



NAPA VALLEY TRANSPORTATION AUTHORITY

Board Agenda Memo

TO: NVTA Board of Directors
FROM: Danielle Schmitz, Executive Director
REPORT BY: Grant Bailey, Program Manager - Engineer
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SUBJECT: Soscol Junction Project – Suscol Creek Fish Passage Technical Memorandum Overview

RECOMMENDATION

Information only

COMMITTEE RECOMMENDATION

None

EXECUTIVE SUMMARY

At the request of the Board, this item provides an overview of a 2021 technical memorandum evaluating potential fish passage improvements at Suscol Creek as part of the State Route 29/ State Route 221 Soscol Junction Improvement Project, and an explanation of why those improvements were not ultimately included in the constructed project.

During early project development, a conceptual fish passage design was evaluated in connection with potential widening of the Suscol Creek crossing structure. As the design advanced, the project was revised to eliminate the need to widen the bridge, thereby avoiding in-channel work and associated environmental permitting. Because the final project limits avoided impacts to Suscol Creek, fish passage improvements were no longer required and were removed from the scope.

FISCAL IMPACT

Not Applicable.

CEQA REQUIREMENTS

ENVIRONMENTAL DETERMINATION: CEQA is not applicable.

BACKGROUND

The Soscol Junction Improvement Project reconfigured the intersection of State Route 29 and State Route 221 to improve traffic operations, safety, and multimodal connectivity in southern Napa County. Through the 65% design phase, the project extended beyond Suscol Creek, which required bridge widening and improvements within the creek, including measures intended to facilitate fish passage through the existing culvert and channel system.

A technical memorandum prepared in 2021 evaluated a conceptual fish passage design that included channel grading, installation of rock weirs, and construction of baffles within the existing concrete-lined channel to improve hydraulic conditions for fish movement. These improvements were developed in coordination with resource agencies, including the National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), and the Regional Water Quality Control Board.

As the project advanced into final design, agency coordination identified differing perspectives on in-channel work within Suscol Creek, which would have been required as part of the bridge widening. Due to permitting complexity and potential creek impacts, the project was revised at the 95% design stage to eliminate the structure widening scope. This revision avoided direct impacts to the creek and did not require modification of the channel or crossing structures. As a result, fish passage improvements were no longer required and were removed from the project scope.

NVTA worked with resource and regulatory agencies on mitigation for project impacts to both the Swainson Hawk and the Reg Legged Frog, totaling over \$1.13 million in mitigation costs.

| Mitigation | Organization/Provider | Description | Cost |
|-----------------------------------|----------------------------------|---|--------------------|
| Red Legged Frog Habitat | Napa Land Trust | Step-pool habitat creation, design and management | \$416,500 |
| Swainson Hawk Nesting Tree Credit | Bullock Bend Mitigation Bank | 1 nesting tree credit | \$175,000 |
| Swainson Hawk Habitat | Cannon Station LLC (Muzzy Ranch) | 17.32 habitat credits | \$433,500 |
| Swainson Hawk Habitat | Cannon Station LLC (Muzzy Ranch) | 3.1 habitat credits | \$108,500 |
| | | Total | \$1,133,500 |

NVTA understands there is ongoing interest in fish passage conditions at this location. Separate from the Soscol Junction project, other agencies and partners, including the Napa County Resource Conservation District, are actively evaluating opportunities for creek restoration and fish passage improvements in the Suscol Creek corridor. Staff is coordinating with these partners to provide additional information to the Board as part of this informational item.

ALTERNATIVES

This is an informational item; no alternatives are presented.

COUNTYWIDE PLAN GOALS MET BY THIS PROPOSAL

Goal 2 – Improve system safety

The Soscol Junction Project improved safety for all users by reducing conflict points and modernizing the intersection.

Goal 3 – Use taxpayer dollars efficiently

Revising the project to avoid in-channel work reduced permitting complexity, minimized risk, and supported timely and cost-effective project delivery.

ATTACHMENT(S)

1. Suscol Creek Fish Passage Improvement Memorandum (2021)
2. Napa Resource Conservation District Fish Barrier Removal Factsheet



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Memorandum

Date: June 18, 2021
To: Trenton Hoffman and Heather Anderson – GHD
From: Chris Sewell, Jennifer Abrams, and Zhiqing Kou – WRECO
Project: State Route 29 & State Route 221 Soscol Junction Improvement Project
Subject: Suscol Creek Fish Passage Improvement Memorandum

1. INTRODUCTION

The California Department of Transportation (Caltrans), in partnership with the Napa Valley Transportation Authority, proposes to reconfigure the existing intersection (Soscol Junction) of State Route (SR) 29 and SR 221/Soscol Ferry Road in Napa County from a signalized intersection to a full-diamond interchange, with two roundabout intersections on either side of SR 29. This proposed project is to improve traffic operations to alleviate congestion between Napa Valley and towards Interstate (I-) 80 and SR 37. Bicycle and pedestrian access is proposed to improve connectivity between existing bicycle and pedestrian access on SR 29 and SR 221. The proposed SR 29/SR 221 Soscol Junction Improvement Project is located in Napa County at post mile (PM) R5.6/R6.7 at SR 29 and PM 0.0/0.4 at SR 221. See Figure 1 for the Project location map, Figure 2 for the Project vicinity map, and Figure 3 for the Project aerial map.

The existing SR 29 Bridge crossing at Suscol Creek consists of three structures: two arch box culverts built in 1915 and 1944, and a southbound (SB) slab on pile structure built in 1980. Based on current Caltrans bridge inspection reports, Caltrans has determined the remaining life span of these structures is 50 years and thus, a bridge replacement is not required as a part of this congestion relief project. The Project would require widening the SB Suscol Creek crossing by approximately 15 feet (ft) to provide room for SR 221 northbound (NB) to SR 29 ramp. The new structure would consist of two cast-in-steel-shell columns driven to a depth of approximately 30 to 40 ft, two abutments, and a box girder deck. The two piles are spaced approximately 30 ft from the center of the creek, one on each side of the existing concrete-lined channel.

Soscol Creek Bridge Left (21-0071L) was constructed as part of project 04-381134 (April 1980). It consists of a reinforced concrete slab supported by reinforced concrete abutments and bents. By contract change order, rock slope protection (RSP) was placed in the creek channel under the new bridge and approximately 25 ft downstream of the dripline and then covered in concrete, forming a flat smooth apron. Additional RSP is present downstream of the concrete apron and was also included in this change order. These measures were added to correct significant erosion that occurred during the winter of 1980/1981. Soscol Creek Bridge Right (21-



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0071R), the bridge for SR 29 NB and the SR 29 NB to SR 221 NB connector ramp, consists of two arch culverts. The arch culvert built prior to 1915 by Napa County is an approximately 10-ft-wide by 8-ft-high by 24-ft-long structure constructed from rubble masonry. There are no as-built plans available for this structure. The crossing was then widened with another arch culvert on the upstream side, while a wingwall/headwall extension was constructed on the downstream side (project 10ATC2, August 1943). The arch culvert extension is approximately 10-ft-wide by 8-ft-high by 77-ft-long, consisting of reinforced concrete. The downstream headwall structure is approximately 14 ft in length and consists of reinforced concrete.

The proposed fish passage improvements include channel grading, construction of a series of rock weirs, and concrete berm-type baffles (See Appendix A) for the updated fish passage plan. The approach was developed in discussions with California Department of Fish and Wildlife (CDFW), National Marine Fisheries Service (NMFS), and the Regional Water Quality Control Board (RWQCB) and based on site design limitations. The concrete apron and culverts are to remain in place. The baffles are proposed within the concrete apron to provide passage within the apron and cause backwater within the culverts. The backwater within the culverts is anticipated to assist in fish passage through the culverts. The channel grading with rock weirs and pools, downstream of the bridge and apron, are proposed to address the existing fish passage barrier just downstream of the bridge. The quantity of rock weirs and pools was based on discussions with the agencies and their requirements for maintaining a 6-inch drop within the graded channel segment of the Project.

Purpose of Memorandum

The preliminary fish passage improvement design was evaluated at the Project's Approval & Environmental Document (PA&ED) stage and the analysis results were included in the *Draft Fish Passage Design Report* (WRECO, 2020). The purpose of this memorandum is to present hydraulic characteristics and additional calculations for the updated fish passage design following guidance from Part IX Fish Passage Evaluation at Stream Crossing including in the *California Salmonid Stream Habitat Restoration Manual* (CSSHRM) (CDFW, 2004).



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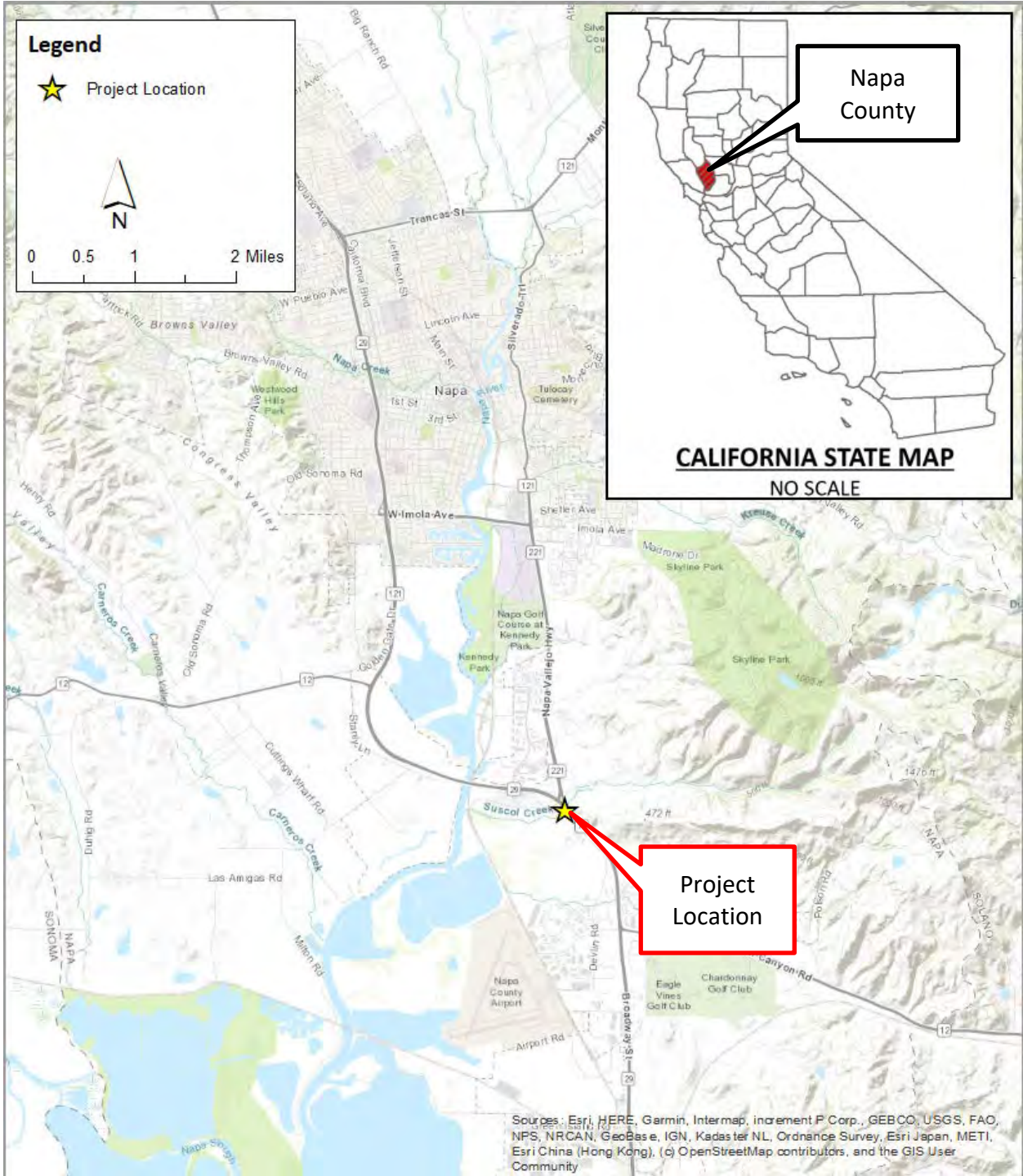


Figure 1. Project Location Map

Source: ESRI





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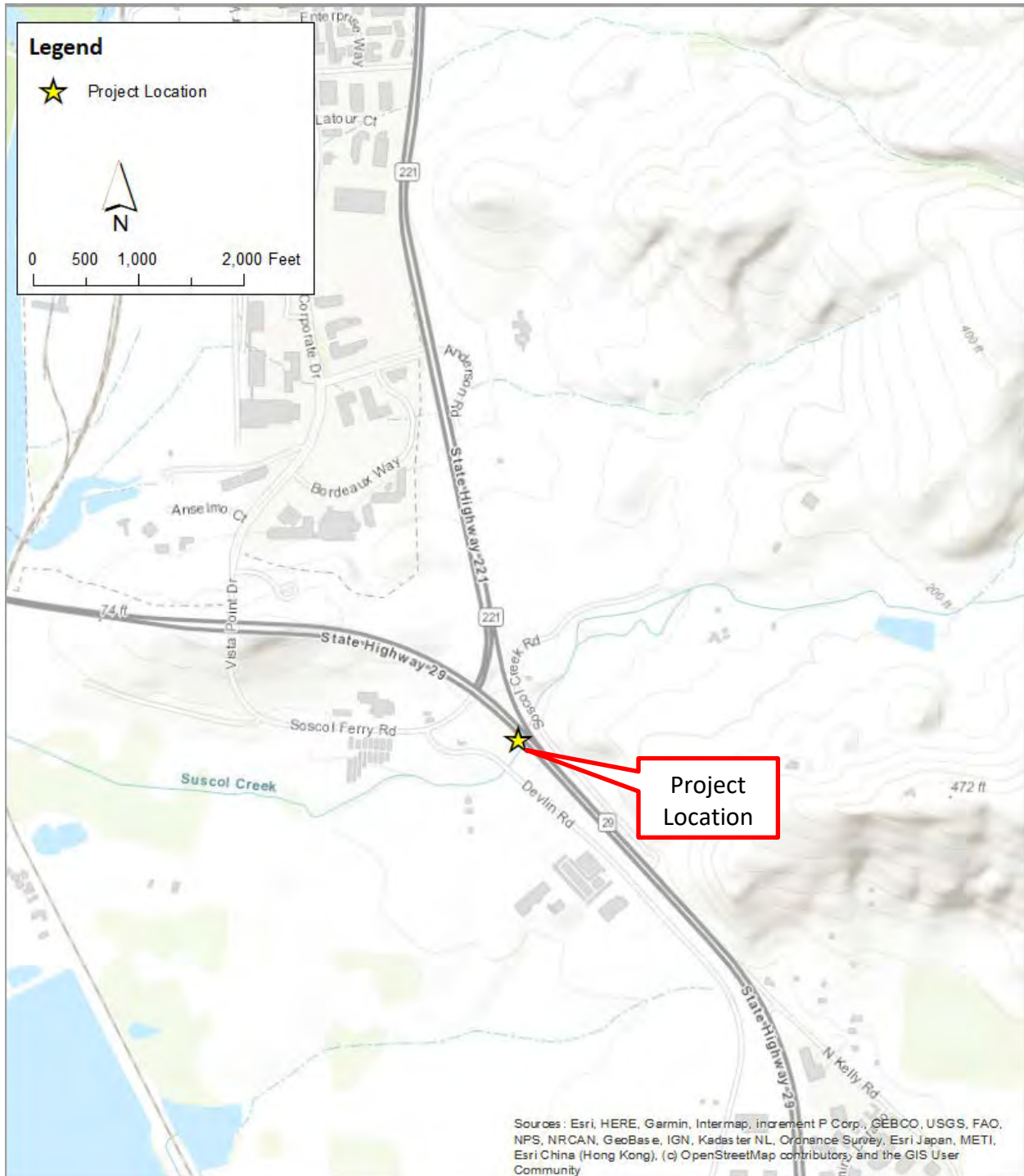


Figure 2. Project Vicinity Map

Source: ESRI





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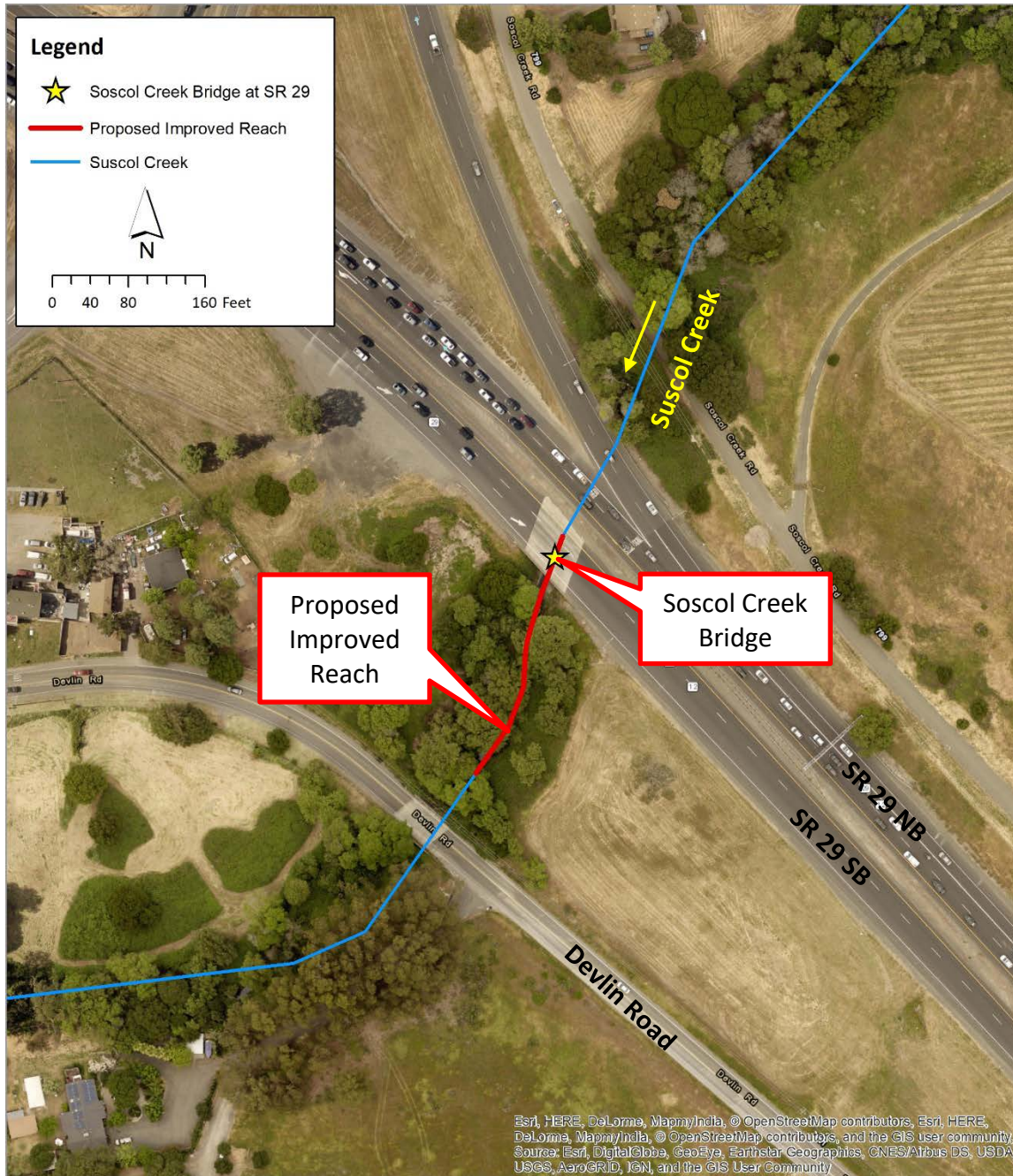


Figure 3. Project Aerial Map

Source: ESRI (2020)



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Fish Passage Design Criteria

The Part IX Fish Passage Evaluation at Stream Crossing included in the CSSHRM was published in 2004 by CDFW including approaches and technical methods for anadromous salmonid habitat restoration. The engineering document - *Fish Passage Design for Road Crossings Guidance* (FPDRCG) prepared by Caltrans (2014) was written to be in conformance with both CDFW and National Oceanic Atmospheric Administration (NOAA) Fisheries Service, and Southwest Region fish passage criteria. Both documents provide detailed instructions to assist designers in generating projects to achieve resource agency goals for fish passage within a state highway project context. Both Caltrans' and CDFW's standards were used in the design of the proposed fish passage improvement for the Project.

Vertical Datum

The Project references the North American Vertical Datum of 1988 (NAVD 88).



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2. MODEL SETUP

Design Event Peak Flow

According to the *Draft Fish Passage Report* (WRECO, 2020), the Suscol Creek drains a watershed with an area of approximately 2.8 square miles at the existing bridge on SR 29 SB (USGS StreamStats, 2020). The peak discharges of Suscol Creek at the Project site was estimated using the following hydrologic design methods (WRECO, 2020):

1. USGS Regional Flood-Frequency Equations;
2. The *Highway 29 Culvert at Suscol Creek Fish Passage Assessment Report* prepared by Napa County Resource Conservation District (NCRCD) (2011);
3. Unit Hydrograph Method.

The peak discharges estimated using the Unit Hydrograph method were selected for use in the hydraulic analysis, because the Unit Hydrograph method provided a more detailed analysis of the watershed characteristics (WRECO, 2020). Another reason is that the peak discharges using this method are more conservative than those calculated using the USGS regional regression method and NCRCD. The selected peak discharges are summarized in Table 1.

Table 1. Estimated Peak Discharges Using Unit Hydrograph Method

| Recurrence Interval (year) | Peak Discharge (cubic feet per second [cfs]) |
|-------------------------------|---|
| 100 | 1,520 |
| 50 | 1,310 |
| 25 | 1,095 |
| 10 | 812 |
| 5 | 603 |
| 2 | 353 |
| 1.5 | 263 |

Migration Season Flows

The typical migration season for Salmonid located in the Project's geographical area range from November to April of each year. In order to understand typical flows present at the Project site during the migration season, a hydrologic model was developed based on long-term rainfall data and watershed characteristics using the United States Environmental Protection Agency (US EPA) Stormwater Management Model (SWMM). Long-term rainfall data for the Project watershed was obtained from National Oceanic and Atmospheric Administration (NOAA) Land Based Station Database Fairfield Station from the years 1972 to 2014. The watershed characteristics was collected from the United States Geological Survey (USGS) Streamstats application and the United States Department of Agriculture (USDA) Web Soil Survey.



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The flow analysis was performed per methodology in the Caltrans District 4 Guideline and adapted to conditions specific to the Project site. Calculations for the full year's return period flows were performed using the USGS Regional Flood Frequency regression equations. The full year's flows were then calculated using the US EPA SWMM model, using the USGS regression equation flows as a form of calibration.

Using the SWMM model, a time-series of flow data was developed for the Project site. The time-series output results were filtered down to only include the migration season for salmonid at the project site. The time-series flow data was then use to evaluate the occurrence of specified flows during the migration seasons.

Fish Passage Design Flow

According to Caltrans' FPDRCG (2014), the criteria used to determine the high and low fish passage design flow rates for adult and juvenile steelheads are presented in Table 2. The high passage flow rates for adult and juvenile salmonids were 50% and 10% of the 2-year peak discharge, respectively. There is no stream gage data available to develop a more site-specific set of low passage flows. Therefore, the default minimum low passage flow rates for adult and juvenile salmonids recommended in Caltrans' FPDRCG (2014) were used at the Project location.



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Table 2. Adult Anadromous and Juvenile Salmonids Design Flow Criteria

| | Species/Life Stage | Percentage of 2-Year Recurrence Interval Flow |
|-------------------|----------------------------|---|
| High Passage Flow | Adult Anadromous Salmonids | 50% |
| | Juvenile Salmonids | 10% |
| | Species/Life Stage | Default Minimum Flow (cfs) |
| Low Passage Flow | Adult Anadromous Salmonids | 3 |
| | Juvenile Salmonids | 1 |

The estimated fish passage design flow rates at the Project location are presented in Table 3.

Table 3. Calculated Adult and Juvenile Salmonids Design Flow

| | Species/Life Stage | Design Fish Passage Flow (cfs) |
|-------------------|----------------------------|--------------------------------|
| High Passage Flow | Adult Anadromous Salmonids | 177 |
| | Juvenile Salmonids | 36 |
| Low Passage Flow | Adult Anadromous Salmonids | 3 |
| | Juvenile Salmonids | 1 |

Hydraulic Model

The steady-state hydraulic model developed using the United States Army Corp Engineer Hydrologic Engineering Center's River Analysis System (HEC-RAS) modeling software (Version 5.0.7) at the Project's PA/ED stage was updated to assess the hydraulic characteristics of the existing condition and to assess the changes to the hydraulic characteristics based on the proposed Project improvements. For fish passage flows (high and low design flow for adult and juvenile steelhead), the arch culvert and box culvert were modeled as open-channel to provide more detailed hydraulic output parameters for the in-channel improvements (CDFW, 2020). For peak flows such as 100- and 50-year peak flows, the arch culvert and box culvert were modeled as culvert objects to represent the pressure flow during the 100- and 50-year storms, because no features are proposed within the culverts. The baffles were modeled using a sharp-crested weir coefficient.



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3. MODEL RESULTS AND FISH PASSAGE ANALYSIS

The following sections discuss the evaluation of the hydraulic model results with respect to fish passage design criteria, fish passage channel stability design criteria, and hydraulic design events. The hydraulic model and associative design calculations were performed based on the assumption the system will be maintained and not contain an excess of sedimentation.

Fish passage results for depth and velocity are shown in the following figures. Water surface elevation (WSE) profiles during adult and juvenile fish passage flows are shown in Figure 4 and Figure 5, respectively. Velocity profiles during adult and juvenile fish passage flows are shown in Figure 6 and Figure 7, respectively.

Additional WSE and velocity profiles for 1.5-year, 2-year, 5-year, and 10-year comparing existing and proposed conditions are provided in Appendix B.



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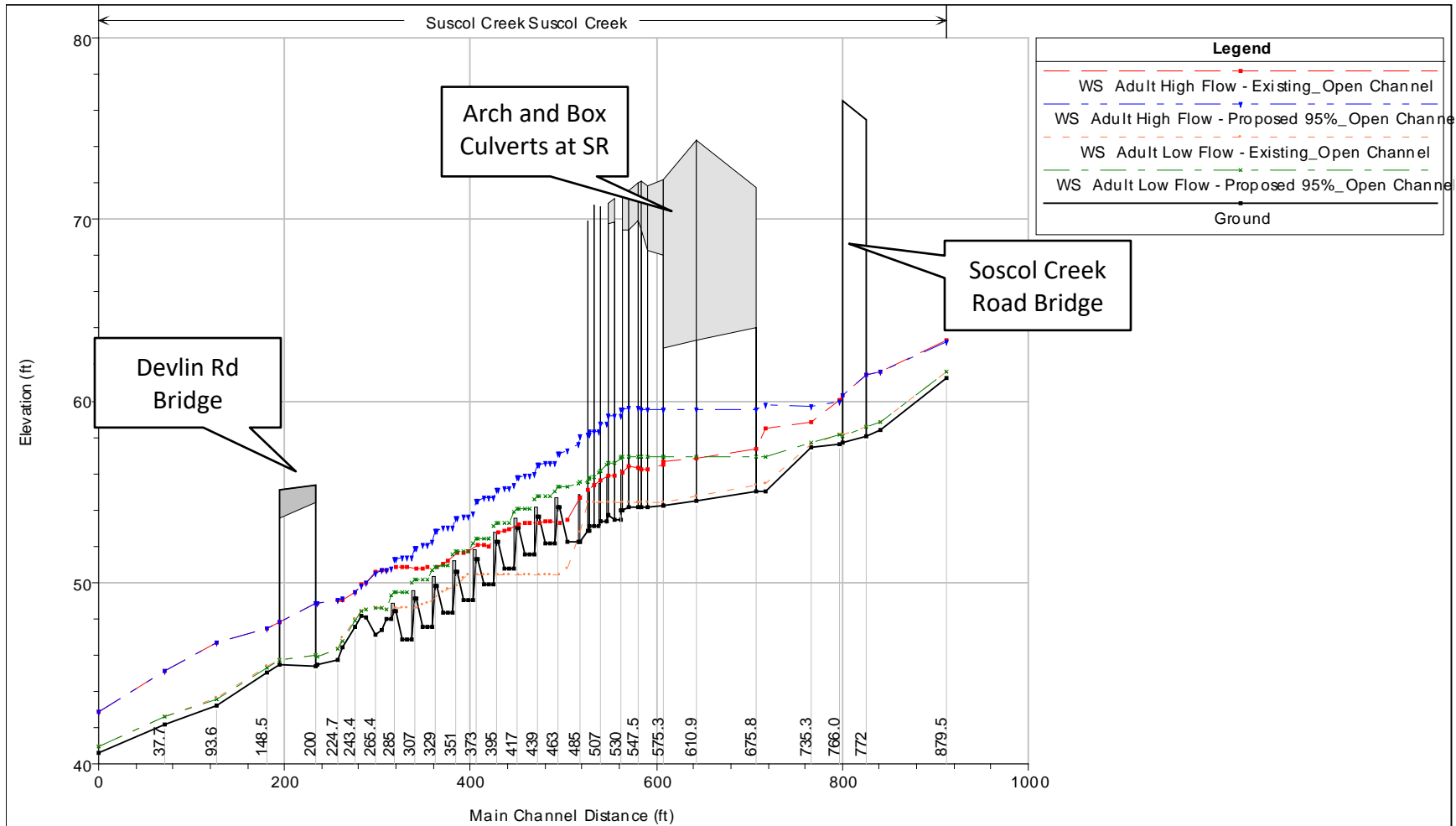


Figure 4. WSE Profile During Adult Fish Passage Flows



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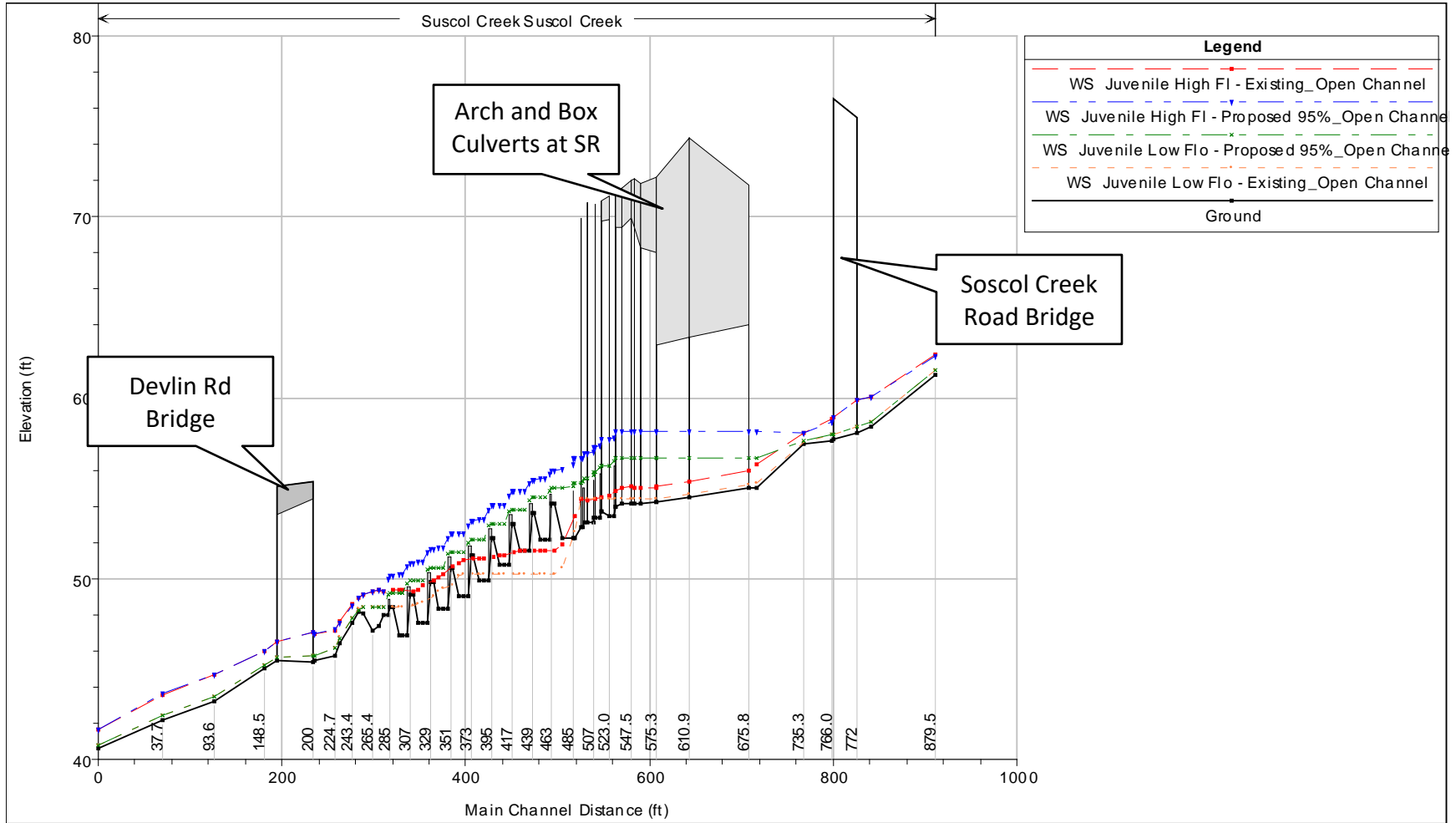


Figure 5. WSE Profile During Juvenile Fish Passage Flows





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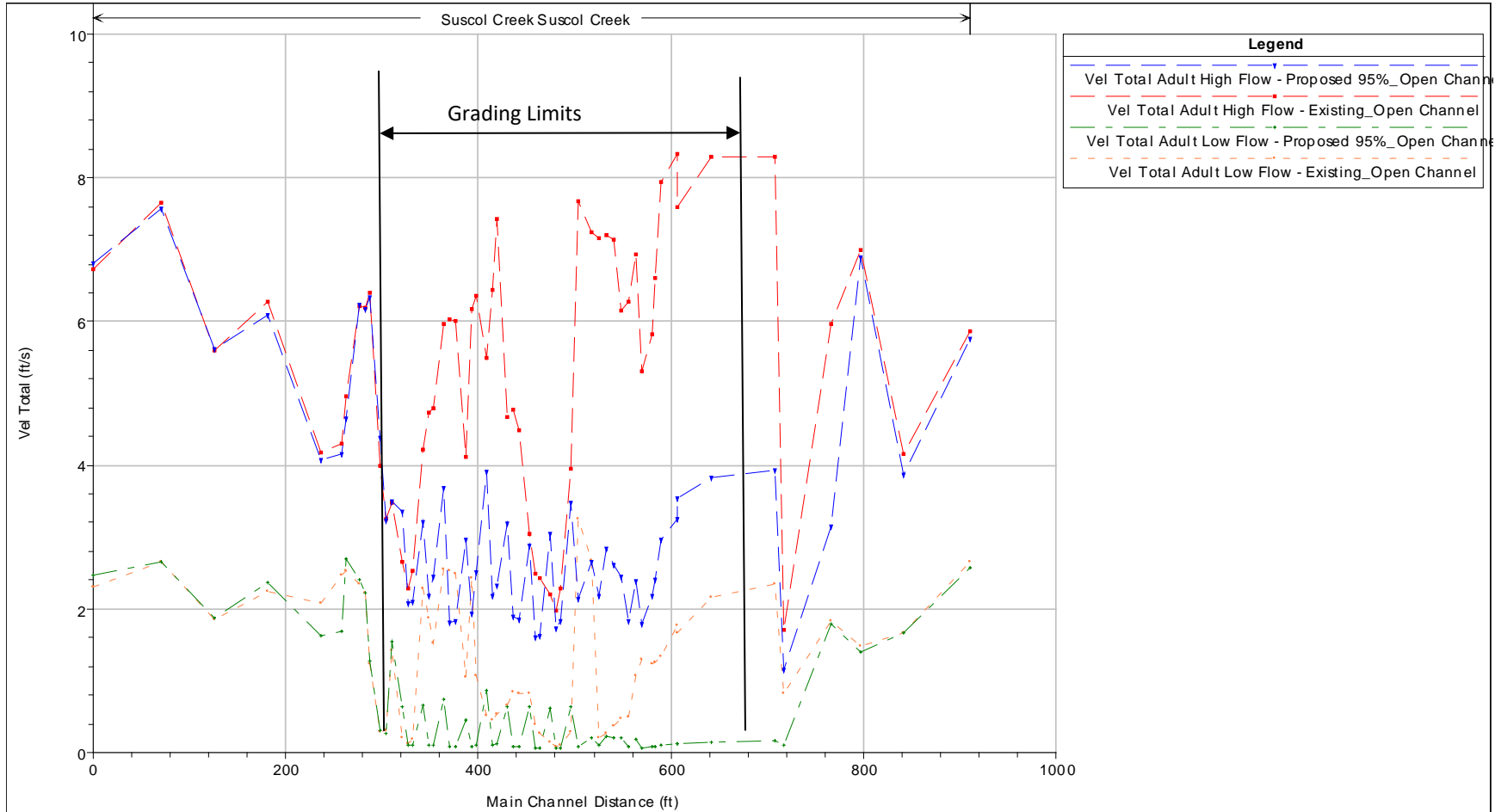


Figure 6. Velocity Profile During Adult Fish Passage Flows





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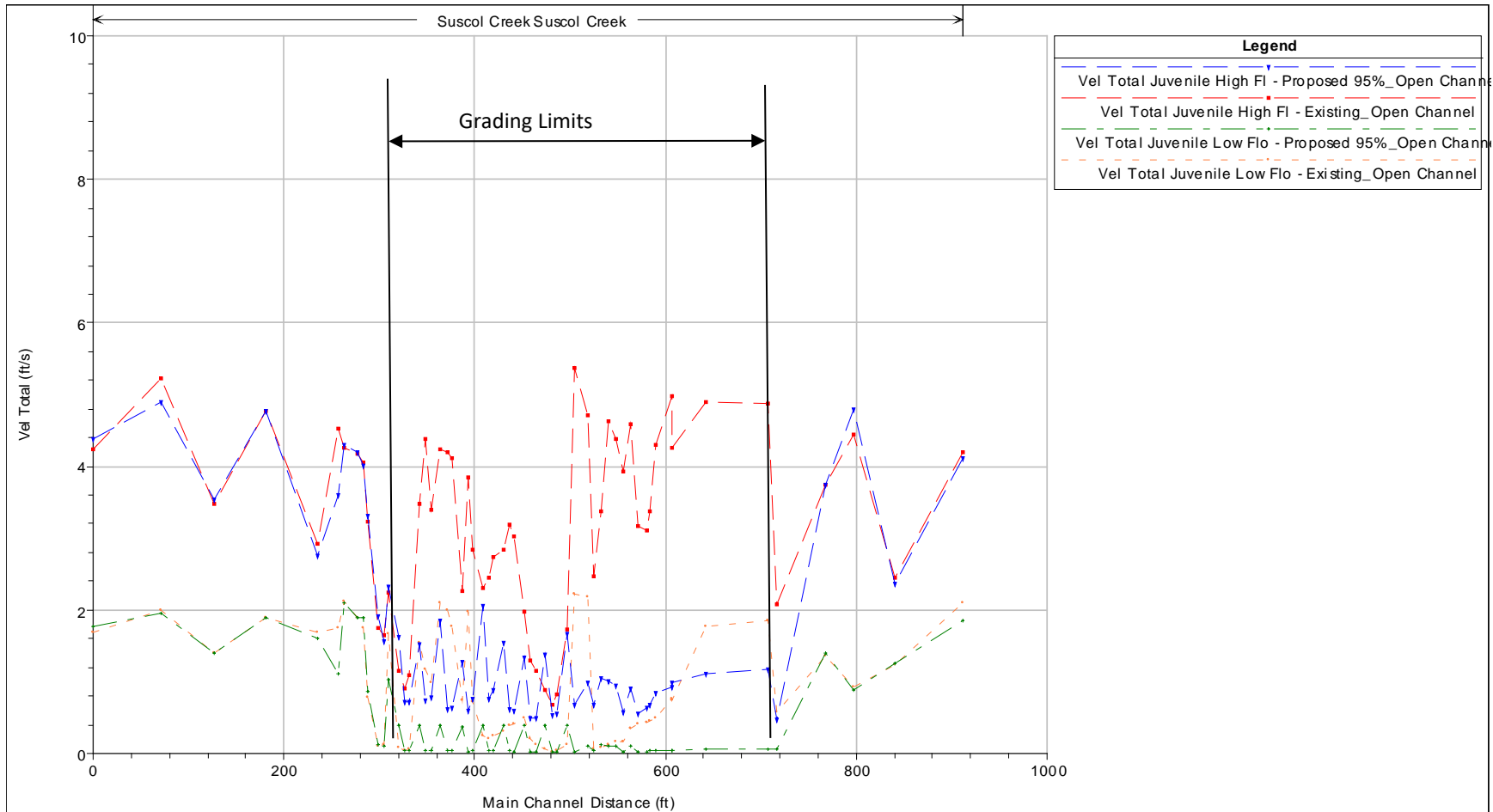


Figure 7. Velocity Profile During Juvenile Fish Passage Flows



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Arch and Box Culvert

According to the FPDRCG (Caltrans, 2014), the hydraulics of the proposed fish passage within the culvert should be evaluated for the maximum allowable velocity during the high passage design flow for adult and juvenile steelheads, and should be evaluated for the minimum allowable water depth during the low passage design flow as shown in Table 4.

Table 4. Maximum Allowable Velocity and Minimum Water Depth Criteria for Adult and Juvenile Steelheads in a Culvert

| Species/ Life stage | Flow Type | Flow Rate (cfs) | Maximum Velocity (feet/second [ft/s]) | Minimum Water Depth (ft) |
|------------------------|------------------|--------------------|--|--------------------------------|
| Adult Steelhead | High Design Flow | 177 | 3* | N/A |
| | Low Design Flow | 3 | N/A | 1 |
| Juvenile Steelhead | High Design Flow | 36 | 1 | N/A |
| | Low Design Flow | 1 | N/A | 0.5 |

Note: * Maximum average water velocity for a culvert length of 245 ft per Table 6.3 in the FPDRCG.

With the proposed fish passage improvements, the maximum velocities and minimum water depths are summarized in Table 5 for adult and juvenile steelheads during the high and low passage design flows in the arch and box culverts (see Appendix B for the detailed analysis of the existing condition and Appendix D for the detailed hydraulic analysis results of the proposed condition).

Table 5. Maximum Velocity and Minimum Water Depth for Adult and Juvenile Steelheads in Arch and Box Culverts

| Species/ Life stage | Flow Type | Maximum Velocity* (ft/s) | Minimum Water Depth** (ft) |
|------------------------|---------------------------|-----------------------------|-------------------------------|
| Adult Steelhead | High Design Flow | 3.8 | N/A |
| | Low Design Flow | N/A | 1.9 |
| | Criteria Boundary 125 cfs | 2.9 | N/A |
| Juvenile Steelhead | High Design Flow | 1.1 | N/A |
| | Low Design Flow | N/A | 1.6 |
| | Criteria Boundary 30 cfs | 1.0 | N/A |

Note: *Maximum velocity was rounded to nearest 0.1 ft/s.

** Minimum water depth was rounded to nearest 0.1 ft.

The hydraulic analysis results indicated the proposed fish passage improvements would satisfy the minimum water depth requirements for adult and juvenile steelhead in the arch and box culverts.



The maximum velocity requirements for adult and juvenile steelhead are not met under the proposed conditions. Due to the limitations in site conditions, the design could not accommodate concrete baffles high enough to reduce the flow velocity to below adult or juvenile criteria without further increasing the 100-year and 50-year design water surface elevations upstream of the crossing. Since the creek is generally dry and does not experience sufficient flow during summer months for steelhead to be migrating upstream, the proposed velocity conditions are not anticipated to further obstruct the passage of adult or juvenile steelhead, and they are an improvement over the existing conditions.

Additional flows were evaluated to understand the threshold under which velocity criteria could be met for adult and juvenile fish passage. Results showed adult fish passage criteria could be met for flows up to 125 cfs, and juvenile fish passage criteria could be met for flows up to 30 cfs.

Concrete Baffles

Energy Dissipation Factor Analysis

According to the Part IX Fish Passage Evaluation at Stream Crossing including in the CSSHRM, a fishway is a structure for passing fish over vertical impediment. The concrete-lined channel under the SR 29 SB bridge was evaluated as a fishway. Per the "Part IX Fish Passage Evaluation at Stream Crossing" in the CSSHRM (CDFW, 2004), "the volume in a fishway pool must be adequate to dissipate energy without too turbulent for fish to hold and move through it." The following equation should be used to evaluate the energy dissipation factor (EDF) in a fishway step-pool.

$$EDF = \frac{\gamma Q h}{V}$$

Where:

- EDF = Energy Dissipation Factor (ft-lb/s/ft³)
- γ = Unit weight of water (62.4 lb/ft³)
- Q = Flow entering the pool (ft³/s)
- h = Head of the drop flow entering the pool (ft)
- V = Effective volume of the pool for dissipating energy (ft³)

The head of flow is the sum of the static head (drop in water surface) and kinetic head entering the step-pool, which was negligible (CDFW, 2004). The effective volume of the pool for dissipating energy was calculated based on a pool length of 8 feet (ft) for energy dissipation in each step-pool. The EDF calculation is included in Appendix E for the adult high fish passage flow. A maximum EDF of 4.0 ft-lb/s/ft³ is recommended for adult salmon and steelhead (Bell,



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1991). However, the calculated EDF for the proposed baffle pools for the Project ranged between 5.6 and 8.1 ft-lb/s/ft³, as shown in Table 6. Due to the physical constraints of the existing apron geometry, the only way to make the EDF meet the 4.0 ft-lb/ft³ criterion would be to reduce the drop heights. The design cannot accommodate the reduced drop heights while still providing comparable drop heights in the rock weirs and pools segment. The design is an improvement over the existing conditions for fish passage and the EDF was minimized to the extent possible while balancing the other design criteria.

Various flows were analyzed to understand the threshold under which EDF at each pool is below the criterion of 4-ft-lb/s/ft³. Results showed the proposed fish passage design passed the EDF criteria up to 75 cfs (Table 6).

Table 6. Energy Dissipation Factors at Baffle Pools

| Baffle Pool No. | EDF (ft-lb/s/ft ³) | |
|-----------------|--|-----------------------------|
| | Adult High Fish Passage Design Flow (177 cfs) | Threshold Boundary (75 cfs) |
| 1 | 5.6 | 3.0 |
| 2 | 6.8 | 3.4 |
| 3 | 7.1 | 4.0 |
| 4 | 6.1 | 2.0 |
| 5 | 8.1 | 4.0 |

Plunging and Streaming Flow Evaluation

The normal flow circulation pattern preferred for fish passage in a pool and weir fishway is a plunging flow regime. At higher flows the hydraulics transition into a streaming flow regime. The CSSHRM reports the following equation to solve for the transition flow between plunging and streaming flows based on pool geometry.

$$Q = Q_{t*} \sqrt{g} b_0 S_0 L^{2/3}$$

Where:

- Q = Transition flow (cfs)
- Q_{t*} = Dimensionless transition flow (from Figure XII-45 in Part XII CSSHRM)
- g = Gravitational acceleration (32.2 ft/s²)
- b_0 = Width of fishway weir (ft³/s)
- S_0 = Slope of fishway (ft)
- L = Length of pool (ft)



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Results showed the transition flow ranged between 11 and 26 cfs between Baffles No. 1 through No. 4. The transition flow at Baffle No. 5 is higher at 96 cfs. For detailed calculations, see Appendix F. Low fish passage flows for both juvenile and adult steelhead are both within the plunging flow regime; however, the high fish passage flows for both juvenile and adults are above the transition flow and therefore may be within the streaming flow regime. Due to the lateral limitations for the baffle pool geometry, creating a plunging flow for high fish passage flows was not obtainable.

The baffles have been designed with a notch configuration to create a nappe that during low flows allows water to plunge over a small portion of the weir shoulders into the downstream pool. Water levels during fish passage flows over Baffle No. 3 are shown Figure 8 to demonstrate a typical baffle cross section. Flow rates up to 168 cfs are within the weir shoulders, allowing fish passage at the margins of flow.

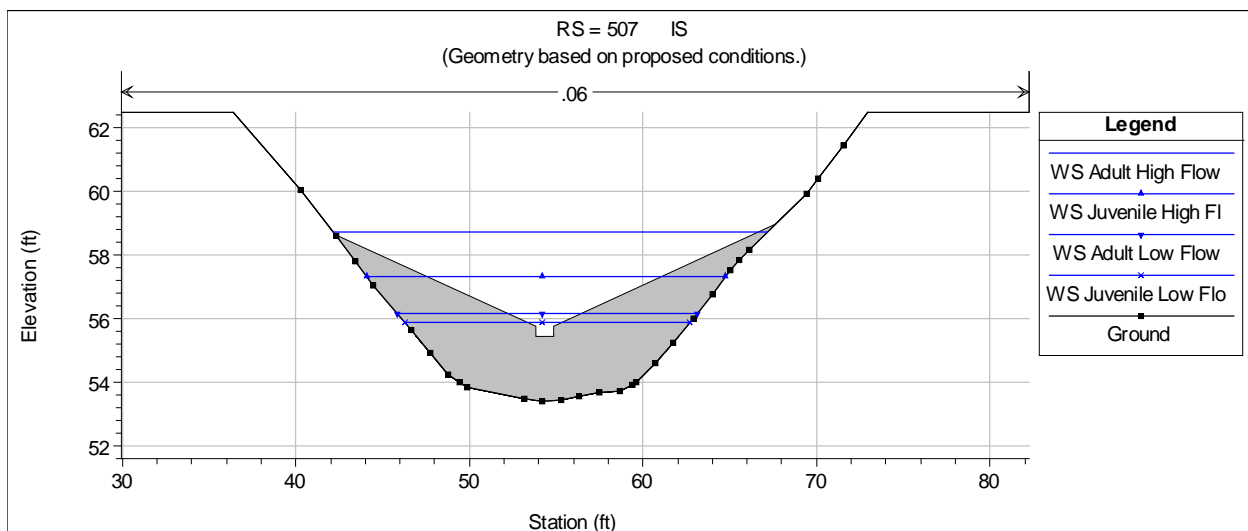


Figure 8. Sosc Creek Low Fish Passage Flows at Baffle No. 3

Rock Weirs and Pools

According to the FPDRCG (Caltrans, 2014), the hydraulics of the proposed fish passage within the creek should be evaluated for the maximum allowable velocity during the high passage design flow for adult and juvenile steelheads, and should be evaluated for the minimum allowable water depth during the low passage design flow as shown in Table 7.



Table 7. Maximum Allowable Velocity and Minimum Water Depth Criteria for Adult and Juvenile Steelheads in a Channel

| Species/ Life stage | Flow Type | Flow Rate (cfs) | Maximum Velocity (ft/s) | Minimum Water Depth (ft) |
|------------------------|------------------|--------------------|----------------------------|--------------------------------|
| Adult Steelhead | High Design Flow | 177 | 5* | N/A |
| | Low Design Flow | 3 | N/A | 0.5 |
| Juvenile Steelhead | High Design Flow | 36 | 1 | N/A |
| | Low Design Flow | 1 | N/A | 0.5 |

Note: * Maximum average water velocity in a channel.

With the proposed fish passage improvements, the maximum velocities and minimum water depths are summarized in Table 8 for adult and juvenile steelheads during the high and low passage design flows in the channel (see Appendix A for the detailed analysis of the existing condition and Appendix B for the detailed hydraulic analysis results of the proposed condition).

Table 8. Maximum Velocity and Minimum Water Depth for Adult and Juvenile Steelheads in the Channel Downstream of the Bridge at SR 29 SB

| Species/ Life stage | Flow Type | Location | Maximum Velocity* (ft/s) | Minimum Water Depth** (ft) |
|------------------------|------------------|--------------------|--------------------------------|----------------------------------|
| Adult Steelhead | High Design Flow | In the Channel | 3.9 | N/A |
| | Low Design Flow | In the Channel | N/A | 1.1 |
| | | At Rock Weir Crest | | 0.5 |
| Juvenile Steelhead | High Design Flow | In the Channel | 2.0 | N/A |
| | Low Design Flow | In the Channel | N/A | 0.8 |
| | | At Rock Weir Crest | | 0.3 |

Note: *Maximum velocity was rounded to nearest 0.1 ft/s.

** Minimum water depth was rounded to nearest 0.1 ft.

Adult Steelhead Hydraulic Drop, Velocity, and Depth Criteria

According to the hydraulic analysis results, the maximum hydraulic drop during the adult steelhead high fish passage flow within the improved channel reach range from 0.38 ft to 0.66 ft. This meets the criterion requiring drops to be less than 1.0 ft. Although the hydraulic drops at some of the rock weirs were slightly greater than 6 inches, they were the minimum achievable based on the site-specific geometry. The 6-inch drop heights were still targeted per comments provided to the Project design team from CDFW and NMFS. CDFW and NMFS stated the requirement is still applicable for stability.



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The hydraulic analysis results indicated the minimum water depth requirements for the adult steelheads during the low fish passage flow were satisfied within the improved creek reach except at the rock weir crests. According to the prolonged and burst swimming characteristics of salmonids from the CSSHRM, adult steelhead are expected to be able to pass over the relatively short length of the rock weirs.

The average cross-sectional velocity at each channel section within the improved channel grading reach are below the 5.0 ft/s maximum velocity threshold during the adult steelhead high design flows.

Juvenile Steelhead Velocity and Depth Criteria

Due to the lack of summer flows at the site, juvenile steelhead are not anticipated to require jumping upstream. However, the criteria are evaluated below for reference.

The hydraulic analysis results indicated the minimum water depth requirements for the juvenile steelheads during the low fish passage flow were satisfied within the improved creek reach except at the rock weir crests. According to the prolonged and burst swimming characteristics of salmonids from the CSSHRM, juvenile steelhead less than 6-inch-long are expected to be able to pass over the relatively short length of the rock weirs.

The average cross-sectional velocity for a large portion of the channel cross sections within the improved channel segment of the project during the juvenile high fish passage flows are more than the 1 ft/s maximum criterion. As mentioned, the improved channel is expected to have high velocities through the deepest part of the channel and lower velocities along the shallower margins of the flow. The velocities at the margins of flow are less than the 1.0 ft/s maximum criterion, as shown in Figure 7. Velocity Profile During Juvenile Fish Passage Flow. Therefore, the proposed fish passage improvements would meet the maximum velocity requirement for juvenile steelhead during the high fish passage flow within the improved channel portion of the Project.

Step-pool Energy Dissipation Factor Analysis

As mentioned previously the volume of a fish passage pool must be adequate to dissipate energy without being too turbulent for fish passage. The EDF was evaluated at each step-pool can be evaluated by the EDF (CDFW, 2004). The EDF was calculated at the high passage flow using the following equation:

$$EDF = \frac{\gamma Qh}{V}$$

Where:



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- EDF = Energy Dissipation Factor (ft-lb/s/ft³)
 γ = Unit weight of water (62.4 lb/ft³)
 Q = Flow entering the pool (ft³/s)
 h = Head of the drop flow entering the pool (ft)
 V = Effective volume of the pool for dissipating energy (ft³)

According to the criteria, the EDF should not exceed 4 ft-lb/s/ft³ for adult salmon and steelhead (Bates et al., 2003). The EDF calculation is presented in Appendix E and was performed using a pool length limitation of 8 ft and depth limitation of 4 ft, per comments from CDFW. The calculated EDF for the proposed step-pools for the Project ranged between 5.5 and 10.2 ft-lb/s/ft³, as shown in Table 9. Due to the limitation in effective pool length and depth, the remaining variables that could be changes to reduce the EDF are the head drop and channel width. The channel width is limited by cultural resources along the north and south banks of the channel and existing trees to the north, so it cannot be significantly expanded beyond the current design. To sufficiently reduce the drop height, approximately double the rock weirs would be required in the same length of creek. The resulting pools would be too small to be constructable. Therefore, due to the channel geometry, the EDF criteria was not able to be met during high adult fish passage flows. The drops were reduced to the extent feasible to minimize the EDF.

Various flows were analyzed to understand the threshold under which EDF at each pool is below the criterion of 4-ft-lb/s/ft³. Results showed the proposed fish passage design passed the EDF criteria for flows up to 26 cfs (Table 9).

Table 9. Energy Dissipation Factors at Rock Weir Step Pools

| Rock Weir Pool No. | EDF (ft-lb/s/ft ³) | |
|--------------------|---|----------------------------|
| | Adult High Fish Passage Flow (177 cfs) | Passing Threshold (26 cfs) |
| 1 | 5.5 | 1.5 |
| 2 | 5.8 | 1.9 |
| 3 | 8.4 | 2.7 |
| 4 | 6.9 | 3.9 |
| 5 | 10.2 | 2.4 |
| 6 | 7.0 | 2.5 |
| 7 | 7.9 | 3.1 |
| 8 | 7.5 | 2.9 |

Engineered Streambed Material Analysis

According to the Part IX Fish Passage Evaluation at Stream Crossing in the CSSHRM (CDFW, 2004), the engineered streambed material (ESM) that forms the bed of a roughened channel consists of two components: large rock that forms a framework and smaller material that fills



the interstitial voids in that framework. The framework of larger rocks should be sized using the following equation (ACOE, 1994) to be immobile during the stable bed design flow, or 100-year flow, for rock chutes with slopes greater than 2%.

$$D_{30-ACOE} = \frac{1.95S^{0.555}(1.25q)^{\frac{2}{3}}}{g^{\frac{1}{3}}}$$

Where:

$$D_{30-ACOE} = D_{30} \text{ Stable particle size based on rock gradation provided in ACOE 1994 (ft)}$$

$$S = \text{Hydraulic slope (ft/ft)}$$

$$q = \text{Unit discharge within the active channel at the stable bed design flow (ft}^3\text{/s)}$$

$$g = \text{Gravitational acceleration (32.2 ft/s}^2\text{)}$$

The estimated $D_{30-ACOE}$ for the site is around 1.7 ft or 20 inches.

Bates et al. (2003) recommends the following three equations to obtain a uniform rock slope protection gradation in order to achieve a stable bedform while filling the interstitial voids.

$$D_{84-ESM} = 1.5D_{30-ACOE}$$

$$D_{50-ESM} = 0.4D_{84-ESM}$$

$$D_{100-ESM} = 2.5D_{84-ESM}$$

Where:

$$D_{84-ESM} = D_{84} \text{ Suitable particle size (ft)}$$

$$D_{50-ESM} = D_{50} \text{ Suitable particle size (ft)}$$

$$D_{100-ESM} = D_{100} \text{ Suitable particle size (ft)}$$

The above equations were applied at each step pool location along the proposed channel. The estimated D_{84-ESM} ranged from 22 inches to 33 inches and the estimated D_{50-ESM} ranged from 9 inches to 13 inches (see Appendix G). The estimated $D_{100-ESM}$ particle size ranged from 55 inches to 81 inches. The $D_{100-ESM}$ is reviewed as guidance per the CSSHRM and can be decreased (CDFW, 2004). In the case of this project, the $D_{100-ESM}$ was decreased to 30 inches to better suit the site conditions.

The following equations included in USFS (2008) can be used to size the material smaller than D_{50-ESM} that serves to fill the interstitial voids between the large rocks.

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$



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It is recommended that n value between 0.45 and 0.70 be used to develop the design particle-size distribution. The n values should be selected to result in the D_{8-ESM} to be approximately 2 millimeters (mm). The estimated D_{16-ESM} has a particle size ranging from 0.70 inches (18 mm) to 1 inch (26 mm). The estimated D_{8-ESM} has a particle size ranging from 0.15 inches (4 mm) to 0.22 inches (6 mm). Because D_{8-ESM} is greater than 2 mm, additional fines should be added to the mix to achieve the recommend 5 to 10% fines in the ESM mix (CDFW, 2004).

According to the “Part IX Fish Passage Evaluation at Stream Crossing” in the CSSHRM (CDFW, 2004), the D_{84-ESM} to $D_{100-ESM}$ are separated from the gradation and be used to construct steps and other stable large rock features.

The remainder of the material ($\leq D_{84-ESM}$) is used to form the bed between the rock weirs. Therefore, the ESM mixture used to form the channel bed is proposed to range up to approximately 24 inch diameter rocks, with a D_{50} of 12 inches. The thickness of the ESM between large rock weirs should at least equal to the largest rock used in the channel bed. The ESM layer thickness for this Project will be 2.5 ft.

Rock Weir Sizing Analysis

According to the “Part IX Fish Passage Evaluation at Stream Crossing” in the CSSHRM (CDFW, 2004), the following equation is recommended to estimate the stable median rock size based on the Far West States Lane Method riprap sizing method (Natural Resources Conservation Service [NRCS], 1996).

$$D_{75-riprap} = \frac{3.5wDS}{CK}$$

Where:

- $D_{75-riprap}$ = D_{75} riprap size (inches)
- w = Channel top width at the design flow (ft)
- D = Maximum depth of flow in channel (ft)
- S = Channel slope (ft/ft)
- C = Coefficient for channel curvature. Ranges from 0.6 to 1 with a value of 1 for straight channels
- K = Side slope coefficient. Typically ranges from 0.53 to 0.87 for installed rock slope revetments of 1.5H:1V to 3H:1V, respectively.

The value of K has a significant impact on the computed rock size. A value of 1 was used by Fripp et al. because the rock was placed flat on the streambed.

The following equation was recommended to obtain $D_{50-riprap}$ (NRCS, 1996):



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$$D_{75-riprap} = 1.2D_{50-riprap}$$

The rock gradation for rock weirs can be determined using the following equations:

$$D_{50-weir} = 1.2D_{50-riprap}$$

$$D_{100-weir} = 4D_{50-riprap}$$

$$D_{min-weir} = 0.75D_{50-riprap}$$

NRCS recommends larger rocks be forming the surface of the weir and the smaller rock filling the voids between the larger rock. By applying the above calculations, the estimated $D_{100-weir}$ ranged from 7 inches to 25 inches throughout the proposed channel. For detailed calculations see Appendix H.

These results produce recommended rock sizes that will be more prone to failure due to scour. The CSSHRM recommends a minimum rock size between 2 and 3 ft. Therefore, the rocks proposed to construct the rock weirs will range from 24 to 36 inches, or 2 to 3 ft.

The rock weirs will be keyed into the channel side slopes by approximately two times the D_{100} , or 6 feet.

Summary of Grain Size Distributions

The grain size distribution utilized for this project consists of ESM and structural rock used to construct rock weirs. The final distribution is shown in Table 10. The ESM material will consist primarily of rocks sized between D_{50} and D_{84} with rocks sized D_{16} and below used to fill interstitial voids throughout the streambed and rock weirs. The structural rocks present in the rock weirs will be made up of predominantly rocks sized at D_{100} with no structural rocks smaller than D_{84} .

Table 10. Grain Size Distribution

| Percent (%) | Grain Size (in) |
|-------------|-----------------|
| 8 | 0.2 |
| 16 | 0.8 |
| 50 | 12 |
| 84 | 24 |
| 100 | 36 |

Rock Weir Scour Depth analysis

The scour depth at the rock weirs is calculated following Federal Highway Administration's (FHWA) Hydraulic Engineering Circular No. 23 – Bridge Scour and Stream Instability



Countermeasures, vol. 2 (FHWA, 2009). The equation of estimating local scour depth of a vertical structure is:

$$d_s = K_u H_t^{0.225} q^{0.54} - d_m$$

Where:

- d_s = Local scour depth for a free overfall, measured from the streambed downstream of the drop (ft)
 K_u = 1.32 for English units
 H_t = Total drop in head, measured from the upstream to downstream energy grade line (ft)
 q = Discharge per unit width (cfs/ft)
 H_d = Tailwater depth (ft)

Due to back water caused by the Devlin Rd Bridge located downstream of the Project site, there is no head drop for Rock Weirs No. 7 through No. 9. The maximum scour depth of the proposed rock weirs was estimated to be 6.3 ft downstream of the Rock Weir No. 1. Scour was also calculated between the final baffle and the first rock weir, and yielded a scour depth of 5.7 ft. The remaining rock weirs were calculated to have scour depths below 2.3 ft. Due to the increased scour potential at Rock Weir No. 1, an additional rock layer will be included for added ballast to prevent scour. See Appendix I for the rock weir scour calculation.

Design Event Evaluation

The water surface elevations at the upstream and downstream of the SR 29 crossing are compared between the existing and proposed conditions in Table 11 for the 100-year storm and Table 12 for the 50-year storm. The hydraulic model results indicated that the proposed improvement would result in an increase in the water surface elevations for the studied reach, a maximum increase of 0.6 ft for the 100-year storm and 0.5 ft for the 50-year storm upstream of the arch culvert at SR 29 NB (RS 684.8).

Table 11. 100-Year Water Surface Elevation Comparison

| RS | Location | WSE* (ft NAVD 88) | | WSE Difference (ft) |
|-------|-------------------------------|-----------------------|-----------------------|---------------------------|
| | | Existing Condition | Proposed Condition | |
| 684.8 | Upstream of Arch Culvert | 72.1 | 72.7 | 0.6 |
| 485.5 | Downstream of SR 29 SB Bridge | 59.4 | 61.6 | 2.2 |

Note: * Water surface elevations were rounded to nearest 0.1 ft.



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Table 12. 50-Year Water Surface Elevation Comparison

| RS | Location | WSE* (ft NAVD 88) | | WSE Difference (ft) |
|-------|-------------------------------|-----------------------|-----------------------|---------------------------|
| | | Existing Condition | Proposed Condition | |
| 684.8 | Upstream of Arch Culvert | 70.7 | 71.2 | 0.5 |
| 485.5 | Downstream of SR 29 SB Bridge | 58.9 | 61.3 | 2.4 |

Note: * Water surface elevations were rounded to nearest 0.1 ft.



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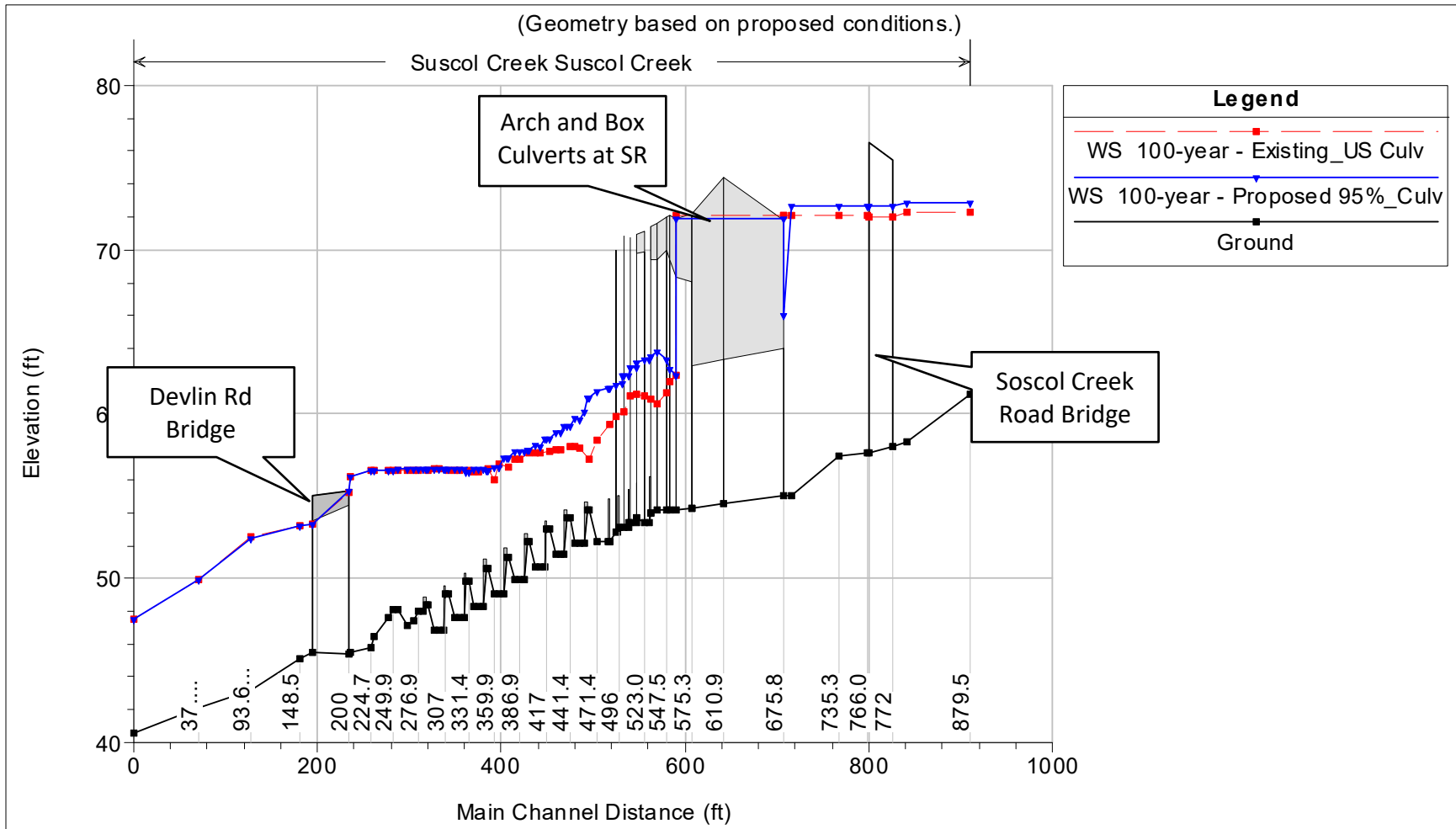


Figure 9. Suscol Creek 100-year Existing and Proposed Water Surface Profiles at SR 29 Crossing





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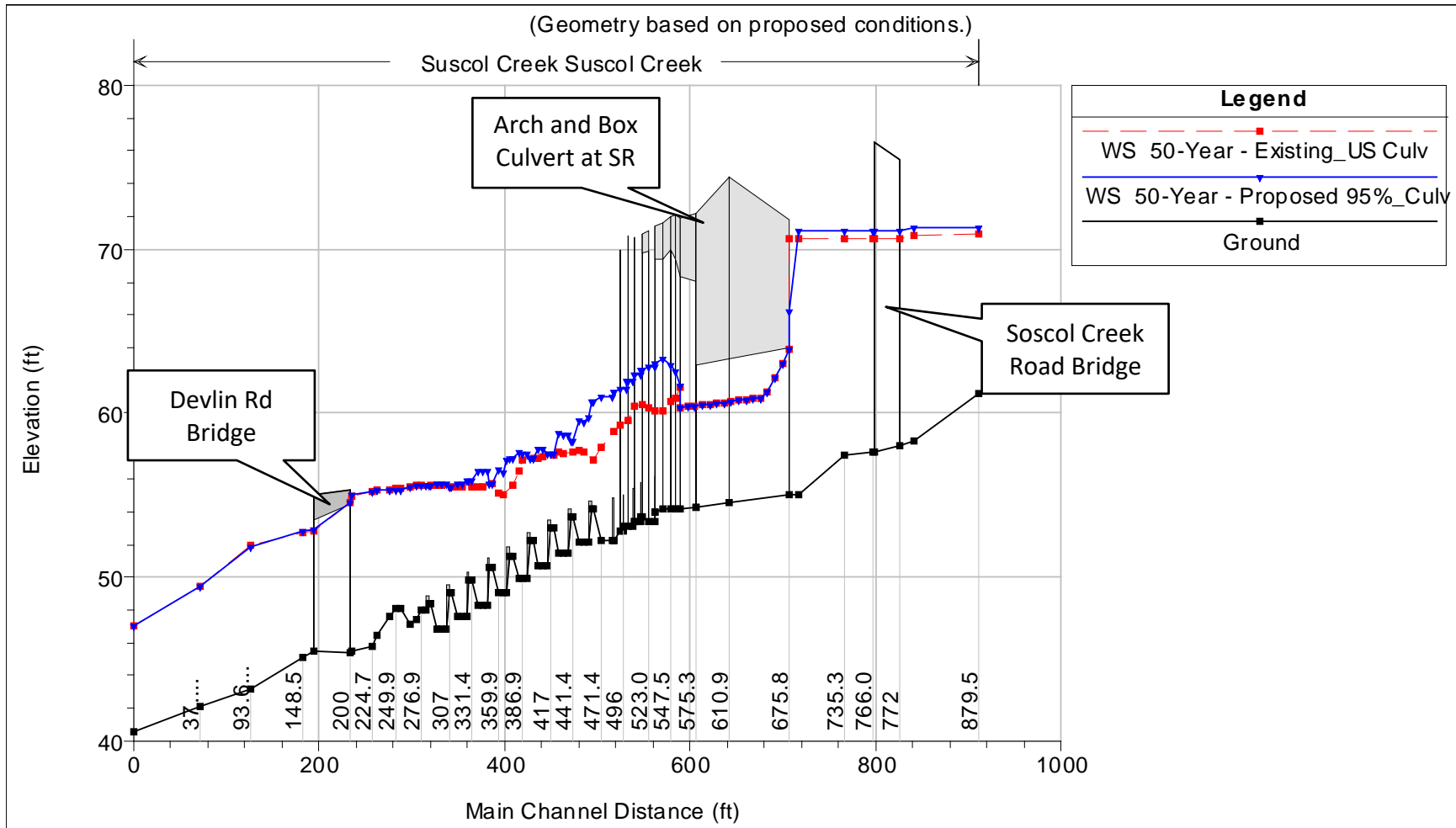


Figure 10. Suscol Creek 50-year Existing and Proposed Water Surface Profiles at SR 29 Crossing





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Rock Slope Protection for Channel Banks

Portions of the channel bank of Soscol Creek that contain natural slopes steeper than 2:1 (Horizontal: Vertical) require regrading following the installation of the buried weir ends. To minimize the slope disturbance due to archeological concerns in the Project vicinity, the eastern portion of the channel that requires regrading is proposed at a 1.5:1 side slope. In order to reduce the risk of slope erosion along this channel section, RSP will be placed as an erosion countermeasure.

The *Caltrans Highway Design Manual (HDM) (2020)* was used to calculate the RSP size for the proposed 100-year flow condition. However, the HDM rock sizing calculation is limited to channels with longitudinal slopes no steeper than 2%. Soscol Creek contains a longitudinal slope of 3%, and therefore, an alternative method for calculating rock size was evaluated. The *Hydraulic Engineering Circular No. 23 Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance, Third Edition, Volume 2 (HEC-23)* was used as an alternative method to calculate rock sizing. The HDM rock sizing calculations produced the most conservative results and ultimately were used in for the design of this Project.

RSP class calculated for all areas of the regraded streambank was Class V or smaller. Therefore, Class V is the recommended RSP size to be placed along the regraded channel side slope at the Project location. Class V has a median particle diameter of 18 inches and a median particle weight of 1/4 ton.

According to the HDM (2020), the minimum layer thickness of the RSP layer needs to be 1.5 times the median particle diameter or the maximum diameter, whichever is greater. The minimum layer thickness for Class V RSP is 2.3 ft. A gravel (granular) filter is recommended as a separator between the RSP layer and the channel streambed. The gravel layer will consist of Class II permeable material. See Rock Slope Protection Calculation Appendix J for RSP sizing calculations.



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Fish Passage Conclusion

Fish passage criteria for drop heights, velocities, and depths were evaluated at various segments within the proposed channel which include the box/arch culvert, the concrete baffles, and the weirs and pools for both juvenile and adult salmonid. The EDF was evaluated for the concrete baffles and the weirs and pools of the proposed channel for adult salmonid.

During high adult fish passage flows, criteria for drop heights were met in all segments of the channel while the velocity criteria was met in all segments of the channel with the exception of the box and arch culvert. During low adult fish passage flows, the depth criteria was met for all segments of the proposed channel. The adult fish passage criteria for drop height, velocity, and depth are all met up to 125 cfs. Based on the time series hydrologic model discussed in Section 2, flows at the Project site during the migration period (from November through April) have historically been less than 125 cfs 98% of the time. As demonstrated based on historical rainfall, the design is expected to meet design criteria 97% of the time that there is at least 1 cfs flow at the site from November through April.

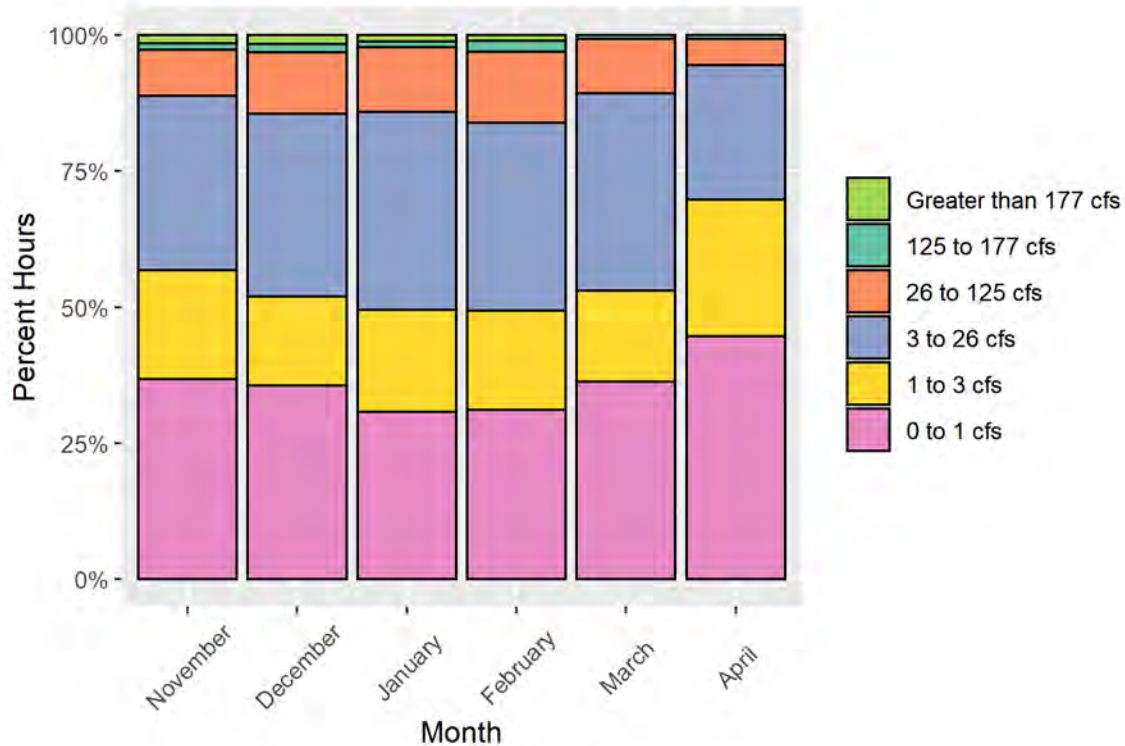
During juvenile fish passage flows, criteria for drop heights were met in all segments of the channel while the velocity criteria was met in all segments of the channel with the exception of the box and arch culvert. During low juvenile fish passage flows, the depth criteria was met for all segments of the proposed channel. The Juvenile fish passage criteria for drop height, velocity, and depth are all met up to 30 cfs. Based on the hydrologic model, flows at the Project site from November through April have historically been less than 30 cfs 90% of the time. As demonstrated based on historical rainfall, the design is expected to meet design criteria 84% of the time that there is at least 1 cfs flow at the site from November through April.

EDF criteria was not met at the concrete baffles or the rock weir and pools under adult high fish passage flows. The EDF factors throughout the constructed reach meet the criteria at flows up to 26 cfs. Based on the hydrologic model, flows at the Project site from November through April have historically been less than 26 cfs 87% of the time. As demonstrated based on historical rainfall, the design is expected to meet design criteria 80% of the time that there is at least 1 cfs flow at the site from November through April.

These flow occurrences are shown in further detail in Figure 11.



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Notes:

1. 177 cfs is the high adult fish passage design flow rate.
2. 125 cfs is the flow rate at which adult passage depth and velocity criteria are met.
3. 26 cfs is the flow rate at which EDF criteria are met.
4. 3 cfs is the low adult fish passage design flow rate.
5. 1 cfs is the low juvenile fish passage design flow rate. The design also meets depth and velocity criteria for adults at 1 cfs.

Figure 11. Historical Occurrence of Flow Rates at Site from November through April



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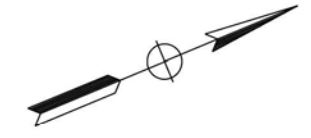
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Appendix A. Fish Passage Plan

| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
|------|--------|--------|--------------------|-----------|--------------|
| 04 | Nap | 29,221 | 3.5/6.0 0.0/0.2 | -- | -- |



REGISTERED CIVIL ENGINEER DATE _____
 PLANS APPROVAL DATE _____
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CURVE DATA

| No. | R | Δ | T | L | N | E |
|-----|---------|-----------|--------|--------|------------|------------|
| ① | 20.00' | 58°08'41" | 10.95' | 20.13' | 6484683.14 | 1849167.98 |
| ② | 50.00' | 58°42'51" | 28.20' | 51.24' | 6484692.45 | 1849245.93 |
| ③ | 20.00' | 12°05'22" | 2.12' | 4.22' | 6484727.24 | 1849267.24 |
| ④ | 50.00' | 05°34'48" | 2.44' | 4.87' | 6484797.06 | 1849279.25 |
| ⑤ | 100.00' | 12°19'03" | 10.79' | 21.50' | 6484849.05 | 1849301.51 |
| ⑥ | 100.00' | 03°13'42" | 2.82' | 5.63' | 6484859.79 | 1849336.65 |
| ⑦ | 100.00' | 10°47'38" | 9.45' | 18.91' | 6484883.34 | 1849402.22 |

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
 CONSULTANT FUNCTIONAL SUPERVISOR: HAN-BIN LIANG
 CALCULATED/DESIGNED BY: SHANNON MCCARTY
 CHECKED BY: JENNIFER ABRAMS
 REVISED BY: SHANNON MCCARTY
 DATE REVISED: JENNIFER ABRAMS

NOTE:
 FOR ACCURATE RIGHT OF WAY DATA, CONTACT
 RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CONSTRUCTION DETAILS
FISH PASSAGE PLAN
 SCALE: 1" = 20'
C-75

LAST REVISION: DATE PLOTTED => 30-MAR-2021 00-00-00 TIME PLOTTED => 16:04

| Dist | COUNTY | ROUTE | POST MILES (LOCAL) | SHEET No. | TOTAL SHEETS |
|------|--------|--------|--------------------|-----------|--------------|
| 04 | Nap | 29,221 | 0.5/0.2 0.0/0.2 | -- | -- |

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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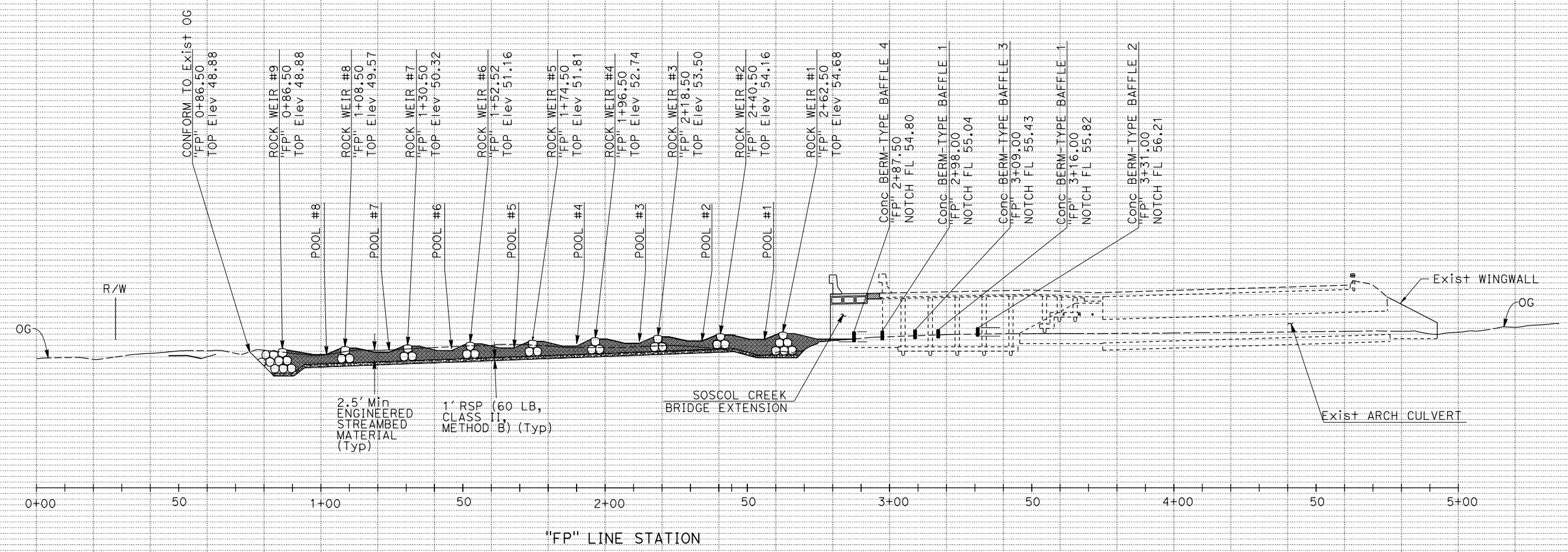


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NOTE:
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- LEGEND:**
- ROCK WEIR
 - VOID FILLER
 - ▨ ENGINEERED STREAMBED MATERIAL
 - ▨ CLASS II PERMEABLE MATERIAL
 - ▨ CLASS V RSP, METHOD B



CONSTRUCTION DETAILS
FISH PASSAGE PROFILE
SCALE: 1" = 20'

C-76

| | | | |
|--|----------------------------------|------------------------|-----------------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | CALCULATED-DESIGNED BY | REVISOR |
| Caltrans | HAN-BIN LIANG | SHANNON MCCARTY | SHANNON MCCARTY |
| | | CHECKED BY | DATE REVISED |
| | | JENNIFER ABRAMS | |

USERNAME => Shannon_McCarty
DGN FILE => 0400000769ga076.dgn



UNIT 0000

PROJECT NUMBER & PHASE

04000007691

BORDER LAST REVISED 7/2/2010

LAST REVISION DATE PLOTTED => 30-MAR-2021
00-00-00 TIME PLOTTED => 16:17

Attachment 1

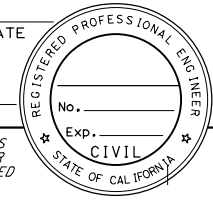
REGISTERED CIVIL ENGINEER DATE _____

PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

NVTA
625 BURNELL STREET
NAPA, CA 94559

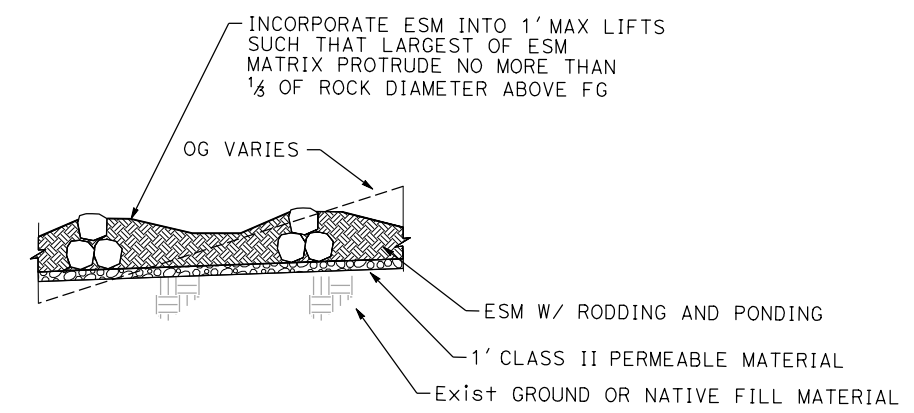


NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE

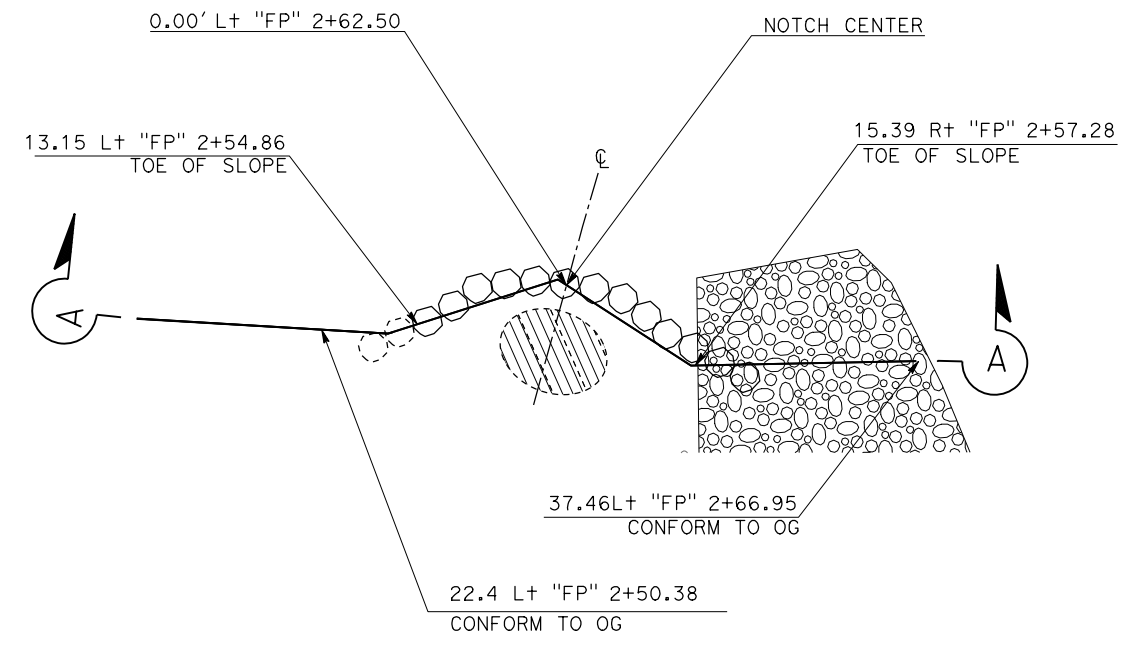
- LEGEND:**
- ROCK WEIR
 - VOID FILLER
 - ESM
 - CLASS II PERMEABLE MATERIAL
 - CLASS V RSP, METHOD B

QUANTITIES

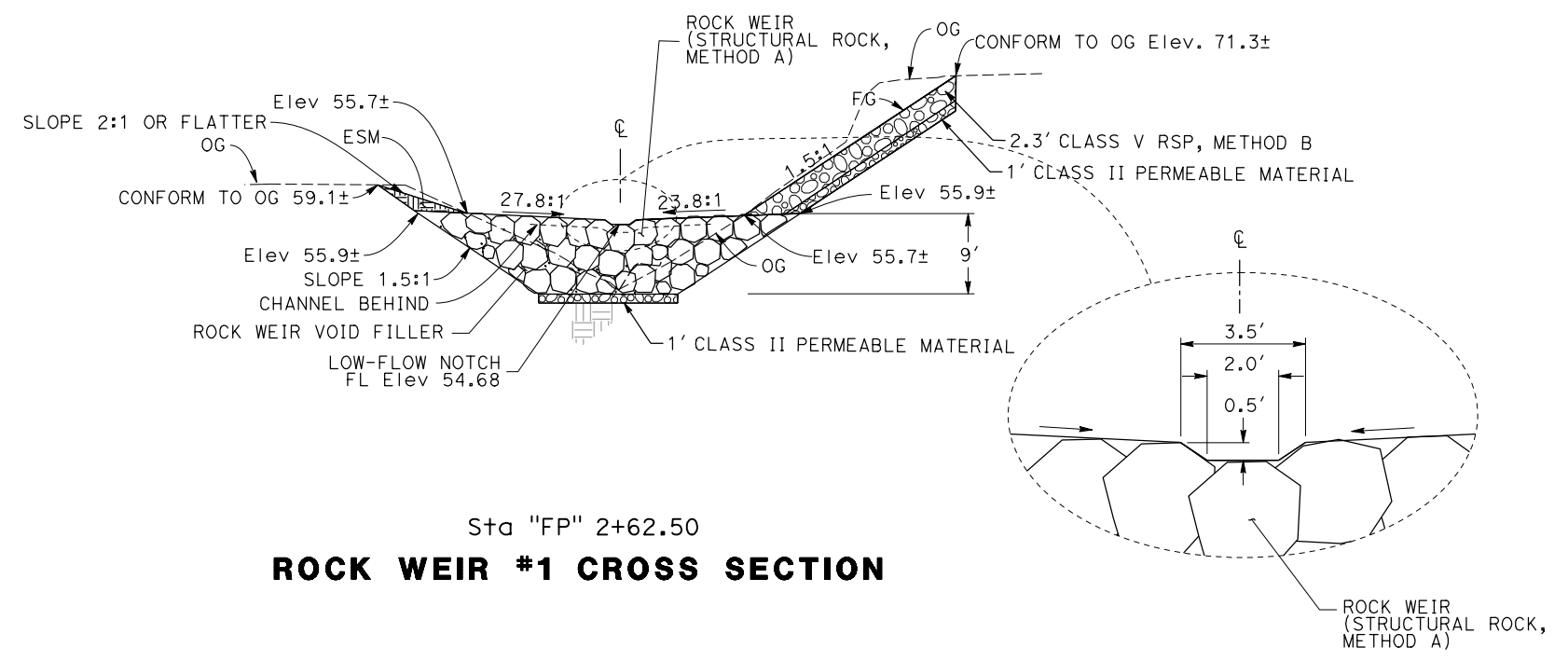
| CHANNEL EXCAVATION | ESM (12" D50) PLACEMENT METHOD B | VOID FILLER | CLASS II PERMEABLE MATERIAL | STRUCTURAL ROCK, METHOD A | CLASS V RSP, 1/4 TON, METHOD B |
|--------------------|----------------------------------|-------------|-----------------------------|---------------------------|--------------------------------|
| CY | CY | CY | CY | CY | CY |
| 1,248 | 388 | 412 | 253 | 374 | 336 |



**TYPICAL DETAIL
ESM LIFT PLACEMENT**



ROCK WEIR #1 PLAN VIEW



**Sta 'FP' 2+62.50
ROCK WEIR #1 CROSS SECTION**

CONSTRUCTION DETAILS
NO SCALE

C-77

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
|------|--------|--------|------------|-----------|--------------|
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

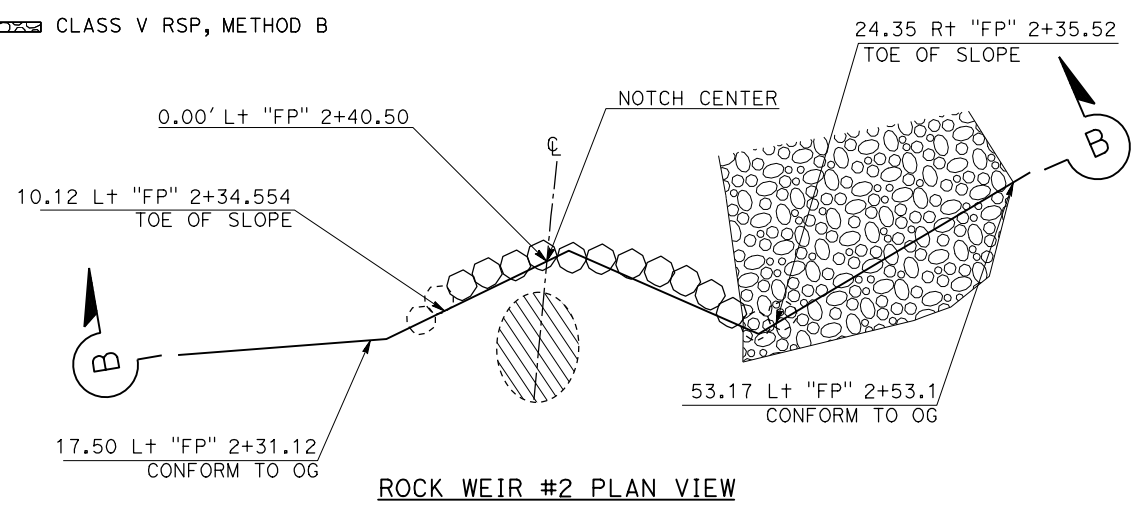


WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

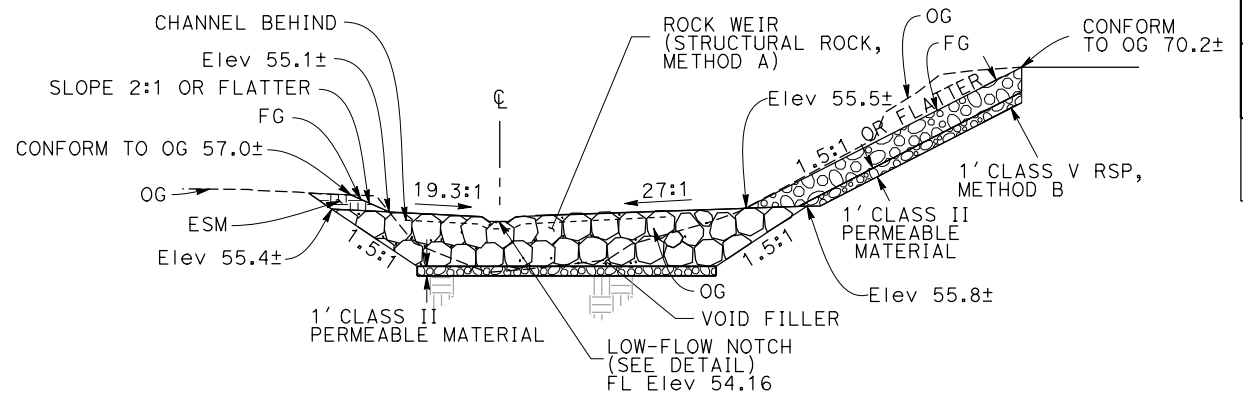
NVTA
625 BURNELL STREET
NAPA, CA 94559

- LEGEND:**
- ROCK WEIR
 - VOID FILLER
 - ESM
 - CLASS II PERMEABLE MATERIAL
 - CLASS V RSP, METHOD B

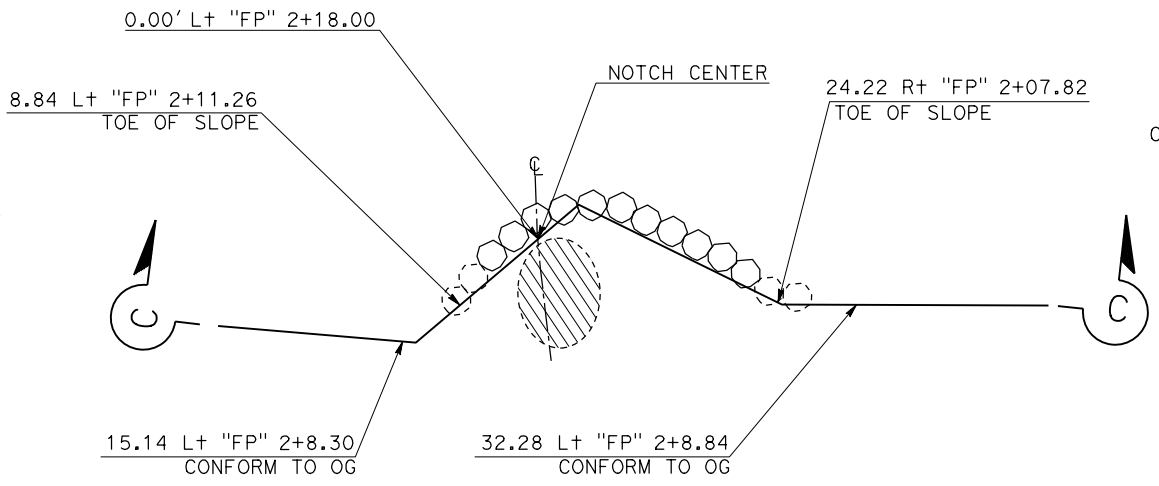
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



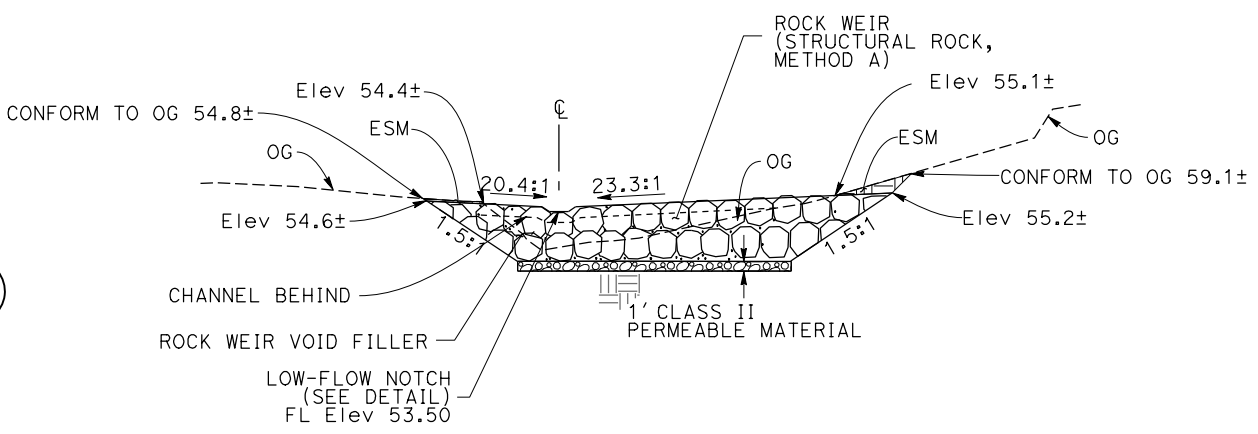
ROCK WEIR #2 PLAN VIEW



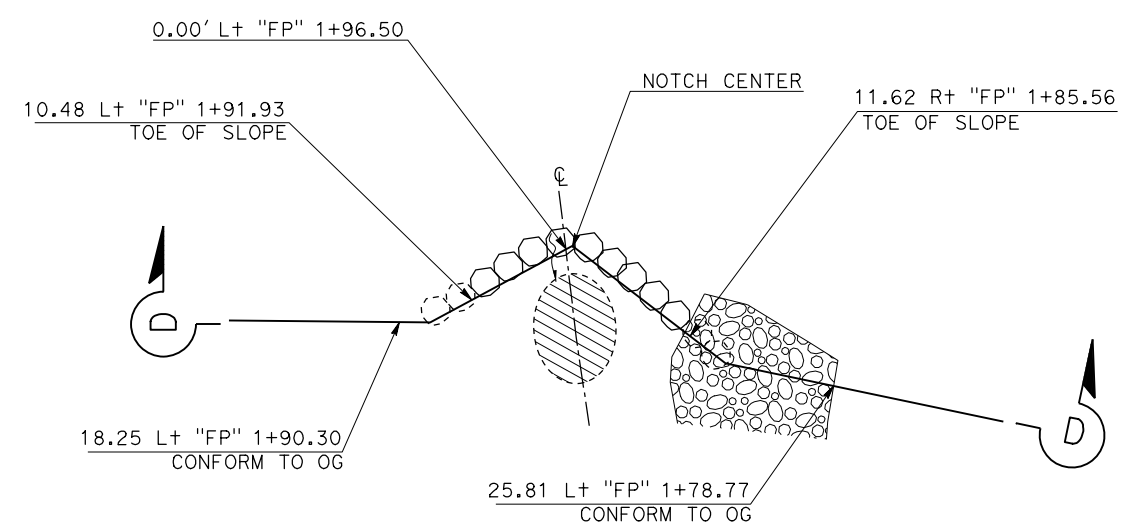
Sta "FP" 2+40.50
ROCK WEIR #2 CROSS SECTION



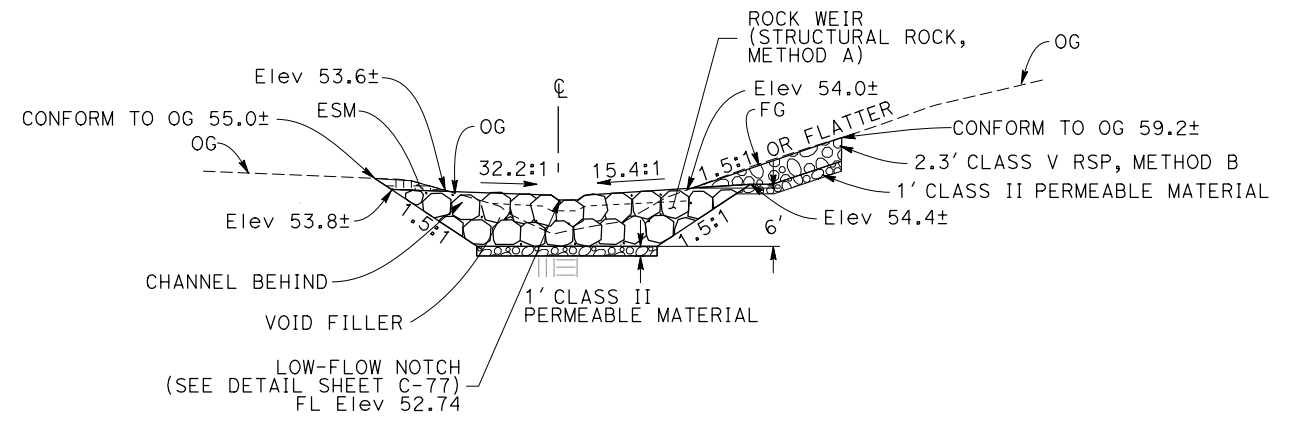
ROCK WEIR #3 PLAN VIEW



Sta "FP" 2+18.50
ROCK WEIR #3 CROSS SECTION



ROCK WEIR #4 PLAN VIEW



Sta "FP" 1+96.50
ROCK WEIR #4 CROSS SECTION

CONSTRUCTION DETAILS
NO SCALE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SHANNON MCCARTY
JENNIFER ABRAMS
HAN-BIN LIANG

REVISOR BY DATE
DESIGNED BY CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR



USERNAME => Shannon_McCarthy
DGN FILE => 0400000769ga078.dgn



UNIT 0000

PROJECT NUMBER & PHASE 04000007691

C-78

LAST REVISION DATE PLOTTED => 30-MAR-2021
00-00-00 TIME PLOTTED => 16:34

| | | | | | |
|------|--------|--------|------------|-----------|--------------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

