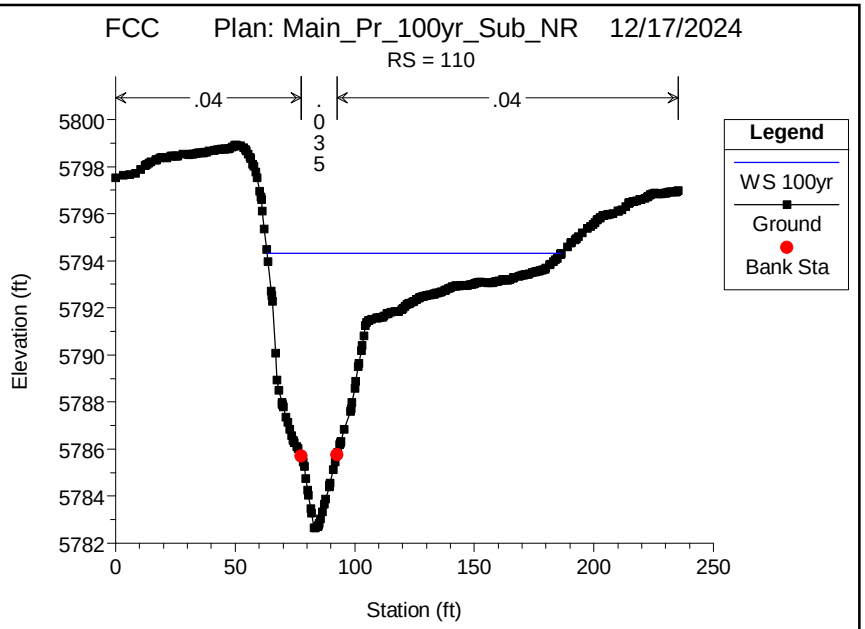

FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1680
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1543
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1357
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1272
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta

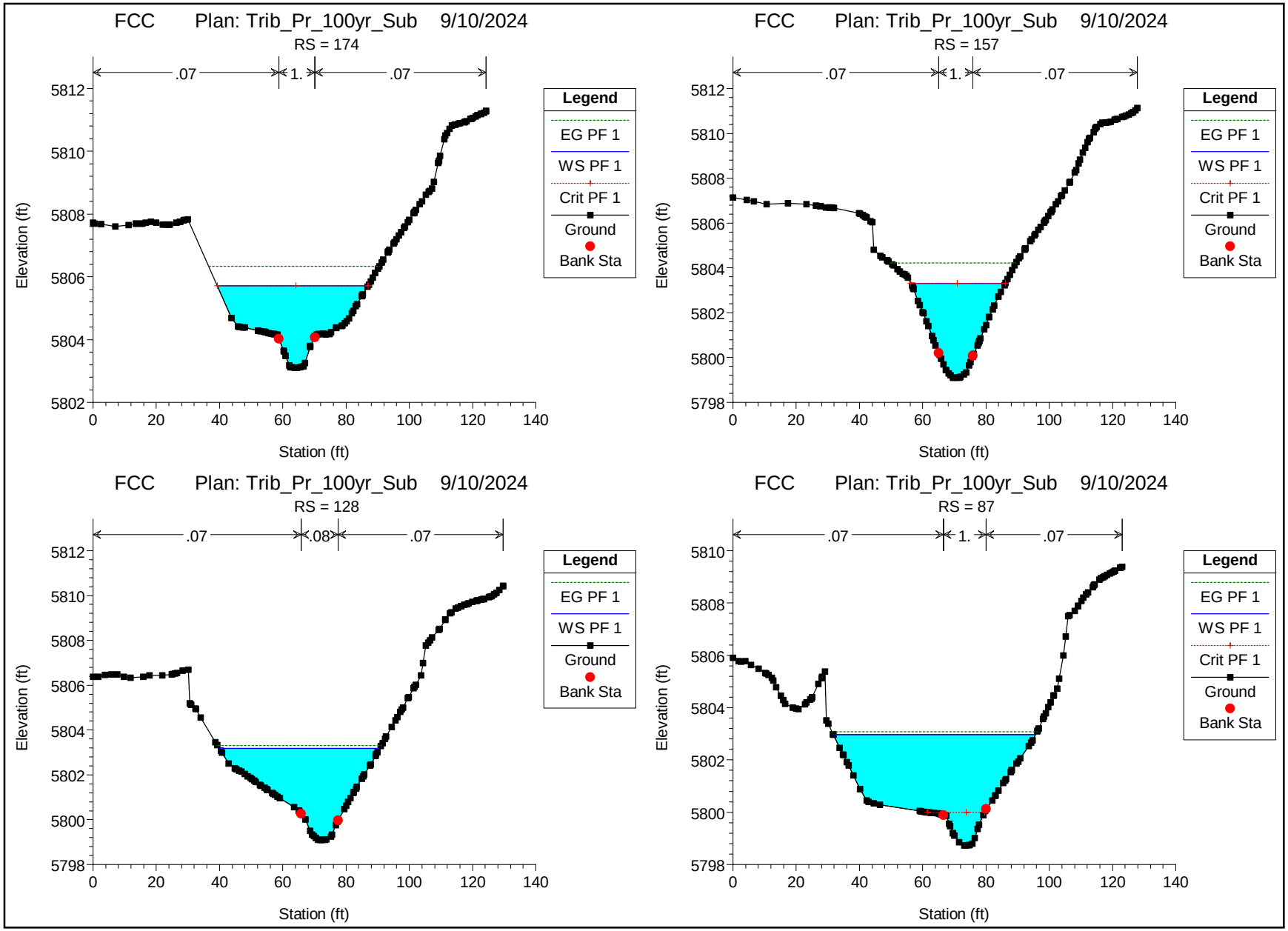

FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1200
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1117
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 1003
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 920
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

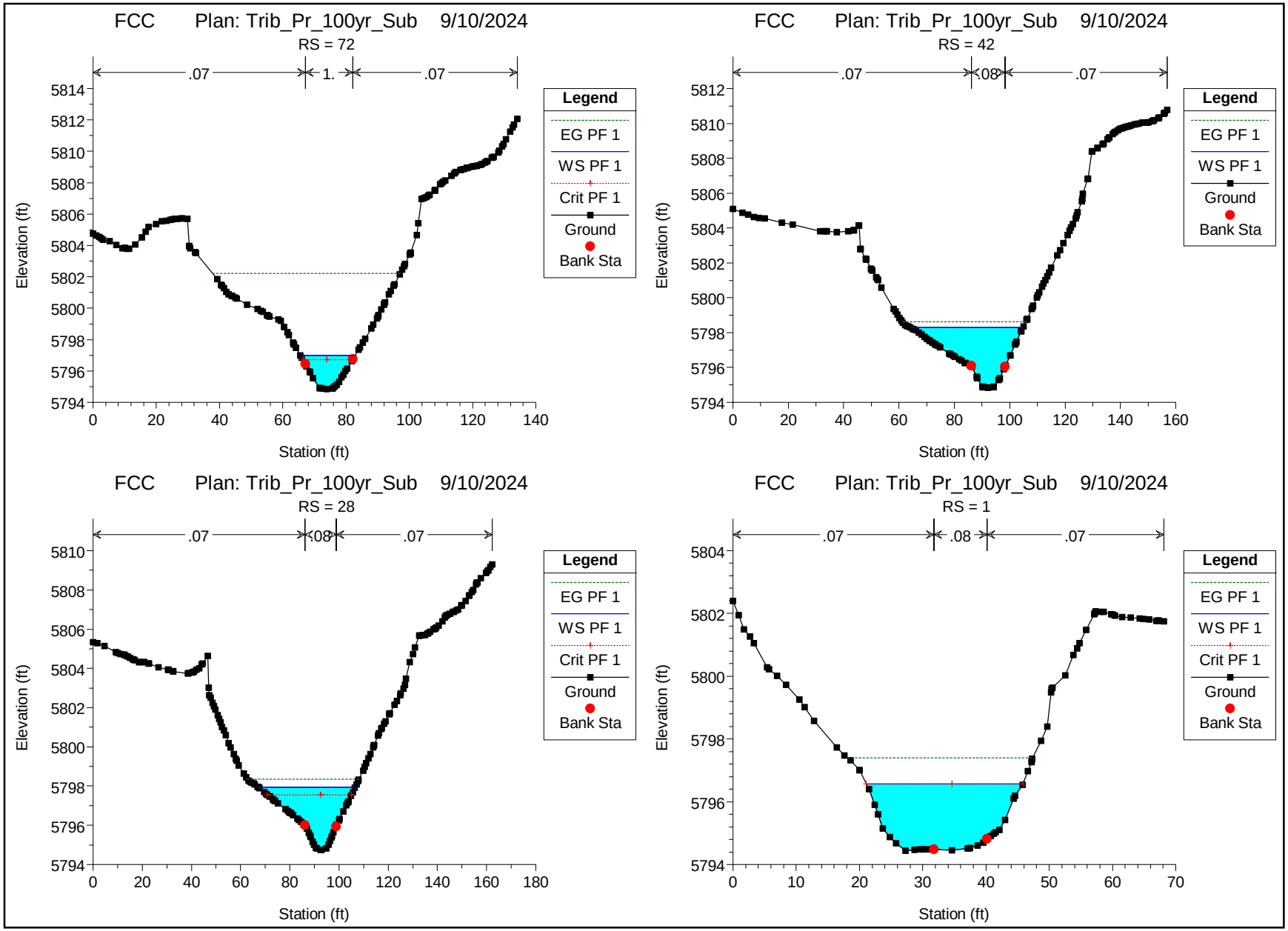

FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 831
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Ineff
Bank Sta
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 736
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Ineff
Bank Sta
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 637
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Ineff
Bank Sta
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 532
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100yr
Ground
Bank Sta


FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 436
.04
.065
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 423
.04
.065
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 320
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 280 BR
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 214
.04
.035
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
5810
5805
5800
5795
5790
5785
5780
0
50
100
150
200
250


FCC Plan: Main_Pr_100yr_Sub_NR 12/17/2024
RS = 110
.04
.035
.04
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
5800
5798
5796
5794
5792
5790
5788
5786
5784
5782
0
50
100
150
200
250


FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 174
.07
1.
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 157
.07
1.
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 128
.07
.08
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 87
.07
1.
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 72
.07
1.
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 42
.07
.08
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 28
.07
.08
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
FCC Plan: Trib_Pr_100yr_Sub 9/10/2024
RS = 1
.07
.08
.07
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

PROPOSED TRIBUTARY

HEC-RAS Plan: Trib_Pr_100yr_Sub River: FCC-Trib Reach: Trib Profile: 290 cfs

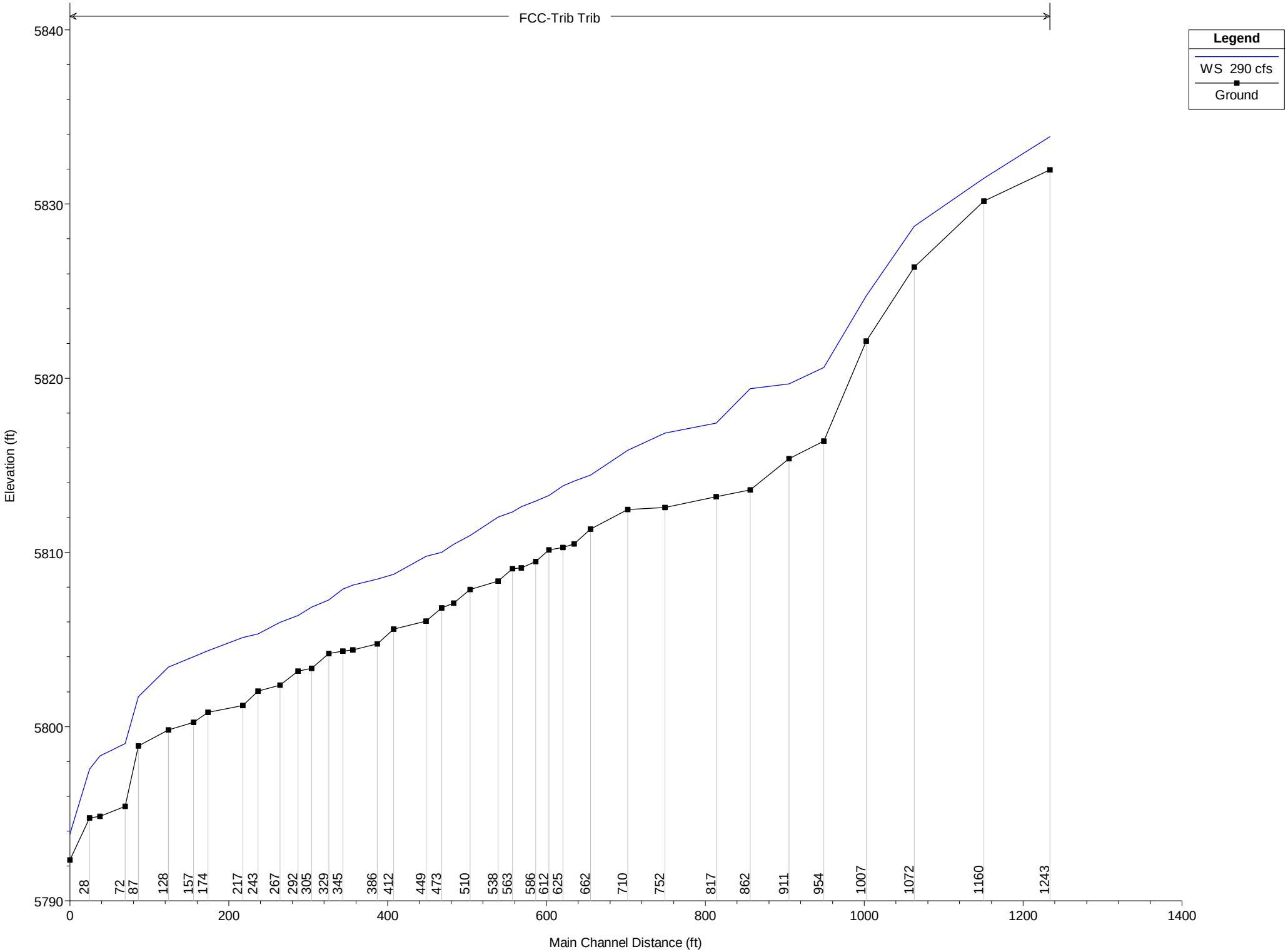
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Trib	1243	290 cfs	290.00	5831.96	5833.87		5834.00	0.025676	0.44	112.51	79.49	0.06	2.25
Trib	1160	290 cfs	290.00	5830.18	5831.48	[illegible]	[illegible]	[illegible]	4.63	77.42	96.71	0.76	1.45
Trib	1072	290 cfs	290.00	5826.38	5828.73	5828.73	5829.07	0.030870	6.58	71.85	92.10	0.83	1.50
Trib	1007	290 cfs	290.00	5822.12	5824.72	5824.72	5825.43	0.029411	7.35	49.44	42.08	0.85	2.13
Trib	954	290 cfs	290.00	5816.38	5820.62		5820.99	0.009152	5.28	63.64	26.01	0.50	1.31
Trib	911	290 cfs	290.00	5815.37	5819.68		5820.43	0.015920	7.15	44.57	15.55	0.66	2.39
Trib	862	290 cfs	290.00	5813.58	5819.40		5819.66	0.010555	4.22	71.98	20.28	0.34	1.96
Trib	817	290 cfs	290.00	5813.20	5817.42	5817.42	5818.59	0.081001	8.97	34.29	14.86	0.86	9.90
Trib	752	290 cfs	290.00	5812.58	5816.85		5817.06	0.007870	3.92	81.38	29.20	0.36	1.29
Trib	710	290 cfs	290.00	5812.47	5815.87		5816.40	0.026722	6.34	52.42	24.79	0.63	3.36
Trib	662	290 cfs	290.00	5811.33	5814.45		5814.94	0.039161	6.02	54.41	38.15	0.64	3.42
Trib	637	290 cfs	290.00	5810.49	5814.10		5814.40	0.014849	4.88	73.98	62.42	0.48	1.08
Trib	625	290 cfs	290.00	5810.28	5813.82		5814.17	0.017749	5.21	72.40	58.74	0.52	1.35
Trib	612	290 cfs	290.00	5810.14	5813.26	5812.85	5813.71	0.037846	5.94	58.61	57.62	0.63	2.37
Trib	586	290 cfs	290.00	5809.48	5812.94		5813.27	0.016598	5.09	66.69	32.57	0.51	2.05
Trib	575	290 cfs	290.00	5809.12	5812.62		5812.97	0.017214	5.15	64.84	30.63	0.51	2.18
Trib	563	290 cfs	290.00	5809.06	5812.33		5812.72	0.029458	5.51	60.47	38.75	0.56	2.81
Trib	538	290 cfs	290.00	5808.36	5812.02		5812.32	0.015009	5.17	80.79	64.84	0.49	1.15
Trib	510	290 cfs	290.00	5807.88	5810.97		5811.48	0.041398	6.20	53.16	32.67	0.66	4.12
Trib	484	290 cfs	290.00	5807.09	5810.46		5810.85	0.020871	5.57	62.79	36.12	0.56	2.22
Trib	473	290 cfs	290.00	5806.81	5810.01		5810.45	0.034342	5.83	57.06	34.52	0.60	3.46
Trib	449	290 cfs	290.00	5806.06	5809.77		5810.02	0.012201	4.60	79.66	44.64	0.44	1.33
Trib	412	290 cfs	290.00	5805.59	5808.75		5809.21	0.036553	5.84	56.07	33.75	0.62	3.71
Trib	386	290 cfs	290.00	5804.75	5808.47		5808.74	0.012692	4.63	75.20	38.88	0.45	1.50
Trib	363	290 cfs	290.00	5804.41	5808.13		5808.36	0.010909	4.28	80.51	42.62	0.41	1.26
Trib	345	290 cfs	290.00	5804.34	5807.89		5808.20	0.015466	4.92	71.90	41.28	0.49	1.65
Trib	329	290 cfs	290.00	5804.19	5807.28		5807.77	0.040282	6.03	54.07	32.93	0.65	4.04
Trib	305	290 cfs	290.00	5803.35	5806.87		5807.19	0.016284	5.01	69.20	37.78	0.50	1.82
Trib	292	290 cfs	290.00	5803.19	5806.39		5806.80	0.033228	5.57	58.86	35.55	0.59	3.36
Trib	267	290 cfs	290.00	5802.39	5805.98		5806.29	0.015252	4.86	69.02	34.14	0.48	1.88
Trib	243	290 cfs	290.00	5802.03	5805.32		5805.71	0.029720	5.37	59.63	31.80	0.56	3.39
Trib	217	290 cfs	290.00	5801.21	5805.10		5805.34	0.010583	4.44	78.43	35.35	0.41	1.42
Trib	174	290 cfs	290.00	5800.81	5804.34		5804.64	0.026887	4.64	67.21	34.38	0.46	3.20
Trib	157	290 cfs	290.00	5800.25	5804.01		5804.23	0.017093	4.03	77.05	37.26	0.38	2.15
Trib	128	290 cfs	290.00	5799.81	5803.41		5803.72	0.015160	4.99	69.23	34.44	0.49	1.86
Trib	87	290 cfs	290.00	5798.88	5801.72	5801.72	5802.52	0.090410	7.57	41.24	25.81	0.83	8.75
Trib	72	290 cfs	290.00	5795.41	5799.02		5799.45	0.039242	5.51	55.85	26.49	0.56	4.94
Trib	42	290 cfs	290.00	5794.84	5798.32		5798.63	0.017504	5.05	69.62	39.58	0.51	1.88
Trib	28	290 cfs	290.00	5794.76	5797.56	5797.56	5798.27	0.051329	7.55	46.86	33.99	0.85	4.34
Trib	1	290 cfs	290.00	5792.35	5793.84	5793.84	5794.33	0.057190	5.71	54.70	52.80	0.83	3.64

OUTSIDE PROJECT AREA

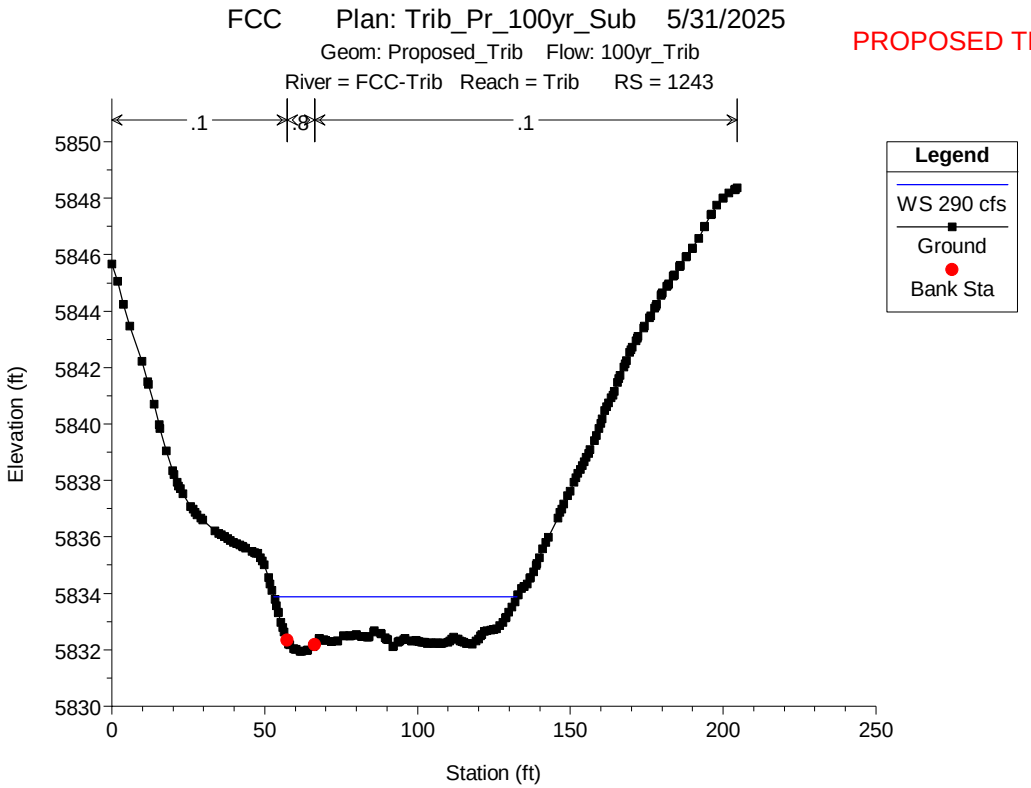
FCC Plan: Trib_Pr_100yr_Sub 5/31/2025

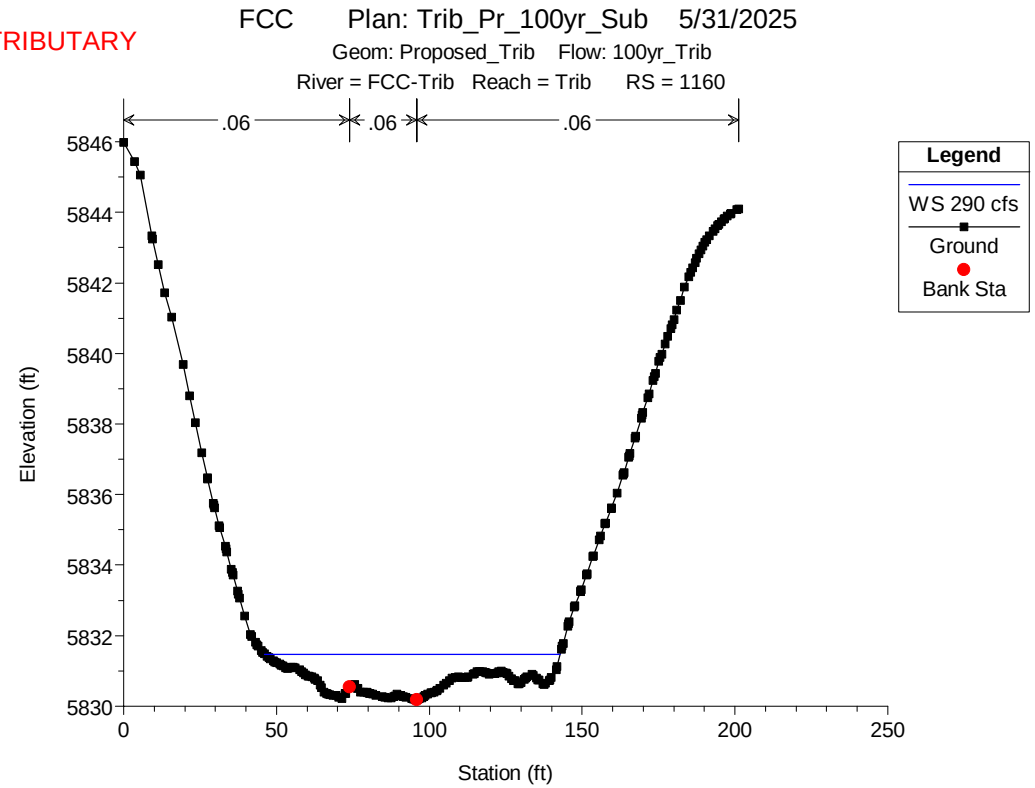
Geom: Proposed_Trib Flow: 100yr_Trib

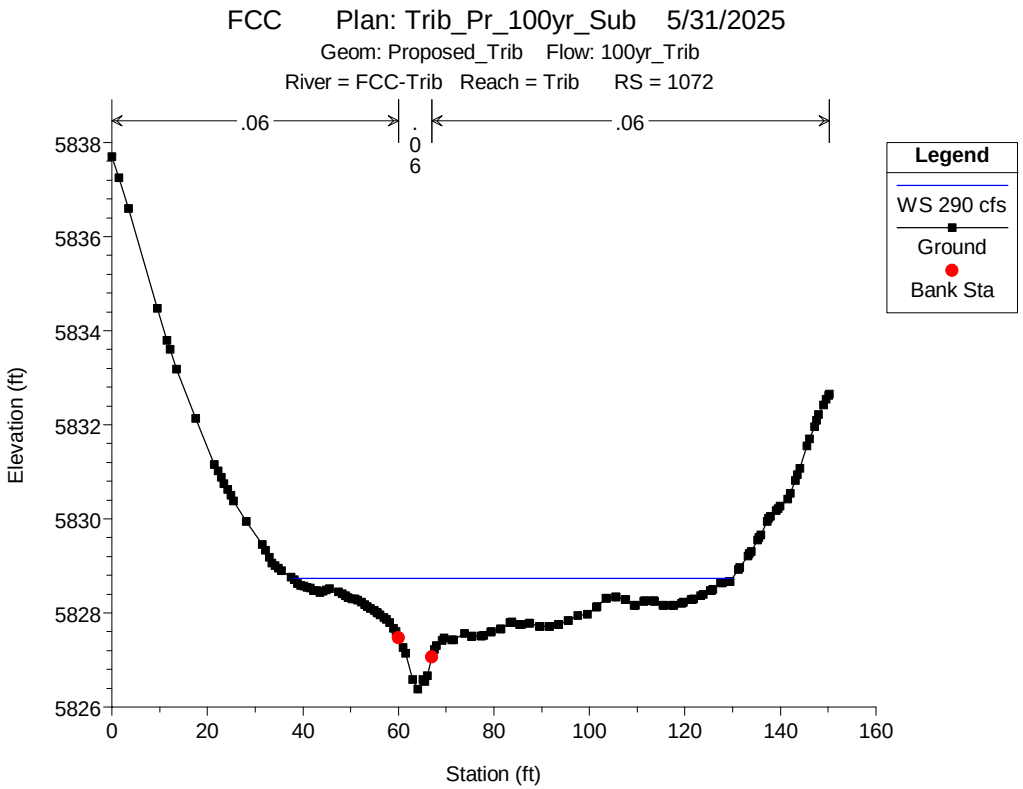
PROPOSED TRIBUTARY

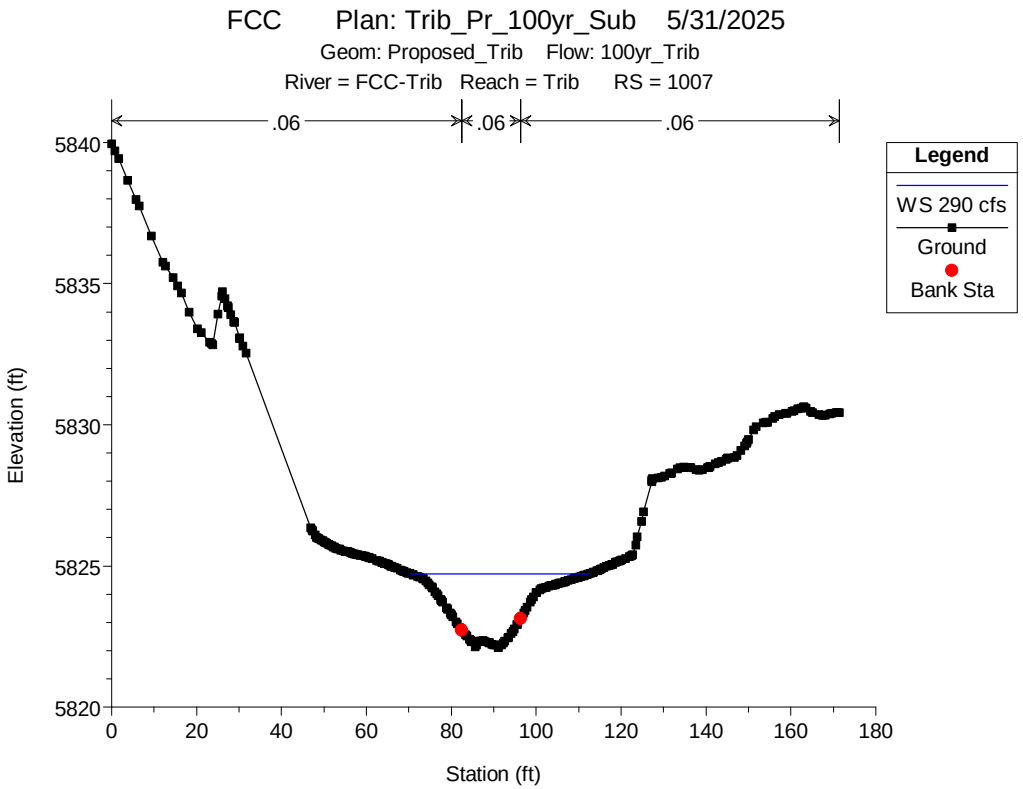


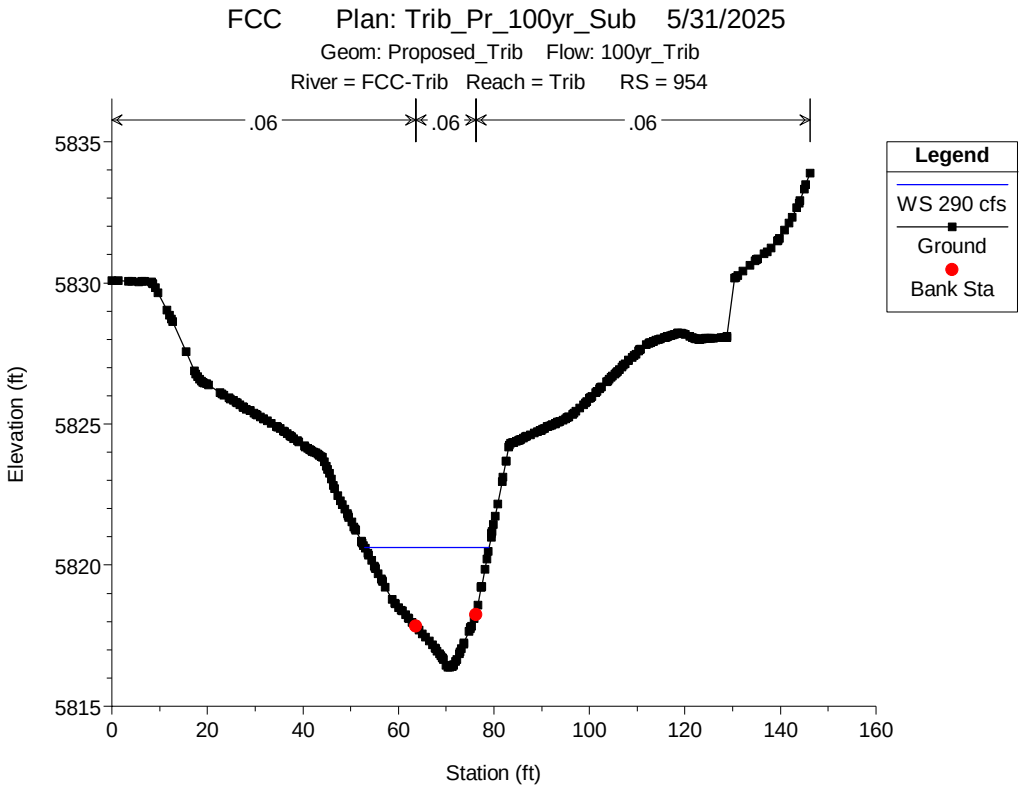
PROPOSED TRIBUTARY

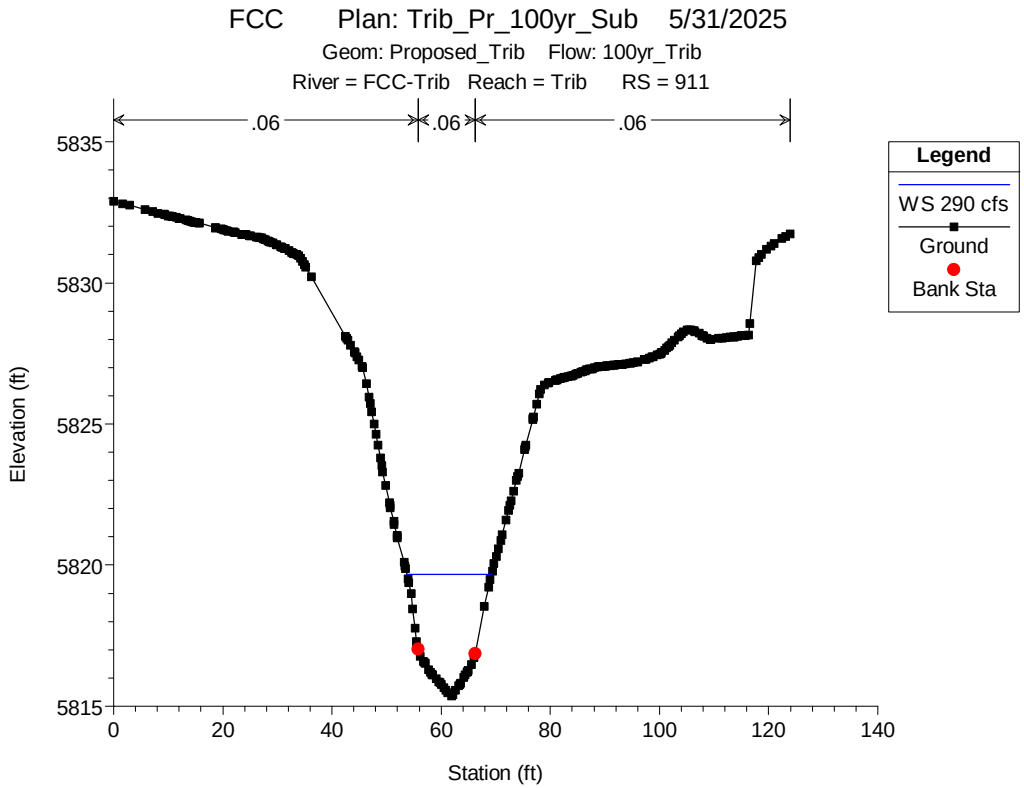


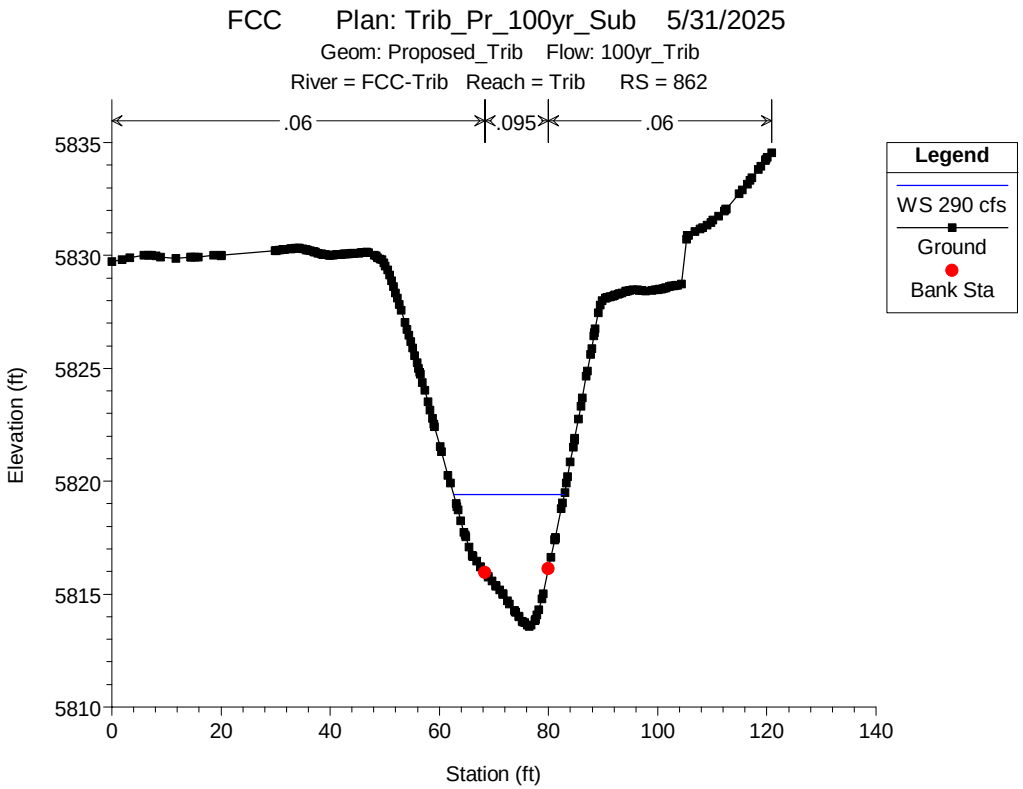


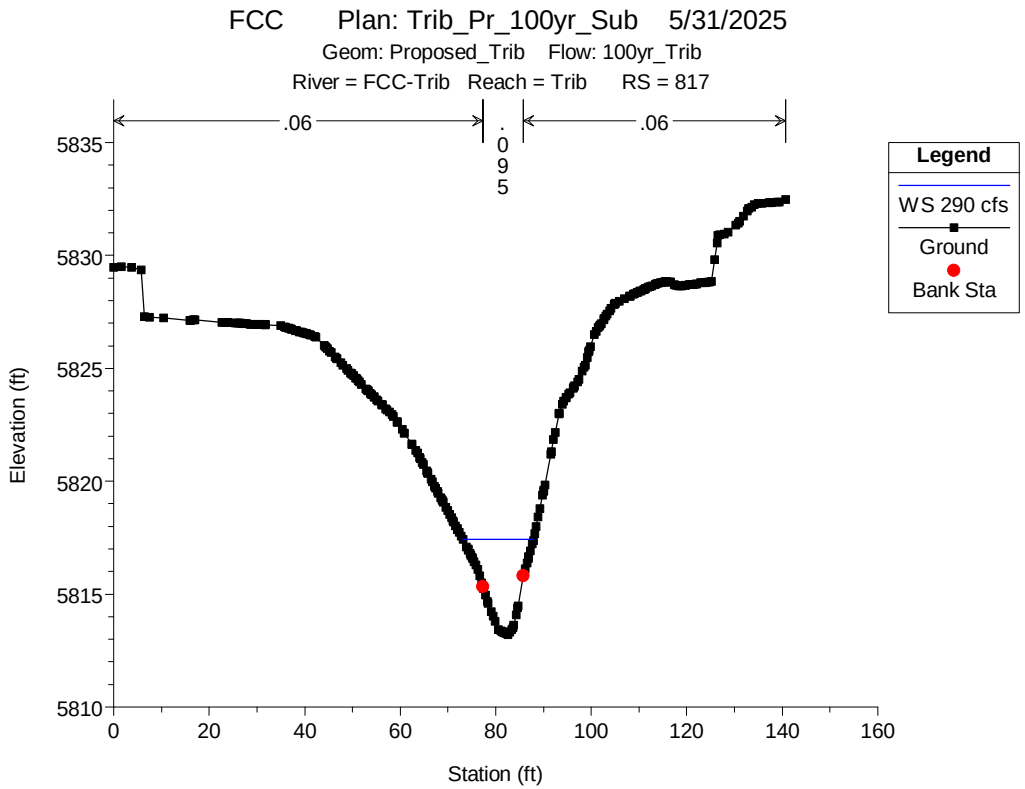


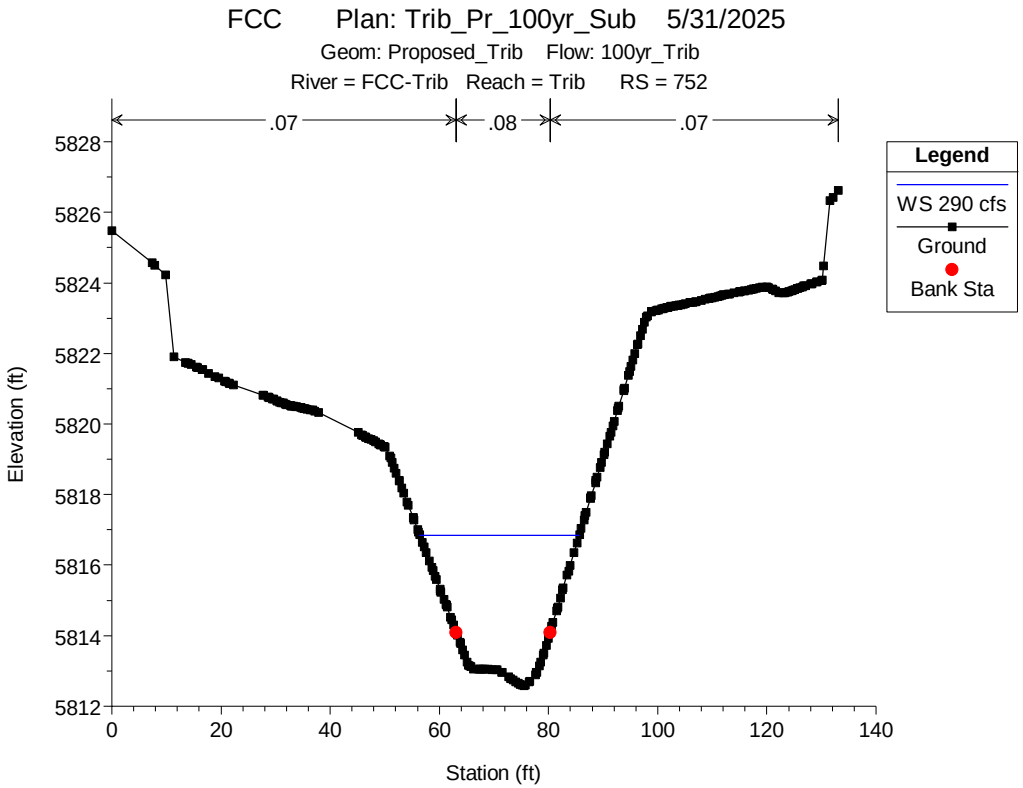


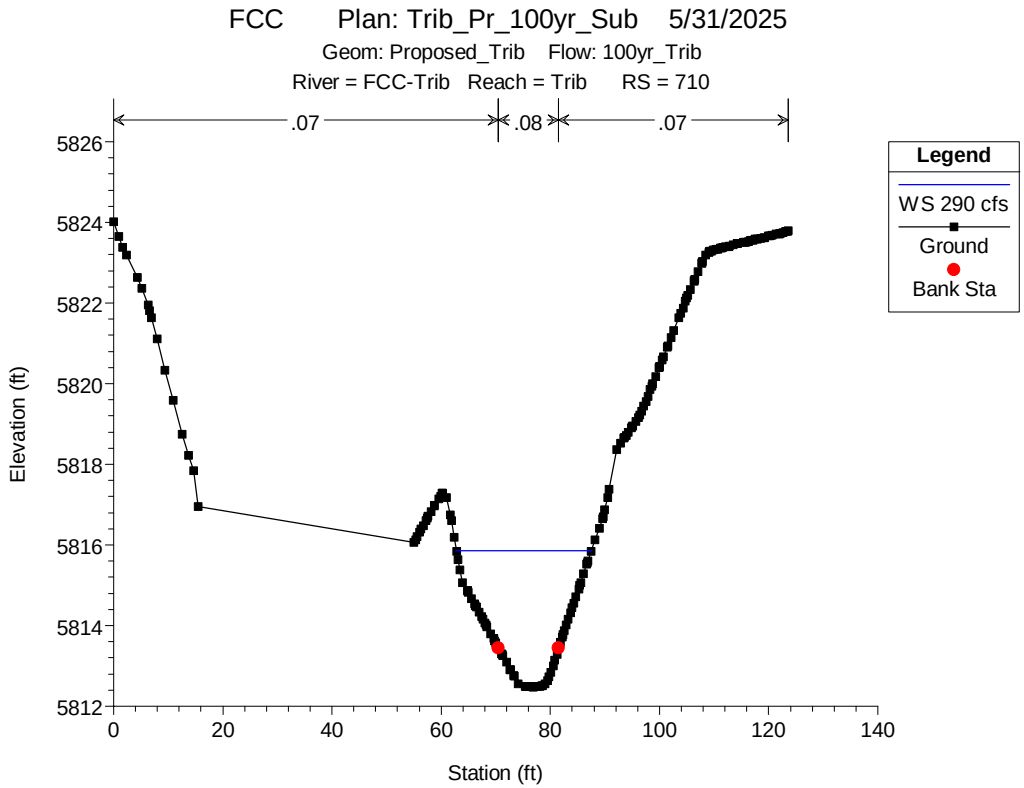

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 954
.06
.06
.06
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

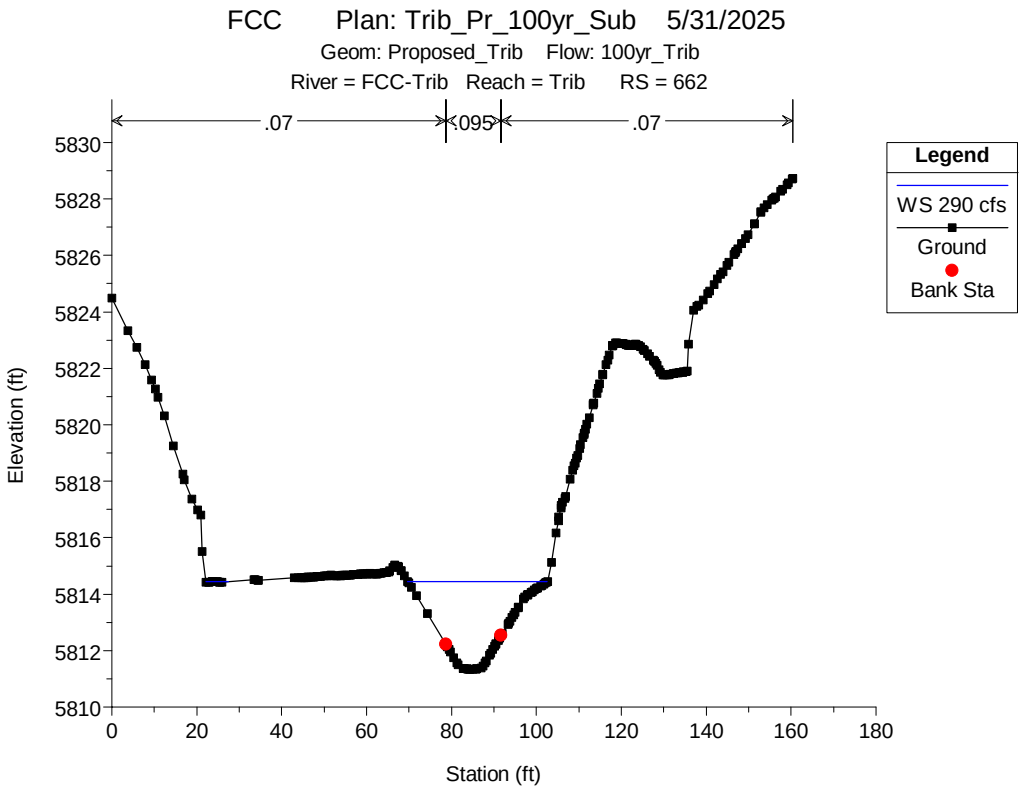

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 911
.06
.06
.06
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

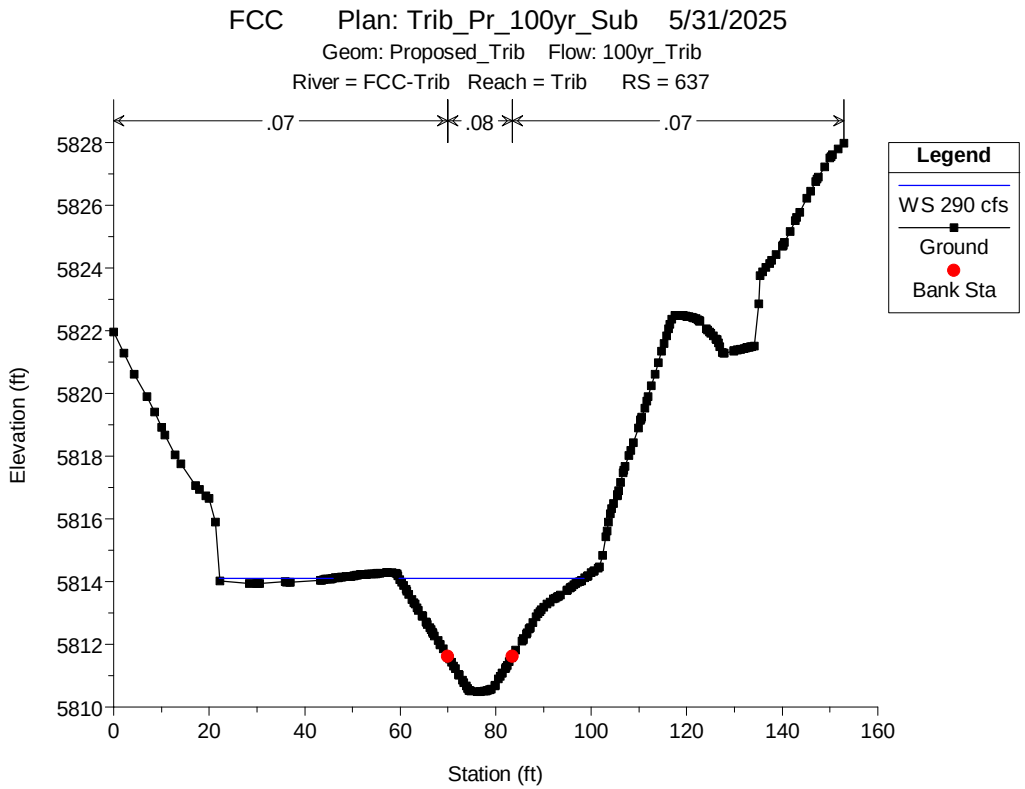

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 862
.06
.095
.06
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

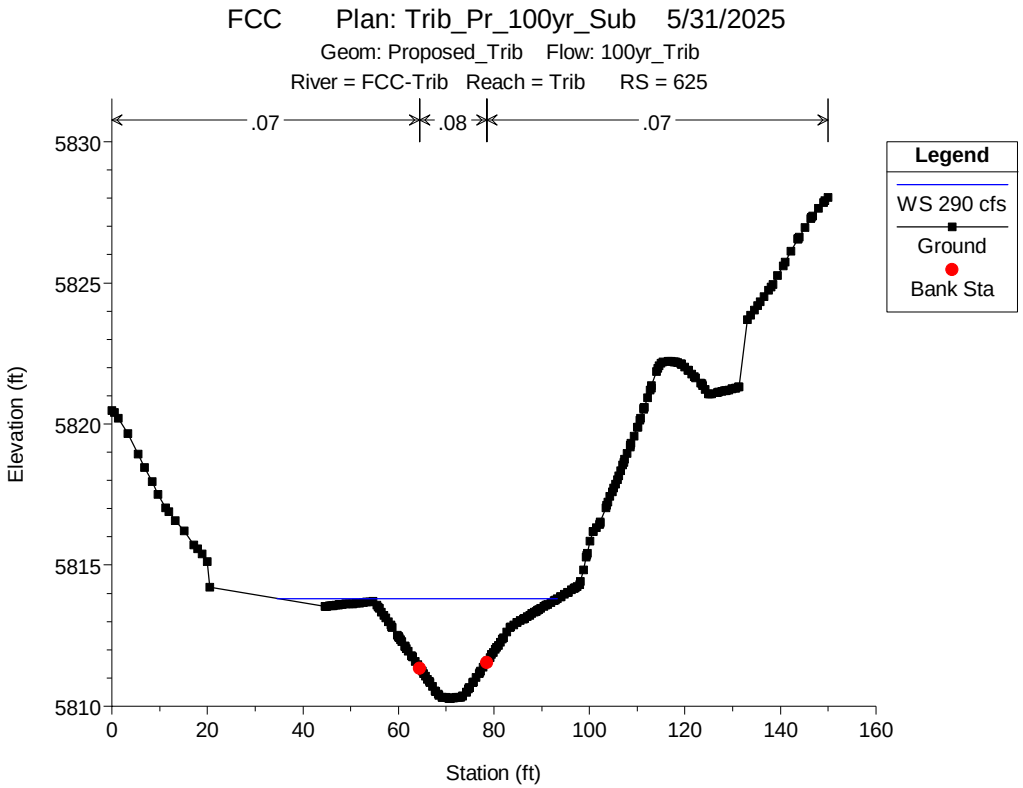

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 817
.06
.095
.06
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

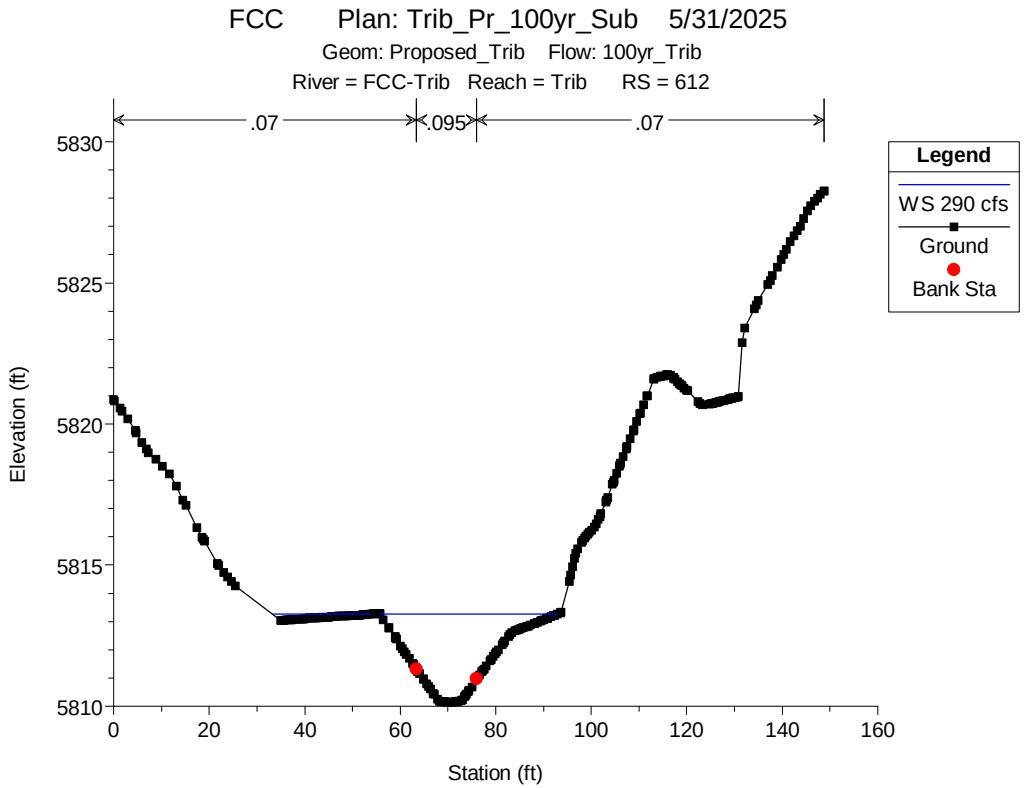

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 752
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

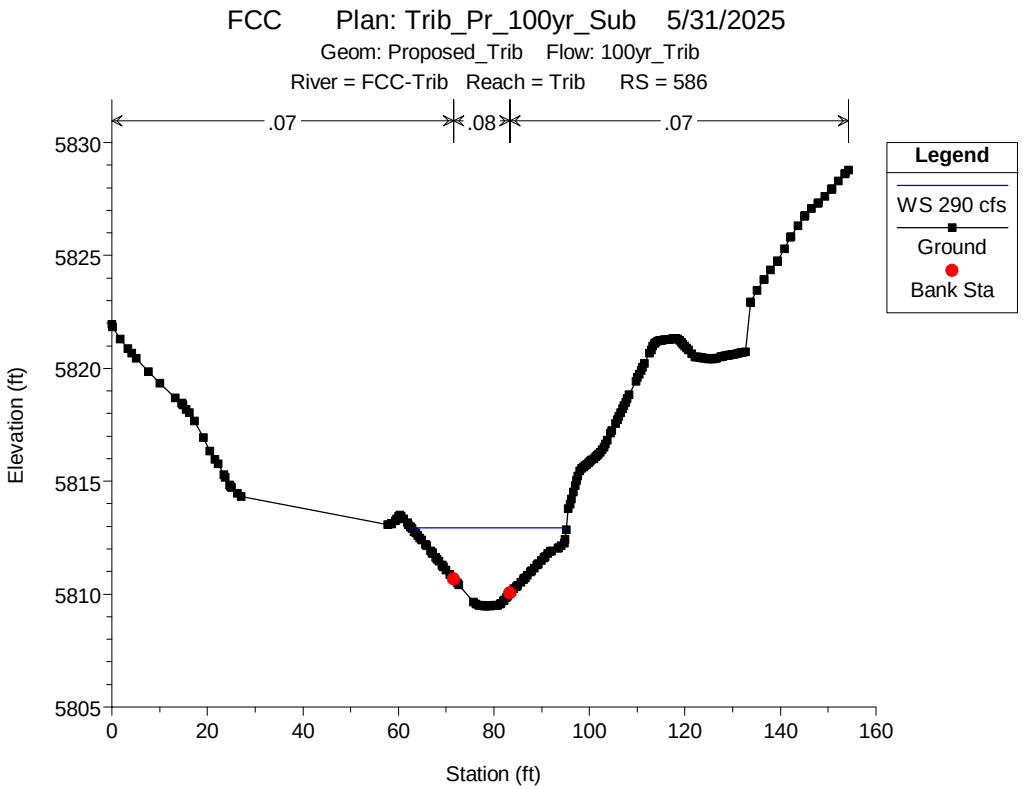

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 710
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

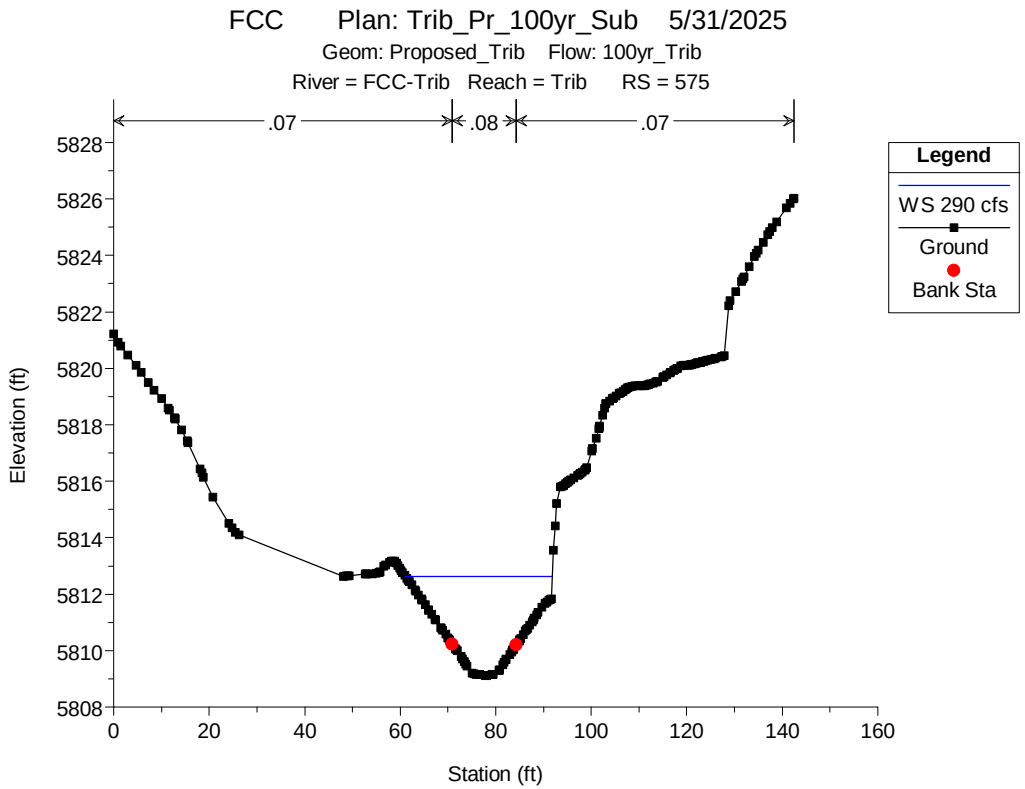

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 662
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

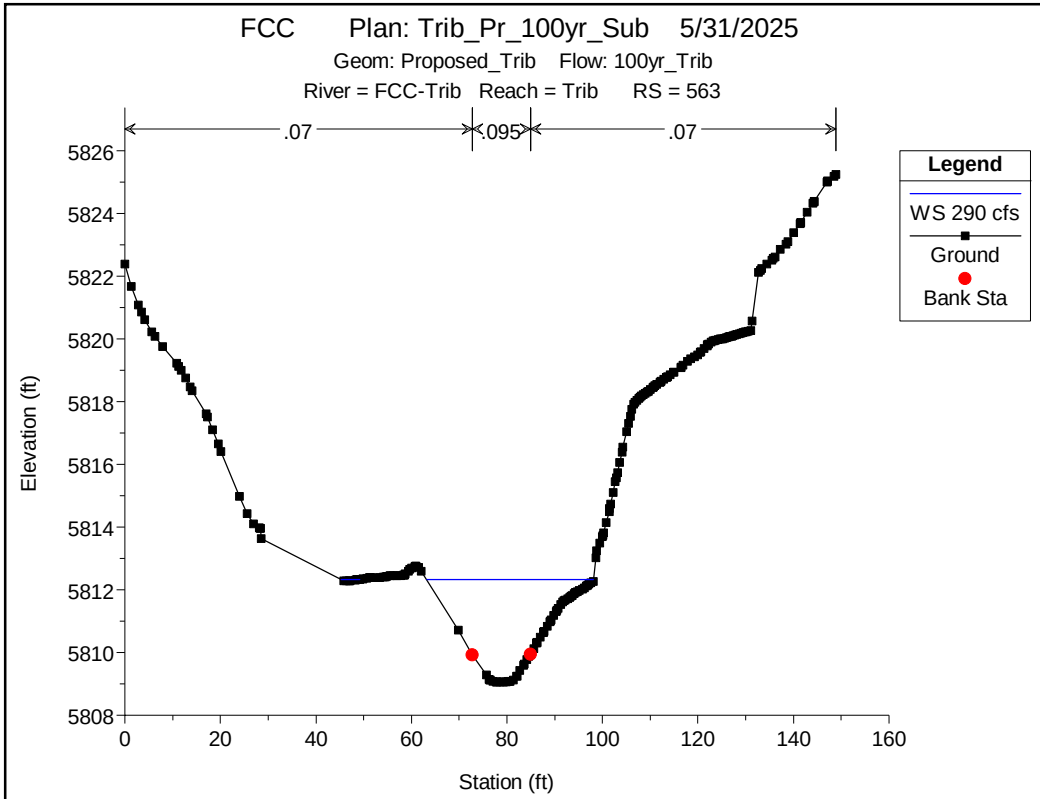

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 637
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

