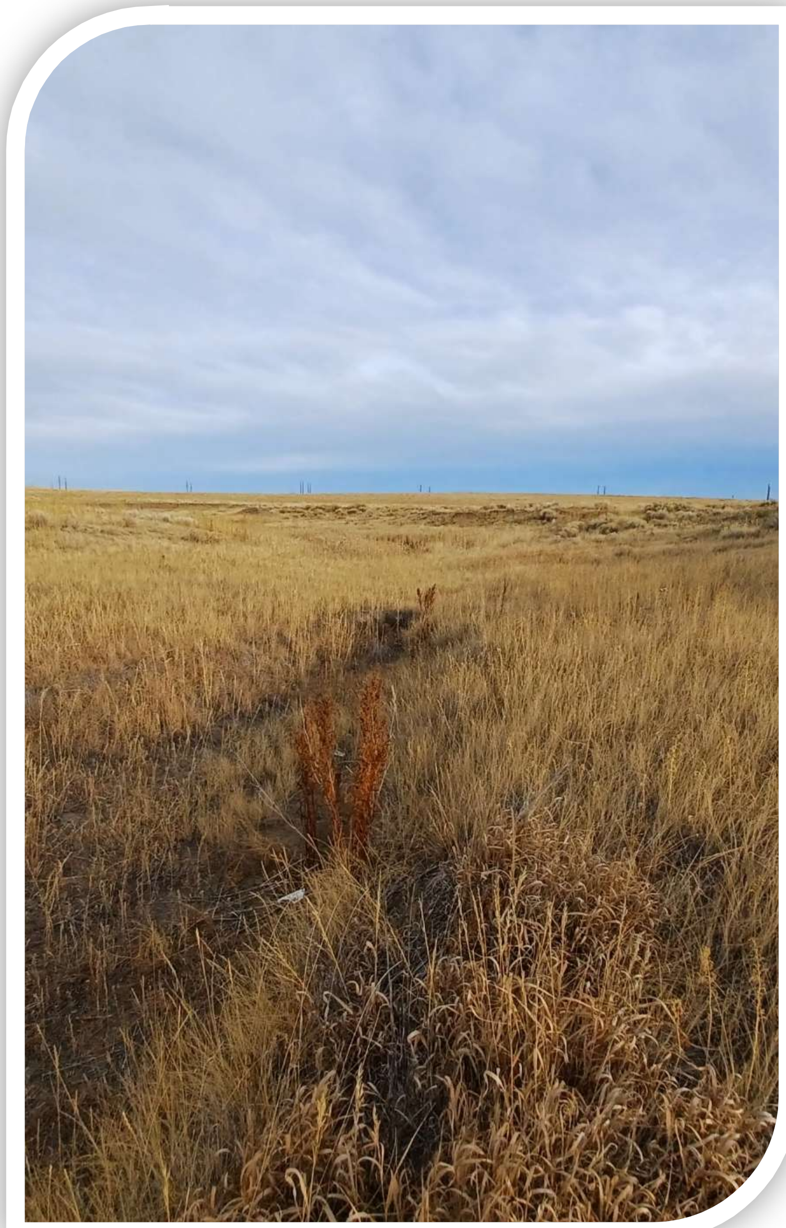
Channel Design Report For 100% Design:
Rolling Meadows Channel and Floodplain Modification – Phase 1

Prepared for:

Prepared by:



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On Behalf of:

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Updated: May 2026

Engineer's Statement:
The channel design plan and report of Rolling Meadows Channel and Floodplain Modification – Phase 1 were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said report has been prepared according to the criteria established by the county for channel design report. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

SIGNATURE: **SEAL**

____

Andrew J Beck
Registered Professional Engineer
State of Colorado
No. 48153

Developer's Statement:
I, **Landhuis Company** the developer have read and will comply with all the requirements specified in this report and plan.

The Landhuis Company
By: Jeff Mark
Title: President
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EL PASO COUNTY ONLY:
Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

____________________________________ ________________________

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

Conditions:

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Introduction

A. Report Description

This channel design report is submitted in support of Phase 1 of the 100% Design Plans (Plans) for the proposed East Fork Jimmy Camp Creek channel improvements at the Rolling Meadows development (Project) which includes Antelope Ridge at Bull Hill Phase 1. The proposed channel improvements are being constructed in association with The Landhuis Company (Client). Design elements have been coordinated with the Client, the City of Colorado Springs (City), and El Paso County (County). The Project limits are within the boundaries of both the City and County. Per previous coordination meetings with the City and County, City review will take precedent up to channel station 30+89 and County review will take precedent on the channel upstream. The City will also review the Bradley Road crossing since the City owns the Bradley Road right-of-way at the channel crossing.

B. Purpose

The purpose of this report is to document the design criteria, present data analysis, and provide supplemental information to support the proposed improvements shown in the Plans.

C. Location

The project is located between Bradley Road and the Lorson Ranch East development in El Paso County, Colorado and is in Township 15 South, Section 1, 12, & 13, Range 65 West of the 6th Principal Meridian. The project reach includes over 7,000 linear feet of East Fork Jimmy Camp Creek with approximately 2,000 feet of the downstream section located within City limits.

The location of the project is shown in Figure 1. Detailed location information is also included in the Plans. Design and construction phasing are discussed in more detail in the Phasing section of the report to follow.

Figure 1. Project Location

Previous Reports and Jurisdictional Requirements

A. DBPS Reference

The Project reach was previously included in the Jimmy Camp Creek Drainage Basin Planning Study, herein referred to as "2015 DBPS". The findings of the 2015 DBPS study identify the project reach as a dry wash with ephemeral flow. It notes no significant habitat presence and a lack of bed and bank configurations in the project reach, downstream of Meridian Road. The 2015 DBPS identifies the existing culvert crossing at Bradley Road as undersized and that additional capacity will need to be added.

B. FEMA Regulations & Floodplain Development

The project reach is within a Zone AE regulatory 100-year floodplain shown on Flood Insurance Rate Map (FIRM) Panels 08041C0769G, 08041C0790G and 08041C0976G, dated December 7, 2018. The reach is approximately between cross sections R and I and has 100-year Base Flood Elevations and a regulatory floodway. The floodplain datum is North American Vertical Datum 1988 (NAVD88). The Project will impact the regulatory floodplain; therefore, it will require a floodplain development permit (CLOMR case number 24-08-0597R). The CLOMR has been approved.

The proposed channel design introduces a defined channel throughout the project area. It is not anticipated that changes to floodplain mapping will have negative impacts on the existing infrastructure. The current effective floodplain limits do not include the impact of Bradley Road. The effective floodplain limits are shown on the FIRM panels included in the Appendix C.

C. U.S. Fish and Wildlife Service Requirements

This site is not suitable habitat for any federally listed threatened or endangered species that may be found in the area. Endangered Species Act consultation was completed as part of the CLOMR process and resulted in a determination of "no potential for take". Pre-construction site surveys should be conducted to avoid impacts to nesting birds. Construction should occur outside of the April 1st to August 15th window.

D. U.S. Army Corps of Engineers (USACE) Requirements

The USACE has determined that the project area is not considered "Waters of the United States," exempting the project from the 404 permitting process. Refer to Appendix D for the jurisdictional determination (SPA-2005-00418), dated March 17, 2023. This determination has been grandfathered into recent regulatory rule changes.

Site Description

A. Channel Description and Features

The subsections below provide a summary of the existing conditions of the project reach.

Existing Conditions Map

The existing conditions map is shown within the Plans (Appendix A). The map shows the existing terrain, utility locations, and parcel boundaries. The existing terrain was obtained from a 2022 LiDAR flight of the project site (one-foot contour intervals) by M&S Civil Consultants, Inc. All elevations are referenced to the North Geodetic Vertical Datum of 1929. Horizontal control information is provided on the Title Sheet (TS01) of the Design Plans.

Channel and Adjacent Land Use

The existing channel area has no defined bank or bed features and conveys no baseflow. During flooding, the water spreads extensively across the undeveloped plains, as modeled in the FEMA floodplain mapping. Example photos of the floodplain are in Figure 2 though Figure 5 below. The Project reach extends approximately 100 feet north of Bradley Road and is bordered by the Lorson Ranch East development to the south.

Figure 2. Typical floodplain on East Fork Jimmy Camp Creek.

Figure 3. Bradley Road Culvert

Figure 4. View from Bradley Road looking South.

Figure 5. View from southern end of project extents.

Existing Vegetation

The Project area supports upland plains vegetation throughout most of the reach. Many sections of the Project reach appear to be grazed by livestock. Due to the lack of baseflow in the creek, there are few riparian species present in the project reach. Upland areas consist mostly of native grasses. Few mature trees are present in the reach.

Matrix conducted a wetland delineation and will conduct a riparian vegetation assessment for the CSQT, if required by the USACE. Memoranda for these assessments are provided in Appendix D.

Notable Features

An existing waterline and the associated hydrants will be relocated by others as part of the channel construction and site development. A future watermain and sanitary line, to be installed by others prior to channel construction, will cross the proposed channel at station 59+41 and 61+45, respectively.

Additional features include the Bradley Road crossings and the channel tie-in at Lorson Ranch East.

Erosion and Degradation Issues

This channel is not presently experiencing erosion or degradation issues. Work is being completed in anticipation of suburban development and anticipated hydrology changes therein.

Channel Bottom and Bank Characteristics

The majority of the Project site does not have a defined channel or banks. Wetland areas are noted, primarily to the south of Bradley Road in extremely small pockets of the existing drainage. As previously described, flood events inundate the existing undeveloped plains and flow over the site.

Overbank Limitations

The existing crossing (two 12'x8' concrete box culverts) at Bradley Road is undersized, causing water to pond behind Bradley Road and overtop at the low point on the east side of the road. Additional limitations include proposed development throughout the adjacent property.

Geomorphology

The Project reach currently exists as an ephemeral swale with an undefined low flow channel within an unconfined valley.

Prior Studies

The 2015 DBPS provides background information on the Jimmy Camp Creek basin; a summary of basin characteristics and environmental resources; updated hydrology for existing and future flows; and an updated hydraulic analysis (Kiowa, 2015).

The City and Matrix completed a study of the Jimmy Camp Creek watershed in 2013 to provide guidance for low flow estimation of the design. This study, along with the accompanying data, provides guidance for the establishment of low flow hydrology within the Jimmy Camp Creek watershed (Matrix, 2013).

B. Tributary Watershed

The drainage area contributing to the project reach is 4.2 square miles at Bradley Road and 7.2 square miles at Lorson Ranch East (StreamStats, 2022). The existing land use of the contributing watershed is rural and undeveloped. The 2015 DBPS estimates that future watershed land use will include low to medium density residential lots with some commercial use increasing the impervious cover to 42%.

Existing and future land use conditions in the East Fork Jimmy Camp Creek watershed can be seen in Table II-2 and II-3 of the 2015 DBPS (Kiowa, 2015). Runoff from proposed development will be attenuated through full spectrum detention storage, as specified in the 2015 DBPS. Detention facilities along East Fork Jimmy Camp Creek will be designed by others as part of the Rolling Meadows-Bull Hills development.

C. Adjacent Developments Bounding the Improvement

The adjacent property is currently being platted for development as part of the Rolling Meadows-Bull Hill development.

D. Major Crossings

The project reach extends approximately 100 feet north of Bradley Road. Two 12’x8’ concrete box culverts convey flows underneath Bradley Road (DBPS, 2015). The 2015 DBPS notes that the Bradley Road culverts do not contain adequate capacity to pass the existing 100-year flows, 2,860 CFS, and recommends the installation of an additional culvert to pass the existing 100-year flows.

E. Parcel Ownership and Conveyance

The Project crosses parcels owned by Murray Foundation LLC, Eagle Development Company Heidi LLC, and BLH NO2 LLC. Parcel numbers and owners are noted on the Existing Conditions and Demolition Plan sheets in the 100% Design Plans. Coordination between the Landhuis Company and Banning Lewis Ranch is ongoing. This channel is currently and will remain within a tract in the property within El Paso County.

F. Soil Conditions

Soils data is described in the NRCS Web Soil Survey, available in Appendix E. The channel bottom was predominantly classified as Sampson loam, 0% to 3% slopes, and Ascalon sandy loam, 1% to 9% slopes.

Areas adjacent to the channel are composed of fine sandy loam, sandy loam, and clay loam. These soils are in Hydrologic Soil Group B, which is characterized by well-drained soils.

Geotechnical investigations, describe the area as composed of clay to sandy clay, silty to clayey sand, sandstone, and claystone bedrock. The report, completed by RMG, identifies possible foundation concerns on the site.

Proposed Conditions

A. Reference to Proposed Conditions Map

The proposed improvements are shown in the Design Plans in Appendix A. The Overall Drainage Plan shows an overview of proposed conditions and proposed site grading. The Plan and Profile sheets provide greater detail on the proposed improvements. A total of about 75 acres of disturbance is associated with this project.

Drop structures, grading, and revegetation are proposed throughout the reach. Due to wide, shallow characteristics of the existing floodplain, channel realignment and establishment of a stable channel cross section is proposed throughout the reach to establish a single channel.

B. Channel and Adjacent Land Use

The proposed channel improvements are designed to mimic natural, stable conditions of a moderately entrenched, moderate gradient channel. The proposed multi-staged cross section will help maintain geomorphic equilibrium, reducing tendencies for excessive degradation and aggradation. This corridor will engage floodplain benches at different flood frequency events, creating a diverse riparian habitat and slowing the overbank flows to non-erosive levels.

Due to the low resistivity of the local soils, the proposed stable slope is shallow, resulting in the need for constructed drop structures throughout the project reach. This is consistent with the findings of the 2015 DBPS Report. The grade control structures will provide vertical grade control to prevent the propagation of a headcut through the project reach as well as energy dissipation within the channel.

El Paso County requires maintenance access to the proposed channel. An access road will be constructed along both sides of the channel and will provide vehicular access to the channel every 500 feet. The access road will double as a community multi-use trail.

C. Project Need

The goals of the Project are to stabilize and protect the channel against excessive erosion and deposition and to limit the regulatory floodplain extents through the Project area.

D. General Description of Proposed Channel Modifications

The proposed modifications aim to establish a single-thread, stable channel along East Fork Jimmy Camp Creek which can convey the 100-year storm event with a minimum of one foot of freeboard, with no additional superelevation height required. The design will generally maintain a naturally lined channel with appropriately placed grade control.

Stabilization elements include hydraulic grade control structures and riprap revetments within the channel. The proposed grade control structures are sculpted concrete with a 4H:1V sloping face. These structures are installed to achieve a flatter bed slope based on the expected long-term stable slope.

The channel improvement effort focuses on establishing multi-stage channel geometry to create a riparian corridor with a functional floodplain. The channel staging is based on an estimated bankfull flow that informs the channel geometry and meander planform. The revegetation plan matches the staged geometry, where hydrologic zones and groundwater availability determine the locations of riparian, and upland plant species.

E. Variances/Deviations

Partial-Width Drop Structures

Partial-width drop structures are proposed throughout the reach. The lateral extents of concrete extend to the low flow width with sheet pile and soil riprap providing protection across the 100-year floodplain. Additional discussion of this is provided in the deviation request included as part of this submittal package.

Channel Hydraulics

Due to the use of partial width drop structures, velocity and shear stresses in excess of the City and County criteria may be found within the channel. These areas will be stabilized to prevent any erosion within the channel and validated with hydraulic modeling. Additional discussion of this is provided in the deviation request included as part of this submittal package.

F. Maintenance and Access

El Paso County requires maintenance access per their Engineering Criteria Manual, Section 3.3.3.K. A dual-purpose 15-feet wide maintenance access road and multi-use trail shall be constructed to provide access for both maintenance and recreational purposes. The maintenance access road shall be constructed on both sides of the channel, with vehicular access to the channel provided every 500 feet.

The project site can be accessed off Bradley Road. It is not anticipated that construction access will be an issue since the project site is relatively flat and should be able to accommodate construction traffic. As the adjacent site is developed, access from the residential roads will be provided.

The proposed grading plan has 4:1 slopes or flatter, improving the possibility of access. Permanent access will be provided by the maintenance access road proposed along the channel.

Post-construction channel maintenance is anticipated to be transferred to the County and City for maintenance.

G. Tributary Stormwater Facilities

The project site is undeveloped and there are no existing stormwater outfalls or detention facilities present within the project reach. There is one road crossing within the reach, Bradley Road, which is discussed above. Stormwater outfalls are being designed by others and will be shown in the design plans by others. There are no existing, significant wetland habitats within the project site and no significant wetland habitats anticipated to be created as part of channel construction.

Channel, Structure and Utility Crossing Design

A. Variances to DBPS

The design of East Fork Jimmy Camp Creek varies from the design in the 2015 DBPS in the channel cross section design and drop structure design. Due to the use of full spectrum detention in the adjacent development, it is not appropriate to use the future flows as shown in the 2015 DBPS. The proposed improvements utilize modifications to the 2015 DBPS recommendations of a floodplain bench, grade control, and planform modifications for stabilizing East Fork Jimmy Camp Creek. See Section D for discussion of the typical cross section and floodplain staging.

B. Hydrologic and Hydraulic Criteria

The design hydrology for the project includes baseflow, bankfull flow, low flow, and 10 and 100-year flows.

Baseflow

Since the East Fork Jimmy Camp Creek is ephemeral, the baseflow hydrology is based on the minimum constructable channel. As the project reach becomes developed and the impervious area increases, this base flow channel will accommodate the minimum flows in the reach.

Bankfull Flow

The bankfull flow was estimated using regional regression equations developed by Matrix.

Low Flow

Low flow data, compiled as part of the City's assessment of Jimmy Camp Creek, was used to develop regression equations for the watershed (Matrix, 2013). These regression equations calculate a low flow that was incorporated into the cross-section design.

10- and 100-year Flows

Matrix used the hydrology from the 2015 DBPS and FEMA FIS for the design flood flows. The 2015 DBPS provides the most recent hydrologic study of the basin, and the flows have been approved by the City and County for use. This design uses the 10-year flow from the 2015 DBPS. The 100-year flow in the 2015 DBPS is less than the FEMA FIS. In discussions with stakeholders, it was determined that a reduction to the FEMA 100-year flows would not be acceptable. Therefore, the FEMA 100-year flows were used in this design.

The project design flows are summarized in Table 1 below with the source of each value noted.

Table 1. Design Flows

Return Period	Phase 1 Bradley Road to Lorson Ranch (CFS)	Source
Baseflow	4	Min. constructable channel*
Bankfull	40	Matrix Regression
Low Flow	227	County Jimmy Camp Creek low flow equation
10-year	3,729	2015 DBPS
100-year	4,400	FEMA FIS

*There is no baseflow in the existing condition since the creek is ephemeral. The minimum constructable channel is designed to accept the anticipated nuisance flows as the basin is developed.

Hydraulic Criteria

The hydraulic criteria used for the 100% Design includes criteria from the City of Colorado Springs, El Paso County, and the Mile High Flood District. Design criteria for each calculation is noted within that calculation.

C. Site Constraints

Several constraints were identified for the project, including but not limited to:

Bradley Road crossing

- The existing box culverts at Bradley Road are undersized and will be removed and replaced by a 60’x13.25’ CONSPAN culvert which has capacity for future 100-year flows, 4,400 cfs. Refer to the Structure Selection Report, included as part of this submittal package, for this crossing. The 100% Design Plans show this proposed culvert and include references to the culvert plans to be completed by others.
- Bradley Road will be widened to a Principal Arterial roadway. The proposed culvert is long enough to accommodate the future widening of Bradley Road. The future width of Bradley Road is shown in the 100% Design Plans and will be completed by others.

Lorson Ranch East channel – the proposed channel improvements must tie into the existing geometry of the Lorson Ranch reach of East Fork Jimmy Camp Creek.

- The proposed channel through Rolling Meadows is a multi-staged channel while the Lorson Ranch section is a single staged, trapezoidal channel. The downstream channel tie-in will require adjustment of the typical channel section to maintain capacity while smoothly transitioning to the Lorson Ranch channel geometry.

Water main relocation – the watermain and hydrants approximately between stations 31+00 and 59+50 will be relocated to avoid conflict with the proposed channel.

- The water main relocation is being coordinated by others.

D. Major Channel Components/Attributes

The major channel components are broken out based on Section, Planform, and Profile.

Section

The typical cross section is shown in Figure 6, as well as in the Design Plans. The geometry consists of four stages: base flow, bankfull, low flow, and 100-year floodplain. The contributing watershed area changes significantly between Phase 1 and Phase 2 of the project. Two channel cross sections are proposed to accommodate the change in flow throughout the project reach. The upper section, for Phase 2, applies from the start of the project at Drennan Road to the Bradley Road crossing. The lower section, for Phase 1, applies through the Bradley Road crossing to the end of the project reach at Lorson Ranch East. The upstream tie-in of Phase 1 consists of a short length of the Phase 2 cross section.

Baseflow

The dimensions of the base flow stage are based on the minimum constructable channel dimensions. There is currently no base flow within the channel. Erosion control fabric and seed will be placed to prevent erosion during site development. As the upland areas are developed, it is anticipated that base flow will be established within the channel, and this base flow channel will maintain sediment transport at low flows.

Bankfull

The bankfull stages were designed to maintain an average width-to-depth ratio (W/D) of approximately 21, based on appropriate Rosgen B stream type channel criteria and design success in similar systems. This W/D will help convey sediment in a manner that minimizes the potential for excessive erosion and deposition.

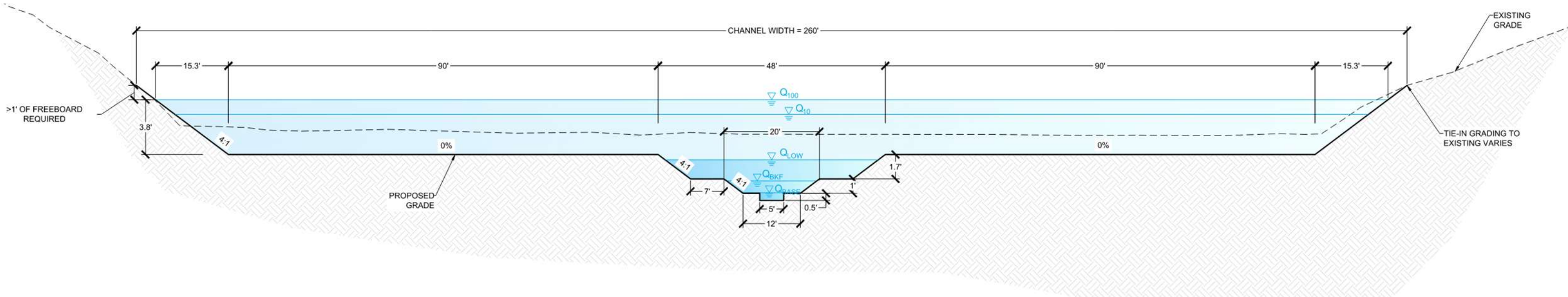
Low Flow

The dimensions of the low flow channel targeted a depth of double the maximum bankfull depth, for an entrenchment ratio of 2.33, appropriate for a moderately entrenched channel in this region.

100-year Flow

The typical floodplain width of 266 feet was sized to meet City velocity criteria in the 100-year event. The floodplain is wider in areas where the existing valley has little topographic relief. The City DCM criteria for threshold design was used to identify areas where additional floodplain stabilization is required. The 10-year flows shown in Table 1 fit within the 100-year floodplain.

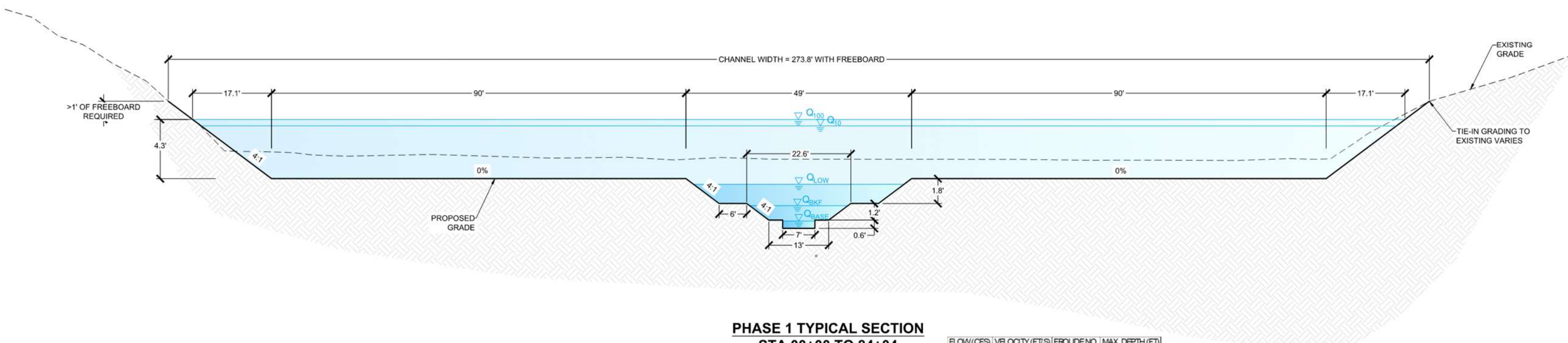
Figure 6. Typical Channel Cross Sections



NOTE:
FLOODPLAIN DEPTH VARIES BASED ON CHANNEL HYDRAULICS.

PHASE 2 TYPICAL SECTION
STA 84+04 TO 84+29
NOT TO SCALE
NOTE 3:1 VERTICAL EXAGGERATION

FLOW (CFS)	VELOCITY (FT/S)	FROUDE NO.	MAX. DEPTH (FT)
Q_{BASE}	2	0.25	0.54
Q_{BKF}	25	0.31	1.36
Q_{LOW}	183	0.36	2.83
Q_{10}	2320	0.31	6.00
Q_{100}	3600	0.32	7.02



PHASE 1 TYPICAL SECTION
STA 00+00 TO 84+04
NOT TO SCALE
NOTE 3:1 VERTICAL EXAGGERATION

FLOW (CFS)	VELOCITY (FT/S)	FROUDE NO.	MAX. DEPTH (FT)
Q_{BASE}	4	0.27	0.53
Q_{BKF}	40	0.32	1.64
Q_{LOW}	227	0.37	3.19
Q_{10}	3729	0.32	7.42
Q_{100}	440	0.32	7.88

FLOW DATA SOURCES:
Q_{BASE} - MIN. CONSTRUCTIBLE CHANNEL
Q_{BKF} - MATRIX REGRESSION EQUATIONS
Q_{LOW} - CITY/COUNTY EQUATIONS
Q_{10} - 2015 DBPS
Q_{100} - FEMA FIS

Planform

The proposed planform is shown in the 100% Design Plans. The overall floodplain alignment follows the low point in the valley and the low flow channel meanders within the floodplain alignment. The proposed meander planform creates facet lengths and bend radii based on dimensionless ratios, normalized by bankfull width, and consistent with reference reach data. The meander planform aids in maintaining stream length and provides energy distribution consistent with natural and healthy stream systems.

Profile

The profile design is based on relevant City DCM criteria and informed by local experience within the Fountain Creek watershed. The existing average bed slope through the reach is 1.0%. Planned future development is expected to impact flows in East Fork Jimmy Camp Creek which could destabilize the creek. This can be preempted by implementing the proposed channel improvements within the Project reach. To achieve a stable longitudinal profile, hardened drop structures are proposed that provide shear resistance over a steep drop, with flatter bed slopes of 0.25% between each drop. The proposed drop structures are discussed in the Section E below.

The longitudinal slope of the naturally lined portion of channel was determined using guidance provided in Chapter 12, Section 3.1.2 of the City of Colorado Springs DCM and hydraulic modeling. The stable slope based on Figure 12-4 of the DCM for Q_{100} = 4,400 cfs is S=0.09%. Figure 12-4 is specific to sand bed channels and per the NRCS Web Soil Survey report and the Geotechnical report, the soils present in the project area are mostly a mix of loam and clay loam. FlowMaster was used to create a hydraulic model to determine what slope and cross section configuration would meet capacity requirements while adhering to DCM criteria. A design slope of approximately 0.25% was selected for the project based on the model results. FlowMaster results are included in the Appendix F.

It should be noted that in the proposed profile the approximately 0.25% slope represents an average bed slope for the naturally lined portion of the design reach. See the Plan and Profile Sheets of the Plans for details on the proposed longitudinal profile.

E. Major Drop Structure Components/Attributes

The 100% Design Plans propose sculpted concrete drop structures for grade control. These structures will have a drop height of 2.5’, 3.0’ (downstream drop), 3.5’, 4.5’, and 4.9’ (upstream drop). The Plan and Profile sheets show the location and height of the proposed grade control structures.

Large Drop Structures

The details of typical large drop structures are shown in the Design Plans. The design is based on guidance from the Mile High Flood District Drainage Criteria Manual (MHFD DCM). The typical structure consists of a sloping 4:1 longitudinal face, with a stilling basin for dissipating energy.

Minor flood events up to the low flow event will be contained within the sculpted concrete structure. This approach reduces the footprint of the structure and provides increased vegetation potential, improved stream function, reduced cost, and improved aesthetics. The partial width drop structure approach requires a variance, provided in the deviation request included as part of this submittal package.

The Q_{low} event (227 cfs) was selected as the threshold for the flood event completely contained within the structure and the crest geometry was sized accordingly. The typical section is shown in Figure 7, with additional detail in the Design Plans. The concrete structure is extended to the top of the low flow channel with buried soil riprap placed along the sides of the structure. In the larger storm events, the hydraulic models showed a weak hydraulic jump, even in the larger drop structures. Riprap is proposed around the structures to protect against degradation as described below.

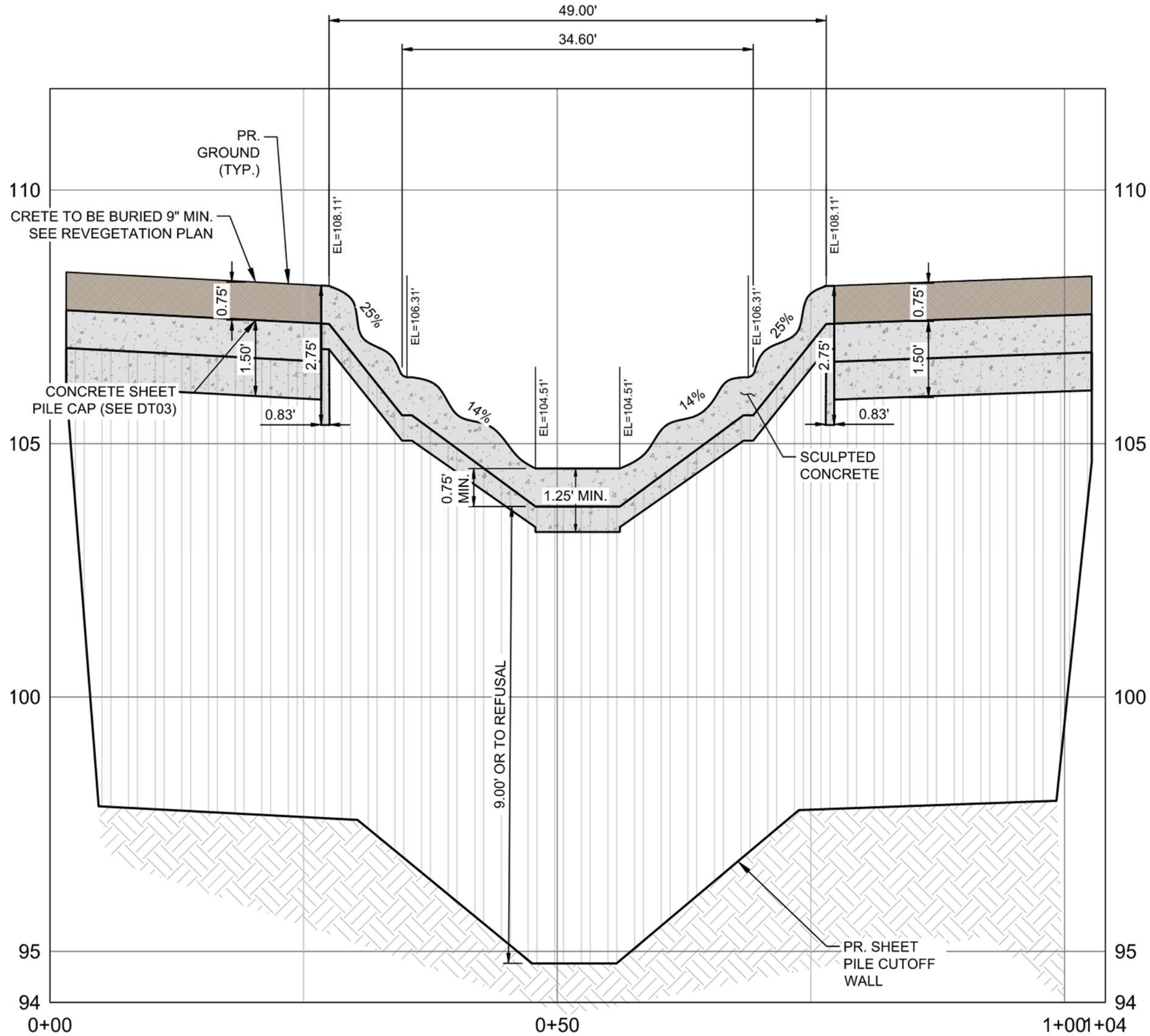
Each structure will include additional elements to ensure long-term vertical and horizontal stability in the floodplain. A sheet pile cut off wall will be placed at the crest of each drop and will be keyed down to a depth sufficient to protect against downstream degradation. This depth is determined by Lane's weighted creep analysis included in Appendix G. As a result of this analysis, an end sill is placed at the downstream end of each drop to protect the drop from hydraulic uplift.

Adjacent Riprap

A riprap apron is placed upstream and downstream of each drop structure to provide a transition to the natural channel and protection against accelerating and turbulent flows. Sizing for this riprap was completed using MHFD DCM criteria. Calculations are in Appendix G. Type M riprap is to be placed on all drop structures.

Buried soil riprap is to be placed adjacent to the sculpted concrete drops per MHFD DCM criteria. The buried soil riprap is a secondary measure of protection should the vegetated overbanks begin to erode. The downstream riprap extents were calculated as part of the stilling basin design per the MHFD DCM minimum length requirements. Both the upstream and downstream riprap were placed at the MHFD DCM minimum extents. Steep slope sizing equations were used, per criteria in the City of Colorado Springs Drainage Criteria Manual (COS DCM). Riprap sizing calculations provided unreasonably small riprap D_{50} values, and a minimum size of Type M riprap will be used. Calculations for all riprap sizing are located in Appendix G.

Figure 7. Crest Section of Large Drop Structure



4.5' DROP - CROSS SECTION B-B' - CREST

F. Major Components/Attributes

The major components of the project include channel realignment, earthwork, drop structures, and revegetation. Channel realignment and drop structures are discussed above in Section C and Section D respectively.

Earthwork

A proposed grading plan was created for the purposes of detailed hydraulic modeling, drop structure placement and tie in, and estimating construction cost.

The earthwork estimates indicate that there will be approximately 25,336 cubic yards of onsite cut and fill work with approximately 402,594 cubic yards of excess material for phase 1. This estimate assumes 15% soil shrinkage and is adjusted for material displaced by the drop structures, riprap protection, and soil amendment.

The geotechnical report (Rocky Mountain Group, 2022) indicates that expansive soils are present onsite and structure subgrade may need to be moisture conditioned or replaced with granular subgrade. The technical specifications address criteria and testing requirements for structural fill. The availability of suitable structural fill onsite is to be determined, with the possibility that material may need to be imported to establish structure subgrade.

Revegetation

As part of the design, Matrix conducted a wetland assessment and delineation. The Memorandum summarizing the results can be found in the Appendix D.

A revegetation plan was created and can be found in the Design Plans. The revegetation plan shows the planting and fabric placement throughout the project reach. Seed mixes and soil amendments are also outlined in the Design Plans. Due to the anticipated changes to the site as the surrounding area is developed, the seed mixes have been developed to create a seed bank for future site conditions. Each of the provided seed mixes have been developed based on site suitability and for long-term site success. For example, the Low-Grow mix has been designed for placement along the trail to provide a native mix that would be attractive to trail users, while not growing too high for safety and access reasons. It is Matrix's recommendation that site monitoring be completed as vegetation emerges to prevent the establishment of noxious or undesirable weed species.

Soil testing will be required, and topsoil may require amendment to provide suitable soil conditions for revegetation.

Future floodplain grading around the proposed stormwater outfalls may provide an opportunity for cultivation of beneficial riparian or wetland vegetation, adding ecological value to the site.

Erosion control fabric will be required to stabilize soils until the vegetation can establish. Within the bankfull channel but excluding the bottom, Nedia KoirWrap 900 is specified for erosion control. Outside of the bankfull channel, Nedia C400B (coconut blanket) is specified for erosion control. Crimped straw is to be placed outside of the 100-year floodplain. Fabric placement has been designed to withstand modeled velocities and shear stresses while still providing cost savings and vegetative success.

Overbank Shear Protection

In the overbanks, adjacent to each drop, lateral scour protection is provided by a combination of sheet pile and riprap sills. Sheet pile placement and extents are shown in the plan and profile sheets, and sheet pile depths are outlined in the Design Plans. Sheet pile is placed in the overbanks where 2D hydraulic modeling shows excessive shear stress due to the increased overbank slope. Riprap will be placed on the downstream side of the sheet pile to provide protection from rill erosion in the floodplain. As an alternative to sheet pile, a buried soil riprap apron can be placed in the overbanks adjacent to the drop structures to provide a larger area with high shear resistance. The crest cutoff wall for the drop structure upstream of Bradley Road will tie directly into the culvert wingwall.

G. Major Drainage Structure Components/Attributes

Stormwater Outfalls

There are no existing stormwater outfalls to the channel. Proposed stormwater outfalls and detention pond outlets for the Rolling Meadows development will be designed by others.

Overbank Protection

Hydraulic modeling, discussed in the next section, indicates the possibility of high shear stress in the overbanks adjacent to the drop structures. To account of the possibility of erosive forces in the overbanks, sheet pile will be extended across the 100-year floodplain. The depth of overbank sheet pile is noted in the Design Plans for each drop height. Additional discussion of overbank protection is provided in the previous section.

Soils

Soils have been discussed in previous sections. It will be the construction contractor's responsibility to ensure all compaction requirements in the technical specifications are met.

H. Hydraulic Analysis

Hydraulic analysis on the typical cross sections was completed in Hydraulic Toolbox and represents general values for each cross section. Table 2 shows the maximum flow depth, velocity, shear stress, and Froude number for the typical cross section. Refer to Appendix F for more Hydraulic Toolbox results.

Table 2. Forces in the Typical Cross Sections

Flow (CFS)		Max Flow Depth (ft)	Avg Velocity (fps)	Fr	Avg Shear Stress (lb/sf)
Baseflow	4	0.53	1.11	0.27	0.07
Bankfull	40	1.64	1.82	0.32	0.15
Low	227	3.19	2.80	0.37	0.27
10-year	3729	7.42	3.61	0.32	0.62
100-year	4400	7.88	3.81	0.32	0.68

A detailed proposed conditions 1D hydraulic analysis for the project was performed and an additional 1D and 2D hydraulic analysis was completed for the drop structures. Water surface elevations and velocities were computed using the USACE HEC-RAS computer modeling program, Version 5.0.5. The HEC-RAS model was used to inform drop structure design, grading efforts, and general project design calculations. The 1D hydraulic model provides channel and overbank velocities and shear stresses. The flows inside the drop structures and stilling basins are modeled at supercritical flow and outside of the drop structures at subcritical flow.

Manning's n coefficients used in the hydraulic computations were chosen by engineering judgment based on field observations of the channel bottom and floodplain areas and are consistent with design guidance in criteria manuals. The Manning's n value for the proposed overbanks was increased to represent the fully developed vegetation in the site. Manning's n values are summarized in Table 3 below.

Table 3. Manning's n Values for Hydraulic Modeling

<table>
<tr><th colspan="2">Terrain</th><th>Manning's n</th></tr>
<tr><td>Existing</td><td>Channel Bottom and Overbanks</td><td>0.04</td></tr>
<tr><td rowspan="3">Proposed</td><td>Channel</td><td>0.04</td></tr>
<tr><td>Overbanks</td><td>0.06</td></tr>
<tr><td>Drop Structures</td><td>0.025</td></tr>
</table>

The 1D hydraulic model was developed per MHFD DCM criteria for detailed drop structure design. This model was used to determine the length of each stilling basin, perform a creep analysis, and size riprap. These calculations and the 1D hydraulic model are provided in Appendix F.

The crossing at Bradley Road was modeled in both the Federal Highway Administration's HY-8 culvert modeling program and in a 2D hydraulic model. For the 2D model, the computational mesh was developed with breaklines inserted into the mesh to align computational cell faces with the direction of flow within the channel. The 2D model computations were solved with the Full Momentum equations. Additionally, the upstream and downstream reaches were connected with the proposed culvert. The unsteady hydrograph modeled both the upper and lower values of the 100-year flood event, with Results of the 2D HEC-RAS analysis are presented in Appendix F.

I. Riprap Design

Drop Structures

Riprap will be placed around the sculpted concrete drop structures. The placement and sizing of this material was discussed in Section F.

Overbanks

Riprap sills are proposed in the overbanks adjacent to each drop structure and on the downstream side of the sheet pile for shear protection. Steep slope riprap sizing equations were used to size this riprap.

Culvert Rundowns

The riprap apron proposed downstream of the Bradley Road crossing was sized according to MHFD DCM criteria. This calculation is available in Appendix G.

J. Stability Analysis

Stability analysis was conducted using the hydraulic modeling previously described. Areas indicating excessive shear stress or velocities are to be reinforced to provide additional protection to the reach.

Hydraulic modeling does not indicate the presence of erosive forces at channel bends either within the low flow channel or at the 100-year floodplain.

K. Improvement Design Description

The proposed improvements will discourage future degradation of East Fork Jimmy Camp Creek caused by increased flow from development. Proposed channel improvements will also enhance the ecological integrity of the project area, increase stream function, and establish the creek as a community asset.

Design of the proposed improvements follow guidance provided in the COS DCM, the El Paso County DCM and Engineering Criteria Manual (ECM), and the MHFD DCM. Design elements outside of the specifications of the COS DCM and El Paso County DCM and ECM will be submitted as a variance.

Drainage and Bridge Fees

A. Major Watershed

The project reach is within the Jimmy Camp Creek watershed which is a part of the Fountain Creek watershed.

B. Current Year and Fees

The 2026 City of Colorado Springs Jimmy Camp basin fees are listed below. Note that the total drainage basin fee amount will be calculated by others in future final drainage reports for the Rolling Meadows-Bull Hill development.

Drainage fee – $11,857 per platted acre

Pond facility fee – $3,864 per platted acre

The 2026 El Paso County Drainage Basin Fees rate sheet states that “per Resolutions 25-95 and 25-96, the Bull-Hill/Rolling Meadows development and the West Fork Jimmy Camp Creek are closed for fees”.

Construction Cost Opinion

The anticipated cost of the project is as follows:

Table 4. 100% Design – Opinion of Probable Construction Cost (OPCC)

	OPCC	-10%	+15%
100% Project Cost Estimate	$13,098,100	$11,788,290	$15,062,815

The cost estimate is an AACE International Class 2 Cost Estimate, which includes a lower estimate of 10% less and an upper estimate of 15% more. A more detailed breakdown is provided in the Appendix B. The determination of private versus public responsibilities and reimbursable versus non-reimbursable costs will be completed by others.

Phasing

The Project construction will be phased. The reach from Lorson Ranch to Bradley Road is Phase 1 and the reach from Bradley Road to Drennan Road is Phase 2. Phase 1 is anticipated to be constructed from summer of 2026 to summer of 2027. The construction of Phase 2 will follow Phase 1. The construction of major facilities and the overall development will occur after channel improvements. Refer to future Rolling Meadows – Bull Hill development Final Drainage Reports and Stormwater Management Plans for phasing.

Summary

A. Scope of Work and Need

East Fork Jimmy Camp Creek between Drennan Road and Lorson Ranch is anticipated to see elevated flows due to increased impervious cover caused by a change in land use. The prescribed 2015 DBPS channel improvements intend to mitigate these effects through channel stabilization efforts.

Existing conditions in the project area include a wide, shallow floodplain that is approximately 2,000 feet wide. Additionally, the existing double 12’x8’ concrete box culverts at Bradley Road are undersized for the 100-year event. Development of the contributing watershed is expected to increase runoff and decrease the available sediment supply leading to channel instability.

The proposed project aims to mitigate the risk of channel degradation by establishing a long-term stable slope between proposed grade control structures. Project goals include channel stabilization, flood conveyance, establishment of native flora, and the creation of a riparian corridor that is an asset to the community.

B. Design Conformance with 2015 DBPS

The design uses the hydrology provided by the 2015 DBPS. No significant variances from the 2015 DBPS are required. The proposed improvements utilize a floodplain bench, grade control, and planform as methods for stabilizing East Fork Jimmy Camp Creek in accordance with the 2015 DBPS recommendations.

C. Environmental Habitat

Due to the wide, shallow nature of the existing floodplain, channel realignment is necessary. Thus, the channel corridor will undergo significant temporary disturbance creating significant challenges to preserve existing vegetation near the channel. However, one of the project goals is to establish a healthy, native plant community. To achieve this community, a revegetation plan has been developed to ensure there is not a net loss of riparian and wetland areas within the project.

D. Safety

The proposed grading plan maintains slopes at 4:1 or flatter for nearly all the grading to provide appropriate ingress and egress. The drop structure elements are considered low-risk and meet criteria consistent with structures used throughout the City.

E. No Adverse Impacts

The proposed improvements will not adversely affect the downstream and surrounding development. The Project aims to reduce the risk of channel degradation by establishing a long-term stable slope between proposed grade control structures. Project goals include channel stabilization, flood conveyance, establishment of native flora, and the creation of a riparian corridor that is an asset to the community.

References

COS. 2014. City of Colorado Springs, *Drainage Criteria Manual*, Volume 1, May 2014, Revised January 2021.

Kiowa. 2015. Jimmy Camp Creek Drainage Basin Planning Study Development of Alternatives & Design of Selected Plan Report, March 2015.

Matrix Design Group. 2013. *Low Flow Estimation for Natural Channel Design*, Technical memorandum, April 9, 2013.

StreamStats. 2021. US Geological Survey, https://streamstats.usgs.gov/ss/

MHFD DCM. 2016. Mile High Flood Control District, *Urban Storm Drainage Criteria Manual*, Volumes 1 and 2, 2016.

Appendix A

100% Design Plans

(Attached)

Appendix B

Opinion of Probable Construction Cost

THE LANDHUIS COMPANY

100% Design Opinion of Probable Construction Cost
AACE International Class 2 Cost Estimate

ROLLING MEADOWS CHANNEL DESIGN

MATRIX PROJECT NO. 21.1129.009

BID ITEM NO.	DESCRIPTION OF BID ITEM	QUANTITY	PAY UNIT	UNIT PRICE	TOTAL COST OF BID ITEM
1	Mobilization	1	LS	$594,000	$594,000
2	Traffic Control	1	LS	$60,000	$60,000
3	Water Control and Dewatering	1	LS	$178,000	$178,000
4	Erosion and Sediment Control	1	LS	$238,000	$238,000
5	Clearing and Grubbing	66	AC	$2,500	$165,000
6	Earthwork - Cut/Fill Onsite	20,934	CY	$12	$251,208
7	Earthwork - Excess Cut Onsite	400,582	CY	$5.50	$2,203,201
8	Drop Structure - Sculpted Concrete	3,936	SY	$475	$1,869,600
9	Drop Structure - Sheet Pile	4,839	SF	$50	$241,950
10	Drop Structure - Type M Soil Riprap	842	CY	$130	$109,460
11	Drop Structure - Type M Void-Filled Riprap	610	CY	$175	$106,750
12	Floodplain Sill - Sheet Pile	18,425	SF	$50	$921,250
13	Floodplain Sill - Concrete Sheet Pile Cap	2,648	LF	$150	$397,200
14	Floodplain Sill - Type M Soil Riprap	1,759	CY	$130	$228,670
15	Bradley R. Crossing - Type M Soil Riprap	955	CY	$130	$124,150
16	Bradley Rd. Crossing - Type M Void-Filled Riprap	967	CY	$175	$169,225
17	Bradley Rd. Crossing - CONSPAN O-Series 60'x13.25'	1	LS	$2,122,596	$2,122,596
18	Bradley Rd. Crossing - 2x12'x8' Box Culvert Removal	1	LS	$50,000	$50,000
19	County Access Road / Trail - Crushed Limestone	5,280	CY	$120	$633,600
20	County Access Road / Trail - Concrete (5" Depth)	824	SY	$110	$90,640
21	18" Concrete Curb	318	LF	$100	$31,800
22	Riparian Seed	8.0	AC	$3,500	$28,000
23	Upland Seed & Overseed	40.9	AC	$3,000	$122,700
24	Temporary Seeding	6.4	AC	$2,500	$16,000
25	Low Grow Seeding	12.0	AC	$3,000	$36,000
26	Shrub Overseed	1.8	AC	$2,000	$3,600
27	Compost Amendment	8,800	CY	$60	$528,000
28	Humate	16,800	LBS	$3	$50,400
29	Landscape Maintenance	24	MONTH	$3,800	$91,200
30	Koir Fabric (KoirMat 700) w/ Straw Underlayment	32,000	SY	$20	$640,000
31	100% Coconut Fabric (Nedia C400B)	113,300	SY	$6	$679,800
32	Straw Blanket (Nedia S400B)	76,900	SY	$1	$76,900
33	Crimped Straw (3000 lbs/ac)	19.6	AC	$2,000	$39,200
				Total	**$13,098,100**

AACE Class 2 Low Estimate (-10%)	$	11,788,290
AACE Class 2 Upper Estimate (+15%)	$	15,062,815

AACE International CLASS 2 Cost Estimate – Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the “bid” estimate to establish contract value. Typically, engineering is from 30% to 70% complete. Typical accuracy ranges for Class 2 estimates are –5% to –15% on the low side, and +5 to +20% on the high side, depending on the technological complexity of the project.

Matrix

Appendix C

FEMA Floodplain Maps

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.

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

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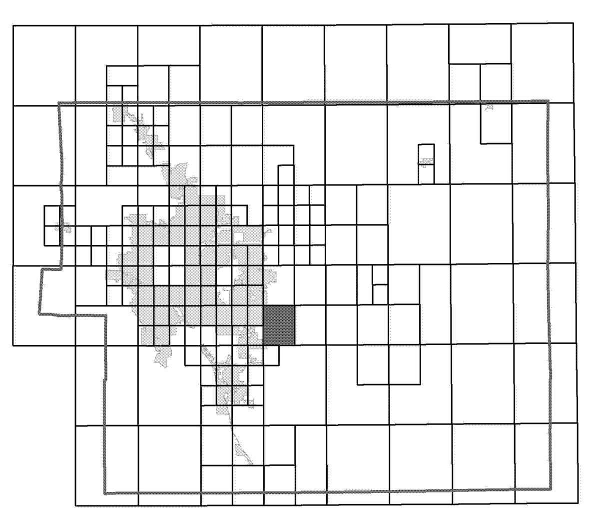
El Paso County Vertical Datum Offset Table

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



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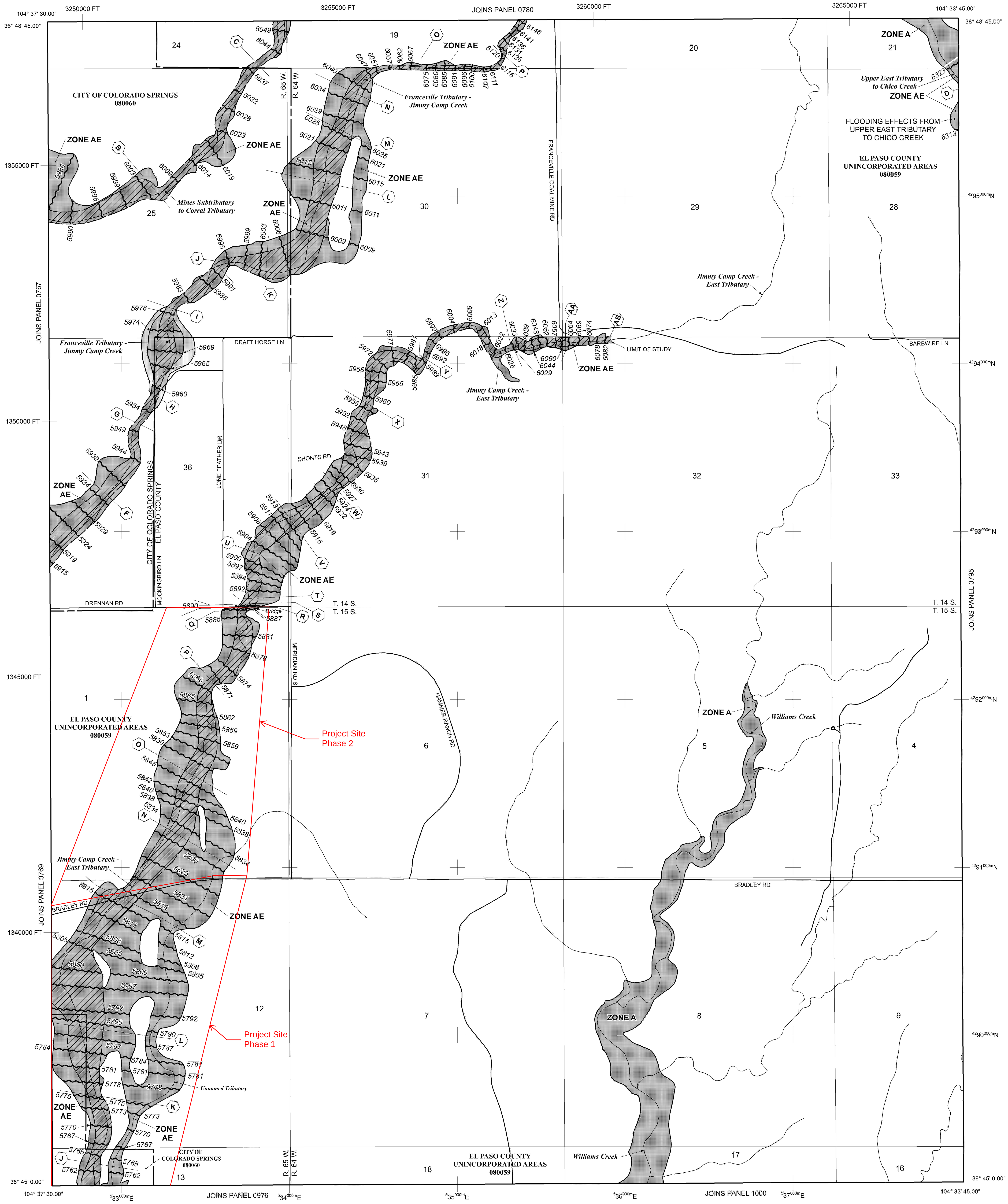

LEGEND

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 0790G

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

PANEL 790 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0790	G
EL PASO COUNTY	080059	0790	G

Notice: This map was reissued on 05/15/2020 to make a correction.This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

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
08041C0790G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

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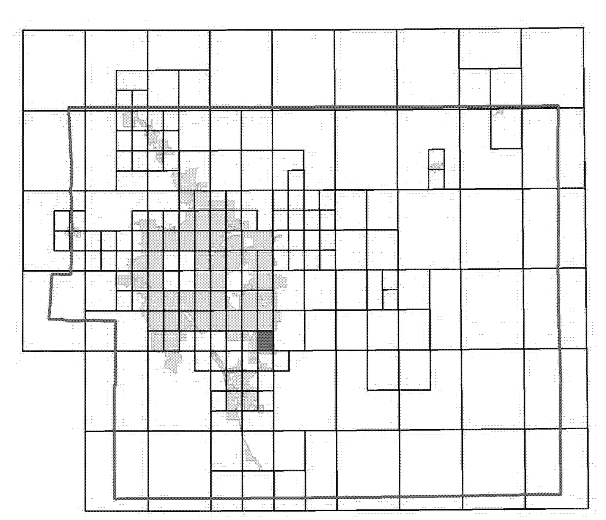

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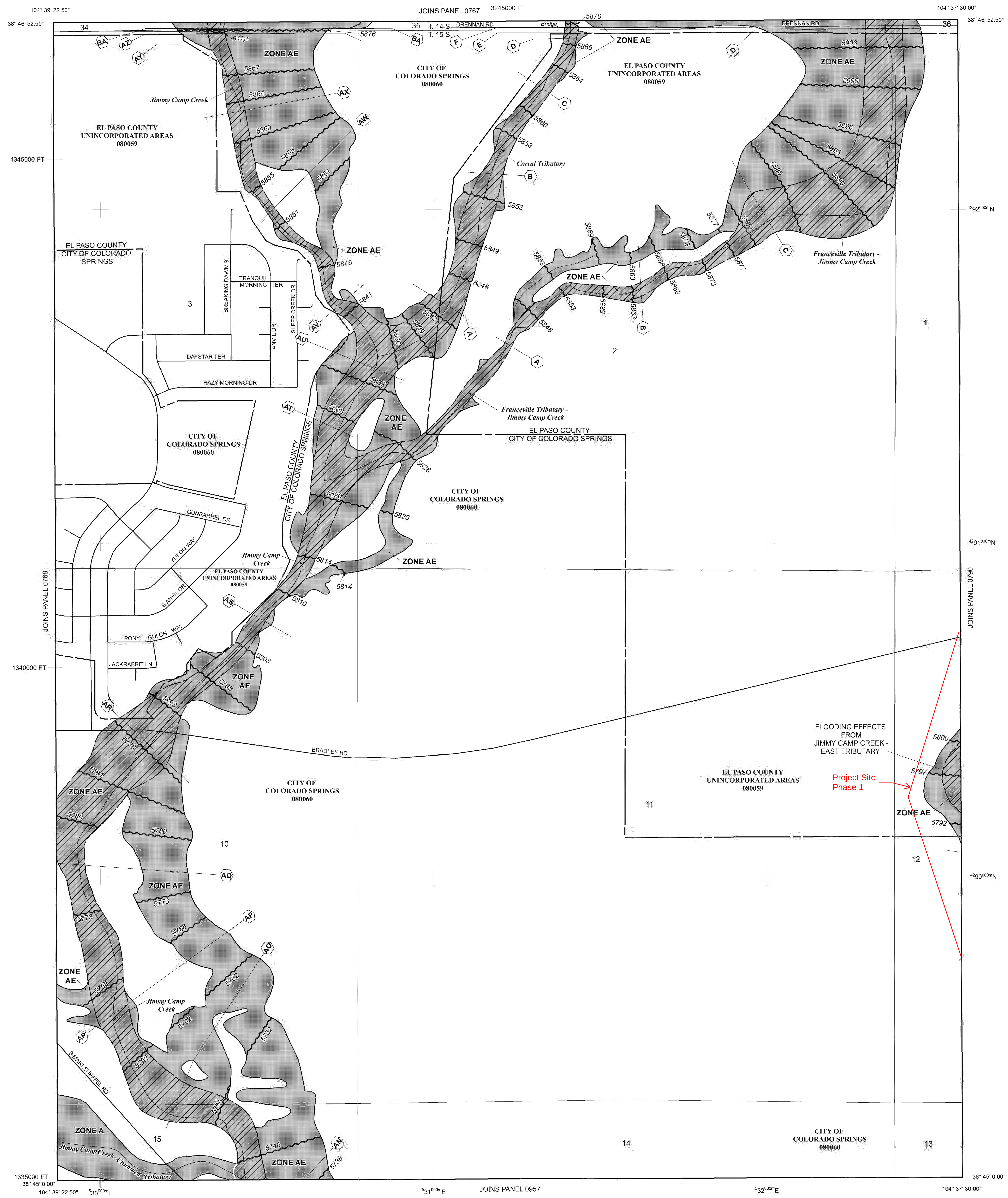

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 14 SOUTH, RANGE 65 WEST, AND TOWNSHIP 15 SOUTH, RANGE 65 WEST.

LEGEND

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

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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" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0769G