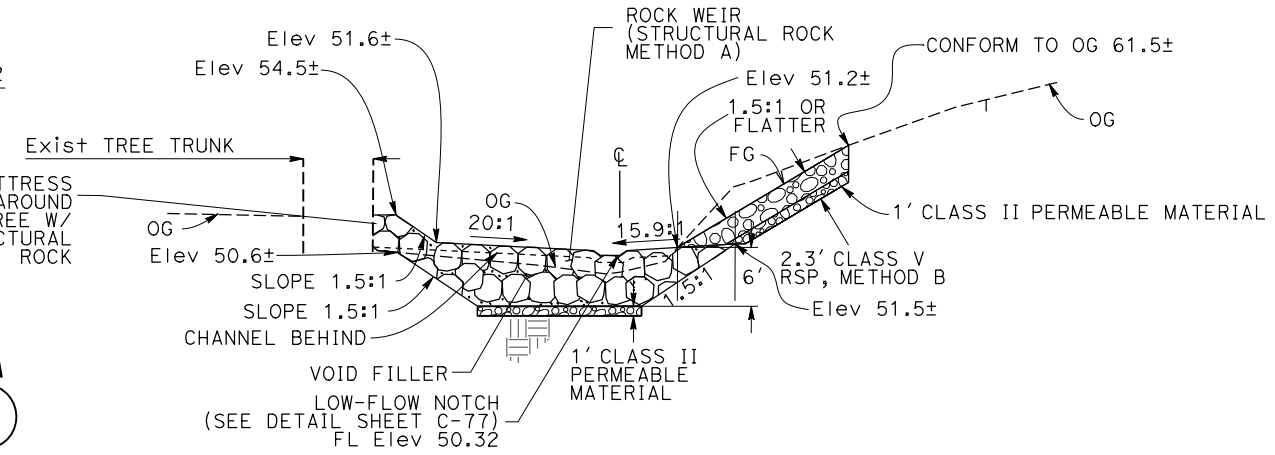
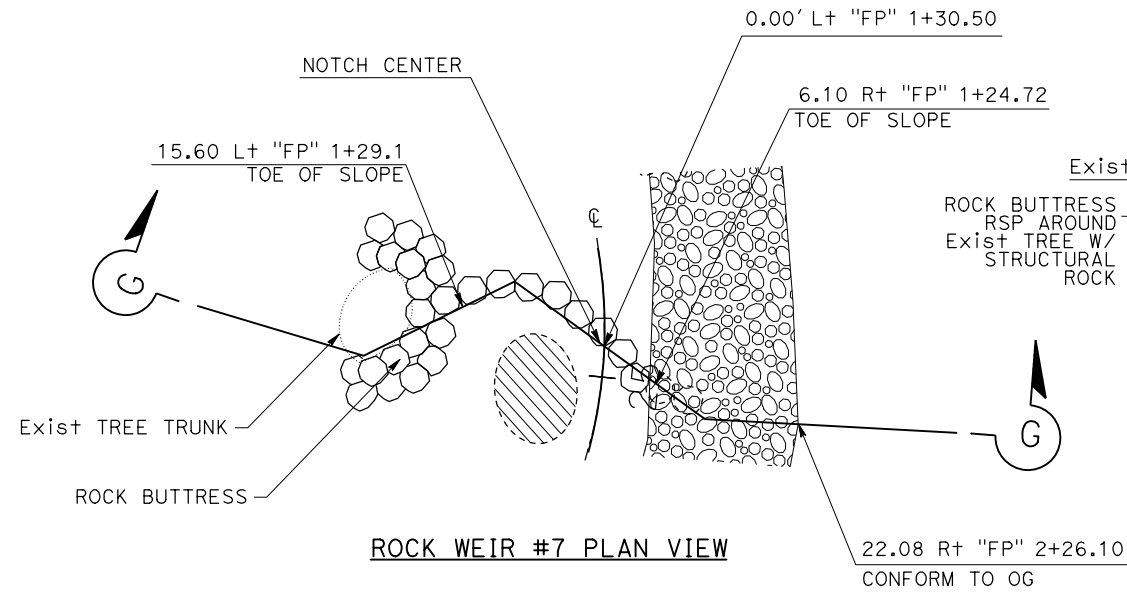
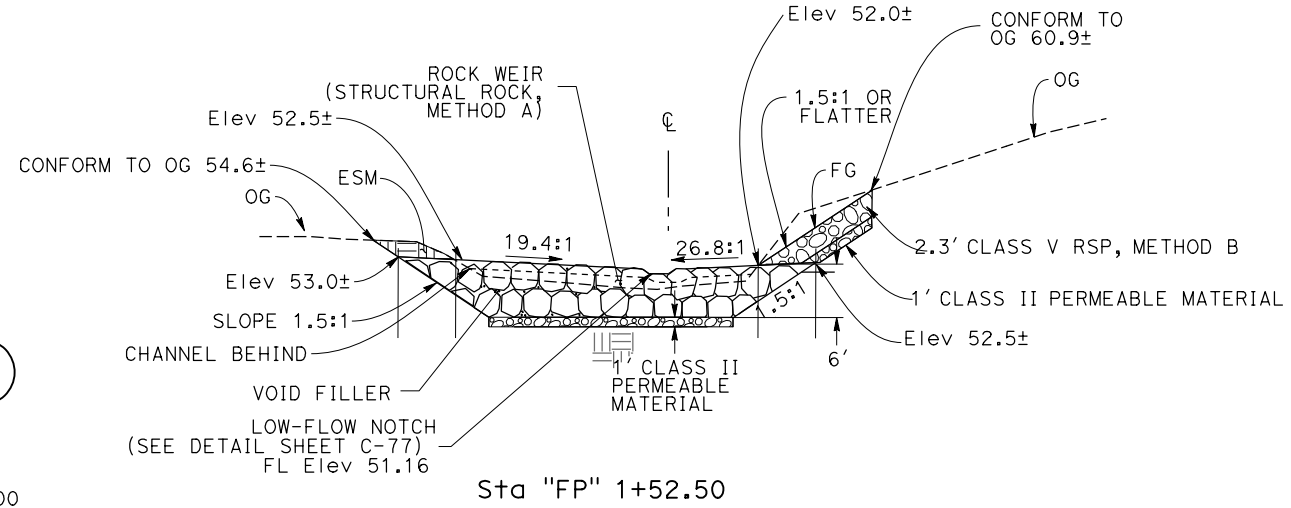
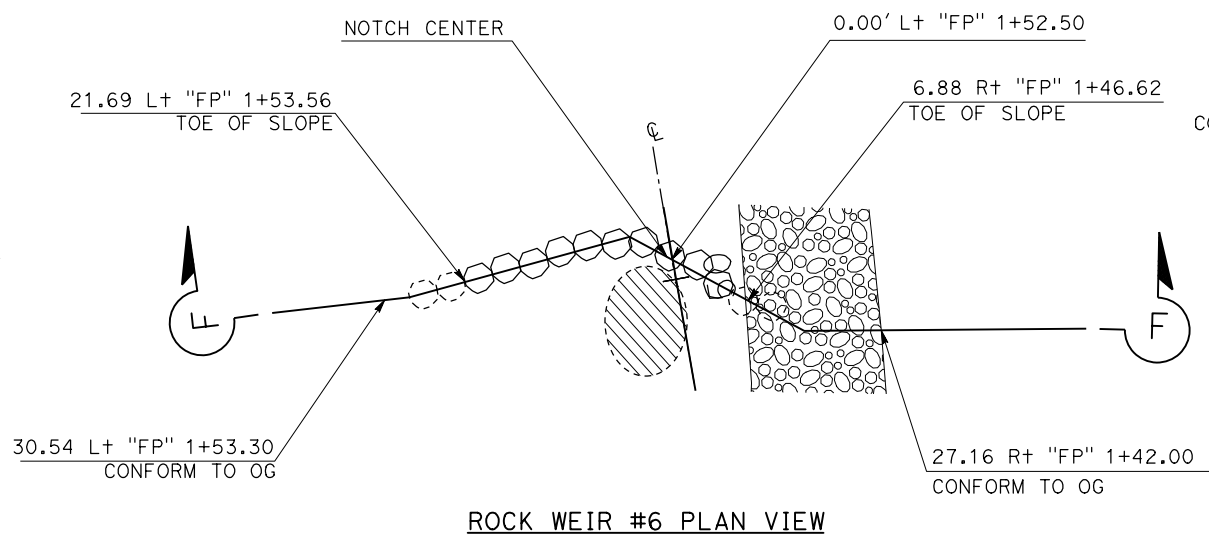
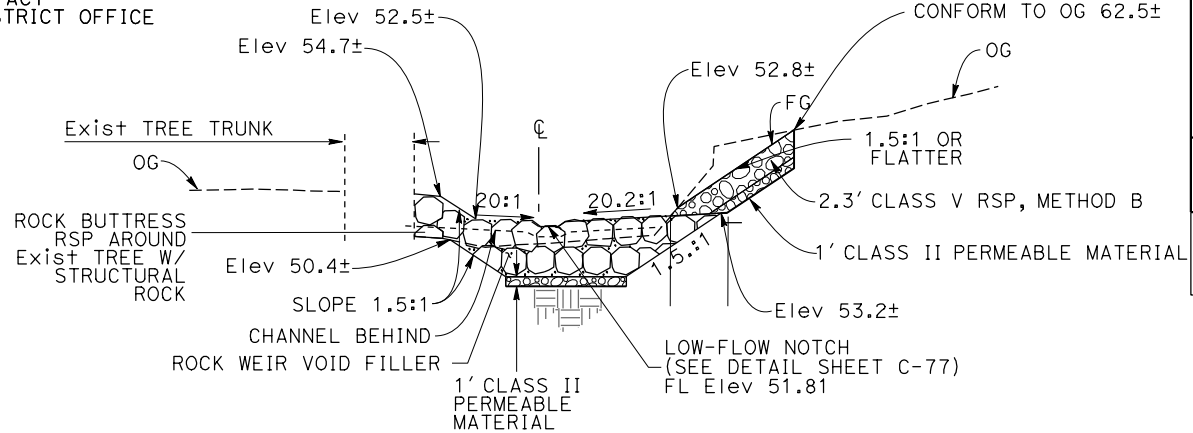
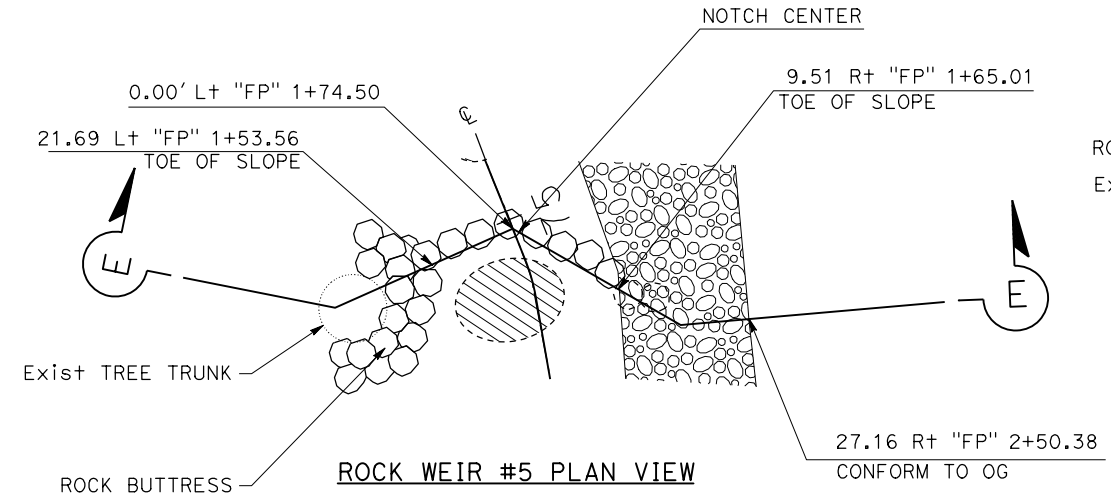
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

NVTA
625 BURNELL STREET
NAPA, CA 94559

- LEGEND:**
- ROCK WEIR
 - VOID FILLER
 - ESM
 - CLASS II PERMEABLE MATERIAL
 - CLASS V RSP, METHOD B

NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



CONSTRUCTION DETAILS
NO SCALE
C-79

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SHANNON MCCARTY
JENNIFER ABRAMS
HAN-BIN LIANG

REVISOR BY DATE
DESIGNED BY CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

ESTIMATED COST

USERNAME => Shannon_McCarthy
DGN FILE => 0400000769ga079.dgn

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

UNIT 0000

PROJECT NUMBER & PHASE

04000007691

LAST REVISION DATE PLOTTED => 30-MAR-2021
00-00-00 TIME PLOTTED => 16:42

| | | | | | |
|------|--------|--------|------------|-----------|--------------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

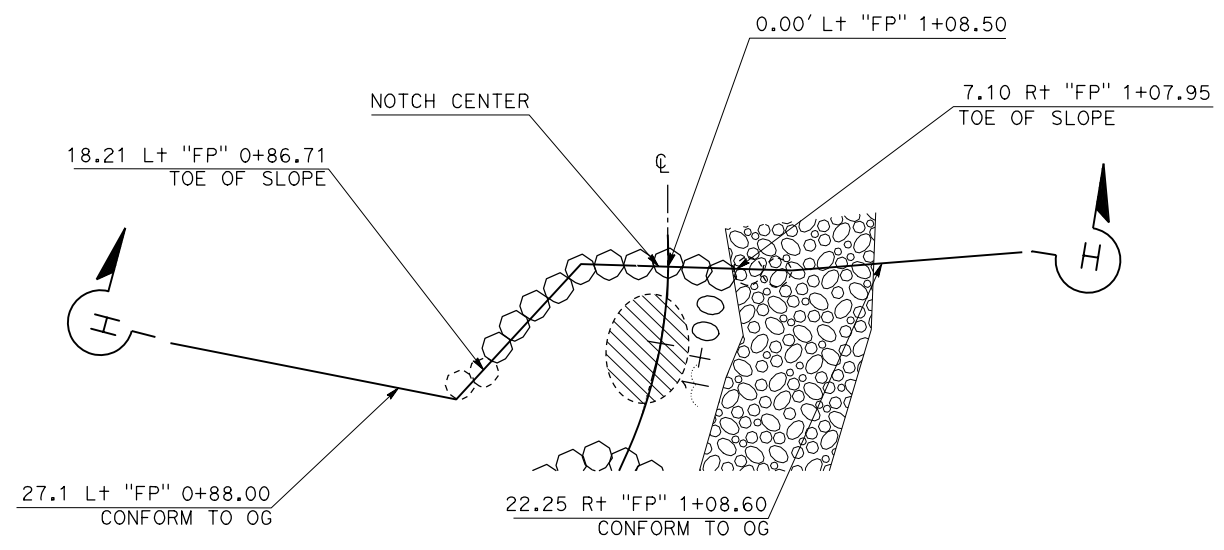
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

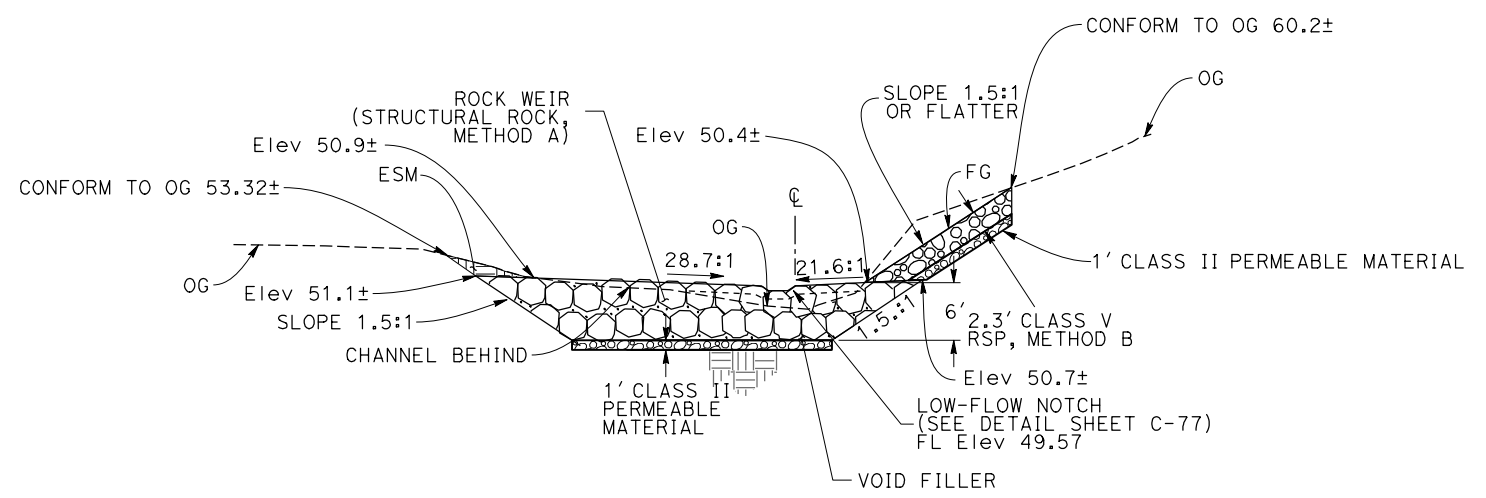
NVTA
625 BURNELL STREET
NAPA, CA 94559

- LEGEND:**
- ROCK WEIR
 - VOID FILLER
 - ESM
 - CLASS II PERMEABLE MATERIAL
 - CLASS V RSP, METHOD B

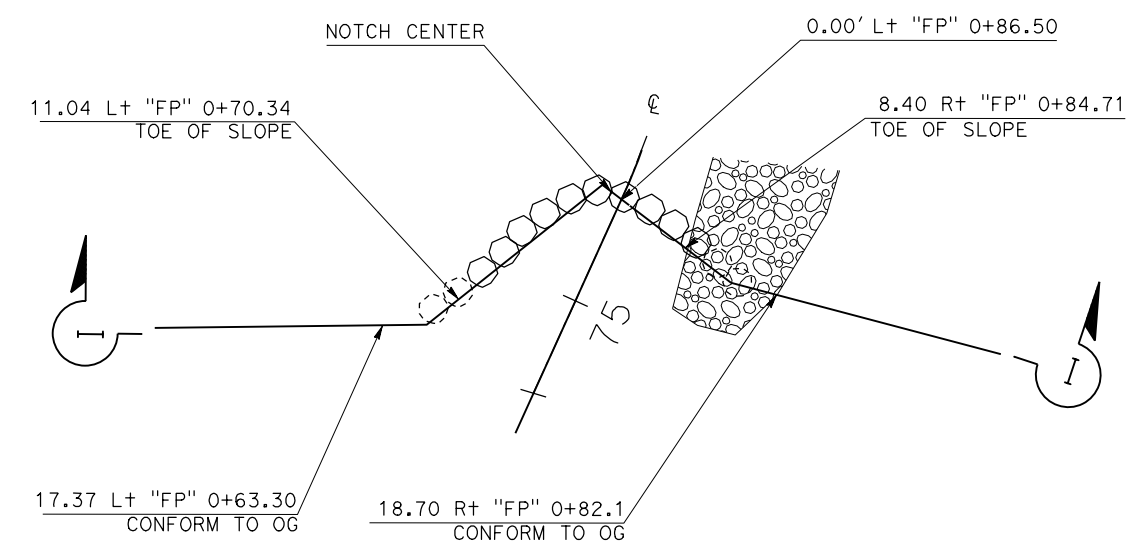
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



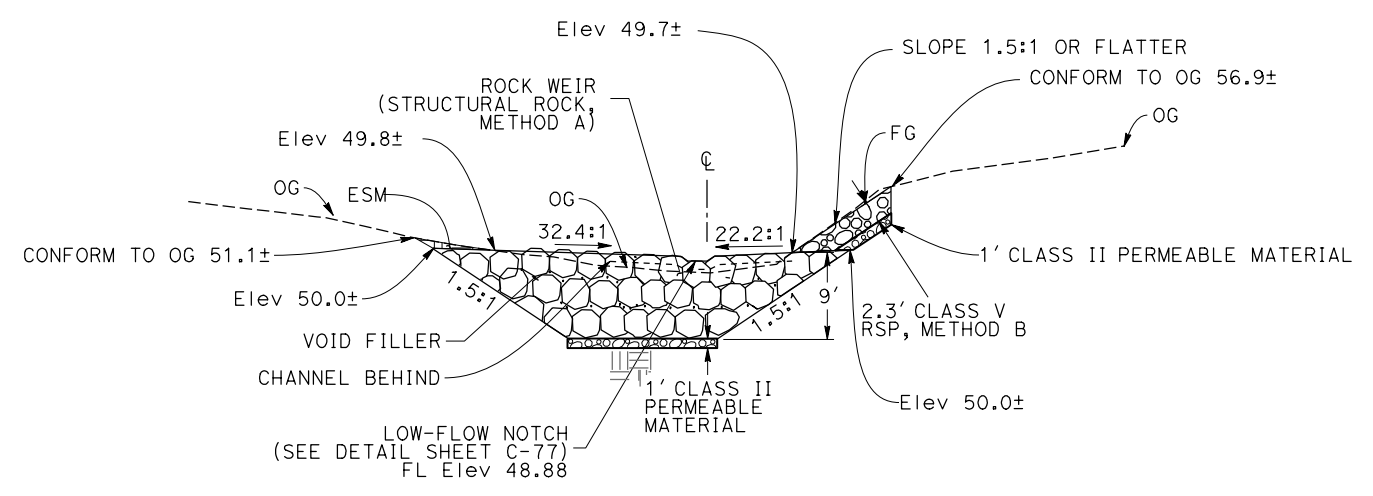
ROCK WEIR #8 PLAN VIEW



Sta "FP" 1+08.50
ROCK WEIR #8 CROSS SECTION



ROCK WEIR #9 PLAN VIEW



Sta "FP" 0+86.50
ROCK WEIR #9 CROSS SECTION

CONSTRUCTION DETAILS
NO SCALE

C-80

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

REVISOR: SHANNON MCCARTY, JENNIFER ABRAMS
DATE: [REDACTED]

CONSULTANT: HAN-BIN LIANG

LAST REVISION DATE PLOTTED => 30-MAR-2021
00-00-00 TIME PLOTTED => 16:47

| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
|------|--------|--------|------------|-----------|--------------|
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

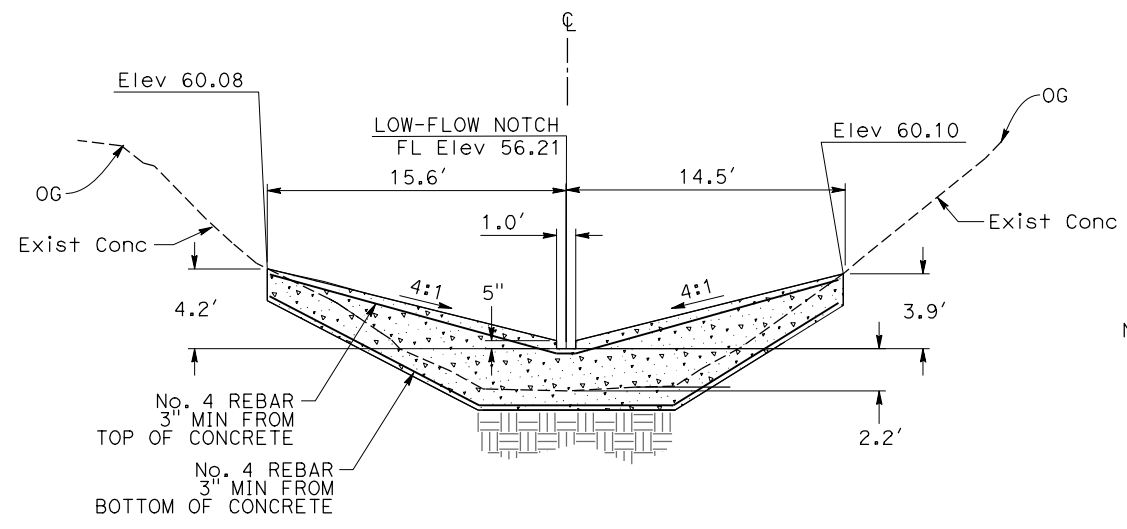
REGISTERED CIVIL ENGINEER DATE _____
 PLANS APPROVAL DATE _____
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



WRECO
 1243 ALPINE ROAD
 SUITE 108
 WALNUT CREEK, CA 94596

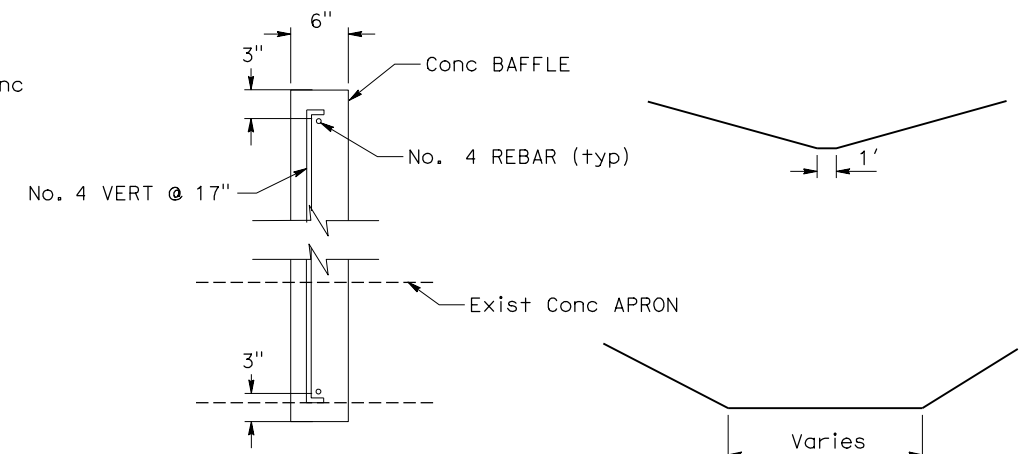
NVTA
 625 BURNELL STREET
 NAPA, CA 94559

NOTE:
 FOR ACCURATE RIGHT OF WAY DATA, CONTACT
 RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE

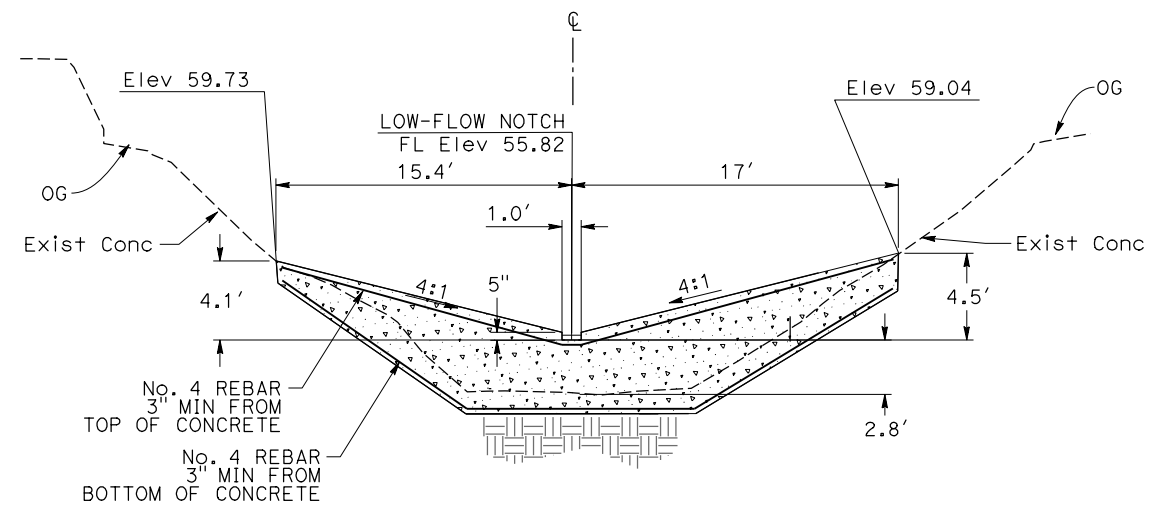


Sta "FP" 3+31.00

Conc BERM-TYPE BAFFLE #1

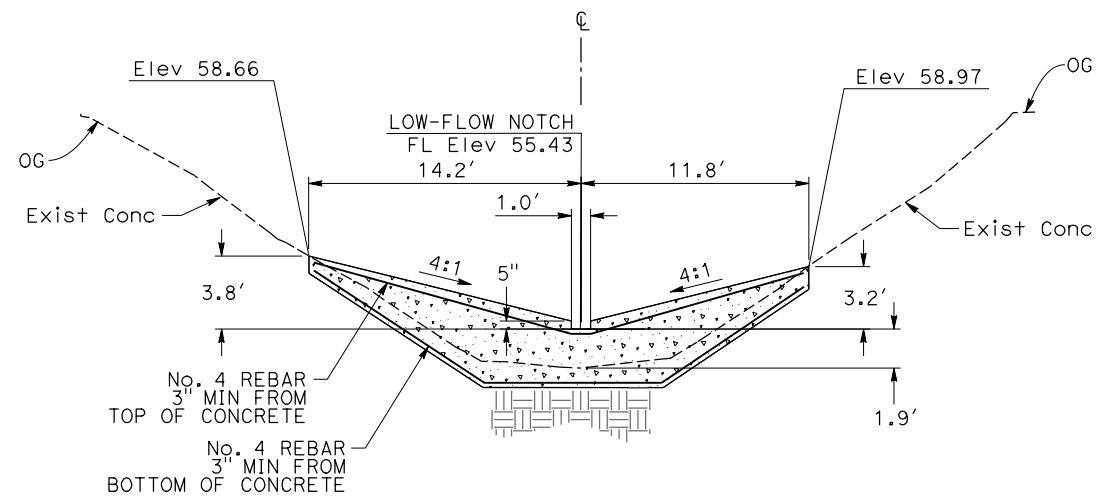


BAFFLE TYPICAL SECTION
 NO SCALE



Sta "FP" 3+16.00

Conc BERM-TYPE BAFFLE #2



Sta "FP" 3+09.00

Conc BERM-TYPE BAFFLE #3

CONSTRUCTION DETAILS

SCALE" 1"= 5' =

C-81

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
 Caltrans

REVISOR BY SHANNON MCCARTY
 DATE REVISOR DATE

DESIGNED BY SHANNON MCCARTY
 CHECKED BY JENNIFER ABRAMS

CONSULTANT SUPERVISOR HAN-BIN LIANG

USERNAME => Shannon_McCarty
 DGN FILE => 0400000769ga081.dgn



UNIT 0000

PROJECT NUMBER & PHASE

04000007691

LAST REVISION DATE PLOTTED => 30-MAR-2021
 00-00-00 TIME PLOTTED => 16:50

| | | | | | |
|------|--------|--------|------------|-----------|--------------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE _____

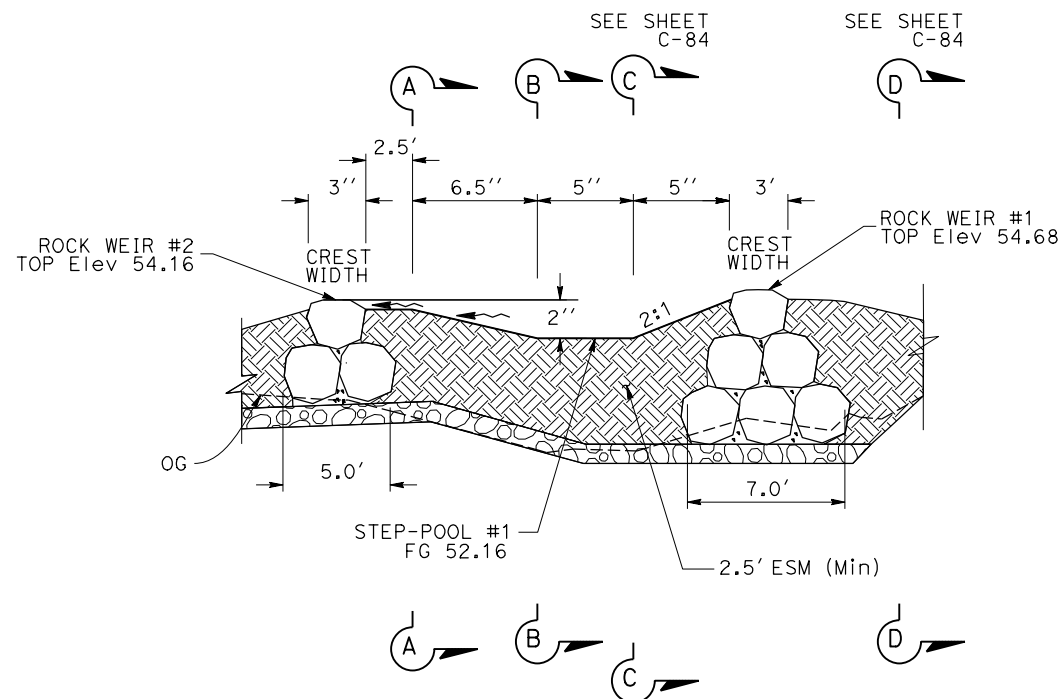
PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

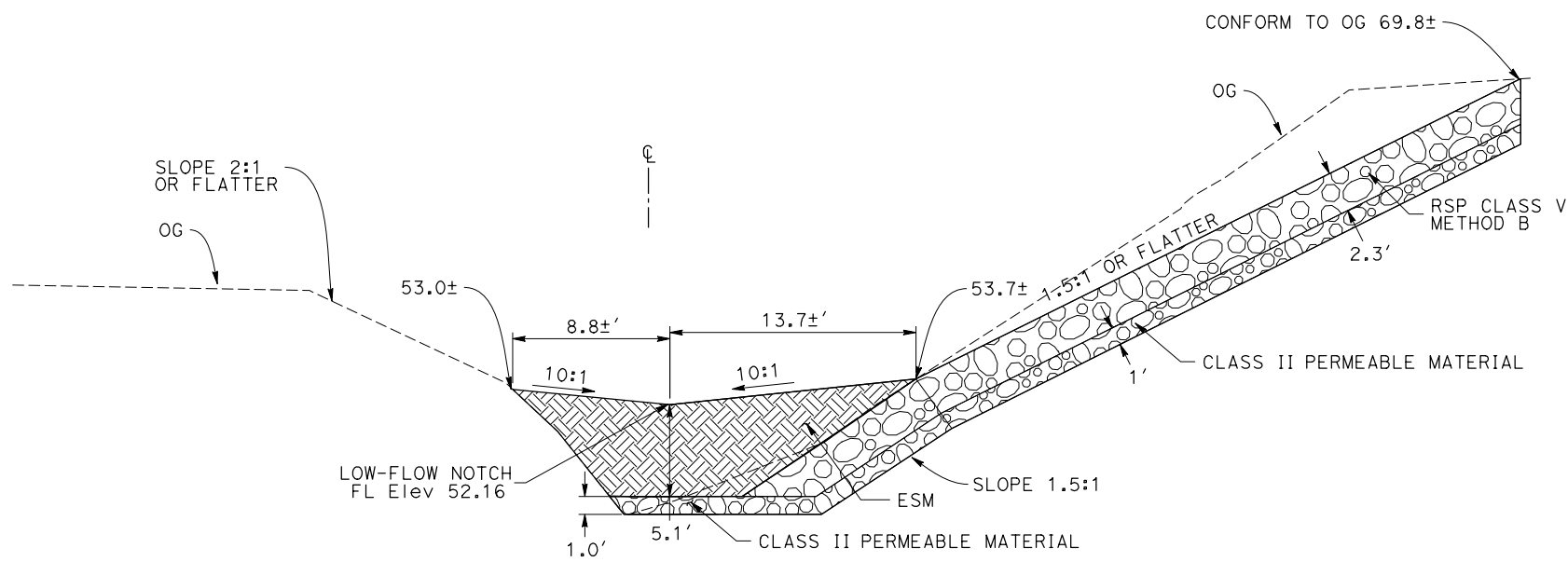
NVTA
625 BURNELL STREET
NAPA, CA 94559

NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE

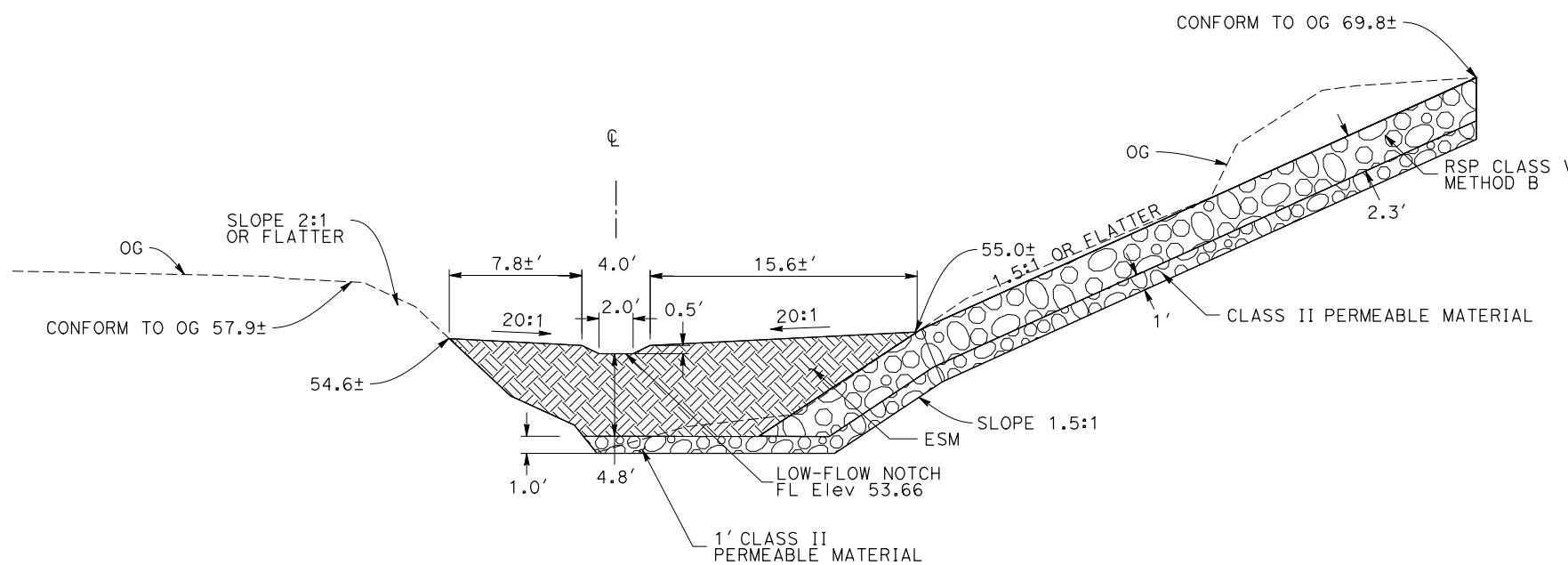


Sta "FP" 2+40.50 TO 2+62.50
STEP-POOL #1 SECTION VIEW

NO SCALE



SECTION B-B
Sta "FP" 2+51.00



SECTION A-A
Sta "FP" 2+44.50

STEP-POOL #1 DETAILS

CONSTRUCTION DETAILS

SCALE: 1" = 5'

C-83

| | | | |
|--|----------------------------------|-----------------|------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | REVISOR | DATE |
| Caltrans | HAN-BIN LIANG | SHANNON MCCARTY | |
| | | JENNIFER ABRAMS | |
| | | | |
| | | | |

USERNAME => Shannon_McCarthy
DGN FILE => 0400000769ga083b.dgn



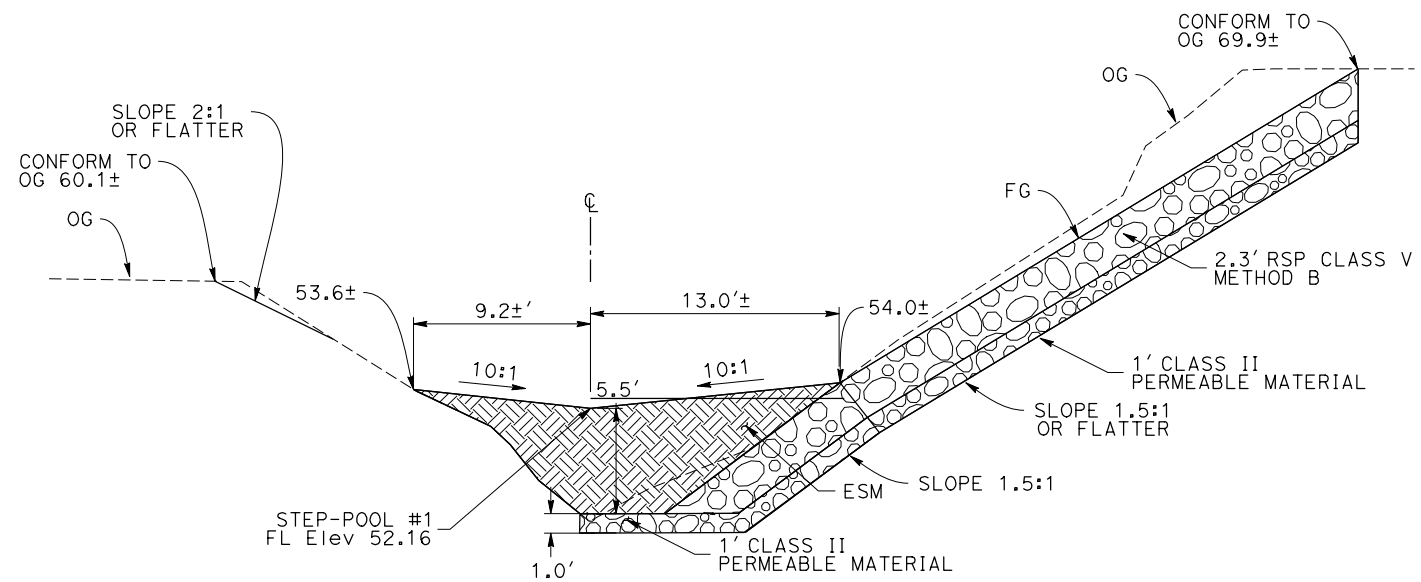
UNIT 0000

PROJECT NUMBER & PHASE 04000007691

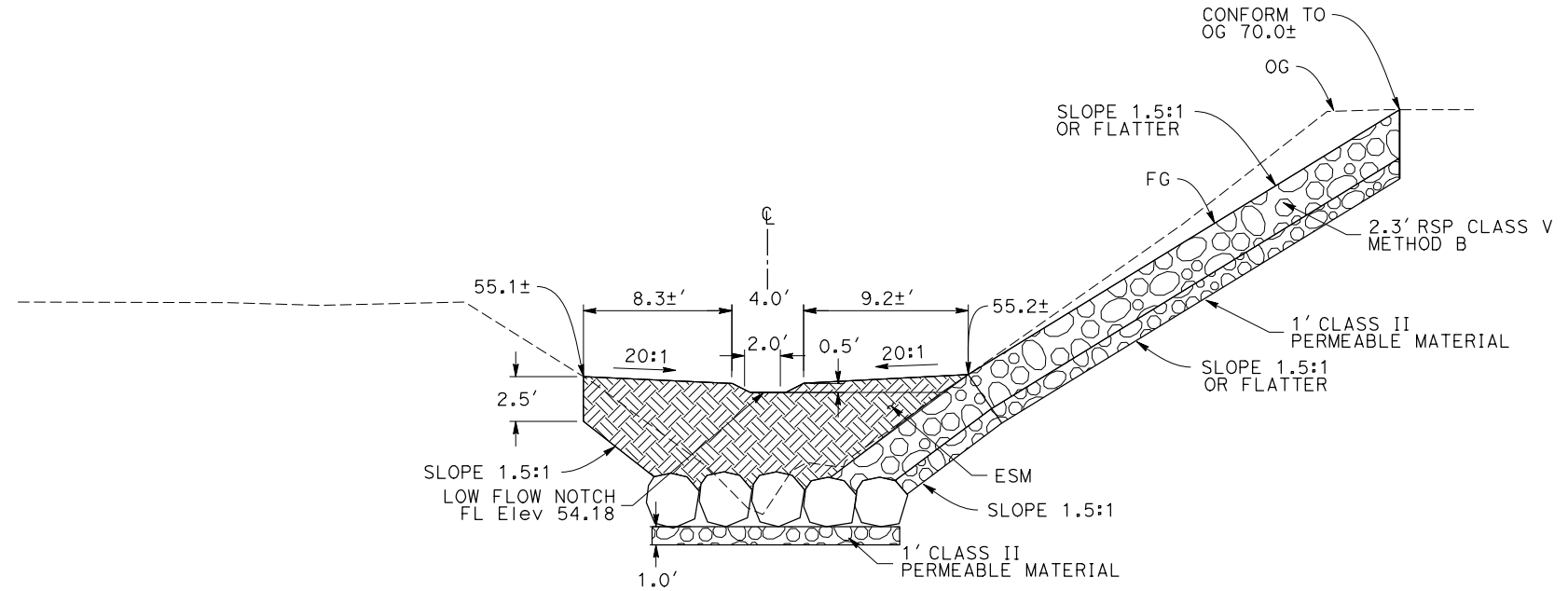
LAST REVISION DATE PLOTTED => 31-MAR-2021
00-00-00 TIME PLOTTED => 10:01

| | | | | | |
|---|--------|--------|--------------------|-----------|--------------|
| Dist | COUNTY | ROUTE | POST MILES PROJECT | SHEET No. | TOTAL SHEETS |
| 04 | Nap | 29,221 | 3.5/6.1 0.0/0.2 | -- | -- |
| REGISTERED CIVIL ENGINEER DATE _____ PLANS APPROVAL DATE _____ THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET. WRECO 1243 ALPINE ROAD SUITE 108 WALNUT CREEK, CA 94596 NVTA 625 BURNELL STREET NAPA, CA 94559 | | | | | |

NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



SECTION C-C
Sta "FP" 2+56.00



SECTION D-D
Sta "FP" 2+66.40

STEP-POOL #1 DETAILS

CONSTRUCTION DETAILS

SCALE: 1" = 5'

C-84

| | | | |
|--|----------------------------------|-----------------|-----------------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | DESIGNED BY | REVISOR |
| Caltrans | HAN-BIN LIANG | SHANNON MCCARTY | SHANNON MCCARTY |
| | CHECKED BY | DATE | DATE |
| | JENNIFER ABRAMS | | |

USERNAME => Shannon_McCarthy
DGN FILE => 0400000769ga083.dgn



UNIT 0000

PROJECT NUMBER & PHASE 04000007691

LAST REVISION | DATE PLOTTED => 30-MAR-2021
00-00-00 | TIME PLOTTED => 16:55

| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
|------|--------|--------|------------|-----------|--------------|
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE _____

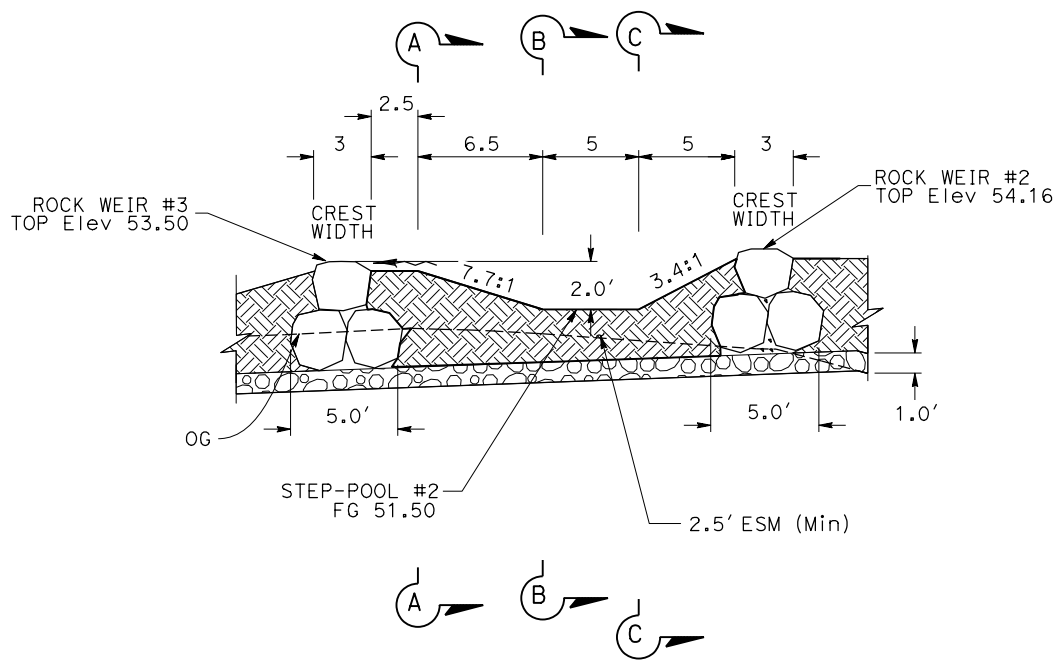
PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

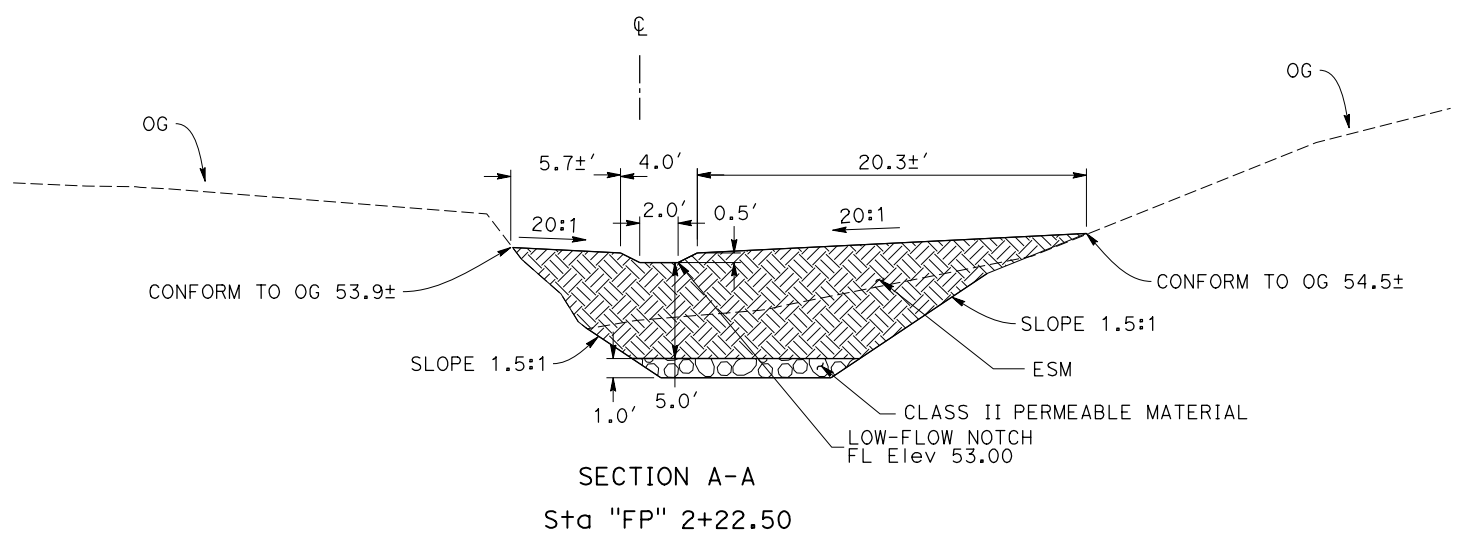
WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

NVTA
625 BURNELL STREET
NAPA, CA 94559

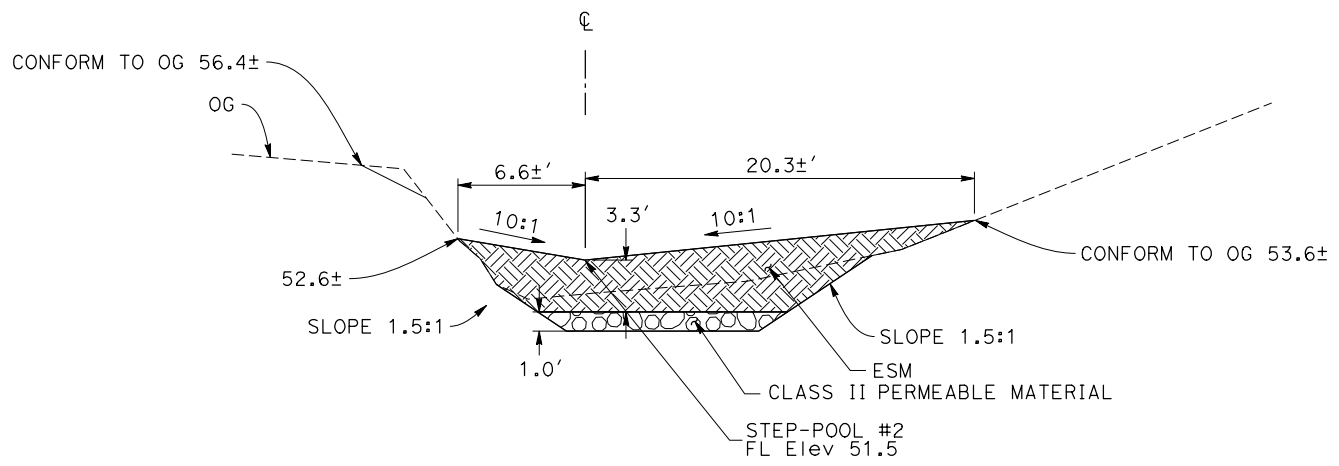
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



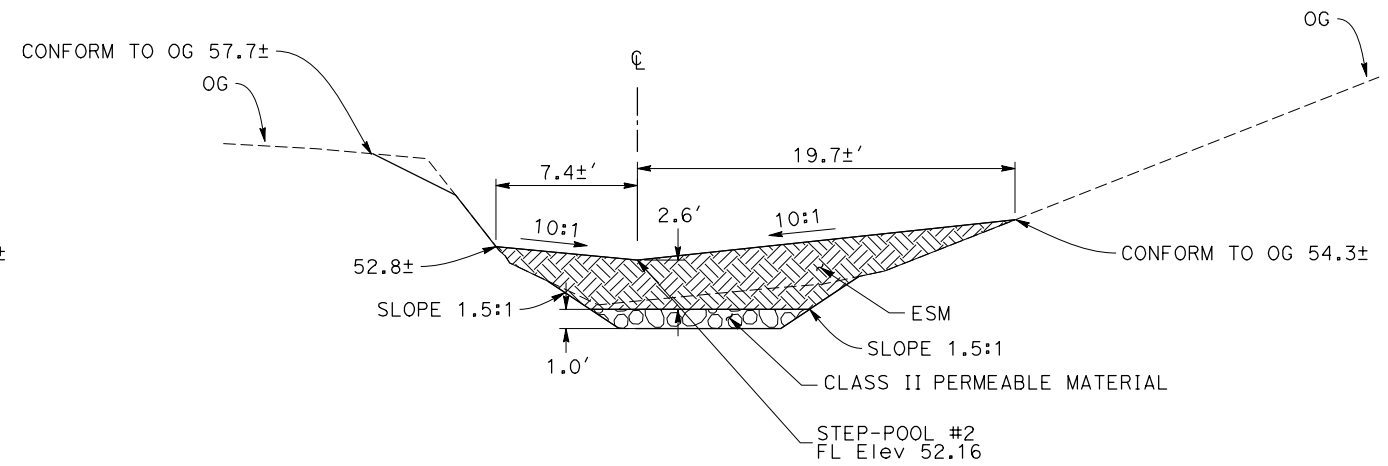
Sta "FP" 2+18.50 TO 2+40.50
STEP-POOL #2 SECTION VIEW
NO SCALE



SECTION A-A
Sta "FP" 2+22.50



SECTION B-B
Sta "FP" 2+29.00



SECTION C-C
Sta "FP" 2+34.00

STEP-POOL #2 DETAILS

CONSTRUCTION DETAILS
SCALE: 1" = 5'

C-85

| | | | |
|--|----------------------------------|-----------------|-----------------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | DESIGNED BY | REVISOR |
| Caltrans | HAN-BIN LIANG | SHANNON MCCARTY | SHANNON MCCARTY |
| | | CHECKED BY | DATE REVISED |
| | | JENNIFER ABRAMS | JENNIFER ABRAMS |

| | | | | | |
|------|--------|--------|--------------------|-------|-------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET | TOTAL |
| 04 | Nap | 29,221 | 3.5/6.1 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE

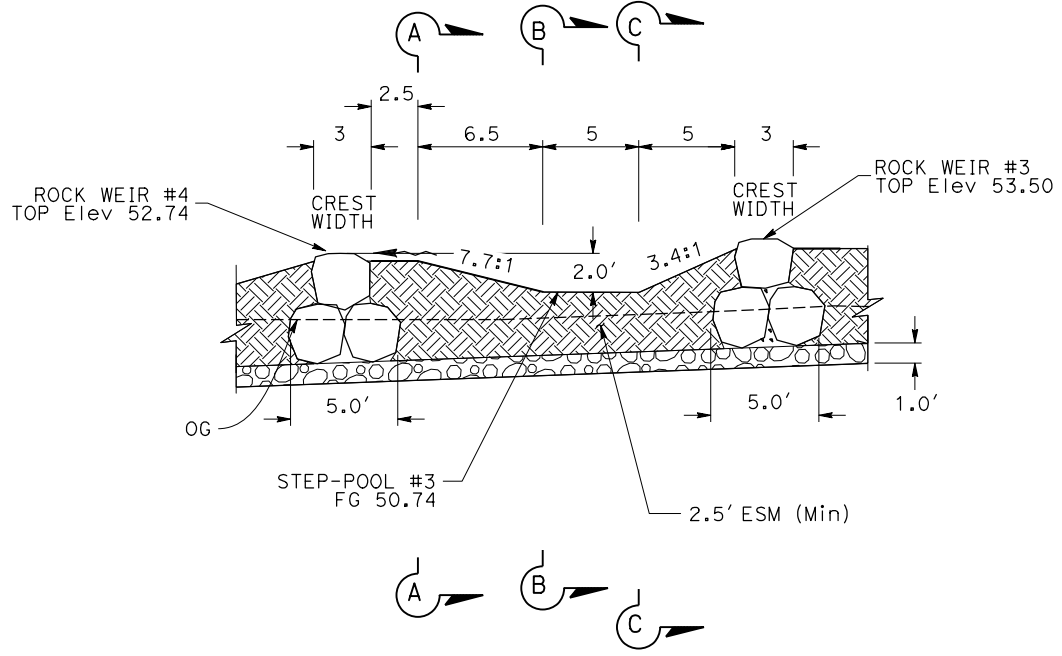
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

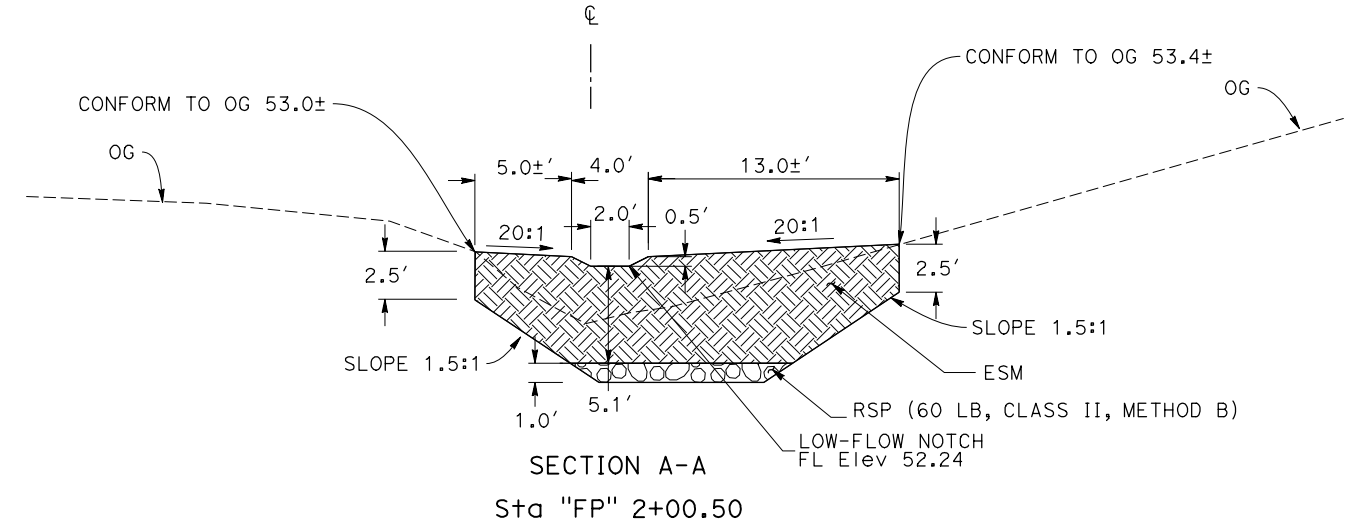
WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

NVTA
625 BURNELL STREET
NAPA, CA 94559

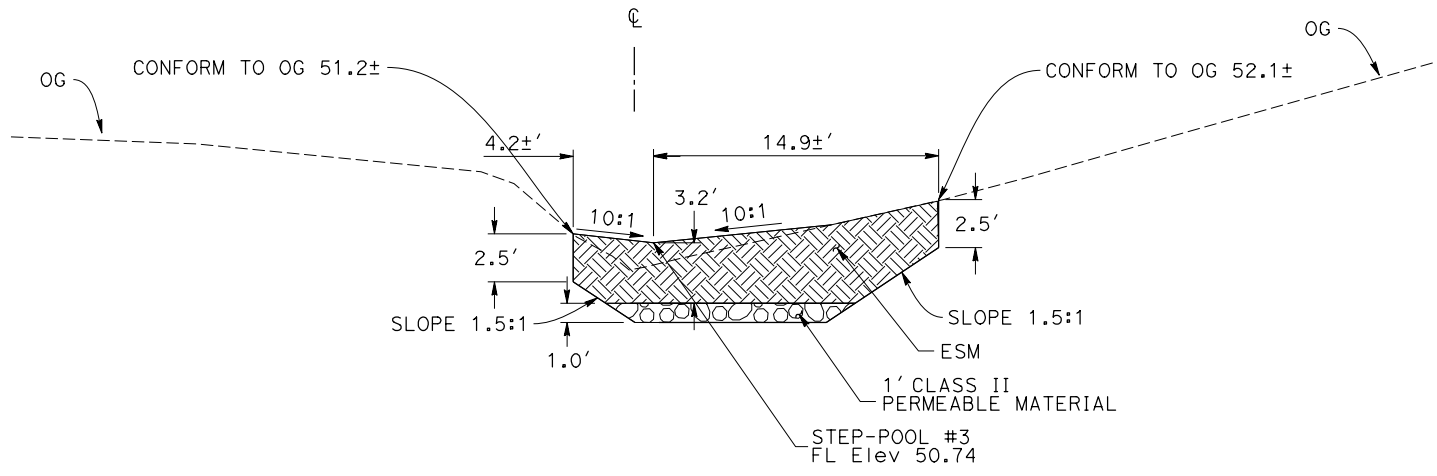
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



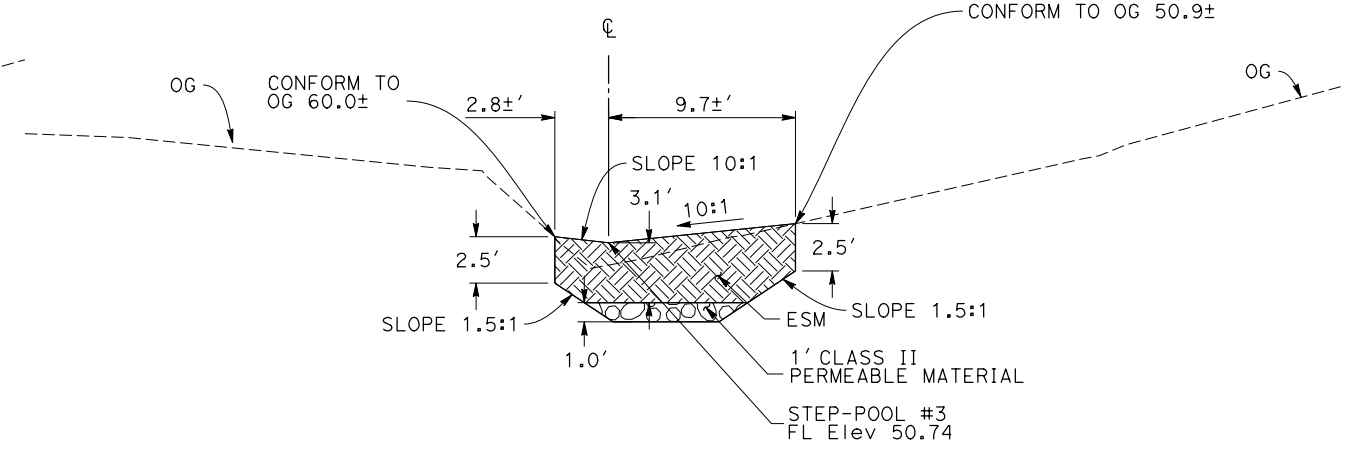
Sta "FP" 1+96.50 TO 2+18.50
STEP-POOL #3 SECTION VIEW
NO SCALE



SECTION A-A
Sta "FP" 2+00.50



SECTION B-B
Sta "FP" 2+07.00



SECTION C-C
Sta "FP" 2+12.00

STEP-POOL #3 DETAILS

CONSTRUCTION DETAILS

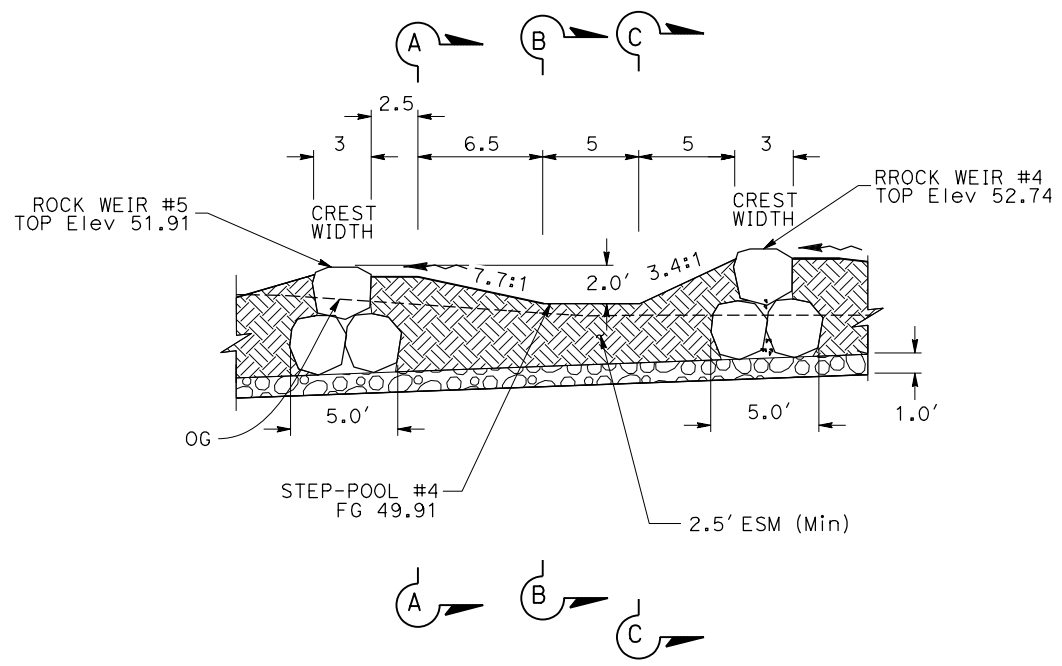
SCALE: 1" = 5'

C-86

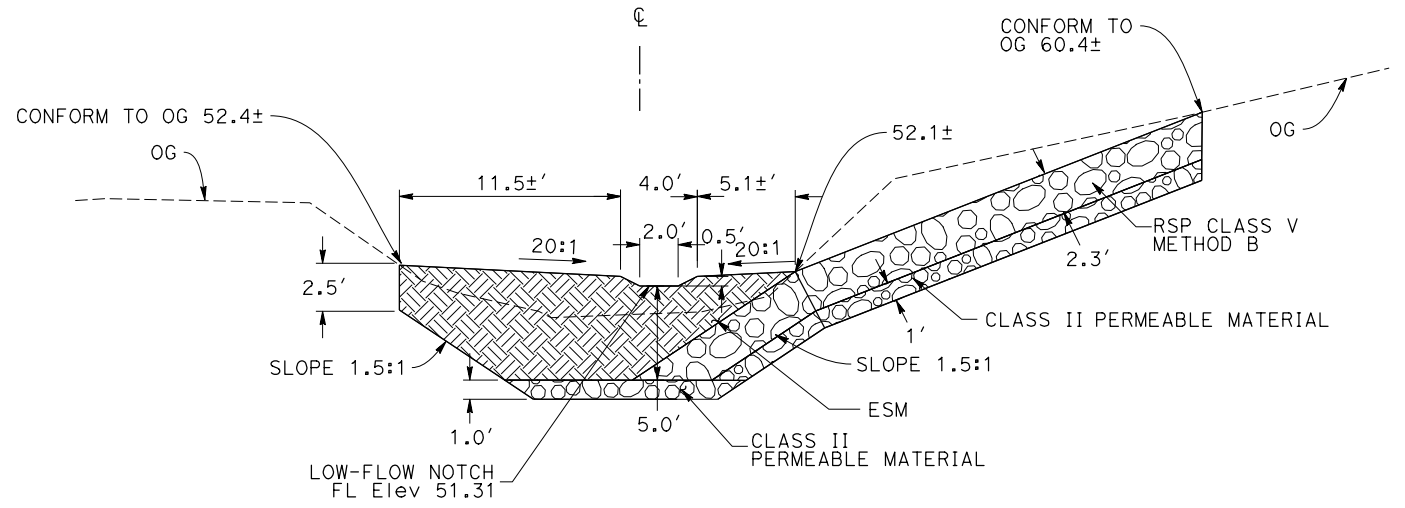
| | | | |
|--|----------------------------------|-----------------|-----------------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | DESIGNED BY | REVISOR |
| Caltrans | HAN-BIN LIANG | SHANNON MCCARTY | SHANNON MCCARTY |
| | | CHECKED BY | DATE REVISED |
| | | JENNIFER ABRAMS | |

| | | | | | |
|--|--------|--------|--------------------|-------|-------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET | TOTAL |
| 04 | Nap | 29,221 | 3.5/6.7 0.0/0.2 | -- | -- |
| REGISTERED CIVIL ENGINEER DATE _____ PLANS APPROVAL DATE _____ THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET. WRECO 1243 ALPINE ROAD SUITE 108 WALNUT CREEK, CA 94596 NVT 625 BURNELL STREET NAPA, CA 94559 | | | | | |

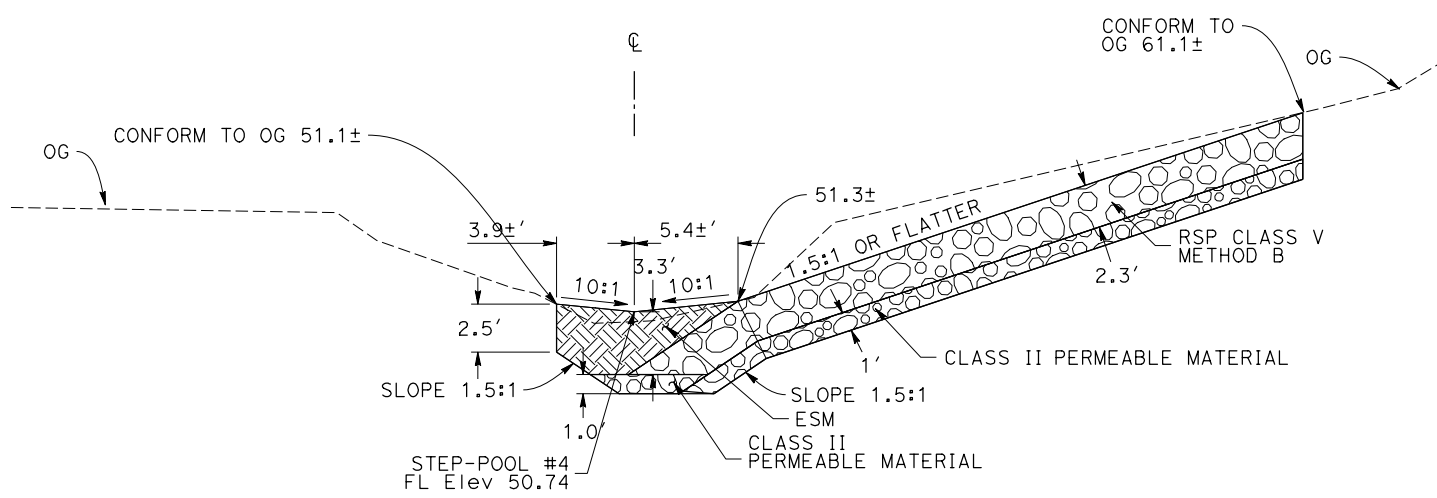
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



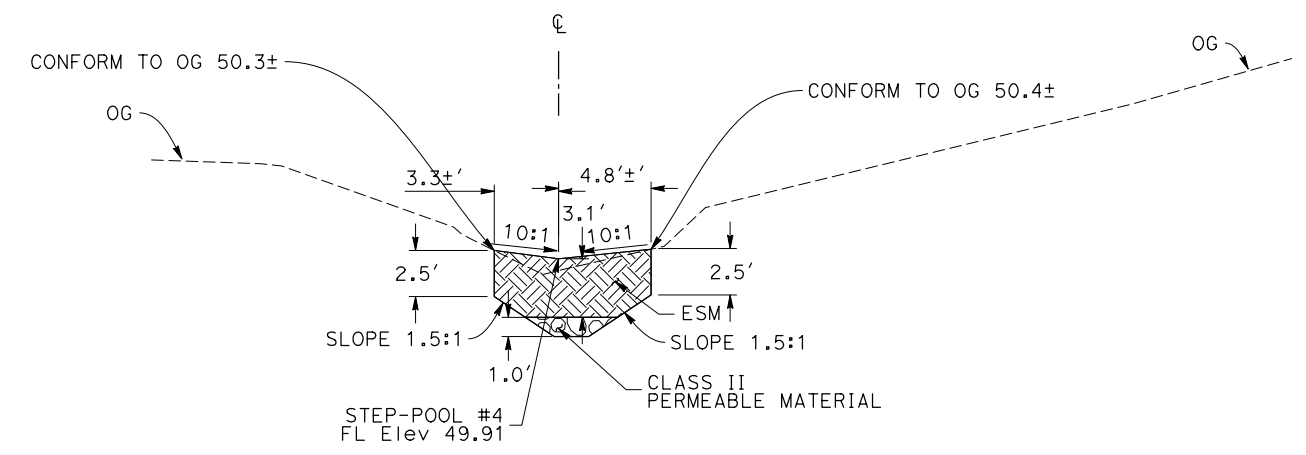
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STEP-POOL #4 SECTION VIEW
NO SCALE



SECTION A-A
Sta "FP" 1+78.50



SECTION B-B
Sta "FP" 1+85.00



SECTION C-C
Sta "FP" 1+90.00

STEP-POOL #4 DETAILS

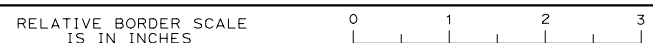
CONSTRUCTION DETAILS

SCALE: 1" = 5'

C-87

| | | | |
|--|----------------------------------|-----------------|-----------------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | DESIGNED BY | REVISOR |
| Caltrans | HAN-BIN LIANG | SHANNON MCCARTY | SHANNON MCCARTY |
| | | CHECKED BY | DATE REVISED |
| | | JENNIFER ABRAMS | JENNIFER ABRAMS |

USERNAME => Shannon_McCarthy
DGN FILE => 0400000769ga086.dgn



UNIT 0000

PROJECT NUMBER & PHASE

04000007691

LAST REVISION | DATE PLOTTED => 30-MAR-2021
00-00-00 | TIME PLOTTED => 17:04

| Dist | COUNTY | ROUTE | POST MILES PROJECT | SHEET No. | TOTAL SHEETS |
|------|--------|--------|--------------------|-----------|--------------|
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE _____

PLANS APPROVAL DATE _____

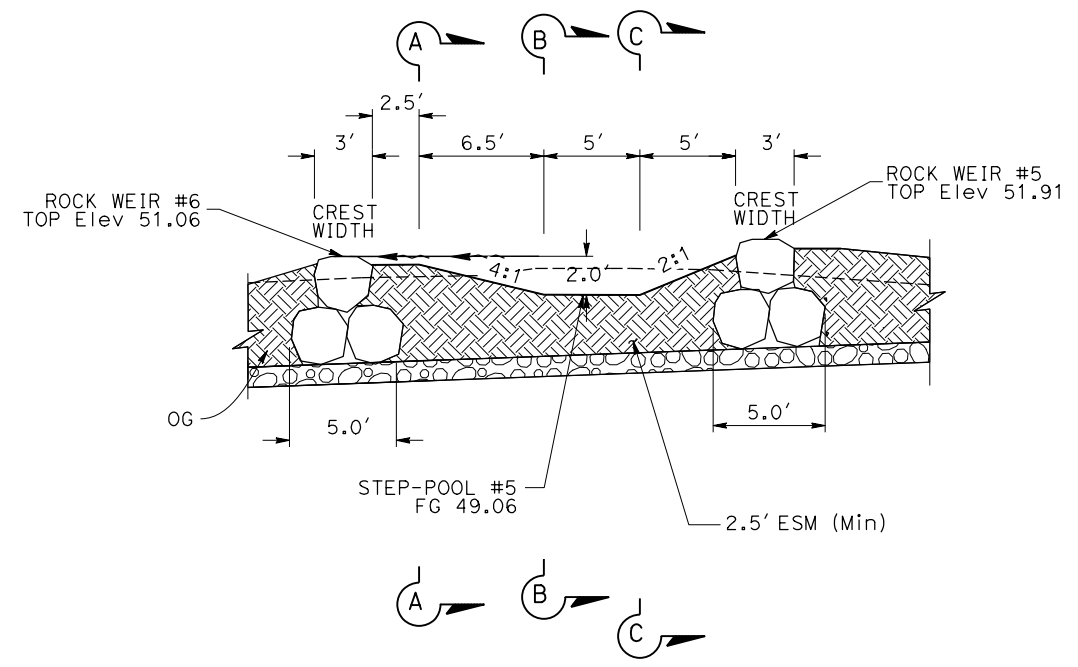
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



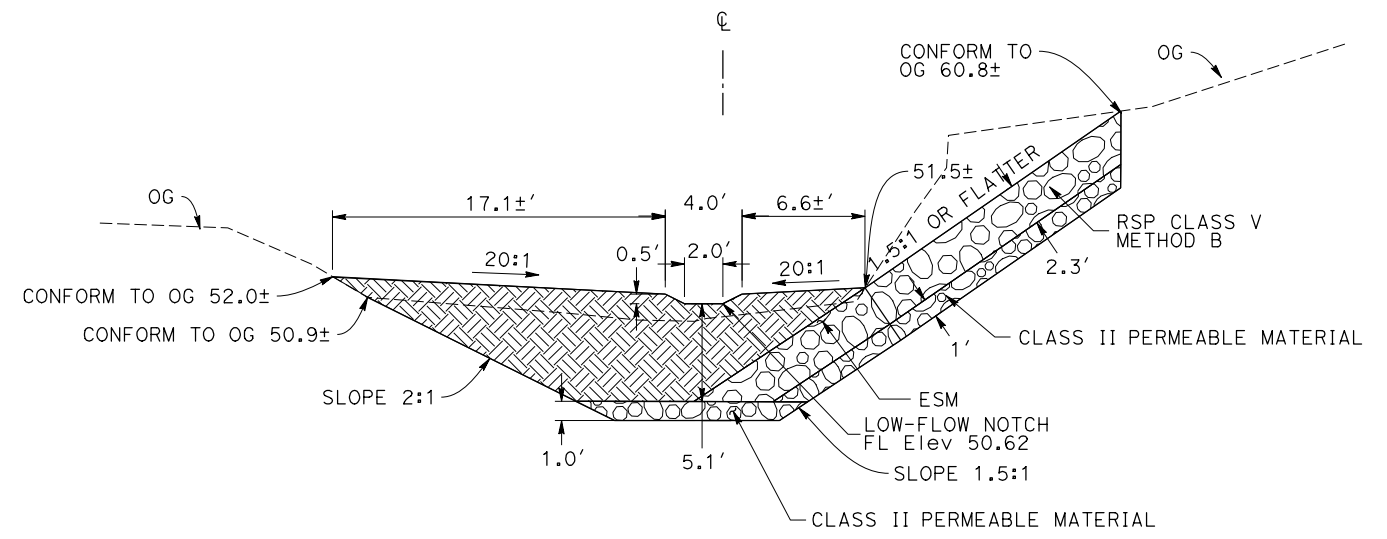
WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

NVTA
625 BURNELL STREET
NAPA, CA 94559

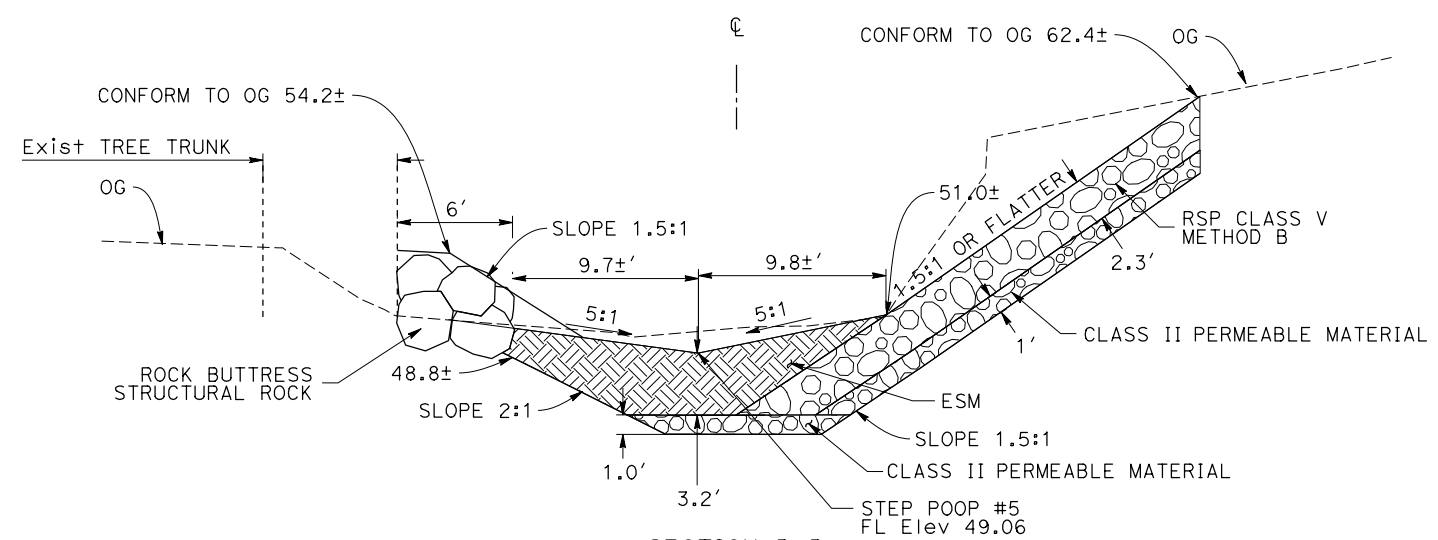
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



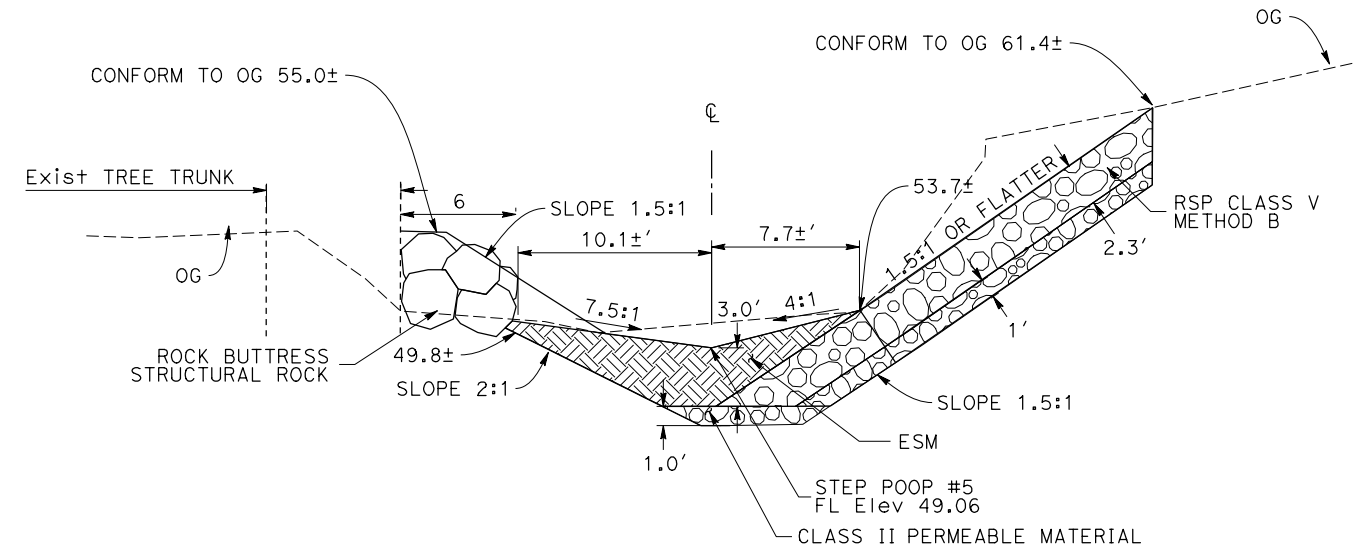
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STEP-POOL #5 SECTION VIEW
NO SCALE



SECTION A-A
Sta "FP" 1+56.50



SECTION B-B
Sta "FP" 1+63.00



SECTION C-C
Sta "FP" 1+68.00

STEP-POOL #5 DETAILS

CONSTRUCTION DETAILS

SCALE: 1" = 5' **C-88**

| | | |
|----------------------------------|------------|----------|
| REVISOR | DATE | REVISION |
| SHANNON MCCARTY | | |
| JENNIFER ABRAMS | | |
| CALCULATED/DESIGNED BY | CHECKED BY | |
| HAN-BIN LIANG | | |
| CONSULTANT FUNCTIONAL SUPERVISOR | | |
| DEPARTMENT OF TRANSPORTATION | | |
| STATE OF CALIFORNIA | | |

NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE

| | | | | | |
|------|--------|--------|------------|-------|-------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET | TOTAL |
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

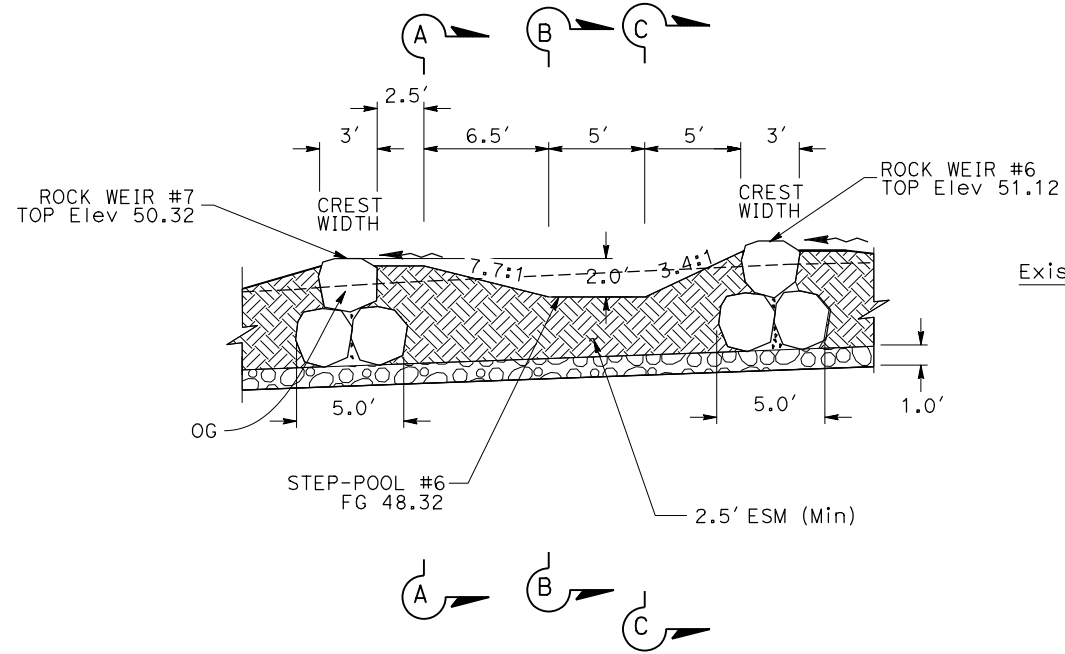
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

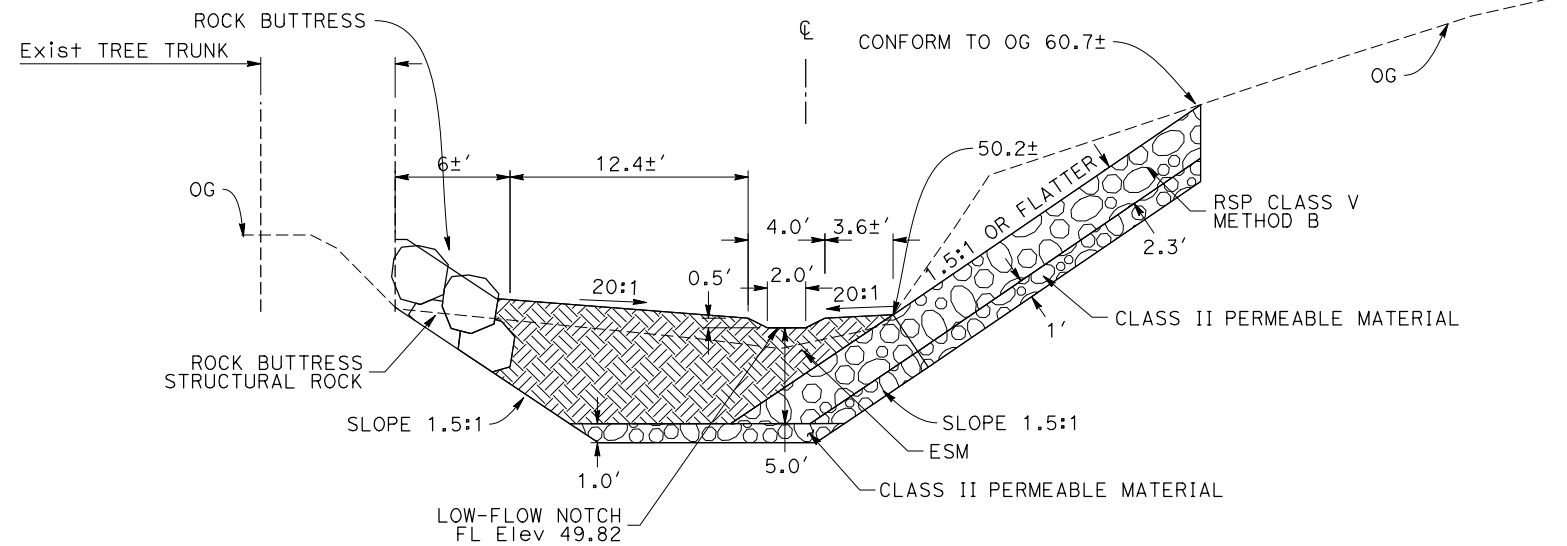
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

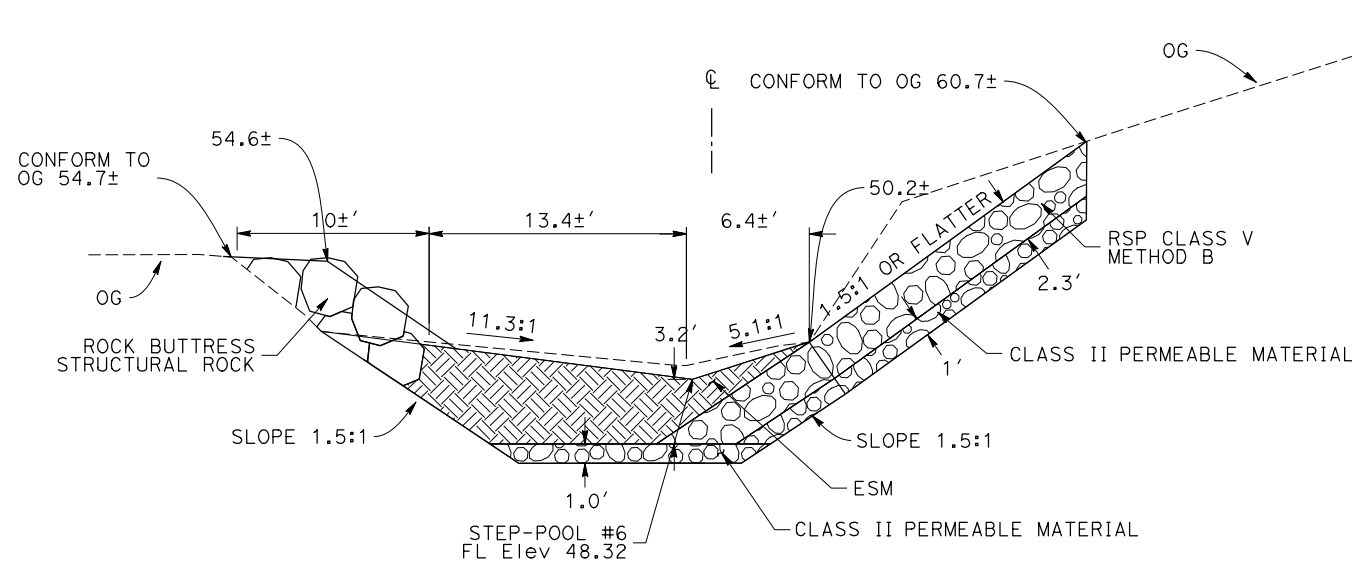
NVTA
625 BURNELL STREET
NAPA, CA 94559



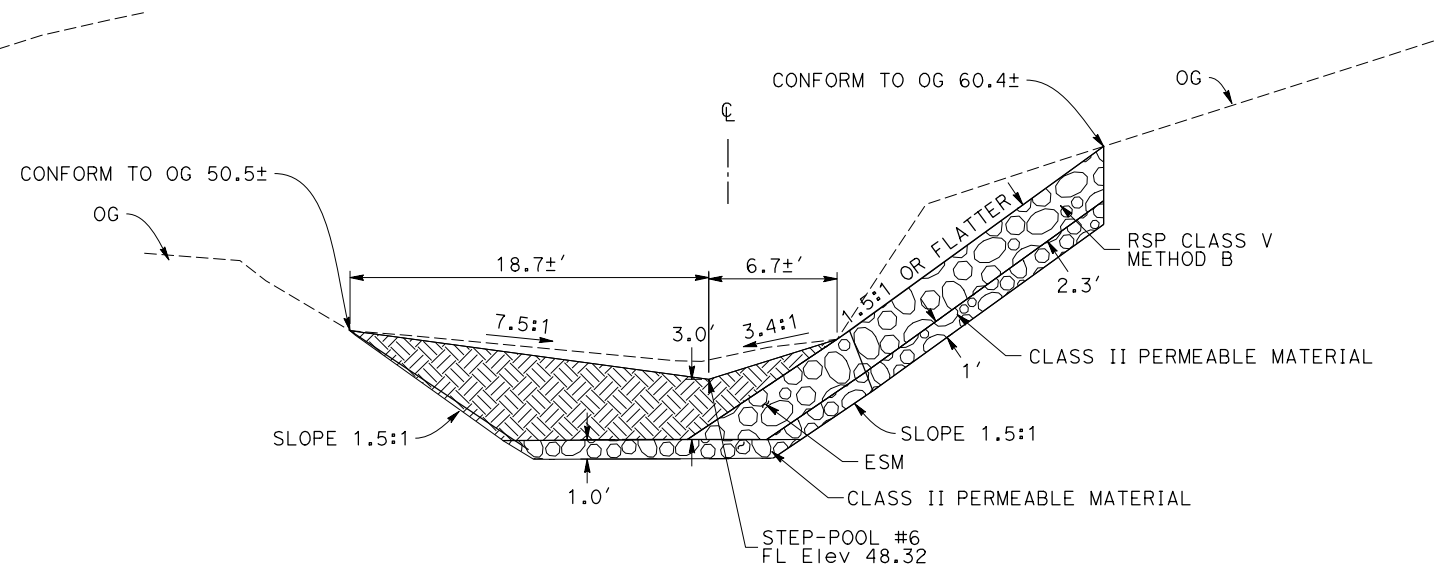
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STEP-POOL #6 SECTION VIEW
NO SCALE



SECTION A-A
Sta "FP" 1+34.50



SECTION B-B
Sta "FP" 1+41.00



SECTION C-C
Sta "FP" 1+46.00

STEP-POOL #6 DETAILS

CONSTRUCTION DETAILS

SCALE: 1" = 5'

C-89

| | | | | | |
|------|--------|--------|------------|-------|-------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET | TOTAL |
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |

Attachment 1

REGISTERED CIVIL ENGINEER DATE _____

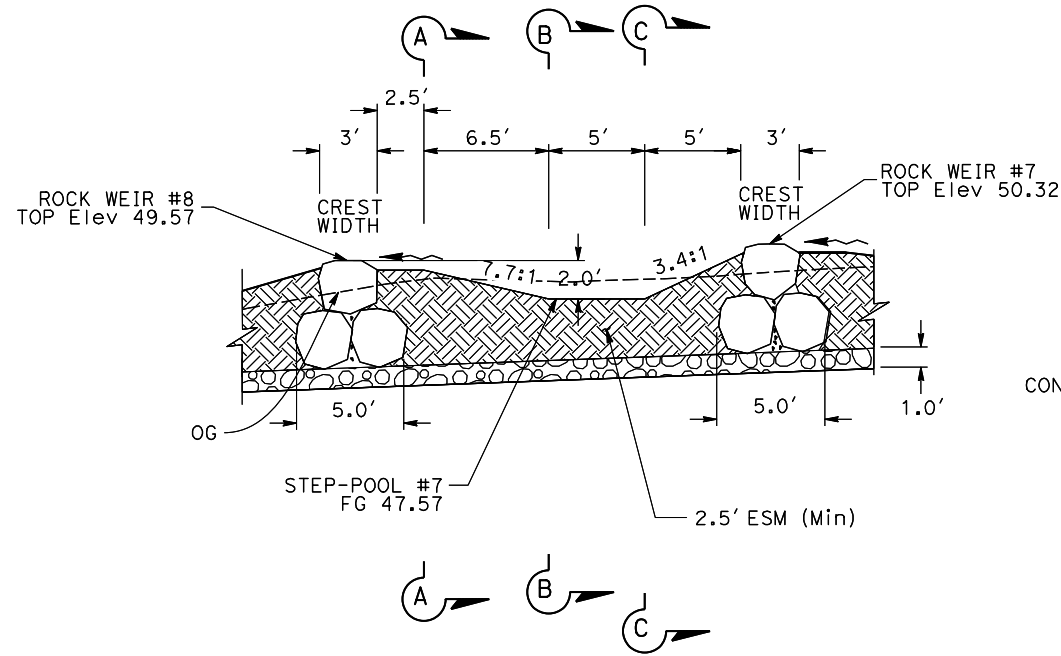
PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

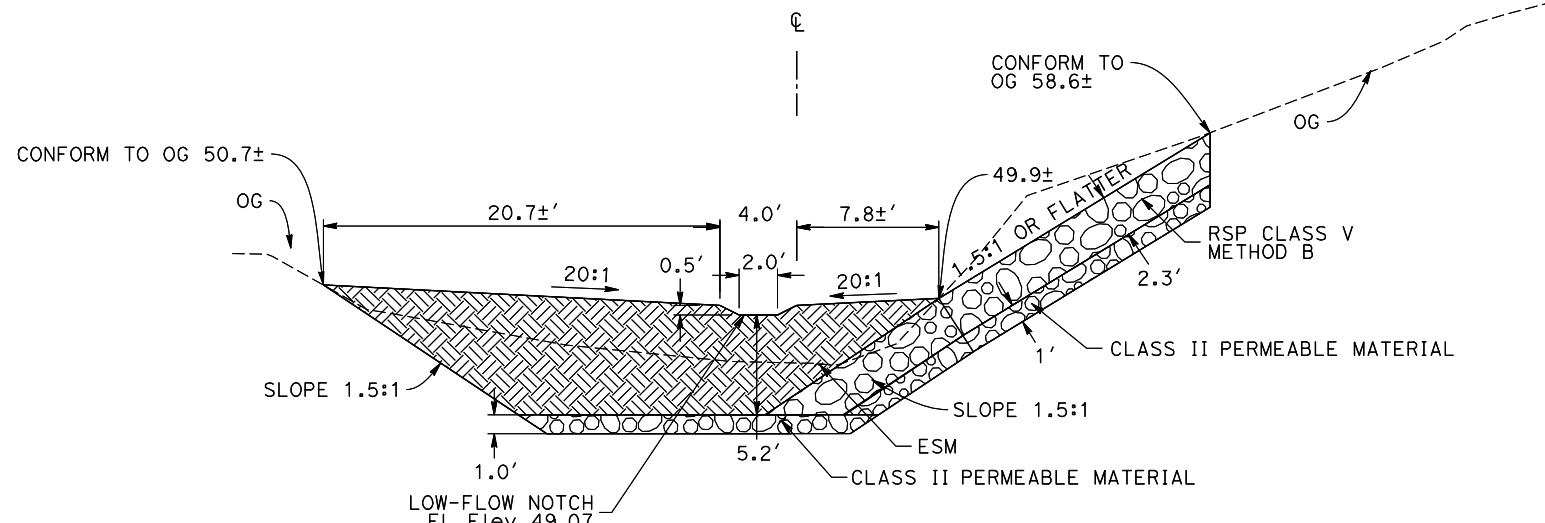
WRECO
1243 ALPINE ROAD
SUITE 108
WALNUT CREEK, CA 94596

NVTA
625 BURNELL STREET
NAPA, CA 94559

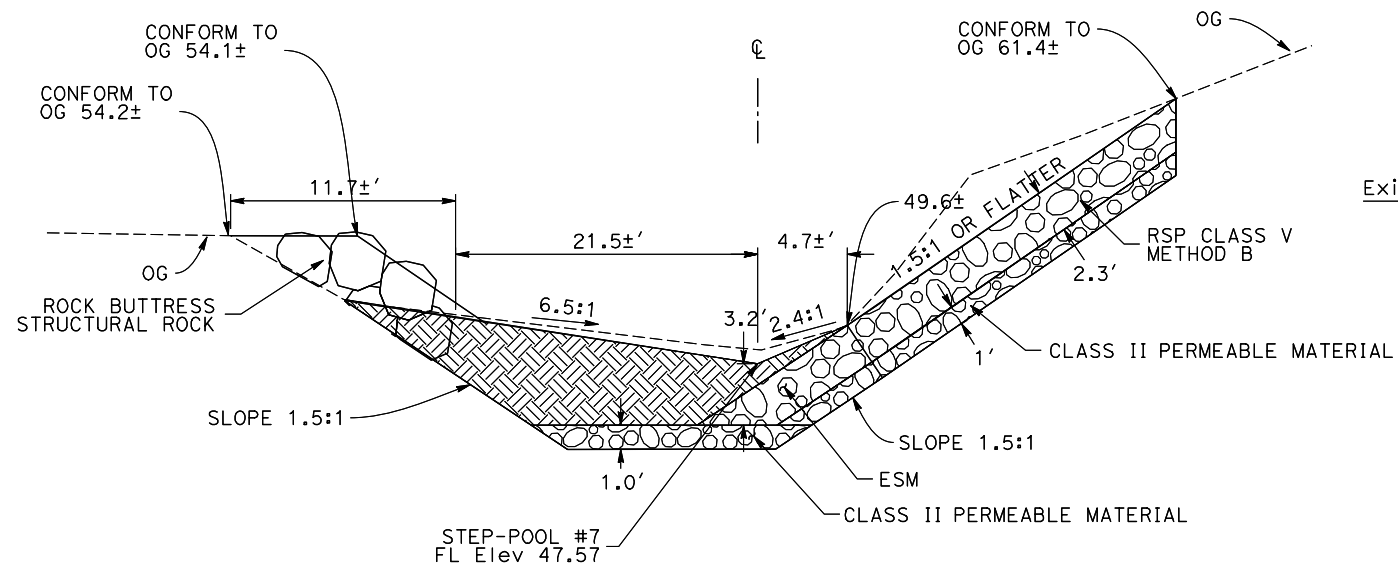
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



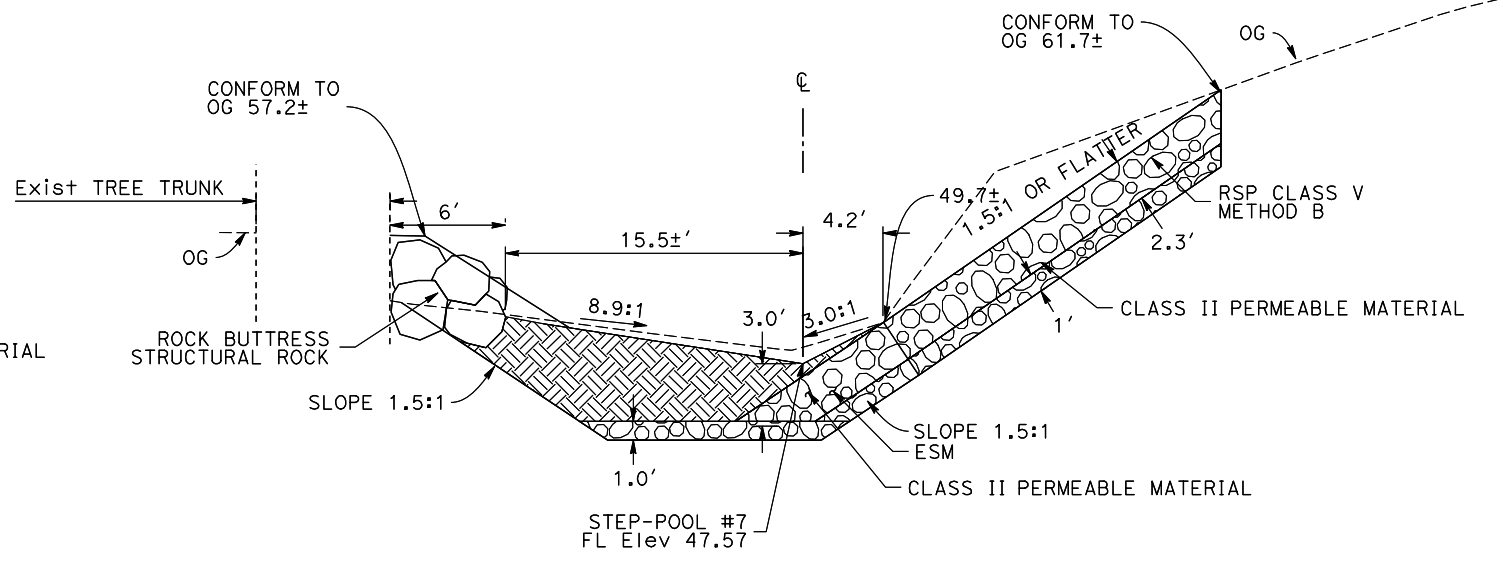
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STEP-POOL #7 SECTION VIEW
NO SCALE