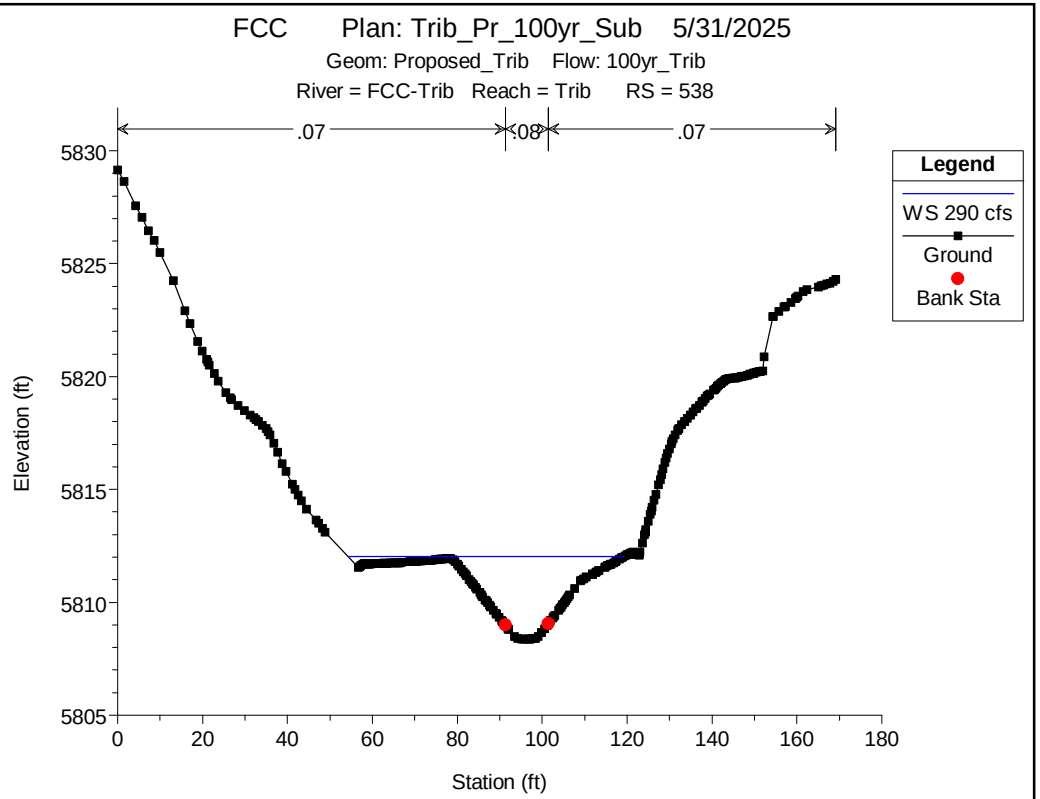

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 625
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

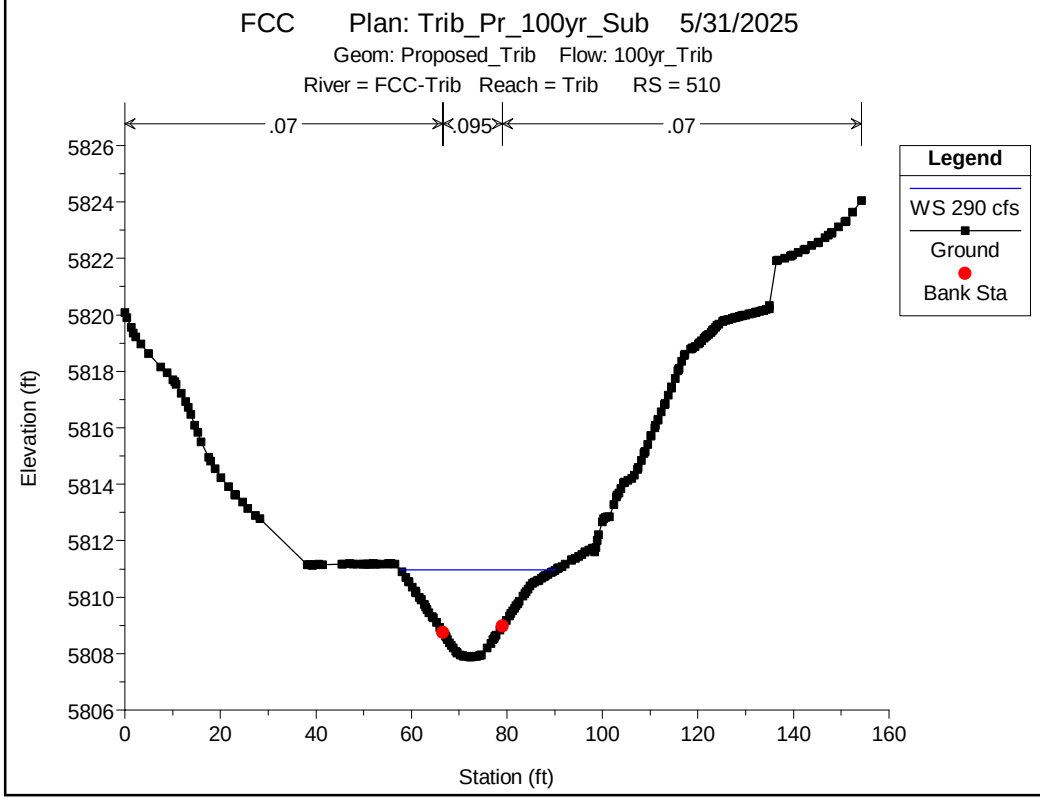

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 612
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

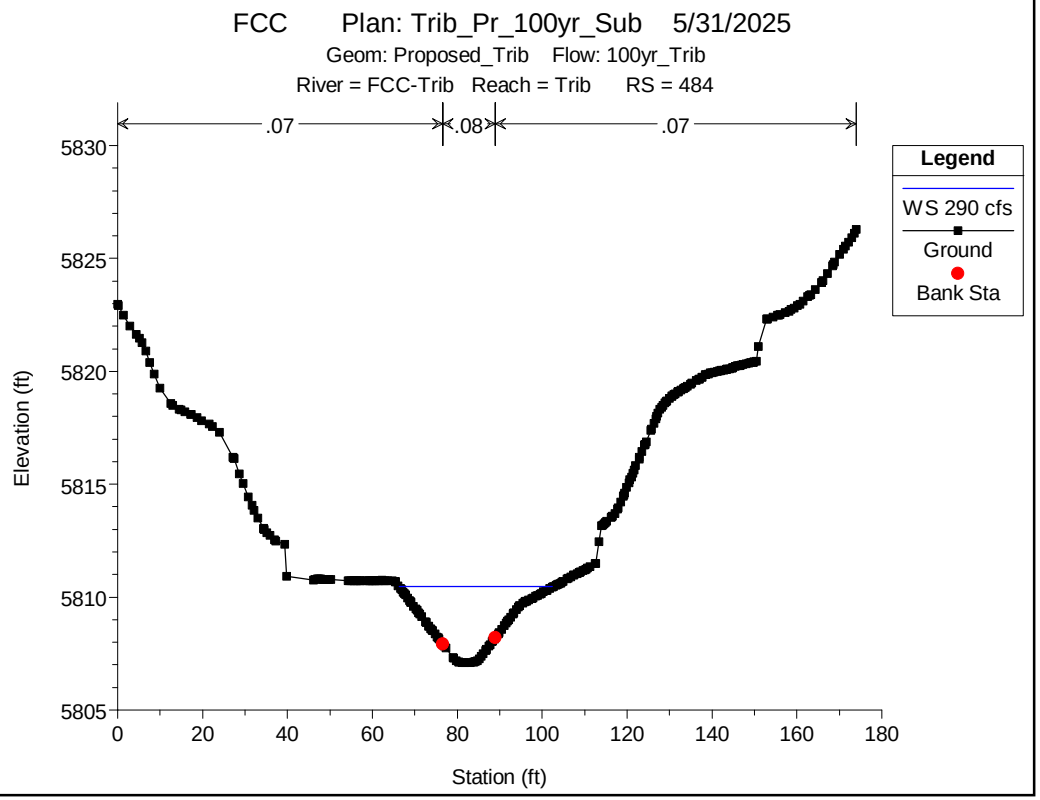

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 586
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

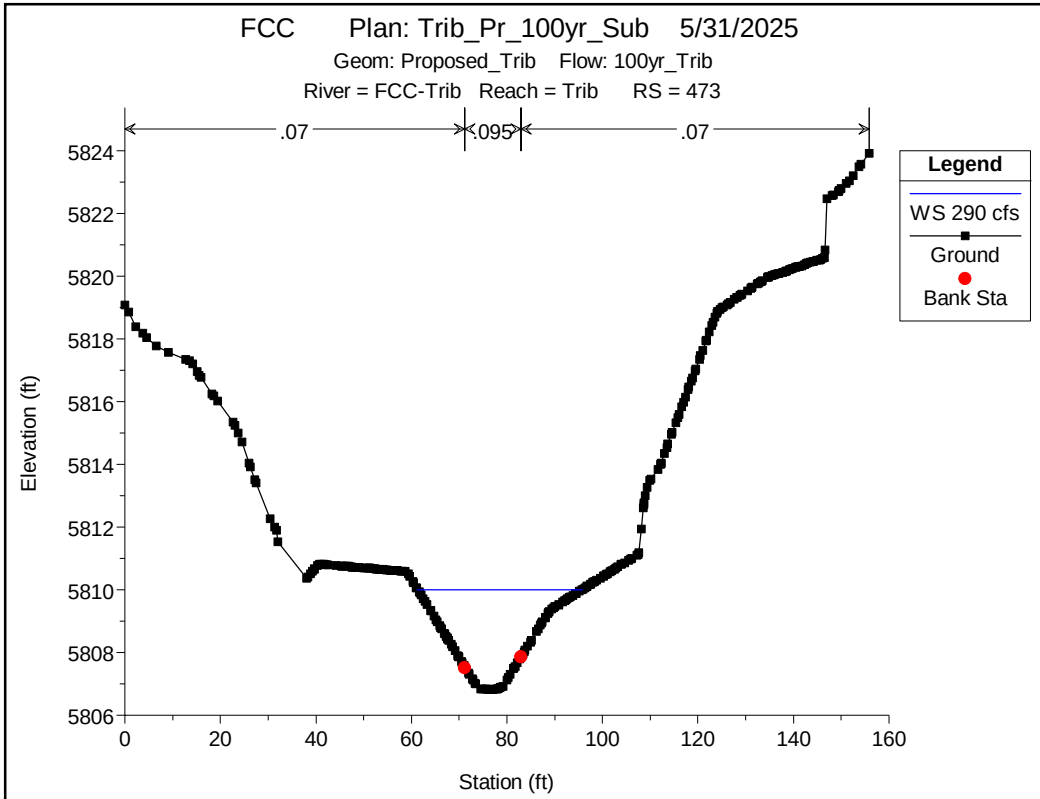

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 575
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

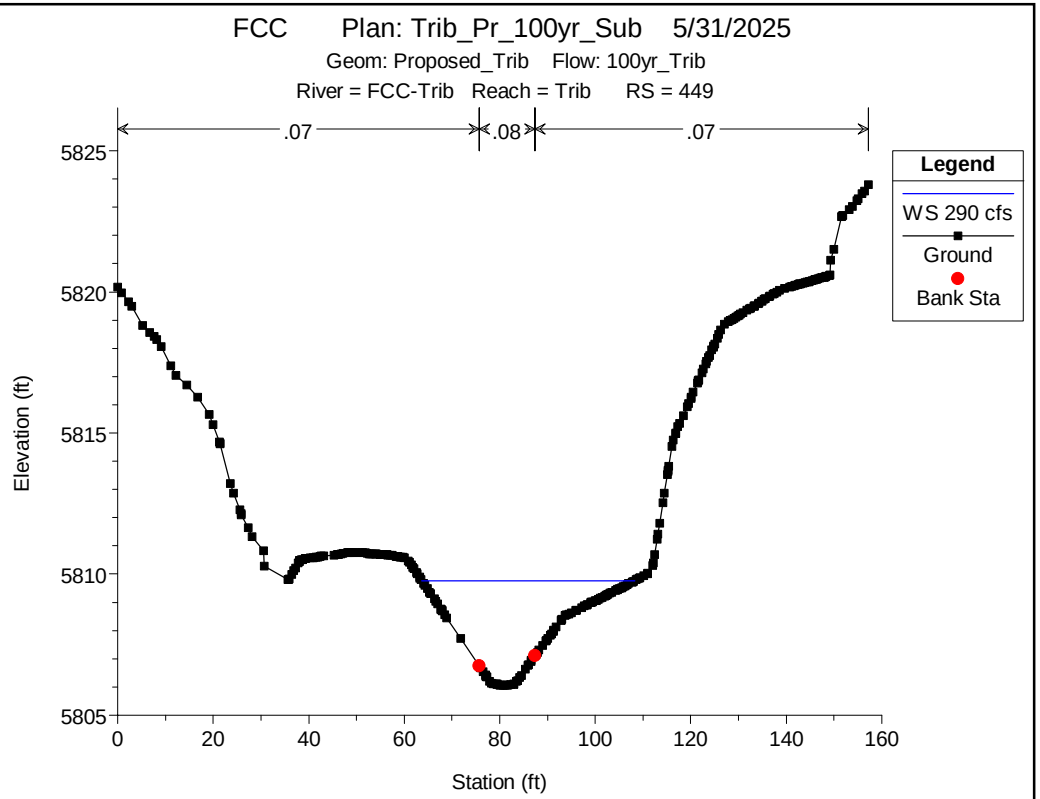

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 563
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

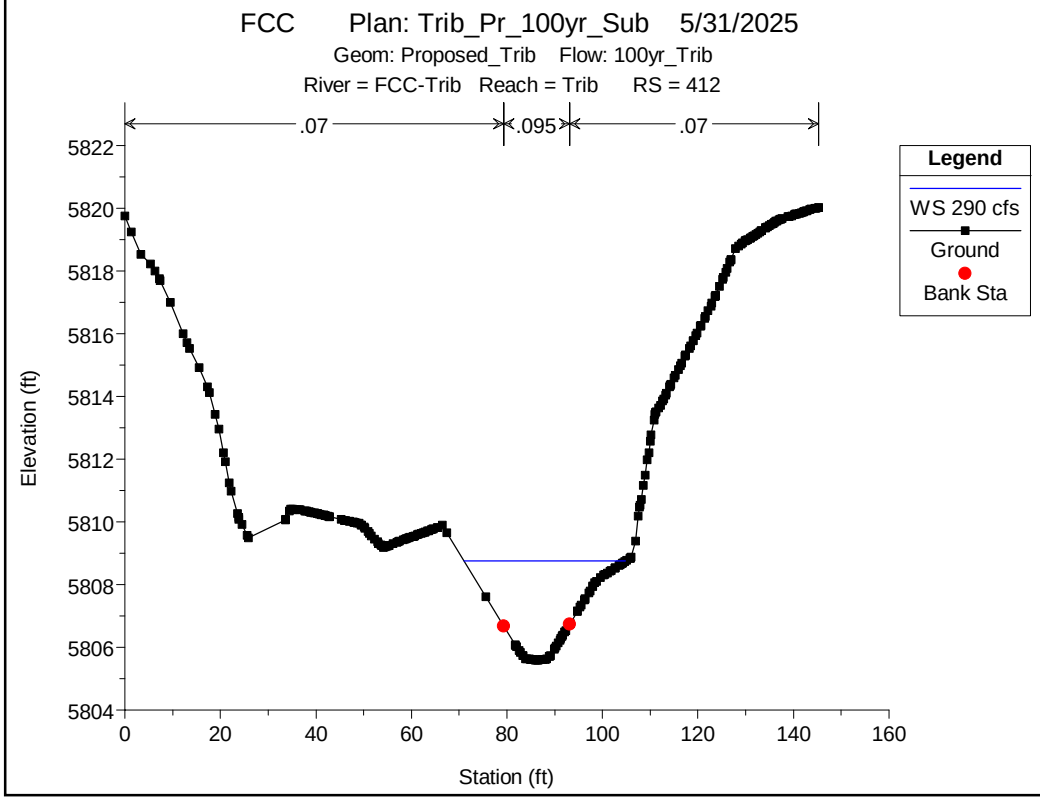

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 538
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

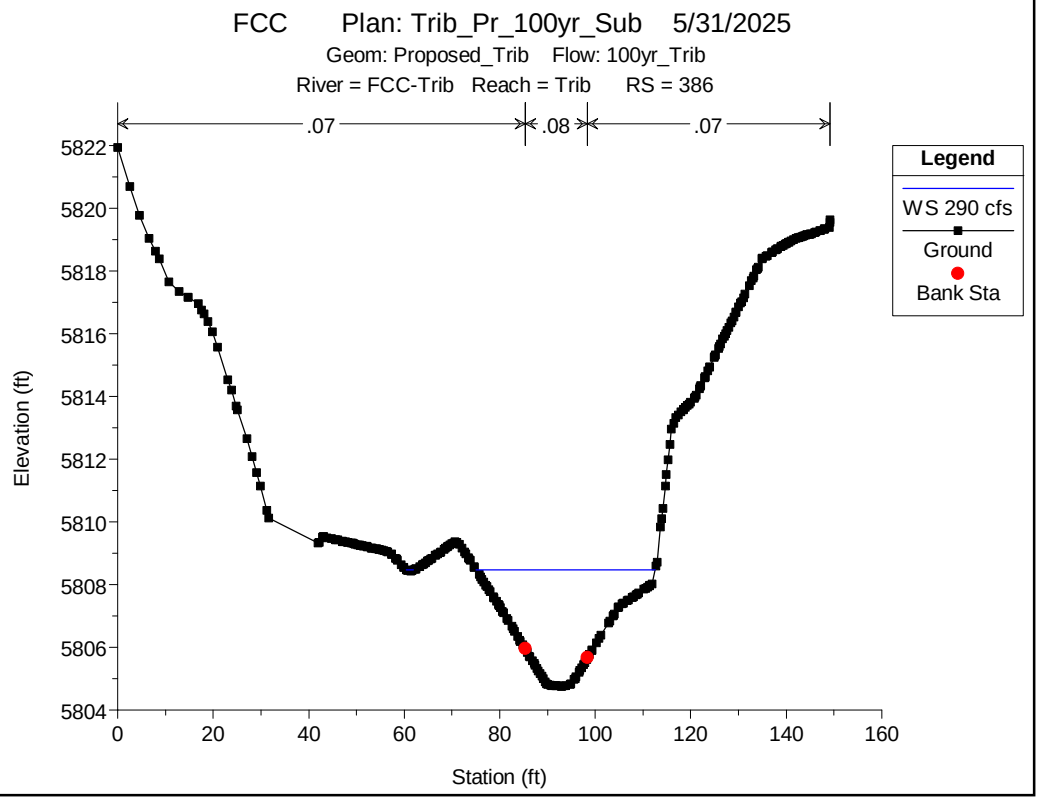

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 510
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

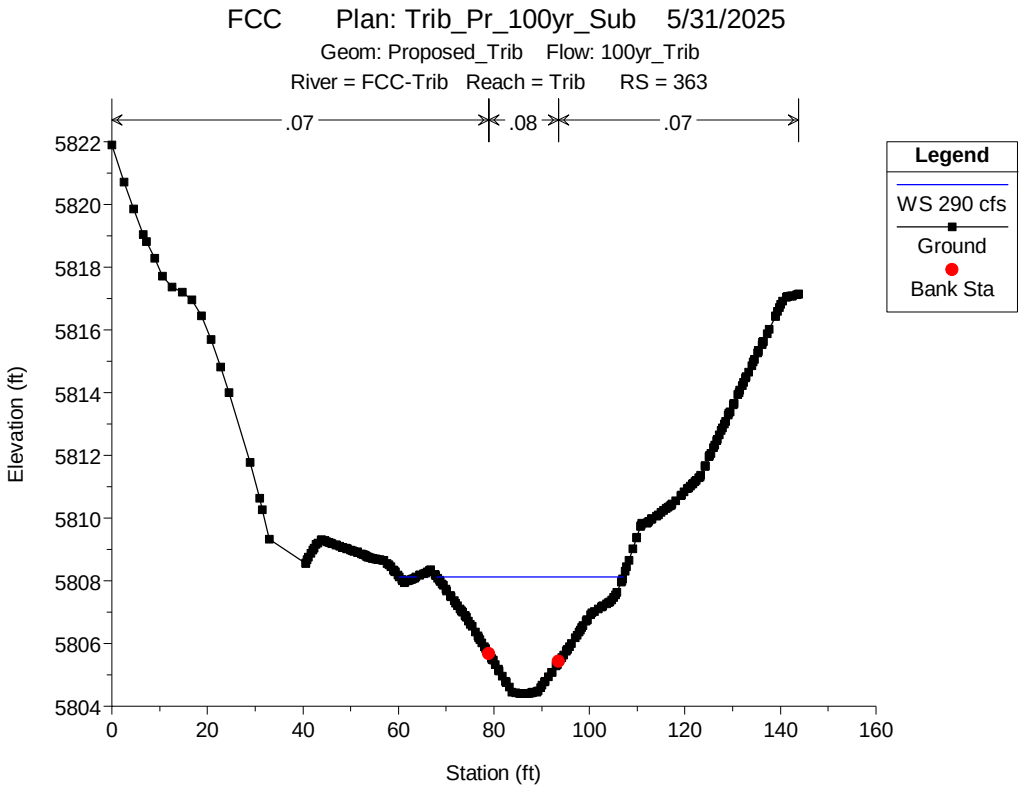

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 484
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

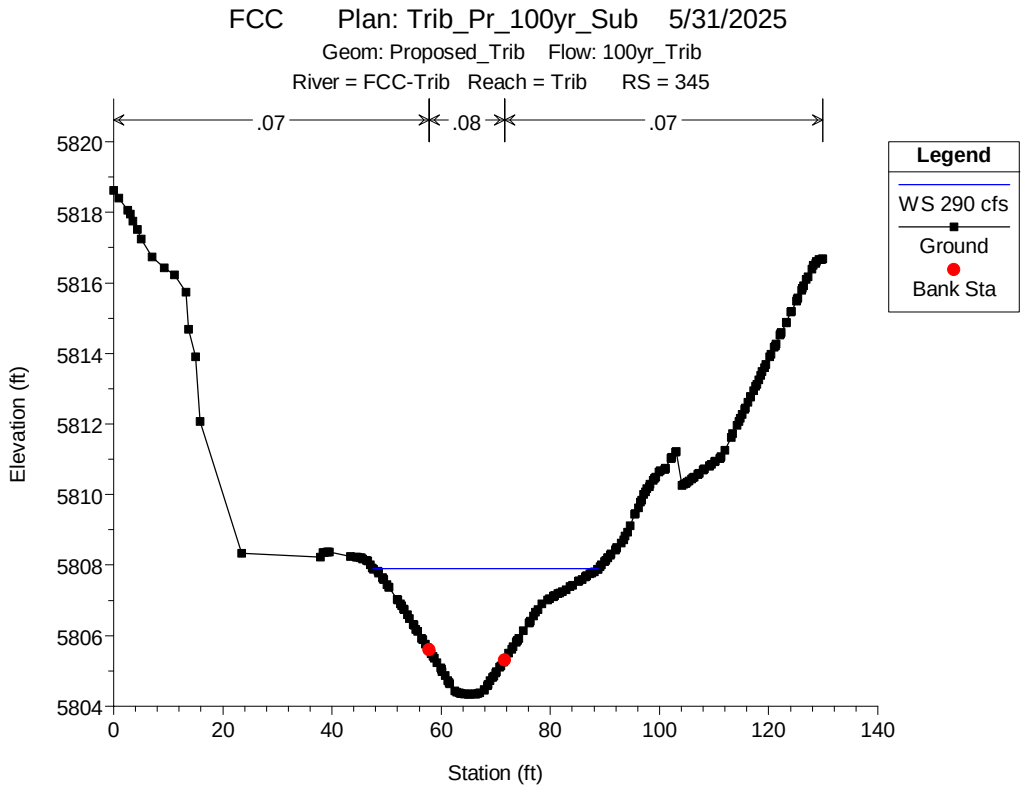

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 473
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

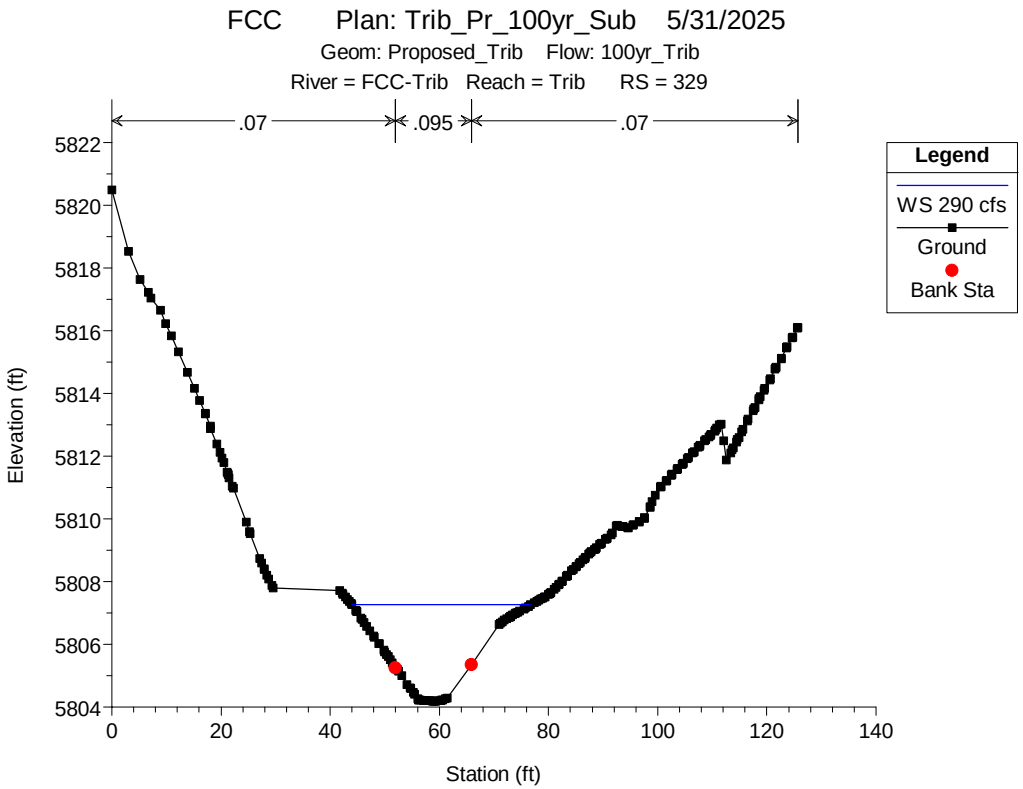

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 449
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

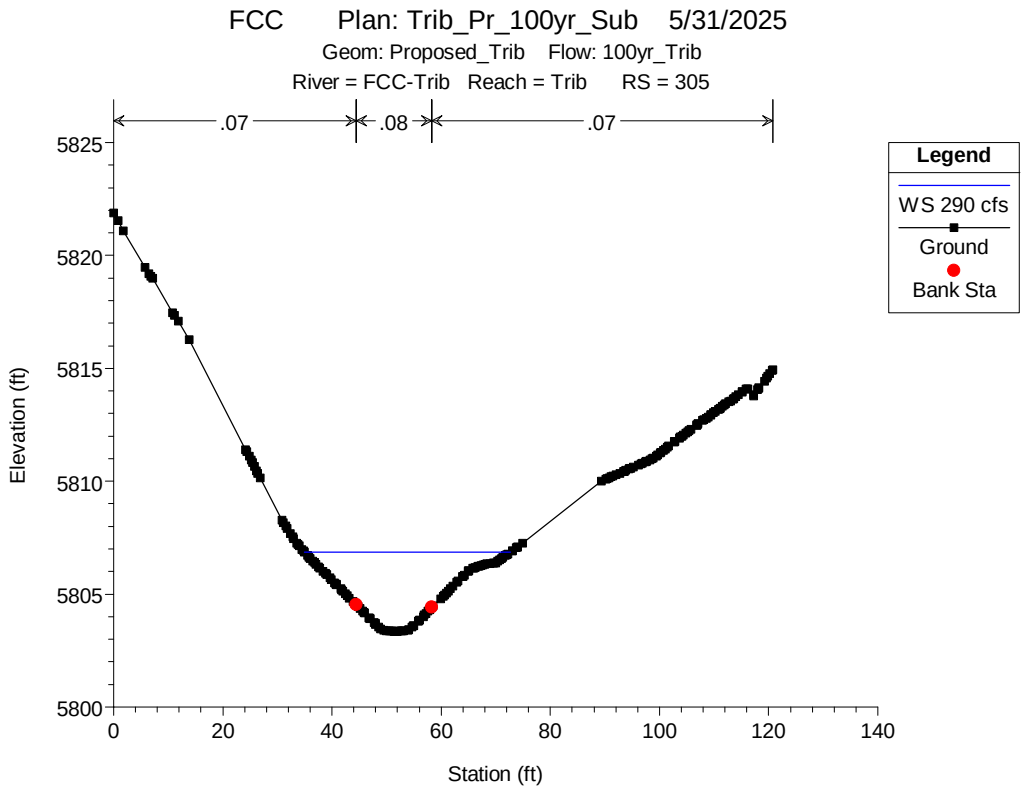

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 412
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

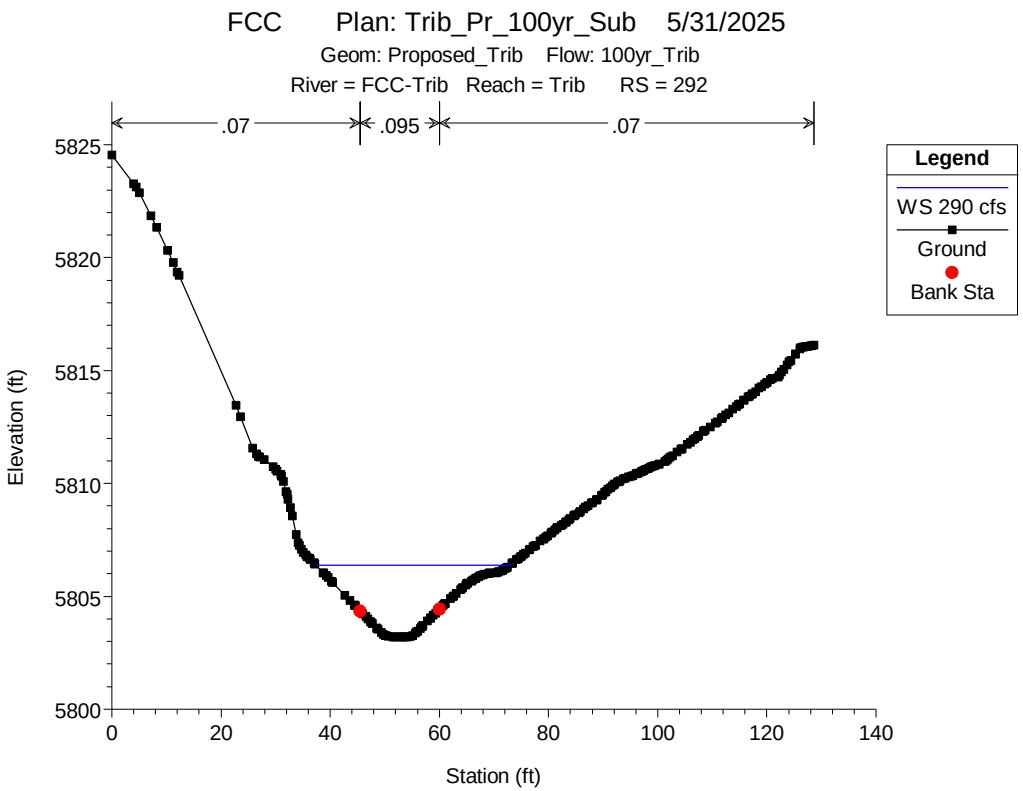

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 386
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

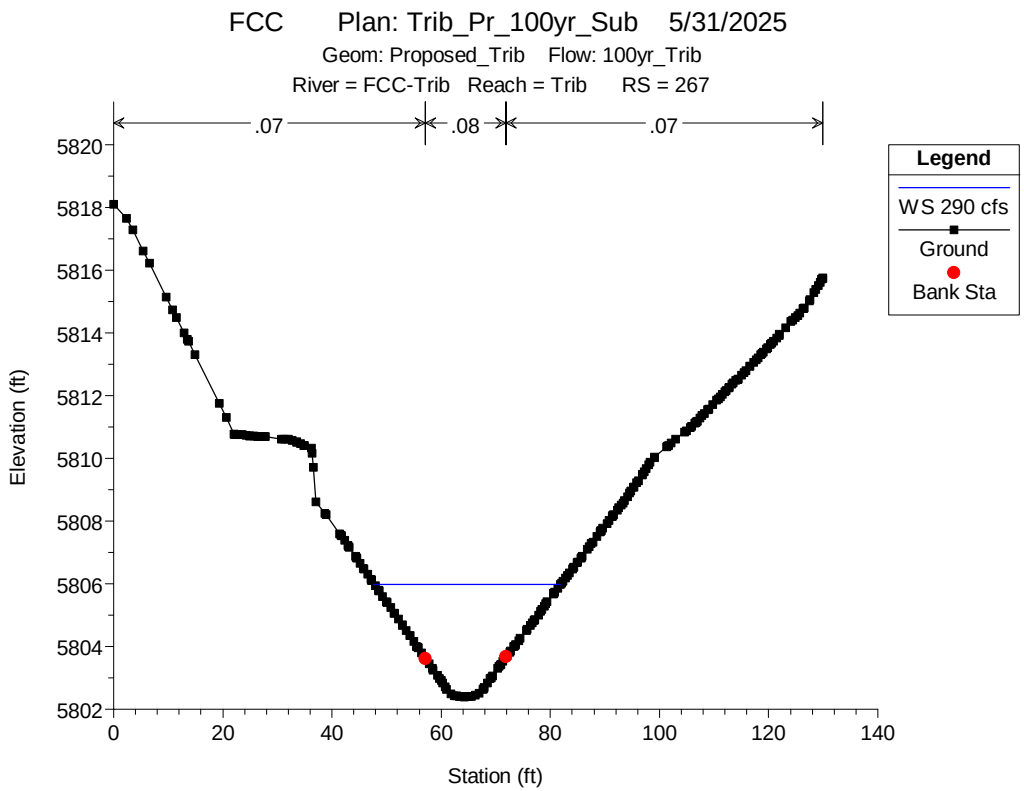

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 363
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

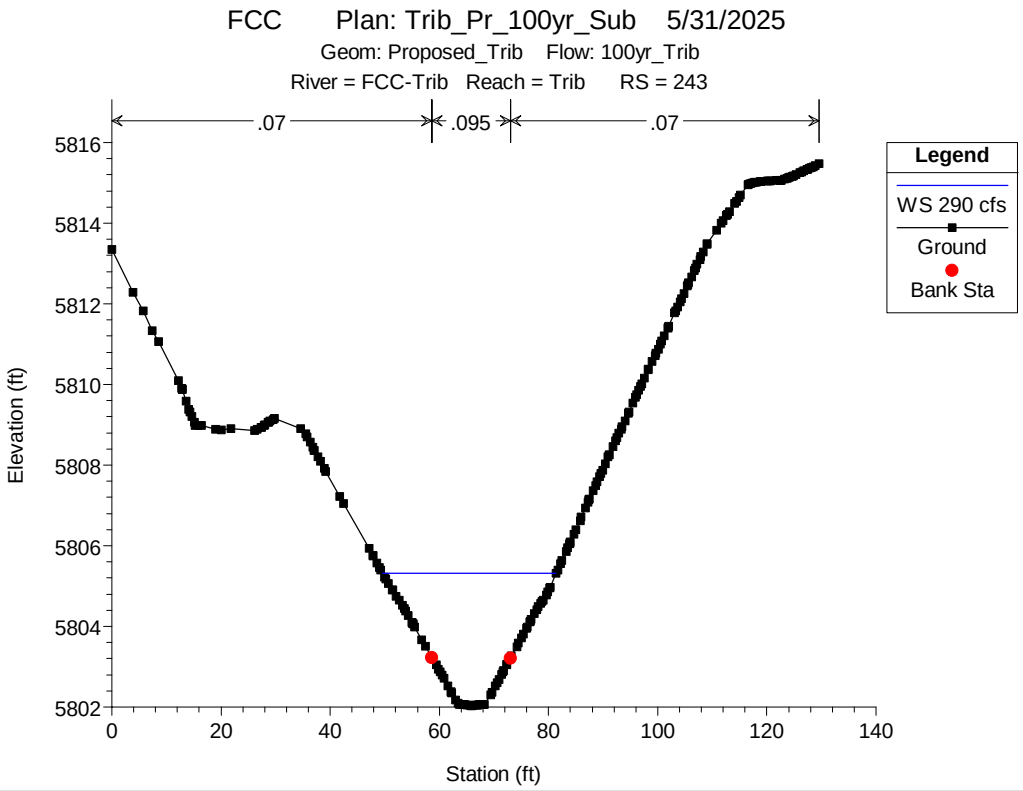

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 345
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

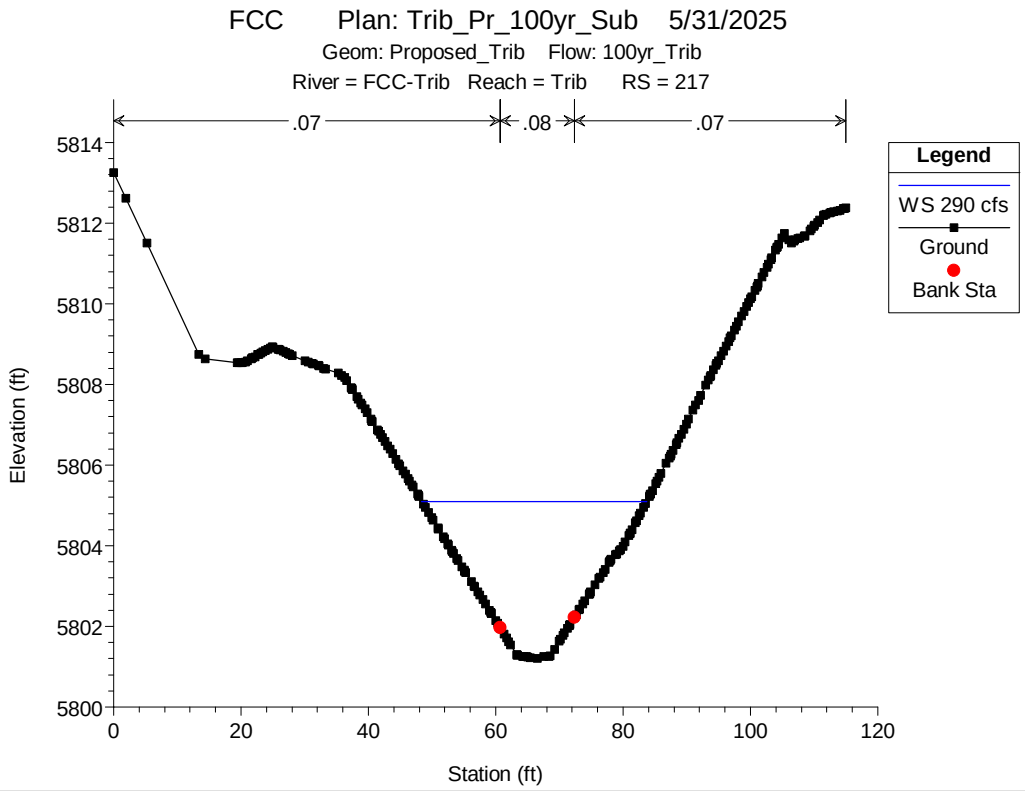

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 329
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

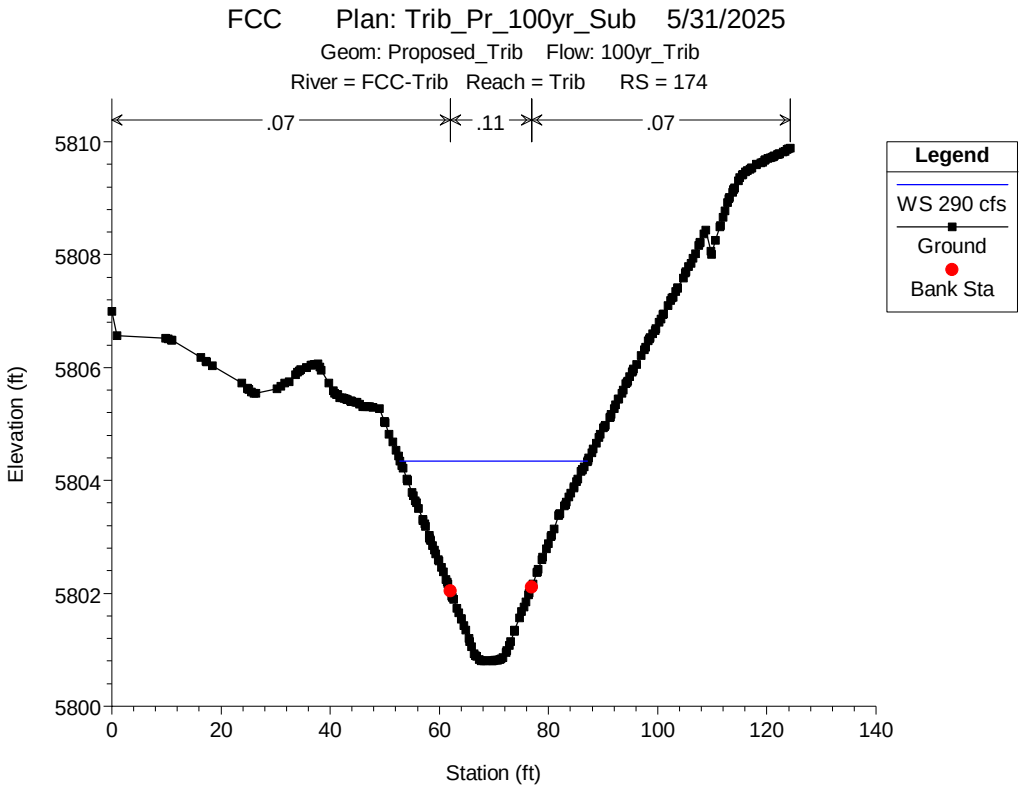

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 305
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

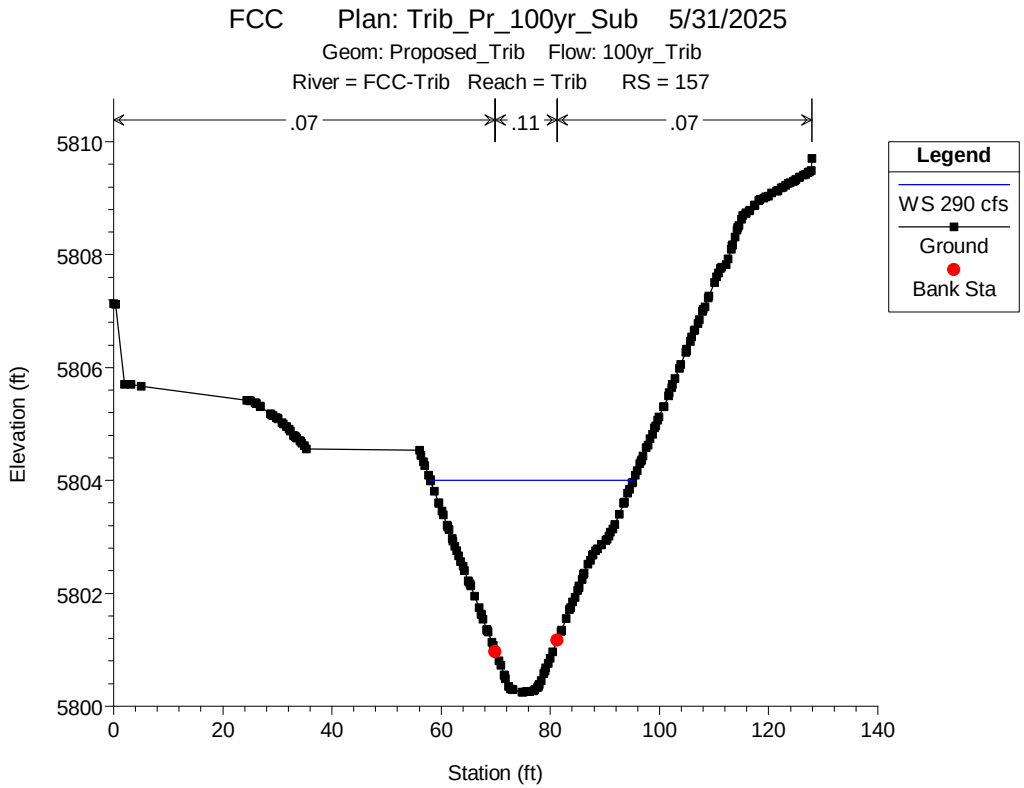

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 292
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

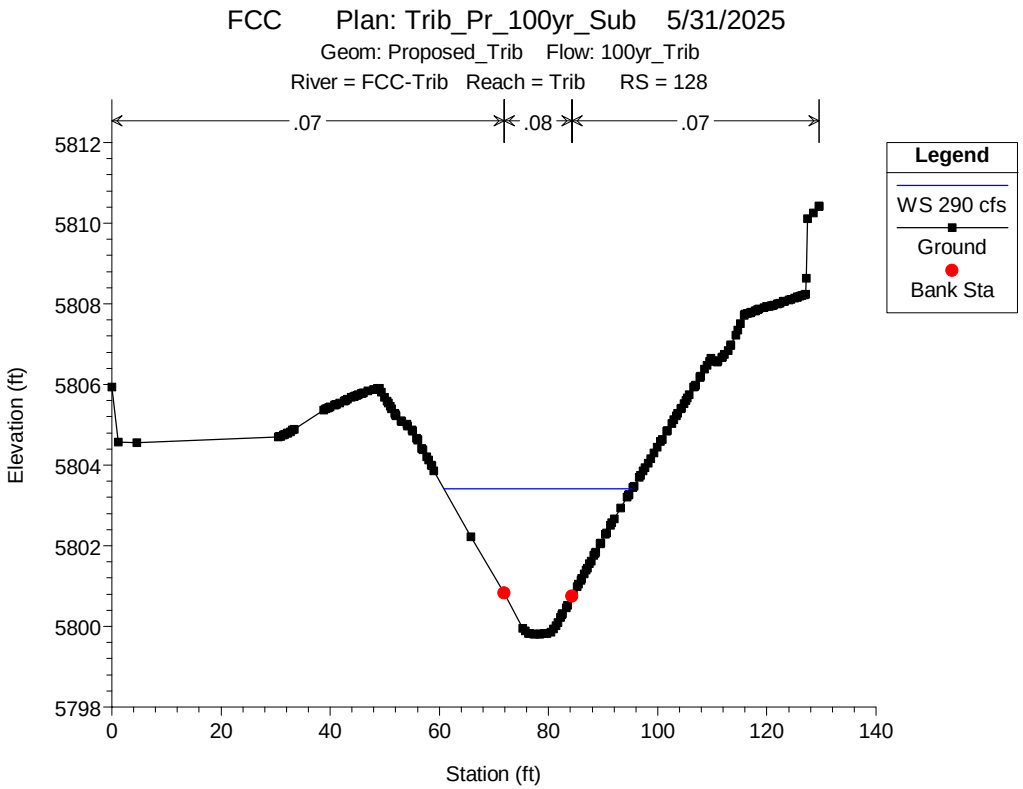

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 267
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

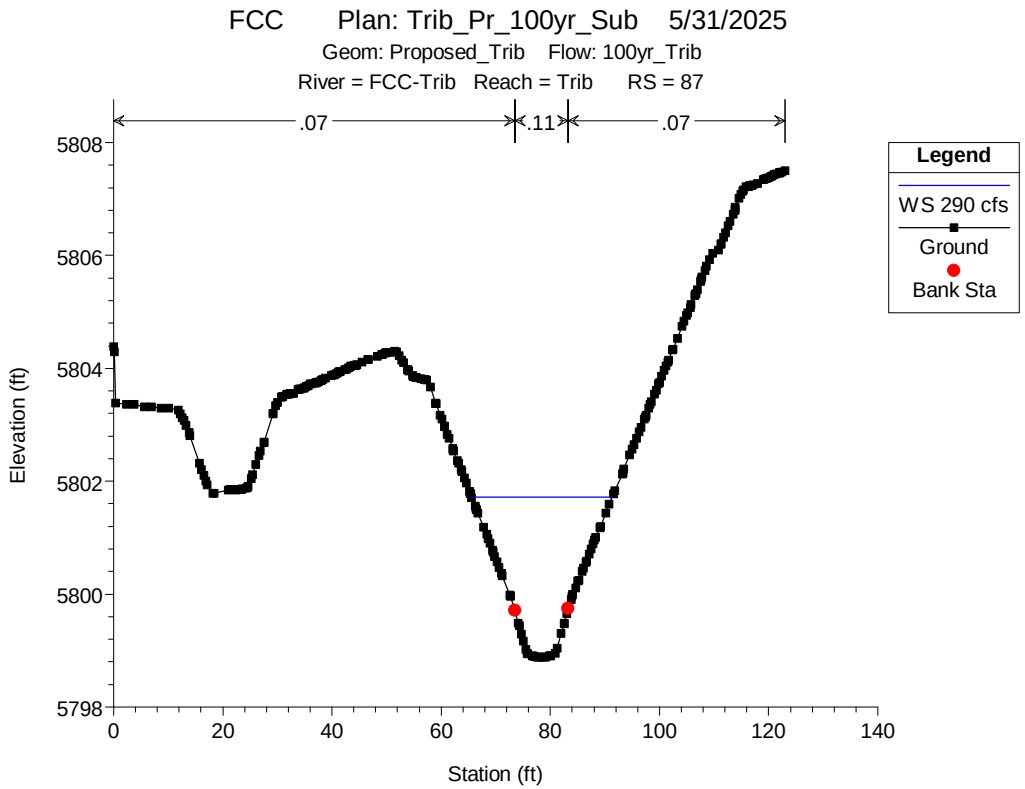

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 243
.07
.095
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

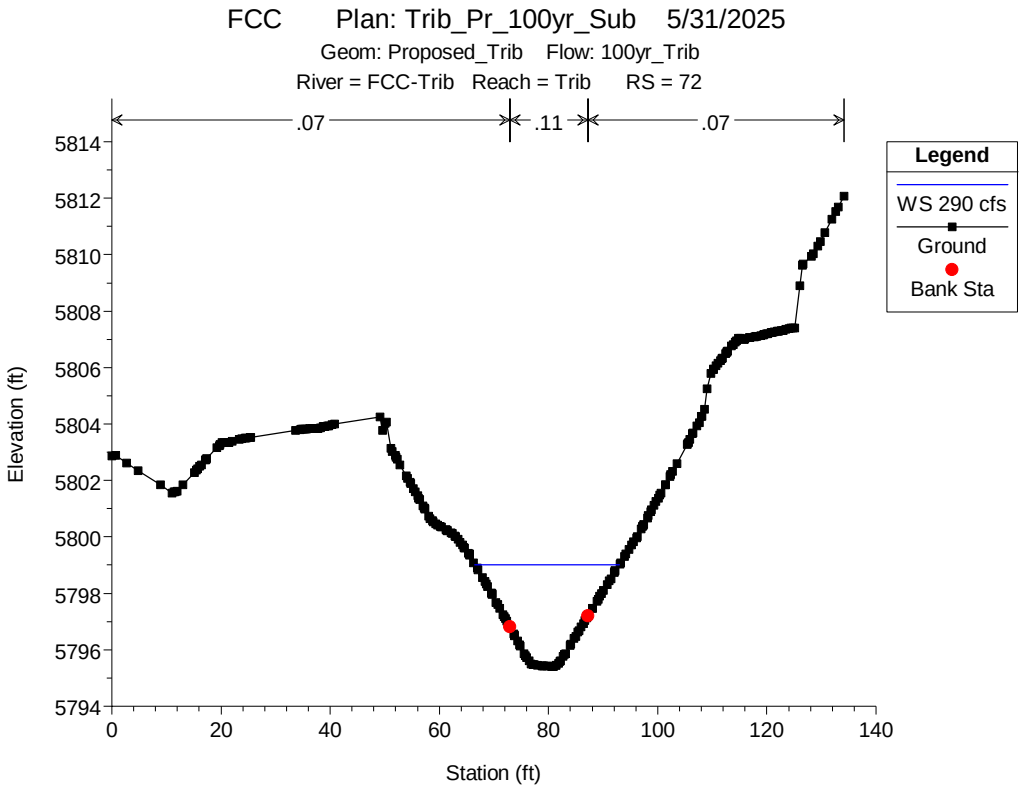

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 217
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

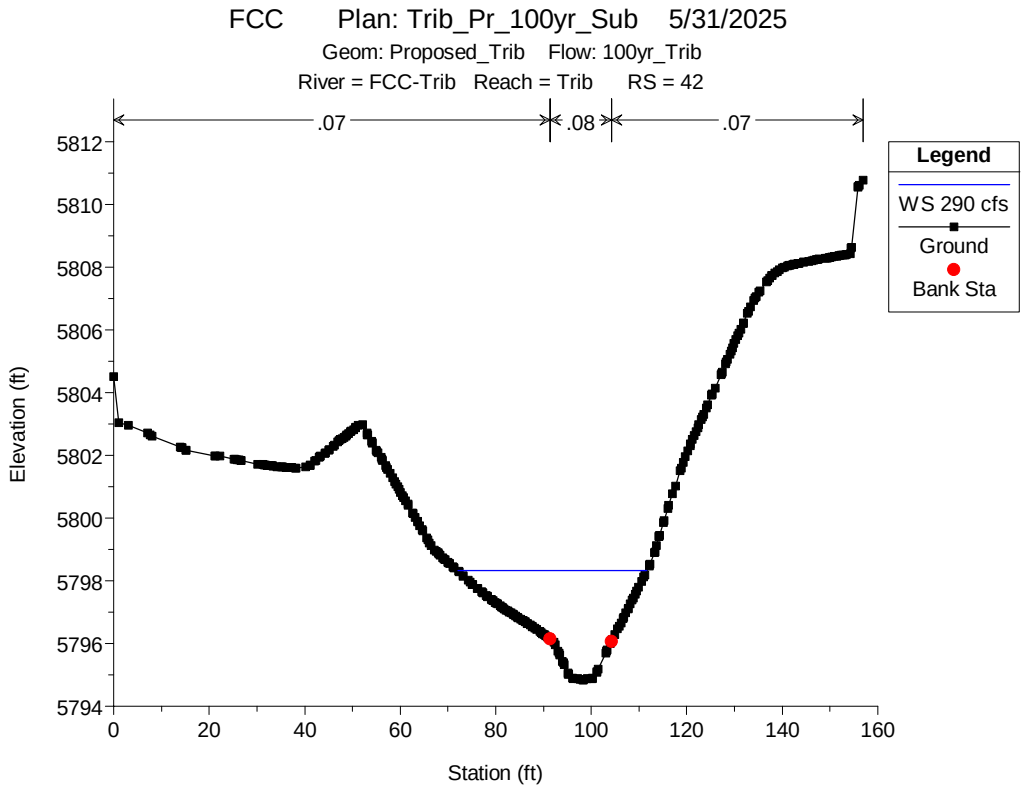

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 174
.07
.11
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

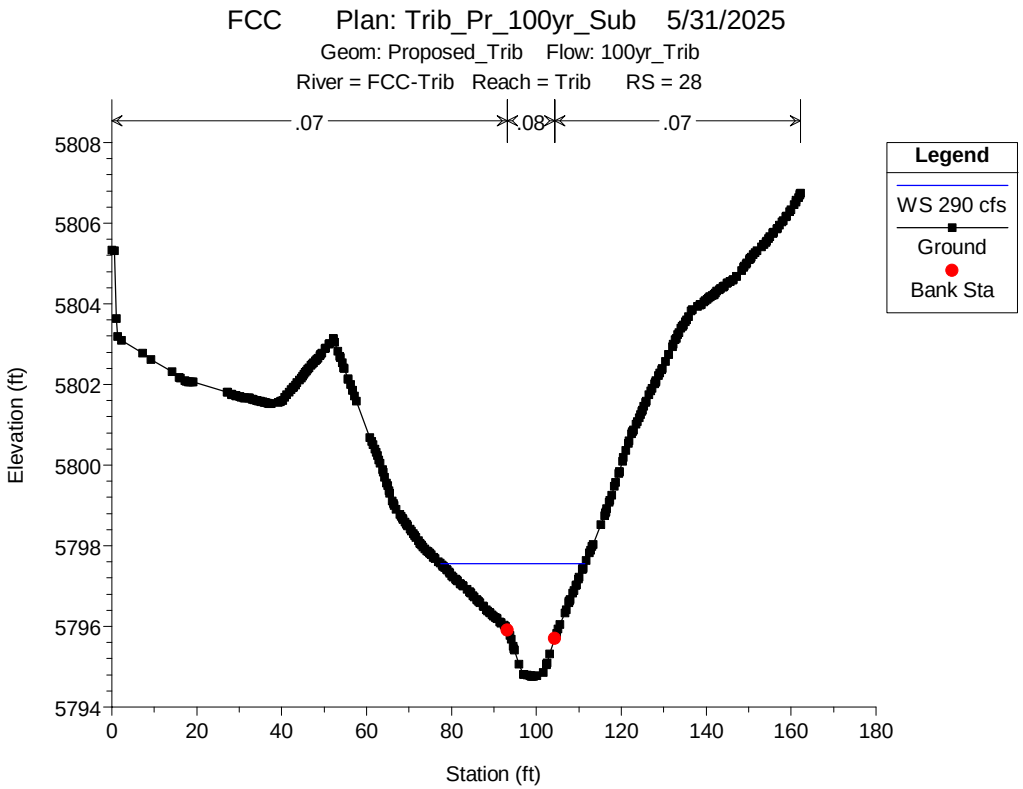

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 157
.07
.11
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

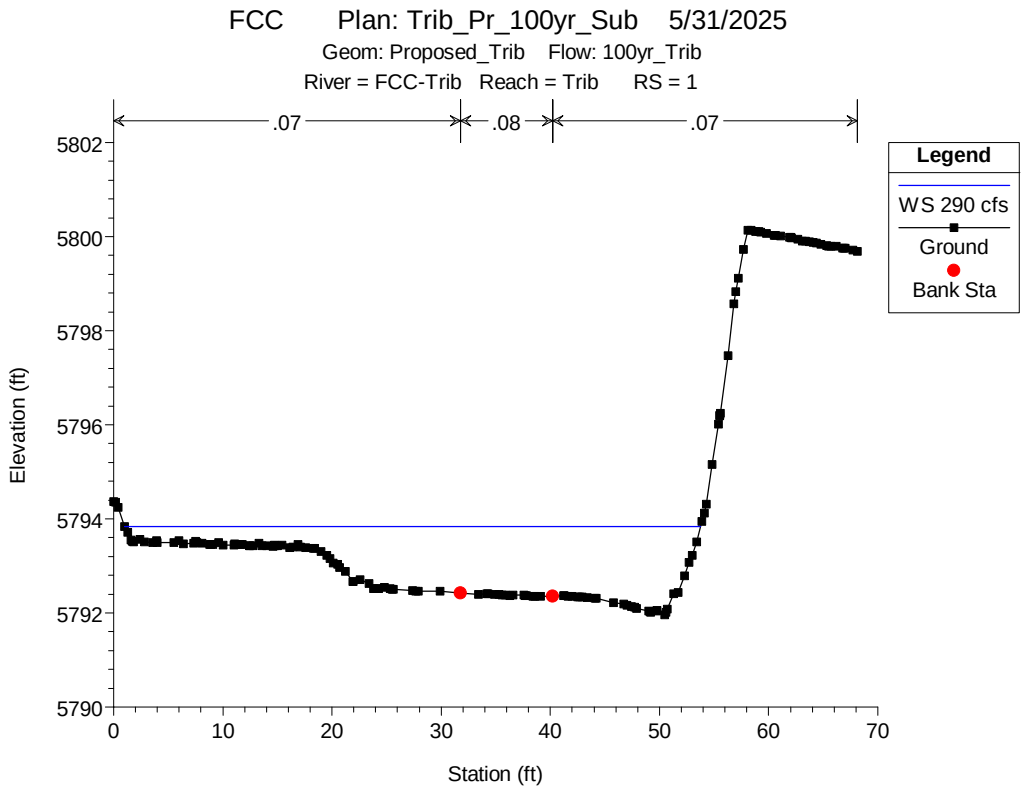

FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 128
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 87
.07
.11
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 72
.07
.11
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 42
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 28
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


FCC Plan: Trib_Pr_100yr_Sub 5/31/2025
Geom: Proposed_Trib Flow: 100yr_Trib
River = FCC-Trib Reach = Trib RS = 1
.07
.08
.07
Legend
WS 290 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

APPENDIX C: CONSTRUCTION DOCUMENTS

FISHERS CANYON CREEK

CHANNEL IMPROVEMENT PLANS

A PORTION OF THE WESTERN ONE-HALF (W. $\frac{1}{2}$) OF SECTION 4, TOWNSHIP 15 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO

PROJECT DESCRIPTION:

FISHERS CANYON APARTMENTS IS A MULTI-FAMILY RESIDENTIAL DEVELOPMENT THAT PROPOSES 336 DWELLING UNITS ALONG THE FISHERS CANYON CREEK CORRIDOR. THE PROJECT EMBRACES FISHERS CANYON CREEK TRIBUTARY TO THE WEST AND FISHERS CANYON CREEK TO THE NORTH WITH CREEK IMPROVEMENTS.

FLOODPLAIN

A PORTION OF THIS PROPERTY IS LOCATED WITHIN ZONE AE PER FEMA FLOOD INSURANCE RATE MAP NUMBER 08041C0743G, DATED 12/07/2018.

