# FINAL DESIGN REPORT FOR SAND CREEK RESTORATION

**Prepared For:**

**SR Land, LLC**
20 Boulder Crescent, 2nd Flood
Colorado Springs, CO 80903
(719) 491-3024

**Prepared By:**

**JR Engineering, LLC**
5475 Tech Center Drive
Colorado Springs, CO 80919
(303) 267-6240
Contact: Mike Bramlett, PE

January 23, 2023

**ENGINEER'S STATEMENT:**
The attached design report was prepared under my direction and supervision and is correct to the best of my knowledge and belief. Said design report has been prepared according to the criteria established by El Paso County for drainage plans and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

_____ _____

Mike Bramlett, Colorado P.E. # 32314 Date
For and On Behalf of JR Engineering, LLC

**DEVELOPER'S STATEMENT:**
I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: _____

By: _____

Title: _____
Address: _____
_____

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

_____ _____

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

Conditions:

# TABLE OF CONTENTS

**INTRODUCTION ..... 4**

A. PROJECT BACKGROUND ..... 4
B. PURPOSE OF STUDY ..... 4

**II. GENERAL LOCATION AND DESCRIPTION ..... 4**

A. SITE LOCATION ..... 4
B. DESCRIPTION OF PROPERTY ..... 5

**III. DRAINAGE BASINS AND SUB-BASINS ..... 6**

A. MAJOR BASIN DESCRIPTION ..... 6
B. PREVIOUS STUDIES ..... 6
C. IRRIGATION FACILITIES ..... 6
D. FLOODPLAIN ..... 6

**IV. DRAINAGE DESIGN CRITERIA ..... 7**

A. REGULATIONS ..... 7
B. HYDROLOGIC CRITERIA ..... 7
C. HYDRAULIC CRITERIA ..... 7

**V. DRAINAGE FACILITY DESIGN ..... 9**

A. GENERAL CONCEPT ..... 9
B. SPECIFIC DETAILS ..... 10
C. WETLANDS ..... 16
D. FUTURE CONSIDERATIONS ..... 16

**VI. CONCLUSION ..... 18**

**VII. REFERENCES ..... 19**

## APPENDICES

A. Figures and Exhibits
B. Existing Conditions Hydraulic Model
C. Proposed Conditions Hydraulic Modeling
D. Excerpts From Reference Material
E. Work Map
F. Wetlands Mitigation Plan

# INTRODUCTION

## A. Project Background

JR Engineering has contracted to provide professional services for the design of the Sand Creek Restoration in El Paso County, Colorado. This project is part of the larger Sterling Ranch development that is occurring across multiple phases and filings adjacent to the channel. Improvements to the channel include a re-alignment of the channel with a new high-performance, low maintenance, naturalized design utilizing a meandering bankfull section with a 57 foot wide flood terrace and floodplain ranging from approximately 100 to 500 feet wide. Due to the grades on-site, 8 grouted boulder drop structures are also being proposed. The design also includes the construction of the Regional Pond W-3 as proposed in the *2022 Sterling Ranch MDDP Amendment* by JR Engineering, and improvements to two existing on-site stock ponds.

## B. Purpose of Study

The proposed Sand Creek Restoration was required by El Paso County for the continued development of Sterling Ranch. Sand Creek is hydraulically steep and prone to erosion through this section, and further development will only compound these issues over time. Improving Sand Creek now will ensure its long term stability through the course of all future development. This *Final Design Report for the Sand Creek Restoration* was prepared to provide a final design for the proposed Sand Creek channel within the Sterling Ranch development. The design includes proposed infrastructure plans; hydrologic and hydraulic modeling; channel hydraulic calculations for Sand Creek, design calculations for the on-line detention and retention ponds; and all relevant figures and reference information.

# II. GENERAL LOCATION AND DESCRIPTION

## A. Site Location

Sterling Ranch, known as “the site” from herein, is a parcel of land located in Section 27, 28, 33 and 34, Township 12 South, and Section 4, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. To the west the site is bound by Vollmer Road. To the north and east, the site is bounded by undeveloped land and the Retreat at Timber Ridge. To the south, the site is bound by the Pawnee Rancheros and Woodmen Heights developments. A vicinity map can be see below and is presented in Appendix A.

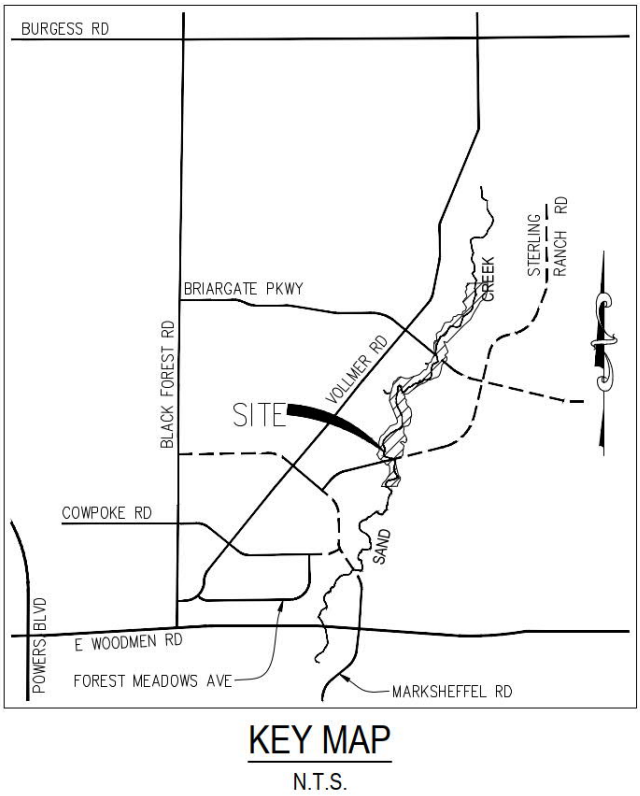



**Figure 1 – Vicinity Map**

## B. Description of Property

Sterling Ranch is 1444 acres and is a Planned Unit Development to be built in multiple phases. The site is currently in various stages of development, with portions already in construction, with others unoccupied and undeveloped. The existing ground cover is sparse vegetation and open space, typical of a Colorado rolling range land condition. In general, the site slopes from north to south and the existing drainageways follow this topography. Ultimately, the Sand Creek channel will be located within a platted drainage tract owned and maintained by the Sterling Ranch Metropolitan District.

Per a NRCS web soil survey of the area, the site is made up of Type A and B soils. Type A soils cover roughly 65% of the site while Type B soils cover the remaining 35% of the site. Group A soils have a high infiltration rate when thoroughly wet. Type B soils have a moderate infiltration when thoroughly wet. Type D soils have a very slow infiltration rate when thoroughly wet and have a high shrink-swell potential. A NRCS soil survey map has been presented in Appendix A.

# III. DRAINAGE BASINS AND SUB-BASINS

## A. Major Basin Description

Sterling Ranch lies completely the Sand Creek Drainage Basin. The basin has been previously studied firstly in the 1996 Drainage Basin Planning Study (DBPS) by Kiowa, again in the 2018 Sterling Ranch MDDP by M&S, in the 2021 DBPS by Stantec (Not adopted by El Paso County), and finally in the 2022 MDDP Amendment by JR Engineering.

The Sand Creek Drainage Basin covers approximately 22 square miles and begins approximately five miles northeast of the Town of Falcon and travels approximately 15 miles to the southeast. While the majority of the area within the basin is developed and is characterized as rolling range land typically associated with Colorado's semi-arid climates, development is still actively occurring along multiple stretches of Sand Creek both upstream and downstream of the Sterling Ranch development. The proposed improvements to Sand Creek cover approximately 66 acres beginning at the southern property line of Sterling Ranch, approximately 800 feet south of Sterling Ranch Road and continue north approximately 1.67 miles to the north property line at Poco Road.

## B. Previous Studies

As part of its drainage research, JR Engineering reviewed the following drainage studies and reports:

- Upper Sand Creek Drainage Basin Study prepared by Wilson in 2011
- Sand Creek Drainage Basin Study prepared by Kiowa in 1996
- Sand Creek Drainage Basin Study prepared by Stantec in 2021
- Sterling Ranch Master Development Drainage Plan prepared by M&S in 2018
- Sterling Ranch Master Development Drainage Plan Amendment prepared by JR Engineering in 2022

This Final Design Report builds upon the sub-basin delineation and design point convention from the 2022 MDDP Amendment modeling with no changes to the sub-basin hydrology or routed flow rates.

## C. Irrigation Facilities

There are no existing irrigation facilities within the site. However, the Sterling Ranch Metropolitan District (SRMD) has been granted a water right to store surface flows along Sand Creek in two existing stock ponds located on Sand Creek, one just north of Sterling Ranch Road and the other north of Briargate Parkway. These surface flows are comprised of Lawn Irrigated Return Flows from excess irrigation in the developments adjacent to Sand Creek. The determination, management, and accounting of the District's water rights are outside the scope of this analysis.

## D. Floodplain

Based on the FEMA FIRM Map numbers 08041C0533G and 08041C0535G, dated December 7, 2018, the site lies within Zone AE and Zone X of the Sand Creek floodplain. Zone AE is defined as area subject to inundation by the 1-percent-annual-chance flood event. Zone X is defined as area outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood. All proposed development within the site occurs in Zone X. The current FIRM Map has been presented in Appendix A.

# IV. DRAINAGE DESIGN CRITERIA

## A. Regulations

Storm Drainage analysis and design criteria for this project was taken from "El Paso County Drainage Criteria Manual" and the Colorado Springs Drainage Criteria Manual was used as a reference. The deviations taken with the proposed design are discussed in the Specific Details and Variance sections of the report.

## B. Hydrologic Criteria

The baseline report for this Final Design Report is the 2022 Sand Creek MDDP Amendment, referenced in Section III of this report. No changes to the MDDP sub-basin hydrology are proposed herein.

All hydrologic data was obtained from the aforementioned MDDP Amendment by JR Engineering, September 2022, which was prepared in conformance with the El Paso County Drainage Criteria Manual. The MDDP states:

> "Previously, the MDDP used HEC-HMS to model hydrologic conditions. With all of the on- and off-line detention present along Sand Creek, it was decided that CUHP-SWMM would be a more appropriate way to model the hydrologic conditions. All hydrologic data was obtained from NOAA Atlas 2 isopluvial maps found in the EPCDCM. Runoff was calculated using CUHP Version 2.0.0, developed by Urban Drainage and Flood Control District. The model utilizes the raingauge classified as "a 24-Hr Type II Storm" to simulate a long duration front storm common to the area, which is the same rain gauge used in the original MDDP. The following rainfall depths were utilized in the model: 2.1 inches for the 2 year storm, 2.5 inches for the 5 year storm, 3.0 inches for the 10 year storm, 3.6 inches for the 25 year storm, 4.1 inches for the 50 year storm, and 4.6 inches for the 100 year storm, which are the same point precipitation values used in the original MDDP. Using Table 5.2 from the EPCDCM, a distribution curve was created for each of the design storms to be used in CUHP. EPA SWMM 5.1 was utilized to route runoff flow rates for the sizing of stormwater storage facilities. The CUHP calculations and SWMM model are presented in Appendices B and C."

The flow rates used in the design and hydraulic analysis originated from the MDDP report and SWMM modeling files. **Table 3**, below, presents a summary of design flows for the major design storms at various design points.

**Table 3: Sand Creek Flow Rates**

| SAND CREEK FLOW RATES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | Station | Flow Rate (cfs) | | | | | | |
| | | 2-YR | 5-YR | 10-YR | 25-YR | 50-YR | 100-YR Design | 100-YR FIS |
| Northern Bndy | STA: 87+10 | 149.3 | 472.6 | 771.4 | 1012.8 | 1386.3 | 1644.1 | 2600 |
| SRMD Pond 2 | STA:73+50 | 149.6 | 477.2 | 780.5 | 1025.8 | 1405.3 | 1667.0 | 2600 |
| Briargate Pkwy | STA:61+00 | 146.5 | 512.4 | 847.5 | 1108.9 | 1497.6 | 1763.9 | 2600 |
| | STA:36+05 | 143.9 | 533.2 | 890.8 | 1171.0 | 1589.8 | 1880.4 | 2600 |
| SRMD Pond 1 | STA:16+80 | 133.7 | 512.3 | 863.8 | 1143.6 | 1561.3 | 1848.8 | 2600 |
| Sterling Ranch Road | STA:09+05 | 101.6 | 398.7 | 676.7 | 931.2 | 1282.9 | 1562.5 | 2600 |
| Sterling Ranch Southern Bndy | STA:00+00 | 128.6 | 480.4 | 763.8 | 1005.4 | 1368.3 | 1585.2 | 2600 |

## C. Hydraulic Criteria

The Federal Highway Administration's (FHWA) HY-8 Culvert Analysis Program (Build 7.50 July 28, 2016) was utilized to size the proposed outfall culvert for Pond W-3. The culvert analysis uses a trapezoidal channel section as tailwater to generate a tailwater depth for the analysis, the results of which are imported into SWMM as stage-discharge inputs for the Pond W-3 outfall ratings curve.

To size the outlet structures for the stock ponds, a calculation was done to iteratively determine weir and orifice capacity of various sizes of structure. Once it was determined whether the structure was weir or orifice controlled at each stage, a ratings curve based on head was modeled in SWMM to verify that the structure was large enough to prevent overtopping while still providing the static water surface necessary to maintain the water right for the stock ponds. StormCAD Version 10.03 by Bentley Software was used to size the outfall pipes from the ponds. The impact stilling basins were sized using calculations found in the Mile High Flood District Drainage Criteria Manual, January 2016 Edition.

The U.S. Army Corps of Engineers HEC-RAS program, version 5.0.3 (September 2016) was used to perform the hydraulic analysis. The final design of the Sand Creek channel and proposed culverts at Sterling Ranch Road and Briargate Parkway are modeled in HEC-RAS to evaluate flow conditions, shear stresses, and velocities for the range of flood events for the purposes of assessing drainageway stability. Five models were run to evaluate the channel:

1. The first model was an existing conditions model to evaluate the current topography with the MDDP Amendment hydrology. The existing conditions model used the FEMA cross section locations and resampled the topography based on the most recent survey by JR Engineering. Flows were taken from the above table in order to be able to directly compare the impacts of the ultimate hydrologic conditions to the current state of the channel and to demonstrate the necessity for the proposed improvements.
2. The second model was a low Manning's *n* analysis of the channel to evaluate shear and velocities along the channel using the MDDP Amendment hydrology in a subcritical flow regime.
3. The third model was a high Manning's *n* analysis of the channel to evaluate the water surface of the channel using the MDDP Amendment hydrology in a subcritical flow regime.
4. The fourth model was a mixed flow analysis of the low Manning's *n* shear stress model to design the grouted boulder drop structures.
5. The fifth model was a proposed conditions subcritical, high Manning's *n* model to evaluate the water surface of the current 100-year FIS flowrate.

For both the existing and proposed hydraulic modeling, the flows at the various design points are shown above in Table 3. Each flow change location represents a design point from the MDDP. As shown, flows accumulate further down the stream as more developed area is included in the basin area. During the major storm event flows pass through the stock pond outlet structures undetained so no additional flow change was needed at the stock pond outlets. Pond W-3 has a release rate to keep flows downstream of the pond lower than existing conditions. The HEC-RAS modeling uses these steady flows, taken from the MDDP.

In order to accurately model the stilling basin outfalls from each of the stock ponds, the vertical outlet structures were modeled as vertical open channel connecting the culverts. During all of the design storms, all of the water is directed through the outlet structure and outfalls into the stilling basin. Since HEC-RAS is unable to incorporate a vertical structure, vertical open channels ensured that all of the water exited the ponds through the stilling basin, and thus was able to accurately calculate a hydraulic jump and size the basins.

During the FIS 100-year flood event, flows overtop the emergency spillway instead of going through the outlet structure. In order to accurately model this scenario, the vertical open channel sections and culverts were removed so that all of the flows were directed down the spillway.

There were 7 different flow rates analyzed for the design based on the MDDP Amendment flows; 2-year, 5-year, 10-year, 25-year, 50-year, 100-year, and ultimately the existing FIS 100-year flows. For each of the flood events, two different scenarios were analyzed. One scenario was evaluated using higher Manning's *n* values (0.05/Native Grasses; 0.07/Gravel or Cobble Bed; 0.12/Herbaceous Wetlands) in order to calculate the extents of the respective

water surfaces and show them on the plans. A second scenario, with lower Manning's *n* values (0.032 Native Grasses; 0.035/Gravel or Cobble Bed; 0.06/Herbaceous Wetlands) was also used to more conservatively analyze velocities and shear stresses. These Manning's *n* values are taken from Table 8-5 of the USDCM.

The downstream boundary for Sand Creek is Section CU approximately 250 feet downstream of the southern property boundary of Sterling Ranch. The downstream boundary condition is taken as normal depth with a channel slope of 0.017 ft/ft for all design storms except the FIS scenario, which uses a known water surface of 6990.04 from the 1996 DBPS at Section CU. The upstream boundary condition for Sand Creek at the southern property boundary of Sterling Ranch is taken as normal depth with a channel slope of 0.018 ft/ft. While the model was extended north to Poco Road, all of the area between the Sterling Ranch property line and Poco Road is considered outside the extents of this study. That portion of channel was previously studied by Classic Engineering in support of their approved channel improvements to Sand Creek along that stretch.

Topographic mapping of the area used in the hydraulic model was done by JR Engineering on the NAD 83 Projection and NGVD29 vertical datum. The survey was used to generate a 1-foot contour interval map. The project is designed on a modified State Plane coordinate system (NAD83 Colorado State Plane, Southern Zone, U.S. Foot) and is on the National Geodetic Vertical Datum of 1929 (NGVD29 datum).

All hydraulic calculations and applicable charts and graphs are included in **Appendix E** of this report.

# V. DRAINAGE FACILITY DESIGN

## A. General Concept

As development has occurred along Sand Creek within Sterling Ranch, the need to stabilize the creek has increased. The additional development brings additional runoff, further degrading the conditions previously mentioned in the 1996 DBPS. All along the creek there are unstable slopes that left unattended will continue to degrade with the potential to cause damage the surrounding properties. As development continues in the future, the degradation will accelerate as more runoff is added to the creek. Stabilizing the creek now will avoid any future damage to development and ensure the long term health of the creek. Successfully mitigating this portion of stream will ensure it functions hydraulically in the future.

There are 3 main criteria that determined the initial concept. The first was the Preliminary Stream Geomorphology Report performed by 5 Smooth Stones Restoration (5SSR), PLLC in April 2021. The second was our previous experience working with the Army Corps of Engineers (USACE) and their approval process with regards to wetlands disturbances. The third main determinant was with regards to El Paso County's current channel stabilization and hydraulic criteria.

The previous DBPS was completed in 1996. In that span of time the concepts in stream design have evolved. A simple riprap lined trapezoidal channel, as previously suggested would prove to be far more intrusive than the meandering bankfull design that has been adopted along the Front Range in the last decade, and such as design was rejected by the USACE previously for this portion of Sand Creek. The meandering bankfull design is a high performance, low maintenance design. It allows for improved vegetation along the channel for hydraulic roughness and earth stabilization, while still providing proper flood control. The previous DBPS referred to Urban Drainage Flood Control District, now Mile High Flood District (MHFD), for its recommendation of check structures to aid in longitudinal stabilization and prevent headcutting. In the preceding years, MHFD has moved away from the use of vertical check structures in favor of grouted boulder or sculpted concrete drop structures as grade control structures. These structures provide a more aesthetic and long term solution, and most importantly they do not promote erosion and degradation. When the vertical check structures function as designed, they eventually turn into vertical drop structures and all the sediment is carried downstream.

For the purposes of being able to work on portions of the design separately, the channel has been broken up into three separate reaches:

1. Reach 1 is the portion of channel south of Sterling Ranch Road to the southern property line
2. Reach 2 is the portion of channel between Briargate Parkway and Sterling Ranch Road
3. Reach 3 is the portion of channel between the northern property line and Briargate Parkway.

The general concept of the channel design is to design a low maintenance, high performance channel with a meandering bankfull channel and flood terrace. Along each of the three reaches, the design cuts in a new bankfull section offset to the east from the existing thalweg, daylight the flood terrace to west taking care to leave as many existing wetlands intact as possible, and then extend a 1% floodplain to the east between 80 and 120 ft. depending on the cross-sectional channel width necessary to limit shear stresses and allowable velocities to allowable values. The below table provides a summary of the rest of the bankfull and flood terrace design criteria, which was based on the preliminary geomorphology report.

The purpose of trying to keep the existing channel hydraulically connected to the new thalweg is to maintain as many existing wetlands as possible and satisfy the USACE. A previous design effort by others followed more traditional hydraulic engineering principles and resulted in significant loss of wetlands, and this previous design was rejected by USACE. While the County's criteria are certainly a determining factor, considering the need to satisfy the USACE is the highest priority, because without their approval the project won't be granted a 404 permit.

The County review of the previous design by others states that the maximum stable longitudinal slope of the channel is 0.17%. Using this longitudinal slope would have required the use of at least 10 and possibly 15 or more GSB drop structures. This channel slope also ensures the destruction of more wetlands by taking the existing ones offline due to large changes in elevation or additional hardscapes that cannot be mitigated. It is the intent of this design report to prove that a steeper slope can remain stable long term, thus allowing for the preservation of more wetlands and appease the USACE.

## B. Specific Details

### *Sand Creek Channel*

Based on the Geomorphic Report, a four stage cross section was recommended for Sand Creek. The four proposed stages are a low flow section, bankfull with an inner berm, flood terrace, and floodplain. The low flow was sized to be 30% of the bankfull area. The low flow has an area of 4.32 sq. ft., with a mean depth of 0.68 feet and a top width of 12.90 feet with a design capacity of 7 cfs.

The bankfull has an area of 14.29 sq.ft., a width of 16.90 ft., and a mean depth of 1.54 ft. The use of an inner berm in the cross section was recommended as a way to quickly and effectively establish vegetation within the bankfull. This bankfull section was determined using regional curve information and existing site conditions, with a design capacity of 29 cfs. This is smaller than a bankfull based on county criteria which would have a required minimum capacity of approximately 180 cfs based on 10% of the 100-year design storm or 150 cfs based on the 2-year storm. Please refer to the Variance section for further discussion of this deviation.