SECTION A-A
Sta "FP" 1+12.50



SECTION B-B
Sta "FP" 1+19.00



SECTION C-C
Sta "FP" 1+24.00

STEP-POOL #7 DETAILS

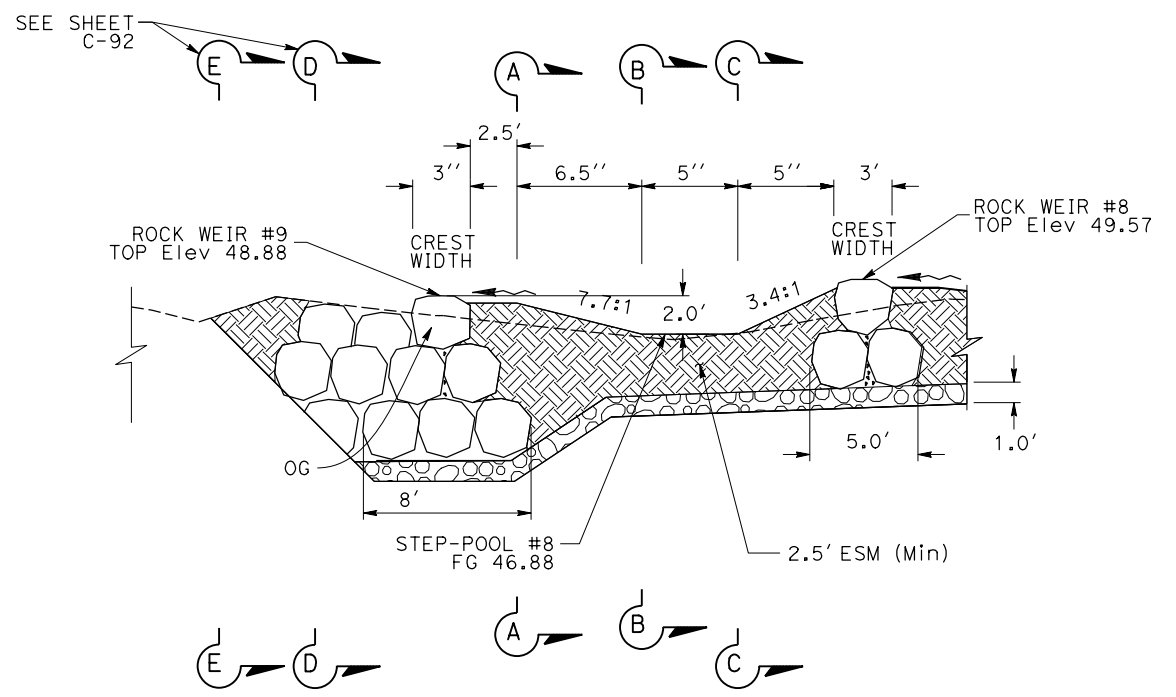
CONSTRUCTION DETAILS

SCALE: 1" = 5' **C-90**

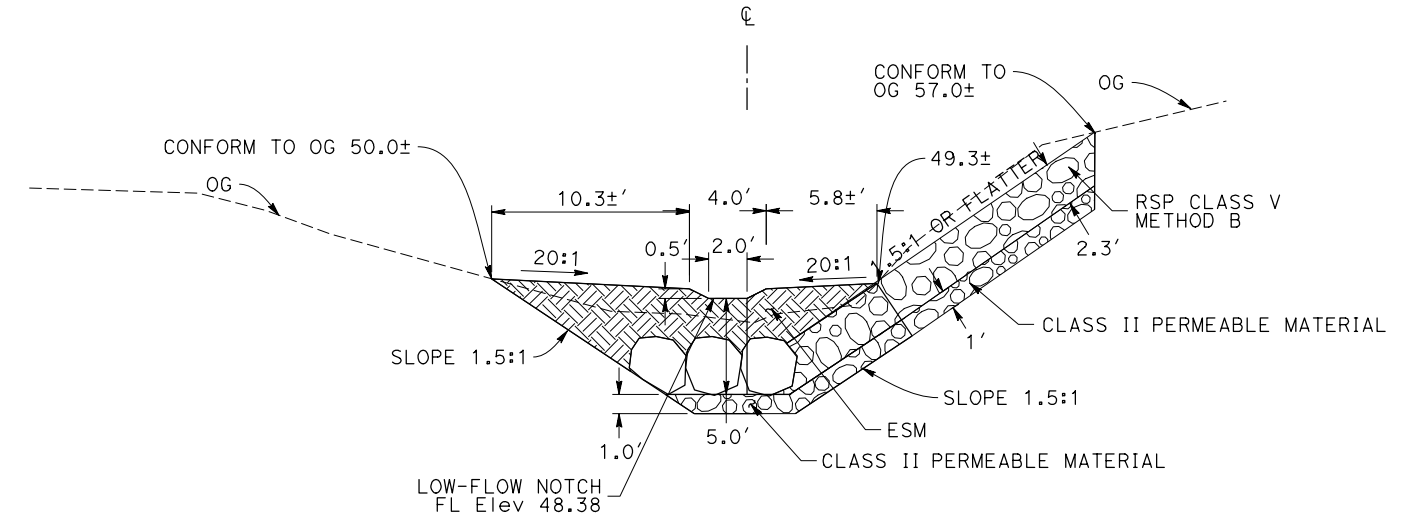
| | | | |
|--|----------------------------------|-----------------|------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | REVISOR | DATE |
| Caltrans | HAN-BIN LIANG | SHANNON MCCARTY | |
| | | JENNIFER ABRAMS | |
| | CHECKED BY | DESIGNED BY | |
| | | | |

| | | | | | |
|--|--------|--------|------------|-------|-------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET | TOTAL |
| 04 | Nap | 29,221 | 0.0/0.2 | -- | -- |
| REGISTERED CIVIL ENGINEER DATE _____ PLANS APPROVAL DATE _____ THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET. WRECO 1243 ALPINE ROAD SUITE 108 WALNUT CREEK, CA 94596 NVTA 625 BURNELL STREET NAPA, CA 94559 | | | | | |

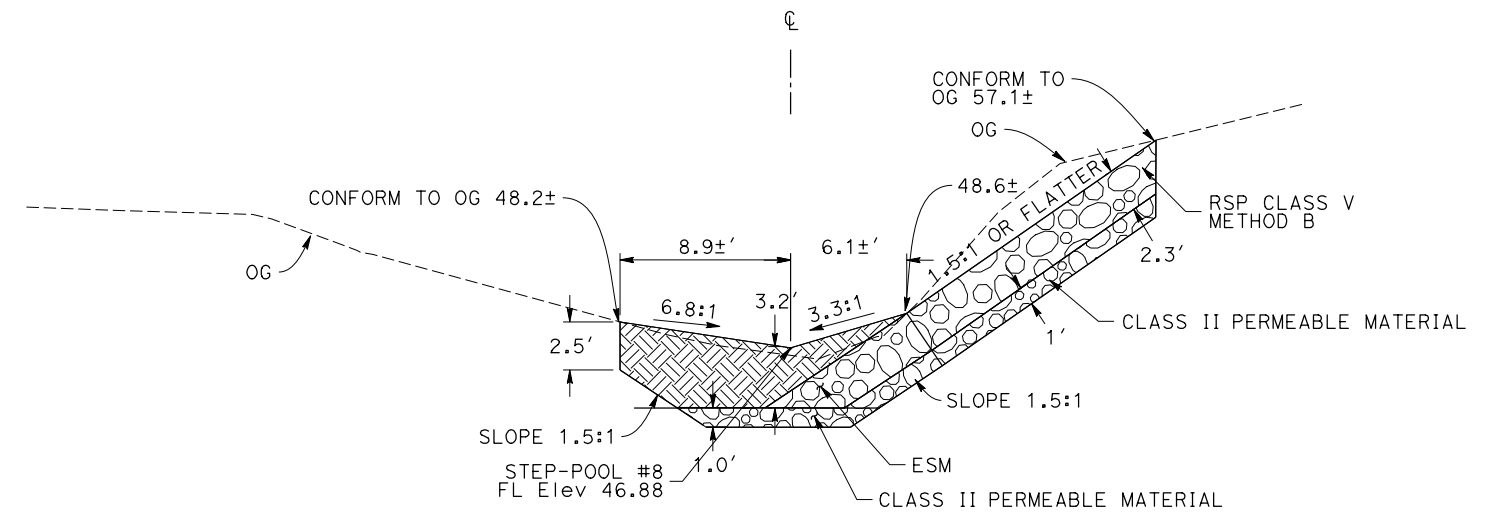
NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



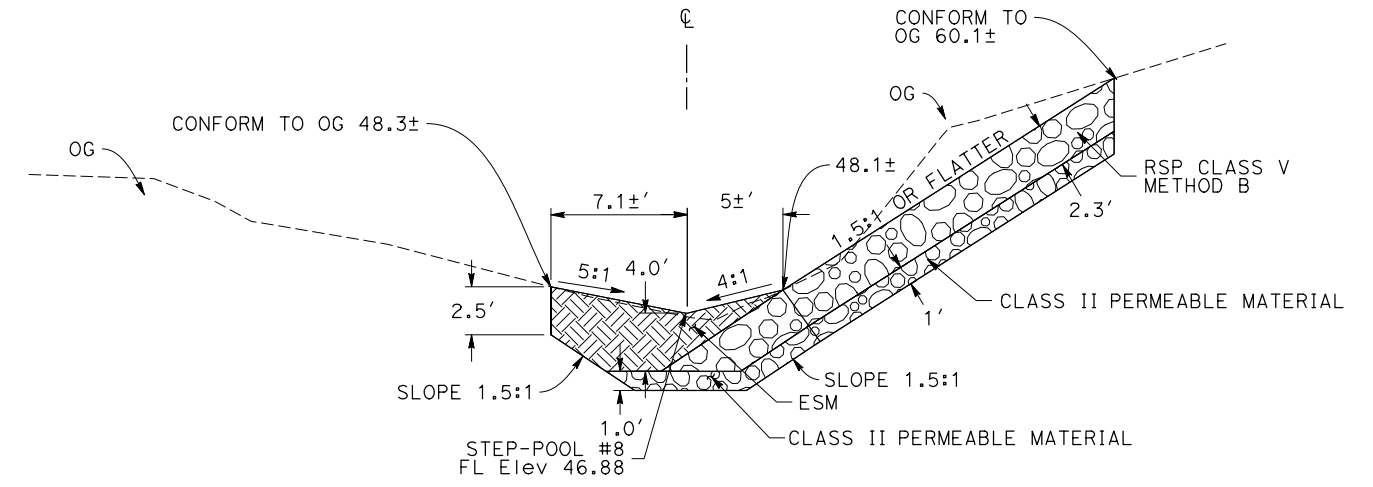
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STEP-POOL #8 SECTION VIEW
NO SCALE



SECTION A-A
Sta "FP" 0+90.50



SECTION B-B
Sta "FP" 0+97.00



SECTION C-C
Sta "FP" 1+02.00

STEP-POOL #8 DETAILS

CONSTRUCTION DETAILS

SCALE: 1" = 5'

C-91

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

USERNAME => Shannon_McCarthy
DGN FILE => 0400000769ga090.dgn

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

UNIT 0000

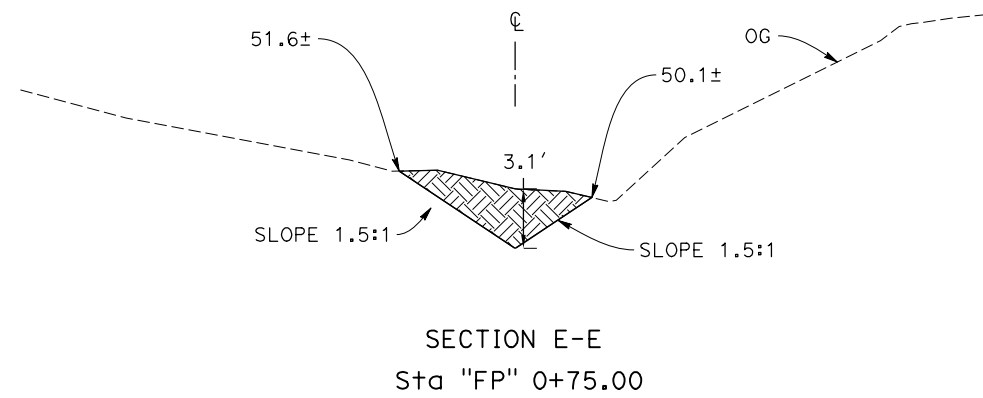
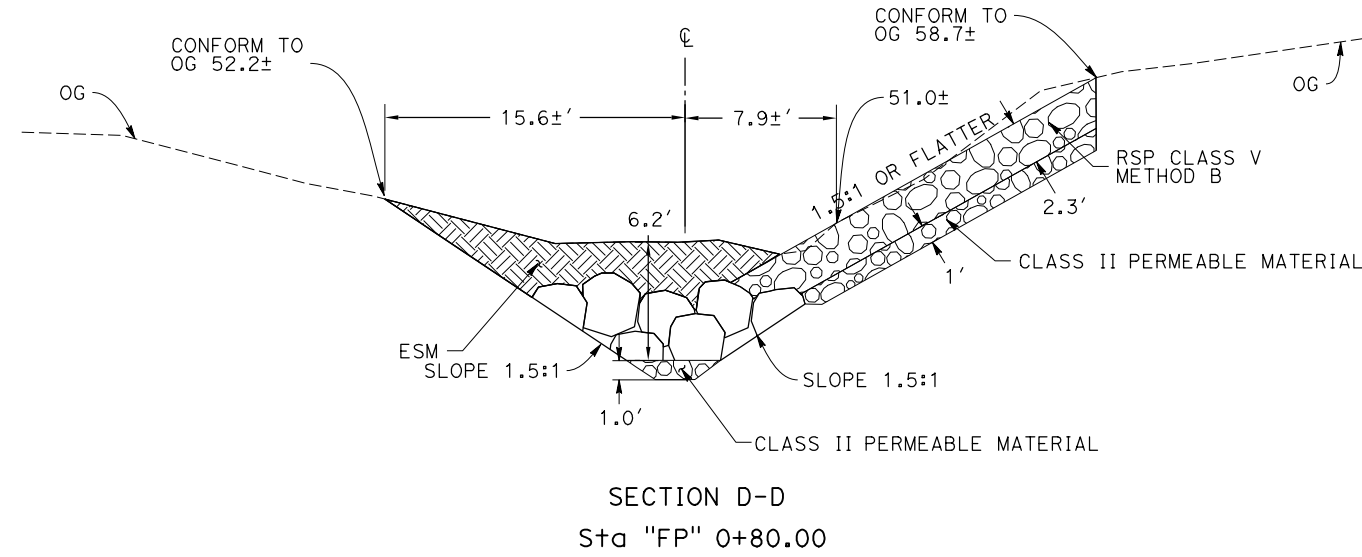
PROJECT NUMBER & PHASE

04000007691

LAST REVISION | DATE PLOTTED => 30-MAR-2021
00-00-00 | TIME PLOTTED => 17:27

| | | | | | |
|--|----------------------------------|------------|-------------|-----------------|------|
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | CONSULTANT FUNCTIONAL SUPERVISOR | CHECKED BY | DESIGNED BY | REVISOR | DATE |
| | HAN-BIN LIANG | | | SHANNON MCCARTY | |
| | | | | JENNIFER ABRAMS | |

NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE



| | | | | | |
|------|--------|--------|--------------------|-----------|--------------|
| Dist | COUNTY | ROUTE | POST MILES | SHEET No. | TOTAL SHEETS |
| 04 | Nap | 29,221 | 3.5/8.1 0.0/0.2 | -- | -- |

REGISTERED CIVIL ENGINEER DATE _____

PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

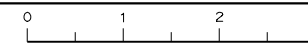
| | |
|--|--|
| WRECO 1243 ALPINE ROAD SUITE 108 WALNUT CREEK, CA 94596 | NVTA 625 BURNELL STREET NAPA, CA 94559 |
|--|--|



CONSTRUCTION DETAILS

SCALE: 1" = 5'

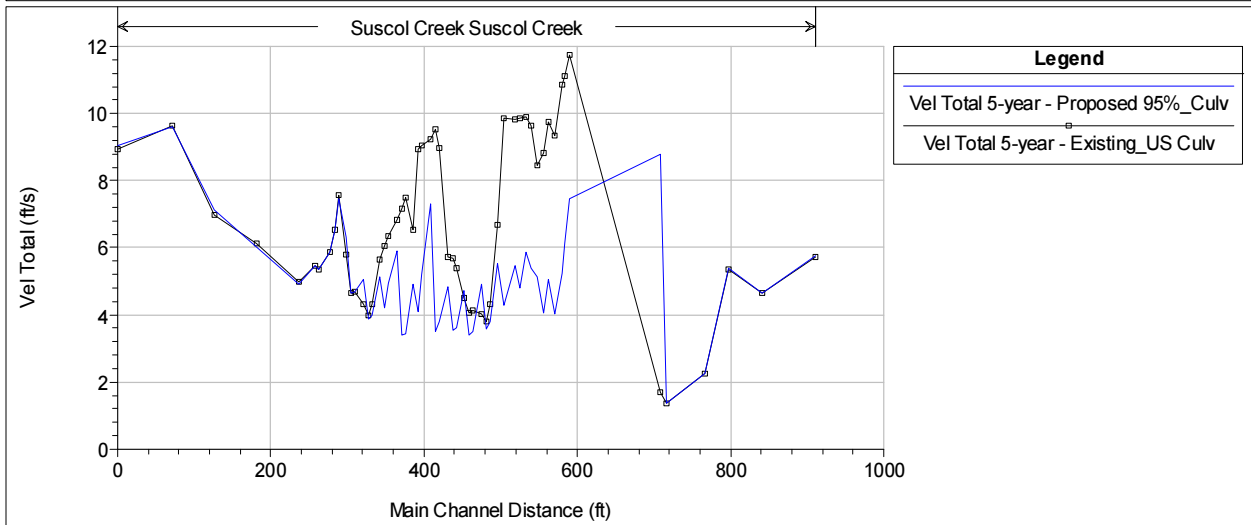
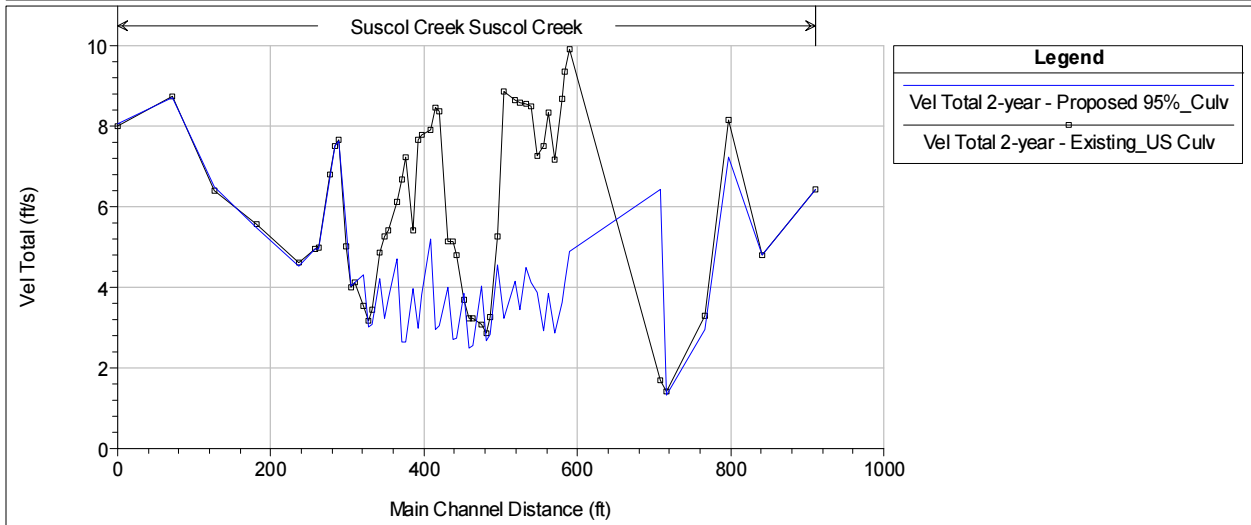
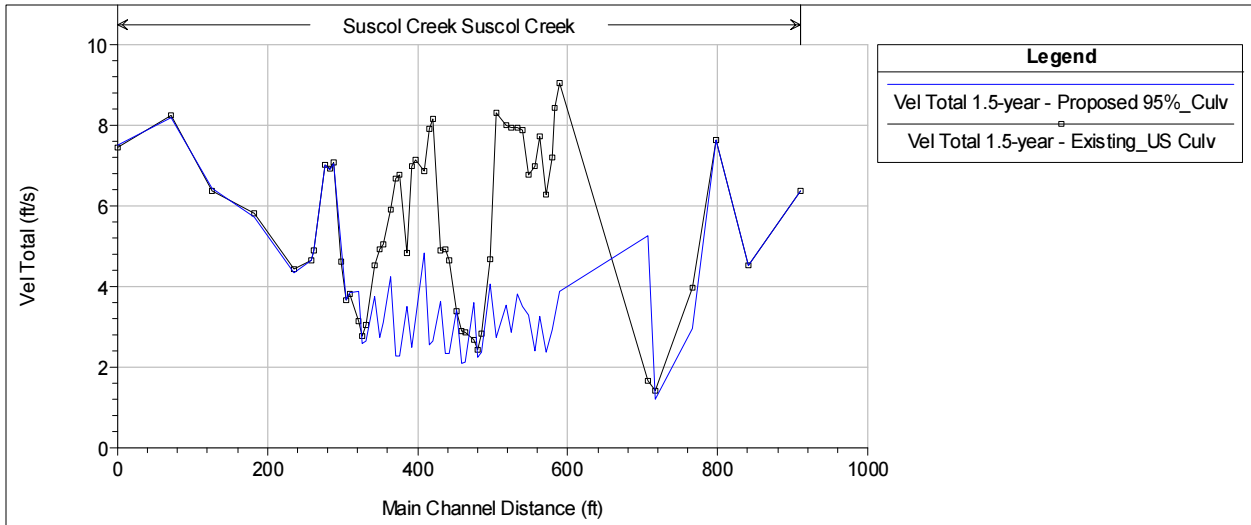
C-92

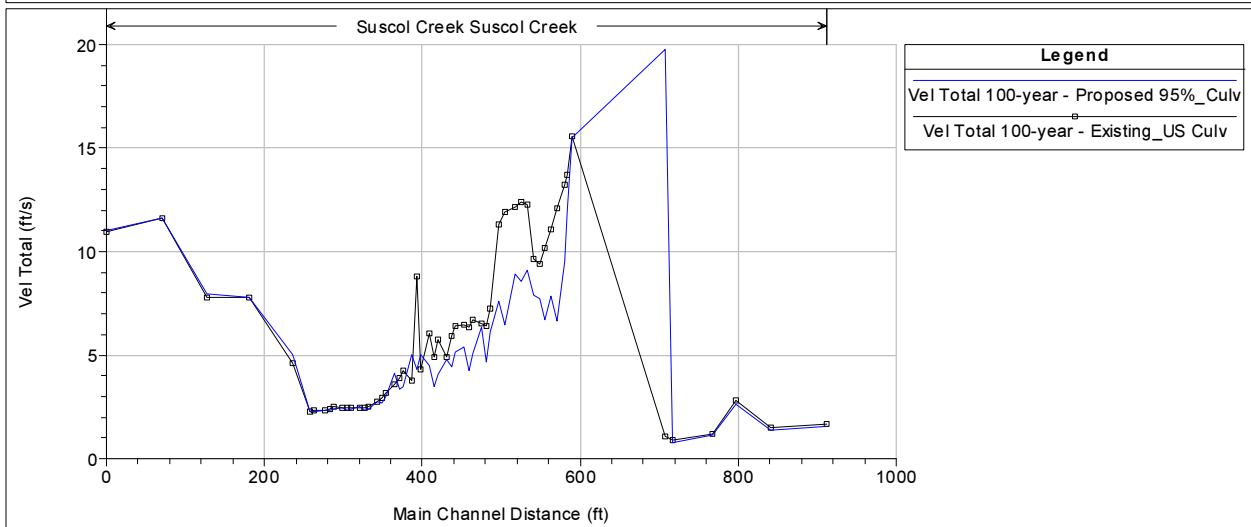
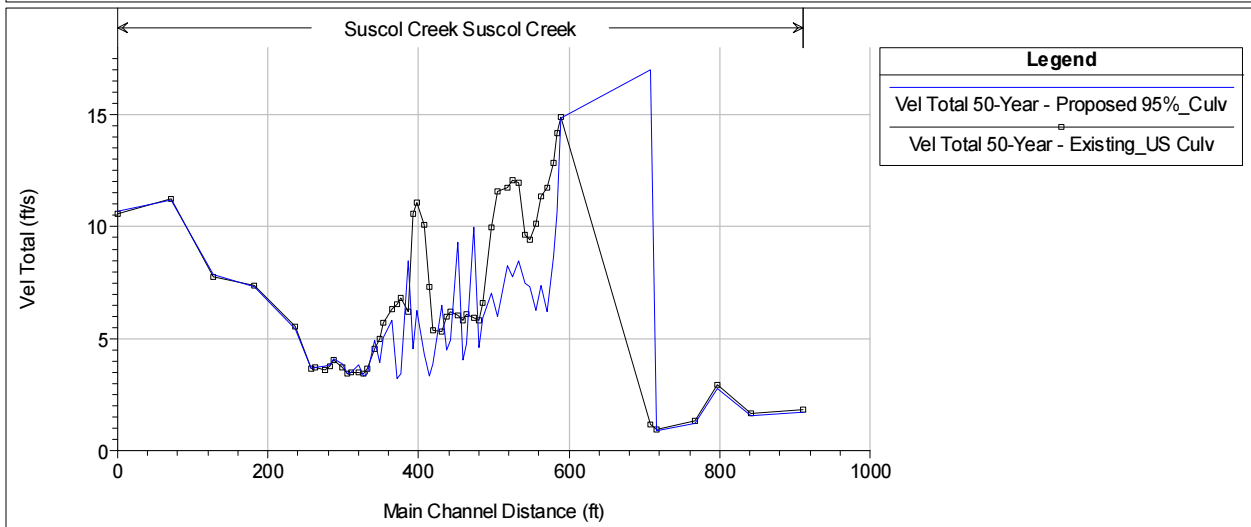
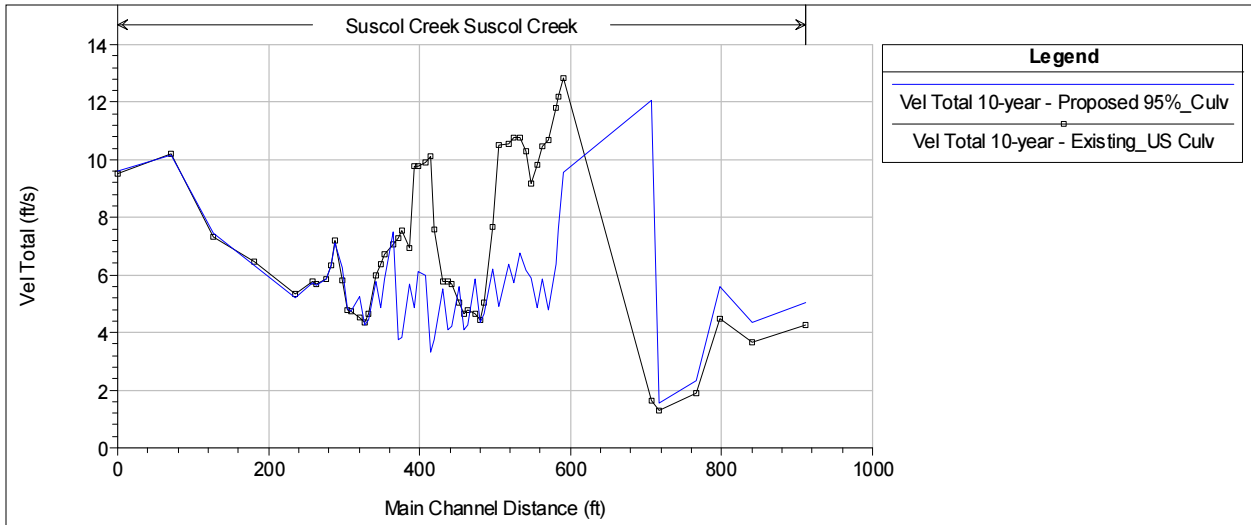


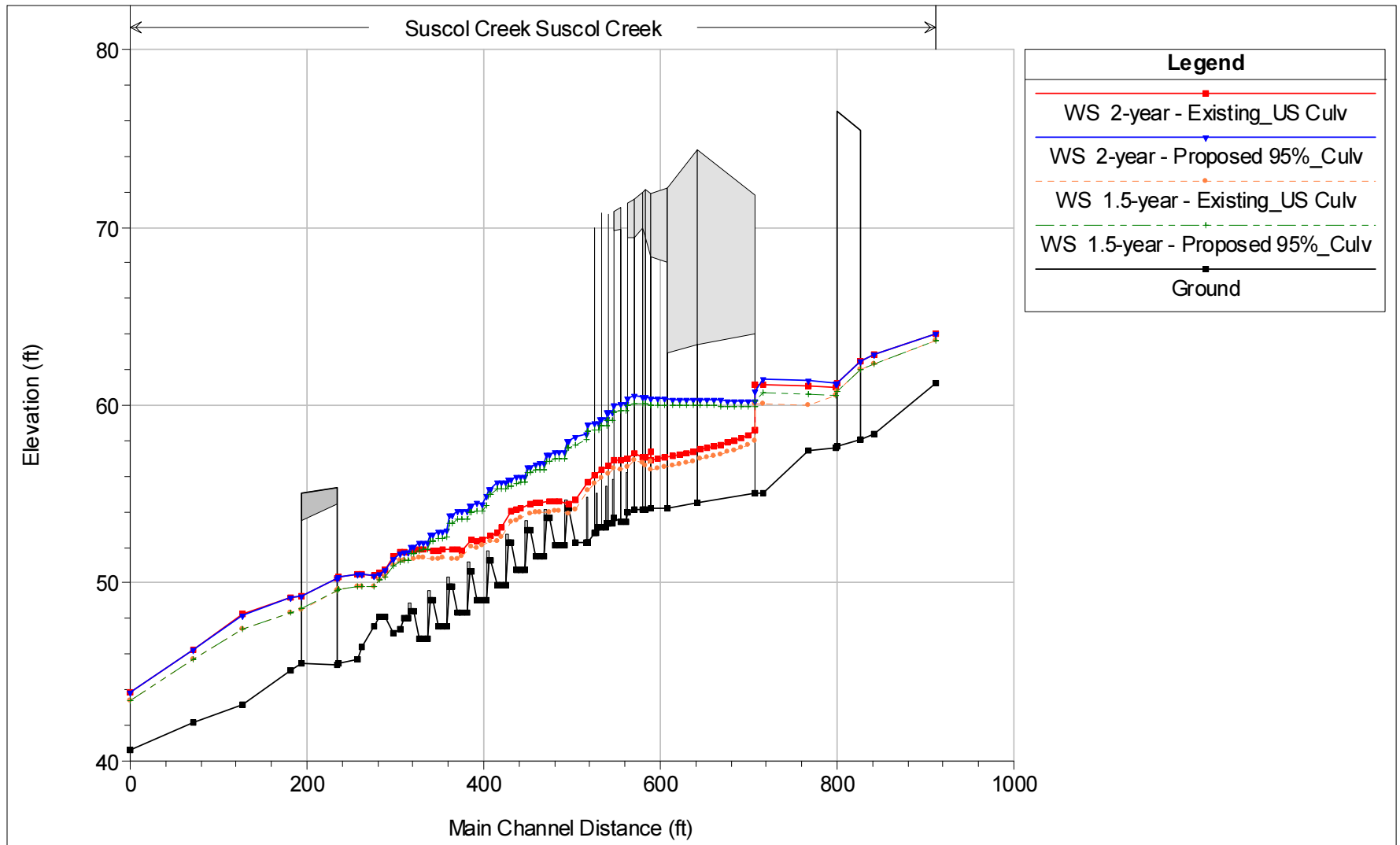


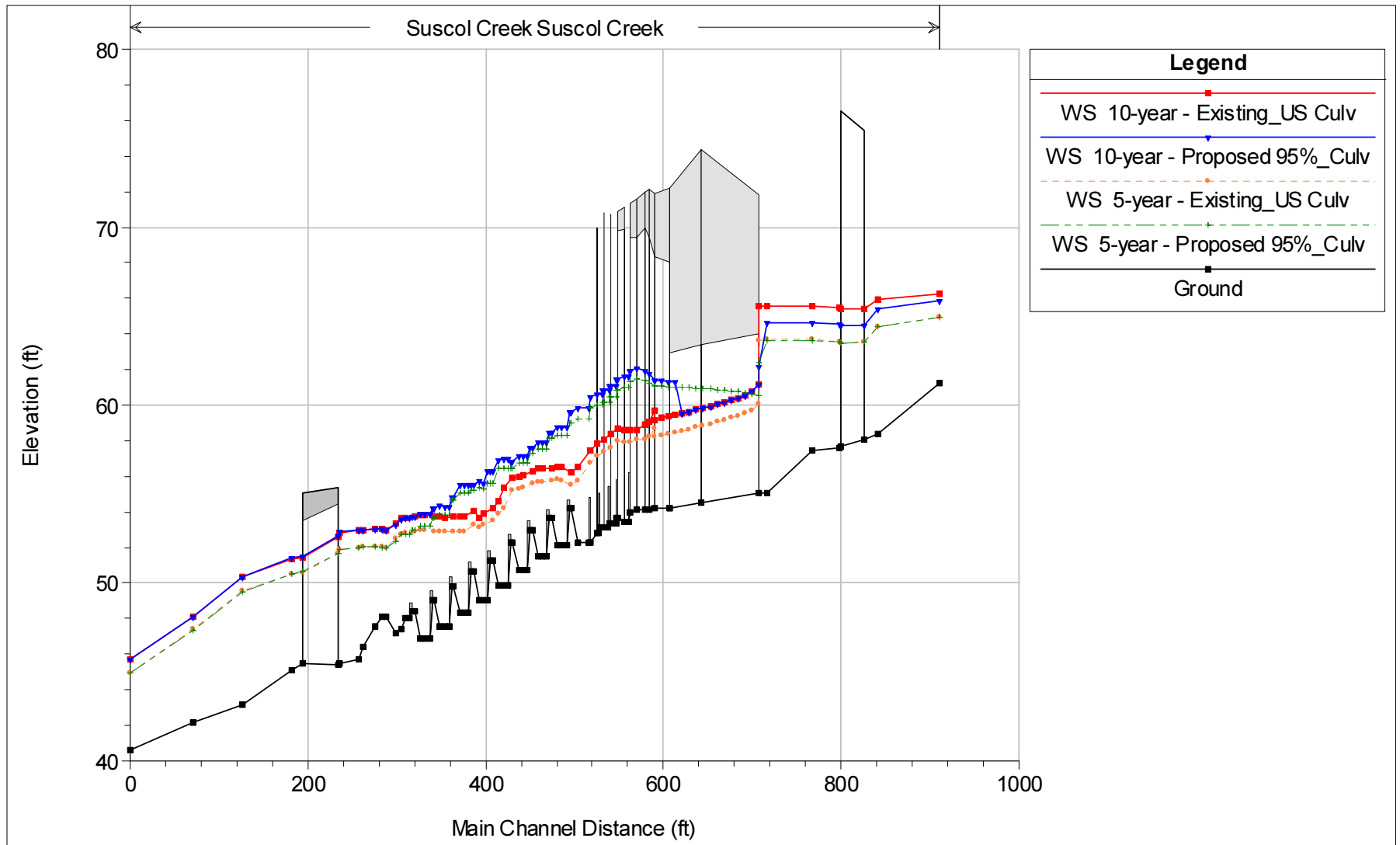
1243 Alpine Road, Suite 108
Walnut Creek, CA 94596
Phone: 925.941.0017
Fax: 925.941.0018
www.wreco.com

Appendix B. WSE and Velocity Profiles





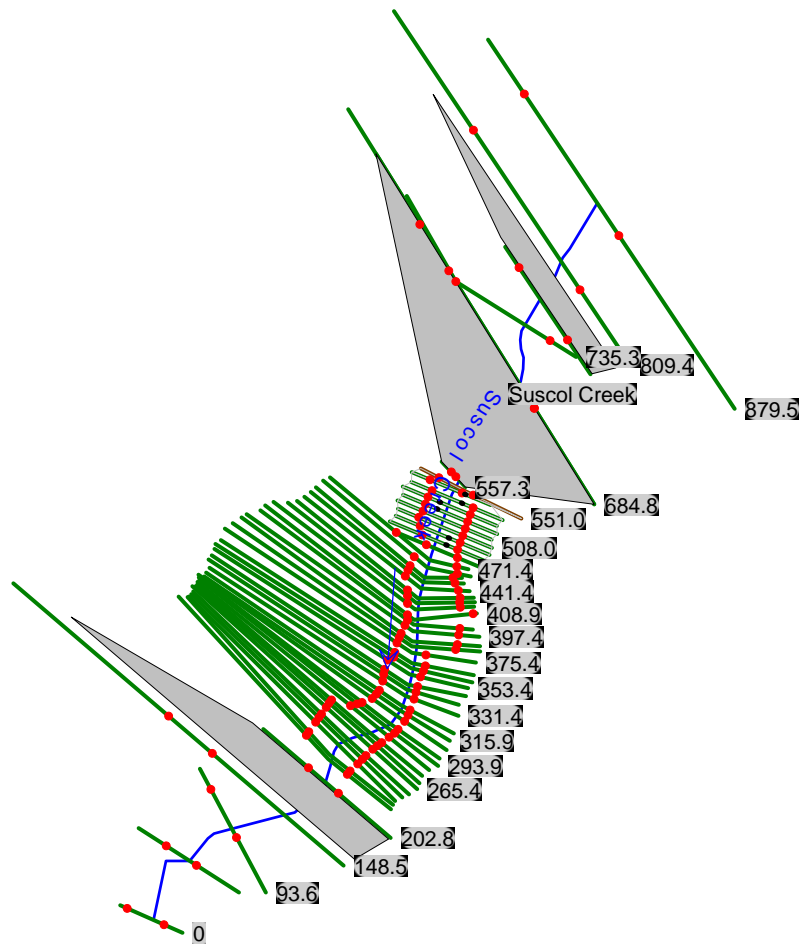






1243 Alpine Road, Suite 108
Walnut Creek, CA 94596
Phone: 925.941.0017
Fax: 925.941.0018
www.wreco.com

Appendix C. Hydraulic Analysis Results: Existing Condition



HEC-RAS Plan: Existing_Open Channel River: Suscol Creek Reach: Suscol Creek

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 879.5 | Adult High Flow | 177.00 | 61.21 | 63.30 | 63.30 | 63.84 | 0.018556 | 5.87 | 30.13 | 28.99 | 1.02 |
| Suscol Creek | 879.5 | Juvenile High FI | 36.00 | 61.21 | 62.35 | 62.35 | 62.63 | 0.023243 | 4.21 | 8.56 | 16.12 | 1.02 |
| Suscol Creek | 879.5 | Adult Low Flow | 3.00 | 61.21 | 61.64 | 61.64 | 61.75 | 0.031213 | 2.66 | 1.13 | 5.25 | 1.01 |
| Suscol Creek | 879.5 | Juvenile Low Flo | 1.00 | 61.21 | 61.49 | 61.49 | 61.56 | 0.034872 | 2.11 | 0.47 | 3.41 | 1.00 |
| Suscol Creek | 809.4 | Adult High Flow | 177.00 | 58.30 | 61.63 | 60.73 | 61.89 | 0.007055 | 4.15 | 42.63 | 21.48 | 0.52 |
| Suscol Creek | 809.4 | Juvenile High FI | 36.00 | 58.30 | 60.05 | 59.47 | 60.14 | 0.005056 | 2.44 | 14.76 | 13.85 | 0.42 |
| Suscol Creek | 809.4 | Adult Low Flow | 3.00 | 58.30 | 58.85 | 58.73 | 58.89 | 0.012410 | 1.67 | 1.79 | 6.54 | 0.56 |
| Suscol Creek | 809.4 | Juvenile Low Flo | 1.00 | 58.30 | 58.67 | 58.58 | 58.69 | 0.011619 | 1.24 | 0.81 | 4.39 | 0.51 |
| Suscol Creek | 772 | Bridge | | | | | | | | | | |
| Suscol Creek | 766.0 | Adult High Flow | 177.00 | 57.61 | 60.07 | 60.07 | 60.83 | 0.035195 | 7.01 | 25.27 | 16.91 | 1.01 |
| Suscol Creek | 766.0 | Juvenile High FI | 36.00 | 57.61 | 58.81 | 58.74 | 59.12 | 0.025370 | 4.45 | 8.08 | 10.48 | 0.89 |
| Suscol Creek | 766.0 | Adult Low Flow | 3.00 | 57.61 | 58.10 | 57.97 | 58.14 | 0.008154 | 1.49 | 2.01 | 6.68 | 0.48 |
| Suscol Creek | 766.0 | Juvenile Low Flo | 1.00 | 57.61 | 57.96 | 57.85 | 57.97 | 0.005631 | 0.92 | 1.09 | 5.87 | 0.38 |
| Suscol Creek | 735.3 | Adult High Flow | 177.00 | 57.36 | 58.81 | 58.81 | 59.37 | 0.028482 | 5.96 | 29.69 | 27.30 | 1.01 |
| Suscol Creek | 735.3 | Juvenile High FI | 36.00 | 57.36 | 58.00 | 58.00 | 58.22 | 0.030461 | 3.74 | 9.64 | 22.14 | 1.00 |
| Suscol Creek | 735.3 | Adult Low Flow | 3.00 | 57.36 | 57.61 | 57.61 | 57.66 | 0.037670 | 1.83 | 1.64 | 14.09 | 0.94 |
| Suscol Creek | 735.3 | Juvenile Low Flo | 1.00 | 57.36 | 57.54 | 57.54 | 57.57 | 0.051724 | 1.36 | 0.74 | 12.88 | 1.00 |
| Suscol Creek | 684.8 | Adult High Flow | 177.00 | 54.93 | 58.50 | 58.50 | 58.55 | 0.001341 | 1.71 | 103.63 | 49.58 | 0.21 |
| Suscol Creek | 684.8 | Juvenile High FI | 36.00 | 54.93 | 56.32 | 56.32 | 56.39 | 0.003052 | 2.08 | 17.27 | 18.57 | 0.38 |
| Suscol Creek | 684.8 | Adult Low Flow | 3.00 | 54.93 | 55.45 | 55.45 | 55.46 | 0.002305 | 0.83 | 3.61 | 13.62 | 0.29 |
| Suscol Creek | 684.8 | Juvenile Low Flo | 1.00 | 54.93 | 55.31 | 55.31 | 55.31 | 0.002036 | 0.58 | 1.74 | 10.53 | 0.25 |
| Suscol Creek | 675.8 | Adult High Flow | 177.00 | 55.00 | 57.36 | 57.36 | 58.42 | 0.003844 | 8.29 | 21.36 | 10.00 | 0.95 |
| Suscol Creek | 675.8 | Juvenile High FI | 36.00 | 55.00 | 55.96 | 55.96 | 56.33 | 0.004277 | 4.89 | 7.37 | 10.00 | 0.88 |
| Suscol Creek | 675.8 | Adult Low Flow | 3.00 | 55.00 | 55.34 | 55.34 | 55.42 | 0.006348 | 2.35 | 1.27 | 7.79 | 1.03 |
| Suscol Creek | 675.8 | Juvenile Low Flo | 1.00 | 55.00 | 55.22 | 55.22 | 55.28 | 0.006762 | 1.85 | 0.54 | 4.94 | 0.99 |
| Suscol Creek | 610.9 | Adult High Flow | 177.00 | 54.51 | 56.81 | 56.81 | 57.88 | 0.003167 | 8.30 | 21.33 | 9.93 | 1.00 |
| Suscol Creek | 610.9 | Juvenile High FI | 36.00 | 54.51 | 55.39 | 55.39 | 55.76 | 0.003834 | 4.90 | 7.35 | 9.78 | 1.00 |
| Suscol Creek | 610.9 | Adult Low Flow | 3.00 | 54.51 | 54.78 | 54.78 | 54.85 | 0.005849 | 2.17 | 1.38 | 9.01 | 0.98 |
| Suscol Creek | 610.9 | Juvenile Low Flo | 1.00 | 54.51 | 54.68 | 54.68 | 54.72 | 0.008593 | 1.77 | 0.57 | 6.68 | 1.07 |
| Suscol Creek | 575.4 | Adult High Flow | 177.00 | 54.22 | 56.67 | 56.44 | 57.56 | 0.003066 | 7.59 | 23.32 | 9.69 | 0.86 |
| Suscol Creek | 575.4 | Juvenile High FI | 36.00 | 54.22 | 55.14 | 55.02 | 55.42 | 0.002695 | 4.25 | 8.47 | 9.69 | 0.78 |
| Suscol Creek | 575.4 | Adult Low Flow | 3.00 | 54.22 | 54.45 | 54.40 | 54.49 | 0.002623 | 1.66 | 1.81 | 9.61 | 0.67 |
| Suscol Creek | 575.4 | Juvenile Low Flo | 1.00 | 54.22 | 54.40 | 54.32 | 54.41 | 0.000774 | 0.74 | 1.35 | 9.60 | 0.35 |
| Suscol Creek | 575.3 | Adult High Flow | 177.00 | 54.22 | 56.47 | 56.47 | 57.55 | 0.003939 | 8.34 | 21.23 | 9.85 | 1.00 |
| Suscol Creek | 575.3 | Juvenile High FI | 36.00 | 54.22 | 55.03 | 55.03 | 55.41 | 0.004297 | 4.98 | 7.23 | 9.50 | 1.01 |
| Suscol Creek | 575.3 | Adult Low Flow | 3.00 | 54.22 | 54.44 | 54.40 | 54.49 | 0.003195 | 1.77 | 1.70 | 9.34 | 0.73 |
| Suscol Creek | 575.3 | Juvenile Low Flo | 1.00 | 54.22 | 54.40 | 54.33 | 54.41 | 0.000852 | 0.77 | 1.30 | 9.33 | 0.36 |
| Suscol Creek | 557.3 | Adult High Flow | 177.00 | 54.17 | 56.23 | 56.23 | 57.21 | 0.003708 | 7.94 | 22.28 | 11.39 | 1.00 |
| Suscol Creek | 557.3 | Juvenile High FI | 36.00 | 54.17 | 54.98 | 54.91 | 55.27 | 0.003100 | 4.29 | 8.39 | 10.95 | 0.86 |
| Suscol Creek | 557.3 | Adult Low Flow | 3.00 | 54.17 | 54.42 | 54.33 | 54.44 | 0.001505 | 1.33 | 2.25 | 10.76 | 0.51 |
| Suscol Creek | 557.3 | Juvenile Low Flo | 1.00 | 54.17 | 54.39 | 54.27 | 54.40 | 0.000246 | 0.50 | 2.00 | 10.75 | 0.20 |
| Suscol Creek | 551.0 | Adult High Flow | 177.00 | 54.16 | 56.25 | 56.01 | 56.93 | 0.002399 | 6.59 | 26.84 | 13.61 | 0.83 |
| Suscol Creek | 551.0 | Juvenile High FI | 36.00 | 54.16 | 55.04 | 54.85 | 55.22 | 0.001734 | 3.37 | 10.69 | 13.19 | 0.66 |
| Suscol Creek | 551.0 | Adult Low Flow | 3.00 | 54.16 | 54.41 | 54.34 | 54.43 | 0.001592 | 1.26 | 2.38 | 12.99 | 0.52 |
| Suscol Creek | 551.0 | Juvenile Low Flo | 1.00 | 54.16 | 54.39 | 54.28 | 54.40 | 0.000242 | 0.46 | 2.16 | 12.98 | 0.20 |
| Suscol Creek | 547.5 | Adult High Flow | 177.00 | 54.16 | 56.35 | 55.93 | 56.87 | 0.001738 | 5.83 | 30.36 | 14.74 | 0.72 |
| Suscol Creek | 547.5 | Juvenile High FI | 36.00 | 54.16 | 55.05 | 54.82 | 55.20 | 0.001436 | 3.10 | 11.61 | 14.21 | 0.61 |
| Suscol Creek | 547.5 | Adult Low Flow | 3.00 | 54.16 | 54.40 | 54.34 | 54.43 | 0.001620 | 1.23 | 2.43 | 13.98 | 0.52 |
| Suscol Creek | 547.5 | Juvenile Low Flo | 1.00 | 54.16 | 54.39 | 54.28 | 54.39 | 0.000229 | 0.44 | 2.26 | 13.98 | 0.19 |
| Suscol Creek | 538.0 | Adult High Flow | 177.00 | 54.11 | 56.39 | 55.91 | 56.83 | 0.001373 | 5.31 | 33.31 | 17.30 | 0.68 |
| Suscol Creek | 538.0 | Juvenile High FI | 36.00 | 54.11 | 55.03 | 54.82 | 55.19 | 0.001510 | 3.16 | 11.40 | 14.82 | 0.63 |
| Suscol Creek | 538.0 | Adult Low Flow | 3.00 | 54.11 | 54.38 | 54.32 | 54.41 | 0.001774 | 1.30 | 2.30 | 13.15 | 0.55 |
| Suscol Creek | 538.0 | Juvenile Low Flo | 1.00 | 54.11 | 54.39 | 54.24 | 54.39 | 0.000175 | 0.42 | 2.39 | 13.17 | 0.17 |
| Suscol Creek | 530.5 | Adult High Flow | 177.00 | 54.00 | 56.04 | 56.04 | 56.79 | 0.003058 | 6.93 | 25.53 | 16.98 | 1.00 |
| Suscol Creek | 530.5 | Juvenile High FI | 36.00 | 54.00 | 54.82 | 54.82 | 55.15 | 0.003970 | 4.58 | 7.86 | 12.16 | 1.00 |
| Suscol Creek | 530.5 | Adult Low Flow | 3.00 | 54.00 | 54.38 | 54.24 | 54.40 | 0.000689 | 1.06 | 2.82 | 10.67 | 0.36 |
| Suscol Creek | 530.5 | Juvenile Low Flo | 1.00 | 54.00 | 54.39 | 54.15 | 54.39 | 0.000069 | 0.34 | 2.91 | 10.70 | 0.12 |
| Suscol Creek | 523.0 | Adult High Flow | 177.00 | 53.15 | 55.86 | 55.68 | 56.48 | 0.002389 | 6.28 | 28.18 | 16.73 | 0.85 |
| Suscol Creek | 523.0 | Juvenile High FI | 36.00 | 53.15 | 54.62 | 54.55 | 54.86 | 0.003082 | 3.94 | 9.14 | 13.77 | 0.85 |
| Suscol Creek | 523.0 | Adult Low Flow | 3.00 | 53.15 | 54.39 | 53.99 | 54.39 | 0.000080 | 0.50 | 6.04 | 13.23 | 0.13 |
| Suscol Creek | 523.0 | Juvenile Low Flo | 1.00 | 53.15 | 54.39 | 53.63 | 54.39 | 0.000009 | 0.17 | 6.06 | 13.24 | 0.04 |
| Suscol Creek | 515.5 | Adult High Flow | 177.00 | 53.68 | 55.86 | 55.66 | 56.45 | 0.002194 | 6.14 | 28.82 | 17.20 | 0.84 |
| Suscol Creek | 515.5 | Juvenile High FI | 36.00 | 53.68 | 54.53 | 54.53 | 54.83 | 0.004117 | 4.37 | 8.23 | 13.61 | 0.99 |
| Suscol Creek | 515.5 | Adult Low Flow | 3.00 | 53.68 | 54.39 | 53.97 | 54.39 | 0.000065 | 0.47 | 6.33 | 13.18 | 0.12 |
| Suscol Creek | 515.5 | Juvenile Low Flo | 1.00 | 53.68 | 54.39 | 53.88 | 54.39 | 0.000007 | 0.16 | 6.35 | 13.19 | 0.04 |
| Suscol Creek | 508.0 | Adult High Flow | 177.00 | 53.41 | 55.61 | 55.61 | 56.40 | 0.003049 | 7.14 | 24.80 | 15.59 | 1.00 |
| Suscol Creek | 508.0 | Juvenile High FI | 36.00 | 53.41 | 54.37 | 54.37 | 54.70 | 0.003881 | 4.62 | 7.79 | 11.69 | 1.00 |

HEC-RAS Plan: Existing_Open Channel River: Suscol Creek Reach: Suscol Creek (Continued)

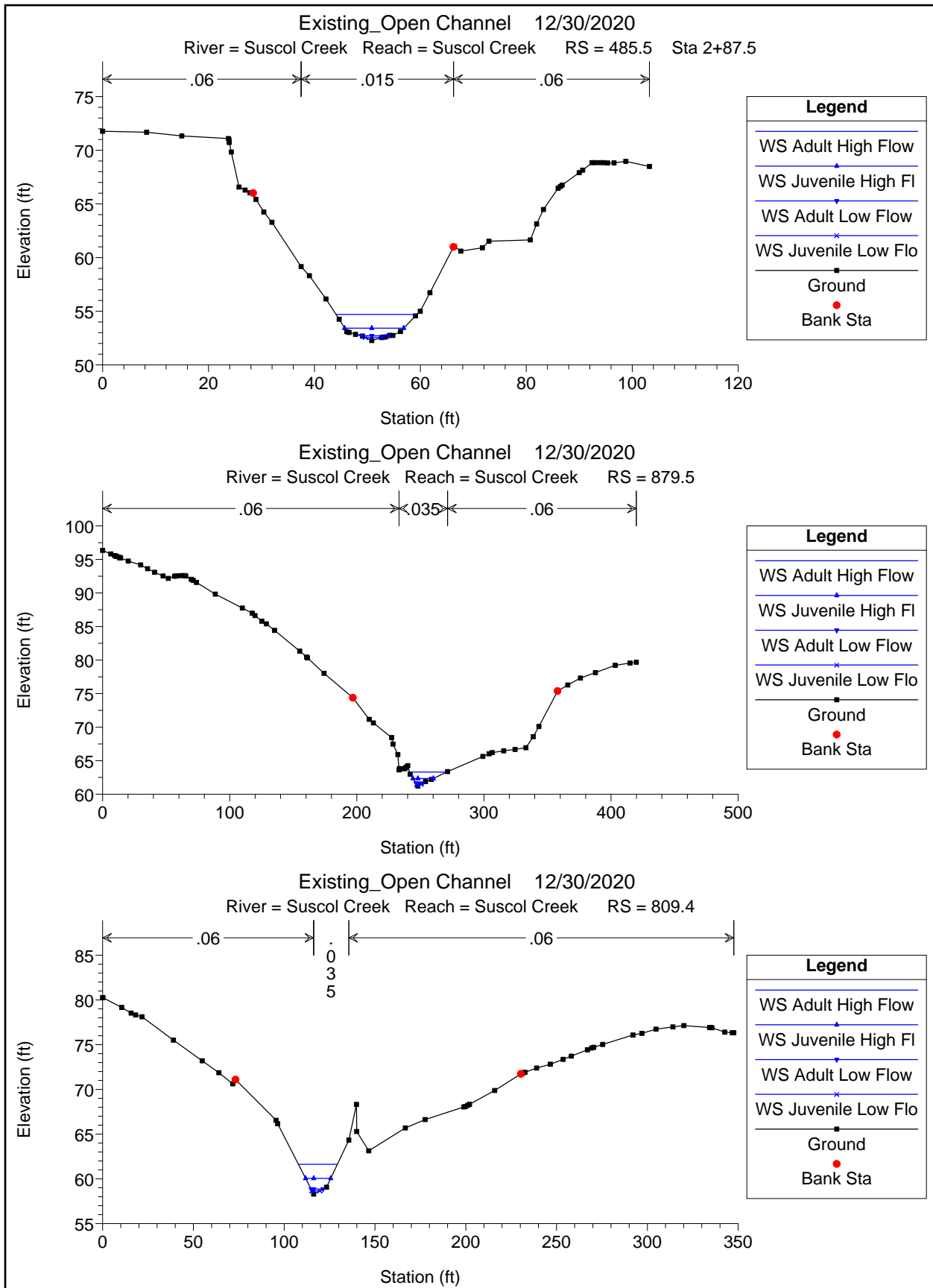
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 508.0 | Adult Low Flow | 3.00 | 53.41 | 54.39 | 53.74 | 54.39 | 0.000024 | 0.37 | 8.08 | 11.78 | 0.08 |
| Suscol Creek | 508.0 | Juvenile Low Flo | 1.00 | 53.41 | 54.39 | 53.61 | 54.39 | 0.000003 | 0.12 | 8.09 | 11.78 | 0.03 |
| Suscol Creek | 500.5 | Adult High Flow | 177.00 | 53.14 | 55.34 | 55.34 | 56.15 | 0.003074 | 7.20 | 24.58 | 15.31 | 1.00 |
| Suscol Creek | 500.5 | Juvenile High FI | 36.00 | 53.14 | 54.34 | 54.09 | 54.52 | 0.001470 | 3.37 | 10.69 | 12.35 | 0.64 |
| Suscol Creek | 500.5 | Adult Low Flow | 3.00 | 53.14 | 54.39 | 53.46 | 54.39 | 0.000009 | 0.27 | 11.31 | 12.50 | 0.05 |
| Suscol Creek | 500.5 | Juvenile Low Flo | 1.00 | 53.14 | 54.39 | 53.34 | 54.39 | 0.000001 | 0.09 | 11.31 | 12.50 | 0.02 |
| Suscol Creek | 493.0 | Adult High Flow | 177.00 | 54.37 | 55.09 | 55.09 | 55.88 | 0.003433 | 7.17 | 24.70 | 15.54 | 1.49 |
| Suscol Creek | 493.0 | Juvenile High FI | 36.00 | 54.37 | 54.39 | 54.39 | 54.49 | 0.000597 | 2.47 | 14.58 | 13.51 | 2.93 |
| Suscol Creek | 493.0 | Adult Low Flow | 3.00 | 54.37 | 54.39 | 54.39 | 54.39 | 0.000004 | 0.21 | 14.58 | 13.51 | 0.24 |
| Suscol Creek | 493.0 | Juvenile Low Flo | 1.00 | 54.37 | 54.39 | 54.39 | 54.39 | 0.000000 | 0.07 | 14.58 | 13.51 | 0.08 |
| Suscol Creek | 485.5 | Adult High Flow | 177.00 | 52.26 | 54.69 | 54.69 | 55.51 | 0.003136 | 7.25 | 24.42 | 15.25 | 1.01 |
| Suscol Creek | 485.5 | Juvenile High FI | 36.00 | 52.26 | 53.42 | 53.42 | 53.77 | 0.003936 | 4.72 | 7.62 | 11.16 | 1.01 |
| Suscol Creek | 485.5 | Adult Low Flow | 3.00 | 52.26 | 52.71 | 52.71 | 52.82 | 0.005626 | 2.68 | 1.12 | 5.09 | 1.01 |
| Suscol Creek | 485.5 | Juvenile Low Flo | 1.00 | 52.26 | 52.55 | 52.55 | 52.63 | 0.006524 | 2.18 | 0.46 | 3.16 | 1.01 |
| Suscol Creek | 471.4 | Adult High Flow | 177.00 | 50.16 | 53.49 | 53.49 | 54.40 | 0.031494 | 7.67 | 23.09 | 12.67 | 1.00 |
| Suscol Creek | 471.4 | Juvenile High FI | 36.00 | 50.16 | 51.85 | 51.85 | 52.30 | 0.025610 | 5.36 | 6.71 | 7.78 | 1.02 |
| Suscol Creek | 471.4 | Adult Low Flow | 3.00 | 50.16 | 50.73 | 50.73 | 50.89 | 0.030946 | 3.25 | 0.92 | 2.89 | 1.01 |
| Suscol Creek | 471.4 | Juvenile Low Flo | 1.00 | 50.16 | 50.55 | 50.55 | 50.63 | 0.028792 | 2.23 | 0.45 | 2.40 | 0.91 |
| Suscol Creek | 463.4 | Adult High Flow | 177.00 | 47.37 | 53.23 | | 53.48 | 0.006155 | 3.95 | 44.77 | 16.35 | 0.42 |
| Suscol Creek | 463.4 | Juvenile High FI | 36.00 | 47.37 | 51.51 | | 51.56 | 0.001707 | 1.73 | 20.82 | 11.51 | 0.23 |
| Suscol Creek | 463.4 | Adult Low Flow | 3.00 | 47.37 | 50.44 | | 50.44 | 0.000069 | 0.30 | 10.10 | 8.53 | 0.05 |
| Suscol Creek | 463.4 | Juvenile Low Flo | 1.00 | 47.37 | 50.23 | | 50.23 | 0.000011 | 0.12 | 8.40 | 7.48 | 0.02 |
| Suscol Creek | 452.9 | Adult High Flow | 177.00 | 46.28 | 53.32 | | 53.40 | 0.001314 | 2.28 | 77.51 | 21.65 | 0.21 |
| Suscol Creek | 452.9 | Juvenile High FI | 36.00 | 46.28 | 51.53 | | 51.54 | 0.000220 | 0.83 | 43.43 | 16.50 | 0.09 |
| Suscol Creek | 452.9 | Adult Low Flow | 3.00 | 46.28 | 50.44 | | 50.44 | 0.000004 | 0.11 | 27.20 | 13.01 | 0.01 |
| Suscol Creek | 452.9 | Juvenile Low Flo | 1.00 | 46.28 | 50.23 | | 50.23 | 0.000001 | 0.04 | 24.56 | 12.51 | 0.01 |
| Suscol Creek | 447.9 | Adult High Flow | 177.00 | 45.92 | 53.33 | | 53.39 | 0.001179 | 1.97 | 89.97 | 23.60 | 0.18 |
| Suscol Creek | 447.9 | Juvenile High FI | 36.00 | 45.92 | 51.53 | | 51.54 | 0.000177 | 0.67 | 53.68 | 17.56 | 0.07 |
| Suscol Creek | 447.9 | Adult Low Flow | 3.00 | 45.92 | 50.44 | | 50.44 | 0.000004 | 0.08 | 35.90 | 14.94 | 0.01 |
| Suscol Creek | 447.9 | Juvenile Low Flo | 1.00 | 45.92 | 50.23 | | 50.23 | 0.000001 | 0.03 | 32.86 | 14.50 | 0.00 |
| Suscol Creek | 441.4 | Adult High Flow | 177.00 | 47.65 | 53.30 | | 53.38 | 0.001180 | 2.20 | 80.41 | 24.58 | 0.21 |
| Suscol Creek | 441.4 | Juvenile High FI | 36.00 | 47.65 | 51.53 | | 51.54 | 0.000285 | 0.88 | 40.92 | 19.89 | 0.11 |
| Suscol Creek | 441.4 | Adult Low Flow | 3.00 | 47.65 | 50.44 | | 50.44 | 0.000011 | 0.14 | 21.02 | 16.38 | 0.02 |
| Suscol Creek | 441.4 | Juvenile Low Flo | 1.00 | 47.65 | 50.23 | | 50.23 | 0.000002 | 0.06 | 17.73 | 15.58 | 0.01 |
| Suscol Creek | 430.9 | Adult High Flow | 177.00 | 49.13 | 53.27 | | 53.36 | 0.001427 | 2.43 | 72.72 | 26.32 | 0.26 |
| Suscol Creek | 430.9 | Juvenile High FI | 36.00 | 49.13 | 51.51 | | 51.53 | 0.000509 | 1.15 | 31.29 | 20.63 | 0.16 |
| Suscol Creek | 430.9 | Adult Low Flow | 3.00 | 49.13 | 50.44 | | 50.44 | 0.000061 | 0.26 | 11.53 | 16.24 | 0.05 |
| Suscol Creek | 430.9 | Juvenile Low Flo | 1.00 | 49.13 | 50.23 | | 50.23 | 0.000019 | 0.12 | 8.27 | 15.45 | 0.03 |
| Suscol Creek | 425.9 | Adult High Flow | 177.00 | 49.38 | 53.26 | | 53.36 | 0.001971 | 2.49 | 71.06 | 27.72 | 0.27 |
| Suscol Creek | 425.9 | Juvenile High FI | 36.00 | 49.38 | 51.50 | | 51.53 | 0.001054 | 1.30 | 27.77 | 21.50 | 0.20 |
| Suscol Creek | 425.9 | Adult Low Flow | 3.00 | 49.38 | 50.44 | | 50.44 | 0.000237 | 0.40 | 7.58 | 15.29 | 0.10 |
| Suscol Creek | 425.9 | Juvenile Low Flo | 1.00 | 49.38 | 50.23 | | 50.23 | 0.000094 | 0.21 | 4.70 | 12.45 | 0.06 |
| Suscol Creek | 419.4 | Adult High Flow | 177.00 | 49.57 | 53.19 | | 53.33 | 0.004044 | 3.04 | 58.32 | 27.26 | 0.37 |
| Suscol Creek | 419.4 | Juvenile High FI | 36.00 | 49.57 | 51.46 | | 51.52 | 0.003372 | 1.98 | 18.16 | 17.52 | 0.34 |
| Suscol Creek | 419.4 | Adult Low Flow | 3.00 | 49.57 | 50.43 | | 50.44 | 0.001467 | 0.83 | 3.63 | 9.62 | 0.24 |
| Suscol Creek | 419.4 | Juvenile Low Flo | 1.00 | 49.57 | 50.23 | | 50.23 | 0.000734 | 0.49 | 2.02 | 6.85 | 0.16 |
| Suscol Creek | 408.9 | Adult High Flow | 177.00 | 49.40 | 52.94 | | 53.25 | 0.011534 | 4.48 | 39.51 | 21.89 | 0.59 |
| Suscol Creek | 408.9 | Juvenile High FI | 36.00 | 49.40 | 51.31 | | 51.46 | 0.008164 | 3.02 | 11.90 | 12.09 | 0.54 |
| Suscol Creek | 408.9 | Adult Low Flow | 3.00 | 49.40 | 50.41 | | 50.42 | 0.000902 | 0.83 | 3.63 | 6.58 | 0.20 |
| Suscol Creek | 408.9 | Juvenile Low Flo | 1.00 | 49.40 | 50.22 | | 50.23 | 0.000279 | 0.40 | 2.49 | 5.54 | 0.11 |
| Suscol Creek | 403.9 | Adult High Flow | 177.00 | 49.32 | 52.82 | | 53.18 | 0.015873 | 4.78 | 37.04 | 20.80 | 0.63 |
| Suscol Creek | 403.9 | Juvenile High FI | 36.00 | 49.32 | 51.24 | | 51.40 | 0.013765 | 3.19 | 11.28 | 11.77 | 0.57 |
| Suscol Creek | 403.9 | Adult Low Flow | 3.00 | 49.32 | 50.41 | | 50.42 | 0.001414 | 0.83 | 3.60 | 6.52 | 0.20 |
| Suscol Creek | 403.9 | Juvenile Low Flo | 1.00 | 49.32 | 50.22 | | 50.23 | 0.000365 | 0.40 | 2.50 | 5.39 | 0.10 |
| Suscol Creek | 397.4 | Adult High Flow | 177.00 | 49.23 | 52.74 | | 53.08 | 0.013458 | 4.67 | 37.93 | 20.05 | 0.60 |
| Suscol Creek | 397.4 | Juvenile High FI | 36.00 | 49.23 | 51.19 | | 51.32 | 0.009498 | 2.84 | 12.69 | 12.44 | 0.49 |
| Suscol Creek | 397.4 | Adult Low Flow | 3.00 | 49.23 | 50.40 | | 50.41 | 0.000807 | 0.85 | 4.63 | 7.99 | 0.15 |
| Suscol Creek | 397.4 | Juvenile Low Flo | 1.00 | 49.23 | 50.22 | | 50.22 | 0.000207 | 0.31 | 3.27 | 6.95 | 0.08 |
| Suscol Creek | 386.9 | Adult High Flow | 177.00 | 49.10 | 51.98 | 51.95 | 52.84 | 0.025167 | 7.43 | 23.81 | 13.56 | 0.99 |
| Suscol Creek | 386.9 | Juvenile High FI | 36.00 | 49.10 | 51.13 | | 51.24 | 0.004777 | 2.74 | 13.13 | 11.50 | 0.45 |
| Suscol Creek | 386.9 | Adult Low Flow | 3.00 | 49.10 | 50.40 | | 50.40 | 0.000293 | 0.53 | 5.64 | 8.60 | 0.12 |
| Suscol Creek | 386.9 | Juvenile Low Flo | 1.00 | 49.10 | 50.22 | | 50.22 | 0.000071 | 0.24 | 4.21 | 7.43 | 0.06 |
| Suscol Creek | 381.9 | Adult High Flow | 177.00 | 49.24 | 52.02 | 51.83 | 52.67 | 0.017695 | 6.44 | 27.46 | 15.94 | 0.87 |
| Suscol Creek | 381.9 | Juvenile High FI | 36.00 | 49.24 | 51.12 | | 51.22 | 0.003186 | 2.45 | 14.69 | 12.65 | 0.40 |
| Suscol Creek | 381.9 | Adult Low Flow | 3.00 | 49.24 | 50.40 | | 50.40 | 0.000207 | 0.46 | 6.48 | 9.46 | 0.10 |
| Suscol Creek | 381.9 | Juvenile Low Flo | 1.00 | 49.24 | 50.22 | | 50.22 | 0.000050 | 0.20 | 4.89 | 8.33 | 0.05 |
| Suscol Creek | 375.4 | Adult High Flow | 177.00 | 49.52 | 52.05 | | 52.52 | 0.012684 | 5.50 | 32.19 | 19.45 | 0.75 |

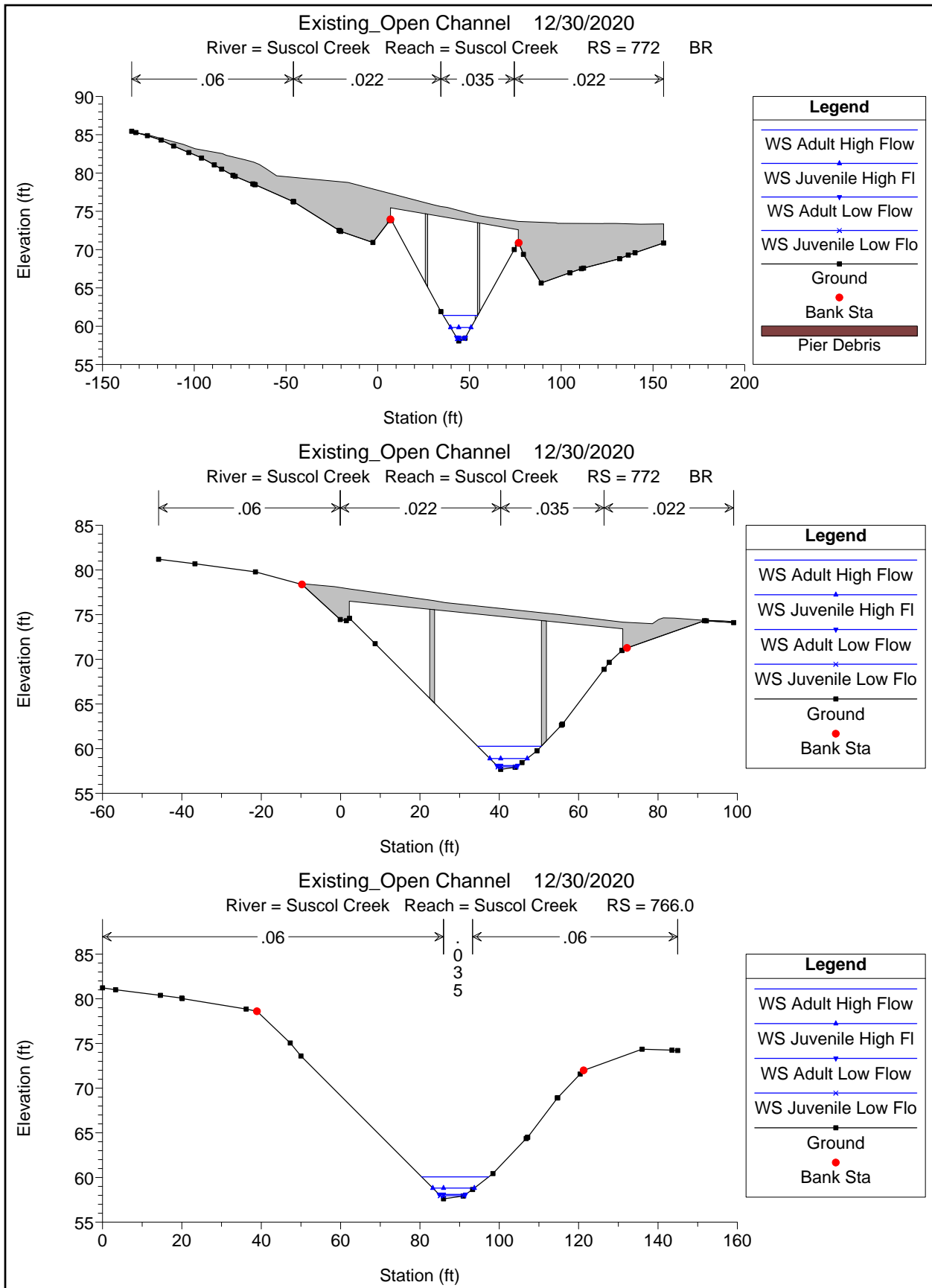
HEC-RAS Plan: Existing_Open Channel River: Suscol Creek Reach: Suscol Creek (Continued)

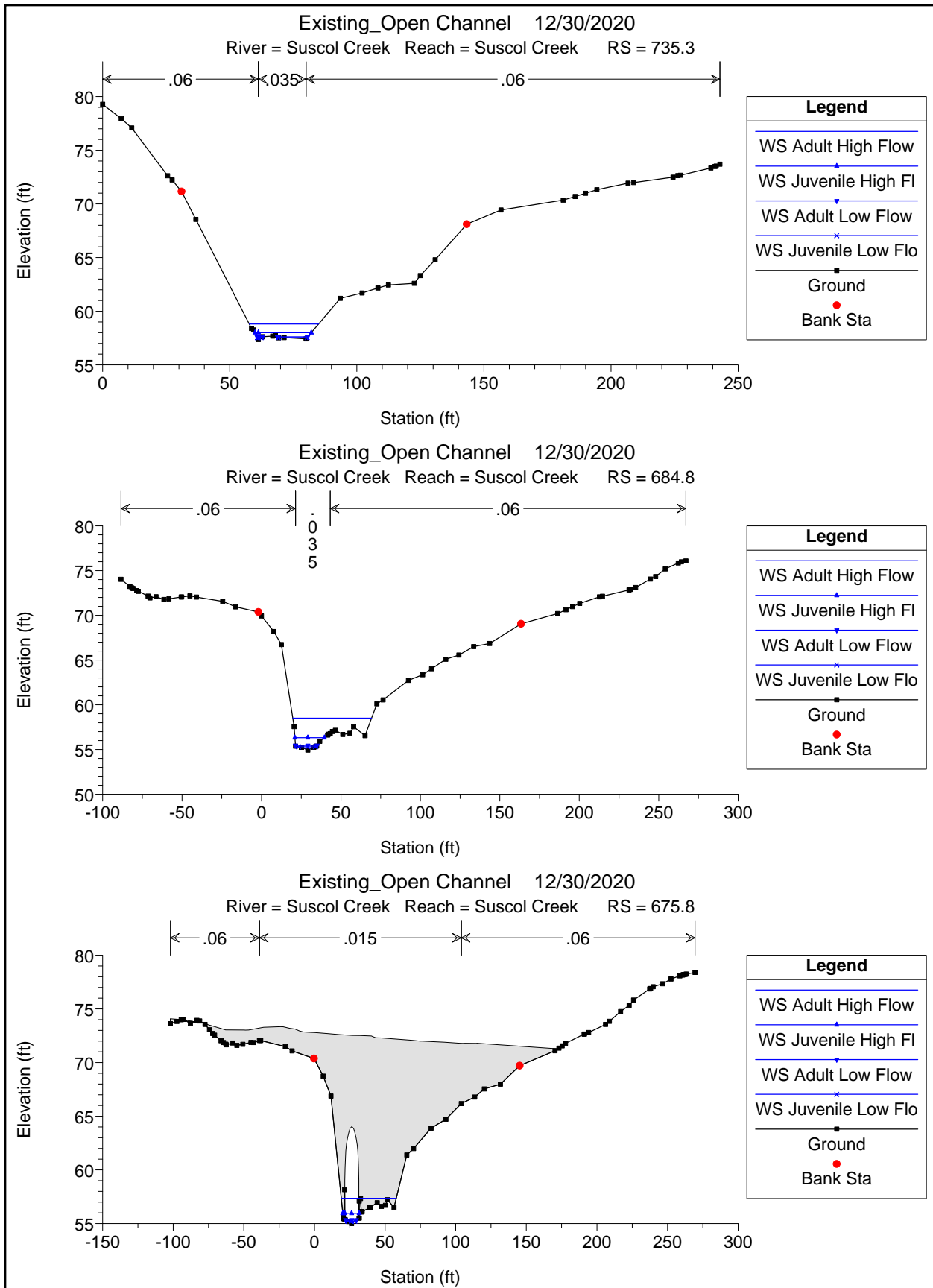
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 375.4 | Juvenile High FI | 36.00 | 49.52 | 51.11 | | 51.19 | 0.003319 | 2.30 | 15.62 | 15.96 | 0.41 |
| Suscol Creek | 375.4 | Adult Low Flow | 3.00 | 49.52 | 50.40 | | 50.40 | 0.00369 | 0.52 | 5.78 | 11.14 | 0.13 |
| Suscol Creek | 375.4 | Juvenile Low Flo | 1.00 | 49.52 | 50.22 | | 50.22 | 0.000131 | 0.26 | 3.91 | 10.02 | 0.07 |
| Suscol Creek | 364.9 | Adult High Flow | 177.00 | 49.81 | 51.71 | 51.71 | 52.33 | 0.019295 | 6.35 | 27.87 | 22.58 | 1.01 |
| Suscol Creek | 364.9 | Juvenile High FI | 36.00 | 49.81 | 51.01 | | 51.13 | 0.008805 | 2.84 | 12.68 | 20.86 | 0.64 |
| Suscol Creek | 364.9 | Adult Low Flow | 3.00 | 49.81 | 50.37 | | 50.39 | 0.003486 | 1.07 | 2.80 | 9.94 | 0.36 |
| Suscol Creek | 364.9 | Juvenile Low Flo | 1.00 | 49.81 | 50.21 | | 50.22 | 0.002438 | 0.71 | 1.40 | 7.04 | 0.28 |
| Suscol Creek | 359.9 | Adult High Flow | 177.00 | 49.88 | 51.63 | 51.63 | 52.22 | 0.020253 | 6.18 | 28.65 | 24.76 | 1.01 |
| Suscol Creek | 359.9 | Juvenile High FI | 36.00 | 49.88 | 50.83 | 50.83 | 51.06 | 0.024455 | 3.84 | 9.38 | 21.22 | 1.02 |
| Suscol Creek | 359.9 | Adult Low Flow | 3.00 | 49.88 | 50.25 | 50.25 | 50.34 | 0.031225 | 2.43 | 1.23 | 6.62 | 0.99 |
| Suscol Creek | 359.9 | Juvenile Low Flo | 1.00 | 49.88 | 50.12 | 50.12 | 50.18 | 0.036936 | 1.97 | 0.51 | 4.25 | 1.00 |
| Suscol Creek | 351.9 | Adult High Flow | 177.00 | 49.28 | 51.65 | | 51.91 | 0.012337 | 4.12 | 42.95 | 28.16 | 0.59 |
| Suscol Creek | 351.9 | Juvenile High FI | 36.00 | 49.28 | 50.63 | | 50.71 | 0.009896 | 2.26 | 15.96 | 23.05 | 0.48 |
| Suscol Creek | 351.9 | Adult Low Flow | 3.00 | 49.28 | 49.82 | | 49.84 | 0.006063 | 1.06 | 2.83 | 9.36 | 0.34 |
| Suscol Creek | 351.9 | Juvenile Low Flo | 1.00 | 49.28 | 49.64 | | 49.65 | 0.004670 | 0.74 | 1.35 | 6.60 | 0.29 |
| Suscol Creek | 342.9 | Adult High Flow | 177.00 | 49.28 | 51.16 | 51.16 | 51.72 | 0.020008 | 6.01 | 29.44 | 26.99 | 1.01 |
| Suscol Creek | 342.9 | Juvenile High FI | 36.00 | 49.28 | 50.28 | 50.28 | 50.54 | 0.023165 | 4.11 | 8.76 | 17.12 | 1.01 |
| Suscol Creek | 342.9 | Adult Low Flow | 3.00 | 49.28 | 49.62 | 49.62 | 49.71 | 0.030967 | 2.48 | 1.21 | 6.28 | 1.00 |
| Suscol Creek | 342.9 | Juvenile Low Flo | 1.00 | 49.28 | 49.50 | 49.50 | 49.54 | 0.027610 | 1.77 | 0.56 | 4.46 | 0.88 |
| Suscol Creek | 337.9 | Adult High Flow | 177.00 | 49.06 | 51.01 | 51.01 | 51.57 | 0.019941 | 6.04 | 29.31 | 26.77 | 1.02 |
| Suscol Creek | 337.9 | Juvenile High FI | 36.00 | 49.06 | 50.09 | 50.09 | 50.36 | 0.022844 | 4.19 | 8.58 | 16.09 | 1.01 |
| Suscol Creek | 337.9 | Adult Low Flow | 3.00 | 49.06 | 49.42 | 49.42 | 49.52 | 0.031718 | 2.53 | 1.19 | 6.09 | 1.01 |
| Suscol Creek | 337.9 | Juvenile Low Flo | 1.00 | 49.06 | 49.28 | 49.28 | 49.35 | 0.035839 | 1.99 | 0.50 | 4.03 | 1.00 |
| Suscol Creek | 331.4 | Adult High Flow | 177.00 | 48.76 | 50.84 | 50.84 | 51.39 | 0.018574 | 5.97 | 29.63 | 26.37 | 0.99 |
| Suscol Creek | 331.4 | Juvenile High FI | 36.00 | 48.76 | 49.86 | 49.86 | 50.13 | 0.022890 | 4.24 | 8.49 | 15.64 | 1.01 |
| Suscol Creek | 331.4 | Adult Low Flow | 3.00 | 48.76 | 49.18 | 49.18 | 49.28 | 0.030491 | 2.55 | 1.18 | 5.79 | 0.99 |
| Suscol Creek | 331.4 | Juvenile Low Flo | 1.00 | 48.76 | 49.03 | 49.03 | 49.10 | 0.036335 | 2.11 | 0.47 | 3.52 | 1.01 |
| Suscol Creek | 320.9 | Adult High Flow | 177.00 | 48.27 | 50.84 | | 51.20 | 0.009464 | 4.79 | 36.95 | 26.91 | 0.72 |
| Suscol Creek | 320.9 | Juvenile High FI | 36.00 | 48.27 | 49.61 | | 49.79 | 0.010683 | 3.39 | 10.62 | 15.34 | 0.72 |
| Suscol Creek | 320.9 | Adult Low Flow | 3.00 | 48.27 | 48.83 | | 48.86 | 0.006955 | 1.53 | 1.96 | 6.81 | 0.50 |
| Suscol Creek | 320.9 | Juvenile Low Flo | 1.00 | 48.27 | 48.67 | | 48.68 | 0.004642 | 0.99 | 1.01 | 4.93 | 0.39 |
| Suscol Creek | 315.9 | Adult High Flow | 177.00 | 48.29 | 50.80 | | 51.15 | 0.009981 | 4.74 | 37.36 | 26.98 | 0.71 |
| Suscol Creek | 315.9 | Juvenile High FI | 36.00 | 48.29 | 49.40 | 49.40 | 49.70 | 0.022432 | 4.38 | 8.21 | 14.12 | 1.01 |
| Suscol Creek | 315.9 | Adult Low Flow | 3.00 | 48.29 | 48.76 | 48.69 | 48.82 | 0.012493 | 1.86 | 1.61 | 6.46 | 0.66 |
| Suscol Creek | 315.9 | Juvenile Low Flo | 1.00 | 48.29 | 48.63 | 48.55 | 48.65 | 0.007733 | 1.16 | 0.86 | 4.86 | 0.49 |
| Suscol Creek | 309.4 | Adult High Flow | 177.00 | 48.32 | 50.78 | | 51.06 | 0.009867 | 4.21 | 42.02 | 26.22 | 0.59 |
| Suscol Creek | 309.4 | Juvenile High FI | 36.00 | 48.32 | 49.31 | | 49.49 | 0.015041 | 3.47 | 10.37 | 16.46 | 0.77 |
| Suscol Creek | 309.4 | Adult Low Flow | 3.00 | 48.32 | 48.61 | 48.61 | 48.69 | 0.034017 | 2.29 | 1.31 | 8.25 | 1.01 |
| Suscol Creek | 309.4 | Juvenile Low Flo | 1.00 | 48.32 | 48.52 | 48.52 | 48.56 | 0.031804 | 1.55 | 0.65 | 6.94 | 0.90 |
| Suscol Creek | 298.9 | Adult High Flow | 177.00 | 46.62 | 50.87 | | 50.97 | 0.001844 | 2.54 | 69.65 | 28.84 | 0.29 |
| Suscol Creek | 298.9 | Juvenile High FI | 36.00 | 46.62 | 49.41 | | 49.43 | 0.000496 | 1.10 | 32.74 | 21.56 | 0.16 |
| Suscol Creek | 298.9 | Adult Low Flow | 3.00 | 46.62 | 48.57 | | 48.57 | 0.000019 | 0.18 | 16.97 | 15.95 | 0.03 |
| Suscol Creek | 298.9 | Juvenile Low Flo | 1.00 | 46.62 | 48.43 | | 48.43 | 0.000003 | 0.07 | 14.88 | 15.05 | 0.01 |
| Suscol Creek | 293.9 | Adult High Flow | 177.00 | 46.24 | 50.87 | | 50.95 | 0.001723 | 2.27 | 77.82 | 29.54 | 0.25 |
| Suscol Creek | 293.9 | Juvenile High FI | 36.00 | 46.24 | 49.41 | | 49.42 | 0.000382 | 0.90 | 39.86 | 22.34 | 0.12 |
| Suscol Creek | 293.9 | Adult Low Flow | 3.00 | 46.24 | 48.57 | | 48.57 | 0.000009 | 0.13 | 23.16 | 17.38 | 0.02 |
| Suscol Creek | 293.9 | Juvenile Low Flo | 1.00 | 46.24 | 48.43 | | 48.43 | 0.000001 | 0.05 | 20.86 | 16.70 | 0.01 |
| Suscol Creek | 287.4 | Adult High Flow | 177.00 | 47.10 | 50.83 | | 50.94 | 0.002185 | 2.65 | 66.89 | 28.35 | 0.30 |
| Suscol Creek | 287.4 | Juvenile High FI | 36.00 | 47.10 | 49.40 | | 49.42 | 0.000599 | 1.15 | 31.17 | 21.65 | 0.17 |
| Suscol Creek | 287.4 | Adult Low Flow | 3.00 | 47.10 | 48.57 | | 48.57 | 0.000032 | 0.20 | 14.85 | 17.53 | 0.04 |
| Suscol Creek | 287.4 | Juvenile Low Flo | 1.00 | 47.10 | 48.43 | | 48.43 | 0.000006 | 0.08 | 12.54 | 16.85 | 0.02 |
| Suscol Creek | 276.9 | Adult High Flow | 177.00 | 48.12 | 50.70 | | 50.89 | 0.006184 | 3.47 | 50.97 | 30.70 | 0.48 |
| Suscol Creek | 276.9 | Juvenile High FI | 36.00 | 48.12 | 49.32 | | 49.40 | 0.004352 | 2.25 | 16.02 | 19.80 | 0.44 |
| Suscol Creek | 276.9 | Adult Low Flow | 3.00 | 48.12 | 48.53 | | 48.56 | 0.015620 | 1.41 | 2.13 | 15.45 | 0.67 |
| Suscol Creek | 276.9 | Juvenile Low Flo | 1.00 | 48.12 | 48.38 | 48.38 | 48.43 | 0.047336 | 1.67 | 0.60 | 7.76 | 1.06 |
| Suscol Creek | 271.9 | Adult High Flow | 177.00 | 47.44 | 50.69 | | 50.85 | 0.005296 | 3.24 | 54.58 | 29.63 | 0.42 |
| Suscol Creek | 271.9 | Juvenile High FI | 36.00 | 47.44 | 49.33 | | 49.38 | 0.001779 | 1.64 | 21.99 | 18.63 | 0.27 |
| Suscol Creek | 271.9 | Adult Low Flow | 3.00 | 47.44 | 48.55 | | 48.55 | 0.000108 | 0.31 | 9.55 | 13.60 | 0.07 |
| Suscol Creek | 271.9 | Juvenile Low Flo | 1.00 | 47.44 | 48.40 | | 48.40 | 0.000024 | 0.13 | 7.60 | 13.06 | 0.03 |
| Suscol Creek | 265.4 | Adult High Flow | 177.00 | 47.02 | 50.55 | | 50.80 | 0.009610 | 3.99 | 44.31 | 23.69 | 0.52 |
| Suscol Creek | 265.4 | Juvenile High FI | 36.00 | 47.02 | 49.31 | | 49.36 | 0.002427 | 1.75 | 20.57 | 15.20 | 0.27 |
| Suscol Creek | 265.4 | Adult Low Flow | 3.00 | 47.02 | 48.55 | | 48.55 | 0.000071 | 0.28 | 10.73 | 10.50 | 0.05 |
| Suscol Creek | 265.4 | Juvenile Low Flo | 1.00 | 47.02 | 48.40 | | 48.40 | 0.000011 | 0.11 | 9.27 | 9.61 | 0.02 |
| Suscol Creek | 254.9 | Adult High Flow | 177.00 | 48.08 | 49.97 | 49.97 | 50.61 | 0.024284 | 6.39 | 27.69 | 22.16 | 1.01 |
| Suscol Creek | 254.9 | Juvenile High FI | 36.00 | 48.08 | 49.14 | | 49.30 | 0.010972 | 3.23 | 11.16 | 17.27 | 0.71 |
| Suscol Creek | 254.9 | Adult Low Flow | 3.00 | 48.08 | 48.52 | | 48.55 | 0.005465 | 1.22 | 2.45 | 10.00 | 0.44 |
| Suscol Creek | 254.9 | Juvenile Low Flo | 1.00 | 48.08 | 48.39 | | 48.40 | 0.004096 | 0.79 | 1.27 | 8.10 | 0.35 |

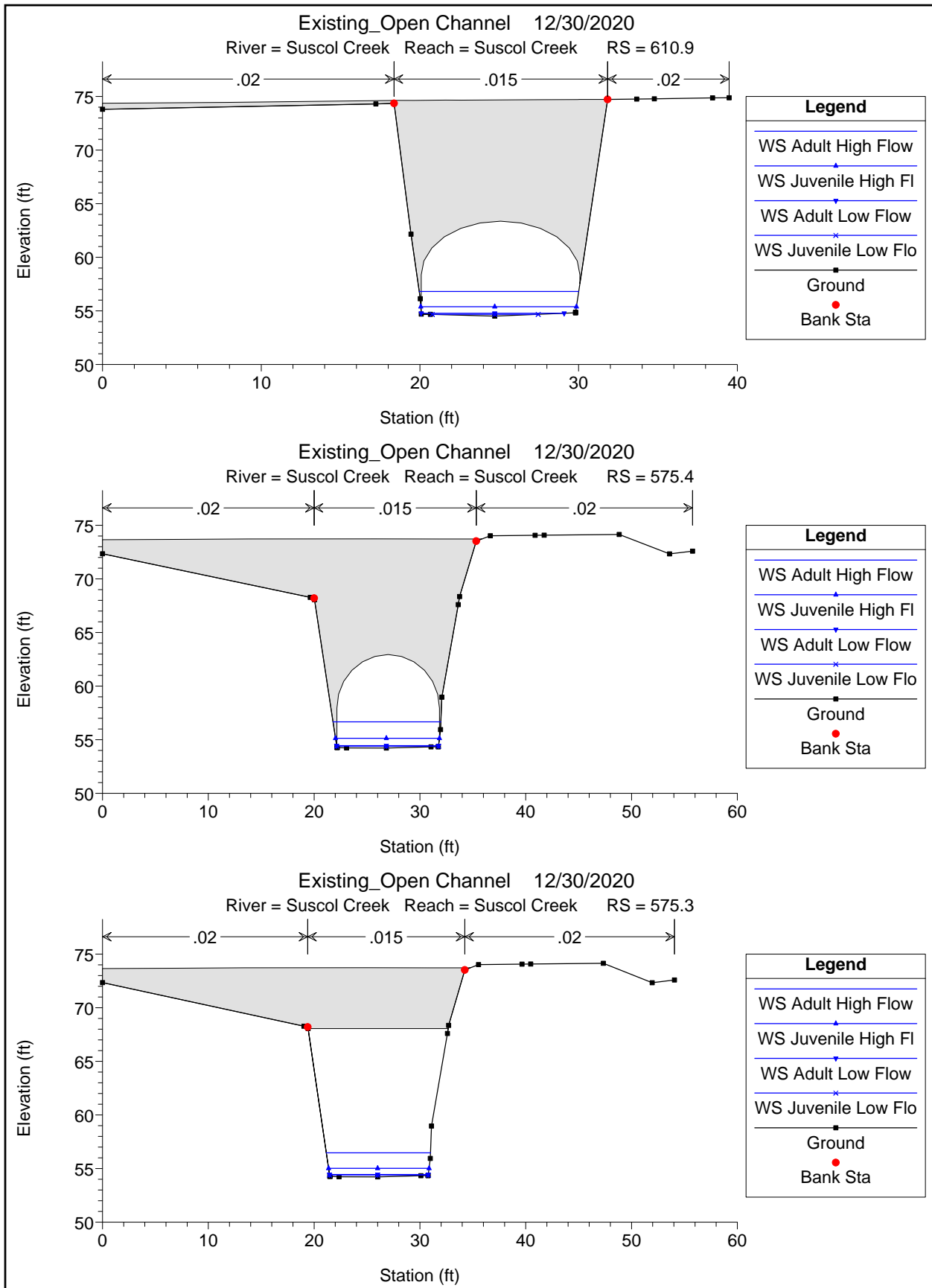
HEC-RAS Plan: Existing_Open Channel River: Suscol Creek Reach: Suscol Creek (Continued)

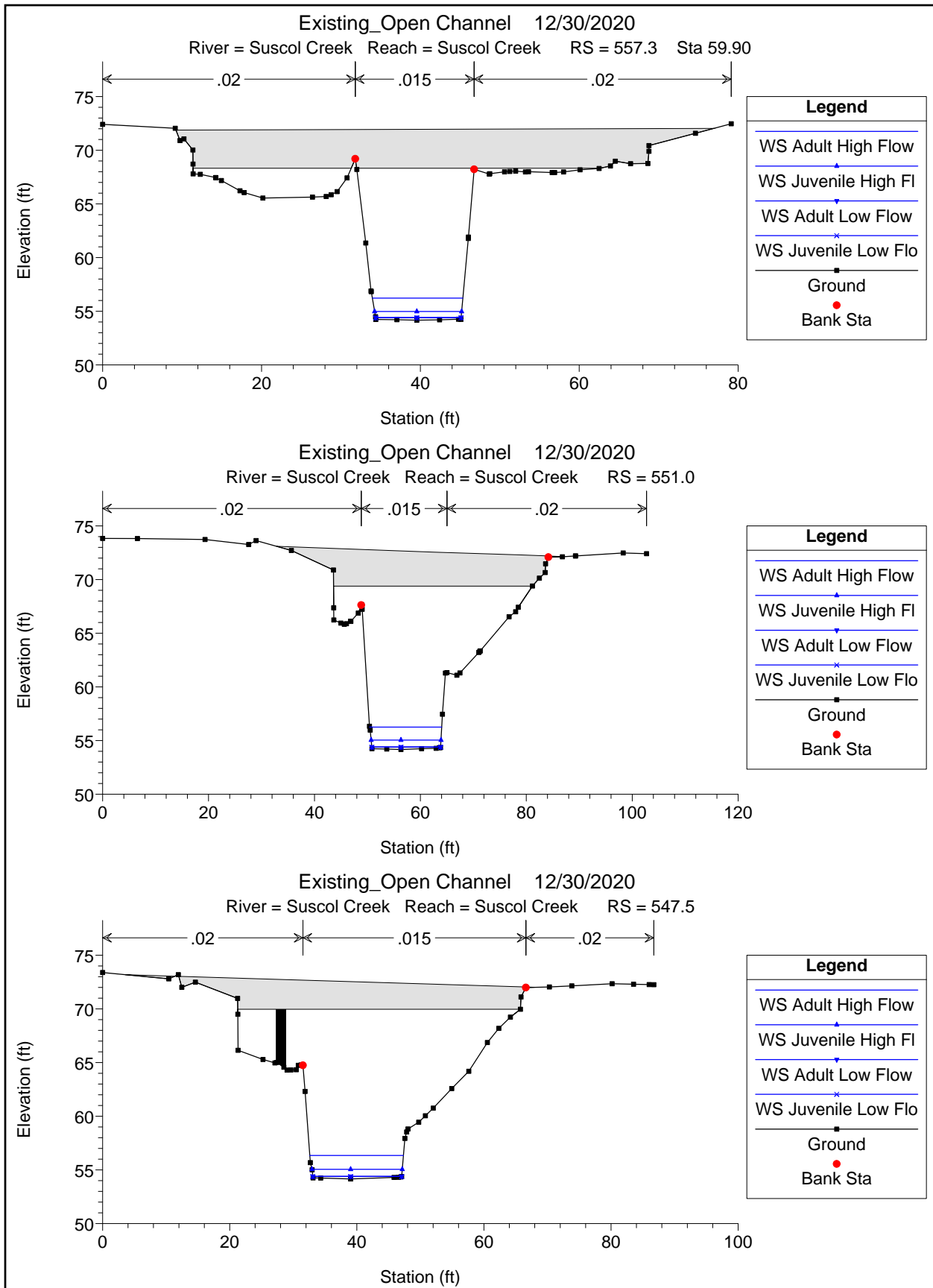
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 249.9 | Adult High Flow | 177.00 | 48.11 | 49.85 | 49.85 | 50.45 | 0.020554 | 6.20 | 28.56 | 24.46 | 1.01 |
| Suscol Creek | 249.9 | Juvenile High Fl | 36.00 | 48.11 | 48.96 | 48.96 | 49.22 | 0.023188 | 4.05 | 8.89 | 17.79 | 1.01 |
| Suscol Creek | 249.9 | Adult Low Flow | 3.00 | 48.11 | 48.41 | 48.41 | 48.49 | 0.033069 | 2.22 | 1.35 | 8.75 | 1.00 |
| Suscol Creek | 249.9 | Juvenile Low Flo | 1.00 | 48.11 | 48.31 | 48.31 | 48.35 | 0.039065 | 1.74 | 0.57 | 6.05 | 1.00 |
| Suscol Creek | 243.4 | Adult High Flow | 177.00 | 47.62 | 49.48 | 49.48 | 50.08 | 0.021083 | 6.21 | 28.50 | 24.42 | 1.01 |
| Suscol Creek | 243.4 | Juvenile High Fl | 36.00 | 47.62 | 48.55 | 48.55 | 48.82 | 0.024025 | 4.17 | 8.63 | 16.40 | 1.01 |
| Suscol Creek | 243.4 | Adult Low Flow | 3.00 | 47.62 | 47.96 | 47.96 | 48.04 | 0.031935 | 2.35 | 1.28 | 7.36 | 1.00 |
| Suscol Creek | 243.4 | Juvenile Low Flo | 1.00 | 47.62 | 47.84 | 47.84 | 47.89 | 0.036950 | 1.89 | 0.53 | 4.75 | 1.00 |
| Suscol Creek | 229.4 | Adult High Flow | 177.00 | 46.54 | 49.01 | | 49.39 | 0.011008 | 4.95 | 35.76 | 21.77 | 0.68 |
| Suscol Creek | 229.4 | Juvenile High Fl | 36.00 | 46.54 | 47.59 | 47.59 | 47.88 | 0.023387 | 4.26 | 8.45 | 15.49 | 1.02 |
| Suscol Creek | 229.4 | Adult Low Flow | 3.00 | 46.54 | 46.92 | 46.92 | 47.02 | 0.030711 | 2.53 | 1.18 | 5.89 | 1.00 |
| Suscol Creek | 229.4 | Juvenile Low Flo | 1.00 | 46.54 | 46.76 | 46.76 | 46.83 | 0.038899 | 2.12 | 0.47 | 3.66 | 1.04 |
| Suscol Creek | 224.7 | Adult High Flow | 177.00 | 45.80 | 49.03 | | 49.32 | 0.008078 | 4.29 | 41.25 | 19.76 | 0.52 |
| Suscol Creek | 224.7 | Juvenile High Fl | 36.00 | 45.80 | 47.11 | 47.10 | 47.43 | 0.026165 | 4.54 | 7.94 | 12.52 | 1.00 |
| Suscol Creek | 224.7 | Adult Low Flow | 3.00 | 45.80 | 46.29 | | 46.39 | 0.022100 | 2.46 | 1.22 | 4.90 | 0.87 |
| Suscol Creek | 224.7 | Juvenile Low Flo | 1.00 | 45.80 | 46.14 | 46.10 | 46.18 | 0.018473 | 1.75 | 0.57 | 3.37 | 0.75 |
| Suscol Creek | 202.8 | Adult High Flow | 177.00 | 45.44 | 48.87 | 47.87 | 49.14 | 0.007829 | 4.18 | 42.33 | 20.00 | 0.51 |
| Suscol Creek | 202.8 | Juvenile High Fl | 36.00 | 45.44 | 46.98 | 46.55 | 47.11 | 0.006818 | 2.93 | 12.30 | 12.00 | 0.51 |
| Suscol Creek | 202.8 | Adult Low Flow | 3.00 | 45.44 | 45.93 | 45.86 | 45.99 | 0.015000 | 2.08 | 1.44 | 5.62 | 0.72 |
| Suscol Creek | 202.8 | Juvenile Low Flo | 1.00 | 45.44 | 45.74 | 45.71 | 45.79 | 0.018474 | 1.69 | 0.59 | 3.64 | 0.74 |
| Suscol Creek | 200 | Bridge | | | | | | | | | | |
| Suscol Creek | 148.5 | Adult High Flow | 177.00 | 45.09 | 47.46 | 47.31 | 48.07 | 0.022091 | 6.27 | 28.24 | 18.12 | 0.89 |
| Suscol Creek | 148.5 | Juvenile High Fl | 36.00 | 45.09 | 46.00 | 46.00 | 46.35 | 0.025603 | 4.77 | 7.54 | 10.83 | 1.01 |
| Suscol Creek | 148.5 | Adult Low Flow | 3.00 | 45.09 | 45.36 | 45.36 | 45.43 | 0.033588 | 2.25 | 1.33 | 8.44 | 1.00 |
| Suscol Creek | 148.5 | Juvenile Low Flo | 1.00 | 45.09 | 45.24 | 45.24 | 45.29 | 0.038394 | 1.89 | 0.53 | 4.87 | 1.01 |
| Suscol Creek | 93.6 | Adult High Flow | 177.00 | 43.18 | 46.65 | | 47.13 | 0.011973 | 5.59 | 31.66 | 11.88 | 0.60 |
| Suscol Creek | 93.6 | Juvenile High Fl | 36.00 | 43.18 | 44.65 | | 44.83 | 0.009275 | 3.47 | 10.37 | 9.41 | 0.58 |
| Suscol Creek | 93.6 | Adult Low Flow | 3.00 | 43.18 | 43.61 | | 43.66 | 0.012160 | 1.85 | 1.62 | 6.24 | 0.64 |
| Suscol Creek | 93.6 | Juvenile Low Flo | 1.00 | 43.18 | 43.45 | | 43.48 | 0.014222 | 1.41 | 0.71 | 4.81 | 0.65 |
| Suscol Creek | 37.7 | Adult High Flow | 177.00 | 42.08 | 45.10 | 45.10 | 46.01 | 0.036542 | 7.65 | 23.13 | 12.96 | 1.01 |
| Suscol Creek | 37.7 | Juvenile High Fl | 36.00 | 42.08 | 43.54 | 43.53 | 43.97 | 0.029595 | 5.22 | 6.90 | 8.01 | 0.99 |
| Suscol Creek | 37.7 | Adult Low Flow | 3.00 | 42.08 | 42.64 | 42.62 | 42.75 | 0.022604 | 2.65 | 1.13 | 4.06 | 0.89 |
| Suscol Creek | 37.7 | Juvenile Low Flo | 1.00 | 42.08 | 42.45 | 42.42 | 42.52 | 0.021393 | 1.99 | 0.50 | 2.66 | 0.81 |
| Suscol Creek | 0 | Adult High Flow | 177.00 | 40.62 | 42.87 | 42.80 | 43.58 | 0.026016 | 6.73 | 26.30 | 16.56 | 0.94 |
| Suscol Creek | 0 | Juvenile High Fl | 36.00 | 40.62 | 41.68 | 41.65 | 41.96 | 0.026007 | 4.24 | 8.49 | 13.37 | 0.94 |
| Suscol Creek | 0 | Adult Low Flow | 3.00 | 40.62 | 40.95 | 40.92 | 41.03 | 0.026047 | 2.31 | 1.30 | 5.61 | 0.85 |
| Suscol Creek | 0 | Juvenile Low Flo | 1.00 | 40.62 | 40.80 | 40.78 | 40.85 | 0.026019 | 1.70 | 0.59 | 4.24 | 0.80 |