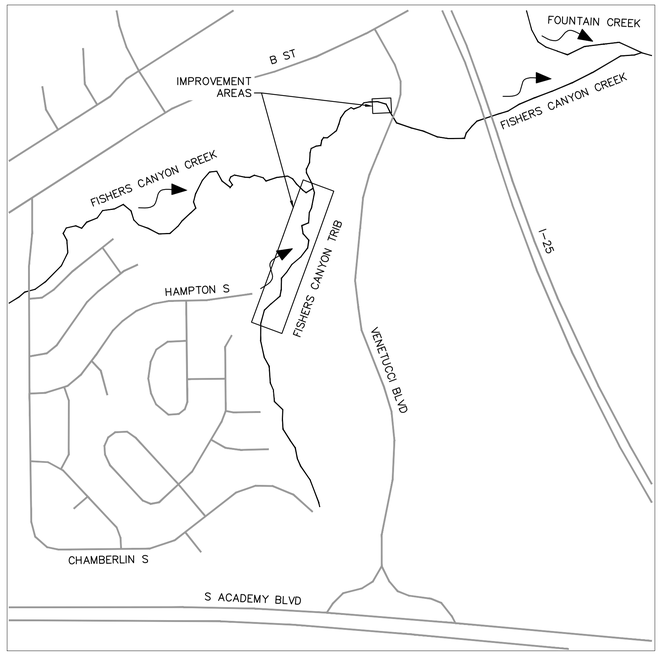
BASIS OF BEARING:

COMMENCING AT THE NORTHWESTERLY CORNER OF SOUTH ACADEMY HIGHLANDS FILING NO. 4 RECORDED UNDER RECEPTION NO. 222714970, EL PASO COUNTY, COLORADO; THENCE N 53° 59' 29" E, ALONG THE NORTHERLY LINE OF SAID SOUTH ACADEMY HIGHLANDS FILING NO. 4 (BASIS OF BEARING), A DISTANCE OF 226.24 FEET TO THE POINT OF BEGINNING.

BASIS OF ELEVATIONS: ELEVATIONS ARE BASED UPON COLORADO SPRINGS UTILITIES MONUMENT F159, A 3-1/4" ALUMINUM CAP IN RANGE BOX. (ELEVATION=5797.28 NAVD 88)

BENCHMARK

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
C970	COVER
C971	GENERAL NOTES
C972	EX. CONDITION & SURVEY CONTROL
C973	PLAN AND PROFILE
C974	PLAN AND PROFILE
C975	PLAN AND PROFILE
C976	PLAN AND PROFILE
C977	ENLARGED DROP STRUCTURE 2
C978	ENLARGED DROP STRUCTURE 1
C979	TYPICAL SECTIONS
C980	CHANNEL DETAILS
C981	CHANNEL DETAILS
C982	GENERAL NOTES
C983	REVEGETATION - TRIBUTARY & MAIN
C984	REVEGETATION DETAILS
C985	CUT FILL MAP
C986	INITIAL GEC PLAN
C987	INITIAL GEC PLAN
C988	FINAL GEC PLAN
C989	FINAL GEC PLAN
C990	GEC DETAILS
C991	GEC DETAILS
C992	GEC DETAILS
C993	GEC DETAILS



VICINITY MAP
1" = 500'

DESIGN TEAM CONTACTS:

DEVELOPER/OWNER:
CS 2005 INVESTMENT, LLC
1480 HUMBOLDT STREET
DENVER, CO 80218
TEL: (303) 503-1016
CONTACT: CHAD ELLINGTON

ENGINEER:
KIMLEY-HORN AND ASSOCIATES, INC.
6200 SYRACUSE WAY, SUITE 300
GREENWOOD VILLAGE, CO 80111
TEL: (303) 228-2300
EMAIL:
FRANS.LAMBRECHSTEN@KIMLEY-HORN.COM
CONTACT: FRANS LAMBRECHSTEN, PE, CFM

SURVEYOR:
BARRON LAND
2790 NORTH ACADEMY BOULEVARD, SUITE 311
COLORADO SPRINGS, CO 80917
TEL: (719) 360-6827
EMAIL:
CONTACT@BARRONLAND.COM
CONTACT: SPENCER BARRON

AGENCY CONTACTS:

EL PASO COUNTY DEPT. PUBLIC WORKS:
TEL: (719) 520-7877
EMAIL: JEFFRICE@ELPASOCO.COM
CONTACT: JEFFREY RICE, PE, CFM

COLORADO SPRINGS UTILITIES:
1521 HANCOCK EXPRESSWAY
MAIL CODE 1812
COLORADO SPRINGS, CO 80903
PHONE: 719.668.8769

STRATMOOR HILLS WATER & SANITATION:
1811 B STREET
COLORADO SPRINGS, CO 80906
PHONE: 719.576.0311

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

EL PASO COUNTY PCD
FILE NO.: CDR246.

DEVELOPER'S/OWNER'S SIGNATURE BLOCK

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN AND ALL OF THE REQUIREMENTS SPECIFIED IN THESE DETAILED PLANS AND SPECIFICATIONS.

OWNER SIGNATURE DATE

ENGINEER'S SIGNATURE BLOCK

THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR DETAILED ROADWAY, DRAINAGE, GRADING AND EROSION CONTROL PLANS AND SPECIFICATIONS, AND SAID PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH APPLICABLE MASTER DRAINAGE PLANS AND MASTER TRANSPORTATION PLANS. SAID PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE PARTICULAR ROADWAY AND DRAINAGE FACILITIES ARE DESIGNED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARATION OF THESE DETAILED PLANS AND SPECIFICATIONS.

FRANS J LAMBRECHTSEN, PE - KIMLEY-HORN AND ASSOCIATES, INC. DATE

EL PASO COUNTY

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT. FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL, AS AMENDED.

IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION.

COUNTY ENGINEER/ECM ADMINISTRATOR DATE

CITY OF FOUNTAIN

CITY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH CITY DESIGN CRITERIA. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE CITY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

CITY ENGINEER DATE

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
COVER

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C970

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_CV.dwg Kummerfen, Kayla 6/26/2025 8:40 AM

GENERAL NOTES

1. THE LOCATIONS OF EXISTING ABOVE GROUND AND UNDERGROUND UTILITIES ARE SHOWN IN THEIR APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. CONTRACTOR TO CALL FOR UTILITY LOCATOR AT LEAST 3 CALENDAR DAYS BEFORE EARTHWORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL ABOVE GROUND AND UNDERGROUND UTILITIES. IN THE EVENT THAT THE CONTRACTOR UTILITY VERIFICATION RESULTS IN EXISTING STRUCTURES OR UTILITIES BEING IN CONFLICT WITH THE PROPOSED WORK OF THIS CONTRACT, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY UTILITIES AND COORDINATE ANY NEEDED MODIFICATIONS TO THE PROPOSED WORK AS DIRECTED BY AFFECTED AGENCY OR UTILITY.
2. THE CONTRACTOR SHALL COORDINATE WITH ALL AFFECTED UTILITY OWNERS TO ESTABLISH THE REQUIREMENTS AND METHODS TO ACCOMMODATE THE PROTECTION, TEMPORARY SUPPORT, ADJUSTMENT OR RELOCATION OF UTILITIES PRIOR TO THE START OF CONSTRUCTION.
3. OVERHEAD UTILITIES ARE NOT INDICATED ON PROFILE OR SECTION DRAWINGS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING AND MAINTAINING IN CONTINUOUS OPERATION, ALL EXISTING STRUCTURES. NOT ALL POTENTIALLY IMPACTED STRUCTURES MAY BE SHOWN ON THE DRAWINGS AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT ALL STRUCTURES INCLUDING BUT NOT LIMITED TO STREETS, CURB AND GUTTER, BRIDGE PIERS AND ABUTMENTS, CREEK BANK PROTECTION OF VARIOUS TYPES, CREEK DROP STRUCTURES, SIGNS, PEDESTRIAN WALKS, RETAINING WALLS AND FENCING. IN THE EVENT THAT A STRUCTURE OR UTILITY IS DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER OF THE FACILITY IN WRITING AND COORDINATE AND COOPERATE WITH NEEDED REPAIRS PER THE APPROPRIATE SPECIFICATIONS ACCORDING TO THE OWNER'S DIRECTION.
5. THE CONTRACTOR SHALL CONFIRM THE RECEIPT OF ALL NECESSARY PERMITS AND APPROVALS BEFORE THE START OF CONSTRUCTION.
6. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARDS OF EL PASO COUNTY AND THE MILE HIGH FLOOD DISTRICT, AS NOTED, UNLESS SPECIFICALLY DETAILED OTHERWISE ON THESE PLANS AND ASSOCIATED SPECIFICATIONS.
7. THE CONTRACTOR SHALL MAINTAIN AT THE SITE AT ALL TIMES ONE SIGNED COPY OF THE PROJECT DRAWINGS AND SPECIFICATIONS, ONE COPY OF THE STORMWATER MANAGEMENT PLAN AND ONE COPY OF ALL REQUIRED PERMITS.
8. THE CONTRACTOR SHALL CONDUCT THEIR OPERATIONS IN SUCH A WAY THAT THE AREA OF DISTURBANCE IS MINIMIZED. ALL EXISTING TREES, SHRUBS AND VEGETATION SHALL BE PROTECTED UNLESS OTHERWISE NOTED ON THE DRAWINGS. NO TREES SHALL BE REMOVED WITHOUT APPROVAL. DESIGNATED ACCESS SHALL BE MINIMAL AND AGREED UPON WITH THE ENGINEER PRIOR TO CONSTRUCTION ACTIVITIES.
9. FOR ALL SITE GRADING, SMOOTH, PARABOLIC TRANSITIONS SHALL BE MADE BETWEEN CHANGES IN SLOPE.
10. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES AND FOR SATISFYING ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS. THIS INCLUDES BUT IS NOT LIMITED TO BENCHING, SHORING, AND SLOPING AS NEEDED FOR CONSTRUCTION.
11. CONSTRUCTION OF THE PROPOSED WORK WILL TAKE PLACE WITHIN THE CHANNEL AND WATER CONTROL MEASURES WILL BE REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCEPTANCE AND CONTROL OF DRAINAGE WATER FROM AREAS ADJACENT TO FISHERS CANYON CREEK AND FOR FLOW WITHIN FISHERS CANYON CREEK AND ITS TRIBUTARIES INCLUDING STORMWATER OUTFALLS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ESTABLISHING MEANS AND METHODS OF GROUND AND SURFACE WATER CONTROL APPROPRIATE FOR CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT DRAWINGS AND SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS AND PERMITS.
12. THE CONTRACTOR SHALL PREPARE AND MAINTAIN THE STORMWATER MANAGEMENT PLAN AND OBTAIN THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT THROUGH THE COLORADO DEPARTMENT OF PUBLIC HEALTH (CDPHE) AND ALL OTHER APPROPRIATE FEDERAL, STATE AND LOCAL PERMITS. ADDITIONAL INFORMATION IS PROVIDED ON THE GRADING AND EROSION CONTROL PLANS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT DRAWINGS TO BE MAINTAINED AND SUBMITTED TO EL PASO COUNTY.
14. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ON-SITE SURVEY CONTROL AND CONSTRUCTION STAKING.
15. CONTRACTOR SHALL FENCE OFF CRITICAL AREAS TO BE PROTECTED AT THE DISCRETION OF EL PASO COUNTY.
16. THE CONTRACTOR SHALL DEVELOP A TRAFFIC CONTROL PLAN FOR PLANNED ACCESS TO THE SITE AND FOR EXITING AND ENTERING PUBLIC ROADS.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING AND MAINTAINING PHYSICAL AND LEGAL ACCESS TO THE PROJECT SITE AND SHALL LIMIT TRANSPORTATION TO AND FROM THE SITE TO THOSE APPROVED BY EL PASO COUNTY.
18. THE CONTRACTOR SHALL TAKE MEASURES TO PREVENT AND MANAGE SPILLS OF TOXIC MATERIALS, SUCH AS EQUIPMENT FUELS.
19. ALL MATERIALS USED SHALL BE NEW AND WITHOUT FLAWS OR DEFECTS OF ANY TYPE AND SHALL BE THE BEST OF THEIR CLASS AND KIND.
20. WORK INCLUDES FURNISHING OF LABOR, MATERIALS, TOOLS, AND EQUIPMENT TO COMPLETE THE CONSTRUCTION OF ALL ELEMENTS OF THE DESIGN PLANS.

CHANNEL IMPROVEMENTS LEGEND

SYMBOL OR LINETYPE	DESCRIPTION
XXXX	PROPOSED CHANNEL MAJOR CONTOUR
XXXX	PROPOSED CHANNEL MINOR CONTOUR
XXXX	PROPOSED SITE MAJOR CONTOUR
XXXX	PROPOSED SITE MINOR CONTOUR
10+00	PROPOSED STREAM CENTERLINE ALIGNMENT
	PROPOSED RIPRAP
	PROPOSED GROUTED BOULDER DROP STRUCTURE
	PROPOSED SHEETPILE CUTOFF WALL
LDA	PROPOSED LIMIT OF CHANNEL DISTURBANCE
	PROPOSED RIPARIAN SEED MIX
	PROPOSED UPLAND SEED MIX

EXISTING SURVEY LEGEND:

SYMBOL OR LINETYPE	DESCRIPTION
XXXX	EXISTING MAJOR CONTOUR
XXXX	EXISTING MINOR CONTOUR
	PROPERTY LINE
G	GAS LINE
W	WATER LINE
OH	OVERHEAD POWER
ST	STORM LINE
E	UNDERGROUND POWER LINE
SS	SANITARY LINE
FO	COMMUNICATION LINE, FIBER OPTIC
T	COMMUNICATION LINE, TELEPHONE
	CURB AND GUTTER
	TREE/SHRUB
	SIGN
TS	TRAFFIC SIGNAL
GV	GAS VALVE
	LIGHT POLE
	POWER POLE
	GUY WIRE
	WATER VALVE
	FIRE HYDRANT
	EXISTING 100-YEAR FEMA BOUNDARY

ABBREVIATIONS

AC	ASPHALT CONCRETE
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS
APPROX	APPROXIMATE OR APPROXIMATELY
BP OR BOP	BEGINNING OF PROJECT
BCR	BEGIN CURB RADIUS
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
℄	CENTERLINE
CLR	CLEARANCE
CONC	CONCRETE
DWG	DRAWING
DR	DRIVE
EA	EACH
EP OR EOP	END OF PROJECT
ECR	END CURB RADIUS
ELEV OR EL	ELEVATION
ESMT	EASEMENT
EW	EACH WAY
EX	EXISTING
FES	FLARED END SECTION
FL	FLOWLINE
FT	FOOT/FEET
HMA	HOT MIX ASPHALT
HCL	HORIZONTAL CONTROL LINE
K	VERTICAL CURVE RATIO
LT	LEFT
ME	MATCH EXISTING
MAX	MAXIMUM
MIN	MINIMUM

LEGEND NOTES:

1. THIS IS A STANDARD DRAWING SHOWING COMMON SYMBOLOGY. ALL SYMBOLS ARE NOT NECESSARILY USED ON THIS PROJECT.
2. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH DRAWING FOR USAGE.
3. THESE ABBREVIATIONS APPLY TO THE ENTIRE SET OF CONTRACT DRAWINGS.
4. LISTING OF ABBREVIATIONS DOES NOT IMPLY THAT ALL ABBREVIATIONS ARE USED IN THE CONTRACT DRAWINGS.
5. ABBREVIATIONS SHOWN ON THIS SHEET INCLUDE VARIATIONS OF A WORD. FOR EXAMPLE, "MOD" MAY MEAN MODIFY OR MODIFICATION; "INC" MAY MEAN INCLUDED OR INCLUDING AND "REINF" MAY MEAN EITHER REINFORCE OR REINFORCING.

MISC. ABBREVIATIONS

@	AT
ø	PHASE, DIAMETER
&	AND
'	FEET, MINUTES
"	INCHES, SECONDS
°	DEGREE
#	NUMBER
℄	CENTERLINE

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

NO.	REVISION	BY.	DATE	APPR.

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

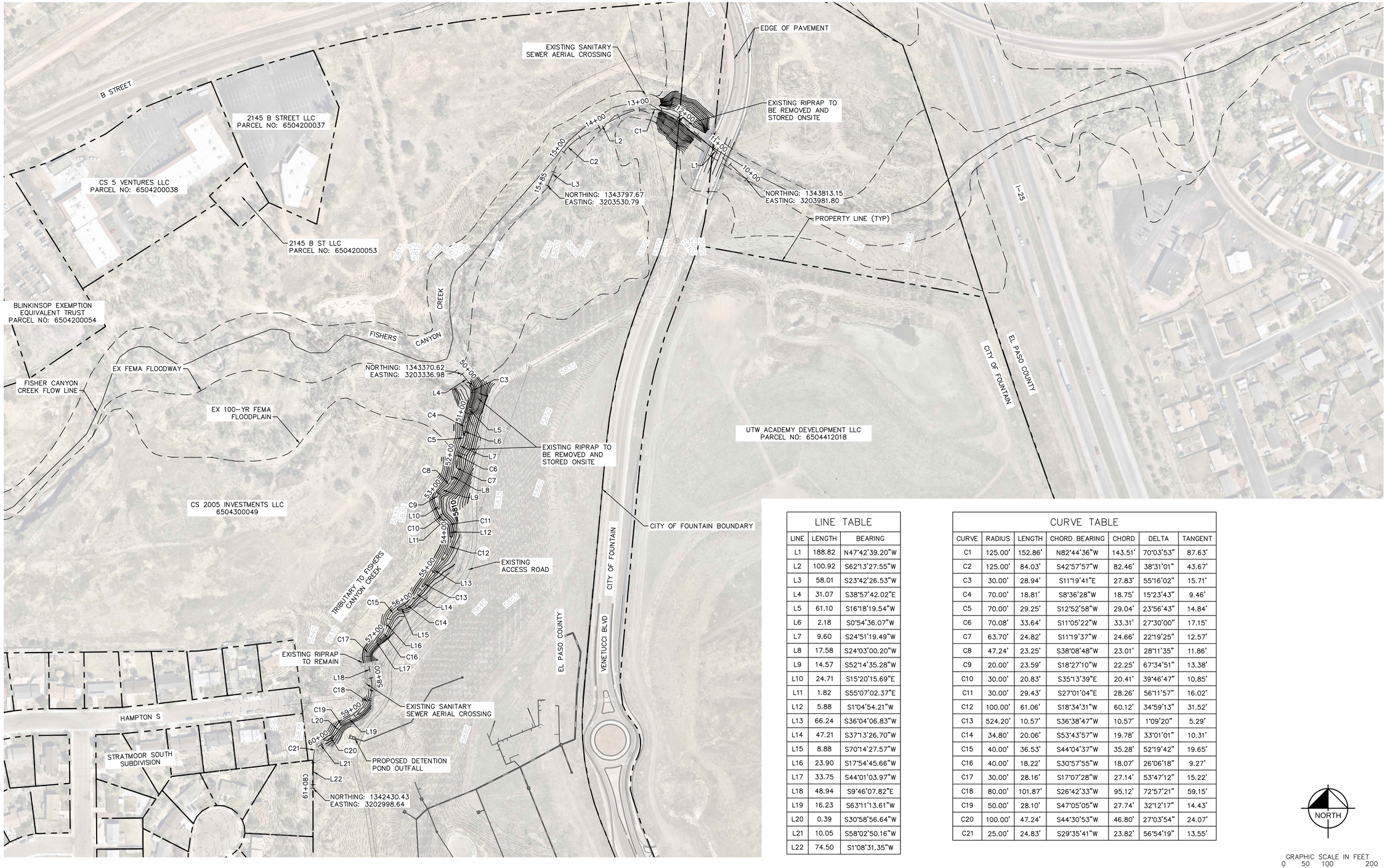
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
GENERAL NOTES

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C971

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_CV.dwg Kummerfen, Kayla 6/26/2025 8:40 AM



LINE TABLE		
LINE	LENGTH	BEARING
L1	188.82	N47°42'39.20"W
L2	100.92	S62°13'27.55"W
L3	58.01	S23°42'26.53"W
L4	31.07	S38°57'42.02"E
L5	61.10	S16°18'19.54"W
L6	2.18	S0°54'36.07"W
L7	9.60	S24°51'19.49"W
L8	17.58	S24°03'00.20"W
L9	14.57	S52°14'35.28"W
L10	24.71	S15°20'15.69"E
L11	1.82	S55°07'02.37"E
L12	5.88	S1°04'54.21"W
L13	66.24	S36°04'06.83"W
L14	47.21	S37°13'26.70"W
L15	8.88	S70°14'27.57"W
L16	23.90	S17°54'45.66"W
L17	33.75	S44°01'03.97"W
L18	48.94	S9°46'07.82"E
L19	16.23	S63°11'13.61"W
L20	0.39	S30°58'56.64"W
L21	10.05	S58°02'50.16"W
L22	74.50	S1°08'31.35"W

CURVE TABLE						
CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
C1	125.00'	152.86'	N82°44'36"W	143.51'	70°03'53"	87.63'
C2	125.00'	84.03'	S42°57'57"W	82.46'	38°31'01"	43.67'
C3	30.00'	28.94'	S11°19'41"E	27.83'	55°16'02"	15.71'
C4	70.00'	18.81'	S8°36'28"W	18.75'	15°23'43"	9.46'
C5	70.00'	29.25'	S12°52'58"W	29.04'	23°56'43"	14.84'
C6	70.08'	33.64'	S11°05'22"W	33.31'	27°30'00"	17.15'
C7	63.70'	24.82'	S11°19'37"W	24.66'	22°19'25"	12.57'
C8	47.24'	23.25'	S38°08'48"W	23.01'	28°11'35"	11.86'
C9	20.00'	23.59'	S18°27'10"W	22.25'	67°34'51"	13.38'
C10	30.00'	20.83'	S35°13'39"E	20.41'	39°46'47"	10.85'
C11	30.00'	29.43'	S27°01'04"E	28.26'	56°11'57"	16.02'
C12	100.00'	61.06'	S18°34'31"W	60.12'	34°59'13"	31.52'
C13	524.20'	10.57'	S36°38'47"W	10.57'	1°09'20"	5.29'
C14	34.80'	20.06'	S53°43'57"W	19.78'	33°01'01"	10.31'
C15	40.00'	36.53'	S44°04'37"W	35.28'	52°19'42"	19.65'
C16	40.00'	18.22'	S30°57'55"W	18.07'	26°06'18"	9.27'
C17	30.00'	28.16'	S17°07'28"W	27.14'	53°47'12"	15.22'
C18	80.00'	101.87'	S26°42'33"W	95.12'	72°57'21"	59.15'
C19	50.00'	28.10'	S47°05'05"W	27.74'	32°12'17"	14.43'
C20	100.00'	47.24'	S44°30'53"W	46.80'	27°03'54"	24.07'
C21	25.00'	24.83'	S29°35'41"W	23.82'	56°54'19"	13.55'

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

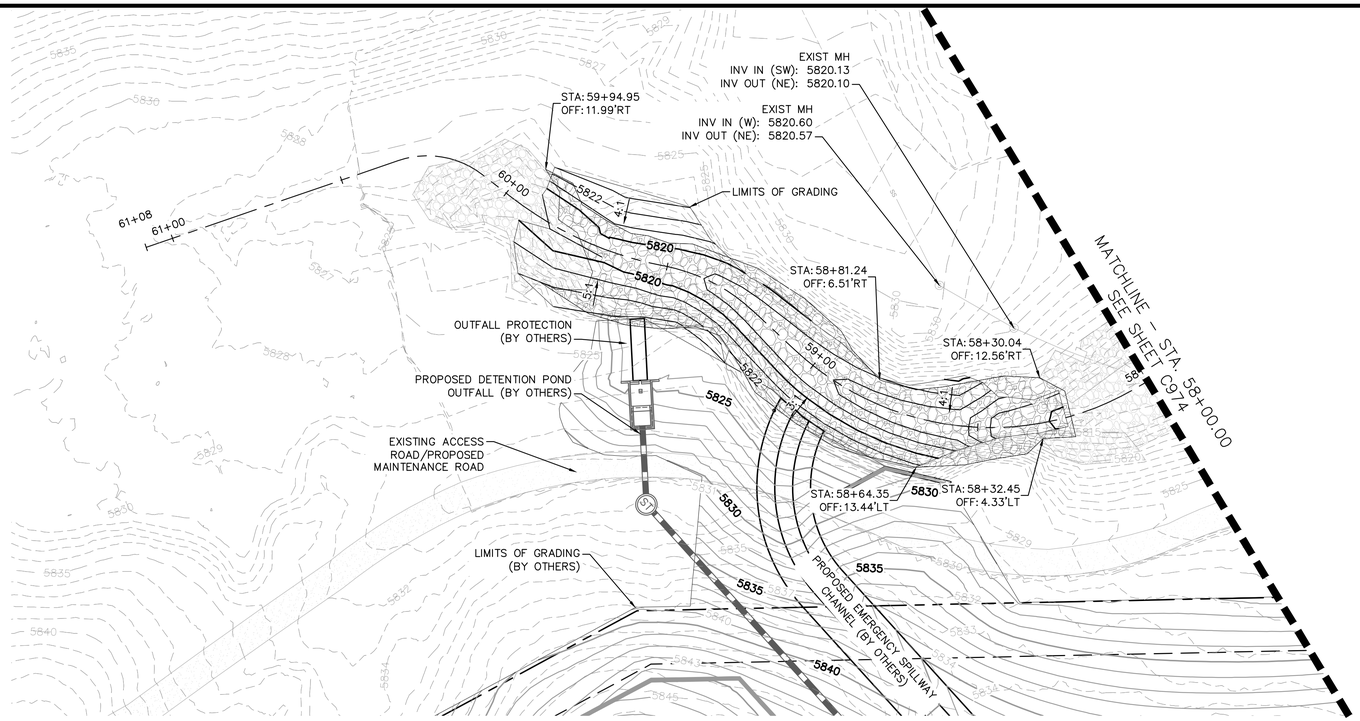
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
EX. CONDITION & SURVEY CONTROL

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

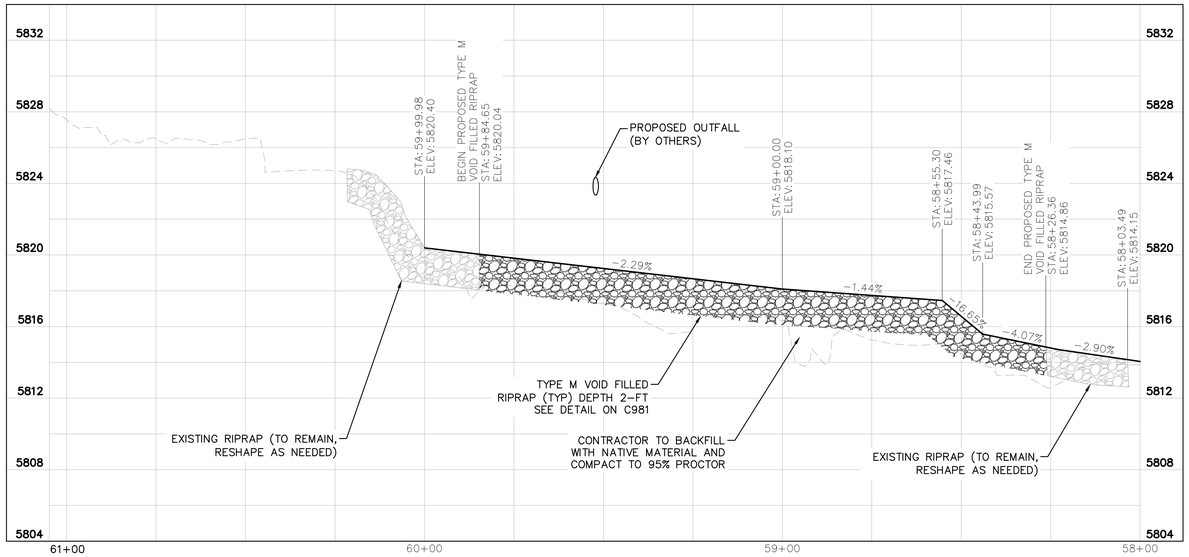
PROJECT NO.
196825001

SHEET
C972

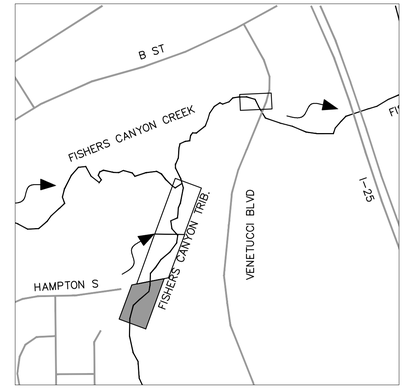
K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_EX_HC.dwg Kummerlen, Kayla 6/26/2025 8:41 AM



TRIBUTARY – PLAN VIEW
STA. 61+05 TO 58+00



TRIBUTARY – PROFILE VIEW
STA. 61+00 TO 58+00



KEY MAP
N.T.S.

NOTES

1. SEE SHEET C980 FOR RIPRAP PLACEMENT DETAILS AND SPECIFICATIONS.
2. SEE SHEET C981 FOR SHEET PILE CUTOFF WALL AND CONCRETE CAP DETAILS.
3. CONTRACTOR SHALL NOT PERFORM WORK WITHIN 10 FEET OF THE EXISTING SANITARY SEWER AND PROTECT THE SANITARY SEWER.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL
0 2 4 8
VERTICAL

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's below. Call before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

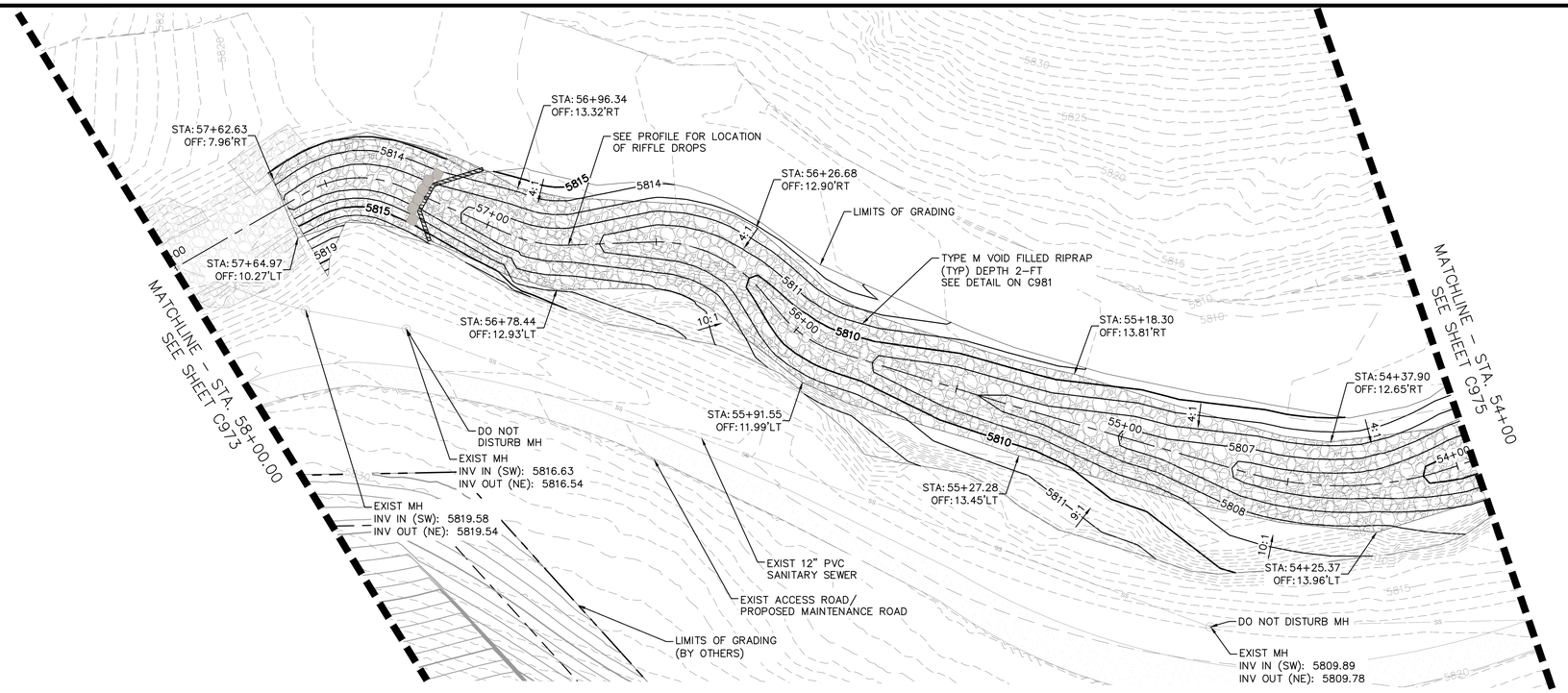
DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
PLAN AND PROFILE

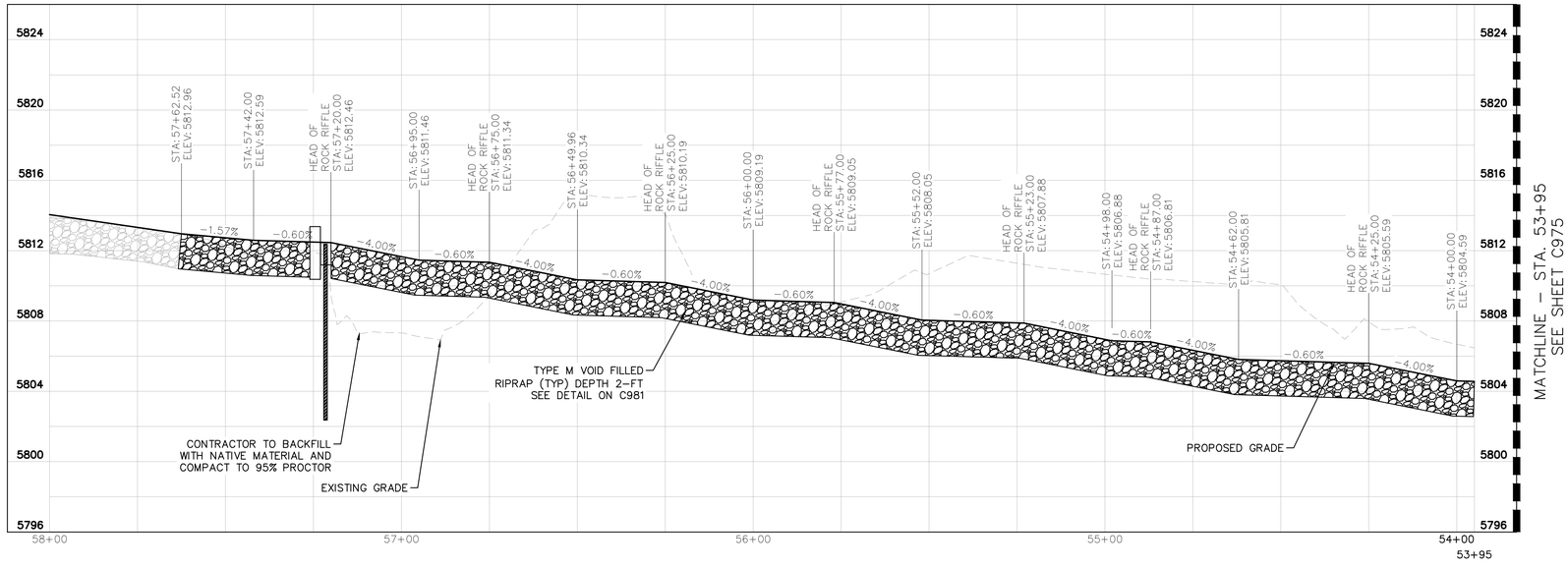
PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

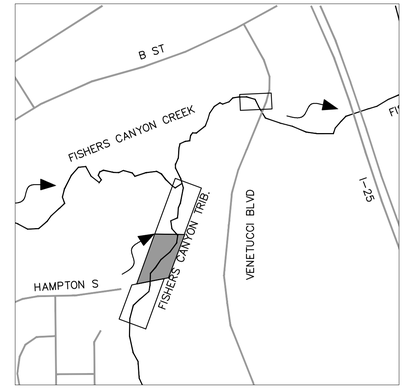
SHEET
C973



TRIBUTARY - PLAN VIEW
STA. 58+00 TO 54+00



TRIBUTARY - PROFILE VIEW
STA. 58+00 TO 54+00



KEY MAP
N.T.S.

NOTES

1. SEE SHEET C980 FOR RIFFLE-POOL DETAILS.
2. SEE SHEET C980 FOR RIPRAP PLACEMENT DETAILS AND SPECIFICATIONS.
3. SEE SHEET C981 FOR SHEET PILE CUTOFF WALL AND CONCRETE CAP DETAILS.
4. CONTRACTOR SHALL NOT PERFORM WORK WITHIN 10 FEET OF THE EXISTING SANITARY SEWER AND PROTECT THE SANITARY SEWER.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL
0 2 4 8
VERTICAL

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's below. Call before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

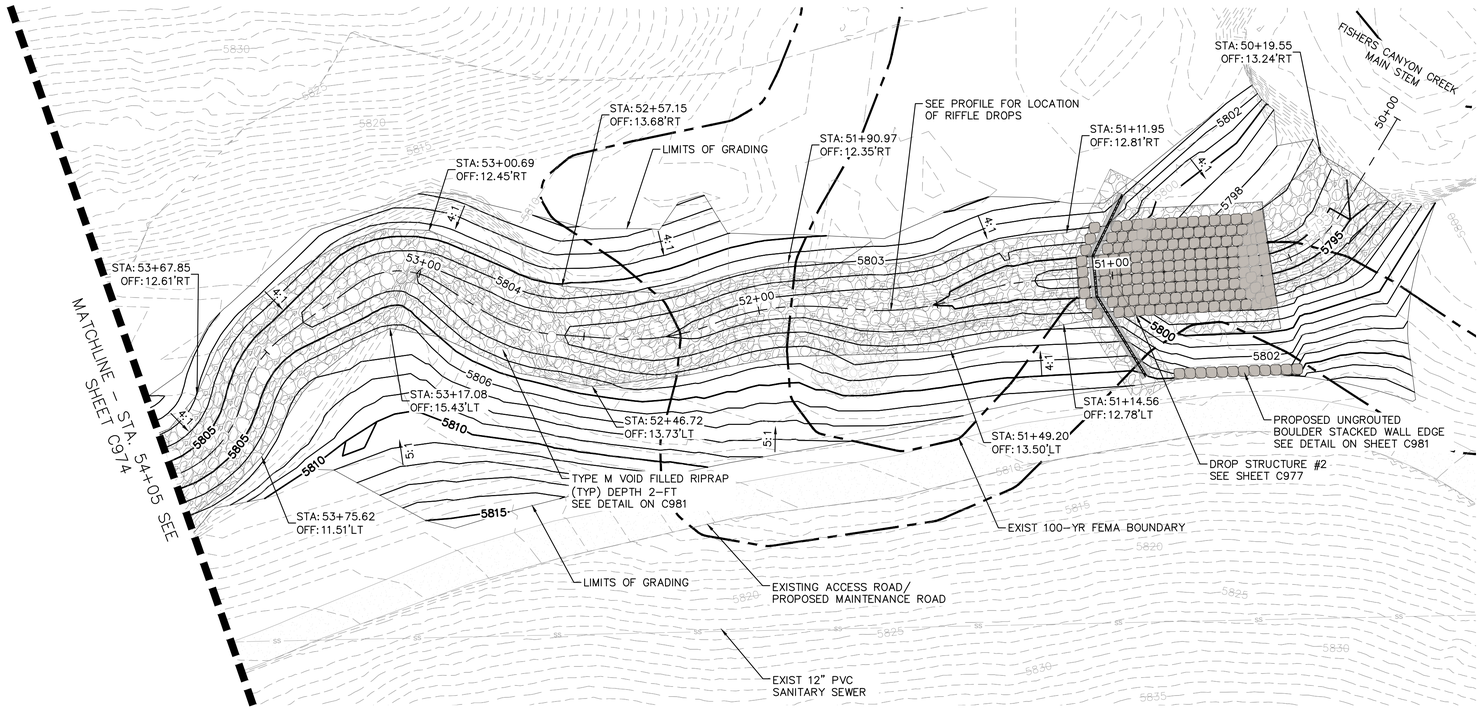
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
PLAN AND PROFILE

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

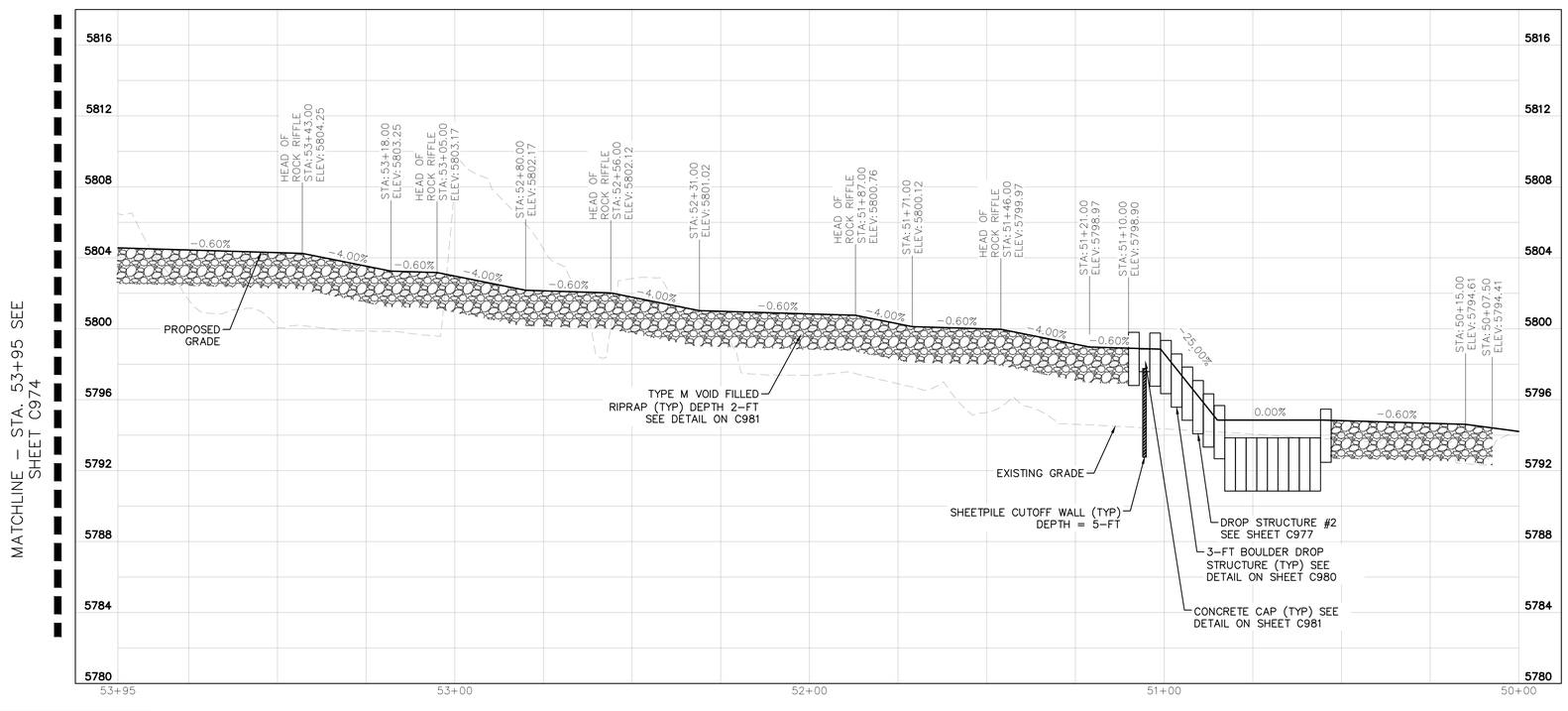
PROJECT NO.
196825001

SHEET
C974

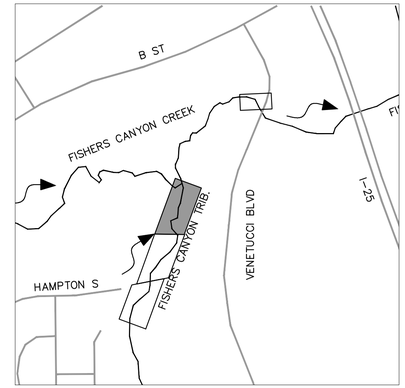
K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_PLAN_PROFILE.dwg Kummerlen, Kayla 6/26/2025 8:43 AM



TRIBUTARY – PLAN VIEW
STA. 54+00 – 50+00



TRIBUTARY – PROFILE VIEW
STA. 54+00 TO 50+00



KEY MAP
N.T.S.

NOTES

1. SEE SHEET C980 FOR RIFFLE–POOL DETAILS.
2. SEE SHEET C980 FOR RIPRAP PLACEMENT DETAILS AND SPECIFICATIONS.
3. SEE SHEET C981 FOR SHEET PILE CUTOFF WALL AND CONCRETE CAP DETAILS.
4. CONTRACTOR SHALL NOT PERFORM WORK WITHIN 10 FEET OF THE EXISTING SANITARY SEWER AND PROTECT THE SANITARY SEWER.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL
0 2 4 8
VERTICAL

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2–BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's below. Call before you dig.

NO.	REVISION	BY:	DATE	APPR.

Kimley»Horn
2025 KIMLEY–HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453–0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
PLAN AND PROFILE

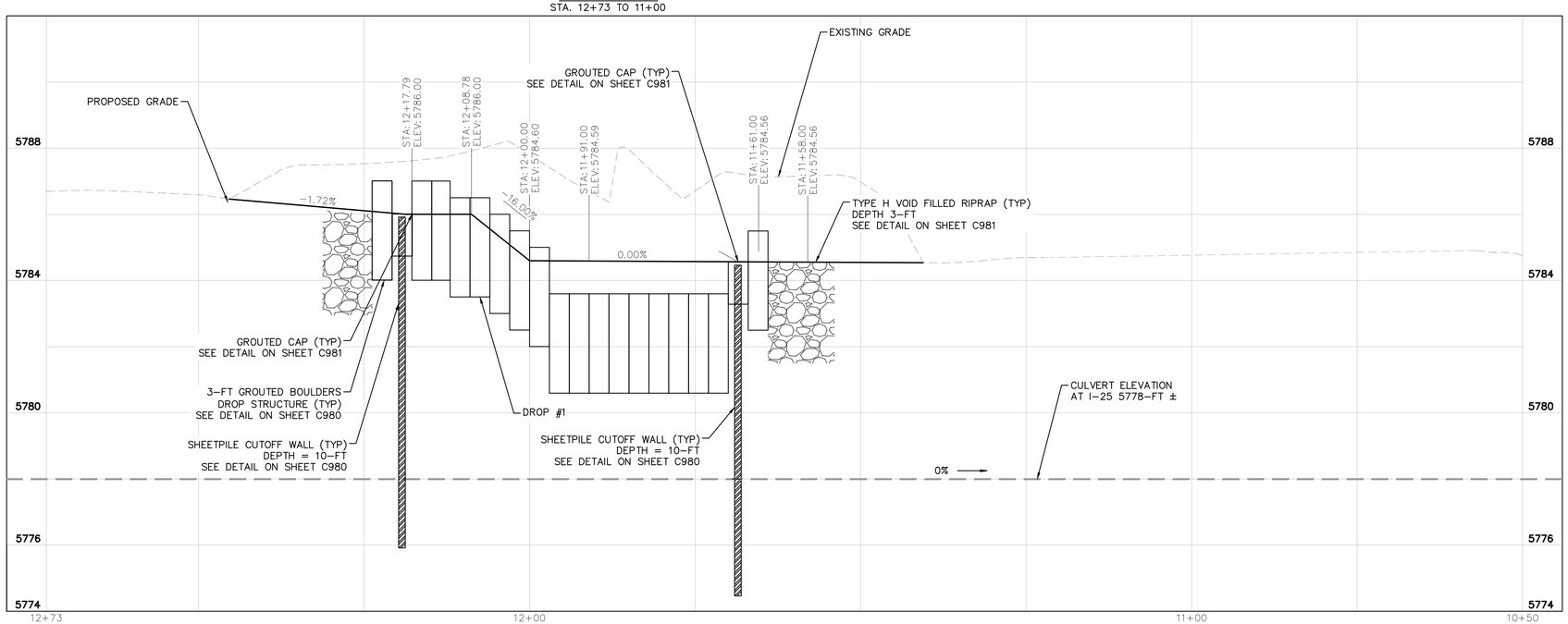
PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

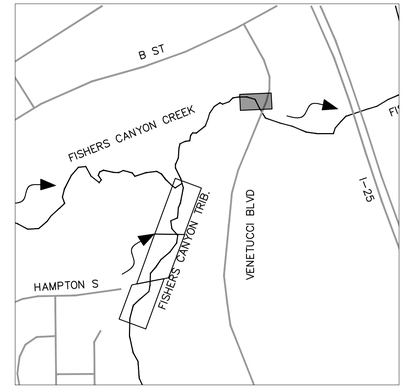
SHEET
C975

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_PLAN_PROFILE.dwg Kummerlen, Kayla 6/26/2025 8:43 AM

MAIN – PLAN VIEW
STA. 12+73 TO 11+00



MAIN – PROFILE VIEW
STA. 12+73 TO 11+10



KEY MAP
N.T.S.

NORTH

NOTES

1. SEE SHEET C980 FOR RIPRAP PLACEMENT DETAILS AND SPECIFICATIONS.
2. SEE SHEET C981 FOR SHEET PILE CUTOFF WALL AND CONCRETE CAP DETAILS.
3. CONTRACTOR SHALL NOT PERFORM WORK WITHIN 10 FEET OF THE EXISTING SANITARY SEWER AND PROTECT THE SANITARY SEWER.

NORTH

GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL
0 2 4 8
VERTICAL

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's below. Call before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

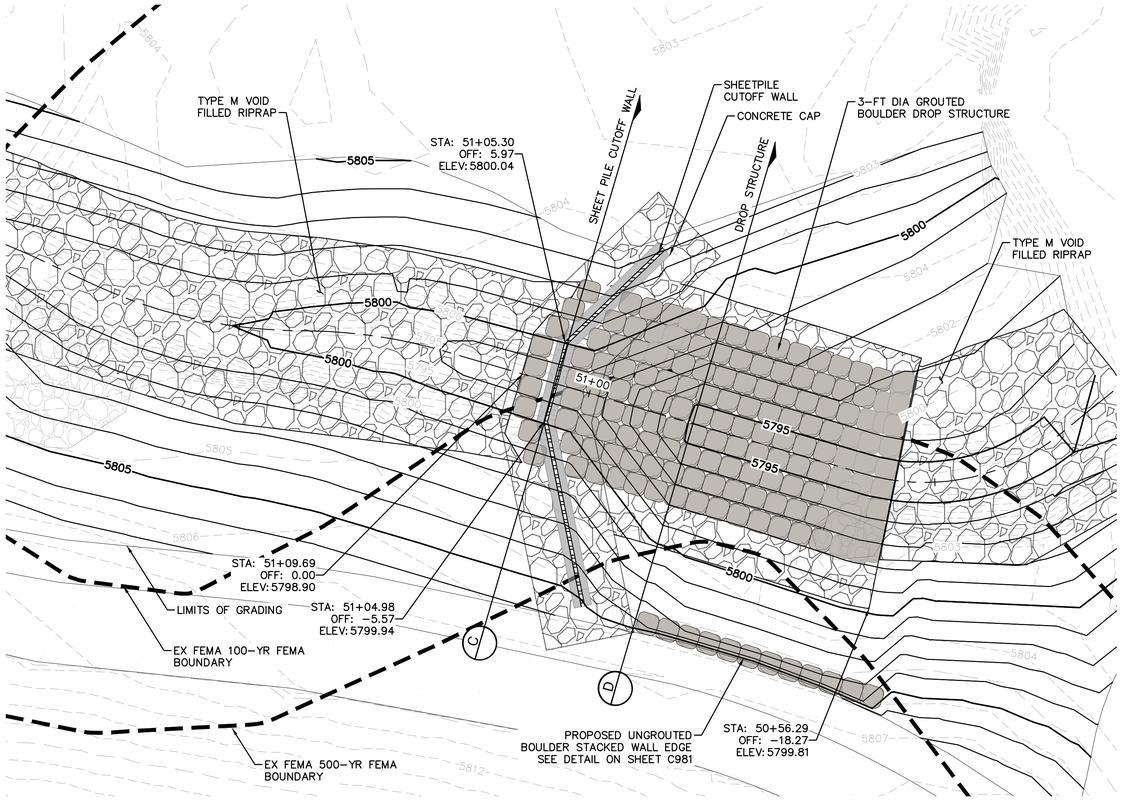
DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

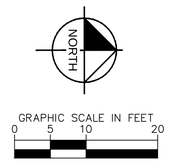
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
PLAN AND PROFILE

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C976

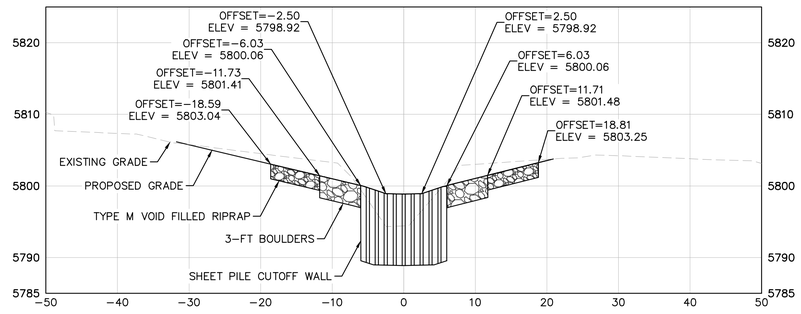




GRAPHIC SCALE IN FEET
0 5 10 20

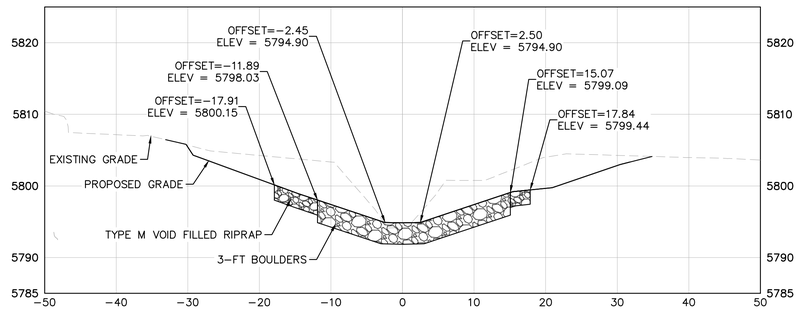
TRIBUTARY DROP STRUCTURE #2

51+05



SECTION C

50+85



SECTION D

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

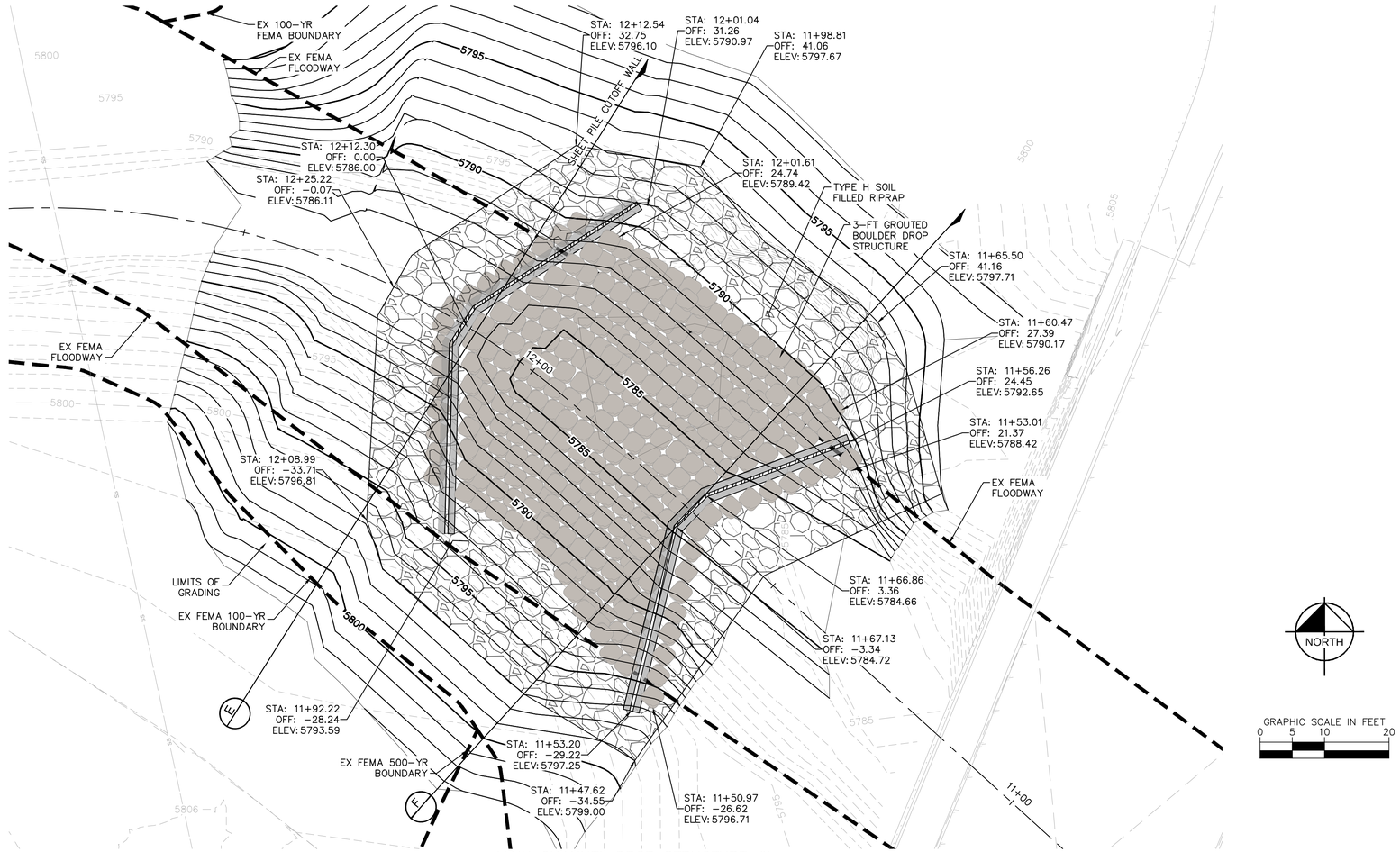
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
ENLARGED DROP STRUCTURE 2

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

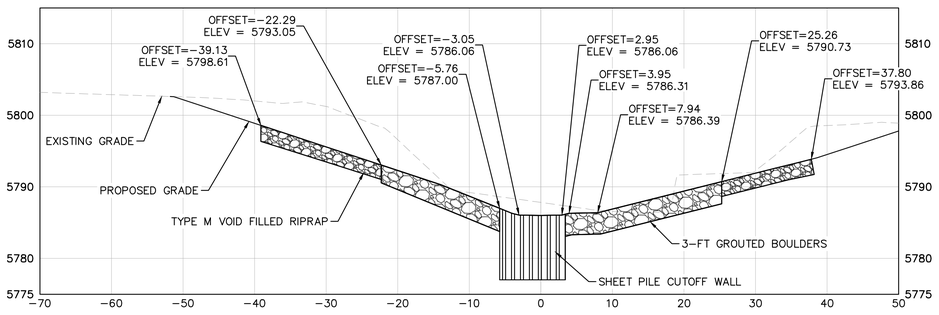
SHEET
C977

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_ENLARGED.dwg Kummerlen, Kayla 6/26/2025 8:44 AM



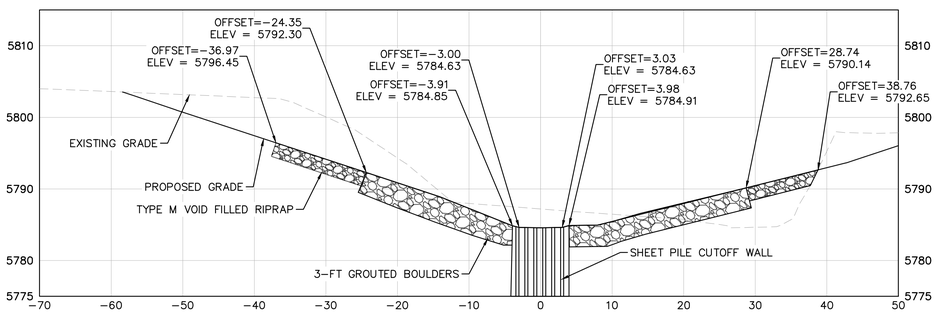
MAIN CHANNEL DROP STRUCTURE #1

12+11



SECTION E

11+67



SECTION F

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

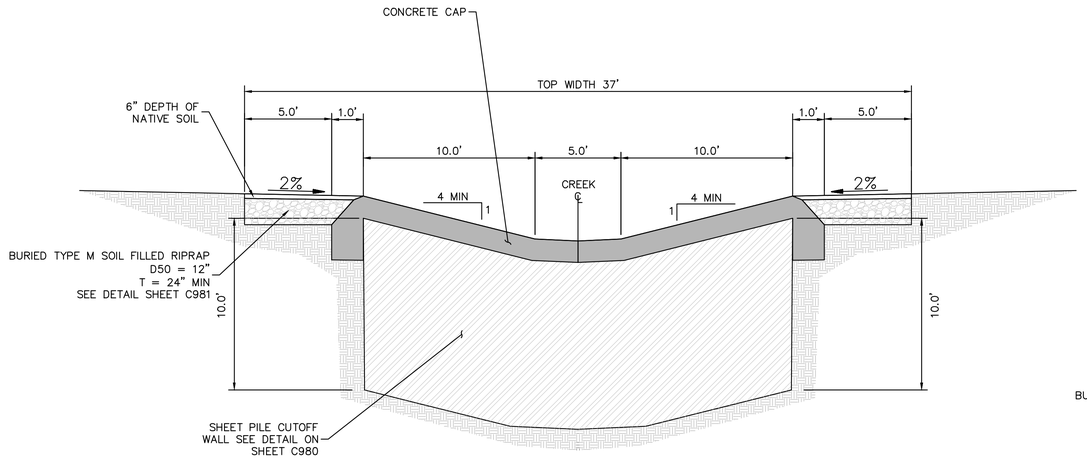
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
ENLARGED DROP STRUCTURE 1

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

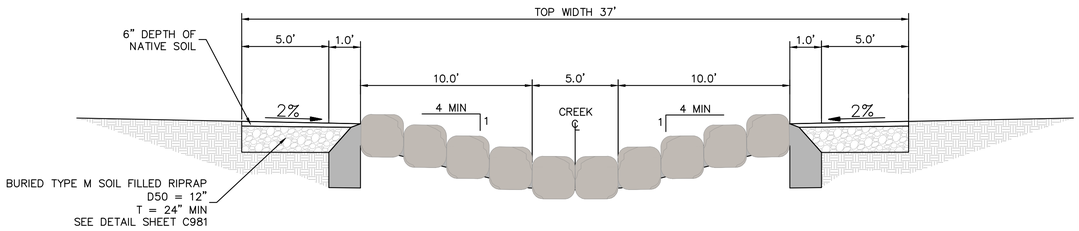
SHEET
C978

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_ENLARGED.dwg Kummerlen, Kayla 6/26/2025 8:44 AM



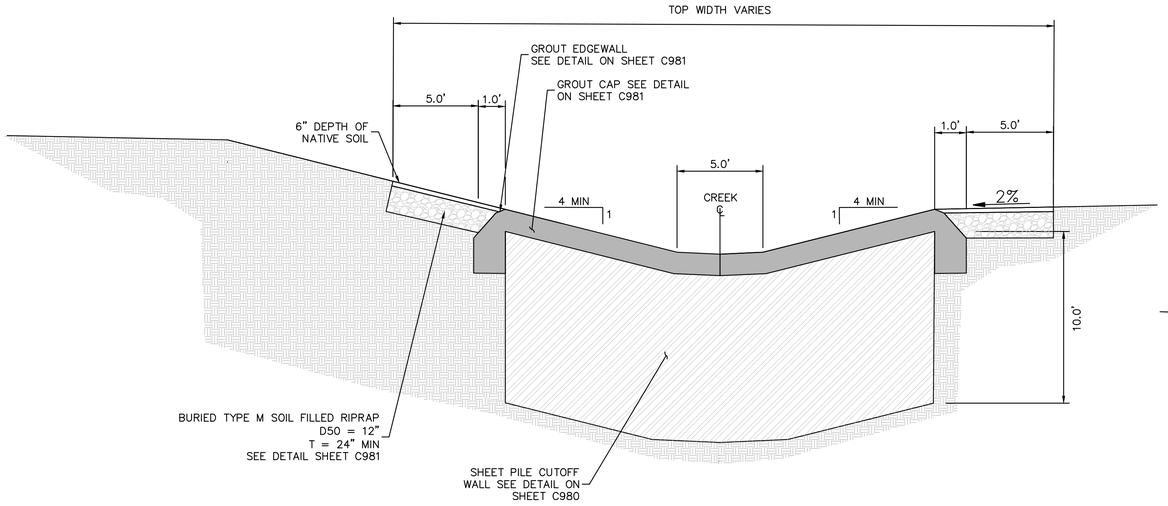
A FISHERS CANYON CREEK TRIBUTARY TYPICAL DROP STRUCTURE - SHEET PILE CUTOFF WALL

NTS



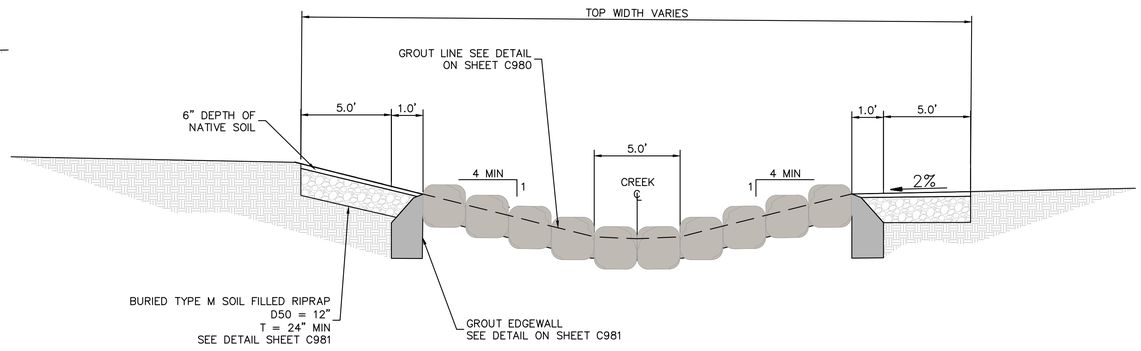
B FISHERS CANYON CREEK TRIBUTARY TYPICAL DROP STRUCTURE- GROUTED BOULDER DROP

NTS



C FISHERS CANYON CREEK TYPICAL DROP STRUCTURE - SHEET PILE CUTOFF WALL

NTS



D FISHERS CANYON CREEK TYPICAL DROP STRUCTURE- GROUTED BOULDER DROP

NTS

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

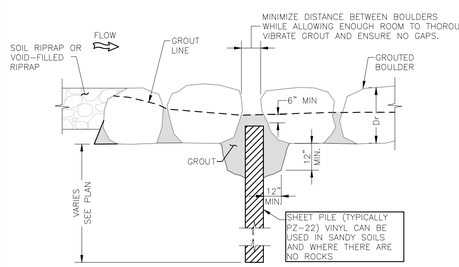
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
TYPICAL SECTIONS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

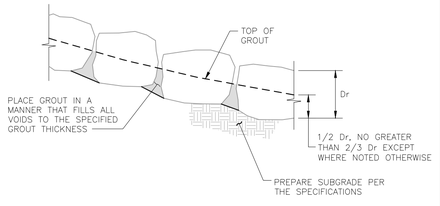
PROJECT NO.
196825001

SHEET
C979

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_DETAILS.dwg Kummerlen, Kayla 6/26/2025 8:45 AM



1 SHEET PILE CONNECTION BETWEEN BOULDERS
NTS

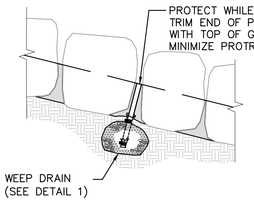


BOULDER PLACEMENT NOTES:
1. PLACE BOULDERS WITH THE REQUIRED BOULDER HEIGHT VERTICAL. PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT. THE SMALL DIMENSION OF A 2X4 CAN BE USED AS A GUIDE TO CHECK MINIMUM SPACING.
2. BEFORE GROUTING, CLEAN ALL DIRT AND MATERIAL FROM ROCK THAT COULD PREVENT THE GROUT FROM BINDING TO THE ROCK. KEEP BOULDERS FROM TOUCHING. AVOID SLIDING BOULDERS AGAINST SUBGRADE TO PROPERLY POSITION.