The flood terrace is 65.4 feet wide with a depth of 1 foot and 1% cross slope. The flood terrace has been sized to convey the 2-year storm (150 cfs±). Events larger than the 2-year storm begin to expand out into the full extents of the floodplain. Using a smaller bankfull section ensures that the channel doesn't eventually cut its own low flow channel into what would have been a much larger bankfull section. The straight riffle sections of channel have a maximum grade of 3.18%, while the curved sections with the scour pools are flat from invert in to invert out. Maximum velocities in the channel were limited to 9 ft/s during the 100-year storm and 7 ft/s

during the 10-year storm, except when going over drop structures.

Per the geomorphic report, the floodplain design assumes that vegetation along each reach can provide stability up to an applied shear stress of 1.2 lb/sq.ft. The report also recommended the following treatment methods based on shear stress are listed below:

- 0 to 1.0 lb/sq. ft. – Treatment seed and straw with riparian plantings
- 1.1-1.4 lb/sq. ft. - Treatment floodplain coir matting/ seed and straw with riparian plantings
- 1.5 and 2.0 lb/sq. ft - Treatment floodplain boulder/log sills, floodplain coir matting/ seed and straw with riparian plantings
- 2.0-4.0 lb/sq. ft. – Treatment floodplain vegetated riprap, floodplain coir matting/ seed and straw with riparian plantings

Permanent geotextile solutions are proposed in areas with shears above 4.0 lb/sq. ft or Froude numbers approaching critical as a cost effective way to permanently armor large areas while achieving sheer stresses up to 6 lb/sq.ft, which is high enough to adequately protect any areas of the overbanks that are above 1.5 lb-ft. While modeling the channel, excessive velocities and shears within the riffle sections were ignored since those areas already be armored with void-filled riprap. Soil lifts were added around the outer bend of all the bankfull curves to reinforce the scour pools. Ultimately, the goal is to have vegetation established within the inner berm section all the way out to the extents of the floodplain to provide vegetative resistance to reduce velocities and shear stresses within the channel and ensure a permanently stable, albeit steeper channel.

There are 8 grouted boulder drop structures proposed within the channel. There is a 3.5’ drop and a 1.5’ drop proposed in Reach 1 at station 3+71 and 8+19, respectively. Along Reach 2 there is a 6’ drop at station 41+71 , a 4’ drop at station 50+06, and a 5’ drop at station 53+56. Along Reach 3 there is a 5’ drop at station 71+30 going into SRMD Pond #2, a 6’ drop at station 74+89, and a 4.3’ drop at station 78+00. The use of drops larger than 4’ was done in order to maintain grades close to existing so that the existing thalweg could remain connected. All of the GSB’s use a typical design across the flood terrace. For simplicity, the inner berm is not present through the drop, so only a single stage trapezoidal low flow section is used. Once outside of the flood terrace, the vertical drop of the GSB drop structure is blended into the overall channel cross-sectional width and varying longitudinal slopes of 1% to 15% are used across the channel, with soil-riprap armament and vegetative cover as required and based on shear stresses and velocities. Sheet piling with a concrete cap has been extended across the crest of the drop the full width of the FIS floodplain. Weep drains will be used to prevent any uplift or groundwater migration.

The proposed design calls for 66 riffle drops; 9 along Reach 1, 38 along Reach 2, and 19 along Reach 3. The riffles vary in length and slope in order to minimize wetlands disturbances created by grade changes. The geomorphic report called for 100 – 1 foot drop riffle pools in lieu of drop structures. The use of riffles to make up grade differences rather than more drop structures is preferable because it allows for flatter slopes to tie the riffle sections to the existing ground. Revising the longitudinal slope of the channel in order to eliminate supercritical areas necessitated the use of 8 drops, rather than the previously proposed 6. Design calculations for all of the GSBs have been provided in Appendix C.

Per County criteria, maintenance access has been provided along the entire stretch. A 15’ wide gravel trail will serve as the main access along both sides of the channel. At key infrastructure such as drop structures and ponds, spur trails have been provided to gain access to both the upstream and downstream areas of the structures. Since development is occurring on both sides of the stream, construction of the trails will occur along with different developments. The portions of the trail that will be built with this project are along the entire east side of the creek from the southern property line to the northern property line, as well as along the

western side of the creek between Sterling Ranch Road and Briargate Parkway.

**Table 1. Sand Creek Design Matrix**

| Sand Creek Design Matrix | | |
|---|---|---|
| | Limit | Proposed |
| El Paso County Criteria | | |
| Maximum Depth outside of Bankfull Channel | 5 ft | 4.88 ft |
| Maximum Velocity 100-YR excluding drops | 9 ft/s | 8.10 ft/s |
| Maximum Velocity 5-YR excluding drops | 7 ft/s | 6.21 ft/s |
| Minimum Bankfull Capacity | 180 cfs | 29 cfs (150 cfs Floodterrace) |
| Maximum Side slopes - grass lined | 4:01 | 4:01 |
| Maximum Side slopes - grouted boulder | 2.5:1 | 4:01 |
| Minimum Bottom Width | 8 ft | 2.4 ft |
| Centerline radius - Bankfull | 2.5x BF Width | 2.5-3.5x BF Width |
| Maximum GSB Drop Height | 4' | 6' |
| Maximum GSP Drop Height with add't testing and seepage | 12' | 6' |
| Non-Juridictional Maximum Ponding Height | 10' | 10' |
| 15' Maintenance Trail | Yes | Yes |
| Maintenance access provided | Yes | Yes |
| City of Colorado Springs Criteria | | |
| Maximum Longitudinal Slope | 0.17% | 3.18% |
| Froude No 100-YR - main channel | 0.8 | 0.9 |
| Froude No 5-YR - main channel | 0.7 | 0.8 |
| MHFD Criteria | | |
| Mannings *n* value - water surface evaluation (native grass/cobble bed/herbaceous wetlands) | 0.05/0.07/0.12 | 0.05/0.07/0.12 |
| Mannings *n* value - shear evaluation (native grass/cobble bed/herbaceous wetlands) | 0.032/0.035/.06 | 0.032/0.035/.06 |
| Geomorphologist Criteria | | |
| Maximum Shear Stress, 100-YR main channel excluding drops/culverts | 1.2 lb/sf | 2.24 lb/sf |
| Permissible Shear Stress – Vegetated | | 1.4 lb/sf |
| Permissible Shear Stress – Coir Mat | | 4.0 lb/sf |
| Permissible Shear Stress – Geotextile | | 6.0 lb/sf |

**Table 2. Bankfull/Flood Terrace Design Criteria**

| | | | | |
|---|---|---|---|---|
| Bankfull Channel | Width; ft | | 16.9 | |
| | Mean Depth; ft | | 0.85 | |
| | Max Depth; ft | | | |
| | Area; sqft | | 14.0 | |
| | Bend to Bend Spacing; ft | 4.5 -6 times Bankfull Width | 76 | 101 |
| | Radius of Curvature (ROC); ft | 2.5 - 3.5 times Bankfull Width | 42 | 59 |
| | Tangent Lengths; ft | 1.5 - 2.5 times Bankfull Width | 25 | 42 |
| | Meander Wavelength; ft | 9- 12 times Bankfull Width | 152 | 203 |
| | Meander Beltwidth; ft | 2 - 3.5 times Bankfull Width | 34 | 59 |
| Flood Terrace | Width; ft | | 64.5 | |
| | Area (300% of Bankfull Area); sqft | | | |
| | Bend to Bend Spacing; ft | Same as Bankfull Pattern | -- | -- |
| | Radius of Curvature; ft | 2 - 4 times the Flood Terrace Width | 129 | 258 |
| | Tangent Riffle Lengths; ft | 1 - 2 times the Bankfull Width | 17 | 34 |
| | Meander Beltwidth; ft | 1.5 - 2 times the Flood Terrace Width | 97 | 129 |
| | Expansion and Contraction Ratios | greater than 10:1 | -- | -- |

***Discussion of Existing Conditions Hydraulic Results***

In the existing conditions model, Reach 1 had velocities ranging from 4.33 ft/s to 5.72 ft/s and 6.87 ft/s to 8.45 ft/s in the 5-year and 100-year storms, respectively. Froude numbers along Reach 1 were approaching or at supercritical levels in both storms for the majority of cross sections. Reach 2 had velocities ranging from 0.47 ft/s to 7.79 ft/s and 1.25 ft/s to 9.78 ft/s in the 5-year and 100-year storms, respectively. Froude numbers along Reach 2 were approaching or at supercritical levels in both storms for the majority of cross sections. Reach 3 has velocities ranging from 0.94 ft/s to 6.32 ft/s and 1.87 ft/s to 8.79 ft/s for the 5-year and 100-year storms, respectively. Froude numbers along Reach 3 are supercritical across multiple of the cross sections. Shear stresses along Reach 1 range from 0.01 lb/sq ft to 7.10 lb/sq ft, Along Reach 2 range from 0.14 lb/sq ft to 1.95 lb/sq ft, and along Reach 3 range from 0.48 lb/ sq ft to 1.68 lb/sq ft. Results from the Existing Conditions HEC-RAS modeling can be found in **Appendix B**.

***Discussion of Proposed Conditions Hydraulic Reults***

Based on the hydraulic analysis for shear stress and velocity, Reach 1 has velocities ranging from 0.81 ft/s to 10.16 ft/s. Outside of the drop structures, no cross section had velocities above 5.51 ft/s. Shear stresses along Reach 1 range from 0.01 lb/sq ft to 10.35 lb/sq ft (at the drop structure). The shear stresses along Reach 1 are consistently higher than the 1.2 lb/sq ft as suggested in the geomorphology report within the bankfull section and around the drop structures, but these areas are going to be armored already. There are no areas within the overbanks that have high shear stresses, so no areas in this reach will require additional armoring in the overbank sections. Froude numbers along Reach 1 are all subcritical except within the drop areas. Cross sections 1804 – 2046 represent the area downstream of the proposed bankfull to the property boundary. As the channel begins to narrow and sharply turn 90 degrees towards the property line, the channel goes supercritical in most storm events. The addition of new wetland vegetation between the end of the new channel section and the property line is not enough to get the areas into subcritical flows. What will be required in the future is the widening of the channel so that the channel does not take an abrupt 90 degree turn into its most narrow section. With the channel being on private property downstream of Sterling Ranch, any channel improvements requiring grading near the property line are currently unfeasible. To help control erosion in this portion of channel, a sheetpile with concrete cap will be placed just upstream of the property line. Bank stabilization along the east bank will aid in erosion control until channel improvements downstream of Sterling Ranch can be undertaken.

Based on the hydraulic analysis for shear stress and velocity, Reach 2 has velocities ranging from 0.99 ft/s to 10.62 ft/s. There are no areas of high velocities outside of the drop structures. Shear stresses along Reach 2

range from 0.77 lb/sq ft to 11.24 lb/sq ft, with the highest values occurring through the drop structures. The shear stresses along Reach 2 are, except for a few areas, lower than 1.2 lb/sq. ft. and will not require any significant armoring. Froude numbers along Reach 2 are all subcritical outside of the drop structures. One area of concern is the area downstream of the Briargate culvert, to the first drop structure approximately 300 feet downstream. Due to the wingwalls and the grading coming out of the culverts, the channel is narrower than necessary to produce low velocities and shear stresses. As seen in the design by Kiowa for the area downstream of the culvert, the first 40 feet of channel coming out of the culvert will all have soil riprap to help armor the channel to their proposed concrete check structure. Approximately 120 downstream of the check structure is where the meandering bankfull will begin. The channel floodplain does not begin to expand until downstream of GSB #5, so the entire area between the culvert and GSB experiences high shear stresses, and will require reinforcement from geotextile matting.

Based on the hydraulic analysis for shear stress and velocity, Reach 3 has velocities ranging from 0.24 ft/s to 15.54 ft/s. The areas of high velocities occur at the drop structures and culverts. Shear stresses along Reach 3 range from 0.01 lb/sq ft to 5.64 lb/sq ft. The shear stresses along Reach 3 are, except for a few areas, lower than 1.2 lb/sq. ft. and will not require any significant armoring. Froude numbers along Reach 3 are all subcritical. Results from the Proposed Conditions HEC-RAS modeling can be found in **Appendix C**.

***Pond W-3***

The MDDP Amendment hydrology confirmed that a Regional Detention Pond (Pond W-3) at Sterling Ranch Road will be required to reduce 100-year flows to less than existing conditions. Based on the revised hydrology in the MDDP Amendment, the pond is approximately 51.27 ac-ft., which is a considerable reduction in size from the previously proposed 76 ac-ft. pond in the 2018 MDDP. Conceptually, the pond will function similarly to how it was proposed in the MDDP. The county prohibits ponding at roadways, so the pond has to outfall before it reaches the proposed conspan arch culvert at Sterling Ranch Road. The proposed outfall will consist of a 3-barrel (2-13'x4', 1-13'x2') box culvert approximately 40 feet north of the road, with an overflow spillway that extends to the wingwalls of the road culvert, essentially creating one contiguous structure, while still avoiding ponding along the road and allowing flows to pass through the road culvert with freeboard. The smaller center barrel has an invert 0.5' lower than the outer barrels to maintain a low flow channel, while the outer barrels will be used in higher flow events. The overflow weir is approximately 288 feet long. In order to avoid being classified as a jurisdictional dam the overflow weir was set at 10 feet above the invert with a crest elevation of 7011.17. A sheet pile wall with a concrete cap will provide reinforcement for the berm. At the invert of the culvert a 1.5' deep plunge pool will help dissipate energy before entering the culvert at Sterling Ranch Road. The section of Sand Creek running through Pond W-3 is a meandering, 17 foot wide, 0.71 foot deep trapezoidal low-flow channel with 1.0% floodplain slopes out to the toe of the pond. Due to the outlet control structure it wasn't possible to incorporate the typical 4 stage section used along the rest of the channel without compromising the pond depth and pond volume. Using a 0.50% cross slope in the pond bottom will allow wetlands to establish easier within the pond. With the upstream SRMD Pond #1 controlling flows during most storm events, Pond W-3 will rarely be used for flood control.

***SRMD Pond 1***

The large stock pond approximately 700 feet north of Sterling Ranch Road will remain in place with the stream improvements and is now defined as SRMD Pond 1. Previously, the pond was designated as "Waters of the U.S." and Sterling Ranch Metropolitan District was granted a water right to use the pond as storage for irrigation runoff, so it was decided that the best design would be to include the pond in the channel, rather than trying to modify its dimensions or route flows around it. The water right for the stock pond was previously determined to be a volume of 12.25 ac-ft with a surface area of 109,612 sq.ft. Since the pond's dimensions are not proposed to be modified, the water right will remain intact.

The existing stock pond has a berm elevation of 7040, which is 39 feet above the proposed invert of the culvert at Sterling Ranch Road. Using a series of drop structures would require, at a minimum, 4-10' tall drops to achieve this grade, a series of 7 drops to get to the toe of slope, or a single concrete/grouted boulder spillway from top to toe of slope. Stepping the drops would require a longer longitudinal profile which would in turn take away area from Pond W-3. The existing channel flows around the west side of the pond downstream to Sterling Ranch Road. Given the proposed development west of Sand Creek, there is no possibility to expand the channel west in this area, and so this would end up being the most constricted portion of channel

The proposed solution to conveying water through the stock pond and also making up 39' of vertical drop was to design an outlet structure for water to discharge out of the stock pond and into Pond W-3. Using an outlet structure allows for a static water surface in the pond that maintains SRMD's water right to the pond. In minor and major storm events, water ponds up to the static WSEL of 7036, where it will outfall into a 25'x25' square orifice. Water flows through the 12'x10' RCBC outfall pipe and discharges into a grouted boulder impact stilling basin. Flows leave the impact basin and are conveyed to the Pond W-3 outfall via low flow channel. In the event of flows above the 100-year design storm or an emergency situation, flows will overtop the existing berm and down an emergency spillway to Pond W-3. The overflow spillway will be approximately 300 feet long. To reinforce the spillway, a sheetpile cutoff wall with a concrete cap will be incorporated into the design. Due to the fact that this spillway will be an online feature within the channel, it will be armored using a geotextile fabric able to withstand the FIS flow rate.

Due to the height from the toe of slope to the spillway crest, SRMD Pond 1 has been classified as a Jurisdictional Dam. In the event of a breach the dam would spill directly into Pond W-3, which is sized to contain the flows. Because of this, the dam is classified as a no-hazard dam. An application to the State Engineer will be required prior to final approval.

DamID 100600 has been assigned?

***SRMD Pond 2***

Upstream of Briargate Parkway there are two existing stock ponds. The smaller of the two ponds will be removed with the stream restoration, while the larger pond will remain and is now referred to as SRMD Pond 2. Previously, the larger pond was designated as "Waters of the U.S." and Sterling Ranch Metropolitan District was granted a water right to use the pond as storage for irrigation runoff, so it was decided that the best design would be to include the pond in the channel, rather than trying to route flows around it. The water right for the stock pond was previously determined to be a volume of 4.29 ac-ft with a surface area of 53,720 sq.ft. While the pond's grading will be modified, the volume and surface area of the pond will not change, so the water right will remain intact.

B?

The existing stock pond has a berm elevation of 7121, which is 20 feet above the toe of slope. Using a series of drop structures would require, at a minimum, 4-10' tall drops to achieve this grade and more likely would require a series of 7 drops to get to the toe of slope. Stepping the drops would require a longer longitudinal profile which would in turn take away area from Pond W-2. The existing channel discharges from the pond using a 24" RCP culvert. Given the proposed development west of Sand Creek, there is no possibility to expand the channel west in this area, and so this would end up being the most constricted portion of channel

Similar to Existing Stock Pond 1, the proposed solution to conveying water through the stock pond and also making up 20' of vertical drop was to design an outlet structure for water to discharge out of the stock pond and into the downstream channel. Using an outlet structure allows for a static water surface in the pond that maintains SRMD's water right to the pond. In minor and major storm events, water ponds up to the static WSEL of 7117.75, where it will outfall into a 25'x25' square orifice. Water flows through the 10'x10' RCBC outfall pipe and discharges into a grouted boulder stilling basin. Flows leave the stilling basin and are



JR Engineering: Text has been revised for clarity

conveyed south via the Sand Creek Channel. In the event of flows above the 100-year design storm or an emergency situation, flows will overtop the existing berm and down an emergency spillway to the downstream channel. The overflow spillway will be approximately 200 feet long. To reinforce the spillway, a sheetpile cutoff wall with a concrete cap will be incorporated into the design. Due to the fact that this spillway will be an online feature within the channel, it will be armored using a geotextile fabric able to withstand the FIS flow rate.

Due to the height from the toe of slope to the spillway crest, SRMD Pond 2 has been classified as a Jurisdictional Dam. In the event of a breach the dam would spill directly into the Sand Creek channel, which is sized to contain the flows. Because of this, the dam is classified as a no-hazard dam. An application to the State Engineer will be required prior to final approval.

DamID 100601

## C. Wetlands

The existing Sand Creek channel has wetlands present along the entire portion within Sterling Ranch. With Sand Creek being an ephemeral stream, and development on both sides of it incomplete, there are not base flows present for many parts of the year. Wetlands are confined to areas mostly within the existing bankfull channel and around the existing stock ponds. With the goal of the proposed channel design to keep the existing thalweg intact wherever possible, it is anticipated that portions of these wetlands will remain intact.

The wetlands along Sand Creek were previously delineated with a total area of 16.29 acres, which does not include areas that will be disturbed from the proposed roadway culverts at Sterling Ranch Road and Briargate Parkway. Of these 16.29 acres, 10.68 acres will be disturbed. Disturbed wetlands are described as any area where improvements occur that causes change in finished grade of the wetland or where vegetation cannot be re-established. Of these disturbances 7.06 acres will be re-established as part of the mitigation plan. Of the 16.29 acres of on-site wetlands, 7.04 acres will be either be preserved or enhanced. Preserved wetlands are defined as areas that may or may not have been improved, but whose finished grade has not changed, while enhanced wetlands will see no disturbances in grade, but will have addition riparian plantings.

There are no designated off-channel mitigation areas within Sterling Ranch. With the design of a 64.5’ wide, 1% grade flood terrace as well as a 1% grade floodplain ranging from 100 to 500 feet, it is expected that all of the proposed flood terrace and floodplain will be mitigation area. Areas where existing wetlands are impacted but will remain will either be enhanced or re-established. The only areas not expected to be utilized for mitigation are areas of steep slopes or areas around the drop structures where grouted boulders will be placed. As development occurs and runoff increases, groundwater migration will be able to support wetland vegetation across the floodplains, while runoff from adjacent developments will also aid in the support of wetlands in the channel. Mitigation is currently proposed on-site along the entire stretch of the channel. There will be 26.18 acres of newly established wetlands. Along with the re-established wetlands, as well as the preserved and enhanced existing wetlands, a total area of 40.27 acres of mitigation is proposed for the site, giving a mitigation to permanent loss ratio of 3.77. Aiming for a ratio above 1 to 1 allows for the possibility that not all the floodplain will be able to establish wetlands, or that some of the existing ones could become disconnected over time.

## D. Future Considerations

Within the Sterling Ranch development there will be more full-spectrum detention ponds constructed as development progresses. All of these ponds are expected to contribute base flows to Sand Creek within Sterling Ranch. Of those currently proposed, Pond FSD14A, which is located along Sterling Ranch Road just east of Pond W-3, FSD11B, which is located east of Sand Creek along the southern property line, as well as Ponds A, B, and C

from the Homestead North development are expected to outfall directly into the channel. Future pond outfalls will need to account for the channel tailwater and provide erosion protection.

The privately owned portion of Sand Creek between the Sterling Ranch property boundary and the Aspen Meadows development remains in its existing condition, which are shown to be unstable. A check structure and slope stabilization at the property boundary will help slow erosion downstream of the project, but ultimately channel improvements similar to ones proposed with Sterling Ranch or Aspen Meadows will be necessary to ensure the long term stability of the channel through this reach. At this time, this portion of Sand Creek is on private property and no improvements are expected.

The portion of Sand Creek north of the proposed Sterling Ranch channel improvements up to Poco Road is part of the Retreat at Timber Ridge project by Classic Engineering. Design and analysis of Sand Creek in that section was completed and approved as part of that project. The results from that design show that the design is stable. Adjacent to Sand Creek along the west side running from the norther property boundary to Poco Road is the Homestead North development being designed by JR Engineering. As part of that project, bank stabilization along Sand Creek will be required with the construction of the proposed maintenance trail.

### E. Permitting

The 404 permitting for Sand Creek will be handled by Bristlecone Ecology. Prior to construction, a floodplain development permit from Pikes Peak Regional Building Department will be required. A CLOMR will also be completed through FEMA prior to final approval of the plans. Applications for the two stock ponds to be Jurisdictional Dams from the State engineer will also be approved prior to final approval of the plans. Once all of the channel improvements along Sand Creek within Sterling Ranch have been completed, a LOMR will be submitted.