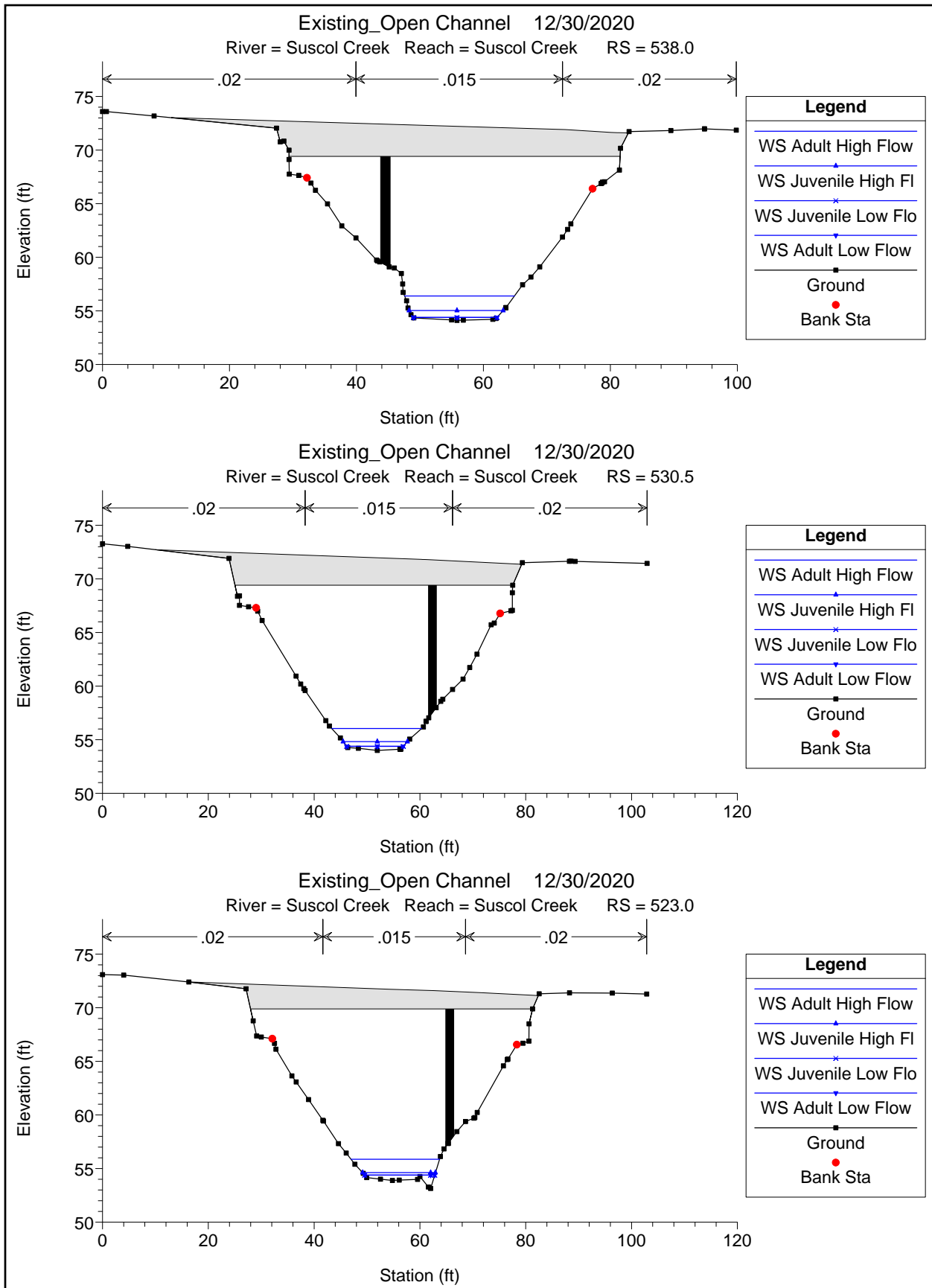


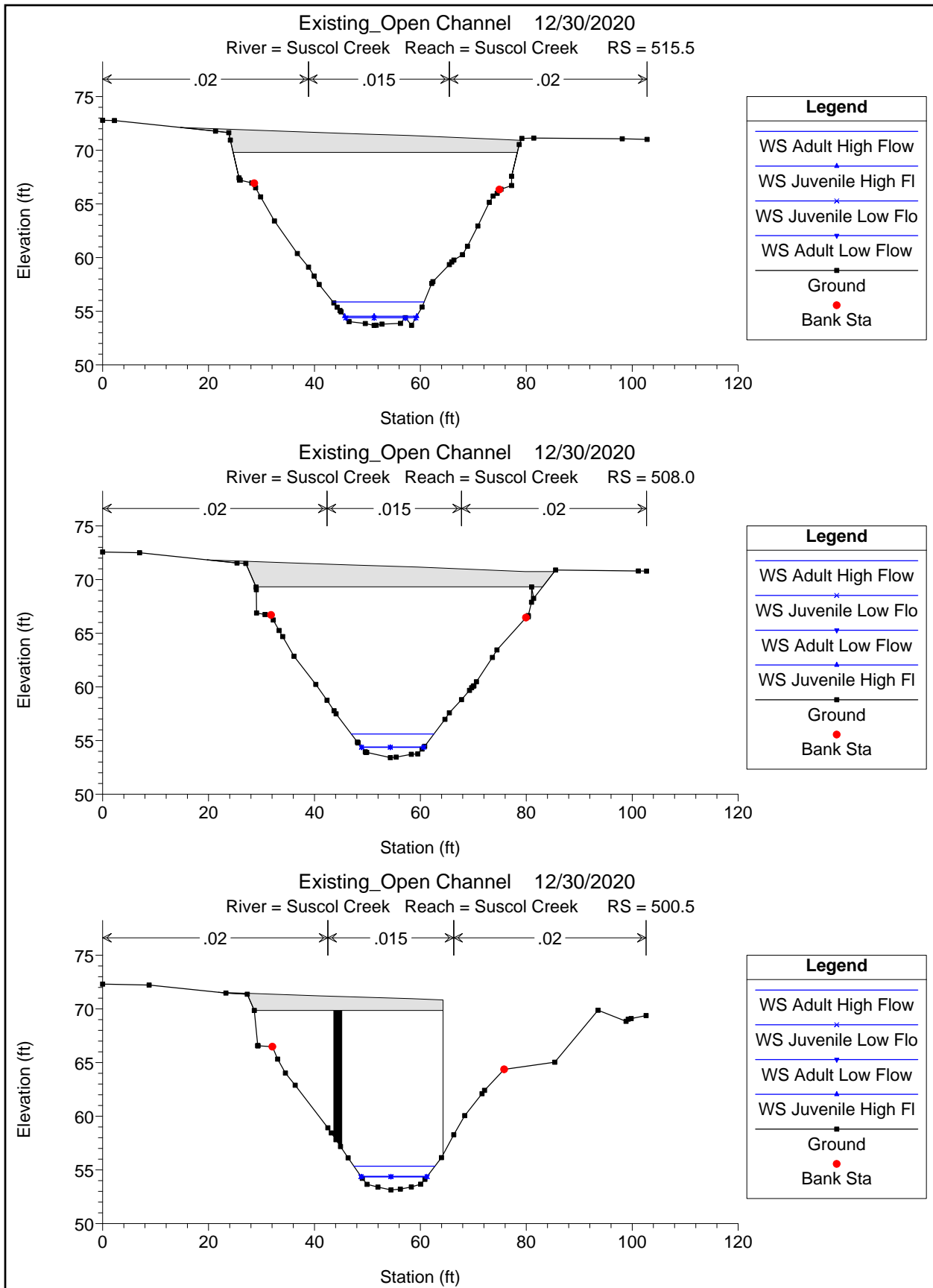


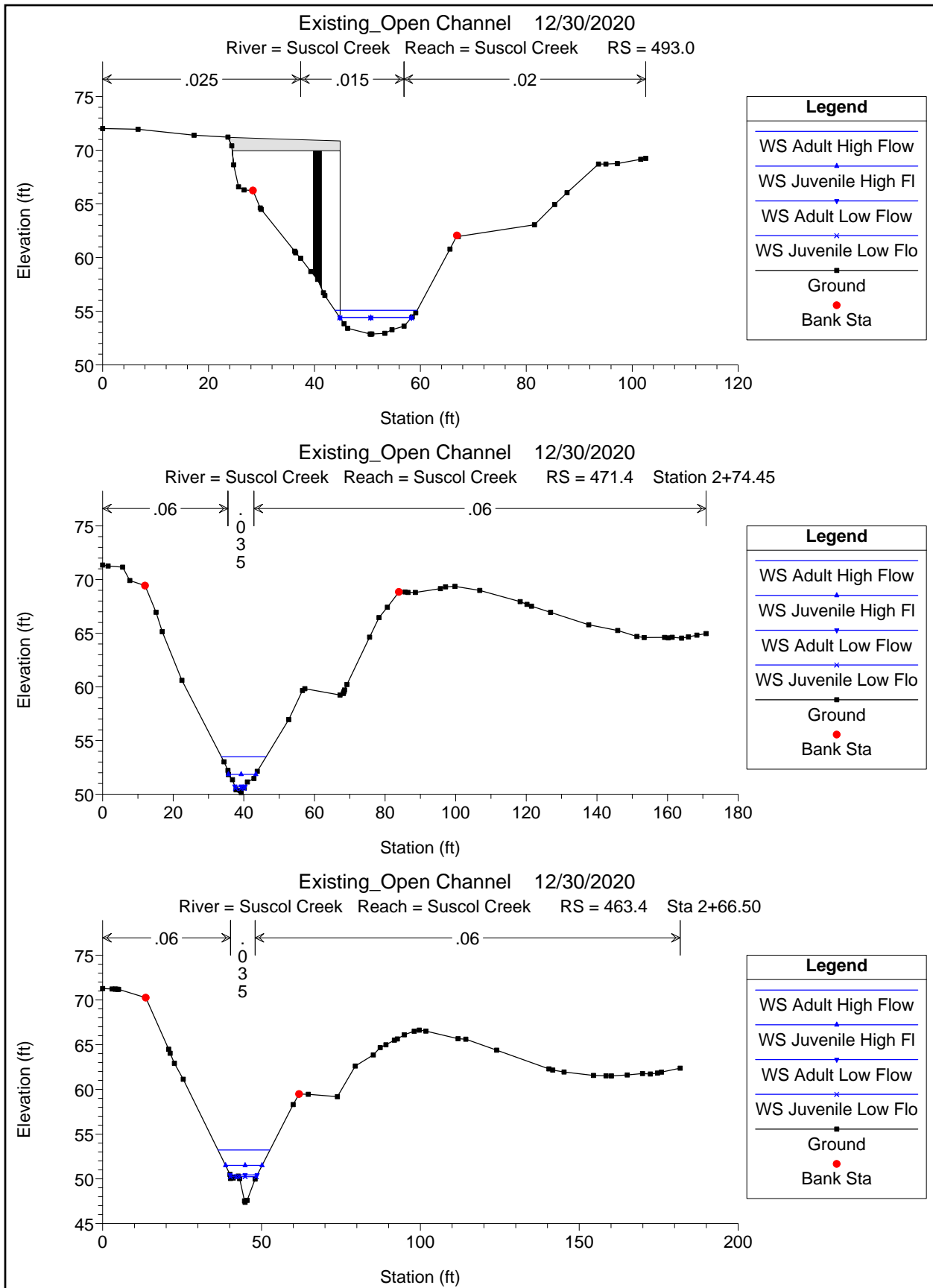


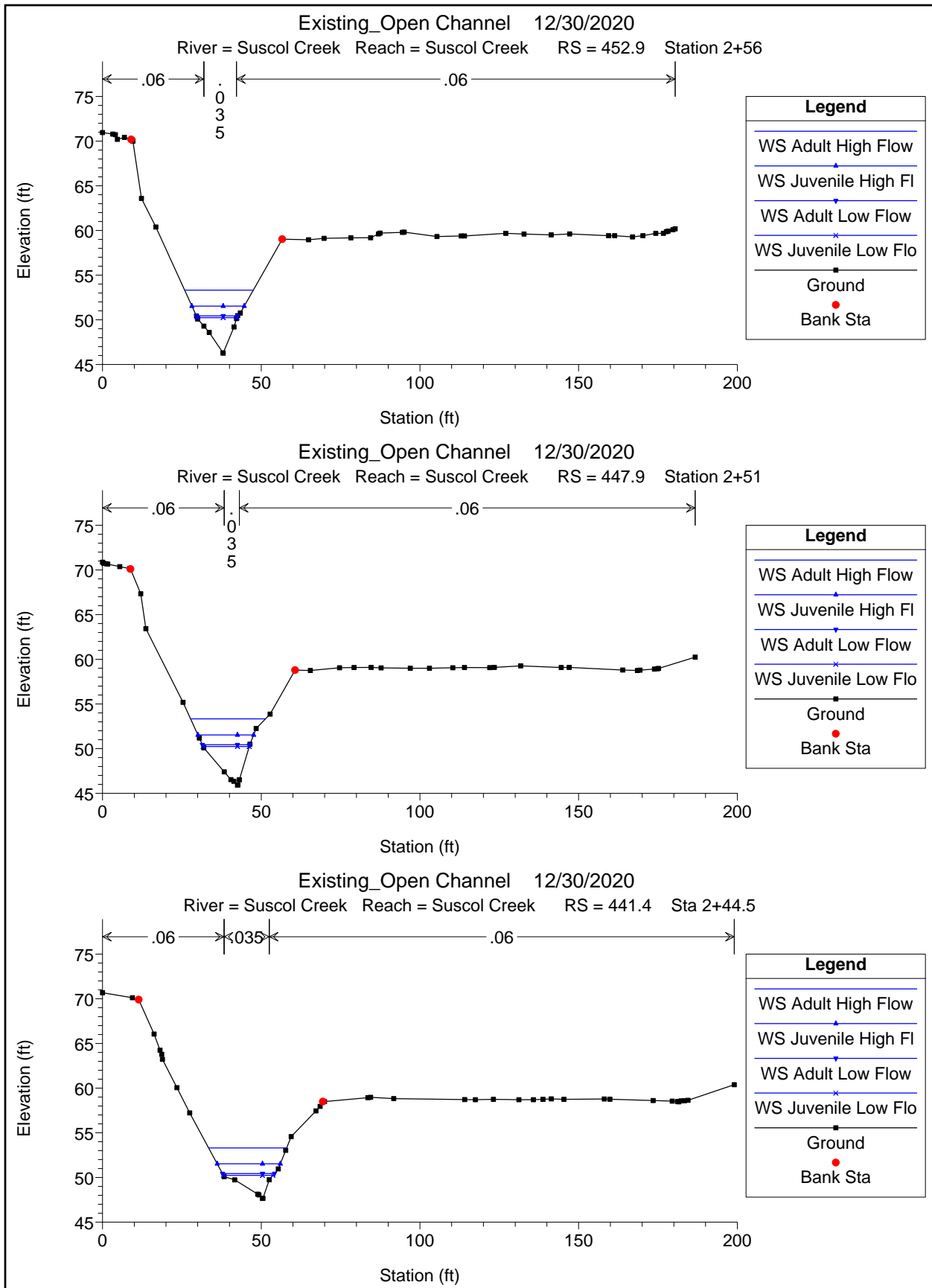


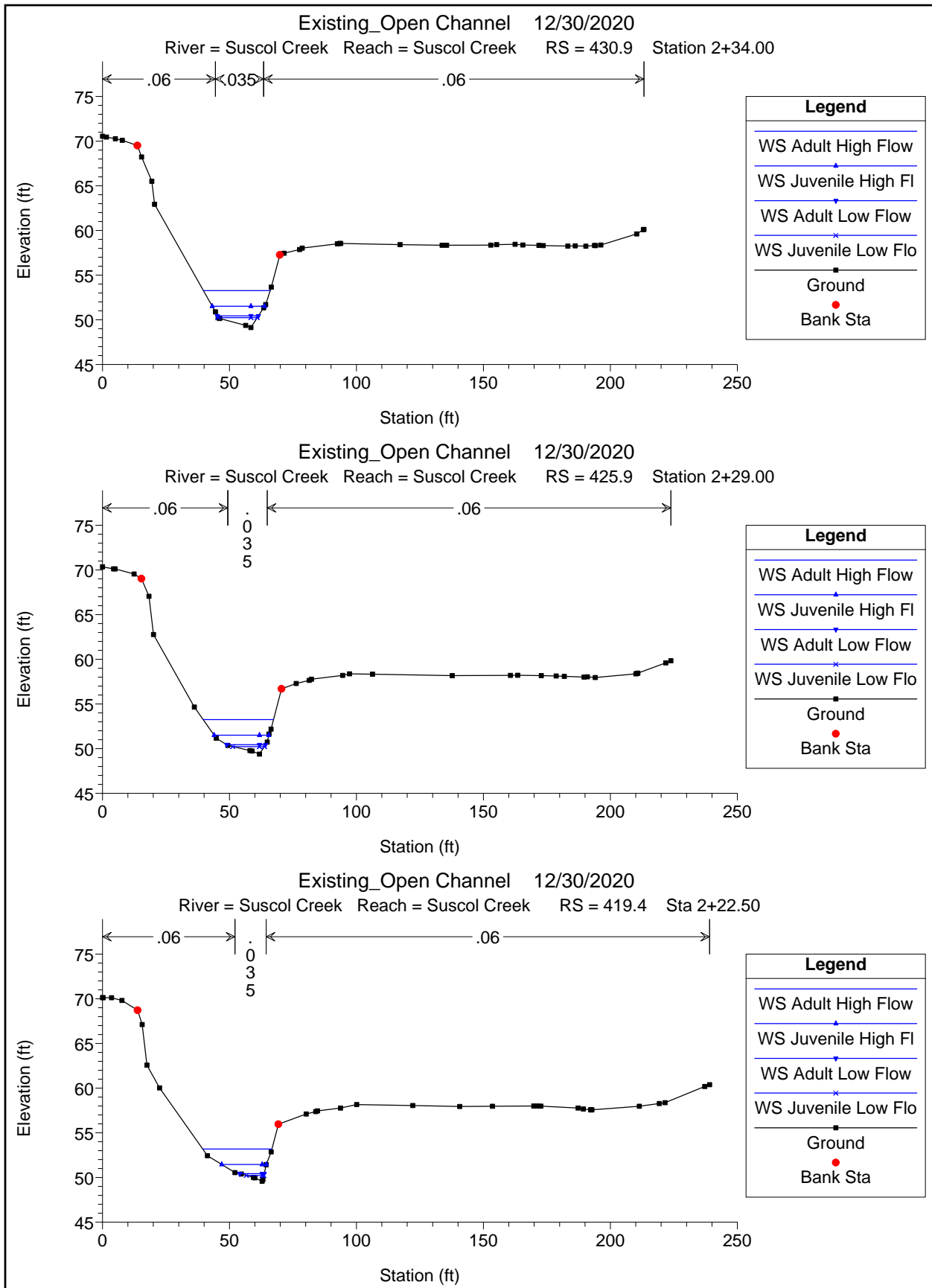


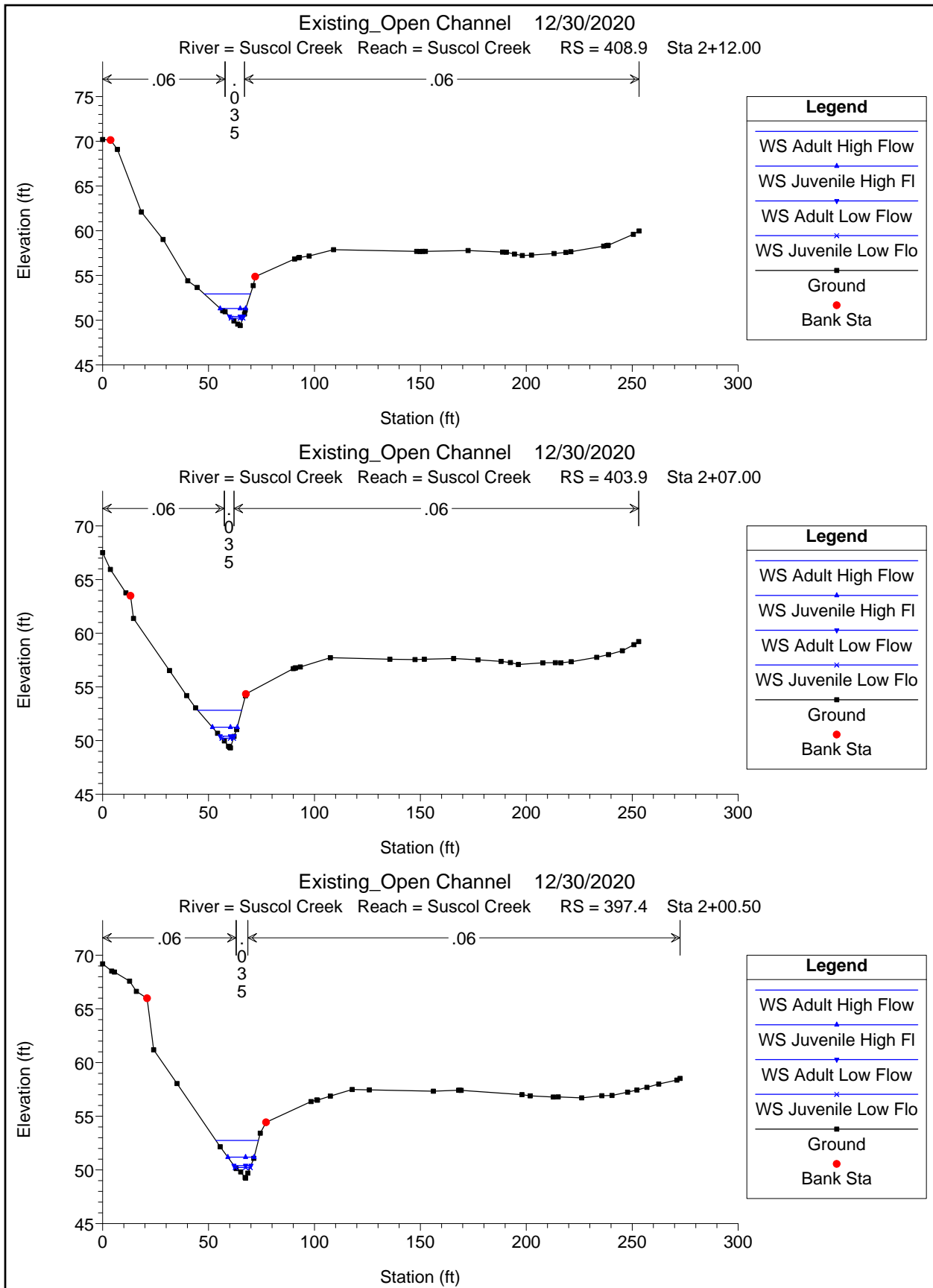


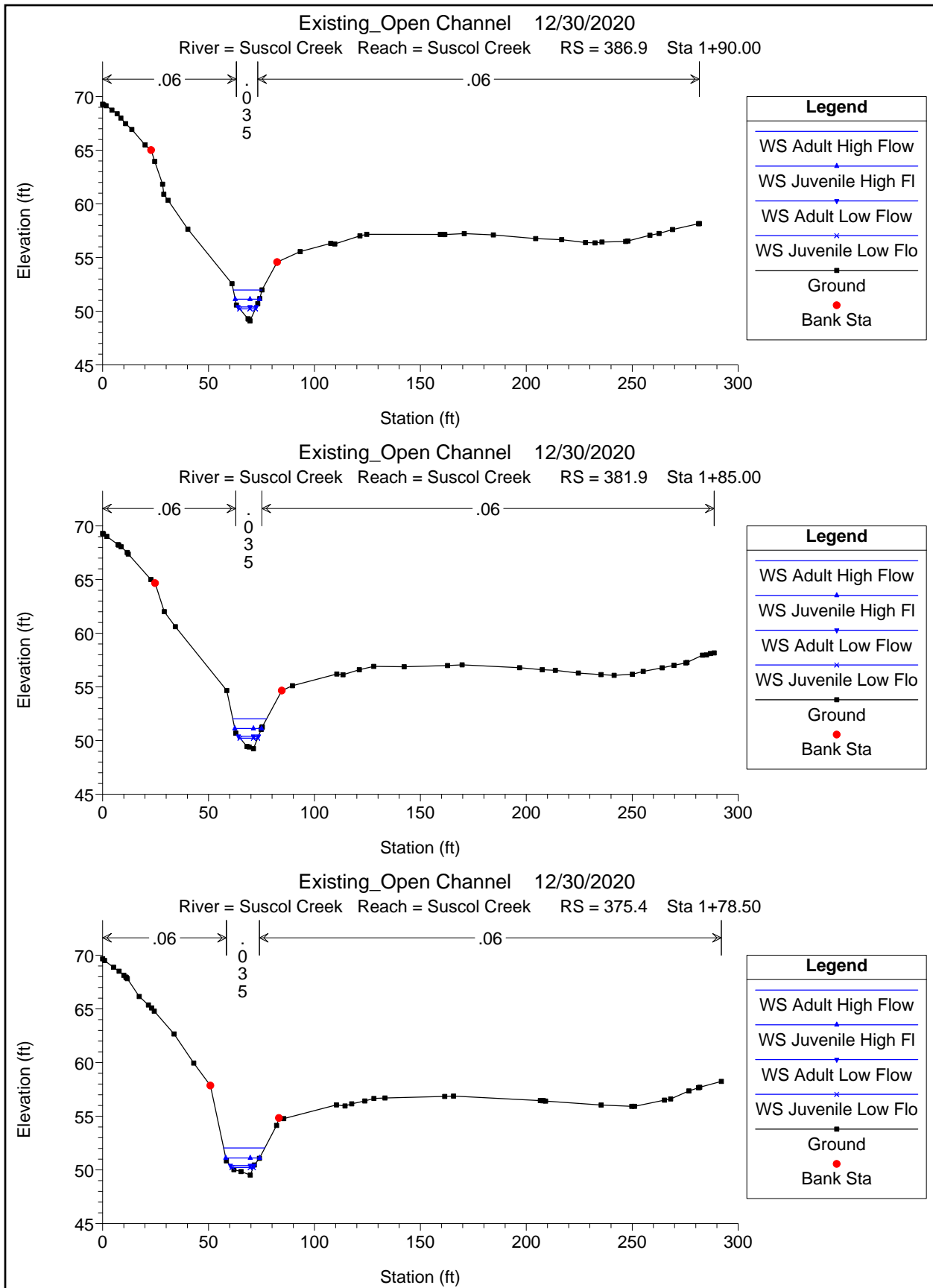


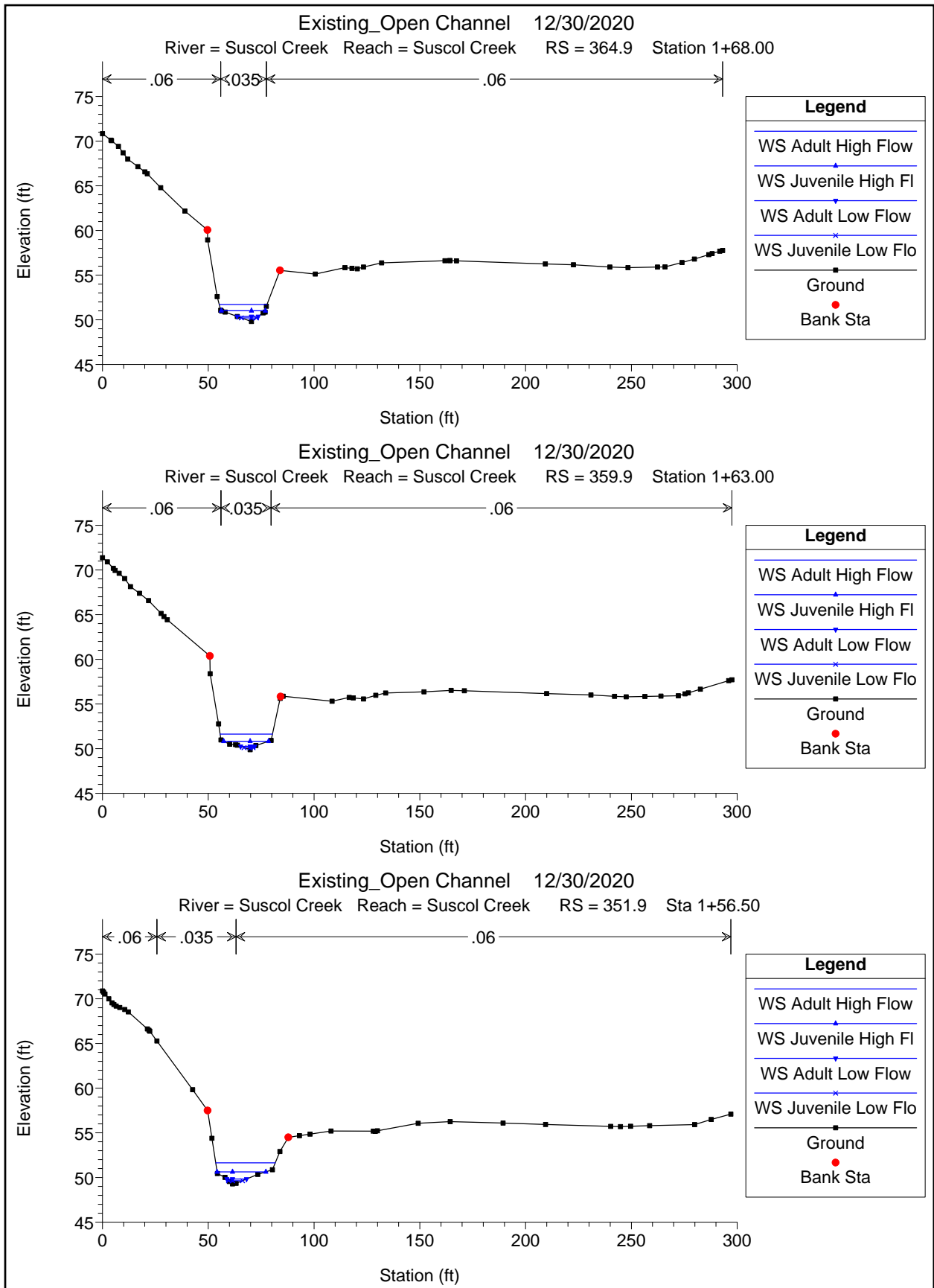


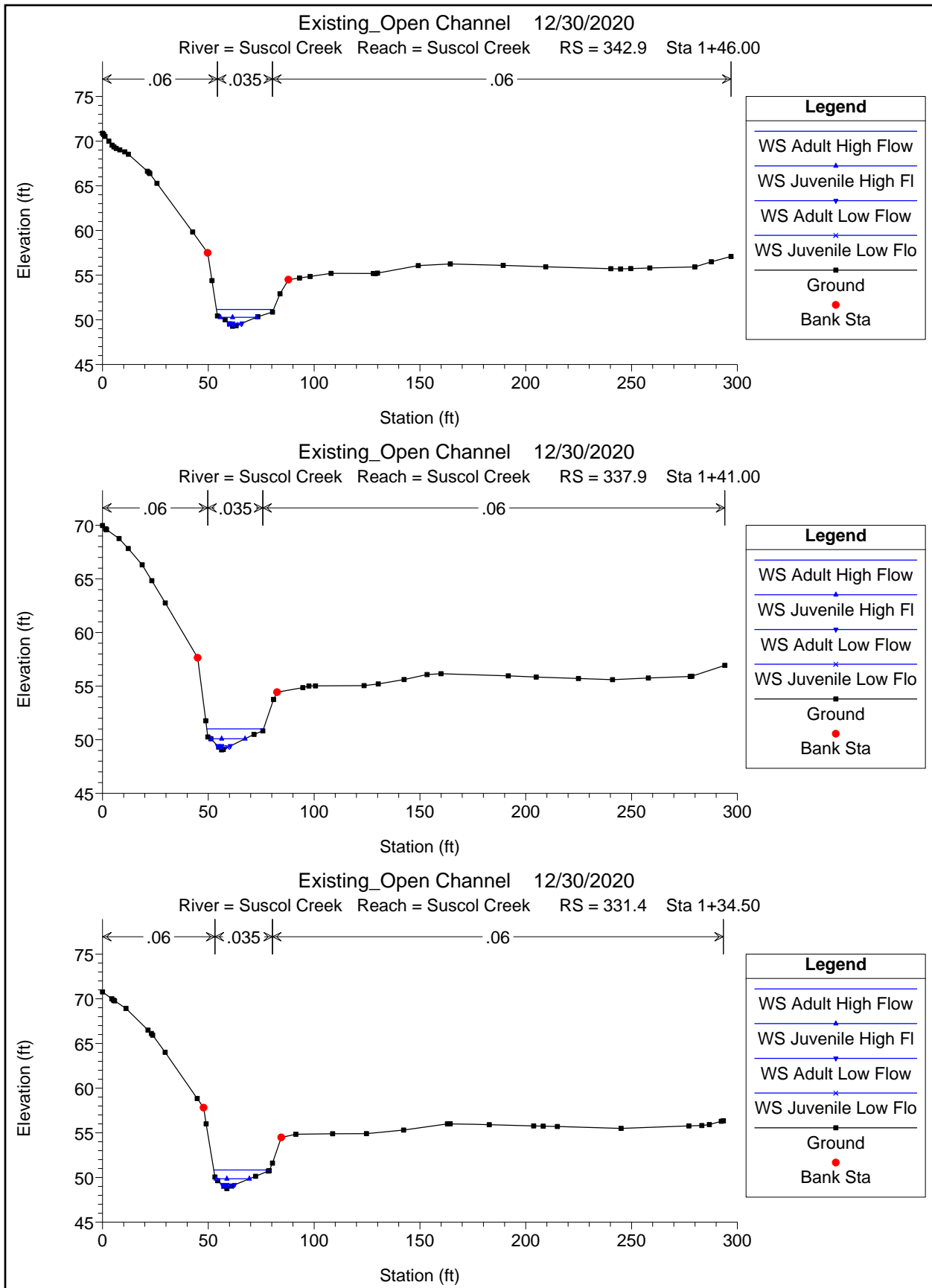


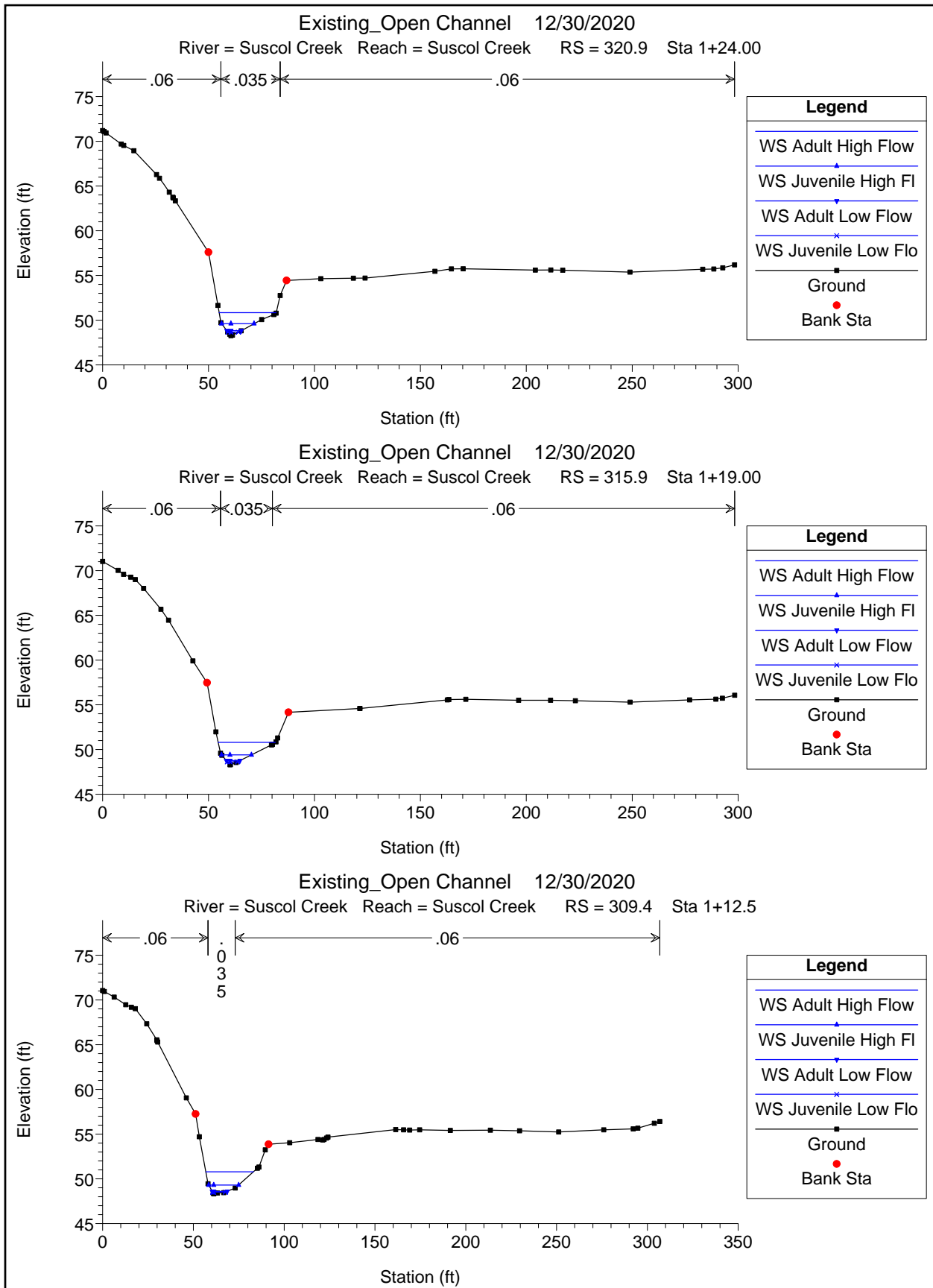


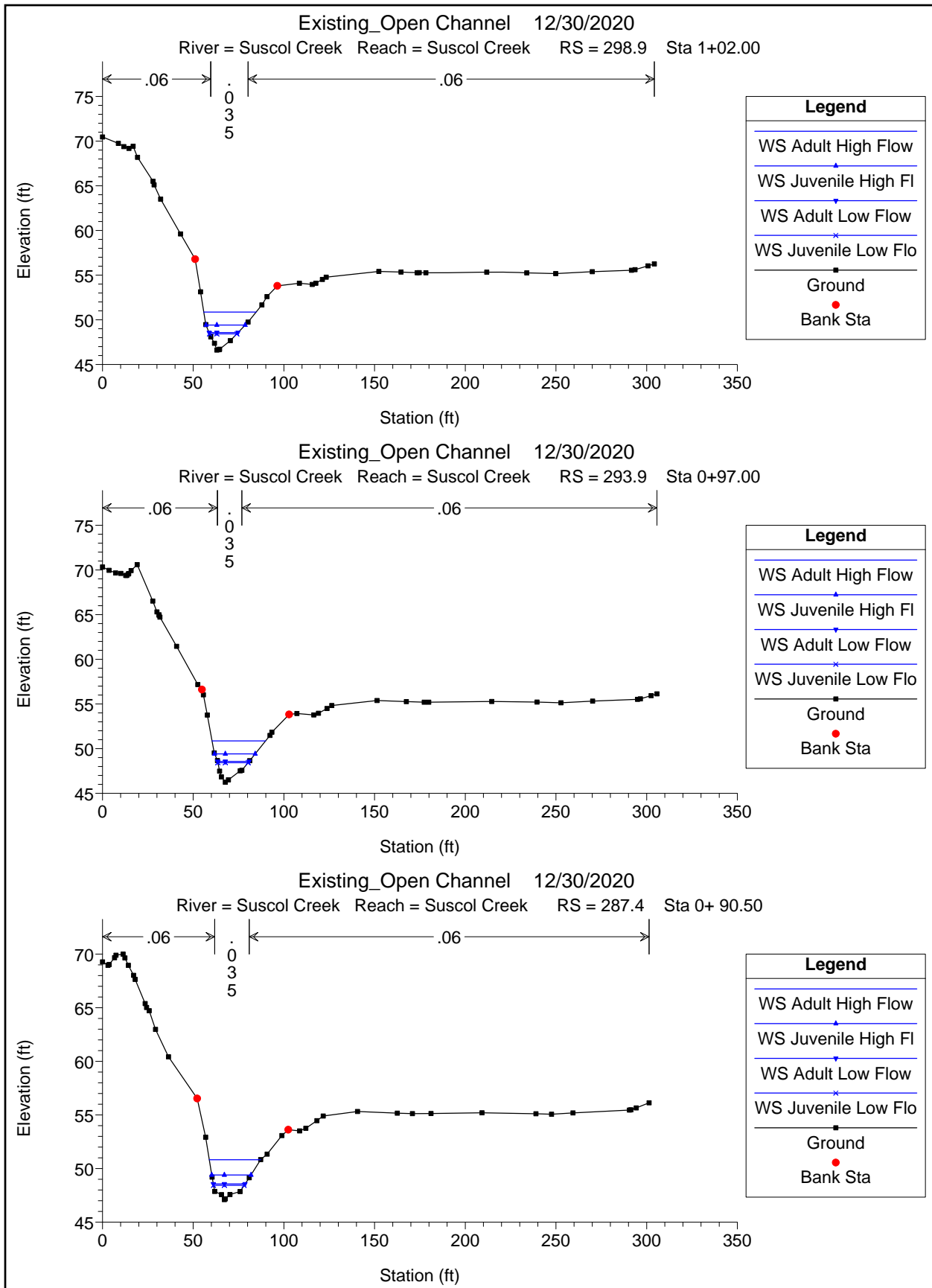


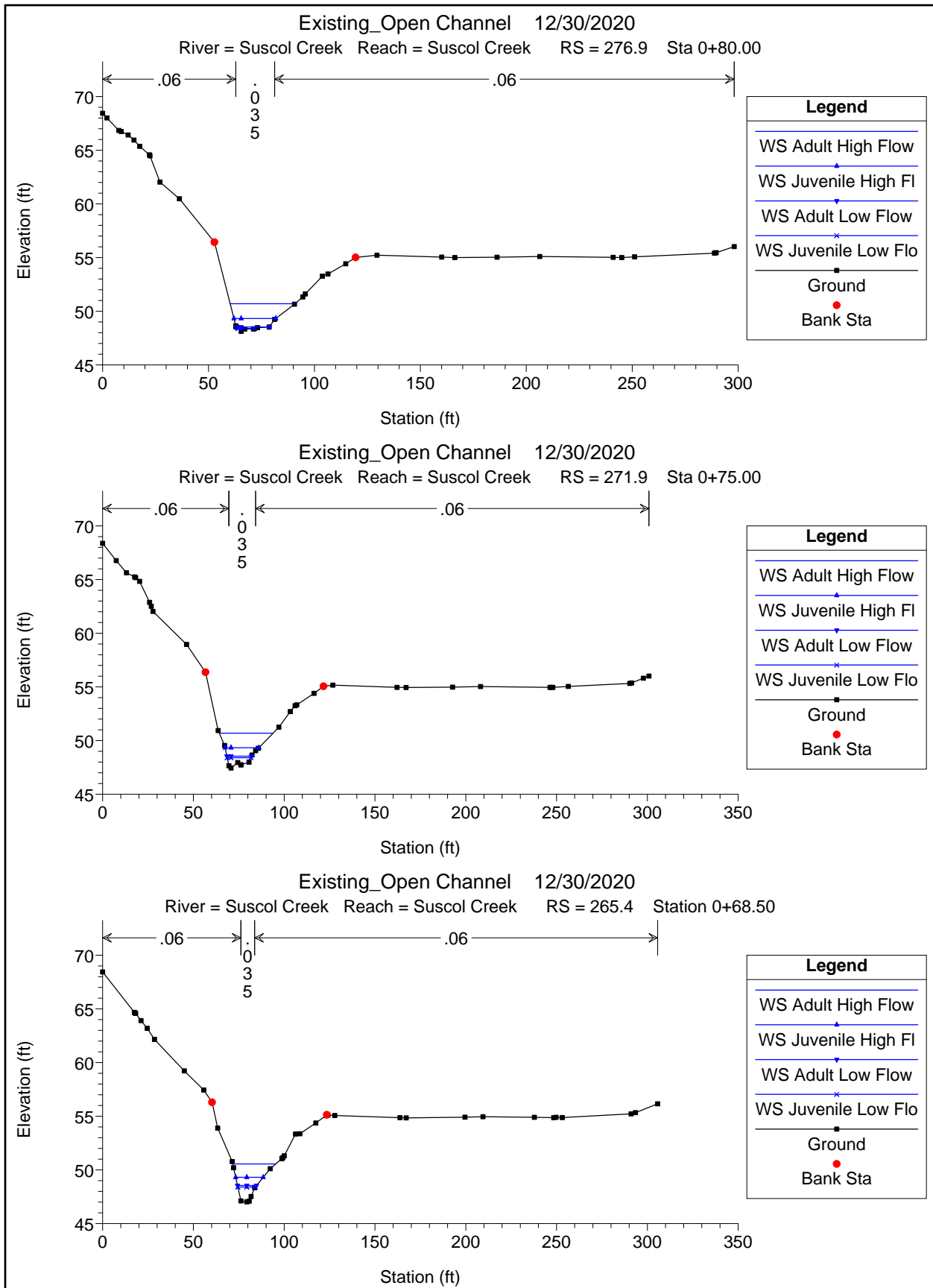


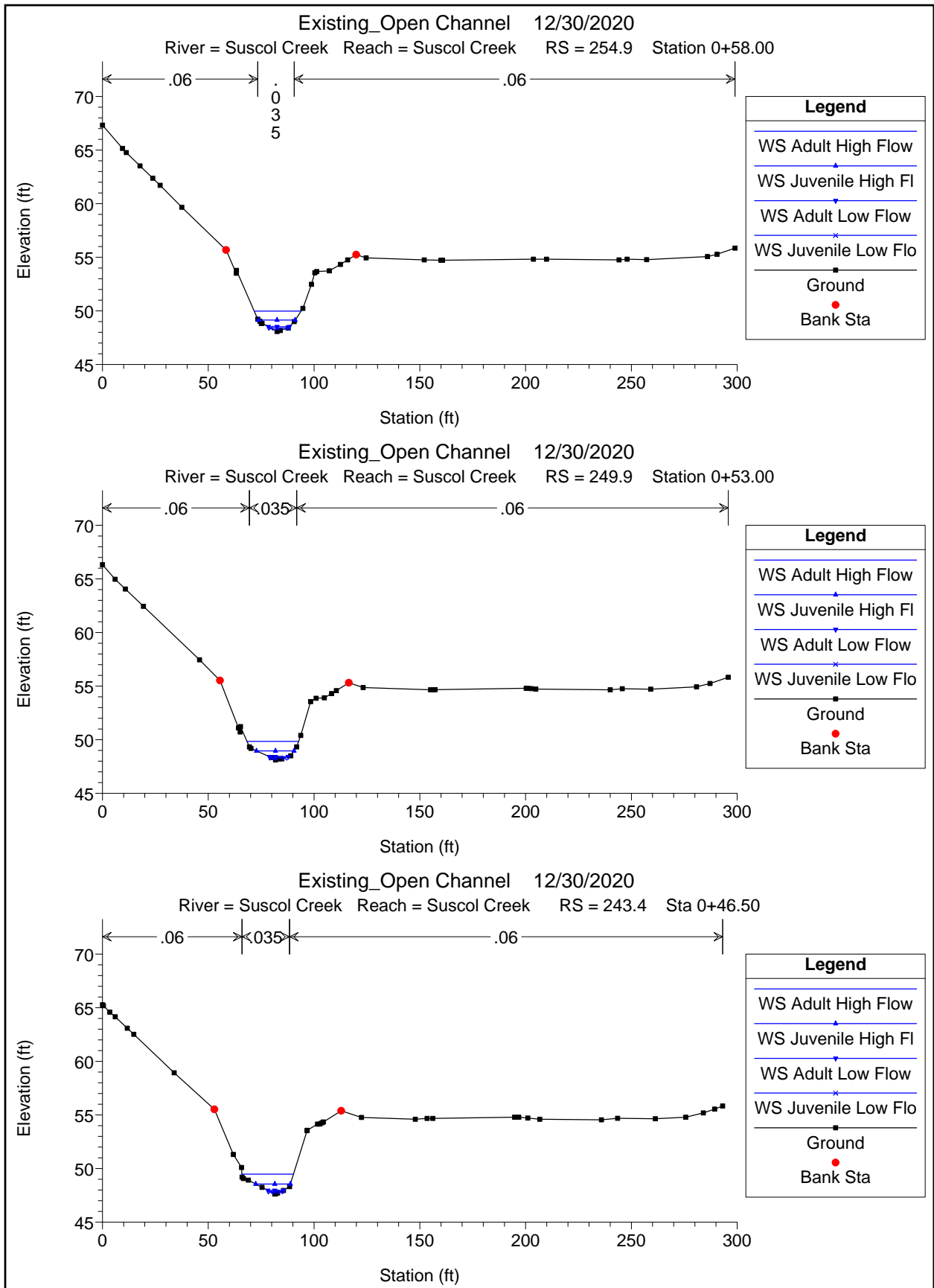


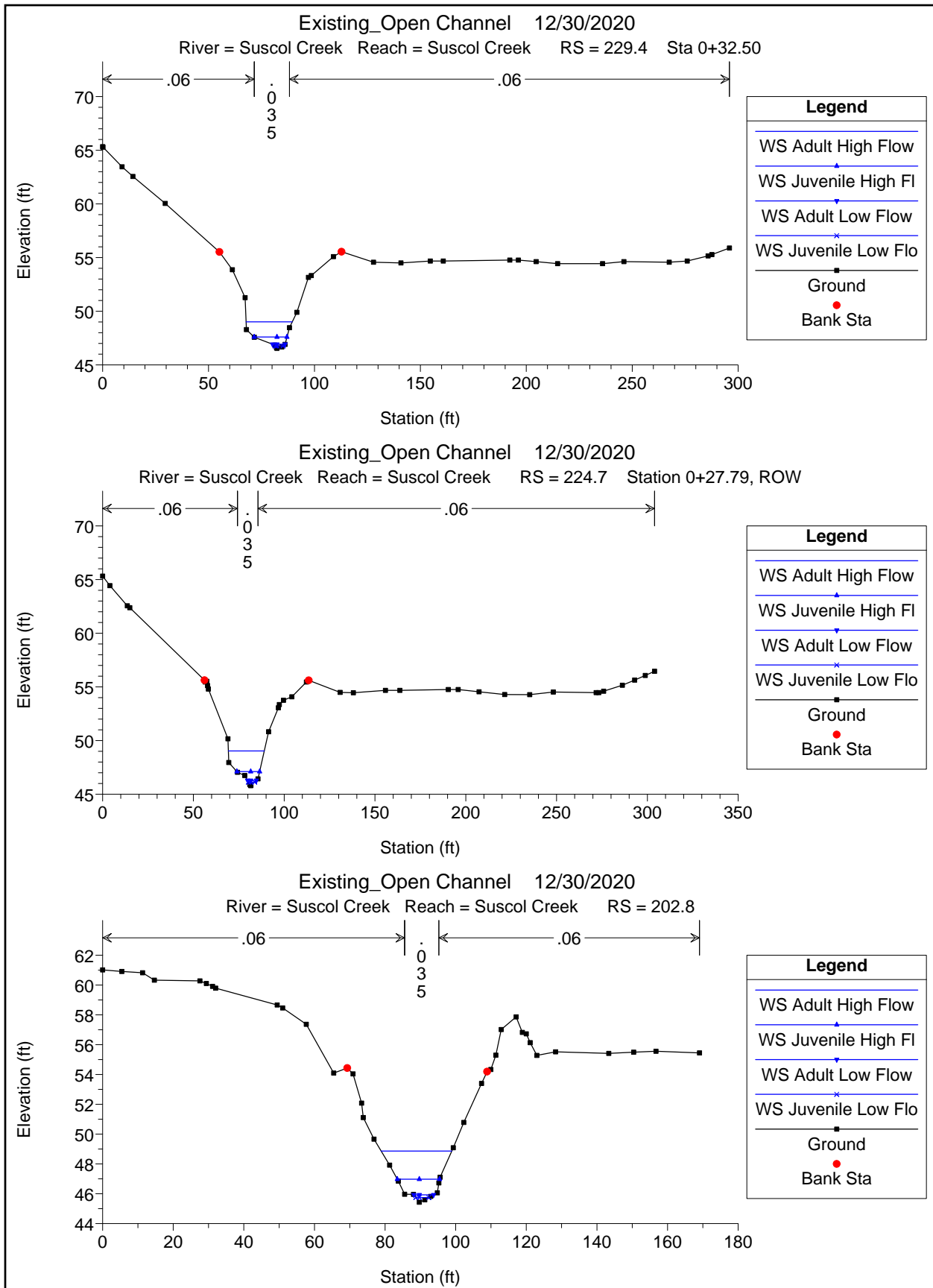


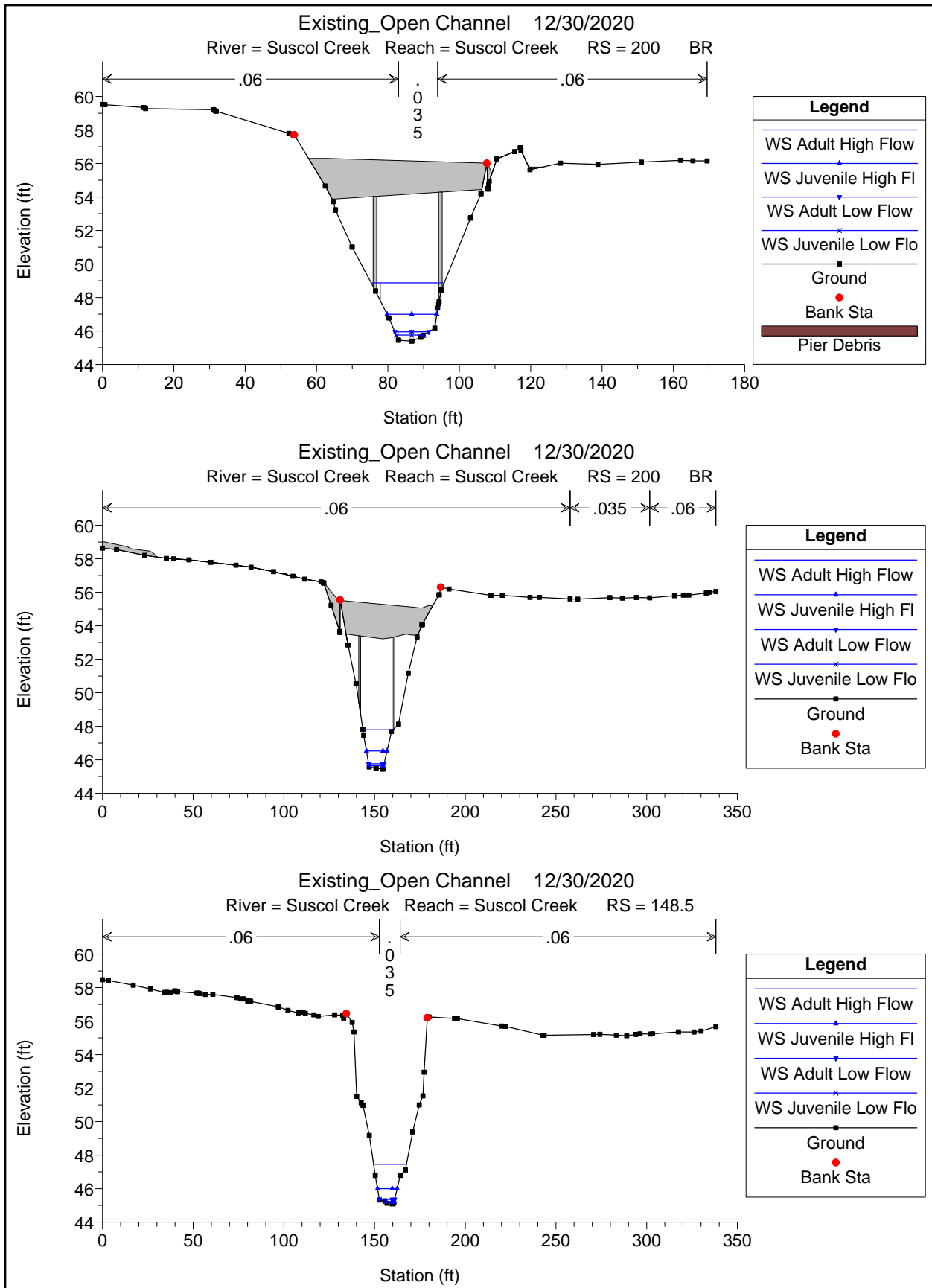


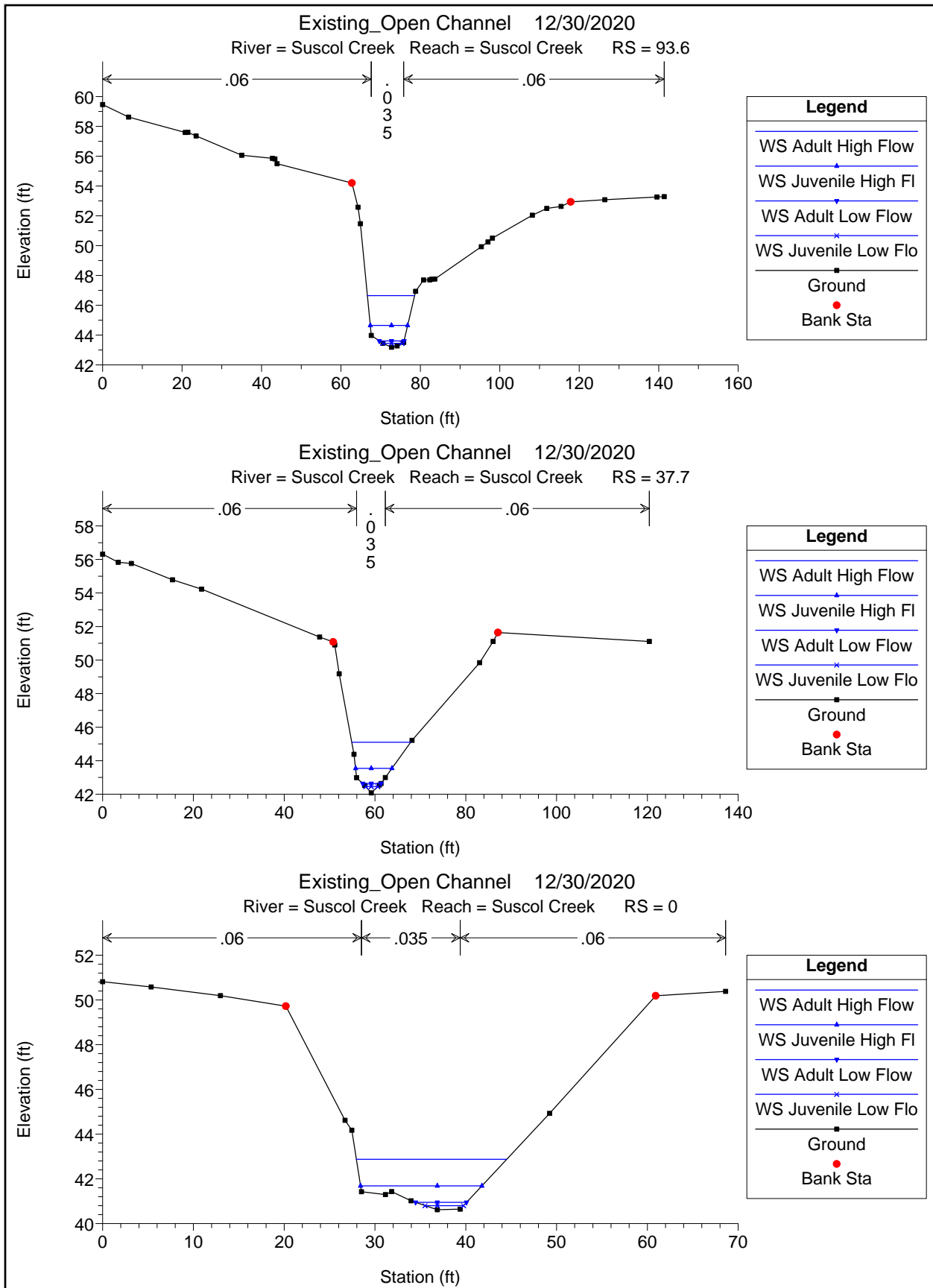












HEC-RAS Plan: Existing_US Culv River: Suscol Creek Reach: Suscol Creek

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 879.5 | 100-year | 1520.00 | 61.21 | 72.27 | | 72.31 | 0.000333 | 1.68 | 906.39 | 144.01 | 0.12 |
| Suscol Creek | 879.5 | 50-Year | 1310.00 | 61.21 | 70.90 | | 70.95 | 0.000487 | 1.83 | 714.84 | 134.08 | 0.14 |
| Suscol Creek | 879.5 | 10-year | 812.00 | 61.21 | 66.25 | | 66.53 | 0.005995 | 4.27 | 190.22 | 76.34 | 0.48 |
| Suscol Creek | 879.5 | 5-year | 603.00 | 61.21 | 64.97 | | 65.48 | 0.014092 | 5.74 | 105.04 | 58.31 | 0.75 |
| Suscol Creek | 879.5 | 2-year | 353.00 | 61.21 | 64.01 | 64.01 | 64.65 | 0.023101 | 6.42 | 55.02 | 44.32 | 1.02 |
| Suscol Creek | 879.5 | 1.5-year | 263.00 | 61.21 | 63.65 | 63.65 | 64.29 | 0.020677 | 6.37 | 41.27 | 33.84 | 1.02 |
| Suscol Creek | 809.4 | 100-year | 1520.00 | 58.30 | 72.25 | 64.97 | 72.29 | 0.000318 | 1.53 | 1004.61 | 175.90 | 0.11 |
| Suscol Creek | 809.4 | 50-Year | 1310.00 | 58.30 | 70.87 | 64.59 | 70.91 | 0.000499 | 1.68 | 777.78 | 151.66 | 0.13 |
| Suscol Creek | 809.4 | 10-year | 812.00 | 58.30 | 65.96 | 63.34 | 66.16 | 0.004057 | 3.65 | 222.61 | 70.29 | 0.36 |
| Suscol Creek | 809.4 | 5-year | 603.00 | 58.30 | 64.40 | 62.62 | 64.73 | 0.007353 | 4.66 | 129.47 | 48.64 | 0.50 |
| Suscol Creek | 809.4 | 2-year | 353.00 | 58.30 | 62.89 | 61.69 | 63.25 | 0.006556 | 4.79 | 73.71 | 27.61 | 0.52 |
| Suscol Creek | 809.4 | 1.5-year | 263.00 | 58.30 | 62.29 | 61.24 | 62.61 | 0.006843 | 4.53 | 58.09 | 24.72 | 0.52 |
| Suscol Creek | 772 | | Bridge | | | | | | | | | |
| Suscol Creek | 766.0 | 100-year | 1520.00 | 57.61 | 72.06 | | 72.18 | 0.000863 | 2.83 | 536.86 | 68.26 | 0.18 |
| Suscol Creek | 766.0 | 50-Year | 1310.00 | 57.61 | 70.65 | | 70.79 | 0.001045 | 2.94 | 445.61 | 61.78 | 0.19 |
| Suscol Creek | 766.0 | 10-year | 812.00 | 57.61 | 65.46 | | 65.77 | 0.004292 | 4.48 | 181.39 | 40.47 | 0.37 |
| Suscol Creek | 766.0 | 5-year | 603.00 | 57.61 | 63.58 | | 64.03 | 0.008279 | 5.35 | 112.76 | 32.59 | 0.51 |
| Suscol Creek | 766.0 | 2-year | 353.00 | 57.61 | 61.00 | 61.00 | 62.04 | 0.034868 | 8.17 | 43.22 | 21.29 | 1.01 |
| Suscol Creek | 766.0 | 1.5-year | 263.00 | 57.61 | 60.57 | 60.57 | 61.48 | 0.035200 | 7.64 | 34.43 | 19.39 | 1.01 |
| Suscol Creek | 735.3 | 100-year | 1520.00 | 57.36 | 72.10 | | 72.12 | 0.000123 | 1.32 | 1239.41 | 184.42 | 0.07 |
| Suscol Creek | 735.3 | 50-Year | 1310.00 | 57.36 | 70.69 | | 70.72 | 0.000156 | 1.35 | 1005.07 | 153.88 | 0.08 |
| Suscol Creek | 735.3 | 10-year | 812.00 | 57.36 | 65.54 | | 65.60 | 0.000664 | 1.90 | 426.78 | 90.50 | 0.15 |
| Suscol Creek | 735.3 | 5-year | 603.00 | 57.36 | 63.68 | | 63.76 | 0.001392 | 2.24 | 268.65 | 79.21 | 0.21 |
| Suscol Creek | 735.3 | 2-year | 353.00 | 57.36 | 61.09 | | 61.26 | 0.003467 | 3.31 | 106.77 | 40.33 | 0.36 |
| Suscol Creek | 735.3 | 1.5-year | 263.00 | 57.36 | 60.00 | | 60.25 | 0.006921 | 3.98 | 66.11 | 34.08 | 0.50 |
| Suscol Creek | 684.8 | 100-year | 1520.00 | 54.93 | 72.10 | | 72.12 | 0.000067 | 0.93 | 1712.91 | 279.45 | 0.05 |
| Suscol Creek | 684.8 | 50-Year | 1310.00 | 54.93 | 70.70 | | 70.71 | 0.000086 | 0.96 | 1391.51 | 202.60 | 0.06 |
| Suscol Creek | 684.8 | 10-year | 812.00 | 54.93 | 65.54 | | 65.57 | 0.000260 | 1.31 | 621.34 | 110.40 | 0.10 |
| Suscol Creek | 684.8 | 5-year | 603.00 | 54.93 | 63.68 | | 63.71 | 0.000331 | 1.37 | 438.96 | 88.96 | 0.11 |
| Suscol Creek | 684.8 | 2-year | 353.00 | 54.93 | 61.14 | | 61.17 | 0.000449 | 1.42 | 248.28 | 63.53 | 0.13 |
| Suscol Creek | 684.8 | 1.5-year | 263.00 | 54.93 | 60.09 | | 60.12 | 0.000504 | 1.41 | 186.02 | 54.23 | 0.13 |
| Suscol Creek | 675.8 | 100-year | 1520.00 | 55.00 | 72.10 | | 72.12 | 0.000008 | 1.14 | 1408.31 | 249.20 | 0.07 |
| Suscol Creek | 675.8 | 50-Year | 1310.00 | 55.00 | 70.69 | | 70.71 | 0.000010 | 1.17 | 1126.43 | 170.06 | 0.07 |
| Suscol Creek | 675.8 | 10-year | 812.00 | 55.00 | 65.53 | | 65.57 | 0.000032 | 1.63 | 496.86 | 86.37 | 0.12 |
| Suscol Creek | 675.8 | 5-year | 603.00 | 55.00 | 63.67 | | 63.71 | 0.000041 | 1.71 | 353.13 | 67.00 | 0.13 |
| Suscol Creek | 675.8 | 2-year | 353.00 | 55.00 | 61.13 | | 61.17 | 0.000057 | 1.71 | 206.86 | 48.79 | 0.15 |
| Suscol Creek | 675.8 | 1.5-year | 263.00 | 55.00 | 60.07 | | 60.12 | 0.000073 | 1.68 | 156.92 | 46.04 | 0.16 |
| Suscol Creek | 675 | | Culvert | | | | | | | | | |
| Suscol Creek | 557.3 | 100-year | 1520.00 | 54.17 | 62.37 | 62.37 | 66.13 | 0.004468 | 15.55 | 97.75 | 13.14 | 1.01 |
| Suscol Creek | 557.3 | 50-Year | 1310.00 | 54.17 | 61.62 | 61.62 | 65.06 | 0.004355 | 14.87 | 88.07 | 12.93 | 1.00 |
| Suscol Creek | 557.3 | 10-year | 812.00 | 54.17 | 59.67 | 59.67 | 62.23 | 0.004022 | 12.82 | 63.32 | 12.39 | 1.00 |
| Suscol Creek | 557.3 | 5-year | 603.00 | 54.17 | 58.70 | 58.70 | 60.84 | 0.003919 | 11.73 | 51.39 | 12.13 | 1.00 |
| Suscol Creek | 557.3 | 2-year | 353.00 | 54.17 | 57.37 | 57.37 | 58.90 | 0.003767 | 9.92 | 35.59 | 11.77 | 1.01 |
| Suscol Creek | 557.3 | 1.5-year | 263.00 | 54.17 | 56.82 | 56.82 | 58.09 | 0.003728 | 9.03 | 29.12 | 11.60 | 1.00 |
| Suscol Creek | 551.0 | 100-year | 1520.00 | 54.16 | 61.94 | 61.94 | 64.86 | 0.003962 | 13.71 | 110.84 | 18.97 | 1.00 |
| Suscol Creek | 551.0 | 50-Year | 1310.00 | 54.16 | 60.87 | 60.87 | 63.98 | 0.003807 | 14.16 | 92.54 | 14.85 | 1.00 |
| Suscol Creek | 551.0 | 10-year | 812.00 | 54.16 | 59.09 | 59.09 | 61.40 | 0.003614 | 12.21 | 66.51 | 14.36 | 1.00 |
| Suscol Creek | 551.0 | 5-year | 603.00 | 54.16 | 58.22 | 58.22 | 60.15 | 0.003542 | 11.12 | 54.21 | 14.13 | 1.00 |
| Suscol Creek | 551.0 | 2-year | 353.00 | 54.16 | 57.04 | 57.04 | 58.40 | 0.003457 | 9.35 | 37.73 | 13.82 | 1.00 |
| Suscol Creek | 551.0 | 1.5-year | 263.00 | 54.16 | 56.57 | 56.55 | 57.67 | 0.003377 | 8.43 | 31.18 | 13.71 | 0.99 |
| Suscol Creek | 547.5 | 100-year | 1520.00 | 54.16 | 61.34 | 61.34 | 64.07 | 0.003164 | 13.25 | 114.71 | 20.98 | 1.00 |
| Suscol Creek | 547.5 | 50-Year | 1310.00 | 54.16 | 60.72 | 60.72 | 63.28 | 0.003208 | 12.84 | 102.05 | 19.91 | 1.00 |
| Suscol Creek | 547.5 | 10-year | 812.00 | 54.16 | 58.89 | 58.89 | 61.05 | 0.003379 | 11.79 | 68.86 | 15.98 | 1.00 |
| Suscol Creek | 547.5 | 5-year | 603.00 | 54.16 | 58.03 | 58.03 | 59.86 | 0.003376 | 10.84 | 55.62 | 15.22 | 1.00 |
| Suscol Creek | 547.5 | 2-year | 353.00 | 54.16 | 57.04 | 56.91 | 58.21 | 0.002884 | 8.68 | 40.66 | 14.92 | 0.93 |
| Suscol Creek | 547.5 | 1.5-year | 263.00 | 54.16 | 56.76 | 56.43 | 57.57 | 0.002201 | 7.20 | 36.53 | 14.85 | 0.81 |
| Suscol Creek | 538.0 | 100-year | 1520.00 | 54.11 | 60.64 | 60.63 | 62.91 | 0.002757 | 12.08 | 125.85 | 27.58 | 1.00 |
| Suscol Creek | 538.0 | 50-Year | 1310.00 | 54.11 | 60.11 | 60.11 | 62.25 | 0.002722 | 11.73 | 111.68 | 26.08 | 1.00 |
| Suscol Creek | 538.0 | 10-year | 812.00 | 54.11 | 58.62 | 58.62 | 60.39 | 0.002729 | 10.68 | 76.00 | 21.39 | 1.00 |
| Suscol Creek | 538.0 | 5-year | 603.00 | 54.11 | 58.06 | 57.87 | 59.42 | 0.002371 | 9.36 | 64.44 | 20.16 | 0.92 |
| Suscol Creek | 538.0 | 2-year | 353.00 | 54.11 | 57.28 | 56.84 | 58.08 | 0.001723 | 7.15 | 49.34 | 18.68 | 0.78 |
| Suscol Creek | 538.0 | 1.5-year | 263.00 | 54.11 | 56.88 | 56.40 | 57.49 | 0.001539 | 6.27 | 41.94 | 18.14 | 0.73 |
| Suscol Creek | 530.5 | 100-year | 1520.00 | 54.00 | 60.88 | 60.58 | 62.78 | 0.002651 | 11.05 | 137.50 | 30.26 | 0.91 |
| Suscol Creek | 530.5 | 50-Year | 1310.00 | 54.00 | 60.13 | 60.08 | 62.12 | 0.002911 | 11.34 | 115.57 | 28.03 | 0.98 |
| Suscol Creek | 530.5 | 10-year | 812.00 | 54.00 | 58.64 | 58.64 | 60.34 | 0.002788 | 10.45 | 77.69 | 22.95 | 1.00 |
| Suscol Creek | 530.5 | 5-year | 603.00 | 54.00 | 57.92 | 57.92 | 59.40 | 0.002697 | 9.74 | 61.93 | 21.00 | 1.00 |
| Suscol Creek | 530.5 | 2-year | 353.00 | 54.00 | 56.96 | 56.96 | 58.04 | 0.002802 | 8.33 | 42.35 | 19.59 | 1.00 |
| Suscol Creek | 530.5 | 1.5-year | 263.00 | 54.00 | 56.52 | 56.52 | 57.45 | 0.002930 | 7.73 | 34.03 | 18.41 | 1.00 |

HEC-RAS Plan: Existing_US Culv River: Suscol Creek Reach: Suscol Creek (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 523.0 | 100-year | 1520.00 | 53.15 | 61.06 | 60.33 | 62.67 | 0.002243 | 10.18 | 149.30 | 30.82 | 0.82 |
| Suscol Creek | 523.0 | 50-Year | 1310.00 | 53.15 | 60.38 | 59.86 | 61.99 | 0.002354 | 10.16 | 128.93 | 29.09 | 0.85 |
| Suscol Creek | 523.0 | 10-year | 812.00 | 53.15 | 58.61 | 58.35 | 60.11 | 0.002412 | 9.81 | 82.74 | 22.91 | 0.91 |
| Suscol Creek | 523.0 | 5-year | 603.00 | 53.15 | 57.95 | 57.64 | 59.17 | 0.002142 | 8.84 | 68.25 | 21.15 | 0.87 |
| Suscol Creek | 523.0 | 2-year | 353.00 | 53.15 | 56.91 | 56.63 | 57.79 | 0.002143 | 7.50 | 47.07 | 19.39 | 0.85 |
| Suscol Creek | 523.0 | 1.5-year | 263.00 | 53.15 | 56.41 | 56.17 | 57.17 | 0.002259 | 6.99 | 37.61 | 18.01 | 0.85 |
| Suscol Creek | 515.5 | 100-year | 1520.00 | 53.68 | 61.21 | 60.25 | 62.59 | 0.001545 | 9.41 | 161.48 | 33.48 | 0.76 |
| Suscol Creek | 515.5 | 50-Year | 1310.00 | 53.68 | 60.52 | 59.72 | 61.90 | 0.001687 | 9.42 | 139.09 | 31.70 | 0.79 |
| Suscol Creek | 515.5 | 10-year | 812.00 | 53.68 | 58.72 | 58.31 | 60.04 | 0.001916 | 9.19 | 88.31 | 24.88 | 0.86 |
| Suscol Creek | 515.5 | 5-year | 603.00 | 53.68 | 58.01 | 57.59 | 59.12 | 0.001881 | 8.45 | 71.38 | 22.59 | 0.84 |
| Suscol Creek | 515.5 | 2-year | 353.00 | 53.68 | 56.93 | 56.58 | 57.75 | 0.001901 | 7.26 | 48.65 | 19.81 | 0.82 |
| Suscol Creek | 515.5 | 1.5-year | 263.00 | 53.68 | 56.42 | 56.14 | 57.13 | 0.002027 | 6.78 | 38.79 | 18.56 | 0.83 |
| Suscol Creek | 508.0 | 100-year | 1520.00 | 53.41 | 61.12 | 60.21 | 62.57 | 0.001607 | 9.65 | 157.46 | 32.56 | 0.77 |
| Suscol Creek | 508.0 | 50-Year | 1310.00 | 53.41 | 60.44 | 59.72 | 61.88 | 0.001720 | 9.64 | 135.95 | 30.58 | 0.81 |
| Suscol Creek | 508.0 | 10-year | 812.00 | 53.41 | 58.35 | 58.35 | 59.99 | 0.002540 | 10.29 | 78.90 | 23.96 | 1.00 |
| Suscol Creek | 508.0 | 5-year | 603.00 | 53.41 | 57.63 | 57.63 | 59.08 | 0.002628 | 9.63 | 62.60 | 21.67 | 1.00 |
| Suscol Creek | 508.0 | 2-year | 353.00 | 53.41 | 56.59 | 56.59 | 57.71 | 0.002815 | 8.49 | 41.56 | 18.58 | 1.00 |
| Suscol Creek | 508.0 | 1.5-year | 263.00 | 53.41 | 56.13 | 56.13 | 57.10 | 0.002893 | 7.88 | 33.37 | 17.19 | 1.00 |
| Suscol Creek | 500.5 | 100-year | 1520.00 | 53.14 | 60.12 | 60.12 | 62.46 | 0.003937 | 12.29 | 123.69 | 26.29 | 0.82 |
| Suscol Creek | 500.5 | 50-Year | 1310.00 | 53.14 | 59.57 | 59.57 | 61.79 | 0.003735 | 11.94 | 109.73 | 24.78 | 0.83 |
| Suscol Creek | 500.5 | 10-year | 812.00 | 53.14 | 58.06 | 58.06 | 59.87 | 0.003132 | 10.77 | 75.41 | 20.91 | 0.86 |
| Suscol Creek | 500.5 | 5-year | 603.00 | 53.14 | 57.36 | 57.36 | 58.88 | 0.002982 | 9.88 | 61.02 | 20.15 | 0.85 |
| Suscol Creek | 500.5 | 2-year | 353.00 | 53.14 | 56.34 | 56.34 | 57.48 | 0.002817 | 8.56 | 41.22 | 18.14 | 1.00 |
| Suscol Creek | 500.5 | 1.5-year | 263.00 | 53.14 | 55.88 | 55.88 | 56.86 | 0.002894 | 7.93 | 33.16 | 16.88 | 1.00 |
| Suscol Creek | 493.0 | 100-year | 1520.00 | 54.37 | 59.85 | 59.85 | 62.24 | 0.004098 | 12.42 | 122.43 | 25.54 | 0.93 |
| Suscol Creek | 493.0 | 50-Year | 1310.00 | 54.37 | 59.29 | 59.29 | 61.55 | 0.003991 | 12.06 | 108.66 | 24.08 | 0.96 |
| Suscol Creek | 493.0 | 10-year | 812.00 | 54.37 | 57.81 | 57.81 | 59.60 | 0.003659 | 10.75 | 75.51 | 21.04 | 1.02 |
| Suscol Creek | 493.0 | 5-year | 603.00 | 54.37 | 57.11 | 57.11 | 58.62 | 0.003557 | 9.87 | 61.06 | 20.23 | 1.05 |
| Suscol Creek | 493.0 | 2-year | 353.00 | 54.37 | 56.06 | 56.06 | 57.21 | 0.003488 | 8.59 | 41.08 | 17.95 | 1.16 |
| Suscol Creek | 493.0 | 1.5-year | 263.00 | 54.37 | 55.60 | 55.60 | 56.59 | 0.003440 | 7.95 | 33.10 | 16.82 | 1.26 |
| Suscol Creek | 485.5 | 100-year | 1520.00 | 52.26 | 59.42 | 59.42 | 61.71 | 0.002744 | 12.13 | 125.29 | 27.49 | 1.00 |
| Suscol Creek | 485.5 | 50-Year | 1310.00 | 52.26 | 58.92 | 58.92 | 61.05 | 0.002450 | 11.72 | 111.75 | 26.17 | 1.00 |
| Suscol Creek | 485.5 | 10-year | 812.00 | 52.26 | 57.48 | 57.48 | 59.21 | 0.002578 | 10.54 | 77.06 | 22.34 | 1.00 |
| Suscol Creek | 485.5 | 5-year | 603.00 | 52.26 | 56.75 | 56.75 | 58.25 | 0.002661 | 9.82 | 61.43 | 20.52 | 1.00 |
| Suscol Creek | 485.5 | 2-year | 353.00 | 52.26 | 55.68 | 55.68 | 56.84 | 0.002871 | 8.64 | 40.86 | 17.90 | 1.01 |
| Suscol Creek | 485.5 | 1.5-year | 263.00 | 52.26 | 55.22 | 55.22 | 56.21 | 0.002987 | 8.01 | 32.83 | 16.80 | 1.01 |
| Suscol Creek | 471.4 | 100-year | 1520.00 | 50.16 | 58.45 | 58.45 | 60.66 | 0.032377 | 11.92 | 127.52 | 29.00 | 1.00 |
| Suscol Creek | 471.4 | 50-Year | 1310.00 | 50.16 | 57.93 | 57.93 | 60.03 | 0.033022 | 11.60 | 112.91 | 27.44 | 1.01 |
| Suscol Creek | 471.4 | 10-year | 812.00 | 50.16 | 56.53 | 56.53 | 58.24 | 0.033664 | 10.49 | 77.39 | 23.04 | 1.01 |
| Suscol Creek | 471.4 | 5-year | 603.00 | 50.16 | 55.78 | 55.78 | 57.30 | 0.033687 | 9.87 | 61.09 | 20.48 | 1.01 |
| Suscol Creek | 471.4 | 2-year | 353.00 | 50.16 | 54.64 | 54.64 | 55.85 | 0.033365 | 8.85 | 39.87 | 16.58 | 1.01 |
| Suscol Creek | 471.4 | 1.5-year | 263.00 | 50.16 | 54.11 | 54.11 | 55.19 | 0.032522 | 8.30 | 31.68 | 14.80 | 1.00 |
| Suscol Creek | 463.4 | 100-year | 1520.00 | 47.37 | 57.28 | 56.90 | 59.28 | 0.027778 | 11.34 | 133.98 | 27.75 | 0.91 |
| Suscol Creek | 463.4 | 50-Year | 1310.00 | 47.37 | 57.18 | | 58.73 | 0.021766 | 9.98 | 131.23 | 27.47 | 0.81 |
| Suscol Creek | 463.4 | 10-year | 812.00 | 47.37 | 56.21 | | 57.12 | 0.014521 | 7.67 | 105.88 | 24.74 | 0.65 |
| Suscol Creek | 463.4 | 5-year | 603.00 | 47.37 | 55.55 | | 56.24 | 0.012060 | 6.68 | 90.24 | 22.88 | 0.59 |
| Suscol Creek | 463.4 | 2-year | 353.00 | 47.37 | 54.47 | | 54.90 | 0.008787 | 5.26 | 67.13 | 19.83 | 0.50 |
| Suscol Creek | 463.4 | 1.5-year | 263.00 | 47.37 | 53.90 | | 54.24 | 0.007589 | 4.66 | 56.40 | 18.25 | 0.47 |
| Suscol Creek | 452.9 | 100-year | 1520.00 | 46.28 | 57.96 | | 58.78 | 0.008092 | 7.28 | 208.92 | 35.01 | 0.53 |
| Suscol Creek | 452.9 | 50-Year | 1310.00 | 46.28 | 57.67 | | 58.34 | 0.006808 | 6.59 | 198.93 | 34.18 | 0.48 |
| Suscol Creek | 452.9 | 10-year | 812.00 | 46.28 | 56.49 | | 56.89 | 0.004496 | 5.06 | 160.63 | 30.78 | 0.39 |
| Suscol Creek | 452.9 | 5-year | 603.00 | 46.28 | 55.77 | | 56.06 | 0.003559 | 4.33 | 139.17 | 28.70 | 0.35 |
| Suscol Creek | 452.9 | 2-year | 353.00 | 46.28 | 54.61 | | 54.78 | 0.002309 | 3.27 | 107.84 | 25.37 | 0.28 |
| Suscol Creek | 452.9 | 1.5-year | 263.00 | 46.28 | 54.02 | | 54.14 | 0.001833 | 2.82 | 93.38 | 23.66 | 0.25 |
| Suscol Creek | 447.9 | 100-year | 1520.00 | 45.92 | 58.05 | | 58.69 | 0.006922 | 6.42 | 236.63 | 38.17 | 0.45 |
| Suscol Creek | 447.9 | 50-Year | 1310.00 | 45.92 | 57.74 | | 58.27 | 0.005868 | 5.82 | 225.06 | 37.25 | 0.42 |
| Suscol Creek | 447.9 | 10-year | 812.00 | 45.92 | 56.53 | | 56.84 | 0.003934 | 4.46 | 182.22 | 33.60 | 0.34 |
| Suscol Creek | 447.9 | 5-year | 603.00 | 45.92 | 55.80 | | 56.02 | 0.003138 | 3.81 | 158.41 | 31.39 | 0.30 |
| Suscol Creek | 447.9 | 2-year | 353.00 | 45.92 | 54.63 | | 54.75 | 0.002070 | 2.85 | 123.68 | 27.94 | 0.24 |
| Suscol Creek | 447.9 | 1.5-year | 263.00 | 45.92 | 54.03 | | 54.13 | 0.001665 | 2.44 | 107.57 | 26.23 | 0.21 |
| Suscol Creek | 441.4 | 100-year | 1520.00 | 47.65 | 57.99 | | 58.65 | 0.006438 | 6.50 | 233.74 | 42.23 | 0.49 |
| Suscol Creek | 441.4 | 50-Year | 1310.00 | 47.65 | 57.68 | | 58.23 | 0.005492 | 5.93 | 221.09 | 41.02 | 0.45 |
| Suscol Creek | 441.4 | 10-year | 812.00 | 47.65 | 56.48 | | 56.81 | 0.003749 | 4.65 | 174.55 | 35.97 | 0.37 |
| Suscol Creek | 441.4 | 5-year | 603.00 | 47.65 | 55.75 | | 56.00 | 0.002988 | 4.03 | 149.49 | 32.90 | 0.33 |
| Suscol Creek | 441.4 | 2-year | 353.00 | 47.65 | 54.59 | | 54.74 | 0.001905 | 3.09 | 114.23 | 28.02 | 0.27 |
| Suscol Creek | 441.4 | 1.5-year | 263.00 | 47.65 | 54.00 | | 54.11 | 0.001556 | 2.68 | 98.22 | 26.43 | 0.24 |
| Suscol Creek | 430.9 | 100-year | 1520.00 | 49.13 | 57.87 | | 58.58 | 0.005790 | 6.76 | 226.76 | 46.96 | 0.50 |
| Suscol Creek | 430.9 | 50-Year | 1310.00 | 49.13 | 57.59 | | 58.17 | 0.004956 | 6.13 | 214.32 | 42.35 | 0.46 |
| Suscol Creek | 430.9 | 10-year | 812.00 | 49.13 | 56.42 | | 56.77 | 0.003452 | 4.77 | 170.28 | 35.60 | 0.38 |
| Suscol Creek | 430.9 | 5-year | 603.00 | 49.13 | 55.70 | | 55.97 | 0.002837 | 4.14 | 145.49 | 33.50 | 0.35 |

HEC-RAS Plan: Existing_US Culv River: Suscol Creek Reach: Suscol Creek (Continued)

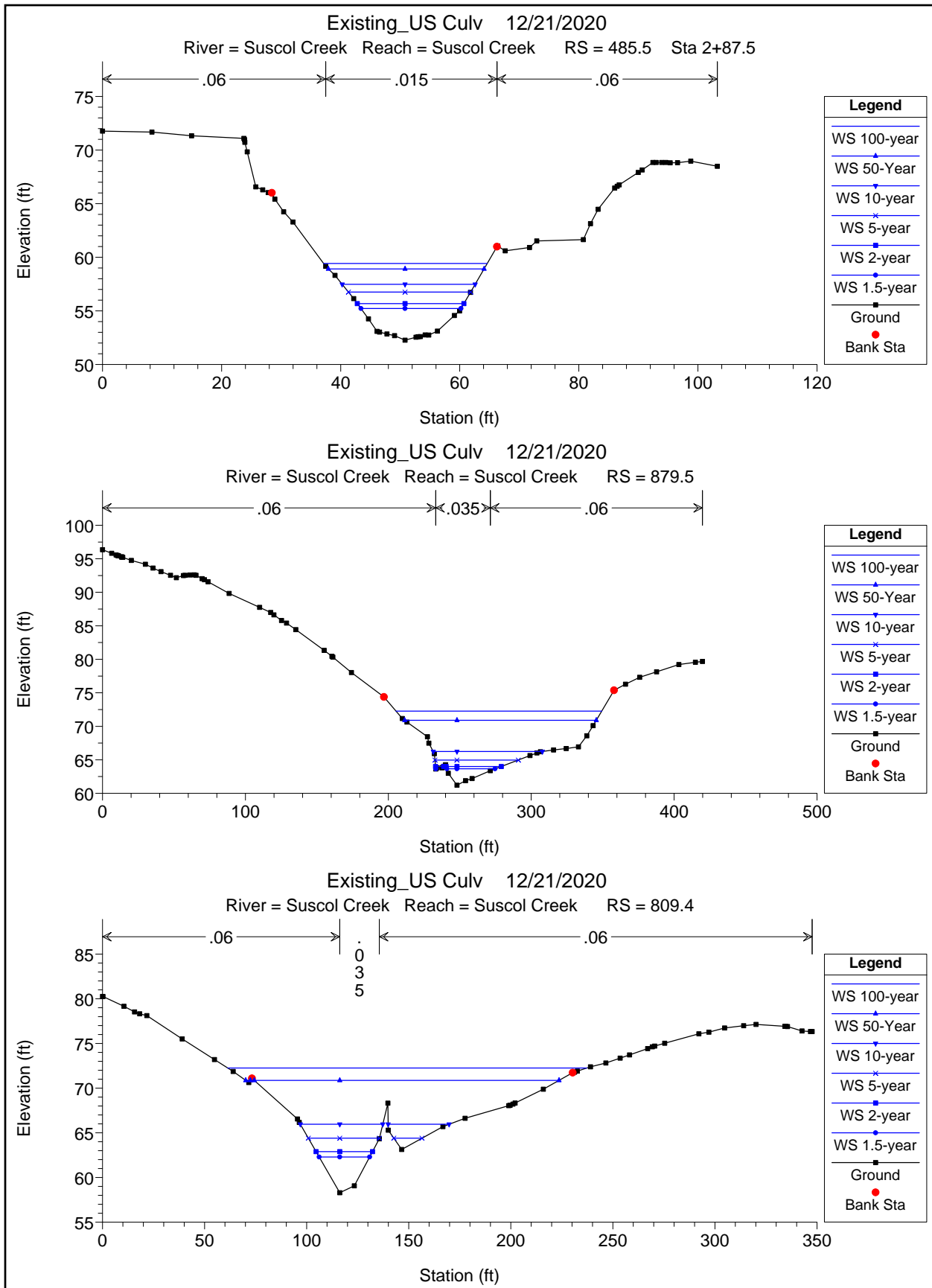
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 430.9 | 2-year | 353.00 | 49.13 | 54.55 | | 54.72 | 0.002027 | 3.24 | 108.94 | 30.14 | 0.30 |
| Suscol Creek | 430.9 | 1.5-year | 263.00 | 49.13 | 53.97 | | 54.09 | 0.001743 | 2.87 | 91.75 | 28.42 | 0.28 |
| Suscol Creek | 425.9 | 100-year | 1520.00 | 49.38 | 57.88 | | 58.53 | 0.005844 | 6.51 | 239.53 | 55.49 | 0.48 |
| Suscol Creek | 425.9 | 50-Year | 1310.00 | 49.38 | 57.59 | | 58.13 | 0.005053 | 5.92 | 224.65 | 50.28 | 0.45 |
| Suscol Creek | 425.9 | 10-year | 812.00 | 49.38 | 56.41 | | 56.75 | 0.003783 | 4.65 | 174.69 | 37.59 | 0.38 |
| Suscol Creek | 425.9 | 5-year | 603.00 | 49.38 | 55.69 | | 55.95 | 0.003221 | 4.06 | 148.41 | 35.50 | 0.35 |
| Suscol Creek | 425.9 | 2-year | 353.00 | 49.38 | 54.54 | | 54.71 | 0.002495 | 3.22 | 109.49 | 32.10 | 0.31 |
| Suscol Creek | 425.9 | 1.5-year | 263.00 | 49.38 | 53.96 | | 54.08 | 0.002243 | 2.88 | 91.19 | 30.09 | 0.29 |
| Suscol Creek | 419.4 | 100-year | 1520.00 | 49.57 | 57.76 | | 58.48 | 0.007485 | 6.87 | 235.38 | 79.17 | 0.53 |
| Suscol Creek | 419.4 | 50-Year | 1310.00 | 49.57 | 57.49 | | 58.09 | 0.006537 | 6.28 | 217.20 | 56.64 | 0.49 |
| Suscol Creek | 419.4 | 10-year | 812.00 | 49.57 | 56.32 | | 56.71 | 0.005299 | 5.07 | 160.68 | 40.95 | 0.43 |
| Suscol Creek | 419.4 | 5-year | 603.00 | 49.57 | 55.61 | | 55.92 | 0.004788 | 4.50 | 134.11 | 35.50 | 0.41 |
| Suscol Creek | 419.4 | 2-year | 353.00 | 49.57 | 54.47 | | 54.68 | 0.004057 | 3.68 | 95.98 | 31.62 | 0.37 |
| Suscol Creek | 419.4 | 1.5-year | 263.00 | 49.57 | 53.88 | | 54.06 | 0.003970 | 3.37 | 78.05 | 29.63 | 0.37 |
| Suscol Creek | 408.9 | 100-year | 1520.00 | 49.40 | 57.61 | | 58.38 | 0.009791 | 7.30 | 237.69 | 102.34 | 0.58 |
| Suscol Creek | 408.9 | 50-Year | 1310.00 | 49.40 | 57.32 | | 58.00 | 0.009015 | 6.82 | 211.39 | 75.60 | 0.56 |
| Suscol Creek | 408.9 | 10-year | 812.00 | 49.40 | 56.10 | | 56.63 | 0.008730 | 5.89 | 143.09 | 47.75 | 0.53 |
| Suscol Creek | 408.9 | 5-year | 603.00 | 49.40 | 55.38 | | 55.84 | 0.009095 | 5.45 | 111.73 | 39.11 | 0.54 |
| Suscol Creek | 408.9 | 2-year | 353.00 | 49.40 | 54.24 | | 54.60 | 0.010005 | 4.81 | 73.37 | 30.34 | 0.55 |
| Suscol Creek | 408.9 | 1.5-year | 263.00 | 49.40 | 53.64 | | 53.98 | 0.010454 | 4.66 | 56.47 | 26.15 | 0.56 |
| Suscol Creek | 403.9 | 100-year | 1520.00 | 49.32 | 57.60 | 56.40 | 58.31 | 0.010673 | 7.16 | 255.77 | 162.91 | 0.58 |
| Suscol Creek | 403.9 | 50-Year | 1310.00 | 49.32 | 57.28 | | 57.95 | 0.010218 | 6.82 | 218.04 | 97.44 | 0.57 |
| Suscol Creek | 403.9 | 10-year | 812.00 | 49.32 | 56.01 | | 56.58 | 0.010666 | 6.16 | 140.18 | 50.11 | 0.56 |
| Suscol Creek | 403.9 | 5-year | 603.00 | 49.32 | 55.25 | | 55.78 | 0.011522 | 5.85 | 105.95 | 40.28 | 0.57 |
| Suscol Creek | 403.9 | 2-year | 353.00 | 49.32 | 54.13 | | 54.54 | 0.012309 | 5.14 | 68.69 | 27.50 | 0.57 |
| Suscol Creek | 403.9 | 1.5-year | 263.00 | 49.32 | 53.54 | | 53.92 | 0.013322 | 4.92 | 53.42 | 24.56 | 0.59 |
| Suscol Creek | 397.4 | 100-year | 1520.00 | 49.23 | 57.59 | 56.34 | 58.23 | 0.009536 | 6.85 | 308.21 | 218.43 | 0.56 |
| Suscol Creek | 397.4 | 50-Year | 1310.00 | 49.23 | 57.27 | | 57.86 | 0.009063 | 6.50 | 247.39 | 145.80 | 0.54 |
| Suscol Creek | 397.4 | 10-year | 812.00 | 49.23 | 55.94 | | 56.51 | 0.010475 | 6.14 | 140.44 | 51.30 | 0.56 |
| Suscol Creek | 397.4 | 5-year | 603.00 | 49.23 | 55.18 | | 55.71 | 0.011408 | 5.84 | 105.51 | 40.34 | 0.58 |
| Suscol Creek | 397.4 | 2-year | 353.00 | 49.23 | 54.05 | | 54.46 | 0.011856 | 5.15 | 68.59 | 27.21 | 0.57 |
| Suscol Creek | 397.4 | 1.5-year | 263.00 | 49.23 | 53.47 | | 53.84 | 0.012014 | 4.90 | 53.72 | 23.57 | 0.57 |
| Suscol Creek | 386.9 | 100-year | 1520.00 | 49.10 | 57.22 | 56.88 | 58.08 | 0.013291 | 7.87 | 264.46 | 218.25 | 0.68 |
| Suscol Creek | 386.9 | 50-Year | 1310.00 | 49.10 | 57.11 | 56.15 | 57.76 | 0.010271 | 6.86 | 244.03 | 156.34 | 0.59 |
| Suscol Creek | 386.9 | 10-year | 812.00 | 49.10 | 55.40 | 54.84 | 56.33 | 0.018463 | 7.76 | 107.40 | 42.03 | 0.77 |
| Suscol Creek | 386.9 | 5-year | 603.00 | 49.10 | 54.19 | 54.18 | 55.45 | 0.032229 | 8.99 | 67.07 | 26.92 | 1.00 |
| Suscol Creek | 386.9 | 2-year | 353.00 | 49.10 | 53.12 | 53.12 | 54.21 | 0.030484 | 8.37 | 42.17 | 19.56 | 1.01 |
| Suscol Creek | 386.9 | 1.5-year | 263.00 | 49.10 | 52.55 | 52.55 | 53.59 | 0.027988 | 8.16 | 32.23 | 15.74 | 1.01 |
| Suscol Creek | 381.9 | 100-year | 1520.00 | 49.24 | 57.27 | 57.27 | 57.97 | 0.010267 | 7.39 | 309.80 | 227.83 | 0.61 |
| Suscol Creek | 381.9 | 50-Year | 1310.00 | 49.24 | 56.52 | 56.52 | 57.65 | 0.016012 | 8.80 | 178.60 | 111.47 | 0.76 |
| Suscol Creek | 381.9 | 10-year | 812.00 | 49.24 | 54.56 | 54.56 | 56.15 | 0.028190 | 10.11 | 80.34 | 25.65 | 1.01 |
| Suscol Creek | 381.9 | 5-year | 603.00 | 49.24 | 53.87 | 53.87 | 55.27 | 0.027795 | 9.51 | 63.42 | 22.99 | 1.01 |
| Suscol Creek | 381.9 | 2-year | 353.00 | 49.24 | 52.83 | 52.83 | 53.95 | 0.026302 | 8.47 | 41.67 | 19.04 | 1.01 |
| Suscol Creek | 381.9 | 1.5-year | 263.00 | 49.24 | 52.37 | 52.37 | 53.34 | 0.024945 | 7.91 | 33.26 | 17.27 | 1.00 |
| Suscol Creek | 375.4 | 100-year | 1520.00 | 49.52 | 56.79 | 56.50 | 57.79 | 0.010409 | 8.50 | 251.34 | 193.82 | 0.66 |
| Suscol Creek | 375.4 | 50-Year | 1310.00 | 49.52 | 55.57 | 55.57 | 57.29 | 0.020876 | 10.58 | 130.02 | 47.46 | 0.92 |
| Suscol Creek | 375.4 | 10-year | 812.00 | 49.52 | 54.17 | 54.17 | 55.70 | 0.025634 | 9.91 | 81.94 | 27.32 | 1.01 |
| Suscol Creek | 375.4 | 5-year | 603.00 | 49.52 | 53.53 | 53.53 | 54.86 | 0.025070 | 9.24 | 65.23 | 24.98 | 1.01 |
| Suscol Creek | 375.4 | 2-year | 353.00 | 49.52 | 52.65 | 52.59 | 53.62 | 0.022192 | 7.91 | 44.65 | 21.70 | 0.97 |
| Suscol Creek | 375.4 | 1.5-year | 263.00 | 49.52 | 52.35 | | 53.08 | 0.018074 | 6.86 | 38.32 | 20.59 | 0.89 |
| Suscol Creek | 364.9 | 100-year | 1520.00 | 49.81 | 57.00 | 56.18 | 57.59 | 0.005529 | 6.84 | 352.66 | 231.37 | 0.52 |
| Suscol Creek | 364.9 | 50-Year | 1310.00 | 49.81 | 55.08 | 55.07 | 56.99 | 0.021089 | 11.08 | 118.22 | 30.74 | 1.00 |
| Suscol Creek | 364.9 | 10-year | 812.00 | 49.81 | 53.88 | 53.88 | 55.37 | 0.020504 | 9.78 | 83.00 | 27.96 | 1.00 |
| Suscol Creek | 364.9 | 5-year | 603.00 | 49.81 | 53.28 | 53.28 | 54.55 | 0.020376 | 9.06 | 66.57 | 26.56 | 1.01 |
| Suscol Creek | 364.9 | 2-year | 353.00 | 49.81 | 52.45 | 52.45 | 53.39 | 0.019772 | 7.77 | 45.41 | 24.58 | 1.01 |
| Suscol Creek | 364.9 | 1.5-year | 263.00 | 49.81 | 52.09 | 52.09 | 52.89 | 0.019538 | 7.14 | 36.81 | 23.62 | 1.01 |
| Suscol Creek | 359.9 | 100-year | 1520.00 | 49.88 | 55.99 | 55.24 | 57.47 | 0.013046 | 9.84 | 173.17 | 117.63 | 0.79 |
| Suscol Creek | 359.9 | 50-Year | 1310.00 | 49.88 | 55.10 | 54.84 | 56.83 | 0.017315 | 10.56 | 124.01 | 30.31 | 0.92 |
| Suscol Creek | 359.9 | 10-year | 812.00 | 49.88 | 53.69 | 53.69 | 55.18 | 0.019836 | 9.80 | 82.89 | 28.02 | 1.00 |
| Suscol Creek | 359.9 | 5-year | 603.00 | 49.88 | 53.13 | 53.13 | 54.37 | 0.019434 | 8.95 | 67.41 | 27.11 | 1.00 |
| Suscol Creek | 359.9 | 2-year | 353.00 | 49.88 | 52.32 | 52.32 | 53.23 | 0.019621 | 7.65 | 46.16 | 25.84 | 1.01 |
| Suscol Creek | 359.9 | 1.5-year | 263.00 | 49.88 | 51.99 | 51.99 | 52.75 | 0.019796 | 6.99 | 37.64 | 25.32 | 1.01 |
| Suscol Creek | 351.9 | 100-year | 1520.00 | 49.28 | 56.68 | | 57.10 | 0.004389 | 5.72 | 402.37 | 240.29 | 0.42 |
| Suscol Creek | 351.9 | 50-Year | 1310.00 | 49.28 | 55.72 | | 56.46 | 0.008316 | 7.05 | 210.72 | 98.31 | 0.57 |
| Suscol Creek | 351.9 | 10-year | 812.00 | 49.28 | 54.03 | | 54.77 | 0.012807 | 6.92 | 117.35 | 34.72 | 0.66 |
| Suscol Creek | 351.9 | 5-year | 603.00 | 49.28 | 53.28 | | 53.94 | 0.014105 | 6.54 | 92.23 | 32.35 | 0.68 |
| Suscol Creek | 351.9 | 2-year | 353.00 | 49.28 | 52.40 | | 52.86 | 0.013677 | 5.43 | 65.03 | 29.97 | 0.65 |
| Suscol Creek | 351.9 | 1.5-year | 263.00 | 49.28 | 52.05 | | 52.41 | 0.013005 | 4.82 | 54.54 | 29.12 | 0.62 |
| Suscol Creek | 342.9 | 100-year | 1520.00 | 49.28 | 56.48 | | 57.03 | 0.004430 | 6.37 | 355.67 | 237.12 | 0.48 |

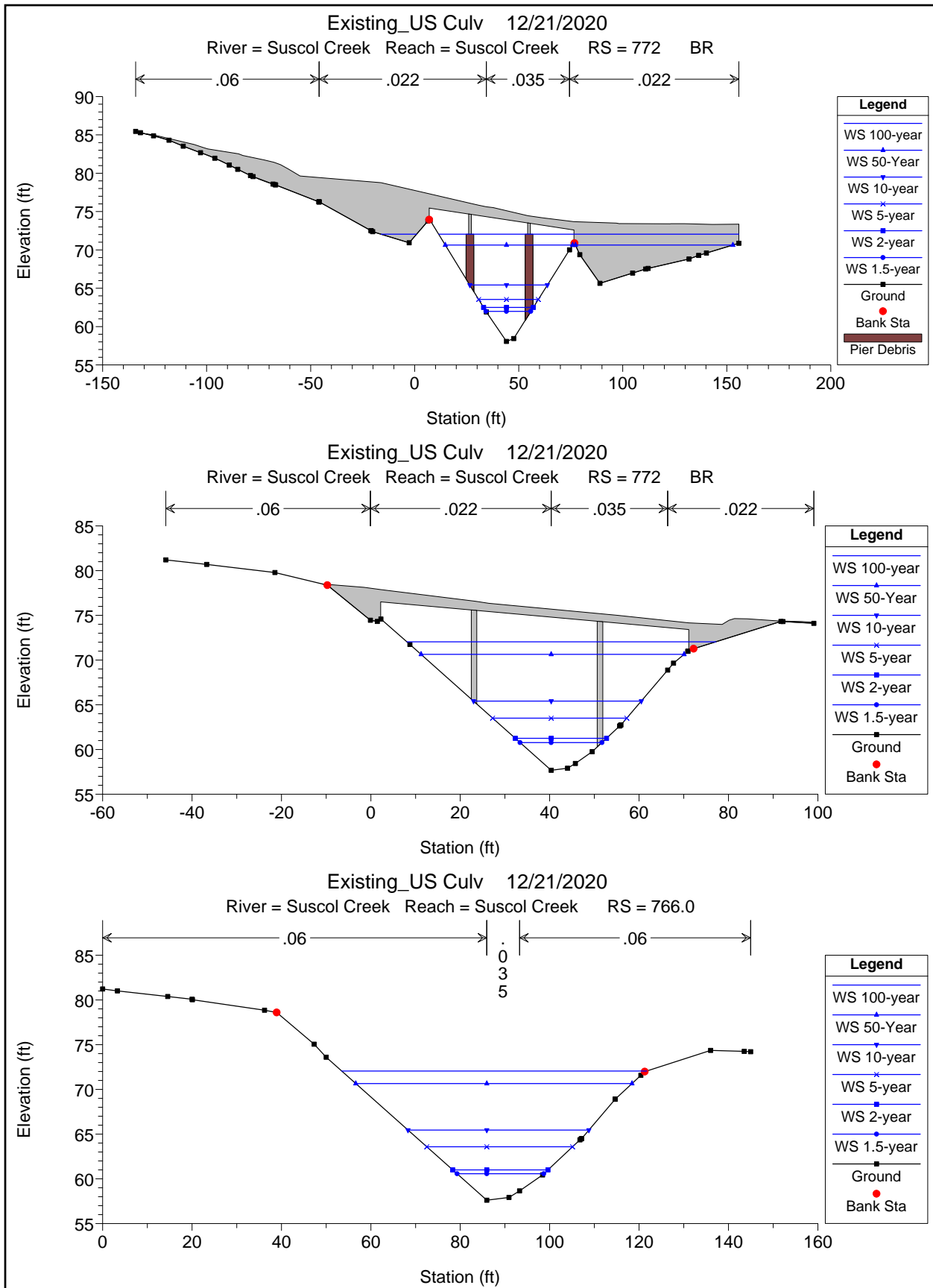
HEC-RAS Plan: Existing_US Culv River: Suscol Creek Reach: Suscol Creek (Continued)