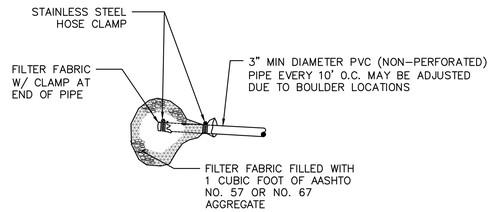
MATERIAL SPECIFICATIONS:
1. ALL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH EQUAL TO 3200 PSI.
2. ONE CUBIC YARD OF GROUT SHALL HAVE A MINIMUM OF SIX (6) SACKS OF TYPE II PORTLAND CEMENT.
3. A MAXIMUM OF 25% TYPE F FLY ASH MAY BE SUBSTITUTED FOR THE PORTLAND CEMENT.
4. THE AGGREGATE SHALL BE COMPRISED OF 70% NATURAL SAND (FINES) AND 30% ⅜-INCH ROCK (COARSE).
5. THE GROUT SLUMP SHALL BE BETWEEN 4-INCHES TO 6-INCHES.
6. AIR ENTRAINMENT SHALL BE BETWEEN 5.5% AND 7.5%.
7. TO CONTROL SHRINKAGE AND CRACKING, 1.5 POUNDS OF FIBERMESH, OR EQUIVALENT, SHALL BE USED PER CUBIC YARD OF GROUT.
8. COLOR ADDITIVE IN REQUIRED AMOUNTS SHALL BE USED WHEN SO SPECIFIED BY CONTRACT.

GROUT PLACEMENT SPECIFICATIONS:
1. SPECIAL PROCEDURES SHALL BE REQUIRED FOR GROUT PLACEMENT WHEN THE AIR TEMPERATURES ARE LESS THAN 40°F OR GREATER THAN 90°F. CONTRACTOR SHALL OBTAIN PRIOR APPROVAL FROM THE DESIGN ENGINEER OF THE PROCEDURES TO BE USED FOR PROTECTING THE GROUT.
2. GROUT SHALL BE DELIVERED BY MEANS OF A LOW PRESSURE (LESS THAN 10 PSI) GROUT PUMP USING A 2-INCH DIAMETER (MAXIMUM) NOZZLE.
3. FULL DEPTH PENETRATION OF THE GROUT INTO THE BOULDER VOIDS SHALL BE ACHIEVED BY INJECTING GROUT STARTING WITH THE NOZZLE NEAR THE BOTTOM AND RAISING IT AS THE GROUT FILLS, WHILE VIBRATING GROUT INTO PLACE USING A PENCIL VIBRATOR.
4. ALL GROUT BETWEEN BOULDERS SHALL BE TREATED WITH A BROOM FINISH.
5. AFTER GROUT PLACEMENT, EXPOSED BOULDER FACES SHALL BE CLEANED AND FREE OF GROUT.
6. ALL FINISHED GROUT SURFACES SHALL BE SPRAYED WITH A CLEAR LIQUID MEMBRANE CURING COMPOUND AS SPECIFIED IN ASTM C309.

2 GROUTED BOULDER PLACEMENT DETAIL
NTS

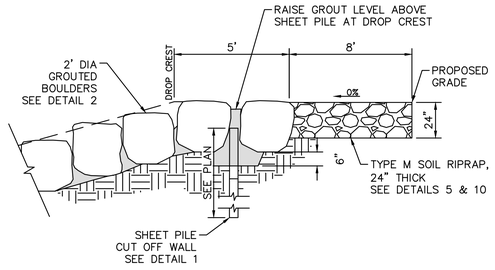


GROUTED BOULDERS

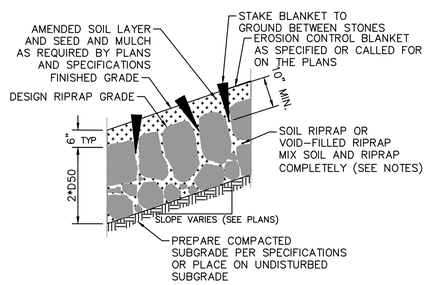


NOTE: INSTALL WEEP DRAINS FOR DROPS AND WALLS 5' AND GREATER AT 10' O.C. AT ELEVATIONS AND LOCATIONS SHOWN ON THE DRAWINGS

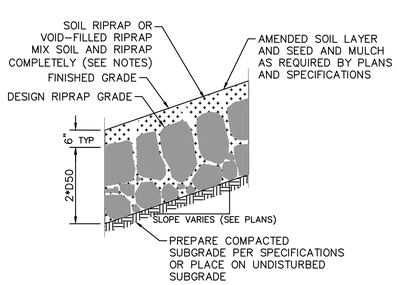
3 WEEP DRAIN DETAIL
NTS



4 TYPICAL SHEET PILE CUT OFF WALL
NTS



EROSION CONTROL BLANKET SECTION



MULCH SECTION

NOTES:
1. SOIL RIPRAP DETAILS ARE APPLICABLE TO SLOPED AREAS. REFER TO THE SITE PLAN ACTUAL LOCATION AND LIMITS.
2. MIX UNIFORMLY 65% RIPRAP BY VOLUME WITH 35% OF APPROVED SOIL BY VOLUME PRIOR TO PLACEMENT.
3. PLACE STONE-SOIL MIX TO RESULT IN SECURELY INTERLOCKED ROCK AT THE DESIGN THICKNESS AND GRADE. COMPACT AND LEVEL TO ELIMINATE ALL VOIDS AND ROCKS PROJECTING ABOVE DESIGN RIPRAP TOP GRADE.
4. CRIMP OR TACKIFY MULCH OR USE APPROVED HYDROMULCH AS CALLED FOR IN THE PLANS AND SPECIFICATIONS.
5. FOR TOE PROTECTION SEE DETAIL 10 ON THIS SHEET.

5 SOIL RIPRAP AND VOID-FILLED RIPRAP
NTS

TYPE M VOID-FILLED RIPRAP MIX DESCRIPTION

APPROXIMATE PROPORTIONS (LOADER BUCKETS)	MATERIAL TYPE	MATERIAL DESCRIPTION
5	RIPRAP	TYPE M RIPRAP (D50= 12 INCHES)
1	RIPRAP	TYPE L RIPRAP (D50= 9 INCHES)
3	VOID-FILLED MATERIAL	7-INCH MINUS CRUSHED ROCK SURGE (100% PASSING 7-INCH SIEVE, 80-100% PASSING 6-INCH SIEVE, 35-50% PASSING 3-INCH SIEVE, 10-20% PASSING 1.5-INCH SIEVE)
1	VOID-FILLED MATERIAL	2 TO 4-INCH COBBLE (ROUND WASHED RIVER ROCK THAT IS WELL-GRADED, 100% PASSING 6-INCH SIEVE, 35-50% PASSING 3-INCH SIEVE, 5-20% PASSING 2-INCH SIEVE)
1	VOID-FILLED MATERIAL	4-INCH MINUS PIT RUN SURGE (ROUND RIVER ROCK AND SAND, WELL GRADED, 90-100% PASSING 4-INCH SIEVE, 70-80% PASSING 1.5-INCH SIEVE, 40-60% PASSING 3/8-INCH SIEVE, 10-30% PASSING #16 SIEVE).
1.5	VOID-FILLED MATERIAL	TYPE II BEDDING
0.5	VOID-FILLED MATERIAL	NATIVE TOPSOIL
TOP LAYER	TOP DRESSING	ADDITIONAL 4 TO 12-INCH COBBLES (ROUND WASHED RIVER ROCK THAT IS WELL GRADED, 80-100% PASSING 12-INCH SIEVE, 35-50% PASSING 6-INCH SIEVE, 5-20% PASSING 4-INCH SIEVE) SHALL BE MIXED IN ON THE SURFACE OF THE VOID-FILLED RIPRAP (COVERING APPROXIMATELY 30% OF THE SURFACE) PRIOR TO COMPACTION OF THE VOID-FILLED RIPRAP. COBBLES SHALL BE FULLY EMBEDDED INTO THE MASS OF THE VOID-FILLED RIPRAP
NOTE: MIX PROPORTIONS ARE APPROXIMATE AND SUBJECT TO FIELD ADJUSTMENT BY THE ENGINEER OR OWNER		

6 VOID-FILLED RIPRAP MIX NOTES
NTS

VOID-FILLED RIPRAP REPLACEMENT NOTES:
1. LABORATORY TEST CERTIFICATES AND GRADATIONS FOR ALL MATERIALS INCLUDED IN THE VOID-FILLED RIPRAP MIX SHALL BE SUBMITTED FOR REVIEW. FOR THE 7-INCH MINUS CRUSHED SURGE AND THE 4-INCH MINUS PIT RUN SURGE MATERIALS, PROVIDE SAMPLES IN 5-GALLON BUCKETS FOR REVIEW.

2. THE GOAL OF MIXING IS TO FILL THE VOIDS OF THE BASE RIPRAP MATERIAL WITHOUT DISPLACING THE RIPRAP. THE INTERLOCKING NATURE OF RIPRAP IN THE MIXED MATERIAL NEEDS TO REMAIN ESSENTIALLY THE SAME AS IF THE RIPRAP WAS PLACED WITHOUT VOID-FILLED MATERIAL.

3. THE SPECIFIED MIX PROPORTIONS ARE NOTED AS APPROXIMATE BECAUSE THE TWO SURGE MATERIALS VARY SOMEWHAT BETWEEN DIFFERENT SUPPLIERS AND VARIATIONS IN GRAVEL PITS. THE SURGE MATERIALS ARE ONLY PROCESSED THROUGH ONE SCREEN SIZE (7-INCH MINUS OR 4-INCH MINUS), SO THE GRADATIONS VARY. IT IS IMPORTANT THAT THE DESIGN ENGINEER IS ON-SITE DURING THE MIXING OPERATION TO MAKE ADJUSTMENTS TO THE PROPORTIONS IF NECESSARY. THE AMOUNT OF COBBLES IN THE 4-INCH MINUS PIT RUN SURGE MATERIAL DICTATES THE ADDITION OR REDUCTION IN THE AMOUNT OF 2 TO 4-INCH COBBLE MATERIAL.

4. VOID-FILLED RIPRAP MATERIAL CAN BE CHALLENGING TO PLACE BECAUSE IT HAS A TENDENCY TO SEGREGATE. THE FINER SANDS AND GRAVELS TEND TO SEPARATE FROM THE LARGER RIPRAP. CONTRACTORS SHALL TAKE CARE TO MINIMIZE SEGREGATION WHEN HAULING THE MIXED MATERIAL FROM STOCKPILE TO THE INSTALLATION LOCATION.

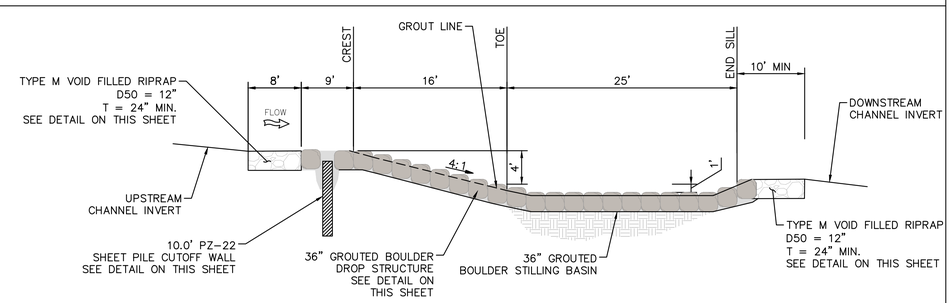
5. THE LOOSE MATERIAL IS TO BE PLACED IN A SINGLE LIFT OR SUFFICIENT HEIGHT SUCH THAT FINAL GRADE WILL BE ACHIEVED UPON COMPACTION. IN MOST CASES, SOME ADDITIONAL MIXING WITH A TRACK EXCAVATOR IS NEEDED AFTER THE INITIAL PLACEMENT TO MAKE SURE THAT VOID-FILLED RIPRAP CONSISTS PRIMARILY OF THE SMALLER VOID-FILL MATERIALS. THE GOAL IS TO COMPLETELY FILL THE RIPRAP VOIDS WITHOUT DISPLACING THE RIPRAP. IN SOME CASES, ADDITIONAL VOID-FILLING MAY BE NECESSARY AFTER THE VOID-FILLED RIPRAP HAS BEEN PLACED BECAUSE THE FINES HAVE A TENDENCY TO MIGRATE TO THE BOTTOM. IN THESE SITUATIONS, A 50:50 MIXTURE OF THE PIT RUN AND TYPE II BEDDING CAN BE SPRINKLED ON THE SURFACE AND WASHED IN WITH WATER USING A HIGH PRESSURE HOSE TO FILL ANY SMALL VOIDS THAT MAY EXIST BELOW THE SURFACE. OTHER THAN FILLING VOIDS THAT MAY EXTEND DOWN INTO THE VOID-FILLED RIPRAP, NOT MUCH OF THIS MATERIAL SHOULD BE LEFT ON THE SURFACE, AS IT WILL WASH AWAY DURING RUNOFF EVENTS.

6. AFTER THE VOID-FILLED RIPRAP MATERIAL HAS BEEN LOOSELY PLACED (PRIOR TO COMPACTION), A TOP DRESSING OF THE LARGE COBBLES CAN BE MIXED IN ON THE SURFACE FOR A MORE NATURAL RIVER BED LOOK, IF DESIRED. THIS IS USUALLY DONE BY SPRINKLING COBBLES SUCH THAT THEY COVER APPROXIMATELY 30-PERCENT OF THE SURFACE.

7. THE LAST STEP IS TO COMPACT THE LOOSELY PLACED VOID-FILLED RIPRAP MATERIAL. WATER CAN BE ADDED, IF NECESSARY, SO THAT THE MOISTURE CONTENT OF THE MIXTURE IS AT OPTIMUM CONDITIONS DURING THE COMPACTION PROCESS.

8. IT IS IMPORTANT THAT THE FINISHED TOP ELEVATIONS OF THE VOID-FILLED RIPRAP LAYER CLOSELY MATCH DESIGN GRADES TO WITHIN A TOLERANCE OF 0.10 FEET. HAVING TIGHT ELEVATION TOLERANCES HELPS TO MINIMIZE DEVELOPMENT OF FLOW CONCENTRATIONS. IF THE COMPACTED MATERIAL ENDS UP BELOW FINAL GRADE, IT IS NOT ACCEPTABLE TO ALLOW PLACEMENT OF ONLY THE SMALLER VOID-FILLED MATERIAL OR ADDITIONAL TOP DRESSING COBBLES TO ACHIEVE FINAL GRADE. IN SUCH CASES IT IS NECESSARY TO ADD MORE STANDARD SIZE VOID-FILLED RIPRAP MATERIAL AND REMIX THE ENTIRE THICKNESS OF ROCK TO ACHIEVE THE DESIGN SECTION. CONTRACTOR SHALL INSTALL A TEST SECTION OF THE VOID-FILLED RIPRAP MATERIAL AT THE BEGINNING OF THE PROJECT FOR REVIEW AND APPROVAL BY THE DESIGN ENGINEER.

7 VOID-FILLED RIPRAP PLACEMENT NOTES



8 GROUTED BOULDER DROP WITH DEPRESSED STILLING BASIN - PROFILE VIEW
NTS

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's below. Call before you dig.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

NO.	REVISION	BY:	DATE	APPR.

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

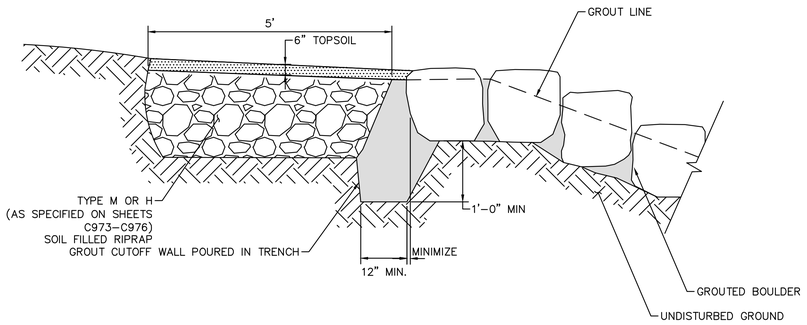
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
CHANNEL DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

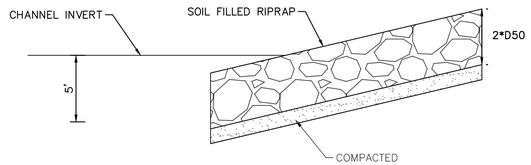
SHEET
C980

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_DETAILS.dwg Kummerlen, Kayla 6/26/2025 8:45 AM



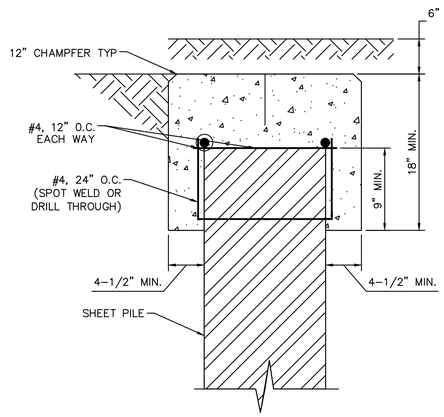
9 STRUCTURE EDGE WALL DETAIL (GSB)

NTS



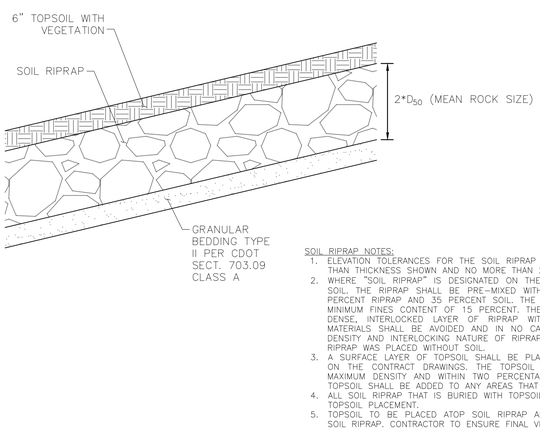
10 TOE-IN CHANNEL DETAIL

NTS



11 CONCRETE SHEET PILE CAP DETAIL

NTS



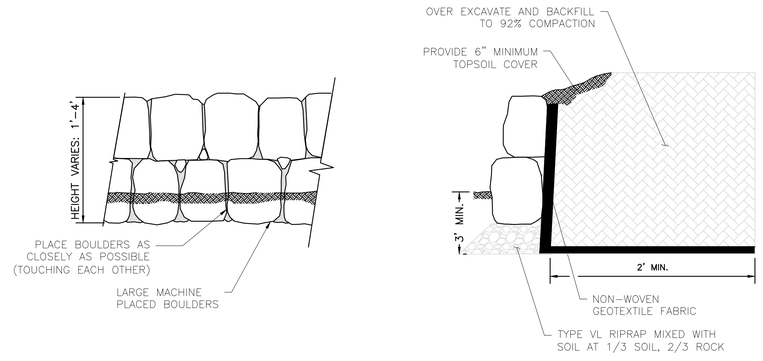
GRADATION FOR GRANULAR BEDDING	
U.S. STANDARD SIEVE SIZE	TYPE II CDOT SECT. 703.09 CLASS A
3 INCHES	90 – 100
1½ INCHES	–
¾ INCHES	20 – 90
⅜ INCHES	–
#4	0 – 20
#16	–
#50	–
#100	–
#200	0 – 3

SOIL RIPRAP NOTES:

1. ELEVATION TOLERANCES FOR THE SOIL RIPRAP SHALL BE 0.10 FEET. THICKNESS OF SOIL RIPRAP SHALL BE NO LESS THAN THICKNESS SHOWN AND NO MORE THAN 2–INCHES GREATER THAN THE THICKNESS SHOWN.
2. WHERE "SOIL RIPRAP" IS DESIGNATED ON THE CONTRACT DRAWINGS, RIPRAP VOIDS ARE TO BE FILLED WITH NATIVE SOIL. THE RIPRAP SHALL BE PRE–MIXED WITH THE NATIVE SOIL AT THE FOLLOWING PROPORTIONS BY VOLUME: 65 PERCENT RIPRAP AND 35 PERCENT SOIL. THE SOIL USED FOR MIXING SHALL BE NATIVE TOPSOIL AND SHALL HAVE A MINIMUM FINES CONTENT OF 15 PERCENT. THE SOIL RIPRAP SHALL BE INSTALLED IN A MANNER THAT RESULTS IN A DENSE, INTERLOCKED LAYER OF RIPRAP WITH RIPRAP VOIDS FILLED COMPLETELY WITH SOIL. SEGREGATION OF MATERIALS SHALL BE AVOIDED AND IN NO CASE SHALL THE COMBINED MATERIAL CONSIST PRIMARILY OF SOIL; THE DENSITY AND INTERLOCKING NATURE OF RIPRAP IN THE MIXED MATERIAL SHALL ESSENTIALLY BE THE SAME AS IF THE RIPRAP WAS PLACED WITHOUT SOIL.
3. A SURFACE LAYER OF TOPSOIL SHALL BE PLACED OVER THE SOIL RIPRAP ACCORDING TO THE THICKNESS SPECIFIED ON THE CONTRACT DRAWINGS. THE TOPSOIL SURFACE LAYER SHALL BE COMPACTED TO APPROXIMATELY 85% OF MAXIMUM DENSITY AND WITHIN TWO PERCENTAGE POINTS OF OPTIMUM MOISTURE IN ACCORDANCE WITH ASTM D698. TOPSOIL SHALL BE ADDED TO ANY AREAS THAT SETTLE.
4. ALL SOIL RIPRAP THAT IS BURIED WITH TOPSOIL SHALL BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO ANY TOPSOIL PLACEMENT.
5. TOPSOIL TO BE PLACED ATOP SOIL RIPRAP AND CONTRACTOR TO ENSURE PERMANENT SEEDING IS APPLIED TO ALL SOIL RIPRAP. CONTRACTOR TO ENSURE FINAL VEGETATION STANDARDS ARE MET PER EL PASO COUNTY REQUIREMENTS.
6. RIPRAP SHALL BE PLACED SO THAT TOP OF RIPRAP IS FLUSH WITH PROPOSED OR EXISTING GRADE.
7. AT THE UPSTREAM AND DOWNSTREAM TERMINATION OF RIPRAP LINING, THE THICKNESS SHALL BE INCREASED 50% FOR AT LEAST 3 LINEAR FEET TO PREVENT UNDERCUTTING.
8. THE PLACEMENT OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEIVING CHANNEL SHALL NOT BE ALLOWED.

12 SOIL FILLED RIPRAP DETAIL

NTS



15 BOULDER STACKED WALL EDGE

NTS

RIP RAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WIEGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D50* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18
*D50 = MEAN ROCK SIZE			

13 RIPRAP SIZING DETAIL

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2–BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's below. Call before you dig.

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_DETAILS.dwg Kummerlen, Kayla 6/26/2025 8:45 AM

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY–HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453–0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
CHANNEL DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C981

EPC STANDARD GEC PLAN NOTES

1. STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCES SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF-SITE WATERS, INCLUDING WETLANDS.
2. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGNS AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO HE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
3. A SEPARATE STORMWATER MANAGEMENT PLAN (SMWP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. MANAGEMENT OF THE SWMP DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QUALIFIED STORMWATER MANAGER OR CERTIFIED EROSION CONTROL INSPECTOR. THE SWMP SHALL BE LOCATED ON SITE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
4. ONCE THE ESQCP IS APPROVED AND A "NOTICE TO PROCEED" HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON THE APPROVAL GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY STAFF.
5. CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND DISTURBED LAND AREAS SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF THE DISTURBANCE.
6. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.
7. TEMPORARY STABILIZATION SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.
8. FINAL STABILIZATION MUST BE IMPLEMENTED AT ALL APPLICABLE CONSTRUCTION SITES. FINAL STABILIZATION IS ACHIEVED WHEN ALL GROUND DISTURBING ACTIVITIES ARE COMPLETE AND ALL DISTURBED AREAS EITHER HAVE A UNIFORM VEGETATIVE COVER WITH INDIVIDUAL PLANT DENSITY OF 70 PERCENT OF PRE-DISTURBANCE LEVELS ESTABLISHED OR EQUIVALENT PERMANENT ALTERNATIVE STABILIZATION METHOD IS IMPLEMENTED. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED UPON FINAL STABILIZATION AND BEFORE PERMIT CLOSURE.
9. ALL PERMANENT STORMWATER MANAGEMENT FACILITIES SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT EFFECT THE DESIGN OR FUNCTION OF PERMANENT STORMWATER MANAGEMENT STRUCTURES MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.
10. EARTH DISTURBANCES SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY MINIMIZE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME. PRE-EXISTING VEGETATION SHALL BE PROTECTED AND MAINTAINED WITHIN 50 HORIZONTAL FEET OF A WATERS OF THE STATE UNLESS SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED.
11. COMPACTION OF SOIL MUST BE PREVENTED IN AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES OR WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATIVE COVER. AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF COMPACTION PREVENTION IS NOT FEASIBLE DUE TO SITE CONSTRAINTS, ALL AREAS DESIGNATED FOR INFILTRATION AND VEGETATION CONTROL MEASURES MUST BE LOOSENED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).
12. ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE A STABILIZED CONVEYANCE DESIGNED TO MINIMIZE EROSION AND THE DISCHARGE OF SEDIMENT OFF SITE.
13. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.
14. DURING DEWATERING OPERATIONS OF UNCONTAMINATED GROUND WATER MAY BE DISCHARGED ON SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE.
15. EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
17. WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
18. TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
19. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
20. THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
21. NO CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED ONSITE UNLESS PERMISSION FOR THE USE OF SUCH CHEMICAL(S) IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING APPROVAL FOR THE USE OF SUCH CHEMICAL(S), SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
22. BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OF 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ONSITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.
23. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.
24. OWNER/DEVELOPER AND THEIR AGENTS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS OF THE LAND DEVELOPMENT CODE, DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
25. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.
26. PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
27. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND SHALL BE UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
28. THE PRELIMINARY GEOTECHNICAL EXPLORATION REPORT FOR THIS SITE HAS BEEN PREPARED BY PROFESSIONAL SERVICE INDUSTRIES, INC. AND SHALL BE CONSIDERED A PART OF THESE PLANS.
29. AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE (1) ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
WATER QUALITY CONTROL DIVISION
WQCD - PERMITS
4300 CHERRY CREEK DRIVE SOUTH
DENVER, CO 80246-1530
ATTN: PERMITS UNIT

CHANNEL IMPROVEMENTS LEGEND

SYMBOL OR LINETYPE	DESCRIPTION
XXXX	PROPOSED CHANNEL MAJOR CONTOUR
XXXX	PROPOSED CHANNEL MINOR CONTOUR
XXXX	PROPOSED SITE MAJOR CONTOUR
XXXX	PROPOSED SITE MINOR CONTOUR
10+00	PROPOSED STREAM CENTERLINE ALIGNMENT
	PROPOSED RIPRAP
	PROPOSED GROUTED BOULDER DROP STRUCTURE
	PROPOSED SHEETPILE CUTOFF WALL
LDA	PROPOSED LIMIT OF CHANNEL DISTURBANCE
	PROPOSED RIPARIAN SEED MIX
	PROPOSED UPLAND SEED MIX

EXISTING SURVEY LEGEND:

SYMBOL OR LINETYPE	DESCRIPTION
XXXX	EXISTING MAJOR CONTOUR
XXXX	EXISTING MINOR CONTOUR
	PROPERTY LINE
G	GAS LINE
W	WATER LINE
OH	OVERHEAD POWER
ST	STORM LINE
E	UNDERGROUND POWER LINE
SS	SANITARY LINE
FO	COMMUNICATION LINE, FIBER OPTIC
T	COMMUNICATION LINE, TELEPHONE
	CURB AND GUTTER
	TREE/SHRUB
	SIGN
TS	TRAFFIC SIGNAL
GV	GAS VALVE
	LIGHT POLE
	POWER POLE
	GUY WIRE
	WATER VALVE
	FIRE HYDRANT
	EXISTING 100-YEAR FEMA BOUNDARY

ABBREVIATIONS

AC	ASPHALT CONCRETE
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS
APPROX	APPROXIMATE OR APPROXIMATELY
BP OR BOP	BEGINNING OF PROJECT
BCR	BEGIN CURB RADIUS
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
℄	CENTERLINE
CLR	CLEARANCE
CONC	CONCRETE
DWG	DRAWING
DR	DRIVE
EA	EACH
EP OR EOP	END OF PROJECT
ECR	END CURB RADIUS
ELEV OR EL	ELEVATION
ESMT	EASEMENT
EW	EACH WAY
EX	EXISTING
FES	FLARED END SECTION
FL	FLOWLINE
FT	FOOT/FEET
HMA	HOT MIX ASPHALT
HCL	HORIZONTAL CONTROL LINE
K	VERTICAL CURVE RATIO
LT	LEFT
ME	MATCH EXISTING
MAX	MAXIMUM
MIN	MINIMUM

LEGEND NOTES:

1. THIS IS A STANDARD DRAWING SHOWING COMMON SYMBOLOGY. ALL SYMBOLS ARE NOT NECESSARILY USED ON THIS PROJECT.
2. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH DRAWING FOR USAGE.
3. THESE ABBREVIATIONS APPLY TO THE ENTIRE SET OF CONTRACT DRAWINGS.
4. LISTING OF ABBREVIATIONS DOES NOT IMPLY THAT ALL ABBREVIATIONS ARE USED IN THE CONTRACT DRAWINGS.
5. ABBREVIATIONS SHOWN ON THIS SHEET INCLUDE VARIATIONS OF A WORD. FOR EXAMPLE, "MOD" MAY MEAN MODIFY OR MODIFICATION; "INC" MAY MEAN INCLUDED OR INCLUDING AND "REINF" MAY MEAN EITHER REINFORCE OR REINFORCING.

MISC. ABBREVIATIONS

@	AT
ø	PHASE, DIAMETER
&	AND
'	FEET, MINUTES
"	INCHES, SECONDS
°	DEGREE
#	NUMBER
℄	CENTERLINE

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

Kimley»Horn
2024 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

NO.	REVISION	BY	DATE	APPR.

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

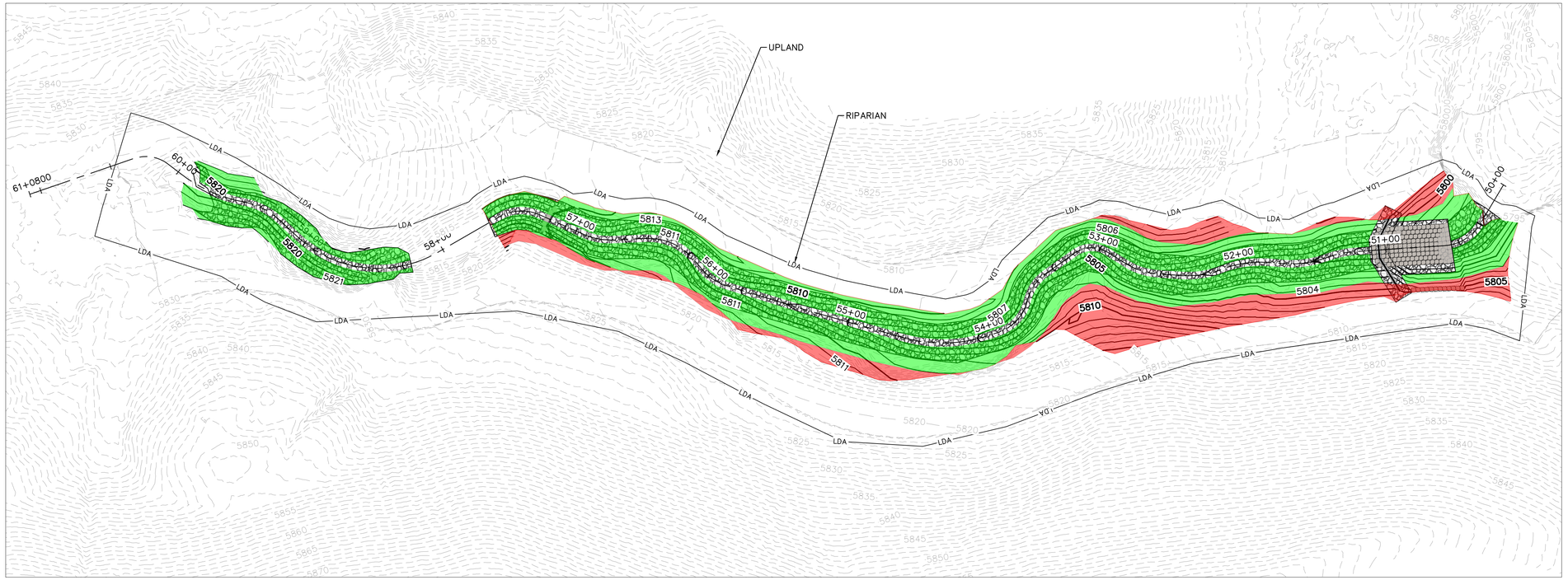
FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
GENERAL NOTES

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

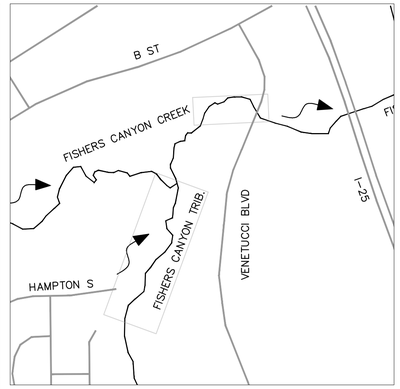
PROJECT NO.
196825001

SHEET
C982

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_CV.dwg, 6/26/2025 8:45 AM



TRIBUTARY – PLAN VIEW

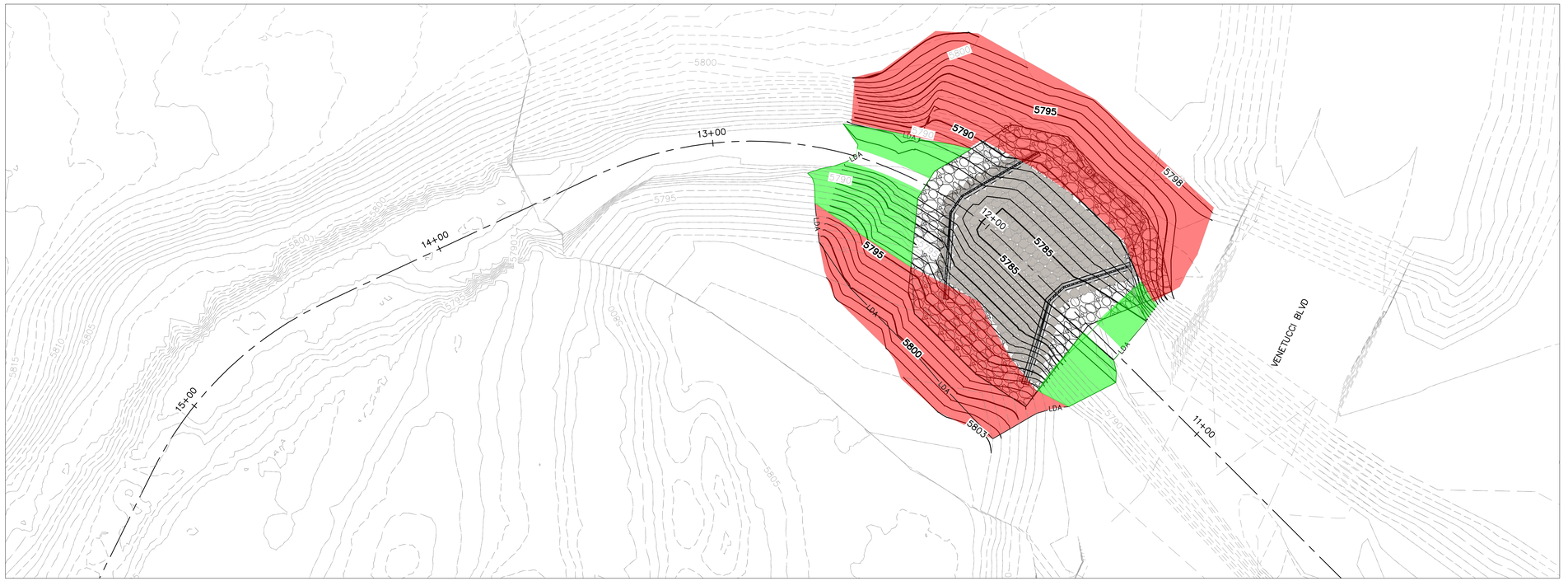


KEY MAP
N.T.S.

LEGEND:
RIPARIAN
UPLANDS

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80



MAIN – PLAN VIEW

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
REVEGETATION - TRIBUTARY & MAIN

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C983

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\CHANNEL\CHNL_VEG.dwg Kummerlen, Kayla 6/26/2025 8:46 AM

Table A-2. Upland area seed mix – sandy soil

Common Name	Scientific Name	Growth Season	Growth Form	% Mix	Lb/ac (PLS[1])
Grasses					
Switchgrass	*Panicum virgatum*	Warm	Sod/Bunch	15	2.3
Prairie sandreed	*Calamovilfa longifolia*	Warm	Sod	10	2.2
Sideoats grama	*Bouteloua curtipendula*	Warm	Sod	10	3.1
Blue grama	*Bouteloua gracilis*	Warm	Sod	10	0.7
Indian ricegrass	*Oryzopsis hymenoides*	Cool	Bunch	10	4.3
Western wheatgrass	*Pascopyrum smithii*	Cool	Sod	10	5.5
Little bluestem	*Schizachyrium scoparium*	Warm	Bunch	10	2.3
Sand dropseed	*Sporobolus cryptandrus*	Warm	Bunch	10	0.1
Green needlegrass	*Stipa viridula*	Cool	Bunch	10	3.3
Herbaceous/Wildflowers					
Pasture sage	*Artemisia frigida*			1	0.1
Blanket flower	*Gaillardia aristata*			2	0.9
Tansy aster	*Maceranthera tanacetifolia*			2	0.2
TOTAL PLS POUNDS/ACRE				**100**	**25**

[1]PLS = Pure Live Seed – If broadcast seeding, double the rate

Table A-5. Riparian area seed mix – sandy soil

(Recommended for middle to upper terraces and slopes above 5-year flood elevations.)

Common Name	Scientific Name	Growth Season	Growth Form	% Mix	Lb/ac (PLS[1])
Sand dropseed	*Sporobolus*	Warm	Bunch	20	0.2
Switchgrass	*Panicum virgatum*	Warm	Sod/Bunch	20	3.1
Blue grama	*Bouteloua gracilis*	Warm	Sod	15	1.1
Canada wildrye	*Elymus canadensis*	Cool	Bunch	10	5.2
Sand bluestem	*Andropogon hallii*	Warm	Bunch	10	5.3
Western wheatgrass	*Pascopyrum smithii*	Cool	Sod	10	5.5
Yellow Indiangrass	*Sorghastrum nutans*	Warm	Sod	10	3.5
Wildflowers					
Blanket flower	*Gaillardia aristata*			1	0.5
Rocky Mountain	*Penstemon strictus*			1	0.1
Purple prairie clover	*Dalea purpurea*			1	0.3
Mexican hat	*Ratibida columnifera*			1	0.1
Western yarrow	*Achillea millefolium*			1	0.02
TOTAL PLS POUNDS/ACRE				**100**	**24.92**

[1]PLS = Pure Live Seed – If broadcast seeding, double the rate

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

NO. | REVISION | BY | DATE | APPR.

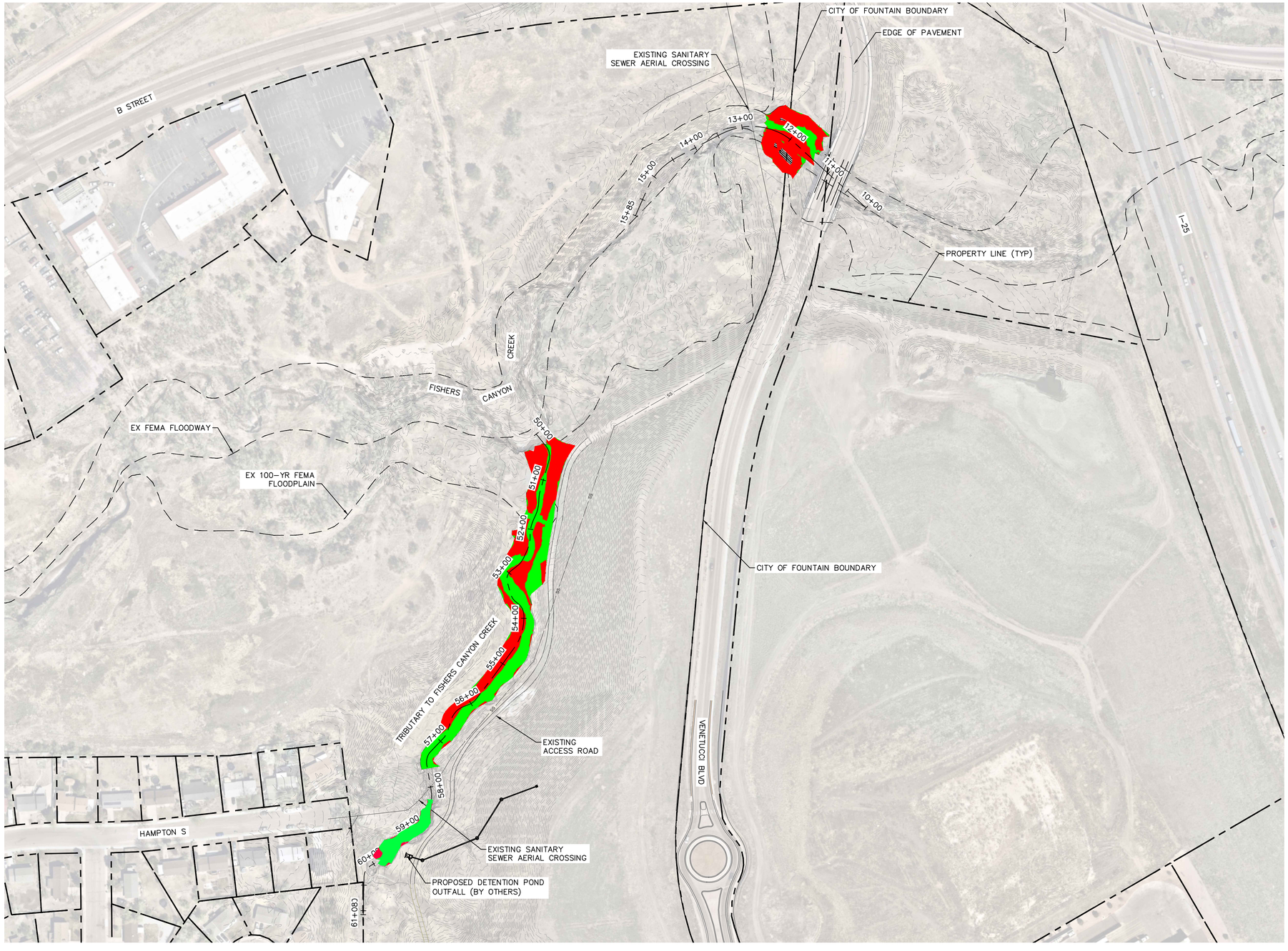
DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
REVEGETATION DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C984



NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

LEGEND

CUT AREA

FILL AREA

TOTAL CUT: 2395 CY

TOTAL FILL: 2062 CY

NET: 334 CY (CUT)

*RAW NEW VALUE – NO FILL FACTOR APPLIED

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY:	DATE	APPR.

Kimley»Horn
2025 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

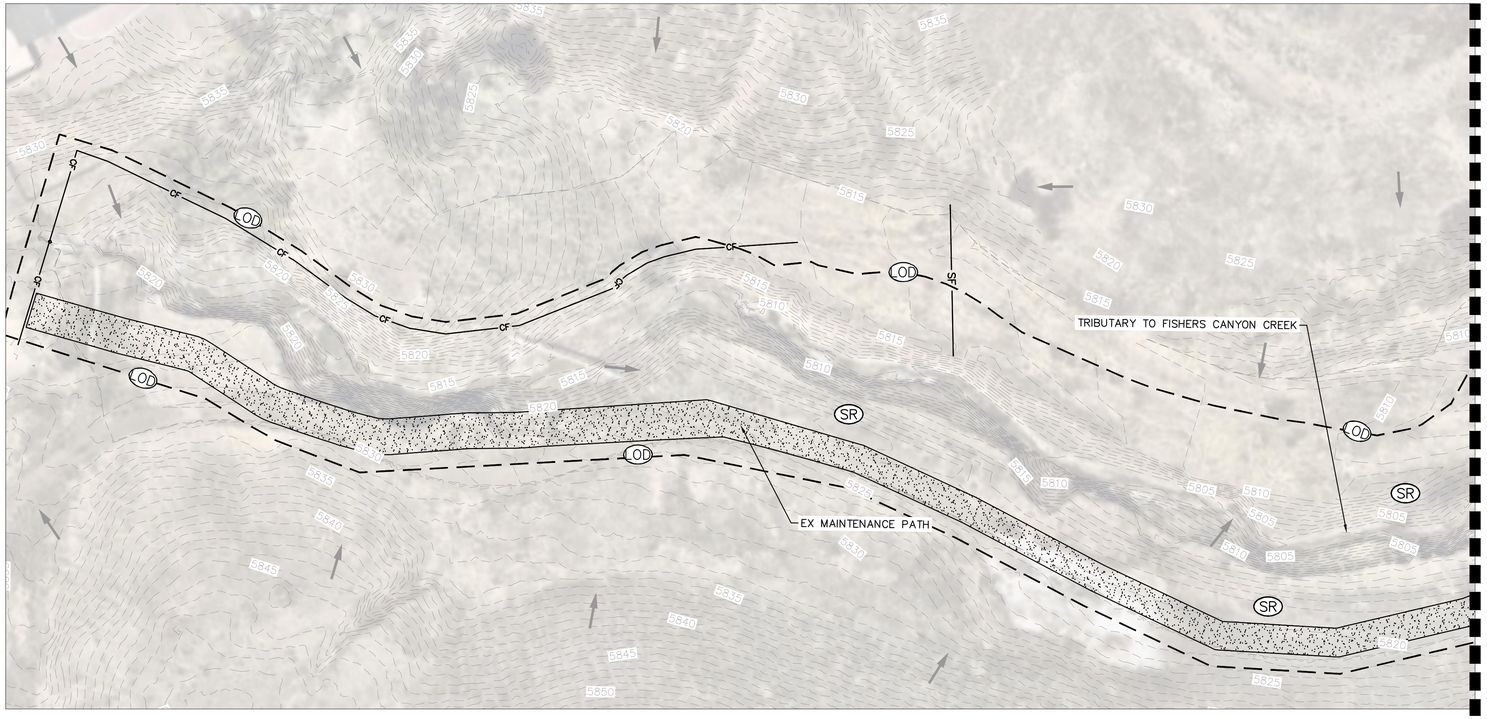
FISHERS CANYON CREEK
CHANNEL IMPROVEMENT PLANS
EL PASO COUNTY, COLORADO
CUT FILL MAP

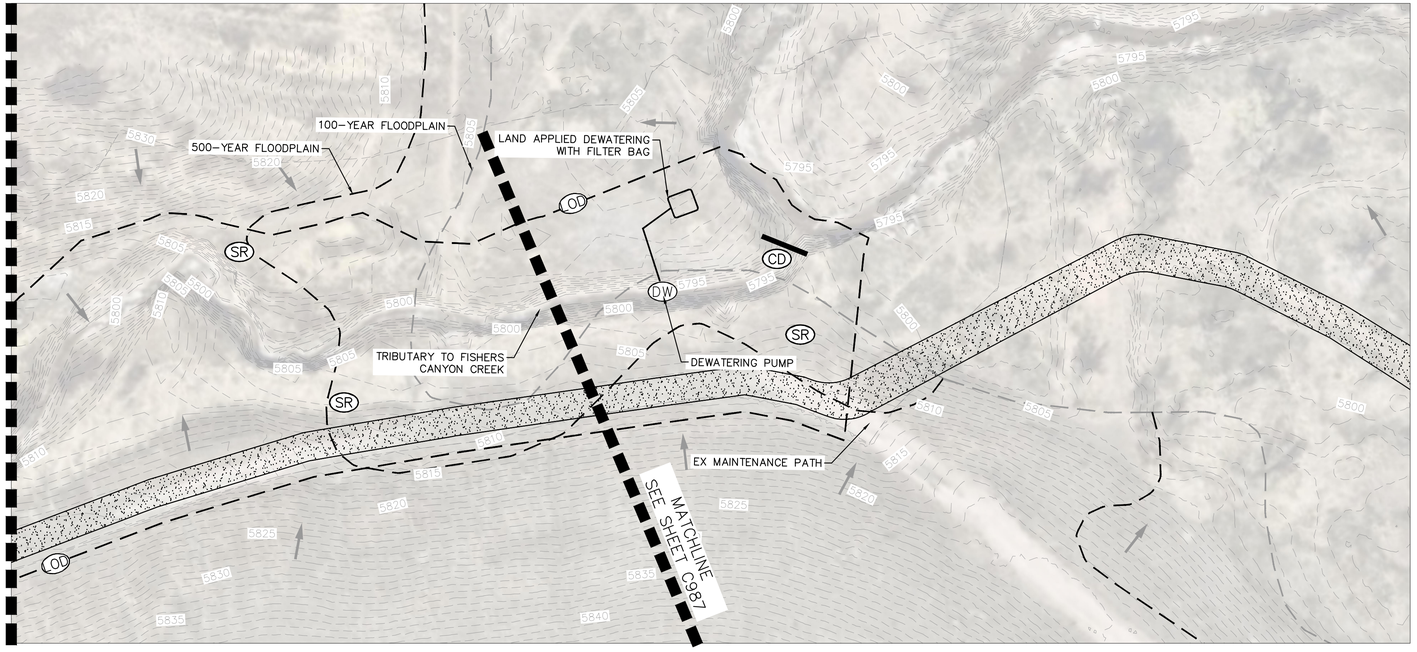
PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C985

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_CUT_FILL.dwg Kummerlen, Kayla 6/26/2025 8:47 AM





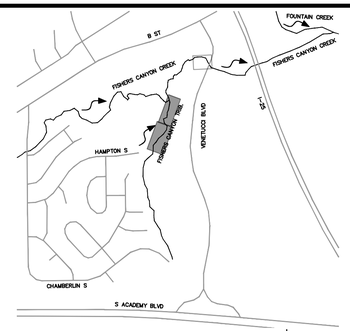
LIMITS OF CONSTRUCTION

TOTAL ONSITE DISTURBANCE =±2.66 ACRES

ONSITE DISTURBANCE (THIS SHEET) =±2.12 ACRES

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60



KEY MAP
N.T.S.

NORTH

LEGEND

- PROPERTY LINE
- (OD) LIMITS OF DISTURBANCE/CONSTRUCTION
- EXISTING MAINTENANCE PATH
- EXISTING FLOW ARROW
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR

INITIAL BMPS

- (SF) SILT FENCE
- (CF) CONSTRUCTION FENCE
- (CWA) CONCRETE WASHOUT AREA
- (SSA) STABILIZED STAGING AREA
- (VTC) VEHICLE TRACKING CONTROL
- (SP) SOIL STOCKPILE
- (SM) SEEDING AND MULCHING
- (DW) DEWATERING

INTERIM BMPS

- (CD) CHECK DAMS
- (SR) SURFACE ROUGHENING

VEGETATION NOTES

1. THE EXST VEGETATION IS PRIMARILY NATIVE GRASSES AND WITH NO NOTABLE VEGETATION. TREES WITHIN THE CONSTRUCTION LIMITS ARE LIMITED AND ANY EXST TREES SHALL BE PROTECTED FROM ANY CONSTRUCTION ACTIVITIES.

NOTES

1. THE INTENT OF THIS PLAN IS TO IDENTIFY THE EROSION CONTROL PRACTICES RECOMMENDED. THE CONTRACTOR SHALL REFERENCE ADDITIONAL CONSTRUCTION PLANS FOR DEMOLITION OF EXISTING AND CONSTRUCTION OF PROPOSED IMPROVEMENTS.
2. ADJACENT STREETS SHALL BE KEPT CLEAN AND FREE OF SEDIMENT AND/OR DEBRIS AT ALL TIMES.
3. TEMPORARY STABILIZATION (TS) SHALL BE IMPLEMENTED WITHIN THE DISTURBED PORTIONS OF THE PROJECT SITE NO LATER THAN 14 DAYS FOLLOWING THE CEASE OF CONSTRUCTION ACTIVITIES WITHIN THE DISTURBED AREAS.
4. PERMANENT STABILIZATION (PS) MAY BE USED WITHIN AREAS OF TEMPORARY STABILIZATION (TS) AT THE CONTRACTOR'S DISCRETION. STABILIZATION SHALL BE APPLIED IN ACCORDANCE WITH APPLICABLE TEMPORARY STABILIZATION SEQUENCING REQUIREMENTS.
5. CONTRACTOR SHALL UTILIZE ROLLED EROSION CONTROL PRODUCTS (STRAW-SINGLE NET EROSION CONTROL BLANKETS AND OPEN WEAVE TEXTILES) ON ALL SLOPES 3H:1V OR GREATER TO ACHIEVE REQUIRED STABILIZATION.
6. CONTRACTOR SHALL MAINTAIN ACCEPTABLE EROSION CONTROL PRACTICES WITHIN THE ANTICIPATED LIMITS OF CONSTRUCTION IDENTIFIED HEREIN. BEST MANAGEMENT PRACTICES AND STABILIZATION SHALL BE COMPLETED AS IDENTIFIED HEREIN IN ACCORDANCE WITHIN OWNER REQUIREMENTS.
7. SILT FENCE TO BE INSTALLED PRIOR TO COMMENCEMENT OF ONSITE GRADING AND CONSTRUCTION ACTIVITIES.
8. DEMOLITION, REMOVAL, OVEREXCAVATION AND SOIL TREATMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER RECOMMENDATIONS AS NOTED IN THE APPROVED PROJECT GEOTECHNICAL REPORT.
9. VEGETATION COVER IS ABOUT 90% CONSISTING OF NATIVE GRASSES, TREES AND SHRUBS, BASED ON VISUAL INSPECTION
10. NO ASPHALT OR CONCRETE BATCH PLANTS SHALL BE USED FOR THIS PROJECT.
11. REFERENCE SHEETS C1.3-C1.7 FOR STABILIZED DRAINAGE WAY CONSTRUCTION DESIGN

SURFACE ROUGHENING NOTES

1. STAIR STEP GRADING – USED ON SLOPES WITH GRADIENTS BETWEEN 3:1 AND 2:1 AND FOR SOIL CONTAINING A LARGE AMOUNT OF SMALL ROCKS. STAIRS ARE TO BE WIDE ENOUGH TO WORK WITH STANDARD EARTH MOVING EQUIPMENT.
2. GROOVE CUTTING – USED ON SLOPES WITH GRADIENTS BETWEEN 3:1 AND 2:1. GROOVES ARE TO BE AT LEAST 3 INCHES DEEP AND NO MORE THAN 15 INCHES APART.
3. TRACKING – USED ON SOILS WITH HIGHER SAND CONTENT DUE TO COMPACTION BY HEAVY MACHINERY.
4. REGULAR INSPECTIONS ARE TO BE MADE OF ALL SURFACE ROUGHENED AREAS.
5. SURFACE ROUGHENING IS TO BE REPEATED AS OFTEN AS NECESSARY.
6. VEHICLES OR EQUIPMENT IS NOT TO BE DRIVEN OVER AREAS THAT HAVE BEEN ROUGHENED.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's below. Call before you dig.

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\PlanSheets\GEC\GEC_Initial.dwg, 6/26/2025 8:48 AM

NO.	REVISION	BY:	DATE	APPR.