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

PANEL 769 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0769	G
EL PASO COUNTY	080059	0769	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
08041C0769G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency
~~~

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.

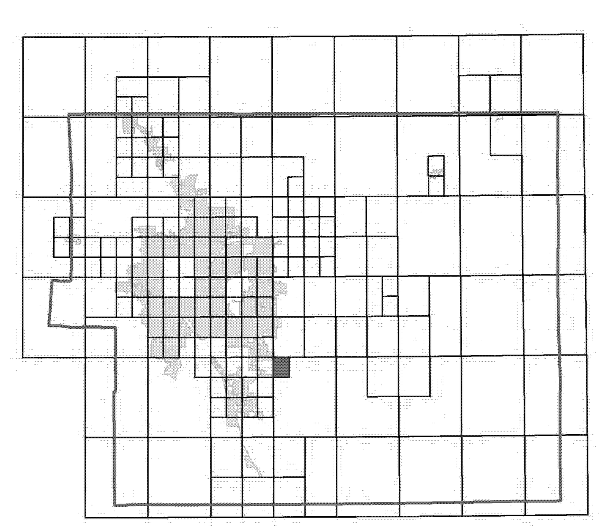
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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

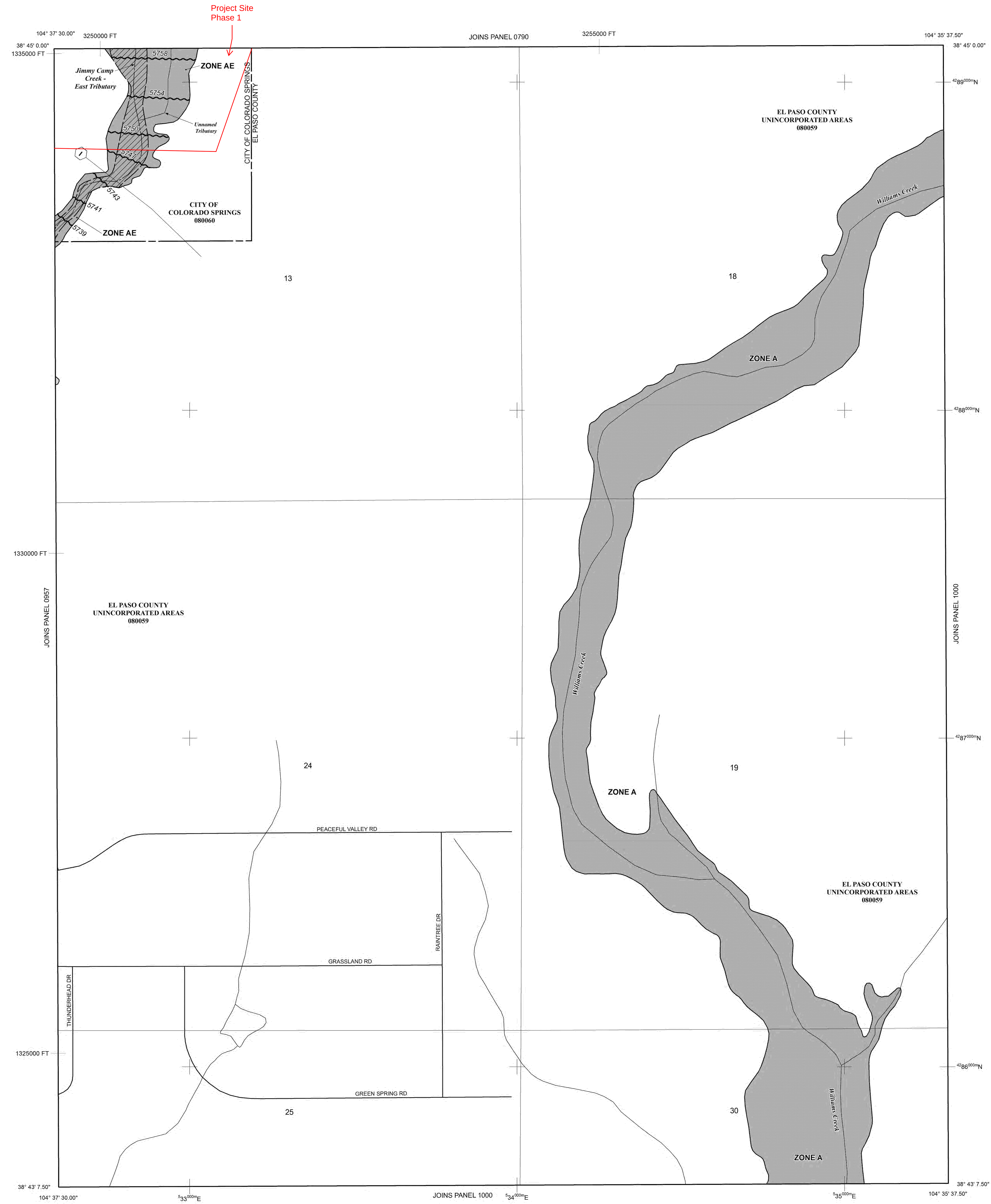
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 15 SOUTH, RANGE 64 WEST, AND TOWNSHIP 15 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)
$^{42}75^{000m}$N	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.

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MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0976G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 976 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0976	G
EL PASO COUNTY	080059	0976	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 08041C0976G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

Appendix D

Wetland Delineation Reports and Jurisdictional Determination

2435 Research Pkwy, Suite 300
Colorado Springs, Colorado 80920
Phone: 719.575.0100
Fax: 719.575.0208
matrixdesigngroup.com

Date: 22 September 2021

To: Tony Martinez, U.S. Army Corps of Engineers

From: Tierney Walsh, Matrix Environmental Services

Subject: Wetland Assessment and Delineation Report – Rolling Hills Development at Jimmy Camp Creek East Tributary, West of S Meridian Road and South of Drennan Road, El Paso County, Colorado

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Mr. Martinez,

On behalf of the Landhuis Company, Matrix Environmental Services, LLC (MES) is pleased to submit this report summarizing the assessment and delineation of wetlands within the Rolling Hills development area (the Site), which is located west of S. Meridian Road and south of Drennan Road in El Paso County, Colorado.

The scope of work for the wetland assessment and delineation included the entire Site, which totals approximately 1,025 acres. Similar plant communities were identified throughout the Site; therefore, the observed plant communities were divided into eight distinct communities with one data sample point collected in each community.

The assessment and delineation field work were conducted May 13-14, 2021 (Communities 1-5) and August 7-8, 2021 (Communities 6-8). Climatic and hydrologic conditions at the Site were drier than average for the time of year during the May assessment due to below-normal rainfall; however, conditions were normal during the August assessment. The wet season in Colorado Springs is between April and September, peaking in July and August.

Community 1 includes the relatively flat area identified as a seasonally flooded, intermittent riverine system by the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), which is unnamed and shown by the USFWS NWI to converge with the Jimmy Camp Creek East Tributary at a point approximately 1.75-miles southwest. Community 1 is dominated by common kochia (*Bassia scoparia*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. Community 1 vegetation also includes minor amounts of groundplum milkvetch (*Astragalus crassicarpus*), lamb's quarters (*Chenopodium album*) and musk thistle (*Carduus nutans*). No hydric soil indicators were observed within the area's sandy clay soils. Additionally, saturation and a water table were not observed within Community 1: soil was dry to a depth of 28 inches. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils and a lack of wetland hydrology.

Community 2 includes a small depression near the eastern boundary of the Site, which is dominated by Russian olive (*Elaeagnus angustifolia*), common kochia (*Bassia scoparia*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. Community 2 vegetation also includes minor amounts of field bindweed (*Convolvulus arvensis*) and Russian thistle (*Salsola tragus*). No hydric soil indicators were observed within the area's sandy clay loam and clay soils. Additionally, saturation and a water table were not observed within Community 2 despite the soil pit being advanced to 42 inches below the ground surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils and a lack of wetland hydrology.

Community 3 includes the drainage swale identified as Jimmy Camp Creek East Tributary, which is dominated by common kochia (*Bassia scoparia*), a grass that was not identifiable at the time of assessment due to the lack of inflorescence and Woods' rose (*Rosa woodsii*). Community 3 vegetation also includes minor amounts of curly dock (*Rumex crispus*) and Russian thistle (*Salsola tragus*). No hydric soil indicators were observed within the area's sandy loam, loamy sand and sand soils. Additionally, saturation and a water table were not observed within Community 3 despite the soil pit being advanced to 52 inches below the ground surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils and a lack of wetland hydrology.

Community 4 includes the relatively flat area identified as a seasonally flooded, intermittent riverine system by the USFWS NWI, which the NWI shows to converge onsite with Jimmy Camp Creek East Tributary. Community 4 is dominated by common kochia (*Bassia scoparia*) and field bindweed (*Convolvulus arvensis*) with minor amounts of lamb's quarters (*Chenopodium album*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. No hydric soil indicators were observed within the area's sandy loam and sandy clay loam soils. Additionally, saturation and a water table were not observed within Community 4 despite the soil pit being advanced to 38 inches below the ground surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of dominance of hydrophytic vegetation, a negative prevalence index, the lack of hydric soils and a lack of wetland hydrology.

Community 5 includes a depression near the eastern boundary of the Site within the area identified as a seasonally flooded, intermittent riverine system by the USFWS NWI. Community 5 is dominated by field bindweed (*Convolvulus arvensis*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. Vegetation in Community 5 also includes minor amounts of lamb's quarters (*Chenopodium album*) and common kochia (*Bassia scoparia*). No hydric soil indicators were observed within the area's sandy clay and sandy loam soils. Additionally, saturation and a water table were not observed within Community 5: soil was dry to a depth of 38 inches. However, oxidized rhizospheres along living roots were detectable within 12 inches of the soil surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils.

Community 6 is approximately 0.18 acres and includes a drainage channel associated with a windmill-powered well south of Bradley Road. Community 6 is dominated by foxtail barley (*Hordeum jubatum*) and common kochia (*Bassia scoparia*) with minor amounts of lamb's quarters (*Chenopodium album*), Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*) and alfalfa dodder (*Cuscuta approximata*). The community had visible surface water in approximately 30% of the area, surface soil cracks, algal mats and oxidized rhizospheres along living roots from 4-12 inches. Additionally, 5% prominent redox concentrations from 4-12 inches satisfy the criteria for redox dark surface. In my professional opinion, this community meets the criteria to be identified as a wetland based on the predominance of hydrophytic vegetation and the observation of hydric soil and wetland hydrology indicators.

Community 7 is located immediately south of Community 6 and includes the southern edge of the drainage channel that forms Community 6. Community 7 is dominated by blue grama (*Bouteloua gracilis*) and common kochia (*Bassia scoparia*) with minor amounts of lamb's quarters (*Chenopodium album*), alfalfa dodder (*Cuscuta approximata*), annual meadow grass (*Poa annua*), proso millet (*Panicum miliaceum*), common sunflower (*Helianthus annuus*) and golden crownbeard (*Verbesina encelioides*). No hydric soil indicators were observed within the area's silty clay loam and sandy loam soils. Additionally, saturation and a water table were not observed within Community 7: soil was dry to a depth of 30 inches. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of dominance of hydrophytic vegetation, a negative prevalence index, lack of hydric soils, and a lack of wetland hydrology indicators.

Community 8 includes the relatively flat area identified as Jimmy Camp Creek East Tributary south of Bradley Road, which the USFWS NWI describes as a seasonally flooded, intermittent riverine system. Community 8 is dominated by blue grama (*Bouteloua gracilis*), lamb's quarters (*Chenopodium album*) and red-root amaranth (*Amaranthus retroflexus*) with minor amounts of pineapple-weed (*Matricaria discoidea*), common kochia (*Bassia scoparia*), golden crownbeard (*Verbesina encelioides*) and curly dock (*Rumex crispus*). No hydric soil indicators were observed within the area's clay loam and silty loam soils. Additionally, saturation and a water table were not observed within Community 8: soil was dry to a depth of 48 inches. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of dominance of hydrophytic vegetation, a negative prevalence index, the lack of hydric soils and a lack of wetland hydrology.

According to the National Resources Conservation Service's Web Soil Survey, most soils within the Site are classified as Sampson loam, except soils within Community 3 which are classified as Ellicott loamy coarse sand. Additionally, portions of the Site are classified as wetlands according to the USFWS NWI map, including communities 1, 3, 4, 5 and 8 which the NWI describes as temporarily or seasonally flooded riverine habitats.

Flags were placed along the boundaries of areas identified as wetlands within the Site, which was limited to Community 6 as indicated in the attached figure.

The professional opinions made in this report regarding the location and extent of areas that do or do not satisfy the criteria of a wetland were determined pursuant to the Army Corps of Engineer's Regional Supplement and appropriate guidance and pursuant to confirmation by appropriate regulatory staff including but not limited to the Army Corps of Engineers.

Please contact Ms. Tierney Walsh at 719-457-5613 or Tierney.Walsh@matrixdesigngroup.com should you have any questions or comments.

Sincerely,

Matrix Environmental Services, LLC

Tierney Walsh

Tierney Walsh

Environmental Scientist

Enclosures:

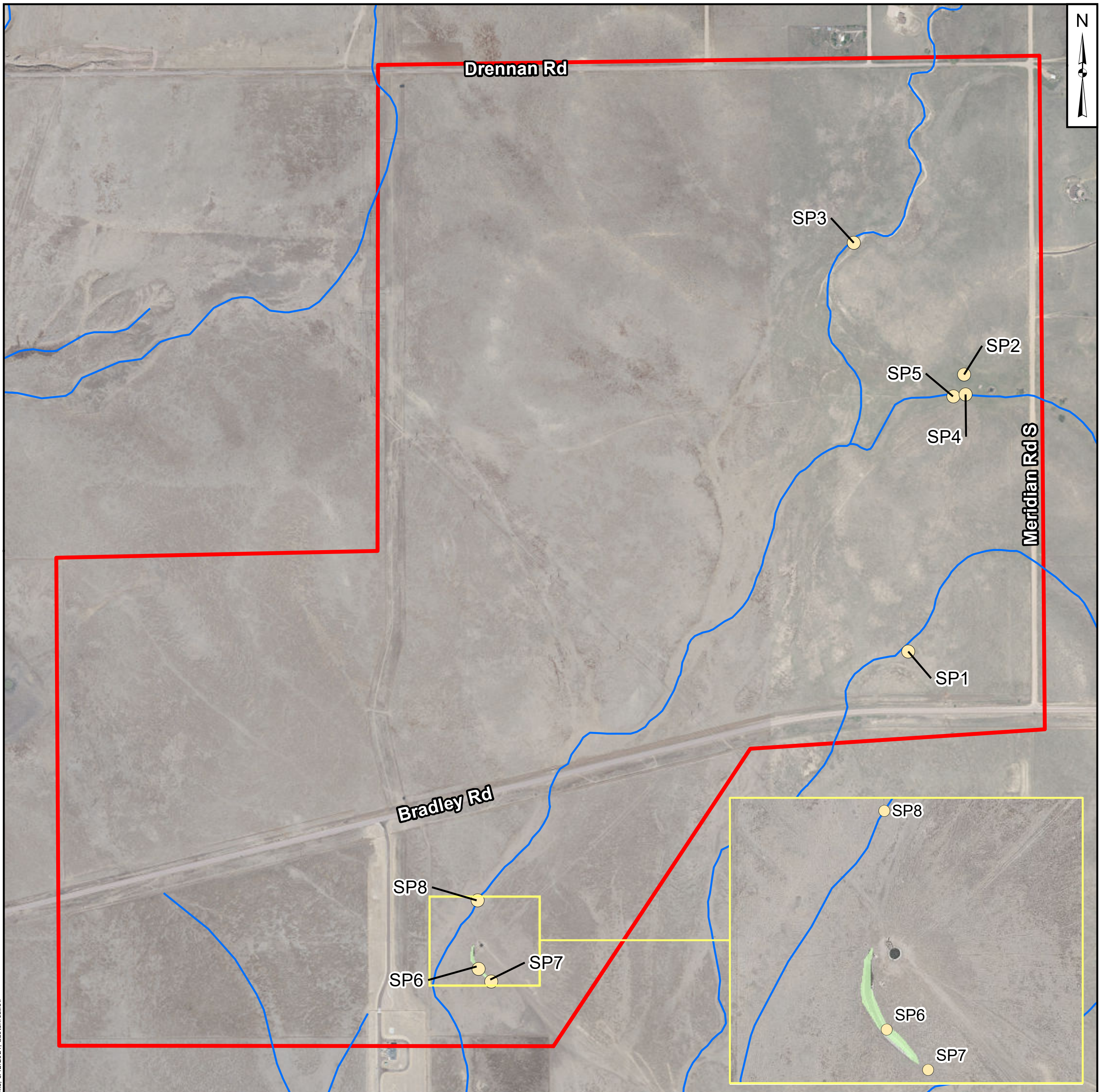
Site Figure

Photolog

Field Data Forms

cc: Mr. Jeff Mark, The Landhuis Company

Figures



Legend

- Sampling Point
- Ephemeral Stream
- Wetland
- Site Boundary

0 1,200 2,400 Feet

Rolling Hills Wetland Delineation

Matrix ENVIRONMENTAL

Figure 1

FILE: G:\gis_projects\MES_RollingHills\active\apps\FigureX_RollingHillsl_WetlandDelineation_2021_08_12_AKC.mxd, 8/12/2021, austen.cutrell

Photolog

Photo Log
Wetland Delineation for Rolling Hills Development
Colorado Springs, Colorado

Photo 1 – Community 1 includes a relatively flat area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit shown in center of foreground.

Photo 2 – Community 1's sandy clay soils didn't exhibit hydric soil indicators. Additionally, saturation and a water table were not encountered despite the soil pit extending to a depth of 28 inches.

Photo 3 – Community 2 includes a small depression near the eastern boundary of the Site. Test pit is in the center of the middle ground.

Photo 4 – Community 2's sandy clay loam and clay soils didn't exhibit hydric soil indicators. Additionally, saturation and a water table were not encountered despite the soil pit extending to a depth of 42 inches.

Photo Log
Wetland Delineation for Rolling Hills Development
Colorado Springs, Colorado

Photo 5 – Community 3 includes the drainage swale identified as Jimmy Camp Creek East Tributary. Test pit is in the center of the foreground.

Photo 6 – Community 3's sandy loam, loamy sand and sand soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 52 inches.

Photo 7 – Community 4 includes a relatively flat area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit is in the center of the middle ground.

Photo 8 – Community 4's sandy loam and sandy clay loam soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 38 inches.

Photo 9 – Community 5 includes a depression near the eastern boundary of the Site within the area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit is on the left in the middle ground.

Photo 10 – Community 5's sandy clay and sandy loam soils didn't exhibit hydric soil indicators; however, oxidized rhizospheres along living roots were detectable within 12 inches of the soil surface.

Photo 11 – Community 6 is approximately 0.18 acres and includes a drainage channel associated with a windmill-powered well south of Bradley Road. Test pit is partially shown in the center of the foreground.

Photo 12 – Community 6's sandy loam soils contained 5% prominent redox concentrations from 4-12 inches, which satisfied the criteria for redox dark surface.

Photo Log
Wetland Delineation for Rolling Hills Development
Colorado Springs, Colorado

Photo 13 – Community 7 includes the southern edge of the drainage channel that forms Community 6. Test pit is in the center of the middle ground.

Photo 14 – Community 7's silty clay loam and sandy loam soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 30 inches.

Photo 15 – Community 8 includes a relatively flat area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit is in the center of the foreground.

Photo 16 – Community 8's clay loam and silty loam soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 48 inches.

Field Forms

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/13/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 1

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): flat w/ NWI trib. boundary Local relief (concave, convex, none): none Slope (%): 0-3%

Subregion (LRR): D Lat: N38.767754 Long: W104.612189 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ✓	**Is the Sampled Area within a Wetland?**	Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓		
Wetland Hydrology Present?	Yes ______	No ✓		

Remarks:
Moderate Drought in area during assessment (Drought.gov)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. unidentifiable grass (no reproductive structures)	60%	Y	NA
2. Bassia scoparia	20%	Y	FAC
3. Astragalus crassicarpus	5%	N	NI
4. Chenopodium album	2%	N	FACU
5. Carduus nutans	2%	N	UPL
6. Senecio crassulus	1%	N	FACU
7.			
8.			
9.			
10.			
11.			
= Total Cover	90%		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 10%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species	20	x 3 =	60
FACU species	3	x 4 =	12
UPL species	2	x 5 =	10
Column Totals:	25 (A)		82 (B)

Prevalence Index = B/A = 3.28

Hydrophytic Vegetation Indicators:

- _ 1 - Rapid Test for Hydrophytic Vegetation
- _ 2 - Dominance Test is >50%
- _ 3 - Prevalence Index is ≤3.0[1]
- _ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- _ 5 - Wetland Non-Vascular Plants[1]
- _ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:
*sampled entire plant community

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-11.5	10YR 2/2	100%					sandy clay	moist.
11.5-20	10YR3/2	99%	10YR5/8	1%			sandy clay	hard, dry
20-28	10YR3/2	98%	10YR5/8	2%	C	M	sandy clay	hard, dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): >28"

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? **Yes** ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/13/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 2

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): D Lat: N 38.774002 Long: W 104.610502 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ✓ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ___	No ✓	
Wetland Hydrology Present?	Yes ___	No ✓	

Remarks:

Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: *)			
1. Elaeagnus angustifolia	90%	Y	FAC
2.			
3.			
4.			
	90%	= Total Cover	
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: *)			
1. Bassia scoparia	20%	Y	FAC
2. unidentifiable grass (warm season bunch grass)	20%	Y	NA
3. Convolvulus arvensis	10%	N	NI
4. Salsola tragus	5%	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	55%	= Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum 45%			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	66%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species	110	x 3 =	330
FACU species	5	x 4 =	20
UPL species		x 5 =	
Column Totals:	115	(A)	350 (B)

Prevalence Index = B/A = 3.04

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- + 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

* sampled entire plant community

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100%					Sandy clay loam	moist
6-13	10YR 2/2	100%					clay	dry, more compact, $CaCO_3$
13-21	10YR 3/2	99%	10YR 3/6	1%	C	PL	clay	moist
21-31	10YR 4/2	50%	~~[illegible]~~				clay	moist, $CaCO_3$.
	10YR 2/2	50%						
31-42	10YR 5/3	98%	10YR 5/8	2%	C	M	loamy sand	moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- — Histosol (A1)
- — Histic Epipedon (A2)
- — Black Histic (A3)
- — Hydrogen Sulfide (A4)
- — Depleted Below Dark Surface (A11)
- — Thick Dark Surface (A12)
- — Sandy Mucky Mineral (S1)
- — Sandy Gleyed Matrix (S4)
- — Sandy Redox (S5)
- — Stripped Matrix (S6)
- — Loamy Mucky Mineral (F1) **(except MLRA 1)**
- — Loamy Gleyed Matrix (F2)
- — Depleted Matrix (F3)
- — Redox Dark Surface (F6)
- — Depleted Dark Surface (F7)
- — Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- — 2 cm Muck (A10)
- — Red Parent Material (TF2)
- — Very Shallow Dark Surface (TF12)
- — Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- — Surface Water (A1)
- — High Water Table (A2)
- — Saturation (A3)
- — Water Marks (B1)
- — Sediment Deposits (B2)
- — Drift Deposits (B3)
- — Algal Mat or Crust (B4)
- — Iron Deposits (B5)
- — Surface Soil Cracks (B6)
- — Inundation Visible on Aerial Imagery (B7)
- — Sparsely Vegetated Concave Surface (B8)
- — Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- — Salt Crust (B11)
- — Aquatic Invertebrates (B13)
- — Hydrogen Sulfide Odor (C1)
- — Oxidized Rhizospheres along Living Roots (C3)
- — Presence of Reduced Iron (C4)
- — Recent Iron Reduction in Tilled Soils (C6)
- — Stunted or Stressed Plants (D1) **(LRR A)**
- — Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- — Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- — Drainage Patterns (B10)
- — Dry-Season Water Table (C2)
- — Saturation Visible on Aerial Imagery (C9)
- + Geomorphic Position (D2)
- — Shallow Aquitard (D3)
- — FAC-Neutral Test (D5)
- — Raised Ant Mounds (D6) **(LRR A)**
- — Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): >42"

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): > 42"

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/13/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 3

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): drainage swale Local relief (concave, convex, none): concave Slope (%): 0-3%

Subregion (LRR): D Lat: N 38.777078 Long: W104.613583 Datum: WGS 84

Soil Map Unit Name: Ellicott loamy coarse sand NWI classification: R4SBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ____ No ✓	

Remarks:
Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: *)			
1. Rosa woodsii	5%	Y	FACU
2.			
3.			
4.			
5.			
= Total Cover	5%		
Herb Stratum (Plot size: *)			
1. unidentifiable grass (no reproductive structures)	40%	Y	NA
2. Bassia scoparia	30%	Y	FAC
3. Rumex crispus	5%	N	FAC
4. Salsola tragus	5%	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	80%		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum 20%			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species		x 1 =
FACW species		x 2 =
FAC species	35	x 3 = 105
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	45 (A)	145 (B)

Prevalence Index = B/A = 3.22

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- – 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:
* sampled entire plant community

Sampling Point: 3

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10 YR 4/2	100%					Sandy loam	
3-12	10YR 4/2	100%					sandy loam	moist.
12-20	10 YR 5/4	99%	10YR 3/6	1%	C	PL	loamy sand	moist
20-33	10 YR 5/4	100%					sand.	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): >52"

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): >52"

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/14/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 4

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): flat w/in trib. boundary Local relief (concave, convex, none): none Slope (%): 0%

Subregion (LRR): D Lat: N38°46.414' Long: W104°36.626 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No ✓		Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present? Yes ____ No ✓		
Wetland Hydrology Present? Yes ____ No ✓		

Remarks:
Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. Bassia scoparia	40%	Y	FAC
2. Convolvulus arvensis	40%	Y	NI
3. Chenopodium album	10%	N	FACU
4. unidentifiable grass (no reproductive structures)	5%	N	NA
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	95%		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 5%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	40	x 3 = 120
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	50 (A)	160 (B)

Prevalence Index = B/A = 3.20

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- 5 - Wetland Non-Vascular Plants[1]
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:
* sampled entire plant community

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/2	100%					sandy loam	dry
3-9.5	10YR 2/2	100%					sandy clay loam	moist.
9.5-38	10YR 2/2	99%	10YR 3/6	1%	C	PL	sandy clay loam	compacted, dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)
__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____
Water Table Present? Yes ____ No ✓ Depth (inches): >38"
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/14/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 5

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0-5

Subregion (LRR): D Lat: 38°46.413N Long: W104°36.647 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		✓
Hydric Soil Present?		✓
Wetland Hydrology Present?	✓	
Is the Sampled Area within a Wetland?		✓

Remarks: Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: * ____)			
1. unidentifiable grass (no reproductive structures)	40%	Y	NA
2. Convolvulus arvensis	20%	Y	NI
3. Chenopodium album	10%	N	FACU
4. Bassia scoparia	10%	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	80%		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 20%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	10	x 3 = 30
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	20 (A)	70 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- – 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: *sampled entire plant community

Sampling Point: 5

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4.5	10YR 2/2						sandy clay	moist
4.5-7.5	10YR 2/2	98%	7.5YR 3/4	2%	C	PL	sandy clay	composite
7.5-11	10YR 2/2	97%	7.5YR 3/4	3%	C	PL	sandy clay	↓
11-19	10YR 2/2	97%	10YR 3/6	3%	C	M	sandy clay	dry
19-21	10YR 3/1	93%	10YR 3/6	7%	C	M	sandy clay	
21-22	10YR 5/4	95%	10YR 3/6	5%	C	M	sandy loam	
22-38	10YR 5/4	100%					sandy loam	dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- + Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- + Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No ✓	Depth (inches): ______
Water Table Present?	Yes ___	No ✓	Depth (inches): >38"
Saturation Present? (includes capillary fringe)	Yes ___	No ✓	Depth (inches): >38"

Wetland Hydrology Present? **Yes** ✓ **No** FBTs

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 8/7/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 6

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S12 T15S R65W

Landform (hillslope, terrace, etc.): drainage channel for onsite well Local relief (concave, convex, none): concave Slope (%): 0-2%

Subregion (LRR): D Lat: N38° 45.642′ Long: W104° 37.478′ Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. Hordeum jubatum	30	Y	FAC
2. Bassia scoparia	30	Y	FAC
3. Chenopodium album	15	N	FACU
4. Cirsium arvense	2	N	FAC
5. Convolvulus arvensis	2	N	NI
6. Cuscuta approximata	2	N	NI
7. Rumex crispus	1	N	FAC
8. Andropogon gerardii	1	N	FACU
9. Helianthus annus	1	N	FACU
10. Verbesina encelioides	1	N	FACU
11.			
= Total Cover	85		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 20%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	63	x 3 = 189
FACU species	18	x 4 = 72
UPL species	0	x 5 = 0
Column Totals:	81 (A)	261 (B)

Prevalence Index = B/A = 3.22

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- + 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

* Sampled entire plant community

Sampling Point: 6

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100					Sandy loam	
4-6	10YR 2/2	97	10YR 3/6	3%	C	PL		Prominent
6-12	10YR 2/2	95	10YR 3/6	5%	C	PL		
12-16	10YR 3/2	98	10YR 3/6	2	C	PL	~~sandy loam~~	
16-22	10YR 3/2	97	10YR 4/6	3%			Sandy Clay	prom.
22-27	10YR 4/2	95	10YR 4/6	5%	C	PL	sandy clay loam	
27-30	10YR 4/2	99	10YR 4/6	1%	C	M	loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- + Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- __ 2 cm Muck (A10)
- __ Red Parent Material (TF2)
- __ Very Shallow Dark Surface (TF12)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks: ≤3/≤2 5% dist/prom redox in upper 12"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- + Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- + Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- + Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- __ Salt Crust (B11)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- + Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Stunted or Stressed Plants (D1) **(LRR A)**
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Saturation Visible on Aerial Imagery (C9)
- + Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)
- __ Raised Ant Mounds (D6) **(LRR A)**
- __ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No __ Depth (inches): 0-11"

Water Table Present? Yes __ No __ Depth (inches): >48 wise

Saturation Present? (includes capillary fringe) Yes __ No __ Depth (inches): >48

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 8/7/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 7

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S12 T15S R65W

Landform (hillslope, terrace, etc.): end of drainage channel. Local relief (concave, convex, none): none-concave Slope (%): 2-3%

Subregion (LRR): D Lat: N 38° 45.625' Long: W 104° 37.456' Datum: WGS 84

Soil Map Unit Name: Sampson Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓		
Wetland Hydrology Present?	Yes ____ No ✓		

Remarks:
No drought at time of assessment in El Paso (drought.gov)

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. Bouteloua gracilis	30%	Y	NI
2. Bassia scoparia	30%	Y	FAC
3. Chenopodium album	20%	N	FACU
4. Cuscuta ~~campestris~~ approximata	10%	N	NI
5. Poa annua	10%	N	FAC
6. Panicum miliaceum	5%	N	NI
7. Helianthus annuus	2%	N	FACU
8. Verbesina encelioides	2%	N	FACU
9. Pascopyrum smithii	1%	N	FACU
10.			
11.			
= Total Cover	110		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	40	x 3 =	120
FACU species	25	x 4 =	100
UPL species	0	x 5 =	0
Column Totals:	65 (A)		225 (B)

Prevalence Index = B/A = 3.46

Hydrophytic Vegetation Indicators:

– 1 - Rapid Test for Hydrophytic Vegetation
– 2 - Dominance Test is >50%
– 3 - Prevalence Index is ≤3.0[1]
– 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:
*Sampled entire plant community

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR2/2	100%					silty clay loam	
9-16	10YR2/2	99%	10YR3/6	1%	C	PL	sandy loam	prom
16-30	10YR2/2	99%	10YR3/6	1%	C	M	clay loam	calcium deposits

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ________

Water Table Present? Yes ___ No ✓ Depth (inches): >30"

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 8/8/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 8

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): ~~flat~~ w/in trib. boundary Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR): D Lat: 38°45.735' Long: W104°37.478' Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓
Hydric Soil Present?	Yes ____	No ✓
Wetland Hydrology Present?	Yes ____	No ✓

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			

Sapling/Shrub Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
= Total Cover			

Herb Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Bouteloua gracilis	50%	Y	NI
2. Chenopodium album	20%	Y	FACU
3. Amaranthus retroflexus	20%	Y	FACU
4. ~~Chamomilla suaveolens~~ Matricaria discoidea BTW	10%	N	~~NI~~ FACU BTW
5. Bassia scoparia	5%	N	FAC
6. Verbesina ~~occidentalis~~ encelioides BTW	3%	N	FACU
7. Rumex crispus	2%	N	FAC
8. Convolvulus arvensis	1%	N	NI
9. Cirsium arvense	1%	N	FAC
10.			
11.			
112 = Total Cover			

Woody Vine Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	8	x 3 = 24
FACU species	53	x 4 = ~~232~~ 212 BTW
UPL species		x 5 =
Column Totals:	61 (A)	236 (B)

Prevalence Index = B/A = 3.87

Hydrophytic Vegetation Indicators:

– 1 - Rapid Test for Hydrophytic Vegetation
– 2 - Dominance Test is >50%
– 3 - Prevalence Index is ≤3.0[1]
– 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– 5 - Wetland Non-Vascular Plants[1]
– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 2/2	100%					clay loam	dry
13-30	10YR 3/2	100%					silty loam	↓
30-48	10YR 3/2	100%					Sandy loam	↓

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1) (**except MLRA 1**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- 2 cm Muck (A10)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (**LRR A**)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (**LRR A**)
- Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): >48"

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): >48"

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Request for Approved Jurisdictional Determination for Rolling Meadows El Paso County, Colorado

Prepared for:

Pueblo U.S. Army Corps of Engineers, Regulatory Field Office
201 West 8th Street, Suite 350
Pueblo, CO 81003

On Behalf of:

The Landhuis Company
212 N Wahsatch Ave #301
Colorado Springs, CO, 80903

Prepared by:

Matrix
Excellence by Design

707 17th Street, Suite 3150
Denver, CO 80202
Contact: Justin Apfel

December 13, 2022

Table of Contents

Appendices

To whom this may concern,

Matrix Design Group, Inc. (Matrix) is submitting this request for an Approved Jurisdictional Determination (AJD) on behalf of the Landhuis Company for aquatic resources associated with six unnamed drainages on the Rolling Meadows property (Property) located in El Paso County, Colorado. The Property is approximately 1,869 acres and is located south of Drennan Road and north of the Grand Mountain School. Matrix visited the Property on October 12, 2022 and December 5, 2022, to evaluate the characteristics of the unnamed drainages and their potential connection to downstream waters subject to Clean Water Act (CWA) Section 404 jurisdiction. In the following request, we provide background on the Property location, field methodology, and details on the characteristics of the unnamed drainages and our evaluation of the potential jurisdictional status of aquatic resources on the Property. Please refer to the figures in Appendix A for a depiction of the Property and representative images in Appendix B.

1.0 Location

The Property is approximately 1,869-acres and is located southeast of Colorado Springs, approximately 3.5 miles southeast of the Colorado Springs Airport. The Property is situated within Section 1, 12 and 13, Township 15 South, and Range 65 West. The approximate center of the primary drainage feature, Unnamed Drainage 1, within the Property is in UTM Zone 13S, NAD83; 533224.33m E, 4290806.97m N; Latitude 38.764447, Longitude -104.617576; U.S. Geological Survey (USGS) Colorado Springs, CO Quadrangle. The Property is located within Hydrologic Unit Code (HUC) 11020303, an approximately 928 square mile watershed. Based on National Weather Service 30-year precipitation data, Colorado Springs receives 15.91 inches of annual precipitation on average with 13.14 inches per year as rain and 2.77 inches per year as snow.

Bradley Road runs east to west through the approximate center of the Property and two unnamed drainage features are conveyed under the road through culverts. The Property is currently undeveloped and has historically been used for grazing.

2.0 Project Applicant and Consultant

2.1 Applicant

The Landhuis Company
Jeff Mark
212 N. Wwahsatch Ave, Suite 301
Colorado Springs, CO 80903
jmark@landhuisco.com
(719) 635-3200

2.2 Consultant

Matrix Design Group, Inc.
Justin Apfel
707 17th Street, Suite 3150
Denver, CO 80202
justin.apfel@matrixdesigngroup.com
(757) 817-4267

3.0 Assessment Methods

Matrix staff originally visited a portion of the Property on May 13-14 and August 7-8, 2021, to evaluate the characteristics and potential surface or subsurface connections of one drainage located in the northern section of the Property, north of Bradley Road. The methodology and results of the original site visit can be found in the Wetland Assessment and Delineation Report in Appendix D. Matrix conducted additional site visits on October 12, 2022, and December 5, 2022 to evaluate the characteristics and potential surface or subsurface connections of the six unnamed drainages located throughout the Property to known or expected CWA jurisdictional Waters of the U.S. (WOTUS). Prior to conducting field-based assessments, Matrix reviewed current and historic aerial imagery (Google Earth, 2022), current and historic USGS topographic maps, National Oceanic and Atmospheric Administration National Weather Service Weather

Forecast Office (NOAA, 2022), Natural Resources Conservation Service Web Soil Survey (Figure 5; NRCS, 2022), and US Fish and Wildlife Service (USFWS) National Wetlands Inventory and US Geological Survey (USGS) National Hydrography Dataset (Figure 4; NHD and NWI; USGS, 2022 and USFWS, 2022).

Drainage features were evaluated to characterize areas with defined bed and bank and identify manmade or natural breaks in the drainage features, if present, to determine if a hydrologic connection existed with downstream WOTUS. Matrix evaluated potential wetlands using the United States Army Corps of Engineers (USACE) 1987 Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coasts Region (Version 2.0) (Regional Supplement) (USACE, 2008a).

During the field investigation, plant species were recorded to assess vegetation communities, the area was inspected for indicators of wetland hydrology, and the soils were inspected for indicators of hydric conditions. The 2020 National Wetland Plant List (NWPL) website, Version 3.2 (Lichvar, et al., 2020) was used to determine the indicator status of plant species. Taxonomy of plant species follows Lichvar, et al. (2016) and the NRCS PLANTS Database (United States Department of Agriculture [USDA] NRCS, 2017). At those sites where the vegetation, soil, and hydrology criteria were met, the site was identified as a wetland and categorized following suggestions of Cowardin, et al. (1979).

4.0 Results

4.1 Background Review

Based on the historic aerials and topographic maps, there are no obvious or significant land use or topology changes since the earliest aerial imagery record of 1999 (Google, 2022). According to the National Wetland Inventory and National Hydrology Database, six drainages extend through the Property. All six drainages are shown as intermittent streams on the USGS Corral Bluffs and Fountain NE quadrangles and by the NHD (USGS 2022). The USFWS NWI classifies the drainages as Riverine – Intermittent, Streambed Temporarily Flooded (R4SBA; USFWS 2020).

4.2 Land Use

The land use within the Property is primarily undisturbed grasslands with small patches of upland scrub/shrub communities. A housing development exists southwest of the Property with undisturbed grasslands in all other directions.

4.3 Aquatic Resources

Six unnamed drainages (Unnamed Drainage 1, Unnamed Drainage 2, Unnamed Drainage 3, Unnamed Drainage 4, Unnamed Drainage 5, and Unnamed Drainage 6) are located on the larger 1,869-acre Property. Small depressional features and a detention basin with an earthen dam were also observed on the Property during the site visit. Vegetation, hydrology, and soils throughout the Property are described in greater detail in the following sections.

4.3.1 Vegetation

Two distinct vegetation communities were observed within the Property: upland grasslands within the drainage channels and adjacent uplands and Palustrine Emergent Wetlands (PEM) associated with small depressional features. A riparian corridor was not observed surrounding the drainages within the Property. The vegetation community in the uplands extended into the drainage features and was mostly comprised of upland species. The wetland vegetation community types are based on the Cowardin, et al. (1979) classification system (Cowardin, 1979). Please refer to Appendix B for representative photographs of the vegetation observed within the Property.

Vegetation within the Property has been practically undisturbed by the lack of access and activities within the Property. The drainage channels are almost entirely vegetated with upland species, except for the small depressions. The dominant species within the drainage channels include blue grama (*Bouteloua gracilis*, No Indicator [NI]), western wheatgrass (*Pascopyrum smithii*, Facultative Upland [FACU]), and kochia (*Bassia scoparia*, Facultative [FAC]). Only subtle differences in dominate vegetation species were observed between the drainage channels and adjacent uplands which were dominated by blue grama, fetid marigold (*Dyssodia papposa*, NI), winterfat (*Krascheninnikovia lanata*, NI), and rubber rabbitbrush (*Ericnameria nauseosa*, NI). Depressional features observed within the property are sparsely vegetated with a narrow emergent fringe. Dominant species within the depressions include mountain rush (*Juncus arcticus* ssp. *littoralis*, Facultative Wetland [FACW]), vine mesquite (*Panicum* obtusum, FACU), common spikerush (*Eleocharis palustris,* Obligate [OBL]), barnyardgrass (*Echinochloa crus-galli*, FAC), and Pennsylvania smartweed (*Persicaria pennsylcanicum*, FACW).

4.3.2 Hydrology

The East Fork of Jimmy Camp Creek is an ungauged tributary to the mainstem of Jimmy Camp Creek (JCC). The proposed project is located 1.6 miles from the confluence of JCC and the East Fork of JCC. JCC is considered ephemeral from its headwaters to its crossing at Link Rd, over 3 miles south of the confluence with East Fork JCC. The closest stream gauge in the basin is located on JCC, 1.5 miles upstream of the confluence with Fountain Creek and measures an average flow between 1 and 3 CFS (Kiowa 2015).

Hydrologic studies have been conducted to determine the flows along the East Fork of JCC. Matrix reviewed the effective Federal Emergency Management Agency (FEMA) Flood Insurance Maps (FIS), the 2015 Drainage Basin Planning Study (DBPS), a 2013 memo on low flow estimation for the basin, and Matrix's internal regional regression equations. There are significant inconsistencies between each of these hydrologic studies. A revised study is currently underway for the basin, but the data is not available at this time.

Review of aerial imagery and field observations confirmed the location and extents of all six unnamed drainages, which traverse through the center of the Property and one detention basin, which included a ponding area behind an earthen dam. No culvert connection or overflow structure was observed along the earthen dam during the site visit; however, a vegetated drainage channel was observed downstream of the dam which confluences with Unnamed Drainage 1. No standing water was observed in the detention basin during the site visit. Based on NHD mapping, all drainage headwaters originate east of the Property (Figure 4), and flow, if present, would be conveyed from the northeast to the southwest across the Property, and adjacent lands, before converging with an intermittent stream, Jimmy Camp Creek, east of Marksheffel Road. Fountain Creek is the closest naturally occurring, year-round flowing feature with a continuous ordinary high-water mark (OHWM). It is approximately 13 river miles and approximately 6.5 aerial miles from the downstream end of the Property. The drainages are generally situated within a relatively flat grassland with gentle slopes from east to the southwest and within the mapped 100-year floodplain. The surrounding landscape is typical of the region, with rolling hills dominated by prairie grassland species. Annual precipitation values for the El Paso County based on 20-year averages (2002 through 2022) are 15.27 inches of rainfall, within the month of October (NOAA, 2022).

At the time of the field assessment, potential flow indicators (e.g., water-stained leaves, drift lines, sediment deposits) within the drainage were not observed and no evidence of recent flows were noted. No surface water, flowing or stagnant, was observed within the drainage channels at the time of the site visit. The drainage channels are fully vegetated and do not contain a defined bed and bank. These drainage channels are largely driven by topographic changes over the landscape, but do not receive flows frequently enough to create OHWM indicators or a defined bed and bank. The unnamed drainages are wide and deep (roughly 40 feet wide and greater than four feet deep), but poorly defined. Several small, actively eroding head cuts were observed along the drainage channels; however, the channel was not well defined upstream or downstream of the head cuts and remained vegetated. The drainages were almost completely vegetated with no defined bed and bank or OHWM. The channels lack consistency and connectivity throughout the Property. OHWM forms can be found in Appendix C.

Several pocket depressions throughout the unnamed drainages support 26 areas of isolated wetlands, including hydrophytic vegetation, hydric soils, and indicators of wetland hydrology. No concentrated flow paths were observed on the downstream ends of the depressions and depressions may sever flows to downstream drainage features in normal years. These depressions were delineated in the field and are shown in Table 1 and on Figure 7A and Figure 7B. Wetland determination forms can be referenced in Appendix C. Though flows were not recently evident in the channel or at the time of the site assessment, nor were they observed on aerial imagery, it is believed that the drainages collect surface runoff from adjacent hillslopes and roadways in addition to direct precipitation. Based on field and aerial imagery observations, it is our professional opinion that the flow regime of the unnamed drainages may best be described as ephemeral, and largely driven by stormwater and overland flows. Table 1 describes the aquatic features found within the Property.

Table 1. Aquatic Resources Within the Property

Name	Flow Frequency	Flows to	Proximity	More info Needed	Size: Length, width, square feet
Drainage 1	< 3 mo/yr	Jimmy Camp Creek		Yes	13,963 ft, ~40ft wide
Drainage 2	< 3 mo/yr	Jimmy Camp Creek		Yes	918 ft, ~20ft wide
Drainage 3	< 3 mo/yr	Jimmy Camp Creek		Yes	3,795 ft, ~40ft wide
Drainage 4	< 3 mo/yr	Jimmy Camp Creek		Yes	1,305 ft, ~15ft wide
Drainage 5	< 3 mo/yr	Jimmy Camp Creek		Yes	5,243 ft, ~25ft wide
Drainage 6	< 3 mo/yr	Jimmy Camp Creek		Yes	15,586 ft, ~40ft wide
Total Drainage Length within Property					**40,810 ft**
Wetland 1		Drainage 1	Abutting	Yes	957.23
Wetland 2		Drainage 1	Abutting	Yes	342.50
Wetland 3		Drainage 1	Abutting	Yes	7,014.58
Wetland 4		Drainage 1	Abutting	Yes	1,004.73
Wetland 5		Drainage 1	Abutting	Yes	393.88
Wetland 6		Drainage 1	Abutting	Yes	854.68
Wetland 7		Drainage 1	Abutting	Yes	2,745.70
Wetland 8		Drainage 1	Abutting	Yes	2,128.62
Wetland 9		Drainage 1	Adjacent	Yes	753.57
Wetland 10		Drainage 1	Abutting	Yes	3,186.88
Wetland 11		Drainage 6	Abutting	Yes	5,130.13
Wetland 12		Drainage 1	Abutting	Yes	1,668.00
Wetland 13		Drainage 1	Abutting	Yes	13175.83
Wetland 14		Drainage 6	Abutting	Yes	8,955.15
Wetland 15		Drainage 6	Abutting	Yes	4,240.34
Wetland 16		Drainage 1	Abutting	Yes	366.75
Wetland 17		Isolated – no outlet	Isolated	Yes	22,173.98
Wetland 18		Drainage 1	Abutting	Yes	1,397.86
Wetland 19		Drainage 6	Abutting	Yes	686.02
Wetland 20		Drainage 1	Abutting	Yes	455.03
Wetland 21		Drainage 1	Abutting	Yes	638.37
Wetland 22		Drainage 1	Adjacent	Yes	1,686.31
Wetland 23		Drainage 1	Adjacent	Yes	397.35
Wetland 24		Drainage 1	Abutting	Yes	1,857.29
Wetland 25		Drainage 1	Abutting	Yes	1,596.11
Wetland 26		Isolated – no outlet	Isolated	Yes	2,702.99
Total Wetlands in Property					86,509.88 sf / 1.99 ac

4.3.3 Soils

Based on the NRCS Web Soil Survey for El Paso County, Nevada (NRCS, 2022), the Property contains eight mapped soil units (Figure 5). Descriptions of the mapped soil types are provided below.

- Ascalon sandy loam, 1 to 3 percent slopes – Ascalon sandy soils are well drained with low runoff potential and moderately high to high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).
- Ascalon sandy loam, 3 to 9 percent slopes – Ascalon sandy soils are well drained with medium runoff potential and moderately high to high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).
- Manzanst clay loam, 0 to 3 percent slopes – Manzanst clay soils are well drained and moderately low to moderately high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).
- Nelson-Tassel fine sandy loam, 3 to 18 percent slopes – Nelson-Tassel fine sandy soils are well drained with medium runoff potential and moderately low to moderately high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).
- Razor-Midway complex – Razor-Midway complex soils are well drained with medium runoff potential and moderately low to moderately high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).
- Sampson loam, 0 to 3 percent slopes – Sampson loam soils are well drained with low runoff potential and moderately high to high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).
- Tassel fine sandy loam, 3 to 18 percent slopes –Tassel fine sandy soils are well drained with medium runoff potential and moderately high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).
- Olnest sandy loam, 0 to 3 percent slopes – Olnest sandy loam soils are well drained with low runoff potential and moderately high to high permeability. Based on the national hydric soils list, this soil is not classified as hydric in El Paso County, Colorado (NRCS, 2022).

At the time of the field assessment, soil pits were sampled in various depressions and upland areas, to determine hydric soil indicators. Soils within the pocket depressions tended to be moist, dark in color, with redox depressions throughout the soil profile and upland soil samples tended to be lighter in color, dry and crumbly, with no hydric indicators.

5.0 Wildlife

The Property likely provides habitat for small mammals (rabbits, voles, mice, etc.) and larger mammals such as mule deer, pronghorn, and coyotes. Six pronghorns were observed within the Property during the site visit but were not seen using the detention basin or small depressional wetland features, likely because these features did not contain any water. Active prairie dog colonies were also observed on portions of the Property. The Property does not contain habitat for federally listed threatened or endangered species.

6.0 Significant Nexus Evaluation

In implementing the 2008 Rapanos guidance for non-navigable tributaries that are not relatively permanent, Matrix assessed all six unnamed drainages for physical indicators of flow – bed and bank, and OHWM indicators– to identify signs of a direct surface connection, or in absence, to determine if the drainage contributes to the chemical, physical, or biological functions to downstream waters, thus meeting the definition of a “significant nexus.” From our field evaluations and review of historic Google Earth imagery, the unnamed drainages do not appear to support a continuous hydrologic connection between upstream and downstream channel segments. It is assumed that much of the precipitation that falls on the Property infiltrates in the undeveloped uplands, while small amounts likely reach the drainage channels as surface runoff. Wetlands were observed in isolated depressional features and may be supported by runoff and direct precipitation. The lack of sufficient duration and volume of flows within the channel may preclude development of in-channel and adjacent wetlands. There is a lack of evident flows within the channel and no defined channel, bed and bank, or OHWM indicators. Based on these observations, Matrix believes that channel flows within the drainage do not connect to lower sections of the drainage in a normal year and the drainages only contain water during major storm events. Further, Matrix believes that flows within the drainages are infrequent and driven by major storm events, and that consequently the drainage may contribute insubstantially to the chemical, physical, and biological integrity of a downstream navigable water.

7.0 Discussion

Matrix evaluated the Property for the presence, location, and extent of aquatic resources and, reviewed available data sources to assist USACE in making a jurisdictional determination. Following field evaluations and review of available aerial imagery, Matrix identified six unnamed drainage features on the Property. The Landhuis Company requests an approved JD of the unnamed drainages, as described above. Please let us know if you need any additional information to complete your review and make this determination. I can be reached at: justin.apfel@matrixdesigngroup.com or 757-817-4267.

Sincerely,

Justin Apfel

Ecologist, Matrix Design Group, Inc.

8.0 References

Cowardin, L. M., et al. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior. U.S. Government Printing Office, Washington, D.C.

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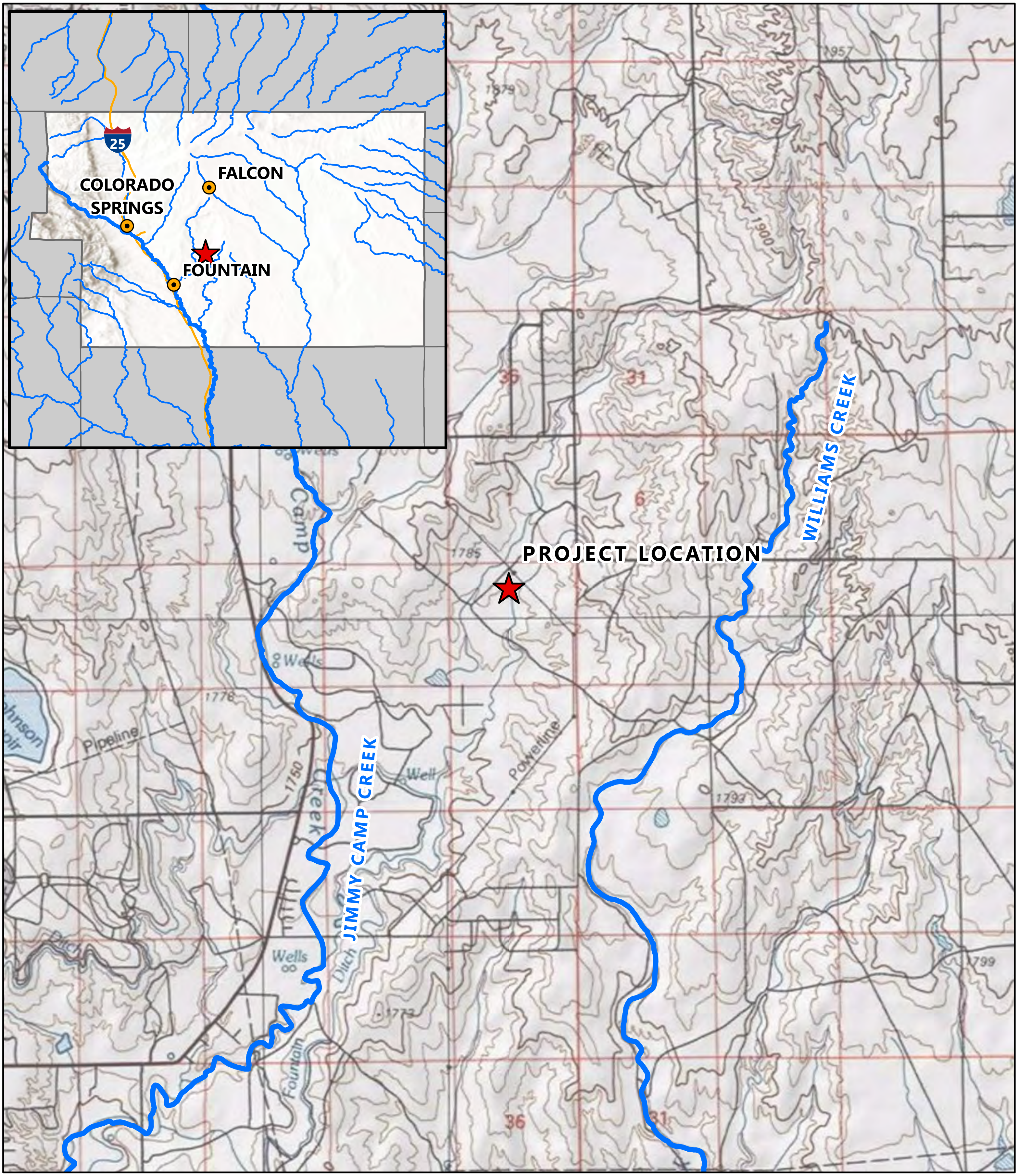
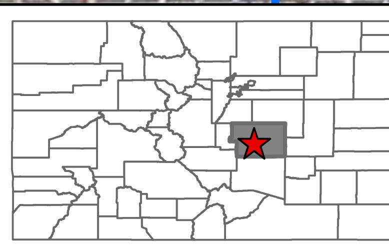
Appendix A: Figures



ROLLING MEADOWS
FIGURE 1: VICINITY MAP



N

Mile
0 0.5 1

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): USGS, ESRI

Matrix

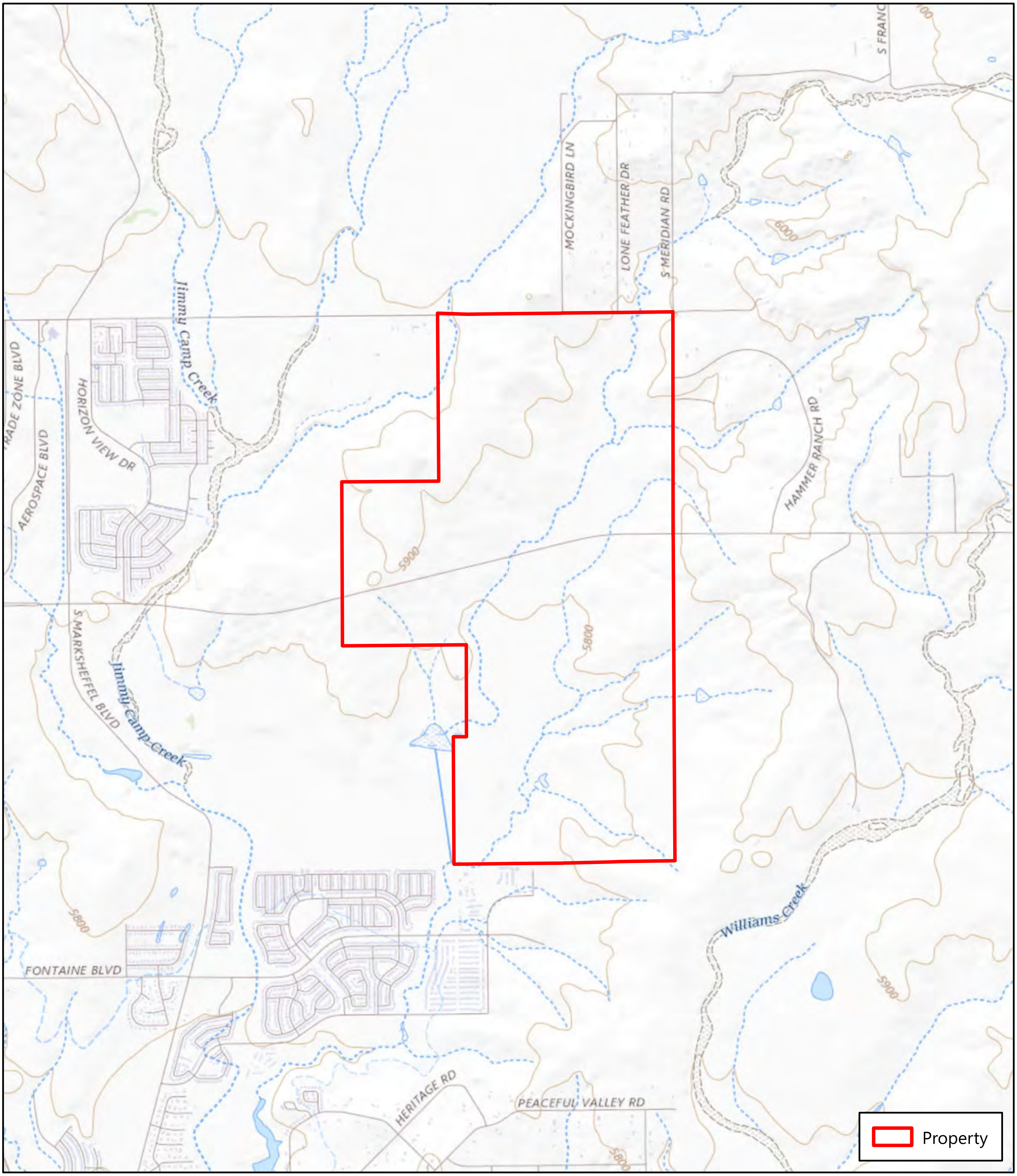
ROLLING MEADOWS
FIGURE 2: PROPERTY

N

0 500 1,000 Feet

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): ESRI

Matrix

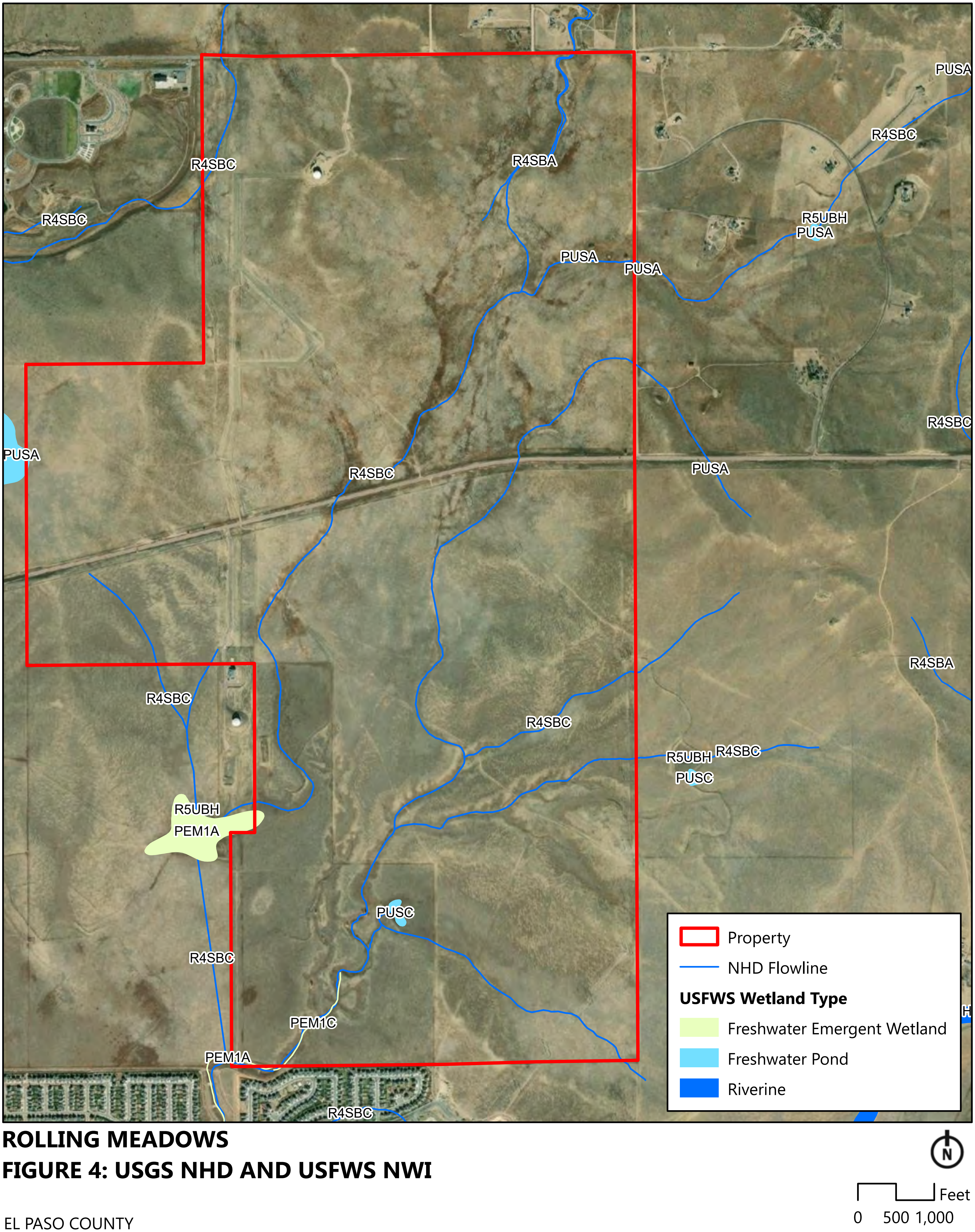


ROLLING MEADOWS
FIGURE 3: TOPOGRAPHIC MAP

0 1,500 3,000 Feet

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): ESRI, USGS

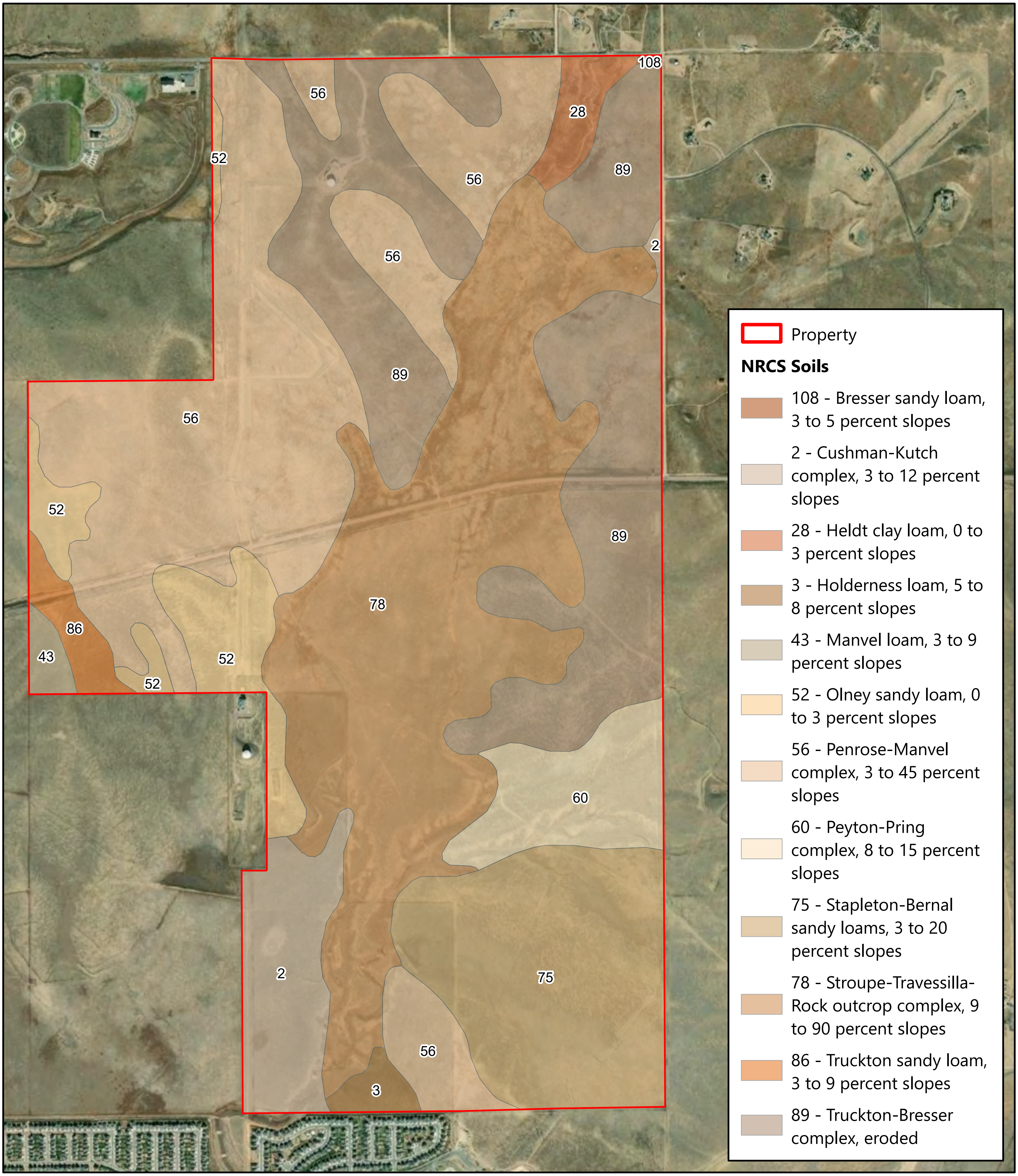
Matrix



ROLLING MEADOWS
FIGURE 4: USGS NHD AND USFWS NWI

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): ESRI, USGS, USFWS

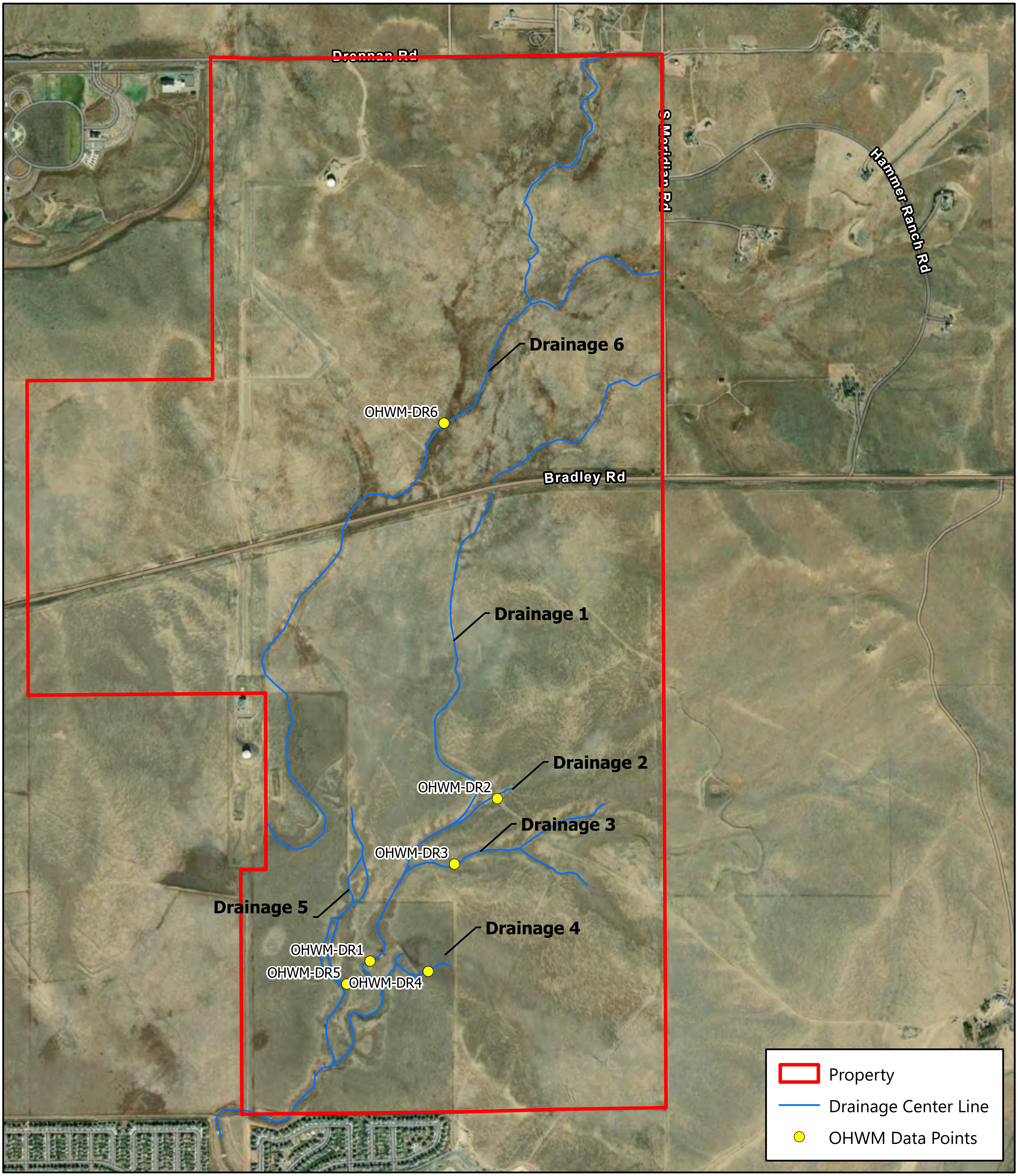
Matrix



ROLLING MEADOWS
FIGURE 5: NRCS SOILS

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): ESRI, NRCS

Matrix

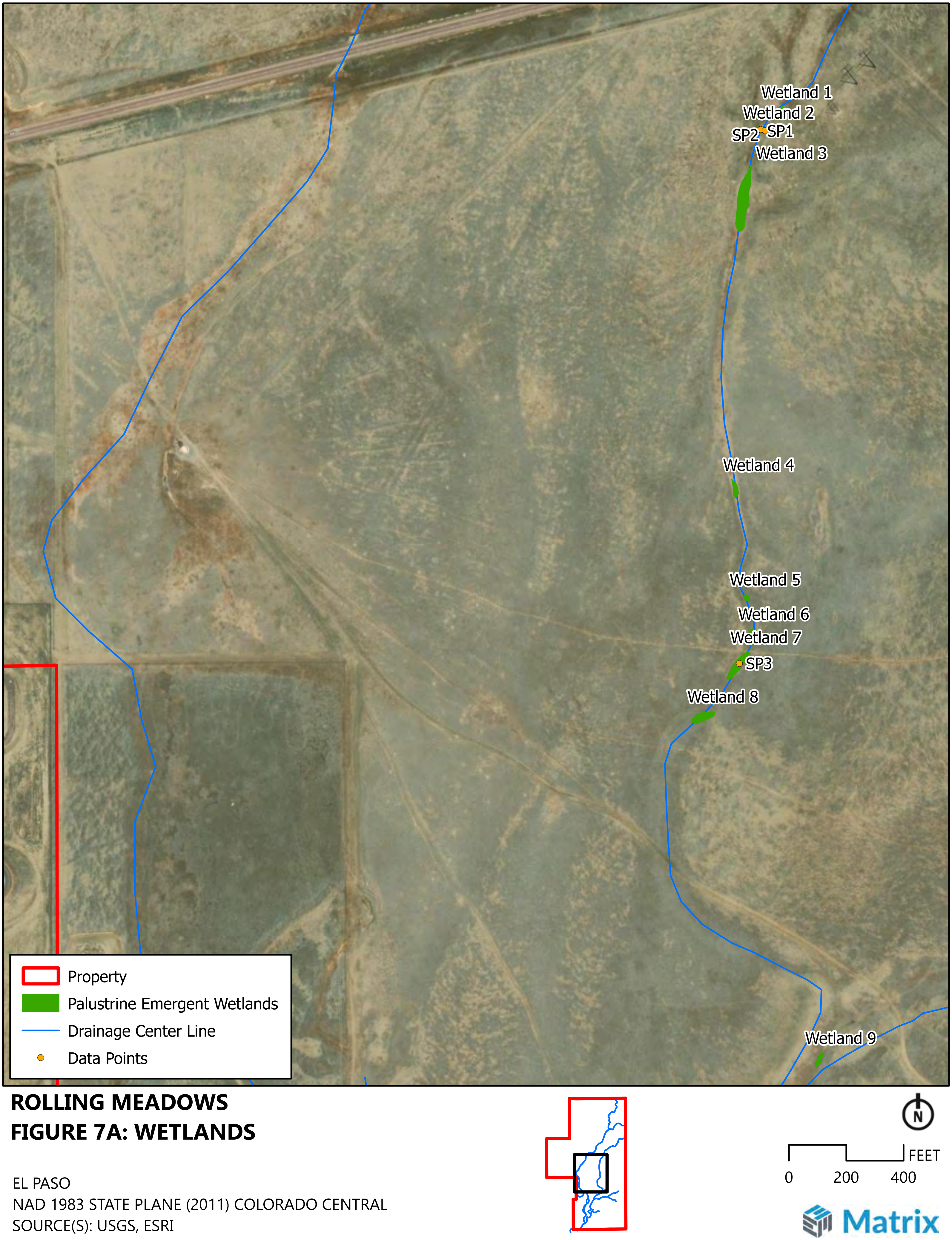


ROLLING MEADOWS

FIGURE 6: SITE FEATURES

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): ESRI

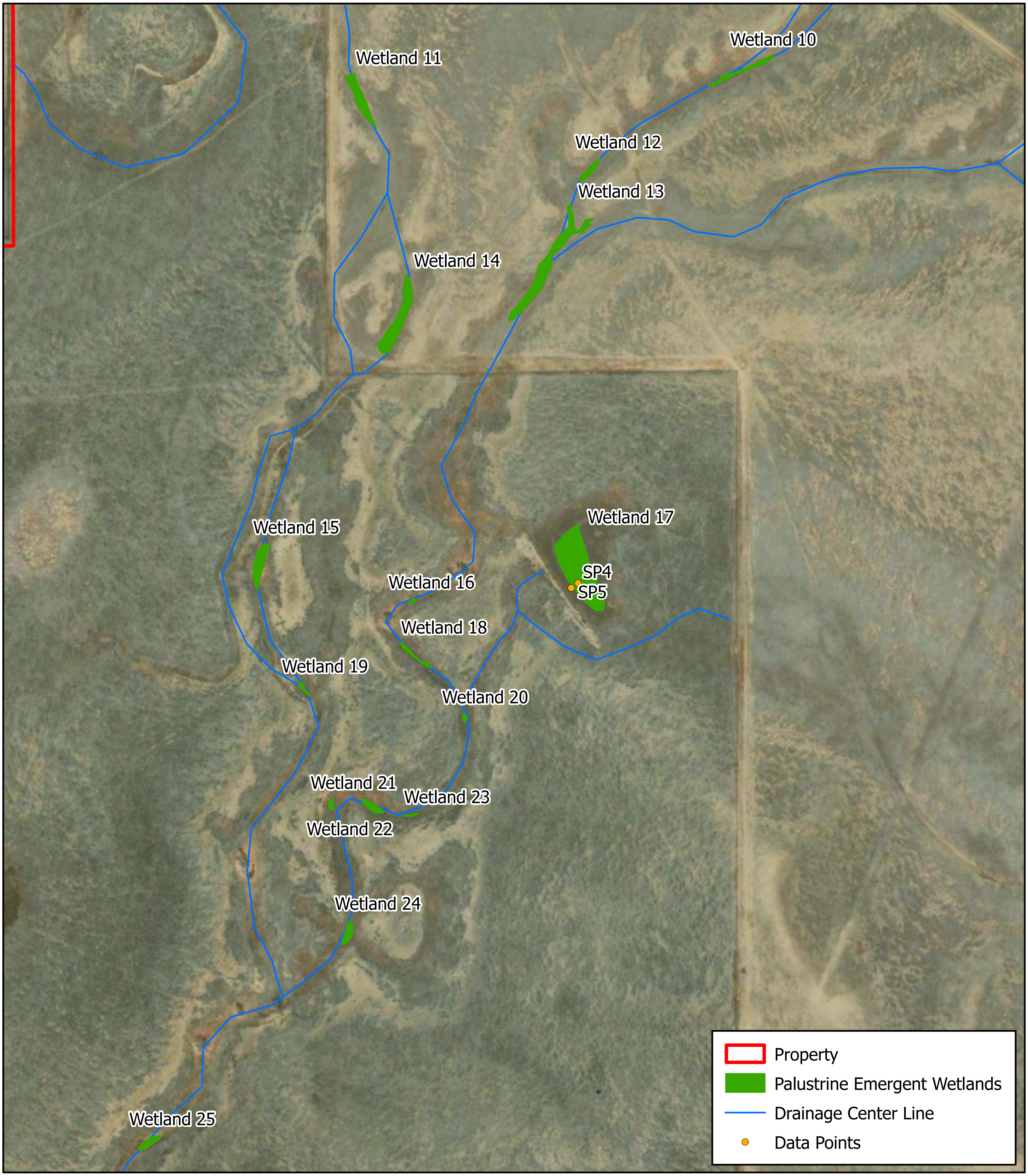
Matrix



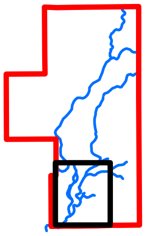
ROLLING MEADOWS
FIGURE 7A: WETLANDS

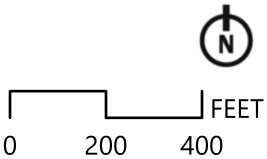
EL PASO
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): USGS, ESRI

Matrix



ROLLING MEADOWS
FIGURE 7B: WETLANDS





EL PASO
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): USGS, ESRI

Matrix

Appendix B: Representative Images

Photo 1: Standing at the northern side of the Property, looking north, towards the culvert crossing.

Photo 2: Standing away from the northern side of the Property, looking north, towards the culvert crossing.

Photo 3: Representative photo of the channel within the northern section of the Property.

Photo 4: Representative photo of the lack of channel connectivity, throughout the drainage.

Photo 5: Representative of fully vegetated channel, near the center of the Property.

Photo 6: Representative photo of an isolated depression within the channel.

Photo 7: Representative photo of the top soil within the isolated depressions.

Photo 8: Representative photo of an earthen dam, dividing the channel.

Photo 9: Depression within the channel.

Photo 10: Standing in the channel, facing northwest, on the southern end of the Property.

Photo 11: Representative photo of the channel on the south end of the Property.

Photo 12: Representative photo of a rock structure within the channel, near the south end of the Property.

Photo 13: Representative photo of the upland soil profile, throughout the Property.

Photo 14: Representative photo of the isolated wetland depressional soil profile, throughout the Property.

Appendix C: Wetland Determination and OHWM Forms

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region** See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Rolling Meadows City/County: Colorado Springs Sampling Date: 10/12/22

Applicant/Owner: The Landhuis Company State: CO Sampling Point: SP1

Investigator(s): S. O'Brien and J. Apfel Section, Township, Range: 12, 15S, 65W

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1-3

Subregion (LRR): LRR E Lat: 38.7642625 Long: -104.6174996 Datum: NAD 83

Soil Map Unit Name: Stroupe-Travessilla-Rock outcrop complex, 9 to 90 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area**	
Hydric Soil Present?	Yes X	No X	**within a Wetland?**	**Yes** X **No** ___
Wetland Hydrology Present?	Yes X	No ___		

Remarks:
Disconnected PEM wetland depression within the channel.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 10 sq ft)			
1. *Echinochloa crus-galli*	85	Yes	FAC
2. *Pascopyrum smithii*	5	No	FACU
3. *Salsola kali*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95	=Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		=Total Cover	
% Bare Ground in Herb Stratum 5			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	85	x 3 =	255
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	95 (A)		295 (B)

Prevalence Index = B/A = 3.11

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:
Almost completely barnyeard grass

SOIL

Sampling Point: SP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10yr 3/1	96	2.5yr 4/8	4			Loamy/Clayey	Dry on top/moist on bottom

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ 1 cm Muck (A9) **(LRR D, G)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(LRR A, E)**
___ Iron-Manganese Masses (F12) **(LRR D)**
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: None
Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:
Redox throughout. Dry on the surface, compact and moist from 6" and below.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Large surface cracks within depression within drainage area.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region** See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Rolling Meadows City/County: Colorado Springs Sampling Date: 10/12/22

Applicant/Owner: The Landhuis Company State: CO Sampling Point: SP2

Investigator(s): S. O'Brien and J. Apfel Section, Township, Range: 12, 15S, 65W

Landform (hillside, terrace, etc.): Slight hillslope Local relief (concave, convex, none): none Slope (%): 2-5

Subregion (LRR): LRR E Lat: 38.7642678 Long: -104.6174788 Datum: NAD 83

Soil Map Unit Name: Stroupe-Travessilla-Rock outcrop complex, 9 to 90 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?** **Yes** ___ **No** X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:
Paired point to SP1_WET, taken adjacent to depressional feature.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 10 sq ft)			
1. *Cirsium undulatum*	69	Yes	FACW
2. *Dyssodia papposa*	10	No	UPL
3. *Bouteloua gracilis*	10	No	UPL
4. *Pascopyrum smithii*	5	No	FACU
5. *Centaurea diffusa*	4	No	UPL
6. *Salsola kali*	2	No	FACU
7.			
8.			
9.			
10.			
11.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		=Total Cover	
% Bare Ground in Herb Stratum ___			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	69	x 2 =	138
FAC species	0	x 3 =	0
FACU species	7	x 4 =	28
UPL species	24	x 5 =	120
Column Totals:	100 (A)		286 (B)

Prevalence Index = B/A = 2.86

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks:
None. Upland.

SOIL

Sampling Point: SP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10yr 4/3	100					Loamy/Clayey	Dry and blocky

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ 1 cm Muck (A9) **(LRR D, G)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(LRR A, E)**
___ Iron-Manganese Masses (F12) **(LRR D)**
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: None
Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:
None. Upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
X Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
X FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
None. Upland

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Rolling Meadows City/County: Colorado Springs Sampling Date: 10/12/22

Applicant/Owner: The Landhuis Company State: CO Sampling Point: SP3

Investigator(s): S. O'Brien and J. Apfel Section, Township, Range: 12, 15S, 65W

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): LRR E Lat: ___ Long: ___ Datum: NAD 83

Soil Map Unit Name: Stroupe-Travessilla-Rock outcrop complex, 9 to 90 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:
Depressional feature. No defined channel leading up to or exiting the depression. No water in depression at the time of the site visit.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 10 sq ft)			
1. *Juncus arcticus*	20	Yes	FACW
2. *Echinochloa crus-galli*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	30	=Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		=Total Cover	
% Bare Ground in Herb Stratum 70			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	30 (A)		70 (B)

Prevalence Index = B/A = 2.33

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:
Depression with hydrophytic vegetation.

SOIL

Sampling Point: SP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10yr 5/3	100					Sandy	Dry and blocky
2-12	10yr 2/1	98	10yr 3/6	2	C	M	Loamy/Clayey	Faint redox
12-16	10yr 4/2	100					Loamy/Clayey	No redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ 1 cm Muck (A9) **(LRR D, G)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(LRR A, E)**
___ Iron-Manganese Masses (F12) **(LRR D)**
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: None

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
X Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
X FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? Yes ___ No X Depth (inches): ___
(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No water in depression at the time of the site visit, but likely holds water from overland flow during storm events.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region** See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Rolling Meadows City/County: Colorado Springs Sampling Date: 10/12/22

Applicant/Owner: The Landhuis Company State: CO Sampling Point: SP4

Investigator(s): S. O'Brien and J. Apfel Section, Township, Range: 13, 15S, 65W

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1-3

Subregion (LRR): LRR E Lat: 38.7500779 Long: -104.6198798 Datum: NAD 83

Soil Map Unit Name: Stapleton-Bernal sandy loams, 3 to 20 percent slopes NWI classification: PEM (isolated)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___	**Is the Sampled Area**	
Hydric Soil Present? Yes X No ___	**within a Wetland?**	**Yes** X **No** ___
Wetland Hydrology Present? Yes X No ___		

Remarks:
Disconnected PEM wetland retention pond, with dam. Visible on ariel and on the NWI layer as a wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 10 sq ft)			
1. *Potentilla norvegica*	32	Yes	FAC
2. *Bassia scoparia*	5	No	FAC
3. *Chenopodium album*	3	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40	=Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		=Total Cover	
% Bare Ground in Herb Stratum 60			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	37	x 3 =	111
FACU species	3	x 4 =	12
UPL species	0	x 5 =	0
Column Totals:	40 (A)		123 (B)

Prevalence Index = B/A = 3.08

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:
Problimatic vegetation due to pond, dam, and likely heavy salt content within soil

SOIL

Sampling Point: SP4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10yr 4/1	100				PL/M	Loamy/Clayey	Dry
1-12	10yr 3/2	85	10yr 4/6	15		PL/M	Loamy/Clayey	Moist
12-18	10yr 3/2	98	10yr 4/6	2		PL/M	Loamy/Clayey	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ 1 cm Muck (A9) **(LRR D, G)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR A, E)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: None

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:
Moist with redox throughout. Dry and blocky

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- X Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? Yes ___ No X Depth (inches): ___
(includes capillary fringe)

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Ponging. No Draiange or connecter to main channel.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region
See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Rolling Meadows City/County: Colorado Springs Sampling Date: 10/12/22
Applicant/Owner: The Landhuis Company State: CO Sampling Point: SP5
Investigator(s): S. O'Brien and J. Apfel Section, Township, Range: 13, 15S, 65W
Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 10-15
Subregion (LRR): LRR E Lat: 38.7500484 Long: -104.6199312 Datum: NAD 83
Soil Map Unit Name: Stapleton-Bernal sandy loams, 3 to 20 percent slopes NWI classification: Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks:
Upland point

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 10 sq ft)			
1. *Salsola*	35	Yes	FACU
2. *Helianthus annuus*	8	No	FACU
3. *Convolvulus arvensis*	7	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50	=Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		=Total Cover	
% Bare Ground in Herb Stratum 50			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	50 (A)		200 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks:
None. Hillside to the pond

SOIL

Sampling Point: SP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10yr 4/1	60	7.5yr 5/8	40	C	M	Loamy/Clayey	Dry and blocky
6-16	10yr 3/1	90	10yr 4/6	10	C	M	Loamy/Clayey	Dry and blocky

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ 1 cm Muck (A9) **(LRR D, G)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
X Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(LRR A, E)**
___ Iron-Manganese Masses (F12) **(LRR D)**
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: None
Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Upland. Pond hillside. Wet when filled.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
None. Hillside

Project: Rolling Hills
Project Number: 21.1129.009
Stream: Drainage 1
Investigator(s): S O'Brien and J. Apfel

Date: 10/12/2022 **Time: 9:45**
Town: CO Springs **State: CO**
Photo begin file# **Photo end file#**

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: Located just south of Bradely Rd
Datum:
Coordinates: 38.749935, -104.621694

Notes: OHWM is not present throughout the entire channel corridor. Present in several locations throughout the channel right-of-way.

Brief site description: Fully vegetated drainage feature, with topographic breaks on both sides. OHWM and other hydrology indicators, not consistent throughout the channel corridor.

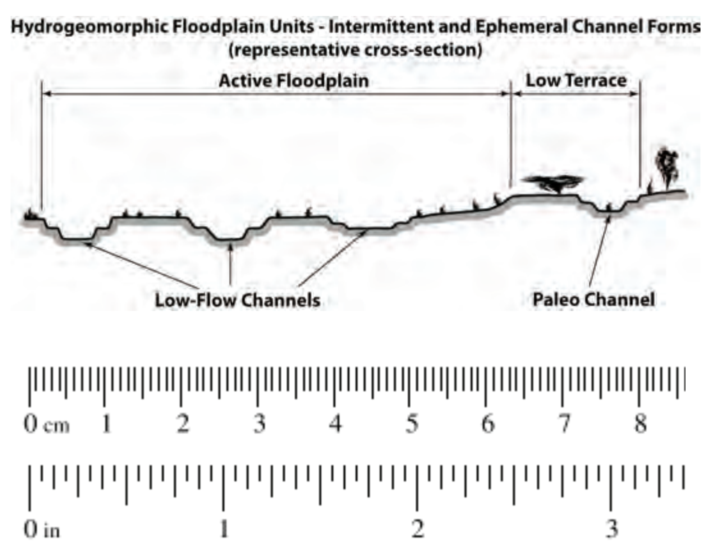
Checklist of resources (if available):

☒ Aerial photography
Dates:
☒ Topographic maps
Scale:
☐ Geologic maps
☒ Vegetation maps
☒ Soils maps
☐ Rainfall/precipitation maps
☐ Existing delineation(s) for site
☐ Global positioning system (GPS)
☐ Other studies

☐ Stream gage data
Gage number:
Period of record:
☐ Clinometer / level
☐ History of recent effective discharges
☐ Results of flood frequency analysis
☐ Most recent shift-adjusted rating
☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Millimeters (mm)	Inches (in)	Wentworth size class	
		Boulder	Gravel
10.08	256	Cobble	Gravel
2.56	64	Pebble	Gravel
0.157	4	Granule	Gravel
0.079	2.00	Very coarse sand	Sand
0.039	1.00	Coarse sand	Sand
0.020	0.50	Medium sand	Sand
1/2 0.0098	0.25	Fine sand	Sand
1/4 0.005	0.125	Very fine sand	Sand
1/8 0.0025	0.0625	Coarse silt	Silt
1/16 0.0012	0.031	Medium silt	Silt
1/32 0.00061	0.0156	Fine silt	Silt
1/64 0.00031	0.0078	Very fine silt	Silt
1/128 0.00015	0.0039	Clay	Mud



☒	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
☒	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: _Silt__ Total veg cover: __80__ % Tree: __0__ Shrub: __0__% Herb: __80__% % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Western wheat (*Pascopyrum smithii*), Field bindweed (*Convolvulus arvensis*), Kochia (*Bassia scoparia*) Other: ☒ _No bed and bank for low flow channel____ ☒ _No evidence of recent flows____ ☐ ____ ☐ ____
☒	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: ☐ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☒ Other: Change in slope ☐ Other:____
☒	**Continue walking the channel cross-section. Record observations below.** Characteristics of the low-flow channel: Average sediment texture: __Silt ____ Total veg cover: __70_ % Tree: __0__% Shrub: __0_% Herb: _70_% Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Western wheat (*Pascopyrum smithii*), Field bindweed (*Convolvulus arvensis*), Kochia (*Bassia scoparia*), Blue grama (*Bouteloua gracilis*) Other: ☒ Depressional features within drainage (sparsley vegetated)____ ☐ ____ ☐ ____ ☐ ____

[X]	**Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.** Characteristics used to delineate the active floodplain/ low terrace boundary: ☐ Change in average sediment texture ☐ Change in total veg cover ☐ Tree ☐ Shrub [X] Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris [X] Other: _No Change ___________________ ☐ Other: _________________________________
[X]	**Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.** Consistency of indicators used to delineate the active floodplain/low terrace boundary: Y ☐ N [X] Change in average sediment texture Y [X] N ☐ Change in total veg cover ☐ Tree [X] Shrub [X] Herb Y [X] N ☐ Change in overall vegetation maturity Y [X] N ☐ Change in dominant species present Y [X] N ☐ Other: Y ☐ N [X] Presence of bed and bank Y ☐ N [X] Drift and/or debris Y [X] N ☐ Other: _Slope (Slightly)_____ Y ☐ N ☐ Other: ____________________
[X]	**If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**
[X]	**Continue walking the channel cross-section. Record characteristics of the low terrace.** Characteristics of the low terrace: Average sediment texture: Silt________________ Total veg cover: __75_ % Tree: __0__ Shrub: __20_% Herb: __55_% % Community successional stage: ☐ NA [X] Mid (herbaceous, shrubs, saplings) ☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Western wheat (*Pascopyrum smithii*), Field bindweed (*Convolvulus arvensis*), Kochia (*Bassia scoparia*), Blue grama (*Bouteloua gracilis*), Yellow bush lupine (*Lupinus arboreus*), Rabbit brush (*Ericameria nauseosa*) Other: ☐ ____________________ ☐ ____________________ ☐ ____________________ ☐ ____________________
[X]	**If characteristics used to delineate the active floodplain/low terrace boundary were deemed reliable, acquire boundary.** Active floodplain/low terrace boundary acquired via: [X] Mapping on aerial photograph [X] GPS ☐ Digitized on computer ☐ Other: ______________________________

Project: Rolling Meadows **Project Number: 21.1129.009** **Stream: Drainage 2** **Investigator(s): Seymone O'Brien**	**Date: 12/6/2022** **Time: 1pm** **Town: Colorado Springs** **State: CO** **Photo begin file#** **Photo end file#**
Y [X] / N [ ] Do normal circumstances exist on the site? Y [ ] / N [X] Is the site significantly disturbed?	**Location Details: Tributary to drainage 1, located on the east side of the project area.** **Datum:** **Projection:** **Coordinates:** 38.755488, -104.61603

Notes: Discontinuous stream channel. Very shallow and completely dry without evidence of recent flows.

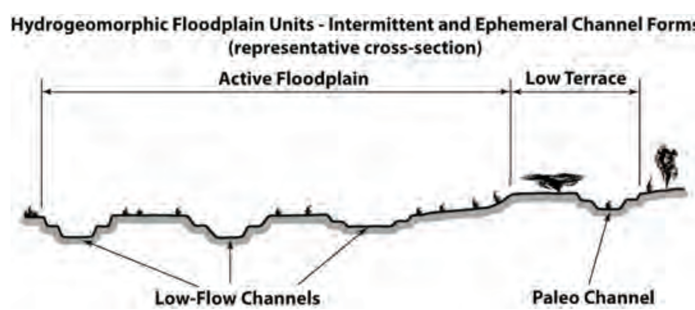
Brief site description: Fully vegetated drainage. Contributes to the main drainage 1, within the Project Area.

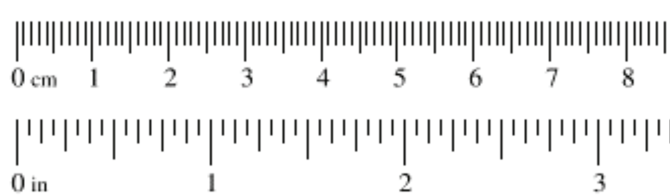
Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
  Scale:
- [ ] Geologic maps
- [X] Vegetation maps
- [X] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] Clinometer / level
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Millimeters (mm)		Inches (in)	Wentworth size class	
			Boulder	Gravel
	10.08	256		
			Cobble	
	2.56	64		
			Pebble	
	0.157	4		
			Granule	
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	
	0.020	0.50		
			Medium sand	
1/2	0.0098	0.25		
			Fine sand	
1/4	0.005	0.125		
			Very fine sand	
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	0.031		
			Medium silt	
1/32	0.00061	0.0156		
			Fine silt	
1/64	0.00031	0.0078		
			Very fine silt	
1/128	0.00015	0.0039		
			Clay	Mud





[X]	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
[X]	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sandy-loam/Clay Total veg cover: 80 % Tree: 0 % Shrub: 0 % Herb: 80 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*), crested wheatgrass (*Agropyron cristatum*) Other: ☐ No bed and bank for low flow channel ☐ No evidence of recent flows ☐ ☐
[X]	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: ☐ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present No Change ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☐ Other: ☐ Other:
[X]	**Continue walking the channel cross-section. Record observations below.** Characteristics of the low-flow channel: Average sediment texture: Clay Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*), crested wheatgrass (*Agropyron cristatum*) Other: ☐ ☐ ☐ ☐

[X]	**Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.** Characteristics used to delineate the active floodplain/ low terrace boundary: ☐ Change in average sediment texture ☐ Change in total veg cover ☐ Tree ☐ Shrub [X] Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☐ Other: ______ ☐ Other: ______ No Change
[X]	**Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.** Consistency of indicators used to delineate the active floodplain/low terrace boundary: Y ☐ N [X] Change in average sediment texture Y ☐ N [X] Change in total veg cover ☐ Tree ☐ Shrub ☐ Herb Y ☐ N [X] Change in overall vegetation maturity Y ☐ N [X] Change in dominant species present Y ☐ N [X] Other: Y ☐ N ☐ Presence of bed and bank Y ☐ N ☐ Drift and/or debris Y ☐ N ☐ Other: ______ Y ☐ N ☐ Other: ______
[X]	**If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**
[X]	**Continue walking the channel cross-section. Record characteristics of the low terrace.** Characteristics of the low terrace: Average sediment texture: Clay Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) [X] Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*), crested wheatgrass (*Agropyron cristatum*) Other: ☐ ______ ☐ ______ ☐ ______ ☐ ______
☐	**If characteristics used to delineate the active floodplain/low terrace boundary were deemed reliable, acquire boundary.** Active floodplain/low terrace boundary acquired via: ☐ Mapping on aerial photograph ☐ GPS ☐ Digitized on computer ☐ Other: ______

Project: Rolling Meadows **Project Number: 21.1129.009** **Stream: Drainage 3** **Investigator(s): Seymone O'Brien**	**Date: 12/6/2022** **Time: 1pm** **Town: Colorado Springs** **State: CO** **Photo begin file#** **Photo end file#**
Y [X] / N [ ] Do normal circumstances exist on the site? Y [ ] / N [X] Is the site significantly disturbed?	**Location Details: North side of the Project Area.** **Datum:** **Projection:** **Coordinates:** 38.753248, -104.617944

Notes: Discontinuous stream channel. Very shallow and completely dry without evidence of recent flows.

Brief site description: Fully vegetated drainage. Within the eastern section of the Project Area.

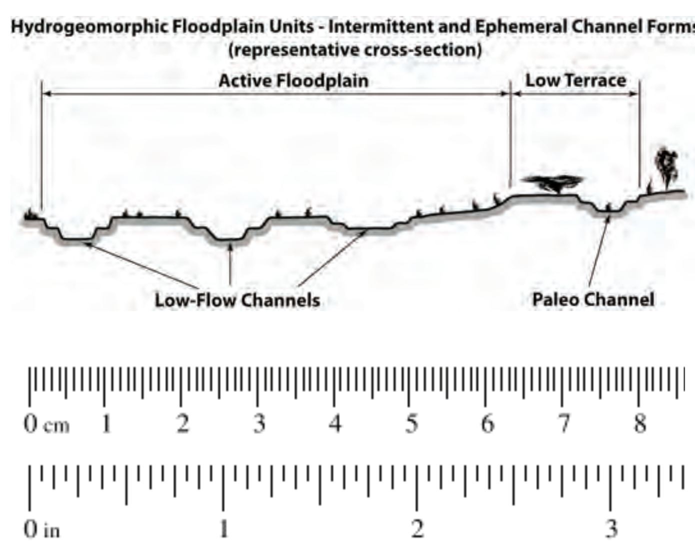
Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
  Scale:
- [ ] Geologic maps
- [X] Vegetation maps
- [X] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] Clinometer / level
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Millimeters (mm)		Inches (in)	Wentworth size class	
			Boulder	Gravel
	10.08	256		
			Cobble	
	2.56	64		
			Pebble	
	0.157	4		
			Granule	
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	
	0.020	0.50		
			Medium sand	
1/2	0.0098	0.25		
			Fine sand	
1/4	0.005	0.125		
			Very fine sand	
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	0.031		
			Medium silt	
1/32	0.00061	0.0156		
			Fine silt	
1/64	0.00031	0.0078		
			Very fine silt	
1/128	0.00015	0.0039		
			Clay	Mud



☒	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
☒	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sandy-loam/Clay Total veg cover: 80 % Tree: 0 % Shrub: 0 % Herb: 80 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*) Other: ☒ No bed and bank or low flow channel ☒ No evidence of recent flows ☐ ☐
☒	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: ☐ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present No Change ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☐ Other: ☐ Other:
☒	**Continue walking the channel cross-section. Record observations below.** Characteristics of the low-flow channel: Average sediment texture: Clay Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*) Other: ☐ ☐ ☐ ☐

[X]	**Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.** Characteristics used to delineate the active floodplain/ low terrace boundary: ☐ Change in average sediment texture ☐ Change in total veg cover ☐ Tree ☐ Shrub [X] Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☐ Other: ______ ☐ Other: ______ No Change
[X]	**Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.** Consistency of indicators used to delineate the active floodplain/low terrace boundary: Y ☐ N [X] Change in average sediment texture Y ☐ N [X] Change in total veg cover ☐ Tree ☐ Shrub ☐ Herb Y ☐ N [X] Change in overall vegetation maturity Y ☐ N [X] Change in dominant species present Y ☐ N [X] Other: Y ☐ N ☐ Presence of bed and bank Y ☐ N ☐ Drift and/or debris Y ☐ N ☐ Other: ______ Y ☐ N ☐ Other: ______
[X]	**If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**
[X]	**Continue walking the channel cross-section. Record characteristics of the low terrace.** Characteristics of the low terrace: Average sediment texture: Clay Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) [X] Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*) Other: ☐ ______ ☐ ______ ☐ ______ ☐ ______
☐	**If characteristics used to delineate the active floodplain/low terrace boundary were deemed reliable, acquire boundary.** Active floodplain/low terrace boundary acquired via: ☐ Mapping on aerial photograph ☐ GPS ☐ Digitized on computer ☐ Other: ______

Project: Rolling Meadows **Project Number: 21.1129.009** **Stream: Drainage 4** **Investigator(s): Seymone O'Brien**	**Date: 12/6/2022** **Time: 1pm** **Town: Colorado Springs** **State: CO** **Photo begin file#** **Photo end file#**
Y ☒ / N ☐ Do normal circumstances exist on the site? Y ☐ / N ☒ Is the site significantly disturbed?	**Location Details: North side of the Project Area.** **Datum:** **Projection:** **Coordinates:** 38.74956, -104.619144

Notes: Discontinuous stream channel. Very shallow and completely dry without evidence of recent flows.

Brief site description: Fully vegetated drainage. Within the eastern section of the Project Area.

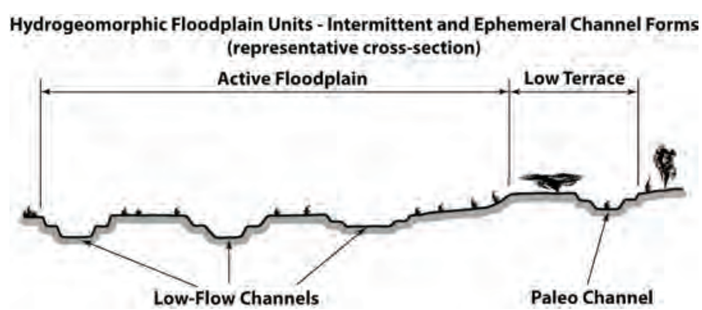
Checklist of resources (if available):

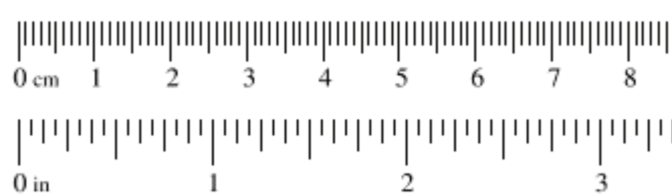
☒ Aerial photography
Dates:
☒ Topographic maps
Scale:
☐ Geologic maps
☒ Vegetation maps
☒ Soils maps
☐ Rainfall/precipitation maps
☐ Existing delineation(s) for site
☒ Global positioning system (GPS)
☐ Other studies

☐ Stream gage data
Gage number:
Period of record:
☐ Clinometer / level
☐ History of recent effective discharges
☐ Results of flood frequency analysis
☐ Most recent shift-adjusted rating
☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Millimeters (mm)		Inches (in)	Wentworth size class	
			Boulder	Gravel
	10.08	256		
			Cobble	
	2.56	64		
			Pebble	
	0.157	4		
			Granule	
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	
	0.020	0.50		
			Medium sand	
1/2	0.0098	0.25		
			Fine sand	
1/4	0.005	0.125		
			Very fine sand	
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	0.031		
			Medium silt	
1/32	0.00061	0.0156		
			Fine silt	
1/64	0.00031	0.0078		
			Very fine silt	
1/128	0.00015	0.0039		
			Clay	Mud





[X]	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
[X]	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sandy-loam/Clay Total veg cover: 80 % Tree: 0 % Shrub: 0 % Herb: 80 % Community successional stage: [ ] NA [ ] Mid (herbaceous, shrubs, saplings) [X] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*), crested wheatgrass (Agropyron cristatum) Other: [ ] No bed and bank or low flow channel [ ] No evidence of recent flows [ ] [ ]
[X]	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: [ ] Change in total veg cover [ ] Tree [ ] Shrub [X] Herb [ ] Change in overall vegetation maturity [ ] Change in dominant species present No Change [ ] Other [ ] Presence of bed and bank [ ] Drift and/or debris [ ] Other: [ ] Other:
[X]	**Continue walking the channel cross-section. Record observations below.** Characteristics of the low-flow channel: Average sediment texture: Clay Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 % Community successional stage: [ ] NA [ ] Mid (herbaceous, shrubs, saplings) [X] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*),crested wheatgrass (Agropyron cristatum) Other: [ ] [ ] [ ] [ ]

[X]	**Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.** Characteristics used to delineate the active floodplain/ low terrace boundary: [ ] Change in average sediment texture [ ] Change in total veg cover [ ] Tree [ ] Shrub [X] Herb [ ] Change in overall vegetation maturity [ ] Change in dominant species present [ ] Other [ ] Presence of bed and bank [ ] Drift and/or debris [ ] Other: ______ [ ] Other: ______ No Change
[X]	**Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.** Consistency of indicators used to delineate the active floodplain/low terrace boundary: Y [ ] N [X] Change in average sediment texture Y [ ] N [X] Change in total veg cover [ ] Tree [ ] Shrub [ ] Herb Y [ ] N [X] Change in overall vegetation maturity Y [ ] N [X] Change in dominant species present Y [ ] N [X] Other: Y [ ] N [ ] Presence of bed and bank Y [ ] N [ ] Drift and/or debris Y [ ] N [ ] Other: ______ Y [ ] N [ ] Other: ______
[X]	**If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**
[X]	**Continue walking the channel cross-section. Record characteristics of the low terrace.** Characteristics of the low terrace: Average sediment texture: Clay Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 % Community successional stage: [ ] NA [ ] Mid (herbaceous, shrubs, saplings) [X] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama *(Bouteloua gracilis),* fetid marigold *(Dyssodia papposa),* Russian thistle *(Salsola kali)* Other: [ ] ______ [ ] ______ [ ] ______ [ ] ______
[ ]	**If characteristics used to delineate the active floodplain/low terrace boundary were deemed reliable, acquire boundary.** Active floodplain/low terrace boundary acquired via: [ ] Mapping on aerial photograph [ ] GPS [ ] Digitized on computer [ ] Other: ______

Project: Rolling Meadows | **Date: 12/6/2022** | **Time: 1pm**
Project Number: 21.1129.009 | **Town: Colorado Springs** | **State: CO**
Stream: Drainage 5 | **Photo begin file#** | **Photo end file#**
Investigator(s): Seymone O'Brien

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: Tributary to drainage 1, located on the east side of the project area.
Datum: **Projection:**
Coordinates: 38.749153, -104.622732

Notes: Discontinuous stream channel. Very shallow and completely dry without evidence of recent flows.

Brief site description: Fully vegetated drainage. Contributes to the main drainage 1, within the Project Area. Head cut on the west side of the channel.

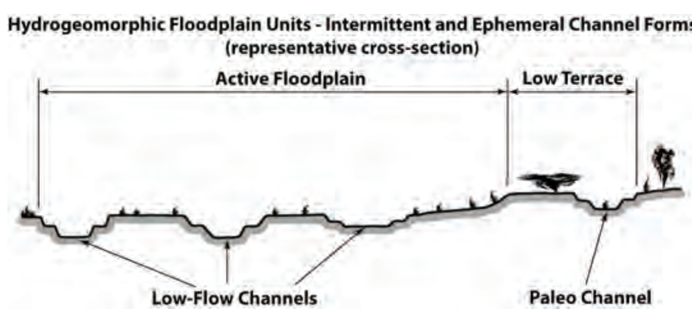
Checklist of resources (if available):

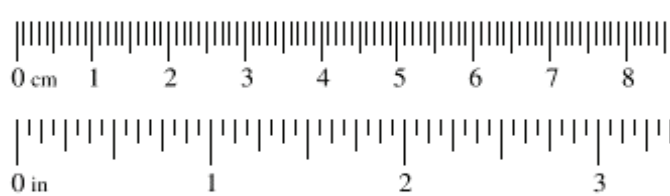
- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
  Scale:
- ☐ Geologic maps
- ☒ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ Clinometer / level
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Millimeters (mm)		Inches (in)	Wentworth size class	
			Boulder	Gravel
	10.08	256		
			Cobble	Gravel
	2.56	64		
			Pebble	Gravel
	0.157	4		
			Granule	Gravel
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	Sand
	0.020	0.50		
			Medium sand	Sand
1/2	0.0098	0.25		
			Fine sand	Sand
1/4	0.005	0.125		
			Very fine sand	Sand
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	0.031		
			Medium silt	Silt
1/32	0.00061	0.0156		
			Fine silt	Silt
1/64	0.00031	0.0078		
			Very fine silt	Silt
1/128	0.00015	0.0039		
			Clay	Mud





☒	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
☒	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sandy-loam/Clay Total veg cover: 90 % Tree: 0 % Shrub: 0 % Herb: 90 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), Russian thistle (*Salsola kali*), crested wheatgrass (*Agropyron cristatum*), western wheatgrass (*Pascopyrum smithii*), kochia (*Bassia prostrata*), scotch thistle (*Onopordum acanthium*) Other: ☒ No evidence of recent flows ☐ ☐ ☐
☒	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: ☐ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☐ Change in overall vegetation maturity ☒ Change in dominant species present ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☐ Other: ☐ Other:
☒	**Continue walking the channel cross-section. Record observations below.** Characteristics of the low-flow channel: Average sediment texture: Clay Total veg cover: 80 % Tree: 0 % Shrub: 0 % Herb: 80 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), Russian thistle (*Salsola kali)*, crested wheatgrass (*Agropyron cristatum*), western wheatgrass (*Pascopyrum smithii*), kochia (*Bassia prostrata*), scotch thistle (*Onopordum acanthium*) Other: ☐ ☐ ☐ ☐

☒	**Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.** Characteristics used to delineate the active floodplain/ low terrace boundary: ☐ Change in average sediment texture ☐ Change in total veg cover ☐ Tree ☒ Shrub ☒ Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☐ Other: ____________ ☐ Other: ____________
☒	**Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.** Consistency of indicators used to delineate the active floodplain/low terrace boundary: Y ☐ N ☒ Change in average sediment texture Y ☒ N ☐ Change in total veg cover ☐ Tree ☒ Shrub ☒ Herb Y ☒ N ☐ Change in overall vegetation maturity Y ☒ N ☐ Change in dominant species present Y ☐ N ☒ Other: Y ☐ N ☐ Presence of bed and bank Y ☐ N ☐ Drift and/or debris Y ☐ N ☐ Other: ____________ Y ☐ N ☐ Other: ____________
☒	**If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**
☒	**Continue walking the channel cross-section. Record characteristics of the low terrace.** Characteristics of the low terrace: Average sediment texture: Clay Total veg cover: 60 % Tree: 0 % Shrub: 10 % Herb: 50 % Community successional stage: ☐ NA ☒ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*), crested wheatgrass (*Agropyron cristatum*), winterfat (*Krascheninnikovia lanata*), rabbit brush (*Chrysothamnus*), big sagebrush (*Artemisia tridentata*), prickly pear (*Opuntia*) Other: ☐ ____________ ☐ ____________ ☐ ____________ ☐ ____________
☐	**If characteristics used to delineate the active floodplain/low terrace boundary were deemed reliable, acquire boundary.** Active floodplain/low terrace boundary acquired via: ☐ Mapping on aerial photograph ☐ GPS ☐ Digitized on computer ☐ Other: ____________

Project: Rolling Meadows **Project Number: 21.1129.009** **Stream: Drainage 6** **Investigator(s): Seymone O'Brien**		**Date: 12/6/2022** **Town: Colorado Springs** **Photo begin file#**	**Time: 1pm** **State: CO** **Photo end file#**
Y [X] / N [ ] Do normal circumstances exist on the site? Y [ ] / N [X] Is the site significantly disturbed?		**Location Details: North side of the Project Area.** **Datum:** **Projection:** **Coordinates:** 38.768436, -104.618213	

Notes: Discontinuous stream channel. Very shallow and completely dry without evidence of recent flows.

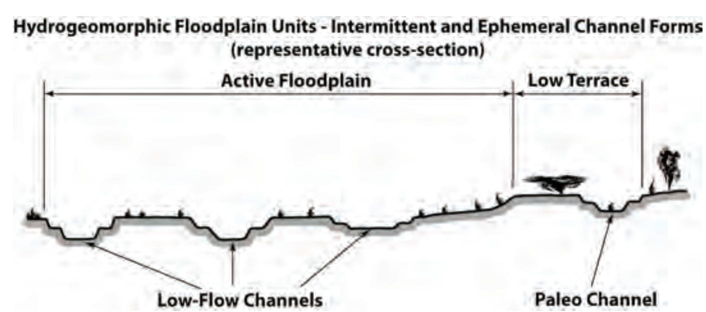
Brief site description: Fully vegetated drainage. Within the northern section of the Project Area. North of Bradley Road

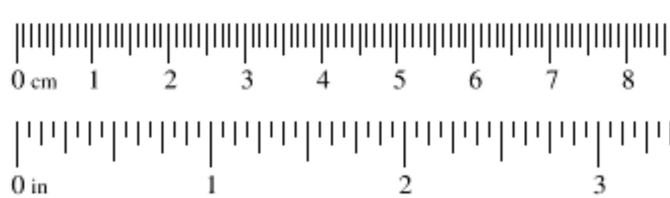
Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
  Scale:
- [ ] Geologic maps
- [X] Vegetation maps
- [X] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] Clinometer / level
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

	Millimeters (mm)	Inches (in)	Wentworth size class	
			Boulder	Gravel
	10.08	256		
			Cobble	
	2.56	64		
			Pebble	
	0.157	4		
			Granule	
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	
	0.020	0.50		
			Medium sand	
1/2	0.0098	0.25		
			Fine sand	
1/4	0.005	0.125		
			Very fine sand	
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	0.031		
			Medium silt	
1/32	0.00061	0.0156		
			Fine silt	
1/64	0.00031	0.0078		
			Very fine silt	
1/128	0.00015	0.0039		
			Clay	Mud





☒	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
☒	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sandy-loam/Clay Total veg cover: 80 % Tree: 0 % Shrub: 0 % Herb: 80 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*) Other: ☐ _No bed and bank or low flow channel ☐ _No evidence of recent flows ☐ ☐
☒	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: ☐ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☐ Change in overall vegetation maturity ☐ Change in dominant species present No Change ☐ Other ☐ Presence of bed and bank ☐ Drift and/or debris ☐ Other: ☐ Other:
☒	**Continue walking the channel cross-section. Record observations below.** Characteristics of the low-flow channel: Average sediment texture: Clay Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 % Community successional stage: ☐ NA ☐ Mid (herbaceous, shrubs, saplings) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: Blue grama (*Bouteloua gracilis*), fetid marigold (*Dyssodia papposa*), Russian thistle (*Salsola kali*) Other: ☐ ☐ ☐ ☐

- [X] **Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.**

Characteristics used to delineate the active floodplain/ low terrace boundary:

- [ ] Change in average sediment texture
- [ ] Change in total veg cover [ ] Tree [ ] Shrub [X] Herb
- [ ] Change in overall vegetation maturity
- [ ] Change in dominant species present
- [ ] Other [ ] Presence of bed and bank
  - [ ] Drift and/or debris
  - [ ] Other: ______
  - [ ] Other: ______

No Change

- [X] **Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.**

Consistency of indicators used to delineate the active floodplain/low terrace boundary:

- Y [ ] N [X] Change in average sediment texture
- Y [ ] N [X] Change in total veg cover [ ] Tree [ ] Shrub [ ] Herb
- Y [ ] N [X] Change in overall vegetation maturity
- Y [ ] N [X] Change in dominant species present
- Y [ ] N [X] Other: Y [ ] N [ ] Presence of bed and bank
  - Y [ ] N [ ] Drift and/or debris
  - Y [ ] N [ ] Other: ______
  - Y [ ] N [ ] Other: ______

- [X] **If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**

- [X] **Continue walking the channel cross-section. Record characteristics of the low terrace.**

Characteristics of the low terrace:

Average sediment texture: Clay

Total veg cover: 20 % Tree: 0 % Shrub: 0 % Herb: 20 %

Community successional stage:

- [ ] NA
- [X] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Dominant species present: Blue grama *(Bouteloua gracilis)*, fetid marigold *(Dyssodia papposa)*, Russian thistle *(Salsola kali)*

Other:
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

- [ ] **If characteristics used to delineate the active floodplain/low terrace boundary were deemed reliable, acquire boundary.**

Active floodplain/low terrace boundary acquired via:

- [ ] Mapping on aerial photograph
- [ ] Digitized on computer
- [ ] GPS
- [ ] Other: ______

Appendix D: 2021 Wetland Assessment and Delineation Report

2435 Research Pkwy, Suite 300
Colorado Springs, Colorado 80920
Phone: 719.575.0100
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matrixdesigngroup.com

Date: 22 September 2021

To: Tony Martinez, U.S. Army Corps of Engineers

From: Tierney Walsh, Matrix Environmental Services

Subject: Wetland Assessment and Delineation Report – Rolling Hills Development at Jimmy Camp Creek East Tributary, West of S Meridian Road and South of Drennan Road, El Paso County, Colorado

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Mr. Martinez,

On behalf of the Landhuis Company, Matrix Environmental Services, LLC (MES) is pleased to submit this report summarizing the assessment and delineation of wetlands within the Rolling Hills development area (the Site), which is located west of S. Meridian Road and south of Drennan Road in El Paso County, Colorado.

The scope of work for the wetland assessment and delineation included the entire Site, which totals approximately 1,025 acres. Similar plant communities were identified throughout the Site; therefore, the observed plant communities were divided into eight distinct communities with one data sample point collected in each community.

The assessment and delineation field work were conducted May 13-14, 2021 (Communities 1-5) and August 7-8, 2021 (Communities 6-8). Climatic and hydrologic conditions at the Site were drier than average for the time of year during the May assessment due to below-normal rainfall; however, conditions were normal during the August assessment. The wet season in Colorado Springs is between April and September, peaking in July and August.

Community 1 includes the relatively flat area identified as a seasonally flooded, intermittent riverine system by the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), which is unnamed and shown by the USFWS NWI to converge with the Jimmy Camp Creek East Tributary at a point approximately 1.75-miles southwest. Community 1 is dominated by common kochia (*Bassia scoparia*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. Community 1 vegetation also includes minor amounts of groundplum milkvetch (*Astragalus crassicarpus*), lamb's quarters (*Chenopodium album*) and musk thistle (*Carduus nutans*). No hydric soil indicators were observed within the area's sandy clay soils. Additionally, saturation and a water table were not observed within Community 1: soil was dry to a depth of 28 inches. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils and a lack of wetland hydrology.

Community 2 includes a small depression near the eastern boundary of the Site, which is dominated by Russian olive (*Elaeagnus angustifolia*), common kochia (*Bassia scoparia*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. Community 2 vegetation also includes minor amounts of field bindweed (*Convolvulus arvensis*) and Russian thistle (*Salsola tragus*). No hydric soil indicators were observed within the area's sandy clay loam and clay soils. Additionally, saturation and a water table were not observed within Community 2 despite the soil pit being advanced to 42 inches below the ground surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils and a lack of wetland hydrology.

Community 3 includes the drainage swale identified as Jimmy Camp Creek East Tributary, which is dominated by common kochia (*Bassia scoparia*), a grass that was not identifiable at the time of assessment due to the lack of inflorescence and Woods' rose (*Rosa woodsii*). Community 3 vegetation also includes minor amounts of curly dock (*Rumex crispus*) and Russian thistle (*Salsola tragus*). No hydric soil indicators were observed within the area's sandy loam, loamy sand and sand soils. Additionally, saturation and a water table were not observed within Community 3 despite the soil pit being advanced to 52 inches below the ground surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils and a lack of wetland hydrology.

Community 4 includes the relatively flat area identified as a seasonally flooded, intermittent riverine system by the USFWS NWI, which the NWI shows to converge onsite with Jimmy Camp Creek East Tributary. Community 4 is dominated by common kochia (*Bassia scoparia*) and field bindweed (*Convolvulus arvensis*) with minor amounts of lamb's quarters (*Chenopodium album*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. No hydric soil indicators were observed within the area's sandy loam and sandy clay loam soils. Additionally, saturation and a water table were not observed within Community 4 despite the soil pit being advanced to 38 inches below the ground surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of dominance of hydrophytic vegetation, a negative prevalence index, the lack of hydric soils and a lack of wetland hydrology.

Community 5 includes a depression near the eastern boundary of the Site within the area identified as a seasonally flooded, intermittent riverine system by the USFWS NWI. Community 5 is dominated by field bindweed (*Convolvulus arvensis*) and a grass that was not identifiable at the time of assessment due to the lack of inflorescence. Vegetation in Community 5 also includes minor amounts of lamb's quarters (*Chenopodium album*) and common kochia (*Bassia scoparia*). No hydric soil indicators were observed within the area's sandy clay and sandy loam soils. Additionally, saturation and a water table were not observed within Community 5: soil was dry to a depth of 38 inches. However, oxidized rhizospheres along living roots were detectable within 12 inches of the soil surface. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of hydric soils.

Community 6 is approximately 0.18 acres and includes a drainage channel associated with a windmill-powered well south of Bradley Road. Community 6 is dominated by foxtail barley (*Hordeum jubatum*) and common kochia (*Bassia scoparia*) with minor amounts of lamb's quarters (*Chenopodium album*), Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*) and alfalfa dodder (*Cuscuta approximata*). The community had visible surface water in approximately 30% of the area, surface soil cracks, algal mats and oxidized rhizospheres along living roots from 4-12 inches. Additionally, 5% prominent redox concentrations from 4-12 inches satisfy the criteria for redox dark surface. In my professional opinion, this community meets the criteria to be identified as a wetland based on the predominance of hydrophytic vegetation and the observation of hydric soil and wetland hydrology indicators.

Community 7 is located immediately south of Community 6 and includes the southern edge of the drainage channel that forms Community 6. Community 7 is dominated by blue grama (*Bouteloua gracilis*) and common kochia (*Bassia scoparia*) with minor amounts of lamb's quarters (*Chenopodium album*), alfalfa dodder (*Cuscuta approximata*), annual meadow grass (*Poa annua*), proso millet (*Panicum miliaceum*), common sunflower (*Helianthus annuus*) and golden crownbeard (*Verbesina encelioides*). No hydric soil indicators were observed within the area's silty clay loam and sandy loam soils. Additionally, saturation and a water table were not observed within Community 7: soil was dry to a depth of 30 inches. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of dominance of hydrophytic vegetation, a negative prevalence index, lack of hydric soils, and a lack of wetland hydrology indicators.

Community 8 includes the relatively flat area identified as Jimmy Camp Creek East Tributary south of Bradley Road, which the USFWS NWI describes as a seasonally flooded, intermittent riverine system. Community 8 is dominated by blue grama (*Bouteloua gracilis*), lamb's quarters (*Chenopodium album*) and red-root amaranth (*Amaranthus retroflexus*) with minor amounts of pineapple-weed (*Matricaria discoidea*), common kochia (*Bassia scoparia*), golden crownbeard (*Verbesina encelioides*) and curly dock (*Rumex crispus*). No hydric soil indicators were observed within the area's clay loam and silty loam soils. Additionally, saturation and a water table were not observed within Community 8: soil was dry to a depth of 48 inches. In my professional opinion, this community does not meet the criteria of a wetland based on the lack of dominance of hydrophytic vegetation, a negative prevalence index, the lack of hydric soils and a lack of wetland hydrology.

According to the National Resources Conservation Service's Web Soil Survey, most soils within the Site are classified as Sampson loam, except soils within Community 3 which are classified as Ellicott loamy coarse sand. Additionally, portions of the Site are classified as wetlands according to the USFWS NWI map, including communities 1, 3, 4, 5 and 8 which the NWI describes as temporarily or seasonally flooded riverine habitats.

Flags were placed along the boundaries of areas identified as wetlands within the Site, which was limited to Community 6 as indicated in the attached figure.

The professional opinions made in this report regarding the location and extent of areas that do or do not satisfy the criteria of a wetland were determined pursuant to the Army Corps of Engineer's Regional Supplement and appropriate guidance and pursuant to confirmation by appropriate regulatory staff including but not limited to the Army Corps of Engineers.

Please contact Ms. Tierney Walsh at 719-457-5613 or Tierney.Walsh@matrixdesigngroup.com should you have any questions or comments.

Sincerely,

Matrix Environmental Services, LLC

Tierney Walsh

Tierney Walsh

Environmental Scientist

Enclosures:

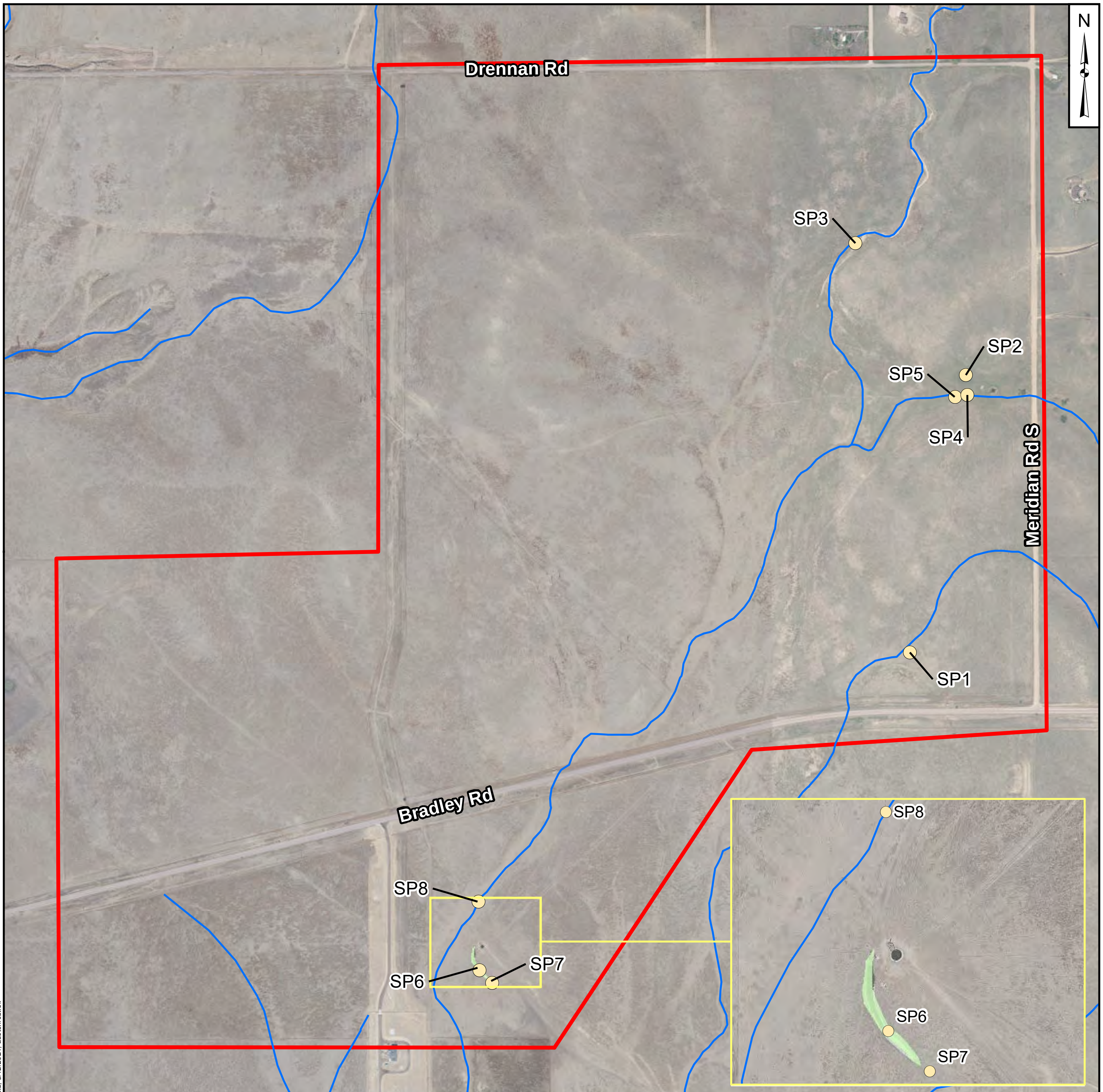
Site Figure

Photolog

Field Data Forms

cc: Mr. Jeff Mark, The Landhuis Company

Figures



Legend

- Sampling Point
- Ephemeral Stream
- Wetland
- Site Boundary

0 1,200 2,400 Feet

Rolling Hills Wetland Delineation

Matrix ENVIRONMENTAL

Figure 1

FILE: G:\gis_projects\MES_RollingHills\active\apps\FigureX_RollingHillsI_WetlandDelineation_2021_08_12_AKC.mxd, 8/12/2021, austen.cutrell

Photolog

Photo Log
Wetland Delineation for Rolling Hills Development
Colorado Springs, Colorado

Photo 1 – Community 1 includes a relatively flat area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit shown in center of foreground.

Photo 2 – Community 1's sandy clay soils didn't exhibit hydric soil indicators. Additionally, saturation and a water table were not encountered despite the soil pit extending to a depth of 28 inches.

Photo 3 – Community 2 includes a small depression near the eastern boundary of the Site. Test pit is in the center of the middle ground.

Photo 4 – Community 2's sandy clay loam and clay soils didn't exhibit hydric soil indicators. Additionally, saturation and a water table were not encountered despite the soil pit extending to a depth of 42 inches.

Photo 5 – Community 3 includes the drainage swale identified as Jimmy Camp Creek East Tributary. Test pit is in the center of the foreground.

Photo 6 – Community 3's sandy loam, loamy sand and sand soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 52 inches.

Photo 7 – Community 4 includes a relatively flat area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit is in the center of the middle ground.

Photo 8 – Community 4's sandy loam and sandy clay loam soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 38 inches.

Photo 9 – Community 5 includes a depression near the eastern boundary of the Site within the area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit is on the left in the middle ground.

Photo 10 – Community 5's sandy clay and sandy loam soils didn't exhibit hydric soil indicators; however, oxidized rhizospheres along living roots were detectable within 12 inches of the soil surface.

Photo 11 – Community 6 is approximately 0.18 acres and includes a drainage channel associated with a windmill-powered well south of Bradley Road. Test pit is partially shown in the center of the foreground.

Photo 12 – Community 6's sandy loam soils contained 5% prominent redox concentrations from 4-12 inches, which satisfied the criteria for redox dark surface.

Photo Log
Wetland Delineation for Rolling Hills Development
Colorado Springs, Colorado

Photo 13 – Community 7 includes the southern edge of the drainage channel that forms Community 6. Test pit is in the center of the middle ground.

Photo 14 – Community 7's silty clay loam and sandy loam soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 30 inches.

Photo 15 – Community 8 includes a relatively flat area identified as a seasonally flooded riverine system by the USFWS NWI. Test pit is in the center of the foreground.

Photo 16 – Community 8's clay loam and silty loam soils didn't exhibit hydric soil indicators, and saturation and a water table were not encountered despite the soil pit extending to a depth of 48 inches.

Field Forms

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/13/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 1

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): NWI boundary Local relief (concave, convex, none): none Slope (%): 0-3%

Subregion (LRR): D Lat: N38.767754 Long: W104.612189 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓		
Wetland Hydrology Present?	Yes ____ No ✓		

Remarks:
Moderate Drought in area during assessment (Drought.gov)

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. unidentifiable grass (no reproductive structures)	60%	Y	NA
2. Bassia scoparia	20%	Y	FAC
3. Astragalus crassicarpus	5%	N	NI
4. Chenopodium album	2%	N	FACU
5. Carduus nutans	2%	N	UPL
6. Senecio crassulus	1%	N	FACU
7.			
8.			
9.			
10.			
11.			
= Total Cover	90%		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 10%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	20	x 3 = 60
FACU species	3	x 4 = 12
UPL species	2	x 5 = 10
Column Totals:	25 (A)	82 (B)

Prevalence Index = B/A = 3.28

Hydrophytic Vegetation Indicators:

– 1 - Rapid Test for Hydrophytic Vegetation
– 2 - Dominance Test is >50%
– 3 - Prevalence Index is ≤3.0[1]
– 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– 5 - Wetland Non-Vascular Plants[1]
– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:
*sampled entire plant community

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-11.5	10YR2/2	100%					sandy clay	moist.
11.5-20	10YR3/2	99%.	10YR5/8	1%			sandy clay	hard, dry
20-28	10YR3/2	98%.	10YR5/8	2%	C	M	sandy clay	hard, dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- __ 2 cm Muck (A10)
- __ Red Parent Material (TF2)
- __ Very Shallow Dark Surface (TF12)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- __ Salt Crust (B11)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Stunted or Stressed Plants (D1) (**LRR A**)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)
- __ Raised Ant Mounds (D6) (**LRR A**)
- __ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): >28"

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/3/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 2

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): D Lat: N 38.774002 Long: W 104.610502 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓		
Wetland Hydrology Present?	Yes ____ No ✓		

Remarks:
Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: *)			
1. Elaeagnus angustifolia	90%	Y	FAC
2.			
3.			
4.			
	90% = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: *)			
1. Bassia scoparia	20%	Y	FAC
2. unidentifiable grass (warm season bunchgrass)	20%	Y	NA
3. Convolvulus arvensis	10%	N	NI
4. Salsola tragus	5%	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	55% = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	= Total Cover		
% Bare Ground in Herb Stratum 45%			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	110	x 3 = 330
FACU species	5	x 4 = 20
UPL species		x 5 =
Column Totals:	115 (A)	350 (B)

Prevalence Index = B/A = 3.04

Hydrophytic Vegetation Indicators:

– 1 - Rapid Test for Hydrophytic Vegetation
+ 2 - Dominance Test is >50%
– 3 - Prevalence Index is ≤3.0[1]
– 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– 5 - Wetland Non-Vascular Plants[1]
– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:
* sampled entire plant community

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100%					Sandy clay loam	moist
6-13	10YR 2/2	100%					clay	dry, moist compact, $CaCO_3$
13-21	10YR 3/2	99%	10YR 3/2	1%	C	PL	clay	moist
21-31	10YR 4/2	50%	~~10YR~~				clay	Moist, $CaCO_3$
	10YR 2/2	50%						
31-42	10YR 5/3	98%	10YR 5/8	2%	C	M	loamy sand	moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- – Histosol (A1)
- – Histic Epipedon (A2)
- – Black Histic (A3)
- – Hydrogen Sulfide (A4)
- – Depleted Below Dark Surface (A11)
- – Thick Dark Surface (A12)
- – Sandy Mucky Mineral (S1)
- – Sandy Gleyed Matrix (S4)
- – Sandy Redox (S5)
- – Stripped Matrix (S6)
- – Loamy Mucky Mineral (F1) **(except MLRA 1)**
- – Loamy Gleyed Matrix (F2)
- – Depleted Matrix (F3)
- – Redox Dark Surface (F6)
- – Depleted Dark Surface (F7)
- – Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- – 2 cm Muck (A10)
- – Red Parent Material (TF2)
- – Very Shallow Dark Surface (TF12)
- – Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- – Surface Water (A1)
- – High Water Table (A2)
- – Saturation (A3)
- – Water Marks (B1)
- – Sediment Deposits (B2)
- – Drift Deposits (B3)
- – Algal Mat or Crust (B4)
- – Iron Deposits (B5)
- – Surface Soil Cracks (B6)
- – Inundation Visible on Aerial Imagery (B7)
- – Sparsely Vegetated Concave Surface (B8)
- – Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- – Salt Crust (B11)
- – Aquatic Invertebrates (B13)
- – Hydrogen Sulfide Odor (C1)
- – Oxidized Rhizospheres along Living Roots (C3)
- – Presence of Reduced Iron (C4)
- – Recent Iron Reduction in Tilled Soils (C6)
- – Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- – Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- – Drainage Patterns (B10)
- – Dry-Season Water Table (C2)
- – Saturation Visible on Aerial Imagery (C9)
- + Geomorphic Position (D2)
- – Shallow Aquitard (D3)
- – FAC-Neutral Test (D5)
- – Raised Ant Mounds (D6) **(LRR A)**
- – Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): >42"

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): >42"

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/13/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 3

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): drainage swale Local relief (concave, convex, none): concave Slope (%): 0-3%

Subregion (LRR): D Lat: N 38.777078 Long: W104.613583 Datum: WGS 84

Soil Map Unit Name: Ellicott loamy coarse sand NWI classification: R4SBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ✓ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ✓	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ___ No ✓	
Wetland Hydrology Present?	Yes ___ No ✓	

Remarks:
Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: *)			
1. Rosa woodsii	5%	Y	FACU
2.			
3.			
4.			
5.			
	5%	= Total Cover	
Herb Stratum (Plot size: *)			
1. unidentifiable grass (no reproductive structures)	40%	Y	NA
2. Bassia scoparia	30%	Y	FAC
3. Rumex crispus	5%	N	FAC
4. Salsola tragus	5%	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	80%	= Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 20%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	35	x 3 = 105
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	45 (A)	145 (B)

Prevalence Index = B/A = 3.22

Hydrophytic Vegetation Indicators:

- _ 1 - Rapid Test for Hydrophytic Vegetation
- _ 2 - Dominance Test is >50%
- _ 3 - Prevalence Index is ≤3.0[1]
- _ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- _ 5 - Wetland Non-Vascular Plants[1]
- _ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:
* sampled entire plant community

Sampling Point: 3

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10 YR 4/2	100%					Sandy loam	
3-12	10YR 4/2	100%					sandy loam, moist.	
12-20	10 YR 5/4	99%	10YR 3/6	1%	C	PL	loamy sand moist	
20-33	10 YR 5/4	100%					sand.	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): >52"

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): >52"

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/14/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 4

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): flat w/in trib. boundary Local relief (concave, convex, none): none Slope (%): 0%

Subregion (LRR): D Lat: N 38°46.414' Long: W 104°36.626 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ____ No ✓	

Remarks:
Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: *)			
1. Bassia scoparia	40%	Y	FAC
2. Convolvulus arvensis	40%	Y	NI
3. Chenopodium album	10%	N	FACU
4. unidentifiable grass (no reproductive structures)	5%	N	NA
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 5%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	40	x 3 = 120
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	50 (A)	160 (B)

Prevalence Index = B/A = 3.20

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- – 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:
* sampled entire plant community

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/2	100%					sandy loam	dry
3-9.5	10YR 2/2	100%					sandy clay loam	moist.