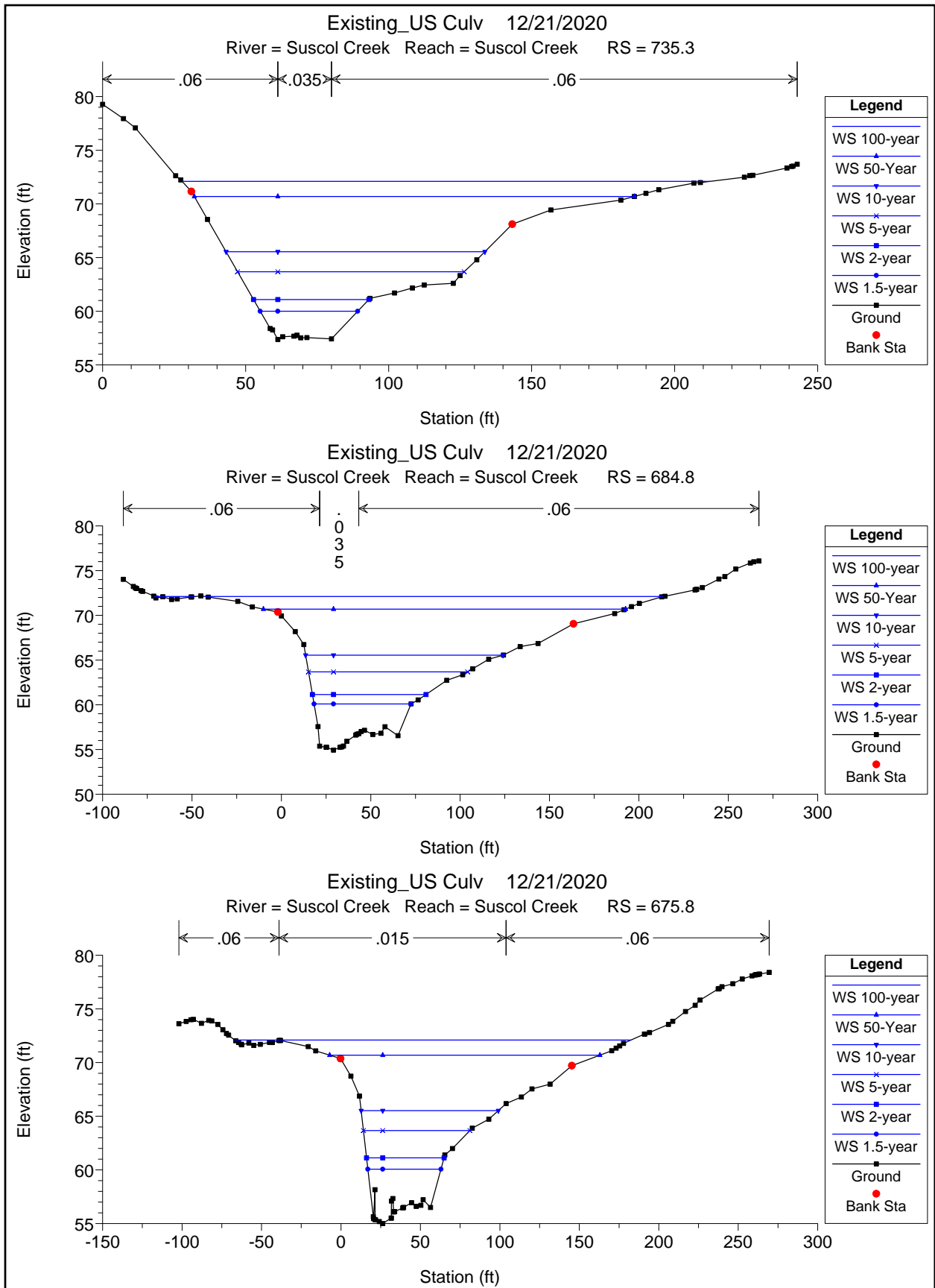
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 342.9 | 50-Year | 1310.00 | 49.28 | 55.50 | 54.20 | 56.37 | 0.007552 | 7.53 | 191.56 | 85.28 | 0.62 |
| Suscol Creek | 342.9 | 10-year | 812.00 | 49.28 | 53.75 | | 54.63 | 0.011090 | 7.53 | 107.85 | 33.84 | 0.74 |
| Suscol Creek | 342.9 | 5-year | 603.00 | 49.28 | 52.90 | | 53.78 | 0.013173 | 7.51 | 80.27 | 31.16 | 0.83 |
| Suscol Creek | 342.9 | 2-year | 353.00 | 49.28 | 51.85 | 51.81 | 52.66 | 0.018249 | 7.24 | 48.76 | 28.65 | 0.98 |
| Suscol Creek | 342.9 | 1.5-year | 263.00 | 49.28 | 51.50 | 51.50 | 52.21 | 0.019609 | 6.78 | 38.79 | 27.80 | 1.01 |
| Suscol Creek | 337.9 | 100-year | 1520.00 | 49.06 | 56.52 | | 56.99 | 0.003785 | 6.02 | 391.38 | 242.00 | 0.44 |
| Suscol Creek | 337.9 | 50-Year | 1310.00 | 49.06 | 55.50 | 54.06 | 56.31 | 0.006878 | 7.35 | 201.26 | 92.77 | 0.59 |
| Suscol Creek | 337.9 | 10-year | 812.00 | 49.06 | 53.74 | | 54.56 | 0.009779 | 7.29 | 111.33 | 33.30 | 0.70 |
| Suscol Creek | 337.9 | 5-year | 603.00 | 49.06 | 52.90 | | 53.70 | 0.011451 | 7.16 | 84.24 | 31.30 | 0.77 |
| Suscol Creek | 337.9 | 2-year | 353.00 | 49.06 | 51.86 | | 52.55 | 0.014297 | 6.67 | 52.90 | 28.80 | 0.87 |
| Suscol Creek | 337.9 | 1.5-year | 263.00 | 49.06 | 51.38 | 51.36 | 52.07 | 0.018532 | 6.68 | 39.35 | 27.65 | 0.99 |
| Suscol Creek | 331.4 | 100-year | 1520.00 | 48.76 | 56.54 | | 56.95 | 0.003134 | 5.74 | 425.72 | 244.81 | 0.42 |
| Suscol Creek | 331.4 | 50-Year | 1310.00 | 48.76 | 55.48 | 53.90 | 56.27 | 0.006040 | 7.25 | 207.58 | 97.95 | 0.57 |
| Suscol Creek | 331.4 | 10-year | 812.00 | 48.76 | 53.71 | | 54.49 | 0.008176 | 7.07 | 114.89 | 32.78 | 0.67 |
| Suscol Creek | 331.4 | 5-year | 603.00 | 48.76 | 52.88 | | 53.61 | 0.009095 | 6.82 | 88.40 | 30.99 | 0.71 |
| Suscol Creek | 331.4 | 2-year | 353.00 | 48.76 | 51.86 | | 52.44 | 0.010079 | 6.12 | 57.69 | 28.78 | 0.76 |
| Suscol Creek | 331.4 | 1.5-year | 263.00 | 48.76 | 51.39 | | 51.93 | 0.011970 | 5.92 | 44.41 | 27.70 | 0.82 |
| Suscol Creek | 320.9 | 100-year | 1520.00 | 48.27 | 56.56 | | 56.90 | 0.002460 | 5.26 | 477.63 | 247.55 | 0.37 |
| Suscol Creek | 320.9 | 50-Year | 1310.00 | 48.27 | 55.48 | 53.66 | 56.18 | 0.005011 | 6.85 | 229.42 | 135.02 | 0.53 |
| Suscol Creek | 320.9 | 10-year | 812.00 | 48.27 | 53.69 | | 54.39 | 0.006596 | 6.71 | 120.95 | 32.58 | 0.61 |
| Suscol Creek | 320.9 | 5-year | 603.00 | 48.27 | 52.87 | | 53.50 | 0.006667 | 6.34 | 95.11 | 30.50 | 0.63 |
| Suscol Creek | 320.9 | 2-year | 353.00 | 48.27 | 51.86 | | 52.31 | 0.006779 | 5.41 | 65.21 | 28.65 | 0.63 |
| Suscol Creek | 320.9 | 1.5-year | 263.00 | 48.27 | 51.40 | | 51.79 | 0.007320 | 5.04 | 52.17 | 27.86 | 0.65 |
| Suscol Creek | 315.9 | 100-year | 1520.00 | 48.29 | 56.60 | | 56.87 | 0.002223 | 4.74 | 521.11 | 248.39 | 0.34 |
| Suscol Creek | 315.9 | 50-Year | 1310.00 | 48.29 | 55.55 | 53.55 | 56.12 | 0.004691 | 6.28 | 263.11 | 202.83 | 0.48 |
| Suscol Creek | 315.9 | 10-year | 812.00 | 48.29 | 53.71 | | 54.34 | 0.007104 | 6.35 | 127.78 | 34.81 | 0.58 |
| Suscol Creek | 315.9 | 5-year | 603.00 | 48.29 | 52.88 | | 53.44 | 0.007626 | 6.05 | 99.69 | 32.69 | 0.61 |
| Suscol Creek | 315.9 | 2-year | 353.00 | 48.29 | 51.84 | | 52.27 | 0.007706 | 5.25 | 67.19 | 30.04 | 0.62 |
| Suscol Creek | 315.9 | 1.5-year | 263.00 | 48.29 | 51.37 | | 51.75 | 0.008131 | 4.93 | 53.37 | 28.77 | 0.64 |
| Suscol Creek | 309.4 | 100-year | 1520.00 | 48.32 | 56.62 | | 56.84 | 0.002250 | 4.29 | 554.33 | 255.12 | 0.30 |
| Suscol Creek | 309.4 | 50-Year | 1310.00 | 48.32 | 55.55 | 53.35 | 56.07 | 0.005268 | 5.96 | 287.36 | 234.10 | 0.46 |
| Suscol Creek | 309.4 | 10-year | 812.00 | 48.32 | 53.71 | | 54.26 | 0.008151 | 5.97 | 136.09 | 36.77 | 0.55 |
| Suscol Creek | 309.4 | 5-year | 603.00 | 48.32 | 52.87 | | 53.37 | 0.008749 | 5.66 | 106.53 | 33.98 | 0.56 |
| Suscol Creek | 309.4 | 2-year | 353.00 | 48.32 | 51.83 | | 52.19 | 0.009016 | 4.87 | 72.48 | 31.14 | 0.56 |
| Suscol Creek | 309.4 | 1.5-year | 263.00 | 48.32 | 51.35 | | 51.67 | 0.009603 | 4.54 | 57.98 | 29.85 | 0.57 |
| Suscol Creek | 298.9 | 100-year | 1520.00 | 46.62 | 56.63 | | 56.81 | 0.001533 | 3.81 | 604.22 | 253.00 | 0.26 |
| Suscol Creek | 298.9 | 50-Year | 1310.00 | 46.62 | 55.64 | | 55.97 | 0.002892 | 4.81 | 356.86 | 242.06 | 0.35 |
| Suscol Creek | 298.9 | 10-year | 812.00 | 46.62 | 53.80 | | 54.14 | 0.004141 | 4.67 | 174.01 | 43.02 | 0.41 |
| Suscol Creek | 298.9 | 5-year | 603.00 | 46.62 | 52.96 | | 53.25 | 0.003813 | 4.31 | 139.82 | 38.21 | 0.40 |
| Suscol Creek | 298.9 | 2-year | 353.00 | 46.62 | 51.90 | | 52.09 | 0.002855 | 3.45 | 102.18 | 33.57 | 0.35 |
| Suscol Creek | 298.9 | 1.5-year | 263.00 | 46.62 | 51.43 | | 51.57 | 0.002398 | 3.03 | 86.66 | 31.53 | 0.32 |
| Suscol Creek | 293.9 | 100-year | 1520.00 | 46.24 | 56.64 | | 56.79 | 0.001526 | 3.57 | 622.85 | 250.98 | 0.24 |
| Suscol Creek | 293.9 | 50-Year | 1310.00 | 46.24 | 55.66 | | 55.95 | 0.002838 | 4.47 | 379.14 | 242.02 | 0.33 |
| Suscol Creek | 293.9 | 10-year | 812.00 | 46.24 | 53.81 | | 54.11 | 0.004073 | 4.35 | 186.61 | 48.14 | 0.38 |
| Suscol Creek | 293.9 | 5-year | 603.00 | 46.24 | 52.97 | | 53.22 | 0.003823 | 4.01 | 150.53 | 40.28 | 0.37 |
| Suscol Creek | 293.9 | 2-year | 353.00 | 46.24 | 51.91 | | 52.07 | 0.002747 | 3.18 | 111.08 | 34.29 | 0.31 |
| Suscol Creek | 293.9 | 1.5-year | 263.00 | 46.24 | 51.43 | | 51.55 | 0.002280 | 2.76 | 95.24 | 32.26 | 0.28 |
| Suscol Creek | 287.4 | 100-year | 1520.00 | 47.10 | 56.63 | | 56.78 | 0.001491 | 3.59 | 620.44 | 249.56 | 0.25 |
| Suscol Creek | 287.4 | 50-Year | 1310.00 | 47.10 | 55.63 | | 55.93 | 0.002861 | 4.54 | 374.88 | 240.39 | 0.34 |
| Suscol Creek | 287.4 | 10-year | 812.00 | 47.10 | 53.75 | | 54.08 | 0.004536 | 4.57 | 179.03 | 56.18 | 0.41 |
| Suscol Creek | 287.4 | 5-year | 603.00 | 47.10 | 52.90 | | 53.19 | 0.004486 | 4.32 | 139.68 | 41.17 | 0.41 |
| Suscol Creek | 287.4 | 2-year | 353.00 | 47.10 | 51.85 | | 52.04 | 0.003547 | 3.54 | 99.61 | 35.21 | 0.37 |
| Suscol Creek | 287.4 | 1.5-year | 263.00 | 47.10 | 51.38 | | 51.53 | 0.003013 | 3.14 | 83.73 | 32.55 | 0.35 |
| Suscol Creek | 276.9 | 100-year | 1520.00 | 48.12 | 56.62 | | 56.76 | 0.001650 | 3.30 | 620.45 | 246.17 | 0.25 |
| Suscol Creek | 276.9 | 50-Year | 1310.00 | 48.12 | 55.62 | | 55.88 | 0.003502 | 4.26 | 375.74 | 238.32 | 0.36 |
| Suscol Creek | 276.9 | 10-year | 812.00 | 48.12 | 53.67 | | 54.02 | 0.006008 | 4.76 | 170.77 | 51.80 | 0.46 |
| Suscol Creek | 276.9 | 5-year | 603.00 | 48.12 | 52.79 | | 53.13 | 0.006383 | 4.67 | 128.99 | 43.90 | 0.48 |
| Suscol Creek | 276.9 | 2-year | 353.00 | 48.12 | 51.73 | | 51.99 | 0.006337 | 4.11 | 85.87 | 37.37 | 0.48 |
| Suscol Creek | 276.9 | 1.5-year | 263.00 | 48.12 | 51.26 | | 51.48 | 0.006303 | 3.81 | 68.95 | 34.58 | 0.48 |
| Suscol Creek | 271.9 | 100-year | 1520.00 | 47.44 | 56.62 | | 56.75 | 0.001678 | 3.28 | 625.97 | 245.26 | 0.25 |
| Suscol Creek | 271.9 | 50-Year | 1310.00 | 47.44 | 55.60 | | 55.87 | 0.003640 | 4.26 | 379.79 | 237.09 | 0.36 |
| Suscol Creek | 271.9 | 10-year | 812.00 | 47.44 | 53.64 | | 53.99 | 0.006128 | 4.79 | 169.70 | 49.51 | 0.46 |
| Suscol Creek | 271.9 | 5-year | 603.00 | 47.44 | 52.76 | | 53.09 | 0.006419 | 4.65 | 129.80 | 42.36 | 0.47 |
| Suscol Creek | 271.9 | 2-year | 353.00 | 47.44 | 51.70 | | 51.95 | 0.006117 | 4.00 | 88.33 | 36.41 | 0.45 |
| Suscol Creek | 271.9 | 1.5-year | 263.00 | 47.44 | 51.24 | | 51.44 | 0.005894 | 3.66 | 71.90 | 33.76 | 0.44 |
| Suscol Creek | 265.4 | 100-year | 1520.00 | 47.02 | 56.60 | | 56.74 | 0.002012 | 3.33 | 614.99 | 246.64 | 0.26 |
| Suscol Creek | 265.4 | 50-Year | 1310.00 | 47.02 | 55.52 | | 55.83 | 0.005227 | 4.65 | 352.76 | 235.01 | 0.40 |
| Suscol Creek | 265.4 | 10-year | 812.00 | 47.02 | 53.40 | | 53.92 | 0.011286 | 5.82 | 139.60 | 44.21 | 0.58 |
| Suscol Creek | 265.4 | 5-year | 603.00 | 47.02 | 52.50 | | 53.02 | 0.012524 | 5.78 | 104.35 | 36.71 | 0.60 |
| Suscol Creek | 265.4 | 2-year | 353.00 | 47.02 | 51.49 | | 51.88 | 0.012466 | 5.03 | 70.18 | 31.00 | 0.59 |

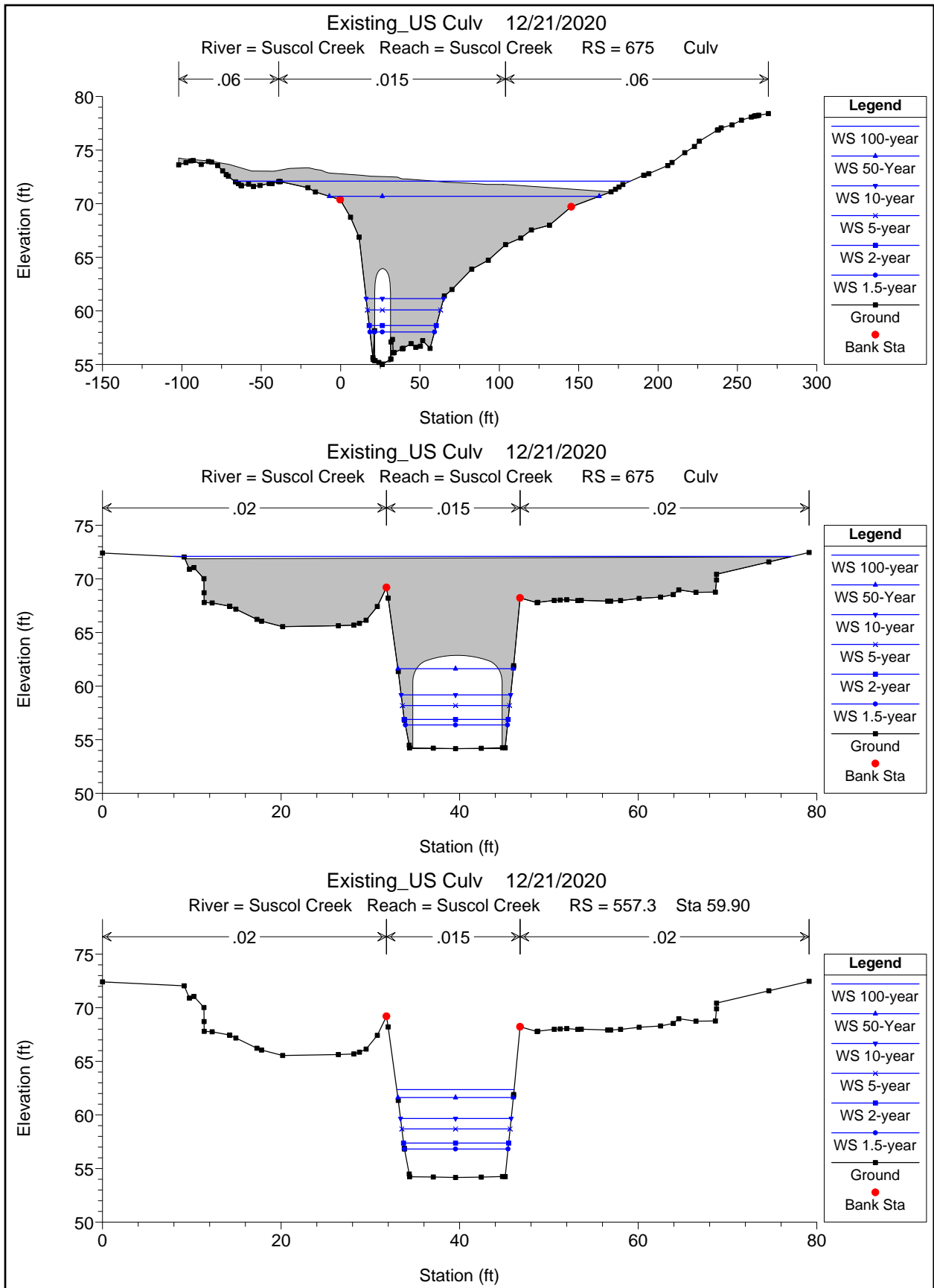
HEC-RAS Plan: Existing_US Culv River: Suscol Creek Reach: Suscol Creek (Continued)

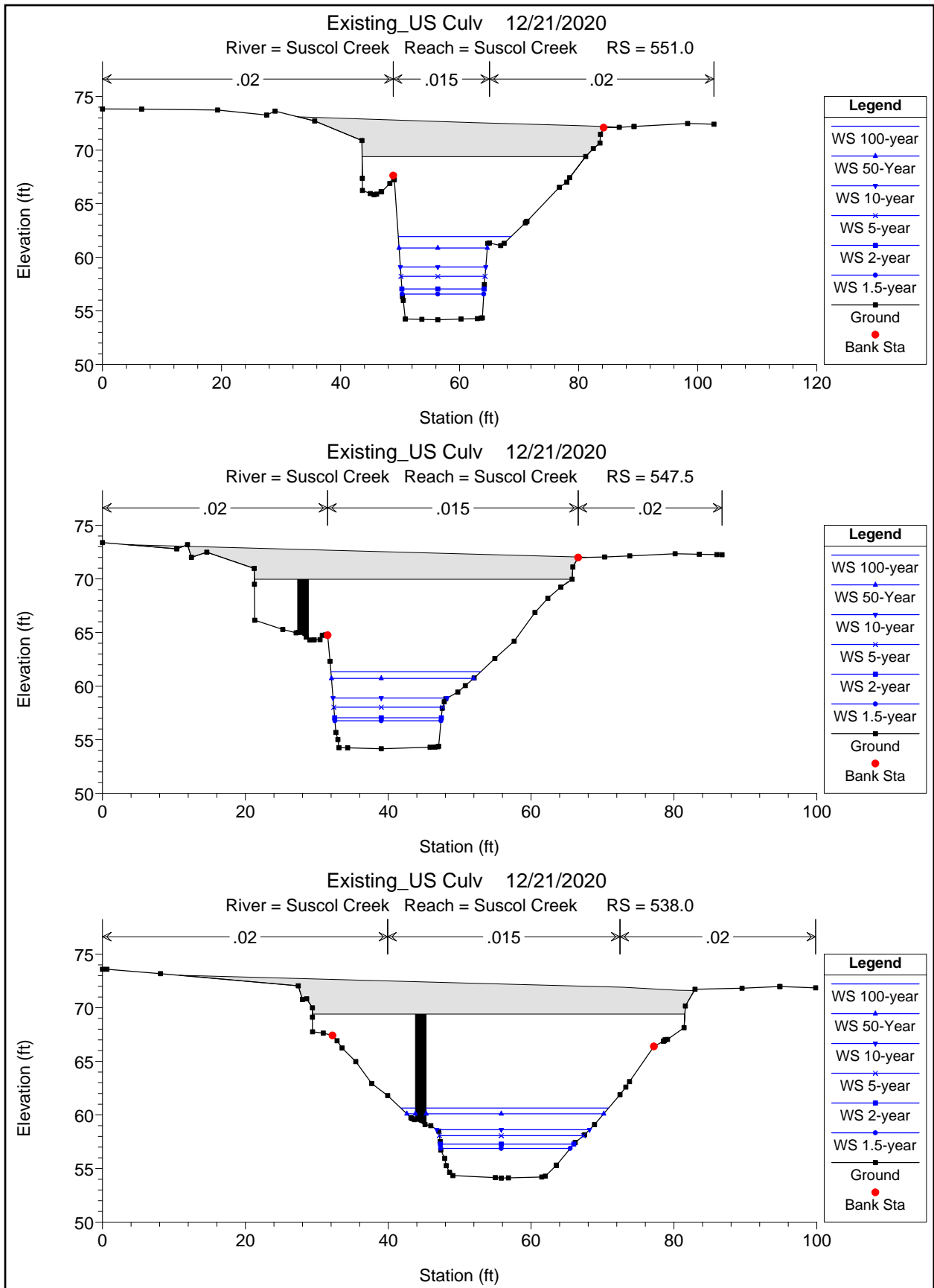
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 265.4 | 1.5-year | 263.00 | 47.02 | 51.05 | | 51.38 | 0.011803 | 4.60 | 57.14 | 28.07 | 0.57 |
| Suscol Creek | 254.9 | 100-year | 1520.00 | 48.08 | 56.58 | | 56.72 | 0.001976 | 3.43 | 610.68 | 245.30 | 0.27 |
| Suscol Creek | 254.9 | 50-Year | 1310.00 | 48.08 | 55.38 | | 55.76 | 0.006434 | 5.19 | 322.11 | 232.90 | 0.47 |
| Suscol Creek | 254.9 | 10-year | 812.00 | 48.08 | 52.97 | | 53.77 | 0.012259 | 7.19 | 112.97 | 34.37 | 0.70 |
| Suscol Creek | 254.9 | 5-year | 603.00 | 48.08 | 51.94 | | 52.83 | 0.016965 | 7.57 | 79.65 | 30.41 | 0.82 |
| Suscol Creek | 254.9 | 2-year | 353.00 | 48.08 | 50.74 | 50.74 | 51.65 | 0.024952 | 7.67 | 46.04 | 25.61 | 1.01 |
| Suscol Creek | 254.9 | 1.5-year | 263.00 | 48.08 | 50.38 | 50.38 | 51.16 | 0.024845 | 7.09 | 37.11 | 24.18 | 1.01 |
| Suscol Creek | 249.9 | 100-year | 1520.00 | 48.11 | 56.57 | | 56.71 | 0.001657 | 3.35 | 634.17 | 245.52 | 0.26 |
| Suscol Creek | 249.9 | 50-Year | 1310.00 | 48.11 | 55.38 | | 55.72 | 0.004952 | 4.88 | 346.83 | 233.50 | 0.43 |
| Suscol Creek | 249.9 | 10-year | 812.00 | 48.11 | 53.04 | | 53.67 | 0.008343 | 6.34 | 127.98 | 37.17 | 0.60 |
| Suscol Creek | 249.9 | 5-year | 603.00 | 48.11 | 52.03 | | 52.69 | 0.011120 | 6.55 | 92.10 | 33.68 | 0.70 |
| Suscol Creek | 249.9 | 2-year | 353.00 | 48.11 | 50.56 | 50.56 | 51.44 | 0.021094 | 7.52 | 46.95 | 27.26 | 1.01 |
| Suscol Creek | 249.9 | 1.5-year | 263.00 | 48.11 | 50.22 | 50.22 | 50.97 | 0.020794 | 6.93 | 37.98 | 25.96 | 1.01 |
| Suscol Creek | 243.4 | 100-year | 1520.00 | 47.62 | 56.57 | | 56.69 | 0.001514 | 3.28 | 650.66 | 246.07 | 0.25 |
| Suscol Creek | 243.4 | 50-Year | 1310.00 | 47.62 | 55.37 | | 55.68 | 0.004332 | 4.72 | 361.48 | 233.04 | 0.41 |
| Suscol Creek | 243.4 | 10-year | 812.00 | 47.62 | 53.06 | | 53.59 | 0.006627 | 5.85 | 138.78 | 37.82 | 0.54 |
| Suscol Creek | 243.4 | 5-year | 603.00 | 47.62 | 52.06 | | 52.59 | 0.007981 | 5.86 | 102.87 | 34.12 | 0.60 |
| Suscol Creek | 243.4 | 2-year | 353.00 | 47.62 | 50.40 | 50.19 | 51.12 | 0.015660 | 6.81 | 51.85 | 26.97 | 0.87 |
| Suscol Creek | 243.4 | 1.5-year | 263.00 | 47.62 | 49.84 | 49.84 | 50.61 | 0.020789 | 7.02 | 37.48 | 25.07 | 1.01 |
| Suscol Creek | 229.4 | 100-year | 1520.00 | 46.54 | 56.55 | | 56.67 | 0.001592 | 3.23 | 655.77 | 246.54 | 0.24 |
| Suscol Creek | 229.4 | 50-Year | 1310.00 | 46.54 | 55.29 | | 55.62 | 0.004650 | 4.83 | 352.81 | 225.57 | 0.40 |
| Suscol Creek | 229.4 | 10-year | 812.00 | 46.54 | 52.99 | | 53.49 | 0.006163 | 5.68 | 142.98 | 33.60 | 0.49 |
| Suscol Creek | 229.4 | 5-year | 603.00 | 46.54 | 52.02 | | 52.47 | 0.006104 | 5.37 | 112.33 | 29.74 | 0.49 |
| Suscol Creek | 229.4 | 2-year | 353.00 | 46.54 | 50.49 | | 50.88 | 0.006797 | 4.98 | 70.92 | 25.27 | 0.52 |
| Suscol Creek | 229.4 | 1.5-year | 263.00 | 46.54 | 49.80 | | 50.17 | 0.008044 | 4.89 | 53.82 | 23.87 | 0.57 |
| Suscol Creek | 224.7 | 100-year | 1520.00 | 45.80 | 56.55 | | 56.66 | 0.001657 | 3.17 | 664.59 | 253.42 | 0.24 |
| Suscol Creek | 224.7 | 50-Year | 1310.00 | 45.80 | 55.28 | | 55.59 | 0.004817 | 4.77 | 358.20 | 222.86 | 0.39 |
| Suscol Creek | 224.7 | 10-year | 812.00 | 45.80 | 52.94 | | 53.45 | 0.007562 | 5.77 | 140.78 | 33.96 | 0.50 |
| Suscol Creek | 224.7 | 5-year | 603.00 | 45.80 | 51.97 | | 52.44 | 0.007540 | 5.47 | 110.16 | 29.35 | 0.50 |
| Suscol Creek | 224.7 | 2-year | 353.00 | 45.80 | 50.46 | | 50.84 | 0.007203 | 4.95 | 71.26 | 22.58 | 0.49 |
| Suscol Creek | 224.7 | 1.5-year | 263.00 | 45.80 | 49.79 | | 50.12 | 0.007287 | 4.64 | 56.70 | 20.92 | 0.50 |
| Suscol Creek | 202.8 | 100-year | 1520.00 | 45.44 | 56.18 | 52.23 | 56.58 | 0.003208 | 5.22 | 328.72 | 99.66 | 0.35 |
| Suscol Creek | 202.8 | 50-Year | 1310.00 | 45.44 | 54.98 | 51.79 | 55.47 | 0.004794 | 5.64 | 236.09 | 47.54 | 0.41 |
| Suscol Creek | 202.8 | 10-year | 812.00 | 45.44 | 52.84 | 50.55 | 53.29 | 0.005906 | 5.35 | 151.84 | 33.84 | 0.45 |
| Suscol Creek | 202.8 | 5-year | 603.00 | 45.44 | 51.88 | 49.89 | 52.27 | 0.006006 | 5.00 | 120.64 | 30.94 | 0.45 |
| Suscol Creek | 202.8 | 2-year | 353.00 | 45.44 | 50.34 | 48.88 | 50.68 | 0.006904 | 4.61 | 76.54 | 26.07 | 0.47 |
| Suscol Creek | 202.8 | 1.5-year | 263.00 | 45.44 | 49.65 | 48.41 | 49.95 | 0.007414 | 4.43 | 59.32 | 23.38 | 0.49 |
| Suscol Creek | 200 | Bridge | | | | | | | | | | |
| Suscol Creek | 148.5 | 100-year | 1520.00 | 45.09 | 53.22 | | 54.17 | 0.010750 | 7.80 | 194.84 | 37.98 | 0.61 |
| Suscol Creek | 148.5 | 50-Year | 1310.00 | 45.09 | 52.76 | | 53.61 | 0.010539 | 7.39 | 177.27 | 37.57 | 0.60 |
| Suscol Creek | 148.5 | 10-year | 812.00 | 45.09 | 51.35 | | 52.00 | 0.010775 | 6.48 | 125.27 | 34.78 | 0.60 |
| Suscol Creek | 148.5 | 5-year | 603.00 | 45.09 | 50.49 | | 51.07 | 0.009896 | 6.12 | 98.49 | 28.93 | 0.58 |
| Suscol Creek | 148.5 | 2-year | 353.00 | 45.09 | 49.15 | | 49.63 | 0.010111 | 5.56 | 63.51 | 23.46 | 0.60 |
| Suscol Creek | 148.5 | 1.5-year | 263.00 | 45.09 | 48.32 | | 48.85 | 0.013821 | 5.83 | 45.14 | 20.85 | 0.70 |
| Suscol Creek | 93.6 | 100-year | 1520.00 | 43.18 | 52.50 | | 53.44 | 0.016513 | 7.78 | 195.37 | 47.64 | 0.68 |
| Suscol Creek | 93.6 | 50-Year | 1310.00 | 43.18 | 51.93 | | 52.86 | 0.017045 | 7.73 | 169.53 | 42.79 | 0.68 |
| Suscol Creek | 93.6 | 10-year | 812.00 | 43.18 | 50.36 | | 51.19 | 0.018095 | 7.31 | 111.02 | 32.21 | 0.69 |
| Suscol Creek | 93.6 | 5-year | 603.00 | 43.18 | 49.54 | | 50.30 | 0.018440 | 6.98 | 86.39 | 27.63 | 0.70 |
| Suscol Creek | 93.6 | 2-year | 353.00 | 43.18 | 48.23 | | 48.87 | 0.017630 | 6.40 | 55.14 | 20.07 | 0.68 |
| Suscol Creek | 93.6 | 1.5-year | 263.00 | 43.18 | 47.42 | | 48.04 | 0.014451 | 6.36 | 41.37 | 13.69 | 0.64 |
| Suscol Creek | 37.7 | 100-year | 1520.00 | 42.08 | 49.94 | 49.94 | 52.03 | 0.035116 | 11.59 | 131.15 | 31.59 | 1.00 |
| Suscol Creek | 37.7 | 50-Year | 1310.00 | 42.08 | 49.47 | 49.47 | 51.43 | 0.035326 | 11.22 | 116.76 | 29.90 | 1.00 |
| Suscol Creek | 37.7 | 10-year | 812.00 | 42.08 | 48.11 | 48.11 | 49.73 | 0.036195 | 10.20 | 79.59 | 24.62 | 1.00 |
| Suscol Creek | 37.7 | 5-year | 603.00 | 42.08 | 47.37 | 47.37 | 48.82 | 0.036680 | 9.63 | 62.59 | 21.76 | 1.00 |
| Suscol Creek | 37.7 | 2-year | 353.00 | 42.08 | 46.24 | 46.24 | 47.43 | 0.037368 | 8.73 | 40.45 | 17.35 | 1.01 |
| Suscol Creek | 37.7 | 1.5-year | 263.00 | 42.08 | 45.72 | 45.72 | 46.78 | 0.037183 | 8.25 | 31.87 | 15.31 | 1.01 |
| Suscol Creek | 0 | 100-year | 1520.00 | 40.62 | 47.56 | 47.31 | 49.42 | 0.026006 | 10.94 | 138.92 | 32.15 | 0.93 |
| Suscol Creek | 0 | 50-Year | 1310.00 | 40.62 | 47.08 | 46.83 | 48.82 | 0.026052 | 10.59 | 123.65 | 30.44 | 0.93 |
| Suscol Creek | 0 | 10-year | 812.00 | 40.62 | 45.70 | 45.49 | 47.12 | 0.026006 | 9.53 | 85.16 | 25.64 | 0.92 |
| Suscol Creek | 0 | 5-year | 603.00 | 40.62 | 44.98 | 44.80 | 46.22 | 0.026020 | 8.94 | 67.43 | 23.10 | 0.92 |
| Suscol Creek | 0 | 2-year | 353.00 | 40.62 | 43.87 | 43.74 | 44.87 | 0.026015 | 7.99 | 44.15 | 19.24 | 0.93 |
| Suscol Creek | 0 | 1.5-year | 263.00 | 40.62 | 43.40 | 43.29 | 44.26 | 0.026010 | 7.44 | 35.34 | 17.97 | 0.94 |

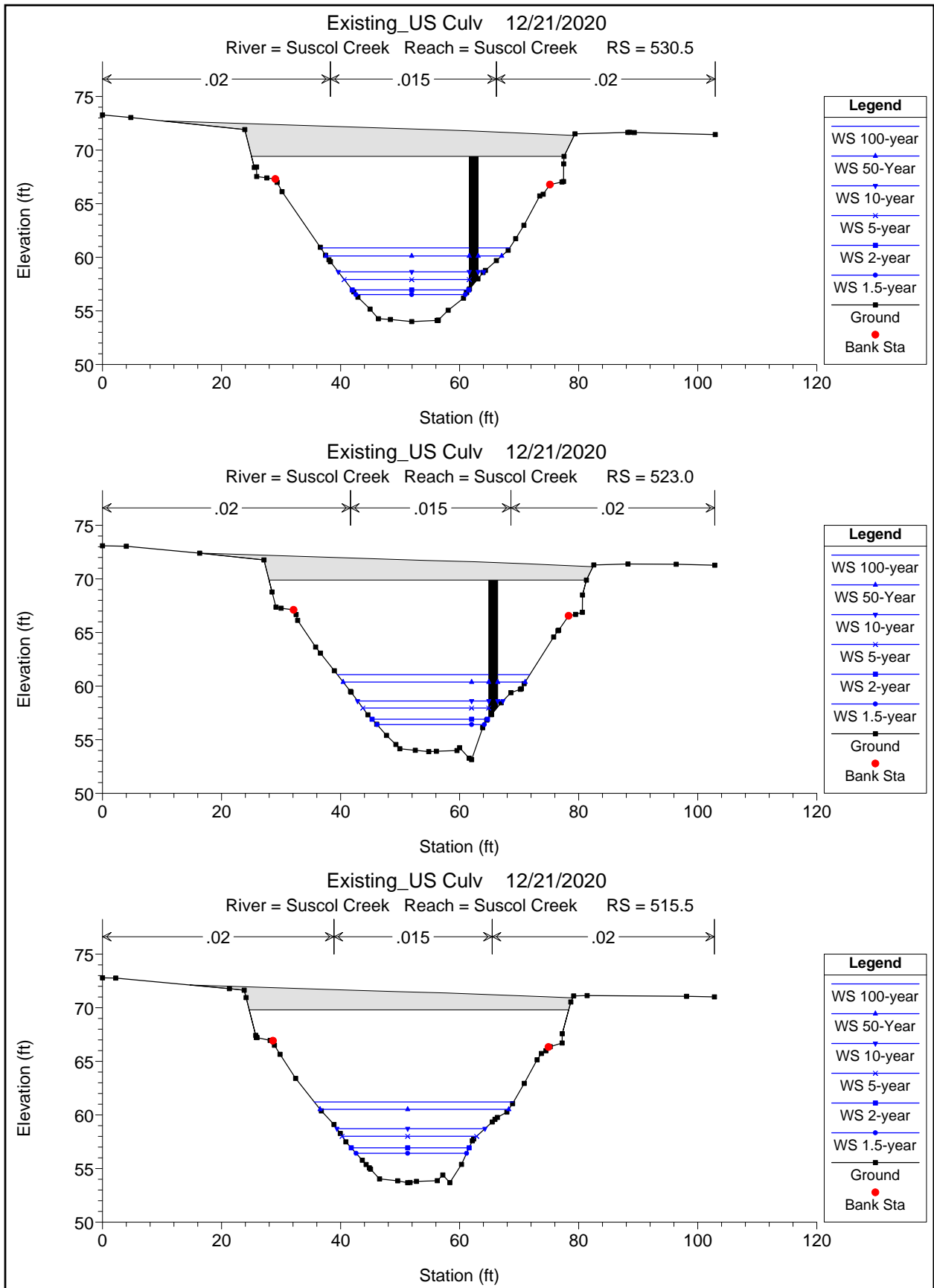


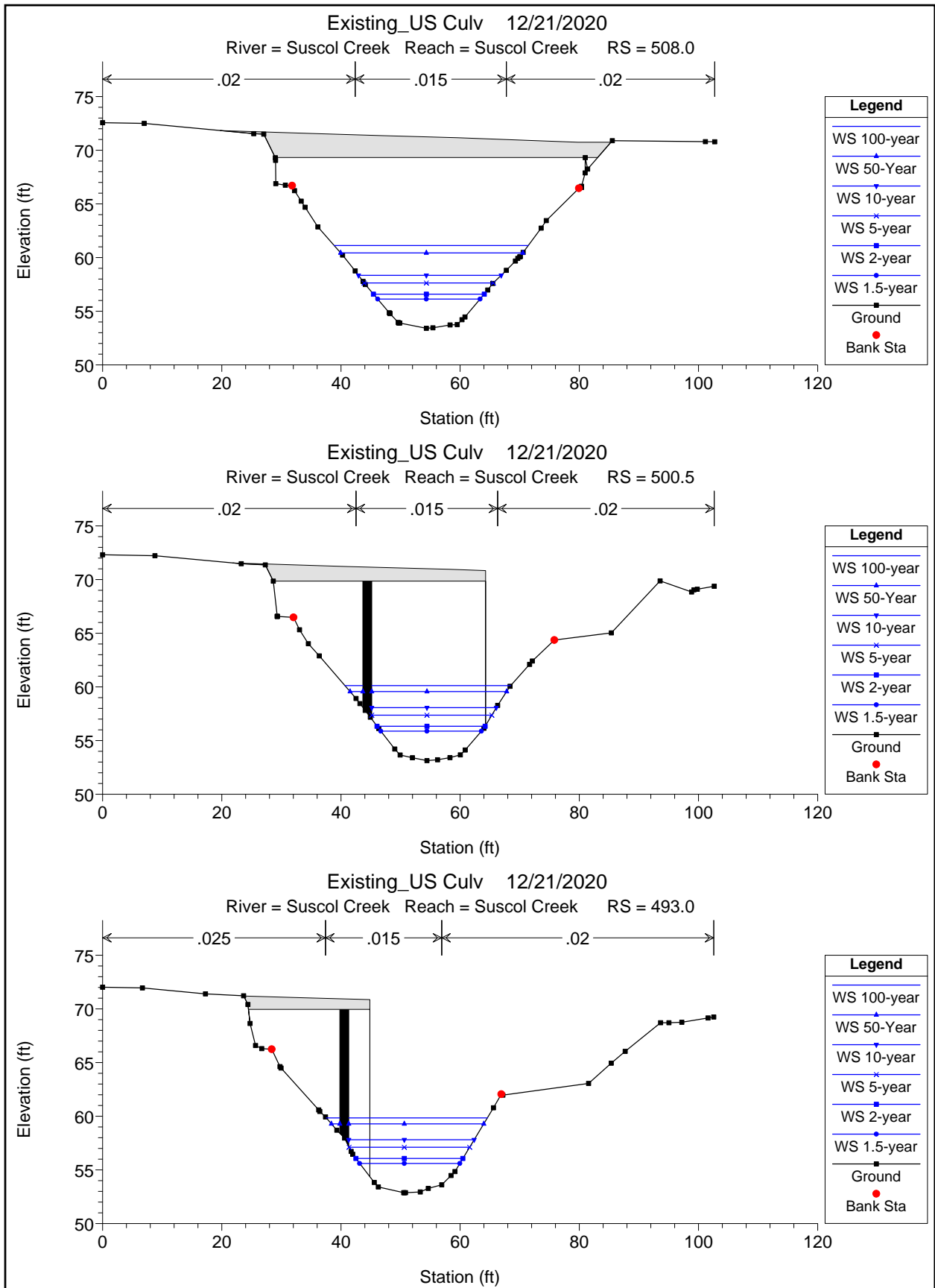


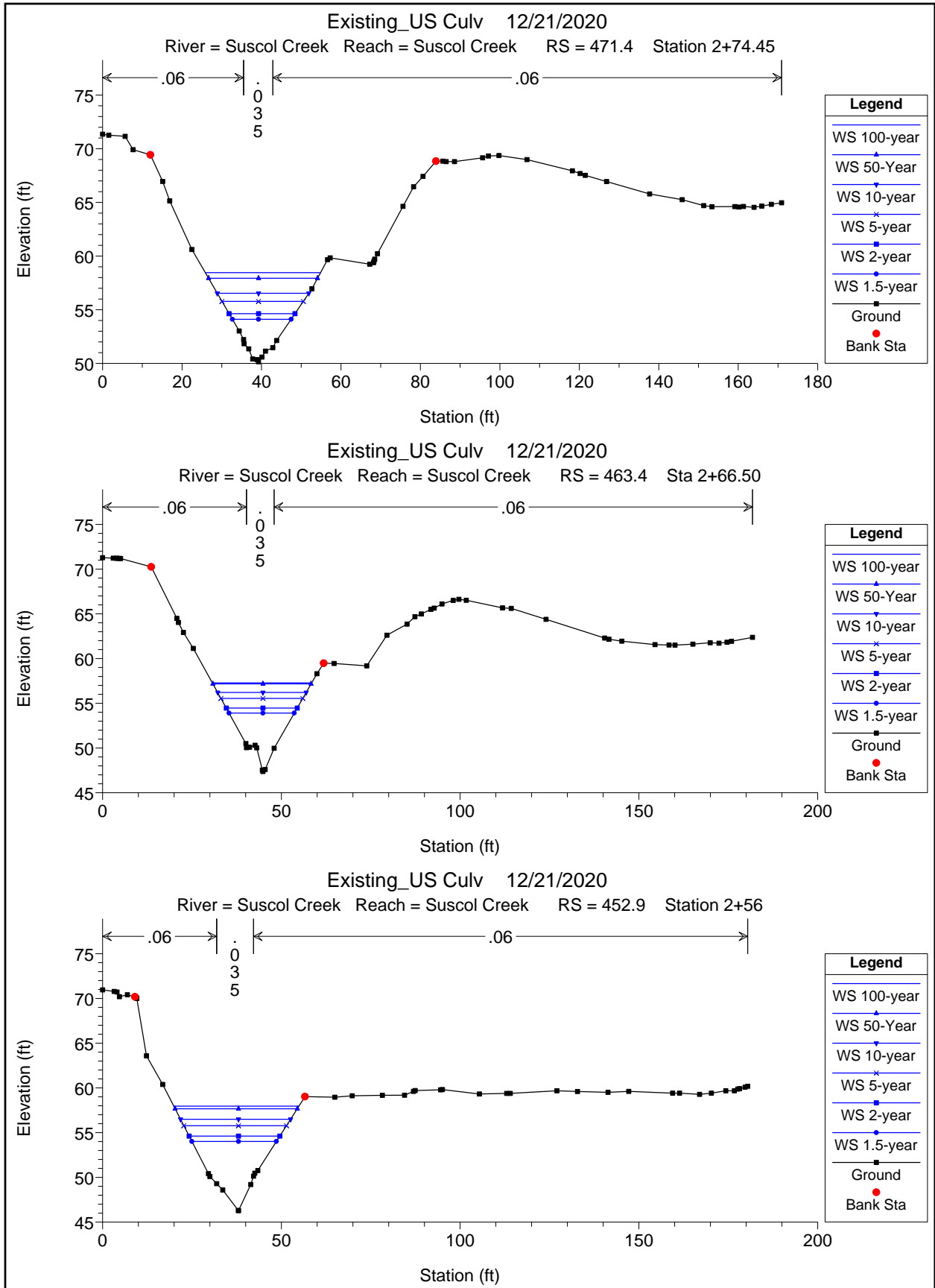


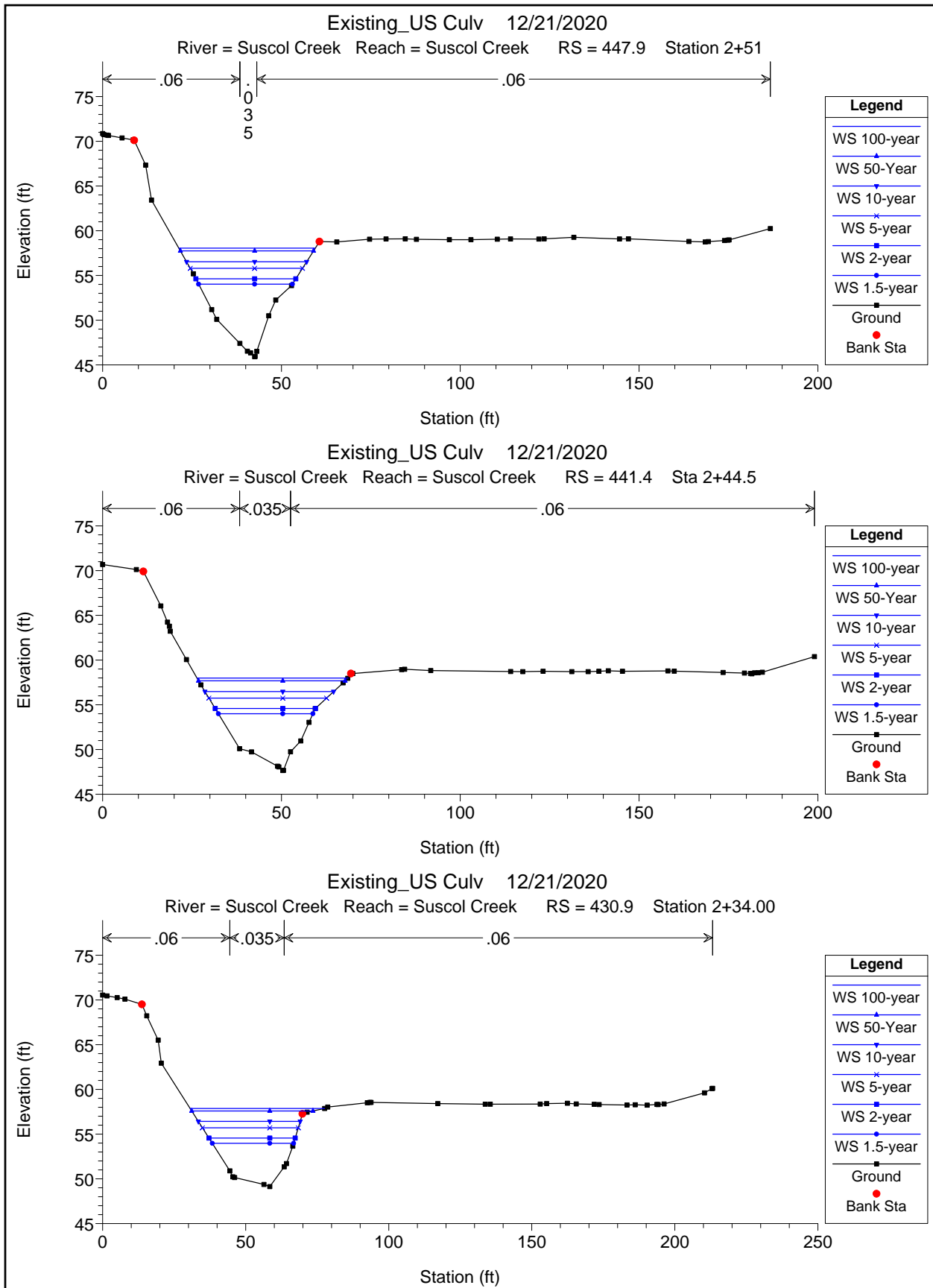


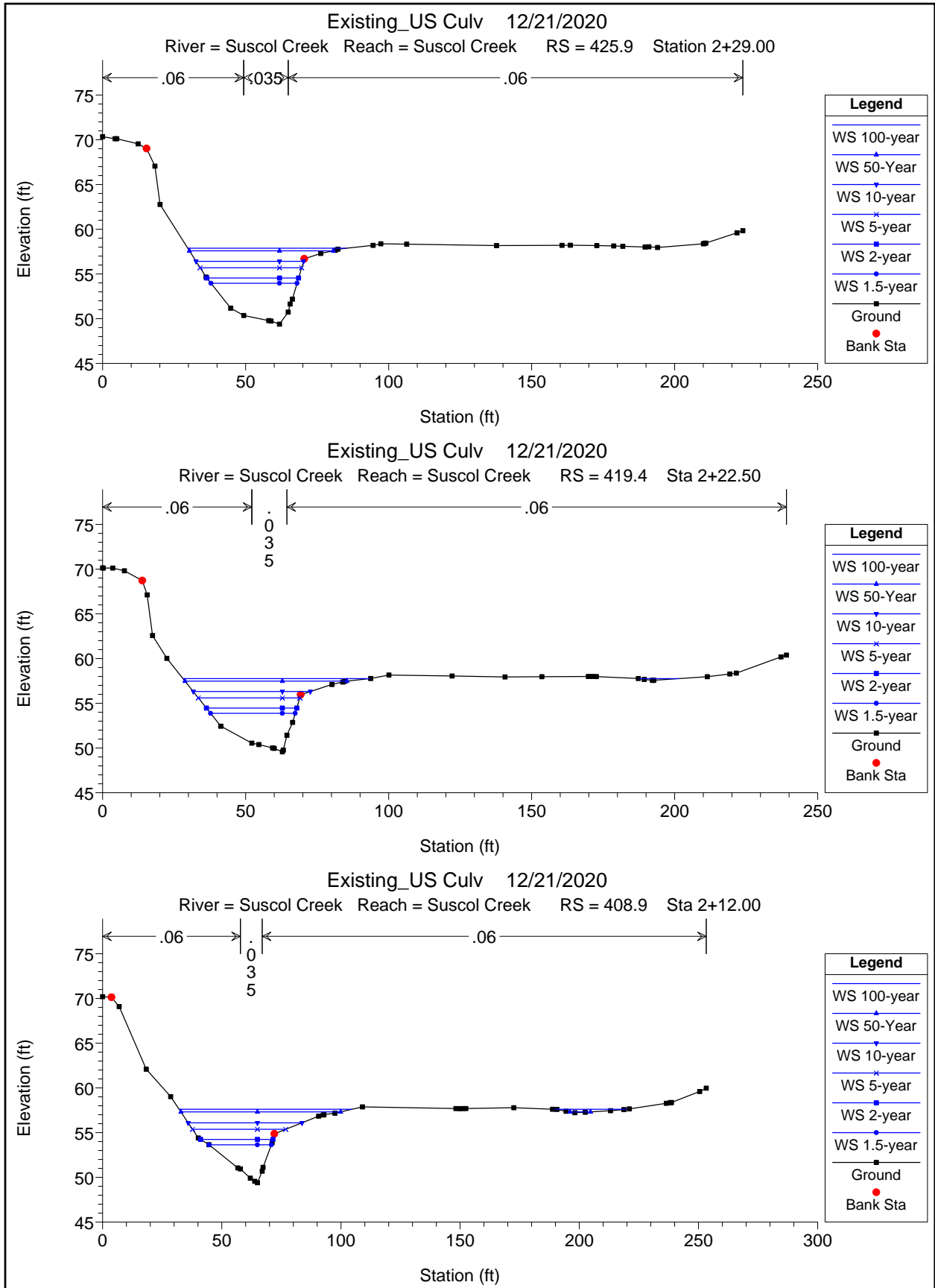


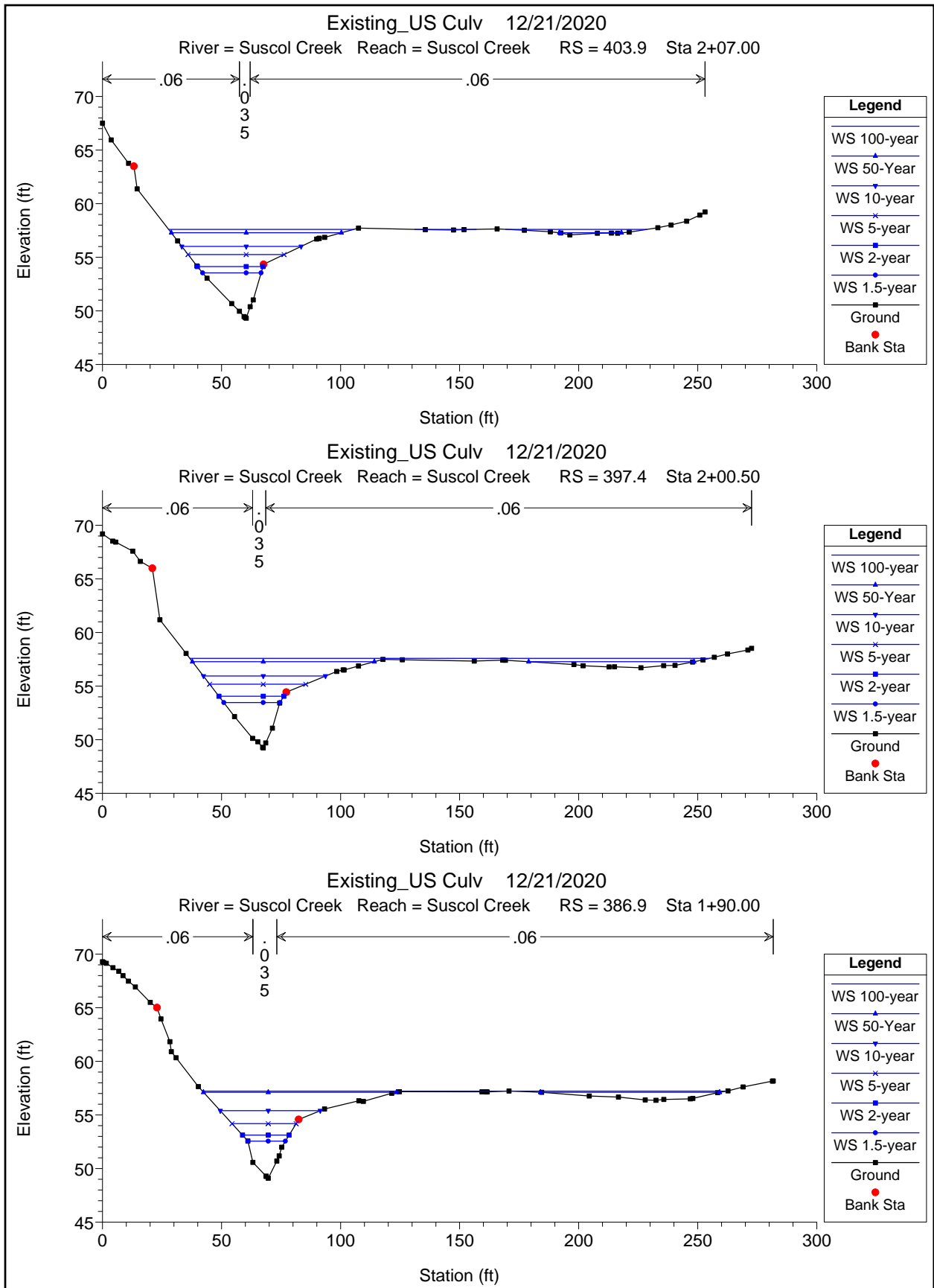


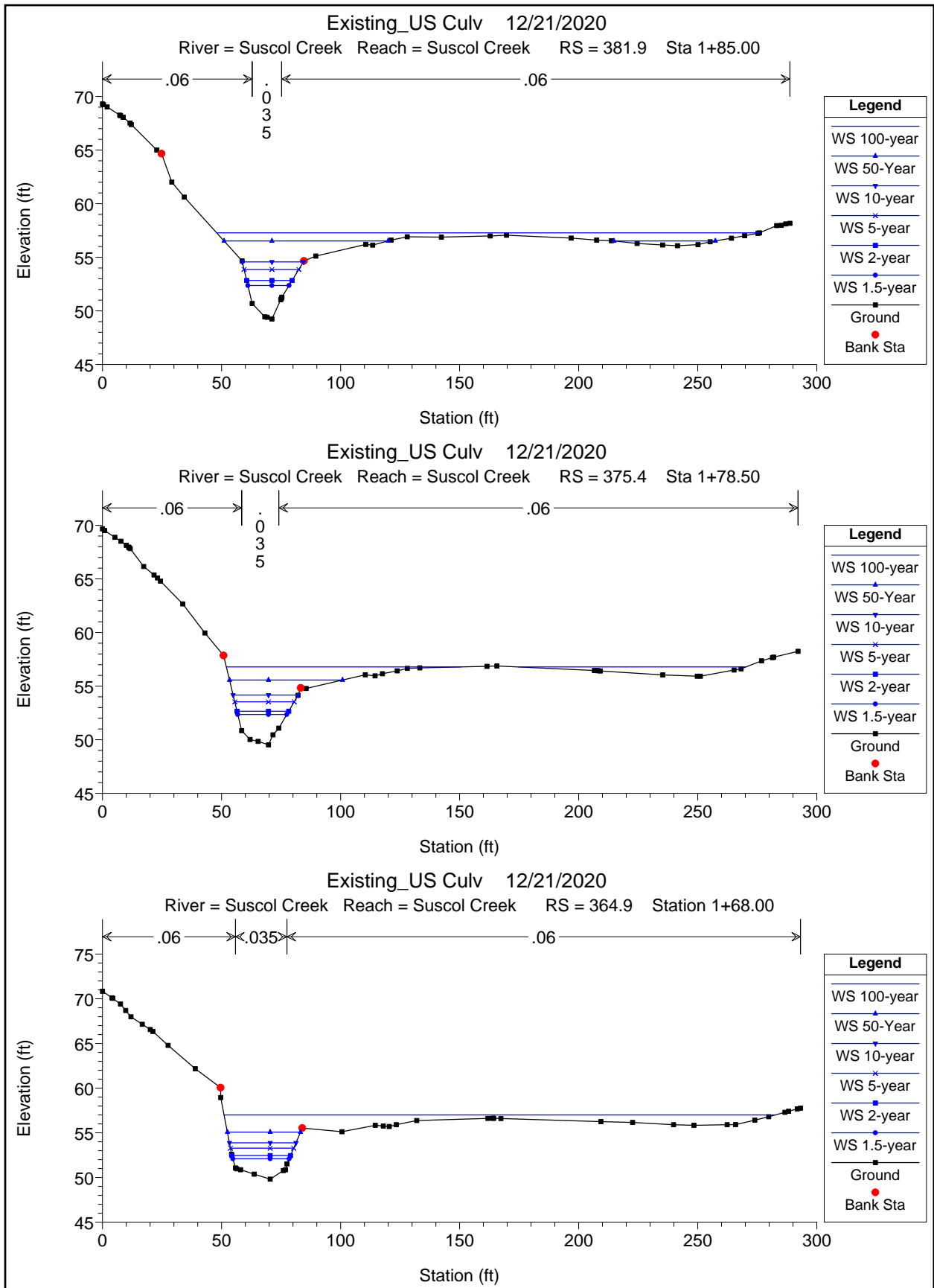


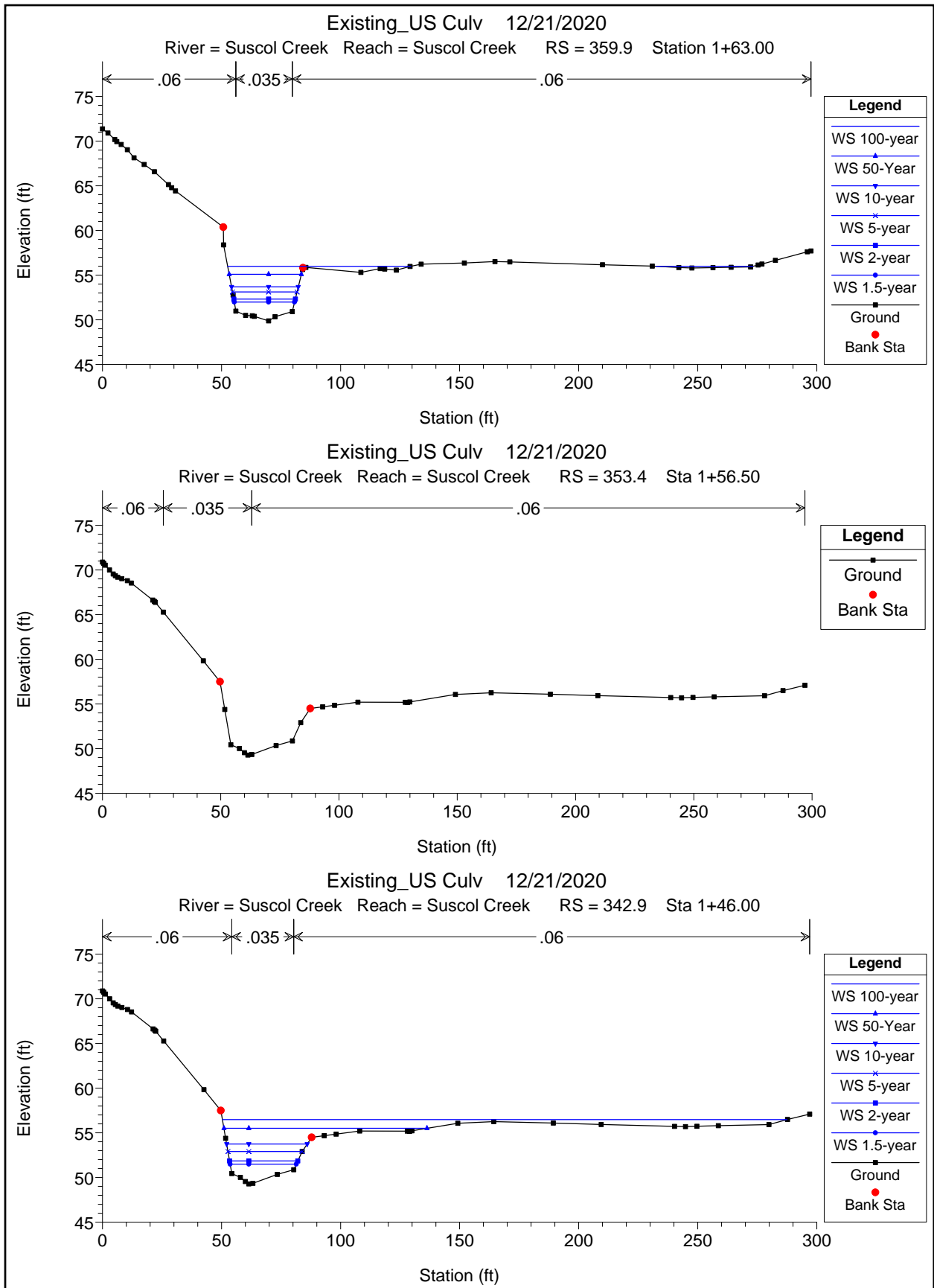


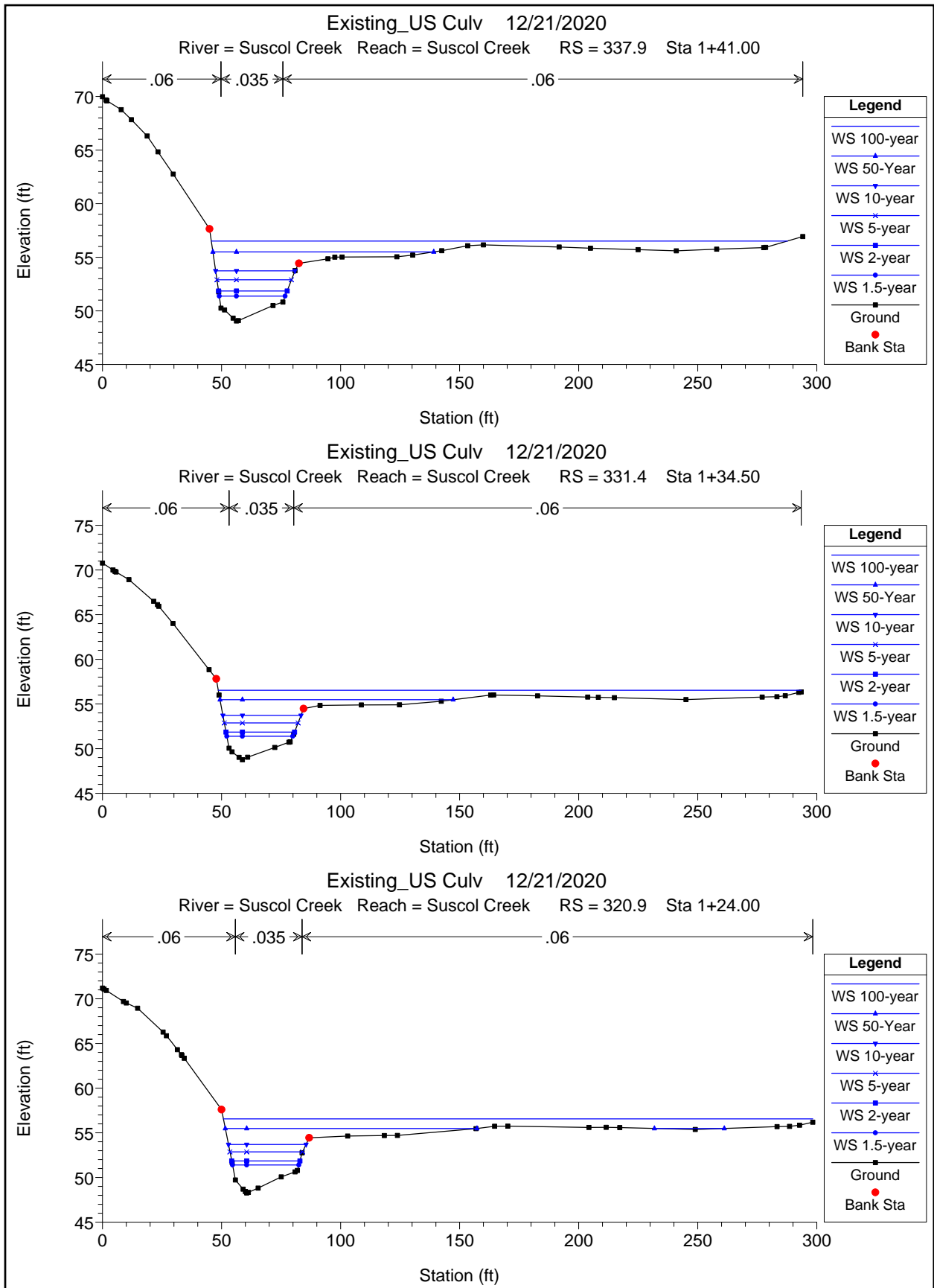


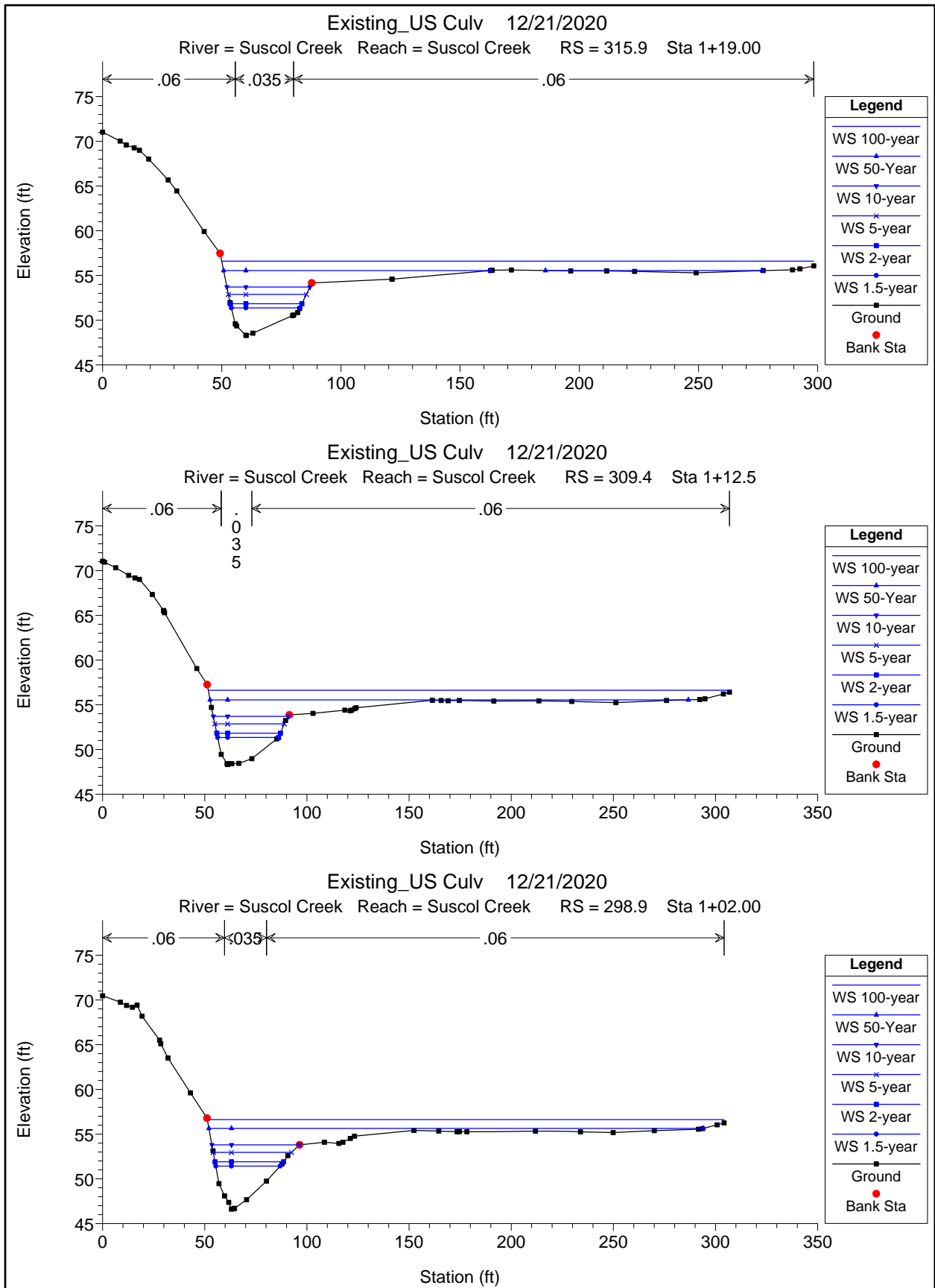


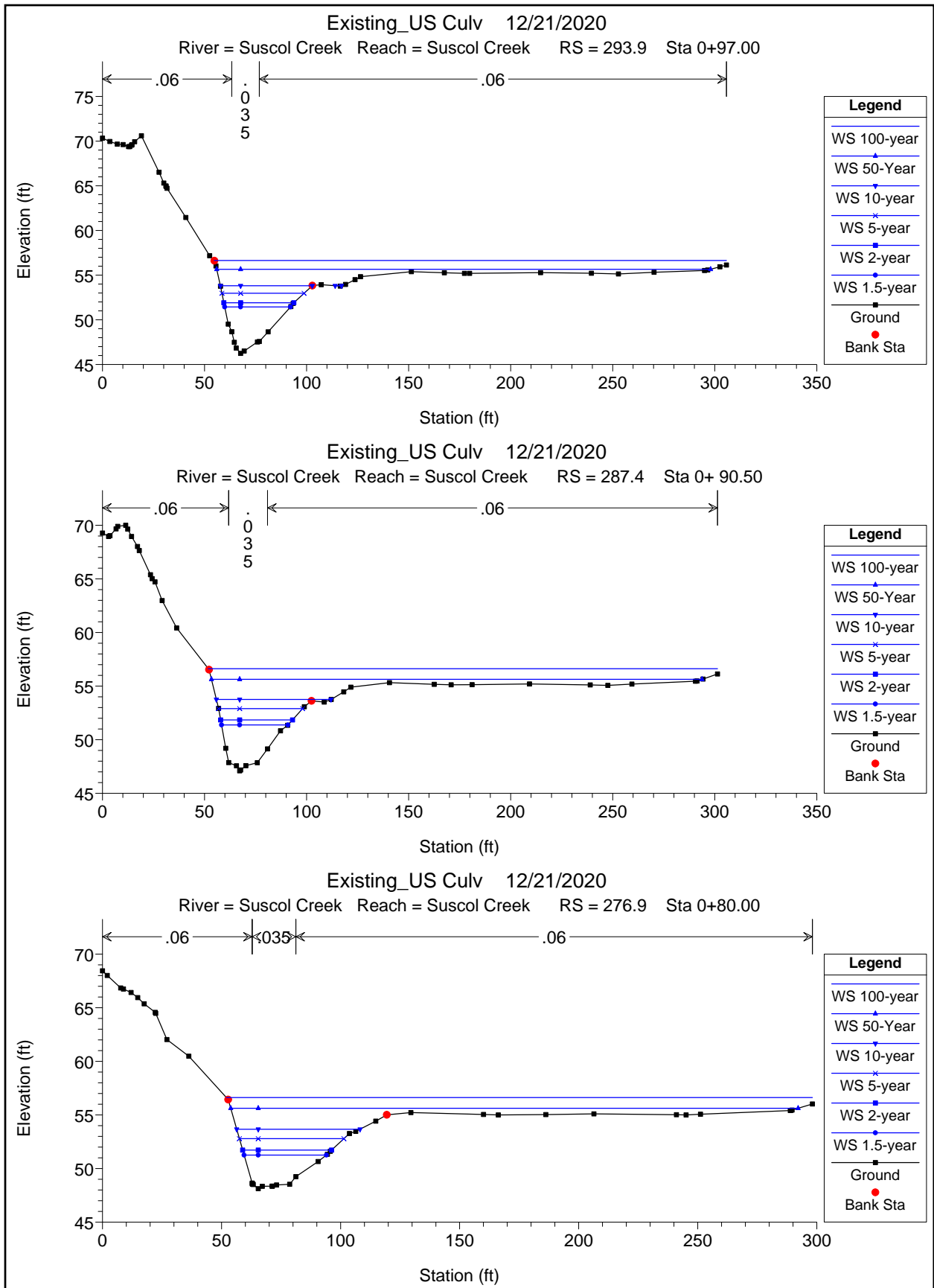


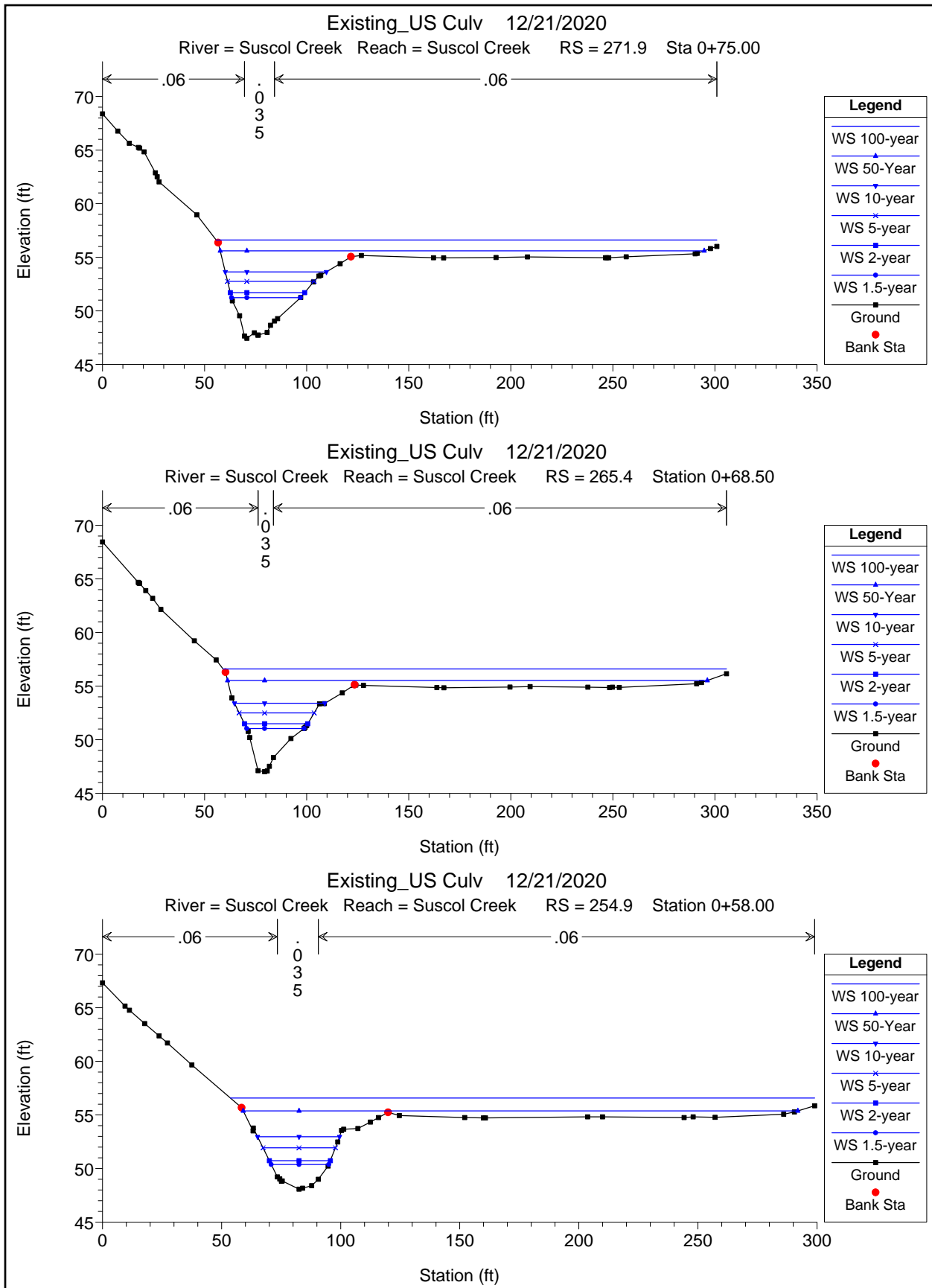


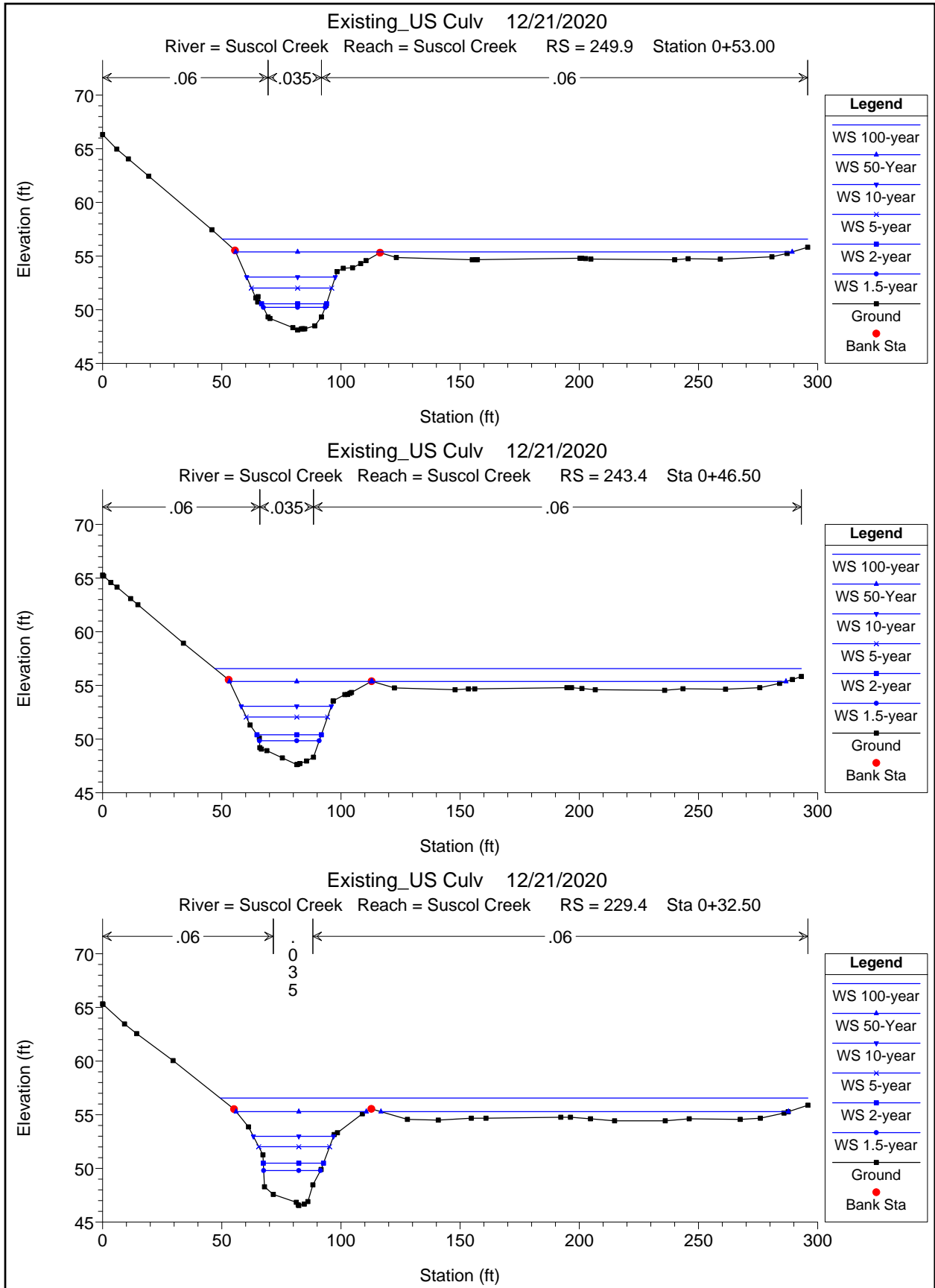


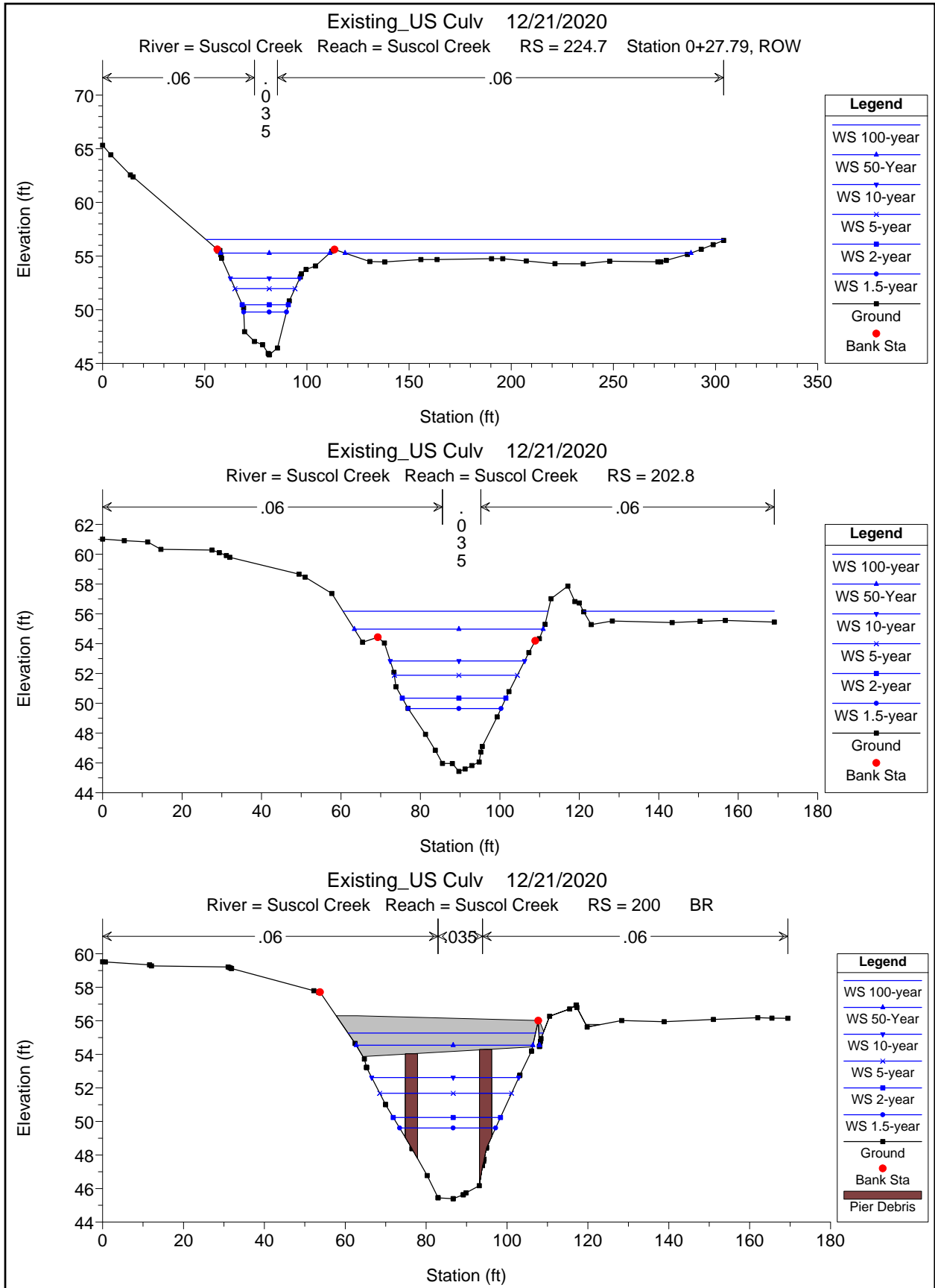


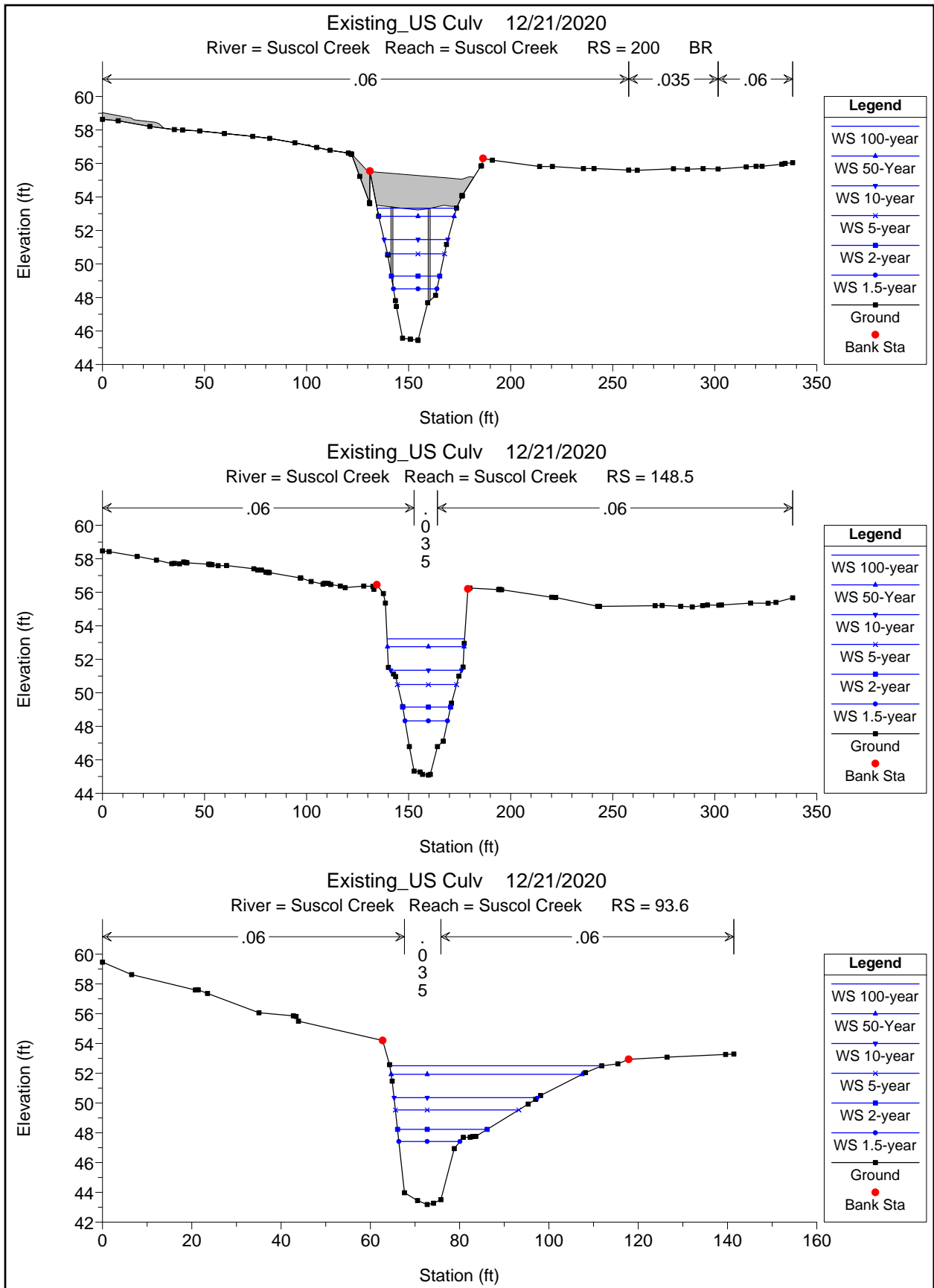


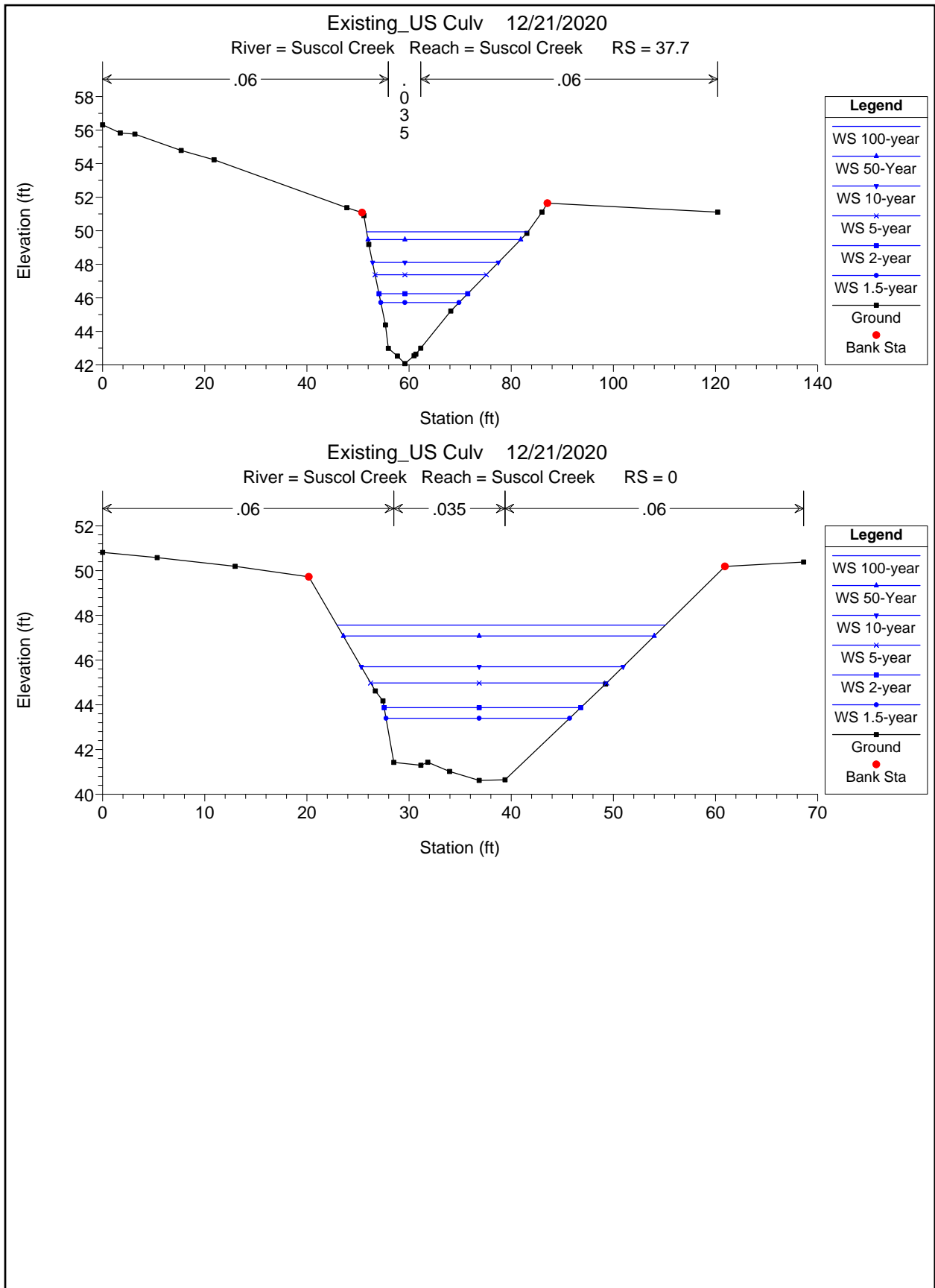








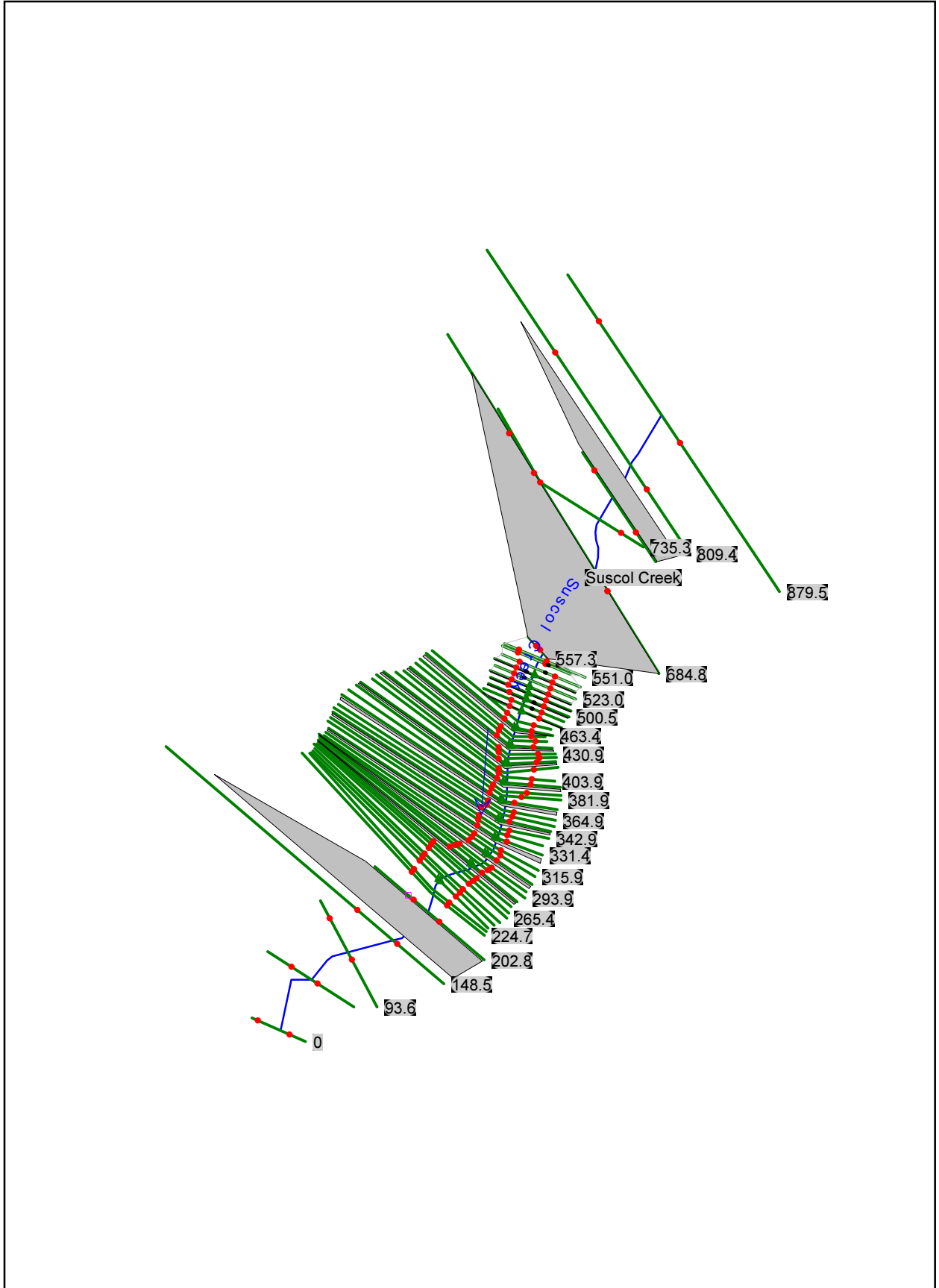






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Appendix D. Hydraulic Analysis Results: Proposed Condition



HEC-RAS Plan: Proposed 95%_Culv_test River: Suscol Creek Reach: Suscol Creek

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 879.5 | 100-year | 1520.00 | 61.21 | 72.85 | | 72.89 | 0.000258 | 1.53 | 991.12 | 147.95 | 0.10 |
| Suscol Creek | 879.5 | 50-Year | 1310.00 | 61.21 | 71.32 | | 71.36 | 0.000392 | 1.70 | 772.44 | 137.55 | 0.13 |
| Suscol Creek | 879.5 | 10-year | 812.00 | 61.21 | 65.85 | | 66.25 | 0.008700 | 5.02 | 161.72 | 69.66 | 0.58 |
| Suscol Creek | 879.5 | 5-year | 603.00 | 61.21 | 64.97 | | 65.48 | 0.014160 | 5.75 | 104.84 | 58.27 | 0.76 |
| Suscol Creek | 879.5 | 2-year | 353.00 | 61.21 | 64.01 | 64.01 | 64.65 | 0.023107 | 6.42 | 55.01 | 44.32 | 1.02 |
| Suscol Creek | 879.5 | 1.5-year | 263.00 | 61.21 | 63.65 | 63.65 | 64.29 | 0.020677 | 6.37 | 41.27 | 33.84 | 1.02 |
| Suscol Creek | 809.4 | 100-year | 1520.00 | 58.30 | 72.84 | 64.97 | 72.87 | 0.000235 | 1.39 | 1111.50 | 189.63 | 0.09 |
| Suscol Creek | 809.4 | 50-Year | 1310.00 | 58.30 | 71.30 | 64.61 | 71.33 | 0.000397 | 1.55 | 844.89 | 159.50 | 0.12 |
| Suscol Creek | 809.4 | 10-year | 812.00 | 58.30 | 65.42 | 63.34 | 65.71 | 0.006078 | 4.35 | 186.69 | 63.06 | 0.45 |
| Suscol Creek | 809.4 | 5-year | 603.00 | 58.30 | 64.39 | 62.62 | 64.73 | 0.007390 | 4.67 | 129.15 | 48.55 | 0.50 |
| Suscol Creek | 809.4 | 2-year | 353.00 | 58.30 | 62.89 | 61.67 | 63.25 | 0.006556 | 4.79 | 73.71 | 27.61 | 0.52 |
| Suscol Creek | 809.4 | 1.5-year | 263.00 | 58.30 | 62.29 | 61.24 | 62.61 | 0.006843 | 4.53 | 58.09 | 24.72 | 0.52 |
| Suscol Creek | 772 | Bridge | | | | | | | | | | |
| Suscol Creek | 766.0 | 100-year | 1520.00 | 57.61 | 72.67 | | 72.78 | 0.000690 | 2.62 | 580.36 | 73.43 | 0.16 |
| Suscol Creek | 766.0 | 50-Year | 1310.00 | 57.61 | 71.11 | | 71.23 | 0.000888 | 2.76 | 474.31 | 63.79 | 0.18 |
| Suscol Creek | 766.0 | 10-year | 812.00 | 57.61 | 64.53 | | 65.01 | 0.007728 | 5.58 | 145.51 | 36.80 | 0.49 |
| Suscol Creek | 766.0 | 5-year | 603.00 | 57.61 | 63.56 | | 64.01 | 0.008416 | 5.38 | 112.05 | 32.50 | 0.51 |
| Suscol Creek | 766.0 | 2-year | 353.00 | 57.61 | 61.25 | 61.02 | 62.07 | 0.025440 | 7.24 | 48.74 | 22.39 | 0.87 |
| Suscol Creek | 766.0 | 1.5-year | 263.00 | 57.61 | 60.57 | 60.57 | 61.48 | 0.035196 | 7.64 | 34.43 | 19.40 | 1.01 |
| Suscol Creek | 735.3 | 100-year | 1520.00 | 57.36 | 72.71 | | 72.73 | 0.000098 | 1.23 | 1357.80 | 202.82 | 0.07 |
| Suscol Creek | 735.3 | 50-Year | 1310.00 | 57.36 | 71.15 | | 71.17 | 0.000131 | 1.27 | 1076.29 | 160.93 | 0.07 |
| Suscol Creek | 735.3 | 10-year | 812.00 | 57.36 | 64.65 | | 64.74 | 0.001187 | 2.33 | 348.57 | 85.22 | 0.20 |
| Suscol Creek | 735.3 | 5-year | 603.00 | 57.36 | 63.66 | | 63.74 | 0.001417 | 2.26 | 266.99 | 79.09 | 0.22 |
| Suscol Creek | 735.3 | 2-year | 353.00 | 57.36 | 61.40 | | 61.53 | 0.002842 | 2.95 | 119.56 | 44.72 | 0.32 |
| Suscol Creek | 735.3 | 1.5-year | 263.00 | 57.36 | 60.64 | | 60.78 | 0.003107 | 2.95 | 89.14 | 37.75 | 0.34 |
| Suscol Creek | 684.8 | 100-year | 1520.00 | 54.93 | 72.71 | | 72.72 | 0.000053 | 0.87 | 1892.44 | 306.24 | 0.05 |
| Suscol Creek | 684.8 | 50-Year | 1310.00 | 54.93 | 71.15 | | 71.16 | 0.000072 | 0.90 | 1486.67 | 216.92 | 0.05 |
| Suscol Creek | 684.8 | 10-year | 812.00 | 54.93 | 64.65 | | 64.69 | 0.000371 | 1.53 | 529.69 | 97.97 | 0.12 |
| Suscol Creek | 684.8 | 5-year | 603.00 | 54.93 | 63.66 | | 63.69 | 0.000334 | 1.38 | 437.11 | 88.77 | 0.11 |
| Suscol Creek | 684.8 | 2-year | 353.00 | 54.93 | 61.43 | | 61.46 | 0.000373 | 1.32 | 267.14 | 65.91 | 0.12 |
| Suscol Creek | 684.8 | 1.5-year | 263.00 | 54.93 | 60.68 | | 60.71 | 0.000338 | 1.20 | 219.98 | 59.78 | 0.11 |
| Suscol Creek | 675.8 | 100-year | 1520.00 | 55.00 | 66.05 | 63.14 | 72.12 | 0.011822 | 19.76 | 76.93 | | 1.05 |
| Suscol Creek | 675.8 | 50-Year | 1310.00 | 55.00 | 66.20 | 62.71 | 70.71 | 0.008781 | 17.03 | 76.93 | | 0.90 |
| Suscol Creek | 675.8 | 10-year | 812.00 | 55.00 | 62.20 | 61.00 | 64.46 | 0.003378 | 12.06 | 67.32 | 7.64 | 0.79 |
| Suscol Creek | 675.8 | 5-year | 603.00 | 55.00 | 62.37 | 60.03 | 63.57 | 0.001795 | 8.79 | 68.58 | 7.39 | 0.57 |
| Suscol Creek | 675.8 | 2-year | 353.00 | 55.00 | 60.75 | 58.60 | 61.39 | 0.001014 | 6.44 | 54.85 | 9.30 | 0.47 |
| Suscol Creek | 675.8 | 1.5-year | 263.00 | 55.00 | 60.23 | 58.00 | 60.66 | 0.000712 | 5.27 | 49.88 | 9.68 | 0.41 |
| Suscol Creek | 675 | Culvert | | | | | | | | | | |
| Suscol Creek | 557.3 | 100-year | 1520.00 | 54.17 | 62.39 | 62.39 | 66.13 | 0.004433 | 15.50 | 98.05 | 13.14 | 1.00 |
| Suscol Creek | 557.3 | 50-Year | 1310.00 | 54.17 | 61.65 | 61.65 | 65.06 | 0.004316 | 14.82 | 88.38 | 12.93 | 1.00 |
| Suscol Creek | 557.3 | 10-year | 812.00 | 54.17 | 61.39 | 59.67 | 62.81 | 0.001836 | 9.55 | 85.01 | 12.86 | 0.65 |
| Suscol Creek | 557.3 | 5-year | 603.00 | 54.17 | 61.06 | 58.71 | 61.92 | 0.001158 | 7.46 | 80.79 | 12.77 | 0.52 |
| Suscol Creek | 557.3 | 2-year | 353.00 | 54.17 | 60.36 | 57.38 | 60.74 | 0.000539 | 4.90 | 71.97 | 12.58 | 0.36 |
| Suscol Creek | 557.3 | 1.5-year | 263.00 | 54.17 | 60.01 | 56.83 | 60.25 | 0.000354 | 3.89 | 67.57 | 12.48 | 0.29 |
| Suscol Creek | 551.0 | 100-year | 1520.00 | 54.16 | 62.76 | 61.94 | 64.98 | 0.002864 | 11.96 | 127.05 | 20.60 | 0.85 |
| Suscol Creek | 551.0 | 50-Year | 1310.00 | 54.16 | 62.56 | 60.87 | 64.32 | 0.002295 | 10.64 | 123.08 | 20.22 | 0.76 |
| Suscol Creek | 551.0 | 10-year | 812.00 | 54.16 | 61.75 | 59.09 | 62.64 | 0.001221 | 7.57 | 107.29 | 18.60 | 0.56 |
| Suscol Creek | 551.0 | 5-year | 603.00 | 54.16 | 61.25 | 58.22 | 61.83 | 0.000775 | 6.13 | 98.32 | 16.60 | 0.44 |
| Suscol Creek | 551.0 | 2-year | 353.00 | 54.16 | 60.44 | 57.04 | 60.70 | 0.000335 | 4.10 | 86.17 | 14.73 | 0.30 |
| Suscol Creek | 551.0 | 1.5-year | 263.00 | 54.16 | 60.06 | 56.55 | 60.22 | 0.000223 | 3.26 | 80.58 | 14.63 | 0.25 |
| Suscol Creek | 547.5 | 100-year | 1520.00 | 54.16 | 63.32 | 61.34 | 64.73 | 0.001317 | 9.52 | 159.69 | 24.46 | 0.66 |
| Suscol Creek | 547.5 | 50-Year | 1310.00 | 54.16 | 62.97 | 60.72 | 64.13 | 0.001129 | 8.66 | 151.21 | 23.82 | 0.61 |
| Suscol Creek | 547.5 | 10-year | 812.00 | 54.16 | 61.92 | 58.89 | 62.56 | 0.000684 | 6.38 | 127.31 | 21.99 | 0.47 |
| Suscol Creek | 547.5 | 5-year | 603.00 | 54.16 | 61.36 | 58.03 | 61.78 | 0.000493 | 5.24 | 115.12 | 21.01 | 0.39 |
| Suscol Creek | 547.5 | 2-year | 353.00 | 54.16 | 60.48 | 56.91 | 60.68 | 0.000264 | 3.63 | 97.30 | 19.47 | 0.29 |
| Suscol Creek | 547.5 | 1.5-year | 263.00 | 54.16 | 60.08 | 56.43 | 60.21 | 0.000182 | 2.93 | 89.70 | 18.73 | 0.24 |
| Suscol Creek | 538.0 | 100-year | 1520.00 | 54.11 | 63.81 | 60.63 | 64.50 | 0.000705 | 6.68 | 227.71 | 36.28 | 0.47 |
| Suscol Creek | 538.0 | 50-Year | 1310.00 | 54.11 | 63.36 | 60.11 | 63.95 | 0.000623 | 6.19 | 211.59 | 35.32 | 0.45 |
| Suscol Creek | 538.0 | 10-year | 812.00 | 54.11 | 62.11 | 58.62 | 62.47 | 0.000391 | 4.79 | 169.51 | 31.89 | 0.37 |
| Suscol Creek | 538.0 | 5-year | 603.00 | 54.11 | 61.48 | 57.87 | 61.73 | 0.000285 | 4.02 | 149.86 | 29.97 | 0.32 |
| Suscol Creek | 538.0 | 2-year | 353.00 | 54.11 | 60.53 | 56.84 | 60.66 | 0.000158 | 2.88 | 122.74 | 27.26 | 0.24 |
| Suscol Creek | 538.0 | 1.5-year | 263.00 | 54.11 | 60.11 | 56.40 | 60.20 | 0.000110 | 2.36 | 111.61 | 26.07 | 0.20 |
| Suscol Creek | 530.5 | 100-year | 1520.00 | 54.00 | 63.51 | 61.73 | 64.47 | 0.001147 | 7.86 | 193.43 | 36.40 | 0.60 |
| Suscol Creek | 530.5 | 50-Year | 1310.00 | 54.00 | 63.08 | 61.30 | 63.92 | 0.001062 | 7.35 | 178.18 | 35.46 | 0.58 |