Kimley»Horn
2024 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

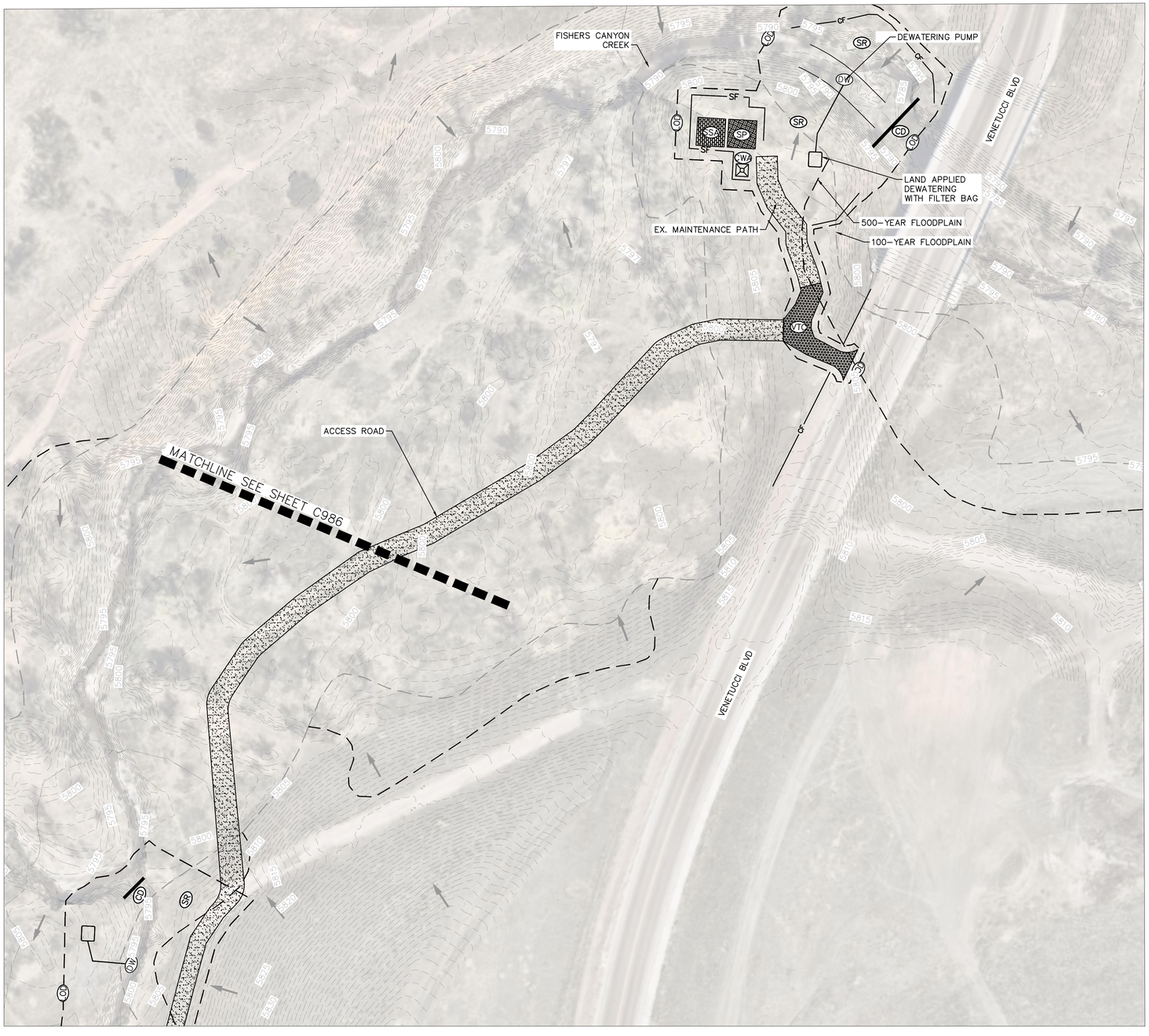
DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
INITIAL GEC PLAN

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

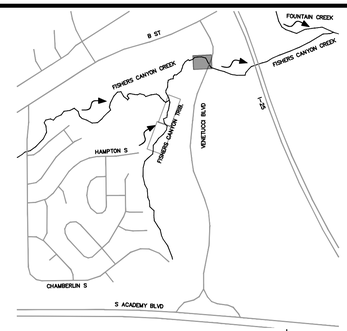
SHEET
C986



LIMITS OF CONSTRUCTION

TOTAL ONSITE DISTURBANCE =±2.66 ACRES

ONSITE DISTURBANCE (THIS SHEET) =±0.54 ACRES



KEY MAP
N.T.S.

LEGEND

- PROPERTY LINE
- (LOD) LIMITS OF DISTURBANCE/CONSTRUCTION
- EXISTING MAINTENANCE PATH
- EXISTING FLOW ARROW
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR

INITIAL BMPS

- (SF) SILT FENCE
- (CF) CONSTRUCTION FENCE
- (CWA) CONCRETE WASHOUT AREA
- (SSA) STABILIZED STAGING AREA
- (VTC) VEHICLE TRACKING CONTROL
- (SP) SOIL STOCKPILE
- (SM) SEEDING AND MULCHING
- (DW) DEWATERING

INTERIM BMPS

- (CD) CHECK DAMS
- (SR) SURFACE ROUGHENING

VEGETATION NOTES

1. THE EXST VEGETATION IS PRIMARILY NATIVE GRASSES AND WITH NO NOTABLE VEGETATION. TREES WITHIN THE CONSTRUCTION LIMITS ARE LIMITED AND ANY EXST TREES SHALL BE PROTECTED FROM ANY CONSTRUCTION ACTIVITIES.

NOTES

1. THE INTENT OF THIS PLAN IS TO IDENTIFY THE EROSION CONTROL PRACTICES RECOMMENDED. THE CONTRACTOR SHALL REFERENCE ADDITIONAL CONSTRUCTION PLANS FOR DEMOLITION OF EXISTING AND CONSTRUCTION OF PROPOSED IMPROVEMENTS.
2. ADJACENT STREETS SHALL BE KEPT CLEAN AND FREE OF SEDIMENT AND/OR DEBRIS AT ALL TIMES.
3. TEMPORARY STABILIZATION (TS) SHALL BE IMPLEMENTED WITHIN THE DISTURBED PORTIONS OF THE PROJECT SITE NO LATER THAN 14 DAYS FOLLOWING THE CEASE OF CONSTRUCTION ACTIVITIES WITHIN THE DISTURBED AREAS.
4. PERMANENT STABILIZATION (PS) MAY BE USED WITHIN AREAS OF TEMPORARY STABILIZATION (TS) AT THE CONTRACTOR'S DISCRETION. STABILIZATION SHALL BE APPLIED IN ACCORDANCE WITH APPLICABLE TEMPORARY STABILIZATION SEQUENCING REQUIREMENTS.
5. CONTRACTOR SHALL UTILIZE ROLLED EROSION CONTROL PRODUCTS (STRAW-SINGLE NET EROSION CONTROL BLANKETS AND OPEN WEAVE TEXTILES) ON ALL SLOPES 3H:1V OR GREATER TO ACHIEVE REQUIRED STABILIZATION.
6. CONTRACTOR SHALL MAINTAIN ACCEPTABLE EROSION CONTROL PRACTICES WITHIN THE ANTICIPATED LIMITS OF CONSTRUCTION IDENTIFIED HEREIN. BEST MANAGEMENT PRACTICES AND STABILIZATION SHALL BE COMPLETED AS IDENTIFIED HEREIN IN ACCORDANCE WITHIN OWNER REQUIREMENTS.
7. SILT FENCE TO BE INSTALLED PRIOR TO COMMENCEMENT OF ONSITE GRADING AND CONSTRUCTION ACTIVITIES.
8. DEMOLITION, REMOVAL, OVEREXCAVATION AND SOIL TREATMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER RECOMMENDATIONS AS NOTED IN THE APPROVED PROJECT GEOTECHNICAL REPORT.
9. VEGETATION COVER IS ABOUT 90% CONSISTING OF NATIVE GRASSES, TREES AND SHRUBS, BASED ON VISUAL INSPECTION
10. NO ASPHALT OR CONCRETE BATCH PLANTS SHALL BE USED FOR THIS PROJECT.
11. REFERENCE SHEETS C1.3–C1.7 FOR STABILIZED DRAINAGE WAY CONSTRUCTION DESIGN

SURFACE ROUGHENING NOTES

1. STAIR STEP GRADING – USED ON SLOPES WITH GRADIENTS BETWEEN 3:1 AND 2:1 AND FOR SOIL CONTAINING A LARGE AMOUNT OF SMALL ROCKS. STAIRS ARE TO BE WIDE ENOUGH TO WORK WITH STANDARD EARTH MOVING EQUIPMENT.
2. GROOVE CUTTING – USED ON SLOPES WITH GRADIENTS BETWEEN 3:1 AND 2:1. GROOVES ARE TO BE AT LEAST 3 INCHES DEEP AND NO MORE THAN 15 INCHES APART.
3. TRACKING – USED ON SOILS WITH HIGHER SAND CONTENT DUE TO COMPACTION BY HEAVY MACHINERY.
4. REGULAR INSPECTIONS ARE TO BE MADE OF ALL SURFACE ROUGHENED AREAS.
5. SURFACE ROUGHENING IS TO BE REPEATED AS OFTEN AS NECESSARY.
6. VEHICLES OR EQUIPMENT IS NOT TO BE DRIVEN OVER AREAS THAT HAVE BEEN ROUGHENED.

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_Initial.dwg, 6/26/2025 8:48 AM

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2024 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

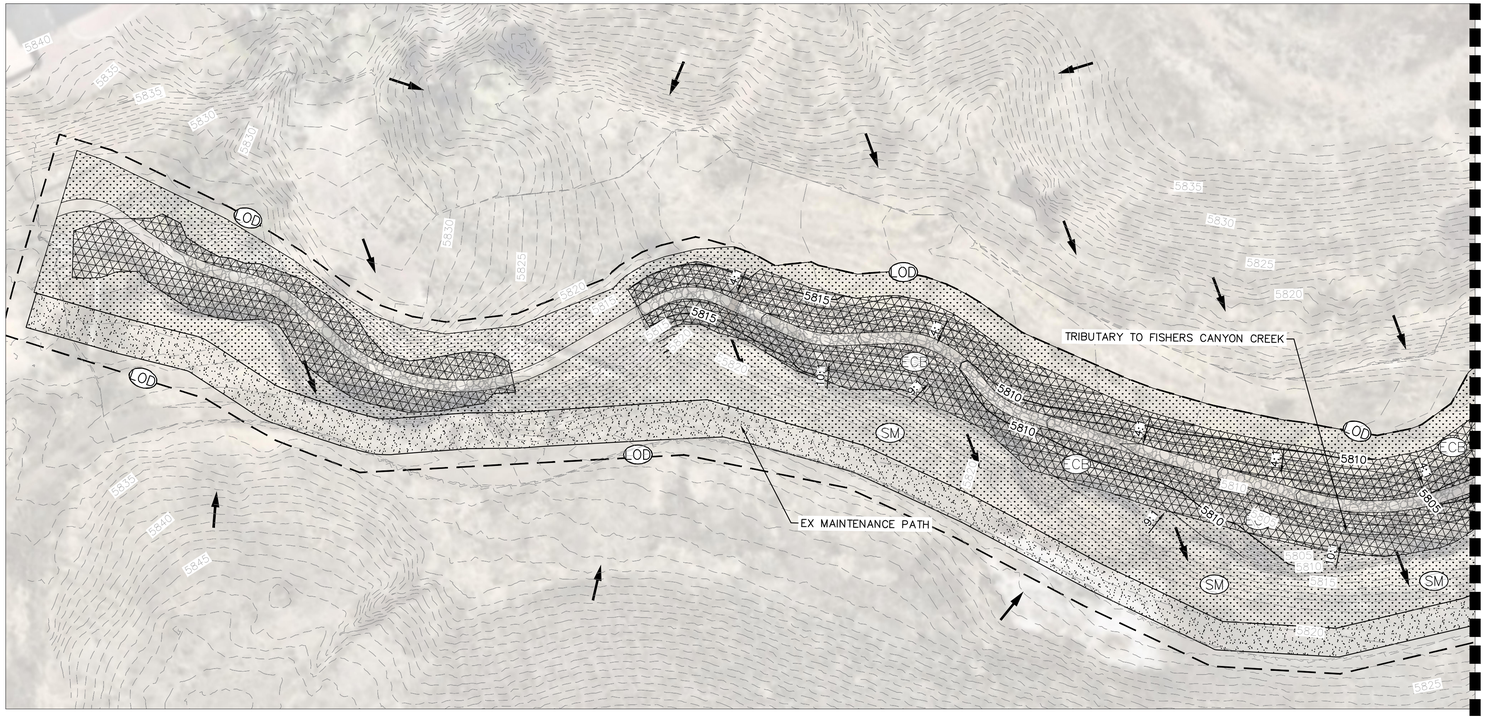
DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

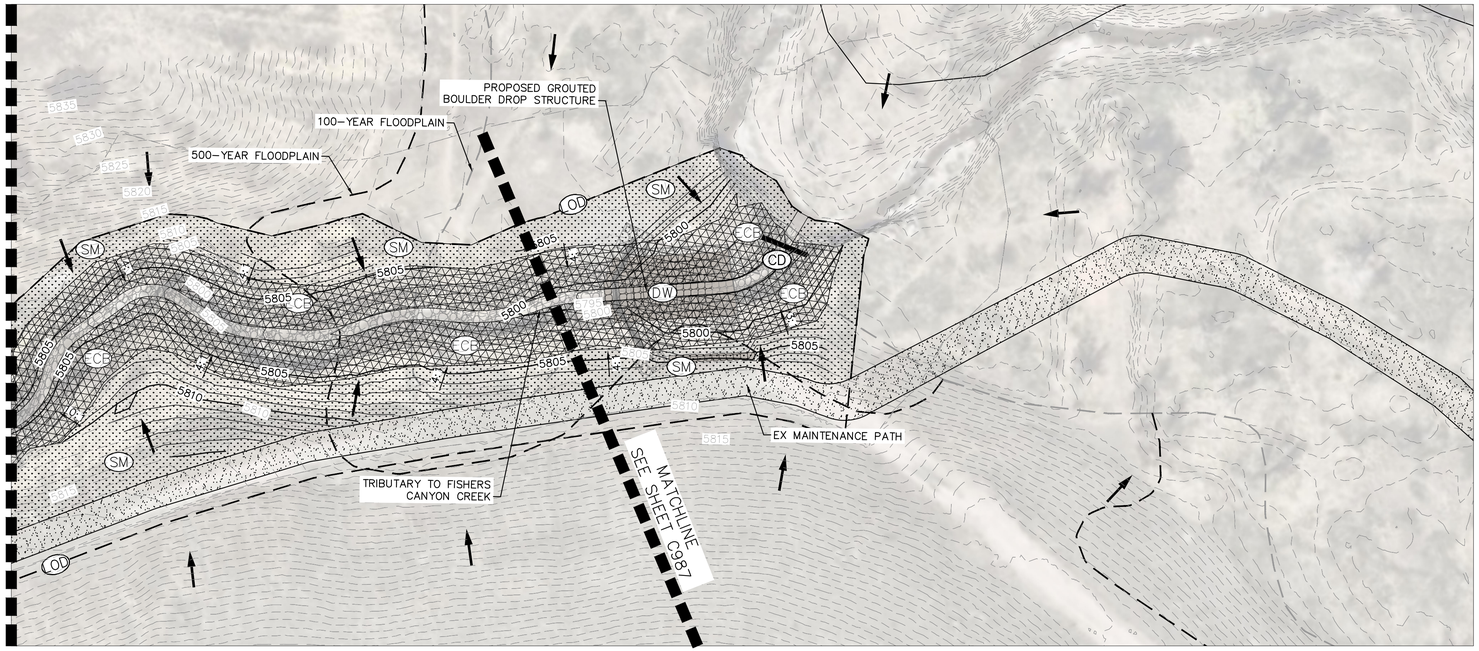
FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
INITIAL GEC PLAN

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C987





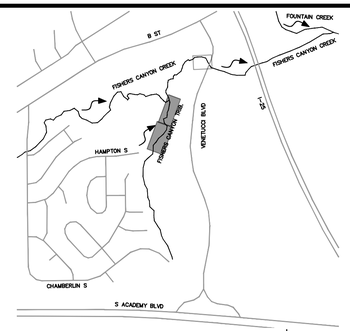
LIMITS OF CONSTRUCTION

TOTAL ONSITE DISTURBANCE =±2.66 ACRES

ONSITE DISTURBANCE (THIS SHEET) =±2.12 ACRES

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60



KEY MAP
N.T.S.

NORTH

LEGEND

- PROPERTY LINE
- LOD — LIMITS OF DISTURBANCE/CONSTRUCTION
- ECB — EROSION CONTROL BLANKET
- RIPRAP
- SM — SEEDING AND MULCH
- CD — CHECK DAMS
- SR — SURFACE ROUGHENING
- EXISTING MAINTENANCE PATH
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW
- -64XX- EXISTING MINOR CONTOUR
- -64XX- EXISTING MAJOR CONTOUR
- 54XX PROPOSED MAJOR CONTOUR
- 54XX EXISTING MAJOR CONTOUR

NOTES

1. THE INTENT OF THIS PLAN IS TO IDENTIFY THE EROSION CONTROL PRACTICES RECOMMENDED. THE CONTRACTOR SHALL REFERENCE ADDITIONAL CONSTRUCTION PLANS FOR DEMOLITION OF EXISTING AND CONSTRUCTION OF PROPOSED IMPROVEMENTS.
2. ADJACENT STREETS SHALL BE KEPT CLEAN AND FREE OF SEDIMENT AND/OR DEBRIS AT ALL TIMES.
3. TEMPORARY STABILIZATION (TS) SHALL BE IMPLEMENTED WITHIN THE DISTURBED PORTIONS OF THE PROJECT SITE NO LATER THAN 14 DAYS FOLLOWING THE CEASE OF CONSTRUCTION ACTIVITIES WITHIN THE DISTURBED AREAS.
4. PERMANENT STABILIZATION (PS) MAY BE USED WITHIN AREAS OF TEMPORARY STABILIZATION (TS) AT THE CONTRACTOR'S DISCRETION. STABILIZATION SHALL BE APPLIED IN ACCORDANCE WITH APPLICABLE TEMPORARY STABILIZATION SEQUENCING REQUIREMENTS.
5. CONTRACTOR SHALL UTILIZE ROLLED EROSION CONTROL PRODUCTS (STRAW-SINGLE NET EROSION CONTROL BLANKETS AND OPEN WEAVE TEXTILES) ON ALL SLOPES 3H:1V OR GREATER TO ACHIEVE REQUIRED STABILIZATION.
6. CONTRACTOR SHALL MAINTAIN ACCEPTABLE EROSION CONTROL PRACTICES WITHIN THE ANTICIPATED LIMITS OF CONSTRUCTION IDENTIFIED HEREIN. BEST MANAGEMENT PRACTICES AND STABILIZATION SHALL BE COMPLETED AS IDENTIFIED HEREIN IN ACCORDANCE WITHIN OWNER REQUIREMENTS.
7. ALL WORK IN THE HODGEN ROAD AND MERIDAIN ROAD ROW REQUIRES A ROW PERMIT FROM EL PASO COUNTY. CONTRACTOR IS RESPONSIBLE FOR APPLYING FOR AND OBTAINING ALL NECESSARY ROW PERMITS.
8. SILT FENCE TO BE INSTALLED PRIOR TO COMMENCEMENT OF ONSITE GRADING AND CONSTRUCTION ACTIVITIES.
9. DEMOLITION, REMOVAL, OVEREXCAVATION AND SOIL TREATMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER RECOMMENDATIONS AS NOTED IN THE APPROVED PROJECT GEOTECHNICAL REPORT.
10. VEGETATION COVER IS ABOUT 90% CONSISTING OF NATIVE GRASSES, TREES AND SHRUBS, BASED ON VISUAL INSPECTION
11. NO ASPHALT OR CONCRETE BATCH PLANTS SHALL BE USED FOR THIS PROJECT.
12. CHECK DAMS TO BE PLACED IN TEMPORARY AND PERMANENT DRAINAGE SWALES AND ROADSIDE DITCHES AND TO BE SPACED AS DEEMED NECESSARY. RIRPRAP IN CHECK DAMS TO BE SUBSTITUTED WITH SCL.
13. TRM MATTING DEPICTED IN PLAN VIEW SHALL BE PLACED BY THE CONTRACTOR SUCH THAT IT COVERS THE CHANNEL BOTTOM EXTENDS 2 VERTICAL FEET UP THE SIDE SLOPES FROM THE TOE OF SLOPE.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
© 2024 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

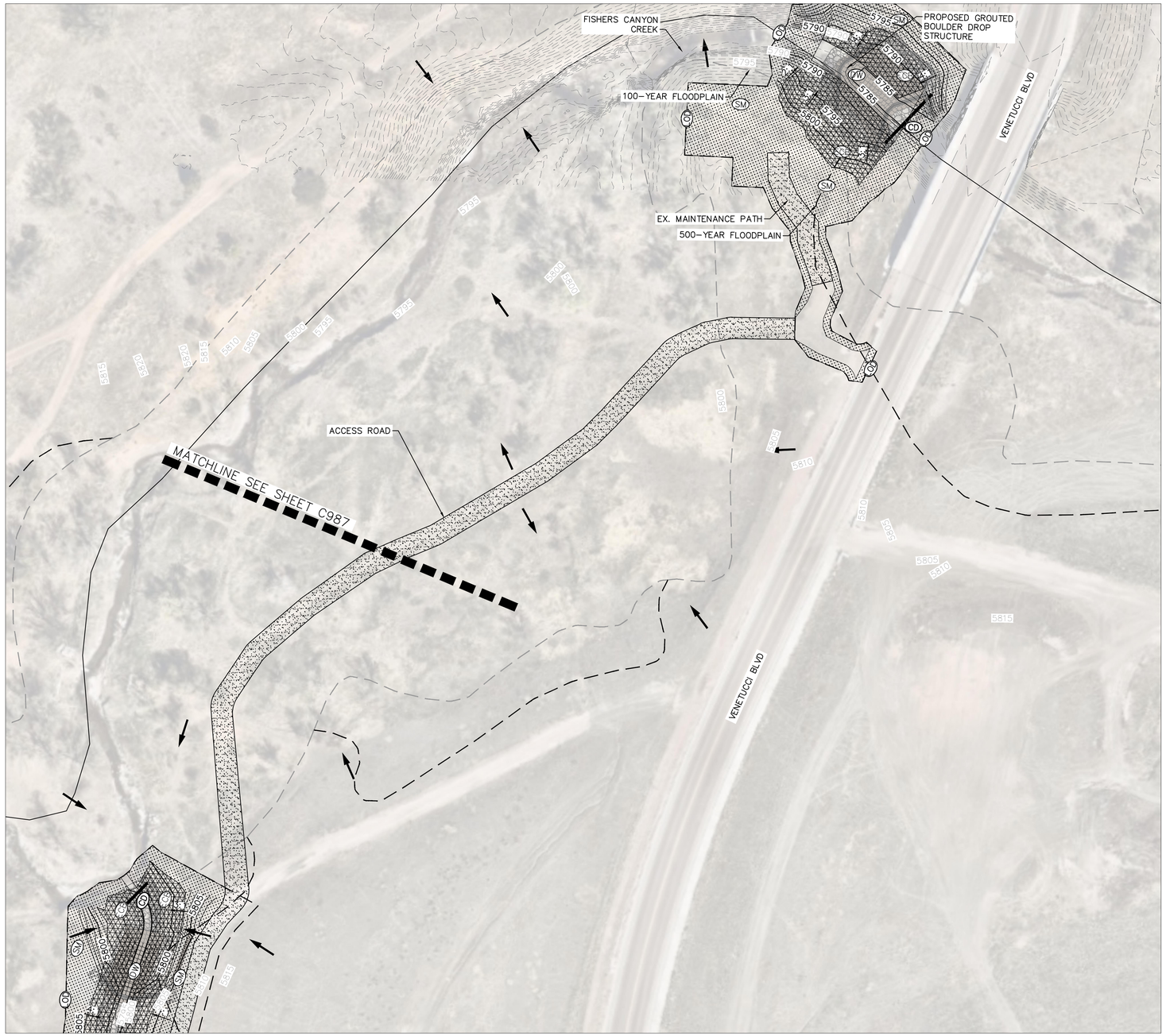
FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
FINAL GEC PLAN

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C988

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_Final.dwg, 6/26/2025 8:50 AM



LIMITS OF CONSTRUCTION

TOTAL ONSITE DISTURBANCE	=±2.66 ACRES
ONSITE DISTURBANCE (THIS SHEET)	=±0.54 ACRES

KEY MAP
N.T.S.

LEGEND

- PROPERTY LINE
- (LOD) LIMITS OF DISTURBANCE/CONSTRUCTION
- (ECB) EROSION CONTROL BLANKET
- RIPRAP
- (SM) SEEDING AND MULCH
- (CD) CHECK DAMS
- (SR) SURFACE ROUGHENING
- EXISTING MAINTENANCE PATH
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW
- 64XX EXISTING MINOR CONTOUR
- 64XX EXISTING MAJOR CONTOUR
- 54XX PROPOSED MAJOR CONTOUR
- 54XX EXISTING MAJOR CONTOUR

NOTES

1. THE INTENT OF THIS PLAN IS TO IDENTIFY THE EROSION CONTROL PRACTICES RECOMMENDED. THE CONTRACTOR SHALL REFERENCE ADDITIONAL CONSTRUCTION PLANS FOR DEMOLITION OF EXISTING AND CONSTRUCTION OF PROPOSED IMPROVEMENTS.
2. ADJACENT STREETS SHALL BE KEPT CLEAN AND FREE OF SEDIMENT AND/OR DEBRIS AT ALL TIMES.
3. TEMPORARY STABILIZATION (TS) SHALL BE IMPLEMENTED WITHIN THE DISTURBED PORTIONS OF THE PROJECT SITE NO LATER THAN 14 DAYS FOLLOWING THE CEASE OF CONSTRUCTION ACTIVITIES WITHIN THE DISTURBED AREAS.
4. PERMANENT STABILIZATION (PS) MAY BE USED WITHIN AREAS OF TEMPORARY STABILIZATION (TS) AT THE CONTRACTOR'S DISCRETION. STABILIZATION SHALL BE APPLIED IN ACCORDANCE WITH APPLICABLE TEMPORARY STABILIZATION SEQUENCING REQUIREMENTS.
5. CONTRACTOR SHALL UTILIZE ROLLED EROSION CONTROL PRODUCTS (STRAW-SINGLE NET EROSION CONTROL BLANKETS AND OPEN WEAVE TEXTILES) ON ALL SLOPES 3H:1V OR GREATER TO ACHIEVE REQUIRED STABILIZATION.
6. CONTRACTOR SHALL MAINTAIN ACCEPTABLE EROSION CONTROL PRACTICES WITHIN THE ANTICIPATED LIMITS OF CONSTRUCTION IDENTIFIED HEREIN. BEST MANAGEMENT PRACTICES AND STABILIZATION SHALL BE COMPLETED AS IDENTIFIED HEREIN IN ACCORDANCE WITHIN OWNER REQUIREMENTS.
7. ALL WORK IN THE HODGEN ROAD AND MERDIAIN ROAD ROW REQUIRES A ROW PERMIT FROM EL PASO COUNTY. CONTRACTOR IS RESPONSIBLE FOR APPLYING FOR AND OBTAINING ALL NECESSARY ROW PERMITS.
8. SILT FENCE TO BE INSTALLED PRIOR TO COMMENCEMENT OF ONSITE GRADING AND CONSTRUCTION ACTIVITIES.
9. DEMOLITION, REMOVAL, OVEREXCAVATION AND SOIL TREATMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER RECOMMENDATIONS AS NOTED IN THE APPROVED PROJECT GEOTECHNICAL REPORT.
10. VEGETATION COVER IS ABOUT 90% CONSISTING OF NATIVE GRASSES, TREES AND SHRUBS, BASED ON VISUAL INSPECTION
11. NO ASPHALT OR CONCRETE BATCH PLANTS SHALL BE USED FOR THIS PROJECT.
12. CHECK DAMS TO BE PLACED IN TEMPORARY AND PERMANENT DRAINAGE SWALES AND ROADSIDE DITCHES AND TO BE SPACED AS DEEMED NECESSARY. RIRPRAP IN CHECK DAMS TO BE SUBSTITUTED WITH SCL.
13. TRM MATTING DEPICTED IN PLAN VIEW SHALL BE PLACED BY THE CONTRACTOR SUCH THAT IT COVERS THE CHANNEL BOTTOM EXTENDS 2 VERTICAL FEET UP THE SIDE SLOPES FROM THE TOE OF SLOPE.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

811 Know what's **below.** **Call** before you dig.

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2024 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
FINAL GEC PLAN

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C989

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_Final.dwg, 6/26/2025 8:50 AM

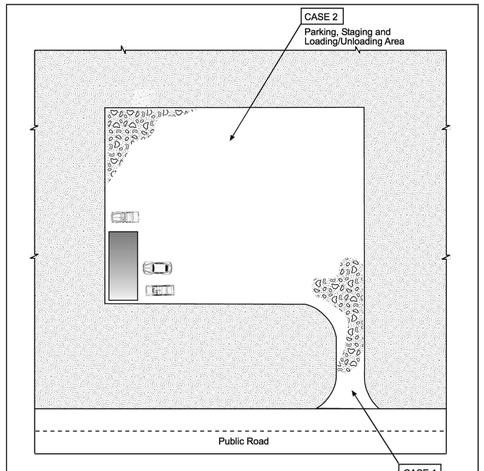


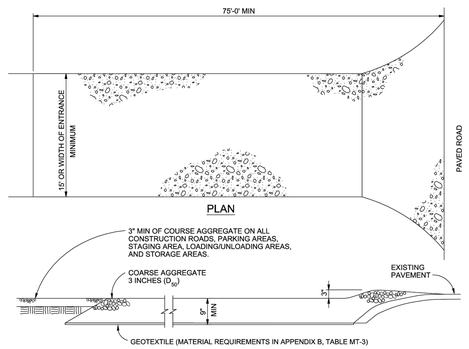
Table VT-1

	Case 1	Case 2
Gravel Thickness	9"	3"
Filter Fabric	YES	NO

City of Colorado Springs
Storm Water Quality

Figure VT-1
Vehicle Tracking
Application Examples

DEN/M\153722.CS.CB/FigVT-1/9-99



VEHICLE TRACKING
NTS

VEHICLE TRACKING NOTES

INSTALLATION REQUIREMENTS

1. ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO CONSTRUCTION BEGINNING.

2. CONSTRUCTION ENTRANCES ARE TO BE BUILT WITH AN APRON TO ALLOW FOR TURNING TRAFFIC, BUT SHOULD NOT BE BUILT OVER EXISTING PAVEMENT EXCEPT FOR A SLIGHT OVERLAP.

3. AREAS TO BE STABILIZED ARE TO BE PROPERLY GRADED AND COMPACTED PRIOR TO LAYING DOWN GEOTEXTILE AND STONE.

4. CONSTRUCTION ROADS, PARKING AREAS, LOADING/UNLOADING ZONES, STORAGE AREAS, AND STAGING AREAS ARE TO BE STABILIZED.

5. CONSTRUCTION ROADS ARE TO BE BUILT TO CONFORM TO SITE GRADES, BUT SHOULD NOT HAVE SIDE SLOPES OR ROAD GRADES THAT ARE EXCESSIVELY STEEP.

MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL STABILIZED AREAS, ESPECIALLY AFTER STORM EVENTS.

2. STONES ARE TO BE REAPPLIED PERIODICALLY AND WHEN REPAIR IS NECESSARY.

3. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED DAILY BY SHOVELING OR SWEEPING. SEDIMENT IS NOT TO BE WASHED DOWN STORM SEWER DRAINS.

4. STORM SEWER INLET PROTECTION IS TO BE IN PLACE, INSPECTED, AND CLEANED IF NECESSARY.

5. OTHER ASSOCIATED SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED TO ENSURE GOOD WORKING CONDITION.

City of Colorado Springs
Stormwater Quality

Figure VT-2
Vehicle Tracking
Application Examples

Stabilized Staging Area (SSA) SM-6

Description

A stabilized staging area is a clearly designated area where construction equipment and vehicles, stockpiles, waste bins, and other construction-related materials are stored. The contractor office trailer may also be located in this area. Depending on the size of the construction site, more than one staging area may be necessary.

Photograph SSA-1. Example of a staging area with a gravel surface to prevent mud tracking and reduce runoff. Photo courtesy of Douglas County.

Appropriate Uses

Most construction sites will require a staging area, which should be clearly designated in SWMP drawings. The layout of the staging area may vary depending on the type of construction activity. Staging areas located in roadways due to space constraints require special measures to avoid materials being washed into storm inlets.

Design and Installation

Stabilized staging areas should be completed prior to other construction activities beginning on the site. Major components of a stabilized staging area include:

- Appropriate space to contain storage and provide for loading/unloading operations, as well as parking if necessary.
- A stabilized surface, either paved or covered, with 3-inch diameter aggregate or larger.
- Perimeter controls such as silt fence, sediment control logs, or other measures.
- Construction fencing to prevent unauthorized access to construction materials.
- Provisions for Good Housekeeping practices related to materials storage and disposal, as described in the Good Housekeeping BMP Fact Sheet.
- A stabilized construction entrance/exit, as described in the Vehicle Tracking Control BMP Fact Sheet, to accommodate traffic associated with material delivery and waste disposal vehicles.

Over-sizing the stabilized staging area may result in disturbance of existing vegetation in excess of that required for the project. This increases costs, as well as requirements for long-term stabilization following the construction period. When designing the stabilized staging area, minimize the area of disturbance to the extent practical.

Stabilized Staging Area	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material	Yes

NO.	REVISION	BY.	DATE	APPR.

Kimley»Horn
2024 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
GEC DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C990

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_Details.dwg, 6/26/2025 8:51 AM

Minimizing Long-Term Stabilization Requirements

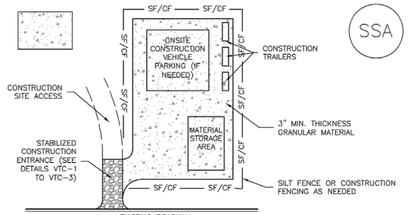
- Utilize off-site parking and restrict vehicle access to the site.
- Use construction mats in lieu of rock when staging is provided in an area that will not be disturbed otherwise.
- Consider use of a bermed contained area for materials and equipment that do not require a stabilized surface.
- Consider phasing of staging areas to avoid disturbance in an area that will not be otherwise disturbed.

See Detail SSA-1 for a typical stabilized staging area and SSA-2 for a stabilized staging area when materials staging in roadways is required.

Maintenance and Removal

Maintenance of stabilized staging areas includes maintaining a stable surface cover of gravel, repairing perimeter controls, and following good housekeeping practices.

When construction is complete, debris, unused stockpiles and materials should be recycled or properly disposed. In some cases, this will require disposal of contaminated soil from equipment leaks in an appropriate landfill. Staging areas should then be permanently stabilized with vegetation or other surface cover planned for the development.



SSA

SSA–1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   –LOCATION OF STAGING AREA(S).
   –CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.
5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. §703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

Description

Photograph SR-1. Surface roughening via imprinting for temporary stabilization.

Surface roughening is an erosion control practice that involves tracking, scarifying, imprinting, or tilling a disturbed area to provide temporary stabilization of disturbed areas. Surface roughening creates variations in the soil surface that help to minimize wind and water erosion. Depending on the technique used, surface roughening may also help establish conditions favorable to establishment of vegetation.

Appropriate Uses

Surface roughening can be used to provide temporary stabilization of disturbed areas, such as when revegetation cannot be immediately established due to seasonal planting limitations. Surface roughening is not a stand-alone BMP, and should be used in conjunction with other erosion and sediment controls.

Surface roughening is often implemented in conjunction with grading and is typically performed using heavy construction equipment to track the surface. Be aware that tracking with heavy equipment will also compact soils, which is not desirable in areas that will be revegetated. Scarifying, tilling, or ripping are better surface roughening techniques in locations where revegetation is planned. Roughening is not effective in very sandy soils and cannot be effectively performed in rocky soil.

Design and Installation

Typical design details for surfacing roughening on steep and mild slopes are provided in Details SR-1 and SR-2, respectively.

Surface roughening should be performed either after final grading or to temporarily stabilize an area during active construction that may be inactive for a short time period. Surface roughening should create depressions 2 to 6 inches deep and approximately 6 inches apart. The surface of exposed soil can be roughened by a number of techniques and equipment. Horizontal grooves (running parallel to the contours of the land) can be made using tracks from equipment treads, stair-step grading, ripping, or tilling.

Fill slopes can be constructed with a roughened surface. Cut slopes that have been smooth graded can be roughened as a subsequent operation. Roughening should follow along the contours of the slope. The tracks left by truck mounted equipment working perpendicular to the contour can leave acceptable horizontal depressions; however, the equipment will also compact the soil.

Surface Roughening	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

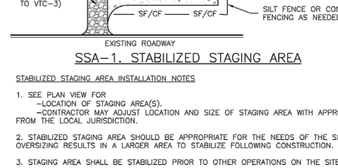
Maintenance and Removal

Care should be taken not to drive vehicles or equipment over areas that have been surface roughened. Tire tracks will smooth the roughened surface and may cause runoff to collect into rills and gullies.

Because surface roughening is only a temporary control, additional treatments may be necessary to maintain the soil surface in a roughened condition.

Areas should be inspected for signs of erosion. Surface roughening is a temporary measure, and will not provide long-term erosion control.

PLAN VIEW



SECTION A–A

NOTES:
1. SIGN MATERIAL, EXCAVATION, AND RESTORATION ARE INCLUDED IN THE COST OF THE CONCRETE WASHOUT STRUCTURE.
2. EROSION BALES MAY BE USED AS AN ALTERNATIVE FOR THE BERM.

1/1/08 DATE APPROVED: John A. McCarty DEPARTMENT OF TRANSPORTATION	Concrete Washout Structure Standard Drawing	EL PASO COUNTY DEPARTMENT OF TRANSPORTATION
	REVISION DATE: 7/17/07	FILE NAME: SD_3-84

Description

Photograph MU-1. An area that was recently seeded, mulched, and crimped.

Mulching consists of evenly applying straw, hay, shredded wood mulch, rock, bark or compost to disturbed soils and securing the mulch by crimping, tackifiers, netting or other measures. Mulching helps reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff. Although often applied in conjunction with temporary or permanent seeding, it can also be used for temporary stabilization of areas that cannot be reseeded due to seasonal constraints.

Mulch can be applied either using standard mechanical dry application methods or using hydromulching equipment that hydraulically applies a slurry of water, wood fiber mulch, and often a tackifier.

Appropriate Uses

Use mulch in conjunction with seeding to help protect the seedbed and stabilize the soil. Mulch can also be used as a temporary cover on low to mild slopes to help temporarily stabilize disturbed areas where growing season constraints prevent effective reseeding. Disturbed areas should be properly mulched and tacked, or seeded, mulched and tacked promptly after final grade is reached (typically within no longer than 14 days) on portions of the site not otherwise permanently stabilized.

Standard dry mulching is encouraged in most jurisdictions; however, hydromulching may not be allowed in certain jurisdictions or may not be allowed near waterways.

Do not apply mulch during windy conditions.

Design and Installation

Prior to mulching, surface-roughen areas by rolling with a crimping or punching type roller or by track walking. Track walking should only be used where other methods are impractical because track walking with heavy equipment typically compacts the soil.

A variety of mulches can be used effectively at construction sites. Consider the following:

Mulch	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

- Clean, weed-free and seed-free cereal grain straw should be applied evenly at a rate of 2 tons per acre and must be tacked or fastened by a method suitable for the condition of the site. Straw mulch must be anchored (and not merely placed) on the surface. This can be accomplished mechanically by crimping or with the aid of tackifiers or nets. Anchoring with a crimping implement is preferred, and is the recommended method for areas flatter than 3:1. Mechanical crimpers must be capable of tucking the long mulch fibers into the soil to a depth of 3 inches without cutting them. An agricultural disk, while not an ideal substitute, may work if the disk blades are dull or blunted and set vertically; however, the frame may have to be weighted to afford proper soil penetration.
- Grass hay may be used in place of straw; however, because hay is comprised of the entire plant including seed, mulching with hay may seed the site with non-native grass species which might in turn out-compete the native seed. Alternatively, native species of grass hay may be purchased, but can be difficult to find and are more expensive than straw. Purchasing and utilizing a certified weed-free straw is an easier and less costly mulching method. When using grass hay, follow the same guidelines as for straw (provided above).
- On small areas sheltered from the wind and heavy runoff, spraying a tackifier on the mulch is satisfactory for holding it in place. For steep slopes and special situations where greater control is needed, erosion control blankets anchored with stakes should be used instead of mulch.
- Hydraulic mulching consists of wood cellulose fibers mixed with water and a tackifying agent and should be applied at a rate of no less than 1,500 pounds per acre (1,425 lbs of fibers mixed with at least 75 lbs of tackifier) with a hydraulic mulcher. For steeper slopes, up to 2000 pounds per acre may be required for effective hydroseeding. Hydromulch typically requires up to 24 hours to dry; therefore, it should not be applied immediately prior to inclement weather. Application to roads, waterways and existing vegetation should be avoided.
- Erosion control mats, blankets, or nets are recommended to help stabilize steep slopes (generally 3:1 and steeper) and waterways. Depending on the product, these may be used alone or in conjunction with grass or straw mulch. Normally, use of these products will be restricted to relatively small areas. Biodegradable mats made of straw and jute, straw-coconut, coconut fiber, or excelsior can be used instead of mulch. (See the ECM/TRM BMP for more information.)
- Some tackifiers or binders may be used to anchor mulch. Check with the local jurisdiction for allowed tackifiers. Manufacturer's recommendations should be followed at all times. (See the Soil Binder BMP for more information on general types of tackifiers.)
- Rock can also be used as mulch. It provides protection of exposed soils to wind and water erosion and allows infiltration of precipitation. An aggregate base course can be spread on disturbed areas for temporary or permanent stabilization. The rock mulch layer should be thick enough to provide full coverage of exposed soil on the area it is applied.

Maintenance and Removal

After mulching, the bare ground surface should not be more than 10 percent exposed. Reapply mulch, as needed, to cover bare areas.

Kimley»Horn
2024 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

NO.	REVISION	BY	DATE	APPR.

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
GEC DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C991

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_Details.dwg, 6/26/2025 8:51 AM

Description

Photograph CD-1. Rock check dams in a roadside ditch. Photo courtesy of WWE.

Check dams are temporary grade control structures placed in drainage channels to limit the erosivity of stormwater by reducing flow velocity. Check dams are typically constructed from rock, gravel bags, sand bags, or sometimes, proprietary devices. Reinforced check dams are typically constructed from rock and wire gabion. Although the primary function of check dams is to reduce the velocity of concentrated flows, a secondary benefit is sediment trapping upstream of the structure.

Appropriate Uses

Use as a grade control for temporary drainage ditches or swales until final soil stabilization measures are established upstream and downstream. Check dams can be used on mild or moderately steep slopes. Check dams may be used under the following conditions:

- As temporary grade control facilities along waterways until final stabilization is established.
- Along permanent swales that need protection prior to installation of a non-erodible lining.
- Along temporary channels, ditches or swales that need protection where construction of a non-erodible lining is not practicable.
- Reinforced check dams should be used in areas subject to high flow velocities.

Design and Installation

Place check dams at regularly spaced intervals along the drainage swale or ditch. Check dams heights should allow for pools to develop upstream of each check dam, extending to the downstream toe of the check dam immediately upstream.

When rock is used for the check dam, place rock mechanically or by hand. Do not dump rocks into the drainage channel. Where multiple check dams are used, the top of the lower dam should be at the same elevation as the toe of the upper dam.

When reinforced check dams are used, install erosion control fabric under and around the check dam to prevent erosion on the upstream and downstream sides. Each section of the dam should be keyed in to reduce the potential for washout or undermining. A rock apron upstream and downstream of the dam may be necessary to further control erosion.

Check Dams	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

Design details with notes are provided for the following types of check dams:

- Rock Check Dams (CD-1)
- Reinforced Check Dams (CD-2)

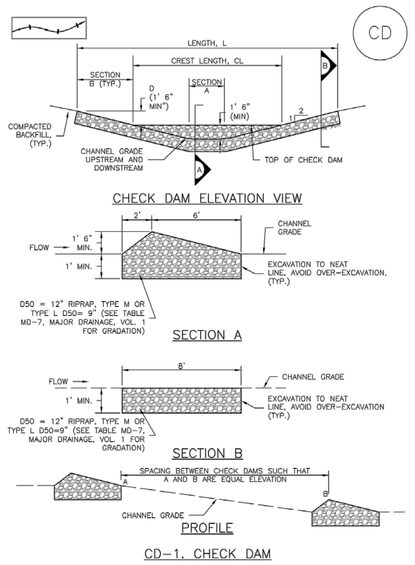
Sediment control logs may also be used as check dams; however, silt fence is not appropriate for use as a check dam. Many jurisdictions also prohibit or discourage use of straw bales for this purpose.

Maintenance and Removal

Replace missing rocks causing voids in the check dam. If gravel bags or sandbags are used, replace or repair torn or displaced bags.

Remove accumulated sediment, as needed to maintain BMP effectiveness, typically before the sediment depth upstream of the check dam is within ½ of the crest height. Remove accumulated sediment prior to mulching, seeding, or chemical soil stabilization. Removed sediment can be incorporated into the earthwork with approval from the Project Engineer, or disposed of at an alternate location in accordance with the standard specifications.

Check dams constructed in permanent swales should be removed when perennial grasses have become established, or immediately prior to installation of a non-erodible lining. All of the rock and accumulated sediment should be removed, and the area seeded and mulched, or otherwise stabilized.



CD–1. CHECK DAM

CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF CHECK DAMS.
   –CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM).
   –LENGTH (L), CREST LENGTH (CL), AND DEPTH (D).

2. CHECK DAMS INDICATED ON INITIAL SWMP SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND DISTURBING ACTIVITIES.

3. RIPRAP UTILIZED FOR CHECK DAMS SHOULD BE OF APPROPRIATE SIZE FOR THE APPLICATION. TYPICAL TYPES OF RIPRAP USED FOR CHECK DAMS ARE TYPE M (D50 12") OR TYPE L (D50 9").

4. RIPRAP PAD SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1'.

5. THE ENDS OF THE CHECK DAM SHALL BE A MINIMUM OF 1' 6" HIGHER THAN THE CENTER OF THE CHECK DAM.

CHECK DAM MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

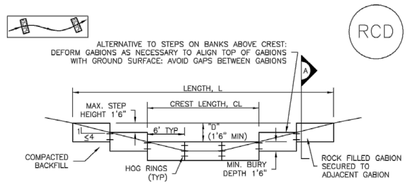
4. SEDIMENT ACCUMULATED UPSTREAM OF THE CHECK DAMS SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS WITHIN ½ OF THE HEIGHT OF THE CREST.

5. CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

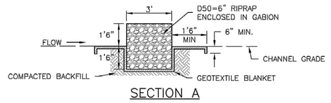
6. WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACKFILL. DISTURBED AREA SHALL BE SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.



REINFORCED CHECK DAM ELEVATION VIEW



SECTION A

REINFORCED CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATIONS OF CHECK DAMS.
   –CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM).
   –LENGTH (L), CREST LENGTH (CL), AND DEPTH (D).

2. CHECK DAMS INDICATED ON THE SWMP SHALL BE INSTALLED PRIOR TO AN UPSTREAM LAND–DISTURBING ACTIVITIES.

3. REINFORCED CHECK DAMS, GABIONS SHALL HAVE GALVANIZED TWISTED WIRE NETTING WITH A MAXIMUM OPENING DIMENSION OF 4½" AND A MINIMUM WIRE THICKNESS OF 0.10". WIRE "HOG RINGS" AT 4" SPACING OR OTHER APPROVED MEANS SHALL BE USED AT ALL GABION SEAMS AND TO SECURE THE GABION TO THE ADJACENT SECTION.

4. THE CHECK DAM SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1' 6".

5. GEOTEXTILE BLANKET SHALL BE PLACED IN THE REINFORCED CHECK DAM TRENCH EXTENDING A MINIMUM OF 1' 6" ON BOTH THE UPSTREAM AND DOWNSTREAM SIDES OF THE REINFORCED CHECK DAM.

CD–2. REINFORCED CHECK DAM

REINFORCED CHECK DAM MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF REINFORCED CHECK DAMS SHALL BE REMOVED AS NEEDED TO MAINTAIN THE EFFECTIVENESS OF BMP, TYPICALLY WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN ½ THE HEIGHT OF THE CREST.

5. REPAIR OR REPLACE REINFORCED CHECK DAMS WHEN THERE ARE SIGNS OF DAMAGE SUCH AS HOLES IN THE GABION OR UNDERCUTTING.

6. REINFORCED CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

7. WHEN REINFORCED CHECK DAMS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, AND COVERED WITH A GEOTEXTILE BLANKET, OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Kimley»Horn
2024 KIMLEY–HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453–0180

NO.	REVISION	BY:	DATE	APPR.

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

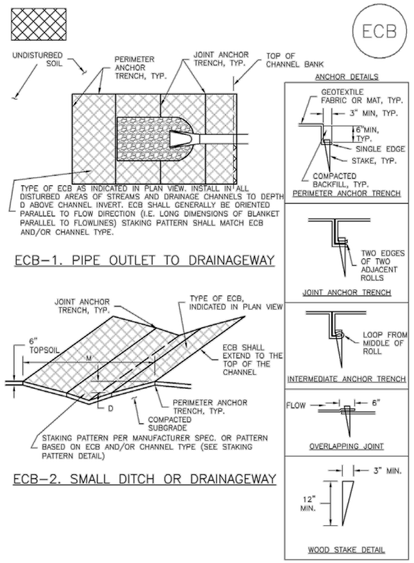
FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
GEC DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

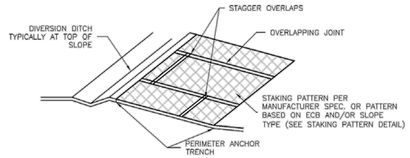
SHEET
C992

K:\COS_WaterResources\196825001_Fishers Canyon Creek\CADD\Plansheets\GEC\GEC_Details.dwg, 6/26/2025 8:51 AM

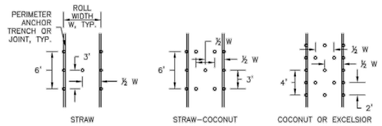


ECB–1. PIPE OUTLET TO DRAINAGEWAY

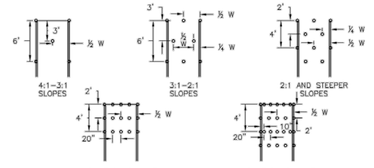
ECB–2. SMALL DITCH OR DRAINAGEWAY



ECB–3. OUTSIDE OF DRAINAGEWAY



STAKING PATTERNS BY ECB TYPE



STAKING PATTERNS BY SLOPE OR CHANNEL TYPE

EROSION CONTROL BLANKET INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF ECB.
   –TYPE OF ECB (STRAW, STRAW–COCONUT, COCONUT, OR EXCELSIOR).
   –AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.

2. 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPs, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.

3. IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.

4. PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.

5. JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.

6. INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE–HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.

7. OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.

8. MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB–1.

9. ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBS SHALL BE RESEEDED AND MULCHED.

10. DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

TABLE ECB–1. ECB MATERIAL SPECIFICATIONS

TYPE	COCONUT CONTENT	STRAW CONTENT	EXCELSIOR CONTENT	RECOMMENDED NETTING**
STRAW*	–	100%	–	DOUBLE/ NATURAL
STRAW–COCONUT	30% MIN	70% MAX	–	DOUBLE/ NATURAL
COCONUT	100%	–	–	DOUBLE/ NATURAL
EXCELSIOR	–	–	100%	DOUBLE/ NATURAL

*STRAW ECBs MAY ONLY BE USED OUTSIDE OF STREAMS AND DRAINAGE CHANNEL.
**ALTERNATE NETTING MAY BE ACCEPTABLE IN SOME JURISDICTIONS

EROSION CONTROL BLANKET MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.

5. ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATED A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO AND TOWN OF PARKER COLORADO, NOT AVAILABLE IN AUTOCAD)

NO.	REVISION	BY:	DATE	APPR.

Kimley»Horn
2024 KIMLEY–HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903 (719) 453–0180

DESIGNED BY: DCM
DRAWN BY: LWM
CHECKED BY: DCM
DATE: 6/26/2025

FISHERS CANYON CREEK
GRADING AND EROSION CONTROL PLANS
EL PASO COUNTY, COLORADO
GEC DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn and Associates, Inc.

PROJECT NO.
196825001

SHEET
C993

APPENDIX D: REFERENCES

Approved
El Paso County
Planning Commission
This 16th day of July 19 91
Chairman
Secretary

MULLER

Fishers Canyon Drainage Basin Planning Study

FINAL DESIGN REPORT

Prepared For:
El Paso County
Department of Public Works

Prepared By:
Muller Engineering Company

September, 1991

SECTION VII

DESCRIPTION OF ALTERNATIVE PLANS

Initial Alternative Formulation

The alternative formulation process started with brainstorming possible solutions to the drainage concerns existing in the basin. The objective of this phase was to approach the existing problems in a broad, complete manner to ensure that all types of possible solutions were considered. Ideas considered for Stratmoor Hills and Stratmoor Valley included various configurations of detention, development of open channel conveyances, acquisition of residential structures, regrading streets, and installation of various sizes of storm sewer systems. Concepts examined for the Fishers Canyon Drainageway and Fishers Canyon Tributary included conveying flows in a closed conduit, constructing concrete lined, riprap lined, or grass-lined channel sections, adding a limited number or a large number of drop structures, constructing small check structures and expecting some erosion when their capacity is exceeded, and installing rock low flow channels of various sizes. The do-nothing alternative was also considered throughout the basin.

After the initial formulation of alternatives, the least favorable concepts were eliminated based on negative impressions regarding cost, adverse environmental impact, effectiveness and maintenance requirements. The remaining alternative concepts were refined into two general plans.

Description of Alternative 1 and Alternative 2

Stratmoor Hills: Alternative 1 - Storm Sewer Improvements with No Detention. The residential area north of B Street has experienced frequent nuisance flooding during storm events. The area is developed on a hillside, with runoff typically being conveyed down slopes between houses instead of remaining in streets and gutters. The presence of Clover Ditch, no longer in use for irrigation purposes, exacerbates flooding problems by collecting stormwater runoff and releasing it over low banks toward houses below. The ditch has too flat of a longitudinal slope to be useful in coveying runoff out of the area.

A system of storm sewer improvements is proposed to collect runoff in Stratmoor Hills and minimize flooding problems. The plan is shown in Figure VII-1. The plan generally consists of storm sewers sized for a 10-year return period upstream of Clover Ditch and for a 100-year return period downstream of the ditch. This sizing strategy satisfies design criteria promulgated in the City of Colorado Springs/El Paso County Drainage Criteria Manual. The ditch itself is proposed to be graded toward inlets near each road crossing which would be designed to drain the ditch and eliminate overtopping in the 100-year storm. Additional information regarding Alternative 1, including quantification of areas of riparian vegetation potentially impacted, is shown in Table VII-1.

Stratmoor Hills: Alternative 2 - Storm Sewer Improvements with Detention. Alternative 2 is similar to Alternative 1, but incorporates a detention facility upstream in the basin in order to reduce flows and required pipe sizes. The plan is depicted in Figure VII-1. Additional information is shown in Table VII-1.

TABLE VII-1
STRATMOOR HILLS ALTERNATIVE COMPARISON

Consideration	Alternative 1 Storm Sewer Improvements With No Detention	Alternative 2 Storm Sewer Improvements With Detention
1. Probable Cost (including construction, R.O.W., engineering)	$2.15 Million	$ 2.22 Million
2. Existing Wetland/Riparian Vegetation	1 acre* of herbaceous/shrub wetlands on side tributary. 5 acres (2,800 l.f.) of grass overbank with shrubs and trees along Fisher's Canyon.	1 acre* of herbaceous/shrub wetlands on side tributary. 5 acres (2,800 l.f.) of grass overbank with shrubs and trees along Fisher's Canyon
3. Wetland/Riparian Impacts	Preserves wetlands on side tributary at location of detention pond. Minor loss of grass/shrub/tree riparian overbank at isolated outfalls on Fisher's Canyon.	Loss of wetlands on side tributary at location of detention pond. Minor loss of grass/shrub/tree riparian overbank at isolated outfalls on Fisher's Canyon.
4. Compensation Mitigation Opportunities	Opportunity for on-site replacement of grass/shrub overbank.	Opportunity for on-site wetland replacement at location of detention pond. Opportunity for on-site grass/shrub overbank.
5. Maintenance Requirements	Periodic maintenance is required to keep Clover Ditch inlets clear.	Periodic maintenance is required to keep Clover Ditch inlets clear. Periodic maintenance of detention pond is required.
6. Right-of-Way Requirements	Easement is required for Crestridge Avenue outfall to Fishers Canyon drainageway.	Easement is required for Crestridge Avenue outfall to Fishers Canyon drainageway. R.O.W. is required for detention pond.
7. Constructability	Three pipe crossings of railroad are required. Outfalls to Fishers Canyon drainageway require adequate scour protection.	Three pipe crossings of railroad are required. Outfall to Fishers Canyon drainageway require adequate scour protection.

*all acreages of vegetation are estimates

Stratmoor Valley: Alternative 1 - Storm Sewer Improvements with No Detention. Like Stratmoor Hills, Stratmoor Valley was developed without an adequate initial drainage system. A plan of storm sewer improvements is proposed and is shown in Figure VII-1. Proposed storm sewers are sized to convey 10-year flows from the currently developed area and 100-year flows from upstream areas that may develop in the future. Table VII-2 shows additional information regarding Alternative 1.

Stratmoor Valley: Alternative 2 - Storm Sewer Improvements with Detention. Alternative 2 is similar to Alternative 1, but proposes detention ponds to limit runoff from future upstream developing areas to historic levels. The plan is depicted in Figure VII-1. Additional information is shown in Table VII-2.

Fishers Canyon Drainageway and Tributary: Alternative 1 - Vegetated Channel with a Rock Low Flow Channel. The Fishers Canyon drainageway and its tributaries between B Street and Interstate 25 are currently experiencing significant bed and bank erosion. The erosion discourages the establishment of wetland vegetation along the channel and is contributing to sediment deposition in the culvert under Interstate 25 and in the downstream channel.

Alternative 1 consists of a system of stabilization improvements including a rock low flow channel, a number of drop structures, selected riprap bank protection, and widening of constricted areas. The plan is shown in Figure VII-1. Typical cross sections and details are shown in Figure VII-2. The improvements would encourage the formation of wetland vegetation along the channel. Additional information regarding Alternative 1 improvements is shown in Table VII-3.

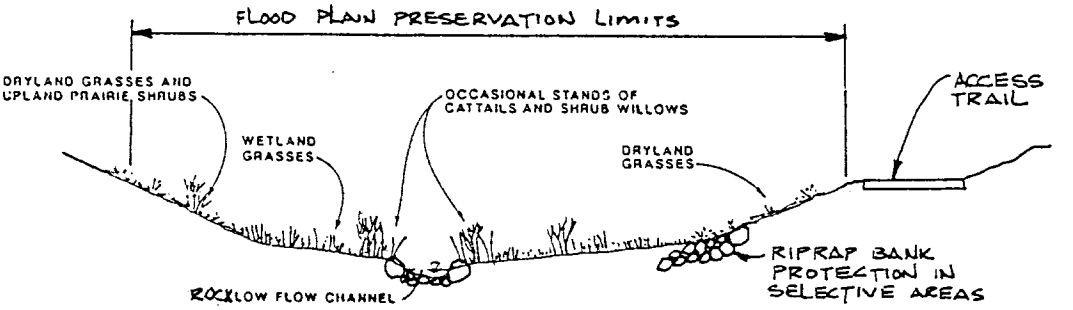
TABLE VII-2
STRATMOOR VALLEY ALTERNATIVE COMPARISON

Consideration	Alternative 1 Storm Sewer Improvements With No Detention	Alternative 2 Storm Sewer Improvements With Detention
1. Probable Cost (including construction, R.O.W., engineering)	$1.35 Million	$1.42 Million
2. Existing Wetland/Riparian Vegetation	110 acres (8,000 l.f.) of riparian woodland along Fountain Creek.	110 acres (8,000 l.f.) of riparian woodland along Fountain Creek.
3. Wetland/Riparian Impacts	Disturbance/loss of riparian woodland at isolated locations for pipeline and outfall structure within riparian area.	Disturbance/loss of riparian woodland at isolated locations for pipeline and outfall structure within riparian area.
4. Compensation Mitigation Opportunities	On-site replacement of riparian woodland.	On-site replacement of riparian woodland.
5. Maintenance Requirements	Periodic clearing of inlets may be required.	Periodic clearing of inlet may be required. Periodic maintenance of detention pond is required.
6. Right-of-Way Requirements	Easement is required for Kensington Drive outfall.	Easement is required for Kensington Drive outfall. R.O.W. is required for detention pond.
7. Constructability	Outfalls to Fountain Creek require adequate scour protection.	Outfalls to Fountain Creek require adequate scour protection

TABLE VII-3
FISHERS CANYON DRAINAGEWAY
ALTERNATIVE COMPARISON

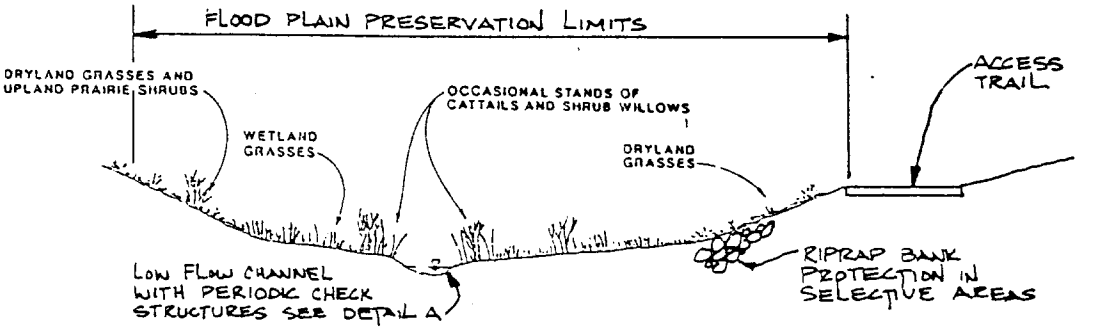
Consideration	Alternative 1 Vegetated Channel with Rock Low Flow Channel	Alternative 2 Vegetated Channel with Periodic Check Structures
1. Probable Cost (including construction, R.O.W., engineering)	$ 2.74 Million	$2.64 Million
2. Existing Wetland/Riparian Vegetation	5 acres (2,800 l.f.) of grass overbank with shrubs and trees along portions of Fisher's Canyon.	5 acres (2,800 l.f.) of grass overbank with shrubs and trees along portions of Fisher's Canyon.
3. Wetland/Riparian Impacts	Proposed improvements stabilize eroding channel and promote growth of wetland vegetation. Loss of minimal grass/shrub/tree riparian overbank.	Proposed improvements stabilize eroding channel and promote growth of wetland vegetation. Loss of significant grass/shrub/tree riparian overbank.
4. Compensation Mitigation Opportunities	On-site replacement of riparian grass and shrubs within grass-lined channel.	On-site replacement of riparian grass and shrubs within grass-lined channel.
5. Maintenance Requirements	Periodic channel maintenance is required	"Soft" low flow channel requires greater maintenance effort than rock low flow channel
6. Right-of-Way Requirements	Management of regulatory flood plain is recommended	Management of regulatory flood plain is recommended
7. Constructability	Control of water is required during construction	Control of water is required during construction. May require regrading of eroded low flow channel banks.

NOTE: PERIODIC CHANNEL DROP STRUCTURES MAY BE REQUIRED.

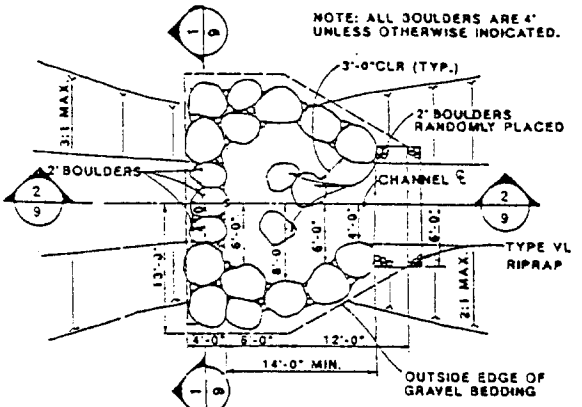


ALTERNATIVE 1 VEGETATED CHANNEL
N.T.S

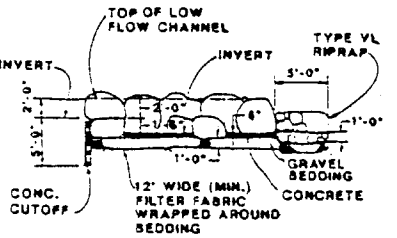
NOTE: PERIODIC CHANNEL DROP STRUCTURES MAY BE REQUIRED



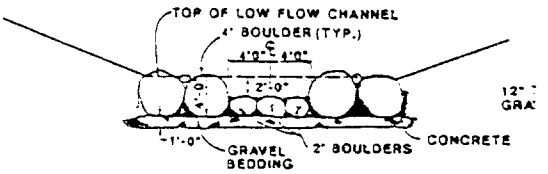
ALTERNATIVE 2 VEGETATED CHANNEL
N.T.S.