## VI. VARIANCES (DEVIATIONS)

Multiple variances from the County design criteria are requested as part of the design of the channel and hydraulic structures along it. The first change is the size of the low flow. Section 6.9.2 of the County criteria states that the low flow channel should be sized for either the 2-year storm or as previously stated, as low as 10% of the 100-year storm, which in this case would be approximately 150 cfs and 180 cfs, respectively. The proposed design uses a low flow capacity of 7 cfs, while the bankfull has a capacity of 29 cfs, and the flood terrace was sized to handle the 2-year event, which is approximately 150 cfs along this reach. After consulting with the geomorphologist it was decided that a narrower low flow section would be preferable. Base flows in this portion of Sand Creek are a fraction of the required low flow capacity and the required low flow channel would be far larger than necessary to deal with the base flows, eventually leading the channel to cut its own low flow section for base flows. By using a narrower multi-stage section within the bankfull, dense vegetation can establish itself, particularly along the inner berm. Instead of the bankfull being sized for the larger events, the flood terrace has been sized to convey the two year storm. The frequency that the flood terrace sees inundation will also allow for denser vegetation within the flood terrace extents. Since the bankfull will be carrying a smaller proportion of the larger events, the floodplain is wide enough to ensure that flow depth remains low outside of the flood terrace. Shear stresses in the overbanks are low enough that seeding and riparian plantings will be sufficient to withstand the high flow events, with only a few areas requiring more substantial treatment.

The second variance requested is the maximum allowable shear stress. The criteria states that the maximum allowable shear stress for vegetated channels is 1.2lb/sq. ft. Based on recent design experiences along the Front Range, the geomorphologist provided us with a wider range of allowable shear stresses. Up to 1.0 lb/sq. ft. would just need treatment seed and straw with riparian plantings. Shears ranging from 1.1-1.4 lb/sq. ft. would need coir matting in addition to the other treatments. For areas between 1.5 and 2.0 lb/sq. ft treatment would require floodplain boulder/log sills in addition to the previously stated treatments. And in areas that are between 2.0-4.0

lb/sq. ft. will require vegetated riprap on top of coir matting and seed and straw with riparian plantings. Based on these ranges, treatments have been revised where necessary to ensure erosion is kept to a minimum.

The third variance requested is the maximum drop height allowed. The County criteria states that the maximum drop height for a grouted boulder drop structure is 4 feet, but can go up to 12 feet if approved by the County engineer. Five of the eight drop structures range between 4 and 6 feet in height. Calculations have been provided to show that the structures are capable of handling the velocities and shears present on the structure. Weep drain plans have also been provided to show how the taller structures will mitigate seepage and avoid any uplift of the structures. Prior to final design, soil borings were also taken at the locations for 6 of the 8 structures. The soil borings showed that the bedrock is shallow enough to allow a sheetpile to be sunk all the way to bedrock at all of the drop structure locations.

# VII. CONCLUSION

The purpose of this report is to present the final design for the proposed Sand Creek Restoration. The design proposed herein meets the requirements of El Paso County and the city of Colorado Springs unless where stated otherwise. The design proposed in this report complies with the El Paso County Drainage Manual, City of Colorado Springs Drainage Criteria Manual, and the proposed Sand Creek MDDP Amendment, unless where stated otherwise. The proposed Pond W-3 and the revised existing stock ponds will have no adverse effect on stormwater quality, quantity, or timing and will meet the requirements of CRS §37-92-602 (8) for drain time.

The implementation of drainage concepts presented within this report will assure proper conveyance and attenuation of stormwater discharges with no anticipated adverse impacts to Sand Creek downstream infrastructure. The proposed improvements to the channel will not be injurious to water rights and will be in conformance with established decrees.

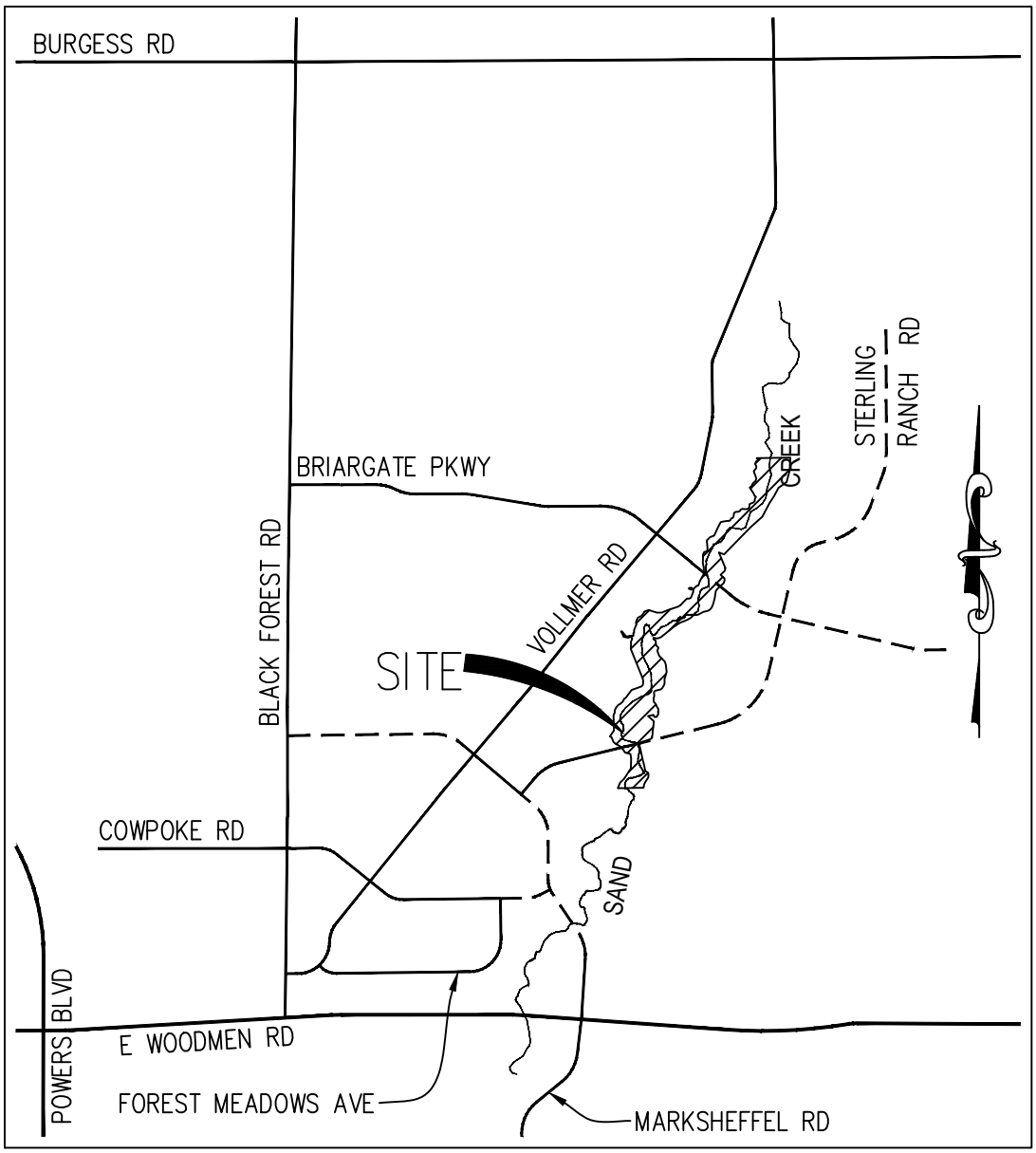
Any future off-line water quality or detention ponds shall be final-designed under separate drainage studies occurring with each specific development project or capital improvement project, and shall meet all applicable design criteria at the time of final design.

# VIII. REFERENCES


1. City of Colorado Springs Drainage Criteria Manual Volume 1, City of Colorado Springs, CO, May 2014.
2. El Paso County Drainage Criteria Manual Volume 1, El Paso County, CO, June 2021.
3. Final Drainage Report for Retreat at Timberridge Filing No. 1, Classic Consulting, June 2020.
4. Sand Creek Drainage Basin Planning Study, Stantec, January 2021.
5. Sand Creek MDDP Amendment, JR Engineering, September 2022.
6. Sand Creek Channel Stabilization Project - General Guidelines for Geomorphic
7. Assessment / Design and Performance Standards, 5 Smooth Stones Restoration PLLC, April 2021.
8. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Latest Revision.

# Appendix A

# Figures and Exhibits




# KEY MAP

N.T.S.

VICINITY MAP
STERLING RANCH
JOB NO. 25188.03
10/21/2021
SHEET 1 OF 1

J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

X:\2510000.all\2518804\Drawings\Vicinity Map.dwg, 8.5x11 Portrait, 10/18/2021 2:40:40 PM, vaughtd

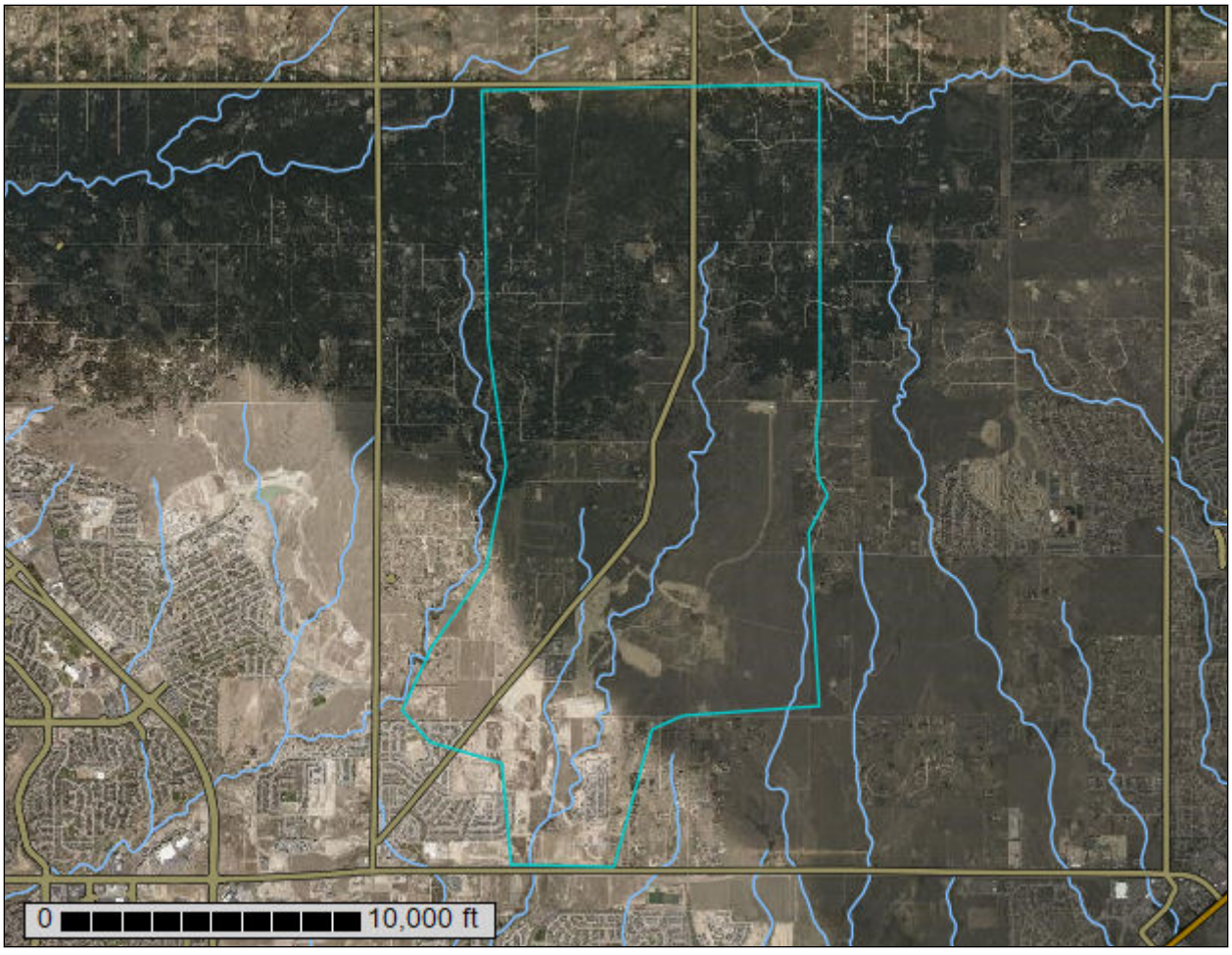
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

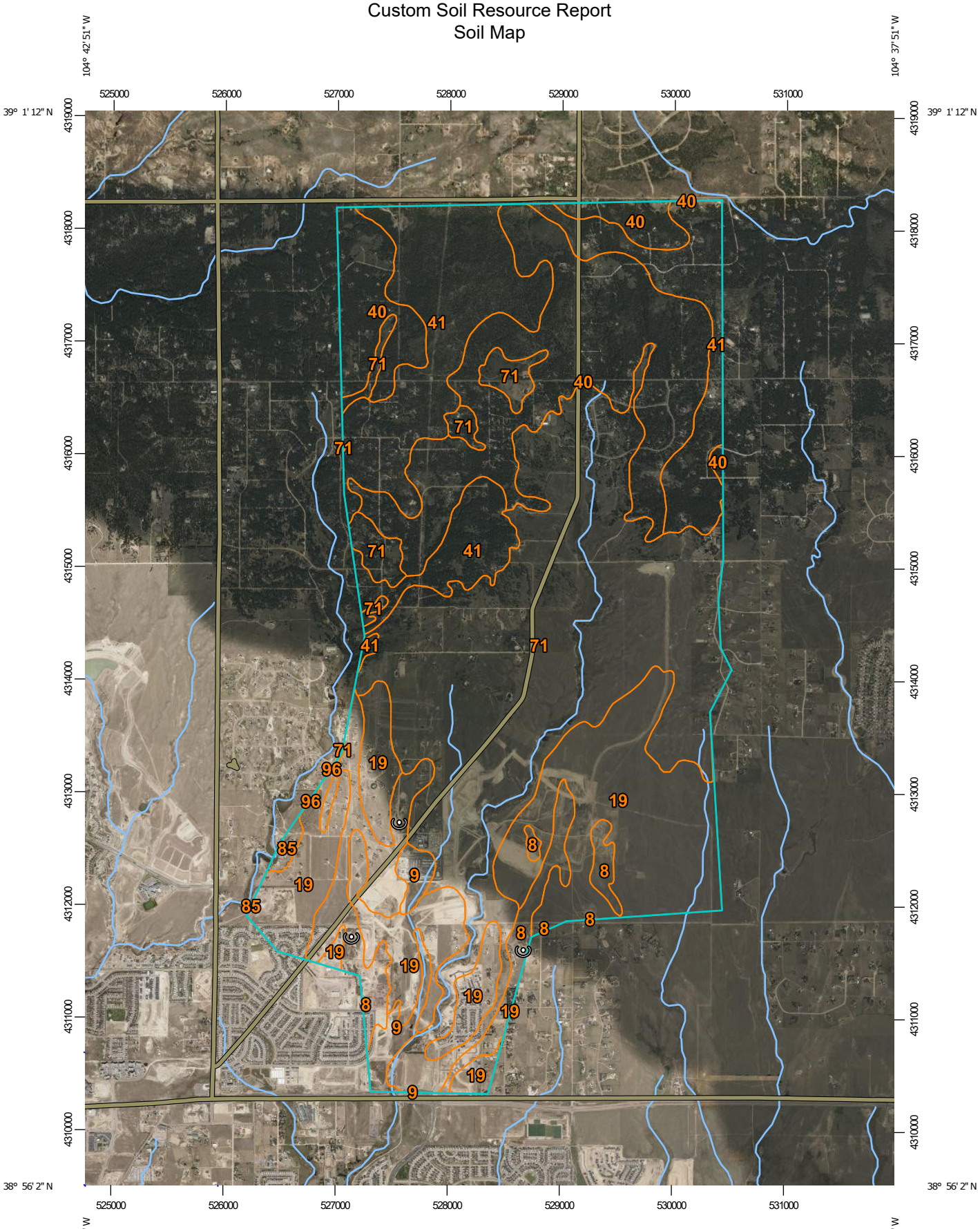
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for El Paso County Area, Colorado




January 24, 2022

# Custom Soil Resource Report
## Soil Map




Map Scale: 1:46,500 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

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

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 8 | Blakeland loamy sand, 1 to 9 percent slopes | 385.1 | 6.4% |
| 9 | Blakeland-Fluvaquentic Haplaquolls | 91.2 | 1.5% |
| 19 | Columbine gravelly sandy loam, 0 to 3 percent slopes | 1,196.8 | 19.9% |
| 40 | Kettle gravelly loamy sand, 3 to 8 percent slopes | 1,190.9 | 19.8% |
| 41 | Kettle gravelly loamy sand, 8 to 40 percent slopes | 1,028.9 | 17.1% |
| 71 | Pring coarse sandy loam, 3 to 8 percent slopes | 2,108.3 | 35.0% |
| 85 | Stapleton-Bernal sandy loams, 3 to 20 percent slopes | 16.9 | 0.3% |
| 96 | Truckton sandy loam, 0 to 3 percent slopes | 2.2 | 0.0% |
| **Totals for Area of Interest** | | **6,020.4** | **100.0%** |

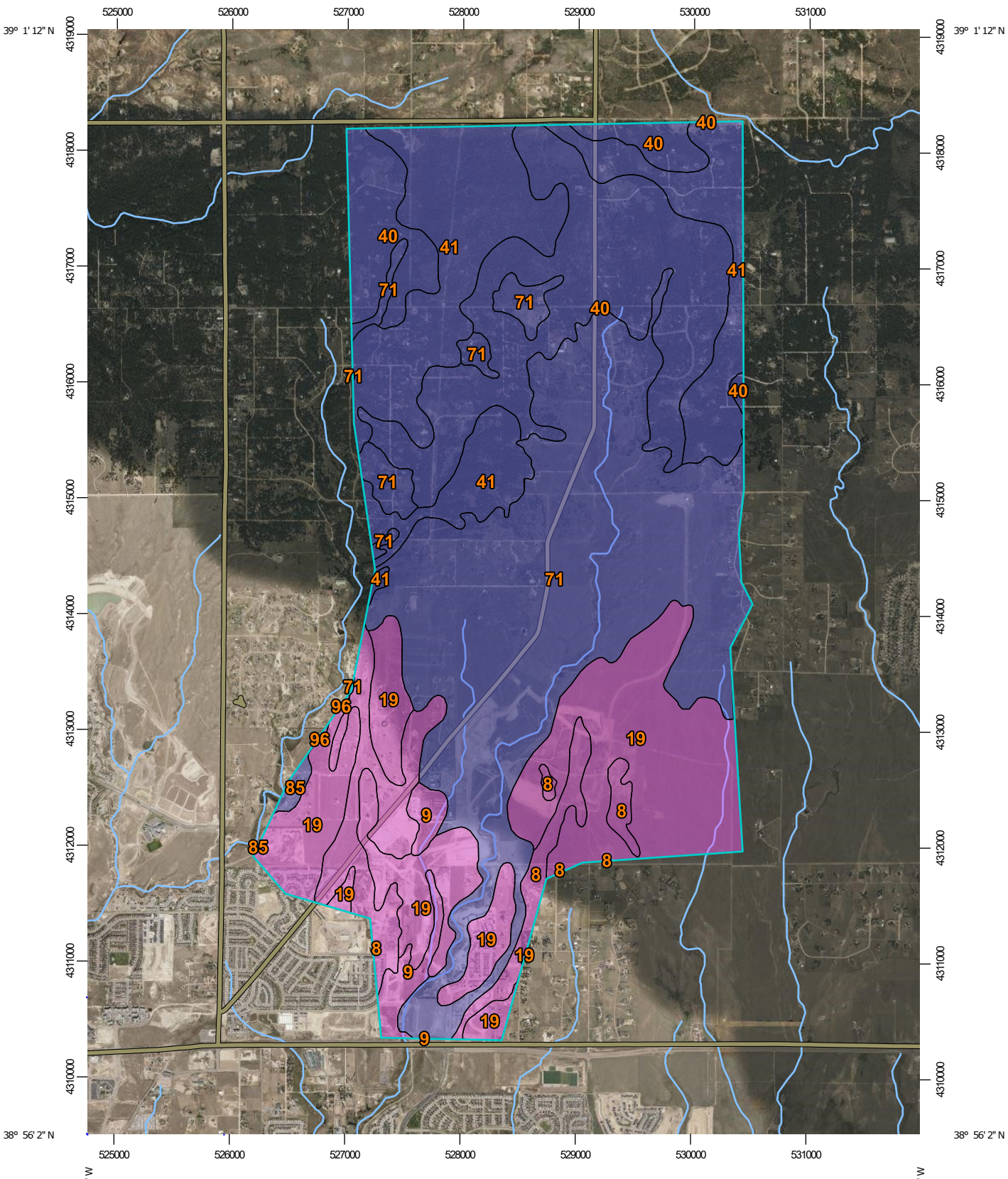
# Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas

# Custom Soil Resource Report
## Map—Hydrologic Soil Group




Map Scale: 1:46,500 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 500 1000 2000 3000

Feet: 0 2000 4000 8000 12000

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

## Table—Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| 8 | Blakeland loamy sand, 1 to 9 percent slopes | A | 385.1 | 6.4% |
| 9 | Blakeland-Fluvaquentic Haplaquolls | A | 91.2 | 1.5% |
| 19 | Columbine gravelly sandy loam, 0 to 3 percent slopes | A | 1,196.8 | 19.9% |
| 40 | Kettle gravelly loamy sand, 3 to 8 percent slopes | B | 1,190.9 | 19.8% |
| 41 | Kettle gravelly loamy sand, 8 to 40 percent slopes | B | 1,028.9 | 17.1% |
| 71 | Pring coarse sandy loam, 3 to 8 percent slopes | B | 2,108.3 | 35.0% |
| 85 | Stapleton-Bernal sandy loams, 3 to 20 percent slopes | B | 16.9 | 0.3% |
| 96 | Truckton sandy loam, 0 to 3 percent slopes | A | 2.2 | 0.0% |
| **Totals for Area of Interest** | | | **6,020.4** | **100.0%** |

## Rating Options—Hydrologic Soil Group

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

# NOTES TO USERS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

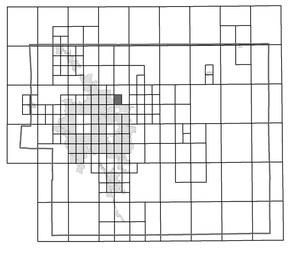
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