9.5-38	10YR 2/1	99%	10YR 3/6	1%	C	PL	sandy clay loam	compacted, dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- _ Histosol (A1)
- _ Histic Epipedon (A2)
- _ Black Histic (A3)
- _ Hydrogen Sulfide (A4)
- _ Depleted Below Dark Surface (A11)
- _ Thick Dark Surface (A12)
- _ Sandy Mucky Mineral (S1)
- _ Sandy Gleyed Matrix (S4)
- _ Sandy Redox (S5)
- _ Stripped Matrix (S6)
- _ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- _ Loamy Gleyed Matrix (F2)
- _ Depleted Matrix (F3)
- _ Redox Dark Surface (F6)
- _ Depleted Dark Surface (F7)
- _ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- _ 2 cm Muck (A10)
- _ Red Parent Material (TF2)
- _ Very Shallow Dark Surface (TF12)
- _ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- _ Surface Water (A1)
- _ High Water Table (A2)
- _ Saturation (A3)
- _ Water Marks (B1)
- _ Sediment Deposits (B2)
- _ Drift Deposits (B3)
- _ Algal Mat or Crust (B4)
- _ Iron Deposits (B5)
- _ Surface Soil Cracks (B6)
- _ Inundation Visible on Aerial Imagery (B7)
- _ Sparsely Vegetated Concave Surface (B8)
- _ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- _ Salt Crust (B11)
- _ Aquatic Invertebrates (B13)
- _ Hydrogen Sulfide Odor (C1)
- _ Oxidized Rhizospheres along Living Roots (C3)
- _ Presence of Reduced Iron (C4)
- _ Recent Iron Reduction in Tilled Soils (C6)
- _ Stunted or Stressed Plants (D1) **(LRR A)**
- _ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- _ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- _ Drainage Patterns (B10)
- _ Dry-Season Water Table (C2)
- _ Saturation Visible on Aerial Imagery (C9)
- _ Geomorphic Position (D2)
- _ Shallow Aquitard (D3)
- _ FAC-Neutral Test (D5)
- _ Raised Ant Mounds (D6) **(LRR A)**
- _ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ~~[illegible]~~

Water Table Present? Yes ____ No ✓ Depth (inches): >38"

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 5/14/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 5

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0-5

Subregion (LRR): D Lat: 38°46.413N Long: W104°36.647 Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks: Moderate drought in area during assessment (drought.gov)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. unidentifiable grass (no reproductive structures)	40%	Y	NA
2. Convolvulus arvensis	20%	Y	NI
3. Chenopodium album	10%	N	FACU
4. Bassia scoparia	10%	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	80%		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum 20%			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	10	x 3 = 30
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	20 (A)	70 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- – 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:
* sampled entire plant community

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4.5	10YR 2/2						sandy clay	moist
4.5-7.5	10YR 2/2	98%	7.5YR 3/4	2%	C	PL	sandy clay	compacted
7.5-11	10YR 2/2	97%	7.5YR 3/4	3%	C	PL	sandy clay	
11-19	10YR 2/2	97%	10YR 3/6	3%	C	M	sandy clay	dry
19-21	10YR 3/1	93%	10YR 3/6	7%	C	M	sandy clay	
21-22	10YR 5/4	95%	10YR 3/6	5%	C	M	sandy loam	
22-38	10YR 5/4	100%					sandy loam	dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1) (**except MLRA 1**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- 2 cm Muck (A10)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- + Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (**LRR A**)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- + Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (**LRR A**)
- Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): >38"

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): >38"

Wetland Hydrology Present? Yes ✓ No ~~JBTC~~

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 8/7/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 6

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S12 T15S R65W

Landform (hillslope, terrace, etc.): drainage channel for onsite well Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR): D Lat: N38° 45.642' Long: W104° 37.478' Datum: WGS 84

Soil Map Unit Name: Sampson loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. Hordeum jubatum	30	Y	FAC
2. Bassia scoparia	30	Y	FAC
3. Chenopodium album	15	N	FACU
4. Cirsium arvense	2	N	FAC
5. Convolvulus arvensis	2	N	NI
6. Cuscuta approximata	2	N	NI
7. Rumex crispus	1	N	FAC
8. Andropogon gerardii	1	N	FACU
9. Helianthus annus	1	N	FACU
10. Verbesina encelioides	1	N	FACU
11.			
= Total Cover	85		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 20%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	63	x 3 = 189
FACU species	18	x 4 = 72
UPL species	0	x 5 = 0
Column Totals:	81 (A)	261 (B)

Prevalence Index = B/A = 3.22

Hydrophytic Vegetation Indicators:

– 1 - Rapid Test for Hydrophytic Vegetation
+ 2 - Dominance Test is >50%
– 3 - Prevalence Index is ≤3.0[1]
– 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– 5 - Wetland Non-Vascular Plants[1]
– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:
* Sampled entire plant community

Sampling Point: 16

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100					sandy loam	
4-6	10YR 2/2	97	10YR 3/6	3%	C	PL		Prominent
6-12	10YR 2/2	95	10YR 3/6	5%	C	PL		
12-16	10YR 2/2	98	10YR 3/6	2	C	PL	sandy loam	
16-22	10YR 3/2	97	10YR 4/6	3%			sandy clay	prom.
22-27	10YR 4/2	95	10YR 4/6	5%	C	PL	sandy clay loam	
27-30	10YR 4/2	99	10YR 4/6	1%	C	M	loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- – Histosol (A1)
- – Histic Epipedon (A2)
- – Black Histic (A3)
- – Hydrogen Sulfide (A4)
- – Depleted Below Dark Surface (A11)
- – Thick Dark Surface (A12)
- – Sandy Mucky Mineral (S1)
- – Sandy Gleyed Matrix (S4)
- – Sandy Redox (S5)
- – Stripped Matrix (S6)
- – Loamy Mucky Mineral (F1) **(except MLRA 1)**
- – Loamy Gleyed Matrix (F2)
- – Depleted Matrix (F3)
- + Redox Dark Surface (F6)
- – Depleted Dark Surface (F7)
- – Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- – 2 cm Muck (A10)
- – Red Parent Material (TF2)
- – Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________________

Depth (inches): ____________________

Hydric Soil Present? Yes ✓ No ______

Remarks: ≤3/≤2 5% dist/prom redox in upper 12"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- + Surface Water (A1)
- – High Water Table (A2)
- – Saturation (A3)
- – Water Marks (B1)
- – Sediment Deposits (B2)
- – Drift Deposits (B3)
- + Algal Mat or Crust (B4)
- – Iron Deposits (B5)
- + Surface Soil Cracks (B6)
- – Inundation Visible on Aerial Imagery (B7)
- – Sparsely Vegetated Concave Surface (B8)
- – Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- – Salt Crust (B11)
- – Aquatic Invertebrates (B13)
- – Hydrogen Sulfide Odor (C1)
- + Oxidized Rhizospheres along Living Roots (C3)
- – Presence of Reduced Iron (C4)
- – Recent Iron Reduction in Tilled Soils (C6)
- – Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- – Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- – Drainage Patterns (B10)
- – Dry-Season Water Table (C2)
- – Saturation Visible on Aerial Imagery (C9)
- + Geomorphic Position (D2)
- – Shallow Aquitard (D3)
- – FAC-Neutral Test (D5)
- – Raised Ant Mounds (D6) **(LRR A)**
- – Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 0-11"

Water Table Present? Yes _____ No _____ Depth (inches): >48 wSP

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): >48

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 8/7/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 7

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S12T15S R65W

Landform (hillslope, terrace, etc.): end of drainage channel. Local relief (concave, convex, none): none-concave Slope (%): 2-3%

Subregion (LRR): D Lat: N 38° 45.625' Long: W 104° 37.456' Datum: WGS 84

Soil Map Unit Name: Sampson Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		✓
Hydric Soil Present?		✓
Wetland Hydrology Present?		✓

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks:
No drought at time of assessment in El Paso (drought.gov)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: *)			
1. Bouteloua gracilis	30%	Y	NI
2. Bassia scoparia	30%	Y	FAC
3. Chenopodium album	20%	N	FACU
4. Cuscuta ~~campestris~~ approximata	10%	N	NI
5. Poa annua	10%	N	FAC
6. Panicum miliaceum	5%	N	NI
7. Helianthus annuus	2%	N	FACU
8. Verbesina encelioides	2%	N	FACU
9. Pascopyrum smithii	1%	N	FACU
10.			
11.			
= Total Cover	110		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	40	x 3 = 120
FACU species	25	x 4 = 100
UPL species	0	x 5 = 0
Column Totals:	65 (A)	225 (B)

Prevalence Index = B/A = 3.46

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- – 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:
*Sampled entire plant community

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR2/2	100%					silty clay (Barn)	
9-16	10YR2/2	99%	10YR3/6	1%	C	PL	sandy loam	prom
16-30	10YR2/2	99%	10YR3/6	1%	C	M	clay loam	calcium deposits

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1) (**except MLRA 1**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- 2 cm Muck (A10)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (**LRR A**)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (**LRR A**)
- Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ______

Water Table Present? Yes ____ No ✓ Depth (inches): >30"

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Rolling Hills - East Tributary to Jimmy Camp Creek City/County: Colorado Springs - El Paso County Sampling Date: 8/8/21

Applicant/Owner: Murray Fountain LLC State: CO Sampling Point: 8

Investigator(s): T. Walsh and A. Davis Section, Township, Range: S1 T15S R65W

Landform (hillslope, terrace, etc.): ~~[illegible]~~ w/in trib. boundary Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR): D Lat: 38°45.735' Long: W104°37.478' Datum: WGS84

Soil Map Unit Name: Sampson loam NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ____ No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. Bouteloua gracilis	50%	Y	NI
2. Chenopodium album	20%	Y	FACU
3. Amaranthus retroflexus	20%	Y	FACU
4. ~~Chamomilla suaveolens~~ BTW Matricaria discoidea	10%	N	~~NI~~ BTW FACU
5. Bassia scoparia	5%	N	FAC
6. Verbesina ~~occidentalis~~ BTW encelioides	3%	N	FACU
7. Rumex crispus	2%	N	FAC
8. Convolvulus arvensis	1%	N	NI
9. Cirsium arvense	1%	N	FAC
10.			
11.			
= Total Cover	112		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	8	x 3 = 24
FACU species	53	x 4 = ~~[illegible]~~ 212 BTW
UPL species		x 5 =
Column Totals:	61 (A)	236 (B)

Prevalence Index = B/A = 3.87

Hydrophytic Vegetation Indicators:

- – 1 - Rapid Test for Hydrophytic Vegetation
- – 2 - Dominance Test is >50%
- – 3 - Prevalence Index is ≤3.0[1]
- – 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – 5 - Wetland Non-Vascular Plants[1]
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 2/2	100%					clay loam	dry
13-30	10YR 3/2	100%					silty loam	
30-48	10YR 3/2	100%					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- — Histosol (A1)
- — Histic Epipedon (A2)
- — Black Histic (A3)
- — Hydrogen Sulfide (A4)
- — Depleted Below Dark Surface (A11)
- — Thick Dark Surface (A12)
- — Sandy Mucky Mineral (S1)
- — Sandy Gleyed Matrix (S4)
- — Sandy Redox (S5)
- — Stripped Matrix (S6)
- — Loamy Mucky Mineral (F1) (**except MLRA 1**)
- — Loamy Gleyed Matrix (F2)
- — Depleted Matrix (F3)
- — Redox Dark Surface (F6)
- — Depleted Dark Surface (F7)
- — Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- — 2 cm Muck (A10)
- — Red Parent Material (TF2)
- — Very Shallow Dark Surface (TF12)
- — Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- — Surface Water (A1)
- — High Water Table (A2)
- — Saturation (A3)
- — Water Marks (B1)
- — Sediment Deposits (B2)
- — Drift Deposits (B3)
- — Algal Mat or Crust (B4)
- — Iron Deposits (B5)
- — Surface Soil Cracks (B6)
- — Inundation Visible on Aerial Imagery (B7)
- — Sparsely Vegetated Concave Surface (B8)
- — Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- — Salt Crust (B11)
- — Aquatic Invertebrates (B13)
- — Hydrogen Sulfide Odor (C1)
- — Oxidized Rhizospheres along Living Roots (C3)
- — Presence of Reduced Iron (C4)
- — Recent Iron Reduction in Tilled Soils (C6)
- — Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- — Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- — Drainage Patterns (B10)
- — Dry-Season Water Table (C2)
- — Saturation Visible on Aerial Imagery (C9)
- — Geomorphic Position (D2)
- — Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- — Raised Ant Mounds (D6) (**LRR A**)
- — Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): >48"

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): >48"

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, ALBUQUERQUE DISTRICT
201 WEST 8TH STREET, SUITE 350
PUEBLO, CO 81003

March 17, 2023

Regulatory Division

SUBJECT: Jurisdictional Determination (SPA-2005-00418)

Murray Fountain, LLC
Attn: Jeff Mark
212 North Wahsatch, Suite 301
Colorado Springs, CO 80903
jmark@landhuisco.com

Dear Mr. Mark:

This letter responds to your request for a jurisdictional determination (JD) for the Rolling Meadows property located at approximately latitude 38.7633, longitude -104.6198, in El Paso County, Colorado. We have assigned Action No. SPA-2005-00418 to your request. Please reference this number in all future correspondence concerning the site.

Based on the information provided, we have determined that the review area (enclosure 1) does not contain waters of the United States that are subject to regulation under Section 404 of the Clean Water Act. The enclosed JD form describes the area that was evaluated and determined to contain no waters of the United States. If you intend to conduct work that could result in a discharge of dredged or fill material into waters of the United States, please contact this office for a determination of Department of the Army permit requirements and refer to Action No. SPA-2005-00418.

The basis for this approved JD (enclosure 2) is that the project site contains isolated wetlands (i.e., Wetland-1, Wetland-2, Wetland-3, Wetland-4, Wetland-5, Wetland-6, Wetland-7, Wetland-8, Wetland-9, Wetland-10, Wetland-11, Wetland-12, Wetland-13, Wetland- 14, Wetland-15, Wetland-16, Wetland-18, Wetland-19, Wetland-20, Wetland-21, Wetland-22, Wetland-23, Wetland-24, and Wetland-25), other isolated waters of the United States (Drainage-6), and an upland stock pond (Wetland-17). A copy of this JD is also available at http://www.spa.usace.army.mil/reg/JD. This approved JD is valid for 5 years unless new information warrants revision of the determination before the expiration date.

You may accept or appeal this approved JD or provide new information in accordance with the attached Notification of Administration Appeal Options and Process and Request for Appeal. If you elect to appeal this approved JD, you must complete Section II of the form (enclosure 3) and return it to the Army Engineer Division, South Pacific, CESPD-PDS-O, Attn: Travis Morse, Administrative Appeal Review Officer, P.O.

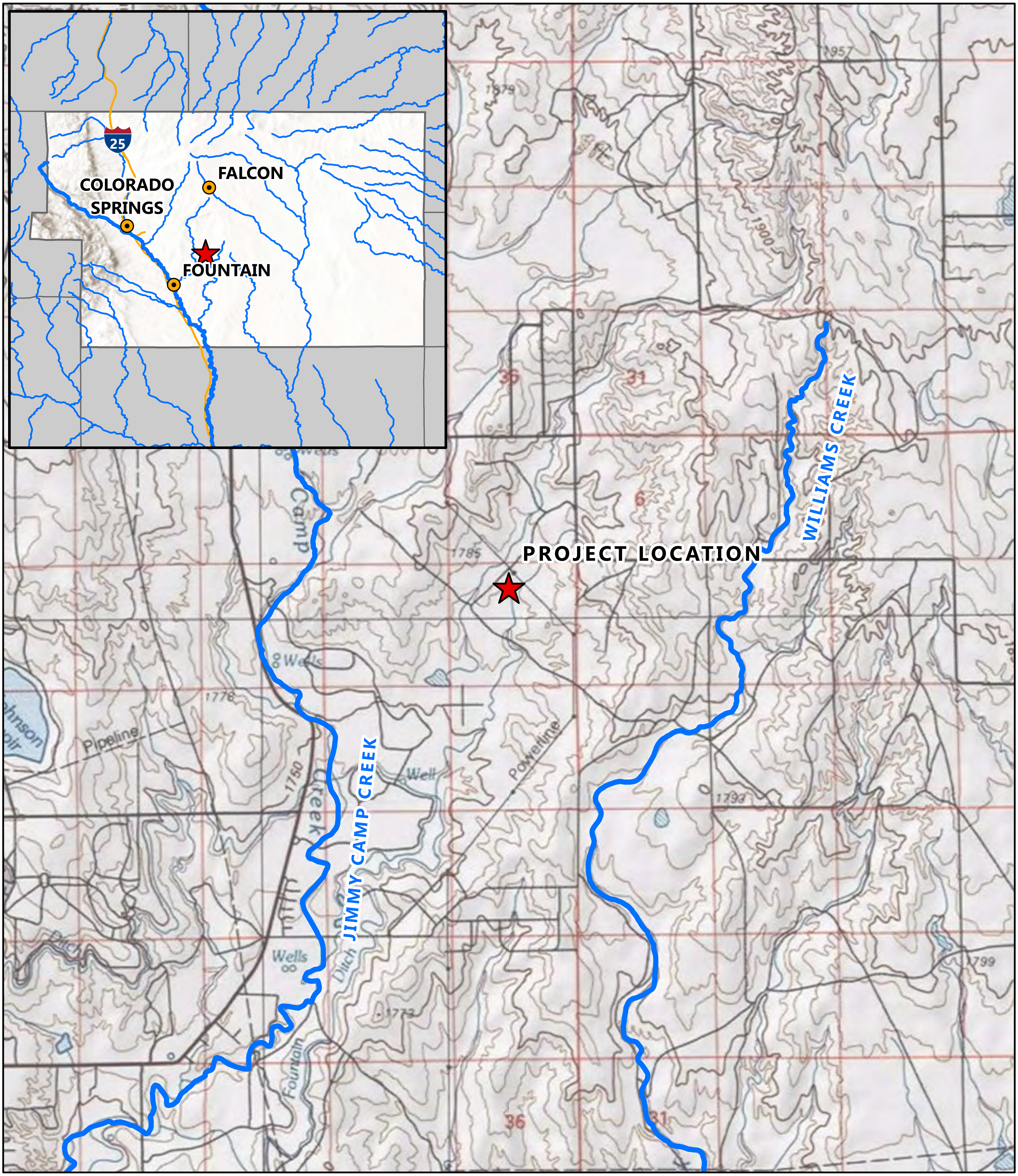
Box 36023, 450 Golden Gate Avenue, San Francisco, CA 94102 within 60 days of the date of this notice. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

Please refer to identification number SPA-2005-00418 in any correspondence concerning this project. If you have any questions, please contact me by email at Daniel.i.Delgado@usace.army.mil, or telephone at (719) 543-9459.

Sincerely,

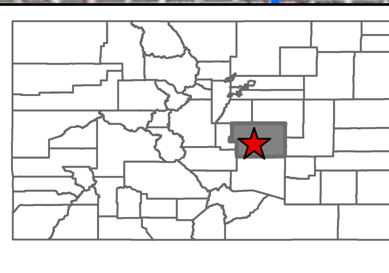
Kara Hellige
Chief, Southern Colorado Branch

Enclosures



ROLLING MEADOWS

Enclosure 1: Location of review area



N

0 0.5 1 Mile

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): USGS, ESRI

Matrix

ROLLING MEADOWS

Enclosure 1: Review Area

EL PASO COUNTY

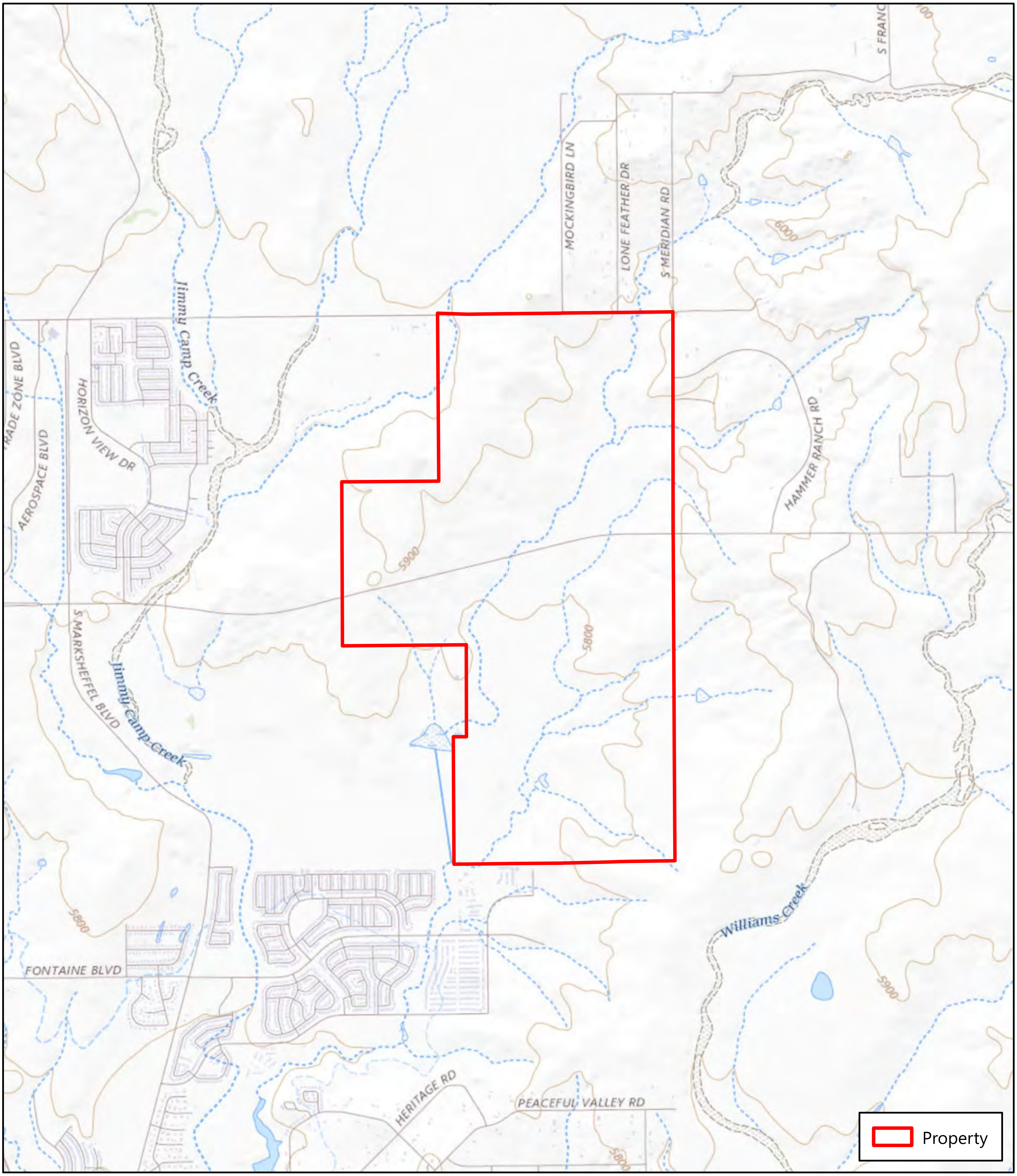
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL

SOURCE(S): ESRI

N

0 500 1,000 Feet

Matrix



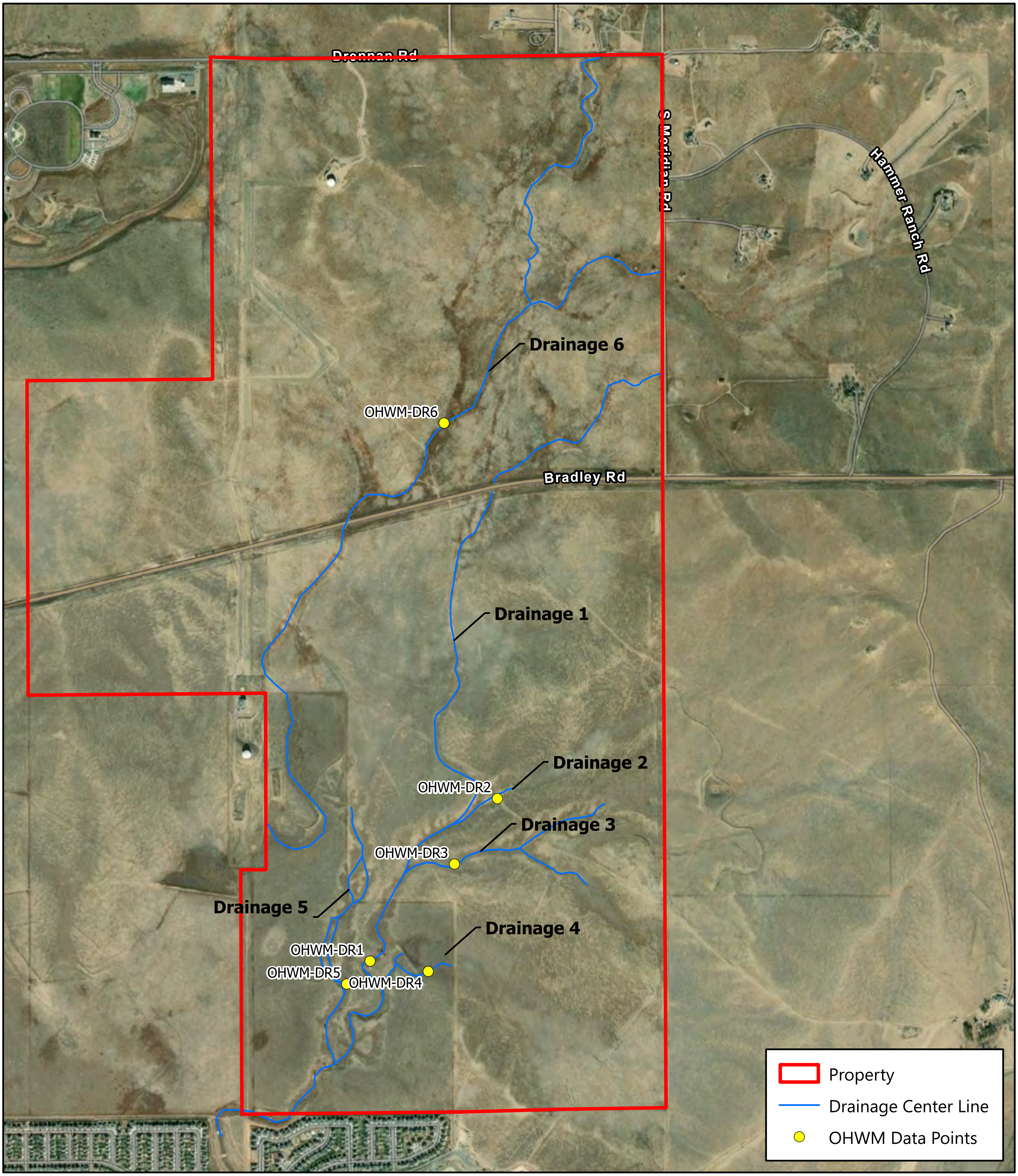
ROLLING MEADOWS

Enclosure 1: Review Area

0 1,500 3,000 Feet

EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): ESRI, USGS

Matrix



ROLLING MEADOWS

Enclosure 1: Review Area Features

N

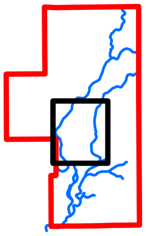
0 500 1,000 Feet

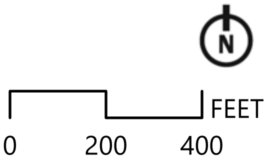
EL PASO COUNTY
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): ESRI

Matrix

ROLLING MEADOWS

Enclosure 1: Review Area Wetlands



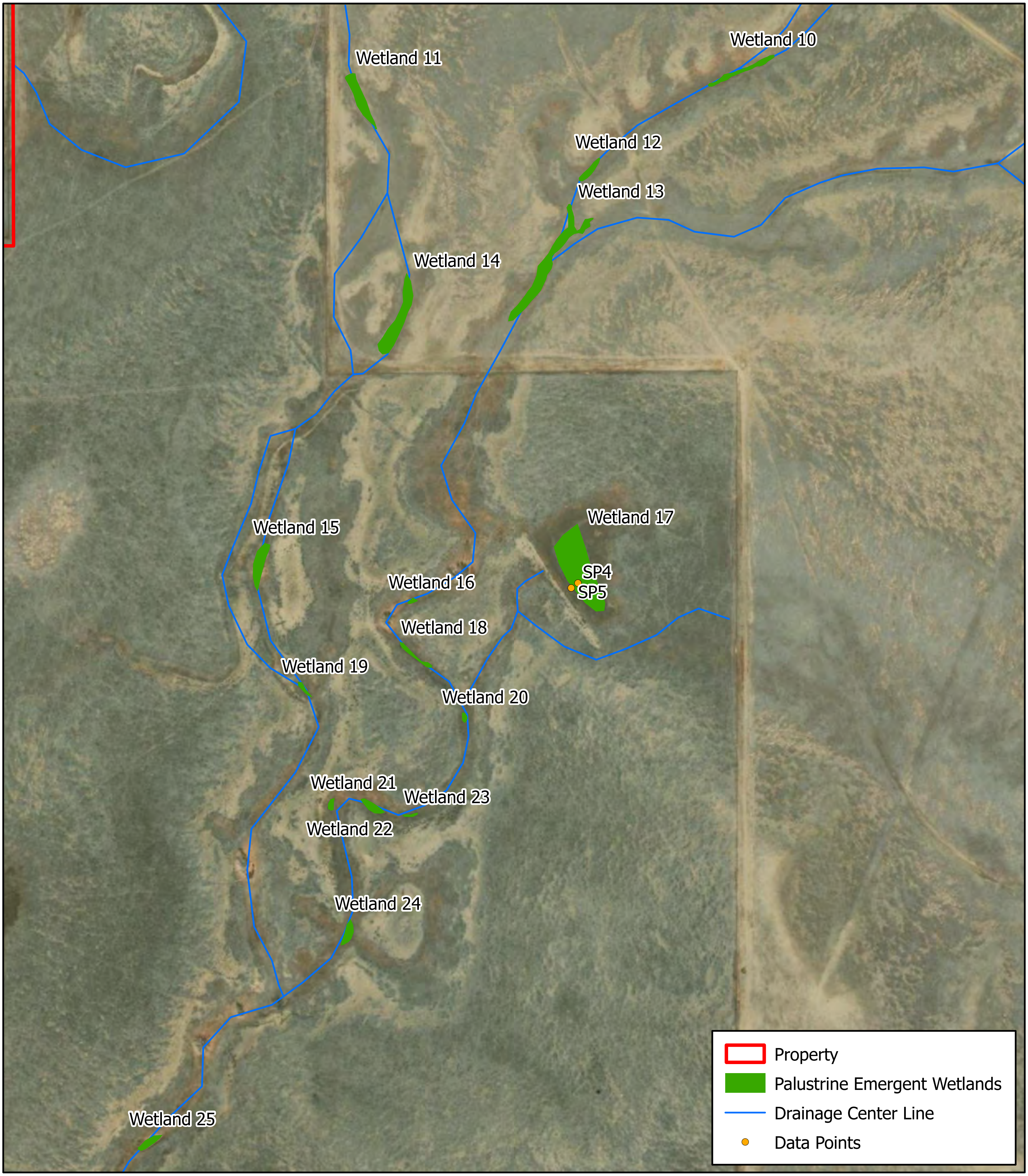


EL PASO

NAD 1983 STATE PLANE (2011) COLORADO CENTRAL

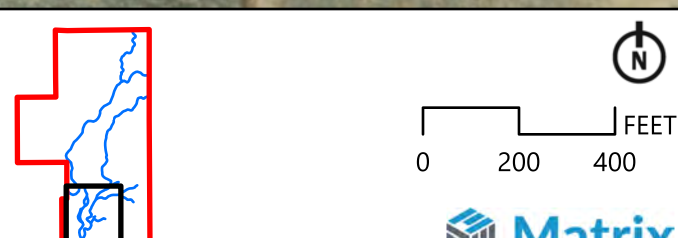
SOURCE(S): USGS, ESRI

Matrix



ROLLING MEADOWS

Enclosure 1: Review Area Wetlands



EL PASO
NAD 1983 STATE PLANE (2011) COLORADO CENTRAL
SOURCE(S): USGS, ESRI

Matrix

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 17 March 2023

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Albuquerque District, ROLLING HILLS RANCH DEVELOPMENT-NORRIS , SPA-2005-00418-SCO

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State: **Colorado** County/parish/borough: **El Paso County** City: **Fountain**
Center coordinates of site (lat/long in degree decimal format): Lat. **38.7633508362061°**, Long. **-104.619855468774°**
Universal Transverse Mercator: **13 533026.8 4290584.5**
Name of nearest waterbody: **Jimmy Camp Creek**
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: **N/A**
Name of watershed or Hydrologic Unit Code (HUC): **10 Digit HUC-Middle Fountain Creek, 1102000303**
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form:

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☒ Office (Desk) Determination. Date: **February XX, 2023**
☒ Field Determination. Date(s): **February 3, 2023**

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Pick List** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet, wide, and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Pick List**
      Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain: **Wetland-1, Wetland-2, Wetland-3 , Wetland-4, Wetland-5 , Wetland-6, Wetland-7 , Wetland-8 , Wetland-9 , Wetland-10 , Wetland-11 , Wetland-12 , Wetland-13, Wetland- 14, Wetland-15, Wetland-16 , Wetland-18 , Wetland-19, Wetland-20, Wetland-21, Wetland-22, Wetland-23, Wetland-24, and Wetland-25 are isolated depressional wetlands lacking a discrete connection between wetlands within the same drainage and a discrete connection to a downstream RPW. Drainage-6 is an isolated water exhibiting an OHWM only within a 2,099-linear feet reach at the northern boundary of the review area, which then transitions to a vegetated swale past this point with no discrete**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

connection to a downstream RPW. Wetland-17 is located within a stock pond constructed in uplands and receiving flows from uplands with no discrete downstream connection to an RPW. See Section IV B. below.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW:

Summarize rationale supporting determination:

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain:

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW[5]:
Tributary stream order, if known:

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain:
☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime:
Other information on duration and volume:

Surface flow is: **Pick List.** Characteristics:

Subsurface flow: **Pick List**. Explain findings:
☐ Dye (or other) test performed:

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.). Explain:
Identify specific pollutants, if known:

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width):
☐ Wetland fringe. Characteristics:
☐ Habitat for:
  ☐ Federally Listed species. Explain findings:
  ☐ Fish/spawn areas. Explain findings:
  ☐ Other environmentally-sensitive species. Explain findings:
  ☐ Aquatic/wildlife diversity. Explain findings:

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
  Wetland size: acres
  Wetland type. Explain:
  Wetland quality. Explain:
Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:
Flow is: **Pick List**. Explain:

Surface flow is**: Pick List**
  Characteristics:

Subsurface flow: **Pick List**. Explain findings:
  ☐ Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:
☐ Directly abutting
☐ Not directly abutting
  ☐ Discrete wetland hydrologic connection. Explain:
  ☐ Ecological connection. Explain:
  ☐ Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW
Project wetlands are **Pick List** river miles from TNW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Flow is from: **Pick List.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain:
Identify specific pollutants, if known:

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width):
☐ Vegetation type/percent cover. Explain:
☐ Habitat for:
  ☐ Federally Listed species. Explain findings:
  ☐ Fish/spawn areas. Explain findings:
  ☐ Other environmentally-sensitive species. Explain findings:
  ☐ Aquatic/wildlife diversity. Explain findings:

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet, wide, Or acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial:
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   ☐ Tributary waters: linear feet wide.
   ☐ Other non-wetland waters: acres.
   Identify type(s) of waters:

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   ☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):

[8]See Footnote # 3.

☐ Tributary waters: linear feet, wide.
☐ Other non-wetland waters: acres.
Identify type(s) of waters:

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.[9]
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain:
☐ Other factors. Explain:

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet, wide.
☐ Other non-wetland waters: acres.
Identify type(s) of waters:
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based <u>solely</u> on the "Migratory Bird Rule" (MBR).

[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain:
☒ Other: (explain, if not covered above): **Isolated depressional wetlands: Wetland-1 (0.02-acre), Wetland-2 (0.0007-acre), Wetland-3 (0.16-acre), Wetland-4 (0.02-acre), Wetland-5 (0.009-acre), Wetland-6 (0.01-acre), Wetland-7 (0.06-acre), Wetland-8 (0.04-acre), Wetland-9 (0.01-acre), Wetland-10 (0.07-acre), Wetland-11 (0.11-acre), Wetland-12 (0.03-acre), Wetland-13 (0.3-acre), Wetland- 14 (0.2-acre), Wetland-15 (0.09-acre) Wetland-16 (0.008-acre), Wetland-18 (0.03-acre), Wetland-19 (0.01-acre), Wetland-20 (0.01-acre), Wetland-21 (0.01-acre), Wetland-22 (0.03-acre), Wetland-23 (0.009-acre), Wetland-24 (0.04-acre), & Wetland-25 (0.03-acre). Isolated waters: Drainage-6 (2,099-linear feet). Stock pond: Wetland-17 (0.5-acre).**

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, wide.
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource:
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, wide.
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource:
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: **Request for Approved Jurisdictional Determination for ROlling Meadows El Paso County, Colorado, dated December 13, 2022**
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  ☒ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps:
☐ Corps navigable waters' study:
☒ U.S. Geological Survey Hydrologic Atlas:
  ☒ USGS NHD data.
  ☐ USGS 8 and 12 digit HUC maps.
☐ U.S. Geological Survey map(s). Cite scale & quad name:
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: **U.S. Natural Resources Conservation Service. Soil Web Sruvey. Custom Soil Resource Report for El Paso County Area, Colorado.**
☐ National wetlands inventory map(s). Cite name:
☐ State/Local wetland inventory map(s):
☐ FEMA/FIRM maps:
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): **Digital Globe aerial imagery (see dates below).**
  or ☒ Other (Name & Date): **Applicant submitted photographs taken on 12 Oct. 2022 & Corps Photos taken 3 Feb. 2023.**
☐ Previous determination(s). File no. and date of response letter:
☐ Applicable/supporting case law:
☐ Applicable/supporting scientific literature:
☒ Other information (please specify): **U.S. Geological Service TNM – National Hydrography Dataset. Data Refreshed January, 2023. USGS The National Map: Orthoimagery. https://apps.nationalmap.gov/viewer/. Accessed 22 Jan. 2023. USACE Anticedent Precipitation Tool. USGS StreamStats Report.**

B. ADDITIONAL COMMENTS TO SUPPORT JD:

The review area for this JD is equivalent to the 1,869-acre survey area depicted on the map set provided in the aquatic resource delineation report prepared by Matrix Design Group, Inc. (Matrix), dated December 13, 2022 (Attached).

Drainage 6:

Drainage-6 is mapped from the northern boundary of the review and terminating at a point within the southern half of the review area, near what appears to be a large above ground storage tank outside the western boundary of the review area. The U.S. Geological Service (USGS) National Hydrography Data (NHD) indicate flows from Drainage-6 have a potential or historically continued outside of the review area to a confluence at the southwestern corner of the review area. Aerial imagery of the review area

indicate flows that may originate within Drainage-6 are currently captured by an approximately 1,325-foot-long earthen berm near the above ground storage tank. Contributing flows to this drainage originate from within and outside of the review area.

The applicant's ordinary high-water mark (OHWM) datasheet indicates Drainage-6 exhibits no indicators of an OHWM and is fully vegetated with upland plant species such as Blue gramma (Bouteloua gracilis), Fetid marigold (Dyssodia papposa), and Russian thistle (Salsola kali) within its potential flow path at the study point north of Bradley Road (longitude 38.7684/ latitude -104.6182). Aerial imagery obtained from Digital Globe for the dates of September 7, 2022, August 19, 2022, July 31, 2022, July 7, 2022, and April 15, 2022, indicate the presence of approximately 2,099-linear feet of an OHWM at the northern most extent of the review area, approximately 1-mile north of Bradley Road. The aerial imagery and applicant's OHWM datasheet indicate the area of OHWM transitions to a vegetative swale throughout the majority of the mapped extent of Drainage-6 north of Bradley Road and south of Bradley Road. South of Bradley Road, Drainage-6 exhibits the presence of a marginal grassy swale within small reaches as evident by aerial imagery depicting vegetation that is greener than the surrounding vegetation. Aerial images for the date range above do not depict a defined flow path near the earthen berm nor do they suggest flows entering the berm area flow past the berm. The lack of a defined OHWM is likely a result of the topography within the review area, which is gently sloping throughout the entirety. An elevation profile of the review area obtained from the USGS National Map Viewer website, approximates an elevation change of approximately 140 feet along an approximately 2.6-mile path across the review area. Based on the information above, the area of Drainage-6 at the northern most extent of the review area exhibits an OHWM with the rest of the flow path to the earthen berm exhibiting patchy, at best, swale features. Considering a flow path is not present past the berm and the drainage is composed primarily of a vegetative swale, Drainage-6 throughout the entirety of the OHWM within the review area to the north is considered isolated and does not meet the criteria of a water of the U.S.

Drainage 5:
Drainage-5 is a shallow vegetated swale throughout its entirety. Aerial imagery indicates an earthen berm intersects the swale midway through its potential flow path. The applicant's site visit and site photos from October 12, 2022, confirm portions of the drainage do not exhibit indicators of an ordinary high-water mark. Four (4) depressional wetlands (Wetland-11 [0.11-acre], Wetland-14 [0.2-acre], Wetland-15 [0.09-acre], & Wetland-19 [0.01-acre]) are located within Drainage-5. The identified wetlands are likely a result of headcuts and scour which are ponding water and creating wetland conditions. Digital Globe aerial imagery does not indicate a discrete flow path between the wetlands. The lack of defined OHWM and flow paths between wetlands is likely a result of the topography within the review area, which is gently sloping throughout the entirety. An elevation profile of the review area obtained from the USGS National Map Viewer website, approximates an elevation change of approximately 140 feet along an approximately 2.6-mile path across the review area. The Natural Resources Conservation Service (NRCS) soil web survey indicates the dominate soil type in and around the wetlands is Sampson loam, 0 to 3 percent slope, which are typically found in depressions, are well drained, and are not rated as hydric. Digital Globe aerial imagery for the dates of 12 Dec 2022, 14 Oct. 2022, 7 Sept. 2022, 19 Aug. 2022, 31 July 22, 7 July 22, and 15 March 22, indicate the presence of surface water within the wetlands from the timeframe on or before 31 July 22, but not earlier than 7 July 22, to a date prior to 7 Sept. 2022. Based on the lack of a discrete connection between Wetlands 11, 14, 15, & 19, and lack of discrete connection to a downstream RPW, the Corps has determined Wetlands 11, Wetland-14, Wetland-15, and Wetland-19 are isolated and do not meet the criteria of a water of the U.S.

Drainage-1:
Drainage-1 is a shallow vegetated swale throughout the potential flow path. This is evident by the lack of an identifiable ordinary high-water mark (OHWM) throughout the extent of drainage and confirmed by applicant submitted photographs taken on October 12, 2022, and a Corps site visit conducted on February 3, 2023. Furthermore, Drainage-1 contains 20 depressional wetlands [i.e., Wetlands-1 (0.02-acre), 2 (0.0007-acre), 3 (0.16-acre), 4 (0.02-acre), 5 (0.009-acre), 6 (0.01-acre), 7 (0.06-acre), 8 (0.04-acre), 9 (0.01-acre), 10 (0.07-acre), 12 (0.03-acre), 13 (0.3-acre), 16 (0.008-acre), 18 (0.03-acre), 20 (0.01-acre), 21 (0.01-acre), 22 (0.03-acre), 23 (0.009-acre), 24 (0.04-acre), & 25 (0.03-acre)] along its potential flow path. Digital Globe aerial imagery, the applicant submitted photographs, and Corps site visit photos do not indicate a discrete flow path between the wetlands. The identified wetlands are likely a result of headcuts and scour which are ponding water and creating wetland conditions. The lack of defined a OHWM and flow paths between wetlands is likely a result of the topography within the review area, which is gently sloping throughout the entirety. An elevation profile of the review area obtained from the USGS National Map Viewer website, approximates an elevation change of approximately 140 feet along an approximately 2.6-mile path across the review area. The Natural Resources Conservation Service (NRCS) soil web survey indicate the dominate soil type in and around the wetlands is Sampson loam, 0 to 3 percent slope, which are typically found in depressions, are well drained, and are not rated as hydric. Digital Globe aerial imagery for the dates of 12 Dec 2022, 14 Oct. 2022, 7 Sept. 2022, 19 Aug. 2022, 31 July 22, 7 July 22, and 15 March 22, indicate the presence of surface water within the wetlands from the timeframe on or before 31 July 22, but not earlier than 7 July 22, to a date prior to 7 Sept. 2022. Based on the lack of a discrete connection between the wetlands, and lack of discrete connection to a downstream RPW, the Corps has determined Wetlands-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 16, 18, 20, 21, 22, 23, 24, & 25 are isolated and do not meet the criteria of a water of the U.S.

Wetland-17:

Wetland-17 (0.5-acre) is located within a stock pond adjacent to Drainage-4. Digital Globe aerial imagery does not indicate an aquatic resource containing an ordinary high-water mark up-stream of the stock pond. The applicant's submitted photographs taken on October 12, 2022, indicate the presence of a vegetated swale below the earthen dam with no indications of an OHWM. Wetland-17 is located within a stock pond that was constructed in uplands and capturing flow from the surrounding uplands, and is, therefore, considered part of the stock-pond. The 1986 preamble to 33 CFR Part 328.3, states that the Corps generally does not consider artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which is used

exclusively for such purposes as stock watering, irrigation, or settling basins to be waters of the U.S. Therefore, Wetland-17 is not a water of the U.S. as it is located within a stock pond.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Jeff Mark; Murray Fountain, LLC	File No.: SPA-2005-00418	Date: March 17, 2023

Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at *http://www.usace.army.mil/cecw/pages/reg_materials.aspx* or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Daniel Delgado Senior Regulatory Project Manager USACE-Albuquerque District, Regulatory Division Southern Colorado Branch, Pueblo Field Office 201 West 8th Street, Suite 350 Pueblo, CO 81003 Phone: (719) 543-9459 Email: Daniel.i.Delgado@usace.army.mil	Travis Morse Administrative Appeal Review Officer U.S. Army Corps of Engineers South Pacific Division 450 Golden Gate Avenue, San Francisco, CA 941021455 Phone: (213) 452-3146 Email: Travis.W.Morse@usace.army.mil

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

______________________________ Signature of appellant or agent.	Date:	Telephone number:

Appendix E

NRCS Web Soil Survey

United States Department of Agriculture

NRCS

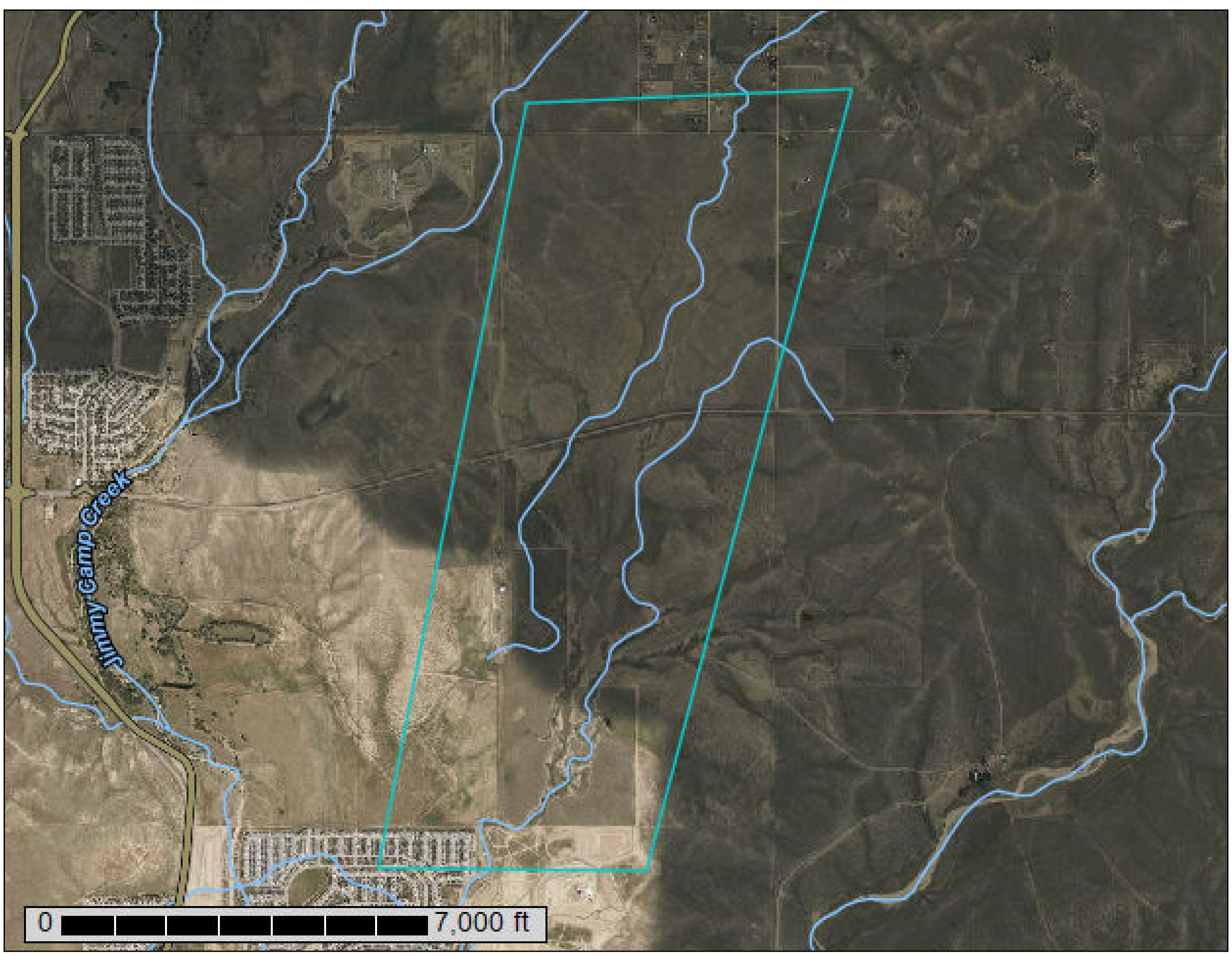
Natural Resources Conservation Service

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

Custom Soil Resource Report for

El Paso County Area, Colorado

Rolling Meadows



August 2, 2022

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

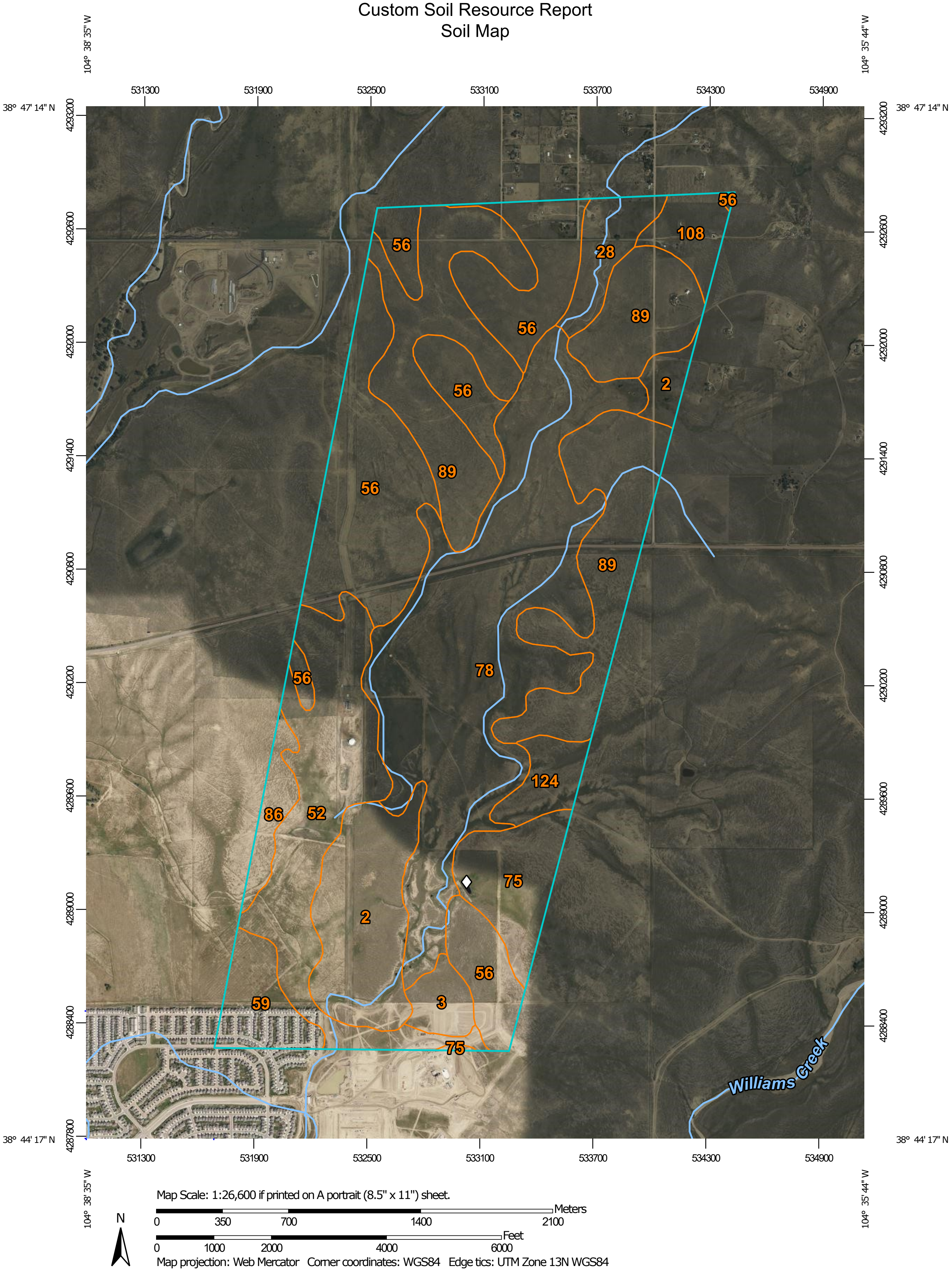
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map


104° 38' 35" W
104° 35' 44" W
38° 47' 14" N
38° 44' 17" N
531300
531900
532500
533100
533700
534300
534900
4293200
4292600
4292000
4291400
4290800
4290200
4289600
4289000
4288400
4287800
56
108
28
89
2
78
124
86
52
75
3
59
Williams Creek
Map Scale: 1:26,600 if printed on A portrait (8.5" x 11") sheet.
Meters
0 350 700 1400 2100
Feet
0 1000 2000 4000 6000
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Aug 14, 2018—Oct 20, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Ascalon sandy loam, 1 to 3 percent slopes	154.3	8.0%
3	Ascalon sandy loam, 3 to 9 percent slopes	27.3	1.4%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	44.5	2.3%
52	Manzanst clay loam, 0 to 3 percent slopes	206.2	10.7%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	375.2	19.5%
59	Nunn clay loam, 0 to 3 percent slopes	53.1	2.8%
75	Razor-Midway complex	78.1	4.1%
78	Sampson loam, 0 to 3 percent slopes	477.5	24.9%
86	Stoneham sandy loam, 3 to 8 percent slopes	29.2	1.5%
89	Tassel fine sandy loam, 3 to 18 percent slopes	404.6	21.1%
108	Wiley silt loam, 3 to 9 percent slopes	35.6	1.9%
124	Olnest sandy loam, 0 to 3 percent slopes	35.7	1.9%
Totals for Area of Interest		**1,921.3**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

El Paso County Area, Colorado

2—Ascalon sandy loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367q
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 130 to 150 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ascalon and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or eolian deposits

Typical profile

A - 0 to 8 inches: sandy loam
Bt - 8 to 21 inches: sandy clay loam
BC - 21 to 27 inches: sandy loam
Ck1 - 27 to 48 inches: sandy loam
Ck2 - 48 to 60 inches: loamy sand

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R069XY026CO - Sandy Plains LRU's A and B
Other vegetative classification: SANDY PLAINS (069BY026CO)
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

3—Ascalon sandy loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2tlny
Elevation: 3,870 to 5,960 feet
Mean annual precipitation: 13 to 18 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 95 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Ascalon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 6 inches: sandy loam
Bt1 - 6 to 12 inches: sandy clay loam
Bt2 - 12 to 19 inches: sandy clay loam
Bk1 - 19 to 35 inches: fine sandy loam
Bk2 - 35 to 80 inches: fine sandy loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 5.98 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.1 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Olnest

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Vona

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

28—Ellicott loamy coarse sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 3680
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Ellicott and similar soils: 97 percent
Minor components: 3 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ellicott

Setting

Landform: Flood plains, stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile

A - 0 to 4 inches: loamy coarse sand
C - 4 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R069XY031CO - Sandy Bottomland LRU's A and B
Other vegetative classification: SANDY BOTTOMLAND (069AY031CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquoll

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

Other soils

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

Pleasant

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

52—Manzanst clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w4nr
Elevation: 4,060 to 6,660 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Manzanst and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manzanst

Setting

Landform: Terraces, drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Clayey alluvium derived from shale

Typical profile

A - 0 to 3 inches: clay loam
Bt - 3 to 12 inches: clay
Btk - 12 to 37 inches: clay
Bk1 - 37 to 52 inches: clay
Bk2 - 52 to 79 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 3 percent
Maximum salinity: Slightly saline (4.0 to 7.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C

Ecological site: R067BY037CO - Saline Overflow
Hydric soil rating: No

Minor Components

Ritoazul

Percent of map unit: 7 percent
Landform: Drainageways, interfluves
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY042CO - Clayey Plains
Hydric soil rating: No

Arvada

Percent of map unit: 6 percent
Landform: Drainageways, interfluves
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY033CO - Salt Flat
Hydric soil rating: No

Wiley

Percent of map unit: 2 percent
Landform: Interfluves
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains
Hydric soil rating: No

56—Nelson-Tassel fine sandy loams, 3 to 18 percent slopes

Map Unit Setting

National map unit symbol: 3690
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Nelson and similar soils: 55 percent
Tassel and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nelson

Setting

Landform: Hills
Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous residuum weathered from interbedded sedimentary rock

Typical profile

A - 0 to 5 inches: fine sandy loam
Ck - 5 to 23 inches: fine sandy loam
Cr - 23 to 27 inches: weathered bedrock

Properties and qualities

Slope: 3 to 12 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R067BY045CO - Shaly Plains
Other vegetative classification: SHALY PLAINS (069AY046CO)
Hydric soil rating: No

Description of Tassel

Setting

Landform: Hills
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous slope alluvium over residuum weathered from sandstone

Typical profile

A - 0 to 4 inches: fine sandy loam
C - 4 to 10 inches: fine sandy loam
Cr - 10 to 14 inches: weathered bedrock

Properties and qualities

Slope: 3 to 18 percent
Depth to restrictive feature: 6 to 20 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: R067BY045CO - Shaly Plains
Other vegetative classification: SHALY PLAINS (069AY046CO)
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

59—Nunn clay loam, 0 to 3 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Nunn

Setting

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

Typical profile

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

C - 58 to 72 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

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

Minor Components

Other soils

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

Pleasant

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

75—Razor-Midway complex

Map Unit Setting

National map unit symbol: 369p
Elevation: 5,300 to 6,100 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Razor and similar soils: 60 percent
Midway and similar soils: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Razor

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, concave
Across-slope shape: Linear
Parent material: Clayey slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 4 inches: stony clay loam
Bw - 4 to 22 inches: cobbly clay loam
Bk - 22 to 29 inches: cobbly clay
Cr - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

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

Description of Midway

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 4 inches: clay loam
C - 4 to 13 inches: clay
Cr - 13 to 17 inches: weathered bedrock

Properties and qualities

Slope: 3 to 25 percent
Depth to restrictive feature: 6 to 20 inches to paralithic bedrock
Drainage class: Well drained

Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 15 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R069XY046CO - Shaly Plains LRU's A and B
Other vegetative classification: SHALY PLAINS (069AY045CO)
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

78—Sampson loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 369s
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Sampson

Setting

Landform: Depressions, alluvial fans, terraces

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 15 inches: loam
Bt - 15 to 34 inches: clay loam
Bk - 34 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B
Ecological site: R049XB202CO - Loamy Foothill
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

86—Stoneham sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 36b2
Elevation: 5,100 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Stoneham

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous loamy alluvium

Typical profile

A - 0 to 4 inches: sandy loam
Bt - 4 to 8 inches: sandy clay loam
Btk - 8 to 11 inches: sandy clay loam
Ck - 11 to 60 inches: loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R067BY024CO - Sandy Plains
Other vegetative classification: SANDY PLAINS (069AY026CO)
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

89—Tassel fine sandy loam, 3 to 18 percent slopes

Map Unit Setting

National map unit symbol: 36b5
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 51 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Tassel

Setting

Landform: Hills
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous slope alluvium over residuum weathered from sandstone

Typical profile

A - 0 to 4 inches: fine sandy loam
C - 4 to 10 inches: sandy loam
Cr - 10 to 14 inches: weathered bedrock

Properties and qualities

Slope: 3 to 18 percent
Depth to restrictive feature: 6 to 20 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: R067BY024CO - Sandy Plains
Other vegetative classification: SANDY PLAINS (069AY026CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

108—Wiley silt loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 367b
Elevation: 5,200 to 6,200 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Wiley

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous silty eolian deposits

Typical profile

A - 0 to 4 inches: silt loam
Bt - 4 to 16 inches: silt loam
Bk - 16 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R067BY002CO - Loamy Plains
Other vegetative classification: LOAMY PLAINS (069AY006CO)
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

124—Olnest sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2t51j
Elevation: 4,500 to 6,100 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Olnest and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Olnest

Setting

Landform: Sand sheets
Parent material: Eolian sands

Typical profile

A - 0 to 4 inches: sandy loam
Bt - 4 to 20 inches: sandy clay loam
Bk1 - 20 to 48 inches: sandy loam
Bk2 - 48 to 79 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 14 percent
Maximum salinity: Very slightly saline (2.0 to 3.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups
Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Udic haplusterts, ponded
Percent of map unit: 5 percent
Landform: Closed depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R067BY010CO - Closed Upland Depression
Hydric soil rating: No

Otero
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Vona
Percent of map unit: 5 percent
Landform: Sand sheets
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

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Appendix F

Hydraulic Modeling

HY-8 Model

HY-8 Culvert Analysis Report

Table 1 - Project Headwater Table

Crossing Name	Culvert Name	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	HW / D (ft)	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Outlet Velocity (ft/s)
Bradley Rd Crossing_BridgeCOR	BridgeCOR	4400.00	3399.13	5833.48	10.00	13.039	0.96	13.59	5.77	11.27	8.09
Bradley Rd Crossing_BridgeCOR	Existing Culverts	4400.00	1000.84	5833.48	28.01	21.933	3.50	8.00	8.00	8.00	22.92

Crossing Input: Bradley Rd Crossing_BridgeCOR

Parameter	Value	Units
DISCHARGE DATA		
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	1100.000	cfs
Design Flow	4400.000	cfs
Maximum Flow	4400.000	cfs
TAILWATER DATA		
Channel Type	Irregular Channel	
Irregular Channel	Define...	
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Constant Roadway Elevation	
First Roadway Station	0.000	ft
Crest Length	1000.000	ft
Crest Elevation	5817.000	ft
Roadway Surface	Paved	
Top Width	50.000	ft

Culvert Input: Bradley Rd Crossing_BridgeCOR

Parameter	Value	Units
CULVERT DATA		
Name	BridgeCOR	
Shape	User Defined	
Material	Corrugated Metal Riveted or Welded	
Coordinates	Define...	
Span	42.990	ft
Rise	13.590	ft
Embedment Depth	0.000	in
Manning's n (Top/Sides)	0.035	
Manning's n (Bottom)	0.035	
Culvert Type	Straight	
Inlet Configuration	Square Edge with Headwall (Ke=0.5)	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	8332.010	ft
Inlet Elevation	5798.940	ft
Outlet Station	8110.020	ft
Outlet Elevation	5798.390	ft
Number of Barrels	1	
Computed Culvert Slope	0.002478	ft/ft

Culvert Input: Bradley Rd Crossing_BridgeCOR

Parameter	Value	Units
CULVERT DATA		
Name	Existing Culverts	
Shape	Concrete Box	
Material	Concrete	
Span	12.000	ft
Rise	8.000	ft
Embedment Depth	0.000	in
Manning's n	0.012	
Culvert Type	Straight	
Inlet Configuration	Square Edge (90º) Headwall (Ke=0.5)	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	5805.470	ft
Outlet Station	219.000	ft
Outlet Elevation	5804.850	ft
Number of Barrels	2	
Computed Culvert Slope	0.002831	ft/ft

Table 2 - Culvert Summary Table: BridgeCOR

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	HW / D (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
1100.00	913.90	5808.18	4.10	9.245	0.68	3-M1t	4.35	2.41	9.57	2.49	2.43	21.35
1430.00	1174.27	5808.55	4.86	9.613	0.71	3-M1t	5.17	2.85	9.82	2.74	3.07	23.27
1760.00	1430.89	5808.92	5.55	9.978	0.73	3-M1t	5.94	3.25	10.03	2.95	3.68	24.89
2090.00	1684.00	5809.28	6.19	10.343	0.76	3-M1t	6.72	3.62	10.23	3.15	4.27	26.29
2420.00	1934.14	5809.65	6.80	10.712	0.79	3-M1t	7.51	3.97	10.41	3.33	4.85	27.53
2750.00	2182.18	5810.03	7.35	11.087	0.82	3-M1t	8.38	4.30	10.58	3.50	5.41	28.65
3080.00	2392.47	5810.65	7.81	11.713	0.86	3-M1t	9.18	4.57	11.07	3.99	5.76	16.18
3410.00	2644.63	5810.96	8.36	12.017	0.88	3-M1t	10.33	4.88	11.12	4.04	6.35	16.84
3740.00	2896.22	5811.28	8.91	12.339	0.91	3-M2t	13.59	5.18	11.17	4.09	6.93	17.46
4070.00	3147.60	5811.62	9.46	12.679	0.93	3-M2t	13.59	5.48	11.22	4.14	7.51	18.05
4400.00	3399.13	5833.48	10.00	13.039	0.96	3-M2t	13.59	5.77	11.27	4.19	8.09	18.61
4400.00	3360.40	5812.17	9.92	12.988	0.96	3-M2t	13.59	5.72	11.27	4.19	8.00	18.61

Water Surface Profile Plot for Culvert: BridgeCOR

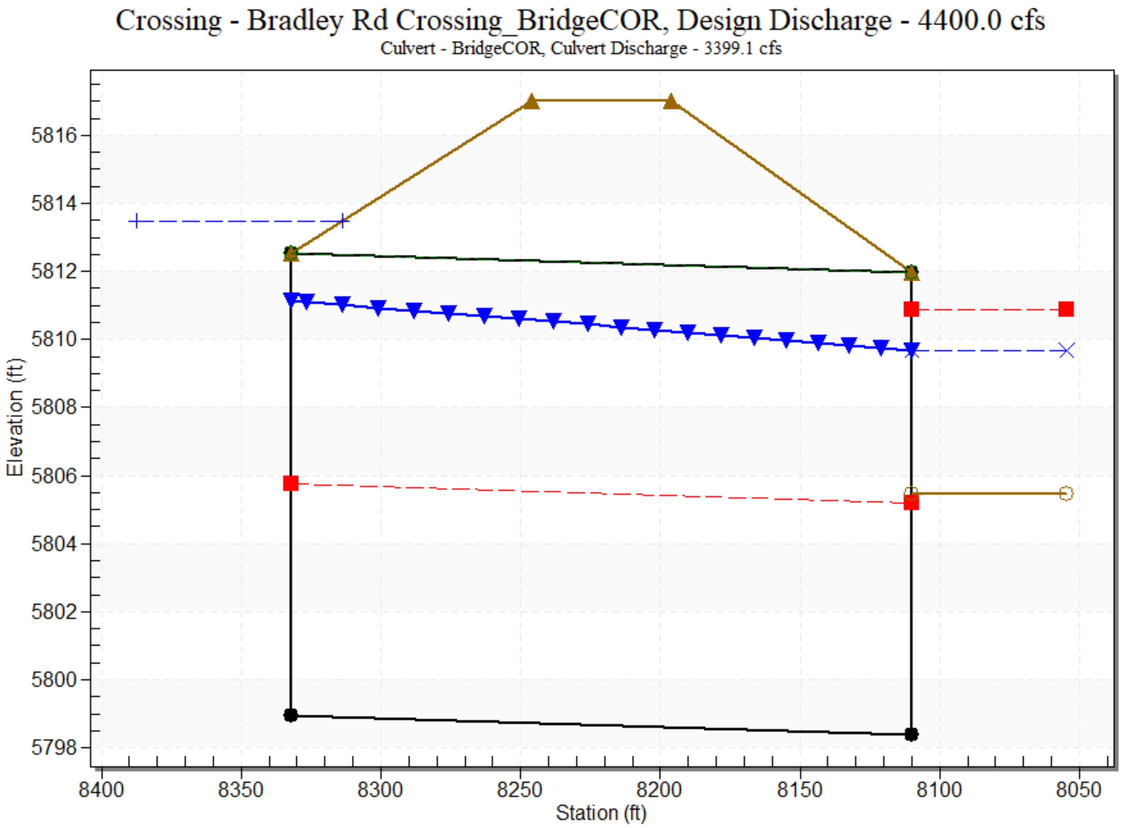
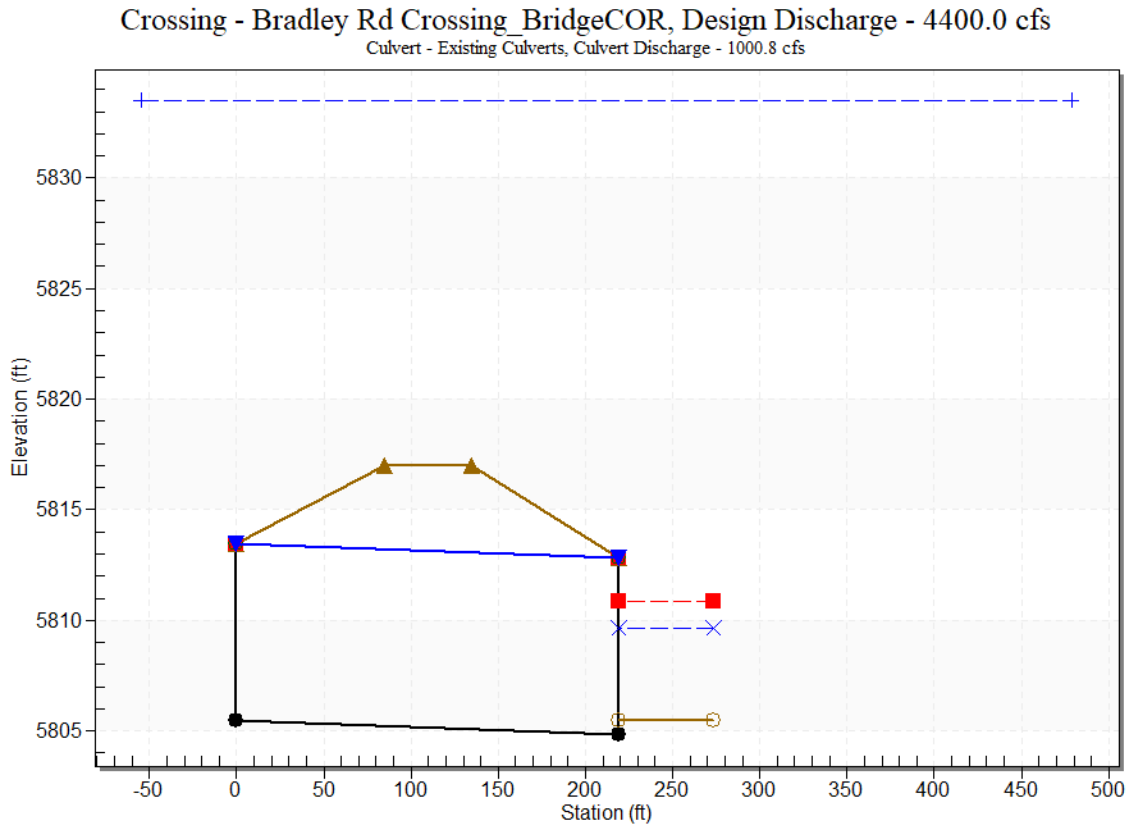


Table 3 - Culvert Summary Table: Existing Culverts

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	HW / D (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
1100.00	186.38	5808.18	2.11	2.715	0.34	1-S1t	1.18	1.23	3.11	2.49	2.49	21.35
1430.00	255.77	5808.55	2.61	3.082	0.39	1-S1t	1.45	1.52	3.36	2.74	3.18	23.27
1760.00	329.28	5808.92	3.09	3.446	0.43	1-S1t	1.71	1.80	3.57	2.95	3.84	24.89
2090.00	406.03	5809.28	3.55	3.811	0.48	1-S1t	1.97	2.07	3.77	3.15	4.49	26.29
2420.00	485.87	5809.65	4.00	4.181	0.52	1-S1t	2.22	2.33	3.95	3.33	5.12	27.53
2750.00	567.95	5810.03	4.42	4.556	0.57	1-S1t	2.47	2.59	4.12	3.50	5.74	28.65
3080.00	687.55	5810.65	5.00	5.183	0.65	1-S1t	2.81	2.94	4.61	3.99	6.22	16.18
3410.00	765.37	5810.96	5.36	5.486	0.69	1-S1t	3.03	3.16	4.66	4.04	6.84	16.84
3740.00	843.68	5811.28	5.71	5.807	0.73	1-S1t	3.24	3.37	4.71	4.09	7.46	17.46
4070.00	922.47	5811.62	6.06	6.149	0.77	1-S1t	3.45	3.58	4.76	4.14	8.08	18.05
4400.00	1000.84	5813.47	28.01	21.933	3.50	6-FFc	8.00	8.00	8.00	4.19	22.92	18.61
4400.00	1039.59	5812.17	6.55	6.700	0.84	1-S1t	3.75	3.88	4.81	4.19	9.01	18.61

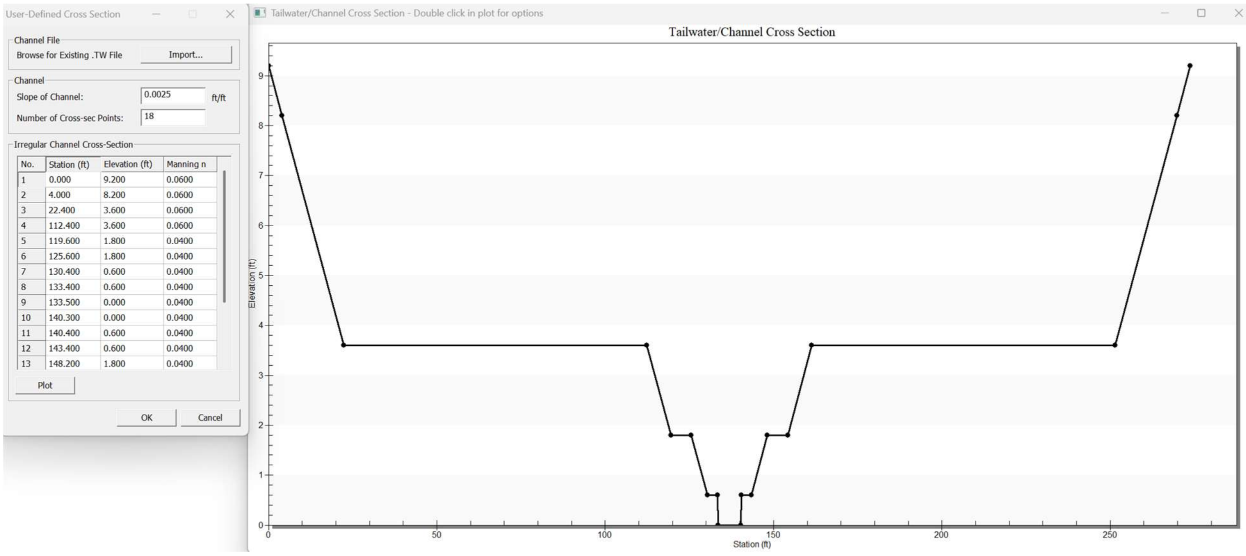
Water Surface Profile Plot for Culvert: Existing Culverts



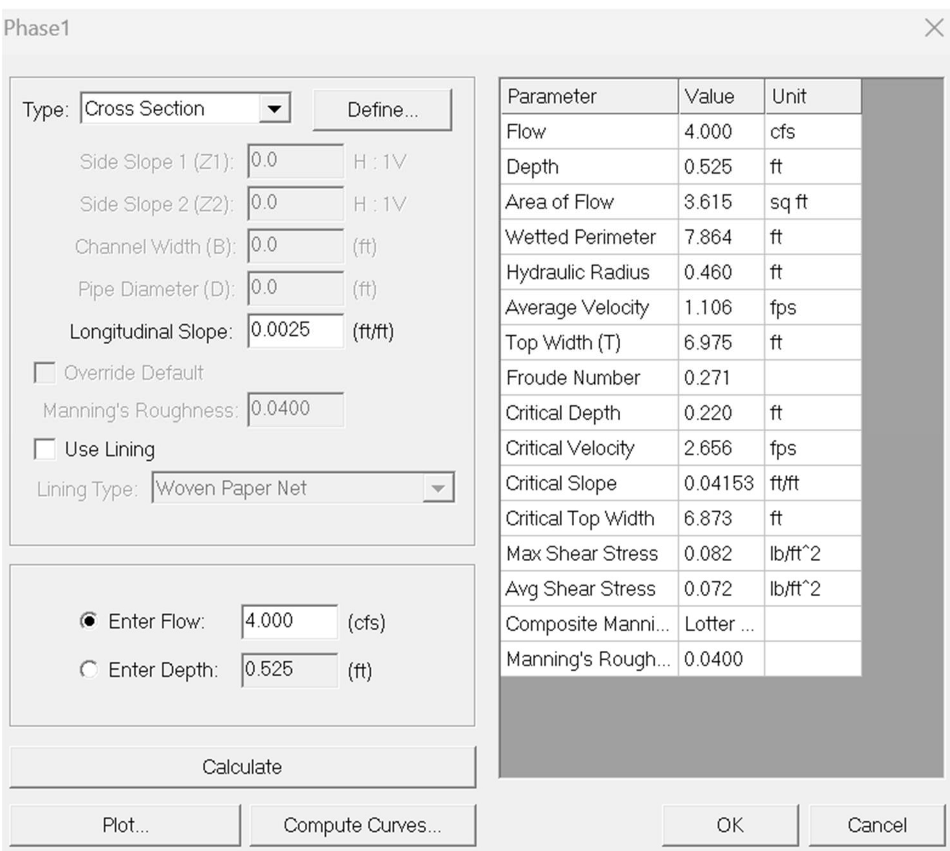
Hydraulic Toolbox Results

Rolling Meadows Hydraulic Toolbox Results – Phase 1

May 2026

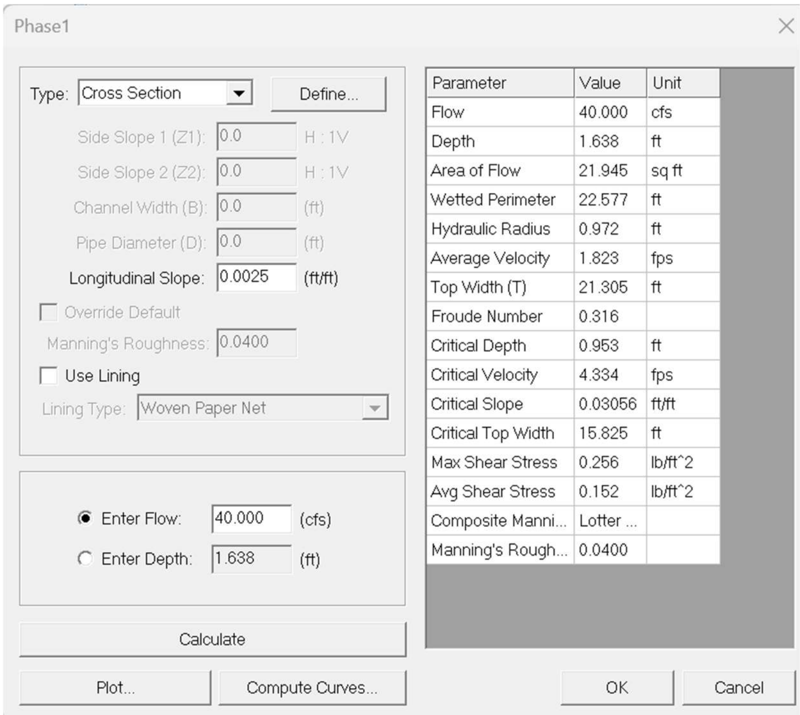


Baseflow (4 cfs)



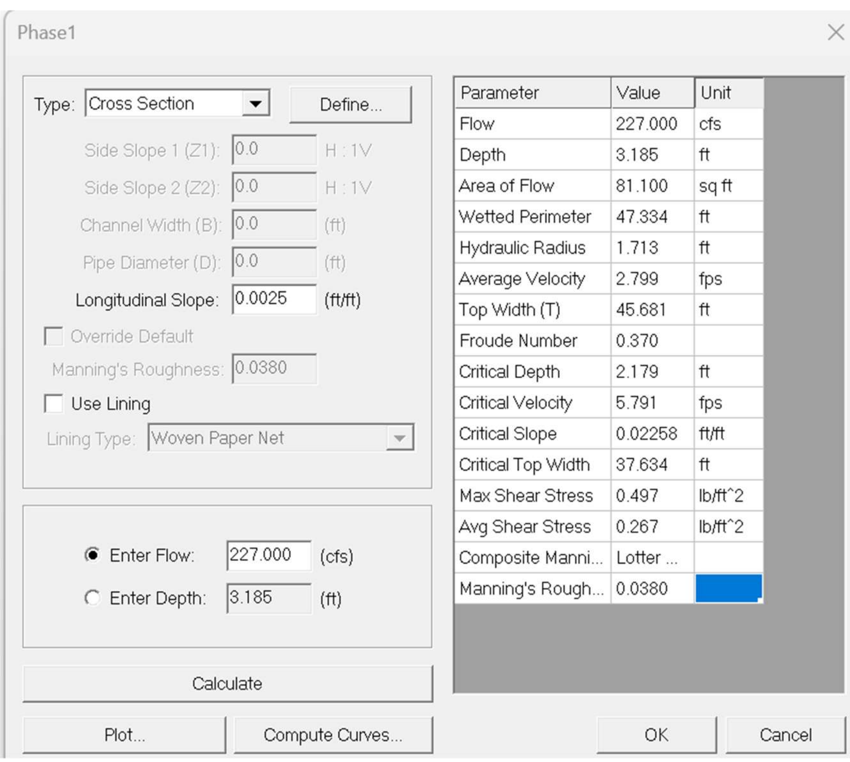
Parameter	Value	Unit
Flow	4.000	cfs
Depth	0.525	ft
Area of Flow	3.615	sq ft
Wetted Perimeter	7.864	ft
Hydraulic Radius	0.460	ft
Average Velocity	1.106	fps
Top Width (T)	6.975	ft
Froude Number	0.271	
Critical Depth	0.220	ft
Critical Velocity	2.656	fps
Critical Slope	0.04153	ft/ft
Critical Top Width	6.873	ft
Max Shear Stress	0.082	lb/ft^2
Avg Shear Stress	0.072	lb/ft^2
Composite Manni...	Lotter ...	
Manning's Rough...	0.0400	

Bankfull (40 cfs)



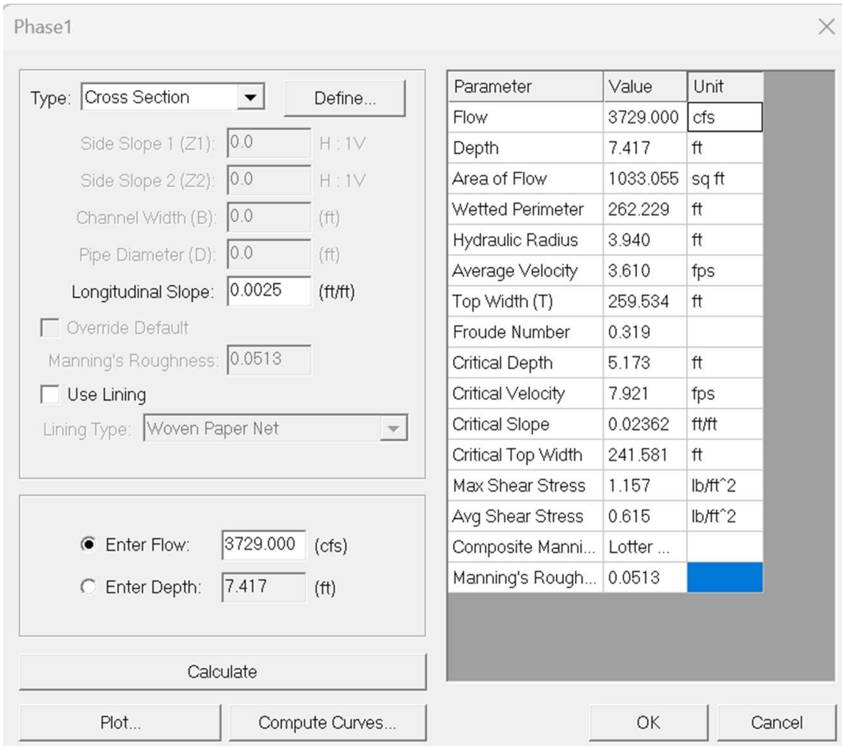
Parameter	Value	Unit
Flow	40.000	cfs
Depth	1.638	ft
Area of Flow	21.945	sq ft
Wetted Perimeter	22.577	ft
Hydraulic Radius	0.972	ft
Average Velocity	1.823	fps
Top Width (T)	21.305	ft
Froude Number	0.316	
Critical Depth	0.953	ft
Critical Velocity	4.334	fps
Critical Slope	0.03056	ft/ft
Critical Top Width	15.825	ft
Max Shear Stress	0.256	lb/ft^2
Avg Shear Stress	0.152	lb/ft^2
Composite Manni...	Lotter ...	
Manning's Rough...	0.0400	

Low (227 cfs)



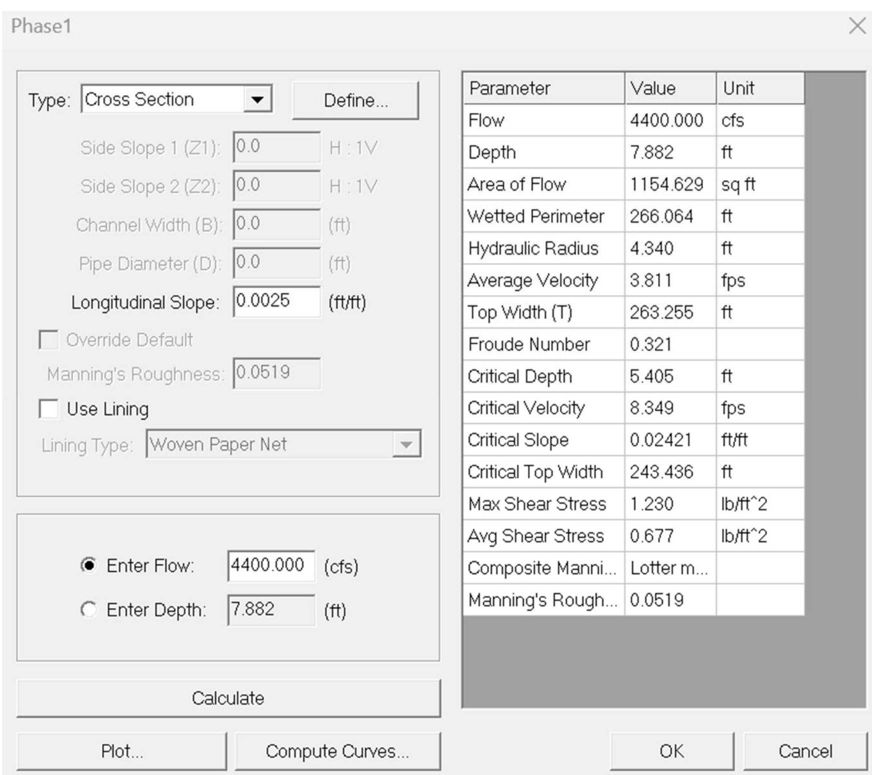
Parameter	Value	Unit
Flow	227.000	cfs
Depth	3.185	ft
Area of Flow	81.100	sq ft
Wetted Perimeter	47.334	ft
Hydraulic Radius	1.713	ft
Average Velocity	2.799	fps
Top Width (T)	45.681	ft
Froude Number	0.370	
Critical Depth	2.179	ft
Critical Velocity	5.791	fps
Critical Slope	0.02258	ft/ft
Critical Top Width	37.634	ft
Max Shear Stress	0.497	lb/ft^2
Avg Shear Stress	0.267	lb/ft^2
Composite Manni...	Lotter ...	
Manning's Rough...	0.0380	

10-year (3,729 cfs)



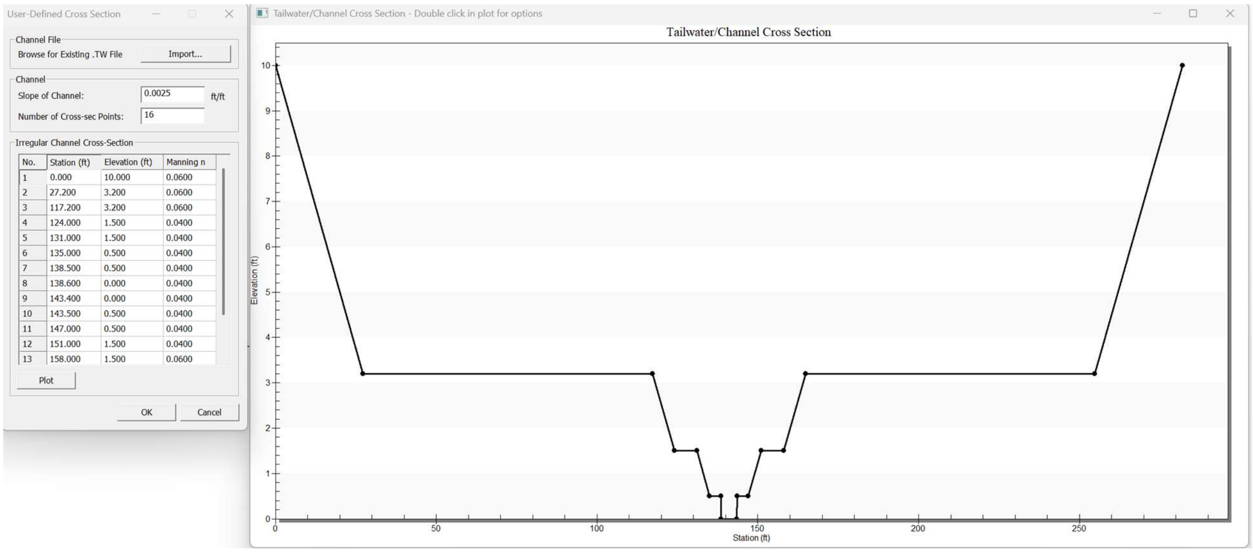
Parameter	Value	Unit
Flow	3729.000	cfs
Depth	7.417	ft
Area of Flow	1033.055	sq ft
Wetted Perimeter	262.229	ft
Hydraulic Radius	3.940	ft
Average Velocity	3.610	fps
Top Width (T)	259.534	ft
Froude Number	0.319	
Critical Depth	5.173	ft
Critical Velocity	7.921	fps
Critical Slope	0.02362	ft/ft
Critical Top Width	241.581	ft
Max Shear Stress	1.157	lb/ft^2
Avg Shear Stress	0.615	lb/ft^2
Composite Manni...	Lotter ...	
Manning's Rough...	0.0513	

100-year (4,400 cfs)

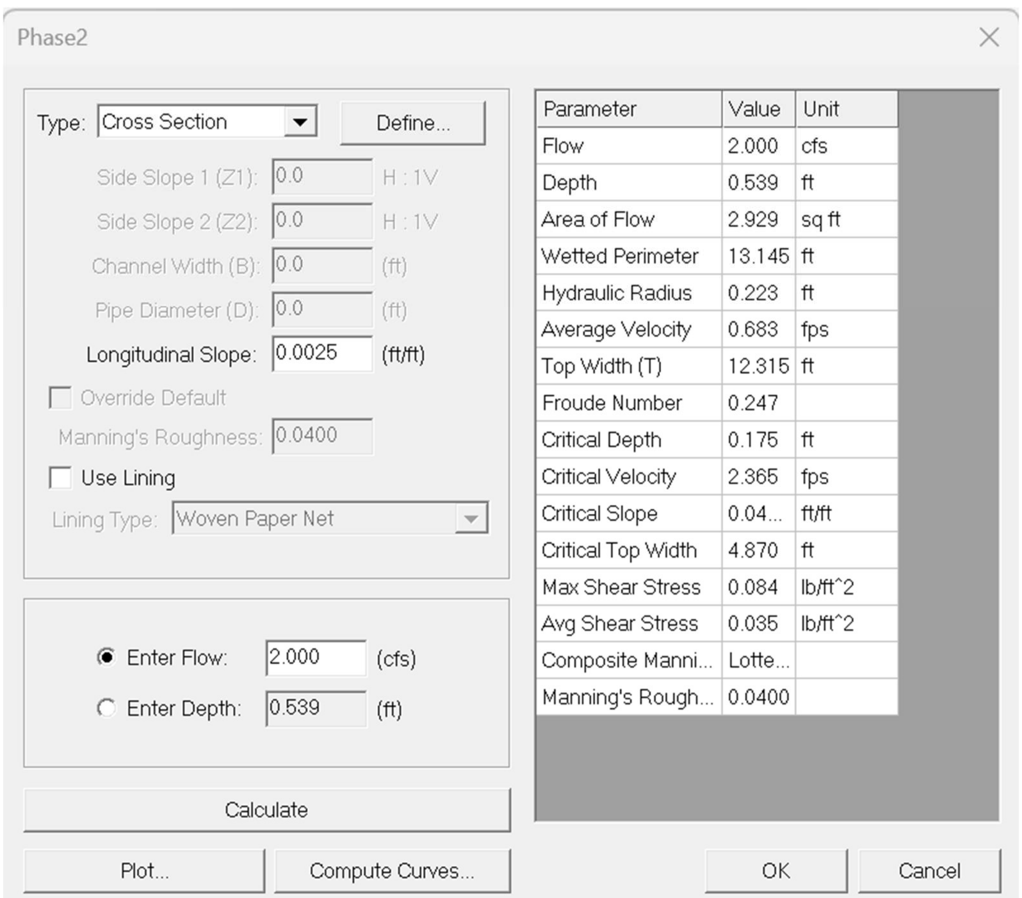


Parameter	Value	Unit
Flow	4400.000	cfs
Depth	7.882	ft
Area of Flow	1154.629	sq ft
Wetted Perimeter	266.064	ft
Hydraulic Radius	4.340	ft
Average Velocity	3.811	fps
Top Width (T)	263.255	ft
Froude Number	0.321	
Critical Depth	5.405	ft
Critical Velocity	8.349	fps
Critical Slope	0.02421	ft/ft
Critical Top Width	243.436	ft
Max Shear Stress	1.230	lb/ft^2
Avg Shear Stress	0.677	lb/ft^2
Composite Manni...	Lotter m...	
Manning's Rough...	0.0519	

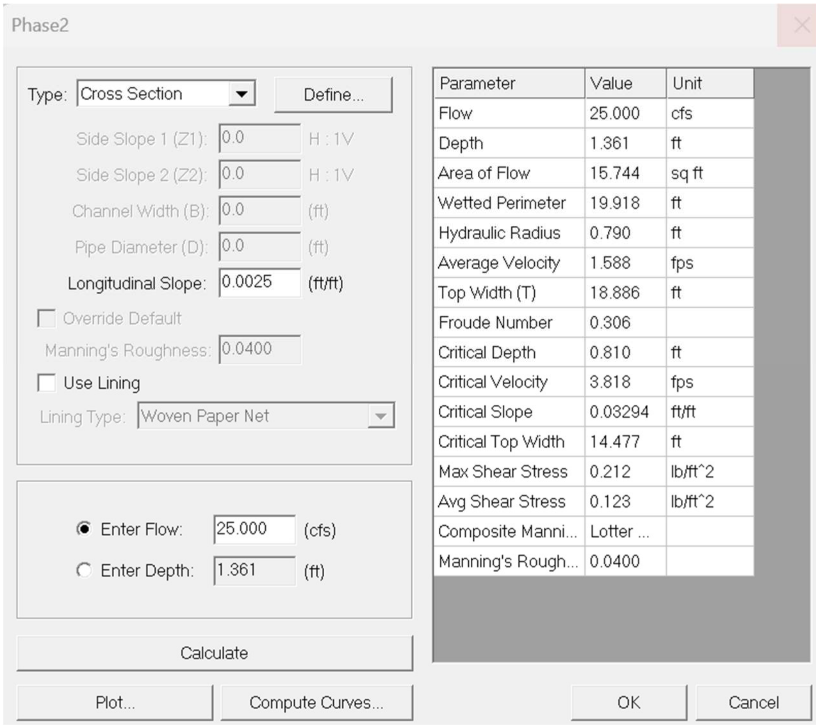
Phase 2



Baseflow (2 cfs)

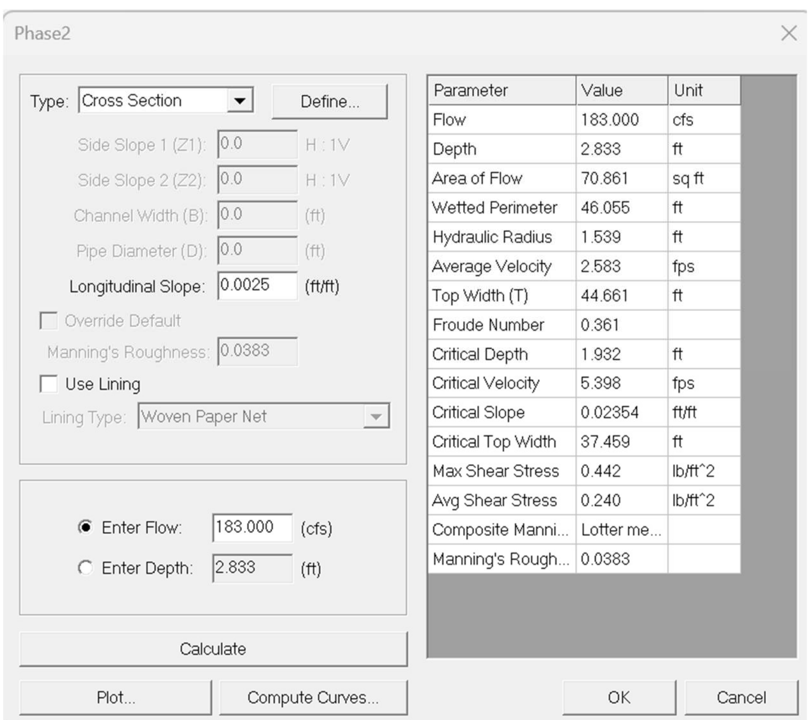


Bankfull (25 cfs)



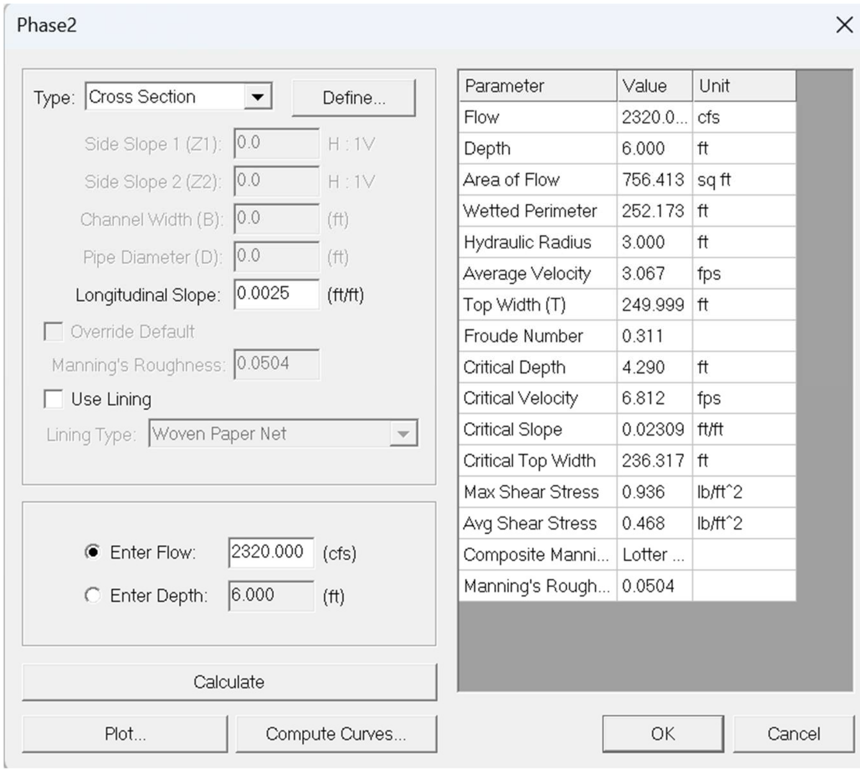
Parameter	Value	Unit
Flow	25.000	cfs
Depth	1.361	ft
Area of Flow	15.744	sq ft
Wetted Perimeter	19.918	ft
Hydraulic Radius	0.790	ft
Average Velocity	1.588	fps
Top Width (T)	18.886	ft
Froude Number	0.306	
Critical Depth	0.810	ft
Critical Velocity	3.818	fps
Critical Slope	0.03294	ft/ft
Critical Top Width	14.477	ft
Max Shear Stress	0.212	lb/ft^2
Avg Shear Stress	0.123	lb/ft^2
Composite Manni...	Lotter ...	
Manning's Rough...	0.0400	

Low Flow (183 cfs)

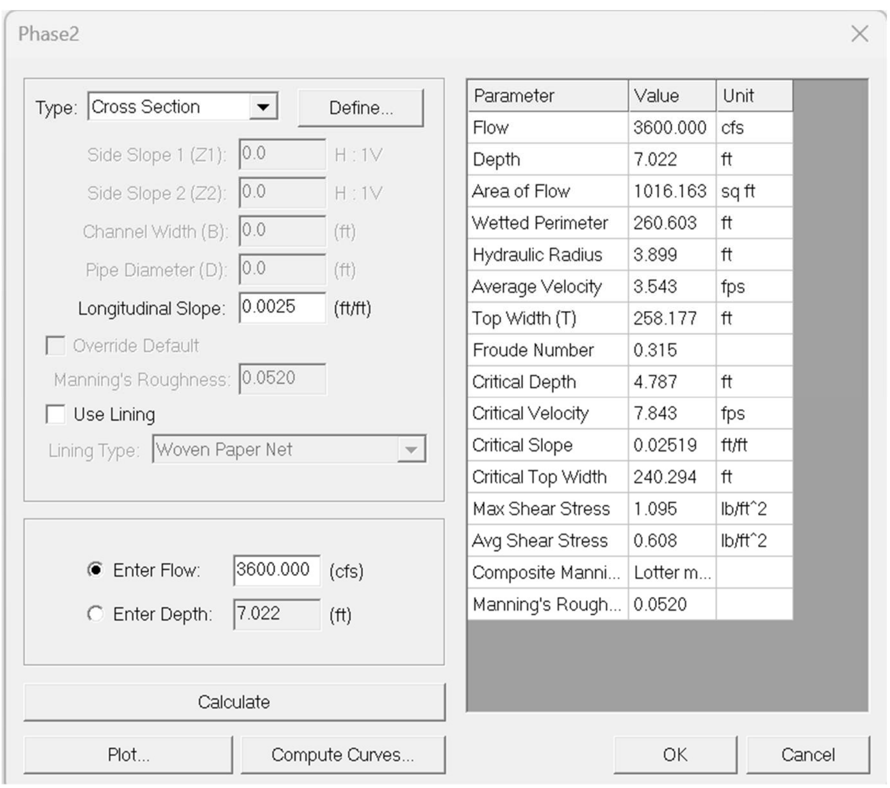


Parameter	Value	Unit
Flow	183.000	cfs
Depth	2.833	ft
Area of Flow	70.861	sq ft
Wetted Perimeter	46.055	ft
Hydraulic Radius	1.539	ft
Average Velocity	2.583	fps
Top Width (T)	44.661	ft
Froude Number	0.361	
Critical Depth	1.932	ft
Critical Velocity	5.398	fps
Critical Slope	0.02354	ft/ft
Critical Top Width	37.459	ft
Max Shear Stress	0.442	lb/ft^2
Avg Shear Stress	0.240	lb/ft^2
Composite Manni...	Lotter me...	
Manning's Rough...	0.0383	

10-year (2,320 cfs)

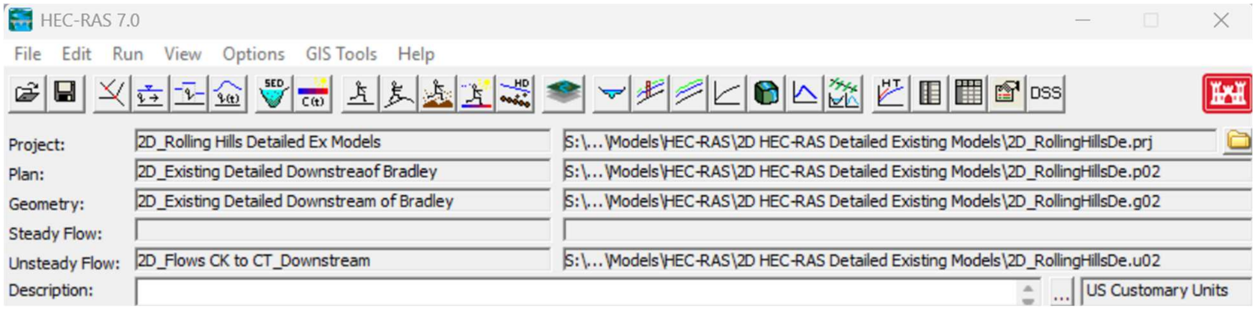


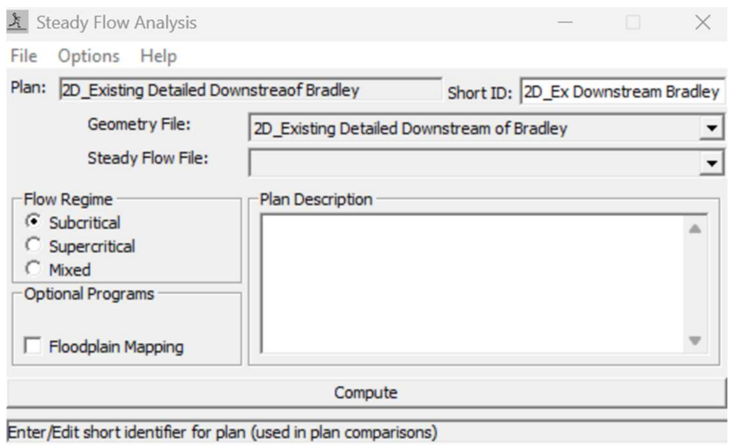
100-year (3,600 cfs)

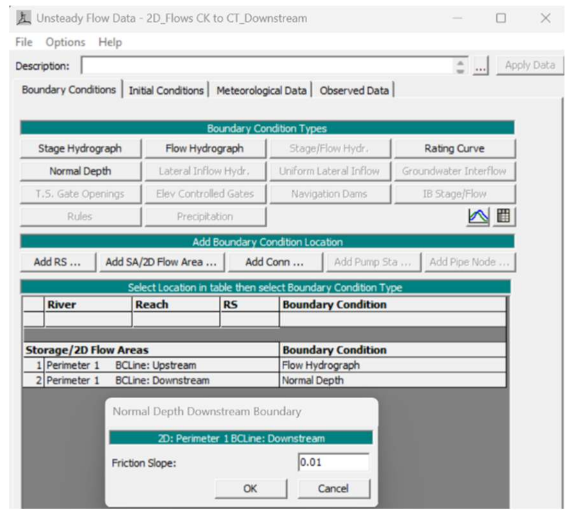


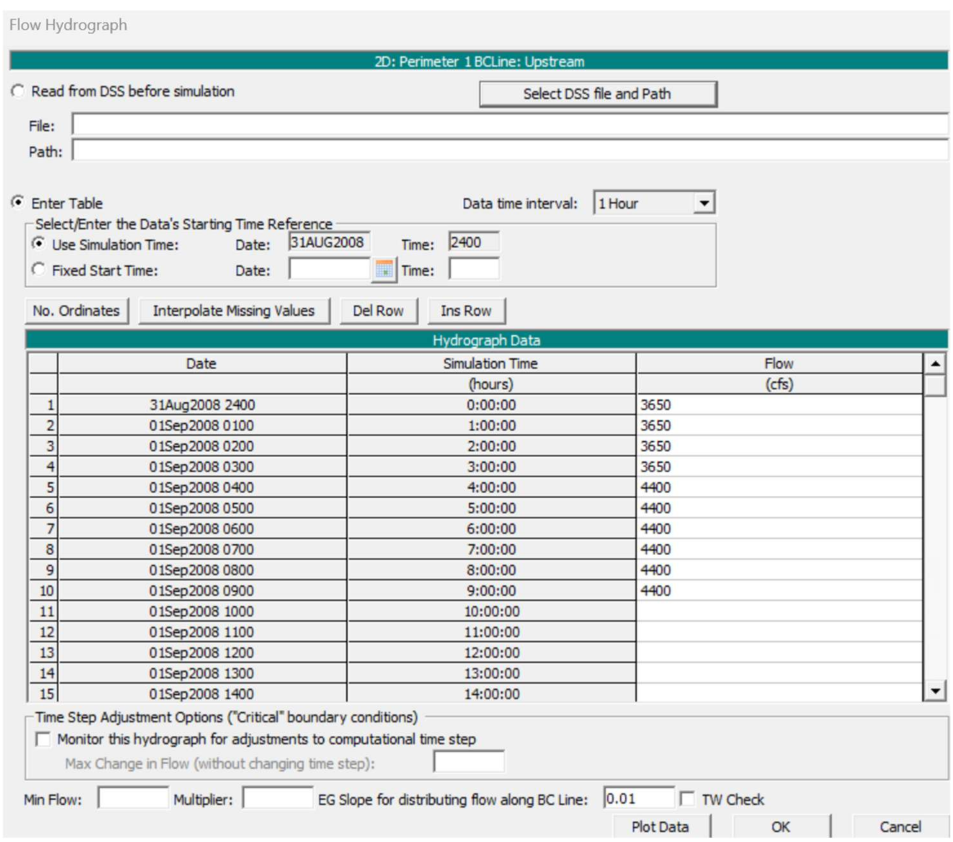
HEC-RAS Inputs and Results

HEC-RAS EXISTING 2D – INPUT DATA

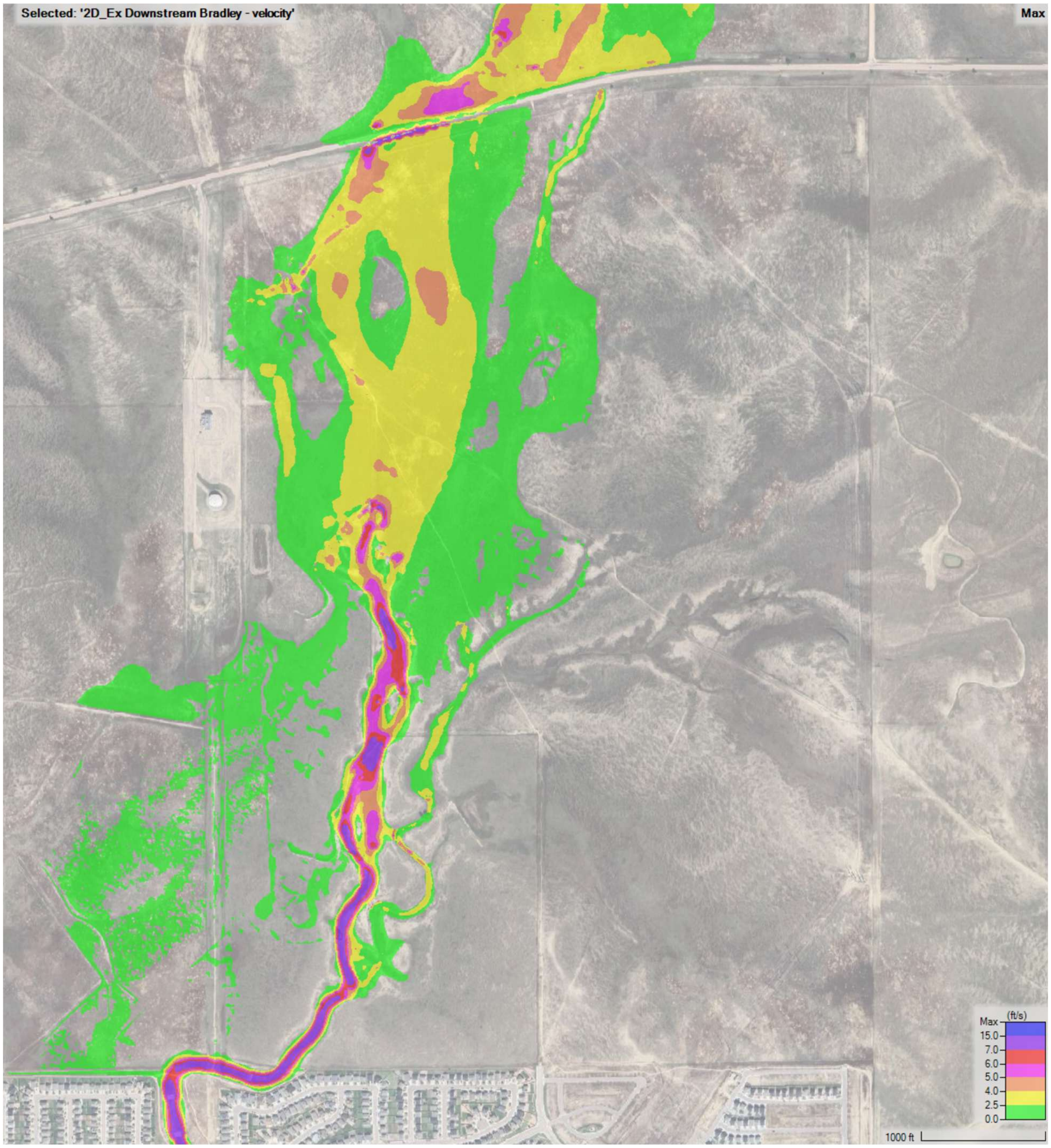




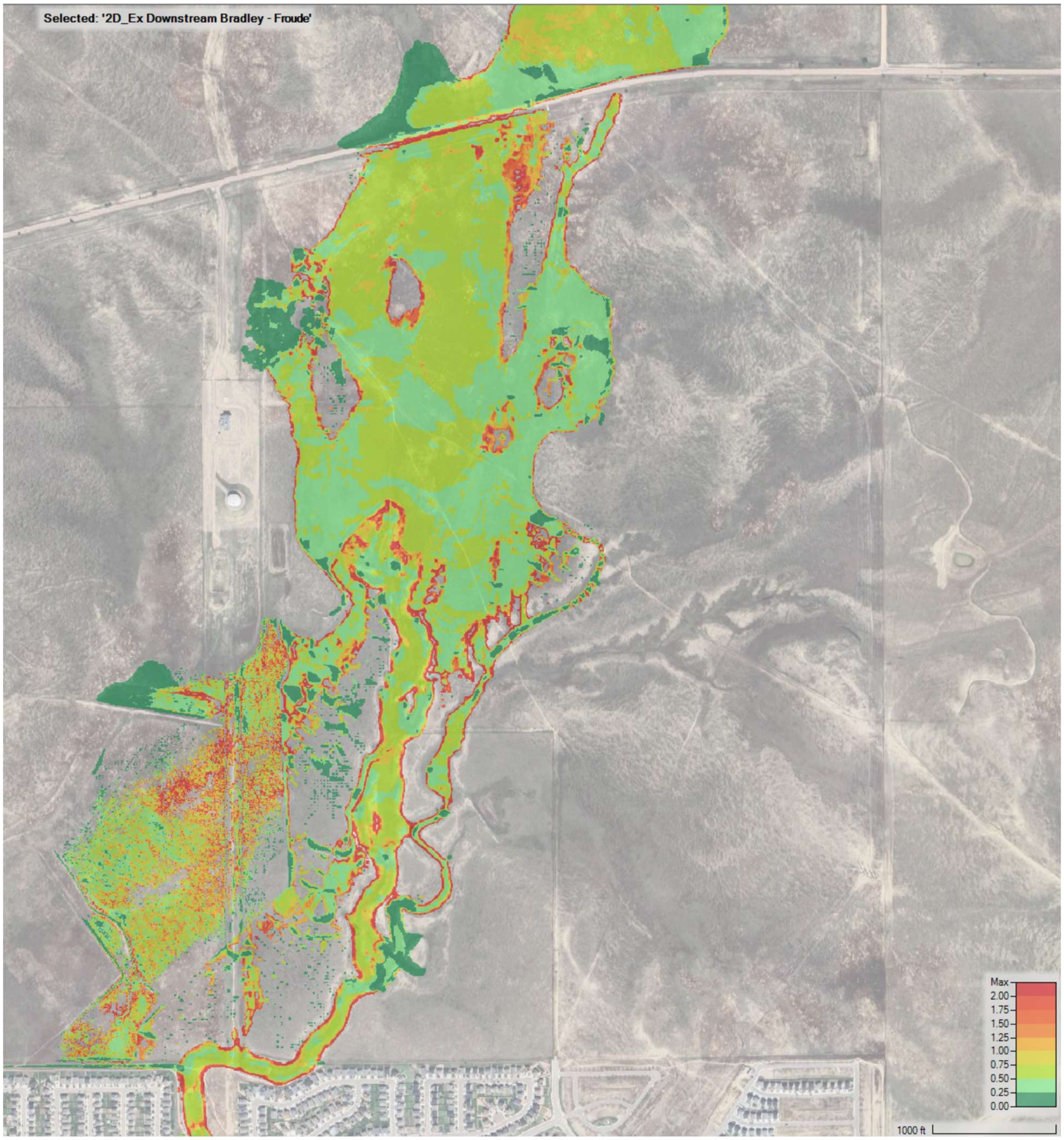




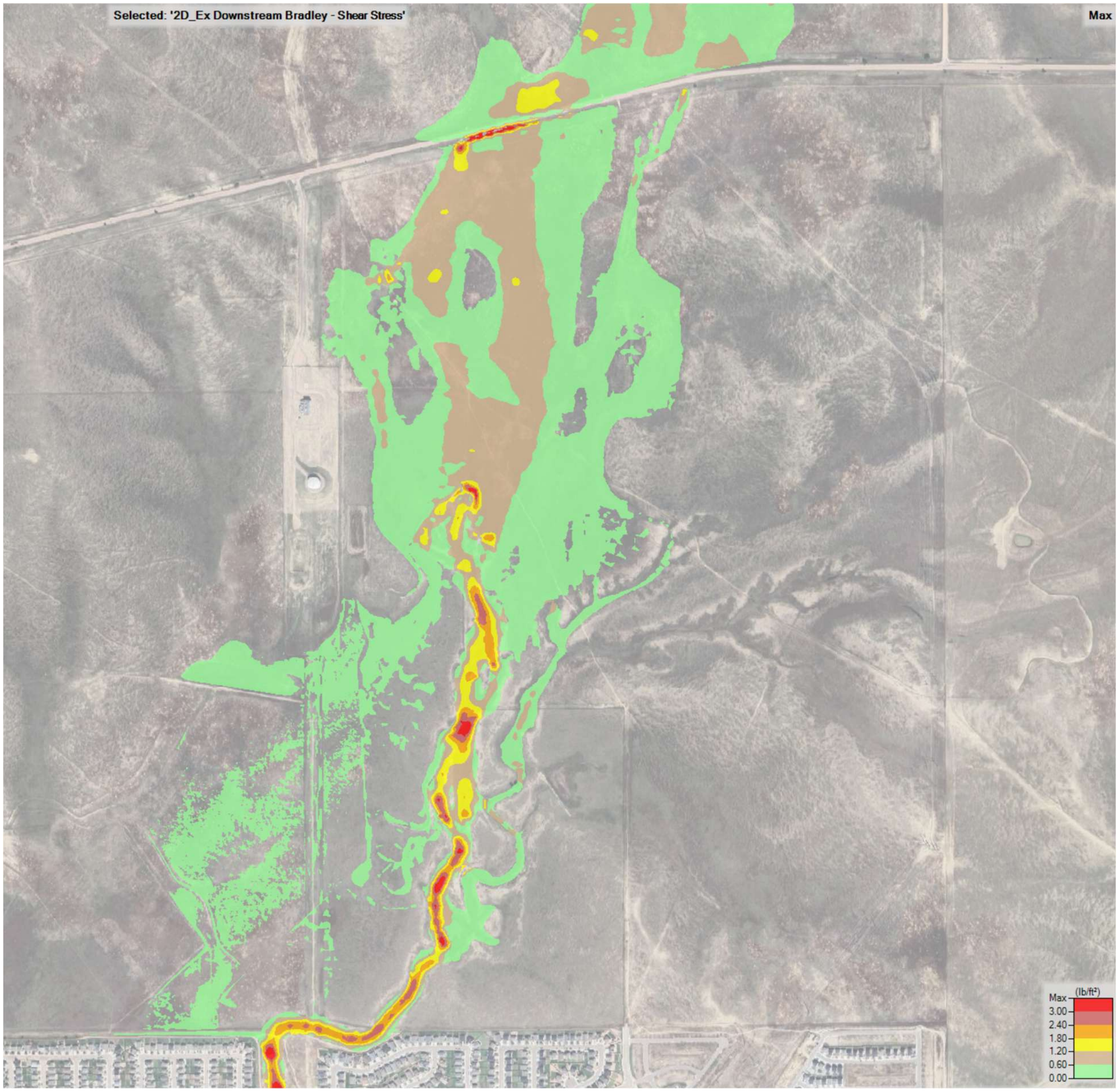
HEC-RAS Existing Results (2D) – Velocity:



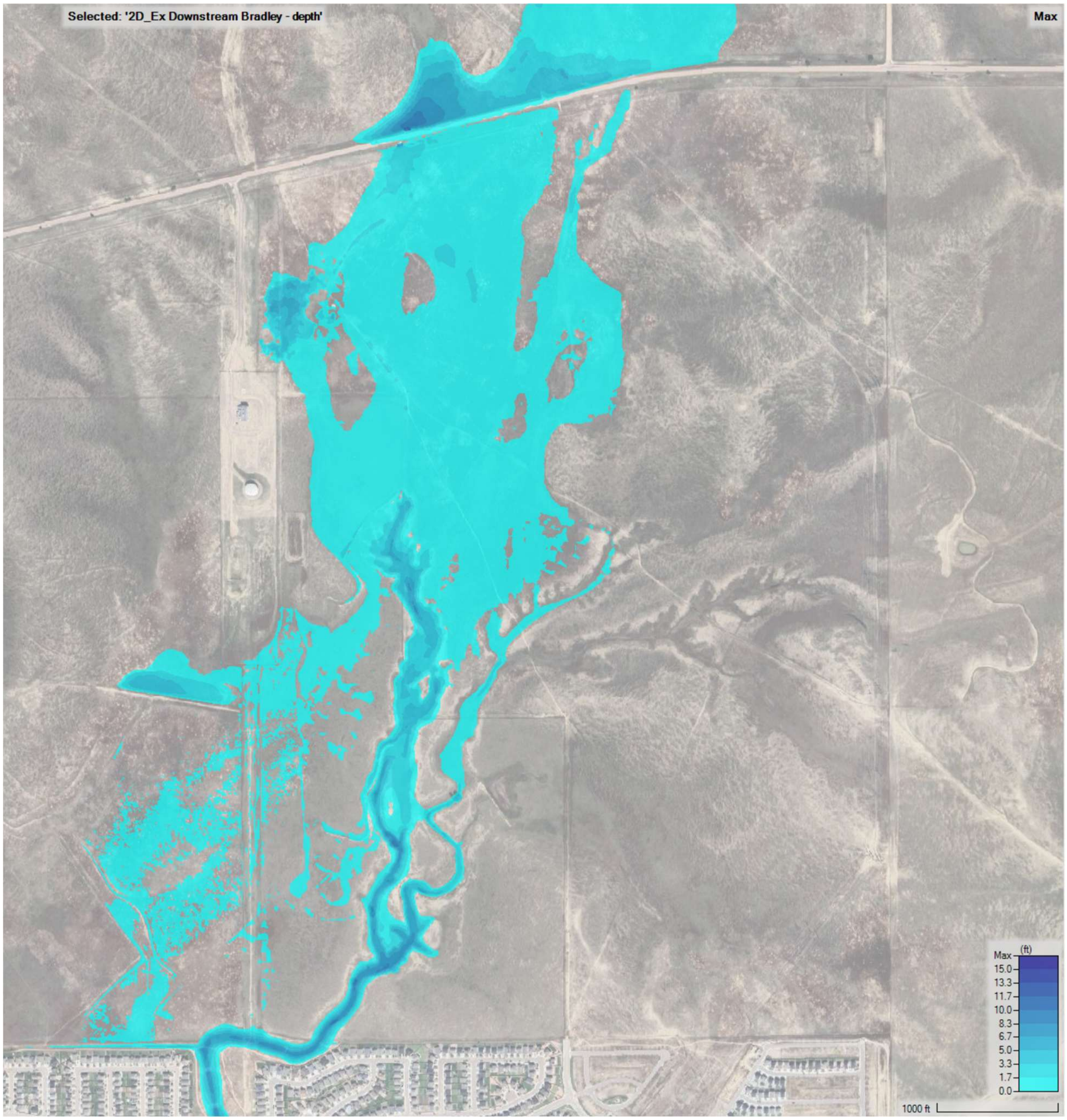
HEC-RAS Existing Results (2D) – Froude No.:



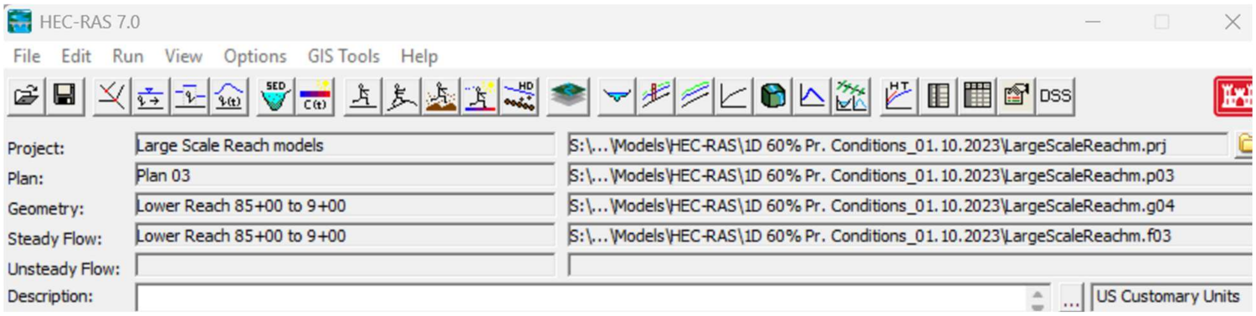
HEC-RAS Existing Results (2D) – Shear Stress:

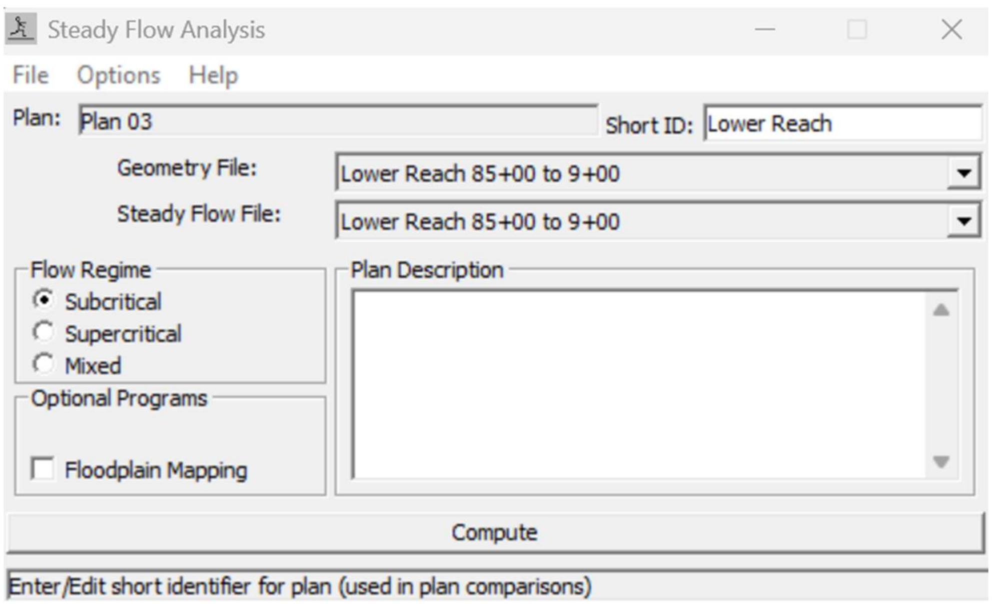


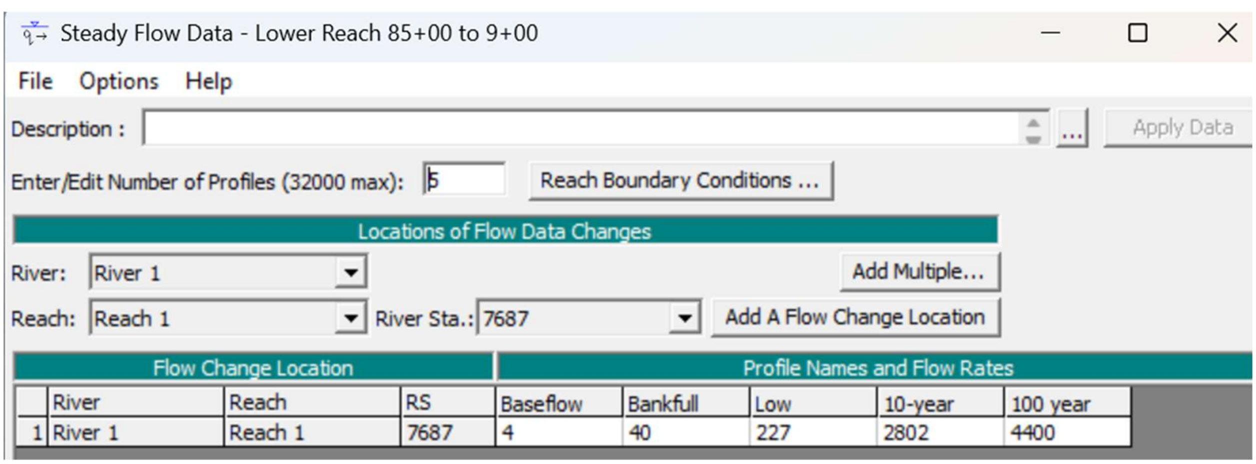
HEC-RAS Existing Results (2D) – Depth:



HEC-RAS PROPOSED 1D – INPUT DATA







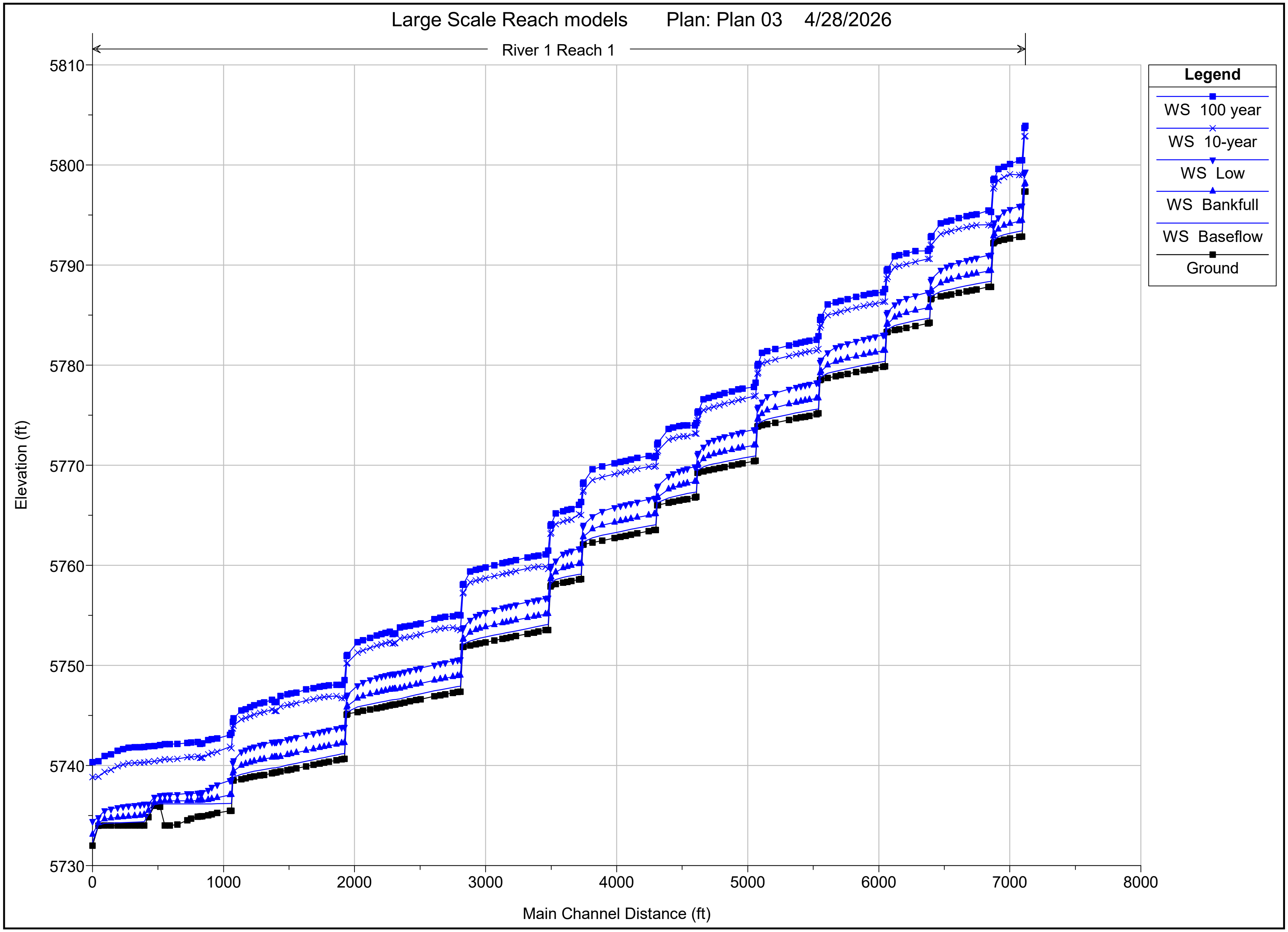
ROLLING HILLS FLOODPLAIN & PERMITTING

Matrix
Excellence by Design
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Contact: Tori Mack
Phone (719) 575-0100

DRAWING NAME: 2026-04-24 HEC-RAS WORKMAP

HEC-RAS WORK MAP

DATE: April 27, 2026



Large Scale Reach models Plan: Plan 03 4/28/2026
River 1 Reach 1
Legend
WS 100 year
WS 10-year
WS Low
WS Bankfull
WS Baseflow
Ground
Elevation (ft)
5810
5800
5790
5780
5770
5760
5750
5740
5730
0
1000
2000
3000
4000
5000
6000
7000
8000
Main Channel Distance (ft)

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	527	Baseflow	4.00	5732.00	5732.34	5732.16	5732.35	0.003301	0.88	4.53	17.02	0.30
Reach 1	527	Bankfull	40.00	5732.00	5733.10	5732.65	5733.14	0.003305	1.71	23.36	32.43	0.36
Reach 1	527	Low	227.00	5732.00	5734.42	5733.56	5734.54	0.003301	2.74	82.96	56.87	0.40
Reach 1	527	10-year	2802.00	5732.00	5738.84	5737.08	5739.48	0.003301	6.67	497.12	130.75	0.50
Reach 1	527	100 year	4400.00	5732.00	5740.33	5738.35	5741.17	0.003301	7.81	712.07	158.68	0.52