DETAIL A
TYPICAL CHECK STRUCTURE
N.T.S.



SECTION 2/9
N.T.S.



SECTION 1/9
N.T.S.

FISHERS CANYON DRAINAGE BASIN PLANNING STUDY	TYPICAL CHANNEL SECTIONS	FIGURE VII-2

Fishers Canyon Drainageway and Tributary: Alternative 2 - Vegetated Channel with Periodic Check Structures. This concept is similar to Alternative 1 but proposes the use of small periodic check structures instead of a continuous rock low flow channel. Between check structures the low flow channel would be unlined and would be allowed to erode and flatten over time to a stable equilibrium slope. Additional information comparing Alternative 2 to Alternative 1 is shown in Table VII-3.

Public Comments Regarding Alternative Plans

Review comments regarding the Alternative 1 and Alternative 2 plans were solicited from varous public agencies. Written comments were received rom the EPA, Colorado Division of Wildlife, and Colorado Department of Highways. In addition, a public meeting was held near the study area on September 18, 1990 to explain the alternative plans to interested citizens and to seek feedback. In general, support was expressed for constructing a system of drainage improvements in the basin to address existing concerns. Specific comments regarding Alternative 1 and Alternative 2 were varied, although the Alternative 1 plans were generally favored over the Alternative 2 plans. A summary of comments made at the public meeting, as well as copies of written comments received from public agencies, appear in Appendix A.

SECTION VIII

SUMMARY OF SELECTED PLAN

Plan Refinements

After a review of the public comments received concerning the alternative plans, as well as an evaluation based on County objectives such as constructibility and long term maintenance, El Paso County staff provided direction regarding the selected alternative to undergo preliminary design. This direction is summarized below:

Stratmoor Hills and Stratmoor Valley. Alternative 1, storm sewer improvements with no detention was selected with the one modification; namely, that downsizing or elimination of some of the less critical storm sewer laterals be considered in order to optimize the system and reduce the total cost of the improvements relative to benefits received.

Fishers Canyon Drainageway and Tributaries. Alternative 1, vegetated channel with a rock low flow channel was selected with several modifications. First, an attempt was to be made to lay out the rock lining in the incised, eroding channel in such a way that disturbance to the adjacent natural riparian vegetation would be minimized. Second, consideration was to be given to a detention facility upstream of Interstate 25 to reduce the anticipated 100-year discharge to the capacity of the existing box culvert under the highway.

The selected plan was to address a number of concerns expressed by public agencies associated with the Letter of Permission (LOP) process, including the Environmental Protection Agency (EPA), and the Colorado Division of Wildlife (CDOW). These concerns and the actions recommended in the selected plan to respond to the concerns are summarized below:

1. Stratmoor Hills and Stratmoor Valley

	LOP Agency Input	Action
A.	Storm sewer outfalls to Fishers Canyon Drainageway and Fountain Creek create potential for serious local scour and bank erosion problems.	Plan will identify measures to provide adequate scour protection at outfalls and to avoid or mitigate impacts to riparian habitats.
B.	(From CDOW) Detention is recommended to reduce peak storm water discharges at outfalls to Fishers Canyon Drainageway and Fountain Creek.	In these specific applications, there would be no peak flow reduction from detention by the time the Stratmoor Hills storm sewer reaches the Fishers Canyon Drainageway and little reduction by the time the Stratmoor Valley system reaches Fountain Creek. Consequently, detention is not an effective way to reduce impacts to downstream receiving waters. For the detention alternative the cost advantages of smaller pipes immediately downstream of the detention ponds are outweighed by the costs of the ponds themselves. In addition, avoiding the construction of these small detention ponds avoids disturbance to the existing Stratmoor Hills wetland (avoidance is preferred to mitigation) and minimizes ongoing maintenance requirements. Energy dissipation structures are proposed at the storm sewer outfalls to protect downstream receiving waters.

2. Fishers Canyon Drainageway and Tributaries

LOP Agency Input	Action
A. Existing riparian vegetation along the drainageway should be protected.	The existing riparian vegetation is located on overbanks adjacent to an incised channel which is actively eroding and is generally devoid of vegetation. The selected alternative is designed to stabilize the incised channel through the construction of a rock lining and to avoid, as much as possible, disturbance to the adjacent riparian vegetation between B Street and Interstate 25. Because of the steep gradient of the existing drainageway (as high as 1.6 percent), maintaining an unlined bottom would require significant channel regrading between frequent check structures. The unlined approach would cause more disturbance to the riparian vegetation and be more costly to construct and maintain than the selected alternative.
B. Impacted areas of wetland and riparian vegetation should be quantified.	The summary report for the drainage basin planning study includes estimates of impacted areas of wetland and riparian vegetation (shown in Tables VII-2 through VII-3 for alternative concepts and in this section for the selected plan).

3. General

Both the EPA and CDOW have expressed concerns regarding the procedural aspects of the Letter of Permission process. These concerns are not specifically addressed by the Fishers Canyon Drainage Basin Planning Study; however, it is expected that future communications among the LOP agencies will lead toward the goal of an effective and efficient 404 process.

Preliminary Design

Preliminary design drawings of the selected drainage plan for the Fishers Canyon Basin are shown in Figures VIII-1 through VIII-4. The selected plan is depicted on aerial photography of the basin at a scale of 1-inch equals 200 feet superimposed with 2 foot contour interval topographic information. The

photography for the mapping was taken on February 9, 1990. A legend for the preliminary design depiction is shown on Figure VIII-3. Sheet indexing is indicated on Figure VII-2. Profiles of the selected plan improvements are shown on Figures VIII-5 and VIII-6.

Storm sewer profiles shown on Figure VIII-6 in Stratmoor Hills, Westmark, and Stratmoor Valley are preliminary in nature. Refinements to the profiles will be required during the final design phase to avoid conflicts with the sanitary sewer system and other major utilities. The existing sanitary sewer system is shown in plan view in the vicinity of proposed storm sewer improvements. This information was transferred from mapping obtained from Stratmoor Hills Water and Sanitation District. Sanitary sewer crossings are indicated in profile on Figure VIII-6; however, the depths of the sanitary sewers are unknown at this time.

At the encouragement of the County, proposed storm sewer improvements in Stratmoor Hills and Stratmoor Valley reflect some downsizing of laterals from the 10-year level of protection shown in Alternative 1. This downsizing reflects a shift in strategy from meeting standard drainage design criteria for new developments to installing the minimum system necessary to eliminate, as much as possible, the inundation of houses during the 100-year event. The approximate design recurrance interval of these downsized laterals, which would function in large runoff events in combination with a certain amount of sheet flow between houses, is 2 years. The maximum quanitity of sheet flow assumed to pass between houses during a 100-year event is 1.0 cubic feet per second per foot of width. Flows in excess of this amount would be designed to be conveyed in the proposed storm sewer.

Typical channel sections of Fishers Canyon Drainageway and Fishers Canyon Tributary are shown on Figure VIII-5. The selected plan for Fishers Canyon Drainageway is designed to stabilize the bed and banks of the eroding active channel in a manner which preserves, as much as possible, the adjacent riparian vegetation. Six drop structures are proposed to reduce the steep existing stream gradient and decrease flood velocities. A side channel detention pond is proposed upstream of Interstate 25 to reduce the estimated future development condition 100-year flow from 3170 cfs to 2900 cfs, which is the design capacity of the culverts under Interstate 25 and Maxwell Street. A drop structure and channel enlargement downstream of Maxwell Street, in conjunction with fill placed south of the channel between Interstate 25 and Maxwell Street, would enable the Fishers Canyon 100-year flood plain to be confined to the channel instead of spilling south to inundate houses in Stratmoor Valley.

The selected plan for Fishers Canyon Tributary would fill and stabilize the steep, deeply incised channel. A rock low flow channel and three drop structures are proposed.

Environmental Impact Mitigation Guidelines

The Fishers Canyon Drainageway, although in a deteriorating condition, has the potential to be a valued local resource providing natural beauty and a diversity of vegetation and wildlife habitat. The proposed improvements, while necessary to address serious erosion problems and flood hazards, must not in themselves alter the stream from a natural to an "engineered" character. The proposed improvements are intended to be designed to blend in with the natural stream environment.

In developing the selected plan for Fishers Canyon Drainageway and Tributary, the following objectives were considered. The first priority was to minimize if not avoid disturbance to the existing riparian vegetation adjacent to the eroding active channel. Accordingly, the proposed improvements would leave much of the existing overbank vegetation intact. Preserving the existing vegetation maintains the stream's hydraulic roughness and resistance to erosion provided by vegetal root structures, and minimizes disturbance to existing wildlife habitat. Where avoidance was not possible, the next priority was to minimize disturbance to existing riparian vegetation. The selected plan minimizes disturbance to adjacent riparian vegetation by confining the width of rock stabilization improvements to approximately the same width as the active channel, which is eroding and generally devoid of vegetation. It is recommended that relatively narrow construction limits be specified during the final design of channel improvements to minimize disturbance to overbank vegetation. Zones where disturbance to vegetation is unavoidable are to be replanted with riparian species selected for their habitat value and suitability to local conditions.

Positive environmental impacts are planned as part of the proposed improvements. The crests of proposed drop structures could be extended above the existing channel invert to encourage the formation of new backwater wetland areas. The rock low flow channel would be designed to be pervious to allow lateral passage of water for support of adjacent vegetation. The improvements would stabilize the channel against bed and bank erosion which is currently hindering the establishment of channel vegetation.

Of the estimated five acres of riparian vegetation along Fishers Canyon Drainageway, made up primarily of dryland grasses, shrubs and trees, approximately 60 percent, or three acres, are to be left undisturbed. Approximately thirty percent, or 1.5 acres, are estimated to be disturbed during construction and subsequently replanted for no net loss of vegetation. Approximately ten percent of the dryland vegetation, or 0.5 acres, is estimated to be lost due to the installation of a gravel trail along the drainageway for maintenance and pedestrian access.

DBPS COST BREAKDOWN

ESTIMATE OF EQUIVALENT DBPS COSTS
FISHERS CANYON CREEK IMPROVEMENTS
KIMLEY-HORN
5/30/2025

ATTEMPTED ITEMIZATION OF ORIGINAL DBPS PROBABLE COSTS

Location	Item	Details	Cost	Notes:
Fishers Canyon Creek				
	Drop Structure	1 - 6' Drop Structure at 3200 CFS	$105,000	This discharge for the Maxwell Street Drop Structure of 290 cfs seems like a typo because the flow from upstream of this is 3200 cfs.
	Drop Structure	1 - 4' Drop Structure at 3200 CFS	$95,000	
	Drop Structure	1 - 4' Drop Structure at 3200 CFS	$95,000	
	Drop Structure	1 - 4' Drop Structure at 2900 CFS	$85,000	
	Drop Structure	1 - 4' Drop Structure at 2900 CFS	$85,000	
	Drop Structure	1 - 5' Drop Structure at 2800 CFS	$90,000	
	Drop Structure	1 - 4' Drop Structure at 2600 CFS	$78,000	
	Drop Structure	1 - 4' Drop Structure at 2600 CFS	$78,000	
	Channel Lining	7700 LF 20.5' Wide at 2' Thick @ $35/CY (11693 CY)	$409,241	
	Other Costs	Revegetation, Excavation, Clearing (Assuming 2,500 LF of these costs)	$536,759	The DBPS doesn't eplicitly itemize this information so this number was entered to equal the total amount from Table IX-4. An estimate per linear foot will be used to break this down below.
	Contingencies	5%	$82,850	
	Engineering	10% of Contingency + Construction	$173,985	
	Detention Property		$56,000	
		Total Improvement Costs	$1,969,835	
Fishers Canyon Tributary				
	Drop Structure	1 - 11' Drop Structure at 290 CFS	$23,000	
	Drop Structure	1 - 6' Drop Structure at 290 CFS	$20,000	
	Drop Structure	1 - 5' Drop Structure at 290 CFS	$18,000	
	Drop Structure	1 - 4' Drop Structure at 120 CFS	$9,000	
	Drop Structure	1 - 4' Drop Structure at 120 CFS	$9,000	
	Channel Lining	2,500 LF 11.5' Wide at 2' Thick @ $35/CY (852 CY)	$74,537	
	Other Costs	Revegetation, Excavation, Clearing (Assuming 2,500 LF of these costs)	$66,636	The DBPS doesn't eplicitly itemize this information so this number was entered to equal the total amount from Table IX-4. An estimate per linear foot will be used to break this down below.
	Contingencies	5%	$7,677	
	Engineering	10% of Contingency + Construction	$22,785	
		Total Improvement Costs	$250,635	
Combined		Total Improvement Costs	$2,220,470	

ATTEMPTED ITEMIZATION OF EQUIVALENT DBPS PROBABLE COSTS

Location	Item	Details	Cost	
Fishers Canyon Creek				
	Drop Structure	1 - 4' Drop Structure at 3200 CFS	$95,000	
	Channel Lining	100 LF 20.5' Wide at 2' Thick @ $35/CY (151 CY)	$5,315	
	Other Costs	Revegetation, Excavation, Clearing (Assuming 2,500 LF of these costs)	$6,971	100 LF OF 7700 LF
	Contingencies	5%	$5,364	
	Engineering	10% of Contingency + Construction	$11,265	
		Total Improvement Costs	$123,915	
Fishers Canyon Tributary				
	Drop Structure	1 - 11' Drop Structure at 290 CFS	$23,000	
	Drop Structure	1 - 6' Drop Structure at 290 CFS	$20,000	
	Drop Structure	1 - 5' Drop Structure at 290 CFS	$18,000	
	Channel Lining	1,000 LF 11.5' Wide at 2' Thick @ $35/CY (852 CY)	$29,815	
	Other Costs	Revegetation, Excavation, Clearing (Assuming 2,500 LF of these costs)	$26,654	1000 LF OF 2500 LF
	Contingencies	5%	$4,541	
	Engineering	10% of Contingency + Construction	$12,201	
		Total Improvement Costs	$134,211	
Combined		Total Improvement Costs	$258,126	

Project Costs

For the proposed improvements presented in this report, the costs for constructing the respective facilities have been estimated using current material prices and labor rates. No costs have been included for property acquisition as needed land is anticipated to be donated to the County at no cost. The unit costs used for preparing the opinions of probable cost are listed in Table IX-1. Costs for storm sewer systems are based on unit costs according to pipe diameter and include pipe, manholes, inlets, inlet laterals, energy dissipation structures, mobilization, and excavation and backfill. In areas where storm sewers are located within streets, additional unit costs by pipe diameter apply to pavement removal and replacement and traffic control. The probable costs of the proposed improvements were itemized in the categories of drainage improvement costs, street crossing costs, utility relocation costs, and property costs. A five percent contingency was added to probable construction costs and a ten percent factor was added to account for engineering design.

Table IX-2 through IX-4 summarize the probable costs of the selected plan.

TABLE IX-1

UNIT COSTS

	Unit	Unit Cost
DRAINAGE IMPROVEMENT COSTS		
Clearing	Ac	$5,000.00
Excavation (includes hauling off-site)	CY	5.00
Embankment (includes on-site excavation)	CY	4.00
Riprap	CY	35.00
Boulders	CY	45.00
Grout for Boulders	CY	120.00
Gravel Filter	CY	25.00
Grouted Boulder Drop Structures		(See Fig. IX-1)
Wetland/Riparian Revegetation	Ac	6,500.00
Native Grass Revegetation	Ac	2,500.00
10' Gravel Access Path	LF	10.00
STORM SEWER PIPE, MANHOLE, LATERAL, INLET, & MOBILIZATION		
18 Inch	LF	63.00
21 Inch	LF	75.00
24 Inch	LF	88.00
27 Inch	LF	100.00
30 Inch	LF	113.00
33 Inch	LF	119.00
36 Inch	LF	125.00
39 Inch	LF	138.00
42 Inch	LF	150.00
48 Inch	LF	175.00
54 Inch	LF	200.00
60 Inch	LF	225.00
STORM SEWER ASPHALT REMOVAL AND REPLACEMENT, TRAFFIC CONTROL		
18 Inch	LF	7.00
21 Inch	LF	8.00
24 Inch	LF	10.00
27 Inch	LF	11.00
30 Inch	LF	13.00
33 Inch	LF	14.00
36 Inch	LF	14.00
39 Inch	LF	15.00
42 Inch	LF	17.00
48 Inch	LF	20.00
54 Inch	LF	22.00
60 Inch	LF	25.00
UTILITY RELOCATION COSTS		
Assumed as ten percent of storm sewer construction costs		

COST DATA DERIVED FROM
"DROP STRUCTURES IN THE
DENVER METROPOLITAN AREA"
PREPARED FOR UDFCD, DEC.,1986.

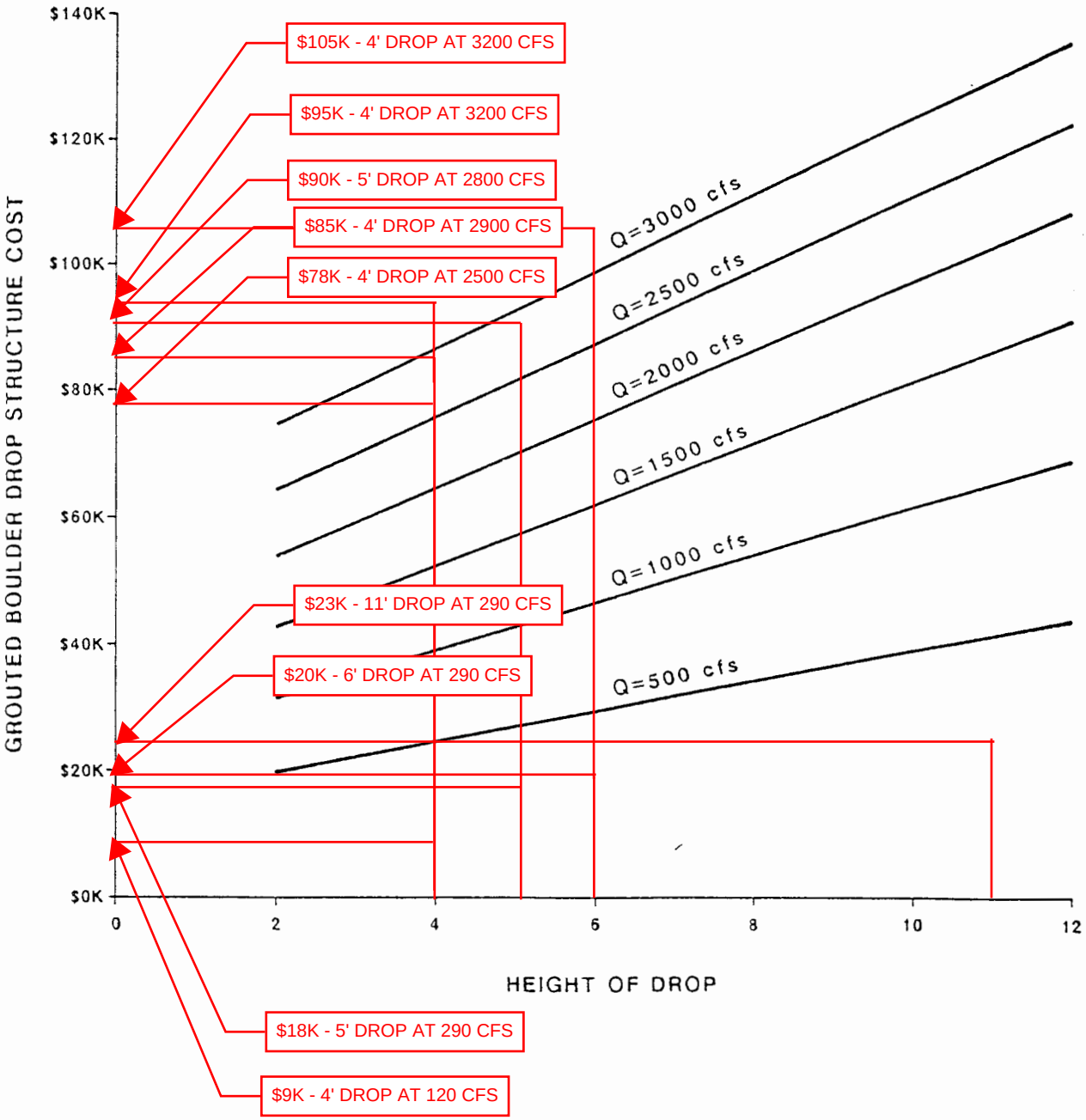


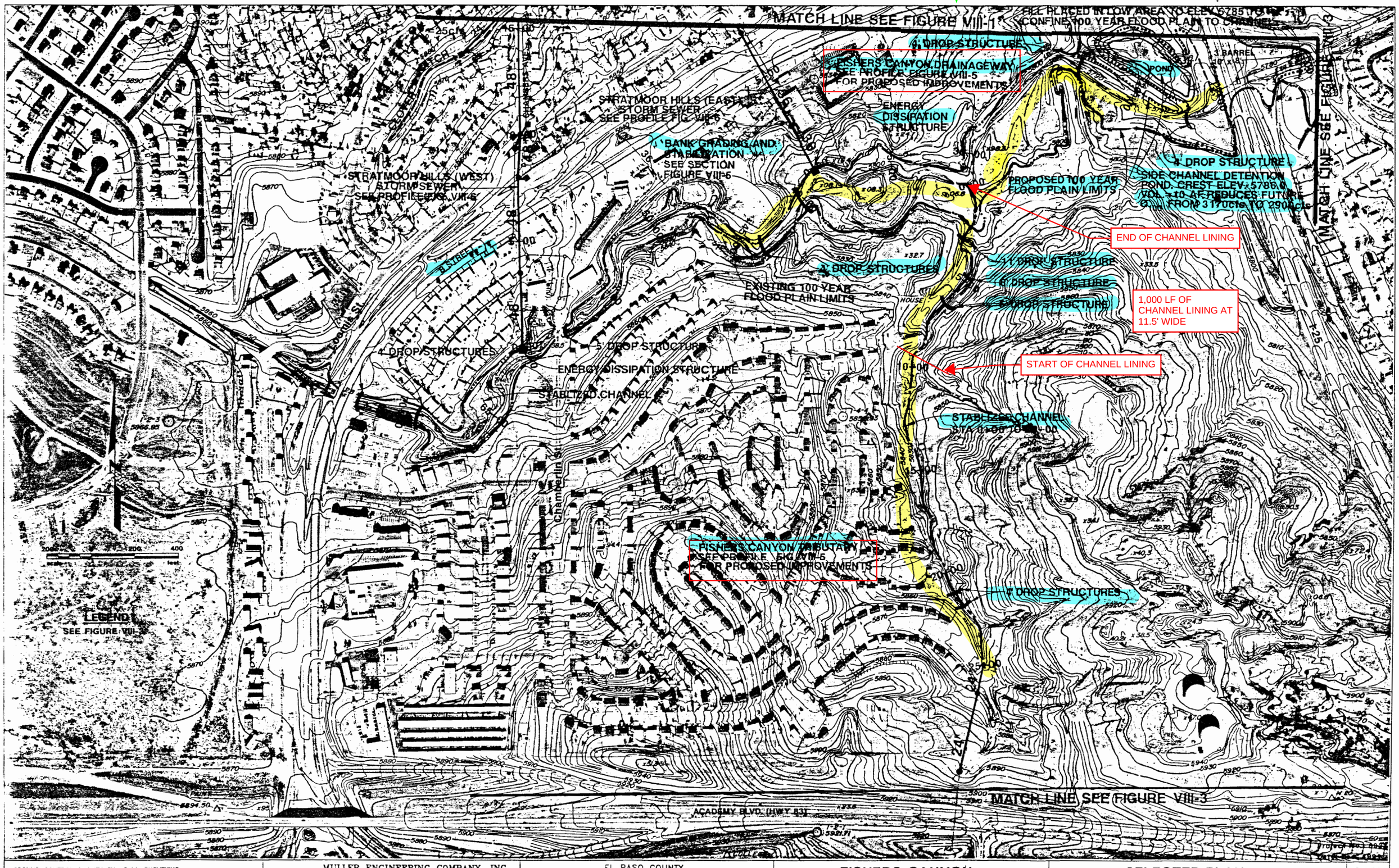
FIGURE IX-1
GROUTED BOULDER
DROP STRUCTURE COSTS

TABLE IX-4

OPINION OF PROBABLE COSTS
FISHERS CANYON DRAINAGEWAY AND TRIBUTARY

FISHERS CANYON DRAINAGEWAY		
Drainage Improvement Costs	SEE COST BREAKOUT BELOW	$ 1,657,000.00
Street Crossing Costs		0.00
Utility Relocation Costs		0.00
Construction Cost		1,657,000.00
Contingencies (5% of Construction Cost)		82,850.00
Engineering (10% of Construction Cost and Contingencies)		173,985.00
Property Costs for Channel (16 acres)*		0.00
Property Costs for Detention (4 acres)		56,000.00
TOTAL IMPROVEMENT COSTS		$ 1,969,835.00
FISHERS CANYON TRIBUTARY		
Drainage Improvement Costs		$ 312,000.00
Street Crossing Costs		0.00
Utility Relocation Costs		0.00
Construction Cost		312,000.00
Contingencies (5% of Construction Cost)		15,600.00
Engineering (10% of Construction Cost and Contingencies)		32,760.00
Property Costs (3.5 acres)*		0.00
TOTAL IMPROVEMENT COSTS		$ 360,360.00
TOTAL IMPROVEMENT COSTS, FISHERS CANYON DRAINAGEWAY AND TRIBUTARY		$ 2,330,195.00

*An easement or right-of-way is required for this improvement. Land dedication is anticipated at no cost to the County.



GROUND CONTROL SURVEY BY: B.J.I. SURVEYING
AERIAL PHOTOGRAPHY BY: ROCKY MOUNTAIN AERIAL SURVEYS, INC.
TOPOGRAPHIC MAPPING BY: REID'S AERIAL MAPPING
DATE FLOWN: 2/9/90

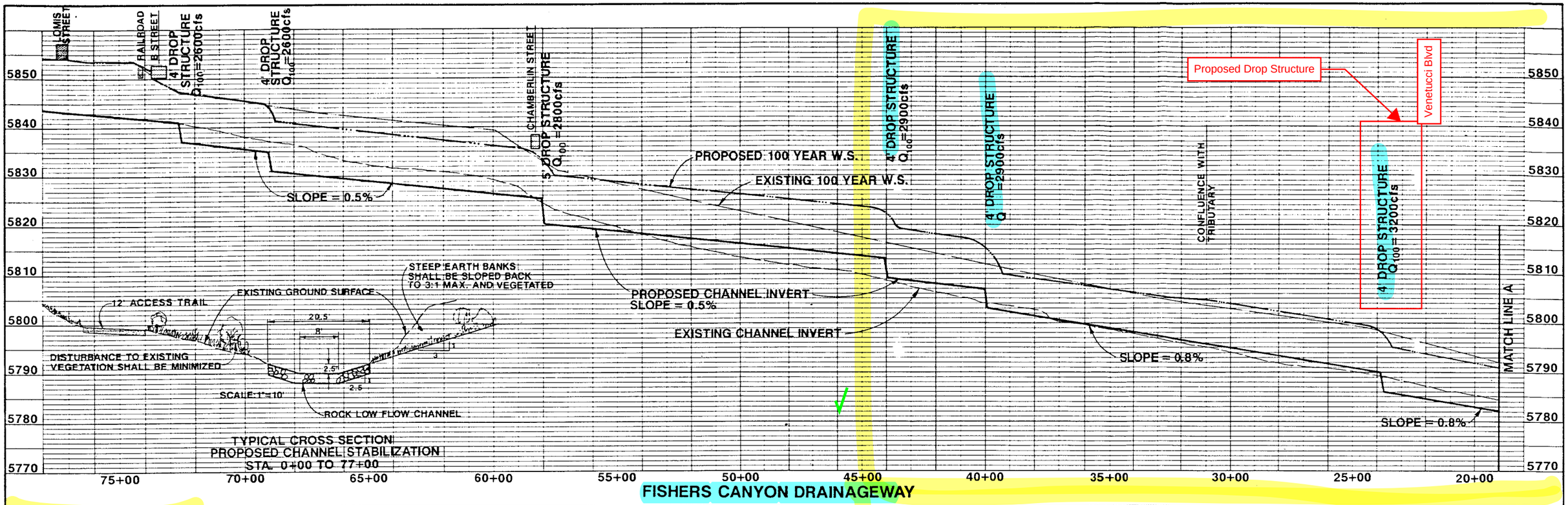
MULLER ENGINEERING COMPANY, INC.
CONSULTING ENGINEERS
550 SOUTH WADSWORTH BOULEVARD, SUITE 500
LAKEWOOD, COLORADO 80226-3118
(303) 937-3500

EL PASO COUNTY
DEPARTMENT OF PUBLIC WORKS
3170 CENTURY STREET
COLORADO SPRINGS, COLORADO 80907
(719) 520-6460

FISHERS CANYON
DRAINAGE BASIN PLANNING STUDY

SELECTED PLAN
SHEET 2 OF 4

FIGURE
VIII-2



Project No.: 8933
Date: Dec. 1991

MULLER ENGINEERING COMPANY, INC.
CONSULTING ENGINEERS
550 SOUTH WADSWORTH BOULEVARD, SUITE 500
LAKEWOOD, COLORADO 80226-3118
(303) 937-3500

EL PASO COUNTY
DEPARTMENT OF PUBLIC WORKS
3170 CENTURY STREET
COLORADO SPRINGS, COLORADO 80907
(719) 520-6460

FISHERS CANYON
DRAINAGE BASIN PLANNING STUDY

PROFILES
FISHERS CANYON DRAINAGEWAY AND FISHERS CANYON TRIBUTARY

FIGURE VIII-5

APPENDIX E: OPCC

2025 Financial Assurance Estimate Form
(with pre-plat construction)

Updated: 2/2025

PROJECT INFORMATION			
CDR Fishers Canyon Channel		Date: 5/16/25	CDR246

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	(with Pre-Plat Construction) Remaining
SECTION 1 - GRADING AND EROSION CONTROL (Construction and Permanent BMPs)							
Earthwork							
less than 1,000; $5,300 min		CY	$ 10.00	=	$ -		$ -
1,000-5,000; $8,000 min	4105.	CY	$ 7.50	=	$ 30,787.50		$ 30,787.50
5,001-20,000; $30,000 min		CY	$ 6.50	=	$ -		$ -
20,001-50,000; $100,000 min		CY	$ 4.50	=	$ -		$ -
50,001-200,000; $175,000 min		CY	$ 3.00	=	$ -		$ -
greater than 200,000; $500,000 min		CY	$ 2.50	=	$ -		$ -
Permanent Erosion Control Blanket	3860.	SY	$ 9.50	=	$ 36,670.00		$ 36,670.00
Permanent Seeding (inc. noxious weed mgmnt.) & Mulching	.89	AC	$ 2,169.00	=	$ 1,930.41		$ 1,930.41
					$ -		$ -
					$ -		$ -
[insert items not listed but part of construction plans]					$ -		$ -
Concrete Washout Basin	1.	EA	$ 1,260.00	=	$ 1,260.00		$ 1,260.00
Inlet Protection	1.	EA	$ 233.00	=	$ 233.00		$ 233.00
Rock Check Dam	2.	EA	$ 700.00	=	$ 1,400.00		$ 1,400.00
Safety Fence	690.	LF	$ 3.00	=	$ 2,070.00		$ 2,070.00
Silt Fence	290.	LF	$ 4.00	=	$ 1,160.00		$ 1,160.00
Construction Fence	690.	LF	$ 3.00	=	$ 2,070.00		$ 2,070.00
Staging Area	100.	SY	$ 45.00	=	$ 4,500.00		$ 4,500.00
Surface Roughening	.89	AC	$ 289.00	=	$ 257.21		$ 257.21
Temporary Seeding and Mulching	.89	AC	$ 1,927.00	=	$ 1,715.03		$ 1,715.03
Vehicle Tracking Control	1.	EA	$ 3,316.00	=	$ 3,316.00		$ 3,316.00
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
MAINTENANCE (35% of Construction BMPs)				=	$ 5,852.43		$ 5,852.43
* - Subject to defect warranty financial assurance. A minimum of 20% shall be retained until final acceptance (MAXIMUM OF 80% COMPLETE ALLOWED)		**Section 1 Subtotal**		=	$ 93,221.58		$ 93,221.58
SECTION 2 - PUBLIC IMPROVEMENTS *							
ROADWAY IMPROVEMENTS							
Construction Traffic Control	1.	LS	$ 35,000.00	=	$ 35,000.00		$ 35,000.00
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
STORM DRAIN IMPROVEMENTS							
Drainage Channel Lining, Rip Rap Type M	1745.	CY	$ 145.00	=	$ 253,025.00		$ 253,025.00
Drainage Channel Lining, Rip Rap Type H	321.	CY	$ 155.00	=	$ 49,755.00		$ 49,755.00
Boulders, Grouted, 36-Inch	280.	SY	$ 350.00	=	$ 98,000.00		$ 98,000.00
Boulders, Ungrouted, 36-Inch	50.	SY	$ 340.00		$ 17,000.00		$ 17,000.00
Boulder Edging	45.	LF	$ 285.00		$ 12,825.00		$ 12,825.00
Sheet Pile Cap, Concrete	220.	LF	$ 151.00	=	$ 33,220.00		$ 33,220.00
Sheet Pile, Steel, PZ-22	2200.	SF	$ 32.00	=	$ 70,400.00		$ 70,400.00
				=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
* - Subject to defect warranty financial assurance. A minimum of 20% shall be retained until final acceptance (MAXIMUM OF 80% COMPLETE ALLOWED)		**Section 2 Subtotal**		=	$ 569,225.00		$ 569,225.00

PROJECT INFORMATION			
CDR Fishers Canyon Channel		Date: 5/16/25	CDR246

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	Remaining
SECTION 3 - COMMON DEVELOPMENT IMPROVEMENTS (Private or District and NOT Maintained by EPC)**							
ROADWAY IMPROVEMENTS							
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
STORM DRAIN IMPROVEMENTS	(Exception: Permanent Pond/BMP shall be itemized under Section 1)						
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
WATER SYSTEM IMPROVEMENTS							
Water Main Pipe (PVC), Size 8"		LF	$ 90.00	=	$ -		$ -
Water Main Pipe (Ductile Iron), Size 8"		LF	$ 105.00	=	$ -		$ -
Gate Valves, 8"		EA	$ 2,599.00	=	$ -		$ -
Fire Hydrant Assembly, w/ all valves		EA	$ 9,228.00	=	$ -		$ -
Water Service Line Installation, inc. tap and valves		EA	$ 1,852.00	=	$ -		$ -
Fire Cistern Installation, complete		EA		=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
SANITARY SEWER IMPROVEMENTS							
Sewer Main Pipe (PVC), Size 8"		LF	$ 90.00	=	$ -		$ -
Sanitary Sewer Manhole, Depth < 15 feet		EA	$ 6,136.00	=	$ -		$ -
Sanitary Service Line Installation, complete		EA	$ 1,962.00	=	$ -		$ -
Sanitary Sewer Lift Station, complete		EA		=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
LANDSCAPING IMPROVEMENTS	(For subdivision specific condition of approval, or PUD)						
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
** - Section 3 is not subject to defect warranty requirements		**Section 3 Subtotal**		=	$ -		$ -
AS-BUILT PLANS (Public Improvements inc. Permanent WQCV BMPs)			$ 45,000.00	=	$ 45,000.00		$ 45,000.00
POND/BMP CERTIFICATION (inc. elevations and volume calculations)		LS	$ 10,000.00	=	$ 10,000.00		$ 10,000.00

Total Construction Financial Assurance $ 717,446.58
(Sum of all section subtotals plus as-builts and pond/BMP certification)

Total Remaining Construction Financial Assurance (with Pre-Plat Construction) $ 717,446.58
(Sum of all section totals less credit for items complete plus as-builts and pond/BMP certification)

Total Defect Warranty Financial Assurance $ 127,722.58
(20% of all items identified as (*). To be collateralized at time of preliminary acceptance)

Approvals

I hereby certify that this is an accurate and complete estimate of costs for the work as shown on the Grading and Erosion Control Plan and Construction Drawings associated with the Project.

Engineer (P.E. Seal Required)

Approved by Owner / Applicant — Date

Approved by El Paso County Engineer / ECM Administrator — Date

APPENDIX F: PERMITS

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS ALBUQUERQUE DISTRICT REGULATORY DIVISION
SOUTHERN COLORADO BRANCH, DURANGO OFFICE
1970 EAST 3RD AVENUE, SUITE 109
DURANGO, COLORADO 81301-5025

December 5, 2024

Regulatory Division

SUBJECT: Nationwide Permit Verification (SPA-2024-00262)

Attn: Chad Ellington
CS 2005 Investments, LLC
1480 Humboldt Street
Denver, CO 80218
chad@peakdevgrp.com

Dear Mr. Ellington:

We are responding to your pre-construction notification (PCN), dated October 18, 2024, submitted to us for verification of authorization under Nationwide Permit (NWP) for the *Fishers Canyon Creek Residential and Channel Improvement Projects.* The project sites are located within Fishers Canyon Creek and an unnamed tributary to Fishers Canyon Creek, with a central project location of approximately latitude 38.77368°, longitude -104.78673°, in the City of Colorado Springs, El Paso County, Colorado.

Based on the information provided, we have determined that the two single and complete projects will involve the discharge of dredged or fill material into waters of the United States, subject to Section 404 of the Clean Water Act. The specific activities that require Corps authorization are the installation of a total of three (3) total grouted riprap structures, nine (9) un-grouted step-pool complexes, and re-contouring of the channel(s) to provide grade control, reduce future erosion potential, and protect an existing sewer main. The two projects will permanently impact a combined total of approximately 0.046 acre (195 linear feet) of perennial stream, and temporarily impact 0.167 acre (717 linear feet) of perennial stream. The projects will be conducted as described in the referenced PCN.

We have determined that both activities associated with the project are authorized by 2021 NWP 29 – *Residential Development*. A summary of this NWP and the 2021 Colorado Regional Conditions are available on our website at www.spa.usace.army.mil/reg/nwp. Failure to comply with all terms and conditions of this NWP may result in the suspension or revocation of this authorization. As required by General Condition 30, you shall sign the enclosed Compliance Certification (Enclosure 1) and return it to this office within 30 days after completion of the authorized work. For specific information regarding compliance with water quality certification (WQC) requirements, please refer to our website at www.spa.usace.army.mil/reg/wqc.

Our review of this project also addressed its effects on threatened and endangered species and historic properties in accordance with General Conditions 18 and 20. Based on the information provided, we have determined that this project will have no effect to federally listed species or their critical habitat. Additionally, the project has no potential to cause effects on historic properties. However, these determinations may be invalidated if the project is not completed as authorized or you did not provide accurate information in your PCN.

This permit verification is valid until March 14, 2026, unless the NWP is modified, suspended, reissued, or revoked prior to that date. Continued confirmation that an activity complies with the terms and conditions, and any changes to the NWP, is the responsibility of the permittee. Activities that have commenced, or are under contract to commence, in reliance on an NWP will remain authorized provided the activity is completed within 12 months of the date of the NWP's expiration, modification, or revocation.

This letter does not constitute approval of the project design features, nor does it imply that the construction is adequate for its intended purpose. This permit does not authorize any injury to property or invasion of rights or any infringement of federal, state, local, or tribal laws or regulations. The permittee and/or any contractors acting on behalf of the permittee must possess the authority and any other approvals required by law, including property rights, to undertake the proposed work.

The landowner must allow Corps representatives to inspect the authorized activity at any time deemed necessary to ensure that it is being, or has been, accomplished in accordance with the terms and conditions of the permit.

We would appreciate your feedback on this permit action including your interaction with our staff or suggestions for improving our program. For more information about our program or to complete our Regulatory Program national customer service survey, visit our website at https://www.spa.usace.army.mil/Missions/Regulatory-Program-and-Permits/.

Please refer to identification number SPA-2024-00262 in any correspondence concerning this project. If you have any questions, please contact me by email at tucker.j.feyder@usace.army.mil, or telephone at (970) 259-1764 x 2.

Sincerely,

Tucker J. Feyder
Sr. Project Manager
Southern Colorado Branch

Enclosure

COMPLIANCE CERTIFICATION

Action Number: SPA-2024-00262

Name of Permittee: CS 2005 Investments, LLC; Attn: Chad Ellington

Nationwide Permit: 29 – *Residential Development*

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address or by email:

U.S. Army Corps of Engineers, Albuquerque District
1970 East 3rd Avenue, Suite 109
Durango, Colorado 81301-5025

Email: SPA-RD-CO@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Please enclose photographs showing the completed project.

I hereby certify that the work authorized by the above-referenced permit has been completed in accordance with the terms and conditions of the said permit.

Date Work Started _____

Date Work Completed _____

_____ _____
Signature of Permittee Date

Encl 1

Pikes Peak Regional Building Department

Permit # 25018 **FLOOD PLAIN DEVELOPMENT PERMIT** **Date 07-Mar-2025**

Owner Information

Name: CS 2005 INVESTMENTS LLC C/O ROBERT M. LYNCS 2005 I

Address: 10801 W CHARLESTON BLVD SUITE 170
LAS VEGAS, NV 89135
Attention: CHAD ELLINGTON

Project Location

Address: FISCHER CANYON NO RISE

,

Location/Directions:

Contractor/Engineer: tdb Phone: 719

Project Description

Single Family Residential:	[ ]	Addition/Remodel (<50%):	[ ]
Multi-Family Residential:	[ ]	Rehabilitation	[ ]
Manufactured Home:	[ ]	Subst. (>50 Appraisal) Imprv:	[ ]
Non-Residential	[ ]	Fill	[X]
New Construction	[ ]	Bridge/Culvert	[ ]
Watercourse Modification:	[X]	Levee:	[ ]

Project Cost: $0.00 Structure Market Value: $0.00
Creek: fischers canyon creek
Description of work: Channel improvements along Fishers Canyon Creek and the Tributary to Fishers Canyon creek

Flood Hazard Data

Location: Floodway
Base (1%) Flood Elevation: 5803-5793
Lowest Floor Elevation:
Floodproofing Level:
Source Document:

Permit Action

Permit Granted (Y/N): Yes Variance Granted (Y/N): No
Action Comments:

Compliance Section

Elevation Certificate: N Date:

LOMA: N Date: CLOMR: N Date: LOMR: N Date:

Site Inspection:
Preliminary Required: N Date:
Final Required: Y Date:

For Inspection Requests call: Keith 327-2898

Compliance Comments:

Regional Floodplain Division: Date 07-Mar-2025

NOTE: This permit expires twelve (12) months from the date it is issued.

PIKES PEAK REGIONAL BUILDING DEPARTMENT

2880 International Circle
Colorado Springs, Colorado 80910
Website: www.pprbd.org

Follow us on social media

facebook.com/PPRegionalBuilding/
@PPRBD
@ppregionalbuilding

Receipt

6/26/2025 12:54:19 PM
(KEITH)
Receipt #: 2192927
Customer: CS 2005 INVESTMENTS LLC C/O RO

Transaction Summary

Account	Description	Reference	Amount
1301-40020	FLOODPLAIN PERMIT FEES	25018	$500.00
1301-40112	CONVENIENCE FEE (PHONE)	FEE	$11.50

Total Due: $511.50

Payment Summary

Account	Description	Reference	Amount
9801-55700	COLLECTION, VISA/Master-Card	204362262	$511.50

Total Tendered: $511.50

Comment: FP# 25018--FISCHER CANYON NO RISE

I agree to pay above total amount according to card issuer agreement.

APPENDIX G: GEOTECHNICAL REPORT

Report of Geotechnical Engineering Evaluation

Venetucci Boulevard Channel Improvements
Venetucci Boulevard
Colorado Springs, Colorado

Prepared for

Peak Development
1480 Humboldt Street
Denver, Colorado 80218
ATTN: Mr. Chad Ellington

Prepared by

Professional Service Industries, Inc.
1070 West 124th Avenue
Suite 800
Westminster, Colorado 80234

June 26, 2025

PSI Project No. 05322860

PSI Project No. 05322860
June 26, 2025

Professional Service Industries, Inc.
1070 West 124th Avenue, Suite 800
Westminster, Colorado 80234
Phone: (303) 424-5578
Fax: (303) 423-5625

Mr. Chad Ellington
Peak Development
1480 Humboldt Street
Denver, Colorado 80218

Re: Report of Geotechnical Engineering Evaluation
Venetucci Boulevard Channel Improvements
Thompson Thrift Residential
Colorado Springs, Colorado

Dear Mr. Ellington:

Professional Service Industries, Inc (PSI), an Intertek Company, is pleased to transmit our Report of Geotechnical Engineering Evaluation for the proposed channel improvements associated with the new multifamily development in Colorado Springs, Colorado. The report includes the field exploration and laboratory testing results, as well as site preparation and foundation design recommendations.

If you have questions pertaining to this report, or if we may be of further service, please contact us at your convenience. PSI thanks you for your business and we look forward to finding ways to grow our partnership, expand our services, and continue Building Better Together.

Professional Service Industries, Inc.

Joshua W. Edin
Staff Engineer

Hannah C. Tawfik, P.E.
Senior Project Engineer

Reviewed by: Lloyd Lasher, P.E.
Principal Consultant

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

Professional Service Industries, Inc. (PSI), an Intertek Company, has conducted a geotechnical engineering evaluation for the site of the proposed channel improvements associated with the new multifamily development in Colorado Springs, Colorado. The purpose of our study was to characterize the subsurface strata at the subject site and to develop recommendations for site preparation and provide geotechnical parameters for the design of retaining walls for the proposed development by others. Our services on this project were provided in general accordance with PSI Proposal Number 426925 dated June 5, 2024, authorized by Mr. Chad Ellington with Peak Development on June 5, 2024.

PSI's scope of services for the geotechnical study did not include an assessment of environmental conditions in the soil, bedrock, surface water, groundwater, or air, on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

The report, which follows, presents a brief review of our understanding of the project, a discussion of the site and subsurface conditions encountered, and our recommended soil properties to assist with the design and construction of retaining walls by others.

2.0 PROJECT INFORMATION

Based on information provided by Mr. Tim Govert with Thompson Thrift Residential, which included a Geotechnical RFP dated May 20, 2024 and a Topographic Survey dated July 2, 2024, PSI understands the project consists of channel improvements to existing creeks adjacent to the proposed multi-family development site. We understand two areas (Channel Area 1 and Channel Area 2) will undergo improvements including grouted boulder grade control structures with a sheet pile cutoff wall and a concrete cap. Additionally, there will be riffle drops which are made of riprap placed in the channel bottom. Some grading of the adjacent slopes may also be necessary. PSI has provided recommended soil properties including lateral earth pressures to aid in design of the proposed improvements by others. PSI did not evaluate for scour.

Local stability should be performed by the wall designer. PSI can perform a check for global stability of the proposed walls following completion of design if cross sections, wall geometry and types are provided at critical locations along the wall alignments. PSI should review the wall design to confirm our recommended soil properties were properly implemented.

The site is currently covered with moderate vegetation. The latitude and longitude of the subject site is approximately 38.7704° North and 104.7859° West. The site is bounded by vacant land to the north, Venetucci Boulevard/Commercial Development to the east, vacant land/Residential Development to the west and vacant to the south. The site significantly slopes around the creeks, however; we understand no structures are immediately adjacent to the slopes or creeks. No services were provided related to an evaluation or assessment of the stability or protection of

adjacent structures, pavements or other appurtenances along the project either currently or following the proposed improvements. Borings were generally performed in the area of the requested locations, however, borings were offset due to utility lines and access considerations.

Descriptions of the site are based upon observations made during our field exploration program. The geotechnical recommendations presented in this report are based upon the provided project information and the subsurface materials described in this report. If any of the noted information is incorrect, please inform us so that we may amend the recommendations presented in this report, if needed.

3.0 SUBSURFACE INFORMATION

The following sections provide information relating to subsurface conditions encountered at the boring locations and published geologic information in the general vicinity of the project site. The geology section is based upon the "Geological Map of Colorado" by Ogden Tweto dated 1979 and information relating to subsurface conditions within the property gathered from our current field study.

3.1 Site Geology and Geologic Hazards

Based on the referenced map by Tweto 1979, the site lies in an area mapped as Pierre Shale-Upper unit (Phanerozoic, Mesozoic, Cretaceous) can be described as "Including sedimentary, clastic, mudstone, shale".

Based upon historical aerial photographs, the site has been vacant since prior to 1993, however, the site appears to have undergone significant grading to support adjacent development starting in the early-2010s.

3.2 Subsurface Conditions

As part of PSI's evaluation of this site, three (3) exploratory borings were drilled at the approximate locations as indicated on Figure 2, the Boring Location Map. Three (3) borings were drilled in the areas along the proposed channel improvements to depths of approximately 25 to 35 feet below existing grade.

The borings were advanced using a CME-50 truck mounted drill rig equipped with 4-inch diameter, solid-stem, continuous-flight auger. Soil samples were recovered at selected depths during drilling with the truck-mounted drill rig using a Modified California Sampler (outside diameter- 2.4 inches; inside diameter – 2.0 inches) driven by a 140-lb. weight free falling 30 inches. The number of blows required to drive the sampler 12 inches is designated as the penetration resistance (N-value, blows per foot) and provides an indication of the consistency of cohesive soils and the relative density of granular materials. While the procedure is similar to that employed in the Standard Penetration Test (ASTM D1586), the penetration resistance obtained using the California barrel sampler is generally higher than that obtained using the standard split-spoon sampler. A correction factor of 0.6 for sand and 0.77 for clay is typically used for N-Values

collected using the Modified California sampler. The N-values on the attached logs were not corrected.

A representative from our office observed the drilling and prepared borings logs of the subsurface conditions encountered. Individual logs of the borings are presented on Figures 3 through 5. It should be noted that the subsurface conditions presented on the boring logs are representative of the conditions at the specific locations drilled. Variations may occur and should be expected across the site. The soil morphology represents the approximate boundary between subsurface materials and the transitions may be gradual and indistinct. Water level information, if encountered, obtained during our field operations is also shown on the boring logs. Elevations referenced were obtained via Google Earth and should be considered approximations.

3.2.1 Subsurface Profile

The soil profile generally consisted of high plasticity soils with varying amounts of sand overlying claystone bedrock. PSI observed high plasticity soils with varying amounts of sand from the current ground surface to the bedrock elevation in the borings performed. The high plasticity soils with varying amounts of sand can be described as fine to coarse grained sand with trace amounts of gravel, dry to moist, brown to dark brown, gray to dark gray, and orange, and stiff to very stiff in consistency. The high plastic clays may be highly weathered bedrock.

Claystone was encountered approximately 5 feet to 19 feet below existing grade, extending to termination depths of borings and can be described as fine to coarse grained sand with trace amounts of gravel, dry to saturated, brown to dark brown, gray to dark gray, black and blue, and very stiff to hard in consistency. Bedrock depths were variable across the site.

3.2.2 Swell Potential

PSI has reviewed the “Potentially Swelling Soil and Rock in the Front Range Urban Corridor, Colorado” by Stephen S. Hart, dated 1972. Based on this published map, the subject site lies with an area described as having “Low Swell Potential” designation. Low Swell Potential designation is described as “This category includes several bedrock formations and many surficial deposits. The thickness of the surficial deposits may be variable, therefore, bedrock with a higher swell potential may locally be less than 10 feet below the surface.”

PSI performed ASTM D4546 Swell Testing on selected samples of the recovered on-site material from the soil borings. The following table summarizes the results of the Denver Swell tests:

Boring	Sample Depth (feet)	Surcharge (psf)	Swell Potential (%)	Swell Pressure (psf)	Moisture Content (%)	Soil Classification
B1	7 ½	750	**1.7**	3,200	24.7	CH
B2	2 ½	250	**4.4**	2,100	28.1	CH
B2	10	1,000	**0.3**	1,600	25.5	CH(Bedrock)

Based upon the swell test results, the native overburden soils and claystone bedrock encountered are classified as having a "low to high" potential for swell, therefore; mitigation for swell is recommended. In addition, if excessive drying and rewetting of these soils is allowed to occur, the risk of swell will increase. Proper drainage and good maintenance should be followed.

3.2.3 Groundwater Conditions

Free-flowing groundwater was observed at a depth of 16-feet during drilling operations in Boring B2 which was performed approximately 15 feet above the creek level at the time of drilling. Free flowing groundwater was not observed in Borings B1 and B3, however, due to the clay soils, infiltration may be very slow. Based on the provided topographic map, the ground surface at the boring locations were approximately 9 to 20 feet above creek level.

It should be noted that it is possible for the groundwater table to fluctuate during the year depending upon climatic and rainfall conditions and changes to surface topography and drainage patterns. Discontinuous zones of perched water may also exist, or develop, within the overburden materials subsequent to the construction of the proposed development. We recommend the contractor determine groundwater levels at the time of construction.

3.2.4 Laboratory Testing

The soil samples obtained during the field exploration were transported to the laboratory and selected soil samples were tested in the laboratory to measure material properties for our geotechnical evaluation. Laboratory testing was accomplished in general accordance with ASTM and other applicable procedures. Laboratory testing was performed on selected samples to evaluate the classification, swell and other engineering characteristics of the subsurface materials. Laboratory test data along with detailed descriptions of the soils can be found on the logs of borings and in Appendix A. The samples that were not altered by laboratory testing will be retained for 60 days from the date of this report and then will be discarded without further notice.

4.0 GEOTECHNICAL EVALUATION

The primary geotechnical concerns at this site are high swelling and high plastic soils and shallow depths to bedrock. The laboratory results indicated high swell in the shallow overburden soils.

Sheet piling should be constructed in accordance with FHWA (NHI-05-042) and CDOT specifications. Grouted boulder grade control structures and riprap channel should be designed in accordance with City of Colorado Springs Specifications Section 620.

Shallow bedrock depths may limit sheet penetration depths, requiring anchors or preforming.

Excavated claystone bedrock and high plasticity clays should not be reused as structural fill or for use behind walls and should only be placed in non-structural areas. If areas where unsuitable materials are encountered during site grading, we recommend they be completely removed from the site. We recommend a contingency for waste of unsuitable materials and import of suitable materials be included in the construction budget.

Moisture fluctuation of the onsite soils will increase its swell/collapse potential, therefore maintenance of the structure and pavements, as well as controlling water runoff will be critical to the functionality of the facility. Proper moisture control will be imperative at this site during and following construction. The risk of swelling/collapsible soils can be reduced, but not eliminated, by preventing fluctuations in moisture content. Therefore, it is imperative that positive slope away from the addition and foundations is maintained, hardscape is constructed around the addition perimeter, utilities are prevented from transmitting water via trench bedding or broken lines, and pavements are regularly maintained.

Free-flowing groundwater was observed during our exploration at a depth 16-feet below existing grade in Boring B2 which was performed approximately 15 feet above the creek level existing at the time of drilling. However, due to the proposed work within the creek area, water levels may fluctuate, and dewatering is likely required during the proposed construction. We recommend the contractor determine groundwater levels at the time of construction.

The following geotechnical design recommendations have been developed based on the described project characteristics and subsurface conditions encountered. Once final design/grading plans and specifications are available, a general review by PSI is required as a means to check that the recommendations presented in the following sections of this report are properly interpreted and implemented.

5.0 SITE GRADING RECOMMENDATIONS

Prior to site grading or excavation for construction, any debris, vegetation and root systems, and utilities not being used for the new construction should be properly and completely removed from the site. Protection and shoring of existing features, slopes, utilities, and other appurtenances to remain should be made the responsibility of the contractor. Proposed grades can then be reestablished with moisture conditioned and recompacted structural fill. If materials are encountered that differ from those observed in our exploration, PSI should be notified, and the areas will need to be evaluated.

Slopes and grades for channel embankments and slopes should be in accordance with City of Colorado Springs Manual Section 620.

Following rough grading and over-excavation for moisture conditioning and prior to placement of structural fill, a proofroll should be performed. The proofroll should be conducted with a loaded tandem-axle dump truck or similar pneumatic-tired equipment with a minimum weight of 15 tons. Areas that deflect excessively should be further over-excavated, moisture conditioned and recompacted.

Trash and debris, if encountered, should be removed from the site and disposed of in accordance with local and state regulations.

Excavations into the claystone bedrock are expected to require moderate effort with standard excavation equipment. No blasting, chiseling, etc. is anticipated to be needed, based on the soils at the boring locations.

5.1 Structural Fill

Based on PSI's field and laboratory data, the majority of the on-site overburden soils and bedrock do not appear to be suitable for re-use as site grading, backfill soils, or for use as structural fill. High plasticity clays and claystone bedrock should not be reused. If material such as construction debris, trash, or other undesirable material is encountered during construction, they should be removed off site.

Specifications for rip rap materials should be in accordance with City of Colorado Springs Manual Section 620.

Imported structural fill for general site grading, if required, should be free of organic or other deleterious materials, have a liquid limit less than 30, a plasticity index less than 10, and meet the following gradation outlined below. This structural fill criteria is intended as a general guideline. Imported structural fill materials should have a swell potential of less than 1 percent when compacted to 95 percent of maximum dry unit weight (MDUW) and at 2 percent below optimum moisture content (OMC) and tested under a swell test surcharge of 500 psf. The MDUW and OMC should be determined by ASTM D698 (Standard Proctor).

Screen Size	Percent Passing
2 Inch	100
#4	50 – 100
#200	10 - 30

Imported fill material proposed for use on this site that does not meet these criteria should be submitted to the project geotechnical engineer for evaluation and approval. The geotechnical engineer should evaluate the proposed import fill prior to purchase and delivery. Fine-grained soils used for fill require close moisture content control and careful placement by the contractor to achieve the recommended degree of compaction and to address swell potential and settlement issues.

5.2 General Fill Placement and Testing

Fill placement regarding embankments and channel improvements should be performed in accordance with City of Colorado Springs Manual Section 620.

For general fill placement, unless otherwise specified, fill material should be compacted to at least 95 percent of the maximum dry unit weight as determined by the Standard Proctor Test (ASTM D 698). **For fill depths in excess of 5 feet, compaction should be 100 percent maximum dry unit weight.** Each lift of compacted fill should be tested for density by a representative of the geotechnical engineer prior to placement of subsequent lifts. Fill soils should be moisture conditioned to a range from optimum moisture content to 4-percent above optimum moisture content for clay soils, and to a range of 2-percent below to 2-percent above optimum moisture content for sand soils. Fill material should be placed horizontally in maximum eight-inch loose lifts.

A sample(s) of the proposed backfill soil(s) should be obtained for moisture density relationship (proctor test) three to four days prior to backfilling operations to expedite compaction and moisture content testing by the materials testing service provider.

To facilitate compaction, it may be necessary to bench existing slopes along the existing channels and creeks prior to placing new fills. The benched placement of engineered structural fill on slopes steeper than five (5) horizontal to one (1) vertical where the final area will be uncontained is recommended. The placement of fill should begin at the base of the natural slope with benches or terraces. The benches or terraces should be a minimum of eight (8) feet wide laterally and should be cut into the slope every five (5) feet of vertical rise to facilitate the level operation of compaction equipment. The naturally occurring existing soils should be prepared and filled in accordance with the previously described structural fill guidelines. A representative of the geotechnical engineer should monitor the benching and fill placement operations.

Unless specifically designed, temporary slopes shall not exceed steeper than a ratio of two (2) horizontal to one (1) vertical where workers or equipment will occupy space at the toe or of the movement of the excavated slope will jeopardize the stability of an adjacent structure. Temporary slopes exceeding ten (10) feet in vertical height should have a slope stability analysis. Temporary slopes exceeding twenty (20) feet in vertical height should have shear strength testing performed to assess the in-situ strength characteristics.

Permanent cut slopes shall not be constructed to a total height of 5 feet or a final grade steeper than a ratio of three (3) horizontal to one (1) vertical without a specific slope stability analysis. Specific shear strength testing should be performed to assess the in-situ strength characteristics for permanent slopes steeper than four (4) horizontal to one (1) vertical.

Weather conditions in the site area are typically dry in the summer and early fall. Precipitation in the form of snowfall is common from October through March. While grading can be inhibited for short periods during and following times of precipitation, grading can generally be conducted year-round. The major factor that must be considered during the winter months is ground

freezing. During extended periods of sub-freezing weather, it can be difficult to properly moisture condition and compact soils. Grading must be conducted during the warmer parts of the day in freezing weather.

6.0 GEOTECHNICAL RECOMMENDATIONS

6.1 Seismic Parameters

The project site is located within a municipality that employs the International Building Code, 2021 edition. As part of this code, the design of structures must consider dynamic forces resulting from seismic events. These forces are dependent upon the magnitude of the earthquake event as well as the properties of the soils that underlie the site. As part of the procedure to evaluate seismic forces, the code requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface. To define the Site Class for this project, we have interpreted the expected results of soil test borings drilled with the project site and estimated appropriate soil properties below grade to a depth of 100 feet, as permitted by Chapter 20.3-1 of the code. The estimated soil properties were based upon data available in published geologic reports and our experience with subsurface conditions in the general site area.

Based upon our evaluation, it is our opinion that the subsurface conditions within the site are consistent with the characteristics of Site Class C as defined in Chapter 20.3-1 of the ASCE 7-16 code.

The USGS-NEHRP interpolated probabilistic ground motion values near latitude 38.7704 North and 104.7859 West obtained from the USGS geohazards web page are as follows:

Period (seconds)	2% Probability of Event in 50 years (g)	Site Coefficients	Maximum Spectral Acceleration Parameters	Design Spectral Acceleration Parameters	
0.2 (S_s)	0.199	F_a = 1.3	S_{ms} = 0.259	S_{Ds}= 0.173	T_0= 0.067
1.0 (S_1)	0.058	F_v = 1.5	S_{m1} = 0.087	S_{D1}= 0.058	T_s= 0.335
			$S_{ms} = F_aS_s$ $S_{m1} = F_vS_1$	$S_{Ds} = ⅔*S_{ms}$ $S_{D1} = ⅔*S_{m1}$	$T_0= 0.2*S_{D1}/S_{Ds}$ $T_s= S_{D1}/S_{Ds}$

The Site Coefficients, Fa and Fv presented in the above table were interpolated from Chapter 20.3-1 as a function of the site classification and mapped spectral response acceleration at the short (S_s) and 1 second (S_1) periods.

6.2 Soil Corrosivity

Composite samples obtained in the subsurface profile of the upper 15 feet were tested to evaluate the chemical reactivity of the on-site soils and are shown in the following table. Soil pH

was performed using method AASHTO T289-91. Resistivity testing was performed using AASHTO T288-91. Water Soluble Sulfate testing was performed using AASHTO T290-91/ASTM D4327.

Note: Samples were sent to an outside laboratory to test for sulfides, chloride ion content, and resistivity. Results from these tests are pending. PSI will update the report once available.