**El Paso County Vertical Datum Offset Table**

| Flooding Source | Vertical Datum Offset (ft) |
|---|---|

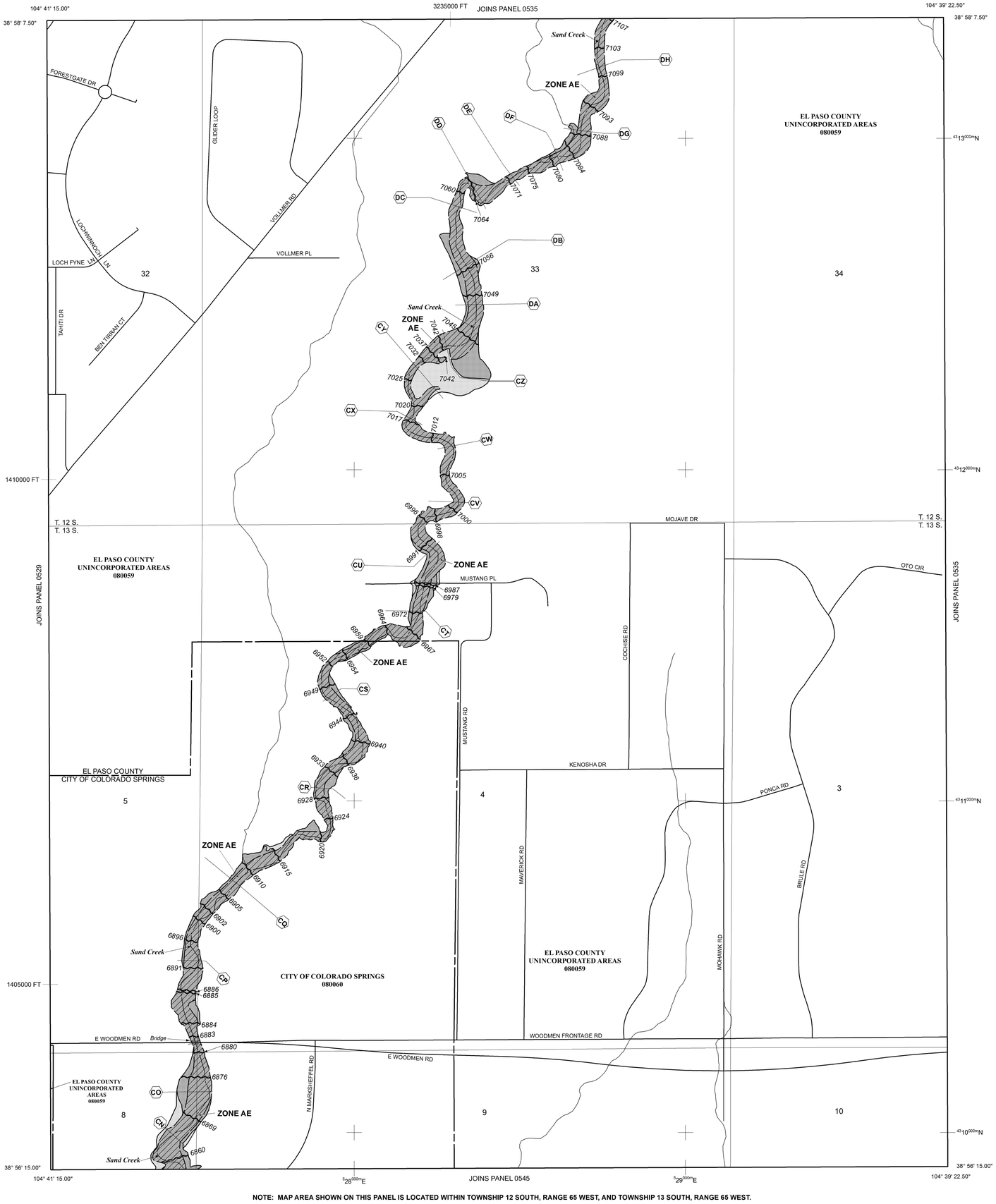
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

**Panel Location Map**



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

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




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

# LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

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

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

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

**MAP SCALE 1" = 500'**

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

**PANEL 0533G**

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

## EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

**PANEL 533 OF 1300**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| COLORADO SPRINGS, CITY OF | 080060 | 0533 | G |
| EL PASO COUNTY | 080059 | 0533 | G |

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

**MAP NUMBER**
**08041C0533G**

**MAP REVISED**
**DECEMBER 7, 2018**

Federal Emergency Management Agency

# NOTES TO USERS

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

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

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

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

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

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

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

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

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

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

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

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

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

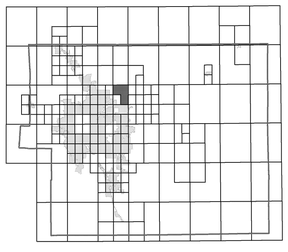
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this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

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

**El Paso County Vertical Datum Offset Table**

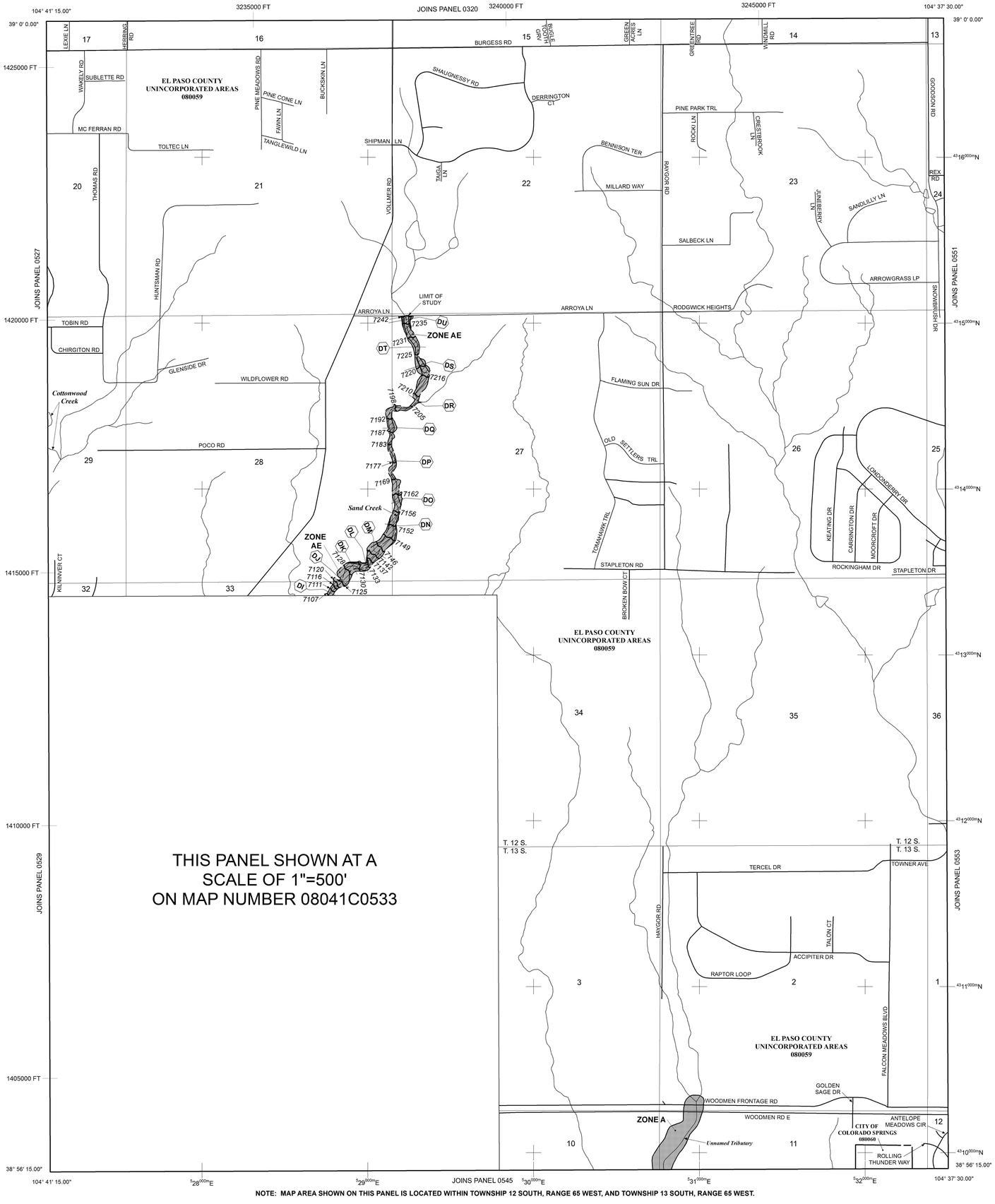
| Flooding Source | Vertical Datum Offset (ft) |
|---|---|
| REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION | |

**Panel Location Map**



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

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




# LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

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

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

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

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

NFIP

**PANEL 0535G**

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

**FLOOD INSURANCE RATE MAP**

## EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

**PANEL 535 OF 1300**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

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

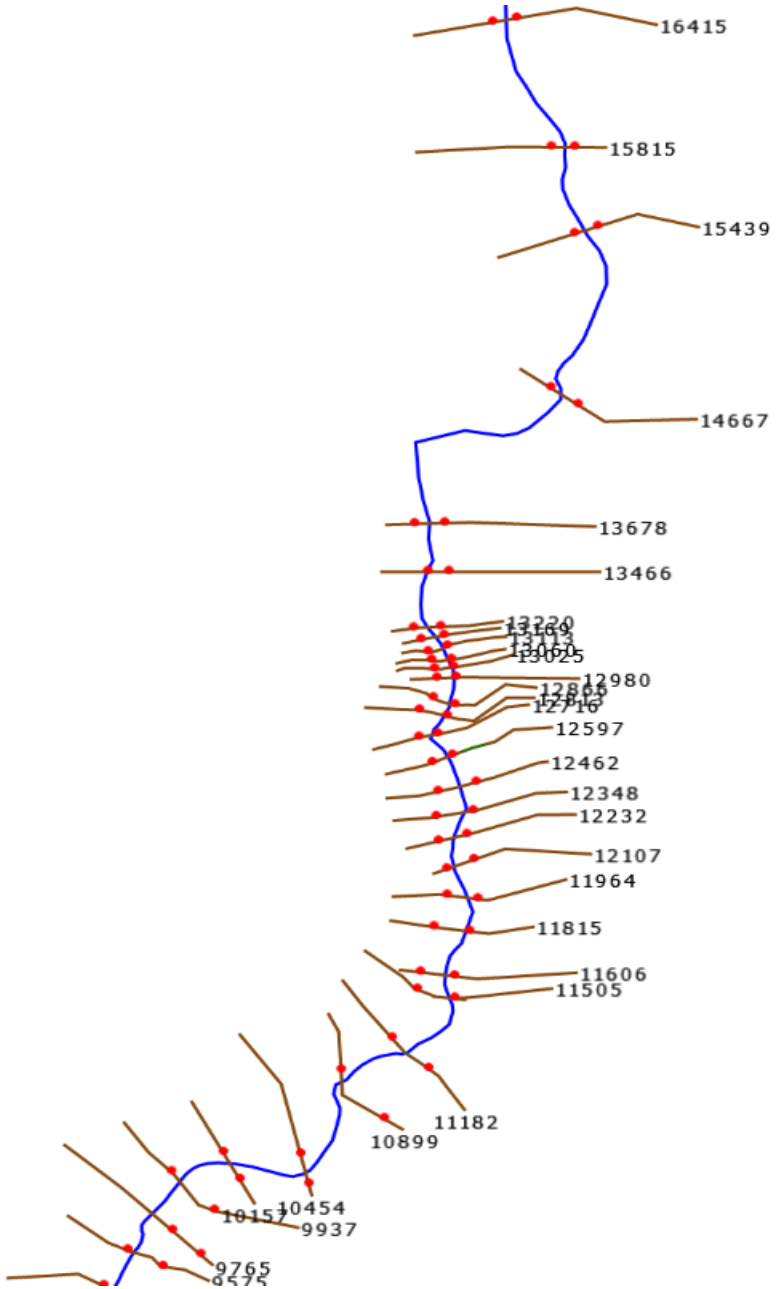
**MAP NUMBER 08041C0535G**

**MAP REVISED DECEMBER 7, 2018**

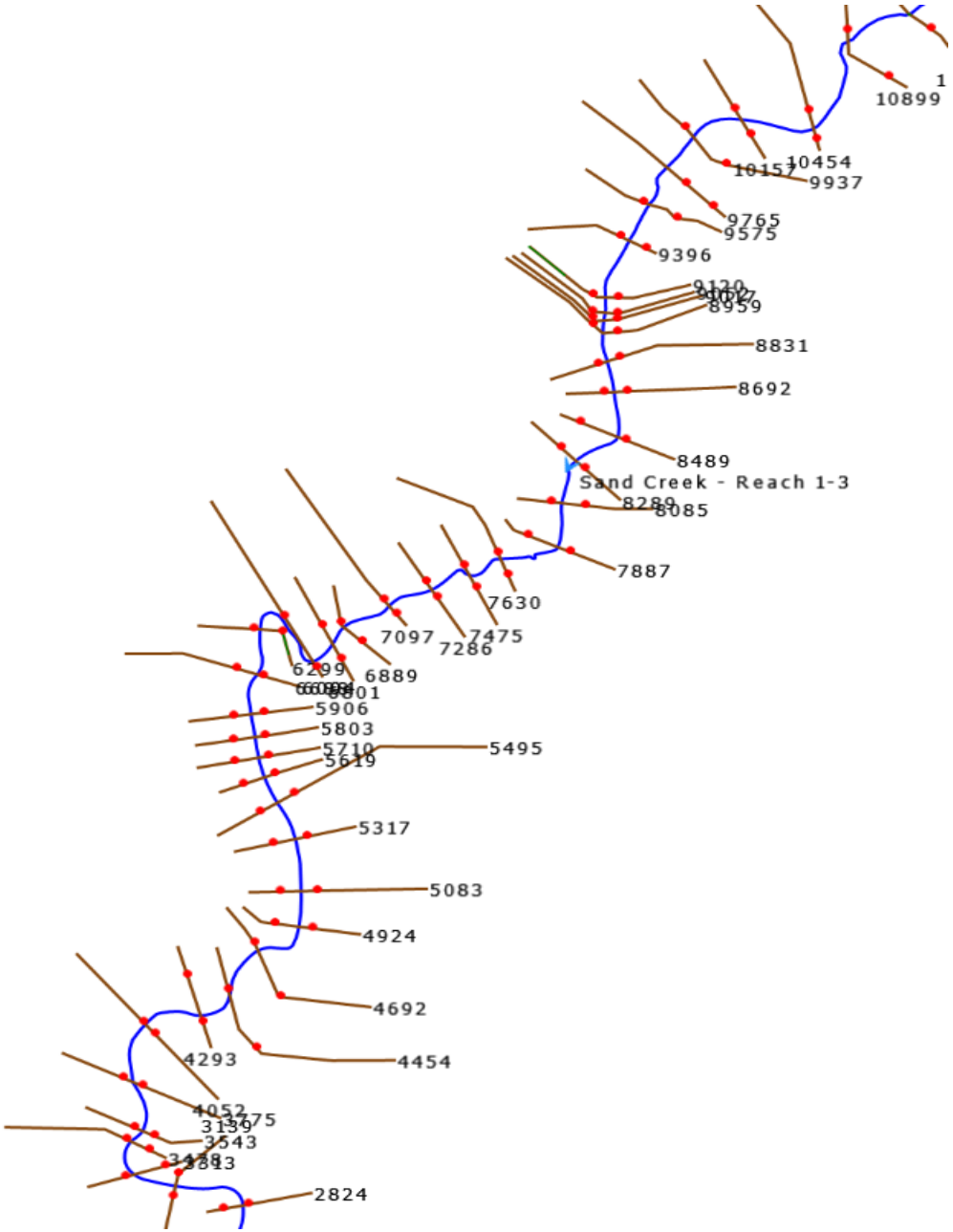
**Federal Emergency Management Agency**

# Appendix B

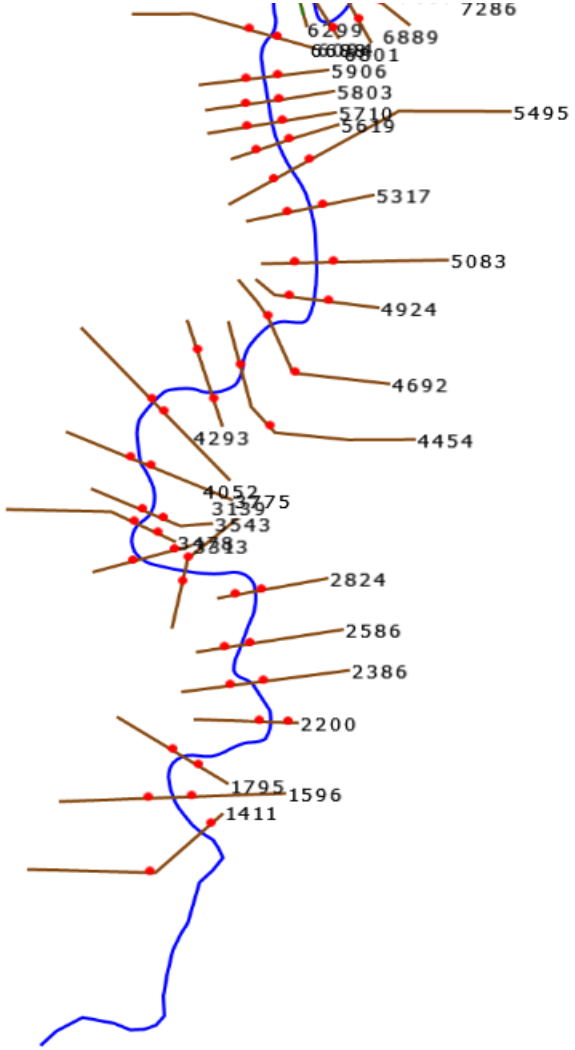
# Existing Conditions Hydraulic Modeling




Created with GeoHECRAS v3.1.0.1170



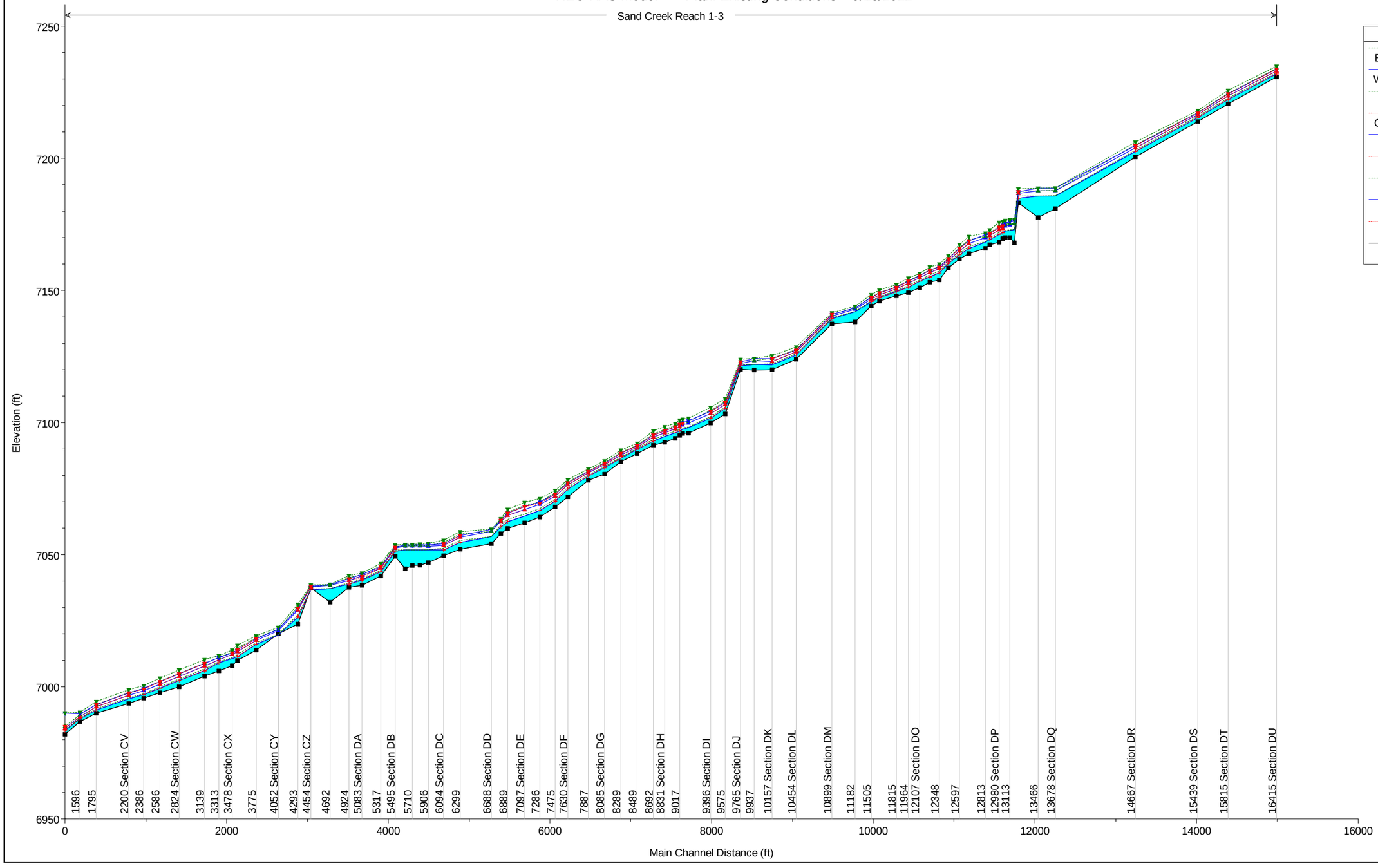

Created with GeoHECRAS v3.1.0.1170




Created with GeoHECRAS v3.1.0.1170

HEC-RAS Model  Plan: Existing Conditions  9/13/2022

Sand Creek Reach 1-3




**Legend**

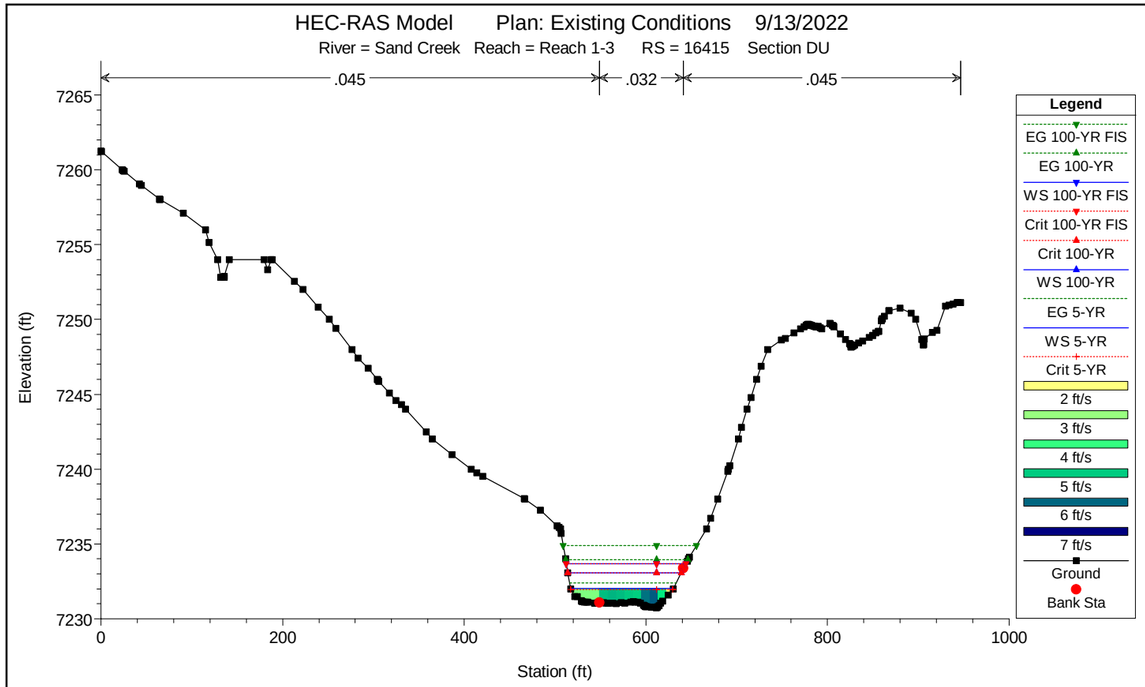
- EG 100-YR FIS
- WS 100-YR FIS
- EG 100-YR
- Crit 100-YR FIS
- WS 100-YR
- Crit 100-YR
- EG 5-YR
- WS 5-YR
- Crit 5-YR
- Ground