HEC-RAS Plan: Proposed 95% Culv_test River: Suscol Creek Reach: Suscol Creek (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 530.5 | 10-year | 812.00 | 54.00 | 61.91 | 60.10 | 62.45 | 0.000810 | 5.88 | 138.12 | 32.73 | 0.50 |
| Suscol Creek | 530.5 | 5-year | 603.00 | 54.00 | 61.31 | 59.48 | 61.71 | 0.000671 | 5.07 | 118.94 | 31.30 | 0.46 |
| Suscol Creek | 530.5 | 2-year | 353.00 | 54.00 | 60.42 | 58.58 | 60.65 | 0.000464 | 3.84 | 91.92 | 28.97 | 0.38 |
| Suscol Creek | 530.5 | 1.5-year | 263.00 | 54.00 | 60.02 | 58.20 | 60.19 | 0.000364 | 3.25 | 80.80 | 27.67 | 0.34 |
| Suscol Creek | 530 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 523.0 | 100-year | 1520.00 | 53.15 | 63.35 | 60.33 | 64.05 | 0.000830 | 6.71 | 226.37 | 36.66 | 0.48 |
| Suscol Creek | 523.0 | 50-Year | 1310.00 | 53.15 | 62.88 | 59.86 | 63.49 | 0.000743 | 6.25 | 209.47 | 35.47 | 0.45 |
| Suscol Creek | 523.0 | 10-year | 812.00 | 53.15 | 61.64 | 58.35 | 62.00 | 0.000487 | 4.85 | 167.52 | 32.29 | 0.38 |
| Suscol Creek | 523.0 | 5-year | 603.00 | 53.15 | 61.02 | 57.64 | 61.28 | 0.000360 | 4.07 | 147.99 | 30.71 | 0.33 |
| Suscol Creek | 523.0 | 2-year | 353.00 | 53.15 | 60.11 | 56.63 | 60.24 | 0.000198 | 2.92 | 121.09 | 28.41 | 0.25 |
| Suscol Creek | 523.0 | 1.5-year | 263.00 | 53.15 | 59.70 | 56.17 | 59.79 | 0.000139 | 2.40 | 109.59 | 27.32 | 0.21 |
| Suscol Creek | 515.5 | 100-year | 1520.00 | 53.69 | 63.09 | 61.35 | 64.02 | 0.000823 | 7.71 | 197.16 | 38.11 | 0.60 |
| Suscol Creek | 515.5 | 50-Year | 1310.00 | 53.69 | 62.63 | 60.93 | 63.46 | 0.000795 | 7.29 | 179.81 | 37.02 | 0.58 |
| Suscol Creek | 515.5 | 10-year | 812.00 | 53.69 | 61.44 | 59.73 | 61.98 | 0.000662 | 5.91 | 137.39 | 34.08 | 0.52 |
| Suscol Creek | 515.5 | 5-year | 603.00 | 53.69 | 60.85 | 59.11 | 61.26 | 0.000569 | 5.12 | 117.81 | 32.52 | 0.47 |
| Suscol Creek | 515.5 | 2-year | 353.00 | 53.69 | 60.00 | 58.23 | 60.23 | 0.000404 | 3.87 | 91.12 | 29.60 | 0.39 |
| Suscol Creek | 515.5 | 1.5-year | 263.00 | 53.69 | 59.61 | 57.85 | 59.78 | 0.000319 | 3.29 | 80.04 | 27.85 | 0.34 |
| Suscol Creek | 515 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 508.0 | 100-year | 1520.00 | 53.39 | 62.84 | 61.14 | 63.81 | 0.000857 | 7.89 | 192.61 | 37.54 | 0.61 |
| Suscol Creek | 508.0 | 50-Year | 1310.00 | 53.39 | 62.38 | 60.69 | 63.24 | 0.000825 | 7.47 | 175.48 | 36.20 | 0.60 |
| Suscol Creek | 508.0 | 10-year | 812.00 | 53.39 | 61.11 | 59.46 | 61.70 | 0.000705 | 6.16 | 131.82 | 32.48 | 0.54 |
| Suscol Creek | 508.0 | 5-year | 603.00 | 53.39 | 60.47 | 58.84 | 60.92 | 0.000620 | 5.40 | 111.72 | 30.59 | 0.50 |
| Suscol Creek | 508.0 | 2-year | 353.00 | 53.39 | 59.58 | 57.93 | 59.84 | 0.000450 | 4.12 | 85.69 | 27.82 | 0.41 |
| Suscol Creek | 508.0 | 1.5-year | 263.00 | 53.39 | 59.18 | 57.54 | 59.37 | 0.000366 | 3.51 | 74.88 | 26.52 | 0.37 |
| Suscol Creek | 507 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 500.5 | 100-year | 1520.00 | 53.14 | 62.36 | 61.10 | 63.64 | 0.001620 | 9.09 | 167.27 | 33.25 | 0.71 |
| Suscol Creek | 500.5 | 50-Year | 1310.00 | 53.14 | 61.96 | 60.60 | 63.08 | 0.001474 | 8.49 | 154.32 | 31.95 | 0.68 |
| Suscol Creek | 500.5 | 10-year | 812.00 | 53.14 | 60.82 | 59.24 | 61.53 | 0.001071 | 6.77 | 120.00 | 28.40 | 0.58 |
| Suscol Creek | 500.5 | 5-year | 603.00 | 53.14 | 60.19 | 58.56 | 60.73 | 0.000875 | 5.87 | 102.76 | 26.50 | 0.53 |
| Suscol Creek | 500.5 | 2-year | 353.00 | 53.14 | 59.24 | 57.58 | 59.55 | 0.000593 | 4.48 | 78.74 | 23.87 | 0.44 |
| Suscol Creek | 500.5 | 1.5-year | 263.00 | 53.14 | 58.81 | 57.19 | 59.04 | 0.000469 | 3.83 | 68.73 | 22.77 | 0.39 |
| Suscol Creek | 496 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 493.0 | 100-year | 1520.00 | 52.85 | 61.80 | 59.87 | 62.94 | 0.001562 | 8.56 | 177.60 | 31.09 | 0.63 |
| Suscol Creek | 493.0 | 50-Year | 1310.00 | 52.85 | 61.53 | 59.31 | 62.46 | 0.001283 | 7.74 | 169.33 | 30.27 | 0.58 |
| Suscol Creek | 493.0 | 10-year | 812.00 | 52.85 | 60.59 | 57.80 | 61.10 | 0.000714 | 5.72 | 142.05 | 27.72 | 0.45 |
| Suscol Creek | 493.0 | 5-year | 603.00 | 52.85 | 59.97 | 57.09 | 60.33 | 0.000516 | 4.81 | 125.41 | 26.05 | 0.39 |
| Suscol Creek | 493.0 | 2-year | 353.00 | 52.85 | 59.03 | 56.04 | 59.21 | 0.000284 | 3.46 | 102.09 | 23.37 | 0.29 |
| Suscol Creek | 493.0 | 1.5-year | 263.00 | 52.85 | 58.60 | 55.59 | 58.73 | 0.000197 | 2.85 | 92.36 | 22.15 | 0.25 |
| Suscol Creek | 485.5 | 100-year | 1520.00 | 52.27 | 61.58 | 60.51 | 62.90 | 0.011148 | 9.22 | 170.71 | 46.13 | 0.72 |
| Suscol Creek | 485.5 | 50-Year | 1310.00 | 52.27 | 61.33 | 60.02 | 62.42 | 0.009802 | 8.42 | 158.96 | 44.97 | 0.67 |
| Suscol Creek | 485.5 | 10-year | 812.00 | 52.27 | 60.44 | 58.77 | 61.07 | 0.006674 | 6.36 | 127.60 | 30.14 | 0.55 |
| Suscol Creek | 485.5 | 5-year | 603.00 | 52.27 | 59.84 | 58.13 | 60.31 | 0.005596 | 5.48 | 109.99 | 28.60 | 0.49 |
| Suscol Creek | 485.5 | 2-year | 353.00 | 52.27 | 58.93 | 57.21 | 59.20 | 0.004011 | 4.16 | 84.94 | 26.30 | 0.41 |
| Suscol Creek | 485.5 | 1.5-year | 263.00 | 52.27 | 58.52 | 56.83 | 58.72 | 0.003254 | 3.54 | 74.39 | 25.18 | 0.36 |
| Suscol Creek | 485 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 471.4 | 100-year | 1520.00 | 52.26 | 61.36 | | 62.06 | 0.007211 | 6.88 | 235.50 | 49.44 | 0.49 |
| Suscol Creek | 471.4 | 50-Year | 1310.00 | 52.26 | 61.03 | | 61.63 | 0.006448 | 6.33 | 219.36 | 48.54 | 0.46 |
| Suscol Creek | 471.4 | 10-year | 812.00 | 52.26 | 59.88 | | 60.27 | 0.005040 | 5.03 | 165.31 | 45.32 | 0.40 |
| Suscol Creek | 471.4 | 5-year | 603.00 | 52.26 | 59.26 | | 59.54 | 0.004120 | 4.29 | 140.59 | 32.31 | 0.36 |
| Suscol Creek | 471.4 | 2-year | 353.00 | 52.26 | 58.22 | | 58.38 | 0.002788 | 3.23 | 109.40 | 28.73 | 0.29 |
| Suscol Creek | 471.4 | 1.5-year | 263.00 | 52.26 | 57.76 | | 57.88 | 0.002186 | 2.73 | 96.41 | 27.47 | 0.26 |
| Suscol Creek | 463.4 | 100-year | 1520.00 | 54.18 | 60.97 | 59.96 | 61.97 | 0.008342 | 8.19 | 199.71 | 51.64 | 0.65 |
| Suscol Creek | 463.4 | 50-Year | 1310.00 | 54.18 | 60.69 | 59.51 | 61.55 | 0.007630 | 7.54 | 185.72 | 50.79 | 0.62 |
| Suscol Creek | 463.4 | 10-year | 812.00 | 54.18 | 59.58 | 58.29 | 60.20 | 0.007148 | 6.31 | 131.24 | 47.30 | 0.58 |
| Suscol Creek | 463.4 | 5-year | 603.00 | 54.18 | 59.00 | 57.72 | 59.48 | 0.006416 | 5.55 | 108.73 | 33.11 | 0.54 |
| Suscol Creek | 463.4 | 2-year | 353.00 | 54.18 | 58.01 | 56.94 | 58.34 | 0.005914 | 4.56 | 77.43 | 30.09 | 0.50 |
| Suscol Creek | 463.4 | 1.5-year | 263.00 | 54.18 | 57.58 | 56.62 | 57.83 | 0.005644 | 4.07 | 64.56 | 28.86 | 0.48 |
| Suscol Creek | 463 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 452.9 | 100-year | 1520.00 | 52.16 | 59.65 | 57.75 | 60.41 | 0.007173 | 7.05 | 248.34 | 158.20 | 0.54 |
| Suscol Creek | 452.9 | 50-Year | 1310.00 | 52.16 | 59.47 | 57.33 | 60.10 | 0.006178 | 6.39 | 221.37 | 126.14 | 0.50 |
| Suscol Creek | 452.9 | 10-year | 812.00 | 52.16 | 58.76 | | 59.10 | 0.003836 | 4.64 | 175.01 | 39.58 | 0.39 |

HEC-RAS Plan: Proposed 95% Culv_test River: Suscol Creek Reach: Suscol Creek (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 452.9 | 5-year | 603.00 | 52.16 | 58.32 | | 58.55 | 0.002803 | 3.82 | 157.93 | 37.95 | 0.33 |
| Suscol Creek | 452.9 | 2-year | 353.00 | 52.16 | 57.41 | | 57.54 | 0.001769 | 2.82 | 124.96 | 34.63 | 0.26 |
| Suscol Creek | 452.9 | 1.5-year | 263.00 | 52.16 | 57.02 | | 57.10 | 0.001321 | 2.36 | 111.56 | 33.18 | 0.23 |
| Suscol Creek | 447.9 | 100-year | 1520.00 | 52.16 | 59.79 | 57.63 | 60.30 | 0.005054 | 6.03 | 323.65 | 164.74 | 0.46 |
| Suscol Creek | 447.9 | 50-Year | 1310.00 | 52.16 | 59.55 | | 60.02 | 0.004630 | 5.64 | 285.19 | 162.13 | 0.44 |
| Suscol Creek | 447.9 | 10-year | 812.00 | 52.16 | 58.77 | | 59.07 | 0.003259 | 4.36 | 186.60 | 48.64 | 0.36 |
| Suscol Creek | 447.9 | 5-year | 603.00 | 52.16 | 58.33 | | 58.53 | 0.002461 | 3.59 | 167.78 | 40.96 | 0.31 |
| Suscol Creek | 447.9 | 2-year | 353.00 | 52.16 | 57.41 | | 57.52 | 0.001610 | 2.68 | 131.92 | 37.46 | 0.25 |
| Suscol Creek | 447.9 | 1.5-year | 263.00 | 52.16 | 57.02 | | 57.09 | 0.001204 | 2.24 | 117.44 | 35.71 | 0.22 |
| Suscol Creek | 441.4 | 100-year | 1520.00 | 53.66 | 59.28 | 59.28 | 60.22 | 0.010725 | 8.08 | 240.22 | 165.87 | 0.73 |
| Suscol Creek | 441.4 | 50-Year | 1310.00 | 53.66 | 58.32 | 58.32 | 59.86 | 0.021815 | 9.95 | 131.71 | 43.03 | 1.00 |
| Suscol Creek | 441.4 | 10-year | 812.00 | 53.66 | 58.48 | 57.38 | 59.01 | 0.007244 | 5.87 | 138.47 | 45.61 | 0.58 |
| Suscol Creek | 441.4 | 5-year | 603.00 | 53.66 | 58.11 | 56.90 | 58.49 | 0.005700 | 4.92 | 122.64 | 42.18 | 0.51 |
| Suscol Creek | 441.4 | 2-year | 353.00 | 53.66 | 57.24 | 56.24 | 57.49 | 0.005340 | 4.04 | 87.41 | 38.72 | 0.47 |
| Suscol Creek | 441.4 | 1.5-year | 263.00 | 53.66 | 56.87 | 55.95 | 57.07 | 0.005030 | 3.59 | 73.35 | 37.25 | 0.45 |
| Suscol Creek | 439 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 430.9 | 100-year | 1520.00 | 51.50 | 58.87 | | 59.46 | 0.005732 | 6.33 | 300.24 | 175.49 | 0.49 |
| Suscol Creek | 430.9 | 50-Year | 1310.00 | 51.50 | 58.72 | | 59.22 | 0.004841 | 5.75 | 274.37 | 173.46 | 0.45 |
| Suscol Creek | 430.9 | 10-year | 812.00 | 51.50 | 57.92 | | 58.21 | 0.003228 | 4.36 | 189.67 | 48.22 | 0.36 |
| Suscol Creek | 430.9 | 5-year | 603.00 | 51.50 | 57.52 | | 57.71 | 0.002328 | 3.56 | 171.29 | 43.05 | 0.30 |
| Suscol Creek | 430.9 | 2-year | 353.00 | 51.50 | 56.72 | | 56.82 | 0.001453 | 2.55 | 138.64 | 39.24 | 0.24 |
| Suscol Creek | 430.9 | 1.5-year | 263.00 | 51.50 | 56.35 | | 56.42 | 0.001113 | 2.12 | 124.19 | 37.62 | 0.20 |
| Suscol Creek | 425.9 | 100-year | 1520.00 | 51.50 | 58.94 | | 59.39 | 0.004526 | 5.73 | 356.30 | 189.52 | 0.44 |
| Suscol Creek | 425.9 | 50-Year | 1310.00 | 51.50 | 58.77 | | 59.17 | 0.003943 | 5.27 | 324.52 | 187.72 | 0.41 |
| Suscol Creek | 425.9 | 10-year | 812.00 | 51.50 | 57.92 | | 58.19 | 0.002977 | 4.23 | 198.74 | 54.09 | 0.35 |
| Suscol Creek | 425.9 | 5-year | 603.00 | 51.50 | 57.51 | | 57.70 | 0.002182 | 3.47 | 177.69 | 50.19 | 0.30 |
| Suscol Creek | 425.9 | 2-year | 353.00 | 51.50 | 56.72 | | 56.81 | 0.001384 | 2.50 | 141.84 | 41.46 | 0.23 |
| Suscol Creek | 425.9 | 1.5-year | 263.00 | 51.50 | 56.34 | | 56.41 | 0.001067 | 2.08 | 126.59 | 39.80 | 0.20 |
| Suscol Creek | 419.4 | 100-year | 1520.00 | 53.00 | 58.52 | 58.52 | 59.32 | 0.009237 | 7.68 | 281.33 | 197.76 | 0.68 |
| Suscol Creek | 419.4 | 50-Year | 1310.00 | 53.00 | 57.51 | 57.51 | 59.01 | 0.020953 | 9.94 | 140.54 | 56.40 | 0.99 |
| Suscol Creek | 419.4 | 10-year | 812.00 | 53.00 | 57.59 | 56.65 | 58.14 | 0.007411 | 5.99 | 145.35 | 63.16 | 0.59 |
| Suscol Creek | 419.4 | 5-year | 603.00 | 53.00 | 57.28 | 56.18 | 57.66 | 0.005721 | 4.98 | 127.70 | 54.22 | 0.51 |
| Suscol Creek | 419.4 | 2-year | 353.00 | 53.00 | 56.55 | 55.55 | 56.79 | 0.004856 | 3.93 | 91.66 | 44.51 | 0.46 |
| Suscol Creek | 419.4 | 1.5-year | 263.00 | 53.00 | 56.20 | 55.28 | 56.39 | 0.004487 | 3.45 | 76.98 | 40.40 | 0.43 |
| Suscol Creek | 417 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 408.9 | 100-year | 1520.00 | 50.74 | 58.02 | 56.57 | 58.67 | 0.008375 | 6.83 | 295.72 | 198.92 | 0.54 |
| Suscol Creek | 408.9 | 50-Year | 1310.00 | 50.74 | 57.87 | 56.15 | 58.39 | 0.006792 | 6.07 | 266.59 | 193.08 | 0.49 |
| Suscol Creek | 408.9 | 10-year | 812.00 | 50.74 | 57.18 | | 57.49 | 0.004508 | 4.62 | 192.43 | 64.41 | 0.39 |
| Suscol Creek | 408.9 | 5-year | 603.00 | 50.74 | 56.75 | | 56.98 | 0.003442 | 3.85 | 167.40 | 55.56 | 0.34 |
| Suscol Creek | 408.9 | 2-year | 353.00 | 50.74 | 56.01 | | 56.13 | 0.002239 | 2.83 | 129.30 | 46.65 | 0.27 |
| Suscol Creek | 408.9 | 1.5-year | 263.00 | 50.74 | 55.64 | | 55.73 | 0.001751 | 2.37 | 113.10 | 42.30 | 0.24 |
| Suscol Creek | 403.9 | 100-year | 1520.00 | 50.74 | 58.07 | 56.56 | 58.59 | 0.007305 | 6.34 | 342.57 | 213.84 | 0.51 |
| Suscol Creek | 403.9 | 50-Year | 1310.00 | 50.74 | 57.84 | 56.27 | 58.36 | 0.007280 | 6.13 | 293.76 | 208.16 | 0.50 |
| Suscol Creek | 403.9 | 10-year | 812.00 | 50.74 | 57.16 | | 57.47 | 0.004675 | 4.62 | 197.94 | 75.80 | 0.40 |
| Suscol Creek | 403.9 | 5-year | 603.00 | 50.74 | 56.74 | | 56.96 | 0.003596 | 3.90 | 170.37 | 59.75 | 0.35 |
| Suscol Creek | 403.9 | 2-year | 353.00 | 50.74 | 55.99 | | 56.12 | 0.002352 | 2.91 | 129.65 | 49.86 | 0.28 |
| Suscol Creek | 403.9 | 1.5-year | 263.00 | 50.74 | 55.63 | | 55.72 | 0.001834 | 2.45 | 112.45 | 45.17 | 0.24 |
| Suscol Creek | 397.4 | 100-year | 1520.00 | 52.24 | 57.83 | 57.83 | 58.53 | 0.009404 | 7.58 | 315.84 | 223.64 | 0.69 |
| Suscol Creek | 397.4 | 50-Year | 1310.00 | 52.24 | 57.27 | 57.27 | 58.25 | 0.013775 | 8.53 | 201.38 | 145.11 | 0.82 |
| Suscol Creek | 397.4 | 10-year | 812.00 | 52.24 | 56.81 | 56.16 | 57.40 | 0.009061 | 6.46 | 146.72 | 86.47 | 0.65 |
| Suscol Creek | 397.4 | 5-year | 603.00 | 52.24 | 56.47 | 55.67 | 56.90 | 0.007343 | 5.50 | 124.43 | 59.78 | 0.58 |
| Suscol Creek | 397.4 | 2-year | 353.00 | 52.24 | 55.80 | 54.95 | 56.08 | 0.006060 | 4.37 | 87.97 | 49.31 | 0.51 |
| Suscol Creek | 397.4 | 1.5-year | 263.00 | 52.24 | 55.46 | 54.63 | 55.69 | 0.005595 | 3.88 | 72.32 | 44.52 | 0.48 |
| Suscol Creek | 395 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 386.9 | 100-year | 1520.00 | 49.91 | 57.73 | | 58.16 | 0.007502 | 5.99 | 374.42 | 231.79 | 0.50 |
| Suscol Creek | 386.9 | 50-Year | 1310.00 | 49.91 | 57.56 | | 57.96 | 0.007021 | 5.68 | 335.67 | 227.58 | 0.48 |
| Suscol Creek | 386.9 | 10-year | 812.00 | 49.91 | 56.96 | | 57.26 | 0.005141 | 4.61 | 217.45 | 140.51 | 0.41 |
| Suscol Creek | 386.9 | 5-year | 603.00 | 49.91 | 56.44 | | 56.70 | 0.004714 | 4.20 | 159.09 | 76.59 | 0.39 |
| Suscol Creek | 386.9 | 2-year | 353.00 | 49.91 | 55.68 | | 55.84 | 0.003203 | 3.18 | 115.86 | 47.31 | 0.31 |
| Suscol Creek | 386.9 | 1.5-year | 263.00 | 49.91 | 55.30 | | 55.41 | 0.002562 | 2.71 | 99.22 | 40.55 | 0.28 |
| Suscol Creek | 381.9 | 100-year | 1520.00 | 49.91 | 57.78 | | 58.09 | 0.005264 | 5.33 | 435.74 | 237.12 | 0.42 |
| Suscol Creek | 381.9 | 50-Year | 1310.00 | 49.91 | 57.61 | | 57.90 | 0.004912 | 5.03 | 395.93 | 234.65 | 0.41 |
| Suscol Creek | 381.9 | 10-year | 812.00 | 49.91 | 56.95 | | 57.23 | 0.004718 | 4.51 | 245.81 | 200.72 | 0.39 |

HEC-RAS Plan: Proposed 95% Culv_test River: Suscol Creek Reach: Suscol Creek (Continued)

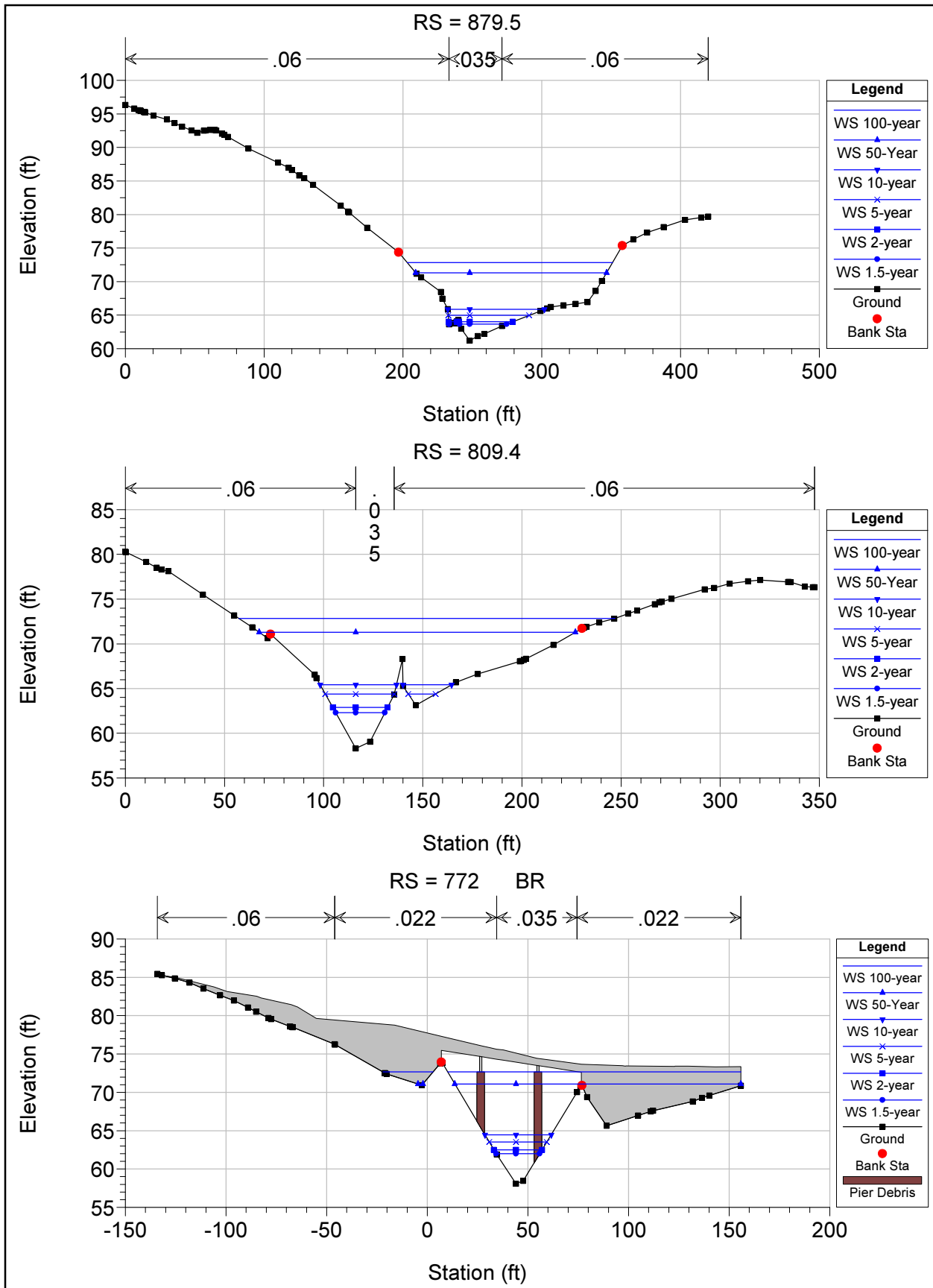
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 381.9 | 5-year | 603.00 | 49.91 | 56.43 | | 56.67 | 0.004220 | 4.08 | 172.63 | 107.48 | 0.36 |
| Suscol Creek | 381.9 | 2-year | 353.00 | 49.91 | 55.67 | | 55.82 | 0.002838 | 3.10 | 119.38 | 48.88 | 0.29 |
| Suscol Creek | 381.9 | 1.5-year | 263.00 | 49.91 | 55.29 | | 55.40 | 0.002207 | 2.61 | 102.56 | 40.16 | 0.26 |
| Suscol Creek | 375.4 | 100-year | 1520.00 | 51.31 | 57.36 | 57.36 | 58.01 | 0.009274 | 7.74 | 337.44 | 230.16 | 0.68 |
| Suscol Creek | 375.4 | 50-Year | 1310.00 | 51.31 | 57.21 | 57.21 | 57.82 | 0.008779 | 7.34 | 303.04 | 227.63 | 0.66 |
| Suscol Creek | 375.4 | 10-year | 812.00 | 51.31 | 56.31 | 56.31 | 57.13 | 0.013355 | 7.59 | 135.74 | 117.77 | 0.78 |
| Suscol Creek | 375.4 | 5-year | 603.00 | 51.31 | 55.61 | 55.61 | 56.55 | 0.020544 | 7.89 | 82.68 | 51.19 | 0.92 |
| Suscol Creek | 375.4 | 2-year | 353.00 | 51.31 | 55.30 | 54.54 | 55.76 | 0.011644 | 5.43 | 67.88 | 44.67 | 0.68 |
| Suscol Creek | 375.4 | 1.5-year | 263.00 | 51.31 | 54.98 | 54.18 | 55.35 | 0.011547 | 4.88 | 54.46 | 37.59 | 0.66 |
| Suscol Creek | 373 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 364.9 | 100-year | 1520.00 | 49.06 | 56.79 | 56.79 | 57.56 | 0.009266 | 7.65 | 301.48 | 232.08 | 0.61 |
| Suscol Creek | 364.9 | 50-Year | 1310.00 | 49.06 | 56.35 | 56.04 | 57.27 | 0.011498 | 7.99 | 209.36 | 161.11 | 0.67 |
| Suscol Creek | 364.9 | 10-year | 812.00 | 49.06 | 55.62 | | 56.25 | 0.009347 | 6.39 | 132.73 | 61.25 | 0.59 |
| Suscol Creek | 364.9 | 5-year | 603.00 | 49.06 | 55.29 | | 55.71 | 0.005288 | 5.21 | 116.15 | 37.38 | 0.46 |
| Suscol Creek | 364.9 | 2-year | 353.00 | 49.06 | 54.45 | | 54.68 | 0.003293 | 3.82 | 92.38 | 26.33 | 0.36 |
| Suscol Creek | 364.9 | 1.5-year | 263.00 | 49.06 | 54.04 | | 54.20 | 0.002530 | 3.22 | 81.80 | 25.08 | 0.31 |
| Suscol Creek | 359.9 | 100-year | 1520.00 | 49.06 | 56.81 | 54.92 | 57.39 | 0.004968 | 6.61 | 352.24 | 237.27 | 0.48 |
| Suscol Creek | 359.9 | 50-Year | 1310.00 | 49.06 | 56.55 | 54.50 | 57.13 | 0.004964 | 6.41 | 289.87 | 233.09 | 0.48 |
| Suscol Creek | 359.9 | 10-year | 812.00 | 49.06 | 55.76 | | 56.15 | 0.003793 | 5.06 | 167.10 | 71.55 | 0.41 |
| Suscol Creek | 359.9 | 5-year | 603.00 | 49.06 | 55.39 | | 55.65 | 0.002708 | 4.09 | 147.69 | 36.34 | 0.34 |
| Suscol Creek | 359.9 | 2-year | 353.00 | 49.06 | 54.50 | | 54.64 | 0.001749 | 2.98 | 118.64 | 31.62 | 0.27 |
| Suscol Creek | 359.9 | 1.5-year | 263.00 | 49.06 | 54.07 | | 54.17 | 0.001355 | 2.50 | 105.36 | 30.58 | 0.24 |
| Suscol Creek | 353.4 | 100-year | 1520.00 | 50.62 | 56.57 | 56.57 | 57.34 | 0.007687 | 7.60 | 303.25 | 237.41 | 0.63 |
| Suscol Creek | 353.4 | 50-Year | 1310.00 | 50.62 | 55.88 | 55.68 | 57.01 | 0.015504 | 9.32 | 154.12 | 80.91 | 0.87 |
| Suscol Creek | 353.4 | 10-year | 812.00 | 50.62 | 55.54 | 54.37 | 56.10 | 0.006918 | 6.06 | 142.84 | 74.51 | 0.57 |
| Suscol Creek | 353.4 | 5-year | 603.00 | 50.62 | 55.22 | 53.87 | 55.61 | 0.005371 | 5.01 | 123.23 | 52.91 | 0.50 |
| Suscol Creek | 353.4 | 2-year | 353.00 | 50.62 | 54.36 | 53.18 | 54.61 | 0.004400 | 3.97 | 88.94 | 34.93 | 0.44 |
| Suscol Creek | 353.4 | 1.5-year | 263.00 | 50.62 | 53.95 | 52.89 | 54.15 | 0.004220 | 3.51 | 74.83 | 33.84 | 0.42 |
| Suscol Creek | 351 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 342.9 | 100-year | 1520.00 | 48.32 | 56.71 | | 57.06 | 0.003424 | 5.21 | 435.67 | 245.82 | 0.38 |
| Suscol Creek | 342.9 | 50-Year | 1310.00 | 48.32 | 56.50 | | 56.82 | 0.003205 | 4.92 | 383.92 | 241.99 | 0.37 |
| Suscol Creek | 342.9 | 10-year | 812.00 | 48.32 | 55.52 | | 55.79 | 0.002938 | 4.19 | 212.36 | 89.95 | 0.34 |
| Suscol Creek | 342.9 | 5-year | 603.00 | 48.32 | 55.07 | | 55.26 | 0.002274 | 3.50 | 176.18 | 55.91 | 0.30 |
| Suscol Creek | 342.9 | 2-year | 353.00 | 48.32 | 54.08 | | 54.19 | 0.001580 | 2.65 | 133.41 | 36.70 | 0.24 |
| Suscol Creek | 342.9 | 1.5-year | 263.00 | 48.32 | 53.58 | | 53.66 | 0.001275 | 2.28 | 115.53 | 34.64 | 0.22 |
| Suscol Creek | 337.9 | 100-year | 1520.00 | 48.32 | 56.71 | | 57.04 | 0.003020 | 5.13 | 456.98 | 249.41 | 0.37 |
| Suscol Creek | 337.9 | 50-Year | 1310.00 | 48.32 | 56.49 | | 56.80 | 0.002820 | 4.84 | 404.46 | 245.81 | 0.35 |
| Suscol Creek | 337.9 | 10-year | 812.00 | 48.32 | 55.51 | | 55.77 | 0.002689 | 4.18 | 217.38 | 96.48 | 0.34 |
| Suscol Creek | 337.9 | 5-year | 603.00 | 48.32 | 55.06 | | 55.25 | 0.002139 | 3.51 | 177.08 | 80.24 | 0.30 |
| Suscol Creek | 337.9 | 2-year | 353.00 | 48.32 | 54.07 | | 54.18 | 0.001484 | 2.64 | 133.76 | 36.39 | 0.24 |
| Suscol Creek | 337.9 | 1.5-year | 263.00 | 48.32 | 53.57 | | 53.65 | 0.001191 | 2.27 | 116.07 | 34.47 | 0.22 |
| Suscol Creek | 331.4 | 100-year | 1520.00 | 49.82 | 56.45 | 56.01 | 56.99 | 0.006342 | 6.67 | 368.19 | 249.64 | 0.57 |
| Suscol Creek | 331.4 | 50-Year | 1310.00 | 49.82 | 55.86 | 55.86 | 56.72 | 0.010528 | 7.82 | 226.25 | 208.99 | 0.71 |
| Suscol Creek | 331.4 | 10-year | 812.00 | 49.82 | 54.80 | 54.14 | 55.68 | 0.014191 | 7.53 | 108.63 | 44.20 | 0.79 |
| Suscol Creek | 331.4 | 5-year | 603.00 | 49.82 | 54.64 | 53.57 | 55.19 | 0.009355 | 5.92 | 102.07 | 41.02 | 0.64 |
| Suscol Creek | 331.4 | 2-year | 353.00 | 49.82 | 53.80 | 52.77 | 54.14 | 0.006330 | 4.71 | 74.94 | 29.22 | 0.52 |
| Suscol Creek | 331.4 | 1.5-year | 263.00 | 49.82 | 53.34 | 52.43 | 53.62 | 0.006181 | 4.25 | 61.88 | 27.82 | 0.50 |
| Suscol Creek | 329 | | Inl Struct | | | | | | | | | |
| Suscol Creek | 320.9 | 100-year | 1520.00 | 47.57 | 56.67 | | 56.93 | 0.002824 | 4.75 | 510.96 | 252.82 | 0.34 |
| Suscol Creek | 320.9 | 50-Year | 1310.00 | 47.57 | 55.66 | 53.64 | 56.25 | 0.006547 | 6.41 | 260.32 | 206.26 | 0.50 |
| Suscol Creek | 320.9 | 10-year | 812.00 | 47.57 | 54.31 | | 54.85 | 0.006561 | 5.88 | 138.21 | 32.36 | 0.50 |
| Suscol Creek | 320.9 | 5-year | 603.00 | 47.57 | 53.79 | | 54.17 | 0.005202 | 4.95 | 121.90 | 30.76 | 0.44 |
| Suscol Creek | 320.9 | 2-year | 353.00 | 47.57 | 52.88 | | 53.10 | 0.003394 | 3.71 | 95.20 | 27.96 | 0.35 |
| Suscol Creek | 320.9 | 1.5-year | 263.00 | 47.57 | 52.48 | | 52.63 | 0.002594 | 3.12 | 84.24 | 26.72 | 0.31 |
| Suscol Creek | 315.9 | 100-year | 1520.00 | 47.57 | 56.70 | | 56.90 | 0.001940 | 4.21 | 568.72 | 253.07 | 0.29 |
| Suscol Creek | 315.9 | 50-Year | 1310.00 | 47.57 | 55.76 | | 56.18 | 0.004020 | 5.45 | 331.25 | 246.24 | 0.41 |
| Suscol Creek | 315.9 | 10-year | 812.00 | 47.57 | 54.40 | | 54.77 | 0.004506 | 4.92 | 167.50 | 59.34 | 0.42 |
| Suscol Creek | 315.9 | 5-year | 603.00 | 47.57 | 53.85 | | 54.12 | 0.003683 | 4.20 | 143.52 | 37.53 | 0.38 |
| Suscol Creek | 315.9 | 2-year | 353.00 | 47.57 | 52.91 | | 53.07 | 0.002606 | 3.22 | 109.75 | 34.39 | 0.32 |
| Suscol Creek | 315.9 | 1.5-year | 263.00 | 47.57 | 52.49 | | 52.61 | 0.002092 | 2.74 | 95.89 | 33.02 | 0.28 |
| Suscol Creek | 309.4 | 100-year | 1520.00 | 49.07 | 56.65 | 54.55 | 56.89 | 0.001939 | 4.54 | 553.47 | 259.25 | 0.33 |
| Suscol Creek | 309.4 | 50-Year | 1310.00 | 49.07 | 55.51 | 53.95 | 56.13 | 0.005241 | 6.46 | 266.08 | 231.57 | 0.52 |
| Suscol Creek | 309.4 | 10-year | 812.00 | 49.07 | 54.19 | 52.94 | 54.72 | 0.006578 | 5.87 | 141.02 | 58.03 | 0.56 |

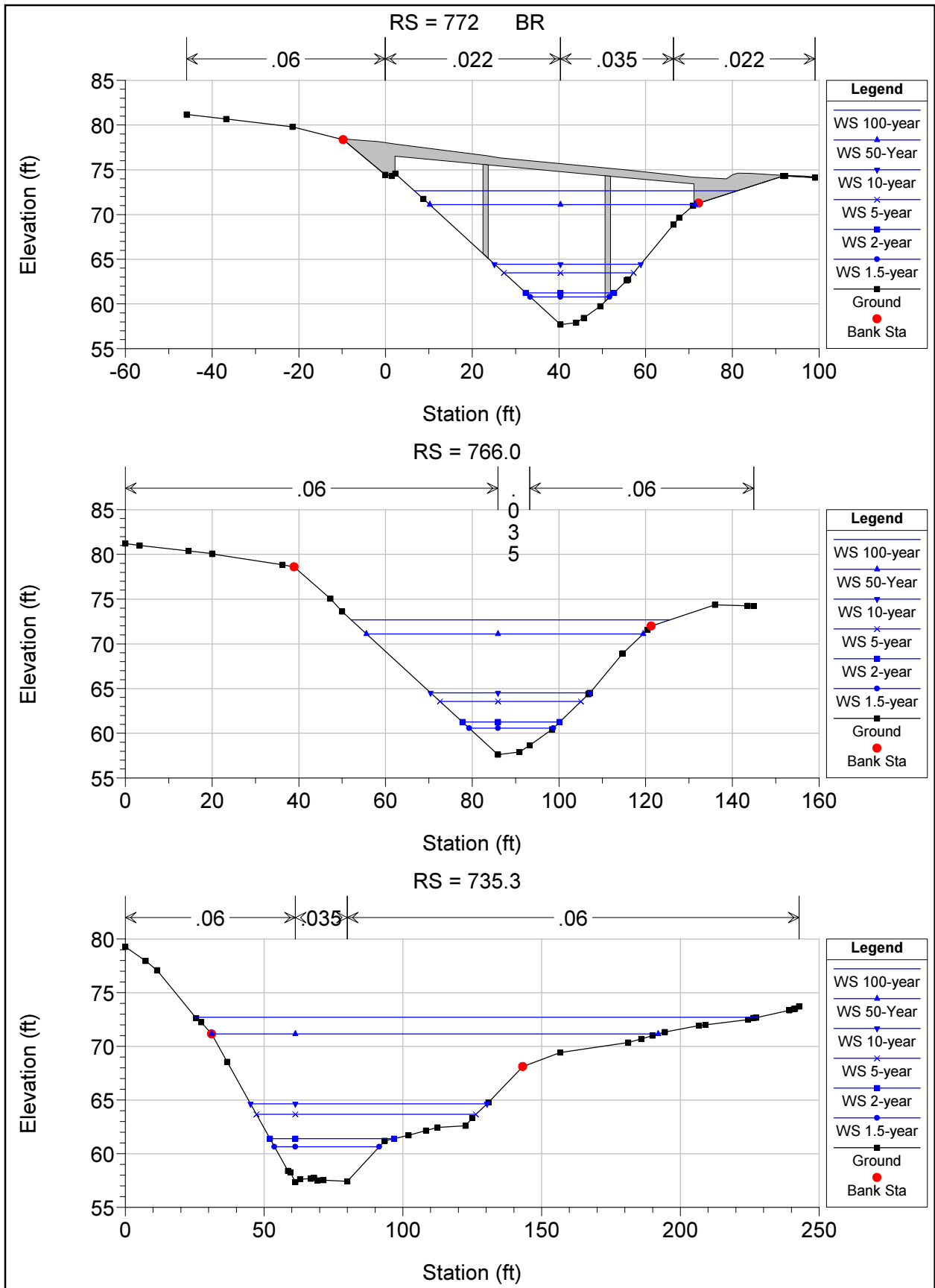
HEC-RAS Plan: Proposed 95% Culv_test River: Suscol Creek Reach: Suscol Creek (Continued)

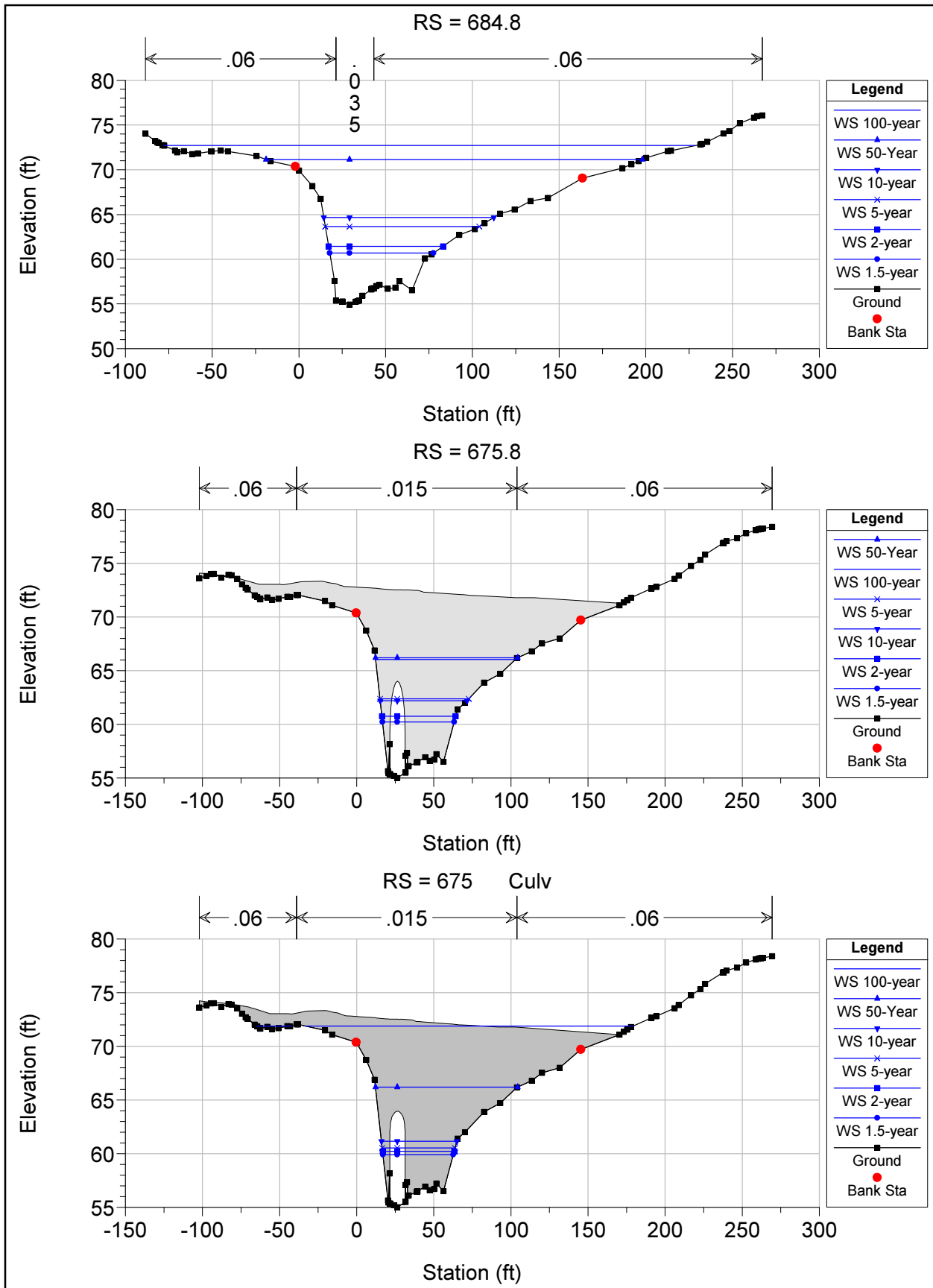
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 309.4 | 5-year | 603.00 | 49.07 | 53.67 | 52.45 | 54.08 | 0.005959 | 5.14 | 117.24 | 38.78 | 0.52 |
| Suscol Creek | 309.4 | 2-year | 353.00 | 49.07 | 52.75 | 51.74 | 53.03 | 0.005520 | 4.22 | 83.59 | 35.36 | 0.48 |
| Suscol Creek | 309.4 | 1.5-year | 263.00 | 49.07 | 52.36 | 51.45 | 52.58 | 0.005253 | 3.76 | 69.94 | 34.09 | 0.46 |
| Suscol Creek | 307 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 298.9 | 100-year | 1520.00 | 46.88 | 56.70 | | 56.85 | 0.001543 | 3.52 | 636.35 | 257.76 | 0.24 |
| Suscol Creek | 298.9 | 50-Year | 1310.00 | 46.88 | 55.70 | | 55.99 | 0.003146 | 4.51 | 381.60 | 247.17 | 0.33 |
| Suscol Creek | 298.9 | 10-year | 812.00 | 46.88 | 53.94 | | 54.24 | 0.004751 | 4.43 | 183.77 | 51.61 | 0.39 |
| Suscol Creek | 298.9 | 5-year | 603.00 | 46.88 | 53.21 | | 53.45 | 0.004367 | 3.99 | 151.10 | 41.91 | 0.37 |
| Suscol Creek | 298.9 | 2-year | 353.00 | 46.88 | 52.27 | | 52.42 | 0.003055 | 3.08 | 114.60 | 36.57 | 0.31 |
| Suscol Creek | 298.9 | 1.5-year | 263.00 | 46.88 | 51.86 | | 51.96 | 0.002470 | 2.63 | 99.83 | 34.69 | 0.27 |
| Suscol Creek | 293.9 | 100-year | 1520.00 | 46.88 | 56.70 | | 56.84 | 0.001350 | 3.47 | 648.60 | 255.70 | 0.24 |
| Suscol Creek | 293.9 | 50-Year | 1310.00 | 46.88 | 55.70 | | 55.97 | 0.002647 | 4.37 | 395.31 | 247.10 | 0.32 |
| Suscol Creek | 293.9 | 10-year | 812.00 | 46.88 | 53.93 | | 54.21 | 0.004158 | 4.28 | 191.21 | 63.97 | 0.38 |
| Suscol Creek | 293.9 | 5-year | 603.00 | 46.88 | 53.19 | | 53.43 | 0.003932 | 3.88 | 155.40 | 44.36 | 0.37 |
| Suscol Creek | 293.9 | 2-year | 353.00 | 46.88 | 52.26 | | 52.40 | 0.002756 | 3.02 | 116.74 | 38.28 | 0.31 |
| Suscol Creek | 293.9 | 1.5-year | 263.00 | 46.88 | 51.85 | | 51.95 | 0.002170 | 2.59 | 101.49 | 35.66 | 0.27 |
| Suscol Creek | 287.4 | 100-year | 1520.00 | 48.38 | 56.65 | 53.72 | 56.83 | 0.001313 | 3.86 | 610.41 | 252.28 | 0.28 |
| Suscol Creek | 287.4 | 50-Year | 1310.00 | 48.38 | 55.57 | 53.34 | 55.94 | 0.002891 | 5.03 | 342.47 | 241.99 | 0.40 |
| Suscol Creek | 287.4 | 10-year | 812.00 | 48.38 | 53.73 | 52.36 | 54.17 | 0.005824 | 5.28 | 155.13 | 57.90 | 0.52 |
| Suscol Creek | 287.4 | 5-year | 603.00 | 48.38 | 52.98 | 51.87 | 53.38 | 0.006519 | 5.07 | 118.82 | 43.41 | 0.54 |
| Suscol Creek | 287.4 | 2-year | 353.00 | 48.38 | 52.07 | 51.15 | 52.36 | 0.006352 | 4.30 | 82.07 | 37.82 | 0.51 |
| Suscol Creek | 287.4 | 1.5-year | 263.00 | 48.38 | 51.68 | 50.80 | 51.92 | 0.006112 | 3.88 | 67.72 | 35.40 | 0.50 |
| Suscol Creek | 285 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 276.9 | 100-year | 1520.00 | 48.02 | 56.67 | | 56.80 | 0.001526 | 3.22 | 639.02 | 247.32 | 0.24 |
| Suscol Creek | 276.9 | 50-Year | 1310.00 | 48.02 | 55.60 | | 55.86 | 0.003541 | 4.23 | 376.87 | 239.38 | 0.36 |
| Suscol Creek | 276.9 | 10-year | 812.00 | 48.02 | 53.65 | | 54.00 | 0.006187 | 4.76 | 170.67 | 52.26 | 0.46 |
| Suscol Creek | 276.9 | 5-year | 603.00 | 48.02 | 52.77 | | 53.11 | 0.006630 | 4.68 | 128.73 | 44.23 | 0.48 |
| Suscol Creek | 276.9 | 2-year | 353.00 | 48.02 | 51.71 | | 51.97 | 0.006659 | 4.13 | 85.45 | 37.53 | 0.48 |
| Suscol Creek | 276.9 | 1.5-year | 263.00 | 48.02 | 51.24 | | 51.47 | 0.006684 | 3.84 | 68.48 | 34.69 | 0.48 |
| Suscol Creek | 271.9 | 100-year | 1520.00 | 47.38 | 56.67 | | 56.79 | 0.001587 | 3.18 | 644.41 | 246.16 | 0.24 |
| Suscol Creek | 271.9 | 50-Year | 1310.00 | 47.38 | 55.59 | | 55.85 | 0.003791 | 4.24 | 380.54 | 238.09 | 0.36 |
| Suscol Creek | 271.9 | 10-year | 812.00 | 47.38 | 53.61 | | 53.96 | 0.006576 | 4.81 | 168.90 | 49.71 | 0.46 |
| Suscol Creek | 271.9 | 5-year | 603.00 | 47.38 | 52.74 | | 53.07 | 0.006967 | 4.67 | 129.23 | 42.54 | 0.47 |
| Suscol Creek | 271.9 | 2-year | 353.00 | 47.38 | 51.68 | | 51.94 | 0.006704 | 4.02 | 87.80 | 36.30 | 0.46 |
| Suscol Creek | 271.9 | 1.5-year | 263.00 | 47.38 | 51.22 | | 51.43 | 0.006406 | 3.67 | 71.57 | 33.38 | 0.44 |
| Suscol Creek | 265.4 | 100-year | 1520.00 | 47.16 | 56.65 | | 56.78 | 0.001953 | 3.28 | 624.97 | 247.51 | 0.26 |
| Suscol Creek | 265.4 | 50-Year | 1310.00 | 47.16 | 55.48 | | 55.81 | 0.005950 | 4.82 | 338.75 | 235.08 | 0.43 |
| Suscol Creek | 265.4 | 10-year | 812.00 | 47.16 | 53.27 | | 53.88 | 0.012555 | 6.26 | 129.71 | 40.02 | 0.61 |
| Suscol Creek | 265.4 | 5-year | 603.00 | 47.16 | 52.36 | | 52.98 | 0.015585 | 6.30 | 95.64 | 34.89 | 0.67 |
| Suscol Creek | 265.4 | 2-year | 353.00 | 47.16 | 51.38 | | 51.85 | 0.015763 | 5.52 | 63.96 | 29.45 | 0.66 |
| Suscol Creek | 265.4 | 1.5-year | 263.00 | 47.16 | 50.95 | | 51.35 | 0.014856 | 5.05 | 52.06 | 26.60 | 0.64 |
| Suscol Creek | 254.9 | 100-year | 1520.00 | 48.10 | 56.63 | | 56.76 | 0.001767 | 3.36 | 628.33 | 246.11 | 0.27 |
| Suscol Creek | 254.9 | 50-Year | 1310.00 | 48.10 | 55.35 | | 55.74 | 0.006198 | 5.21 | 320.23 | 232.67 | 0.47 |
| Suscol Creek | 254.9 | 10-year | 812.00 | 48.10 | 52.95 | | 53.74 | 0.011018 | 7.11 | 114.25 | 34.59 | 0.69 |
| Suscol Creek | 254.9 | 5-year | 603.00 | 48.10 | 51.93 | | 52.80 | 0.014903 | 7.45 | 80.90 | 30.74 | 0.81 |
| Suscol Creek | 254.9 | 2-year | 353.00 | 48.10 | 50.71 | 50.71 | 51.62 | 0.022083 | 7.64 | 46.21 | 25.88 | 1.01 |
| Suscol Creek | 254.9 | 1.5-year | 263.00 | 48.10 | 50.35 | 50.35 | 51.13 | 0.021724 | 7.06 | 37.27 | 24.47 | 1.01 |
| Suscol Creek | 249.9 | 100-year | 1520.00 | 48.14 | 56.63 | | 56.75 | 0.001589 | 3.25 | 649.65 | 245.76 | 0.25 |
| Suscol Creek | 249.9 | 50-Year | 1310.00 | 48.14 | 55.35 | | 55.69 | 0.005231 | 4.92 | 342.32 | 233.15 | 0.44 |
| Suscol Creek | 249.9 | 10-year | 812.00 | 48.14 | 53.02 | | 53.64 | 0.008890 | 6.34 | 128.10 | 37.19 | 0.60 |
| Suscol Creek | 249.9 | 5-year | 603.00 | 48.14 | 52.01 | | 52.67 | 0.011933 | 6.53 | 92.28 | 33.68 | 0.70 |
| Suscol Creek | 249.9 | 2-year | 353.00 | 48.14 | 50.54 | 50.54 | 51.41 | 0.024612 | 7.50 | 47.09 | 27.42 | 1.01 |
| Suscol Creek | 249.9 | 1.5-year | 263.00 | 48.14 | 50.20 | 50.20 | 50.94 | 0.024798 | 6.91 | 38.07 | 26.18 | 1.01 |
| Suscol Creek | 243.4 | 100-year | 1520.00 | 47.59 | 56.58 | | 56.74 | 0.000840 | 3.63 | 654.49 | 246.19 | 0.28 |
| Suscol Creek | 243.4 | 50-Year | 1310.00 | 47.59 | 55.31 | | 55.67 | 0.002224 | 5.00 | 348.27 | 230.28 | 0.43 |
| Suscol Creek | 243.4 | 10-year | 812.00 | 47.59 | 53.04 | | 53.58 | 0.003693 | 5.87 | 138.31 | 37.71 | 0.54 |
| Suscol Creek | 243.4 | 5-year | 603.00 | 47.59 | 52.05 | | 52.59 | 0.004736 | 5.87 | 102.88 | 33.95 | 0.60 |
| Suscol Creek | 243.4 | 2-year | 353.00 | 47.59 | 50.40 | | 51.10 | 0.010559 | 6.70 | 52.71 | 26.39 | 0.84 |
| Suscol Creek | 243.4 | 1.5-year | 263.00 | 47.59 | 49.81 | 49.81 | 50.57 | 0.016681 | 7.02 | 37.45 | 24.97 | 1.01 |
| Suscol Creek | 229.4 | 100-year | 1520.00 | 46.54 | 56.59 | | 56.71 | 0.001526 | 3.18 | 666.19 | 246.78 | 0.24 |
| Suscol Creek | 229.4 | 50-Year | 1310.00 | 46.54 | 55.29 | | 55.62 | 0.004654 | 4.83 | 352.58 | 225.52 | 0.40 |
| Suscol Creek | 229.4 | 10-year | 812.00 | 46.54 | 53.00 | | 53.50 | 0.006108 | 5.66 | 143.50 | 33.67 | 0.48 |
| Suscol Creek | 229.4 | 5-year | 603.00 | 46.54 | 52.04 | | 52.48 | 0.006043 | 5.35 | 112.80 | 29.80 | 0.48 |
| Suscol Creek | 229.4 | 2-year | 353.00 | 46.54 | 50.50 | | 50.88 | 0.006742 | 4.96 | 71.13 | 25.28 | 0.52 |

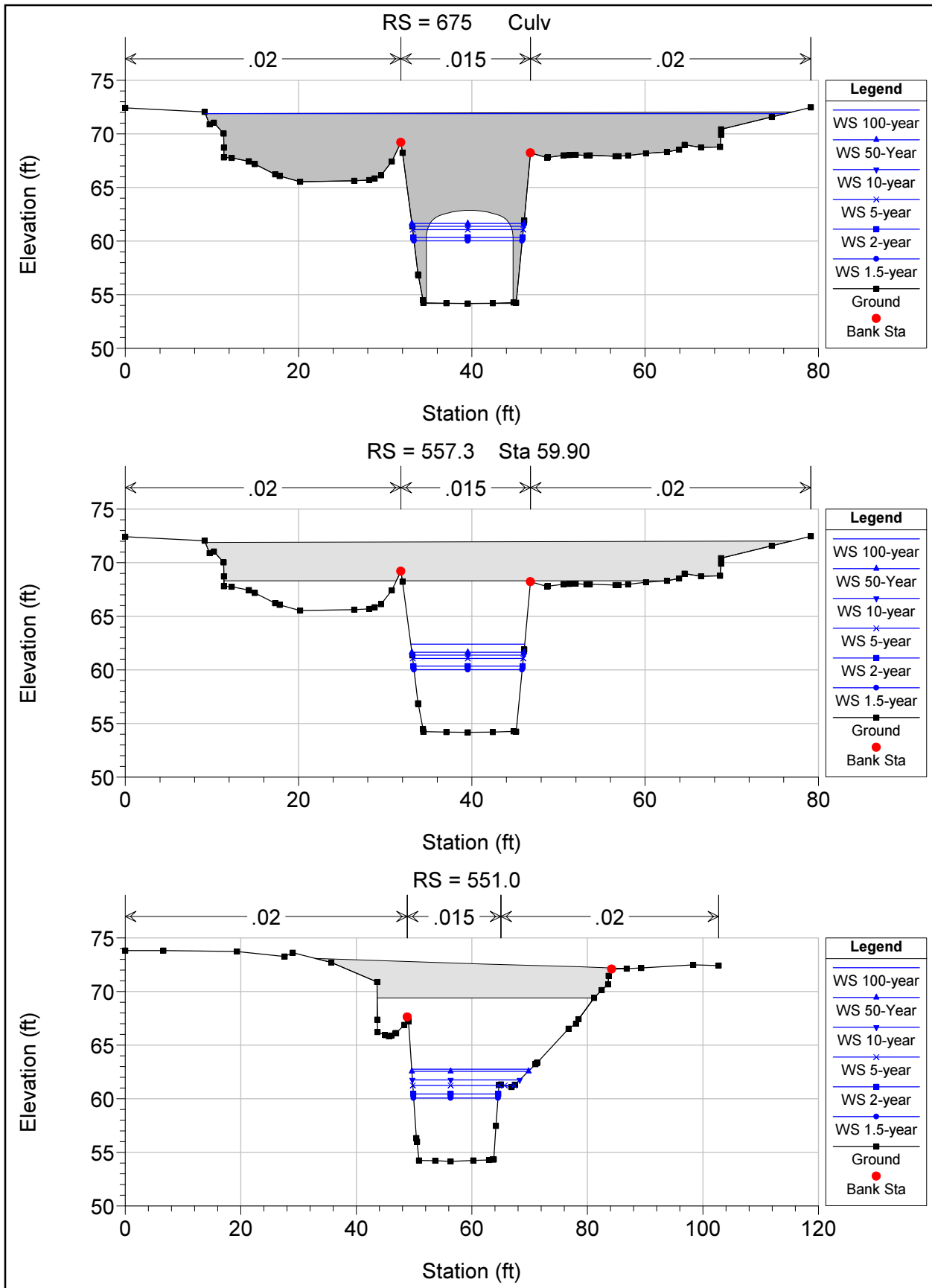
HEC-RAS Plan: Proposed 95% Culv_test River: Suscol Creek Reach: Suscol Creek (Continued)

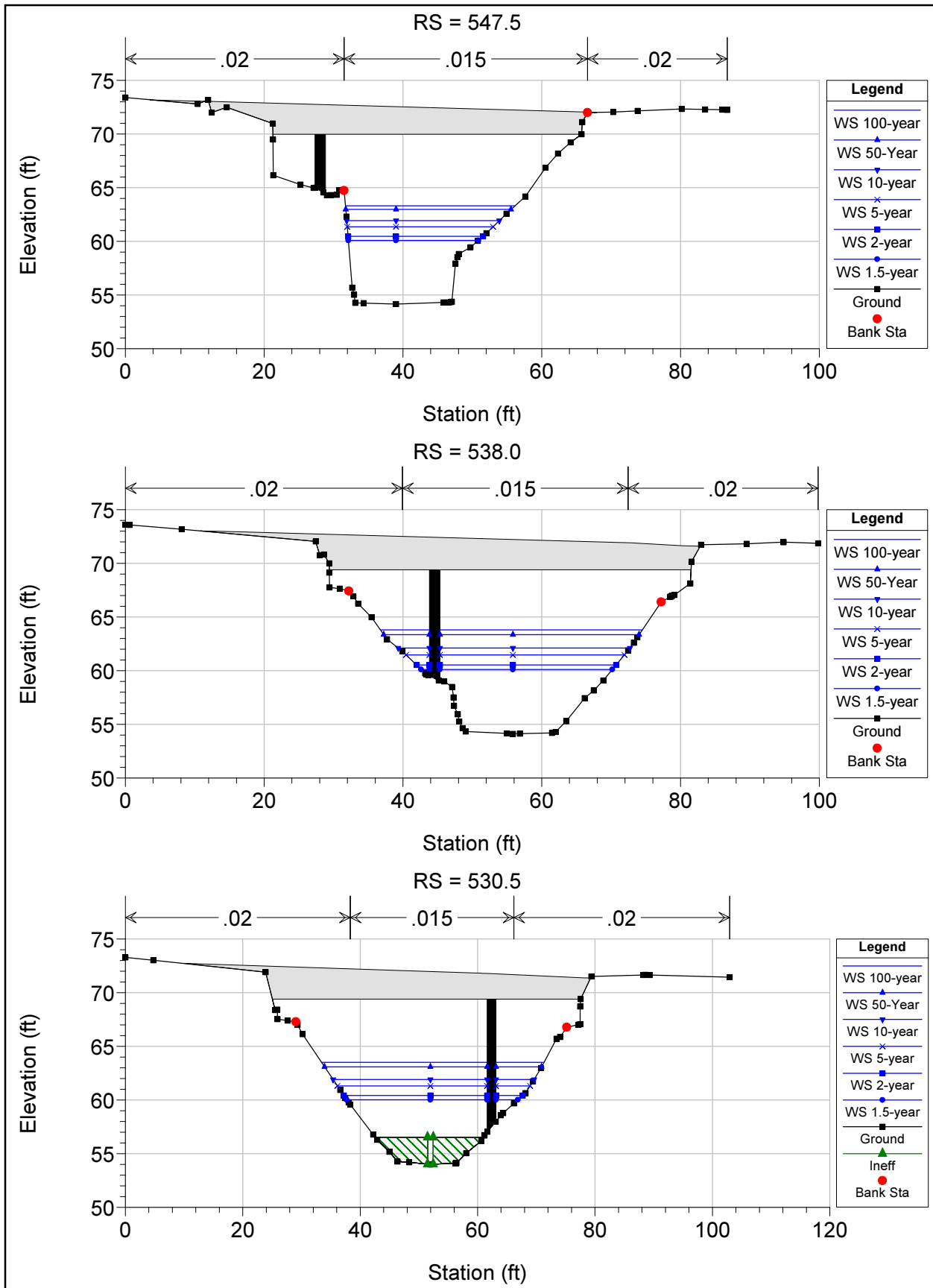
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 229.4 | 1.5-year | 263.00 | 46.54 | 49.80 | | 50.17 | 0.008008 | 4.88 | 53.92 | 23.88 | 0.57 |
| Suscol Creek | 224.7 | 100-year | 1520.00 | 45.80 | 56.59 | | 56.70 | 0.001586 | 3.11 | 675.39 | 253.68 | 0.23 |
| Suscol Creek | 224.7 | 50-Year | 1310.00 | 45.80 | 55.28 | | 55.59 | 0.004822 | 4.77 | 357.96 | 222.82 | 0.40 |
| Suscol Creek | 224.7 | 10-year | 812.00 | 45.80 | 52.95 | | 53.47 | 0.007489 | 5.75 | 141.34 | 34.03 | 0.50 |
| Suscol Creek | 224.7 | 5-year | 603.00 | 45.80 | 51.99 | | 52.45 | 0.007462 | 5.45 | 110.65 | 29.43 | 0.50 |
| Suscol Creek | 224.7 | 2-year | 353.00 | 45.80 | 50.47 | | 50.85 | 0.007157 | 4.94 | 71.45 | 22.61 | 0.49 |
| Suscol Creek | 224.7 | 1.5-year | 263.00 | 45.80 | 49.79 | | 50.13 | 0.007259 | 4.63 | 56.78 | 20.93 | 0.50 |
| Suscol Creek | 202.8 | 100-year | 1520.00 | 45.45 | 56.20 | 52.21 | 56.62 | 0.003198 | 5.25 | 301.17 | 52.09 | 0.35 |
| Suscol Creek | 202.8 | 50-Year | 1310.00 | 45.45 | 55.00 | 51.75 | 55.47 | 0.004503 | 5.52 | 241.39 | 47.77 | 0.40 |
| Suscol Creek | 202.8 | 10-year | 812.00 | 45.45 | 52.87 | 50.50 | 53.30 | 0.005727 | 5.23 | 155.38 | 34.65 | 0.44 |
| Suscol Creek | 202.8 | 5-year | 603.00 | 45.45 | 51.90 | 49.84 | 52.28 | 0.005929 | 4.90 | 123.10 | 31.83 | 0.44 |
| Suscol Creek | 202.8 | 2-year | 353.00 | 45.45 | 50.37 | 48.82 | 50.68 | 0.006692 | 4.51 | 78.31 | 26.39 | 0.46 |
| Suscol Creek | 202.8 | 1.5-year | 263.00 | 45.45 | 49.66 | 48.36 | 49.96 | 0.007152 | 4.33 | 60.79 | 23.61 | 0.48 |
| Suscol Creek | 200 | Bridge | | | | | | | | | | |
| Suscol Creek | 148.5 | 100-year | 1520.00 | 45.06 | 53.24 | | 54.18 | 0.010806 | 7.77 | 195.67 | 37.55 | 0.60 |
| Suscol Creek | 148.5 | 50-Year | 1310.00 | 45.06 | 52.79 | | 53.62 | 0.010467 | 7.33 | 178.71 | 37.10 | 0.59 |
| Suscol Creek | 148.5 | 10-year | 812.00 | 45.06 | 51.39 | | 52.02 | 0.010598 | 6.34 | 128.15 | 35.03 | 0.58 |
| Suscol Creek | 148.5 | 5-year | 603.00 | 45.06 | 50.53 | | 51.09 | 0.010052 | 6.00 | 100.50 | 29.39 | 0.57 |
| Suscol Creek | 148.5 | 2-year | 353.00 | 45.06 | 49.17 | | 49.64 | 0.010590 | 5.48 | 64.46 | 23.73 | 0.59 |
| Suscol Creek | 148.5 | 1.5-year | 263.00 | 45.06 | 48.34 | | 48.85 | 0.014385 | 5.72 | 45.97 | 20.92 | 0.68 |
| Suscol Creek | 93.6 | 100-year | 1520.00 | 43.17 | 52.45 | | 53.43 | 0.017091 | 7.94 | 191.48 | 46.87 | 0.69 |
| Suscol Creek | 93.6 | 50-Year | 1310.00 | 43.17 | 51.89 | | 52.85 | 0.017623 | 7.87 | 166.42 | 42.27 | 0.70 |
| Suscol Creek | 93.6 | 10-year | 812.00 | 43.17 | 50.33 | | 51.19 | 0.018577 | 7.46 | 108.90 | 31.68 | 0.71 |
| Suscol Creek | 93.6 | 5-year | 603.00 | 43.17 | 49.50 | | 50.29 | 0.018654 | 7.11 | 84.76 | 26.95 | 0.71 |
| Suscol Creek | 93.6 | 2-year | 353.00 | 43.17 | 48.20 | | 48.85 | 0.017225 | 6.48 | 54.50 | 19.57 | 0.68 |
| Suscol Creek | 93.6 | 1.5-year | 263.00 | 43.17 | 47.39 | | 48.03 | 0.014032 | 6.42 | 40.98 | 13.52 | 0.65 |
| Suscol Creek | 37.7 | 100-year | 1520.00 | 42.14 | 49.89 | 49.89 | 51.98 | 0.036129 | 11.59 | 131.13 | 31.64 | 1.00 |
| Suscol Creek | 37.7 | 50-Year | 1310.00 | 42.14 | 49.43 | 49.43 | 51.38 | 0.036447 | 11.21 | 116.88 | 30.07 | 1.00 |
| Suscol Creek | 37.7 | 10-year | 812.00 | 42.14 | 48.07 | 48.07 | 49.68 | 0.037545 | 10.18 | 79.76 | 24.78 | 1.00 |
| Suscol Creek | 37.7 | 5-year | 603.00 | 42.14 | 47.35 | 47.35 | 48.78 | 0.038210 | 9.60 | 62.84 | 21.99 | 1.00 |
| Suscol Creek | 37.7 | 2-year | 353.00 | 42.14 | 46.22 | 46.22 | 47.40 | 0.039698 | 8.70 | 40.59 | 17.58 | 1.01 |
| Suscol Creek | 37.7 | 1.5-year | 263.00 | 42.14 | 45.71 | 45.71 | 46.75 | 0.039845 | 8.20 | 32.08 | 15.61 | 1.01 |
| Suscol Creek | 0 | 100-year | 1520.00 | 40.63 | 47.54 | 47.30 | 49.42 | 0.026007 | 11.02 | 137.99 | 32.11 | 0.94 |
| Suscol Creek | 0 | 50-Year | 1310.00 | 40.63 | 47.05 | 46.84 | 48.82 | 0.026045 | 10.67 | 122.78 | 30.40 | 0.94 |
| Suscol Creek | 0 | 10-year | 812.00 | 40.63 | 45.68 | 45.50 | 47.12 | 0.026010 | 9.62 | 84.38 | 25.58 | 0.93 |
| Suscol Creek | 0 | 5-year | 603.00 | 40.63 | 44.95 | 44.80 | 46.22 | 0.026018 | 9.03 | 66.75 | 23.05 | 0.94 |
| Suscol Creek | 0 | 2-year | 353.00 | 40.63 | 43.86 | 43.77 | 44.88 | 0.026021 | 8.07 | 43.76 | 19.34 | 0.95 |
| Suscol Creek | 0 | 1.5-year | 263.00 | 40.63 | 43.39 | 43.31 | 44.27 | 0.026009 | 7.52 | 34.98 | 18.01 | 0.95 |