Reach 1	571	Baseflow	4.00	5733.97	5734.04	5734.04	5734.08	0.059972	1.40	2.86	47.41	1.00
Reach 1	571	Bankfull	40.00	5733.97	5734.26	5734.26	5734.40	0.035878	2.92	13.68	51.00	1.00
Reach 1	571	Low	227.00	5733.97	5734.82	5734.82	5735.23	0.027885	5.13	44.27	58.80	1.04
Reach 1	571	10-year	2802.00	5733.97	5738.89	5737.92	5739.72	0.005559	7.54	430.13	136.06	0.63
Reach 1	571	100 year	4400.00	5733.97	5740.42	5739.10	5741.37	0.004571	8.31	662.68	169.28	0.60
Reach 1	621	Baseflow	4.00	5734.00	5734.21	5734.06	5734.21	0.000898	0.38	10.53	52.75	0.15
Reach 1	621	Bankfull	40.00	5734.00	5734.64	5734.27	5734.66	0.001976	1.15	34.74	59.58	0.27
Reach 1	621	Low	227.00	5734.00	5735.51	5734.83	5735.60	0.003206	2.45	92.49	73.18	0.38
Reach 1	621	10-year	2802.00	5734.00	5739.36	5737.82	5739.95	0.003518	6.41	532.03	180.22	0.51
Reach 1	621	100 year	4400.00	5734.00	5740.94	5739.02	5741.58	0.002864	6.95	850.32	223.73	0.48
Reach 1	666	Baseflow	4.00	5734.00	5734.25	5734.07	5734.25	0.000712	0.38	10.66	45.80	0.14
Reach 1	666	Bankfull	40.00	5734.00	5734.73	5734.31	5734.75	0.001751	1.14	35.02	55.51	0.25
Reach 1	666	Low	227.00	5734.00	5735.67	5734.92	5735.75	0.002910	2.36	96.21	75.13	0.37
Reach 1	666	10-year	2802.00	5734.00	5739.58	5737.89	5740.12	0.003119	6.10	559.03	182.80	0.48
Reach 1	666	100 year	4400.00	5734.00	5741.11	5739.22	5741.71	0.002670	6.73	869.92	223.89	0.46
Reach 1	731	Baseflow	4.00	5734.00	5734.27	5734.07	5734.28	0.000394	0.30	13.44	52.34	0.10
Reach 1	731	Bankfull	40.00	5734.00	5734.80	5734.27	5734.81	0.000983	0.90	44.23	64.55	0.19
Reach 1	731	Low	227.00	5734.00	5735.81	5734.85	5735.86	0.001661	1.92	118.42	83.17	0.28
Reach 1	731	10-year	2802.00	5734.00	5739.93	5737.68	5740.25	0.001856	4.96	742.23	223.52	0.37
Reach 1	731	100 year	4400.00	5734.00	5741.46	5738.78	5741.84	0.001644	5.51	1109.49	251.97	0.37
Reach 1	760	Baseflow	4.00	5734.00	5734.30	5734.10	5734.30	0.001012	0.46	8.62	35.01	0.16
Reach 1	760	Bankfull	40.00	5734.00	5734.85	5734.41	5734.88	0.002015	1.20	33.41	54.86	0.27
Reach 1	760	Low	227.00	5734.00	5735.89	5735.08	5735.95	0.002338	1.96	123.81	122.42	0.32
Reach 1	760	10-year	2802.00	5734.00	5740.11	5737.53	5740.33	0.001387	4.22	883.13	249.62	0.32
Reach 1	760	100 year	4400.00	5734.00	5741.64	5738.43	5741.91	0.001238	4.72	1290.84	279.60	0.32
Reach 1	790	Baseflow	4.00	5734.00	5734.32	5734.06	5734.32	0.000251	0.26	16.08	57.49	0.08
Reach 1	790	Bankfull	40.00	5734.00	5734.91	5734.29	5734.92	0.000591	0.73	57.54	82.46	0.15
Reach 1	790	Low	227.00	5734.00	5735.98	5734.82	5736.01	0.000894	1.46	169.18	127.08	0.21
Reach 1	790	10-year	2802.00	5734.00	5740.23	5737.27	5740.39	0.000961	3.70	1071.06	285.10	0.27
Reach 1	790	100 year	4400.00	5734.00	5741.77	5738.02	5741.96	0.000892	4.17	1536.01	315.19	0.27
Reach 1	847	Baseflow	4.00	5734.00	5734.34	5734.09	5734.34	0.000642	0.41	9.80	34.24	0.13
Reach 1	847	Bankfull	40.00	5734.00	5734.94	5734.40	5734.96	0.001456	1.10	36.31	52.94	0.23
Reach 1	847	Low	227.00	5734.00	5736.01	5735.09	5736.08	0.002144	2.03	115.79	117.41	0.32
Reach 1	847	10-year	2802.00	5734.00	5740.27	5737.73	5740.43	0.001092	3.83	1086.88	314.53	0.29
Reach 1	847	100 year	4400.00	5734.00	5741.82	5738.50	5742.00	0.000935	4.18	1601.03	346.15	0.28
Reach 1	885	Baseflow	4.00	5734.00	5734.37	5734.11	5734.37	0.000958	0.49	8.12	28.97	0.16
Reach 1	885	Bankfull	40.00	5734.00	5735.01	5734.49	5735.03	0.001741	1.17	34.30	52.48	0.25
Reach 1	885	Low	227.00	5734.00	5736.10	5735.23	5736.16	0.001866	2.03	116.75	114.72	0.30
Reach 1	885	10-year	2802.00	5734.00	5740.30	5737.86	5740.48	0.001247	4.14	1018.74	291.74	0.31
Reach 1	885	100 year	4400.00	5734.00	5741.84	5738.71	5742.05	0.001091	4.55	1496.40	326.70	0.30
Reach 1	917	Baseflow	4.00	5734.00	5734.40	5734.12	5734.40	0.000861	0.48	8.26	27.84	0.16
Reach 1	917	Bankfull	40.00	5734.00	5735.06	5734.51	5735.08	0.001629	1.14	34.96	52.37	0.25
Reach 1	917	Low	227.00	5734.00	5736.15	5735.25	5736.22	0.001816	2.08	114.14	100.75	0.30
Reach 1	917	10-year	2802.00	5734.00	5740.32	5737.98	5740.52	0.001379	4.38	987.44	290.25	0.32
Reach 1	917	100 year	4400.00	5734.00	5741.85	5738.90	5742.08	0.001197	4.79	1467.83	334.20	0.31
Reach 1	952	Baseflow	4.00	5734.84	5735.09	5735.09	5735.16	0.041657	2.00	2.00	14.77	0.96
Reach 1	952	Bankfull	40.00	5734.84	5735.50	5735.50	5735.67	0.033269	3.28	12.21	36.31	1.00
Reach 1	952	Low	227.00	5734.84	5736.15	5736.15	5736.45	0.023038	4.39	54.08	99.00	0.93
Reach 1	952	10-year	2802.00	5734.84	5740.38	5738.26	5740.57	0.001604	4.21	979.24	309.06	0.34
Reach 1	952	100 year	4400.00	5734.84	5741.92	5739.15	5742.12	0.001252	4.49	1486.72	349.39	0.31
Reach 1	986	Baseflow	4.00	5735.97	5736.08	5736.05	5736.09	0.013263	0.80	5.70	85.65	0.50
Reach 1	986	Bankfull	40.00	5735.97	5736.30	5736.21	5736.33	0.009651	1.59	32.22	131.62	0.52
Reach 1	986	Low	227.00	5735.97	5736.84	5736.55	5736.92	0.007084	2.55	110.25	154.36	0.52
Reach 1	986	10-year	2802.00	5735.97	5740.43	5738.44	5740.64	0.002263	4.68	902.11	288.95	0.40
Reach 1	986	100 year	4400.00	5735.97	5741.95	5739.32	5742.18	0.001696	4.96	1370.62	326.85	0.36
Reach 1	1033	Baseflow	4.00	5735.87	5736.16	5736.04	5736.17	0.000759	0.31	14.70	110.02	0.13
Reach 1	1033	Bankfull	40.00	5735.87	5736.45	5736.19	5736.46	0.001843	0.92	54.50	153.61	0.25
Reach 1	1033	Low	227.00	5735.87	5737.01	5736.53	5737.06	0.002825	1.98	145.99	168.54	0.35
Reach 1	1033	10-year	2802.00	5735.87	5740.52	5738.33	5740.71	0.001840	4.35	1001.71	349.03	0.36

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1033	100 year	4400.00	5735.87	5742.04	5739.25	5742.23	0.001348	4.52	1667.61	545.33	0.32
Reach 1	1069	Baseflow	4.00	5734.00	5736.17	5734.16	5736.17	0.000001	0.05	85.87	115.58	0.01
Reach 1	1069	Bankfull	40.00	5734.00	5736.46	5734.61	5736.46	0.000057	0.39	122.54	133.10	0.05
Reach 1	1069	Low	227.00	5734.00	5737.07	5735.50	5737.10	0.000501	1.42	215.60	174.78	0.17
Reach 1	1069	10-year	2802.00	5734.00	5740.63	5738.35	5740.76	0.001043	3.86	1290.25	409.93	0.28
Reach 1	1069	100 year	4400.00	5734.00	5742.14	5738.86	5742.27	0.000844	4.05	1937.57	454.71	0.26
Reach 1	1101	Baseflow	4.00	5734.00	5736.17	5734.12	5736.17	0.000001	0.05	85.08	116.81	0.01
Reach 1	1101	Bankfull	40.00	5734.00	5736.46	5734.51	5736.46	0.000055	0.41	121.79	131.47	0.05
Reach 1	1101	Low	227.00	5734.00	5737.09	5735.41	5737.12	0.000503	1.52	212.67	158.73	0.17
Reach 1	1101	10-year	2802.00	5734.00	5740.63	5738.36	5740.82	0.001450	4.67	1077.93	336.18	0.34
Reach 1	1101	100 year	4400.00	5734.00	5742.13	5739.13	5742.32	0.001216	4.96	1617.30	384.39	0.32
Reach 1	1166	Baseflow	4.00	5734.09	5736.17	5734.29	5736.17	0.000003	0.07	55.66	46.61	0.01
Reach 1	1166	Bankfull	40.00	5734.09	5736.47	5734.79	5736.47	0.000153	0.57	72.90	70.62	0.08
Reach 1	1166	Low	227.00	5734.09	5737.10	5735.68	5737.17	0.001219	2.06	137.72	140.82	0.25
Reach 1	1166	10-year	2802.00	5734.09	5740.68	5738.96	5740.91	0.001908	5.06	956.43	309.59	0.38
Reach 1	1166	100 year	4400.00	5734.09	5742.16	5739.84	5742.40	0.001553	5.34	1443.93	350.34	0.35
Reach 1	1249	Baseflow	4.00	5734.53	5736.17	5734.70	5736.17	0.000003	0.06	66.01	73.06	0.01
Reach 1	1249	Bankfull	40.00	5734.53	5736.48	5735.09	5736.48	0.000104	0.47	91.83	93.07	0.07
Reach 1	1249	Low	227.00	5734.53	5737.20	5735.85	5737.24	0.000686	1.59	175.85	134.41	0.19
Reach 1	1249	10-year	2802.00	5734.53	5740.82	5738.66	5741.04	0.001502	4.60	966.79	276.24	0.34
Reach 1	1249	100 year	4400.00	5734.53	5742.26	5739.55	5742.51	0.001398	5.15	1384.08	307.46	0.34
Reach 1	1278	Baseflow	4.00	5734.69	5736.17	5734.86	5736.17	0.000006	0.08	49.28	61.79	0.02
Reach 1	1278	Bankfull	40.00	5734.69	5736.48	5735.30	5736.49	0.000211	0.58	71.04	77.55	0.10
Reach 1	1278	Low	227.00	5734.69	5737.22	5736.10	5737.27	0.001104	1.86	141.41	110.67	0.24
Reach 1	1278	10-year	2802.00	5734.69	5740.86	5739.15	5741.10	0.001753	4.84	901.49	260.82	0.36
Reach 1	1278	100 year	4400.00	5734.69	5742.29	5739.86	5742.57	0.001589	5.37	1289.31	282.38	0.36
Reach 1	1330	Baseflow	4.00	5734.88	5736.17	5735.10	5736.17	0.000052	0.19	20.81	34.05	0.04
Reach 1	1330	Bankfull	40.00	5734.88	5736.49	5735.80	5736.51	0.001513	1.19	33.49	44.26	0.24
Reach 1	1330	Low	227.00	5734.88	5737.25	5736.71	5737.40	0.004931	3.01	76.22	67.79	0.48
Reach 1	1330	10-year	2802.00	5734.88	5740.91	5739.71	5741.23	0.002713	5.56	779.73	252.14	0.44
Reach 1	1330	100 year	4400.00	5734.88	5742.34	5740.38	5742.68	0.002182	5.92	1148.65	264.28	0.41
Reach 1	1349	Baseflow	4.00	5734.91	5736.17	5735.15	5736.17	0.000026	0.23	17.47	25.98	0.05
Reach 1	1349	Bankfull	40.00	5734.91	5736.50	5735.83	5736.54	0.000796	1.45	27.51	33.71	0.28
Reach 1	1349	Low	227.00	5734.91	5737.28	5736.86	5737.50	0.003329	3.76	60.30	51.99	0.62
Reach 1	1349	10-year	2802.00	5734.91	5740.75	5740.05	5741.37	0.002147	7.55	705.26	250.13	0.62
Reach 1	1349	100 year	4400.00	5734.91	5742.17	5740.83	5742.81	0.001706	8.06	1067.80	261.84	0.58
Reach 1	1361	Baseflow	4.00	5734.94	5736.17	5735.17	5736.17	0.000030	0.25	16.27	24.29	0.05
Reach 1	1361	Bankfull	40.00	5734.94	5736.51	5735.88	5736.55	0.000874	1.57	25.49	29.72	0.30
Reach 1	1361	Low	227.00	5734.94	5737.29	5736.94	5737.55	0.003934	4.10	55.36	47.43	0.67
Reach 1	1361	10-year	2802.00	5734.94	5740.79	5740.09	5741.39	0.002183	7.35	696.24	250.15	0.62
Reach 1	1361	100 year	4400.00	5734.94	5742.20	5740.89	5742.82	0.001700	7.83	1057.81	261.79	0.57
Reach 1	1367	Baseflow	4.00	5734.94	5736.17	5735.17	5736.17	0.000029	0.24	16.67	25.09	0.05
Reach 1	1367	Bankfull	40.00	5734.94	5736.52	5735.87	5736.55	0.000797	1.52	26.37	30.26	0.29
Reach 1	1367	Low	227.00	5734.94	5737.32	5736.91	5737.56	0.003420	3.97	57.19	46.37	0.63
Reach 1	1367	10-year	2802.00	5734.94	5740.78	5740.14	5741.40	0.002264	7.49	686.47	249.47	0.63
Reach 1	1367	100 year	4400.00	5734.94	5742.20	5740.93	5742.84	0.001752	7.95	1047.17	261.02	0.58
Reach 1	1411	Baseflow	4.00	5735.03	5736.17	5735.27	5736.17	0.000120	0.32	12.50	17.54	0.07
Reach 1	1411	Bankfull	40.00	5735.03	5736.56	5735.99	5736.62	0.003158	2.00	19.96	20.68	0.36
Reach 1	1411	Low	227.00	5735.03	5737.53	5737.22	5737.82	0.010055	4.34	52.27	40.79	0.68
Reach 1	1411	10-year	2802.00	5735.03	5741.11	5740.36	5741.56	0.004567	6.81	668.73	246.69	0.56
Reach 1	1411	100 year	4400.00	5735.03	5742.54	5741.07	5742.96	0.003230	6.87	1029.01	258.80	0.50
Reach 1	1432	Baseflow	4.00	5735.12	5736.17	5735.35	5736.18	0.000167	0.35	11.28	17.41	0.08
Reach 1	1432	Bankfull	40.00	5735.12	5736.65	5736.07	5736.71	0.002997	1.95	20.50	21.35	0.35
Reach 1	1432	Low	227.00	5735.12	5737.84	5737.28	5738.04	0.005825	3.59	63.18	43.56	0.53
Reach 1	1432	10-year	2802.00	5735.12	5741.25	5740.50	5741.69	0.004339	6.68	675.54	245.25	0.55
Reach 1	1432	100 year	4400.00	5735.12	5742.62	5741.17	5743.05	0.003238	6.87	1020.16	256.10	0.50
Reach 1	1481	Baseflow	4.00	5735.25	5736.18	5735.48	5736.19	0.000310	0.44	9.06	15.98	0.10
Reach 1	1481	Bankfull	40.00	5735.25	5736.78	5736.20	5736.84	0.003181	2.00	19.98	20.85	0.36
Reach 1	1481	Low	227.00	5735.25	5738.09	5737.41	5738.27	0.004854	3.39	66.92	43.76	0.48
Reach 1	1481	10-year	2802.00	5735.25	5741.38	5740.74	5741.91	0.004987	7.19	625.30	232.03	0.59
Reach 1	1481	100 year	4400.00	5735.25	5742.71	5741.46	5743.23	0.003852	7.47	941.29	244.40	0.54
Reach 1	1571	Baseflow	4.00	5735.47	5736.22	5735.69	5736.22	0.000430	0.52	7.62	13.40	0.12
Reach 1	1571	Bankfull	40.00	5735.47	5737.06	5736.32	5737.10	0.002364	1.75	22.89	23.73	0.31

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1571	Low	227.00	5735.47	5738.51	5737.58	5738.64	0.003102	2.95	76.82	44.32	0.40
Reach 1	1571	10-year	2802.00	5735.47	5741.88	5741.88	5743.20	0.008782	9.92	400.97	193.97	0.79
Reach 1	1571	100 year	4400.00	5735.47	5743.07	5743.07	5744.39	0.007509	10.61	660.21	232.48	0.76
Reach 1	1582	Baseflow	4.00	5735.47	5736.22	5735.69	5736.22	0.000131	0.45	8.88	16.32	0.11
Reach 1	1582	Bankfull	40.00	5735.47	5737.08	5736.26	5737.12	0.000592	1.50	26.74	25.11	0.26
Reach 1	1582	Low	227.00	5735.47	5738.52	5737.43	5738.67	0.001238	3.02	75.19	42.82	0.40
Reach 1	1582	10-year	2802.00	5735.47	5741.73	5741.73	5743.42	0.004742	10.49	304.82	136.24	0.91
Reach 1	1582	100 year	4400.00	5735.47	5743.24	5743.24	5744.89	0.003390	10.91	620.14	234.60	0.81
Reach 1	1595	Baseflow	4.00	5738.50	5738.68	5738.68	5738.76	0.046633	2.33	1.71	10.92	1.04
Reach 1	1595	Bankfull	40.00	5738.50	5739.23	5739.23	5739.48	0.028387	4.07	9.84	18.68	0.99
Reach 1	1595	Low	227.00	5738.50	5740.27	5740.27	5740.84	0.023485	6.05	37.49	33.94	1.02
Reach 1	1595	10-year	2802.00	5738.50	5743.69	5743.69	5744.59	0.010176	9.20	494.69	237.94	0.82
Reach 1	1595	100 year	4400.00	5738.50	5744.36	5744.36	5745.53	0.011548	10.89	655.43	242.70	0.90
Reach 1	1600	Baseflow	4.00	5738.50	5738.83	5738.71	5738.86	0.008416	1.40	2.86	10.78	0.48
Reach 1	1600	Bankfull	40.00	5738.50	5739.43	5739.31	5739.61	0.015060	3.33	12.03	19.14	0.74
Reach 1	1600	Low	227.00	5738.50	5740.50	5740.44	5740.98	0.018808	5.52	41.12	36.16	0.91
Reach 1	1600	10-year	2802.00	5738.50	5743.98	5743.72	5744.66	0.007585	8.18	555.45	240.01	0.71
Reach 1	1600	100 year	4400.00	5738.50	5744.71	5744.37	5745.60	0.008542	9.69	732.31	245.22	0.78
Reach 1	1640	Baseflow	4.00	5738.62	5739.12	5738.85	5739.14	0.002966	1.15	3.47	7.78	0.30
Reach 1	1640	Bankfull	40.00	5738.62	5740.00	5739.57	5740.09	0.004925	2.34	17.08	19.57	0.44
Reach 1	1640	Low	227.00	5738.62	5741.38	5740.80	5741.58	0.005717	3.58	63.34	43.14	0.52
Reach 1	1640	10-year	2802.00	5738.62	5744.63	5743.88	5745.04	0.004399	6.60	692.08	255.46	0.55
Reach 1	1640	100 year	4400.00	5738.62	5745.49	5744.51	5746.03	0.004789	7.75	916.09	262.33	0.59
Reach 1	1681	Baseflow	4.00	5738.72	5739.23	5738.97	5739.25	0.003604	1.23	3.25	7.70	0.33
Reach 1	1681	Bankfull	40.00	5738.72	5740.17	5739.69	5740.24	0.004225	2.22	18.00	19.92	0.41
Reach 1	1681	Low	227.00	5738.72	5741.58	5740.90	5741.76	0.004825	3.40	66.81	43.46	0.48
Reach 1	1681	10-year	2802.00	5738.72	5744.75	5743.97	5745.17	0.004419	6.65	685.05	249.67	0.55
Reach 1	1681	100 year	4400.00	5738.72	5745.62	5744.64	5746.18	0.004830	7.82	905.60	256.67	0.59
Reach 1	1723	Baseflow	4.00	5738.84	5739.34	5739.07	5739.36	0.002880	1.13	3.53	7.97	0.30
Reach 1	1723	Bankfull	40.00	5738.84	5740.31	5739.77	5740.38	0.003530	2.06	19.41	20.99	0.38
Reach 1	1723	Low	227.00	5738.84	5741.75	5740.97	5741.90	0.003910	3.13	72.48	45.44	0.44
Reach 1	1723	10-year	2802.00	5738.84	5744.93	5744.07	5745.31	0.003956	6.35	711.71	252.35	0.52
Reach 1	1723	100 year	4400.00	5738.84	5745.82	5744.72	5746.33	0.004313	7.47	941.20	259.63	0.56
Reach 1	1752	Baseflow	4.00	5738.91	5739.42	5739.15	5739.44	0.002698	1.12	3.58	7.87	0.29
Reach 1	1752	Bankfull	40.00	5738.91	5740.42	5739.86	5740.48	0.003216	2.00	19.98	21.04	0.36
Reach 1	1752	Low	227.00	5738.91	5741.88	5741.08	5742.02	0.003615	3.04	74.65	46.15	0.42
Reach 1	1752	10-year	2802.00	5738.91	5745.09	5744.16	5745.46	0.003687	6.25	728.70	253.31	0.51
Reach 1	1752	100 year	4400.00	5738.91	5746.01	5744.82	5746.50	0.003999	7.34	965.65	260.74	0.55
Reach 1	1789	Baseflow	4.00	5739.00	5739.54	5739.24	5739.55	0.002256	1.04	3.83	8.16	0.27
Reach 1	1789	Bankfull	40.00	5739.00	5740.56	5739.95	5740.61	0.002645	1.85	21.58	22.08	0.33
Reach 1	1789	Low	227.00	5739.00	5742.05	5741.13	5742.17	0.003025	2.86	79.32	47.02	0.39
Reach 1	1789	10-year	2802.00	5739.00	5745.27	5744.22	5745.62	0.003404	6.06	744.81	252.11	0.49
Reach 1	1789	100 year	4400.00	5739.00	5746.20	5744.93	5746.67	0.003716	7.14	984.62	259.73	0.53
Reach 1	1815	Baseflow	4.00	5739.06	5739.60	5739.29	5739.62	0.002005	1.00	4.01	8.34	0.25
Reach 1	1815	Bankfull	40.00	5739.06	5740.64	5740.02	5740.70	0.002773	1.92	20.79	20.75	0.34
Reach 1	1815	Low	227.00	5739.06	5742.14	5741.24	5742.28	0.003299	2.99	75.88	44.81	0.41
Reach 1	1815	10-year	2802.00	5739.06	5745.36	5744.38	5745.71	0.003497	6.16	742.33	251.59	0.50
Reach 1	1815	100 year	4400.00	5739.06	5746.31	5745.03	5746.77	0.003776	7.22	984.29	259.27	0.53
Reach 1	1870	Baseflow	4.00	5739.22	5739.73	5739.45	5739.75	0.002425	1.03	3.89	9.03	0.28
Reach 1	1870	Bankfull	40.00	5739.22	5740.80	5740.12	5740.84	0.002115	1.69	23.73	23.80	0.30
Reach 1	1870	Low	227.00	5739.22	5742.34	5741.31	5742.44	0.002327	2.58	88.15	50.43	0.34
Reach 1	1870	10-year	2802.00	5739.22	5745.59	5744.44	5745.90	0.002901	5.71	783.85	255.20	0.45
Reach 1	1870	100 year	4400.00	5739.22	5746.56	5745.09	5746.98	0.003172	6.74	1035.71	263.20	0.49
Reach 1	1892	Baseflow	4.00	5739.28	5739.76	5739.50	5739.78	0.001077	1.09	3.66	8.48	0.29
Reach 1	1892	Bankfull	40.00	5739.28	5740.82	5740.18	5740.87	0.001015	1.84	21.73	22.21	0.33
Reach 1	1892	Low	227.00	5739.28	5742.36	5741.41	5742.48	0.001076	2.77	82.02	47.66	0.37
Reach 1	1892	10-year	2802.00	5739.28	5745.44	5744.75	5746.04	0.002138	7.59	721.11	251.90	0.62
Reach 1	1892	100 year	4400.00	5739.28	5746.33	5745.54	5747.16	0.002494	9.21	949.36	259.22	0.69
Reach 1	1903	Baseflow	4.00	5739.31	5739.77	5739.55	5739.80	0.001647	1.30	3.07	7.49	0.36
Reach 1	1903	Bankfull	40.00	5739.31	5740.82	5740.25	5740.89	0.001241	1.98	20.15	21.33	0.36
Reach 1	1903	Low	227.00	5739.31	5742.36	5741.47	5742.49	0.001205	2.88	78.75	46.86	0.39
Reach 1	1903	10-year	2802.00	5739.31	5745.45	5744.78	5746.07	0.002231	7.73	714.39	251.23	0.63
Reach 1	1903	100 year	4400.00	5739.31	5746.34	5745.58	5747.19	0.002583	9.35	942.49	258.51	0.70

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1908	Baseflow	4.00	5739.31	5739.78	5739.55	5739.80	0.001409	1.21	3.30	8.02	0.33
Reach 1	1908	Bankfull	40.00	5739.31	5740.83	5740.25	5740.89	0.001209	1.98	20.20	21.09	0.36
Reach 1	1908	Low	227.00	5739.31	5742.37	5741.46	5742.50	0.001224	2.91	77.95	46.23	0.40
Reach 1	1908	10-year	2802.00	5739.31	5745.45	5744.83	5746.09	0.002284	7.86	709.59	250.83	0.64
Reach 1	1908	100 year	4400.00	5739.31	5746.34	5745.63	5747.21	0.002646	9.51	936.87	258.15	0.71
Reach 1	1939	Baseflow	4.00	5739.41	5739.85	5739.65	5739.88	0.005451	1.43	2.80	7.25	0.40
Reach 1	1939	Bankfull	40.00	5739.41	5740.88	5740.38	5740.96	0.003825	2.15	18.60	20.08	0.39
Reach 1	1939	Low	227.00	5739.41	5742.42	5741.60	5742.56	0.003622	3.09	73.43	44.35	0.42
Reach 1	1939	10-year	2802.00	5739.41	5745.90	5744.66	5746.20	0.002855	5.71	796.40	253.39	0.45
Reach 1	1939	100 year	4400.00	5739.41	5746.95	5745.28	5747.34	0.002956	6.61	1069.50	262.12	0.47
Reach 1	1990	Baseflow	4.00	5739.53	5740.06	5739.77	5740.07	0.002617	1.09	3.65	8.11	0.29
Reach 1	1990	Bankfull	40.00	5739.53	5741.07	5740.47	5741.13	0.003032	1.98	20.20	20.73	0.35
Reach 1	1990	Low	227.00	5739.53	5742.60	5741.69	5742.74	0.003147	2.95	76.94	45.20	0.40
Reach 1	1990	10-year	2802.00	5739.53	5746.04	5744.84	5746.35	0.002812	5.77	801.55	254.29	0.45
Reach 1	1990	100 year	4400.00	5739.53	5747.11	5745.51	5747.50	0.002911	6.66	1077.32	262.90	0.47
Reach 1	2019	Baseflow	4.00	5739.59	5740.13	5739.83	5740.15	0.002404	1.08	3.69	7.76	0.28
Reach 1	2019	Bankfull	40.00	5739.59	5741.16	5740.56	5741.22	0.003023	1.98	20.23	20.68	0.35
Reach 1	2019	Low	227.00	5739.59	5742.70	5741.80	5742.83	0.003180	2.96	76.77	44.85	0.40
Reach 1	2019	10-year	2802.00	5739.59	5746.12	5744.97	5746.43	0.002924	5.77	790.51	256.18	0.46
Reach 1	2019	100 year	4400.00	5739.59	5747.19	5745.63	5747.58	0.002975	6.63	1069.30	265.05	0.48
Reach 1	2059	Baseflow	4.00	5739.72	5740.22	5739.95	5740.24	0.002615	1.09	3.67	8.19	0.29
Reach 1	2059	Bankfull	40.00	5739.72	5741.28	5740.66	5741.33	0.002801	1.93	20.76	20.87	0.34
Reach 1	2059	Low	227.00	5739.72	5742.82	5741.89	5742.95	0.002967	2.89	78.66	45.29	0.39
Reach 1	2059	10-year	2802.00	5739.72	5746.23	5745.05	5746.56	0.003046	5.95	760.81	241.31	0.47
Reach 1	2059	100 year	4400.00	5739.72	5747.28	5745.76	5747.72	0.003318	7.04	1023.18	264.01	0.50
Reach 1	2135	Baseflow	4.00	5739.91	5740.42	5740.15	5740.44	0.002789	1.13	3.54	7.86	0.30
Reach 1	2135	Bankfull	40.00	5739.91	5741.49	5740.86	5741.54	0.002808	1.93	20.74	20.86	0.34
Reach 1	2135	Low	227.00	5739.91	5743.05	5742.09	5743.18	0.002942	2.88	78.87	45.33	0.38
Reach 1	2135	10-year	2802.00	5739.91	5746.49	5745.19	5746.77	0.002584	5.51	830.93	259.06	0.43
Reach 1	2135	100 year	4400.00	5739.91	5747.60	5745.85	5747.95	0.002627	6.33	1121.90	268.01	0.45
Reach 1	2194	Baseflow	4.00	5740.06	5740.58	5740.29	5740.60	0.002693	1.12	3.56	7.74	0.29
Reach 1	2194	Bankfull	40.00	5740.06	5741.64	5741.02	5741.70	0.002811	1.93	20.77	20.93	0.34
Reach 1	2194	Low	227.00	5740.06	5743.21	5742.25	5743.34	0.002864	2.85	79.64	45.47	0.38
Reach 1	2194	10-year	2802.00	5740.06	5746.63	5745.37	5746.92	0.002705	5.62	809.66	253.06	0.44
Reach 1	2194	100 year	4400.00	5740.06	5747.74	5745.95	5748.10	0.002748	6.46	1094.08	261.98	0.46
Reach 1	2241	Baseflow	4.00	5740.19	5740.70	5740.42	5740.72	0.002427	1.06	3.77	8.24	0.28
Reach 1	2241	Bankfull	40.00	5740.19	5741.77	5741.10	5741.83	0.002628	1.89	21.19	20.92	0.33
Reach 1	2241	Low	227.00	5740.19	5743.34	5742.35	5743.47	0.002755	2.82	80.57	45.46	0.37
Reach 1	2241	10-year	2802.00	5740.19	5746.77	5745.48	5747.04	0.002585	5.51	830.09	258.94	0.43
Reach 1	2241	100 year	4400.00	5740.19	5747.88	5746.10	5748.23	0.002613	6.32	1122.89	267.80	0.45
Reach 1	2276	Baseflow	4.00	5740.28	5740.79	5740.51	5740.81	0.002873	1.15	3.49	7.70	0.30
Reach 1	2276	Bankfull	40.00	5740.28	5741.86	5741.25	5741.92	0.002788	1.92	20.81	20.89	0.34
Reach 1	2276	Low	227.00	5740.28	5743.44	5742.44	5743.56	0.002791	2.83	80.32	45.55	0.38
Reach 1	2276	10-year	2802.00	5740.28	5746.84	5745.58	5747.14	0.002753	5.68	803.56	252.29	0.44
Reach 1	2276	100 year	4400.00	5740.28	5747.95	5746.27	5748.32	0.002782	6.51	1088.23	261.18	0.46
Reach 1	2315	Baseflow	4.00	5740.38	5740.89	5740.61	5740.91	0.002461	1.06	3.77	8.41	0.28
Reach 1	2315	Bankfull	40.00	5740.38	5741.97	5741.31	5742.02	0.002586	1.88	21.27	20.90	0.33
Reach 1	2315	Low	227.00	5740.38	5743.54	5742.55	5743.67	0.002761	2.82	80.55	45.56	0.37
Reach 1	2315	10-year	2802.00	5740.38	5746.91	5745.90	5747.27	0.003278	6.19	745.67	250.82	0.48
Reach 1	2315	100 year	4400.00	5740.38	5748.02	5746.59	5748.45	0.003194	6.97	1029.99	260.33	0.49
Reach 1	2373	Baseflow	4.00	5740.53	5741.04	5740.76	5741.06	0.002846	1.14	3.50	7.73	0.30
Reach 1	2373	Bankfull	40.00	5740.53	5742.12	5741.49	5742.17	0.002725	1.91	20.97	20.94	0.34
Reach 1	2373	Low	227.00	5740.53	5743.70	5742.71	5743.82	0.002676	2.81	80.90	45.61	0.37
Reach 1	2373	10-year	2802.00	5740.53	5746.95	5746.36	5747.60	0.005331	7.84	588.76	234.46	0.62
Reach 1	2373	100 year	4400.00	5740.53	5748.06	5747.29	5748.76	0.004805	8.51	858.08	245.57	0.61
Reach 1	2413	Baseflow	4.00	5740.62	5741.15	5740.87	5741.17	0.002812	1.12	3.58	8.12	0.30
Reach 1	2413	Bankfull	40.00	5740.62	5742.22	5741.56	5742.28	0.002667	1.90	21.11	21.00	0.33
Reach 1	2413	Low	227.00	5740.62	5743.81	5742.80	5743.93	0.002738	2.81	80.78	45.61	0.37
Reach 1	2413	10-year	2802.00	5740.62	5746.74	5746.74	5748.16	0.010802	10.27	373.64	169.67	0.86
Reach 1	2413	100 year	4400.00	5740.62	5748.05	5748.05	5749.39	0.008198	10.64	646.25	235.41	0.78
Reach 1	2434	Baseflow	4.00	5740.67	5741.19	5740.87	5741.20	0.000512	0.73	5.50	13.72	0.20
Reach 1	2434	Bankfull	40.00	5740.67	5742.27	5741.45	5742.31	0.000609	1.51	26.48	25.02	0.26
Reach 1	2434	Low	227.00	5740.67	5743.84	5742.64	5743.97	0.001035	2.80	81.12	45.27	0.37
Reach 1	2434	10-year	2802.00	5740.67	5746.76	5746.76	5748.51	0.005537	10.64	274.99	92.28	0.97

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2434	100 year	4400.00	5740.67	5748.52	5748.52	5750.24	0.003426	10.80	551.09	234.65	0.81
Reach 1	2452	Baseflow	4.00	5745.06	5745.26	5745.26	5745.34	0.016602	2.26	1.77	11.03	0.99
Reach 1	2452	Bankfull	40.00	5745.06	5745.80	5745.80	5746.06	0.011443	4.09	9.77	18.79	1.00
Reach 1	2452	Low	227.00	5745.06	5746.87	5746.87	5747.42	0.008755	5.95	38.16	34.22	0.99
Reach 1	2452	10-year	2802.00	5745.06	5750.18	5750.18	5751.22	0.004735	9.92	555.68	246.69	0.89
Reach 1	2452	100 year	4400.00	5745.06	5750.94	5750.94	5752.32	0.005263	11.81	747.23	253.02	0.97
Reach 1	2457	Baseflow	4.00	5745.16	5745.36	5745.36	5745.44	0.016597	2.37	1.69	9.75	1.01
Reach 1	2457	Bankfull	40.00	5745.16	5745.94	5745.94	5746.20	0.010637	4.06	9.85	18.14	0.97
Reach 1	2457	Low	227.00	5745.16	5747.05	5747.05	5747.59	0.008772	5.87	38.69	35.49	0.99
Reach 1	2457	10-year	2802.00	5745.16	5750.27	5750.27	5751.30	0.004783	9.96	558.38	247.03	0.90
Reach 1	2457	100 year	4400.00	5745.16	5751.05	5751.05	5752.40	0.005234	11.80	753.83	253.35	0.97
Reach 1	2534	Baseflow	4.00	5745.34	5745.86	5745.58	5745.88	0.002754	1.13	3.54	7.72	0.29
Reach 1	2534	Bankfull	40.00	5745.34	5746.70	5746.30	5746.79	0.005600	2.46	16.27	19.04	0.47
Reach 1	2534	Low	227.00	5745.34	5747.99	5747.53	5748.23	0.007413	3.94	57.66	41.40	0.59
Reach 1	2534	10-year	2802.00	5745.34	5751.28	5750.56	5751.71	0.004791	6.80	674.83	255.66	0.57
Reach 1	2534	100 year	4400.00	5745.34	5752.32	5751.23	5752.83	0.004386	7.50	946.41	263.15	0.57
Reach 1	2577	Baseflow	4.00	5745.47	5745.98	5745.69	5746.00	0.002831	1.13	3.53	7.87	0.30
Reach 1	2577	Bankfull	40.00	5745.47	5746.92	5746.42	5746.99	0.004014	2.19	18.29	19.91	0.40
Reach 1	2577	Low	227.00	5745.47	5748.31	5747.65	5748.49	0.004849	3.41	66.51	43.05	0.48
Reach 1	2577	10-year	2802.00	5745.47	5751.49	5750.73	5751.91	0.004410	6.65	687.06	249.95	0.55
Reach 1	2577	100 year	4400.00	5745.47	5752.51	5751.37	5753.01	0.004278	7.50	945.48	258.13	0.56
Reach 1	2633	Baseflow	4.00	5745.59	5746.12	5745.84	5746.14	0.002635	1.10	3.63	8.06	0.29
Reach 1	2633	Bankfull	40.00	5745.59	5747.12	5746.54	5747.19	0.003224	2.03	19.71	20.40	0.36
Reach 1	2633	Low	227.00	5745.59	5748.57	5747.79	5748.73	0.003894	3.17	71.62	43.98	0.44
Reach 1	2633	10-year	2802.00	5745.59	5751.75	5750.87	5752.13	0.003960	6.37	711.66	250.12	0.52
Reach 1	2633	100 year	4400.00	5745.59	5752.75	5751.52	5753.23	0.003971	7.28	966.93	257.86	0.54
Reach 1	2684	Baseflow	4.00	5745.72	5746.25	5745.96	5746.27	0.002474	1.08	3.70	7.97	0.28
Reach 1	2684	Bankfull	40.00	5745.72	5747.28	5746.68	5747.34	0.003015	1.98	20.22	20.63	0.35
Reach 1	2684	Low	227.00	5745.72	5748.77	5747.92	5748.91	0.003474	3.05	74.52	44.54	0.42
Reach 1	2684	10-year	2802.00	5745.72	5751.99	5751.00	5752.33	0.003506	6.10	746.70	254.75	0.50
Reach 1	2684	100 year	4400.00	5745.72	5753.00	5751.64	5753.44	0.003574	7.01	1008.75	263.02	0.52
Reach 1	2721	Baseflow	4.00	5745.81	5746.35	5746.07	5746.37	0.002885	1.17	3.43	7.35	0.30
Reach 1	2721	Bankfull	40.00	5745.81	5747.39	5746.79	5747.45	0.003026	1.97	20.27	20.78	0.35
Reach 1	2721	Low	227.00	5745.81	5748.90	5748.01	5749.04	0.003296	2.99	75.91	44.79	0.40
Reach 1	2721	10-year	2802.00	5745.81	5752.11	5751.11	5752.46	0.003507	6.12	741.99	251.36	0.50
Reach 1	2721	100 year	4400.00	5745.81	5753.12	5751.77	5753.56	0.003596	7.05	1000.58	259.55	0.52
Reach 1	2751	Baseflow	4.00	5745.91	5746.43	5746.15	5746.45	0.002655	1.10	3.63	8.08	0.29
Reach 1	2751	Bankfull	40.00	5745.91	5747.49	5746.85	5747.54	0.002782	1.93	20.76	20.78	0.34
Reach 1	2751	Low	227.00	5745.91	5749.00	5748.09	5749.14	0.003162	2.95	76.94	44.98	0.40
Reach 1	2751	10-year	2802.00	5745.91	5752.22	5751.21	5752.57	0.003381	6.08	752.58	252.67	0.49
Reach 1	2751	100 year	4400.00	5745.91	5753.24	5751.86	5753.68	0.003475	7.01	1014.26	260.84	0.51
Reach 1	2785	Baseflow	4.00	5746.00	5746.53	5746.24	5746.55	0.003003	1.16	3.46	7.85	0.31
Reach 1	2785	Bankfull	40.00	5746.00	5747.58	5746.96	5747.64	0.002844	1.94	20.67	20.92	0.34
Reach 1	2785	Low	227.00	5746.00	5749.11	5748.19	5749.24	0.003047	2.91	77.91	45.15	0.39
Reach 1	2785	10-year	2802.00	5746.00	5752.34	5751.29	5752.68	0.003283	6.00	759.59	252.49	0.48
Reach 1	2785	100 year	4400.00	5746.00	5753.36	5751.94	5753.79	0.003391	6.93	1021.58	260.81	0.51
Reach 1	2806	Baseflow	4.00	5746.06	5746.57	5746.31	5746.59	0.001325	1.21	3.30	7.63	0.33
Reach 1	2806	Bankfull	40.00	5746.06	5747.62	5747.03	5747.68	0.001189	1.98	20.20	20.79	0.35
Reach 1	2806	Low	227.00	5746.06	5749.15	5748.25	5749.28	0.001228	2.94	77.17	45.12	0.40
Reach 1	2806	10-year	2802.00	5746.06	5752.19	5751.57	5752.83	0.002361	7.92	706.01	250.59	0.65
Reach 1	2806	100 year	4400.00	5746.06	5753.14	5752.38	5753.98	0.002605	9.42	947.28	258.24	0.70
Reach 1	2820	Baseflow	4.00	5746.09	5746.59	5746.33	5746.61	0.001293	1.19	3.36	7.86	0.32
Reach 1	2820	Bankfull	40.00	5746.09	5747.63	5747.05	5747.69	0.001210	2.00	20.00	20.53	0.36
Reach 1	2820	Low	227.00	5746.09	5749.16	5748.27	5749.30	0.001263	2.97	76.34	44.86	0.40
Reach 1	2820	10-year	2802.00	5746.09	5752.23	5751.62	5752.86	0.002356	7.87	705.67	250.74	0.65
Reach 1	2820	100 year	4400.00	5746.09	5753.18	5752.40	5754.01	0.002584	9.35	948.47	258.53	0.70
Reach 1	2825	Baseflow	4.00	5746.09	5746.59	5746.33	5746.61	0.001354	1.22	3.27	7.57	0.33
Reach 1	2825	Bankfull	40.00	5746.09	5747.64	5747.06	5747.70	0.001243	2.02	19.80	20.44	0.36
Reach 1	2825	Low	227.00	5746.09	5749.17	5748.29	5749.31	0.001296	3.00	75.63	44.68	0.41
Reach 1	2825	10-year	2802.00	5746.09	5752.24	5751.62	5752.87	0.002359	7.87	706.17	250.62	0.65
Reach 1	2825	100 year	4400.00	5746.09	5753.19	5752.41	5754.02	0.002584	9.34	949.20	258.28	0.70
Reach 1	2863	Baseflow	4.00	5746.19	5746.67	5746.44	5746.69	0.003834	1.27	3.15	7.44	0.34
Reach 1	2863	Bankfull	40.00	5746.19	5747.71	5747.16	5747.77	0.003410	2.06	19.46	20.57	0.37

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2863	Low	227.00	5746.19	5749.24	5748.38	5749.38	0.003325	2.98	76.14	45.50	0.41
Reach 1	2863	10-year	2802.00	5746.19	5752.70	5751.46	5752.99	0.002749	5.60	808.49	255.87	0.44
Reach 1	2863	100 year	4400.00	5746.19	5753.79	5752.09	5754.16	0.002792	6.44	1092.23	264.75	0.46
Reach 1	2897	Baseflow	4.00	5746.28	5746.79	5746.52	5746.81	0.002833	1.12	3.56	8.08	0.30
Reach 1	2897	Bankfull	40.00	5746.28	5747.82	5747.23	5747.89	0.003074	2.00	20.04	20.51	0.36
Reach 1	2897	Low	227.00	5746.28	5749.36	5748.48	5749.50	0.003262	2.98	76.12	44.81	0.40
Reach 1	2897	10-year	2802.00	5746.28	5752.79	5751.58	5753.09	0.002845	5.69	800.24	256.76	0.45
Reach 1	2897	100 year	4400.00	5746.28	5753.88	5752.25	5754.26	0.002863	6.52	1085.96	266.19	0.47
Reach 1	2941	Baseflow	4.00	5746.41	5746.92	5746.66	5746.94	0.003311	1.21	3.30	7.49	0.32
Reach 1	2941	Bankfull	40.00	5746.41	5747.95	5747.36	5748.02	0.003161	2.00	19.96	20.73	0.36
Reach 1	2941	Low	227.00	5746.41	5749.50	5748.60	5749.63	0.003155	2.95	76.94	44.89	0.40
Reach 1	2941	10-year	2802.00	5746.41	5752.88	5751.82	5753.23	0.003294	6.13	747.57	250.04	0.48
Reach 1	2941	100 year	4400.00	5746.41	5753.97	5752.51	5754.40	0.003261	6.96	1025.60	260.12	0.50
Reach 1	2988	Baseflow	4.00	5746.53	5747.05	5746.76	5747.07	0.002617	1.11	3.60	7.78	0.29
Reach 1	2988	Bankfull	40.00	5746.53	5748.10	5747.49	5748.16	0.002880	1.94	20.57	20.79	0.34
Reach 1	2988	Low	227.00	5746.53	5749.64	5748.71	5749.77	0.003006	2.90	78.30	45.19	0.39
Reach 1	2988	10-year	2802.00	5746.53	5753.01	5751.98	5753.40	0.003498	6.29	723.66	247.72	0.50
Reach 1	2988	100 year	4400.00	5746.53	5754.10	5752.69	5754.57	0.003469	7.15	1001.44	263.46	0.51
Reach 1	3023	Baseflow	4.00	5746.62	5747.15	5746.88	5747.17	0.003247	1.23	3.26	7.08	0.32
Reach 1	3023	Bankfull	40.00	5746.62	5748.20	5747.60	5748.26	0.003027	1.97	20.29	20.88	0.35
Reach 1	3023	Low	227.00	5746.62	5749.75	5748.81	5749.88	0.003006	2.90	78.31	45.23	0.39
Reach 1	3023	10-year	2802.00	5746.62	5753.14	5752.07	5753.51	0.003369	6.17	719.40	231.77	0.49
Reach 1	3023	100 year	4400.00	5746.62	5754.20	5752.76	5754.68	0.003465	7.13	971.28	239.80	0.51
Reach 1	3132	Baseflow	4.00	5746.91	5747.46	5747.16	5747.47	0.002546	1.10	3.64	7.87	0.28
Reach 1	3132	Bankfull	40.00	5746.91	5748.50	5747.87	5748.56	0.002711	1.90	21.03	21.06	0.34
Reach 1	3132	Low	227.00	5746.91	5750.06	5749.09	5750.18	0.002816	2.83	80.11	45.62	0.38
Reach 1	3132	10-year	2802.00	5746.91	5753.53	5752.30	5753.84	0.002754	5.70	795.11	249.09	0.45
Reach 1	3132	100 year	4400.00	5746.91	5754.63	5752.96	5755.02	0.002822	6.58	1074.17	258.64	0.47
Reach 1	3178	Baseflow	4.00	5747.01	5747.57	5747.26	5747.58	0.002242	1.05	3.79	7.87	0.27
Reach 1	3178	Bankfull	40.00	5747.01	5748.62	5747.98	5748.68	0.002599	1.88	21.33	21.07	0.33
Reach 1	3178	Low	227.00	5747.01	5750.19	5749.21	5750.31	0.002756	2.81	80.68	45.63	0.37
Reach 1	3178	10-year	2802.00	5747.01	5753.66	5752.42	5753.97	0.002734	5.68	801.25	253.31	0.44
Reach 1	3178	100 year	4400.00	5747.01	5754.77	5753.11	5755.15	0.002772	6.52	1087.29	263.41	0.46
Reach 1	3216	Baseflow	4.00	5747.12	5747.65	5747.35	5747.67	0.002352	1.06	3.76	7.98	0.27
Reach 1	3216	Bankfull	40.00	5747.12	5748.72	5748.06	5748.78	0.002585	1.87	21.38	21.12	0.33
Reach 1	3216	Low	227.00	5747.12	5750.29	5749.30	5750.42	0.002715	2.80	81.09	45.69	0.37
Reach 1	3216	10-year	2802.00	5747.12	5753.75	5752.63	5754.09	0.003002	5.94	765.61	248.69	0.46
Reach 1	3216	100 year	4400.00	5747.12	5754.86	5753.33	5755.28	0.003002	6.77	1046.40	258.28	0.48
Reach 1	3274	Baseflow	4.00	5747.26	5747.80	5747.52	5747.82	0.002660	1.12	3.58	7.77	0.29
Reach 1	3274	Bankfull	40.00	5747.26	5748.87	5748.23	5748.93	0.002664	1.89	21.15	21.09	0.33
Reach 1	3274	Low	227.00	5747.26	5750.45	5749.46	5750.57	0.002720	2.80	81.00	45.69	0.37
Reach 1	3274	10-year	2802.00	5747.26	5753.80	5753.10	5754.38	0.004701	7.34	615.38	233.68	0.58
Reach 1	3274	100 year	4400.00	5747.26	5754.91	5753.97	5755.55	0.004375	8.10	880.07	242.90	0.58
Reach 1	3310	Baseflow	4.00	5747.34	5747.89	5747.60	5747.91	0.002488	1.08	3.70	8.04	0.28
Reach 1	3310	Bankfull	40.00	5747.34	5748.97	5748.31	5749.02	0.002591	1.87	21.34	21.11	0.33
Reach 1	3310	Low	227.00	5747.34	5750.55	5749.54	5750.67	0.002687	2.79	81.32	45.73	0.37
Reach 1	3310	10-year	2802.00	5747.34	5753.65	5753.65	5755.02	0.009632	10.18	382.93	162.99	0.82
Reach 1	3310	100 year	4400.00	5747.34	5755.04	5755.04	5756.36	0.007469	10.64	661.33	233.83	0.76
Reach 1	3331	Baseflow	4.00	5747.38	5747.92	5747.59	5747.93	0.000423	0.68	5.87	13.99	0.19
Reach 1	3331	Bankfull	40.00	5747.38	5749.01	5748.16	5749.05	0.000546	1.45	27.56	25.49	0.25
Reach 1	3331	Low	227.00	5747.38	5750.59	5749.33	5750.70	0.000952	2.75	82.65	44.53	0.36
Reach 1	3331	10-year	2802.00	5747.38	5753.54	5753.54	5755.33	0.005626	10.76	267.16	84.80	0.97
Reach 1	3331	100 year	4400.00	5747.38	5755.00	5755.00	5757.14	0.004474	11.92	440.16	162.66	0.92
Reach 1	3350	Baseflow	4.00	5751.86	5752.05	5752.05	5752.13	0.017996	2.29	1.74	11.29	1.03
Reach 1	3350	Bankfull	40.00	5751.86	5752.58	5752.58	5752.85	0.011703	4.12	9.72	18.88	1.01
Reach 1	3350	Low	227.00	5751.86	5753.66	5753.66	5754.21	0.008584	5.91	38.40	34.27	0.98
Reach 1	3350	10-year	2802.00	5751.86	5757.22	5757.22	5758.31	0.004336	9.89	547.32	246.14	0.86
Reach 1	3350	100 year	4400.00	5751.86	5758.06	5758.06	5759.43	0.004632	11.58	756.93	253.36	0.92
Reach 1	3355	Baseflow	4.00	5751.88	5752.14	5752.02	5752.19	0.006422	1.75	2.28	10.15	0.65
Reach 1	3355	Bankfull	40.00	5751.88	5752.66	5752.66	5752.93	0.011694	4.20	9.51	17.85	1.02
Reach 1	3355	Low	227.00	5751.88	5753.80	5753.80	5754.33	0.008544	5.82	39.03	35.54	0.98
Reach 1	3355	10-year	2802.00	5751.88	5757.30	5757.30	5758.41	0.004378	9.91	545.79	246.76	0.87
Reach 1	3355	100 year	4400.00	5751.88	5758.13	5758.13	5759.52	0.004716	11.64	752.62	253.90	0.93

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	3408	Baseflow	4.00	5752.00	5752.44	5752.22	5752.46	0.004485	1.31	3.05	7.71	0.37
Reach 1	3408	Bankfull	40.00	5752.00	5753.29	5752.96	5753.40	0.006915	2.65	15.07	18.42	0.52
Reach 1	3408	Low	227.00	5752.00	5754.54	5754.18	5754.82	0.009598	4.30	52.84	40.43	0.66
Reach 1	3408	10-year	2802.00	5752.00	5758.32	5757.31	5758.67	0.003380	6.13	753.28	252.57	0.49
Reach 1	3408	100 year	4400.00	5752.00	5759.38	5757.96	5759.81	0.003377	6.99	1026.16	261.74	0.51
Reach 1	3450	Baseflow	4.00	5752.12	5752.60	5752.36	5752.63	0.003396	1.21	3.30	7.63	0.32
Reach 1	3450	Bankfull	40.00	5752.12	5753.55	5753.08	5753.63	0.004341	2.25	17.79	19.69	0.42
Reach 1	3450	Low	227.00	5752.12	5754.93	5754.30	5755.12	0.005252	3.51	64.73	42.71	0.50
Reach 1	3450	10-year	2802.00	5752.12	5758.49	5757.38	5758.81	0.003148	5.87	773.21	253.99	0.47
Reach 1	3450	100 year	4400.00	5752.12	5759.55	5758.03	5759.95	0.003177	6.73	1047.64	263.06	0.49
Reach 1	3482	Baseflow	4.00	5752.20	5752.72	5752.45	5752.74	0.003684	1.24	3.22	7.62	0.34
Reach 1	3482	Bankfull	40.00	5752.20	5753.69	5753.17	5753.76	0.003869	2.15	18.57	20.15	0.40
Reach 1	3482	Low	227.00	5752.20	5755.11	5754.35	5755.28	0.004449	3.32	68.46	43.44	0.47
Reach 1	3482	10-year	2802.00	5752.20	5758.59	5757.43	5758.90	0.003082	5.86	777.36	252.22	0.47
Reach 1	3482	100 year	4400.00	5752.20	5759.65	5758.09	5760.05	0.003143	6.75	1049.81	261.61	0.49
Reach 1	3524	Baseflow	4.00	5752.31	5752.85	5752.56	5752.87	0.002622	1.12	3.57	7.61	0.29
Reach 1	3524	Bankfull	40.00	5752.31	5753.85	5753.28	5753.91	0.003266	2.03	19.66	20.43	0.37
Reach 1	3524	Low	227.00	5752.31	5755.30	5754.52	5755.46	0.003836	3.15	72.07	44.14	0.43
Reach 1	3524	10-year	2802.00	5752.31	5758.71	5757.62	5759.04	0.003217	5.96	765.78	255.30	0.48
Reach 1	3524	100 year	4400.00	5752.31	5759.78	5758.30	5760.19	0.003213	6.80	1042.61	264.12	0.49
Reach 1	3593	Baseflow	4.00	5752.50	5753.03	5752.74	5753.05	0.002527	1.10	3.65	7.82	0.28
Reach 1	3593	Bankfull	40.00	5752.50	5754.06	5753.45	5754.12	0.002903	1.95	20.48	20.71	0.35
Reach 1	3593	Low	227.00	5752.50	5755.56	5754.69	5755.70	0.003298	2.99	75.83	44.72	0.41
Reach 1	3593	10-year	2802.00	5752.50	5758.93	5757.83	5759.26	0.003162	6.00	763.38	249.37	0.47
Reach 1	3593	100 year	4400.00	5752.50	5759.99	5758.50	5760.41	0.003227	6.89	1034.30	259.85	0.50
Reach 1	3655	Baseflow	4.00	5752.66	5753.18	5752.90	5753.20	0.002584	1.10	3.64	7.91	0.29
Reach 1	3655	Bankfull	40.00	5752.66	5754.24	5753.60	5754.29	0.002762	1.92	20.86	20.88	0.34
Reach 1	3655	Low	227.00	5752.66	5755.76	5754.85	5755.89	0.003088	2.93	77.61	45.10	0.39
Reach 1	3655	10-year	2802.00	5752.66	5759.13	5757.92	5759.45	0.002958	5.82	785.69	252.77	0.46
Reach 1	3655	100 year	4400.00	5752.66	5760.20	5758.60	5760.60	0.003020	6.70	1061.50	261.89	0.48
Reach 1	3686	Baseflow	4.00	5752.73	5753.26	5752.97	5753.28	0.002599	1.11	3.60	7.74	0.29
Reach 1	3686	Bankfull	40.00	5752.73	5754.32	5753.70	5754.38	0.002768	1.92	20.86	20.91	0.34
Reach 1	3686	Low	227.00	5752.73	5755.86	5754.93	5755.99	0.003007	2.90	78.31	45.22	0.39
Reach 1	3686	10-year	2802.00	5752.73	5759.23	5758.02	5759.54	0.002957	5.79	783.81	251.92	0.46
Reach 1	3686	100 year	4400.00	5752.73	5760.30	5758.71	5760.69	0.003014	6.66	1058.83	260.65	0.48
Reach 1	3718	Baseflow	4.00	5752.81	5753.34	5753.04	5753.36	0.002423	1.08	3.70	7.85	0.28
Reach 1	3718	Bankfull	40.00	5752.81	5754.41	5753.75	5754.47	0.002641	1.89	21.17	20.93	0.33
Reach 1	3718	Low	227.00	5752.81	5755.96	5755.01	5756.08	0.002918	2.87	79.08	45.30	0.38
Reach 1	3718	10-year	2802.00	5752.81	5759.32	5758.15	5759.63	0.002909	5.75	789.60	253.29	0.46
Reach 1	3718	100 year	4400.00	5752.81	5760.40	5758.81	5760.79	0.002961	6.61	1066.99	262.00	0.47
Reach 1	3759	Baseflow	4.00	5752.94	5753.44	5753.18	5753.46	0.002918	1.14	3.50	7.91	0.30
Reach 1	3759	Bankfull	40.00	5752.94	5754.52	5753.87	5754.57	0.002739	1.91	20.99	21.08	0.34
Reach 1	3759	Low	227.00	5752.94	5756.07	5755.12	5756.20	0.002867	2.85	79.71	45.62	0.38
Reach 1	3759	10-year	2802.00	5752.94	5759.44	5758.25	5759.75	0.002897	5.74	788.36	251.99	0.45
Reach 1	3759	100 year	4400.00	5752.94	5760.52	5758.91	5760.91	0.002953	6.61	1064.89	260.74	0.47
Reach 1	3849	Baseflow	4.00	5753.16	5753.69	5753.40	5753.70	0.002539	1.09	3.68	8.09	0.28
Reach 1	3849	Bankfull	40.00	5753.16	5754.76	5754.11	5754.81	0.002615	1.88	21.26	21.05	0.33
Reach 1	3849	Low	227.00	5753.16	5756.33	5755.33	5756.45	0.002793	2.83	80.33	45.63	0.38
Reach 1	3849	10-year	2802.00	5753.16	5759.70	5758.50	5760.01	0.002875	5.77	788.37	250.61	0.45
Reach 1	3849	100 year	4400.00	5753.16	5760.78	5759.17	5761.18	0.002935	6.64	1064.75	259.27	0.47
Reach 1	3899	Baseflow	4.00	5753.28	5753.81	5753.52	5753.83	0.002764	1.13	3.55	7.84	0.30
Reach 1	3899	Bankfull	40.00	5753.28	5754.88	5754.24	5754.94	0.002659	1.90	21.10	20.93	0.33
Reach 1	3899	Low	227.00	5753.28	5756.46	5755.48	5756.59	0.002759	2.82	80.58	45.58	0.37
Reach 1	3899	10-year	2802.00	5753.28	5759.82	5758.76	5760.18	0.003250	6.10	748.28	252.38	0.48
Reach 1	3899	100 year	4400.00	5753.28	5760.91	5759.49	5761.35	0.003211	6.92	1027.87	261.04	0.49
Reach 1	3933	Baseflow	4.00	5753.38	5753.90	5753.61	5753.92	0.002625	1.11	3.60	7.80	0.29
Reach 1	3933	Bankfull	40.00	5753.38	5754.98	5754.32	5755.03	0.002652	1.89	21.13	20.90	0.33
Reach 1	3933	Low	227.00	5753.38	5756.56	5755.57	5756.68	0.002746	2.81	80.79	45.65	0.37
Reach 1	3933	10-year	2802.00	5753.38	5759.88	5758.98	5760.32	0.003872	6.60	684.60	243.14	0.52
Reach 1	3933	100 year	4400.00	5753.38	5760.97	5759.78	5761.49	0.003762	7.43	952.40	251.68	0.53
Reach 1	3988	Baseflow	4.00	5753.53	5754.04	5753.75	5754.06	0.002806	1.13	3.55	7.94	0.30
Reach 1	3988	Bankfull	40.00	5753.53	5755.12	5754.47	5755.17	0.002670	1.90	21.10	20.99	0.33
Reach 1	3988	Low	227.00	5753.53	5756.71	5755.70	5756.83	0.002698	2.80	81.18	45.67	0.37
Reach 1	3988	10-year	2802.00	5753.53	5759.85	5759.85	5761.09	0.008829	9.77	406.93	170.91	0.79

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	3988	100 year	4400.00	5753.53	5761.10	5761.10	5762.40	0.007656	10.61	662.22	235.28	0.76
Reach 1	4009	Baseflow	4.00	5753.53	5754.08	5753.73	5754.08	0.000413	0.68	5.91	14.00	0.18
Reach 1	4009	Bankfull	40.00	5753.53	5755.17	5754.31	5755.20	0.000540	1.45	27.65	25.48	0.24
Reach 1	4009	Low	227.00	5753.53	5756.74	5755.48	5756.86	0.000950	2.73	83.29	45.34	0.35
Reach 1	4009	10-year	2802.00	5753.53	5759.65	5759.65	5761.43	0.005498	10.74	270.31	86.47	0.96
Reach 1	4009	100 year	4400.00	5753.53	5761.46	5761.46	5763.24	0.003430	10.97	529.77	233.90	0.81
Reach 1	4027	Baseflow	4.00	5757.90	5758.09	5758.09	5758.17	0.018010	2.30	1.74	11.21	1.03
Reach 1	4027	Bankfull	40.00	5757.90	5758.62	5758.62	5758.88	0.011255	4.08	9.80	18.72	0.99
Reach 1	4027	Low	227.00	5757.90	5759.70	5759.70	5760.25	0.008517	5.91	38.42	34.10	0.98
Reach 1	4027	10-year	2802.00	5757.90	5763.16	5763.16	5764.24	0.004491	9.89	550.46	246.88	0.88
Reach 1	4027	100 year	4400.00	5757.90	5763.97	5763.97	5765.35	0.004894	11.68	752.57	254.85	0.94
Reach 1	4032	Baseflow	4.00	5758.03	5758.23	5758.23	5758.32	0.016442	2.38	1.68	9.56	1.00
Reach 1	4032	Bankfull	40.00	5758.03	5758.81	5758.81	5759.07	0.011037	4.11	9.73	18.09	0.99
Reach 1	4032	Low	227.00	5758.03	5759.94	5759.94	5760.46	0.008502	5.82	39.00	35.35	0.98
Reach 1	4032	10-year	2802.00	5758.03	5763.27	5763.27	5764.34	0.004667	9.95	549.19	247.86	0.89
Reach 1	4032	100 year	4400.00	5758.03	5764.09	5764.09	5765.45	0.004965	11.65	755.66	256.03	0.95
Reach 1	4067	Baseflow	4.00	5758.12	5758.59	5758.38	5758.62	0.005038	1.42	2.82	6.93	0.39
Reach 1	4067	Bankfull	40.00	5758.12	5759.32	5759.11	5759.47	0.010910	3.09	12.95	17.81	0.64
Reach 1	4067	Low	227.00	5758.12	5760.44	5760.33	5760.86	0.015646	5.22	44.27	38.86	0.84
Reach 1	4067	10-year	2802.00	5758.12	5764.13	5763.43	5764.57	0.004985	6.85	667.25	254.39	0.58
Reach 1	4067	100 year	4400.00	5758.12	5765.19	5764.08	5765.69	0.004491	7.53	942.48	264.73	0.57
Reach 1	4123	Baseflow	4.00	5758.28	5758.80	5758.52	5758.82	0.002593	1.10	3.62	7.84	0.29
Reach 1	4123	Bankfull	40.00	5758.28	5759.74	5759.22	5759.81	0.003911	2.17	18.47	20.00	0.40
Reach 1	4123	Low	227.00	5758.28	5761.15	5760.46	5761.32	0.004637	3.36	67.64	43.40	0.47
Reach 1	4123	10-year	2802.00	5758.28	5764.38	5763.70	5764.85	0.004683	6.91	659.31	245.62	0.57
Reach 1	4123	100 year	4400.00	5758.28	5765.41	5764.38	5765.96	0.004493	7.75	916.15	254.39	0.58
Reach 1	4156	Baseflow	4.00	5758.34	5758.88	5758.57	5758.90	0.002309	1.07	3.74	7.78	0.27
Reach 1	4156	Bankfull	40.00	5758.34	5759.87	5759.32	5759.94	0.003386	2.06	19.41	20.29	0.37
Reach 1	4156	Low	227.00	5758.34	5761.31	5760.55	5761.47	0.004091	3.22	70.48	43.76	0.45
Reach 1	4156	10-year	2802.00	5758.34	5764.52	5763.90	5765.02	0.004827	7.06	647.64	246.23	0.58
Reach 1	4156	100 year	4400.00	5758.34	5765.55	5764.58	5766.13	0.004623	7.90	904.46	255.62	0.59
Reach 1	4187	Baseflow	4.00	5758.44	5758.96	5758.67	5758.98	0.002644	1.11	3.61	7.90	0.29
Reach 1	4187	Bankfull	40.00	5758.44	5759.97	5759.38	5760.04	0.003112	2.00	19.98	20.53	0.36
Reach 1	4187	Low	227.00	5758.44	5761.44	5760.62	5761.59	0.003720	3.12	72.77	44.18	0.43
Reach 1	4187	10-year	2802.00	5758.44	5764.58	5764.23	5765.24	0.006081	7.87	576.90	240.74	0.65
Reach 1	4187	100 year	4400.00	5758.44	5765.61	5764.94	5766.33	0.005582	8.63	828.45	249.71	0.64
Reach 1	4246	Baseflow	4.00	5758.59	5759.09	5758.80	5759.11	0.001878	0.88	4.57	11.29	0.24
Reach 1	4246	Bankfull	40.00	5758.59	5760.14	5759.44	5760.20	0.002504	1.88	21.25	20.52	0.33
Reach 1	4246	Low	227.00	5758.59	5761.65	5760.75	5761.79	0.003147	2.96	76.76	44.71	0.40
Reach 1	4246	10-year	2802.00	5758.59	5765.11	5765.11	5766.26	0.007650	9.43	453.97	230.39	0.74
Reach 1	4246	100 year	4400.00	5758.59	5766.04	5766.04	5767.32	0.007749	10.63	673.65	240.78	0.77
Reach 1	4261	Baseflow	4.00	5758.63	5759.11	5758.85	5759.12	0.000736	0.83	4.84	13.10	0.24
Reach 1	4261	Bankfull	40.00	5758.63	5760.18	5759.43	5760.22	0.000717	1.61	24.90	24.24	0.28
Reach 1	4261	Low	227.00	5758.63	5761.67	5760.60	5761.82	0.001271	3.07	73.89	41.75	0.41
Reach 1	4261	10-year	2802.00	5758.63	5765.03	5765.03	5766.52	0.004396	9.93	339.91	176.38	0.87
Reach 1	4261	100 year	4400.00	5758.63	5766.32	5766.32	5767.91	0.003543	10.72	622.88	239.50	0.82
Reach 1	4275	Baseflow	4.00	5762.07	5762.27	5762.27	5762.35	0.016763	2.27	1.76	10.99	1.00
Reach 1	4275	Bankfull	40.00	5762.07	5762.81	5762.81	5763.07	0.011301	4.08	9.81	18.83	1.00
Reach 1	4275	Low	227.00	5762.07	5763.86	5763.86	5764.43	0.009111	6.04	37.61	34.03	1.01
Reach 1	4275	10-year	2802.00	5762.07	5767.34	5767.34	5768.41	0.004476	9.88	550.63	246.37	0.87
Reach 1	4275	100 year	4400.00	5762.07	5768.14	5768.14	5769.52	0.004886	11.67	751.54	253.32	0.94
Reach 1	4280	Baseflow	4.00	5762.09	5762.35	5762.30	5762.40	0.006574	1.78	2.25	10.02	0.66
Reach 1	4280	Bankfull	40.00	5762.09	5762.87	5762.87	5763.15	0.011679	4.21	9.50	17.77	1.02
Reach 1	4280	Low	227.00	5762.09	5764.02	5764.02	5764.55	0.008616	5.84	38.89	35.44	0.98
Reach 1	4280	10-year	2802.00	5762.09	5767.50	5767.50	5768.56	0.004309	9.81	555.10	247.11	0.86
Reach 1	4280	100 year	4400.00	5762.09	5768.26	5768.26	5769.68	0.004933	11.77	745.70	253.87	0.95
Reach 1	4348	Baseflow	4.00	5762.28	5762.75	5762.53	5762.78	0.004689	1.38	2.90	7.04	0.38
Reach 1	4348	Bankfull	40.00	5762.28	5763.63	5763.26	5763.73	0.006178	2.53	15.79	19.05	0.49
Reach 1	4348	Low	227.00	5762.28	5764.89	5764.47	5765.14	0.008108	4.06	55.96	41.12	0.61
Reach 1	4348	10-year	2802.00	5762.28	5768.53	5767.57	5768.89	0.003629	6.17	733.48	251.76	0.50
Reach 1	4348	100 year	4400.00	5762.28	5769.60	5768.18	5770.03	0.003527	6.98	1007.99	260.95	0.51
Reach 1	4424	Baseflow	4.00	5762.47	5763.01	5762.72	5763.03	0.002574	1.12	3.57	7.49	0.29
Reach 1	4424	Bankfull	40.00	5762.47	5764.00	5763.43	5764.06	0.003342	2.05	19.52	20.41	0.37

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	4424	Low	227.00	5762.47	5765.41	5764.67	5765.58	0.004193	3.25	69.89	43.70	0.45
Reach 1	4424	10-year	2802.00	5762.47	5768.81	5767.77	5769.15	0.003327	6.04	756.05	252.13	0.48
Reach 1	4424	100 year	4400.00	5762.47	5769.88	5768.41	5770.30	0.003330	6.90	1028.37	261.15	0.50
Reach 1	4520	Baseflow	4.00	5762.72	5763.25	5762.96	5763.27	0.002444	1.07	3.74	8.18	0.28
Reach 1	4520	Bankfull	40.00	5762.72	5764.29	5763.66	5764.35	0.002774	1.93	20.77	20.76	0.34
Reach 1	4520	Low	227.00	5762.72	5765.79	5764.91	5765.93	0.003297	2.99	75.81	44.73	0.41
Reach 1	4520	10-year	2802.00	5762.72	5769.13	5767.99	5769.44	0.003092	5.81	775.19	252.99	0.47
Reach 1	4520	100 year	4400.00	5762.72	5770.19	5768.65	5770.59	0.003140	6.69	1048.00	262.03	0.49
Reach 1	4566	Baseflow	4.00	5762.84	5763.37	5763.10	5763.39	0.003146	1.18	3.38	7.67	0.31
Reach 1	4566	Bankfull	40.00	5762.84	5764.42	5763.81	5764.48	0.002929	1.96	20.46	20.84	0.35
Reach 1	4566	Low	227.00	5762.84	5765.94	5765.04	5766.07	0.003193	2.96	76.66	44.91	0.40
Reach 1	4566	10-year	2802.00	5762.84	5769.27	5768.18	5769.58	0.003027	5.80	792.29	263.59	0.46
Reach 1	4566	100 year	4400.00	5762.84	5770.34	5768.80	5770.73	0.003007	6.60	1079.80	272.41	0.48
Reach 1	4605	Baseflow	4.00	5762.94	5763.49	5763.20	5763.51	0.002843	1.14	3.49	7.72	0.30
Reach 1	4605	Bankfull	40.00	5762.94	5764.54	5763.90	5764.59	0.002805	1.93	20.77	20.96	0.34
Reach 1	4605	Low	227.00	5762.94	5766.07	5765.13	5766.20	0.003043	2.91	78.00	45.23	0.39
Reach 1	4605	10-year	2802.00	5762.94	5769.37	5768.26	5769.70	0.003099	5.87	771.07	250.53	0.47
Reach 1	4605	100 year	4400.00	5762.94	5770.43	5768.92	5770.85	0.003259	6.86	1041.54	268.86	0.50
Reach 1	4647	Baseflow	4.00	5763.06	5763.59	5763.28	5763.61	0.002206	1.04	3.86	8.12	0.27
Reach 1	4647	Bankfull	40.00	5763.06	5764.65	5764.01	5764.70	0.002636	1.89	21.20	20.98	0.33
Reach 1	4647	Low	227.00	5763.06	5766.19	5765.23	5766.32	0.002896	2.86	79.25	45.30	0.38
Reach 1	4647	10-year	2802.00	5763.06	5769.50	5768.35	5769.81	0.003013	5.81	781.91	253.71	0.46
Reach 1	4647	100 year	4400.00	5763.06	5770.58	5769.02	5770.97	0.003038	6.66	1059.92	262.48	0.48
Reach 1	4696	Baseflow	4.00	5763.19	5763.71	5763.43	5763.73	0.002659	1.12	3.58	7.77	0.29
Reach 1	4696	Bankfull	40.00	5763.19	5764.78	5764.14	5764.83	0.002691	1.90	21.07	21.00	0.33
Reach 1	4696	Low	227.00	5763.19	5766.33	5765.37	5766.46	0.002842	2.84	79.89	45.56	0.38
Reach 1	4696	10-year	2802.00	5763.19	5769.65	5768.50	5769.96	0.002993	5.83	780.97	251.63	0.46
Reach 1	4696	100 year	4400.00	5763.19	5770.73	5769.15	5771.12	0.003033	6.69	1057.14	260.39	0.48
Reach 1	4784	Baseflow	4.00	5763.41	5763.93	5763.63	5763.95	0.002427	1.06	3.76	8.20	0.28
Reach 1	4784	Bankfull	40.00	5763.41	5765.00	5764.35	5765.06	0.002562	1.87	21.37	20.98	0.33
Reach 1	4784	Low	227.00	5763.41	5766.58	5765.58	5766.70	0.002754	2.81	80.66	45.61	0.37
Reach 1	4784	10-year	2802.00	5763.41	5769.85	5769.10	5770.30	0.004052	6.75	679.38	244.79	0.54
Reach 1	4784	100 year	4400.00	5763.41	5770.93	5769.78	5771.46	0.003888	7.54	948.78	253.92	0.54
Reach 1	4828	Baseflow	4.00	5763.53	5764.03	5763.75	5764.04	0.001943	0.88	4.55	11.46	0.25
Reach 1	4828	Bankfull	40.00	5763.53	5765.11	5764.38	5765.16	0.002223	1.79	22.37	21.28	0.31
Reach 1	4828	Low	227.00	5763.53	5766.69	5765.64	5766.82	0.002444	2.84	82.29	45.62	0.36
Reach 1	4828	10-year	2802.00	5763.53	5769.86	5769.86	5770.83	0.007824	9.07	492.70	236.29	0.74
Reach 1	4828	100 year	4400.00	5763.53	5770.79	5770.61	5771.85	0.007523	10.05	717.30	243.86	0.75
Reach 1	4838	Baseflow	4.00	5763.53	5764.05	5763.72	5764.05	0.000464	0.70	5.70	13.97	0.19
Reach 1	4838	Bankfull	40.00	5763.53	5765.14	5764.28	5765.18	0.000544	1.44	27.75	25.86	0.25
Reach 1	4838	Low	227.00	5763.53	5766.72	5765.45	5766.83	0.000939	2.68	84.81	47.08	0.35
Reach 1	4838	10-year	2802.00	5763.53	5769.92	5769.92	5771.19	0.003506	9.40	429.03	235.08	0.79
Reach 1	4838	100 year	4400.00	5763.53	5770.92	5770.92	5772.46	0.003570	10.86	667.32	243.41	0.82
Reach 1	4849	Baseflow	4.00	5765.99	5766.20	5766.20	5766.28	0.015965	2.21	1.81	11.34	0.97
Reach 1	4849	Bankfull	40.00	5765.99	5766.74	5766.74	5766.99	0.011165	4.03	9.91	19.16	0.99
Reach 1	4849	Low	227.00	5765.99	5767.81	5767.81	5768.35	0.008504	5.89	38.57	34.41	0.98
Reach 1	4849	10-year	2802.00	5765.99	5771.29	5771.29	5772.35	0.004378	9.82	553.75	245.27	0.87
Reach 1	4849	100 year	4400.00	5765.99	5772.08	5772.08	5773.47	0.004888	11.69	748.96	251.99	0.94
Reach 1	4854	Baseflow	4.00	5766.03	5766.28	5766.23	5766.33	0.007943	1.88	2.13	10.04	0.72
Reach 1	4854	Bankfull	40.00	5766.03	5766.82	5766.82	5767.08	0.010828	4.09	9.77	18.02	0.98
Reach 1	4854	Low	227.00	5766.03	5767.95	5767.95	5768.48	0.008558	5.83	38.92	35.35	0.98
Reach 1	4854	10-year	2802.00	5766.03	5771.45	5771.45	5772.52	0.004291	9.82	552.51	245.76	0.86
Reach 1	4854	100 year	4400.00	5766.03	5772.26	5772.26	5773.64	0.004718	11.63	754.39	253.10	0.93
Reach 1	4936	Baseflow	4.00	5766.25	5766.73	5766.50	5766.76	0.003613	1.23	3.26	7.76	0.33
Reach 1	4936	Bankfull	40.00	5766.25	5767.61	5767.21	5767.71	0.005379	2.43	16.47	19.13	0.46
Reach 1	4936	Low	227.00	5766.25	5768.91	5768.43	5769.15	0.007101	3.88	58.45	41.57	0.58
Reach 1	4936	10-year	2802.00	5766.25	5772.56	5771.53	5772.90	0.003399	6.05	749.58	251.65	0.49
Reach 1	4936	100 year	4400.00	5766.25	5773.63	5772.13	5774.06	0.003351	6.88	1024.11	260.34	0.50
Reach 1	4970	Baseflow	4.00	5766.34	5766.85	5766.60	5766.88	0.003620	1.26	3.18	7.28	0.34
Reach 1	4970	Bankfull	40.00	5766.34	5767.79	5767.33	5767.87	0.004379	2.25	17.79	19.88	0.42
Reach 1	4970	Low	227.00	5766.34	5769.17	5768.52	5769.35	0.005174	3.49	65.10	42.88	0.50
Reach 1	4970	10-year	2802.00	5766.34	5772.69	5771.60	5773.01	0.003140	5.85	778.44	257.48	0.47
Reach 1	4970	100 year	4400.00	5766.34	5773.77	5772.18	5774.16	0.003118	6.67	1059.94	266.36	0.49

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	5019	Baseflow	4.00	5766.47	5767.00	5766.71	5767.02	0.002519	1.10	3.65	7.79	0.28
Reach 1	5019	Bankfull	40.00	5766.47	5767.98	5767.41	5768.05	0.003352	2.05	19.50	20.39	0.37
Reach 1	5019	Low	227.00	5766.47	5769.41	5768.63	5769.57	0.004064	3.21	70.63	43.80	0.45
Reach 1	5019	10-year	2802.00	5766.47	5772.84	5771.79	5773.18	0.003300	6.01	756.61	253.63	0.48
Reach 1	5019	100 year	4400.00	5766.47	5773.91	5772.44	5774.33	0.003269	6.84	1033.81	262.86	0.50
Reach 1	5053	Baseflow	4.00	5766.56	5767.09	5766.80	5767.11	0.002977	1.17	3.40	7.45	0.31
Reach 1	5053	Bankfull	40.00	5766.56	5768.10	5767.54	5768.16	0.003286	2.03	19.68	20.60	0.37
Reach 1	5053	Low	227.00	5766.56	5769.55	5768.75	5769.70	0.003760	3.13	72.53	44.20	0.43
Reach 1	5053	10-year	2802.00	5766.56	5772.91	5772.09	5773.32	0.003858	6.49	709.45	254.52	0.52
Reach 1	5053	100 year	4400.00	5766.56	5773.99	5772.76	5774.47	0.003678	7.25	989.68	264.75	0.53
Reach 1	5081	Baseflow	4.00	5766.62	5767.17	5766.88	5767.19	0.003204	1.14	3.51	8.56	0.31
Reach 1	5081	Bankfull	40.00	5766.62	5768.19	5767.60	5768.25	0.003041	1.98	20.16	20.68	0.35
Reach 1	5081	Low	227.00	5766.62	5769.66	5768.82	5769.81	0.003541	3.07	74.02	44.51	0.42
Reach 1	5081	10-year	2802.00	5766.62	5772.90	5772.42	5773.52	0.005510	7.60	596.08	241.56	0.62
Reach 1	5081	100 year	4400.00	5766.62	5773.98	5773.15	5774.65	0.004950	8.28	870.33	259.54	0.61
Reach 1	5139	Baseflow	4.00	5766.78	5767.31	5766.99	5767.32	0.001480	0.77	5.21	13.15	0.21
Reach 1	5139	Bankfull	40.00	5766.78	5768.36	5767.59	5768.40	0.002154	1.58	25.36	28.48	0.29
Reach 1	5139	Low	227.00	5766.78	5769.86	5768.78	5769.98	0.002450	2.74	82.94	44.80	0.35
Reach 1	5139	10-year	2802.00	5766.78	5773.17	5773.17	5774.19	0.007089	9.08	484.57	236.92	0.71
Reach 1	5139	100 year	4400.00	5766.78	5773.98	5773.98	5775.23	0.007974	10.64	678.93	243.81	0.77
Reach 1	5150	Baseflow	4.00	5766.84	5767.32	5767.05	5767.33	0.000749	0.83	4.83	13.22	0.24
Reach 1	5150	Bankfull	40.00	5766.84	5768.37	5767.64	5768.41	0.000747	1.63	24.57	24.21	0.28
Reach 1	5150	Low	227.00	5766.84	5769.86	5768.82	5770.01	0.001328	3.03	74.84	44.66	0.41
Reach 1	5150	10-year	2802.00	5766.84	5773.16	5773.16	5774.48	0.003721	9.57	421.37	236.00	0.81
Reach 1	5150	100 year	4400.00	5766.84	5774.22	5774.22	5775.74	0.003573	10.84	674.82	245.05	0.82
Reach 1	5160	Baseflow	4.00	5769.23	5769.44	5769.44	5769.51	0.015237	2.17	1.84	11.44	0.95
Reach 1	5160	Bankfull	40.00	5769.23	5769.96	5769.96	5770.23	0.011538	4.14	9.66	18.38	1.01
Reach 1	5160	Low	227.00	5769.23	5771.04	5771.04	5771.58	0.008716	5.92	38.34	34.54	0.99
Reach 1	5160	10-year	2802.00	5769.23	5774.48	5774.48	5775.53	0.004482	9.81	551.84	245.95	0.87
Reach 1	5160	100 year	4400.00	5769.23	5775.27	5775.27	5776.64	0.004936	11.64	749.62	252.91	0.94
Reach 1	5166	Baseflow	4.00	5769.28	5769.52	5769.49	5769.58	0.009177	2.00	2.00	9.61	0.77
Reach 1	5166	Bankfull	40.00	5769.28	5770.06	5770.06	5770.35	0.011962	4.25	9.41	17.68	1.03
Reach 1	5166	Low	227.00	5769.28	5771.22	5771.22	5771.75	0.008697	5.85	38.82	35.51	0.99
Reach 1	5166	10-year	2802.00	5769.28	5774.62	5774.62	5775.68	0.004474	9.86	553.02	246.48	0.87
Reach 1	5166	100 year	4400.00	5769.28	5775.38	5775.38	5776.78	0.005042	11.78	745.02	253.11	0.96