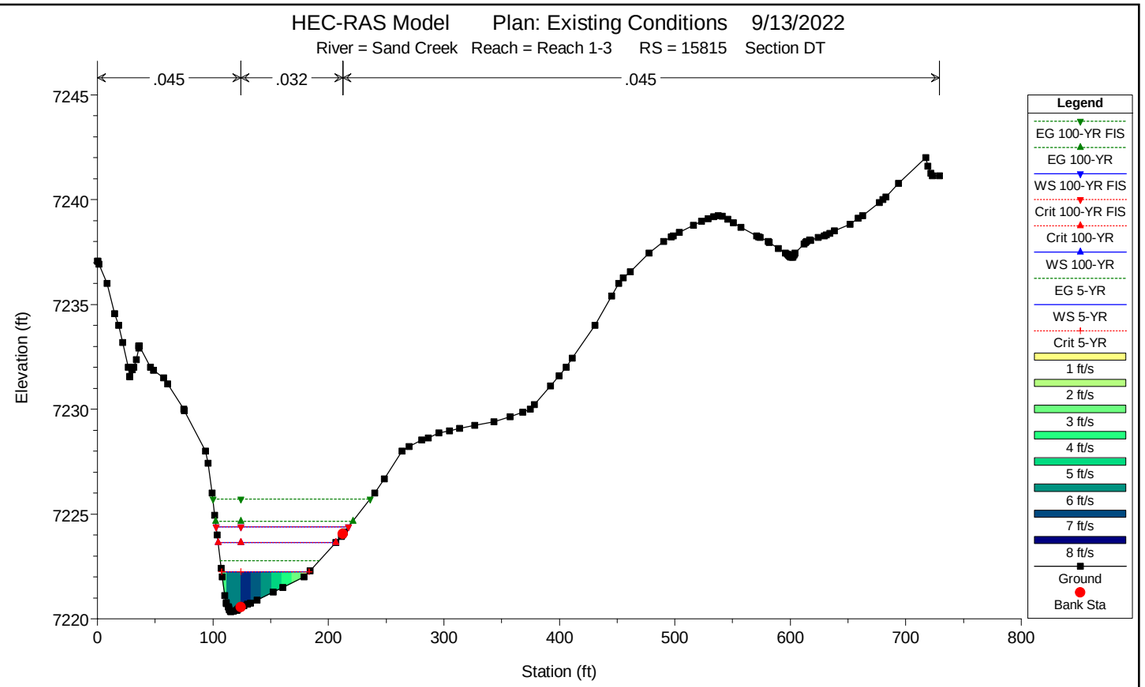
HEC-RAS Plan: EX River: Sand Creek Reach: Reach 1-3 Profile: 100-YR

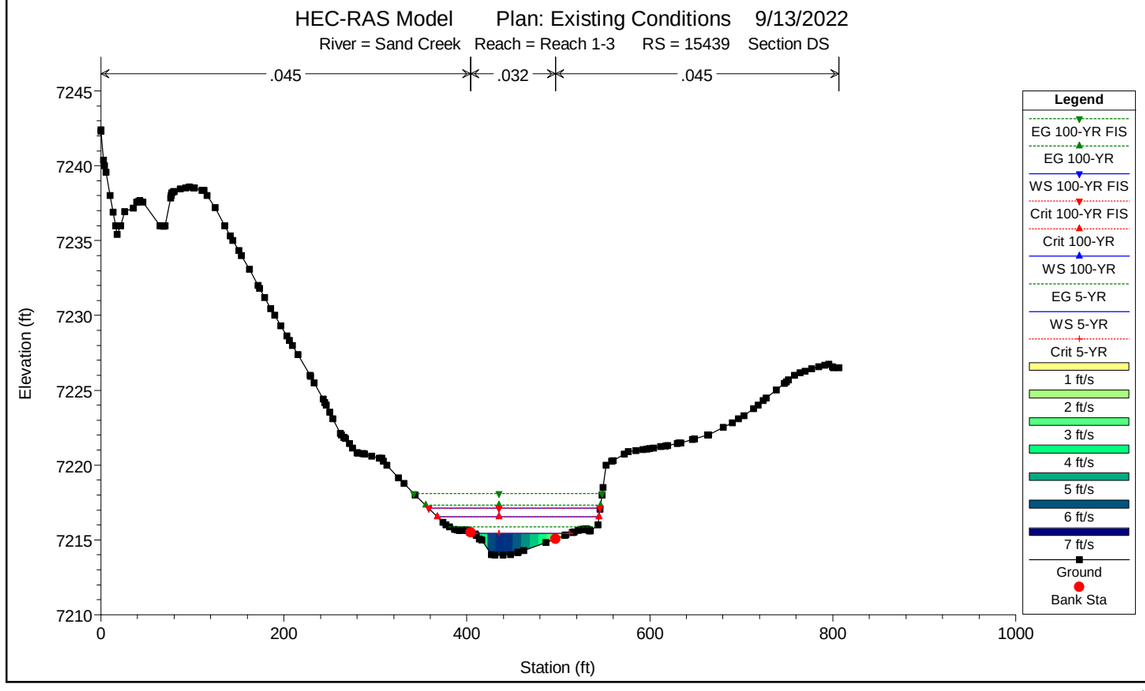
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Vel Left | Vel Chnl | Vel Right | Vel Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (ft/s) | (ft/s) | (ft/s) | (ft/s) |
| Reach 1-3 | 16415 | 100-YR | 1644.00 | 7230.74 | 7233.06 | 7233.06 | 7233.96 | 0.013371 | 124.70 | 1.05 | 1.41 | 1.53 | | 5.41 | 8.04 | | 7.34 |
| Reach 1-3 | 15815 | 100-YR | 1644.00 | 7220.56 | 7223.64 | 7223.64 | 7224.66 | 0.013915 | 101.89 | 1.07 | 2.19 | 1.62 | | 7.22 | 8.30 | | 8.03 |
| Reach 1-3 | 15439 | 100-YR | 1644.00 | 7213.99 | 7216.55 | 7216.55 | 7217.32 | 0.009916 | 176.92 | 0.92 | 0.43 | 1.27 | 0.62 | 2.58 | 7.46 | 3.28 | 6.24 |
| Reach 1-3 | 14667 | 100-YR | 1644.00 | 7200.47 | 7204.00 | 7204.00 | 7205.07 | 0.010598 | 102.02 | 0.96 | 0.46 | 1.53 | | 2.69 | 8.37 | | 7.98 |
| Reach 1-3 | 13678 | 100-YR | 1644.00 | 7180.91 | 7187.75 | | 7187.80 | 0.000207 | 250.50 | 0.15 | 0.05 | 0.07 | 0.03 | 1.20 | 1.98 | 0.77 | 1.60 |
| Reach 1-3 | 13466 | 100-YR | 1644.00 | 7177.63 | 7187.71 | | 7187.77 | 0.000100 | 144.60 | 0.12 | 0.02 | 0.06 | 0.02 | 0.80 | 2.00 | 0.81 | 1.69 |
| Reach 1-3 | 13220 | 100-YR | 1644.00 | 7183.14 | 7186.74 | 7186.74 | 7187.60 | 0.017483 | 128.83 | 1.13 | 2.43 | 1.45 | | 7.45 | 7.43 | | 7.44 |
| Reach 1-3 | 13169 | 100-YR | 1644.00 | 7168.00 | 7175.27 | | 7175.41 | 0.000391 | 92.49 | 0.22 | 0.11 | 0.16 | | 1.74 | 3.15 | | 2.91 |
| Reach 1-3 | 13113 | 100-YR | 1644.00 | 7170.00 | 7174.83 | | 7175.33 | 0.003051 | 88.65 | 0.55 | 0.45 | 0.66 | | 3.25 | 5.86 | | 5.51 |
| Reach 1-3 | 13060 | 100-YR | 1644.00 | 7169.99 | 7174.37 | | 7175.09 | 0.005591 | 81.24 | 0.73 | 1.03 | 1.06 | | 5.09 | 7.27 | | 6.59 |
| Reach 1-3 | 13025 | 100-YR | 1644.00 | 7169.60 | 7173.66 | 7173.46 | 7174.80 | 0.009670 | 72.15 | 0.95 | 1.54 | 1.71 | | 6.07 | 9.15 | | 8.20 |
| Reach 1-3 | 12980 | 100-YR | 1644.00 | 7168.31 | 7172.96 | 7172.96 | 7174.31 | 0.010710 | 70.93 | 1.00 | 1.10 | 1.91 | | 4.77 | 9.68 | | 8.81 |
| Reach 1-3 | 12866 | 100-YR | 1644.00 | 7167.28 | 7170.67 | 7170.67 | 7171.79 | 0.012651 | 92.35 | 1.05 | 1.42 | 1.75 | | 6.05 | 8.88 | | 8.25 |
| Reach 1-3 | 12813 | 100-YR | 1644.00 | 7165.88 | 7169.93 | | 7170.48 | 0.005136 | 114.60 | 0.69 | 0.63 | 0.82 | | 4.16 | 6.24 | | 5.80 |
| Reach 1-3 | 12716 | 100-YR | 1644.00 | 7164.00 | 7167.74 | 7167.74 | 7169.10 | 0.009854 | 71.04 | 0.97 | 0.94 | 1.88 | | 4.36 | 9.71 | | 8.77 |
| Reach 1-3 | 12597 | 100-YR | 1644.00 | 7161.80 | 7164.97 | 7164.97 | 7166.19 | 0.011673 | 99.13 | 1.03 | 1.41 | 1.79 | | 5.54 | 9.14 | | 8.59 |
| Reach 1-3 | 12462 | 100-YR | 1644.00 | 7158.51 | 7161.35 | 7161.35 | 7162.22 | 0.012318 | 133.81 | 1.00 | 0.36 | 1.35 | | 2.23 | 7.51 | | 7.39 |
| Reach 1-3 | 12348 | 100-YR | 1644.00 | 7154.00 | 7158.28 | 7158.12 | 7159.04 | 0.009542 | 126.19 | 0.89 | 0.32 | 1.14 | | 2.15 | 7.01 | | 6.95 |
| Reach 1-3 | 12232 | 100-YR | 1644.00 | 7153.09 | 7156.81 | 7156.81 | 7157.85 | 0.010568 | 110.07 | 0.96 | 0.58 | 1.53 | | 3.12 | 8.36 | | 7.69 |
| Reach 1-3 | 12107 | 100-YR | 1644.00 | 7151.03 | 7154.88 | 7154.88 | 7155.68 | 0.013295 | 140.82 | 1.03 | 1.31 | 1.47 | | 5.17 | 7.82 | | 6.84 |
| Reach 1-3 | 11964 | 100-YR | 1644.00 | 7149.23 | 7152.74 | 7152.74 | 7153.71 | 0.011314 | 113.97 | 0.98 | 0.81 | 1.48 | | 3.85 | 8.10 | | 7.56 |
| Reach 1-3 | 11815 | 100-YR | 1644.00 | 7148.00 | 7150.70 | 7150.51 | 7151.41 | 0.009042 | 133.66 | 0.87 | 0.67 | 1.09 | | 3.51 | 6.85 | | 6.62 |
| Reach 1-3 | 11606 | 100-YR | 1644.00 | 7146.04 | 7148.36 | 7148.36 | 7149.23 | 0.012073 | 134.10 | 0.99 | 0.33 | 1.34 | | 2.10 | 7.50 | | 7.37 |
| Reach 1-3 | 11505 | 100-YR | 1644.00 | 7144.13 | 7146.76 | 7146.76 | 7147.59 | 0.013049 | 140.50 | 1.01 | 0.08 | 1.31 | | 0.78 | 7.29 | | 7.29 |
| Reach 1-3 | 11182 | 100-YR | 1644.00 | 7138.10 | 7142.94 | | 7143.32 | 0.005381 | 204.01 | 0.66 | 0.14 | 0.58 | 0.01 | 1.35 | 4.92 | 0.18 | 4.86 |
| Reach 1-3 | 10899 | 100-YR | 1644.00 | 7137.38 | 7140.34 | 7140.34 | 7140.97 | 0.014099 | 227.77 | 1.01 | | 1.15 | 0.68 | | 6.58 | 3.30 | 6.09 |
| Reach 1-3 | 10454 | 100-YR | 1644.00 | 7124.00 | 7126.83 | 7126.75 | 7127.65 | 0.010937 | 124.34 | 0.94 | | 1.24 | | | 7.23 | | 7.23 |
| Reach 1-3 | 10157 | 100-YR | 1667.00 | 7120.00 | 7123.14 | 7123.14 | 7124.26 | 0.011690 | 88.24 | 1.00 | | 1.61 | | | 8.50 | | 8.50 |
| Reach 1-3 | 9937 | 100-YR | 1667.00 | 7119.89 | 7123.40 | | 7123.46 | 0.000369 | 274.14 | 0.19 | 0.07 | 0.08 | | 1.27 | 1.99 | | 1.87 |
| Reach 1-3 | 9765 | 100-YR | 1667.00 | 7120.11 | 7122.40 | 7122.40 | 7123.19 | 0.016005 | 167.07 | 1.10 | | 1.41 | 1.34 | | 7.38 | 5.08 | 7.00 |
| Reach 1-3 | 9575 | 100-YR | 1667.00 | 7103.29 | 7106.86 | 7106.86 | 7107.93 | 0.012252 | 96.39 | 1.01 | | 1.56 | | | 8.28 | | 8.28 |
| Reach 1-3 | 9396 | 100-YR | 1667.00 | 7099.80 | 7103.38 | 7103.38 | 7104.57 | 0.011349 | 80.70 | 1.00 | | 1.66 | | | 8.73 | | 8.73 |
| Reach 1-3 | 9120 | 100-YR | 1667.00 | 7095.99 | 7099.76 | | 7100.49 | 0.005170 | 87.64 | 0.70 | 0.17 | 0.95 | | 1.55 | 6.85 | | 6.78 |
| Reach 1-3 | 9052 | 100-YR | 1667.00 | 7095.85 | 7099.12 | | 7100.05 | 0.007384 | 82.82 | 0.83 | 0.13 | 1.24 | | 1.22 | 7.73 | | 7.70 |
| Reach 1-3 | 9017 | 100-YR | 1667.00 | 7095.09 | 7098.50 | 7098.50 | 7099.69 | 0.011514 | 80.39 | 1.01 | | 1.68 | | | 8.78 | | 8.78 |
| Reach 1-3 | 8959 | 100-YR | 1763.90 | 7094.00 | 7097.68 | 7097.66 | 7098.78 | 0.011160 | 93.07 | 0.99 | | 1.56 | | | 8.41 | | 8.41 |
| Reach 1-3 | 8831 | 100-YR | 1763.90 | 7092.55 | 7096.14 | 7096.14 | 7097.35 | 0.011010 | 85.23 | 0.99 | 0.18 | 1.68 | | 1.42 | 8.84 | | 8.79 |
| Reach 1-3 | 8692 | 100-YR | 1763.90 | 7091.45 | 7094.55 | 7094.55 | 7095.77 | 0.011059 | 85.97 | 1.00 | 0.32 | 1.69 | | 2.07 | 8.86 | | 8.78 |
| Reach 1-3 | 8489 | 100-YR | 1763.90 | 7088.21 | 7090.72 | 7090.72 | 7091.47 | 0.013336 | 170.45 | 1.01 | | 1.23 | | | 6.97 | | 6.97 |
| Reach 1-3 | 8289 | 100-YR | 1763.90 | 7085.18 | 7087.68 | 7087.68 | 7088.71 | 0.012133 | 107.79 | 1.01 | | 1.52 | | | 8.13 | | 8.13 |
| Reach 1-3 | 8085 | 100-YR | 1763.90 | 7080.51 | 7084.04 | 7084.04 | 7084.89 | 0.011072 | 168.97 | 0.95 | 0.18 | 1.29 | 0.21 | 1.40 | 7.42 | 1.55 | 7.10 |
| Reach 1-3 | 7887 | 100-YR | 1763.90 | 7078.18 | 7080.94 | 7080.94 | 7081.76 | 0.015224 | 150.10 | 1.08 | | 1.41 | 2.02 | | 7.45 | 6.74 | 7.27 |
| Reach 1-3 | 7630 | 100-YR | 1763.90 | 7071.92 | 7076.48 | 7076.48 | 7077.52 | 0.010604 | 114.74 | 0.97 | | 1.54 | 0.65 | | 8.38 | 3.35 | 7.73 |
| Reach 1-3 | 7475 | 100-YR | 1763.90 | 7068.00 | 7072.16 | 7072.16 | 7073.35 | 0.011301 | 86.15 | 1.00 | | 1.68 | 0.49 | | 8.79 | 2.73 | 8.71 |
| Reach 1-3 | 7286 | 100-YR | 1763.90 | 7064.24 | 7069.05 | | 7070.06 | 0.006141 | 73.00 | 0.78 | | 1.30 | 0.63 | | 8.23 | 3.61 | 7.75 |
| Reach 1-3 | 7097 | 100-YR | 1763.90 | 7061.99 | 7067.02 | 7067.00 | 7068.51 | 0.010780 | 63.20 | 0.99 | | 1.95 | 0.08 | | 9.80 | 0.81 | 9.78 |
| Reach 1-3 | 6889 | 100-YR | 1763.90 | 7059.99 | 7064.87 | 7064.87 | 7066.14 | 0.011259 | 76.28 | 1.00 | | 1.75 | | | 9.06 | | 9.06 |
| Reach 1-3 | 6801 | 100-YR | 1763.90 | 7058.00 | 7062.62 | 7062.62 | 7063.19 | 0.006150 | 226.53 | 0.75 | | 0.99 | 0.41 | | 6.85 | 2.70 | 4.95 |
| Reach 1-3 | 6688 | 100-YR | 1763.90 | 7054.20 | 7058.78 | | 7058.88 | 0.001202 | 284.66 | 0.32 | | 0.15 | 0.26 | | 2.58 | 2.62 | 2.60 |
| Reach 1-3 | 6299 | 100-YR | 1880.40 | 7052.00 | 7056.57 | 7056.57 | 7057.79 | 0.010724 | 111.17 | 0.99 | | 1.73 | 0.86 | | 9.04 | 4.04 | 8.62 |
| Reach 1-3 | 6094 | 100-YR | 1880.40 | 7049.53 | 7053.51 | 7053.51 | 7054.67 | 0.011772 | 95.21 | 1.01 | | 1.65 | | | 8.64 | | 8.64 |
| Reach 1-3 | 5906 | 100-YR | 1880.40 | 7047.00 | 7053.20 | | 7053.59 | 0.001865 | 101.12 | 0.44 | 0.12 | 0.46 | | 1.48 | 5.03 | | 4.94 |
| Reach 1-3 | 5803 | 100-YR | 1880.40 | 7046.00 | 7053.30 | | 7053.41 | 0.000532 | 180.34 | 0.24 | | 0.14 | 0.11 | | 2.86 | 1.68 | 2.53 |
| Reach 1-3 | 5710 | 100-YR | 1880.40 | 7045.88 | 7053.23 | | 7053.37 | 0.000440 | 130.78 | 0.22 | 0.01 | 0.14 | | 0.33 | 2.90 | | 2.90 |

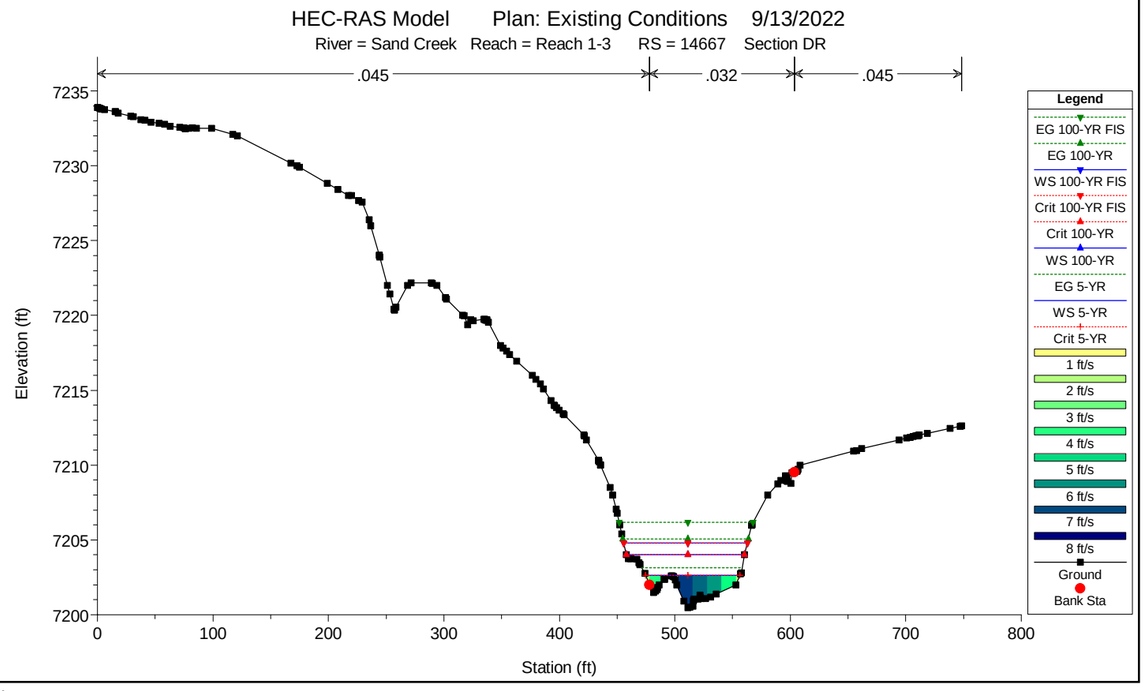
HEC-RAS Plan: EX River: Sand Creek Reach: Reach 1-3 Profile: 100-YR (Continued)