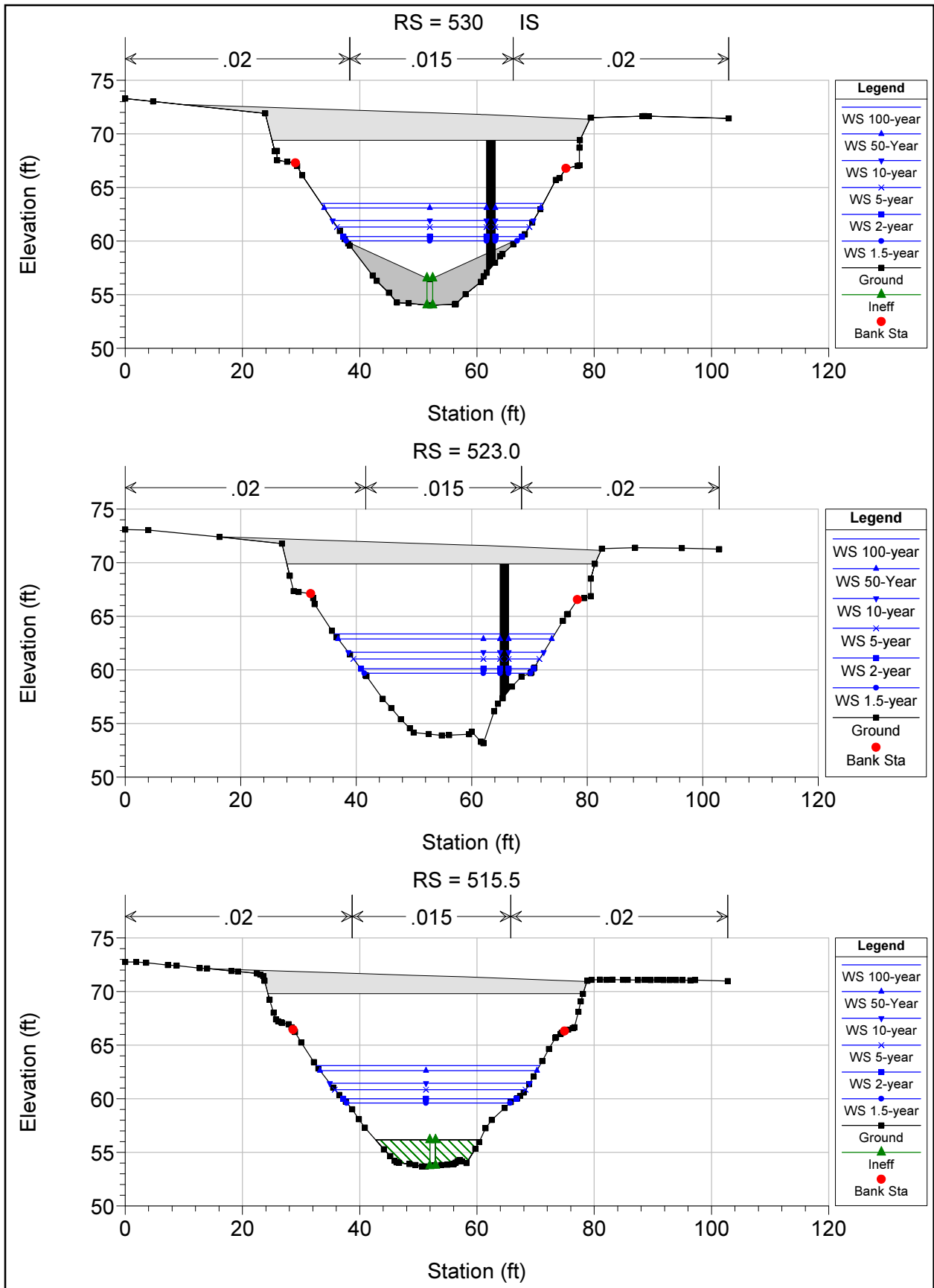


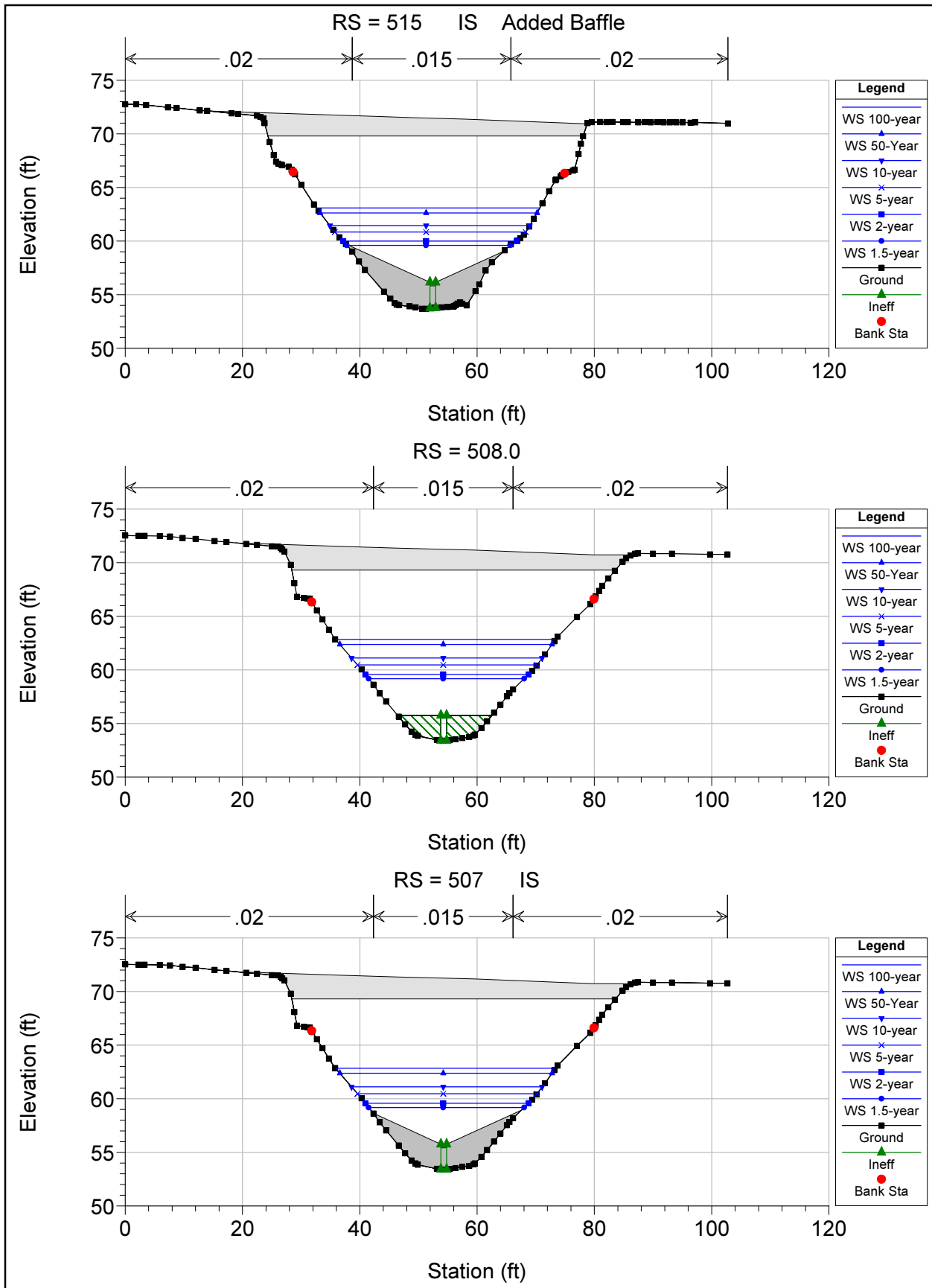


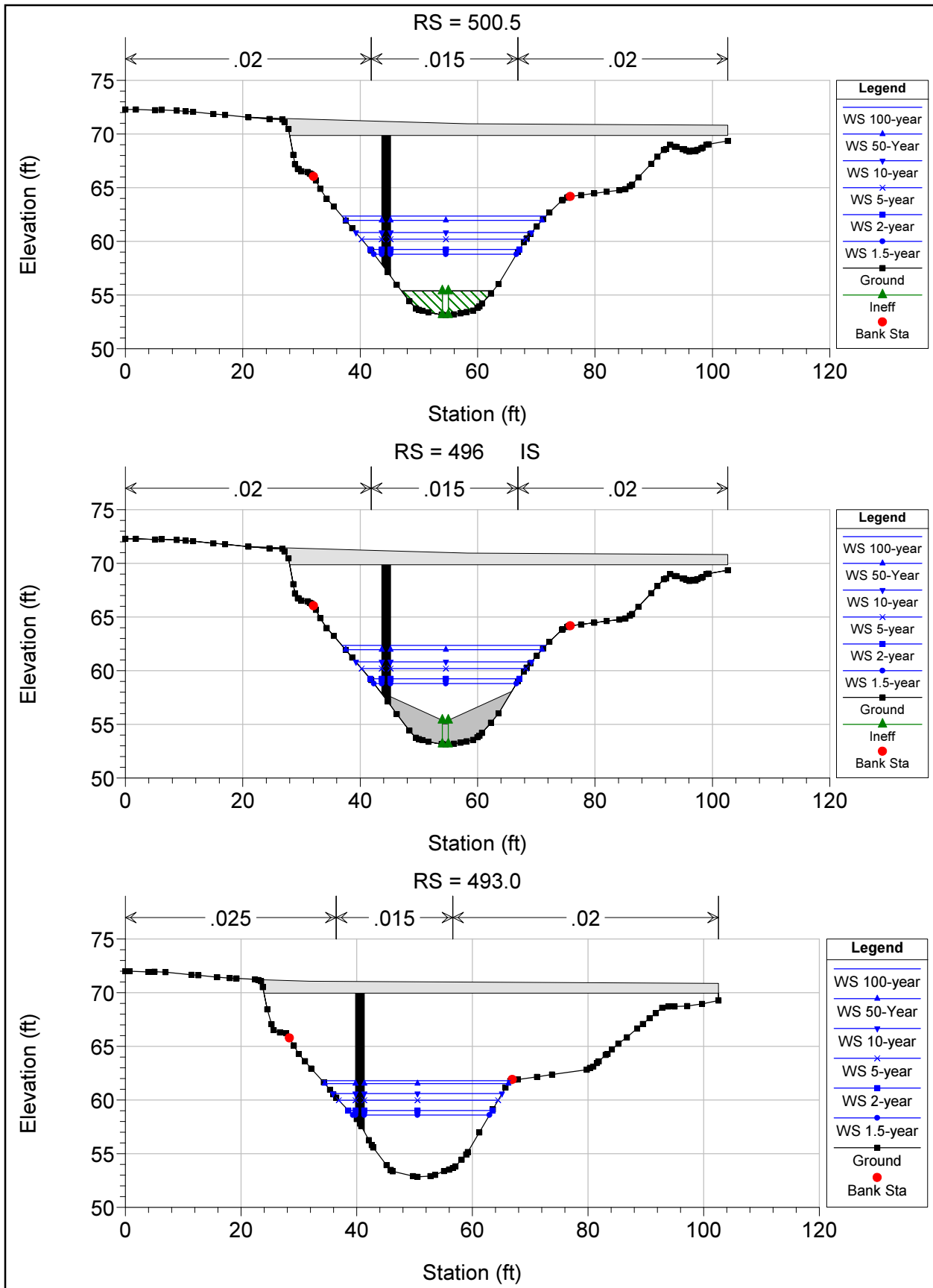


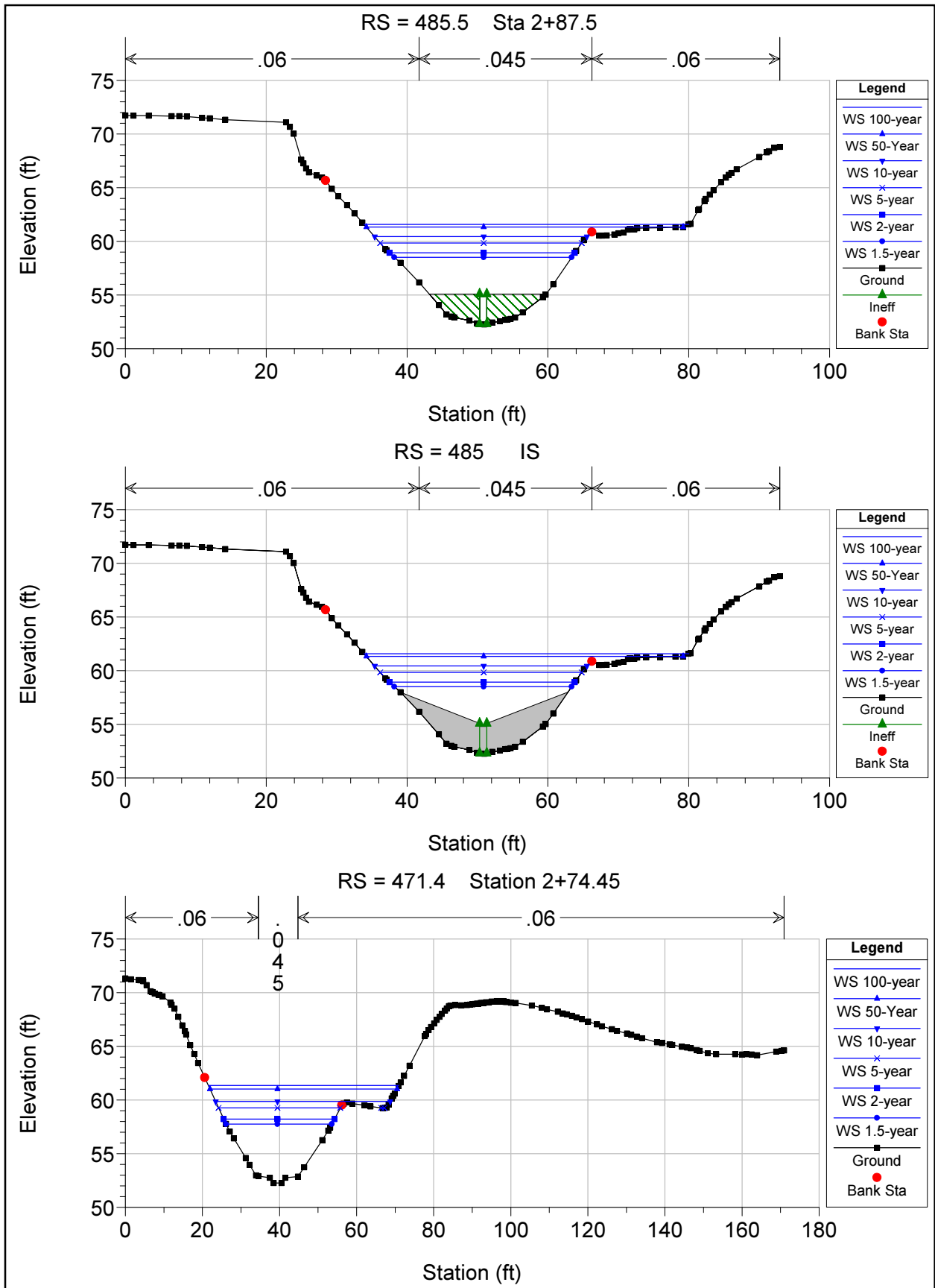


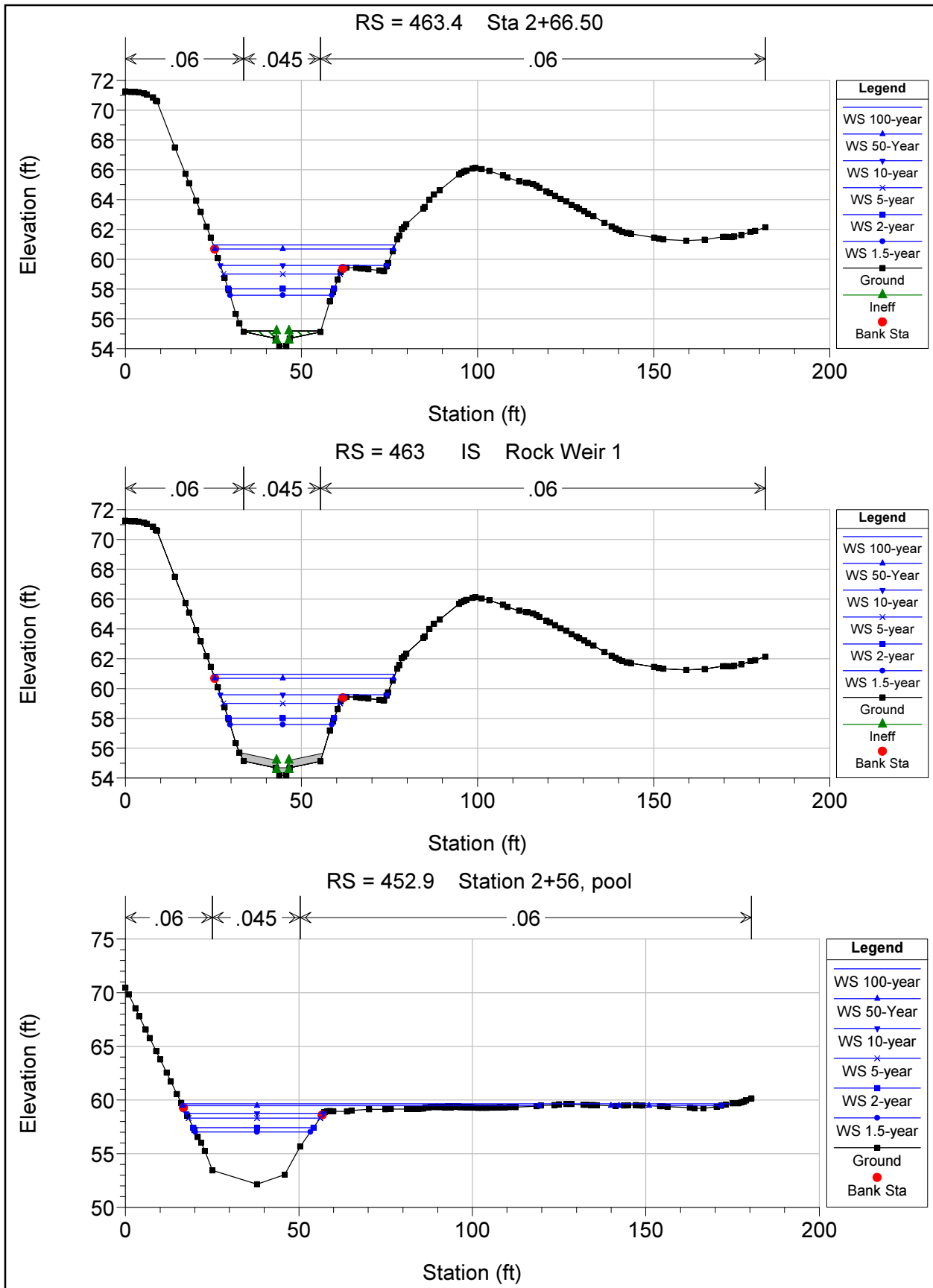


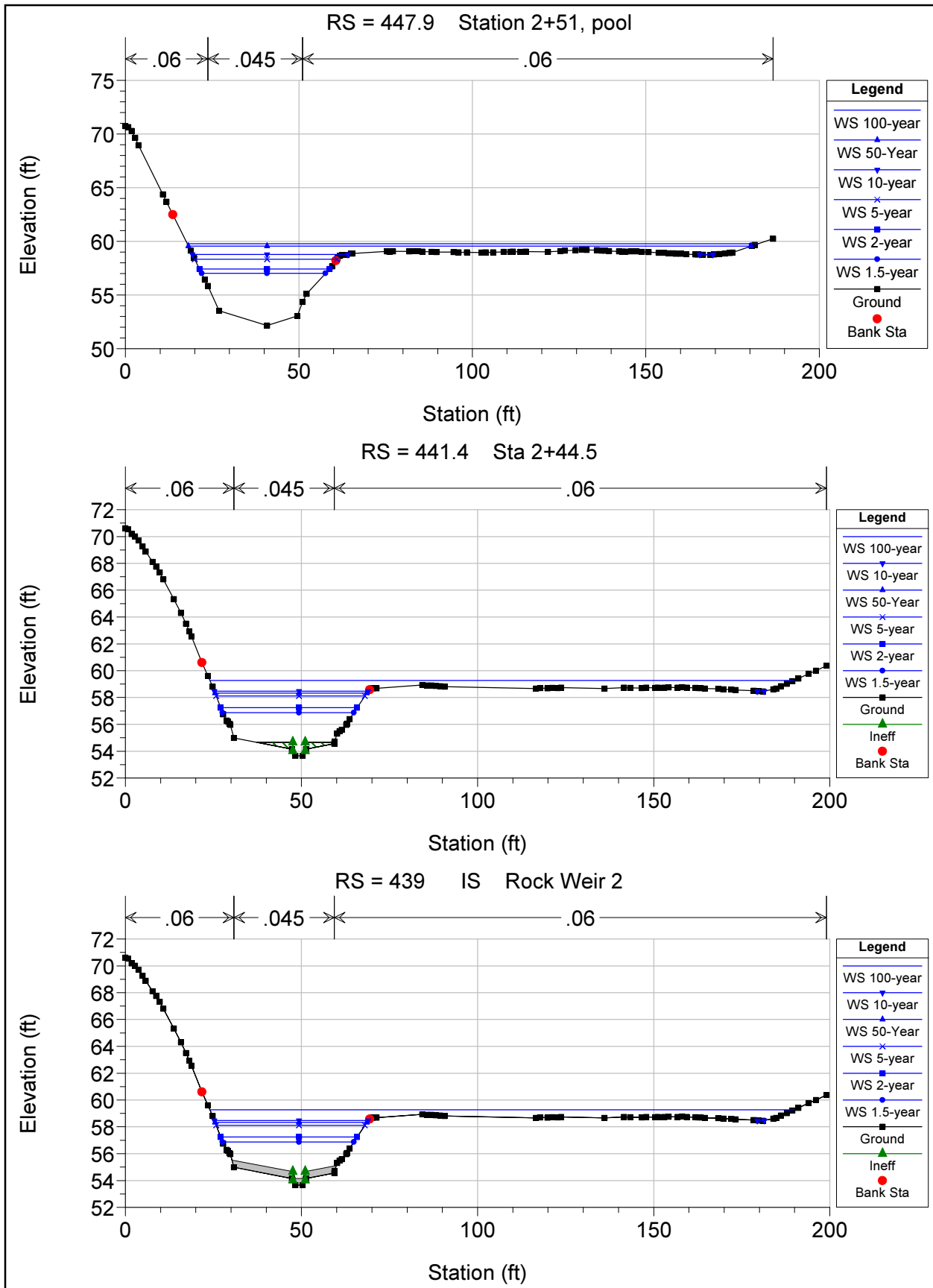


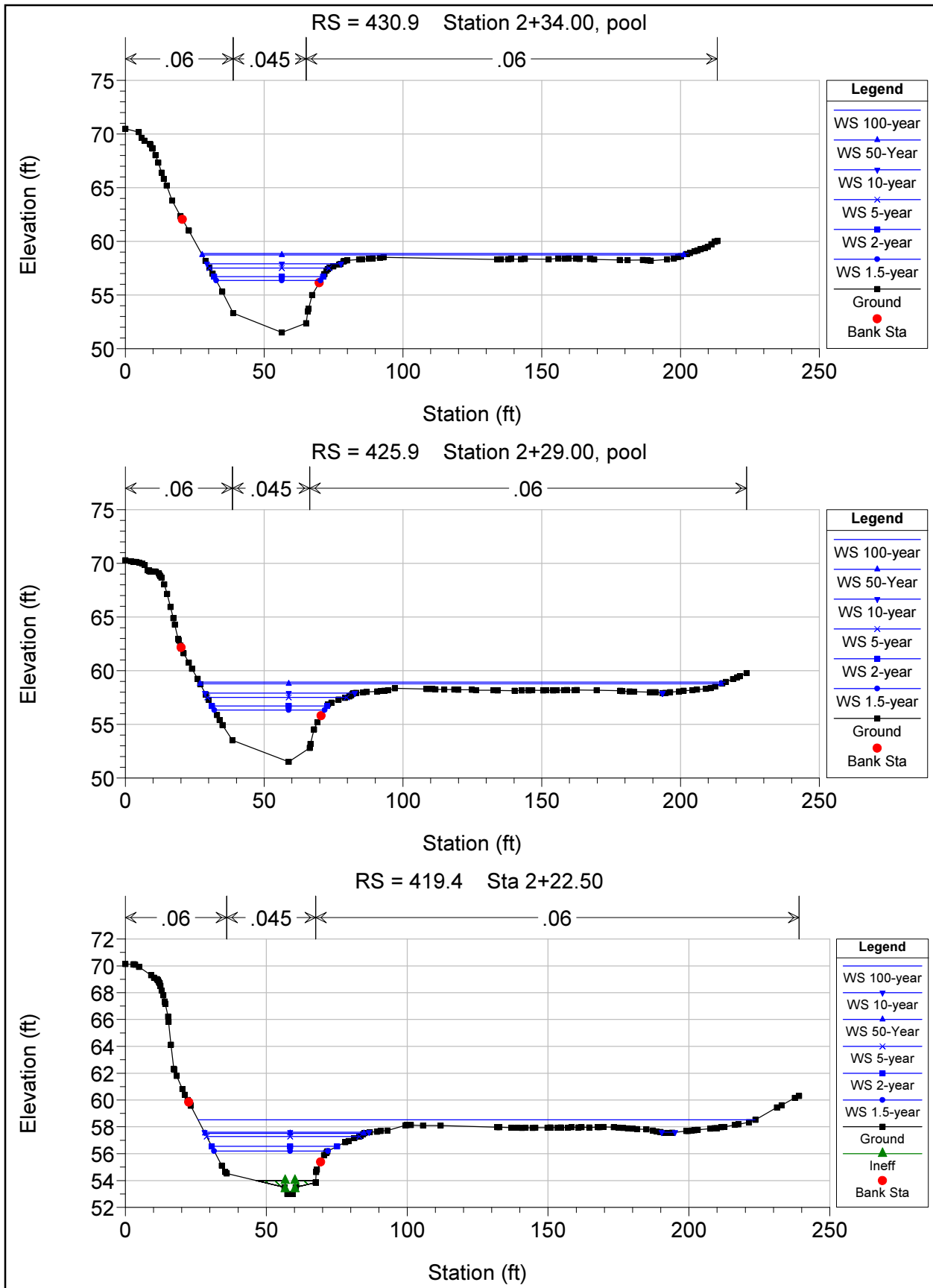


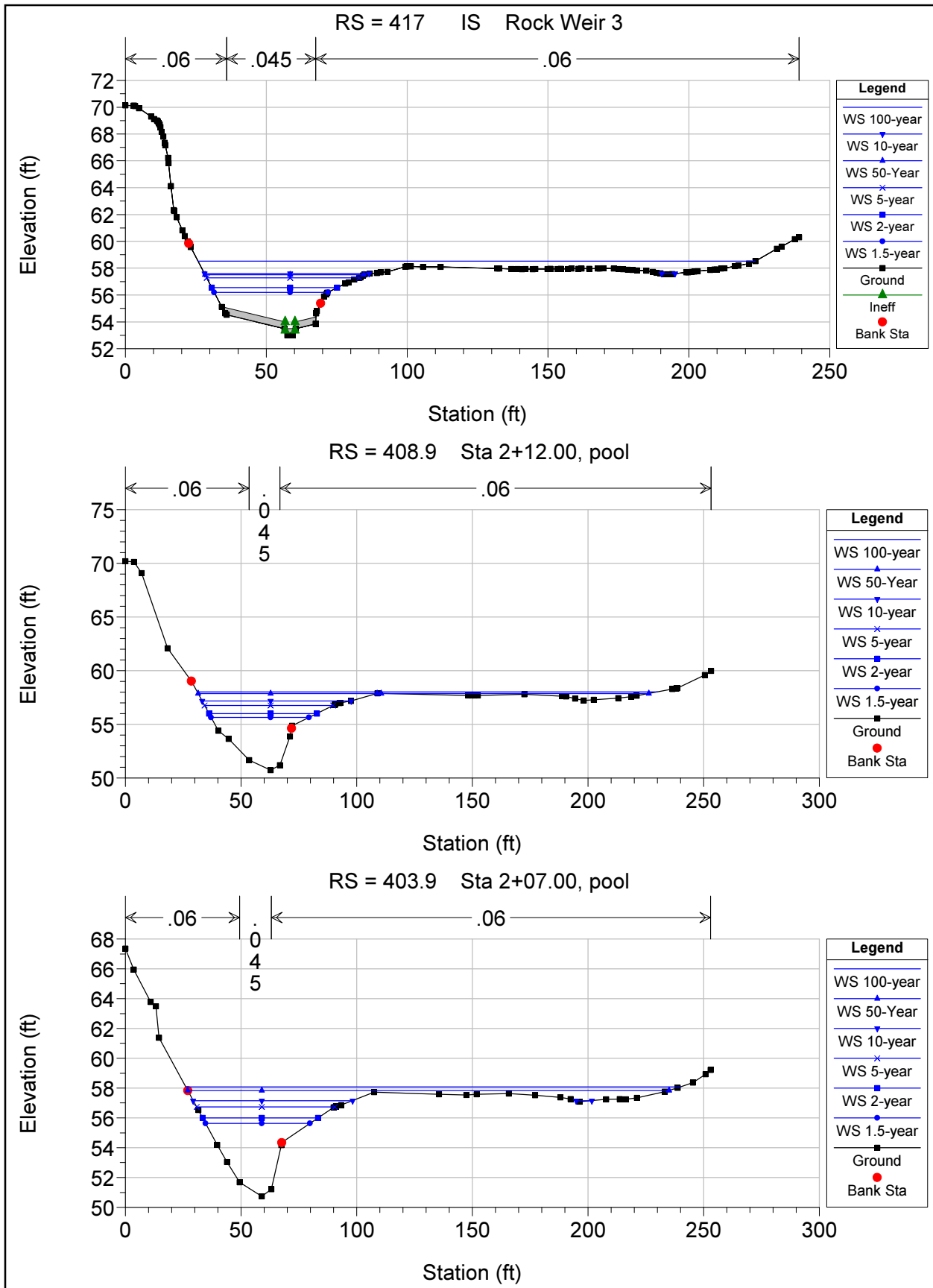


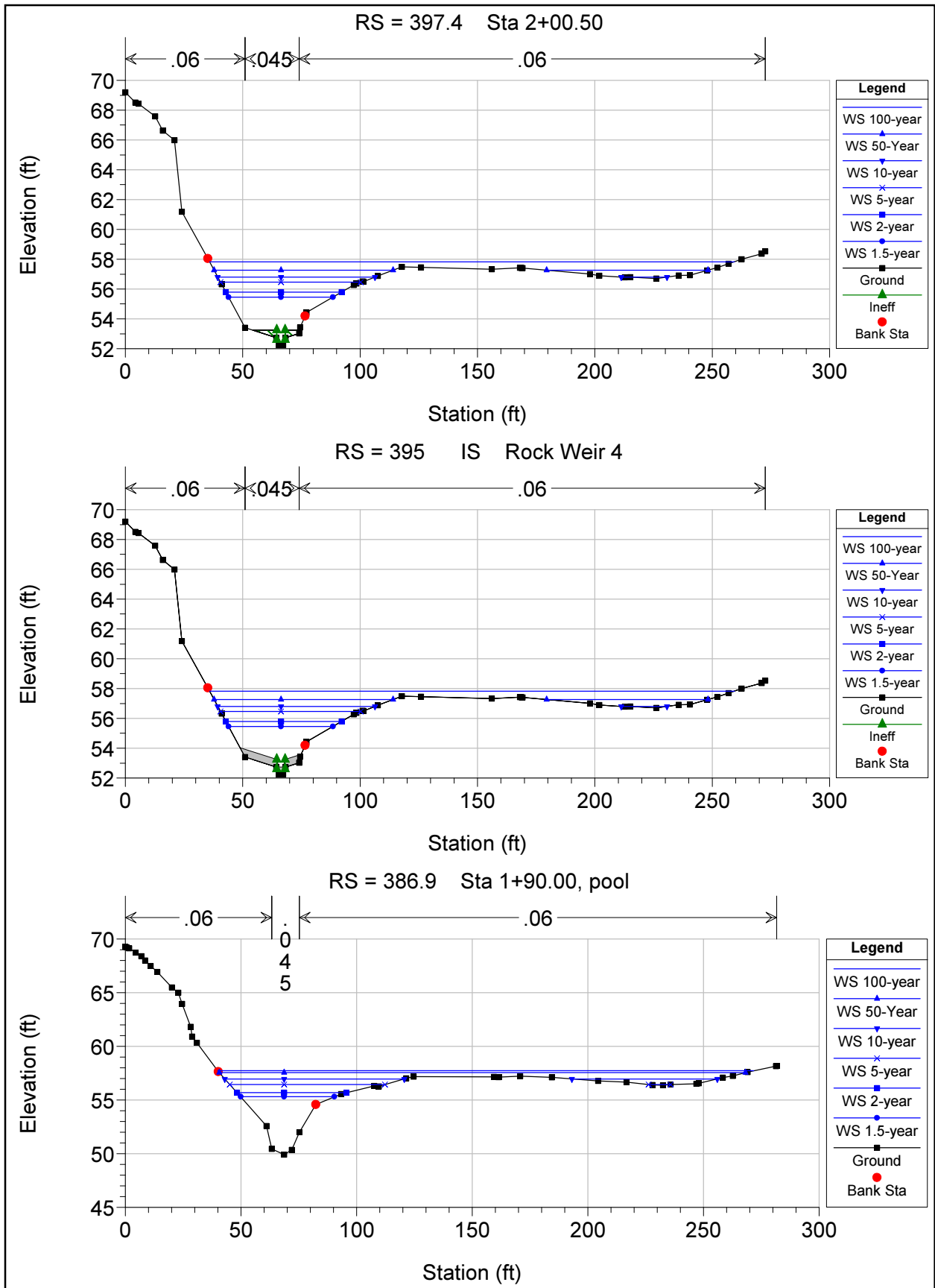


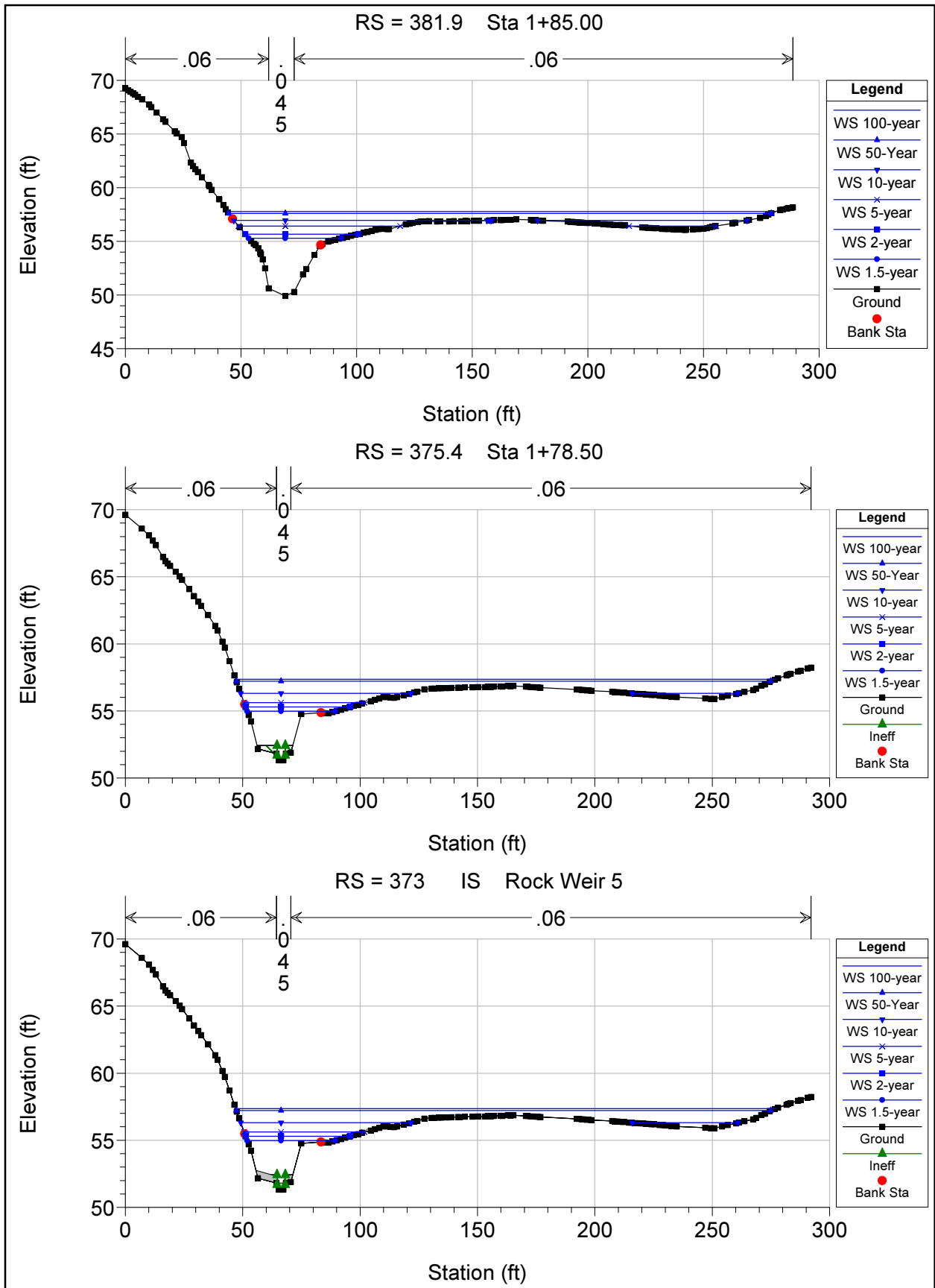


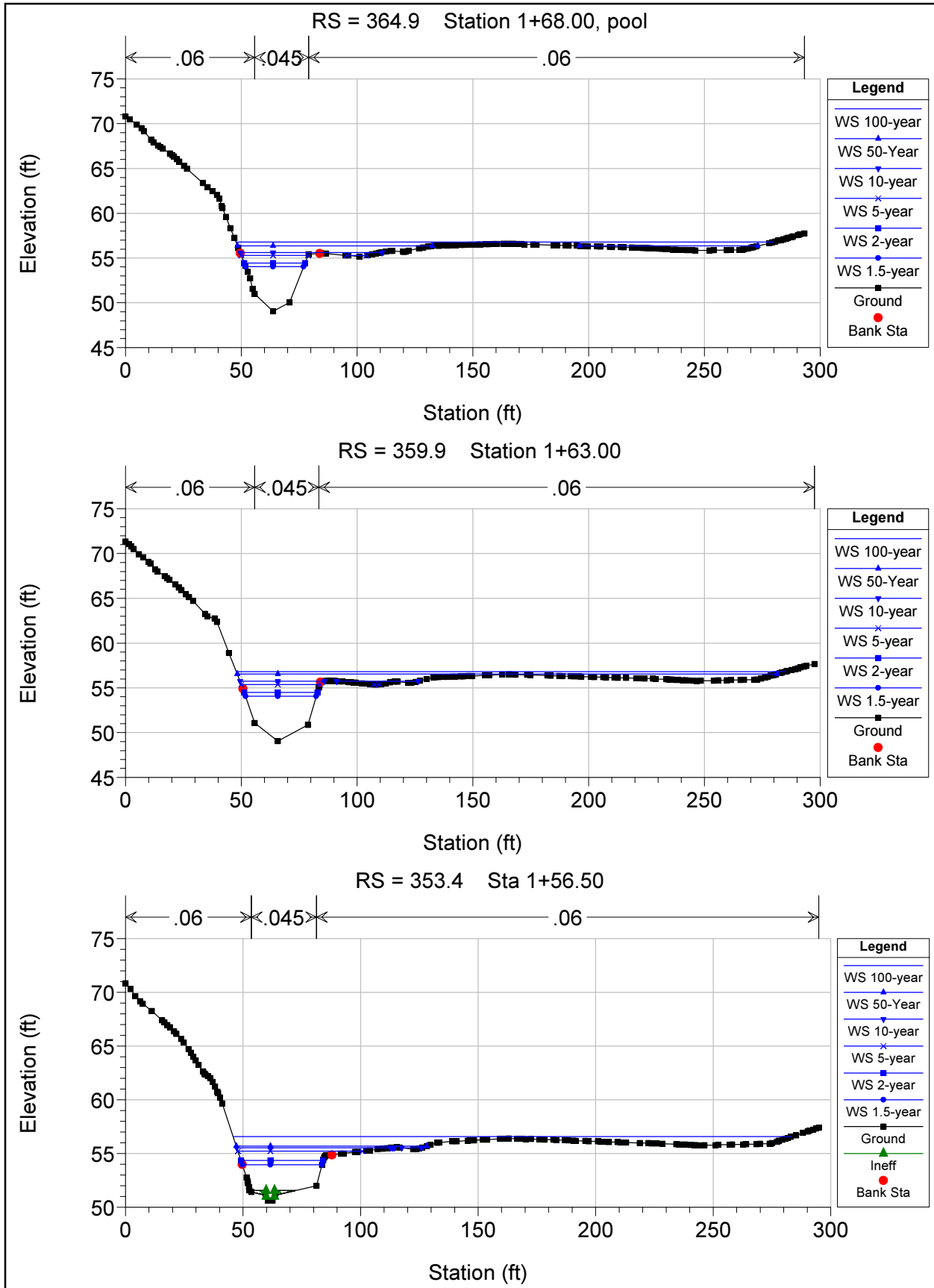


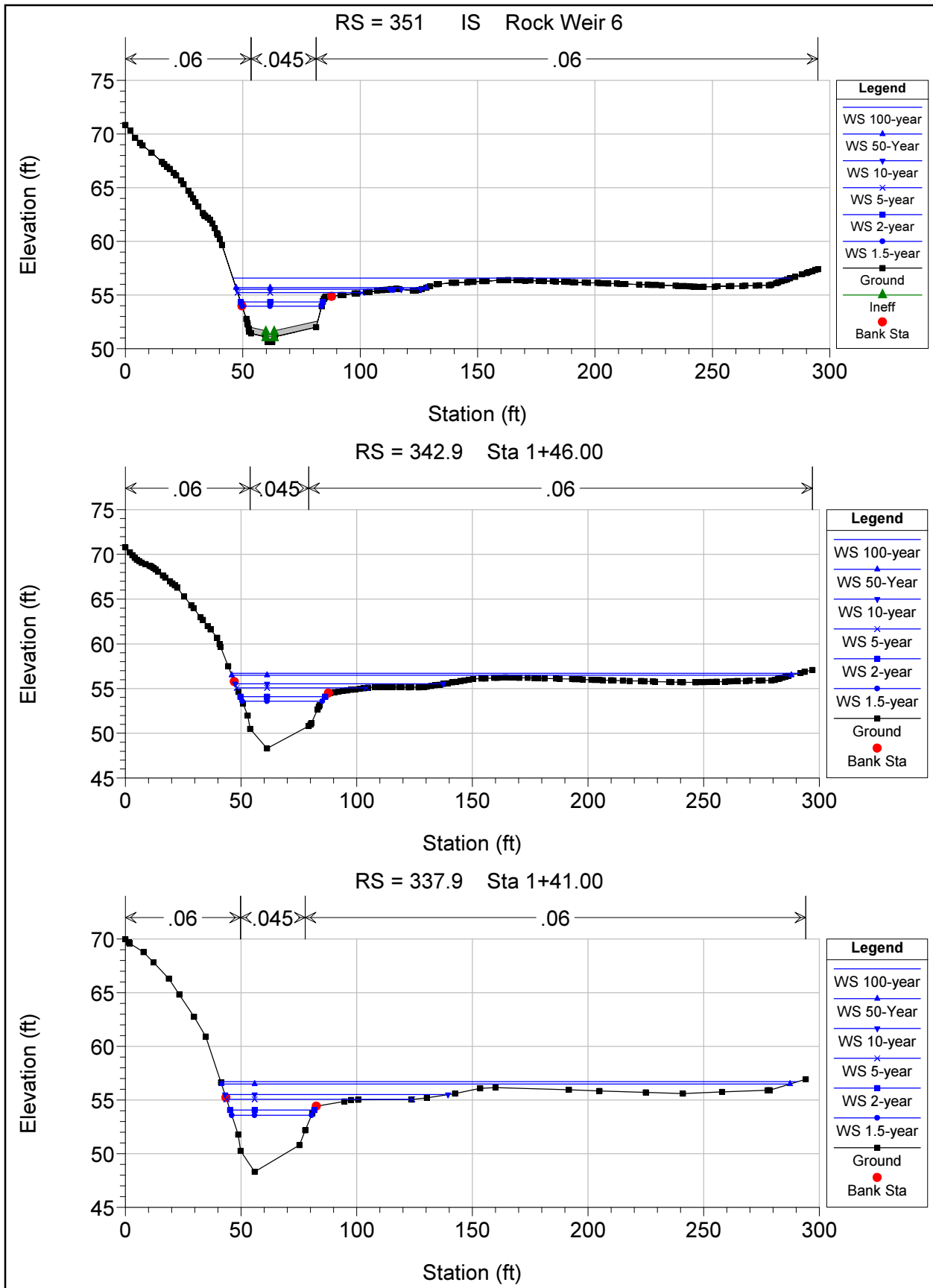


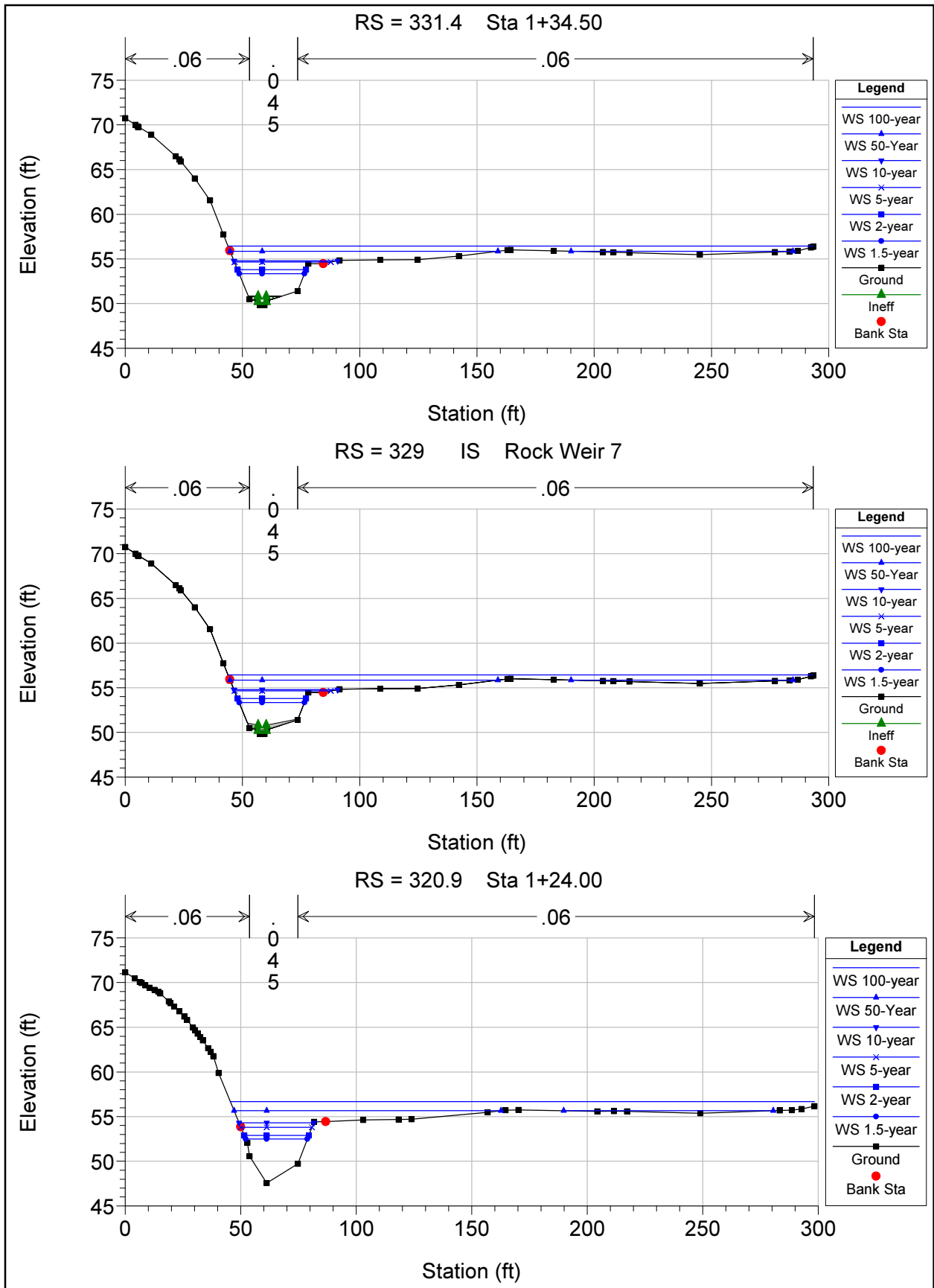


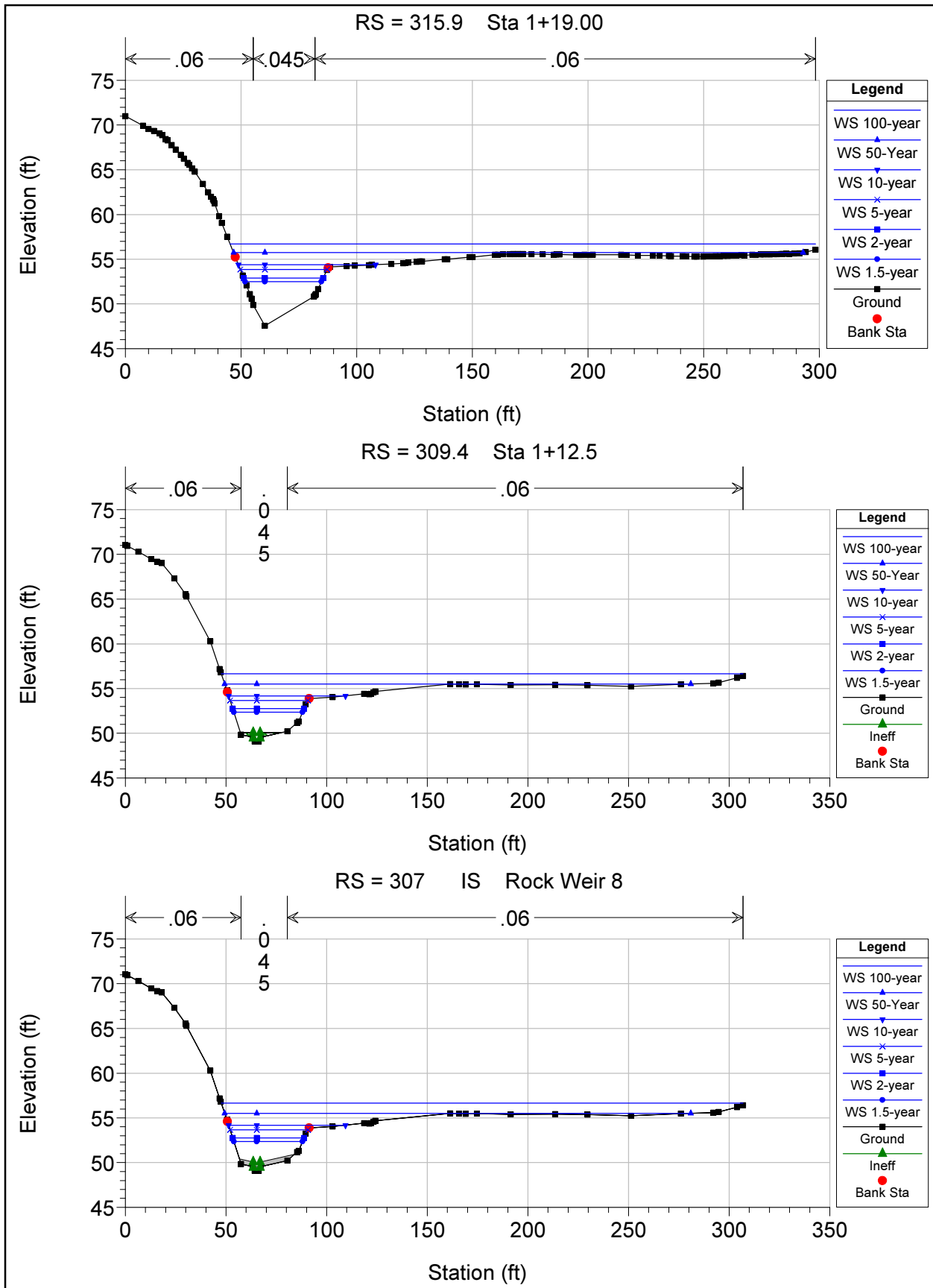


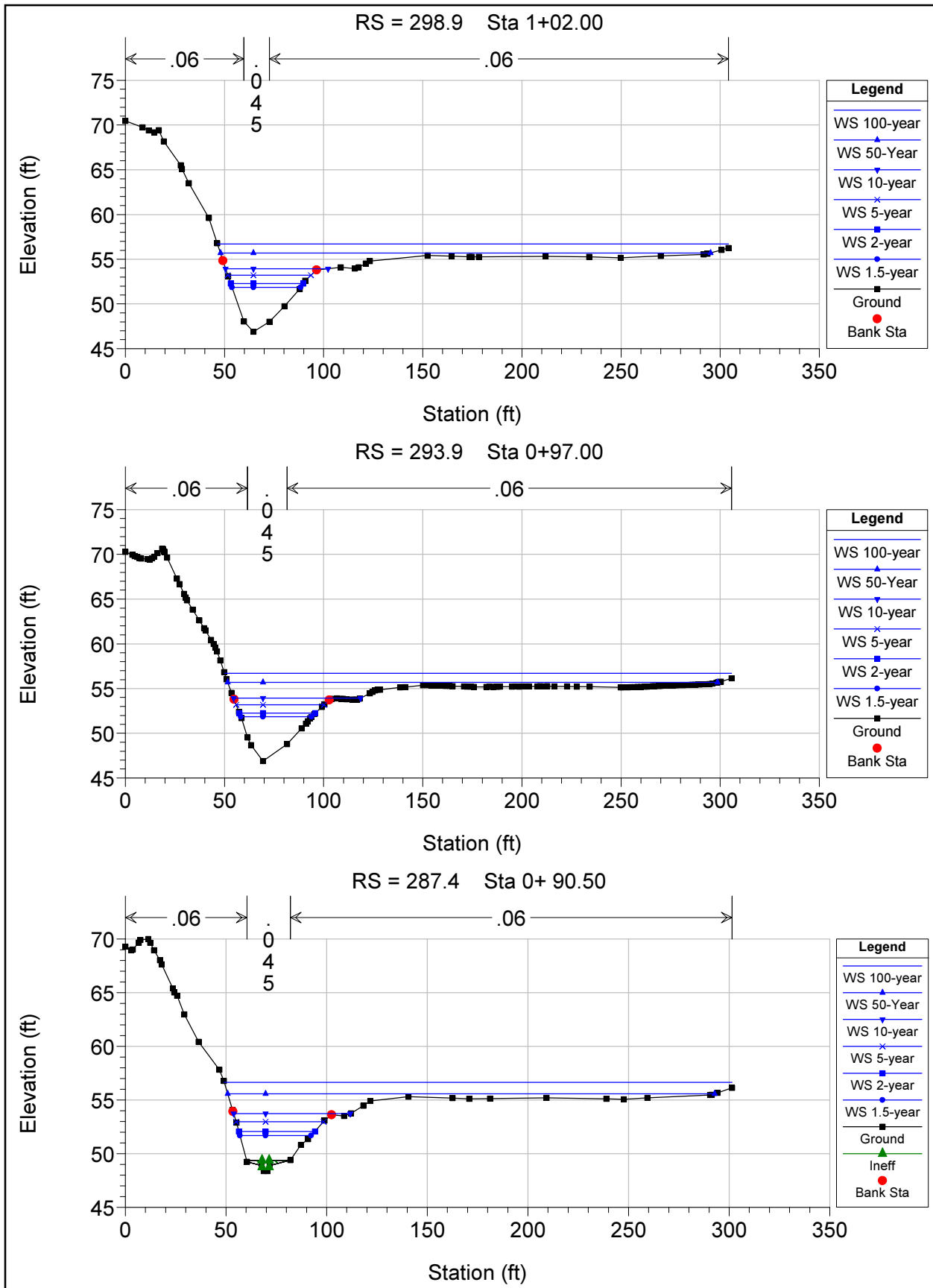


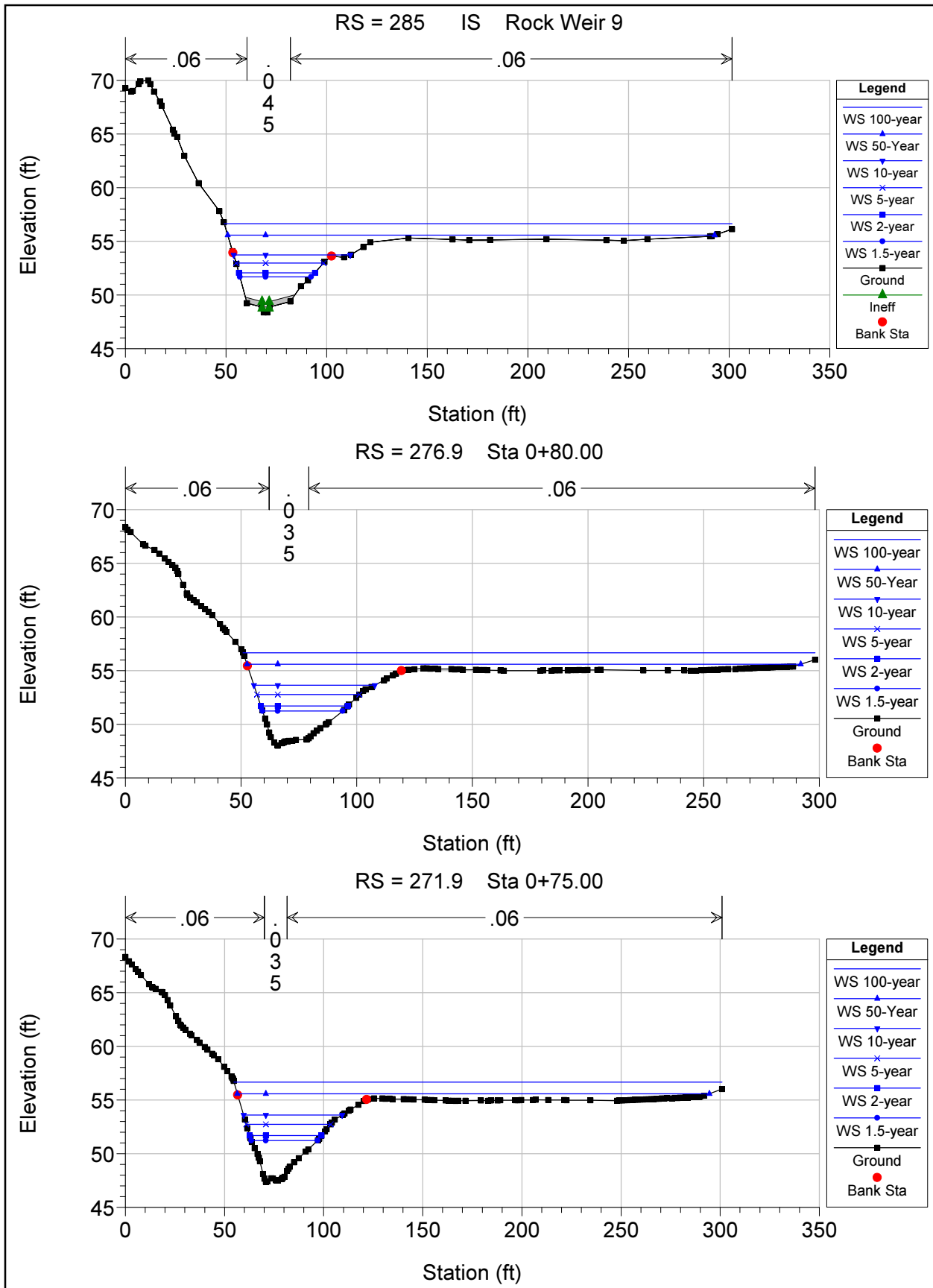


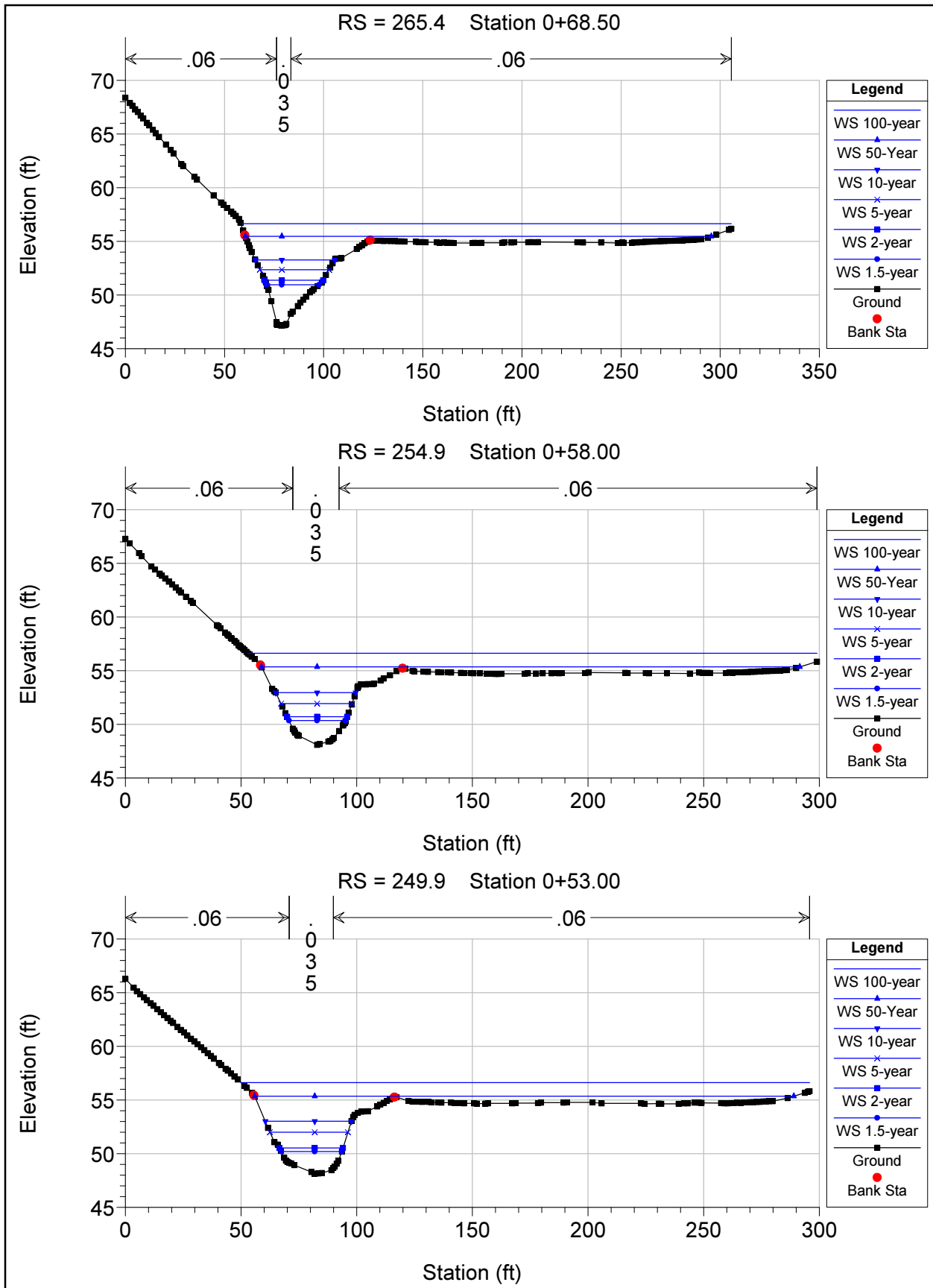


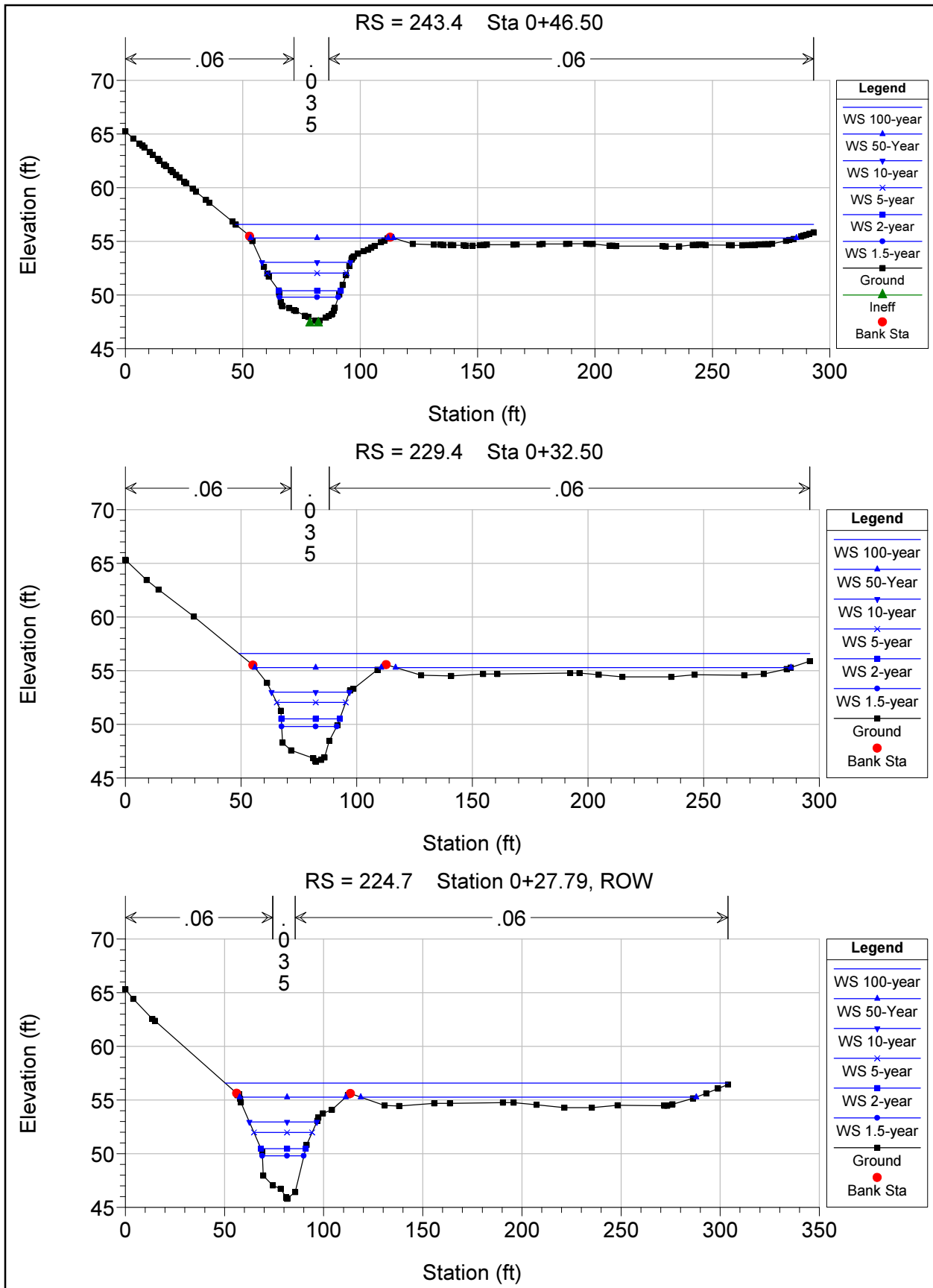


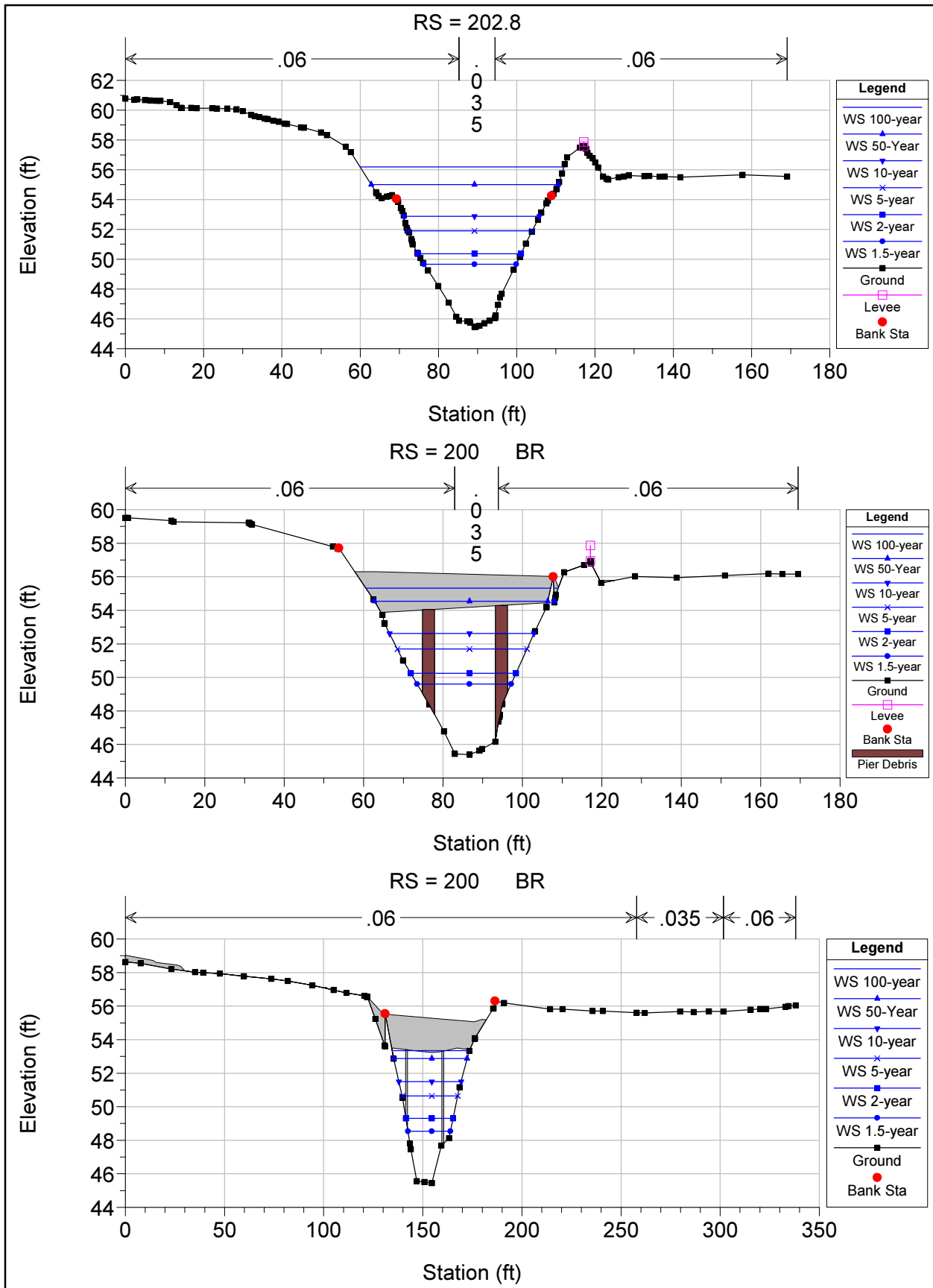


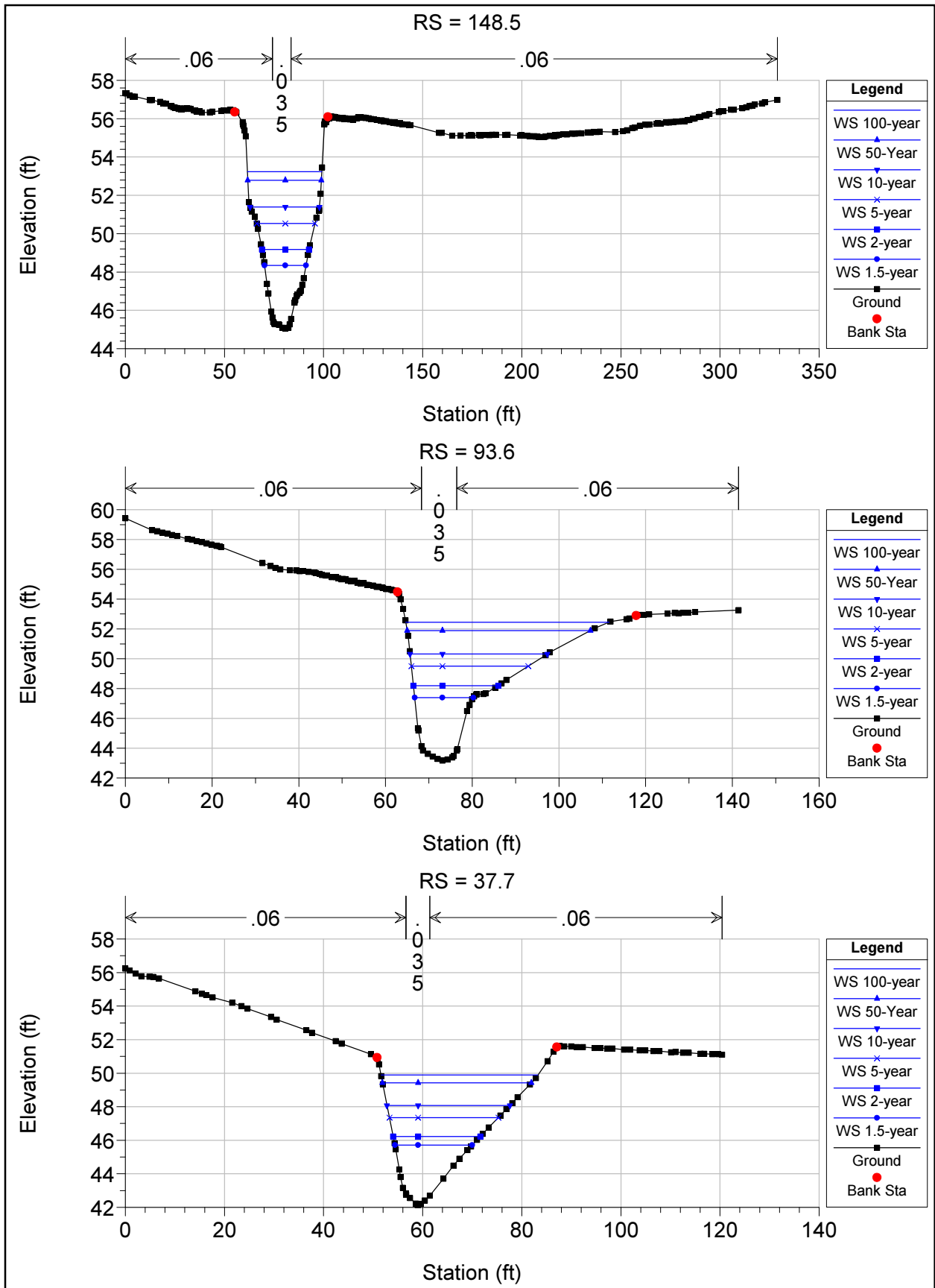


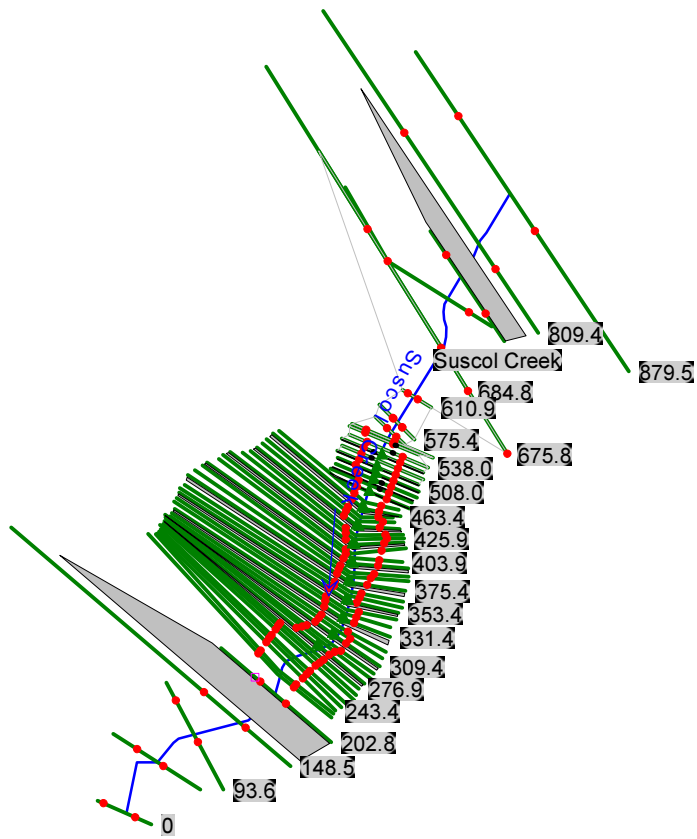












HEC-RAS Plan: Proposed 95%_2' pool_test River: Suscol Creek Reach: Suscol Creek

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 879.5 | Adult High Flow | 177.00 | 61.23 | 63.24 | 63.24 | 63.75 | 0.029473 | 5.76 | 30.72 | 30.71 | 1.02 |
| Suscol Creek | 879.5 | Juvenile High FI | 36.00 | 61.23 | 62.32 | 62.32 | 62.59 | 0.023291 | 4.12 | 8.73 | 17.00 | 1.01 |
| Suscol Creek | 879.5 | Adult Low Flow | 3.00 | 61.23 | 61.62 | 61.62 | 61.72 | 0.030399 | 2.57 | 1.17 | 5.64 | 1.00 |
| Suscol Creek | 879.5 | Juvenile Low Flo | 1.00 | 61.23 | 61.49 | 61.49 | 61.54 | 0.026814 | 1.85 | 0.54 | 3.92 | 0.88 |
| Suscol Creek | 809.4 | Adult High Flow | 177.00 | 58.36 | 61.64 | 60.67 | 61.88 | 0.006017 | 3.87 | 45.72 | 22.96 | 0.48 |
| Suscol Creek | 809.4 | Juvenile High FI | 36.00 | 58.36 | 60.01 | 59.44 | 60.10 | 0.004851 | 2.38 | 15.15 | 14.53 | 0.41 |
| Suscol Creek | 809.4 | Adult Low Flow | 3.00 | 58.36 | 58.83 | 58.72 | 58.87 | 0.012773 | 1.67 | 1.79 | 6.87 | 0.58 |
| Suscol Creek | 809.4 | Juvenile Low Flo | 1.00 | 58.36 | 58.65 | 58.59 | 58.68 | 0.012854 | 1.26 | 0.79 | 4.69 | 0.54 |
| Suscol Creek | 772 | Bridge | | | | | | | | | | |
| Suscol Creek | 766.0 | Adult High Flow | 177.00 | 57.64 | 59.96 | 59.96 | 60.70 | 0.017034 | 6.89 | 25.71 | 17.80 | 1.01 |
| Suscol Creek | 766.0 | Juvenile High FI | 36.00 | 57.64 | 58.69 | 58.69 | 59.04 | 0.021415 | 4.80 | 7.51 | 10.77 | 1.01 |
| Suscol Creek | 766.0 | Adult Low Flow | 3.00 | 57.64 | 58.09 | 57.96 | 58.12 | 0.005797 | 1.41 | 2.13 | 7.35 | 0.46 |
| Suscol Creek | 766.0 | Juvenile Low Flo | 1.00 | 57.64 | 57.95 | 57.86 | 57.96 | 0.004258 | 0.88 | 1.14 | 6.29 | 0.37 |
| Suscol Creek | 735.3 | Adult High Flow | 177.00 | 57.47 | 59.70 | | 59.85 | 0.003477 | 3.15 | 56.26 | 32.89 | 0.42 |
| Suscol Creek | 735.3 | Juvenile High FI | 36.00 | 57.47 | 58.04 | 58.04 | 58.26 | 0.024427 | 3.74 | 9.64 | 22.61 | 1.01 |
| Suscol Creek | 735.3 | Adult Low Flow | 3.00 | 57.47 | 57.67 | 57.67 | 57.72 | 0.046139 | 1.80 | 1.67 | 19.02 | 1.07 |
| Suscol Creek | 735.3 | Juvenile Low Flo | 1.00 | 57.47 | 57.61 | 57.61 | 57.64 | 0.045568 | 1.41 | 0.71 | 11.55 | 1.00 |
| Suscol Creek | 684.8 | Adult High Flow | 177.00 | 55.04 | 59.76 | | 59.78 | 0.000250 | 1.16 | 153.01 | 49.90 | 0.12 |
| Suscol Creek | 684.8 | Juvenile High FI | 36.00 | 55.04 | 58.12 | | 58.12 | 0.000083 | 0.48 | 75.52 | 43.69 | 0.06 |
| Suscol Creek | 684.8 | Adult Low Flow | 3.00 | 55.04 | 56.95 | | 56.95 | 0.000012 | 0.11 | 27.59 | 36.76 | 0.02 |
| Suscol Creek | 684.8 | Juvenile Low Flo | 1.00 | 55.04 | 56.66 | | 56.66 | 0.000003 | 0.06 | 18.05 | 26.75 | 0.01 |
| Suscol Creek | 675.8 | Adult High Flow | 177.00 | 55.04 | 59.51 | 57.34 | 59.76 | 0.000714 | 3.77 | 44.96 | 9.64 | 0.33 |
| Suscol Creek | 675.8 | Juvenile High FI | 36.00 | 55.04 | 58.10 | 55.98 | 58.12 | 0.000083 | 1.13 | 30.63 | 10.64 | 0.12 |
| Suscol Creek | 675.8 | Adult Low Flow | 3.00 | 55.04 | 56.95 | 55.35 | 56.95 | 0.000002 | 0.17 | 17.80 | 11.50 | 0.02 |
| Suscol Creek | 675.8 | Juvenile Low Flo | 1.00 | 55.04 | 56.66 | 55.23 | 56.66 | 0.000000 | 0.07 | 14.51 | 11.03 | 0.01 |
| Suscol Creek | 610.9 | Adult High Flow | 177.00 | 54.53 | 59.49 | 56.95 | 59.72 | 0.000426 | 3.82 | 46.30 | 9.70 | 0.30 |
| Suscol Creek | 610.9 | Juvenile High FI | 36.00 | 54.53 | 58.09 | 55.45 | 58.11 | 0.000046 | 1.11 | 32.50 | 10.00 | 0.10 |
| Suscol Creek | 610.9 | Adult Low Flow | 3.00 | 54.53 | 56.95 | 54.78 | 56.95 | 0.000001 | 0.14 | 21.16 | 9.76 | 0.02 |
| Suscol Creek | 610.9 | Juvenile Low Flo | 1.00 | 54.53 | 56.66 | 54.68 | 56.66 | 0.000000 | 0.05 | 18.33 | 9.62 | 0.01 |
| Suscol Creek | 575.4 | Adult High Flow | 177.00 | 54.22 | 59.50 | 56.49 | 59.69 | 0.000363 | 3.54 | 49.97 | 9.16 | 0.27 |
| Suscol Creek | 575.4 | Juvenile High FI | 36.00 | 54.22 | 58.09 | 55.04 | 58.11 | 0.000034 | 0.98 | 36.69 | 9.65 | 0.09 |
| Suscol Creek | 575.4 | Adult Low Flow | 3.00 | 54.22 | 56.95 | 54.41 | 56.95 | 0.000001 | 0.12 | 25.56 | 9.69 | 0.01 |
| Suscol Creek | 575.4 | Juvenile Low Flo | 1.00 | 54.22 | 56.66 | 54.32 | 56.66 | 0.000000 | 0.04 | 22.73 | 9.69 | 0.00 |
| Suscol Creek | 575.3 | Adult High Flow | 177.00 | 54.22 | 59.52 | 56.50 | 59.68 | 0.000275 | 3.25 | 54.50 | 11.35 | 0.26 |
| Suscol Creek | 575.3 | Juvenile High FI | 36.00 | 54.22 | 58.10 | 55.05 | 58.11 | 0.000029 | 0.93 | 38.65 | 10.92 | 0.09 |
| Suscol Creek | 575.3 | Adult Low Flow | 3.00 | 54.22 | 56.95 | 54.41 | 56.95 | 0.000001 | 0.11 | 26.34 | 10.52 | 0.01 |
| Suscol Creek | 575.3 | Juvenile Low Flo | 1.00 | 54.22 | 56.66 | 54.33 | 56.66 | 0.000000 | 0.04 | 23.28 | 10.42 | 0.01 |
| Suscol Creek | 557.3 | Adult High Flow | 177.00 | 54.18 | 59.53 | 56.32 | 59.67 | 0.000214 | 2.96 | 59.87 | 12.31 | 0.24 |
| Suscol Creek | 557.3 | Juvenile High FI | 36.00 | 54.18 | 58.10 | 54.95 | 58.11 | 0.000023 | 0.85 | 42.51 | 11.82 | 0.08 |
| Suscol Creek | 557.3 | Adult Low Flow | 3.00 | 54.18 | 56.95 | 54.35 | 56.95 | 0.000000 | 0.10 | 29.15 | 11.41 | 0.01 |
| Suscol Creek | 557.3 | Juvenile Low Flo | 1.00 | 54.18 | 56.66 | 54.27 | 56.66 | 0.000000 | 0.04 | 25.84 | 11.28 | 0.00 |
| Suscol Creek | 551.0 | Adult High Flow | 177.00 | 54.16 | 59.57 | 56.04 | 59.66 | 0.000126 | 2.41 | 73.55 | 14.74 | 0.19 |
| Suscol Creek | 551.0 | Juvenile High FI | 36.00 | 54.16 | 58.10 | 54.88 | 58.11 | 0.000014 | 0.89 | 52.29 | 14.27 | 0.06 |
| Suscol Creek | 551.0 | Adult Low Flow | 3.00 | 54.16 | 56.95 | 54.35 | 56.95 | 0.000000 | 0.08 | 36.06 | 13.90 | 0.01 |
| Suscol Creek | 551.0 | Juvenile Low Flo | 1.00 | 54.16 | 56.66 | 54.28 | 56.66 | 0.000000 | 0.03 | 32.01 | 13.81 | 0.00 |
| Suscol Creek | 547.5 | Adult High Flow | 177.00 | 54.16 | 59.58 | 55.97 | 59.65 | 0.000103 | 2.18 | 81.16 | 18.18 | 0.18 |
| Suscol Creek | 547.5 | Juvenile High FI | 36.00 | 54.16 | 58.10 | 54.85 | 58.11 | 0.000011 | 0.64 | 56.51 | 15.61 | 0.06 |
| Suscol Creek | 547.5 | Adult Low Flow | 3.00 | 54.16 | 56.95 | 54.34 | 56.95 | 0.000000 | 0.08 | 38.83 | 15.07 | 0.01 |
| Suscol Creek | 547.5 | Juvenile Low Flo | 1.00 | 54.16 | 56.66 | 54.27 | 56.66 | 0.000000 | 0.03 | 34.45 | 14.93 | 0.00 |
| Suscol Creek | 538.0 | Adult High Flow | 177.00 | 54.13 | 59.59 | 55.93 | 59.64 | 0.000069 | 1.79 | 98.71 | 25.13 | 0.16 |
| Suscol Creek | 538.0 | Juvenile High FI | 36.00 | 54.13 | 58.10 | 54.83 | 58.11 | 0.000008 | 0.55 | 64.92 | 20.35 | 0.05 |
| Suscol Creek | 538.0 | Adult Low Flow | 3.00 | 54.13 | 56.95 | 54.32 | 56.95 | 0.000000 | 0.07 | 42.81 | 18.13 | 0.01 |
| Suscol Creek | 538.0 | Juvenile Low Flo | 1.00 | 54.13 | 56.66 | 54.24 | 56.66 | 0.000000 | 0.03 | 37.59 | 17.65 | 0.00 |
| Suscol Creek | 530.5 | Adult High Flow | 177.00 | 54.00 | 59.55 | 57.51 | 59.64 | 0.000195 | 2.39 | 74.09 | 26.02 | 0.25 |
| Suscol Creek | 530.5 | Juvenile High FI | 36.00 | 54.00 | 58.09 | 56.59 | 58.10 | 0.000044 | 0.91 | 39.66 | 21.58 | 0.12 |
| Suscol Creek | 530.5 | Adult Low Flow | 3.00 | 54.00 | 56.95 | 54.66 | 56.95 | 0.000005 | 0.19 | 15.90 | 19.63 | 0.04 |
| Suscol Creek | 530.5 | Juvenile Low Flo | 1.00 | 54.00 | 56.66 | 54.32 | 56.66 | 0.000002 | 0.10 | 10.30 | 18.79 | 0.02 |
| Suscol Creek | 530 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 523.0 | Adult High Flow | 177.00 | 53.41 | 59.18 | 55.68 | 59.23 | 0.000082 | 1.83 | 96.62 | 24.72 | 0.16 |
| Suscol Creek | 523.0 | Juvenile High FI | 36.00 | 53.41 | 57.71 | 54.55 | 57.72 | 0.000009 | 0.57 | 63.46 | 21.09 | 0.06 |
| Suscol Creek | 523.0 | Adult Low Flow | 3.00 | 53.41 | 56.56 | 54.02 | 56.56 | 0.000000 | 0.07 | 40.55 | 18.50 | 0.01 |
| Suscol Creek | 523.0 | Juvenile Low Flo | 1.00 | 53.41 | 56.27 | 53.76 | 56.27 | 0.000000 | 0.03 | 35.17 | 17.78 | 0.00 |
| Suscol Creek | 515.5 | Adult High Flow | 177.00 | 53.69 | 59.13 | 57.16 | 59.23 | 0.000184 | 2.44 | 72.56 | 26.15 | 0.26 |
| Suscol Creek | 515.5 | Juvenile High FI | 36.00 | 53.69 | 57.70 | 56.22 | 57.71 | 0.000049 | 0.94 | 38.37 | 21.73 | 0.12 |
| Suscol Creek | 515.5 | Adult Low Flow | 3.00 | 53.69 | 56.56 | 54.41 | 56.56 | 0.000006 | 0.20 | 15.32 | 18.80 | 0.04 |
| Suscol Creek | 515.5 | Juvenile Low Flo | 1.00 | 53.69 | 56.27 | 54.07 | 56.27 | 0.000003 | 0.10 | 9.86 | 18.08 | 0.02 |

HEC-RAS Plan: Proposed 95%_2'_pool_test River: Suscol Creek Reach: Suscol Creek (Continued)

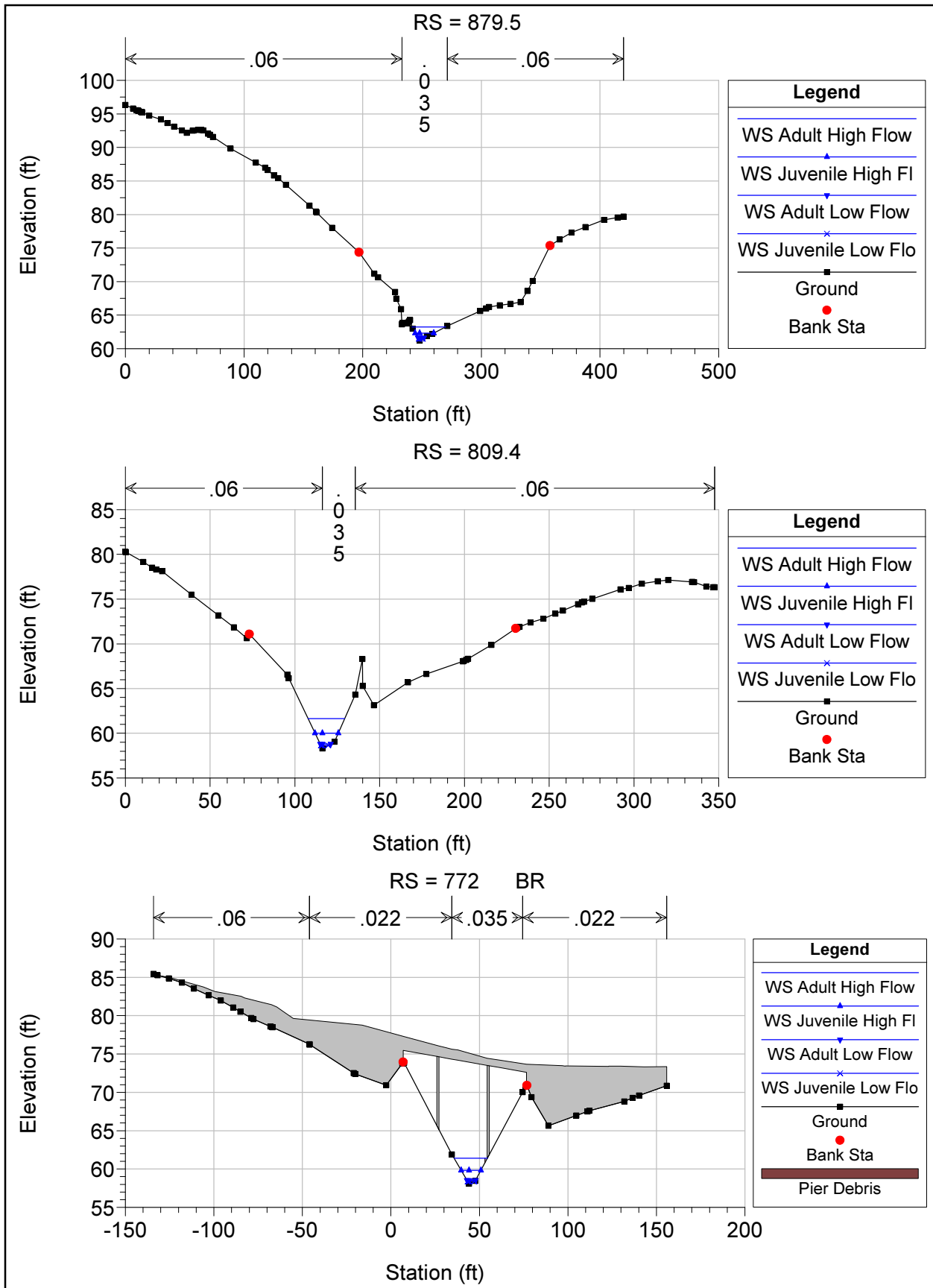
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 515 | | | | | | | | | | | |
| | | Inl Struct | | | | | | | | | | |
| Suscol Creek | 508.0 | Adult High Flow | 177.00 | 53.39 | 58.72 | 56.85 | 58.82 | 0.003402 | 2.81 | 67.79 | 25.01 | 0.28 |
| Suscol Creek | 508.0 | Juvenile High FI | 36.00 | 53.39 | 57.31 | 55.85 | 57.32 | 0.000910 | 1.01 | 35.67 | 20.67 | 0.14 |
| Suscol Creek | 508.0 | Adult Low Flow | 3.00 | 53.39 | 56.17 | 54.06 | 56.17 | 0.000110 | 0.21 | 13.99 | 17.31 | 0.04 |
| Suscol Creek | 508.0 | Juvenile Low Flo | 1.00 | 53.39 | 55.87 | 53.72 | 55.88 | 0.000049 | 0.11 | 9.03 | 16.42 | 0.03 |
| Suscol Creek | 507 | | | | | | | | | | | |
| | | Inl Struct | | | | | | | | | | |
| Suscol Creek | 500.5 | Adult High Flow | 177.00 | 53.14 | 58.32 | 56.50 | 58.44 | 0.000258 | 2.83 | 62.47 | 21.55 | 0.29 |
| Suscol Creek | 500.5 | Juvenile High FI | 36.00 | 53.14 | 56.92 | 55.48 | 56.94 | 0.000061 | 1.05 | 34.23 | 19.38 | 0.14 |
| Suscol Creek | 500.5 | Adult Low Flow | 3.00 | 53.14 | 55.78 | 53.80 | 55.78 | 0.000008 | 0.22 | 13.43 | 16.69 | 0.04 |
| Suscol Creek | 500.5 | Juvenile Low Flo | 1.00 | 53.14 | 55.49 | 53.46 | 55.49 | 0.000003 | 0.11 | 8.72 | 15.85 | 0.03 |
| Suscol Creek | 496 | | | | | | | | | | | |
| | | Inl Struct | | | | | | | | | | |
| Suscol Creek | 493.0 | Adult High Flow | 177.00 | 52.85 | 58.10 | 55.08 | 58.17 | 0.001597 | 2.17 | 81.51 | 21.12 | 0.19 |
| Suscol Creek | 493.0 | Juvenile High FI | 36.00 | 52.85 | 56.67 | 53.84 | 56.68 | 0.000229 | 0.88 | 52.67 | 19.18 | 0.07 |
| Suscol Creek | 493.0 | Adult Low Flow | 3.00 | 52.85 | 55.53 | 53.15 | 55.53 | 0.000007 | 0.09 | 32.07 | 16.70 | 0.01 |
| Suscol Creek | 493.0 | Juvenile Low Flo | 1.00 | 52.85 | 55.24 | 53.02 | 55.24 | 0.000001 | 0.04 | 27.29 | 15.97 | 0.00 |
| Suscol Creek | 485.5 | Adult High Flow | 177.00 | 52.27 | 58.04 | 56.15 | 58.15 | 0.001942 | 2.84 | 66.92 | 23.89 | 0.28 |
| Suscol Creek | 485.5 | Juvenile High FI | 36.00 | 52.27 | 56.66 | 55.17 | 56.68 | 0.000486 | 0.99 | 36.33 | 20.44 | 0.13 |
| Suscol Creek | 485.5 | Adult Low Flow | 3.00 | 52.27 | 55.53 | 52.94 | 55.53 | 0.000055 | 0.20 | 14.70 | 17.66 | 0.04 |
| Suscol Creek | 485.5 | Juvenile Low Flo | 1.00 | 52.27 | 55.24 | 52.60 | 55.24 | 0.000023 | 0.10 | 9.64 | 16.96 | 0.02 |
| Suscol Creek | 485 | | | | | | | | | | | |
| | | Inl Struct | | | | | | | | | | |
| Suscol Creek | 471.4 | Adult High Flow | 177.00 | 52.26 | 57.24 | | 57.31 | 0.001511 | 2.15 | 82.50 | 25.93 | 0.21 |
| Suscol Creek | 471.4 | Juvenile High FI | 36.00 | 52.26 | 56.01 | | 56.02 | 0.000201 | 0.88 | 53.25 | 21.76 | 0.08 |
| Suscol Creek | 471.4 | Adult Low Flow | 3.00 | 52.26 | 55.25 | | 55.25 | 0.000004 | 0.08 | 37.70 | 19.07 | 0.01 |
| Suscol Creek | 471.4 | Juvenile Low Flo | 1.00 | 52.26 | 54.98 | | 54.98 | 0.000001 | 0.03 | 32.67 | 18.11 | 0.00 |
| Suscol Creek | 463.4 | Adult High Flow | 177.00 | 54.18 | 57.09 | 56.26 | 57.28 | 0.005270 | 3.48 | 50.84 | 27.55 | 0.45 |
| Suscol Creek | 463.4 | Juvenile High FI | 36.00 | 54.18 | 55.97 | 55.47 | 56.01 | 0.003124 | 1.66 | 21.64 | 24.53 | 0.31 |
| Suscol Creek | 463.4 | Adult Low Flow | 3.00 | 54.18 | 55.25 | 54.54 | 55.25 | 0.003079 | 0.64 | 4.67 | 22.20 | 0.25 |
| Suscol Creek | 463.4 | Juvenile Low Flo | 1.00 | 54.18 | 54.98 | 54.37 | 54.98 | 0.000240 | 0.40 | 2.52 | 15.96 | 0.08 |
| Suscol Creek | 463 | | | | | | | | | | | |
| | | Inl Struct | | | | | | | | | | |
| Suscol Creek | 452.9 | Adult High Flow | 177.00 | 52.16 | 56.57 | | 56.62 | 0.000860 | 1.82 | 97.13 | 31.53 | 0.18 |
| Suscol Creek | 452.9 | Juvenile High FI | 36.00 | 52.16 | 55.51 | | 55.51 | 0.000100 | 0.55 | 65.80 | 27.60 | 0.06 |
| Suscol Creek | 452.9 | Adult Low Flow | 3.00 | 52.16 | 54.74 | | 54.74 | 0.000002 | 0.07 | 45.42 | 25.31 | 0.01 |
| Suscol Creek | 452.9 | Juvenile Low Flo | 1.00 | 52.16 | 54.46 | | 54.46 | 0.000000 | 0.03 | 38.57 | 24.51 | 0.00 |
| Suscol Creek | 447.9 | Adult High Flow | 177.00 | 52.16 | 56.57 | | 56.62 | 0.000785 | 1.74 | 101.94 | 33.74 | 0.18 |
| Suscol Creek | 447.9 | Juvenile High FI | 36.00 | 52.16 | 55.51 | | 55.51 | 0.000091 | 0.52 | 68.59 | 29.05 | 0.06 |
| Suscol Creek | 447.9 | Adult Low Flow | 3.00 | 52.16 | 54.74 | | 54.74 | 0.000002 | 0.06 | 47.38 | 26.29 | 0.01 |
| Suscol Creek | 447.9 | Juvenile Low Flo | 1.00 | 52.16 | 54.46 | | 54.46 | 0.000000 | 0.02 | 40.27 | 25.49 | 0.00 |
| Suscol Creek | 441.4 | Adult High Flow | 177.00 | 53.66 | 56.45 | 55.63 | 56.60 | 0.004561 | 3.04 | 58.29 | 35.40 | 0.42 |
| Suscol Creek | 441.4 | Juvenile High FI | 36.00 | 53.66 | 55.48 | 54.93 | 55.51 | 0.002224 | 1.38 | 26.09 | 30.44 | 0.26 |
| Suscol Creek | 441.4 | Adult Low Flow | 3.00 | 53.66 | 54.73 | 54.02 | 54.74 | 0.002988 | 0.62 | 4.83 | 23.56 | 0.24 |
| Suscol Creek | 441.4 | Juvenile Low Flo | 1.00 | 53.66 | 54.46 | 53.85 | 54.46 | 0.000240 | 0.40 | 2.52 | 16.06 | 0.08 |
| Suscol Creek | 439 | | | | | | | | | | | |
| | | Inl Struct | | | | | | | | | | |
| Suscol Creek | 430.9 | Adult High Flow | 177.00 | 51.50 | 55.91 | | 55.95 | 0.000743 | 1.64 | 108.23 | 35.72 | 0.17 |
| Suscol Creek | 430.9 | Juvenile High FI | 36.00 | 51.50 | 54.86 | | 54.86 | 0.000089 | 0.49 | 73.00 | 31.34 | 0.06 |
| Suscol Creek | 430.9 | Adult Low Flow | 3.00 | 51.50 | 54.07 | | 54.07 | 0.000002 | 0.06 | 49.34 | 28.99 | 0.01 |
| Suscol Creek | 430.9 | Juvenile Low Flo | 1.00 | 51.50 | 53.80 | | 53.80 | 0.000000 | 0.02 | 41.59 | 28.18 | 0.00 |
| Suscol Creek | 425.9 | Adult High Flow | 177.00 | 51.50 | 55.91 | | 55.95 | 0.000738 | 1.61 | 109.73 | 37.87 | 0.17 |
| Suscol Creek | 425.9 | Juvenile High FI | 36.00 | 51.50 | 54.86 | | 54.86 | 0.000097 | 0.50 | 72.32 | 33.31 | 0.06 |
| Suscol Creek | 425.9 | Adult Low Flow | 3.00 | 51.50 | 54.07 | | 54.07 | 0.000002 | 0.06 | 47.45 | 30.34 | 0.01 |
| Suscol Creek | 425.9 | Juvenile Low Flo | 1.00 | 51.50 | 53.80 | | 53.80 | 0.000000 | 0.03 | 39.34 | 29.42 | 0.00 |
| Suscol Creek | 419.4 | Adult High Flow | 177.00 | 53.00 | 55.80 | 54.97 | 55.93 | 0.004076 | 2.89 | 61.36 | 37.74 | 0.40 |
| Suscol Creek | 419.4 | Juvenile High FI | 36.00 | 53.00 | 54.83 | 54.28 | 54.86 | 0.002233 | 1.34 | 26.96 | 33.07 | 0.26 |
| Suscol Creek | 419.4 | Adult Low Flow | 3.00 | 53.00 | 54.07 | 53.36 | 54.07 | 0.003192 | 0.64 | 4.65 | 22.46 | 0.25 |
| Suscol Creek | 419.4 | Juvenile Low Flo | 1.00 | 53.00 | 53.80 | 53.19 | 53.80 | 0.000241 | 0.40 | 2.51 | 16.02 | 0.08 |
| Suscol Creek | 417 | | | | | | | | | | | |
| | | Inl Struct | | | | | | | | | | |
| Suscol Creek | 408.9 | Adult High Flow | 177.00 | 50.74 | 55.20 | | 55.26 | 0.001261 | 1.86 | 95.58 | 37.01 | 0.20 |
| Suscol Creek | 408.9 | Juvenile High FI | 36.00 | 50.74 | 54.09 | | 54.10 | 0.000196 | 0.61 | 59.46 | 29.32 | 0.07 |
| Suscol Creek | 408.9 | Adult Low Flow | 3.00 | 50.74 | 53.32 | | 53.32 | 0.000004 | 0.08 | 38.81 | 24.12 | 0.01 |
| Suscol Creek | 408.9 | Juvenile Low Flo | 1.00 | 50.74 | 53.04 | | 53.04 | 0.000001 | 0.03 | 32.41 | 22.44 | 0.00 |
| Suscol Creek | 403.9 | Adult High Flow | 177.00 | 50.74 | 55.19 | | 55.25 | 0.001288 | 1.94 | 93.89 | 39.48 | 0.20 |
| Suscol Creek | 403.9 | Juvenile High FI | 36.00 | 50.74 | 54.09 | | 54.10 | 0.000190 | 0.62 | 58.04 | 27.28 | 0.07 |
| Suscol Creek | 403.9 | Adult Low Flow | 3.00 | 50.74 | 53.32 | | 53.32 | 0.000004 | 0.08 | 38.47 | 23.28 | 0.01 |

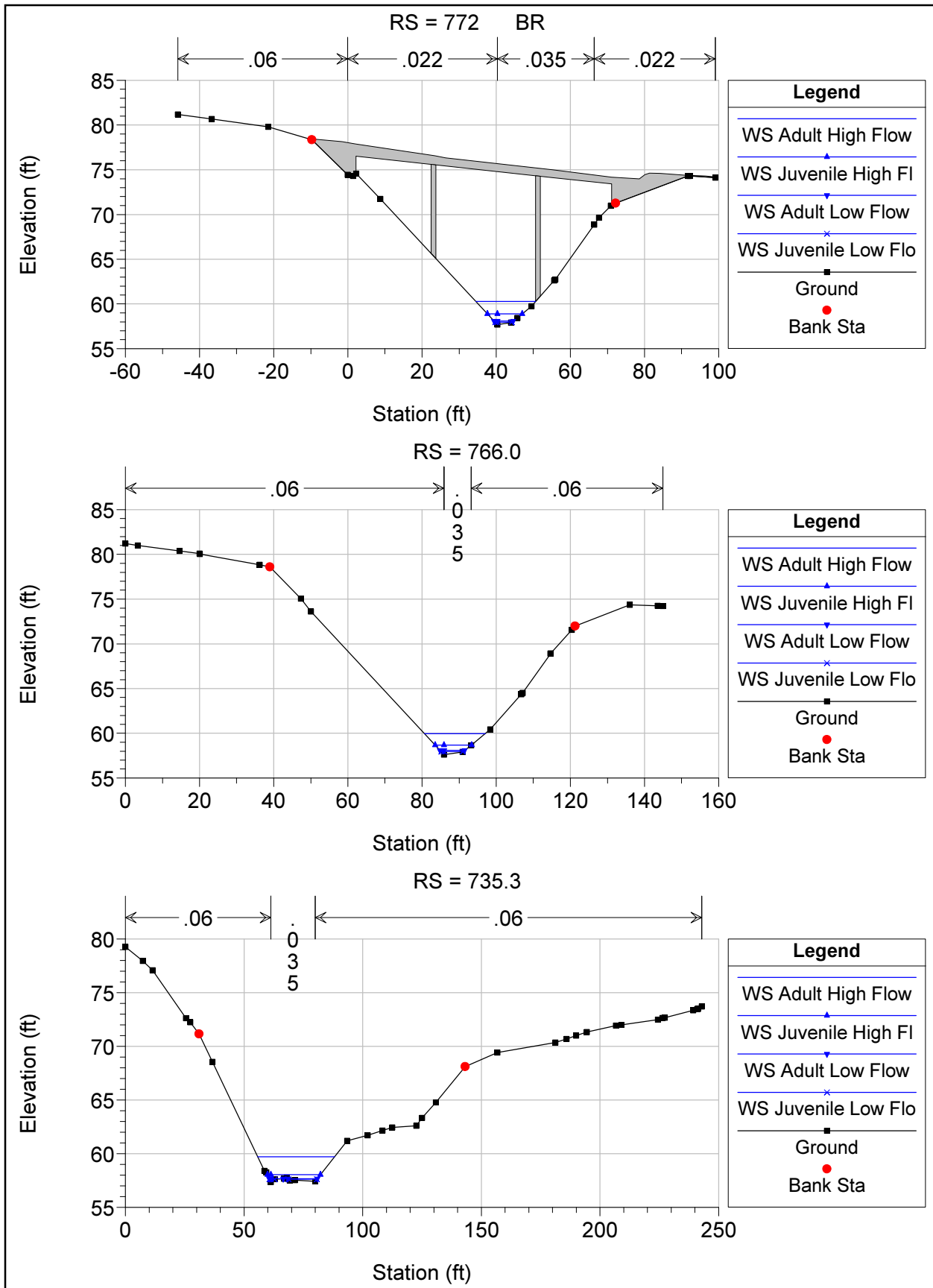
HEC-RAS Plan: Proposed 95%_2'_pool_test River: Suscol Creek Reach: Suscol Creek (Continued)

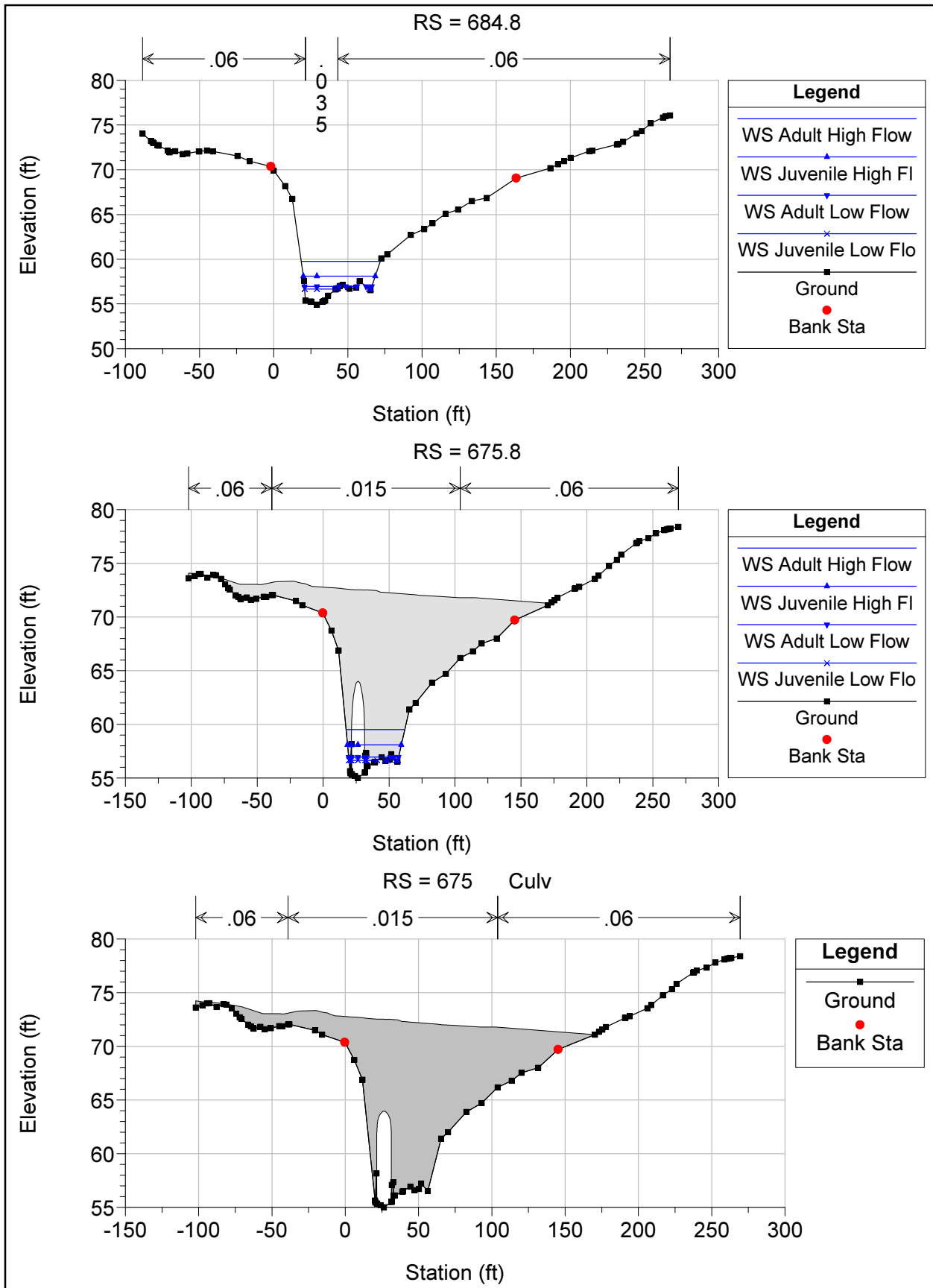
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 403.9 | Juvenile Low Flo | 1.00 | 50.74 | 53.04 | | 53.04 | 0.000001 | 0.03 | 32.26 | 21.86 | 0.00 |
| Suscol Creek | 397.4 | Adult High Flow | 177.00 | 52.24 | 55.06 | 54.29 | 55.22 | 0.005158 | 3.29 | 55.48 | 38.72 | 0.45 |
| Suscol Creek | 397.4 | Juvenile High FI | 36.00 | 52.24 | 54.05 | 53.52 | 54.09 | 0.002807 | 1.55 | 23.28 | 27.39 | 0.30 |
| Suscol Creek | 397.4 | Adult Low Flow | 3.00 | 52.24 | 53.31 | 52.60 | 53.32 | 0.002943 | 0.64 | 4.68 | 21.49 | 0.24 |
| Suscol Creek | 397.4 | Juvenile Low Flo | 1.00 | 52.24 | 53.04 | 52.43 | 53.04 | 0.000240 | 0.40 | 2.52 | 15.76 | 0.08 |
| Suscol Creek | 395 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 386.9 | Adult High Flow | 177.00 | 49.91 | 54.66 | | 54.74 | 0.002266 | 2.32 | 76.25 | 30.76 | 0.26 |
| Suscol Creek | 386.9 | Juvenile High FI | 36.00 | 49.91 | 53.24 | | 53.25 | 0.000427 | 0.89 | 40.45 | 20.40 | 0.11 |
| Suscol Creek | 386.9 | Adult Low Flow | 3.00 | 49.91 | 52.38 | | 52.38 | 0.000008 | 0.12 | 25.45 | 15.09 | 0.02 |
| Suscol Creek | 386.9 | Juvenile Low Flo | 1.00 | 49.91 | 52.11 | | 52.11 | 0.000001 | 0.05 | 21.50 | 14.05 | 0.01 |
| Suscol Creek | 381.9 | Adult High Flow | 177.00 | 49.91 | 54.65 | | 54.73 | 0.001758 | 2.18 | 81.08 | 28.13 | 0.23 |
| Suscol Creek | 381.9 | Juvenile High FI | 36.00 | 49.91 | 53.24 | | 53.25 | 0.000284 | 0.77 | 46.95 | 20.96 | 0.09 |
| Suscol Creek | 381.9 | Adult Low Flow | 3.00 | 49.91 | 52.38 | | 52.38 | 0.000006 | 0.10 | 30.42 | 17.66 | 0.01 |
| Suscol Creek | 381.9 | Juvenile Low Flo | 1.00 | 49.91 | 52.11 | | 52.11 | 0.000001 | 0.04 | 25.78 | 16.65 | 0.01 |
| Suscol Creek | 375.4 | Adult High Flow | 177.00 | 51.31 | 54.45 | 53.65 | 54.69 | 0.006594 | 3.91 | 45.21 | 24.05 | 0.50 |
| Suscol Creek | 375.4 | Juvenile High FI | 36.00 | 51.31 | 53.17 | 52.70 | 53.24 | 0.004730 | 2.06 | 17.52 | 19.44 | 0.38 |
| Suscol Creek | 375.4 | Adult Low Flow | 3.00 | 51.31 | 52.37 | 51.67 | 52.38 | 0.000768 | 0.87 | 3.43 | 17.09 | 0.16 |
| Suscol Creek | 375.4 | Juvenile Low Flo | 1.00 | 51.31 | 52.11 | 51.50 | 52.11 | 0.000238 | 0.40 | 2.52 | 12.26 | 0.08 |
| Suscol Creek | 373 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 364.9 | Adult High Flow | 177.00 | 49.06 | 53.58 | | 53.68 | 0.001694 | 2.51 | 70.66 | 23.67 | 0.26 |
| Suscol Creek | 364.9 | Juvenile High FI | 36.00 | 49.06 | 52.52 | | 52.53 | 0.000213 | 0.76 | 47.12 | 20.67 | 0.09 |
| Suscol Creek | 364.9 | Adult Low Flow | 3.00 | 49.06 | 51.73 | | 51.73 | 0.000005 | 0.09 | 31.62 | 18.78 | 0.01 |
| Suscol Creek | 364.9 | Juvenile Low Flo | 1.00 | 49.06 | 51.46 | | 51.46 | 0.000001 | 0.04 | 26.69 | 18.04 | 0.01 |
| Suscol Creek | 359.9 | Adult High Flow | 177.00 | 49.06 | 53.60 | | 53.66 | 0.000923 | 1.94 | 91.21 | 29.43 | 0.19 |
| Suscol Creek | 359.9 | Juvenile High FI | 36.00 | 49.06 | 52.52 | | 52.52 | 0.000123 | 0.59 | 60.77 | 26.79 | 0.07 |
| Suscol Creek | 359.9 | Adult Low Flow | 3.00 | 49.06 | 51.73 | | 51.73 | 0.000003 | 0.07 | 40.41 | 24.87 | 0.01 |
| Suscol Creek | 359.9 | Juvenile Low Flo | 1.00 | 49.06 | 51.46 | | 51.46 | 0.000001 | 0.03 | 33.86 | 24.22 | 0.00 |
| Suscol Creek | 353.4 | Adult High Flow | 177.00 | 50.62 | 53.51 | 52.57 | 53.64 | 0.003786 | 2.95 | 59.93 | 32.65 | 0.38 |
| Suscol Creek | 353.4 | Juvenile High FI | 36.00 | 50.62 | 52.49 | 51.86 | 52.52 | 0.001674 | 1.27 | 28.26 | 30.03 | 0.23 |
| Suscol Creek | 353.4 | Adult Low Flow | 3.00 | 50.62 | 51.73 | 50.98 | 51.73 | 0.001042 | 0.46 | 6.58 | 23.16 | 0.15 |
| Suscol Creek | 353.4 | Juvenile Low Flo | 1.00 | 50.62 | 51.46 | 50.80 | 51.46 | 0.000199 | 0.38 | 2.66 | 17.10 | 0.08 |
| Suscol Creek | 351 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 342.9 | Adult High Flow | 177.00 | 48.32 | 53.02 | | 53.07 | 0.000921 | 1.83 | 96.73 | 32.40 | 0.19 |
| Suscol Creek | 342.9 | Juvenile High FI | 36.00 | 48.32 | 51.71 | | 51.72 | 0.000166 | 0.63 | 57.17 | 28.34 | 0.08 |
| Suscol Creek | 342.9 | Adult Low Flow | 3.00 | 48.32 | 50.89 | | 50.89 | 0.000005 | 0.09 | 34.73 | 25.93 | 0.01 |
| Suscol Creek | 342.9 | Juvenile Low Flo | 1.00 | 48.32 | 50.62 | | 50.62 | 0.000001 | 0.04 | 27.98 | 24.01 | 0.01 |
| Suscol Creek | 337.9 | Adult High Flow | 177.00 | 48.32 | 53.01 | | 53.07 | 0.000863 | 1.82 | 97.34 | 32.51 | 0.19 |
| Suscol Creek | 337.9 | Juvenile High FI | 36.00 | 48.32 | 51.71 | | 51.72 | 0.000151 | 0.62 | 57.91 | 28.07 | 0.08 |
| Suscol Creek | 337.9 | Adult Low Flow | 3.00 | 48.32 | 50.89 | | 50.89 | 0.000005 | 0.08 | 35.68 | 26.07 | 0.01 |
| Suscol Creek | 337.9 | Juvenile Low Flo | 1.00 | 48.32 | 50.62 | | 50.62 | 0.000001 | 0.03 | 28.84 | 24.32 | 0.01 |
| Suscol Creek | 331.4 | Adult High Flow | 177.00 | 49.82 | 52.83 | 52.05 | 53.04 | 0.005955 | 3.88 | 48.07 | 26.27 | 0.48 |
| Suscol Creek | 331.4 | Juvenile High FI | 36.00 | 49.82 | 51.66 | 51.17 | 51.71 | 0.004072 | 1.86 | 19.38 | 22.70 | 0.35 |
| Suscol Creek | 331.4 | Adult Low Flow | 3.00 | 49.82 | 50.88 | 50.18 | 50.89 | 0.002852 | 0.73 | 4.09 | 14.85 | 0.25 |
| Suscol Creek | 331.4 | Juvenile Low Flo | 1.00 | 49.82 | 50.62 | 50.01 | 50.62 | 0.000243 | 0.40 | 2.51 | 11.22 | 0.08 |
| Suscol Creek | 329 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 320.9 | Adult High Flow | 177.00 | 47.57 | 52.02 | | 52.12 | 0.001757 | 2.45 | 72.12 | 25.18 | 0.26 |
| Suscol Creek | 320.9 | Juvenile High FI | 36.00 | 47.57 | 50.92 | | 50.93 | 0.000263 | 0.79 | 45.66 | 22.88 | 0.10 |
| Suscol Creek | 320.9 | Adult Low Flow | 3.00 | 47.57 | 50.14 | | 50.14 | 0.000007 | 0.10 | 28.60 | 20.47 | 0.02 |
| Suscol Creek | 320.9 | Juvenile Low Flo | 1.00 | 47.57 | 49.87 | | 49.87 | 0.000001 | 0.04 | 23.22 | 19.42 | 0.01 |
| Suscol Creek | 315.9 | Adult High Flow | 177.00 | 47.57 | 52.03 | | 52.10 | 0.001515 | 2.19 | 80.88 | 31.48 | 0.24 |
| Suscol Creek | 315.9 | Juvenile High FI | 36.00 | 47.57 | 50.92 | | 50.93 | 0.000271 | 0.75 | 48.07 | 27.71 | 0.10 |
| Suscol Creek | 315.9 | Adult Low Flow | 3.00 | 47.57 | 50.14 | | 50.14 | 0.000008 | 0.10 | 28.64 | 21.97 | 0.02 |
| Suscol Creek | 315.9 | Juvenile Low Flo | 1.00 | 47.57 | 49.87 | | 49.87 | 0.000002 | 0.04 | 22.98 | 19.96 | 0.01 |
| Suscol Creek | 309.4 | Adult High Flow | 177.00 | 49.07 | 51.92 | 51.13 | 52.08 | 0.004910 | 3.21 | 55.19 | 32.66 | 0.43 |
| Suscol Creek | 309.4 | Juvenile High FI | 36.00 | 49.07 | 50.89 | 50.35 | 50.92 | 0.002733 | 1.53 | 23.61 | 27.78 | 0.29 |
| Suscol Creek | 309.4 | Adult Low Flow | 3.00 | 49.07 | 50.14 | 49.43 | 50.14 | 0.003156 | 0.85 | 4.58 | 21.50 | 0.25 |
| Suscol Creek | 309.4 | Juvenile Low Flo | 1.00 | 49.07 | 49.87 | 49.26 | 49.87 | 0.000239 | 0.40 | 2.52 | 15.79 | 0.08 |
| Suscol Creek | 307 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 298.9 | Adult High Flow | 177.00 | 46.88 | 51.39 | | 51.45 | 0.001772 | 2.11 | 84.01 | 32.26 | 0.23 |
| Suscol Creek | 298.9 | Juvenile High FI | 36.00 | 46.88 | 50.22 | | 50.23 | 0.000284 | 0.72 | 50.22 | 25.81 | 0.09 |
| Suscol Creek | 298.9 | Adult Low Flow | 3.00 | 46.88 | 49.46 | | 49.46 | 0.000006 | 0.09 | 32.09 | 21.45 | 0.01 |
| Suscol Creek | 298.9 | Juvenile Low Flo | 1.00 | 46.88 | 49.18 | | 49.18 | 0.000001 | 0.04 | 26.42 | 19.83 | 0.01 |
| Suscol Creek | 293.9 | Adult High Flow | 177.00 | 46.88 | 51.38 | | 51.45 | 0.001547 | 2.07 | 85.37 | 33.20 | 0.23 |

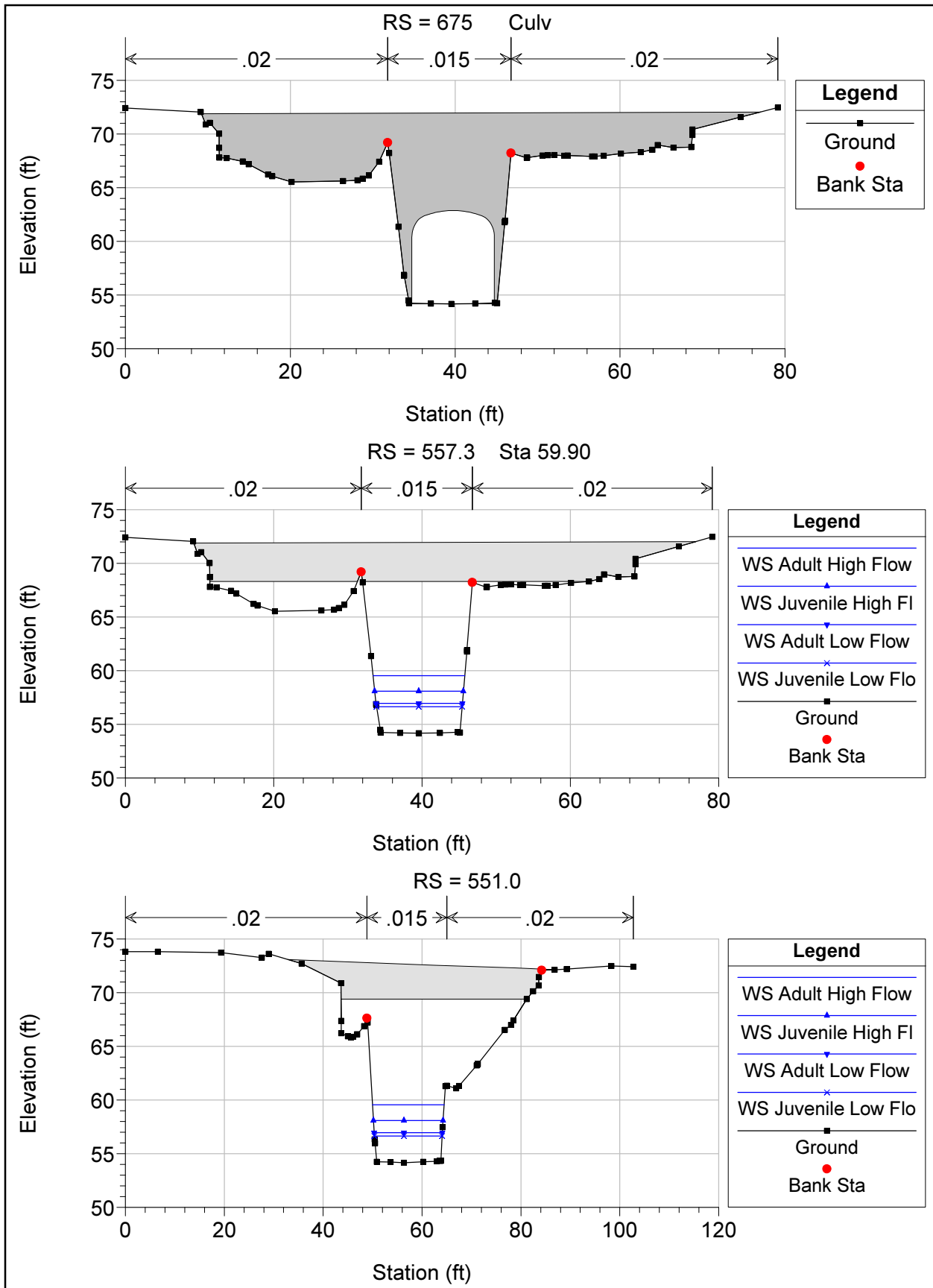
HEC-RAS Plan: Proposed 95%_2' pool_test River: Suscol Creek Reach: Suscol Creek (Continued)

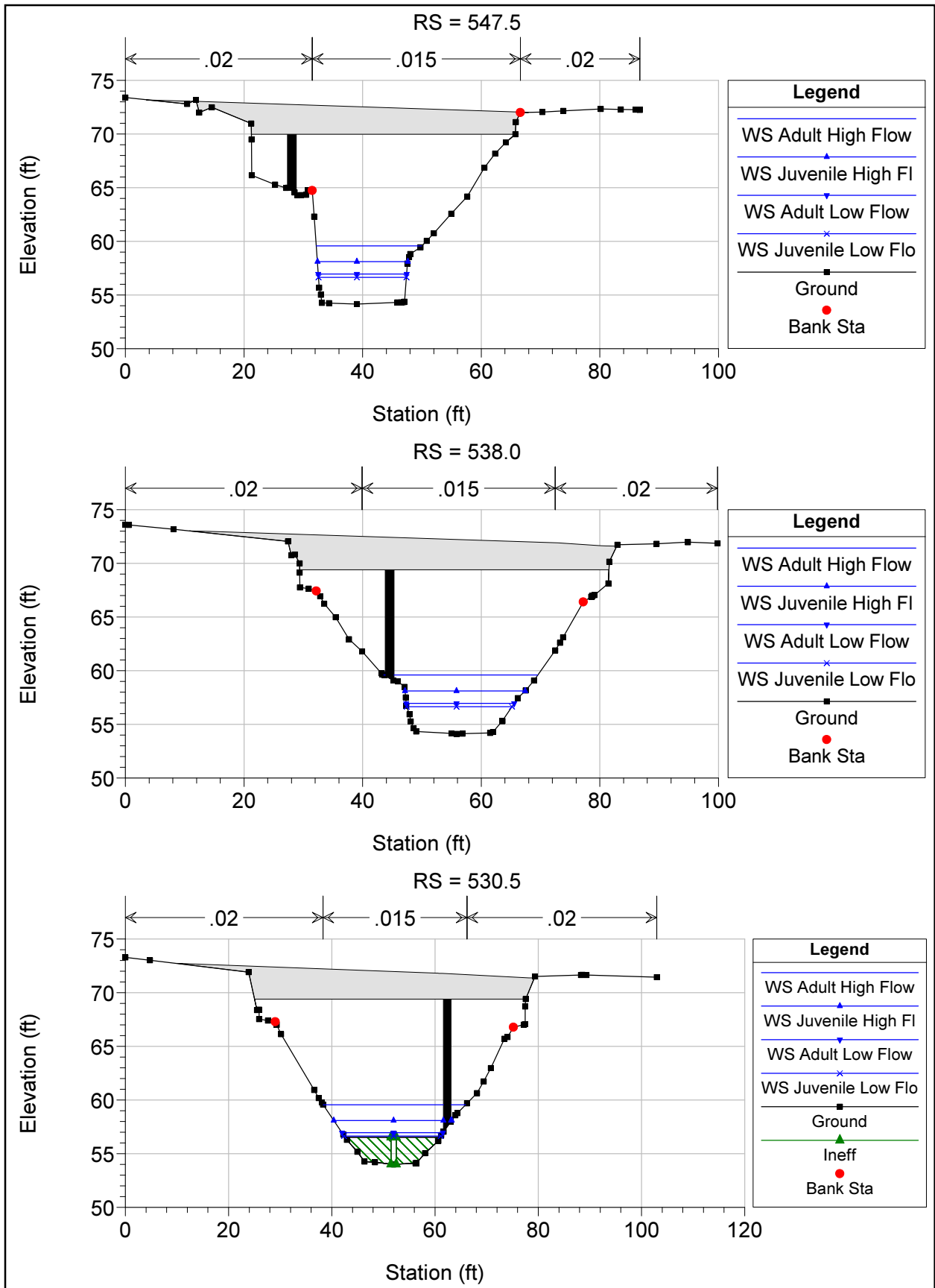
| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Suscol Creek | 293.9 | Juvenile High FI | 36.00 | 46.88 | 50.22 | | 50.23 | 0.000252 | 0.71 | 50.51 | 26.95 | 0.09 |
| Suscol Creek | 293.9 | Adult Low Flow | 3.00 | 46.88 | 49.46 | | 49.46 | 0.000006 | 0.10 | 31.53 | 22.66 | 0.01 |
| Suscol Creek | 293.9 | Juvenile Low Flo | 1.00 | 46.88 | 49.18 | | 49.18 | 0.000001 | 0.04 | 25.54 | 20.95 | 0.01 |
| Suscol Creek | 287.4 | Adult High Flow | 177.00 | 48.38 | 51.24 | 50.46 | 51.42 | 0.005662 | 3.36 | 52.73 | 32.47 | 0.46 |
| Suscol Creek | 287.4 | Juvenile High FI | 36.00 | 48.38 | 50.18 | 49.66 | 50.22 | 0.003036 | 1.62 | 22.22 | 25.79 | 0.31 |
| Suscol Creek | 287.4 | Adult Low Flow | 3.00 | 48.38 | 49.45 | 48.74 | 49.45 | 0.002976 | 0.64 | 4.71 | 22.07 | 0.24 |
| Suscol Creek | 287.4 | Juvenile Low Flo | 1.00 | 48.38 | 49.18 | 48.57 | 49.18 | 0.000242 | 0.40 | 2.51 | 15.93 | 0.08 |
| Suscol Creek | 285 | Inl Struct | | | | | | | | | | |
| Suscol Creek | 276.9 | Adult High Flow | 177.00 | 48.02 | 50.69 | | 50.88 | 0.006557 | 3.50 | 50.61 | 30.66 | 0.48 |
| Suscol Creek | 276.9 | Juvenile High FI | 36.00 | 48.02 | 49.32 | | 49.40 | 0.005461 | 2.32 | 15.54 | 20.15 | 0.46 |
| Suscol Creek | 276.9 | Adult Low Flow | 3.00 | 48.02 | 48.52 | | 48.56 | 0.011352 | 1.55 | 1.94 | 9.61 | 0.61 |
| Suscol Creek | 276.9 | Juvenile Low Flo | 1.00 | 48.02 | 48.39 | | 48.41 | 0.005325 | 1.04 | 0.96 | 4.90 | 0.41 |
| Suscol Creek | 271.9 | Adult High Flow | 177.00 | 47.38 | 50.68 | | 50.84 | 0.005629 | 3.23 | 54.76 | 29.05 | 0.42 |
| Suscol Creek | 271.9 | Juvenile High FI | 36.00 | 47.38 | 49.33 | | 49.37 | 0.001738 | 1.56 | 23.14 | 18.11 | 0.24 |
| Suscol Creek | 271.9 | Adult Low Flow | 3.00 | 47.38 | 48.55 | | 48.55 | 0.000071 | 0.27 | 10.97 | 13.25 | 0.05 |
| Suscol Creek | 271.9 | Juvenile Low Flo | 1.00 | 47.38 | 48.40 | | 48.40 | 0.000013 | 0.11 | 9.08 | 12.61 | 0.02 |
| Suscol Creek | 265.4 | Adult High Flow | 177.00 | 47.16 | 50.48 | | 50.78 | 0.011998 | 4.38 | 40.43 | 22.42 | 0.57 |
| Suscol Creek | 265.4 | Juvenile High FI | 36.00 | 47.16 | 49.30 | | 49.36 | 0.003126 | 1.92 | 18.73 | 14.66 | 0.30 |
| Suscol Creek | 265.4 | Adult Low Flow | 3.00 | 47.16 | 48.55 | | 48.55 | 0.000100 | 0.32 | 9.44 | 10.02 | 0.06 |
| Suscol Creek | 265.4 | Juvenile Low Flo | 1.00 | 47.16 | 48.40 | | 48.40 | 0.000015 | 0.12 | 8.05 | 9.16 | 0.02 |
| Suscol Creek | 254.9 | Adult High Flow | 177.00 | 48.10 | 49.96 | 49.96 | 50.58 | 0.021009 | 6.34 | 27.91 | 22.65 | 1.01 |
| Suscol Creek | 254.9 | Juvenile High FI | 36.00 | 48.10 | 49.12 | | 49.29 | 0.011608 | 3.31 | 10.89 | 17.55 | 0.74 |
| Suscol Creek | 254.9 | Adult Low Flow | 3.00 | 48.10 | 48.52 | | 48.54 | 0.006588 | 1.28 | 2.34 | 10.25 | 0.47 |
| Suscol Creek | 254.9 | Juvenile Low Flo | 1.00 | 48.10 | 48.39 | | 48.40 | 0.005105 | 0.86 | 1.16 | 7.63 | 0.39 |
| Suscol Creek | 249.9 | Adult High Flow | 177.00 | 48.14 | 49.83 | 49.83 | 50.43 | 0.025069 | 6.17 | 28.69 | 24.74 | 1.01 |
| Suscol Creek | 249.9 | Juvenile High FI | 36.00 | 48.14 | 48.95 | 48.95 | 49.20 | 0.025223 | 4.02 | 8.96 | 18.06 | 1.00 |
| Suscol Creek | 249.9 | Adult Low Flow | 3.00 | 48.14 | 48.40 | 48.40 | 48.48 | 0.033123 | 2.22 | 1.35 | 8.75 | 1.00 |
| Suscol Creek | 249.9 | Juvenile Low Flo | 1.00 | 48.14 | 48.28 | 48.28 | 48.34 | 0.048018 | 1.89 | 0.53 | 5.75 | 1.10 |
| Suscol Creek | 243.4 | Adult High Flow | 177.00 | 47.59 | 49.44 | 49.44 | 50.04 | 0.030491 | 6.23 | 28.40 | 24.12 | 1.01 |
| Suscol Creek | 243.4 | Juvenile High FI | 36.00 | 47.59 | 48.50 | 48.50 | 48.78 | 0.027617 | 4.19 | 8.58 | 15.99 | 1.01 |
| Suscol Creek | 243.4 | Adult Low Flow | 3.00 | 47.59 | 47.89 | 47.89 | 47.98 | 0.032616 | 2.40 | 1.25 | 7.08 | 1.01 |
| Suscol Creek | 243.4 | Juvenile Low Flo | 1.00 | 47.59 | 47.77 | 47.77 | 47.83 | 0.037212 | 1.89 | 0.53 | 4.73 | 1.00 |
| Suscol Creek | 229.4 | Adult High Flow | 177.00 | 46.43 | 49.08 | | 49.42 | 0.017865 | 4.66 | 38.00 | 21.33 | 0.62 |
| Suscol Creek | 229.4 | Juvenile High FI | 36.00 | 46.43 | 47.53 | 47.53 | 47.82 | 0.067570 | 4.30 | 8.37 | 15.05 | 1.02 |
| Suscol Creek | 229.4 | Adult Low Flow | 3.00 | 46.43 | 46.81 | 46.81 | 46.92 | 0.087257 | 2.70 | 1.11 | 4.90 | 1.00 |
| Suscol Creek | 229.4 | Juvenile Low Flo | 1.00 | 46.43 | 46.66 | 46.66 | 46.72 | 0.102772 | 2.09 | 0.48 | 3.49 | 1.00 |
| Suscol Creek | 224.7 | Adult High Flow | 177.00 | 45.75 | 49.06 | | 49.33 | 0.011386 | 4.16 | 42.56 | 19.75 | 0.50 |
| Suscol Creek | 224.7 | Juvenile High FI | 36.00 | 45.75 | 47.19 | | 47.39 | 0.031841 | 3.60 | 9.99 | 13.10 | 0.73 |
| Suscol Creek | 224.7 | Adult Low Flow | 3.00 | 45.75 | 46.30 | | 46.34 | 0.023816 | 1.68 | 1.78 | 5.98 | 0.54 |
| Suscol Creek | 224.7 | Juvenile Low Flo | 1.00 | 45.75 | 46.13 | | 46.15 | 0.016794 | 1.12 | 0.90 | 4.29 | 0.43 |
| Suscol Creek | 202.8 | Adult High Flow | 177.00 | 45.45 | 48.87 | 47.82 | 49.13 | 0.007522 | 4.08 | 43.42 | 20.09 | 0.49 |
| Suscol Creek | 202.8 | Juvenile High FI | 36.00 | 45.45 | 46.98 | 46.51 | 47.10 | 0.006415 | 2.75 | 13.10 | 12.44 | 0.47 |
| Suscol Creek | 202.8 | Adult Low Flow | 3.00 | 45.45 | 45.94 | 45.87 | 45.98 | 0.012044 | 1.63 | 1.84 | 8.53 | 0.62 |
| Suscol Creek | 202.8 | Juvenile Low Flo | 1.00 | 45.45 | 45.74 | 45.70 | 45.78 | 0.016112 | 1.60 | 0.62 | 3.79 | 0.70 |
| Suscol Creek | 200 | Bridge | | | | | | | | | | |
| Suscol Creek | 148.5 | Adult High Flow | 177.00 | 45.06 | 47.48 | | 48.05 | 0.022707 | 6.09 | 29.08 | 18.18 | 0.85 |
| Suscol Creek | 148.5 | Juvenile High FI | 36.00 | 45.06 | 45.98 | 45.98 | 46.34 | 0.026810 | 4.77 | 7.55 | 10.88 | 1.01 |
| Suscol Creek | 148.5 | Adult Low Flow | 3.00 | 45.06 | 45.33 | 45.33 | 45.42 | 0.037220 | 2.37 | 1.26 | 8.07 | 1.06 |
| Suscol Creek | 148.5 | Juvenile Low Flo | 1.00 | 45.06 | 45.22 | 45.22 | 45.27 | 0.037257 | 1.88 | 0.53 | 4.80 | 1.00 |
| Suscol Creek | 93.6 | Adult High Flow | 177.00 | 43.17 | 46.65 | | 47.14 | 0.011728 | 5.61 | 31.55 | 12.02 | 0.61 |
| Suscol Creek | 93.6 | Juvenile High FI | 36.00 | 43.17 | 44.64 | | 44.84 | 0.008919 | 3.54 | 10.18 | 9.24 | 0.59 |
| Suscol Creek | 93.6 | Adult Low Flow | 3.00 | 43.17 | 43.60 | | 43.65 | 0.011759 | 1.88 | 1.59 | 6.01 | 0.64 |
| Suscol Creek | 93.6 | Juvenile Low Flo | 1.00 | 43.17 | 43.43 | | 43.46 | 0.013346 | 1.40 | 0.72 | 4.68 | 0.63 |
| Suscol Creek | 37.7 | Adult High Flow | 177.00 | 42.14 | 45.11 | 45.11 | 46.00 | 0.039548 | 7.57 | 23.38 | 13.29 | 1.01 |
| Suscol Creek | 37.7 | Juvenile High FI | 36.00 | 42.14 | 43.61 | 43.54 | 43.98 | 0.030604 | 4.90 | 7.35 | 8.24 | 0.91 |
| Suscol Creek | 37.7 | Adult Low Flow | 3.00 | 42.14 | 42.64 | 42.61 | 42.75 | 0.022695 | 2.65 | 1.13 | 4.10 | 0.89 |
| Suscol Creek | 37.7 | Juvenile Low Flo | 1.00 | 42.14 | 42.46 | 42.43 | 42.52 | 0.021396 | 1.95 | 0.51 | 2.85 | 0.81 |
| Suscol Creek | 0 | Adult High Flow | 177.00 | 40.63 | 42.87 | 42.82 | 43.59 | 0.026012 | 6.81 | 25.98 | 16.56 | 0.96 |
| Suscol Creek | 0 | Juvenile High FI | 36.00 | 40.63 | 41.67 | 41.66 | 41.97 | 0.026005 | 4.39 | 8.21 | 12.91 | 0.97 |
| Suscol Creek | 0 | Adult Low Flow | 3.00 | 40.63 | 40.94 | 40.92 | 41.03 | 0.026051 | 2.47 | 1.21 | 5.52 | 0.93 |
| Suscol Creek | 0 | Juvenile Low Flo | 1.00 | 40.63 | 40.80 | 40.80 | 40.85 | 0.026029 | 1.78 | 0.56 | 4.21 | 0.86 |