Summary of Chemical Reactivity Testing

Boring ID	Depth (feet)	Soil pH	Water Soluble Sulfates
B1	5	8.7	0.26%
B3	15	8.6	0.19%

The existing soil has a potential for corrosion issues. Consideration should be given to providing cathodic protection for buried metal surfaces.

Our test results indicated water-soluble sulfate concentrations of 0.19 to 0.26 percent, which are classified in the “severe” sulfate exposure category according to the American Concrete Institute (ACI) Design Manual Section 318, Chapter 4, 2014 Edition. It is our opinion that concrete in contact with the existing soils may be designed for “S2” sulfate exposure. PSI recommends using Type V Portland Cement. A corrosion engineer should be contacted prior to construction.

6.3 Recommended Soil Properties

PSI has provided recommended soil properties including lateral earth pressures for on-site soils, bedrock, typical imported soils, and crushed stone. Design of sheet-pile walls and sloped structures should be performed by others.

Recommended soil properties for on-site soils are as follows:

Recommended Parameters Typical Wall Backfill Materials				
Material Type	Drained Friction Angle (ϕ')			
On-Site Soil/Weathered Bedrock	22°			
Competent Bedrock	26°			
Imported Structural Fill	30°			
Compacted Dense Graded Crushed Stone	42°			
Total Soil Density (pcf)	120			
Total Bedrock Density (pcf)	125			
Maximum Toe Pressure on Structural Fill (psf)	1,500			
Water Elevation	Dependent on location			
Parameters specific to soil type	**On-Site Soil**	**Bedrock**	**Structural Fill**	**Crushed Stone**
Friction Factor for Base	0.27	0.33	0.38	0.47 *
Coefficient of Active Pressure (K_a) **	0.67	0.39	0.33	0.27 *
Coefficient of Passive Pressure (K_p) **	1.47	2.56	3.00	3.7 *
Coefficient of At-Rest Pressure (K_o) **	0.63	0.56	0.50	0.43 *

* These values may be used for design only if the crushed stone backfill extends back from the wall certain distances. These are a horizontal distance approximately equal to or greater than the total height of the wall at the surface, and at least one-foot beyond the heel of the wall footing.

** Earth pressure coefficients valid for level backfill conditions with no surcharge

The values presented above were calculated based on positive drainage and are provided to prevent the buildup of hydrostatic pressure. If surface loads are placed near the walls, such as traffic loads, they should be designed to resist an additional uniform lateral load of one-half of the vertical surface loads. An "equivalent fluid" pressure can be obtained from the above chart by multiplying the appropriate K-factor times the total unit weight of the soil. This applies to unsaturated conditions only. If a saturated "equivalent fluid" pressure is needed, the effective unit weight (total unit weight minus unit weight of water) should be multiplied times the appropriate K-factor and the unit weight of water added to that resultant. However, PSI does not recommend that earth retaining walls be designed with a hydrostatic load and that drainage should be provided to relieve the pressure.

6.4 Excavation Safety

In addition, confined excavations such as utility trenches are more likely to require rock excavation techniques than large open cuts. All excavations should be sloped or shored in accordance with applicable OSHA regulations.

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P". This document was issued to better allow for the safety of workers entering trenches or excavations. It is mandated by this federal regulation that

excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the Contractor could be liable for substantial penalties.

The Contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The Contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the Contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the Contractor's or other parties' compliance with local, state, and federal safety or other regulations. Groundwater control is critical to excavation safety and is described above.

7.0 LIMITATIONS

The recommendations submitted are based on the subsurface information obtained by PSI and design details furnished by Thompson Thrift Residential. If there are revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

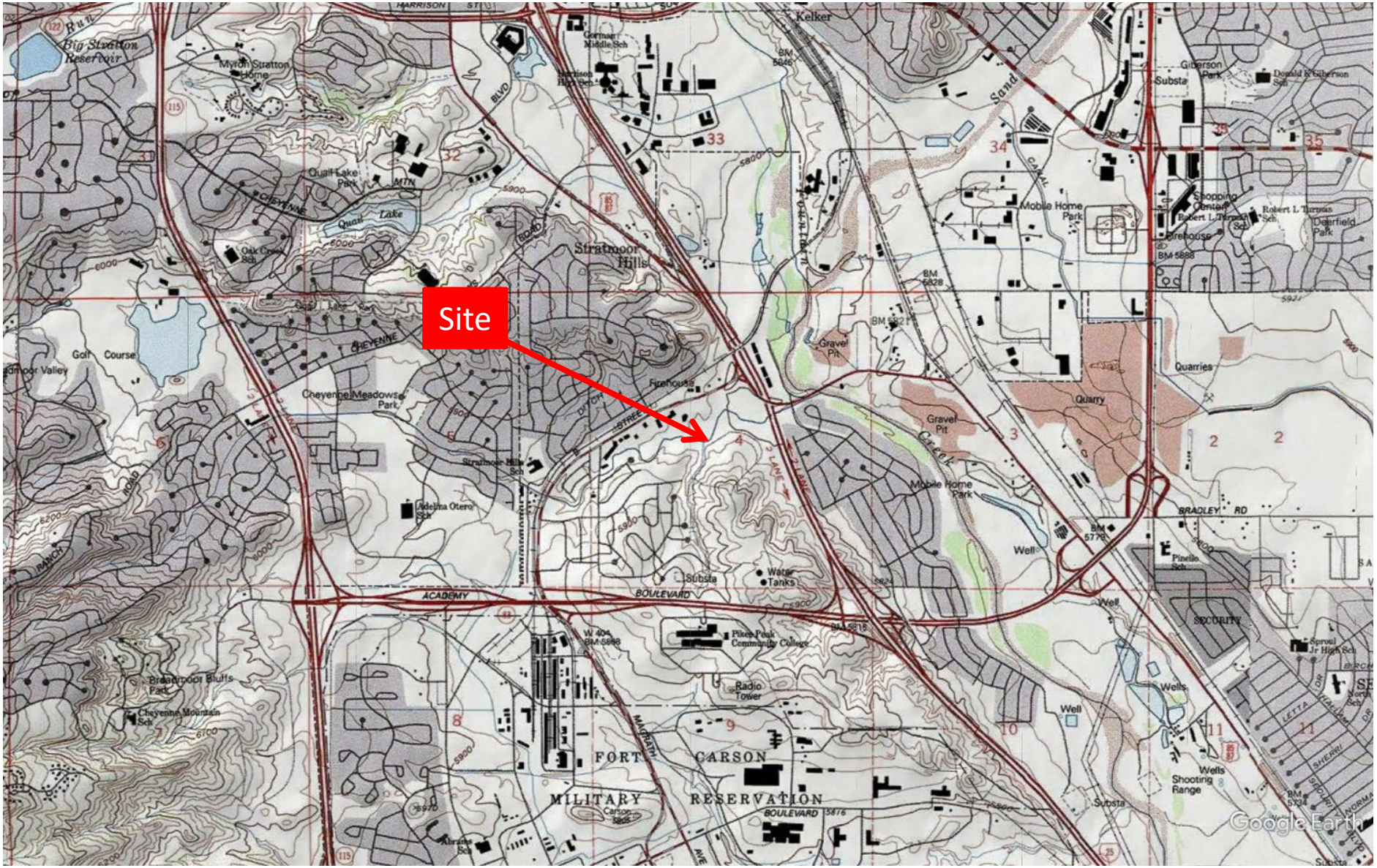
The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. This report has been prepared for the exclusive use of Peak Development and their consultants for the specific application to the proposed channel improvements associated with the new multifamily development in Colorado Springs, Colorado.

Taken From Google Earth

intertek psi

Venetucci Boulevard Channel Improvements	JOB NO.05322860
Site Vicinity Map	FIGURE NO. 1a



Taken From USGS Map -

intertek psi

Venetucci Boulevard Channel Improvements	JOB NO.	05322860
Site Topographical Map	FIGURE NO.	1b

Indicates Approximate Location of Boring

Taken From Google Earth

intertek psi

Venetucci Boulevard Channel Improvements	JOB NO. 05322860
Boring Location Map	FIGURE NO. 2

FIGURE: 3

BORING B1

DATE STARTED:	7/11/24	**DRILL COMPANY:**	Dakota Drilling, Inc.
DATE COMPLETED:	7/11/24	**DRILLER:** ERC	**LOGGED BY:** JW
COMPLETION DEPTH	25.0 ft	**DRILL RIG:**	CME-50
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Stem Auger
ELEVATION:	5809 ft	**SAMPLING METHOD:**	Modified California
LATITUDE:	38.7704°	**HAMMER TYPE:**	Manual
LONGITUDE:	-104.7859°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	HT

REMARKS:

Water		
While Drilling	Not Observed	
Upon Completion	Not Observed	
Delay	N/A	

BORING LOCATION:

See Figure No. 2

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification		Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / STRENGTH, tsf	Additional Remarks
	0					**Fat Clay with Sand:** Fine to coarse grained sand with gravel, dry to moist, brown to dark brown/gray to dark gray, stiff to very stiff.		20-20 N=40			
5805	5			1	12			15-15 N=30	18		DD = 105 pcf LL = 53 PL = 15
				2	12		CH	8-10 N=18	25		GRAD -200 = 80.8% DD = 103 pcf S(750) = 1.7% P = 3.2 Ksf
5800	10			3	12			10-10 N=20	16		DD = 106 pcf -200 = 62.4%
				4	12						
5795	15			5	8	**Claystone:** Fine to medium grained sand with gravel, dry to moist, brown to dark brown/dark gray/black, stiff to hard.		50/8"	21		DD = 106 pcf LL = 61 PL = 23
5790	20			6	4			50/4"	13		DD = 113 pcf Q_u = 6.9 tsf
5785	25			7	3	Weatherd Bedrock Zone 10 to 14 Feet		50/3"			

intertek psi

Professional Service Industries, Inc.
1070 West 124th Avenue, Suite 800
Westminster, CO 80234
Telephone: (303) 424-5578

PROJECT NO.: 05322860
PROJECT: TTRes Channel Improvement
LOCATION: Venetucci Boulevard
Colorado Springs, CO

The stratification lines represent approximate boundaries. The transition may be gradual.

FIGURE: 4

DATE STARTED:	7/11/24	**DRILL COMPANY:**	Dakota Drilling, Inc.
DATE COMPLETED:	7/11/24	**DRILLER:** ERC	**LOGGED BY:** JW
COMPLETION DEPTH	35.0 ft	**DRILL RIG:**	CME-50
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Stem Auger
ELEVATION:	5825 ft	**SAMPLING METHOD:**	Modified California
LATITUDE:	38.7704°	**HAMMER TYPE:**	Manual
LONGITUDE:	-104.7859°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	HT
REMARKS:			

BORING B2

Water			
	While Drilling	16	feet
	Upon Completion	16	feet
	Delay	N/A	

BORING LOCATION:

See Figure No. 2

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification		Moisture, %	Additional Remarks
	0							
		1	12	**Fat Clay:** Fine to coarse grained sand with gravel, dry to moist, brown to dark brown/dark gray, stiff.	CH	8-9 N=17	28	DD = 92 pcf -200 = 93.1% S(250) = 4.4% P = 2.1 Ksf
5820	5	2	12			8-8 N=16	27	DD = 96 pcf GRAD -200 = 89.9%
		3	12			8-8 N=16	29	DD = 92 pcf LL = 64 PL = 20
5815	10	4	12	**Fat Clay with Sand:** Fine to coarse grained sand with gravel, moist, brown/gray to dark gray, stiff.		8-8 N=16	26	GRAD -200 = 79.5% DD = 98 pcf S(1000) = 0.3% P = 1.6 Ksf
5810	15	5	12		CH	10-15 N=25	27	DD = 96 pcf LL = 66 PL = 19
5805	20	6	12	**Claystone:** Fine to medium grained sand, moist to saturated, dark brown/gray to dark gray/black, very stiff to hard.		15-15 N=30	31	-200 = 98.7%
5800	25	7	6			50/6"	22	DD = 101 pcf Q_u = 0.9 tsf
5795	30	8	5			50/5"		
5790	35	9	3	Weathered Bedrock Zone 19-22 Feet		50/3"		

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
Moisture ✕ PL ◪ LL ✚
0 25 50
STRENGTH, tsf
Qu ▲ Qp ✳
0 2.0 4.0

intertek psi

Professional Service Industries, Inc.
1070 West 124th Avenue, Suite 800
Westminster, CO 80234
Telephone: (303) 424-5578

PROJECT NO.: 05322860
PROJECT: TTRes Channel Improvement
LOCATION: Venetucci Boulevard
Colorado Springs, CO

The stratification lines represent approximate boundaries. The transition may be gradual.

FIGURE: 5

BORING B3

DATE STARTED:	7/11/24	**DRILL COMPANY:**	Dakota Drilling, Inc.
DATE COMPLETED:	7/11/24	**DRILLER:** ERC	**LOGGED BY:** JW
COMPLETION DEPTH	25.0 ft	**DRILL RIG:**	CME-50
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Stem Auger
ELEVATION:	5810 ft	**SAMPLING METHOD:**	Modified California
LATITUDE:	38.7704°	**HAMMER TYPE:**	Manual
LONGITUDE:	-104.7859°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	HT

REMARKS:

Water		
	While Drilling	Not Observed
	Upon Completion	Not Observed
	Delay	N/A

BORING LOCATION:

See Figure No. 2

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification		Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / STRENGTH, tsf	Additional Remarks
	0					**Fat Clay:** Fine to medium grained sand with gravel, dry, brown to dark brown/dark gray/orange, very stiff.	CH	15-20 N=35			
5805	5			2	10	**Claystone:** Fine to coarse grained sand with gravel, dry to moist, light brown to dark brown/light gray to dark gray/black/blue, hard.		50/10"		>>◎	
				3	10			50/10"	19	>>◎	DD = 107 pcf -200 = 96.1%
5800	10			4	8			50/8"	18	>>◎	DD = 108 pcf GRAD -200 = 94%
5795	15			5	3			50/3"	13	>>◎ >>	LL = 71 PL = 17
5790	20			6	4			50/4"	12	>>◎ >>	DD = 108 pcf Q_u = 6.3 tsf
5785	25			7	4			50/4"	11	>>◎ >>	DD = 110 pcf Q_u = 6.7 tsf

intertek psi

Professional Service Industries, Inc.
1070 West 124th Avenue, Suite 800
Westminster, CO 80234
Telephone: (303) 424-5578

PROJECT NO.: 05322860
PROJECT: TTRes Channel Improvement
LOCATION: Venetucci Boulevard
Colorado Springs, CO

The stratification lines represent approximate boundaries. The transition may be gradual.

KEY TO SYMBOLS

USCS High Plasticity Clay

Bedrock

SSA = Solid Stem Auger

HSA = Hollow Stem Auger

CFA = Continuous Flight Auger

SPT = Standard Penetration Test

MC - Modified California Sampler

SS = Split-spoon Sampler

ST = Shelby Tube Sampler

RC = Rock Core

DD = Dry Density

MC = Moisture Content

LL = Liquid Limit

PL = Plastic Limit

-200 = Percent Passing the No. 200 Sieve (%)

S(250) = Swell under 250 psf surcharge pressure (%)

S(500) = Swell under 500 psf surcharge pressure (%)

S(1000) = Swell under 1000 psf surcharge pressure (%)

Qu = Unconfined Compressive Strength

RQD = Rock Quality Designation

REC'D = Rock Core Recovery Percentage

PID = Photo Ionic Detector (ppm)

The borings were advanced into the ground using 4-inch solid stem augers. At regular intervals throughout the boring depths, soil samples were obtained with either a 1.4-inch I.D., 2.0-inch O.D., split-spoon sampler or a 2.0-inch I.D., 2.4-inch O.D. Modified California sampler. The samplers were first seated 6-inches to penetrate any loose cuttings and then driven an additional foot where possible with blows of a 140-pound hammer falling 30-inches. The number of hammer blows required to drive the sampler each 6-inch increment is recorded in the field. The penetration resistance "N-value" is redesignated as the number of hammer blows required to drive the sampler the final foot and, when properly evaluated, is an index to cohesion for clays and relative density for sands. N-values recorded on the boring logs are uncorrected. The split-spoon sampling procedures used during this exploration are in general accordance with ASTM Designation D 1586.

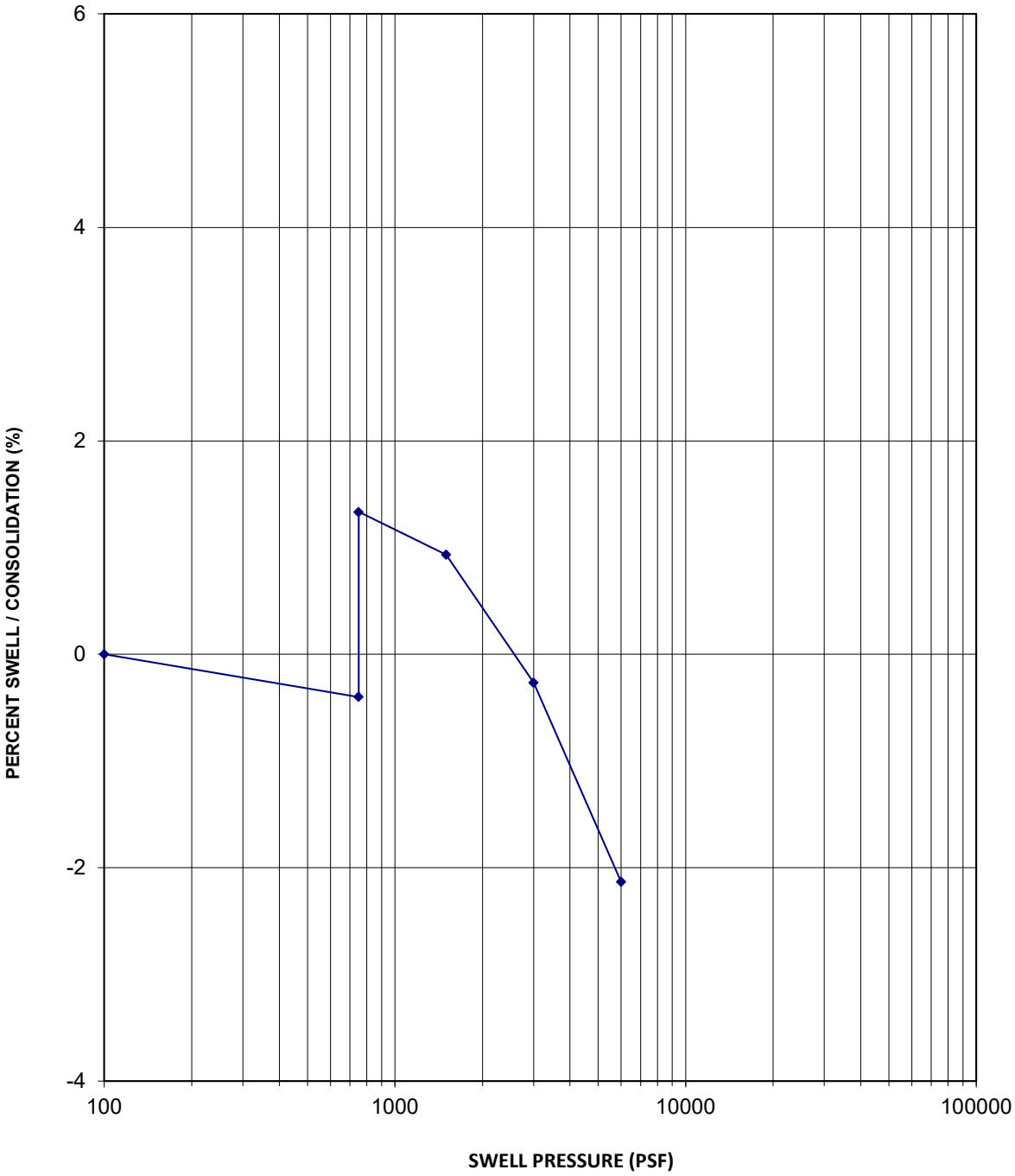
Professional Service Industries, Inc.
1070 West 124th Avenue, Suite 800
Westminster, CO 80234
Telephone: (303) 424-5578
Fax: (303) 423-5625

PSI Job No.: 05322860
Project: TTRes Channel Improvement
Location: Venetucci Boulevard
Colorado Springs, CO

Appendix A

Laboratory Test Results

SWELL-CONSOLIDATION TEST

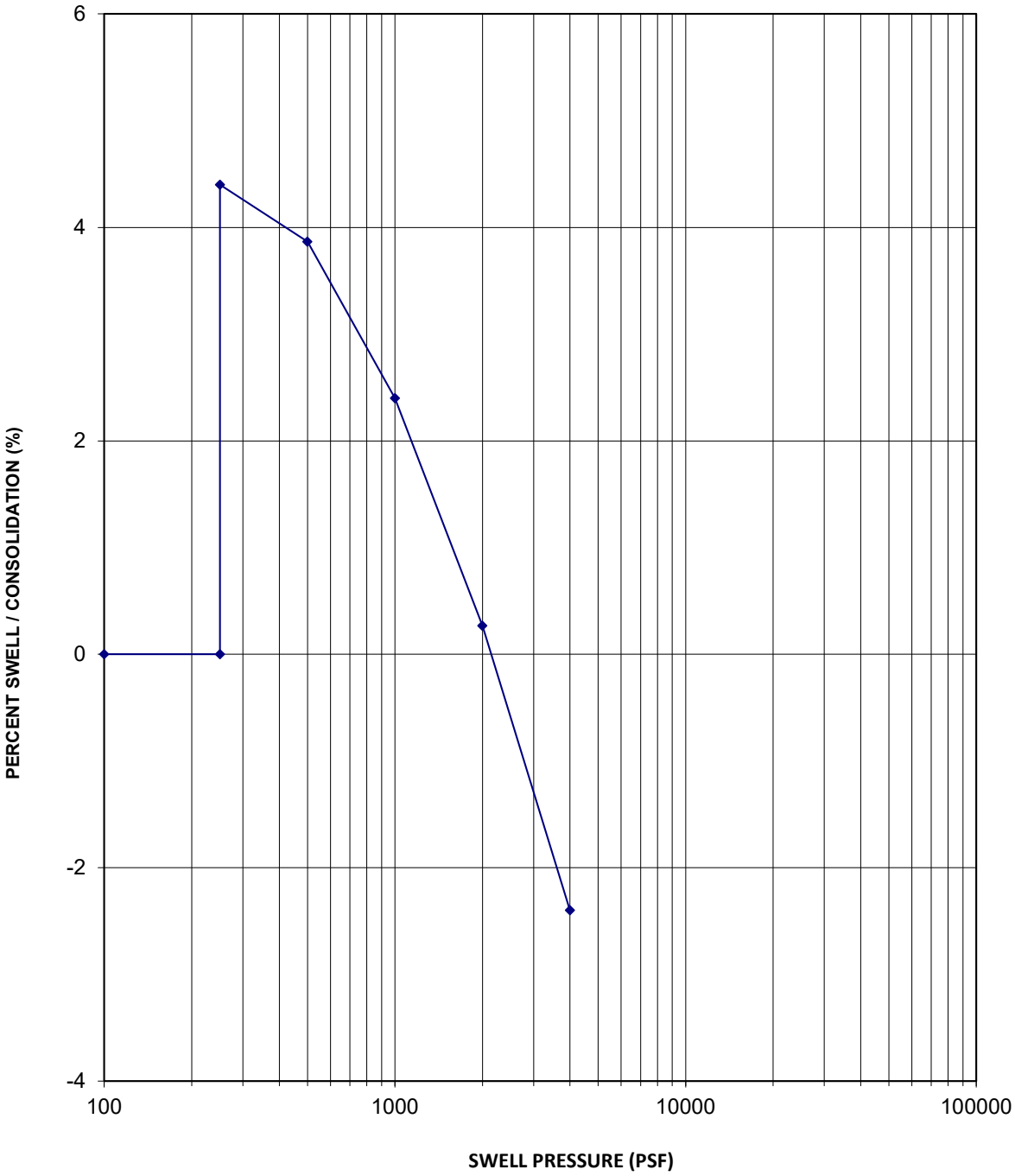


Sample Location	B1
Sample Depth	7.5 feet
Sample Description	Fat Clay with Sand
USCS Classification	CH

Dry Density	103 pcf
In-Situ Moisture Content	24.7 %
Volume Change	1.7 %
Swell Pressure	3,200 psf

intertek psi	**Venetucci Boulevard Channel Improvements**	**JOB NO. 05322860**
	SWELL - CONSOLIDATION TEST	**FIGURE NO. A1**

SWELL-CONSOLIDATION TEST

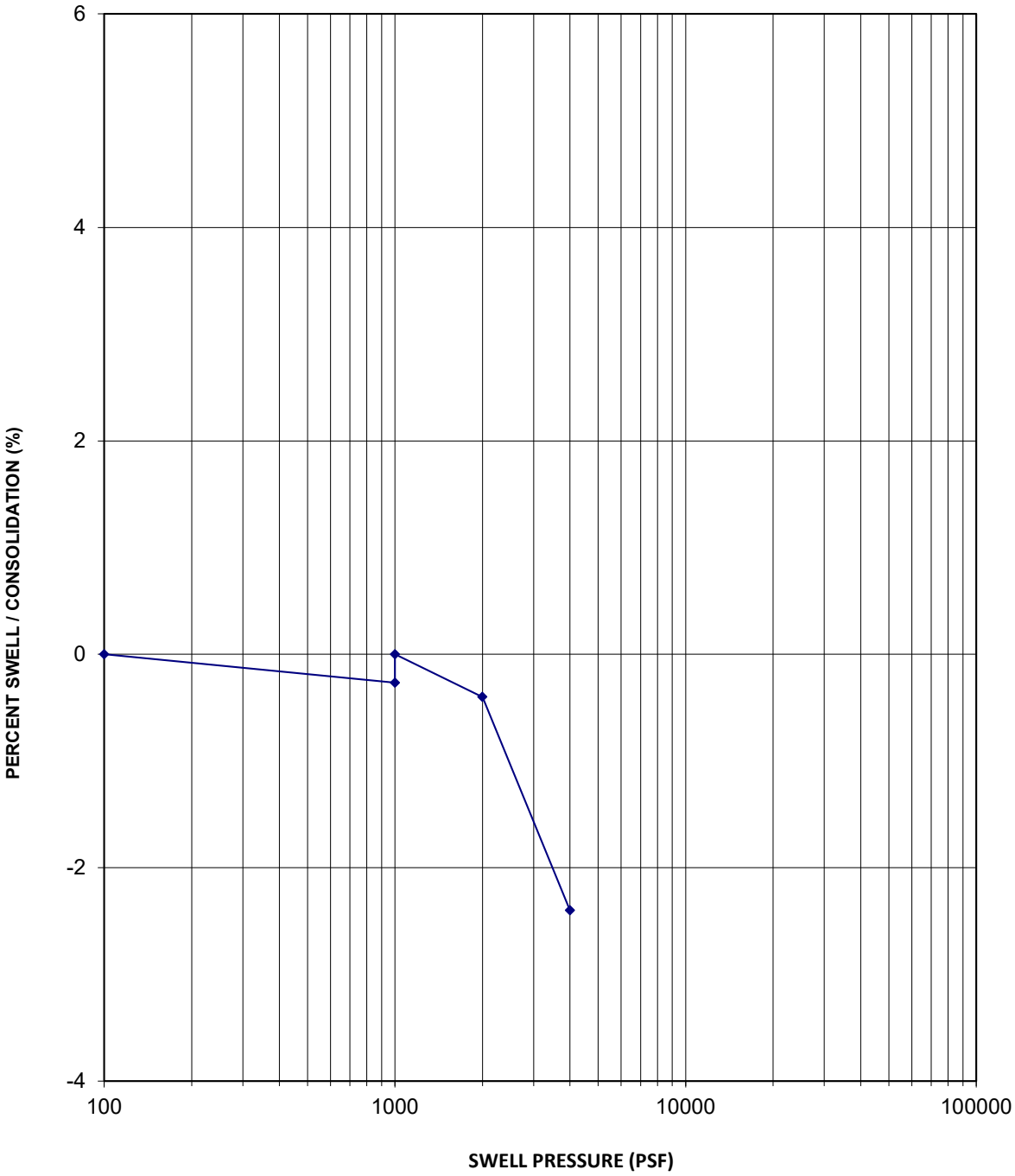


Sample Location	B2
Sample Depth	2.5 feet
Sample Description	Fat Clay
USCS Classification	CH

Dry Density	92 pcf
In-Situ Moisture Content	28.1 %
Volume Change	4.4 %
Swell Pressure	2,100 psf

intertek psi	**Venetucci Boulevard Channel Improvements**	**JOB NO. 05322860**
	SWELL - CONSOLIDATION TEST	**FIGURE NO. A2**

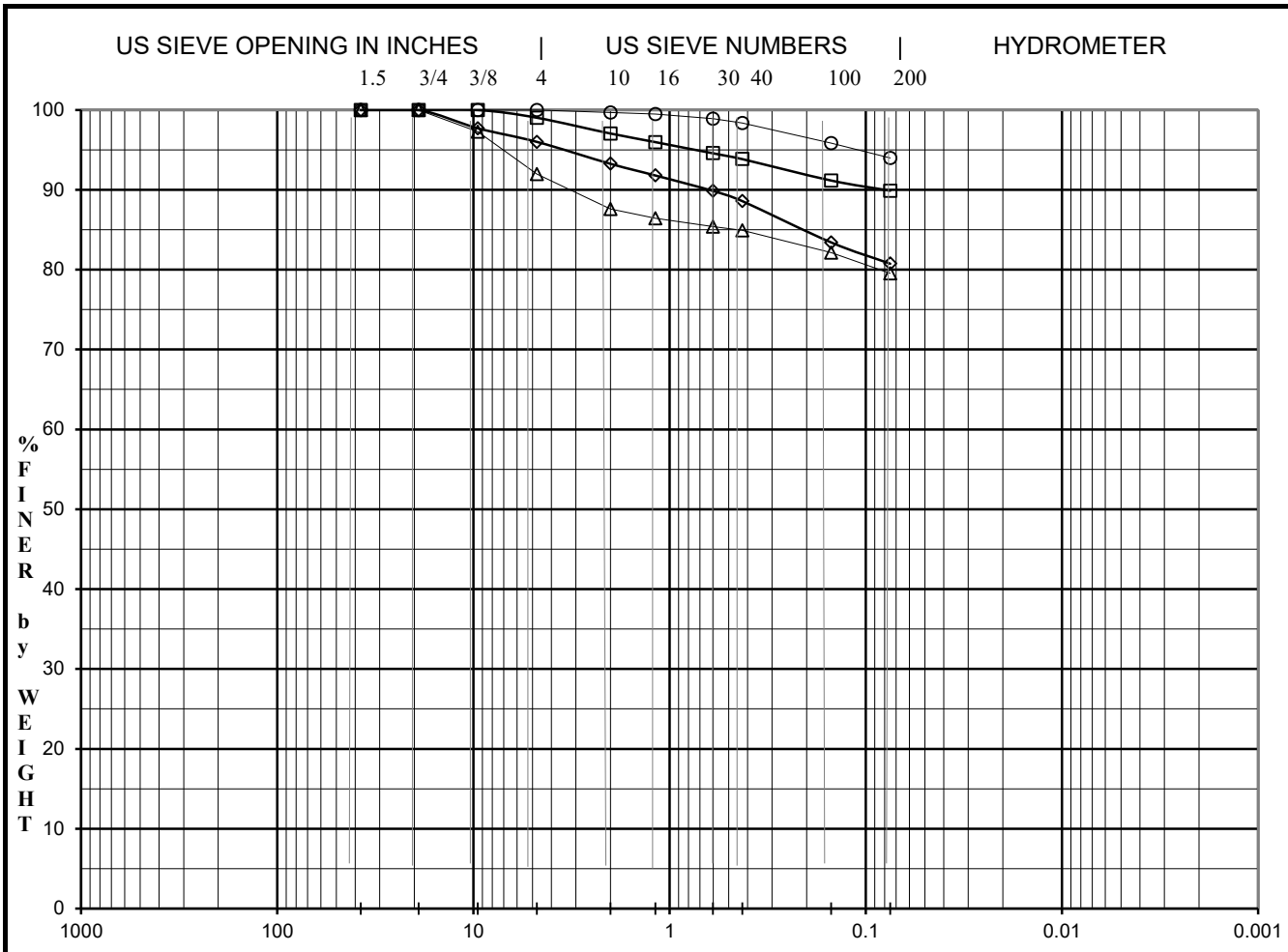
SWELL-CONSOLIDATION TEST



Sample Location	B2
Sample Depth	10 feet
Sample Description	Claystone
USCS Classification	Bedrock

Dry Density	98 pcf
In-Situ Moisture Content	25.5 %
Volume Change	0.3 %
Swell Pressure	1,600 psf

intertek psi	**Venetucci Boulevard Channel Improvements**	**JOB NO. 05322860**
	SWELL - CONSOLIDATION TEST	**FIGURE NO. A3**



GRAIN SIZE (mm)

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MED	FINE	

Specimen I.D.	Description	USCS	AASHTO	Group Index	LL	PI	PL
◇ B1 @ 7.5 FEET	Fat Clay with Sand	CH	A-7-6	31	53	38	15
□ B2 @ 5 FEET	Fat Clay	CH	A-7-6	46	67	47	20
△ B2 @ 10 FEET	Fat Clay with Sand	CH	A-7-6	36	64	44	20
○ B3 @ 10 FEET	Claystone(Bedrock)	CH	A-7-6	56	71	54	17
+							

Specimen I.D.	D100	D60	D30	D10	Cc	Cu	%Gravel	%Sand	%Silt&Clay
◇ B1 @ 7.5 FEET	19.00						4	15	81
□ B2 @ 5 FEET	9.50						1	9	90
△ B2 @ 10 FEET	19.00						8	12	80
○ B3 @ 10 FEET	4.75						0	6	94
+									

intertek psi

Venetucci Boulevard Channel Improvements

JOB NO. 05322860

GRADATION CURVES

FIGURE NO. A4

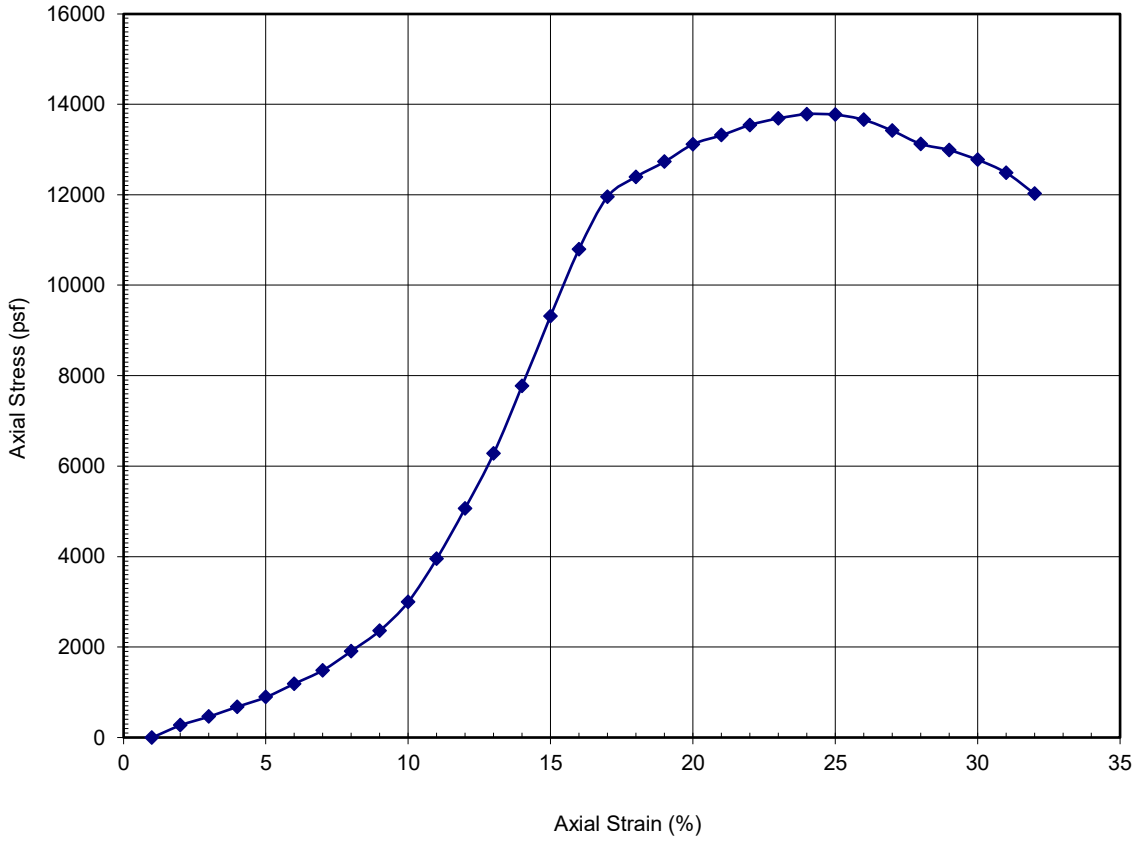
Information To Build On
Engineering • Consulting • Testing

UNCONFINED COMPRESSION REPORT

Tested For: Peak Development
1480 Humboldt Street
Denver, Colorado 80218

Project Name: TTRes Channel Improvements
Venetucci Blvd
Sample Date: July 15, 2024
Project No. 05322860
Sample No. B1
Depth 20

UNCONFINED COMPRESSION TEST: ASTM D2166



Wet Density (pcf)	127.2	**Initial Height (in)**	4.03
Dry Density (pcf)	112.5	**Initial Diameter (in)**	1.93
Moisture Content (%)	13.1	**Relative Compaction (%)**	N/A
Compressive Strength (psf)	13,800	**Deviation From OMC (%)**	N/A

Remarks:

Respectfully Submitted,
Professional Service Industries, Inc.

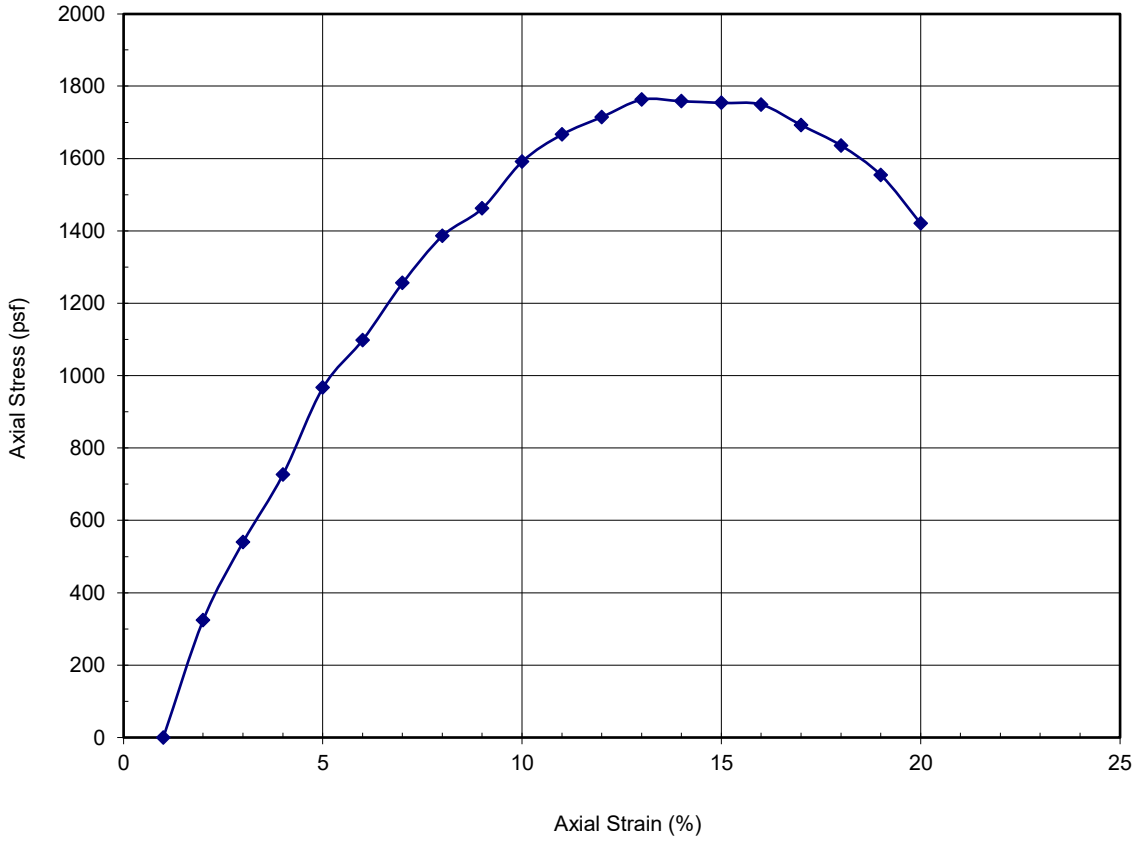
Information To Build On
Engineering • Consulting • Testing

UNCONFINED COMPRESSION REPORT

Tested For: Peak Development
1480 Humboldt Street
Denver, Colorado 80218

Project Name: TTRes Channel Improvements
Venetucci Blvd
Sample Date: July 15, 2024
Project No. 05322860
Sample No. B2
Depth 25

UNCONFINED COMPRESSION TEST: ASTM D2166



Wet Density (pcf)	122.6	**Initial Height (in)**	3.95
Dry Density (pcf)	100.7	**Initial Diameter (in)**	1.94
Moisture Content (%)	21.7	**Relative Compaction (%)**	N/A
Compressive Strength (psf)	1,800	**Deviation From OMC (%)**	N/A

Remarks:

Respectfully Submitted,
Professional Service Industries, Inc.

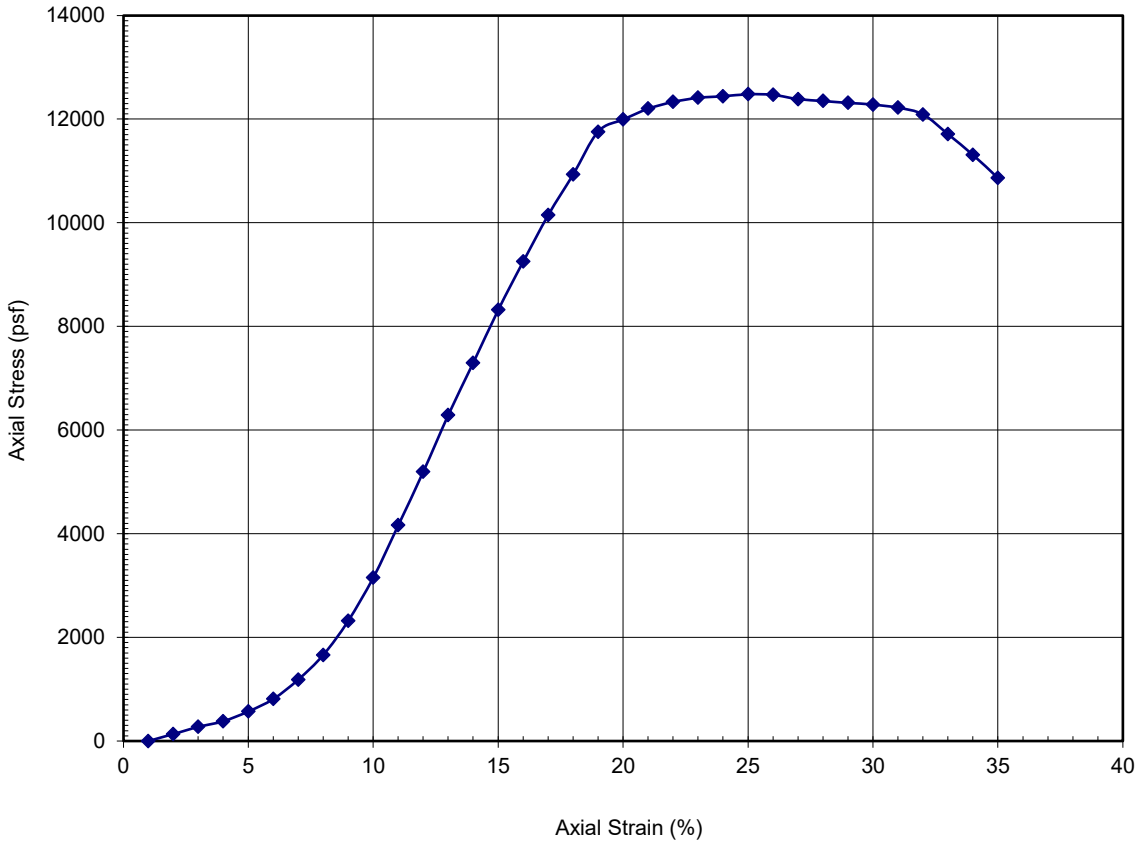
Information To Build On
Engineering • Consulting • Testing

UNCONFINED COMPRESSION REPORT

Tested For: Peak Development
1480 Humboldt Street
Denver, Colorado 80218

Project Name: TTRes Channel Improvements
Venetucci Blvd
Sample Date: July 15, 2024
Project No. 05322860
Sample No. B3
Depth 20

UNCONFINED COMPRESSION TEST: ASTM D2166



Wet Density (pcf)	120.7	**Initial Height (in)**	4.00
Dry Density (pcf)	107.7	**Initial Diameter (in)**	1.92
Moisture Content (%)	12.1	**Relative Compaction (%)**	N/A
Compressive Strength (psf)	12,500	**Deviation From OMC (%)**	N/A

Remarks:

Respectfully Submitted,
Professional Service Industries, Inc.

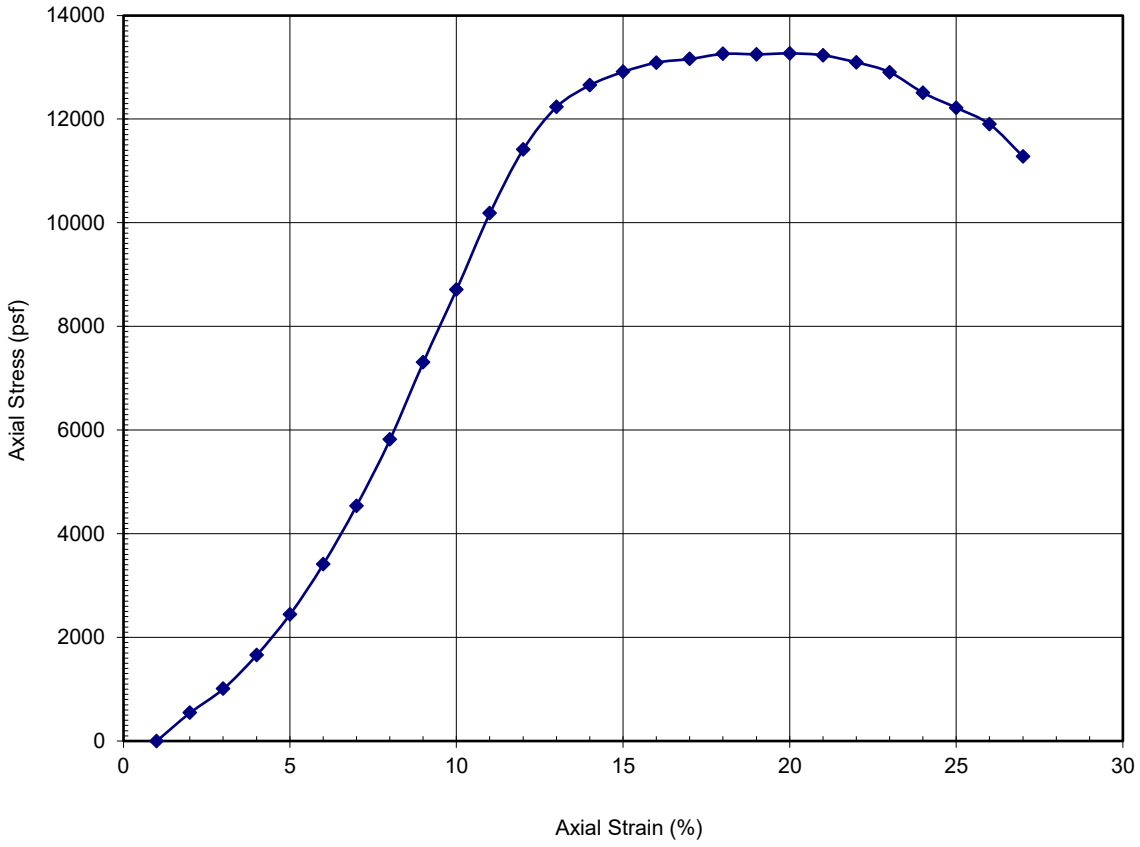
Information To Build On
Engineering • Consulting • Testing

UNCONFINED COMPRESSION REPORT

Tested For: Peak Development
1480 Humboldt Street
Denver, Colorado 80218

Project Name: TTRes Channel Improvements
Venetucci Blvd
Sample Date: July 15, 2024
Project No. 05322860
Sample No. B3
Depth 25

UNCONFINED COMPRESSION TEST: ASTM D2166



Wet Density (pcf)	122.4	**Initial Height (in)**	4.00
Dry Density (pcf)	110.0	**Initial Diameter (in)**	1.93
Moisture Content (%)	11.3	**Relative Compaction (%)**	N/A
Compressive Strength (psf)	13,300	**Deviation From OMC (%)**	N/A

Remarks:

Respectfully Submitted,
Professional Service Industries, Inc.

APPENDIX H: FEMA NO-RISE ANALYSIS

Fishers Canyon Creek Channel Improvement

El Paso County, Colorado

No-Rise Floodplain Analysis

PREPARED FOR

CS 2005 Investments, LLC
1480 Humboldt Street
Denver, Colorado 80218

Prepared By:

Kimley»Horn
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903
(719) 453-0180

JANUARY 16, 2025

ENGINEER'S CERTIFICATION

This report for the floodplain analysis of Fishers Canyon Creek Channel Improvements was prepared by me (or under my direct supervision) in accordance with the provisions of El Paso County criteria.

Frans R. Lambrechtsen, P.E., CFM

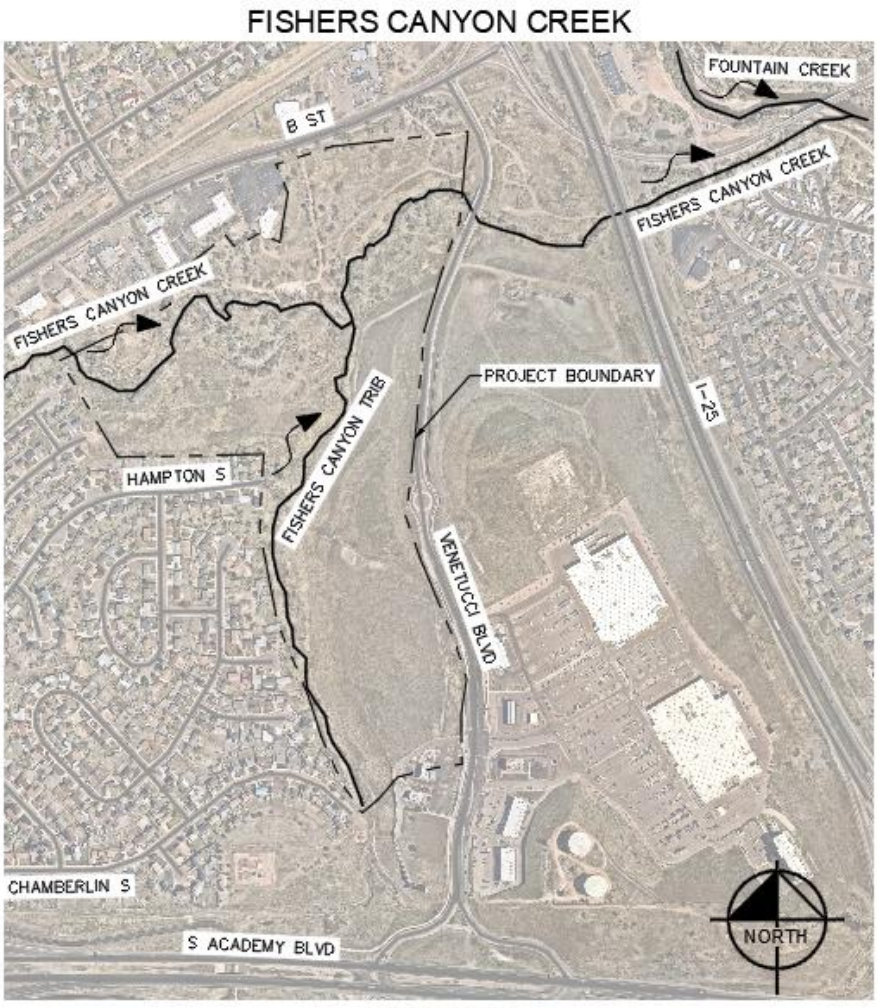
Registered Professional Engineer

State of Colorado No. 54350

INTRODUCTION

Location

The proposed channel improvements are located in a portion of Section 04, Township 15 South, Range 66 West, County of El Paso, State of Colorado ("Site"). The Site is bounded by B Street to the north, I-25 to the east, and residential/commercial land to the south and west. The Site currently comprises undeveloped land with gravel access roads and Venetucci Boulevard, an asphalt road with a concrete bridge that crosses Fishers Canyon Creek. In general, the existing site slopes towards the channels. Fishers Canyon Creek runs west-to-east and the Fishers Canyon Creek Tributary runs south-to-north.



VICINITY MAP
1" = 500'

Existing Site Development

The existing site currently comprises undeveloped land with gravel access roads and Venetucci Boulevard, an asphalt road with a concrete bridge that crosses Fishers Canyon Creek. The entire property is ±64.22 acres.

Proposed Development

The proposed development is multi-family housing known as the Venetucci Apartments. The associated proposed buildings, parking lot, paved drives, and other impervious surfaces comprise approximately 25% (16.23 acres) of the overall Site and are situated in the southeast corner of the parcel.

Generally, the Site slopes towards the channel of Fishers Canyon Creek and Fishers Canyon Creek Tributary. The banks of Fishers Canyon Creek vary greatly in slope, with some areas as low as 33% while other areas are highly incised and nearly vertical. The historic runoff pattern within the vicinity of the proposed development will generally be maintained with the proposed Project.

FLOODPLAIN ANALYSIS

A portion of the subject parcel contains areas that have been mapped Zone AE by FEMA. Zone AE is defined as a special flood hazard area subject to inundation by the 1% annual chance flood event, with base flood elevations determined. A copy of the Flood Insurance Rate Maps (FIRM) has been included in **Appendix A**. The floodplain analysis was completed to illustrate that the proposed site improvements do not adversely impact adjacent properties and will not cause any rise to base flood elevation within the floodway.

Data Collection

Kimley-Horn collected the effective floodplain documentation and hydraulic model from FEMA for Fishers Canyon Creek. The effective model had been developed using the U.S. Army Corps of Engineer's HEC-2 software. Kimley-Horn converted the effective HEC-2 model to a HEC-RAS (Hydrologic Engineering Center – River Analysis System) model using version 6.5.1. The results of the duplicate effective HEC-RAS model were confirmed to match those of the effective HEC-2 model.

Hydrology

No new hydrology was prepared as a part of this analysis. Flow rates were taken from the effective HEC-RAS model. The effective model included the 10-, 50-, 100- and 500-year storms. The floodplain analysis extends from cross-section 2364 to cross-section 110.

Hydraulics

Duplicate Effective Models

The effective HEC-2 model was converted to HEC-RAS to create the duplicate effective model. The duplicate effective model was used as a starting point to create the corrected effective and proposed conditions models.

Corrected Effective Conditions Model

The corrected effective model, also known as the existing conditions model, included adding new cross-sections and updating the cross-section geometry with the existing topography from a site survey conducted by Kimley-Horn in September of 2024 and best available LiDAR data collected from the Colorado Water Conservation Board website. The Venetucci Boulevard bridge was added to the model at the downstream end. Refer to **Appendix B** for HEC-RAS results. A Floodplain Work map is provided in **Appendix C**.

Proposed Conditions Model

The proposed condition model reflects updated geometry to represent the proposed grouted sloped boulder drop structure at cross sections 436 and 423. Refer to **Appendix B** for HEC-RAS results. A Floodplain Work map is provided in **Appendix C**. See **Table 1**, below, for a comparison of floodway water surface elevations between the existing conditions and proposed conditions models.

Vertical Datum

The modeling utilizes the NAVD88 projection for the vertical datum. See **Table 1** below for the water surface elevations (WSEL) comparison between the existing condition and proposed condition models.

Table 1: Floodway WSEL Comparison Table (Proposed vs Existing)

	100-YR Floodway WSEL (NAVD88, ft)			
Cross Section	**Stream**	**Existing Conditions**	**Proposed Conditions**	**Difference (ft)**
1003	Fishers Canyon	5802.57	5802.57	*0*
920	Fishers Canyon	5802.19	5802.19	*0*
831	Fishers Canyon	5802.16	5802.16	*0*
736	Fishers Canyon	5802.16	5802.16	*0*
637	Fishers Canyon	5801.51	5801.51	*0*
532	Fishers Canyon	5797.05	5797.05	*0*
436	Fishers Canyon	5796.36	5796.35	*-0.01*
423	Fishers Canyon	5796.71	5796.75	*-0.04*
320	Fishers Canyon	5795.83	5795.83	*0*
214	Fishers Canyon	5795.95	5795.95	*0*
110	Fishers Canyon	5794.31	5794.31	*0*

CONCLUSIONS

The results of the HEC-RAS modeling for the proposed conditions show no increase in floodway water surface elevations when comparing the results of the proposed conditions and existing conditions models for Fishers Canyon Creek. Please refer to **Appendix B** for the HEC-RAS results.