Reach 1	5205	Baseflow	4.00	5769.38	5769.83	5769.63	5769.86	0.005683	1.46	2.74	7.06	0.41
Reach 1	5205	Bankfull	40.00	5769.38	5770.63	5770.37	5770.76	0.008903	2.88	13.87	18.15	0.58
Reach 1	5205	Low	227.00	5769.38	5771.83	5771.58	5772.16	0.011972	4.63	49.08	39.74	0.73
Reach 1	5205	10-year	2802.00	5769.38	5775.52	5774.65	5775.91	0.004024	6.42	709.77	251.83	0.53
Reach 1	5205	100 year	4400.00	5769.38	5776.58	5775.30	5777.05	0.003832	7.20	982.65	260.89	0.53
Reach 1	5245	Baseflow	4.00	5769.50	5770.02	5769.76	5770.04	0.003646	1.27	3.15	7.17	0.34
Reach 1	5245	Bankfull	40.00	5769.50	5770.94	5770.48	5771.02	0.004566	2.28	17.52	19.72	0.43
Reach 1	5245	Low	227.00	5769.50	5772.30	5771.70	5772.49	0.005458	3.55	63.93	42.65	0.51
Reach 1	5245	10-year	2802.00	5769.50	5775.68	5774.77	5776.06	0.003884	6.33	715.39	250.07	0.52
Reach 1	5245	100 year	4400.00	5769.50	5776.72	5775.43	5777.19	0.003789	7.17	981.61	258.50	0.53
Reach 1	5284	Baseflow	4.00	5769.59	5770.14	5769.83	5770.16	0.002496	1.11	3.62	7.58	0.28
Reach 1	5284	Bankfull	40.00	5769.59	5771.10	5770.56	5771.17	0.003528	2.09	19.15	20.26	0.38
Reach 1	5284	Low	227.00	5769.59	5772.51	5771.79	5772.68	0.004376	3.29	68.91	43.55	0.46
Reach 1	5284	10-year	2802.00	5769.59	5775.85	5774.88	5776.20	0.003572	6.15	741.78	255.00	0.50
Reach 1	5284	100 year	4400.00	5769.59	5776.89	5775.52	5777.33	0.003529	6.99	1013.01	263.40	0.51
Reach 1	5329	Baseflow	4.00	5769.72	5770.25	5769.93	5770.27	0.002575	1.10	3.62	7.78	0.29
Reach 1	5329	Bankfull	40.00	5769.72	5771.25	5770.67	5771.32	0.003155	2.01	19.92	20.54	0.36
Reach 1	5329	Low	227.00	5769.72	5772.71	5771.90	5772.86	0.003723	3.12	72.81	44.25	0.43
Reach 1	5329	10-year	2802.00	5769.72	5776.00	5775.01	5776.35	0.003549	6.20	736.57	250.04	0.50
Reach 1	5329	100 year	4400.00	5769.72	5777.04	5775.68	5777.48	0.003562	7.08	1001.38	258.50	0.52
Reach 1	5369	Baseflow	4.00	5769.81	5770.35	5770.05	5770.37	0.002754	1.15	3.48	7.41	0.30
Reach 1	5369	Bankfull	40.00	5769.81	5771.38	5770.79	5771.44	0.003050	1.98	20.16	20.68	0.35
Reach 1	5369	Low	227.00	5769.81	5772.86	5772.00	5773.00	0.003493	3.05	74.38	44.52	0.42
Reach 1	5369	10-year	2802.00	5769.81	5776.15	5775.13	5776.49	0.003339	6.02	756.21	253.70	0.48
Reach 1	5369	100 year	4400.00	5769.81	5777.20	5775.78	5777.62	0.003366	6.89	1025.63	262.17	0.50
Reach 1	5425	Baseflow	4.00	5769.97	5770.50	5770.20	5770.52	0.002511	1.10	3.65	7.80	0.28
Reach 1	5425	Bankfull	40.00	5769.97	5771.54	5770.93	5771.60	0.002831	1.93	20.69	20.83	0.34
Reach 1	5425	Low	227.00	5769.97	5773.05	5772.15	5773.19	0.003173	2.95	76.85	44.92	0.40
Reach 1	5425	10-year	2802.00	5769.97	5776.33	5775.30	5776.68	0.003357	6.04	748.01	249.89	0.49

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	5425	100 year	4400.00	5769.97	5777.38	5775.97	5777.81	0.003403	6.93	1013.28	258.36	0.51
Reach 1	5474	Baseflow	4.00	5770.09	5770.62	5770.33	5770.64	0.002594	1.09	3.66	8.11	0.29
Reach 1	5474	Bankfull	40.00	5770.09	5771.68	5771.05	5771.74	0.002740	1.91	20.92	20.96	0.34
Reach 1	5474	Low	227.00	5770.09	5773.21	5772.29	5773.34	0.003053	2.92	77.81	45.08	0.39
Reach 1	5474	10-year	2802.00	5770.09	5776.53	5775.41	5776.84	0.003035	5.82	782.66	255.75	0.46
Reach 1	5474	100 year	4400.00	5770.09	5777.58	5776.05	5777.98	0.003101	6.70	1056.59	264.73	0.48
Reach 1	5508	Baseflow	4.00	5770.19	5770.71	5770.43	5770.73	0.002657	1.11	3.59	7.82	0.29
Reach 1	5508	Bankfull	40.00	5770.19	5771.77	5771.13	5771.83	0.002739	1.91	20.93	20.91	0.34
Reach 1	5508	Low	227.00	5770.19	5773.31	5772.36	5773.44	0.002957	2.88	78.73	45.27	0.39
Reach 1	5508	10-year	2802.00	5770.19	5776.61	5775.58	5776.96	0.003316	6.07	745.39	247.20	0.48
Reach 1	5508	100 year	4400.00	5770.19	5777.66	5776.23	5778.10	0.003372	6.97	1009.68	255.59	0.50
Reach 1	5594	Baseflow	4.00	5770.41	5770.91	5770.62	5770.92	0.001803	0.85	4.70	11.79	0.24
Reach 1	5594	Bankfull	40.00	5770.41	5772.00	5771.23	5772.05	0.002361	1.70	23.49	25.25	0.31
Reach 1	5594	Low	227.00	5770.41	5773.56	5772.49	5773.67	0.002472	2.73	83.10	45.46	0.36
Reach 1	5594	10-year	2802.00	5770.41	5776.91	5776.91	5778.02	0.007484	9.20	450.88	222.47	0.73
Reach 1	5594	100 year	4400.00	5770.41	5777.82	5777.82	5779.10	0.007750	10.49	665.64	239.27	0.77
Reach 1	5608	Baseflow	4.00	5770.45	5770.92	5770.66	5770.93	0.000717	0.82	4.87	13.07	0.24
Reach 1	5608	Bankfull	40.00	5770.45	5772.02	5771.24	5772.06	0.000663	1.56	25.66	24.65	0.27
Reach 1	5608	Low	227.00	5770.45	5773.57	5772.42	5773.70	0.001129	2.94	77.28	42.75	0.39
Reach 1	5608	10-year	2802.00	5770.45	5776.95	5776.95	5778.44	0.004027	9.93	348.86	183.49	0.84
Reach 1	5608	100 year	4400.00	5770.45	5778.25	5778.25	5779.84	0.003356	10.80	637.67	239.64	0.80
Reach 1	5622	Baseflow	4.00	5773.86	5774.07	5774.07	5774.14	0.015411	2.19	1.82	11.24	0.96
Reach 1	5622	Bankfull	40.00	5773.86	5774.58	5774.58	5774.86	0.012614	4.24	9.44	18.55	1.05
Reach 1	5622	Low	227.00	5773.86	5775.67	5775.67	5776.22	0.008733	5.94	38.19	34.26	0.99
Reach 1	5622	10-year	2802.00	5773.86	5779.14	5779.14	5780.22	0.004545	9.87	543.77	245.53	0.88
Reach 1	5622	100 year	4400.00	5773.86	5779.94	5779.94	5781.33	0.004923	11.64	744.60	252.39	0.94
Reach 1	5628	Baseflow	4.00	5773.91	5774.16	5774.10	5774.21	0.007205	1.84	2.17	9.79	0.69
Reach 1	5628	Bankfull	40.00	5773.91	5774.70	5774.70	5774.96	0.010981	4.14	9.66	17.69	0.99
Reach 1	5628	Low	227.00	5773.91	5775.83	5775.83	5776.37	0.008892	5.90	38.49	35.33	1.00
Reach 1	5628	10-year	2802.00	5773.91	5779.27	5779.27	5780.37	0.004558	9.98	543.25	246.13	0.88
Reach 1	5628	100 year	4400.00	5773.91	5780.11	5780.11	5781.49	0.004784	11.62	753.96	253.32	0.93
Reach 1	5657	Baseflow	4.00	5774.00	5774.38	5774.23	5774.42	0.007432	1.56	2.56	7.33	0.47
Reach 1	5657	Bankfull	40.00	5774.00	5775.15	5774.96	5775.30	0.011801	3.18	12.56	17.47	0.66
Reach 1	5657	Low	227.00	5774.00	5776.32	5776.18	5776.71	0.015532	5.05	44.99	38.81	0.83
Reach 1	5657	10-year	2802.00	5774.00	5780.19	5779.26	5780.56	0.003742	6.24	727.30	252.03	0.51
Reach 1	5657	100 year	4400.00	5774.00	5781.24	5779.91	5781.69	0.003672	7.08	996.33	261.15	0.52
Reach 1	5696	Baseflow	4.00	5774.09	5774.59	5774.34	5774.61	0.003371	1.22	3.29	7.54	0.32
Reach 1	5696	Bankfull	40.00	5774.09	5775.50	5775.06	5775.58	0.004794	2.33	17.17	19.45	0.44
Reach 1	5696	Low	227.00	5774.09	5776.87	5776.29	5777.08	0.005688	3.60	63.01	42.45	0.52
Reach 1	5696	10-year	2802.00	5774.09	5780.35	5779.31	5780.70	0.003457	6.06	752.56	256.25	0.49
Reach 1	5696	100 year	4400.00	5774.09	5781.40	5779.98	5781.82	0.003432	6.90	1025.79	265.21	0.51
Reach 1	5759	Baseflow	4.00	5774.25	5774.78	5774.48	5774.80	0.002559	1.10	3.63	7.79	0.28
Reach 1	5759	Bankfull	40.00	5774.25	5775.77	5775.20	5775.83	0.003343	2.05	19.48	20.30	0.37
Reach 1	5759	Low	227.00	5774.25	5777.22	5776.45	5777.37	0.003986	3.19	71.09	43.88	0.44
Reach 1	5759	10-year	2802.00	5774.25	5780.57	5779.52	5780.91	0.003356	6.01	753.80	251.71	0.49
Reach 1	5759	100 year	4400.00	5774.25	5781.61	5780.18	5782.04	0.003399	6.90	1020.31	260.32	0.50
Reach 1	5866	Baseflow	4.00	5774.53	5775.07	5774.79	5775.10	0.003165	1.23	3.26	6.95	0.32
Reach 1	5866	Bankfull	40.00	5774.53	5776.11	5775.52	5776.17	0.003079	1.98	20.16	20.81	0.36
Reach 1	5866	Low	227.00	5774.53	5777.62	5776.73	5777.75	0.003286	2.98	76.06	44.97	0.40
Reach 1	5866	10-year	2802.00	5774.53	5780.92	5779.86	5781.26	0.003340	6.03	749.55	250.03	0.49
Reach 1	5866	100 year	4400.00	5774.53	5781.96	5780.52	5782.39	0.003386	6.92	1015.27	258.49	0.50
Reach 1	5921	Baseflow	4.00	5774.69	5775.23	5774.93	5775.25	0.002512	1.09	3.66	7.87	0.28
Reach 1	5921	Bankfull	40.00	5774.69	5776.27	5775.64	5776.32	0.002788	1.92	20.83	20.97	0.34
Reach 1	5921	Low	227.00	5774.69	5777.79	5776.87	5777.93	0.003038	2.91	77.98	45.12	0.39
Reach 1	5921	10-year	2802.00	5774.69	5781.09	5780.11	5781.46	0.003413	6.16	742.25	252.17	0.49
Reach 1	5921	100 year	4400.00	5774.69	5782.14	5780.79	5782.59	0.003425	7.02	1011.24	260.52	0.51
Reach 1	5958	Baseflow	4.00	5774.78	5775.32	5775.01	5775.34	0.002348	1.07	3.73	7.84	0.27
Reach 1	5958	Bankfull	40.00	5774.78	5776.37	5775.73	5776.43	0.002722	1.91	21.00	20.98	0.34
Reach 1	5958	Low	227.00	5774.78	5777.91	5776.96	5778.03	0.002940	2.88	78.90	45.30	0.38
Reach 1	5958	10-year	2802.00	5774.78	5781.19	5780.30	5781.60	0.003715	6.40	708.32	246.35	0.51
Reach 1	5958	100 year	4400.00	5774.78	5782.24	5781.00	5782.73	0.003707	7.29	970.51	254.72	0.53
Reach 1	5992	Baseflow	4.00	5774.84	5775.40	5775.09	5775.42	0.002606	1.15	3.49	7.10	0.29
Reach 1	5992	Bankfull	40.00	5774.84	5776.46	5775.85	5776.52	0.002796	1.92	20.85	21.00	0.34

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	5992	Low	227.00	5774.84	5778.00	5777.06	5778.13	0.002936	2.87	79.04	45.42	0.38
Reach 1	5992	10-year	2802.00	5774.84	5781.29	5780.48	5781.73	0.003950	6.63	690.92	250.33	0.53
Reach 1	5992	100 year	4400.00	5774.84	5782.34	5781.20	5782.86	0.003879	7.48	958.29	260.22	0.54
Reach 1	6025	Baseflow	4.00	5774.94	5775.48	5775.18	5775.50	0.002329	1.07	3.75	7.85	0.27
Reach 1	6025	Bankfull	40.00	5774.94	5776.55	5775.88	5776.60	0.002559	1.87	21.43	21.09	0.33
Reach 1	6025	Low	227.00	5774.94	5778.10	5777.13	5778.23	0.002827	2.84	80.02	45.56	0.38
Reach 1	6025	10-year	2802.00	5774.94	5781.40	5780.66	5781.91	0.004452	7.04	642.87	241.85	0.56
Reach 1	6025	100 year	4400.00	5774.94	5782.44	5781.45	5783.04	0.004357	7.92	900.67	252.68	0.57
Reach 1	6080	Baseflow	4.00	5775.09	5775.60	5775.30	5775.61	0.001804	0.85	4.69	11.67	0.24
Reach 1	6080	Bankfull	40.00	5775.09	5776.68	5775.93	5776.73	0.002177	1.79	22.35	20.91	0.31
Reach 1	6080	Low	227.00	5775.09	5778.25	5777.22	5778.37	0.002610	2.77	81.87	45.53	0.36
Reach 1	6080	10-year	2802.00	5775.09	5781.47	5781.47	5782.67	0.008308	9.58	432.44	206.35	0.77
Reach 1	6080	100 year	4400.00	5775.09	5782.55	5782.55	5783.81	0.007673	10.52	677.27	247.56	0.76
Reach 1	6094	Baseflow	4.00	5775.19	5775.62	5775.40	5775.63	0.001082	0.94	4.25	12.67	0.29
Reach 1	6094	Bankfull	40.00	5775.19	5776.71	5775.97	5776.75	0.000756	1.64	24.44	24.09	0.29
Reach 1	6094	Low	227.00	5775.19	5778.26	5777.15	5778.40	0.001189	3.00	75.69	42.20	0.39
Reach 1	6094	10-year	2802.00	5775.19	5781.60	5781.60	5783.10	0.004321	9.94	340.31	186.40	0.86
Reach 1	6094	100 year	4400.00	5775.19	5782.88	5782.88	5784.51	0.003571	10.83	614.10	235.40	0.82
Reach 1	6108	Baseflow	4.00	5778.51	5778.70	5778.70	5778.79	0.019779	2.39	1.67	10.91	1.08
Reach 1	6108	Bankfull	40.00	5778.51	5779.23	5779.23	5779.51	0.012682	4.27	9.38	18.33	1.05
Reach 1	6108	Low	227.00	5778.51	5780.30	5780.30	5780.87	0.009103	6.04	37.58	33.91	1.01
Reach 1	6108	10-year	2802.00	5778.51	5783.76	5783.76	5784.88	0.004687	9.99	533.33	241.28	0.89
Reach 1	6108	100 year	4400.00	5778.51	5784.52	5784.52	5786.01	0.005340	12.01	718.23	249.34	0.98
Reach 1	6114	Baseflow	4.00	5778.59	5778.81	5778.79	5778.89	0.013592	2.27	1.76	9.33	0.92
Reach 1	6114	Bankfull	40.00	5778.59	5779.39	5779.39	5779.66	0.010800	4.10	9.76	17.91	0.98
Reach 1	6114	Low	227.00	5778.59	5780.53	5780.53	5781.06	0.008616	5.83	38.97	35.62	0.98
Reach 1	6114	10-year	2802.00	5778.59	5783.99	5783.99	5785.09	0.004445	9.94	542.63	242.71	0.87
Reach 1	6114	100 year	4400.00	5778.59	5784.82	5784.82	5786.22	0.004772	11.67	746.96	249.14	0.93
Reach 1	6165	Baseflow	4.00	5778.72	5779.19	5778.95	5779.22	0.003624	1.24	3.24	7.61	0.33
Reach 1	6165	Bankfull	40.00	5778.72	5780.00	5779.69	5780.12	0.007299	2.70	14.83	18.42	0.53
Reach 1	6165	Low	227.00	5778.72	5781.26	5780.90	5781.54	0.009543	4.28	52.98	40.50	0.66
Reach 1	6165	10-year	2802.00	5778.72	5784.99	5784.03	5785.36	0.003627	6.24	731.96	250.84	0.50
Reach 1	6165	100 year	4400.00	5778.72	5786.06	5784.68	5786.51	0.003544	7.06	1005.52	260.34	0.52
Reach 1	6227	Baseflow	4.00	5778.88	5779.39	5779.12	5779.41	0.002783	1.13	3.55	7.84	0.30
Reach 1	6227	Bankfull	40.00	5778.88	5780.36	5779.84	5780.44	0.003767	2.14	18.67	19.95	0.39
Reach 1	6227	Low	227.00	5778.88	5781.77	5781.08	5781.95	0.004601	3.35	67.68	43.20	0.47
Reach 1	6227	10-year	2802.00	5778.88	5785.22	5784.19	5785.57	0.003446	6.08	743.84	250.99	0.49
Reach 1	6227	100 year	4400.00	5778.88	5786.28	5784.81	5786.71	0.003426	6.93	1014.81	260.24	0.51
Reach 1	6266	Baseflow	4.00	5779.00	5779.50	5779.24	5779.52	0.002975	1.16	3.46	7.75	0.31
Reach 1	6266	Bankfull	40.00	5779.00	5780.51	5779.94	5780.57	0.003401	2.07	19.35	20.28	0.37
Reach 1	6266	Low	227.00	5779.00	5781.96	5781.17	5782.11	0.003963	3.19	71.20	43.91	0.44
Reach 1	6266	10-year	2802.00	5779.00	5785.36	5784.31	5785.70	0.003267	5.99	761.37	254.46	0.48
Reach 1	6266	100 year	4400.00	5779.00	5786.43	5784.98	5786.84	0.003267	6.84	1036.63	263.73	0.50
Reach 1	6320	Baseflow	4.00	5779.12	5779.64	5779.36	5779.66	0.002483	1.08	3.69	7.93	0.28
Reach 1	6320	Bankfull	40.00	5779.12	5780.68	5780.06	5780.74	0.002951	1.96	20.38	20.70	0.35
Reach 1	6320	Low	227.00	5779.12	5782.16	5781.31	5782.31	0.003477	3.04	74.59	44.66	0.42
Reach 1	6320	10-year	2802.00	5779.12	5785.54	5784.46	5785.87	0.003226	6.00	760.06	251.33	0.48
Reach 1	6320	100 year	4400.00	5779.12	5786.60	5785.13	5787.02	0.003257	6.88	1031.79	260.39	0.50
Reach 1	6385	Baseflow	4.00	5779.31	5779.82	5779.58	5779.85	0.003546	1.23	3.24	7.55	0.33
Reach 1	6385	Bankfull	40.00	5779.31	5780.87	5780.28	5780.93	0.003056	1.98	20.17	20.75	0.35
Reach 1	6385	Low	227.00	5779.31	5782.39	5781.50	5782.52	0.003242	2.97	76.36	44.99	0.40
Reach 1	6385	10-year	2802.00	5779.31	5785.75	5784.63	5786.07	0.003060	5.86	777.98	254.71	0.47
Reach 1	6385	100 year	4400.00	5779.31	5786.82	5785.28	5787.22	0.003095	6.71	1054.50	263.73	0.48
Reach 1	6445	Baseflow	4.00	5779.47	5780.01	5779.72	5780.03	0.002665	1.12	3.58	7.83	0.29
Reach 1	6445	Bankfull	40.00	5779.47	5781.05	5780.43	5781.11	0.002832	1.93	20.70	20.91	0.34
Reach 1	6445	Low	227.00	5779.47	5782.58	5781.63	5782.71	0.003027	2.91	78.03	45.09	0.39
Reach 1	6445	10-year	2802.00	5779.47	5785.92	5784.82	5786.26	0.003227	6.02	761.67	256.80	0.48
Reach 1	6445	100 year	4400.00	5779.47	5786.99	5785.43	5787.41	0.003203	6.84	1042.41	266.03	0.49
Reach 1	6490	Baseflow	4.00	5779.56	5780.12	5779.81	5780.14	0.002221	1.06	3.78	7.77	0.27
Reach 1	6490	Bankfull	40.00	5779.56	5781.17	5780.52	5781.23	0.002667	1.90	21.08	20.89	0.33
Reach 1	6490	Low	227.00	5779.56	5782.72	5781.77	5782.84	0.002930	2.87	78.98	45.33	0.38
Reach 1	6490	10-year	2802.00	5779.56	5786.07	5785.02	5786.42	0.003242	6.06	751.47	249.83	0.48
Reach 1	6490	100 year	4400.00	5779.56	5787.13	5785.71	5787.57	0.003264	6.93	1022.51	258.21	0.50

HEC-RAS Plan: Lower Reach   River: River 1   Reach: Reach 1 (Continued)

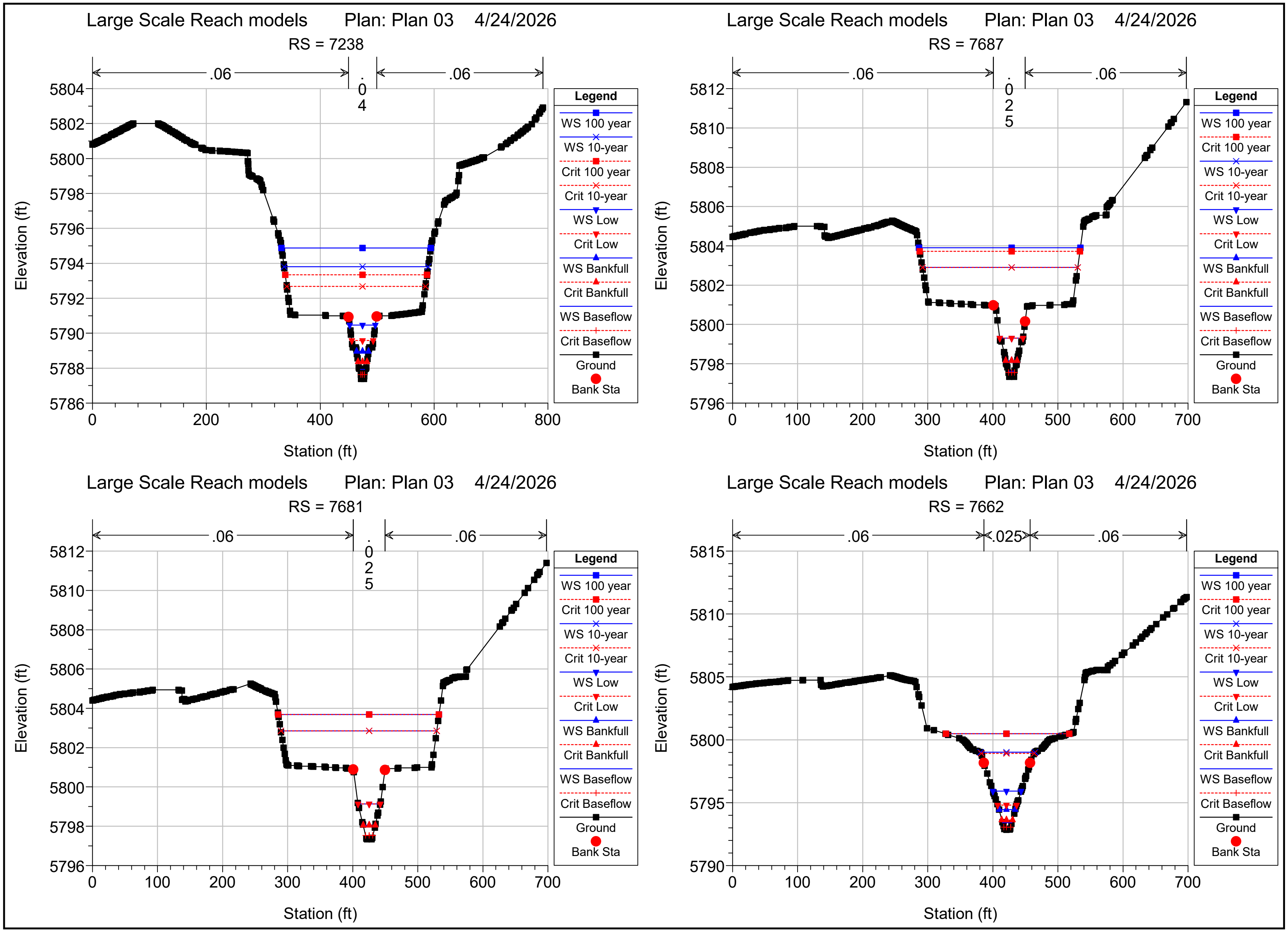
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	6534	Baseflow	4.00	5779.69	5780.22	5779.94	5780.24	0.002699	1.13	3.54	7.65	0.29
Reach 1	6534	Bankfull	40.00	5779.69	5781.29	5780.66	5781.34	0.002658	1.89	21.15	21.01	0.33
Reach 1	6534	Low	227.00	5779.69	5782.84	5781.87	5782.97	0.002848	2.85	79.78	45.51	0.38
Reach 1	6534	10-year	2802.00	5779.69	5786.14	5785.37	5786.62	0.004248	6.89	660.47	241.66	0.55
Reach 1	6534	100 year	4400.00	5779.69	5787.21	5786.12	5787.77	0.004092	7.71	923.60	250.62	0.56
Reach 1	6594	Baseflow	4.00	5779.84	5780.36	5780.05	5780.37	0.001650	0.83	4.81	11.66	0.23
Reach 1	6594	Bankfull	40.00	5779.84	5781.44	5780.68	5781.49	0.002210	1.76	22.75	22.15	0.31
Reach 1	6594	Low	227.00	5779.84	5783.01	5781.94	5783.13	0.002517	2.74	82.71	45.51	0.36
Reach 1	6594	10-year	2802.00	5779.84	5786.34	5786.34	5787.46	0.007590	9.33	452.87	219.99	0.74
Reach 1	6594	100 year	4400.00	5779.84	5787.28	5787.28	5788.55	0.007738	10.57	671.86	239.82	0.77
Reach 1	6608	Baseflow	4.00	5779.88	5780.37	5780.09	5780.38	0.000659	0.80	5.03	13.27	0.23
Reach 1	6608	Bankfull	40.00	5779.88	5781.47	5780.67	5781.51	0.000636	1.53	26.13	25.02	0.26
Reach 1	6608	Low	227.00	5779.88	5783.03	5781.83	5783.16	0.001065	2.88	78.94	43.15	0.37
Reach 1	6608	10-year	2802.00	5779.88	5786.34	5786.34	5787.80	0.004081	9.85	355.85	188.55	0.84
Reach 1	6608	100 year	4400.00	5779.88	5787.60	5787.60	5789.18	0.003435	10.75	636.42	240.53	0.81
Reach 1	6622	Baseflow	4.00	5783.30	5783.51	5783.51	5783.58	0.015558	2.20	1.82	11.23	0.96
Reach 1	6622	Bankfull	40.00	5783.30	5784.04	5784.04	5784.30	0.010955	4.04	9.91	18.88	0.98
Reach 1	6622	Low	227.00	5783.30	5785.11	5785.11	5785.66	0.008594	5.91	38.38	34.27	0.99
Reach 1	6622	10-year	2802.00	5783.30	5788.61	5788.61	5789.71	0.004566	9.91	539.40	246.11	0.88
Reach 1	6622	100 year	4400.00	5783.30	5789.45	5789.45	5790.82	0.004775	11.54	750.63	253.94	0.93
Reach 1	6628	Baseflow	4.00	5783.34	5783.59	5783.54	5783.65	0.008518	1.96	2.04	9.49	0.75
Reach 1	6628	Bankfull	40.00	5783.34	5784.14	5784.14	5784.41	0.011501	4.20	9.53	17.70	1.01
Reach 1	6628	Low	227.00	5783.34	5785.29	5785.29	5785.82	0.008686	5.84	38.84	35.52	0.99
Reach 1	6628	10-year	2802.00	5783.34	5788.82	5788.82	5789.89	0.004225	9.78	554.56	247.30	0.85
Reach 1	6628	100 year	4400.00	5783.34	5789.60	5789.60	5791.00	0.004750	11.66	751.96	254.57	0.93
Reach 1	6683	Baseflow	4.00	5783.50	5783.95	5783.74	5783.98	0.004308	1.30	3.09	7.76	0.36
Reach 1	6683	Bankfull	40.00	5783.50	5784.80	5784.44	5784.90	0.006665	2.62	15.29	18.67	0.51
Reach 1	6683	Low	227.00	5783.50	5786.05	5785.68	5786.33	0.008955	4.20	54.08	40.73	0.64
Reach 1	6683	10-year	2802.00	5783.50	5789.81	5788.80	5790.16	0.003440	6.05	745.57	252.21	0.49
Reach 1	6683	100 year	4400.00	5783.50	5790.88	5789.46	5791.31	0.003381	6.88	1020.54	261.33	0.50
Reach 1	6718	Baseflow	4.00	5783.59	5784.08	5783.84	5784.11	0.003417	1.21	3.30	7.68	0.33
Reach 1	6718	Bankfull	40.00	5783.59	5785.01	5784.56	5785.09	0.004537	2.29	17.48	19.56	0.43
Reach 1	6718	Low	227.00	5783.59	5786.37	5785.77	5786.57	0.005555	3.58	63.47	42.48	0.52
Reach 1	6718	10-year	2802.00	5783.59	5789.93	5788.92	5790.27	0.003380	6.07	751.96	253.98	0.49
Reach 1	6718	100 year	4400.00	5783.59	5791.00	5789.57	5791.42	0.003374	6.93	1027.86	265.87	0.50
Reach 1	6774	Baseflow	4.00	5783.72	5784.25	5783.97	5784.27	0.002622	1.10	3.63	7.93	0.29
Reach 1	6774	Bankfull	40.00	5783.72	5785.24	5784.69	5785.31	0.003428	2.07	19.32	20.28	0.37
Reach 1	6774	Low	227.00	5783.72	5786.68	5785.91	5786.84	0.004116	3.23	70.34	43.77	0.45
Reach 1	6774	10-year	2802.00	5783.72	5790.10	5789.15	5790.47	0.003566	6.24	728.63	248.94	0.50
Reach 1	6774	100 year	4400.00	5783.72	5791.17	5789.82	5791.62	0.003517	7.08	998.58	257.58	0.51
Reach 1	6842	Baseflow	4.00	5783.91	5784.44	5784.18	5784.47	0.003131	1.18	3.38	7.66	0.31
Reach 1	6842	Bankfull	40.00	5783.91	5785.47	5784.89	5785.53	0.003096	1.99	20.08	20.72	0.36
Reach 1	6842	Low	227.00	5783.91	5786.95	5786.11	5787.10	0.003491	3.05	74.44	44.61	0.42
Reach 1	6842	10-year	2802.00	5783.91	5790.34	5789.42	5790.73	0.003607	6.36	721.33	248.75	0.51
Reach 1	6842	100 year	4400.00	5783.91	5791.40	5790.10	5791.87	0.003564	7.21	990.50	257.29	0.52
Reach 1	6939	Baseflow	4.00	5784.16	5784.68	5784.38	5784.69	0.001756	0.84	4.75	11.83	0.23
Reach 1	6939	Bankfull	40.00	5784.16	5785.74	5785.02	5785.79	0.002294	1.78	22.53	22.08	0.31
Reach 1	6939	Low	227.00	5784.16	5787.27	5786.28	5787.40	0.002743	2.82	80.56	45.16	0.37
Reach 1	6939	10-year	2802.00	5784.16	5790.61	5790.61	5791.63	0.007290	9.03	480.79	235.18	0.72
Reach 1	6939	100 year	4400.00	5784.16	5791.42	5791.42	5792.67	0.008137	10.56	673.37	242.06	0.78
Reach 1	6950	Baseflow	4.00	5784.25	5784.69	5784.46	5784.70	0.000911	0.89	4.51	12.86	0.26
Reach 1	6950	Bankfull	40.00	5784.25	5785.76	5785.03	5785.80	0.000768	1.64	24.33	24.13	0.29
Reach 1	6950	Low	227.00	5784.25	5787.28	5786.20	5787.42	0.001259	3.00	75.74	44.20	0.40
Reach 1	6950	10-year	2802.00	5784.25	5790.62	5790.62	5791.91	0.003836	9.31	398.44	234.23	0.81
Reach 1	6950	100 year	4400.00	5784.25	5791.61	5791.61	5793.17	0.003794	10.71	634.38	242.36	0.84
Reach 1	6960	Baseflow	4.00	5786.59	5786.79	5786.79	5786.87	0.016097	2.23	1.79	11.14	0.98
Reach 1	6960	Bankfull	40.00	5786.59	5787.32	5787.32	5787.58	0.011869	4.16	9.61	18.54	1.02
Reach 1	6960	Low	227.00	5786.59	5788.40	5788.40	5788.95	0.008540	5.91	38.41	34.16	0.98
Reach 1	6960	10-year	2802.00	5786.59	5791.98	5791.98	5793.06	0.004306	9.80	547.79	244.33	0.86
Reach 1	6960	100 year	4400.00	5786.59	5792.79	5792.79	5794.18	0.004695	11.57	750.19	251.18	0.93
Reach 1	6966	Baseflow	4.00	5786.69	5786.89	5786.89	5786.98	0.015906	2.37	1.69	9.42	0.99
Reach 1	6966	Bankfull	40.00	5786.69	5787.48	5787.48	5787.74	0.010907	4.10	9.75	18.00	0.98
Reach 1	6966	Low	227.00	5786.69	5788.60	5788.60	5789.13	0.008867	5.88	38.59	35.52	0.99
Reach 1	6966	10-year	2802.00	5786.69	5792.06	5792.06	5793.14	0.004389	9.87	550.15	244.62	0.87

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

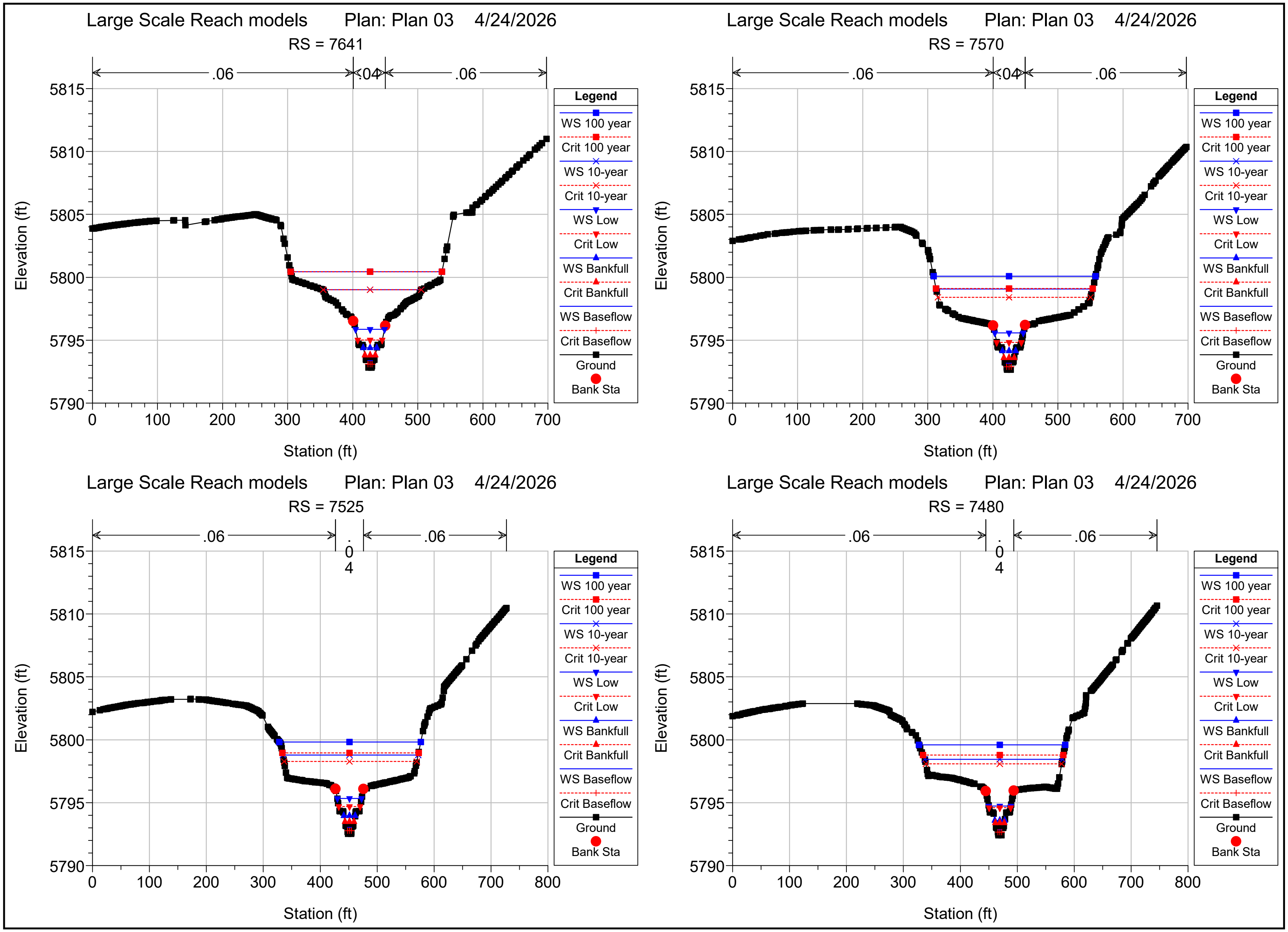
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	6966	100 year	4400.00	5786.69	5792.89	5792.89	5794.26	0.004727	11.60	755.30	251.59	0.93
Reach 1	7038	Baseflow	4.00	5786.88	5787.38	5787.12	5787.40	0.003100	1.17	3.41	7.70	0.31
Reach 1	7038	Bankfull	40.00	5786.88	5788.21	5787.83	5788.31	0.005927	2.50	16.00	19.10	0.48
Reach 1	7038	Low	227.00	5786.88	5789.49	5789.06	5789.74	0.007617	3.97	57.16	41.38	0.60
Reach 1	7038	10-year	2802.00	5786.88	5793.11	5792.15	5793.46	0.003578	6.15	740.12	254.10	0.50
Reach 1	7038	100 year	4400.00	5786.88	5794.17	5792.77	5794.60	0.003547	7.02	1014.24	266.54	0.52
Reach 1	7083	Baseflow	4.00	5786.97	5787.50	5787.20	5787.52	0.002356	1.07	3.75	7.94	0.27
Reach 1	7083	Bankfull	40.00	5786.97	5788.45	5787.91	5788.52	0.003762	2.14	18.68	19.97	0.39
Reach 1	7083	Low	227.00	5786.97	5789.84	5789.16	5790.02	0.004806	3.40	66.75	43.13	0.48
Reach 1	7083	10-year	2802.00	5786.97	5793.29	5792.25	5793.63	0.003369	6.03	754.70	254.05	0.49
Reach 1	7083	100 year	4400.00	5786.97	5794.35	5792.93	5794.78	0.003444	6.96	1029.02	271.29	0.51
Reach 1	7116	Baseflow	4.00	5787.06	5787.59	5787.32	5787.62	0.003450	1.25	3.20	7.10	0.33
Reach 1	7116	Bankfull	40.00	5787.06	5788.58	5788.05	5788.65	0.003671	2.11	18.95	20.34	0.39
Reach 1	7116	Low	227.00	5787.06	5790.00	5789.27	5790.17	0.004251	3.26	69.66	43.78	0.46
Reach 1	7116	10-year	2802.00	5787.06	5793.40	5792.36	5793.74	0.003346	6.01	753.91	251.95	0.49
Reach 1	7116	100 year	4400.00	5787.06	5794.46	5793.02	5794.89	0.003451	6.97	1024.08	268.74	0.51
Reach 1	7176	Baseflow	4.00	5787.22	5787.78	5787.46	5787.80	0.002588	1.09	3.67	8.13	0.29
Reach 1	7176	Bankfull	40.00	5787.22	5788.78	5788.19	5788.84	0.003026	1.98	20.19	20.67	0.35
Reach 1	7176	Low	227.00	5787.22	5790.25	5789.42	5790.40	0.003534	3.06	74.07	44.48	0.42
Reach 1	7176	10-year	2802.00	5787.22	5793.62	5792.51	5793.94	0.003133	5.88	773.94	254.71	0.47
Reach 1	7176	100 year	4400.00	5787.22	5794.68	5793.16	5795.08	0.003143	6.72	1050.90	263.53	0.49
Reach 1	7238	Baseflow	4.00	5787.38	5787.93	5787.63	5787.95	0.002756	1.16	3.46	7.30	0.30
Reach 1	7238	Bankfull	40.00	5787.38	5788.96	5788.36	5789.02	0.002974	1.96	20.41	20.91	0.35
Reach 1	7238	Low	227.00	5787.38	5790.46	5789.58	5790.60	0.003261	2.98	76.26	45.00	0.40
Reach 1	7238	10-year	2802.00	5787.38	5793.80	5792.68	5794.13	0.003136	5.89	770.27	253.17	0.47
Reach 1	7238	100 year	4400.00	5787.38	5794.87	5793.34	5795.28	0.003156	6.75	1045.73	262.22	0.49
Reach 1	7277	Baseflow	4.00	5787.47	5788.04	5787.73	5788.06	0.002538	1.13	3.52	7.18	0.29
Reach 1	7277	Bankfull	40.00	5787.47	5789.08	5788.46	5789.14	0.002859	1.94	20.67	20.95	0.34
Reach 1	7277	Low	227.00	5787.47	5790.60	5789.68	5790.73	0.003100	2.93	77.54	45.16	0.39
Reach 1	7277	10-year	2802.00	5787.47	5793.92	5792.91	5794.27	0.003298	6.06	752.05	252.58	0.48
Reach 1	7277	100 year	4400.00	5787.47	5794.99	5793.57	5795.42	0.003276	6.90	1026.92	260.54	0.50
Reach 1	7314	Baseflow	4.00	5787.56	5788.12	5787.80	5788.14	0.001973	1.01	3.96	7.97	0.25
Reach 1	7314	Bankfull	40.00	5787.56	5789.18	5788.52	5789.23	0.002552	1.86	21.47	21.12	0.33
Reach 1	7314	Low	227.00	5787.56	5790.71	5789.75	5790.84	0.002898	2.86	79.49	45.65	0.38
Reach 1	7314	10-year	2802.00	5787.56	5794.00	5793.18	5794.42	0.003835	6.53	697.19	245.30	0.52
Reach 1	7314	100 year	4400.00	5787.56	5795.07	5793.85	5795.57	0.003742	7.36	963.42	253.15	0.53
Reach 1	7405	Baseflow	4.00	5787.81	5788.34	5788.07	5788.37	0.003107	1.17	3.42	7.81	0.31
Reach 1	7405	Bankfull	40.00	5787.81	5789.42	5788.77	5789.47	0.002700	1.90	21.05	21.08	0.34
Reach 1	7405	Low	227.00	5787.81	5790.97	5790.01	5791.10	0.002835	2.84	79.84	45.49	0.38
Reach 1	7405	10-year	2802.00	5787.81	5794.04	5794.04	5795.45	0.009999	10.38	378.92	158.17	0.84
Reach 1	7405	100 year	4400.00	5787.81	5795.44	5795.44	5796.75	0.007531	10.70	667.86	234.18	0.76
Reach 1	7425	Baseflow	4.00	5787.81	5788.38	5788.01	5788.38	0.000334	0.63	6.37	14.38	0.17
Reach 1	7425	Bankfull	40.00	5787.81	5789.46	5788.57	5789.49	0.000497	1.40	28.61	26.12	0.24
Reach 1	7425	Low	227.00	5787.81	5791.02	5789.72	5791.13	0.000917	2.70	84.18	45.35	0.35
Reach 1	7425	10-year	2802.00	5787.81	5793.97	5793.93	5795.70	0.005461	10.56	272.63	85.12	0.96
Reach 1	7425	100 year	4400.00	5787.81	5795.32	5795.32	5797.51	0.004697	12.01	429.06	167.47	0.93
Reach 1	7443	Baseflow	4.00	5792.17	5792.37	5792.37	5792.45	0.016361	2.23	1.79	11.24	0.99
Reach 1	7443	Bankfull	40.00	5792.17	5792.90	5792.90	5793.16	0.011222	4.07	9.82	18.77	0.99
Reach 1	7443	Low	227.00	5792.17	5793.92	5793.92	5794.52	0.009900	6.23	36.43	33.46	1.05
Reach 1	7443	10-year	2802.00	5792.17	5797.66	5797.66	5798.78	0.004194	9.84	538.63	243.70	0.85
Reach 1	7443	100 year	4400.00	5792.17	5798.52	5798.52	5799.92	0.004479	11.52	749.76	251.40	0.91
Reach 1	7449	Baseflow	4.00	5792.31	5792.51	5792.51	5792.61	0.017483	2.48	1.61	9.07	1.04
Reach 1	7449	Bankfull	40.00	5792.31	5793.11	5793.11	5793.37	0.010694	4.08	9.80	17.97	0.97
Reach 1	7449	Low	227.00	5792.31	5794.25	5794.25	5794.77	0.008536	5.82	39.01	35.48	0.98
Reach 1	7449	10-year	2802.00	5792.31	5797.83	5797.83	5798.91	0.004127	9.77	552.40	244.76	0.85
Reach 1	7449	100 year	4400.00	5792.31	5798.64	5798.64	5800.03	0.004614	11.62	751.53	251.41	0.92
Reach 1	7480	Baseflow	4.00	5792.41	5792.85	5792.66	5792.89	0.005369	1.43	2.80	7.17	0.40
Reach 1	7480	Bankfull	40.00	5792.41	5793.57	5793.39	5793.73	0.011704	3.18	12.60	17.53	0.66
Reach 1	7480	Low	227.00	5792.41	5794.74	5794.61	5795.14	0.015927	5.08	44.65	38.87	0.84
Reach 1	7480	10-year	2802.00	5792.41	5798.46	5798.09	5799.10	0.006154	7.84	580.64	242.13	0.65
Reach 1	7480	100 year	4400.00	5792.41	5799.60	5798.78	5800.26	0.005114	8.31	865.84	256.81	0.62
Reach 1	7525	Baseflow	4.00	5792.53	5793.04	5792.77	5793.06	0.003030	1.17	3.41	7.59	0.31
Reach 1	7525	Bankfull	40.00	5792.53	5793.96	5793.49	5794.04	0.004499	2.27	17.60	19.72	0.42

HEC-RAS Plan: Lower Reach River: River 1 Reach: Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	7525	Low	227.00	5792.53	5795.34	5794.70	5795.53	0.005231	3.50	64.77	42.67	0.50
Reach 1	7525	10-year	2802.00	5792.53	5798.78	5798.27	5799.35	0.005164	7.41	613.89	237.69	0.60
Reach 1	7525	100 year	4400.00	5792.53	5799.82	5798.96	5800.47	0.004949	8.28	864.18	248.49	0.61
Reach 1	7570	Baseflow	4.00	5792.66	5793.17	5792.88	5793.19	0.002821	1.13	3.53	7.82	0.30
Reach 1	7570	Bankfull	40.00	5792.66	5794.15	5793.61	5794.21	0.003543	2.09	19.15	20.35	0.38
Reach 1	7570	Low	227.00	5792.66	5795.58	5794.82	5795.74	0.004156	3.23	70.25	43.99	0.45
Reach 1	7570	10-year	2802.00	5792.66	5799.07	5798.40	5799.58	0.004403	7.00	650.02	240.45	0.56
Reach 1	7570	100 year	4400.00	5792.66	5800.09	5799.11	5800.69	0.004380	7.93	899.66	248.97	0.58
Reach 1	7641	Baseflow	4.00	5792.83	5793.38	5793.09	5793.40	0.003091	1.20	3.34	7.31	0.31
Reach 1	7641	Bankfull	40.00	5792.83	5794.39	5793.82	5794.45	0.003221	2.02	19.84	20.70	0.36
Reach 1	7641	Low	227.00	5792.83	5795.87	5795.01	5796.01	0.003534	3.06	74.10	44.49	0.42
Reach 1	7641	10-year	2802.00	5792.83	5799.01	5799.01	5800.50	0.010719	10.54	361.20	150.91	0.86
Reach 1	7641	100 year	4400.00	5792.83	5800.45	5800.45	5801.77	0.007619	10.64	659.94	232.47	0.76
Reach 1	7662	Baseflow	4.00	5792.84	5793.41	5793.06	5793.42	0.000387	0.66	6.07	14.24	0.18
Reach 1	7662	Bankfull	40.00	5792.84	5794.45	5793.62	5794.48	0.000608	1.51	26.46	24.96	0.26
Reach 1	7662	Low	227.00	5792.84	5795.92	5794.81	5796.05	0.001196	2.98	76.29	43.27	0.40
Reach 1	7662	10-year	2802.00	5792.84	5799.01	5798.93	5800.73	0.005506	10.53	270.38	83.65	0.96
Reach 1	7662	100 year	4400.00	5792.84	5800.47	5800.47	5802.50	0.004277	11.57	459.22	189.50	0.89
Reach 1	7681	Baseflow	4.00	5797.34	5797.53	5797.53	5797.60	0.015896	2.22	1.80	11.11	0.97
Reach 1	7681	Bankfull	40.00	5797.34	5798.06	5798.06	5798.32	0.011522	4.12	9.72	18.65	1.01
Reach 1	7681	Low	227.00	5797.34	5799.14	5799.14	5799.68	0.008549	5.91	38.43	34.25	0.98
Reach 1	7681	10-year	2802.00	5797.34	5802.85	5802.85	5803.95	0.004026	9.79	544.28	239.55	0.84
Reach 1	7681	100 year	4400.00	5797.34	5803.69	5803.69	5805.10	0.004454	11.60	746.88	247.21	0.91
Reach 1	7687	Baseflow	4.00	5797.34	5797.62	5797.56	5797.67	0.005648	1.72	2.32	9.63	0.62
Reach 1	7687	Bankfull	40.00	5797.34	5798.16	5798.16	5798.42	0.010822	4.12	9.70	17.66	0.98
Reach 1	7687	Low	227.00	5797.34	5799.30	5799.30	5799.83	0.008791	5.86	38.75	35.61	0.99
Reach 1	7687	10-year	2802.00	5797.34	5802.90	5802.90	5804.00	0.004195	9.84	544.20	238.71	0.85
Reach 1	7687	100 year	4400.00	5797.34	5803.91	5803.72	5805.16	0.003950	11.04	789.74	248.11	0.86



Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7238
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7687
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7681
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7662
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta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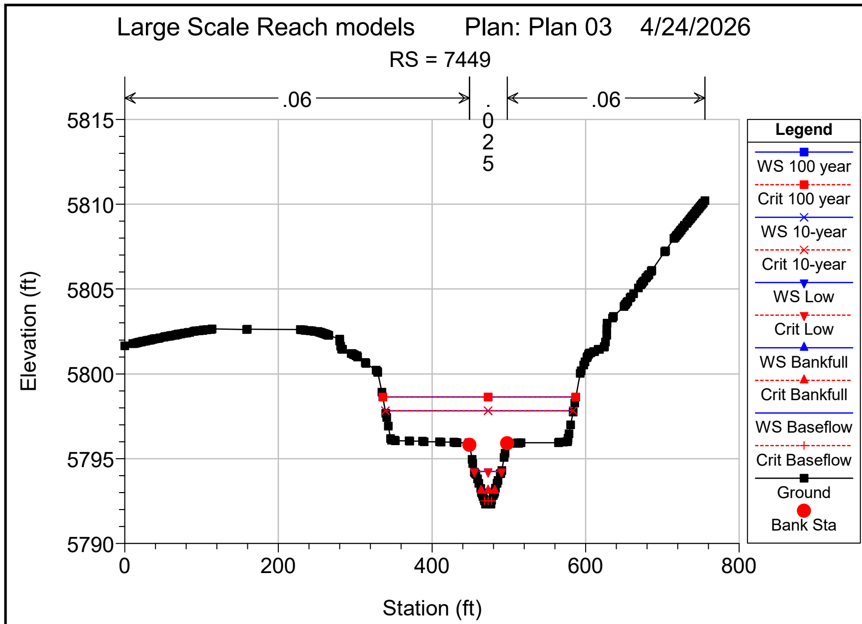
RS = 7641
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7570
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7525
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7480
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta



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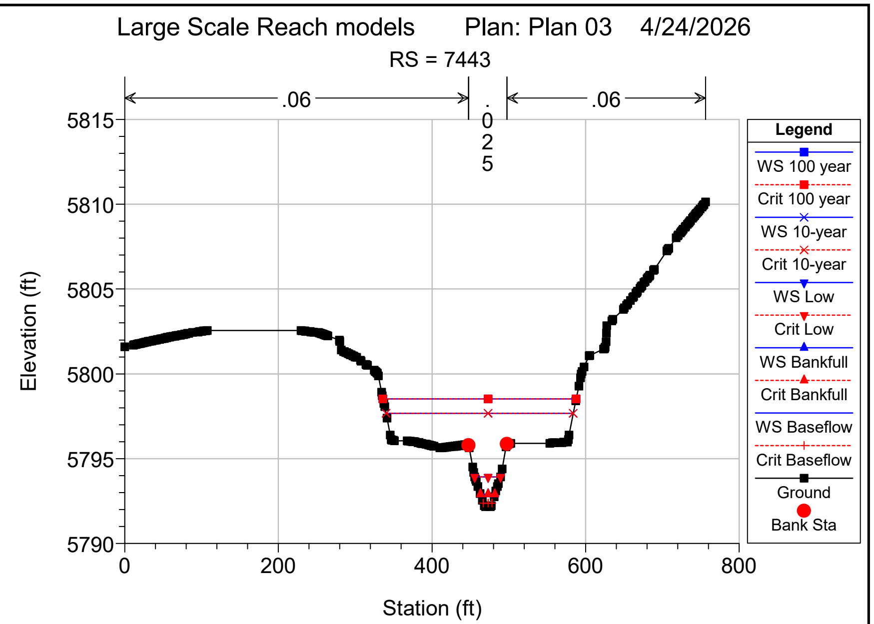
RS = 7449
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta



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.06
.025
.06
Elevation (ft)
Station (ft)
Legend
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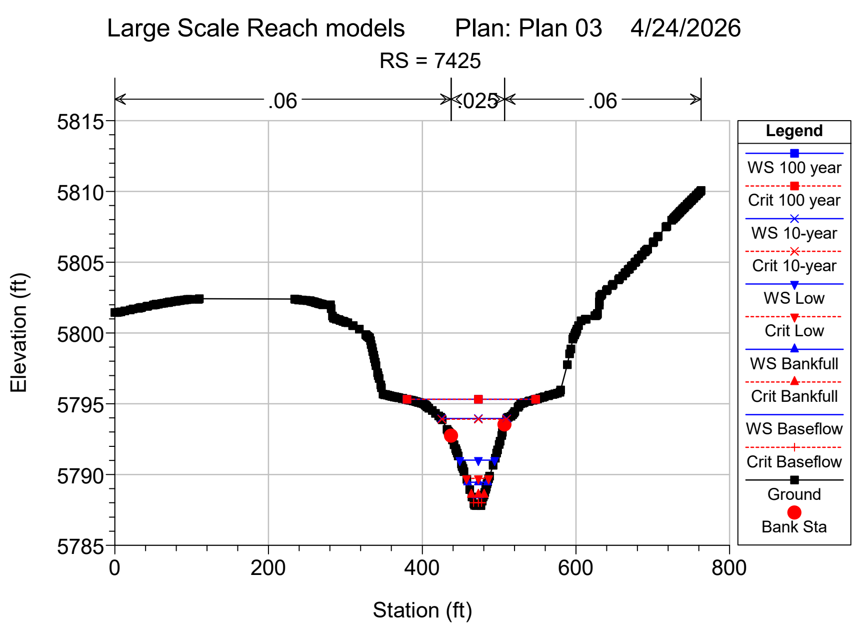
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta



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.06
.025
.06
Elevation (ft)
Station (ft)
Legend
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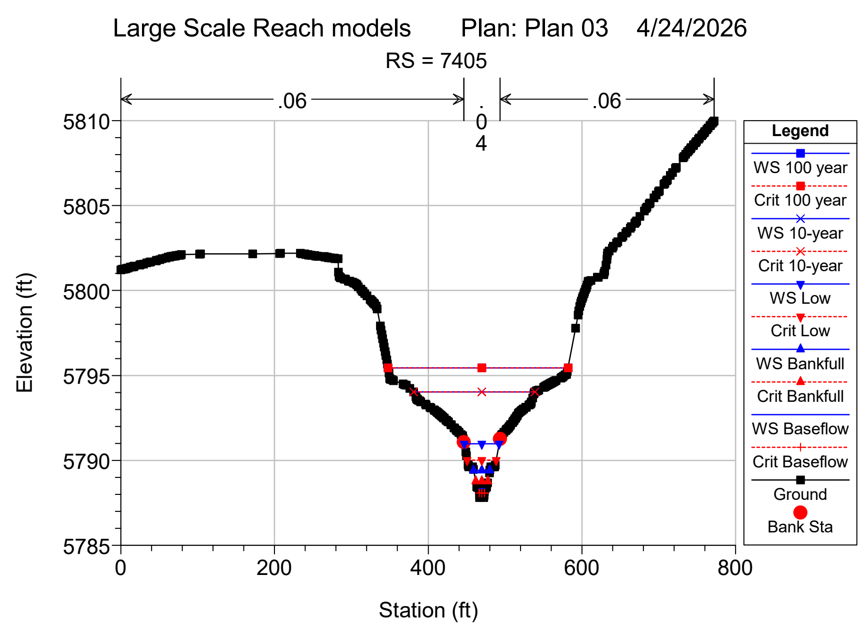
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta



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.04
.06
Elevation (ft)
Station (ft)
Legend
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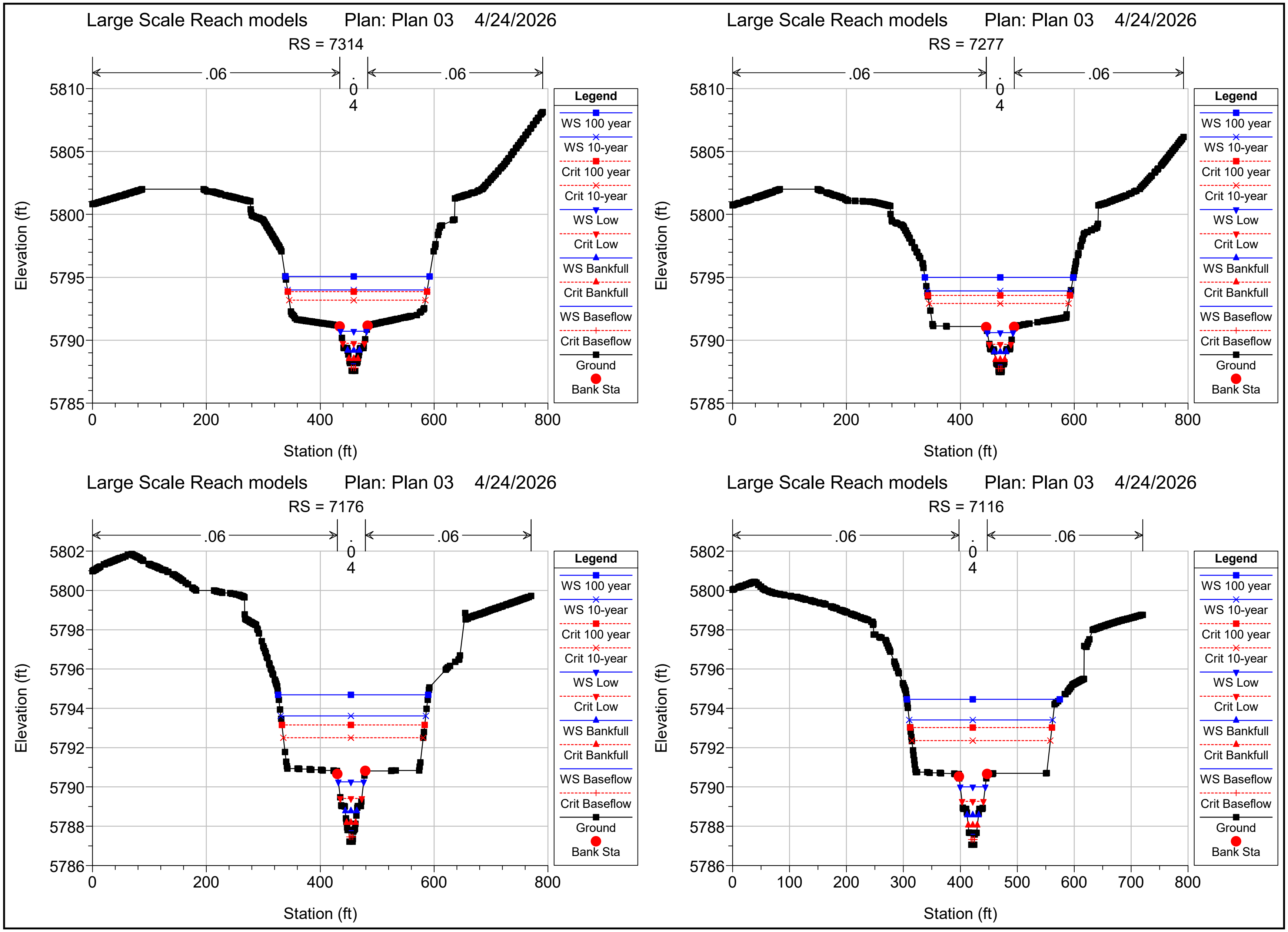
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta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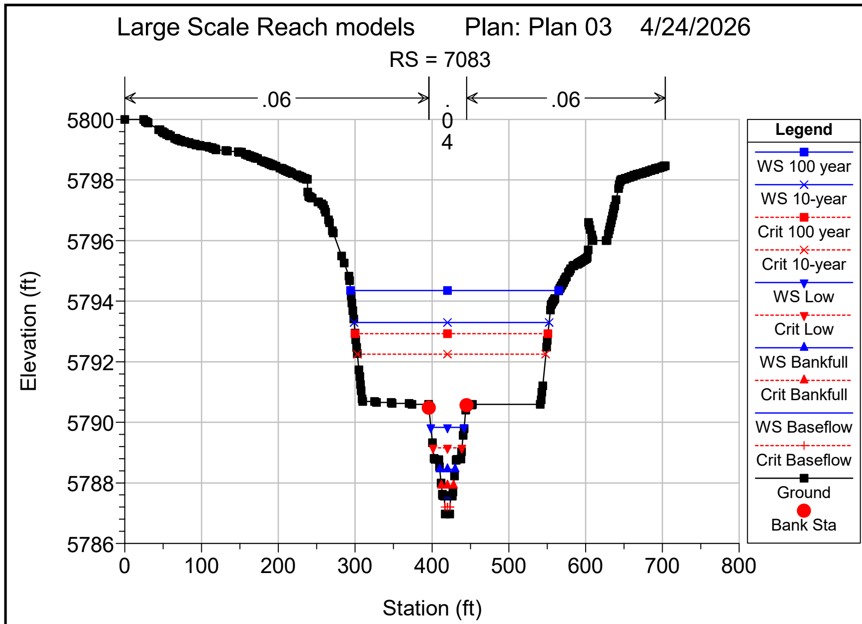
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7277
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7176
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7116
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)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RS = 7083
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.04
.06
Elevation (ft)
Station (ft)
Legend
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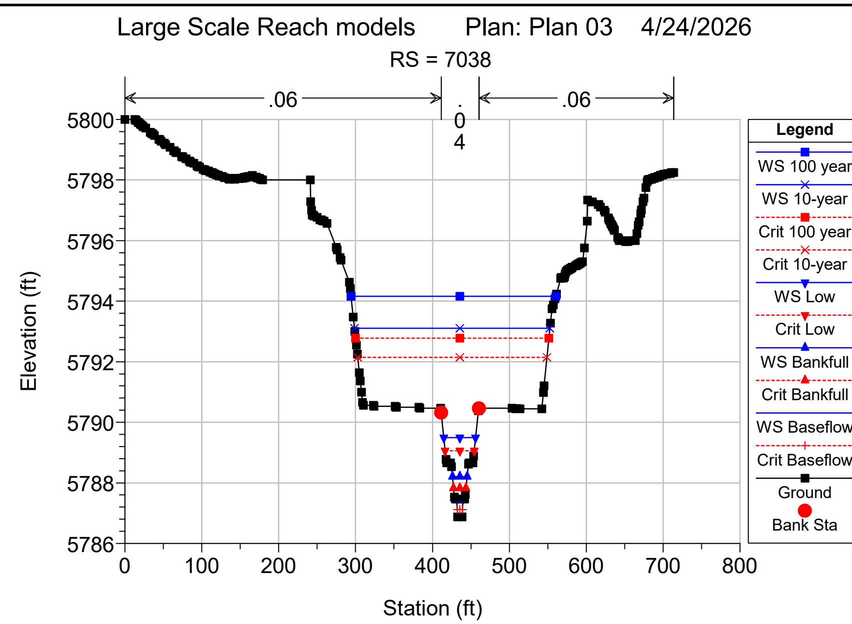
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 7038
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
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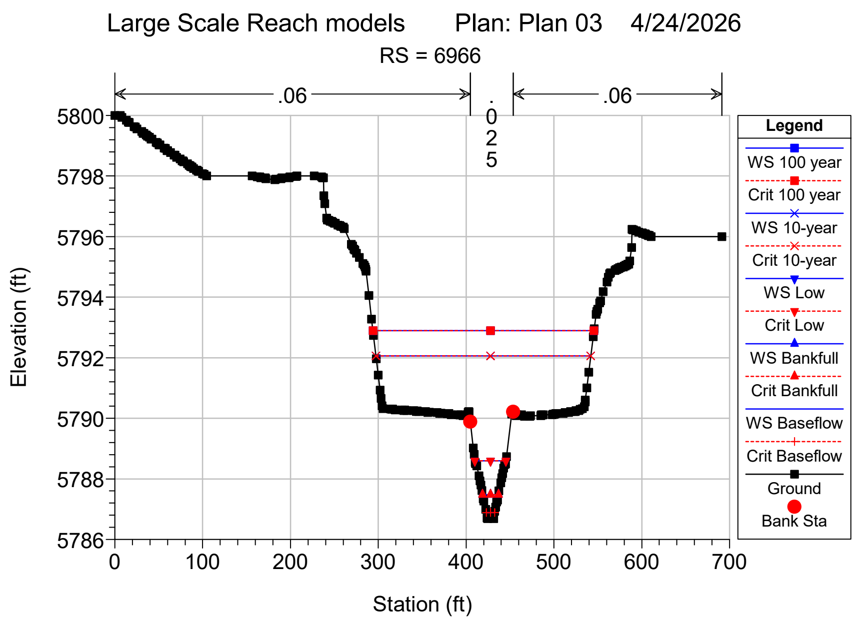
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6966
.06
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.06
Elevation (ft)
Station (ft)
Legend
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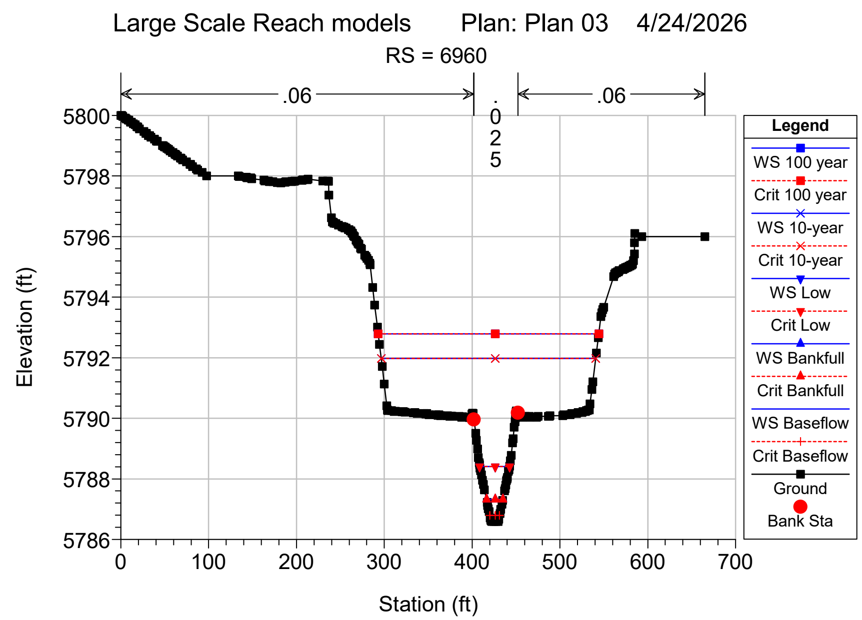
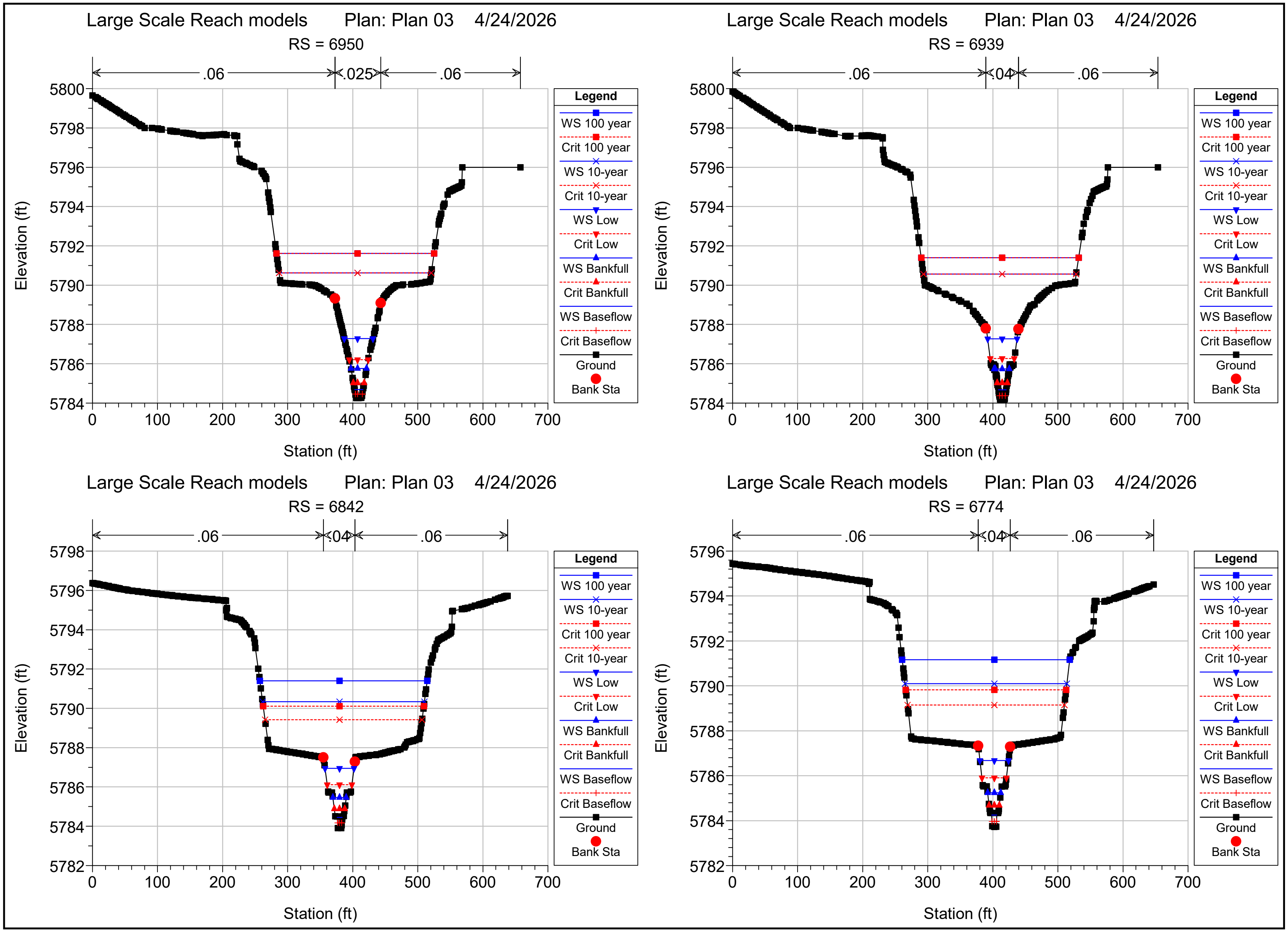
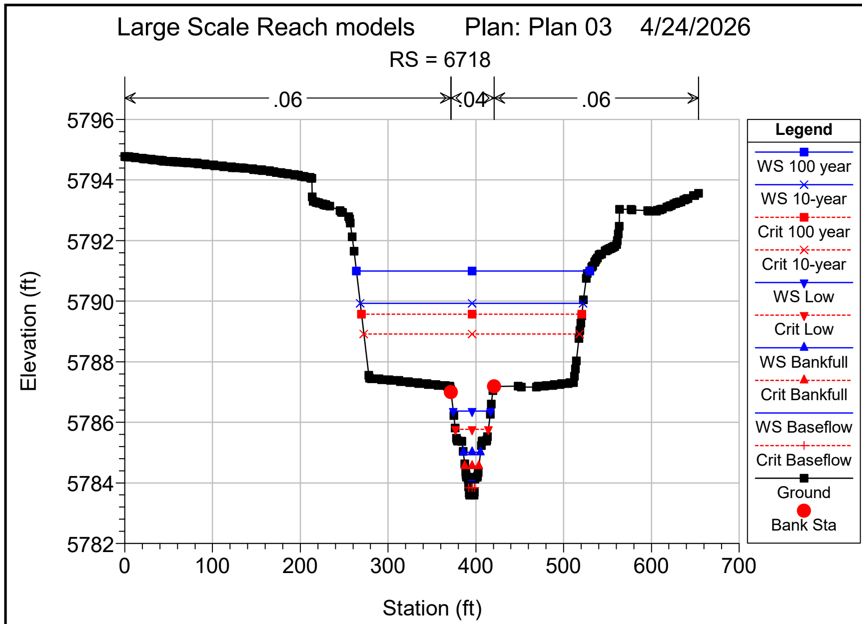
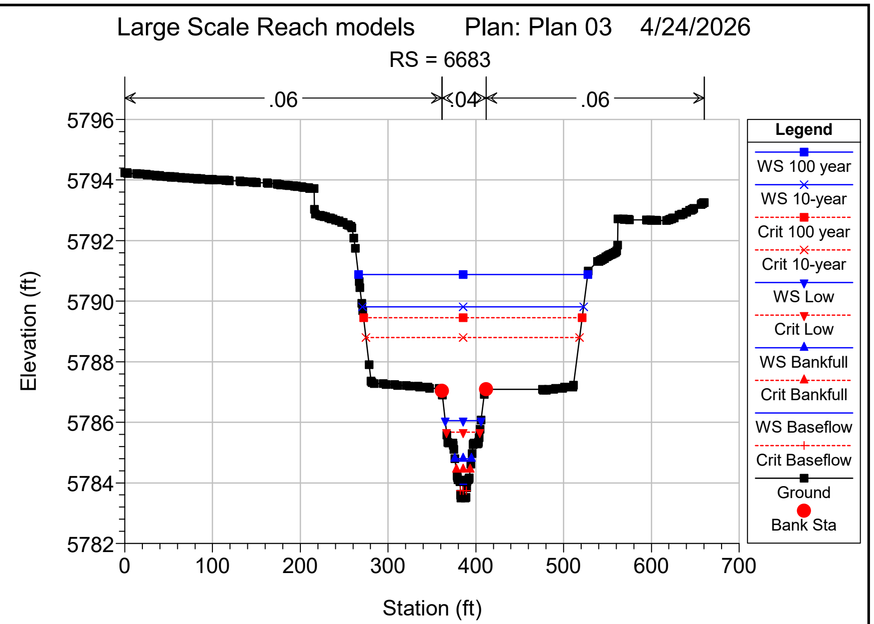
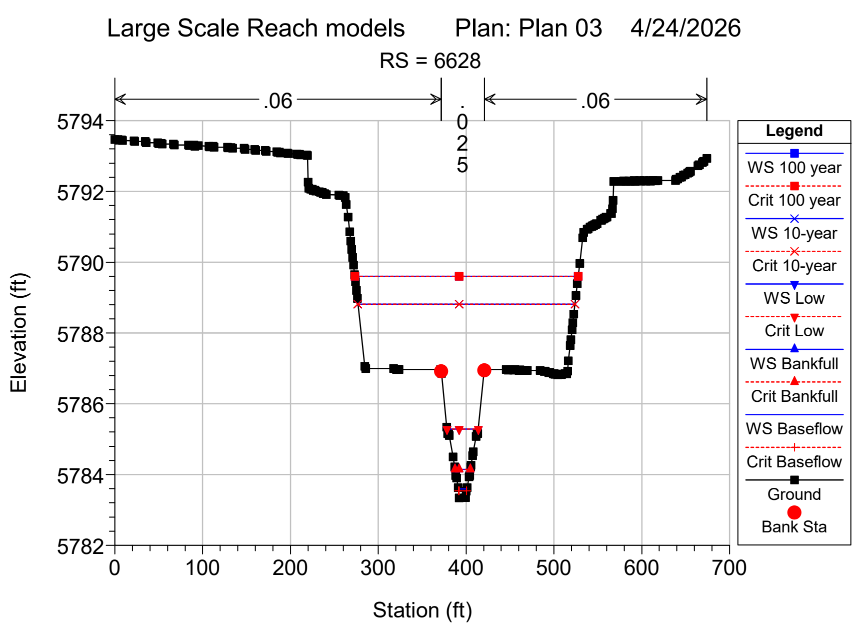
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

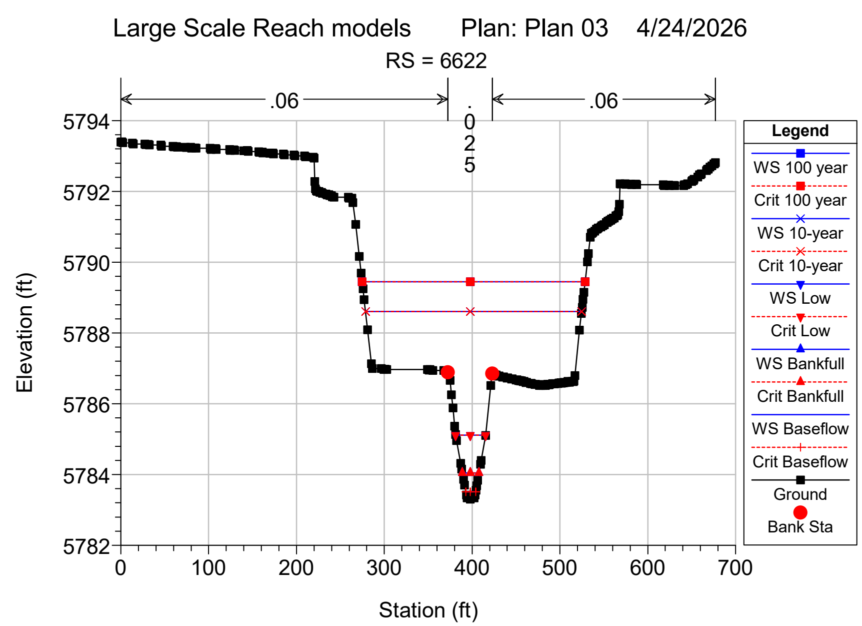

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6960
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

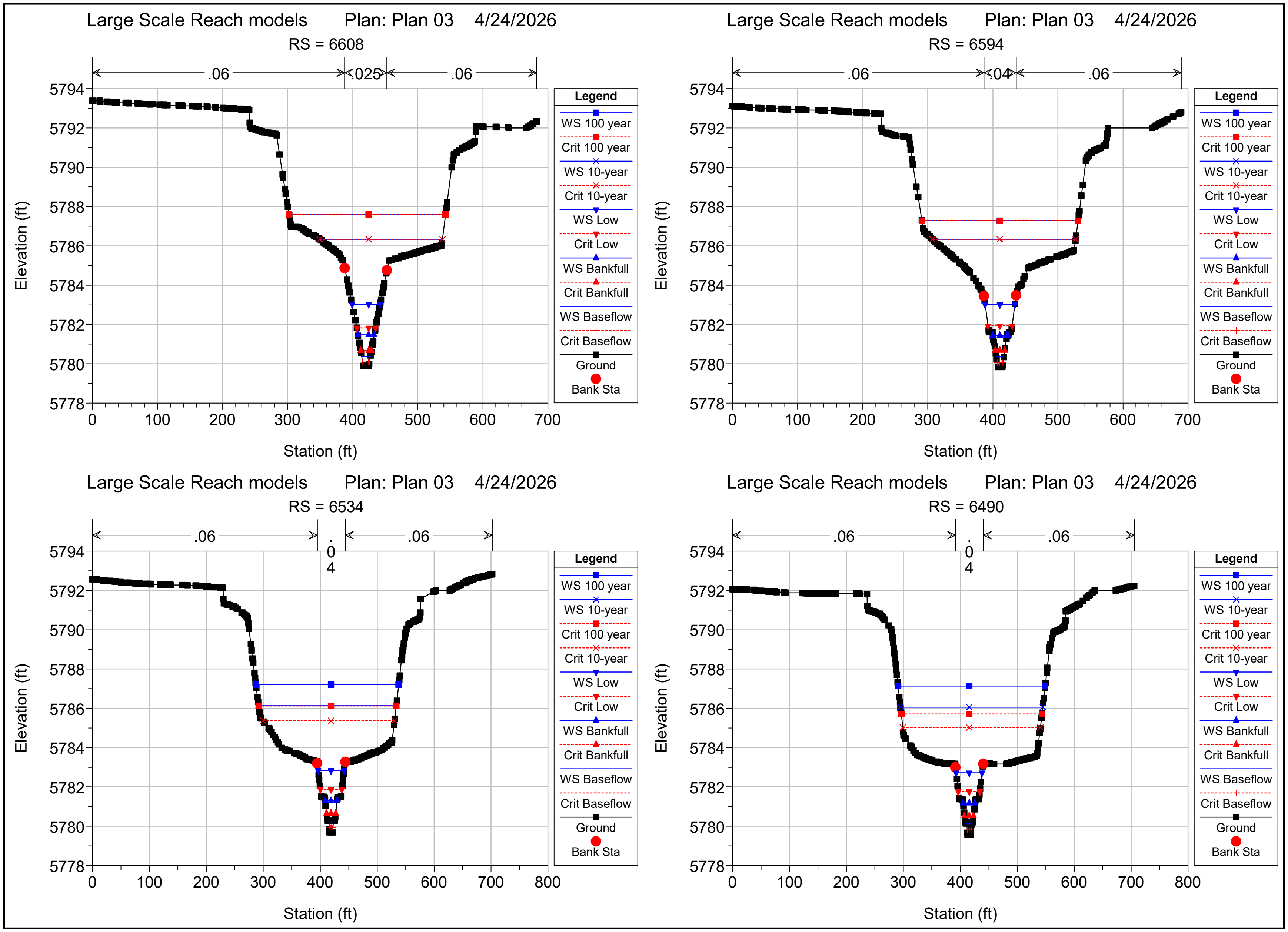

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6950
.06 .025 .06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6939
.06 .04 .06
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6842
.06 .04 .06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6774
.06 .04 .06
Elevation (ft)
Station (ft)


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6718
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

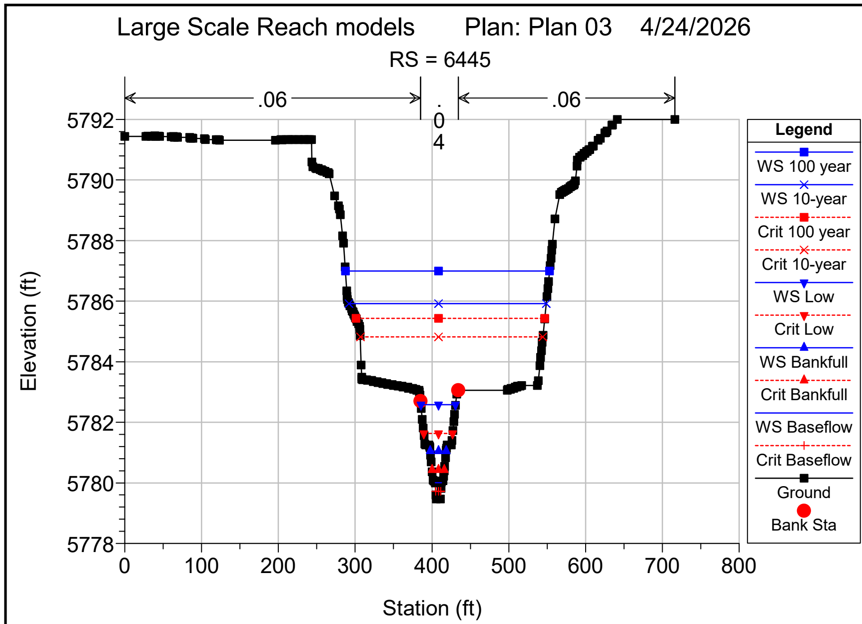

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6683
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

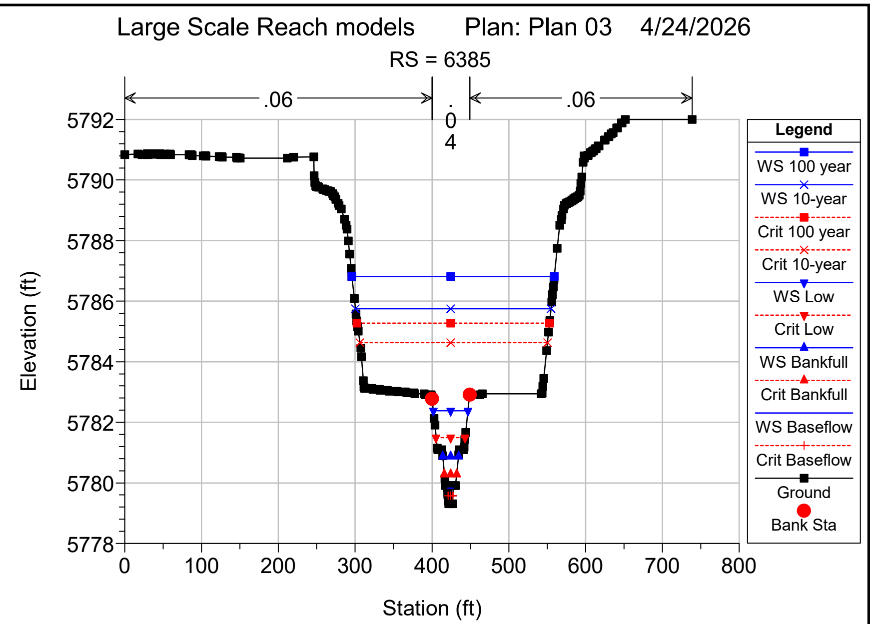

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6628
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

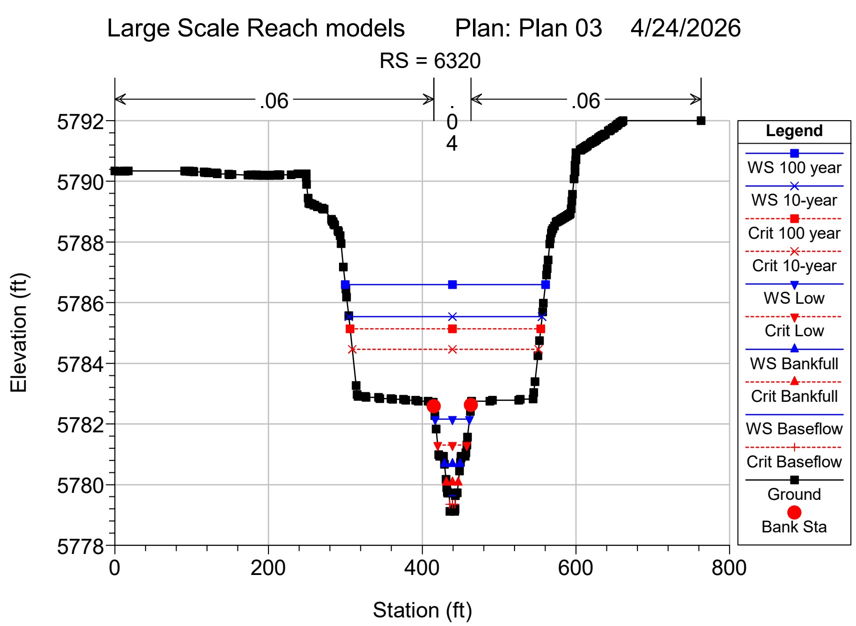

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6622
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

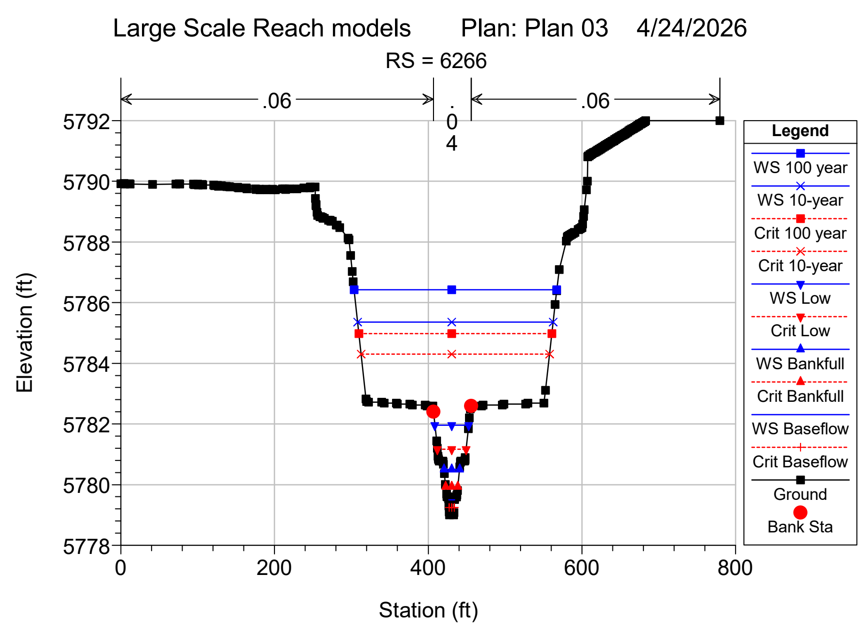


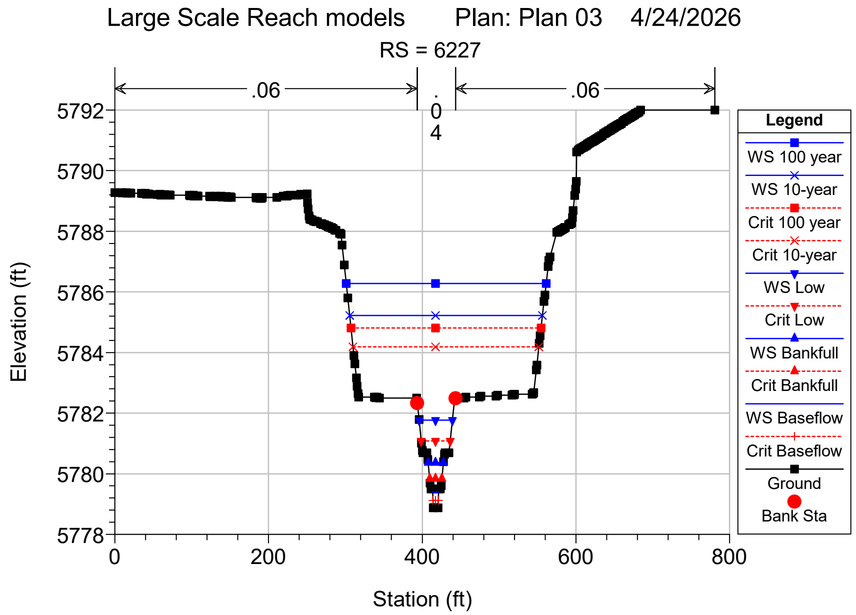
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6608
.06 .025 .06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6594
.06 .04 .06
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6534
.06 .04 .06
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6490
.06 .04 .06
Elevation (ft)
Station (ft)


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6445
.06
.04
.06
Elevation (ft)
5792
5790
5788
5786
5784
5782
5780
5778
0 100 200 300 400 500 600 700 800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

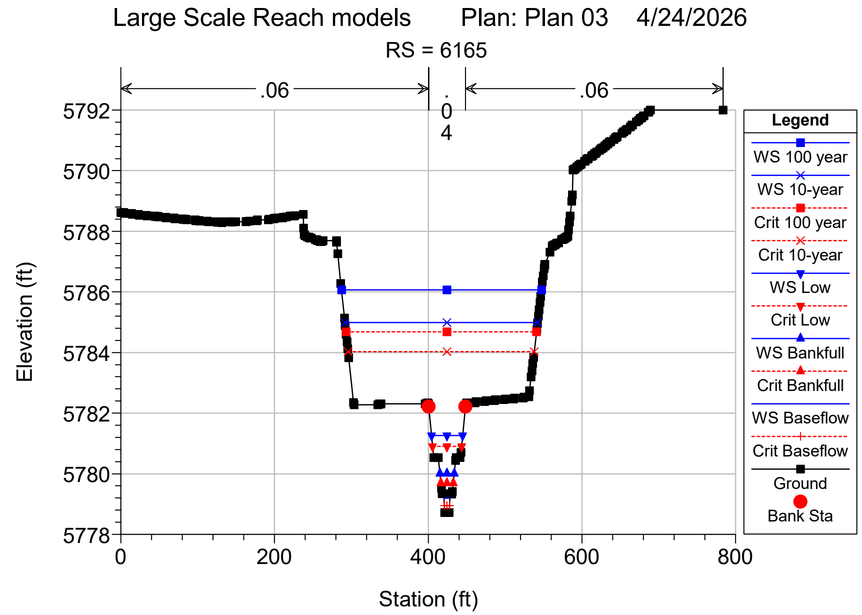

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6385
.06
.04
.06
Elevation (ft)
5792
5790
5788
5786
5784
5782
5780
5778
0 100 200 300 400 500 600 700 800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6320
.06
.04
.06
Elevation (ft)
5792
5790
5788
5786
5784
5782
5780
5778
0 200 400 600 800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

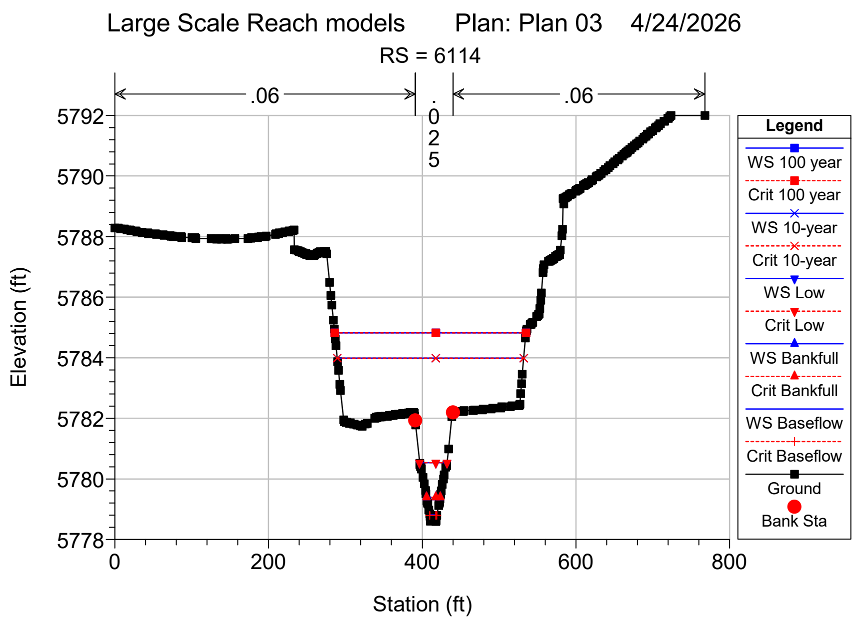

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6266
.06
.04
.06
Elevation (ft)
5792
5790
5788
5786
5784
5782
5780
5778
0 200 400 600 800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta



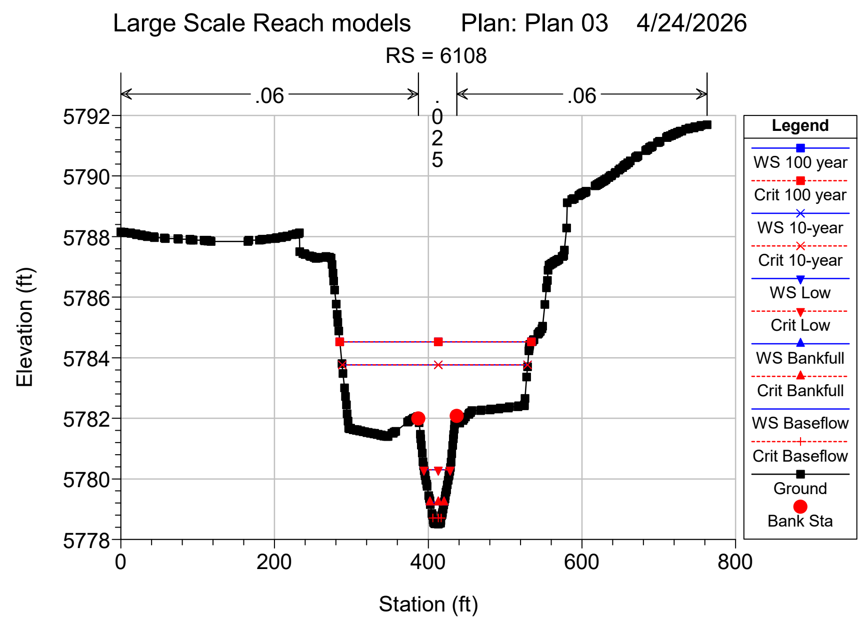
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6227
.06
.04
.06
Elevation (ft)
Station (ft)
5778
5780
5782
5784
5786
5788
5790
5792
0
200
400
600
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta



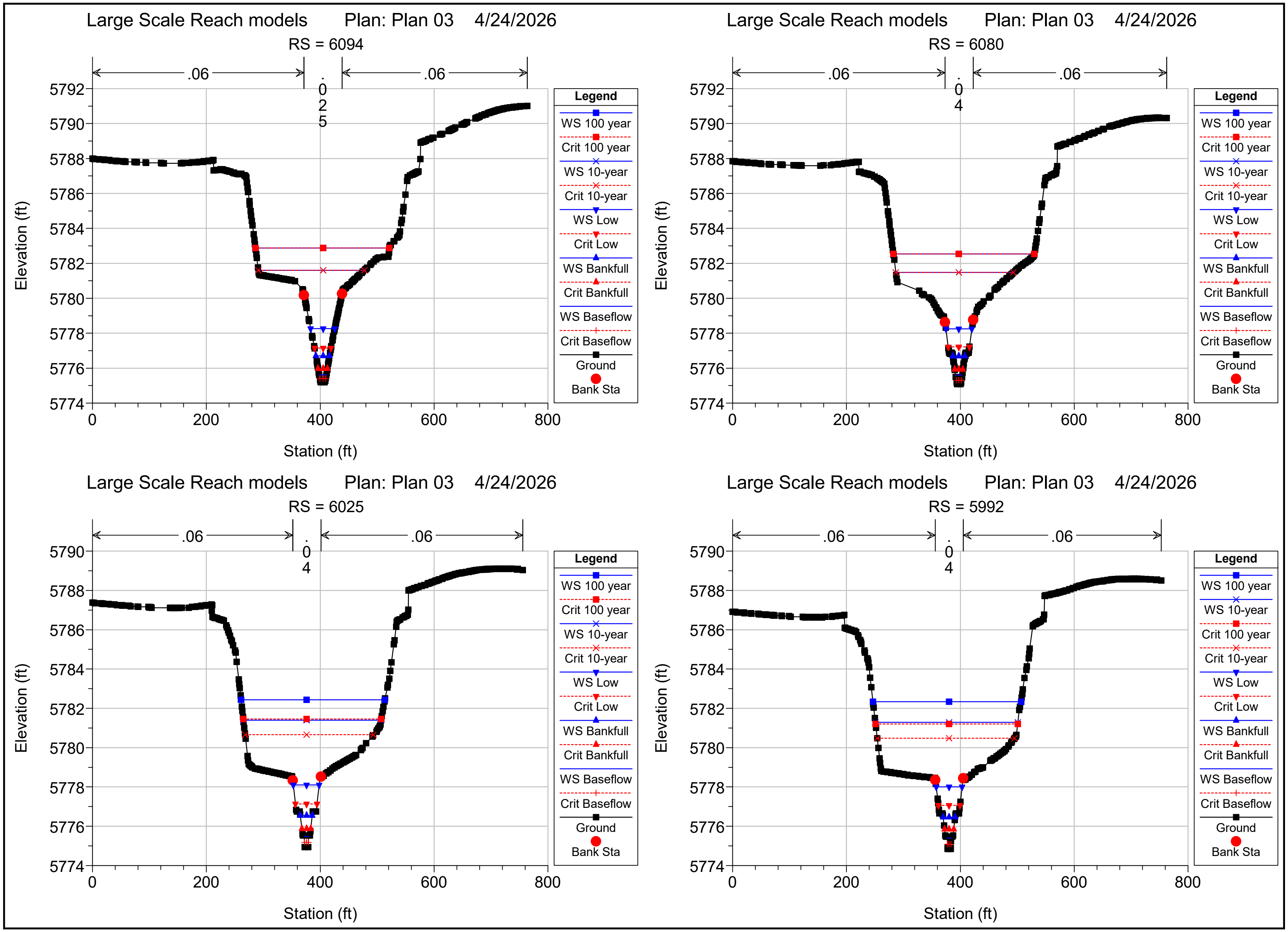
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6165
.06
.04
.06
Elevation (ft)
Station (ft)
5778
5780
5782
5784
5786
5788
5790
5792
0
200
400
600
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta



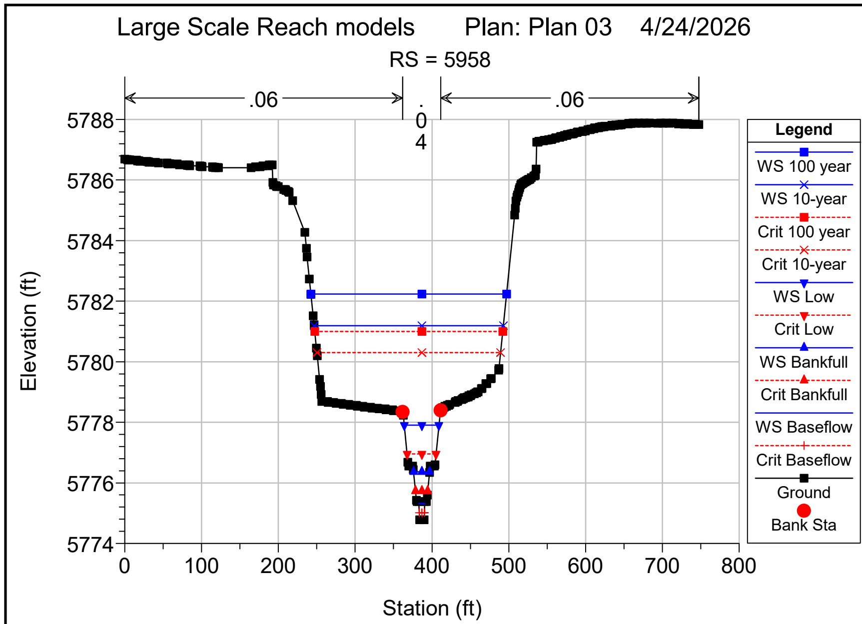
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6114
.06
.025
.06
Elevation (ft)
Station (ft)
5778
5780
5782
5784
5786
5788
5790
5792
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

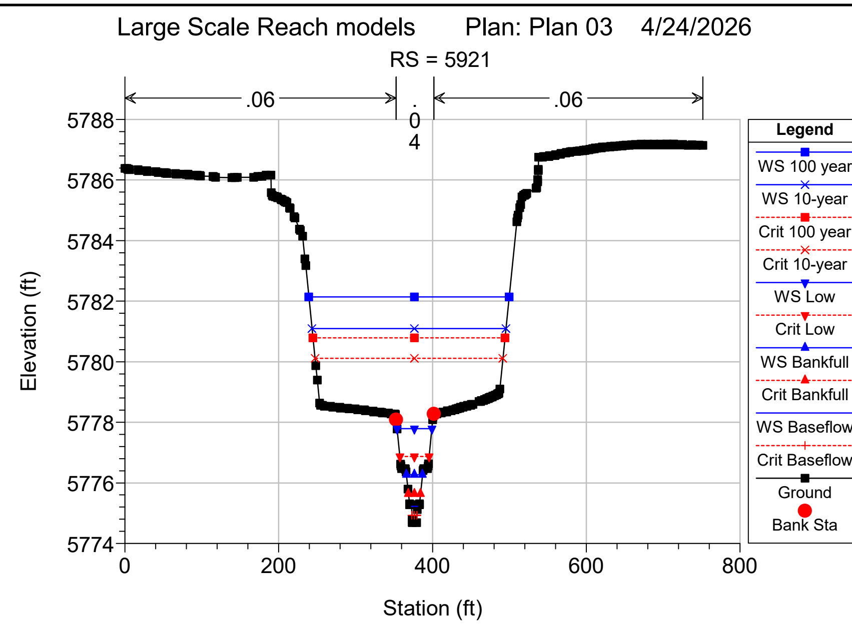


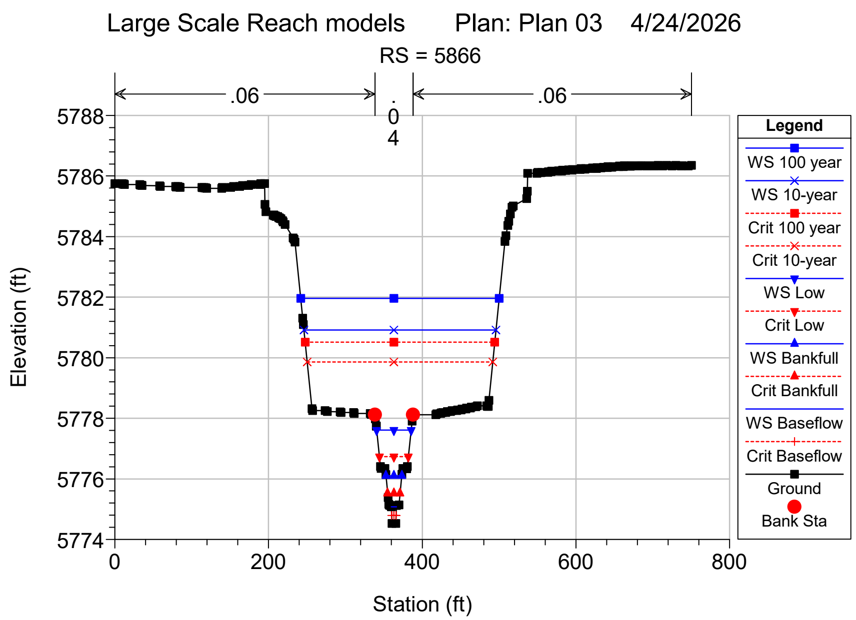
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6108
.06
.025
.06
Elevation (ft)
Station (ft)
5778
5780
5782
5784
5786
5788
5790
5792
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

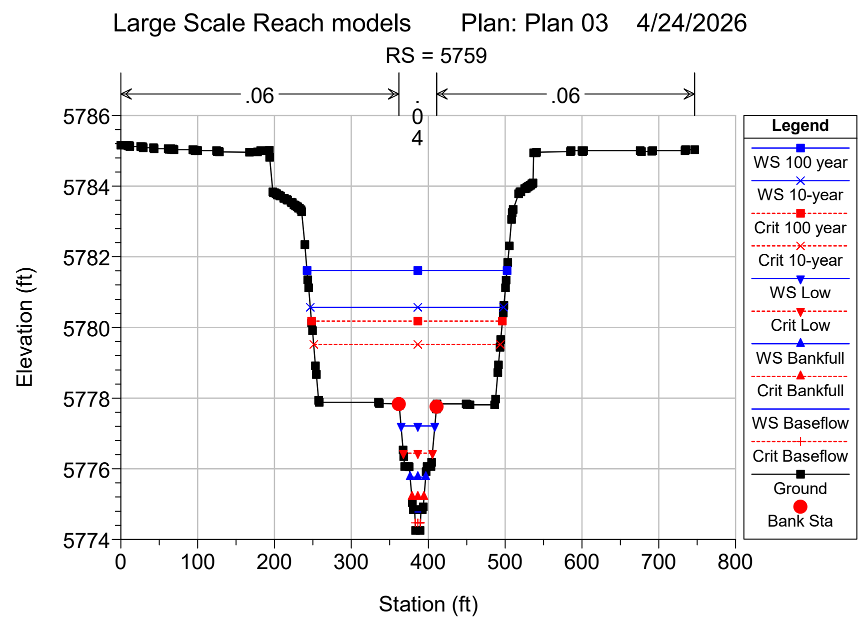


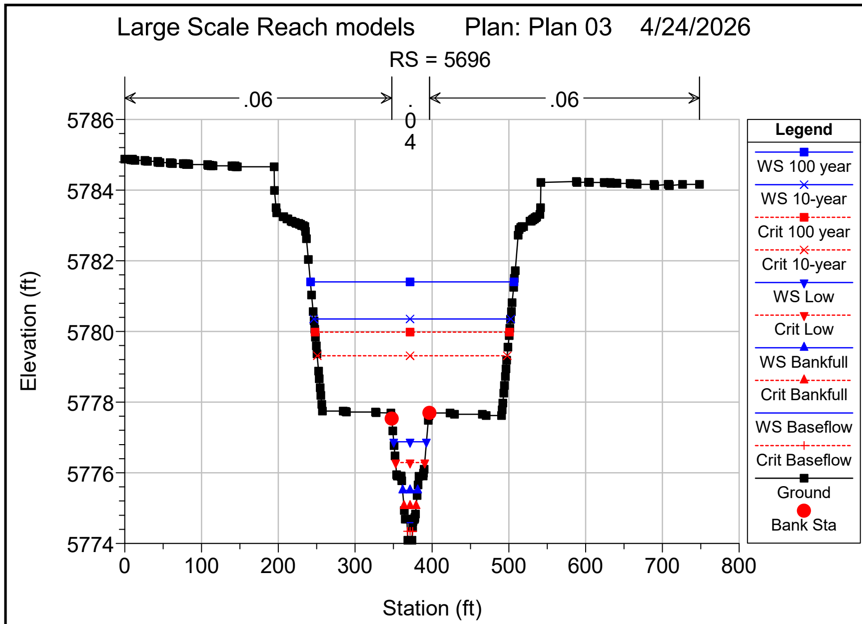
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6094
.06
.025
.06
Elevation (ft)
Station (ft)
5774
5776
5778
5780
5782
5784
5786
5788
5790
5792
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6080
.06
.04
.06
Elevation (ft)
Station (ft)
5774
5776
5778
5780
5782
5784
5786
5788
5790
5792
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 6025
.06
.04
.06
Elevation (ft)
Station (ft)
5774
5776
5778
5780
5782
5784
5786
5788
5790
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5992
.06
.04
.06
Elevation (ft)
Station (ft)
5774
5776
5778
5780
5782
5784
5786
5788
5790
0
200
400
600
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

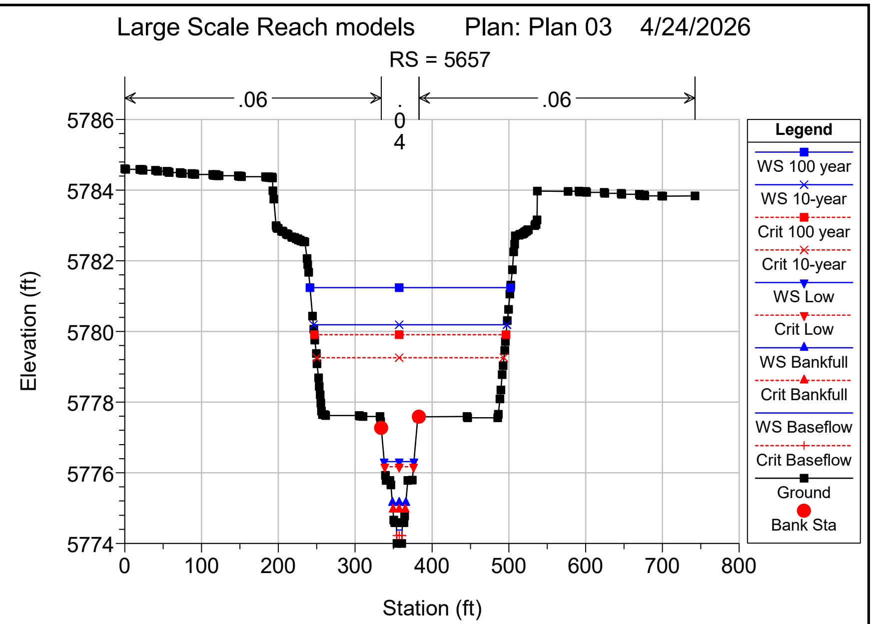

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5958
.06
.
0
4
.06
Elevation (ft)
5774
5776
5778
5780
5782
5784
5786
5788
Station (ft)
0
100
200
300
400
500
600
700
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

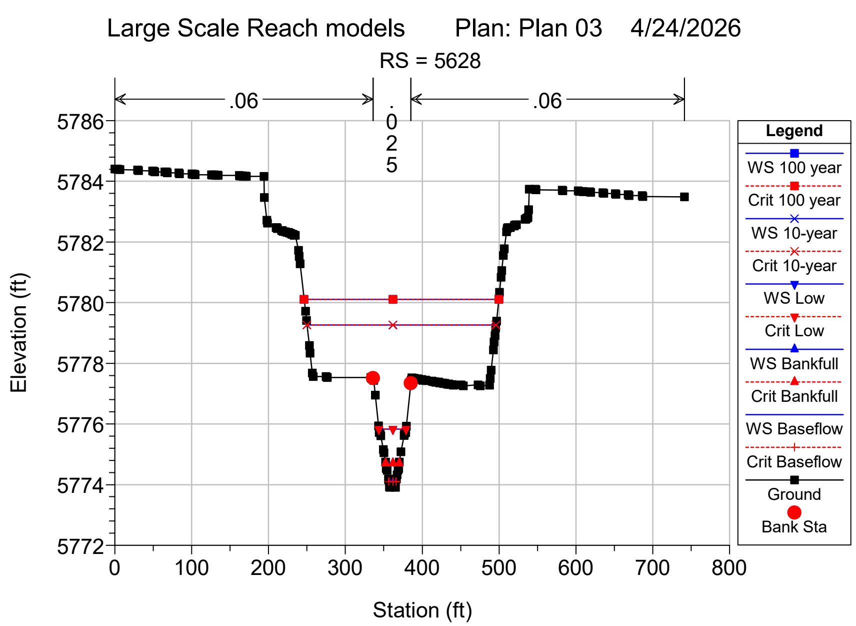

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5921
.06
.
0
4
.06
Elevation (ft)
5774
5776
5778
5780
5782
5784
5786
5788
Station (ft)
0
200
400
600
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

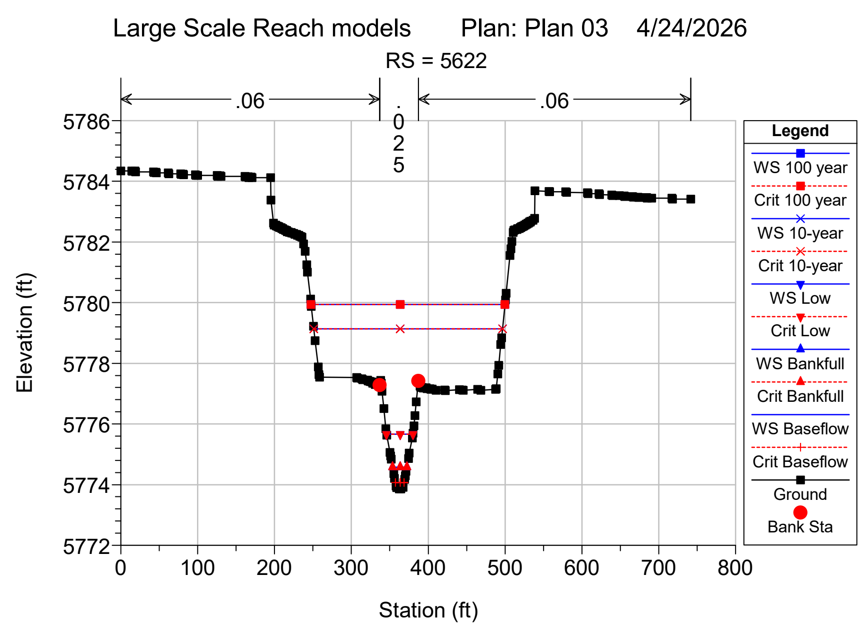

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5866
.06
.
0
4
.06
Elevation (ft)
5774
5776
5778
5780
5782
5784
5786
5788
Station (ft)
0
200
400
600
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

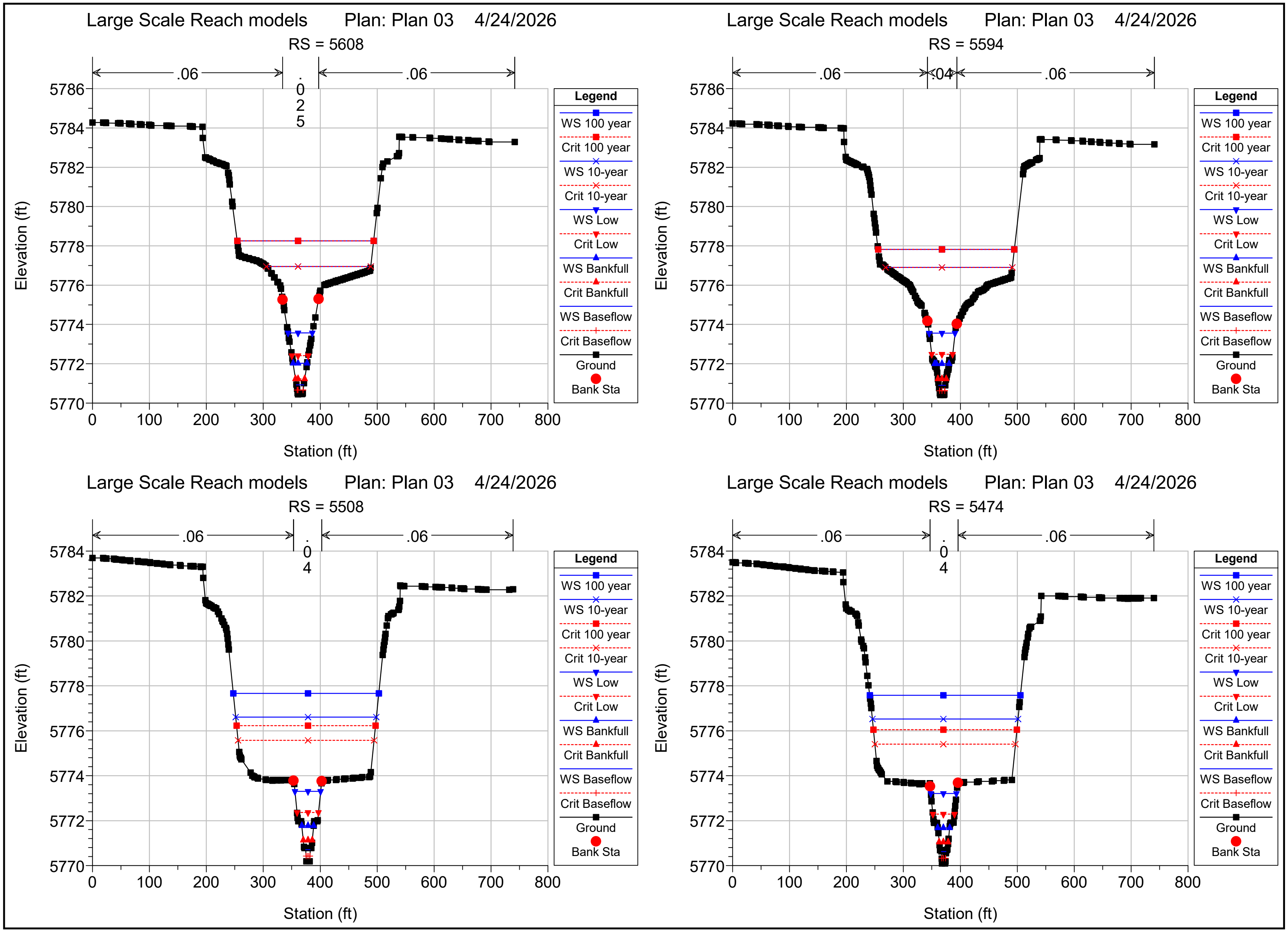

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5759
.06
.
0
4
.06
Elevation (ft)
5774
5776
5778
5780
5782
5784
5786
Station (ft)
0
100
200
300
400
500
600
700
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

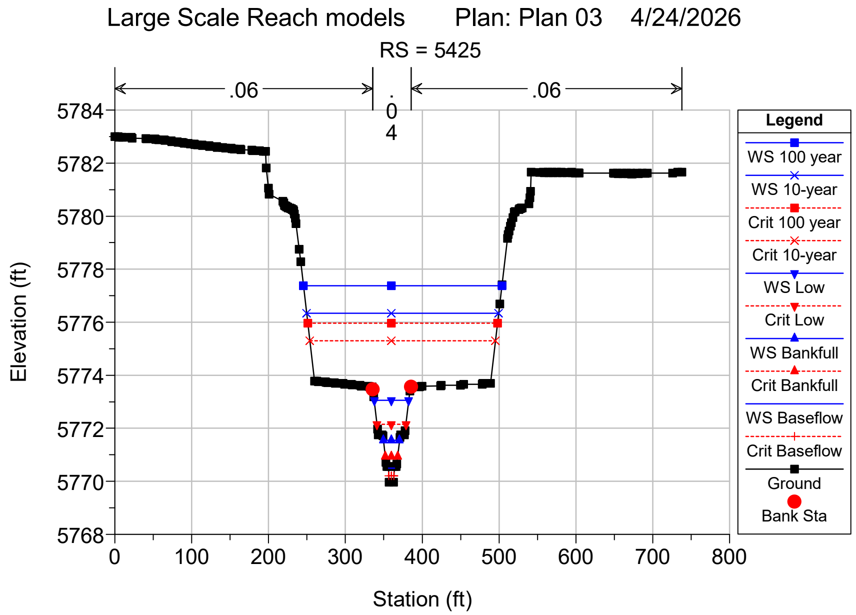

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5696
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

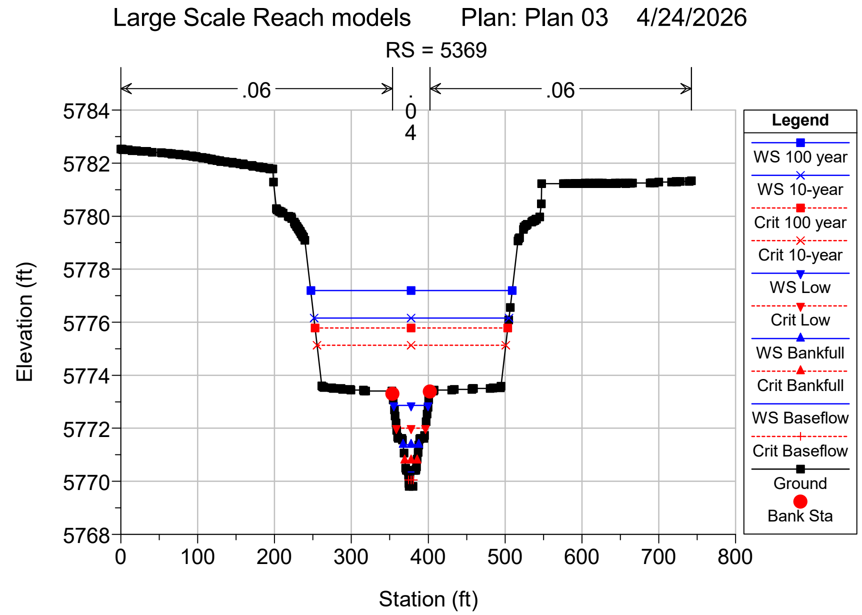

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5657
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

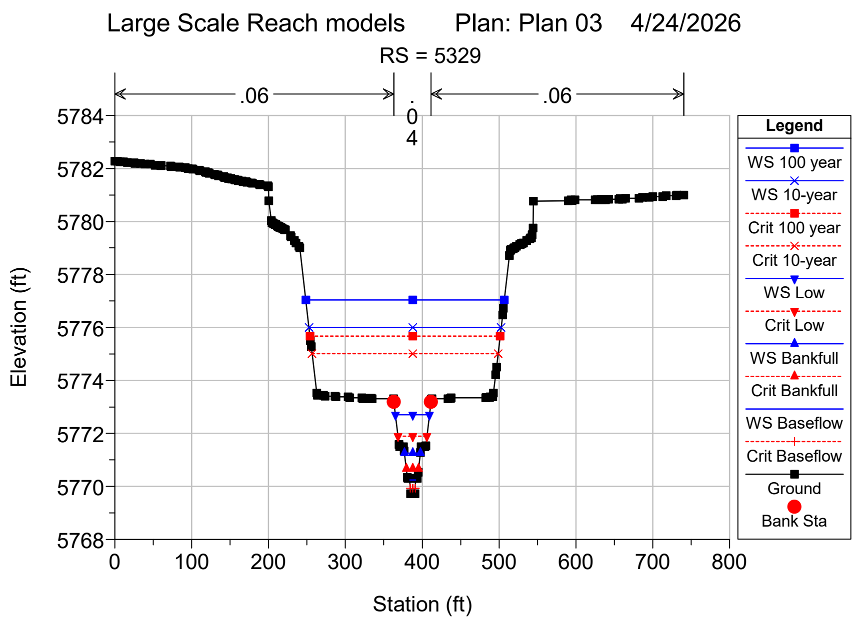

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5628
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

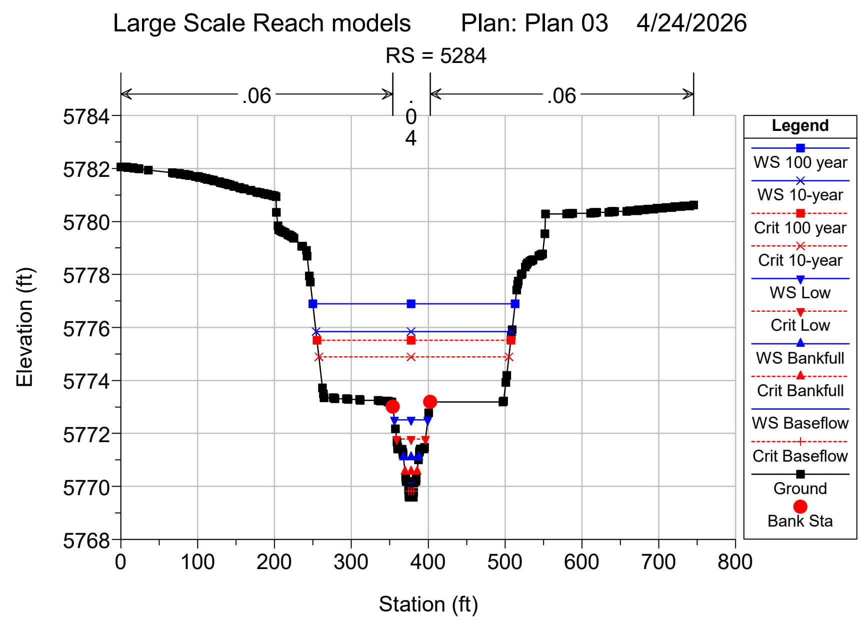

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5622
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

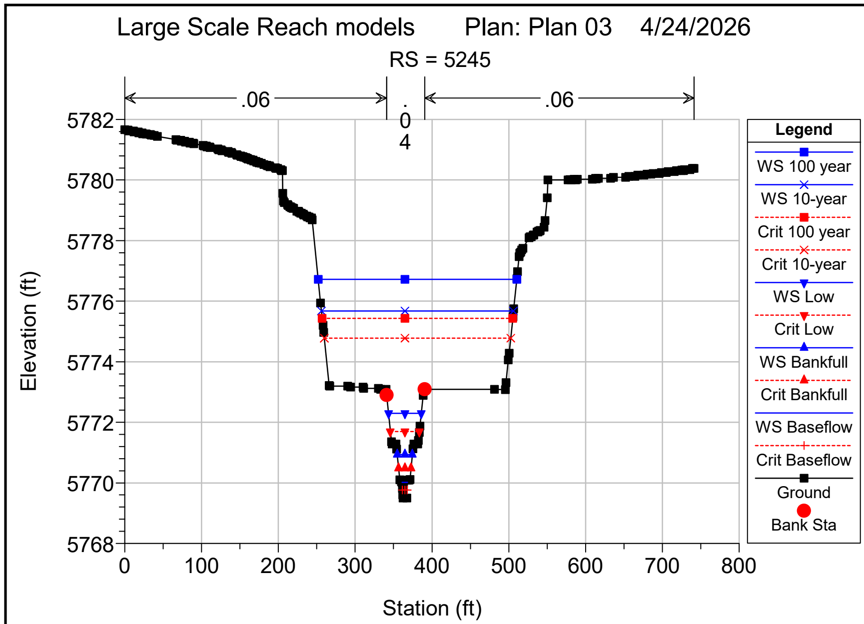

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5608
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5594
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5508
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5474
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

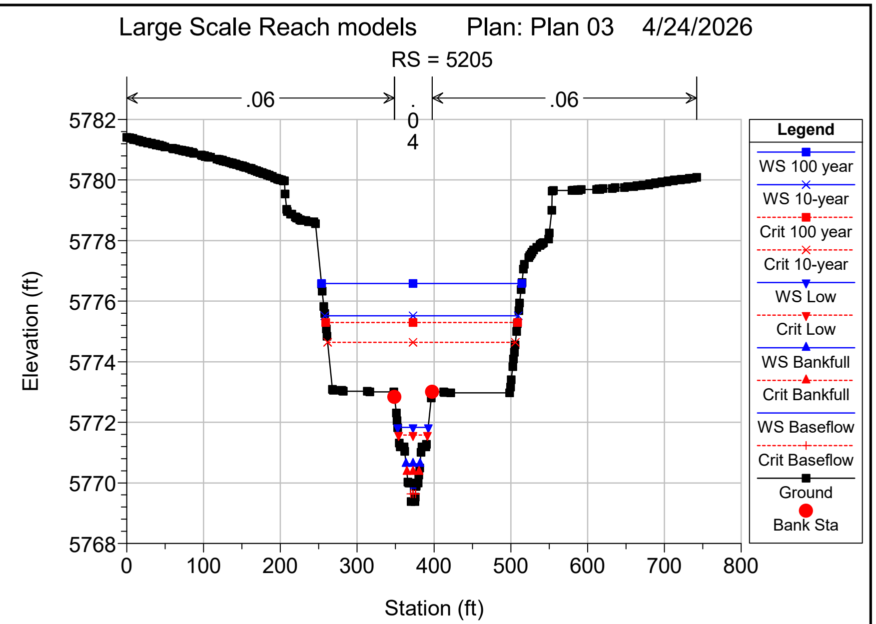

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5425
.06
.04
.06
Elevation (ft)
Station (ft)
5768
5770
5772
5774
5776
5778
5780
5782
5784
0
100
200
300
400
500
600
700
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

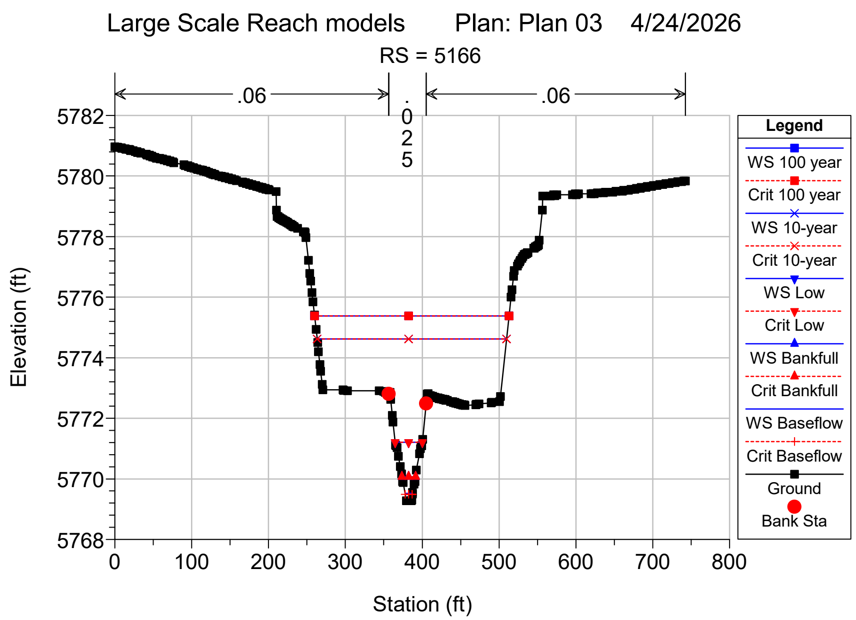

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5369
.06
.04
.06
Elevation (ft)
Station (ft)
5768
5770
5772
5774
5776
5778
5780
5782
5784
0
100
200
300
400
500
600
700
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

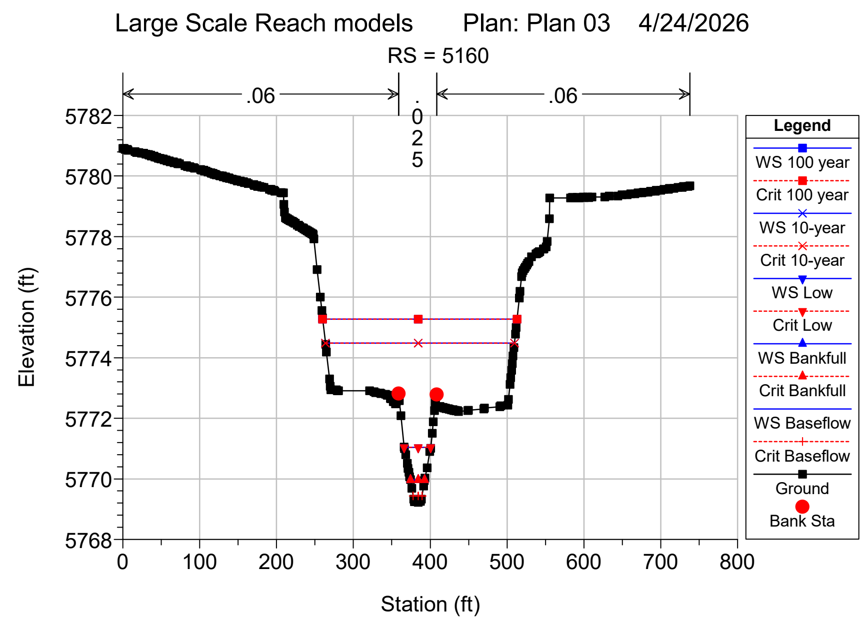

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5329
.06
.04
.06
Elevation (ft)
Station (ft)
5768
5770
5772
5774
5776
5778
5780
5782
5784
0
100
200
300
400
500
600
700
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

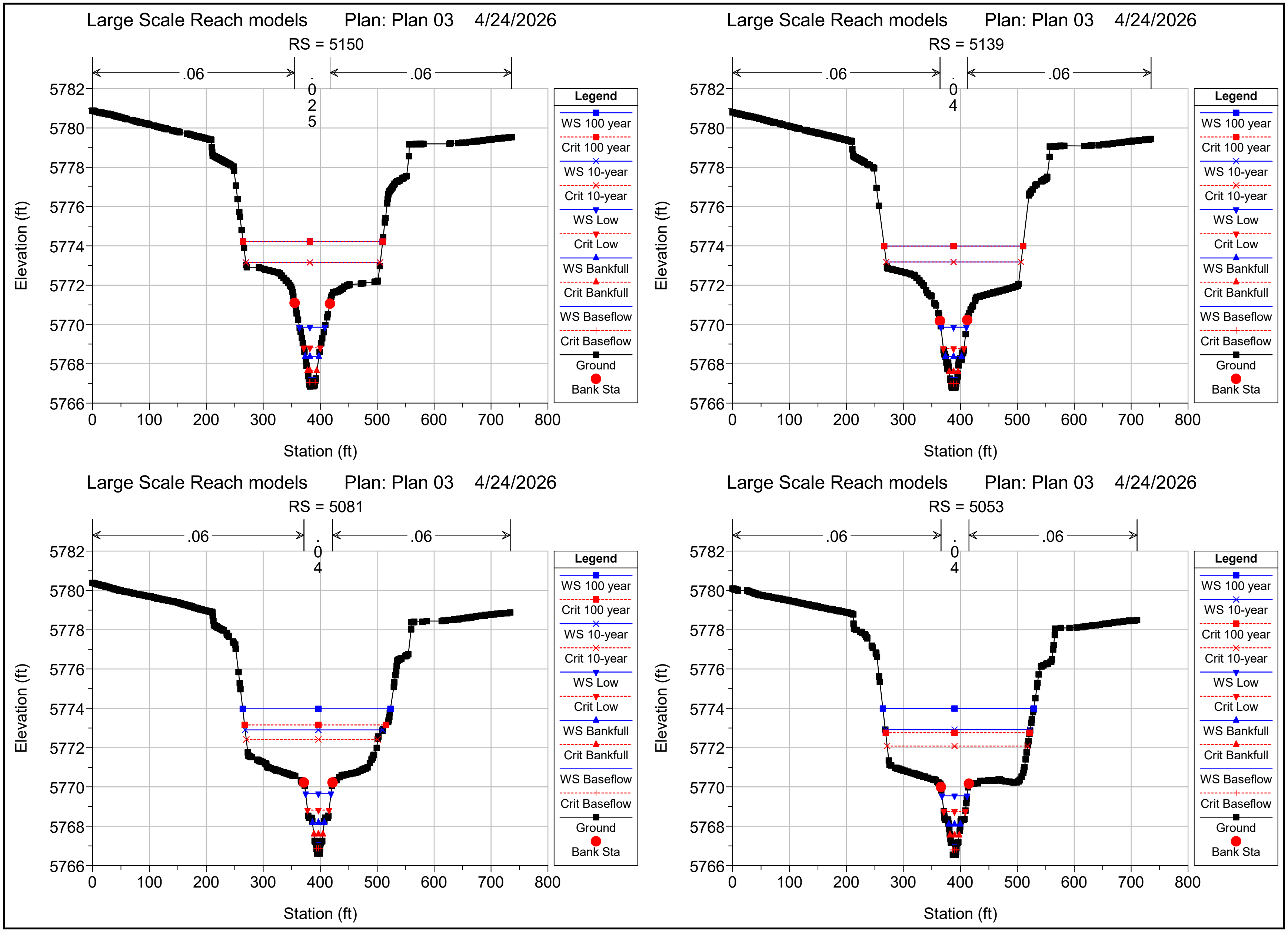

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5284
.06
.04
.06
Elevation (ft)
Station (ft)
5768
5770
5772
5774
5776
5778
5780
5782
5784
0
100
200
300
400
500
600
700
800
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

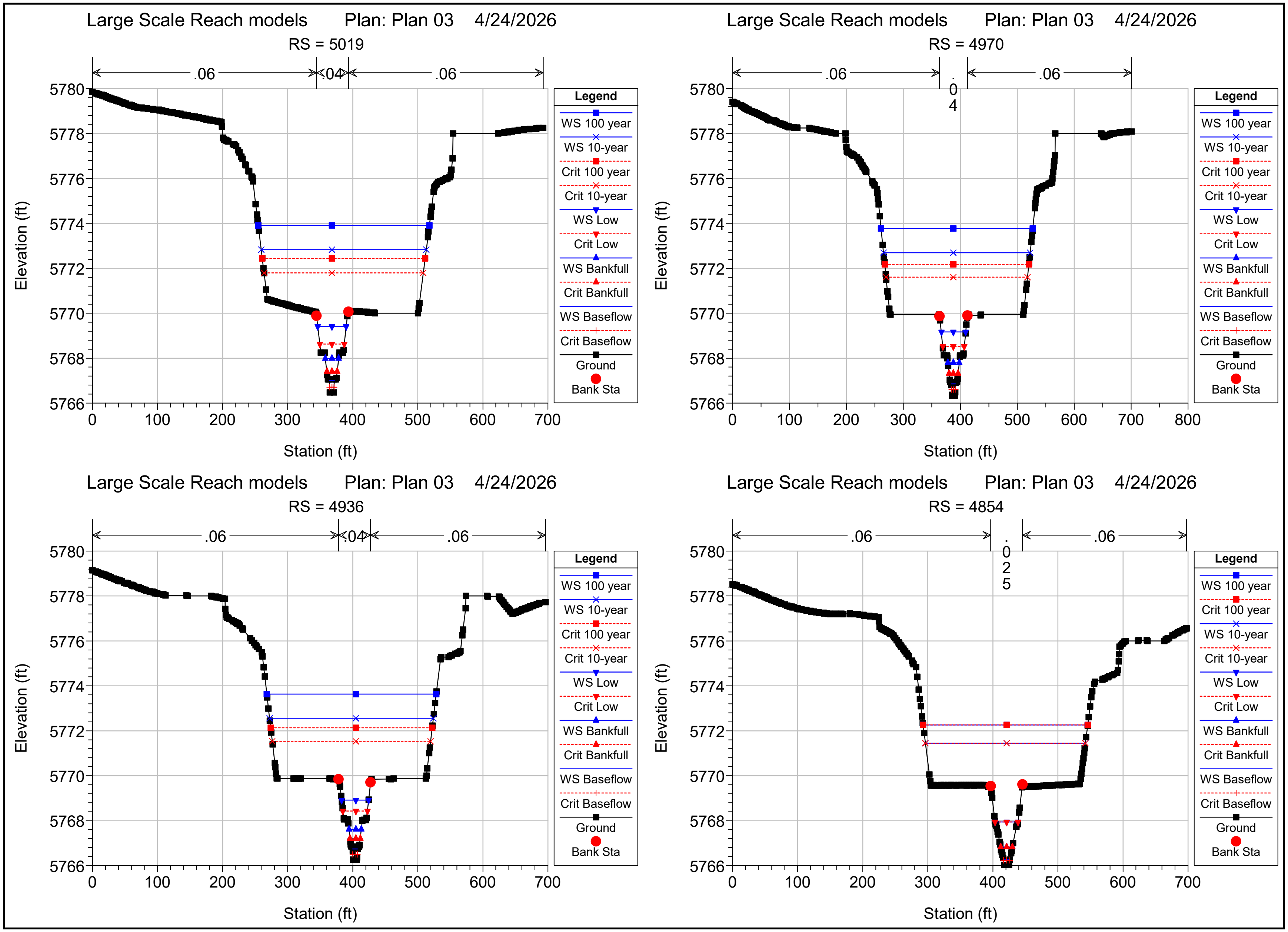

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5245
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5205
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

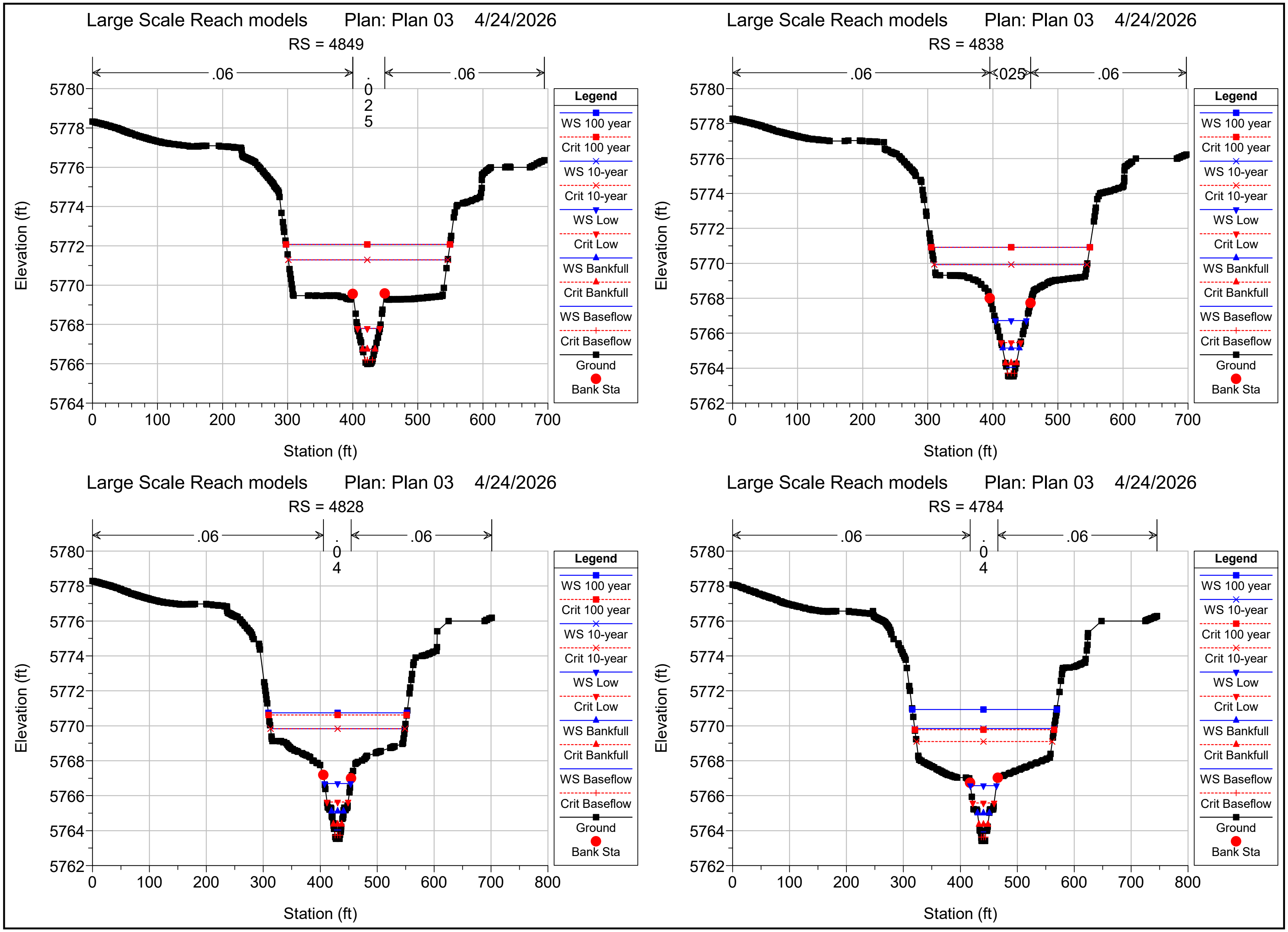

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5166
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5160
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

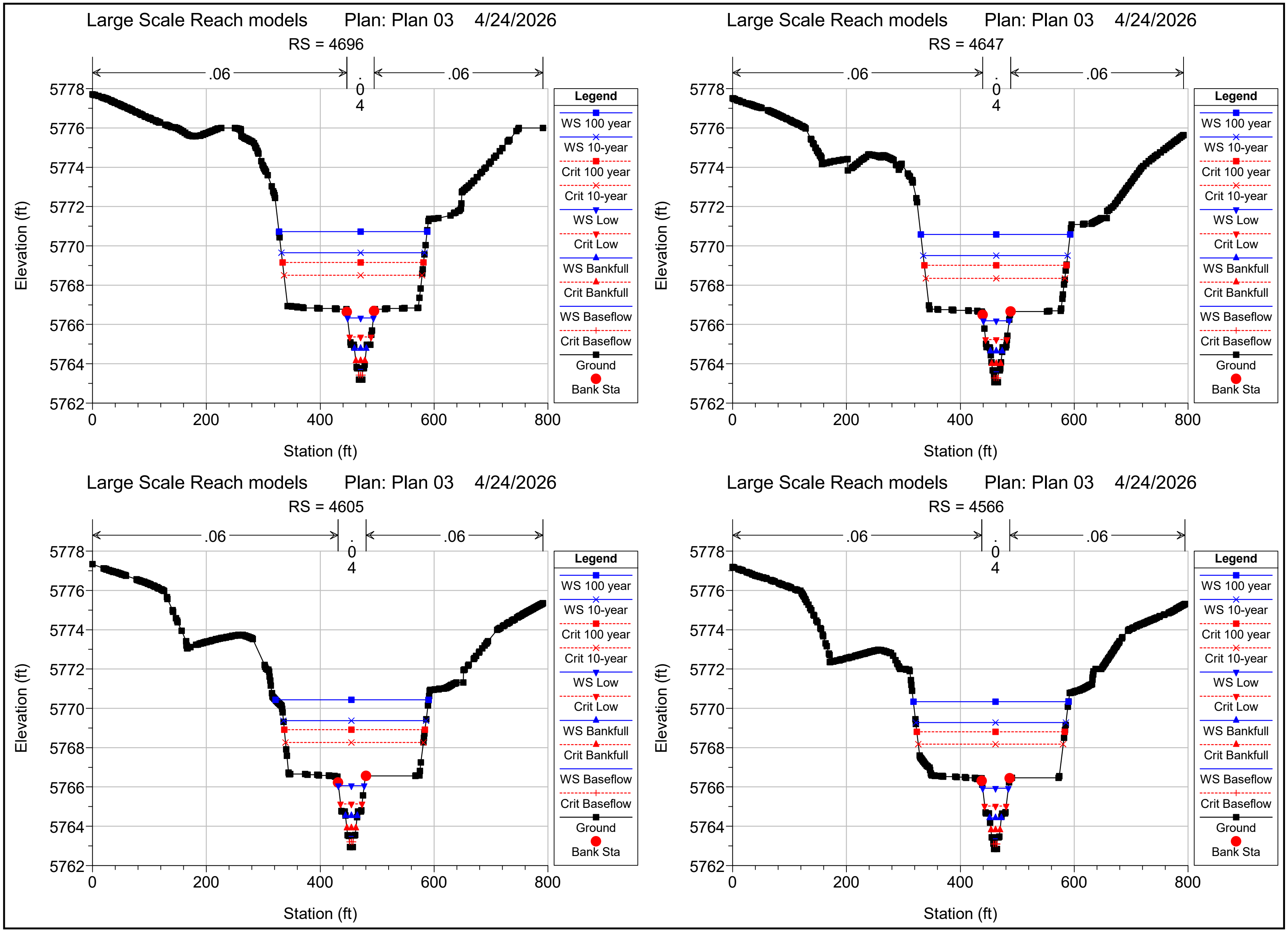

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5150
.06
.025
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5139
.06
.04
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5081
.06
.04
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5053
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

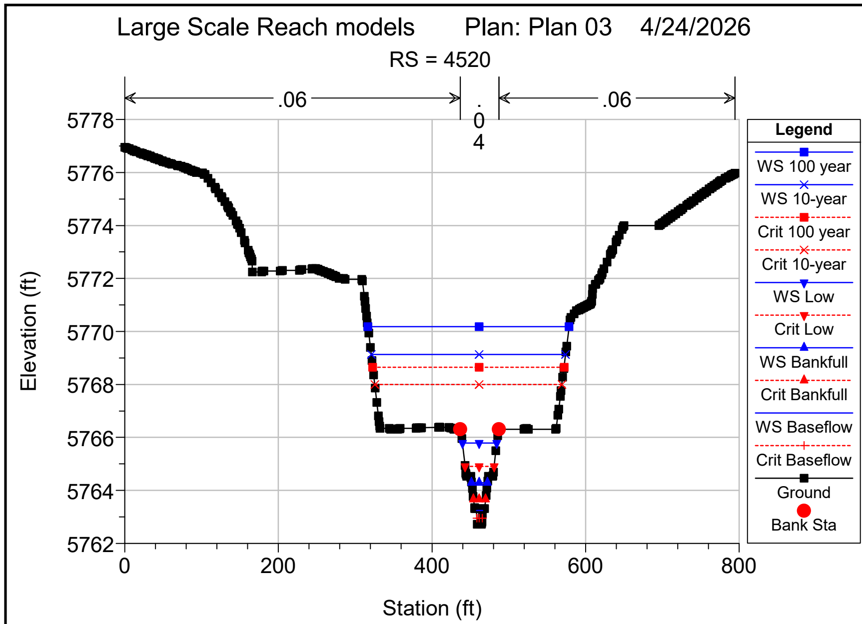


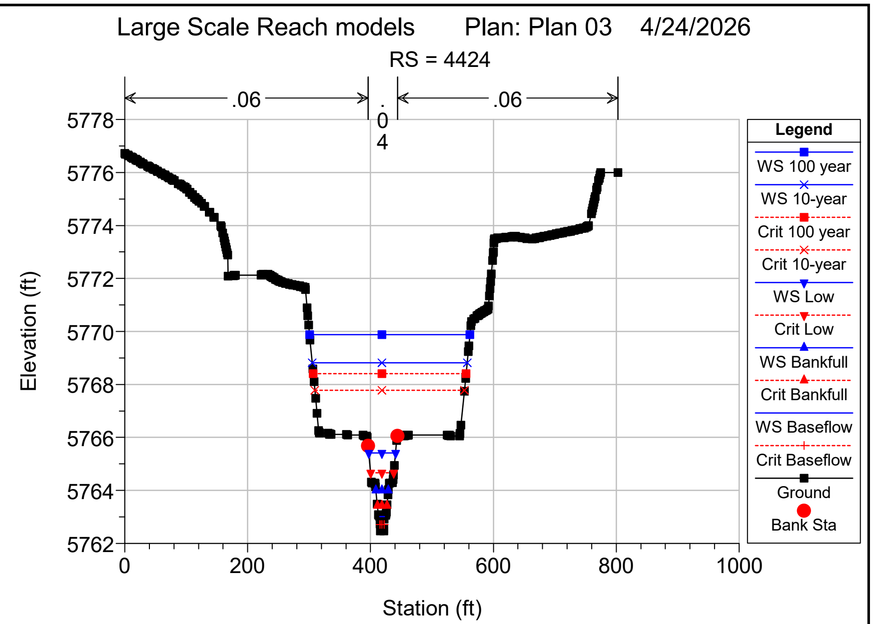
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 5019
RS = 4970
RS = 4936
RS = 4854
.06
.04
.025
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

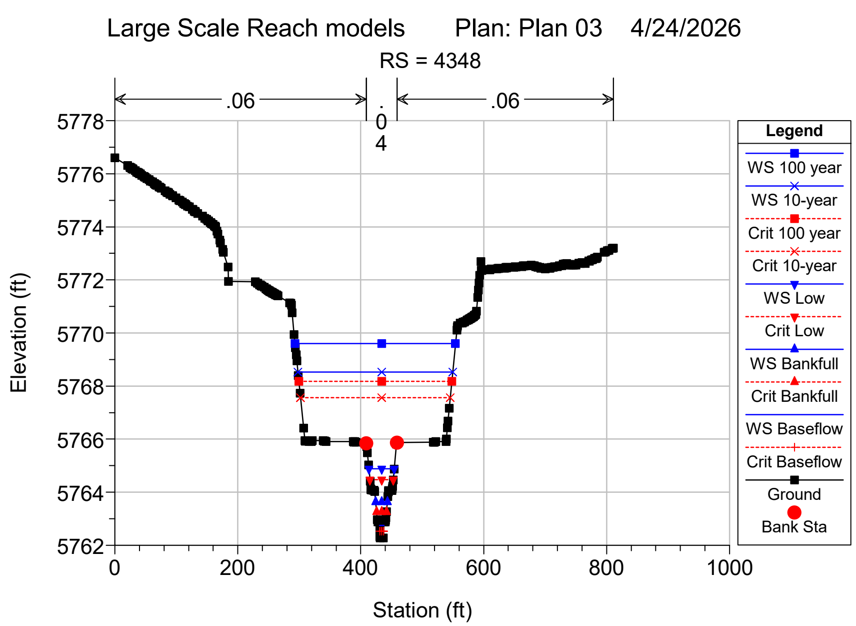


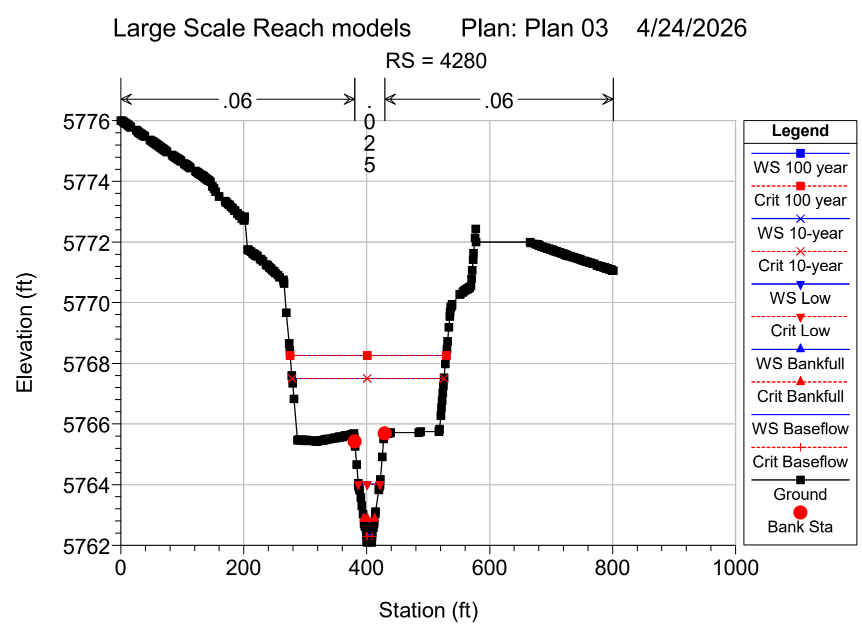
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4849
.06
.025
.06
Elevation (ft)
5780
5778
5776
5774
5772
5770
5768
5766
5764
0 100 200 300 400 500 600 700
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4838
.06
.025
.06
Elevation (ft)
5780
5778
5776
5774
5772
5770
5768
5766
5764
5762
0 100 200 300 400 500 600 700
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4828
.06
.04
.06
Elevation (ft)
5780
5778
5776
5774
5772
5770
5768
5766
5764
5762
0 100 200 300 400 500 600 700 800
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4784
.06
.04
.06
Elevation (ft)
5780
5778
5776
5774
5772
5770
5768
5766
5764
5762
0 100 200 300 400 500 600 700 800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

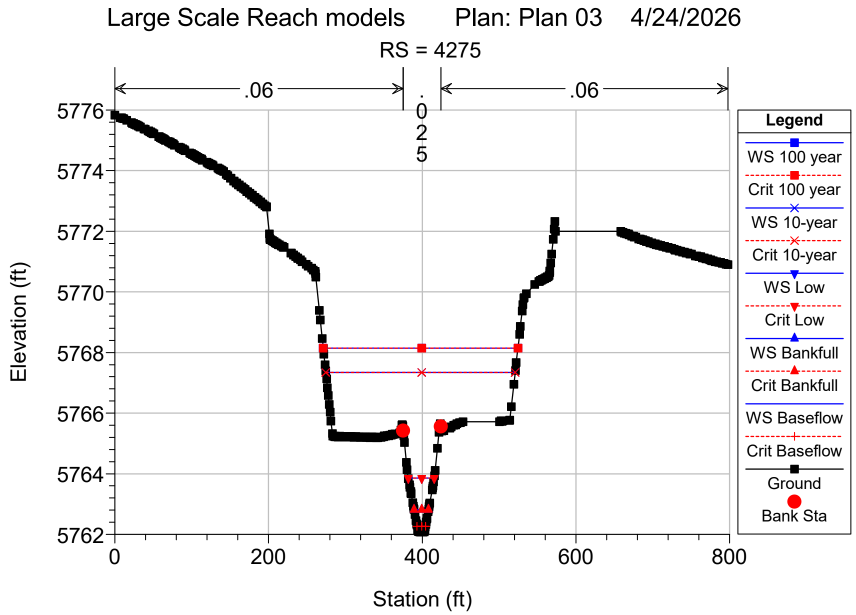

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4696
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4647
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4605
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4566

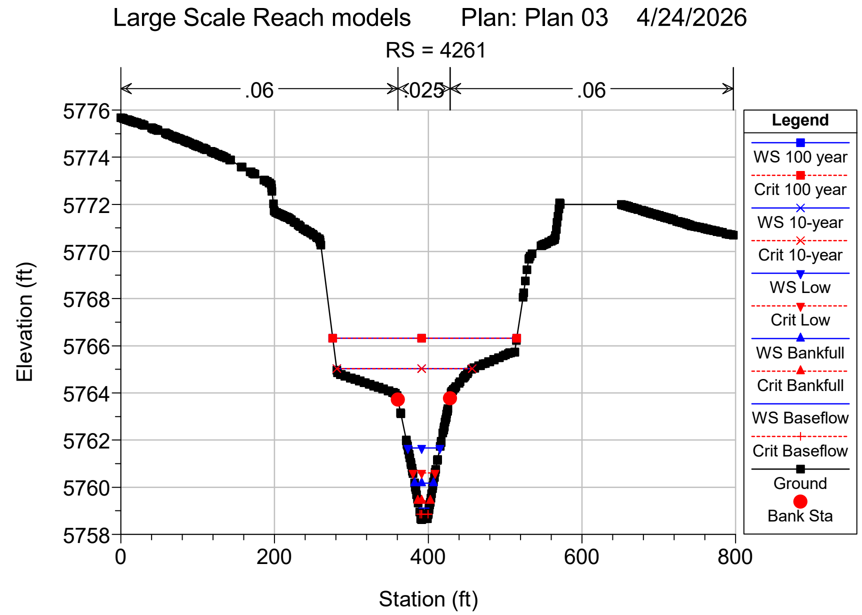

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4520
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

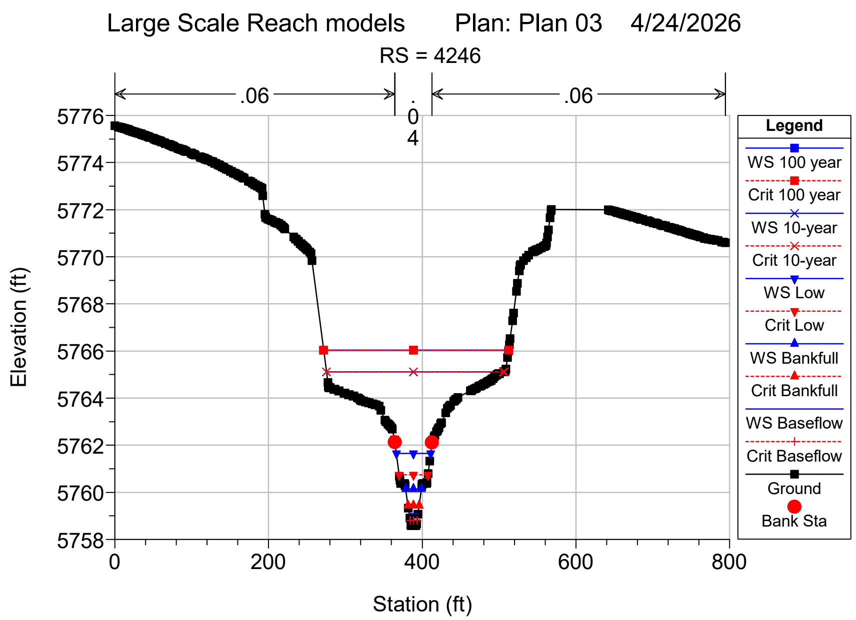

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4424
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

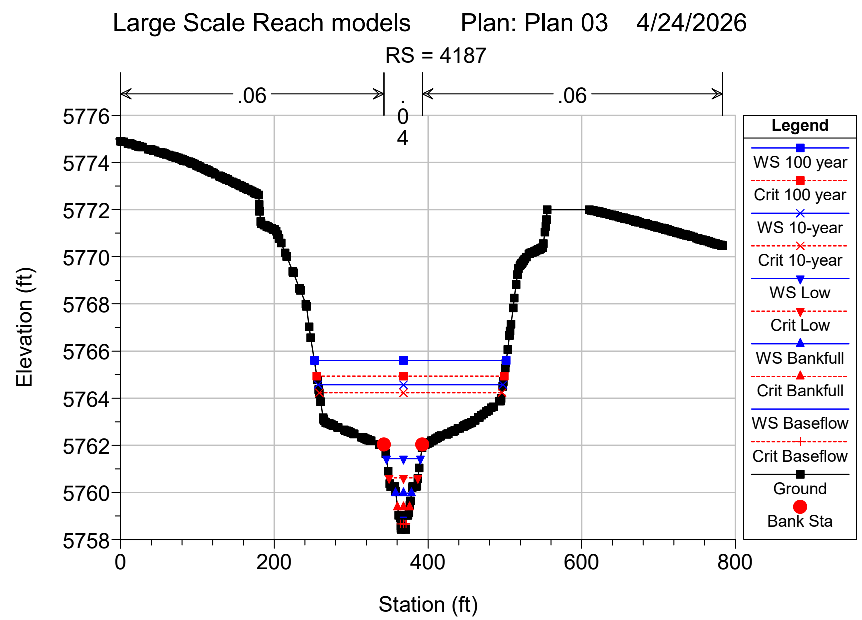

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4348
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

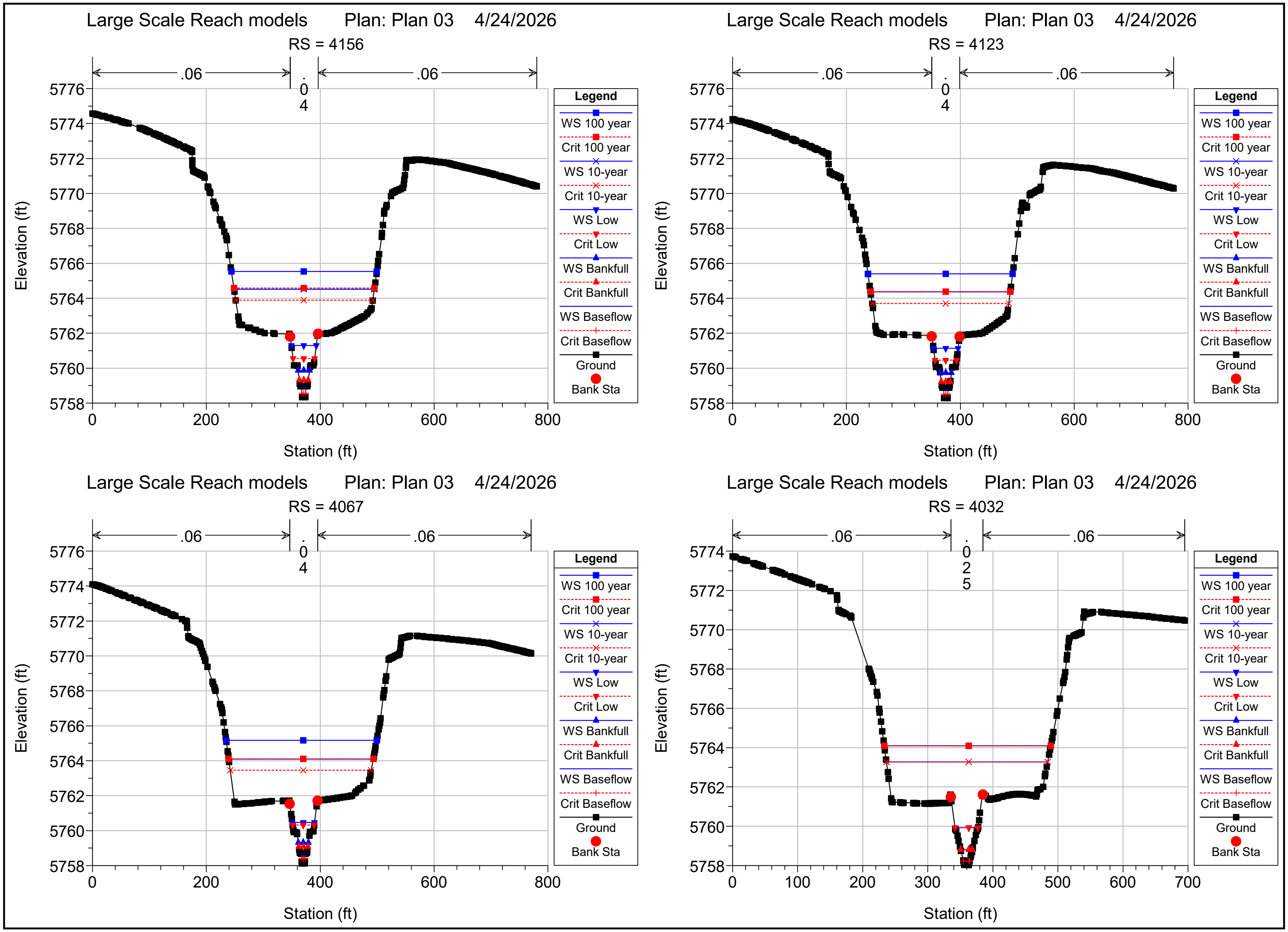

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4280
.06
.025
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4275
.06
.025
.06
Elevation (ft)
Station (ft)
5762
5764
5766
5768
5770
5772
5774
5776
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

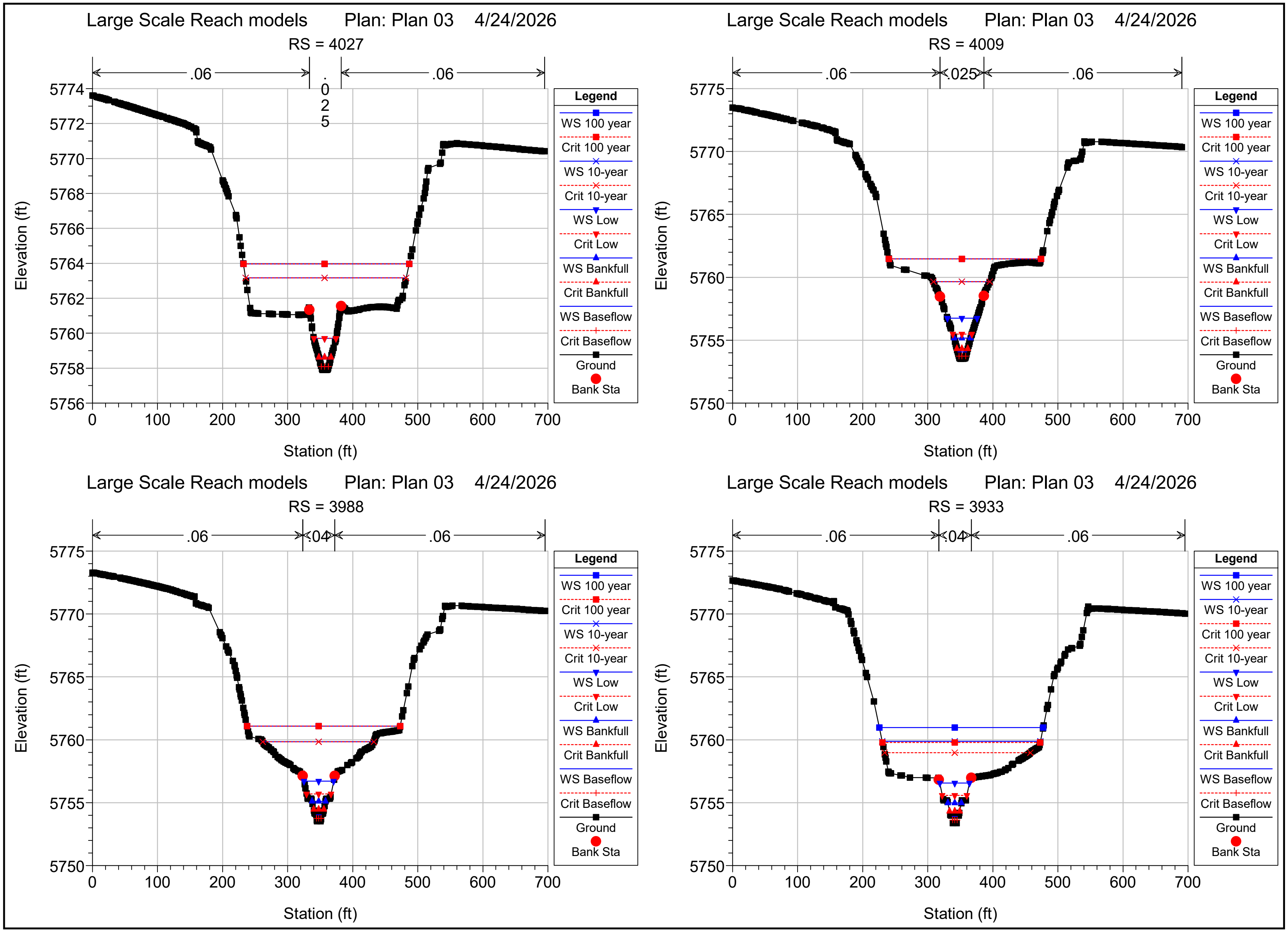

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4261
.06
.025
.06
Elevation (ft)
Station (ft)
5758
5760
5762
5764
5766
5768
5770
5772
5774
5776
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

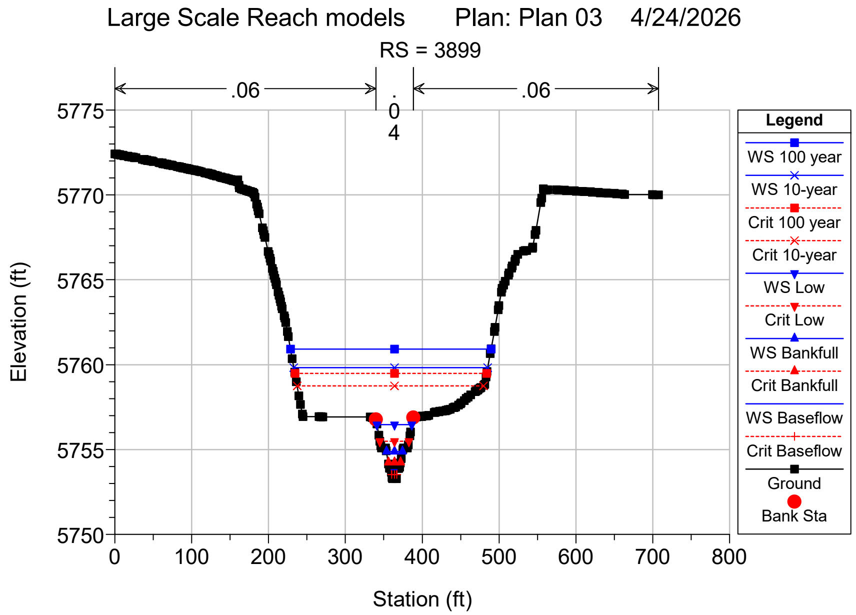

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4246
.06
.04
.06
Elevation (ft)
Station (ft)
5758
5760
5762
5764
5766
5768
5770
5772
5774
5776
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

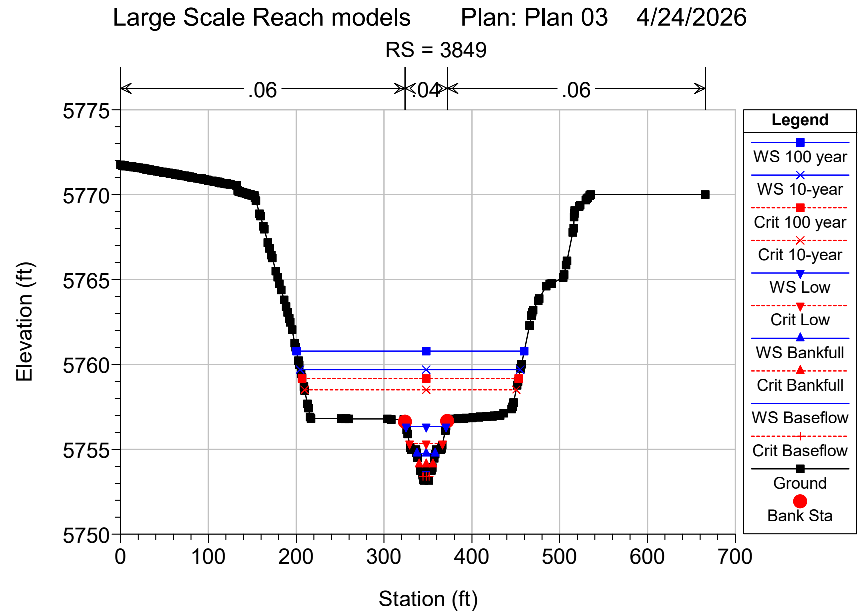

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4187
.06
.04
.06
Elevation (ft)
Station (ft)
5758
5760
5762
5764
5766
5768
5770
5772
5774
5776
0
200
400
600
800
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

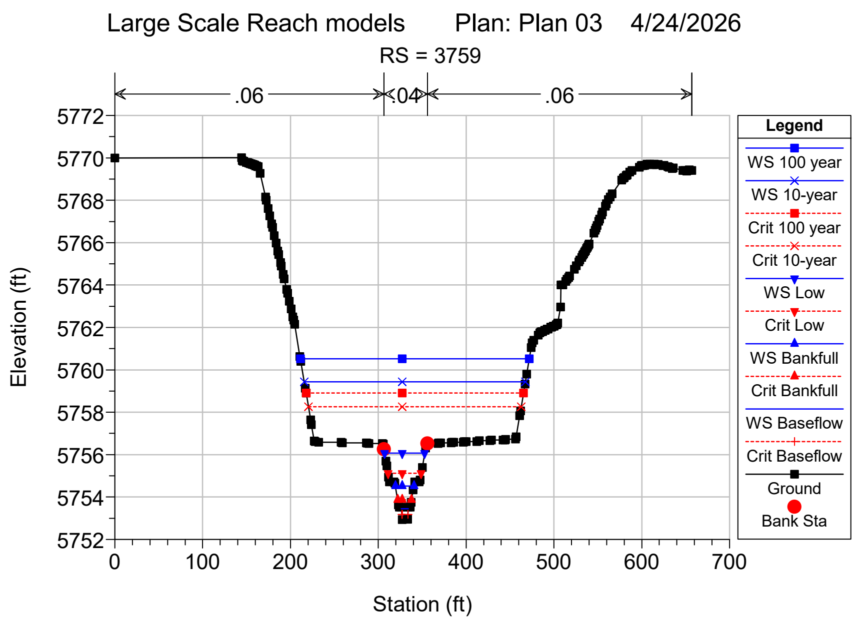


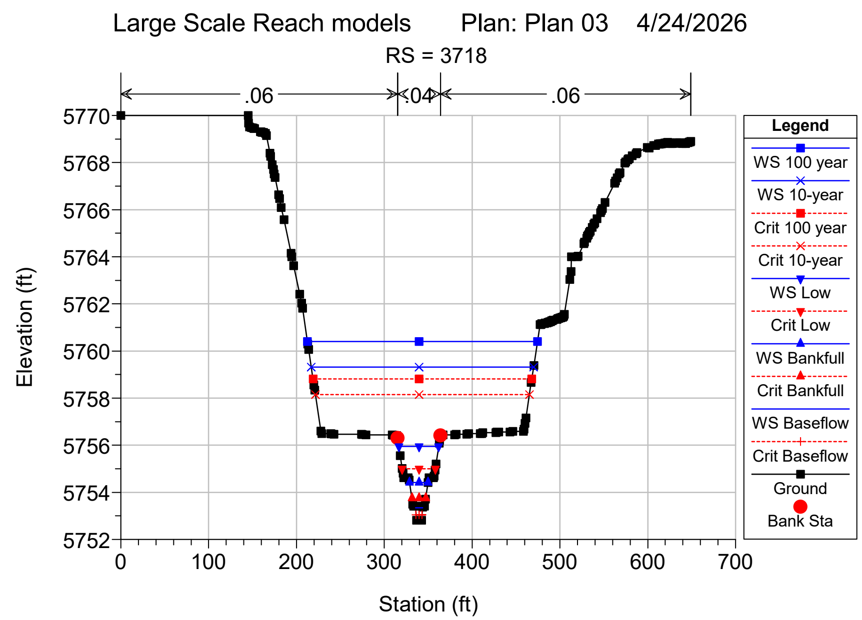
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4156
.06
.04
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
5776
5774
5772
5770
5768
5766
5764
5762
5760
5758
0
200
400
600
800
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4123
.06
.04
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
5776
5774
5772
5770
5768
5766
5764
5762
5760
5758
0
200
400
600
800
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4067
.06
.04
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
5776
5774
5772
5770
5768
5766
5764
5762
5760
5758
0
200
400
600
800
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4032
.06
.025
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
5774
5772
5770
5768
5766
5764
5762
5760
5758
0
100
200
300
400
500
600
700

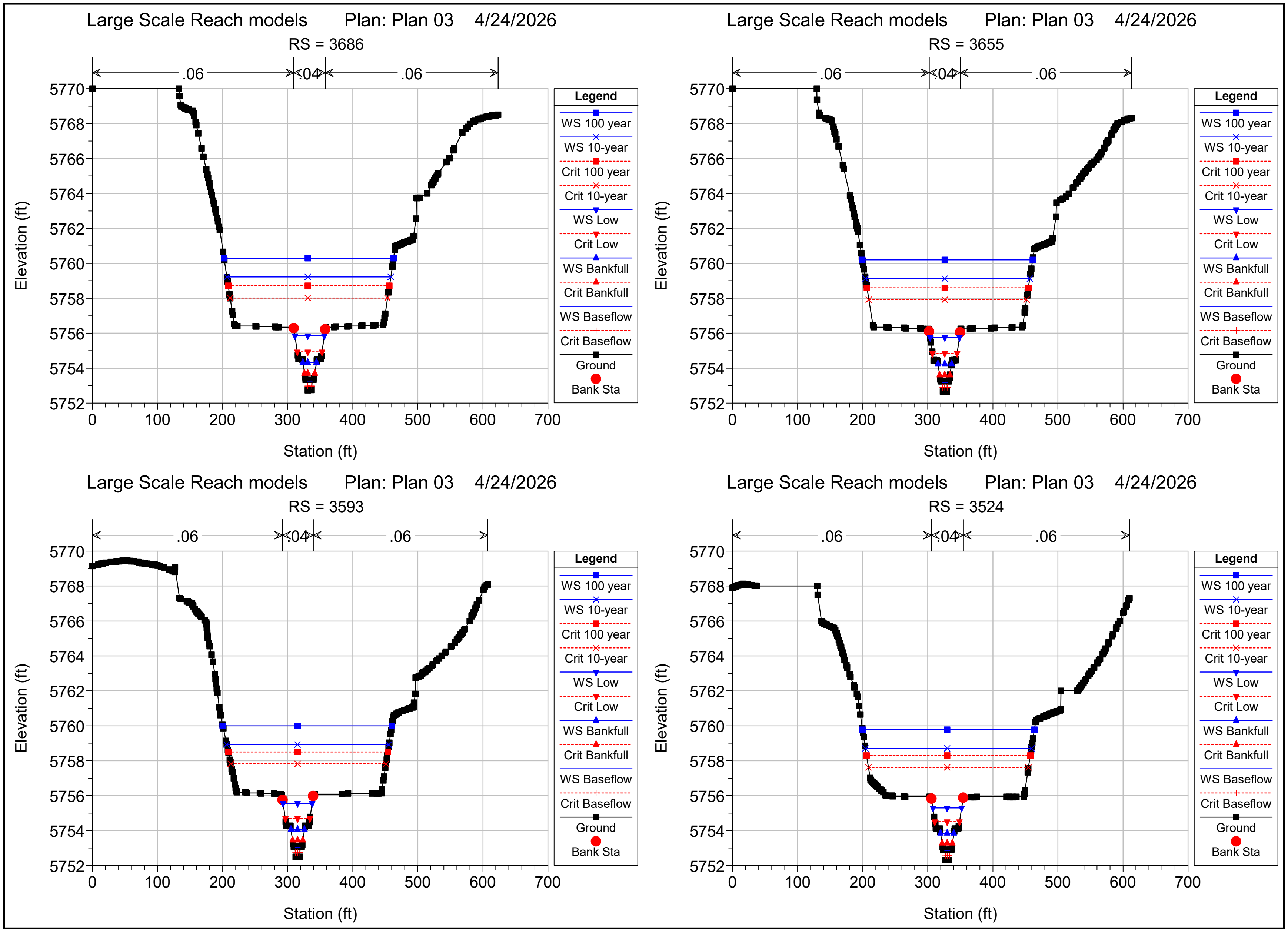

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4027
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 4009
.06
.025
.06
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3988
.06
.04
.06
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3933
.06
.04
.06

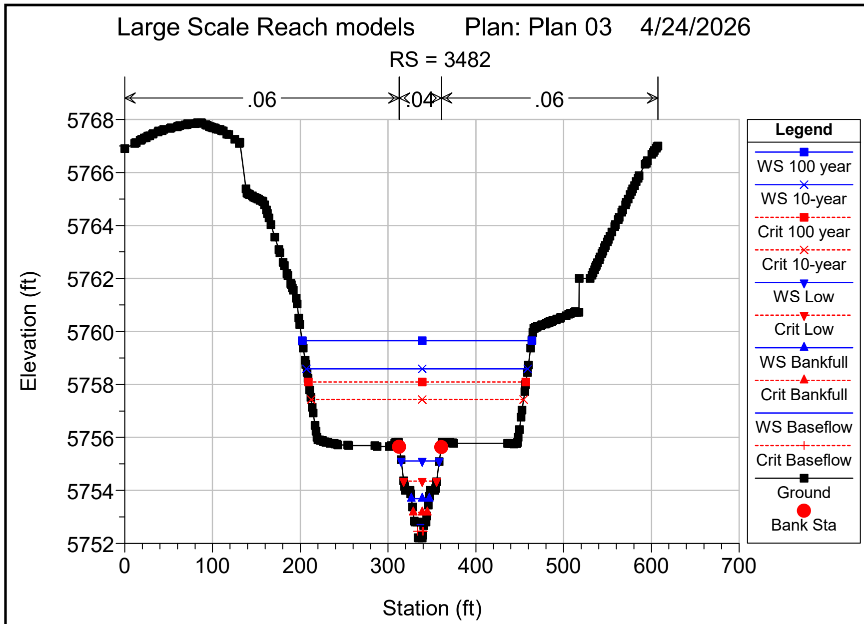

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3899
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

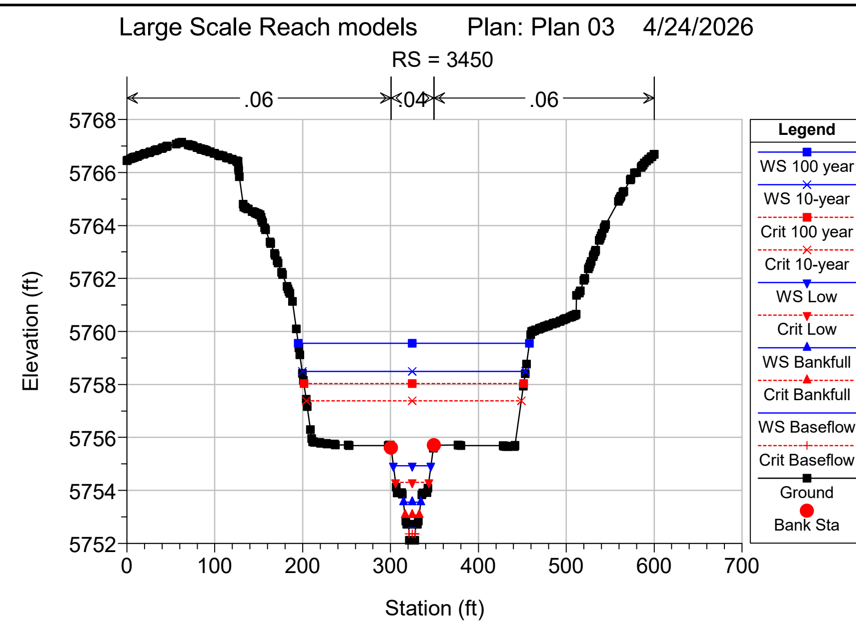

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3849
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

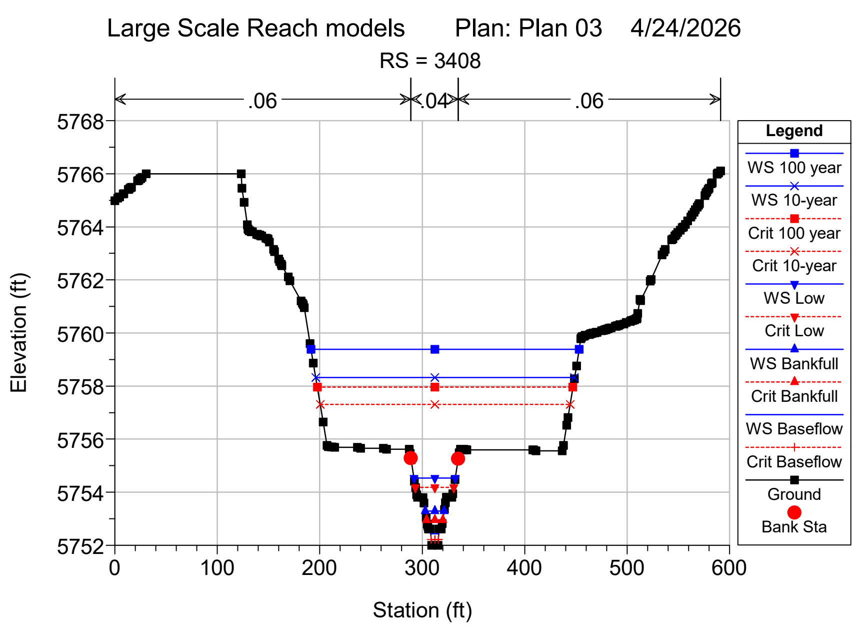

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3759
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

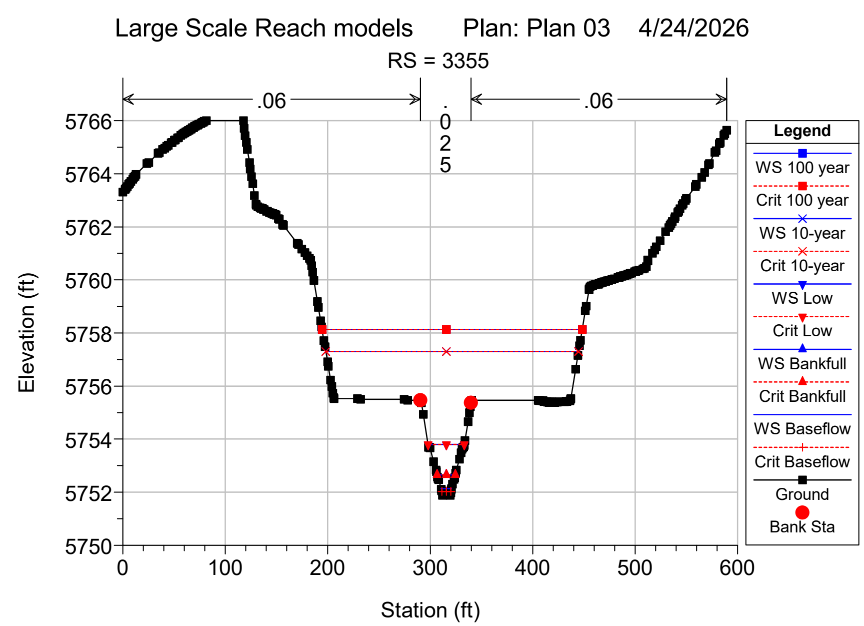

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3718
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

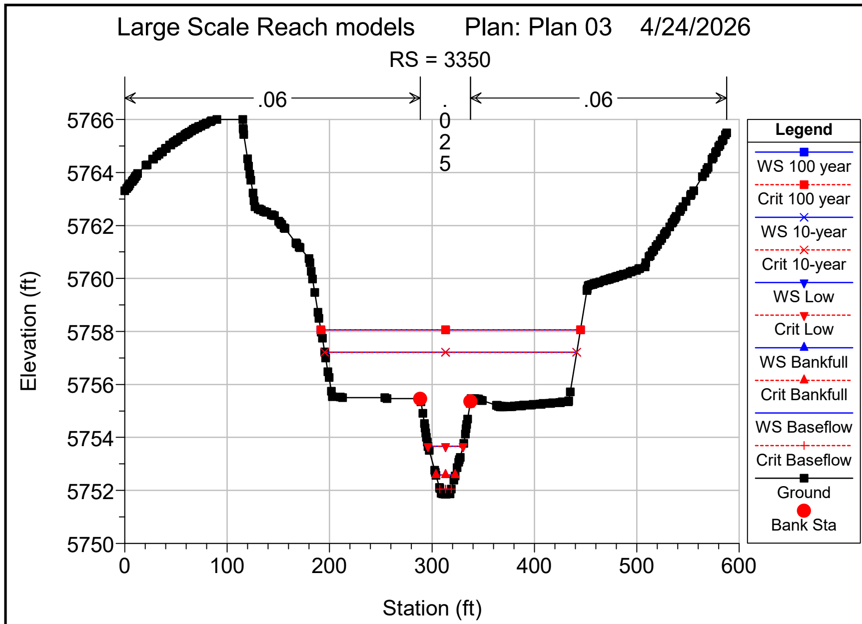

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3686
.06
.04
.06
Elevation (ft)
Station (ft)
5770
5768
5766
5764
5762
5760
5758
5756
5754
5752
0
100
200
300
400
500
600
700
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3655
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3593
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3524
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

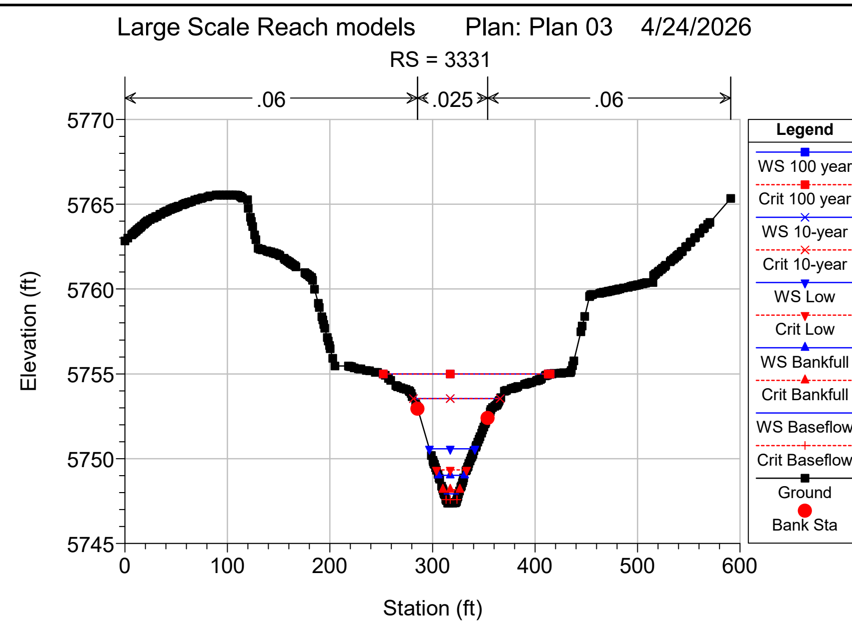

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3482
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

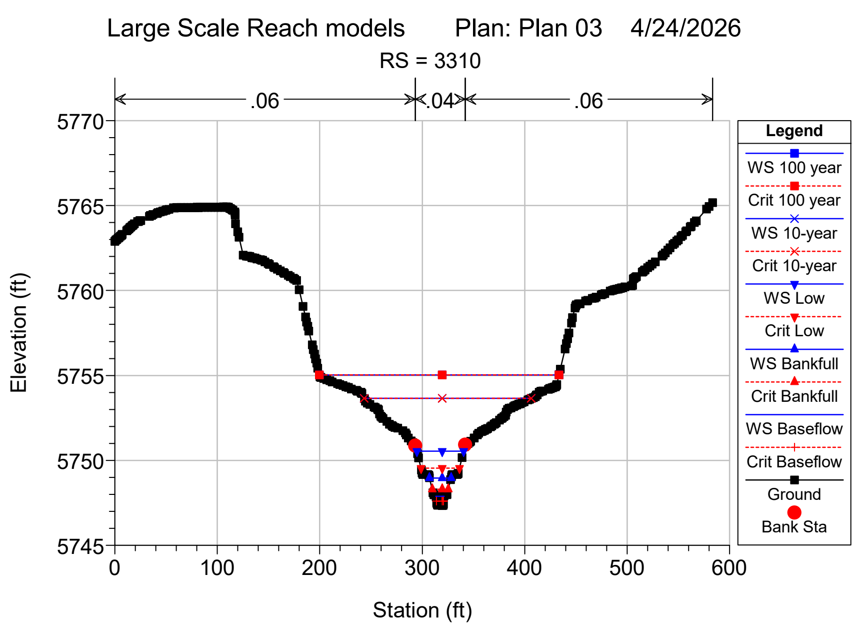

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3450
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3408
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3355
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3350
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3331
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3310
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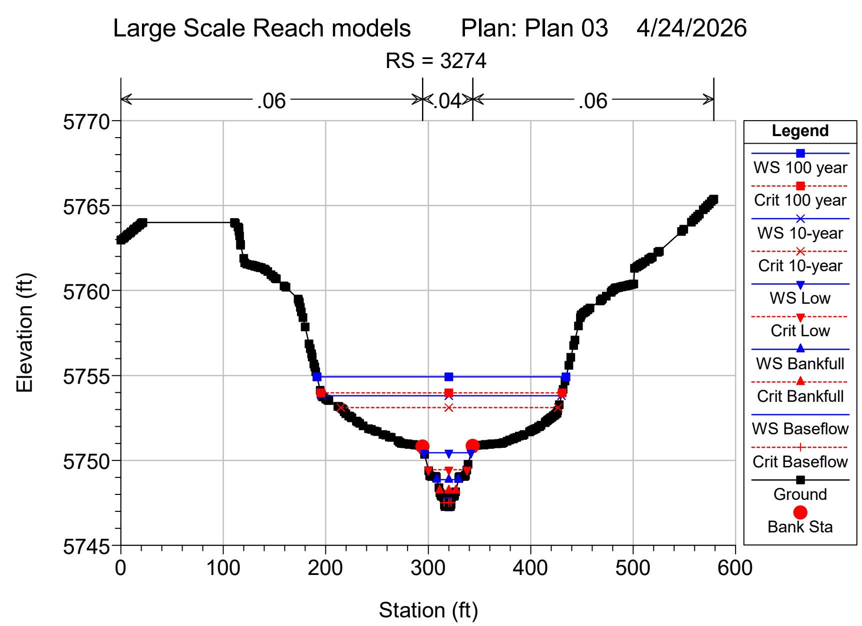
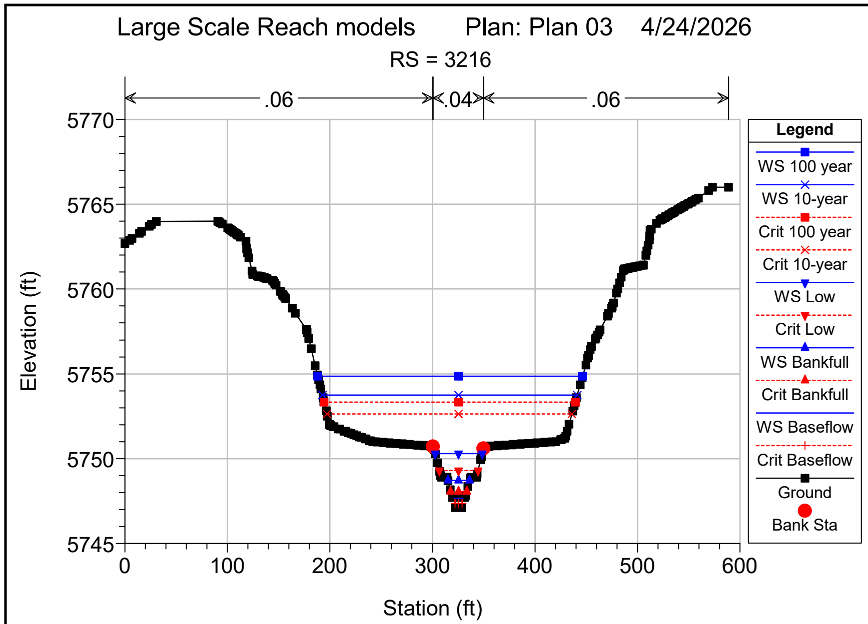
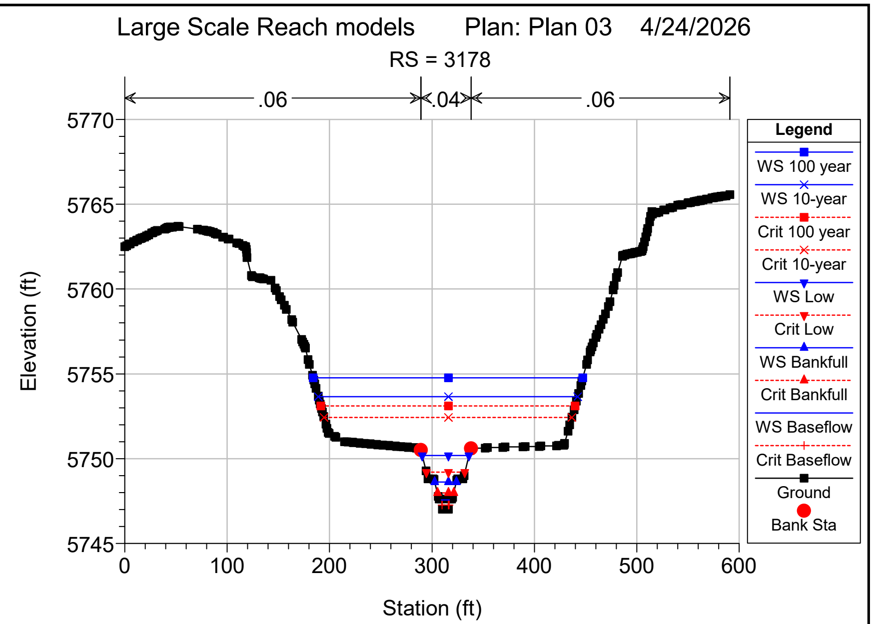
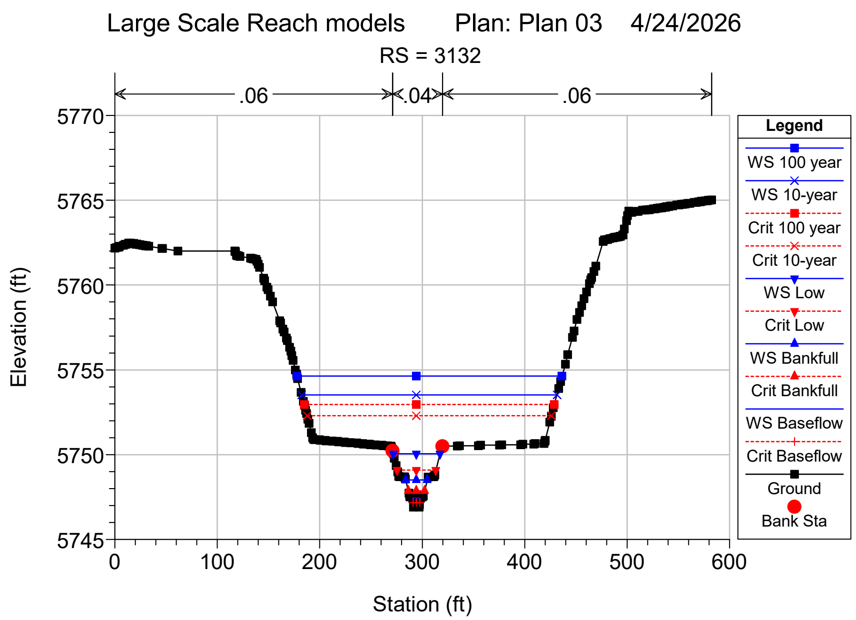
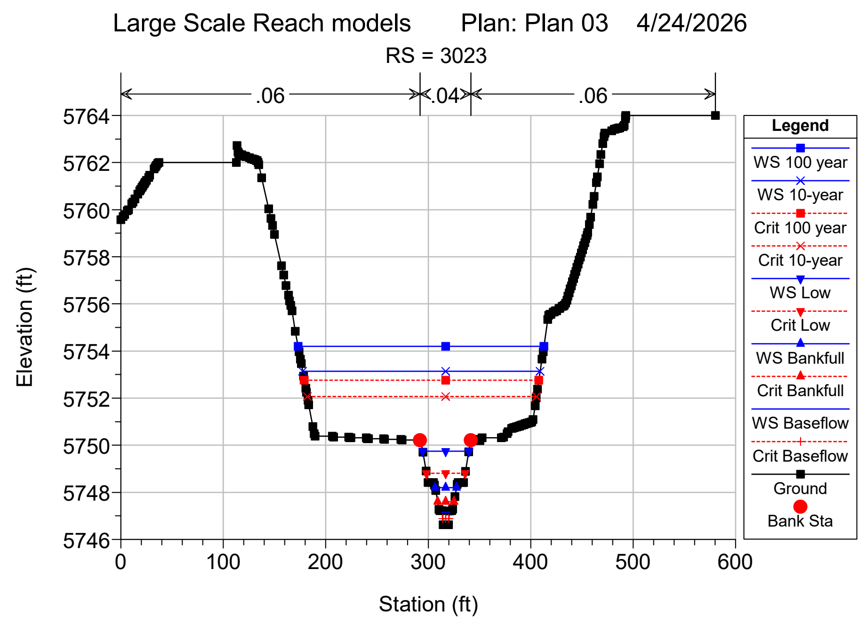
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

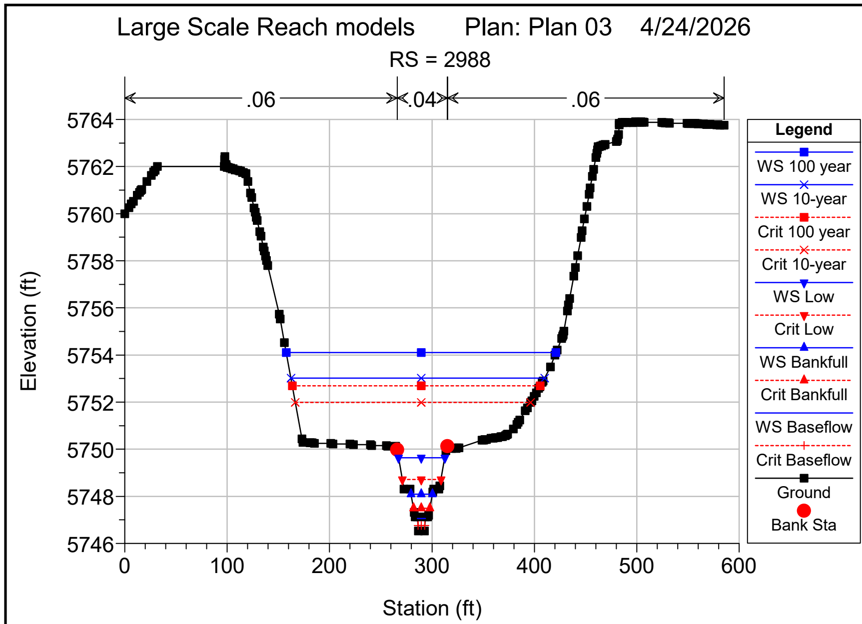

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3274
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

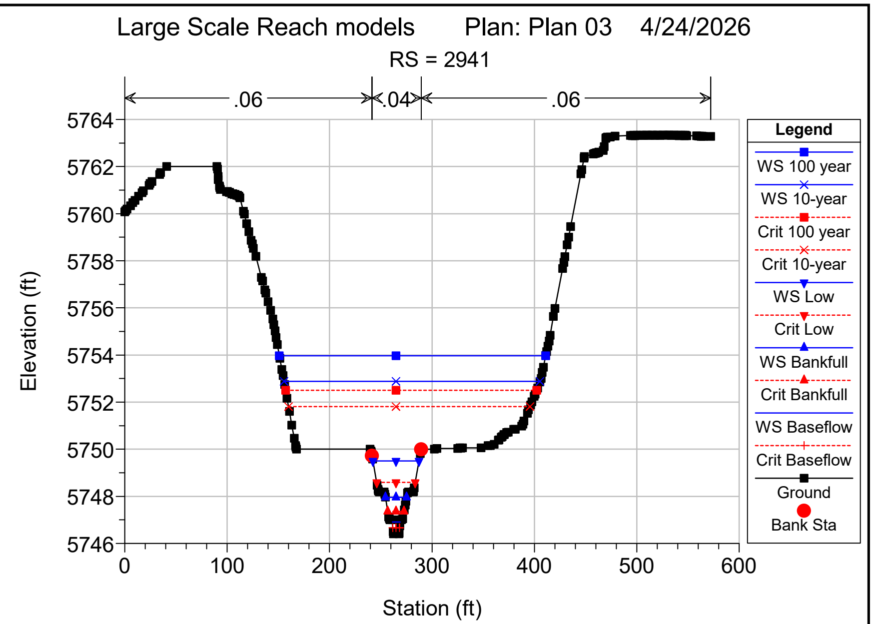

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3216
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

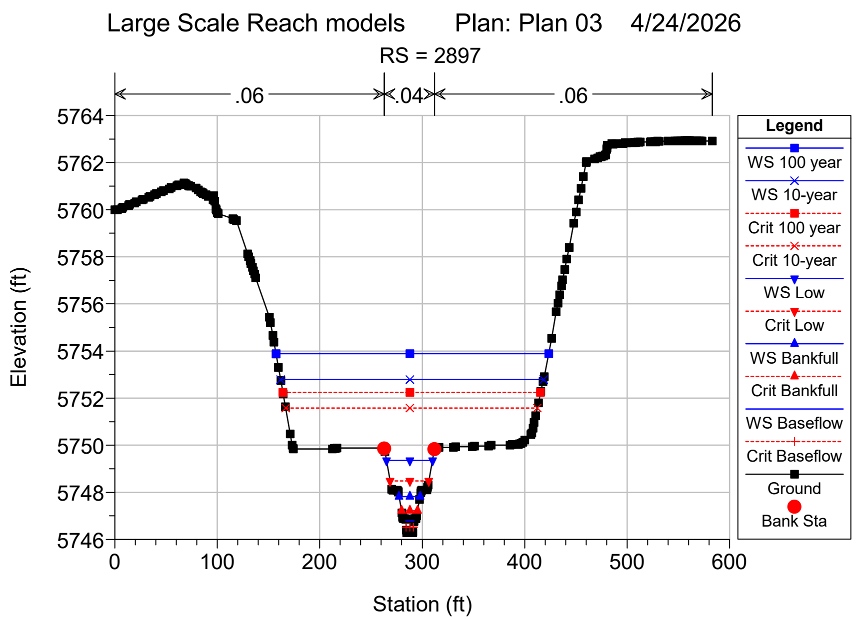

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3178
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

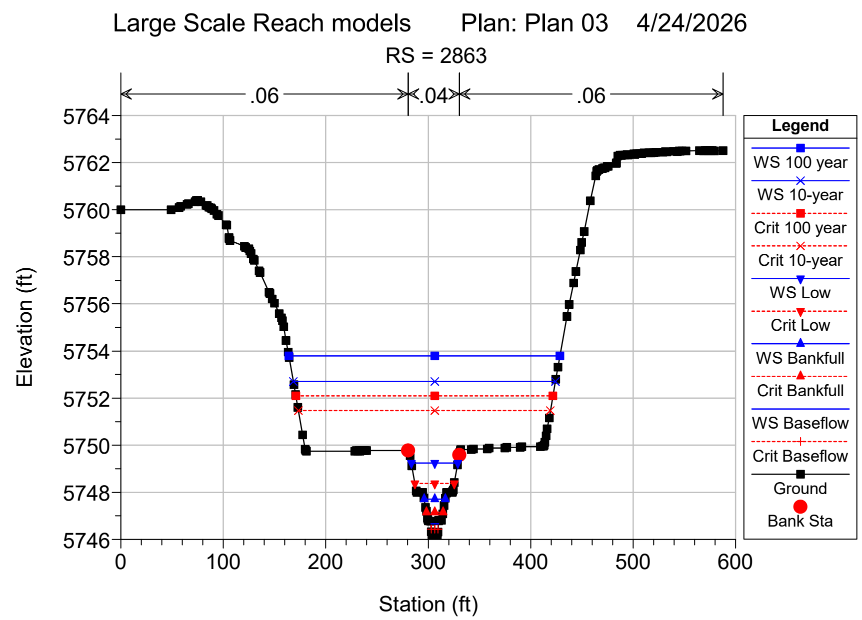

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3132
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

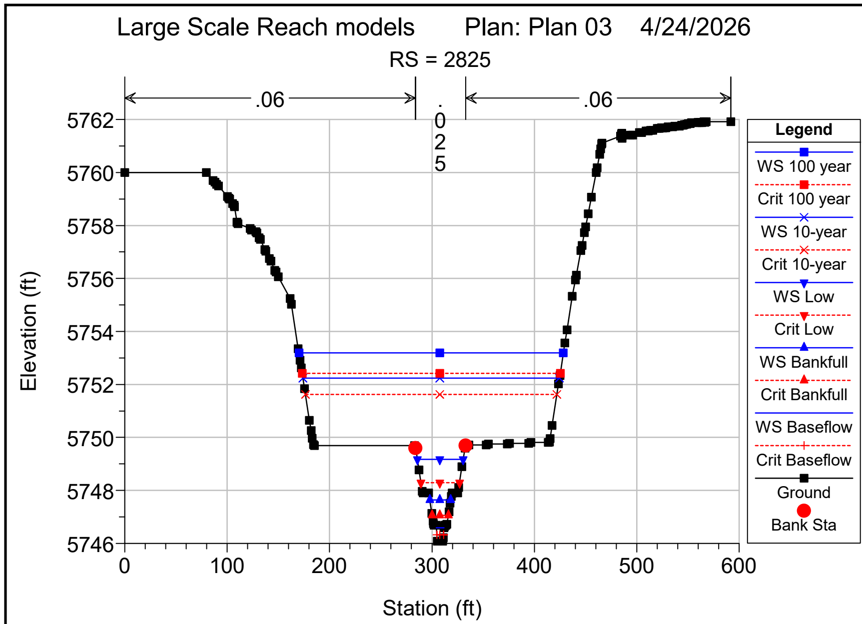

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 3023
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

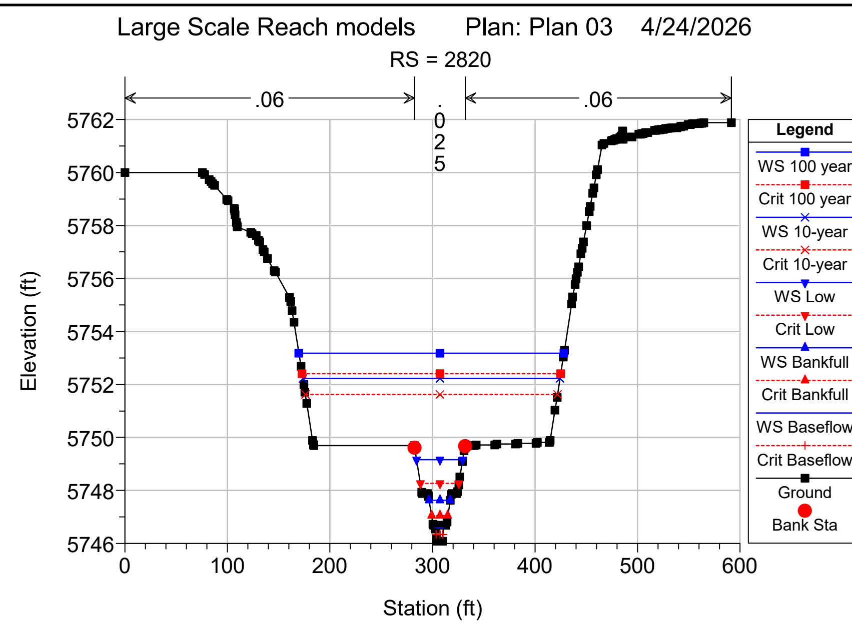

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2988
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

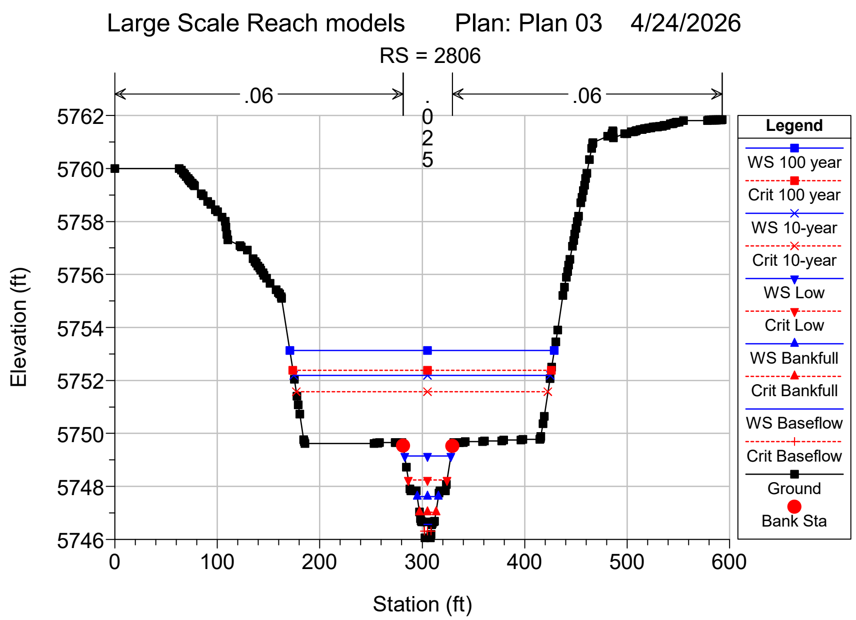

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2941
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

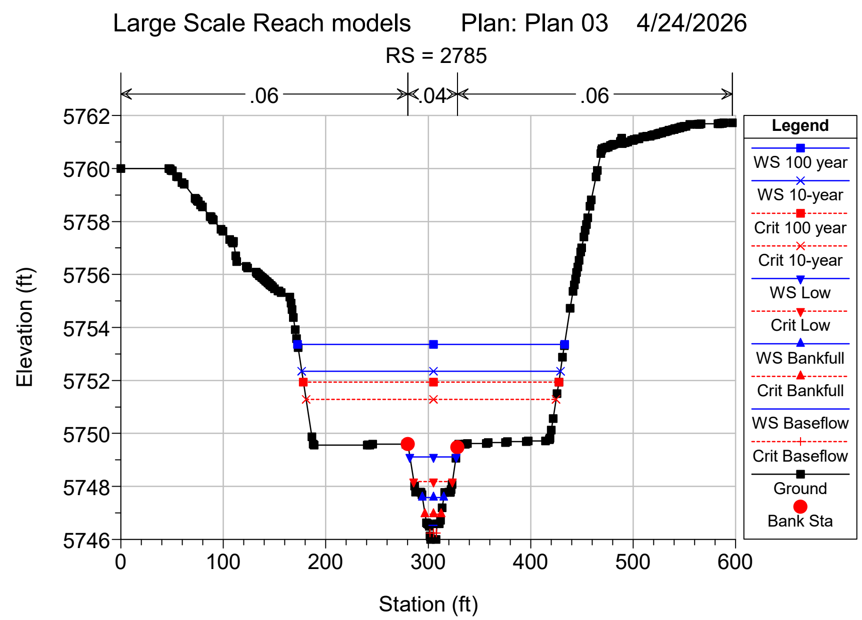

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2897
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

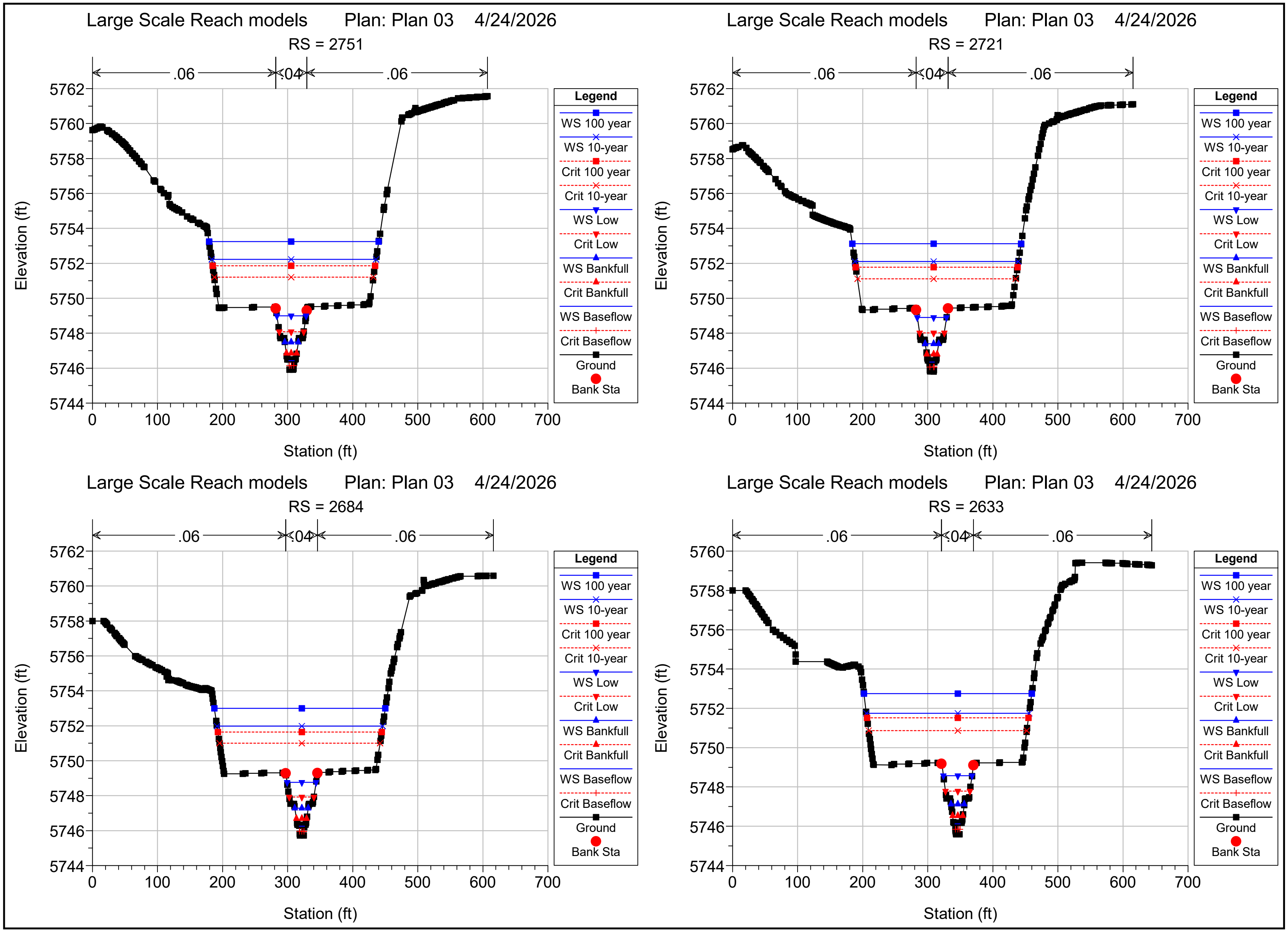

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2863
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

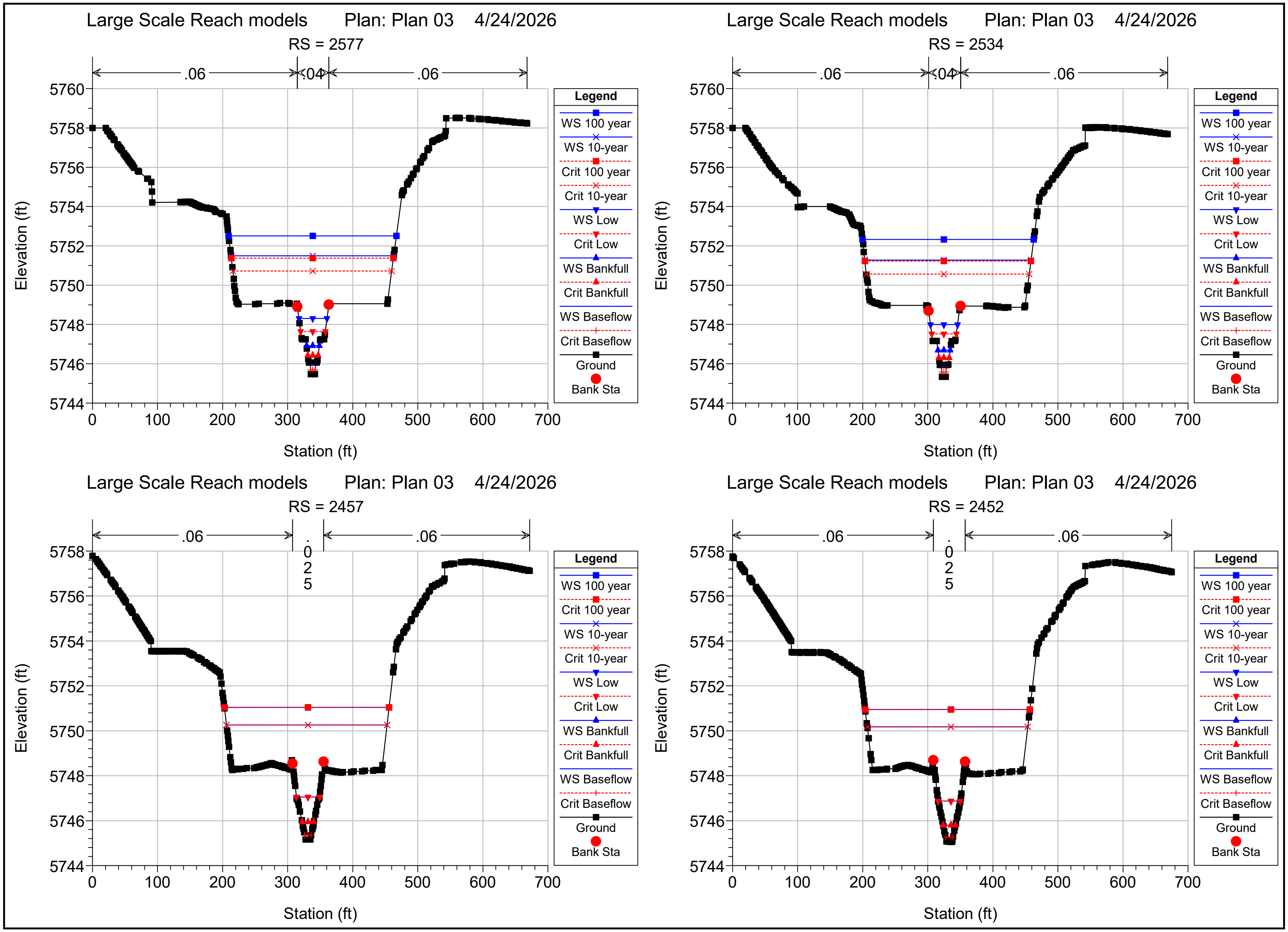

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2825
.06
.025
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2820
.06
.025
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

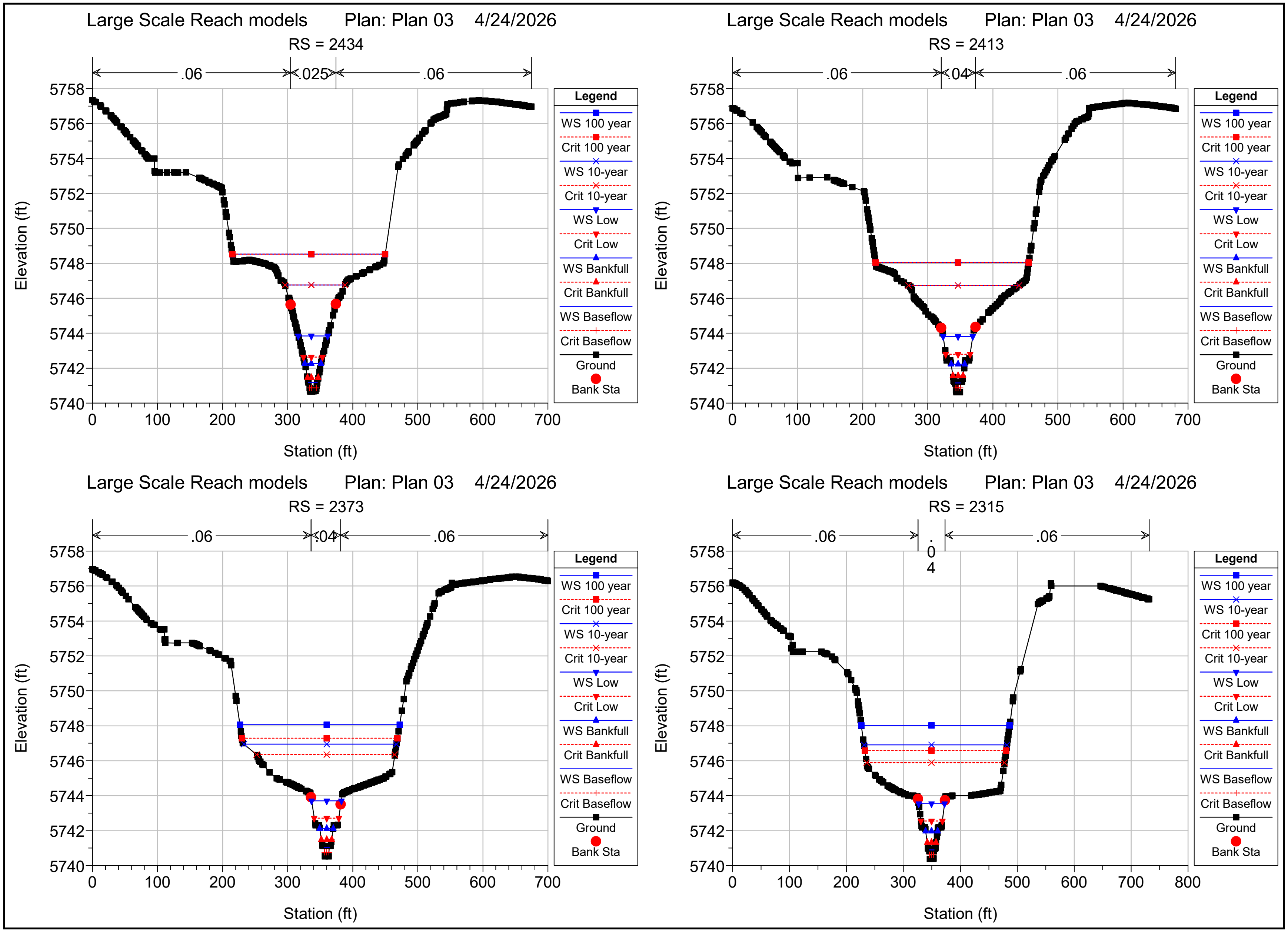

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2806
.06
.025
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

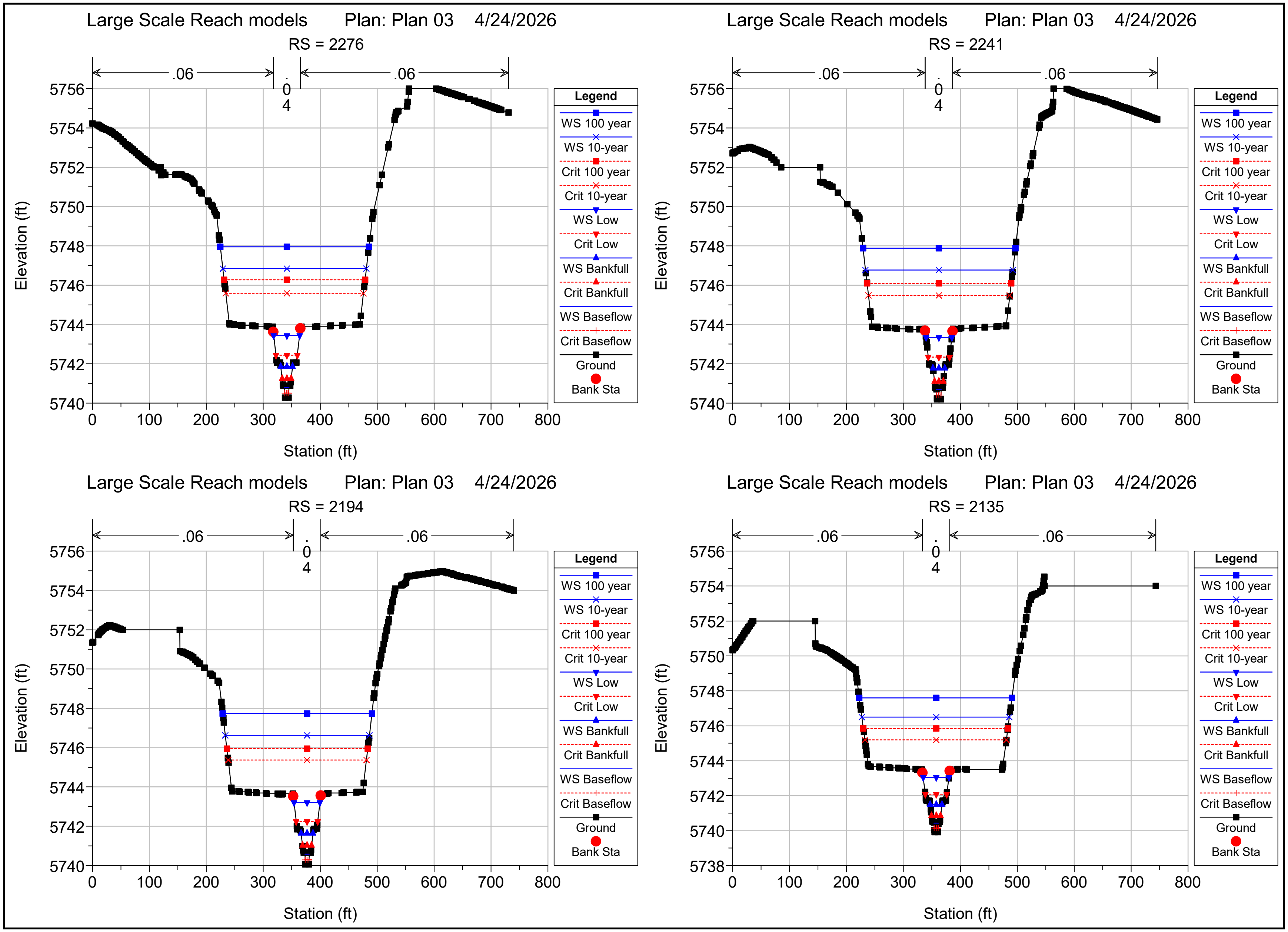

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2785
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

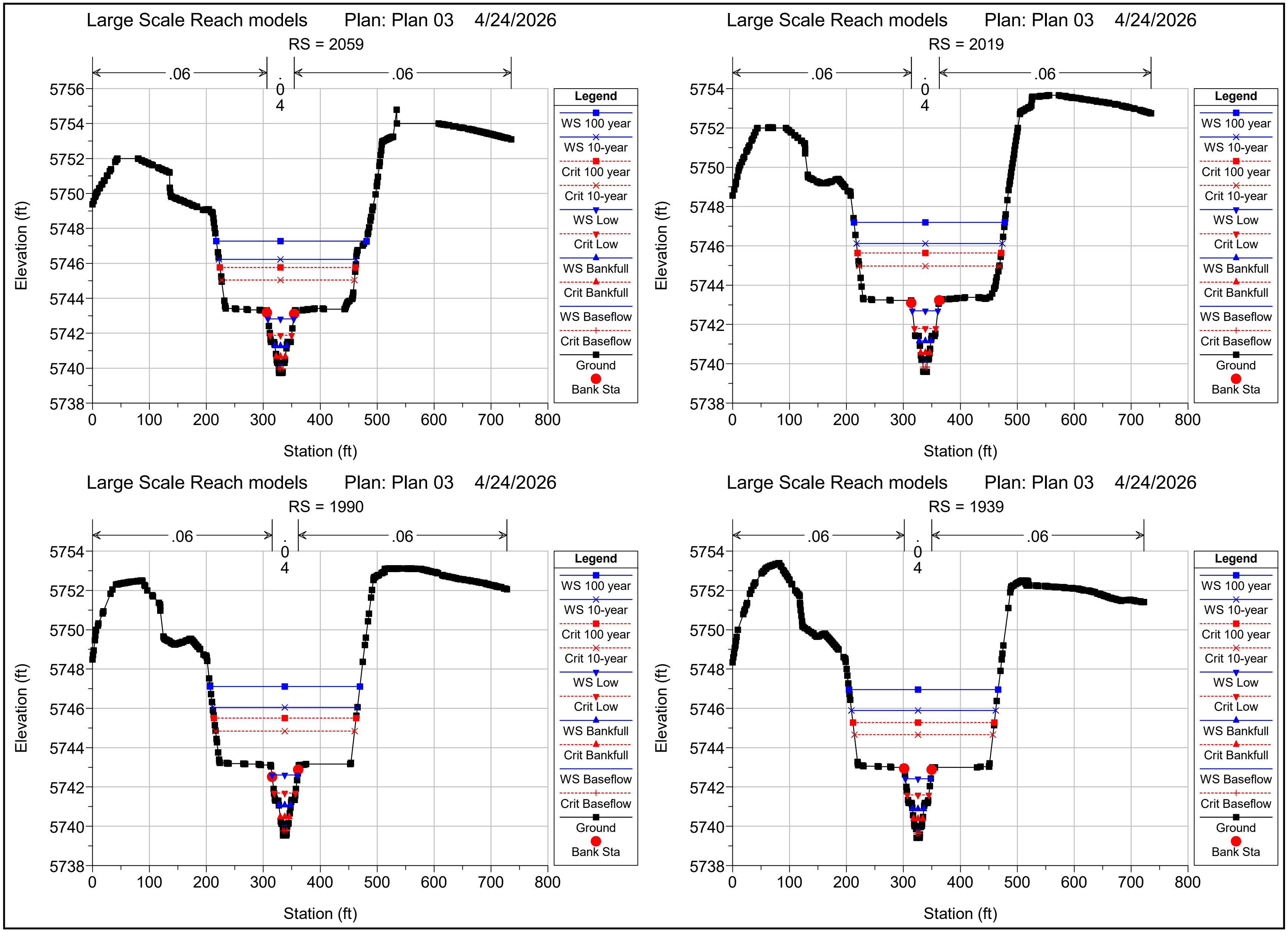

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2751
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2721
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2684
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2633

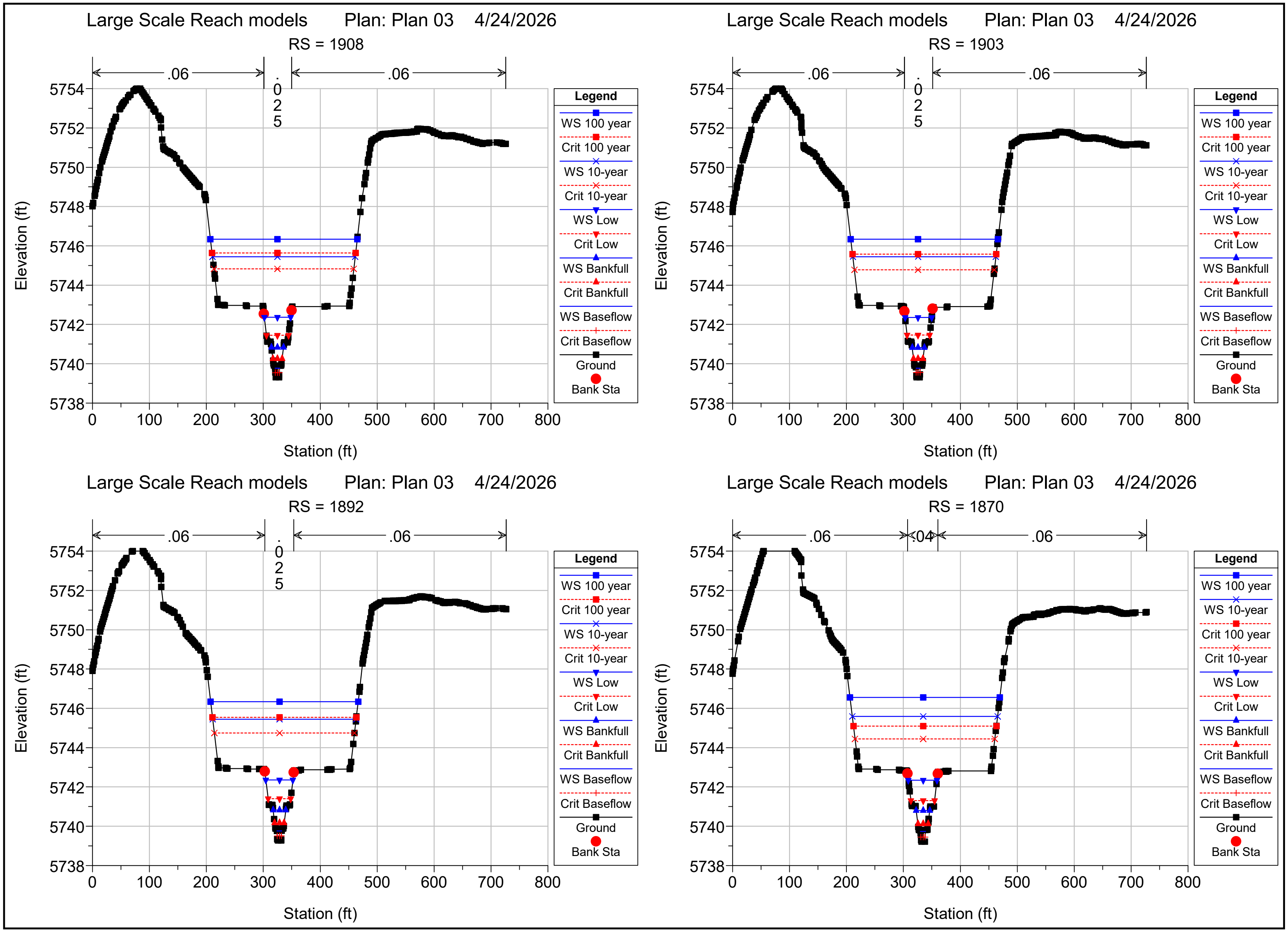


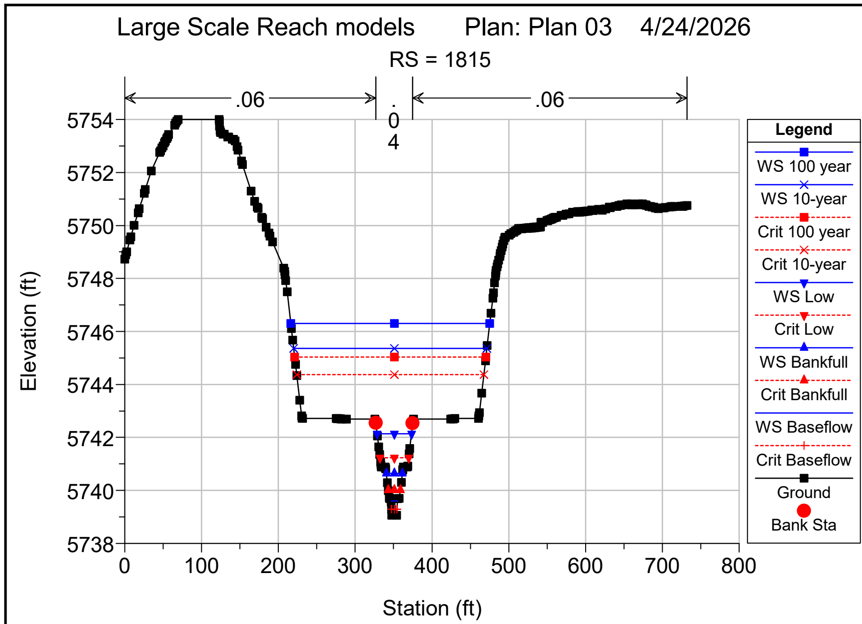
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2577
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2534
.06
.04
.06
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2457
.06
.025
.06
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2452
.06
.025
.06
Elevation (ft)
Station (ft)

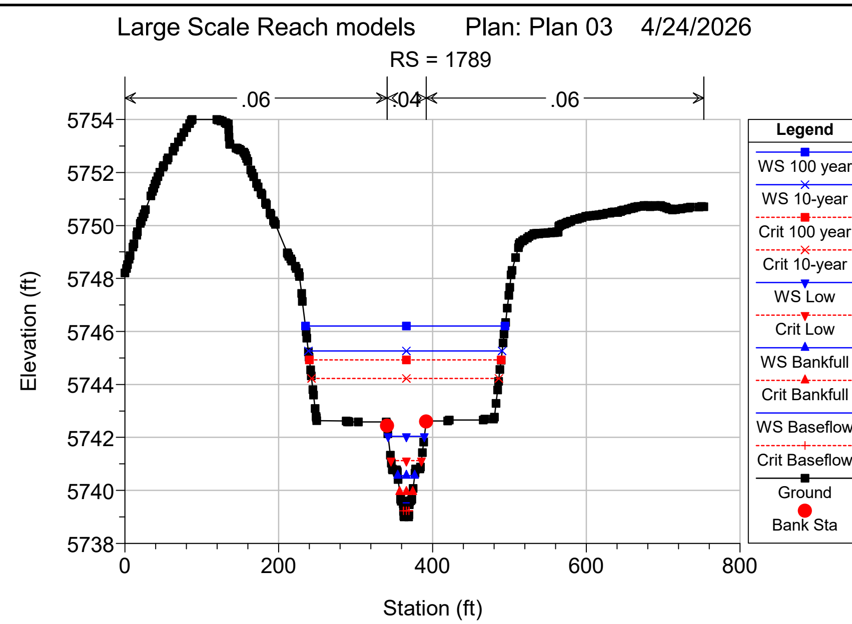

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2434
.06
.025
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2413
.06
.04
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2373
.06
.04
.06
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2315
.06
.
0
4
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

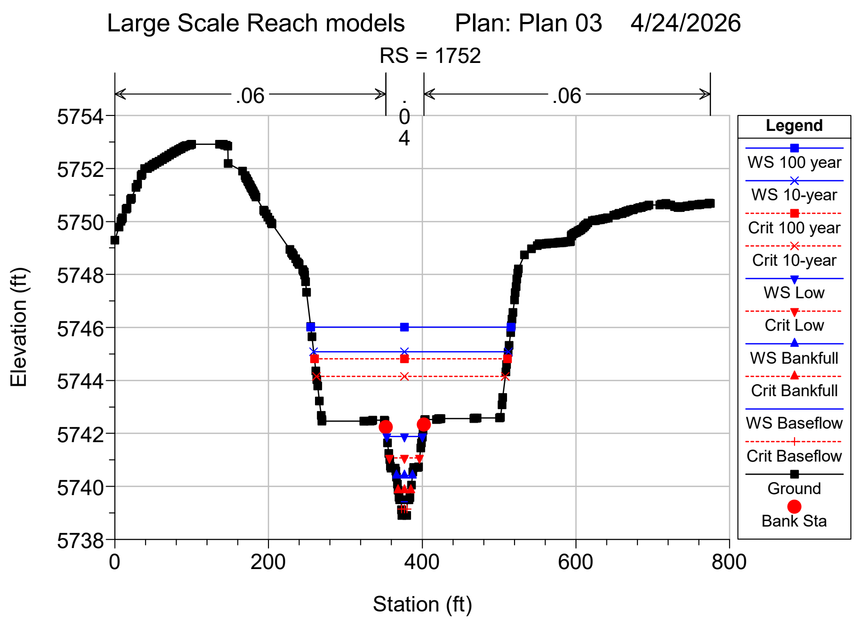

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2276
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2241
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2194
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2135
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

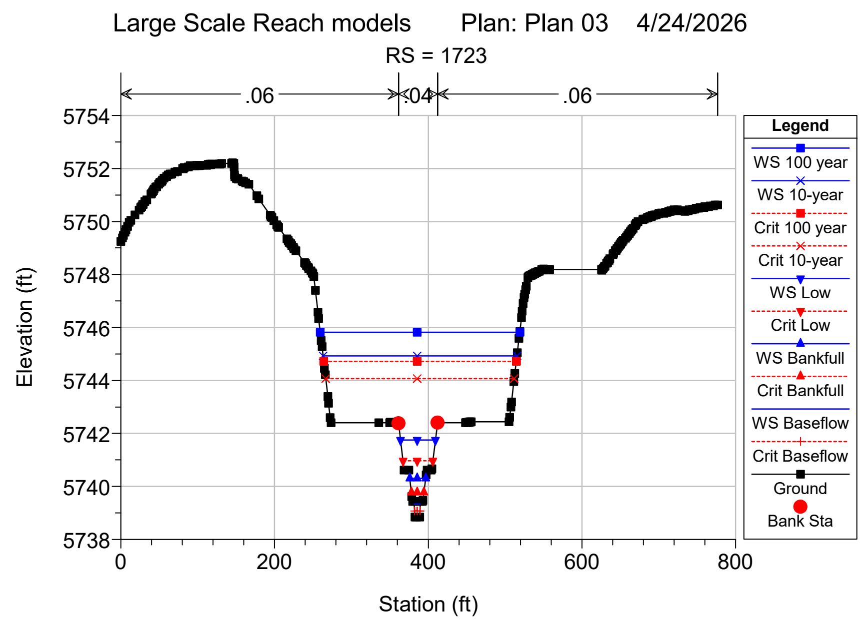

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2059
.06
0
4
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 2019
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1990
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1939
Elevation (ft)
Station (ft)

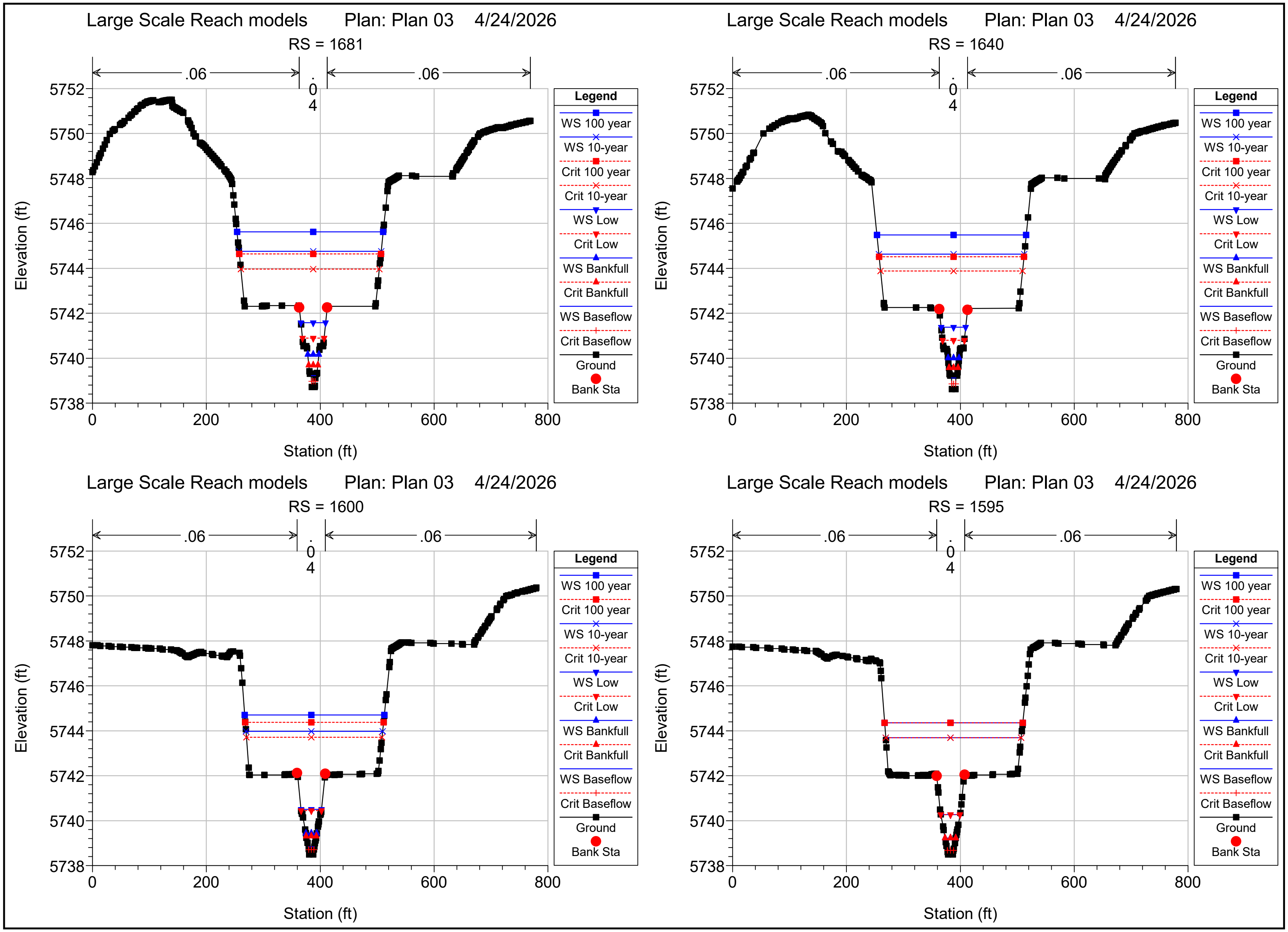

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1908
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1903
.06
.025
.06
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1892
.06
.025
.06
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1870
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1815
.06
.
0
4
.06
Elevation (ft)
5754
5752
5750
5748
5746
5744
5742
5740
5738
0
100
200
300
400
500
600
700
800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

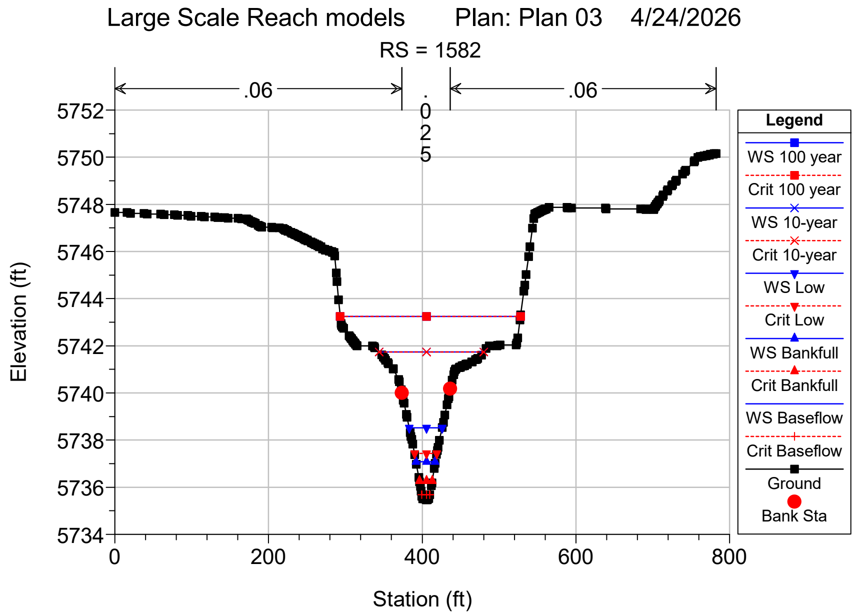

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1789
.06
.04
.06
Elevation (ft)
5754
5752
5750
5748
5746
5744
5742
5740
5738
0
200
400
600
800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

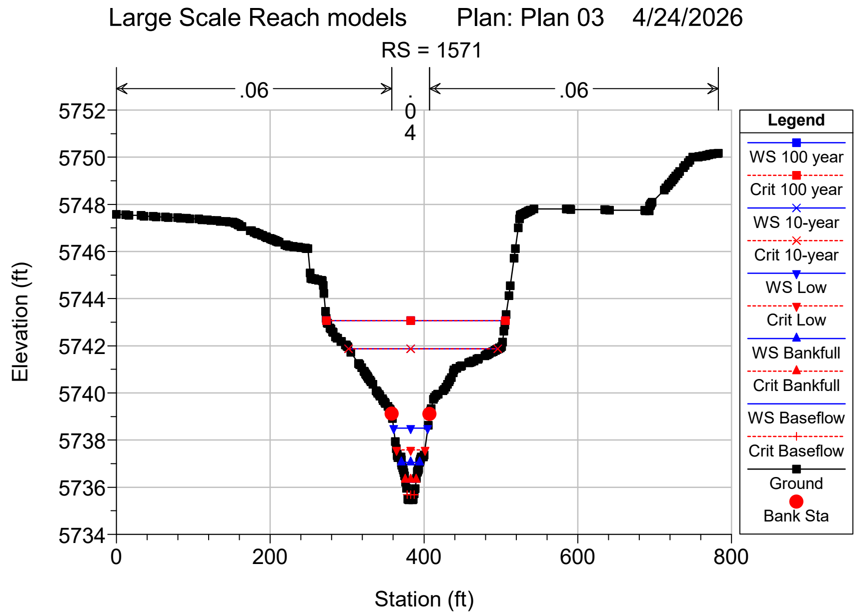

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1752
.06
.
0
4
.06
Elevation (ft)
5754
5752
5750
5748
5746
5744
5742
5740
5738
0
200
400
600
800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

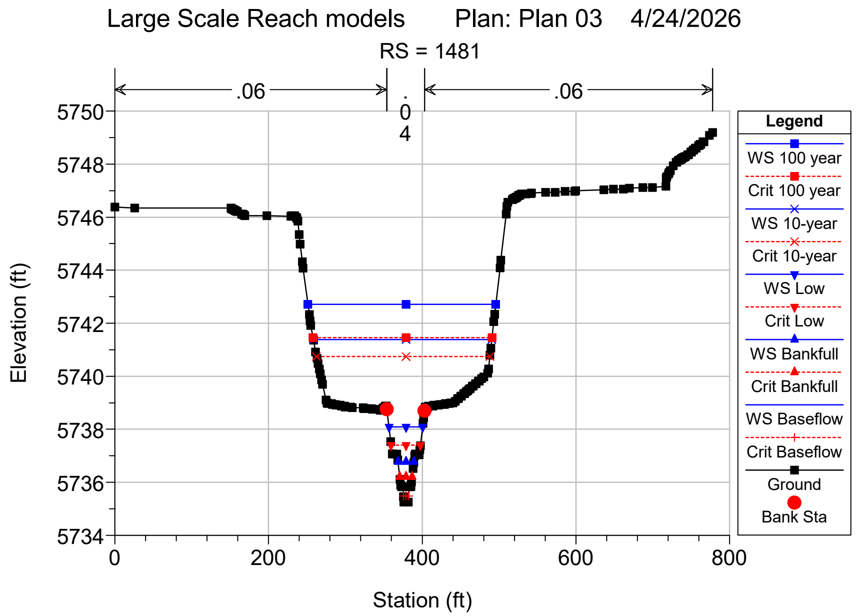

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1723
.06
.04
.06
Elevation (ft)
5754
5752
5750
5748
5746
5744
5742
5740
5738
0
200
400
600
800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

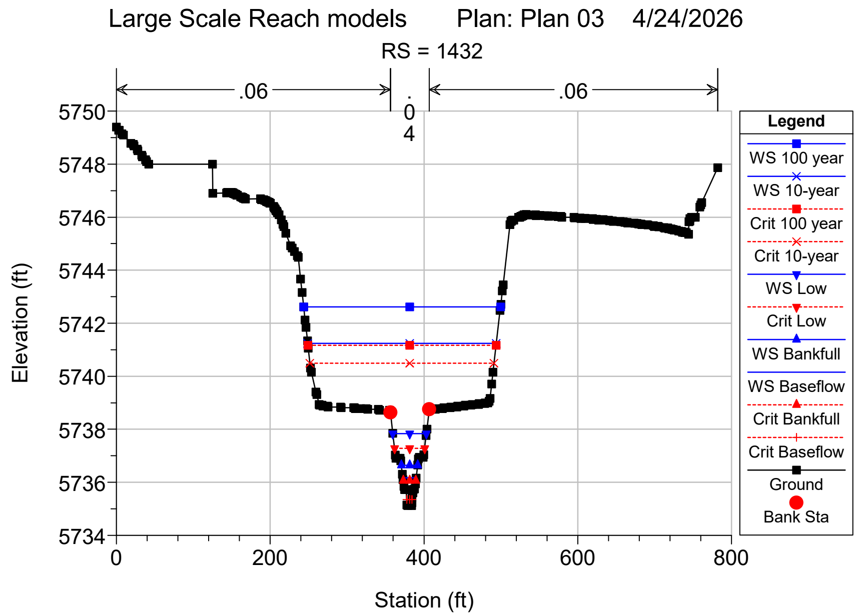


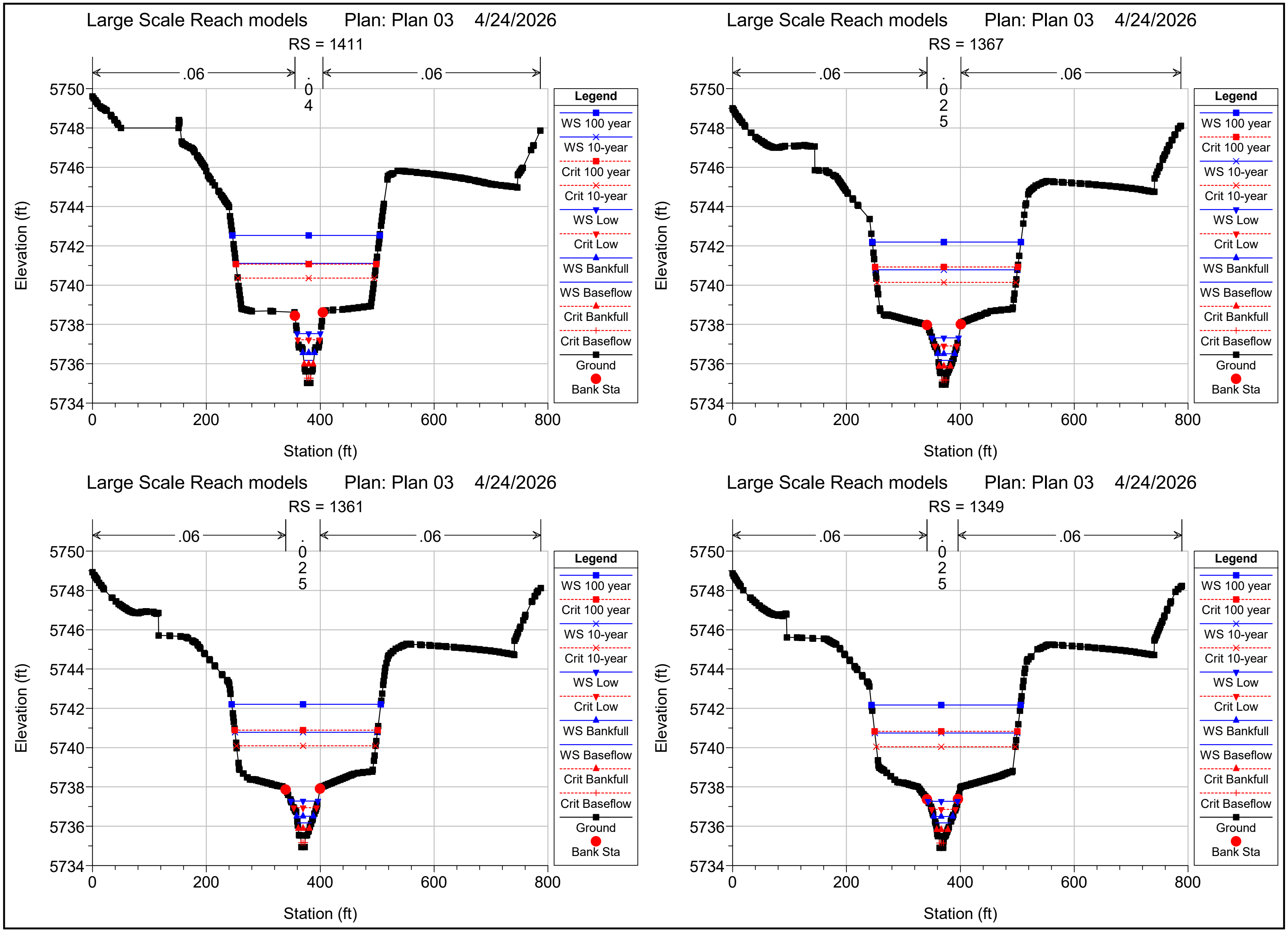
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1681
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1640
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1600
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1595

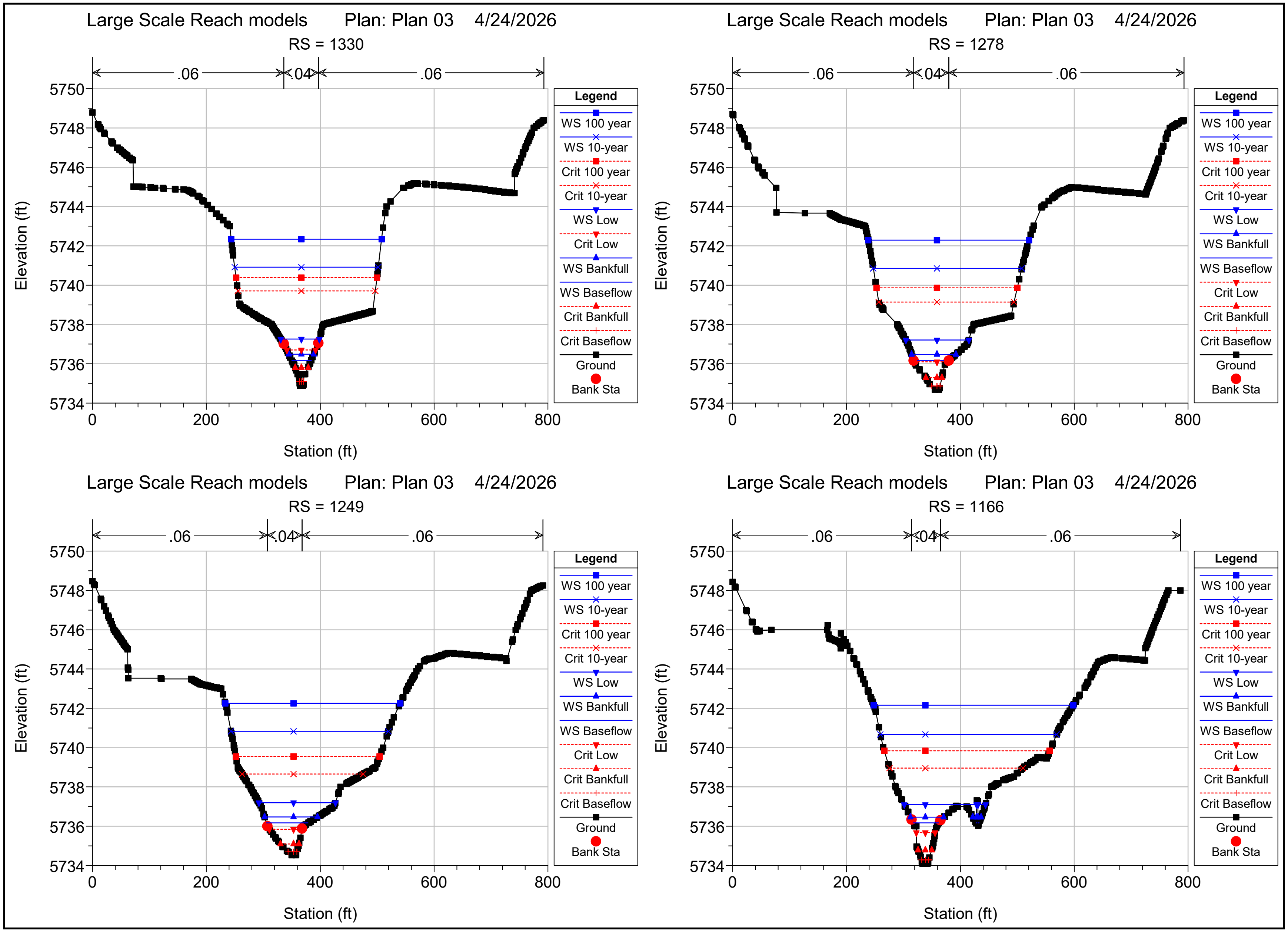

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1582
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1571
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

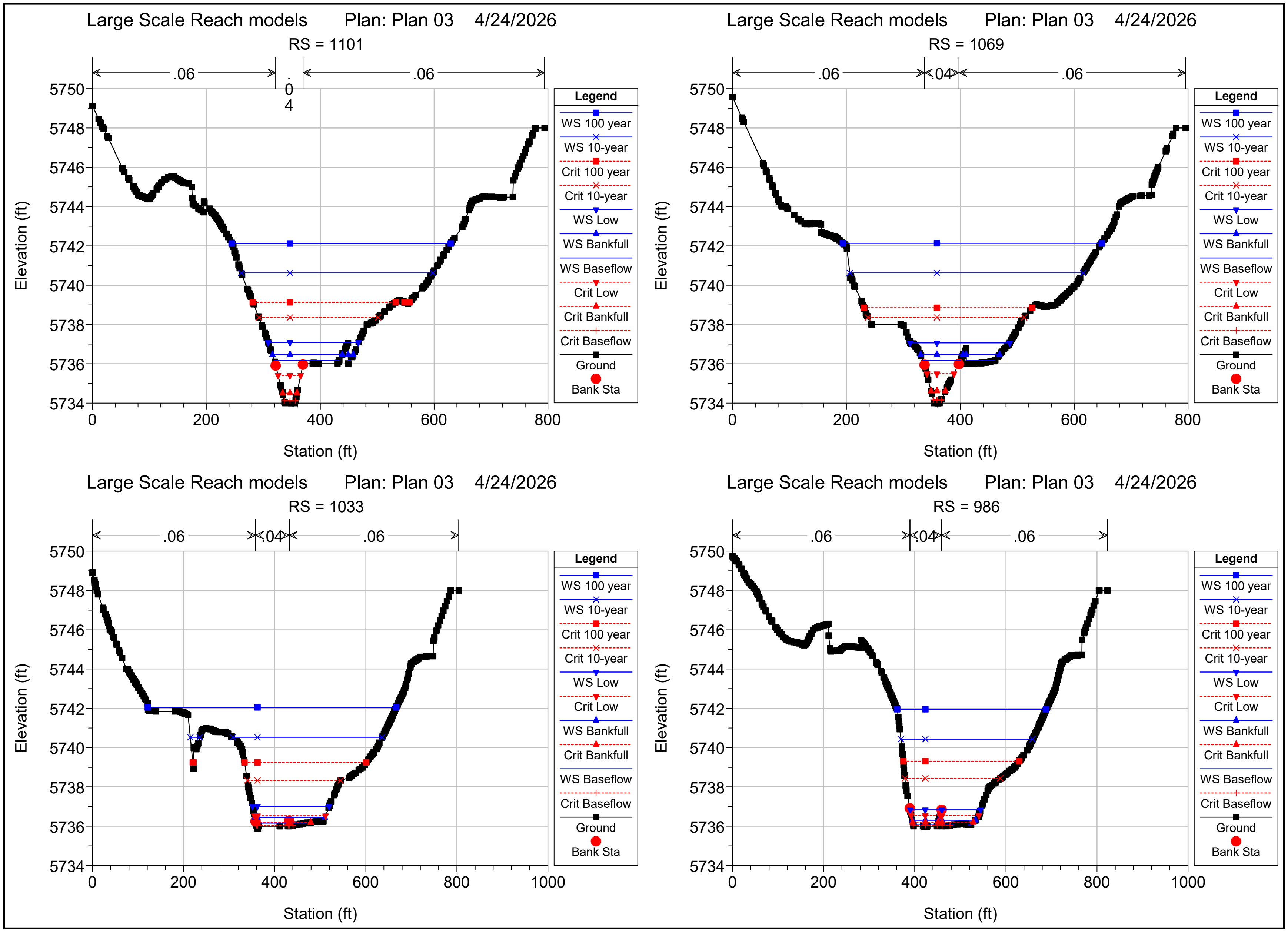

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1481
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

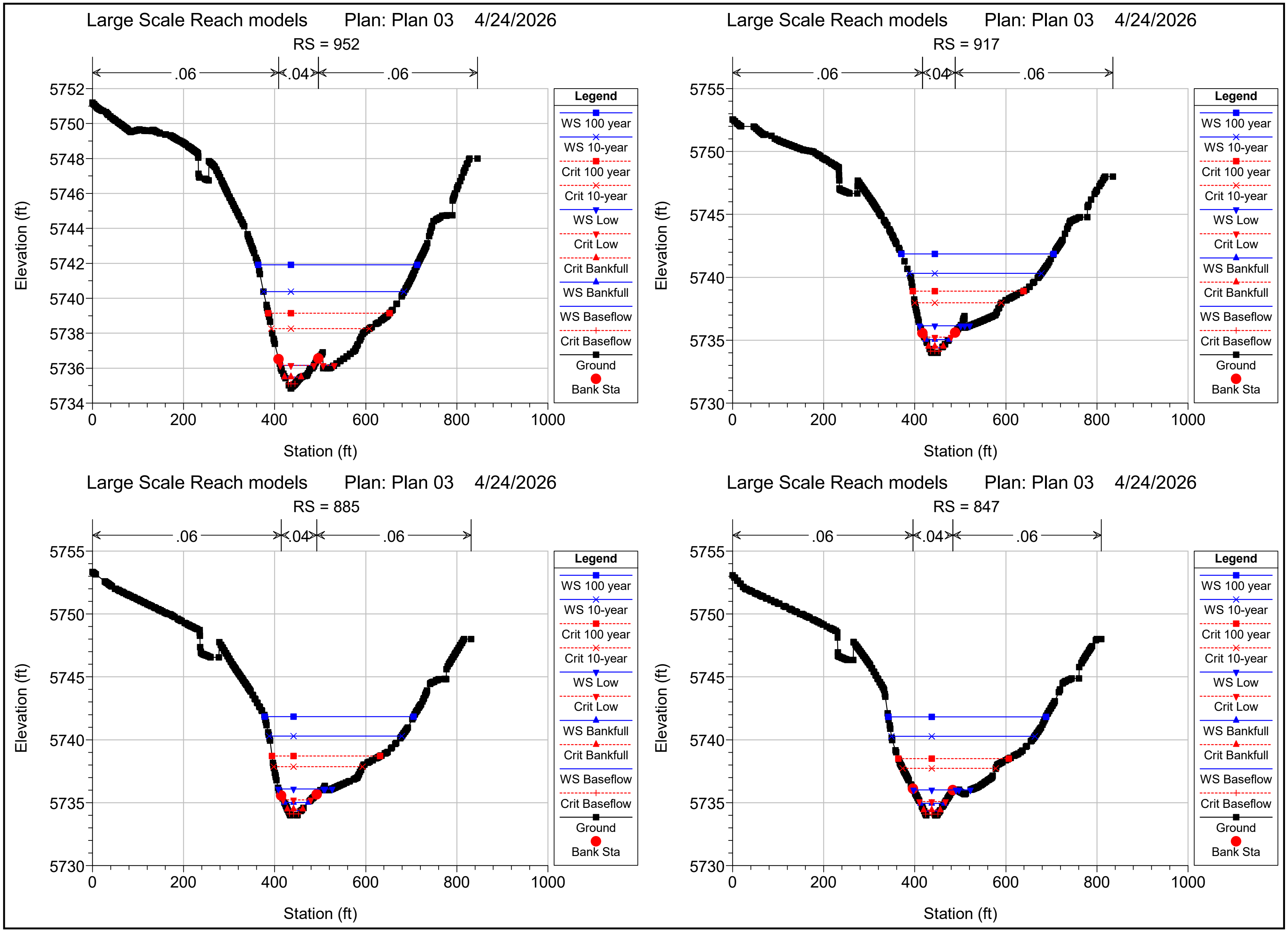

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1432
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta

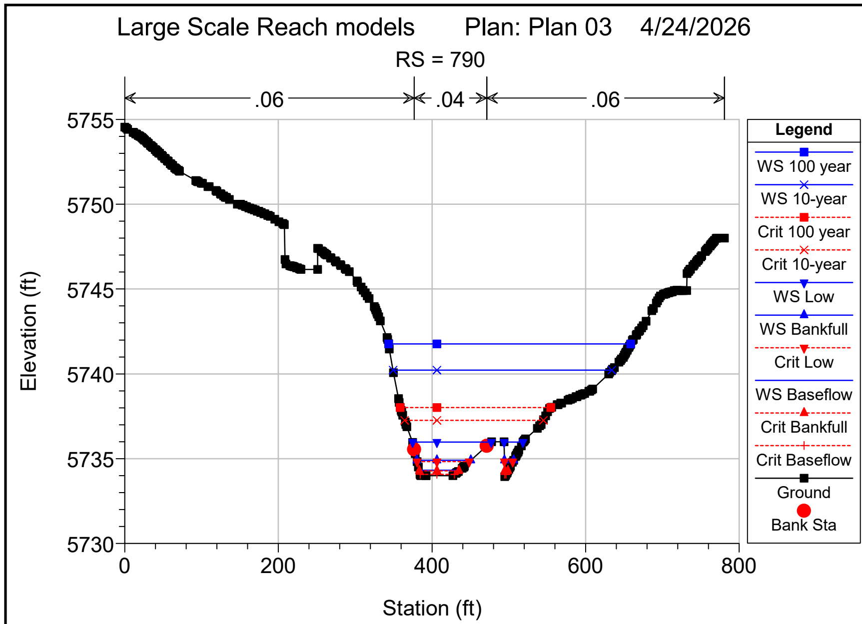

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1411
.06
.04
.06
Elevation (ft)
5750
5748
5746
5744
5742
5740
5738
5736
5734
0
200
400
600
800
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1367
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1361
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1349
.06
.025
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta



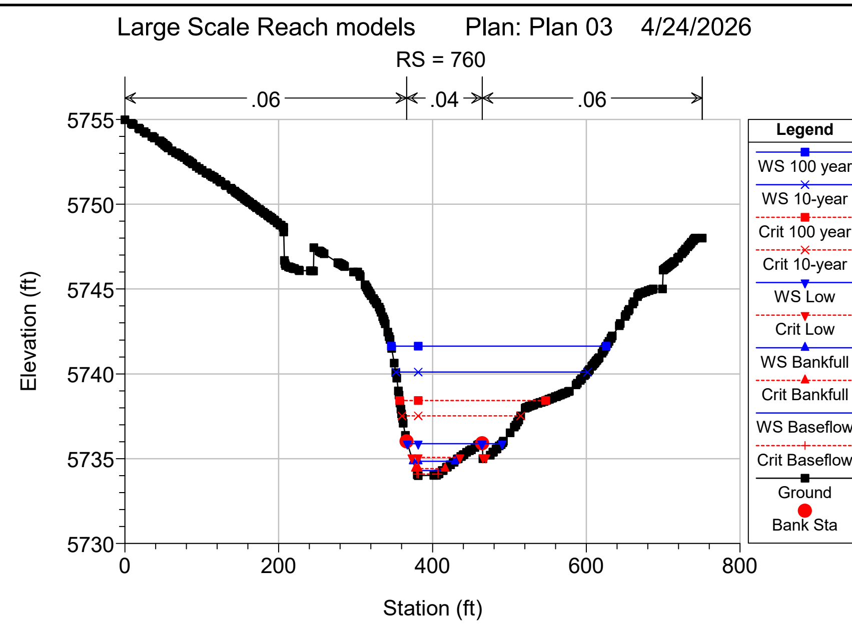
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1330
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1278
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
WS Bankfull
WS Baseflow
Crit Low
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1249
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
WS Bankfull
WS Baseflow
Crit Low
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1166
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
WS Bankfull
WS Baseflow
Crit Low
Crit Bankfull
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1101
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
WS Bankfull
WS Baseflow
Crit Low
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1069
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
WS Bankfull
WS Baseflow
Crit Low
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 1033
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 986
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

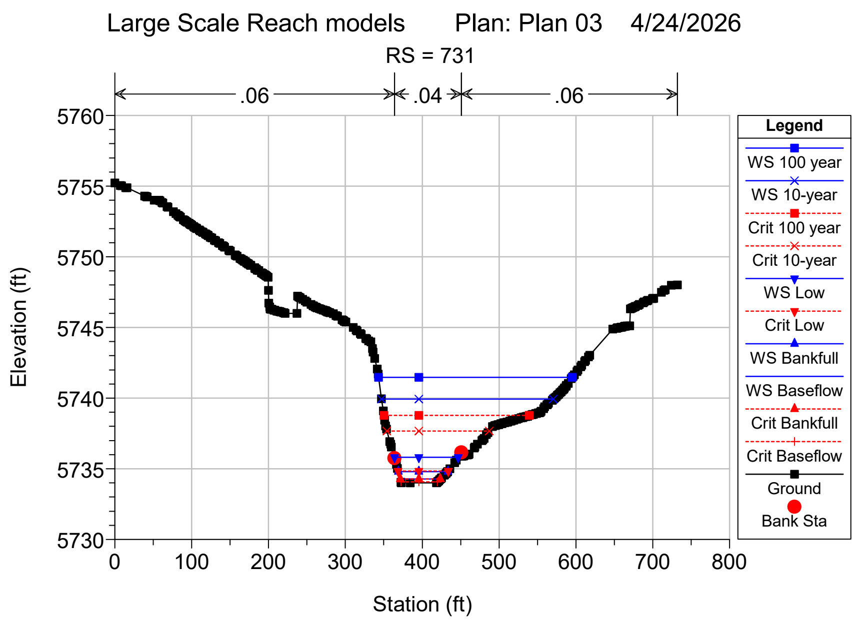

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 952
.06 .04 .06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
Crit Bankfull
WS Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 917
.06 .04 .06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 885
.06 .04 .06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 847
.06 .04 .06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)



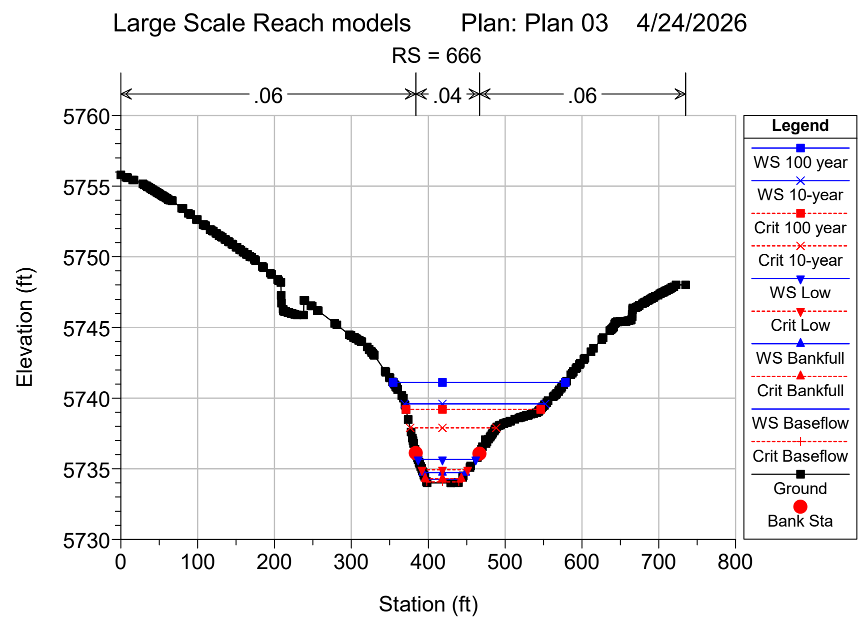
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 790
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
WS Bankfull
Crit Low
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)



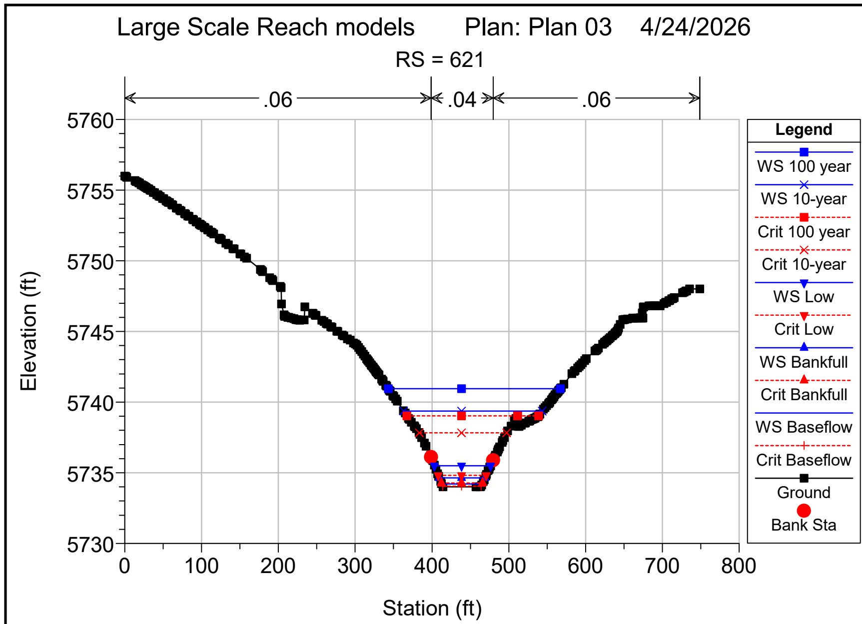
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 760
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)

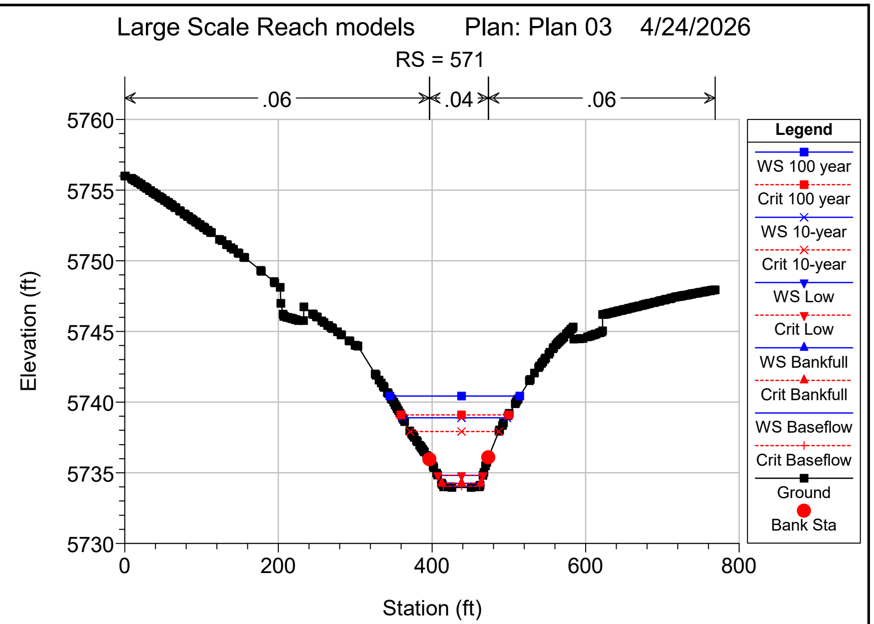


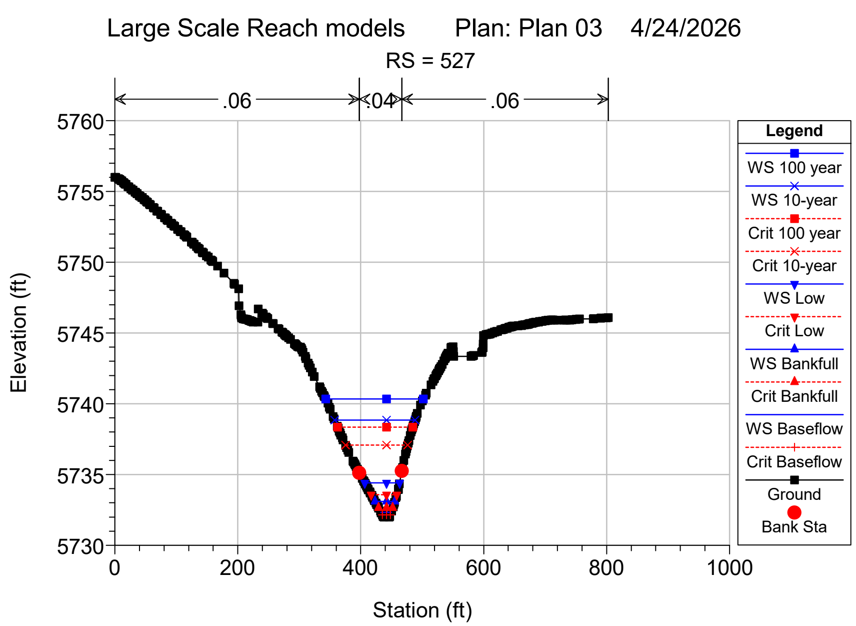
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 731
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
WS Baseflow
Crit Bankfull
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)



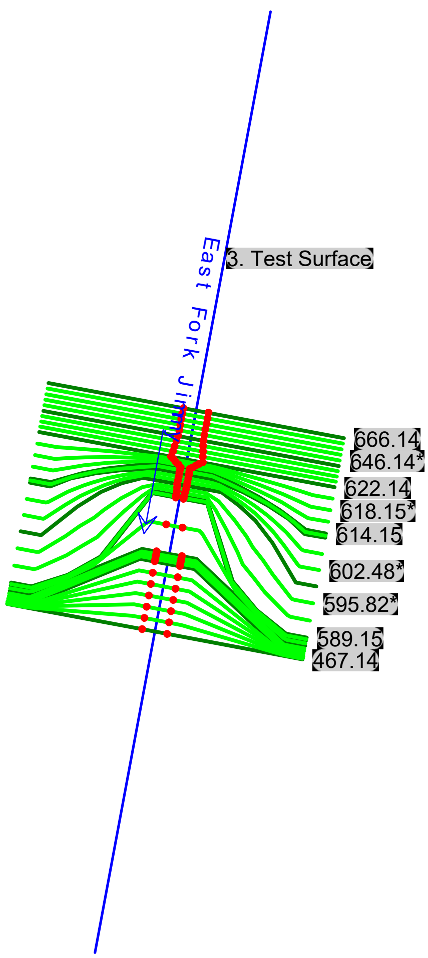
Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 666
.06
.04
.06
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta
Elevation (ft)
Station (ft)


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 621
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

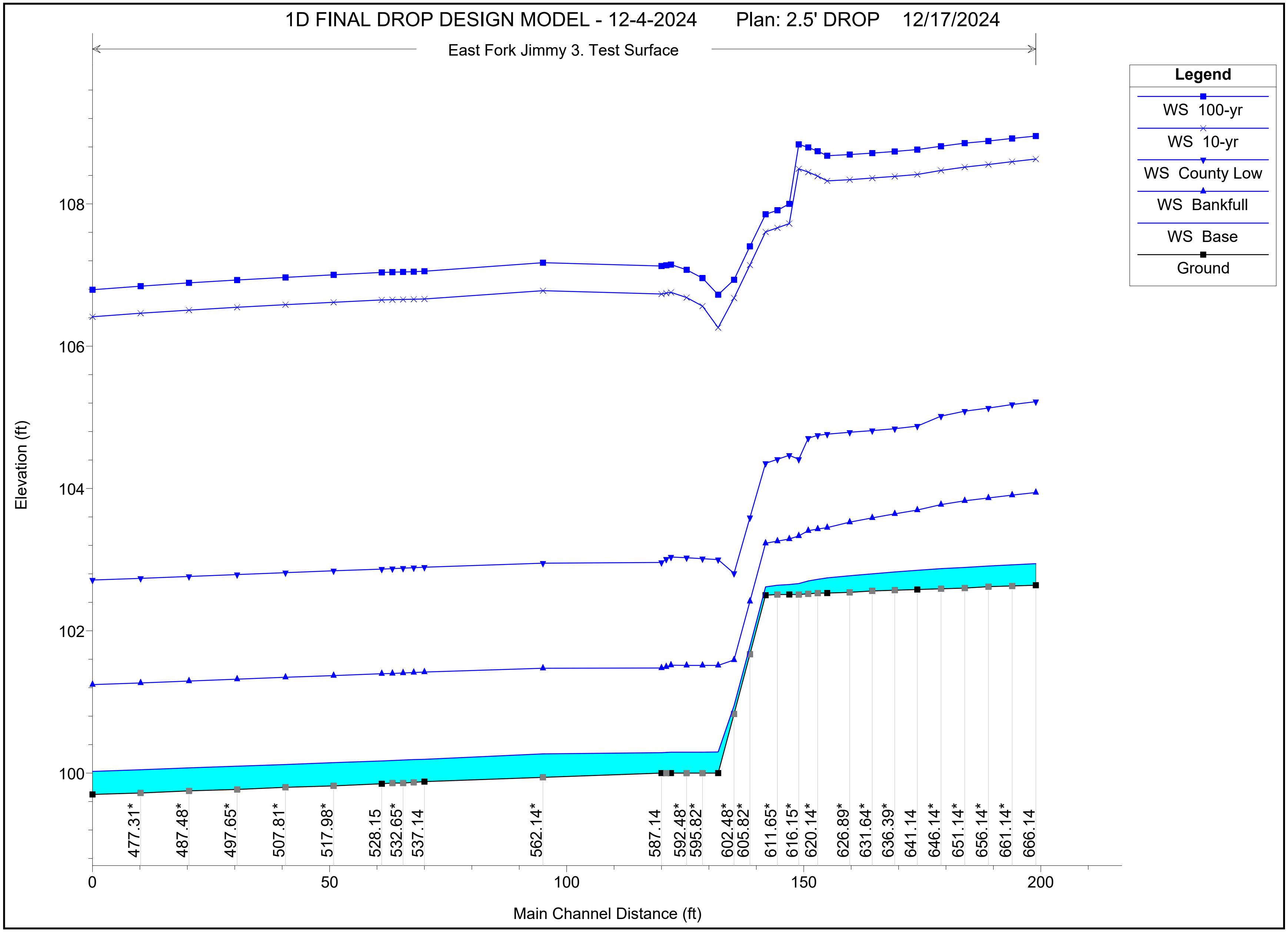

Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 571
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
Crit 100 year
WS 10-year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta


Large Scale Reach models Plan: Plan 03 4/24/2026
RS = 527
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100 year
WS 10-year
Crit 100 year
Crit 10-year
WS Low
Crit Low
WS Bankfull
Crit Bankfull
WS Baseflow
Crit Baseflow
Ground
Bank Sta

2.5' DROP STRUCTURE - PLAN VIEW



1 in Horiz. = 170 ft   1 in Vert. = 65 ft



1 in Horiz. = 30 ft 1 in Vert. = 2 ft

HEC-RAS Plan: 2.5' DROP River: East Fork Jimmy Reach: 3. Test Surface

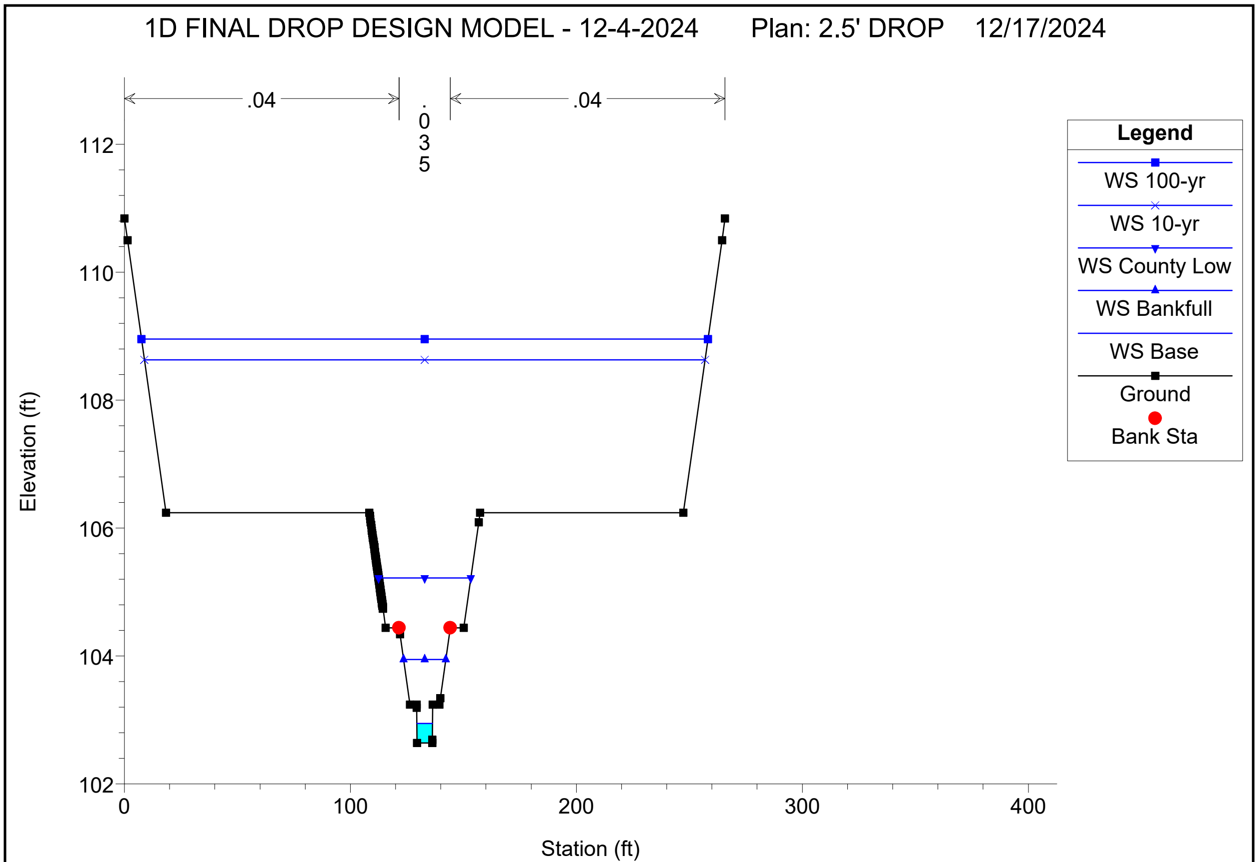
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	666.14	Base	2.10	102.64	102.94		102.96	0.003044	1.01	2.09	6.90	0.32
3. Test Surface	666.14	Bankfull	40.00	102.64	103.94		104.05	0.005398	2.62	15.26	18.63	0.51
3. Test Surface	666.14	County Low	227.00	102.64	105.22		105.53	0.005587	4.70	54.92	40.84	0.60
3. Test Surface	666.14	10-yr	3729.00	102.64	108.63		109.25	0.005142	8.94	671.36	248.15	0.68