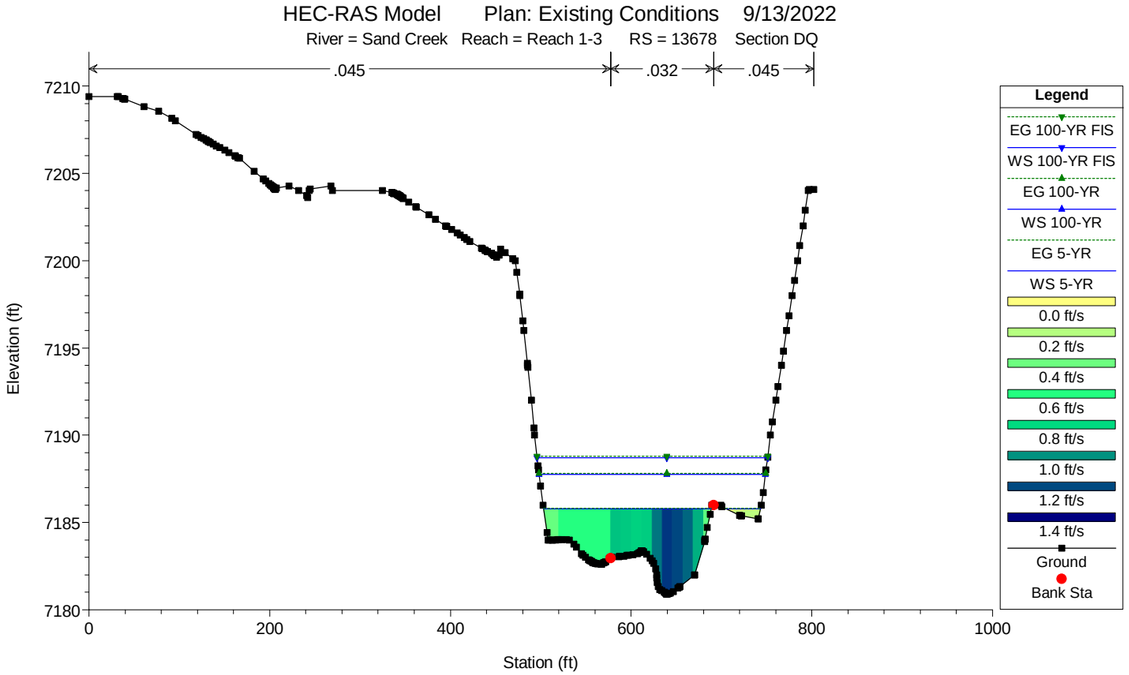
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Vel Left | Vel Chnl | Vel Right | Vel Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (ft/s) | (ft/s) | (ft/s) | (ft/s) |
| Reach 1-3 | 5619 | 100-YR | 1880.40 | 7044.65 | 7053.23 | | 7053.33 | 0.000257 | 133.34 | 0.18 | 0.01 | 0.10 | | 0.48 | 2.53 | | 2.49 |
| Reach 1-3 | 5495 | 100-YR | 1880.40 | 7049.36 | 7052.46 | 7052.46 | 7053.17 | 0.011665 | 235.94 | 0.95 | 0.42 | 1.19 | 0.48 | 2.46 | 6.97 | 2.72 | 6.19 |
| Reach 1-3 | 5317 | 100-YR | 1880.40 | 7042.00 | 7044.91 | 7044.91 | 7045.95 | 0.011879 | 111.33 | 1.00 | | 1.52 | | | 8.18 | | 8.18 |
| Reach 1-3 | 5083 | 100-YR | 1880.40 | 7038.33 | 7041.95 | 7041.22 | 7042.39 | 0.004059 | 150.39 | 0.60 | 0.01 | 0.61 | 0.07 | 0.28 | 5.31 | 0.93 | 5.30 |
| Reach 1-3 | 4924 | 100-YR | 1848.80 | 7037.69 | 7040.29 | 7040.29 | 7041.30 | 0.012077 | 114.42 | 1.01 | | 1.50 | | | 8.07 | | 8.07 |
| Reach 1-3 | 4692 | 100-YR | 1848.80 | 7032.00 | 7038.36 | | 7038.38 | 0.000122 | 324.44 | 0.12 | 0.03 | 0.03 | | 1.03 | 1.37 | | 1.25 |
| Reach 1-3 | 4454 | 100-YR | 1848.80 | 7037.42 | 7037.72 | 7037.72 | 7038.17 | 0.020679 | 402.12 | 0.89 | 1.55 | 0.24 | 0.59 | 5.57 | 2.15 | 2.81 | 5.10 |
| Reach 1-3 | 4293 | 100-YR | 1848.80 | 7023.77 | 7028.98 | 7028.98 | 7030.25 | 0.011654 | 81.16 | 1.00 | | 1.76 | | | 9.04 | | 9.04 |
| Reach 1-3 | 4052 | 100-YR | 1848.80 | 7019.99 | 7021.23 | | 7021.78 | 0.008565 | 145.30 | 0.77 | 1.53 | 0.61 | 0.52 | 6.16 | 4.71 | 2.99 | 5.81 |
| Reach 1-3 | 3775 | 100-YR | 1848.80 | 7013.90 | 7017.62 | 7017.62 | 7018.62 | 0.017858 | 116.26 | 1.17 | 2.56 | 1.78 | | 7.69 | 8.49 | | 8.01 |
| Reach 1-3 | 3543 | 100-YR | 1848.80 | 7009.94 | 7013.29 | 7013.29 | 7014.69 | 0.011143 | 71.18 | 1.01 | | 1.87 | | | 9.47 | | 9.47 |
| Reach 1-3 | 3478 | 100-YR | 1848.80 | 7008.00 | 7012.24 | 7012.24 | 7013.19 | 0.009757 | 158.87 | 0.92 | 0.23 | 1.37 | 0.25 | 1.69 | 7.88 | 1.82 | 7.35 |
| Reach 1-3 | 3313 | 100-YR | 1848.80 | 7006.00 | 7010.23 | 7010.15 | 7011.01 | 0.010793 | 146.22 | 0.93 | 0.14 | 1.20 | | 1.18 | 7.09 | | 7.08 |
| Reach 1-3 | 3139 | 100-YR | 1562.50 | 7003.99 | 7007.92 | 7007.92 | 7009.03 | 0.011822 | 87.94 | 1.00 | 0.07 | 1.60 | | 0.74 | 8.45 | | 8.43 |
| Reach 1-3 | 2824 | 100-YR | 1562.50 | 7000.00 | 7003.98 | 7003.98 | 7005.09 | 0.011782 | 83.68 | 1.00 | | 1.60 | | | 8.45 | | 8.45 |
| Reach 1-3 | 2586 | 100-YR | 1562.50 | 6997.81 | 7000.97 | 7000.97 | 7002.06 | 0.011639 | 85.24 | 1.00 | | 1.58 | | | 8.40 | | 8.40 |
| Reach 1-3 | 2386 | 100-YR | 1562.50 | 6995.72 | 6998.56 | | 6999.33 | 0.008254 | 101.82 | 0.84 | | 1.11 | | | 7.05 | | 7.05 |
| Reach 1-3 | 2200 | 100-YR | 1562.50 | 6993.65 | 6996.84 | 6996.72 | 6997.72 | 0.009049 | 117.66 | 0.89 | | 1.27 | 0.28 | | 7.59 | 1.95 | 7.23 |
| Reach 1-3 | 1795 | 100-YR | 1585.20 | 6989.98 | 6992.41 | 6992.41 | 6993.35 | 0.013001 | 113.88 | 1.03 | | 1.51 | 1.32 | | 8.02 | 5.21 | 7.61 |
| Reach 1-3 | 1596 | 100-YR | 1585.20 | 6986.75 | 6988.70 | 6988.70 | 6989.44 | 0.013539 | 163.65 | 1.01 | 0.10 | 1.21 | | 0.91 | 6.88 | | 6.87 |
| Reach 1-3 | 1411 | 100-YR | 1585.20 | 6982.00 | 6984.39 | 6984.33 | 6985.14 | 0.014080 | 140.56 | 0.96 | | 1.42 | | | 6.96 | | 6.96 |

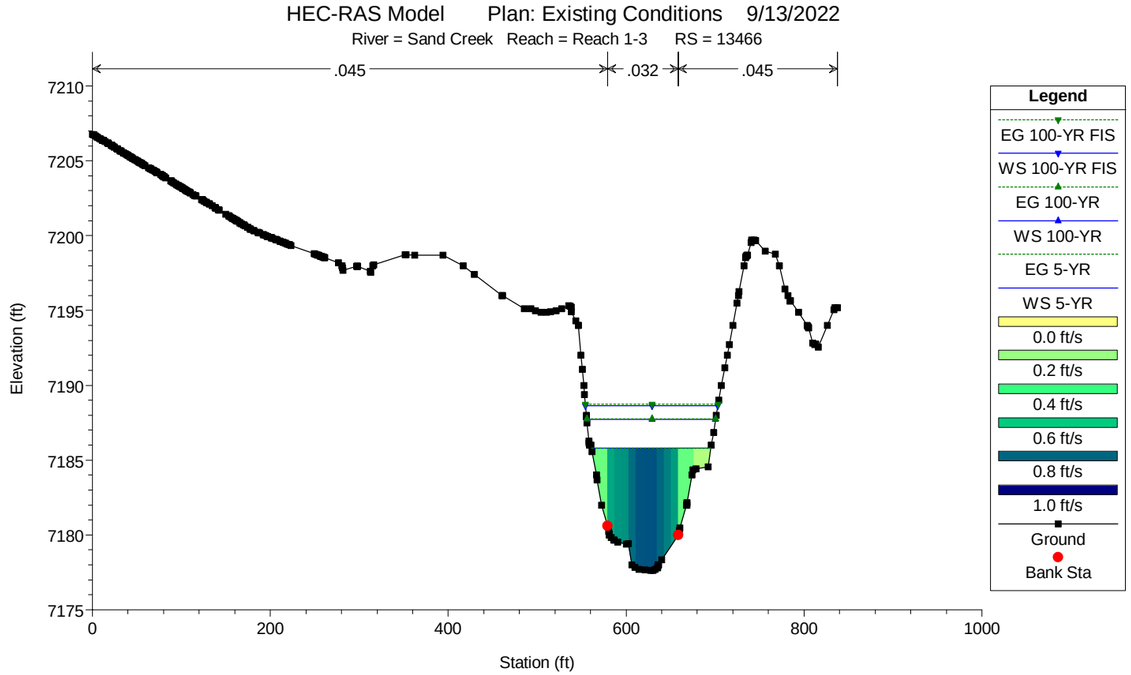

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 16415 Section DU
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

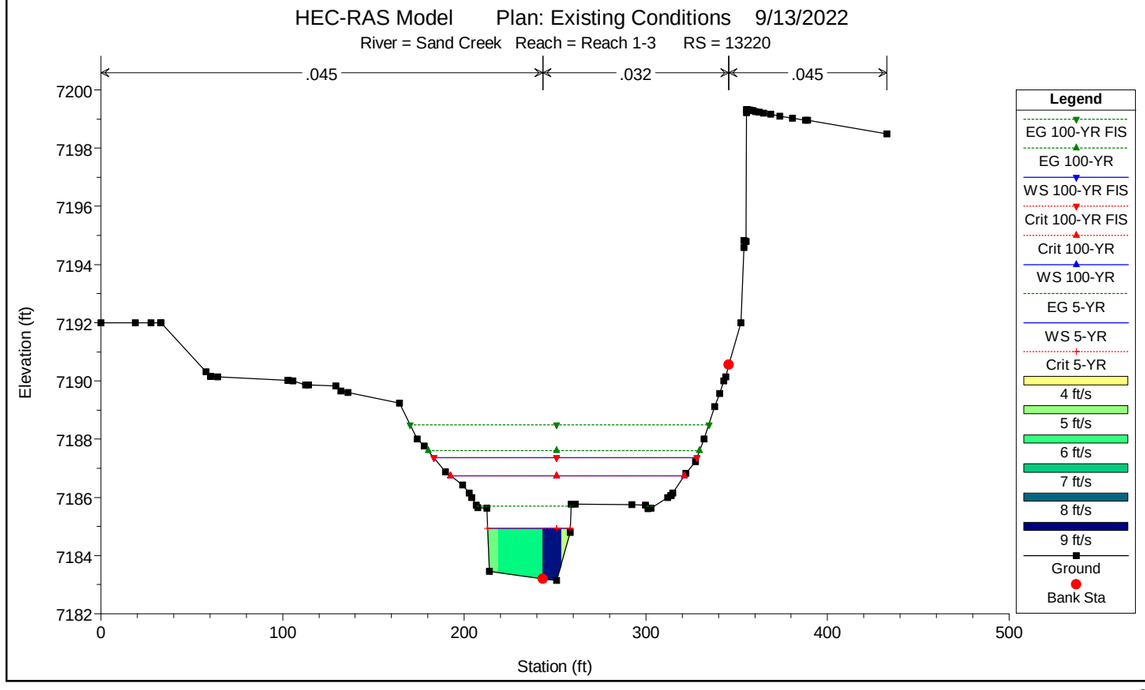

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 15815 Section DT
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

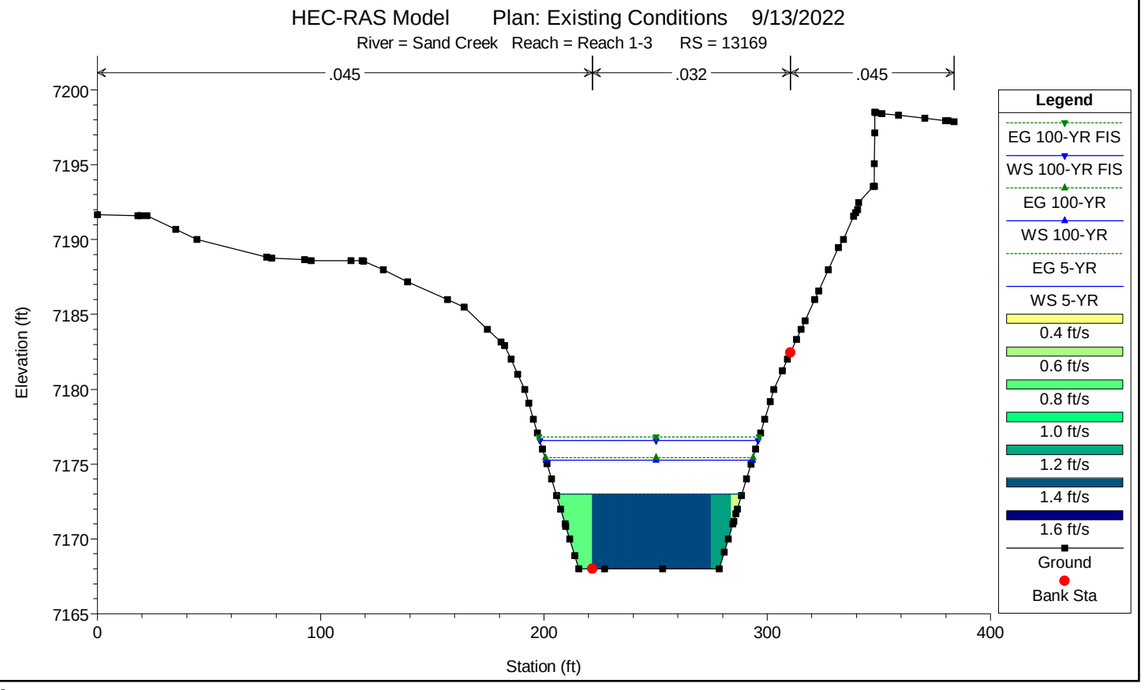

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 15439 Section DS
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

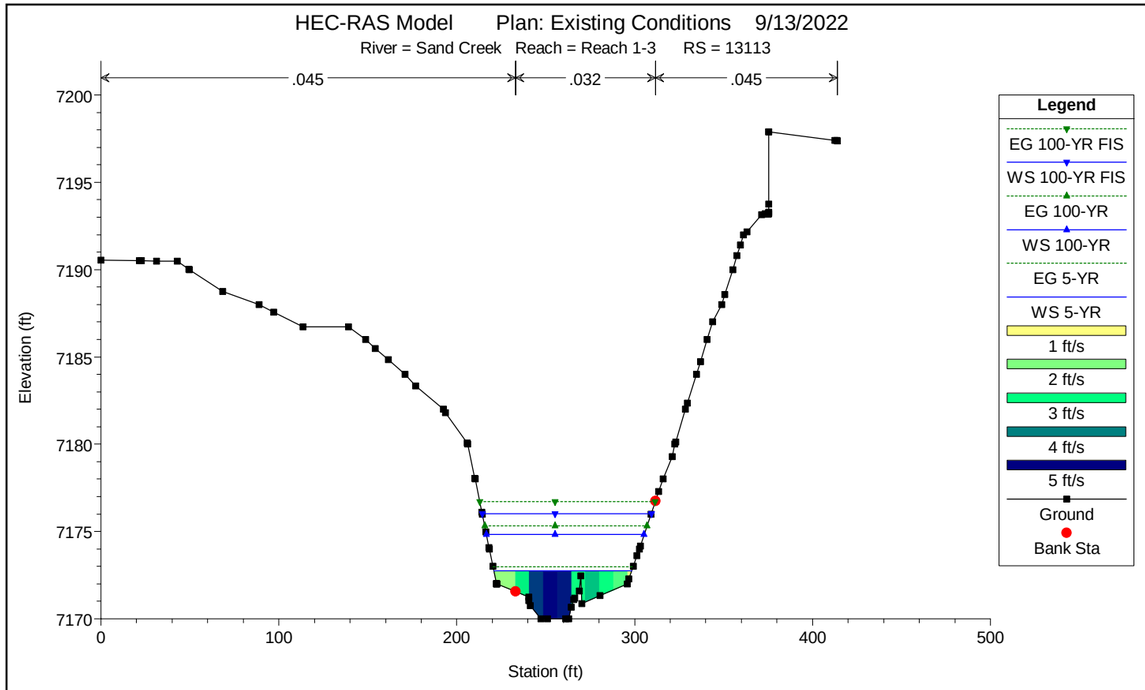

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 14667 Section DR
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

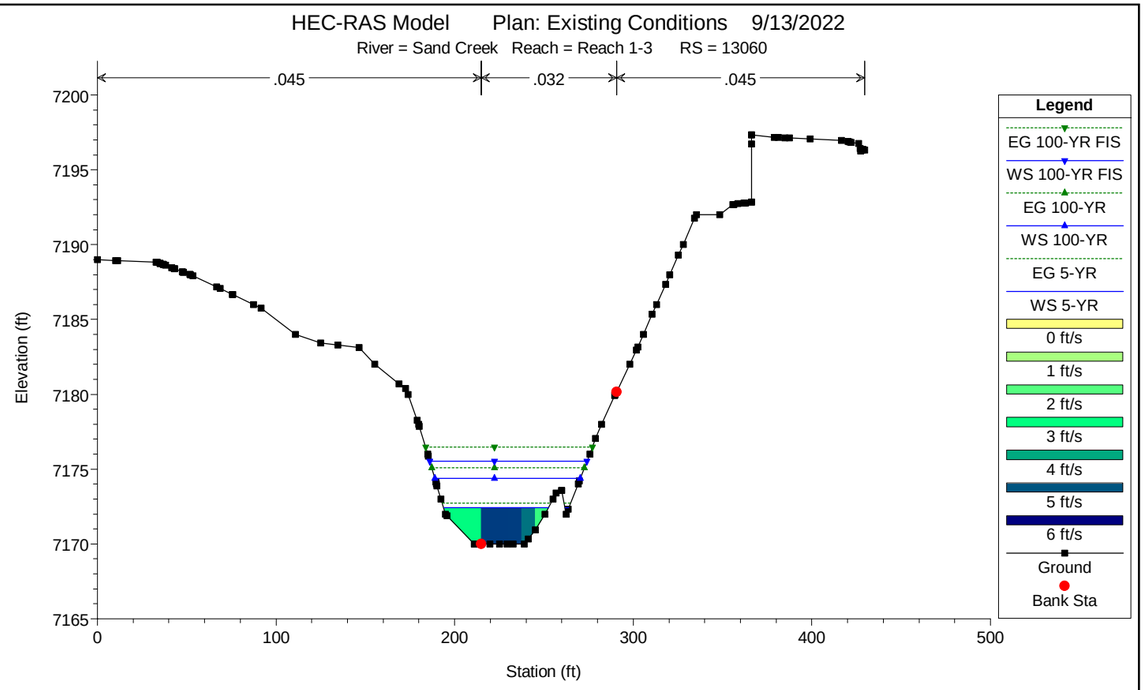

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 13678 Section DQ
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Bank Sta