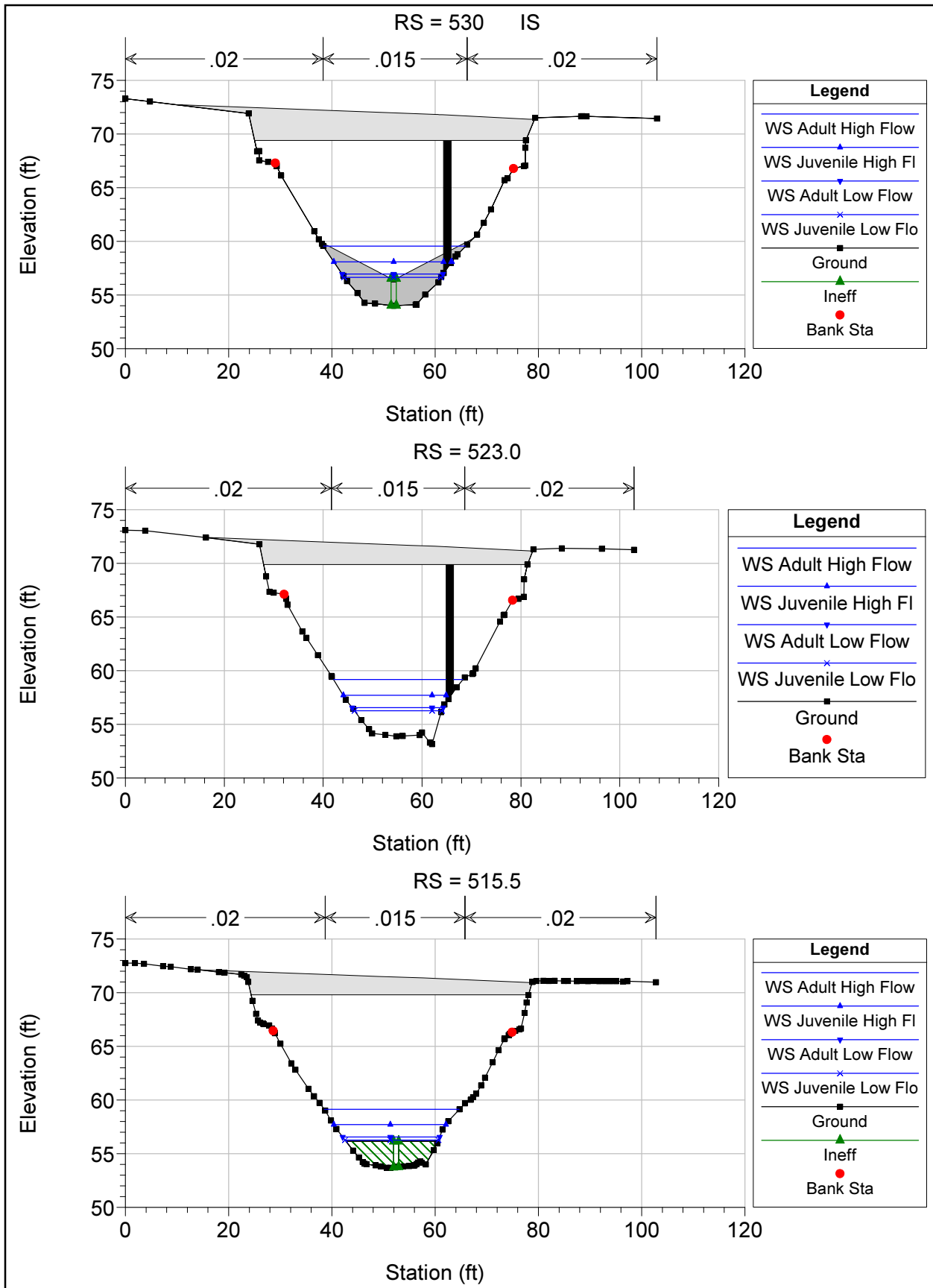


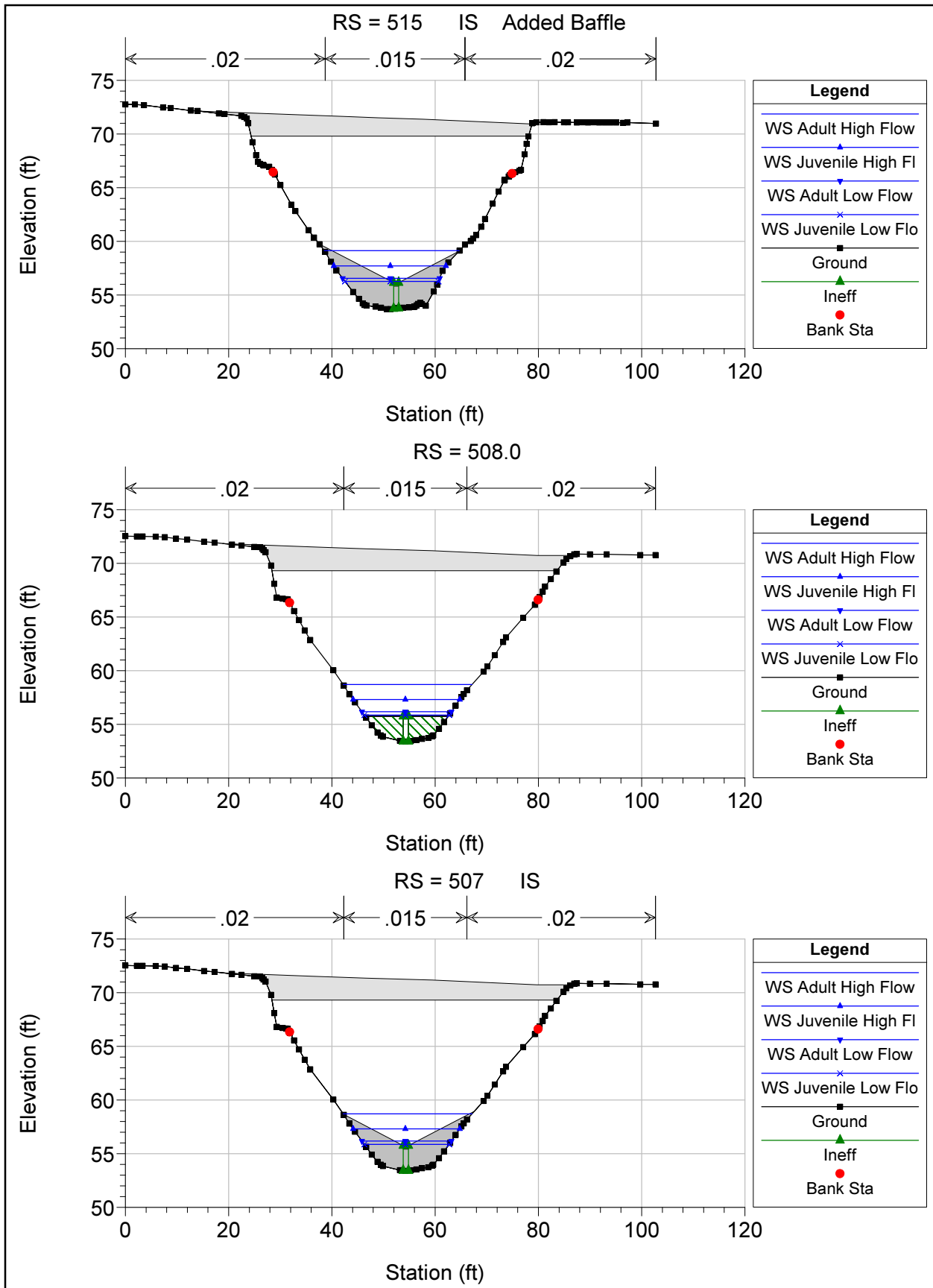


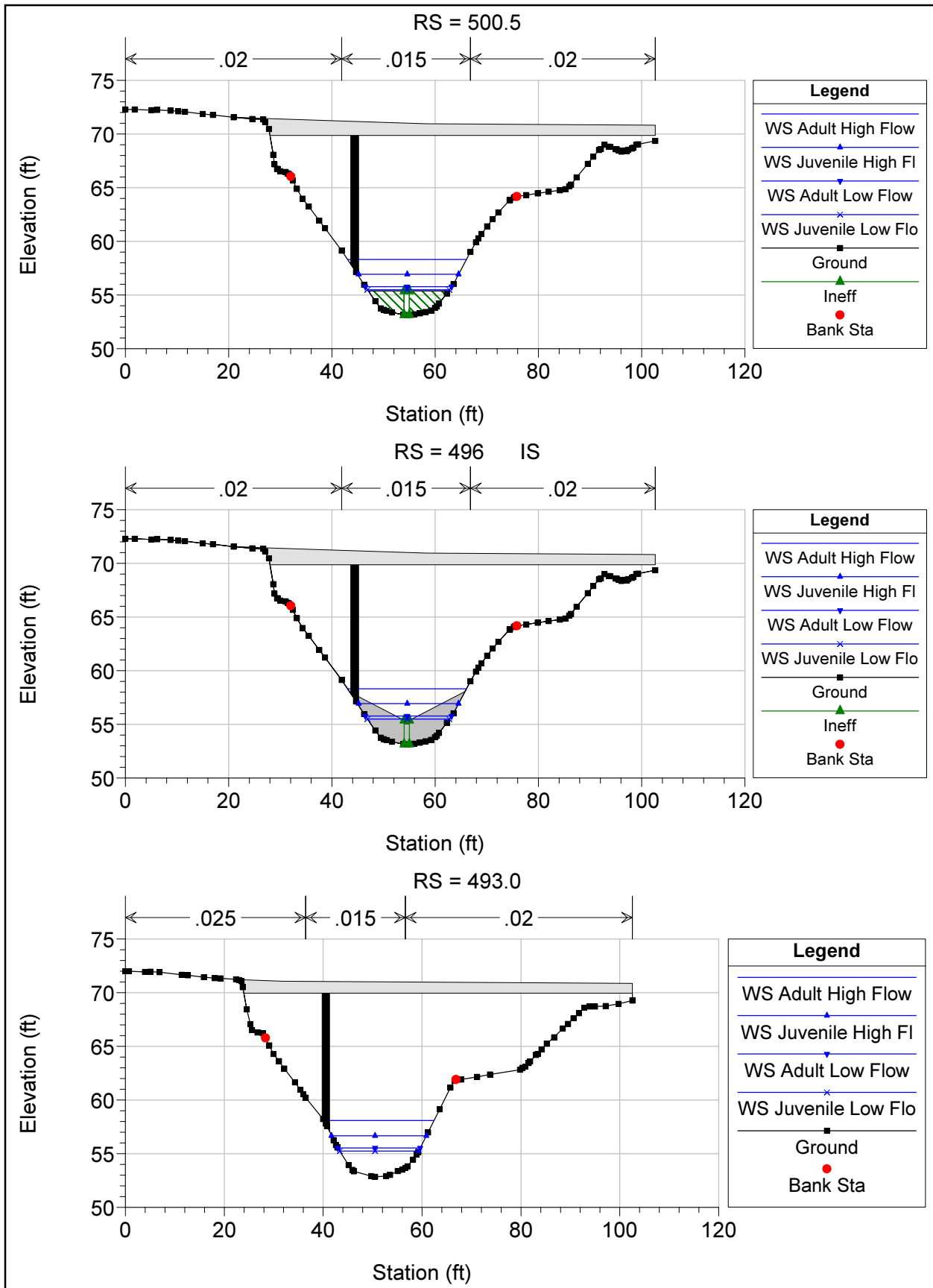


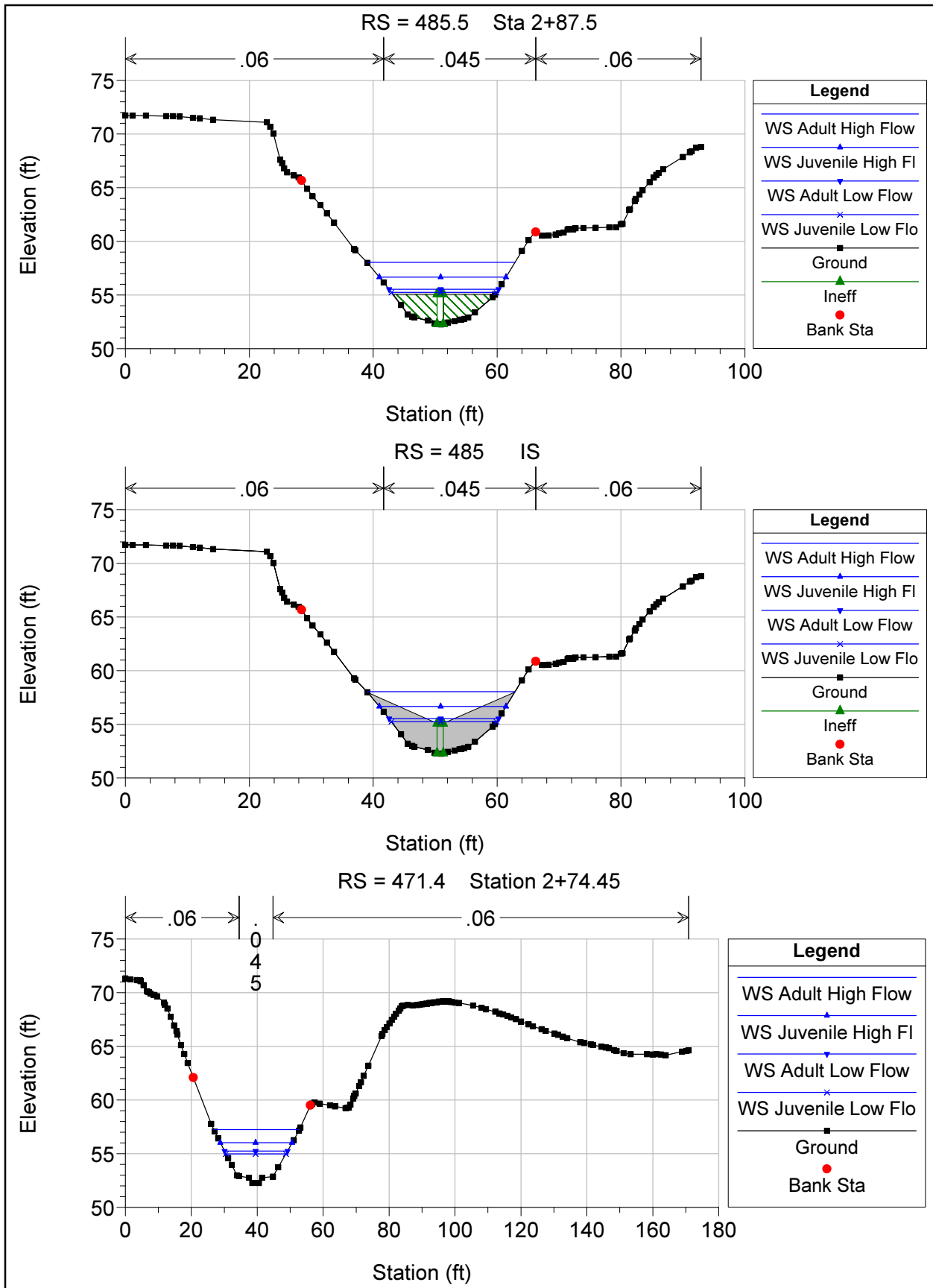


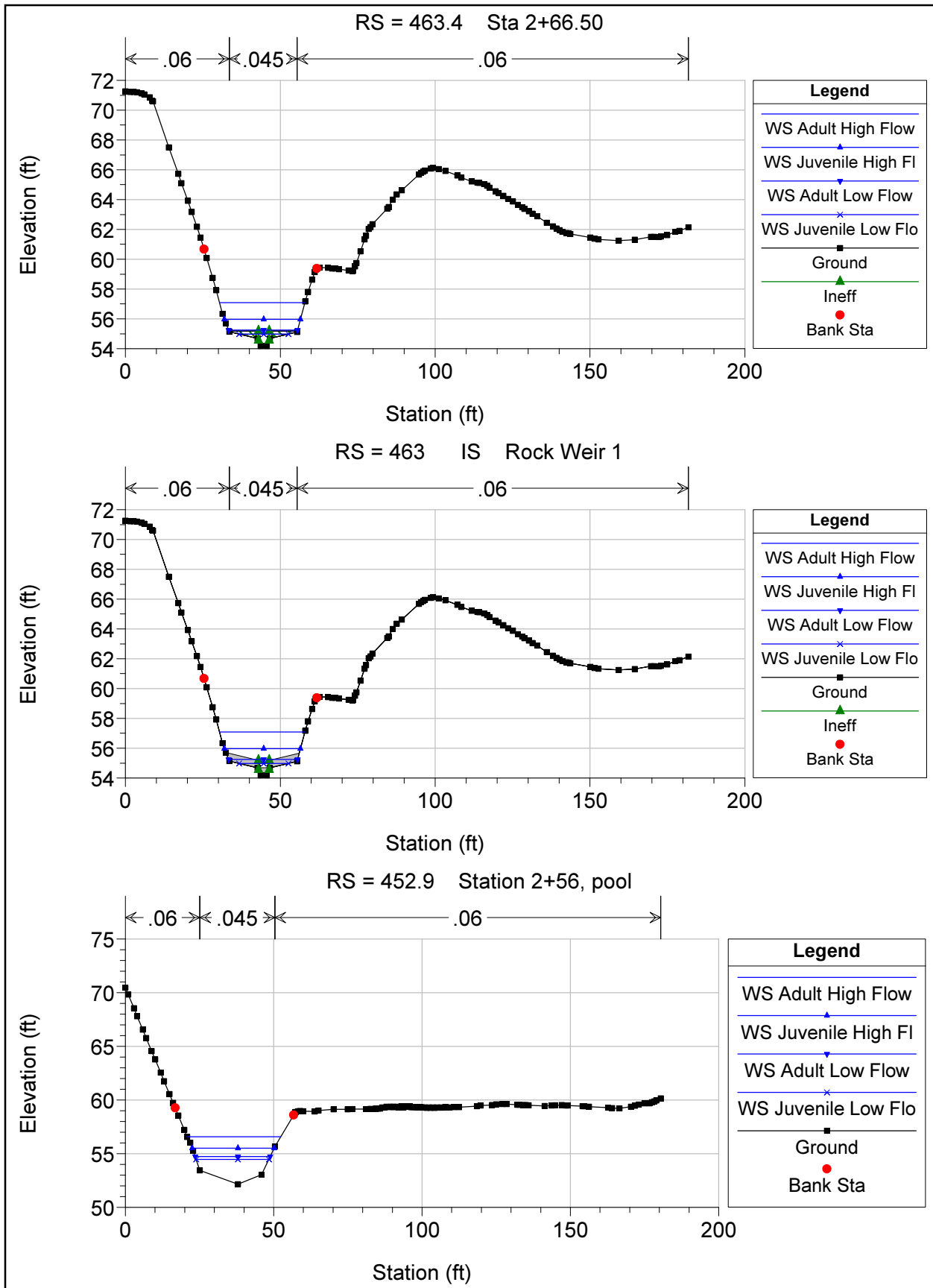


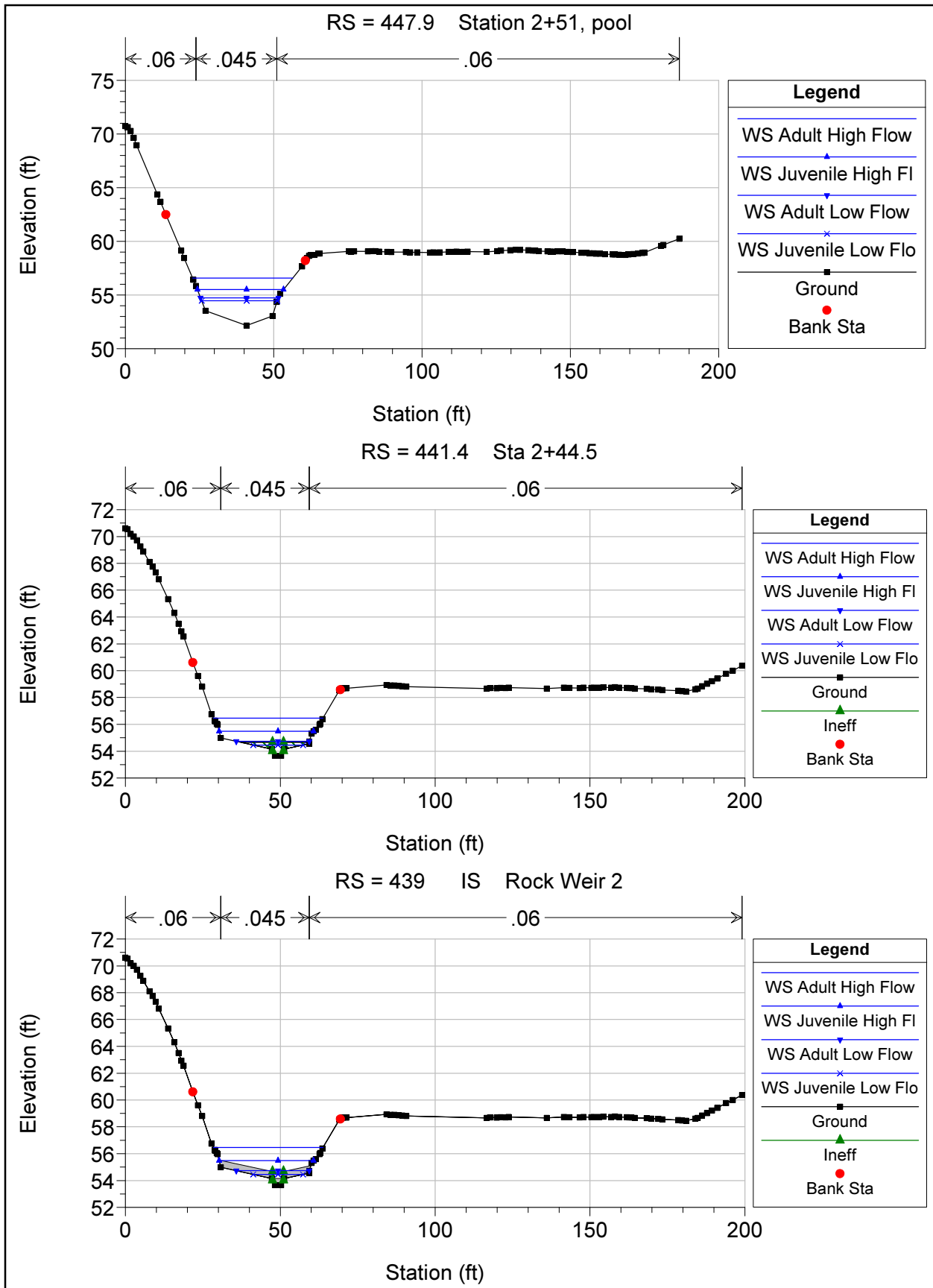


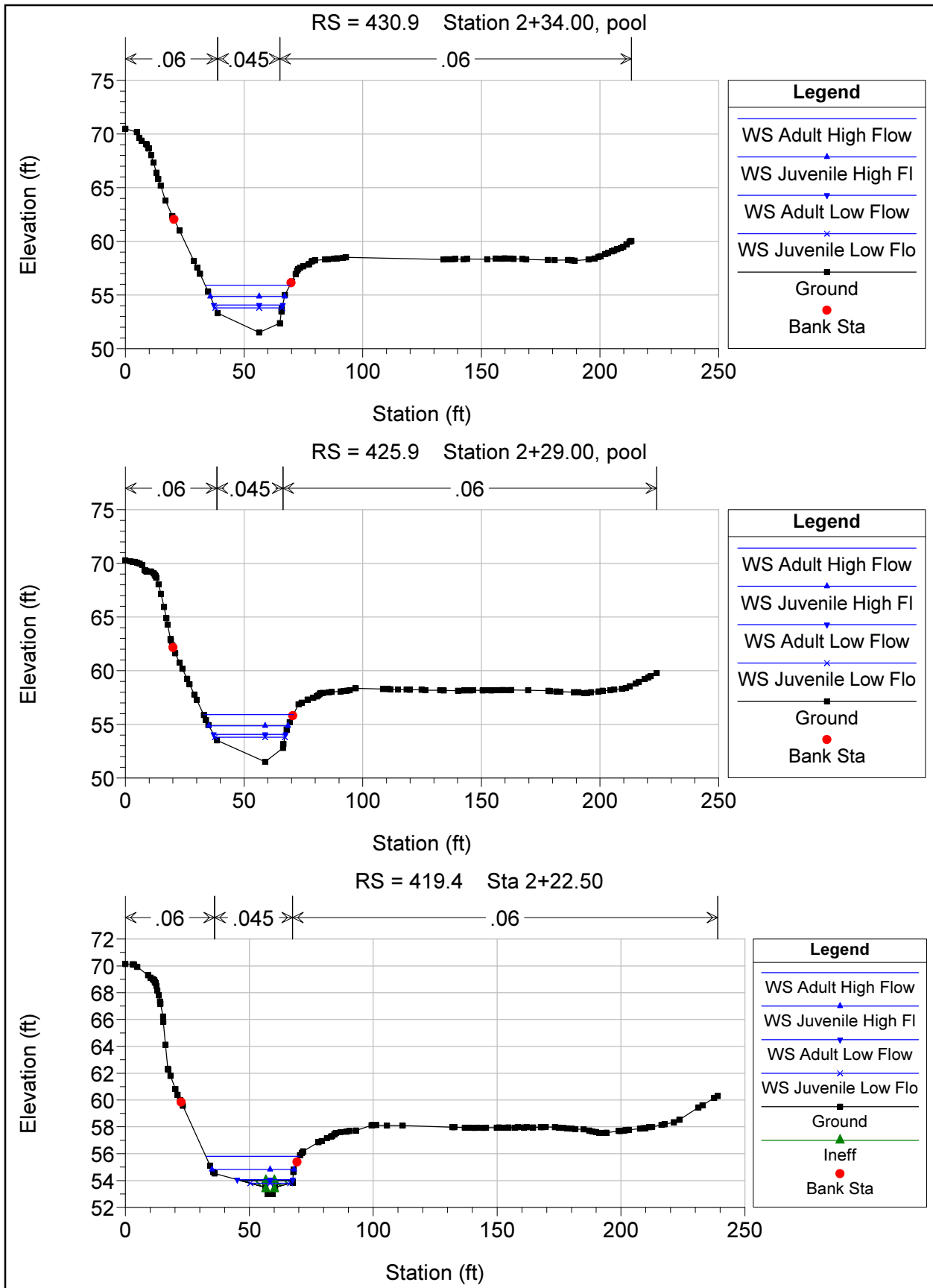


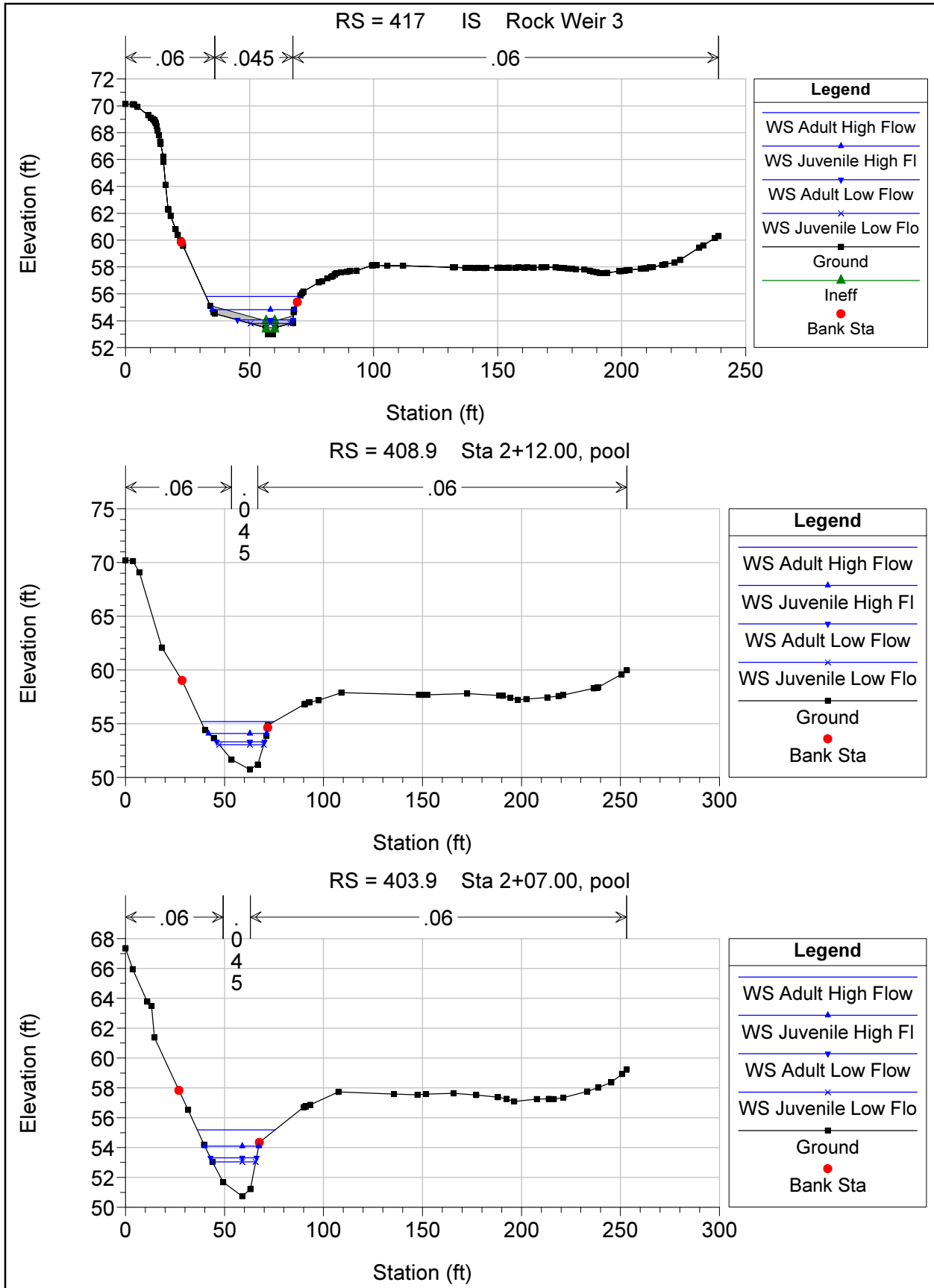


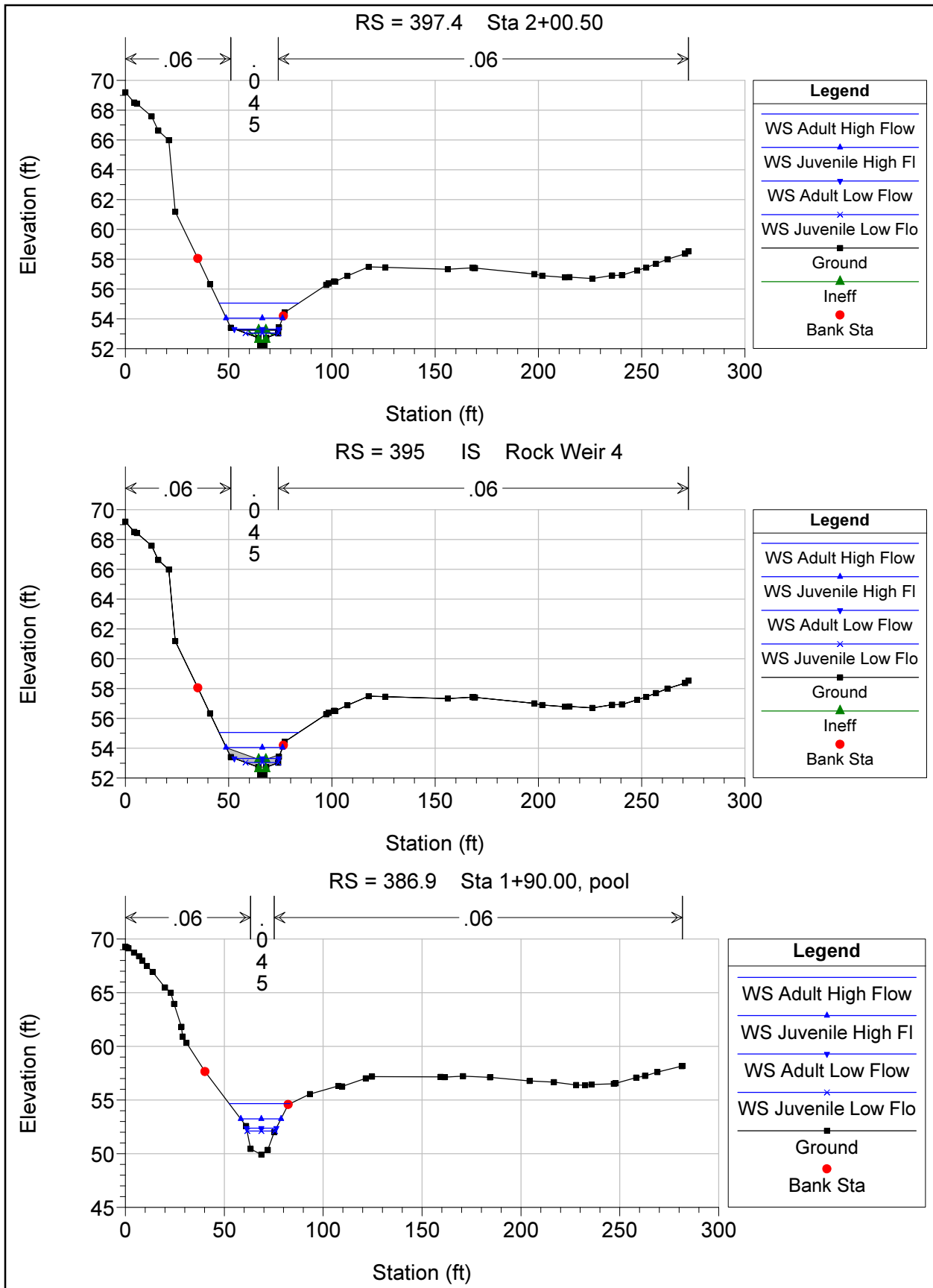


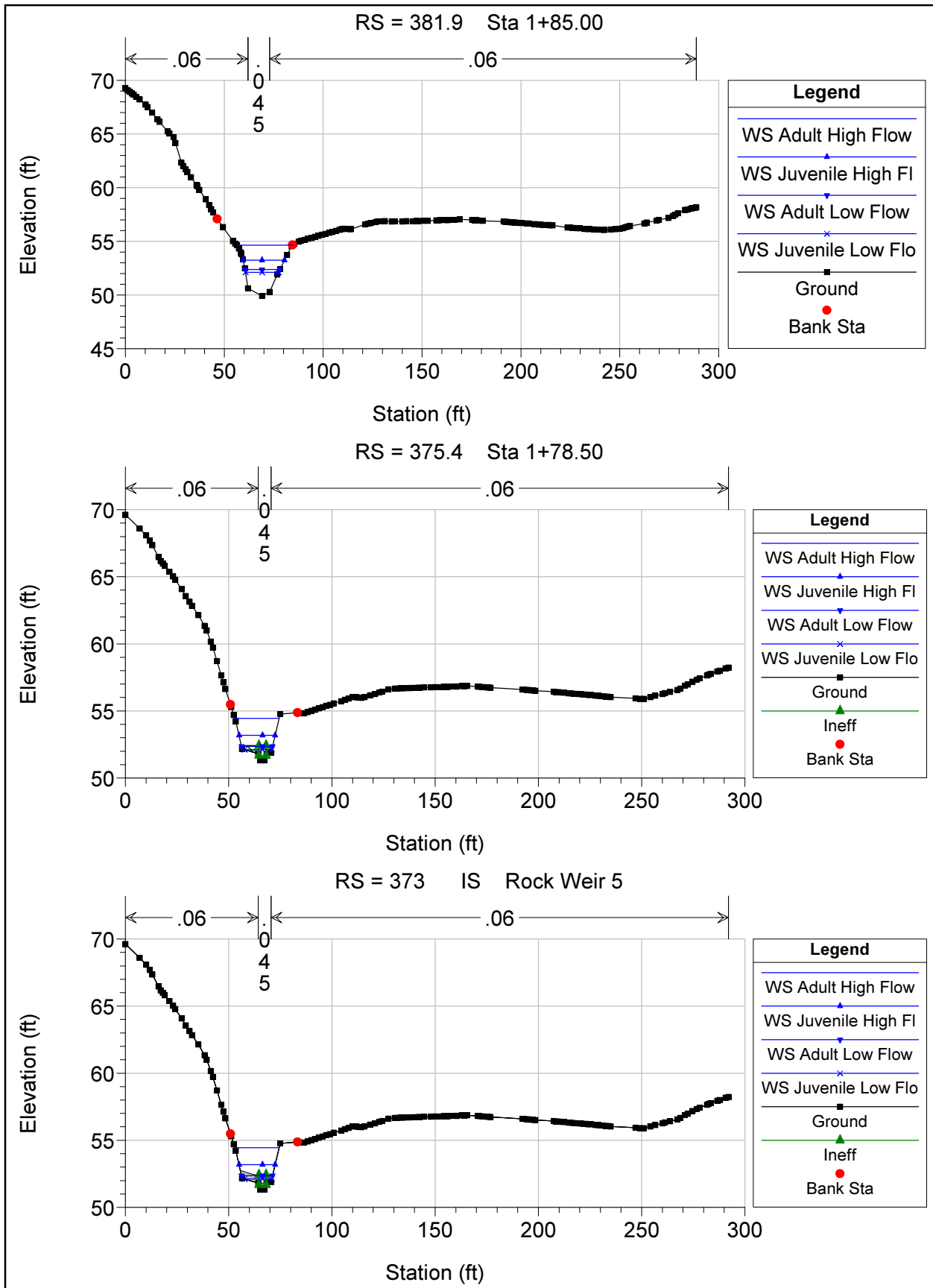


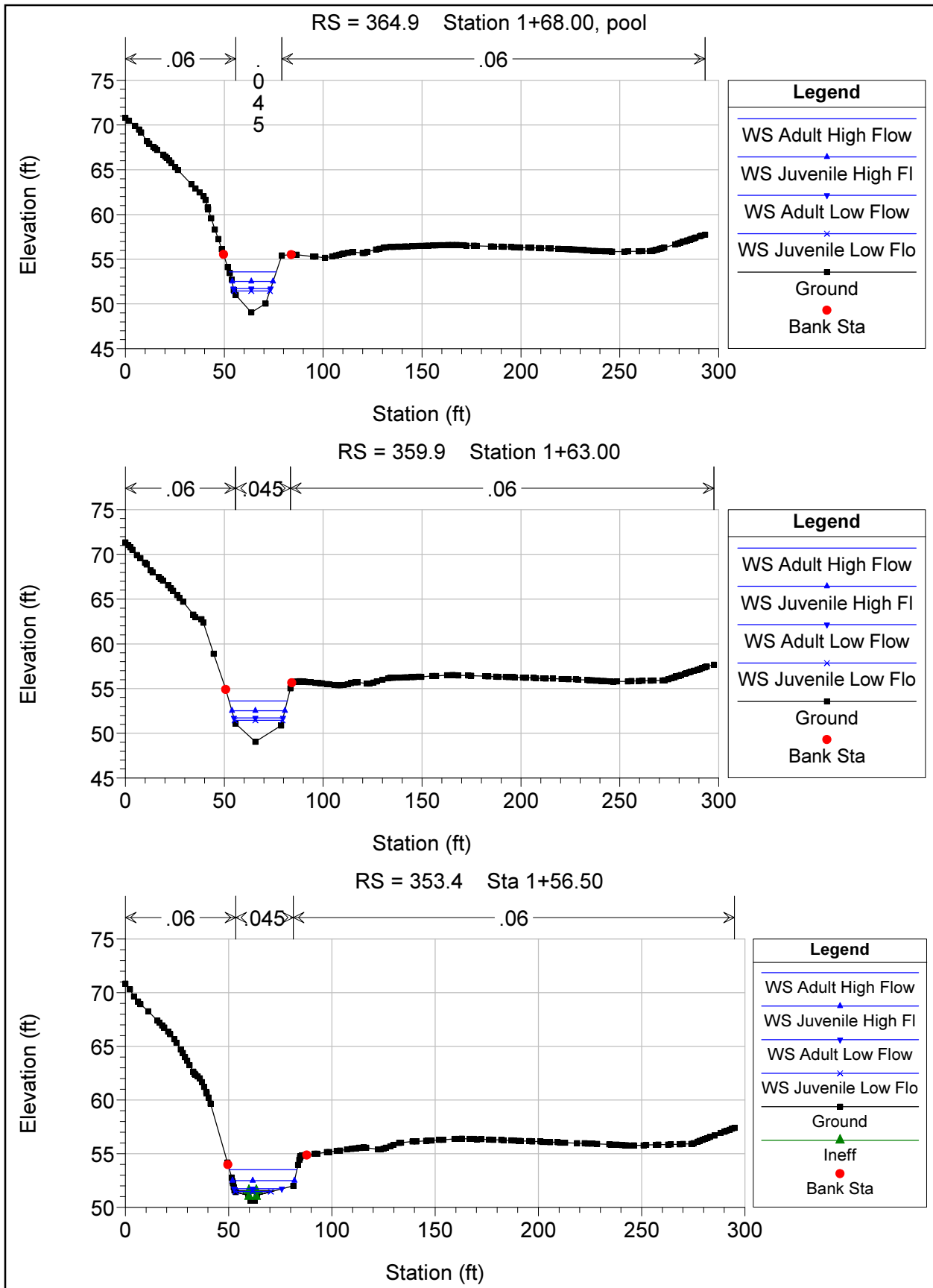


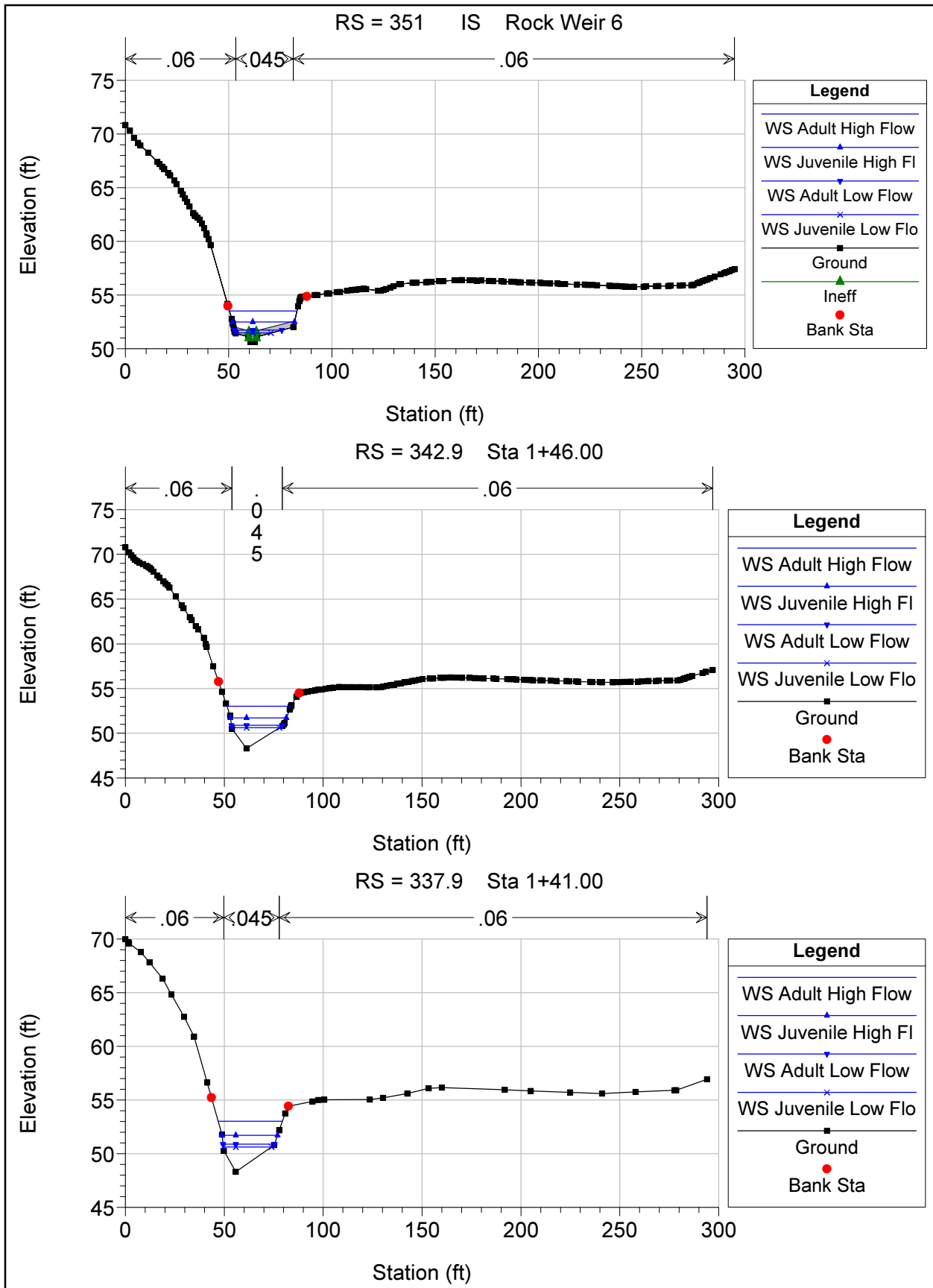


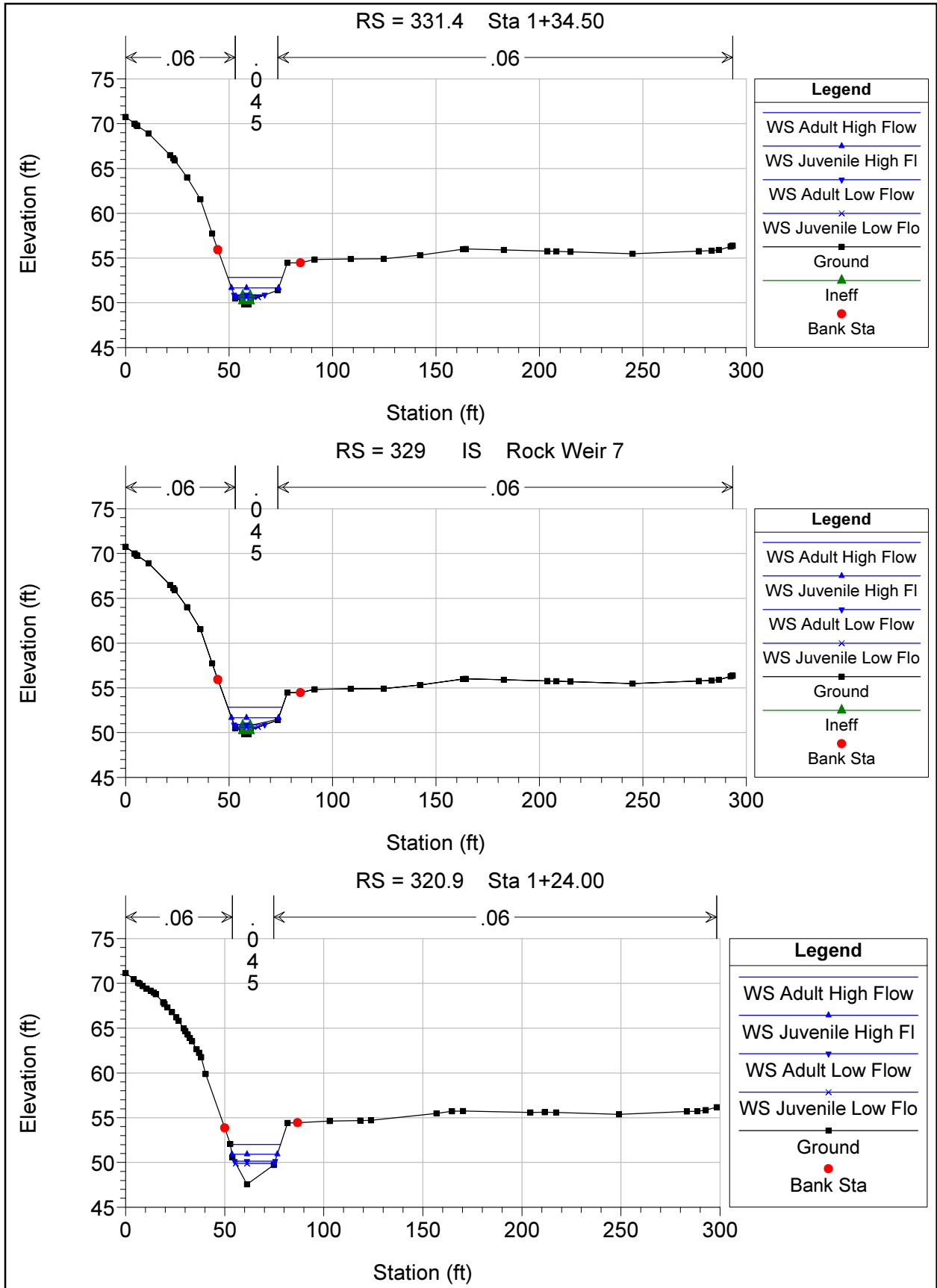


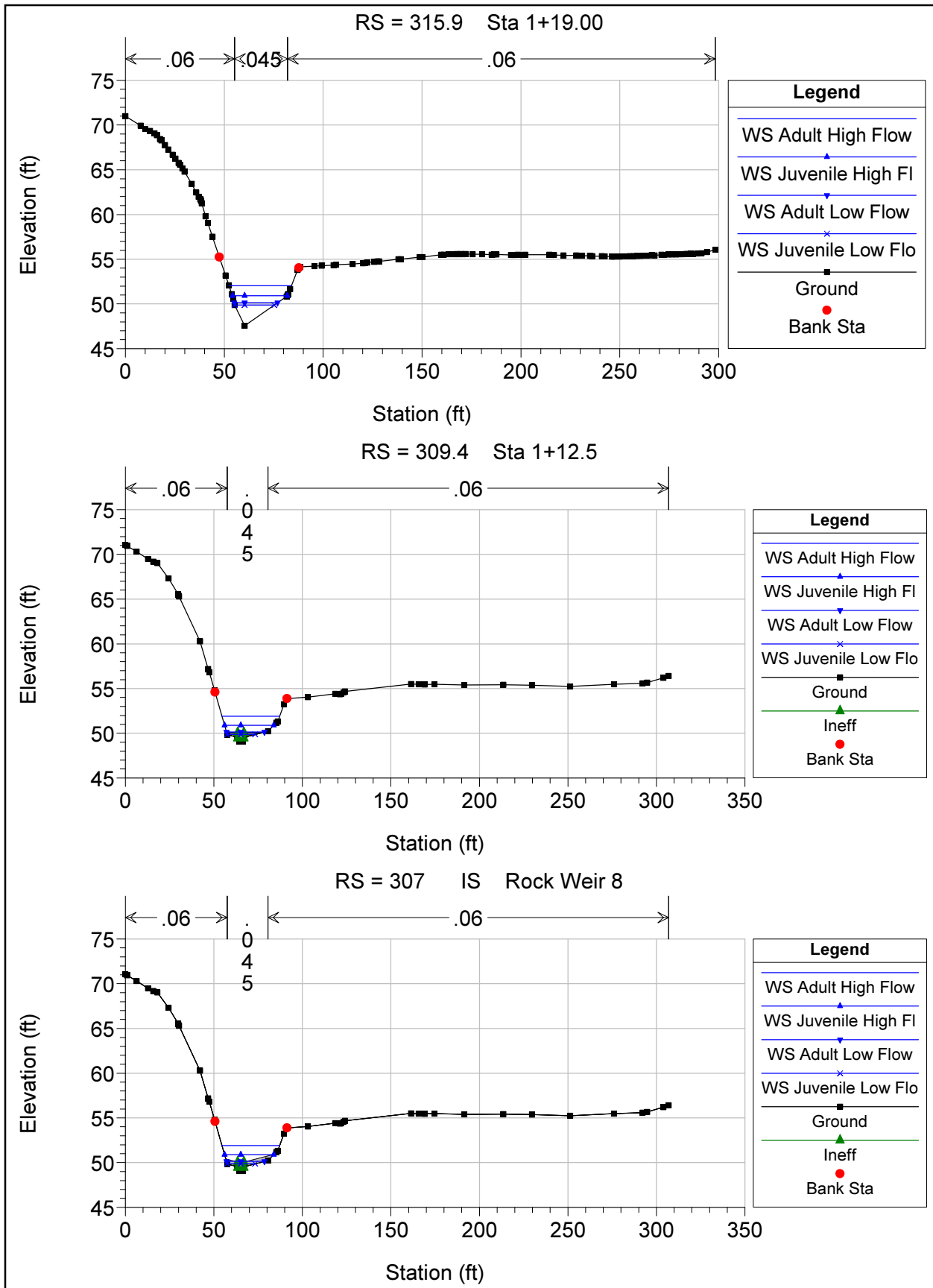


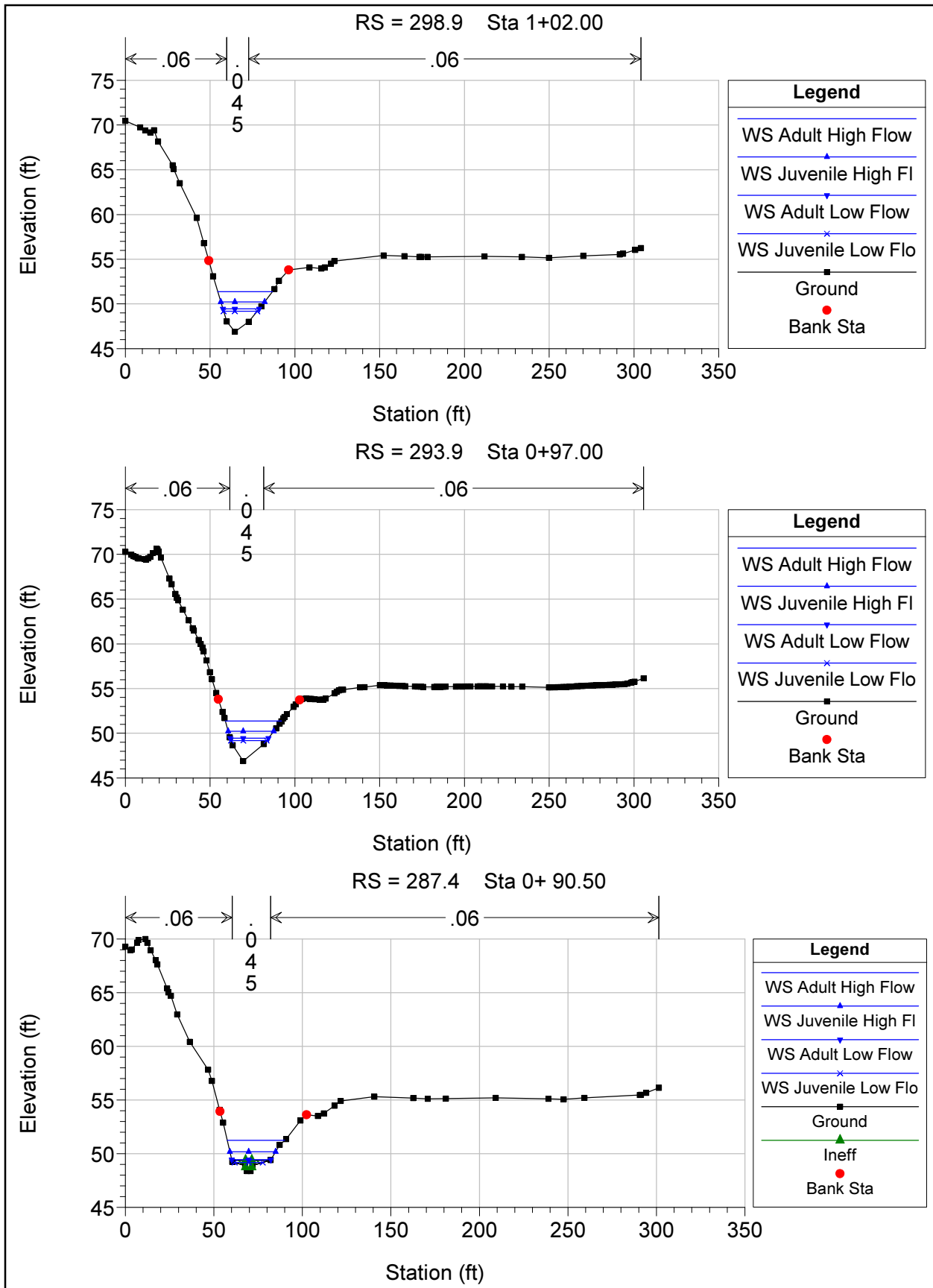


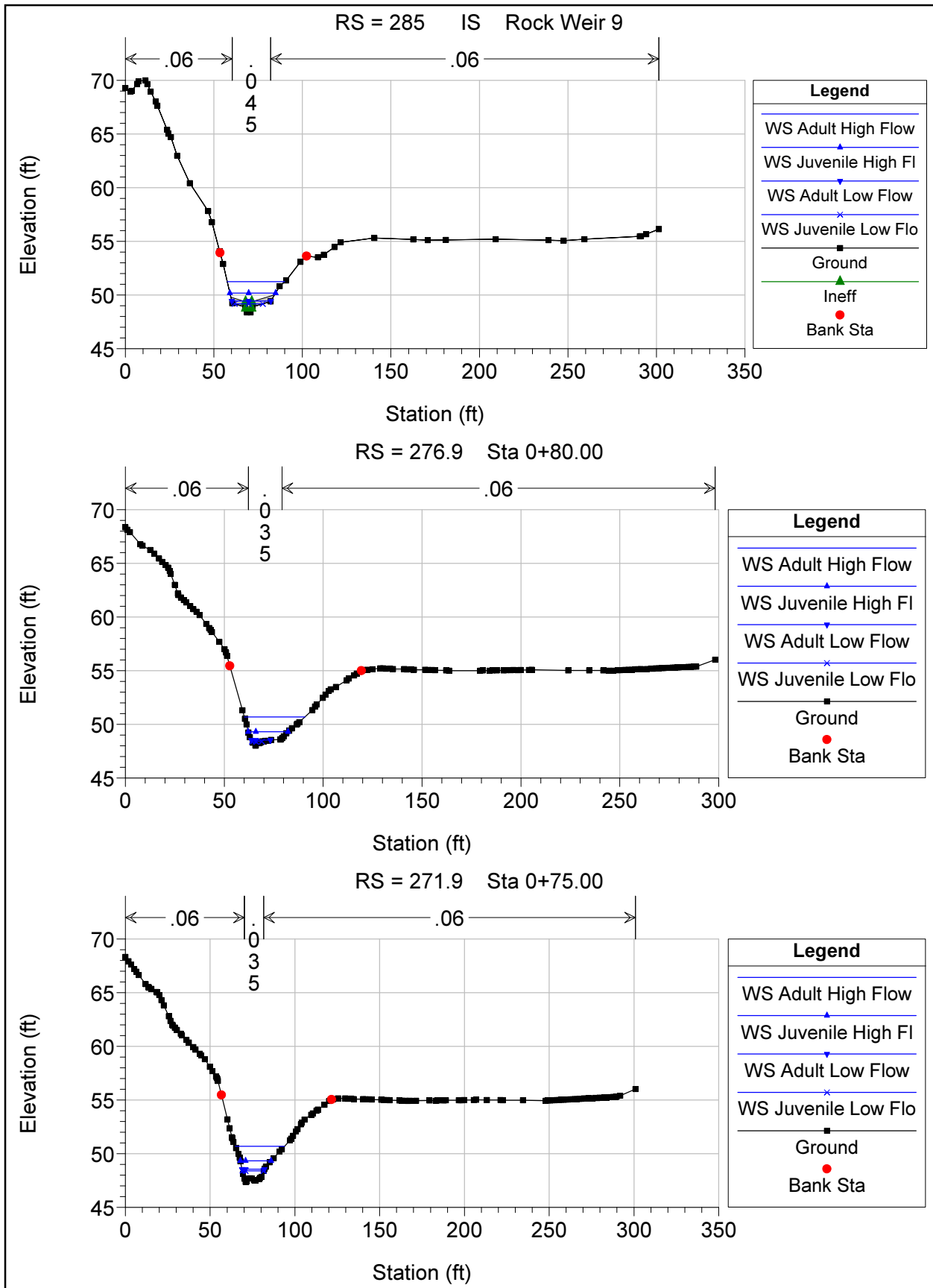


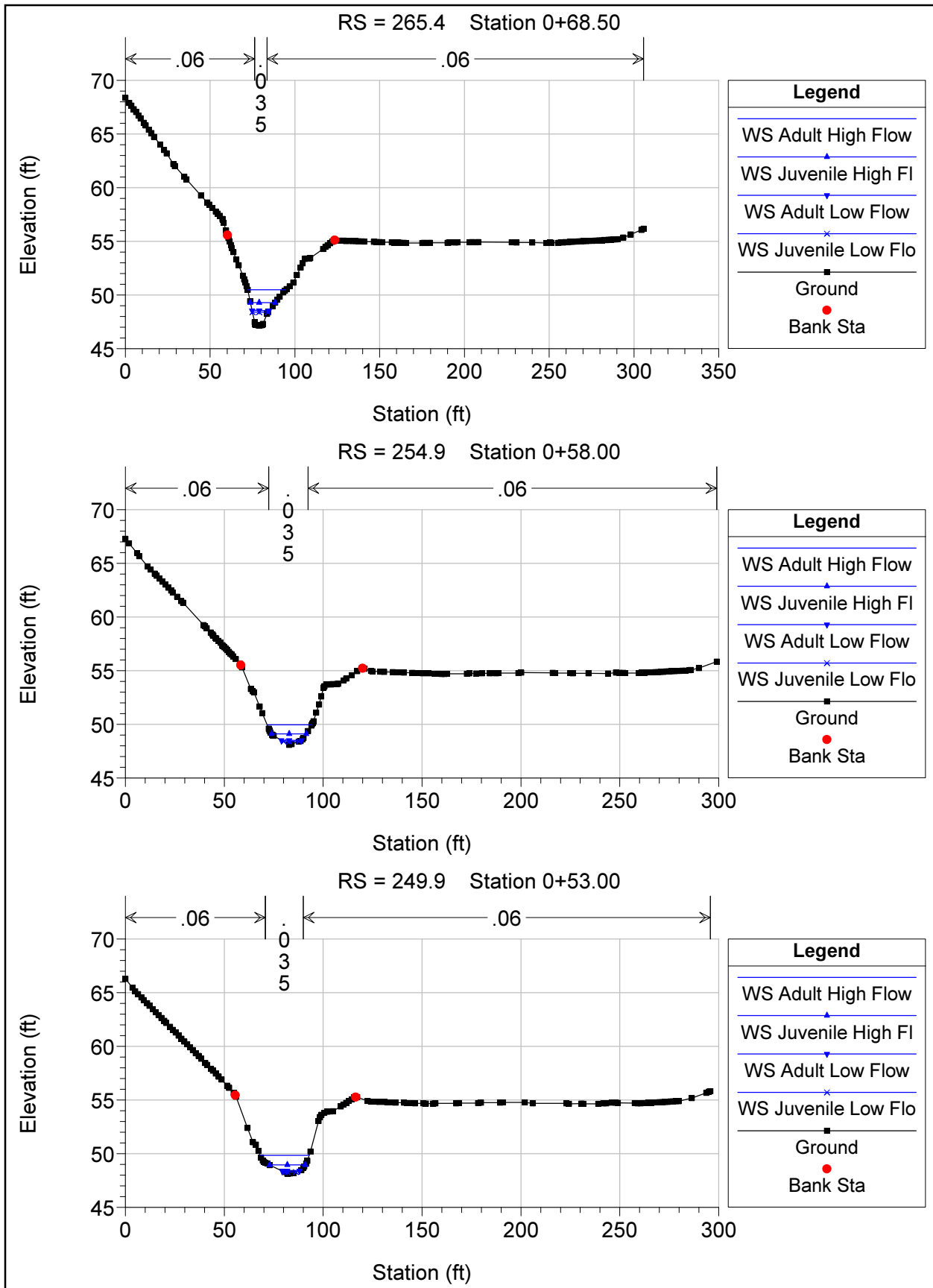


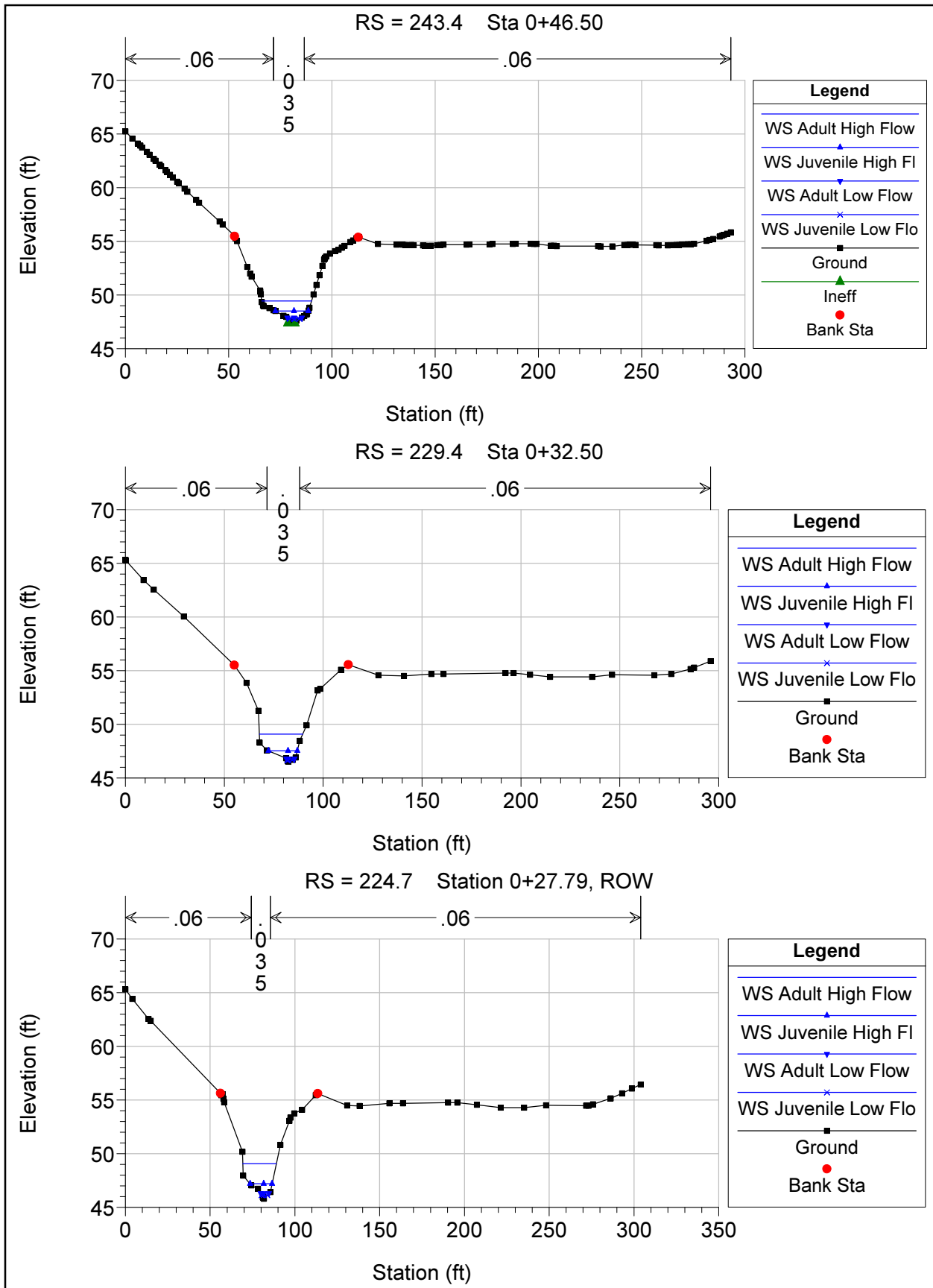


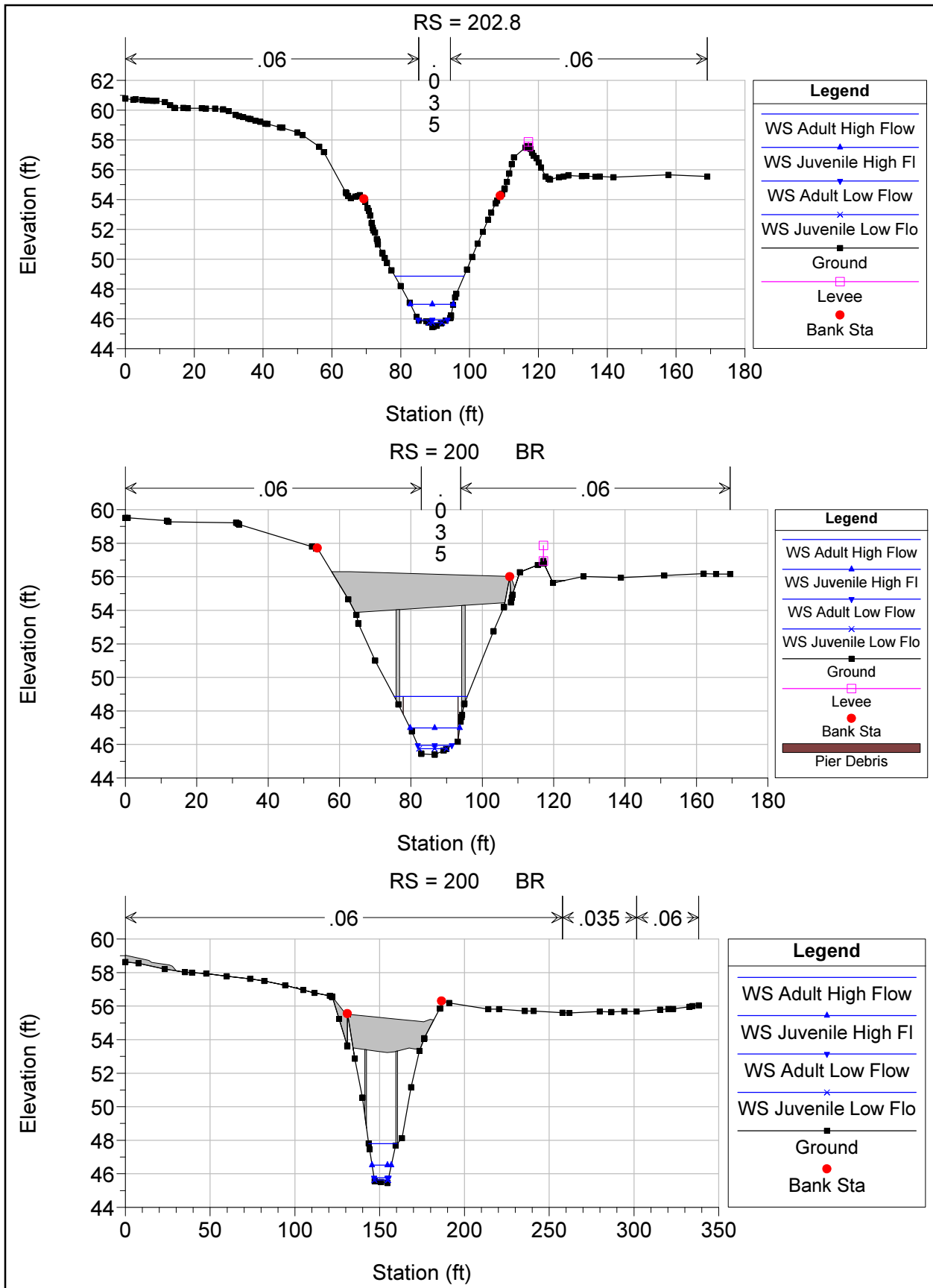


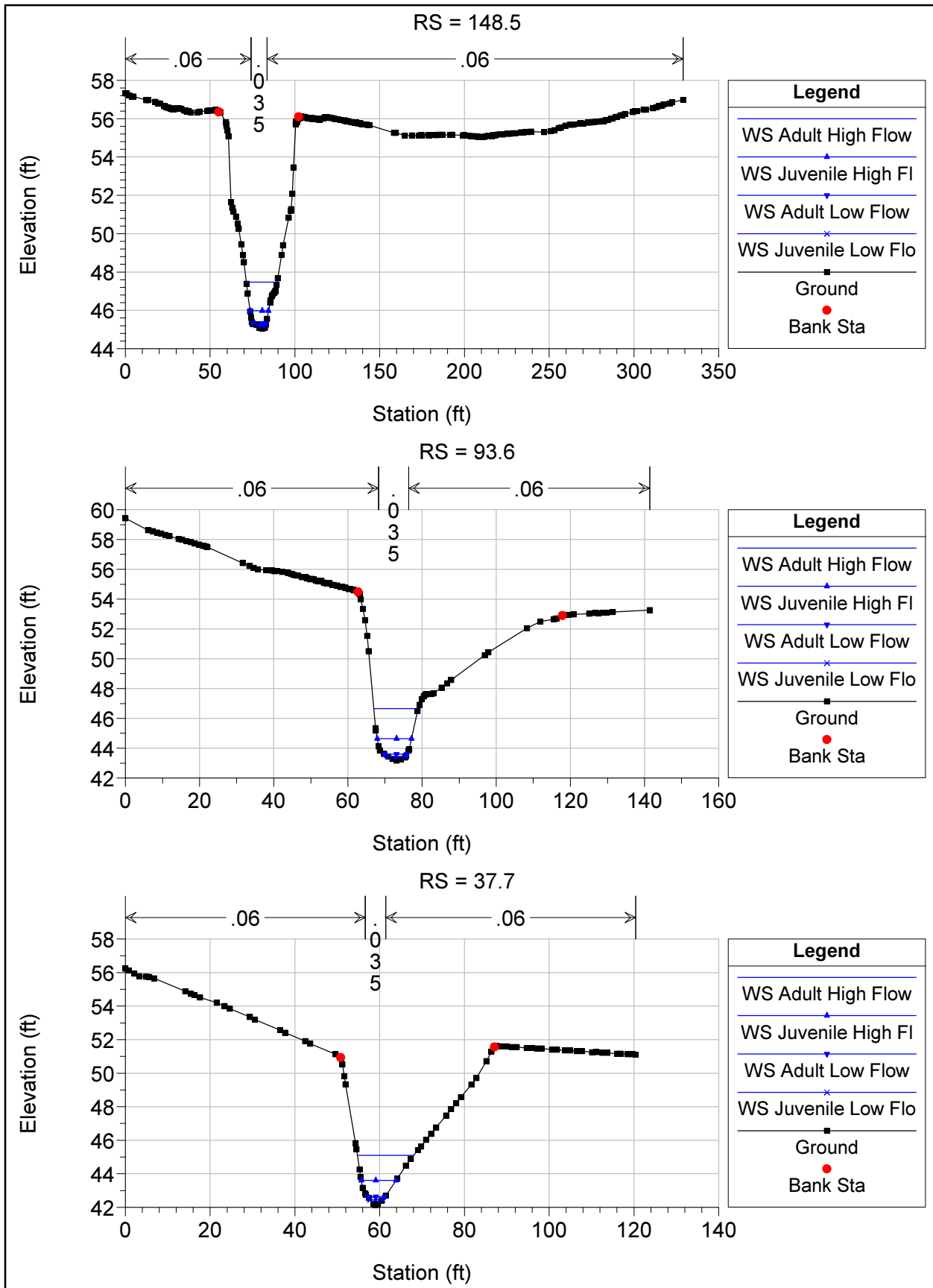


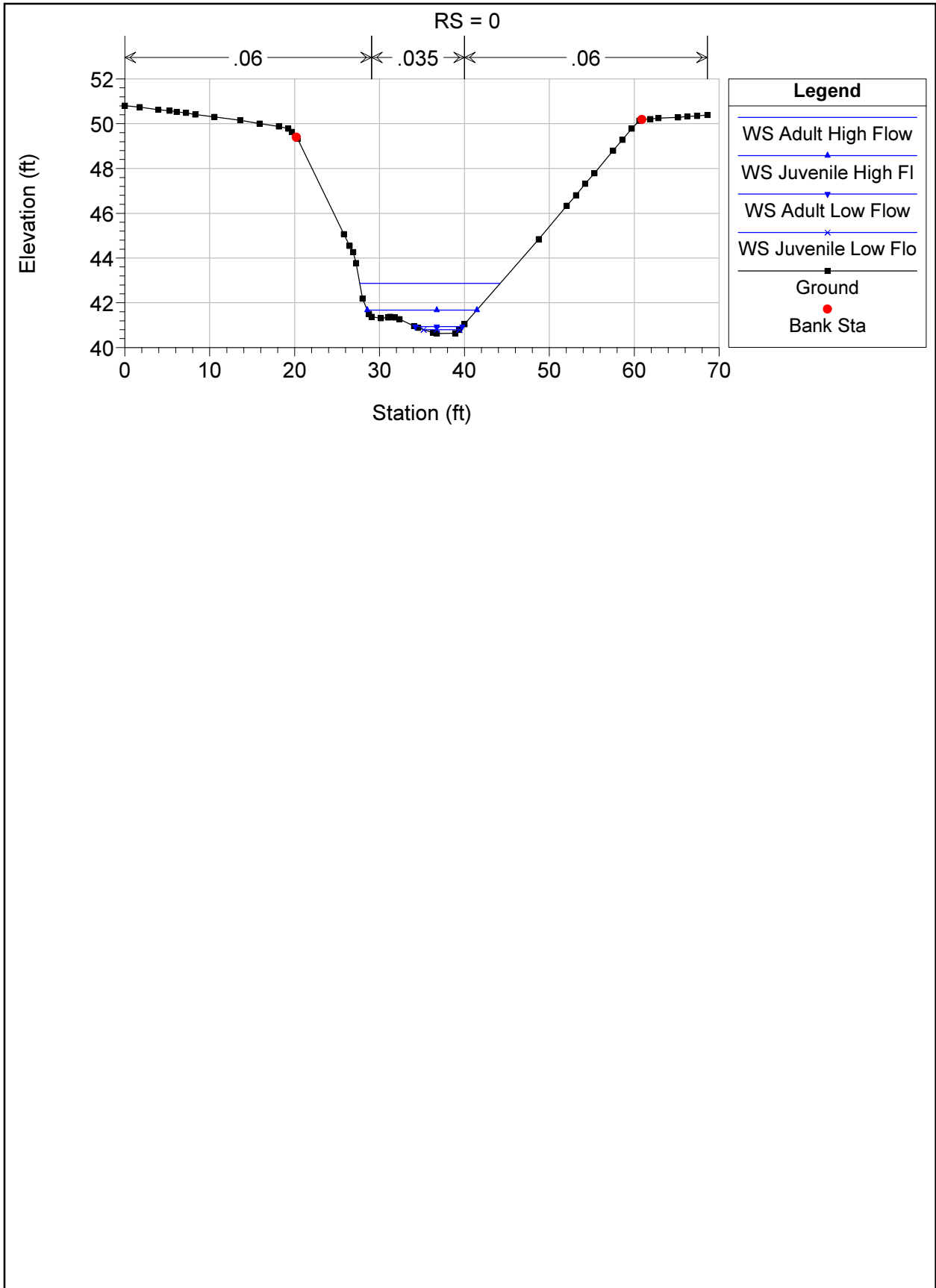














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Appendix E. Energy Dissipation Factor Calculation

P20032 TO 01 Soscol Junction PS&E**04 Nap SR 29 PM 5.5, SR 221 PM 0.0/0.2****Energy Dissipation Factor**

Calculation guideline from CSSHRM Manual (Page XII-115)

$$EDF = \frac{\gamma Qh}{V}$$

| Baffle No. 1 Pool | | RS: 530 |
|-------------------------------------|-------------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.37 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 730.9 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft³/s) | 5.59 | Energy Dissipation Factor |

| Baffle No. 2 Pool | | RS: 515 |
|-------------------------------------|-------------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.42 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 683.6 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft³/s) | 6.79 | Energy Dissipation Factor |

| Baffle No. 3 Pool | | RS: 507 |
|-------------------------------------|-------------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.40 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 626.4 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft³/s) | 7.05 | Energy Dissipation Factor |

| Baffle No. 4 Pool | | RS: 496 |
|-------------------------------------|-------------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.22 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 399.9 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft³/s) | 6.08 | Energy Dissipation Factor |

| Baffle No. 5 Pool | | RS: 485 |
|-------------------------------------|-------------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.45 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 612.8 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft³/s) | 8.11 | Energy Dissipation Factor |

P20032 TO 01 Soscol Junction PS&E
04 Nap SR 29 PM 5.5, SR 221 PM 0.0/0.2
Energy Dissipation Factor
Calculation guideline from CSSHRM (Page XII-115)

$$EDF = \frac{\gamma Qh}{V}$$

Pool No. 1

RS: 452

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Entering the Pool |
| h(ft) | 0.4 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 803.8 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 5.50 | Energy Dissipation Factor |

Pool No. 2

RS: 430.9

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Entering the Pool |
| h(ft) | 0.46 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 877.4 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 5.79 | Energy Dissipation Factor |

Pool No. 3

RS: 408.9

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Entering the Pool |
| h(ft) | 0.56 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 737.0 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 8.39 | Energy Dissipation Factor |

Pool No. 4

RS: 386.9

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Entering the Pool |
| h(ft) | 0.38 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 613.0 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 6.85 | Energy Dissipation Factor |

Pool No. 5

RS: 364

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.66 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 717.4 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 10.16 | Energy Dissipation Factor |

Pool No. 6

RS: 342.9

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.48 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 763.2 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 6.95 | Energy Dissipation Factor |

Pool No. 7

RS: 320.9

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.66 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 646.3 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 7.86 | Energy Dissipation Factor |

Pool No. 8

RS: 298.9

| | | |
|--------------------------------|-------|---|
| r (lb/ft ³) | 62.4 | Unit Weigth of Water |
| Q (ft ³ /s) | 177.0 | Flow Enterining the Pool |
| h(ft) | 0.46 | Head of Drop Flow Entering the Pool |
| V (ft ³) | 674.3 | Effective Volume of the Pool for dissipating Energy |
| EDF (lb*ft/ft ³ /s) | 7.53 | Energy Dissipation Factor |



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Appendix F. Plunging and Streaming Flow Evaluation

P20032 TO 01 Soscol Junction PS&E**04 Nap SR 29 PM 5.5, SR 221 PM 0.0/0.2****Energy Dissipation Factor**

Calculation guideline from CSSHRM Manual (Page XII-115)

$$Q = Q_t \cdot \sqrt{g b_o S_o} L^{3/2}$$

Baffle No. 1 Pool

RS: 530

| | | |
|----------|--------------|----------------------------|
| Qt | 0.9 | Unit Weigth of Water |
| g | 32.2 | Gravitational acceleration |
| b | 30.1 | Width of fishway weir |
| S | 0.0 | Slope of fishway |
| L | 14.0 | Length of pool |
| p | 3.1 | Height of pool |
| Q | 26.79 | Transition Flow |

Baffle No. 2 Pool

RS: 515

| | | |
|----------|--------------|----------------------------|
| Qt | 0.6 | Unit Weigth of Water |
| g | 32.2 | Gravitational acceleration |
| b | 33.4 | Width of fishway weir |
| S | 0.0 | Slope of fishway |
| L | 6.5 | Length of pool |
| p | 2.4 | Height of pool |
| Q | 11.88 | Transition Flow |

Baffle No. 3 Pool

RS: 507

| | | |
|----------|--------------|----------------------------|
| Qt | 0.7 | Unit Weigth of Water |
| g | 32.2 | Gravitational acceleration |
| b | 26 | Width of fishway weir |
| S | 0.0 | Slope of fishway |
| L | 7.0 | Length of pool |
| p | 2.3 | Height of pool |
| Q | 11.34 | Transition Flow |

Baffle No. 4 Pool

RS: 496

| | | |
|----|-------|----------------------------|
| Qt | 1.5 | Unit Weigth of Water |
| g | 32.2 | Gravitational acceleration |
| b | 20.2 | Width of fishway weir |
| S | 0.0 | Slope of fishway |
| L | 13.5 | Length of pool |
| p | 2.2 | Height of pool |
| Q | 29.24 | Transition Flow |

Baffle No. 5 Pool

RS: 485

| | | |
|----|-------|----------------------------|
| Qt | 3.0 | Unit Weigth of Water |
| g | 32.2 | Gravitational acceleration |
| b | 23.7 | Width of fishway weir |
| S | 0.0 | Slope of fishway |
| L | 22.6 | Length of pool |
| p | 2.5 | Height of pool |
| Q | 96.75 | Transition Flow |



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Appendix G. Engineered Streambed Material Calculation

P20032 TO 01 Soscol Junction PS&E
04 Nap SR 29 PM 5.5, SR 221 PM 0.0/0.2
Rock Sizing and Gradation
Calculation guideline from CSSHRM (Page XII-67-71)

$$D_{30-ACOE} = \frac{1.955S^{0.585}(1.25q)^{\frac{2}{3}}}{g^{\frac{1}{3}}}$$

Step Pool No. 1

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 50.66 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.02 | Hydraulic Slope |
| $D_{30-ACOE}$ (ft) | 1.22 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 1.83 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 0.73 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 4.57 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.06 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.01 | D_{8} particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 3.80 | |

Step Pool No. 2

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 51.74 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.03 | Hydraulic Slope |
| $D_{30-ACOE}$ (ft) | 1.41 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 2.12 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 0.85 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 5.29 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.07 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.01 | D_{8} particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 4.39 | |

Step Pool No. 3

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 61.26 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.03 | Hydarulic Slope |
| $D_{30-ACOE}$ (ft) | 1.71 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 2.56 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 1.02 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 6.40 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.08 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.02 | D_{8} particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 5.32 | |

Step Pool No. 4

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 61.93 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.04 | Hydarulic Slope |
| $D_{30-ACOE}$ (ft) | 1.81 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 2.71 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 1.08 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 6.77 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.09 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.02 | D_{8} particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 5.63 | |

Step Pool No. 5

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 58.29 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.04 | Hydraulic Slope |
| $D_{30-ACOE}$ (ft) | 1.76 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 2.64 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 1.05 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 6.59 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.08 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.02 | D_8 particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 5.48 | |

Step Pool No. 6

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 46.19 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.03 | Hydraulic Slope |
| $D_{30-ACOE}$ (ft) | 1.39 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 2.09 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 0.84 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 5.23 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.07 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.01 | D_8 particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 4.34 | |

Step Pool No. 7

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 40.56 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.03 | Hydarulic Slope |
| $D_{30-ACOE}$ (ft) | 1.29 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 1.93 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 0.77 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 4.83 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.06 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.01 | D_8 particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 4.01 | |

Step Pool No. 8

| | | |
|---------------------------|-------|---|
| g (ft/s ²) | 32.2 | Gravitational acceleration |
| q (ft ³ /ft) | 45.72 | Unit discharge within the active channel at the stable bed design flow (100-Year) |
| S (ft/ft) | 0.03 | Hydarulic Slope |
| $D_{30-ACOE}$ (ft) | 1.33 | D_{30} stable particle size based on rock gradation |
| D_{84-ESM} (ft) | 2.00 | D_{84} stable particle size for ESM |
| D_{50-ESM} (ft) | 0.80 | D_{50} stable particle size for ESM |
| $D_{100-ESM}$ (ft) | 4.99 | D_{100} stable particle size for ESM |

$$D_{16-ESM} = 0.32^{\frac{1}{n}} D_{50-ESM}$$

$$D_{8-ESM} = 0.16^{\frac{1}{n}} D_{50-ESM}$$

| | | |
|-------------------|------|---|
| n | 0.45 | Between 0.45 and 0.70. |
| D_{16-ESM} (ft) | 0.06 | D_{16} particle size to fill the interstitial voids |
| D_{8-ESM} (ft) | 0.01 | D_8 particle size to fill the interstitial voids |
| D_{8-ESM} (mm) | 4.15 | |



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Appendix H. Weir Rock Size Calculation

P20032 TO 01 Soscol Junction PS&E
04 Nap SR 29 PM 5.5, SR 221 PM 0.0/0.2
Rock Sizing and Gradation
Calculation guideline from CSSHRM (Page XII-89-91)

$$D_{75\text{-riprap}} = \frac{3.5wDS}{CK}$$

Step Pool No. 1

| | | |
|-------------------------------------|-------------|--|
| w (ft) | 40.6 | Channel top width at the design flow |
| D (ft) | 7.49 | Maximum depth of flow in channel |
| S (ft/ft) | 0.02 | Channel Slope |
| C | 1.00 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| D_{75-riprap} (inch) | 2.10 | D _{75-riprap} riprap size in inches |
| D_{50-riprap} (inch) | 1.75 | D _{50-riprap} riprap size in inches |
| D_{50-Weir} (inch) | 3.49 | D _{50-Weir} riprap size in inches |
| D_{100-Weir} (inch) | 6.98 | D _{100-Weir} riprap size in inches |
| D_{min-Weir} (inch) | 1.31 | D _{min-Weir} riprap size in inches |

Step Pool No. 2

| | | |
|-------------------------------------|--------------|--|
| w (ft) | 49.7 | Channel top width at the design flow |
| D (ft) | 7.37 | Maximum depth of flow in channel |
| S (ft/ft) | 0.03 | Channel Slope |
| C | 1.00 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| D_{75-riprap} (inch) | 3.21 | D _{75-riprap} riprap size in inches |
| D_{50-riprap} (inch) | 2.67 | D _{50-riprap} riprap size in inches |
| D_{50-Weir} (inch) | 5.34 | D _{50-Weir} riprap size in inches |
| D_{100-Weir} (inch) | 10.69 | D _{100-Weir} riprap size in inches |
| D_{min-Weir} (inch) | 2.00 | D _{min-Weir} riprap size in inches |

Step Pool No. 3

| | | |
|-------------------------------------|--------------|--|
| w (ft) | 76.9 | Channel top width at the design flow |
| D (ft) | 7.28 | Maximum depth of flow in channel |
| S (ft/ft) | 0.03 | Channel Slope |
| C | 1.00 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| D_{75-riprap} (inch) | 5.64 | D _{75-riprap} riprap size in inches |
| D_{50-riprap} (inch) | 4.70 | D _{50-riprap} riprap size in inches |
| D_{50-Weir} (inch) | 9.40 | D _{50-Weir} riprap size in inches |
| D_{100-Weir} (inch) | 18.81 | D _{100-Weir} riprap size in inches |
| D_{min-Weir} (inch) | 3.53 | D _{min-Weir} riprap size in inches |

Step Pool No. 4

| | | |
|-------------------------------|-------|--|
| w (ft) | 81.8 | Channel top width at the design flow |
| D (ft) | 7.82 | Maximum depth of flow in channel |
| S (ft/ft) | 0.04 | Channel Slope |
| C | 1.00 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| D _{75-riprap} (inch) | 7.04 | D _{75-riprap} riprap size in inches |
| D _{50-riprap} (inch) | 5.87 | D _{50-riprap} riprap size in inches |
| D _{50-Weir} (inch) | 11.74 | D _{50-Weir} riprap size in inches |
| D _{100-Weir} (inch) | 23.47 | D _{100-Weir} riprap size in inches |
| D _{min-Weir} (inch) | 4.40 | D _{min-Weir} riprap size in inches |

Step Pool No. 5

| | | |
|-------------------------------|-------|--|
| w (ft) | 27.1 | Channel top width at the design flow |
| D (ft) | 7.73 | Maximum depth of flow in channel |
| S (ft/ft) | 0.04 | Channel Slope |
| C | 0.60 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| D _{75-riprap} (inch) | 3.93 | D _{75-riprap} riprap size in inches |
| D _{50-riprap} (inch) | 3.28 | D _{50-riprap} riprap size in inches |
| D _{50-Weir} (inch) | 6.56 | D _{50-Weir} riprap size in inches |
| D _{100-Weir} (inch) | 13.11 | D _{100-Weir} riprap size in inches |
| D _{min-Weir} (inch) | 2.46 | D _{min-Weir} riprap size in inches |

Step Pool No. 6

| | | |
|-------------------------------|-------|--|
| w (ft) | 41.9 | Channel top width at the design flow |
| D (ft) | 8.34 | Maximum depth of flow in channel |
| S (ft/ft) | 0.03 | Channel Slope |
| C | 0.60 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| D _{75-riprap} (inch) | 5.71 | D _{75-riprap} riprap size in inches |
| D _{50-riprap} (inch) | 4.76 | D _{50-riprap} riprap size in inches |
| D _{50-Weir} (inch) | 9.51 | D _{50-Weir} riprap size in inches |
| D _{100-Weir} (inch) | 19.02 | D _{100-Weir} riprap size in inches |
| D _{min-Weir} (inch) | 3.57 | D _{min-Weir} riprap size in inches |

Step Pool No. 7

| | | |
|-------------------------------|-------|--|
| w (ft) | 36.8 | Channel top width at the design flow |
| D (ft) | 9.10 | Maximum depth of flow in channel |
| S (ft/ft) | 0.03 | Channel Slope |
| C | 0.60 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| $D_{75\text{-riprap}}$ (inch) | 5.55 | $D_{75\text{-riprap}}$ riprap size in inches |
| $D_{50\text{-riprap}}$ (inch) | 4.63 | $D_{50\text{-riprap}}$ riprap size in inches |
| $D_{50\text{-Weir}}$ (inch) | 9.26 | $D_{50\text{-Weir}}$ riprap size in inches |
| $D_{100\text{-Weir}}$ (inch) | 18.51 | $D_{100\text{-Weir}}$ riprap size in inches |
| $D_{\text{min-Weir}}$ (inch) | 3.47 | $D_{\text{min-Weir}}$ riprap size in inches |

Step Pool No. 8

| | | |
|-------------------------------|-------|--|
| w (ft) | 49.6 | Channel top width at the design flow |
| D (ft) | 9.82 | Maximum depth of flow in channel |
| S (ft/ft) | 0.03 | Channel Slope |
| C | 0.60 | Coefficient for channel curvature |
| K | 1.00 | Side slope coefficient |
| $D_{75\text{-riprap}}$ (inch) | 7.43 | $D_{75\text{-riprap}}$ riprap size in inches |
| $D_{50\text{-riprap}}$ (inch) | 6.19 | $D_{50\text{-riprap}}$ riprap size in inches |
| $D_{50\text{-Weir}}$ (inch) | 12.38 | $D_{50\text{-Weir}}$ riprap size in inches |
| $D_{100\text{-Weir}}$ (inch) | 24.76 | $D_{100\text{-Weir}}$ riprap size in inches |
| $D_{\text{min-Weir}}$ (inch) | 4.64 | $D_{\text{min-Weir}}$ riprap size in inches |



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Appendix I. Rock Weir Scour Analysis

P20032 TO 01 Soscol Junction PS&E
04 Nap SR 29 PM 5.5, SR 221 PM 0.0/0.2
Rock Weir Scour Depth
Calculation guideline from FHWA, HEC-23

$$d_s = K_u H_t^{0.225} q^{0.54} - d_m$$

Rock Weir I No. 1

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | Pool Depth | 2 |
| q(cfs/ft) | 40.0 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 1.7 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 4.6 | Tailwater Depth | | |
| ds (ft) | 6.3 | | | |

Rock Weir No. 2

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | Pool Depth | 2 |
| W (ft) | 39.2 | Weir Width | | |
| q(cfs/ft) | 26.7 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 0.35 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 5.5 | Tailwater Depth | | |
| ds (ft) | 0.6 | | | |

Rock Weir No. 3

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | pool Depth | 2 |
| q(cfs/ft) | 28.0 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 0.9 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 5.6 | Tailwater Depth | | |
| ds (ft) | 2.2 | | | |

Rock Weir No. 4

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | Pool Depth | 2 |
| q(cfs/ft) | 27.9 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 0.9 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 5.4 | Tailwater Depth | | |
| ds (ft) | 2.3 | | | |

Rock Weir No. 5

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | Pool Depth | 2 |
| q(cfs/ft) | 31.2 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 0.2 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 6.0 | Tailwater Depth | | |
| ds (ft) | 0.0 | | | |

Rock Weir No. 6

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | Pool Depth | 2 |
| q(cfs/ft) | 34.1 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 0.4 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 6.6 | Tailwater Depth | | |
| ds (ft) | 0.6 | | | |

Rock Weir No. 7

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | Pool Depth | 2 |
| q(cfs/ft) | 28.9 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 0.0 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 6.3 | Tailwater Depth | | |
| ds (ft) | -2.6 | | | |

Rock Weir No. 8

| | | | | |
|-----------|--------|--|------------|---|
| Q (cfs) | 1520.0 | 100-year design flow | Pool Depth | 2 |
| q(cfs/ft) | 26.6 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 0.0 | Total drop in head, measured from the upstream to downstream energy grade line | | |
| dm (ft) | 8.1 | Tailwater Depth | | |
| ds (ft) | -4.9 | | | |

Rock Weir No. 9

| | | |
|-----------|--------|--|
| Q (cfs) | 1520.0 | 100-year design flow |
| q(cfs/ft) | 23.4 | Discharge per unit width |
| Ku | 1.32 | 1.32 for English Unit |
| Ht (ft) | 0.0 | Total drop in head, measured from the upstream to downstream energy grade line |
| dm (ft) | 9.0 | Tailwater Depth |
| ds (ft) | -5.4 | |

Pool Depth 2

P20032 TO 01 Soscol Junction PS&E
04 Nap SR 29 PM 5.5, SR 221 PM 0.0/0.2
Rock Weir Scour Depth
Calculation guideline from FHWA, HEC-23

$$d_s = K_u H_t^{0.225} q^{0.54} - d_m$$

Concrete Baffle No. 5

| | | | | |
|-----------|--------|---------------------------------|--|--|
| Q (cfs) | 1520.0 | 100-year design flow | | |
| q(cfs/ft) | 45.1 | Discharge per unit width | | |
| Ku | 1.32 | 1.32 for English Unit | | |
| Ht (ft) | 1.60 | to downstream energy grade line | | |
| dm (ft) | 5.8 | Tailwater Depth | | |
| ds (ft) | 5.7 | | | |

Pool Depth 2.42



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Appendix J. Rock Slope Protection Calculation

Soscol Creek Fish Passage

Napa County

Streambank Rock Slope Protection

Calculation guideline from Caltrans Highway Design Manual

Input from HEC-RAS for Proposed single span

100-year Bulkied Flow

| | | | | | | |
|-------------------------|------------------|------------------|-----------------|-----------------|-----------------|-------------------|
| Location along stream: | Upstream | Upstream Face | Downstream Face | Downstream | Downstream 2 | |
| V_{avg} | 8.1 | 5.7 | 6.7 | 4.5 | 7.7 | ft/s |
| g | 32.2 | 32.2 | 32.2 | 32.2 | 32.2 | ft/s ² |
| Depth based on | Average | Average | Average | Average | Average | |
| y | 3.8 | 5.3 | 4.3 | 5.9 | 4.8 | ft |
| S_f | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | |
| C_s | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| Cross section location: | Straight channel | Straight channel | Outside of bend | Outside of bend | Outside of bend | |
| C_v | 1.00 | 1.00 | 1.18 | 1.18 | 1.18 | |

For outside of bends, need R_c and W :

Note: these parameters also affect the V_{des} ; for natural channels, $V_{des}=V_{avg}$ for $R_c/W>26$

Note: these parameters also affect the V_{des} ; for trapezoidal channels, $V_{des}=V_{avg}$ for $R_c/W>8$

| | | | | | | |
|------------------|---------|---------|---------|---------|---------|-----------------------------------|
| R_c | 26 | 26 | 135 | 135 | 135 | ft |
| W | 1.0 | 1.0 | 40.3 | 40.3 | 40.3 | ft |
| C_t | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| S_g | 2.65 | 2.65 | 2.65 | 2.65 | 2.65 | |
| Type of channel: | Natural | Natural | Natural | Natural | Natural | |
| V_{des} | 8.1 | 5.8 | 9.8 | 6.7 | 11.2 | ft/s |
| K_1 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | |
| θ | 33.7 | 33.7 | 33.7 | 33.7 | 33.7 | degrees |
| SS | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | |
| D_{30} | 0.5 | 0.2 | 0.9 | 0.3 | 1.2 | ft |
| D_{50} | 0.6 | 0.2 | 1.0 | 0.4 | 1.4 | ft |
| D_{50} | 6.7 | 2.6 | 12.3 | 4.3 | 16.8 | inches |
| | II | I | IV | I | V | RSP Class |
| | 60 lb | 20 lb | 300 lb | 20 lb | 1/4 ton | Median particle weight |
| | 9 | 6 | 15 | 6 | 18 | Median particle diameter (inches) |

Soscol Creek Fish Passage

Napa County

Rock Slope Protection Calculations for Abutments

Calculation guideline from HEC-23 3rd Edition

Input from HEC-RAS for Proposed single span

100-year Bulkied Flow

| Location | Upstream | Upstream Face | Downstream Face | Downstream | |
|----------|---------------|---------------|-----------------|---------------|-------------------|
| V | 8.1 | 5.7 | 6.7 | 4.5 | ft/s |
| g | 32.2 | 32.2 | 32.2 | 32.2 | ft/s ² |
| y | 3.8 | 5.3 | 4.3 | 5.9 | ft |
| Fr | 0.73 | 0.44 | 0.56 | 0.33 | |
| Equation | Isbash | Isbash | Isbash | Isbash | |

For Froude Numbers $(V/(gy)^{1/2}) \leq 0.80$, Isbash relationship (Equation 14.1)

$$D_{50} = \frac{yK}{(S_s - 1)} \left[\frac{V^2}{gy} \right]$$

| | | | | | |
|-----------------|--------|-------|--------|-------|--|
| y | 3.8 | 5.3 | 4.3 | 5.9 | depth of flow in the contracted bridge opening, ft |
| K | 1.00 | 1.00 | 1.00 | 1.00 | 1.02 for vertical wall abutment, 0.89 for spill-through abutment |
| S _s | 2.65 | 2.65 | 2.65 | 2.65 | specific gravity of rock |
| V | 8.1 | 5.7 | 6.7 | 4.5 | average velocity in contracted section, ft/s |
| g | 32.2 | 32.2 | 32.2 | 32.2 | gravitational acceleration, ft/s ² |
| D ₅₀ | 1.2 | 0.6 | 0.8 | 0.4 | median stone diameter, ft |
| D ₅₀ | 14.7 | 7.4 | 10.0 | 4.7 | median stone diameter, inches |
| | IV | II | III | I | RSP Class |
| | 300 lb | 60 lb | 150 lb | 20 lb | Median particle weight |
| | 15 | 9 | 12 | 6 | Median particle diameter (inches) |



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Appendix K. Cost Estimate

| ESTIMATE OF COST | | | | | | | |
|--|-----------------|---|--------------------|-----------------------|---------------|-------------------|-------------------|
| 04-281201_Soscol Creek Fish Passage Improvement | | | | | | | |
| 95% PS&E Submittal | | | | | | | |
| 3/31/2021 | | | | | | | |
| No. | BID ITEM No. | BID ITEM DESCRIPTION | UNIT OF MEASURE | ESTIMATED QUANTITY | UNIT PRICE | AMOUNT | |
| 1 | 153247 | REMOVE CONCRETE (MISCELLANEOUS) | CY | 7 | \$ 583 | \$ 4,081 | |
| 2 | 190151 | CHANNEL EXCAVATION | CY | 1,248 | \$ 85 | \$ 106,080 | |
| 3 | 731502 | MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION) | CY | 9 | \$ 2,560 | \$ 23,040 | |
| 4 | | ROCK WEIR (STRUCTURAL ROCK, METHOD A) | CY | 374 | \$ 500 | \$ 187,000 | |
| 5 | 721401A | VOID FILLER | CY | 412 | \$ 75 | \$ 30,900 | |
| 6 | 723080 | CLASS II PERMEABLE MATERIAL | CY | 253 | \$ 517 | \$ 130,801 | |
| 7 | | ESM (12" D50, METHOD B) | CY | 388 | \$ 250 | \$ 97,000 | |
| 8 | 723050 | CLASS V RSP (1/4 TON, METHOD B) | CY | 336 | \$ 365 | \$ 122,640 | |
| | | | | | | | |
| | | | | | | SUBTOTAL | \$ 701,542 |
| | | | | | | CONTINGENCY (20%) | \$ 140,308 |
| | | | | | | TOTAL | \$ 841,850 |

**WHAT SPECIES
BENEFIT?**

JUVENILE STEELHEAD TROUT



ADULT STEELHEAD TROUT



JUVENILE CHINOOK SALMON



ADULT CHINOOK SALMON



CALIFORNIA ROACH



PACIFIC LAMPREY



FISH BARRIER REMOVALS

OVERVIEW

The Napa River watershed includes 171 miles of spawning and rearing habitat, but many of Napa’s native fish are struggling to survive due to barriers that limit access to these critical areas. Historically, the watershed supported the largest steelhead run of any San Francisco Bay tributary outside the Sacramento–San Joaquin system.

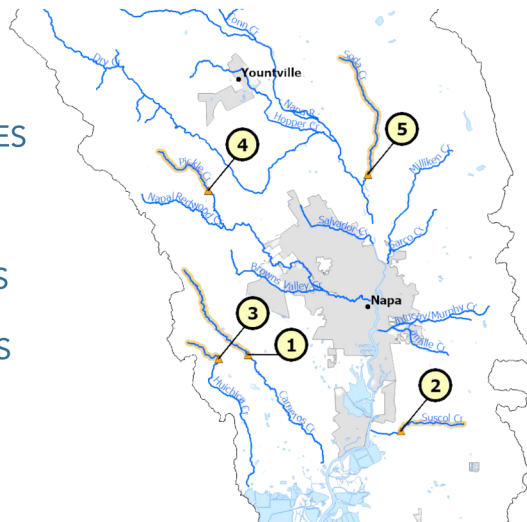
Since 1945, Napa RCD has been a leader in environmental stewardship across Napa County’s forests, farms, and watersheds. In 2024, we launched a major initiative to improve miles of creek habitat for salmon and trout, supported by over \$7.6 million from NOAA and the California Wildlife Conservation Board. Addressing these barriers will give native fish a fighting chance at recovery and long-term survival.

SULPHUR CREEK: 3.2 MILES OF PRIME WILDLIFE HABITAT REOPENED.

Sulphur Creek stands as one of Napa Valley’s highlights for wildlife, thanks to its cool, year-round waters and rich, diverse plant life. Napa RCD’s removal of the old bridge that once stood here has created a pivotal moment for the creek—improving access for fish that have had limited access to this vital stretch of stream for decades. This game-changer offers new opportunities for restoration and a healthier ecosystem for the creatures that call Sulphur Creek home.

UPCOMING PROJECTS

- ① CARNEROS CREEK - 4.7 MILES
- ② SUSCOL CREEK - 2.4 MILES
- ③ HUICHICA CREEK - 1.5 MILES
- ④ PICKLE CANYON - 2.6 MILES
- ⑤ SODA CANYON - 4 MILES



CREATING A ROADMAP FOR FISH PASSAGE IMPROVEMENTS

Alongside a **technical and cultural working group**, we're developing a comprehensive, science-based process to identify and prioritize the barriers that prevent fish from moving freely through the Napa River watershed. This effort will produce a living Barrier Assessment — a flexible, evolving roadmap that guides future action to remove or improve human-made barriers and support the recovery of migratory fish like steelhead trout and salmon.



As part of this initiative, Napa RCD is:

- Removing four key barriers
- Designing and permitting five high-priority projects at sites identified through the assessment process
- Expanding our fish monitoring program to improve how we prioritize projects and evaluate the effectiveness of restoration
- Engaging the community through education, events, school trips, and volunteer opportunities that connect people to local habitat restoration
- Building a project pipeline to secure future funding for design, permitting, implementation, and long-term monitoring

Together, these efforts are laying the groundwork for a future where Napa's creeks run clear and cold, and salmon and steelhead trout can return, year after year.

Partner:



CALIFORNIA TROUT

Construction and
Engineering:



ANCHOR

Funded by:

