EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT

Hydraulic Report

Eagleview
Regional Drainage Improvements
El Paso County, Colorado

Prepared for:
Joe DesJardin
PT Eagleview LLC
1864 Woodmoor Drive, Suite 100
Monument, CO 80132

Prepared by:
Kimley-Horn and Associates, Inc.
2 North Nevada Avenue, Suite 300
Colorado Springs, Colorado 80903
(719) 453-0180
Contact: Brice Hammersland, P.E.

Project #: 196288000

CDR238

PCD Filing No.: XXXXX

Prepared: March 3, 2023

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): _____

Brice Hammersland, P.E.
Colorado P.E. No. 56012 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.

_____
PT Eagleview LLC

_____
Authorized Signature Date

_____
Joseph W. DesJardin

_____
Director of Entitlements

_____
Address:
1864 Woodmoor Drive
Monument, CO 80132

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.

_____ _____
Josh Palmer, P.E. Date
County Engineer/ ECM Administrator

Conditions:

TABLE OF CONTENTS

INTRODUCTION

PURPOSE AND SCOPE

The purpose of this Hydraulic Report is to summarize the channel design and drainage improvements to the West Tributary to the Falcon Basin drainage improvements (RWT054), (RWT092), (RWT080), (SR1), and (RWT094) for the Eagleview ("the Project") for PT Eagleview LLC. The (RWT054 and RWT092) segments will be referred to as the North Channel and the (RWT094) segment will be referred to as the South Channel through the report. The proposed channel and drainage improvements include 10 drop structures, 6 rock chutes, and 1 sub-regional full spectrum detention pond. The proposed channel improvements begin at the north side of the Eagleview property and end approximately 3,400 feet to the south at the southern property line of the Eagleview property. The Project is located within the jurisdictional limits of El Paso County ("the County"). 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 4 miles northwest of Falcon, Colorado within Section 26, Township 12 South, Range 65 West of the 6th Principal Meridian, County of El Paso, State of Colorado ("the Site"). The Site comprises two parcels of land which are bound by Stapleton Estates Filing No. 1 on the west and south, Paint Brush Hills Filing No. 14 (PCD File No. SF2024) to the east, and the Rodgwick Subdivision and MFY Farm Subdivision to the north. A vicinity map has been provided in the **Appendix A** of this report.

The Site is currently owned by PT Eagleview LLC and will be developed by PT Eagleview LLC.

DESCRIPTION OF PROPERTY

The Site is approximately 121 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 small oaks. The Site does not currently provide water quality or detention for the Project area. 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 20%. The west tributary of the Falcon drainage basin runs from the northwest corner of the site to the southeast corner of the Site.

The development of this site will include 38, 2 ½ acre single family lots, roadway improvements to the site will include mowing, clearing and grubbing, weed control, paved access road construction, roadway grading, one sub regional detention pond, two water quality features, roadside ditches, culverts, drainage swales, native seeding and a proposed channel to convey flows to the detention pond and water quality features.

PROJECT BACKGROUND

The Project is located within the West Tributary of the Falcon Drainage Basin and is within the Falcon Drainage Basin Planning Study completed by Matrix Design Group, September 2015 (DBPS). The watershed is generally located in the north central portion of El Paso County. The watershed contains three natural streams and has an overall area of approximately 10.6 square miles at the confluence of Black Squirrel Creek. The headwaters of the watershed are made up of ponderosa pine forest, grassland on undeveloped land, and 2-to-5-acre rural residential lots. The North and South channels are currently natural drainageways running through the Eagleview development. The DBPS identified drainage improvements within the project site. These improvements included grade control structures within the channel to help control velocities and degradation throughout the channel as well as, keeping the channel as natural as possible. In addition, to constructing a sub-regional detention pond onsite to provide water quality treatment and provide flood attenuation for the 100-year storm event. See **Appendix A** for excerpts from the DBPS. The North and South channels will maintain the existing channel alignments. The North Channel will be a trapezoidal section with 4:1 side slopes and maintain a channel slopes of 0.10% to 0.20%. To reduce velocities and keep the channel in a sub-critical flow regime. To achieve the 0.10% to 0.20% channel slopes, the North Channel is proposing 4 grouted boulder drop structures and 2 constructed riffle drops structures due to the steepness of the existing slopes in North Channel. The South Channel will also be a trapezoidal section with 4:1 side slopes and generally maintain a channel slope of 0.40% to reduce velocities and keep the channel in a sub-critical flow regime. To achieve the 0.40% channel slope, the South Channel is proposing 4 constructed riffle drops structures due to the steepness of the existing slopes in South Channel.

EXISTING SUB-BASIN DESCRIPTIONS

Historically the runoff from the Site drains into the West Tributary reach of the Falcon drainage basin. The West Tributary reach bisects the Site from north to south. The Site is located in upper portion of the Falcon drainage basin. Onsite and offsite flows generally flow from north to south overland over vacant and developed land to the West Tributary reach. The off-site basins draining to the site generally encompass rural land with pockets of residential development.

PROPOSED SUB-BASIN DESCRIPTIONS

Provide maps for existing and proposed sub-basins.

For the onsite proposed drainage conditions, stormwater will generally maintain historic flow patterns from north to south. The proposed roadways will alter some of the existing flow paths. The roadway ditches will capture runoff from the roadways and direct flows back to the existing flow paths, which will ultimately outfall to existing natural drainage channels, sub regional pond, or water quality features. The off-site basins are fully developed and no changes to the upstream basins are anticipated. Refer to the Eagleview Final Drainage Report (SF-22-42) for existing and future hydrologic analysis that was used for the design of the overall drainage improvements for the Project.

PREVIOUS REPROTS

The following is a complete list of the existing reports pertaining to the Eagleview site analysis.

1. Falcon Drainage Basin Planning Study Selected Plan Report (DBPS), prepared by Matrix Design Group, September 2015. PCD File No. MP132.

2. Eagleview Subdivision Preliminary Drainage Report (PDR), prepared by Kimley-Horn, October 28, 2022. PCD File No. SP216.

3. Eagleview Subdivision Final Drainage Report (FDR), prepared by Kimley-Horn, under review. Provide PCD File No. (SF2242)

DBPS DRAINAGE IMPROVMENTS

The DBPS made recommendations for channels (RWT054), (RWT092), (RWT080), and (RWT094) onsite. The DBPS also identified a sub-regional dentition pond (SR1) to be constructed onsite to provide water quality and flood attenuation. Refer to the DBPS excerpts in **Appendix A** specially sheets 6-16 and 6-17 for the locations of the DBPS recommendations mentioned above. These improvements were designed as part of the overall Eagleview development.

RWT054 is located on the north side of the site and is known as the North Channel. The future hydrologic calculations per the DBPS show 43 cfs for the 2-year flow and 480 cfs for the 100-year for this channel section. The hydrologic calculations prepared for the Eagleview development Final Drainage Report (FDR) were used for the design of the North and South channels. The 2-year flow of 77.6 cfs at design point P13 was used as the basis to size the low flow portion of the channel in reaches RWT054 and RWT092. Per MHFD criteria 70% of the 2-year flow (54.3 cfs) or 10% of the 100-year (375 cfs) flow determined from design point P13, whichever is greater is recommended to size the low flow portion of the channel. Therefore, the low flow channel was sized using 70% of the 2-year flow. The 100-year flow of 285 cfs from OB7 per the FDR was used to design reach RWT054. The alignment of this reach will remain in the same location. Grouted sloping boulder drops will be used within this reach as well as constructed riffle drops. The drop heights of the grouted sloping boulder drops range from 3.5' to 4' with 4:1 slopes. The drop heights of the constructed riffles are 3' with 4% slopes. A total of 3 grouted sloping boulder drop structures and 2 constructed riffles will be utilized within this reach. The channel sections outside of the drop structures within this reach will have a channel slope that ranges from 0.10% to 0.20% to reduce the potential of erosion.

RWT092 is located between RWT054 and the sub regional detention pond SR1. There is a flow change from reach RWT054 to RWT092. As mentioned above the low flow portion of the channel for both reaches RWT054 and RWT092 were sized using 70% of the 2-year which is 54.3 cfs. However, the two reaches were designed using the actual 100-year flow change occurring from reach RWT054 (285 cfs) to RWT (375 cfs). One grouted sloping boulder drop will be used within this reach as well as riprap rock chute that outfalls into the sub-regional pond SR1. The drop height of the grouted sloping boulder drop is 3.5' with 4:1 slope. The channel sections outside of the drop structure and rock chute within this reach will have a channel slope of 0.20% to reduce the potential of erosion.

RWT080 is located west of RWT092 refer to sheet 6-17 in **Appendix A** of the DBPS excerpts. The alignment of this reach will generally remain the same. This reach will have three riprap rock chutes with stilling basins to address head cutting and to provide erosion protection to reduce the potential of erosion. Downstream of rock chutes #3 and #4 turf reinforced matting (TRM) is being proposed to help with providing erosion protection to reduce the potential of erosion. Rock Cute #2 stilling basin will have dual function to help dissipate energy and function as a forebay. The rock chutes were size for the 100-year storm event utilizing hydrologic analysis performed in the FDR.

Please provide forebay design calculations. The minimum forebay volumes are shown on MHFD T-5 Table EDB-4. The forebay outlet should be sized to release 2% of the undetained peak 100-year discharge.

RWT094 is located south of the sub-regional detention pond SR1 and is known as the South Channel in this report. The future hydrologic calculations per the DBPS show 42 cfs for the 2-year flow and 510 cfs for the 100-year for this channel section. The hydrologic calculations prepared for the Eagleview development Final
of the North and South channels. The 2-year f
basis to size the low flow portion of the chann
year flow (54.3 cfs) or 10% of the 100-year (
whichever is greater is recommended to size
low flow channel was sized using 70% of the
design point P3 per the FDR was used to de
will remain in the same location. A total of 4 c
The drop heights of the constructed riffles ra
channel sections outside of the drop structur
0.40% to reduce the potential of erosion.

SR1 is generally located in the middle of th
RWT094. SR1 is a proposed sub-regional full
ac-ft of storage which is larger than the11.03
three rock chutes #1, #2, and #6 with foreba
include a concrete trickle channel, outlet stru
spillway, and a maintenance path. SR1 has
Refer to the FDR detention pond and rock chu

1. Describe the HEC-RAS boundary condition assumptions/inputs used for modeling.

2. The appendix showed results for both Mixed Flow Regime and Supercritical Flow Regime. Describe why these two flow regimes were used to analyze the channel instead of the typical subcritical flow regime. Provide a summary of the results attached in the appendix.

3. Describe the corresponding cross section the flow change location occurs in the HEC-Ras model

change from reach RWT054 to RWT092. As mentioned above the low flow portion of the channel for both reaches RWT054 and RWT092 were sized using 70% of the 2-year which is 54.3 cfs. However, the two reaches were designed using the actual 100-year flow change occurring from reach RWT054 (285 cfs) to RWT (375 cfs). One grouted sloping boulder drop will be used within this reach as well as riprap rock chute that outfalls into the sub-regional pond

HYDRAUILC ANALYSIS

The proposed channel design was modeled in HEC-RAS using flow rates based on the 2-, 10-, and 100-yr design storms. Flow rates were determined based on hydrologic analyses completed as a part of the Eagleview Subdivision Final Drainage Report and the results of that study are presented therein. The proposed channel was modeled as two distinct reaches (North Channel and South Channel) which are separated by the proposed extended detention basin. Upstream and downstream boundary conditions for both reaches were modeled based the the normal depth slope. A Manning's n value of 0.04 was assigned to the North Channel, both within the channel and on the overbanks. Where
structures are proposed, Manning's n values of 0.065 a
Southern Channel was assigned a Manning's n value
overbanks and a Manning's n value of 0.0395 where rif
is no lateral variation in Manning's n values on the cross

Add the reference table for manning's n and circle the corresponding channel description. Not clear why different mannings n is being used in the channel for the northern and southern section.

The North and South low flow channels are both designed to convey 70% of the 2-yr flow (55 cfs). Due to the constrained and sinuous nature of the North Channel, the low flow geometry consists of a 6-ft wide bottom and 3:1 side slopes while the South Channel low flow geometry consists of a 6-ft bottom and 4:1 side slopes. See FlowMaster cross sections for the low flow channels in the **Appendix B**. The North Channel cross section then transitions to a 3-ft bench at a 1% slope and then 4:1 side slopes to tie into the existing grade. Riprap armoring is proposed within the North Channel to ensure the stabilization of banks along curved lengths of channel. The South Channel becomes considerably wider than the North Channel and this allows for a larger bench of varying width at a 4% slope which transitions to a 4:1 side slope that ties into existing grades. The stated cross section geometries allow for a maximum channel depth of less than 5-ft, a Froude value of less than 0.8, and shear stress of less than 1.2 lb/sf throughout both channels. See **Table 1**, below for a description of all design parameters for the proposed

-All proposed hydraulic work associated with this filing should be discussed, in example the pond calculations should be included. Any comments made on the SF2042 DR pond calcs or other hydraulic calcs apply..

channels. Refer to **Appendix B** for drop structure and supporting HEC-RAS channel calculations.

Table 1: Hydraulic Design Parameters

Design Criteria	Design Value
Maximum 100-year depth outside of bankfull channel	5 ft
Maximum 100-year velocity, main channel	5 ft/s
Froude No., 100-year, main channel	0.8
Maximum Shear Stress, 100-year, main channel	1.2 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
Maximum overbank side slope	4(H):1(V)
Maximum bankfull side slope	2.5(H):1(V)

MAINTENANCE

Maintenance access for the proposed channel improvements is provided by proposed access roads adjacent to the North and South Channels. Access for the North Channel is provided from proposed Chemita Trail and South Arroya Lane while access for the South Channel is provided from proposed South Arroya Lane. See the Construction Documents in Appendix C for the proposed locations of maintenance access roads.

Once construction of the proposed channel improvements are completed, maintenance of the channel will be the responsibility of El Paso County. Ownership of all drainage facilities within public rights-of-way shall fall to El Paso County, pending Board of County Commissioners approval.

FLOODPLAIN STATEMENT

There is no FEMA mapped floodplain on the project site. Refer to **Appendix A** for the Flood Insurance Rate Map (FIRM) number 08041C05350G effective date, December 7, 2018.

CONCLUSION

The Eagleview development lies within the West Tributary of the Falcon Basin Area Watershed. This report has been prepared in accordance with El Paso County stormwater criteria. It outlines the channel improvements onsite. The channel improvements are in general conformance with the DBPS. Additionally, the Site runoff and storm drain facilities will not adversely affect the downstream and surrounding developments.

Add a section for Cost Estimate and reference the opinion of probable construction cost in Appendix D

Add the four step process discussion.

Add a section for Drainage Fee and include a reference to see the FDR for Eagleview final plat application (SF2242) for drainage/bridge fees.

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 Drainage and Flood Control District Drainage Criteria Manuals (UDFCDCM), (Volumes 1, 2 and 3), prepared by Wright-McLaughlin Engineers, June 2001, with latest revisions.

4. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0507F and 08041C0530F, Effective Date March 17, 1997, prepared by the Federal Emergency Management Agency (FEMA).

5. Falcon Drainage Basin Planning Study Selected Plan Report (DBPS), prepared by Matrix Design Group, September 2015. PCD File No. MP132.

6. Eagleview Subdivision Preliminary Drainage Report (PDR), prepared by Kimley-Horn, October 28, 2022. PCD File No. SP216

7. Eagleview Subdivision Final Drainage Report (FDR), prepared by Kimley-Horn, under review.

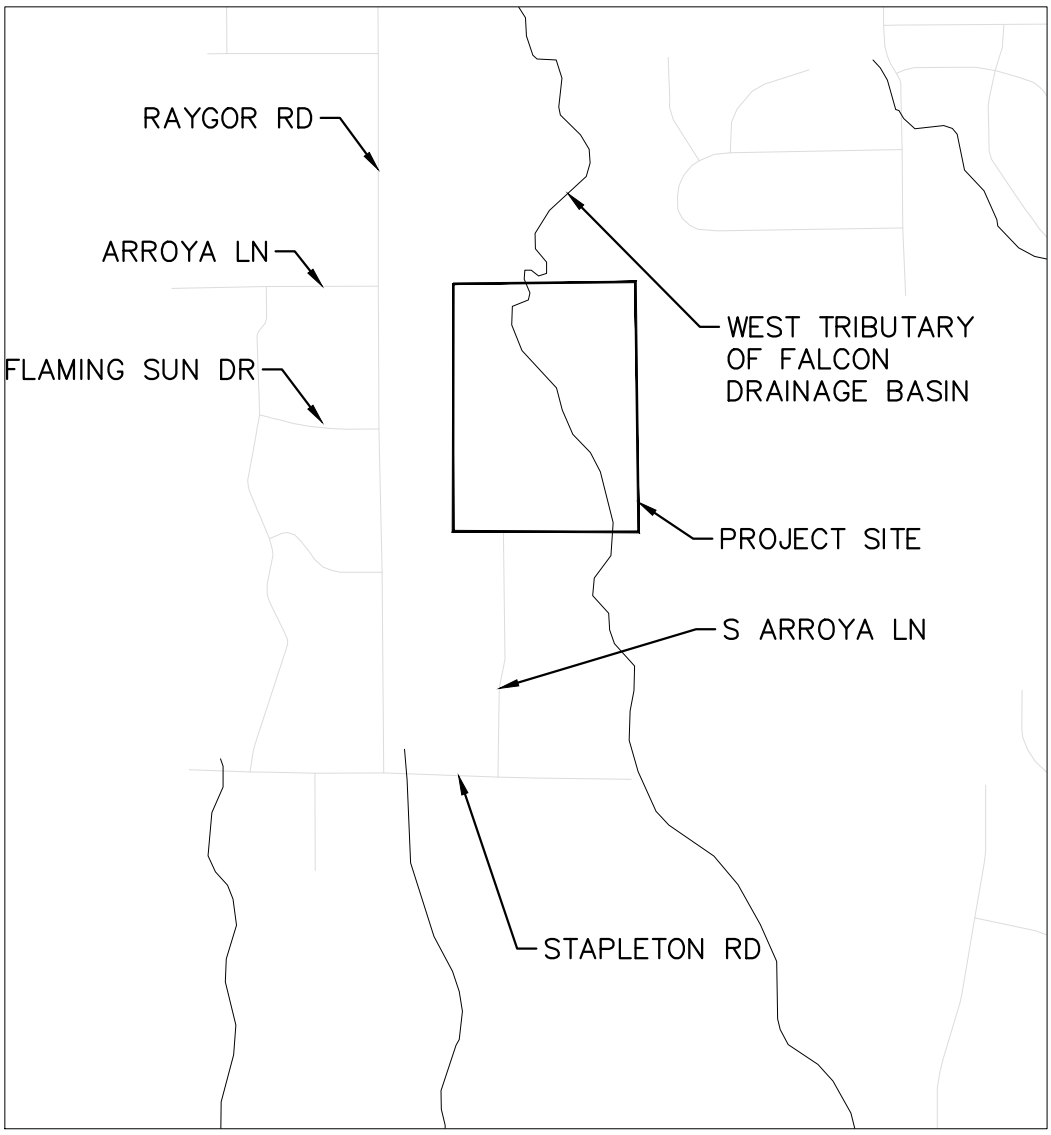
We need to know how much disturbed area is untreated and if there are any exclusions that apply to those areas. So please create a basic overview map (or modify an existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc.) and those disturbed areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App I.7.1.C.1 and exclusions listed in ECM App I.7.1.B.#). An accompanying summary table on this map would also be very helpful (example provided):

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond A (ac)	Disturbed Area Treated via Runoff Reduction (ac)	Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	Area Excluded from WQ per ECM App I.7.1.B.# (ac)	Applicable WQ Exclusions (App I.7.1.B.#)
A	4.50	4.50	4.50	-	-	-	
B	1.25	1.25	-	1.00	0.25	-	
C	6.00	4.00	-	-	-	4.00	ECM App I.7.1.B.5
D	2.50	2.50	1.00	-	0.50	1.00	ECM App I.7.1.B.7
E	3.00	-	3.00	-	-	-	
F	8.25	-	-	-	-	-	
Total	25.50	12.25	8.50	1.00	0.75	5.00	
Comments		*[For each row, the sum of the values in Columns 4-7 must be greater than or equal to the value in Column 3 above.]*	*[Values in this column can be more than Column 3 if over-treating non-disturbed areas.]*	See RR calc spreadsheet.	*[Total must be <20% of site and <1ac.]*		

If Pond SR1 is being built with this CDR, then the MHFD-Detention spreadsheet calcs will need to be included with this FDR.

APPENDIX

APPENDIX A: FIGURES



VICINITY MAP
1"=1,000'

NORTH

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

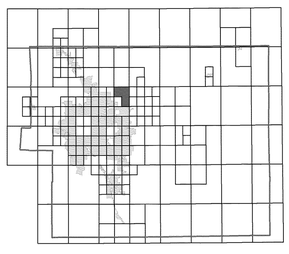
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

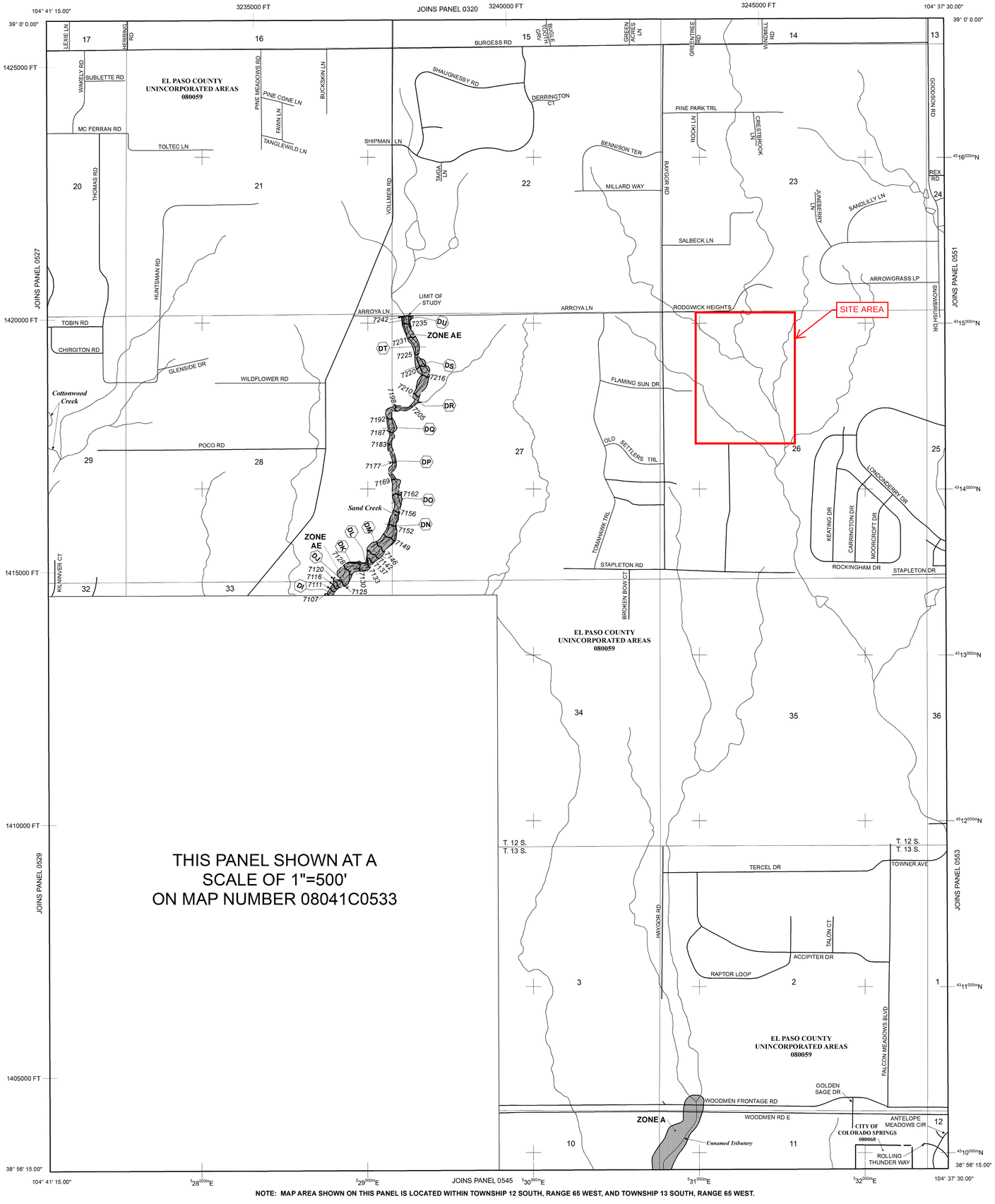
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



THIS PANEL SHOWN AT A SCALE OF 1"=500' ON MAP NUMBER 08041C0533

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST, AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
Floodway boundary
Zone D Boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A—A Cross section line
23—23 Transect line
97° 07' 30.00" / 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in 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.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0535G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 535 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0535	G
EL PASO COUNTY	080059	0535	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 08041C0535G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

FALCON DRAINAGE BASIN PLANNING STUDY

SELECTED PLAN REPORT

FINAL - SEPTEMBER 2015

Prepared for:

El Paso County Public Services Department
3275 Akers Drive
Colorado Springs, CO 80922

Prepared By:

Matrix Design Group
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920

Matrix Project No. 10.122.003

Falcon DBPS

Sub Regional Pond Drainage & Impervious Area

Pond	DA (ft2)	DA (Acres)	Impervious Area (ft2)	% Impervious
Sub Regional Pond SR1	30,622,649	703	831,542	3%
Paint Brush Hills Pond C	5,234,130	120	982,938	19%
Paint Brush Hills Pond A	2,811,615	65	832,760	30%
Paint Brush Hills Pond B1 & B2	10,050,309	231	3,095,805	31%
Sub Regional Pond SR2	17,141,776	394	1,300,551	8%
The Meadows Pond #1	1,601,777	37	127,495	8%
Sub Regional Pond SR3	11,154,554	256	805,816	7%
Regional Pond WU	20,333,432	467	5,914,148	29%
Woodmen Hills Pond H	15,479,390	355	4,492,233	29%
The Meadows Pond #2	8,081,678	186	902,796	11%
Sub Regional Pond SR4	8,717,356	200	1,238,224	14%
Regional pond MN	7,343,530	169	2,065,458	28%
Woodmen Hills Pond #5	1,212,993	28	773,858	64%
Regional Pond R1	23,851,242	548	3,448,795	14%
Paint Brush Hills Pond #4	4,045,968	93	1,167,110	29%
Sub Regional Pond SR6	5,943,070	136	1,971,083	33%
Woodmen Hills Pond #1 North & South	9,842,788	226	2,585,592	26%
Woodmen Hills Pond #2	3,267,140	75	623,185	19%
Woodmen Hills Pond #3	7,957,332	183	1,741,407	22%
Woodmen Hills Pond #4	15,092,968	346	5,150,148	34%
Sub Regional Pond SR5	29,299,647	673	2,287,324	8%
Regional Pond R2	52,661,473	1,209	1,520,507	3%

Notes

1) Areas calculated in ArcMap
2) These values are used for calculating the required EURV/WQCV only
3) Some values incude the drainage areas contributing to upstream ponds where that pond was not able to provide an EURV/WQCV

Sheet 6-16
Falcon DBPS
Conceptual Plan
West Tributary
El Paso County, CO

Drainageway Crossing
Stream Centerline
Existing Approximate 100-yr Floodplain*
Floodplain Study Limit

Storm Sewer
Inlet
Manhole
Pipe

Reach Improvements
Natural Channel Design
Protect In Place
Roadside Ditch Improvement
Small Drop Structures w/ Toe Protection
Existing Detention
Proposed Detention
Proposed Detention Grading
Small Drop Structure
Cross Vane
Immediate Action Required to Preserve Existing Condition

0 100 200 Feet

* These approximate 100-yr floodplain boundaries are for planning purposes only. This information is not intended to replace the information provided on the FEMA Flood Insurance Rate Maps for this area.
** These are conceptual design drawings and are subject to change. These drawings are not intended for construction purposes.

Index Map

SITE

RWT124_Upstream
RWT122
West Tributary
RWT094

matchline - see Sheet 6-15

matchline - See Sheet 6-17

Small Drop Structure
See Detail on Sheet 6-54

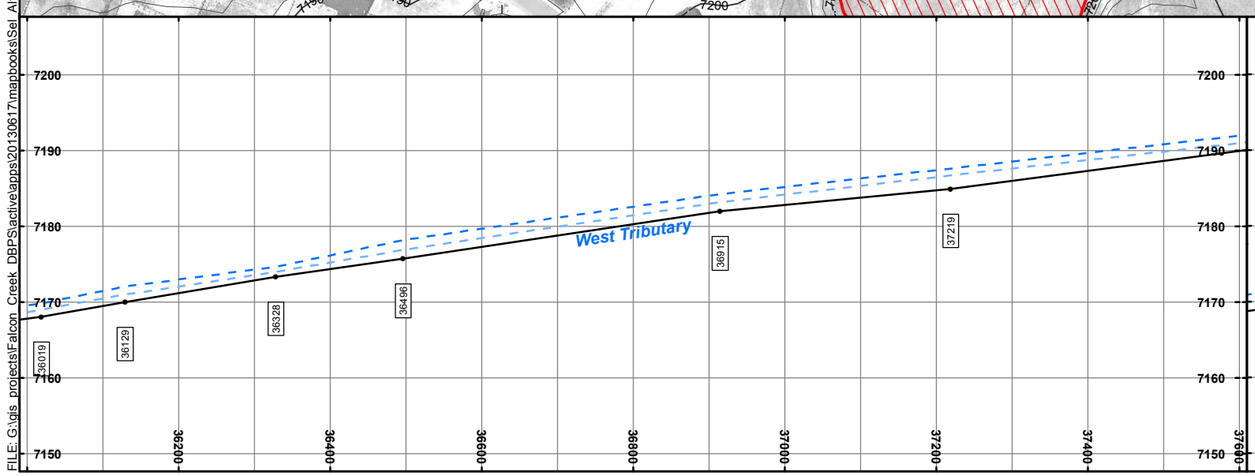
Paint Brush Hills Pond C
EURV = 2.2 AF
100-yr Volume = 6.8 AF
$Q_{2\ in}$ = 56 cfs
$Q_{2\ out}$ = 3 cfs
$Q_{100\ in}$ = 300 cfs
$Q_{100\ out}$ = 140 cfs
See Detail on Sheet 6-55

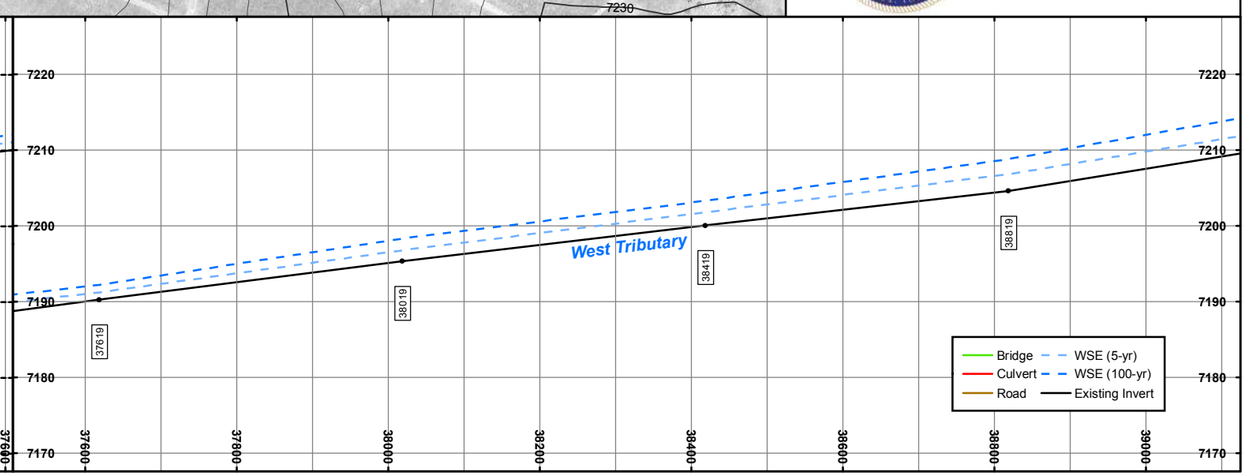
PBHC Outlet

PBHC Outlet

Rockingham Dr

Note:
Infrastructure and channel improvements shown may vary slightly from the final list published in the accompanying report as a result of fee revisions that have occurred following the preparation of this figure. For current information as of September 2015, please see tables in Section 6 of the accompanying report.





FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20130617\mapbooks\Sel_Alt_West_Trib_20151230.mxd 1/11/2016 Jeff_Clonts

Sheet 6-17
Falcon DBPS
Conceptual Plan
West Tributary
El Paso County, CO

Small Drop Structure
See Detail on Sheet 6-54

Sub Regional Pond SR1
WQCV = 1.6 AF
100-yr Volume = 11 AF
$Q_{2\ in}$ = 54 cfs
$Q_{2\ out}$ = 42 cfs
$Q_{100\ in}$ = 610 cfs
$Q_{100\ out}$ = 510 cfs
See Detail on Sheet 6-55

RWT080
RWT092
RWT094
RWT054
WT 11
Rodgwick Heights
SITE
West Tributary

Small Drop Structure
See Detail on Sheet 6-54

WT 11 - Arroya Ln.
EX Size: 1' Circular CMP (x1)
Private drive; no modifications are proposed.

matchline - see Sheet 6-16

matchline - see Sheet 6-18

Drainageway Crossing
Stream Centerline
Existing Approximate 100-yr Floodplain*
Floodplain Study Limit

Storm Sewer
Inlet
Manhole
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Natural Channel Design
Protect In Place
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Index Map

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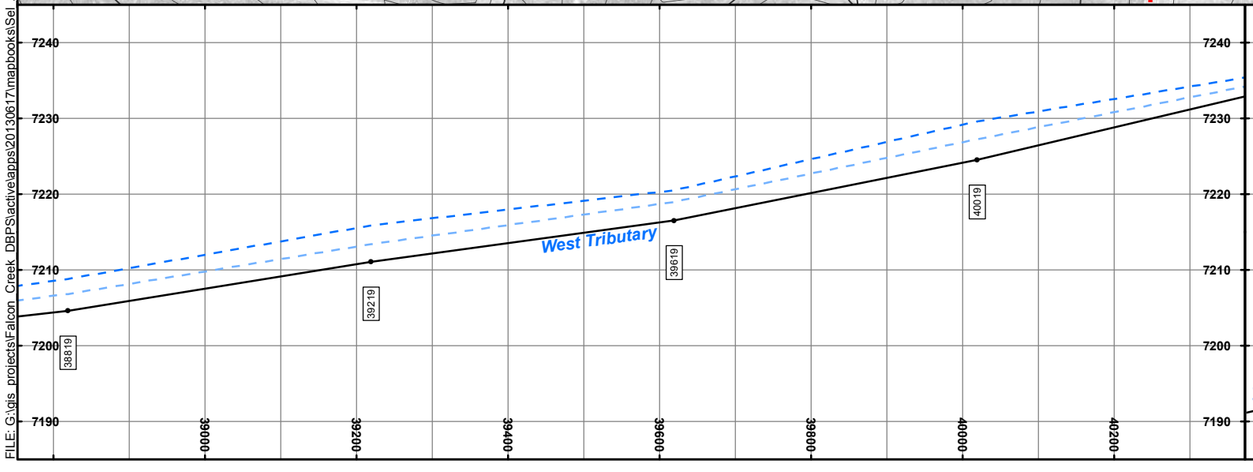
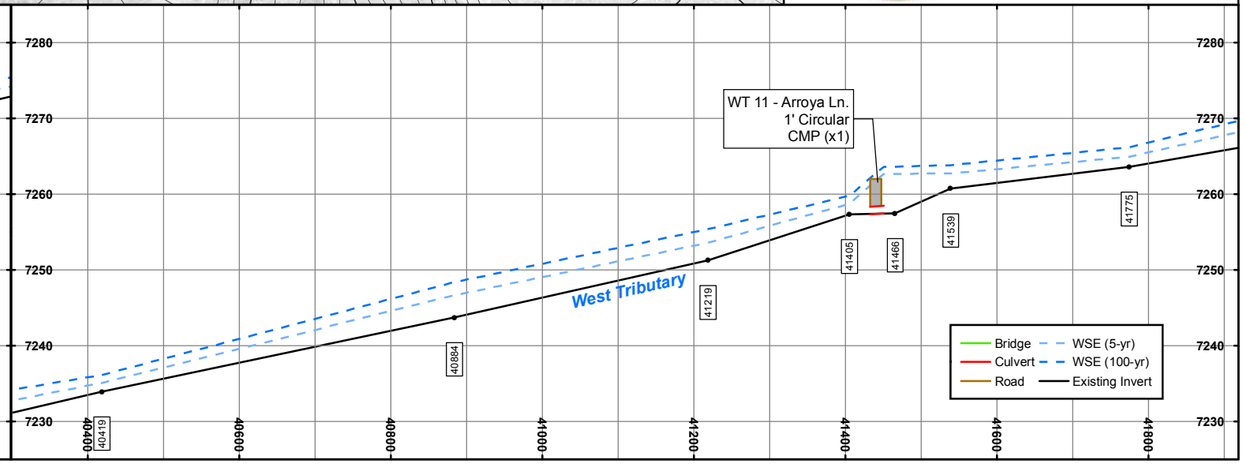
EL PASO COUNTY COLORADO EST. 1861

Matrix DESIGN GROUP





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Sub Regional Detention Alternative[1]						
Pond		Q_2 In (cfs)	Q_2 Out (cfs)	Q_{100} In (cfs)	Q_{100} Out (cfs)	Required Volume (AF)[2]
Paint Brush Hills Pond #4	PBH 4	38	29	200	150	1.34
Paint Brush Hills Pond A	PBH A	35	7	170	140	2.62
Paint Brush Hills Pond B1	PBH B1	80	51	420	270	9.17
Paint Brush Hills Pond B2	PBH B2	51	10	270	180	12.09
Paint Brush Hills Pond C	PBH C	56	3	300	140	6.77
Regional Pond MN	R MN	65	32	850	820	7.53
Regional Pond R1	R R1	110	77	1,600	1,500	25.00
Regional Pond R2	R R2	140	140	2,200	2,200	3.13
Regional Pond WU South	R WUs	47	22	1,100	930	39.54
Sub Regional Pond SR1	SR 1	54	42	610	510	11.03
Sub Regional Pond SR2	SR 2	65	65	840	840	2.05
Sub Regional Pond SR3	SR 3	72	72	910	910	1.03
Sub Regional Pond SR4	SR 4	130	27	1,000	730	19.37
Sub Regional Pond SR6	SR 6	74	9	390	200	11.82
The Meadows Pond #1	M 1	11	0	70	0	3.25
The Meadows Pond #2	M 2	28	5	210	100	7.94
Woodmen Hills Pond #1 North	WH 1N	65	61	390	260	7.13
Woodmen Hills Pond #1 South	WH 1S	61	10	260	260	8.78
Woodmen Hills Pond #2	WH 2	37	10	270	250	9.18
Woodmen Hills Pond #3	WH 3	110	13	530	360	8.35
Woodmen Hills Pond #4	WH 4	110	15	790	260	40.45
Woodmen Hills Pond #5	WH 5	40	1	130	20	4.10
Woodmen Hills Pond H	WH H	140	110	750	750	2.66

Notes

1: Represents future hydrology with retrofit existing detention ponds and 7 new sub regional detention ponds

2: Required volume to highest WSE not including embankment

Reach Alternative	Total (ft)
Natural Channel Design	13,216
Protect in Place	64,325
Roadside Ditch Improvement	7,519
Small Drop Structures w/ Toe Protection	50,750

BURGESS RD
GOODSON RD
MERIDIAN RD
STAPLETON DR
EASTONVILLE RD
JUDGE ORR RD
WOODMEN RD
TAMLIN RD
FALCON HWY
GARRETT RD
MERIDIAN RD
DIVERSION
24

LEGEND

Detention Pond
- Existing
- Proposed
- Existing Watershed Boundary
- Historical and Future Watershed Boundary
- Tributary Basin Boundary
- Subbasin Boundary
- Major Tributary
- Immediate Action Required to Preserve Existing Condition

Reach Alternative
- Natural Channel Design
- Protect In Place
- Roadside Ditch Improvement
- Small Drop Structures w/ Toe Protection

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Figure 6-1
Selected Plan
Falcon DBPS
El Paso County, CO

0 0.5 1
Miles

NOTE: FIGURE MUST BE VIEWED IN COLOR

PPGA (Pikes Peak Geospatial Alliance)

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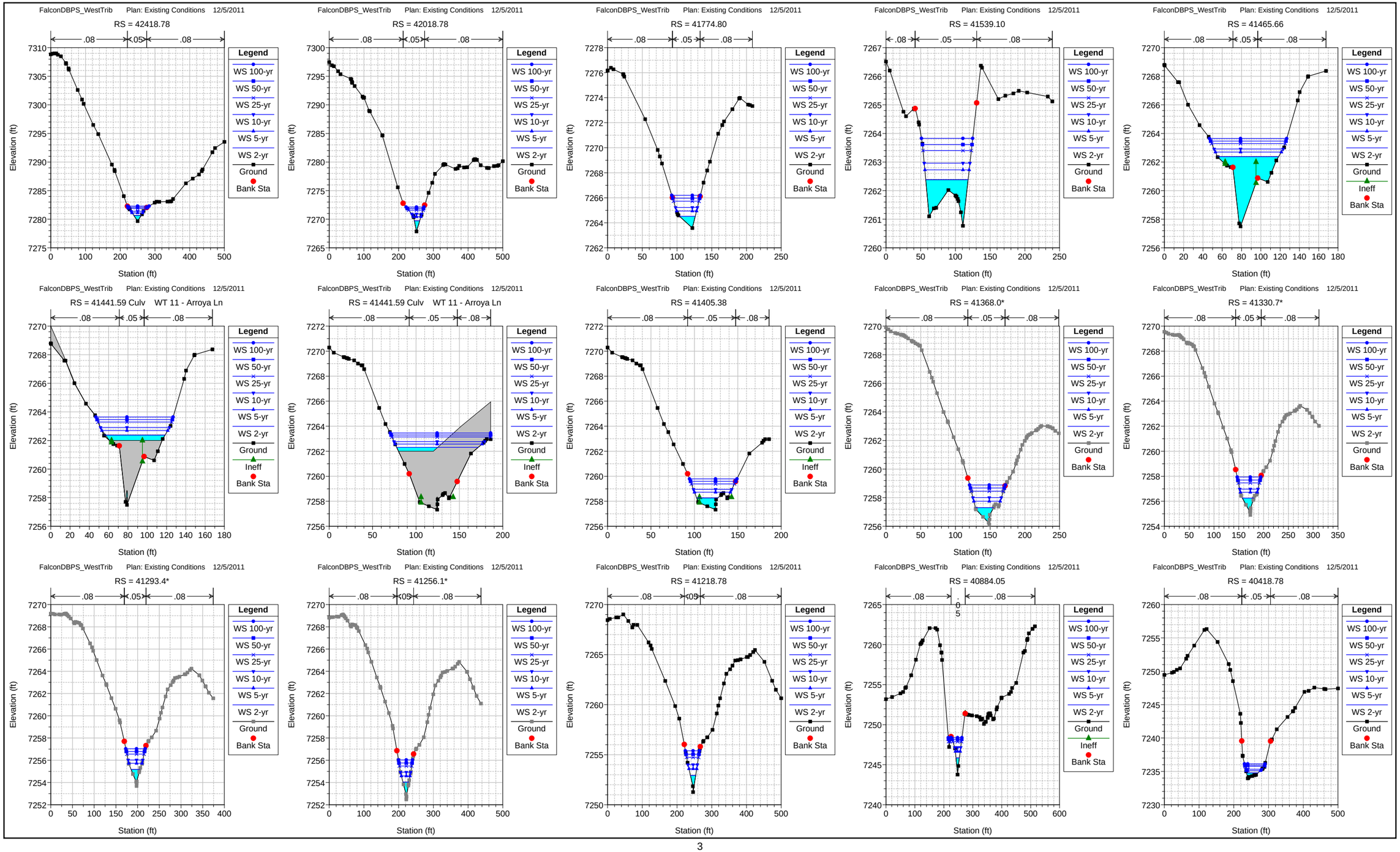
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RS = 41441.59 Culv WT 11 - Arroya Ln
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RS = 41330.7*
RS = 41293.4*
RS = 41256.1*
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.08
.05
Elevation (ft)
Station (ft)
Legend
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 5-yr
WS 2-yr
Ground
Ineff
Bank Sta

FalconDBPS_WestTrib Plan: Existing Conditions 12/5/2011

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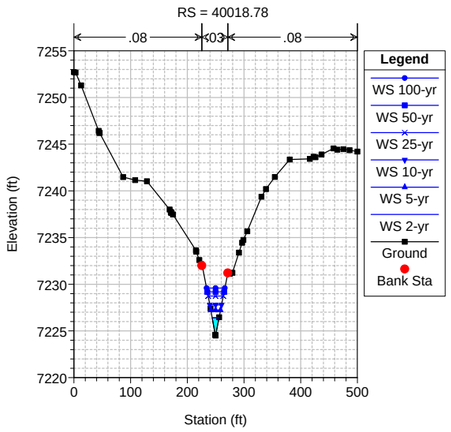

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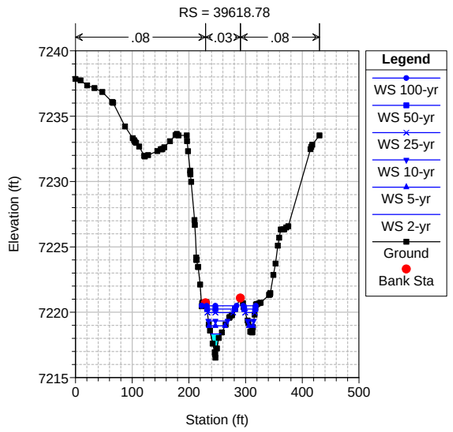

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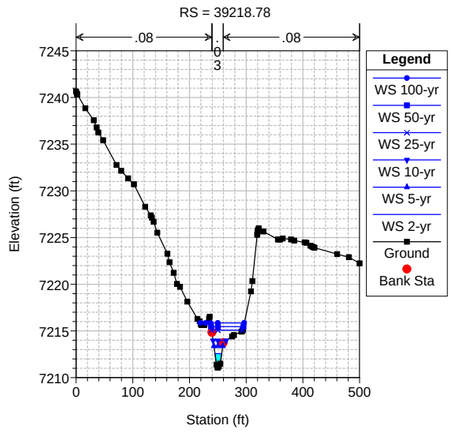

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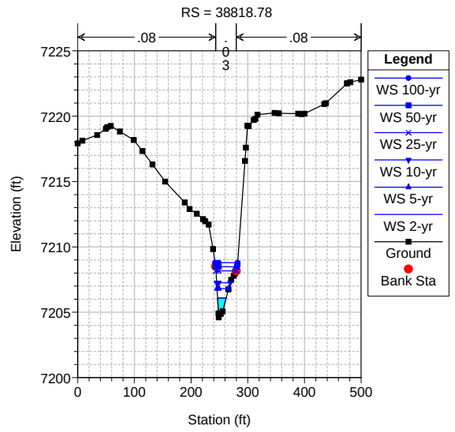

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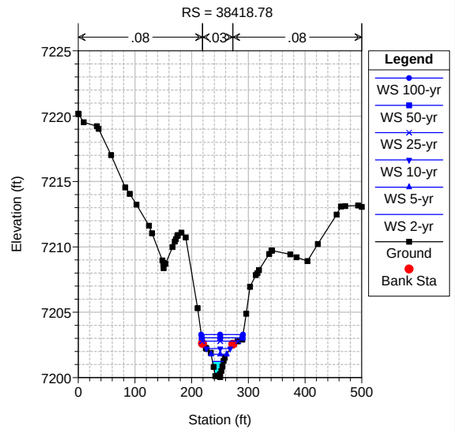

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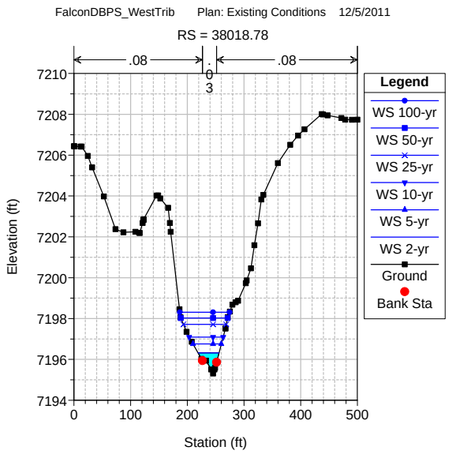

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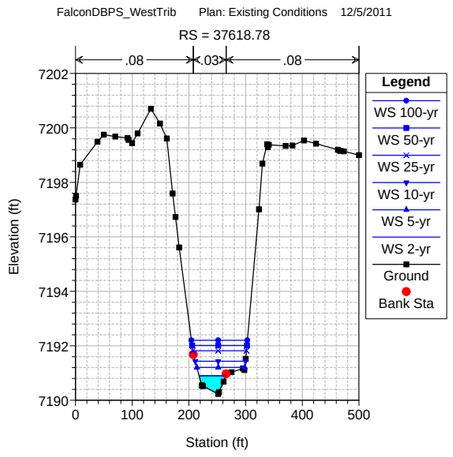

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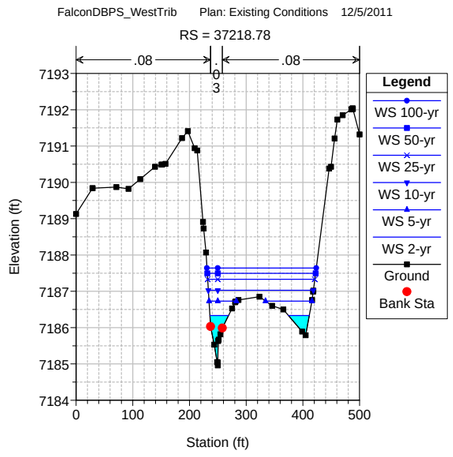

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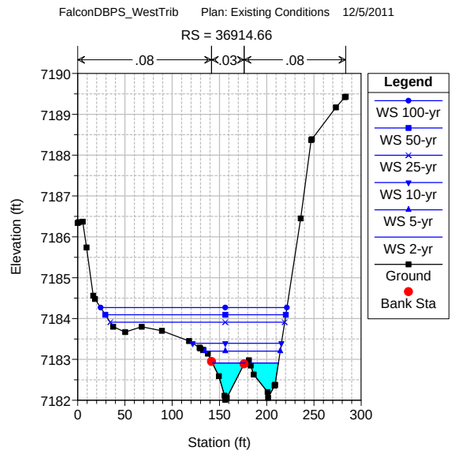

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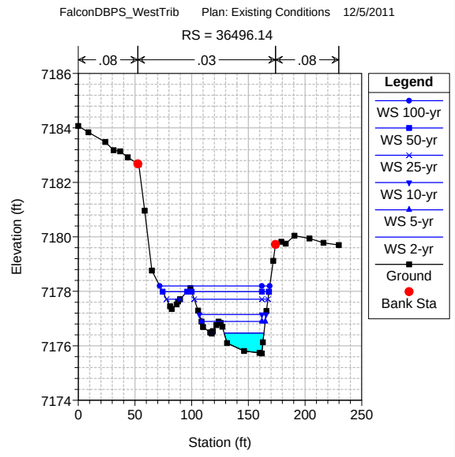

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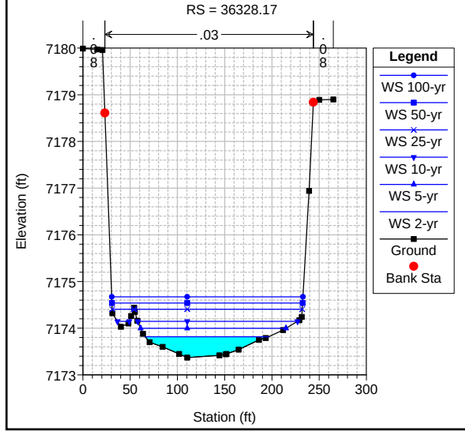

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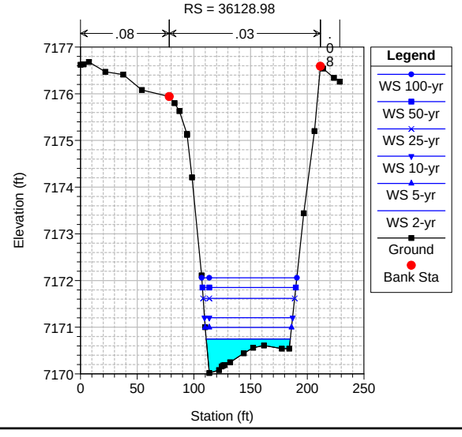

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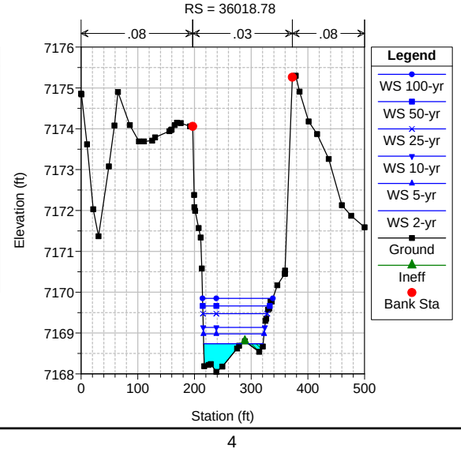

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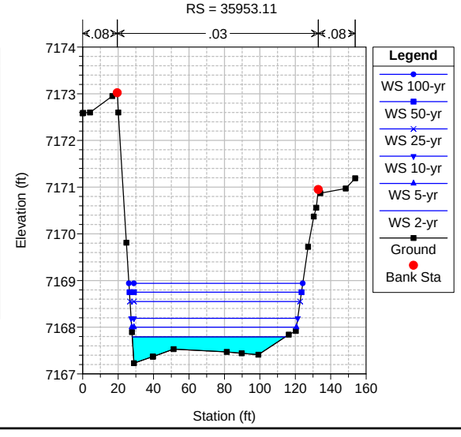

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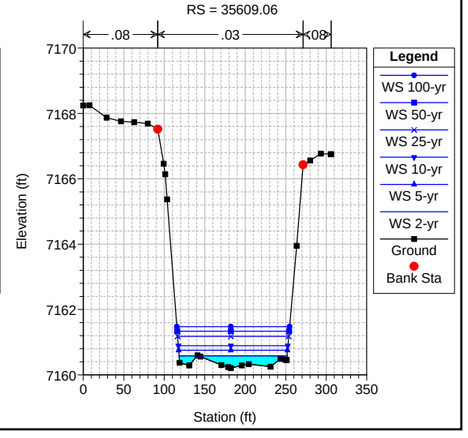

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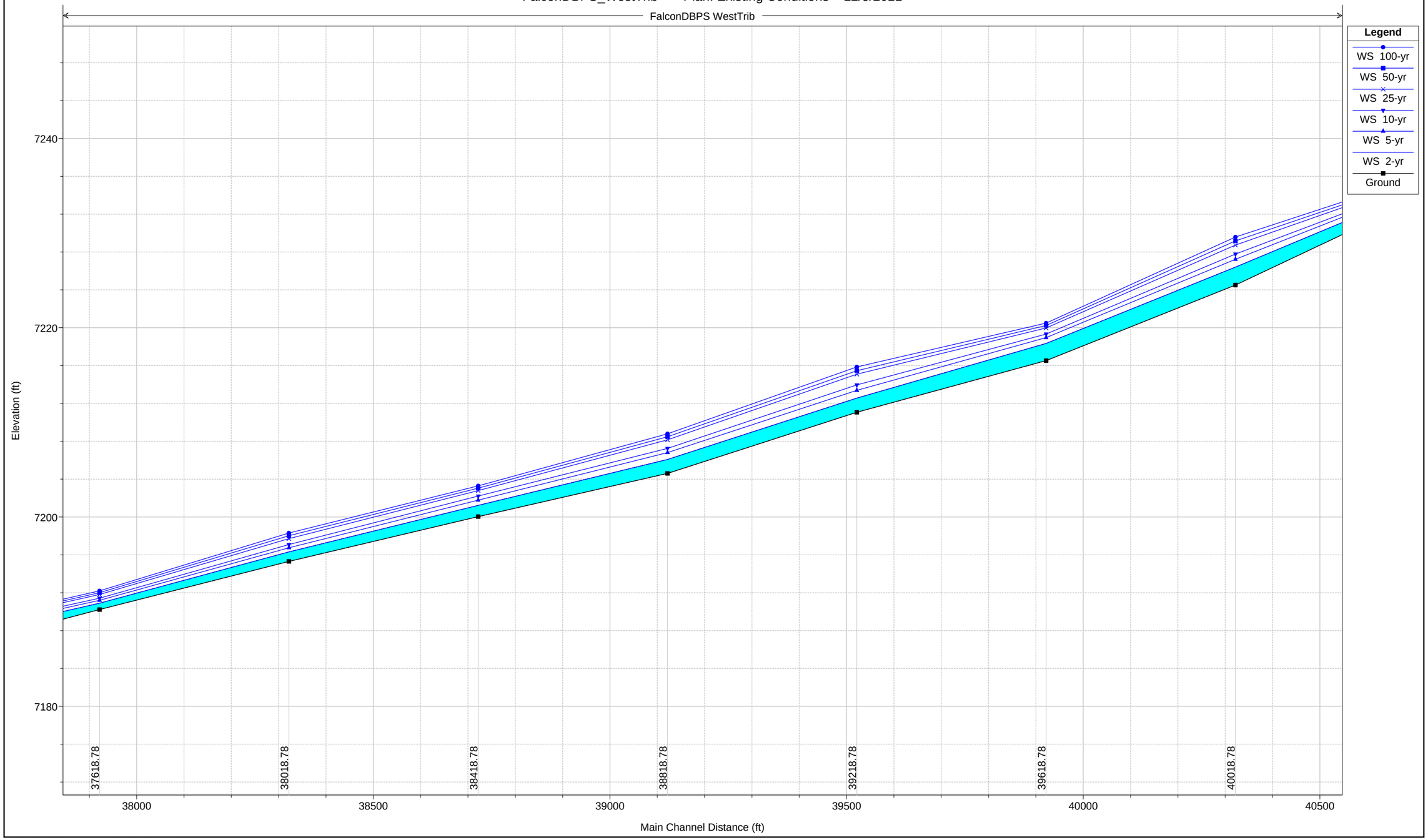

1 in Horiz. = 200 ft 1 in Vert. = 10 ft

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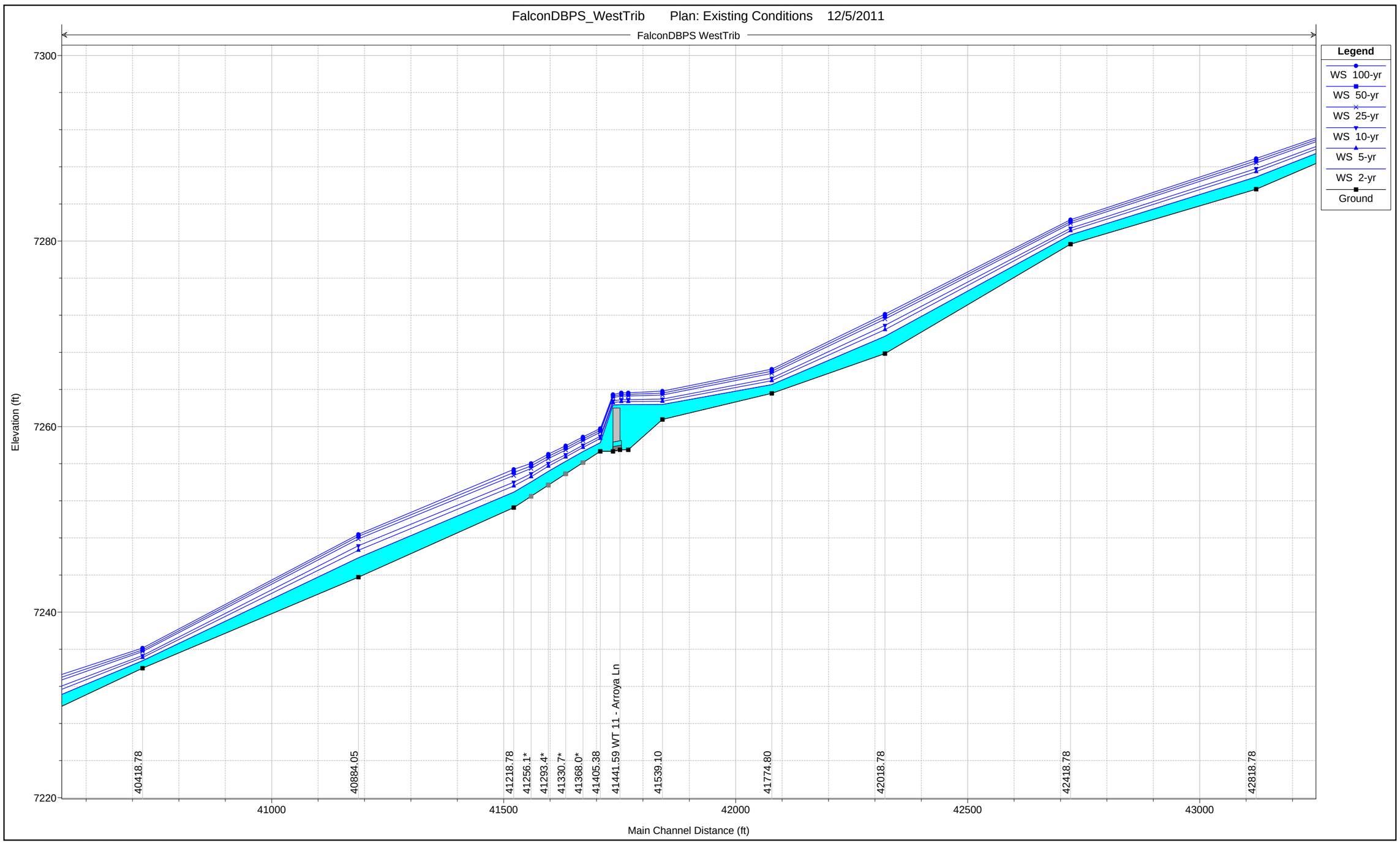

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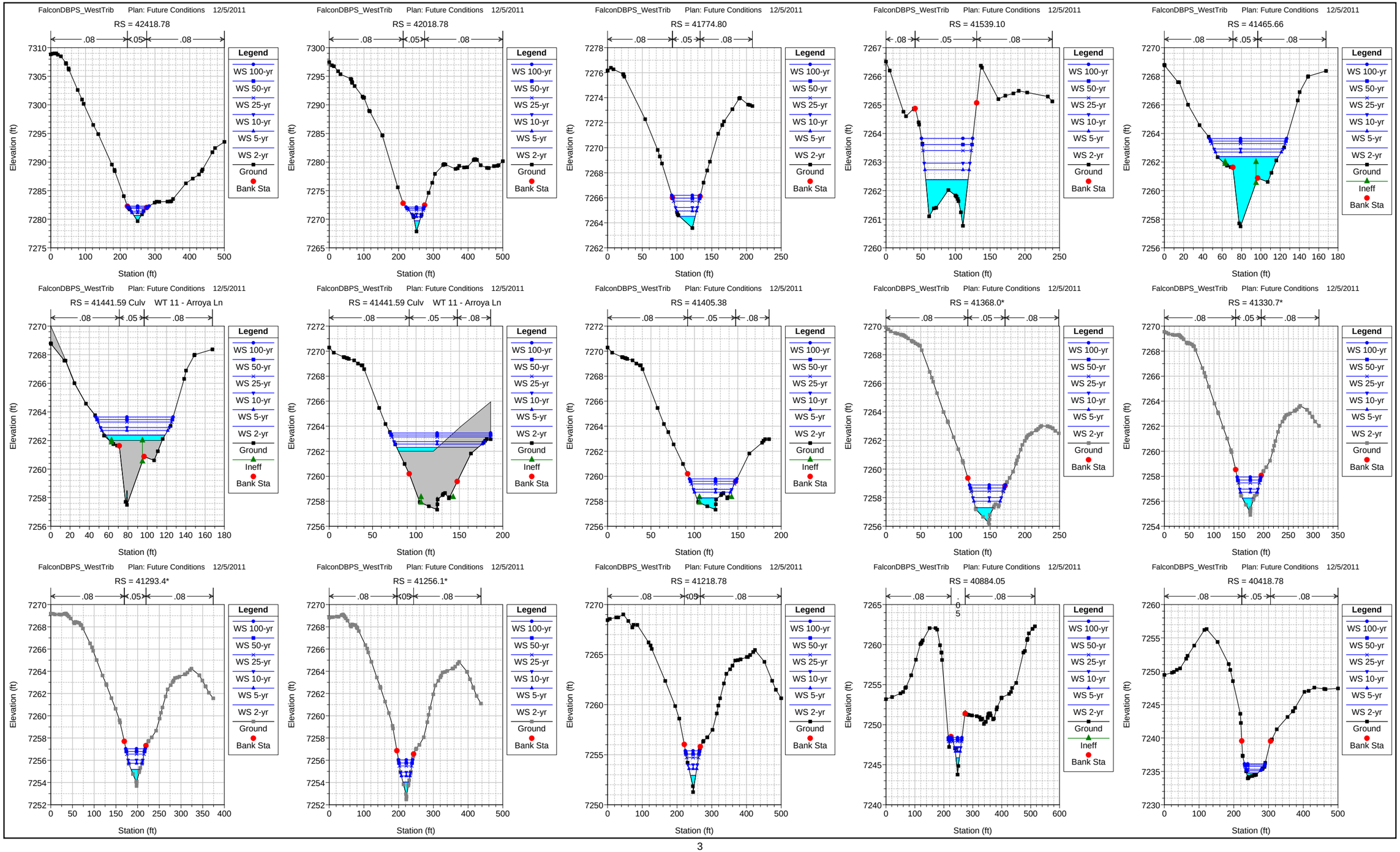
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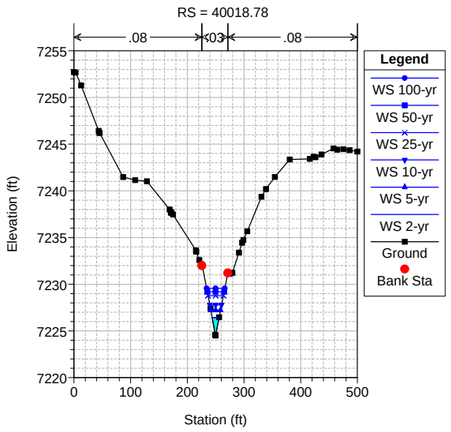

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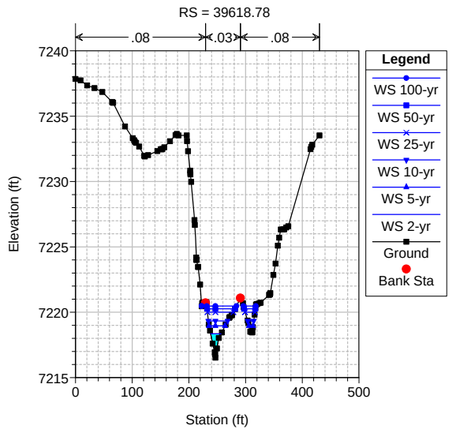

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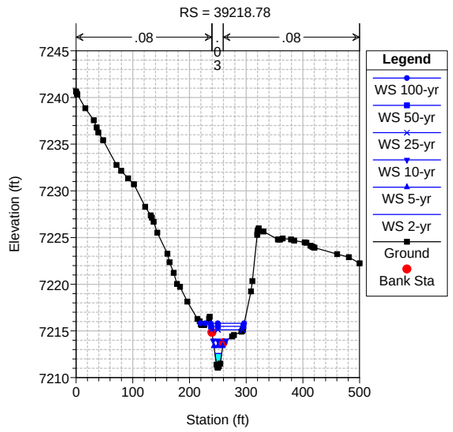

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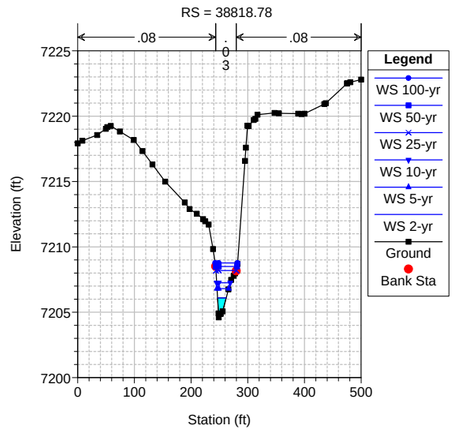

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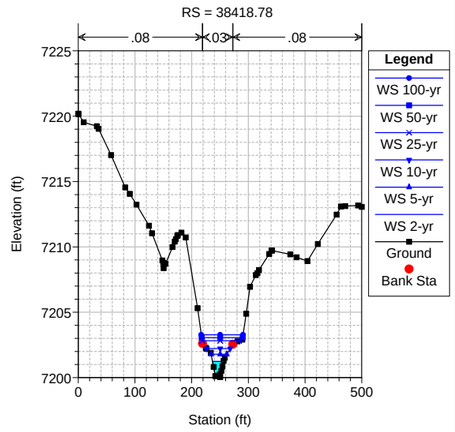

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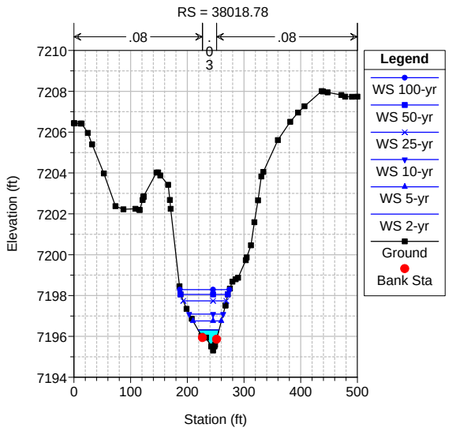

FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

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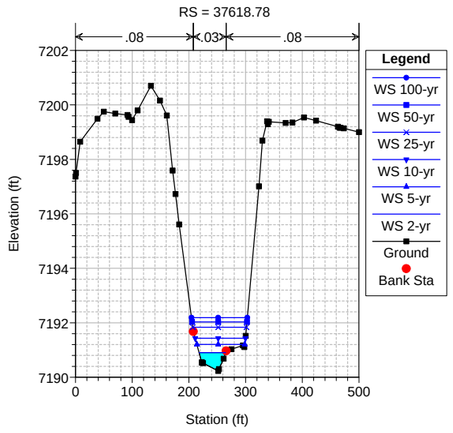
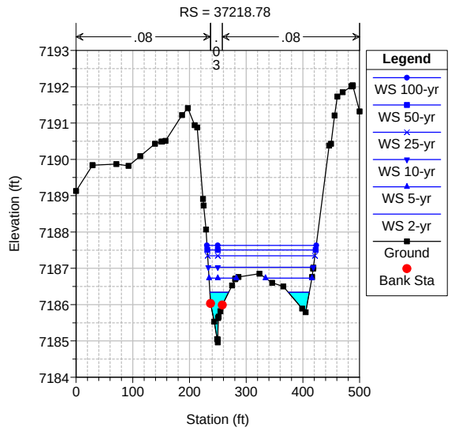


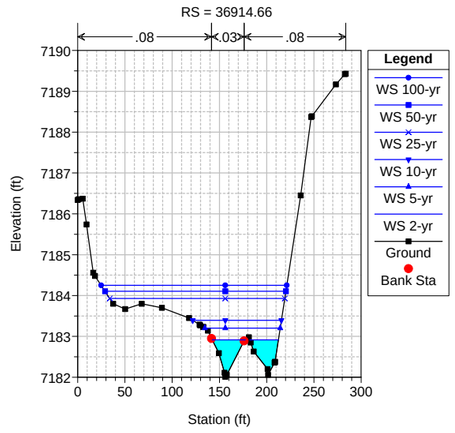
FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 37218.78



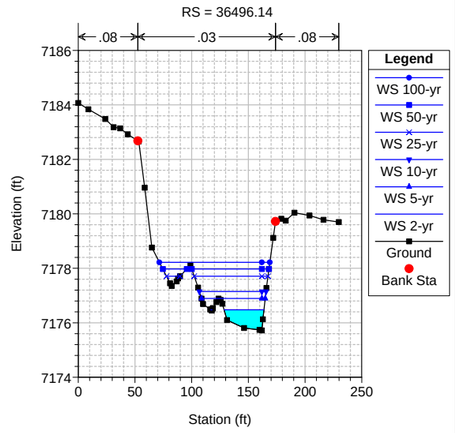
FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 36914.66



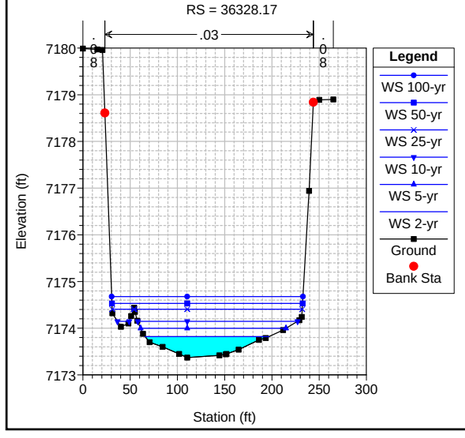
FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 36496.14



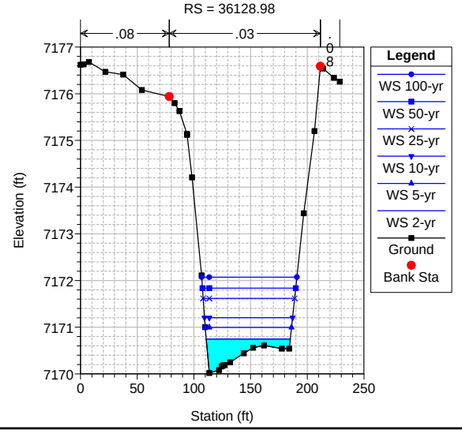
FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 36328.17



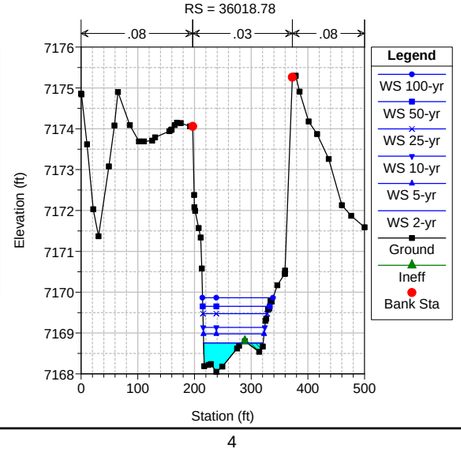
FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 36128.98



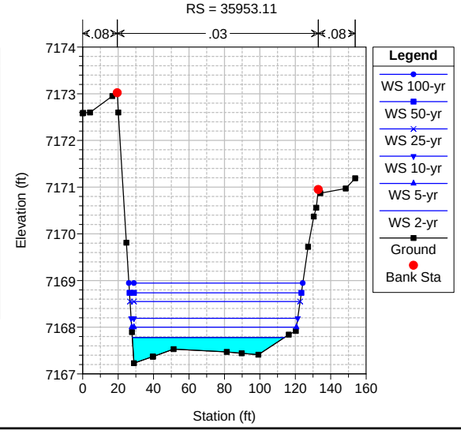
FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 36018.78



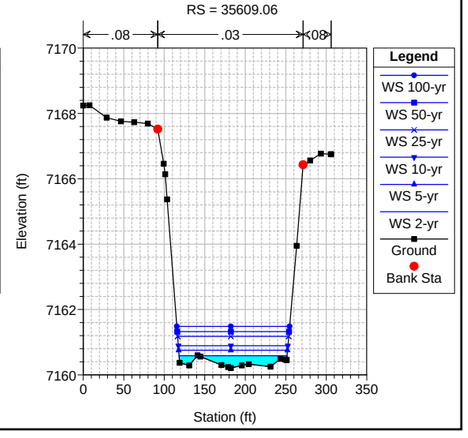
FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 35953.11

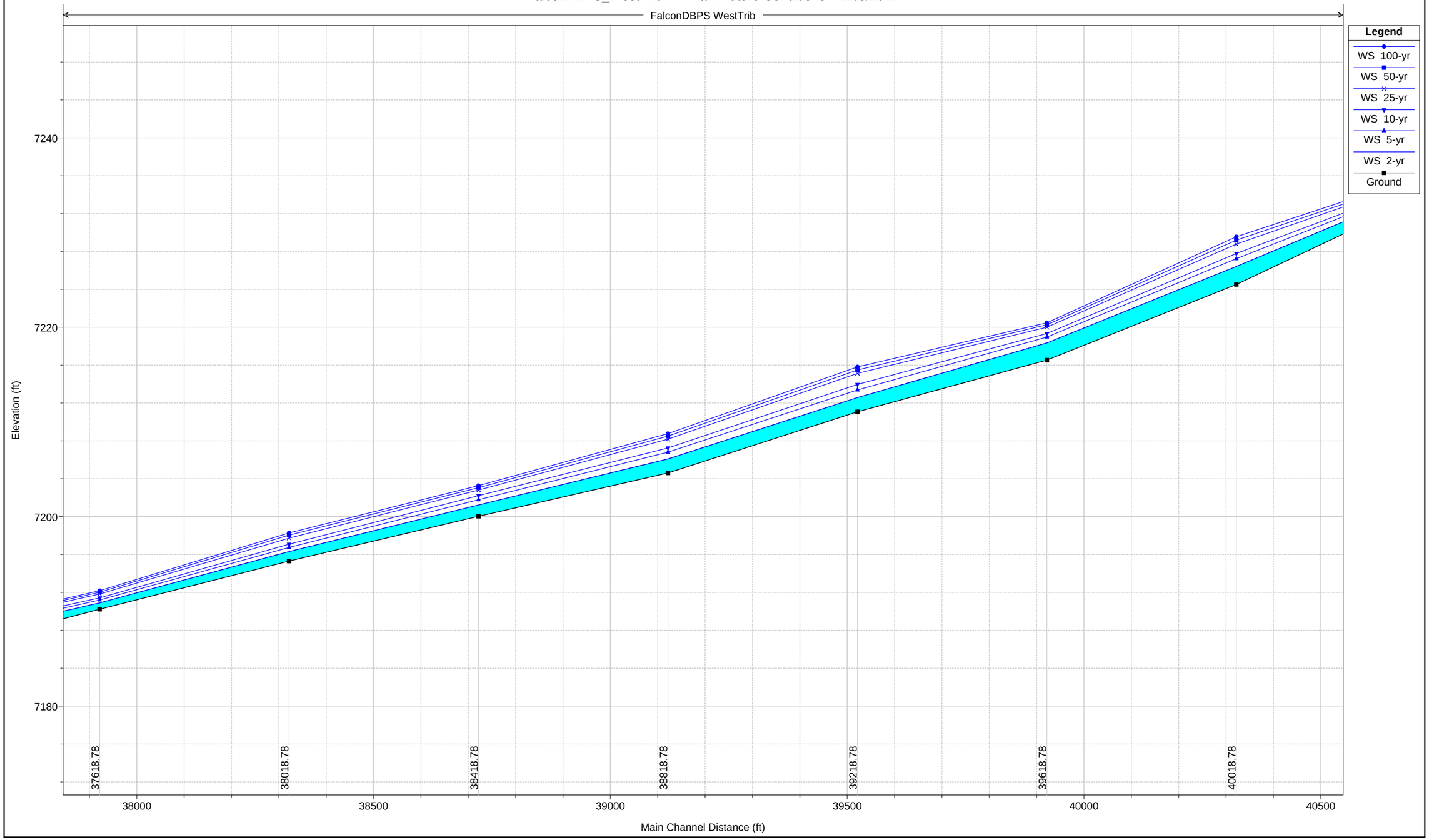


FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011

RS = 35609.06

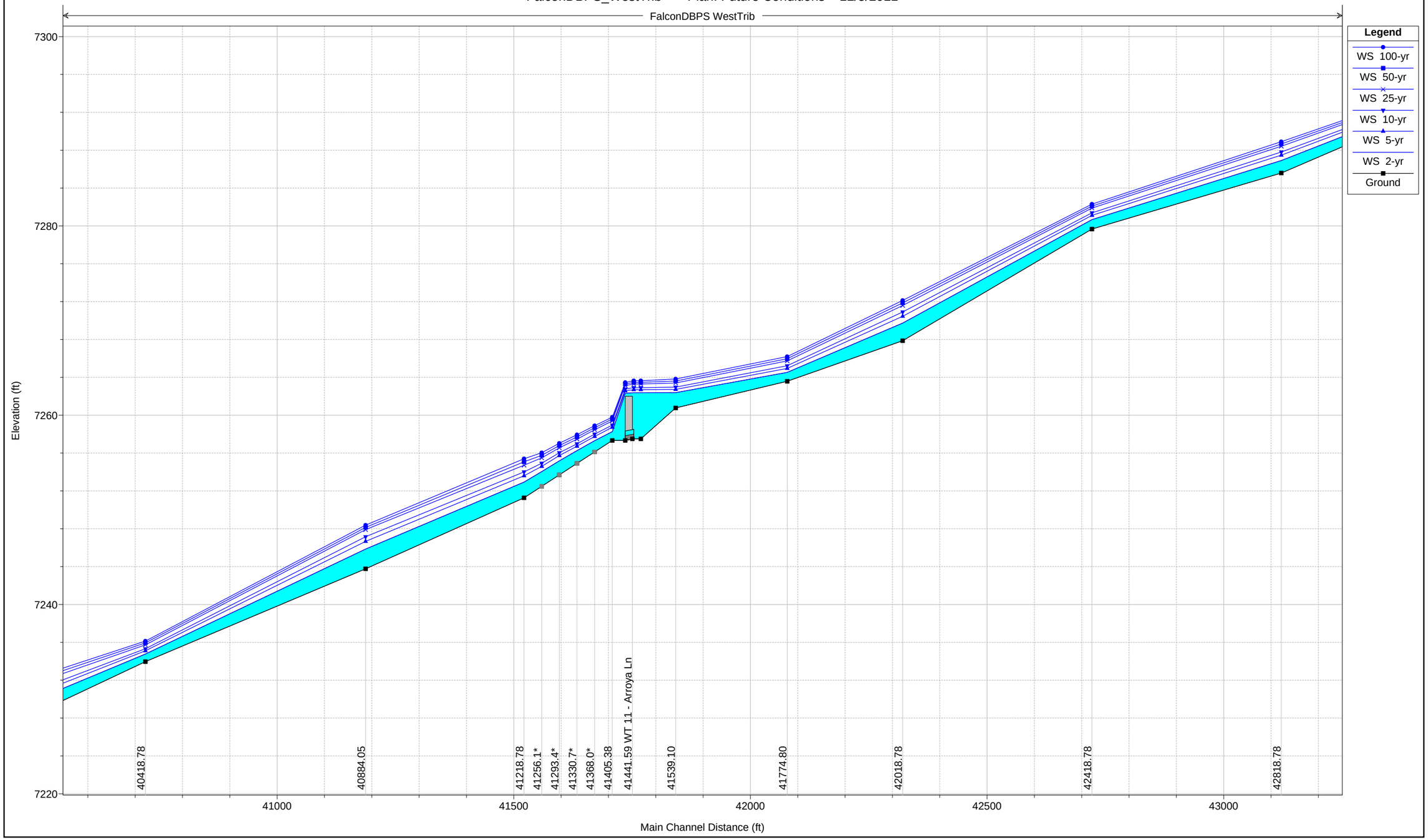


FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011



1 in Horiz. = 200 ft 1 in Vert. = 10 ft

FalconDBPS_WestTrib Plan: Future Conditions 12/5/2011



1 in Horiz. = 200 ft 1 in Vert. = 10 ft

Inputs & Calculations

Falcon DBPS

Expansion & Contraction Coefficients

West Tributary		
River Station	Contraction	Expansion
47452.25	0.1	0.3
47423.5*	0.1	0.3
47394.8*	0.3	0.5
47366.1*	0.3	0.5
47337.4*	0.3	0.5
47308.71	0.3	0.5
47262	Culvert	
47224.28	0.3	0.5
47079.43	0.1	0.3
46818.78	0.1	0.3
46418.78	0.1	0.3
46207.62	0.1	0.3
46026.9	0.1	0.3
45892.82	0.1	0.3
45796.67	0.3	0.5
45766.17	Culvert	
45708.32	0.3	0.5
45564.77	0.1	0.3
45218.78	0.1	0.3
44818.78	0.1	0.3
44499.26	0.1	0.3
44418.78	0.1	0.3
44018.78	0.1	0.3
43618.78	0.1	0.3
43453.91	0.1	0.3
43386.36	0.1	0.3
43218.78	0.1	0.3
42818.78	0.1	0.3
42418.78	0.1	0.3
42018.78	0.1	0.3
41774.8	0.1	0.3
41539.1	0.1	0.3
41465.66	0.3	0.5
41441.59	Culvert	
41405.38	0.3	0.5
41368.0*	0.1	0.3
41330.7*	0.1	0.3
41293.4*	0.1	0.3
41256.1*	0.1	0.3
41218.78	0.1	0.3
40884.05	0.1	0.3
40418.78	0.1	0.3

Middle Tributary		
River Station	Contraction	Expansion
15477.33	0.1	0.3
15411.72	0.1	0.3
15205.81	0.1	0.3
15182.0*	0.1	0.3
15158.2*	0.1	0.3
15134.4*	0.1	0.3
15110.6*	0.1	0.3
15086.8*	0.1	0.3
15063.05	0.1	0.3
14907.55	0.1	0.3
14773.98	0.1	0.3
14507.55	0.1	0.3
14107.55	0.1	0.3
13707.55	0.1	0.3
13306.32	0.1	0.3
13111.17	0.1	0.3
12893	0.1	0.3
12511.32	0.1	0.3
12037.33	0.1	0.3
11628.61	0.1	0.3
11228.61	0.1	0.3
10828.61	0.3	0.5
10741.93	0.3	0.5
10706	Culvert	
10665.96	0.3	0.5
10428.61	0.1	0.3
10028.61	0.1	0.3
9628.612	0.1	0.3
9228.612	0.1	0.3
8741.269	0.1	0.3
8483.946	0.3	0.5
7238	Culvert	
6738.77	0.3	0.5
6420.92	0.1	0.3
6411.64*	0.1	0.3
6402.37*	0.1	0.3
6393.09*	0.1	0.3
6383.82*	0.1	0.3
6374.54*	0.1	0.3
6365.27*	0.1	0.3
6356.00*	0.1	0.3
6346.727	0.3	0.5

East Tributary		
River Station	Contraction	Expansion
32631.79	0.1	0.3
32576.48	0.1	0.3
32537.9*	0.1	0.3
32499.3*	0.1	0.3
32460.7*	0.1	0.3
32422.2	0.3	0.5
32376.64	Culvert	
32335.71	0.3	0.5
32288.3*	0.3	0.5
32241.*	0.3	0.5
32193.6*	0.3	0.5
32146.2*	0.3	0.5
32098.94	0.1	0.3
31698.94	0.3	0.5
31657.1*	0.3	0.5
31615.3*	0.3	0.5
31573.5*	0.3	0.5
31531.79	0.3	0.5
31486	Culvert	
31411.01	0.3	0.5
31375.5*	0.3	0.5
31340.1*	0.3	0.5
31304.66	0.1	0.3
30904.66	0.1	0.3
30742.51	0.1	0.3
28941.08	0.1	0.3
28754.33	0.1	0.3
28478.62	0.1	0.3
28298.89	Culvert	
28137.71	0.3	0.5
28081.78	0.1	0.3
27748.51	0.1	0.3
27350.22	0.1	0.3
26950.22	0.1	0.3
26646.28	0.3	0.5
26550.03	0.3	0.5
26454.7	Culvert	
26366.53	0.3	0.5
26300.77	0.1	0.3
26150.22	0.1	0.3
25750.22	0.1	0.3
25599.02	0.1	0.3

Falcon DBPS

Manning's n Values

West Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
47452.25	n	0.08	0.05	0.08
47423.5*	n	0.08	0.05	0.08
47394.8*	n	0.08	0.05	0.08
47366.1*	n	0.08	0.05	0.08
47337.4*	n	0.08	0.05	0.08
47308.71	n	0.08	0.05	0.08
47262	Culvert			
47224.28	n	0.08	0.05	0.08
47079.43	n	0.08	0.05	0.08
46818.78	n	0.08	0.05	0.08
46418.78	n	0.08	0.05	0.08
46207.62	n	0.08	0.05	0.08
46026.9	n	0.08	0.05	0.08
45892.82	n	0.08	0.05	0.08
45796.67	n	0.08	0.05	0.08
45766.17	Culvert			
45708.32	n	0.08	0.05	0.08
45564.77	n	0.08	0.05	0.08
45218.78	n	0.08	0.05	0.08
44818.78	n	0.08	0.05	0.08
44499.26	n	0.08	0.05	0.08
44418.78	n	0.08	0.05	0.08
44018.78	n	0.08	0.05	0.08
43618.78	n	0.08	0.05	0.08
43453.91	n	0.08	0.05	0.08
43386.36	n	0.08	0.05	0.08
43218.78	n	0.08	0.05	0.08
42818.78	n	0.08	0.05	0.08
42418.78	n	0.08	0.05	0.08
42018.78	n	0.08	0.05	0.08
41774.8	n	0.08	0.05	0.08
41539.1	n	0.08	0.05	0.08
41465.66	n	0.08	0.05	0.08
41441.59	Culvert			
41405.38	n	0.08	0.05	0.08
41368.0*	n	0.08	0.05	0.08
41330.7*	n	0.08	0.05	0.08
41293.4*	n	0.08	0.05	0.08
41256.1*	n	0.08	0.05	0.08
41218.78	n	0.08	0.05	0.08
40884.05	n	0.08	0.05	0.08
40418.78	n	0.08	0.05	0.08

Middle Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
15477.33	n	0.08	0.05	0.08
15411.72	n	0.08	0.05	0.08
15205.81	n	0.08	0.05	0.08
15182.0*	n	0.08	0.05	0.08
15158.2*	n	0.08	0.05	0.08
15134.4*	n	0.08	0.05	0.08
15110.6*	n	0.08	0.05	0.08
15086.8*	n	0.08	0.05	0.08
15063.05	n	0.08	0.05	0.08
14907.55	n	0.08	0.05	0.08
14773.98	n	0.08	0.05	0.08
14507.55	n	0.08	0.05	0.08
14107.55	n	0.08	0.05	0.08
13707.55	n	0.08	0.05	0.08
13306.32	n	0.08	0.05	0.08
13111.17	n	0.08	0.05	0.08
12893	n	0.08	0.05	0.08
12511.32	n	0.08	0.05	0.08
12037.33	n	0.08	0.05	0.08
11628.61	n	0.08	0.05	0.08
11228.61	n	0.08	0.05	0.08
10828.61	n	0.08	0.05	0.08
10741.93	n	0.08	0.05	0.08
10706	Culvert			
10665.96	n	0.08	0.05	0.08
10428.61	n	0.08	0.05	0.08
10028.61	n	0.08	0.05	0.08
9628.612	n	0.08	0.05	0.08
9228.612	n	0.08	0.05	0.08
8741.269	n	0.08	0.05	0.08
8483.946	n	0.08	0.05	0.08
7238	Culvert			
6738.77	n	0.15	0.07	0.15
6420.92	n	0.15	0.07	0.15
6411.64*	n	0.15	0.07	0.15
6402.37*	n	0.15	0.07	0.15
6393.09*	n	0.15	0.07	0.15
6383.82*	n	0.15	0.07	0.15
6374.54*	n	0.15	0.07	0.15
6365.27*	n	0.15	0.07	0.15
6356.00*	n	0.15	0.07	0.15
6346.727	n	0.15	0.07	0.15

East Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
32631.79	n	0.08	0.05	0.08
32576.48	n	0.08	0.05	0.08
32537.9*	n	0.08	0.05	0.08
32499.3*	n	0.08	0.05	0.08
32460.7*	n	0.08	0.05	0.08
32422.2	n	0.08	0.05	0.08
32376.64	Culvert			
32335.71	n	0.08	0.05	0.08
32288.3*	n	0.08	0.05	0.08
32241.*	n	0.08	0.05	0.08
32193.6*	n	0.08	0.05	0.08
32146.2*	n	0.08	0.05	0.08
32098.94	n	0.08	0.05	0.08
31698.94	n	0.08	0.05	0.08
31657.1*	n	0.08	0.05	0.08
31615.3*	n	0.08	0.05	0.08
31573.5*	n	0.08	0.05	0.08
31531.79	n	0.08	0.05	0.08
31486	Culvert			
31411.01	n	0.08	0.05	0.08
31375.5*	n	0.08	0.05	0.08
31340.1*	n	0.08	0.05	0.08
31304.66	n	0.08	0.05	0.08
30904.66	n	0.08	0.05	0.08
30742.51	n	0.08	0.05	0.08
28941.08	n	0.08	0.05	0.08
28754.33	n	0.08	0.05	0.08
28478.62	n	0.08	0.05	0.08
28298.89	Culvert			
28137.71	n	0.08	0.07	0.08
28081.78	n	0.08	0.07	0.08
27748.51	n	0.08	0.07	0.08
27350.22	n	0.08	0.07	0.08
26950.22	n	0.08	0.07	0.08
26646.28	n	0.08	0.07	0.08
26550.03	n	0.08	0.07	0.08
26454.7	Culvert			
26366.53	n	0.08	0.07	0.08
26300.77	n	0.08	0.07	0.08
26150.22	n	0.08	0.07	0.08
25750.22	n	0.08	0.07	0.08
25599.02	n	0.08	0.07	0.08

Falcon DBPS

Manning's n Values

West Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
40018.78	n	0.08	0.03	0.08
39618.78	n	0.08	0.03	0.08
39218.78	n	0.08	0.03	0.08
38818.78	n	0.08	0.03	0.08
38418.78	n	0.08	0.03	0.08
38018.78	n	0.08	0.03	0.08
37618.78	n	0.08	0.03	0.08
37218.78	n	0.08	0.03	0.08
36914.66	n	0.08	0.03	0.08
36496.14	n	0.08	0.03	0.08
36328.17	n	0.08	0.03	0.08
36128.98	n	0.08	0.03	0.08
36018.78	n	0.08	0.03	0.08
35953.11	n	0.08	0.03	0.08
35609.06	n	0.08	0.03	0.08
35576.41	n	0.08	0.03	0.08
35218.78	n	0.08	0.03	0.08
35054.37	n	0.08	0.03	0.08
35025.09	n	0.08	0.03	0.08
34818.78	n	0.08	0.03	0.08
34639.33	n	0.08	0.03	0.08
34399.04	n	0.08	0.03	0.08
34320.25	n	0.08	0.05	0.08
34018.33	n	0.08	0.05	0.08
33792.91	n	0.08	0.05	0.08
33635.33	n	0.08	0.05	0.08
33235.67	n	0.08	0.05	0.08
32862.6	n	0.08	0.05	0.08
32439.34	n	0.08	0.05	0.08
32034.26	n	0.08	0.05	0.08
31765.2	n	0.08	0.05	0.08
31571.99	n	0.08	0.05	0.08
31384.44	n	0.08	0.03	0.08
31149.9	n	0.08	0.03	0.08
30906.88	n	0.08	0.03	0.08
30466.36	n	0.08	0.03	0.08
30109.14	n	0.08	0.03	0.08
29876.27	n	0.08	0.03	0.08
29632.62	n	0.08	0.03	0.08
29330.53	n	0.08	0.03	0.08
29004.24	n	0.08	0.03	0.08
28833.58	n	0.08	0.03	0.08

Middle Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
6320.979	n	0.15	0.07	0.15
6276.979	Bridge			
6210.5	n	0.15	0.07	0.15
6158.16*	n	0.15	0.07	0.15
6105.82*	n	0.15	0.07	0.15
6053.48*	n	0.15	0.07	0.15
6001.15*	n	0.15	0.07	0.15
5948.81*	n	0.15	0.07	0.15
5896.477	n	0.15	0.07	0.15
5551.916	n	0.15	0.07	0.15
5362.949	n	0.15	0.07	0.15
5337.60*	n	0.15	0.07	0.15
5312.26*	n	0.15	0.07	0.15
5286.91*	n	0.15	0.07	0.15
5261.57*	n	0.15	0.07	0.15
5236.23*	n	0.15	0.07	0.15
5210.887	n	0.15	0.07	0.15
5184.12	Bridge			
5159.05	n	0.15	0.07	0.15
5120.029	n	0.15	0.07	0.15
5091.662	n	0.15	0.07	0.15
5035.56	Culvert			
4988.302	n	0.15	0.07	0.15
4971.81*	n	0.15	0.07	0.15
4955.33*	n	0.15	0.07	0.15
4938.84*	n	0.15	0.07	0.15
4922.36*	n	0.15	0.07	0.15
4905.881	n	0.15	0.07	0.15
4751.912	n	0.15	0.07	0.15
4351.913	n	0.15	0.07	0.15
3951.913	n	0.15	0.07	0.15
3849.362	n	0.15	0.07	0.15
3822.34*	n	0.15	0.07	0.15
3795.32*	n	0.15	0.07	0.15
3768.30*	n	0.15	0.07	0.15
3741.28*	n	0.15	0.07	0.15
3714.26	n	0.15	0.07	0.15
3667.171	Culvert			
3619.655	n	0.15	0.07	0.15
3385.78*	n	0.15	0.07	0.15
3151.913	n	0.15	0.07	0.15
2744.492	n	0.15	0.07	0.15

East Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
25501.42	n	0.08	0.07	0.08
25447.05	n	0.08	0.07	0.08
25383.89	n	0.08	0.07	0.08
25320.79	n	0.08	0.07	0.08
25265.56	n	0.08	0.07	0.08
25173.45	n	0.08	0.07	0.08
24950.22	n	0.08	0.07	0.08
24550.22	n	0.08	0.07	0.08
24161.18	n	0.08	0.07	0.08
24122.58	n	0.08	0.07	0.08
24087.33	n	0.08	0.07	0.08
24032.8	n	0.08	0.07	0.08
23750.22	n	0.08	0.07	0.08
23617.72	n	0.08	0.07	0.08
23513.91	n	0.08	0.07	0.08
23413.07	Culvert			
23316.27	n	0.15	0.07	0.15
23184.63	n	0.15	0.07	0.15
22950.22	n	0.15	0.07	0.15
22550.22	n	0.15	0.07	0.15
22150.22	n	0.15	0.07	0.15
21750.22	n	0.15	0.07	0.15
21732.7*	n	0.15	0.07	0.15
21715.3*	n	0.15	0.07	0.15
21697.9*	n	0.15	0.07	0.15
21680.48	n	0.15	0.07	0.15
21604.86	Culvert			
21520.49	n	0.08	0.07	0.08
21350.22	n	0.08	0.07	0.08
21169.19	n	0.08	0.07	0.08
21150.6*	n	0.08	0.07	0.08
21132.0*	n	0.08	0.07	0.08
21113.4*	n	0.08	0.07	0.08
21094.9*	n	0.08	0.07	0.08
21076.3*	n	0.08	0.07	0.08
21057.78	n	0.08	0.07	0.08
20950.22	n	0.08	0.07	0.08
20786.19	n	0.08	0.07	0.08
20763.13	n	0.08	0.07	0.08
20550.22	n	0.08	0.07	0.08
20452.99	n	0.08	0.07	0.08
20393.38	n	0.08	0.07	0.08

Falcon DBPS

Expansion & Contraction Coefficients

West Tributary		
River Station	Contraction	Expansion
40018.78	0.1	0.3
39618.78	0.1	0.3
39218.78	0.1	0.3
38818.78	0.1	0.3
38418.78	0.1	0.3
38018.78	0.1	0.3
37618.78	0.1	0.3
37218.78	0.1	0.3
36914.66	0.1	0.3
36496.14	0.1	0.3
36328.17	0.1	0.3
36128.98	0.1	0.3
36018.78	0.1	0.3
35953.11	0.1	0.3
35609.06	0.1	0.3
35576.41	0.1	0.3
35218.78	0.1	0.3
35054.37	0.1	0.3
35025.09	0.1	0.3
34818.78	0.1	0.3
34639.33	0.1	0.3
34399.04	0.1	0.3
34320.25	0.1	0.3
34018.33	0.1	0.3
33792.91	0.1	0.3
33635.33	0.1	0.3
33235.67	0.1	0.3
32862.6	0.1	0.3
32439.34	0.1	0.3
32034.26	0.1	0.3
31765.2	0.1	0.3
31571.99	0.1	0.3
31384.44	0.1	0.3
31149.9	0.1	0.3
30906.88	0.1	0.3
30466.36	0.1	0.3
30109.14	0.1	0.3
29876.27	0.1	0.3
29632.62	0.1	0.3
29330.53	0.1	0.3
29004.24	0.1	0.3
28833.58	0.1	0.3

Middle Tributary		
River Station	Contraction	Expansion
6320.979	0.3	0.5
6276.979	Bridge	
6210.5	0.3	0.5
6158.16*	0.3	0.5
6105.82*	0.3	0.5
6053.48*	0.3	0.5
6001.15*	0.3	0.5
5948.81*	0.3	0.5
5896.477	0.1	0.3
5551.916	0.1	0.3
5362.949	0.1	0.3
5337.60*	0.1	0.3
5312.26*	0.1	0.3
5286.91*	0.1	0.3
5261.57*	0.1	0.3
5236.23*	0.3	0.5
5210.887	0.3	0.5
5184.12	Bridge	
5159.05	0.3	0.5
5120.029	0.3	0.5
5091.662	0.3	0.5
5035.56	Culvert	
4988.302	0.3	0.5
4971.81*	0.1	0.3
4955.33*	0.1	0.3
4938.84*	0.1	0.3
4922.36*	0.1	0.3
4905.881	0.1	0.3
4751.912	0.1	0.3
4351.913	0.1	0.3
3951.913	0.1	0.3
3849.362	0.1	0.3
3822.34*	0.3	0.5
3795.32*	0.3	0.5
3768.30*	0.3	0.5
3741.28*	0.3	0.5
3714.26	0.3	0.5
3667.171	Culvert	
3619.655	0.3	0.5
3385.78*	0.1	0.3
3151.913	0.1	0.3
2744.492	0.1	0.3

East Tributary		
River Station	Contraction	Expansion
25501.42	0.1	0.3
25447.05	0.1	0.3
25383.89	0.1	0.3
25320.79	0.1	0.3
25265.56	0.1	0.3
25173.45	0.1	0.3
24950.22	0.1	0.3
24550.22	0.1	0.3
24161.18	0.1	0.3
24122.58	0.1	0.3
24087.33	0.1	0.3
24032.8	0.1	0.3
23750.22	0.1	0.3
23617.72	0.3	0.5
23513.91	0.3	0.5
23413.07	Culvert	
23316.27	0.3	0.5
23184.63	0.1	0.3
22950.22	0.1	0.3
22550.22	0.1	0.3
22150.22	0.1	0.3
21750.22	0.3	0.5
21732.7*	0.3	0.5
21715.3*	0.3	0.5
21697.9*	0.3	0.5
21680.48	0.3	0.5
21604.86	Culvert	
21520.49	0.3	0.5
21350.22	0.1	0.3
21169.19	0.1	0.3
21150.6*	0.1	0.3
21132.0*	0.1	0.3
21113.4*	0.1	0.3
21094.9*	0.1	0.3
21076.3*	0.1	0.3
21057.78	0.1	0.3
20950.22	0.1	0.3
20786.19	0.1	0.3
20763.13	0.1	0.3
20550.22	0.1	0.3
20452.99	0.1	0.3
20393.38	0.1	0.3

Falcon DBPS

Steady Flow Data

West Tributary

Hydrologic Element	HEC-RAS Section	Existing Peak Flows (cfs)						Future Peak Flows (cfs)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
JWT 010	47452.3	9	21	32	58	73	89	9	21	32	58	73	89
JWT 042	47079.4	15	37	57	110	140	170	15	37	57	110	140	170
JWT 044	45564.8	24	59	89	170	210	260	24	59	89	170	210	260
JWT 050	42418.0	43	110	170	310	390	480	43	110	170	310	390	480
JWT 090	40018.0	67	160	250	470	600	740	68	160	250	480	610	730
JWT 120	36496.2	84	190	300	570	740	910	85	190	300	570	730	920
JWT 172	34399.0	90	210	320	600	760	930	99	210	320	600	760	960
JWT 180	31149.0	0	15	130	420	590	770	100	220	330	620	800	1000
JWT 200	27507.0	14	32	150	470	670	880	110	230	360	690	890	1200
JWT 210	24630.0	21	50	170	510	720	950	85	210	390	780	950	1100
JWT 234	21713.0	50	93	180	540	760	1000	130	270	420	810	1100	1400
Pond WU North Inflow	19803.0	65	120	186	548	769	1017	128	272	423	813	1054	1398
Pond WU South Inflow	18554.8	14	46	97	508	727	972	83	235	385	773	1013	1347
JWT 240	17784.0	26	54	86	410	670	890	83	200	380	770	940	1100
JWT 260	17399.7	47	92	130	420	690	910	86	210	390	790	970	1100
RWT 295	14577.8	49	97	130	430	690	910	86	210	390	790	970	1100
JWT 310	13268.4	120	230	370	730	1000	1300	160	420	640	1100	1400	1700
JWT 320	10574.0	120	250	370	740	1000	1300	160	410	630	1100	1400	1700
RWT 352 + WT350	8227.4	146	295	440	870	1170	1510	198	479	730	1290	1630	1980
JWT 352	5544.6	160	320	520	1000	1400	1900	210	530	820	1400	2000	2400
JWT 374_OUT	5379.9	190	400	600	1200	1500	1900	230	560	860	1500	2000	2500

Middle Tributary

Hydrologic Element	HEC-RAS Section	Existing Peak Flows (cfs)						Future Peak Flows (cfs)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
JMT 010	15477.3	1	11	25	62	120	160	1	11	25	62	120	160
RMT 62 + MT 60	14907.6	9	32	58	124	190	259	31	70	108	202	280	360
JMT 070	9628.6	61	180	280	510	630	760	150	350	490	800	980	1200
Reg Pond MN Inflow	6738.8	65	180	289	514	644	776	151	360	495	813	991	1184
JMT 080	6346.7	40	110	260	510	640	770	86	330	490	810	980	1200
RMT 102	6210.5	40	110	260	510	640	770	86	320	490	800	980	1200
JMT 106	5363	45	120	260	530	660	800	92	320	490	820	1000	1200
JMT 110	4905.9	46	120	260	540	680	820	94	320	500	830	1000	1200
RMT 114	1489.7	46	120	260	540	670	820	94	320	500	830	1000	1200

Falcon DBPS

West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	43386.36	25-yr	0.02	169.87	0.11	7299.45	7301.19	7301.09	7301.47	0.028076	4.28	39.97	53.96	0.88	5.54	1.29
WestTrib	43386.36	50-yr	0.1	209.31	0.6	7299.45	7301.29	7301.21	7301.63	0.028471	4.67	45.77	57.94	0.92	5.5	1.39
WestTrib	43386.36	100-yr	0.27	257.83	1.89	7299.45	7301.4	7301.34	7301.81	0.029194	5.12	52.5	60.62	0.96	5.47	1.56
WestTrib	43218.78	2-yr		24		7294.2	7294.74	7294.74	7294.89	0.053834	3.12	7.69	25.18	1	4.54	1.02
WestTrib	43218.78	5-yr		59		7294.2	7294.99	7294.99	7295.24	0.046436	4.01	14.7	29.58	1	4.57	1.44
WestTrib	43218.78	10-yr		89		7294.2	7295.17	7295.17	7295.47	0.042954	4.45	20.01	32.51	1	4.53	1.65
WestTrib	43218.78	25-yr		170		7294.2	7295.52	7295.52	7295.94	0.039207	5.24	32.46	38.54	1.01	4.8	2.05
WestTrib	43218.78	50-yr		210		7294.2	7295.66	7295.66	7296.13	0.038086	5.52	38.05	40.83	1.01	4.83	2.21
WestTrib	43218.78	100-yr	0	260	0	7294.2	7295.81	7295.81	7296.34	0.036629	5.82	44.66	43.31	1.01	5	2.35
WestTrib	42818.78	2-yr		24		7285.58	7286.91		7286.95	0.004739	1.65	14.57	19.95	0.34	6.03	0.21
WestTrib	42818.78	5-yr		59		7285.58	7287.47		7287.54	0.004972	2.14	27.54	26.33	0.37	6.06	0.32
WestTrib	42818.78	10-yr		89		7285.58	7287.81		7287.9	0.005019	2.4	37.13	30.19	0.38	6.05	0.38
WestTrib	42818.78	25-yr		170		7285.58	7288.42		7288.56	0.005593	2.95	57.56	37.1	0.42	6.12	0.53
WestTrib	42818.78	50-yr		210		7285.58	7288.66		7288.82	0.005687	3.14	66.92	39.87	0.43	6.12	0.59
WestTrib	42818.78	100-yr		260		7285.58	7288.9		7289.08	0.006047	3.39	76.66	42.56	0.45	6.12	0.67
WestTrib	42418.78	2-yr		43		7279.67	7280.66	7280.66	7280.92	0.04723	4.04	10.64	21.42	1.01	8.26	1.46
WestTrib	42418.78	5-yr		110		7279.67	7281.11	7281.11	7281.49	0.041499	4.92	22.37	30.42	1.01	8.8	1.9
WestTrib	42418.78	10-yr		170		7279.67	7281.39	7281.39	7281.84	0.039464	5.42	31.39	35.56	1.02	9.15	2.16
WestTrib	42418.78	25-yr		310		7279.67	7281.88	7281.88	7282.43	0.03659	5.95	52.13	48.51	1.01	9.38	2.44
WestTrib	42418.78	50-yr		389.99	0.01	7279.67	7282.1	7282.1	7282.69	0.035103	6.19	63.01	54.93	1.02	9.35	2.5
WestTrib	42418.78	100-yr	0	479.25	0.75	7279.67	7282.3	7282.3	7282.95	0.032552	6.47	74.91	62.59	1.04	9.2	2.42
WestTrib	42018.78	2-yr		43		7267.87	7269.74	7269.32	7269.87	0.011442	2.98	14.45	15.49	0.54	5.1	0.65
WestTrib	42018.78	5-yr		110		7267.87	7270.45	7269.98	7270.69	0.013499	3.99	27.55	21.53	0.62	5.36	1.05
WestTrib	42018.78	10-yr		170		7267.87	7270.91	7270.39	7271.21	0.014782	4.35	39.05	28.82	0.66	5.49	1.22
WestTrib	42018.78	25-yr		310		7267.87	7271.59	7271.13	7271.97	0.016158	4.92	62.95	41.5	0.7	5.58	1.5
WestTrib	42018.78	50-yr		390		7267.87	7271.87	7271.43	7272.29	0.016522	5.19	75.17	46.67	0.72	5.57	1.63
WestTrib	42018.78	100-yr		480		7267.87	7272.13	7271.7	7272.59	0.016944	5.46	87.88	51.52	0.74	5.56	1.77
WestTrib	41774.8	2-yr		43		7263.58	7264.52	7264.52	7264.77	0.049342	3.99	10.79	22.86	1.02	1.03	1.45
WestTrib	41774.8	5-yr		110		7263.58	7264.94	7264.94	7265.34	0.041569	5.03	21.88	28.73	1.02	1.74	1.96
WestTrib	41774.8	10-yr		170		7263.58	7265.23	7265.23	7265.71	0.037917	5.61	30.32	31.53	1.01	2.05	2.26
WestTrib	41774.8	25-yr		310		7263.58	7265.73	7265.73	7266.39	0.034384	6.52	47.55	36.58	1.01	2.44	2.76
WestTrib	41774.8	50-yr		390		7263.58	7265.97	7265.97	7266.71	0.033144	6.89	56.61	38.98	1.01	2.58	2.97
WestTrib	41774.8	100-yr	0.06	479.94	0.01	7263.58	7266.2	7266.2	7267.03	0.031712	7.32	65.65	41.24	1.02	2.7	3.12
WestTrib	41539.1	2-yr		43		7260.77	7262.38		7262.4	0.001382	0.92	46.7	60.95	0.19	0.01	0.07
WestTrib	41539.1	5-yr		110		7260.77	7262.73		7262.77	0.002736	1.61	68.12	63.84	0.28	0.05	0.18
WestTrib	41539.1	10-yr		170		7260.77	7262.96		7263.03	0.003453	2.03	83.54	65.85	0.32	0.09	0.27

Falcon DBPS

West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	41539.1	25-yr		310		7260.77	7263.4		7263.52	0.004484	2.74	113.25	69.54	0.38	0.15	0.45
WestTrib	41539.1	50-yr		390		7260.77	7263.61		7263.76	0.004878	3.05	128.04	71.31	0.4	0.19	0.54
WestTrib	41539.1	100-yr		480		7260.77	7263.83		7264	0.005266	3.34	143.65	73.73	0.42	0.22	0.63
WestTrib	41465.66	2-yr	0.64	38.16	4.2	7257.5	7262.38	7258.93	7262.38	0.000058	0.47	115.09	63.38	0.06		0.01
WestTrib	41465.66	5-yr	3.11	94.57	12.33	7257.5	7262.7	7259.66	7262.71	0.000257	1.06	136.22	68.35	0.12		0.03
WestTrib	41465.66	10-yr	6.34	143.06	20.6	7257.5	7262.91	7260.08	7262.94	0.000483	1.51	151.12	71.64	0.17		0.06
WestTrib	41465.66	25-yr	16.38	250.42	43.2	7257.5	7263.29	7260.8	7263.36	0.001069	2.39	179.21	76.25	0.25		0.15
WestTrib	41465.66	50-yr	23.32	309.2	57.48	7257.5	7263.47	7261.09	7263.57	0.001415	2.83	192.82	78.15	0.29		0.21
WestTrib	41465.66	100-yr	31.95	373.73	74.32	7257.5	7263.64	7261.43	7263.78	0.001804	3.28	206.8	80.07	0.32		0.28
WestTrib	41441.59		Culvert													
WestTrib	41405.38	2-yr		43		7257.33	7258.27	7258.14	7258.44	0.026369	3.35	12.83	25	0.77	0.99	0.95
WestTrib	41405.38	5-yr		110		7257.33	7258.73	7258.6	7258.95	0.026345	3.78	29.09	41.35	0.79	0.96	1.14
WestTrib	41405.38	10-yr		170		7257.33	7258.96	7258.8	7259.25	0.025956	4.36	38.97	44.22	0.82	0.94	1.41
WestTrib	41405.38	25-yr		310		7257.33	7259.39	7259.26	7259.81	0.024835	5.23	59.29	49.6	0.84	0.92	1.83
WestTrib	41405.38	50-yr		390	0	7257.33	7259.6	7259.44	7260.08	0.024336	5.59	69.8	52.17	0.85	0.9	2.01
WestTrib	41405.38	100-yr		479.9	0.1	7257.33	7259.79	7259.64	7260.35	0.023897	5.99	80.27	54.6	0.87	0.89	2.17
WestTrib	41368.0*	2-yr		43		7256.12	7257.31		7257.46	0.025882	3.1	13.85	26.11	0.75	1.02	0.85
WestTrib	41368.0*	5-yr		110		7256.12	7257.75		7257.98	0.024963	3.86	28.53	37.9	0.78	0.99	1.16
WestTrib	41368.0*	10-yr		170		7256.12	7258		7258.31	0.024299	4.42	38.49	40.86	0.8	0.98	1.41
WestTrib	41368.0*	25-yr		310		7256.12	7258.46		7258.9	0.023914	5.32	58.25	46.18	0.84	0.94	1.86
WestTrib	41368.0*	50-yr		390		7256.12	7258.68		7259.18	0.023643	5.69	68.57	48.77	0.85	0.92	2.05
WestTrib	41368.0*	100-yr		479.99	0.01	7256.12	7258.89	7258.7	7259.46	0.023453	6.06	79.22	51.56	0.86	0.9	2.22
WestTrib	41330.7*	2-yr		43		7254.91	7256.25	7256.15	7256.43	0.029059	3.38	12.73	23.05	0.8	1.07	0.99
WestTrib	41330.7*	5-yr		110		7254.91	7256.72		7256.99	0.028202	4.17	26.36	34.11	0.84	0.99	1.35
WestTrib	41330.7*	10-yr		170		7254.91	7256.98	7256.86	7257.33	0.027958	4.8	35.43	36.92	0.86	0.97	1.66
WestTrib	41330.7*	25-yr		310		7254.91	7257.47		7257.96	0.026031	5.65	54.83	42.31	0.88	0.92	2.08
WestTrib	41330.7*	50-yr		390		7254.91	7257.7	7257.55	7258.26	0.025458	6.01	64.85	44.85	0.88	0.91	2.27
WestTrib	41330.7*	100-yr		480		7254.91	7257.94	7257.78	7258.56	0.024713	6.32	75.91	47.61	0.88	0.89	2.43
WestTrib	41293.4*	2-yr		43		7253.69	7255.18		7255.37	0.027983	3.53	12.18	20.02	0.8	1.11	1.05
WestTrib	41293.4*	5-yr		110		7253.69	7255.73		7256	0.025079	4.19	26.25	30.83	0.8	1.05	1.32
WestTrib	41293.4*	10-yr		170		7253.69	7256.03		7256.38	0.02389	4.73	35.97	34	0.81	1.01	1.56
WestTrib	41293.4*	25-yr		310		7253.69	7256.55		7257.04	0.023281	5.62	55.21	39.51	0.84	0.96	2
WestTrib	41293.4*	50-yr		390		7253.69	7256.79		7257.35	0.023186	6	65.04	42.04	0.85	0.94	2.21
WestTrib	41293.4*	100-yr		480		7253.69	7257.04	7256.84	7257.66	0.023193	6.36	75.45	44.63	0.86	0.92	2.41
WestTrib	41256.1*	2-yr		43		7252.48	7254.04	7253.94	7254.27	0.031276	3.89	11.06	17.02	0.85	1.1	1.24

Falcon DBPS

West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	43386.36	25-yr	0.02	169.87	0.11	7299.45	7301.19	7301.09	7301.47	0.028076	4.28	39.97	53.96	0.88	5.54	1.29
WestTrib	43386.36	50-yr	0.1	209.31	0.6	7299.45	7301.29	7301.21	7301.63	0.028471	4.67	45.77	57.94	0.92	5.5	1.39
WestTrib	43386.36	100-yr	0.27	257.83	1.89	7299.45	7301.4	7301.34	7301.81	0.029194	5.12	52.5	60.62	0.96	5.47	1.56
WestTrib	43218.78	2-yr		24		7294.2	7294.74	7294.74	7294.89	0.053834	3.12	7.69	25.18	1	4.54	1.02
WestTrib	43218.78	5-yr		59		7294.2	7294.99	7294.99	7295.24	0.046436	4.01	14.7	29.58	1	4.57	1.44
WestTrib	43218.78	10-yr		89		7294.2	7295.17	7295.17	7295.47	0.042954	4.45	20.01	32.51	1	4.53	1.65
WestTrib	43218.78	25-yr		170		7294.2	7295.52	7295.52	7295.94	0.039207	5.24	32.46	38.54	1.01	4.8	2.05
WestTrib	43218.78	50-yr		210		7294.2	7295.66	7295.66	7296.13	0.038086	5.52	38.05	40.83	1.01	4.83	2.21
WestTrib	43218.78	100-yr	0	260	0	7294.2	7295.81	7295.81	7296.34	0.036629	5.82	44.66	43.31	1.01	5	2.35
WestTrib	42818.78	2-yr		24		7285.58	7286.91		7286.95	0.004739	1.65	14.57	19.95	0.34	6.03	0.21
WestTrib	42818.78	5-yr		59		7285.58	7287.47		7287.54	0.004972	2.14	27.54	26.33	0.37	6.06	0.32
WestTrib	42818.78	10-yr		89		7285.58	7287.81		7287.9	0.005019	2.4	37.13	30.19	0.38	6.05	0.38
WestTrib	42818.78	25-yr		170		7285.58	7288.42		7288.56	0.005593	2.95	57.56	37.1	0.42	6.12	0.53
WestTrib	42818.78	50-yr		210		7285.58	7288.66		7288.82	0.005687	3.14	66.92	39.87	0.43	6.12	0.59
WestTrib	42818.78	100-yr		260		7285.58	7288.9		7289.08	0.006047	3.39	76.66	42.56	0.45	6.12	0.67
WestTrib	42418.78	2-yr		43		7279.67	7280.66	7280.66	7280.92	0.04723	4.04	10.64	21.42	1.01	8.26	1.46
WestTrib	42418.78	5-yr		110		7279.67	7281.11	7281.11	7281.49	0.041499	4.92	22.37	30.42	1.01	8.8	1.9
WestTrib	42418.78	10-yr		170		7279.67	7281.39	7281.39	7281.84	0.039464	5.42	31.39	35.56	1.02	9.15	2.16
WestTrib	42418.78	25-yr		310		7279.67	7281.88	7281.88	7282.43	0.03659	5.95	52.13	48.51	1.01	9.38	2.44
WestTrib	42418.78	50-yr		389.99	0.01	7279.67	7282.1	7282.1	7282.69	0.035103	6.19	63.01	54.93	1.02	9.35	2.5
WestTrib	42418.78	100-yr	0	479.25	0.75	7279.67	7282.3	7282.3	7282.95	0.032552	6.47	74.91	62.59	1.04	9.2	2.42
WestTrib	42018.78	2-yr		43		7267.87	7269.74	7269.32	7269.87	0.011442	2.98	14.45	15.49	0.54	5.1	0.65
WestTrib	42018.78	5-yr		110		7267.87	7270.45	7269.98	7270.69	0.013499	3.99	27.55	21.53	0.62	5.36	1.05
WestTrib	42018.78	10-yr		170		7267.87	7270.91	7270.39	7271.21	0.014782	4.35	39.05	28.82	0.66	5.49	1.22
WestTrib	42018.78	25-yr		310		7267.87	7271.59	7271.13	7271.97	0.016158	4.92	62.95	41.5	0.7	5.58	1.5
WestTrib	42018.78	50-yr		390		7267.87	7271.87	7271.43	7272.29	0.016522	5.19	75.17	46.67	0.72	5.57	1.63
WestTrib	42018.78	100-yr		480		7267.87	7272.13	7271.7	7272.59	0.016944	5.46	87.88	51.52	0.74	5.56	1.77
WestTrib	41774.8	2-yr		43		7263.58	7264.52	7264.52	7264.77	0.049342	3.99	10.79	22.86	1.02	1.03	1.45
WestTrib	41774.8	5-yr		110		7263.58	7264.94	7264.94	7265.34	0.041569	5.03	21.88	28.73	1.02	1.74	1.96
WestTrib	41774.8	10-yr		170		7263.58	7265.23	7265.23	7265.71	0.037917	5.61	30.32	31.53	1.01	2.05	2.26
WestTrib	41774.8	25-yr		310		7263.58	7265.73	7265.73	7266.39	0.034384	6.52	47.55	36.58	1.01	2.44	2.76
WestTrib	41774.8	50-yr		390		7263.58	7265.97	7265.97	7266.71	0.033144	6.89	56.61	38.98	1.01	2.58	2.97
WestTrib	41774.8	100-yr	0.06	479.94	0.01	7263.58	7266.2	7266.2	7267.03	0.031712	7.32	65.65	41.24	1.02	2.7	3.12
WestTrib	41539.1	2-yr		43		7260.77	7262.38		7262.4	0.001382	0.92	46.7	60.95	0.19	0.01	0.07
WestTrib	41539.1	5-yr		110		7260.77	7262.73		7262.77	0.002736	1.61	68.12	63.84	0.28	0.05	0.18
WestTrib	41539.1	10-yr		170		7260.77	7262.96		7263.03	0.003453	2.03	83.54	65.85	0.32	0.09	0.27

Falcon DBPS

West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	41539.1	25-yr		310		7260.77	7263.4		7263.52	0.004484	2.74	113.25	69.54	0.38	0.15	0.45
WestTrib	41539.1	50-yr		390		7260.77	7263.61		7263.76	0.004878	3.05	128.04	71.31	0.4	0.19	0.54
WestTrib	41539.1	100-yr		480		7260.77	7263.83		7264	0.005266	3.34	143.65	73.73	0.42	0.22	0.63
WestTrib	41465.66	2-yr	0.64	38.16	4.2	7257.5	7262.38	7258.93	7262.38	0.000058	0.47	115.09	63.38	0.06		0.01
WestTrib	41465.66	5-yr	3.11	94.57	12.33	7257.5	7262.7	7259.66	7262.71	0.000257	1.06	136.22	68.35	0.12		0.03
WestTrib	41465.66	10-yr	6.34	143.06	20.6	7257.5	7262.91	7260.08	7262.94	0.000483	1.51	151.12	71.64	0.17		0.06
WestTrib	41465.66	25-yr	16.38	250.42	43.2	7257.5	7263.29	7260.8	7263.36	0.001069	2.39	179.21	76.25	0.25		0.15
WestTrib	41465.66	50-yr	23.32	309.2	57.48	7257.5	7263.47	7261.09	7263.57	0.001415	2.83	192.82	78.15	0.29		0.21
WestTrib	41465.66	100-yr	31.95	373.73	74.32	7257.5	7263.64	7261.43	7263.78	0.001804	3.28	206.8	80.07	0.32		0.28
WestTrib	41441.59		Culvert													
WestTrib	41405.38	2-yr		43		7257.33	7258.27	7258.14	7258.44	0.026281	3.35	12.85	25.05	0.77	0.99	0.95
WestTrib	41405.38	5-yr		110		7257.33	7258.73	7258.6	7258.95	0.026345	3.78	29.09	41.35	0.79	0.96	1.14
WestTrib	41405.38	10-yr		170		7257.33	7258.96	7258.8	7259.25	0.025956	4.36	38.97	44.22	0.82	0.94	1.41
WestTrib	41405.38	25-yr		310		7257.33	7259.39	7259.26	7259.81	0.024835	5.23	59.29	49.6	0.84	0.92	1.83
WestTrib	41405.38	50-yr		390	0	7257.33	7259.6	7259.44	7260.08	0.024336	5.59	69.8	52.17	0.85	0.9	2.01
WestTrib	41405.38	100-yr		479.9	0.1	7257.33	7259.79	7259.64	7260.35	0.023897	5.99	80.27	54.6	0.87	0.89	2.17
WestTrib	41368.0*	2-yr		43		7256.12	7257.31		7257.46	0.025954	3.11	13.84	26.1	0.75	1.02	0.85
WestTrib	41368.0*	5-yr		110		7256.12	7257.75		7257.98	0.024963	3.86	28.53	37.9	0.78	0.99	1.16
WestTrib	41368.0*	10-yr		170		7256.12	7258		7258.31	0.024299	4.42	38.49	40.86	0.8	0.98	1.41
WestTrib	41368.0*	25-yr		310		7256.12	7258.46		7258.9	0.023914	5.32	58.25	46.18	0.84	0.94	1.86
WestTrib	41368.0*	50-yr		390		7256.12	7258.68		7259.18	0.023643	5.69	68.57	48.77	0.85	0.92	2.05
WestTrib	41368.0*	100-yr		479.99	0.01	7256.12	7258.89	7258.7	7259.46	0.023453	6.06	79.22	51.56	0.86	0.9	2.22
WestTrib	41330.7*	2-yr		43		7254.91	7256.26	7256.15	7256.43	0.028858	3.37	12.76	23.08	0.8	1.07	0.98
WestTrib	41330.7*	5-yr		110		7254.91	7256.72		7256.99	0.028202	4.17	26.36	34.11	0.84	0.99	1.35
WestTrib	41330.7*	10-yr		170		7254.91	7256.98	7256.86	7257.33	0.027958	4.8	35.43	36.92	0.86	0.97	1.66
WestTrib	41330.7*	25-yr		310		7254.91	7257.47		7257.96	0.026003	5.65	54.85	42.31	0.87	0.92	2.08
WestTrib	41330.7*	50-yr		390		7254.91	7257.7	7257.55	7258.26	0.025458	6.01	64.85	44.85	0.88	0.91	2.27
WestTrib	41330.7*	100-yr		480		7254.91	7257.94	7257.78	7258.56	0.024713	6.32	75.91	47.61	0.88	0.89	2.43
WestTrib	41293.4*	2-yr		43		7253.69	7255.18		7255.37	0.028162	3.54	12.15	20	0.8	1.11	1.05
WestTrib	41293.4*	5-yr		110		7253.69	7255.73		7256	0.025079	4.19	26.25	30.83	0.8	1.05	1.32
WestTrib	41293.4*	10-yr		170		7253.69	7256.03		7256.38	0.02389	4.73	35.97	34	0.81	1.01	1.56
WestTrib	41293.4*	25-yr		310		7253.69	7256.55		7257.04	0.023327	5.62	55.17	39.5	0.84	0.96	2.01
WestTrib	41293.4*	50-yr		390		7253.69	7256.8		7257.35	0.023165	5.99	65.06	42.05	0.85	0.94	2.21
WestTrib	41293.4*	100-yr		480		7253.69	7257.04	7256.84	7257.66	0.023193	6.36	75.45	44.63	0.86	0.92	2.41
WestTrib	41256.1*	2-yr		43		7252.48	7254.04	7253.94	7254.27	0.03109	3.88	11.09	17.04	0.85	1.11	1.24

Falcon DBPS

West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	41256.1*	5-yr		110		7252.48	7254.59	7254.51	7254.96	0.031078	4.85	22.66	24.95	0.9	1.03	1.73
WestTrib	41256.1*	10-yr		170		7252.48	7254.93	7254.84	7255.37	0.030111	5.34	31.81	29.66	0.91	0.97	1.98
WestTrib	41256.1*	25-yr		310		7252.48	7255.49	7255.38	7256.08	0.027826	6.19	50.1	35.3	0.92	0.88	2.42
WestTrib	41256.1*	50-yr		390		7252.48	7255.76	7255.64	7256.42	0.0268	6.51	59.86	37.96	0.91	0.84	2.59
WestTrib	41256.1*	100-yr		480		7252.48	7256.03	7255.9	7256.75	0.02556	6.79	70.73	40.72	0.91	0.8	2.72
WestTrib	41218.78	2-yr		43		7251.27	7252.93	7252.81	7253.17	0.028204	3.93	10.95	15.21	0.82	7.11	1.23
WestTrib	41218.78	5-yr		110		7251.27	7253.6	7253.41	7253.94	0.024178	4.67	23.55	22.58	0.81	6.92	1.53
WestTrib	41218.78	10-yr		170		7251.27	7254.01	7253.79	7254.4	0.022229	5.04	33.71	27.1	0.8	6.81	1.68
WestTrib	41218.78	25-yr		310		7251.27	7254.72	7254.39	7255.2	0.018931	5.57	55.65	34.19	0.77	6.74	1.88
WestTrib	41218.78	50-yr		390		7251.27	7255.07	7254.68	7255.58	0.017152	5.71	68.3	37.55	0.75	6.77	1.9
WestTrib	41218.78	100-yr		480		7251.27	7255.4	7254.95	7255.94	0.016345	5.92	81.03	40.68	0.74	6.81	1.99
WestTrib	40884.05	2-yr		43		7243.77	7245.86	7245.55	7246.07	0.016529	3.67	11.72	11.72	0.65	11.14	0.97
WestTrib	40884.05	5-yr		110		7243.77	7246.66	7246.32	7247.02	0.017885	4.76	23.1	16.63	0.71	11.63	1.46
WestTrib	40884.05	10-yr		170		7243.77	7247.16	7246.78	7247.59	0.018671	5.28	32.19	20.57	0.74	11.91	1.73
WestTrib	40884.05	25-yr	2.26	307.74		7243.77	7247.91	7247.64	7248.47	0.021378	6	53.04	35.48	0.86	12.27	1.91
WestTrib	40884.05	50-yr	5.27	384.73		7243.77	7248.14	7247.99	7248.8	0.024108	6.55	61.86	40.27	0.93	12.36	2.22
WestTrib	40884.05	100-yr	10.2	469.8		7243.77	7248.39	7248.31	7249.13	0.025814	7	72.22	45.26	0.97	12.44	2.48
WestTrib	40418.78	2-yr		43		7233.96	7234.77	7234.73	7234.93	0.037584	3.18	13.53	32.93	0.87	8	0.96
WestTrib	40418.78	5-yr		110		7233.96	7235.11	7235.07	7235.38	0.03719	4.21	26.14	41.38	0.93	7.45	1.46
WestTrib	40418.78	10-yr		170		7233.96	7235.33	7235.29	7235.68	0.037068	4.76	35.7	46.83	0.96	7.06	1.76
WestTrib	40418.78	25-yr		310		7233.96	7235.73	7235.69	7236.2	0.033161	5.45	56.84	55.92	0.95	6.35	2.09
WestTrib	40418.78	50-yr		390		7233.96	7235.94	7235.86	7236.44	0.029161	5.68	68.65	57.65	0.92	6.06	2.16
WestTrib	40418.78	100-yr		480		7233.96	7236.14	7236.04	7236.7	0.027473	5.99	80.07	59.28	0.91	5.86	2.3
WestTrib	40018.78	2-yr		68		7224.51	7226.42	7226.42	7226.93	0.014505	5.73	11.88	12.02	1.02	5.73	0.85
WestTrib	40018.78	5-yr		160		7224.51	7227.23	7227.23	7227.94	0.012809	6.75	23.7	17.07	1.01	5.2	1.06
WestTrib	40018.78	10-yr		250		7224.51	7227.79	7227.79	7228.62	0.011921	7.33	34.13	20.62	1	4.91	1.17
WestTrib	40018.78	25-yr		480		7224.51	7228.78	7228.78	7229.85	0.01089	8.3	57.8	27.05	1	4.64	1.38
WestTrib	40018.78	50-yr		610		7224.51	7229.2	7229.2	7230.39	0.01073	8.76	69.63	29.75	1.01	4.6	1.49
WestTrib	40018.78	100-yr		730		7224.51	7229.56	7229.56	7230.83	0.010388	9.05	80.69	32.06	1.01	4.53	1.56
WestTrib	39618.78	2-yr		68		7216.53	7218.35	7218.32	7218.71	0.013929	4.83	14.09	18.35	0.97	5.62	0.65
WestTrib	39618.78	5-yr		157.41	2.59	7216.53	7218.96	7218.96	7219.43	0.012816	5.55	30.88	35.53	1.04	5.13	0.68
WestTrib	39618.78	10-yr		242.04	7.96	7216.53	7219.33	7219.33	7219.89	0.012185	6.05	45.85	44.33	1.03	4.74	0.77
WestTrib	39618.78	25-yr		452.51	27.49	7216.53	7220	7220	7220.68	0.011744	6.8	81.63	63.07	1.03	3.76	0.93
WestTrib	39618.78	50-yr		570.37	39.63	7216.53	7220.26	7220.26	7221.03	0.011665	7.22	98.92	69.33	1.03	3.74	1.02
WestTrib	39618.78	100-yr	0	678.31	51.69	7216.53	7220.47	7220.47	7221.3	0.011639	7.56	114.04	74.31	1.04	3.66	1.09
WestTrib	39218.78	2-yr		68		7211.07	7212.58	7212.58	7213.09	0.014094	5.71	11.91	11.93	1.01	5.64	0.84

Falcon DBPS

West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	39218.78	5-yr		160		7211.07	7213.38	7213.38	7214.14	0.01269	6.96	22.99	15.65	1.01	5.01	1.1
WestTrib	39218.78	10-yr		249.73	0.27	7211.07	7213.96	7213.96	7214.86	0.011376	7.64	33.28	22.95	1.12	4.8	0.98
WestTrib	39218.78	25-yr	0.04	449.42	30.54	7211.07	7215.13	7215.13	7216.1	0.007574	8.18	79.08	54.9	1.16	3.72	0.67
WestTrib	39218.78	50-yr	0.35	549.63	60.03	7211.07	7215.49	7215.49	7216.59	0.007548	8.85	99.22	57.07	1.13	3.62	0.8
WestTrib	39218.78	100-yr	1.41	636.39	92.2	7211.07	7215.82	7215.82	7216.99	0.00725	9.28	119.37	67.49	1.15	3.45	0.78
WestTrib	38818.78	2-yr		68		7204.61	7206.1	7206.08	7206.51	0.013993	5.19	13.11	15.16	0.98	4.98	0.73
WestTrib	38818.78	5-yr		160		7204.61	7206.81	7206.78	7207.4	0.012134	6.19	25.86	20.54	0.97	5.12	0.91
WestTrib	38818.78	10-yr		250		7204.61	7207.25	7207.25	7208.01	0.012439	7	35.69	23.94	1.01	5.26	1.11
WestTrib	38818.78	25-yr		480	0	7204.61	7208.19	7208.19	7209.08	0.011531	7.56	63.45	36.1	1.01	4.75	1.22
WestTrib	38818.78	50-yr		609.87	0.13	7204.61	7208.51	7208.51	7209.53	0.0109	8.14	75.15	37.75	1.02	4.42	1.3
WestTrib	38818.78	100-yr	0.06	729.33	0.62	7204.61	7208.77	7208.77	7209.92	0.010415	8.62	85.4	39.52	1.03	4.2	1.35
WestTrib	38418.78	2-yr		68		7200.04	7201.24	7201.15	7201.54	0.010999	4.41	15.42	19.41	0.87	4.95	0.54
WestTrib	38418.78	5-yr		160		7200.04	7201.78	7201.78	7202.29	0.013386	5.71	28.01	27.76	1	5.08	0.83
WestTrib	38418.78	10-yr		250		7200.04	7202.22	7202.22	7202.75	0.013561	5.81	42.99	42.06	1.01	4.81	0.86
WestTrib	38418.78	25-yr	0.03	479.31	0.66	7200.04	7202.82	7202.82	7203.49	0.011913	6.6	74.06	65.2	1.09	4.26	0.84
WestTrib	38418.78	50-yr	0.23	605.11	4.66	7200.04	7203.07	7203.07	7203.83	0.010814	7.03	91.67	72.27	1.1	3.93	0.85
WestTrib	38418.78	100-yr	0.62	718.74	10.64	7200.04	7203.28	7203.28	7204.11	0.010119	7.39	107.06	73.67	1.07	3.78	0.91
WestTrib	38018.78	2-yr	1.08	66.1	0.82	7195.31	7196.32	7196.31	7196.6	0.013949	4.27	17.98	37	1.06	5.53	0.42
WestTrib	38018.78	5-yr	7.68	147.86	4.46	7195.31	7196.76	7196.76	7197.21	0.011998	5.63	36.9	50.08	1.11	5.11	0.55
WestTrib	38018.78	10-yr	18.44	221.67	9.89	7195.31	7197.09	7197.09	7197.66	0.010713	6.4	55.48	59.76	1.11	4.67	0.62
WestTrib	38018.78	25-yr	56.92	394.13	28.95	7195.31	7197.74	7197.74	7198.52	0.009554	7.78	99.55	76.08	1.09	4.36	0.78
WestTrib	38018.78	50-yr	83.58	484.01	42.42	7195.31	7198.05	7198.05	7198.91	0.008932	8.28	124.63	83.23	1.07	4.12	0.83
WestTrib	38018.78	100-yr	112.2	564.14	53.62	7195.31	7198.29	7198.29	7199.23	0.008819	8.77	144.85	87.48	1.06	4.07	0.91
WestTrib	37618.78	2-yr		68		7190.23	7190.9	7190.86	7191.08	0.013536	3.32	20.46	46.67	0.88	4.53	0.37
WestTrib	37618.78	5-yr		157.66	2.34	7190.23	7191.21	7191.21	7191.51	0.013404	4.46	39.63	84.38	1.14		0.39
WestTrib	37618.78	10-yr		237.96	12.04	7190.23	7191.43	7191.43	7191.81	0.012448	5.03	59.15	88.67	1.06	3.84	0.52
WestTrib	37618.78	25-yr	0.03	437.11	42.87	7190.23	7191.84	7191.84	7192.39	0.012103	6.21	96.52	94.79	1.04	4.39	0.77
WestTrib	37618.78	50-yr	0.25	548	61.75	7190.23	7192.03	7192.03	7192.67	0.011588	6.71	115.24	96.86	1.03	4.42	0.86
WestTrib	37618.78	100-yr	0.65	649.82	79.52	7190.23	7192.19	7192.19	7192.91	0.011465	7.16	130.6	98.54	1.04	4.52	0.95
WestTrib	37218.78	2-yr	0.1	58.65	9.25	7184.96	7186.34	7186.28	7186.55	0.009589	3.89	27.68	70.37	1.02	3.49	0.23
WestTrib	37218.78	5-yr	0.87	118.97	40.17	7184.96	7186.73	7186.7	7187.04	0.009492	5.15	65.65	130.11	1.11	3.56	0.3
WestTrib	37218.78	10-yr	1.99	157.16	90.85	7184.96	7187.03	7187.03	7187.32	0.007525	5.37	117.02	185.32	0.95	3.21	0.3
WestTrib	37218.78	25-yr	4.72	251.14	224.14	7184.96	7187.35	7187.35	7187.77	0.009817	7.01	176.27	189.2	0.95	3.13	0.57
WestTrib	37218.78	50-yr	6.56	297.87	305.57	7184.96	7187.51	7187.51	7187.97	0.010296	7.61	206.63	191.16	0.93	3.21	0.69
WestTrib	37218.78	100-yr	8.38	340.39	381.23	7184.96	7187.63	7187.63	7188.15	0.010866	8.16	230.62	192.7	0.93	3.3	0.81
WestTrib	36914.66	2-yr		48.87	19.13	7182.01	7182.91	7182.83	7183.05	0.013791	3.34	29.06	65.23	0.77	6.3	0.38

Falcon DBPS

West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	41256.1*	5-yr		110		7252.48	7254.59	7254.51	7254.96	0.031078	4.85	22.66	24.95	0.9	1.03	1.73
WestTrib	41256.1*	10-yr		170		7252.48	7254.93	7254.84	7255.37	0.030111	5.34	31.81	29.66	0.91	0.97	1.98
WestTrib	41256.1*	25-yr		310		7252.48	7255.49	7255.38	7256.08	0.027933	6.2	50.03	35.28	0.92	0.88	2.43
WestTrib	41256.1*	50-yr		390		7252.48	7255.76	7255.64	7256.42	0.026777	6.51	59.88	37.97	0.91	0.85	2.59
WestTrib	41256.1*	100-yr		480		7252.48	7256.03	7255.9	7256.75	0.02558	6.79	70.71	40.71	0.91	0.81	2.73
WestTrib	41218.78	2-yr		43		7251.27	7252.93	7252.81	7253.17	0.028003	3.92	10.98	15.23	0.81	7.11	1.22
WestTrib	41218.78	5-yr		110		7251.27	7253.6	7253.41	7253.94	0.024178	4.67	23.55	22.58	0.81	6.92	1.53
WestTrib	41218.78	10-yr		170		7251.27	7254.01	7253.79	7254.4	0.022229	5.04	33.71	27.1	0.8	6.81	1.68
WestTrib	41218.78	25-yr		310		7251.27	7254.73	7254.39	7255.21	0.018488	5.52	56.14	34.33	0.76	6.75	1.84
WestTrib	41218.78	50-yr		390		7251.27	7255.05	7254.68	7255.57	0.017662	5.77	67.57	37.36	0.76	6.77	1.95
WestTrib	41218.78	100-yr		480		7251.27	7255.4	7254.95	7255.94	0.016388	5.93	80.96	40.66	0.74	6.81	1.99
WestTrib	40884.05	2-yr		43		7243.77	7245.86	7245.55	7246.07	0.016636	3.68	11.69	11.71	0.65	11.15	0.98
WestTrib	40884.05	5-yr		110		7243.77	7246.66	7246.32	7247.02	0.017885	4.76	23.1	16.63	0.71	11.63	1.46
WestTrib	40884.05	10-yr		170		7243.77	7247.16	7246.78	7247.59	0.018671	5.28	32.19	20.57	0.74	11.91	1.73
WestTrib	40884.05	25-yr	2.11	307.89		7243.77	7247.89	7247.64	7248.46	0.022044	6.08	52.3	35.04	0.87	12.26	1.97
WestTrib	40884.05	50-yr	5.55	384.45		7243.77	7248.17	7247.99	7248.81	0.023272	6.46	62.85	40.77	0.91	12.37	2.15
WestTrib	40884.05	100-yr	10.22	469.78		7243.77	7248.39	7248.31	7249.13	0.02576	6.99	72.29	45.29	0.97	12.44	2.47
WestTrib	40418.78	2-yr		43		7233.96	7234.77	7234.73	7234.93	0.037324	3.17	13.57	32.96	0.87	8.02	0.96
WestTrib	40418.78	5-yr		110		7233.96	7235.11	7235.07	7235.38	0.03719	4.21	26.14	41.38	0.93	7.45	1.46
WestTrib	40418.78	10-yr		170		7233.96	7235.33	7235.29	7235.68	0.037068	4.76	35.7	46.83	0.96	7.06	1.76
WestTrib	40418.78	25-yr		310		7233.96	7235.75	7235.69	7236.2	0.03185	5.38	57.57	56.03	0.94	6.39	2.03
WestTrib	40418.78	50-yr		390		7233.96	7235.93	7235.86	7236.44	0.030457	5.76	67.69	57.51	0.94	6.09	2.23
WestTrib	40418.78	100-yr		480		7233.96	7236.14	7236.04	7236.7	0.027534	6	80.01	59.27	0.91	5.83	2.31
WestTrib	40018.78	2-yr		67		7224.51	7226.41	7226.41	7226.92	0.014516	5.71	11.74	11.96	1.01	5.72	0.85
WestTrib	40018.78	5-yr		160		7224.51	7227.23	7227.23	7227.94	0.012809	6.75	23.7	17.07	1.01	5.2	1.06
WestTrib	40018.78	10-yr		250		7224.51	7227.79	7227.79	7228.62	0.011921	7.33	34.13	20.62	1	4.91	1.17
WestTrib	40018.78	25-yr		470		7224.51	7228.73	7228.73	7229.81	0.011084	8.32	56.51	26.74	1.01	4.69	1.39
WestTrib	40018.78	50-yr		600		7224.51	7229.18	7229.18	7230.35	0.010591	8.68	69.1	29.63	1	4.57	1.47
WestTrib	40018.78	100-yr		740		7224.51	7229.58	7229.58	7230.86	0.01035	9.07	81.63	32.25	1	4.5	1.56
WestTrib	39618.78	2-yr		67		7216.53	7218.34	7218.31	7218.7	0.013852	4.81	13.94	18.21	0.97	5.64	0.65
WestTrib	39618.78	5-yr		157.41	2.59	7216.53	7218.96	7218.96	7219.43	0.012816	5.55	30.88	35.53	1.04	5.13	0.68
WestTrib	39618.78	10-yr		242.04	7.96	7216.53	7219.33	7219.33	7219.89	0.012185	6.05	45.85	44.33	1.03	4.74	0.77
WestTrib	39618.78	25-yr		443.43	26.57	7216.53	7219.98	7219.98	7220.65	0.011802	6.78	80.13	62.5	1.03	3.79	0.93
WestTrib	39618.78	50-yr		561.35	38.65	7216.53	7220.24	7220.24	7221	0.011696	7.2	97.54	68.85	1.03	3.75	1.02
WestTrib	39618.78	100-yr	0	687.1	52.9	7216.53	7220.5	7220.5	7221.33	0.011505	7.56	115.79	74.96	1.04	3.59	1.09
WestTrib	39218.78	2-yr		67		7211.07	7212.57	7212.57	7213.07	0.014258	5.71	11.74	11.86	1.01	5.68	0.84

Falcon DBPS

West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # XS	Headloss	Shear Total
			(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
WestTrib	39218.78	5-yr		160		7211.07	7213.38	7213.38	7214.14	0.01269	6.96	22.99	15.65	1.01	5.01	1.1
WestTrib	39218.78	10-yr		249.73	0.27	7211.07	7213.96	7213.96	7214.86	0.011376	7.64	33.28	22.95	1.12	4.8	0.98
WestTrib	39218.78	25-yr	0.03	441.83	28.15	7211.07	7215.09	7215.09	7216.06	0.007656	8.15	77.05	54.63	1.17	3.76	0.66
WestTrib	39218.78	50-yr	0.31	542.09	57.6	7211.07	7215.46	7215.46	7216.55	0.007552	8.81	97.71	56.92	1.13	3.62	0.79
WestTrib	39218.78	100-yr	1.75	642.33	95.92	7211.07	7215.86	7215.86	7217.02	0.007089	9.25	122.29	68.57	1.14	3.4	0.77
WestTrib	38818.78	2-yr		67		7204.61	7206.09	7206.07	7206.5	0.014015	5.17	12.97	15.09	0.98	4.98	0.72
WestTrib	38818.78	5-yr		160		7204.61	7206.81	7206.78	7207.4	0.012134	6.19	25.86	20.54	0.97	5.12	0.91
WestTrib	38818.78	10-yr		250		7204.61	7207.25	7207.25	7208.01	0.012439	7	35.69	23.94	1.01	5.26	1.11
WestTrib	38818.78	25-yr		470		7204.61	7208.16	7208.16	7209.04	0.011646	7.53	62.43	35.95	1.01	4.81	1.22
WestTrib	38818.78	50-yr		599.89	0.11	7204.61	7208.48	7208.48	7209.5	0.010925	8.09	74.31	37.64	1.02	4.42	1.29
WestTrib	38818.78	100-yr	0.07	739.26	0.67	7204.61	7208.79	7208.79	7209.96	0.010392	8.66	86.21	39.63	1.03	4.2	1.35
WestTrib	38418.78	2-yr		67		7200.04	7201.23	7201.15	7201.53	0.010975	4.39	15.27	19.33	0.87	4.93	0.53
WestTrib	38418.78	5-yr		160		7200.04	7201.78	7201.78	7202.29	0.013386	5.71	28.01	27.76	1	5.08	0.83
WestTrib	38418.78	10-yr		250		7200.04	7202.22	7202.22	7202.75	0.013561	5.81	42.99	42.06	1.01	4.81	0.86
WestTrib	38418.78	25-yr	0.02	469.46	0.52	7200.04	7202.79	7202.79	7203.46	0.01211	6.57	72.55	63.69	1.08	4.3	0.85
WestTrib	38418.78	50-yr	0.21	595.49	4.3	7200.04	7203.05	7203.05	7203.8	0.010797	6.99	90.61	72.18	1.09	3.96	0.84
WestTrib	38418.78	100-yr	0.66	728.2	11.14	7200.04	7203.29	7203.29	7204.14	0.010114	7.42	108.14	73.77	1.07	3.78	0.92
WestTrib	38018.78	2-yr	1.05	65.16	0.8	7195.31	7196.32	7196.31	7196.59	0.013916	4.24	17.8	36.85	1.06	5.51	0.42
WestTrib	38018.78	5-yr	7.68	147.86	4.46	7195.31	7196.76	7196.76	7197.21	0.011998	5.63	36.9	50.08	1.11	5.11	0.55
WestTrib	38018.78	10-yr	18.44	221.67	9.89	7195.31	7197.09	7197.09	7197.66	0.010713	6.4	55.48	59.76	1.11	4.67	0.62
WestTrib	38018.78	25-yr	55.05	386.96	28	7195.31	7197.72	7197.72	7198.49	0.009571	7.73	97.77	75.55	1.09	4.39	0.77
WestTrib	38018.78	50-yr	81.23	477.53	41.23	7195.31	7198.02	7198.02	7198.88	0.009065	8.27	122.21	82.56	1.08	4.18	0.84
WestTrib	38018.78	100-yr	114.71	570.67	54.63	7195.31	7198.31	7198.31	7199.25	0.008801	8.81	146.56	87.82	1.06	4.06	0.91
WestTrib	37618.78	2-yr		67		7190.23	7190.9	7190.86	7191.07	0.013496	3.3	20.28	46.56	0.88	4.54	0.37
WestTrib	37618.78	5-yr		157.66	2.34	7190.23	7191.21	7191.21	7191.51	0.013404	4.46	39.63	84.38	1.14		0.39
WestTrib	37618.78	10-yr		237.96	12.04	7190.23	7191.43	7191.43	7191.81	0.012448	5.03	59.15	88.67	1.06	3.84	0.52
WestTrib	37618.78	25-yr	0.02	428.64	41.34	7190.23	7191.82	7191.82	7192.36	0.012266	6.19	94.72	94.59	1.04	4.41	0.77
WestTrib	37618.78	50-yr	0.21	539.7	60.09	7190.23	7192.01	7192.01	7192.65	0.011787	6.7	113.3	96.65	1.04	4.44	0.86
WestTrib	37618.78	100-yr	0.71	658.19	81.11	7190.23	7192.2	7192.2	7192.92	0.011392	7.18	132.09	98.7	1.04	4.52	0.95
WestTrib	37218.78	2-yr	0.1	57.94	8.97	7184.96	7186.34	7186.28	7186.54	0.009658	3.88	27.2	69.67	1.02	3.49	0.23
WestTrib	37218.78	5-yr	0.87	118.97	40.17	7184.96	7186.73	7186.7	7187.04	0.009492	5.15	65.65	130.11	1.11	3.56	0.3
WestTrib	37218.78	10-yr	1.99	157.16	90.85	7184.96	7187.03	7187.03	7187.32	0.007525	5.37	117.02	185.32	0.95	3.21	0.3
WestTrib	37218.78	25-yr	4.59	247.57	217.84	7184.96	7187.33	7187.33	7187.75	0.009804	6.97	173.59	189.03	0.95	3.14	0.56
WestTrib	37218.78	50-yr	6.42	294.29	299.29	7184.96	7187.5	7187.5	7187.96	0.010252	7.57	204.49	191.02	0.93	3.19	0.68
WestTrib	37218.78	100-yr	8.53	343.9	387.57	7184.96	7187.64	7187.64	7188.16	0.010914	8.21	232.51	192.82	0.93	3.28	0.82
WestTrib	36914.66	2-yr		48.14	18.86	7182.01	7182.91	7182.83	7183.04	0.01365	3.31	28.87	64.94	0.76	6.29	0.38

APPENDIX B: HYDRAULICS

Include the pond sizing calculation since these are included with these standalone channel improvement project (CDR238). Address any comments given on the FDR submitted with project SF2242.

South_Low Flow @ 55 cfs

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.035	
Channel Slope	0.0040	ft/ft
Left Side Slope	4.000	H:V
Right Side Slope	4.000	H:V
Bottom Width	6.00	ft
Discharge	54.30	cfs

Results		
Normal Depth	19.2	in
Flow Area	19.8	ft²
Wetted Perimeter	19.2	ft
Hydraulic Radius	12.4	in
Top Width	18.78	ft
Critical Depth	12.8	in
Critical Slope	0.0201	ft/ft
Velocity	2.74	ft/s
Velocity Head	0.12	ft
Specific Energy	1.71	ft
Froude Number	0.471	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	19.2	in
Critical Depth	12.8	in
Channel Slope	0.0040	ft/ft
Critical Slope	0.0201	ft/ft

North_Low Flow @ 55 cfs

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.035	
Channel Slope	0.0020	ft/ft
Left Side Slope	3.000	H:V
Right Side Slope	3.000	H:V
Bottom Width	6.00	ft
Discharge	54.30	cfs

Results		
Normal Depth	24.1	in
Flow Area	24.1	ft²
Wetted Perimeter	18.7	ft
Hydraulic Radius	15.5	in
Top Width	18.04	ft
Critical Depth	13.5	in
Critical Slope	0.0198	ft/ft
Velocity	2.25	ft/s
Velocity Head	0.08	ft
Specific Energy	2.09	ft
Froude Number	0.343	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	24.1	in
Critical Depth	13.5	in
Channel Slope	0.0020	ft/ft
Critical Slope	0.0198	ft/ft

Hydraulic Analysis Report

Rock Sizing Calculations shown in this Hydraulic Analysis Report were created from the FHWA Hydraulic ToolBox software version 5.1.1

Project Data

Project Title: Eagleview – RipRap Sizing for Riffle Drops #1-#4, #7, and #9

Designer: BAH

Project Date: Thursday, March 2, 2023

Project Units: U.S. Customary Units

The narrative identified the use of FlowMaster and HEC-RAS.

Update the narrative to include a description of the Hydraulic ToolBox used and summary description of these input & output results.

Channel Lining Analysis: Channel Lining Design Ana 4

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 304.80 mm

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1.5

Calculated Safety Factor: 1.30125

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.73252 ft

Manning's n method: Blodgett

Manning's n: 0.0820778

Channel Bottom Shear Results

V*: 1.65938

Reynold's Number: 136350

Shield's Parameter: 0.109025

Shear stress on channel bottom: 5.33607 lb/ft^2

Permissible shear stress for channel bottom: 11.186 lb/ft^2

Channel bottom is stable

Stable D50: 218.098 mm

Channel Side Shear Results

K1: 0.934

K2: 0.931169

Kb: 0

Shear stress on side of channel: 5.33607 lb/ft^2

Permissible shear stress for side of channel: 10.4161 lb/ft^2

Stable Side D50: 0.717722 lb/ft^2

Side of channel is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: Channel Analysis Drops #1-#4

Channel Analysis: Channel Analysis Drops #1-#4

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width 28.00 ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0821

Flow 405.0000 cfs

Result Parameters

Depth 2.1378 ft

Area of Flow 78.1414 ft^2

Wetted Perimeter 45.6292 ft

Hydraulic Radius 1.7125 ft

Average Velocity 5.1829 ft/s

Top Width 45.1028 ft

Froude Number: 0.6939

Critical Depth 1.7122 ft

Critical Velocity 6.7875 ft/s

Critical Slope: 0.0883 ft/ft

Critical Top Width 41.70 ft

Calculated Max Shear Stress 5.3361 lb/ft^2

Calculated Avg Shear Stress 4.2745 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis Riffle Drops #7

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 304.80 mm

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1.5

Calculated Safety Factor: 1.29727

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.61942 ft

Manning's n method: Blodgett

Manning's n: 0.08488

Channel Bottom Shear Results

V*: 1.64388

Reynold's Number: 135076

Shield's Parameter: 0.108205

Shear stress on channel bottom: 5.23684 lb/ft^2

Permissible shear stress for channel bottom: 11.1019 lb/ft^2

Channel bottom is stable

Stable D50: 215.665 mm

Channel Side Shear Results

K1: 0.934

K2: 0.931169

Kb: 0

Shear stress on side of channel: 5.23684 lb/ft^2

Permissible shear stress for side of channel: 10.3377 lb/ft^2

Stable Side D50: 0.709713 lb/ft^2

Side of channel is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: Channel Analysis Drop#7

Channel Analysis: Channel Analysis Drop#7

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width 20.00 ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0849

Flow 285.0000 cfs

Result Parameters

Depth 2.0982 ft

Area of Flow 59.5752 ft^2

Wetted Perimeter 37.3025 ft

Hydraulic Radius 1.5971 ft

Average Velocity 4.7839 ft/s

Top Width 36.7859 ft

Froude Number: 0.6625

Critical Depth 1.6454 ft

Critical Velocity 6.5164 ft/s

Critical Slope: 0.0974 ft/ft

Critical Top Width 33.16 ft

Calculated Max Shear Stress 5.2372 lb/ft^2

Calculated Avg Shear Stress 3.9863 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis Riffle Drops #9

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 304.80 mm

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1.5

Calculated Safety Factor: 1.29727

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.61942 ft

Manning's n method: Blodgett

Manning's n: 0.08488

Channel Bottom Shear Results

V*: 1.64388

Reynold's Number: 135076

Shield's Parameter: 0.108205

Shear stress on channel bottom: 5.23684 lb/ft^2

Permissible shear stress for channel bottom: 11.1019 lb/ft^2

Channel bottom is stable

Stable D50: 215.665 mm

Channel Side Shear Results

K1: 0.934

K2: 0.931169

Kb: 0

Shear stress on side of channel: 5.23684 lb/ft^2

Permissible shear stress for side of channel: 10.3377 lb/ft^2

Stable Side D50: 0.709713 lb/ft^2

Side of channel is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: Channel Analysis Drop#9

Channel Analysis: Channel Analysis Drop#9

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width 20.00 ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0849

Flow 285.0000 cfs

Result Parameters

Depth 2.0982 ft

Area of Flow 59.5752 ft^2

Wetted Perimeter 37.3025 ft

Hydraulic Radius 1.5971 ft

Average Velocity 4.7839 ft/s

Top Width 36.7859 ft

Froude Number: 0.6625

Critical Depth 1.6454 ft

Critical Velocity 6.5164 ft/s

Critical Slope: 0.0974 ft/ft

Critical Top Width 33.16 ft

Calculated Max Shear Stress 5.2372 lb/ft^2

Calculated Avg Shear Stress 3.9863 lb/ft^2

Grouted Boulder Drop Structure Summary Table

GBDS ID	Min. Riprap Approach Length (ft)	Min. Stilling Basin Length Required (ft)	Stilling Basin Length Proposed (ft)	Boulder Size (ft)	Min. Cutoff Wall Length (ft)	Riprap Length Downstream of Stilling Basin (ft)
#5	8	14	14	2	5	10
#6	8	12	14	2	5	10
#8	8	12	14	2	5	10
#10	8	12	14	2	6.5	10

Grouted Boulder Drop Structure #5 - Boulder Sizing Calculations

Grouted Boulder Drop Structure Boulder Sizing

2-yr Storm			
V =	5.61	fps	Velocity is from XS 233 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.32		

10-yr Storm			
V =	6.32	fps	Velocity is from XS 233 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.738935377		

100-yr Storm			
V =	7.61	fps	Velocity is from XS 233 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	4.50		

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

Rock Sizing Parameter, R_P	Grouted Boulders [1]
	Boulder Classification [2]
Less than 5.00	B24
5.00 to 5.59	B24
5.60 to 6.99	B36
7.00 to 8.00	B48

[1] Grouted to no less than 1/3 the height (+1"/- 0"), no more than 1/2 (+0"/- 1") of boulder height.
[2] See *Open Channels* chapter.

Boulder Sizing

Boulder sizing for GSB drop structures constructed using the simplified method can be determined using Figure 9-1. For drop structures that do not meet the criteria for the simplified design method, the following procedure should be used to determine boulder size.

1. If the vertical distance from the drop toe to the drop crest is less than or equal to six feet, determine the critical velocity for the design flow in both the low-flow channel and the overbanks. This velocity occurs just upstream of the drop crest. For drop structures up to six feet in height, gradually varied flow acceleration is considered negligible. If the vertical distance from the drop toe to the drop crest is greater than six feet, determine the actual velocity at the drop toe using S2 curve drawdown calculations for the design flow in both the low-flow channel and the overbanks. This can be done using either the standard step or the direct step method. If a detailed hydraulic analysis has been completed using HEC-RAS (see Section 2.3), then the actual velocity is provided in the HEC-RAS 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.

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.

Boulder Sizing Rp - From MHFD USDCM Equation 9-7
Boulder Size determined per MHFD USDCM Table 9-4

Grouted Boulder Drop Structure #5 - Seepage Calculation

Lane's Weighted Creep Method

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:

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

Where:

C_W = creep ratio

H_S = differential head between analysis points (ft)

HEC-RAS Resutls (Supercrtical Model)

Station	WSEL Elevation (ft)
223	7226.94
194	7223.48

L_H =	29	ft
L_V =	8.67	ft
Depth of Sheet Pile	5	ft
Depth of grout	1.33	ft
Boulder Dia =	2.00	ft
H_S =	3.46	ft

C_W = 5.30

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

Cutoff wall length determined from MHFD USDCM Equation 9-5 and Table 9-3

Grouted Boulder Drop Structure #5 Stilling Basin Sizing

$$\frac{y_2}{y_1} = \frac{1}{2}\left(\sqrt{1+8F_1^2} - 1\right)$$

Equation 9-4

Where:

y_2 = required depth of tailwater (also called the sequent depth, in feet)

y_1 = depth of water at drop toe, feet (taken from cross section at drop toe, supercritical HEC-RAS model)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

Froude Number

	100-yr Storm	Model XS - 209	10-yr Storm	Model XS - 209	2-yr Storm	Model XS - 209
y1 =	2.24 ft		1.57 ft		1.0 ft	
F1 =	1.9	2	1.6	1.94	1.9	1.72
y2 =	5.31 ft		2.29 ft		1.98 ft	
V1 =	12.64 fps		11.39 fps		8.47 fps	
g =	32.2 ft/s2		32.2 ft/s2		32.2 ft/s2	

Hydraulic Jump Length

2.3.5 Hydraulic Jump Length

After the hydraulic jump has been analyzed using the guidelines provided in Section 2.3.4, the jump length must be calculated. This will aid the designer in determining the appropriate stilling basin length and the need for additional rock lining downstream of the end sill. The following values are required to determine the hydraulic jump length:

y_2 = required depth of tailwater (feet)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

Use the above values to determine the length of the hydraulic jump (L) in Figure 9-4. Note that this figure is for horizontal channels, which is appropriate for most applications in the UDFCD region. Curves for sloping channels (from 5 to 25%) are in Chow, 1959.

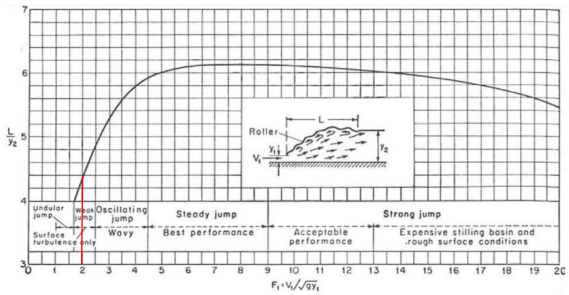


Figure 9-4. Length in terms of sequent depth of jumps in horizontal channels
(Source: US Bureau of Reclamation, 1955)

	100-yr Storm		10-yr Storm		2-yr Storm	
y2 =	5.31	ft	2.29	ft	1.98	ft
F1 =	2.00	Using Model Froude Value	1.94	Using Model Froude Value	1.47	Using Model Froude Value
L/y2 =	4.3	Determined from Figure 9-4	4.3	Determined from Figure 9-4	4.3	Determined from Figure 9-4
Hydraulic Jump Length L =	22.8	ft	9.8	ft	8.5	ft
Recommended Stilling basin be 60% of the hydraulic jump length						
Stilling Basin Length =	13.7	ft	5.9	ft	5.1	ft
Recommend Stilling Basin Length =	14.0	ft				

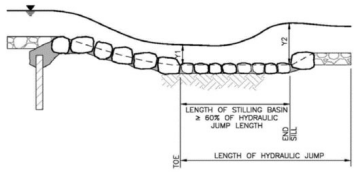


Figure 9-5. Stilling basin profile

Basin Length - From MHFD USDCM Equation 9-4 and Figure 9-4

Grouted Boulder Drop Structure #6 - Boulder Sizing Calculations

Grouted Boulder Drop Structure Boulder Sizing

2-yr Storm			
V =	5.28	fps	Velocity is from XS 402 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.12		

10-yr Storm			
V =	6.17	fps	Velocity is from XS 402 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.65		

100-yr Storm			
V =	7.1	fps	Velocity is from XS 402 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	4.20		

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

Rock Sizing Parameter, R_p	Grouted Boulders [1]
	Boulder Classification [2]
Less than 5.00	B24
5.00 to 5.59	B24
5.60 to 6.99	B36
7.00 to 8.00	B48

[1] Grouted to no less than 1/3 the height (+1"/- 0"), no more than 1/2 (+0"/- 1") of boulder height.
[2] See *Open Channels* chapter.

Boulder Sizing

Boulder sizing for GSB drop structures constructed using the simplified method can be determined using Figure 9-1. For drop structures that do not meet the criteria for the simplified design method, the following procedure should be used to determine boulder size.

1. If the vertical distance from the drop toe to the drop crest is less than or equal to six feet, determine the critical velocity for the design flow in both the low-flow channel and the overbanks. This velocity occurs just upstream of the drop crest. For drop structures up to six feet in height, gradually varied flow acceleration is considered negligible. If the vertical distance from the drop toe to the drop crest is greater than six feet, determine the actual velocity at the drop toe using S2 curve drawdown calculations for the design flow in both the low-flow channel and the overbanks. This can be done using either the standard step or the direct step method. If a detailed hydraulic analysis has been completed using HEC-RAS (see Section 2.3), then the actual velocity is provided in the HEC-RAS 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.

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.

Boulder Sizing Rp - From MHFD USDCM Equation 9-7
Boulder Size determined per MHFD USDCM Table 9-4

Grouted Boulder Drop Structure #6 - Seepage Calculation

Lane's Weighted Creep Method

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:

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

Where:

C_W = creep ratio

H_S = differential head between analysis points (ft)

HEC-RAS Resutls (Supercrtical Model)

Station	WSEL Elevation (ft)
396	7230.35
367	7226.98

L_H =	29	ft
L_V =	8.67	ft
Depth of Sheet Pile	5	ft
Depth of grout	1.33	ft
Boulder Dia =	2.00	ft
H_S =	3.37	ft
C_W =	5.44	

Note : Sheet piles typicall come in lenghts of 40-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

Cutoff wall length determined from MHFD USDCM Equation 9-5 and Table 9-3

Grouted Boulder Drop Structure #6 Stilling Basin Sizing

$$\frac{y_2}{y_1} = \frac{1}{2}\left(\sqrt{1+8F_1^2} - 1\right)$$

Equation 9-4

Where:

y_2 = required depth of tailwater (also called the sequent depth, in feet)

y_1 = depth of water at drop toe, feet (taken from cross section at drop toe, supercritical HEC-RAS model)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

Froude Number

100-yr Storm		Model XS - 382
y1 =	1.95 ft	
F1 =	1.6	1.94
y2 =	4.46 ft	
V1 =	12.41 fps	
g =	32.2 ft/s2	

10-yr Storm		Model XS - 382
y1 =	1.39 ft	
F1 =	1.3	1.82
y2 =	2.12 ft	
V1 =	10.24 fps	
g =	32.2 ft/s2	

2-yr Storm		Model XS - 382
y1 =	0.91 ft	
F1 =	1.4	1.82
y2 =	2.12 ft	
V1 =	7.53 fps	
g =	32.2 ft/s2	

Hydraulic Jump Length

2.3.5 Hydraulic Jump Length

After the hydraulic jump has been analyzed using the guidelines provided in Section 2.3.4, the jump length must be calculated. This will aid the designer in determining the appropriate stilling basin length and the need for additional rock lining downstream of the end sill. The following values are required to determine the hydraulic jump length:

y_2 = required depth of tailwater (feet)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

Use the above values to determine the length of the hydraulic jump (L) in Figure 9-4. Note that this figure is for horizontal channels, which is appropriate for most applications in the UDFCD region. Curves for sloping channels (from 5 to 25%) are in Chow, 1959.