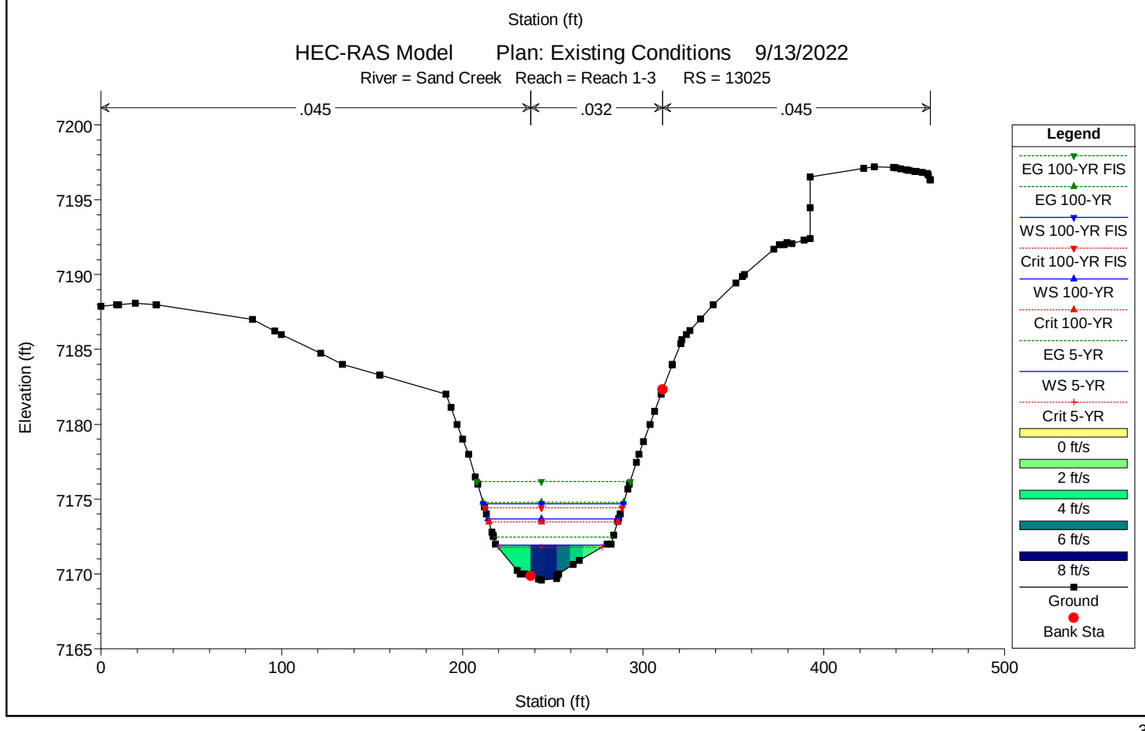

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 13466
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

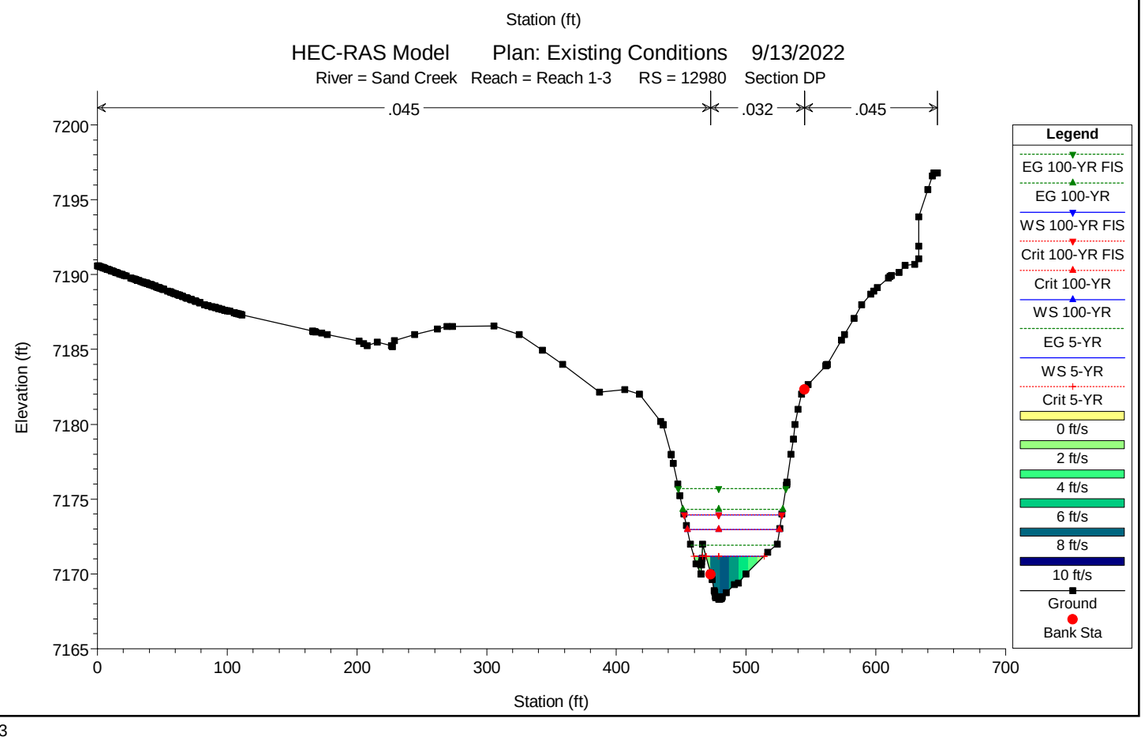

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 13220
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

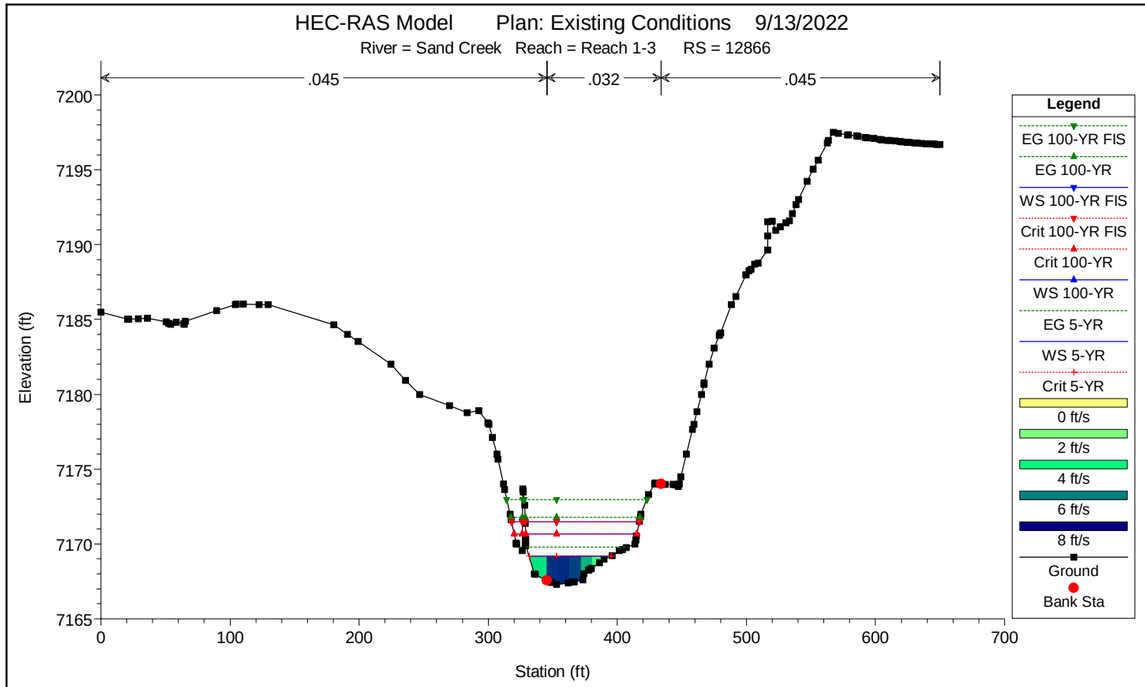

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 13169
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
Ground
Bank Sta

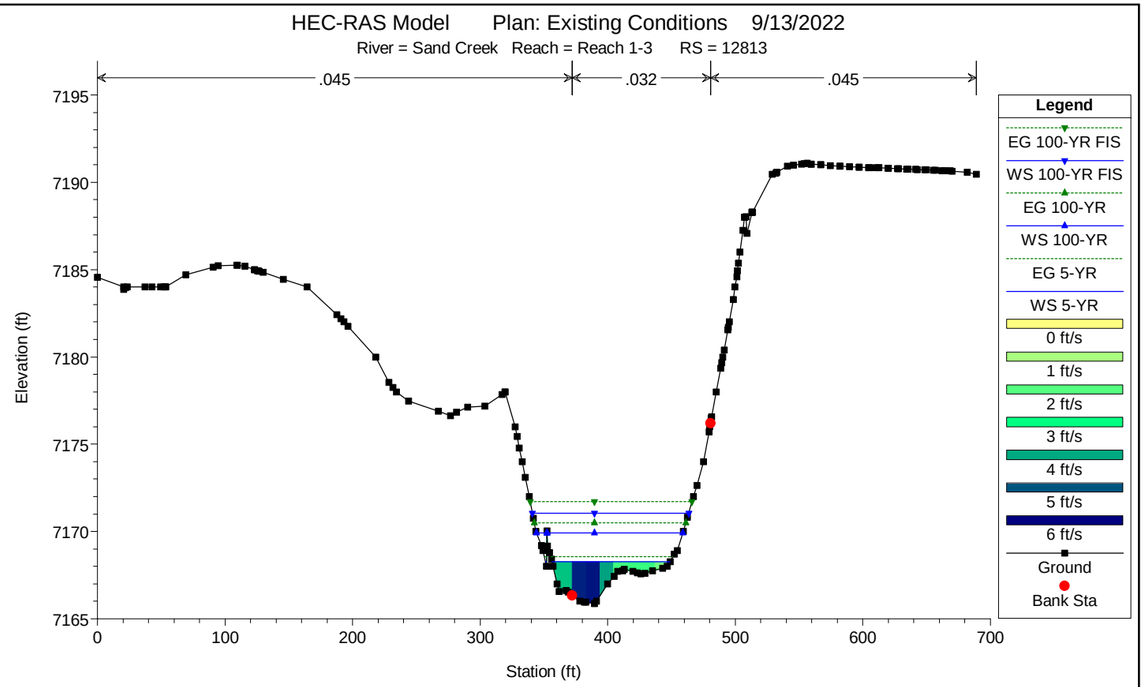

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 13113
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

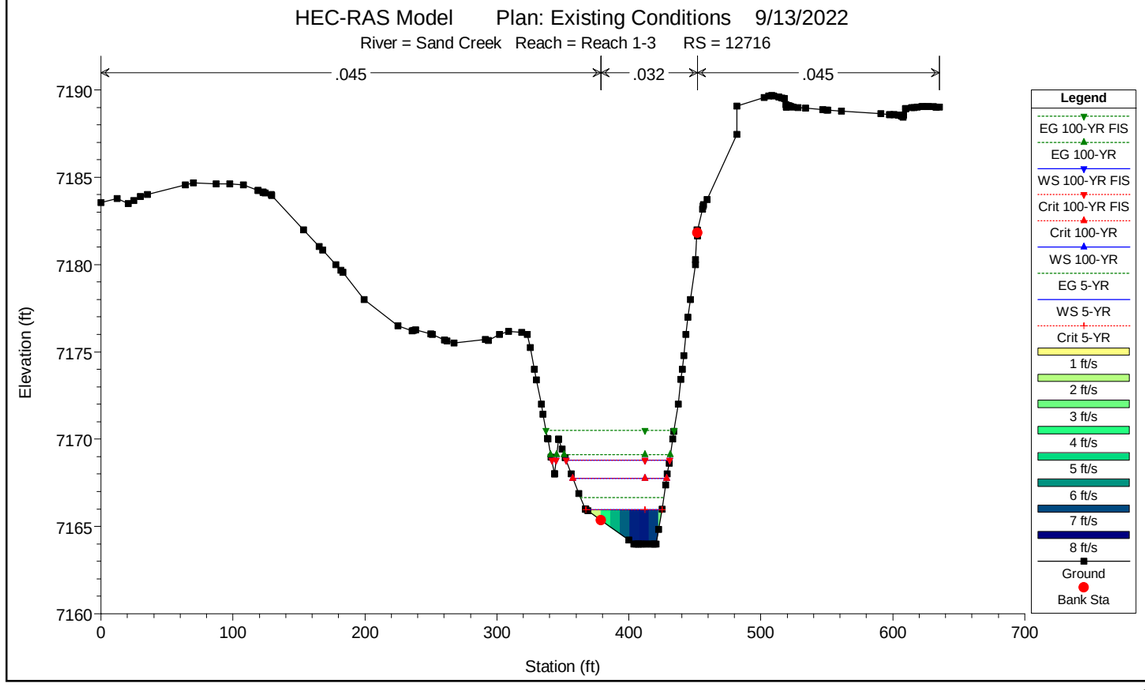

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 13060
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

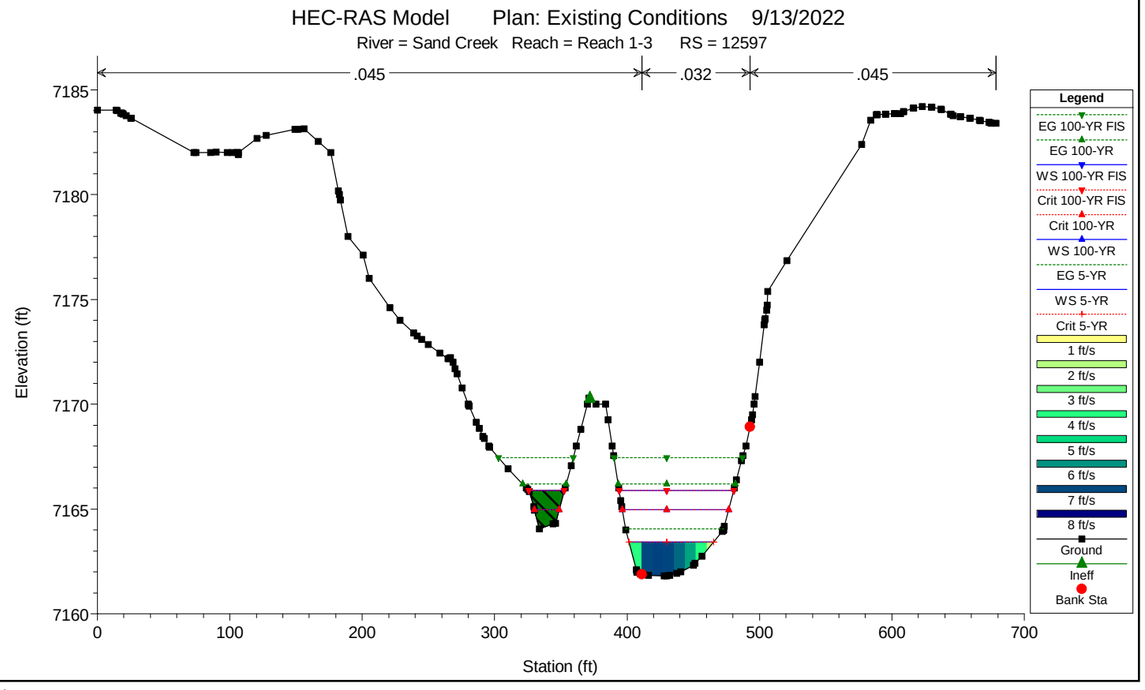

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 13025
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

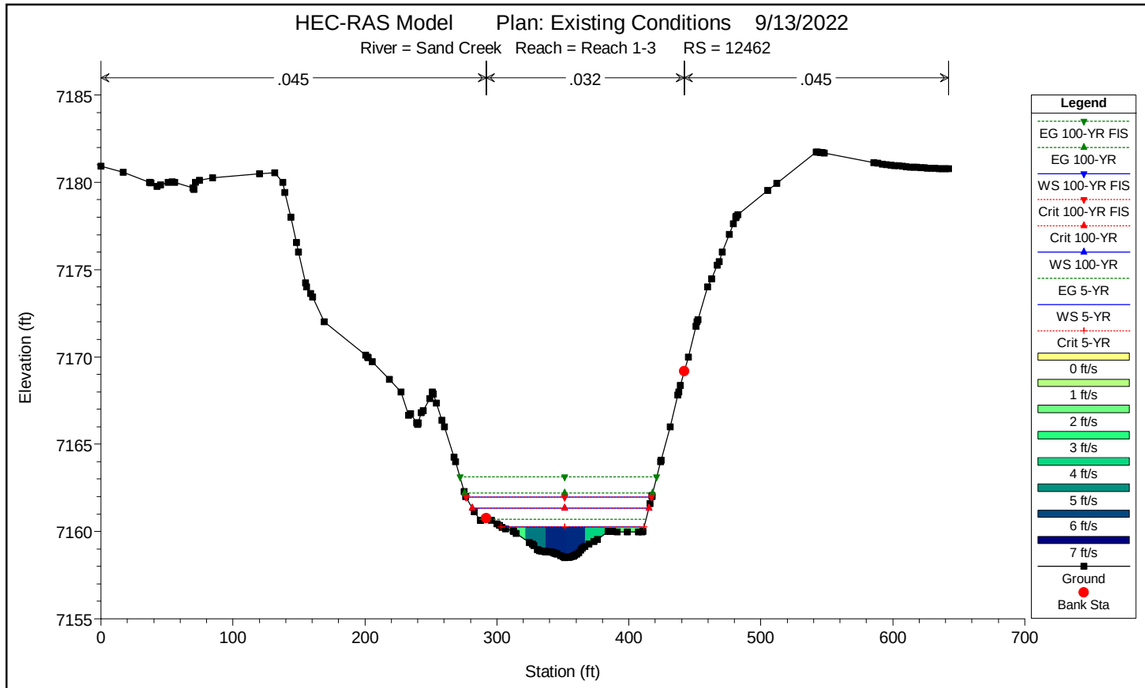

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12980 Section DP
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

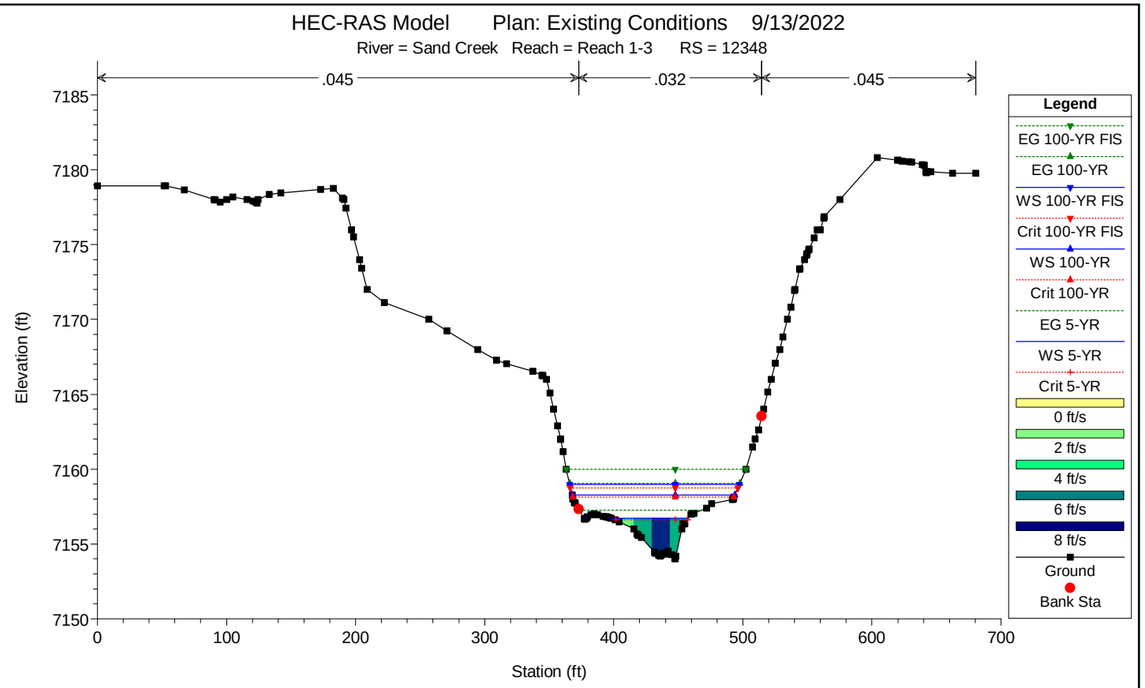

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12866
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

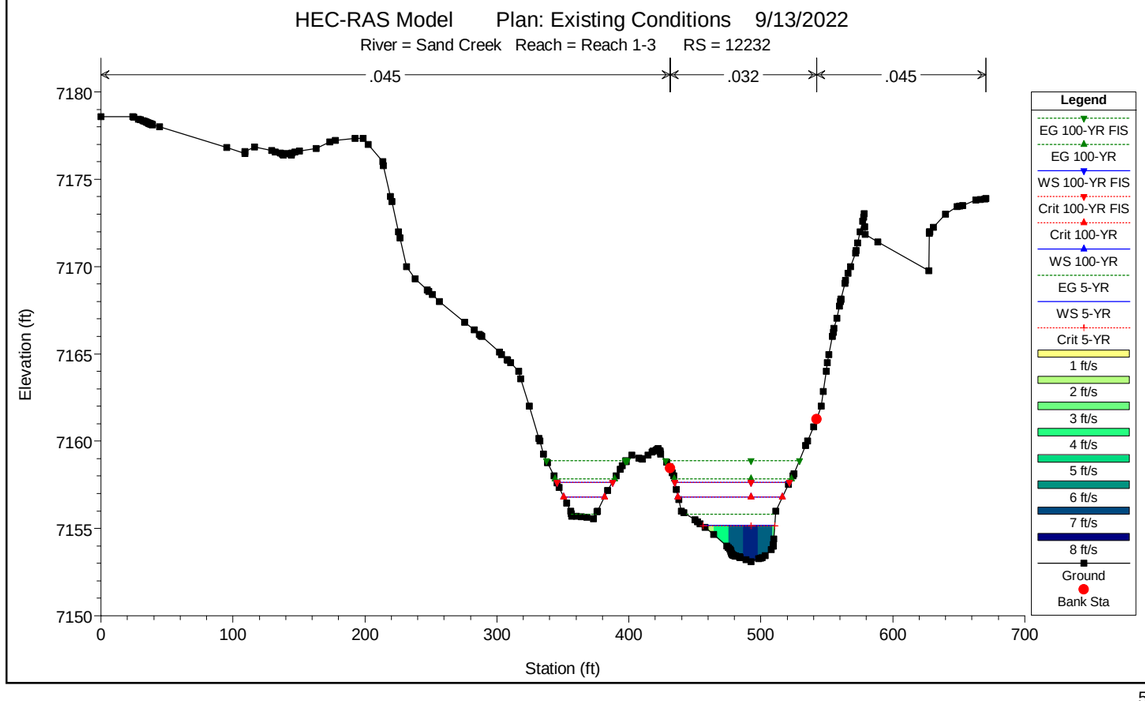

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12813
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