3. Test Surface	666.14	100-yr	4400.00	102.64	108.96		109.61	0.005070	9.23	752.27	250.74	0.68
3. Test Surface	661.14*	Base	2.10	102.63	102.93		102.94	0.003266	1.03	2.04	6.90	0.33
3. Test Surface	661.14*	Bankfull	40.00	102.63	103.91		104.02	0.005891	2.70	14.81	18.43	0.53
3. Test Surface	661.14*	County Low	227.00	102.63	105.18		105.51	0.005940	4.80	53.70	40.60	0.62
3. Test Surface	661.14*	10-yr	3729.00	102.63	108.60		109.22	0.005295	9.04	664.89	247.95	0.69
3. Test Surface	661.14*	100-yr	4400.00	102.63	108.92		109.59	0.005199	9.32	746.08	250.56	0.69
3. Test Surface	656.14*	Base	2.10	102.62	102.91		102.93	0.003570	1.06	1.99	6.90	0.35
3. Test Surface	656.14*	Bankfull	40.00	102.62	103.87		103.99	0.006551	2.80	14.27	18.20	0.56
3. Test Surface	656.14*	County Low	227.00	102.62	105.13		105.48	0.006428	4.92	52.18	40.31	0.64
3. Test Surface	656.14*	10-yr	3729.00	102.62	108.55		109.20	0.005491	9.17	656.92	247.71	0.70
3. Test Surface	656.14*	100-yr	4400.00	102.62	108.89		109.57	0.005338	9.41	739.61	250.37	0.70
3. Test Surface	651.14*	Base	2.10	102.60	102.89		102.91	0.003469	1.05	2.00	6.90	0.34
3. Test Surface	651.14*	Bankfull	40.00	102.60	103.83		103.96	0.007085	2.88	13.88	18.01	0.58
3. Test Surface	651.14*	County Low	227.00	102.60	105.09		105.45	0.006776	5.01	51.19	40.08	0.66
3. Test Surface	651.14*	10-yr	3729.00	102.60	108.52		109.17	0.005583	9.22	653.32	247.54	0.71
3. Test Surface	651.14*	100-yr	4400.00	102.60	108.85		109.54	0.005408	9.46	736.41	250.21	0.71
3. Test Surface	646.14*	Base	2.10	102.59	102.87		102.89	0.003866	1.08	1.94	6.89	0.36
3. Test Surface	646.14*	Bankfull	40.00	102.59	103.77		103.92	0.008382	3.05	13.11	17.68	0.62
3. Test Surface	646.14*	County Low	227.00	102.59	105.02		105.41	0.007698	5.22	48.85	39.63	0.69
3. Test Surface	646.14*	10-yr	3729.00	102.59	108.47		109.15	0.005825	9.38	644.16	247.24	0.72
3. Test Surface	646.14*	100-yr	4400.00	102.59	108.81		109.52	0.005596	9.59	728.19	249.95	0.72
3. Test Surface	641.14	Base	2.10	102.58	102.85		102.87	0.004493	1.13	1.85	6.89	0.39
3. Test Surface	641.14	Bankfull	40.00	102.58	103.70		103.87	0.010997	3.35	11.94	17.14	0.71
3. Test Surface	641.14	County Low	227.00	102.58	104.88	104.78	105.37	0.010379	5.76	43.76	38.60	0.80
3. Test Surface	641.14	10-yr	3729.00	102.58	108.42		109.12	0.006153	9.58	632.58	246.87	0.74
3. Test Surface	641.14	100-yr	4400.00	102.58	108.76		109.49	0.005810	9.73	719.27	249.66	0.73
3. Test Surface	636.39*	Base	2.10	102.57	102.83		102.85	0.004903	1.15	1.82	7.14	0.40
3. Test Surface	636.39*	Bankfull	40.00	102.57	103.64		103.82	0.011171	3.35	11.95	17.71	0.72
3. Test Surface	636.39*	County Low	227.00	102.57	104.84	104.71	105.31	0.009823	5.60	44.31	38.37	0.78
3. Test Surface	636.39*	10-yr	3729.00	102.57	108.39		109.09	0.005936	9.48	637.39	247.13	0.74
3. Test Surface	636.39*	100-yr	4400.00	102.57	108.74		109.46	0.005617	9.64	724.55	249.94	0.73
3. Test Surface	631.64*	Base	2.10	102.56	102.80		102.82	0.005691	1.19	1.76	7.41	0.43
3. Test Surface	631.64*	Bankfull	40.00	102.56	103.59		103.76	0.011634	3.38	11.85	18.17	0.74
3. Test Surface	631.64*	County Low	227.00	102.56	104.82		105.25	0.009057	5.39	45.43	38.28	0.75
3. Test Surface	631.64*	10-yr	3729.00	102.56	108.36		109.06	0.005717	9.37	642.77	247.41	0.73
3. Test Surface	631.64*	100-yr	4400.00	102.56	108.72		109.44	0.005423	9.54	730.33	250.23	0.72
3. Test Surface	626.89*	Base	2.10	102.54	102.77		102.80	0.006002	1.17	1.79	8.18	0.44
3. Test Surface	626.89*	Bankfull	40.00	102.54	103.53		103.71	0.012059	3.41	11.74	18.46	0.75
3. Test Surface	626.89*	County Low	227.00	102.54	104.79		105.20	0.008388	5.19	46.56	38.19	0.73
3. Test Surface	626.89*	10-yr	3729.00	102.54	108.34		109.03	0.005501	9.24	648.81	247.72	0.72
3. Test Surface	626.89*	100-yr	4400.00	102.54	108.69		109.41	0.005233	9.42	736.72	250.54	0.71
3. Test Surface	622.14	Base	2.10	102.53	102.74		102.76	0.006718	1.17	1.80	9.15	0.47
3. Test Surface	622.14	Bankfull	40.00	102.53	103.45		103.65	0.013887	3.56	11.25	18.55	0.81
3. Test Surface	622.14	County Low	227.00	102.53	104.77		105.15	0.007850	5.01	47.65	38.07	0.71
3. Test Surface	622.14	10-yr	3729.00	102.53	108.32		109.00	0.005282	9.08	655.77	248.06	0.71
3. Test Surface	622.14	100-yr	4400.00	102.53	108.68		109.38	0.005043	9.27	743.92	250.88	0.70
3. Test Surface	620.14*	Base	2.10	102.53	102.72		102.75	0.008503	1.27	1.65	9.18	0.53
3. Test Surface	620.14*	Bankfull	40.00	102.53	103.43		103.62	0.011132	3.52	11.37	18.32	0.79
3. Test Surface	620.14*	County Low	227.00	102.53	104.75		105.14	0.006769	5.15	48.73	37.15	0.69
3. Test Surface	620.14*	10-yr	3729.00	102.53	108.39		108.96	0.004396	8.62	706.67	253.32	0.65
3. Test Surface	620.14*	100-yr	4400.00	102.53	108.74		109.34	0.004278	8.86	795.41	256.11	0.65
3. Test Surface	618.15*	Base	2.10	102.52	102.70		102.73	0.010503	1.35	1.55	9.19	0.58
3. Test Surface	618.15*	Bankfull	40.00	102.52	103.41		103.60	0.011025	3.50	11.43	18.16	0.78
3. Test Surface	618.15*	County Low	227.00	102.52	104.71	104.44	105.12	0.006969	5.50	48.63	36.80	0.70
3. Test Surface	618.15*	10-yr	3729.00	102.52	108.45		108.92	0.003746	8.21	756.06	258.45	0.61
3. Test Surface	618.15*	100-yr	4400.00	102.52	108.79		109.30	0.003695	8.48	845.99	261.21	0.61
3. Test Surface	616.15*	Base	2.10	102.51	102.66		102.70	0.017715	1.58	1.33	9.15	0.73
3. Test Surface	616.15*	Bankfull	40.00	102.51	103.34	103.27	103.58	0.013081	3.99	10.63	18.27	0.82
3. Test Surface	616.15*	County Low	227.00	102.51	104.41	104.41	105.08	0.013230	7.24	39.10	33.19	0.95
3. Test Surface	616.15*	10-yr	3729.00	102.51	108.49		108.89	0.003250	7.86	804.02	263.54	0.57
3. Test Surface	616.15*	100-yr	4400.00	102.51	108.84		109.27	0.003238	8.15	895.51	266.30	0.58
3. Test Surface	614.15	Base	2.10	102.51	102.65		102.70	0.002530	1.70	1.28	9.77	0.79

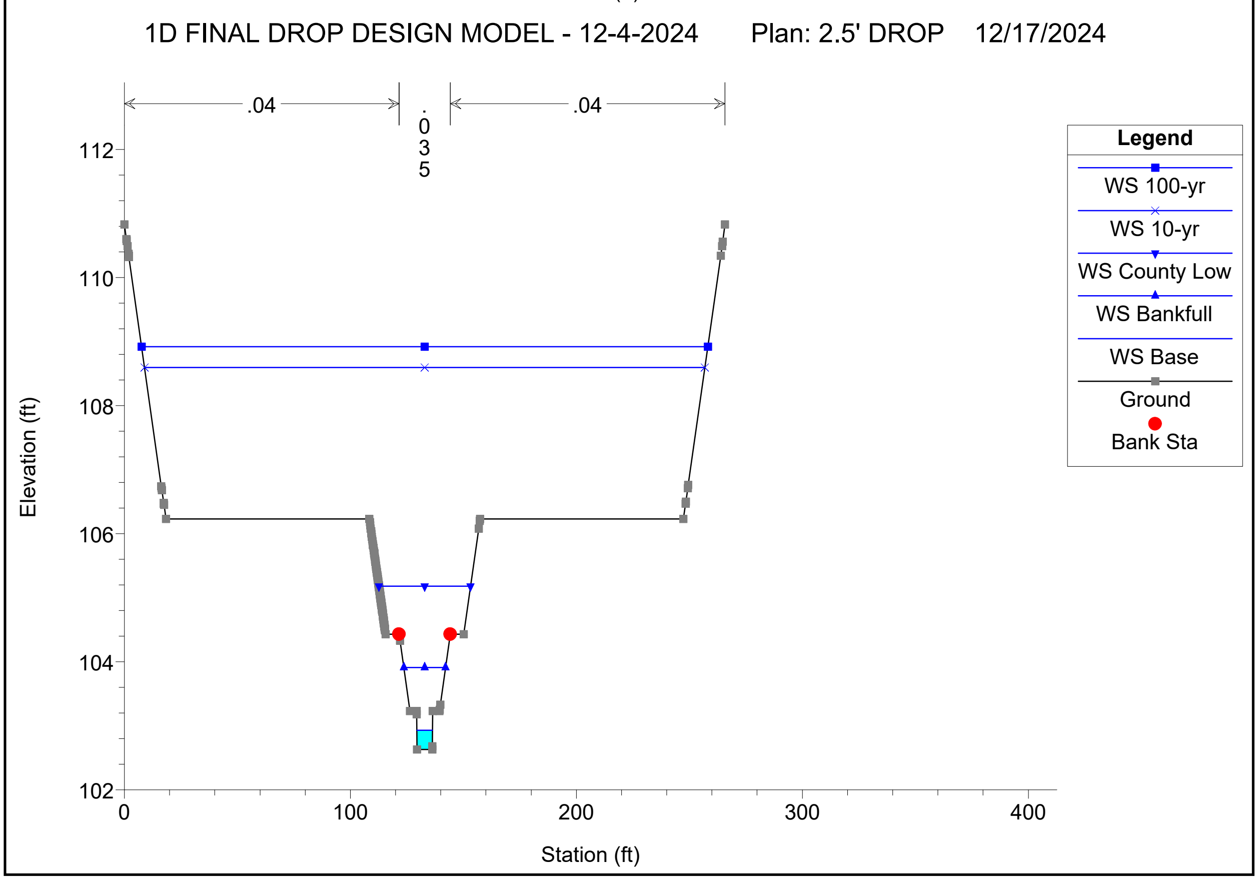
HEC-RAS Plan: 2.5' DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	614.15	Bankfull	40.00	102.51	103.29	103.29	103.57	0.001961	4.65	10.14	18.71	0.93
3. Test Surface	614.15	County Low	227.00	102.51	104.47	104.47	105.03	0.001384	7.21	41.65	35.88	0.91
3. Test Surface	614.15	10-yr	3729.00	102.51	107.72	107.72	108.82	0.001897	16.22	636.91	262.13	1.25
3. Test Surface	614.15	100-yr	4400.00	102.51	108.00	108.00	109.19	0.001992	17.20	709.45	264.33	1.29
3. Test Surface	611.65*	Base	2.10	102.51	102.64	102.63	102.69	0.003175	1.80	1.21	10.08	0.88
3. Test Surface	611.65*	Bankfull	40.00	102.51	103.26	103.26	103.54	0.002047	4.63	10.12	18.96	0.94
3. Test Surface	611.65*	County Low	227.00	102.51	104.41	104.41	104.97	0.001440	7.21	41.12	35.46	0.92
3. Test Surface	611.65*	10-yr	3729.00	102.51	107.67	107.67	108.75	0.001910	16.15	638.74	262.05	1.25
3. Test Surface	611.65*	100-yr	4400.00	102.51	107.91	107.91	109.13	0.002067	17.33	703.04	264.00	1.31
3. Test Surface	609.15	Base	2.10	102.50	102.62	102.62	102.67	0.004242	1.94	1.12	10.30	1.00
3. Test Surface	609.15	Bankfull	40.00	102.50	103.23	103.23	103.50	0.002106	4.61	10.12	19.12	0.95
3. Test Surface	609.15	County Low	227.00	102.50	104.36	104.36	104.92	0.001472	7.17	40.81	35.05	0.93
3. Test Surface	609.15	10-yr	3729.00	102.50	107.61	107.61	108.69	0.001922	16.10	640.85	262.00	1.26
3. Test Surface	609.15	100-yr	4400.00	102.50	107.86	107.86	109.07	0.002072	17.25	705.93	263.99	1.31
3. Test Surface	605.82*	Base	2.10	101.67	101.78	101.78	101.85	0.004856	2.03	1.06	10.03	1.06
3. Test Surface	605.82*	Bankfull	40.00	101.67	102.42	102.42	102.70	0.002102	4.67	9.86	17.83	0.95
3. Test Surface	605.82*	County Low	227.00	101.67	103.59	103.59	104.19	0.001486	7.38	39.86	33.77	0.94
3. Test Surface	605.82*	10-yr	3729.00	101.67	107.14	107.14	108.21	0.001665	15.68	640.69	272.96	1.18
3. Test Surface	605.82*	100-yr	4400.00	101.67	107.41	107.41	108.58	0.001765	16.67	713.52	275.09	1.23
3. Test Surface	602.48*	Base	2.10	100.83	100.95	100.95	101.01	0.004242	1.95	1.10	9.90	1.00
3. Test Surface	602.48*	Bankfull	40.00	100.83	101.59	101.59	101.89	0.002067	4.70	9.72	16.96	0.95
3. Test Surface	602.48*	County Low	227.00	100.83	102.81	102.81	103.44	0.001481	7.51	38.97	32.02	0.94
3. Test Surface	602.48*	10-yr	3729.00	100.83	106.68	106.68	107.73	0.001443	15.26	640.35	283.92	1.11
3. Test Surface	602.48*	100-yr	4400.00	100.83	106.93	106.93	108.09	0.001547	16.27	713.81	285.99	1.16
3. Test Surface	599.15	Base	2.10	100.00	100.30		100.31	0.000178	0.74	3.02	11.66	0.24
3. Test Surface	599.15	Bankfull	40.00	100.00	101.51		101.56	0.000145	1.97	24.81	24.18	0.28
3. Test Surface	599.15	County Low	227.00	100.00	103.00		103.18	0.000258	4.14	74.86	44.00	0.42
3. Test Surface	599.15	10-yr	3729.00	100.00	106.26	106.20	107.25	0.001199	14.56	652.24	295.26	1.03
3. Test Surface	599.15	100-yr	4400.00	100.00	106.73	106.47	107.63	0.001066	14.40	790.65	298.99	0.98
3. Test Surface	595.82*	Base	2.10	100.00	100.30		100.31	0.000203	0.78	2.87	11.33	0.25
3. Test Surface	595.82*	Bankfull	40.00	100.00	101.51		101.56	0.000148	1.99	25.02	25.19	0.28
3. Test Surface	595.82*	County Low	227.00	100.00	103.01		103.17	0.000236	3.97	78.95	46.34	0.40
3. Test Surface	595.82*	10-yr	3729.00	100.00	106.56		107.11	0.000738	11.79	864.85	316.99	0.81
3. Test Surface	595.82*	100-yr	4400.00	100.00	106.96		107.52	0.000731	12.20	990.85	320.16	0.82
3. Test Surface	592.48*	Base	2.10	100.00	100.29		100.30	0.000230	0.83	2.74	11.17	0.27
3. Test Surface	592.48*	Bankfull	40.00	100.00	101.52		101.56	0.000146	1.97	25.96	27.43	0.28
3. Test Surface	592.48*	County Low	227.00	100.00	103.03		103.16	0.000205	3.71	83.15	46.33	0.38
3. Test Surface	592.48*	10-yr	3729.00	100.00	106.69		107.06	0.000558	10.38	1040.55	337.22	0.71
3. Test Surface	592.48*	100-yr	4400.00	100.00	107.08		107.47	0.000568	10.87	1172.69	340.34	0.72
3. Test Surface	589.15	Base	2.10	100.00	100.29		100.30	0.000255	0.87	2.66	11.33	0.28
3. Test Surface	589.15	Bankfull	40.00	100.00	101.52		101.56	0.000129	1.86	28.16	30.27	0.27
3. Test Surface	589.15	County Low	227.00	100.00	103.04		103.16	0.000179	3.47	86.16	44.49	0.35
3. Test Surface	589.15	10-yr	3729.00	100.00	106.76		107.02	0.000445	9.33	1217.50	357.09	0.63
3. Test Surface	589.15	100-yr	4400.00	100.00	107.15		107.44	0.000460	9.86	1357.45	360.21	0.65
3. Test Surface	588.15*	Base	2.10	100.00	100.29		100.30	0.000290	0.93	2.45	10.02	0.30
3. Test Surface	588.15*	Bankfull	40.00	100.00	101.50		101.55	0.000199	2.28	22.72	25.23	0.33
3. Test Surface	588.15*	County Low	227.00	100.00	103.01		103.15	0.000227	3.89	79.42	44.25	0.40
3. Test Surface	588.15*	10-yr	3729.00	100.00	106.75		107.02	0.000464	9.52	1212.28	357.76	0.65
3. Test Surface	588.15*	100-yr	4400.00	100.00	107.14		107.44	0.000478	10.04	1352.74	360.89	0.66
3. Test Surface	587.14	Base	2.10	100.00	100.29		100.30	0.000309	0.95	2.34	9.34	0.31
3. Test Surface	587.14	Bankfull	40.00	100.00	101.48		101.55	0.000244	2.51	19.60	19.75	0.36
3. Test Surface	587.14	County Low	227.00	100.00	102.96		103.15	0.000301	4.43	72.04	43.90	0.45
3. Test Surface	587.14	10-yr	3729.00	100.00	106.74		107.02	0.000485	9.73	1206.54	358.44	0.66
3. Test Surface	587.14	100-yr	4400.00	100.00	107.13		107.44	0.000497	10.23	1347.57	361.58	0.68
3. Test Surface	562.14*	Base	2.10	99.94	100.27		100.28	0.003199	0.88	2.38	10.19	0.32
3. Test Surface	562.14*	Bankfull	40.00	99.94	101.48		101.53	0.001698	2.00	21.95	24.57	0.31
3. Test Surface	562.14*	County Low	227.00	99.94	102.95		103.13	0.002245	3.84	75.04	44.29	0.41
3. Test Surface	562.14*	10-yr	3729.00	99.94	106.78		106.97	0.001390	5.40	1121.39	324.79	0.37
3. Test Surface	562.14*	100-yr	4400.00	99.94	107.17		107.39	0.001381	5.59	1249.86	327.93	0.37
3. Test Surface	537.14	Base	2.10	99.88	100.20		100.21	0.002706	0.97	2.17	6.91	0.31
3. Test Surface	537.14	Bankfull	40.00	99.88	101.42		101.48	0.002489	2.00	20.02	20.61	0.36
3. Test Surface	537.14	County Low	227.00	99.88	102.89		103.07	0.002483	3.60	73.56	44.33	0.41
3. Test Surface	537.14	10-yr	3729.00	99.88	106.67		106.93	0.001859	5.90	984.65	289.88	0.42
3. Test Surface	537.14	100-yr	4400.00	99.88	107.05		107.34	0.001849	6.13	1097.68	292.97	0.42
3. Test Surface	534.89*	Base	2.10	99.87	100.19		100.20	0.002593	0.96	2.19	6.91	0.30
3. Test Surface	534.89*	Bankfull	40.00	99.87	101.42		101.48	0.002457	1.99	20.08	20.57	0.36

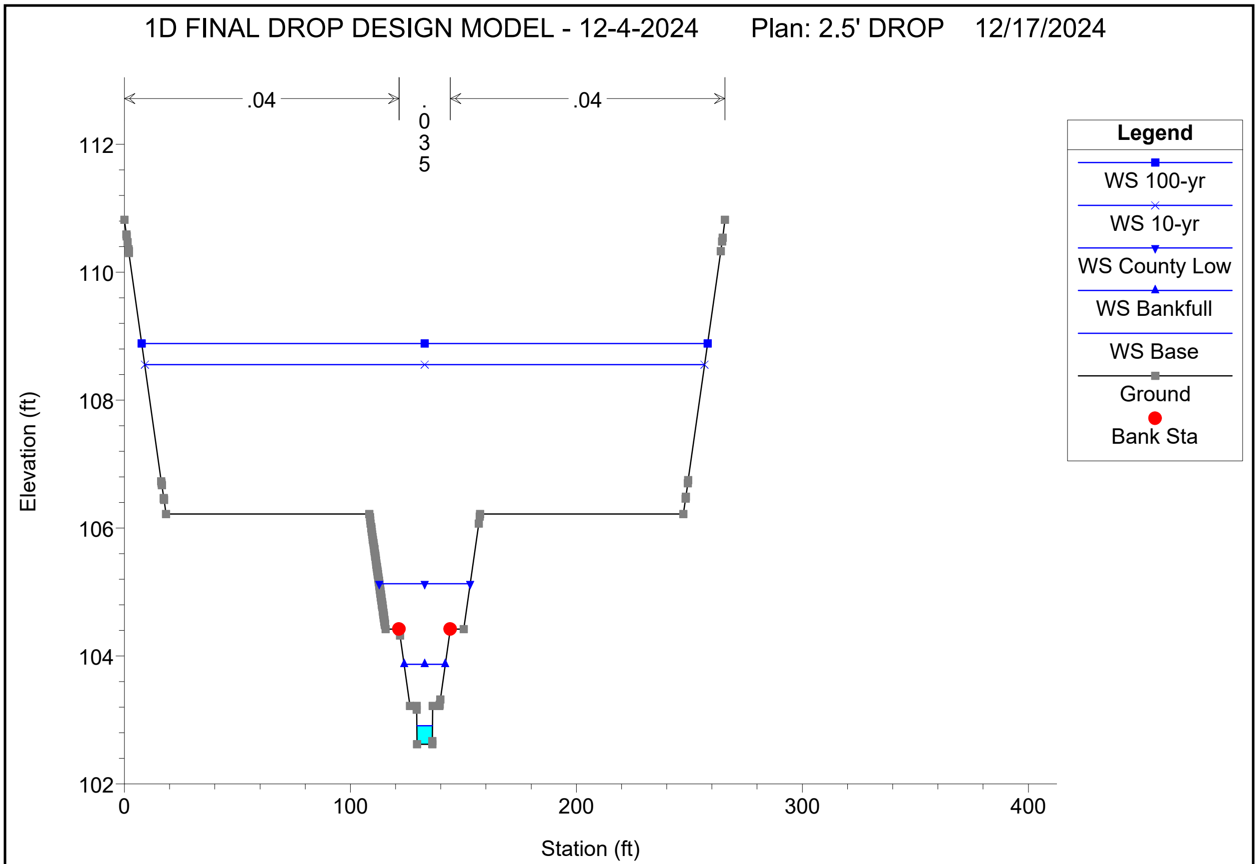
HEC-RAS Plan: 2.5' DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

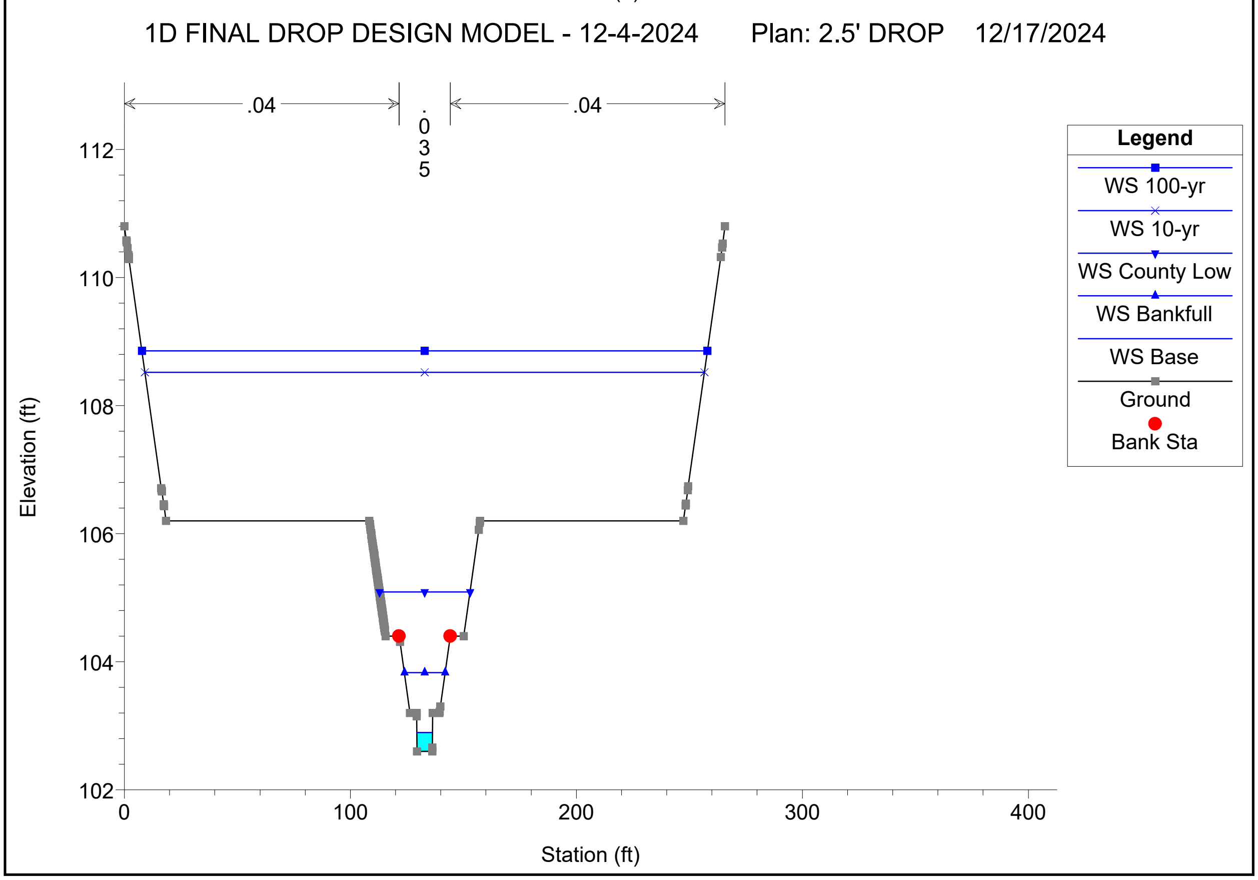
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	534.89*	County Low	227.00	99.87	102.89		103.06	0.002475	3.59	73.65	44.34	0.41
3. Test Surface	534.89*	10-yr	3729.00	99.87	106.66		106.92	0.001852	5.89	985.95	289.93	0.42
3. Test Surface	534.89*	100-yr	4400.00	99.87	107.05		107.34	0.001842	6.12	1099.01	293.01	0.42
3. Test Surface	532.65*	Base	2.10	99.86	100.18		100.20	0.002482	0.94	2.22	6.91	0.29
3. Test Surface	532.65*	Bankfull	40.00	99.86	101.41		101.47	0.002469	1.99	20.07	20.59	0.36
3. Test Surface	532.65*	County Low	227.00	99.86	102.88		103.06	0.002484	3.60	73.55	44.32	0.41
3. Test Surface	532.65*	10-yr	3729.00	99.86	106.66		106.92	0.001845	5.88	987.14	289.95	0.42
3. Test Surface	532.65*	100-yr	4400.00	99.86	107.05		107.33	0.001836	6.11	1100.21	293.03	0.42
3. Test Surface	530.40*	Base	2.10	99.86	100.18		100.19	0.002643	0.96	2.18	6.91	0.30
3. Test Surface	530.40*	Bankfull	40.00	99.86	101.40		101.47	0.002505	2.00	19.97	20.55	0.36
3. Test Surface	530.40*	County Low	227.00	99.86	102.87		103.05	0.002492	3.60	73.52	44.32	0.41
3. Test Surface	530.40*	10-yr	3729.00	99.86	106.65		106.91	0.001838	5.86	988.50	289.95	0.42
3. Test Surface	530.40*	100-yr	4400.00	99.86	107.04		107.33	0.001830	6.10	1101.57	293.08	0.42
3. Test Surface	528.15	Base	2.10	99.85	100.17		100.19	0.002529	0.95	2.21	6.91	0.30
3. Test Surface	528.15	Bankfull	40.00	99.85	101.40		101.46	0.002476	2.00	20.04	20.58	0.36
3. Test Surface	528.15	County Low	227.00	99.85	102.87		103.05	0.002480	3.60	73.59	44.30	0.41
3. Test Surface	528.15	10-yr	3729.00	99.85	106.65		106.91	0.001827	5.85	990.24	290.01	0.42
3. Test Surface	528.15	100-yr	4400.00	99.85	107.04		107.32	0.001821	6.09	1103.34	293.11	0.42
3. Test Surface	517.98*	Base	2.10	99.82	100.15		100.16	0.002391	0.93	2.25	6.91	0.29
3. Test Surface	517.98*	Bankfull	40.00	99.82	101.37		101.43	0.002443	1.99	20.12	20.55	0.35
3. Test Surface	517.98*	County Low	227.00	99.82	102.84		103.02	0.002466	3.59	73.76	44.33	0.41
3. Test Surface	517.98*	10-yr	3729.00	99.82	106.62		106.89	0.001908	5.98	968.71	284.05	0.43
3. Test Surface	517.98*	100-yr	4400.00	99.82	107.01		107.30	0.001903	6.22	1079.18	287.15	0.43
3. Test Surface	507.81*	Base	2.10	99.80	100.12		100.14	0.002524	0.95	2.21	6.91	0.30
3. Test Surface	507.81*	Bankfull	40.00	99.80	101.35		101.41	0.002480	2.00	20.03	20.57	0.36
3. Test Surface	507.81*	County Low	227.00	99.80	102.82		102.99	0.002485	3.60	73.54	44.30	0.41
3. Test Surface	507.81*	10-yr	3729.00	99.80	106.58		106.87	0.002005	6.12	945.67	278.06	0.44
3. Test Surface	507.81*	100-yr	4400.00	99.80	106.97		107.28	0.002001	6.37	1053.44	281.13	0.44
3. Test Surface	497.65*	Base	2.10	99.77	100.10		100.11	0.002384	0.93	2.25	6.91	0.29
3. Test Surface	497.65*	Bankfull	40.00	99.77	101.32		101.38	0.002485	2.00	20.02	20.54	0.36
3. Test Surface	497.65*	County Low	227.00	99.77	102.79		102.97	0.002488	3.60	73.58	44.34	0.41
3. Test Surface	497.65*	10-yr	3729.00	99.77	106.55		106.85	0.002111	6.27	922.48	272.09	0.45
3. Test Surface	497.65*	100-yr	4400.00	99.77	106.93		107.26	0.002108	6.52	1027.60	275.17	0.45
3. Test Surface	487.48*	Base	2.10	99.75	100.07		100.09	0.002514	0.95	2.22	6.91	0.30
3. Test Surface	487.48*	Bankfull	40.00	99.75	101.30		101.36	0.002488	2.00	20.01	20.56	0.36
3. Test Surface	487.48*	County Low	227.00	99.75	102.77		102.94	0.002493	3.60	73.47	44.34	0.41
3. Test Surface	487.48*	10-yr	3729.00	99.75	106.51		106.83	0.002223	6.43	899.40	266.07	0.46
3. Test Surface	487.48*	100-yr	4400.00	99.75	106.89		107.24	0.002222	6.69	1001.77	269.14	0.46
3. Test Surface	477.31*	Base	2.10	99.72	100.05		100.06	0.002371	0.93	2.26	6.91	0.29
3. Test Surface	477.31*	Bankfull	40.00	99.72	101.27		101.33	0.002498	2.00	19.98	20.53	0.36
3. Test Surface	477.31*	County Low	227.00	99.72	102.74		102.92	0.002510	3.61	73.31	44.31	0.42
3. Test Surface	477.31*	10-yr	3729.00	99.72	106.47		106.80	0.002355	6.59	875.31	260.00	0.47
3. Test Surface	477.31*	100-yr	4400.00	99.72	106.85		107.21	0.002355	6.87	974.88	263.06	0.48
3. Test Surface	467.14	Base	2.10	99.70	100.02	99.84	100.04	0.002501	0.95	2.22	6.91	0.29
3. Test Surface	467.14	Bankfull	40.00	99.70	101.24	100.65	101.31	0.002503	2.00	19.97	20.55	0.36
3. Test Surface	467.14	County Low	227.00	99.70	102.71	101.90	102.89	0.002500	3.61	73.40	44.32	0.42
3. Test Surface	467.14	10-yr	3729.00	99.70	106.41	105.25	106.77	0.002501	6.78	850.59	253.91	0.49
3. Test Surface	467.14	100-yr	4400.00	99.70	106.80	105.48	107.19	0.002500	7.06	947.75	256.96	0.49



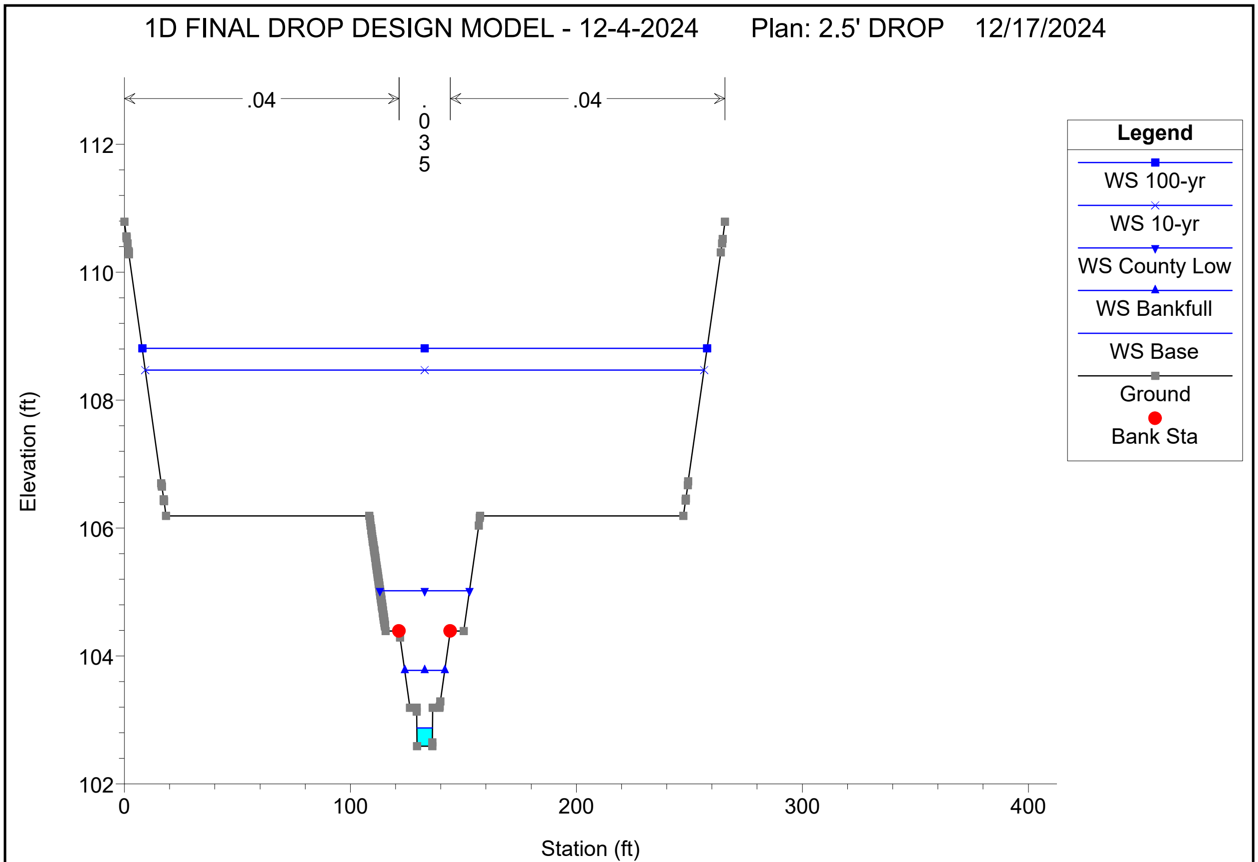


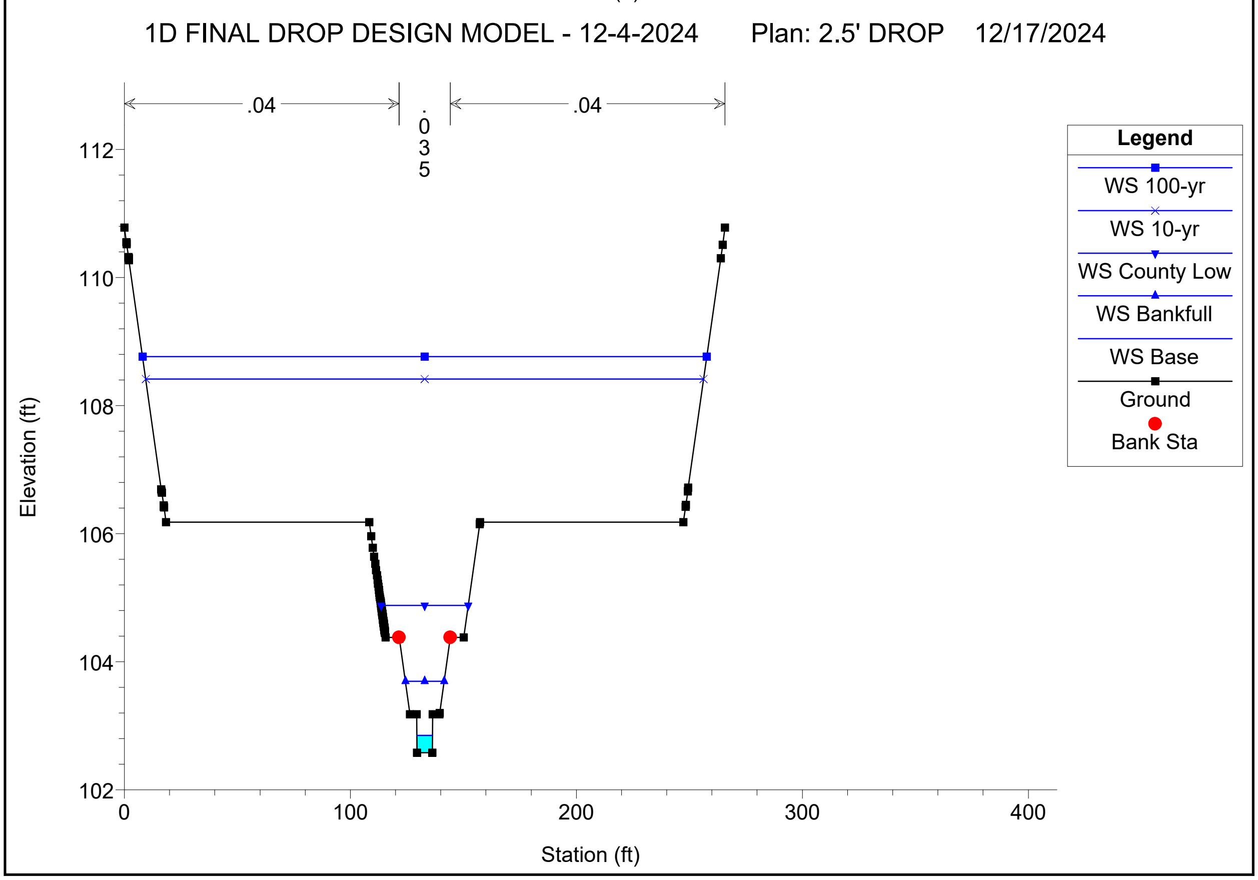
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



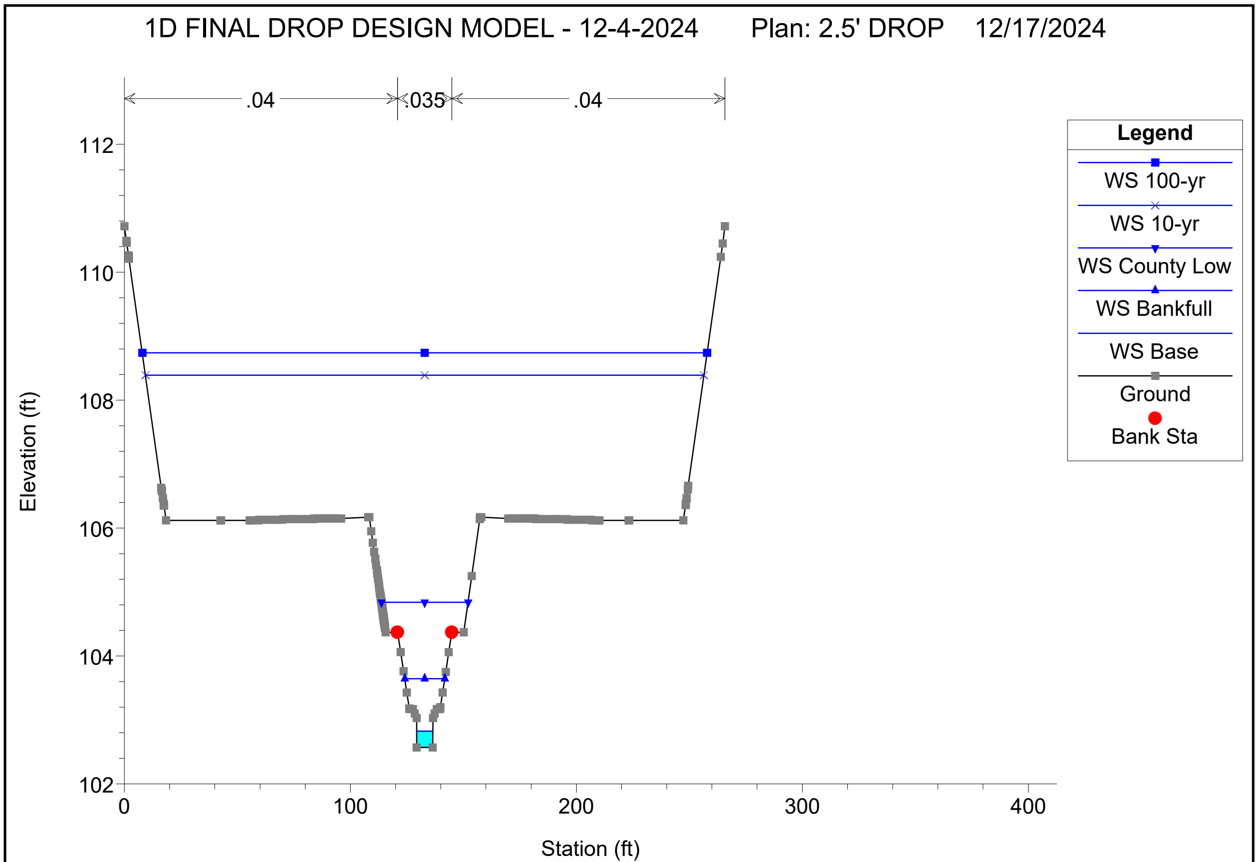


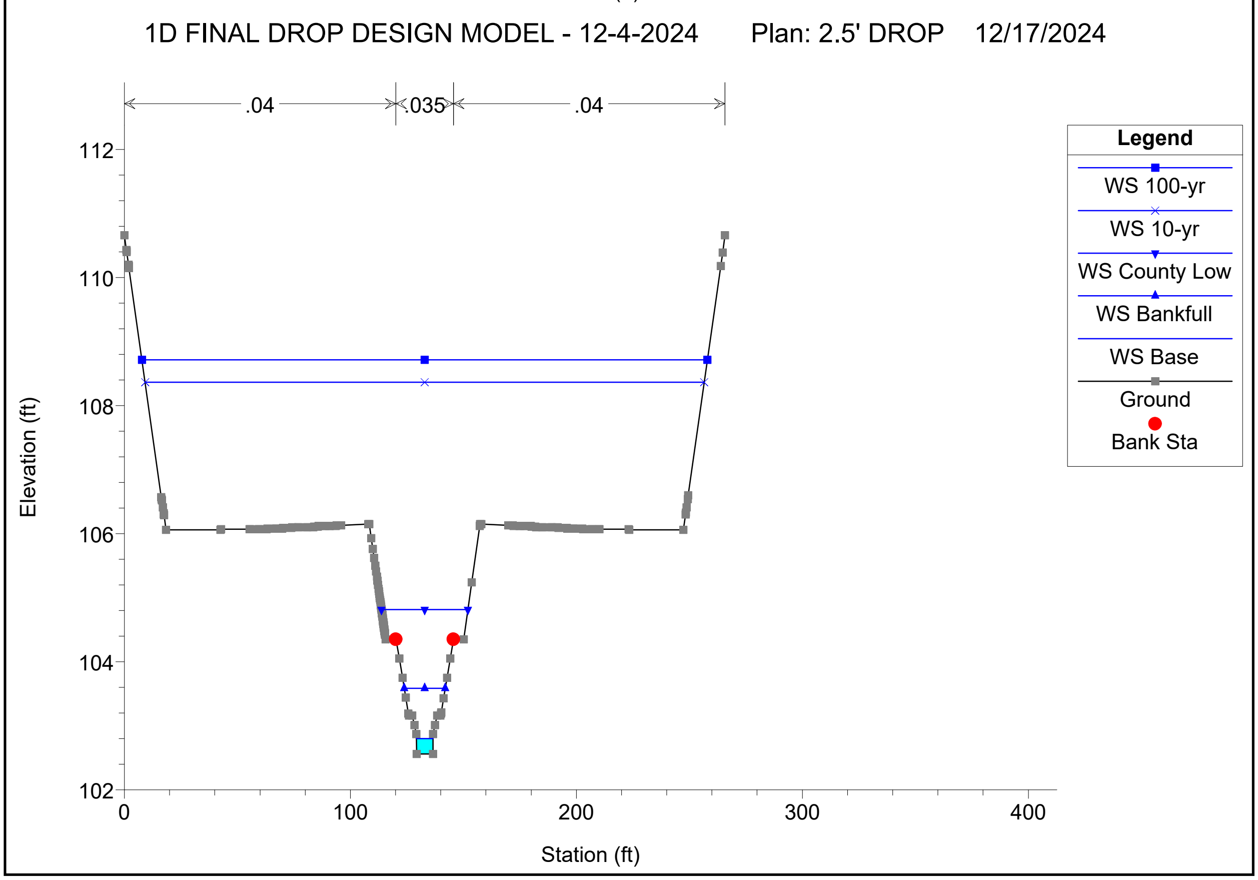
1 in Horiz. = 85 ft 1 in Vert. = 3 ft





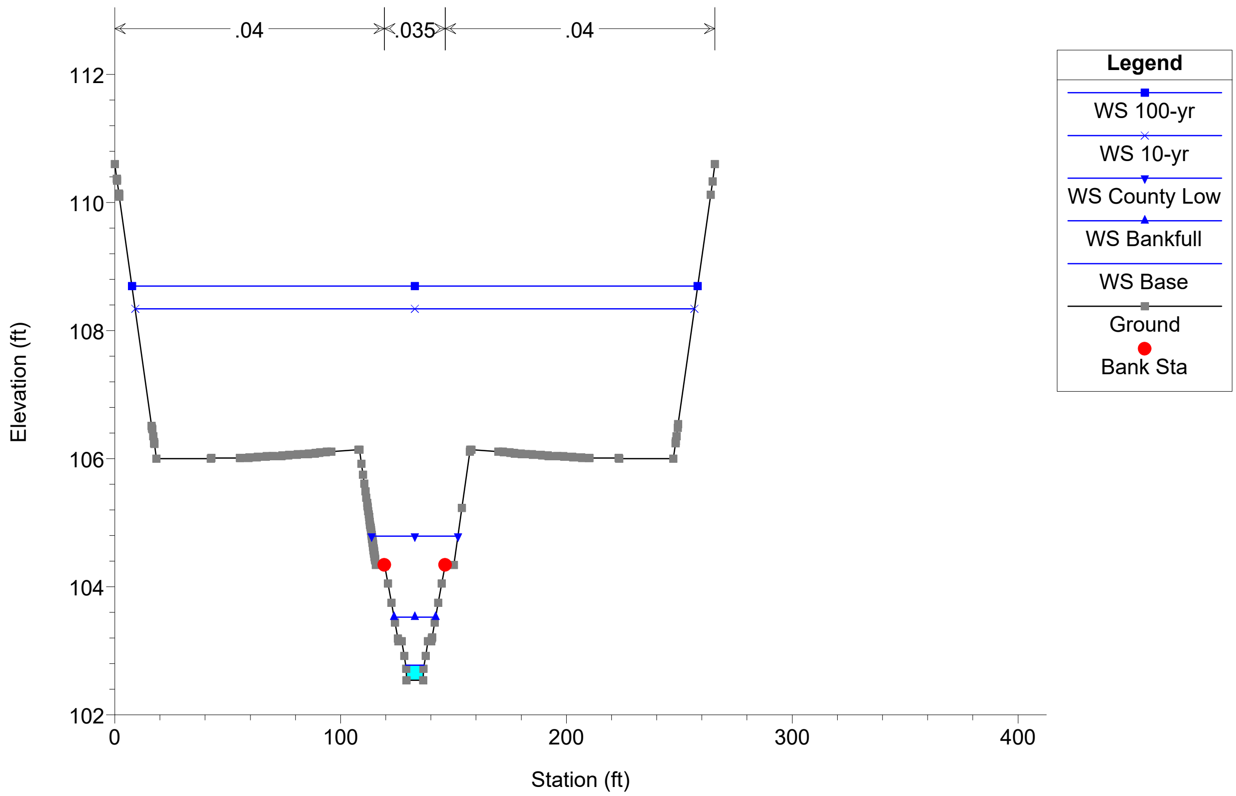
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



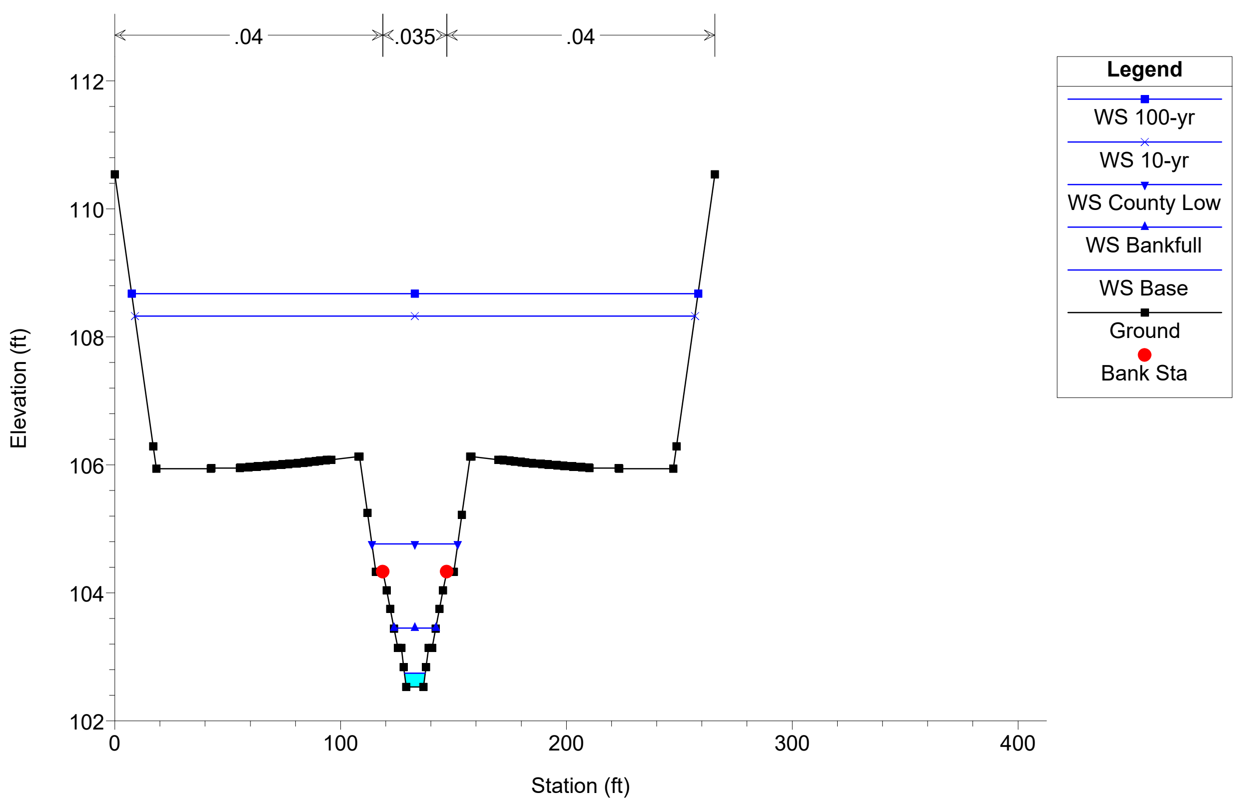


1 in Horiz. = 85 ft 1 in Vert. = 3 ft

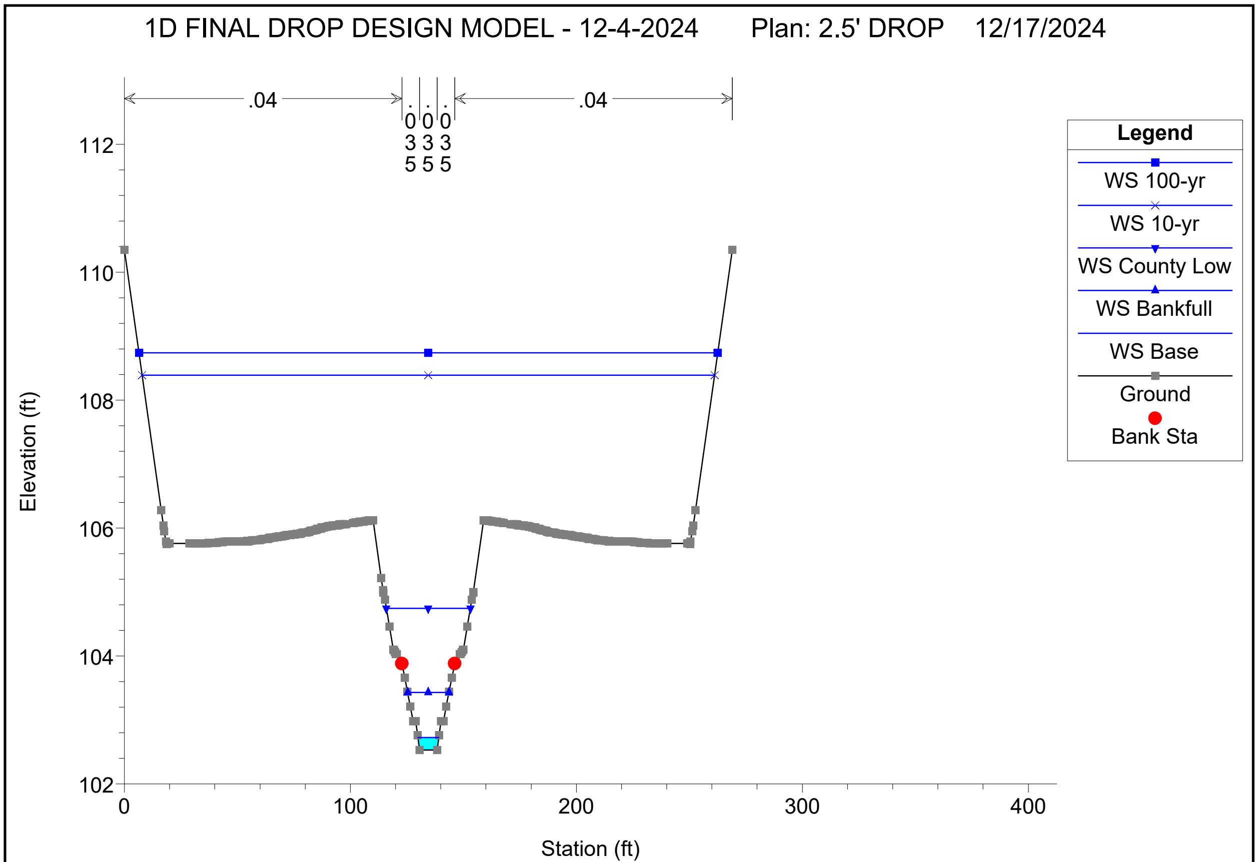
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 2.5' DROP 12/17/2024

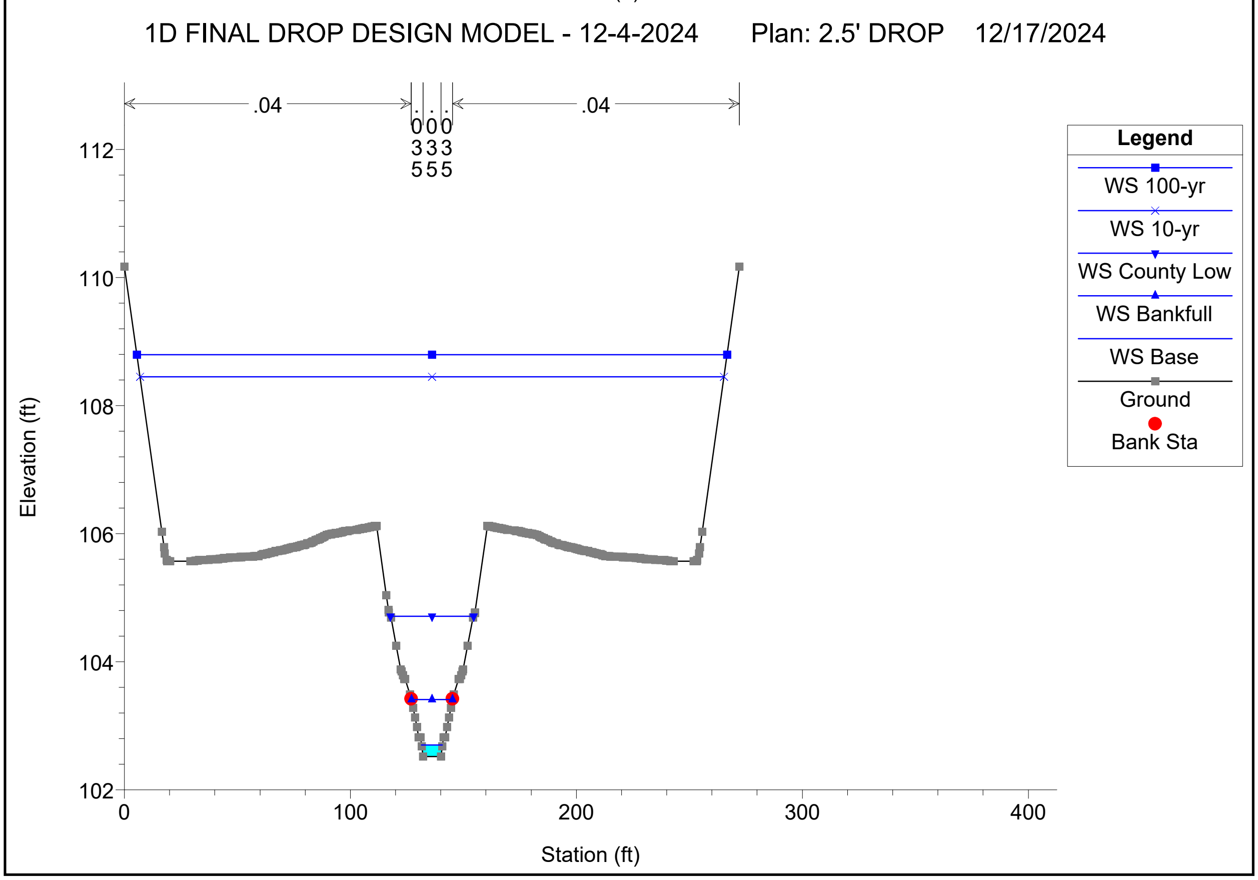


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 2.5' DROP 12/17/2024

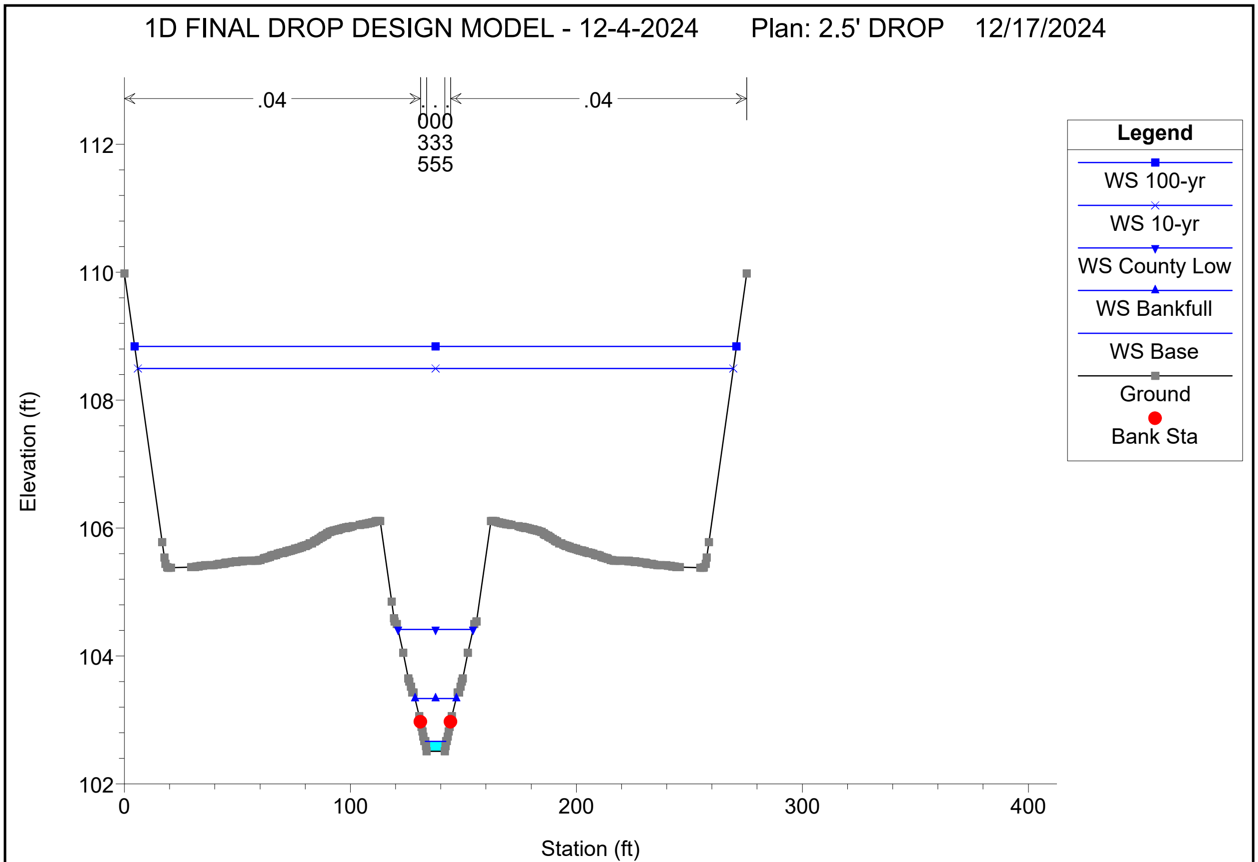


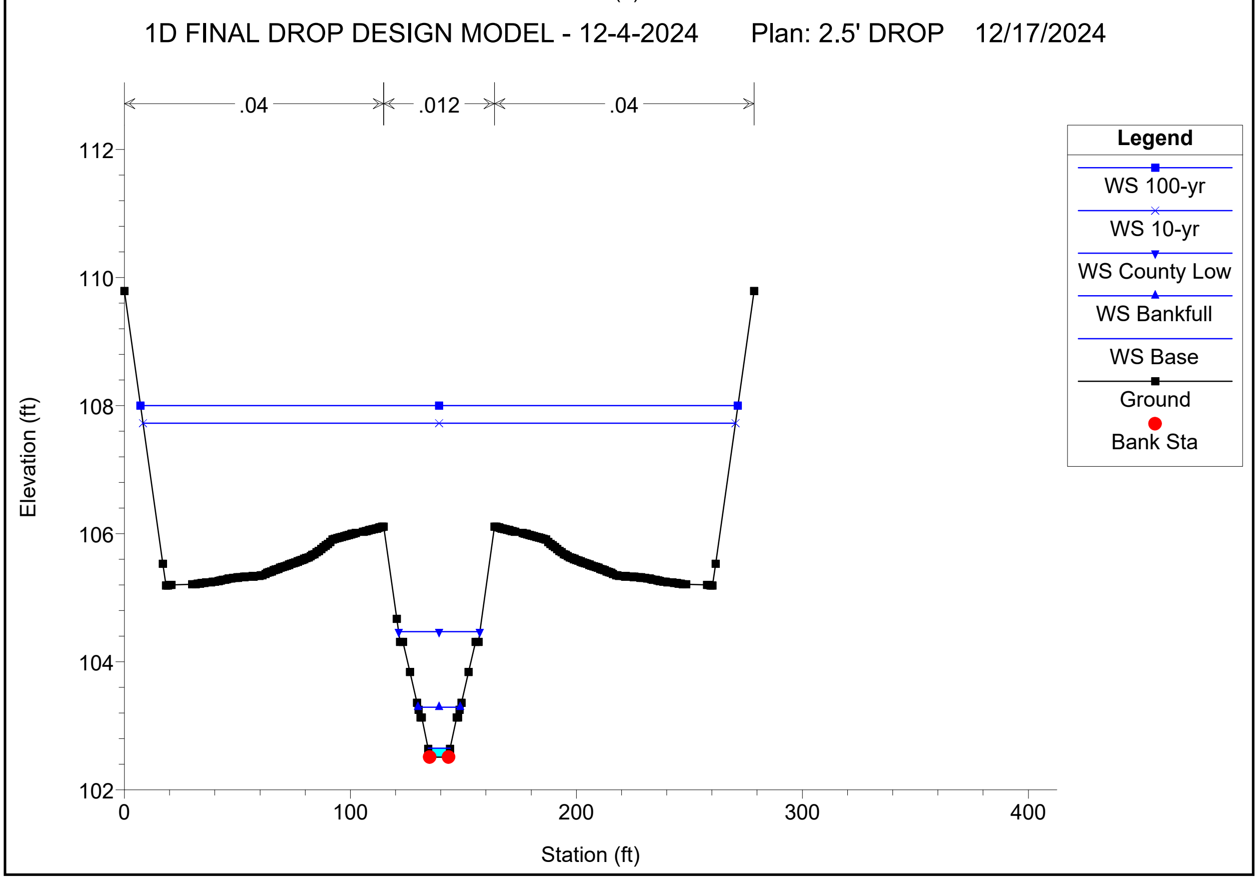
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



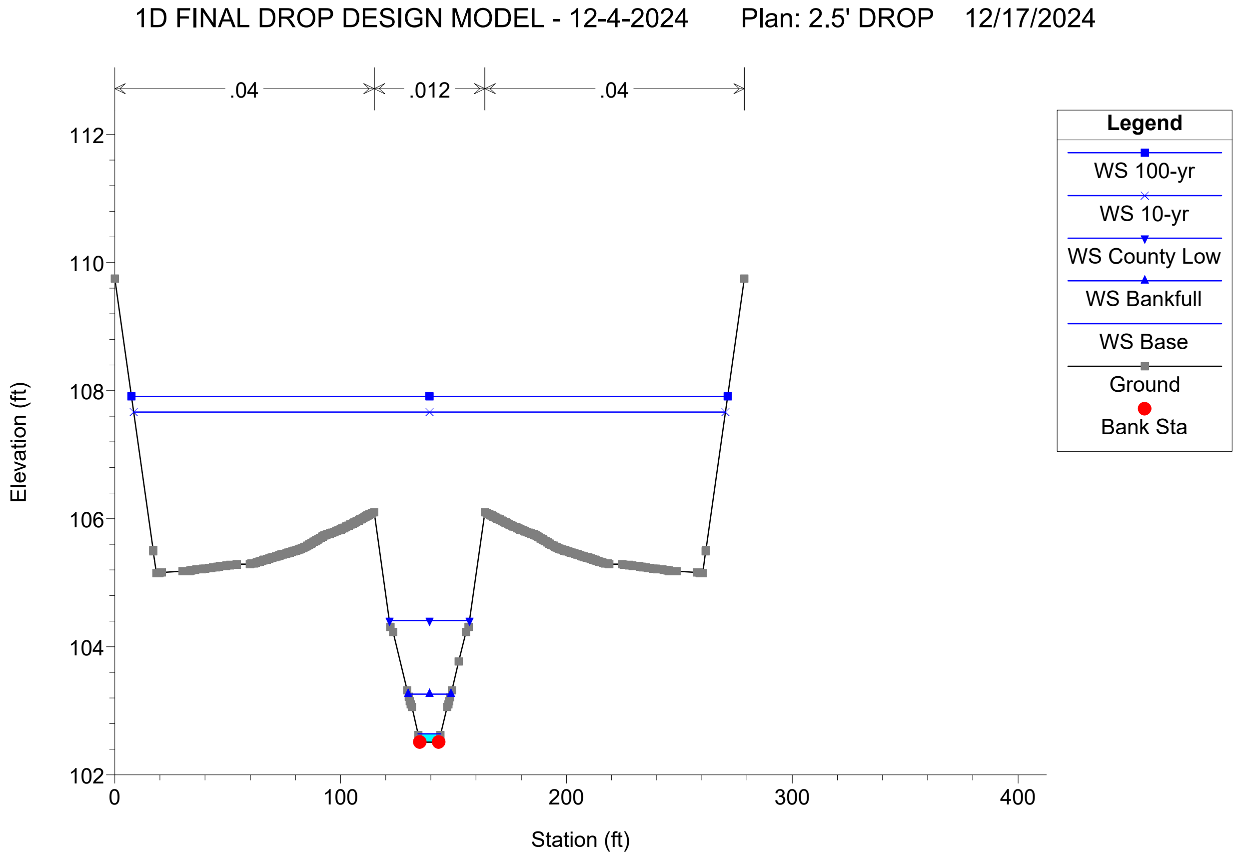


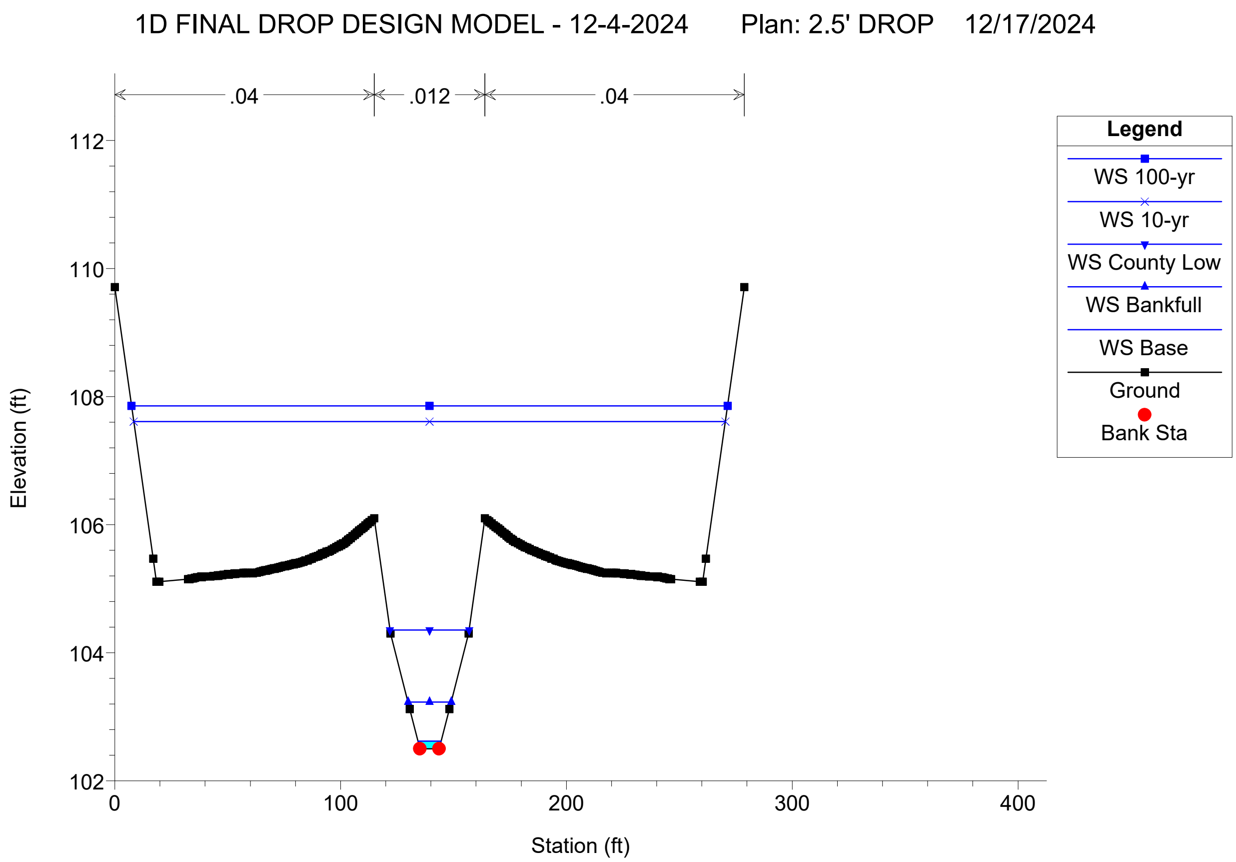
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



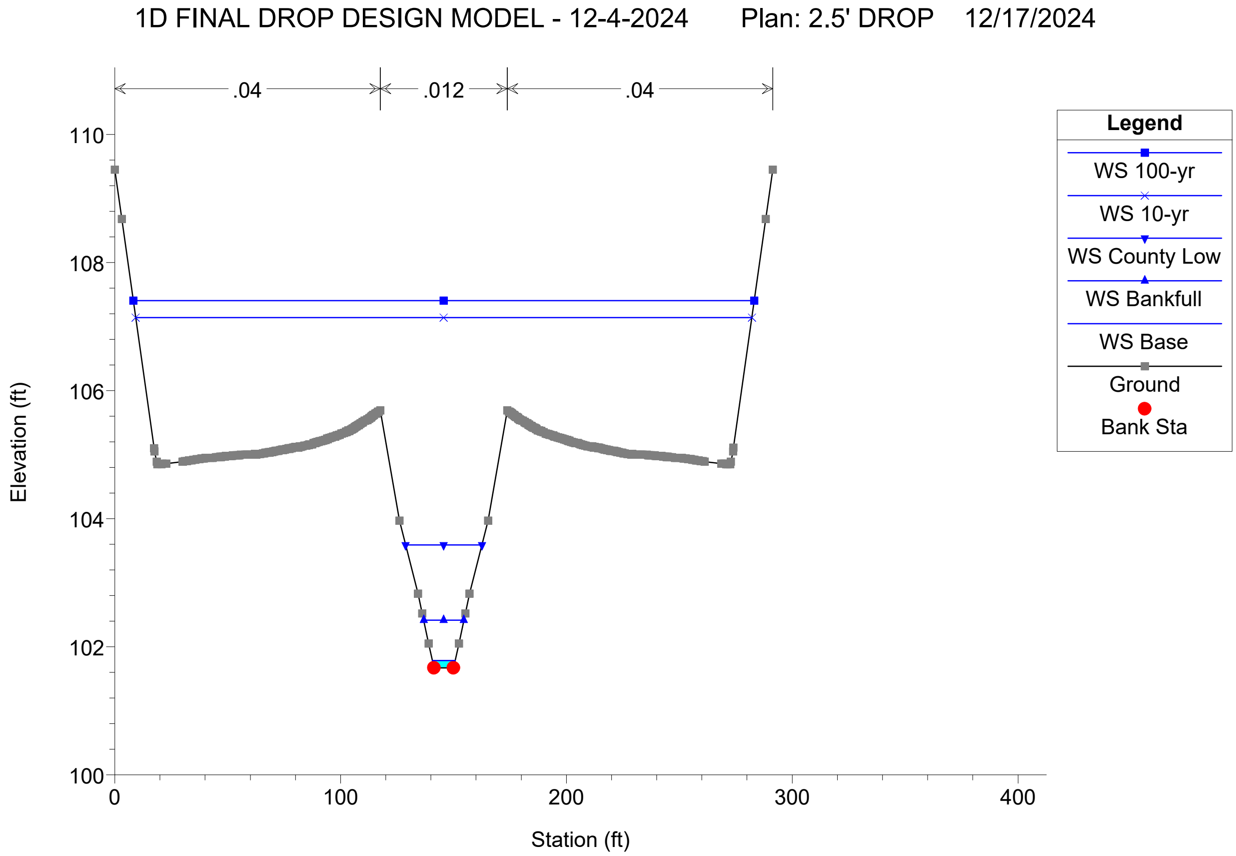


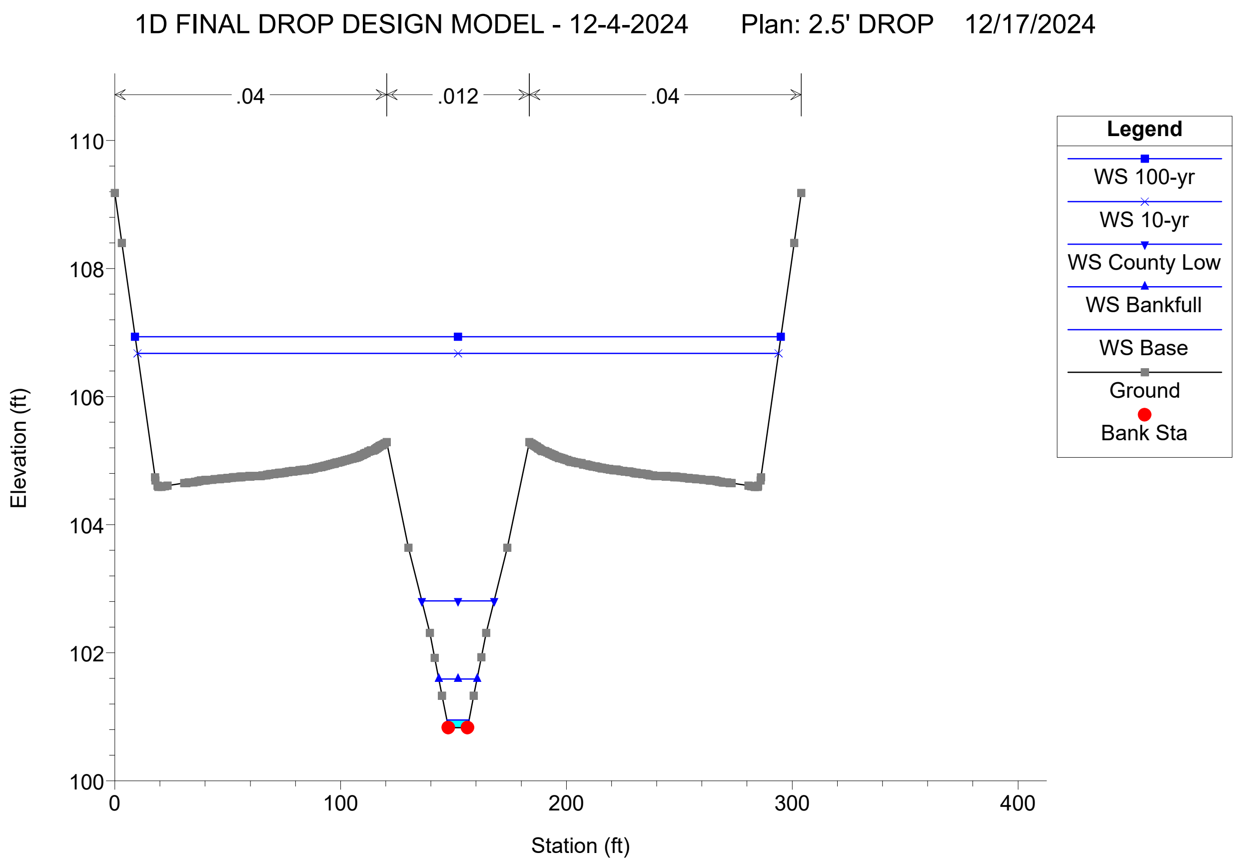
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



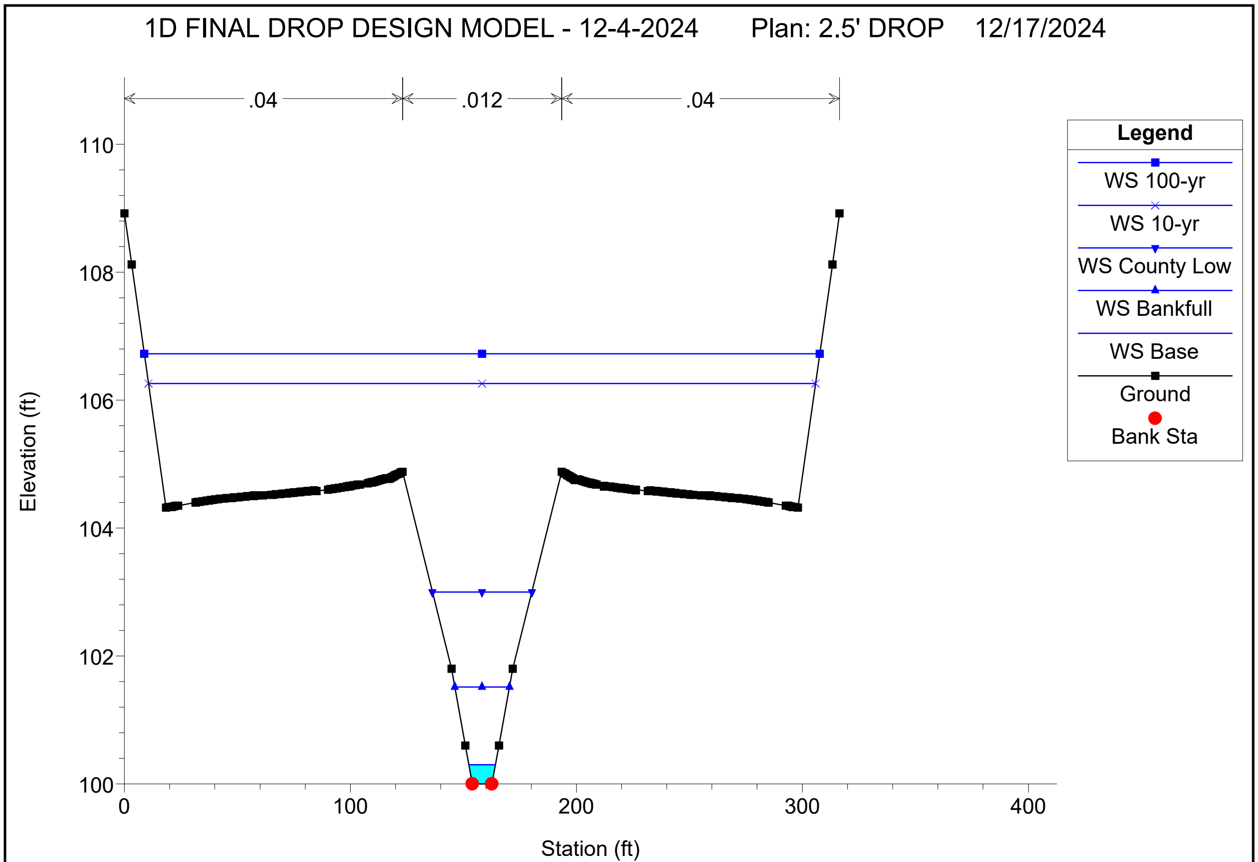


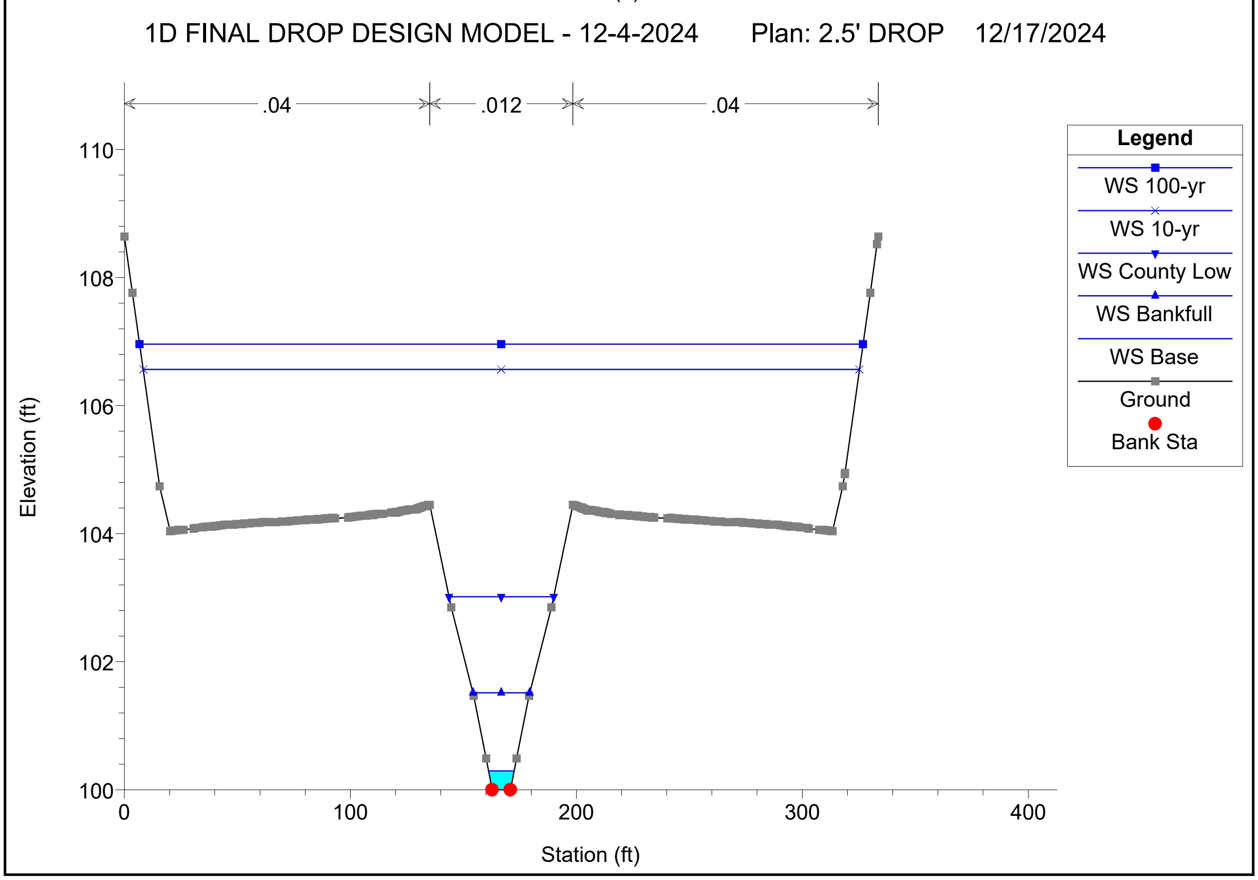
1 in Horiz. = 85 ft 1 in Vert. = 3 ft





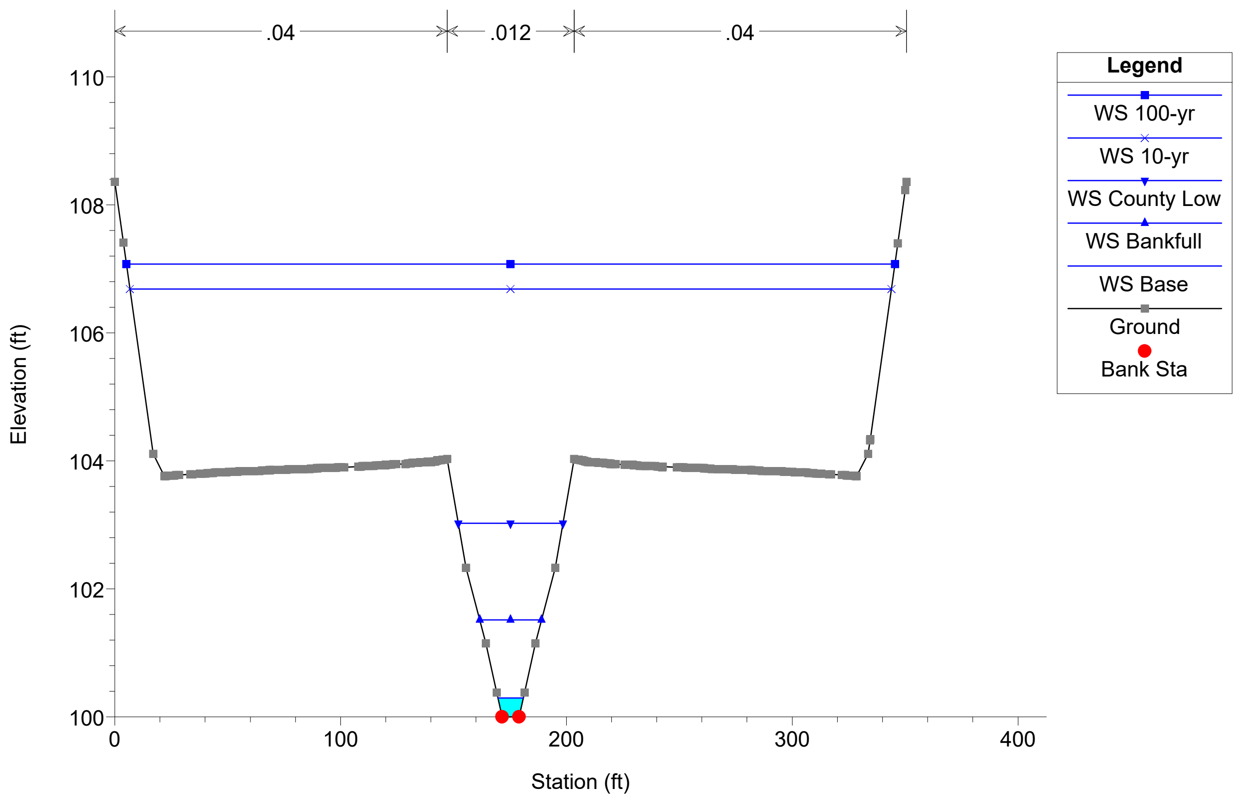
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



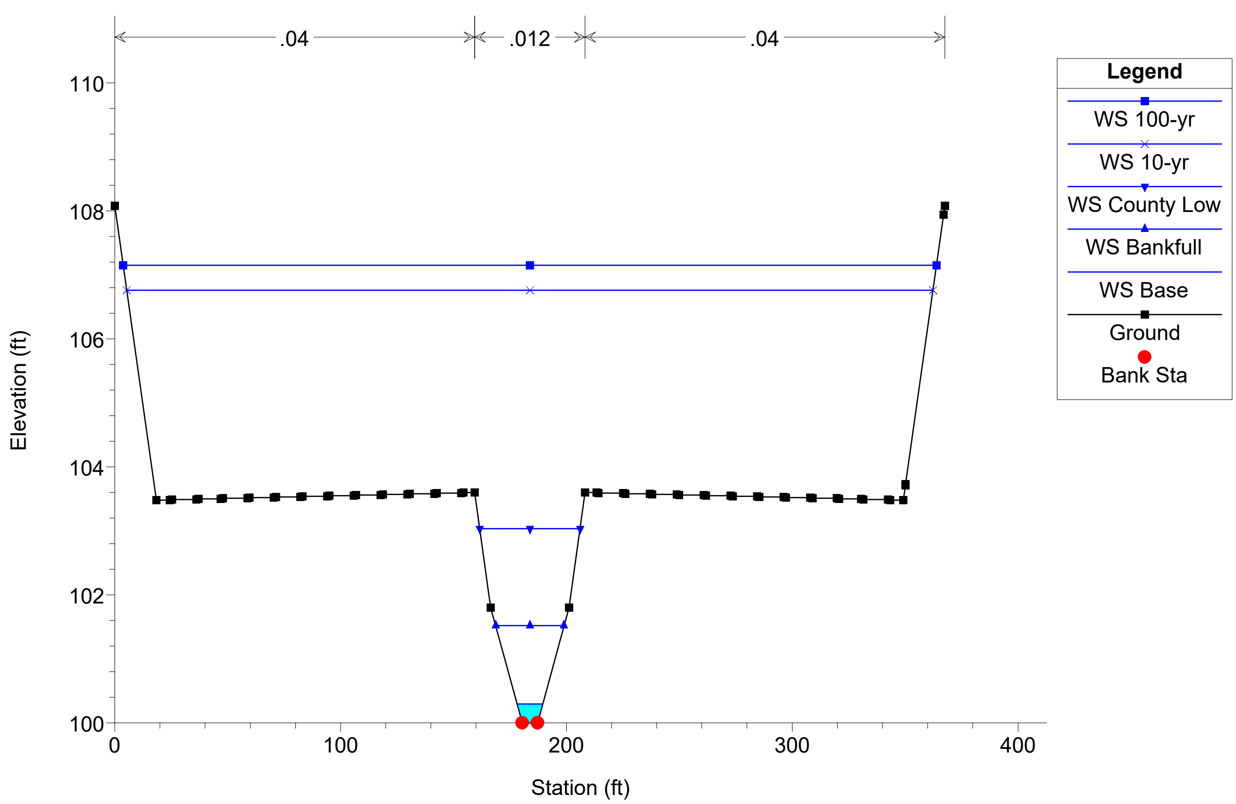


1 in Horiz. = 85 ft 1 in Vert. = 3 ft

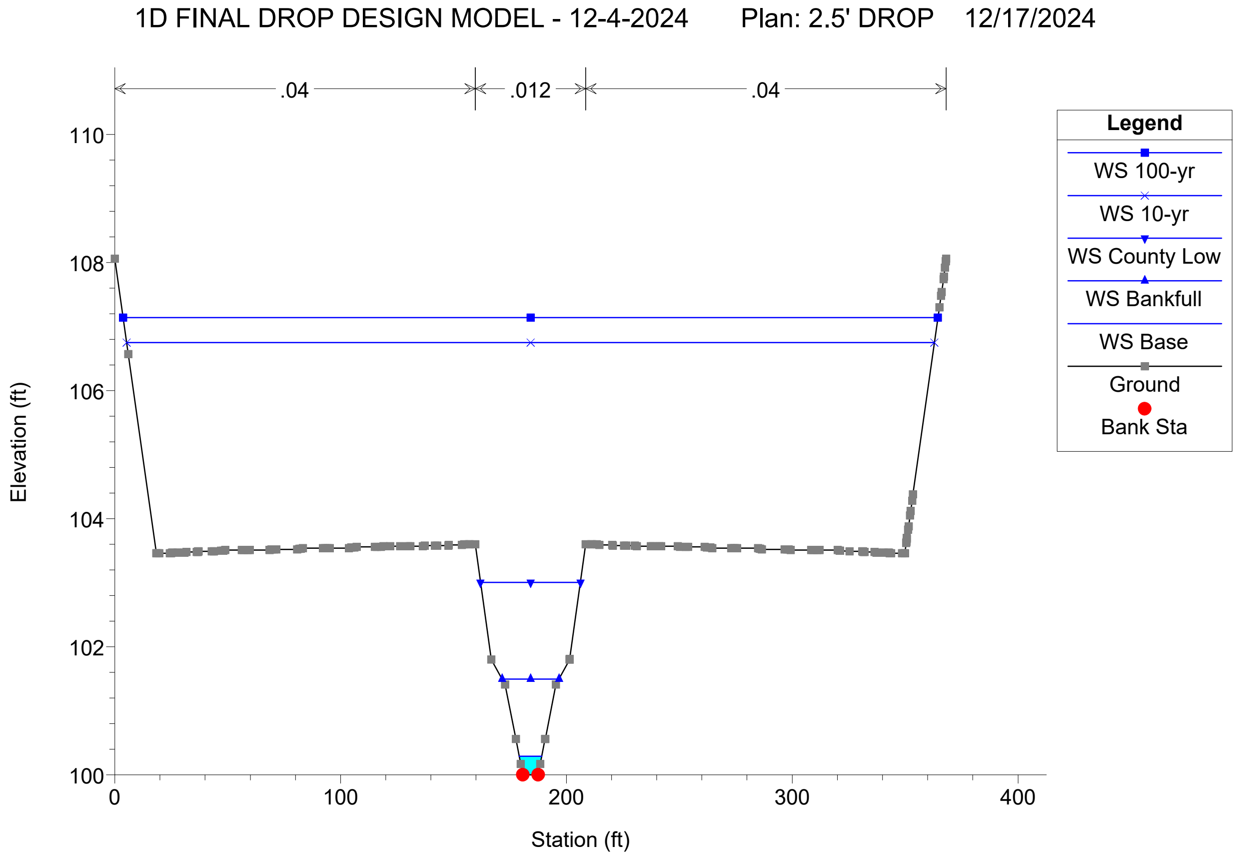
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 2.5' DROP 12/17/2024

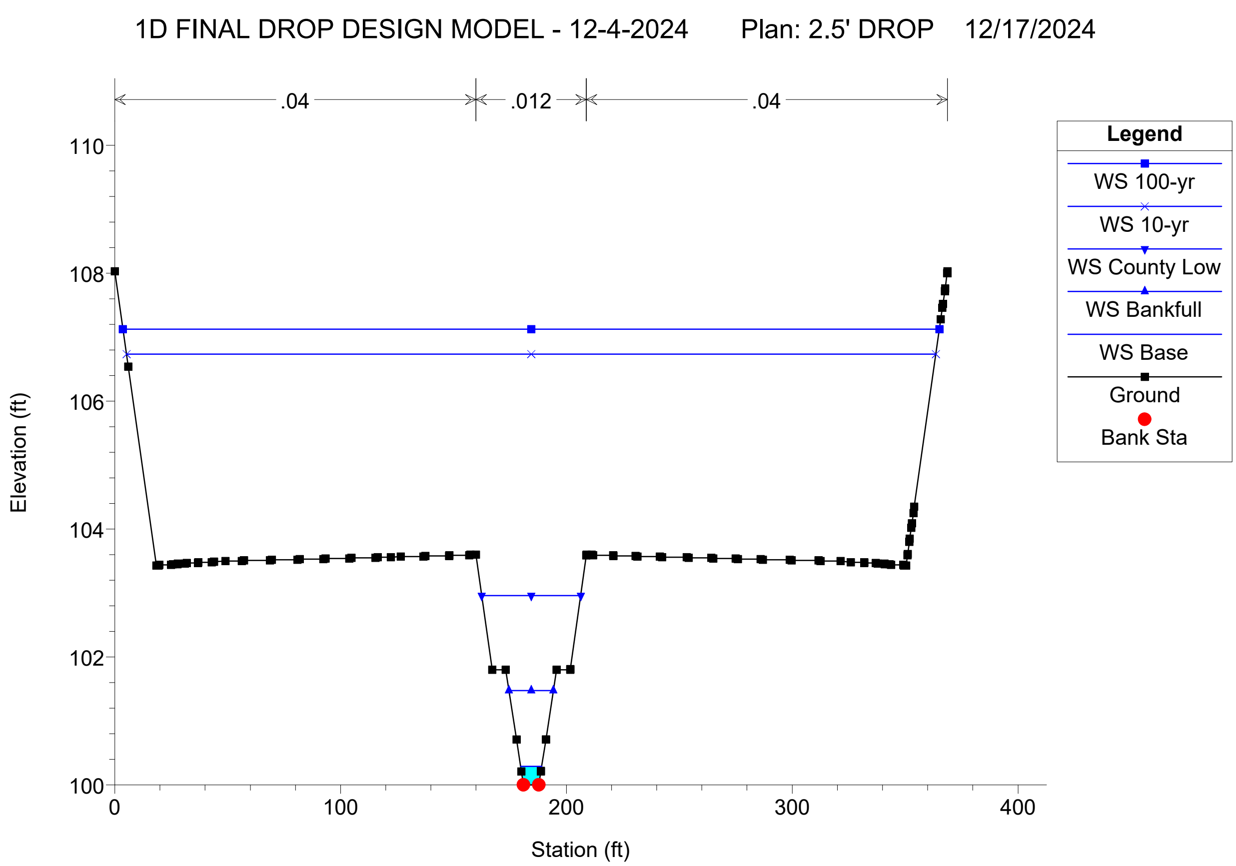


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 2.5' DROP 12/17/2024

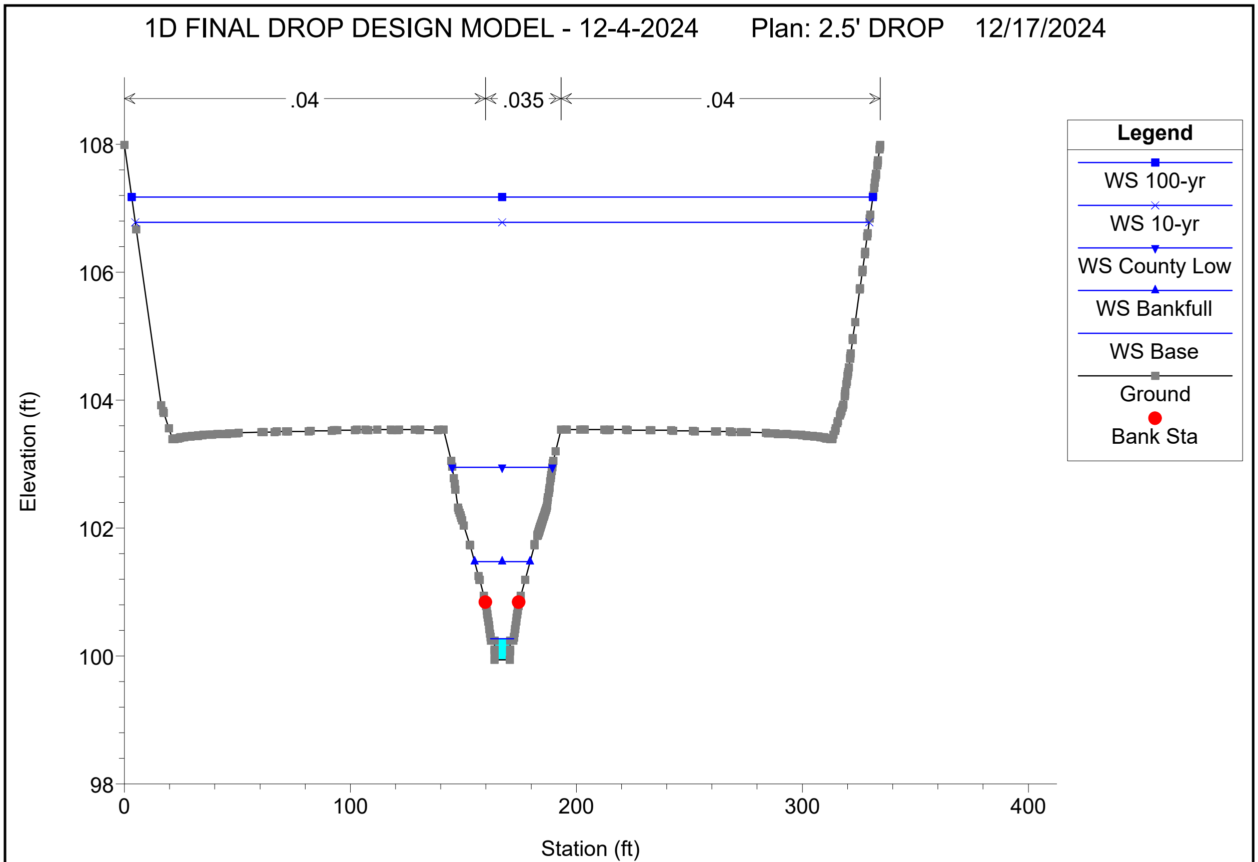


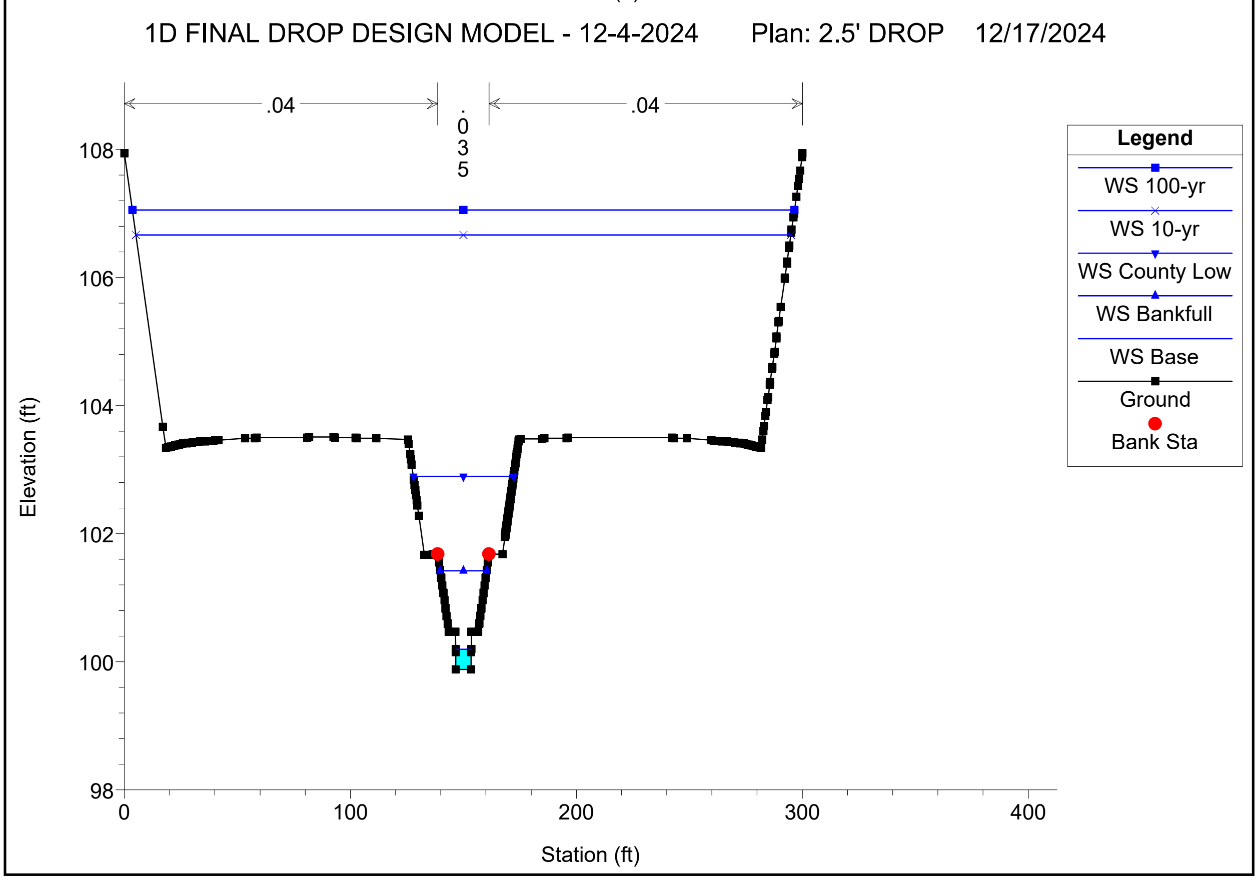
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



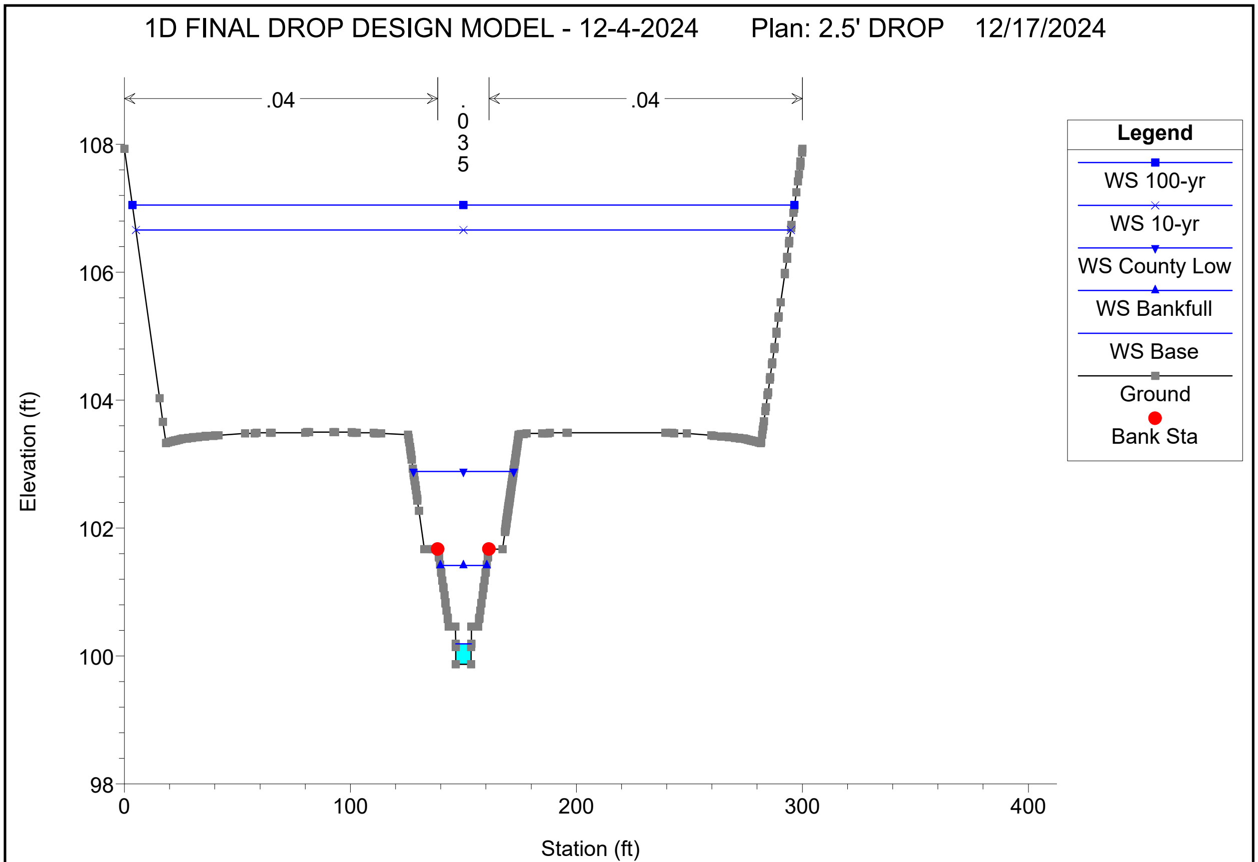


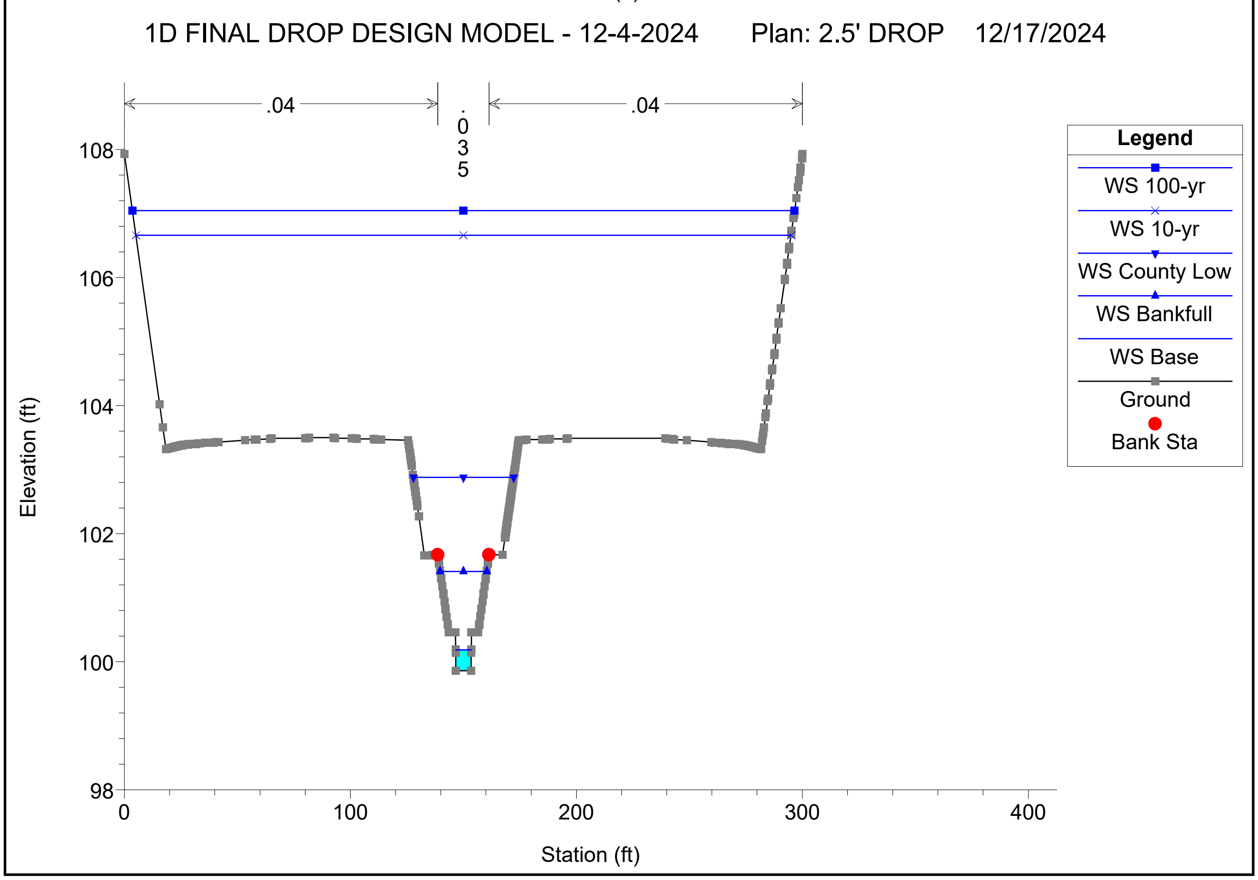
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



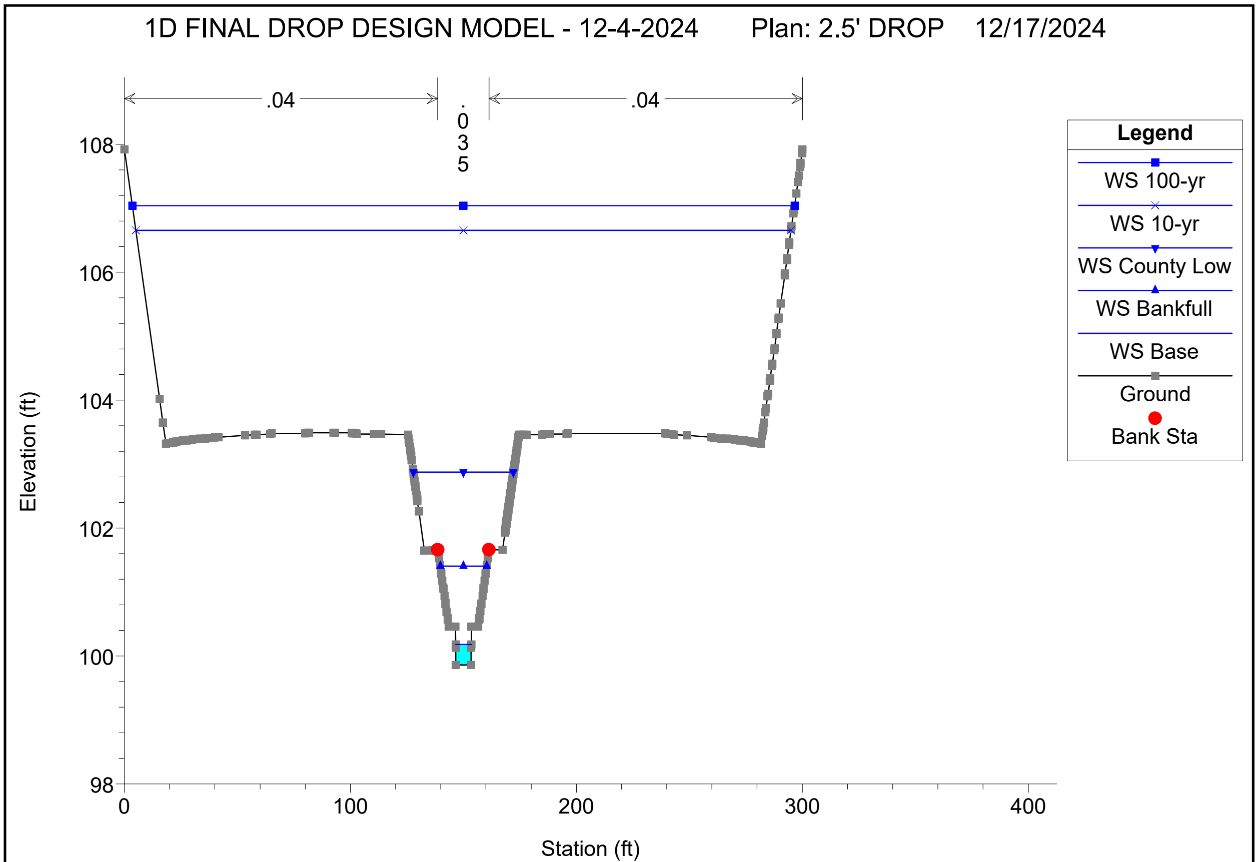


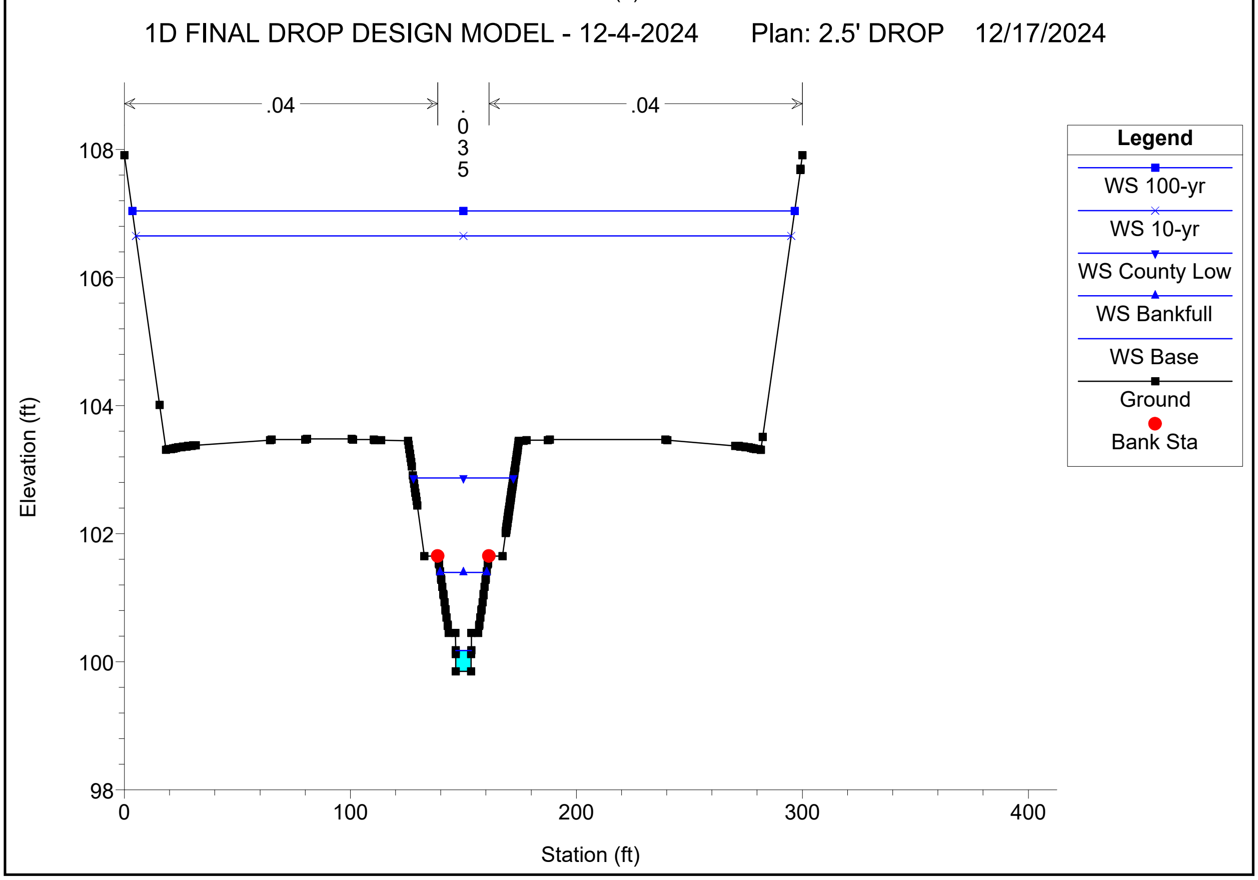
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



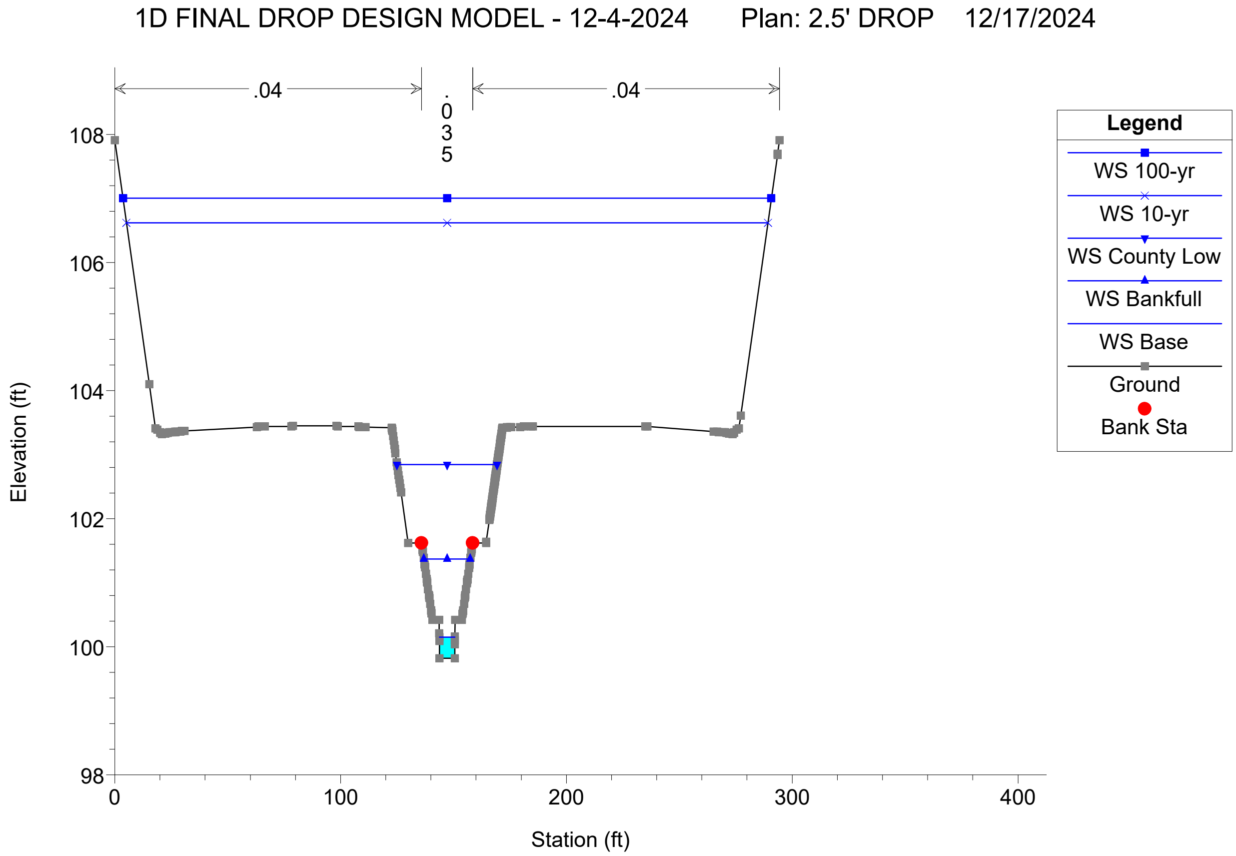


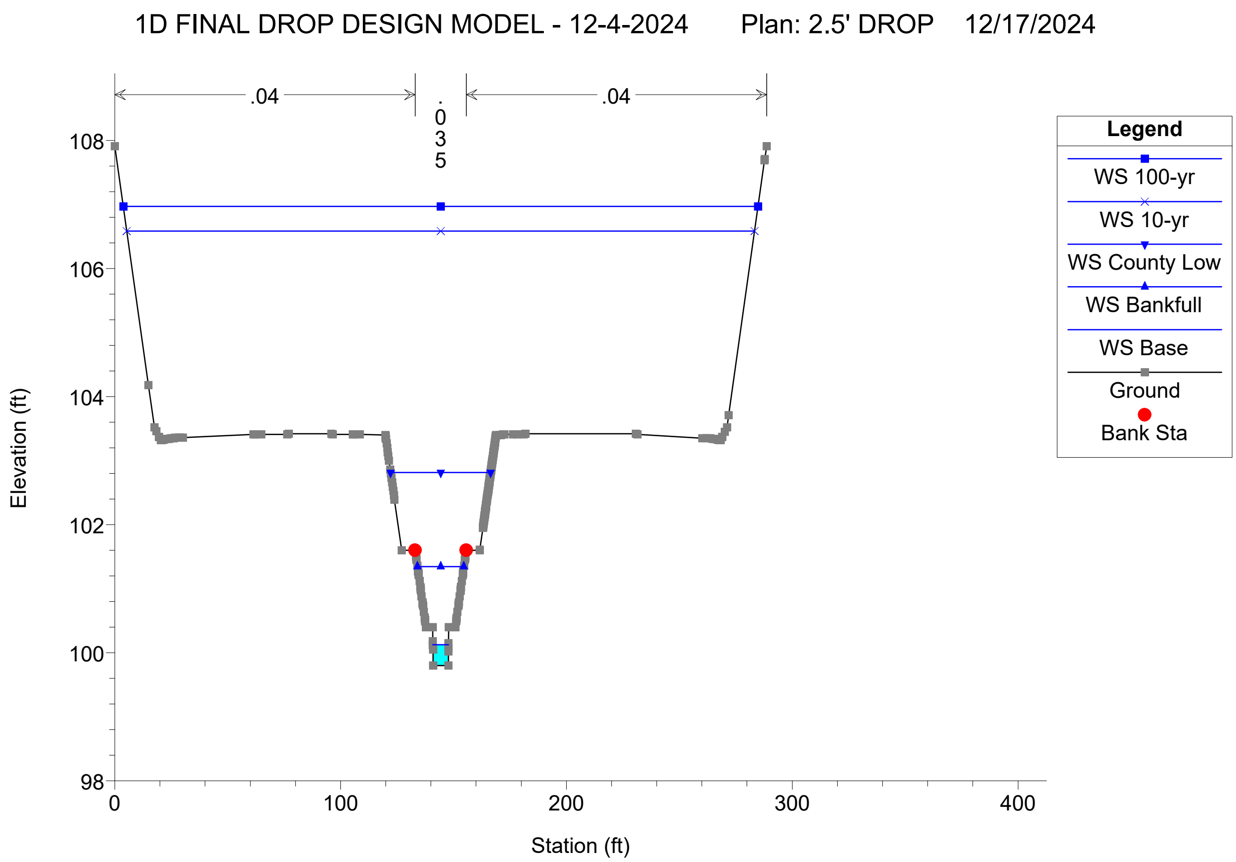
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



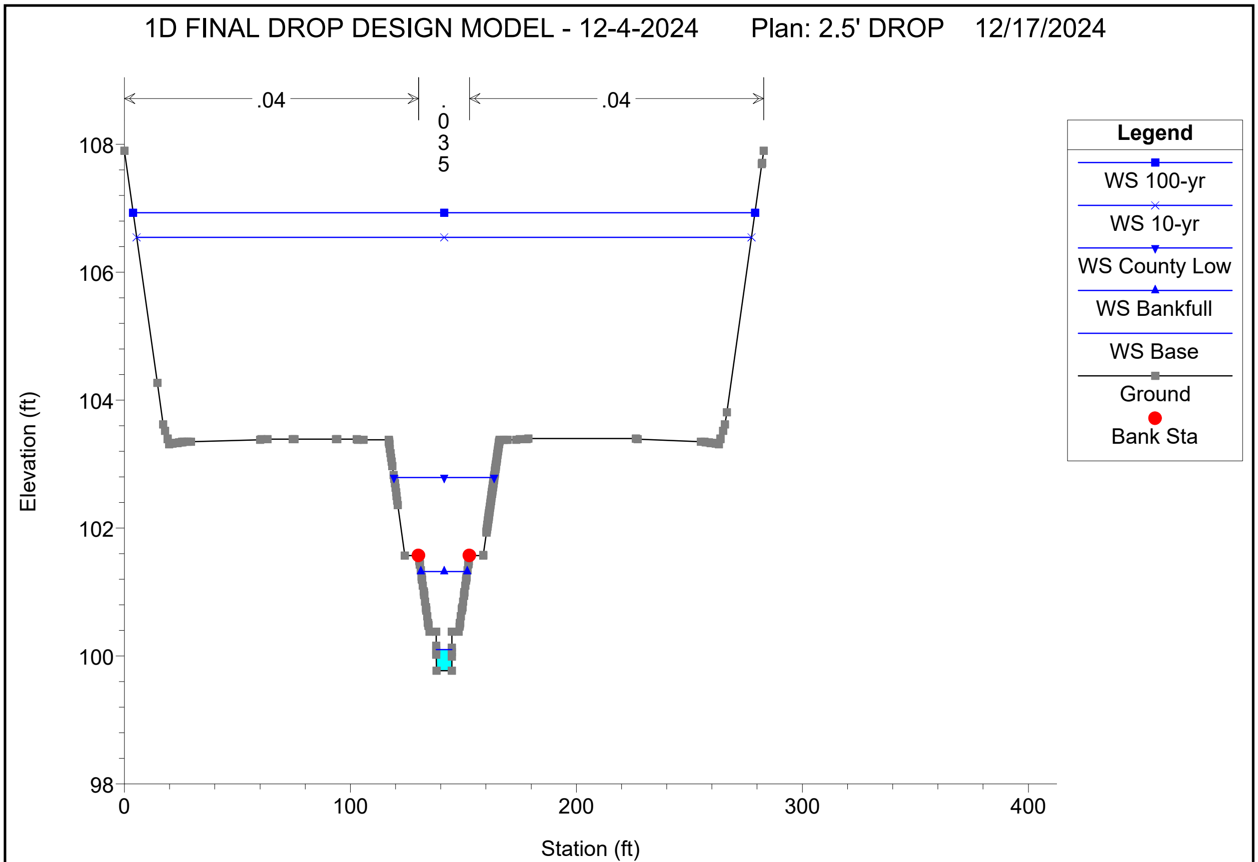


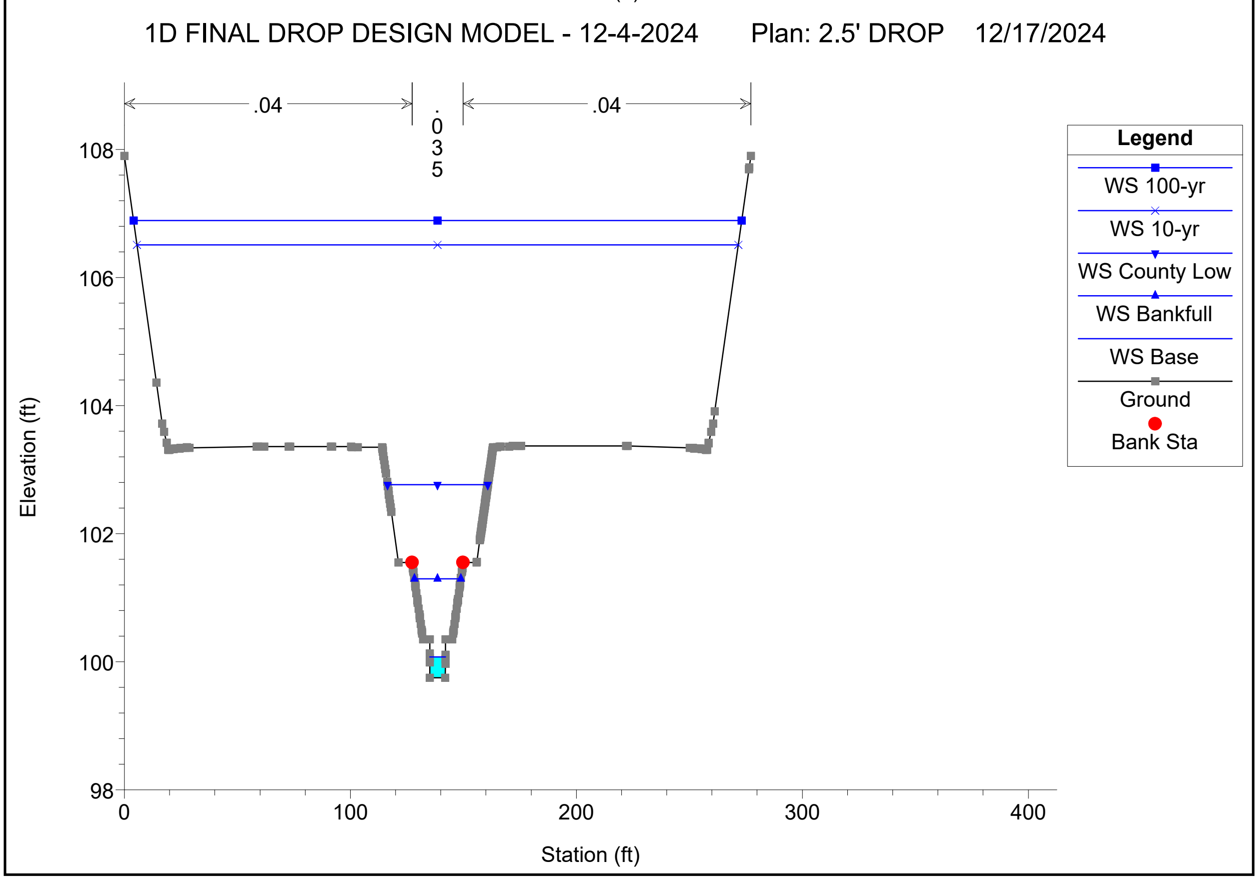
1 in Horiz. = 85 ft 1 in Vert. = 3 ft



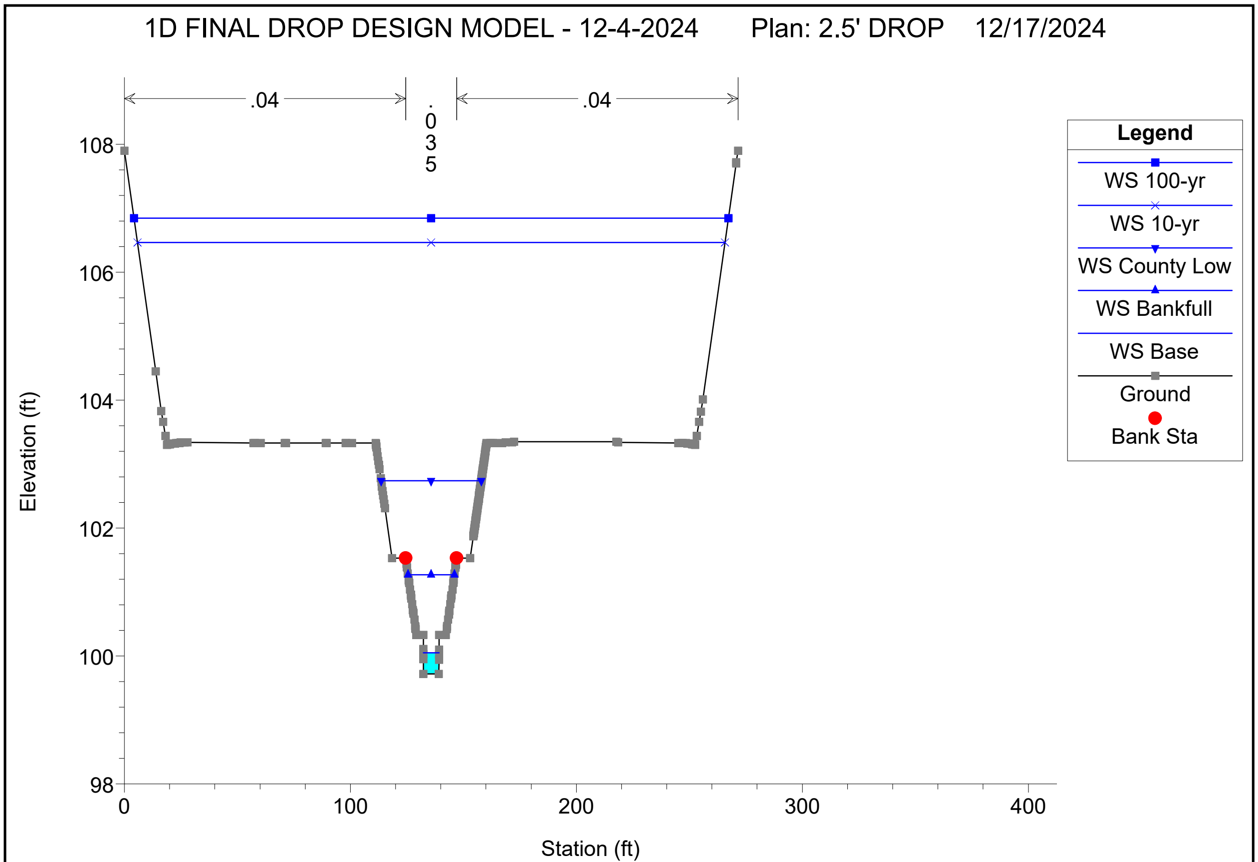


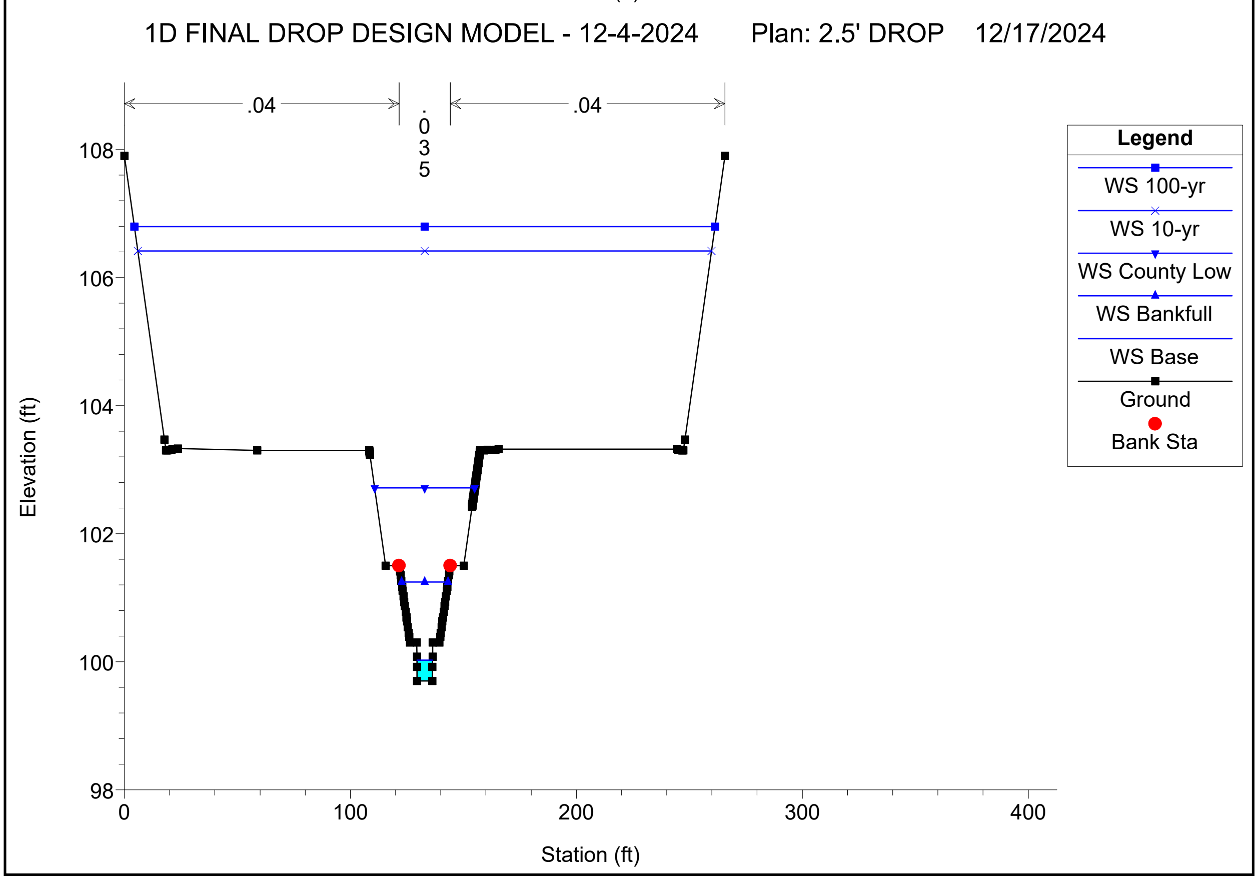
1 in Horiz. = 85 ft 1 in Vert. = 3 ft





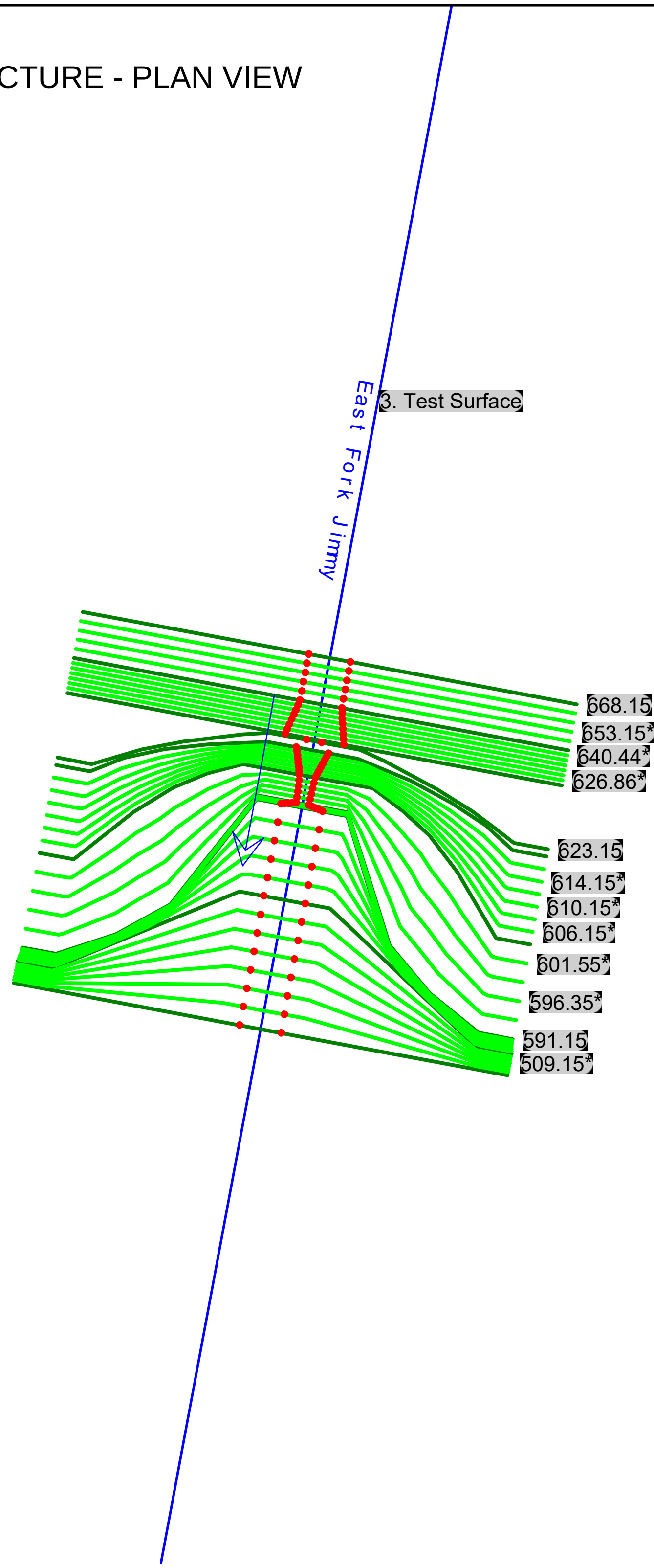
1 in Horiz. = 85 ft 1 in Vert. = 3 ft





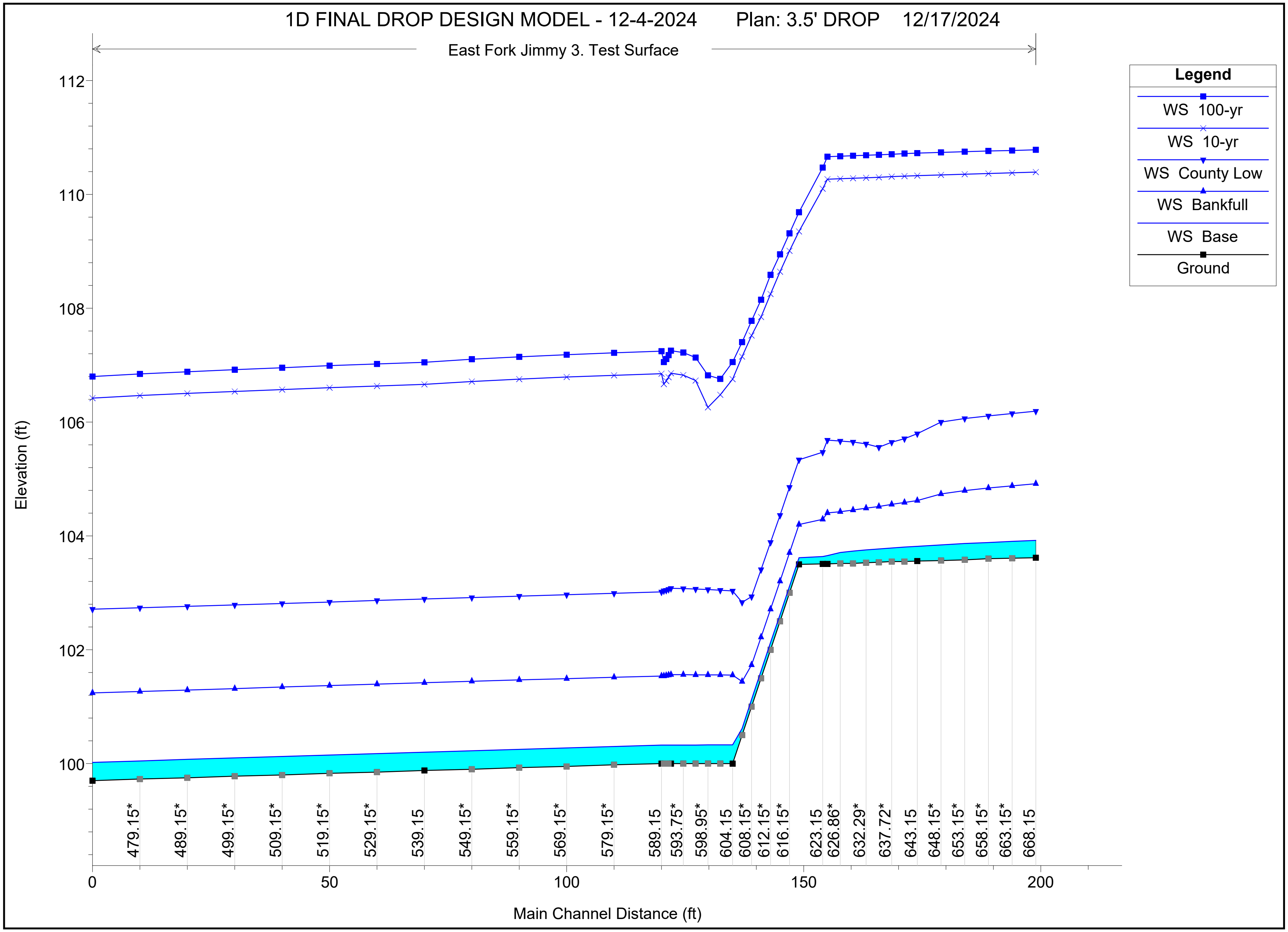
1 in Horiz. = 85 ft 1 in Vert. = 3 ft

3.5' DROP STRUCTURE - PLAN VIEW



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

1 in Horiz. = 100 ft   1 in Vert. = 35 ft



1 in Horiz. = 30 ft 1 in Vert. = 2.5 ft

HEC-RAS Plan: 3.5' DROP River: East Fork Jimmy Reach: 3. Test Surface

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	668.15	Base	2.10	103.62	103.92	103.76	103.94	0.003150	1.02	2.07	6.90	0.33
3. Test Surface	668.15	Bankfull	40.00	103.62	104.92	104.57	105.03	0.005586	2.65	15.08	18.55	0.52
3. Test Surface	668.15	County Low	227.00	103.62	106.19	105.83	106.51	0.005700	4.73	54.51	40.75	0.61
3. Test Surface	668.15	10-yr	3729.00	103.62	110.39	109.14	110.73	0.002358	6.63	867.25	254.33	0.47
3. Test Surface	668.15	100-yr	4400.00	103.62	110.79	109.37	111.16	0.002344	6.89	968.00	257.48	0.48
3. Test Surface	663.15*	Base	2.10	103.61	103.90	103.75	103.92	0.003410	1.04	2.02	6.90	0.34
3. Test Surface	663.15*	Bankfull	40.00	103.61	104.88	104.56	105.00	0.006138	2.74	14.59	18.33	0.54
3. Test Surface	663.15*	County Low	227.00	103.61	106.15	105.82	106.49	0.006075	4.83	53.25	40.52	0.62
3. Test Surface	663.15*	10-yr	3729.00	103.61	110.38	109.13	110.72	0.002362	6.63	866.69	254.32	0.47
3. Test Surface	663.15*	100-yr	4400.00	103.61	110.77	109.36	111.15	0.002348	6.89	967.46	257.46	0.48
3. Test Surface	658.15*	Base	2.10	103.60	103.89	103.74	103.90	0.003779	1.08	1.95	6.90	0.36
3. Test Surface	658.15*	Bankfull	40.00	103.60	104.84	104.55	104.97	0.006757	2.83	14.12	18.13	0.57
3. Test Surface	658.15*	County Low	227.00	103.60	106.11	105.80	106.46	0.006457	4.93	52.10	40.30	0.64
3. Test Surface	658.15*	10-yr	3729.00	103.60	110.37	109.12	110.71	0.002364	6.64	866.46	254.36	0.47
3. Test Surface	658.15*	100-yr	4400.00	103.60	110.76	109.34	111.14	0.002349	6.90	967.28	257.51	0.48
3. Test Surface	653.15*	Base	2.10	103.58	103.87	103.72	103.88	0.003725	1.07	1.96	6.89	0.35
3. Test Surface	653.15*	Bankfull	40.00	103.58	104.80	104.53	104.93	0.007530	2.94	13.60	17.89	0.59
3. Test Surface	653.15*	County Low	227.00	103.58	106.06	105.79	106.43	0.006872	5.03	50.91	40.02	0.66
3. Test Surface	653.15*	10-yr	3729.00	103.58	110.36	109.10	110.70	0.002350	6.62	868.21	254.37	0.47
3. Test Surface	653.15*	100-yr	4400.00	103.58	110.75	109.33	111.12	0.002336	6.88	969.04	257.51	0.48
3. Test Surface	648.15*	Base	2.10	103.57	103.84	103.71	103.86	0.004264	1.12	1.88	6.89	0.38
3. Test Surface	648.15*	Bankfull	40.00	103.57	104.74	104.52	104.89	0.008987	3.13	12.80	17.54	0.65
3. Test Surface	648.15*	County Low	227.00	103.57	106.00	105.77	106.39	0.007673	5.22	48.90	39.63	0.69
3. Test Surface	648.15*	10-yr	3729.00	103.57	110.34	109.09	110.69	0.002352	6.62	867.95	254.41	0.47
3. Test Surface	648.15*	100-yr	4400.00	103.57	110.74	109.34	111.11	0.002338	6.88	968.83	257.56	0.48
3. Test Surface	643.15	Base	2.10	103.56	103.82	103.70	103.84	0.005200	1.19	1.77	6.89	0.41
3. Test Surface	643.15	Bankfull	40.00	103.56	104.62	104.51	104.83	0.013878	3.63	11.02	16.71	0.79
3. Test Surface	643.15	County Low	227.00	103.56	105.80	105.76	106.34	0.011998	6.04	41.45	38.11	0.85
3. Test Surface	643.15	10-yr	3729.00	103.56	110.33	109.08	110.67	0.002356	6.63	867.42	254.39	0.47
3. Test Surface	643.15	100-yr	4400.00	103.56	110.73	109.31	111.10	0.002341	6.89	968.33	257.55	0.48
3. Test Surface	640.44*	Base	2.10	103.55	103.81	103.69	103.83	0.005098	1.17	1.80	7.10	0.41
3. Test Surface	640.44*	Bankfull	40.00	103.55	104.59	104.48	104.79	0.013681	3.58	11.17	17.28	0.79
3. Test Surface	640.44*	County Low	227.00	103.55	105.71	105.71	106.29	0.013547	6.22	39.09	37.43	0.90
3. Test Surface	640.44*	10-yr	3729.00	103.55	110.32	109.08	110.67	0.002333	6.63	867.53	254.51	0.47
3. Test Surface	640.44*	100-yr	4400.00	103.55	110.72	109.32	111.09	0.002320	6.90	968.51	257.68	0.48
3. Test Surface	637.72*	Base	2.10	103.55	103.79	103.69	103.81	0.005990	1.22	1.73	7.31	0.44
3. Test Surface	637.72*	Bankfull	40.00	103.55	104.55	104.45	104.75	0.013710	3.56	11.24	17.81	0.79
3. Test Surface	637.72*	County Low	227.00	103.55	105.65	105.65	106.25	0.014202	6.25	37.99	36.70	0.92
3. Test Surface	637.72*	10-yr	3729.00	103.55	110.31	109.08	110.66	0.002304	6.63	868.40	254.69	0.47
3. Test Surface	637.72*	100-yr	4400.00	103.55	110.71	109.31	111.09	0.002294	6.90	969.47	257.89	0.48
3. Test Surface	635.01*	Base	2.10	103.54	103.77	103.68	103.79	0.006161	1.21	1.73	7.54	0.45
3. Test Surface	635.01*	Bankfull	40.00	103.54	104.52	104.41	104.71	0.013608	3.53	11.35	18.29	0.79
3. Test Surface	635.01*	County Low	227.00	103.54	105.56	105.56	106.18	0.015699	6.35	36.64	33.66	0.97
3. Test Surface	635.01*	10-yr	3729.00	103.54	110.30	109.08	110.66	0.002281	6.63	868.72	254.79	0.47
3. Test Surface	635.01*	100-yr	4400.00	103.54	110.70	109.31	111.08	0.002273	6.90	969.84	258.02	0.48
3. Test Surface	632.29*	Base	2.10	103.53	103.75	103.66	103.78	0.006404	1.22	1.73	7.80	0.46
3. Test Surface	632.29*	Bankfull	40.00	103.53	104.49	104.37	104.67	0.012975	3.46	11.58	18.73	0.77
3. Test Surface	632.29*	County Low	227.00	103.53	105.62	105.50	106.13	0.012004	5.76	40.50	34.79	0.86
3. Test Surface	632.29*	10-yr	3729.00	103.53	110.29	109.08	110.65	0.002252	6.62	869.83	254.98	0.47
3. Test Surface	632.29*	100-yr	4400.00	103.53	110.69	109.31	111.07	0.002247	6.89	971.04	258.23	0.48
3. Test Surface	629.58*	Base	2.10	103.52	103.74	103.65	103.76	0.007076	1.23	1.71	8.27	0.48
3. Test Surface	629.58*	Bankfull	40.00	103.52	104.46	104.34	104.64	0.012823	3.42	11.70	19.18	0.77
3. Test Surface	629.58*	County Low	227.00	103.52	105.65	105.45	106.09	0.009891	5.34	43.64	35.66	0.78
3. Test Surface	629.58*	10-yr	3729.00	103.52	110.29	109.07	110.64	0.002229	6.61	870.39	255.11	0.47
3. Test Surface	629.58*	100-yr	4400.00	103.52	110.68	109.30	111.07	0.002226	6.88	971.64	258.38	0.48
3. Test Surface	626.86*	Base	2.10	103.52	103.71	103.65	103.74	0.010605	1.34	1.57	9.21	0.57
3. Test Surface	626.86*	Bankfull	40.00	103.52	104.42	104.31	104.60	0.012659	3.39	11.78	19.47	0.77
3. Test Surface	626.86*	County Low	227.00	103.52	105.67	105.41	106.06	0.008555	5.03	46.22	36.56	0.73
3. Test Surface	626.86*	10-yr	3729.00	103.52	110.28	109.06	110.64	0.002201	6.58	871.84	255.31	0.47
3. Test Surface	626.86*	100-yr	4400.00	103.52	110.67	109.30	111.06	0.002200	6.86	973.16	258.61	0.48
3. Test Surface	624.15	Base	2.10	103.51	103.66	103.65	103.70	0.020442	1.60	1.31	9.71	0.77
3. Test Surface	624.15	Bankfull	40.00	103.51	104.41	104.27	104.57	0.011683	3.28	12.19	20.01	0.74
3. Test Surface	624.15	County Low	227.00	103.51	105.69	105.36	106.03	0.007413	4.75	48.98	37.54	0.68
3. Test Surface	624.15	10-yr	3729.00	103.51	110.27	109.04	110.63	0.002178	6.56	872.68	255.43	0.47
3. Test Surface	624.15	100-yr	4400.00	103.51	110.66	109.30	111.06	0.002180	6.84	974.04	258.75	0.47
3. Test Surface	623.15	Base	2.10	103.51	103.64	103.63	103.69	0.003371	1.85	1.17	9.63	0.90

HEC-RAS Plan: 3.5' DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

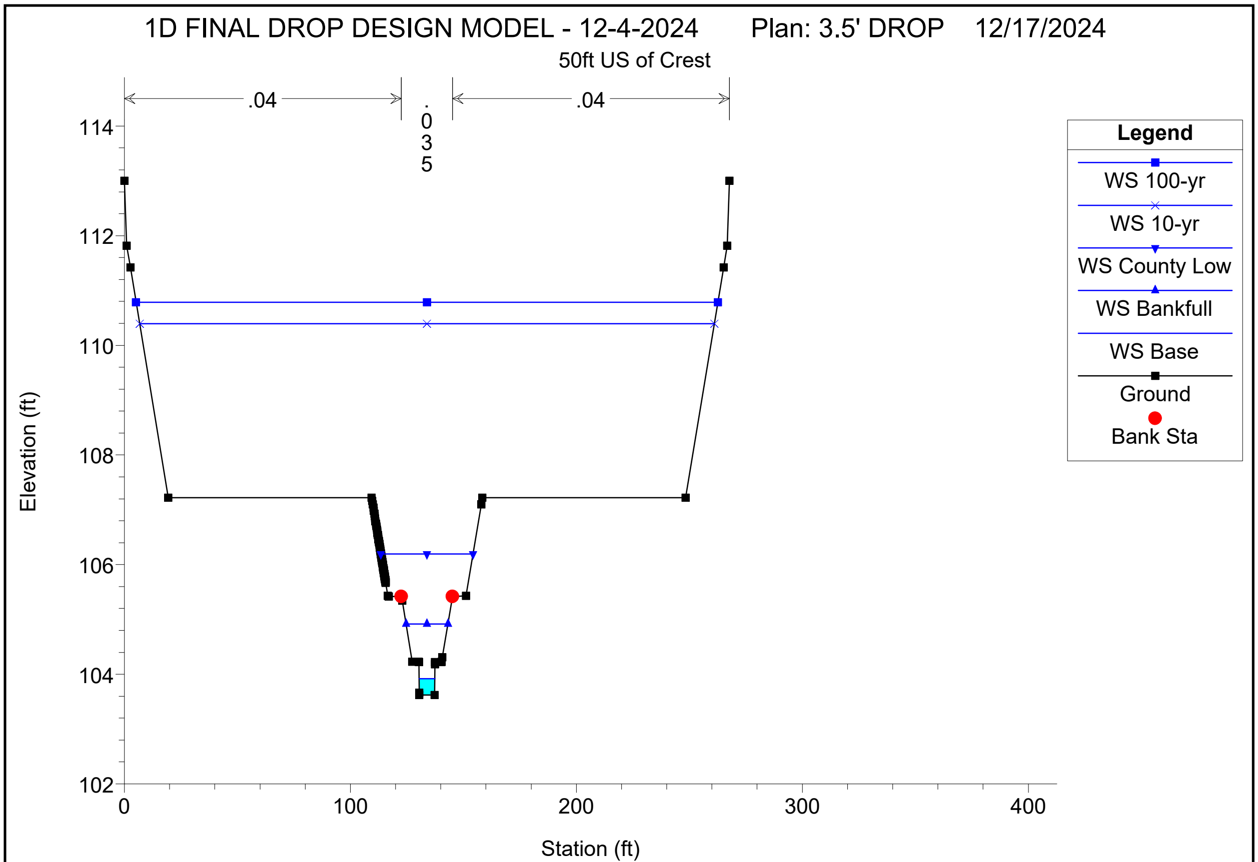
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	623.15	Bankfull	40.00	103.51	104.29	104.29	104.57	0.001946	4.64	10.16	18.68	0.92
3. Test Surface	623.15	County Low	227.00	103.51	105.47	105.47	106.03	0.001382	7.21	41.67	35.89	0.91
3. Test Surface	623.15	10-yr	3729.00	103.51	110.10	109.10	110.63	0.000691	11.45	869.45	264.39	0.79
3. Test Surface	623.15	100-yr	4400.00	103.51	110.47	109.38	111.05	0.000727	12.17	968.20	267.17	0.81
3. Test Surface	618.15	Base	2.10	103.50	103.62	103.62	103.67	0.004443	1.88	1.12	10.31	1.00
3. Test Surface	618.15	Bankfull	40.00	103.50	104.20	104.20	104.47	0.002576	4.18	9.61	18.73	1.00
3. Test Surface	618.15	County Low	227.00	103.50	105.34	105.34	105.92	0.001384	6.49	40.21	34.91	0.88
3. Test Surface	618.15	10-yr	3729.00	103.50	109.35	109.35	110.62	0.001239	13.85	686.11	264.10	1.02
3. Test Surface	618.15	100-yr	4400.00	103.50	109.69	109.69	111.04	0.001278	14.62	775.46	266.41	1.05
3. Test Surface	616.15*	Base	2.10	103.00	103.12	103.12	103.17	0.004530	1.89	1.11	10.30	1.01
3. Test Surface	616.15*	Bankfull	40.00	103.00	103.70	103.70	103.98	0.002415	4.22	9.63	18.59	0.98
3. Test Surface	616.15*	County Low	227.00	103.00	104.86	104.86	105.44	0.001375	6.60	40.01	34.07	0.88
3. Test Surface	616.15*	10-yr	3729.00	103.00	109.01	109.01	110.25	0.001192	13.89	683.89	268.51	1.01
3. Test Surface	616.15*	100-yr	4400.00	103.00	109.32	109.32	110.67	0.001264	14.80	767.14	270.72	1.05
3. Test Surface	614.15*	Base	2.10	102.50	102.62	102.62	102.67	0.004684	1.91	1.10	10.29	1.03
3. Test Surface	614.15*	Bankfull	40.00	102.50	103.21	103.21	103.49	0.002296	4.27	9.65	18.39	0.96
3. Test Surface	614.15*	County Low	227.00	102.50	104.37	104.37	104.97	0.001394	6.75	39.55	33.15	0.89
3. Test Surface	614.15*	10-yr	3729.00	102.50	108.65	108.65	109.87	0.001173	14.04	674.38	272.77	1.01
3. Test Surface	614.15*	100-yr	4400.00	102.50	108.95	108.95	110.29	0.001253	15.00	757.23	275.03	1.05
3. Test Surface	612.15*	Base	2.10	102.00	102.13	102.13	102.17	0.003210	1.69	1.24	10.50	0.87
3. Test Surface	612.15*	Bankfull	40.00	102.00	102.71	102.71	103.00	0.002200	4.34	9.67	18.05	0.95
3. Test Surface	612.15*	County Low	227.00	102.00	103.89	103.89	104.50	0.001399	6.90	39.24	32.35	0.90
3. Test Surface	612.15*	10-yr	3729.00	102.00	108.25	108.25	109.50	0.001190	14.36	655.40	276.66	1.02
3. Test Surface	612.15*	100-yr	4400.00	102.00	108.59	108.59	109.91	0.001232	15.14	750.02	279.31	1.04
3. Test Surface	610.15*	Base	2.10	101.50	101.63	101.63	101.68	0.003153	1.68	1.25	10.46	0.86
3. Test Surface	610.15*	Bankfull	40.00	101.50	102.22	102.22	102.51	0.002122	4.41	9.70	17.77	0.94
3. Test Surface	610.15*	County Low	227.00	101.50	103.41	103.41	104.04	0.001418	7.05	38.86	31.51	0.91
3. Test Surface	610.15*	10-yr	3729.00	101.50	107.85	107.85	108.99	0.001105	14.02	634.05	280.41	0.98
3. Test Surface	610.15*	100-yr	4400.00	101.50	108.15	108.15	109.37	0.001159	14.82	719.26	282.88	1.02
3. Test Surface	608.15*	Base	2.10	101.00	101.13	101.13	101.18	0.003105	1.68	1.25	10.46	0.85
3. Test Surface	608.15*	Bankfull	40.00	101.00	101.74	101.74	102.03	0.002080	4.51	9.68	17.32	0.94
3. Test Surface	608.15*	County Low	227.00	101.00	102.94	102.94	103.58	0.001435	7.22	38.52	30.83	0.92
3. Test Surface	608.15*	10-yr	3729.00	101.00	107.52	107.52	108.61	0.001054	13.98	631.83	284.74	0.97
3. Test Surface	608.15*	100-yr	4400.00	101.00	107.78	107.78	108.99	0.001154	15.02	705.94	286.97	1.02
3. Test Surface	606.15*	Base	2.10	100.50	100.62	100.62	100.67	0.004300	1.89	1.11	10.18	0.99
3. Test Surface	606.15*	Bankfull	40.00	100.50	101.44	101.25	101.61	0.000855	3.46	13.16	19.01	0.63
3. Test Surface	606.15*	County Low	227.00	100.50	102.84	102.46	103.22	0.000703	5.77	50.11	34.31	0.67
3. Test Surface	606.15*	10-yr	3729.00	100.50	107.15	107.15	108.23	0.001053	14.19	615.39	288.52	0.97
3. Test Surface	606.15*	100-yr	4400.00	100.50	107.41	107.41	108.61	0.001159	15.26	689.30	290.87	1.02
3. Test Surface	604.15	Base	2.10	100.00	100.33	100.12	100.34	0.000124	0.66	3.40	11.99	0.20
3. Test Surface	604.15	Bankfull	40.00	100.00	101.56	100.76	101.60	0.000129	1.89	25.87	24.62	0.27
3. Test Surface	604.15	County Low	227.00	100.00	103.03	101.99	103.21	0.000247	4.08	74.72	41.91	0.41
3. Test Surface	604.15	10-yr	3729.00	100.00	106.76	106.76	107.85	0.001076	14.52	591.58	292.19	0.98
3. Test Surface	604.15	100-yr	4400.00	100.00	107.06	107.06	108.22	0.001137	15.36	679.64	294.96	1.02
3. Test Surface	601.55*	Base	2.10	100.00	100.33	100.14	100.34	0.000132	0.68	3.32	11.92	0.21
3. Test Surface	601.55*	Bankfull	40.00	100.00	101.56	100.77	101.60	0.000127	1.88	26.39	25.60	0.27
3. Test Surface	601.55*	County Low	227.00	100.00	103.05	101.98	103.20	0.000228	3.93	77.34	42.44	0.40
3. Test Surface	601.55*	10-yr	3729.00	100.00	106.48	106.48	107.53	0.001166	14.70	613.02	302.92	1.02
3. Test Surface	601.55*	100-yr	4400.00	100.00	106.76	106.76	107.88	0.001234	15.55	698.92	305.45	1.05
3. Test Surface	598.95*	Base	2.10	100.00	100.33	100.13	100.34	0.000141	0.70	3.24	11.81	0.22
3. Test Surface	598.95*	Bankfull	40.00	100.00	101.56	100.78	101.60	0.000126	1.87	26.93	26.71	0.26
3. Test Surface	598.95*	County Low	227.00	100.00	103.06	101.97	103.20	0.000211	3.79	80.01	43.06	0.38
3. Test Surface	598.95*	10-yr	3729.00	100.00	106.26	106.18	107.20	0.001190	14.50	653.31	314.06	1.02
3. Test Surface	598.95*	100-yr	4400.00	100.00	106.82	106.45	107.60	0.000955	13.77	831.83	318.97	0.93
3. Test Surface	596.35*	Base	2.10	100.00	100.33	100.13	100.34	0.000151	0.72	3.17	11.81	0.22
3. Test Surface	596.35*	Bankfull	40.00	100.00	101.56	100.78	101.60	0.000122	1.84	27.70	27.97	0.26
3. Test Surface	596.35*	County Low	227.00	100.00	103.07	101.97	103.20	0.000194	3.65	82.86	43.69	0.37
3. Test Surface	596.35*	10-yr	3729.00	100.00	106.73	105.91	107.18	0.000604	10.85	925.65	331.02	0.74
3. Test Surface	596.35*	100-yr	4400.00	100.00	107.13	106.13	107.59	0.000595	11.19	1058.89	334.42	0.74
3. Test Surface	593.75*	Base	2.10	100.00	100.33	100.13	100.34	0.000160	0.74	3.11	11.84	0.23
3. Test Surface	593.75*	Bankfull	40.00	100.00	101.56	100.79	101.60	0.000118	1.81	28.60	29.42	0.26
3. Test Surface	593.75*	County Low	227.00	100.00	103.08	101.93	103.20	0.000180	3.52	85.51	44.26	0.35
3. Test Surface	593.75*	10-yr	3729.00	100.00	106.83	105.59	107.13	0.000451	9.47	1085.96	344.50	0.64
3. Test Surface	593.75*	100-yr	4400.00	100.00	107.22	105.84	107.55	0.000455	9.87	1223.18	347.79	0.65
3. Test Surface	591.15	Base	2.10	100.00	100.33	100.14	100.33	0.000171	0.77	3.04	11.84	0.24
3. Test Surface	591.15	Bankfull	40.00	100.00	101.56	100.79	101.60	0.000114	1.78	29.53	30.96	0.25

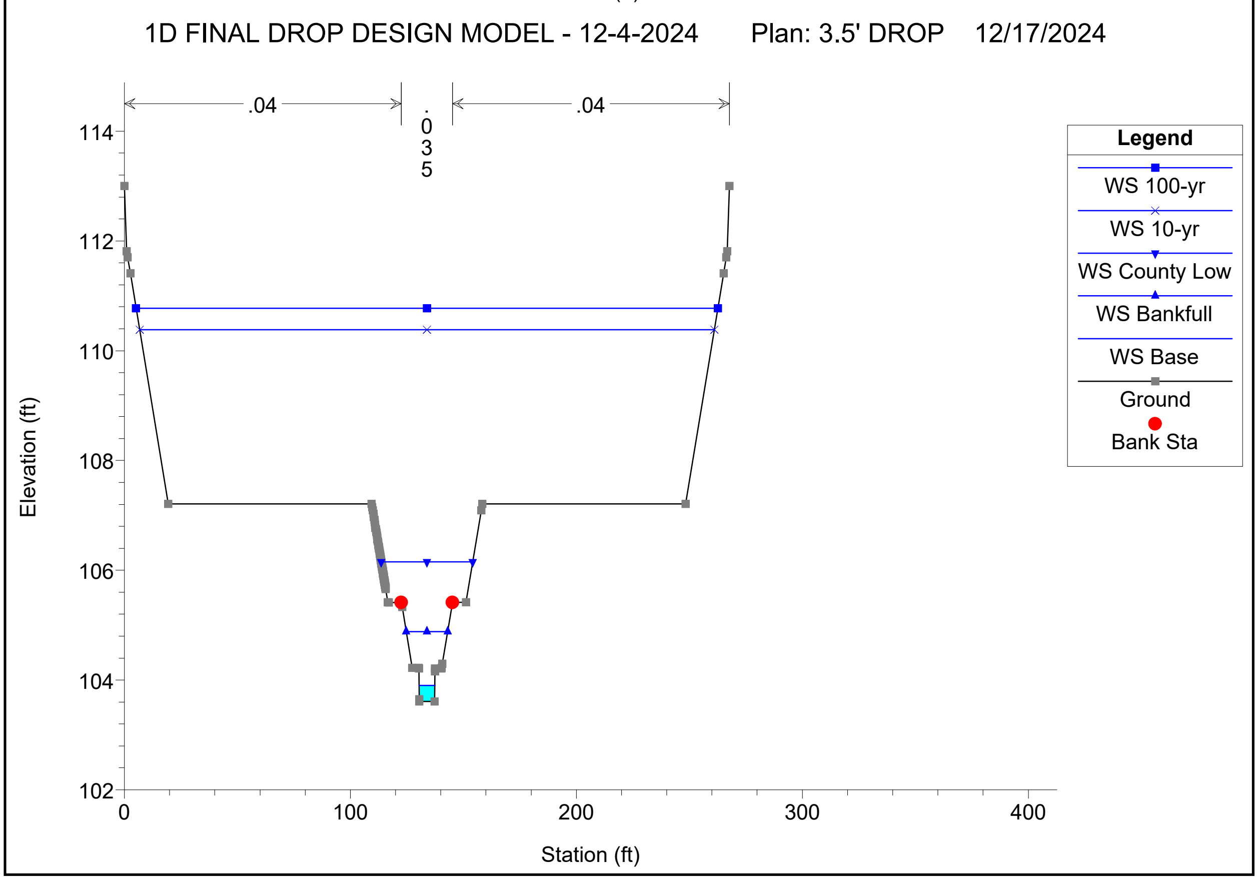
HEC-RAS Plan: 3.5' DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	591.15	County Low	227.00	100.00	103.08	101.90	103.20	0.000167	3.39	88.19	44.86	0.34
3. Test Surface	591.15	10-yr	3729.00	100.00	106.86	105.29	107.12	0.000422	9.18	1234.64	357.32	0.62
3. Test Surface	591.15	100-yr	4400.00	100.00	107.25	105.54	107.53	0.000437	9.71	1375.74	360.51	0.64
3. Test Surface	590.65*	Base	2.10	100.00	100.32	100.14	100.33	0.000223	0.78	2.69	9.68	0.26
3. Test Surface	590.65*	Bankfull	40.00	100.00	101.56	100.85	101.60	0.000126	1.79	27.37	29.42	0.26
3. Test Surface	590.65*	County Low	227.00	100.00	103.07	101.96	103.19	0.000185	3.47	85.50	46.88	0.35
3. Test Surface	590.65*	10-yr	3729.00	100.00	106.79	105.46	107.11	0.000437	9.15	1210.25	357.19	0.62
3. Test Surface	590.65*	100-yr	4400.00	100.00	107.18	105.71	107.53	0.000452	9.66	1350.14	360.36	0.64
3. Test Surface	590.15*	Base	2.10	100.00	100.32	100.14	100.33	0.000222	0.78	2.69	9.68	0.26
3. Test Surface	590.15*	Bankfull	40.00	100.00	101.55	100.84	101.60	0.000156	1.83	25.04	29.58	0.28
3. Test Surface	590.15*	County Low	227.00	100.00	103.05	102.02	103.19	0.000207	3.51	81.60	47.37	0.37
3. Test Surface	590.15*	10-yr	3729.00	100.00	106.72	105.56	107.11	0.000455	9.10	1187.56	357.08	0.63
3. Test Surface	590.15*	100-yr	4400.00	100.00	107.11	105.83	107.52	0.000468	9.59	1326.58	360.23	0.65
3. Test Surface	589.65*	Base	2.10	100.00	100.32	100.14	100.33	0.000216	0.77	2.72	9.79	0.26
3. Test Surface	589.65*	Bankfull	40.00	100.00	101.54	100.84	101.60	0.000208	1.90	21.91	30.16	0.32
3. Test Surface	589.65*	County Low	227.00	100.00	103.04	102.09	103.19	0.000221	3.46	78.08	44.32	0.38
3. Test Surface	589.65*	10-yr	3729.00	100.00	106.67	105.66	107.10	0.000475	9.05	1168.05	357.05	0.64
3. Test Surface	589.65*	100-yr	4400.00	100.00	107.05	105.91	107.52	0.000486	9.53	1306.59	360.20	0.65
3. Test Surface	589.15	Base	2.10	100.00	100.32	100.14	100.33	0.001819	0.77	2.74	9.85	0.26
3. Test Surface	589.15	Bankfull	40.00	100.00	101.54	100.83	101.59	0.001953	1.90	21.07	20.34	0.33
3. Test Surface	589.15	County Low	227.00	100.00	103.02	102.16	103.19	0.002242	3.56	74.66	44.33	0.41
3. Test Surface	589.15	10-yr	3729.00	100.00	106.85	105.20	107.02	0.001180	4.88	1231.49	358.98	0.34
3. Test Surface	589.15	100-yr	4400.00	100.00	107.25	105.38	107.43	0.001166	5.05	1374.49	362.20	0.35
3. Test Surface	579.15*	Base	2.10	99.98	100.30	100.12	100.31	0.002315	0.84	2.49	9.21	0.29
3. Test Surface	579.15*	Bankfull	40.00	99.98	101.52	100.84	101.57	0.002037	1.92	20.86	20.41	0.33
3. Test Surface	579.15*	County Low	227.00	99.98	102.99	102.15	103.17	0.002289	3.57	74.30	44.33	0.41
3. Test Surface	579.15*	10-yr	3729.00	99.98	106.82	105.22	107.01	0.001286	5.07	1180.48	345.18	0.36
3. Test Surface	579.15*	100-yr	4400.00	99.98	107.22	105.41	107.42	0.001271	5.26	1317.59	348.38	0.36
3. Test Surface	569.15*	Base	2.10	99.95	100.28	100.09	100.29	0.002517	0.90	2.33	8.11	0.30
3. Test Surface	569.15*	Bankfull	40.00	99.95	101.50	100.84	101.55	0.002134	1.93	20.68	20.48	0.34
3. Test Surface	569.15*	County Low	227.00	99.95	102.97	102.13	103.14	0.002337	3.58	74.08	44.34	0.41
3. Test Surface	569.15*	10-yr	3729.00	99.95	106.79	105.25	106.99	0.001410	5.27	1129.29	331.40	0.37
3. Test Surface	569.15*	100-yr	4400.00	99.95	107.19	105.43	107.40	0.001394	5.46	1260.49	334.58	0.38
3. Test Surface	559.15*	Base	2.10	99.93	100.25	100.07	100.26	0.002497	0.94	2.23	7.05	0.30
3. Test Surface	559.15*	Bankfull	40.00	99.93	101.47	100.83	101.53	0.002230	1.95	20.48	20.48	0.34
3. Test Surface	559.15*	County Low	227.00	99.93	102.94	102.11	103.12	0.002388	3.59	73.83	44.34	0.41
3. Test Surface	559.15*	10-yr	3729.00	99.93	106.76	105.27	106.98	0.001551	5.49	1078.21	317.57	0.39
3. Test Surface	559.15*	100-yr	4400.00	99.93	107.15	105.49	107.39	0.001535	5.69	1203.39	320.72	0.39
3. Test Surface	549.15*	Base	2.10	99.90	100.23	100.04	100.24	0.002402	0.93	2.25	6.98	0.29
3. Test Surface	549.15*	Bankfull	40.00	99.90	101.45	100.83	101.51	0.002347	1.97	20.26	20.51	0.35
3. Test Surface	549.15*	County Low	227.00	99.90	102.92	102.10	103.09	0.002440	3.60	73.65	44.31	0.41
3. Test Surface	549.15*	10-yr	3729.00	99.90	106.72	105.31	106.96	0.001722	5.73	1025.99	303.73	0.41
3. Test Surface	549.15*	100-yr	4400.00	99.90	107.11	105.51	107.37	0.001705	5.94	1145.12	306.84	0.41
3. Test Surface	539.15	Base	2.10	99.88	100.20	100.02	100.21	0.002590	0.96	2.20	6.91	0.30
3. Test Surface	539.15	Bankfull	40.00	99.88	101.42	100.83	101.48	0.002515	2.01	19.93	20.54	0.36
3. Test Surface	539.15	County Low	227.00	99.88	102.89	102.08	103.07	0.002506	3.61	73.35	44.32	0.42
3. Test Surface	539.15	10-yr	3729.00	99.88	106.67	105.34	106.94	0.001932	6.01	972.23	289.81	0.43
3. Test Surface	539.15	100-yr	4400.00	99.88	107.05	105.54	107.35	0.001915	6.23	1085.18	292.89	0.43
3. Test Surface	529.15*	Base	2.10	99.85	100.18	99.99	100.19	0.002452	0.94	2.23	6.91	0.29
3. Test Surface	529.15*	Bankfull	40.00	99.85	101.40	100.80	101.46	0.002485	2.00	20.02	20.57	0.36
3. Test Surface	529.15*	County Low	227.00	99.85	102.87	102.05	103.04	0.002491	3.60	73.48	44.33	0.41
3. Test Surface	529.15*	10-yr	3729.00	99.85	106.64	105.32	106.92	0.001993	6.10	955.83	284.75	0.44
3. Test Surface	529.15*	100-yr	4400.00	99.85	107.02	105.54	107.33	0.001979	6.33	1066.56	287.83	0.44
3. Test Surface	519.15*	Base	2.10	99.83	100.15	99.97	100.16	0.002596	0.96	2.19	6.91	0.30
3. Test Surface	519.15*	Bankfull	40.00	99.83	101.37	100.78	101.43	0.002519	2.01	19.93	20.54	0.36
3. Test Surface	519.15*	County Low	227.00	99.83	102.84	102.03	103.02	0.002511	3.61	73.28	44.32	0.42
3. Test Surface	519.15*	10-yr	3729.00	99.83	106.61	105.32	106.90	0.002058	6.20	939.56	279.65	0.44
3. Test Surface	519.15*	100-yr	4400.00	99.83	106.99	105.53	107.31	0.002046	6.43	1048.04	282.74	0.45
3. Test Surface	509.15*	Base	2.10	99.80	100.13	99.94	100.14	0.002460	0.94	2.23	6.91	0.29
3. Test Surface	509.15*	Bankfull	40.00	99.80	101.35	100.75	101.41	0.002490	2.00	20.00	20.56	0.36
3. Test Surface	509.15*	County Low	227.00	99.80	102.81	102.00	102.99	0.002497	3.60	73.41	44.33	0.42
3. Test Surface	509.15*	10-yr	3729.00	99.80	106.57	105.30	106.88	0.002132	6.30	922.42	274.56	0.45
3. Test Surface	509.15*	100-yr	4400.00	99.80	106.96	105.52	107.29	0.002122	6.55	1028.64	277.61	0.45
3. Test Surface	499.15*	Base	2.10	99.78	100.10	99.92	100.11	0.002609	0.96	2.19	6.91	0.30
3. Test Surface	499.15*	Bankfull	40.00	99.78	101.32	100.73	101.38	0.002524	2.01	19.91	20.53	0.36
3. Test Surface	499.15*	County Low	227.00	99.78	102.79	101.98	102.97	0.002516	3.61	73.24	44.32	0.42

HEC-RAS Plan: 3.5' DROP   River: East Fork Jimmy   Reach: 3. Test Surface (Continued)

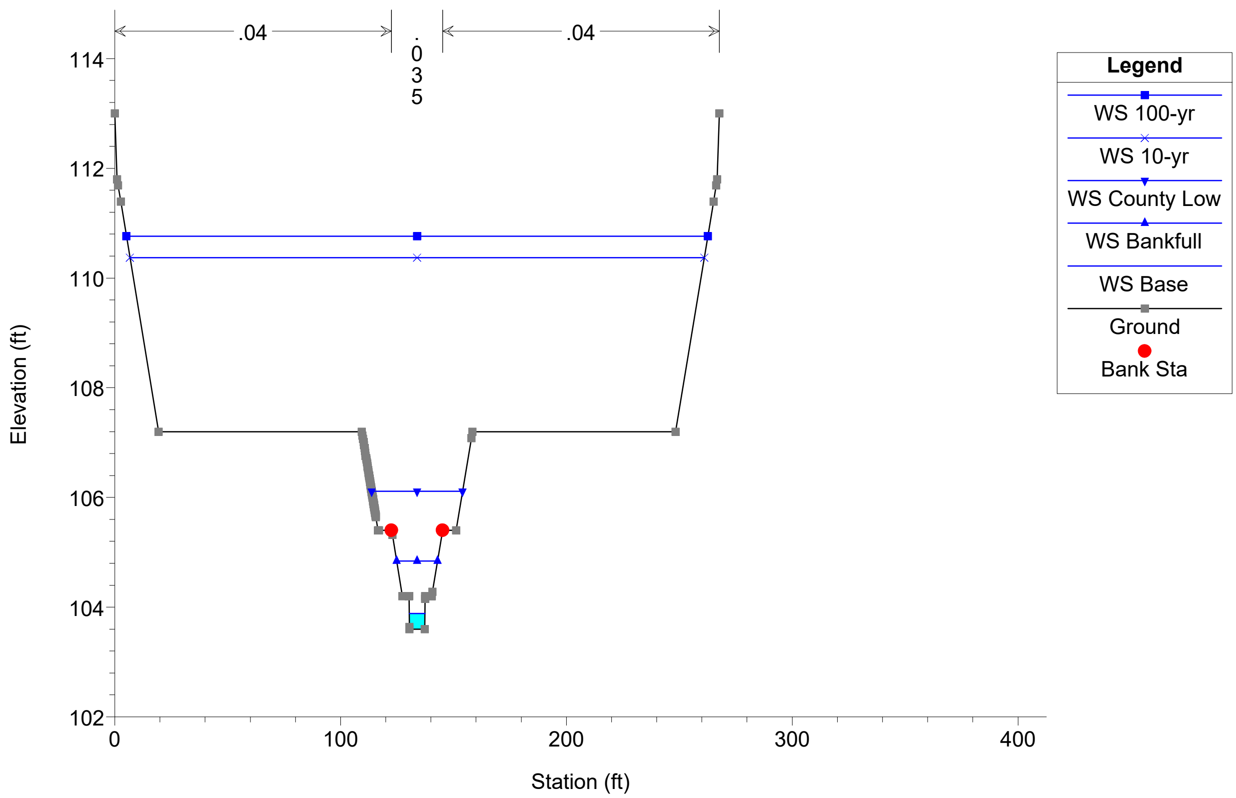
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	499.15*	10-yr	3729.00	99.78	106.54	105.29	106.85	0.002209	6.41	905.46	269.44	0.46
3. Test Surface	499.15*	100-yr	4400.00	99.78	106.92	105.50	107.27	0.002205	6.67	1008.93	272.48	0.46
3. Test Surface	489.15*	Base	2.10	99.75	100.07	99.89	100.09	0.002475	0.94	2.23	6.91	0.29
3. Test Surface	489.15*	Bankfull	40.00	99.75	101.29	100.70	101.36	0.002495	2.00	19.99	20.56	0.36
3. Test Surface	489.15*	County Low	227.00	99.75	102.76	101.95	102.94	0.002502	3.61	73.36	44.32	0.42
3. Test Surface	489.15*	10-yr	3729.00	99.75	106.50	105.28	106.83	0.002293	6.52	888.06	264.32	0.47
3. Test Surface	489.15*	100-yr	4400.00	99.75	106.89	105.50	107.24	0.002292	6.79	989.22	267.39	0.47
3. Test Surface	479.15*	Base	2.10	99.73	100.05	99.87	100.06	0.002630	0.96	2.18	6.91	0.30
3. Test Surface	479.15*	Bankfull	40.00	99.73	101.27	100.68	101.33	0.002530	2.01	19.90	20.53	0.36
3. Test Surface	479.15*	County Low	227.00	99.73	102.74	101.93	102.92	0.002519	3.61	73.21	44.29	0.42
3. Test Surface	479.15*	10-yr	3729.00	99.73	106.47	105.27	106.81	0.002389	6.65	869.93	259.18	0.48
3. Test Surface	479.15*	100-yr	4400.00	99.73	106.85	105.50	107.22	0.002392	6.92	968.69	262.21	0.48
3. Test Surface	469.15	Base	2.10	99.70	100.02	99.84	100.04	0.002501	0.95	2.22	6.91	0.29
3. Test Surface	469.15	Bankfull	40.00	99.70	101.24	100.65	101.31	0.002503	2.00	19.97	20.55	0.36
3. Test Surface	469.15	County Low	227.00	99.70	102.71	101.90	102.89	0.002500	3.61	73.40	44.32	0.42
3. Test Surface	469.15	10-yr	3729.00	99.70	106.42	105.26	106.78	0.002502	6.79	850.55	253.99	0.49
3. Test Surface	469.15	100-yr	4400.00	99.70	106.80	105.49	107.19	0.002500	7.07	947.73	257.03	0.49



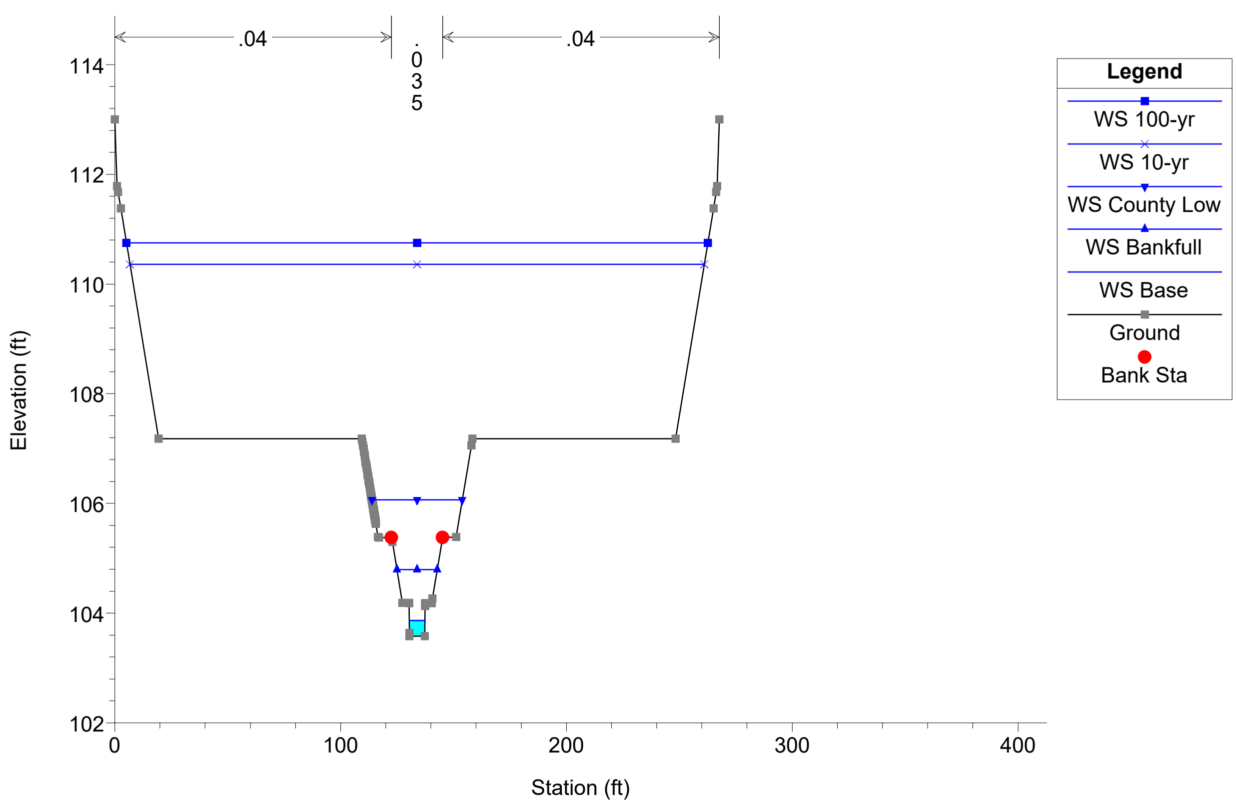


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

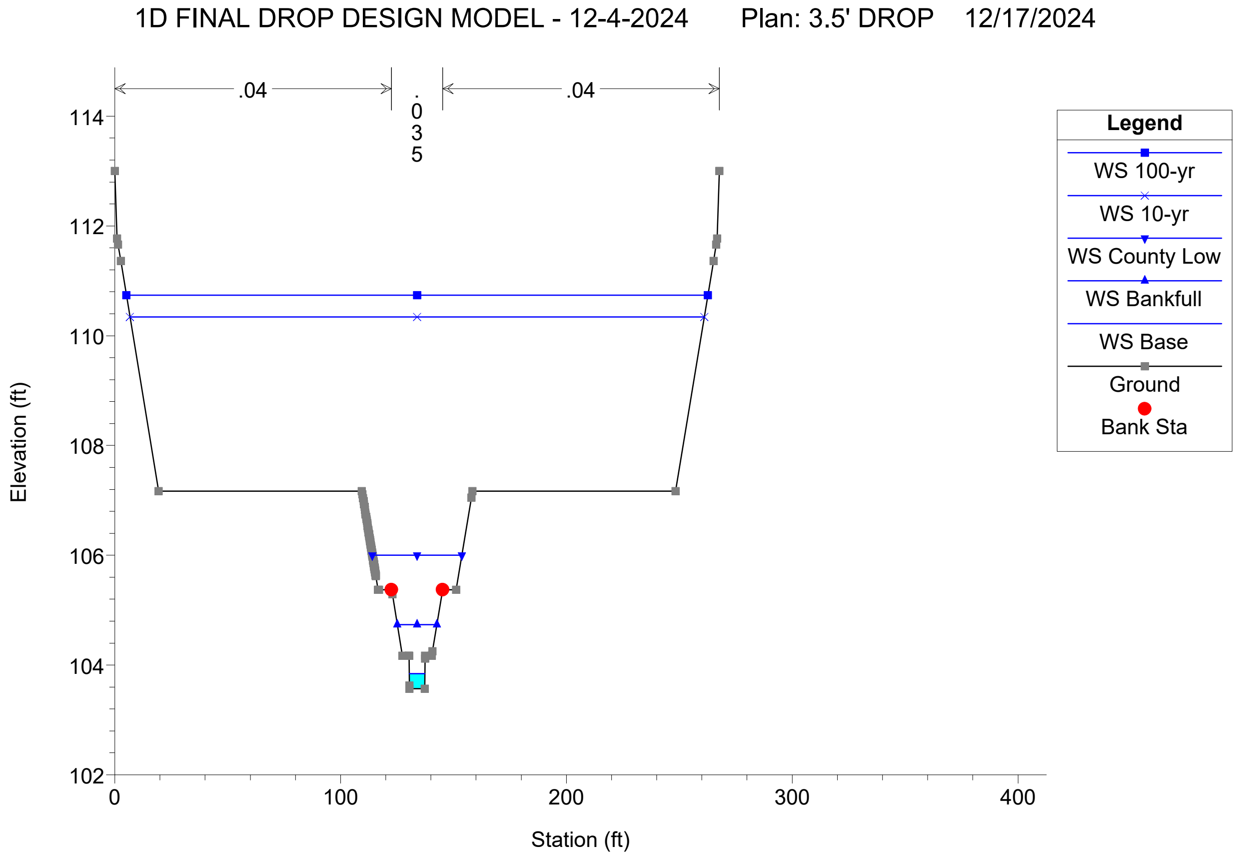
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 3.5' DROP 12/17/2024

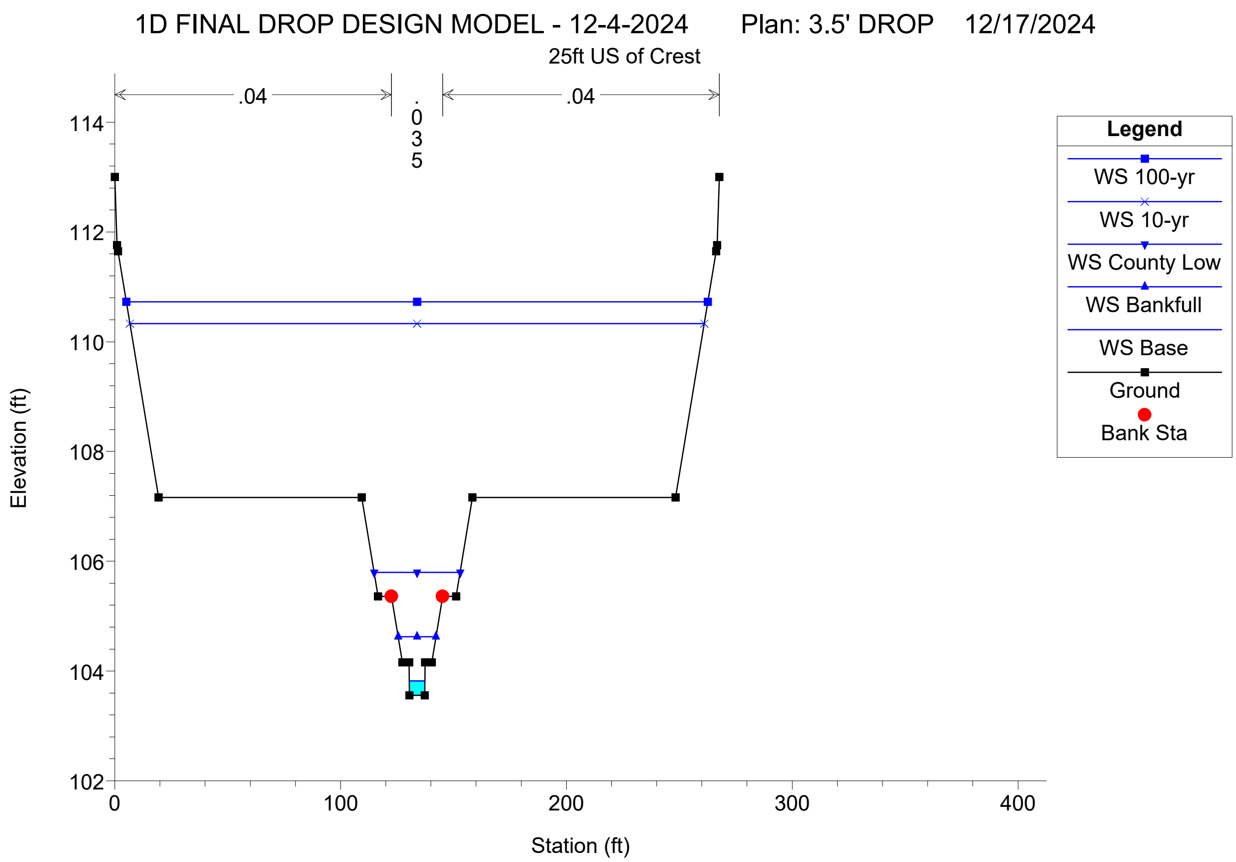


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 3.5' DROP 12/17/2024

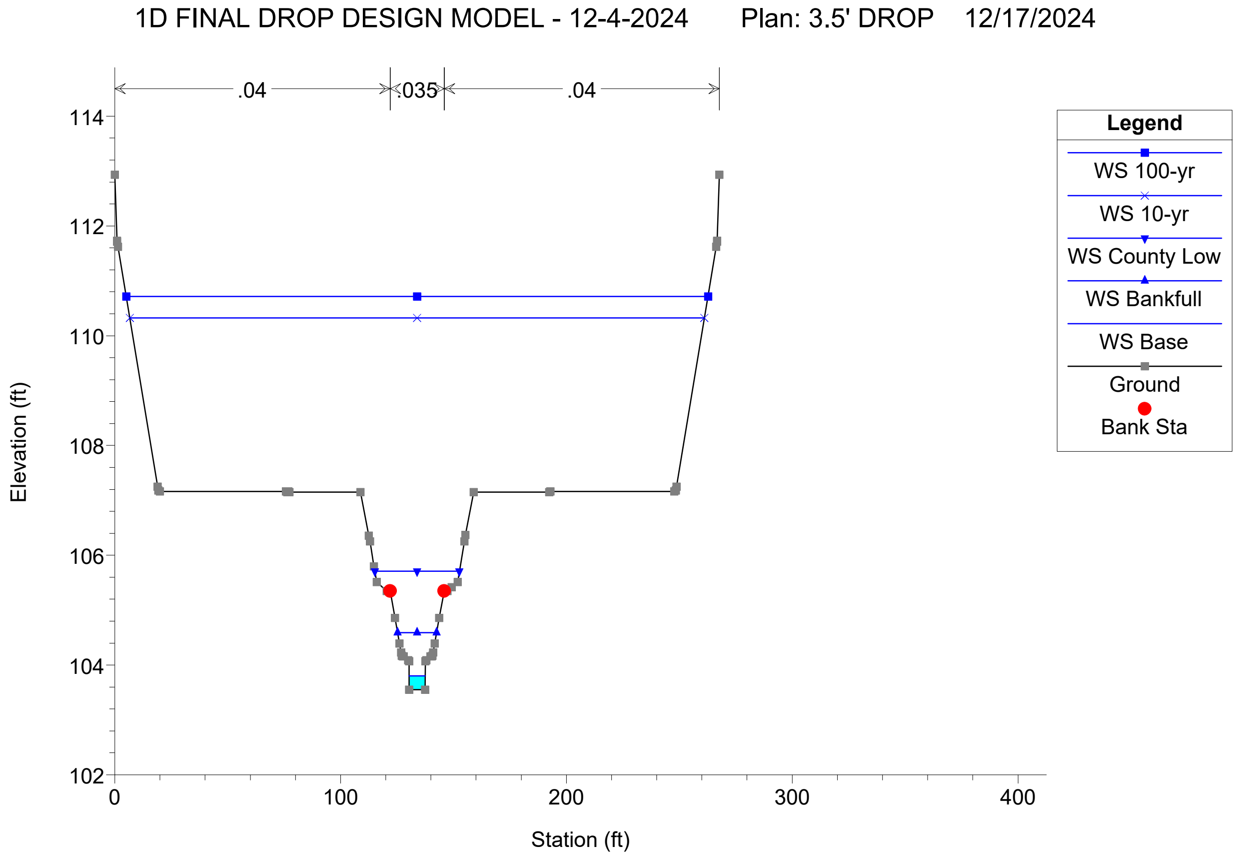


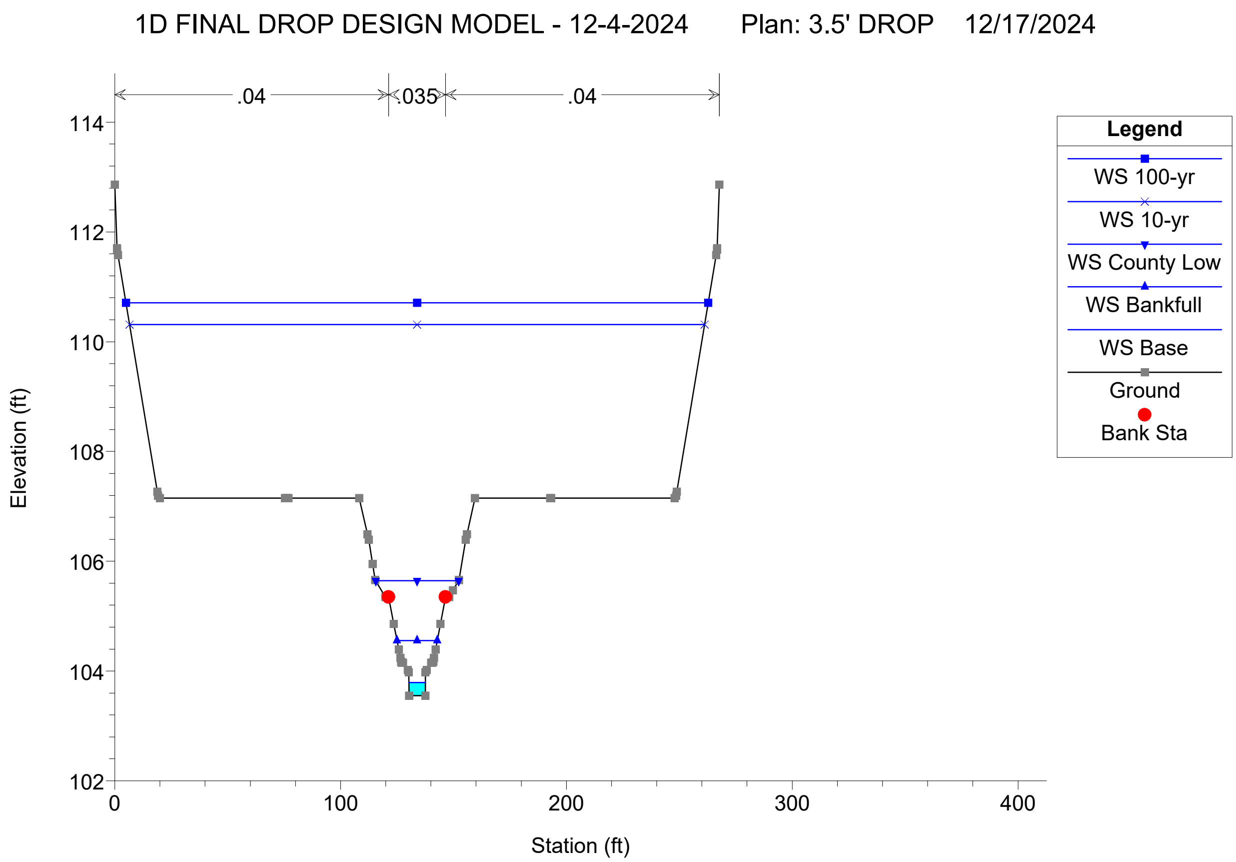
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



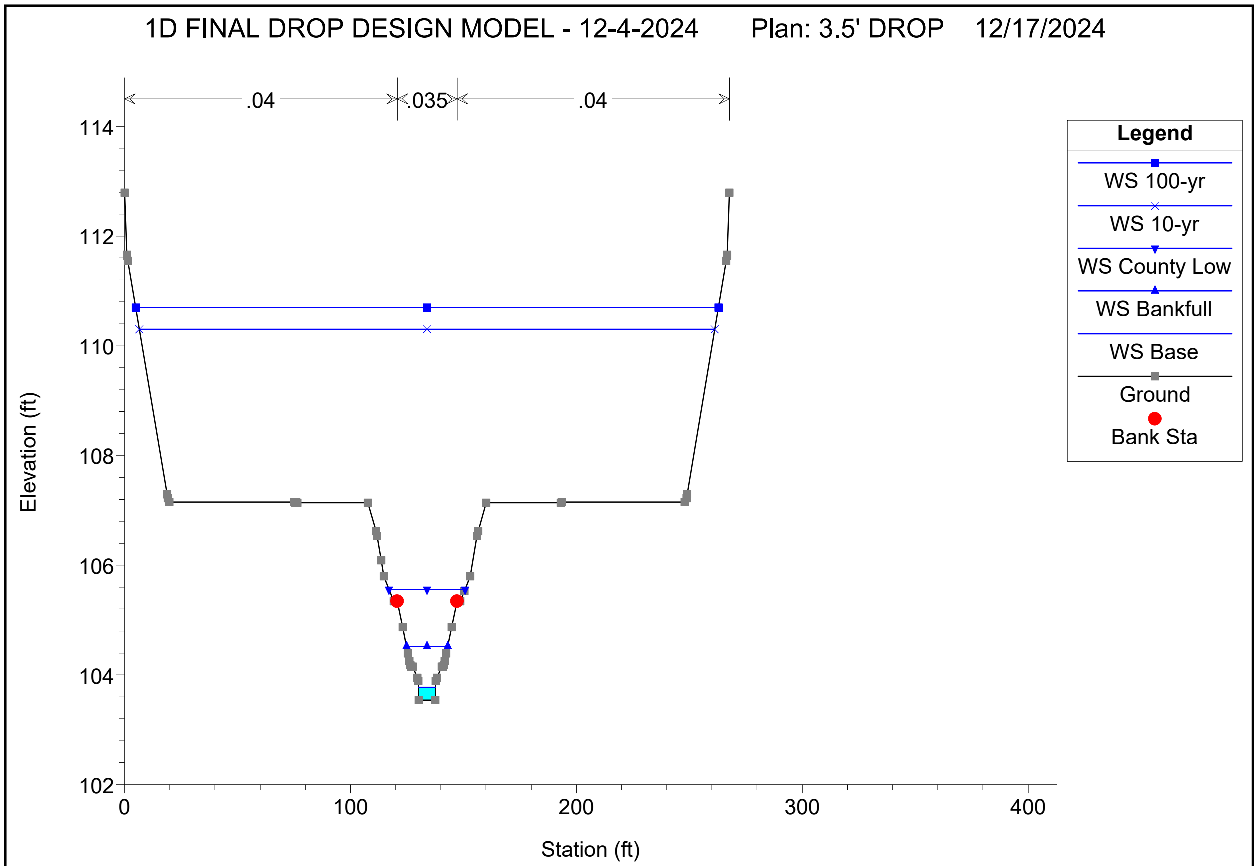


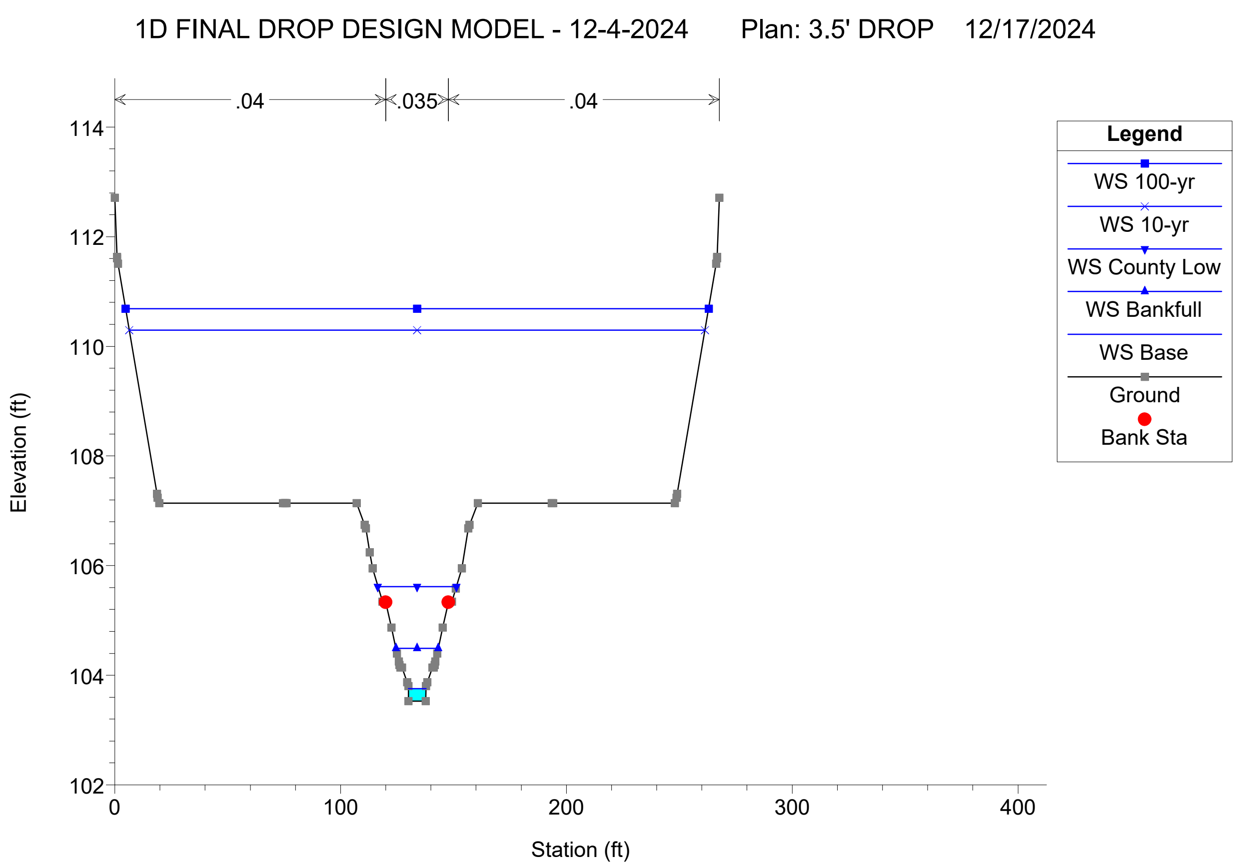
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





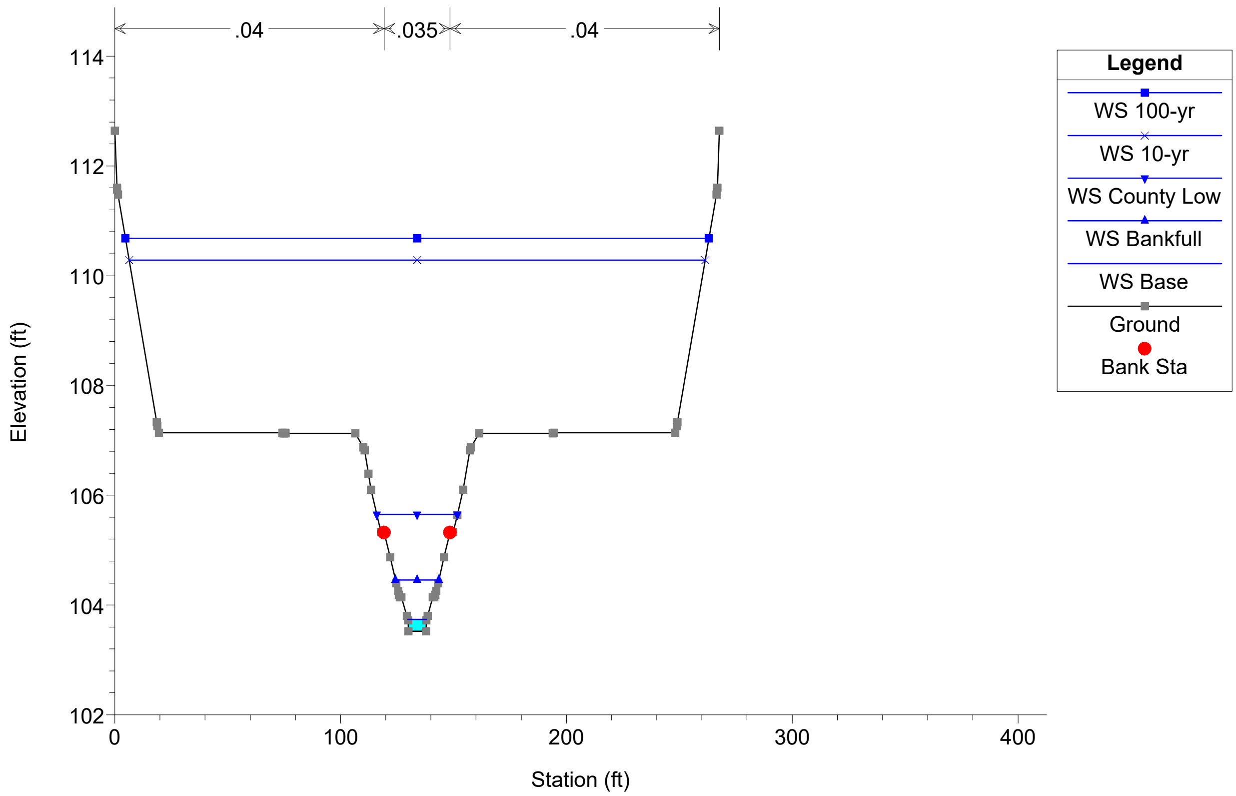
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



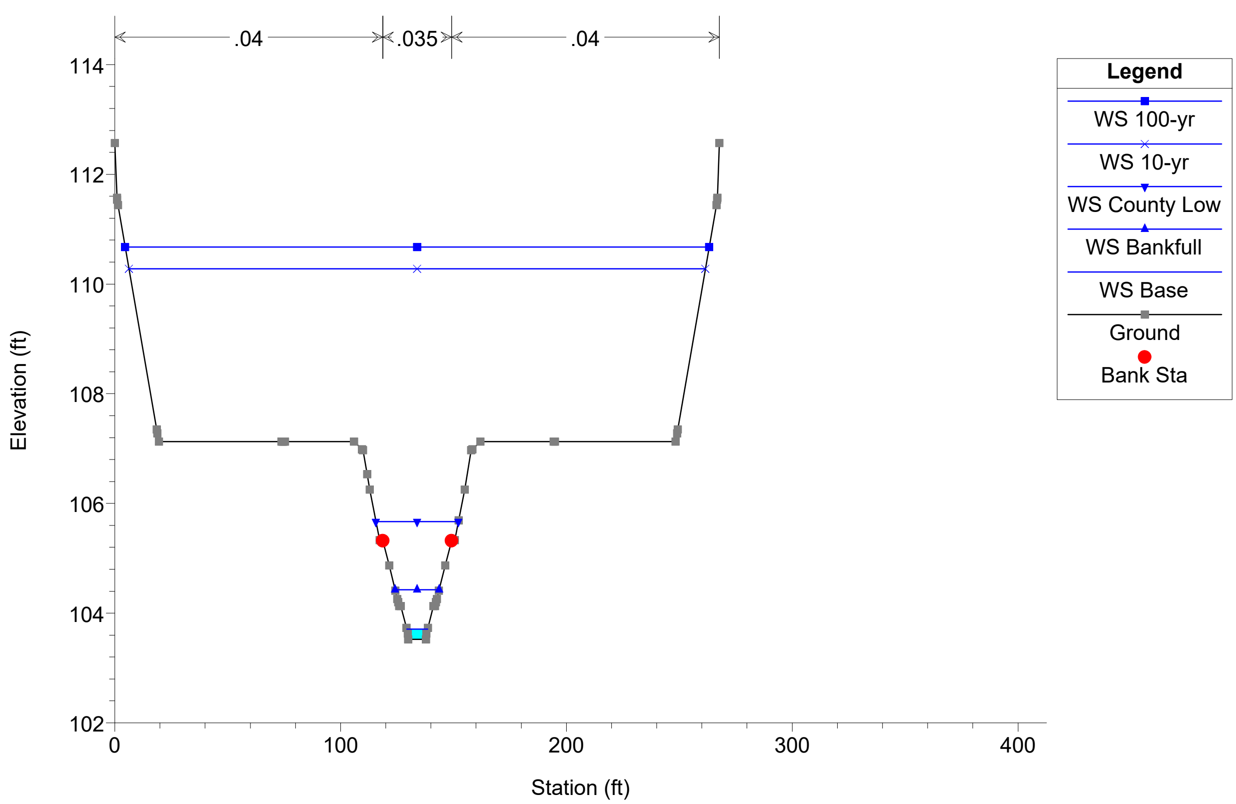


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

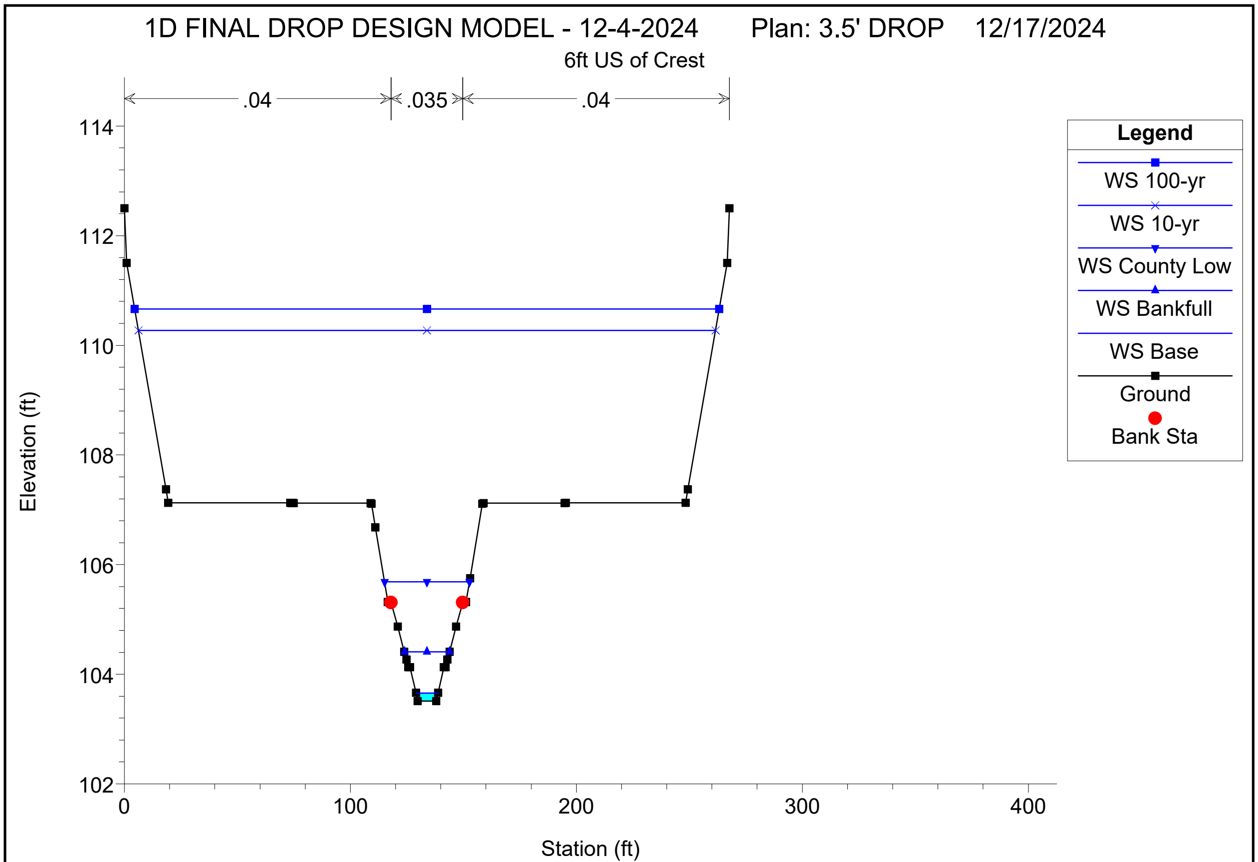
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 3.5' DROP 12/17/2024

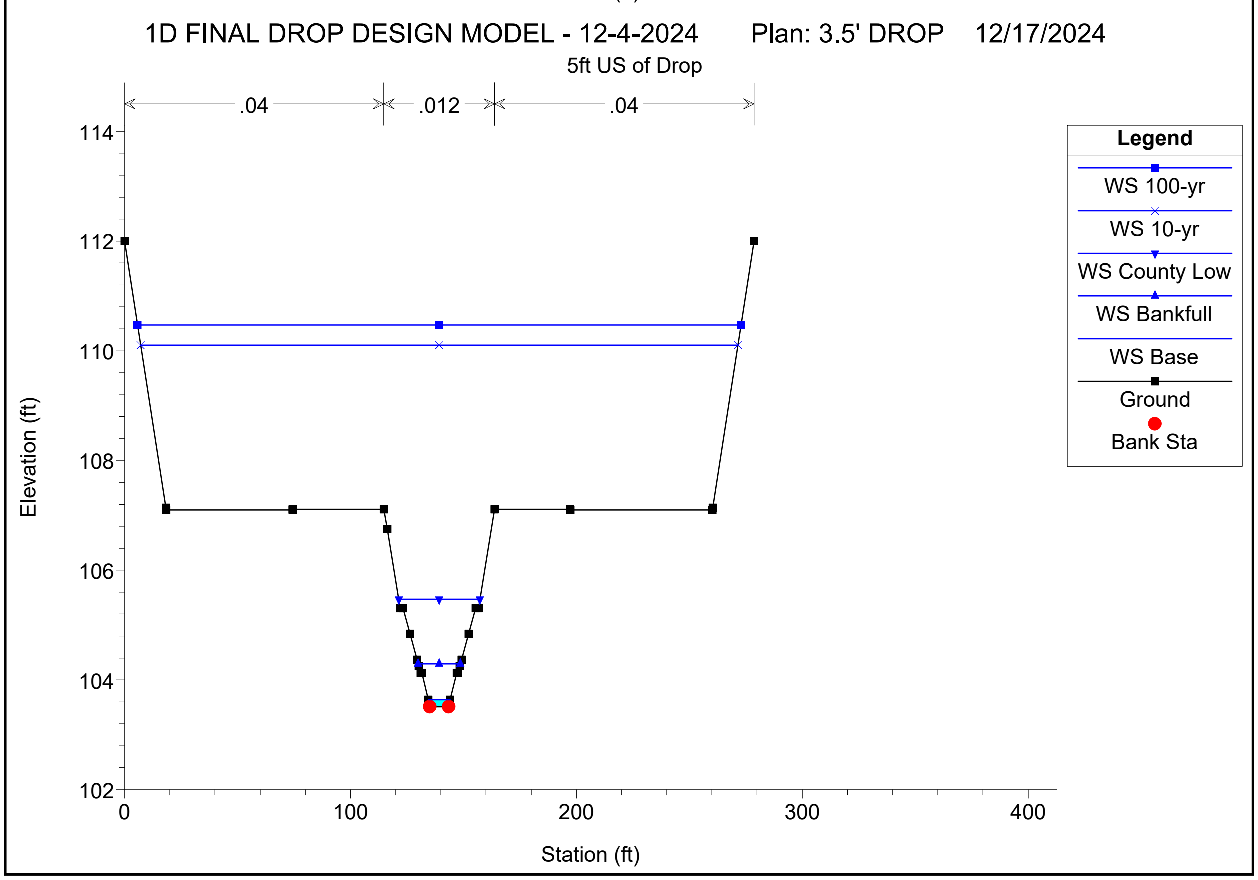


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 3.5' DROP 12/17/2024

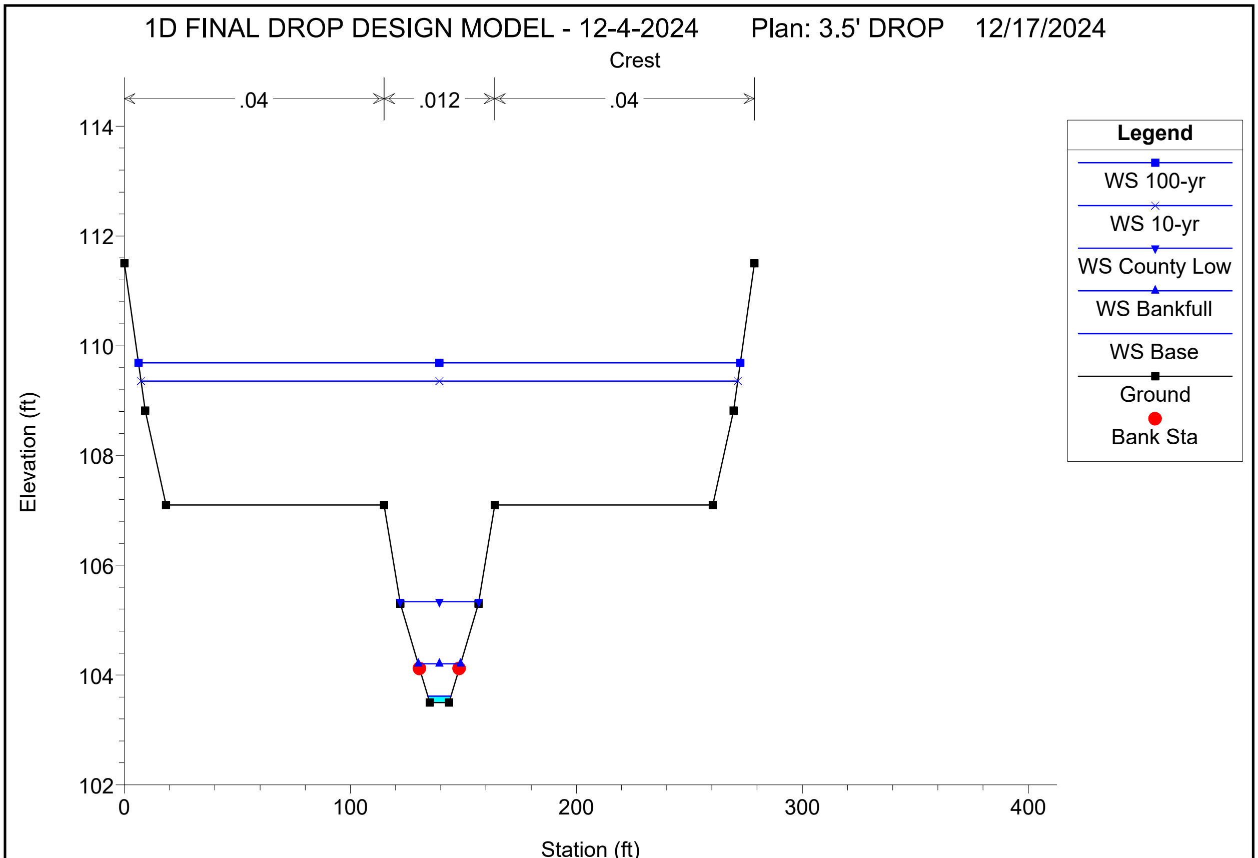


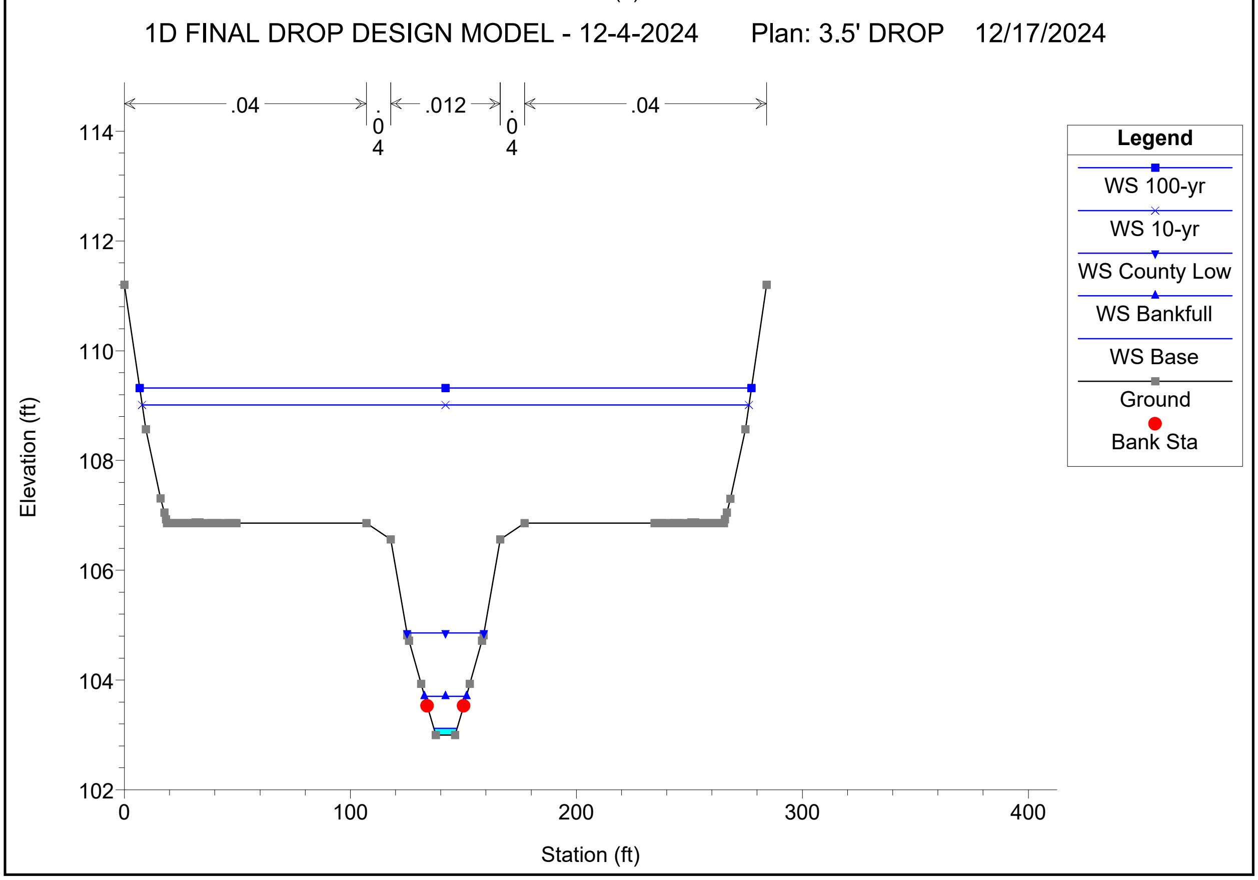
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



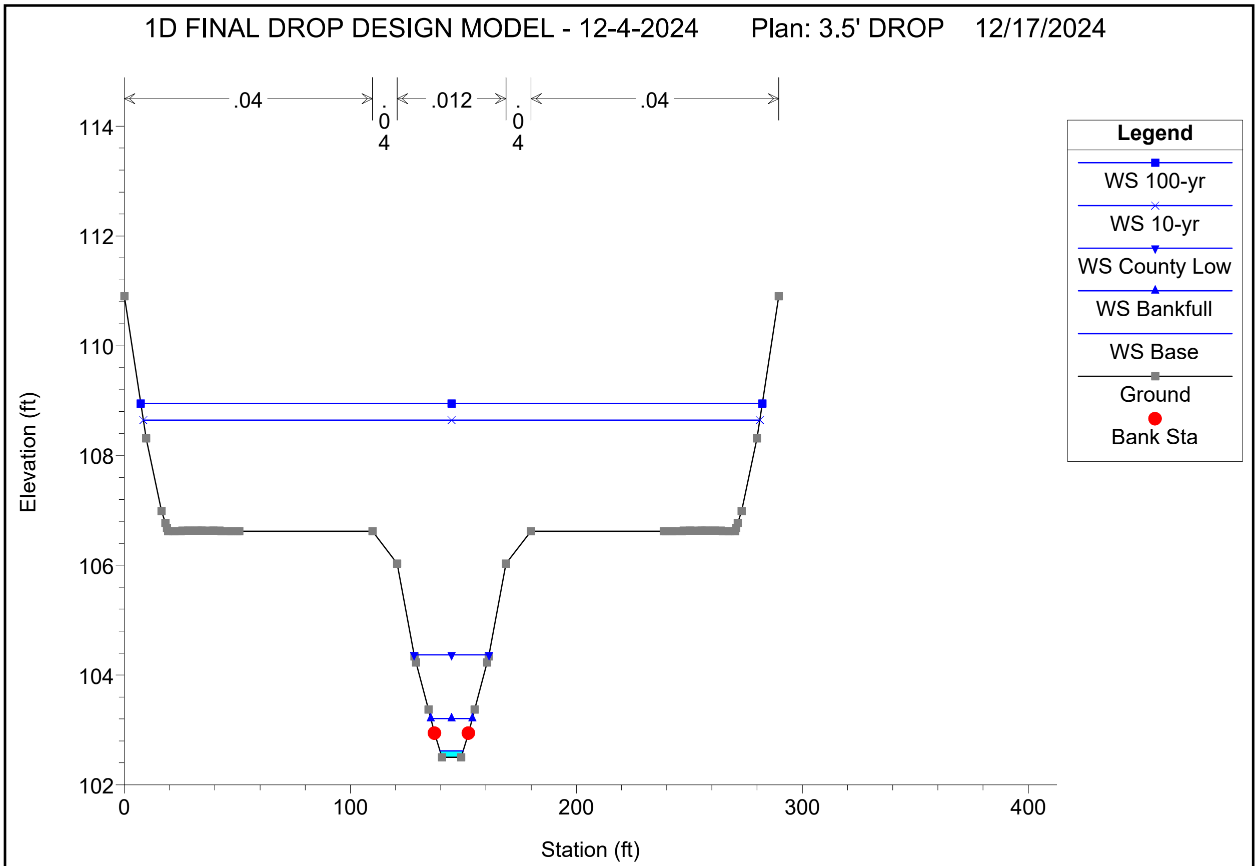


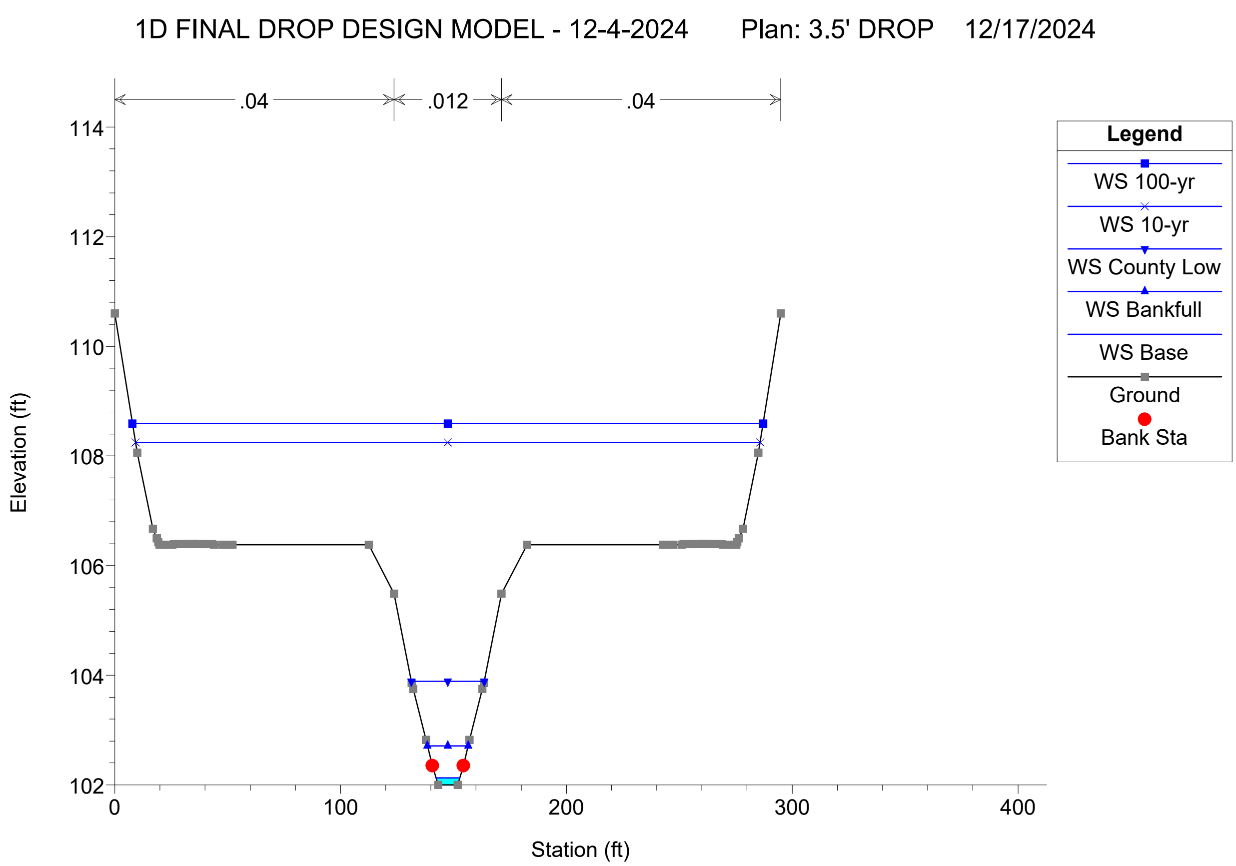
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



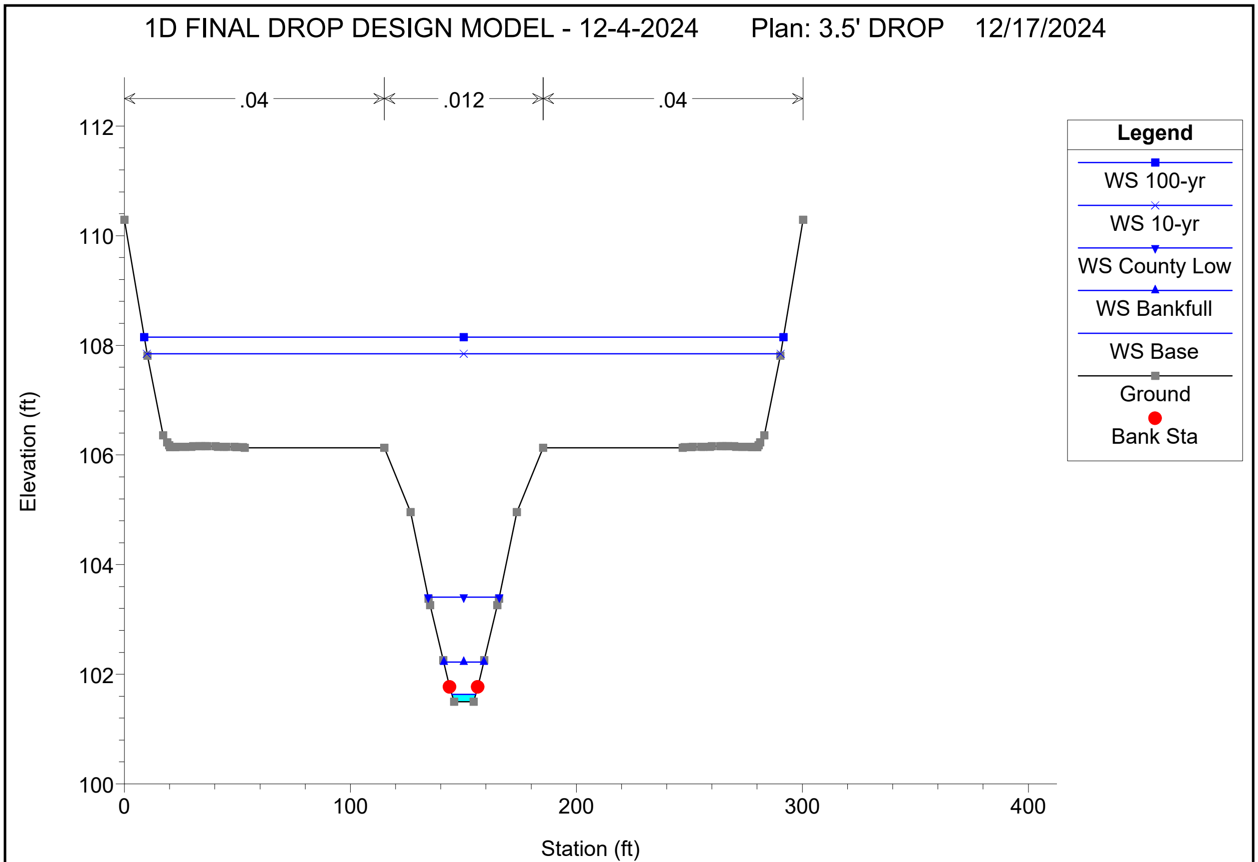


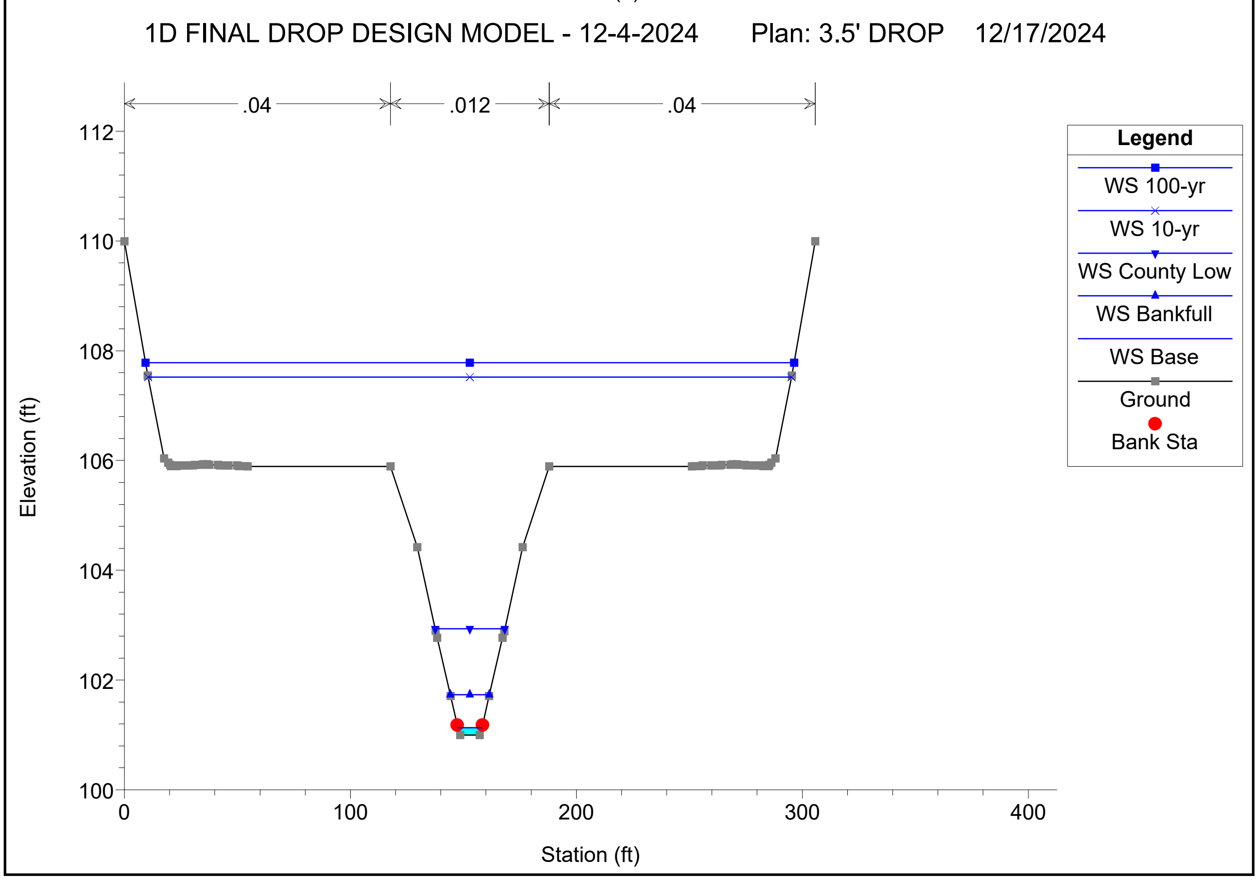
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



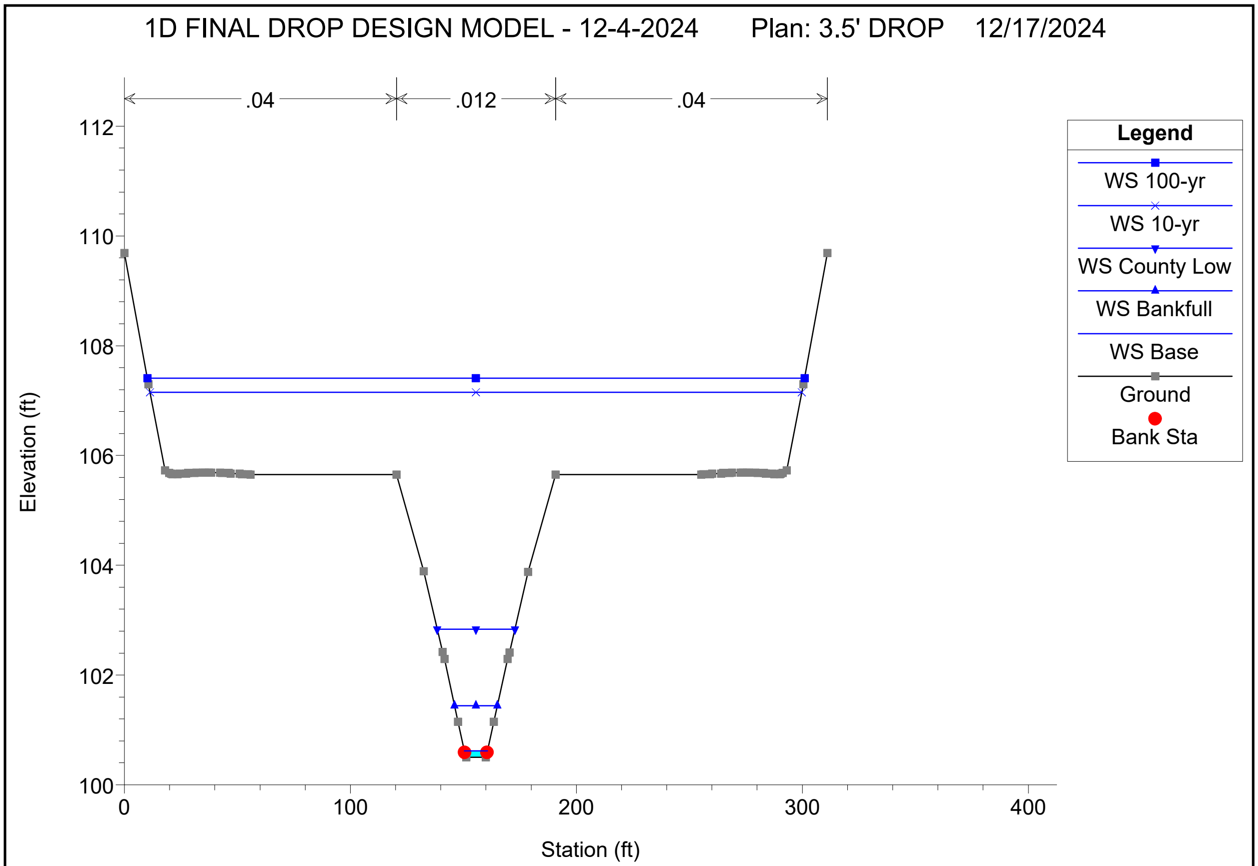


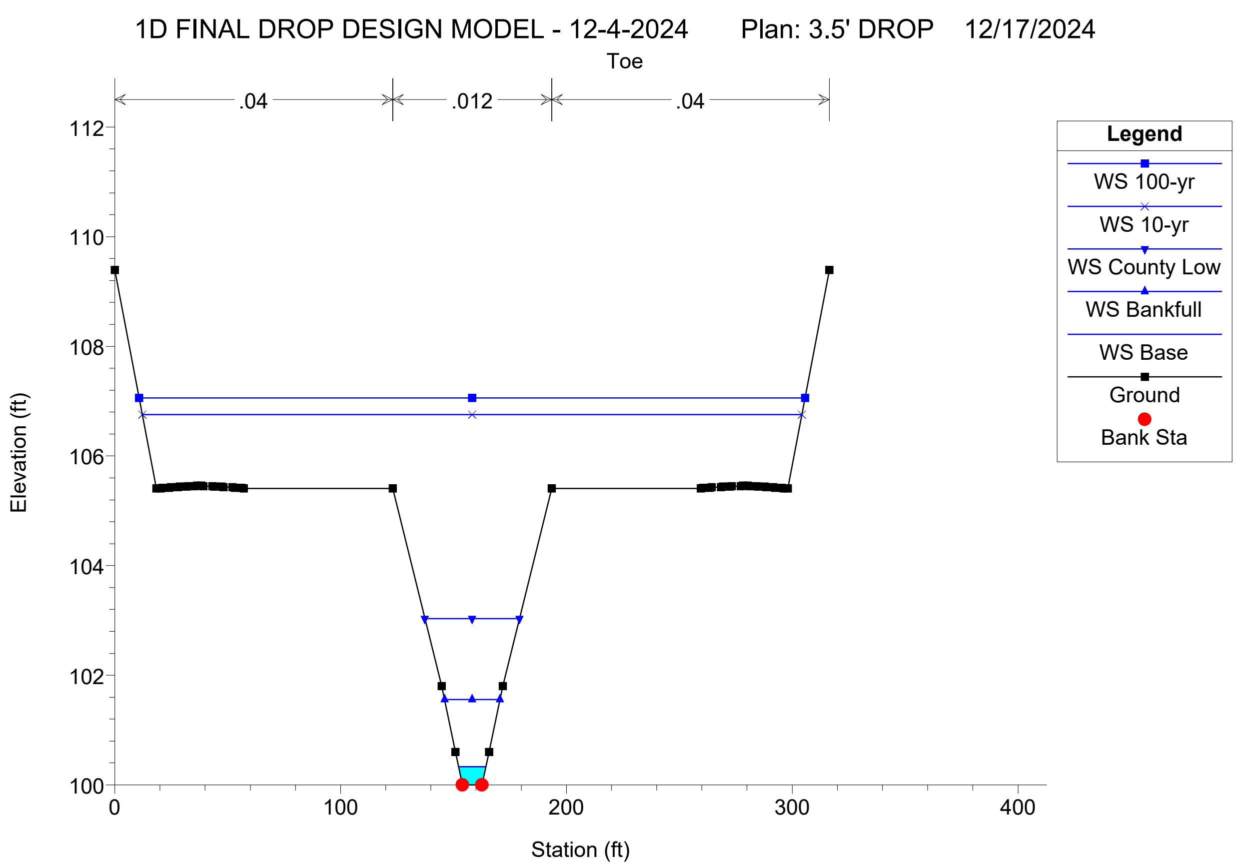
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



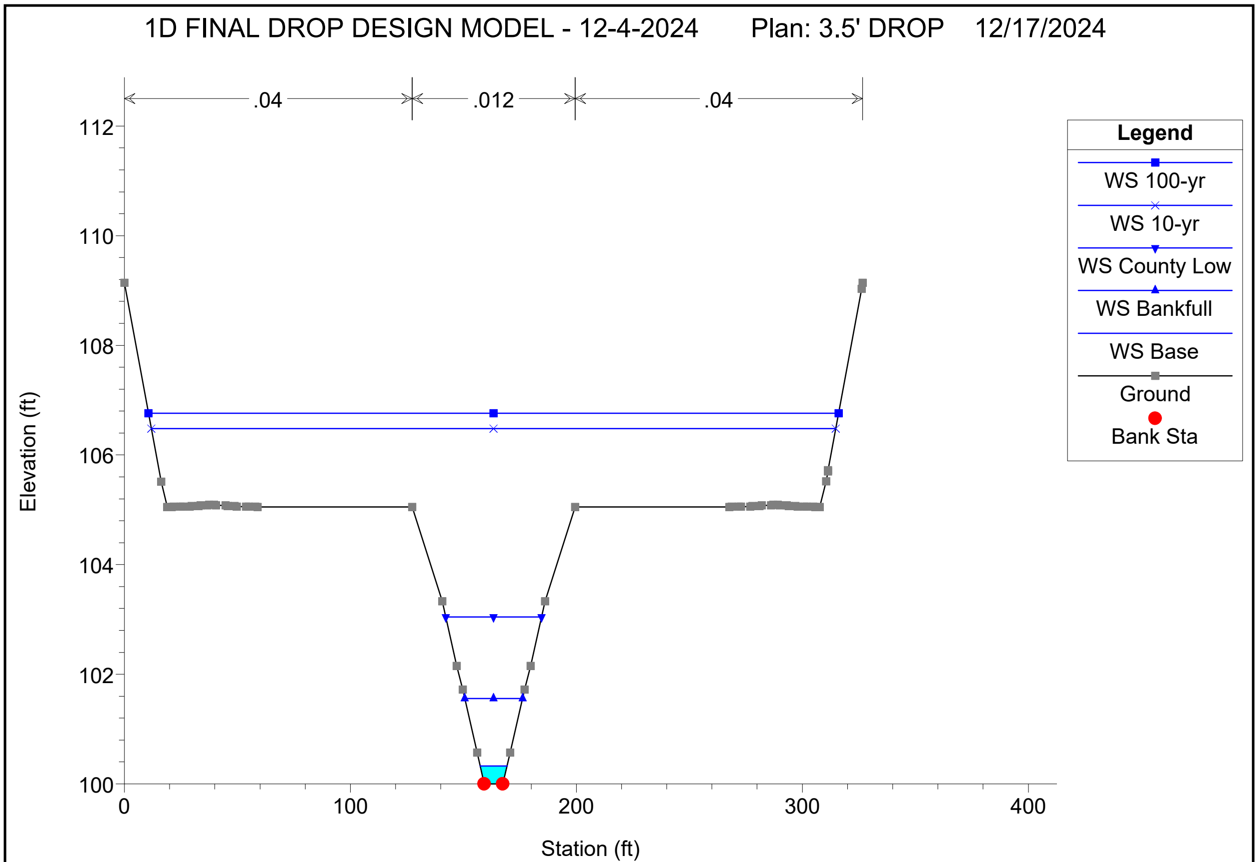


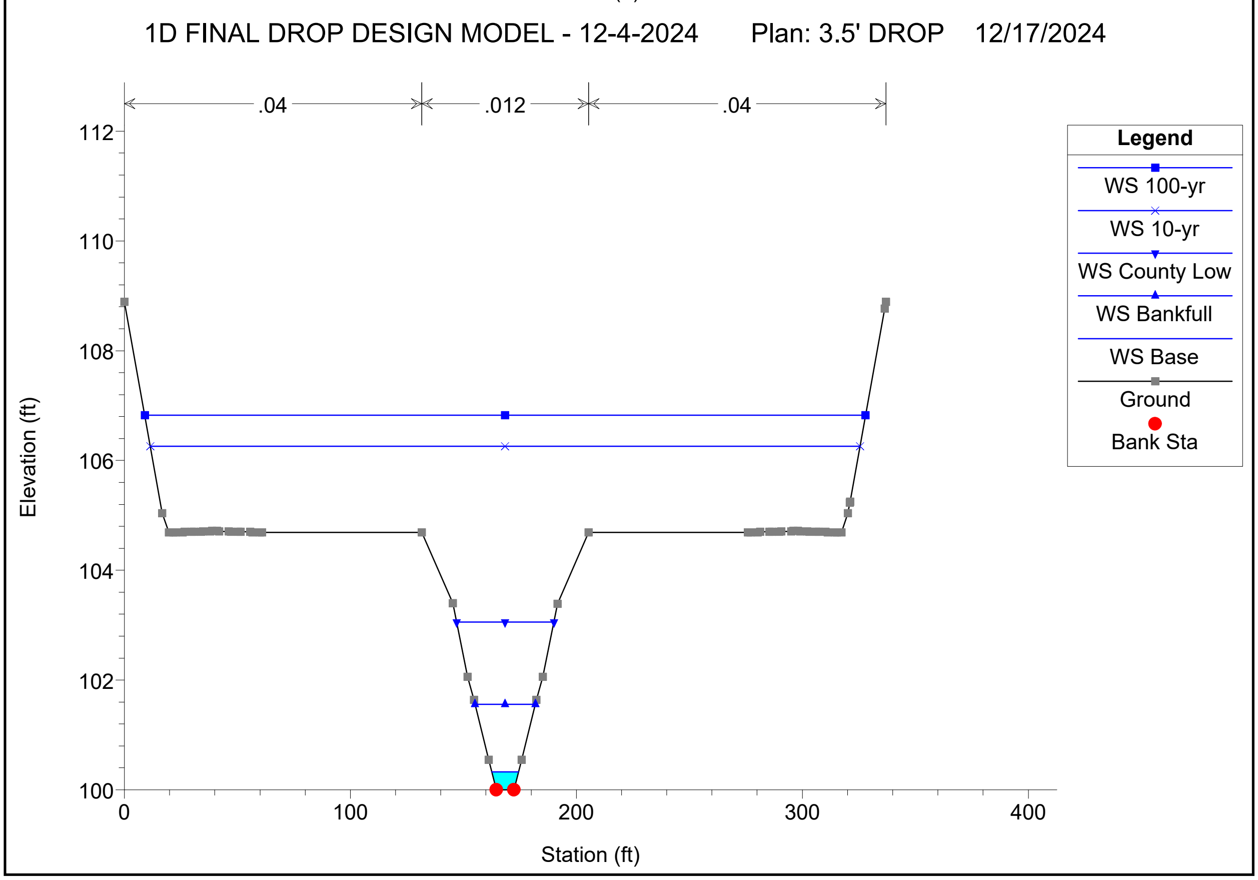
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



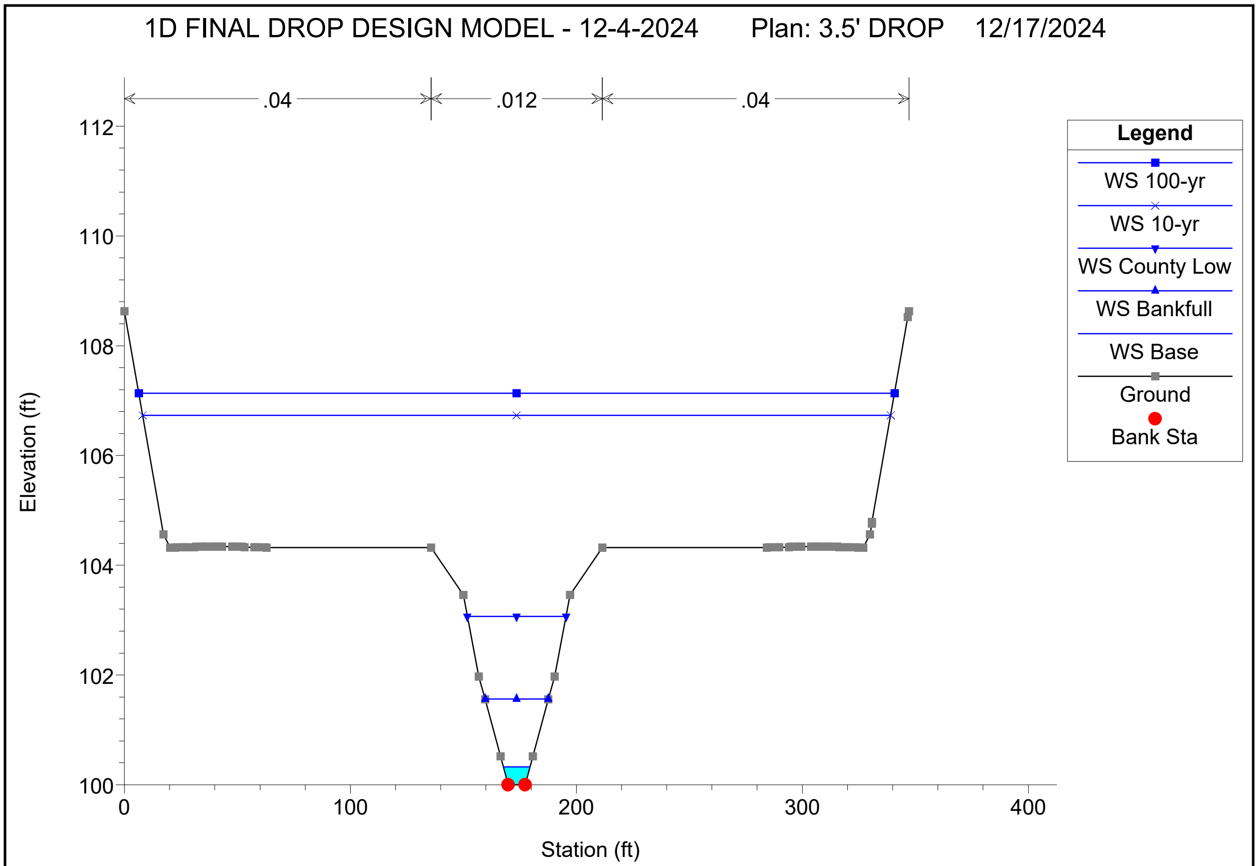


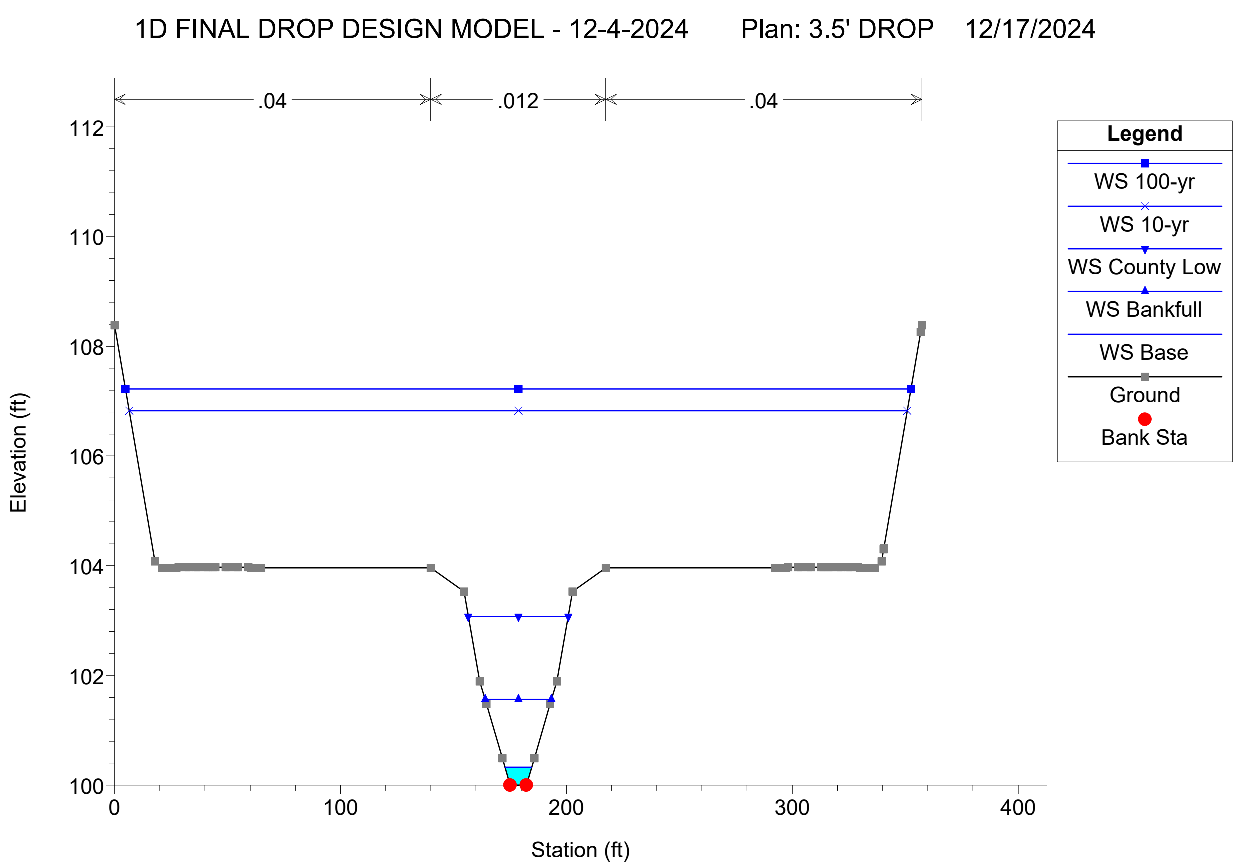
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



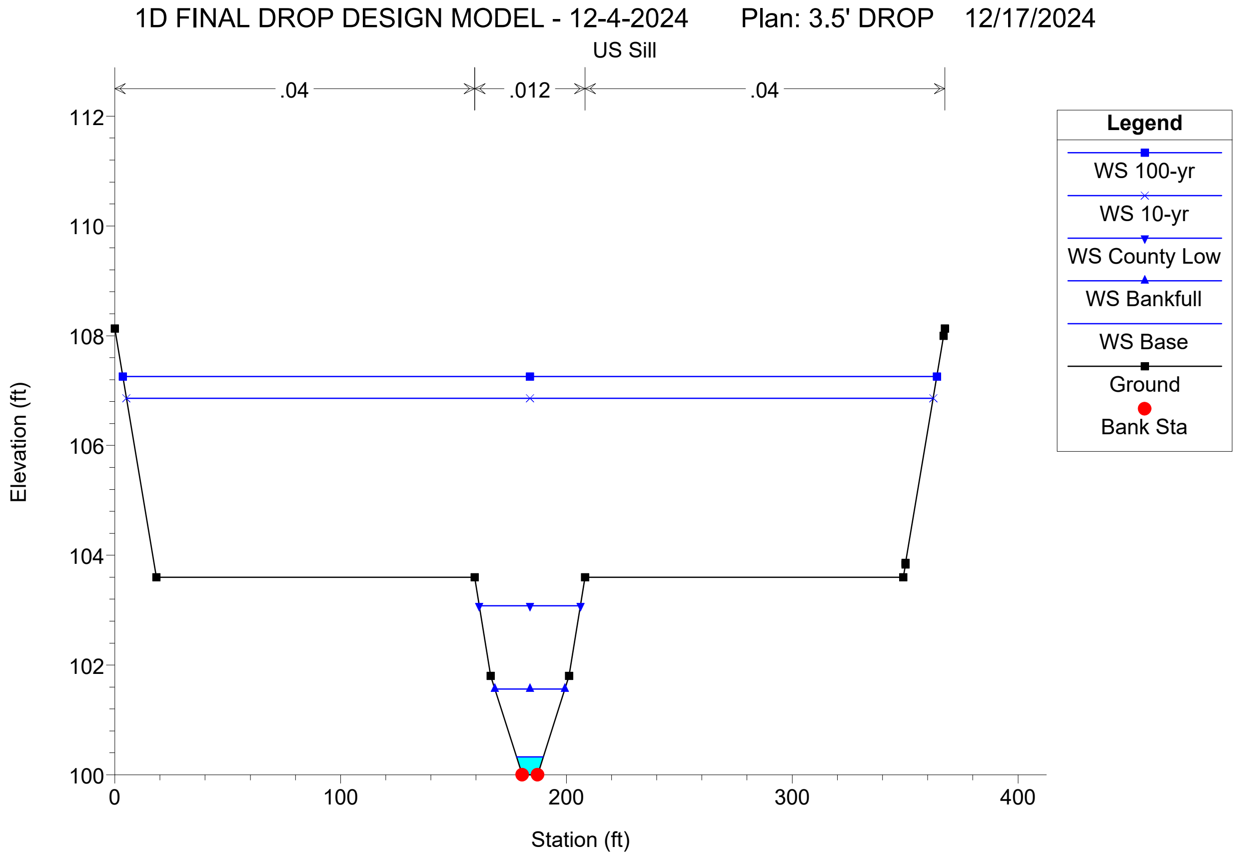


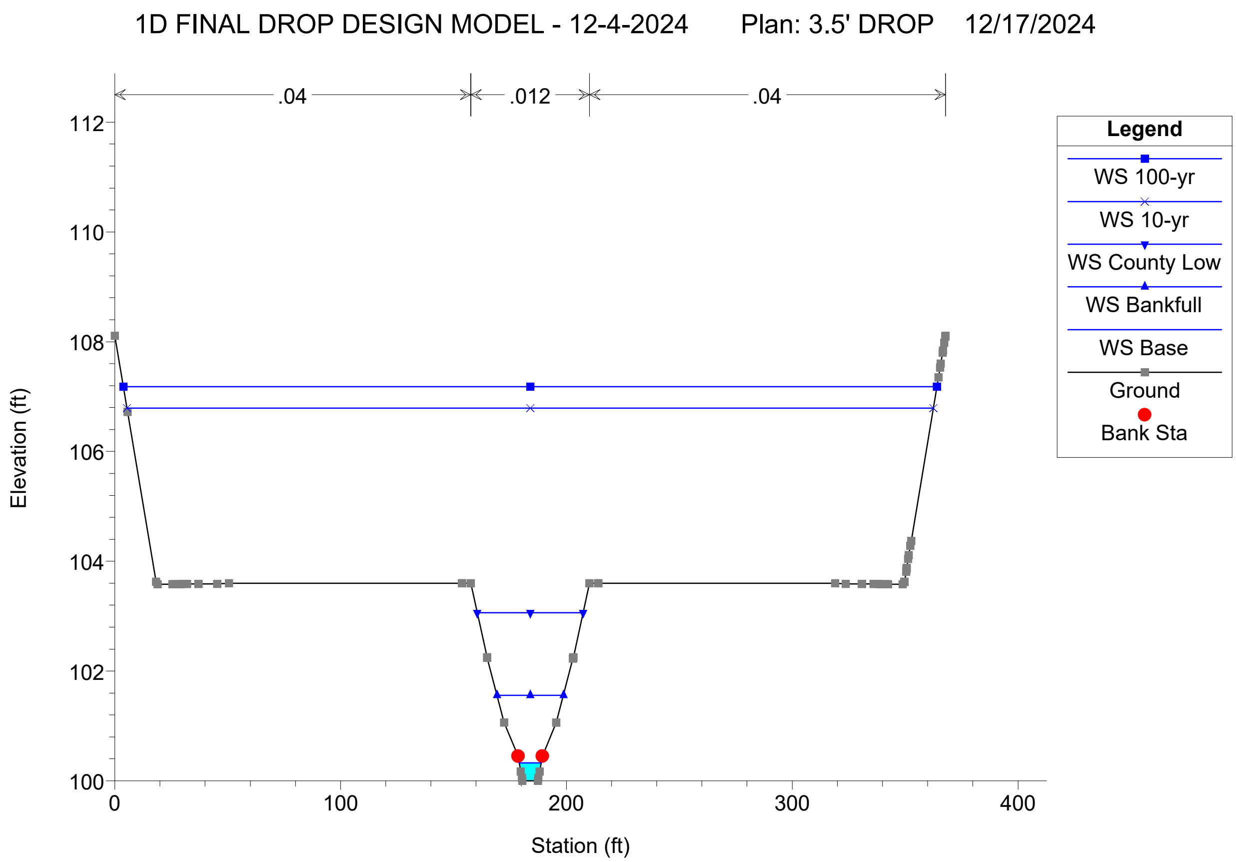
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



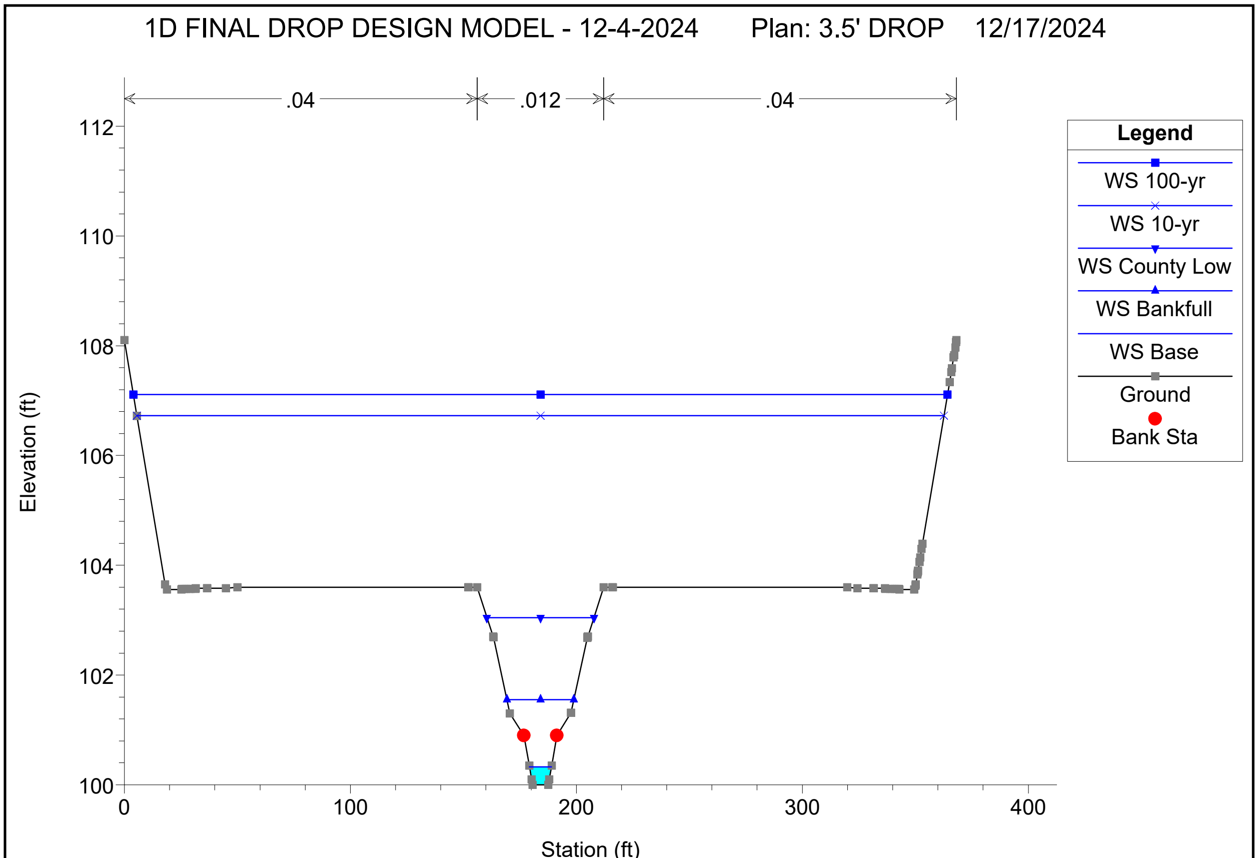


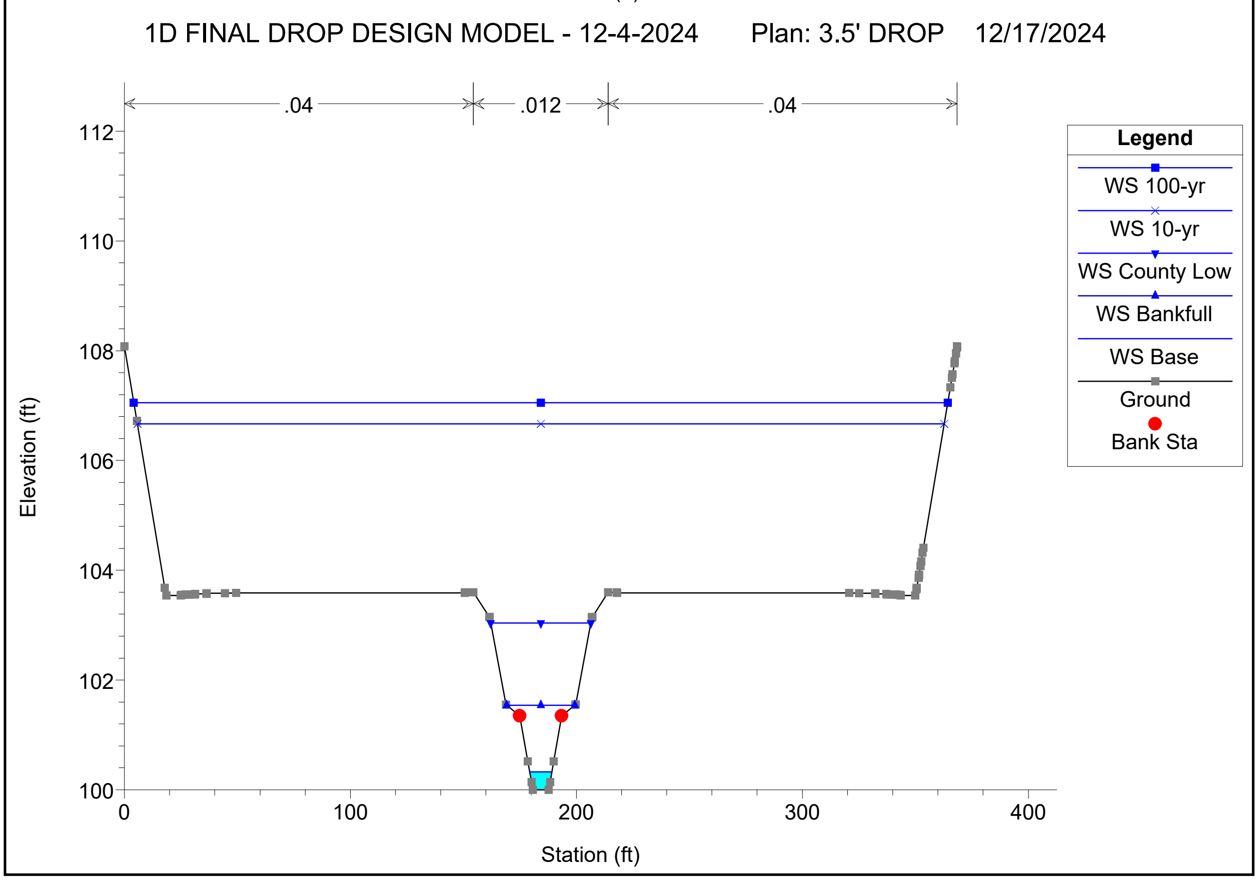
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



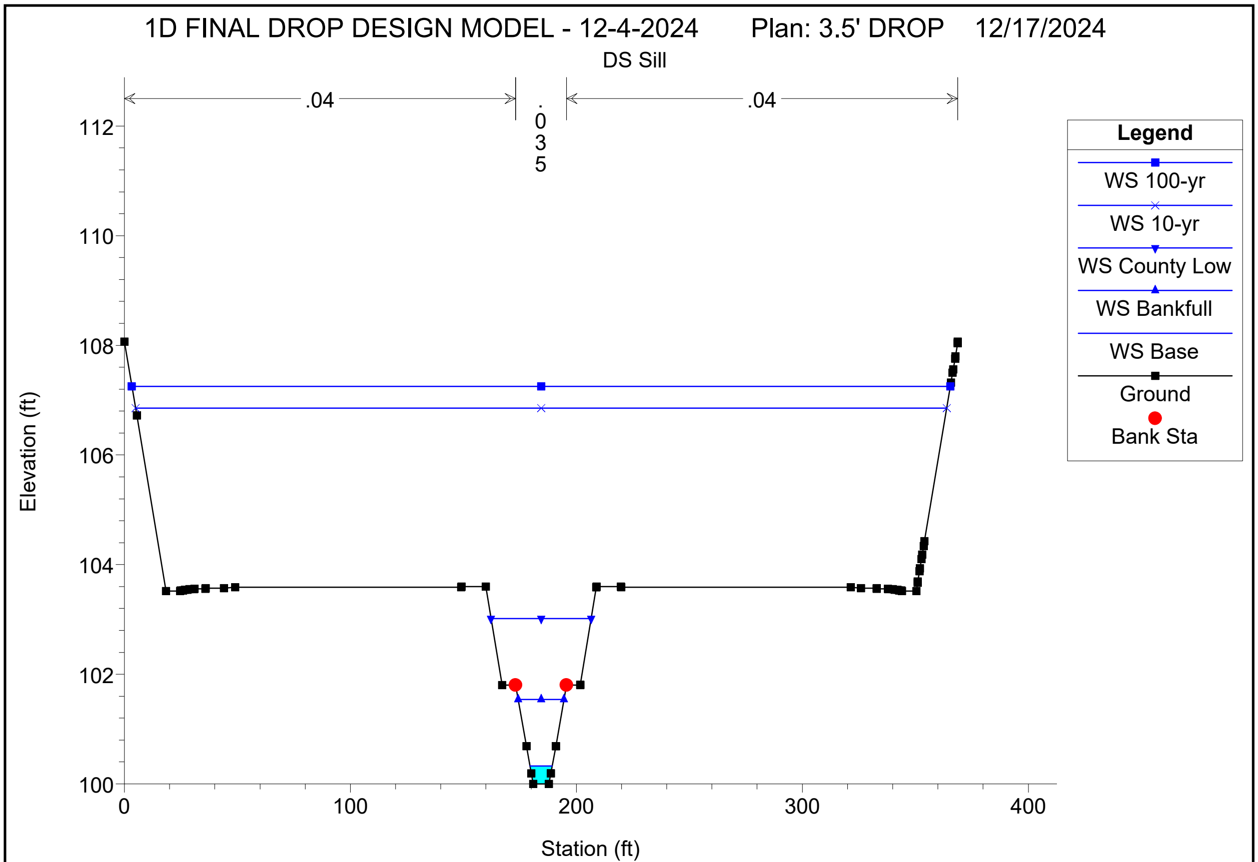


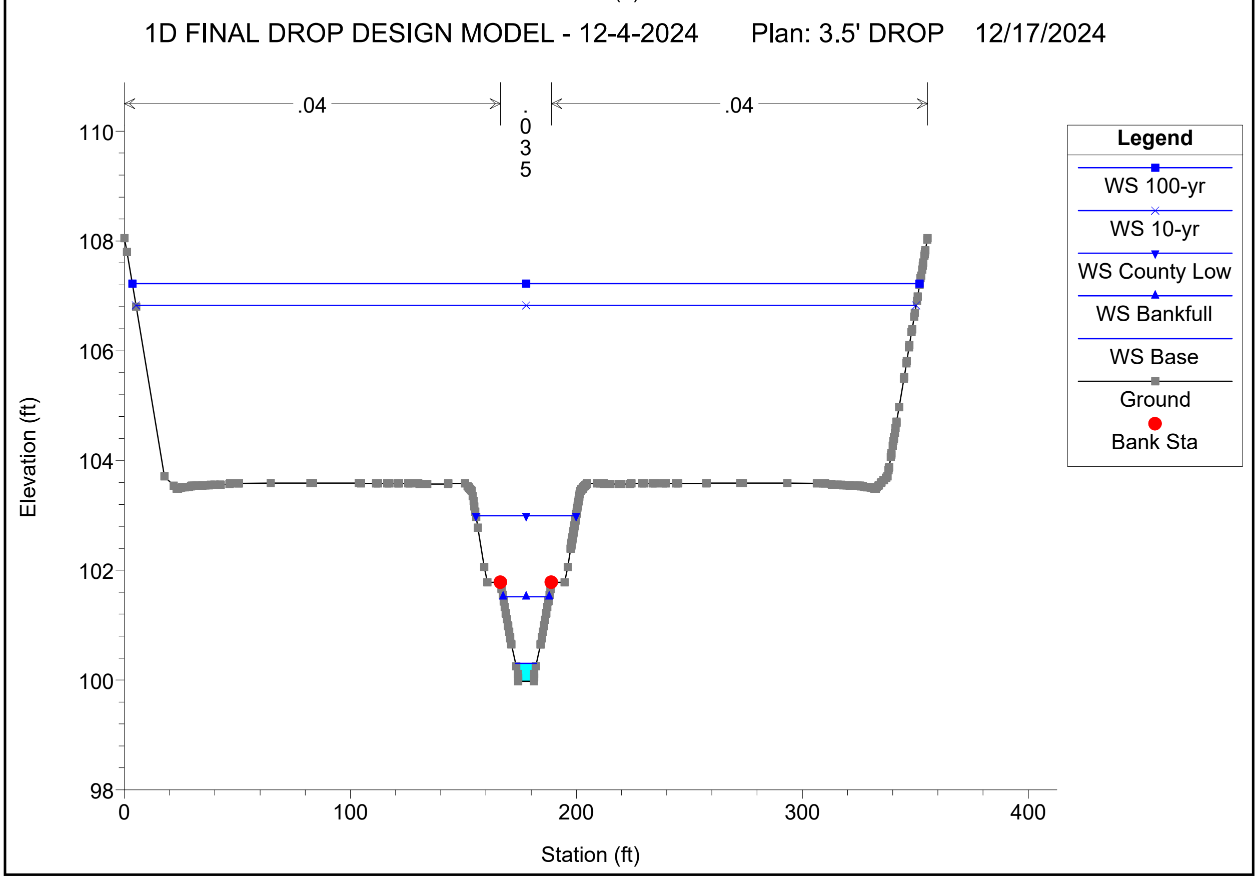
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



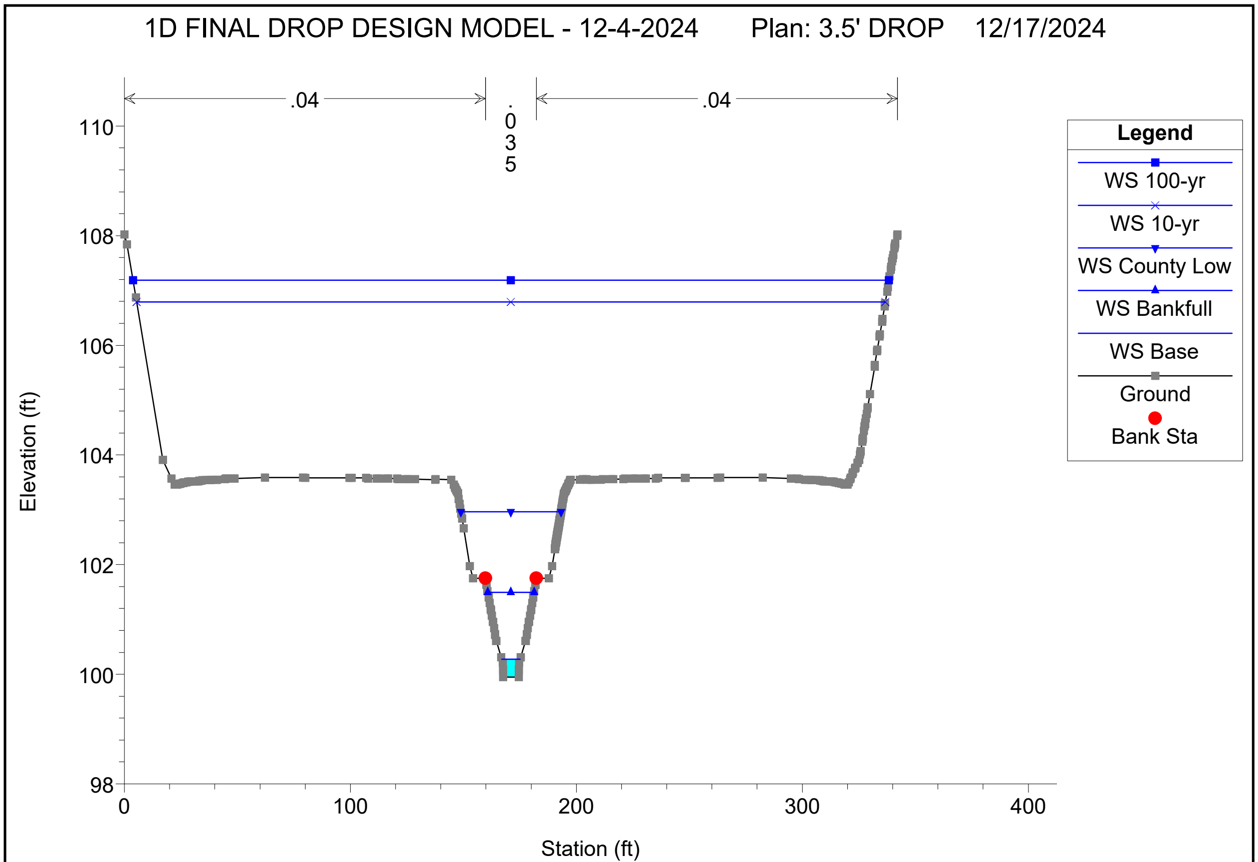


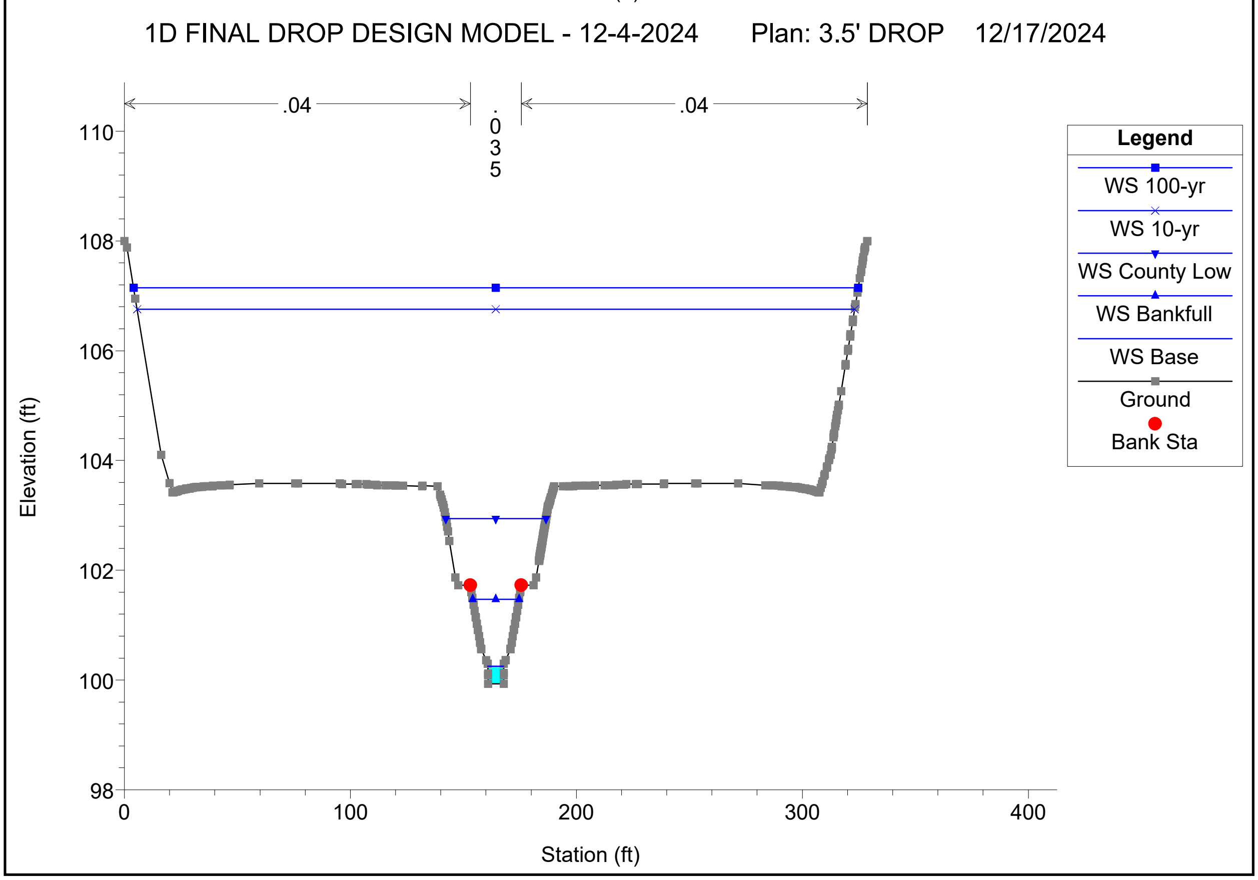
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





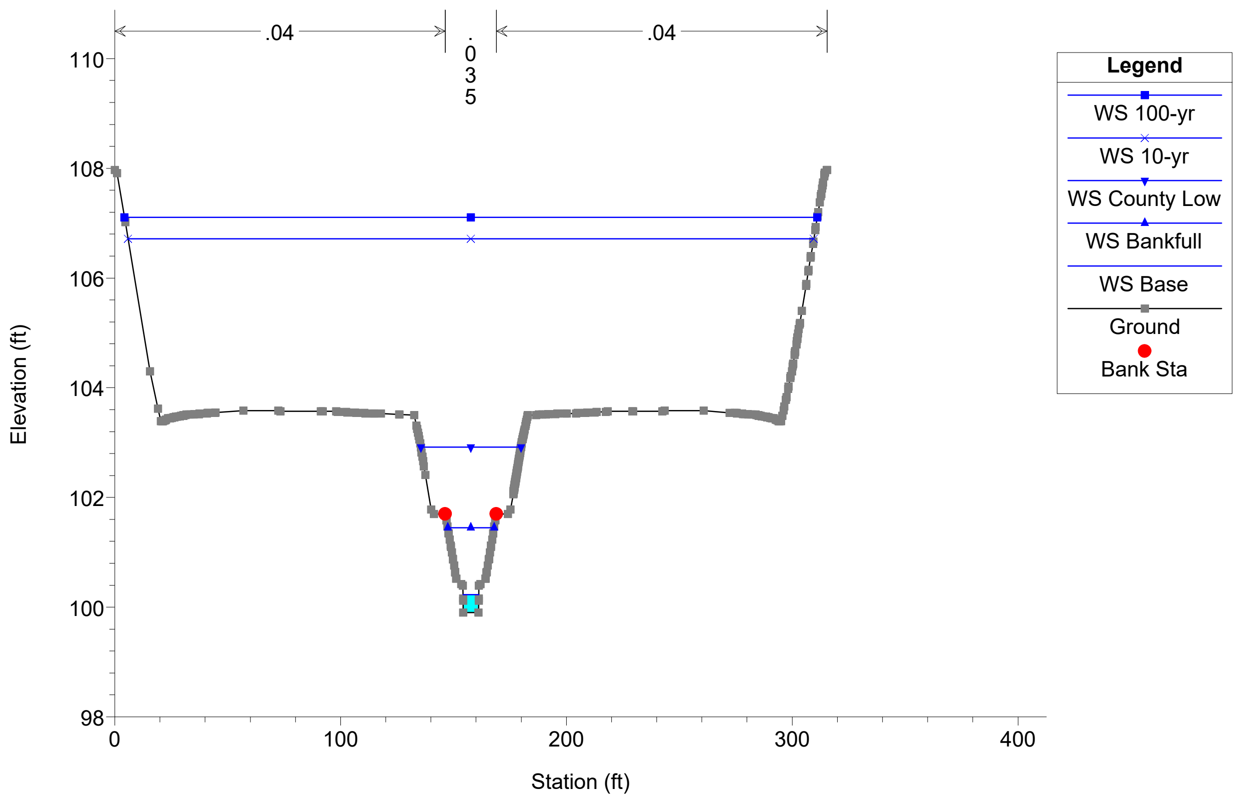
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





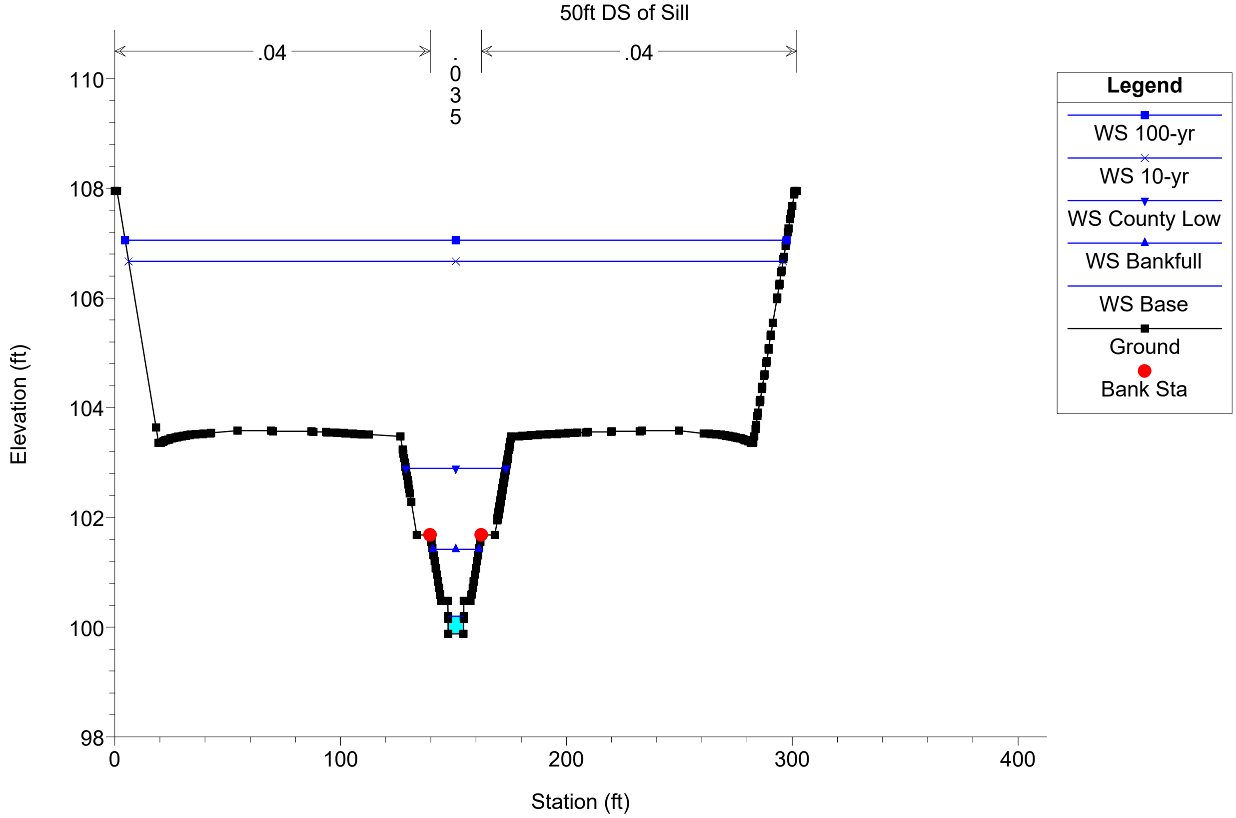
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 3.5' DROP 12/17/2024

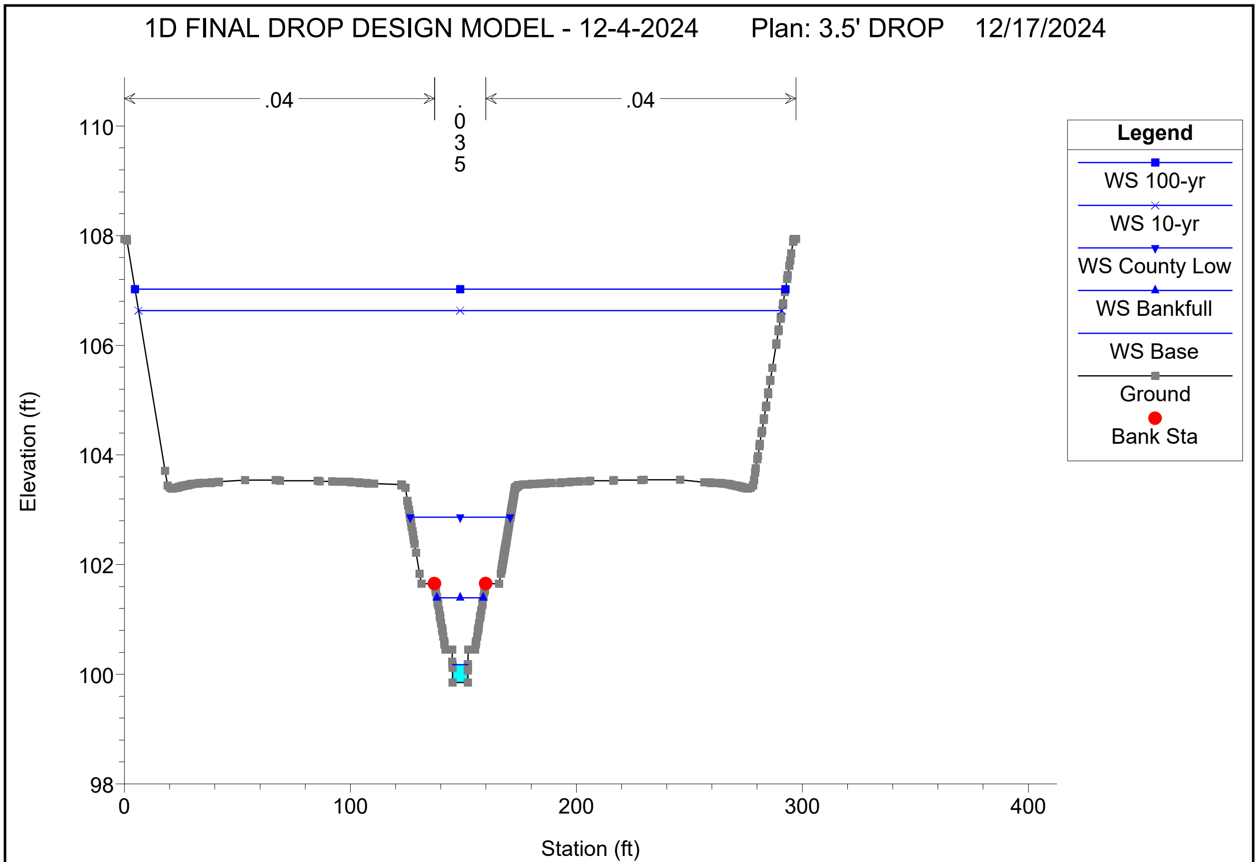


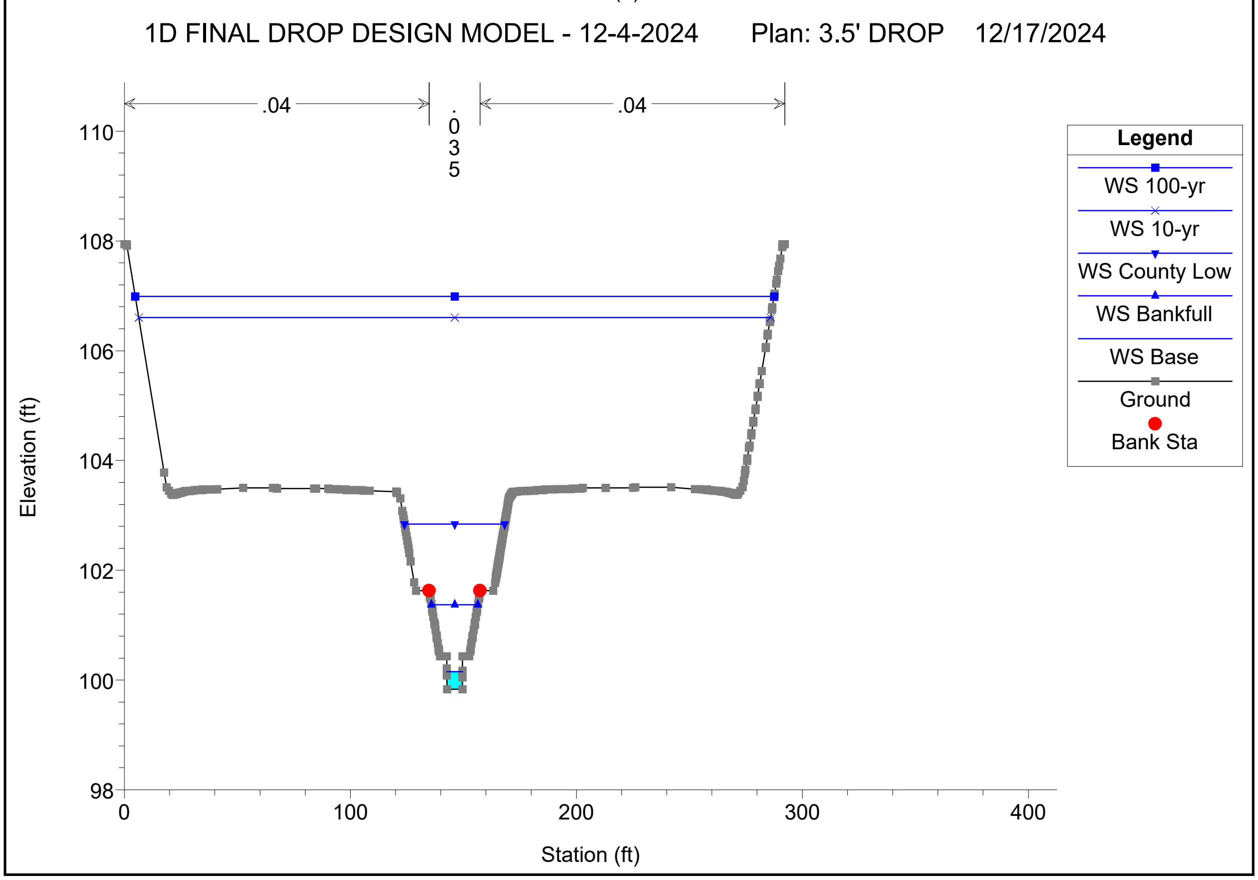
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 3.5' DROP 12/17/2024

50ft DS of Sill

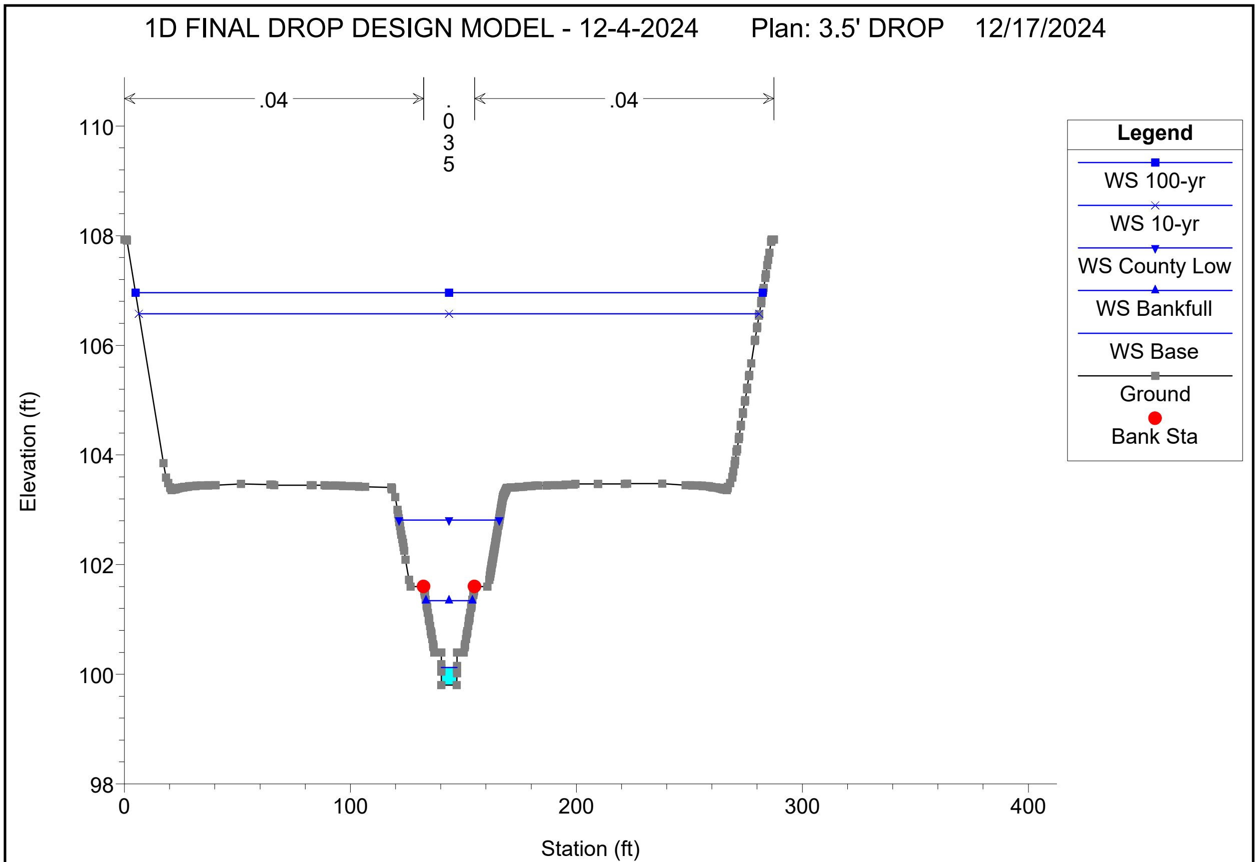


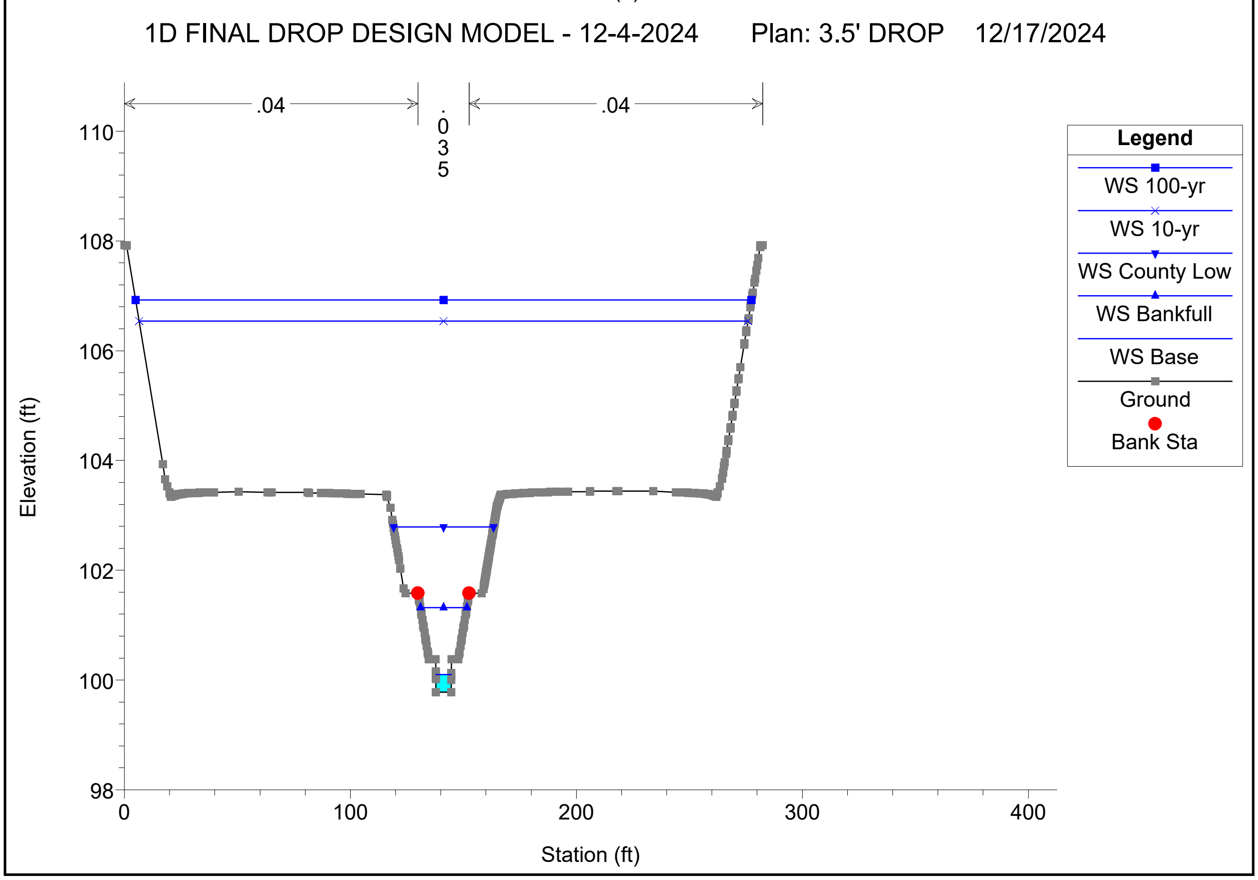
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



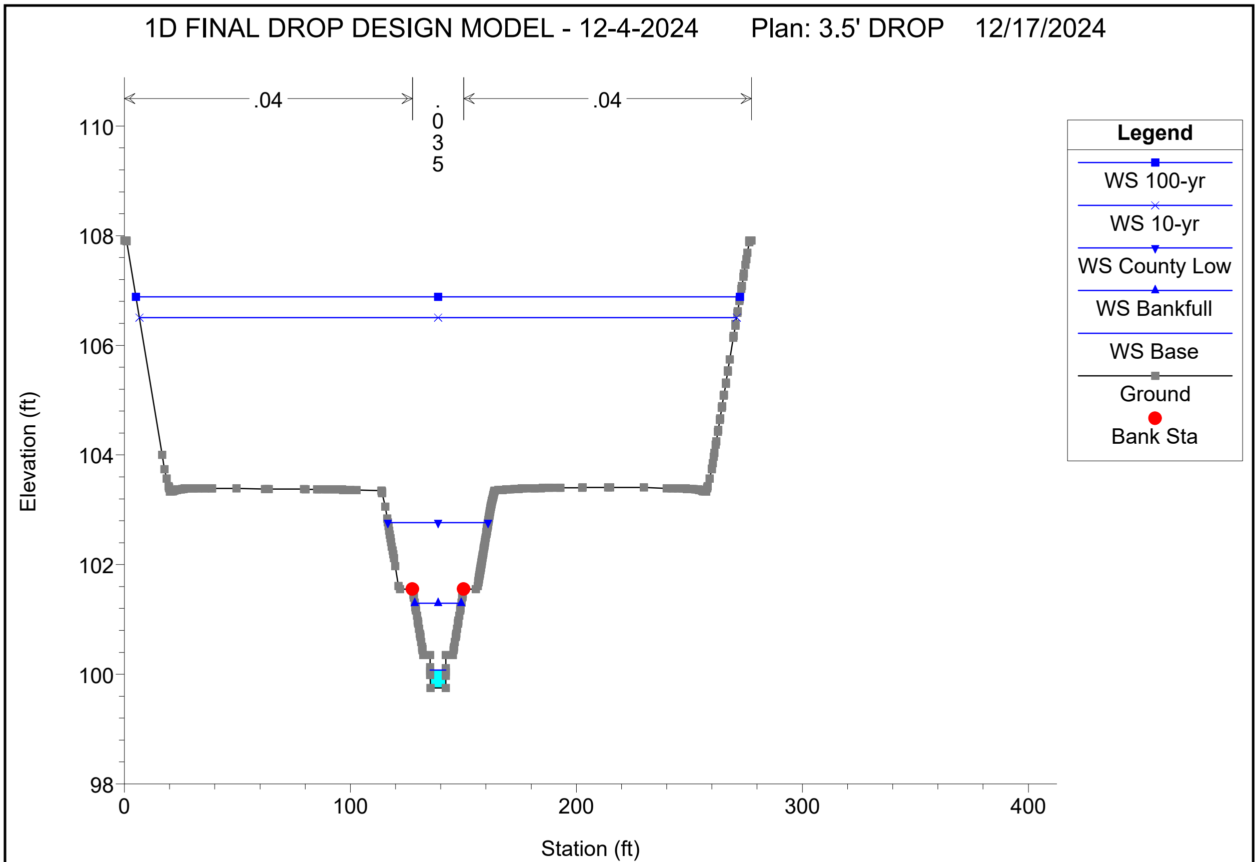


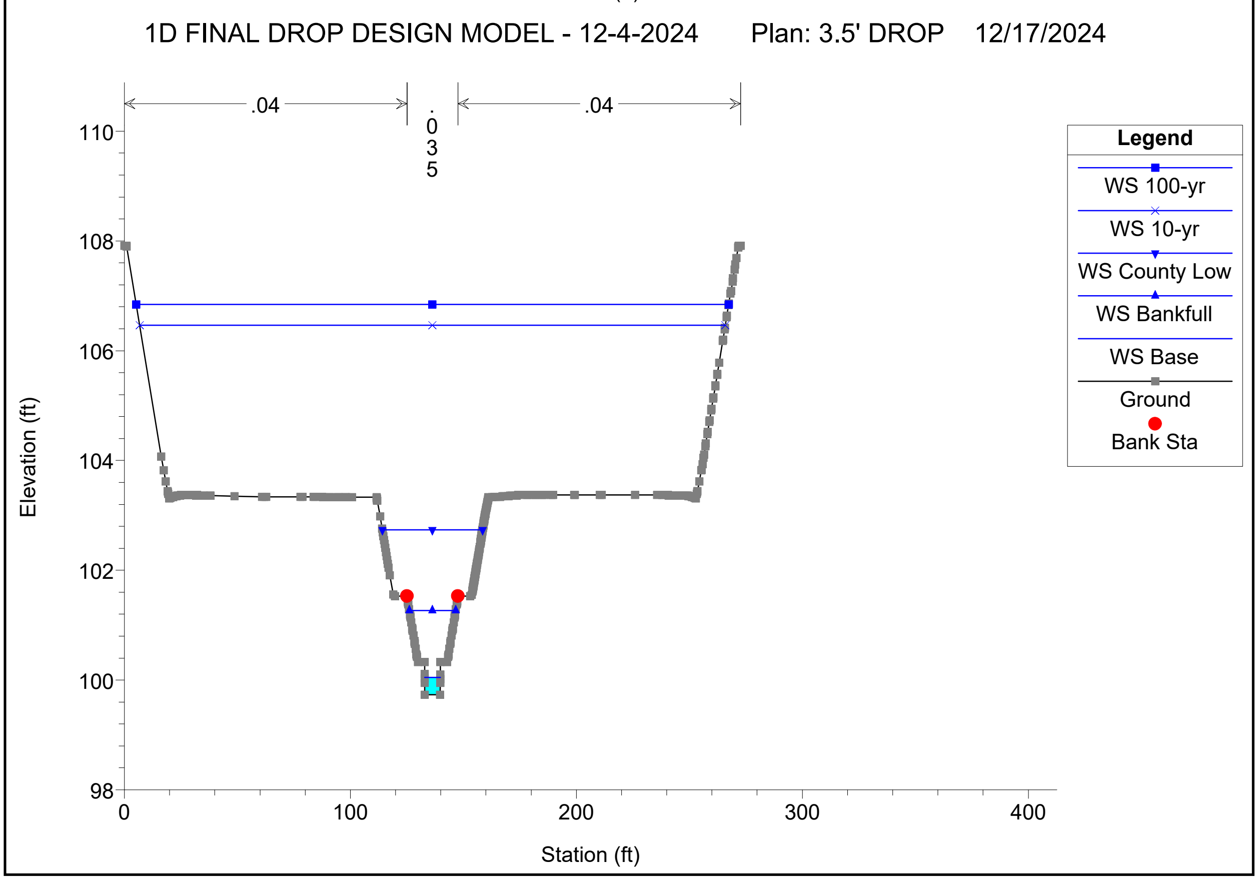
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



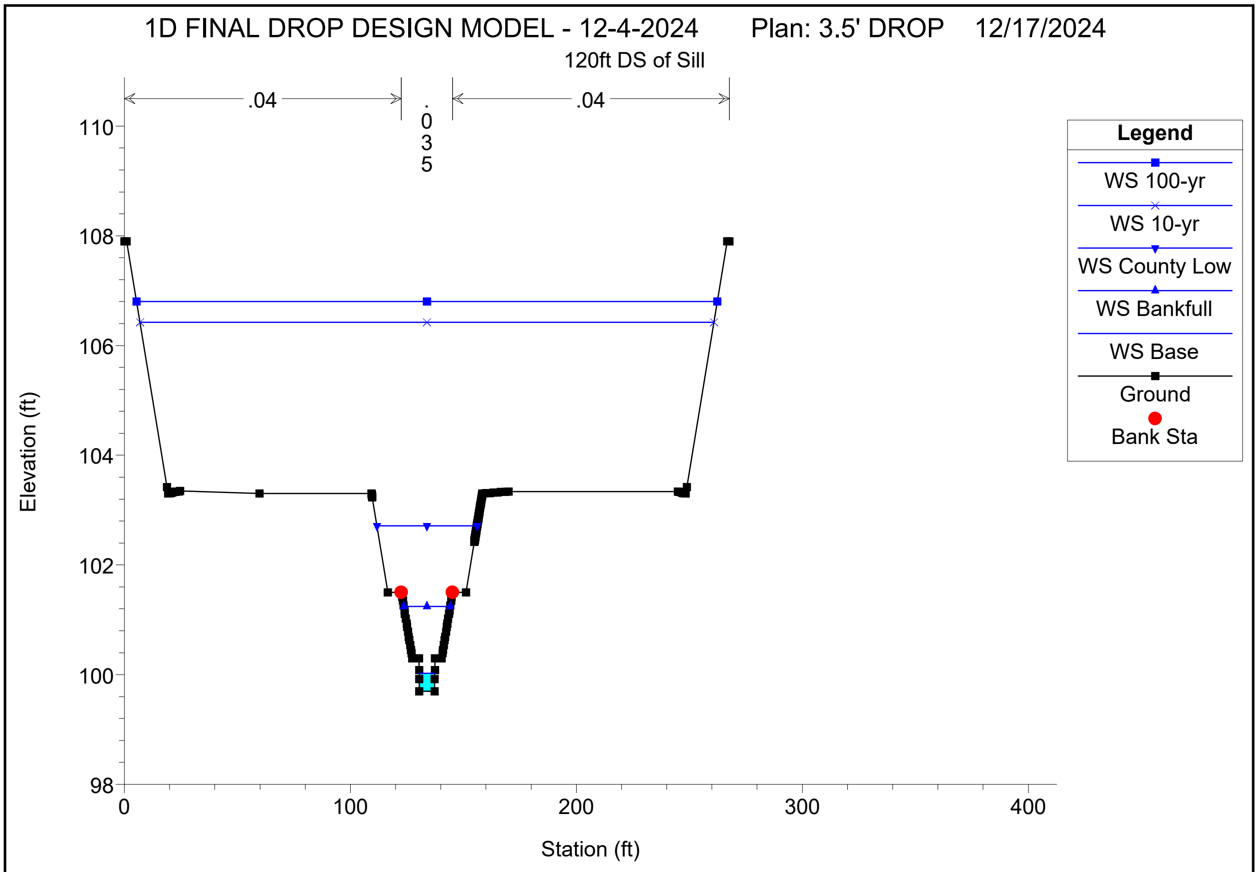


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



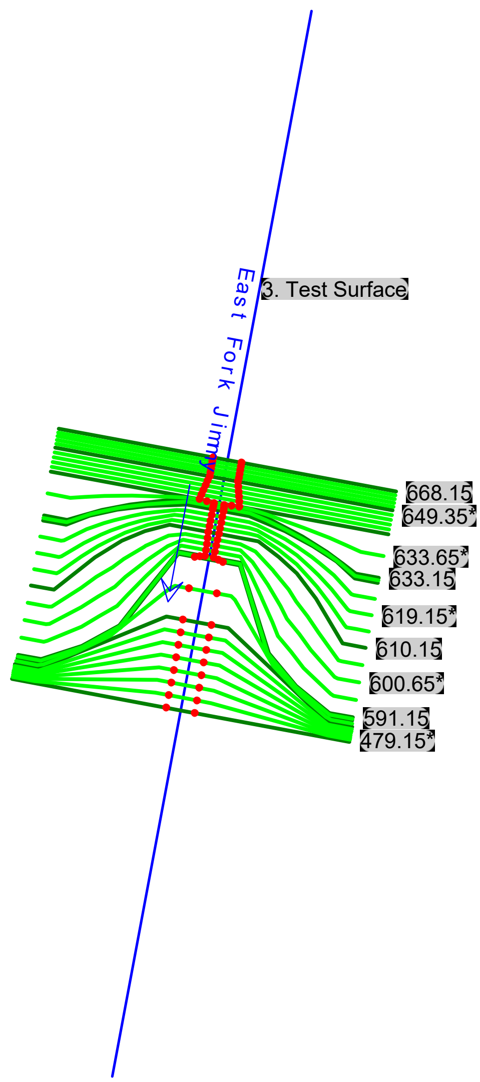


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

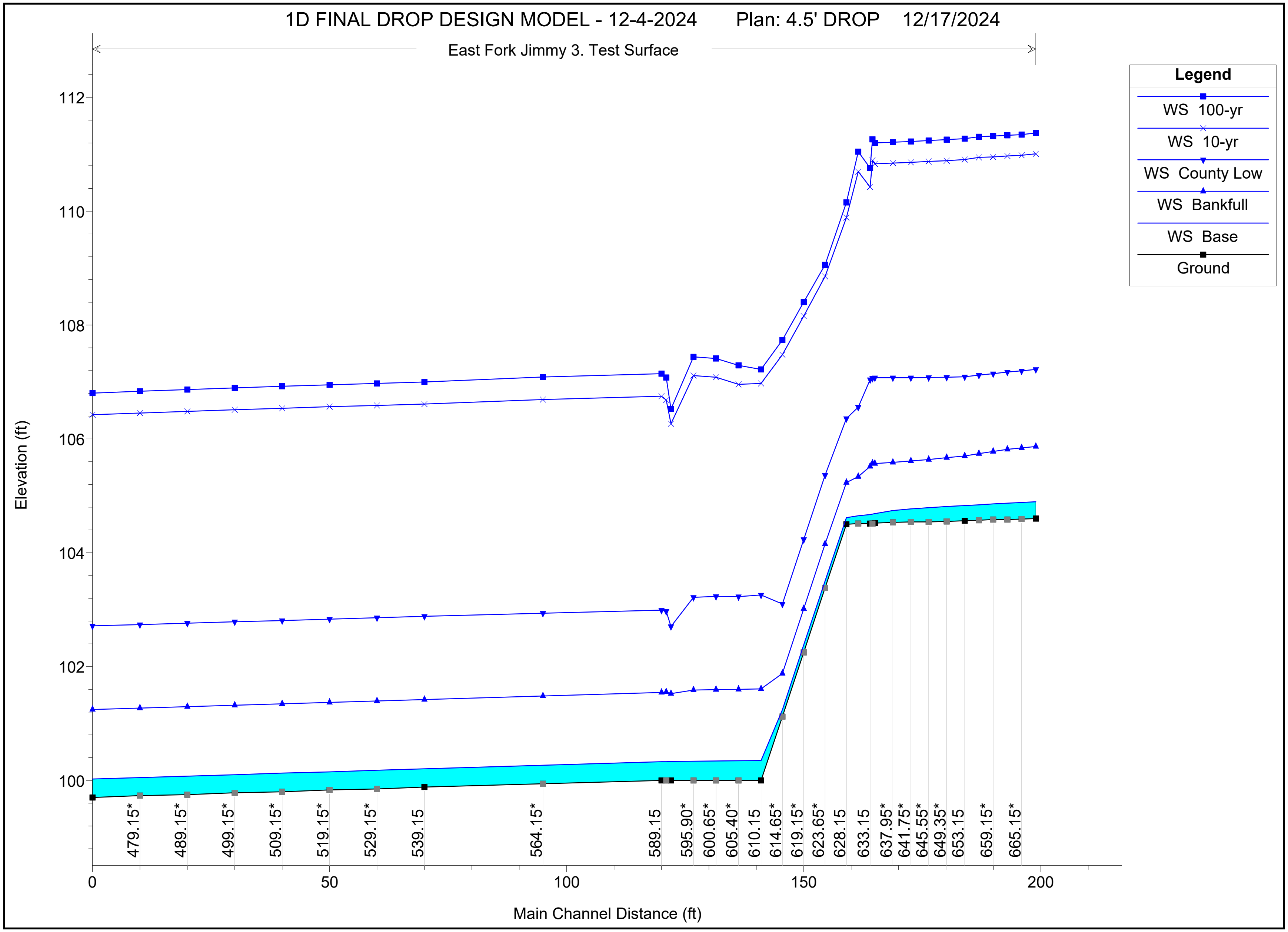


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

4.5' DROP STRUCTURE - PLAN VIEW



1 in Horiz. = 150 ft   1 in Vert. = 50 ft



1 in Horiz. = 30 ft 1 in Vert. = 2.5 ft

HEC-RAS Plan: 4.5' DROP River: East Fork Jimmy Reach: 3. Test Surface

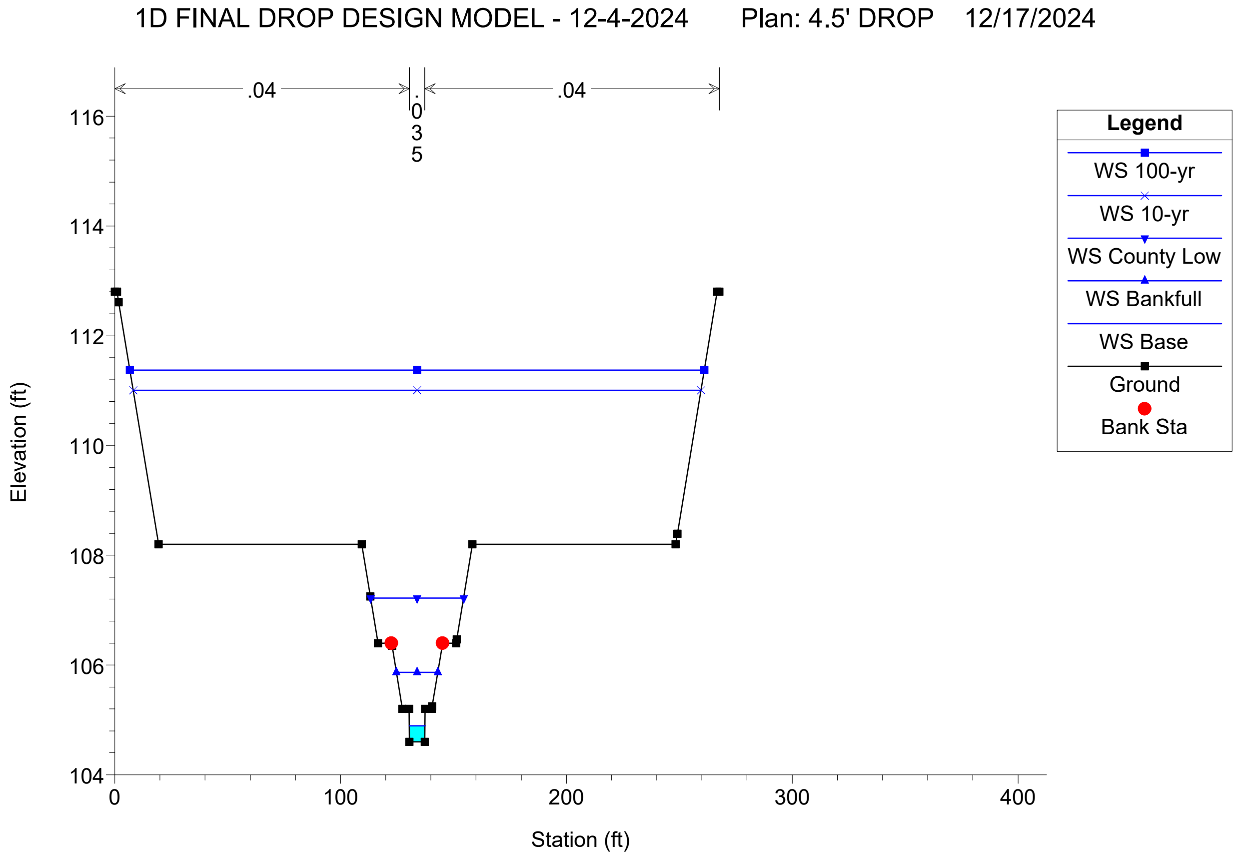
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	668.15	Base	2.10	104.60	104.89		104.91	0.003564	1.05	2.00	6.90	0.34
3. Test Surface	668.15	Bankfull	40.00	104.60	105.87		105.98	0.007376	2.74	14.58	18.33	0.54
3. Test Surface	668.15	County Low	227.00	104.60	107.22		107.51	0.006128	4.52	56.54	41.15	0.57
3. Test Surface	668.15	10-yr	3729.00	104.60	111.01		111.42	0.003488	7.01	775.38	251.47	0.52
3. Test Surface	668.15	100-yr	4400.00	104.60	111.37		111.82	0.003439	7.26	867.13	254.37	0.52
3. Test Surface	665.15*	Base	2.10	104.59	104.88		104.90	0.003553	1.05	2.00	6.90	0.34
3. Test Surface	665.15*	Bankfull	40.00	104.59	105.84		105.96	0.007168	2.80	14.28	18.20	0.56
3. Test Surface	665.15*	County Low	227.00	104.59	107.19		107.49	0.005822	4.60	55.89	41.02	0.58
3. Test Surface	665.15*	10-yr	3729.00	104.59	110.98		111.41	0.003473	7.32	770.56	251.28	0.54
3. Test Surface	665.15*	100-yr	4400.00	104.59	111.34		111.81	0.003422	7.57	862.42	254.20	0.54
3. Test Surface	662.15*	Base	2.10	104.58	104.87		104.89	0.003784	1.06	1.99	6.90	0.35
3. Test Surface	662.15*	Bankfull	40.00	104.58	105.81		105.94	0.007650	2.86	13.97	18.06	0.57
3. Test Surface	662.15*	County Low	227.00	104.58	107.17		107.48	0.005946	4.64	55.37	40.90	0.59
3. Test Surface	662.15*	10-yr	3729.00	104.58	110.97		111.40	0.003475	7.34	770.10	251.27	0.54
3. Test Surface	662.15*	100-yr	4400.00	104.58	111.33		111.80	0.003423	7.59	862.01	254.19	0.54
3. Test Surface	659.15*	Base	2.10	104.58	104.86		104.88	0.004460	1.11	1.89	6.89	0.37
3. Test Surface	659.15*	Bankfull	40.00	104.58	105.78		105.92	0.008761	3.00	13.33	17.78	0.61
3. Test Surface	659.15*	County Low	227.00	104.58	107.14		107.46	0.006293	4.73	54.27	40.74	0.61
3. Test Surface	659.15*	10-yr	3729.00	104.58	110.95		111.39	0.003521	7.38	766.82	251.22	0.54
3. Test Surface	659.15*	100-yr	4400.00	104.58	111.32		111.79	0.003463	7.62	858.82	254.16	0.55
3. Test Surface	656.15*	Base	2.10	104.57	104.84		104.86	0.004699	1.13	1.86	6.89	0.38
3. Test Surface	656.15*	Bankfull	40.00	104.57	105.74		105.89	0.009723	3.11	12.86	17.56	0.64
3. Test Surface	656.15*	County Low	227.00	104.57	107.12		107.44	0.006480	4.77	53.70	40.63	0.61
3. Test Surface	656.15*	10-yr	3729.00	104.57	110.94		111.38	0.003525	7.38	766.51	251.15	0.54
3. Test Surface	656.15*	100-yr	4400.00	104.57	111.31		111.78	0.003465	7.63	858.53	254.08	0.55
3. Test Surface	653.15	Base	2.10	104.56	104.83		104.85	0.004689	1.15	1.83	6.89	0.39
3. Test Surface	653.15	Bankfull	40.00	104.56	105.70		105.86	0.010136	3.26	12.28	17.30	0.68
3. Test Surface	653.15	County Low	227.00	104.56	107.09		107.43	0.006222	4.87	52.80	40.42	0.63
3. Test Surface	653.15	10-yr	3729.00	104.56	110.91		111.37	0.003531	7.73	759.75	250.94	0.57
3. Test Surface	653.15	100-yr	4400.00	104.56	111.27		111.77	0.003458	7.98	852.61	253.89	0.57
3. Test Surface	649.35*	Base	2.10	104.55	104.81		104.83	0.004732	1.14	1.85	7.18	0.40
3. Test Surface	649.35*	Bankfull	40.00	104.55	105.67		105.82	0.009426	3.14	12.73	18.20	0.66
3. Test Surface	649.35*	County Low	227.00	104.55	107.08		107.39	0.005586	4.64	54.30	40.42	0.60
3. Test Surface	649.35*	10-yr	3729.00	104.55	110.89		111.36	0.003486	7.73	759.33	250.87	0.57
3. Test Surface	649.35*	100-yr	4400.00	104.55	111.25		111.76	0.003417	7.98	852.25	253.81	0.57
3. Test Surface	645.55*	Base	2.10	104.54	104.79		104.81	0.004829	1.13	1.86	7.47	0.40
3. Test Surface	645.55*	Bankfull	40.00	104.54	105.64		105.78	0.008932	3.05	13.11	19.01	0.65
3. Test Surface	645.55*	County Low	227.00	104.54	107.08		107.37	0.005013	4.42	56.08	40.48	0.57
3. Test Surface	645.55*	10-yr	3729.00	104.54	110.87		111.34	0.003401	7.67	762.29	250.91	0.57
3. Test Surface	645.55*	100-yr	4400.00	104.54	111.24		111.74	0.003342	7.93	855.22	253.86	0.57
3. Test Surface	641.75*	Base	2.10	104.54	104.77		104.79	0.006212	1.20	1.75	7.77	0.45
3. Test Surface	641.75*	Bankfull	40.00	104.54	105.61		105.75	0.008397	2.97	13.48	19.67	0.63
3. Test Surface	641.75*	County Low	227.00	104.54	107.07		107.34	0.004512	4.21	57.96	40.50	0.55
3. Test Surface	641.75*	10-yr	3729.00	104.54	110.86		111.33	0.003350	7.64	762.78	250.86	0.57
3. Test Surface	641.75*	100-yr	4400.00	104.54	111.22		111.73	0.003297	7.90	855.71	253.81	0.57
3. Test Surface	637.95*	Base	2.10	104.53	104.74		104.76	0.007667	1.26	1.66	8.10	0.49
3. Test Surface	637.95*	Bankfull	40.00	104.53	105.59		105.71	0.007695	2.86	13.97	20.30	0.61
3. Test Surface	637.95*	County Low	227.00	104.53	107.07		107.31	0.004023	3.99	60.28	40.61	0.52
3. Test Surface	637.95*	10-yr	3729.00	104.53	110.84		111.32	0.003260	7.56	766.66	250.90	0.56
3. Test Surface	637.95*	100-yr	4400.00	104.53	111.21		111.72	0.003217	7.83	859.59	253.87	0.57
3. Test Surface	634.15	Base	2.10	104.52	104.68		104.72	0.016485	1.56	1.35	8.56	0.69
3. Test Surface	634.15	Bankfull	40.00	104.52	105.56		105.68	0.006931	2.75	14.55	20.81	0.58
3. Test Surface	634.15	County Low	227.00	104.52	107.07		107.29	0.003601	3.79	62.80	40.66	0.49
3. Test Surface	634.15	10-yr	3729.00	104.52	110.83		111.31	0.003198	7.49	768.87	250.91	0.56
3. Test Surface	634.15	100-yr	4400.00	104.52	111.20		111.71	0.003162	7.77	861.75	253.85	0.56
3. Test Surface	633.65*	Base	2.10	104.51	104.68		104.71	0.017830	1.46	1.43	9.53	0.67
3. Test Surface	633.65*	Bankfull	40.00	104.51	105.57		105.67	0.006314	2.59	15.51	21.97	0.52
3. Test Surface	633.65*	County Low	227.00	104.51	107.07		107.29	0.003514	3.97	63.19	40.61	0.46
3. Test Surface	633.65*	10-yr	3729.00	104.51	110.89		111.25	0.002542	6.52	822.32	259.56	0.47
3. Test Surface	633.65*	100-yr	4400.00	104.51	111.26		111.66	0.002533	6.77	918.22	262.51	0.47
3. Test Surface	633.15	Base	2.10	104.51	104.67		104.71	0.001891	1.59	1.33	8.85	0.70
3. Test Surface	633.15	Bankfull	40.00	104.51	105.51	105.32	105.66	0.000772	3.45	13.97	20.64	0.61
3. Test Surface	633.15	County Low	227.00	104.51	107.04		107.28	0.000440	4.83	62.43	40.45	0.53
3. Test Surface	633.15	10-yr	3729.00	104.51	110.42	109.98	111.20	0.001149	13.72	736.69	263.93	0.99
3. Test Surface	633.15	100-yr	4400.00	104.51	110.76	110.27	111.60	0.001195	14.51	824.81	266.59	1.02
3. Test Surface	630.65*	Base	2.10	104.51	104.65	104.63	104.70	0.031719	1.76	1.20	9.57	0.84

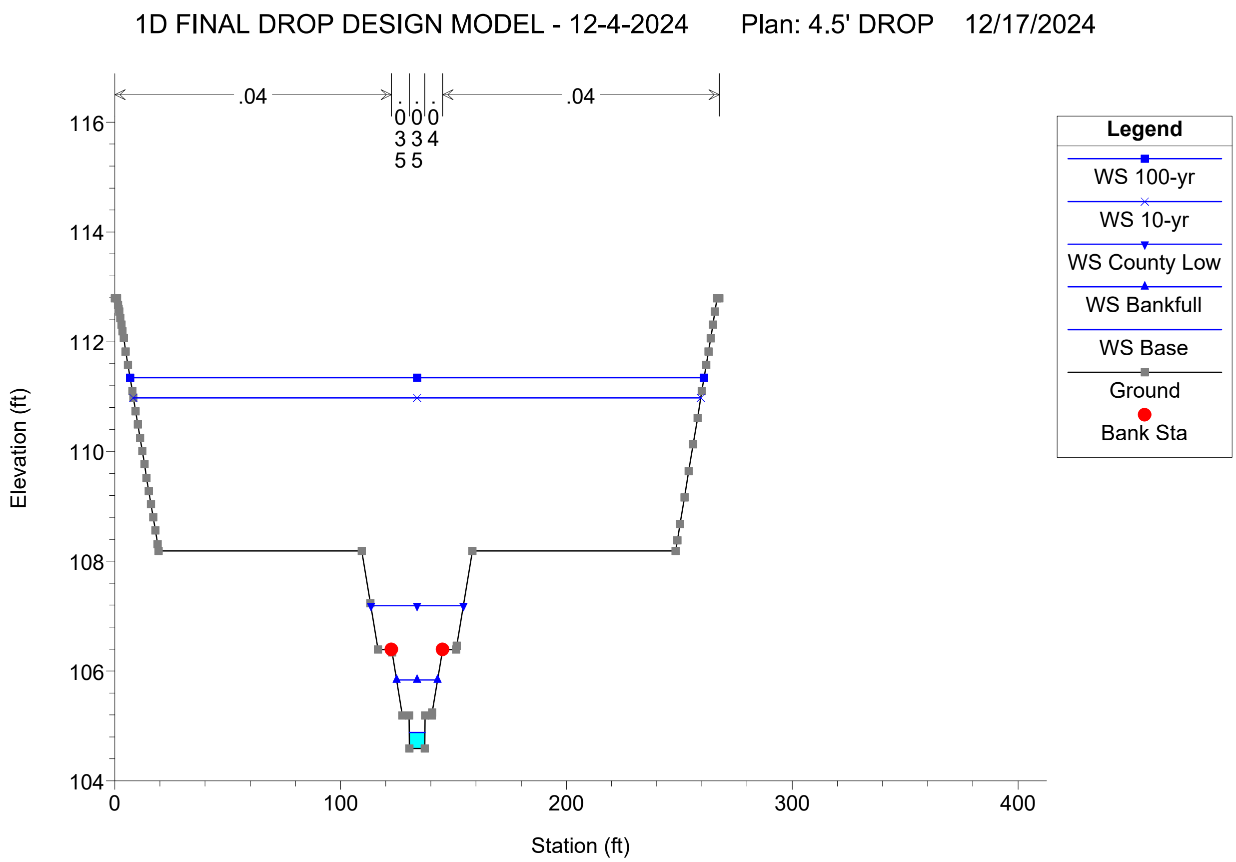
HEC-RAS Plan: 4.5' DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	630.65*	Bankfull	40.00	104.51	105.34	105.34	105.65	0.009345	3.16	11.30	19.36	0.61
3. Test Surface	630.65*	County Low	227.00	104.51	106.56	106.56	107.24	0.004651	4.08	45.79	36.63	0.50
3. Test Surface	630.65*	10-yr	3729.00	104.51	110.69		111.08	0.001737	5.22	823.01	266.85	0.37
3. Test Surface	630.65*	100-yr	4400.00	104.51	111.04		111.47	0.001772	5.47	916.77	269.64	0.38
3. Test Surface	628.15	Base	2.10	104.50	104.62	104.62	104.68	0.004602	1.99	1.09	10.26	1.03
3. Test Surface	628.15	Bankfull	40.00	104.50	105.23	105.23	105.50	0.002102	4.61	10.12	19.13	0.95
3. Test Surface	628.15	County Low	227.00	104.50	106.36	106.36	106.92	0.001472	7.17	40.81	35.05	0.93
3. Test Surface	628.15	10-yr	3729.00	104.50	109.88	109.88	111.00	0.001757	15.95	623.22	261.11	1.21
3. Test Surface	628.15	100-yr	4400.00	104.50	110.15	110.15	111.39	0.001876	17.02	693.38	263.25	1.26
3. Test Surface	623.65*	Base	2.10	103.38	103.50	103.50	103.56	0.041190	1.84	1.13	10.13	0.93
3. Test Surface	623.65*	Bankfull	40.00	103.38	104.15	104.15	104.45	0.013591	3.64	10.41	18.37	0.73
3. Test Surface	623.65*	County Low	227.00	103.38	105.36	105.36	106.00	0.007160	4.96	42.47	34.85	0.62
3. Test Surface	623.65*	10-yr	3729.00	103.38	108.85	108.85	109.82	0.005715	8.72	531.94	266.03	0.66
3. Test Surface	623.65*	100-yr	4400.00	103.38	109.06	109.06	110.15	0.006144	9.27	586.74	267.67	0.69
3. Test Surface	619.15*	Base	2.10	102.25	102.38	102.38	102.43	0.030199	1.68	1.24	10.12	0.81
3. Test Surface	619.15*	Bankfull	40.00	102.25	103.01	103.01	103.31	0.016450	3.98	9.91	17.36	0.80
3. Test Surface	619.15*	County Low	227.00	102.25	104.23	104.23	104.87	0.009121	5.60	40.12	32.80	0.70
3. Test Surface	619.15*	10-yr	3729.00	102.25	108.16	108.16	109.13	0.005600	9.08	527.83	273.63	0.66
3. Test Surface	619.15*	100-yr	4400.00	102.25	108.40	108.40	109.45	0.005765	9.47	595.41	275.60	0.67
3. Test Surface	614.65*	Base	2.10	101.12	101.24	101.24	101.30	0.044512	1.90	1.11	9.88	0.97
3. Test Surface	614.65*	Bankfull	40.00	101.12	101.88	101.88	102.17	0.019144	4.27	9.57	16.69	0.87
3. Test Surface	614.65*	County Low	227.00	101.12	103.10	103.10	103.74	0.011404	6.25	38.20	30.91	0.78
3. Test Surface	614.65*	10-yr	3729.00	101.12	107.48	107.48	108.42	0.005482	9.44	529.79	281.40	0.66
3. Test Surface	614.65*	100-yr	4400.00	101.12	107.73	107.73	108.74	0.005631	9.82	601.84	283.44	0.67
3. Test Surface	610.15	Base	2.10	100.00	100.35		100.35	0.000103	0.62	3.61	12.17	0.19
3. Test Surface	610.15	Bankfull	40.00	100.00	101.61		101.65	0.000114	1.81	27.07	25.12	0.25
3. Test Surface	610.15	County Low	227.00	100.00	103.26		103.39	0.000179	3.64	85.46	46.06	0.36
3. Test Surface	610.15	10-yr	3729.00	100.00	106.97	106.97	108.02	0.000953	13.95	582.59	290.57	0.93
3. Test Surface	610.15	100-yr	4400.00	100.00	107.22	107.22	108.39	0.001061	15.06	653.35	292.51	0.99
3. Test Surface	605.40*	Base	2.10	100.00	100.35		100.35	0.000753	0.61	3.46	11.88	0.18
3. Test Surface	605.40*	Bankfull	40.00	100.00	101.60		101.64	0.000597	1.50	26.85	25.71	0.21
3. Test Surface	605.40*	County Low	227.00	100.00	103.23		103.38	0.000754	2.70	86.49	47.44	0.27
3. Test Surface	605.40*	10-yr	3729.00	100.00	106.96		107.52	0.002208	7.71	721.18	307.25	0.52
3. Test Surface	605.40*	100-yr	4400.00	100.00	107.29		107.88	0.002172	7.89	823.98	309.91	0.52
3. Test Surface	600.65*	Base	2.10	100.00	100.34		100.35	0.000581	0.67	3.30	11.72	0.20
3. Test Surface	600.65*	Bankfull	40.00	100.00	101.59		101.64	0.000487	1.72	27.31	27.13	0.24
3. Test Surface	600.65*	County Low	227.00	100.00	103.23		103.37	0.000623	3.12	90.04	48.77	0.31
3. Test Surface	600.65*	10-yr	3729.00	100.00	107.08		107.43	0.001324	7.67	925.29	325.06	0.51
3. Test Surface	600.65*	100-yr	4400.00	100.00	107.41		107.79	0.001354	7.99	1032.30	327.69	0.52
3. Test Surface	595.90*	Base	2.10	100.00	100.34		100.34	0.000393	0.75	3.17	11.65	0.23
3. Test Surface	595.90*	Bankfull	40.00	100.00	101.58		101.63	0.000369	2.04	28.07	28.74	0.29
3. Test Surface	595.90*	County Low	227.00	100.00	103.21		103.36	0.000512	3.86	92.38	48.01	0.38
3. Test Surface	595.90*	10-yr	3729.00	100.00	107.11		107.39	0.000881	8.58	1119.41	342.12	0.57
3. Test Surface	595.90*	100-yr	4400.00	100.00	107.44		107.75	0.000926	9.07	1232.02	344.75	0.59
3. Test Surface	591.15	Base	2.10	100.00	100.33		100.34	0.000216	0.87	3.10	11.91	0.27