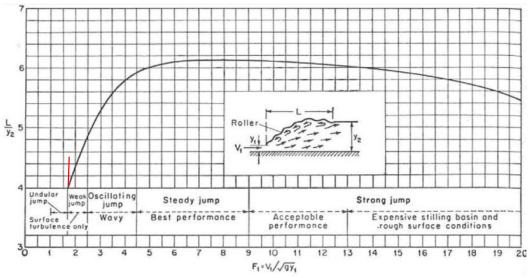


Figure 9-4. Length in terms of sequent depth of jumps in horizontal channels
(Source: US Bureau of Reclamation, 1955)

Basin Length - From MHFD USDCM Equation 9-4 and Figure 9-4

100-yr Storm			
y2 =	4.46	ft	
F1 =	1.94		Using Model Froude Value
L/y2 =	4.3		Determined from Figure 9-4
Hydraulic Jump Length L =	19.2	ft	
Recommended Stilling basin be 60% of the hydrualic jump length			
Stilling Basin Length =	11.5	ft	
Recommend Stilling Basin Length =	14.0	ft	

10-yr Storm			
y2 =	2.12	ft	
F1 =	1.82		Using Model Froude Value
L/y2 =	4.3		Determined from Figure 9-4
Hydraulic Jump Length L =	9.1	ft	
Recommended Stilling basin be 60% of the hydraulic jump length			
Stilling Basin Length =	5.5	ft	

2-yr Storm			
y2 =	2.12	ft	
F1 =	1.82		Using Model Froude Value
L/y2 =	4.3		Determined from Figure 9-4
Hydraulic Jump Length L =	9.1	ft	
Recommended Stilling basin be 60% of the hydraulic jump length			
Stilling Basin Length =	5.5	ft	

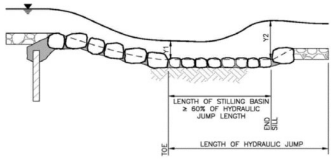


Figure 9-5. Stilling basin profile

Grouted Boulder Drop Structure #8 - Boulder Sizing Calculations

Grouted Boulder Drop Structure Boulder Sizing

2-yr Storm			
V =	5.3	fps	Velocity is from XS 697 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.14		

10-yr Storm			
V =	6.31	fps	Velocity is from XS 697 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.73		

100-yr Storm			
V =	7.09	fps	Velocity is from XS 697 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	4.19		

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

Rock Sizing Parameter, R_p	Grouted Boulders [1]
	Boulder Classification [2]
Less than 5.00	B24
5.00 to 5.59	B24
5.60 to 6.99	B36
7.00 to 8.00	B48

[1] Grouted to no less than 1/3 the height (+1"/- 0"), no more than 1/2 (+0"/- 1") of boulder height.
[2] See *Open Channels* chapter.

Boulder Sizing

Boulder sizing for GSB drop structures constructed using the simplified method can be determined using Figure 9-1. For drop structures that do not meet the criteria for the simplified design method, the following procedure should be used to determine boulder size.

1. If the vertical distance from the drop toe to the drop crest is less than or equal to six feet, determine the critical velocity for the design flow in both the low-flow channel and the overbanks. This velocity occurs just upstream of the drop crest. For drop structures up to six feet in height, gradually varied flow acceleration is considered negligible. If the vertical distance from the drop toe to the drop crest is greater than six feet, determine the actual velocity at the drop toe using S2 curve drawdown calculations for the design flow in both the low-flow channel and the overbanks. This can be done using either the standard step or the direct step method. If a detailed hydraulic analysis has been completed using HEC-RAS (see Section 2.3), then the actual velocity is provided in the HEC-RAS 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.

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.

Boulder Sizing Rp - From MHFD USDCM Equation 9-7
Boulder Size determined per MHFD USDCM Table 9-4

Grouted Boulder Drop Structure #8 - Seepage Calculation

Lane's Weighted Creep Method

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:

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

Where:

C_W = creep ratio

H_S = differential head between analysis points (ft)

HEC-RAS Resutls (Supercrtical Model)

	Station	WSEL Elevation
	697	7237.24
	667	7233.7

L_H =	30	ft
L_V =	8.67	ft
Depth of Sheet Pile	5	ft
Depth of grout	1.33	ft
Boulder Dia =	2.00	ft
H_S =	3.54	ft

C_W = 5.27

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

Cutoff wall length determined from MHFD USDCM Equation 9-5 and Table 9-3

Grouted Boulder Drop Structure #8 Stilling Basin Sizing

$$\frac{y_2}{y_1} = \frac{1}{2}\left(\sqrt{1+8F_1^2}-1\right)$$ Equation 9-4

Where:

y_2 = required depth of tailwater (also called the sequent depth, in feet)

y_1 = depth of water at drop toe, feet (taken from cross section at drop toe, supercritical HEC-RAS model)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

Froude Number

100-yr Storm		Model XS - 674
y1 =	2.01 ft	
F1 =	1.89	1.89
y2 =	4.46 ft	
V1 =	12.17 fps	
g =	32.2 ft/s2	

10-yr Storm		Model XS - 674
y1 =	1.39 ft	
F1 =	1.92	1.92
y2 =	2.26 ft	
V1 =	10.63 fps	
g =	32.2 ft/s2	

2-yr Storm		Model XS - 674
y1 =	0.92 ft	
F1 =	1.69	1.69
y2 =	1.94 ft	
V1 =	7.82 fps	
g =	32.2 ft/s2	

Hydraulic Jump Length

2.3.5 Hydraulic Jump Length

After the hydraulic jump has been analyzed using the guidelines provided in Section 2.3.4, the jump length must be calculated. This will aid the designer in determining the appropriate stilling basin length and the need for additional rock lining downstream of the end sill. The following values are required to determine the hydraulic jump length:

y_2 = required depth of tailwater (feet)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

Use the above values to determine the length of the hydraulic jump (L) in Figure 9-4. Note that this figure is for horizontal channels, which is appropriate for most applications in the UDFCD region. Curves for sloping channels (from 5 to 25%) are in Chow, 1959.

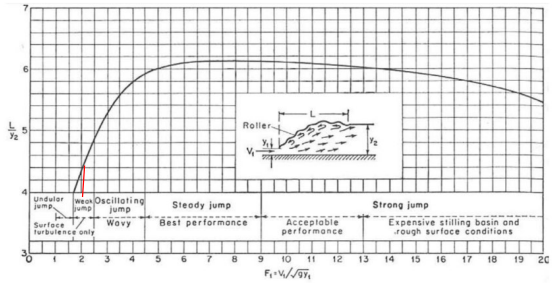


Figure 9-4. Length in terms of sequent depth of jumps in horizontal channels
(Source: US Bureau of Reclamation, 1955)

Basin Length - From MHFD USDCM Equation 9-4 and Figure 9-4

100-yr Storm		
y2 =	4.46	ft
F1 =	1.89	Using Model Froude Value
L/y2 =	4.3	Determined from Figure 9-4
Hydraulic Jump Length L =	19.2	ft
Recommended Stilling basin be 60% of the hydraulic jump length		
Stilling Basin Length =	11.5	ft
Recommend Stilling Basin Length =	14.0	ft

10-yr Storm		
y2 =	2.26	ft
F1 =	1.92	Using Model Froude Value
L/y2 =	4.3	Determined from Figure 9-4
Hydraulic Jump Length L =	9.7	ft
Recommended Stilling basin be 60% of the hydraulic jump length		
Stilling Basin Length =	5.8	ft

2-yr Storm		
y2 =	1.94	ft
F1 =	1.69	Using Model Froude Value
L/y2 =	4.3	Determined from Figure 9-4
Hydraulic Jump Length L =	8.3	ft
Recommended Stilling basin be 60% of the hydraulic jump length		
Stilling Basin Length =	5.0	ft

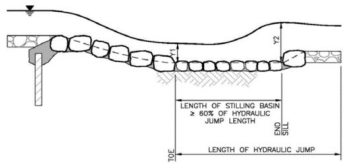


Figure 9-5. Stilling basin profile

Grouted Boulder Drop Structure #10 - Boulder Sizing Calculations

Grouted Boulder Drop Structure Boulder Sizing

2-yr Storm			
V =	5.26	fps	Velocity is from XS 945 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.11		

10-yr Storm			
V =	6.35	fps	Velocity is from XS 945 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	3.76		

100-yr Storm			
V =	7.10	fps	Velocity is from XS 945 just upstream of the drop structure
S =	0.25	ft/ft	
S_s =	2.55		
R_P =	4.20		

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

Rock Sizing Parameter, R_p	Grouted Boulders [1]
	Boulder Classification [2]
Less than 5.00	B24
5.00 to 5.59	B24
5.60 to 6.99	B36
7.00 to 8.00	B48

[1] Grouted to no less than 1/3 the height (+1"/- 0"), no more than 1/2 (+0"/- 1") of boulder height.
[2] See *Open Channels* chapter.

Boulder Sizing

Boulder sizing for GSB drop structures constructed using the simplified method can be determined using Figure 9-1. For drop structures that do not meet the criteria for the simplified design method, the following procedure should be used to determine boulder size.

1. If the vertical distance from the drop toe to the drop crest is less than or equal to six feet, determine the critical velocity for the design flow in both the low-flow channel and the overbanks. This velocity occurs just upstream of the drop crest. For drop structures up to six feet in height, gradually varied flow acceleration is considered negligible. If the vertical distance from the drop toe to the drop crest is greater than six feet, determine the actual velocity at the drop toe using S2 curve drawdown calculations for the design flow in both the low-flow channel and the overbanks. This can be done using either the standard step or the direct step method. If a detailed hydraulic analysis has been completed using HEC-RAS (see Section 2.3), then the actual velocity is provided in the HEC-RAS 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.

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.

Boulder Sizing Rp - From MHFD USDCM Equation 9-7
Boulder Size determined per MHFD USDCM Table 9-4

Grouted Boulder Drop Structure #10 - Seepage Calculation

Lane's Weighted Creep Method

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:

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

Where:

C_W = creep ratio

H_S = differential head between analysis points (ft)

HEC-RAS Resutls (Supercrtical Model)

Station	WSEL Elevation (ft)
945	7244.41
914	7240.17

L_H =	31	ft
L_V =	11.67	ft
Depth of Sheet Pile	6.5	ft
Depth of grout	1.33	ft
Boulder Dia =	2.00	ft
H_S =	4.24	ft

C_W = 5.19

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

Cutoff wall length determined from MHFD USDCM Equation 9-5 and Table 9-3

Grouted Boulder Drop Structure #10 Stilling Basin Sizing

$$\frac{y_2}{y_1} = \frac{1}{2}\left(\sqrt{1+8F_1^2} - 1\right)$$ Equation 9-4 Froude Number

Where:

y_2 = required depth of tailwater (also called the sequent depth, in feet)

y_1 = depth of water at drop toe, feet (taken from cross section at drop toe, supercritical HEC-RAS model)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

	100-yr Storm	Model XS - 929
y1 =	1.94 ft	
F1 =	1.6	1.99
y2 =	4.58 ft	
V1 =	12.69 fps	
g =	32.2 ft/s2	

	10-yr Storm	Model XS - 929
y1 =	1.37 ft	
F1 =	1.6	1.93
y2 =	2.27 ft	
V1 =	10.71 fps	
g =	32.2 ft/s2	

	2-yr Storm	Model XS - 929
y1 =	0.88 ft	
F1 =	1.5	1.78
y2 =	2.07 ft	
V1 =	8.17 fps	
g =	32.2 ft/s2	

Hydraulic Jump Length

2.3.5 Hydraulic Jump Length

After the hydraulic jump has been analyzed using the guidelines provided in Section 2.3.4, the jump length must be calculated. This will aid the designer in determining the appropriate stilling basin length and the need for additional rock lining downstream of the end sill. The following values are required to determine the hydraulic jump length:

y_2 = required depth of tailwater (feet)

F_1 = Froude Number = $V_1/(gy_1)^{1/2}$ (based on depth and velocity at drop toe)

Use the above values to determine the length of the hydraulic jump (L) in Figure 9-4. Note that this figure is for horizontal channels, which is appropriate for most applications in the UDFCD region. Curves for sloping channels (from 5 to 25%) are in Chow, 1959.

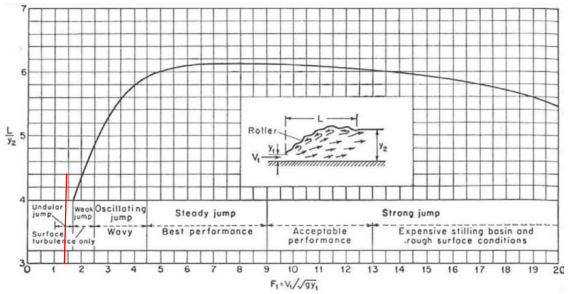


Figure 9-4. Length in terms of sequent depth of jumps in horizontal channels
(Source: US Bureau of Reclamation, 1955)

	100-yr Storm	
y2 =	4.58	ft
F1 =	1.99	Using Model Froude Value
L/y2 =	4.3	Determined from Figure 9-4
Hydraulic Jump Length L =	19.7	ft
Recommended Stilling basin be 60% of the hydraulic jump length		
Stilling Basin Length =	11.8	ft
Recommend Stilling Basin Length =	14.0	ft

	10-yr Storm	
y2 =	2.27	ft
F1 =	1.93	Using Model Froude Value
L/y2 =	4.3	Determined from Figure 9-4
Hydraulic Jump Length L =	9.8	ft
Recommended Stilling basin be 60% of the hydraulic jump length		
Stilling Basin Length =	5.9	ft

	2-yr Storm	
y2 =	2.07	ft
F1 =	1.78	Using Model Froude Value
L/y2 =	4.3	Determined from Figure 9-4
Hydraulic Jump Length L =	8.9	ft
Recommended Stilling basin be 60% of the hydraulic jump length		
Stilling Basin Length =	5.3	ft

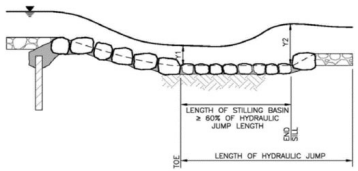


Figure 9-5. Stilling basin profile

Basin Length - From MHFD USDCM Equation 9-4 and Figure 9-4

RipRap Calculations for Outside Banks of Channel Bends

Channel ID	Cross-Section ID	Radius of Curvature of the bend to the Channel Centerline (ft)	Channel Width at WSEL (ft)	Rc/T	HEC-RAS Avg Velocity (ft/sec)	Velocity Adjusted along outside bend[1] (ft/sec)	Channel Slope (ft/ft)	d_{50} RipRap Calculated[2] (ft)	Min. Nominal d_{50} RipRap Size (ft)	F.S. (1.5) x d_{50} (ft)
North Channel	972	35.0	38.00	0.92	4.65	9.49	0.002	0.31	0.50	0.47
North Channel	872	40.0	34.50	1.16	5.27	10.57	0.001	0.31	0.50	0.46
North Channel	772	55.0	37.50	1.47	3.78	7.41	0.002	0.19	0.50	0.29
North Channel	622	35.0	37.00	0.95	3.96	8.07	0.0001	0.08	0.50	0.12
North Channel	347	60.0	42.00	1.43	2.94	5.78	0.002	0.12	0.50	0.18

[1] Evaluation of Erosion at Channel Bends per MHFD USDCM Chapter 8 Equation 8-10

[2] RipRap for Mild Slope Conditions per MHFD USDCM Chapter 8 Equation 8-11

$$V_a = (-0.147 \frac{r_c}{T} + 2.176) V$$ Equation 8-10

Where:

V_a = adjusted channel velocity for riprap sizing along the outside of channel bends (ft/sec)

V = mean channel velocity for the peak flow of the major design flow (ft/sec)

r_c = channel centerline radius (ft)

T = Top width of water during the major design flow (ft)

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):

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

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

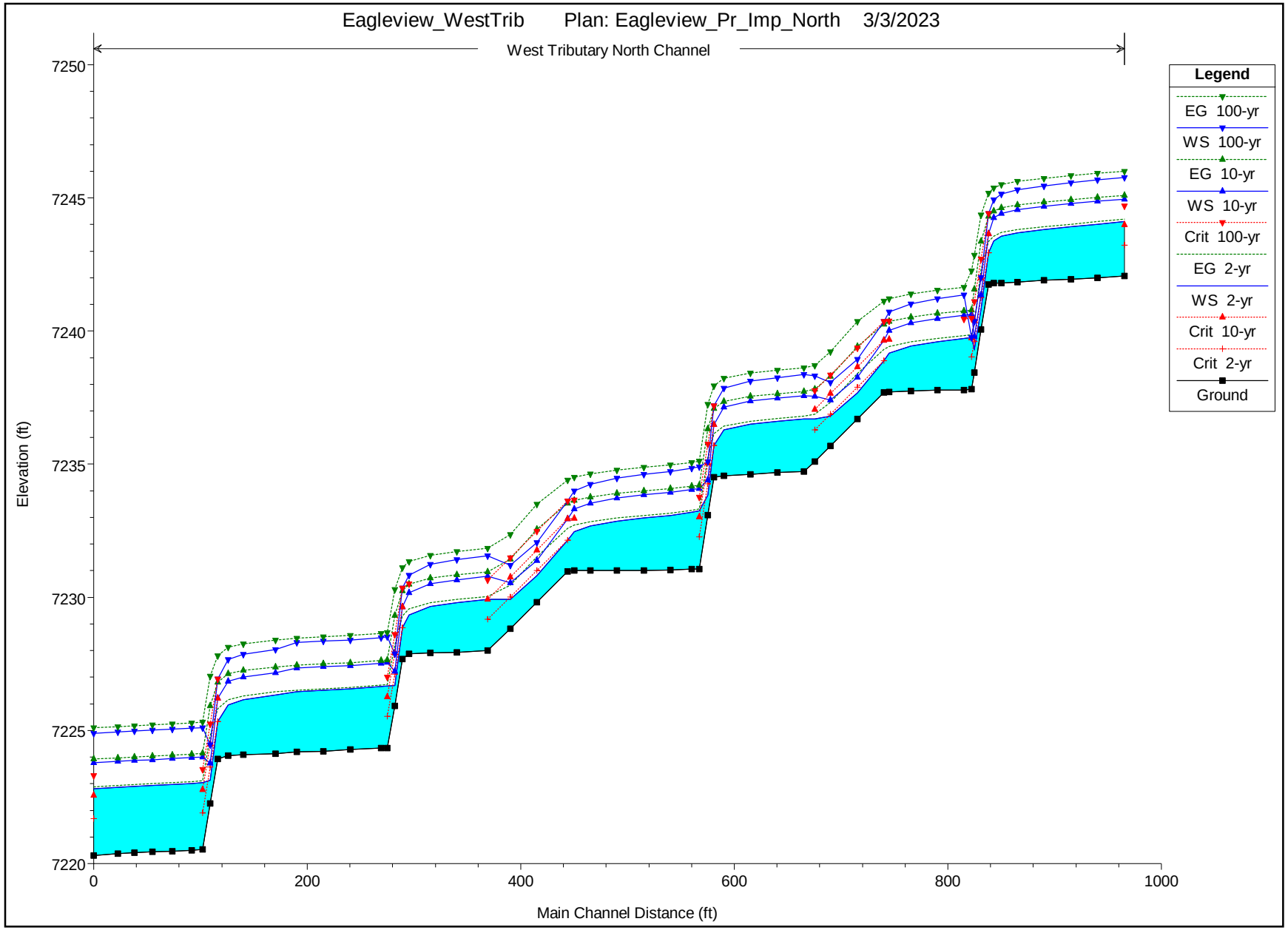
d_{50} = mean rock size (ft)

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 specific gravity of the rock.

Provide a map showing the corresponding HEC-RAS cross sections for review.

Example below.

HEC-RAS Mixed Flow Regime Results


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
West Tributary North Channel
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
Crit 10-yr
Crit 2-yr
Ground
Elevation (ft)
7250
7245
7240
7235
7230
7225
7220
0
200
400
600
800
1000
Main Channel Distance (ft)

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel

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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	1072	2-yr	59.00	7242.06	7244.12	7243.23	7244.20	0.003591	2.29	25.74	24.38	0.39	2.06
North Channel	1072	10-yr	144.00	7242.06	7244.95	7244.00	7245.10	0.002988	3.07	48.88	31.11	0.39	2.89
North Channel	1072	100-yr	285.00	7242.06	7245.76	7244.71	7246.00	0.003240	4.05	76.69	37.70	0.43	3.70
North Channel	1047	2-yr	59.00	7242.00	7244.02		7244.11	0.004160	2.41	24.46	23.62	0.42	2.02
North Channel	1047	10-yr	144.00	7242.00	7244.87		7245.02	0.003158	3.12	48.06	30.94	0.40	2.87
North Channel	1047	100-yr	285.00	7242.00	7245.67		7245.92	0.003413	4.11	75.41	37.38	0.44	3.67
North Channel	1022	2-yr	59.00	7241.94	7243.91		7244.01	0.003533	2.53	23.36	18.48	0.40	1.97
North Channel	1022	10-yr	144.00	7241.94	7244.78		7244.94	0.003410	3.18	46.92	30.86	0.42	2.84
North Channel	1022	100-yr	285.00	7241.94	7245.57		7245.83	0.003640	4.18	73.84	37.39	0.46	3.63
North Channel	997	2-yr	59.00	7241.91	7243.81		7243.92	0.003880	2.64	22.33	17.69	0.41	1.90
North Channel	997	10-yr	144.00	7241.91	7244.68		7244.85	0.003792	3.33	44.86	29.67	0.44	2.77
North Channel	997	100-yr	285.00	7241.91	7245.45		7245.73	0.004136	4.40	69.87	35.39	0.48	3.54
North Channel	972	2-yr	59.00	7241.84	7243.69		7243.81	0.004442	2.78	21.21	17.19	0.44	1.85
North Channel	972	10-yr	144.00	7241.84	7244.56		7244.75	0.004305	3.47	42.97	29.35	0.46	2.72
North Channel	972	100-yr	285.00	7241.84	7245.31		7245.62	0.004652	4.58	67.23	35.20	0.51	3.47
North Channel	957	2-yr	59.00	7241.81	7243.56		7243.70	0.014693	3.02	19.52	16.60	0.49	1.75
North Channel	957	10-yr	144.00	7241.81	7244.42		7244.64	0.013982	3.71	40.02	28.72	0.51	2.61
North Channel	957	100-yr	285.00	7241.81	7245.15		7245.50	0.014826	4.87	62.95	34.48	0.56	3.34
North Channel	950	2-yr	59.00	7241.81	7243.38		7243.57	0.021864	3.50	16.87	15.55	0.59	1.57
North Channel	950	10-yr	144.00	7241.81	7244.25		7244.51	0.020460	4.13	35.43	27.46	0.60	2.44
North Channel	950	100-yr	285.00	7241.81	7244.94		7245.37	0.020473	5.35	56.31	33.01	0.64	3.13
North Channel	945	2-yr	59.00	7241.75	7242.93	7242.93	7243.37	0.068810	5.28	11.17	13.15	1.01	1.18
North Channel	945	10-yr	144.00	7241.75	7243.65	7243.65	7244.31	0.062006	6.51	22.12	17.48	1.02	1.90
North Channel	945	100-yr	285.00	7241.75	7244.41	7244.41	7245.18	0.051291	7.10	41.15	28.92	0.98	2.66
North Channel	938	2-yr	59.00	7240.06	7240.81	7241.25	7242.30	0.393531	9.79	6.03	10.46	2.27	0.75
North Channel	938	10-yr	144.00	7240.06	7241.36	7242.00	7243.36	0.288150	11.36	12.68	13.84	2.09	1.30
North Channel	938	100-yr	285.00	7240.06	7242.02	7242.72	7244.36	0.224435	12.27	23.22	18.65	1.94	1.96
North Channel	932	2-yr	59.00	7238.44	7239.31	7239.62	7240.29	0.215005	7.93	7.44	11.22	1.72	0.87
North Channel	932	10-yr	144.00	7238.44	7239.79	7240.40	7241.58	0.244684	10.73	13.42	14.10	1.94	1.35
North Channel	932	100-yr	285.00	7238.44	7240.36	7241.10	7242.85	0.236082	12.67	22.49	17.88	1.99	1.92
North Channel	929	2-yr	59.00	7237.81	7239.76	7239.02	7239.87	0.009928	2.61	22.62	17.84	0.41	1.95
North Channel	929	10-yr	144.00	7237.81	7240.63	7239.74	7240.80	0.009847	3.28	45.35	30.23	0.43	2.82
North Channel	929	100-yr	285.00	7237.81	7239.75	7240.49	7242.26	0.235747	12.69	22.45	17.75	1.99	1.94

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	922	2-yr	59.00	7237.78	7239.72		7239.83	0.003664	2.58	22.86	17.99	0.40	1.94
North Channel	922	10-yr	144.00	7237.78	7240.60		7240.76	0.003566	3.26	45.92	30.36	0.43	2.82
North Channel	922	100-yr	285.00	7237.78	7241.36	7240.45	7241.64	0.003928	4.33	71.55	36.46	0.47	3.58
North Channel	897	2-yr	59.00	7237.78	7239.60		7239.72	0.004531	2.80	21.05	17.18	0.45	1.82
North Channel	897	10-yr	144.00	7237.78	7240.47		7240.66	0.004408	3.46	42.85	29.55	0.47	2.69
North Channel	897	100-yr	285.00	7237.78	7241.22		7241.53	0.004693	4.55	67.21	35.49	0.51	3.44
North Channel	872	2-yr	59.00	7237.75	7239.44		7239.59	0.006241	3.15	18.74	16.29	0.52	1.68
North Channel	872	10-yr	144.00	7237.75	7240.31		7240.53	0.005988	3.78	38.79	28.39	0.54	2.55
North Channel	872	100-yr	285.00	7237.75	7241.03		7241.39	0.006095	4.92	61.38	34.18	0.58	3.28
North Channel	852	2-yr	59.00	7237.72	7239.17		7239.42	0.011210	3.95	14.95	14.69	0.69	1.45
North Channel	852	10-yr	144.00	7237.72	7240.03	7239.68	7240.36	0.010926	4.61	31.50	26.23	0.71	2.31
North Channel	852	100-yr	285.00	7237.72	7240.72	7240.38	7241.22	0.009814	5.79	51.47	31.75	0.72	2.99
North Channel	847	2-yr	59.00	7237.69	7238.89	7238.89	7239.32	0.025137	5.27	11.19	13.08	1.01	1.20
North Channel	847	10-yr	144.00	7237.69	7239.65	7239.65	7240.26	0.021370	6.25	23.02	18.35	0.98	1.96
North Channel	847	100-yr	285.00	7237.69	7240.37	7240.37	7241.13	0.018119	7.07	41.66	29.31	0.96	2.68
North Channel	822	2-yr	59.00	7236.70	7237.67	7237.89	7238.41	0.052962	6.87	8.59	11.81	1.42	0.97
North Channel	822	10-yr	144.00	7236.70	7238.27	7238.65	7239.42	0.049854	8.63	16.69	15.51	1.47	1.56
North Channel	822	100-yr	285.00	7236.70	7238.94	7239.36	7240.36	0.050398	9.59	29.88	25.69	1.52	2.24
North Channel	797	2-yr	59.00	7235.69	7236.80	7236.87	7237.32	0.032899	5.80	10.18	12.65	1.14	1.11
North Channel	797	10-yr	144.00	7235.69	7237.40	7237.65	7238.30	0.035266	7.62	18.89	16.31	1.25	1.71
North Channel	797	100-yr	285.00	7235.69	7238.06	7238.35	7239.22	0.036208	8.66	33.25	26.75	1.31	2.37
North Channel	782	2-yr	59.00	7235.09	7236.70	7236.28	7236.88	0.007668	3.43	17.18	15.61	0.58	1.60
North Channel	782	10-yr	144.00	7235.09	7237.55	7237.05	7237.81	0.007442	4.13	35.53	27.47	0.60	2.46
North Channel	782	100-yr	285.00	7235.09	7238.31	7237.76	7238.71	0.006675	5.17	58.80	33.54	0.61	3.22
North Channel	772	2-yr	59.00	7234.72	7236.71		7236.80	0.003316	2.48	23.78	18.77	0.39	1.99
North Channel	772	10-yr	144.00	7234.72	7237.58		7237.73	0.003205	3.16	47.34	30.77	0.41	2.85
North Channel	772	100-yr	285.00	7234.72	7238.36		7238.62	0.003495	4.18	74.01	37.06	0.45	3.64
North Channel	747	2-yr	59.00	7234.69	7236.61		7236.72	0.003642	2.58	22.83	17.81	0.40	1.92
North Channel	747	10-yr	144.00	7234.69	7237.48		7237.64	0.003644	3.25	45.74	30.29	0.43	2.79
North Channel	747	100-yr	285.00	7234.69	7238.25		7238.52	0.003941	4.30	71.55	36.46	0.47	3.56
North Channel	722	2-yr	59.00	7234.62	7236.51		7236.62	0.004100	2.69	21.92	17.58	0.43	1.88
North Channel	722	10-yr	144.00	7234.62	7237.37		7237.54	0.004024	3.39	44.06	29.73	0.45	2.75

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	722	100-yr	285.00	7234.62	7238.12		7238.42	0.004379	4.48	68.87	35.87	0.50	3.50
North Channel	697	2-yr	59.00	7234.57	7236.28		7236.43	0.015761	3.10	19.01	16.36	0.51	1.71
North Channel	697	10-yr	144.00	7234.57	7237.14		7237.36	0.015418	3.82	38.77	28.43	0.53	2.57
North Channel	697	100-yr	285.00	7234.57	7237.85		7238.22	0.016320	5.02	60.92	34.05	0.58	3.28
North Channel	688	2-yr	59.00	7234.51	7235.71	7235.71	7236.14	0.068479	5.30	11.14	12.96	1.01	1.20
North Channel	688	10-yr	144.00	7234.51	7236.48	7236.48	7237.08	0.056987	6.21	23.20	18.48	0.98	1.97
North Channel	688	100-yr	285.00	7234.51	7237.20	7237.20	7237.94	0.048713	7.00	42.20	30.57	0.95	2.69
North Channel	682	2-yr	59.00	7233.08	7233.84	7234.27	7235.26	0.363076	9.54	6.18	10.50	2.19	0.76
North Channel	682	10-yr	144.00	7233.08	7234.40	7235.05	7236.32	0.268801	11.11	12.96	13.88	2.03	1.32
North Channel	682	100-yr	285.00	7233.08	7235.09	7235.75	7237.25	0.248483	11.77	24.22	22.47	2.00	2.01
North Channel	674	2-yr	59.00	7231.06	7233.25	7232.28	7233.32	0.007712	2.14	27.63	24.95	0.35	2.19
North Channel	674	10-yr	144.00	7231.06	7234.09	7233.01	7234.22	0.006884	2.92	51.39	31.91	0.37	3.03
North Channel	674	100-yr	285.00	7231.06	7234.90	7233.76	7235.12	0.007643	3.88	79.92	38.22	0.41	3.84
North Channel	667	2-yr	59.00	7231.06	7233.20		7233.27	0.007741	2.14	27.61	25.00	0.36	2.14
North Channel	667	10-yr	144.00	7231.06	7234.04		7234.17	0.006782	2.91	51.59	31.83	0.37	2.98
North Channel	667	100-yr	285.00	7231.06	7234.85		7235.07	0.007612	3.87	79.92	38.23	0.41	3.79
North Channel	647	2-yr	59.00	7231.03	7233.08		7233.16	0.003749	2.34	25.20	23.91	0.40	2.05
North Channel	647	10-yr	144.00	7231.03	7233.94		7234.08	0.002952	3.08	49.00	31.12	0.39	2.91
North Channel	647	100-yr	285.00	7231.03	7234.73		7234.97	0.003318	4.10	76.01	37.39	0.44	3.70
North Channel	622	2-yr	59.00	7231.00	7232.98		7233.07	0.003432	2.50	23.57	18.50	0.39	1.98
North Channel	622	10-yr	144.00	7231.00	7233.85		7234.00	0.003331	3.19	47.02	30.66	0.41	2.85
North Channel	622	100-yr	285.00	7231.00	7234.62		7234.88	0.003703	4.24	73.06	36.70	0.46	3.62
North Channel	597	2-yr	59.00	7231.00	7232.86		7232.98	0.004359	2.76	21.41	17.40	0.44	1.86
North Channel	597	10-yr	144.00	7231.00	7233.72		7233.91	0.004218	3.46	43.20	29.53	0.46	2.72
North Channel	597	100-yr	285.00	7231.00	7234.47		7234.78	0.004635	4.59	67.36	35.51	0.51	3.47
North Channel	572	2-yr	59.00	7231.00	7232.68		7232.84	0.006517	3.21	18.38	16.05	0.53	1.68
North Channel	572	10-yr	144.00	7231.00	7233.54		7233.77	0.006317	3.89	37.81	27.92	0.55	2.54
North Channel	572	100-yr	285.00	7231.00	7234.25		7234.63	0.006579	5.10	59.47	33.37	0.60	3.25
North Channel	557	2-yr	59.00	7231.00	7232.47		7232.71	0.010695	3.88	15.22	14.80	0.67	1.47
North Channel	557	10-yr	144.00	7231.00	7233.33	7232.96	7233.65	0.010330	4.52	32.13	26.39	0.69	2.33
North Channel	557	100-yr	285.00	7231.00	7234.00	7233.66	7234.50	0.009800	5.78	51.54	31.74	0.72	3.00
North Channel	551	2-yr	59.00	7230.97	7232.15	7232.15	7232.59	0.025404	5.30	11.13	13.00	1.01	1.18

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	551	10-yr	144.00	7230.97	7232.94	7232.94	7233.53	0.021217	6.14	23.45	19.13	0.98	1.97
North Channel	551	100-yr	285.00	7230.97	7233.63	7233.63	7234.40	0.018600	7.08	41.42	29.14	0.97	2.66
North Channel	522	2-yr	59.00	7229.82	7230.80	7231.02	7231.53	0.052786	6.85	8.62	11.93	1.42	0.98
North Channel	522	10-yr	144.00	7229.82	7231.38	7231.77	7232.56	0.051241	8.72	16.51	15.44	1.49	1.56
North Channel	522	100-yr	285.00	7229.82	7232.05	7232.49	7233.51	0.050795	9.68	29.65	25.68	1.53	2.23
North Channel	497	2-yr	59.00	7228.82	7229.93	7230.01	7230.45	0.032548	5.78	10.20	12.63	1.13	1.11
North Channel	497	10-yr	144.00	7228.82	7230.54	7230.77	7231.43	0.034495	7.58	19.00	16.27	1.24	1.72
North Channel	497	100-yr	285.00	7228.82	7231.20	7231.49	7232.36	0.035758	8.65	33.35	26.87	1.30	2.38
North Channel	476	2-yr	59.00	7228.00	7229.92	7229.18	7230.03	0.003662	2.61	22.60	17.80	0.41	1.92
North Channel	476	10-yr	144.00	7228.00	7230.79	7229.93	7230.96	0.003657	3.28	45.32	30.23	0.43	2.79
North Channel	476	100-yr	285.00	7228.00	7231.56	7230.66	7231.84	0.003937	4.33	70.95	36.39	0.48	3.56
North Channel	447	2-yr	59.00	7227.94	7229.80		7229.91	0.004332	2.75	21.42	17.34	0.44	1.86
North Channel	447	10-yr	144.00	7227.94	7230.66		7230.84	0.004313	3.43	43.20	29.56	0.46	2.72
North Channel	447	100-yr	285.00	7227.94	7231.41		7231.71	0.004596	4.51	67.67	35.54	0.51	3.47
North Channel	422	2-yr	59.00	7227.91	7229.65		7229.79	0.005449	3.00	19.68	16.68	0.49	1.74
North Channel	422	10-yr	144.00	7227.91	7230.51		7230.72	0.005353	3.71	39.92	28.66	0.51	2.60
North Channel	422	100-yr	285.00	7227.91	7231.23		7231.58	0.005645	4.87	62.90	34.66	0.56	3.32
North Channel	402	2-yr	59.00	7227.87	7229.34		7229.57	0.028175	3.83	15.39	14.91	0.67	1.47
North Channel	402	10-yr	144.00	7227.87	7230.18		7230.50	0.027786	4.54	32.03	26.46	0.69	2.31
North Channel	402	100-yr	285.00	7227.87	7230.83	7230.52	7231.35	0.027546	5.89	50.83	31.72	0.74	2.96
North Channel	396	2-yr	59.00	7227.68	7228.86	7228.86	7229.30	0.068916	5.29	11.15	13.10	1.01	1.18
North Channel	396	10-yr	144.00	7227.68	7229.64	7229.64	7230.24	0.057123	6.23	23.12	18.40	0.98	1.96
North Channel	396	100-yr	285.00	7227.68	7230.35	7230.35	7231.11	0.050544	7.04	41.46	29.13	0.97	2.67
North Channel	389	2-yr	59.00	7225.93	7226.68	7227.12	7228.22	0.417930	9.95	5.93	10.49	2.33	0.75
North Channel	389	10-yr	144.00	7225.93	7227.22	7227.91	7229.31	0.304738	11.61	12.40	13.64	2.15	1.28
North Channel	389	100-yr	285.00	7225.93	7227.88	7228.60	7230.29	0.227261	12.45	22.89	18.12	1.95	1.95
North Channel	382	2-yr	59.00	7224.34	7226.67	7225.53	7226.73	0.004568	1.85	32.25	26.45	0.28	2.33
North Channel	382	10-yr	144.00	7224.34	7227.55	7226.26	7227.66	0.004637	2.61	58.75	33.53	0.31	3.21
North Channel	382	100-yr	285.00	7224.34	7228.52	7227.00	7228.68	0.004760	3.36	94.81	41.33	0.33	4.18
North Channel	376	2-yr	59.00	7224.34	7226.64		7226.70	0.004778	1.88	31.79	26.46	0.29	2.30
North Channel	376	10-yr	144.00	7224.34	7227.52		7227.63	0.004761	2.63	58.23	33.43	0.31	3.18
North Channel	376	100-yr	285.00	7224.34	7228.49		7228.65	0.004847	3.38	94.15	41.09	0.33	4.15

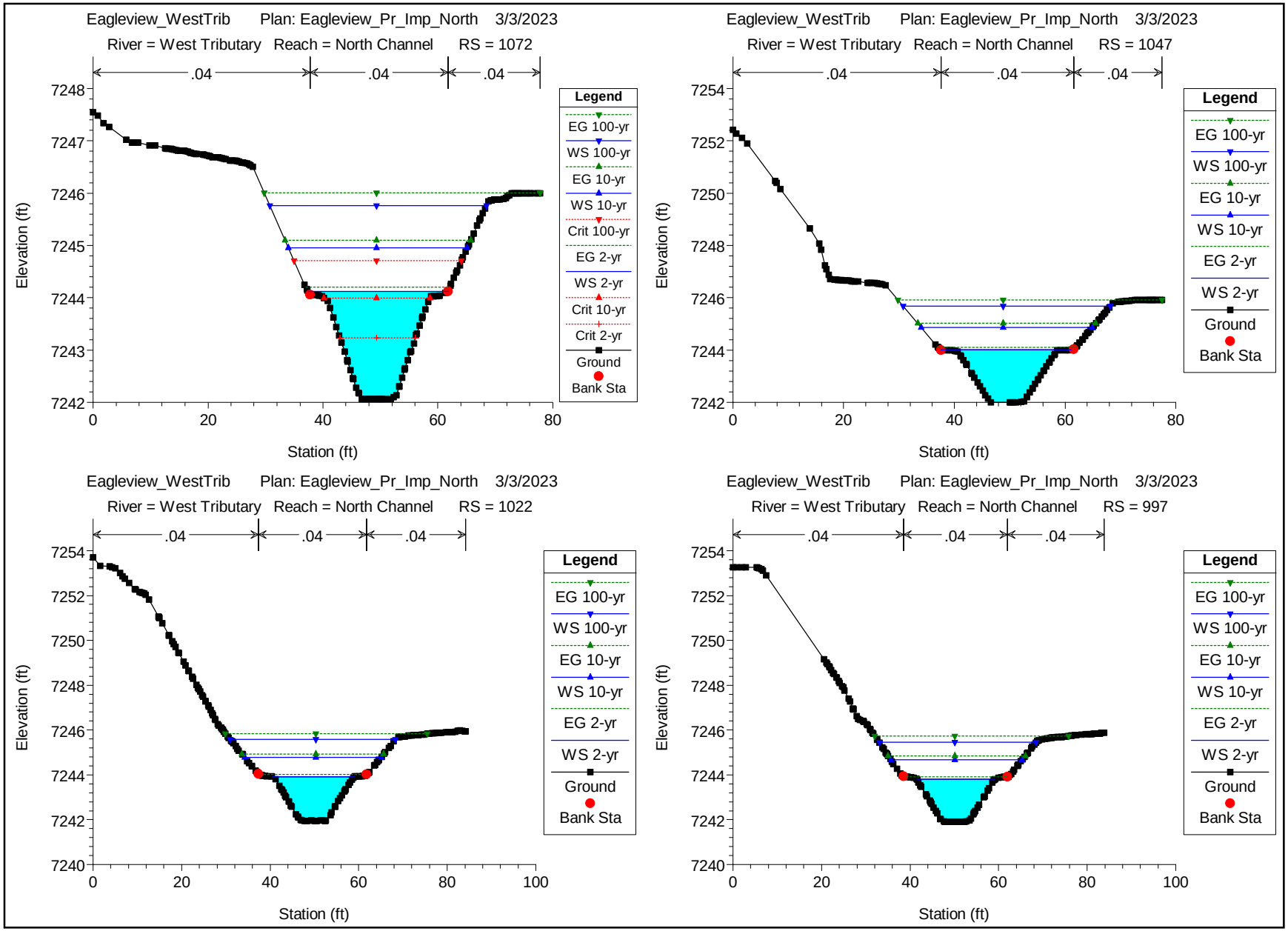
HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (Continued)

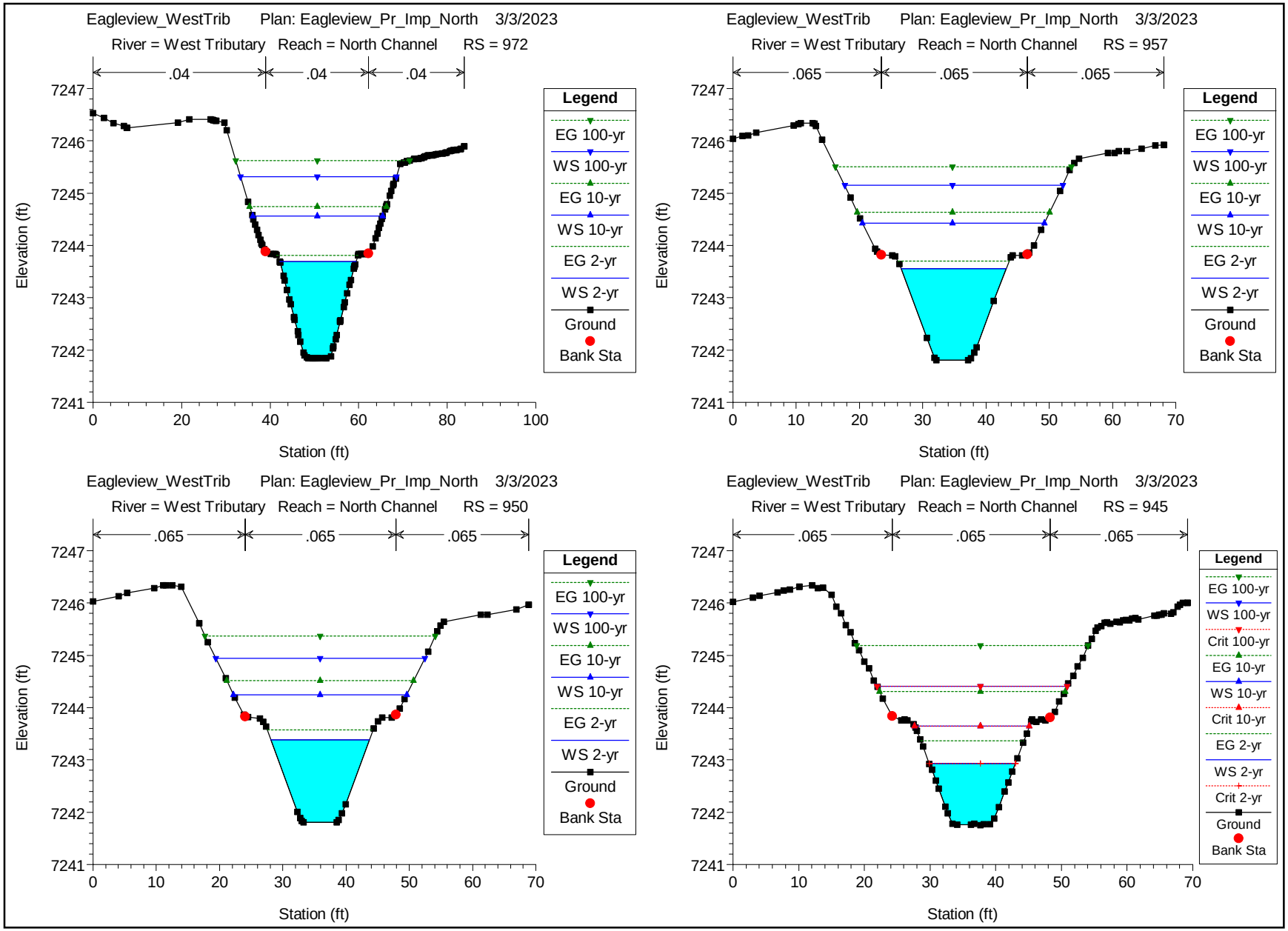
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	347	2-yr	59.00	7224.28	7226.56		7226.61	0.001934	1.92	31.02	26.17	0.30	2.28
North Channel	347	10-yr	144.00	7224.28	7227.44		7227.55	0.001892	2.68	57.15	33.15	0.32	3.16
North Channel	347	100-yr	285.00	7224.28	7228.40		7228.57	0.001918	3.44	92.61	40.91	0.34	4.12
North Channel	322	2-yr	59.00	7224.22	7226.51		7226.56	0.001946	1.91	31.19	26.27	0.30	2.29
North Channel	322	10-yr	144.00	7224.22	7227.39		7227.50	0.001873	2.65	57.50	33.26	0.32	3.17
North Channel	322	100-yr	285.00	7224.22	7228.35		7228.52	0.001894	3.40	93.06	40.93	0.34	4.13
North Channel	297	2-yr	59.00	7224.19	7226.46		7226.52	0.001960	1.92	30.94	25.98	0.30	2.27
North Channel	297	10-yr	144.00	7224.19	7227.34		7227.45	0.001885	2.67	57.59	34.37	0.32	3.15
North Channel	297	100-yr	285.00	7224.19	7228.31		7228.47	0.001864	3.38	94.91	43.22	0.34	4.12
North Channel	277	2-yr	78.00	7224.12	7226.34		7226.45	0.004264	2.70	29.02	25.42	0.43	2.22
North Channel	277	10-yr	189.00	7224.12	7227.17		7227.38	0.004059	3.74	53.08	32.18	0.46	3.05
North Channel	277	100-yr	375.00	7224.12	7228.05		7228.39	0.004328	4.89	84.16	39.05	0.51	3.92
North Channel	247	2-yr	78.00	7224.09	7226.15		7226.30	0.006195	3.01	25.91	24.38	0.51	2.06
North Channel	247	10-yr	189.00	7224.09	7227.01		7227.25	0.004894	3.95	49.79	31.40	0.50	2.92
North Channel	247	100-yr	375.00	7224.09	7227.86		7228.25	0.005104	5.15	79.33	38.07	0.55	3.77
North Channel	233	2-yr	78.00	7224.06	7225.96		7226.15	0.017836	3.47	22.48	17.92	0.55	1.90
North Channel	233	10-yr	189.00	7224.06	7226.84		7227.13	0.016802	4.31	45.45	30.25	0.57	2.78
North Channel	233	100-yr	375.00	7224.06	7227.66		7228.12	0.017060	5.58	72.93	36.78	0.61	3.60
North Channel	223	2-yr	78.00	7223.93	7225.33	7225.33	7225.81	0.065185	5.60	13.94	14.39	1.00	1.40
North Channel	223	10-yr	189.00	7223.93	7226.20	7226.20	7226.81	0.057308	6.27	30.35	26.06	0.98	2.27
North Channel	223	100-yr	375.00	7223.93	7226.94	7226.94	7227.81	0.045566	7.60	51.73	31.98	0.95	3.01
North Channel	216	2-yr	78.00	7222.25	7223.13	7223.62	7224.81	0.369405	10.41	7.49	11.28	2.25	0.87
North Channel	216	10-yr	189.00	7222.25	7223.77	7224.49	7225.93	0.257580	11.78	16.04	15.19	2.02	1.52
North Channel	216	100-yr	375.00	7222.25	7224.46	7225.24	7227.04	0.250425	12.88	29.26	25.65	2.05	2.21
North Channel	209	2-yr	78.00	7220.53	7223.04	7221.91	7223.11	0.005360	2.16	36.83	27.76	0.31	2.50
North Channel	209	10-yr	189.00	7220.53	7224.01	7222.78	7224.14	0.005335	3.00	67.73	35.62	0.34	3.48
North Channel	209	100-yr	375.00	7220.53	7225.11	7223.54	7225.31	0.005209	3.79	111.87	44.20	0.35	4.58
North Channel	199	2-yr	78.00	7220.50	7223.00		7223.08	0.002018	2.14	36.99	27.89	0.31	2.50
North Channel	199	10-yr	189.00	7220.50	7223.98		7224.11	0.002006	2.99	67.92	35.64	0.34	3.48
North Channel	199	100-yr	375.00	7220.50	7225.08		7225.28	0.001955	3.77	112.14	44.10	0.35	4.58
North Channel	180	2-yr	78.00	7220.47	7222.97		7223.04	0.002019	2.15	36.95	27.86	0.31	2.50
North Channel	180	10-yr	189.00	7220.47	7223.94		7224.07	0.002012	2.99	67.85	35.64	0.34	3.47
North Channel	180	100-yr	375.00	7220.47	7225.05		7225.25	0.001958	3.78	112.16	44.19	0.35	4.58

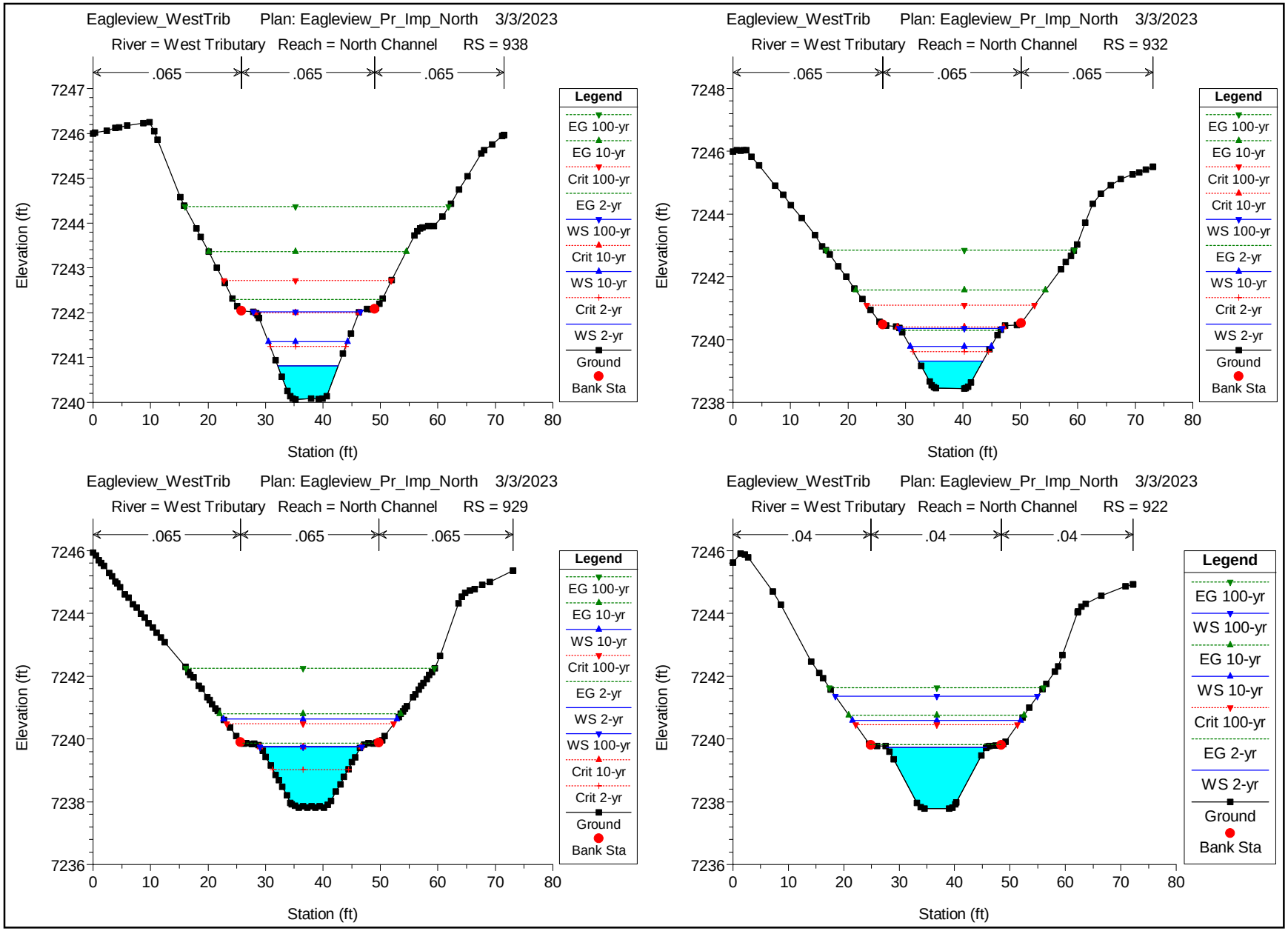
HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (Continued)

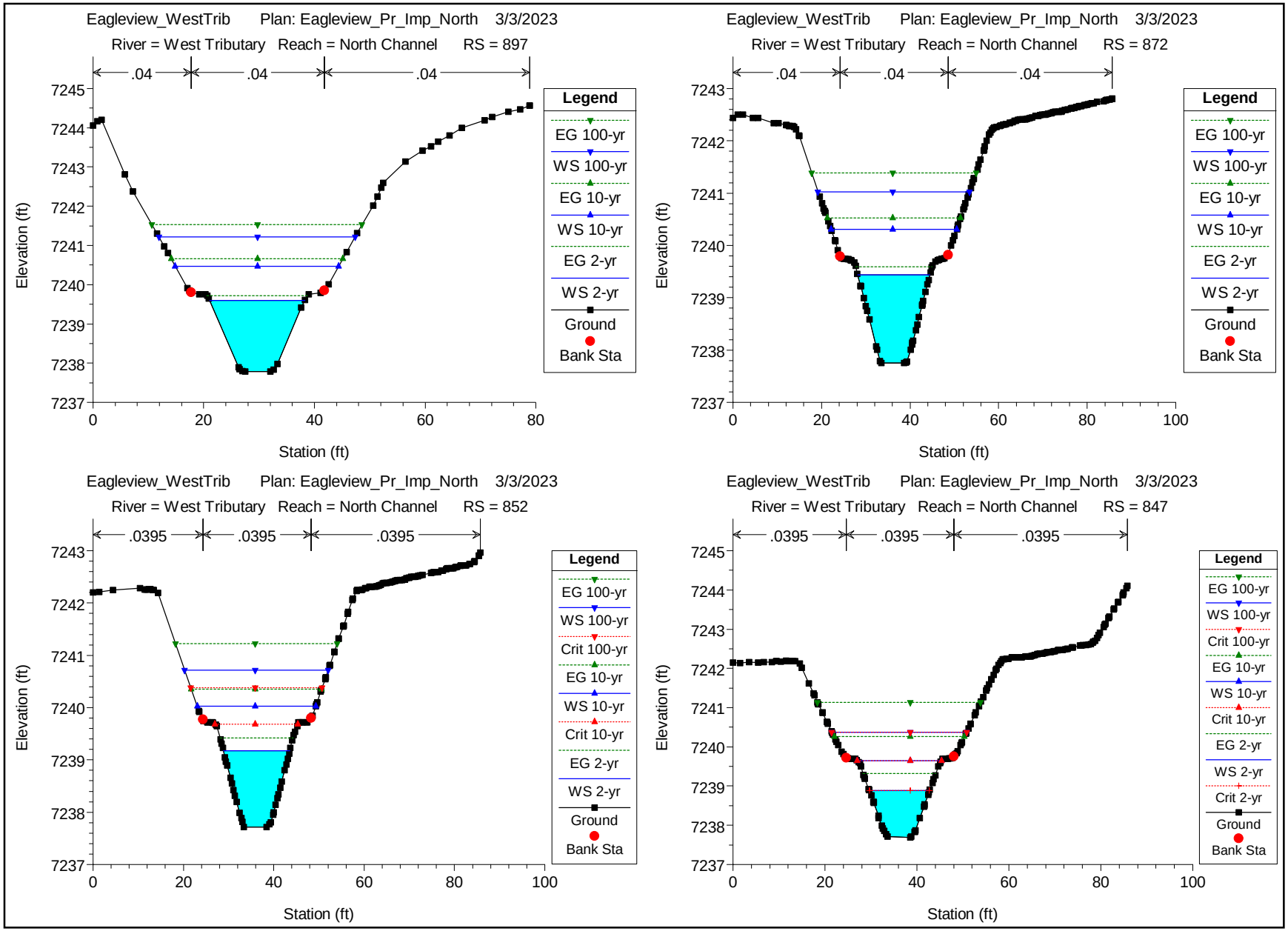
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	162	2-yr	78.00	7220.44	7222.93		7223.00	0.002046	2.15	36.83	27.89	0.31	2.49
North Channel	162	10-yr	189.00	7220.44	7223.90		7224.04	0.002020	2.99	67.76	35.66	0.34	3.46
North Channel	162	100-yr	375.00	7220.44	7225.01		7225.21	0.001959	3.77	112.13	44.22	0.35	4.57
North Channel	145	2-yr	78.00	7220.41	7222.89		7222.97	0.002059	2.15	36.77	27.81	0.31	2.48
North Channel	145	10-yr	189.00	7220.41	7223.87		7224.00	0.002025	2.99	67.70	35.62	0.34	3.46
North Channel	145	100-yr	375.00	7220.41	7224.98		7225.18	0.001961	3.77	112.04	44.18	0.35	4.57
North Channel	130	2-yr	78.00	7220.38	7222.86		7222.93	0.002080	2.15	36.75	27.89	0.31	2.48
North Channel	130	10-yr	189.00	7220.38	7223.84		7223.97	0.002028	2.99	67.73	35.63	0.34	3.46
North Channel	130	100-yr	375.00	7220.38	7224.94		7225.15	0.001988	3.79	112.02	45.94	0.35	4.56
North Channel	107	2-yr	78.00	7220.31	7222.82	7221.69	7222.89	0.002001	2.15	36.93	27.75	0.31	2.51
North Channel	107	10-yr	189.00	7220.31	7223.79	7222.56	7223.92	0.002003	3.00	67.89	35.72	0.34	3.48
North Channel	107	100-yr	375.00	7220.31	7224.89	7223.31	7225.10	0.002002	3.83	112.18	47.15	0.36	4.58

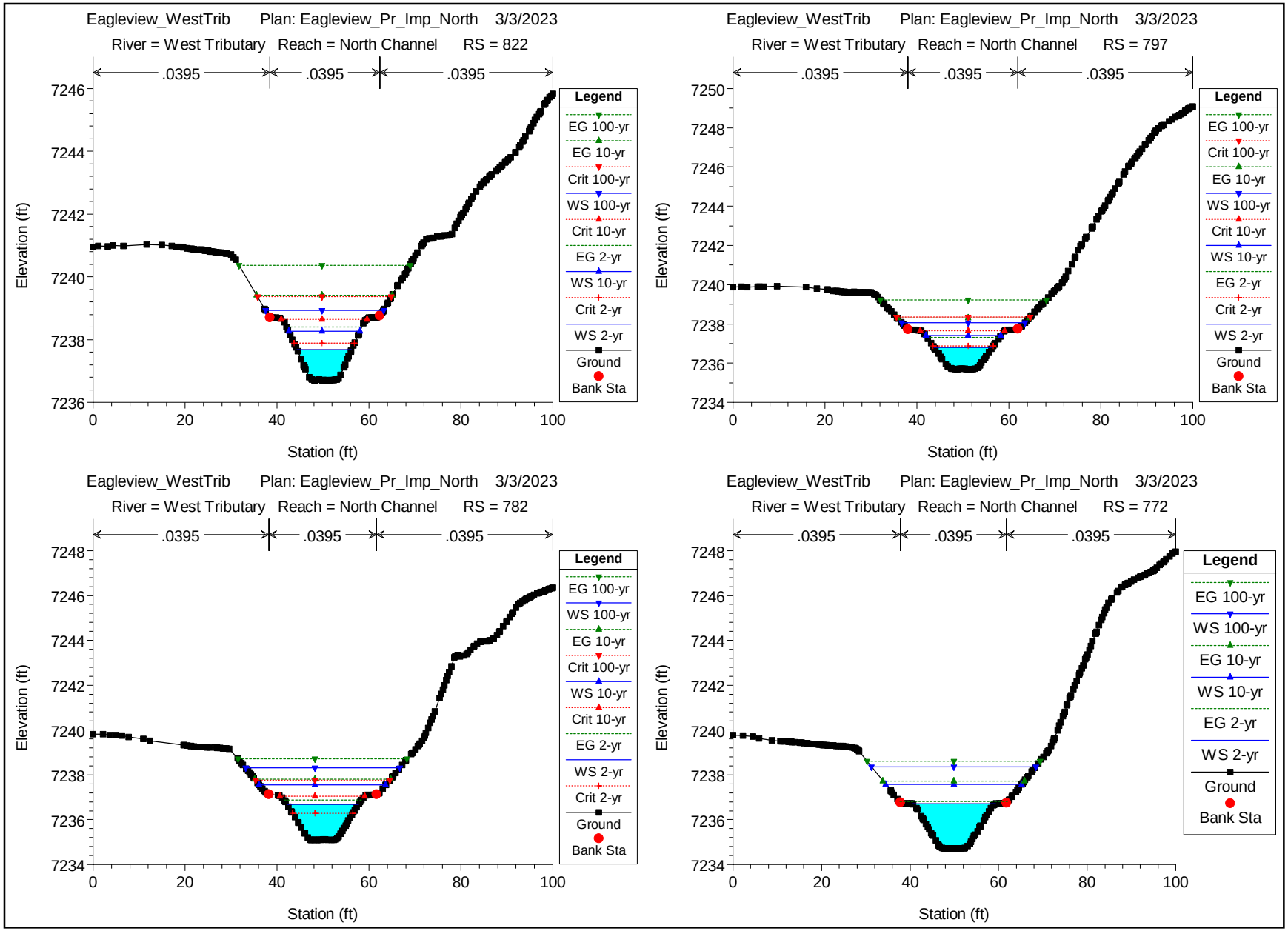
Provide the data input for the downstream reach length showing how the bends were modeled.

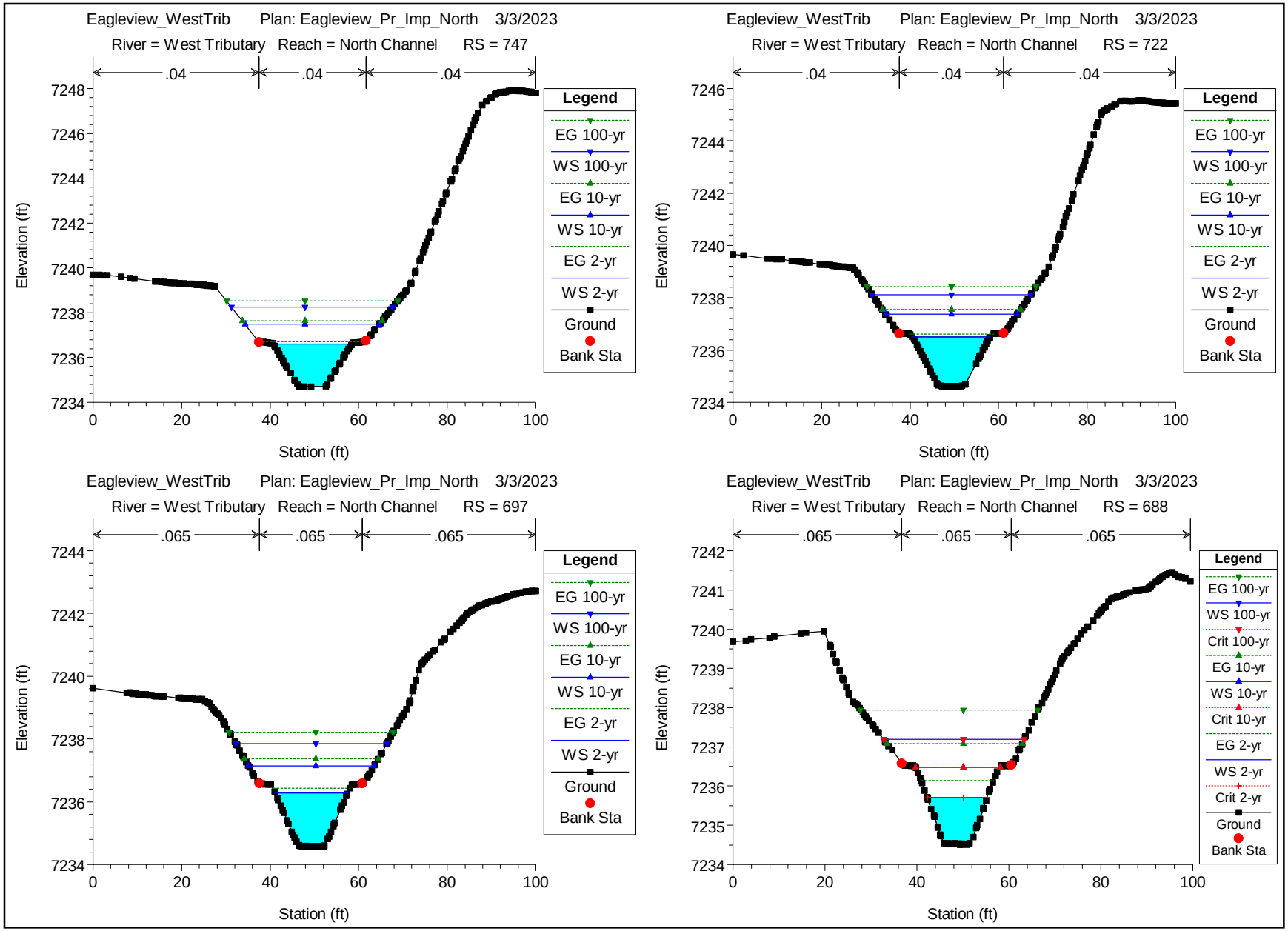

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 1072
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
Crit 10-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 1047
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 1022
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 997

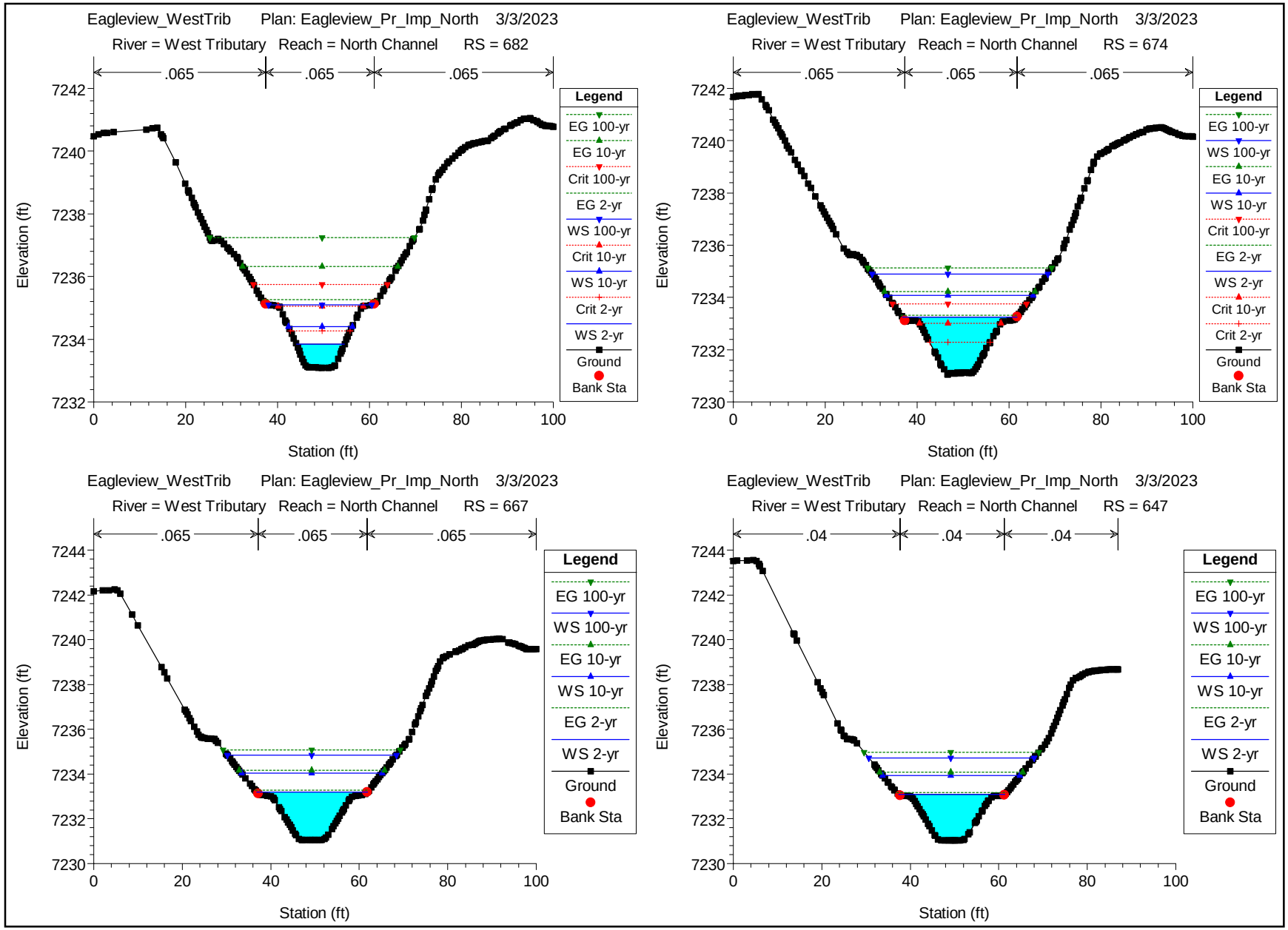

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 972
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 957
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 950
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 945
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

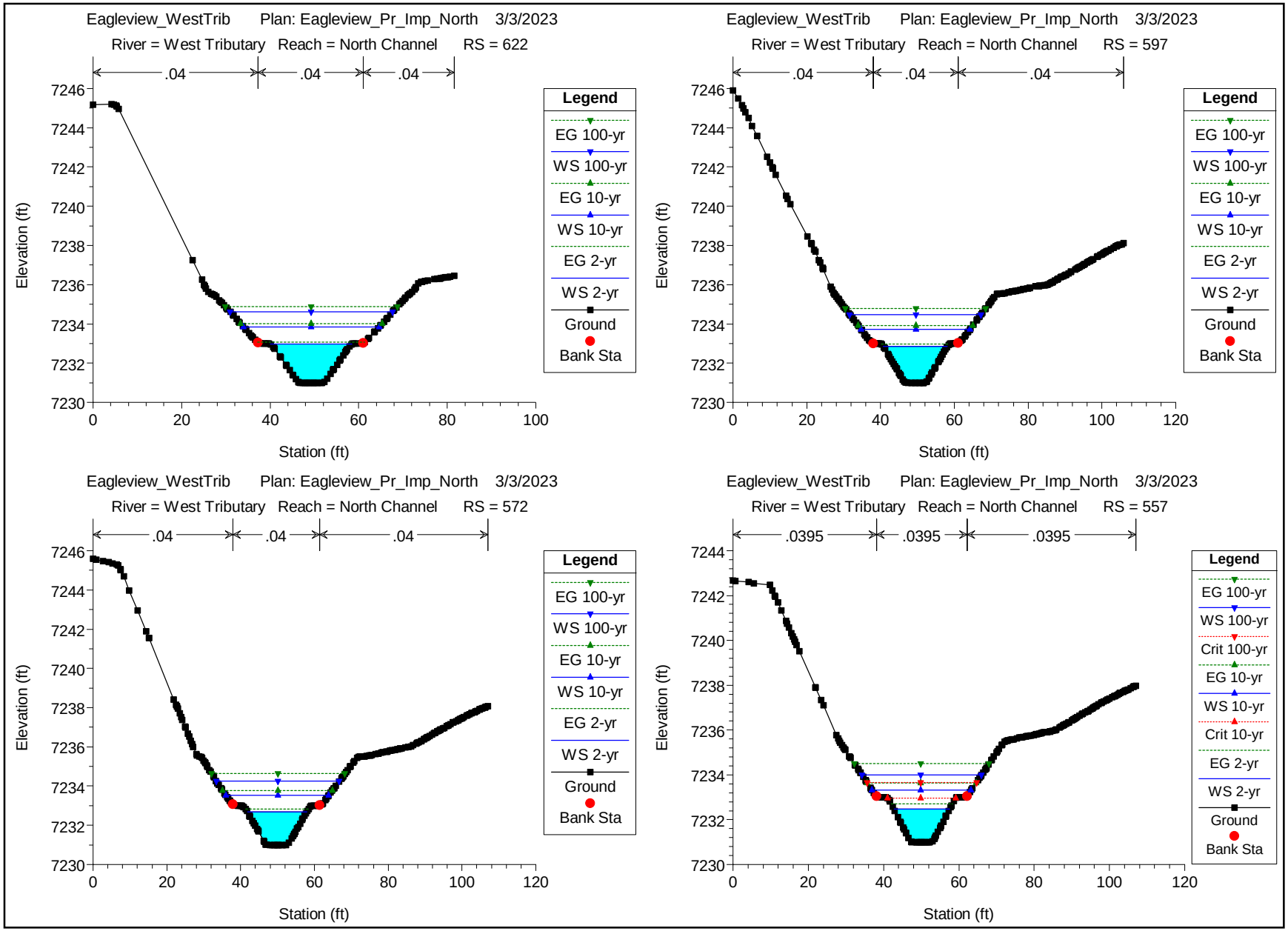

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 938
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
WS 100-yr
Crit 10-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 932
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
Crit 10-yr
WS 100-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 929
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
WS 100-yr
Crit 10-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 922
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta

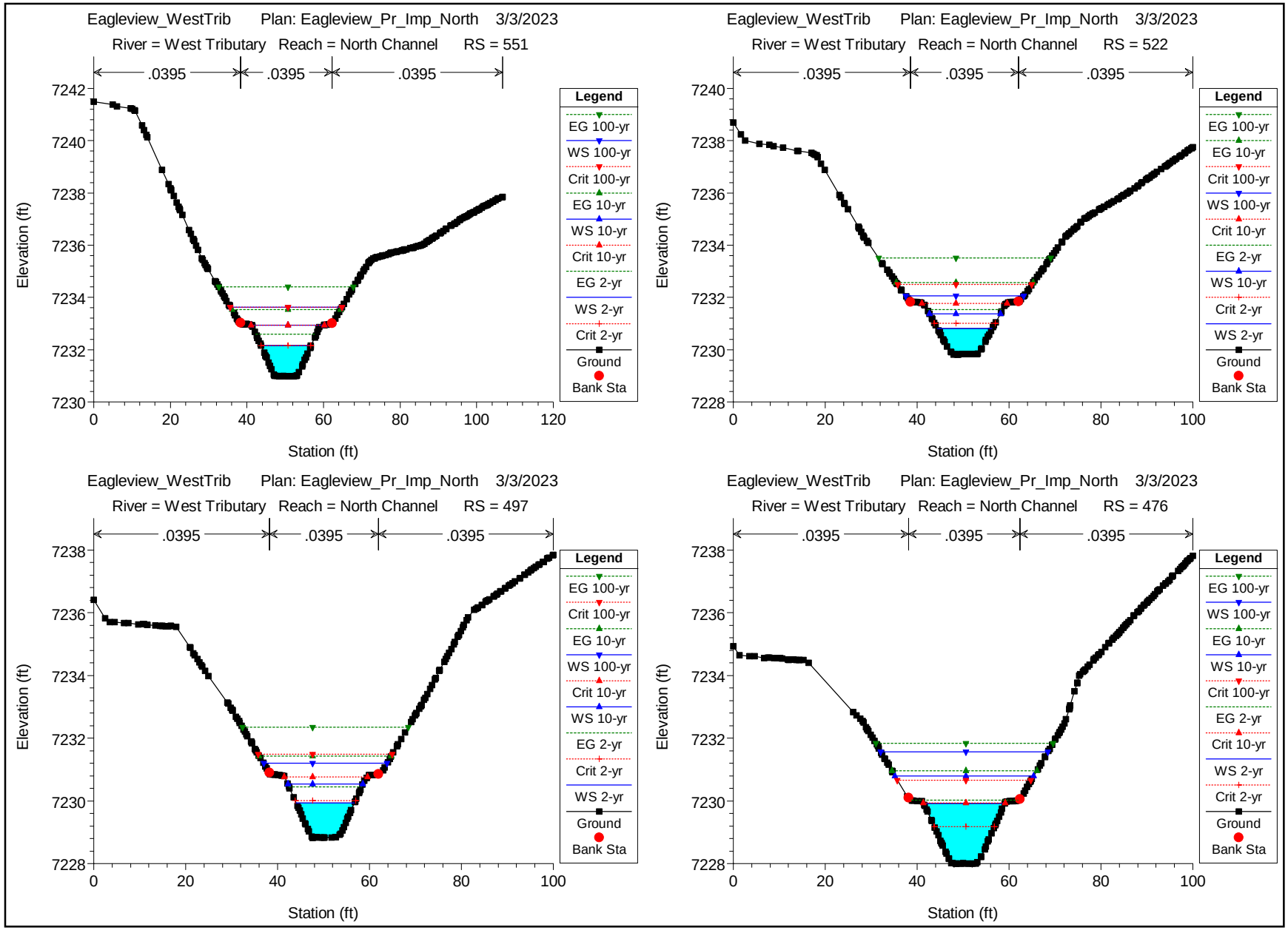

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 897
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 872
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 852
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 847
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

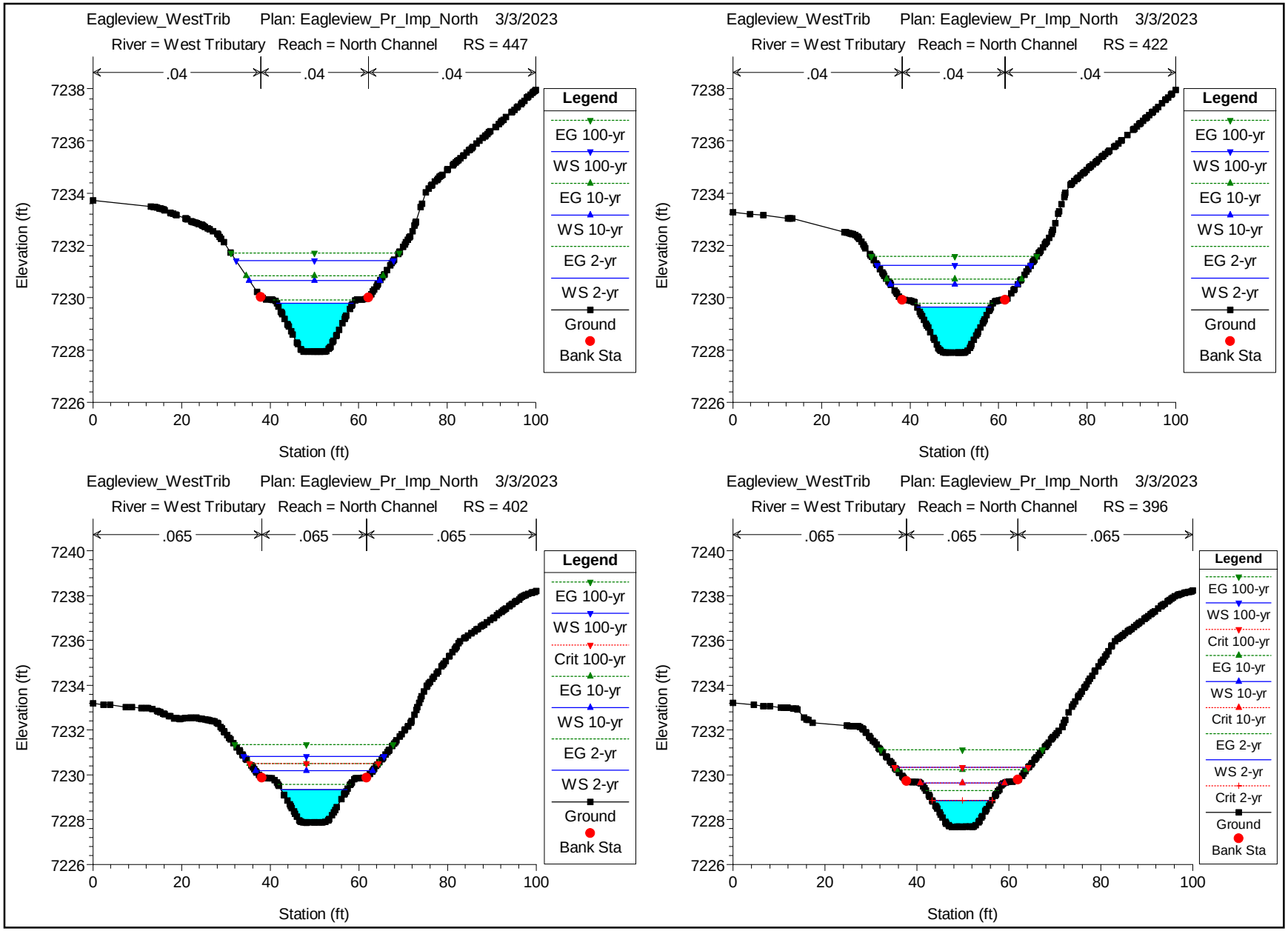

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 822
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 797
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 782
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
Crit 100-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 772
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta

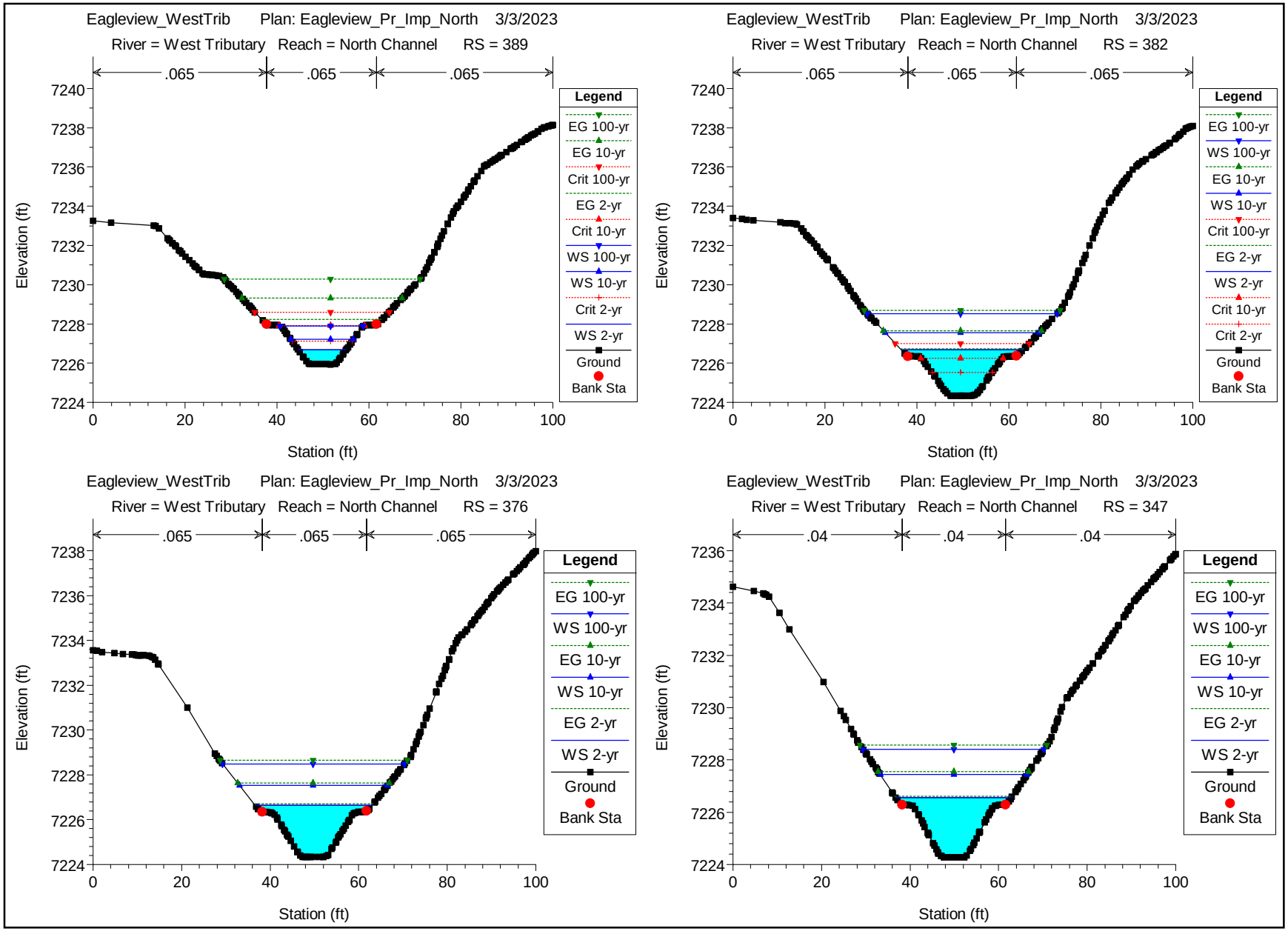

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 747
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 722
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 697
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 688
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

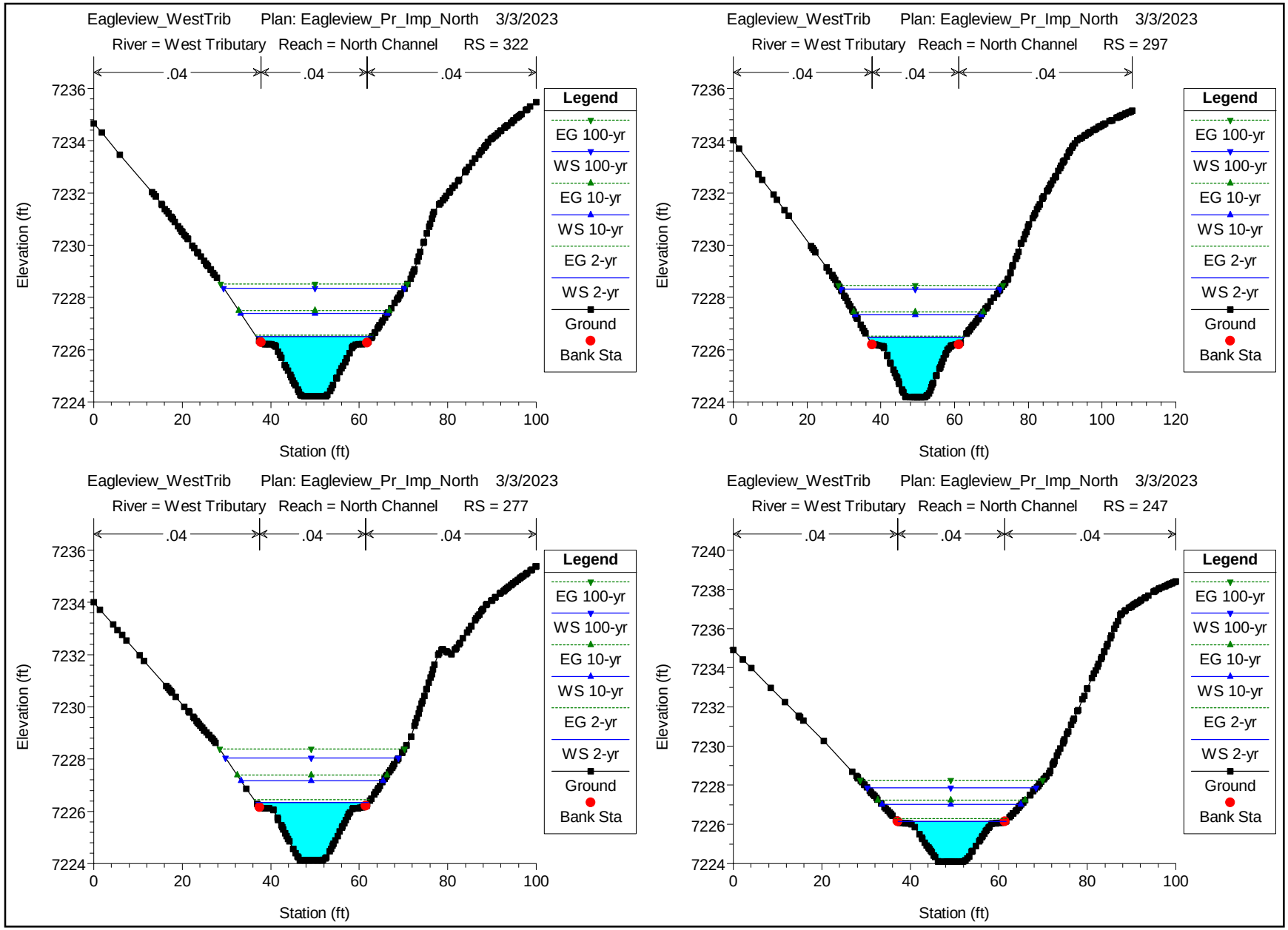

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 682
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
WS 100-yr
Crit 10-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 674
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
Crit 10-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 667
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 647
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta

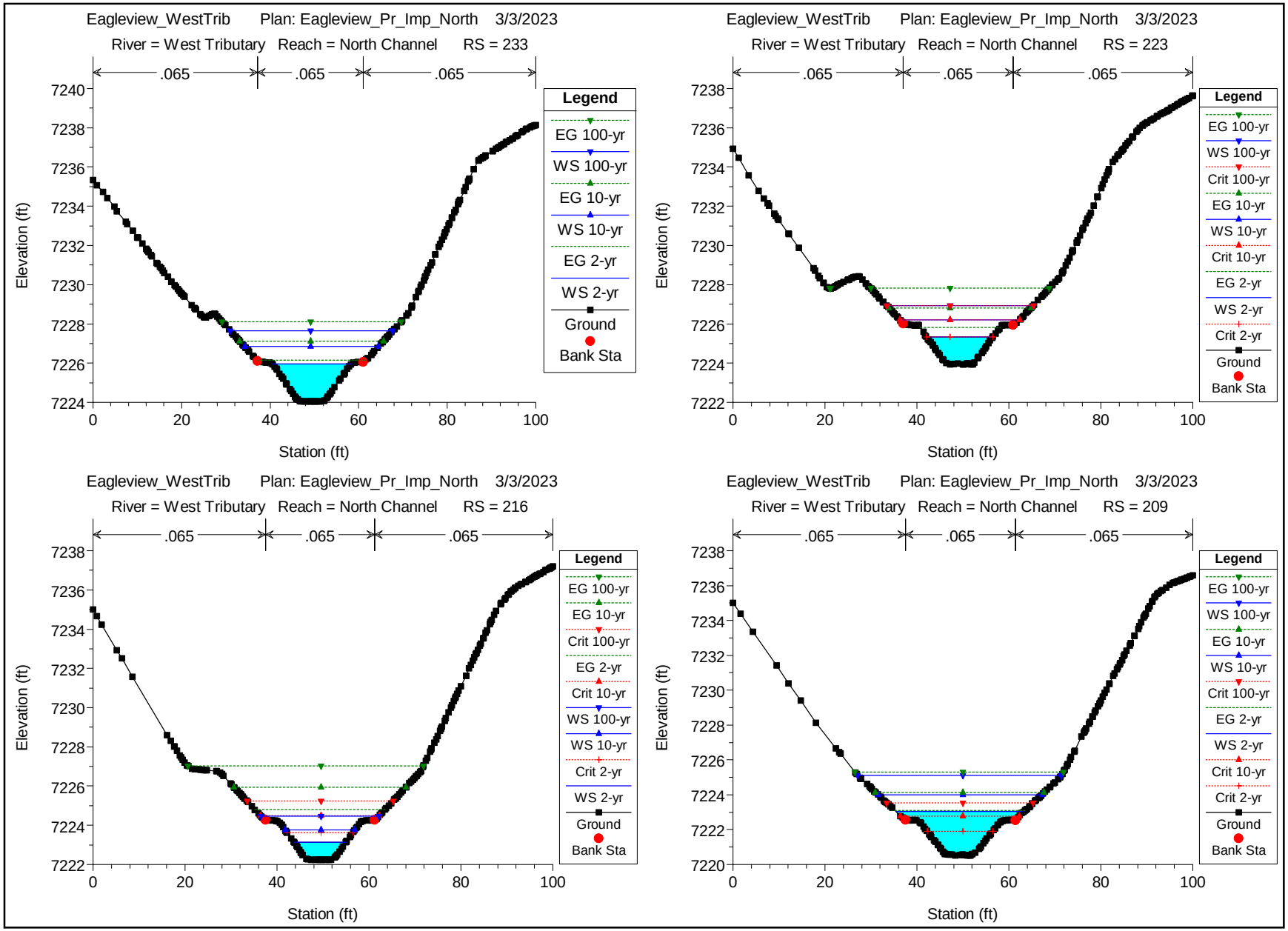

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 622
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 597
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 572
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 557
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta

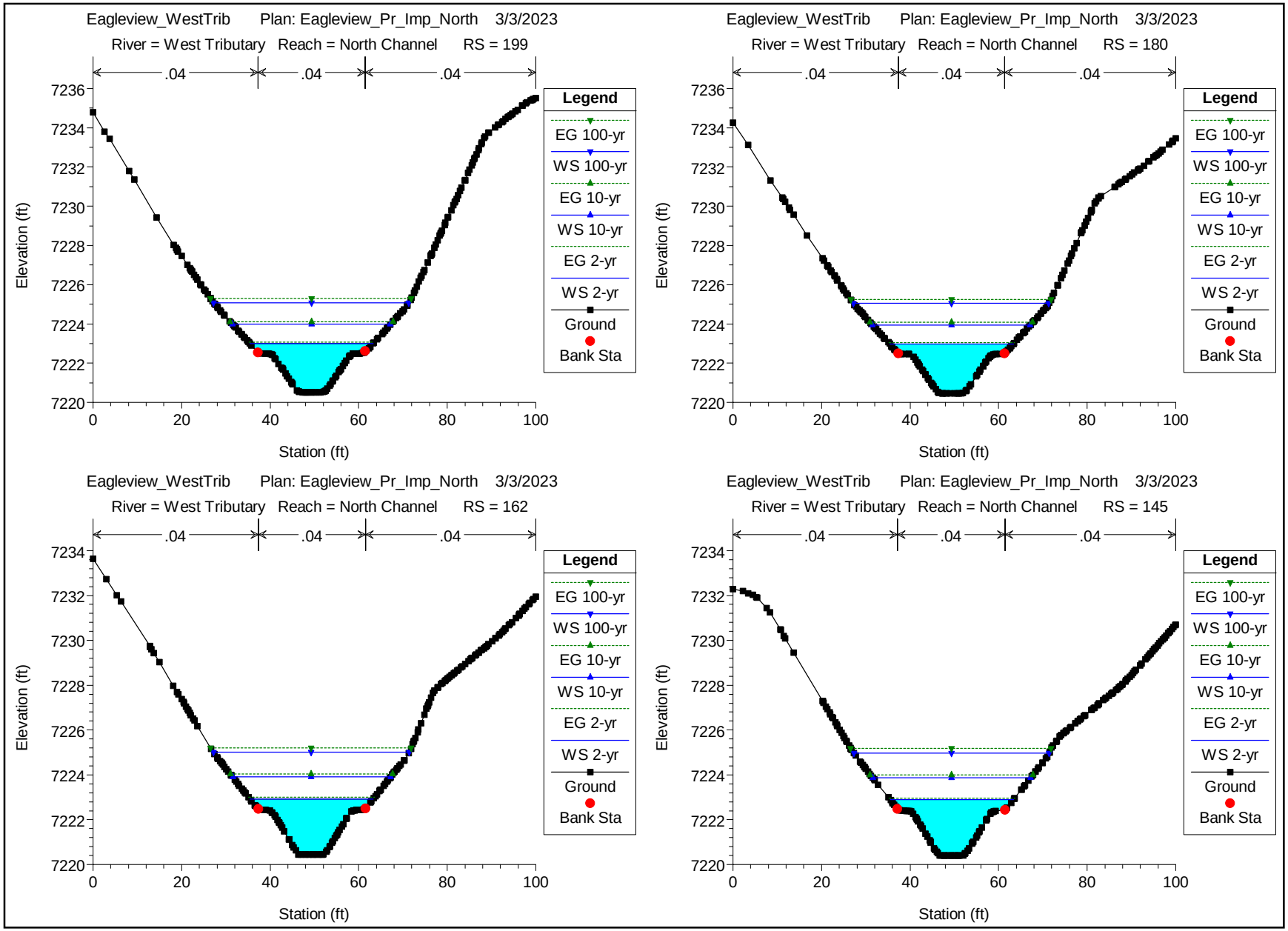

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 551
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 522
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 497
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 476
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
Crit 10-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

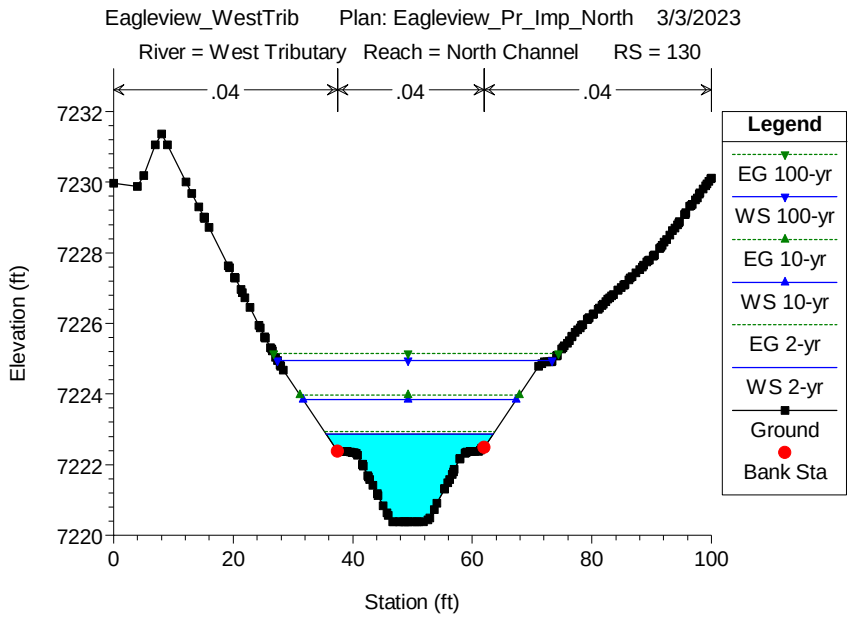

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 447
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 422
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 402
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 396
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

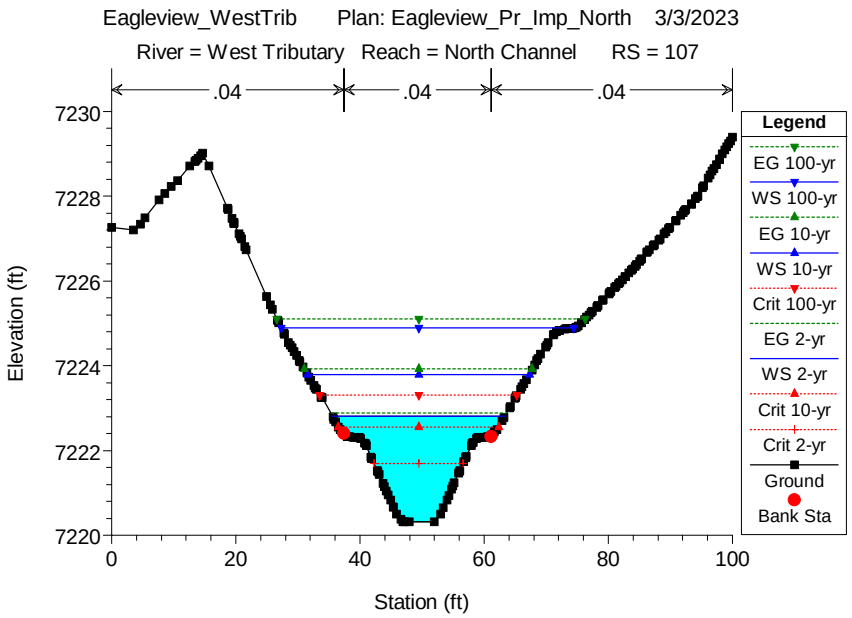

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 389
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
Crit 10-yr
WS 100-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 382
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
Crit 10-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 376
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 347
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta

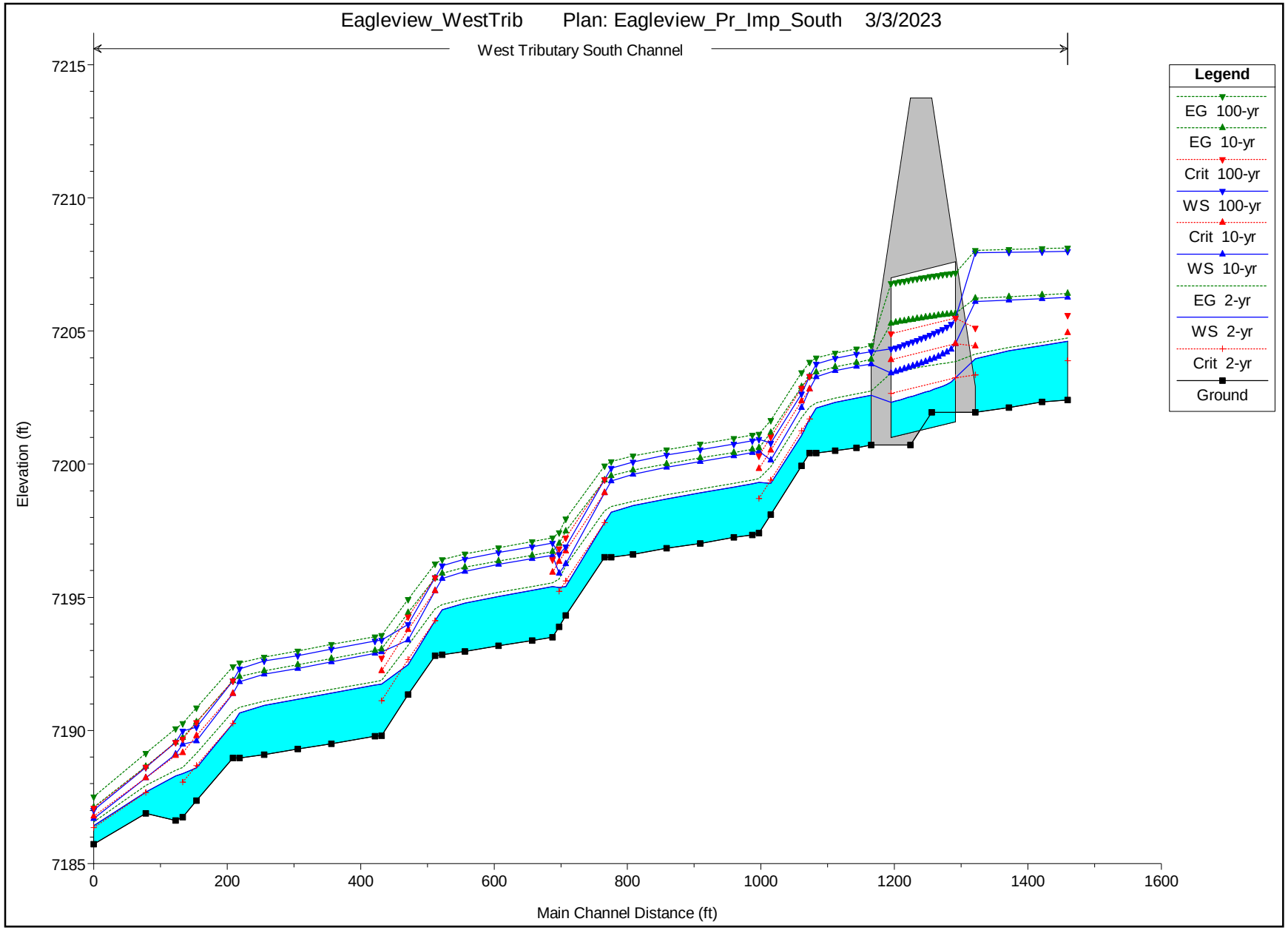

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 322
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 297
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 277
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 247
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 233
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 223
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 216
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
Crit 10-yr
WS 100-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 209
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
Crit 10-yr
Crit 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 199
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 180
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 162
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 145


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 130
.04
.04
.04
Elevation (ft)
7232
7230
7228
7226
7224
7222
7220
0
20
40
60
80
100
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 107
.04
.04
.04
Elevation (ft)
7230
7228
7226
7224
7222
7220
0
20
40
60
80
100
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
EG 2-yr
WS 2-yr
Crit 10-yr
Crit 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
West Tributary South Channel
Elevation (ft)
7215
7210
7205
7200
7195
7190
7185
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground

HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel

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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
South Channel	1406	2-yr	78.00	7202.41	7204.61	7203.89	7204.74	0.003844	2.90	27.09	24.49	0.47	2.20
South Channel	1406	10-yr	235.00	7202.41	7206.26	7204.93	7206.42	0.001553	3.30	78.82	38.11	0.35	3.85
South Channel	1406	100-yr	405.00	7202.41	7208.00	7205.60	7208.12	0.000697	3.04	160.51	55.74	0.25	5.59
South Channel	1368	2-yr	78.00	7202.34	7204.46		7204.59	0.004013	2.88	27.17	24.86	0.48	2.12
South Channel	1368	10-yr	235.00	7202.34	7206.22		7206.36	0.001335	3.10	83.43	39.05	0.32	3.88
South Channel	1368	100-yr	405.00	7202.34	7207.98		7208.09	0.000620	2.90	163.90	52.00	0.24	5.64
South Channel	1318	2-yr	78.00	7202.12	7204.26		7204.39	0.003872	2.85	27.40	24.90	0.47	2.14
South Channel	1318	10-yr	235.00	7202.12	7206.17		7206.29	0.001096	2.91	89.56	40.25	0.29	4.05
South Channel	1318	100-yr	405.00	7202.12	7207.96		7208.06	0.000512	2.71	189.00	73.21	0.22	5.84
South Channel	1268	2-yr	78.00	7201.94	7203.96	7203.36	7204.14	0.006017	3.35	23.31	22.20	0.57	2.02
South Channel	1268	10-yr	235.00	7201.94	7206.12	7204.44	7206.24	0.001052	2.94	89.54	38.91	0.29	4.18
South Channel	1268	100-yr	405.00	7201.94	7207.95	7205.11	7208.03	0.000453	2.60	203.97	79.73	0.20	6.01
South Channel	1188		Culvert										
South Channel	1112	2-yr	78.00	7200.72	7202.58		7202.75	0.005127	3.34	23.34	19.76	0.54	1.86
South Channel	1112	10-yr	235.00	7200.72	7203.77		7203.93	0.004784	3.25	72.50	62.82	0.53	3.05
South Channel	1112	100-yr	405.00	7200.72	7204.22		7204.46	0.005397	3.93	103.72	74.80	0.58	3.50
South Channel	1090	2-yr	78.00	7200.62	7202.48		7202.64	0.004580	3.16	24.70	20.98	0.51	1.86
South Channel	1090	10-yr	235.00	7200.62	7203.67		7203.81	0.004704	2.99	78.53	74.84	0.52	3.05
South Channel	1090	100-yr	405.00	7200.62	7204.14		7204.33	0.004518	3.47	116.98	88.76	0.53	3.52
South Channel	1058	2-yr	78.00	7200.50	7202.32		7202.48	0.004920	3.26	23.95	20.47	0.53	1.82
South Channel	1058	10-yr	235.00	7200.50	7203.50		7203.66	0.005160	3.12	75.41	72.42	0.54	3.00
South Channel	1058	100-yr	405.00	7200.50	7203.98		7204.17	0.005026	3.53	114.96	91.25	0.55	3.48
South Channel	1030	2-yr	78.00	7200.41	7202.11		7202.31	0.008116	3.58	21.78	19.64	0.60	1.70
South Channel	1030	10-yr	235.00	7200.41	7203.28		7203.47	0.008568	3.50	67.12	66.06	0.61	2.87
South Channel	1030	100-yr	405.00	7200.41	7203.75		7203.99	0.008160	3.91	103.62	84.37	0.62	3.34
South Channel	1019	2-yr	78.00	7200.41	7201.71	7201.71	7202.15	0.024321	5.35	14.59	16.44	1.00	1.29
South Channel	1019	10-yr	235.00	7200.41	7202.82	7202.82	7203.30	0.023752	5.58	42.09	44.03	1.01	2.41
South Channel	1019	100-yr	405.00	7200.41	7203.31	7203.31	7203.83	0.023382	5.81	69.76	68.24	1.01	2.90
South Channel	1007	2-yr	78.00	7199.94	7201.08	7201.25	7201.74	0.042125	6.53	11.94	15.08	1.29	1.14
South Channel	1007	10-yr	235.00	7199.94	7202.13	7202.37	7202.91	0.035530	7.12	33.02	32.34	1.24	2.19
South Channel	1007	100-yr	405.00	7199.94	7202.65	7202.86	7203.45	0.038024	7.17	56.52	58.01	1.28	2.71
South Channel	961	2-yr	78.00	7198.10	7199.28	7199.41	7199.90	0.038054	6.29	12.41	15.35	1.23	1.18

HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel (Continued)

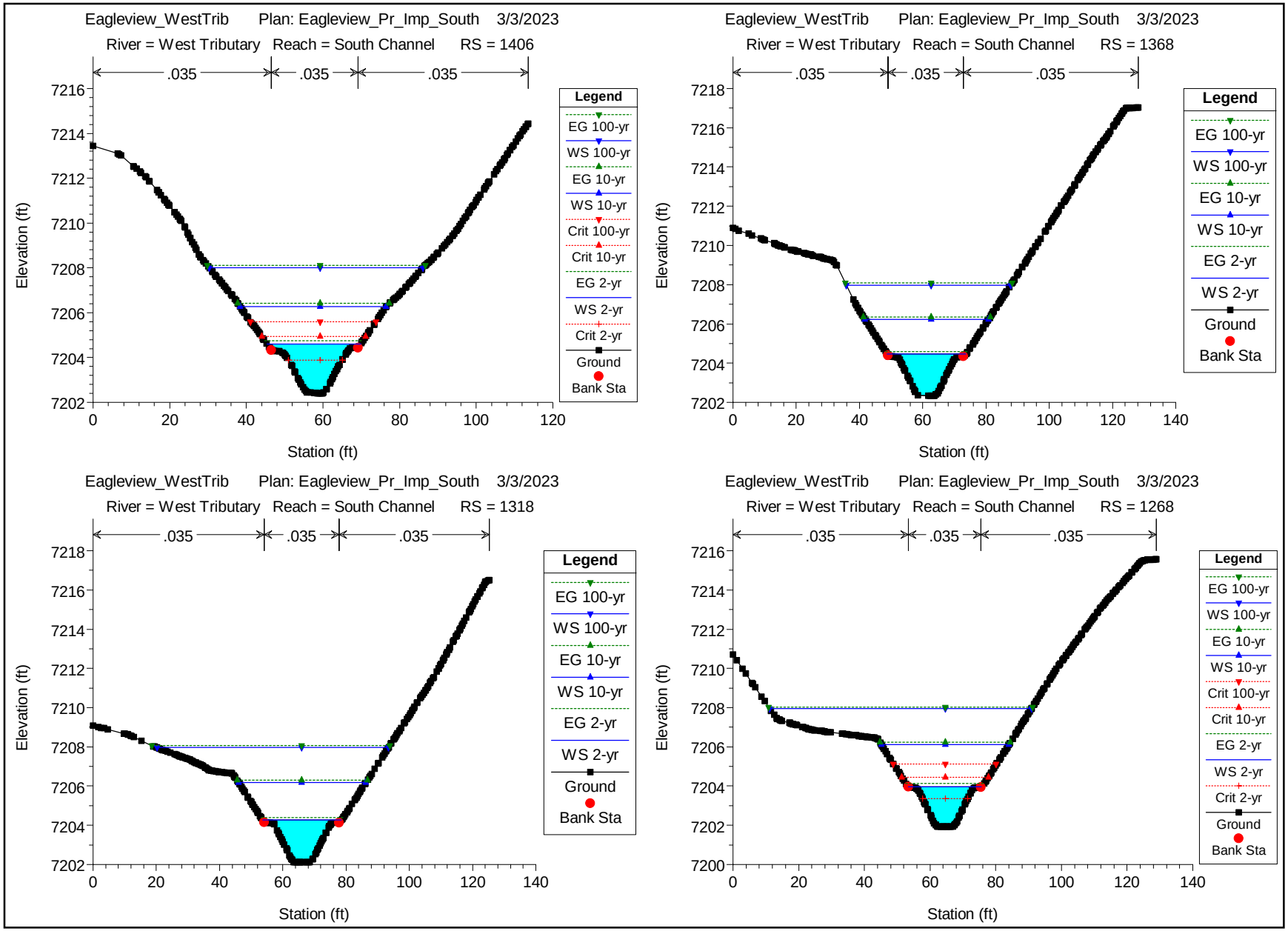
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
South Channel	961	10-yr	235.00	7198.10	7200.15	7200.53	7201.18	0.039269	8.15	28.85	24.76	1.33	2.05
South Channel	961	100-yr	405.00	7198.10	7200.78	7201.02	7201.64	0.041132	7.42	54.59	56.39	1.33	2.68
South Channel	944	2-yr	78.00	7197.41	7199.32	7198.71	7199.46	0.005005	2.99	26.12	21.50	0.48	1.91
South Channel	944	10-yr	235.00	7197.41	7200.48	7199.82	7200.61	0.004815	2.89	81.35	70.32	0.47	3.07
South Channel	944	100-yr	405.00	7197.41	7200.94	7200.31	7201.14	0.004788	3.58	114.01	73.91	0.50	3.53
South Channel	934	2-yr	78.00	7197.34	7199.27		7199.41	0.004944	2.98	26.19	21.44	0.48	1.93
South Channel	934	10-yr	235.00	7197.34	7200.43		7200.56	0.004896	2.91	81.00	70.75	0.47	3.09
South Channel	934	100-yr	405.00	7197.34	7200.89		7201.09	0.004844	3.60	113.75	74.22	0.50	3.54
South Channel	906	2-yr	78.00	7197.25	7199.14		7199.28	0.004151	3.05	25.62	21.30	0.49	1.89
South Channel	906	10-yr	235.00	7197.25	7200.30		7200.44	0.004056	2.97	79.18	69.27	0.49	3.05
South Channel	906	100-yr	405.00	7197.25	7200.76		7200.96	0.004025	3.65	112.23	74.90	0.51	3.51
South Channel	856	2-yr	78.00	7197.03	7198.93		7199.07	0.004186	3.07	25.43	21.06	0.49	1.90
South Channel	856	10-yr	235.00	7197.03	7200.10		7200.23	0.004108	2.99	78.68	68.87	0.49	3.07
South Channel	856	100-yr	405.00	7197.03	7200.55		7200.75	0.004237	3.63	112.45	77.77	0.52	3.52
South Channel	805	2-yr	78.00	7196.84	7198.70		7198.85	0.004477	3.13	24.90	21.03	0.51	1.86
South Channel	805	10-yr	235.00	7196.84	7199.88		7200.02	0.004521	3.00	78.41	72.55	0.51	3.04
South Channel	805	100-yr	405.00	7196.84	7200.34		7200.54	0.004186	3.56	114.41	81.72	0.51	3.50
South Channel	755	2-yr	78.00	7196.62	7198.45		7198.61	0.005014	3.28	23.81	20.48	0.54	1.83
South Channel	755	10-yr	235.00	7196.62	7199.62		7199.78	0.004906	3.18	74.04	67.23	0.53	3.00
South Channel	755	100-yr	405.00	7196.62	7200.09		7200.30	0.005163	3.76	108.31	80.75	0.56	3.47
South Channel	722	2-yr	78.00	7196.50	7198.20		7198.40	0.008294	3.61	21.62	19.61	0.61	1.70
South Channel	722	10-yr	235.00	7196.50	7199.37		7199.57	0.008745	3.54	66.43	65.34	0.62	2.87
South Channel	722	100-yr	405.00	7196.50	7199.85		7200.09	0.008279	3.95	102.73	83.76	0.62	3.35
South Channel	712	2-yr	78.00	7196.50	7197.80	7197.80	7198.25	0.024336	5.35	14.58	16.39	1.00	1.30
South Channel	712	10-yr	235.00	7196.50	7198.92	7198.92	7199.40	0.024047	5.60	41.98	44.10	1.01	2.42
South Channel	712	100-yr	405.00	7196.50	7199.42	7199.42	7199.93	0.023381	5.76	70.31	69.56	1.01	2.92
South Channel	654	2-yr	78.00	7194.32	7195.40	7195.63	7196.18	0.052956	7.09	11.00	14.58	1.44	1.08
South Channel	654	10-yr	235.00	7194.32	7196.26	7196.74	7197.48	0.044208	8.88	26.45	21.73	1.42	1.94
South Channel	654	100-yr	405.00	7194.32	7196.90	7197.24	7197.94	0.051063	8.19	49.47	51.81	1.48	2.58
South Channel	644	2-yr	78.00	7193.90	7195.36	7195.22	7195.69	0.016128	4.60	16.96	17.56	0.83	1.46
South Channel	644	10-yr	235.00	7193.90	7195.90	7196.34	7197.03	0.039836	8.52	27.59	22.32	1.35	2.00
South Channel	644	100-yr	405.00	7193.90	7196.61	7196.82	7197.43	0.039296	7.26	55.78	57.49	1.30	2.71

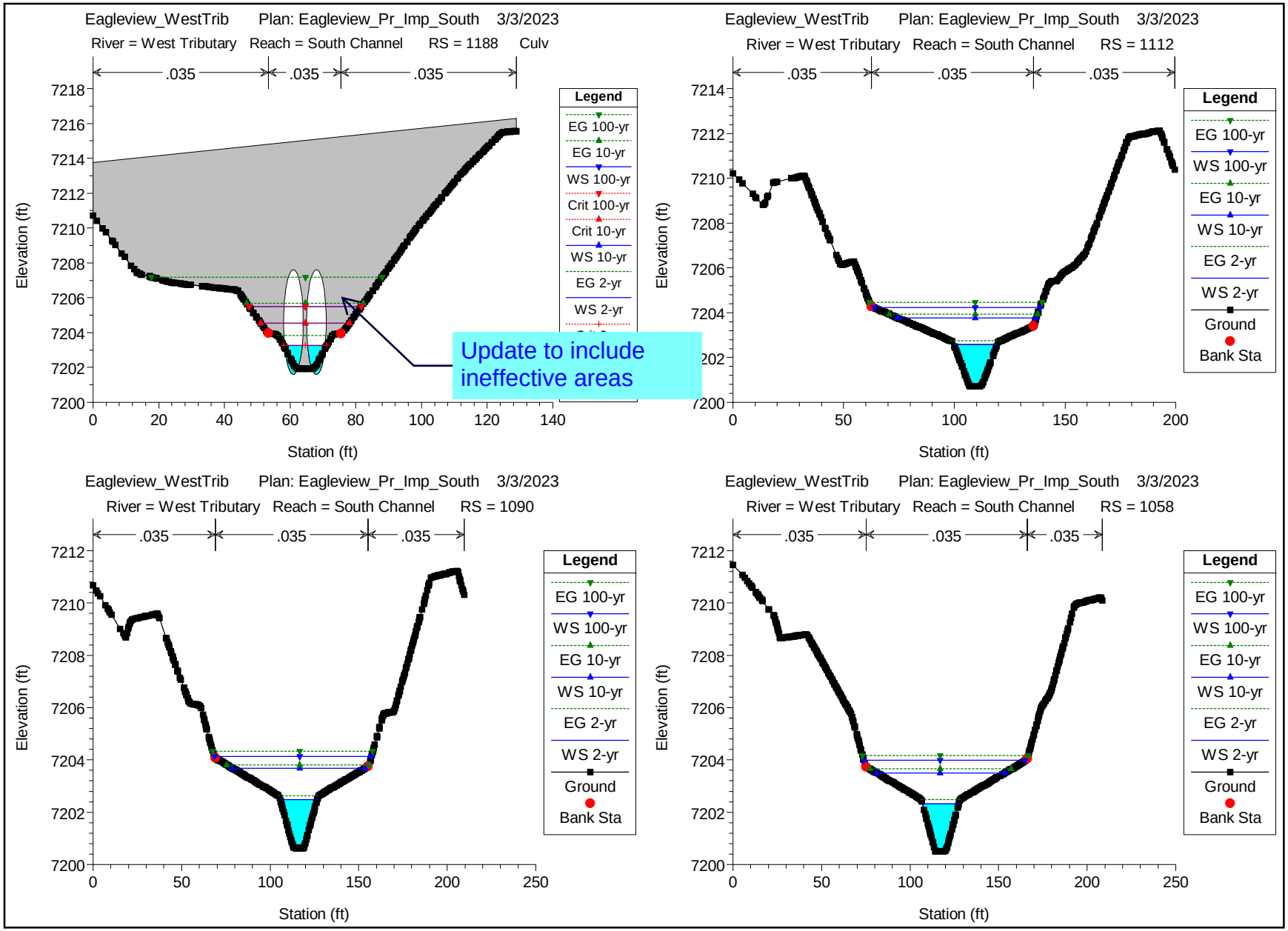
HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel (Continued)

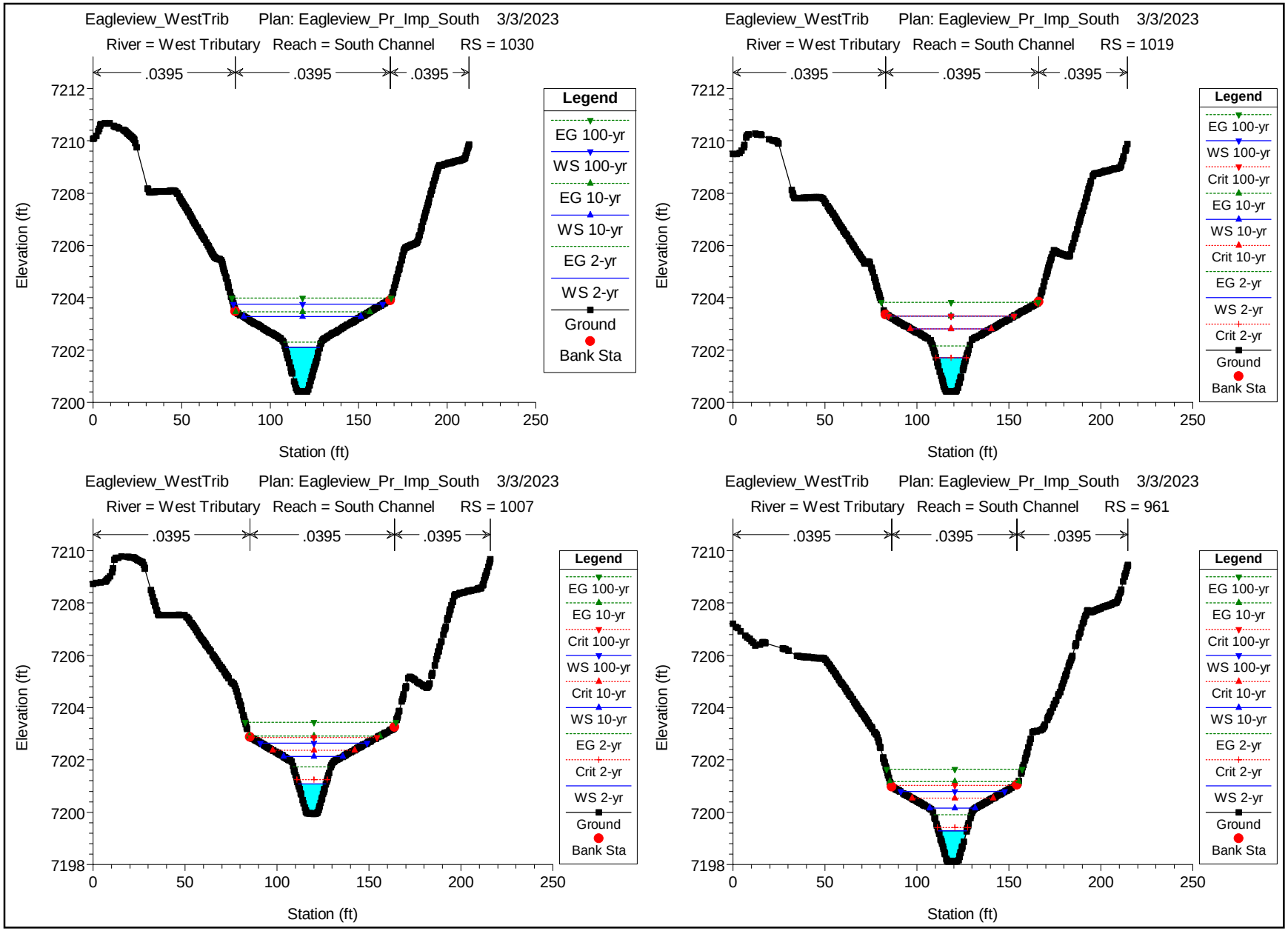
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
South Channel	634	2-yr	78.00	7193.50	7195.40		7195.55	0.005315	3.06	25.53	21.23	0.49	1.90
South Channel	634	10-yr	235.00	7193.50	7196.58	7195.93	7196.72	0.005221	2.95	79.66	70.65	0.49	3.08
South Channel	634	100-yr	405.00	7193.50	7197.05	7196.42	7197.24	0.005621	3.52	115.55	84.28	0.52	3.55
South Channel	604	2-yr	78.00	7193.38	7195.26		7195.41	0.004198	3.07	25.42	21.12	0.49	1.88
South Channel	604	10-yr	235.00	7193.38	7196.45		7196.58	0.004025	2.92	80.66	71.97	0.48	3.07
South Channel	604	100-yr	405.00	7193.38	7196.90		7197.09	0.004422	3.51	116.00	85.20	0.52	3.52
South Channel	553	2-yr	78.00	7193.18	7195.03		7195.19	0.004457	3.14	24.87	20.90	0.51	1.85
South Channel	553	10-yr	235.00	7193.18	7196.23		7196.37	0.004418	2.94	79.99	74.81	0.50	3.05
South Channel	553	100-yr	405.00	7193.18	7196.68		7196.87	0.004267	3.51	115.85	84.02	0.52	3.50
South Channel	503	2-yr	78.00	7192.97	7194.78		7194.95	0.004916	3.26	23.95	20.46	0.53	1.81
South Channel	503	10-yr	235.00	7192.97	7195.98		7196.13	0.005124	3.09	75.96	73.42	0.54	3.01
South Channel	503	100-yr	405.00	7192.97	7196.44		7196.64	0.004935	3.57	113.52	87.51	0.55	3.47
South Channel	469	2-yr	78.00	7192.84	7194.53		7194.73	0.008301	3.62	21.58	19.50	0.61	1.69
South Channel	469	10-yr	235.00	7192.84	7195.70		7195.90	0.008865	3.53	66.64	66.56	0.62	2.86
South Channel	469	100-yr	405.00	7192.84	7196.18		7196.42	0.008349	3.93	103.16	84.97	0.62	3.34
South Channel	458	2-yr	78.00	7192.81	7194.12	7194.12	7194.57	0.024822	5.39	14.48	16.39	1.01	1.30
South Channel	458	10-yr	235.00	7192.81	7195.23	7195.23	7195.72	0.024023	5.60	41.94	44.00	1.01	2.42
South Channel	458	100-yr	405.00	7192.81	7195.73	7195.73	7196.25	0.023126	5.78	70.12	68.57	1.01	2.92
South Channel	417	2-yr	78.00	7191.35	7192.46	7192.67	7193.19	0.048371	6.85	11.38	14.82	1.38	1.11
South Channel	417	10-yr	235.00	7191.35	7193.39	7193.78	7194.43	0.038989	8.17	28.76	24.41	1.33	2.04
South Channel	417	100-yr	405.00	7191.35	7193.99	7194.27	7194.92	0.045249	7.75	52.24	54.24	1.39	2.64
South Channel	378	2-yr	78.00	7189.81	7191.75	7191.11	7191.88	0.004866	2.94	26.53	21.91	0.47	1.94
South Channel	378	10-yr	235.00	7189.81	7192.94	7192.24	7193.06	0.004827	2.74	85.77	79.39	0.46	3.13
South Channel	378	100-yr	405.00	7189.81	7193.40	7192.72	7193.56	0.004657	3.23	125.72	91.08	0.48	3.59
South Channel	368	2-yr	78.00	7189.78	7191.70		7191.83	0.004828	2.95	26.48	21.64	0.47	1.92
South Channel	368	10-yr	235.00	7189.78	7192.89		7193.01	0.004928	2.76	85.08	78.96	0.47	3.11
South Channel	368	100-yr	405.00	7189.78	7193.35		7193.52	0.004670	3.26	124.80	89.68	0.48	3.57
South Channel	303	2-yr	78.00	7189.50	7191.39		7191.54	0.004178	3.06	25.47	21.12	0.49	1.89
South Channel	303	10-yr	235.00	7189.50	7192.57		7192.71	0.004429	2.91	80.64	76.41	0.50	3.07
South Channel	303	100-yr	405.00	7189.50	7193.06		7193.23	0.004266	3.30	122.81	95.37	0.51	3.56
South Channel	253	2-yr	78.00	7189.31	7191.17		7191.32	0.004371	3.11	25.07	21.02	0.50	1.86
South Channel	253	10-yr	235.00	7189.31	7192.32		7192.47	0.004954	3.06	76.76	73.45	0.53	3.01
South Channel	253	100-yr	405.00	7189.31	7192.81		7192.99	0.004994	3.42	118.56	97.17	0.54	3.50

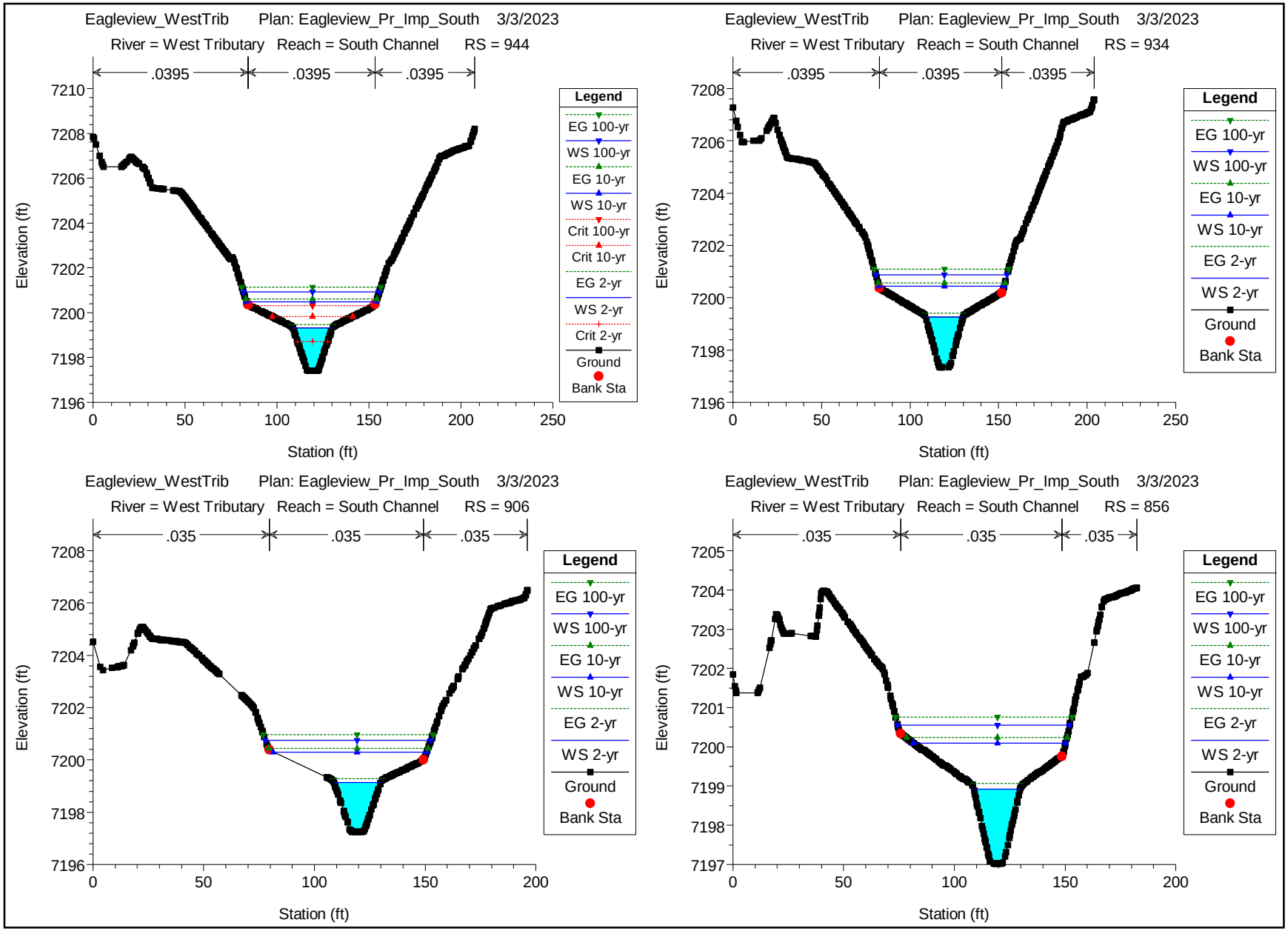
HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel (Continued)

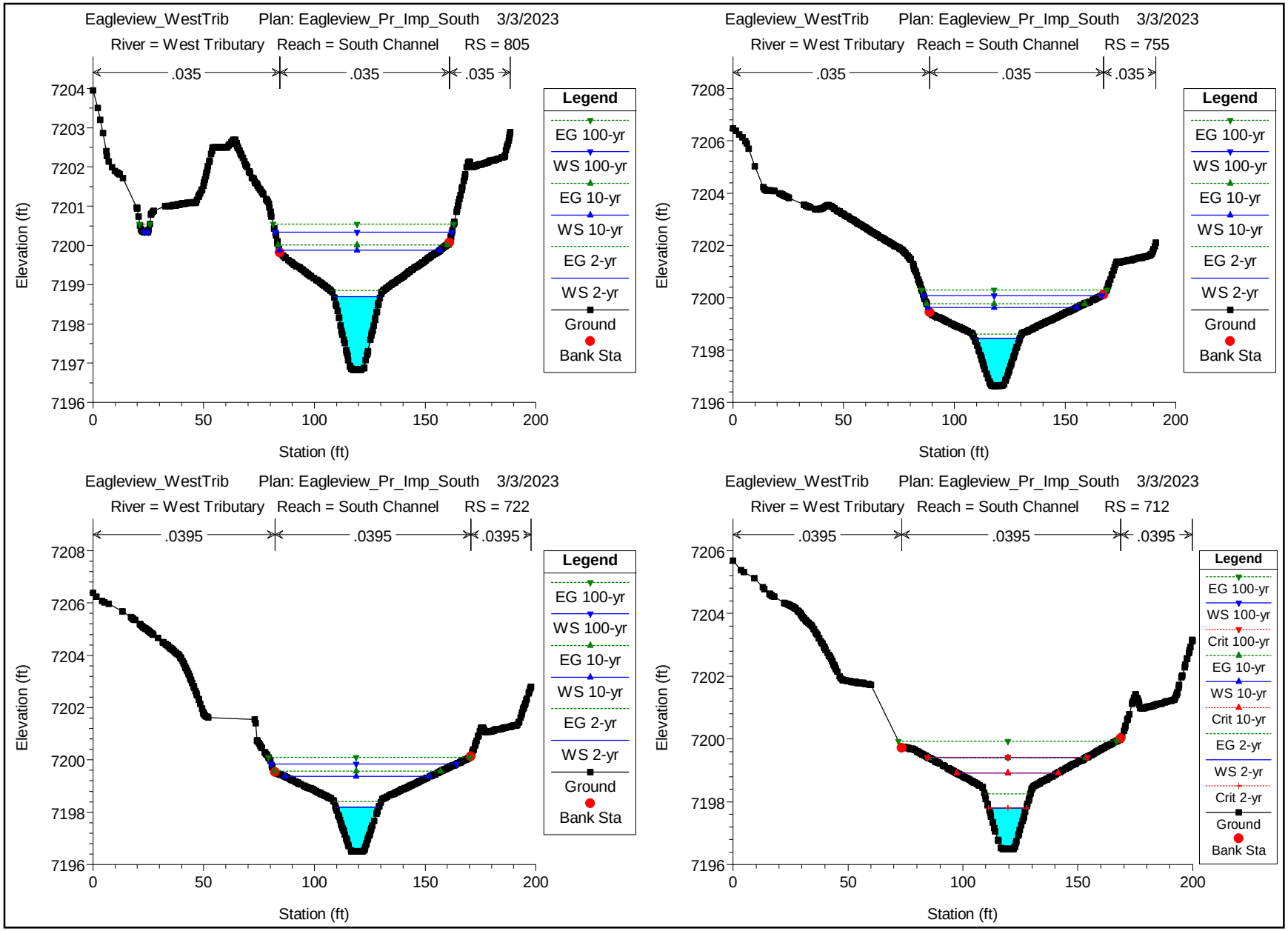
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
South Channel	202	2-yr	78.00	7189.09	7190.93		7191.09	0.004756	3.21	24.29	20.66	0.52	1.84
South Channel	202	10-yr	235.00	7189.09	7192.12		7192.24	0.003935	2.74	85.73	81.49	0.47	3.03
South Channel	202	100-yr	405.00	7189.09	7192.61		7192.76	0.003836	3.10	130.79	101.71	0.48	3.52
South Channel	165	2-yr	78.00	7188.97	7190.66		7190.86	0.008369	3.62	21.56	19.59	0.61	1.69
South Channel	165	10-yr	235.00	7188.97	7191.82		7192.02	0.008942	3.56	66.09	65.60	0.62	2.85
South Channel	165	100-yr	405.00	7188.97	7192.31		7192.55	0.008717	3.90	103.86	88.22	0.63	3.34
South Channel	156	2-yr	78.00	7188.97	7190.26	7190.26	7190.71	0.024565	5.36	14.56	16.48	1.00	1.29
South Channel	156	10-yr	235.00	7188.97	7191.38	7191.38	7191.86	0.023470	5.58	42.09	43.62	1.00	2.41
South Channel	156	100-yr	405.00	7188.97	7191.87	7191.87	7192.39	0.023455	5.79	69.93	68.84	1.01	2.90
South Channel	101	2-yr	78.00	7187.36	7188.59	7188.68	7189.14	0.032881	5.97	13.07	15.66	1.15	1.23
South Channel	101	10-yr	235.00	7187.36	7189.61	7189.80	7190.32	0.032731	6.79	34.63	34.28	1.19	2.25
South Channel	101	100-yr	405.00	7187.36	7190.13	7190.29	7190.85	0.034339	6.84	59.25	60.50	1.22	2.77
South Channel	80	2-yr	78.00	7186.74	7188.38	7188.05	7188.61	0.009702	3.82	20.44	19.15	0.65	1.64
South Channel	80	10-yr	235.00	7186.74	7189.48	7189.17	7189.73	0.012087	4.06	57.83	58.85	0.72	2.74
South Channel	80	100-yr	405.00	7186.74	7189.98	7189.67	7190.27	0.011614	4.32	93.68	84.51	0.72	3.24
South Channel	69	2-yr	78.00	7186.62	7188.28		7188.50	0.009211	3.76	20.76	19.13	0.64	1.66
South Channel	69	10-yr	235.00	7186.62	7189.11	7189.06	7189.55	0.021116	5.26	44.65	46.71	0.95	2.49
South Channel	69	100-yr	405.00	7186.62	7189.56	7189.56	7190.07	0.022915	5.74	70.52	69.06	1.00	2.94
South Channel	25	2-yr	78.00	7186.88	7187.69	7187.66	7187.93	0.019581	3.88	20.12	38.07	0.94	0.81
South Channel	25	10-yr	235.00	7186.88	7188.22	7188.22	7188.64	0.019650	5.22	45.04	54.74	1.01	1.34
South Channel	25	100-yr	405.00	7186.88	7188.62	7188.63	7189.14	0.018917	5.81	69.76	70.21	1.03	1.74
South Channel	5	2-yr	78.00	7185.72	7186.43	7186.36	7186.57	0.015007	2.96	26.38	61.48	0.80	0.71
South Channel	5	10-yr	235.00	7185.72	7186.69	7186.78	7187.13	0.031909	5.26	44.67	77.26	1.22	0.97
South Channel	5	100-yr	405.00	7185.72	7187.01	7187.08	7187.51	0.022577	5.71	72.01	96.89	1.09	1.29

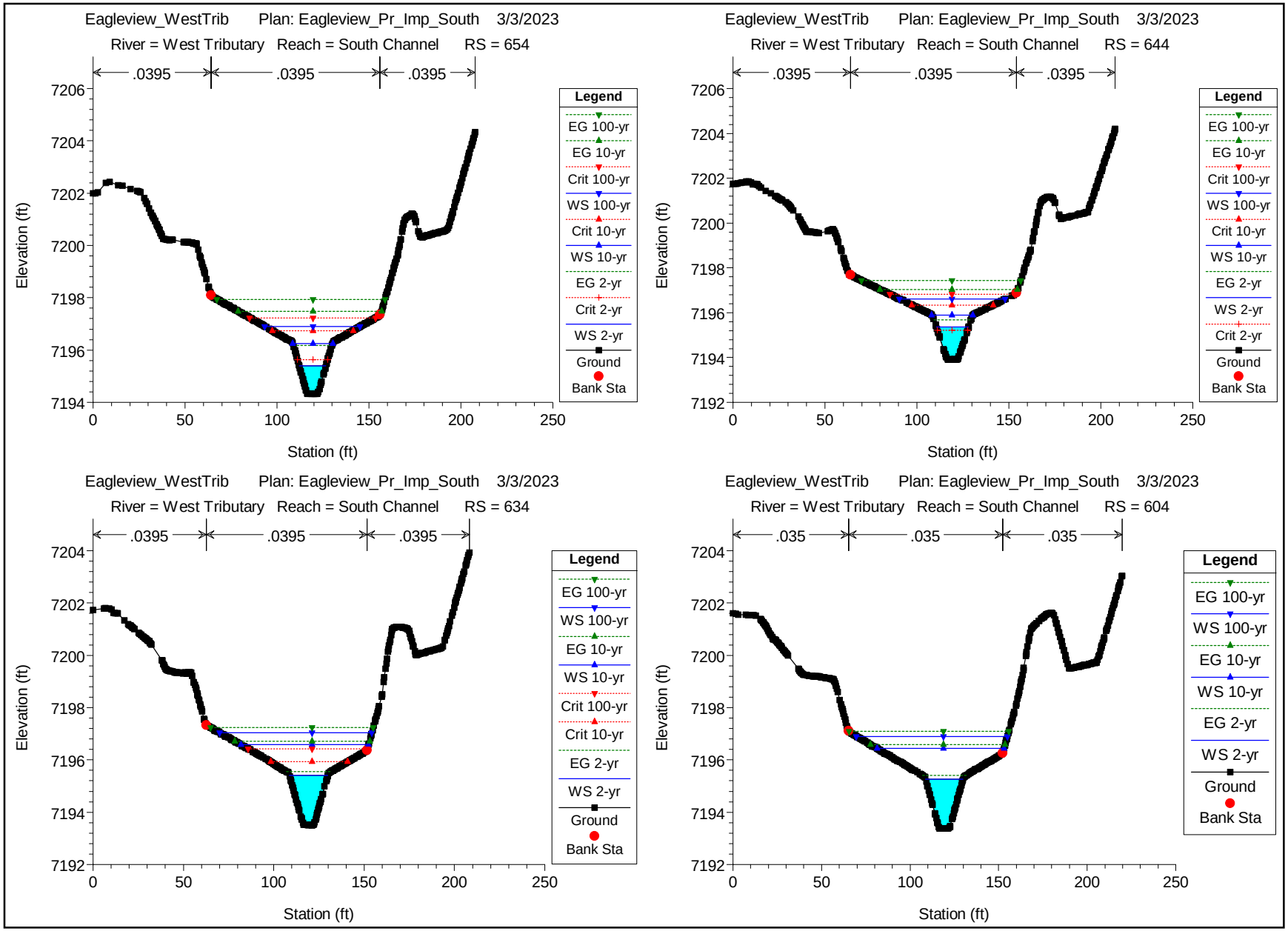

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1406
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1368
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1318
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1268
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

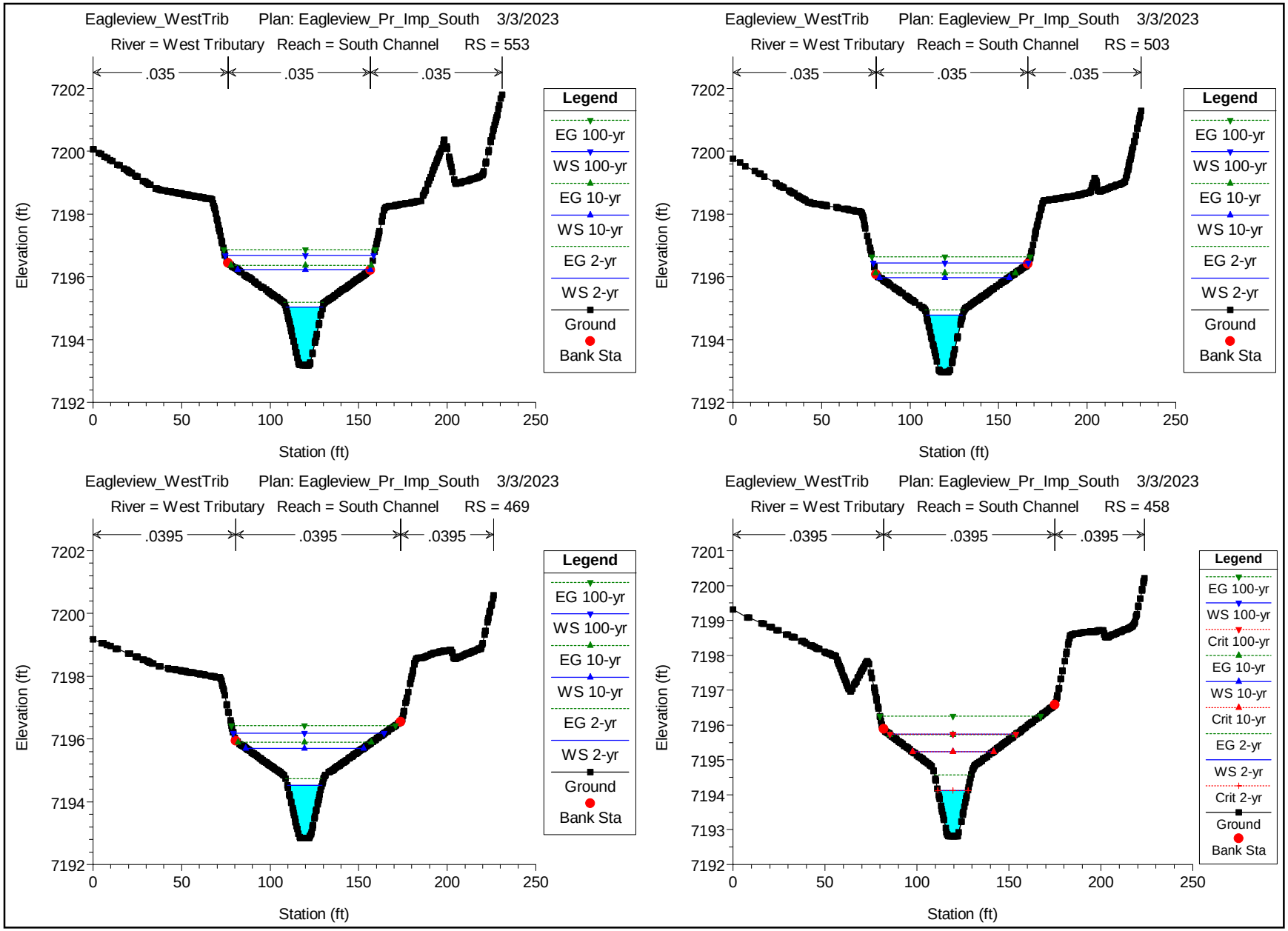

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1188 Culv
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Update to include ineffective areas
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1112
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1090
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1058
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta

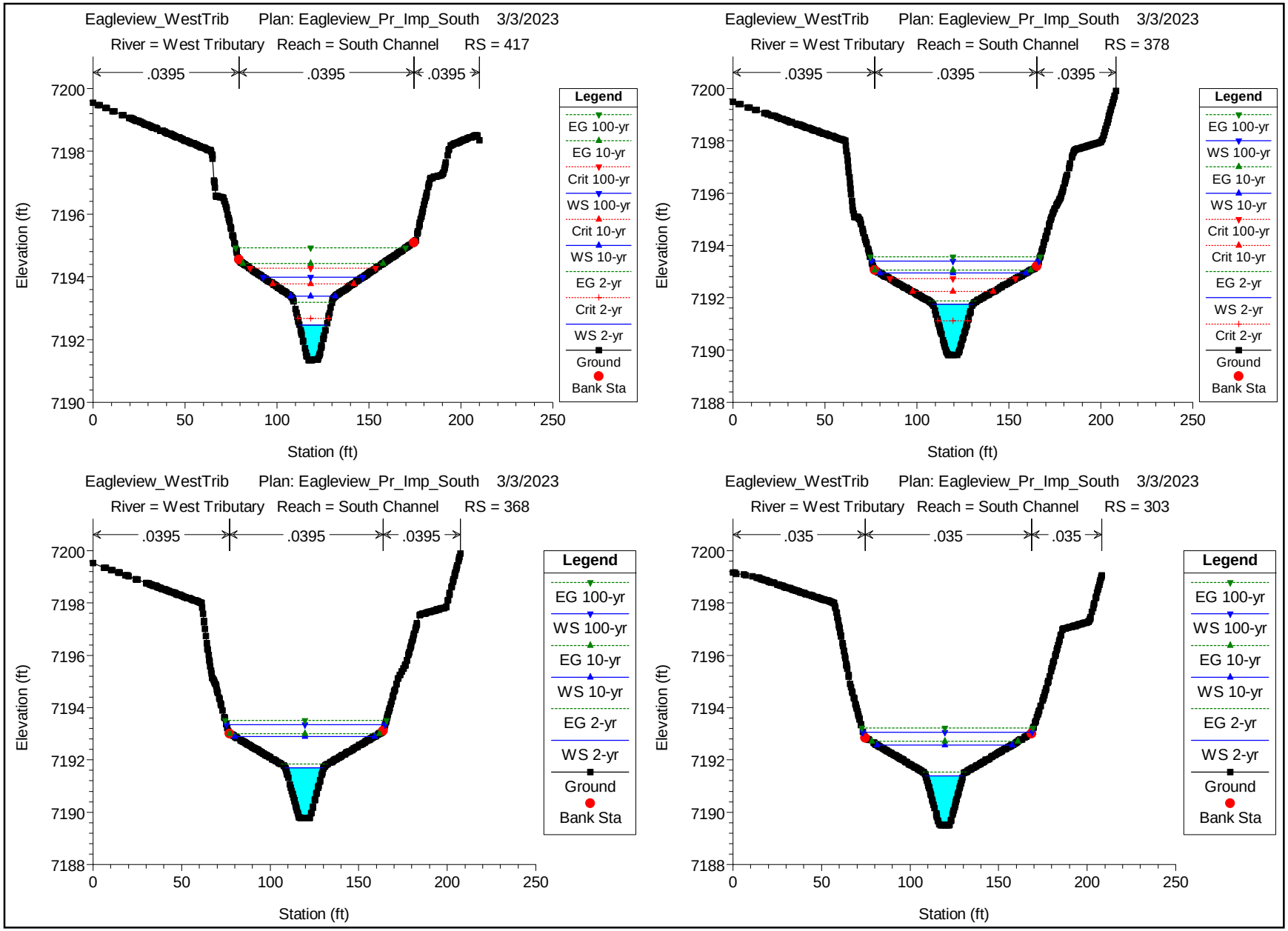

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1030
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1019
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1007
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 961
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta

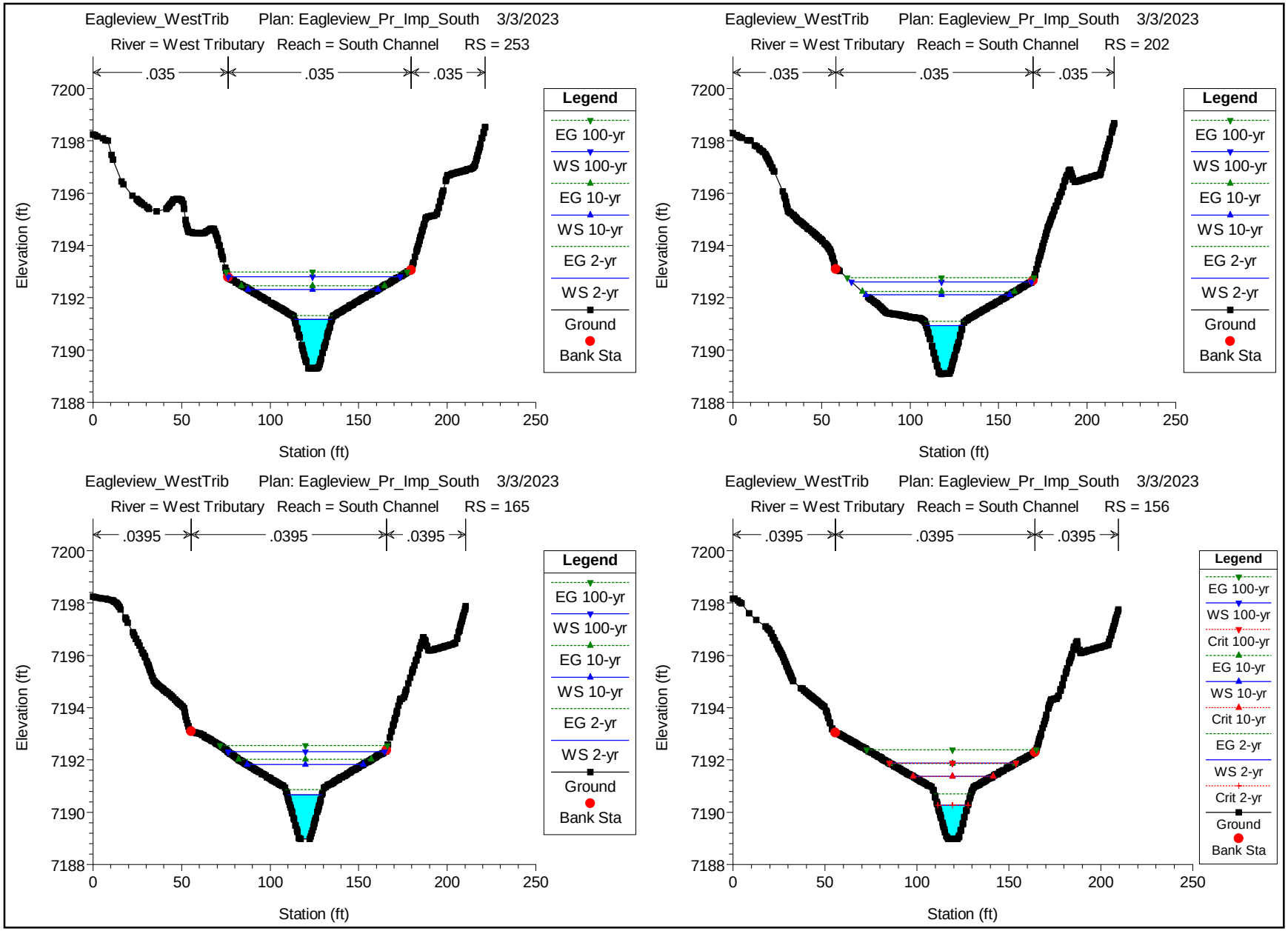

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 944
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 934
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 906
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 856
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta

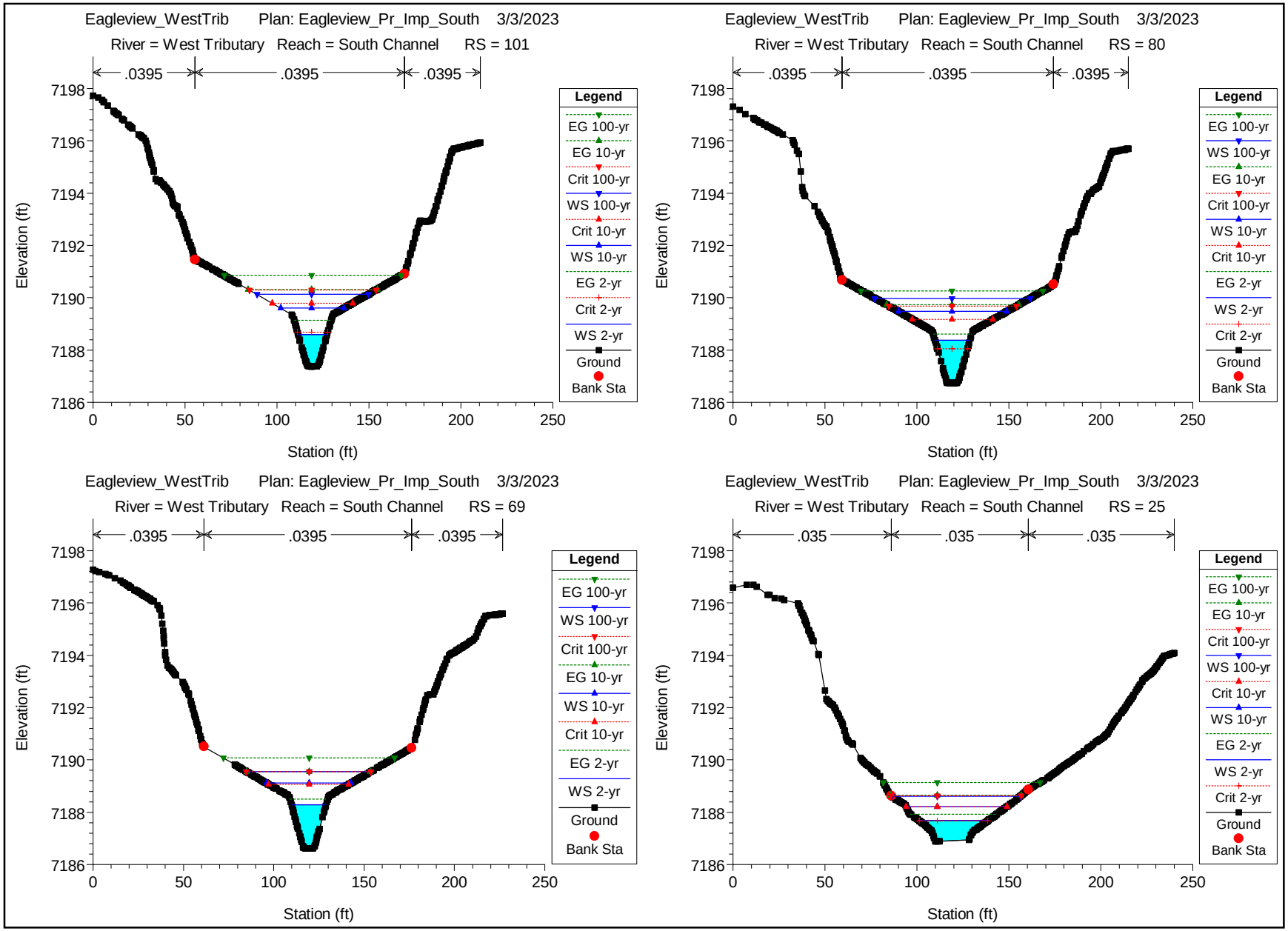

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 805
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 755
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 722
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 712
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

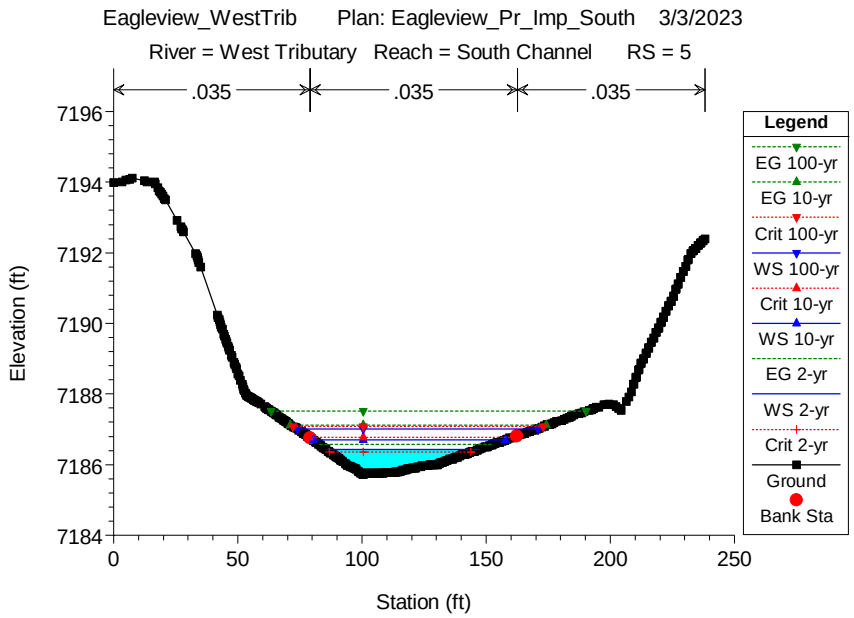

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 654
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 644
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 634
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 604
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 553
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 503
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 469
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 458
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

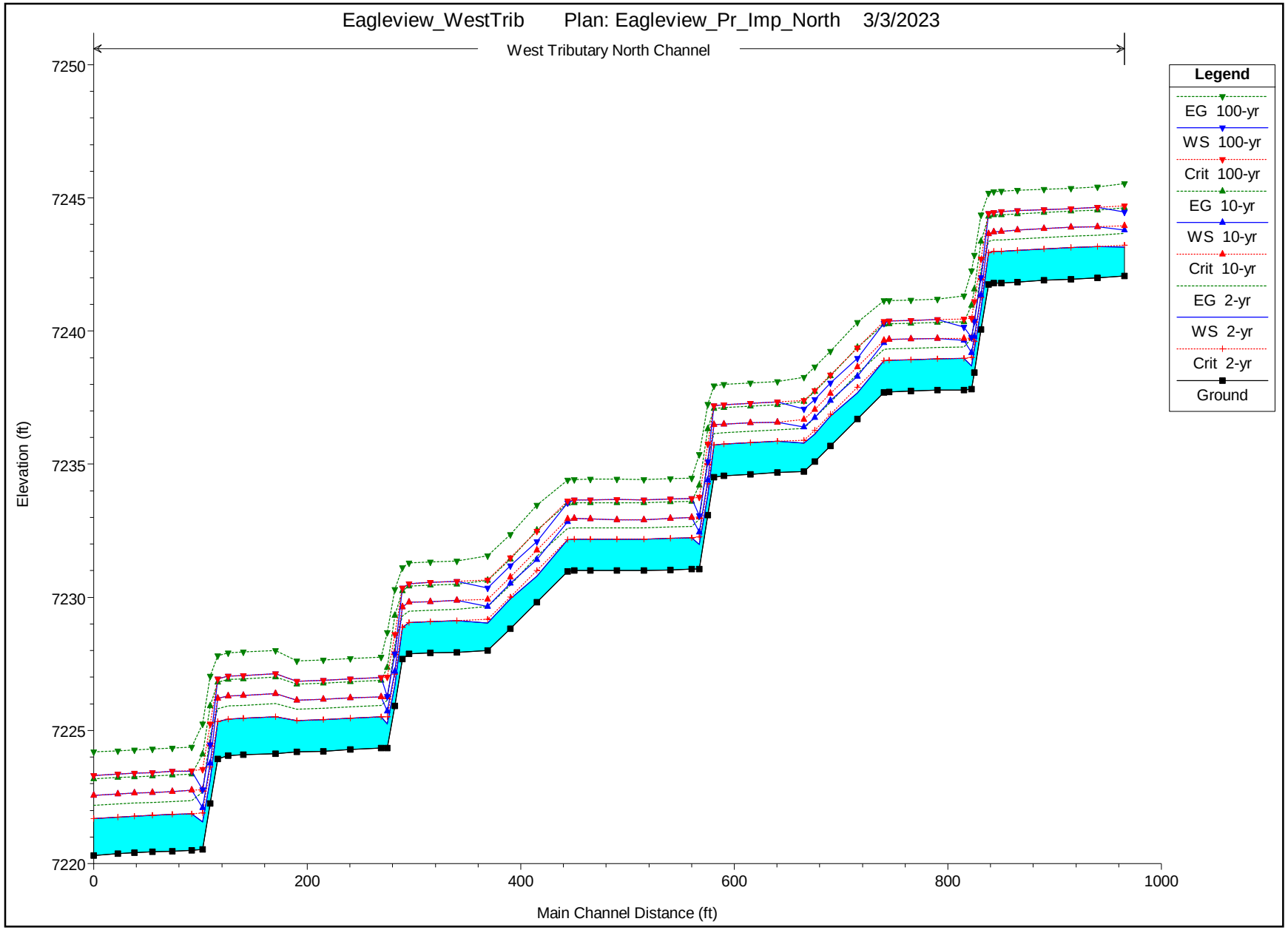

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 417
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 378
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 100-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 368
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 303
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 253
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 202
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 165
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 156
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 101
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 80
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
EG 10-yr
Crit 100-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 69
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 25
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 5
.035
.035
.035
Elevation (ft)
7196
7194
7192
7190
7188
7186
7184
0
50
100
150
200
250
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

HEC-RAS Supercritical Flow Regime Results


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
West Tributary North Channel
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Elevation (ft)
7250
7245
7240
7235
7230
7225
7220
0
200
400
600
800
1000
Main Channel Distance (ft)

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel

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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	1072	2-yr	59.00	7242.06	7243.16	7243.23	7243.67	0.033037	5.74	10.28	12.76	1.13	1.10
North Channel	1072	10-yr	144.00	7242.06	7243.80	7243.96	7244.64	0.033008	7.36	19.58	16.65	1.20	1.74
North Channel	1072	100-yr	285.00	7242.06	7244.46	7244.71	7245.54	0.033028	8.36	34.54	27.18	1.24	2.40
North Channel	1047	2-yr	59.00	7242.00	7243.17	7243.17	7243.61	0.025970	5.28	11.18	13.10	1.01	1.17
North Channel	1047	10-yr	144.00	7242.00	7243.91	7243.91	7244.55	0.022632	6.41	22.47	17.67	1.00	1.91
North Channel	1047	100-yr	285.00	7242.00	7244.65	7244.65	7245.42	0.019071	7.06	41.50	29.21	0.97	2.65
North Channel	1022	2-yr	59.00	7241.94	7243.13	7243.13	7243.56	0.025691	5.26	11.21	13.11	1.00	1.19
North Channel	1022	10-yr	144.00	7241.94	7243.90	7243.90	7244.50	0.021427	6.21	23.18	18.37	0.97	1.96
North Channel	1022	100-yr	285.00	7241.94	7244.60	7244.60	7245.37	0.019428	7.06	41.34	29.39	0.97	2.66
North Channel	997	2-yr	59.00	7241.91	7243.09	7243.09	7243.52	0.025721	5.25	11.23	13.18	1.00	1.18
North Channel	997	10-yr	144.00	7241.91	7243.85	7243.85	7244.45	0.021925	6.22	23.14	18.62	0.98	1.94
North Channel	997	100-yr	285.00	7241.91	7244.56	7244.56	7245.33	0.018821	7.09	41.42	28.84	0.96	2.65
North Channel	972	2-yr	59.00	7241.84	7243.03	7243.03	7243.46	0.025732	5.27	11.21	13.11	1.00	1.19
North Channel	972	10-yr	144.00	7241.84	7243.79	7243.79	7244.40	0.021964	6.29	22.90	18.12	0.99	1.95
North Channel	972	100-yr	285.00	7241.84	7244.52	7244.52	7245.28	0.018428	7.07	41.70	29.07	0.95	2.68
North Channel	957	2-yr	59.00	7241.81	7243.00	7243.00	7243.43	0.067719	5.27	11.20	13.08	1.00	1.19
North Channel	957	10-yr	144.00	7241.81	7243.73	7243.73	7244.37	0.059807	6.39	22.54	17.87	1.00	1.92
North Channel	957	100-yr	285.00	7241.81	7244.48	7244.48	7245.25	0.048855	7.09	41.61	29.17	0.96	2.67
North Channel	950	2-yr	59.00	7241.81	7242.99	7242.99	7243.42	0.067990	5.26	11.21	13.15	1.01	1.18
North Channel	950	10-yr	144.00	7241.81	7243.73	7243.73	7244.36	0.059388	6.35	22.66	18.03	1.00	1.92
North Channel	950	100-yr	285.00	7241.81	7244.46	7244.46	7245.23	0.050610	7.10	41.29	29.09	0.97	2.65
North Channel	945	2-yr	59.00	7241.75	7242.94	7242.94	7243.37	0.067611	5.25	11.24	13.19	1.00	1.19
North Channel	945	10-yr	144.00	7241.75	7243.65	7243.65	7244.31	0.062006	6.51	22.12	17.48	1.02	1.90
North Channel	945	100-yr	285.00	7241.75	7244.41	7244.41	7245.18	0.051291	7.10	41.15	28.92	0.98	2.66
North Channel	938	2-yr	59.00	7240.06	7240.81	7241.25	7242.31	0.397409	9.83	6.00	10.45	2.28	0.75
North Channel	938	10-yr	144.00	7240.06	7241.36	7242.00	7243.36	0.288150	11.36	12.68	13.84	2.09	1.30
North Channel	938	100-yr	285.00	7240.06	7242.02	7242.72	7244.36	0.224435	12.27	23.22	18.65	1.94	1.96
North Channel	932	2-yr	59.00	7238.44	7239.31	7239.62	7240.29	0.214556	7.93	7.44	11.22	1.72	0.87
North Channel	932	10-yr	144.00	7238.44	7239.79	7240.40	7241.58	0.244684	10.73	13.42	14.10	1.94	1.35
North Channel	932	100-yr	285.00	7238.44	7240.36	7241.10	7242.85	0.236082	12.67	22.49	17.88	1.99	1.92
North Channel	929	2-yr	59.00	7237.81	7238.69	7239.02	7239.73	0.232692	8.17	7.22	11.03	1.78	0.88
North Channel	929	10-yr	144.00	7237.81	7239.18	7239.74	7240.97	0.242333	10.71	13.45	14.05	1.93	1.37
North Channel	929	100-yr	285.00	7237.81	7239.75	7240.49	7242.26	0.235747	12.69	22.45	17.75	1.99	1.94