APPENDIX

APPENDIX A – FEMA FLOOD INSURANCE RATE MAP

104°48'45.46"W 38°46'59.11"N

104°46'52.11"W 38°44'53.43"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR DRAFT FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **5/3/2024 11:25 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88

For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 500 feet 1:6,000

0 250 500 1,000 1,500 2,000 Feet

0 50 100 200 300 400 Meters

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PANEL 743 OF 1275

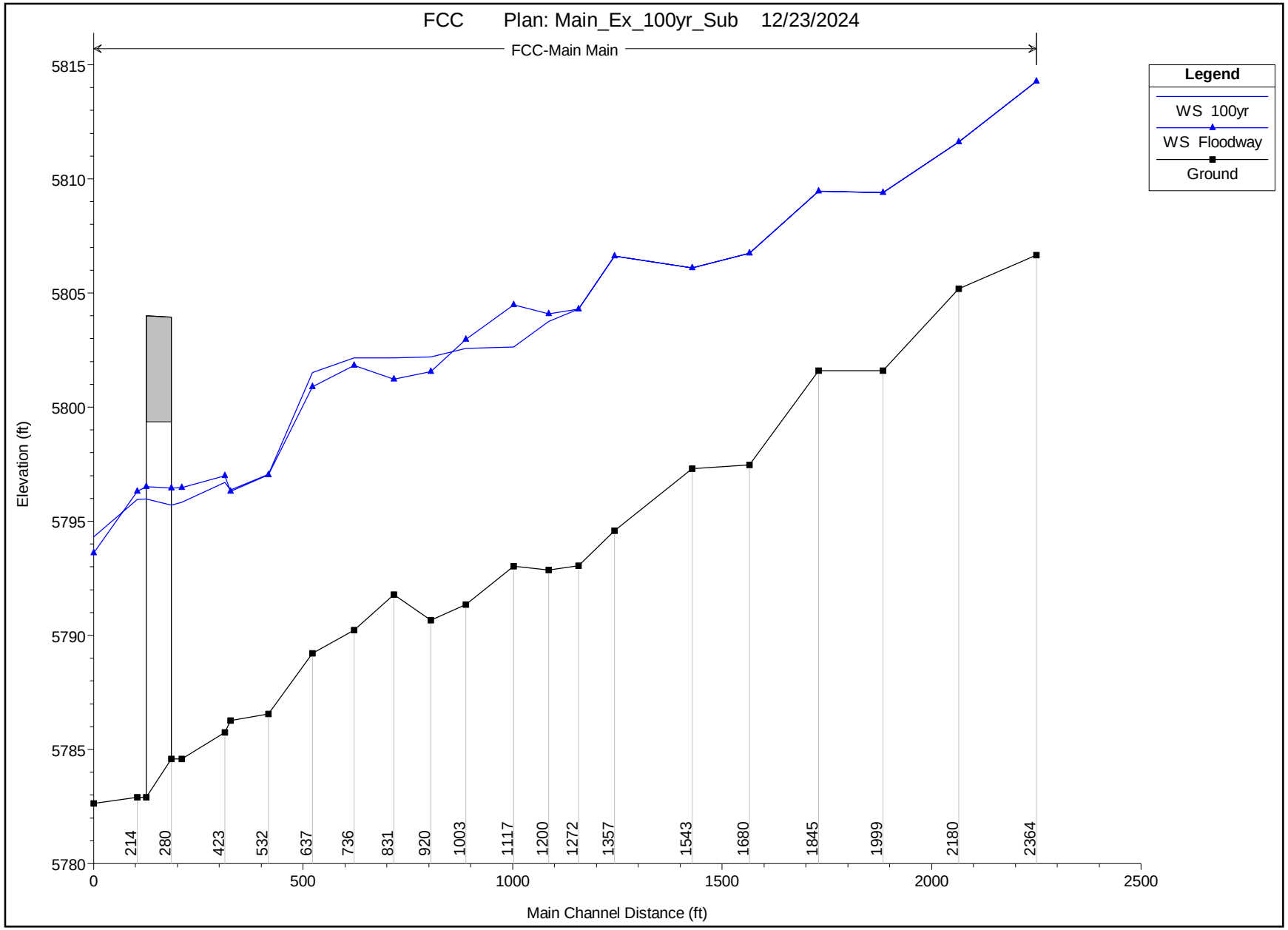
This panel contains:

COMMUNITY	NUMBER	PANEL
EL PASO COUNTY		
CITY OF COLORADO SPRINGS	080059	0743
FORT CARSON	080060	0743
MILITARY RESERVATION	08FED	0743

MAP NUMBER
08041C0743G
EFFECTIVE DATE
December 07, 2

APPENDIX B – HEC-RAS CALCULATIONS

EXISTING CONDITION RESULTS



EXISTING CONDITION RESULTS

HEC-RAS Plan: Main_Ex_100yr_Sub River: FCC-Main Reach: Main

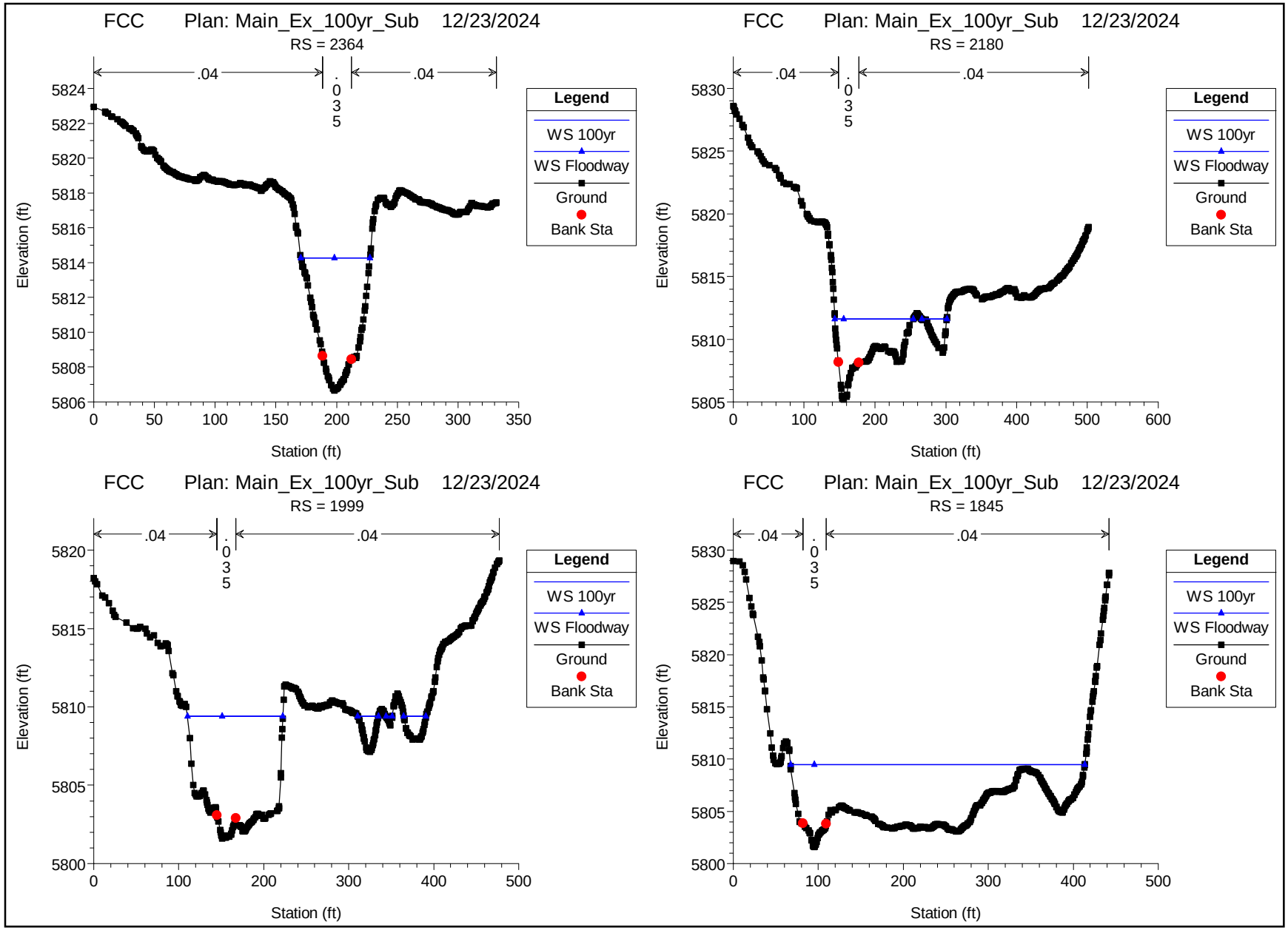
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Main	2364	100yr	3090.00	5806.66	5814.27	5814.27	5816.76	0.008557	14.03	272.12	56.77	0.94	2.44
Main	2364	Floodway	3090.00	5806.66	5814.27	5814.27	5816.76	0.008557	14.03	272.12	56.77	0.94	2.44
Main	2180	100yr	3090.00	5805.19	5811.61	5811.61	5812.94	0.009389	11.44	386.41	146.26	0.92	1.51
Main	2180	Floodway	3090.00	5805.19	5811.61	5811.61	5812.94	0.009389	11.44	386.41	146.26	0.92	1.51
Main	1999	100yr	3090.00	5801.59	5809.40		5809.70	0.001244	5.61	737.86	170.19	0.36	0.33
Main	1999	Floodway	3090.00	5801.59	5809.40		5809.70	0.001244	5.61	737.86	170.19	0.36	0.33
Main	1845	100yr	3090.00	5801.60	5809.46		5809.53	0.000411	3.00	1500.18	346.35	0.21	0.11
Main	1845	Floodway	3090.00	5801.60	5809.46		5809.53	0.000411	3.00	1500.18	346.35	0.21	0.11
Main	1680	100yr	3090.00	5797.46	5806.73	5806.73	5809.12	0.007936	14.74	295.90	65.26	0.90	2.10
Main	1680	Floodway	3090.00	5797.46	5806.73	5806.73	5809.12	0.007936	14.74	295.90	65.26	0.90	2.10
Main	1543	100yr	3090.00	5797.30	5806.10	5806.10	5807.98	0.006275	13.43	346.57	92.82	0.83	1.41
Main	1543	Floodway	3090.00	5797.30	5806.10	5806.10	5807.98	0.006275	13.43	346.57	92.82	0.83	1.41
Main	1357	100yr	3380.00	5794.58	5806.63		5807.05	0.001239	7.13	783.00	154.36	0.38	0.38
Main	1357	Floodway	3380.00	5794.58	5806.63		5807.05	0.001239	7.13	783.00	154.36	0.38	0.38
Main	1272	100yr	3380.00	5793.06	5804.29	5804.29	5806.66	0.005677	15.13	351.84	72.45	0.82	1.58
Main	1272	Floodway	3380.00	5793.06	5804.29	5804.29	5806.66	0.005677	15.13	351.84	72.45	0.82	1.58
Main	1200	100yr	3380.00	5792.87	5803.75	5803.75	5804.92	0.003680	11.70	577.71	199.11	0.64	0.65
Main	1200	Floodway	3380.00	5792.87	5804.09		5804.97	0.002781	10.40	647.35	202.31	0.56	0.54
Main	1117	100yr	3380.00	5793.03	5802.63		5803.31	0.002382	8.89	723.52	246.05	0.52	0.43
Main	1117	Floodway	3380.00	5793.03	5804.48		5804.67	0.000613	5.10	1193.36	259.86	0.27	0.17
Main	1003	100yr	3380.00	5791.34	5802.57	5801.17	5803.03	0.001421	7.49	814.73	239.17	0.40	0.35
Main	1003	Floodway	3380.00	5791.34	5802.96	5801.12	5804.41	0.003050	11.24	414.26	62.09	0.60	1.11
Main	920	100yr	3380.00	5790.66	5802.19	5801.00	5802.86	0.002254	9.08	681.96	274.47	0.50	0.50
Main	920	Floodway	3380.00	5790.66	5801.55	5801.55	5803.96	0.006394	14.65	329.03	63.61	0.83	1.84
Main	831	100yr	3380.00	5791.78	5802.16	5800.11	5802.65	0.001464	7.30	707.25	288.15	0.41	0.46
Main	831	Floodway	3380.00	5791.78	5801.23	5800.36	5802.99	0.004673	12.21	368.57	65.78	0.72	1.49
Main	736	100yr	3380.00	5790.22	5802.16	5798.85	5802.50	0.000850	6.09	867.73	357.90	0.32	0.29
Main	736	Floodway	3380.00	5790.22	5801.82	5798.88	5802.42	0.001359	7.54	624.65	87.87	0.40	0.54
Main	637	100yr	3380.00	5789.21	5801.51	5797.56	5802.34	0.001533	8.06	556.80	341.11	0.43	0.52

EXISTING CONDITION RESULTS

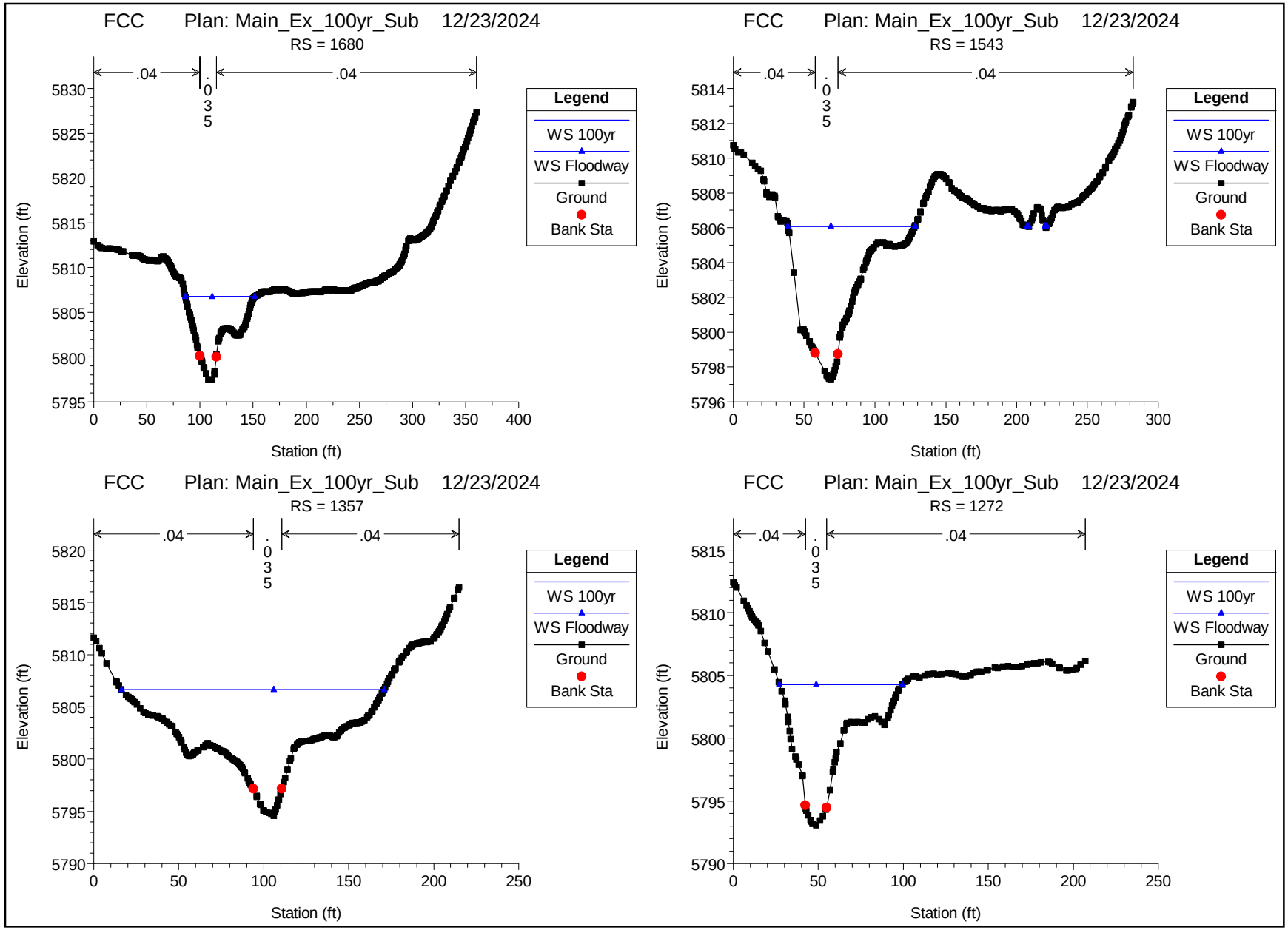
HEC-RAS Plan: Main_Ex_100yr_Sub River: FCC-Main Reach: Main (Continued)

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	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Main	637	Floodway	3380.00	5789.21	5800.90	5797.57	5802.18	0.002325	9.56	424.63	60.40	0.52	0.85
Main	532	100yr	3380.00	5786.56	5797.05	5797.05	5800.48	0.007715	15.80	257.30	41.63	0.90	2.59
Main	532	Floodway	3380.00	5786.56	5797.03	5797.03	5800.48	0.007757	15.83	256.75	41.59	0.90	2.60
Main	436	100yr	3380.00	5786.26	5796.36		5797.80	0.011155	9.93	354.02	53.71	0.59	4.06
Main	436	Floodway	3380.00	5786.26	5796.32		5798.35	0.015637	11.71	300.23	39.47	0.70	5.90
Main	423	100yr	3380.00	5785.75	5796.71		5797.54	0.003806	6.14	480.08	62.39	0.35	1.62
Main	423	Floodway	3380.00	5785.75	5796.98		5797.94	0.004172	6.54	451.06	48.16	0.36	1.84
Main	320	100yr	3380.00	5784.59	5795.83	5792.74	5797.17	0.002479	9.99	435.26	83.79	0.54	0.75
Main	320	Floodway	3380.00	5784.59	5796.47	5792.74	5797.63	0.001968	9.25	431.56	44.95	0.49	0.92
Main	280		Bridge										
Main	214	100yr	3380.00	5782.91	5795.95	5790.73	5796.57	0.001374	8.06	599.09	86.08	0.40	0.54
Main	214	Floodway	3380.00	5782.91	5796.30	5790.81	5797.22	0.001751	9.26	476.74	40.41	0.45	0.83
Main	110	100yr	3380.00	5782.64	5794.31	5794.31	5796.01	0.004645	12.85	434.34	123.07	0.71	0.98
Main	110	Floodway	3380.00	5782.64	5793.61	5793.61	5796.35	0.007384	15.46	299.89	51.13	0.88	2.26

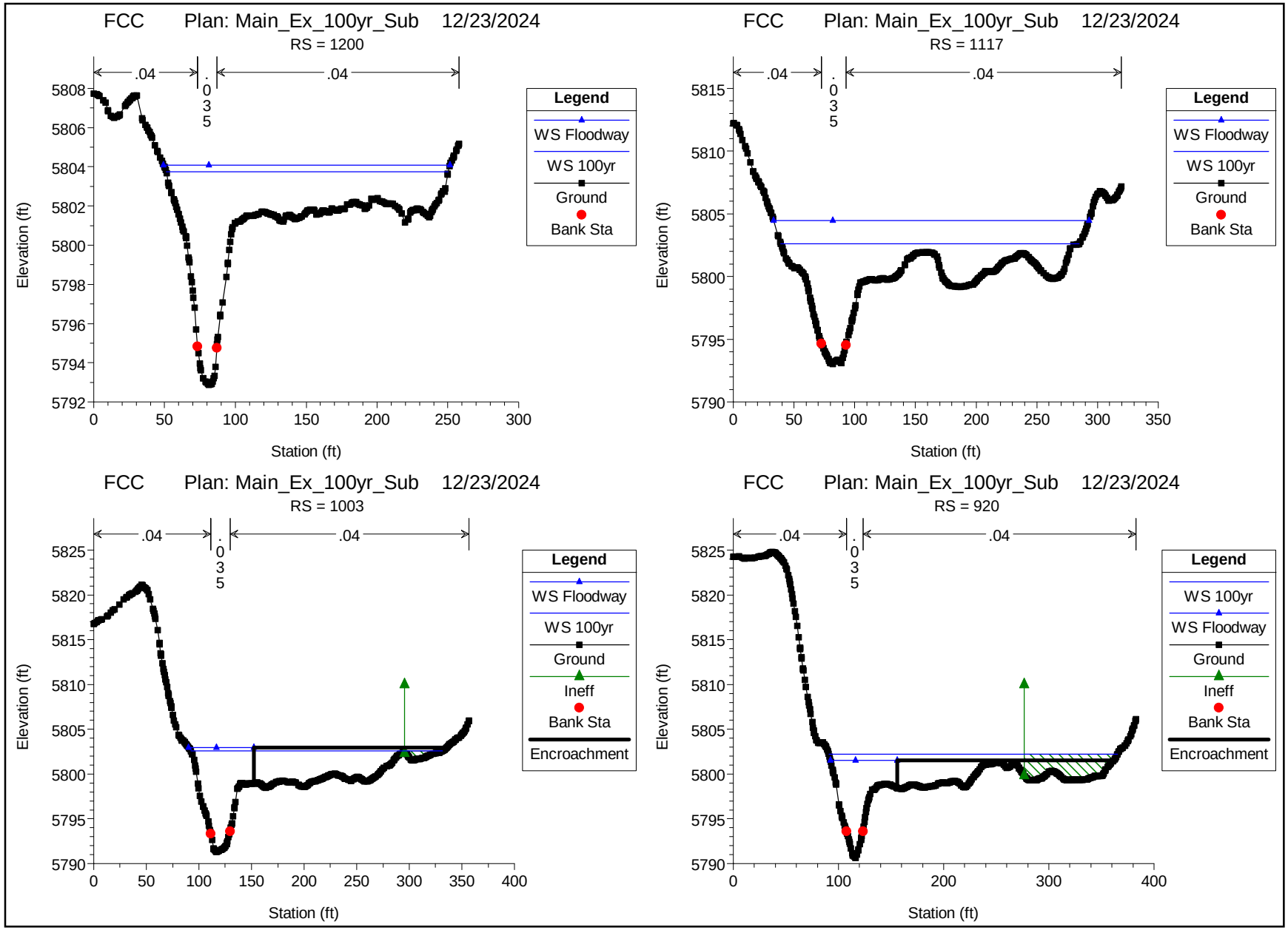
EXISTING CONDITION RESULTS



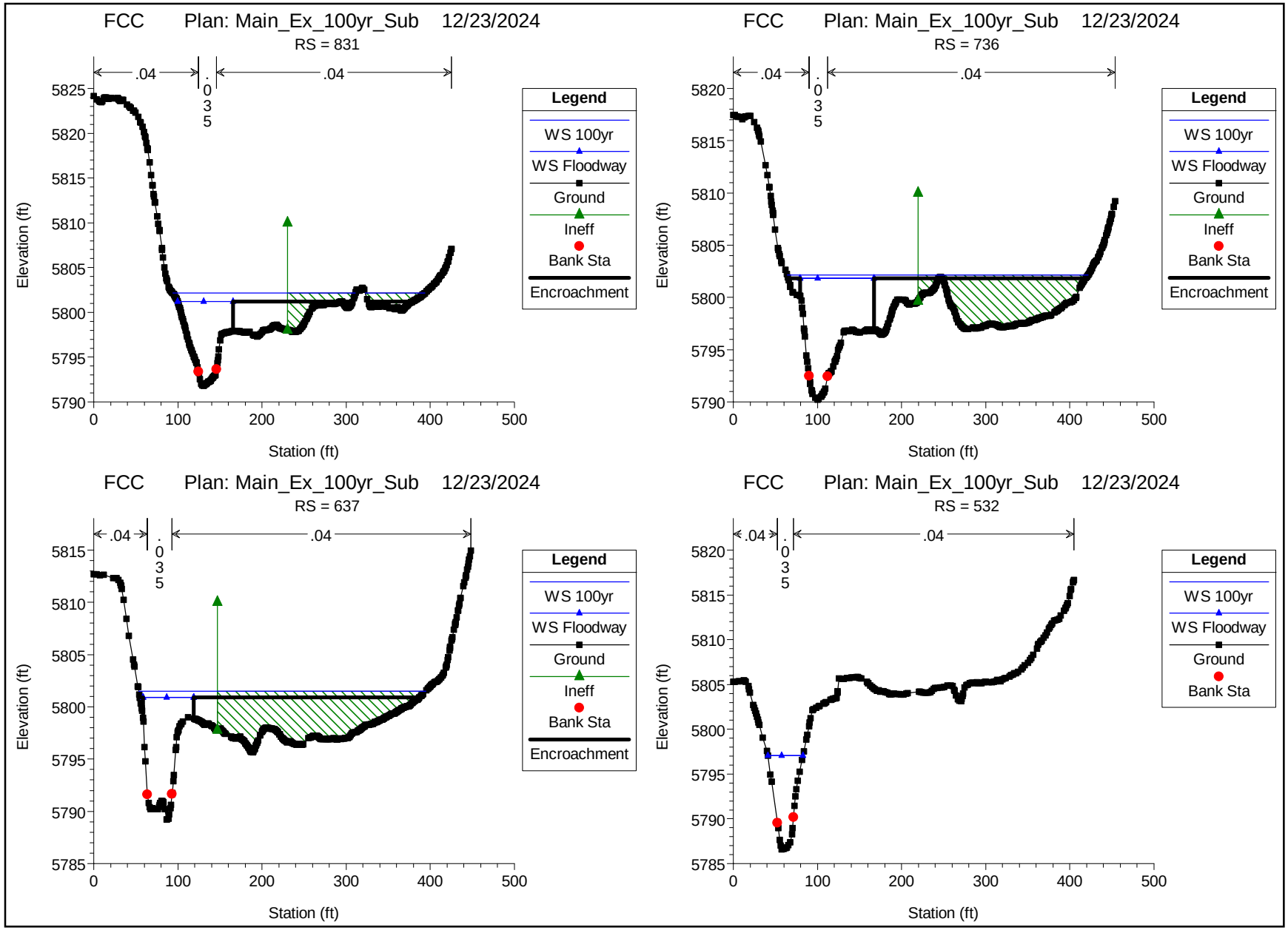
EXISTING CONDITION RESULTS



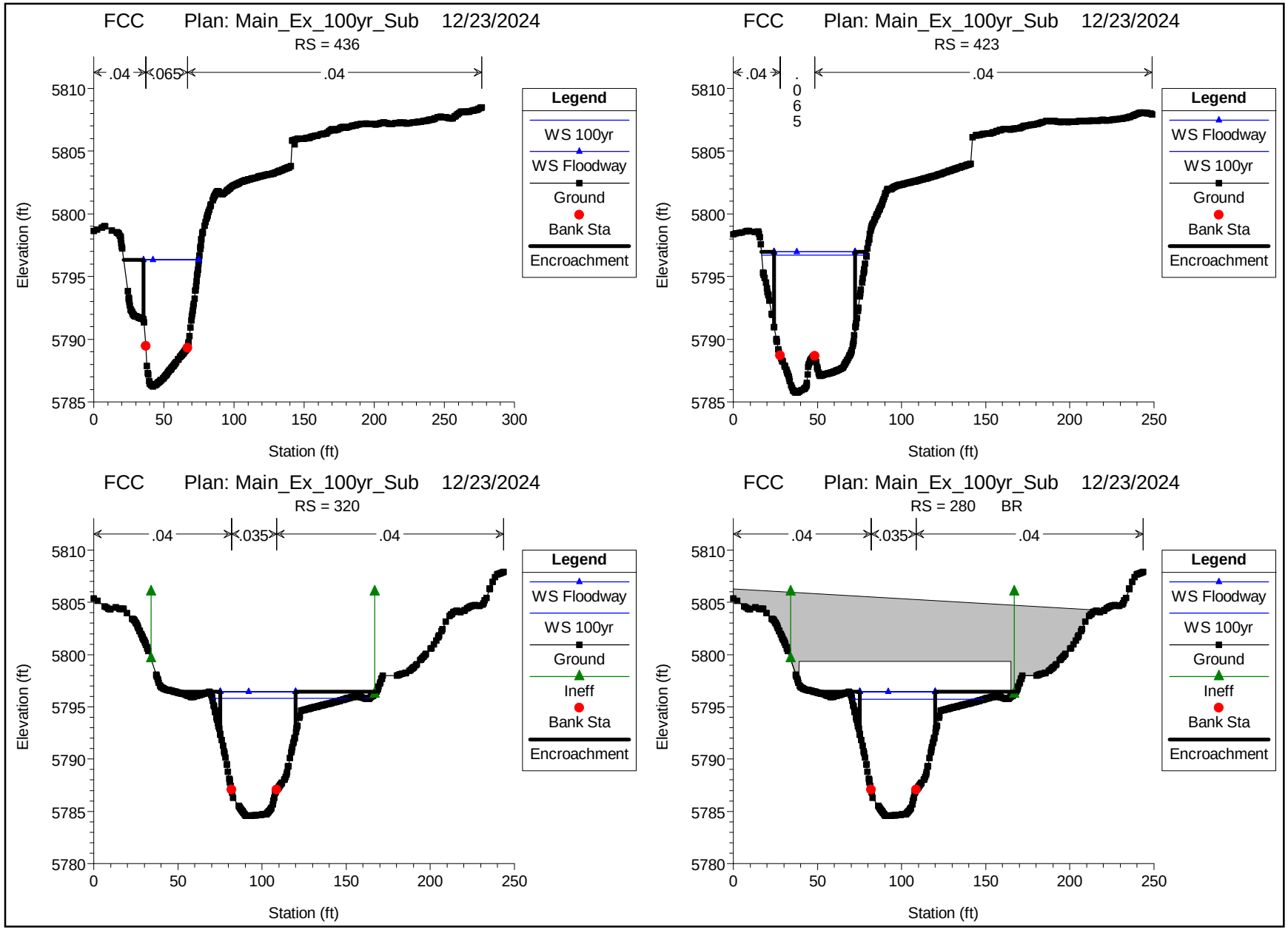
EXISTING CONDITION RESULTS



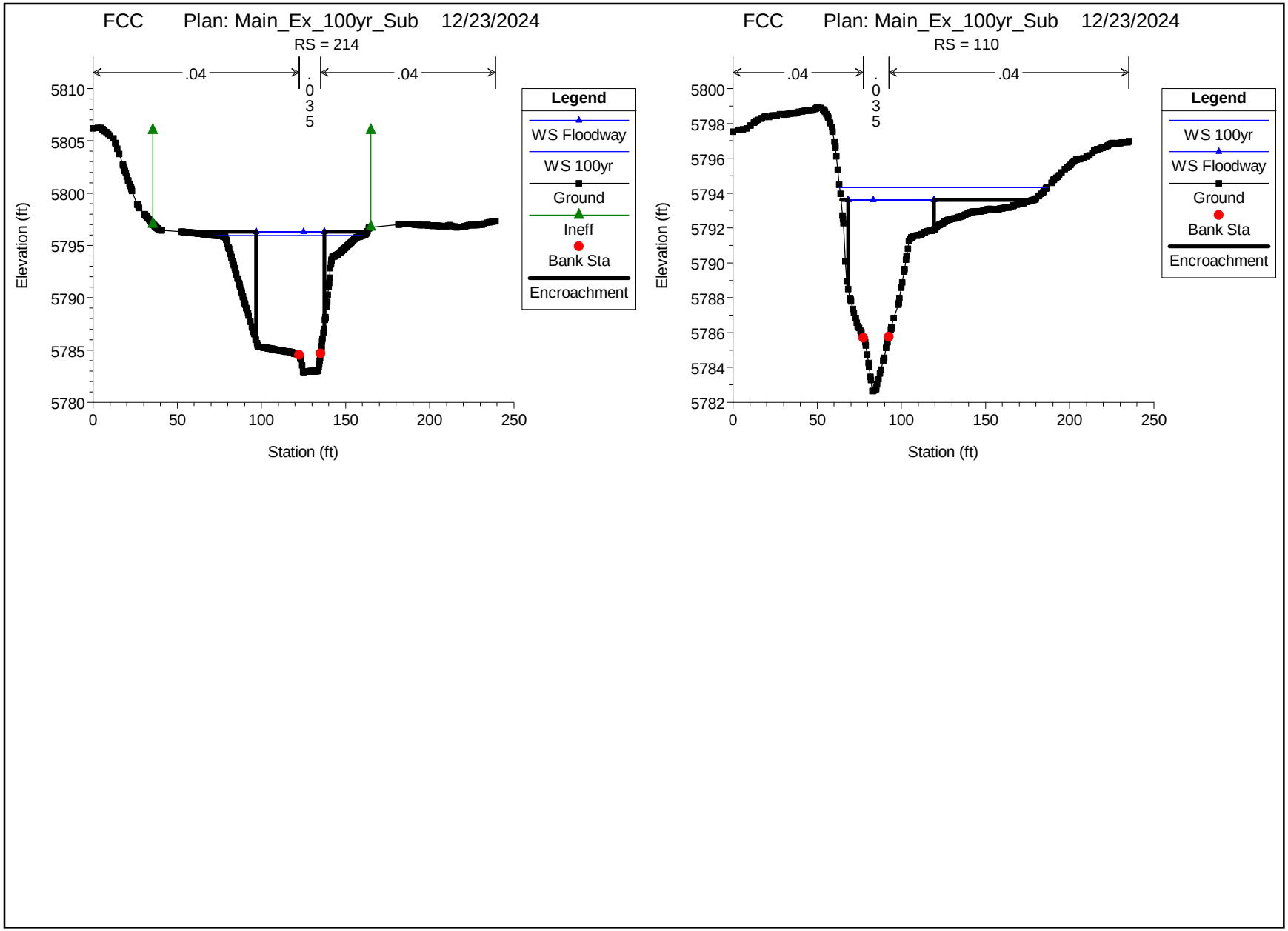
EXISTING CONDITION RESULTS



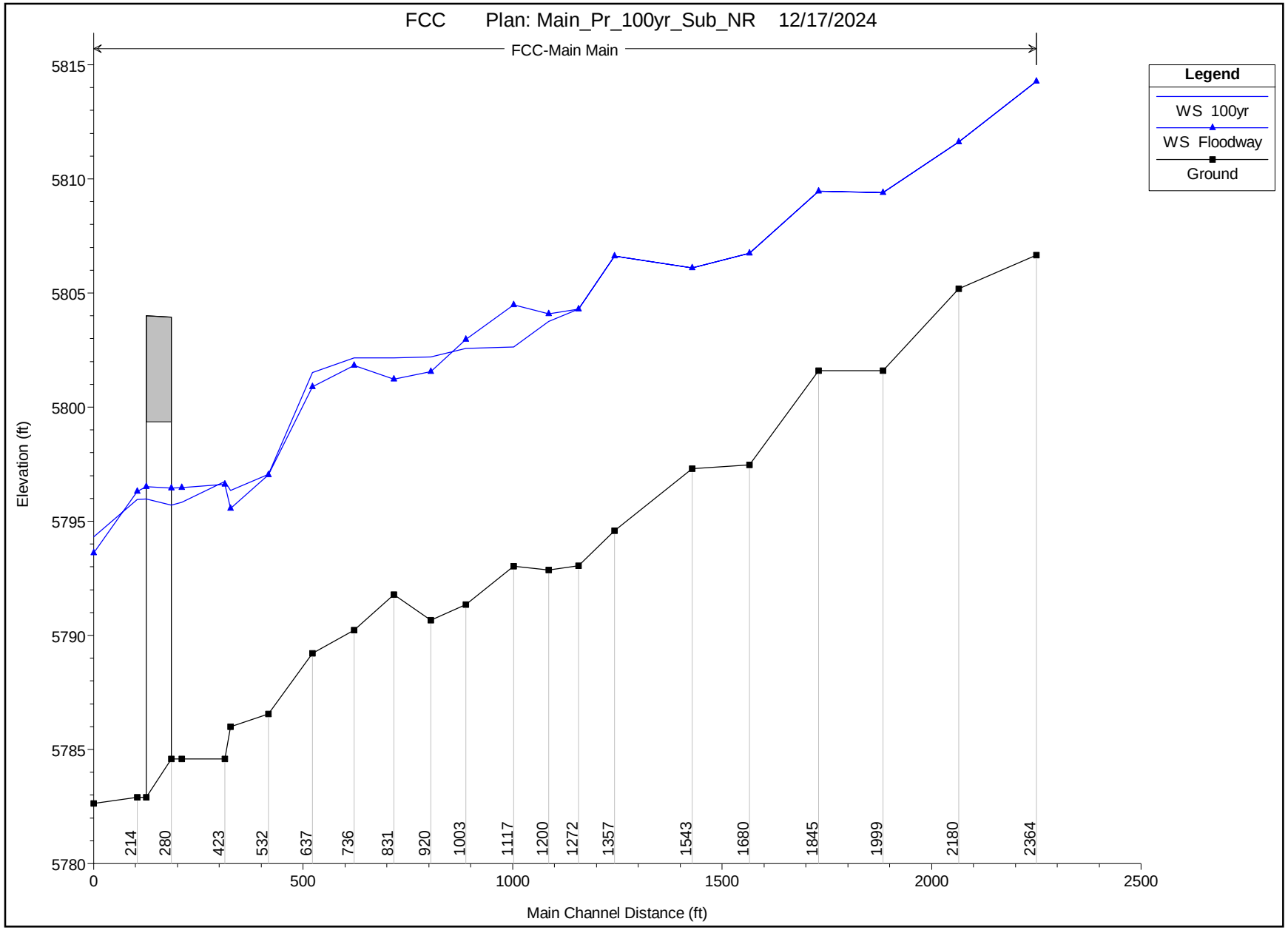
EXISTING CONDITION RESULTS



EXISTING CONDITION RESULTS



PROPOSED CONDITION RESULTS



PROPOSED CONDITION RESULTS

HEC-RAS Plan: PR_NR River: FCC-Main Reach: Main

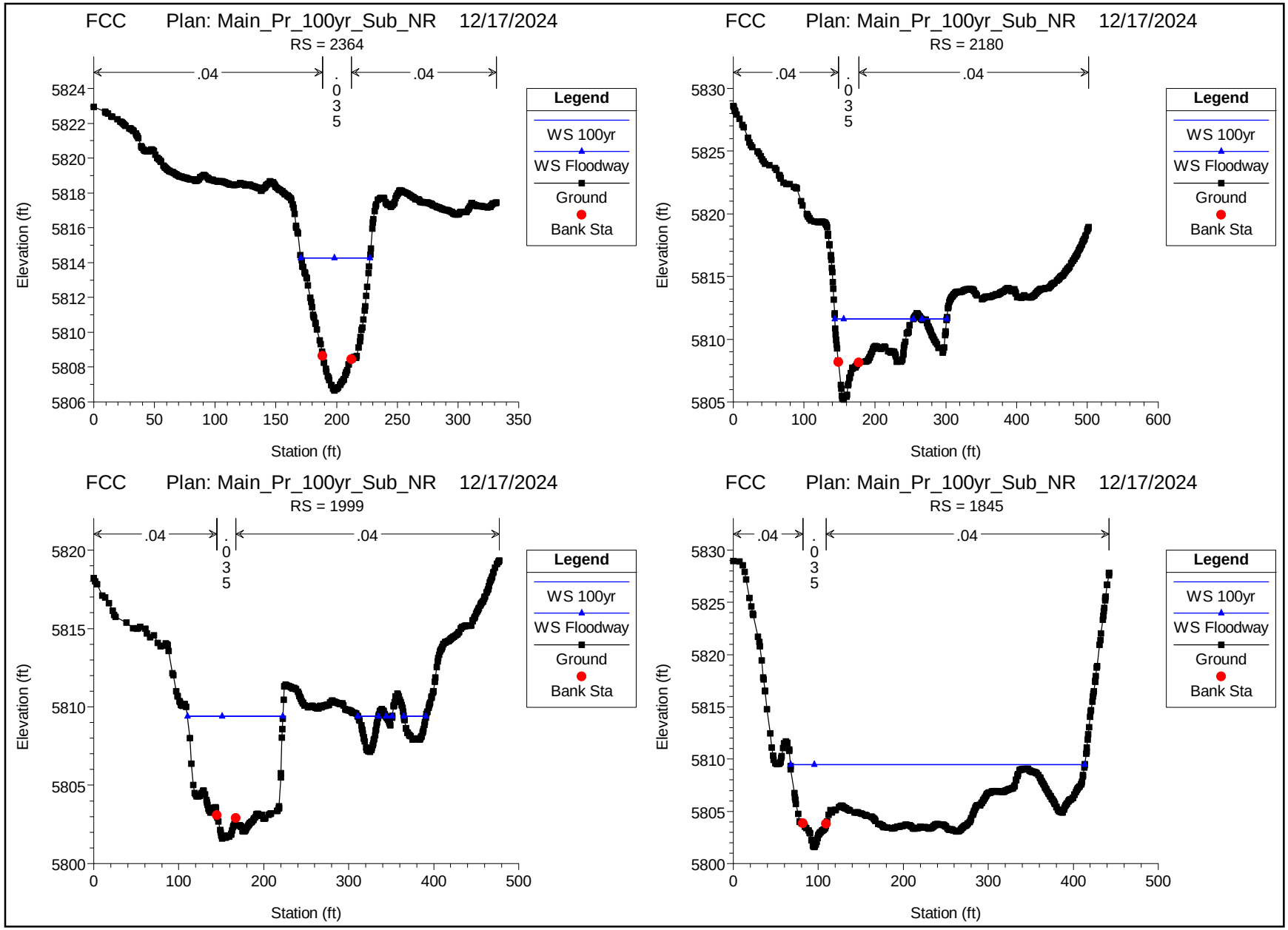
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Main	2364	100yr	3090.00	5806.66	5814.27	5814.27	5816.76	0.008557	14.03	272.12	56.77	0.94	2.44
Main	2364	Floodway	3090.00	5806.66	5814.27	5814.27	5816.76	0.008557	14.03	272.12	56.77	0.94	2.44
Main	2180	100yr	3090.00	5805.19	5811.61	5811.61	5812.94	0.009389	11.44	386.41	146.26	0.92	1.51
Main	2180	Floodway	3090.00	5805.19	5811.61	5811.61	5812.94	0.009389	11.44	386.41	146.26	0.92	1.51
Main	1999	100yr	3090.00	5801.59	5809.40		5809.70	0.001244	5.61	737.86	170.19	0.36	0.33
Main	1999	Floodway	3090.00	5801.59	5809.40		5809.70	0.001244	5.61	737.86	170.19	0.36	0.33
Main	1845	100yr	3090.00	5801.60	5809.46		5809.53	0.000411	3.00	1500.18	346.35	0.21	0.11
Main	1845	Floodway	3090.00	5801.60	5809.46		5809.53	0.000411	3.00	1500.18	346.35	0.21	0.11
Main	1680	100yr	3090.00	5797.46	5806.73	5806.73	5809.12	0.007936	14.74	295.90	65.26	0.90	2.10
Main	1680	Floodway	3090.00	5797.46	5806.73	5806.73	5809.12	0.007936	14.74	295.90	65.26	0.90	2.10
Main	1543	100yr	3090.00	5797.30	5806.10	5806.10	5807.98	0.006275	13.43	346.57	92.82	0.83	1.41
Main	1543	Floodway	3090.00	5797.30	5806.10	5806.10	5807.98	0.006275	13.43	346.57	92.82	0.83	1.41
Main	1357	100yr	3380.00	5794.58	5806.63		5807.05	0.001239	7.13	783.00	154.36	0.38	0.38
Main	1357	Floodway	3380.00	5794.58	5806.63		5807.05	0.001239	7.13	783.00	154.36	0.38	0.38
Main	1272	100yr	3380.00	5793.06	5804.29	5804.29	5806.66	0.005677	15.13	351.84	72.45	0.82	1.58
Main	1272	Floodway	3380.00	5793.06	5804.29	5804.29	5806.66	0.005677	15.13	351.84	72.45	0.82	1.58
Main	1200	100yr	3380.00	5792.87	5803.75	5803.75	5804.92	0.003680	11.70	577.71	199.11	0.64	0.65
Main	1200	Floodway	3380.00	5792.87	5804.09		5804.97	0.002781	10.40	647.35	202.31	0.56	0.54
Main	1117	100yr	3380.00	5793.03	5802.63		5803.31	0.002382	8.89	723.52	246.05	0.52	0.43
Main	1117	Floodway	3380.00	5793.03	5804.48		5804.67	0.000613	5.10	1193.36	259.86	0.27	0.17
Main	1003	100yr	3380.00	5791.34	5802.57	5801.17	5803.03	0.001421	7.49	814.73	239.17	0.40	0.35
Main	1003	Floodway	3380.00	5791.34	5802.96	5801.12	5804.41	0.003050	11.24	414.26	62.09	0.60	1.11
Main	920	100yr	3380.00	5790.66	5802.19	5801.00	5802.86	0.002254	9.08	681.96	274.47	0.50	0.50
Main	920	Floodway	3380.00	5790.66	5801.55	5801.55	5803.96	0.006394	14.65	329.03	63.61	0.83	1.84
Main	831	100yr	3380.00	5791.78	5802.16	5800.11	5802.65	0.001464	7.30	707.25	288.15	0.41	0.46
Main	831	Floodway	3380.00	5791.78	5801.23	5800.36	5802.99	0.004672	12.20	368.60	65.78	0.72	1.49
Main	736	100yr	3380.00	5790.22	5802.16		5802.50	0.000850	6.09	867.73	357.90	0.32	0.29
Main	736	Floodway	3380.00	5790.22	5801.82		5802.42	0.001359	7.54	624.74	87.87	0.40	0.54
Main	637	100yr	3380.00	5789.21	5801.51	5797.56	5802.34	0.001533	8.06	556.80	341.11	0.43	0.52

PROPOSED CONDITION RESULTS

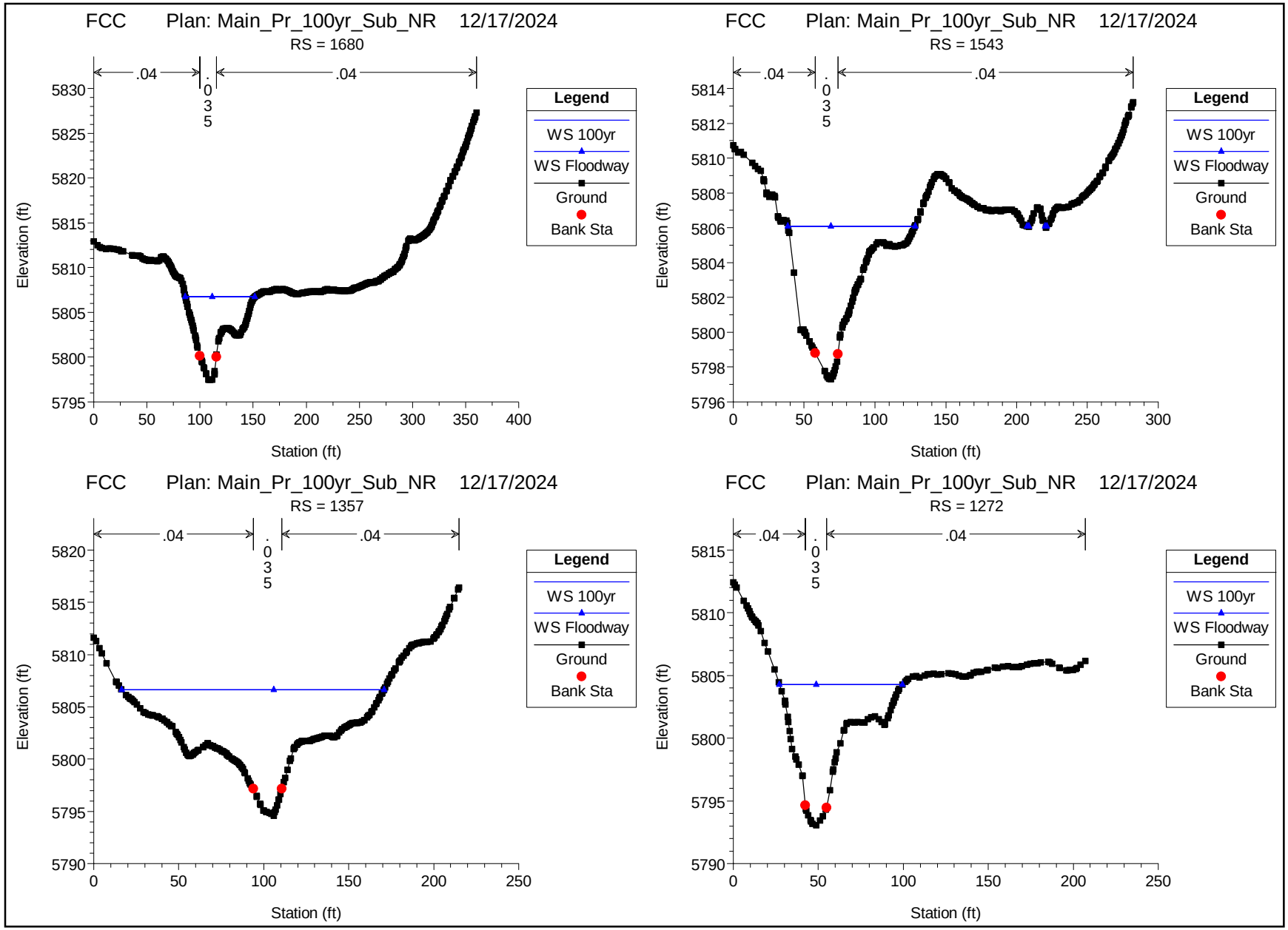
HEC-RAS Plan: PR_NR River: FCC-Main Reach: Main (Continued)

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	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Main	637	Floodway	3380.00	5789.21	5800.90	5797.57	5802.18	0.002324	9.56	424.68	60.40	0.52	0.85
Main	532	100yr	3380.00	5786.56	5797.05	5797.05	5800.48	0.007717	15.80	257.28	41.63	0.90	2.59
Main	532	Floodway	3380.00	5786.56	5797.03	5797.03	5800.48	0.007759	15.83	256.73	41.58	0.90	2.60
Main	436	100yr	3380.00	5786.00	5796.35		5797.67	0.003837	12.35	407.67	63.43	0.68	1.44
Main	436	Floodway	3380.00	5786.00	5795.56	5795.11	5798.46	0.008692	17.62	282.15	42.82	1.01	2.95
Main	423	100yr	3380.00	5784.59	5796.75		5797.45	0.001723	9.25	554.55	73.60	0.47	0.76
Main	423	Floodway	3380.00	5784.59	5796.62		5797.92	0.003038	12.19	417.12	48.16	0.62	1.30
Main	320	100yr	3380.00	5784.59	5795.83	5792.74	5797.17	0.002479	9.99	435.26	83.79	0.54	0.75
Main	320	Floodway	3380.00	5784.59	5796.47	5792.74	5797.63	0.001968	9.25	431.56	44.95	0.49	0.92
Main	280		Bridge										
Main	214	100yr	3380.00	5782.91	5795.95	5790.73	5796.57	0.001374	8.06	599.09	86.08	0.40	0.54
Main	214	Floodway	3380.00	5782.91	5796.30	5790.81	5797.22	0.001751	9.26	476.74	40.41	0.45	0.83
Main	110	100yr	3380.00	5782.64	5794.31	5794.31	5796.01	0.004645	12.85	434.34	123.07	0.71	0.98
Main	110	Floodway	3380.00	5782.64	5793.61	5793.61	5796.35	0.007384	15.46	299.89	51.13	0.88	2.26

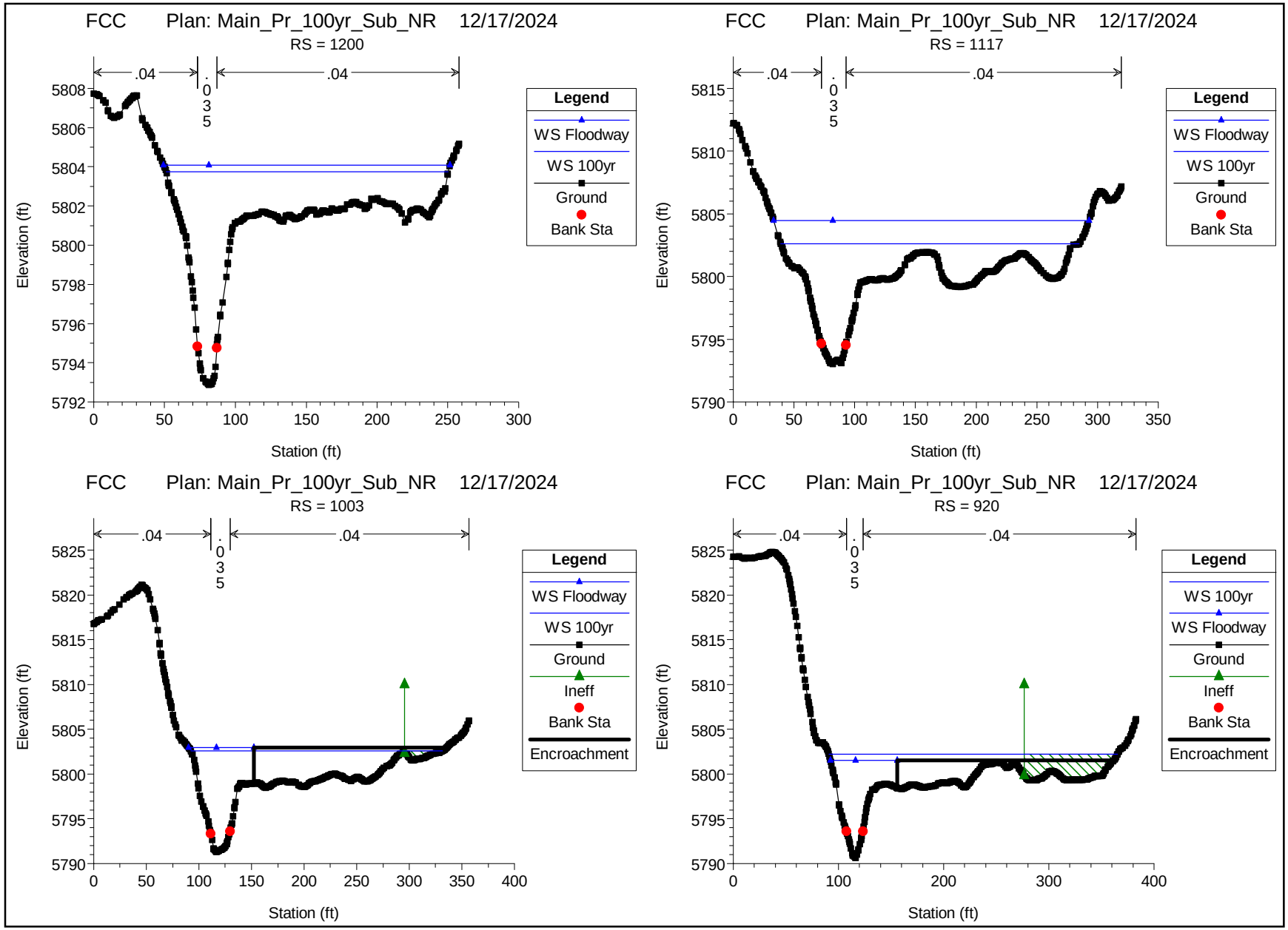
PROPOSED CONDITION RESULTS



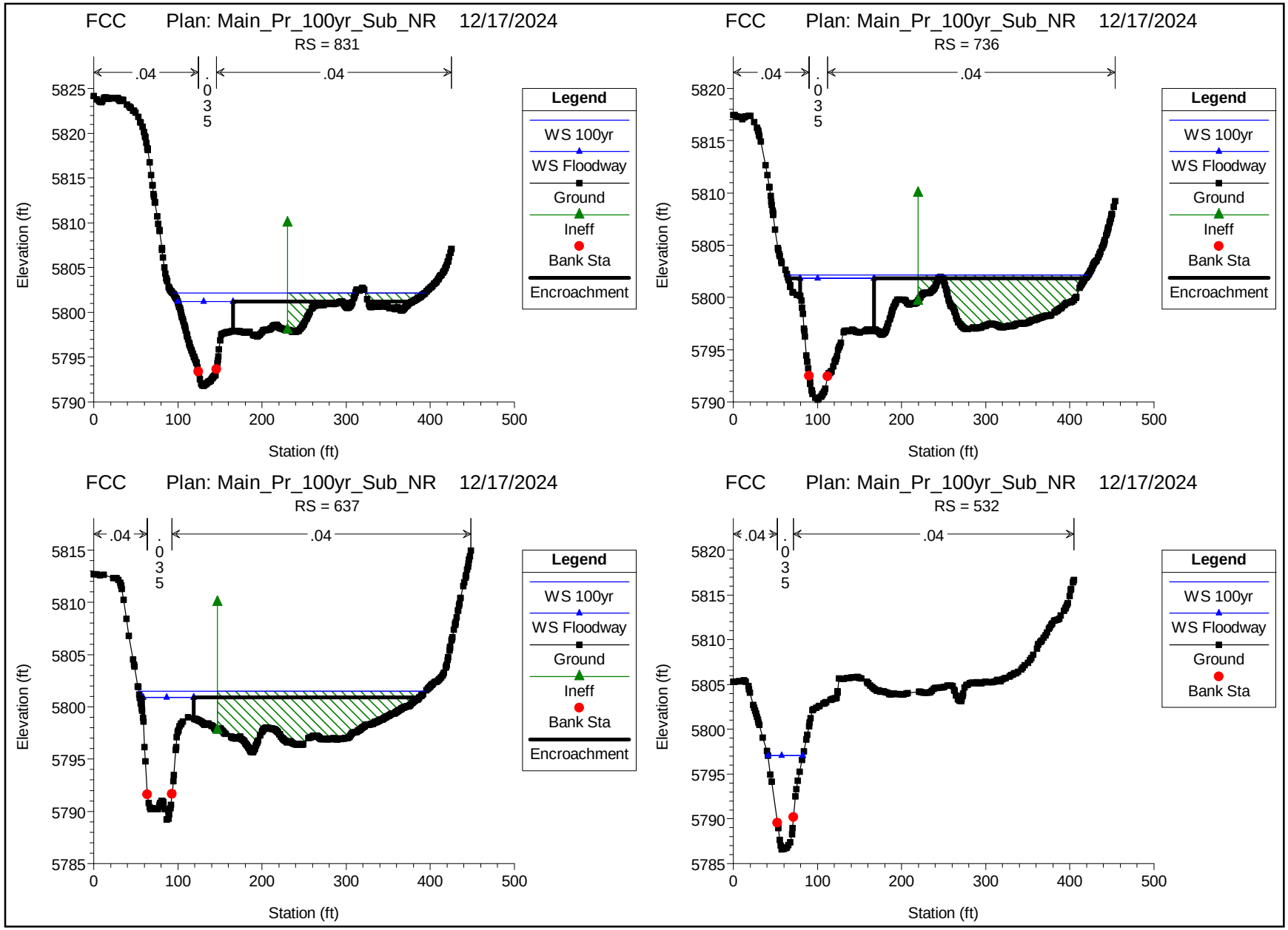
PROPOSED CONDITION RESULTS



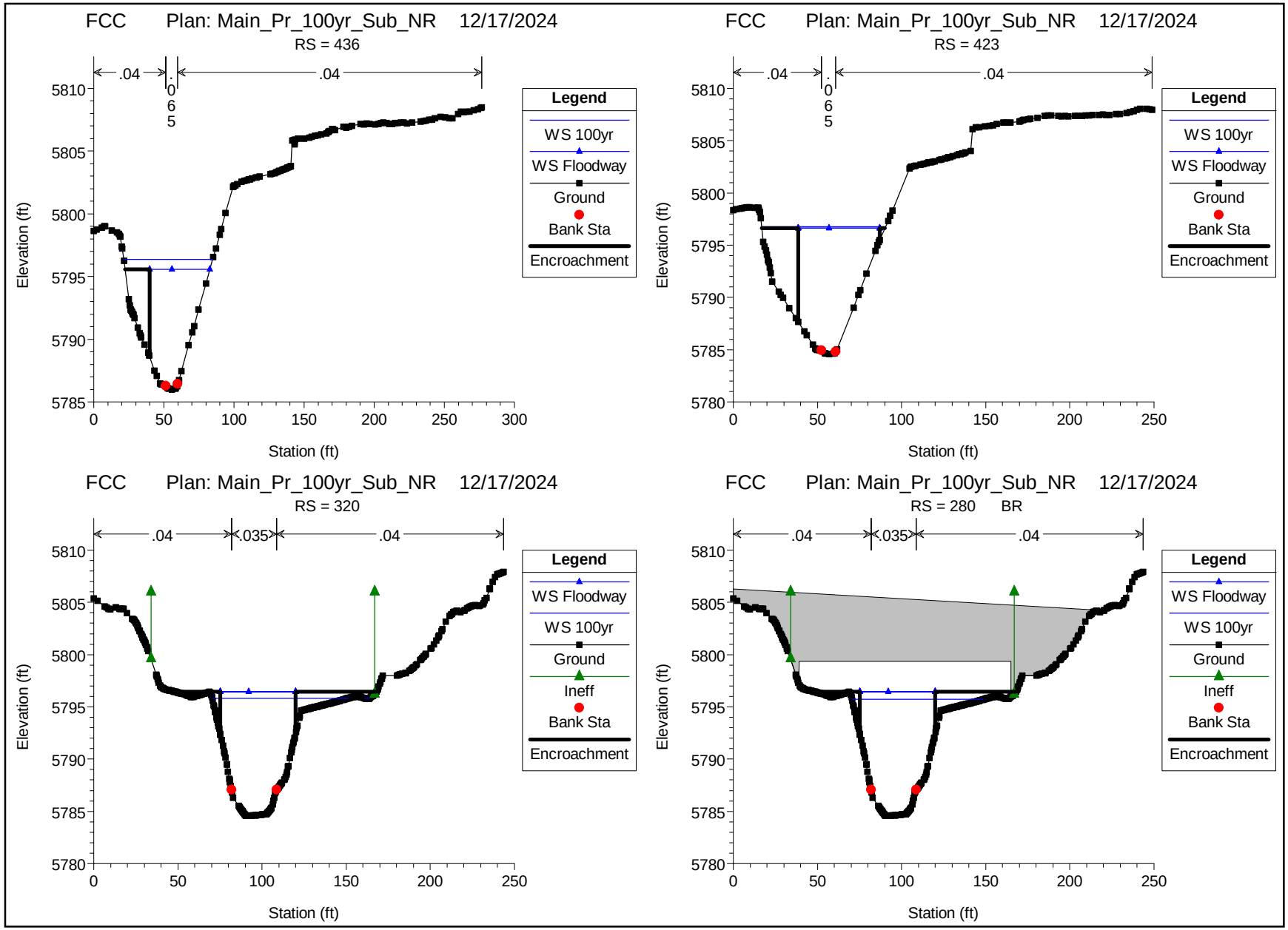
PROPOSED CONDITION RESULTS



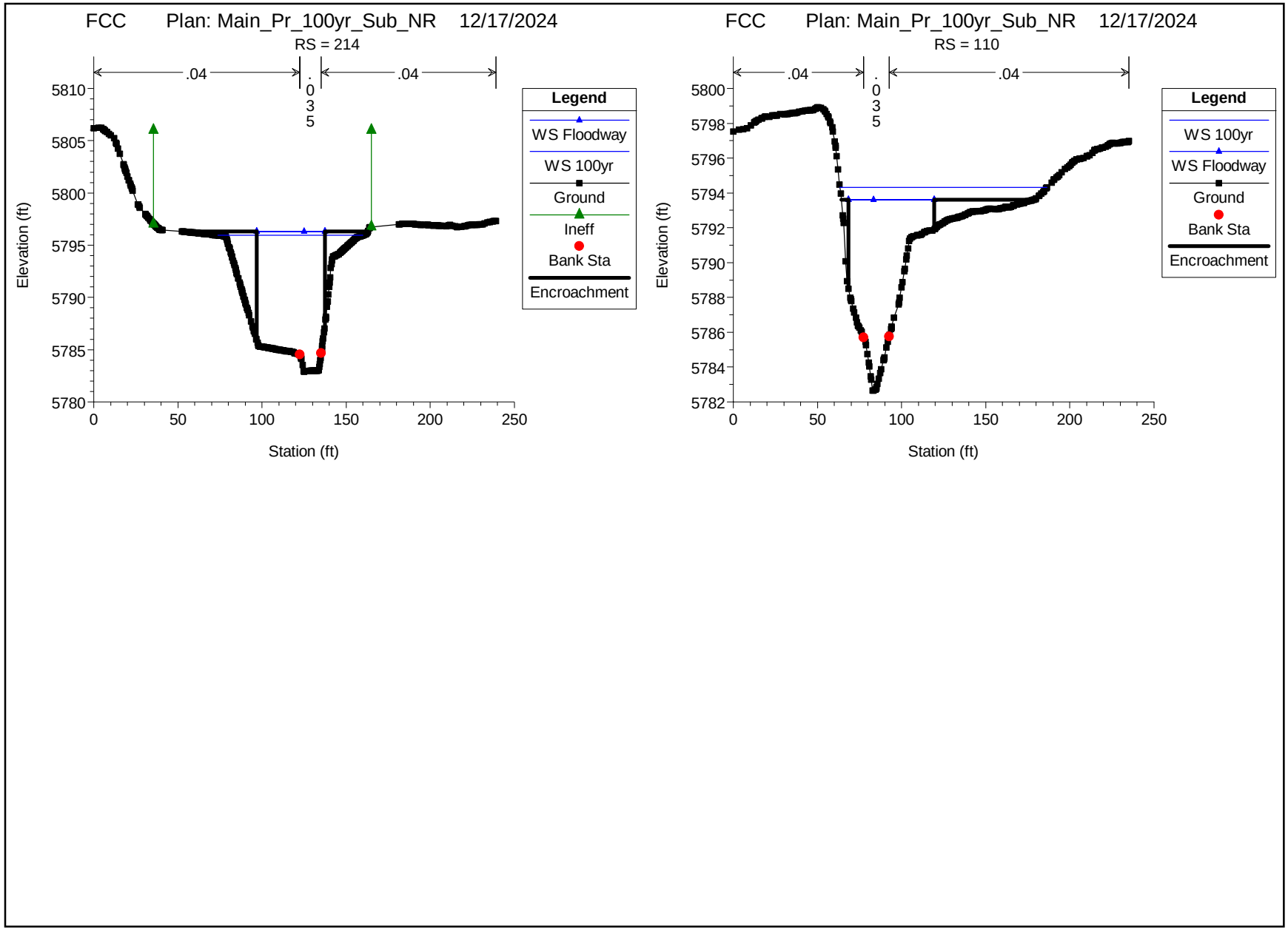
PROPOSED CONDITION RESULTS



PROPOSED CONDITION RESULTS



PROPOSED CONDITION RESULTS



APPENDIX C – FLOODPLAIN WORK MAP

B ST

VENETUCCI BLVD

2364 - G
2180
1999
1845
1680 - F
1543
1357
1272
1200
1117
1003
920
831
736
637
532 - E
436
423
320
214
110

5823 5798 5796 5789 5796 5802 5787 5785 5786 5783 5784 5782
5801 5806 5798 5799 5809 5807 5802 5807 5805 5808 5811 5804 5807 5809 5809 5833
5820 5828 5824 5826 5834 5822 5832 5835 5839 5843 5830 5838 5845 5850 5827 5841 5819 5829 5821 5852 5858 5836 5848 5860 5831 5840 5851 5859 5861 5866 5825 5844 5855 5863 5869 5837

I, FRANS LAMBRECHTSEN, P.E., A LICENSED PROFESSIONAL ENGINEER OF COLORADO, HEREBY CERTIFY THAT THIS WORK MAP WAS PREPARED ON BEHALF OF KENSINGTON DEVELOPMENT PARTNERS, LLC, BY KIMLEY-HORN AND ASSOCIATE, INC. UNDER MY PERSONAL DIRECTION AND IN MY OPINION IS AN ACCURATE REPRESENTATION OF THE LOCATION OF THE DESCRIBED LOTS AND THEIR RELATION TO THE FIRM MAP. DATED THIS XX DAY OF XXX 2024.

Stamp to be Provided at Submittal to FEMA

Legend

- Fishers Canyon Creek Centerline
- FEMA Cross-Section
- Effective 100-Year
- Corrected Effective 100-Year
- Proposed 100-Year Floodplain
- Property Line
- Existing Contour
- Proposed Contour
- Parcels
- HEC-RAS Cross-Section

Path: K:\COS_WaterResources\196825001_Fishers Canyon Creek\GIS\Maps\FEMA Workmap\FCC_FEMA_Workmap.aprx

Kimley»Horn
2 North Nevada, Suite 900
Colorado Springs, CO 80903
TEL: 719.453.0180
www.kimley-horn.com

N

0 60 120 240 Feet

1 in = 120 ft

NOTES:
1. Imagery: ERSI World Imagery - 7/10/2024
2. Vertical Datum: NAVD88, Horizontal Datum: Colorado State Planes Central, US FT
3. There is no effective floodway. Floodway analysis was not performed.

Fishers Canyon Creek Channel Improvements

FEMA Work Map