3. Test Surface	591.15	Bankfull	40.00	100.00	101.52		101.62	0.000317	2.92	28.23	30.30	0.42
3. Test Surface	591.15	County Low	227.00	100.00	102.70		103.31	0.001044	7.77	71.81	41.83	0.83
3. Test Surface	591.15	10-yr	3729.00	100.00	106.27	106.27	107.30	0.001690	17.30	1022.60	352.16	1.22
3. Test Surface	591.15	100-yr	4400.00	100.00	106.52	106.52	107.65	0.001828	18.48	1113.09	354.21	1.28
3. Test Surface	590.15*	Base	2.10	100.00	100.33		100.34	0.001445	0.90	2.34	10.13	0.33
3. Test Surface	590.15*	Bankfull	40.00	100.00	101.55		101.61	0.000699	1.97	24.37	30.66	0.31
3. Test Surface	590.15*	County Low	227.00	100.00	102.97		103.19	0.001203	4.23	78.05	43.94	0.45
3. Test Surface	590.15*	10-yr	3729.00	100.00	106.68		106.95	0.001239	7.63	1168.93	356.42	0.53
3. Test Surface	590.15*	100-yr	4400.00	100.00	107.08		107.36	0.001214	7.86	1311.37	359.61	0.53
3. Test Surface	589.15	Base	2.10	100.00	100.33		100.34	0.002452	0.94	2.23	6.91	0.29
3. Test Surface	589.15	Bankfull	40.00	100.00	101.55		101.61	0.002489	2.00	20.01	20.58	0.36
3. Test Surface	589.15	County Low	227.00	100.00	102.99		103.17	0.002598	3.65	72.37	44.13	0.42
3. Test Surface	589.15	10-yr	3729.00	100.00	106.75		106.92	0.001322	4.95	1191.51	357.85	0.35
3. Test Surface	589.15	100-yr	4400.00	100.00	107.14		107.33	0.001293	5.11	1333.84	361.02	0.35
3. Test Surface	564.15*	Base	2.10	99.94	100.26		100.28	0.002485	0.94	2.22	6.91	0.29
3. Test Surface	564.15*	Bankfull	40.00	99.94	101.48		101.55	0.002493	2.00	20.00	20.58	0.36
3. Test Surface	564.15*	County Low	227.00	99.94	102.93		103.12	0.002573	3.64	72.61	44.17	0.42
3. Test Surface	564.15*	10-yr	3729.00	99.94	106.69		106.91	0.001617	5.48	1074.48	323.65	0.39
3. Test Surface	564.15*	100-yr	4400.00	99.94	107.08		107.32	0.001587	5.66	1202.30	326.83	0.39
3. Test Surface	539.15	Base	2.10	99.88	100.20		100.21	0.002590	0.96	2.20	6.91	0.30
3. Test Surface	539.15	Bankfull	40.00	99.88	101.42		101.48	0.002488	2.00	20.02	20.61	0.36

HEC-RAS Plan: 4.5' DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

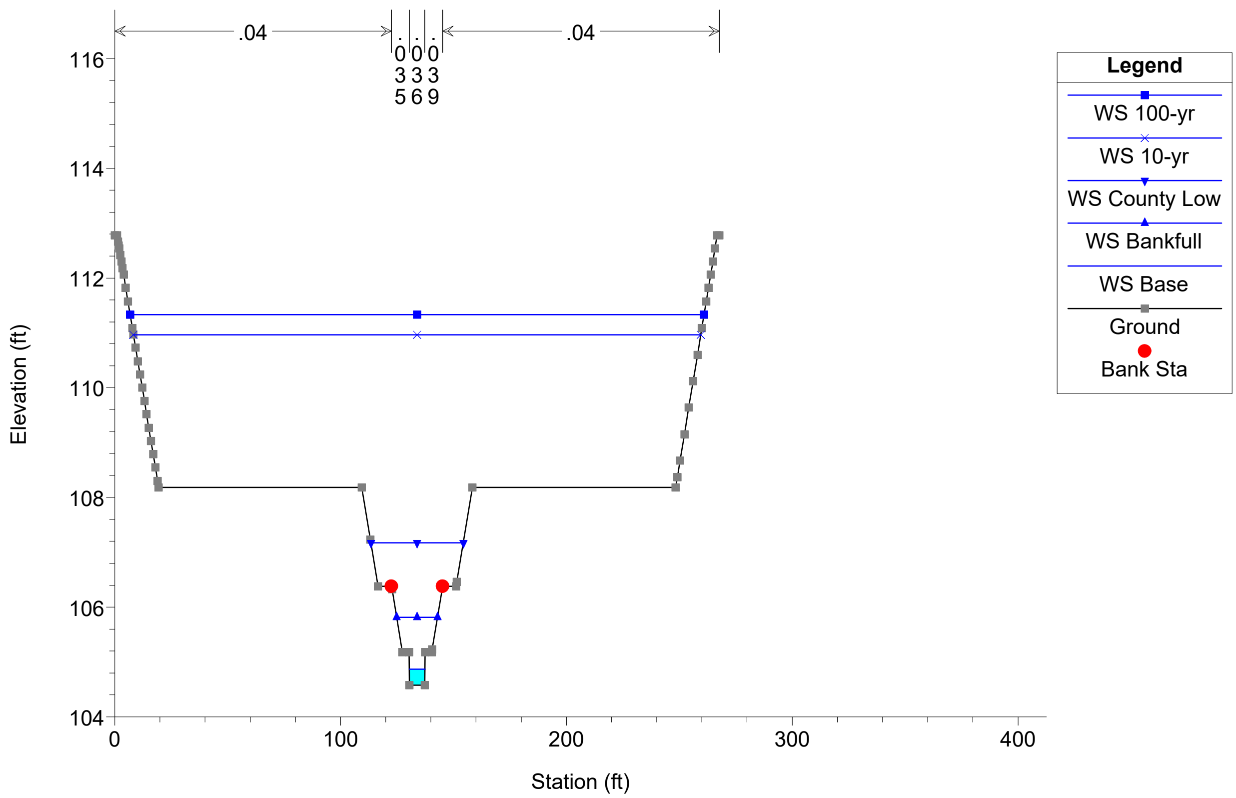
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	539.15	County Low	227.00	99.88	102.88		103.06	0.002538	3.63	72.94	44.24	0.42
3. Test Surface	539.15	10-yr	3729.00	99.88	106.61		106.89	0.002029	6.13	956.57	289.34	0.44
3. Test Surface	539.15	100-yr	4400.00	99.88	107.00		107.30	0.002002	6.34	1069.46	292.46	0.44
3. Test Surface	529.15*	Base	2.10	99.85	100.18		100.19	0.002452	0.94	2.23	6.91	0.29
3. Test Surface	529.15*	Bankfull	40.00	99.85	101.40		101.46	0.002489	2.00	20.00	20.56	0.36
3. Test Surface	529.15*	County Low	227.00	99.85	102.86		103.04	0.002531	3.62	73.04	44.22	0.42
3. Test Surface	529.15*	10-yr	3729.00	99.85	106.59		106.88	0.002085	6.21	941.81	284.31	0.44
3. Test Surface	529.15*	100-yr	4400.00	99.85	106.97		107.29	0.002060	6.43	1052.56	287.40	0.45
3. Test Surface	519.15*	Base	2.10	99.83	100.15		100.16	0.002596	0.96	2.19	6.91	0.30
3. Test Surface	519.15*	Bankfull	40.00	99.83	101.37		101.43	0.002491	2.00	20.01	20.60	0.36
3. Test Surface	519.15*	County Low	227.00	99.83	102.83		103.01	0.002529	3.62	73.04	44.25	0.42
3. Test Surface	519.15*	10-yr	3729.00	99.83	106.56		106.86	0.002141	6.29	927.36	279.27	0.45
3. Test Surface	519.15*	100-yr	4400.00	99.83	106.95		107.28	0.002119	6.53	1035.92	282.35	0.45
3. Test Surface	509.15*	Base	2.10	99.80	100.13		100.14	0.002460	0.94	2.23	6.91	0.29
3. Test Surface	509.15*	Bankfull	40.00	99.80	101.35		101.41	0.002492	2.00	20.00	20.56	0.36
3. Test Surface	509.15*	County Low	227.00	99.80	102.81		102.99	0.002525	3.62	73.12	44.26	0.42
3. Test Surface	509.15*	10-yr	3729.00	99.80	106.54		106.85	0.002205	6.39	912.19	274.23	0.46
3. Test Surface	509.15*	100-yr	4400.00	99.80	106.92		107.26	0.002186	6.62	1018.56	277.31	0.46
3. Test Surface	499.15*	Base	2.10	99.78	100.10		100.11	0.002609	0.96	2.19	6.91	0.30
3. Test Surface	499.15*	Bankfull	40.00	99.78	101.32		101.38	0.002494	2.00	20.00	20.60	0.36
3. Test Surface	499.15*	County Low	227.00	99.78	102.78		102.96	0.002523	3.62	73.10	44.28	0.42
3. Test Surface	499.15*	10-yr	3729.00	99.78	106.51		106.83	0.002268	6.48	897.46	269.20	0.46
3. Test Surface	499.15*	100-yr	4400.00	99.78	106.90		107.25	0.002253	6.73	1001.63	272.28	0.47
3. Test Surface	489.15*	Base	2.10	99.75	100.07		100.09	0.002475	0.94	2.23	6.91	0.29
3. Test Surface	489.15*	Bankfull	40.00	99.75	101.29		101.36	0.002495	2.00	19.99	20.56	0.36
3. Test Surface	489.15*	County Low	227.00	99.75	102.76		102.94	0.002515	3.61	73.21	44.24	0.42
3. Test Surface	489.15*	10-yr	3729.00	99.75	106.48		106.81	0.002342	6.58	881.92	264.15	0.47
3. Test Surface	489.15*	100-yr	4400.00	99.75	106.87		107.23	0.002331	6.84	983.84	267.23	0.47
3. Test Surface	479.15*	Base	2.10	99.73	100.05		100.06	0.002630	0.96	2.18	6.91	0.30
3. Test Surface	479.15*	Bankfull	40.00	99.73	101.27		101.33	0.002498	2.00	19.99	20.60	0.36
3. Test Surface	479.15*	County Low	227.00	99.73	102.74		102.91	0.002513	3.61	73.21	44.29	0.42
3. Test Surface	479.15*	10-yr	3729.00	99.73	106.45		106.80	0.002416	6.68	866.57	259.04	0.48
3. Test Surface	479.15*	100-yr	4400.00	99.73	106.84		107.21	0.002409	6.95	966.22	262.12	0.48
3. Test Surface	469.15	Base	2.10	99.70	100.02	99.84	100.04	0.002501	0.95	2.22	6.91	0.29
3. Test Surface	469.15	Bankfull	40.00	99.70	101.24	100.65	101.31	0.002503	2.00	19.97	20.55	0.36
3. Test Surface	469.15	County Low	227.00	99.70	102.71	101.90	102.89	0.002500	3.61	73.38	44.31	0.42
3. Test Surface	469.15	10-yr	3729.00	99.70	106.42	105.24	106.78	0.002501	6.79	850.54	253.99	0.49
3. Test Surface	469.15	100-yr	4400.00	99.70	106.80	105.49	107.19	0.002500	7.07	947.69	257.03	0.49



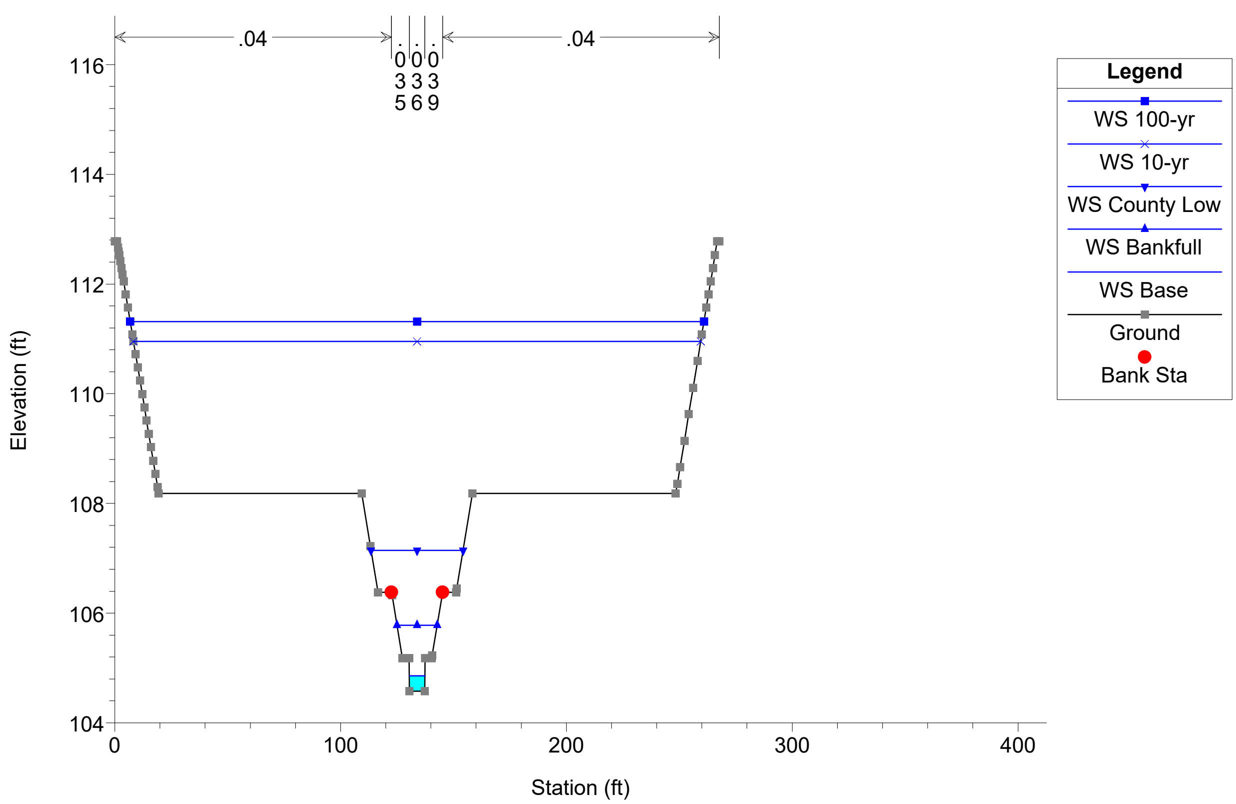


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024



1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024



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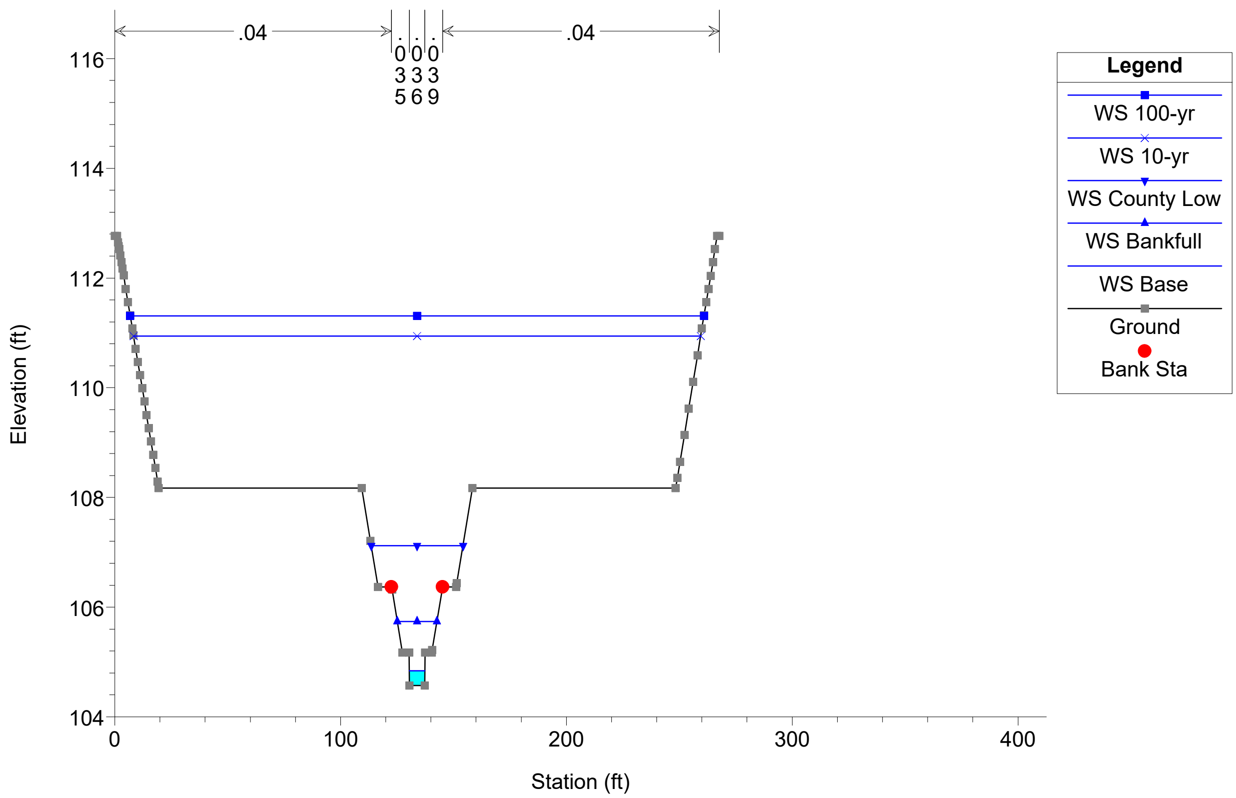
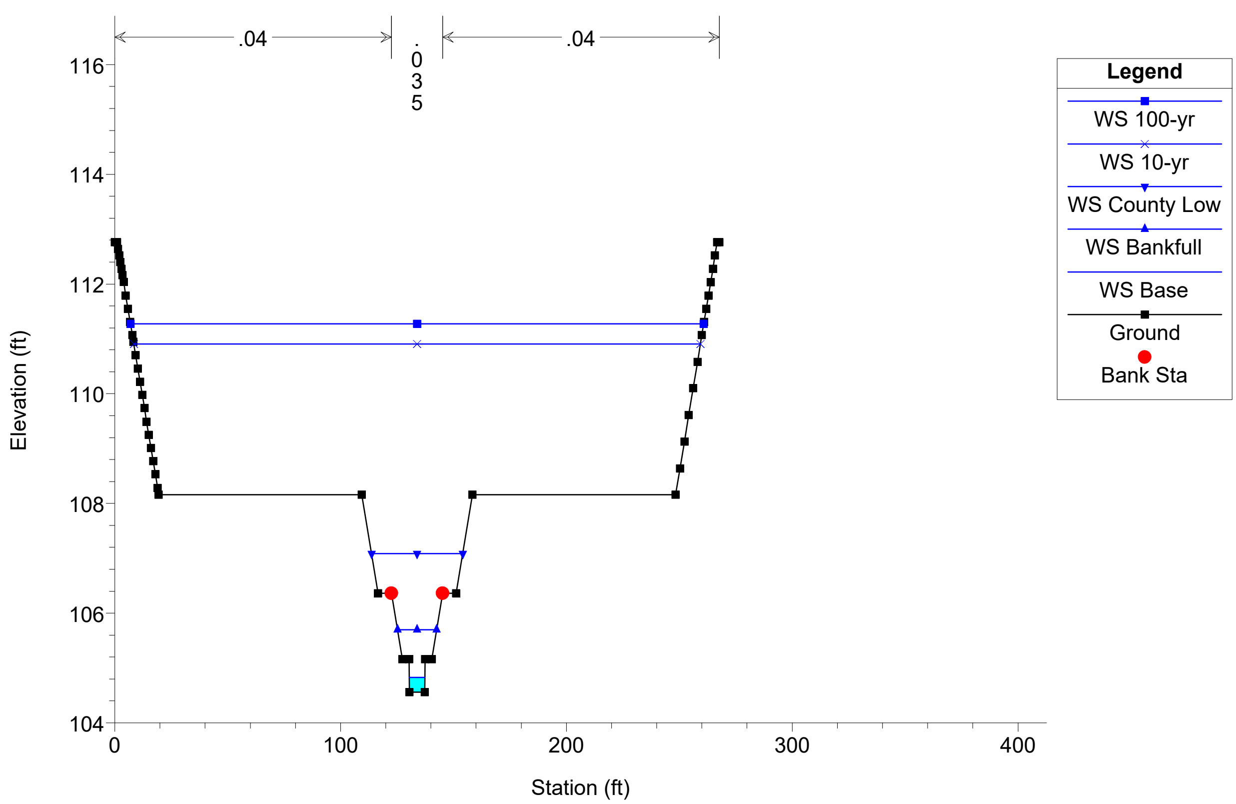
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024



1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024



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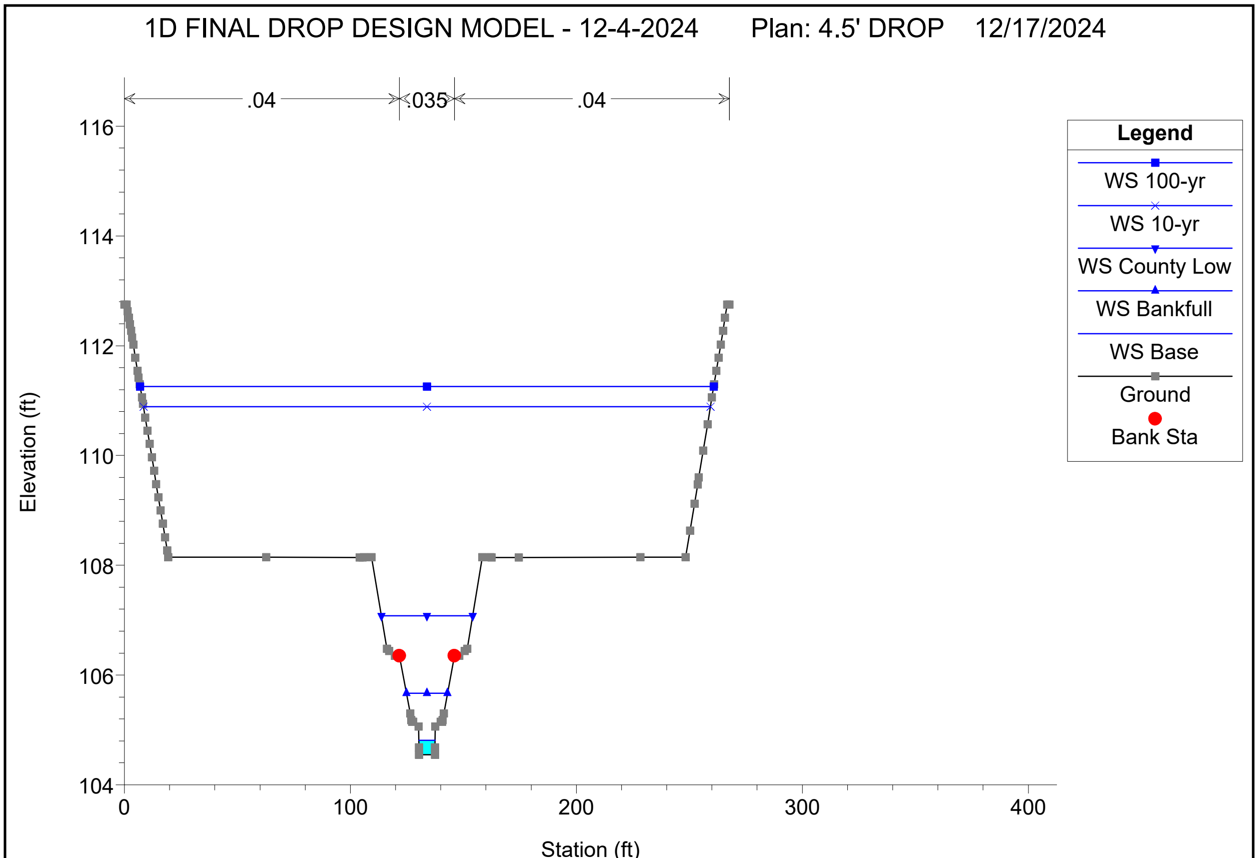

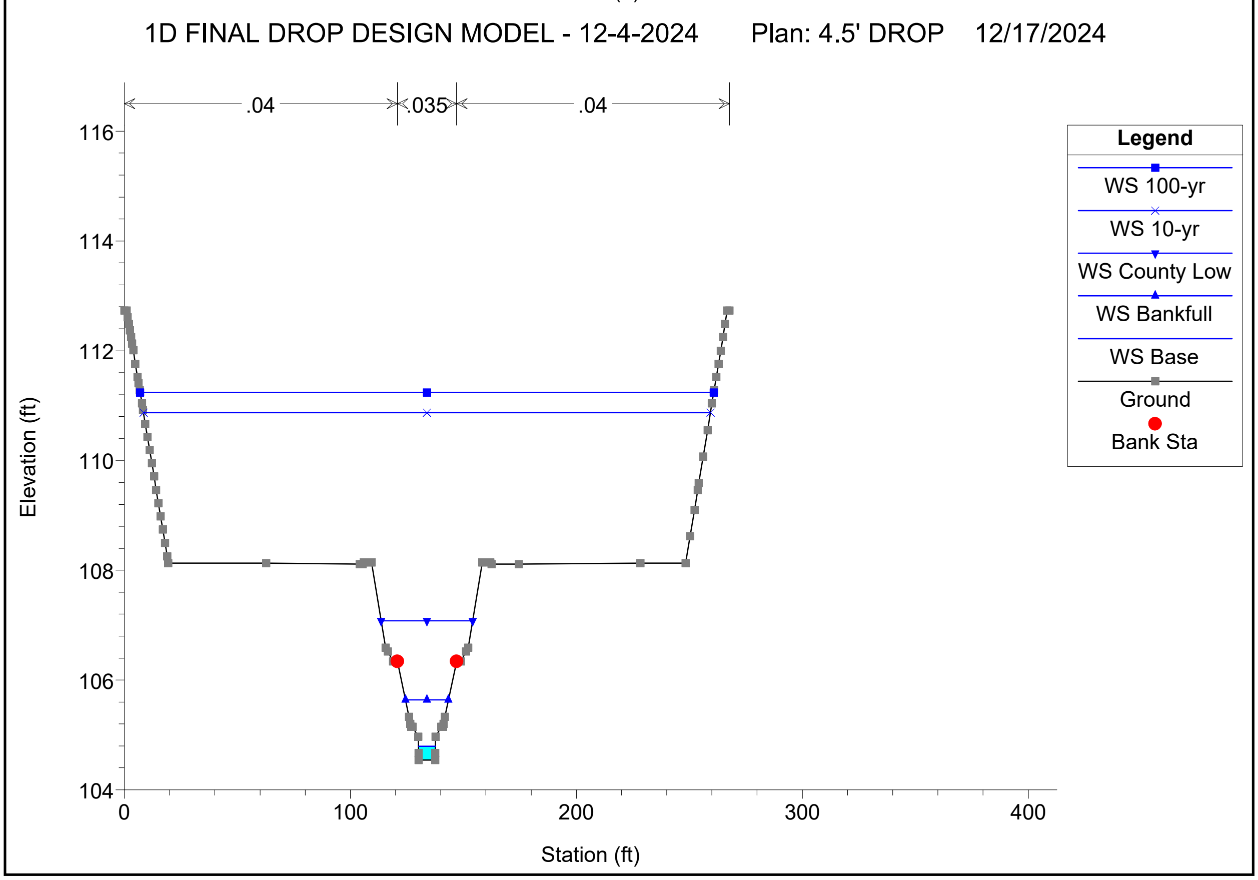

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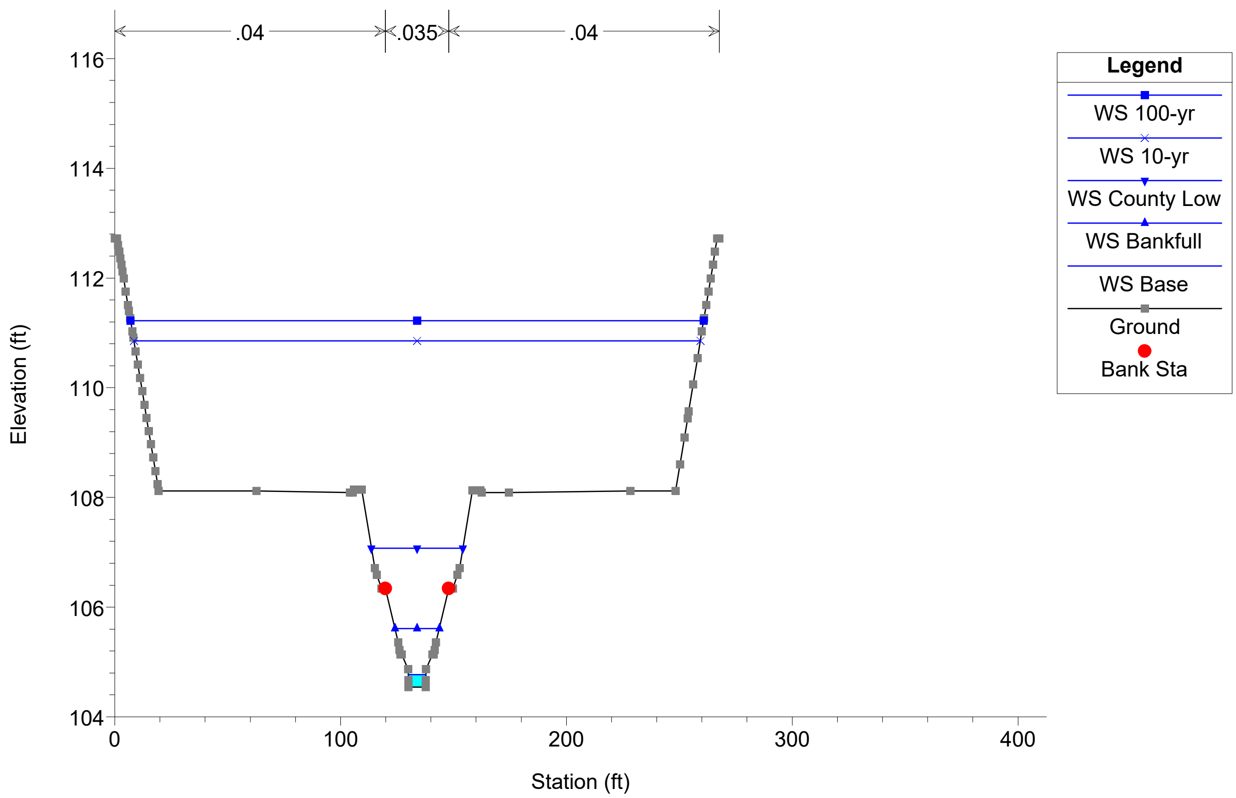
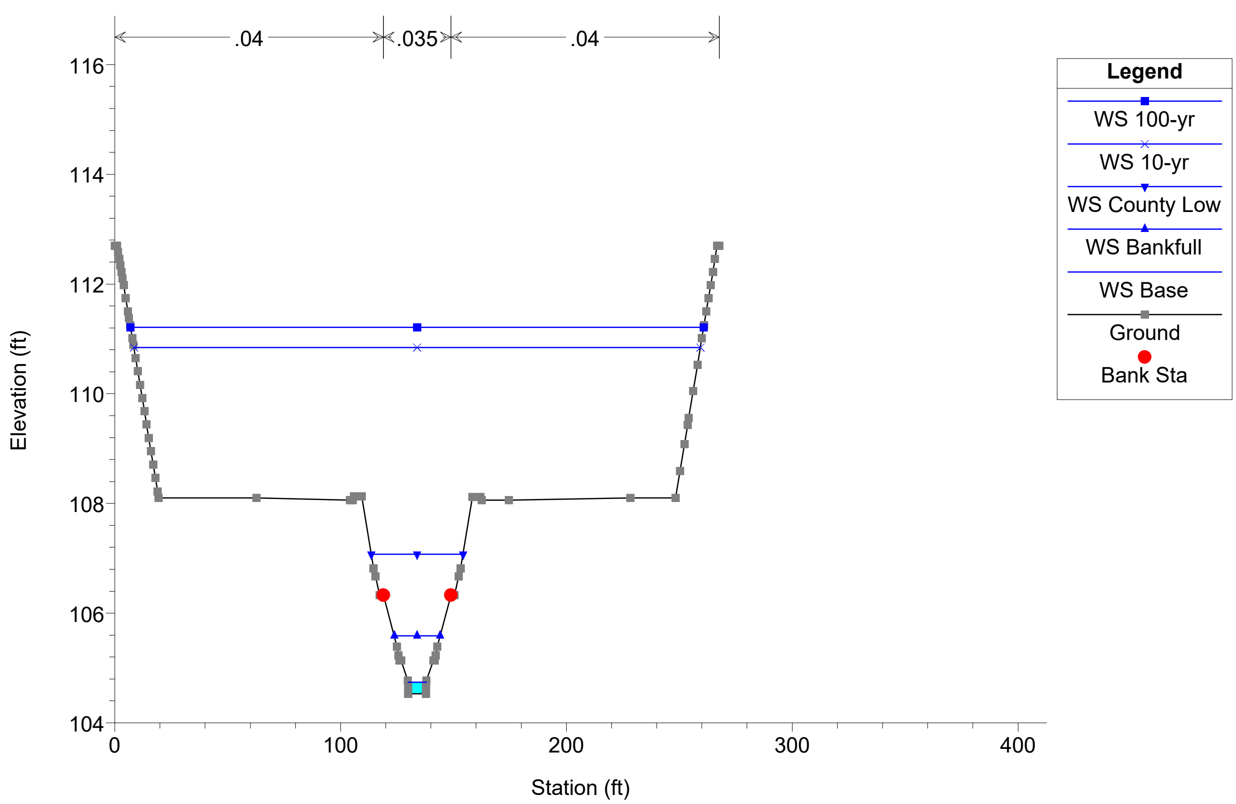
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024



1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024



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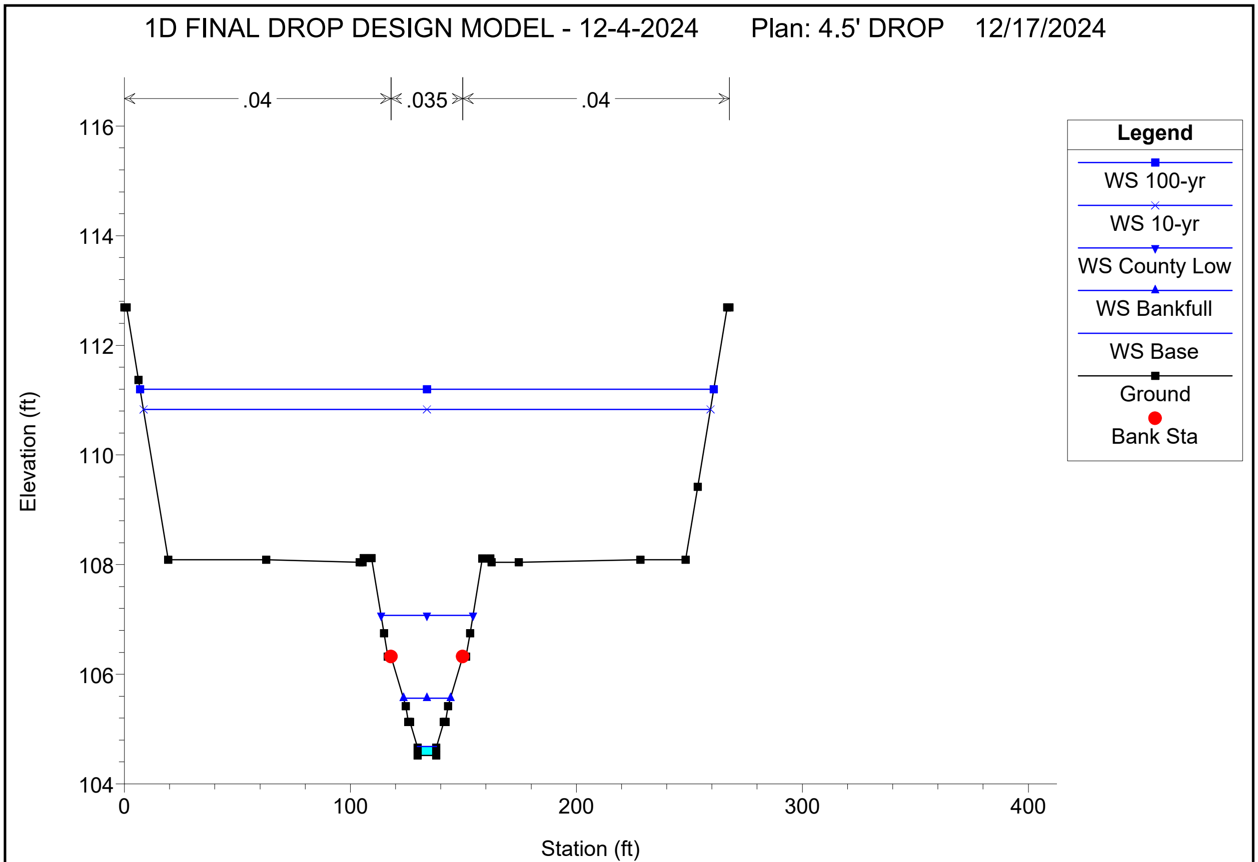

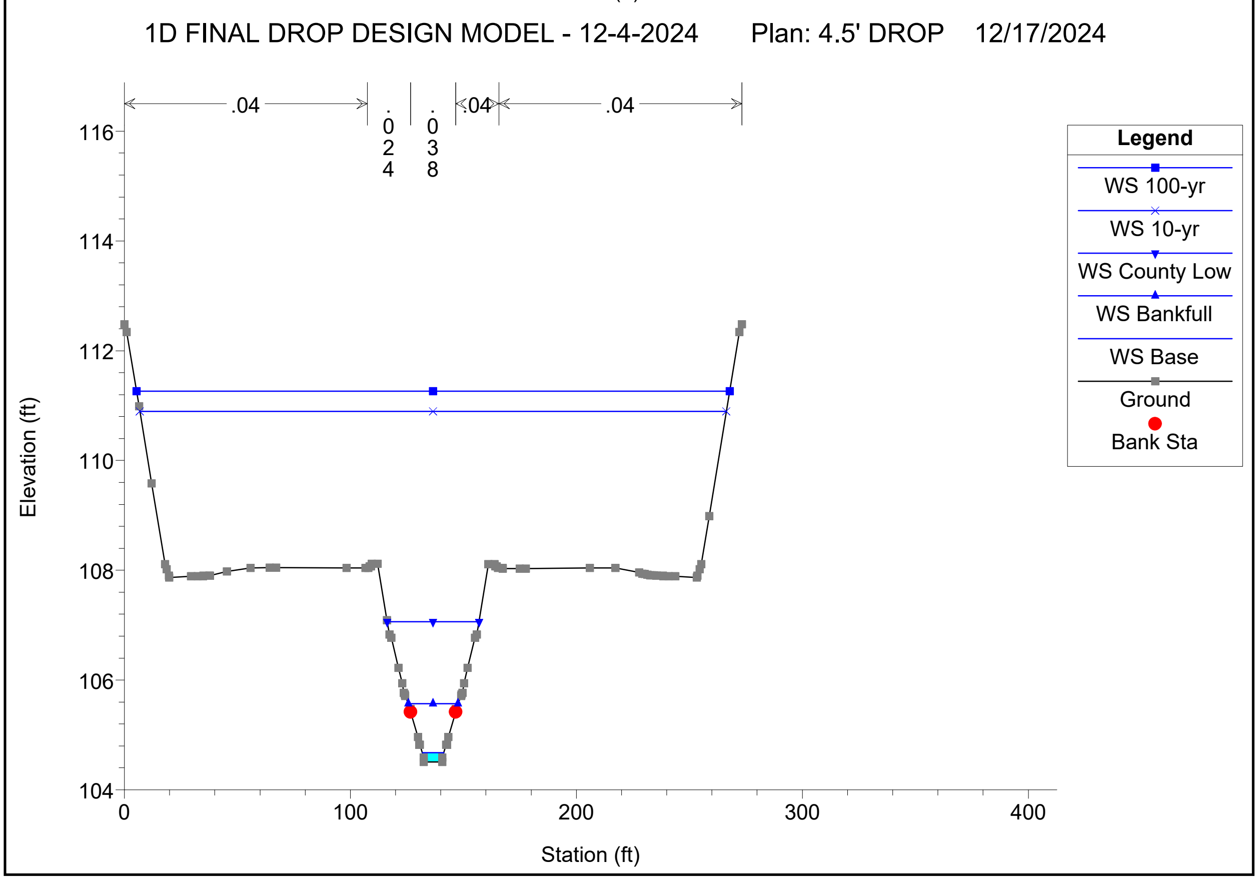

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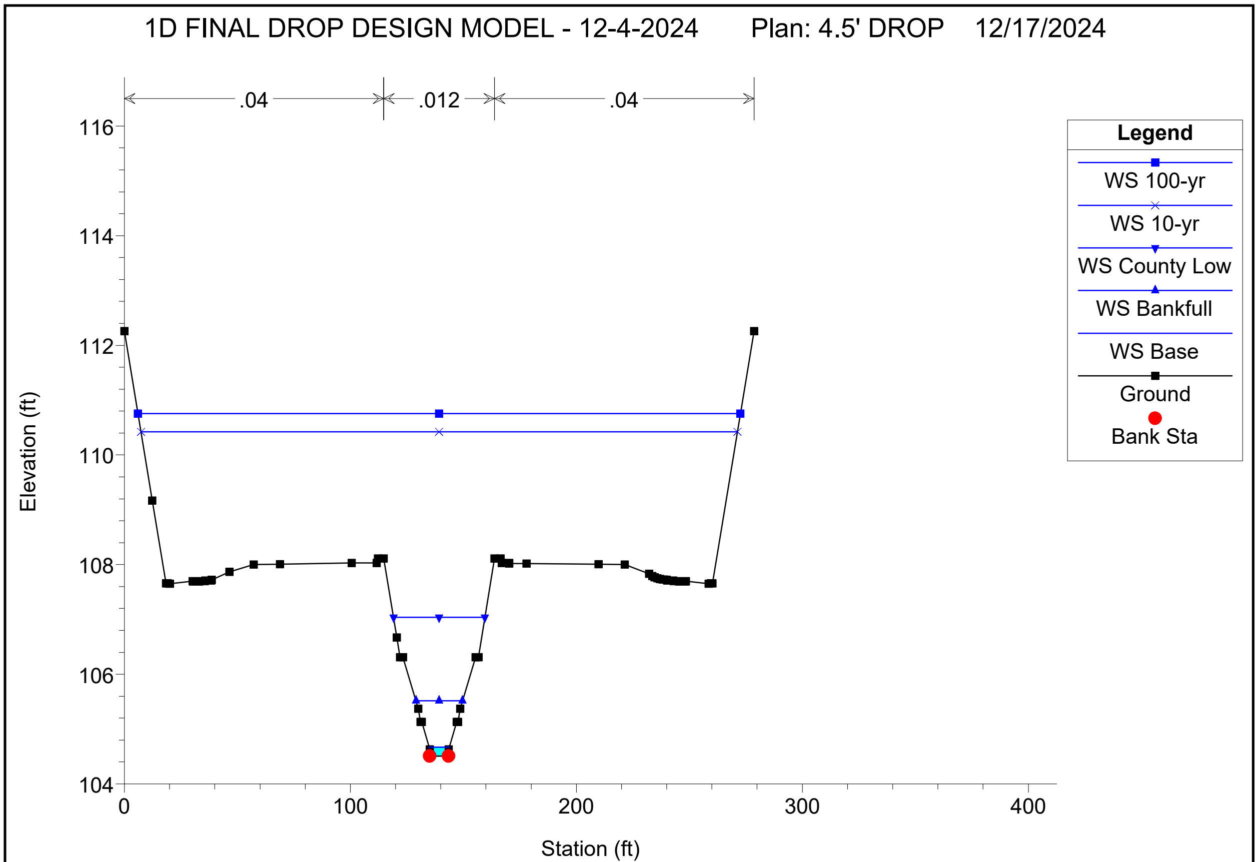

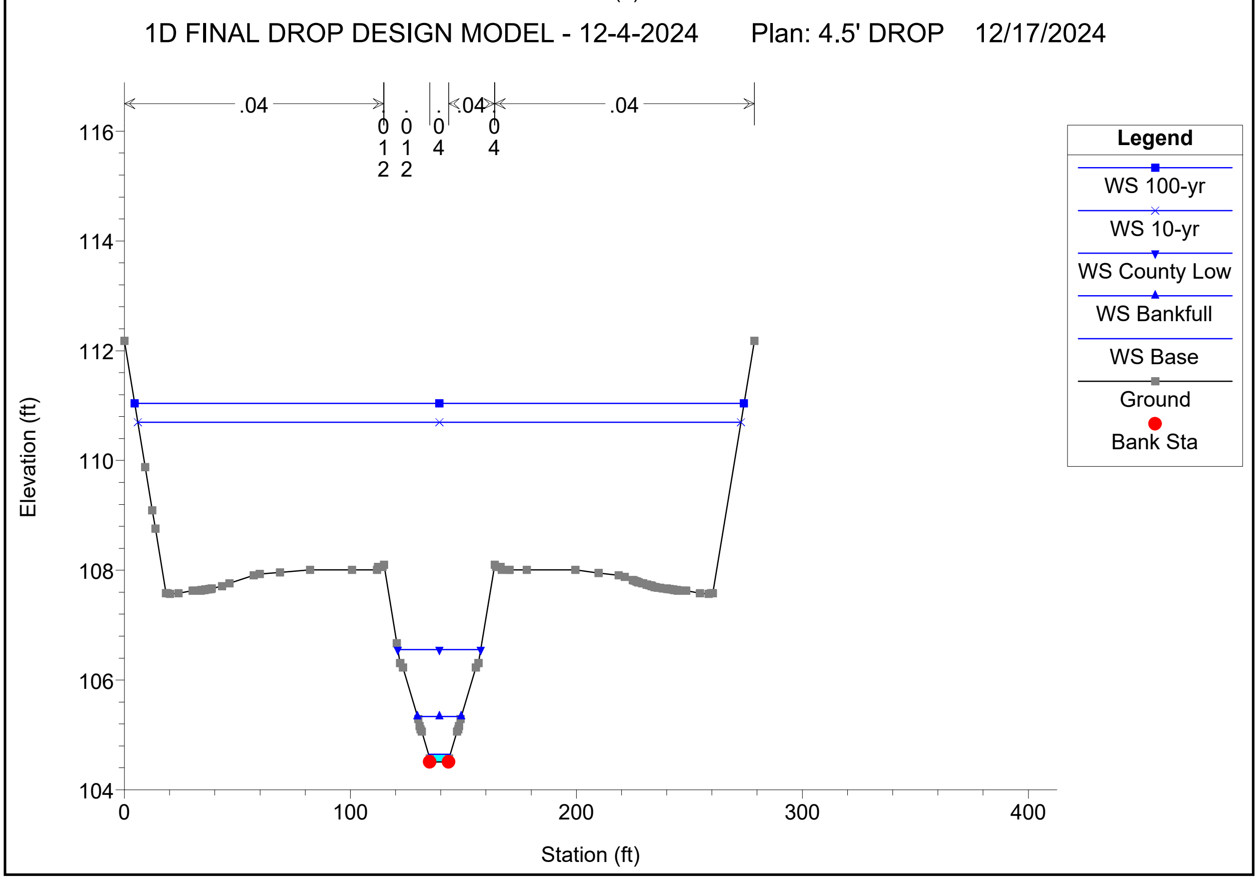

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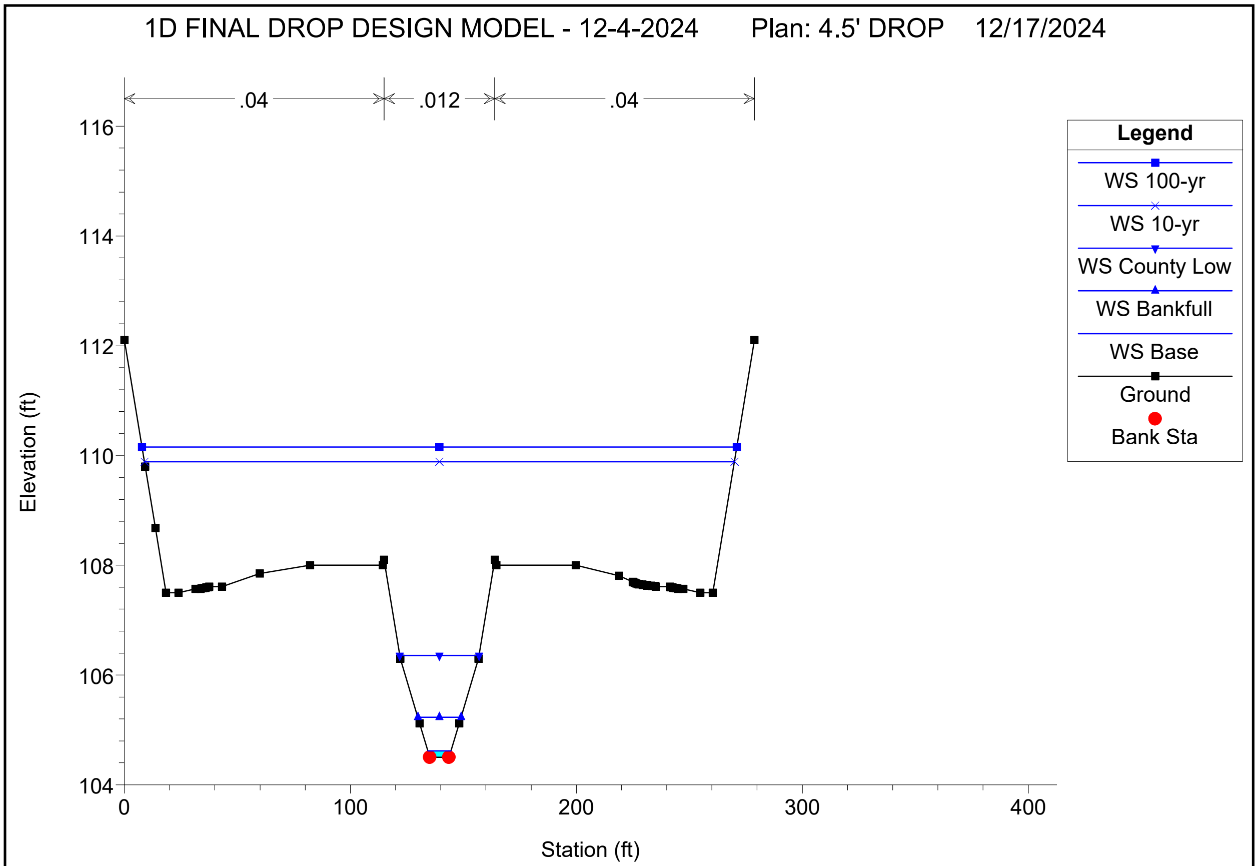

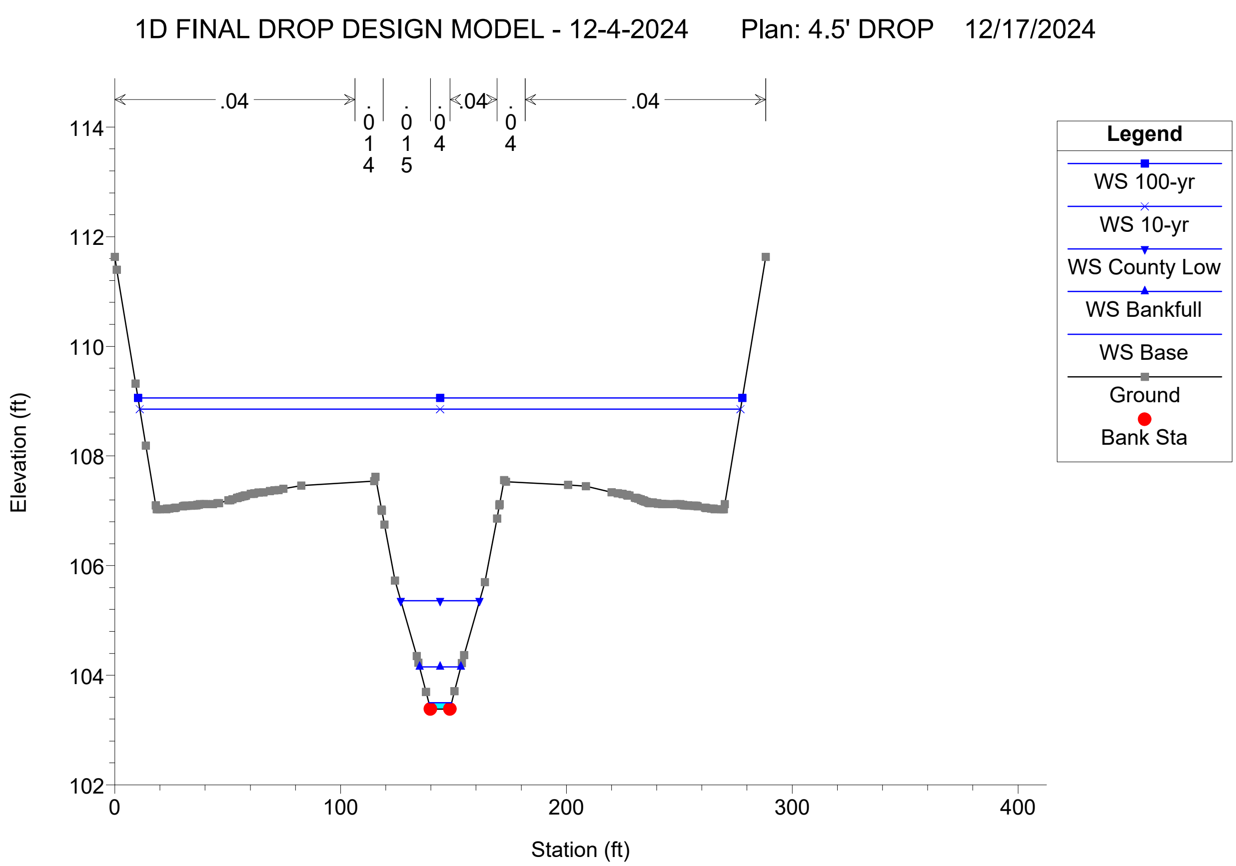

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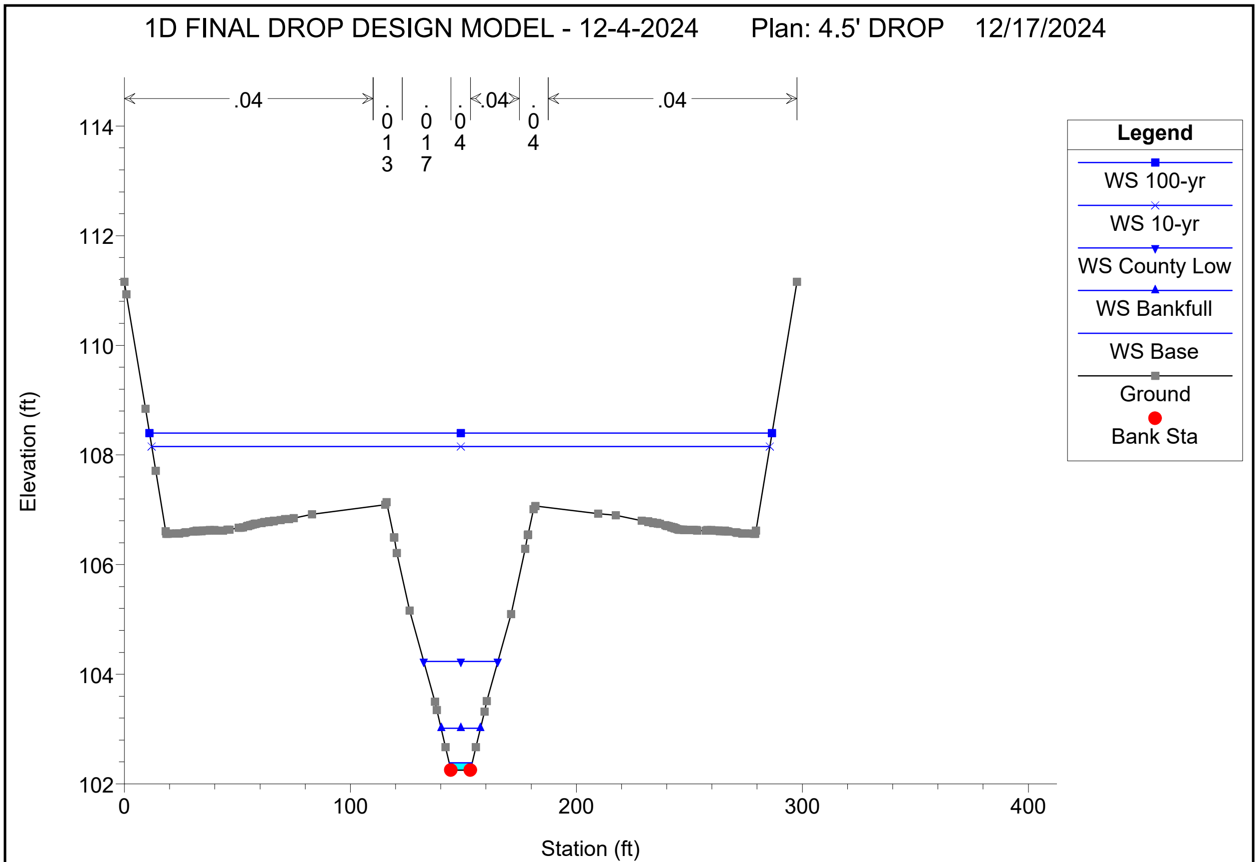

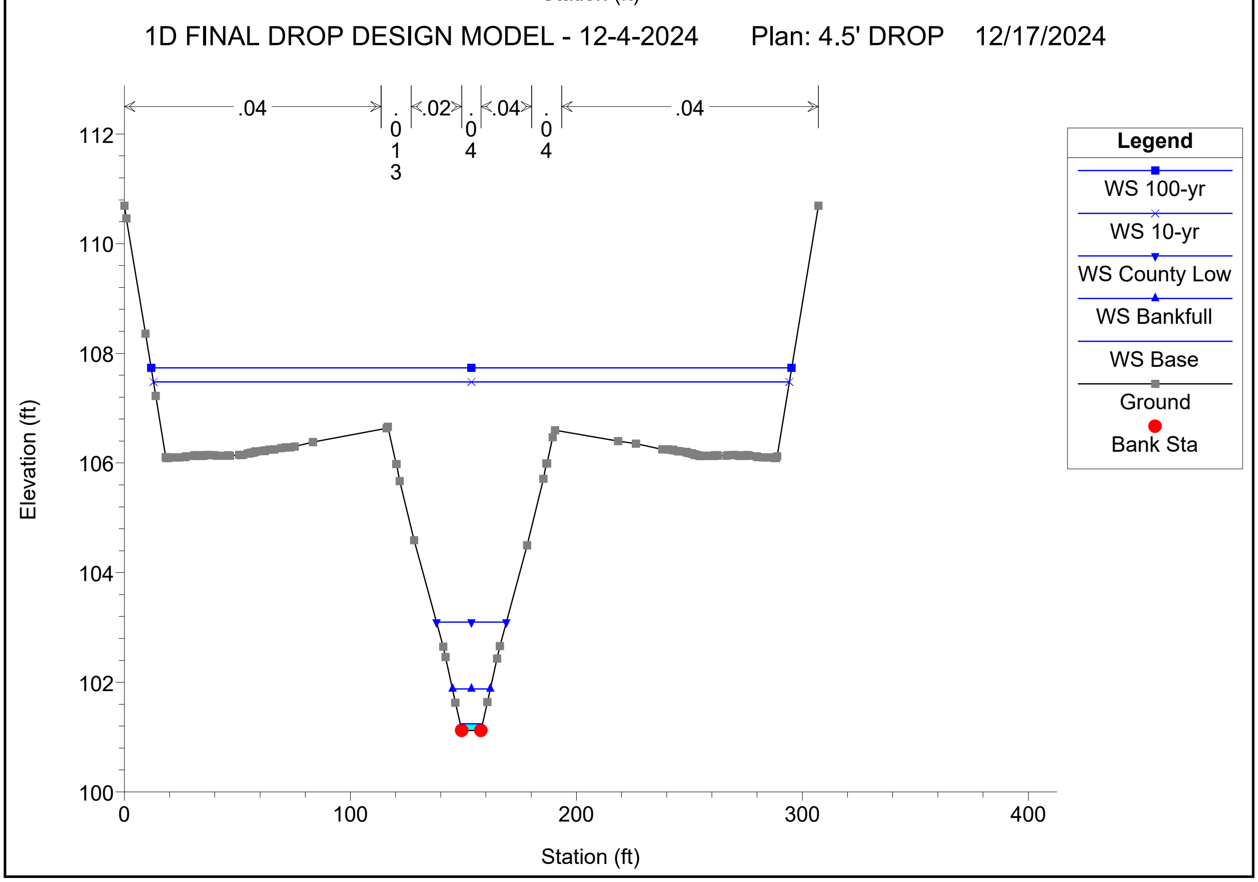

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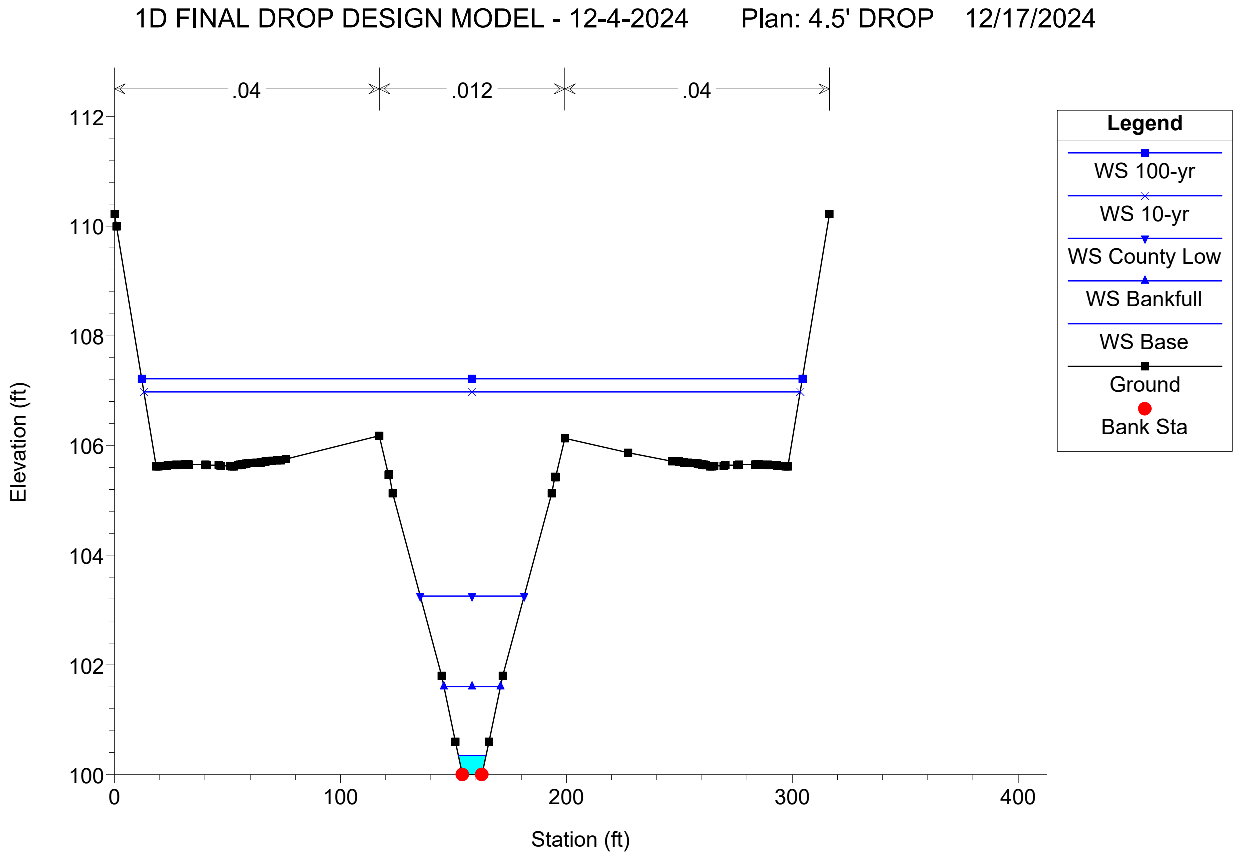

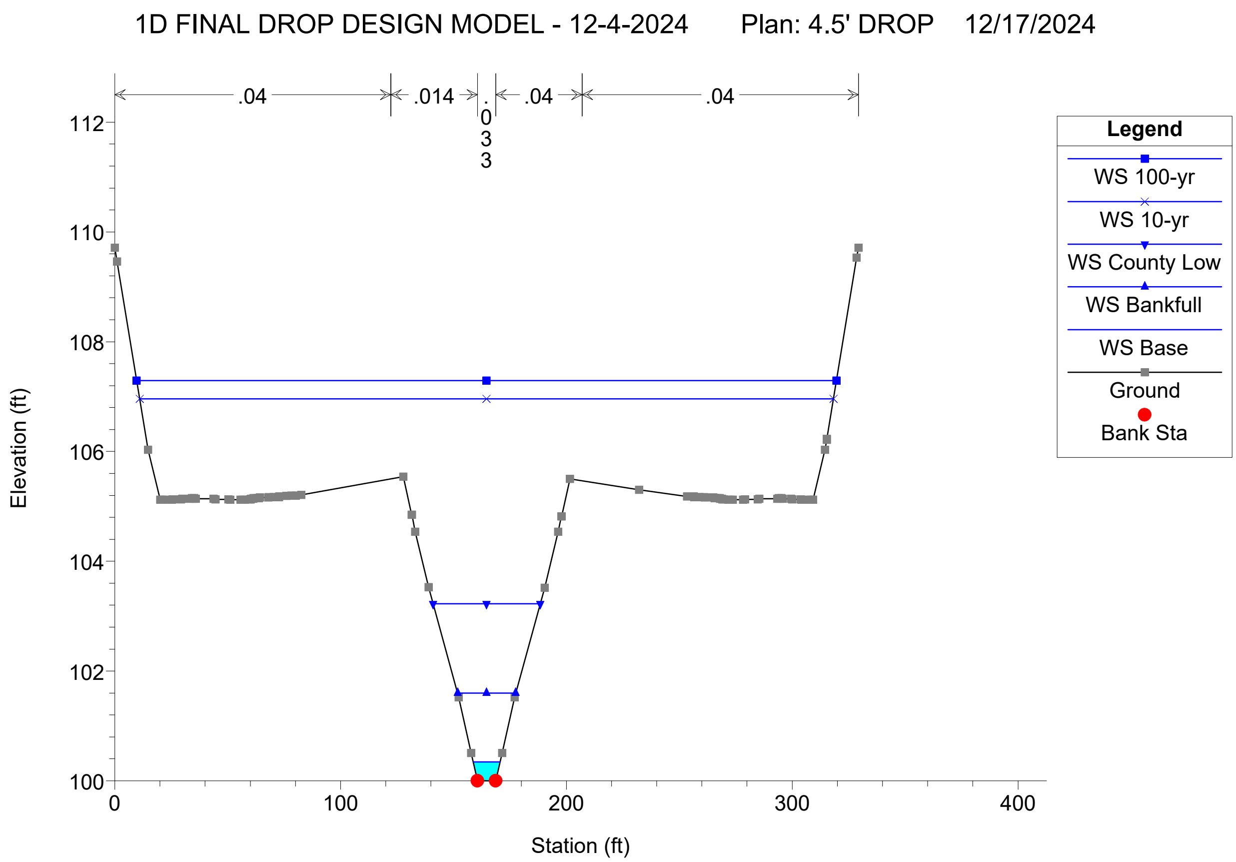

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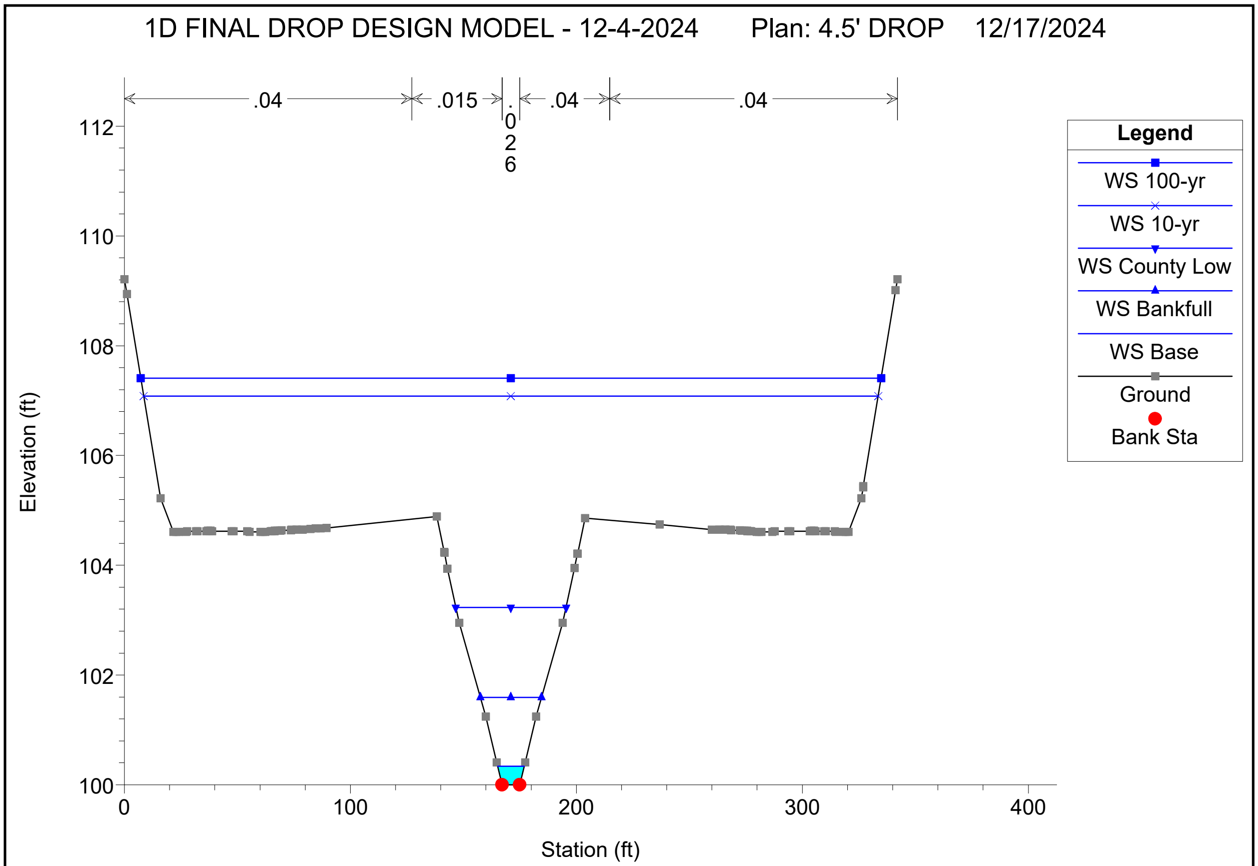

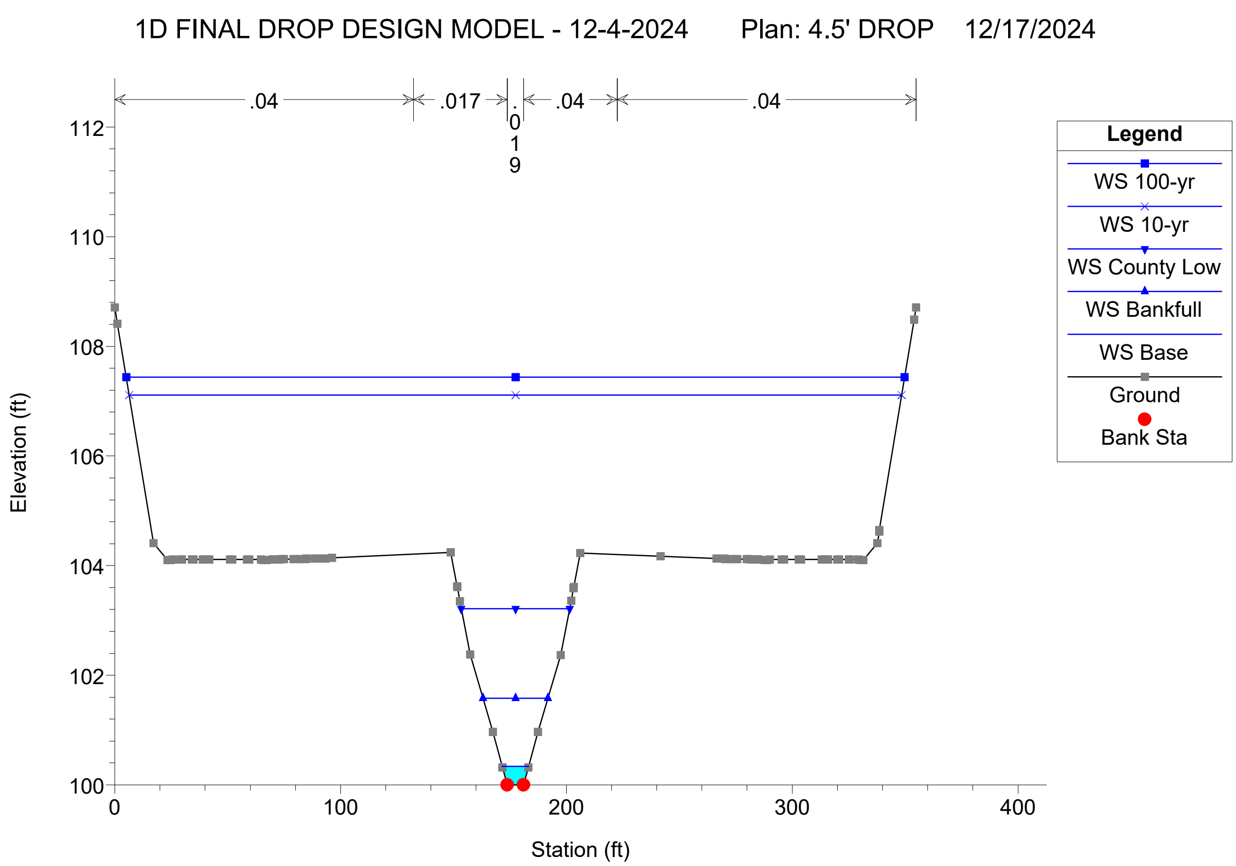

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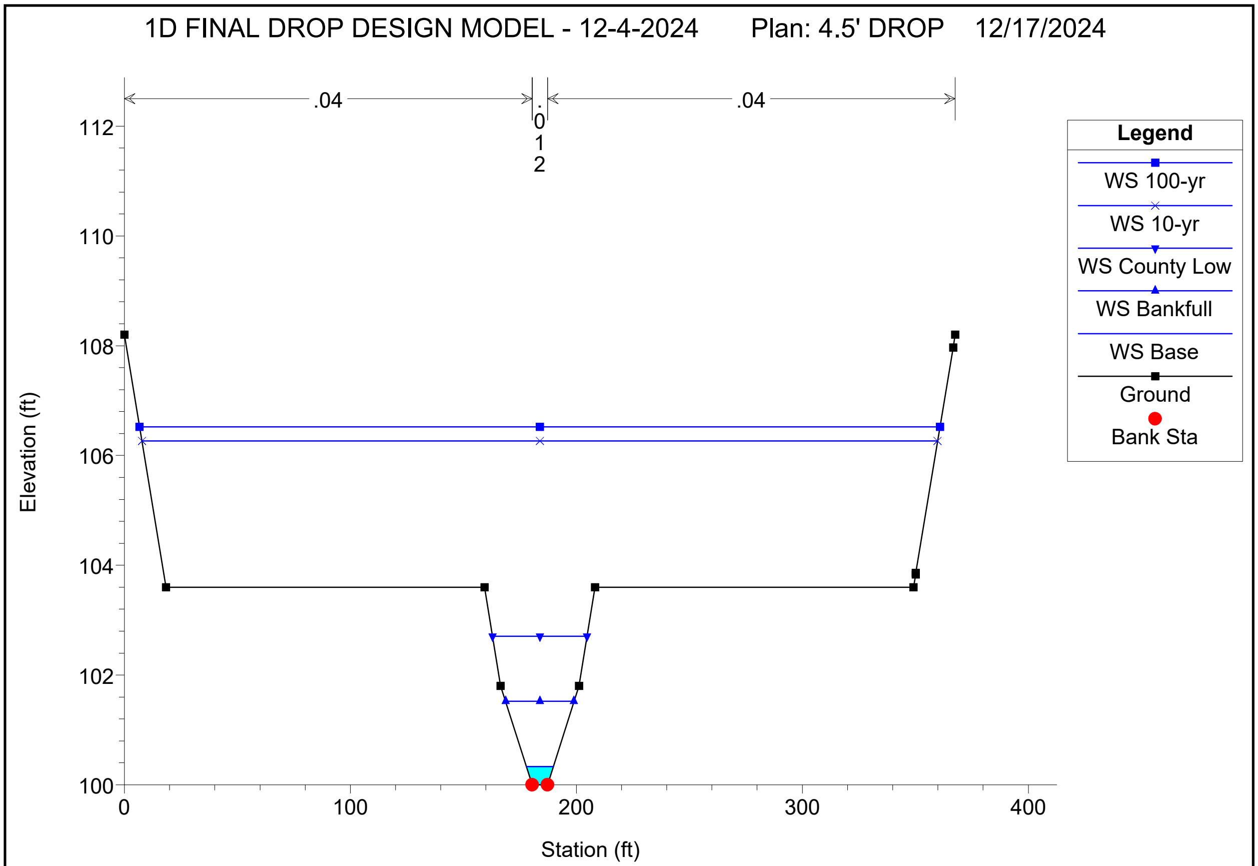

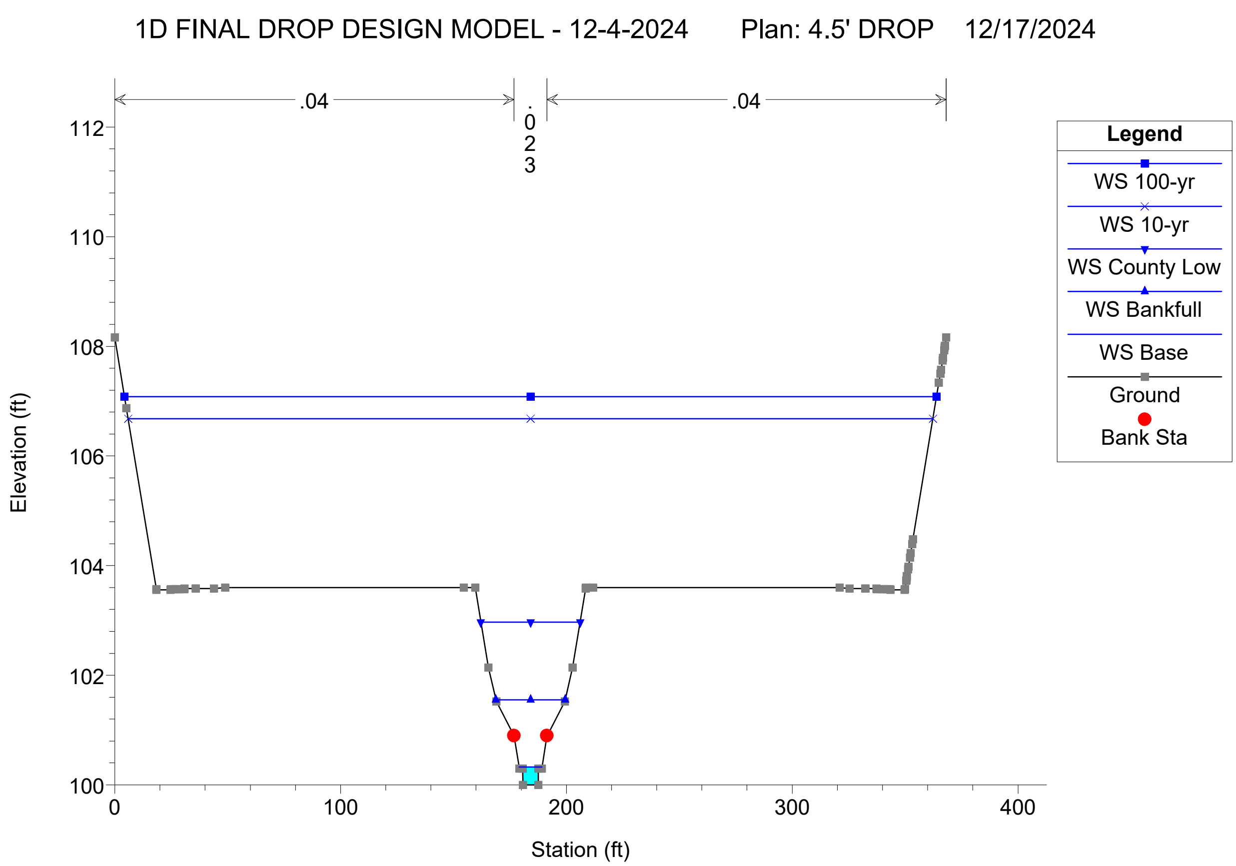

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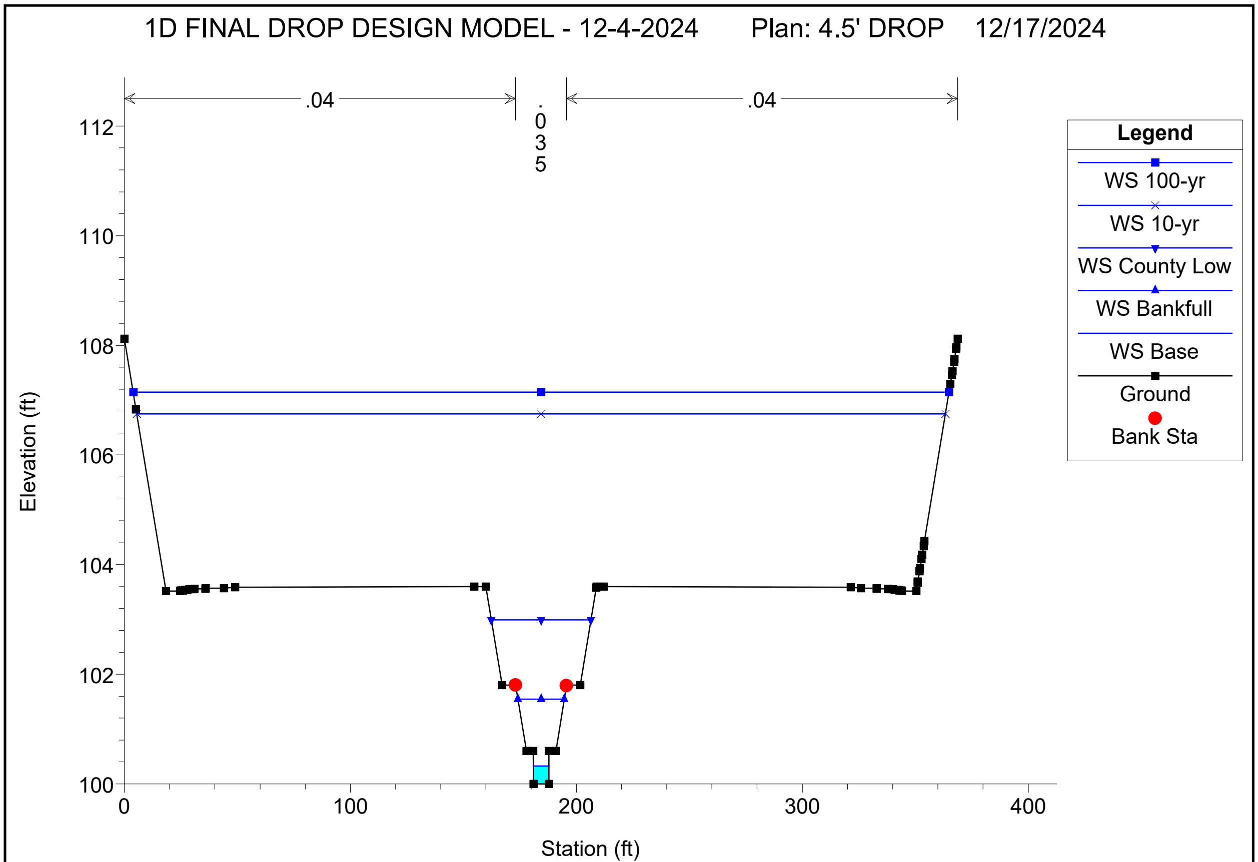

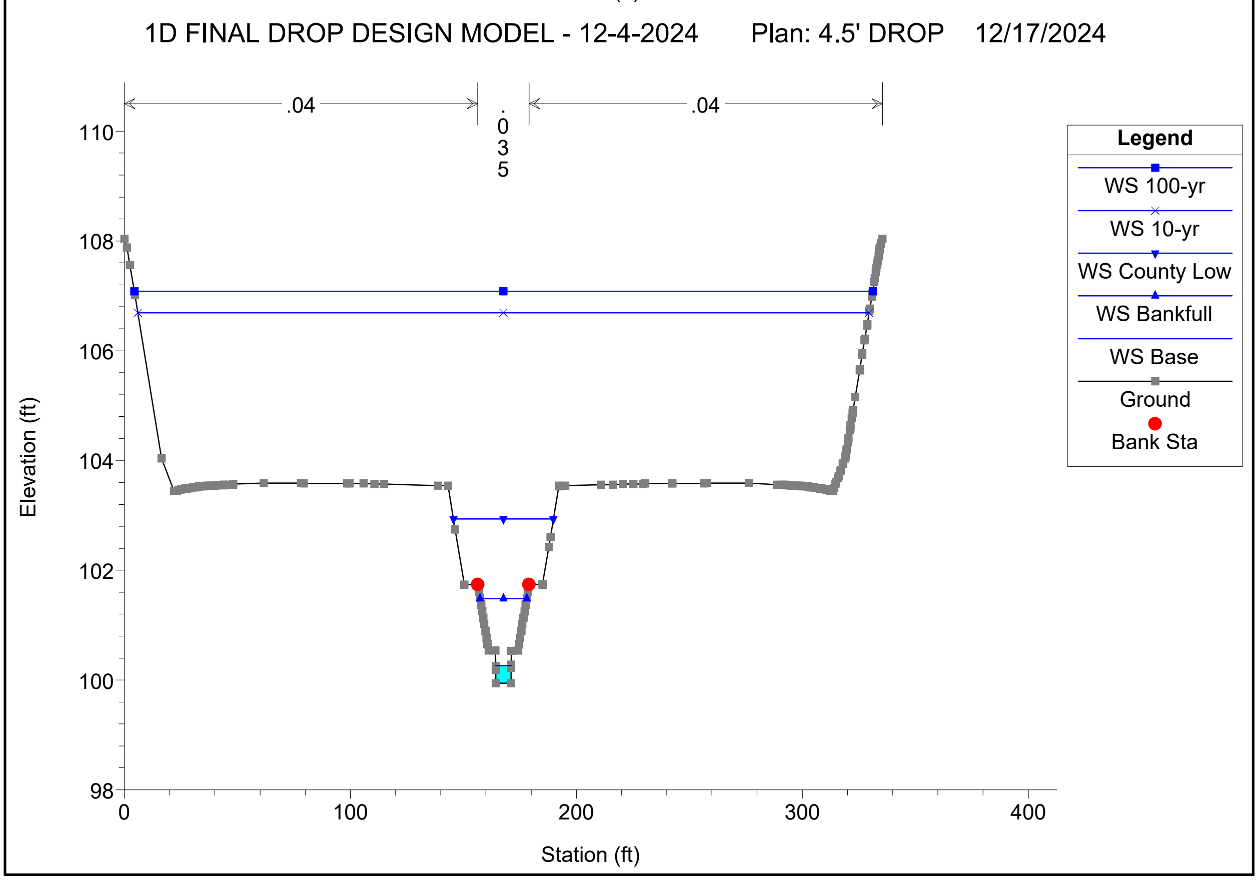

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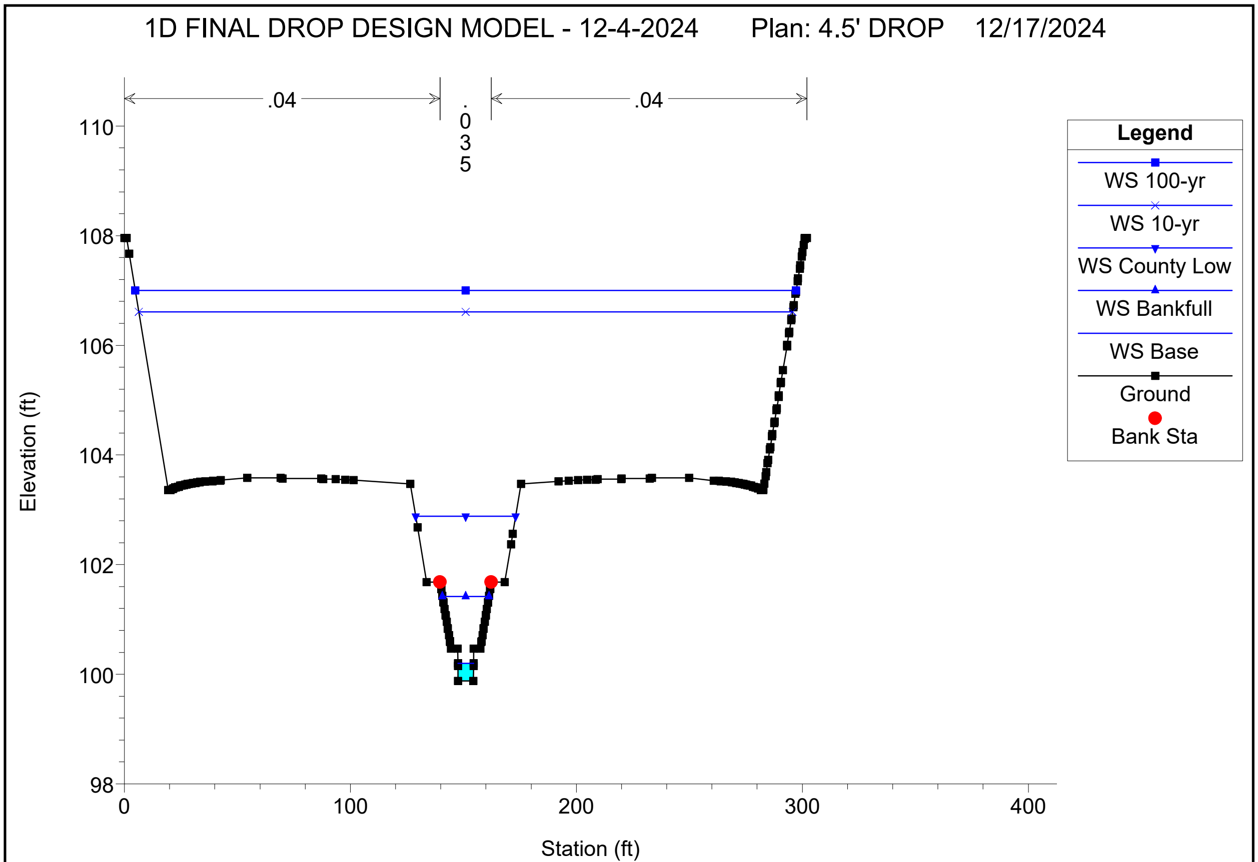
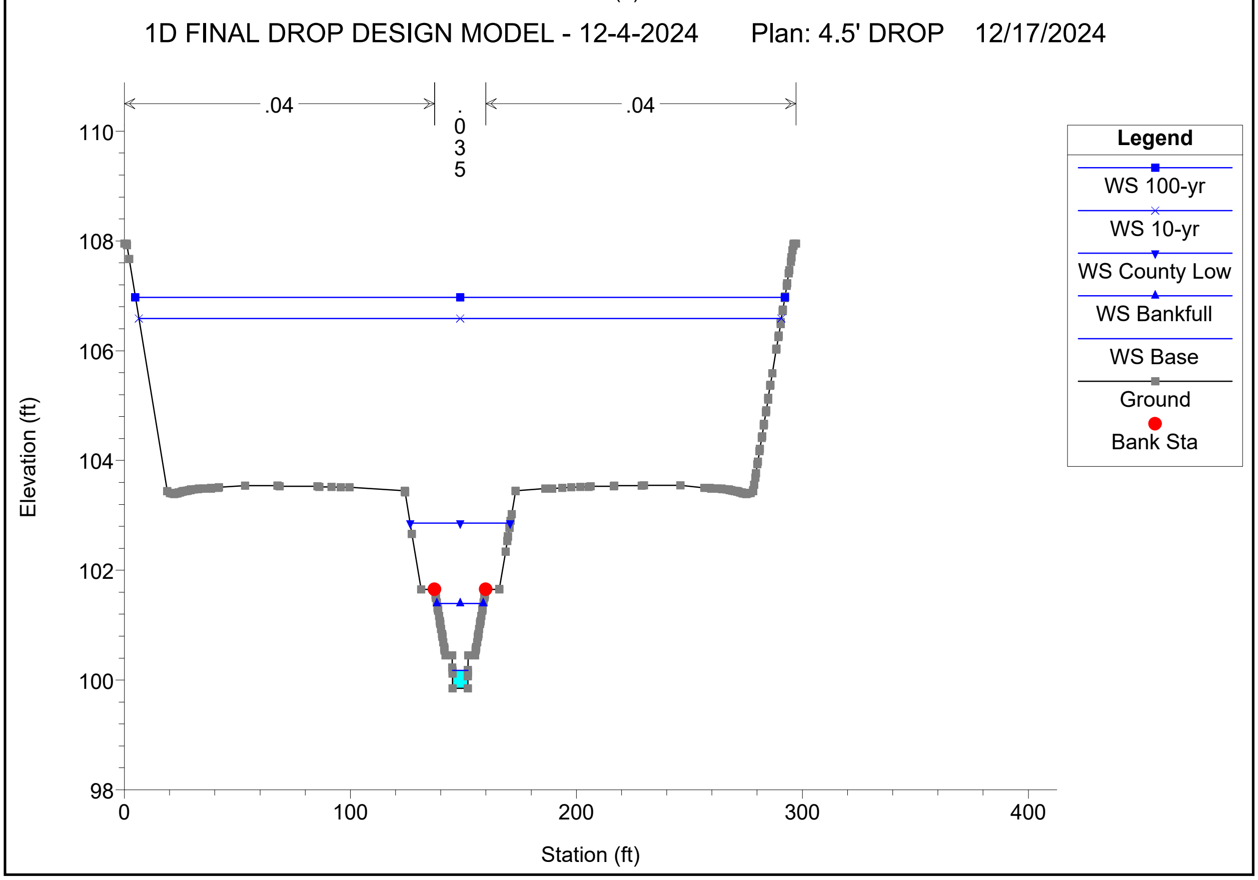
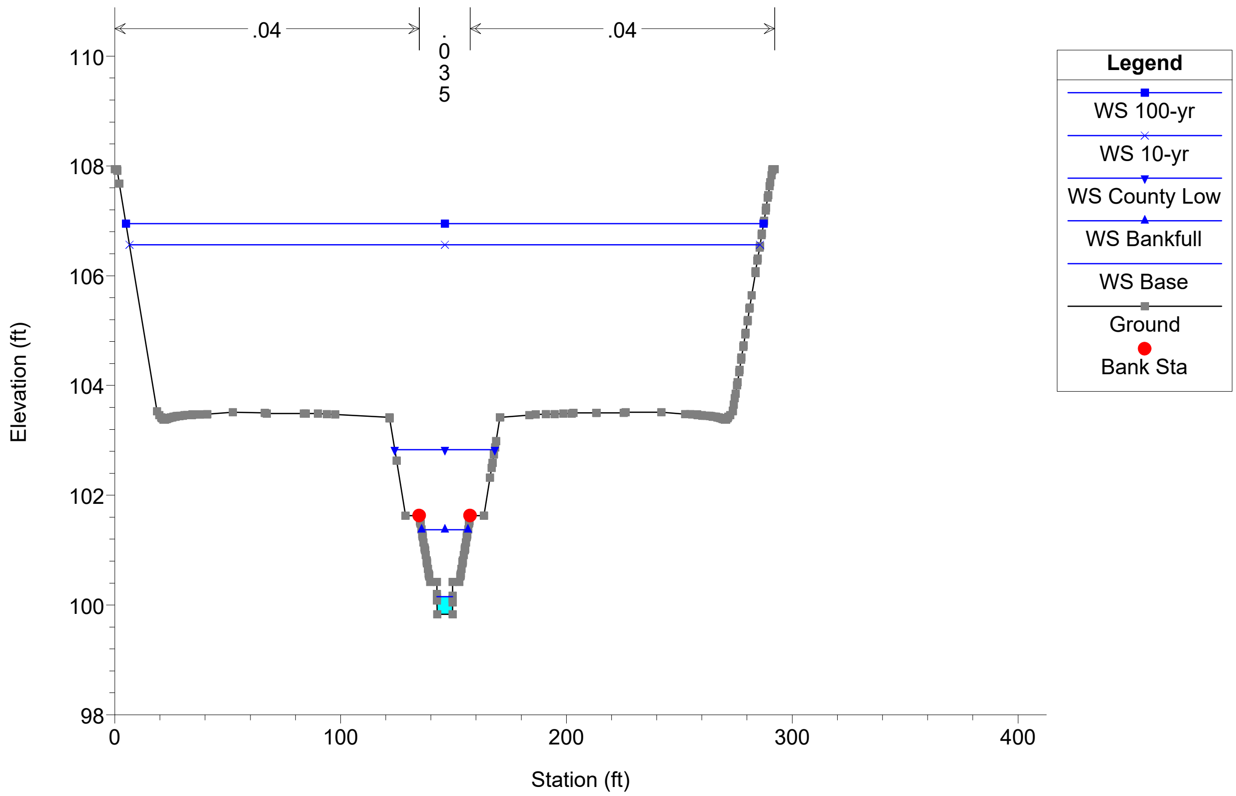


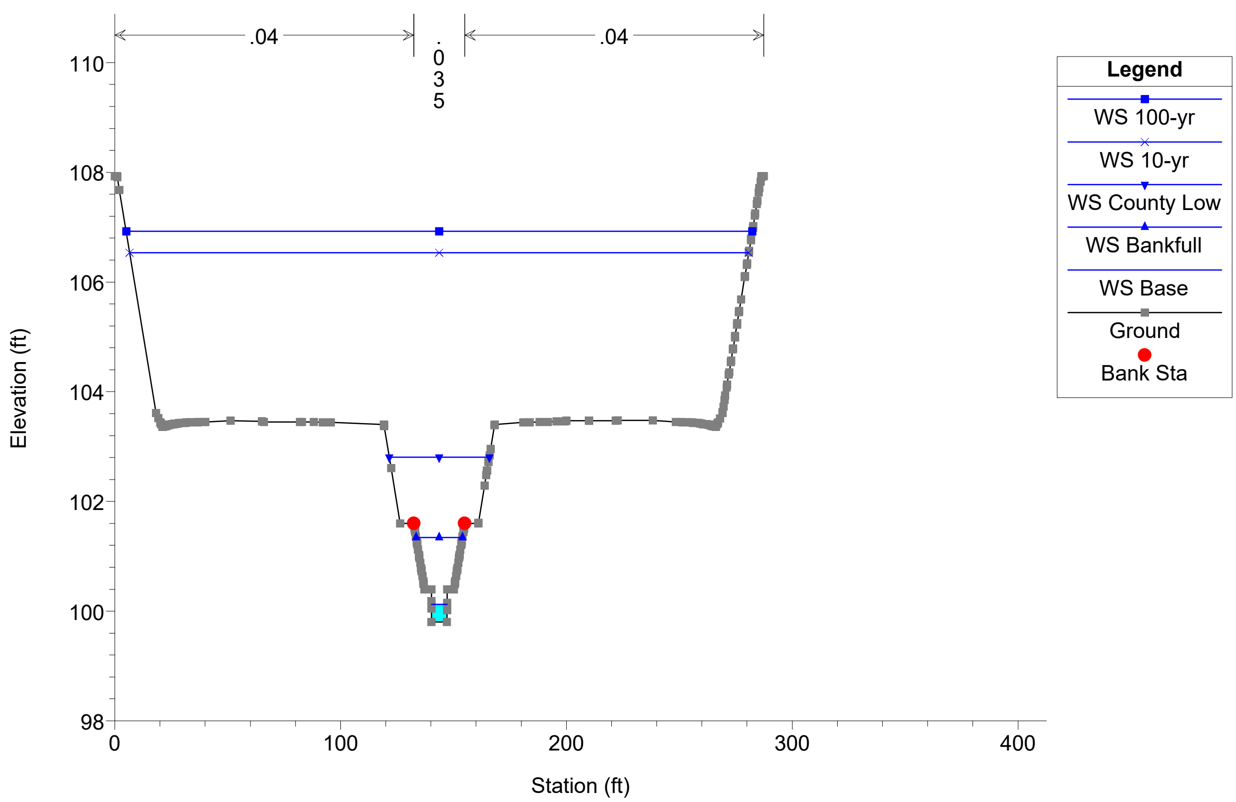


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

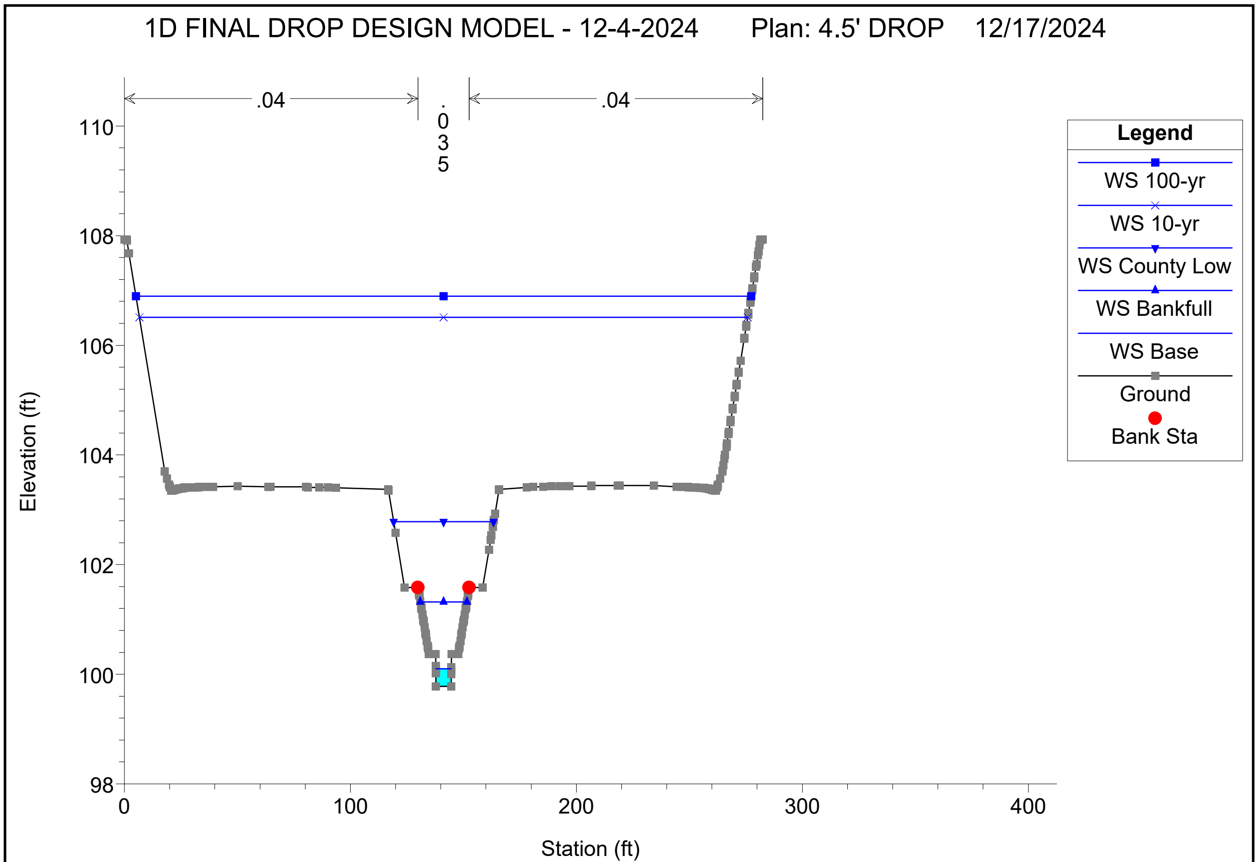
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024

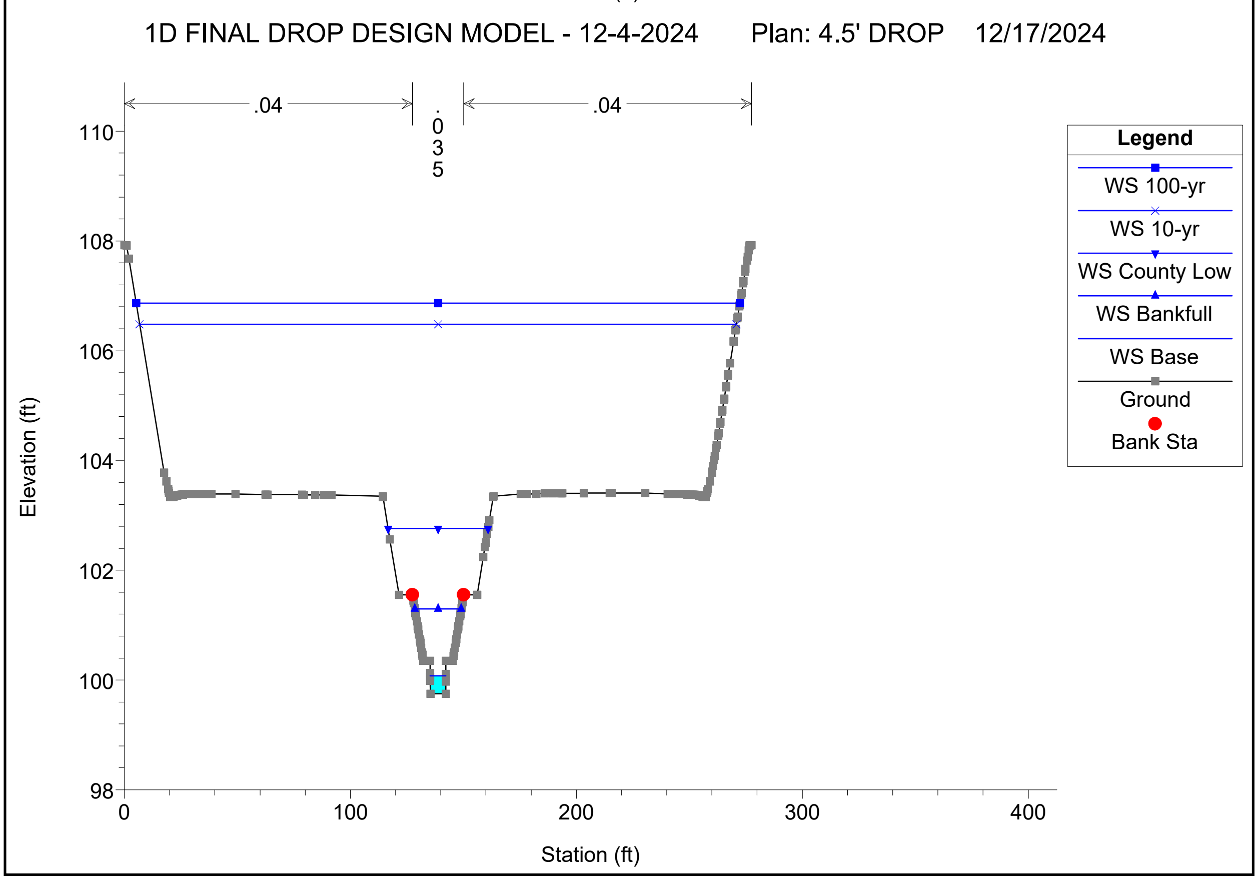


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: 4.5' DROP 12/17/2024

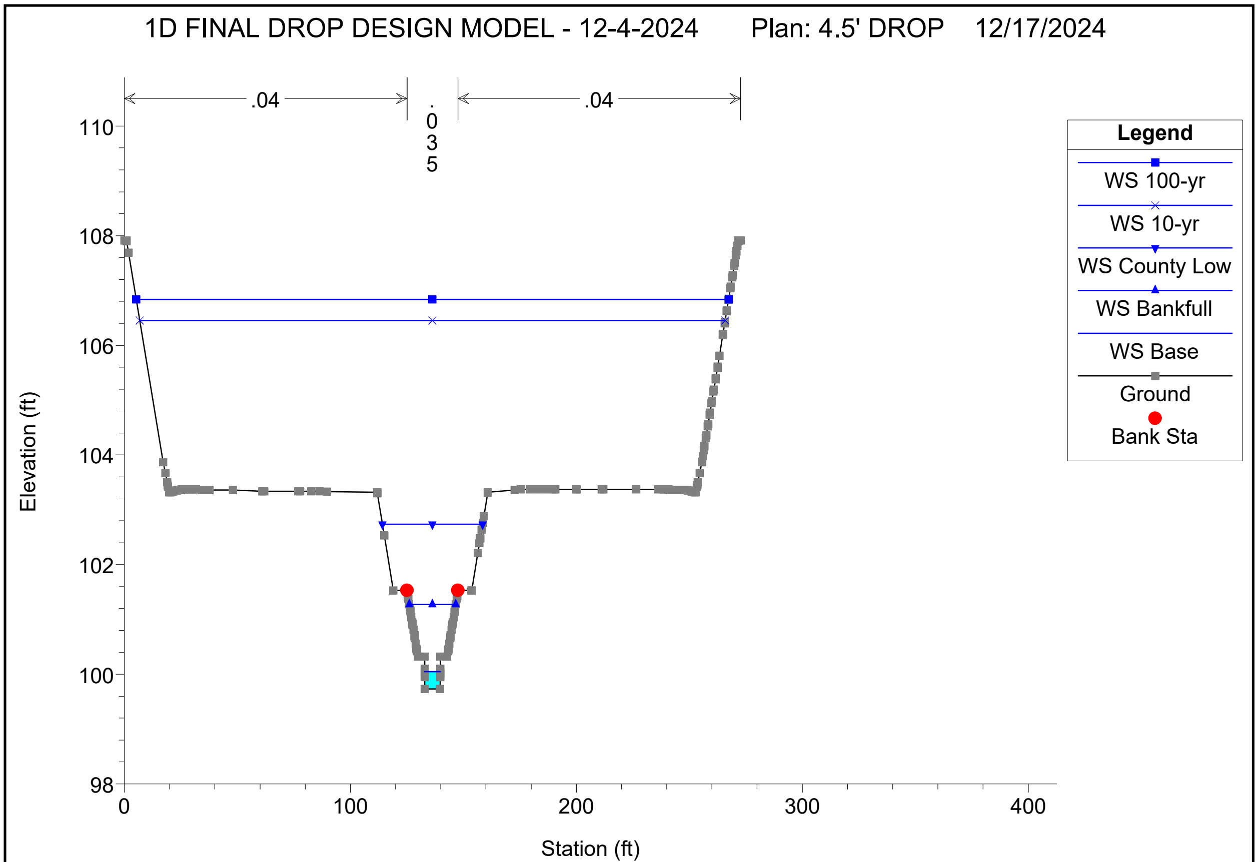


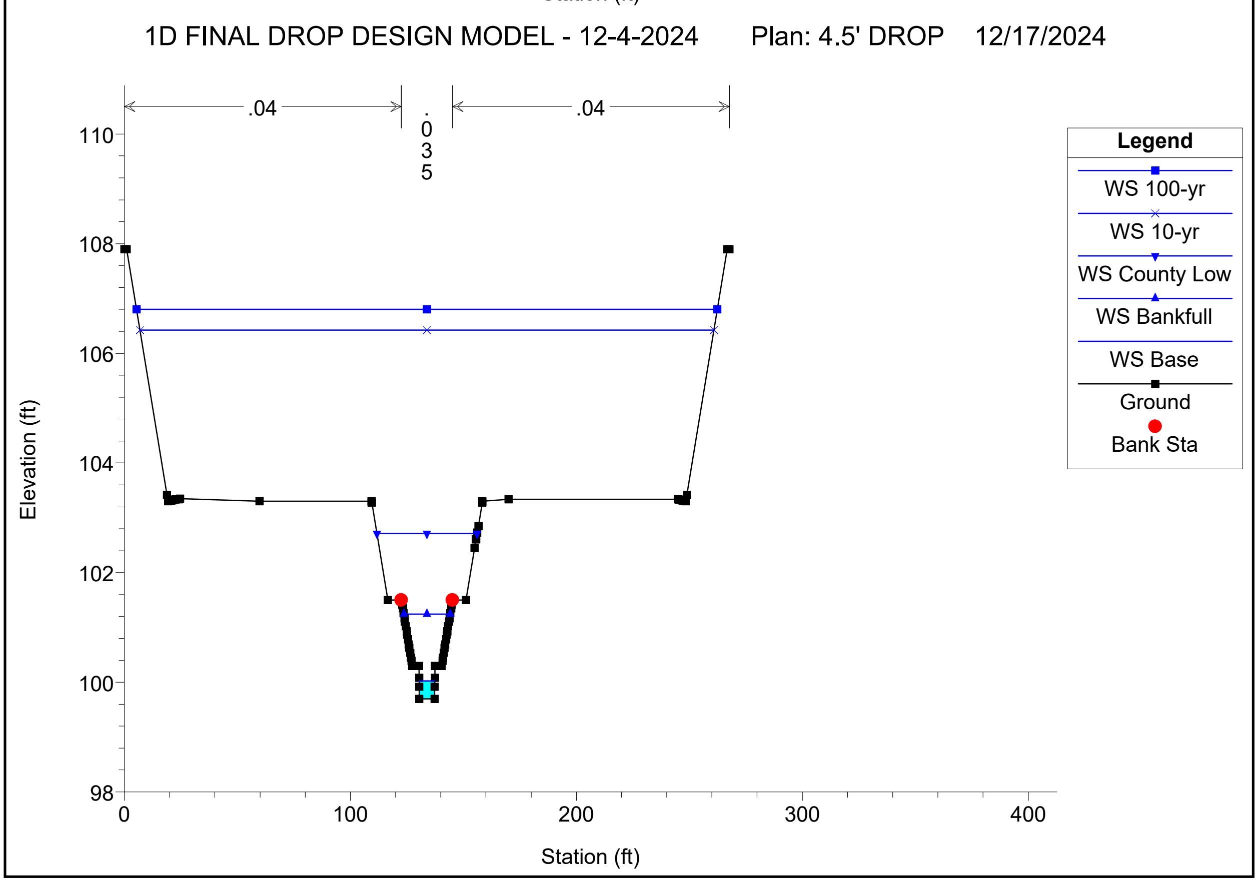
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





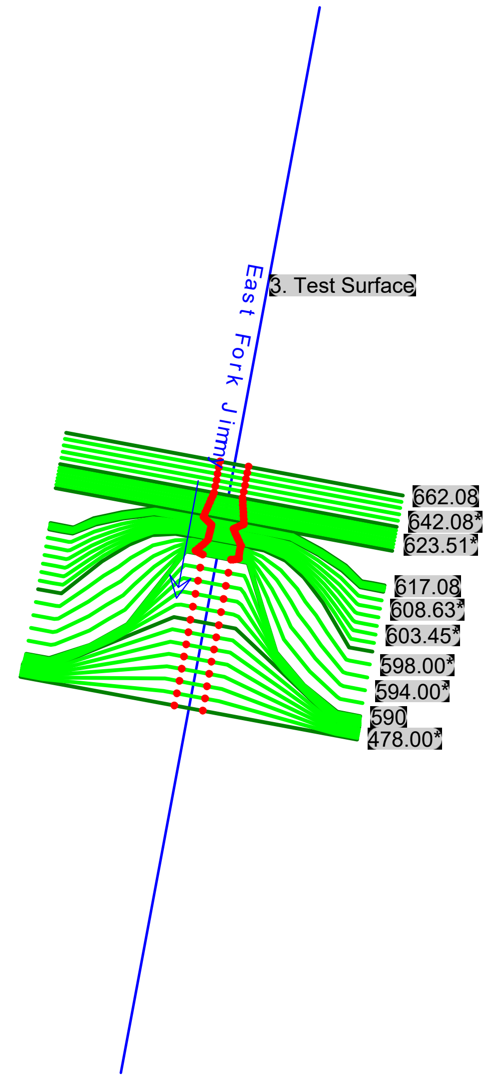
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft



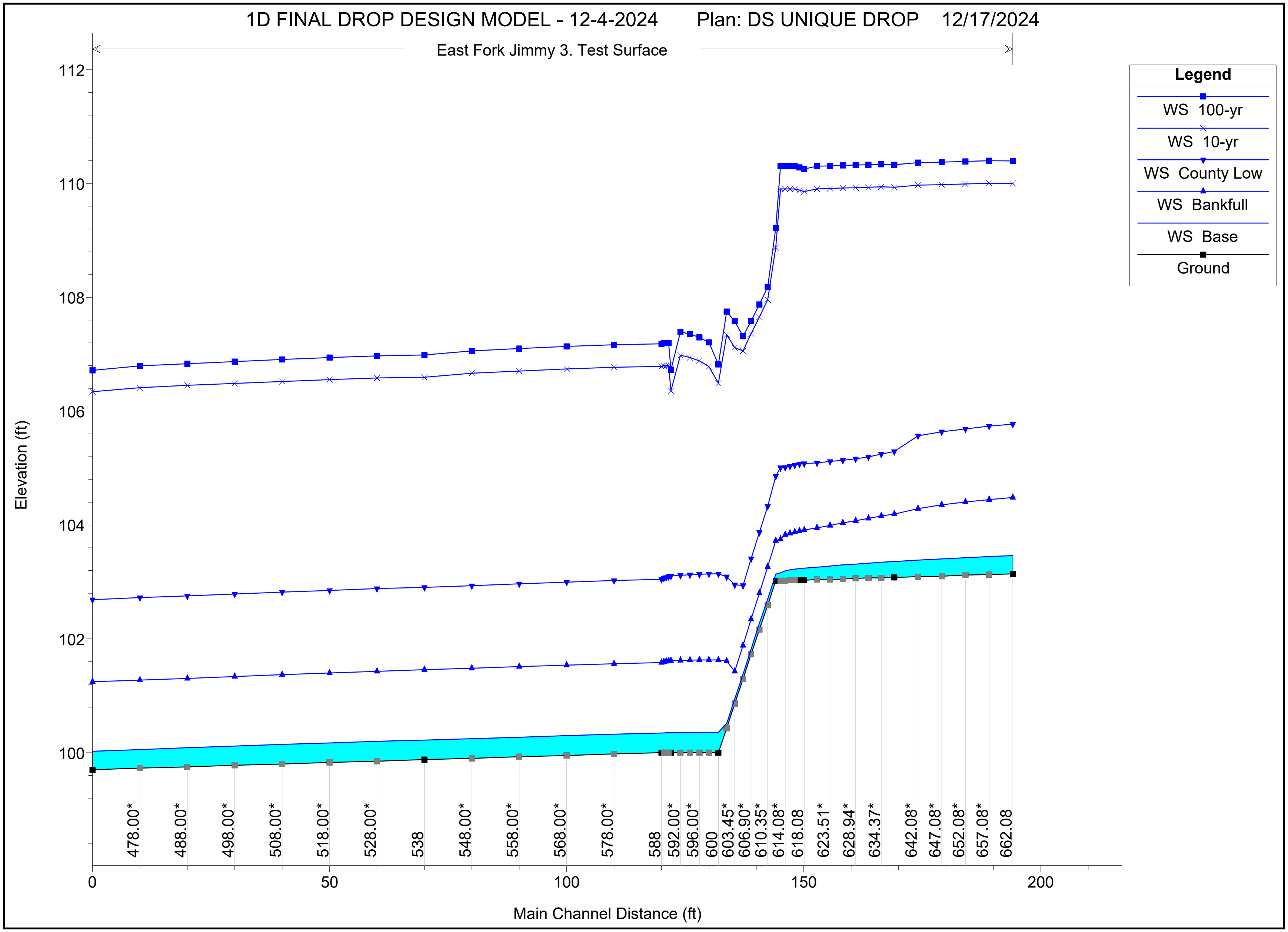


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

DOWNSTREAM SPECIAL DROP STRUCTURE - PLAN VIEW



1 in Horiz. = 150 ft   1 in Vert. = 50 ft



1 in Horiz. = 30 ft 1 in Vert. = 2.5 ft

HEC-RAS Plan: DS UNIQUE DROP River: East Fork Jimmy Reach: 3. Test Surface

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	662.08	Base	2.10	103.14	103.46		103.47	0.002594	0.96	2.19	6.91	0.30
3. Test Surface	662.08	Bankfull	40.00	103.14	104.48		104.58	0.004737	2.51	15.96	18.90	0.48
3. Test Surface	662.08	County Low	227.00	103.14	105.77		106.05	0.004893	4.48	56.94	41.22	0.56
3. Test Surface	662.08	10-yr	3729.00	103.14	110.00		110.31	0.002059	6.25	889.00	255.03	0.44
3. Test Surface	662.08	100-yr	4400.00	103.14	110.39		110.74	0.002062	6.52	990.73	258.20	0.45
3. Test Surface	657.08*	Base	2.10	103.13	103.44		103.46	0.003595	0.97	2.15	6.90	0.31
3. Test Surface	657.08*	Bankfull	40.00	103.13	104.45		104.55	0.006737	2.58	15.50	18.70	0.50
3. Test Surface	657.08*	County Low	227.00	103.13	105.74		106.02	0.006591	4.51	55.96	41.03	0.57
3. Test Surface	657.08*	10-yr	3729.00	103.13	110.00		110.29	0.002205	5.67	892.73	255.15	0.40
3. Test Surface	657.08*	100-yr	4400.00	103.13	110.40		110.72	0.002202	5.90	994.53	258.33	0.41
3. Test Surface	652.08*	Base	2.10	103.12	103.42		103.44	0.003991	1.01	2.09	6.90	0.32
3. Test Surface	652.08*	Bankfull	40.00	103.12	104.40		104.51	0.007610	2.69	14.86	18.45	0.53
3. Test Surface	652.08*	County Low	227.00	103.12	105.69		105.99	0.007166	4.64	54.35	40.75	0.59
3. Test Surface	652.08*	10-yr	3729.00	103.12	109.99		110.28	0.002206	5.67	892.56	255.15	0.40
3. Test Surface	652.08*	100-yr	4400.00	103.12	110.39		110.71	0.002203	5.91	994.37	258.36	0.41
3. Test Surface	647.08*	Base	2.10	103.10	103.40		103.42	0.003993	1.01	2.08	6.90	0.32
3. Test Surface	647.08*	Bankfull	40.00	103.10	104.35		104.47	0.008462	2.79	14.32	18.19	0.56
3. Test Surface	647.08*	County Low	227.00	103.10	105.64		105.96	0.007637	4.74	53.13	40.47	0.61
3. Test Surface	647.08*	10-yr	3729.00	103.10	109.98		110.27	0.002190	5.65	894.60	255.18	0.40
3. Test Surface	647.08*	100-yr	4400.00	103.10	110.38		110.70	0.002189	5.89	996.42	258.35	0.40
3. Test Surface	642.08*	Base	2.10	103.09	103.38		103.40	0.004598	1.05	2.00	6.90	0.34
3. Test Surface	642.08*	Bankfull	40.00	103.09	104.29		104.43	0.010478	3.01	13.31	17.77	0.61
3. Test Surface	642.08*	County Low	227.00	103.09	105.57	105.30	105.92	0.008705	4.95	50.71	39.98	0.65
3. Test Surface	642.08*	10-yr	3729.00	103.09	109.97		110.26	0.002192	5.66	894.43	255.21	0.40
3. Test Surface	642.08*	100-yr	4400.00	103.09	110.37		110.69	0.002190	5.89	996.27	258.41	0.40
3. Test Surface	637.08	Base	2.10	103.08	103.36		103.38	0.004114	1.10	1.90	6.89	0.37
3. Test Surface	637.08	Bankfull	40.00	103.08	104.19		104.37	0.011404	3.39	11.79	17.07	0.72
3. Test Surface	637.08	County Low	227.00	103.08	105.29	105.29	105.85	0.012726	6.14	40.31	37.87	0.87
3. Test Surface	637.08	10-yr	3729.00	103.08	109.93		110.25	0.002067	6.26	887.84	255.00	0.44
3. Test Surface	637.08	100-yr	4400.00	103.08	110.33		110.68	0.002070	6.53	989.56	258.21	0.45
3. Test Surface	634.37*	Base	2.10	103.07	103.35		103.36	0.005160	1.08	1.95	7.11	0.36
3. Test Surface	634.37*	Bankfull	40.00	103.07	104.16		104.33	0.014576	3.34	11.98	17.69	0.72
3. Test Surface	634.37*	County Low	227.00	103.07	105.25	105.24	105.80	0.016735	6.10	39.73	37.57	0.88
3. Test Surface	634.37*	10-yr	3729.00	103.07	109.94		110.24	0.002197	5.69	893.27	255.40	0.40
3. Test Surface	634.37*	100-yr	4400.00	103.07	110.34		110.66	0.002196	5.93	995.22	258.64	0.41
3. Test Surface	631.65*	Base	2.10	103.07	103.33		103.35	0.005922	1.12	1.88	7.32	0.39
3. Test Surface	631.65*	Bankfull	40.00	103.07	104.12		104.29	0.014813	3.33	12.00	18.20	0.72
3. Test Surface	631.65*	County Low	227.00	103.07	105.20	105.18	105.76	0.017095	6.08	39.09	37.21	0.89
3. Test Surface	631.65*	10-yr	3729.00	103.07	109.93		110.23	0.002183	5.71	894.40	255.70	0.40
3. Test Surface	631.65*	100-yr	4400.00	103.07	110.33		110.66	0.002182	5.95	996.50	258.96	0.41
3. Test Surface	628.94*	Base	2.10	103.06	103.31		103.33	0.006009	1.11	1.89	7.55	0.39
3. Test Surface	628.94*	Bankfull	40.00	103.06	104.08		104.25	0.015070	3.33	12.02	18.68	0.73
3. Test Surface	628.94*	County Low	227.00	103.06	105.16	105.09	105.70	0.016591	5.94	39.46	35.22	0.88
3. Test Surface	628.94*	10-yr	3729.00	103.06	109.93		110.22	0.002167	5.72	895.90	255.99	0.41
3. Test Surface	628.94*	100-yr	4400.00	103.06	110.32		110.65	0.002167	5.96	998.17	259.26	0.41
3. Test Surface	626.22*	Base	2.10	103.05	103.30		103.32	0.006111	1.10	1.90	7.82	0.39
3. Test Surface	626.22*	Bankfull	40.00	103.05	104.04		104.21	0.014963	3.31	12.10	19.04	0.73
3. Test Surface	626.22*	County Low	227.00	103.05	105.14	105.02	105.64	0.015571	5.74	40.56	34.81	0.85
3. Test Surface	626.22*	10-yr	3729.00	103.05	109.92		110.22	0.002153	5.73	897.16	256.26	0.41
3. Test Surface	626.22*	100-yr	4400.00	103.05	110.32		110.64	0.002154	5.97	999.57	259.59	0.41
3. Test Surface	623.51*	Base	2.10	103.04	103.28		103.30	0.006698	1.10	1.92	8.62	0.41
3. Test Surface	623.51*	Bankfull	40.00	103.04	103.99		104.17	0.015561	3.33	12.01	19.38	0.75
3. Test Surface	623.51*	County Low	227.00	103.04	105.11	104.97	105.59	0.014701	5.55	41.73	35.07	0.83
3. Test Surface	623.51*	10-yr	3729.00	103.04	109.91		110.21	0.002130	5.72	898.90	256.59	0.41
3. Test Surface	623.51*	100-yr	4400.00	103.04	110.31		110.64	0.002133	5.96	1001.48	259.91	0.41
3. Test Surface	620.79*	Base	2.10	103.04	103.26		103.28	0.008336	1.13	1.86	9.59	0.45
3. Test Surface	620.79*	Bankfull	40.00	103.04	103.95		104.12	0.016283	3.38	11.85	19.51	0.76
3. Test Surface	620.79*	County Low	227.00	103.04	105.09	104.93	105.54	0.014125	5.41	42.71	35.66	0.81
3. Test Surface	620.79*	10-yr	3729.00	103.04	109.90		110.20	0.002117	5.72	900.32	256.88	0.41
3. Test Surface	620.79*	100-yr	4400.00	103.04	110.30		110.63	0.002120	5.96	1003.06	260.24	0.41
3. Test Surface	618.08	Base	2.10	103.03	103.24		103.26	0.005957	1.07	1.96	10.42	0.44
3. Test Surface	618.08	Bankfull	40.00	103.03	103.91		104.09	0.012586	3.37	11.87	19.80	0.77
3. Test Surface	618.08	County Low	227.00	103.03	105.08		105.50	0.010041	5.21	44.29	36.56	0.79
3. Test Surface	618.08	10-yr	3729.00	103.03	109.86		110.20	0.001984	6.31	891.80	256.84	0.45
3. Test Surface	618.08	100-yr	4400.00	103.03	110.25		110.62	0.001994	6.59	994.36	260.30	0.45
3. Test Surface	617.08	Base	2.10	103.03	103.23		103.25	0.006484	1.09	1.92	10.60	0.45

HEC-RAS Plan: DS UNIQUE DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

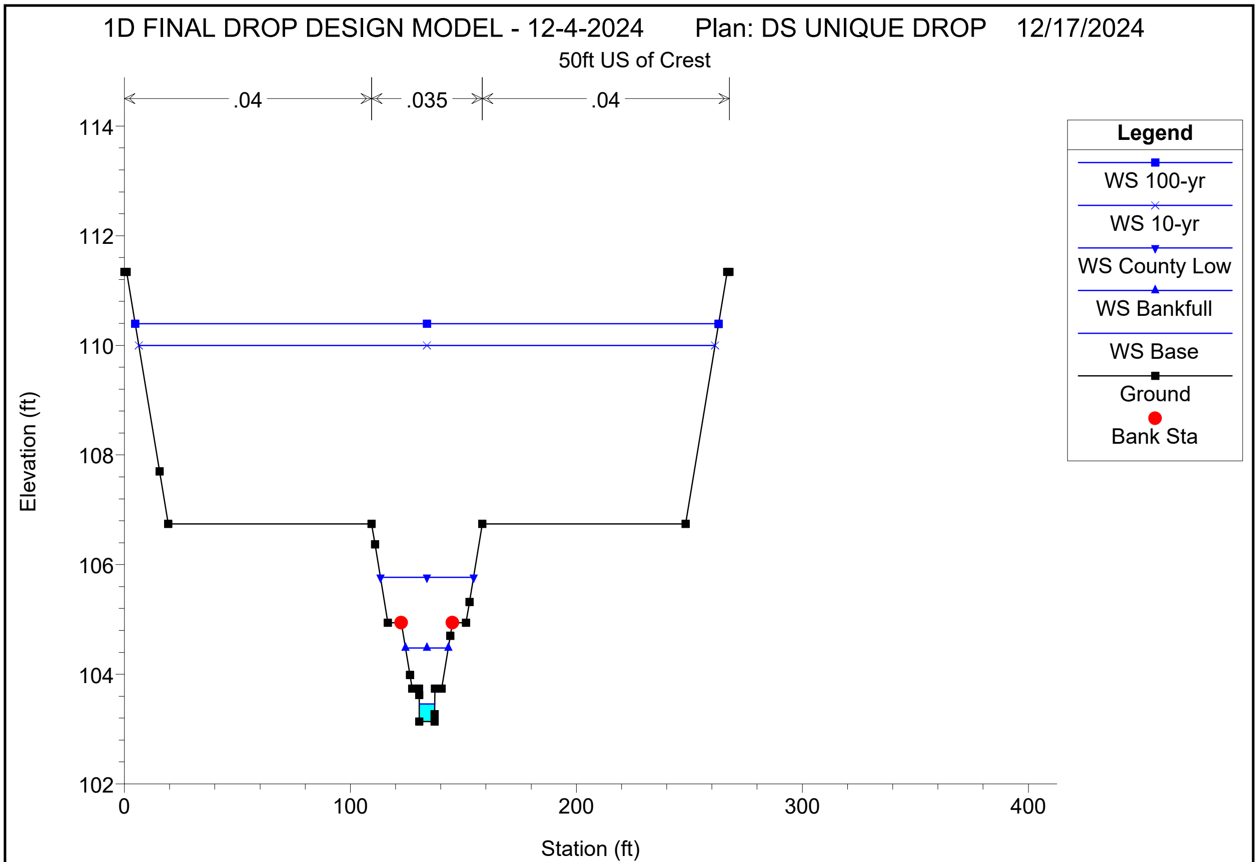
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	617.08	Bankfull	40.00	103.03	103.90		104.07	0.012904	3.39	11.80	19.89	0.78
3. Test Surface	617.08	County Low	227.00	103.03	105.07		105.48	0.009920	5.16	44.59	36.52	0.78
3. Test Surface	617.08	10-yr	3729.00	103.03	109.88		110.18	0.001773	5.98	948.07	273.60	0.42
3. Test Surface	617.08	100-yr	4400.00	103.03	110.28		110.61	0.001775	6.24	1058.68	277.62	0.43
3. Test Surface	616.08*	Base	2.10	103.03	103.22		103.24	0.009838	1.14	1.84	10.63	0.48
3. Test Surface	616.08*	Bankfull	40.00	103.03	103.88		104.06	0.017490	3.44	11.63	19.71	0.79
3. Test Surface	616.08*	County Low	227.00	103.03	105.05		105.47	0.012142	5.23	44.52	35.43	0.76
3. Test Surface	616.08*	10-yr	3729.00	103.03	109.90		110.17	0.001858	5.44	955.38	273.92	0.38
3. Test Surface	616.08*	100-yr	4400.00	103.03	110.30		110.60	0.001854	5.66	1066.20	277.82	0.39
3. Test Surface	615.08*	Base	2.10	103.03	103.21		103.23	0.012442	1.23	1.71	10.63	0.54
3. Test Surface	615.08*	Bankfull	40.00	103.03	103.85		104.04	0.018467	3.51	11.40	19.54	0.81
3. Test Surface	615.08*	County Low	227.00	103.03	105.03		105.47	0.011745	5.36	44.18	34.77	0.76
3. Test Surface	615.08*	10-yr	3729.00	103.03	109.90		110.16	0.001804	5.42	956.89	274.03	0.38
3. Test Surface	615.08*	100-yr	4400.00	103.03	110.30		110.59	0.001801	5.64	1067.73	277.75	0.38
3. Test Surface	614.08*	Base	2.10	103.02	103.19		103.22	0.013737	1.26	1.66	10.62	0.56
3. Test Surface	614.08*	Bankfull	40.00	103.02	103.83	103.75	104.03	0.019527	3.58	11.17	19.37	0.83
3. Test Surface	614.08*	County Low	227.00	103.02	105.01		105.46	0.011418	5.49	43.92	34.63	0.76
3. Test Surface	614.08*	10-yr	3729.00	103.02	109.90		110.16	0.001725	5.36	960.18	274.18	0.37
3. Test Surface	614.08*	100-yr	4400.00	103.02	110.31		110.59	0.001725	5.58	1071.03	277.68	0.37
3. Test Surface	613.08*	Base	2.10	103.02	103.16		103.20	0.031179	1.63	1.29	10.35	0.82
3. Test Surface	613.08*	Bankfull	40.00	103.02	103.75	103.74	104.00	0.028046	4.06	9.86	18.63	0.98
3. Test Surface	613.08*	County Low	227.00	103.02	105.01	104.82	105.45	0.010807	5.55	44.24	35.33	0.74
3. Test Surface	613.08*	10-yr	3729.00	103.02	109.90		110.16	0.001637	5.28	960.34	274.29	0.36
3. Test Surface	613.08*	100-yr	4400.00	103.02	110.30		110.59	0.001639	5.50	1071.15	277.61	0.37
3. Test Surface	612.08	Base	2.10	103.02	103.14	103.14	103.19	0.004556	1.89	1.11	10.29	1.02
3. Test Surface	612.08	Bankfull	40.00	103.02	103.72	103.72	103.99	0.002573	4.18	9.61	18.73	1.00
3. Test Surface	612.08	County Low	227.00	103.02	104.86	104.86	105.44	0.001384	6.49	40.21	34.91	0.88
3. Test Surface	612.08	10-yr	3729.00	103.02	108.88	108.88	110.15	0.001243	13.88	683.40	263.91	1.03
3. Test Surface	612.08	100-yr	4400.00	103.02	109.22	109.22	110.57	0.001281	14.65	773.78	267.38	1.05
3. Test Surface	610.35*	Base	2.10	102.59	102.70	102.70	102.75	0.050782	1.83	1.15	11.28	1.01
3. Test Surface	610.35*	Bankfull	40.00	102.59	103.27	103.27	103.53	0.028912	4.14	9.71	18.94	1.00
3. Test Surface	610.35*	County Low	227.00	102.59	104.33	104.33	104.96	0.015294	6.20	37.72	33.74	0.87
3. Test Surface	610.35*	10-yr	3729.00	102.59	107.96	107.96	108.92	0.006895	9.23	524.16	262.79	0.71
3. Test Surface	610.35*	100-yr	4400.00	102.59	108.18	108.18	109.24	0.007212	9.71	583.16	265.04	0.73
3. Test Surface	608.63*	Base	2.10	102.16	102.27	102.27	102.31	0.036284	1.59	1.32	12.45	0.86
3. Test Surface	608.63*	Bankfull	40.00	102.16	102.80	102.80	103.07	0.028728	4.11	9.80	19.36	1.00
3. Test Surface	608.63*	County Low	227.00	102.16	103.87	103.87	104.47	0.016604	6.33	37.78	33.38	0.90
3. Test Surface	608.63*	10-yr	3729.00	102.16	107.65	107.65	108.60	0.007027	9.45	526.18	267.93	0.72
3. Test Surface	608.63*	100-yr	4400.00	102.16	107.87	107.87	108.92	0.007386	9.95	585.22	270.09	0.75
3. Test Surface	606.90*	Base	2.10	101.73	101.82	101.82	101.87	0.067449	1.86	1.13	13.29	1.13
3. Test Surface	606.90*	Bankfull	40.00	101.73	102.35	102.35	102.60	0.028736	4.08	9.89	19.84	0.99
3. Test Surface	606.90*	County Low	227.00	101.73	103.41	103.41	104.00	0.017486	6.36	37.87	33.10	0.92
3. Test Surface	606.90*	10-yr	3729.00	101.73	107.36	107.36	108.30	0.006805	9.43	529.12	273.26	0.71
3. Test Surface	606.90*	100-yr	4400.00	101.73	107.58	107.58	108.62	0.007128	9.92	590.61	275.42	0.74
3. Test Surface	605.18*	Base	2.10	101.29	101.38	101.38	101.42	0.058635	1.73	1.21	14.39	1.05
3. Test Surface	605.18*	Bankfull	40.00	101.29	101.88	101.88	102.14	0.028606	4.04	9.99	20.31	0.99
3. Test Surface	605.18*	County Low	227.00	101.29	102.94	102.94	103.53	0.018491	6.36	37.80	32.74	0.94
3. Test Surface	605.18*	10-yr	3729.00	101.29	107.06	107.06	108.00	0.006832	9.58	530.10	278.51	0.72
3. Test Surface	605.18*	100-yr	4400.00	101.29	107.31	107.31	108.31	0.006898	9.92	601.47	280.94	0.73
3. Test Surface	603.45*	Base	2.10	100.86	100.95	100.95	100.99	0.054328	1.64	1.28	15.53	1.01
3. Test Surface	603.45*	Bankfull	40.00	100.86	101.43	101.43	101.68	0.028838	4.00	10.10	20.95	0.99
3. Test Surface	603.45*	County Low	227.00	100.86	102.95		103.23	0.006380	4.44	54.99	38.70	0.58
3. Test Surface	603.45*	10-yr	3729.00	100.86	107.11		107.76	0.004402	8.11	632.65	287.16	0.58
3. Test Surface	603.45*	100-yr	4400.00	100.86	107.58		108.17	0.003673	7.78	766.88	291.47	0.54
3. Test Surface	601.73*	Base	2.10	100.43	100.51	100.51	100.55	0.054277	1.60	1.32	16.62	1.00
3. Test Surface	601.73*	Bankfull	40.00	100.43	101.61		101.65	0.001830	1.60	25.99	28.33	0.28
3. Test Surface	601.73*	County Low	227.00	100.43	103.09		103.22	0.002160	3.06	80.69	46.15	0.35
3. Test Surface	601.73*	10-yr	3729.00	100.43	107.34		107.74	0.002466	6.48	790.90	297.18	0.44
3. Test Surface	601.73*	100-yr	4400.00	100.43	107.75		108.16	0.002306	6.52	913.81	300.95	0.43
3. Test Surface	600	Base	2.10	100.00	100.36		100.36	0.000028	0.31	6.73	20.59	0.10
3. Test Surface	600	Bankfull	40.00	100.00	101.63		101.65	0.000045	1.02	41.23	33.68	0.15
3. Test Surface	600	County Low	227.00	100.00	103.14		103.22	0.000097	2.42	106.22	52.84	0.25
3. Test Surface	600	10-yr	3729.00	100.00	106.49	106.49	107.73	0.000799	11.73	631.68	297.46	0.83
3. Test Surface	600	100-yr	4400.00	100.00	106.82	106.82	108.15	0.000839	12.44	729.79	300.42	0.86
3. Test Surface	598.00*	Base	2.10	100.00	100.36		100.36	0.000390	0.34	6.17	19.45	0.11
3. Test Surface	598.00*	Bankfull	40.00	100.00	101.63		101.65	0.000546	1.04	39.69	33.08	0.16

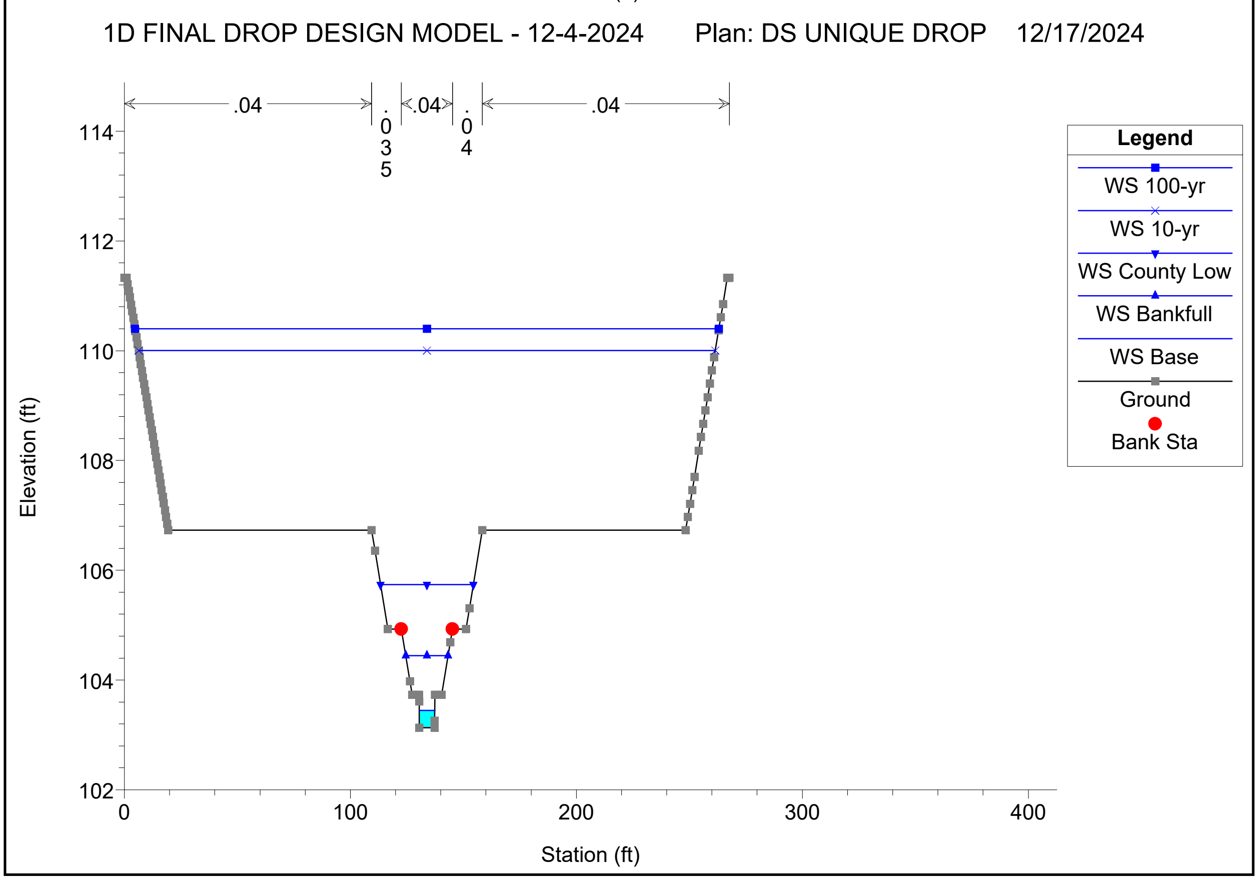
HEC-RAS Plan: DS UNIQUE DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	598.00*	County Low	227.00	100.00	103.14		103.22	0.001060	2.39	103.94	53.46	0.25
3. Test Surface	598.00*	10-yr	3729.00	100.00	106.78		107.17	0.002549	6.46	810.06	311.92	0.45
3. Test Surface	598.00*	100-yr	4400.00	100.00	107.21		107.60	0.002307	6.41	943.72	315.66	0.43
3. Test Surface	596.00*	Base	2.10	100.00	100.36		100.36	0.000511	0.38	5.49	17.79	0.12
3. Test Surface	596.00*	Bankfull	40.00	100.00	101.63		101.64	0.000620	1.07	38.03	32.68	0.17
3. Test Surface	596.00*	County Low	227.00	100.00	103.13		103.22	0.001149	2.44	100.40	52.73	0.26
3. Test Surface	596.00*	10-yr	3729.00	100.00	106.88		107.17	0.001808	5.46	936.12	324.50	0.38
3. Test Surface	596.00*	100-yr	4400.00	100.00	107.30		107.59	0.001693	5.51	1071.36	328.07	0.37
3. Test Surface	594.00*	Base	2.10	100.00	100.36		100.36	0.000697	0.44	4.79	16.02	0.14
3. Test Surface	594.00*	Bankfull	40.00	100.00	101.62		101.64	0.000737	1.12	36.15	32.49	0.18
3. Test Surface	594.00*	County Low	227.00	100.00	103.12		103.22	0.001253	2.49	96.32	50.81	0.27
3. Test Surface	594.00*	10-yr	3729.00	100.00	106.94		107.16	0.001362	4.73	1057.25	336.57	0.33
3. Test Surface	594.00*	100-yr	4400.00	100.00	107.35		107.59	0.001305	4.82	1196.30	340.03	0.32
3. Test Surface	592.00*	Base	2.10	100.00	100.35		100.36	0.001011	0.51	4.09	14.20	0.17
3. Test Surface	592.00*	Bankfull	40.00	100.00	101.62		101.64	0.000940	1.18	33.88	32.39	0.20
3. Test Surface	592.00*	County Low	227.00	100.00	103.12		103.21	0.001373	2.53	92.53	45.58	0.28
3. Test Surface	592.00*	10-yr	3729.00	100.00	106.98		107.16	0.001050	4.12	1175.15	348.44	0.29
3. Test Surface	592.00*	100-yr	4400.00	100.00	107.39		107.58	0.001024	4.25	1318.79	351.83	0.29
3. Test Surface	590	Base	2.10	100.00	100.35		100.36	0.000141	0.62	3.40	12.39	0.21
3. Test Surface	590	Bankfull	40.00	100.00	101.62		101.64	0.000109	1.28	31.34	31.77	0.23
3. Test Surface	590	County Low	227.00	100.00	103.11		103.21	0.000145	2.66	89.45	45.04	0.30
3. Test Surface	590	10-yr	3729.00	100.00	106.36		107.15	0.000624	9.76	1060.49	354.71	0.72
3. Test Surface	590	100-yr	4400.00	100.00	106.73		107.57	0.000639	10.30	1192.40	357.72	0.74
3. Test Surface	589.50*	Base	2.10	100.00	100.35		100.36	0.001640	0.64	3.28	11.79	0.21
3. Test Surface	589.50*	Bankfull	40.00	100.00	101.61		101.64	0.001388	1.38	29.04	29.01	0.24
3. Test Surface	589.50*	County Low	227.00	100.00	103.09		103.21	0.001761	2.78	84.61	44.95	0.32
3. Test Surface	589.50*	10-yr	3729.00	100.00	106.80		106.96	0.001130	4.15	1216.62	358.53	0.30
3. Test Surface	589.50*	100-yr	4400.00	100.00	107.20		107.37	0.001112	4.29	1360.00	361.75	0.30
3. Test Surface	589.00*	Base	2.10	100.00	100.35		100.35	0.001729	0.66	3.17	11.19	0.22
3. Test Surface	589.00*	Bankfull	40.00	100.00	101.60		101.64	0.001611	1.50	26.70	26.26	0.26
3. Test Surface	589.00*	County Low	227.00	100.00	103.08		103.21	0.002030	2.98	80.84	46.36	0.34
3. Test Surface	589.00*	10-yr	3729.00	100.00	106.80		106.96	0.001191	4.26	1215.26	358.79	0.30
3. Test Surface	589.00*	100-yr	4400.00	100.00	107.20		107.37	0.001171	4.41	1358.80	362.02	0.30
3. Test Surface	588.50*	Base	2.10	100.00	100.35		100.35	0.001824	0.69	3.05	10.59	0.23
3. Test Surface	588.50*	Bankfull	40.00	100.00	101.60		101.64	0.001899	1.64	24.34	23.49	0.28
3. Test Surface	588.50*	County Low	227.00	100.00	103.06		103.21	0.002279	3.16	78.25	46.11	0.36
3. Test Surface	588.50*	10-yr	3729.00	100.00	106.80		106.96	0.001226	4.32	1215.83	359.02	0.31
3. Test Surface	588.50*	100-yr	4400.00	100.00	107.20		107.37	0.001204	4.47	1359.46	362.24	0.31
3. Test Surface	588	Base	2.10	100.00	100.35		100.35	0.001476	0.72	2.93	10.00	0.23
3. Test Surface	588	Bankfull	40.00	100.00	101.58		101.64	0.001739	1.82	21.98	20.73	0.31
3. Test Surface	588	County Low	227.00	100.00	103.04		103.20	0.002054	3.43	75.86	44.55	0.39
3. Test Surface	588	10-yr	3729.00	100.00	106.79		106.96	0.001196	4.88	1210.34	359.19	0.35
3. Test Surface	588	100-yr	4400.00	100.00	107.18		107.37	0.001176	5.04	1354.18	362.41	0.35
3. Test Surface	578.00*	Base	2.10	99.98	100.33		100.33	0.002366	0.77	2.71	9.50	0.26
3. Test Surface	578.00*	Bankfull	40.00	99.98	101.56		101.62	0.002358	1.83	21.80	20.82	0.32
3. Test Surface	578.00*	County Low	227.00	99.98	103.02		103.18	0.002643	3.39	75.79	44.61	0.38
3. Test Surface	578.00*	10-yr	3729.00	99.98	106.77		106.94	0.001362	4.54	1165.83	345.33	0.32
3. Test Surface	578.00*	100-yr	4400.00	99.98	107.17		107.36	0.001337	4.69	1303.64	348.55	0.32
3. Test Surface	568.00*	Base	2.10	99.95	100.30		100.31	0.002677	0.83	2.53	8.57	0.27
3. Test Surface	568.00*	Bankfull	40.00	99.95	101.54		101.59	0.002450	1.85	21.63	20.82	0.32
3. Test Surface	568.00*	County Low	227.00	99.95	102.99		103.15	0.002712	3.41	75.35	44.57	0.39
3. Test Surface	568.00*	10-yr	3729.00	99.95	106.74		106.93	0.001487	4.72	1116.36	331.40	0.34
3. Test Surface	568.00*	100-yr	4400.00	99.95	107.13		107.34	0.001462	4.88	1248.18	334.60	0.34
3. Test Surface	558.00*	Base	2.10	99.93	100.27		100.28	0.002665	0.88	2.38	7.07	0.27
3. Test Surface	558.00*	Bankfull	40.00	99.93	101.51		101.57	0.002612	1.88	21.30	20.86	0.33
3. Test Surface	558.00*	County Low	227.00	99.93	102.96		103.12	0.002808	3.43	74.91	44.54	0.39
3. Test Surface	558.00*	10-yr	3729.00	99.93	106.70		106.91	0.001638	4.91	1066.61	317.39	0.35
3. Test Surface	558.00*	100-yr	4400.00	99.93	107.10		107.32	0.001612	5.08	1192.34	320.56	0.35
3. Test Surface	548.00*	Base	2.10	99.90	100.24		100.26	0.002627	0.88	2.38	6.98	0.27
3. Test Surface	548.00*	Bankfull	40.00	99.90	101.48		101.54	0.002750	1.90	21.06	20.85	0.33
3. Test Surface	548.00*	County Low	227.00	99.90	102.93		103.10	0.002882	3.44	74.57	44.52	0.39
3. Test Surface	548.00*	10-yr	3729.00	99.90	106.67		106.89	0.001810	5.12	1016.23	303.40	0.37
3. Test Surface	548.00*	100-yr	4400.00	99.90	107.06		107.31	0.001786	5.30	1135.55	306.54	0.37
3. Test Surface	538	Base	2.10	99.88	100.22		100.23	0.002130	0.90	2.33	6.92	0.27
3. Test Surface	538	Bankfull	40.00	99.88	101.46		101.51	0.002237	1.93	20.78	20.89	0.34
3. Test Surface	538	County Low	227.00	99.88	102.91		103.07	0.002310	3.49	74.27	44.48	0.40

HEC-RAS Plan: DS UNIQUE DROP River: East Fork Jimmy Reach: 3. Test Surface (Continued)

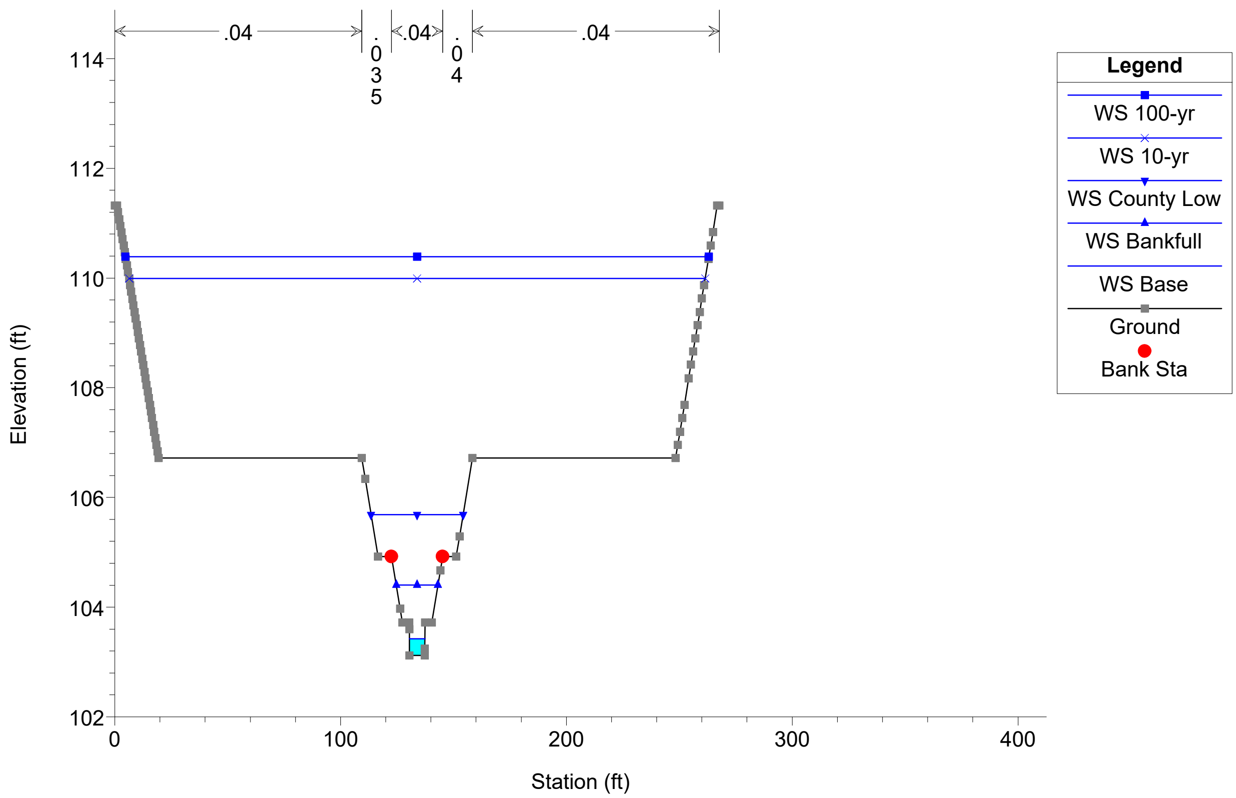
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3. Test Surface	538	10-yr	3729.00	99.88	106.60		106.87	0.001910	5.94	957.99	289.16	0.43
3. Test Surface	538	100-yr	4400.00	99.88	106.98		107.28	0.001891	6.16	1071.09	292.27	0.43
3. Test Surface	528.00*	Base	2.10	99.85	100.20		100.21	0.002596	0.88	2.38	6.92	0.26
3. Test Surface	528.00*	Bankfull	40.00	99.85	101.43		101.49	0.002945	1.93	20.71	20.84	0.34
3. Test Surface	528.00*	County Low	227.00	99.85	102.88		103.04	0.002957	3.45	74.13	44.47	0.40
3. Test Surface	528.00*	10-yr	3729.00	99.85	106.58		106.84	0.002092	5.44	946.54	284.26	0.39
3. Test Surface	528.00*	100-yr	4400.00	99.85	106.97		107.26	0.002066	5.64	1057.55	287.38	0.39
3. Test Surface	518.00*	Base	2.10	99.83	100.17		100.18	0.002784	0.90	2.33	6.92	0.27
3. Test Surface	518.00*	Bankfull	40.00	99.83	101.40		101.46	0.002975	1.94	20.64	20.84	0.34
3. Test Surface	518.00*	County Low	227.00	99.83	102.85		103.01	0.002967	3.45	74.02	44.42	0.40
3. Test Surface	518.00*	10-yr	3729.00	99.83	106.55		106.82	0.002158	5.53	930.45	279.15	0.40
3. Test Surface	518.00*	100-yr	4400.00	99.83	106.94		107.24	0.002135	5.73	1039.24	282.24	0.40
3. Test Surface	508.00*	Base	2.10	99.80	100.14		100.16	0.002709	0.89	2.35	6.91	0.27
3. Test Surface	508.00*	Bankfull	40.00	99.80	101.37		101.43	0.003040	1.95	20.48	20.75	0.35
3. Test Surface	508.00*	County Low	227.00	99.80	102.82		102.98	0.003020	3.47	73.59	44.39	0.40
3. Test Surface	508.00*	10-yr	3729.00	99.80	106.52		106.80	0.002238	5.62	913.39	274.06	0.40
3. Test Surface	508.00*	100-yr	4400.00	99.80	106.91		107.22	0.002217	5.83	1019.97	277.18	0.41
3. Test Surface	498.00*	Base	2.10	99.78	100.11		100.13	0.002952	0.92	2.29	6.91	0.28
3. Test Surface	498.00*	Bankfull	40.00	99.78	101.34		101.40	0.003081	1.96	20.39	20.74	0.35
3. Test Surface	498.00*	County Low	227.00	99.78	102.79		102.95	0.003034	3.48	73.44	44.32	0.40
3. Test Surface	498.00*	10-yr	3729.00	99.78	106.49		106.78	0.002322	5.72	896.19	268.97	0.41
3. Test Surface	498.00*	100-yr	4400.00	99.78	106.87		107.19	0.002305	5.94	1000.13	272.01	0.41
3. Test Surface	488.00*	Base	2.10	99.75	100.08		100.10	0.002931	0.92	2.30	6.91	0.28
3. Test Surface	488.00*	Bankfull	40.00	99.75	101.31		101.37	0.003162	1.98	20.20	20.64	0.35
3. Test Surface	488.00*	County Low	227.00	99.75	102.76		102.92	0.003089	3.50	73.00	44.26	0.40
3. Test Surface	488.00*	10-yr	3729.00	99.75	106.45		106.76	0.002416	5.83	878.52	263.86	0.42
3. Test Surface	488.00*	100-yr	4400.00	99.75	106.83		107.17	0.002402	6.05	980.18	266.93	0.42
3. Test Surface	478.00*	Base	2.10	99.73	100.05		100.07	0.003317	0.95	2.21	6.91	0.30
3. Test Surface	478.00*	Bankfull	40.00	99.73	101.27		101.33	0.003216	1.99	20.09	20.62	0.36
3. Test Surface	478.00*	County Low	227.00	99.73	102.72		102.89	0.003127	3.52	72.80	44.18	0.41
3. Test Surface	478.00*	10-yr	3729.00	99.73	106.41		106.73	0.002528	5.96	860.65	258.73	0.43
3. Test Surface	478.00*	100-yr	4400.00	99.73	106.79		107.14	0.002516	6.19	959.97	261.76	0.43
3. Test Surface	468	Base	2.10	99.70	100.02	99.84	100.04	0.002501	0.95	2.22	6.91	0.29
3. Test Surface	468	Bankfull	40.00	99.70	101.24	100.65	101.31	0.002503	2.00	19.97	20.55	0.36
3. Test Surface	468	County Low	227.00	99.70	102.69	101.90	102.86	0.002501	3.58	72.21	44.10	0.41
3. Test Surface	468	10-yr	3729.00	99.70	106.34	105.16	106.70	0.002501	6.73	833.61	253.31	0.49
3. Test Surface	468	100-yr	4400.00	99.70	106.72	105.39	107.11	0.002500	7.01	929.92	256.34	0.49



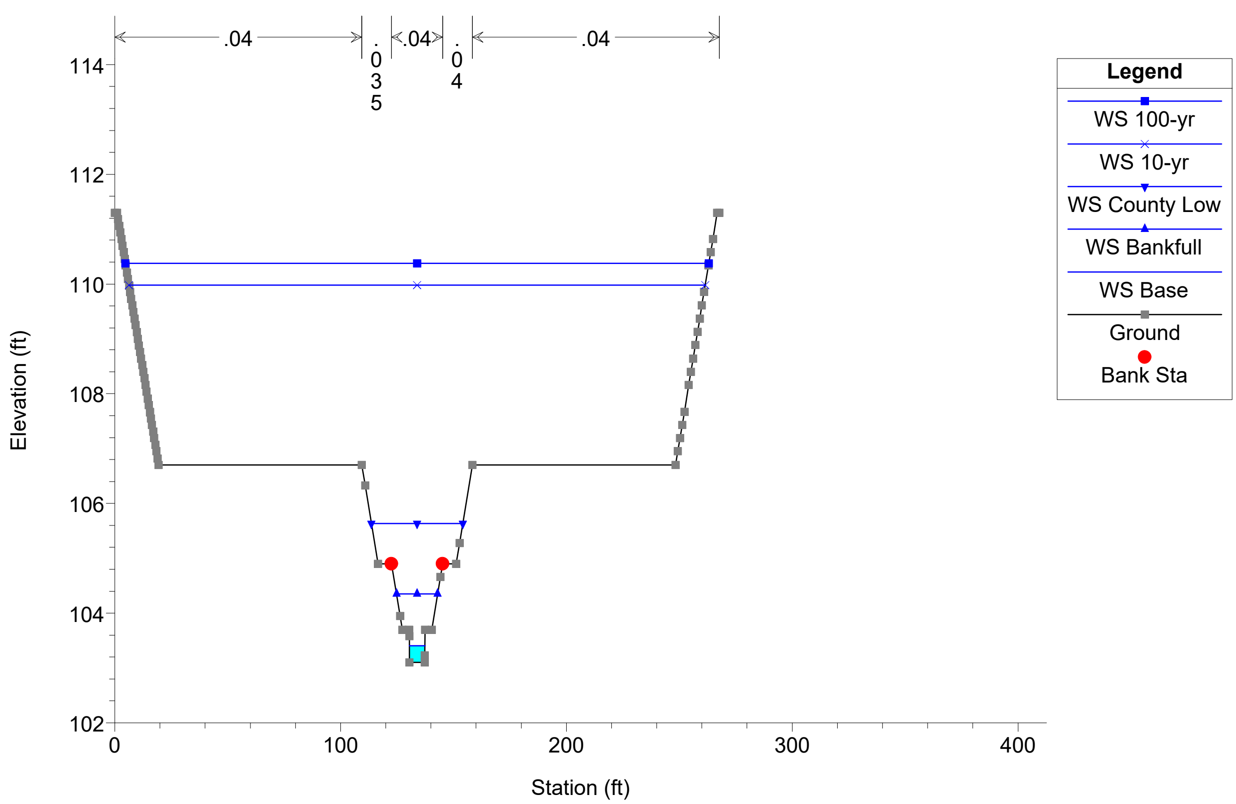


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

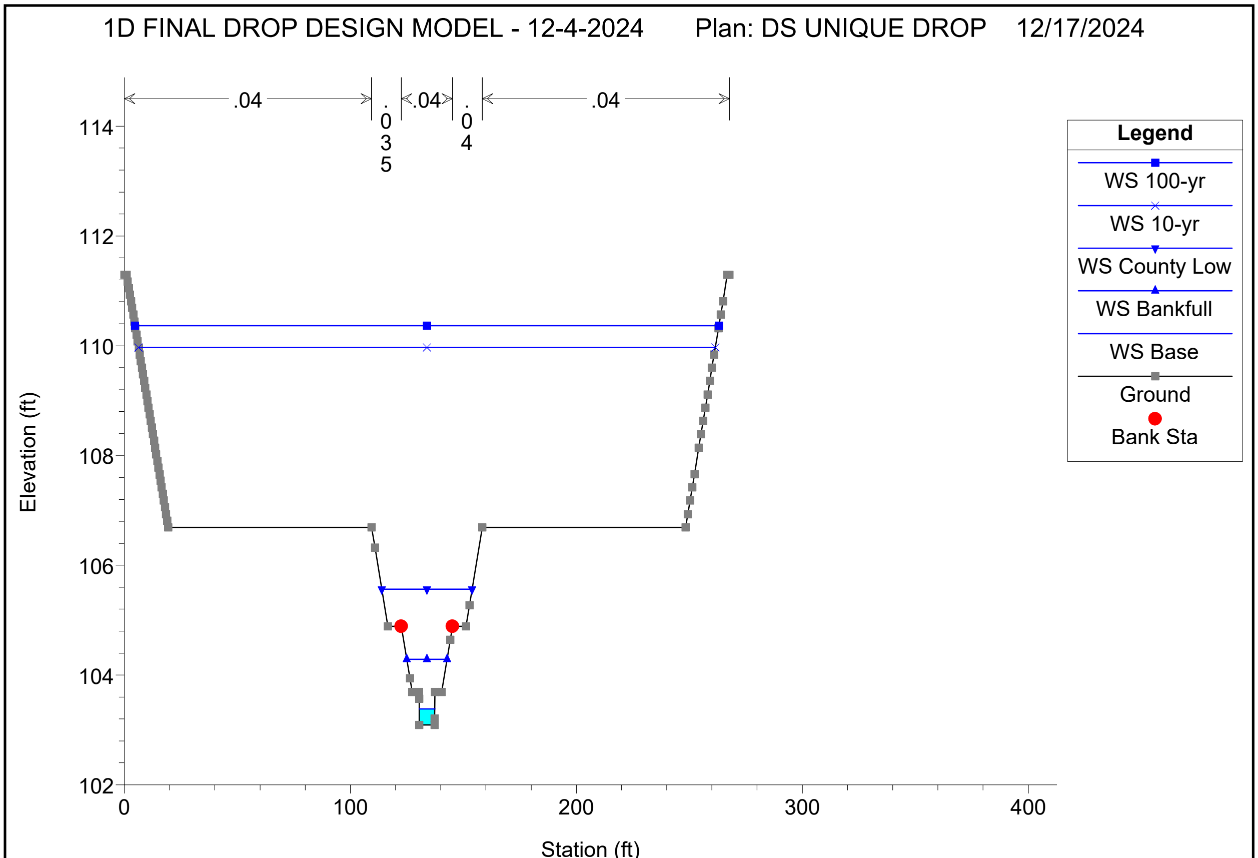
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: DS UNIQUE DROP 12/17/2024

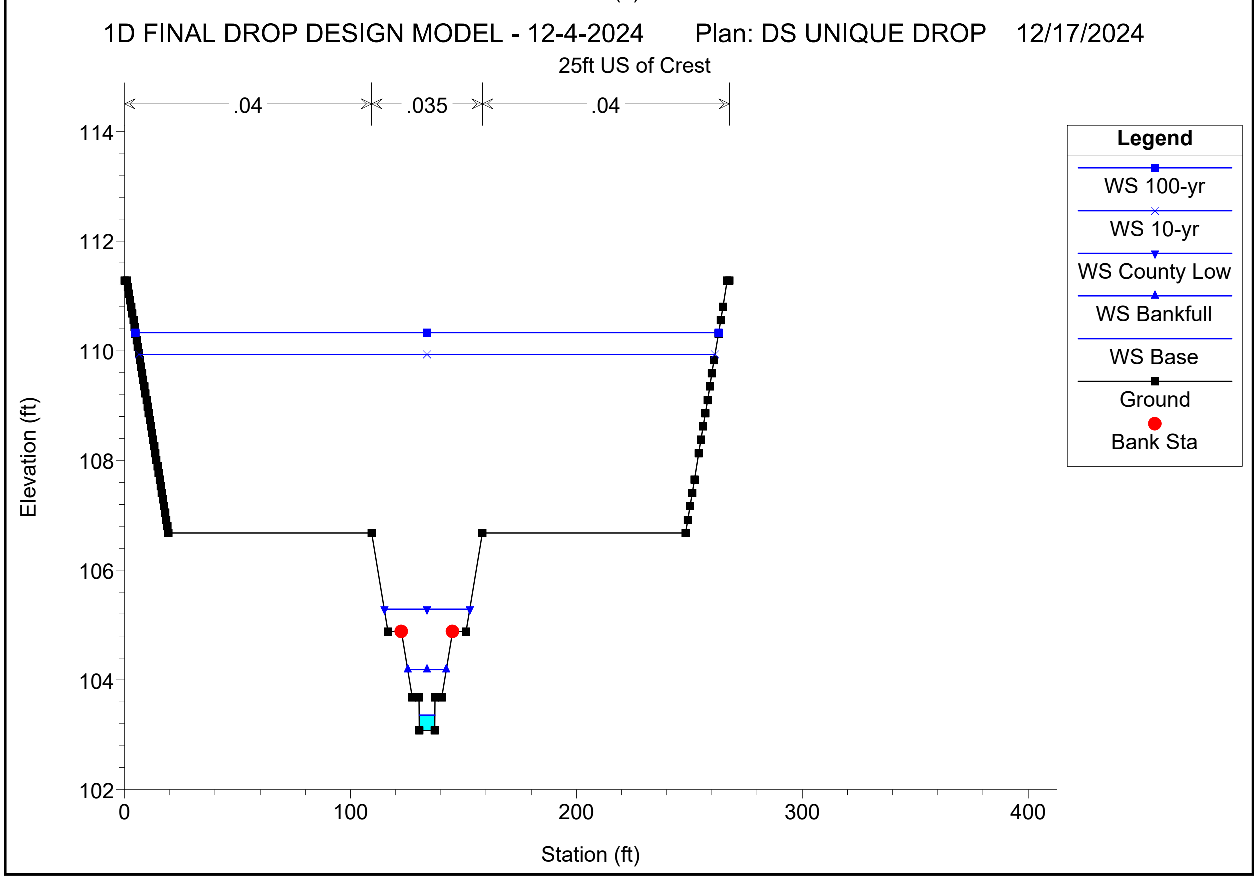


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: DS UNIQUE DROP 12/17/2024

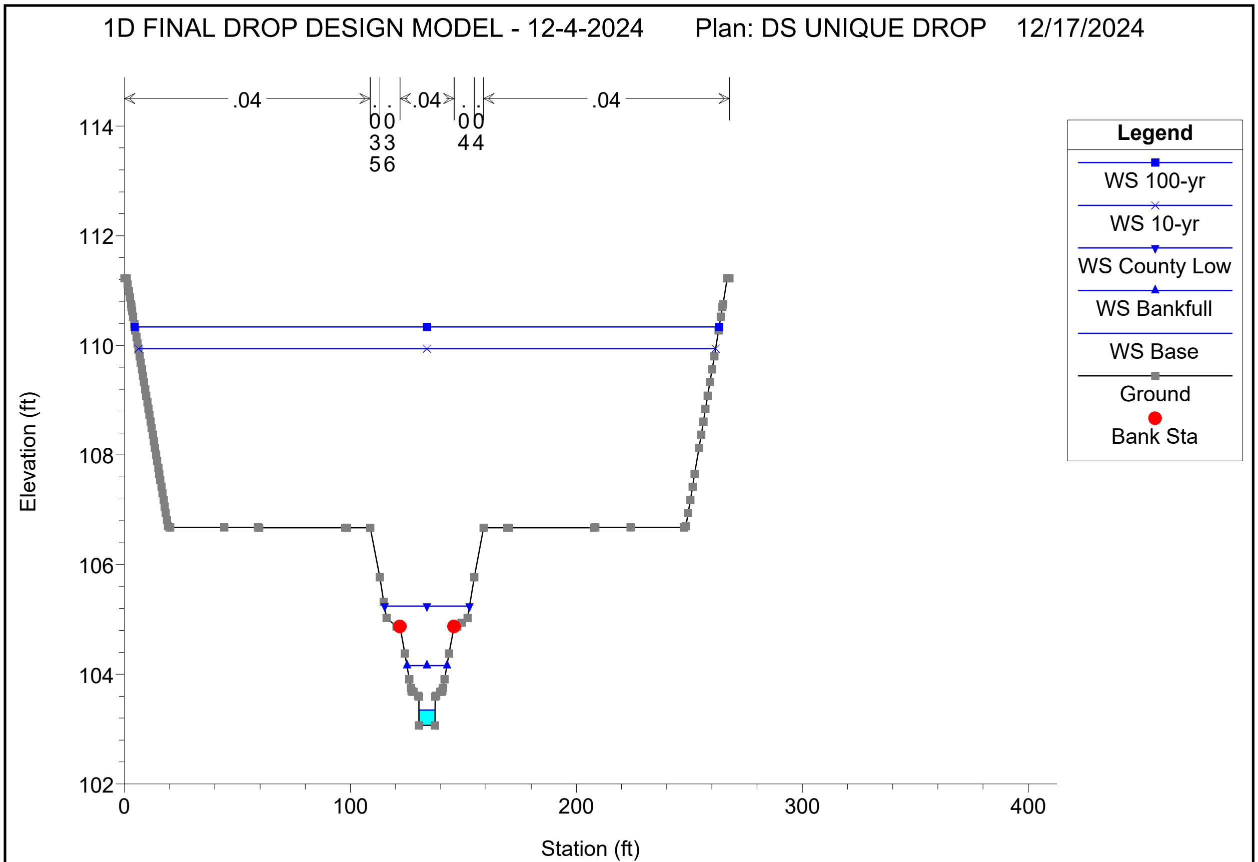


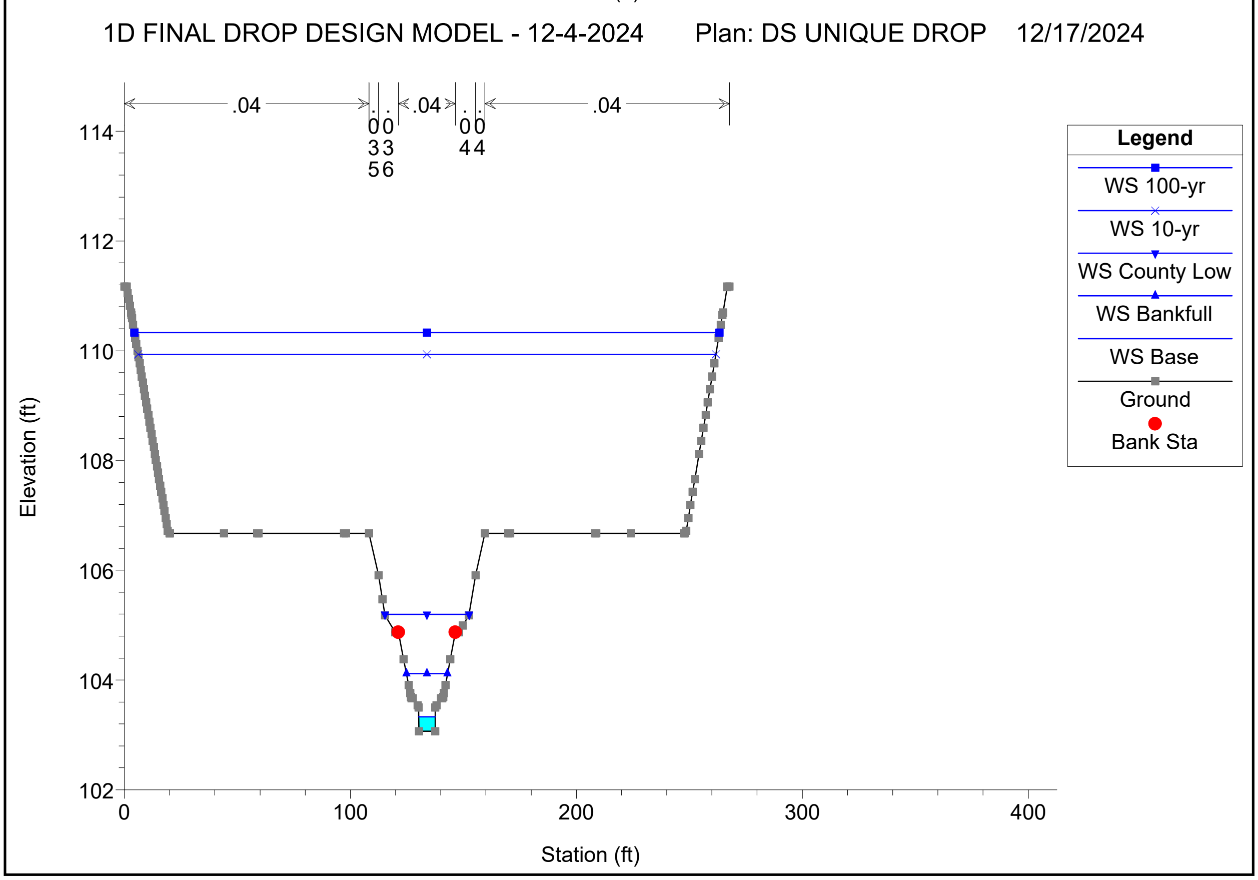
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





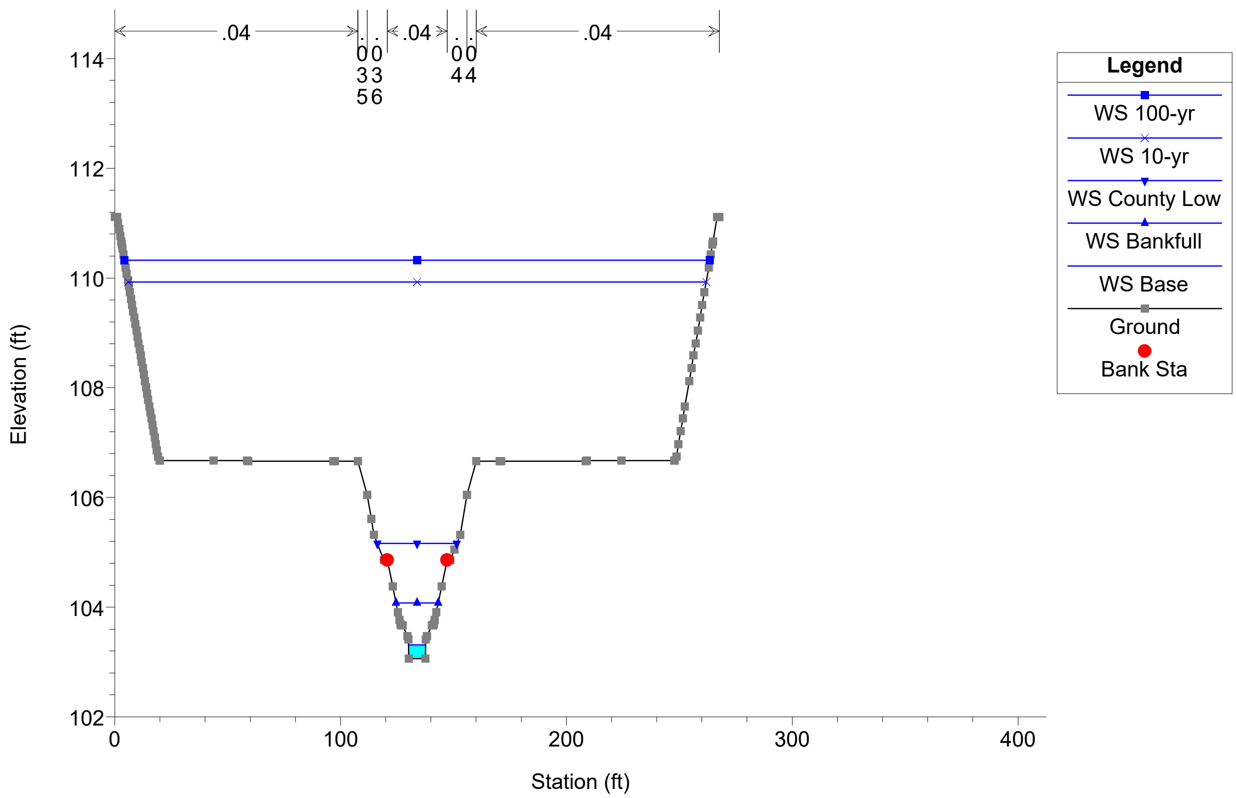
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: DS UNIQUE DROP 12/17/2024



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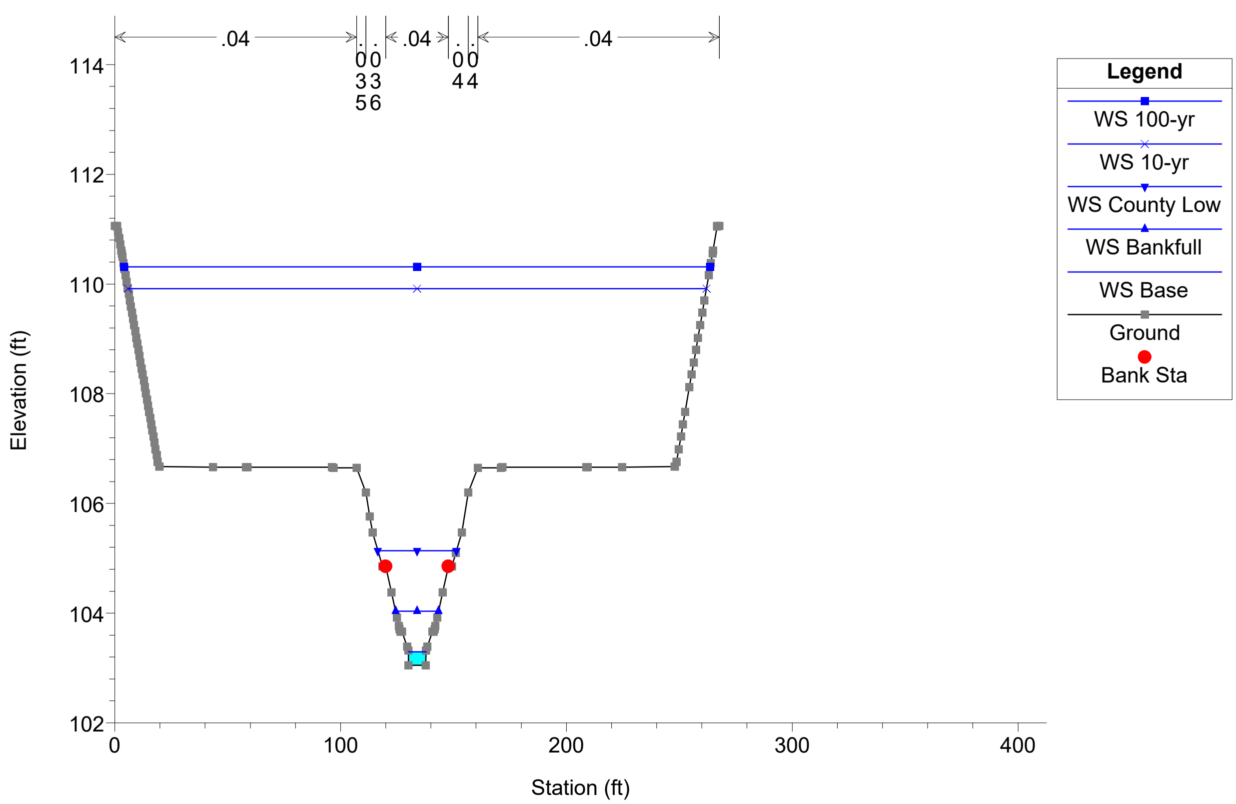
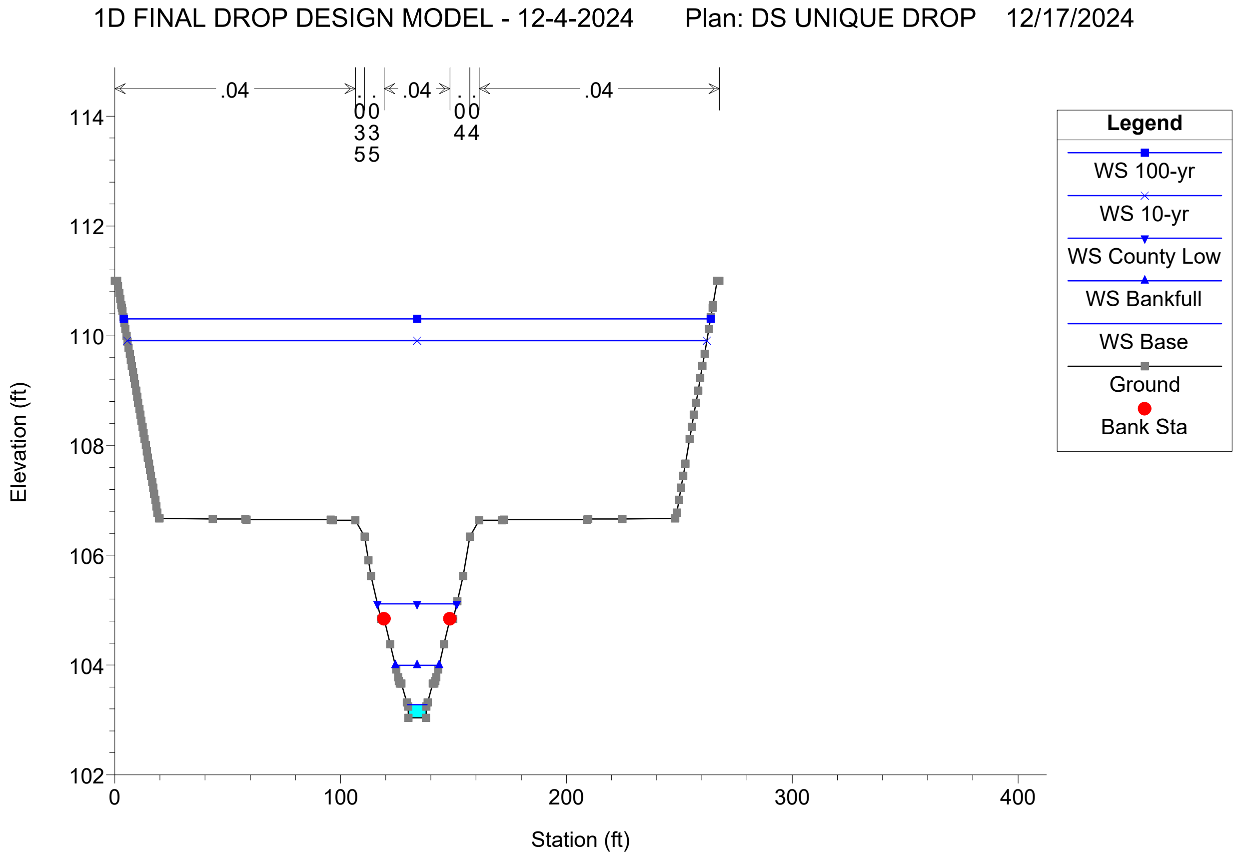
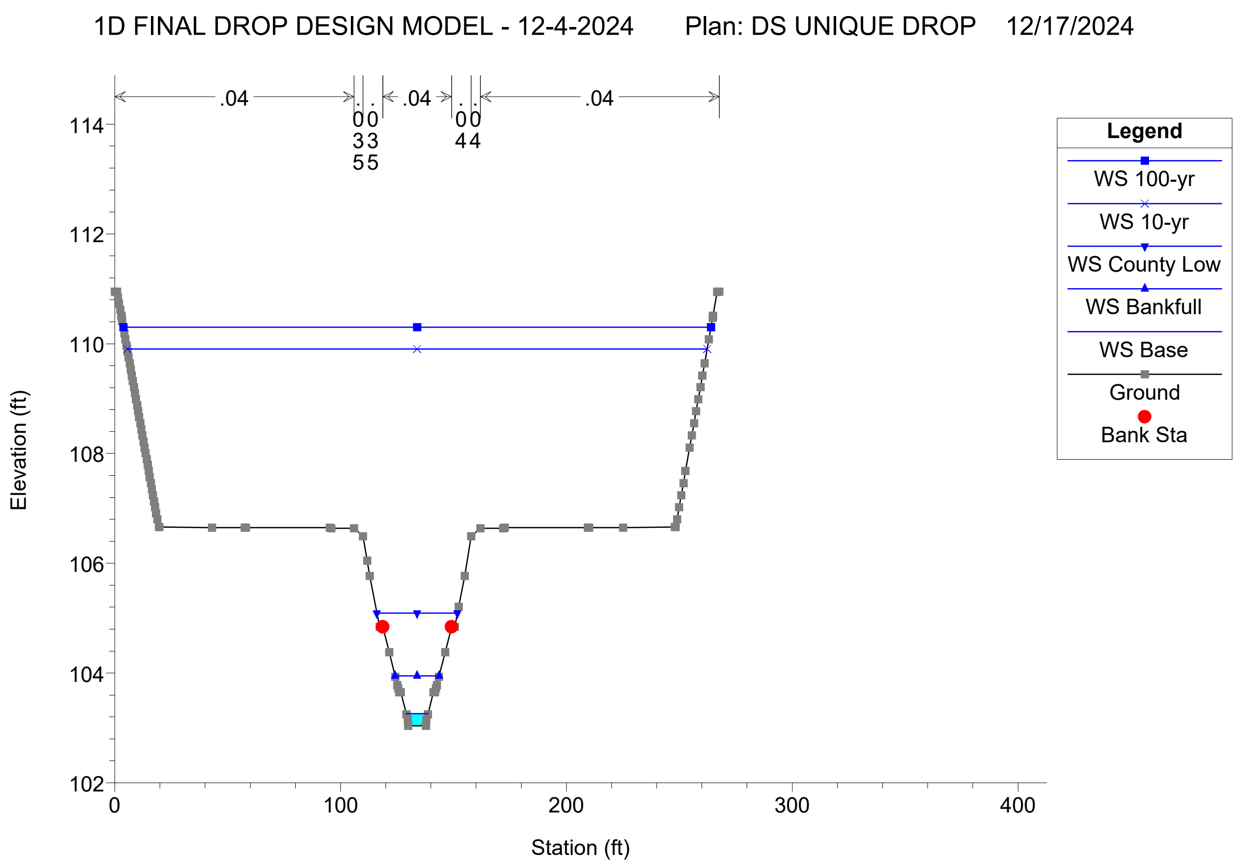
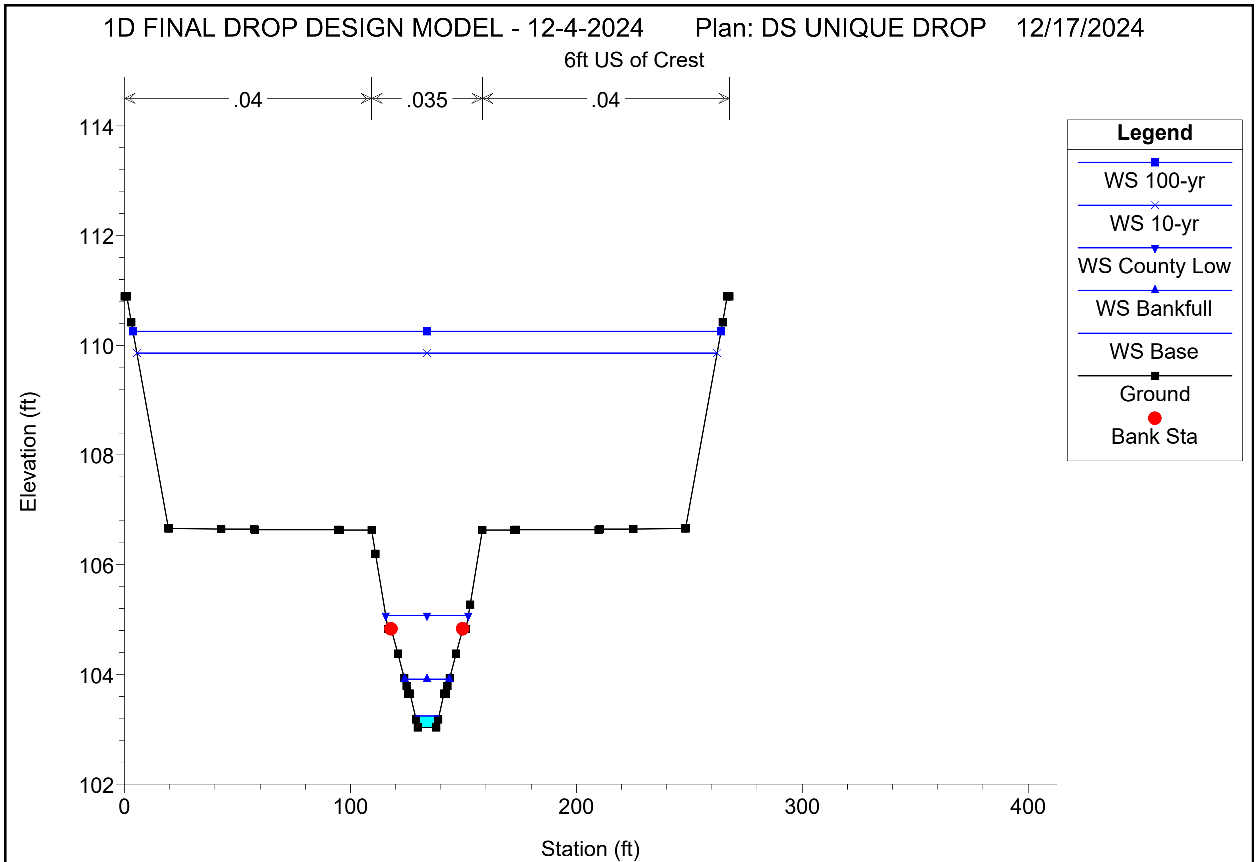


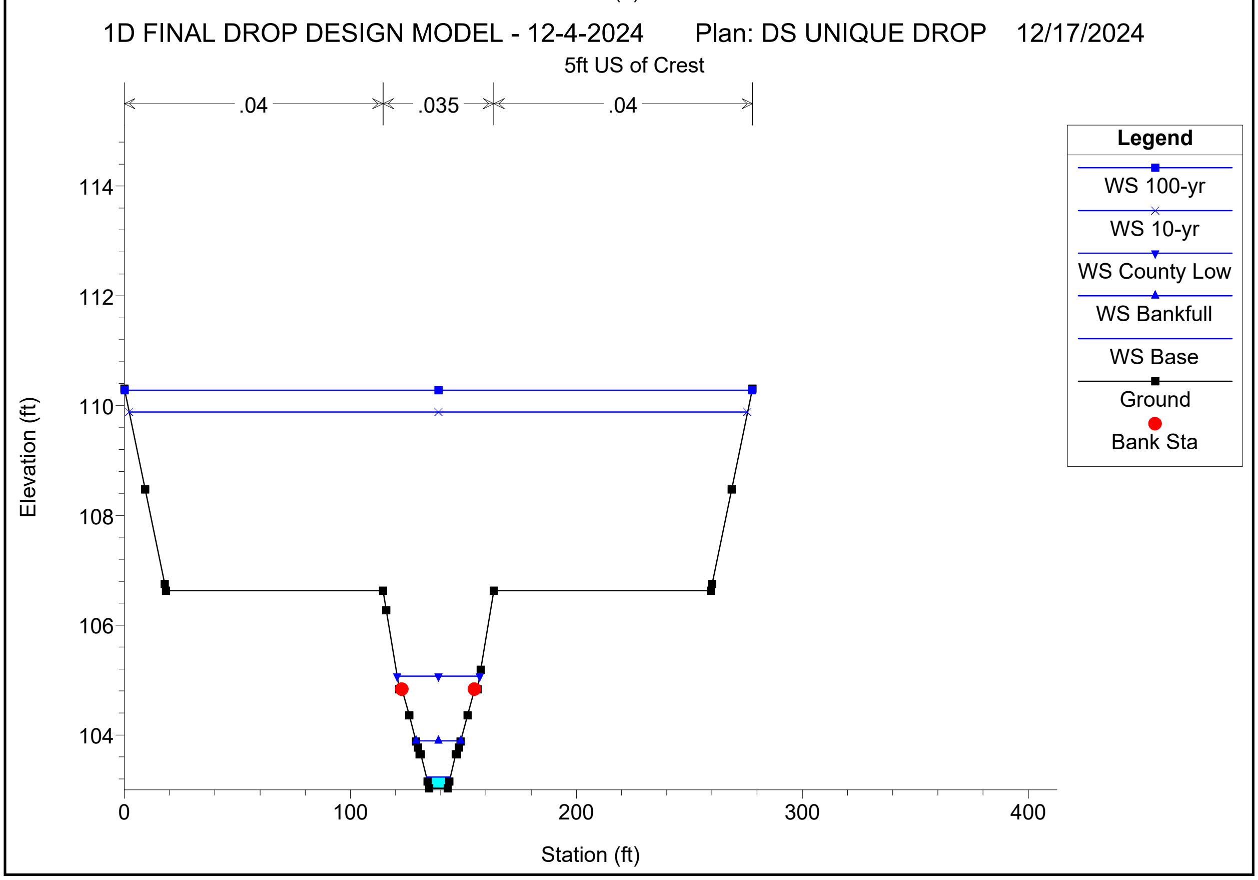
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





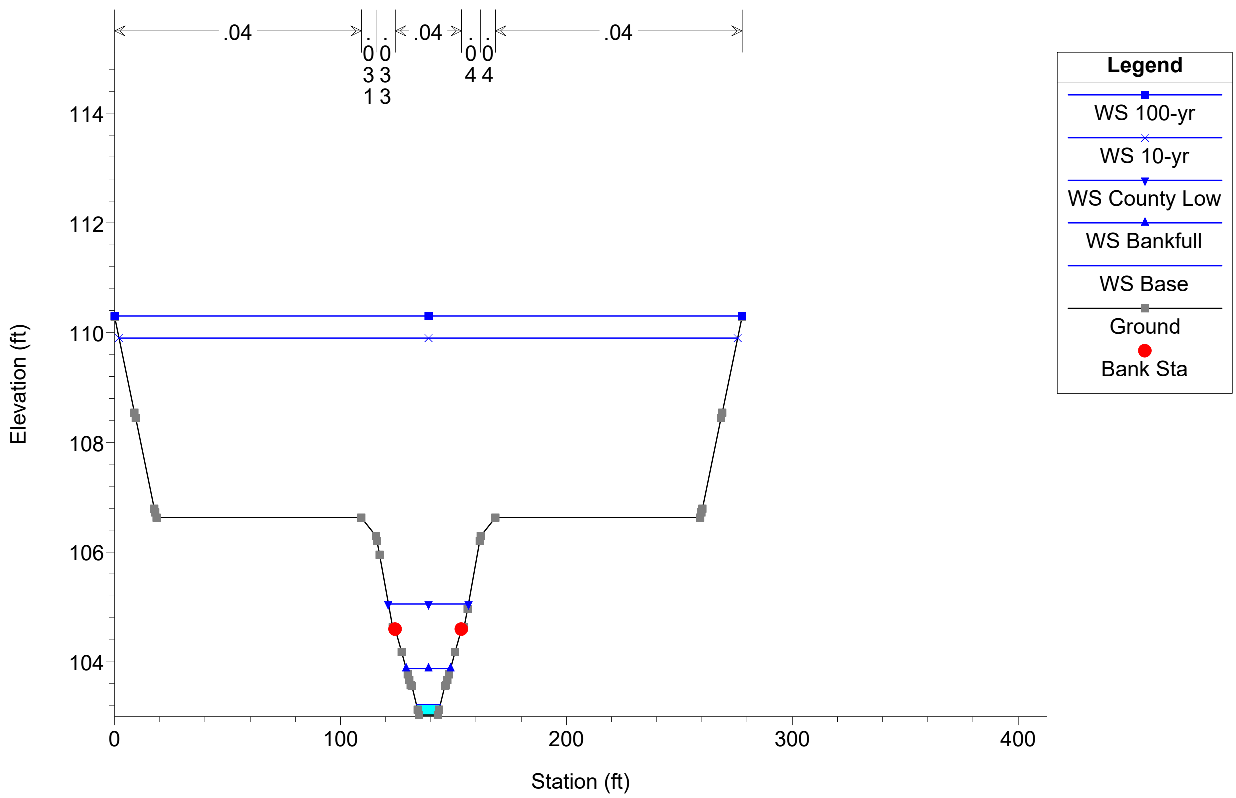
1 in Horiz. = 85 ft   1 in Vert. = 3.5 ft



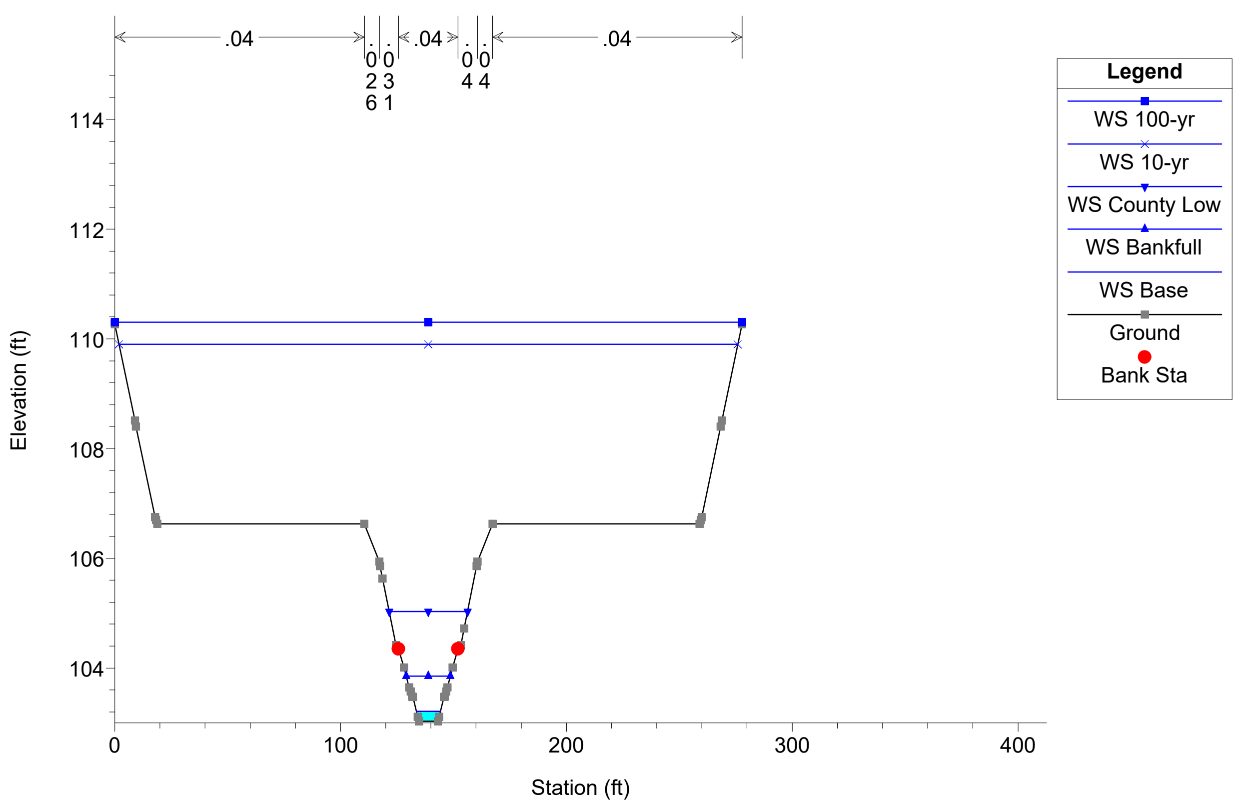


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

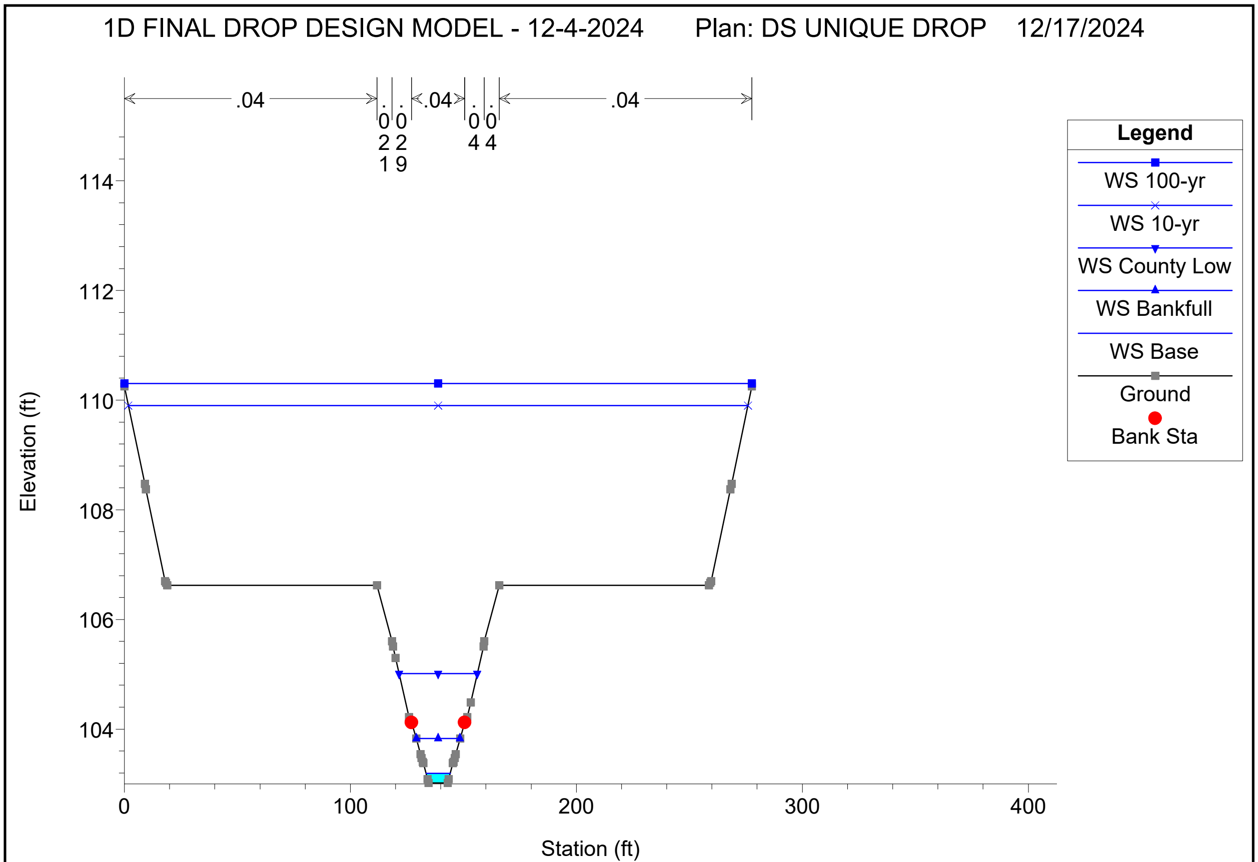
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: DS UNIQUE DROP 12/17/2024

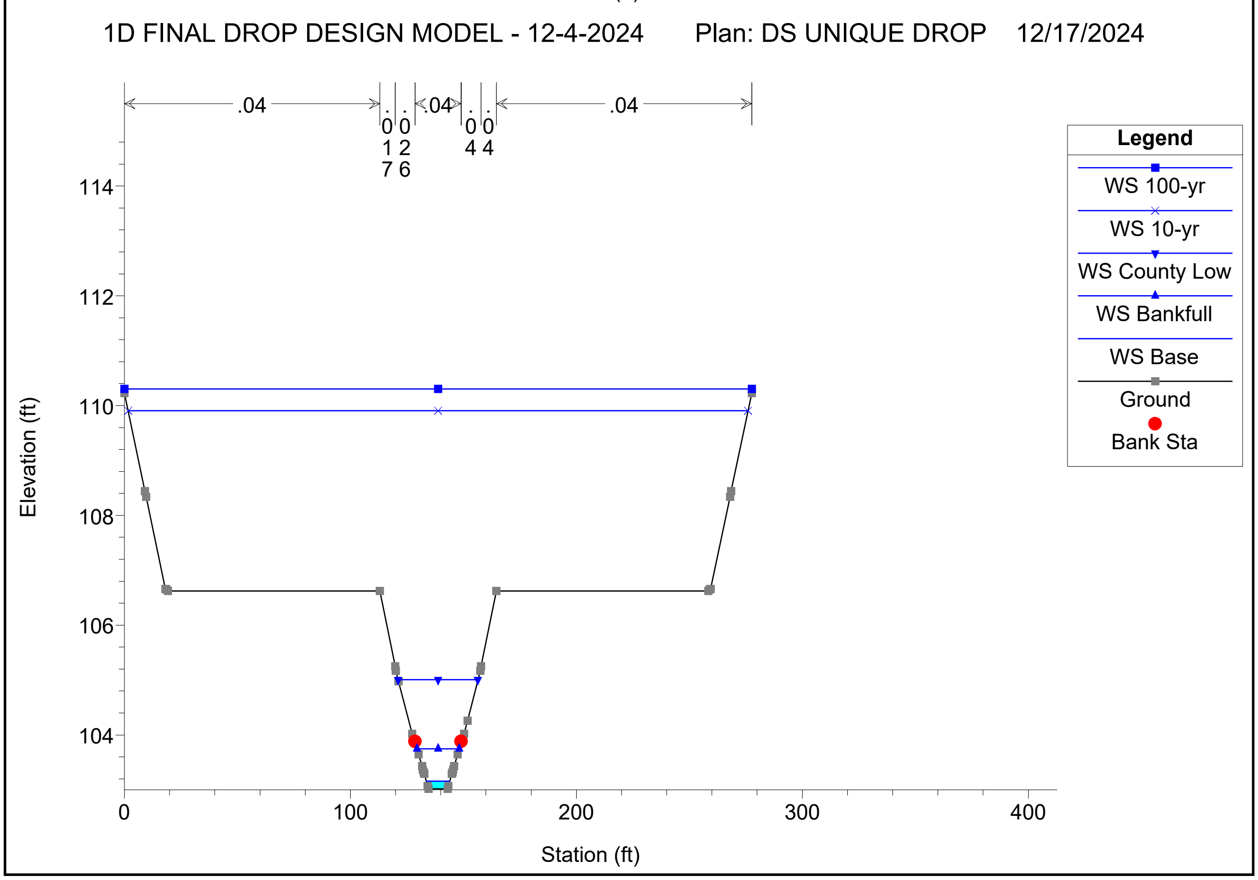


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: DS UNIQUE DROP 12/17/2024

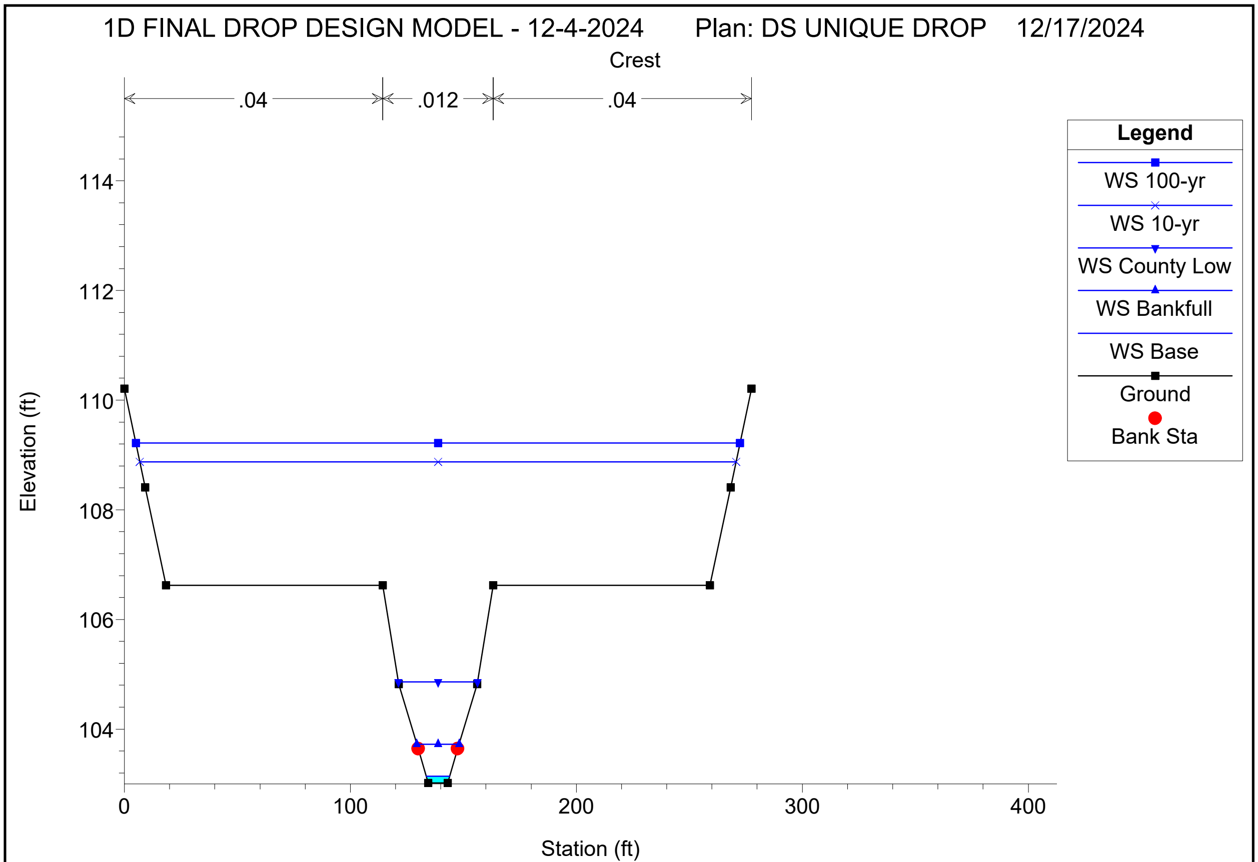


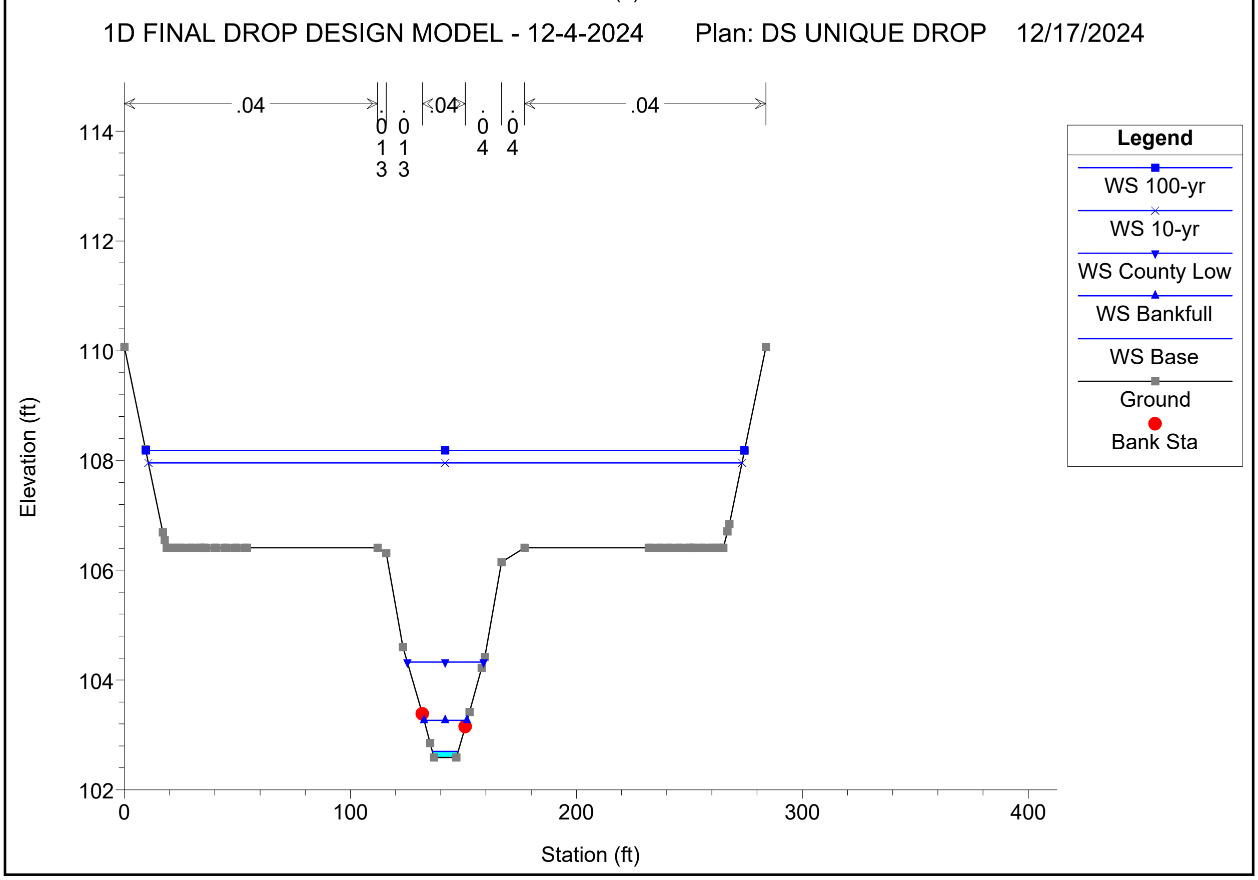
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





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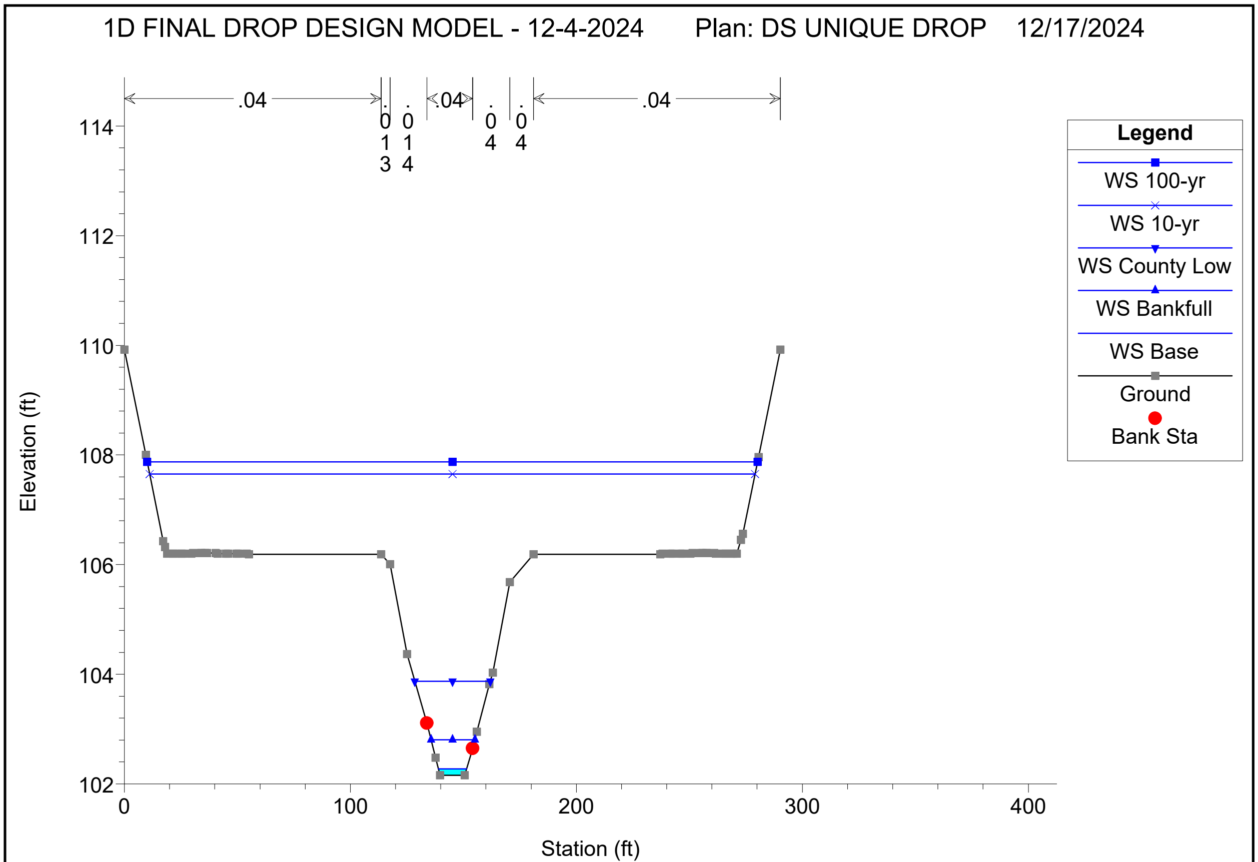

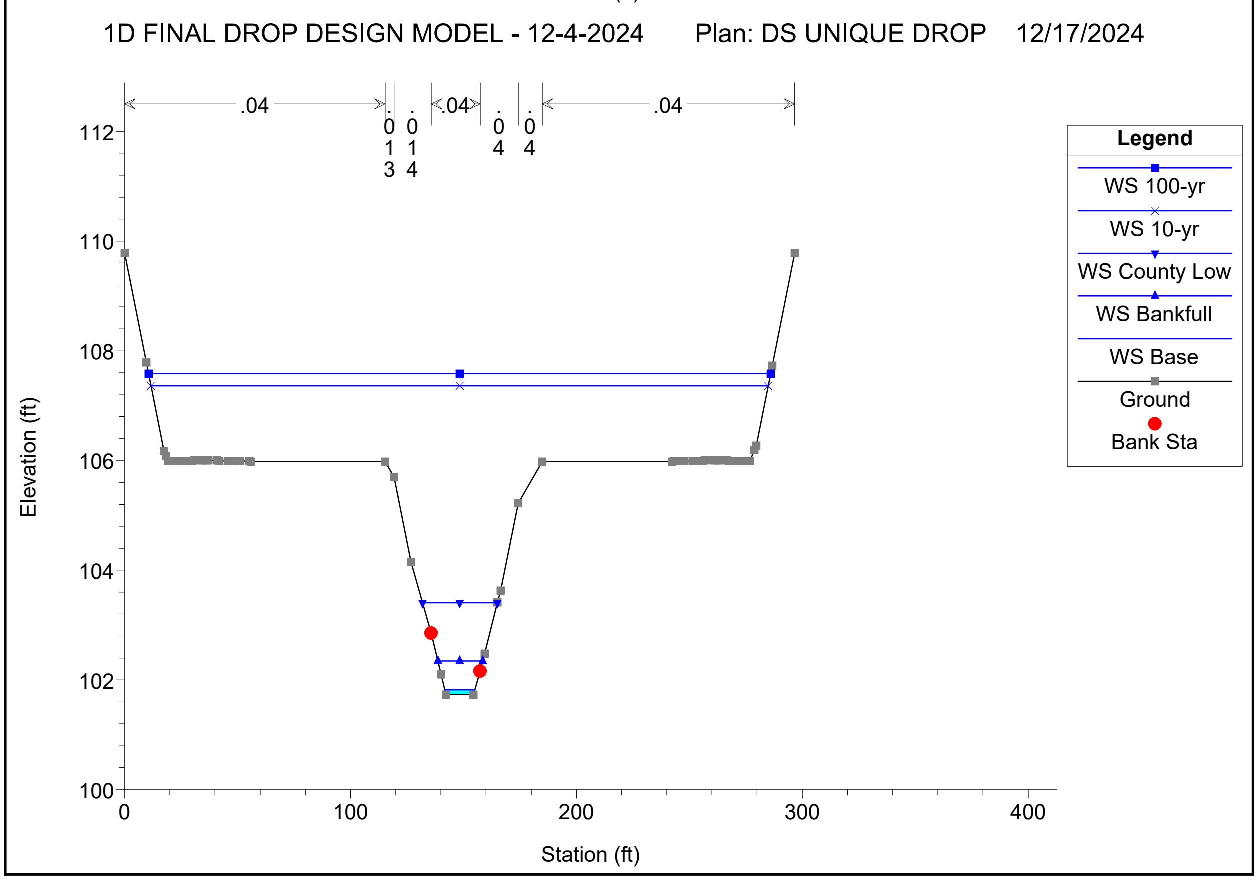

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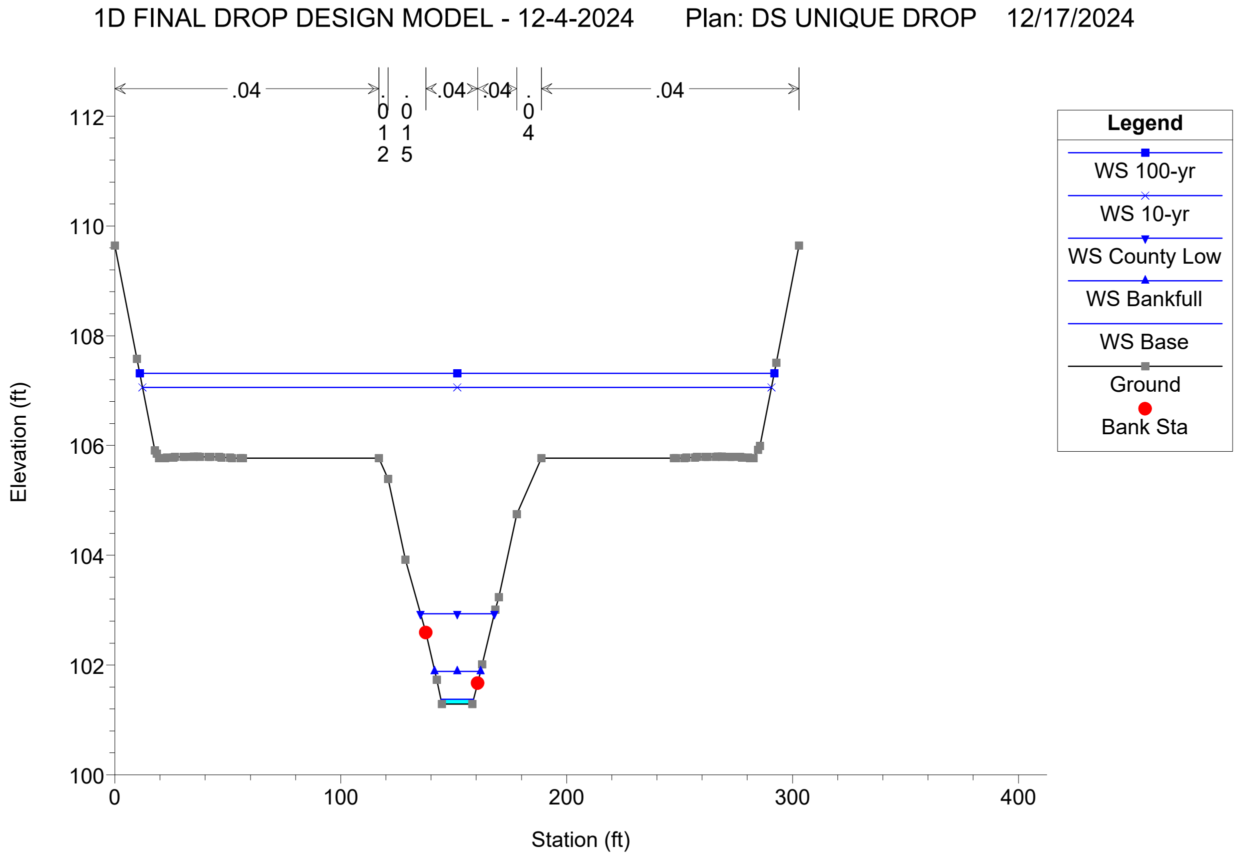

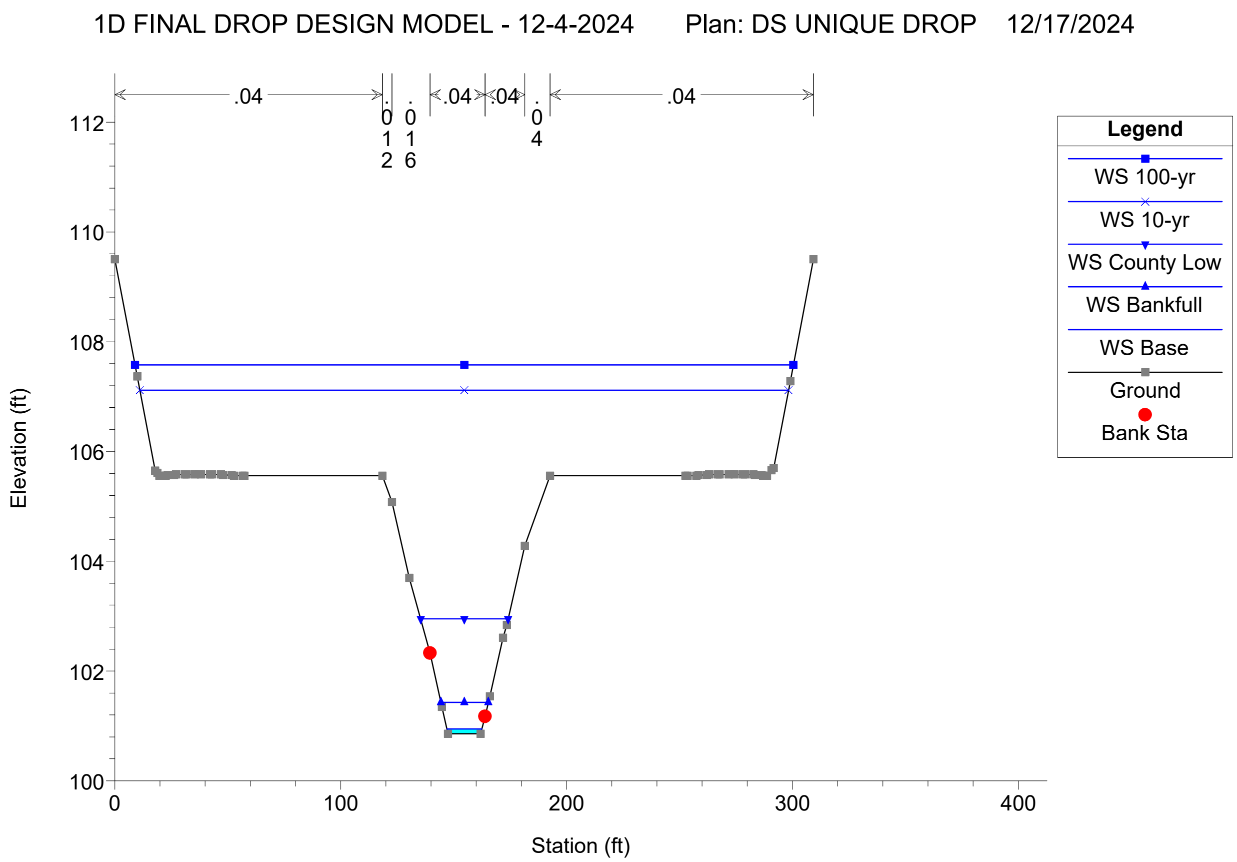

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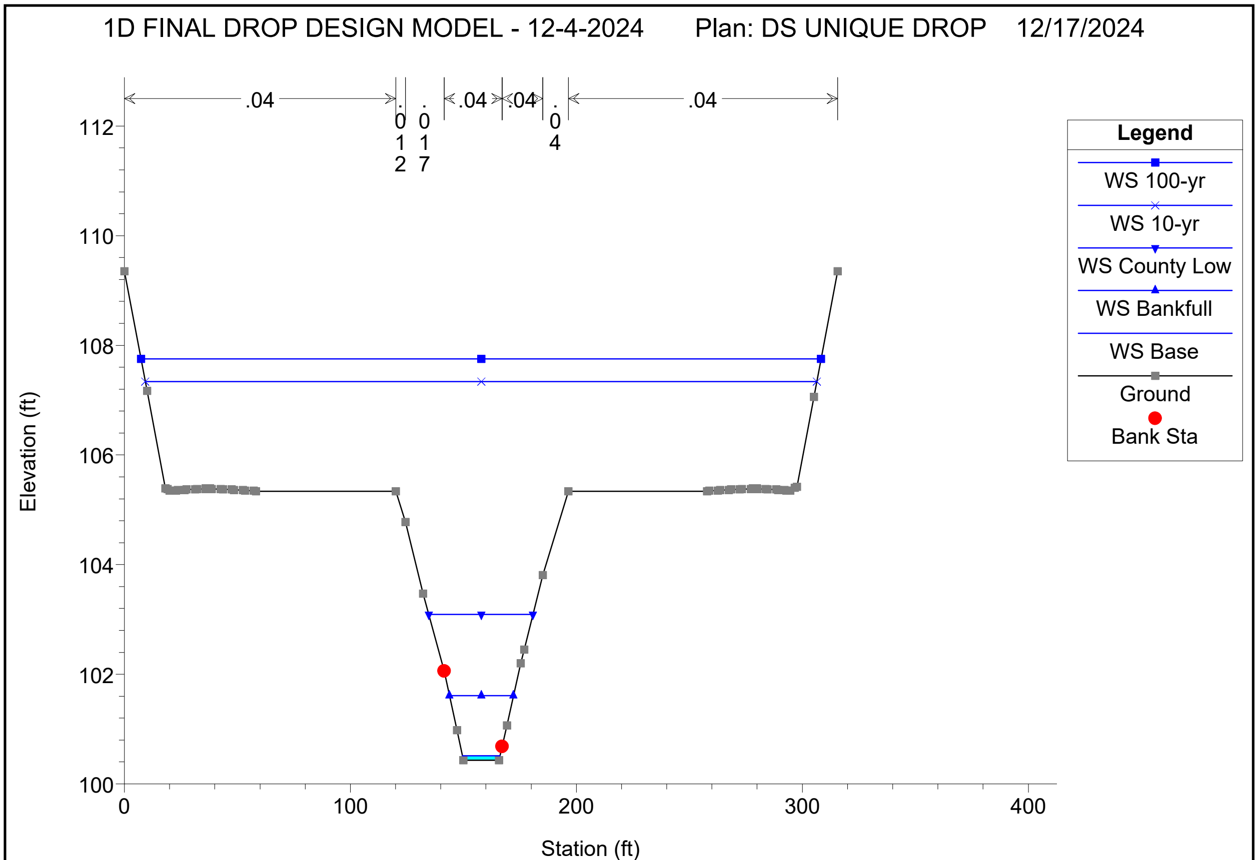

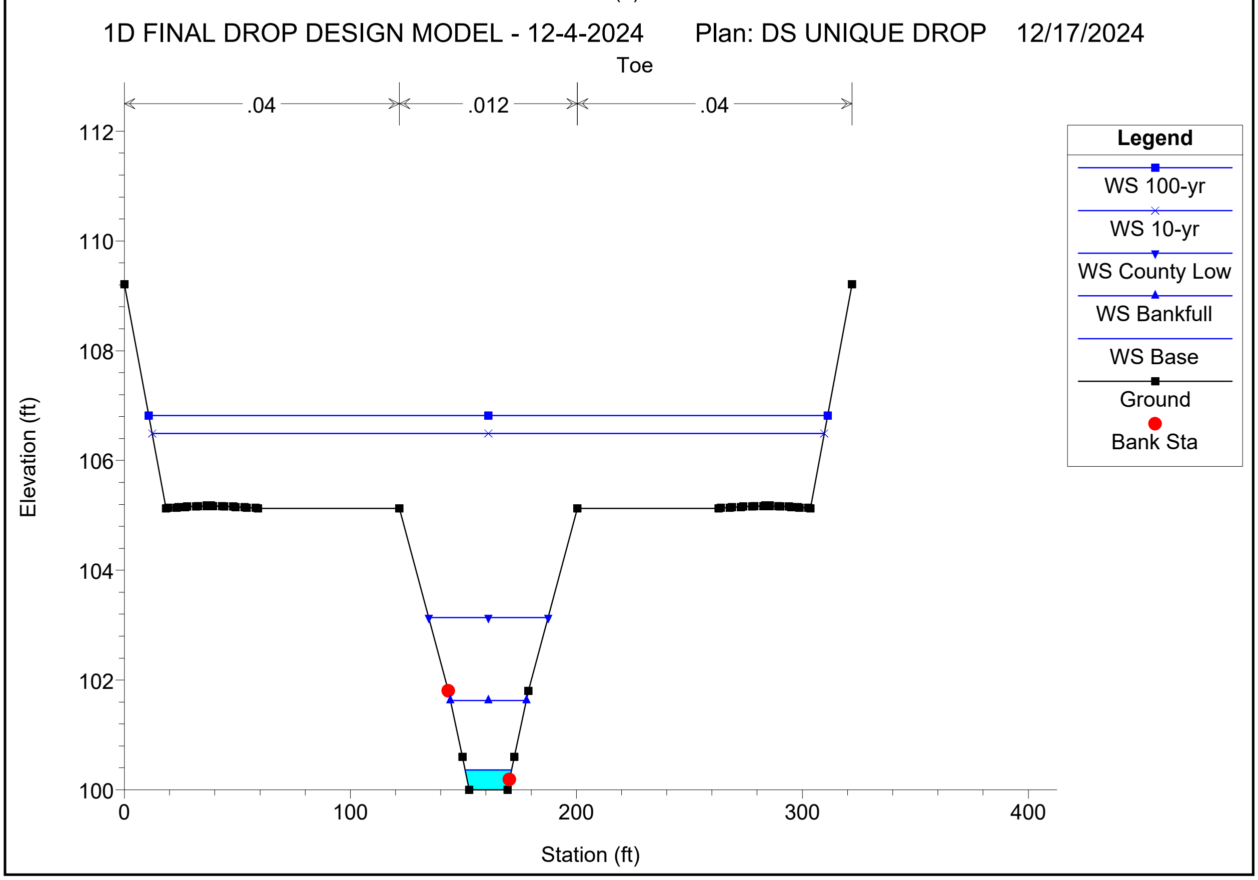

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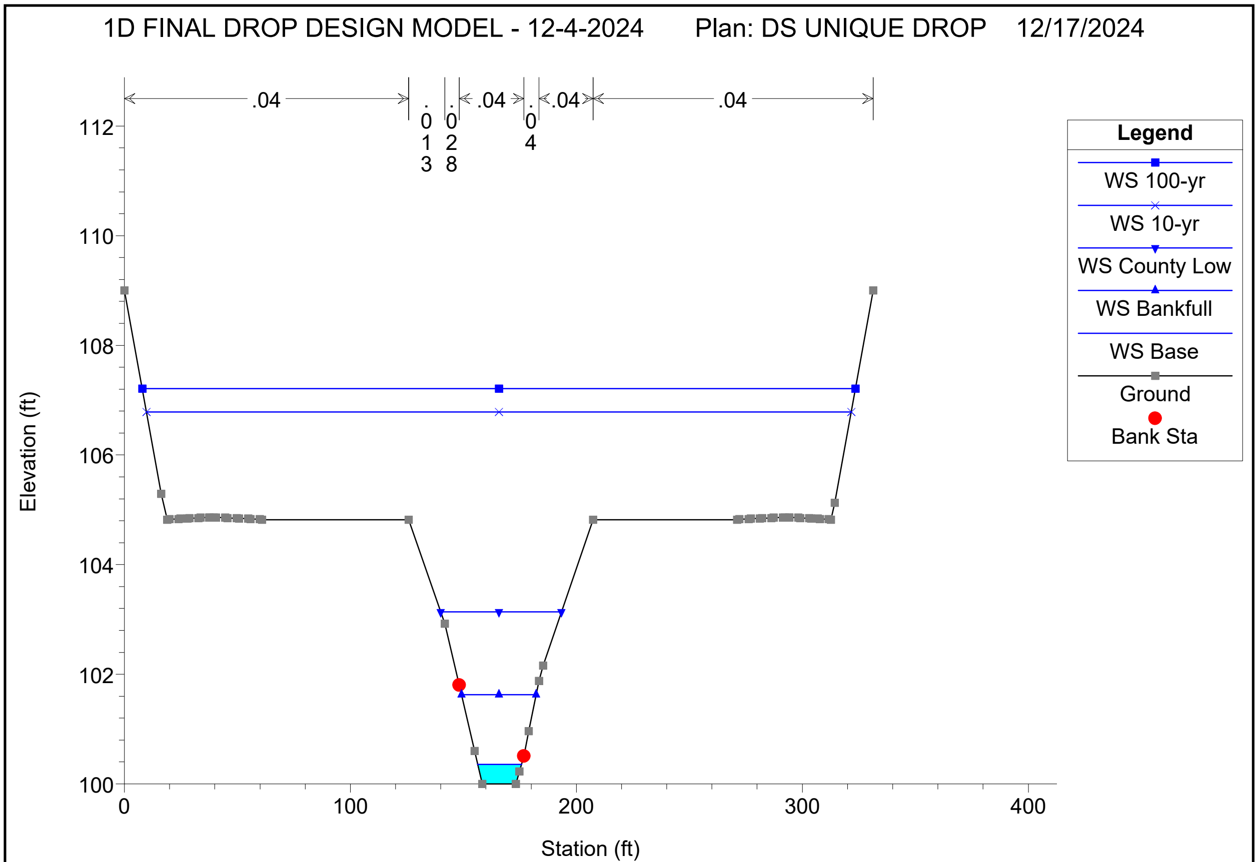

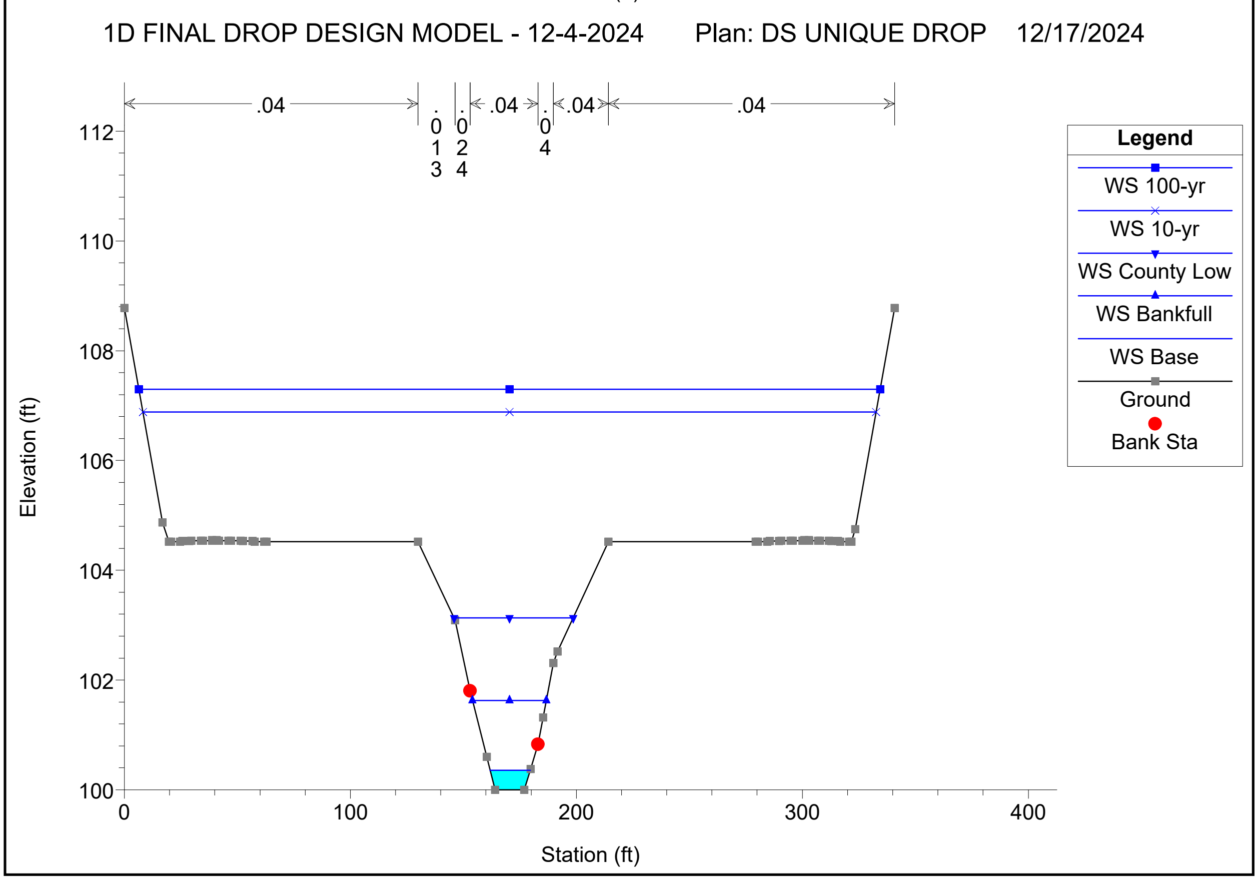

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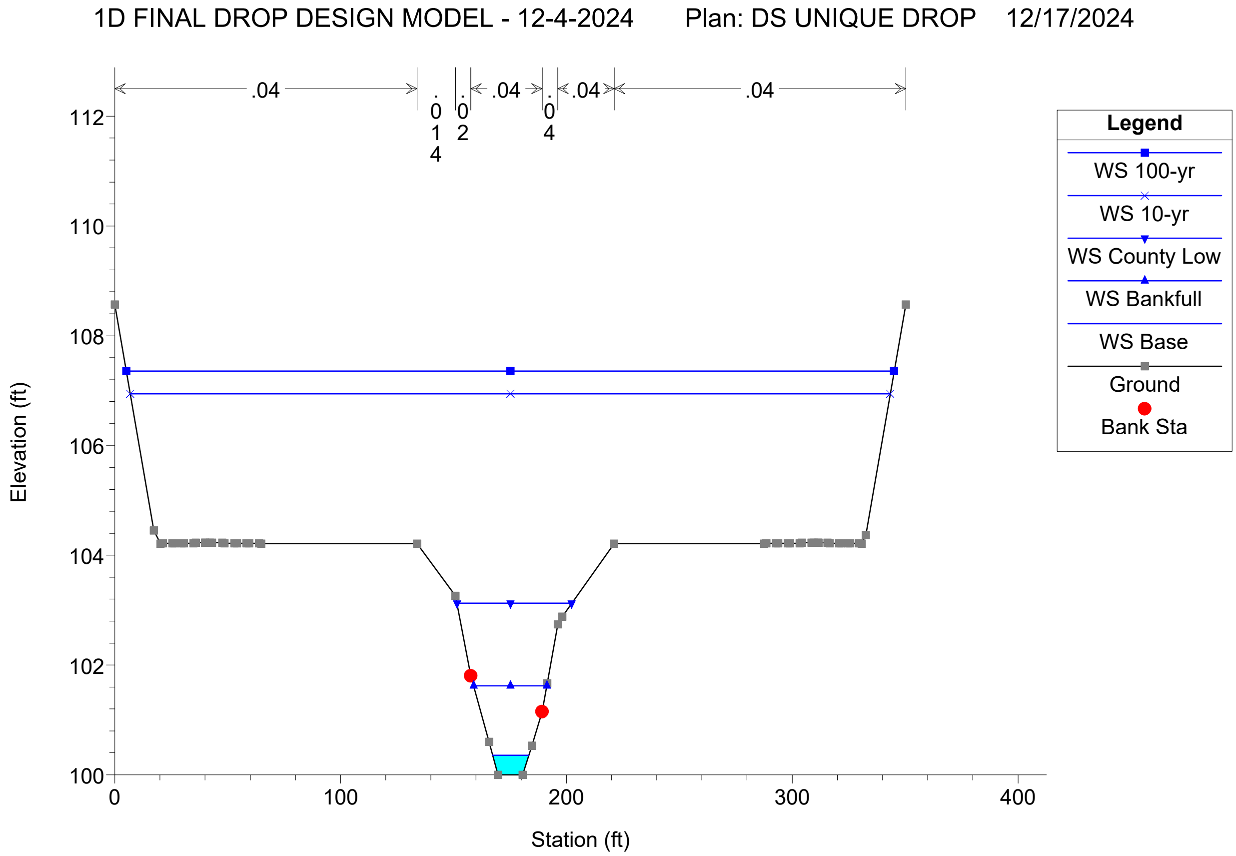

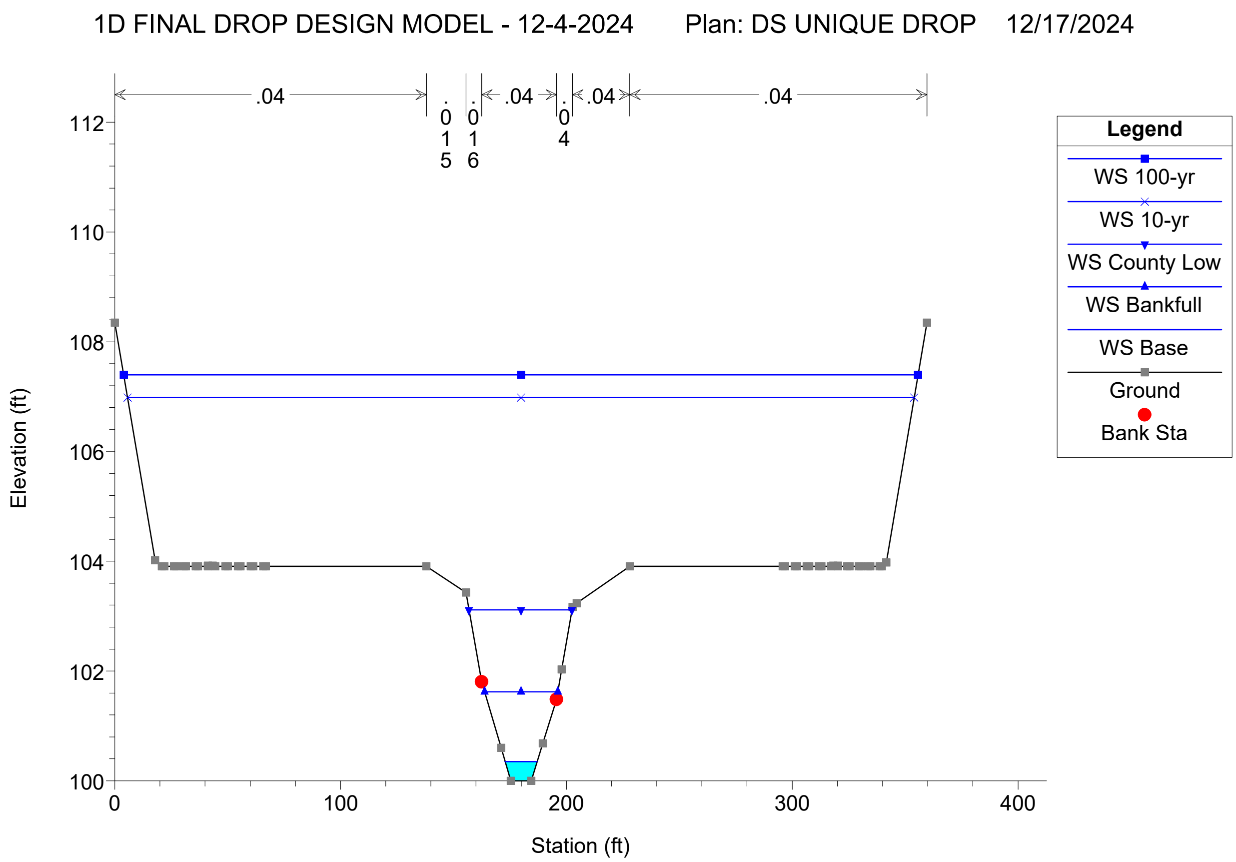

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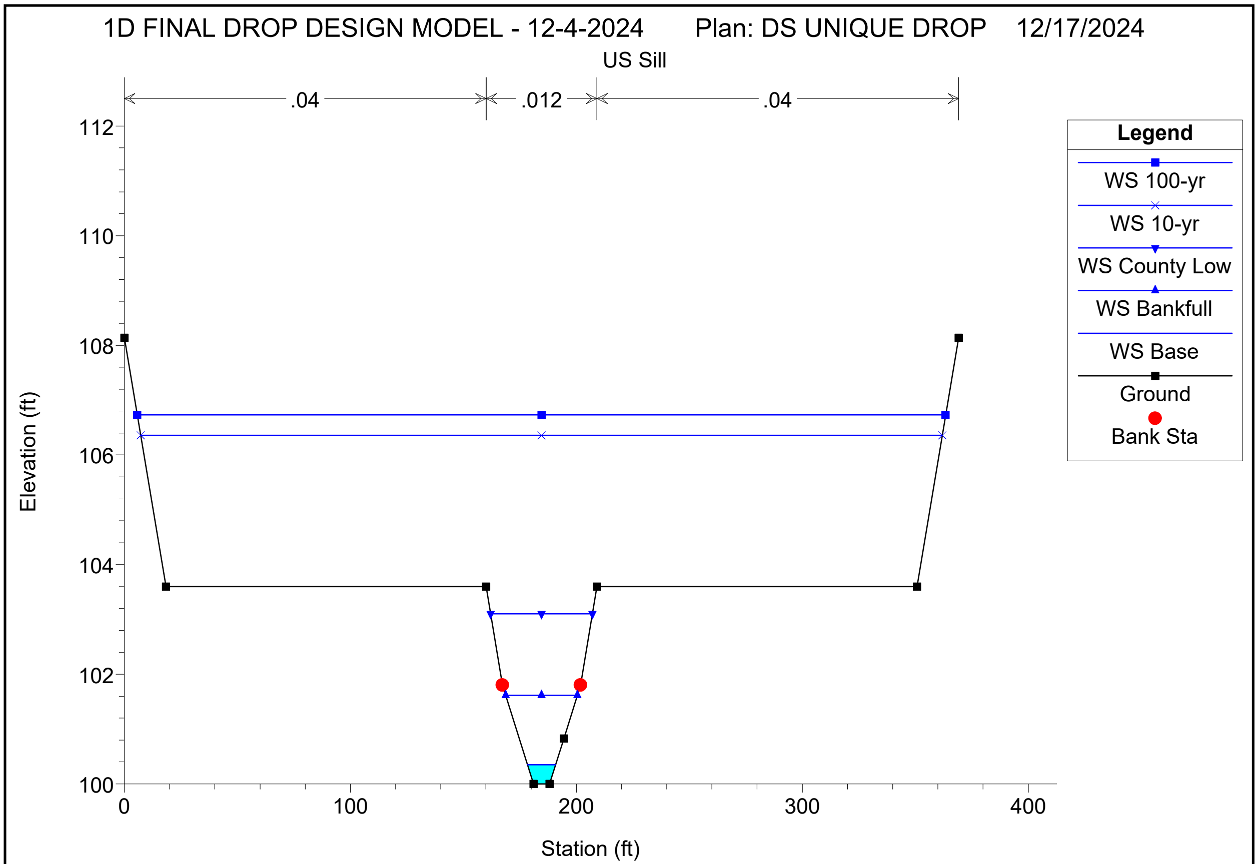

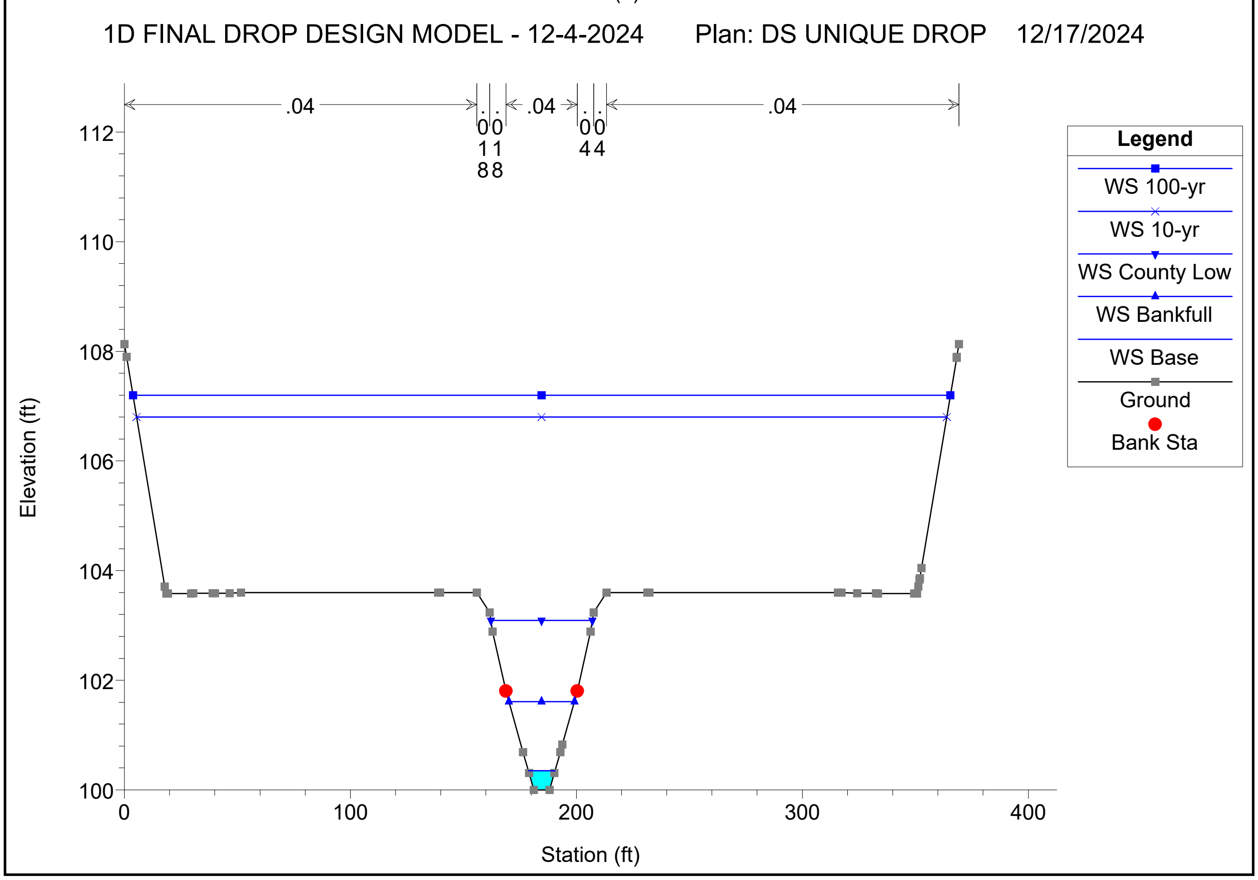

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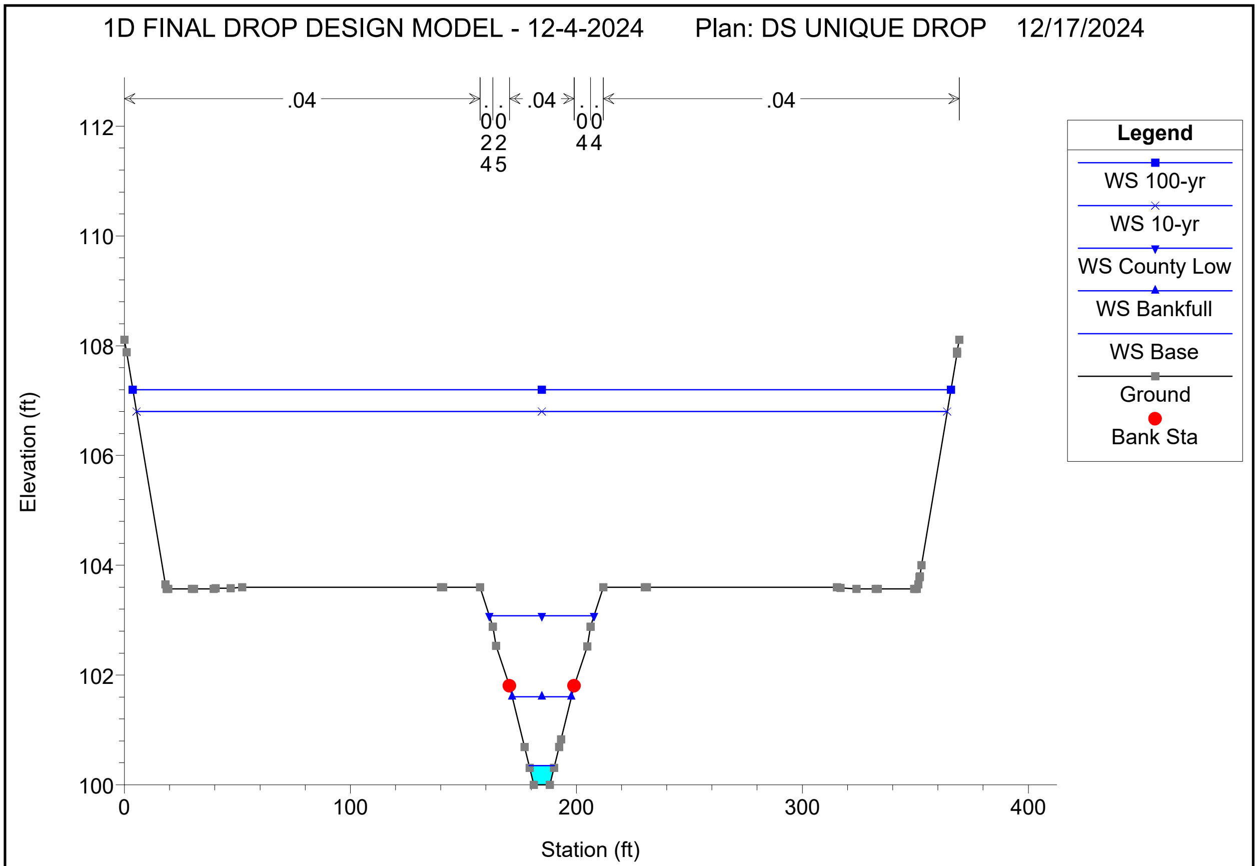

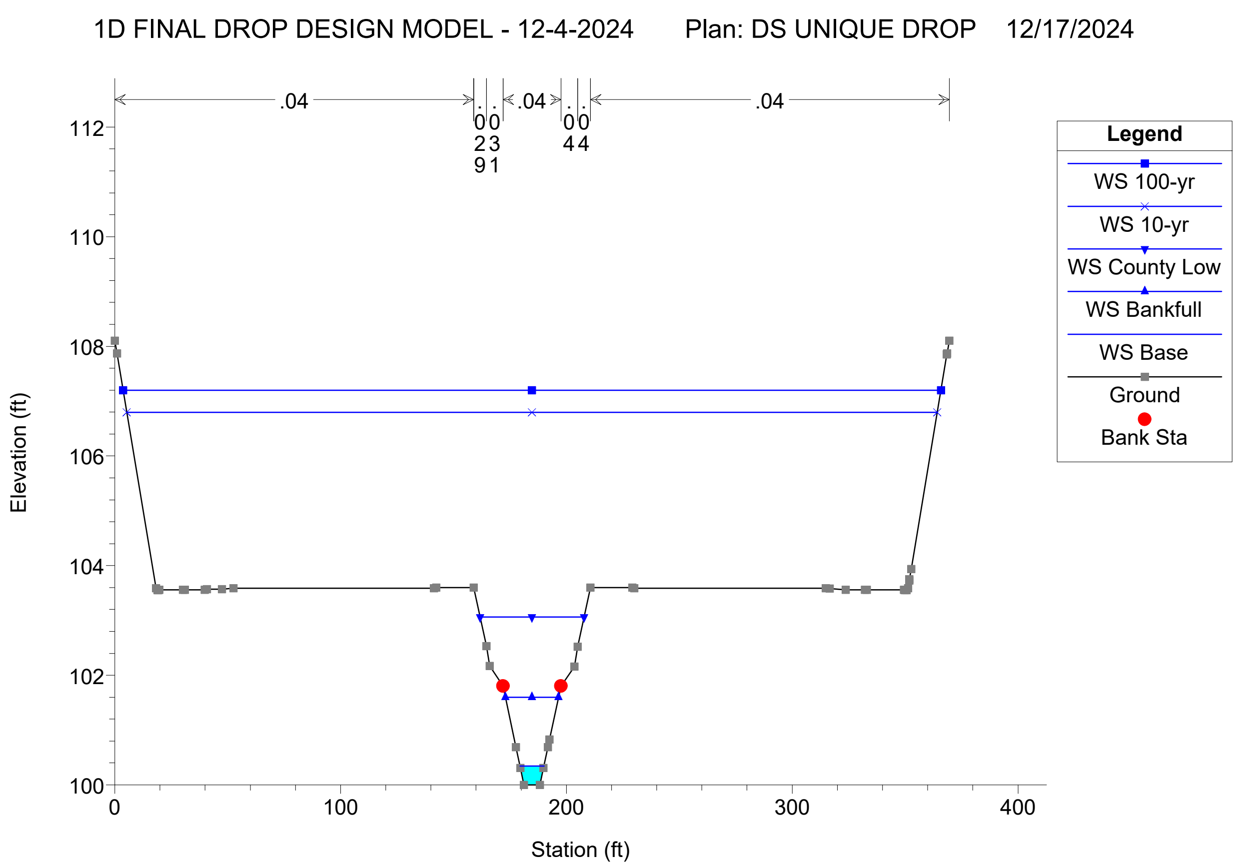

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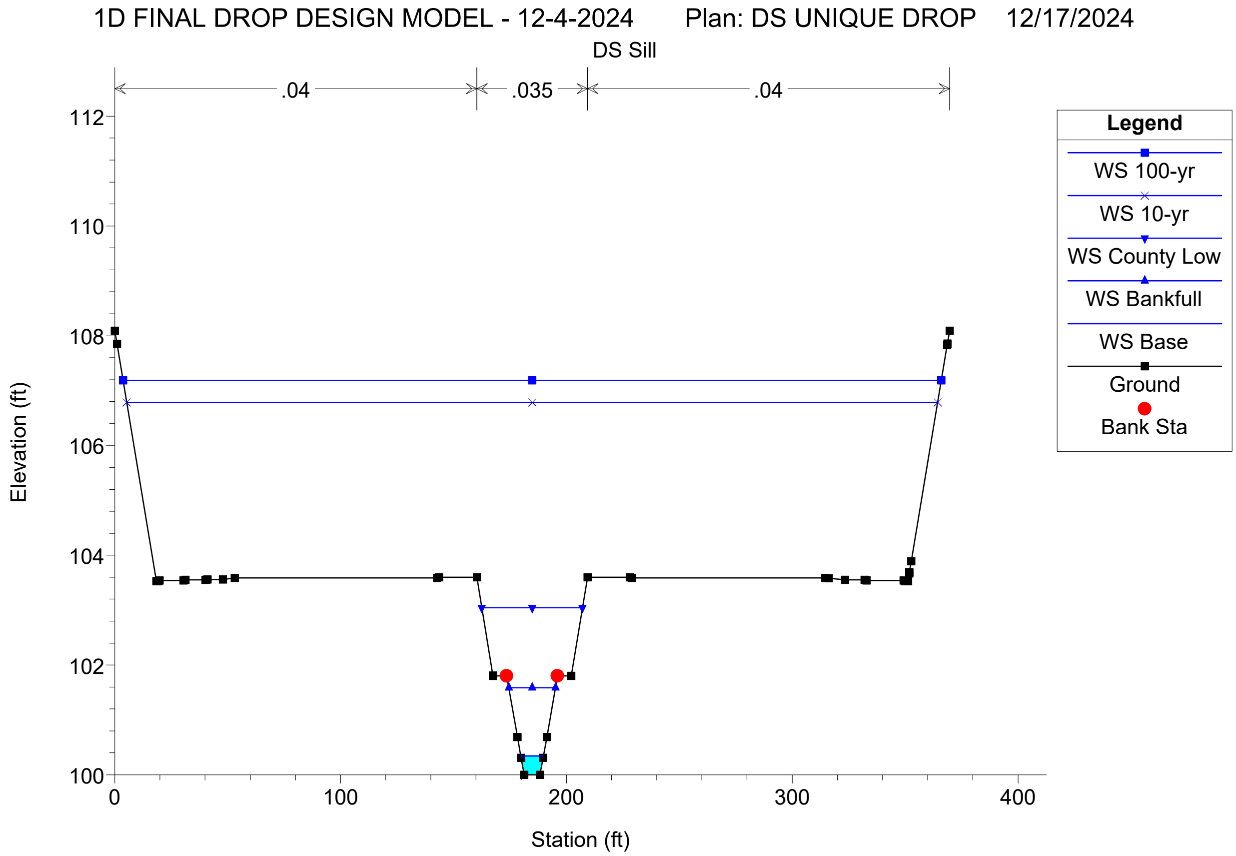

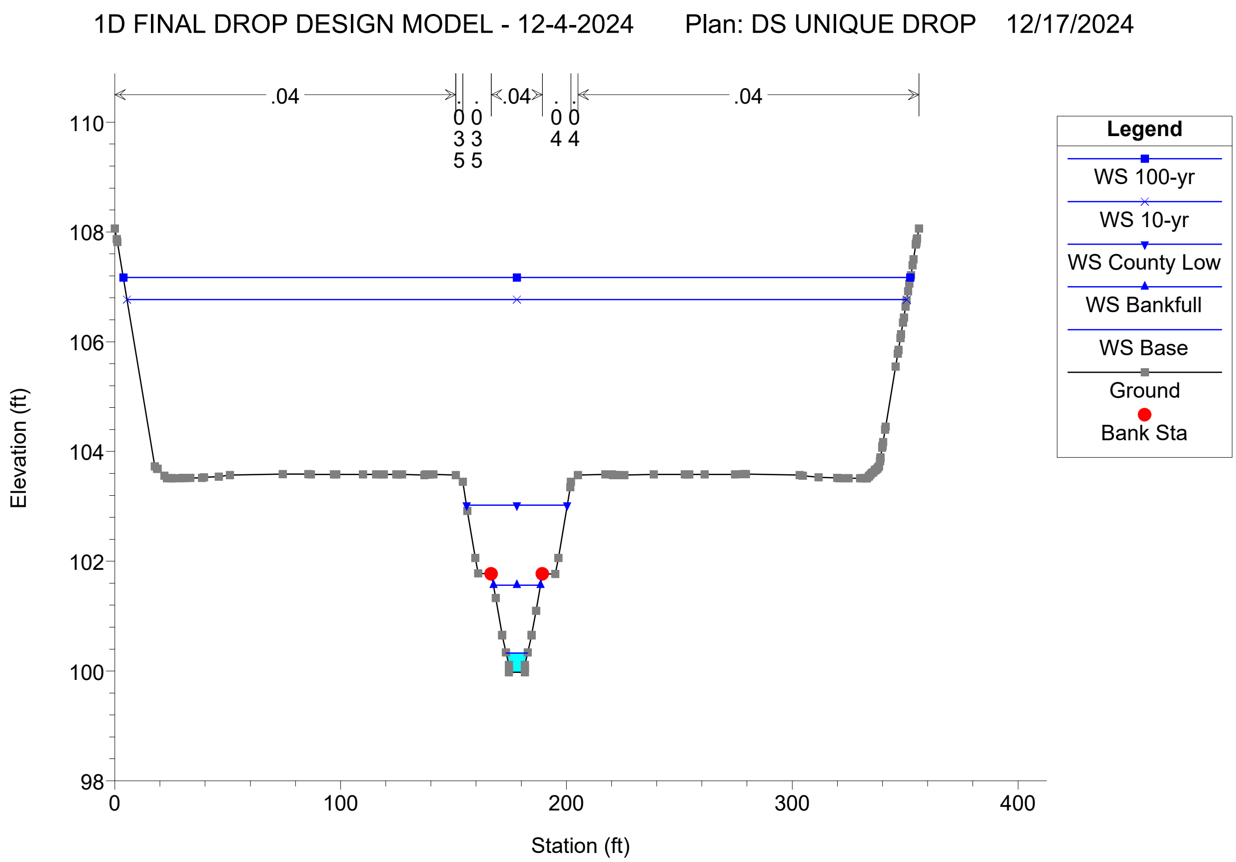

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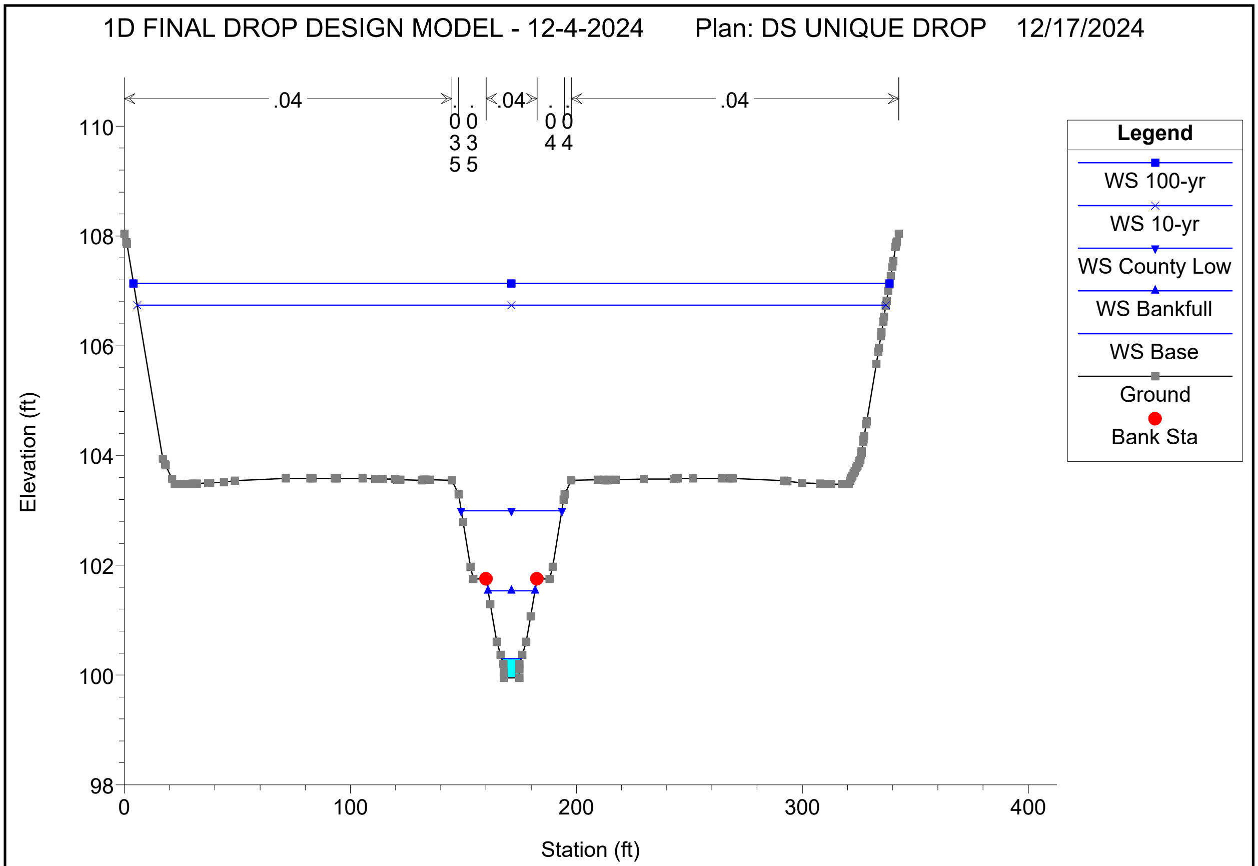
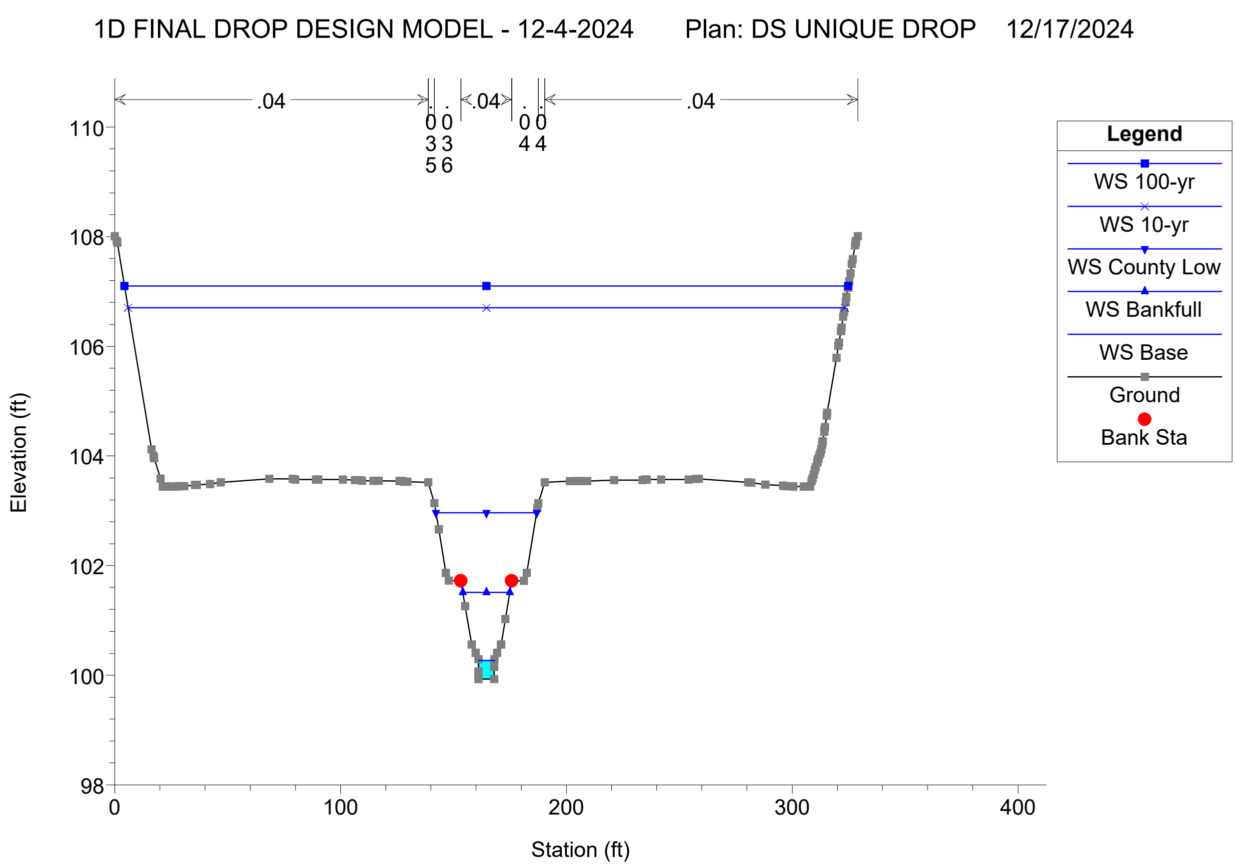
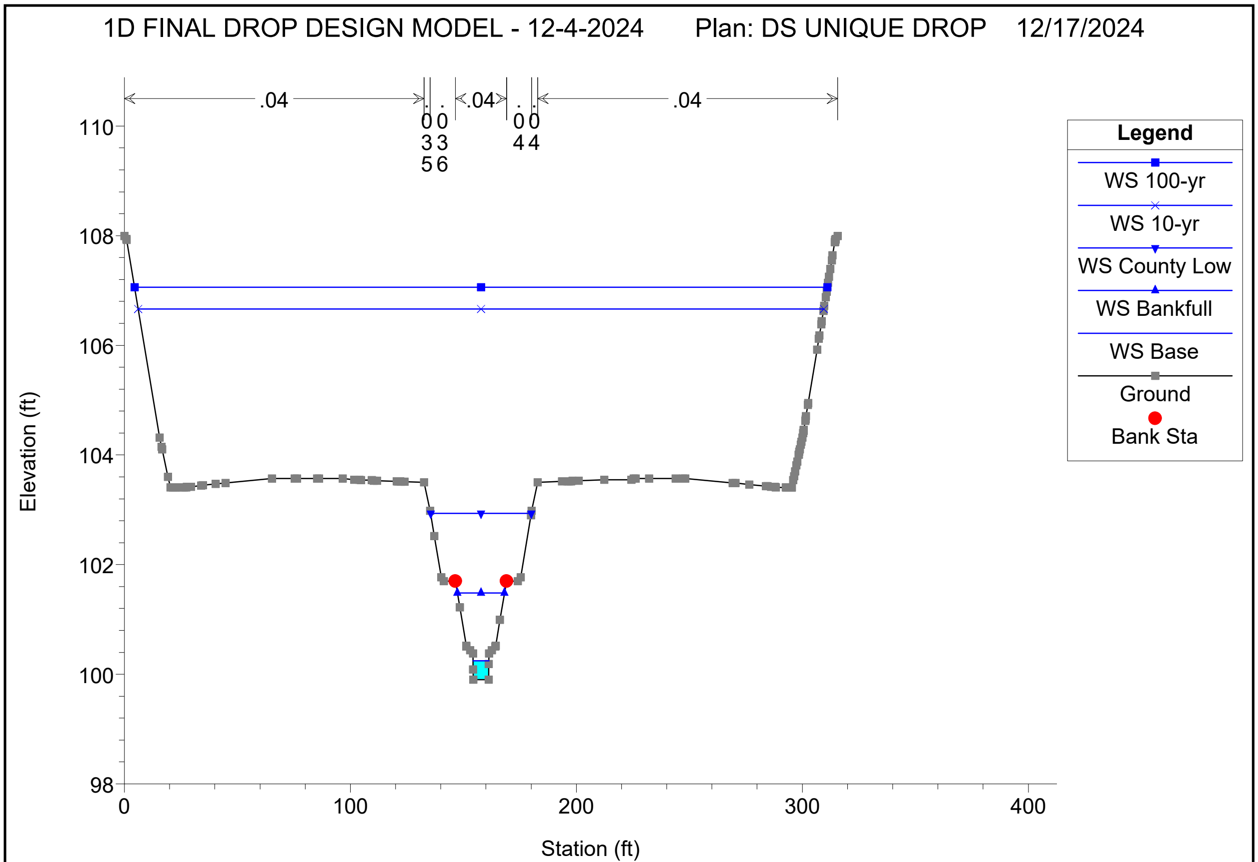
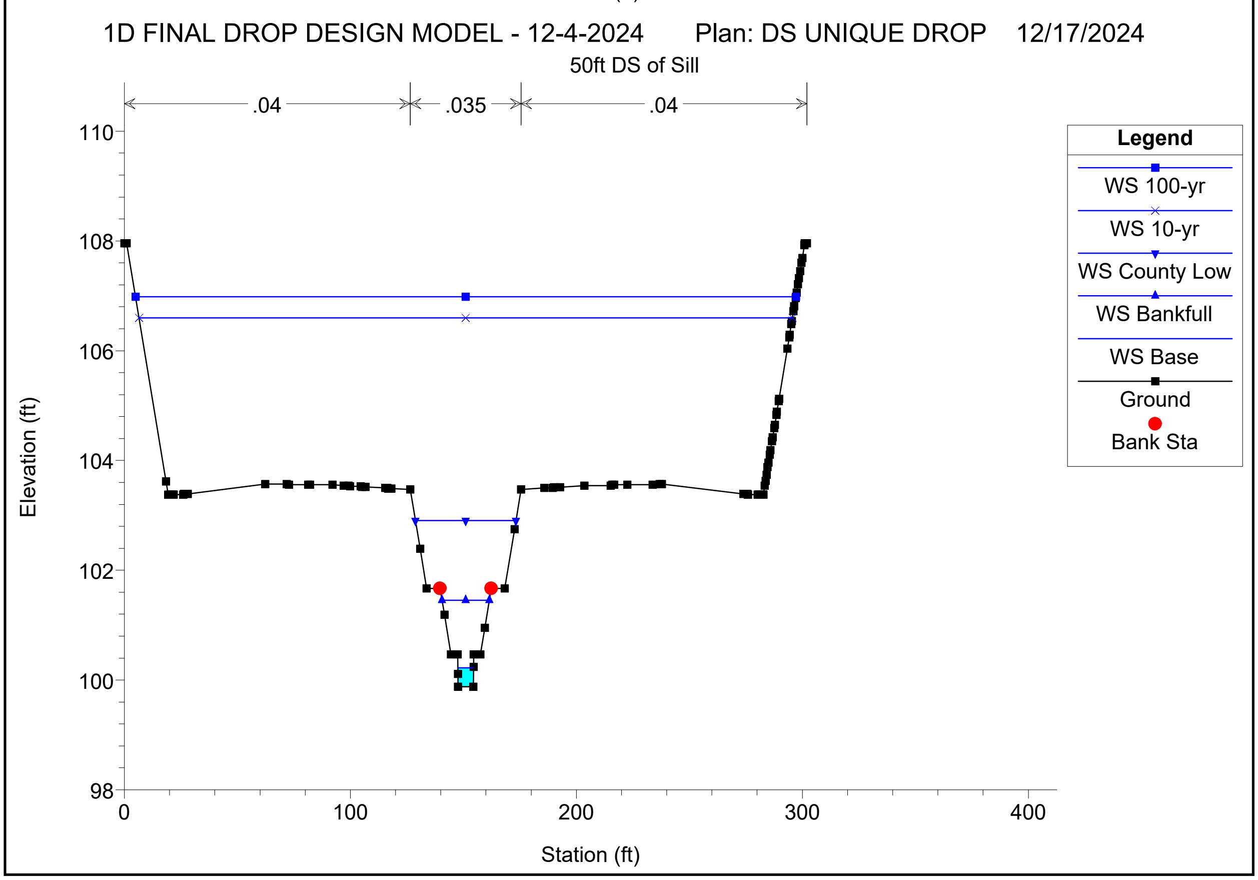




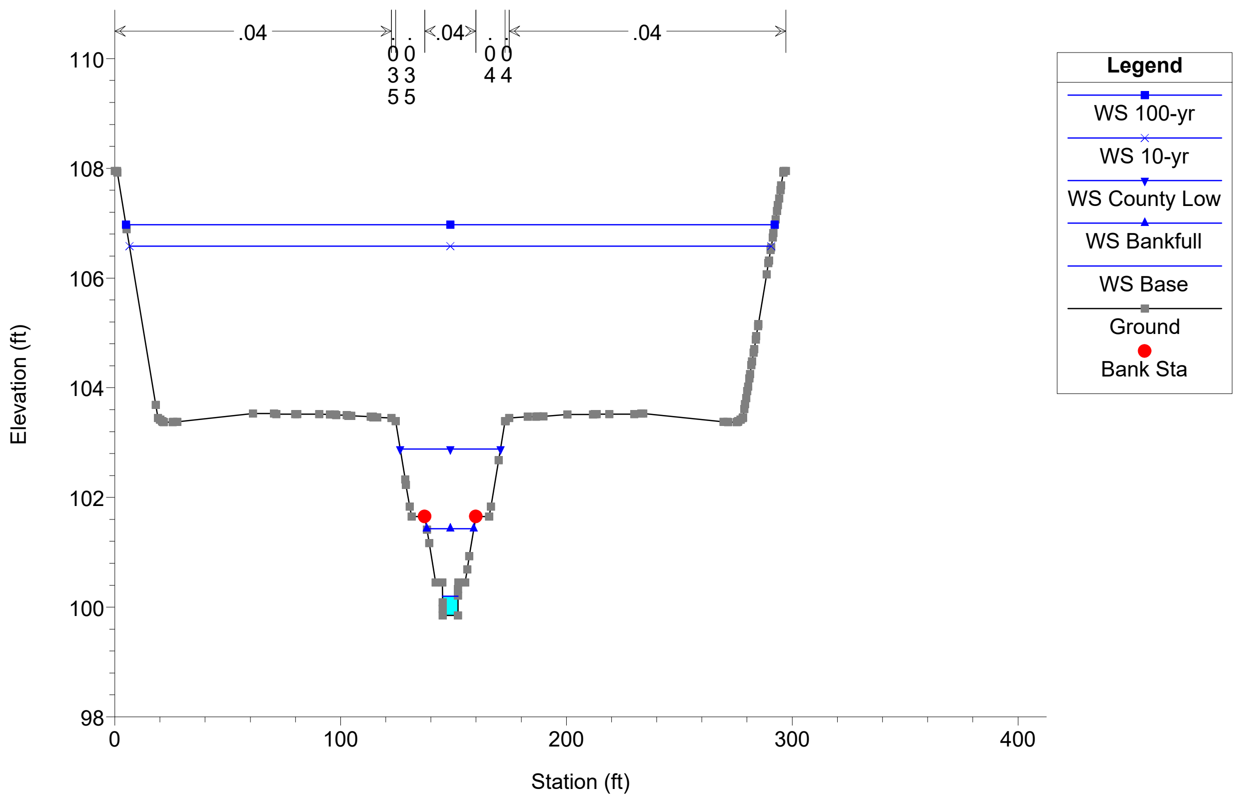
1 in Horiz. = 85 ft   1 in Vert. = 3.5 ft



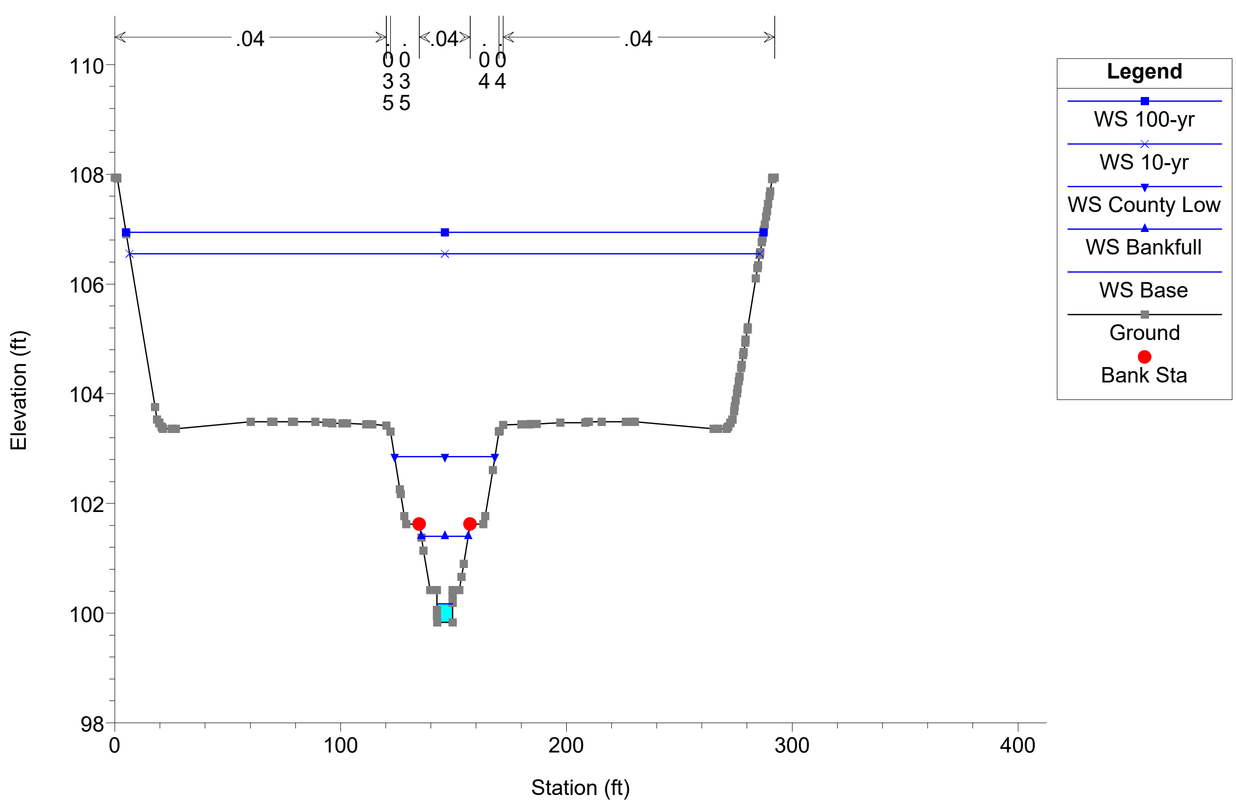


1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

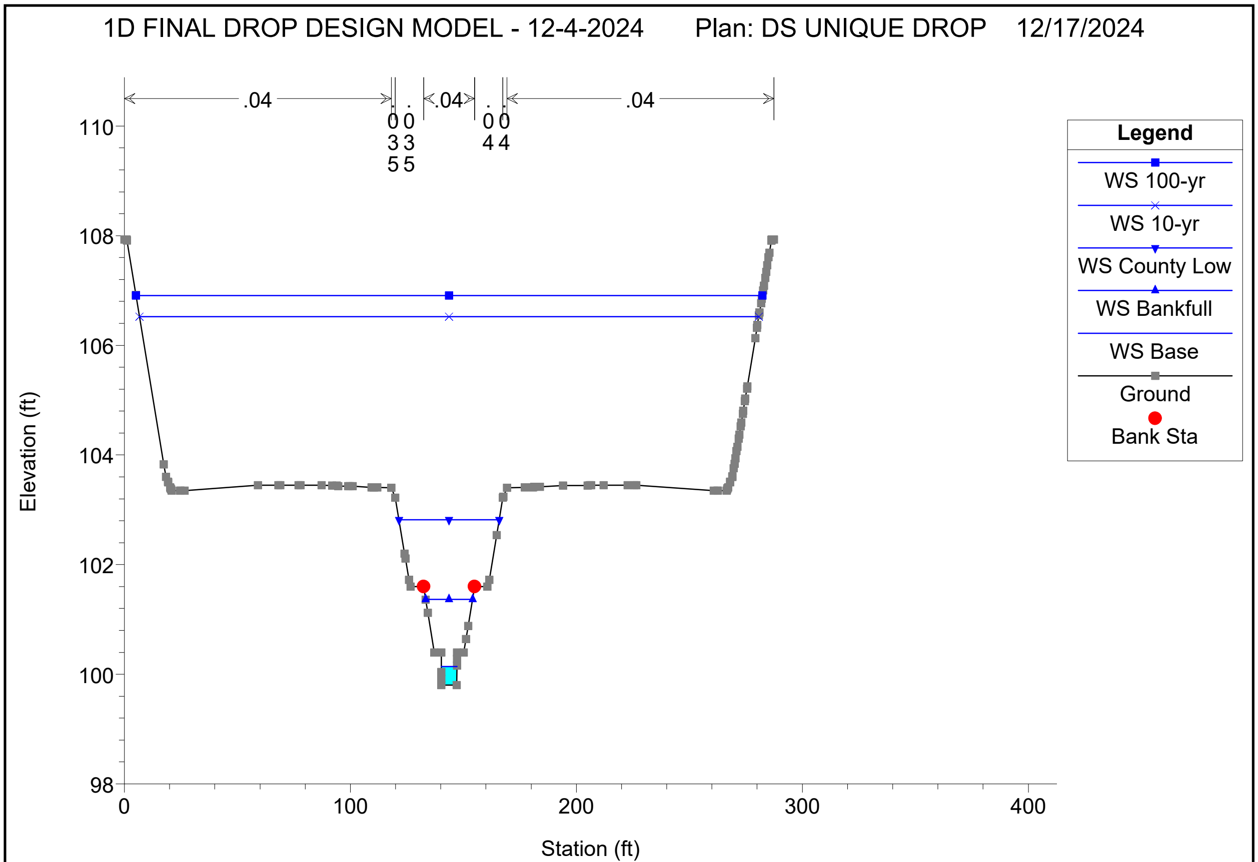
1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: DS UNIQUE DROP 12/17/2024

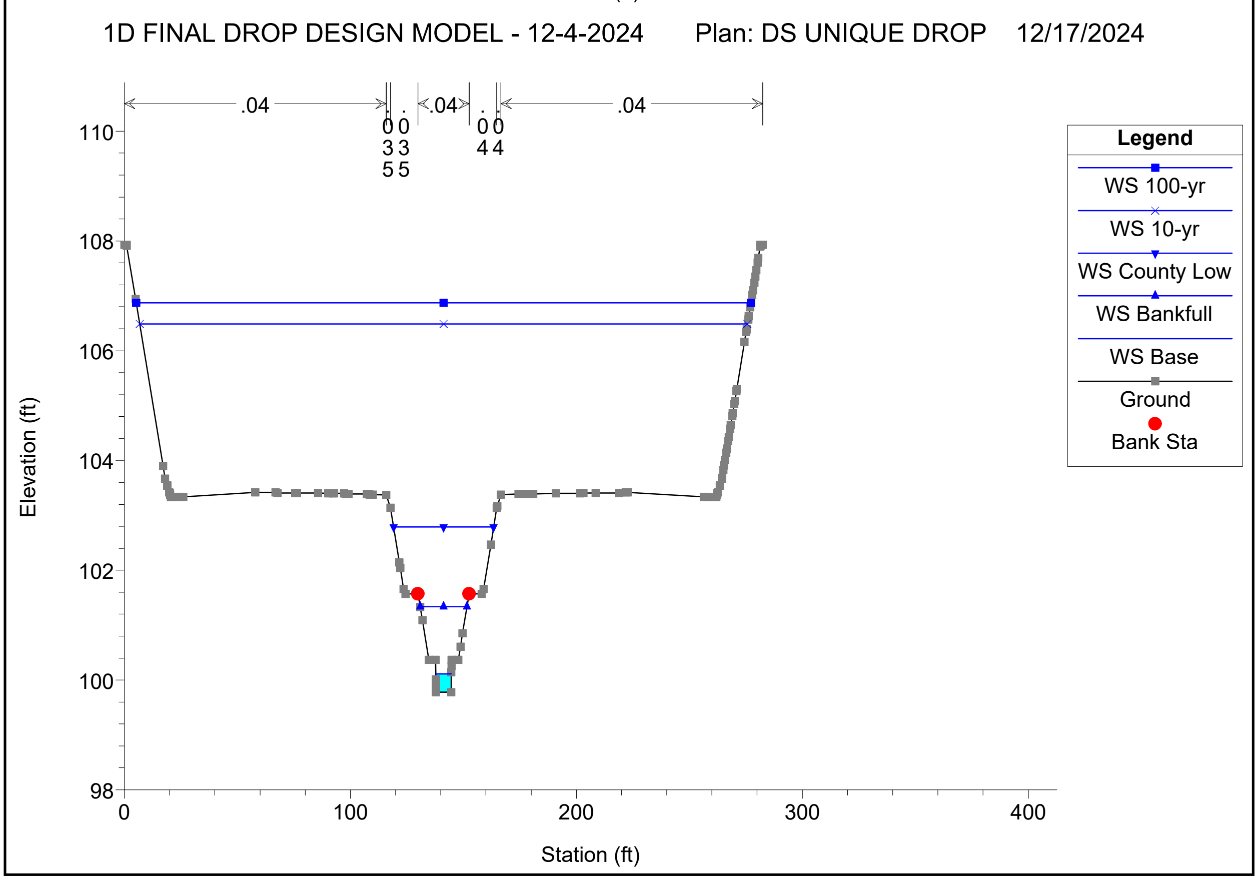


1D FINAL DROP DESIGN MODEL - 12-4-2024 Plan: DS UNIQUE DROP 12/17/2024

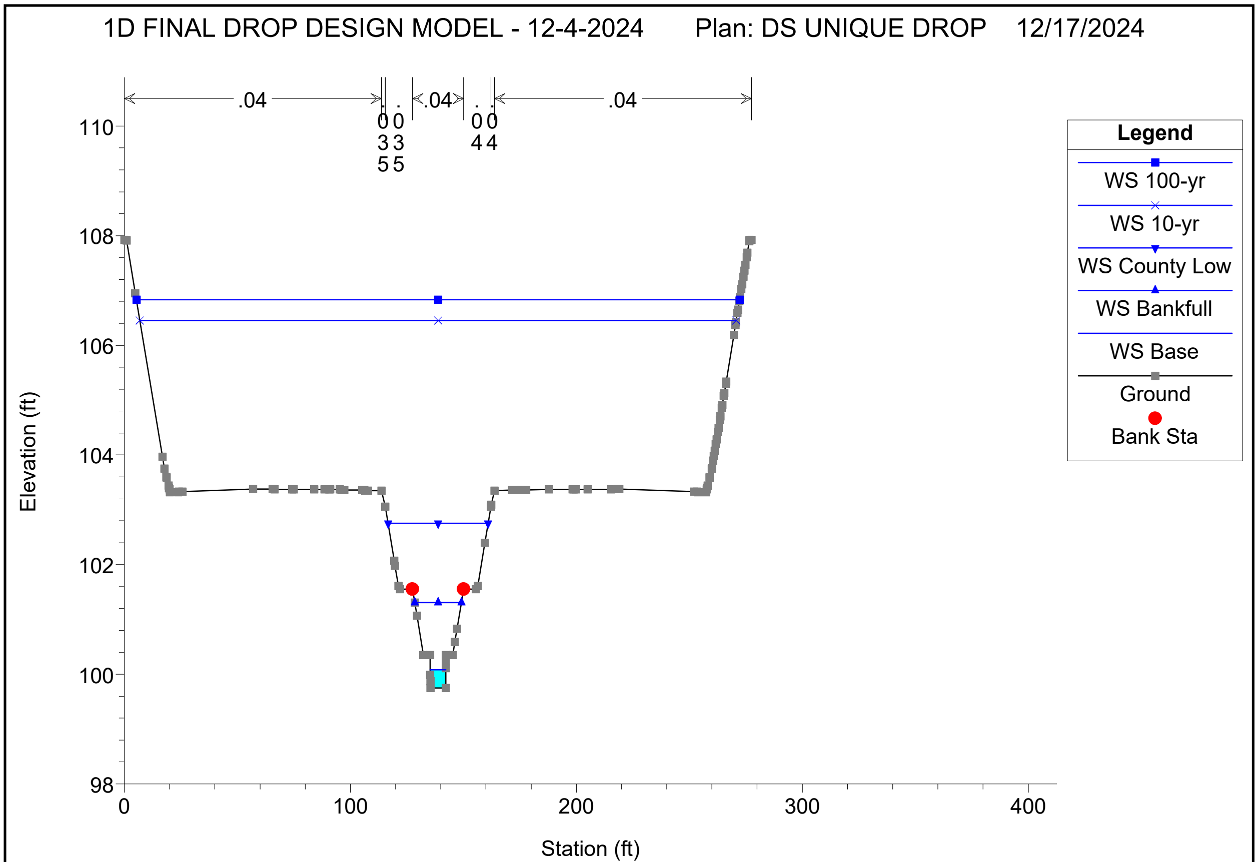


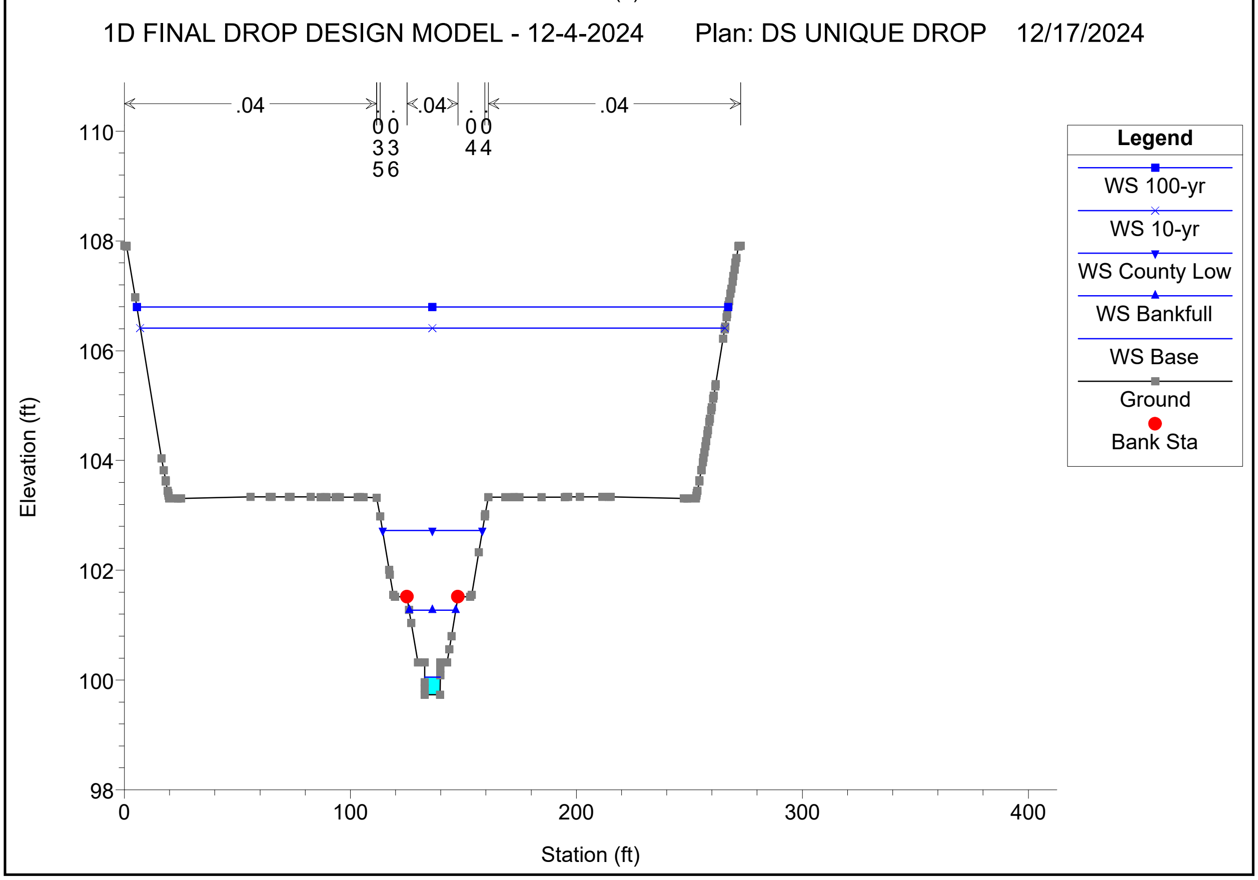
1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft





1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

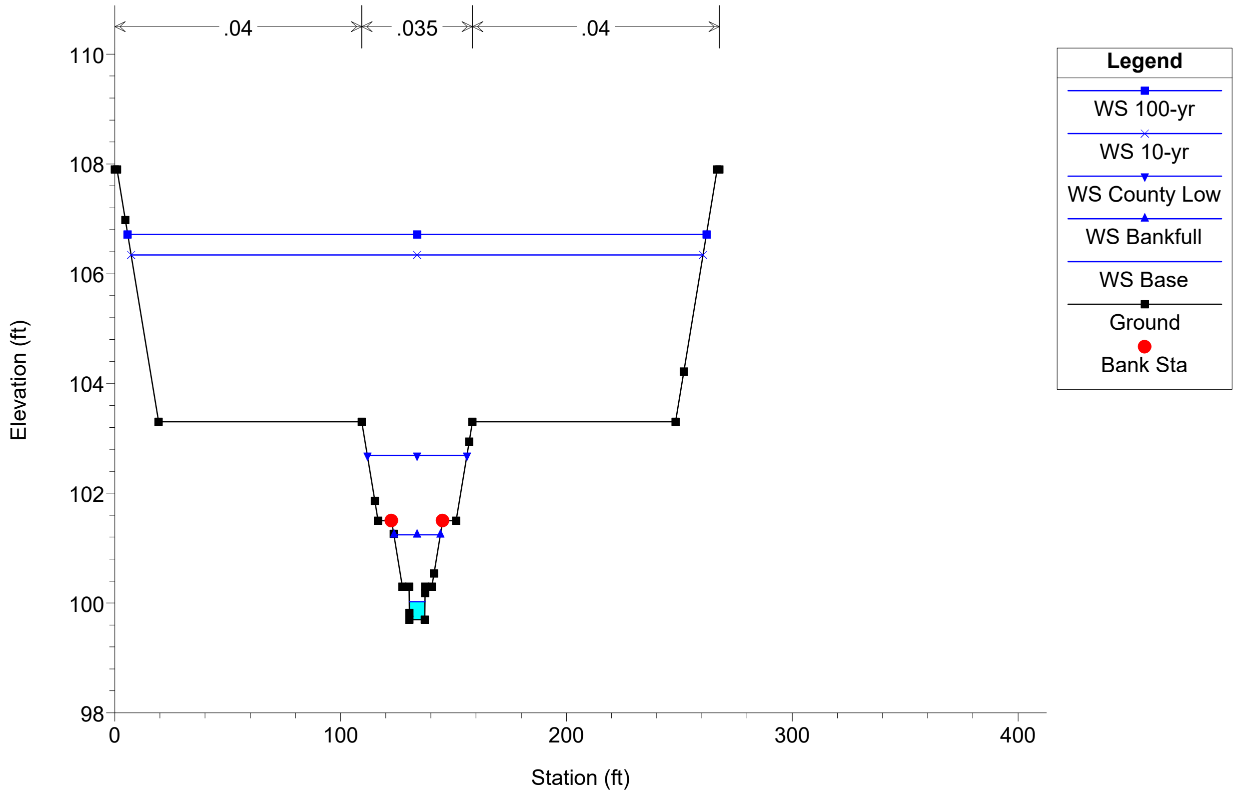




1 in Horiz. = 85 ft 1 in Vert. = 3.5 ft

1D FINAL DROP DESIGN MODEL - 12-4-2024   Plan: DS UNIQUE DROP   12/17/2024

120ft DS of Sill



1 in Horiz. = 85 ft   1 in Vert. = 3.5 ft

Appendix G

Engineering Calculations

Hydraulic Jump Evaluation & Stabilization Design

Project: Rolling Meadows Floodplain Permitting

Date Completed: 10/31/2024
Completed By: Ryan DeGroot, PE
Reviewed By: Tori Mack, PE

<u>Note:</u> v1 and y1 were obtained from a supercritical run and taken at the toe of the face: y1 is max depth of flow and v1 is the velocity is the bottom width of the low-flow channel (per USDCM criteria) and is obtained using the velocity flow distrubition in HEC-RAS 1D. y2 was taken at the downstream end of the stilling basin for a subcritical/mixed run.
Drop structures that did not show a deep enough sequent depth for the low flow profile, had their froude numbers verified within a 2D model to demonstrate a hydraulic jump was forced on the face of the structure.

References: *Urban Drainage, Chapter 9, Section 2.3.4-5*

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

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)

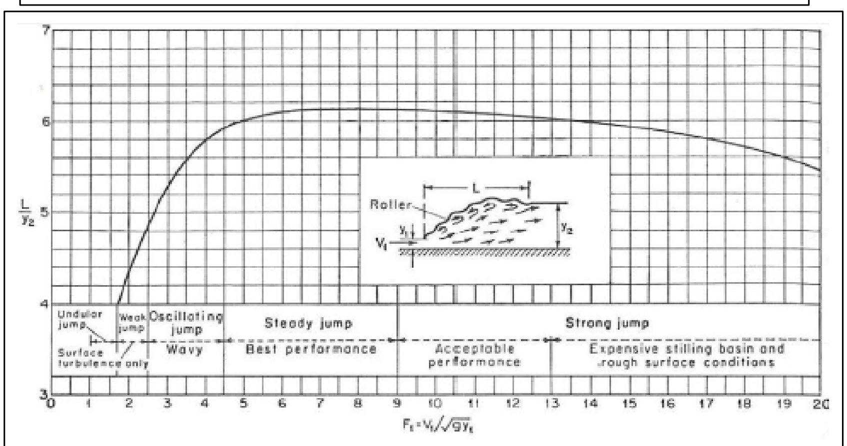
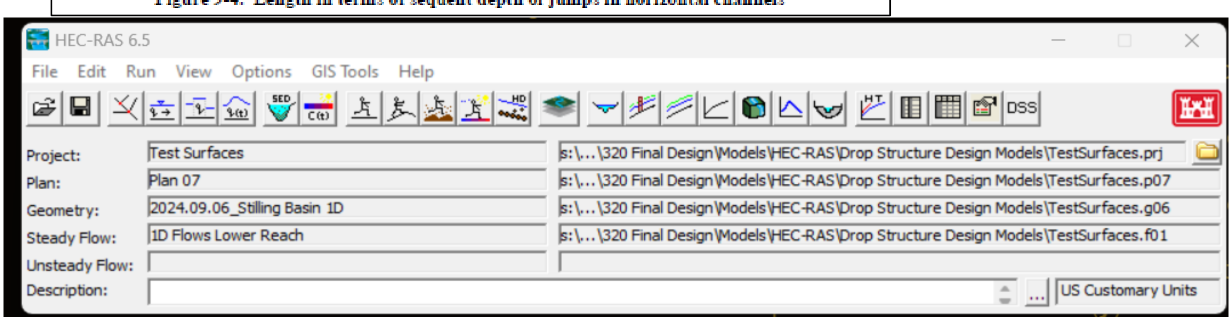


Figure 9-4. Length in terms of sequent depth of jumps in horizontal channels



Drop Structure Design Elements Length Summary*					
Design Element	**2.5' Drop**	**3.5' Drop**	**4.5' Drop**	**D/S Drop**	**U/S of Bradley Drop**
Hydraulic Jump (Low Flow)	16.7	22.1	24.6	13.3	18.8
Calculated Stilling Basin	10.0	13.3	14.8	8.0	11.3
Design Stilling Basin	10.0	13.0	19.0	10.0	20.0
End Sill	2.0	2.0	2.0	2.0	2.0
Downstream Riprap	10.0	10.0	10.0	10.0	417.0
Protected Length	22.0	25.0	31.0	22.0	439.0
*All lengths are in feet.					

Flow	2.5' Drop - 10' Stilling Basin									
	RAS Inputs			Calculations				Sequent Depth Comparision		**Stilling Basin Length [ft]**
Flow	**Supercritical RAS Station**	**y1 (ft)**	**v1 (fps)**	**F1**	**y2 (ft)**	**L/y2**	**L (ft)**	**y (ft)**	**y ≥ y2?**	
Bankfull	602.15	0.3	11.9	3.6	1.6	5.6	8.8	1.5	No	5.3
Low Flow	602.15	1.2	15.1	2.4	3.5	4.7	16.7	3.0	No	**10.0**
10 YR	619.15	4.2	26.1	2.2	11.2	4.5	50.7	6.8	No	30.4
100 YR	619.15	4.4	27.6	2.3	12.3	4.6	56.9	7.2	No	34.1

Flow	3.5' Drop - 13' Stilling Basin									
	RAS Inputs			Calculations				Sequent Depth Comparision		**Stilling Basin Length [ft]**
Flow	**Supercritical RAS Station**	**y1 (ft)**	**v1 (fps)**	**F1**	**y2 (ft)**	**L/y2**	**L (ft)**	**y (ft)**	**y ≥ y2?**	
Bankfull	606.15	0.3	14.5	4.8	1.8	6.0	10.5	1.5	No	6.3
Low Flow	606.15	1.0	18.0	3.2	4.1	5.4	22.1	3.0	No	**13.3**
10 YR	606.15	5.4	24.5	1.9	12.0	4.2	50.9	6.7	No	30.5
100 YR	606.15	5.6	26.3	2.0	13.3	4.3	57.0	7.1	No	34.2

Flow	4.5' Drop - 19' Stilling Basin									
	RAS Inputs			Calculations				Sequent Depth Comparision		**Stilling Basin Length [ft]**
Flow	**Supercritical RAS Station**	**y1 (ft)**	**v1 (fps)**	**F1**	**y2 (ft)**	**L/y2**	**L (ft)**	**y (ft)**	**y ≥ y2?**	
Bankfull	607.15	0.3	15.4	5.1	2.0	6.0	11.7	1.0	No	7.0
Low Flow	607.15	1.0	19.6	3.5	4.4	5.6	24.6	2.2	No	**14.8**
10 YR	607.15	5.2	23.5	1.8	10.9	4.2	45.4	5.6	No	27.2
100 YR	607.15	5.4	25.8	2.0	12.8	4.3	54.9	5.8	No	32.9

Flow	DS Drop - 10' Stilling Basin									
	RAS Inputs			Calculations				Sequent Depth Comparision		**Stilling Basin Length [ft]**
Flow	**Supercritical RAS Station**	**y1 (ft)**	**v1 (fps)**	**F1**	**y2 (ft)**	**L/y2**	**L (ft)**	**y (ft)**	**y ≥ y2?**	
Bankfull	603.45	0.30	8.19	2.6	1.0	4.9	4.8	1.58	Yes	2.9
Low Flow	603.45	0.89	13.43	2.5	2.7	4.9	13.3	3.04	Yes	**8.0**
10 YR	596	4.61	20.10	1.6	8.4	4.0	33.5	6.79	No	20.1
100 YR	596	4.77	21.41	1.7	9.3	4.1	38.1	7.19	No	22.8

Flow	Drop US of Culvert 20' Stilling Basin									
	RAS Inputs			Calculations				Sequent Depth Comparision		**Stilling Basin Length [ft]**
Flow	**Supercritical RAS Station**	**y1 (ft)**	**v1 (fps)**	**F1**	**y2 (ft)**	**L/y2**	**L (ft)**	**y (ft)**	**y ≥ y2?**	
Bankfull	22980	0.36	11.82	3.5	1.6	5.6	8.9	5.10	Yes	5.4
Low Flow	22980	1.05	16.01	2.8	3.7	5.1	18.8	5.33	Yes	**11.3**
10 YR	22980	5.74	19.20	1.4	8.9	4.0	35.4	5.56	No	21.2
100 YR	22980	6.40	19.06	1.3	9.0	4.0	36.0	5.79	No	21.6

CREEP ANALYSIS

Project: ROLLING HILLS/MEADOWS PHASE 1 and 2

Date Completed: 12/5/2024

Completed By: NOAH OLSON, EI

Reviewed By: Jordan Becker, PE

Design Assumptions:

1. Based on the geotechnical report, the soil was found to be predominantly composed of sand, silt, and clay. A target creep ratio for fine sand (Cw=8.5) was assumed based on the very fine sand criteria.
2. Weep drains are being installed, which reduces the calculated creep ratio by 10%.
3. The horizontal creep length (L_H) was taken from the profile in CAD. See figure below.
4. The vertical creep length (L_V) was calculated as the sum of the minimum vertical distance from the upstream channel invert to the bottom of the cutoff wall that would be traveled twice (y2) and the minimum depth of the downstream end sill that water would travel twice (y1).
5. For sheet pile, the depth in the field is determined by the minimum of the design depth or 2' into bedrock, whichever comes first, per the geotechnical report.
6. The differential head was taken from cross sections in the 100% HEC-RAS model. The WSE was measured 25' upstream of the crest of the drop structure outside of the draw-down influence of the structure. The WSE were measured at the sill and up to 5' downstream of the end sill outside of the influence of the hydraulic jump. This approach produces conservative head difference measurements. See the results for additional information.

References: *Urban Drainage, Chapter 9, Section 2.4.3*

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

Where:

C_W = creep ratio

H_S = differential head between analysis points (ft)

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

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

3. Reverse filter drains, weep holes, and pipe drains help to reduce seepage problems, and recommended creep head ratios may be reduced as much as 10% if they are used.

4. In the case where two vertical cutoffs are used, then Equation 9-6 should be used along with Equation 9-2 to check the short path between the bottom of the vertical cutoffs.

$$C_{W2} = \frac{(L_{V-US} + 2L_{H-C} + L_{V-DS})}{H_S} \qquad \text{Equation 9-6}$$

Where:

C_{W2} = creep ratio where two vertical cutoffs are used

L_{V-US} = vertical distance on the upstream side of the upstream cutoff (ft)

L_{V-DS} = vertical distance on the downstream side of the downstream cutoff (ft)

L_{H-C} = horizontal distance between the two vertical cutoffs (ft)

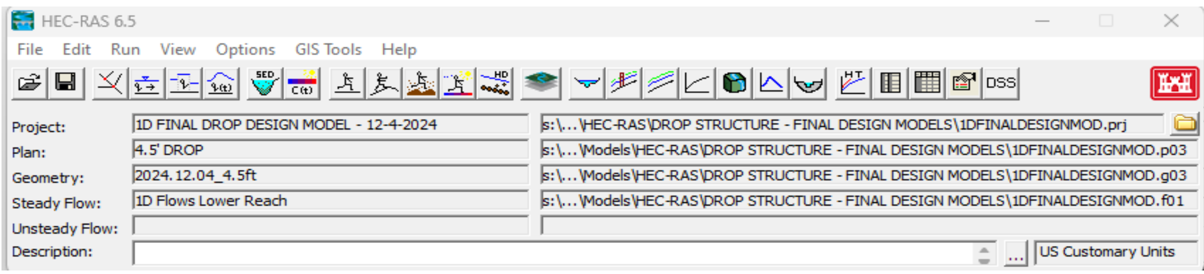
Creep Analysis

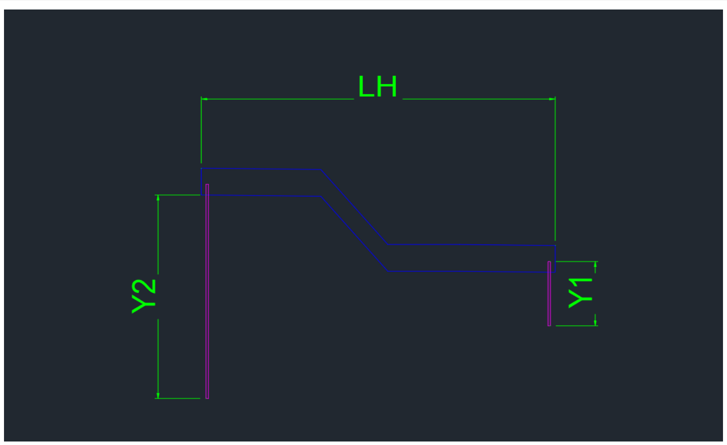
Drop	Design Cw	H*	L_H	Downstream Concrete Cutoff Wall Depth (Y1)	Type	Upstream Design Sheet Pile Depth (Y2)**	Calculated Cw
2.5' DROP	8.5	2.6	27.0	2.0	Sheet Pile	5.00	10.0
3.5' DROP	8.5	3.5	34.0	2.0	Sheet Pile	6.00	8.7
4.5' DROP	8.5	4.5	44.0	2.0	Sheet Pile	9.00	9.1
3.0' UNIQUE DROP	8.5	3.1	29.0	2.0	Sheet Pile	6.00	9.1
4.85' US of Bradley	8.5	4.9	46.4	2.0	Sheet Pile	9.00	8.5

*see note 6 for head differential

**Upstream sheet pile depth is the actual length of sheet pile extending below the concrete cap. Actual installed pile length for Y1 and Y2 is the sheetpile depth plus 0.75' to account for embedment depth into concrete cap.

Weep Drains?	Y





Head Differential

	Drop Height - 2.5'			Drop Height - 3.5'			Drop Height - 4.5'			Drop Height - 3.0' Unique		
XSEC	**641.14**	**587.14**		**643.15**	**589.15**		**653.15**	**589.15**		**637.08**	**588**	
Flow	**U/S WSE**	**D/S WSE**	**H**	**U/S WSE**	**D/S WSE**	**H**	**U/S WSE**	**D/S WSE**	**H**	**U/S WSE**	**D/S WSE**	**H**
Base	102.9	100.3	2.6	103.8	100.3	3.5	104.8	100.3	4.5	103.4	100.4	3.0
Bankfull	103.7	101.5	2.2	104.6	101.5	3.1	105.7	101.6	4.2	104.2	101.6	2.6
County Low	104.9	103.0	1.9	105.8	103.0	2.8	107.1	103.0	4.1	105.3	103.0	2.3
10-yr	108.4	106.7	1.7	110.3	106.9	3.5	110.9	106.8	4.2	109.9	106.8	3.1
100-yr	108.8	107.1	1.6	110.7	107.3	3.5	111.3	107.1	4.1	110.3	107.2	3.1
		Max H:	**2.6**		**Max H:**	**3.5**		**Max H:**	**4.5**		**Max H:**	**3.1**

Drop Structure Riprap Sizing

Project: Rolling Meadows Floodplain Modifications

Date Completed: 12/11/2024
Completed By: Noah Olson, EI
Reviewed By: Jordan Becker, PE

References: *USDCM, Chapter 8, Section 8.1.1, El Paso County DCM Ch 10.10*

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

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

d_{50} = mean rock size (ft)

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

Design Assumptions:

1. This worksheet sizes the rock for the approach riprap for all drop structures and the riprap downstream of all drop structures.
2. USDCM specifies using the energy slope and velocity in the channel.
3. USDCM specifies a minimum of Type M riprap.
4. The slope and velocity are taken at a station at the crest for the approach riprap and at the beginning of the end sill location for the downstream riprap for the 100-yr storm.
5. The riprap for along the sides of the structure was not sized, but instead assumed to be the same as the approach.

Additional Design:

Granular Bedding

1. Site soils classified as fine grained.
2. For Type M riprap - Bedding to be 4 inches Type 1 and 4 inches Type II.

RIPRAP SIZING											
Upstream					Downstream					US Riprap Type	DS Riprap Type
Drop	Station	EG Slope (ft/ft)	V (fps)	D50 (ft)	Drop	Station	EG Slope (ft/ft)	V (fps)	D50 (ft)		
4.5' DROP	628.15	0.00147	7.170	**0.15**	4.5' DROP	589.15	0.00260	3.650	**0.05**	**M**	**M**
3.5' DROP	618.15	0.00138	6.490	**0.12**	3.5' DROP	591.15	0.00017	3.390	**0.02**	**M**	**M**
2.5' DROP	609.15	0.00147	7.170	**0.15**	2.5' DROP	589.15	0.00018	3.470	**0.02**	**M**	**M**
DS UNIQUE DROP	612.08	0.00138	6.490	**0.12**	DS UNIQUE DROP	590	0.00015	2.660	**0.01**	**M**	**M**
US of Bradley	*Calculated D50 is assumed to be marginally larger than 4.5' drop since this drop is 4.85'.*									**M**	**M**

Conclusion: Type M riprap will be sized to go around all concrete drop structures.

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

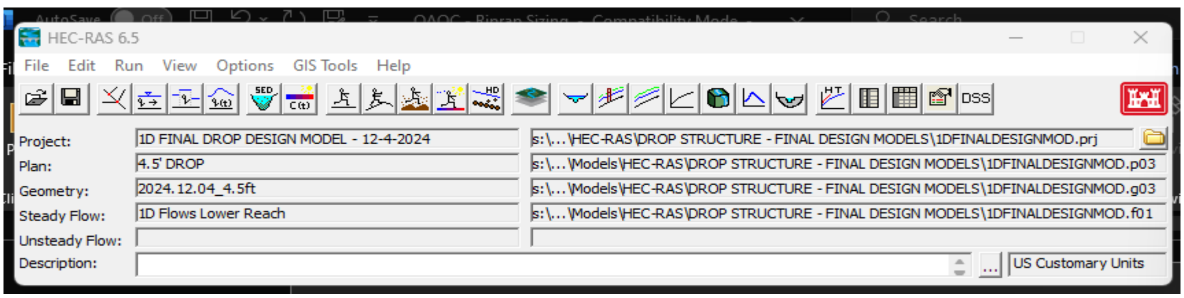
Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

d_{50} = mean rock size (ft)

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



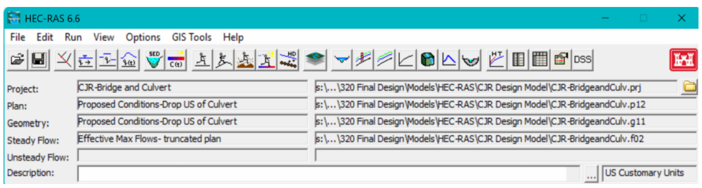
Riprap Apron Sizing and Length

Project:	Rolling Hills Floodplain and Permitting
Date Completed:	7/9/2025
Completed By:	Colin Rickard, EI
Reviewed By:	Jordan Becker, PE

Design Assumptions:

1.) Proposed Culvert is an elliptical open bottom CONSPAN arch culvert (43' Span, 13' 7" Rise), assumed rectangular box culvert for purposes of equation

2.) Tailwater depth data taken from a subcritical run of the proposed hec ras model, 100YR Flow Profile



References: *USDCM, Chapter 9, Section 3.2.1*

Chapter 9 — Hydraulic Structures

3.2.3 Rock Sizing for Riprap Apron and Low Tailwater Basin

Scour resulting from highly turbulent, rapidly decelerating flow is a common problem at conduit outlets. The following section summarizes the method for sizing riprap protection for both riprap aprons (Section 3.2.1) and low tailwater basins (Section 3.2.2).

Use Figure 9-38 to determine the required rock size for circular conduits and Figure 9-39 for rectangular conduits. Figure 9-38 is valid for $Q/D_c^{2.5}$ of 6.0 or less and Figure 9-39 is valid for $Q/WH^{1.5}$ of 8.0 or less. The parameters in these two figures are:

1. $Q/D^{1.5}$ or $Q/WH^{0.5}$ in which Q is the design discharge in cfs, D_c is the diameter of a circular conduit in feet, and W and H are the width and height of a rectangular conduit in feet.
2. Y_t/D_c or Y_t/H in which Y_t is the tailwater depth in feet, D_c is the diameter of a circular conduit in feet, and H is the height of a rectangular conduit in feet. In cases where Y_t is unknown or a hydraulic jump is suspected downstream of the outlet, use $Y_t/D_t = Y_t/H = 0.40$ when using Figures 9-38 and 9-39.
3. The riprap size requirements in Figures 9-38 and 9-39 are based on the non-dimensional parametric Equations 9-16 and 9-17 (Steven, Simons, and Watts 1971 and Smith 1975).

Circular culvert:

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}} \qquad \text{Equation 9-16}$$

Rectangular culvert:

$$d_{50} = \frac{0.014H^{0.5}Q}{Y_t W} \qquad \text{Equation 9-17}$$

These rock size requirements assume that the flow in the culvert is subcritical. It is possible to use Equations 9-16 and 9-17 when the flow in the culvert is supercritical (and less than full) if the value of D_c or H is modified for use in Figures 9-38 and 9-39. Note that rock sizes referenced in these figures are defined in the *Open Channels* chapter. Whenever the flow is supercritical in the culvert, substitute D_a for D_c and H_a for H, in which D_a is defined as:

$$D_a = \frac{(D_c + Y_n)}{2} \qquad \text{Equation 9-18}$$

Where the maximum value of D_a shall not exceed D_c, and

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Hydraulic Structures — Chapter 9

3.2.1 Riprap Apron

This section addresses the use of riprap for erosion protection downstream of conduit and culvert outlets. Refer to the *Open Channels* chapter for additional information on applications for and placement of riprap. Those criteria will be useful in design of erosion protection for conduit outlets. When incorporating a drop into the outfall use Figure 9-40 or 9-41.

Rock Size
The procedure for determining the required riprap size downstream of a conduit outlet is in Section 3.2.3.

Configuration of Riprap Apron
Figure 9-34 illustrates typical riprap protection of culverts at conduit outlets.

Sizing Calculations:

Q100	4400	cfs
Yt	6.64	ft
Open Area of Culvert	450	sf
H Equate	10.47	ft
W Equate	43	ft

D50 Eq. 9-17	0.70	ft

Selection: Type M Riprap

Figure 9-34 illustrates typical riprap protection of culverts at conduit outlets.

Extent of Protection

The length of the riprap protection downstream from the outlet depends on the degree of protection desired. If it is necessary to prevent all erosion, the riprap must extend until the velocity decreases to an acceptable value. The acceptable major event velocity is set at 5 ft/sec for non-cohesive soils and at 7 ft/sec for erosion resistant soils. The rate at which the velocity of a jet from a conduit outlet decreases is not well known. The procedure recommended here assumes the rate of decrease in velocity is related to the angle of lateral expansion, θ, of the jet. The velocity is related to the expansion factor, $(1/(2\tan\theta))$, which can be determined directly using Figure 9-35 or Figure 9-36, by assuming that the expanding jet has a rectangular shape:

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right) \qquad \text{Equation 9-11}$$

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

and:

$$A_t = \frac{Q}{V} \qquad \text{Equation 9-12}$$

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft²)

In certain circumstances, Equation 9-11 may yield unreasonable results. Therefore, in no case should L_p be less than $3H$ or $3D$, nor does L_p need to be greater than $10H$ or $10D$ whenever the Froude parameter, $Q/WH^{1.5}$ or $Q/D^{2.5}$, is less than 8.0 or 6.0, respectively. Whenever the Froude parameter is greater than these maximums, increase the maximum L_p required by ¼ D_c or ¼ H for circular or rectangular (box) culverts, respectively, for each whole number by which the Froude parameter is greater than 8.0 or 6.0, respectively.

Once L_p has been determined, the width of the riprap protection at the furthest downstream point should be verified. This dimension is labeled "T" on Figure 9-34. The first step is to solve for θ using the results from Figure 9-35 or 9-36:

$$\theta = \tan^{-1}\left(\frac{1}{2(\text{ExpansionFactor})}\right) \qquad \text{Equation 9-13}$$

Where:

Expansion Factor = determined using Figure 9-35 or 9-36

T is then calculated using the following equation:

$$T = 2(L_p \tan\theta) + W \qquad \text{Equation 9-14}$$

Multiple Conduit Installations

The procedures outlined in this section can be used to design outlet erosion protection for multi-barrel culvert installations by replacing the multiple barrels with a single hydraulically equivalent hypothetical rectangular conduit. The dimensions of the equivalent conduit may be established as follows:

1. Distribute the total discharge, Q, among the individual conduits. Where all the conduits are hydraulically similar and identically situated, the flow can be assumed to be equally distributed; otherwise, the flow through each barrel must be computed.
2. Compute the Froude parameter $Q_i/D_{ci}^{2.5}$ (circular conduit) or $Q_i/W_iH_i^{1.5}$ (rectangular conduit), where the subscript i indicates the discharge and dimensions associated with an individual conduit.
3. If the installation includes dissimilar conduits, select the conduit with the largest value of the Froude parameter to determine the dimensions of the equivalent conduit.
4. Make the height of the equivalent conduit, H_{eq}, equal to the height, or diameter, of the selected individual conduit.
5. The width of the equivalent conduit, W_{eq}, is determined by equating the Froude parameter from the selected individual conduit with the Froude parameter associated with the equivalent conduit, $Q/W_iH_{eq}^{1.5}$.

Length of Protection Calculations:

Q100	4400	cfs
Yt	6.64	ft
V	10	fps
At	440	sf
H Equate	10.47	ft
W Equate	43	ft
Q/WH^1.5	3.02	*figure 9-36
Yt/H	0.63	*figure 9-36
Exp Factor	6.5	*figure 9-36

Lp	**151**	**ft**
10*H Lp Max	**136**	**ft**

θ	4.4	degrees
T	65	ft

Selection:

Lp set to 136ft using 10*H Max value using rise of arch culvert

T calculated to 65ft, not applicable as we are protecting full 100YR width

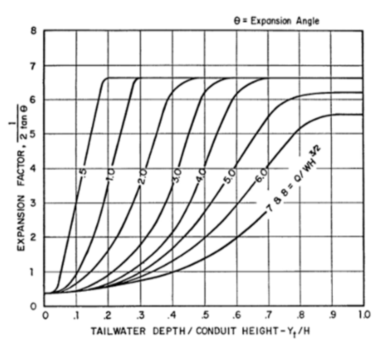

Figure 9-36. Expansion factor for rectangular conduits

Culvert Bottom Riprap Sizing

Project: Rolling Meadows Floodplain Modifications

Date Completed: 7/15/2025
Completed By: Abby Mitchell, EI
Reviewed By: Tori Mack, PE

References: *MHFD CRITERIA MANUAL SECTION 8.1.1*

8.1.1 Mild Slope Conditions

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

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

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

d_{50} = mean rock size (ft)

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

Note that Equation 8-11 is applicable for sizing riprap for channel lining with a longitudinal slope of no more than 2%. This equation is not intended for use in sizing riprap for steep slopes (typically in excess of 2 percent), rundowns, or protection downstream of culverts. Information on rundowns is provided in Section 7.0 of the *Hydraulic Structures* chapter of the USDCM, and protection downstream of culverts is discussed in the *Culverts and Bridges* chapter. For channel slopes greater than 2% use one of the methods presented in 8.1.2.

Rock size does not need to be increased for steeper channel side slopes, provided the side slopes are no steeper than 2.5H:1V (UDFCD 1982). Channel side slopes steeper than 2.5H:1V are not recommended because of stability, safety, and maintenance considerations. See Figure 8-34 for riprap placement specifications. At the upstream and downstream termination of a riprap lining, the thickness should be increased 50% for at least 3 feet to prevent undercutting.

8.1.3 Design Safety Factor

Whether in mild slope or steep slope conditions, consider a safety factor when specifying the sides of riprap. Sizing methods presented in this manual were developed from controlled laboratory conditions. Field installation of rock is much less precise compared to laboratory conditions. It is difficult to grade riprap flat across a channel bottom or in a manner that provides a uniform slope. Sometimes the riprap delivered from local quarries is slightly smaller than specified. Flow conditions in streams can be affected by a variety of elements including debris, sedimentation, vegetation, etc. and can result in flow concentrations. It is important to include a safety factor when using these equations because the variability associated with conditions in the field cannot be quantified.

Design Assumptions:

1. Calculating for a 100-year storm event.
2. Use HY8 data for slope and outlet velocity. Assume specific gravity of 2.65. Use gravity as 32.2
3. Mild slope of less than 2%
4. 10% safety factor.

Equation 8-11	
16.11	ft/s, V (source: HY-8 model)
0.002562	ft/ft, S (source: design plans)
2.65	G_s (midpoint between 2.5 and 2.7)
1.1	safety factor
0.96	ft, d_{50}
11.5	**in, d_{50}**
Type M riprap chosen (12" d_{50}).	

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

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

d_{50} = mean rock size (ft)

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

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

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