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	922	2-yr	59.00	7237.78	7238.97	7238.97	7239.40	0.025394	5.25	11.24	13.10	1.00	1.19
North Channel	922	10-yr	144.00	7237.78	7239.64	7239.73	7240.35	0.025813	6.72	21.42	17.34	1.07	1.86
North Channel	922	100-yr	285.00	7237.78	7240.15	7240.45	7241.33	0.037333	8.74	33.04	26.73	1.31	2.37
North Channel	897	2-yr	59.00	7237.78	7238.95	7238.95	7239.38	0.025913	5.27	11.19	13.15	1.01	1.17
North Channel	897	10-yr	144.00	7237.78	7239.73	7239.73	7240.32	0.021103	6.19	23.26	18.34	0.97	1.95
North Channel	897	100-yr	285.00	7237.78	7240.43	7240.43	7241.19	0.018737	7.02	41.68	29.23	0.96	2.65
North Channel	872	2-yr	59.00	7237.75	7238.92	7238.92	7239.35	0.026039	5.29	11.16	13.07	1.01	1.17
North Channel	872	10-yr	144.00	7237.75	7239.71	7239.71	7240.29	0.021814	6.14	23.44	19.14	0.98	1.96
North Channel	872	100-yr	285.00	7237.75	7240.39	7240.39	7241.16	0.019372	7.06	41.33	29.08	0.97	2.64
North Channel	852	2-yr	59.00	7237.72	7238.91	7238.91	7239.34	0.024984	5.25	11.23	13.15	1.00	1.19
North Channel	852	10-yr	144.00	7237.72	7239.68	7239.68	7240.28	0.020628	6.20	23.23	18.28	0.97	1.96
North Channel	852	100-yr	285.00	7237.72	7240.38	7240.38	7241.15	0.018687	7.08	41.34	29.06	0.97	2.66
North Channel	847	2-yr	59.00	7237.69	7238.89	7238.89	7239.32	0.024900	5.26	11.23	13.10	1.00	1.20
North Channel	847	10-yr	144.00	7237.69	7239.57	7239.65	7240.26	0.024737	6.68	21.54	17.33	1.06	1.88
North Channel	847	100-yr	285.00	7237.69	7240.29	7240.37	7241.14	0.021317	7.43	39.43	28.59	1.03	2.60
North Channel	822	2-yr	59.00	7236.70	7237.67	7237.88	7238.41	0.052863	6.86	8.59	11.82	1.42	0.97
North Channel	822	10-yr	144.00	7236.70	7238.29	7238.65	7239.39	0.046475	8.41	17.12	15.67	1.42	1.59
North Channel	822	100-yr	285.00	7236.70	7238.97	7239.36	7240.32	0.046408	9.35	30.68	25.93	1.46	2.27
North Channel	797	2-yr	59.00	7235.69	7236.80	7236.88	7237.32	0.033015	5.81	10.16	12.65	1.14	1.11
North Channel	797	10-yr	144.00	7235.69	7237.39	7237.65	7238.31	0.036090	7.69	18.73	16.25	1.26	1.70
North Channel	797	100-yr	285.00	7235.69	7238.05	7238.35	7239.23	0.037420	8.75	32.90	26.65	1.33	2.36
North Channel	782	2-yr	59.00	7235.09	7236.13	7236.28	7236.75	0.042347	6.35	9.29	12.17	1.28	1.04
North Channel	782	10-yr	144.00	7235.09	7236.75	7237.05	7237.74	0.039398	7.96	18.10	15.91	1.32	1.66
North Channel	782	100-yr	285.00	7235.09	7237.43	7237.76	7238.66	0.038381	8.90	32.45	26.57	1.34	2.34
North Channel	772	2-yr	59.00	7234.72	7235.80	7235.90	7236.35	0.035508	5.96	9.90	12.51	1.18	1.08
North Channel	772	10-yr	144.00	7234.72	7236.39	7236.68	7237.35	0.038364	7.87	18.30	16.04	1.30	1.67
North Channel	772	100-yr	285.00	7234.72	7237.06	7237.39	7238.27	0.038376	8.82	32.63	26.62	1.34	2.34
North Channel	747	2-yr	59.00	7234.69	7235.86	7235.86	7236.29	0.025412	5.23	11.28	13.21	1.00	1.17
North Channel	747	10-yr	144.00	7234.69	7236.57	7236.57	7237.23	0.023573	6.51	22.14	17.56	1.02	1.88
North Channel	747	100-yr	285.00	7234.69	7237.34	7237.34	7238.10	0.019087	7.05	41.48	29.11	0.97	2.65
North Channel	722	2-yr	59.00	7234.62	7235.80	7235.80	7236.23	0.025982	5.27	11.19	13.14	1.01	1.18
North Channel	722	10-yr	144.00	7234.62	7236.56	7236.56	7237.17	0.022156	6.29	22.91	18.26	0.99	1.94

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	722	100-yr	285.00	7234.62	7237.28	7237.28	7238.05	0.018892	7.09	41.44	29.16	0.96	2.66
North Channel	697	2-yr	59.00	7234.57	7235.75	7235.75	7236.19	0.069568	5.30	11.14	13.18	1.02	1.18
North Channel	697	10-yr	144.00	7234.57	7236.51	7236.51	7237.13	0.057850	6.31	22.82	17.96	0.99	1.94
North Channel	697	100-yr	285.00	7234.57	7237.24	7237.24	7238.00	0.048996	7.09	41.61	29.17	0.96	2.67
North Channel	688	2-yr	59.00	7234.51	7235.71	7235.71	7236.14	0.067188	5.26	11.21	12.99	1.00	1.20
North Channel	688	10-yr	144.00	7234.51	7236.48	7236.48	7237.08	0.056987	6.21	23.20	18.48	0.98	1.97
North Channel	688	100-yr	285.00	7234.51	7237.20	7237.20	7237.94	0.048713	7.00	42.20	30.57	0.95	2.69
North Channel	682	2-yr	59.00	7233.08	7233.84	7234.27	7235.27	0.366557	9.57	6.16	10.49	2.20	0.76
North Channel	682	10-yr	144.00	7233.08	7234.40	7235.05	7236.32	0.268801	11.11	12.96	13.88	2.03	1.32
North Channel	682	100-yr	285.00	7233.08	7235.09	7235.75	7237.25	0.248483	11.77	24.22	22.47	2.00	2.01
North Channel	674	2-yr	59.00	7231.06	7231.98	7232.28	7232.93	0.206682	7.82	7.54	11.27	1.69	0.92
North Channel	674	10-yr	144.00	7231.06	7232.46	7233.01	7234.21	0.240134	10.63	13.55	14.21	1.92	1.39
North Channel	674	100-yr	285.00	7231.06	7233.07	7233.76	7235.37	0.212923	12.17	23.42	18.25	1.89	2.01
North Channel	667	2-yr	59.00	7231.06	7232.23	7232.23	7232.67	0.068886	5.28	11.18	13.20	1.01	1.17
North Channel	667	10-yr	144.00	7231.06	7233.00	7233.00	7233.61	0.057566	6.22	23.16	18.60	0.98	1.94
North Channel	667	100-yr	285.00	7231.06	7233.71	7233.71	7234.47	0.051031	7.04	41.37	29.12	0.97	2.65
North Channel	647	2-yr	59.00	7231.03	7232.21	7232.21	7232.64	0.025502	5.25	11.23	13.11	1.00	1.18
North Channel	647	10-yr	144.00	7231.03	7232.96	7232.96	7233.58	0.022148	6.31	22.82	18.10	0.99	1.93
North Channel	647	100-yr	285.00	7231.03	7233.69	7233.69	7234.46	0.018780	7.08	41.52	29.16	0.96	2.66
North Channel	622	2-yr	59.00	7231.00	7232.19	7232.19	7232.62	0.025624	5.25	11.23	13.15	1.00	1.19
North Channel	622	10-yr	144.00	7231.00	7232.92	7232.92	7233.55	0.022629	6.39	22.52	17.80	1.00	1.92
North Channel	622	100-yr	285.00	7231.00	7233.66	7233.66	7234.43	0.019005	7.09	41.37	29.10	0.97	2.66
North Channel	597	2-yr	59.00	7231.00	7232.18	7232.18	7232.62	0.026454	5.31	11.11	13.10	1.02	1.18
North Channel	597	10-yr	144.00	7231.00	7232.91	7232.91	7233.56	0.023273	6.44	22.35	17.84	1.01	1.91
North Channel	597	100-yr	285.00	7231.00	7233.67	7233.67	7234.44	0.018516	7.10	41.55	29.10	0.96	2.67
North Channel	572	2-yr	59.00	7231.00	7232.18	7232.18	7232.62	0.025624	5.27	11.20	13.05	1.00	1.18
North Channel	572	10-yr	144.00	7231.00	7232.94	7232.94	7233.56	0.021817	6.29	22.89	18.02	0.98	1.94
North Channel	572	100-yr	285.00	7231.00	7233.66	7233.66	7234.44	0.019056	7.11	41.26	28.88	0.97	2.66
North Channel	557	2-yr	59.00	7231.00	7232.18	7232.18	7232.62	0.025379	5.29	11.15	13.03	1.01	1.18
North Channel	557	10-yr	144.00	7231.00	7232.96	7232.96	7233.56	0.020673	6.22	23.16	18.15	0.97	1.96
North Channel	557	100-yr	285.00	7231.00	7233.66	7233.66	7234.43	0.018742	7.07	41.35	29.09	0.97	2.66
North Channel	551	2-yr	59.00	7230.97	7232.16	7232.16	7232.59	0.025324	5.30	11.14	13.00	1.01	1.19

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (Continued)

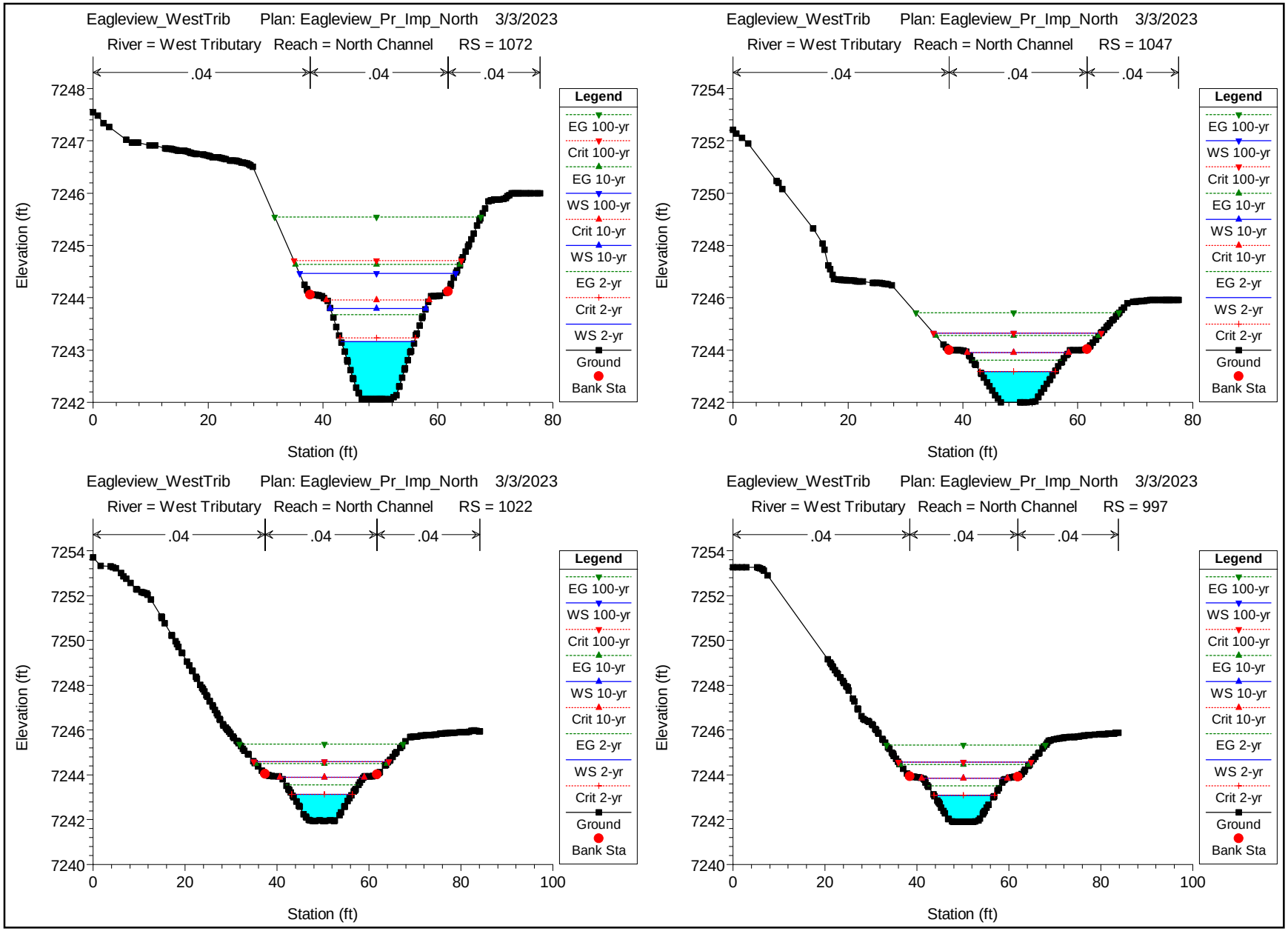
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	551	10-yr	144.00	7230.97	7232.83	7232.94	7233.53	0.025066	6.73	21.40	17.22	1.06	1.86
North Channel	551	100-yr	285.00	7230.97	7233.55	7233.63	7234.41	0.022312	7.49	38.97	28.48	1.05	2.58
North Channel	522	2-yr	59.00	7229.82	7230.80	7231.00	7231.53	0.053092	6.86	8.60	11.92	1.42	0.98
North Channel	522	10-yr	144.00	7229.82	7231.41	7231.77	7232.53	0.046962	8.46	17.03	15.63	1.43	1.59
North Channel	522	100-yr	285.00	7229.82	7232.09	7232.49	7233.46	0.045775	9.38	30.66	26.04	1.46	2.27
North Channel	497	2-yr	59.00	7228.82	7229.93	7230.01	7230.45	0.032382	5.77	10.22	12.64	1.13	1.11
North Channel	497	10-yr	144.00	7228.82	7230.52	7230.77	7231.44	0.035985	7.70	18.71	16.16	1.26	1.70
North Channel	497	100-yr	285.00	7228.82	7231.18	7231.49	7232.37	0.037175	8.76	32.93	26.75	1.32	2.36
North Channel	476	2-yr	59.00	7228.00	7229.03	7229.18	7229.66	0.042583	6.36	9.28	12.20	1.28	1.03
North Channel	476	10-yr	144.00	7228.00	7229.66	7229.93	7230.64	0.039396	7.95	18.12	15.96	1.32	1.66
North Channel	476	100-yr	285.00	7228.00	7230.34	7230.66	7231.55	0.039209	8.83	32.52	26.57	1.35	2.34
North Channel	447	2-yr	59.00	7227.94	7229.11	7229.11	7229.56	0.026423	5.32	11.08	13.04	1.02	1.17
North Channel	447	10-yr	144.00	7227.94	7229.89	7229.89	7230.50	0.021332	6.22	23.15	18.26	0.97	1.95
North Channel	447	100-yr	285.00	7227.94	7230.59	7230.59	7231.36	0.019414	7.08	41.24	29.06	0.97	2.65
North Channel	422	2-yr	59.00	7227.91	7229.08	7229.08	7229.52	0.026076	5.28	11.18	13.19	1.01	1.17
North Channel	422	10-yr	144.00	7227.91	7229.84	7229.84	7230.45	0.021760	6.27	22.98	18.21	0.98	1.93
North Channel	422	100-yr	285.00	7227.91	7230.56	7230.56	7231.33	0.018731	7.10	41.47	29.08	0.96	2.65
North Channel	402	2-yr	59.00	7227.87	7229.04	7229.04	7229.48	0.068914	5.28	11.17	13.17	1.01	1.17
North Channel	402	10-yr	144.00	7227.87	7229.82	7229.82	7230.42	0.056760	6.17	23.32	18.69	0.97	1.95
North Channel	402	100-yr	285.00	7227.87	7230.52	7230.52	7231.29	0.050401	7.10	41.34	29.14	0.97	2.64
North Channel	396	2-yr	59.00	7227.68	7228.87	7228.87	7229.30	0.067814	5.26	11.21	13.12	1.00	1.19
North Channel	396	10-yr	144.00	7227.68	7229.64	7229.64	7230.24	0.057123	6.23	23.12	18.40	0.98	1.96
North Channel	396	100-yr	285.00	7227.68	7230.35	7230.35	7231.11	0.050544	7.04	41.46	29.13	0.97	2.67
North Channel	389	2-yr	59.00	7225.93	7226.68	7227.12	7228.22	0.418953	9.96	5.92	10.49	2.34	0.75
North Channel	389	10-yr	144.00	7225.93	7227.22	7227.91	7229.31	0.304738	11.61	12.40	13.64	2.15	1.28
North Channel	389	100-yr	285.00	7225.93	7227.88	7228.60	7230.29	0.227261	12.45	22.89	18.12	1.95	1.95
North Channel	382	2-yr	59.00	7224.34	7225.25	7225.52	7226.13	0.184080	7.53	7.84	11.37	1.60	0.91
North Channel	382	10-yr	144.00	7224.34	7225.73	7226.26	7227.36	0.215492	10.24	14.06	14.36	1.82	1.39
North Channel	382	100-yr	285.00	7224.34	7226.29	7227.00	7228.68	0.225191	12.41	22.97	18.15	1.94	1.95
North Channel	376	2-yr	59.00	7224.34	7225.52	7225.52	7225.95	0.067602	5.26	11.21	13.08	1.00	1.18
North Channel	376	10-yr	144.00	7224.34	7226.25	7226.25	7226.89	0.060206	6.37	22.60	18.06	1.00	1.91
North Channel	376	100-yr	285.00	7224.34	7226.99	7226.99	7227.76	0.049806	7.08	41.53	29.24	0.96	2.65

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	347	2-yr	59.00	7224.28	7225.46	7225.46	7225.89	0.026264	5.29	11.15	13.16	1.01	1.17
North Channel	347	10-yr	144.00	7224.28	7226.23	7226.23	7226.83	0.021436	6.20	23.21	18.44	0.97	1.95
North Channel	347	100-yr	285.00	7224.28	7226.93	7226.93	7227.71	0.018953	7.11	41.36	29.07	0.97	2.65
North Channel	322	2-yr	59.00	7224.22	7225.40	7225.40	7225.83	0.026002	5.28	11.18	13.13	1.01	1.18
North Channel	322	10-yr	144.00	7224.22	7226.17	7226.17	7226.77	0.021590	6.26	23.02	18.14	0.98	1.95
North Channel	322	100-yr	285.00	7224.22	7226.88	7226.88	7227.64	0.019214	7.08	41.36	29.14	0.97	2.65
North Channel	297	2-yr	59.00	7224.19	7225.36	7225.36	7225.80	0.026100	5.28	11.18	13.19	1.01	1.17
North Channel	297	10-yr	144.00	7224.19	7226.13	7226.13	7226.73	0.021646	6.24	23.06	18.28	0.98	1.94
North Channel	297	100-yr	285.00	7224.19	7226.84	7226.84	7227.61	0.018813	7.08	41.53	29.43	0.96	2.65
North Channel	277	2-yr	78.00	7224.12	7225.51	7225.51	7226.00	0.024529	5.61	13.91	14.26	1.00	1.39
North Channel	277	10-yr	189.00	7224.12	7226.38	7226.38	7227.00	0.022220	6.30	30.13	25.77	1.00	2.26
North Channel	277	100-yr	375.00	7224.12	7227.13	7227.13	7228.00	0.017319	7.61	51.63	31.82	0.95	3.01
North Channel	247	2-yr	78.00	7224.09	7225.45	7225.45	7225.94	0.024623	5.61	13.90	14.27	1.00	1.36
North Channel	247	10-yr	189.00	7224.09	7226.32	7226.32	7226.94	0.022712	6.33	29.99	25.74	1.00	2.23
North Channel	247	100-yr	375.00	7224.09	7227.07	7227.07	7227.94	0.017399	7.60	51.57	31.86	0.95	2.98
North Channel	233	2-yr	78.00	7224.06	7225.43	7225.43	7225.92	0.065684	5.61	13.91	14.42	1.01	1.37
North Channel	233	10-yr	189.00	7224.06	7226.29	7226.29	7226.91	0.058523	6.32	30.08	25.84	0.99	2.23
North Channel	233	100-yr	375.00	7224.06	7227.04	7227.04	7227.92	0.045415	7.61	51.72	31.89	0.95	2.98
North Channel	223	2-yr	78.00	7223.93	7225.33	7225.33	7225.81	0.065089	5.59	13.95	14.40	1.00	1.40
North Channel	223	10-yr	189.00	7223.93	7226.20	7226.20	7226.81	0.057308	6.27	30.35	26.06	0.98	2.27
North Channel	223	100-yr	375.00	7223.93	7226.94	7226.94	7227.81	0.045566	7.60	51.73	31.98	0.95	3.01
North Channel	216	2-yr	78.00	7222.25	7223.12	7223.62	7224.81	0.370155	10.42	7.48	11.28	2.26	0.87
North Channel	216	10-yr	189.00	7222.25	7223.77	7224.49	7225.93	0.257580	11.78	16.04	15.19	2.02	1.52
North Channel	216	100-yr	375.00	7222.25	7224.46	7225.24	7227.04	0.250425	12.88	29.26	25.65	2.05	2.21
North Channel	209	2-yr	78.00	7220.53	7221.56	7221.91	7222.68	0.208072	8.47	9.21	12.26	1.72	1.03
North Channel	209	10-yr	189.00	7220.53	7222.10	7222.78	7224.11	0.235363	11.39	16.59	15.43	1.94	1.57
North Channel	209	100-yr	375.00	7220.53	7222.77	7223.54	7225.25	0.237684	12.64	29.83	25.81	2.00	2.24
North Channel	199	2-yr	78.00	7220.50	7221.87	7221.87	7222.37	0.025034	5.65	13.81	14.23	1.01	1.37
North Channel	199	10-yr	189.00	7220.50	7222.76	7222.76	7223.37	0.021980	6.27	30.30	25.92	0.99	2.26
North Channel	199	100-yr	375.00	7220.50	7223.46	7223.49	7224.37	0.018327	7.73	50.64	31.63	0.97	2.96
North Channel	180	2-yr	78.00	7220.47	7221.85	7221.85	7222.33	0.024516	5.60	13.94	14.32	1.00	1.38
North Channel	180	10-yr	189.00	7220.47	7222.71	7222.71	7223.33	0.022298	6.31	30.11	25.87	1.00	2.24
North Channel	180	100-yr	375.00	7220.47	7223.46	7223.46	7224.34	0.017276	7.60	51.66	31.81	0.95	2.99

HEC-RAS Plan: Pr_Imp_N River: West Tributary Reach: North Channel (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	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
North Channel	162	2-yr	78.00	7220.44	7221.81	7221.81	7222.30	0.024857	5.63	13.85	14.27	1.01	1.37
North Channel	162	10-yr	189.00	7220.44	7222.68	7222.68	7223.30	0.022636	6.32	30.02	25.85	1.00	2.23
North Channel	162	100-yr	375.00	7220.44	7223.42	7223.42	7224.30	0.017375	7.60	51.59	31.81	0.95	2.98
North Channel	145	2-yr	78.00	7220.41	7221.78	7221.78	7222.27	0.024967	5.63	13.85	14.31	1.01	1.37
North Channel	145	10-yr	189.00	7220.41	7222.64	7222.64	7223.26	0.022741	6.32	30.01	25.79	1.00	2.23
North Channel	145	100-yr	375.00	7220.41	7223.39	7223.39	7224.27	0.017421	7.59	51.55	31.87	0.95	2.98
North Channel	130	2-yr	78.00	7220.38	7221.75	7221.75	7222.24	0.024606	5.60	13.94	14.38	1.00	1.37
North Channel	130	10-yr	189.00	7220.38	7222.61	7222.61	7223.23	0.022929	6.32	30.04	25.91	1.01	2.23
North Channel	130	100-yr	375.00	7220.38	7223.37	7223.37	7224.23	0.017181	7.54	51.89	31.90	0.95	2.99
North Channel	107	2-yr	78.00	7220.31	7221.69	7221.69	7222.18	0.024981	5.64	13.83	14.26	1.01	1.38
North Channel	107	10-yr	189.00	7220.31	7222.55	7222.55	7223.18	0.022433	6.35	29.92	25.81	1.00	2.24
North Channel	107	100-yr	375.00	7220.31	7223.31	7223.31	7224.19	0.017146	7.61	51.69	31.76	0.95	3.00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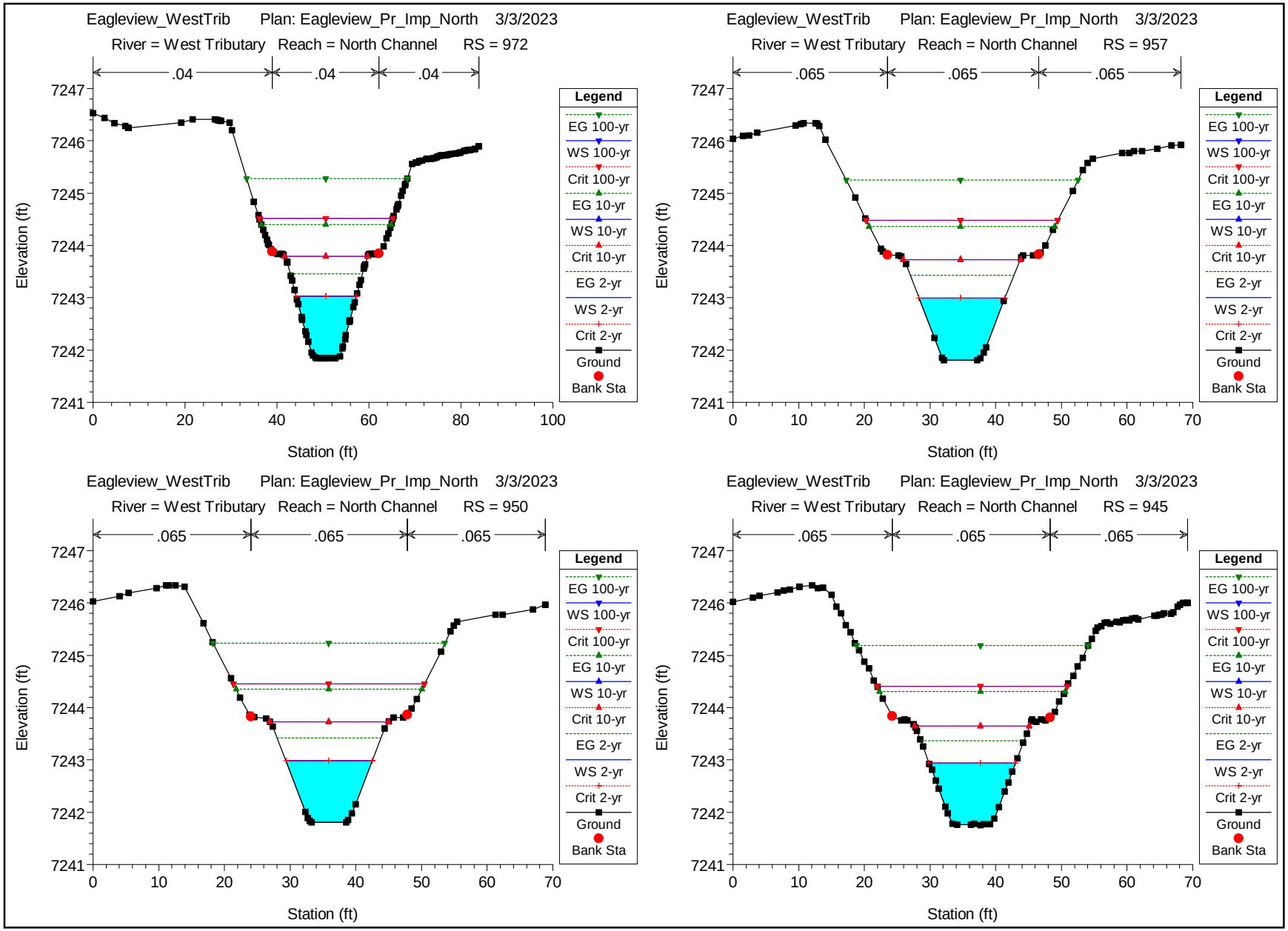
River = West Tributary Reach = North Channel RS = 1072
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 1047
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 1022
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 997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River = West Tributary Reach = North Channel RS = 972
.04
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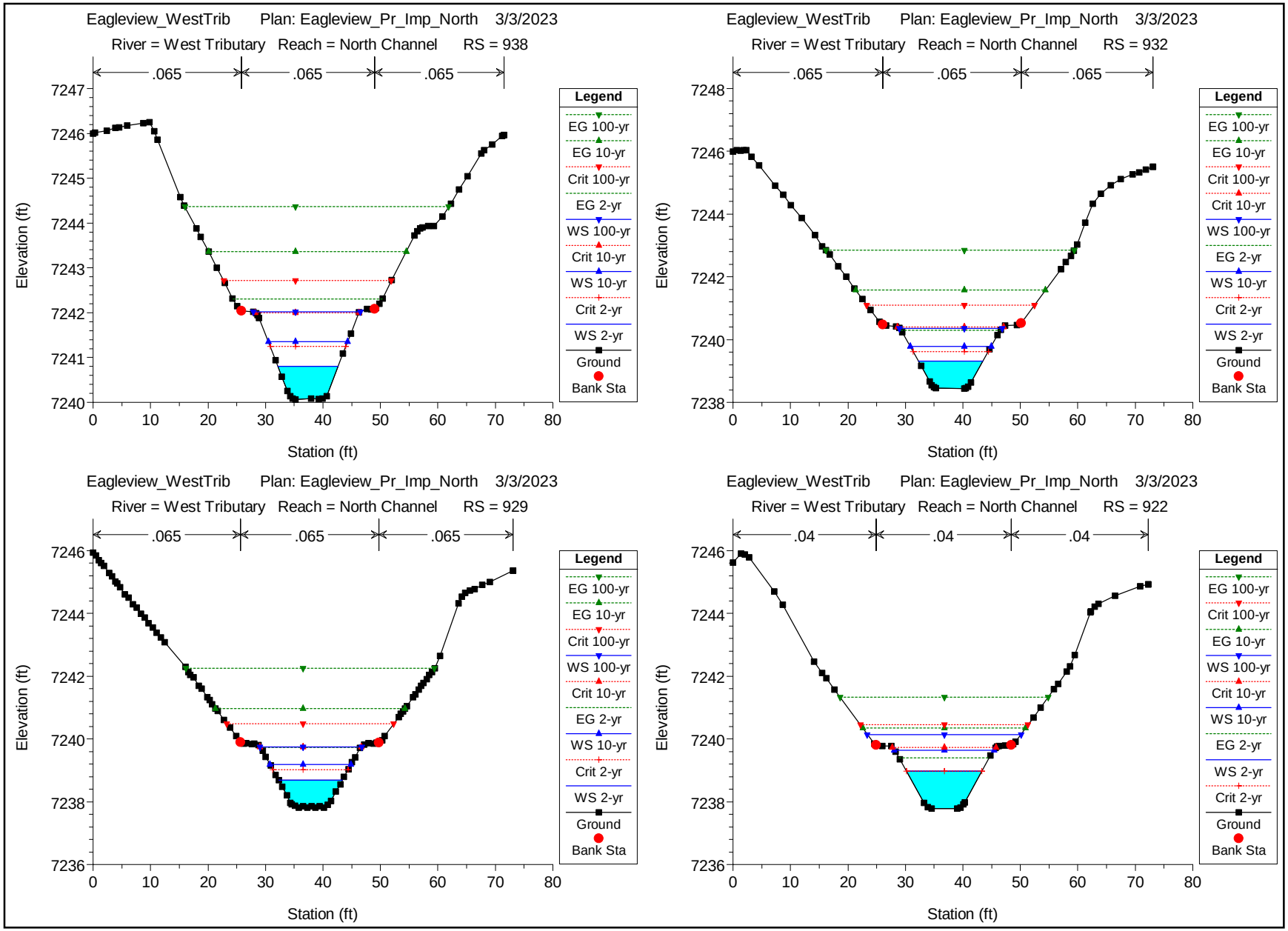
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 957
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 950
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 945
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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River = West Tributary Reach = North Channel RS = 938
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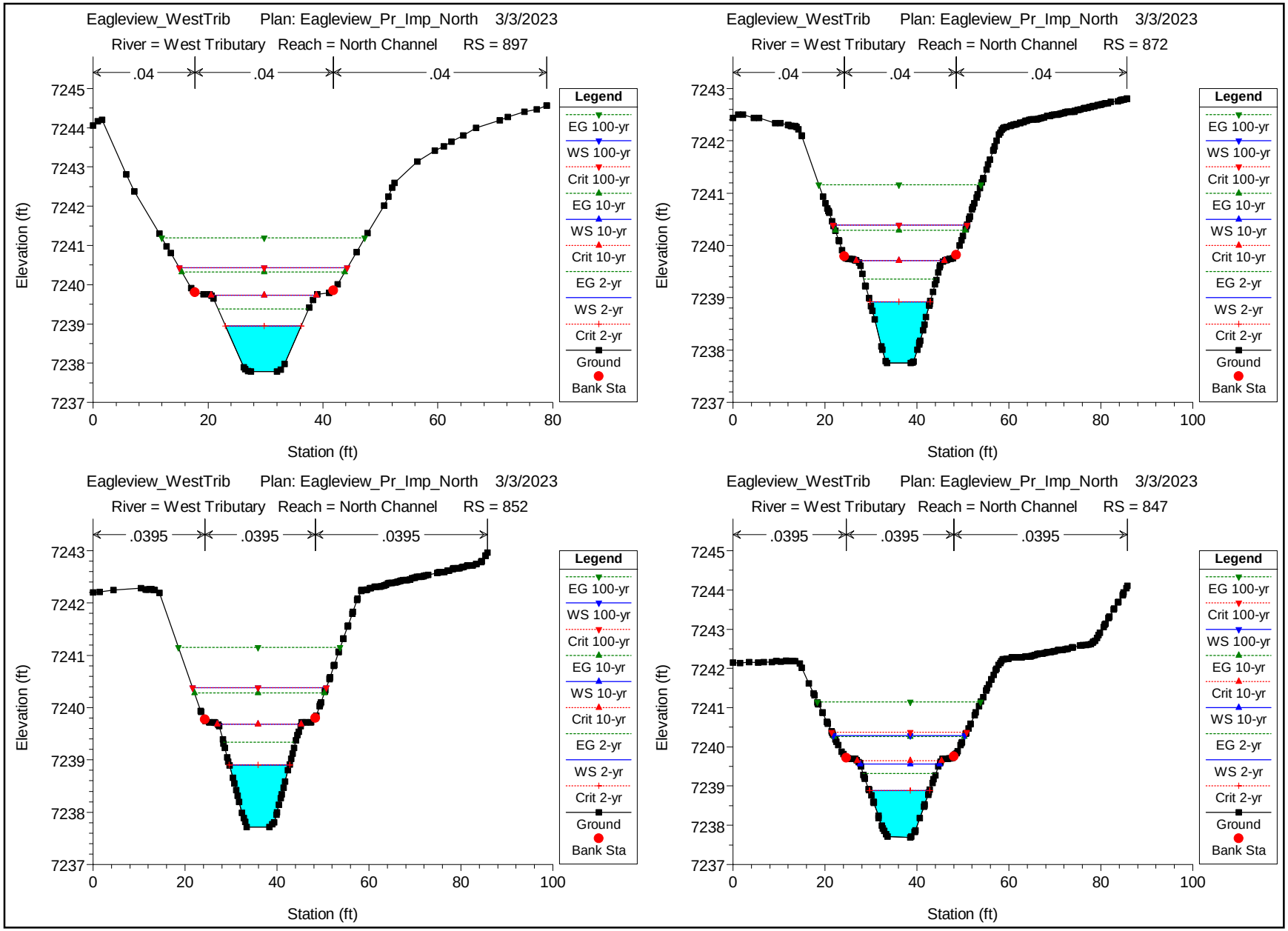
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
WS 100-yr
Crit 10-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 932
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
Crit 10-yr
WS 100-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 929
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 922
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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River = West Tributary Reach = North Channel RS = 897
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.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 872
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 852
.0395
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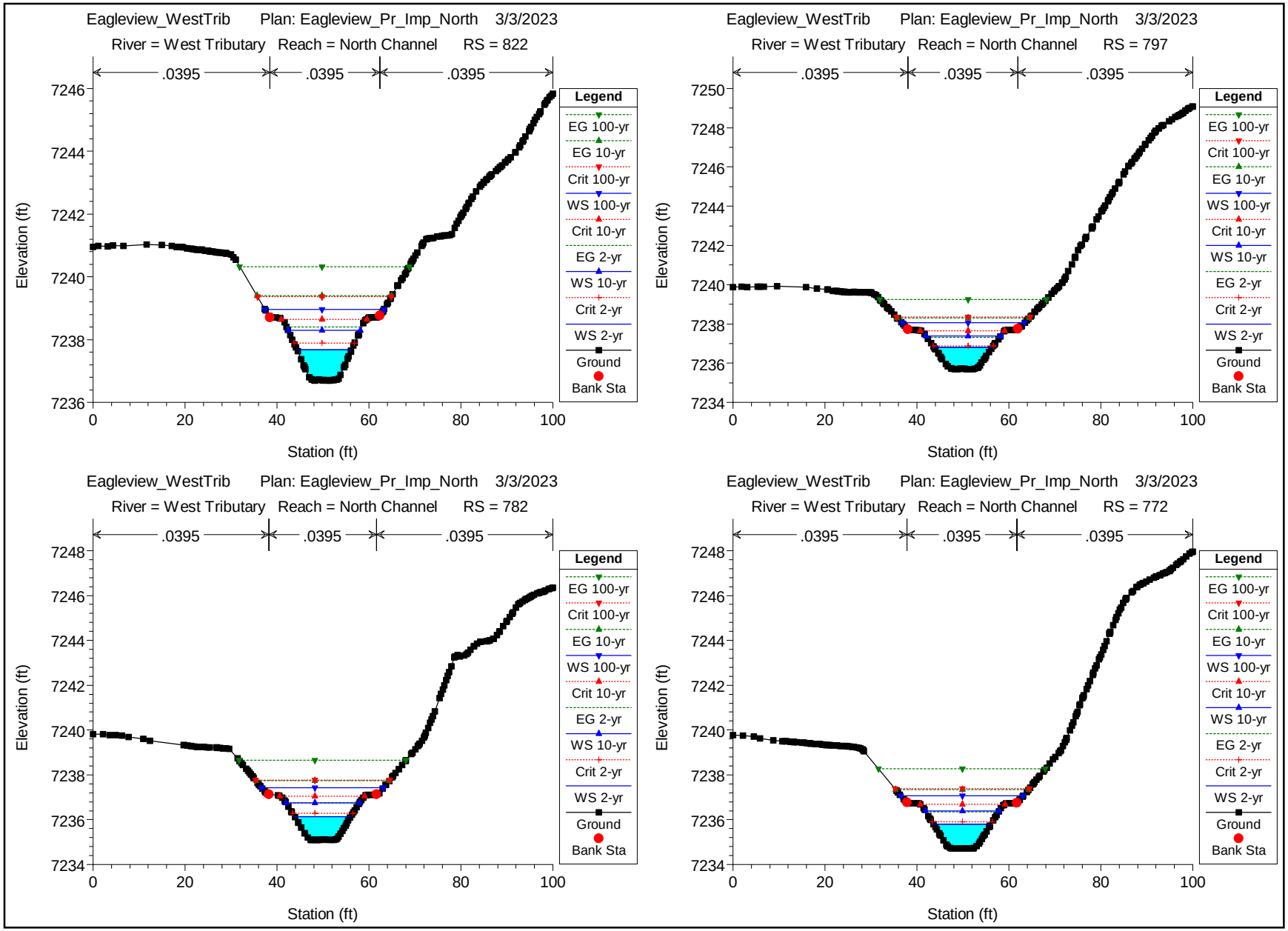
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 847
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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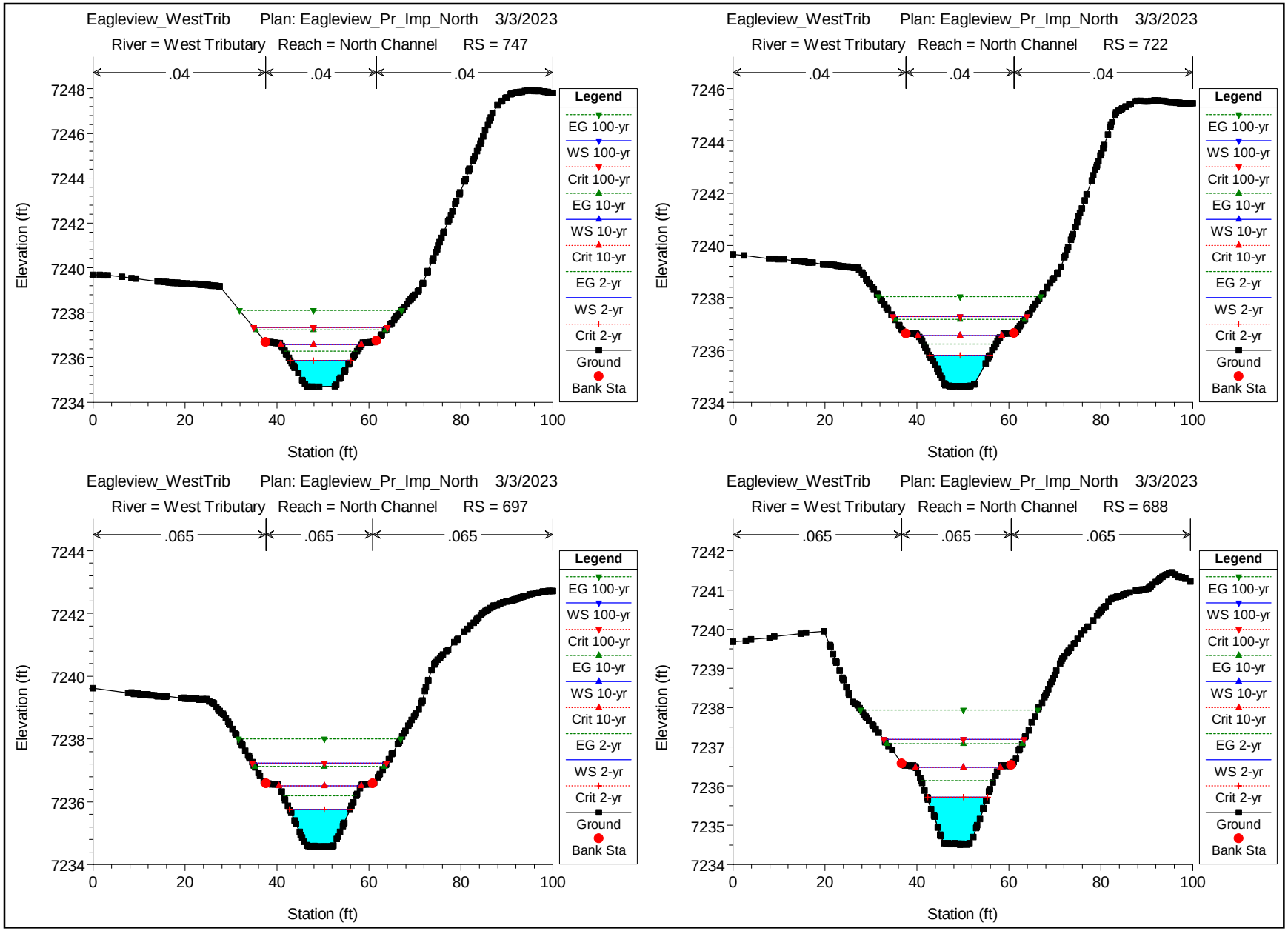
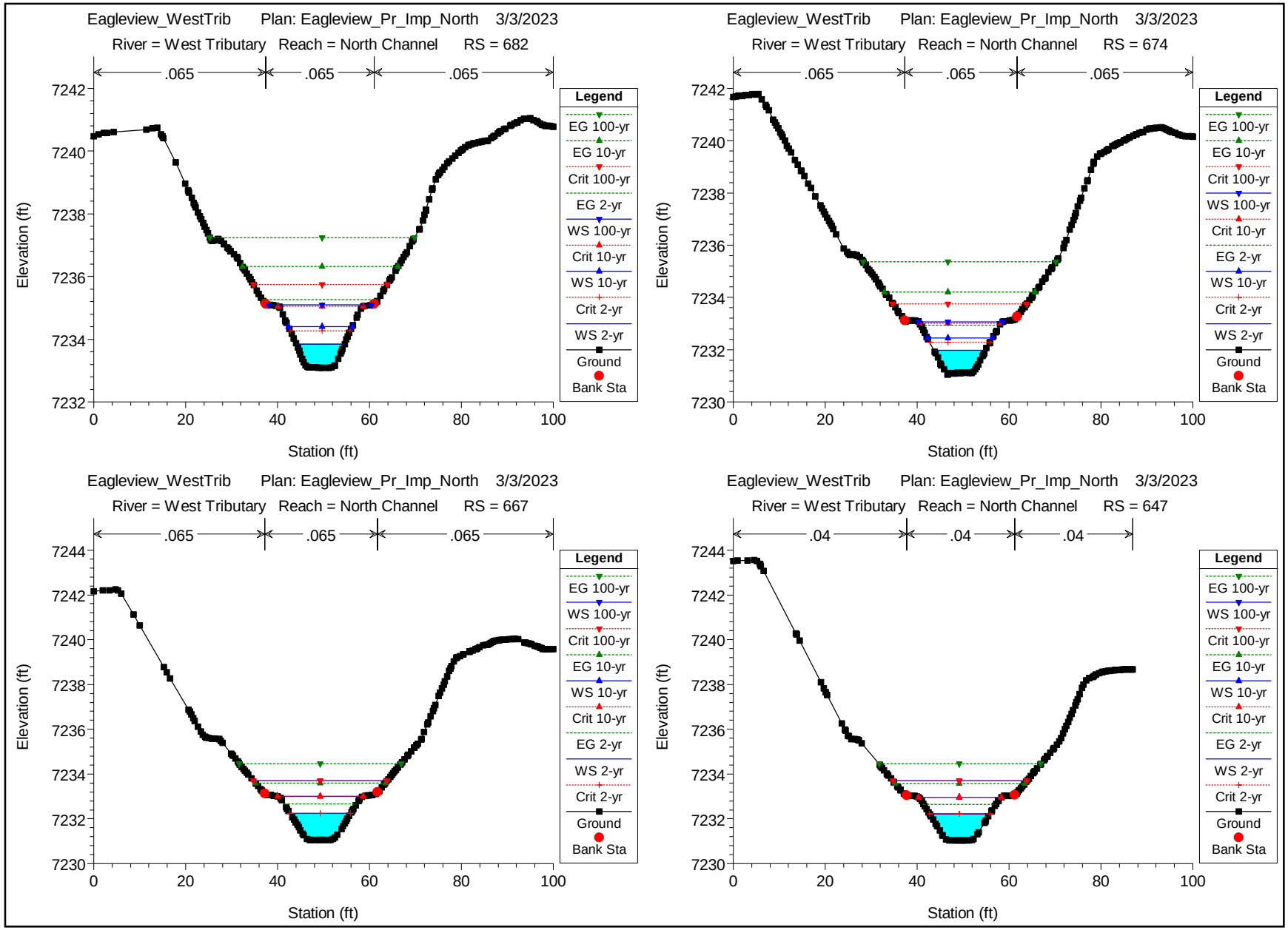
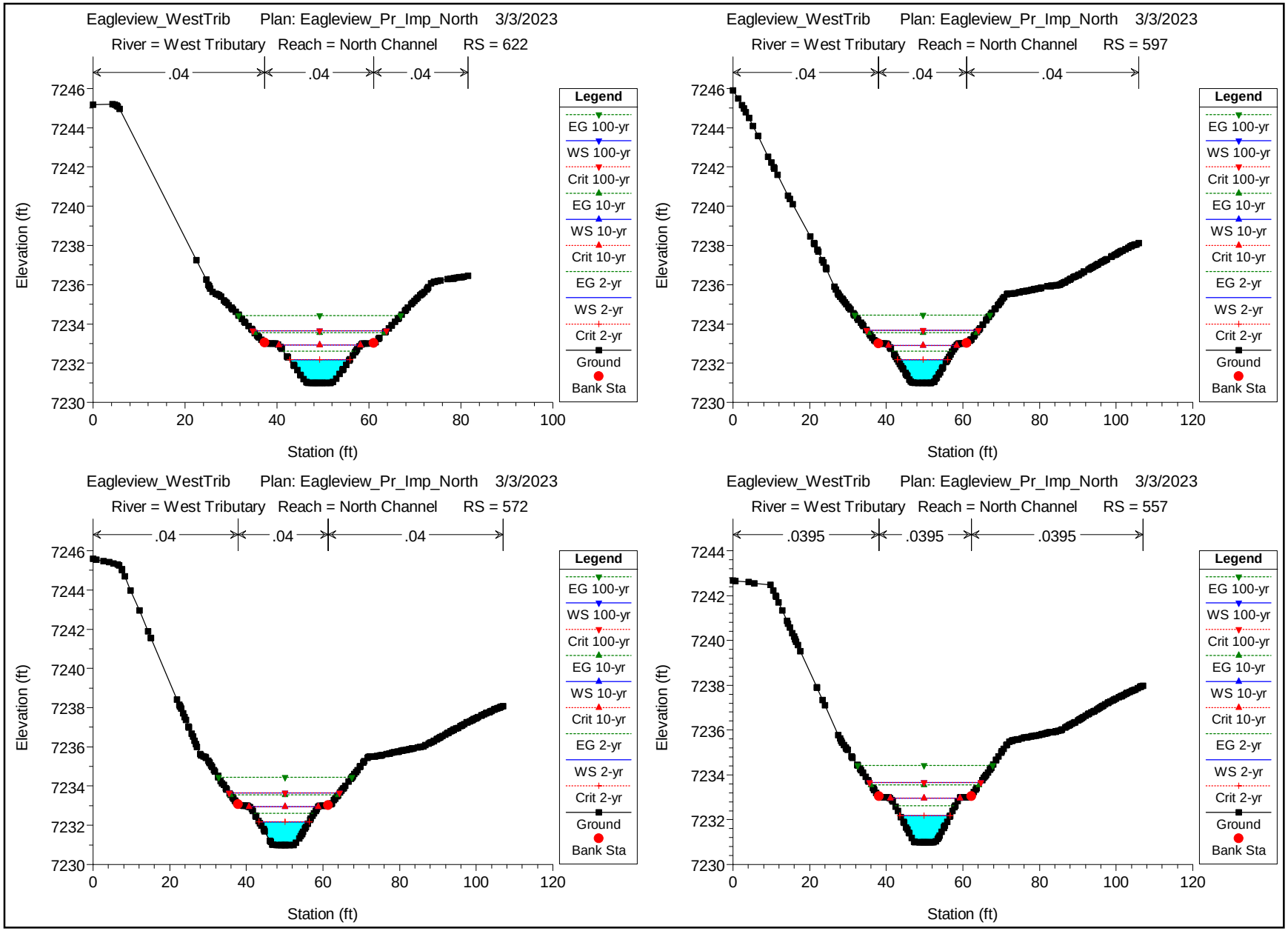
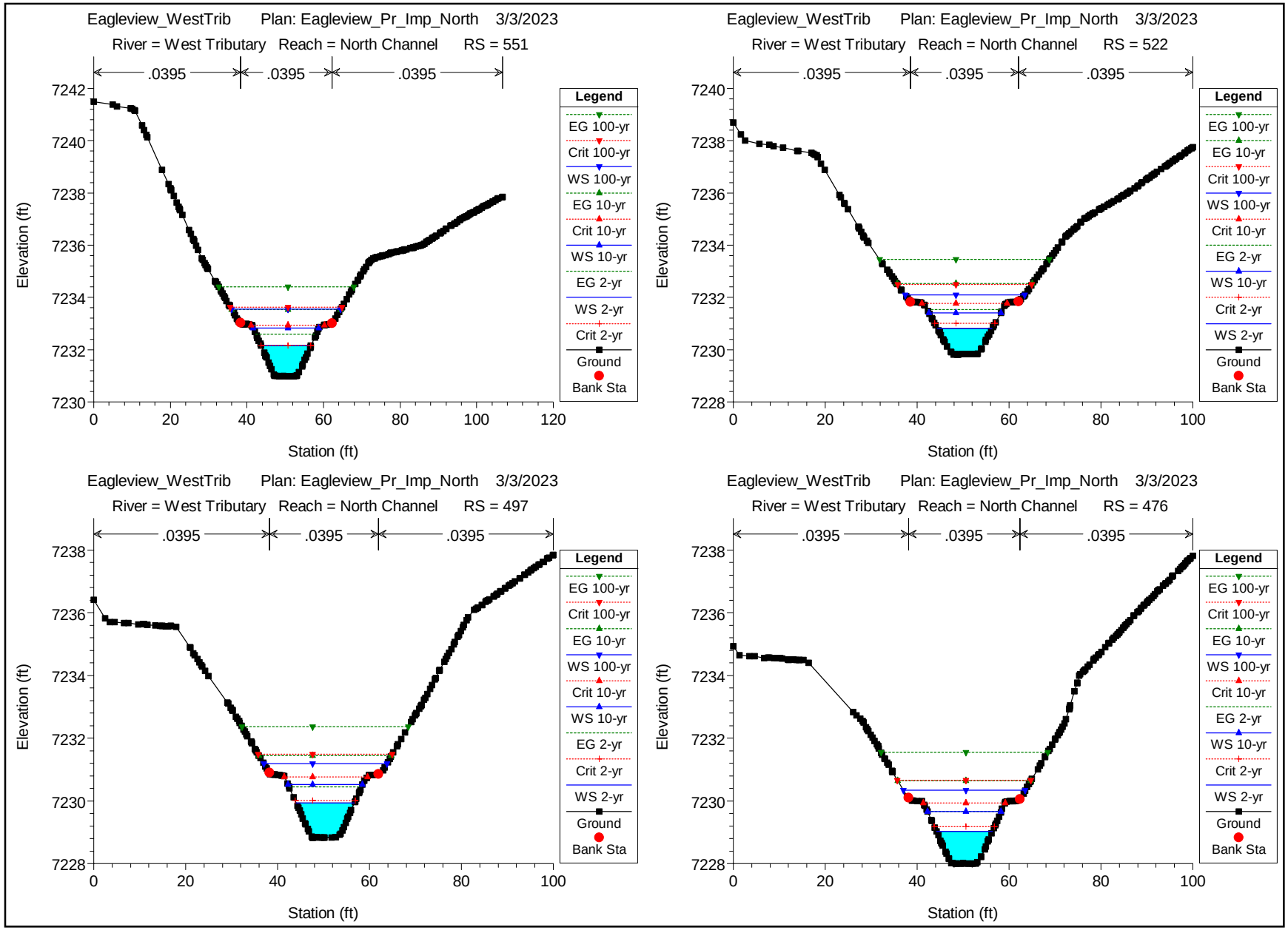
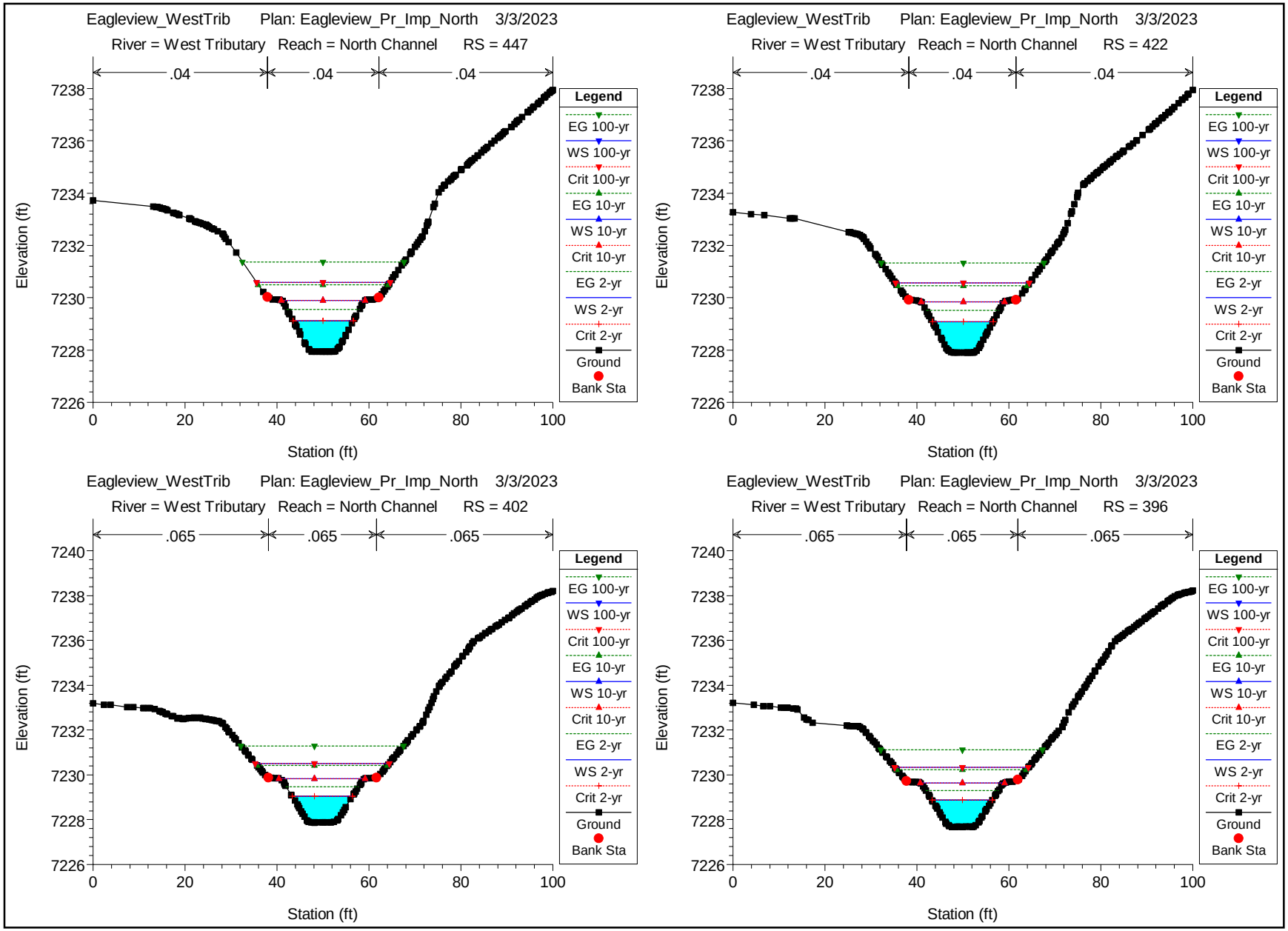
River = West Tributary Reach = North Channel RS = 822
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 797
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 782
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 772
.0395 .0395 .0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta

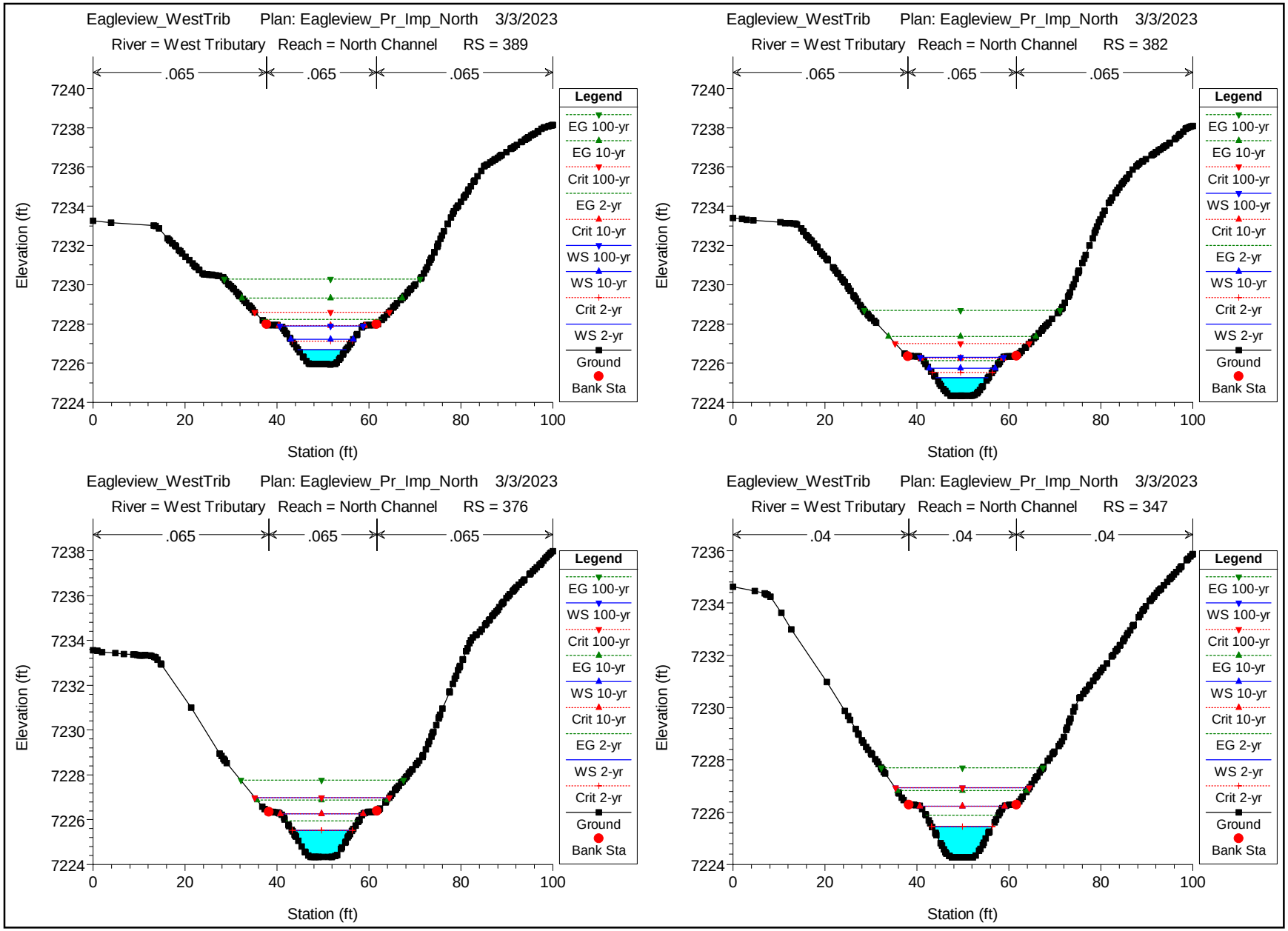

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 747
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 722
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 697
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 688
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

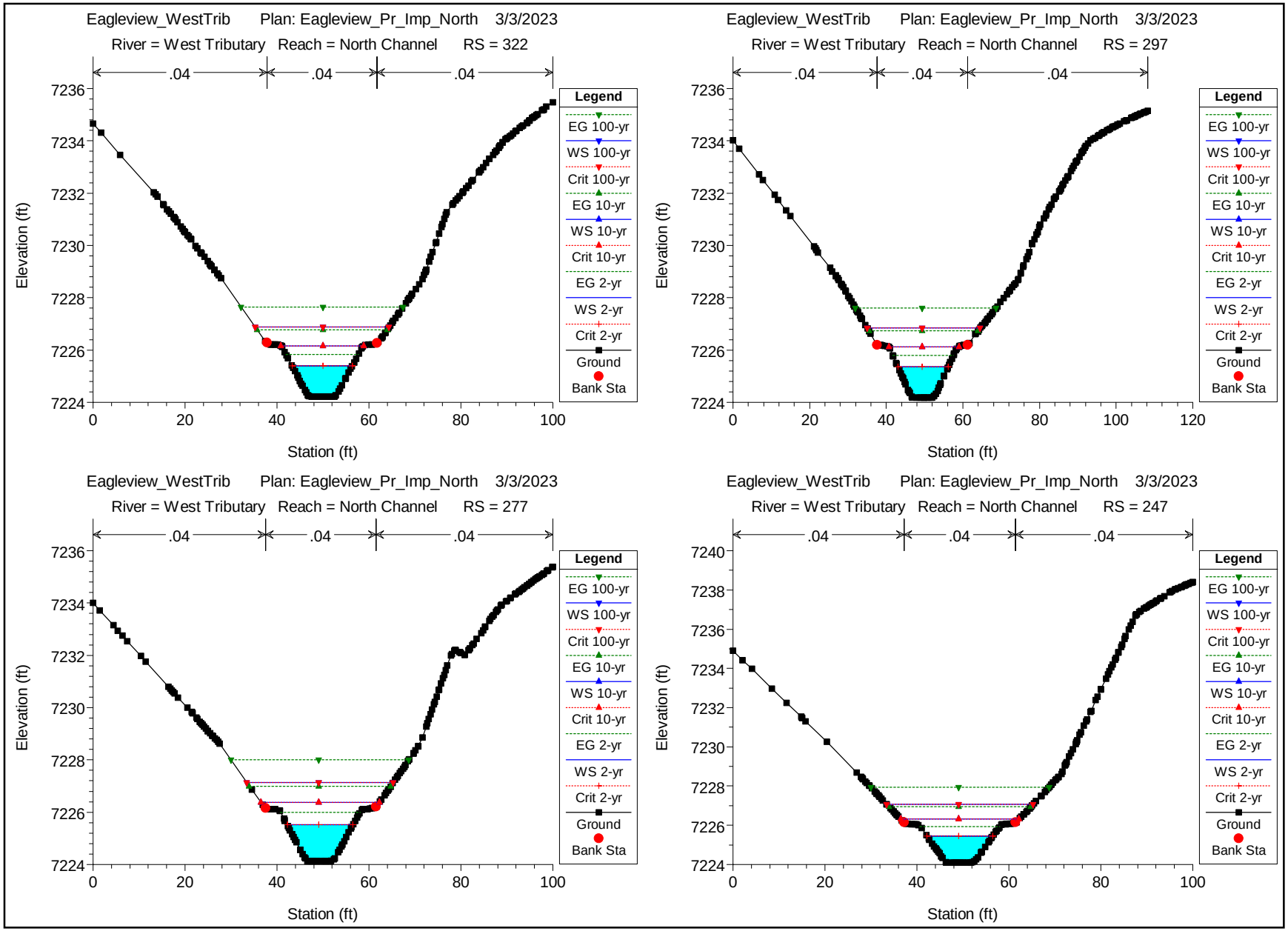

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 682
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
WS 100-yr
Crit 10-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 674
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 667
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 647
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

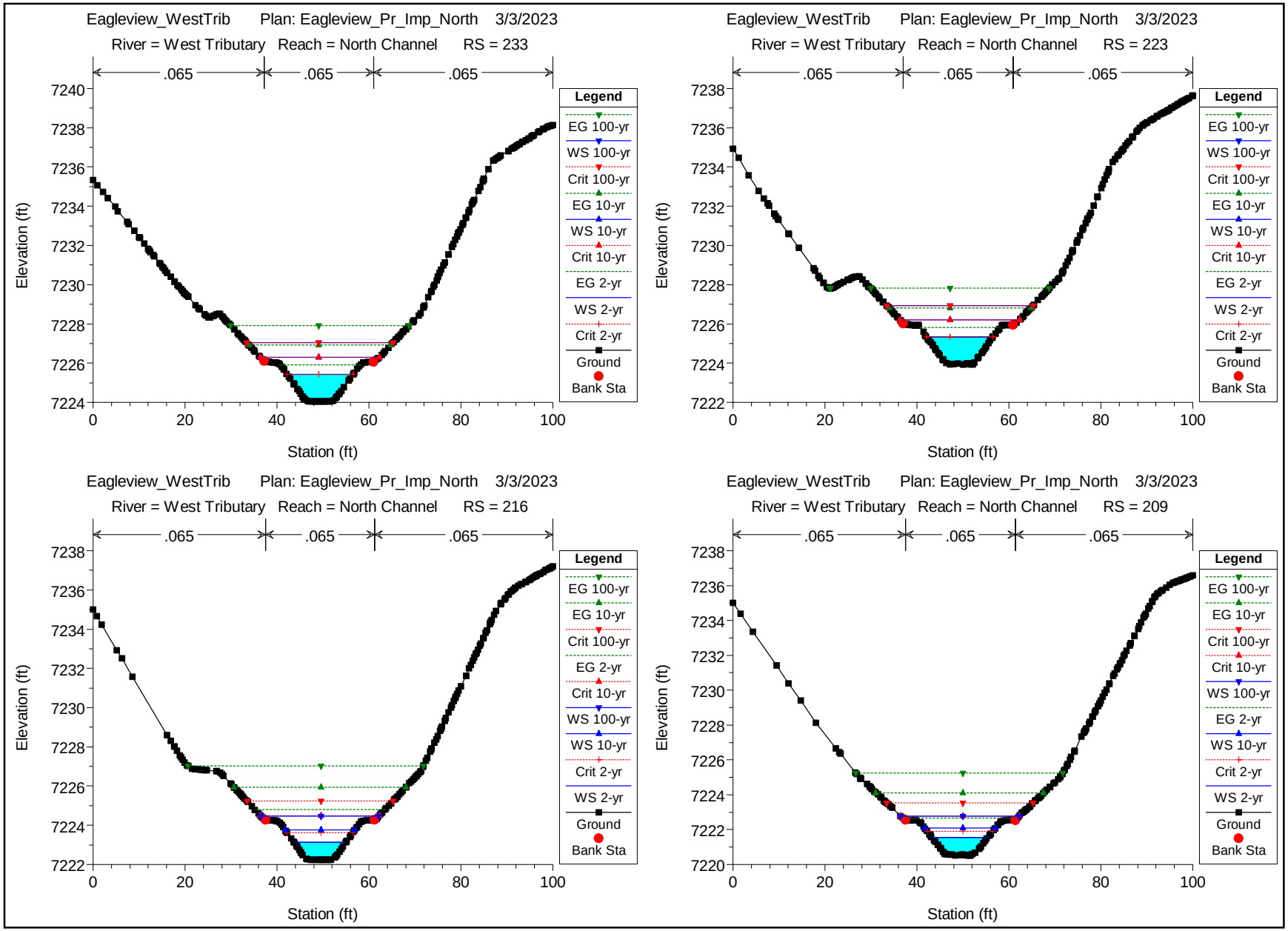

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 622
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 597
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 572
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 557
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

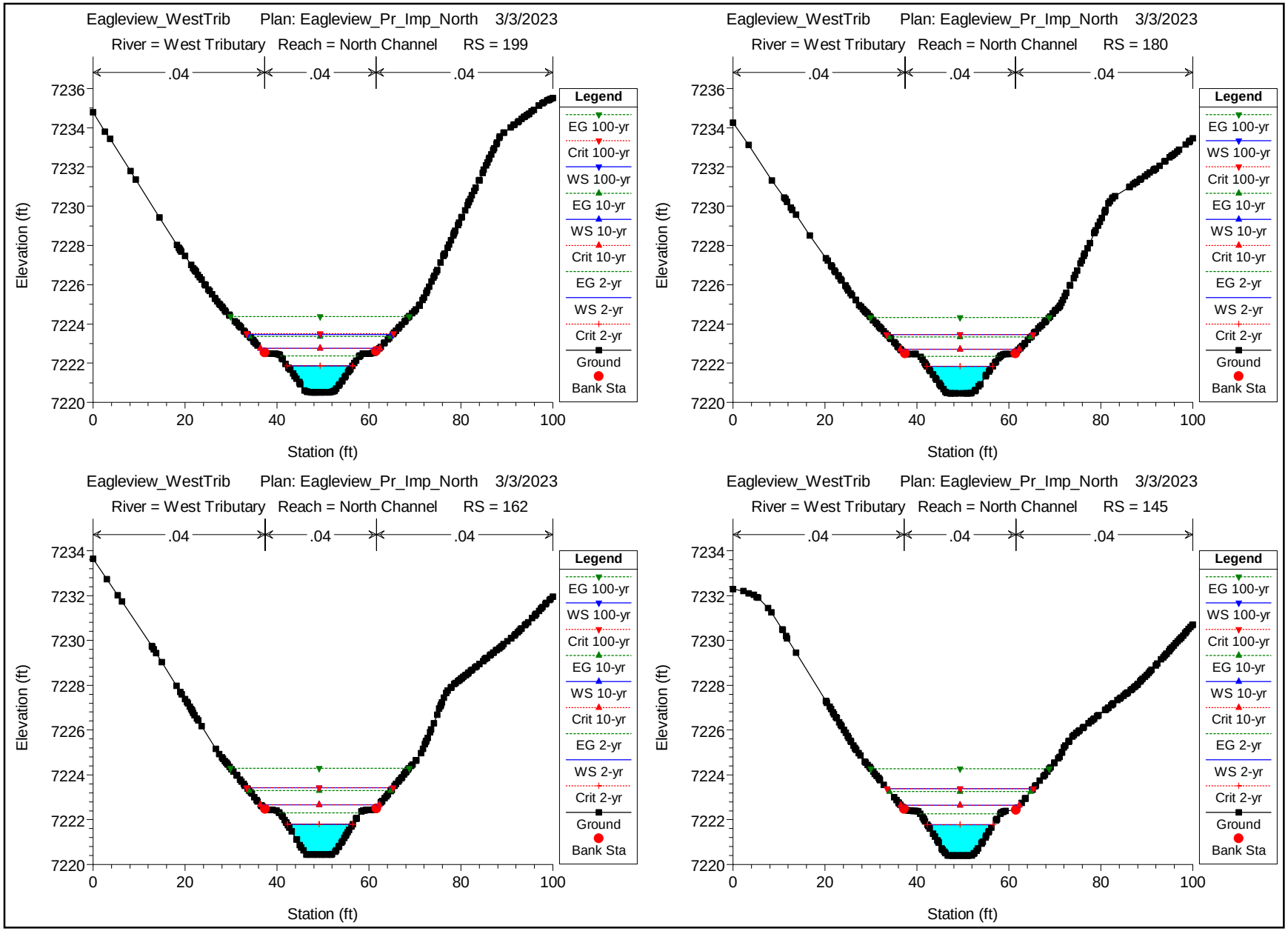

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 551
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 522
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 497
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 476
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta

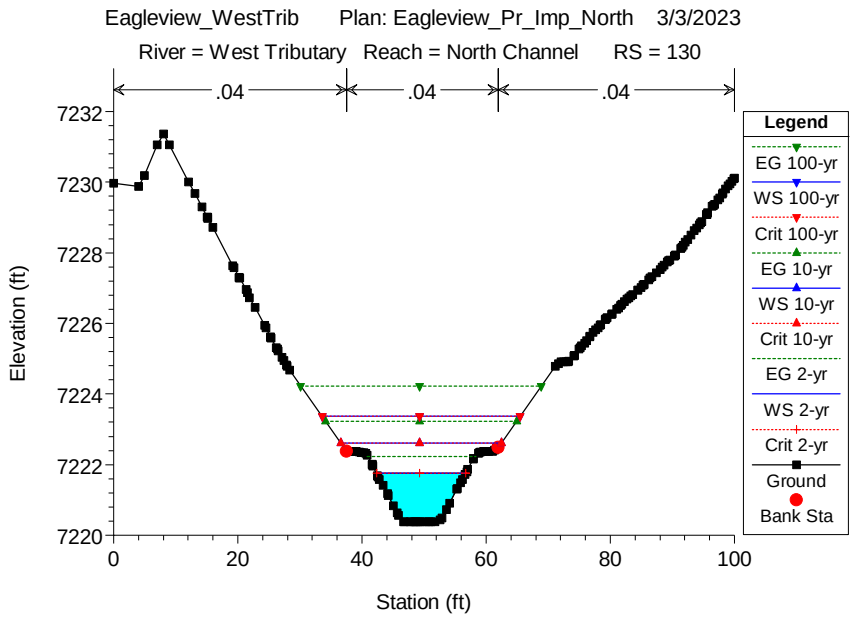

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 447
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 422
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 402
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 396
.065
.065
.065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

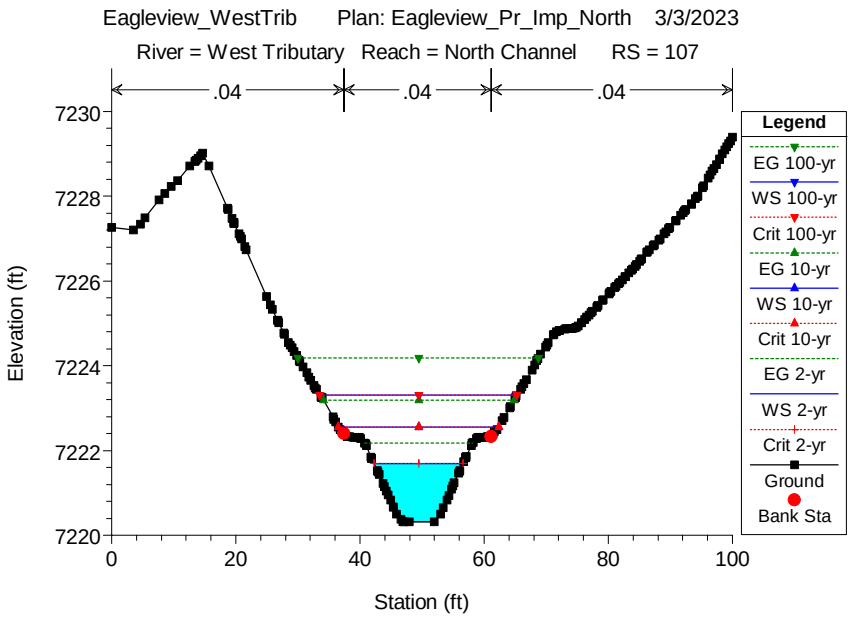

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 389
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
Crit 10-yr
WS 100-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 382
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 376
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 347
.04 .04 .04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

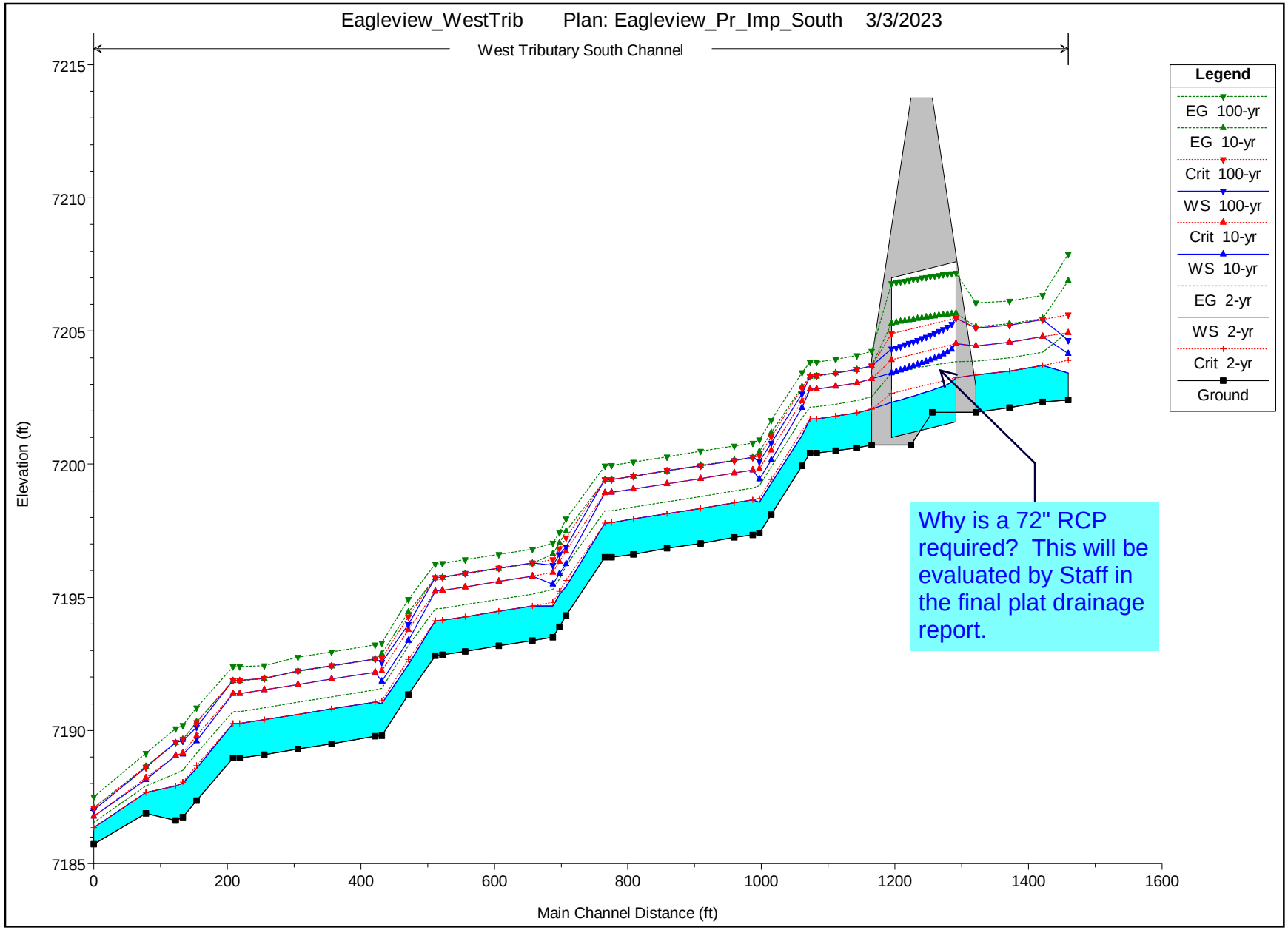

Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 322
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 297
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 277
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 247


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 233
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 223
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 216
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
Crit 10-yr
WS 100-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 209
.065 .065 .065
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
Crit 10-yr
WS 100-yr
EG 2-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 199
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 180
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 162
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 145


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 130
.04
.04
.04
Elevation (ft)
7232
7230
7228
7226
7224
7222
7220
0
20
40
60
80
100
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_North 3/3/2023
River = West Tributary Reach = North Channel RS = 107
.04
.04
.04
Elevation (ft)
7230
7228
7226
7224
7222
7220
0
20
40
60
80
100
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta


Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
West Tributary South Channel
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Why is a 72" RCP required? This will be evaluated by Staff in the final plat drainage report.
Elevation (ft)
7215
7210
7205
7200
7195
7190
7185
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel

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	Max Chl Dpth	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
South Channel	1406	2-yr	78.00	7202.41	7203.42	7203.90	7204.96	0.090157	9.98	7.81	10.98	2.09	1.01	1.01
South Channel	1406	10-yr	235.00	7202.41	7204.15	7204.93	7206.90	0.090099	13.28	17.69	16.09	2.23	1.74	1.74
South Channel	1406	100-yr	405.00	7202.41	7204.66	7205.61	7207.88	0.090035	14.42	28.33	24.91	2.29	2.25	2.25
South Channel	1368	2-yr	78.00	7202.34	7203.71	7203.71	7204.20	0.019004	5.61	13.91	14.39	1.01	1.37	1.37
South Channel	1368	10-yr	235.00	7202.34	7204.79	7204.79	7205.48	0.015403	6.68	35.79	27.54	0.97	2.45	2.45
South Channel	1368	100-yr	405.00	7202.34	7205.43	7205.43	7206.33	0.012792	7.75	55.12	32.71	0.94	3.09	3.09
South Channel	1318	2-yr	78.00	7202.12	7203.50	7203.50	7203.99	0.018992	5.61	13.89	14.34	1.01	1.38	1.38
South Channel	1318	10-yr	235.00	7202.12	7204.58	7204.58	7205.27	0.015573	6.72	35.59	27.47	0.98	2.46	2.46
South Channel	1318	100-yr	405.00	7202.12	7205.22	7205.22	7206.13	0.012894	7.79	54.90	32.61	0.95	3.10	3.10
South Channel	1268	2-yr	78.00	7201.94	7203.36	7203.36	7203.86	0.019052	5.70	13.68	13.77	1.01	1.42	1.42
South Channel	1268	10-yr	235.00	7201.94	7204.44	7204.44	7205.17	0.015293	6.85	35.05	26.32	0.97	2.50	2.50
South Channel	1268	100-yr	405.00	7201.94	7205.11	7205.11	7206.05	0.012608	7.92	54.37	31.37	0.94	3.17	3.17
South Channel	1188		Culvert											
South Channel	1112	2-yr	78.00	7200.72	7202.07	7202.07	7202.53	0.019135	5.43	14.37	15.81	1.00	1.35	1.35
South Channel	1112	10-yr	235.00	7200.72	7203.20	7203.20	7203.69	0.018967	5.61	41.88	43.97	1.01	2.48	2.48
South Channel	1112	100-yr	405.00	7200.72	7203.68	7203.68	7204.25	0.017139	6.03	67.30	59.90	0.99	2.96	2.96
South Channel	1090	2-yr	78.00	7200.62	7201.94	7201.94	7202.38	0.019325	5.38	14.51	16.37	1.01	1.31	1.31
South Channel	1090	10-yr	235.00	7200.62	7203.06	7203.06	7203.54	0.018801	5.60	41.97	43.98	1.01	2.44	2.44
South Channel	1090	100-yr	405.00	7200.62	7203.56	7203.56	7204.08	0.017870	5.74	70.58	68.89	1.00	2.94	2.94
South Channel	1058	2-yr	78.00	7200.50	7201.80	7201.80	7202.26	0.019592	5.40	14.44	16.32	1.01	1.30	1.30
South Channel	1058	10-yr	235.00	7200.50	7202.93	7202.93	7203.42	0.018838	5.61	41.91	43.83	1.01	2.43	2.43
South Channel	1058	100-yr	405.00	7200.50	7203.42	7203.42	7203.95	0.018545	5.82	69.65	68.46	1.02	2.92	2.92
South Channel	1030	2-yr	78.00	7200.41	7201.70	7201.70	7202.15	0.024809	5.38	14.51	16.47	1.01	1.29	1.29
South Channel	1030	10-yr	235.00	7200.41	7202.82	7202.82	7203.31	0.023803	5.59	42.01	43.91	1.01	2.41	2.41
South Channel	1030	100-yr	405.00	7200.41	7203.33	7203.33	7203.84	0.023042	5.73	70.63	69.67	1.00	2.92	2.92
South Channel	1019	2-yr	78.00	7200.41	7201.70	7201.70	7202.15	0.024913	5.39	14.46	16.37	1.01	1.29	1.29
South Channel	1019	10-yr	235.00	7200.41	7202.82	7202.82	7203.30	0.023731	5.58	42.12	44.06	1.01	2.41	2.41
South Channel	1019	100-yr	405.00	7200.41	7203.31	7203.31	7203.83	0.023382	5.81	69.76	68.24	1.01	2.90	2.90
South Channel	1007	2-yr	78.00	7199.94	7201.08	7201.25	7201.74	0.041634	6.50	12.00	15.11	1.29	1.14	1.14
South Channel	1007	10-yr	235.00	7199.94	7202.13	7202.37	7202.91	0.035474	7.11	33.05	32.38	1.24	2.19	2.19
South Channel	1007	100-yr	405.00	7199.94	7202.65	7202.86	7203.45	0.038024	7.17	56.52	58.01	1.28	2.71	2.71
South Channel	961	2-yr	78.00	7198.10	7199.28	7199.42	7199.90	0.038824	6.33	12.32	15.31	1.24	1.17	1.17
South Channel	961	10-yr	235.00	7198.10	7200.15	7200.53	7201.18	0.039269	8.15	28.85	24.76	1.33	2.05	2.05
South Channel	961	100-yr	405.00	7198.10	7200.78	7201.02	7201.64	0.041132	7.42	54.59	56.39	1.33	2.68	2.68
South Channel	944	2-yr	78.00	7197.41	7198.56	7198.71	7199.19	0.039371	6.39	12.22	15.15	1.25	1.15	1.15

HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel (Continued)

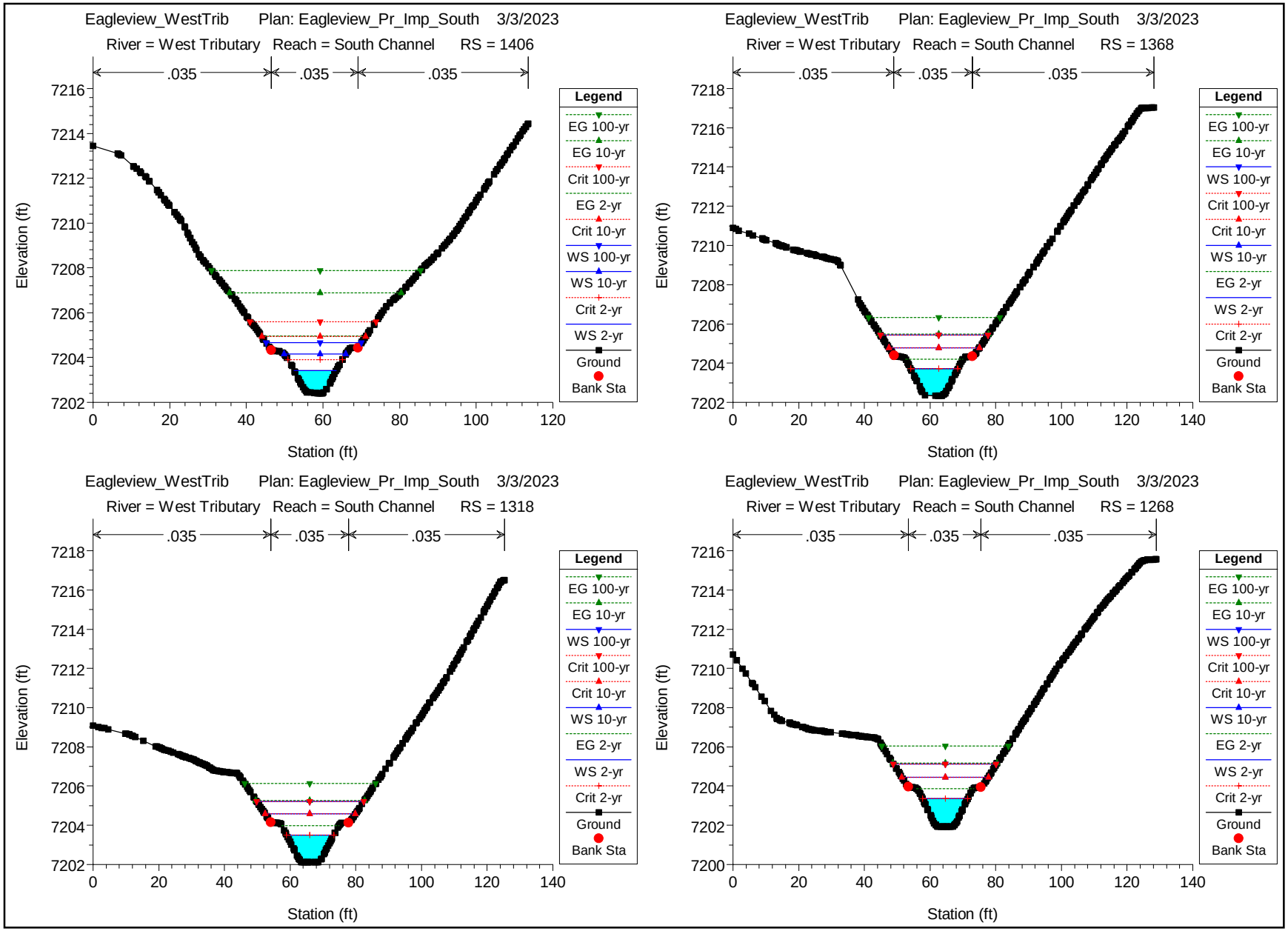
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Max Chl Dpth	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
South Channel	944	10-yr	235.00	7197.41	7199.44	7199.82	7200.47	0.039327	8.17	28.77	24.62	1.33	2.03	2.03
South Channel	944	100-yr	405.00	7197.41	7200.09	7200.31	7200.92	0.039376	7.28	55.66	57.31	1.30	2.68	2.68
South Channel	934	2-yr	78.00	7197.34	7198.65	7198.65	7199.10	0.024451	5.36	14.55	16.40	1.00	1.31	1.31
South Channel	934	10-yr	235.00	7197.34	7199.78	7199.78	7200.26	0.023308	5.58	42.13	43.52	1.00	2.44	2.44
South Channel	934	100-yr	405.00	7197.34	7200.26	7200.26	7200.80	0.023412	5.88	68.93	66.77	1.02	2.92	2.92
South Channel	906	2-yr	78.00	7197.25	7198.55	7198.55	7199.00	0.019257	5.35	14.57	16.48	1.00	1.30	1.30
South Channel	906	10-yr	235.00	7197.25	7199.67	7199.67	7200.15	0.018777	5.58	42.11	44.26	1.01	2.42	2.42
South Channel	906	100-yr	405.00	7197.25	7200.13	7200.13	7200.69	0.018444	5.98	67.79	64.37	1.02	2.88	2.88
South Channel	856	2-yr	78.00	7197.03	7198.34	7198.34	7198.79	0.019434	5.39	14.46	16.29	1.01	1.31	1.31
South Channel	856	10-yr	235.00	7197.03	7199.46	7199.46	7199.95	0.018563	5.59	42.03	43.71	1.01	2.43	2.43
South Channel	856	100-yr	405.00	7197.03	7199.95	7199.95	7200.49	0.017708	5.90	68.73	64.73	1.00	2.92	2.92
South Channel	805	2-yr	78.00	7196.84	7198.15	7198.15	7198.59	0.018819	5.32	14.65	16.44	0.99	1.31	1.31
South Channel	805	10-yr	235.00	7196.84	7199.26	7199.26	7199.75	0.018630	5.58	42.10	44.03	1.01	2.42	2.42
South Channel	805	100-yr	405.00	7196.84	7199.75	7199.75	7200.28	0.018318	5.82	69.59	67.72	1.01	2.91	2.91
South Channel	755	2-yr	78.00	7196.62	7197.94	7197.94	7198.39	0.019246	5.37	14.52	16.35	1.00	1.32	1.32
South Channel	755	10-yr	235.00	7196.62	7199.06	7199.06	7199.55	0.018640	5.60	41.95	43.66	1.01	2.44	2.44
South Channel	755	100-yr	405.00	7196.62	7199.54	7199.54	7200.08	0.018008	5.91	68.58	64.83	1.01	2.92	2.92
South Channel	722	2-yr	78.00	7196.50	7197.81	7197.81	7198.25	0.024452	5.36	14.57	16.46	1.00	1.31	1.31
South Channel	722	10-yr	235.00	7196.50	7198.93	7198.93	7199.42	0.023672	5.56	42.24	44.31	1.00	2.43	2.43
South Channel	722	100-yr	405.00	7196.50	7199.42	7199.42	7199.95	0.023599	5.81	69.73	68.68	1.02	2.92	2.92
South Channel	712	2-yr	78.00	7196.50	7197.79	7197.79	7198.25	0.024891	5.40	14.46	16.33	1.01	1.29	1.29
South Channel	712	10-yr	235.00	7196.50	7198.92	7198.92	7199.40	0.023845	5.57	42.16	44.28	1.01	2.42	2.42
South Channel	712	100-yr	405.00	7196.50	7199.42	7199.42	7199.93	0.023381	5.76	70.31	69.56	1.01	2.92	2.92
South Channel	654	2-yr	78.00	7194.32	7195.40	7195.63	7196.18	0.052574	7.07	11.03	14.59	1.43	1.08	1.08
South Channel	654	10-yr	235.00	7194.32	7196.25	7196.75	7197.48	0.044298	8.89	26.43	21.72	1.42	1.93	1.93
South Channel	654	100-yr	405.00	7194.32	7196.90	7197.24	7197.94	0.051063	8.19	49.47	51.81	1.48	2.58	2.58
South Channel	644	2-yr	78.00	7193.90	7195.11	7195.22	7195.69	0.035614	6.14	12.71	15.51	1.19	1.21	1.21
South Channel	644	10-yr	235.00	7193.90	7195.89	7196.34	7197.04	0.040497	8.58	27.39	22.19	1.36	1.99	1.99
South Channel	644	100-yr	405.00	7193.90	7196.61	7196.82	7197.43	0.039296	7.26	55.78	57.49	1.30	2.71	2.71
South Channel	634	2-yr	78.00	7193.50	7194.67	7194.82	7195.30	0.039822	6.38	12.23	15.32	1.26	1.17	1.17
South Channel	634	10-yr	235.00	7193.50	7195.49	7195.93	7196.63	0.040122	8.56	27.47	22.21	1.36	1.99	1.99
South Channel	634	100-yr	405.00	7193.50	7196.21	7196.42	7197.04	0.038865	7.28	55.60	56.55	1.30	2.71	2.71
South Channel	604	2-yr	78.00	7193.38	7194.68	7194.68	7195.13	0.019253	5.36	14.56	16.48	1.00	1.30	1.30
South Channel	604	10-yr	235.00	7193.38	7195.80	7195.80	7196.28	0.018653	5.60	41.96	43.68	1.01	2.42	2.42
South Channel	604	100-yr	405.00	7193.38	7196.29	7196.29	7196.82	0.018326	5.83	69.42	67.50	1.01	2.91	2.91

HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel (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	Max Chl Dpth	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
South Channel	553	2-yr	78.00	7193.18	7194.48	7194.48	7194.93	0.019278	5.38	14.50	16.31	1.01	1.30	1.30
South Channel	553	10-yr	235.00	7193.18	7195.60	7195.60	7196.08	0.018521	5.60	41.98	43.50	1.00	2.42	2.42
South Channel	553	100-yr	405.00	7193.18	7196.10	7196.10	7196.61	0.018027	5.74	70.57	69.32	1.00	2.92	2.92
South Channel	503	2-yr	78.00	7192.97	7194.27	7194.27	7194.72	0.019586	5.41	14.43	16.30	1.01	1.30	1.30
South Channel	503	10-yr	235.00	7192.97	7195.39	7195.39	7195.88	0.018650	5.60	41.99	43.75	1.01	2.42	2.42
South Channel	503	100-yr	405.00	7192.97	7195.90	7195.90	7196.41	0.017977	5.73	70.72	69.53	1.00	2.93	2.93
South Channel	469	2-yr	78.00	7192.84	7194.14	7194.14	7194.59	0.024548	5.35	14.57	16.52	1.00	1.30	1.30
South Channel	469	10-yr	235.00	7192.84	7195.26	7195.26	7195.74	0.023544	5.56	42.28	44.23	1.00	2.42	2.42
South Channel	469	100-yr	405.00	7192.84	7195.76	7195.76	7196.27	0.022675	5.74	70.61	68.77	1.00	2.92	2.92
South Channel	458	2-yr	78.00	7192.81	7194.12	7194.12	7194.57	0.024822	5.39	14.48	16.39	1.01	1.30	1.30
South Channel	458	10-yr	235.00	7192.81	7195.23	7195.23	7195.72	0.024073	5.61	41.88	43.90	1.01	2.42	2.42
South Channel	458	100-yr	405.00	7192.81	7195.73	7195.73	7196.25	0.023126	5.78	70.12	68.57	1.01	2.92	2.92
South Channel	417	2-yr	78.00	7191.35	7192.47	7192.66	7193.18	0.046700	6.77	11.53	14.90	1.36	1.12	1.12
South Channel	417	10-yr	235.00	7191.35	7193.38	7193.78	7194.44	0.039318	8.23	28.57	24.16	1.33	2.03	2.03
South Channel	417	100-yr	405.00	7191.35	7193.99	7194.27	7194.92	0.045249	7.75	52.24	54.24	1.39	2.64	2.64
South Channel	378	2-yr	78.00	7189.81	7191.01	7191.11	7191.58	0.034123	6.04	12.90	15.63	1.17	1.20	1.20
South Channel	378	10-yr	235.00	7189.81	7191.85	7192.23	7192.88	0.039606	8.15	28.85	24.94	1.34	2.04	2.04
South Channel	378	100-yr	405.00	7189.81	7192.55	7192.72	7193.30	0.035506	6.91	58.63	60.44	1.24	2.74	2.74
South Channel	368	2-yr	78.00	7189.78	7191.07	7191.07	7191.52	0.024654	5.36	14.56	16.53	1.01	1.29	1.29
South Channel	368	10-yr	235.00	7189.78	7192.19	7192.19	7192.68	0.023827	5.58	42.11	44.15	1.01	2.41	2.41
South Channel	368	100-yr	405.00	7189.78	7192.68	7192.68	7193.21	0.023574	5.82	69.59	68.24	1.02	2.90	2.90
South Channel	303	2-yr	78.00	7189.50	7190.81	7190.81	7191.26	0.019252	5.37	14.51	16.32	1.00	1.31	1.31
South Channel	303	10-yr	235.00	7189.50	7191.93	7191.93	7192.42	0.018876	5.59	42.01	44.20	1.01	2.43	2.43
South Channel	303	100-yr	405.00	7189.50	7192.43	7192.43	7192.95	0.018277	5.77	70.16	69.00	1.01	2.93	2.93
South Channel	253	2-yr	78.00	7189.31	7190.61	7190.61	7191.06	0.019443	5.38	14.49	16.39	1.01	1.30	1.30
South Channel	253	10-yr	235.00	7189.31	7191.73	7191.73	7192.22	0.018605	5.59	42.03	43.76	1.01	2.42	2.42
South Channel	253	100-yr	405.00	7189.31	7192.24	7192.24	7192.75	0.017801	5.73	70.73	69.04	1.00	2.93	2.93
South Channel	202	2-yr	78.00	7189.09	7190.41	7190.41	7190.85	0.018985	5.34	14.60	16.37	1.00	1.32	1.32
South Channel	202	10-yr	235.00	7189.09	7191.53	7191.53	7191.95	0.020434	5.20	45.23	56.54	1.02	2.44	2.44
South Channel	202	100-yr	405.00	7189.09	7191.95	7191.95	7192.44	0.018136	5.60	72.33	74.04	1.00	2.86	2.86
South Channel	165	2-yr	78.00	7188.97	7190.27	7190.27	7190.72	0.024628	5.35	14.58	16.59	1.01	1.30	1.30
South Channel	165	10-yr	235.00	7188.97	7191.38	7191.38	7191.87	0.023705	5.59	42.07	43.92	1.01	2.41	2.41
South Channel	165	100-yr	405.00	7188.97	7191.88	7191.88	7192.40	0.023435	5.82	69.58	67.95	1.01	2.90	2.90
South Channel	156	2-yr	78.00	7188.97	7190.27	7190.27	7190.71	0.024380	5.34	14.60	16.50	1.00	1.29	1.29
South Channel	156	10-yr	235.00	7188.97	7191.38	7191.38	7191.86	0.023530	5.59	42.05	43.59	1.00	2.41	2.41
South Channel	156	100-yr	405.00	7188.97	7191.88	7191.88	7192.39	0.023094	5.76	70.37	69.12	1.01	2.91	2.91

HEC-RAS Plan: Pr_Imp_South River: West Tributary Reach: South Channel (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	Max Chl Dpth	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
South Channel	101	2-yr	78.00	7187.36	7188.58	7188.68	7189.14	0.033540	6.01	12.98	15.62	1.16	1.22	1.22
South Channel	101	10-yr	235.00	7187.36	7189.60	7189.79	7190.32	0.032901	6.81	34.53	34.16	1.19	2.24	2.24
South Channel	101	100-yr	405.00	7187.36	7190.13	7190.29	7190.85	0.034184	6.82	59.37	60.59	1.21	2.77	2.77
South Channel	80	2-yr	78.00	7186.74	7188.02	7188.05	7188.50	0.026922	5.55	14.06	16.19	1.05	1.28	1.28
South Channel	80	10-yr	235.00	7186.74	7189.11	7189.17	7189.66	0.026384	5.92	39.68	41.06	1.06	2.37	2.37
South Channel	80	100-yr	405.00	7186.74	7189.61	7189.68	7190.19	0.026452	6.11	66.28	65.88	1.07	2.87	2.87
South Channel	69	2-yr	78.00	7186.62	7187.93	7187.93	7188.38	0.025090	5.41	14.41	16.30	1.02	1.31	1.31
South Channel	69	10-yr	235.00	7186.62	7189.06	7189.06	7189.54	0.023890	5.57	42.23	44.56	1.01	2.44	2.44
South Channel	69	100-yr	405.00	7186.62	7189.56	7189.56	7190.07	0.022973	5.75	70.45	69.02	1.00	2.94	2.94
South Channel	25	2-yr	78.00	7186.88	7187.66	7187.66	7187.93	0.022861	4.11	19.00	37.05	1.01	0.78	0.78
South Channel	25	10-yr	235.00	7186.88	7188.15	7188.22	7188.65	0.025470	5.70	41.20	53.20	1.14	1.27	1.27
South Channel	25	100-yr	405.00	7186.88	7188.61	7188.63	7189.14	0.019438	5.87	69.04	69.82	1.04	1.73	1.73
South Channel	5	2-yr	78.00	7185.72	7186.36	7186.36	7186.55	0.024767	3.54	22.02	57.03	1.00	0.64	0.64
South Channel	5	10-yr	235.00	7185.72	7186.78	7186.78	7187.10	0.021387	4.55	51.68	83.03	1.01	1.06	1.06
South Channel	5	100-yr	405.00	7185.72	7187.01	7187.08	7187.51	0.022267	5.69	72.34	97.06	1.09	1.29	1.29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River = West Tributary Reach = South Channel RS = 1406
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Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
EG 2-yr
Crit 10-yr
WS 100-yr
WS 10-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1368
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Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
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.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1268
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.035
.035
Elevation (ft)
Station (ft)
Legend
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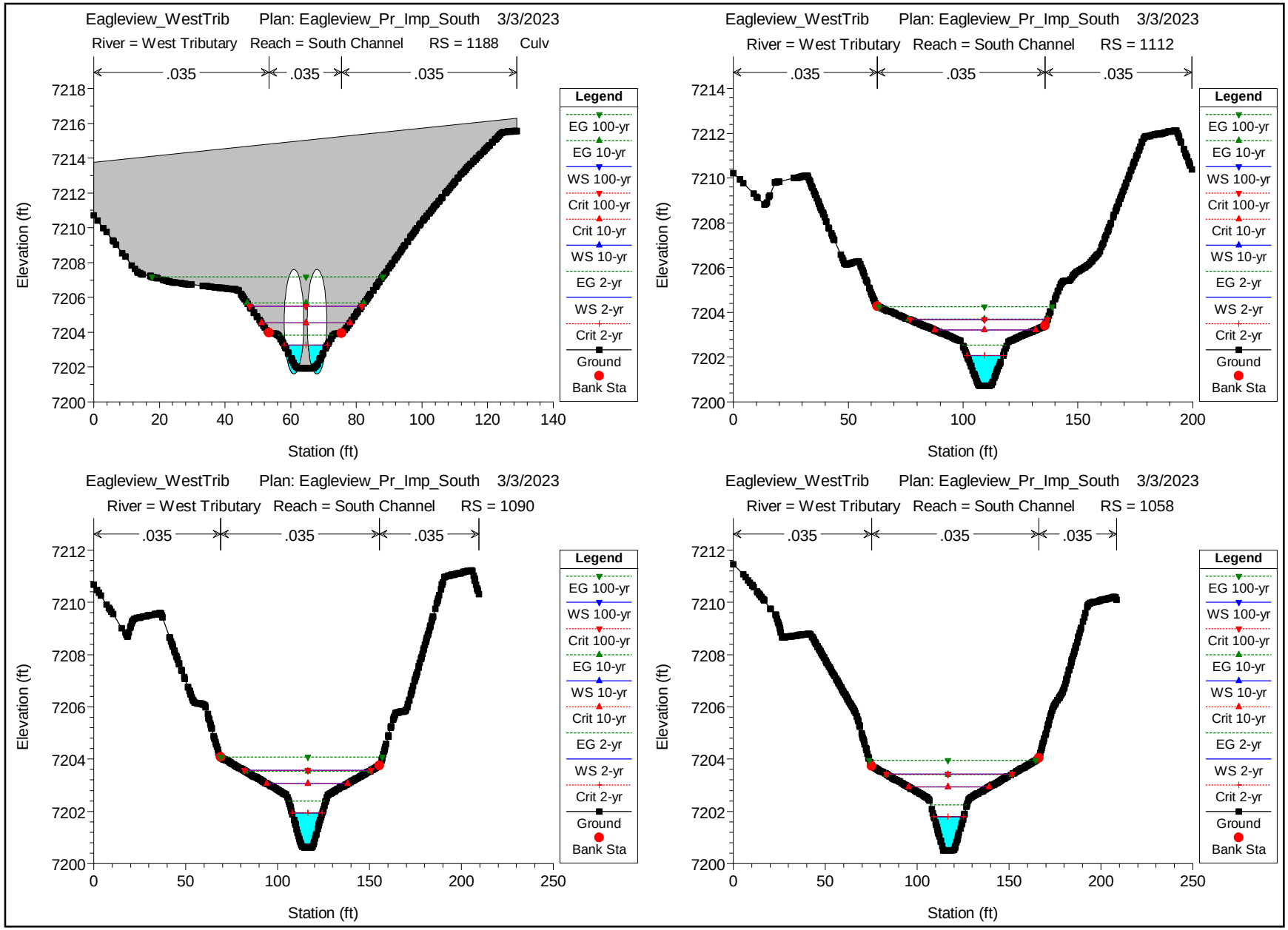
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1112
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Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1090
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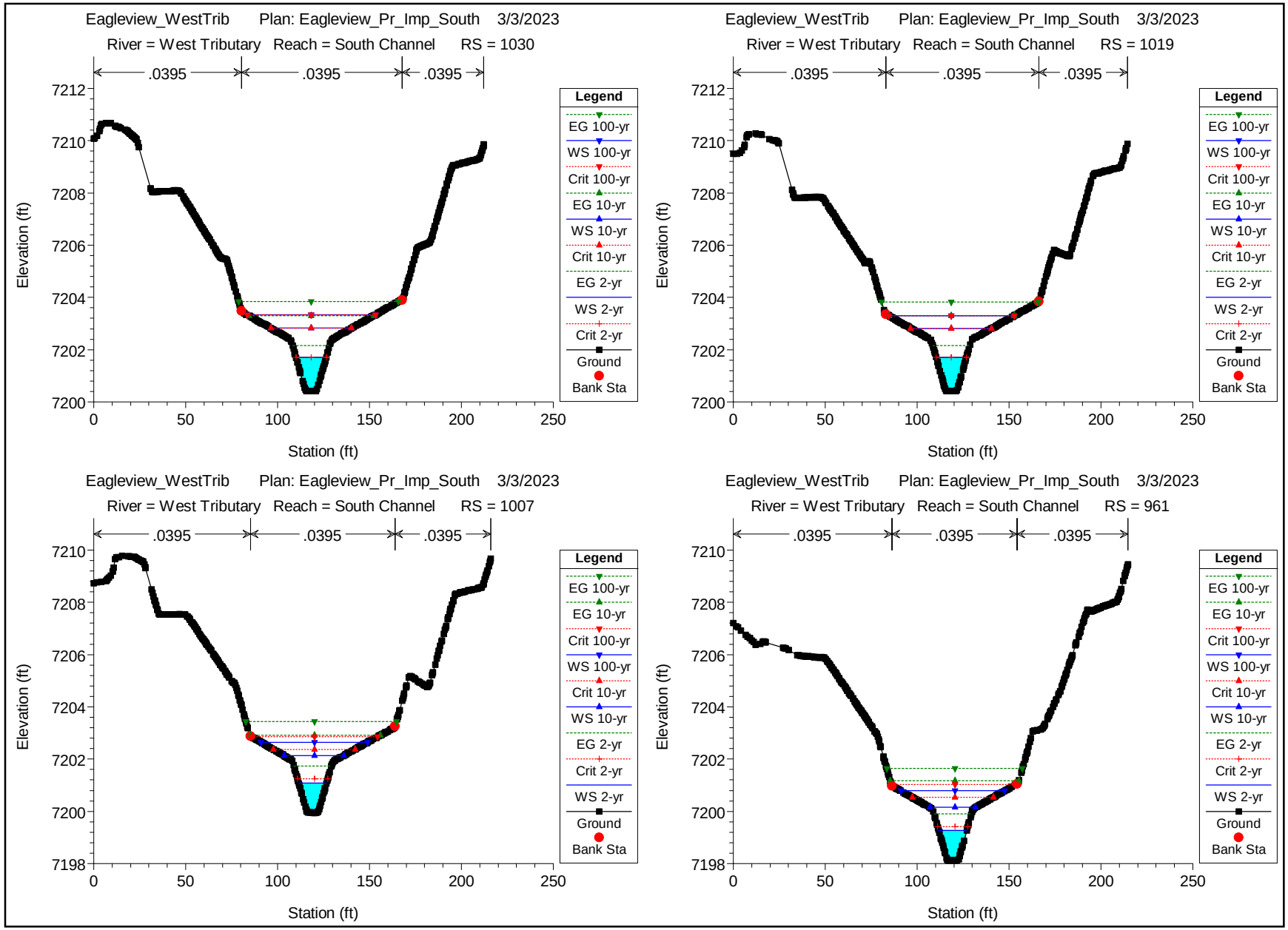
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1058
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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River = West Tributary Reach = South Channel RS = 1030
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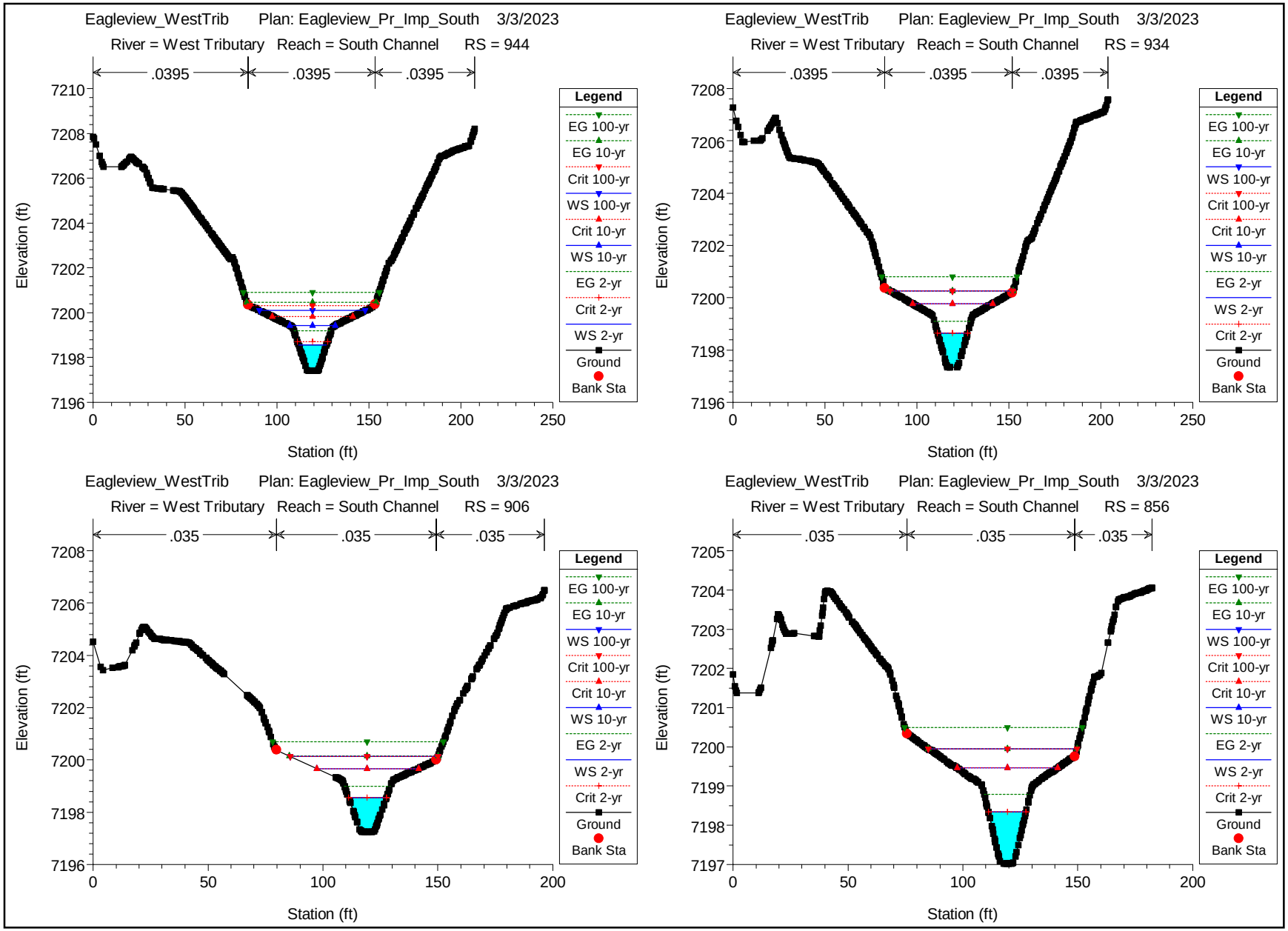
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1019
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 1007
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 961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River = West Tributary Reach = South Channel RS = 944
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.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 934
.0395
.0395
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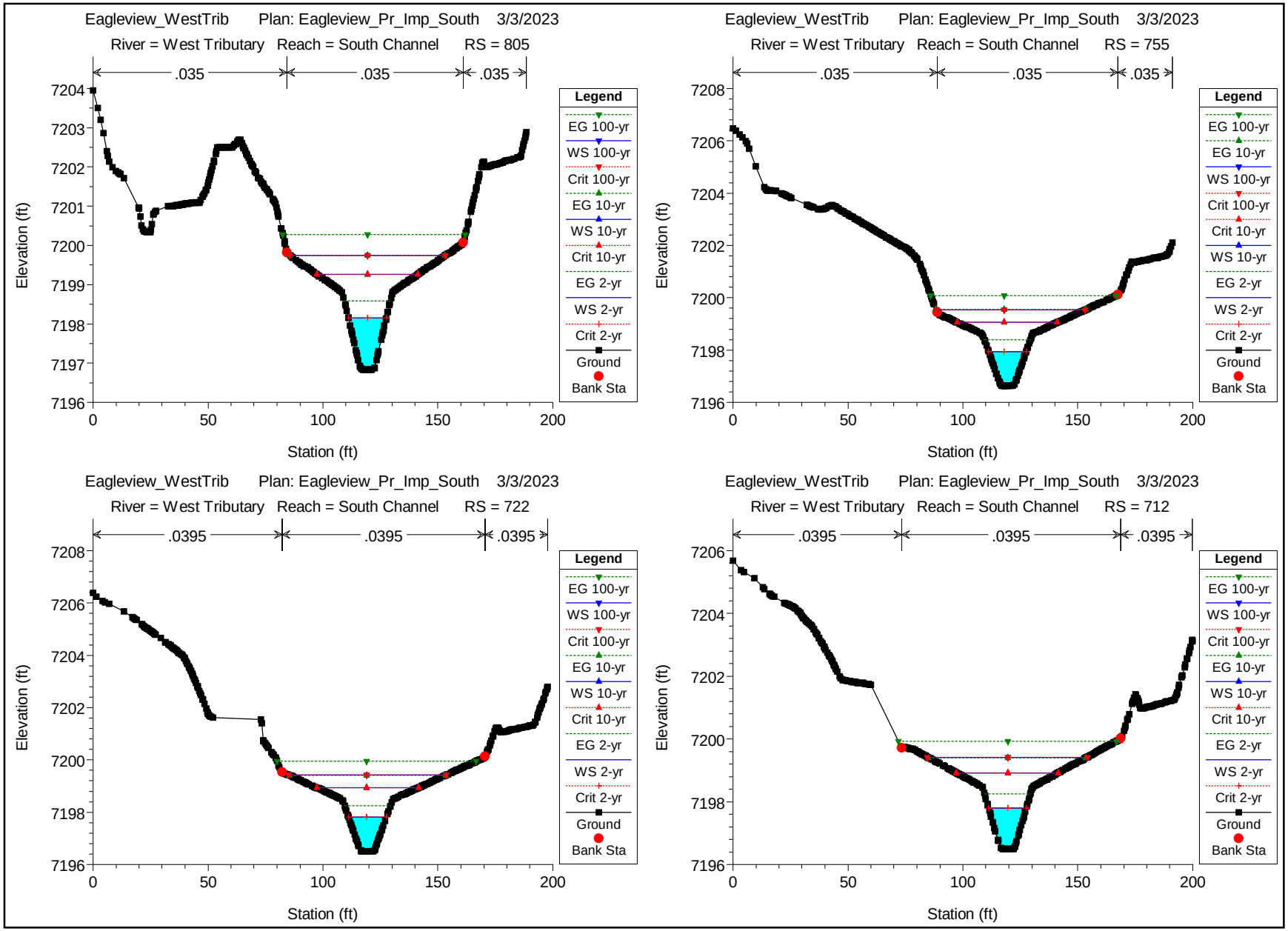
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 906
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 856
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
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.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
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.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
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.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
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Crit 100-yr
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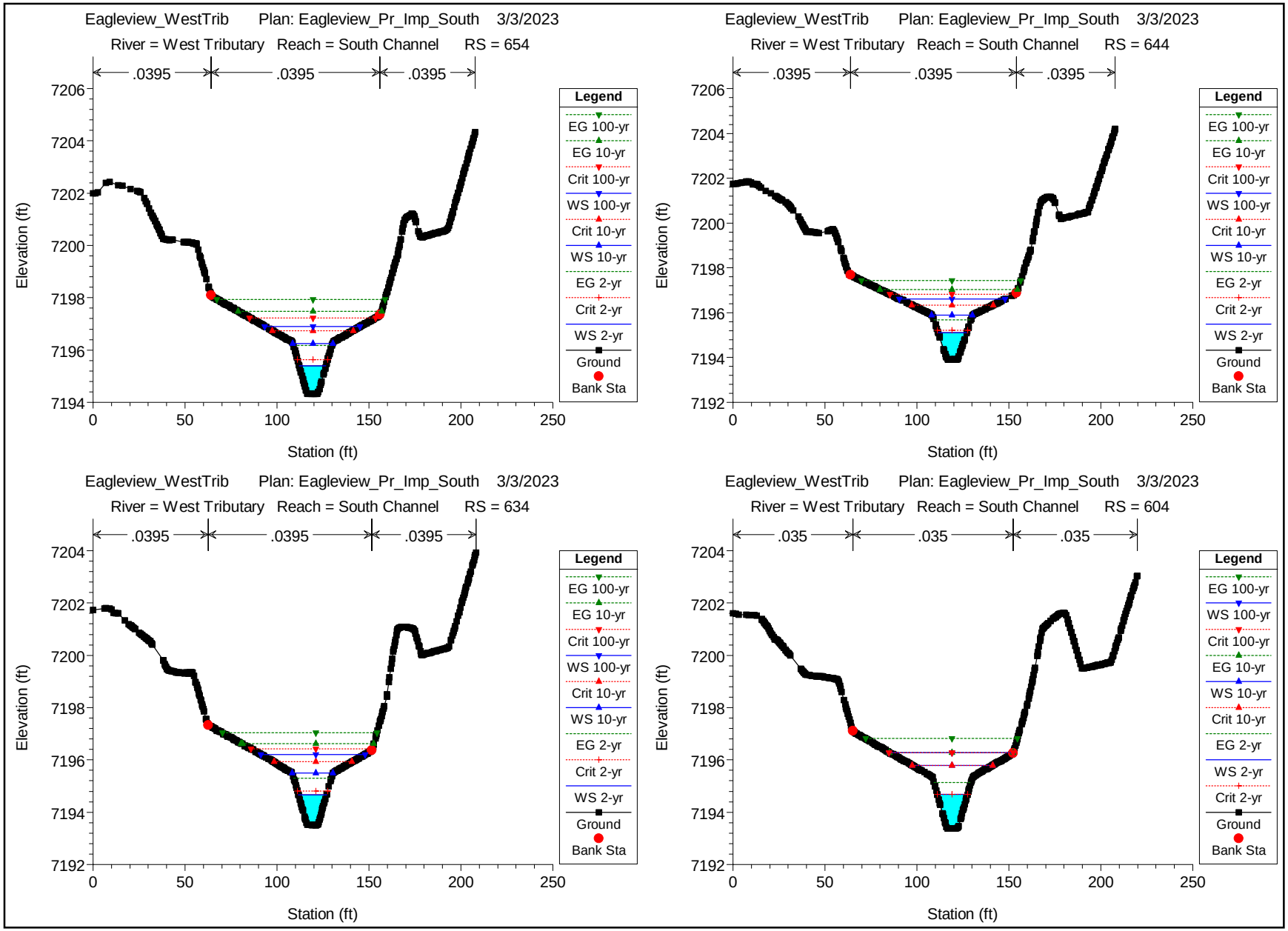
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 644
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
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.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 604
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
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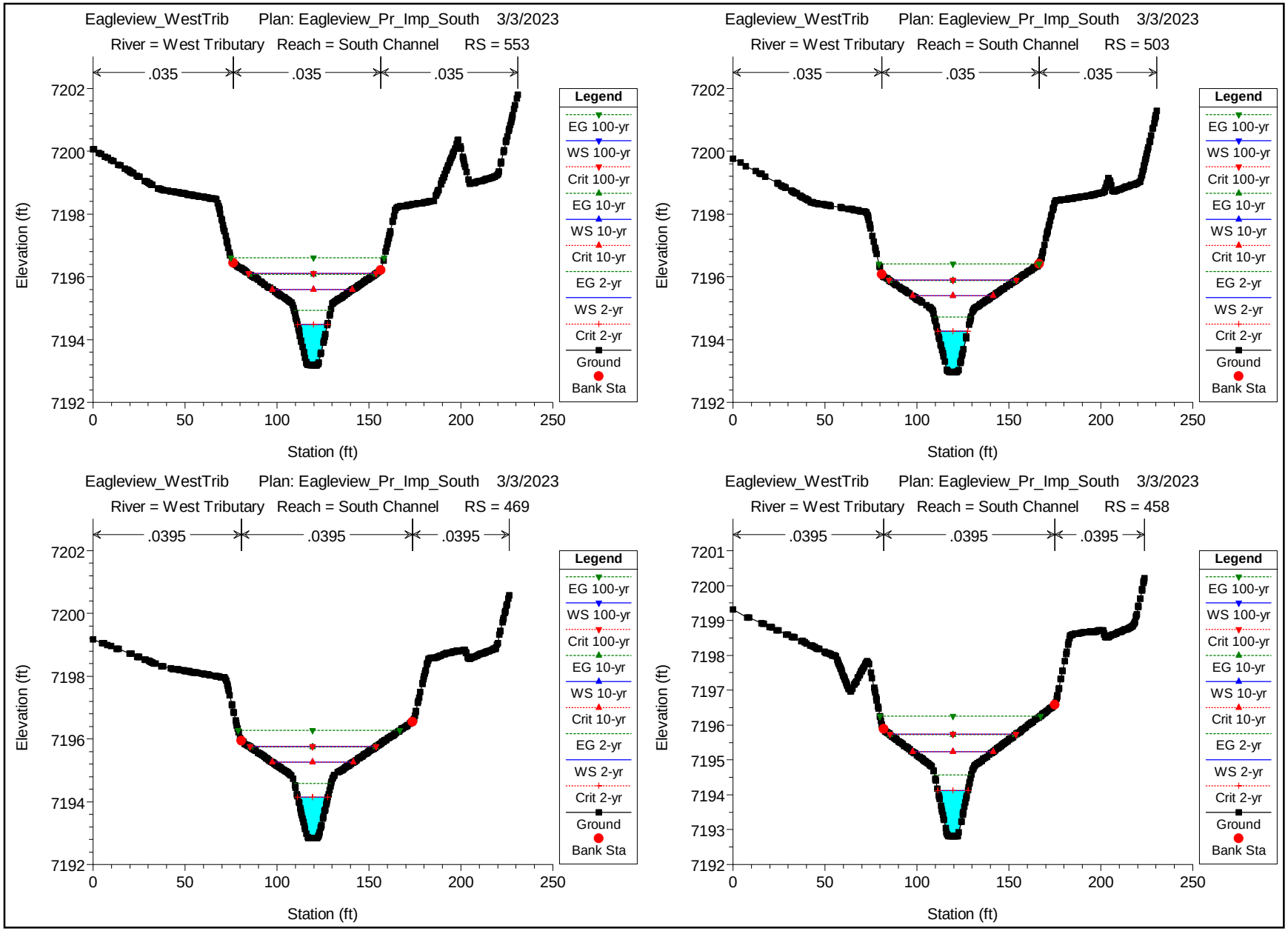
WS 2-yr
Crit 2-yr
Ground
Bank Sta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Station (ft)
Legend
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Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
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.035
.035
.035
Elevation (ft)
Station (ft)
Legend
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WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
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.0395
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.0395
Elevation (ft)
Station (ft)
Legend
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WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
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.0395
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Elevation (ft)
Station (ft)
Legend
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Crit 100-yr
EG 10-yr
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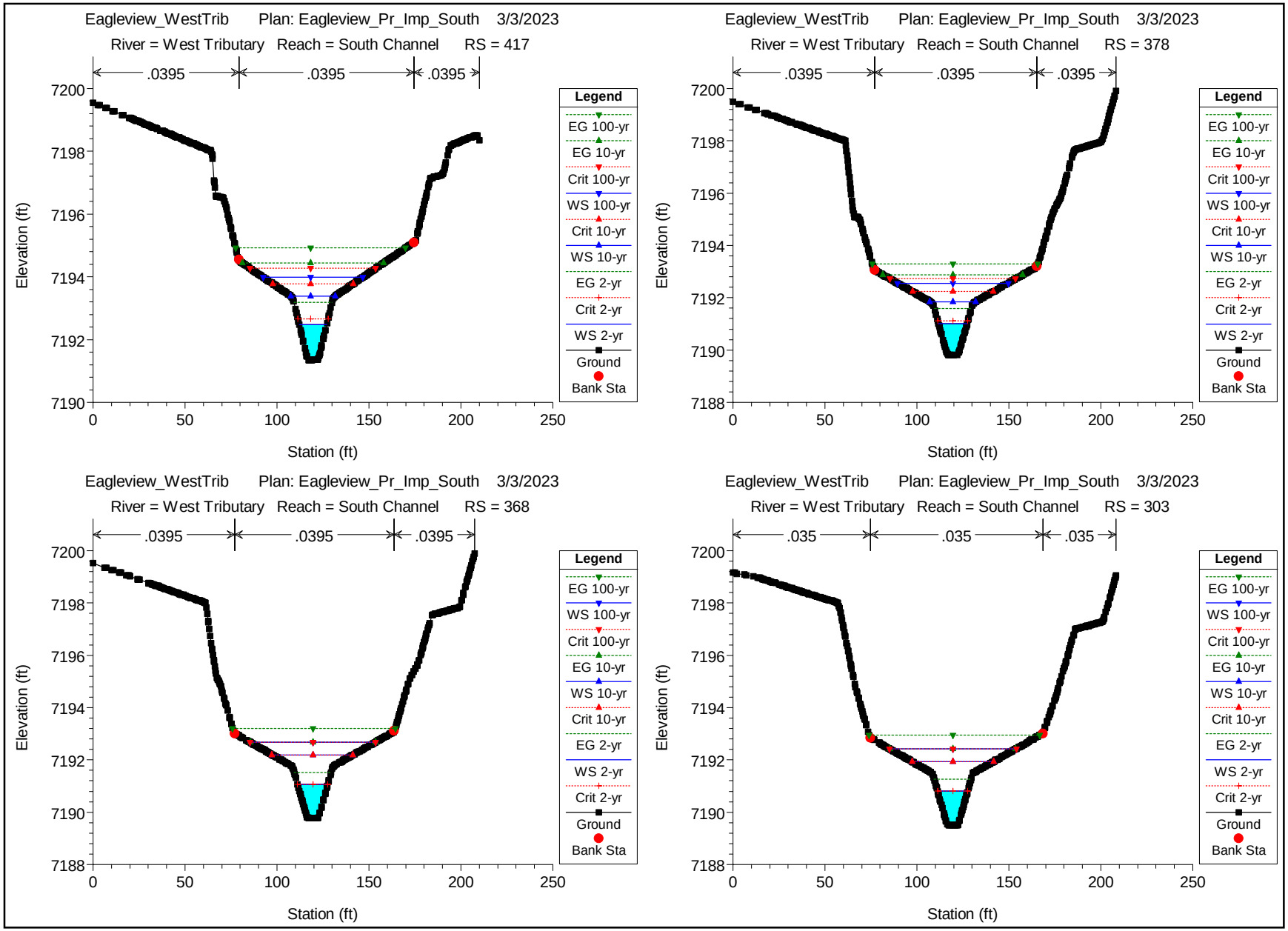
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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.0395
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Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 378
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 368
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 303
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
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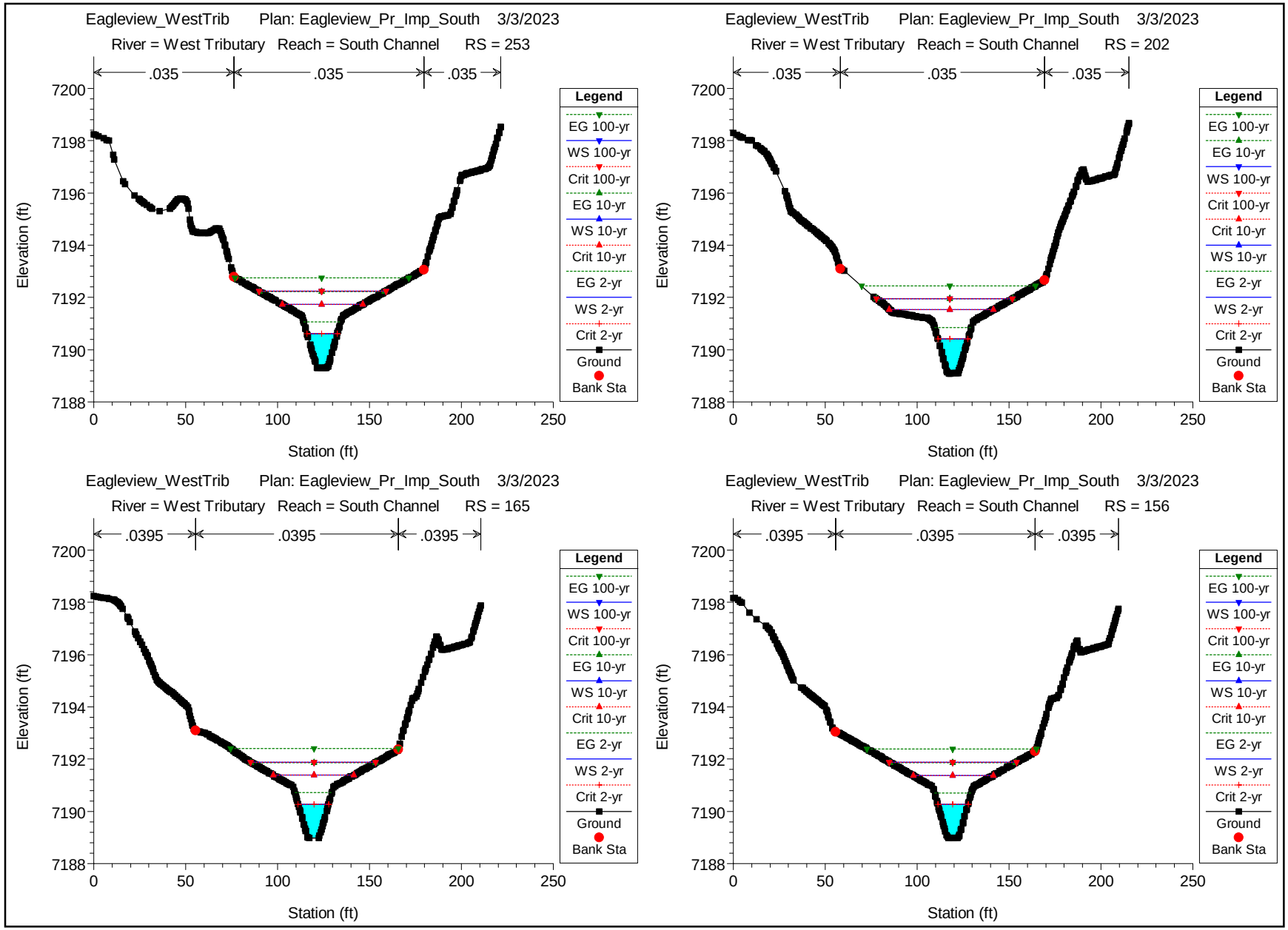
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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.035
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Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
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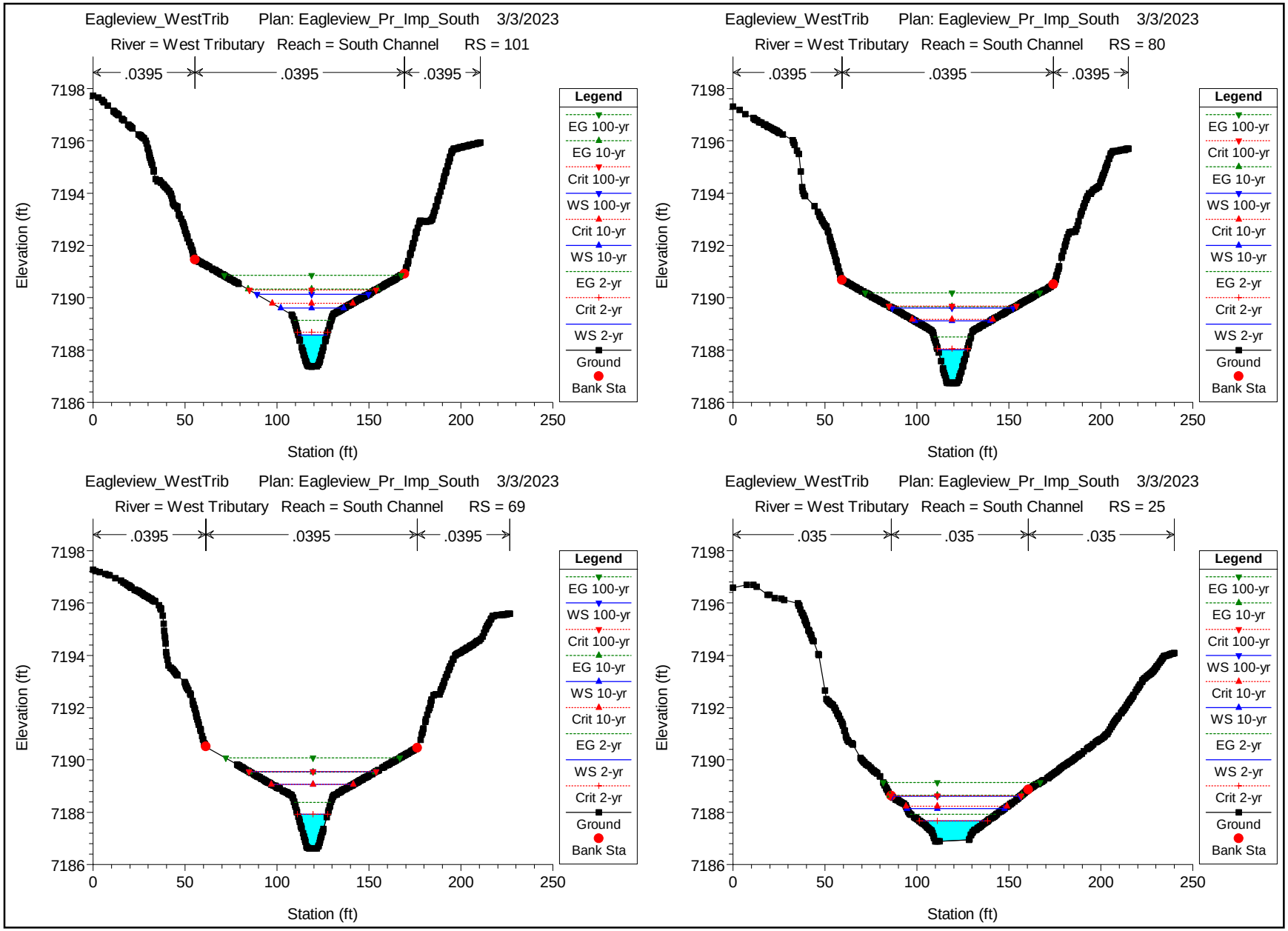
River = West Tributary Reach = South Channel RS = 202
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
WS 100-yr
Crit 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 165
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 156
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 80
.0395
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Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
EG 10-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
Crit 2-yr
WS 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 69
.0395
.0395
.0395
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta
Eagleview_WestTrib Plan: Eagleview_Pr_Imp_South 3/3/2023
River = West Tributary Reach = South Channel RS = 25
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
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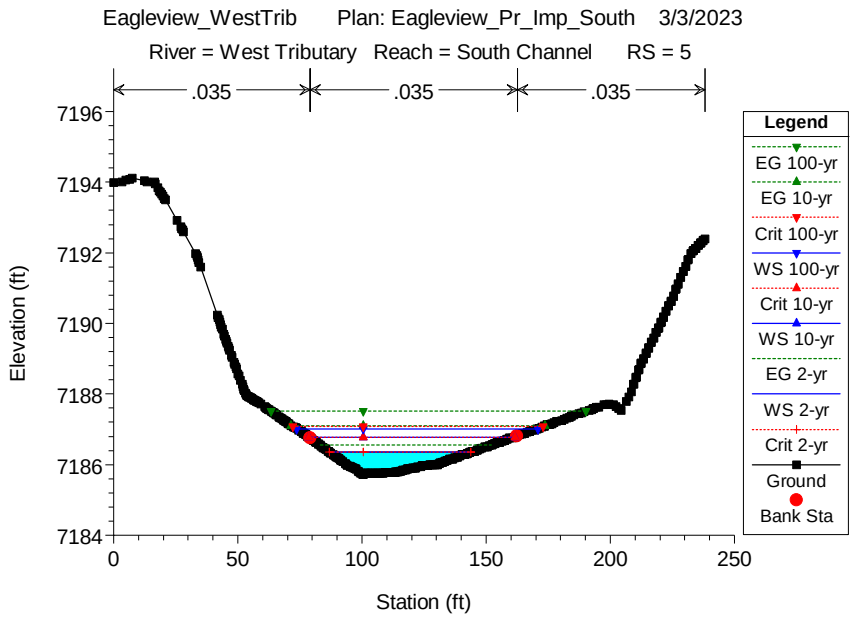
WS 2-yr
Crit 2-yr
Ground
Bank Sta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.035
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.035
7196
7194
7192
7190
7188
7186
7184
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG 100-yr
EG 10-yr
Crit 100-yr
WS 100-yr
Crit 10-yr
WS 10-yr
EG 2-yr
WS 2-yr
Crit 2-yr
Ground
Bank Sta

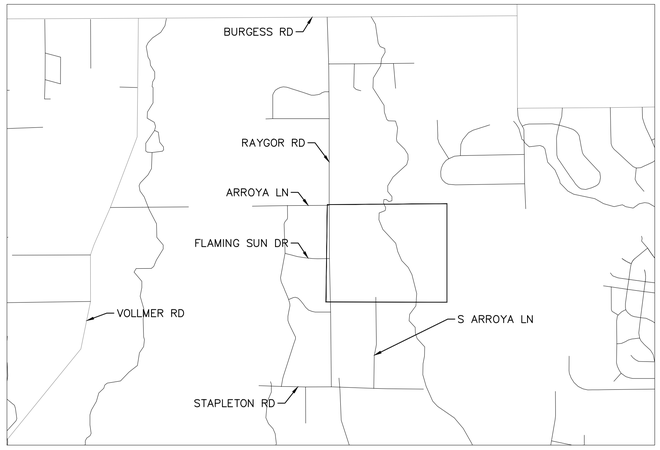
APPENDIX C: CONSTRUCTION DOCUMENTS

EAGLEVIEW REGIONAL DRAINAGE IMPROVEMENTS

CONSTRUCTION DOCUMENTS

A PORTION OF THE NORTHWEST ONE-QUARTER (N.W.1/4) OF SECTION 26
TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO

SHEET INDEX	
SHEET NO.	SHEET TITLE
C2.0	COVER SHEET
C2.1	NOTES, ABBREVIATIONS, & LEGEND
C2.2	TYPICAL SECTIONS
C2.3	OVERALL DRAINAGE IMPROVEMENTS
C2.4	HORIZONTAL CONTROL
C2.5	CHANNEL KEY MAP
C2.6	SOUTH CHANNEL PLAN AND PROFILE
C2.7	SOUTH CHANNEL PLAN AND PROFILE
C2.8	SOUTH CHANNEL PLAN AND PROFILE
C2.9	SOUTH CHANNEL PLAN AND PROFILE
C2.10	NORTH CHANNEL PLAN AND PROFILE
C2.11	NORTH CHANNEL PLAN AND PROFILE
C2.12	NORTH CHANNEL PLAN AND PROFILE
C2.13	DROP STRUCTURE KEY MAP
C2.14	DROP STRUCTURE DETAILS
C2.15	DROP STRUCTURE DETAILS
C2.16	DROP STRUCTURE DETAILS
C2.17	DROP STRUCTURE DETAILS
C2.18	DROP STRUCTURE DETAILS
C2.19	DROP STRUCTURE DETAILS
C2.20	GENERAL DETAILS
C2.21	GENERAL DETAILS
C2.22	SOUTH CHANNEL SECTIONS
C2.23	SOUTH CHANNEL SECTIONS
C2.24	SOUTH CHANNEL SECTIONS
C2.25	SOUTH CHANNEL SECTIONS
C2.26	NORTH CHANNEL SECTIONS
C2.27	NORTH CHANNEL SECTIONS
C2.28	NORTH CHANNEL SECTIONS
C2.29	NORTH CHANNEL SECTIONS
C2.30	END TREATMENT DETAIL
C2.31	SUB-REGIONAL POND GRADING
C2.32	SUB-REGIONAL POND DETAILS
C2.33	ROCK CHUTE DETAILS



VICINITY MAP
1" = 2000'

NORTH

FLOODPLAIN NOTE

ACCORDING TO NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP NUMBER 08041C0535G (MAP REVISED DECEMBER 7, 2018), THE SUBJECT PROPERTY IS LOCATED IN OTHER AREAS, ZONE X, AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

BENCHMARK

CONTROL POINTS AS SHOWN HEREON. ELEVATIONS ARE BASED ON CITY OF COLORADO SPRINGS FIMS MONUMENT F_65. PANEL POINTS 50 FOUND AT THE NW CORNER OF RAYGOR ROAD AND ARROYA LANE (EL=7281.39), AND 51 FOUND AT THE NW CORNER OF RAYGOR ROAD AND FLAMING SUN DRIVE (EL=7251.58). (DATUM: NGVD 29).

BASIS OF BEARINGS

ALL BEARINGS USED HEREIN ARE BASED ON AN ASSUMED BEARING S00°02'11"E (S00°02'11"E PER THE RECORDED DEED), A DISTANCE OF 2587.22 FEET (2587.32 FEET OF RECORD) BETWEEN A 2-1/2" ALUMINUM CAP STAMPED "PLS 4842" AT THE NORTEAST CORNER OF THE NORTHWEST ONE-QUARTER CORNER OF SECTION 26 AND A 2" ALUMINUM CAP STAMPED "PLS 25968" AT THE CENTER ONE-QUARTER OF SAID SECTION 26.

LEGAL DESCRIPTION

A PORTION OF THE NORTHWEST QUARTER OF SECTION 26, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6th P.M., EL PASO COUNTY, COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID NORTHWEST QUARTER OF SECTION 26, AS ACCEPTED AND USED IN THE PLATS OF MFY FARM SUBDIVISION AND PAINT BRUSH HILLS FILING NO. 3, RECORDED IN PLAT BOOK T-3 AT PAGE 93 AND IN PLAT BOOK U-3 AT PAGE 79, RESPECTIVELY, OF THE RECORDS OF SAID EL PASO COUNTY; THENCE S00°02'11"E, ALONG THE EAST LINE OF SAID NORTHWEST QUARTER OF SECTION 26, A DISTANCE OF 2587.22 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 26 (BASIS OF BEARINGS – ASSUMED); THENCE N89°28'49"W, A DISTANCE OF 978.75 FEET TO THE NORTHEAST CORNER OF LOT 30 OF STAPLETON ESTATES FILING NO. 1, AS RECORDED IN PLAT BOOK R-3 AT PAGE 76 OF THE RECORDS OF SAID EL PASO COUNTY; THENCE N89°31'16"W, ALONG THE BOUNDARY LINE OF SAID STAPLETON ESTATES FILING NO. 1, A DISTANCE OF 1063.31 FEET TO THE NORTHWEST CORNER OF LOT 8 OF SAID STAPLETON ESTATES FILING NO. 1; THENCE N00°26'14"W ALONG THE EAST LINE OF SAID STAPLETON ESTATES FILING NO. 1, A DISTANCE OF 2561.60 FEET TO A POINT ON THE NORTH LINE OF SAID NORTHWEST QUARTER OF SECTION 26; THENCE N89°46'46"E, ALONG SAID NORTH LINE AND ALONG THE SOUTHERLY BOUNDARY LINE OF SAID MFY FARM SUBDIVISION AND THE SOUTHERLY LINE OF RODGWICK SUBDIVISION, RECORDED AT RECEPTION NO. 207712566 OF THE RECORDS OF SAID EL PASO COUNTY, A DISTANCE OF 2059.89 FEET TO THE POINT OF BEGINNING.

SAID TRACT CONTAINS 121.20 ACRES OF LAND, MORE OR LESS.

CONTACTS:

DEVELOPER:
PT EAGLEVIEW, LLC
1864 WOODMOOR DRIVE, SUITE 100
MONUMENT, CO 80132
TEL: (719) 476-0800
CONTACT: JOSEPH DESJARDIN

PLANNER/LANDSCAPE ARCHITECT:
NES, INC
619 N CASCADE AVENUE, SUITE 200
COLORADO SPRINGS, CO 80903
TEL: (719) 471-0073
EMAIL: ABARLOW@NESCOLORADO.COM
CONTACT: ANDREA BARLOW

ENGINEER:
KIMLEY-HORN AND ASSOCIATES, INC.
2 NORTH NEVADA AVENUE, SUITE 300
COLORADO SPRINGS, CO 80903
TEL: (719) 352-9194
EMAIL:
KEVIN.KOFFORD@KIMLEY-HORN.COM
CONTACT: KEVIN KOFFORD

SURVEY:
RAMPART SURVEYS, LLC.
1050 TAMARAC PKWY
WOODLAND PARK, CO 80863
TEL: (719) 687-0920
CONTACT: RUSS WOOD

EL PASO COUNTY PLANNING DEPARTMENT
2880 INTERNATIONAL CIRCLE, SUITE 110
COLORADO SPRINGS, CO 80910

PLANNING REVIEWER:
RYAN HOWSER
TEL: (719) 520-6313
EMAIL: RYANHOWSER@ELPASOCO.COM

ENGINEERING REVIEWER:
GILBERT LAFORCE
TEL: (719) 520-7945
EMAIL:
GILBERTLAFORCE@ELPASOCO.COM

COUNTY ENGINEER:
JOSHUA PALMER
TEL: (719) 520-6806
EMAIL: JOSHUAPALMER@ELPASOCO.COM

EPC PCD INSPECTIONS SUPERVISOR:
BRAD WALTERS
TEL: (719) 520-6819
EMAIL: BRADWALTERS@ELPASOCO.COM

FALCON FIRE DEPARTMENT:
AREA: FAL D2
FIRE CHIEF T. HARWIG
7030 OLD MERIDIAN ROAD
PAYTON, CO 80831
TEL: (719) 495-4050
EMAIL: FALCONFIRE@FALCONFIREPD.ORG

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.

KEVIN KOFFORD, 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

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
COVER SHEET

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

PROJECT NO.
196106001

SHEET
C2.0

K:\cos_civil\196288000_eagleview\CADD\PlanSheets\Stream CDs\CD_CV.dwg Kofford, Kevin 3/3/2023 1:48 PM

GENERAL CONSTRUCTION NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE ROUTE OF THE WORK. THE OMISSION FROM OR THE INCLUSION OF UTILITY LOCATIONS ON THE PLANS IS NOT TO BE CONSIDERED AS THE NONEXISTENCE OF OR A DEFINITE LOCATION OF EXISTING UNDERGROUND UTILITIES.

2. THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES FROM DAMAGE DUE TO THIS OPERATION. ANY DAMAGE TO THE UTILITIES WILL BE REPLACED AT THE CONTRACTORS EXPENSE AND ANY SERVICE DISRUPTION WILL BE SETTLED BY THE CONTRACTOR.

3. ADDITIONAL EROSION CONTROL STRUCTURES MAY BE REQUIRED AT THE TIME OF CONSTRUCTION.

4. ALL BACKFILL, SUB-BASE AND / OR BASE COURSE (CLASS 6) MATERIAL SHALL BE COMPACTED TO THE SOILS ENGINEERS RECOMMENDATIONS AND APPROVED BY EL PASO COUNTY DEVELOPMENT SERVICES ENGINEERING DIVISION.

5. ALL STATIONING IS CENTERLINE UNLESS OTHERWISE INDICATED. ALL ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE INDICATED.

6. ALL INTERSECTION ACCESSES TO BE CONSTRUCTED WITH 25 FOOT SIGHT VISIBILITY TRIANGLES AND THERE SHALL BE NO OBSTRUCTIONS GREATER THAN 18" IN THIS AREA,

7. ALL CULVERT AND STORM PIPES SHALL BE SMOOTH INTERIOR REINFORCED CONCRETE PIPE (RCP), ALL CULVERTS SHALL BE PLACED COMPLETE WITH FLARED END SECTIONS. ADEQUACY OF MATERIAL THICKNESS FOR ANY CSP INSTALLED SHALL BE VERIFIED BY OWNERS GEOTECHNICAL ENGINEER TO SUPPORT MINIMUM 50 YEAR DESIGN LIFE. CULVERTS MUST CONFORM TO EPC ECM SECTION 3.32 – CULVERTS.

8. ALL MATERIALS AND INSTALLATION PROCEDURES SHALL BE IN COMPLIANCE WITH ANY AND ALL APPLICABLE EL PASO COUNTY STANDARDS.

9. CONTRACTOR IS RESPONSIBLE FOR PROVIDING DETAILED AS-BUILTS OF ALL WATER MAIN, STORM SEWER, AND SANITARY. SEWER MAIN INSTALLATIONS, INCLUDING ACCURATE DISTANCES OF MAIN LINES, VALVES, FITTINGS, MANHOLES AND LOCATIONS OF WATER AND SEWER SERVICES.

STANDARD NOTES FOR EPC CONSTRUCTION PLAN

1. ALL DRAINAGE AND ROADWAY CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD NOTIFICATION OF ALL EXISTING UTILITIES, WHETHER SHOWN O THE PLANS OR NOT, BEFORE BEGINNING CONSTRUCTION. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CALL 811 TO CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC).

3. CONTRACTOR SHALL KEEP A COPY OF THESE APPROVED PLANS, THE GRADING AND EROSION CONTROL PLAN, THE STORMWATER MANAGEMENT PLAN (SWMP), THE SOILS AND GEOTECHNICAL REPORT, AND THE APPROPRIATE DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, INCLUDING THE FOLLOWING:

A: EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)

B: CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2

C: COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION.

D: CDOT M & S STANDARDS

4. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE 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, THE DRAINAGE CRITERIA MANUAL AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUIRED, AND APPROVED, IN WRITING. ANY MODIFICATIONS NECESSARY TO MEET CRITERIA AFTER-THE-FACT WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.

5. IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITIONS, BOTH ONSITE AND OFFSITE, ON THE CONSTRUCTION PLANS. ANY MODIFICATIONS NECESSARY DUE TO CONFLICTS, OMISSIONS, OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.

6. CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT (PCD) – INSPECTIONS, PRIOR TO STARTING CONSTRUCTION.

7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO UNDERSTAND THE REQUIREMENTS OF ALL JURISDICTIONAL AGENCIES AND TO OBTAIN ALL REQUIRED PERMITS, INCLUDING BUT NOT LIMITED TO EL PASO COUNTY EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP), REGIONAL BUILDING FLOODPLAIN DEVELOPMENT PERMIT, U.S. ARMY CORP OF ENGINEERS-ISSUED 401 AND/OR 404 PERMITS, AND COUNTY AND STATE FUGITIVE DUST PERMITS.

8. CONTRACTOR SHALL NOT DEVIATE FROM THE PLANS WITHOUT FIRST OBTAINING WRITTEN APPROVAL FROM THE DESIGN ENGINEER AND PCD. CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY ERRORS OR INCONSISTENCIES.

9. ALL STORM DRAIN PIPE SHALL BE CLASS III RCP UNLESS OTHERWISE NOTED AND APPROVED BY PCD.

10. CONTRACTOR SHALL COORDINATE GEOTECHNICAL TESTING PER ECM STANDARDS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY PCD PRIOR TO PLACEMENT OF CURB AND GUTTER AND PAVEMENT.

11. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.

12. SIGHT VISIBILITY TRIANGLES AS IDENTIFIED IN THE PLANS SHALL BE PROVIDED AT ALL INTERSECTIONS. OBSTRUCTIONS GREATER THAN 18 INCHES ABOVE FLOWLINE ARE NOT ALLOWED WITHIN SIGHT TRIANGLES.

13. SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DOT AND MUTCD CRITERIA. [IF APPLICABLE, ADDITIONAL SIGNING AND STRIPING NOTES WILL BE PROVIDED.]

14. CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY DOT, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.

15. THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINES UNLESS OTHERWISE NOTED. THE OWNER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNERS(S) PRIOR TO ANY OFF-SITE DISTURBANCE, GRADING, OR CONSTRUCTION.

EL PASO COUNTY GRADING AND EROSION CONTROL 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 DISTURBANCE 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 DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE 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, THE DRAINAGE 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 APPROVED 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 MUST 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 AFFECT 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 SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY ENTECH ENGINEERING, INC. AND DATED APRIL 29, 2021 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

LEGEND

- EXISTING PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (XXXX)
- EXISTING MINOR CONTOUR (XXXX)
- PROPOSED MAJOR CONTOUR (XXXX)
- PROPOSED MINOR CONTOUR (XXXX)
- PROPOSED TRM MATTING
- PROPOSED RIPRAP
- PROPOSED MAINTENANCE ROAD
- PROPOSED GROUT MATERIAL
- TOP SOIL W/ SOIL AMENDMENT
- NATIVE SOIL
- PROPOSED METRO DISTRICT MAINTENANCE DRAINAGE ESMT
- PROPOSED COUNTY MAINTENANCE DRAINAGE ESMT
- PROPOSED STORM PIPE
- STORM PIPE PER ONSITE CIVIL PLANS
- PROPOSED FLARED END SECTION
- PROPOSED BOULDERS
- PROPOSED ROCK CHUTE

ABBREVIATIONS

ATTN	ATTENTION
AVG	AVERAGE
@	AT
BL	BASELINE
BOC	BOTTOM OF CONCRETE
BPS	BEGIN POOL SECTION, LOOKING DOWNSTREAM
BRS	BEGIN RIFFLE SECTION, LOOKING DOWNSTREAM
BVC	BEGINNING OF VERTICAL CURVE
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
CFS	CUBIC FEET PER SECOND
CIP	CAST IN PLACE
CL	CENTERLINE
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CONC	CONCRETE
CONT	CONTINUED, CONTINUOUS, CONTINUATION
COORD	COORDINATE
CS	CROSS SECTION
CTR	CENTER
CU FT	CUBIC FOOT
CY	CUBIC YARD
CU YD	CUBIC YARD
DIA	DIAMETER
DT	DETAIL
E	EAST, EASTING
EA	EACH
EG	EXAMPLE
EL	ELEVATION
ELEV	ELEVATION
ENGR	ENGINEER
EPC	ENGINEERING, PROCUREMENT, AND CONSTRUCTION
EQ	EQUATION
EQL	EQUAL
ESMT	EASEMENT
EURV	EXCESS URBAN RUNOFF VOLUME
EXIST.	EXISTING
FIG	FIGURE
FES	FLARED END SECTION
FG	FINISHED GRADE
FL	FLOWLINE
FT/S	FEET PER SECOND
G, GND	GROUND
GESC	GRADING, EROSION, AND SEDIMENT CONTROL
GPS	GLOBAL POSITIONING SYSTEM
HGL	HYDRAULIC GRADE LINE
HGT	HEIGHT
HORIZ	HORIZONTAL
IE	INVERT ELEVATION
IN	INCH
INV	INVERT
L	LENGTH
LF	LINEAR FEET
LT	LEFT
MAX	MAXIMUM
MIN	MINIMUM
MISC	MISCELLANEOUS
NAVD	NORTH AMERICAN VERTICAL DATUM
N	NORTH, NORTHING
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NO.	NUMBER
NPDES	NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM
NTS	NOT TO SCALE
OC	ON CENTER
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
PROP.	PROPOSED
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
RCP	REINFORCED CONCRETE PIPE
REC	RECORDED
REF	REFER OR REFERENCE
REINF	REINFORCED, REINFORCING, REINFORCE
REQD	REQUIRED
RT	RIGHT
S	SLOPE, SOUTH
SD	STORM DRAIN
SPEC	SPECIFICATION
SQ	SQUARE
SQ FT	SQUARE FOOT, FEET
SQ IN	SQUARE INCH
SQ YD	SQUARE YARD
ST	STORM DRAIN
STA	STATION
STD	STANDARD
TEL	TELEPHONE
THRU	THROUGH
TOC	TOP OF CONCRETE
TOF	TOP OF FOOTING
TOG	TOP OF GROUT, TOP OF GRATE
TOS	TOP OF SLAB
TOW	TOP OF WALL
TRANS	TRANSITION
TYP.	TYPICAL
W	WEST
WQCV	WATER QUALITY CAPTURE VOLUME
WS	WATER SURFACE
WSEL	WATER SURFACE ELEVATION
W/	WITH

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

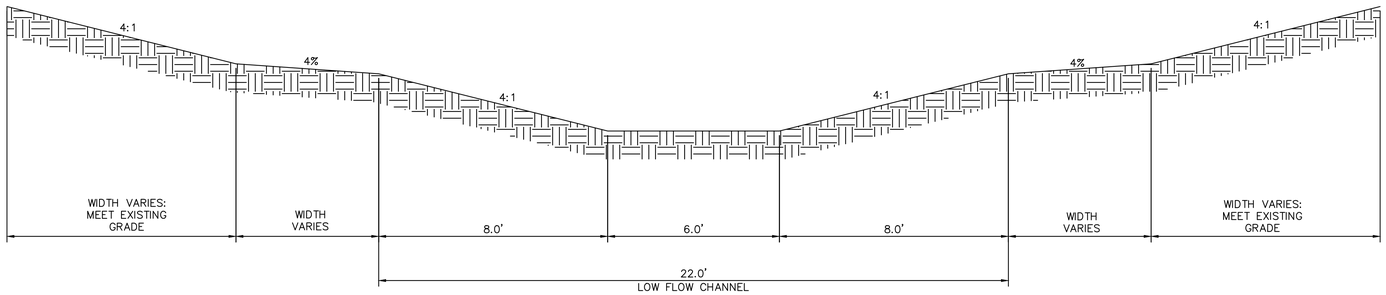
EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

NOTES, ABBREVIATIONS, & LEGEND

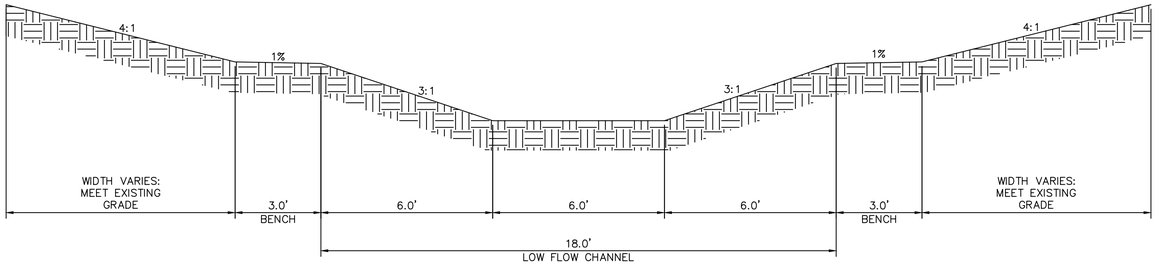
PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001

SHEET
C2.1



SOUTH CHANNEL TYPICAL SECTION
SCALE: NTS



NORTH CHANNEL TYPICAL SECTION
SCALE: NTS

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
TYPICAL SECTIONS

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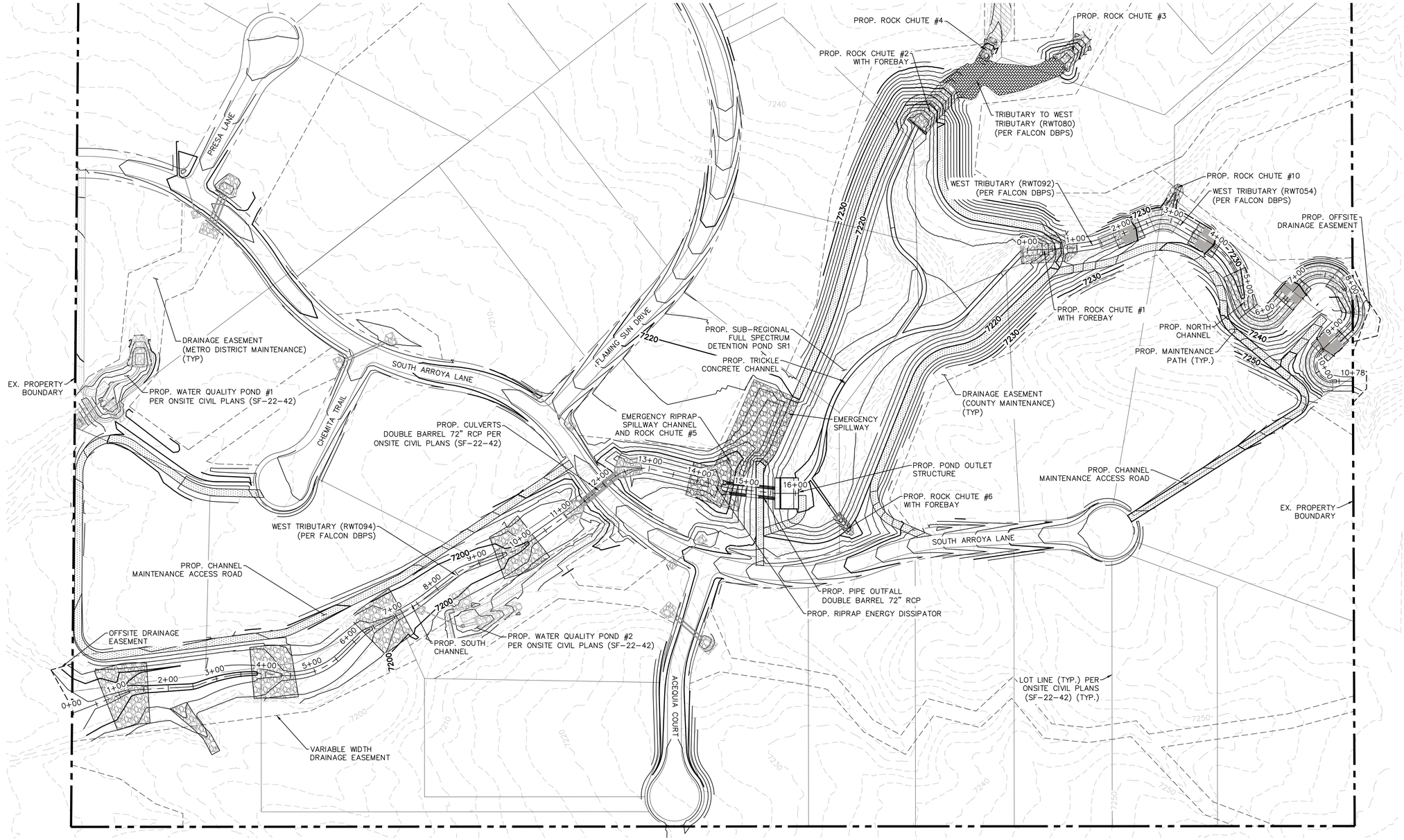
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001

SHEET
C2.2



LEGEND

- EXISTING PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED TRM MATTING
- PROPOSED RIPRAP
- PROPOSED STORM PIPE
- STORM PIPE PER ONSITE CIVIL PLANS

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

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

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

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: DCM
DRAWN BY: DCM
CHECKED BY: BAH
DATE: 03/03/2023

EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

OVERALL DRAINAGE IMPROVEMENTS

PRELIMINARY
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Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196288000

SHEET
C2.3

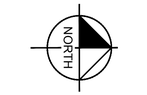
NORTH CHANNEL HORIZONTAL CONTROL
STATION 0+00 – STATION 10+76

CURVE TABLE						
CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
1	72.00'	11.42'	N16°52'09"W	11.41'	9°05'25"	5.72'
2	72.00'	22.85'	N12°19'26"W	22.75'	18°10'50"	11.52'
3	72.00'	22.85'	N12°19'26"W	22.75'	18°10'50"	11.52'
4	300.00'	142.53'	N7°48'14"W	141.19'	27°13'14"	72.63'
5	150.00'	131.96'	N19°23'47"W	127.75'	50°24'19"	70.59'
6	72.00'	22.85'	N35°30'32"W	22.75'	18°10'50"	11.52'
7	300.00'	60.17'	N32°09'52"W	60.07'	11°29'32"	30.19'
8	72.00'	22.85'	N28°49'13"W	22.75'	18°10'50"	11.52'
9	72.00'	20.30'	N27°48'21"W	20.23'	16°09'06"	10.22'
10	100.00'	93.52'	N12°53'42"W	90.15'	53°34'58"	50.49'
11	110.00'	28.83'	N15°12'33"W	28.75'	15°01'08"	14.50'
12	60.00'	55.86'	N3°57'05"E	53.86'	53°20'24"	30.14'
13	130.00'	105.91'	N53°57'41"E	103.01'	46°40'48"	56.09'
14	35.00'	76.69'	N13°57'51"E	62.24'	125°32'32"	68.02'
15	55.00'	105.11'	N14°45'37"E	89.83'	109°29'46"	77.82'
16	40.00'	46.60'	S77°07'08"E	44.01'	66°44'45"	26.35'
17	35.00'	83.03'	N68°17'35"E	64.89'	135°55'20"	86.46'

LINE TABLE		
LINE	LENGTH	BEARING
1	103.55	N21°24'51.26"W
2	103.55	N3°14'01.26"W
3	4.18	N21°24'51.26"W
4	21.53	N5°48'22.36"E
5	52.69	N44°35'56.63"W
6	66.40	N26°25'06.64"W
7	83.22	N37°54'38.17"W
8	103.39	N19°43'48.17"W
9	132.63	N35°52'53.98"W
10	73.17	N39°41'11.16"W
11	4.20	N39°41'11.16"W
12	10.47	N39°41'11.16"W
13	153.50	N13°53'47.19"E
14	94.55	N6°30'44.51"E
15	48.00	N0°03'59.38"E
16	92.22	N2°54'48.25"W
17	31.65	N7°41'58.69"W

LINE TABLE		
LINE	LENGTH	BEARING
18	106.61	N22°43'06.62"W
19	67.64	N30°37'17.37"E
20	6.38	N30°37'17.37"E
21	3.01	N77°18'05.59"E
22	41.60	N76°44'06.39"E
23	79.87	N48°48'25.11"W
24	6.07	N39°59'16.31"W
25	29.08	N69°30'29.60"E
26	71.08	S43°44'45.06"E
27	40.74	N0°19'55.34"E

SOUTH CHANNEL HORIZONTAL CONTROL
STATION 0+00 – STATION 16+17



GRAPHIC SCALE IN FEET
0 35 70 140

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NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
HORIZONTAL CONTROL

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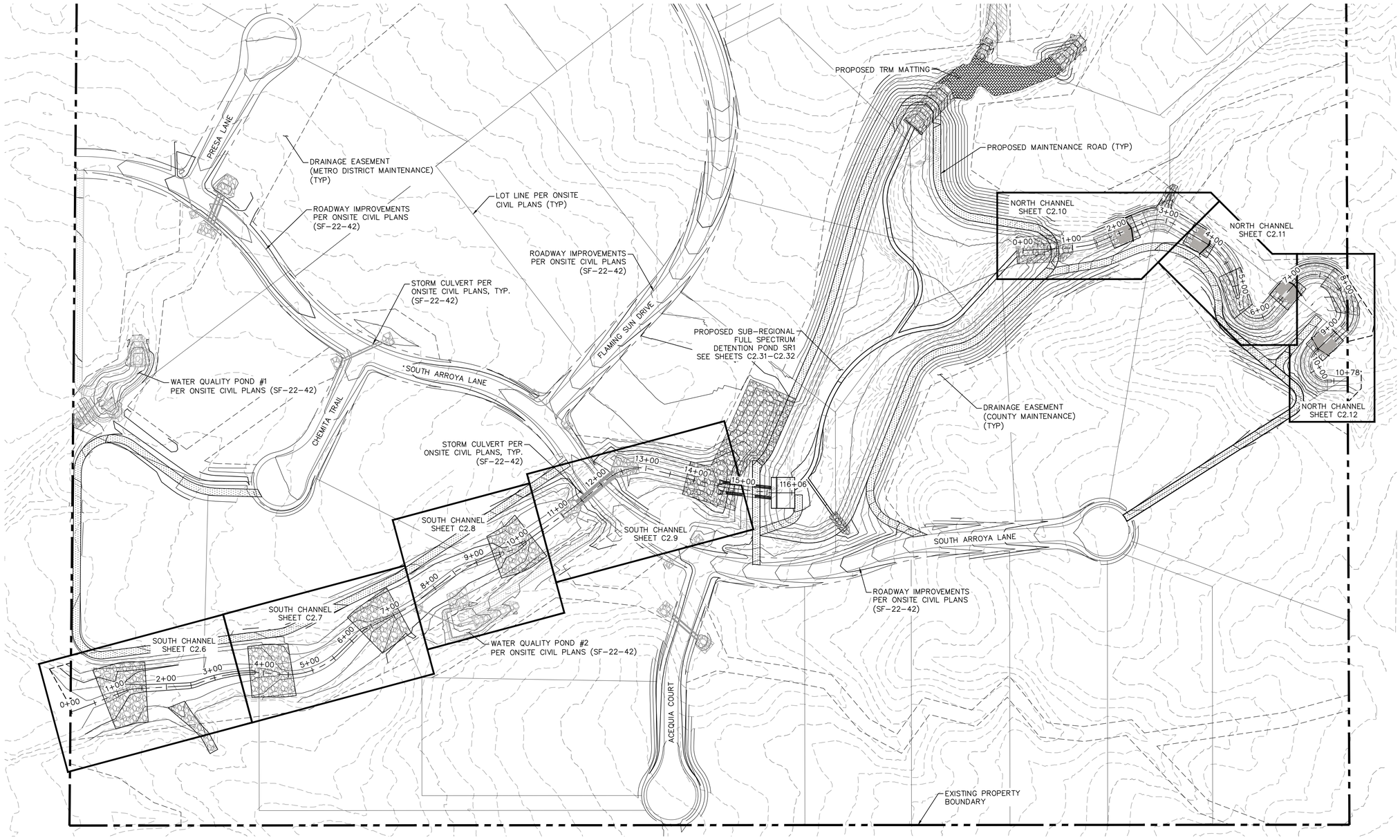
PROJECT NO.
196106001

SHEET
C2.4



GRAPHIC SCALE IN FEET
0 50 100 200

NORTH

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EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
CHANNEL KEY MAP

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SHEET
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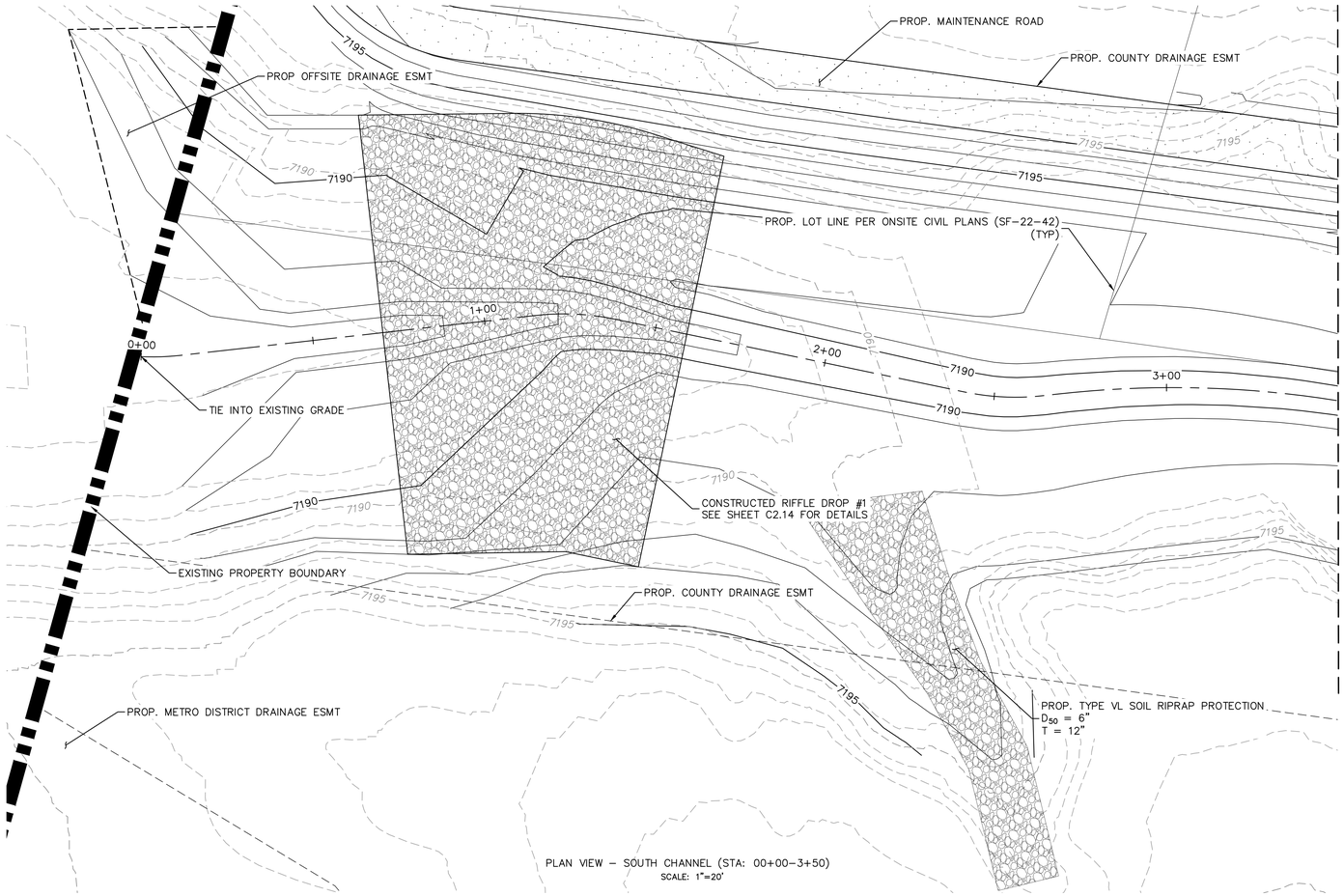
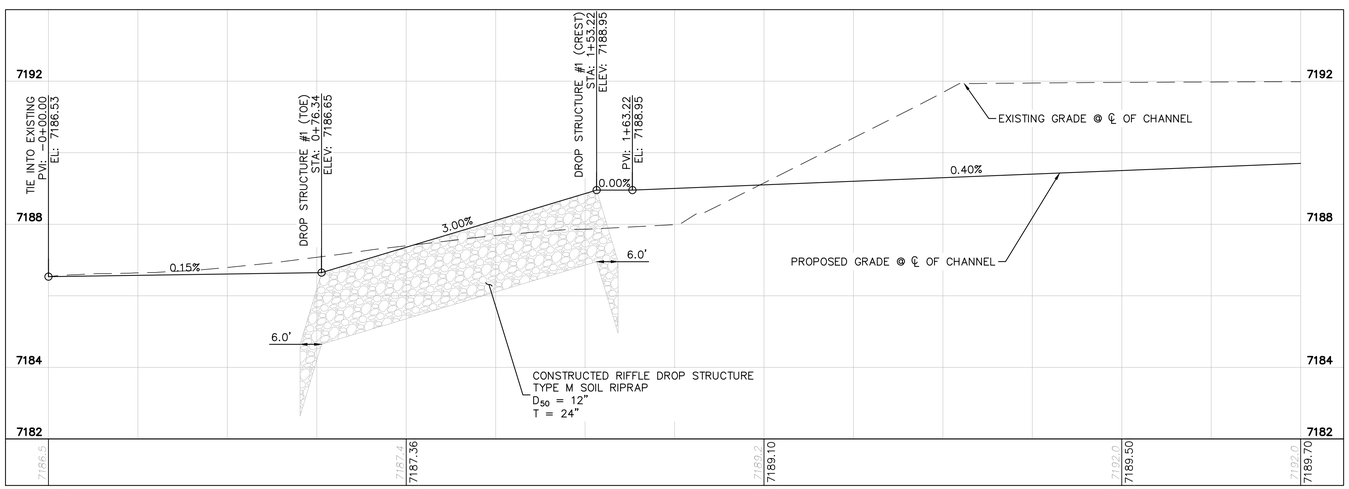
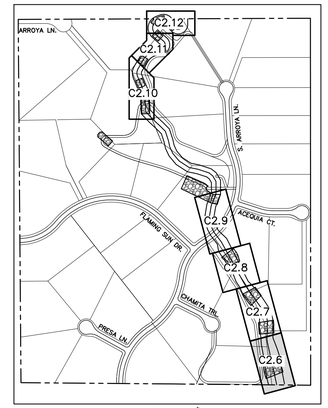


PLAN VIEW – SOUTH CHANNEL (STA: 00+00–3+50)
SCALE: 1"=20'



PROFILE VIEW – SOUTH CHANNEL (STA: 0+00–3+50)
SCALE: 1"=20'



KEY MAP
N.T.S.

NOTES:

1. CHANNEL INVERT SHOWN IN PROFILE VIEW IS THE ELEVATION OF THE LOW FLOW CHANNEL.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL

0 1 2 4
VERTICAL

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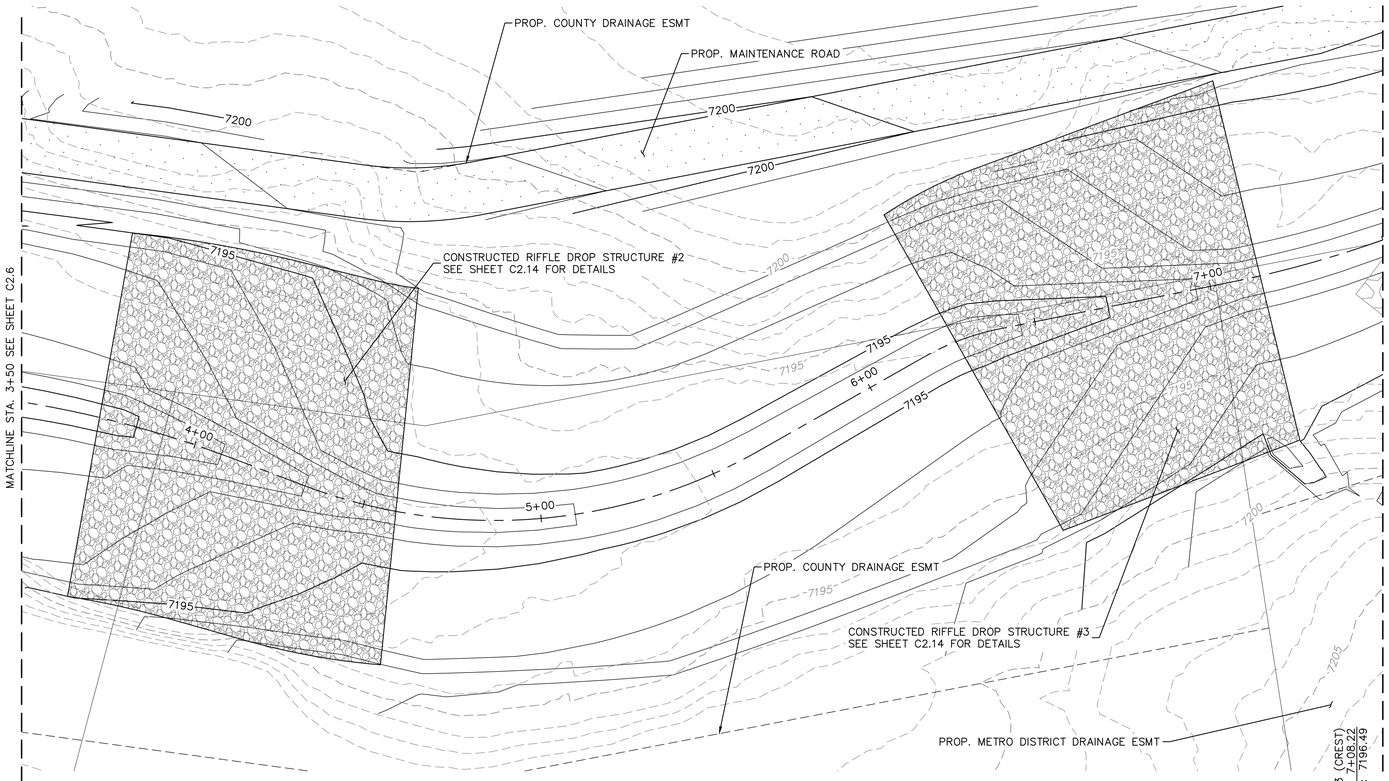
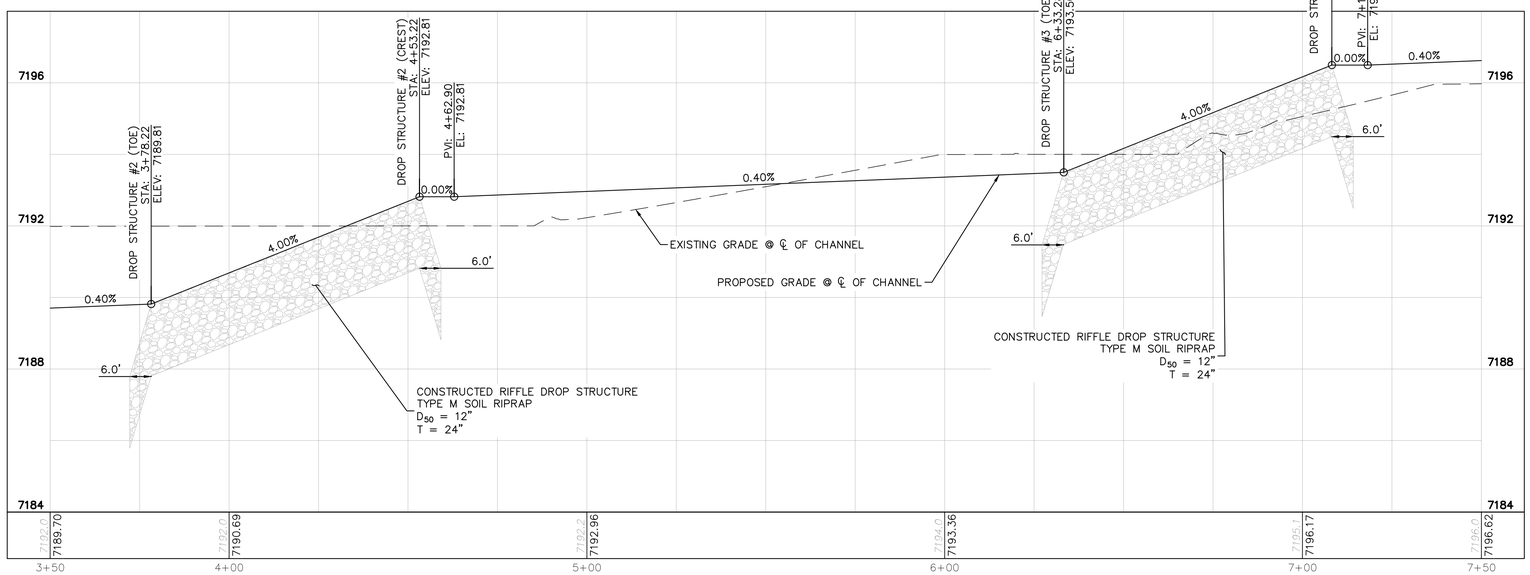
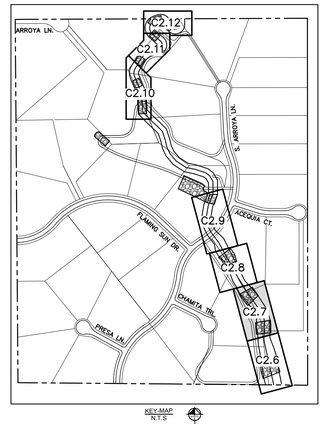
SHEET
C2.6



PLAN VIEW – SOUTH CHANNEL (STA: 3+50–7+50)
SCALE: 1"=20'



PROFILE VIEW – SOUTH CHANNEL (STA: 3+50–7+50)
SCALE: 1"=20'



NOTES:

1. CHANNEL INVERT SHOWN IN PROFILE VIEW IS THE ELEVATION OF THE LOW FLOW CHANNEL.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL

0 1 2 4
VERTICAL

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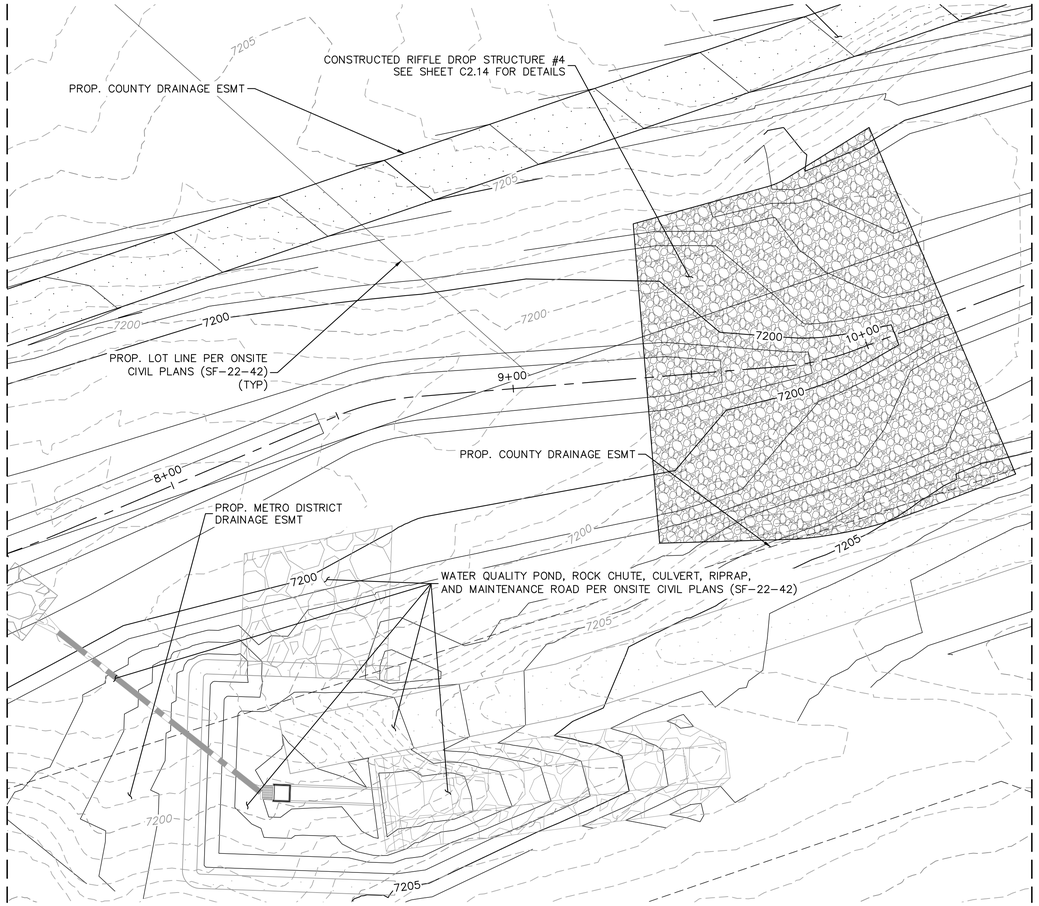
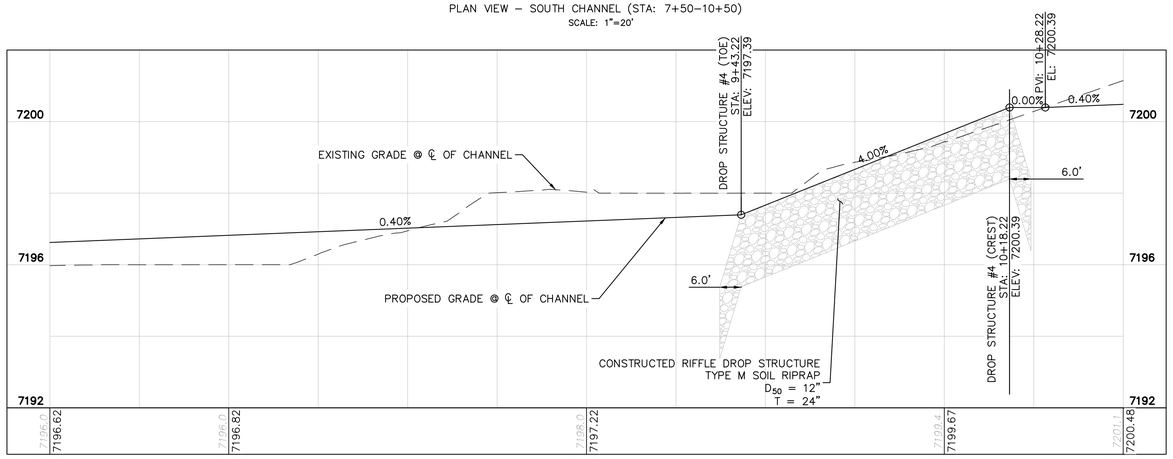
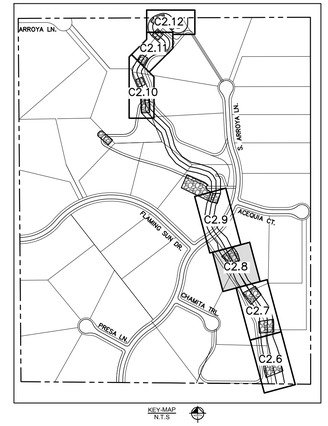
SHEET
C2.7



PLAN VIEW – SOUTH CHANNEL (STA: 7+50–10+50)
SCALE: 1"=20'



PROFILE VIEW – SOUTH CHANNEL (STA: 7+50–10+50)
SCALE: 1"=20'



KEY MAP
N.T.S.

NOTES:

1. CHANNEL INVERT SHOWN IN PROFILE VIEW IS THE ELEVATION OF THE LOW FLOW CHANNEL.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL

0 1 2 4
VERTICAL

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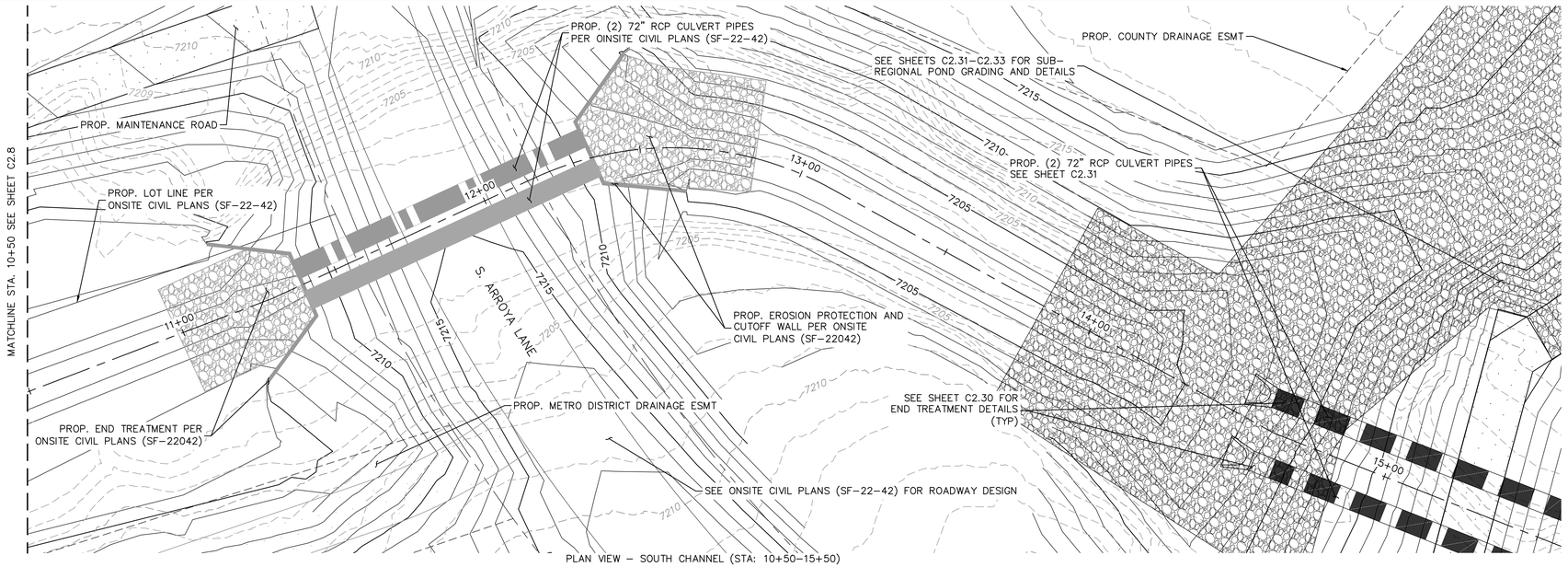
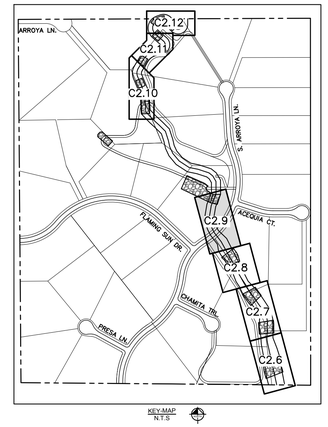
PROJECT NO.
196106001

SHEET
C2.8



PLAN VIEW – SOUTH CHANNEL (STA: 10+50–15+50)
SCALE: 1"=20'



KEY MAP
N.T.S.

NOTES:

1. CHANNEL INVERT SHOWN IN PROFILE VIEW IS THE ELEVATION OF THE LOW FLOW CHANNEL.

PROFILE VIEW – SOUTH CHANNEL (STA: 10+50–15+50)
SCALE: 1"=20'

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL

0 1 2 4
VERTICAL

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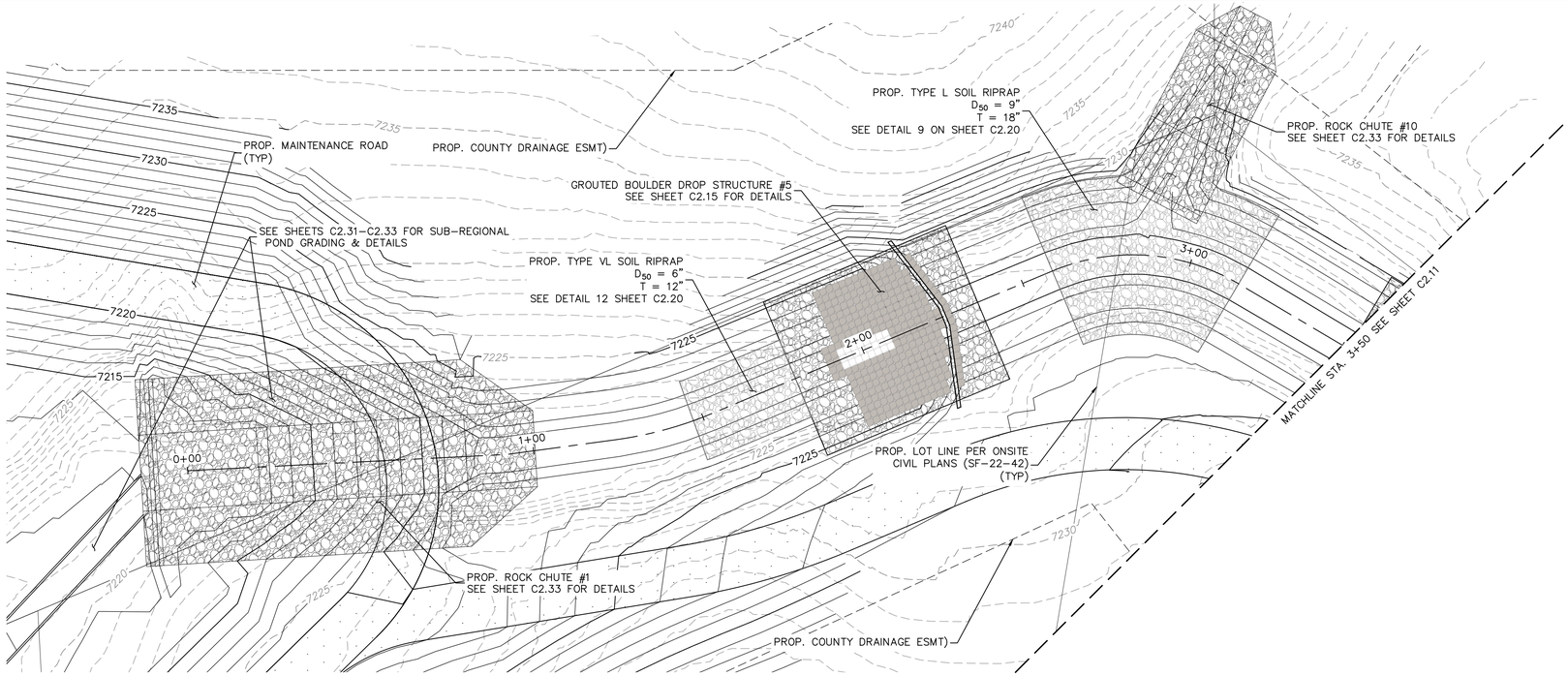
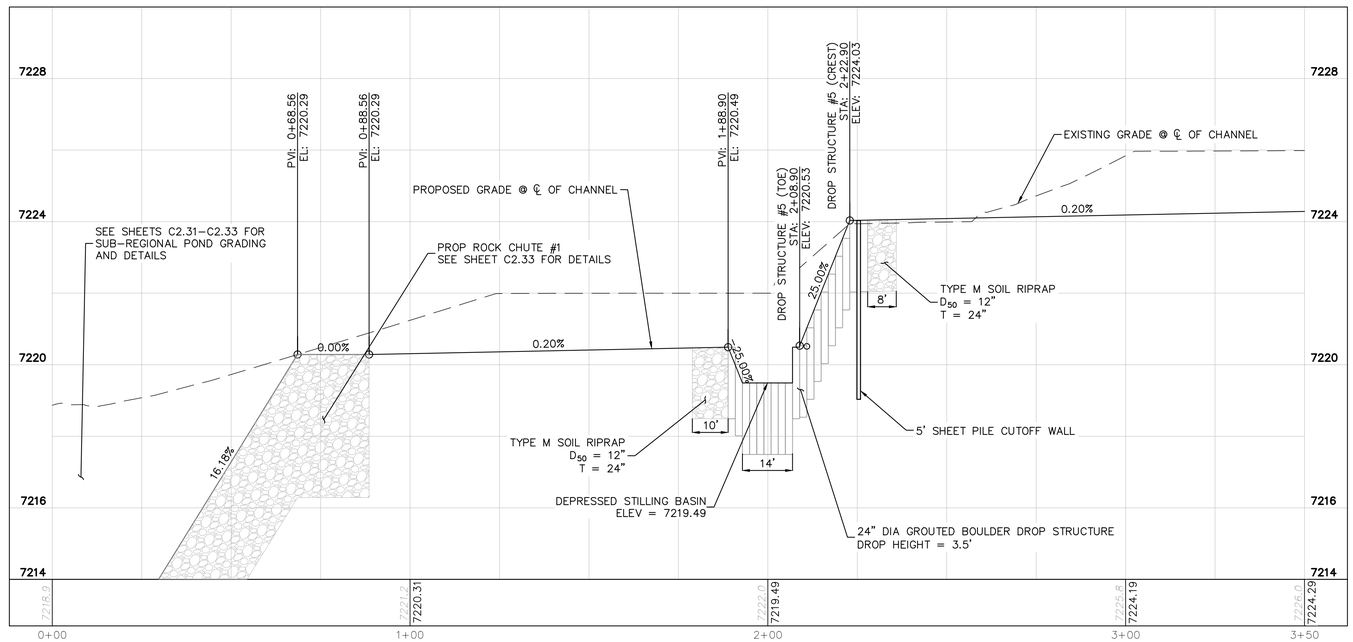
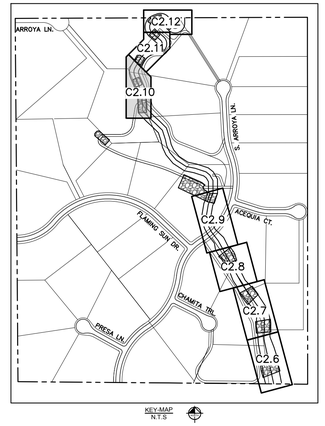
SHEET
C2.9



PLAN VIEW – NORTH CHANNEL (STA: 0+00–3+50)
SCALE: 1"=20'



PROFILE VIEW – NORTH CHANNEL (STA: 0+00–3+50)
SCALE: 1"=20'



NOTES:

1. CHANNEL INVERT SHOWN IN PROFILE VIEW IS THE ELEVATION OF THE LOW FLOW CHANNEL.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL

0 1 2 4
VERTICAL

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SHEET
C2.10

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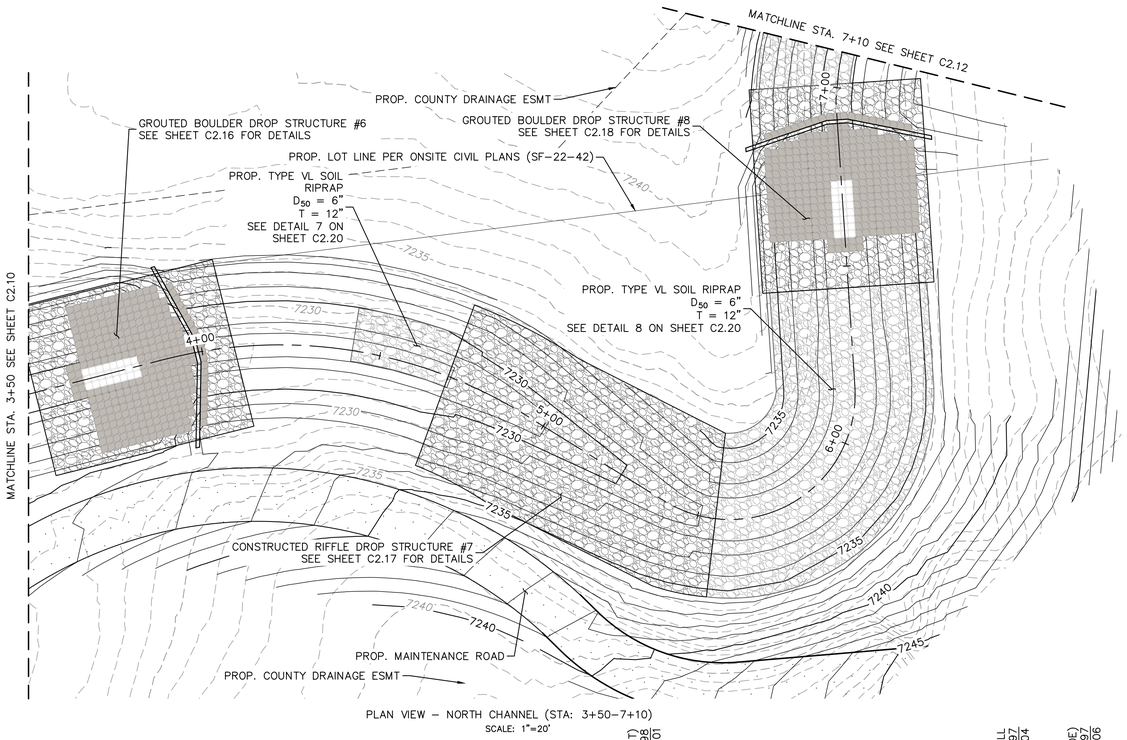
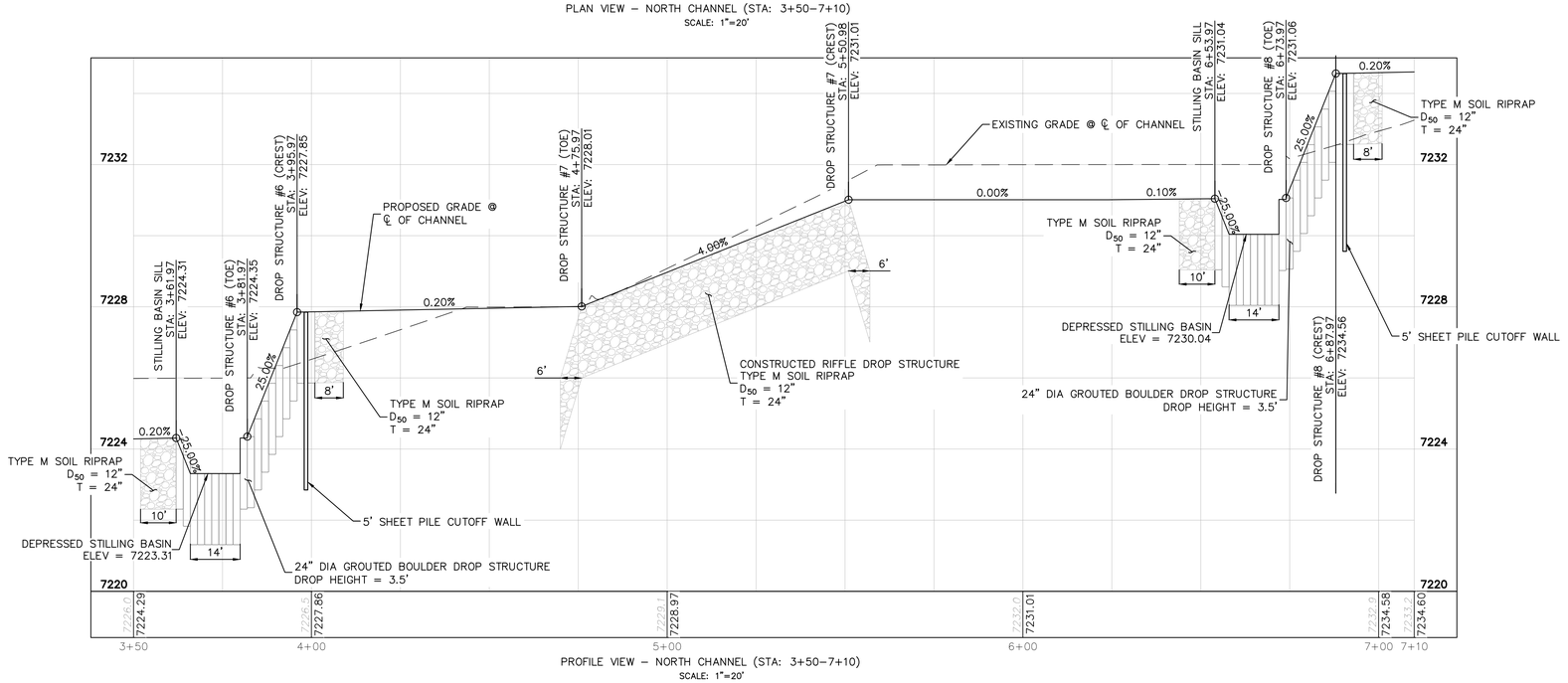
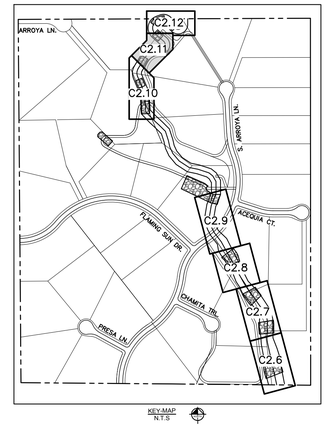


PLAN VIEW – NORTH CHANNEL (STA: 3+50–7+10)
SCALE: 1"=20'



PROFILE VIEW – NORTH CHANNEL (STA: 3+50–7+10)
SCALE: 1"=20'



KEY MAP
N.T.S.

NOTES:

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GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL

0 1 2 4
VERTICAL

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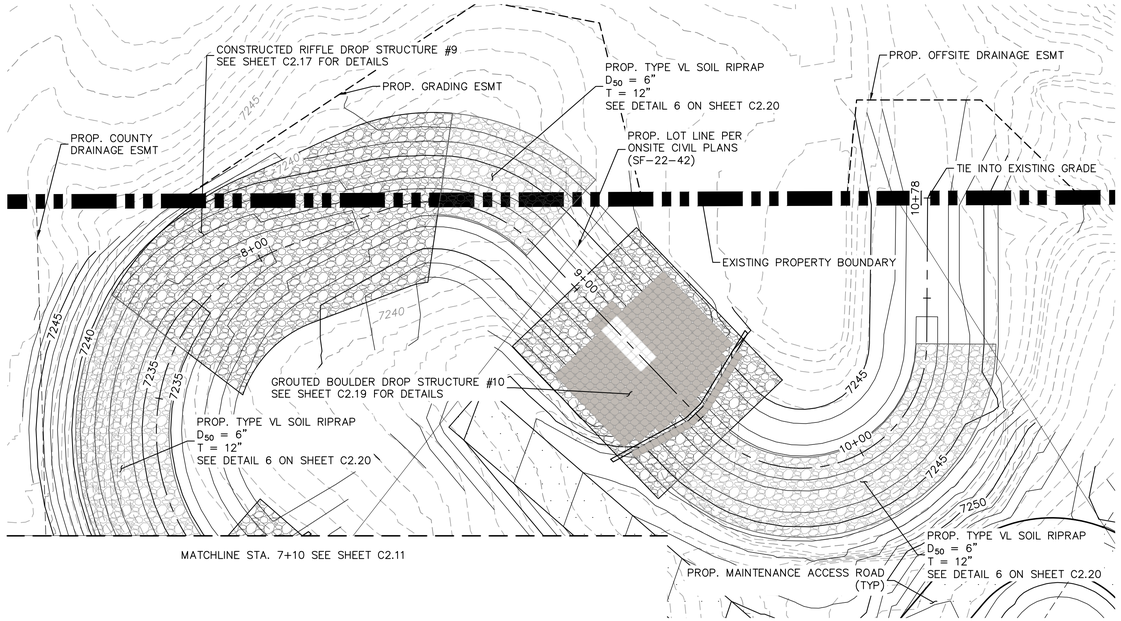
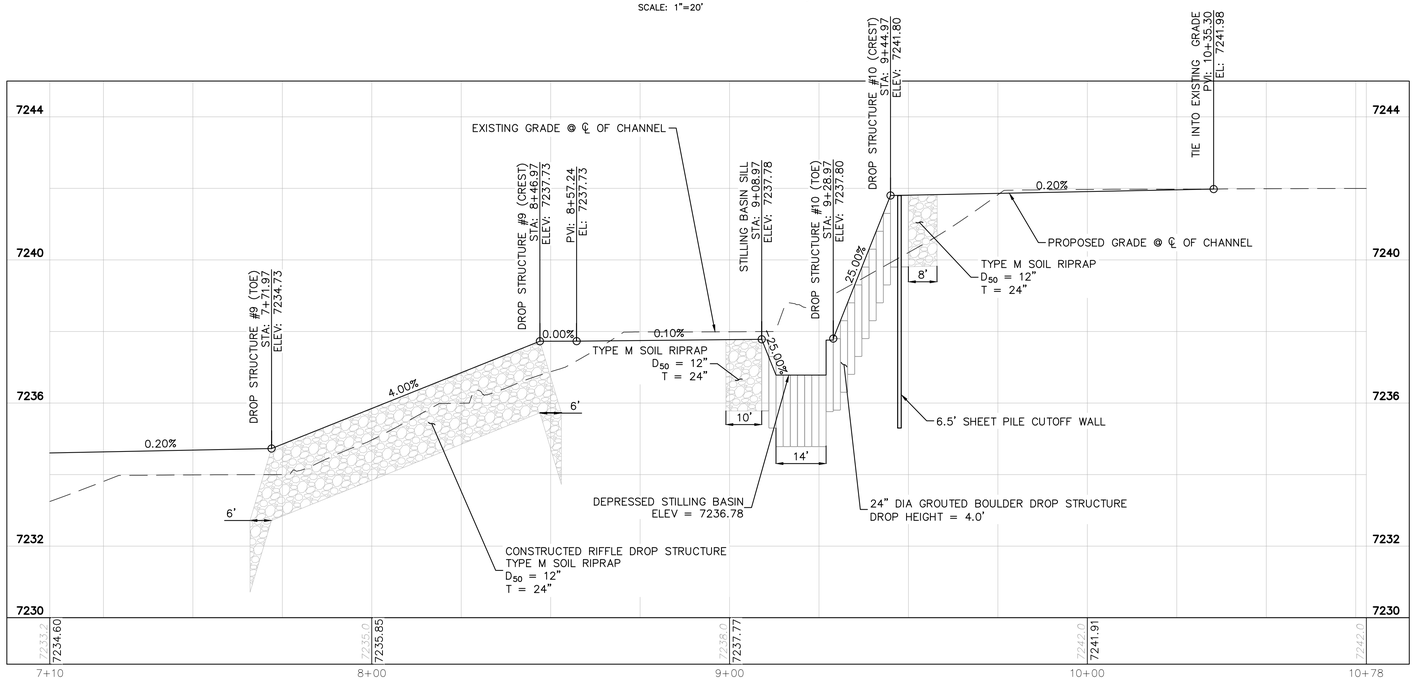
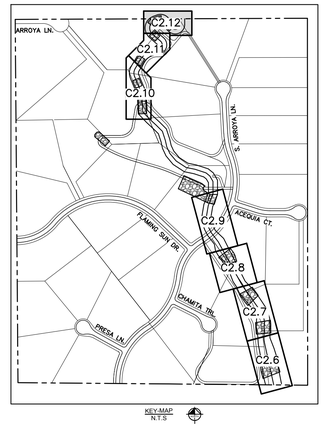
SHEET
C2.11



PLAN VIEW – NORTH CHANNEL (STA: 7+10–10+76)
SCALE: 1"=20'



PROFILE VIEW – NORTH CHANNEL (STA: 7+10–10+76)
SCALE: 1"=20'



KEY MAP
N.T.S.

GRAPHIC SCALE IN FEET
0 10 20 40
HORIZONTAL

0 1 2 4
VERTICAL

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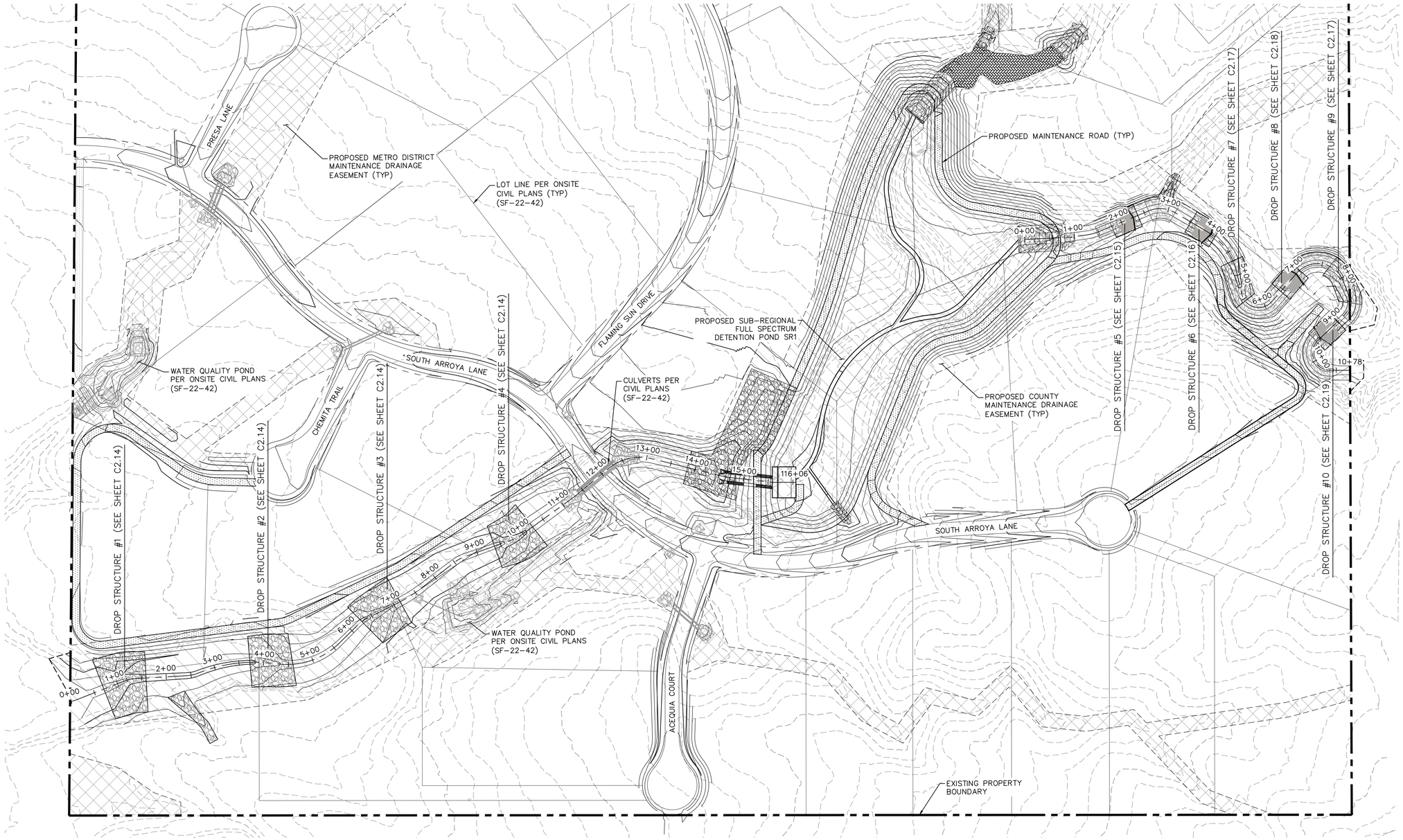
C2.12



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CONSTRUCTION DOCUMENTS

DROP STRUCTURE KEY MAP

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SHEET
C2.13

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GRAPHIC SCALE IN FEET
0 50 100 200

NORTH

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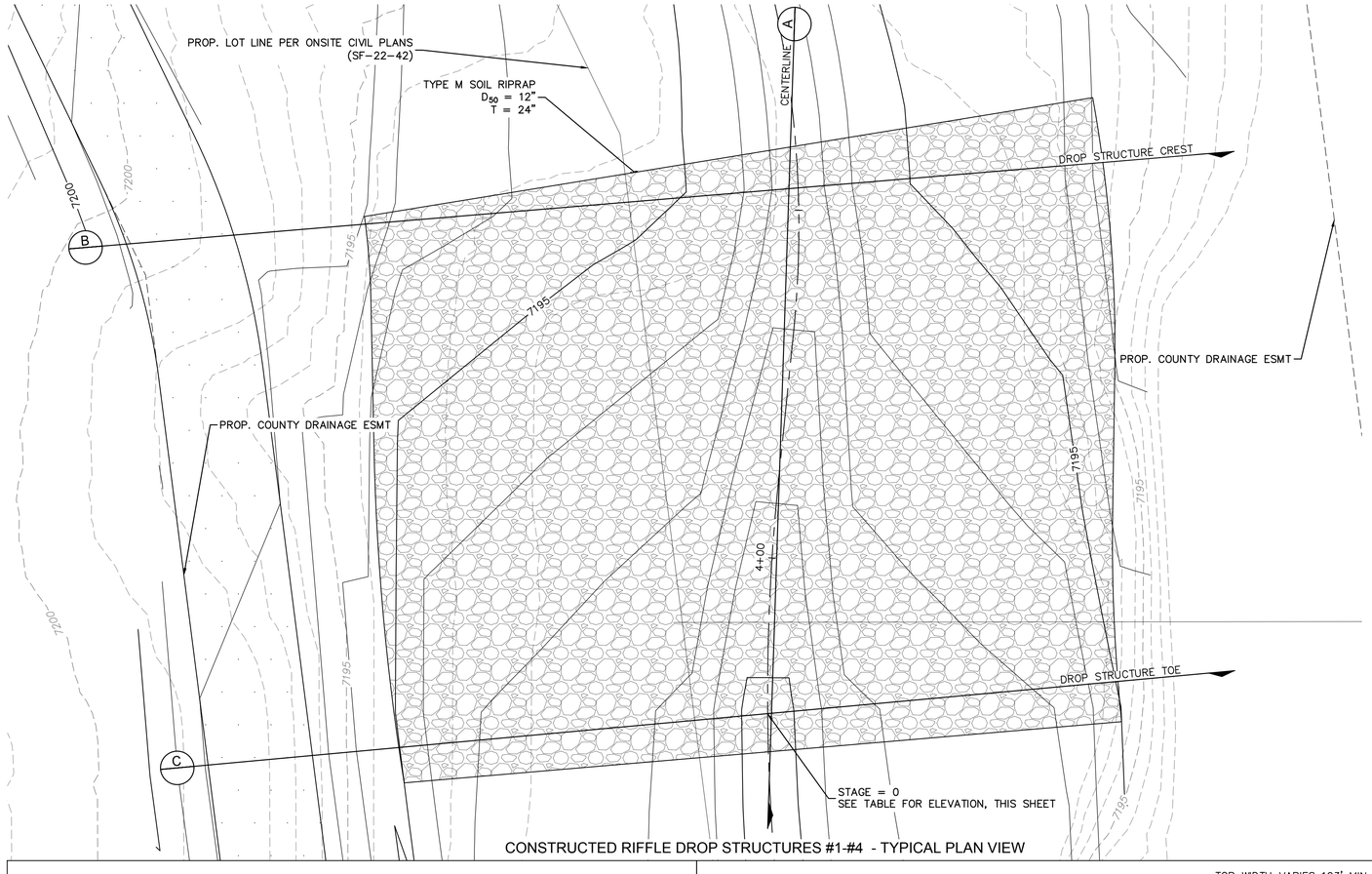
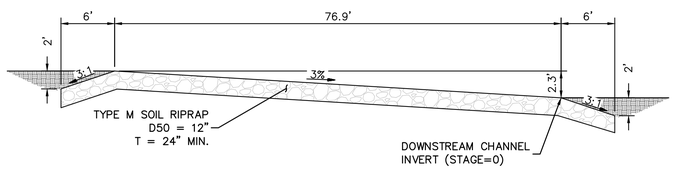
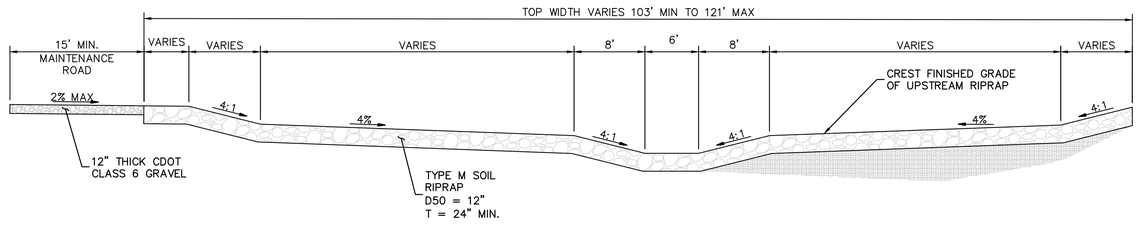


CONSTRUCTED RIFFLE DROP STRUCTURES #1-#4 - TYPICAL PLAN VIEW



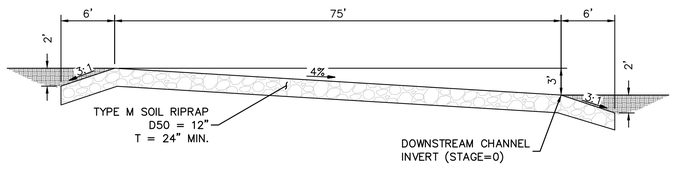
A DROP STRUCTURE (#1) - CENTERLINE PROFILE VIEW

NTS



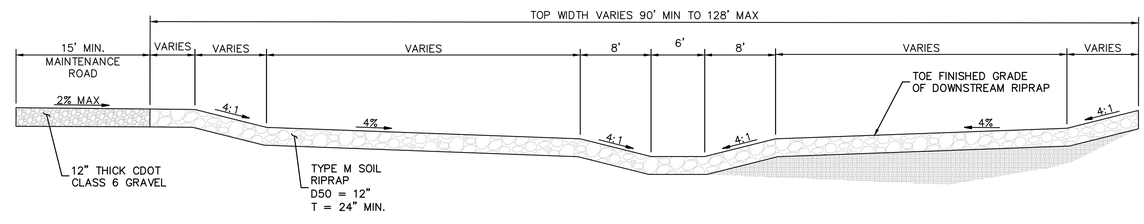
B DROP STRUCTURE (#1, #2, #3, #4) - CREST PROFILE VIEW

NTS



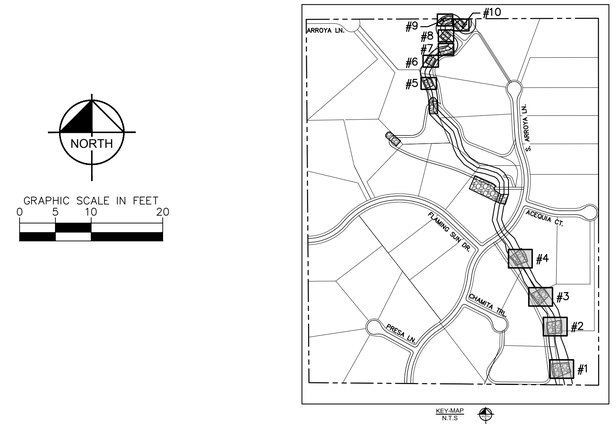
A DROP STRUCTURE (#2-#4, #7, #9) - CENTERLINE PROFILE VIEW

NTS



C DROP STRUCTURE (#1, #2, #3, #4) - TOE PROFILE VIEW

NTS



KEY MAP
N.T.S.

DROP STRUCTURE STAGE ELEVATIONS	
NAME	ELEVATION
DROP STRUCTURE #1	7186.6
DROP STRUCTURE #2	7189.8
DROP STRUCTURE #3	7193.5
DROP STRUCTURE #4	7197.4

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN AND PROFILE SHEETS

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NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

DROP STRUCTURE DETAILS

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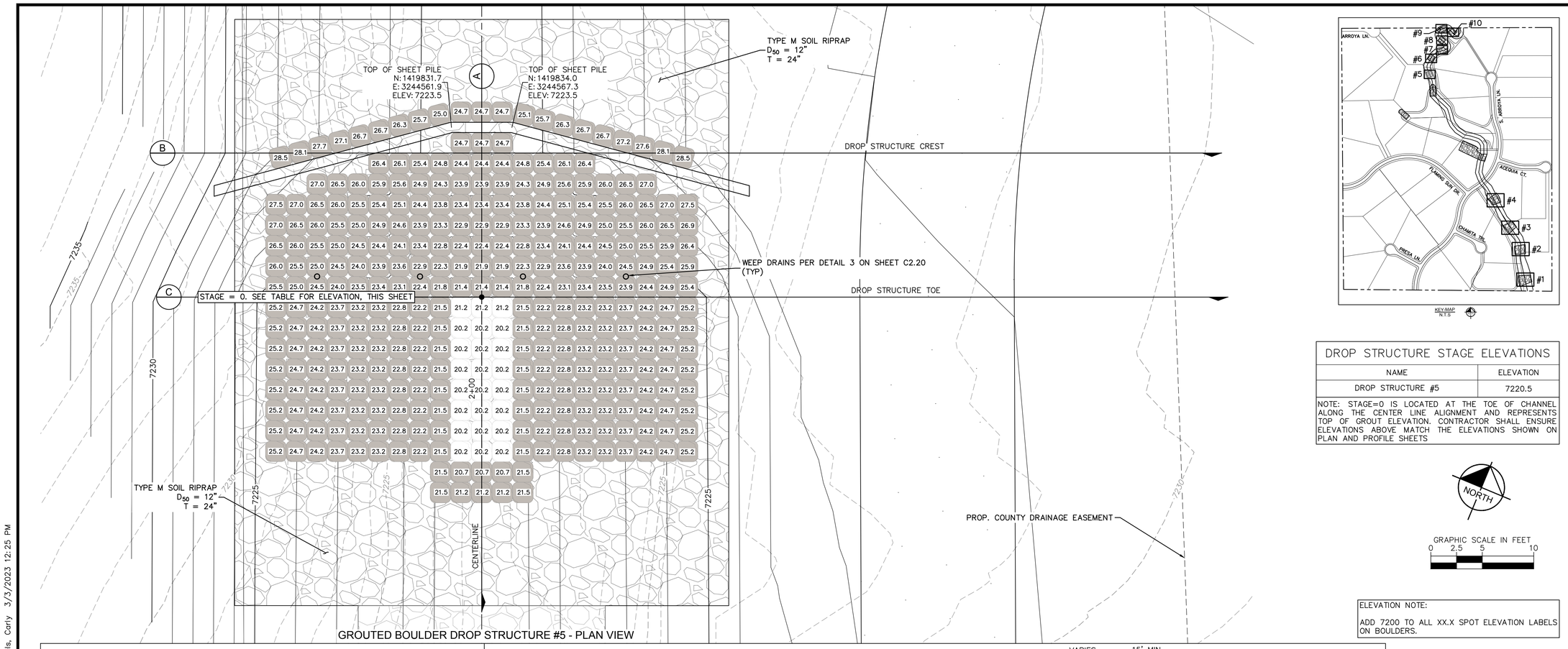
PROJECT NO.
196106001

SHEET
C2.14



GROUTED BOULDER DROP STRUCTURE #5 - PLAN VIEW

KEY MAP
N.T.S.

DROP STRUCTURE STAGE ELEVATIONS

NAME	ELEVATION
DROP STRUCTURE #5	7220.5

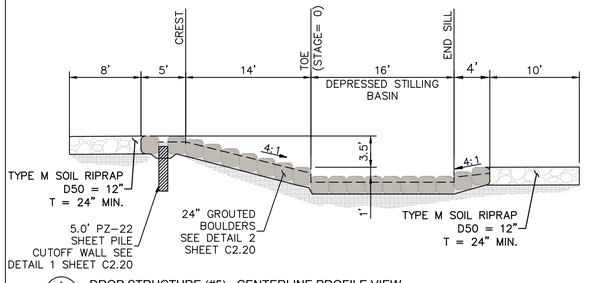
NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT AND REPRESENTS TOP OF GROUT ELEVATION. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN AND PROFILE SHEETS

NORTH

GRAPHIC SCALE IN FEET
0 2.5 5 10

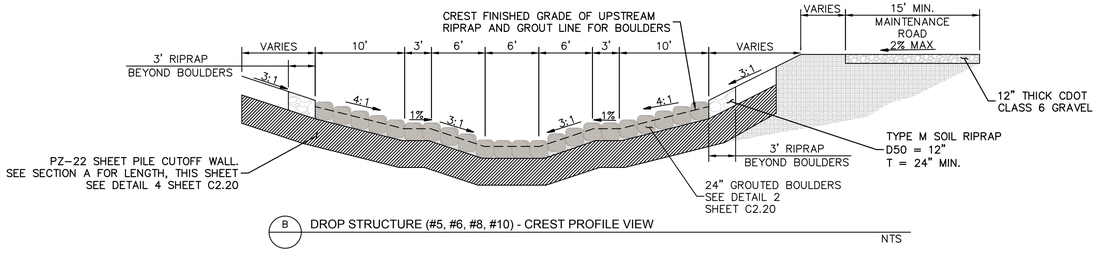
ELEVATION NOTE:

ADD 7200 TO ALL XX.X SPOT ELEVATION LABELS ON BOULDERS.



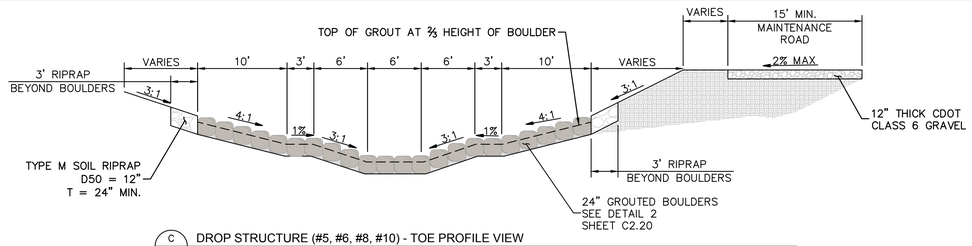
A DROP STRUCTURE (#5) - CENTERLINE PROFILE VIEW

NTS



B DROP STRUCTURE (#5, #6, #8, #10) - CREST PROFILE VIEW

NTS



C DROP STRUCTURE (#5, #6, #8, #10) - TOE PROFILE VIEW

NTS

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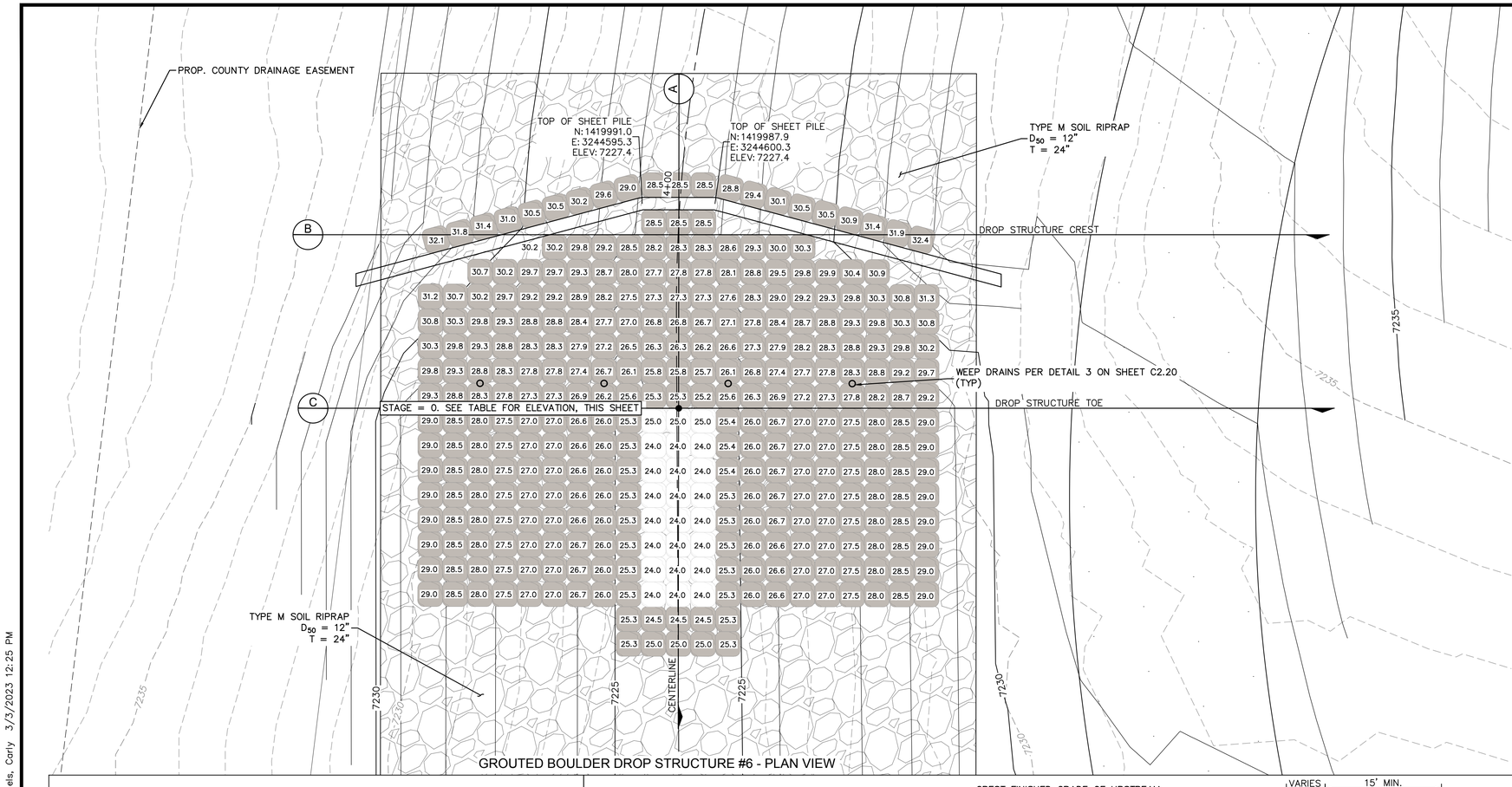
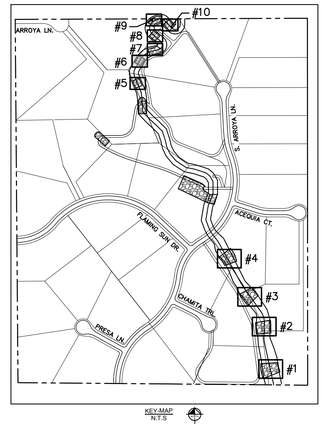
SHEET
C2.15



GROUTED BOULDER DROP STRUCTURE #6 - PLAN VIEW



KEY MAP
N.T.S.

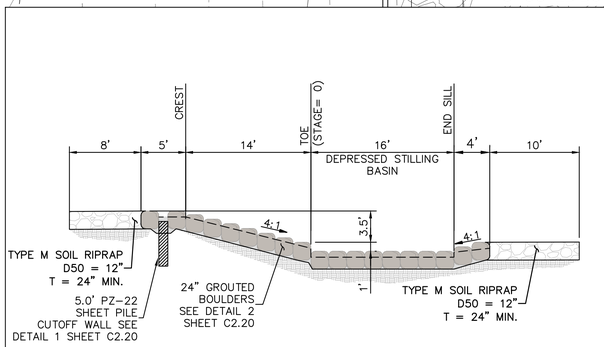
DROP STRUCTURE STAGE ELEVATIONS	
NAME	ELEVATION
DROP STRUCTURE #6	7224.4

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT AND REPRESENTS TOP OF GROUT ELEVATION. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN AND PROFILE SHEETS

GRAPHIC SCALE IN FEET
0 2.5 5 10

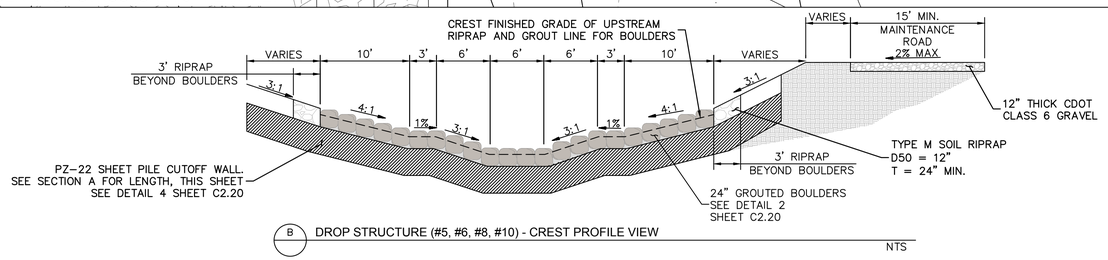
ELEVATION NOTE:

ADD 7200 TO ALL XX.X SPOT ELEVATION LABELS ON BOULDERS.



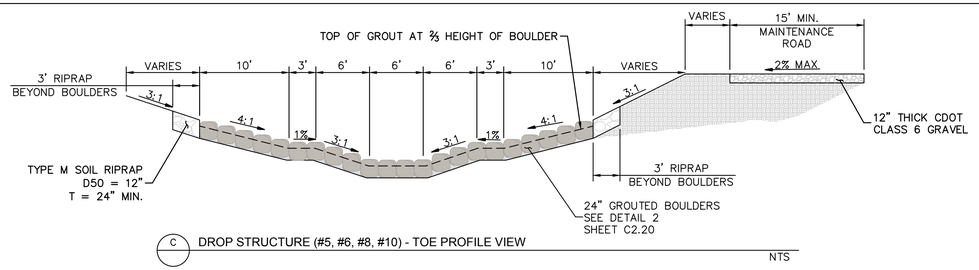
A DROP STRUCTURE (#6, #8) - CENTERLINE PROFILE VIEW

NTS



B DROP STRUCTURE (#5, #6, #8, #10) - CREST PROFILE VIEW

NTS



C DROP STRUCTURE (#5, #6, #8, #10) - TOE PROFILE VIEW

NTS

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SHEET
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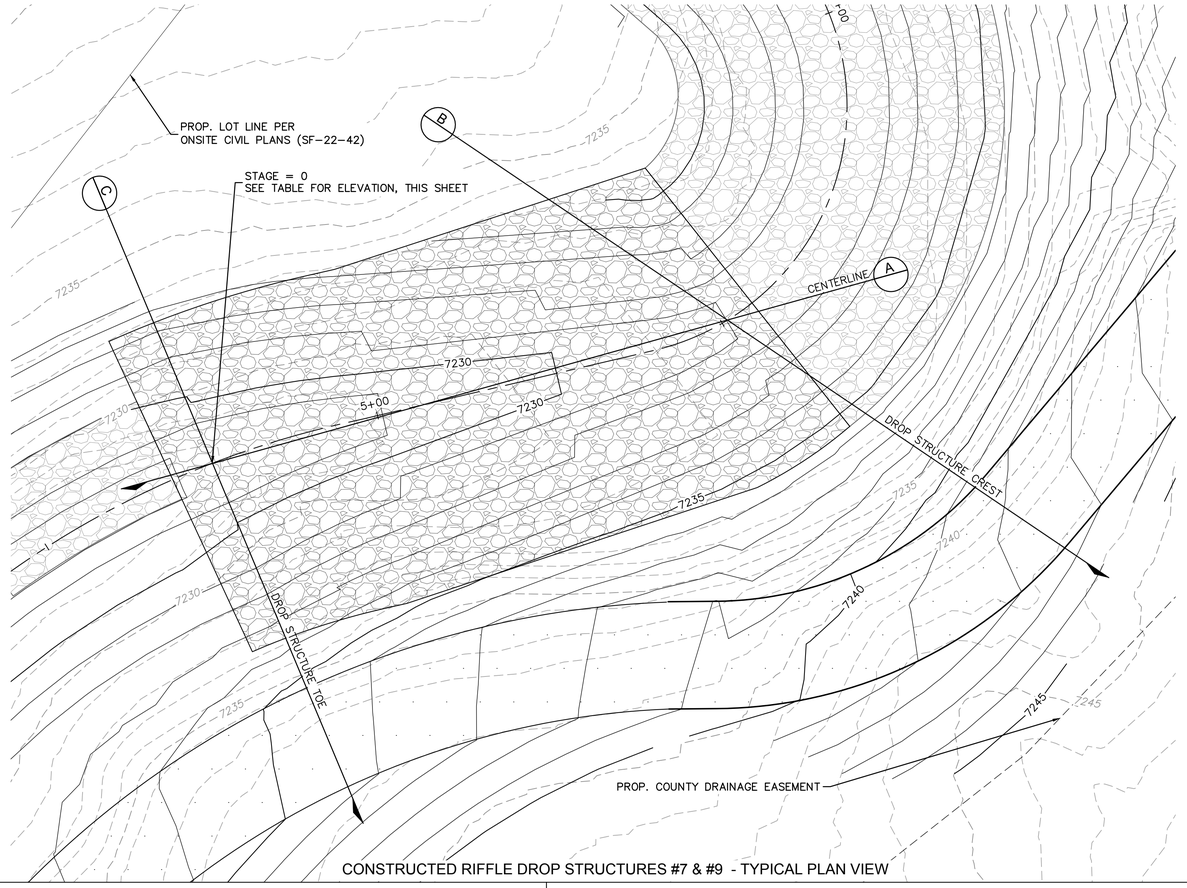
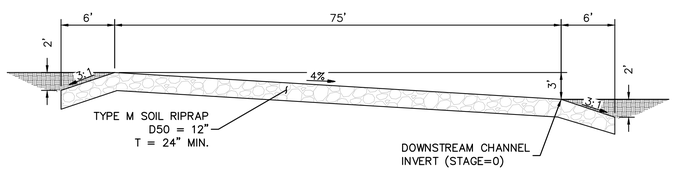
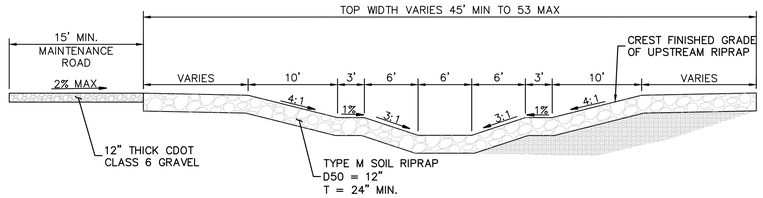


CONSTRUCTED RIFFLE DROP STRUCTURES #7 & #9 - TYPICAL PLAN VIEW



A DROP STRUCTURE (#2-#4, #7, #9) - CENTERLINE PROFILE VIEW

NTS



B DROP STRUCTURE (#7, #9) - CREST PROFILE VIEW

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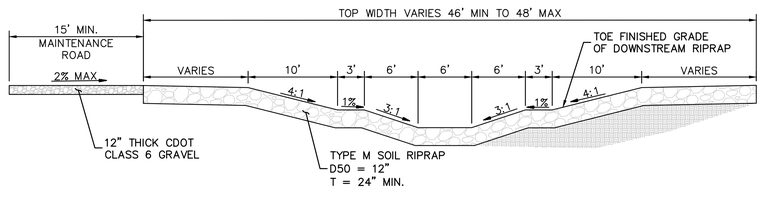

C DROP STRUCTURE (#7, #9) - TOE PROFILE VIEW

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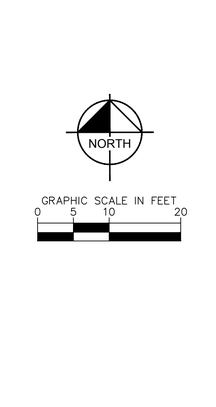

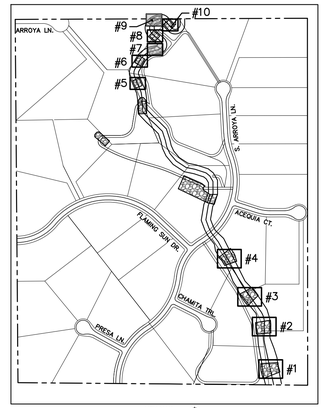

KEY MAP
N.T.S.

DROP STRUCTURE STAGE ELEVATIONS	
NAME	ELEVATION
DROP STRUCTURE #7	7228.0
DROP STRUCTURE #9	7234.7

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN AND PROFILE SHEETS

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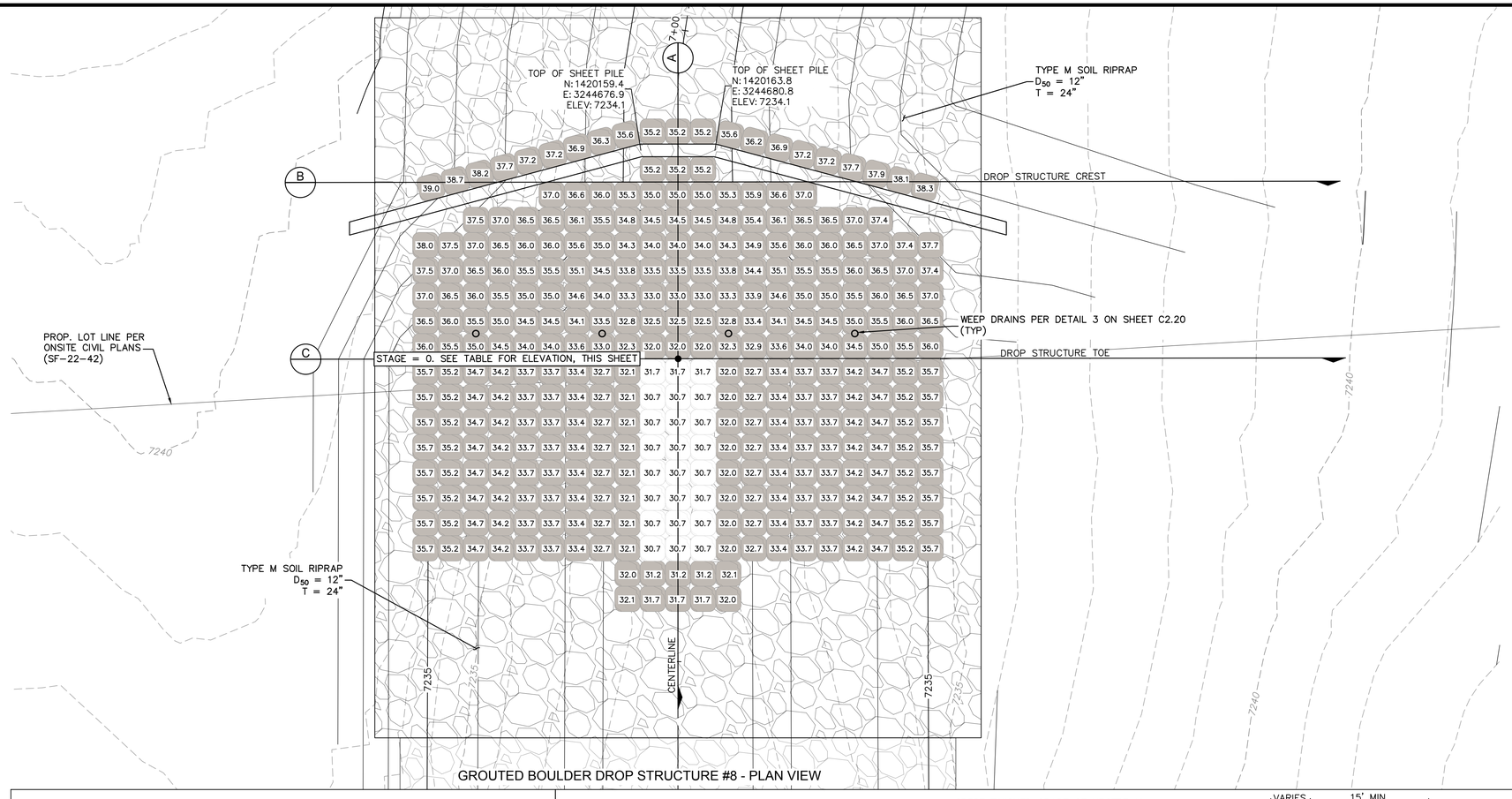
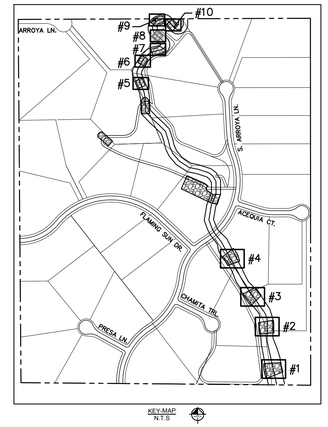


GROUTED BOULDER DROP STRUCTURE #8 - PLAN VIEW



KEY MAP
N.T.S.

DROP STRUCTURE STAGE ELEVATIONS	
NAME	ELEVATION
DROP STRUCTURE #8	7231.1

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT AND REPRESENTS TOP OF GROUT ELEVATION. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN AND PROFILE SHEETS

GRAPHIC SCALE IN FEET
0 2.5 5 10

ELEVATION NOTE:

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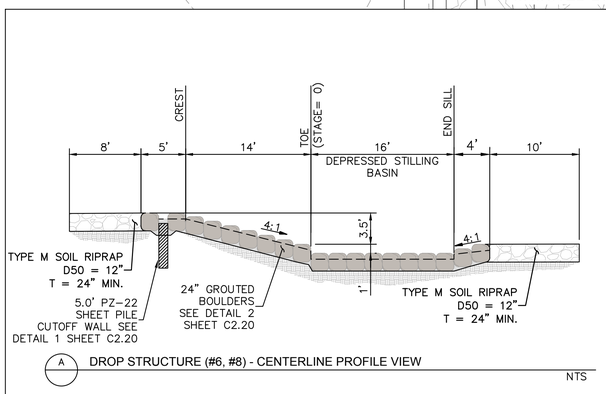
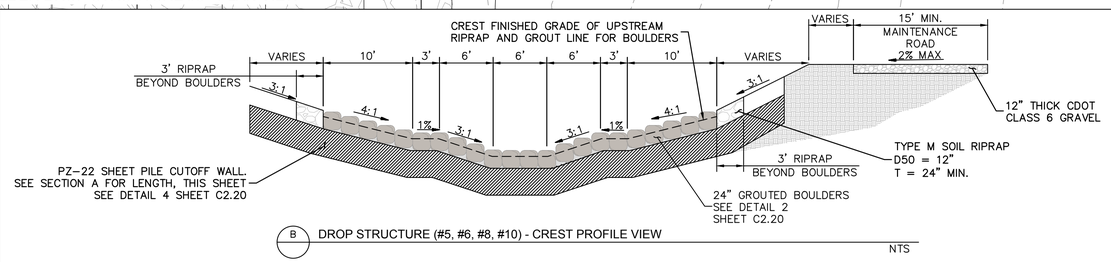
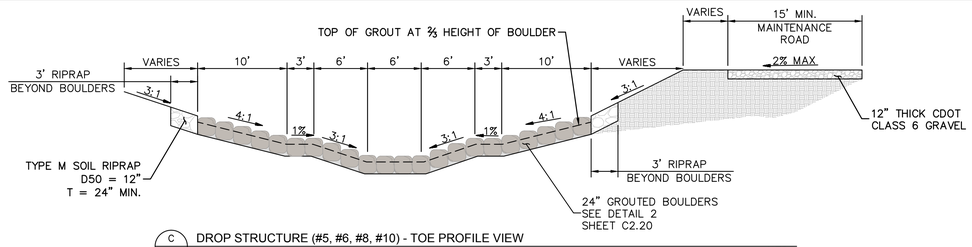


A DROP STRUCTURE (#6, #8) - CENTERLINE PROFILE VIEW
NTS



B DROP STRUCTURE (#5, #6, #8, #10) - CREST PROFILE VIEW
NTS



C DROP STRUCTURE (#5, #6, #8, #10) - TOE PROFILE VIEW
NTS

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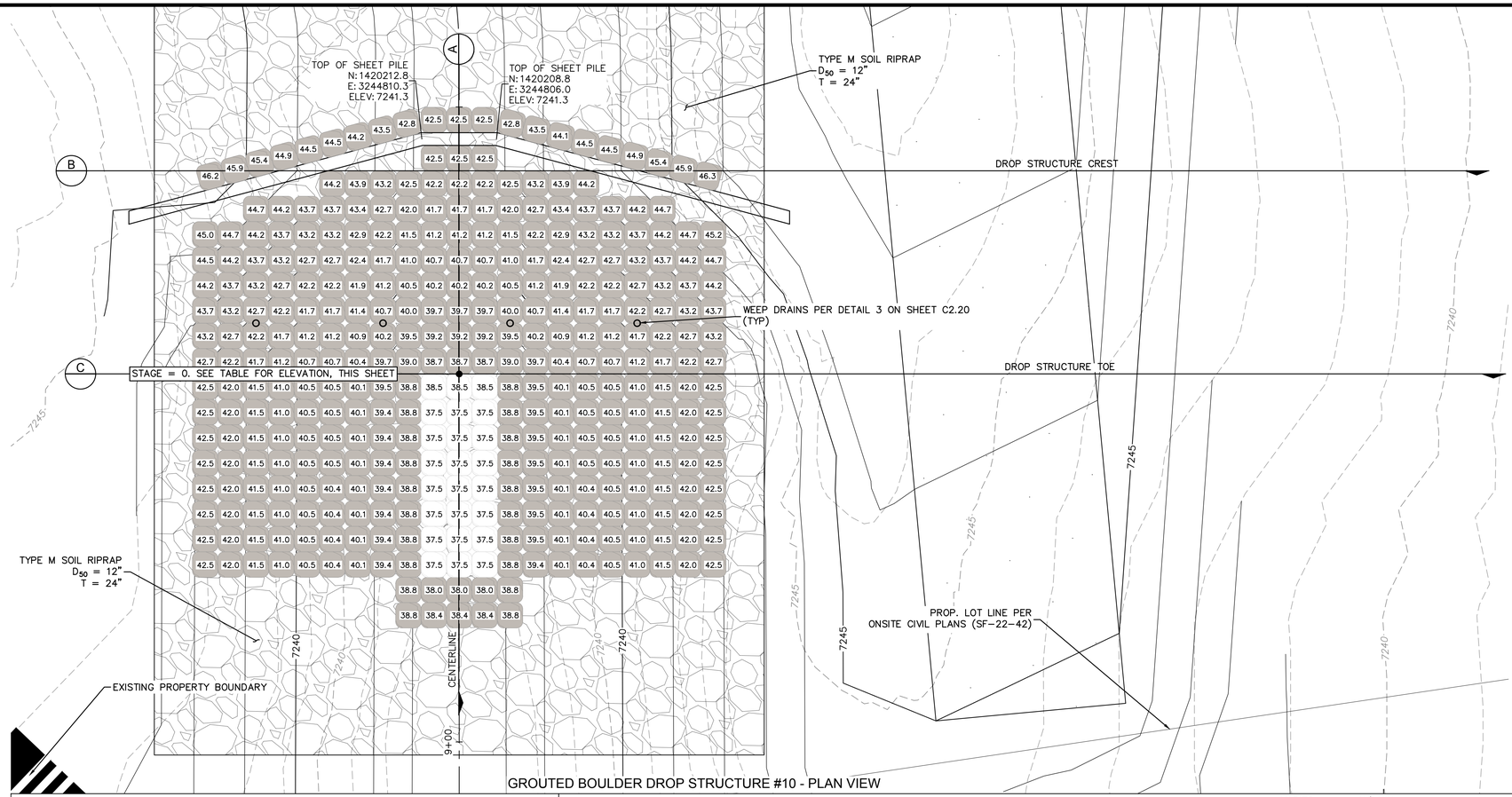
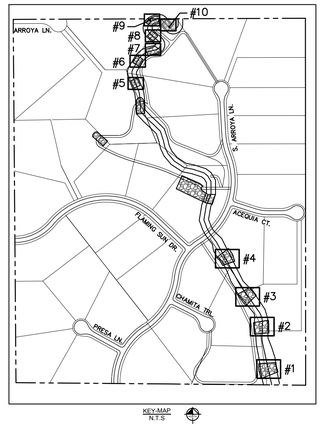


GROUTED BOULDER DROP STRUCTURE #10 - PLAN VIEW



KEY MAP
N.T.S.

DROP STRUCTURE STAGE ELEVATIONS	
NAME	ELEVATION
DROP STRUCTURE #10	7237.8

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT AND REPRESENTS TOP OF GROUT ELEVATION. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN AND PROFILE SHEETS

NORTH

GRAPHIC SCALE IN FEET
0 2.5 5 10

ELEVATION NOTE:

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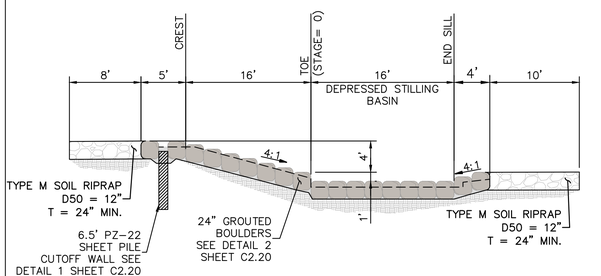
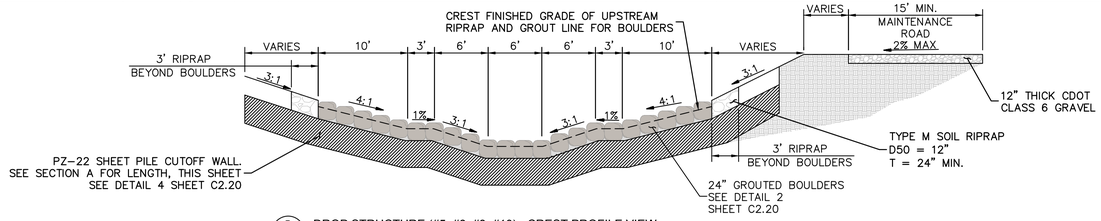


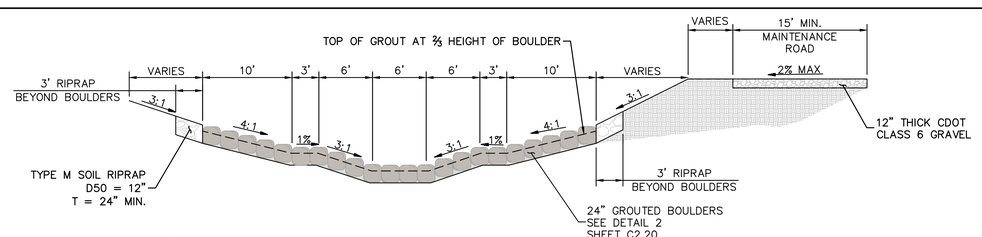
A DROP STRUCTURE (#10) - CENTERLINE PROFILE VIEW

NTS



B DROP STRUCTURE (#5, #6, #8, #10) - CREST PROFILE VIEW

NTS



C DROP STRUCTURE (#5, #6, #8, #10) - TOE PROFILE VIEW

NTS

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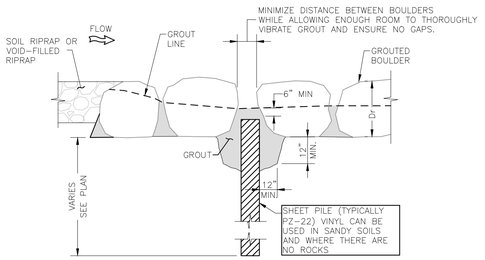
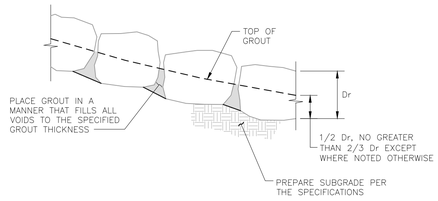


1 SHEET PILE CONNECTION BETWEEN BOULDERS
NTS

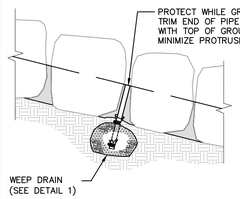


BOULDER PLACEMENT NOTES:
1. PLACE BOULDERS WITH THE REQUIRED BOULDER HEIGHT VERTICAL. PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT. THE SMALL DIMENSION OF A 2X4 CAN BE USED 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.

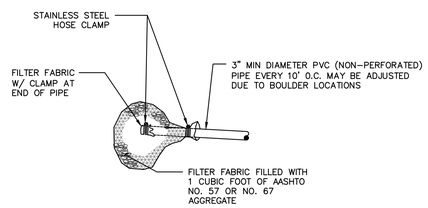
MATERIAL SPECIFICATIONS:
1. ALL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH EQUAL TO 3200 PSI.
2. ONE CUBIC YARD OF GROUT SHALL HAVE A MINIMUM OF SIX (6) SACKS OF TYPE II PORTLAND CEMENT.
3. A MAXIMUM OF 25% TYPE F FLY ASH MAY BE SUBSTITUTED FOR THE PORTLAND CEMENT.
4. THE AGGREGATE SHALL 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

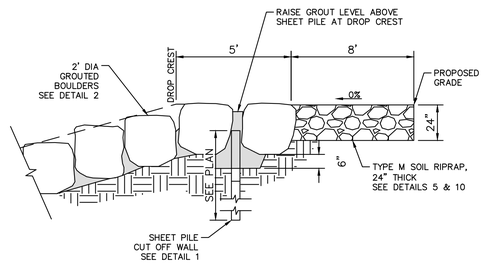


GROUTED BOULDERS

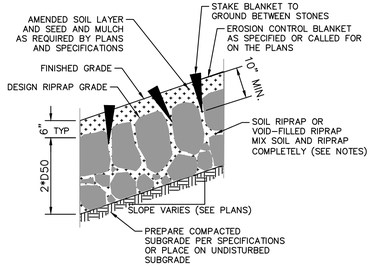


NOTE: INSTALL WEEP DRAINS FOR DROPS AND WALLS 5' AND GREATER AT 10' O.C. AT ELEVATIONS AND LOCATIONS SHOWN ON THE DRAWINGS

3 WEEP DRAIN DETAIL
NTS



4 TYPICAL SHEET PILE CUT OFF WALL
NTS



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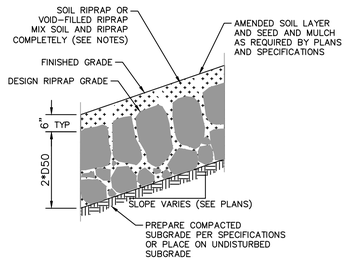
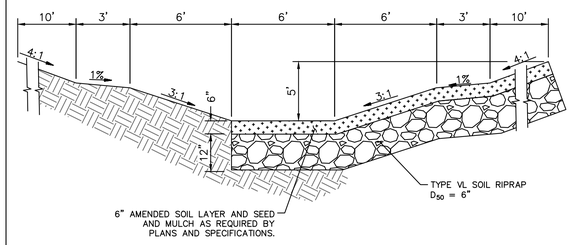


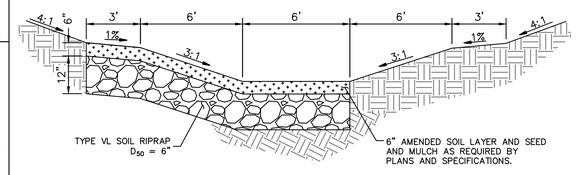
MULCH SECTION

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.

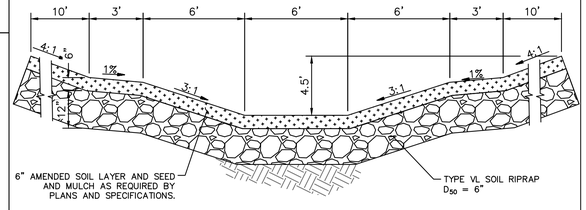
5 SOIL RIPRAP AND VOID-FILLED RIPRAP
NTS



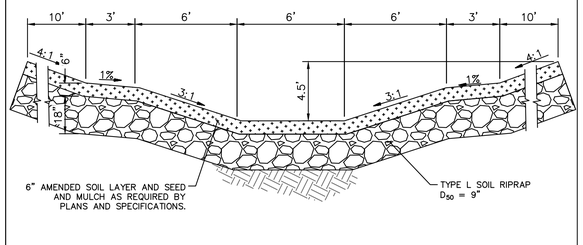
6 RIPRAP TOE PROTECTION - 1
STA: 7+01 – 7+66
STA: 8+52 – 8+83
STA: 9+58 – 10+37
NTS



7 RIPRAP TOE PROTECTION - 2
STA: 1+47 – 1+79
STA: 4+42 – 4+70
NTS



8 CHANNEL PROTECTION STA: 5+57 - 6+44
NTS



9 CHANNEL PROTECTION STA: 2+59 - 3+15
NTS

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Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

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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		

10 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.

11 VOID-FILLED RIPRAP PLACEMENT NOTES
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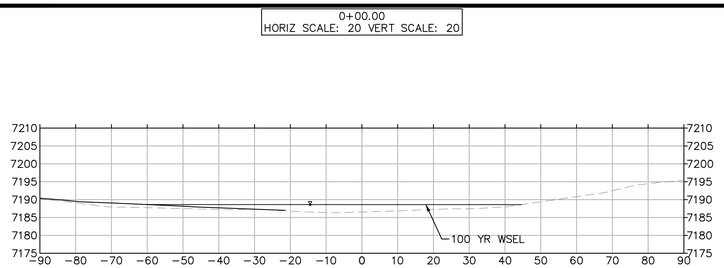

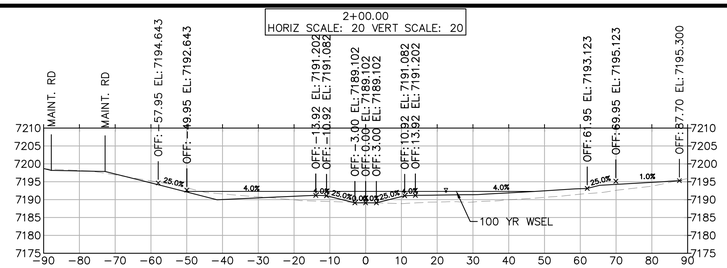

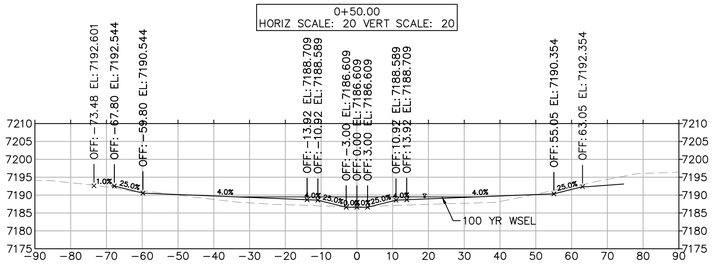

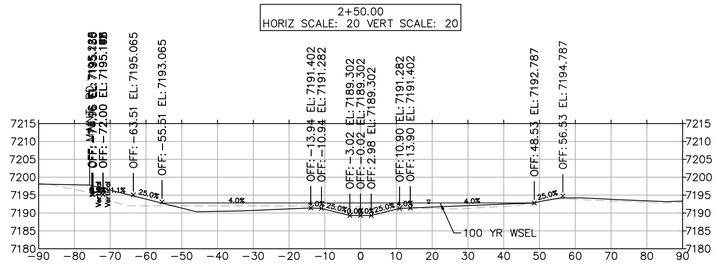

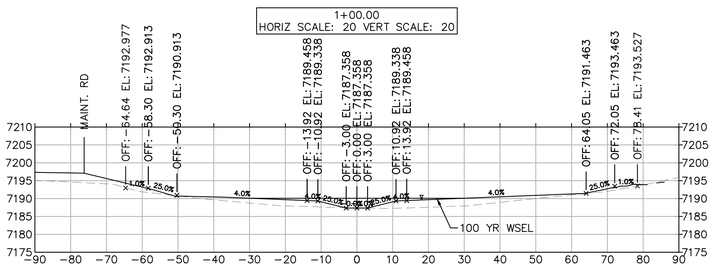

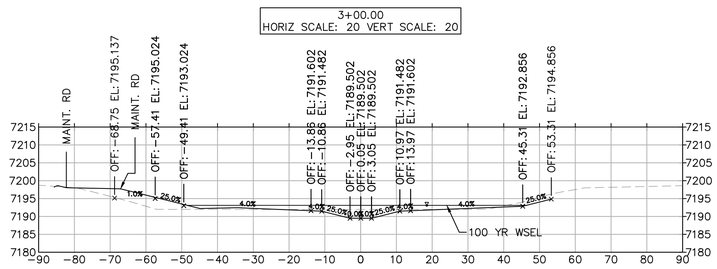

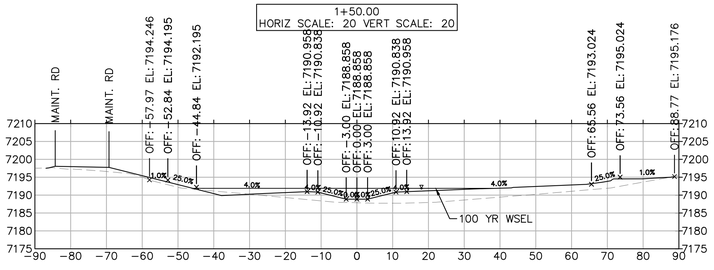

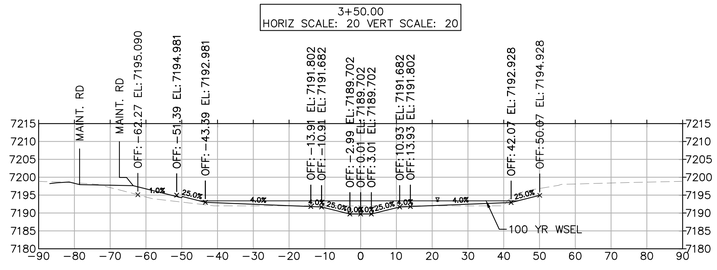

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Colorado Springs, Colorado 80903 (719) 453-0180

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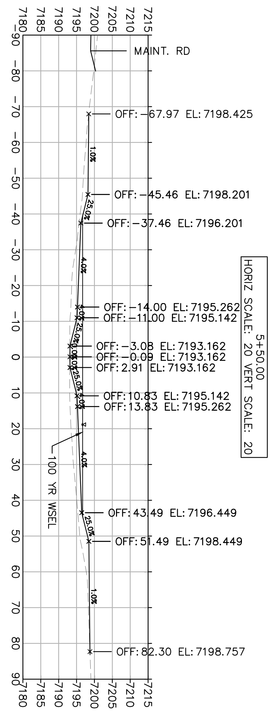

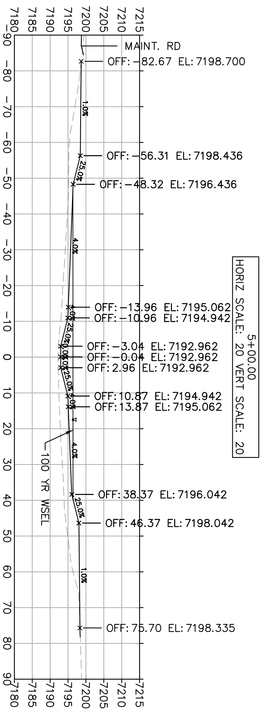

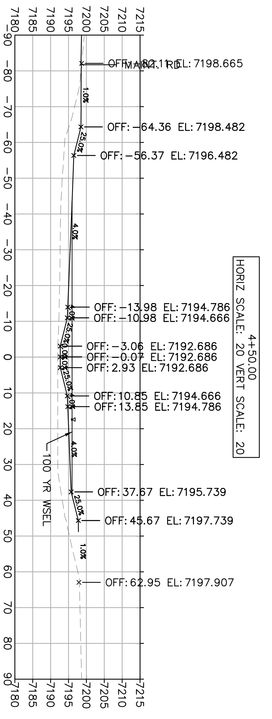

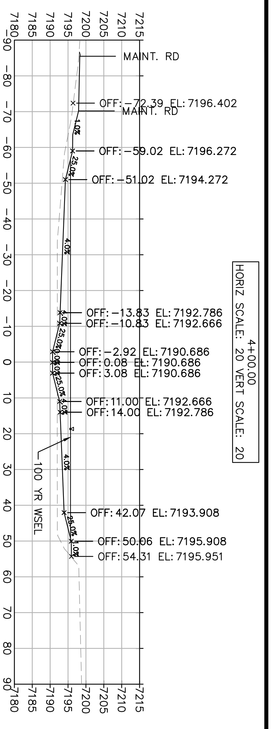

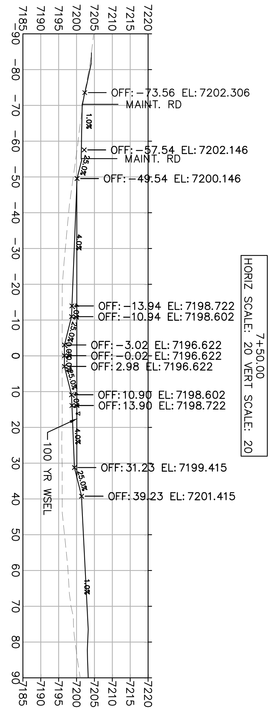

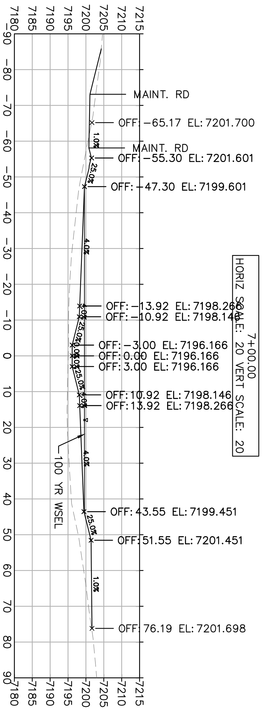

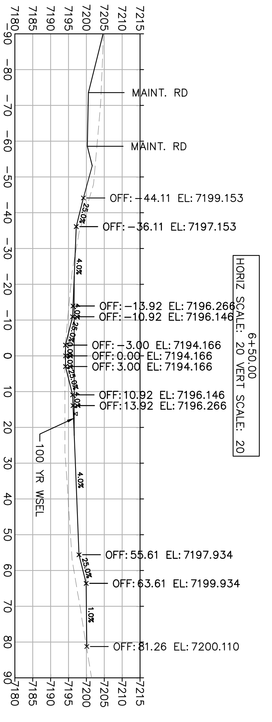

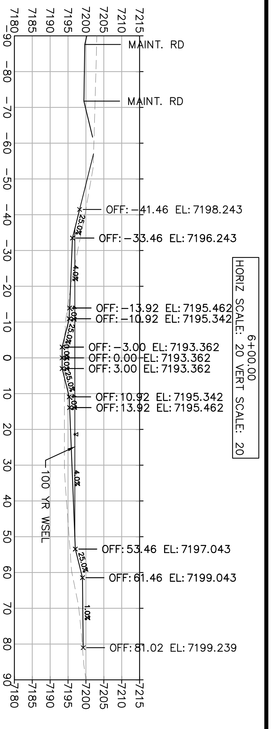

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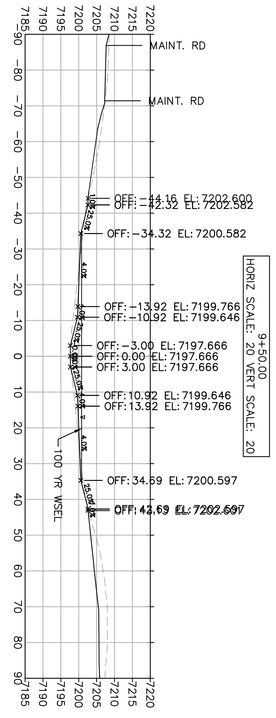

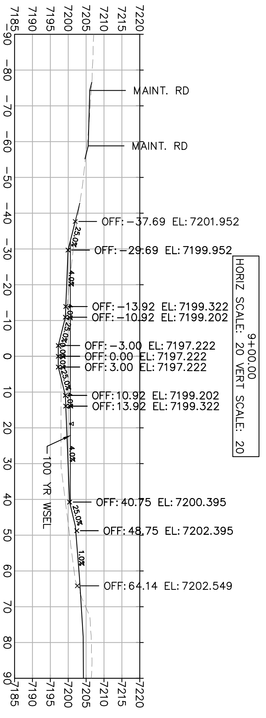

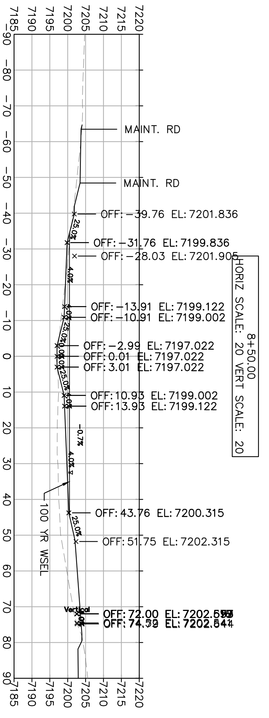

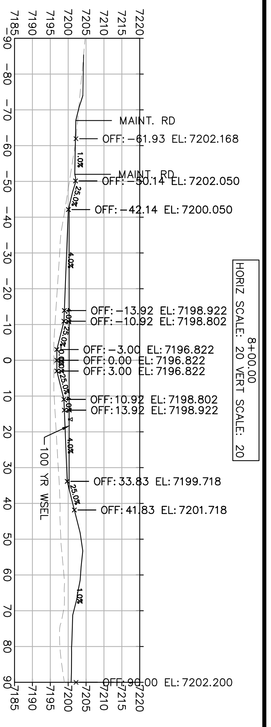

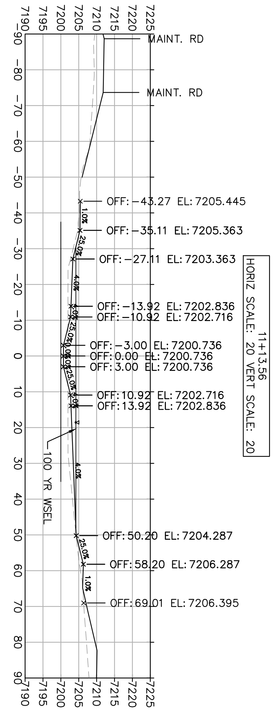

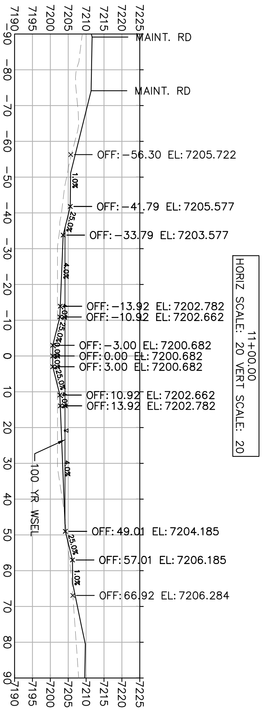

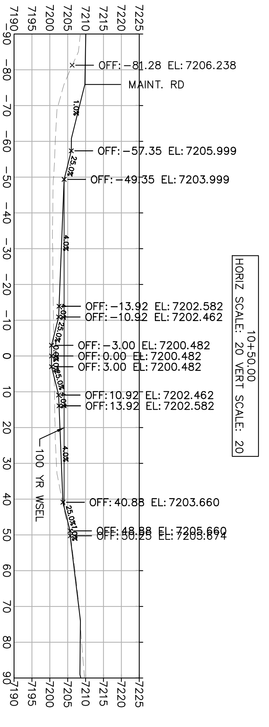

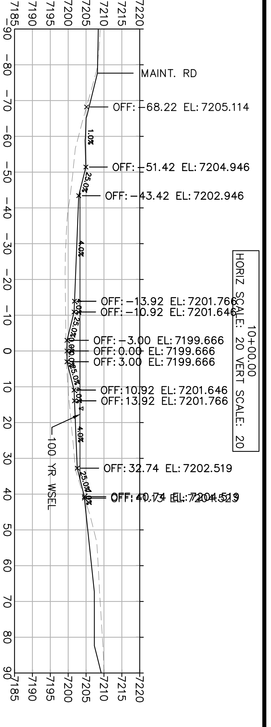

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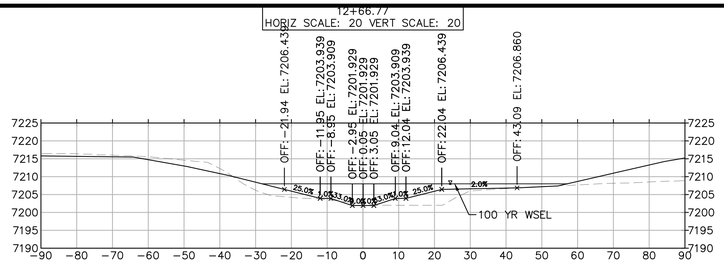

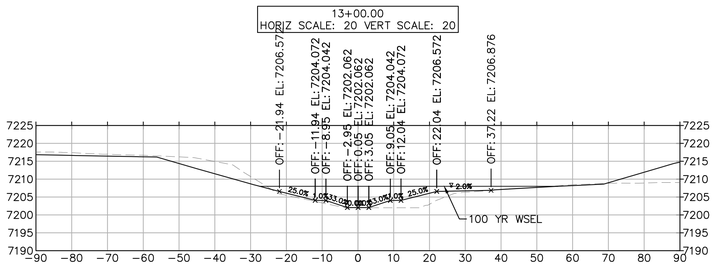

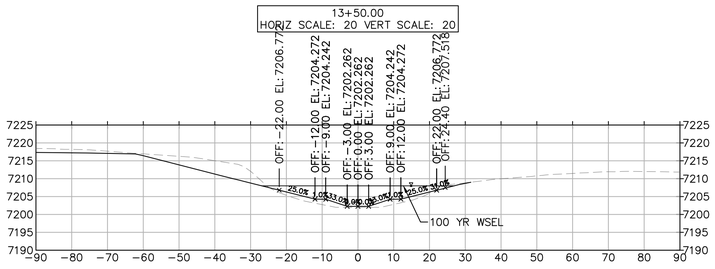

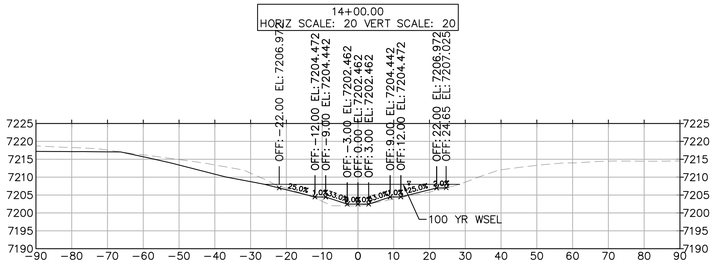

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Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
SOUTH CHANNEL SECTIONS

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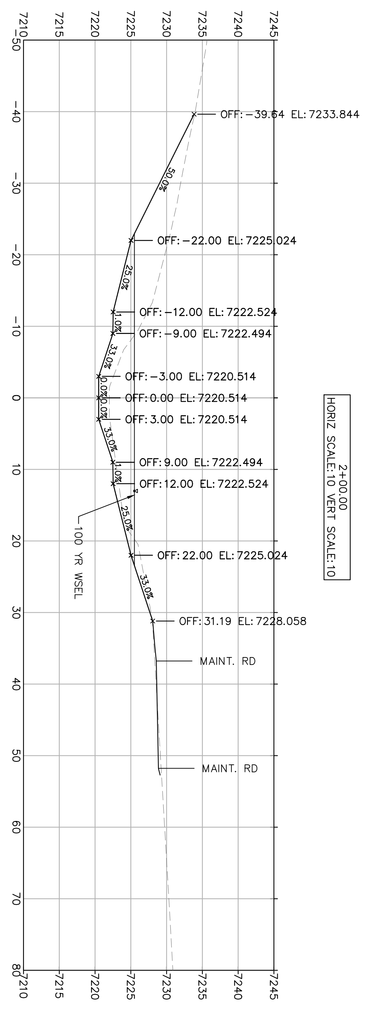
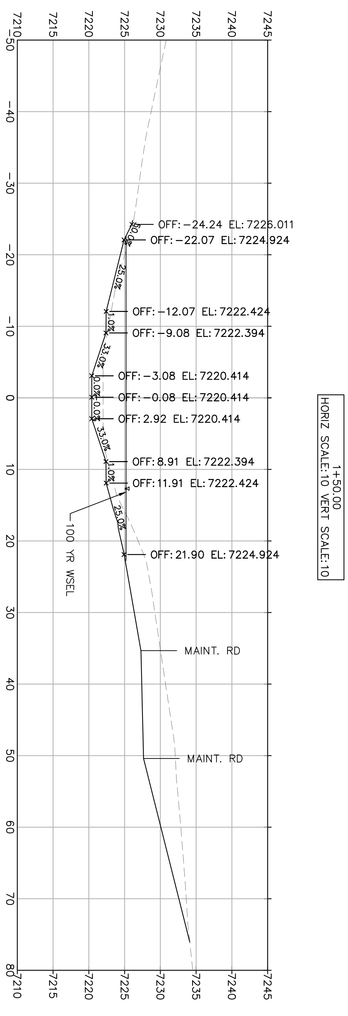
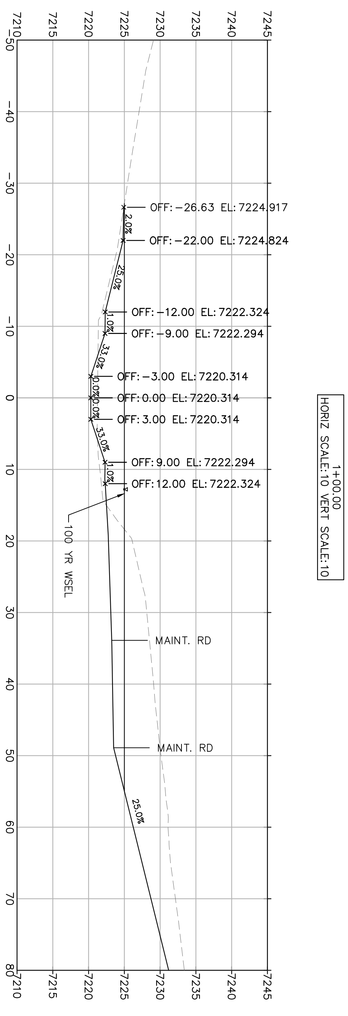
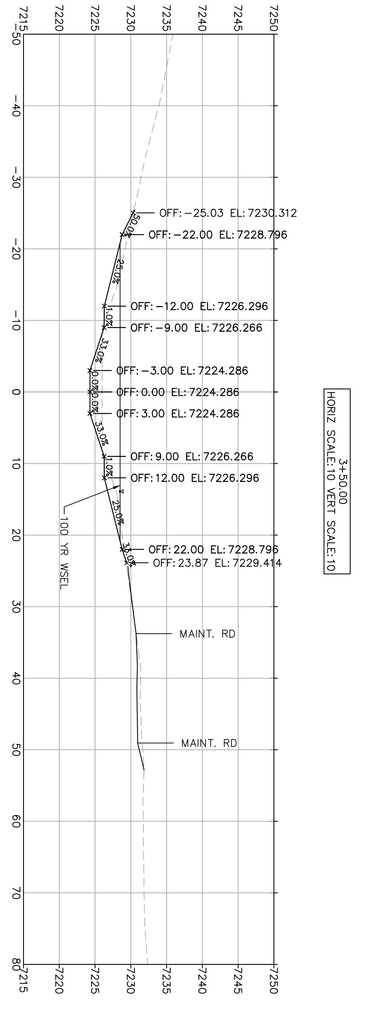
PROJECT NO.
196106001

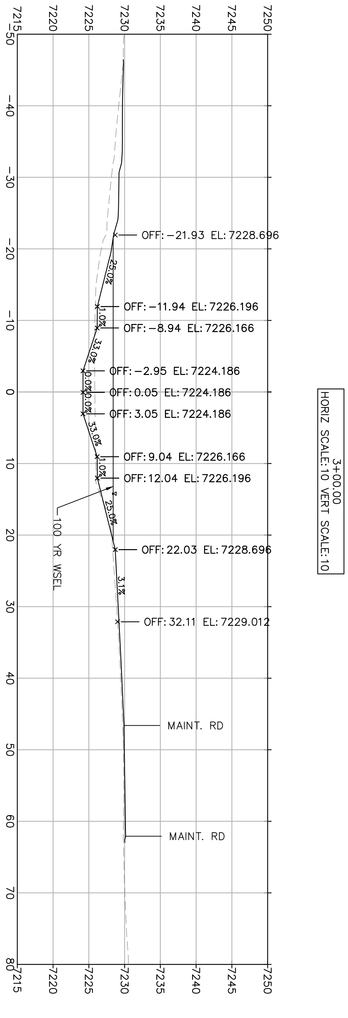
SHEET
C2.25

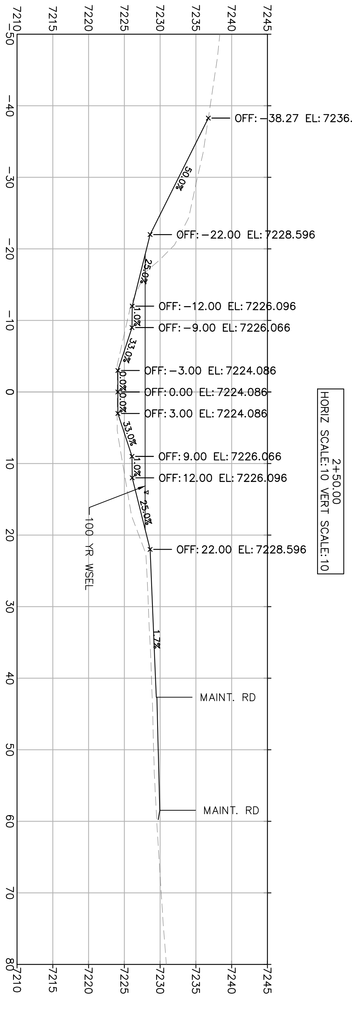












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EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
NORTH CHANNEL SECTIONS

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DATE: 03/03/2023

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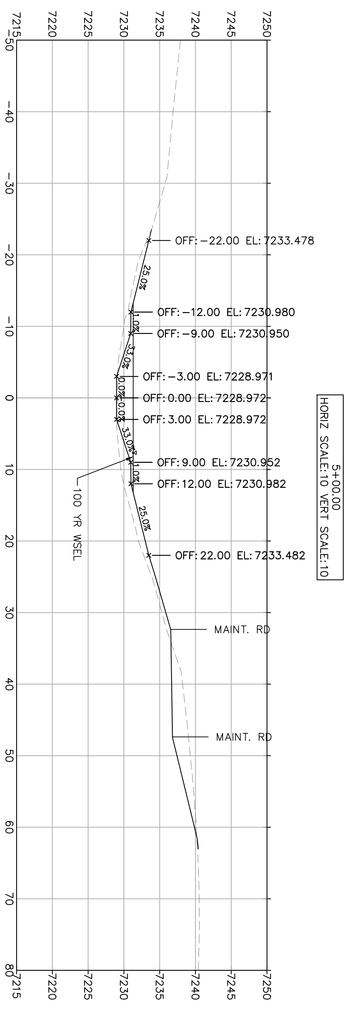

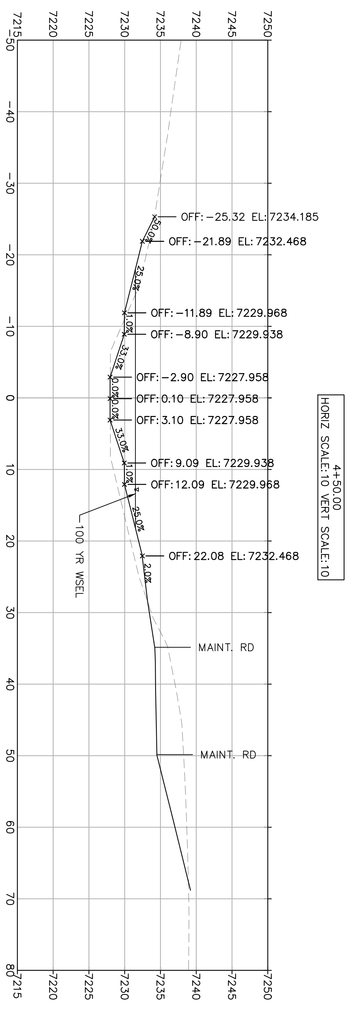

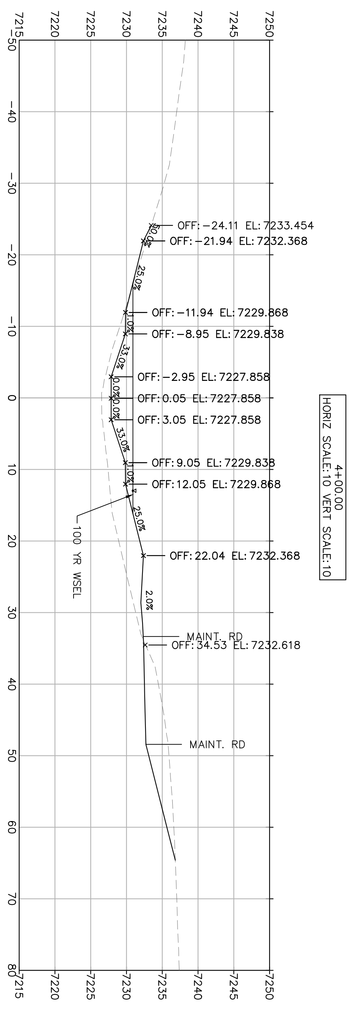

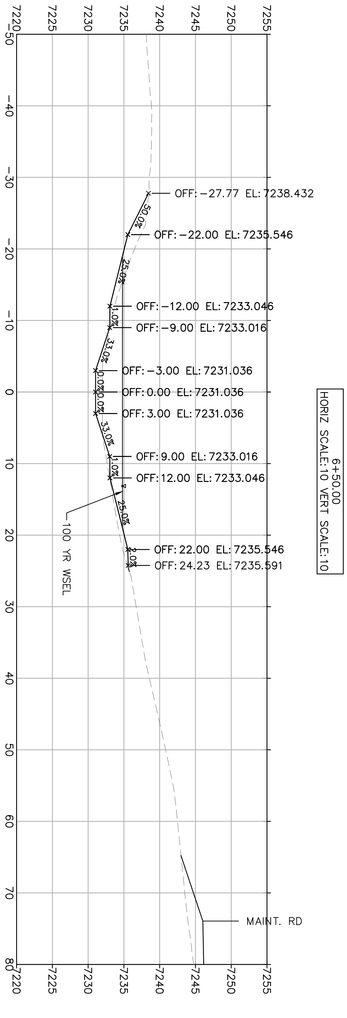

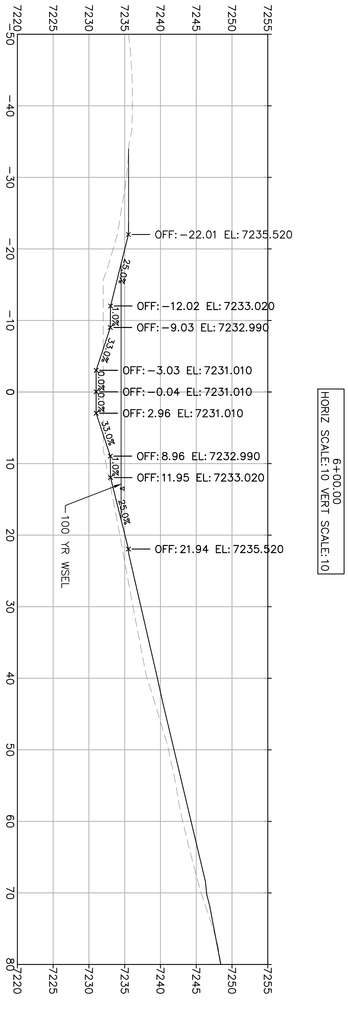

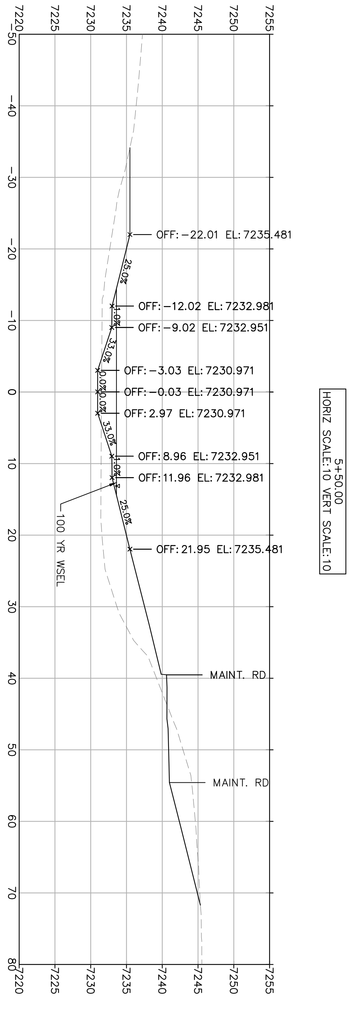

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EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
NORTH CHANNEL SECTIONS

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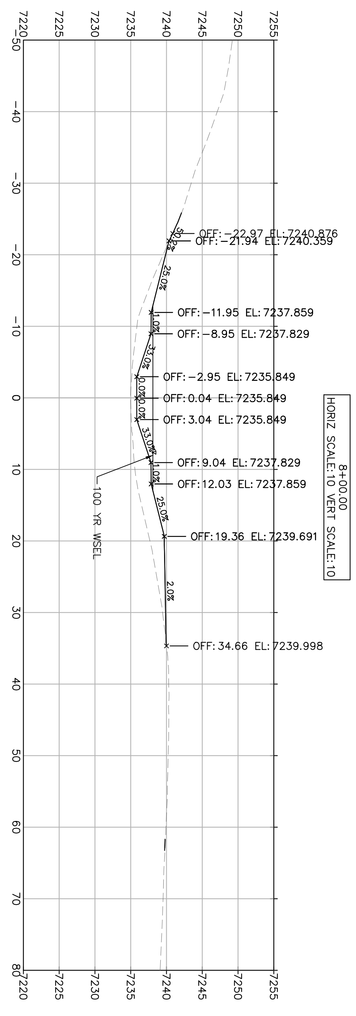

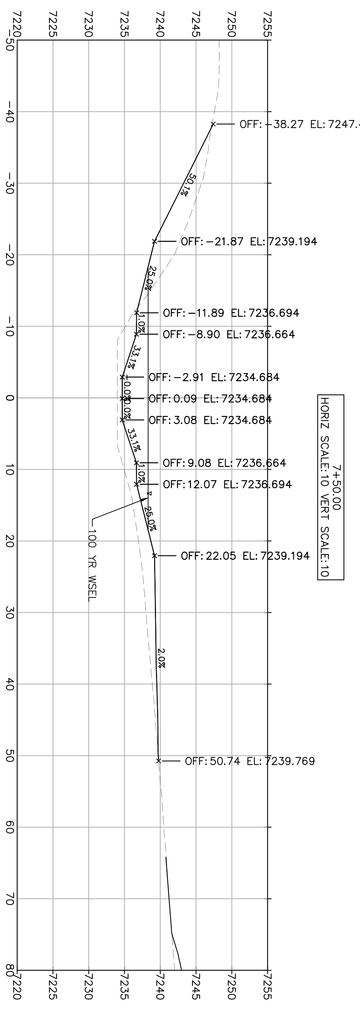

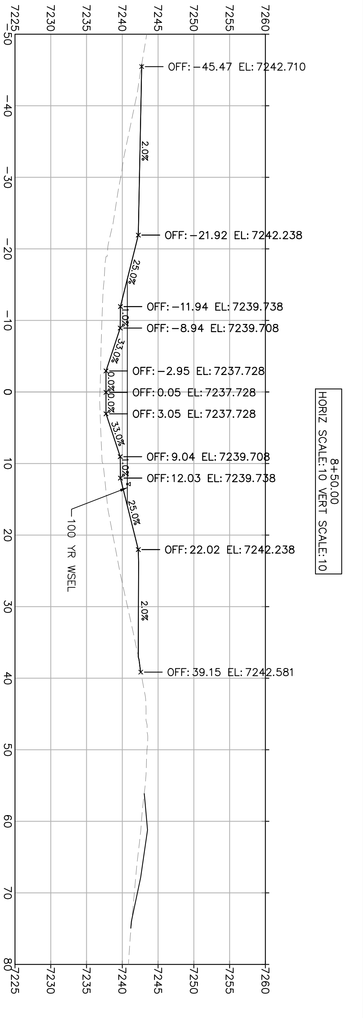

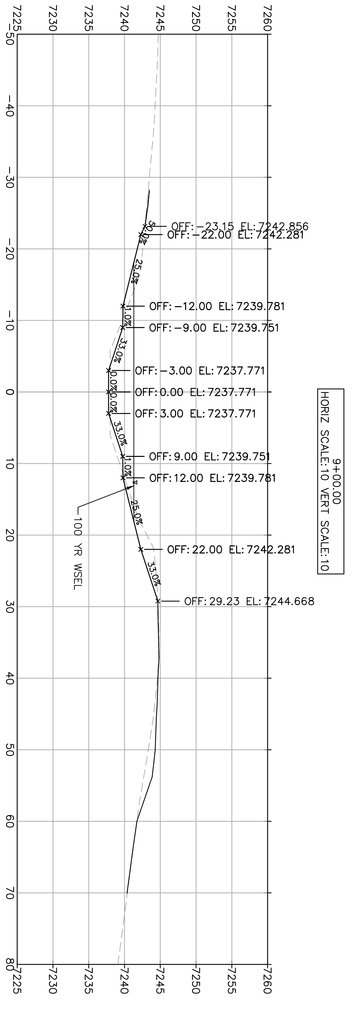

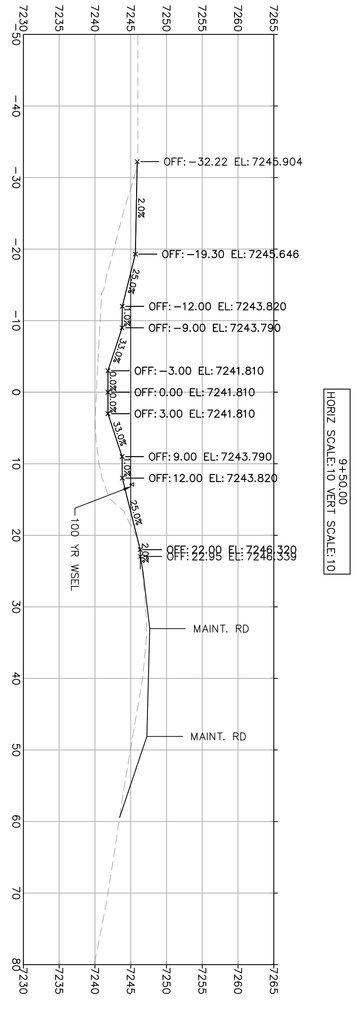

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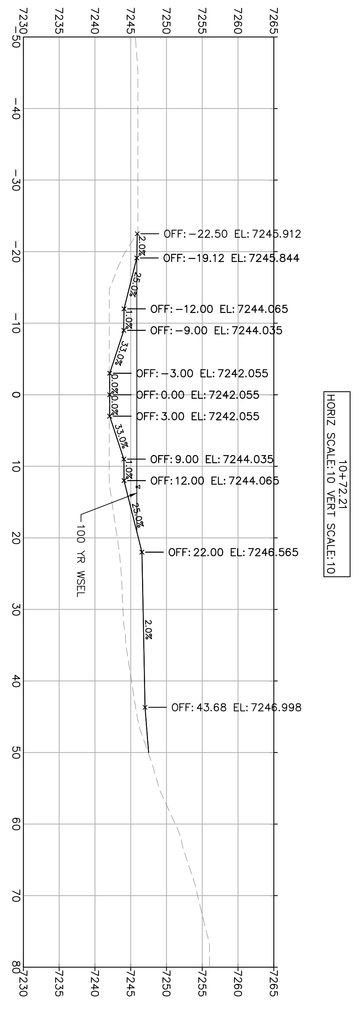

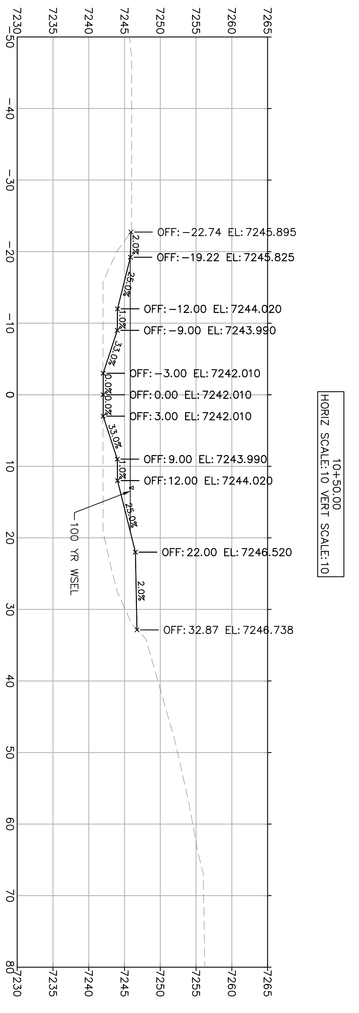

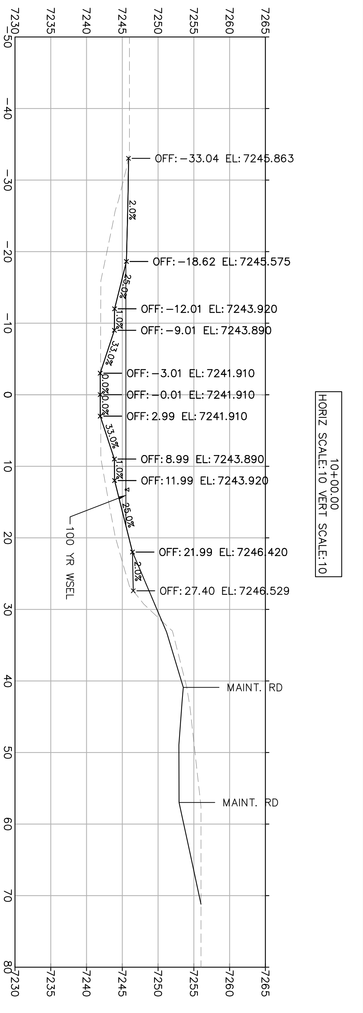

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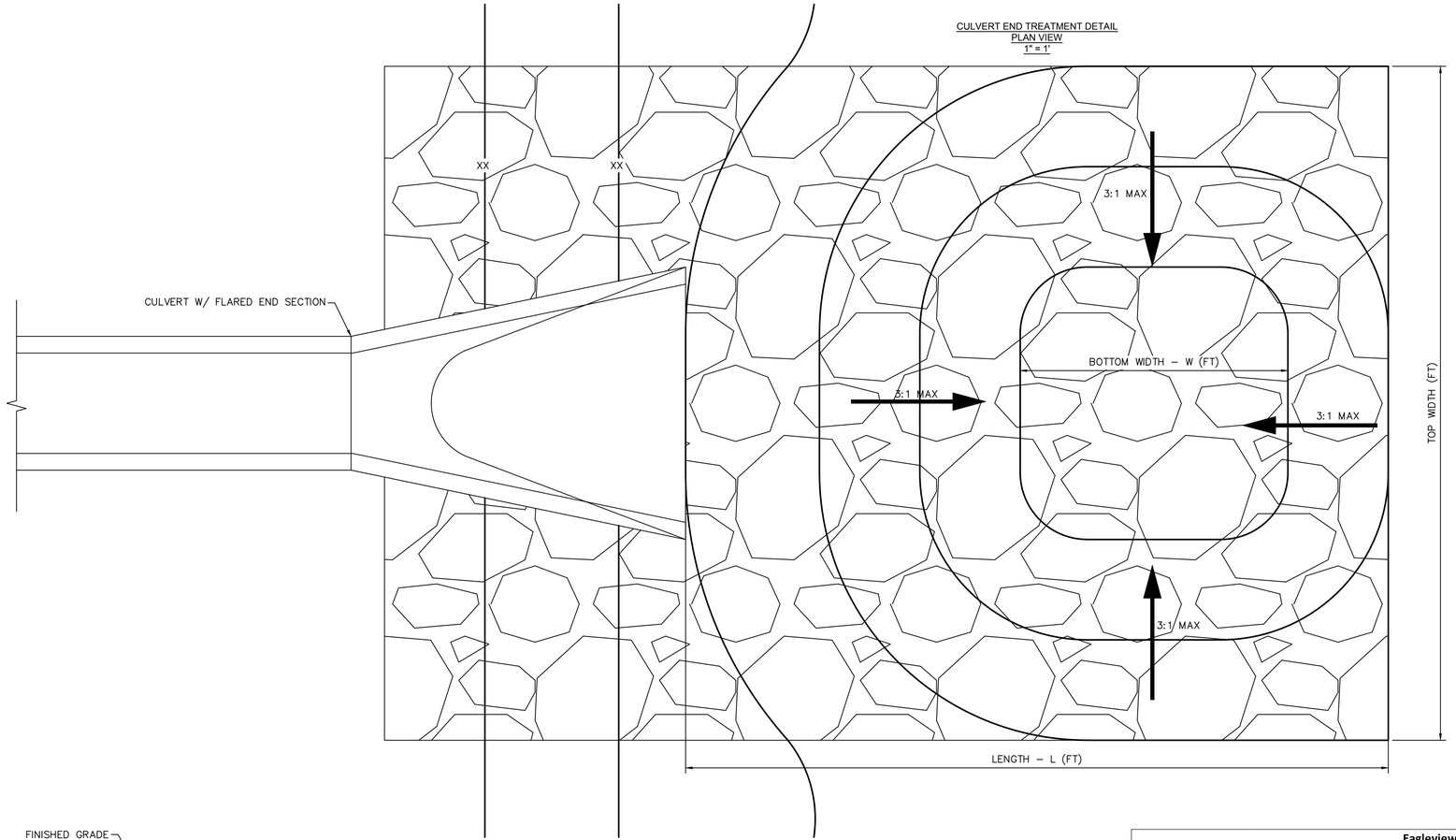
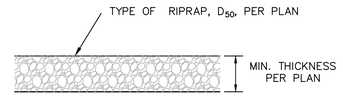
CULVERT END TREATMENT DETAIL
PLAN VIEW
1" = 1'





1. D50 = MEAN PARTICLE SIZE (INTERMEDIATE DIMENSION) BY WEIGHT.
2. RIP RAP SHALL BE PER PLAN AND SHALL BE MIXED WITH 30% SOIL TO 70% RIP RAP.
3. RIP RAP SECTION THICKNESS SHALL BE 2.0 TIMES THE SPECIFIED MEAN PARTICLE SIZE (I.E. D50 X 2.0 MINIMUM) PER ECM SECTION 10.10.3.
4. ALL RIP RAP SHALL BE UNDERLAIN WITH GEOTEXTILE FILTER FABRIC FOR STABILIZATION.
5. RIP RAP SHALL WRAP AROUND AND EXTEND 2' MIN. BEHIND FLUME AND FLARED END SECTIONS.

TYPICAL RIPRAP SECTION DETAIL

Table 506-2

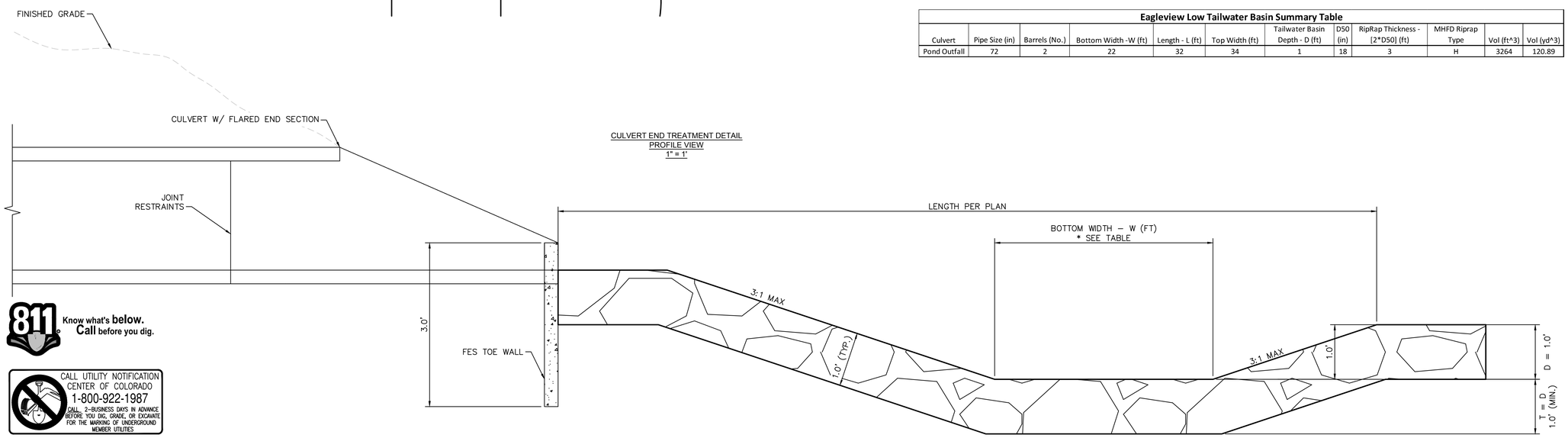
Pay Item		Percent of Material Smaller Than Typical Stone[2]	Typical Stone Dimensions[3] (Inches)	Typical Stone Weight[4] (Pounds)
	Stone Size d50[1] (Inches)			
Riprap	VL	70-100 50-70 35-50 2-10	12 9 6 2	85 35 10 0.4
Riprap	V	70-100 50-70 35-50 2-10	15 12 9 3	160 85 35 1.3
Riprap	M	70-100 50-70 35-50 2-10	21 18 12 4	440 275 85 3
Riprap	L	100 50-70 35-50 2-10	30 24 18 6	1280 650 275 10
Riprap	LH	100 50-70 35-50 2-10	42 33 24 9	3500 1700 650 35

[1]d50 = nominal stone size
[2]based on typical rock mass
[3]equivalent spherical diameter
[4]based on a specific gravity = 2.5

Eagleview Low Tailwater Basin Summary Table

Culvert	Pipe Size (in)	Barrels (No.)	Bottom Width -W (ft)	Length - L (ft)	Top Width (ft)	Tailwater Basin Depth - D (ft)	D50 (in)	RipRap Thickness - [2*D50] (ft)	MHFD Riprap Type	Vol (ft^3)	Vol (yd^3)
Pond Outfall	72	2	22	32	34	1	18	3	H	3264	120.89

CULVERT END TREATMENT DETAIL
PROFILE VIEW
1" = 1'



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

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

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EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
END TREATMENT DETAIL

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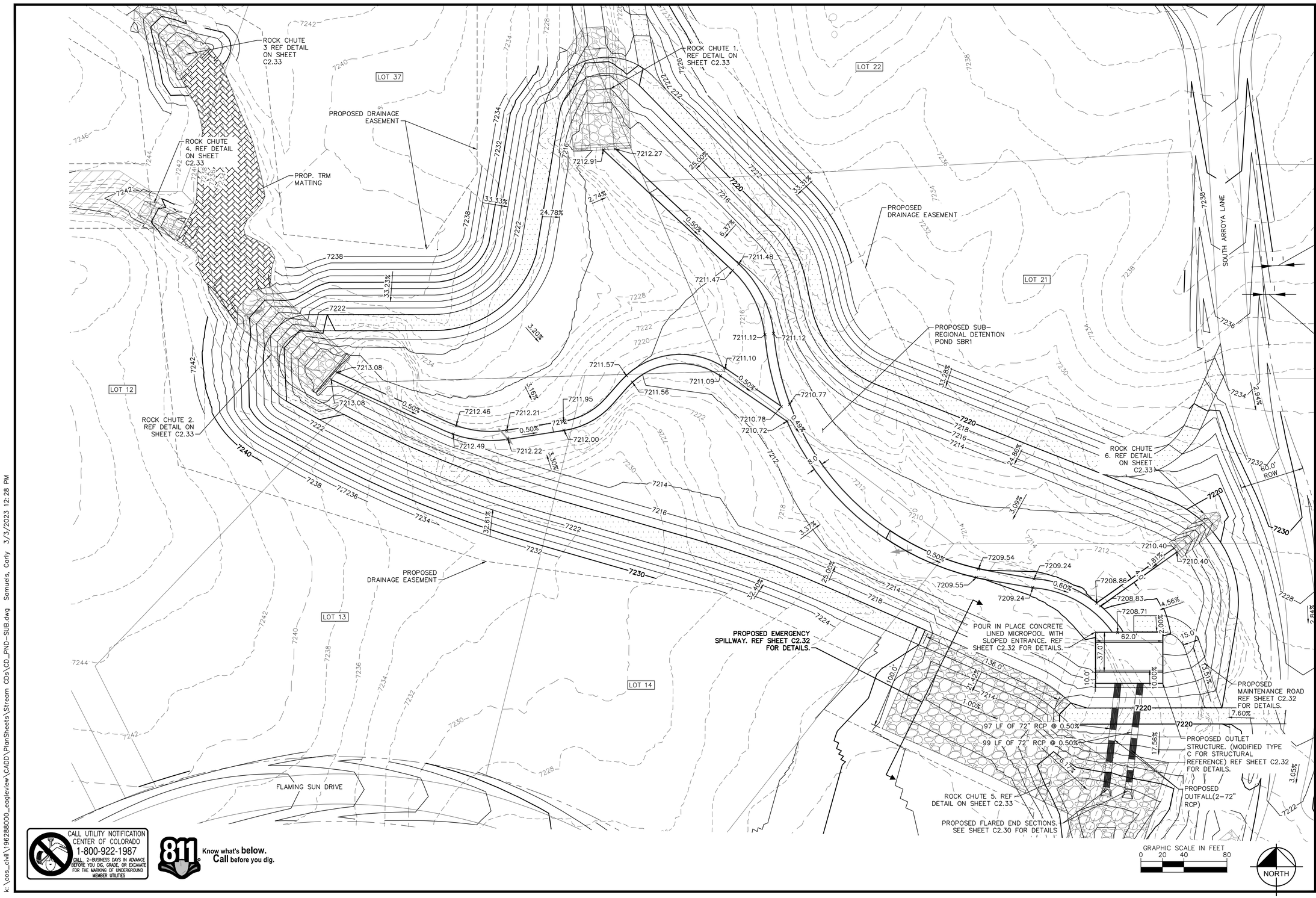

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EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

SUB-REGIONAL POND GRADING

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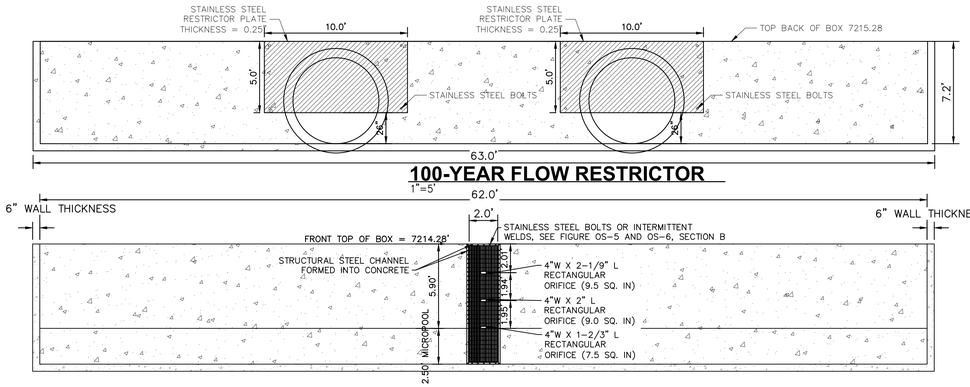


100-YEAR FLOW RESTRICTOR

1"=5'

ORIFICE PLATE AND TRASH RACK DETAIL

1"=5'

ORIFICE PLATE NOTES

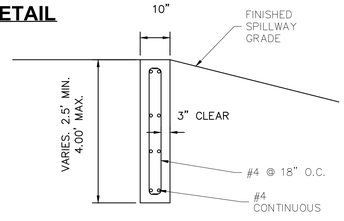
1. PROVIDE CONTINUOUS NEOPRENE GASKET MATERIAL BETWEEN THE ORIFICE PLATE AND CONCRETE.
2. BOLT PLATE TO CONCRETE 12" MAX. ON CENTER. WITH A PLATE THICKNESS OF 0.25".

EURV AND WQCV TRASH RACKS

1. WELL-SCREEN TRASH RACKS SHALL BE STAINLESS STEEL AND SHALL BE ATTACHED BY INTERMITTENT WELDS ALONG THE EDGE OF THE MOUNTING FRAME.
2. BAR GATE TRASH RACKS SHALL BE ALUMINUM AND SHALL BE BOLTED USING STAINLESS STEEL HARDWARE.
3. TRASH RACK OPEN AREAS ARE FOR SPECIFIED TRASH RACK MATERIALS. TOTAL TRASH RACK SIZE MAY NEED TO BE ADJUSTED FOR MATERIALS HAVING DIFFERENT OPEN AREA/GROSS AREA RATIO (R VALUE).
4. STRUCTURAL DESIGN OF TRASH RACKS SHALL BE BASED ON FULL HYDROSTATIC HEAD WITH ZERO HEAD DOWNSTREAM OF THE RACK.

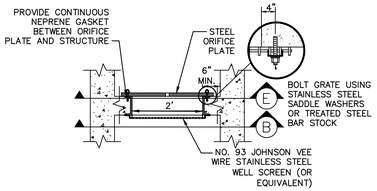
OVERFLOW SAFETY GRATES

1. ALL SAFETY GRATES SHALL BE MOUNTED USING STAINLESS STEEL HARDWARE AND PROVIDED WITH HINGED AND LOCKABLE OR BOLTABLE ACCESS PANELS.
2. SAFETY GRATES SHALL BE STAINLESS STEEL, ALUMINUM, OR STEEL. STEEL GRATES SHALL BE HOT DIP GALVANIZED AND MAY BE HOT POWDER COATED AFTER GALVANIZING.
3. SAFETY GRATES SHALL BE DESIGNED SUCH THAT THE DIAGONAL DIMENSION OF EACH OPENING IS SMALLER THAN THE DIAMETER OF THE OUTLET PIPE.
4. STRUCTURAL DESIGN OF SAFETY GRATES SHALL BE BASED ON FULL HYDROSTATIC HEAD WITH ZERO HEAD DOWNSTREAM OF THE RACK.



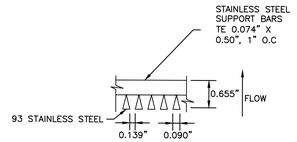
SECTION CREST WALL DETAIL

1"=2



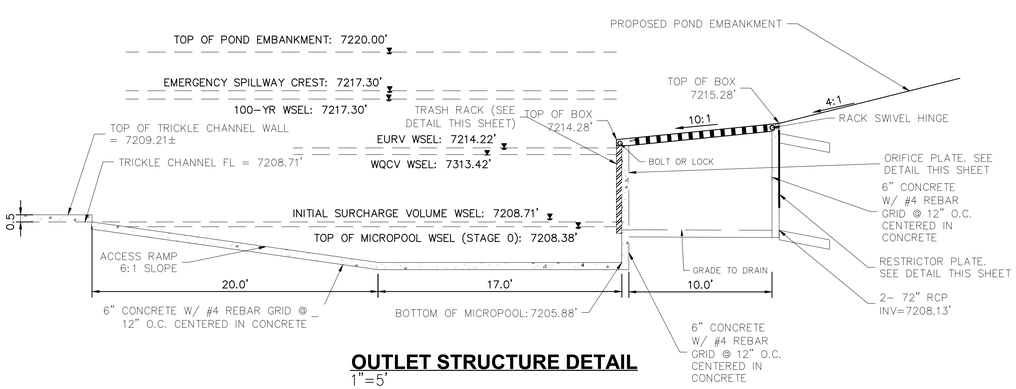
SECTION A

N.T.S.



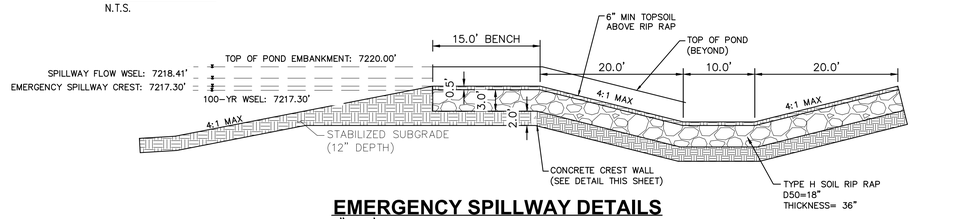
SECTION B

N.T.S.



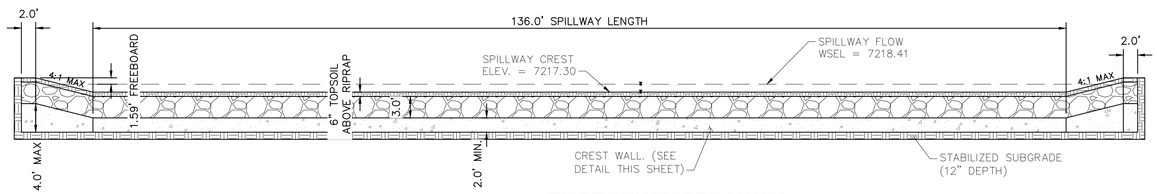
OUTLET STRUCTURE DETAIL

1"=5'



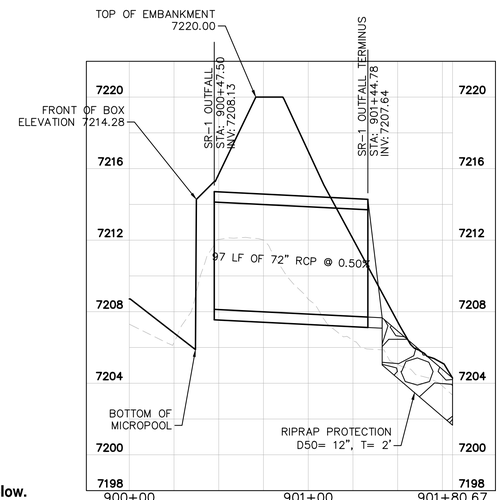
EMERGENCY SPILLWAY DETAILS

1"=10'



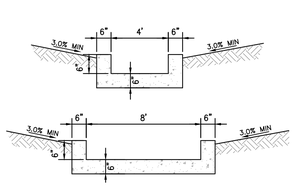
EMERGENCY SPILLWAY

1"=10'



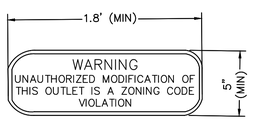
SR-1 OUTFALL PROFILE (2)

1"=40'



CONCRETE TRICKLE CHANNEL

1"=5'

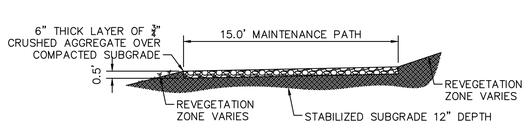


OUTLET SIGNAGE

N.T.S.

OUTLET SIGNAGE NOTES

1. SIGN SHALL BE A MINIMUM OF 0.75 SQUARE FEET AND SHALL BE ATTACHED TO THE OUTLET OR POSTED NEARBY.



MAINTENANCE ROAD

1"=5'

MAINTENANCE PATH NOTES

1. MAINTENANCE PATH SHALL INCLUDE SUBGRADE PREPARATION, GRAVEL BASE, AND COMPACTION.

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NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 900
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: MJK
DRAWN BY: MJK
CHECKED BY: KRK
DATE: 03/03/2023

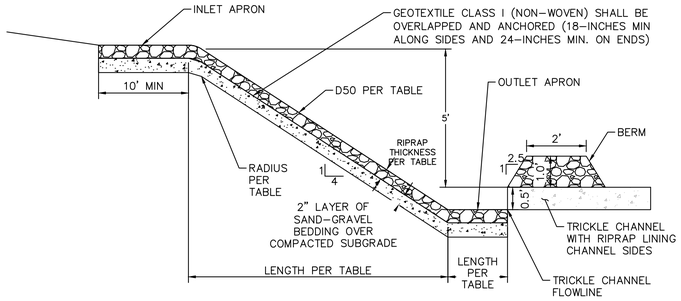
EAGLEVIEW
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

SUB-REGIONAL POND DETAILS

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

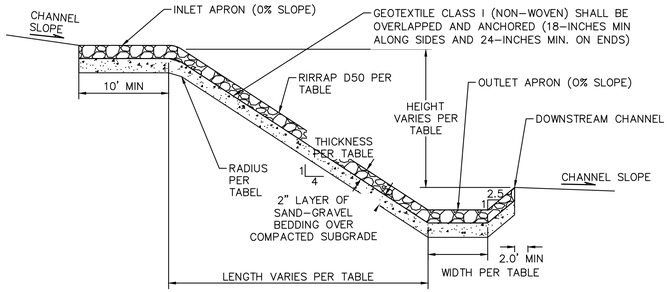
PROJECT NO. 196106001

SHEET C2.32



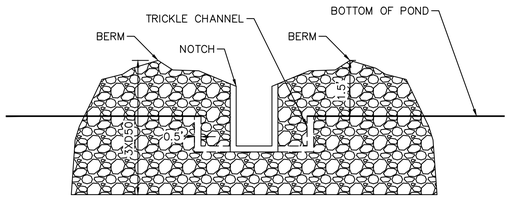
ROCK CHUTE PROFILE- CROSS SECTION -INTO POND/ FOREBAY APPLICATION

N.T.S.



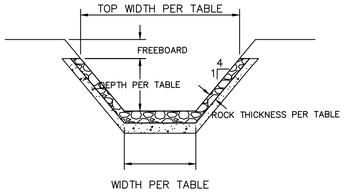
ROCK CHUTE PROFILE- CROSS SECTION

N.T.S.



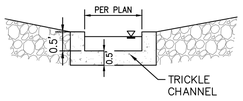
ROCK CHUTE PROFILE- INTO POND/FOREBAY APPLICATION

N.T.S.



ROCK CHUTE PROFILE- CROSS SECTION 2

N.T.S.



ROCK CHUTE TO TRICKLE CHANNEL TRANSITION- INTO POND/FOREBAY APPLICATION

N.T.S.

Rock Chute ID	Rock Chute Location	Contributing Basins	Q100 Flow (cfs)	Upstream Inlet Apron Length (ft)	Drop (ft) *(Inlet Apron to Outlet Apron)*	Chute Length (ft)	Downstream Outlet Apron Length (ft)	Chute Width (ft)	D50 (in)	Rock Chute Thickness (in)	Radius (ft)	Rock Chute Depth* (ft)	Top Chute Width** (ft)
1	PB9	PB9(70%), OB6, OB7	415	20	9	45	29	22	24	48	67	4.0	54
2	PB8	PB8 (70%), OB5	128	10	17	68	18	22	18	36	50	2.5	42
3	PB8	PB8 (40%), OB5	120	12	8	40	19	14	18	36	50	3.0	38
4	PB8	PB8 (30%)	10	10	4	12	7	14	6	12	17	1.5	26
5	PB8	Undetained 100YR Pond Inflow	490	23	7	175	13	20	12	24	33	5.0	60
6	PB14	OB8, PB11, PB14 (10%)	85	11	7	64	15	10	18	36	50	3.0	34
10	P13	OB6 and PB9	91	12	8	32	19	10	18	36	34	2.5	30

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

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

NO.	REVISION	BY	DATE	APPR.

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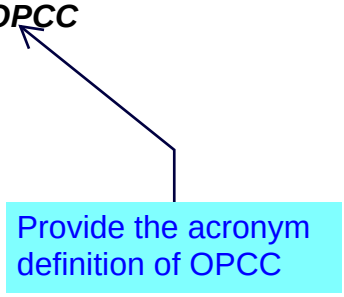
PROJECT NO.
196106001

SHEET
C2.33

APPENDIX D: OPCC



Kimley»Horn
2 North Nevada, Suite 900
Colorado Springs, Colorado 80903

Project: Eagleview Regional Drainage Improvements — Prepared By: CFS
Project Number: — Checked By: BAH
Date: March 2, 2023

Regional Drainage Pond- SR1 (County Cost)					
Rip Rap Chute #1 / Forebay (24" Riprap)	CY	865	$ 178	$	153,924
Rip Rap Chute #2/ Forebay (18" Riprap)	CY	544	$ 178	$	96,812
Rip Rap Chute #6/ Forebay (18" Riprap)	CY	97	$ 178	$	17,345
Pond Earthwork	CY	81160	$ 8	$	649,280
Concrete Trickle Channel (8' wide)	LF	1166	$ 64	$	74,624
Concrete Trickle Channel (4' wide)	LF	92	$ 50	$	4,600
Concrete Micropool	EA	1	$ 25,000	$	25,000
Concrete Outlet Structure	EA	1	$ 35,000	$	35,000
Concrete Outfall Pipe (2- 72 Inch)	LF	196	$ 460	$	90,160
Concrete FES w/ Toe Wall	EA	2	$ 5,000	$	10,000
Rip Rap Emergency Spillway (12" Riprap)	CY	1841	$ 178	$	327,718
Maintenance Road (6" Thick)	CY	647	$ 56	$	36,204
Certification	EA	1	$ 8,000	$	8,000
Mobilization	EA	1	$ 10,000	$	10,000
Erosion Control	LS	1	$ 40,000	$	40,000
Subtotal				$	1,578,667
Reach RWT080 (County Cost)					
Earthwork	CY	1094	$ 8	$	8,752
TRM Matting	SY	1340	$ 12	$	16,084
Rip Rap Chute #3 (18" Riprap)	CY	294	$ 178	$	52,411
Rip Rap Chute #4 (6" Riprap)	CY	34	$ 178	$	6,045
Mobilization	EA	1	$ 5,000	$	5,000
Erosion Control	LS	1	$ 8,000	$	8,000
Subtotal				$	96,293
Reach RWT092 (County Cost)					
Earthwork	CY	665	$ 8	$	5,320
Grouted Boulders (24" Diameter)	SY	158	$ 420	$	66,453
Sheet Pile Cutoff Wall (PZ-22)	SF	270	$ 35	$	9,450
Riprap Protection (Type M - 12")	CY	97	$ 178	$	17,312
Riprap Protection (Type L - 9")	CY	263	$ 178	$	46,814
Riprap Protection (Type VL - 6")	CY	28	$ 178	$	5,043
Rip Rap Chute #10 (18" Riprap)	CY	167	$ 178	$	29,746
Coir Mat 40	SY	375	$ 8	$	3,000
Maintenance Road (6" Thick)	CY	72	$ 56	$	4,037
Mobilization	EA	1	$ 5,000	$	5,000
Erosion Control	LS	1	$ 8,000	$	8,000
Subtotal				$	200,176
Reach RWT054 (County Cost)					
Earthwork	CY	2655	$ 8	$	21,240
Grouted Boulders (24" Diameter)	SY	477	$ 420	$	200,293
Sheet Pile Cutoff Wall (PZ-22)	SF	891	$ 35	$	31,185
Riprap Protection (Type M - 12")	CY	894	$ 178	$	159,211
Riprap Protection (Type VL - 6")	CY	196	$ 178	$	34,974
Coir Mat 40	SY	1528	$ 8	$	12,224
Maintenance Road (6" Thick)	CY	278	$ 56	$	15,556
Mobilization	EA	1	$ 15,000	$	15,000
Erosion Control	LS	1	$ 20,000	$	20,000
Subtotal				$	509,683
Subtotal County Costs				$	2,384,818
Contingency (35%)				$	834,686
TOTAL COUNTY COST				$	3,219,504
Reach RWT094 (Developer Cost)					
Earthwork	CY	8845	$ 8	$	70,760
Riprap Protection (Type M -12")	CY	2757	$ 178	$	490,792
Coir Mat 40	SY	6952	$ 8	$	55,616
Maintenance Road (6" Thick)	CY	443	$ 56	$	24,801
Erosion Control	LS	1	$ 20,000	$	20,000
Subtotal				$	661,969
Subtotal Developer Costs				$	661,969
Contingency (35%)				$	231,689
TOTAL DEVELOPER COST				$	893,658
TOTAL REGIONAL DRAINAGE COST				$	4,113,162

Conceptual Opinion of Probable Construction Cost
The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.