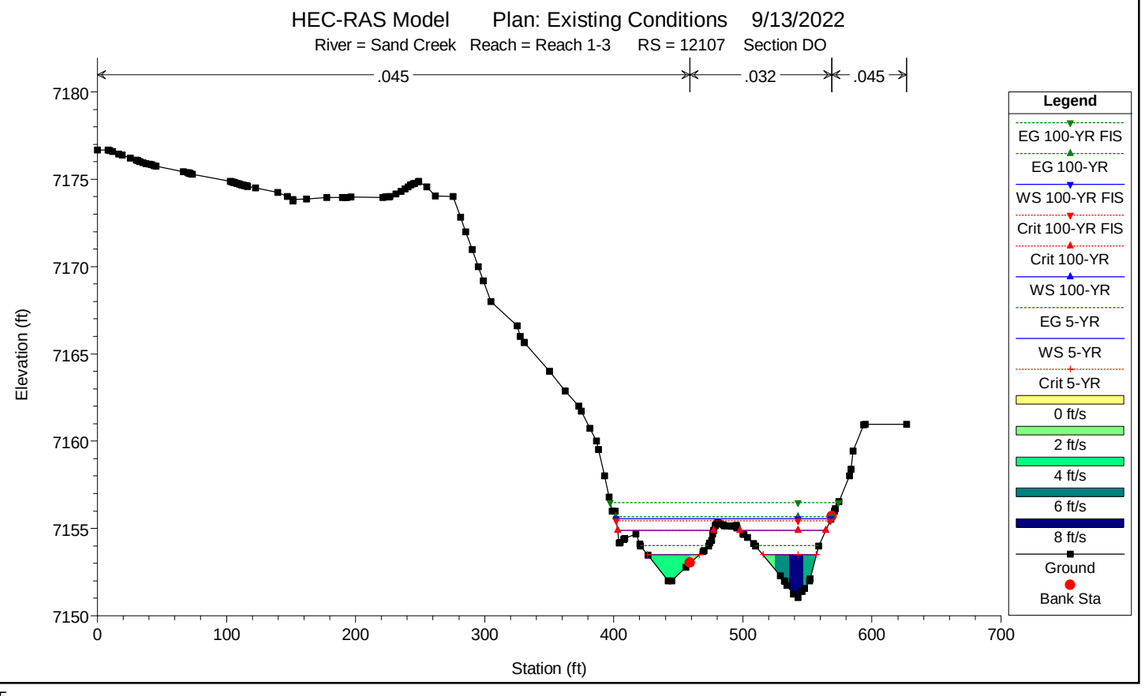

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12716
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

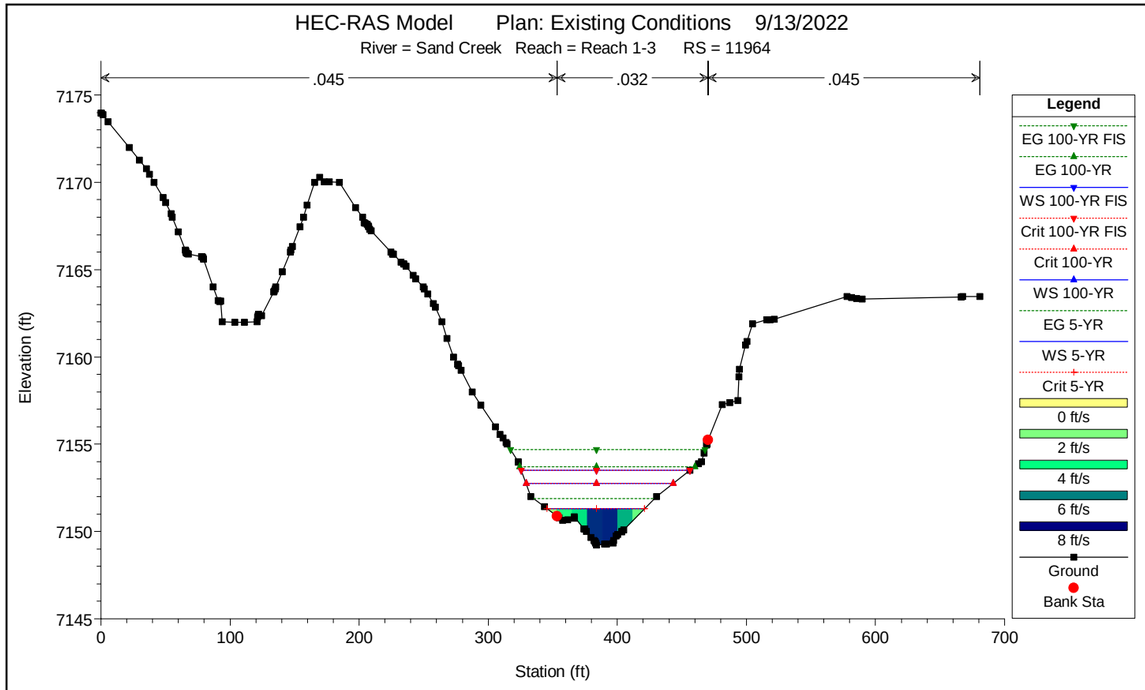

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12597
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta

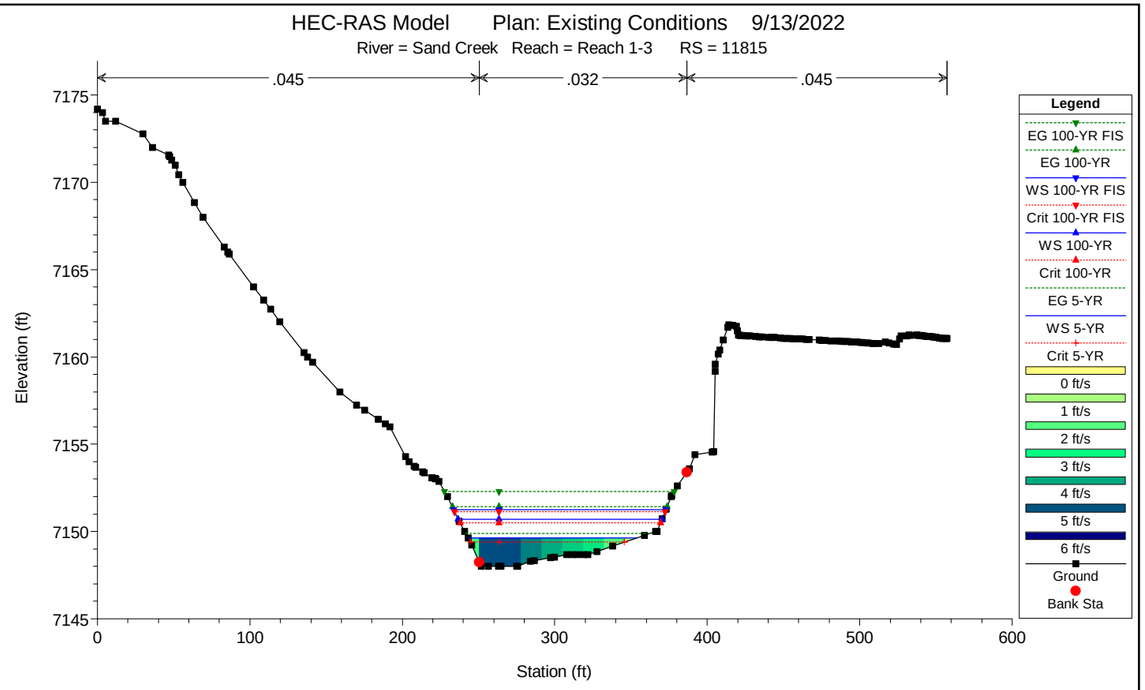

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12462
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

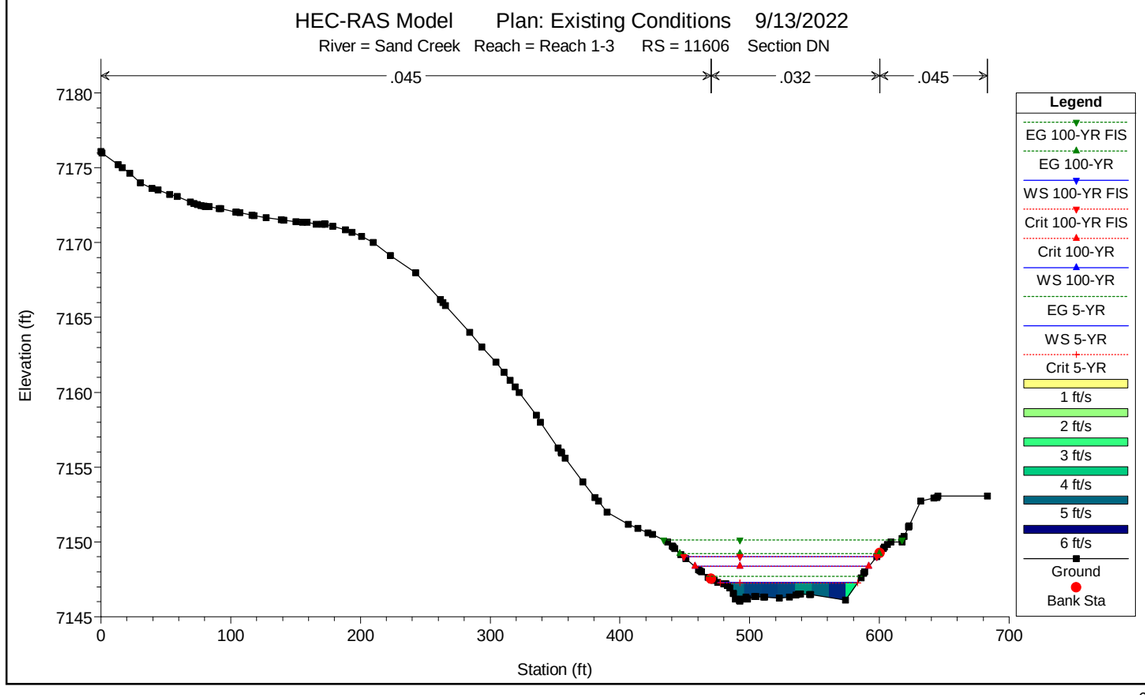

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12348
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

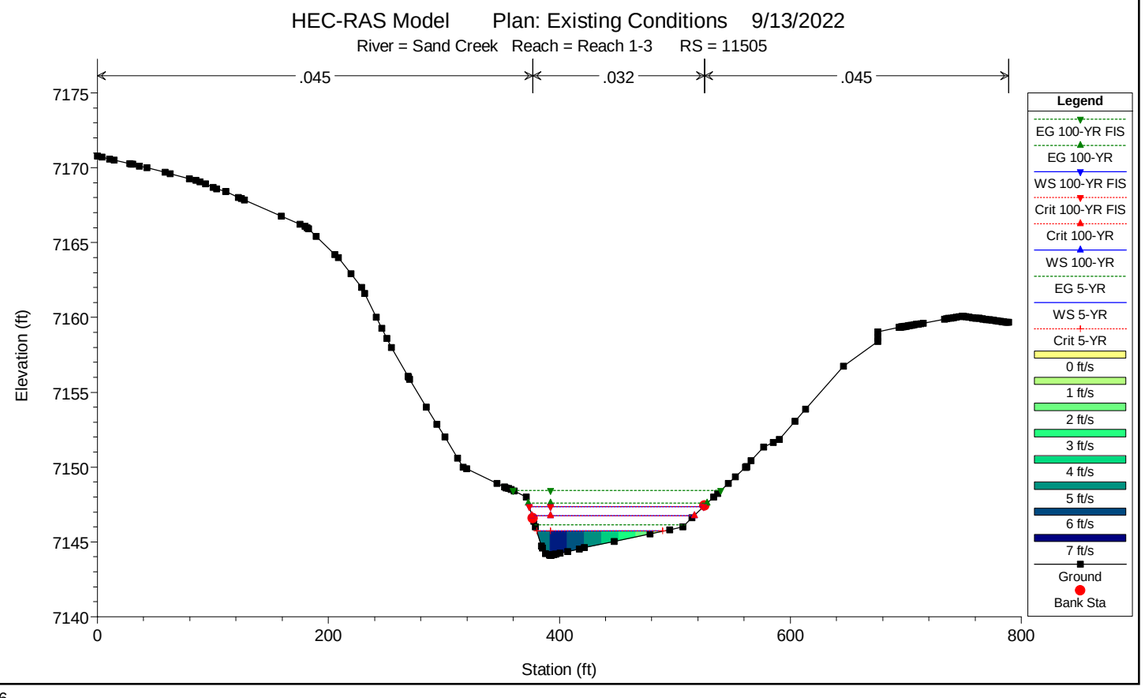

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12232
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

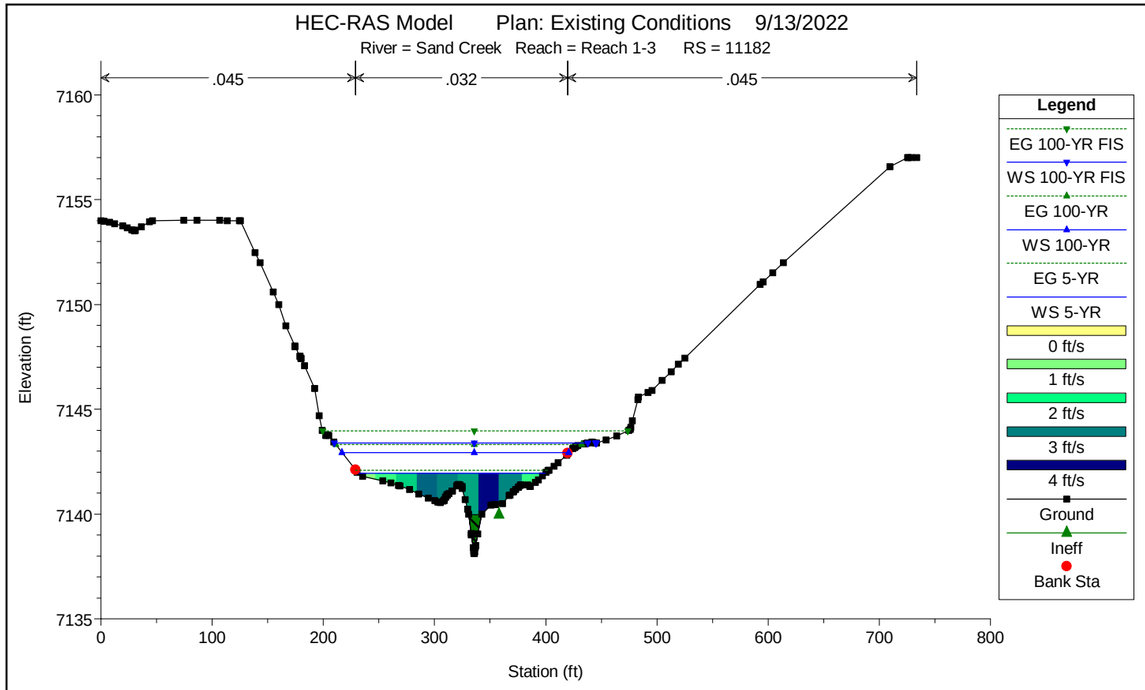

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 12107 Section DO
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

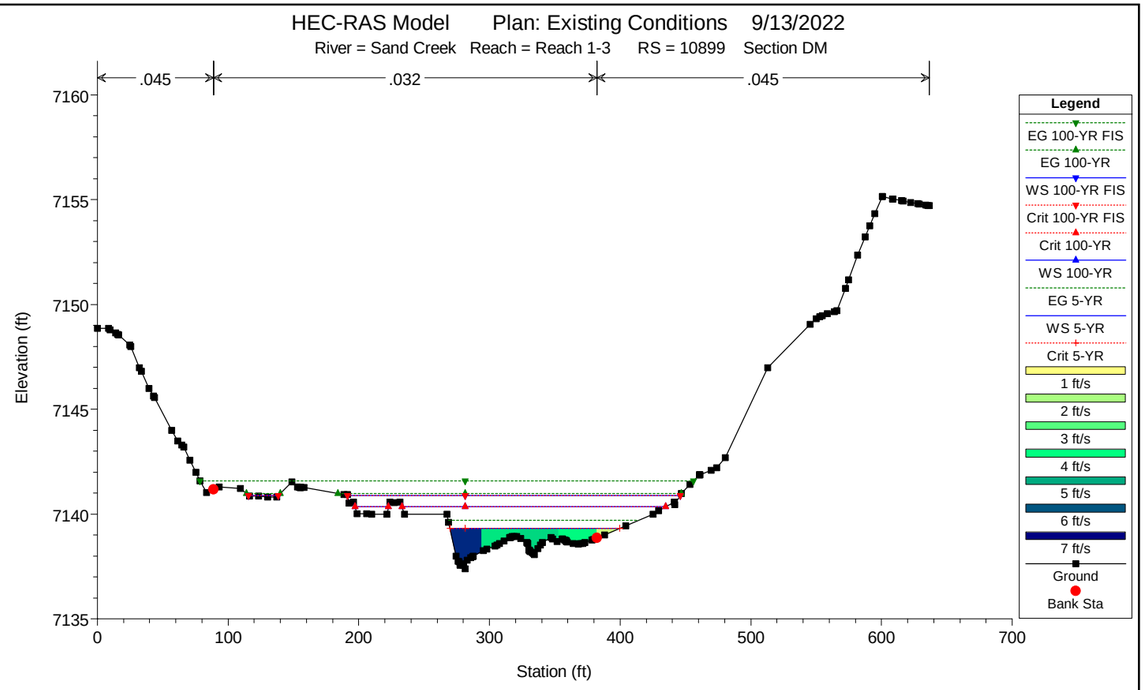

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 11964
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

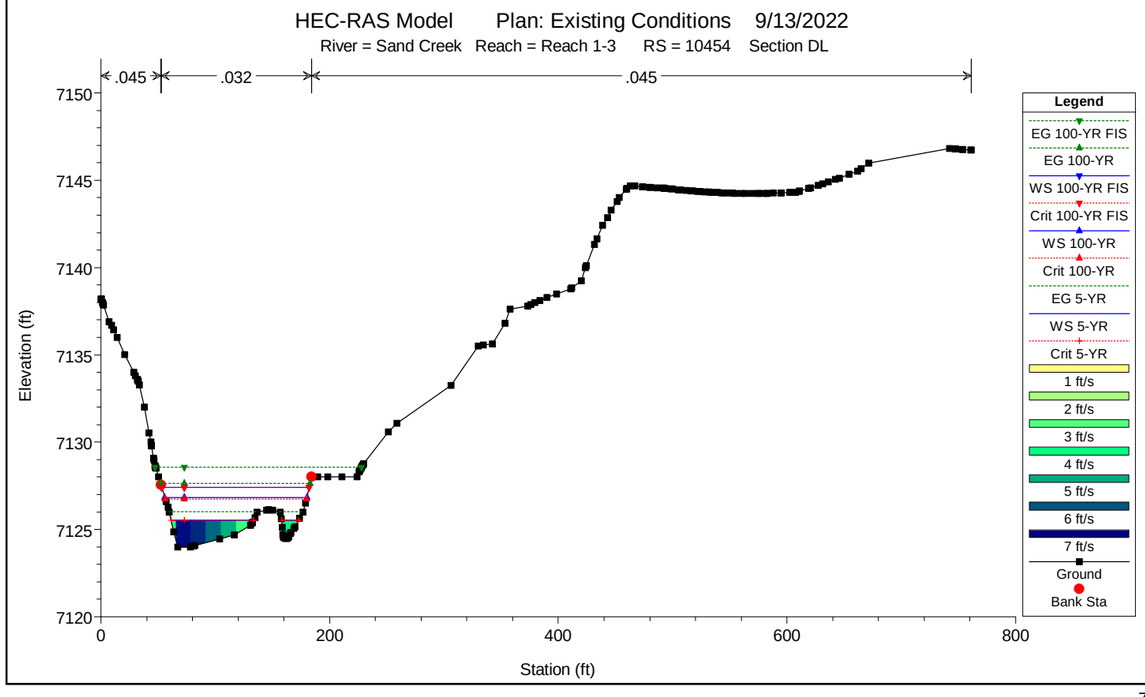

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 11815
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

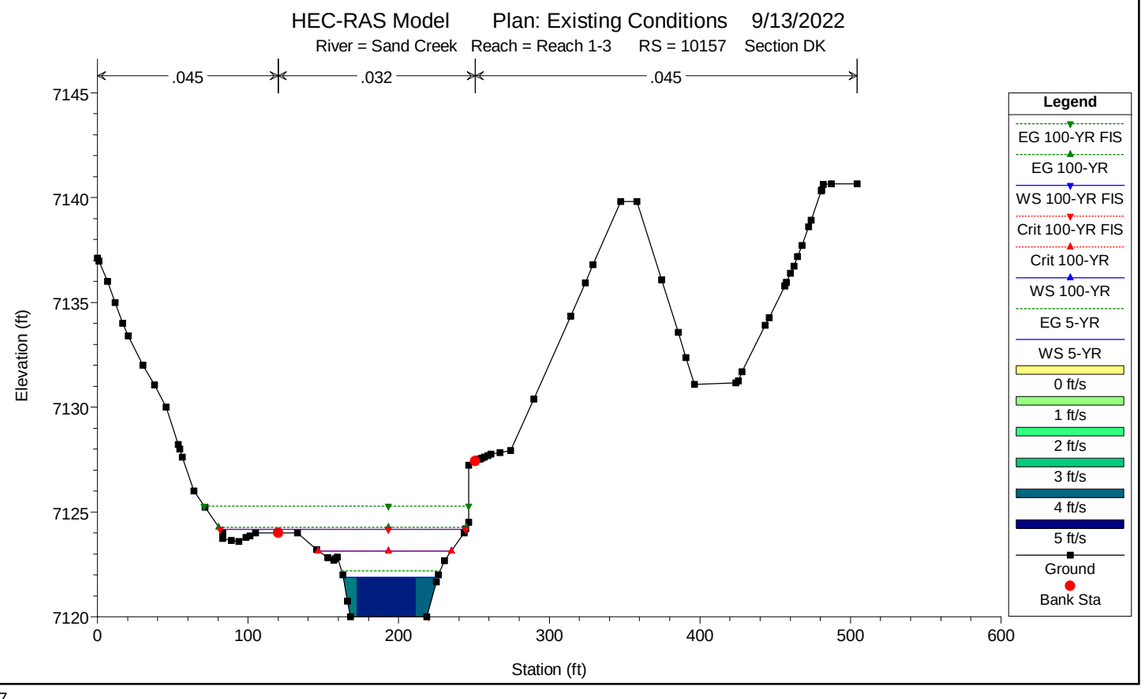

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 11606 Section DN
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

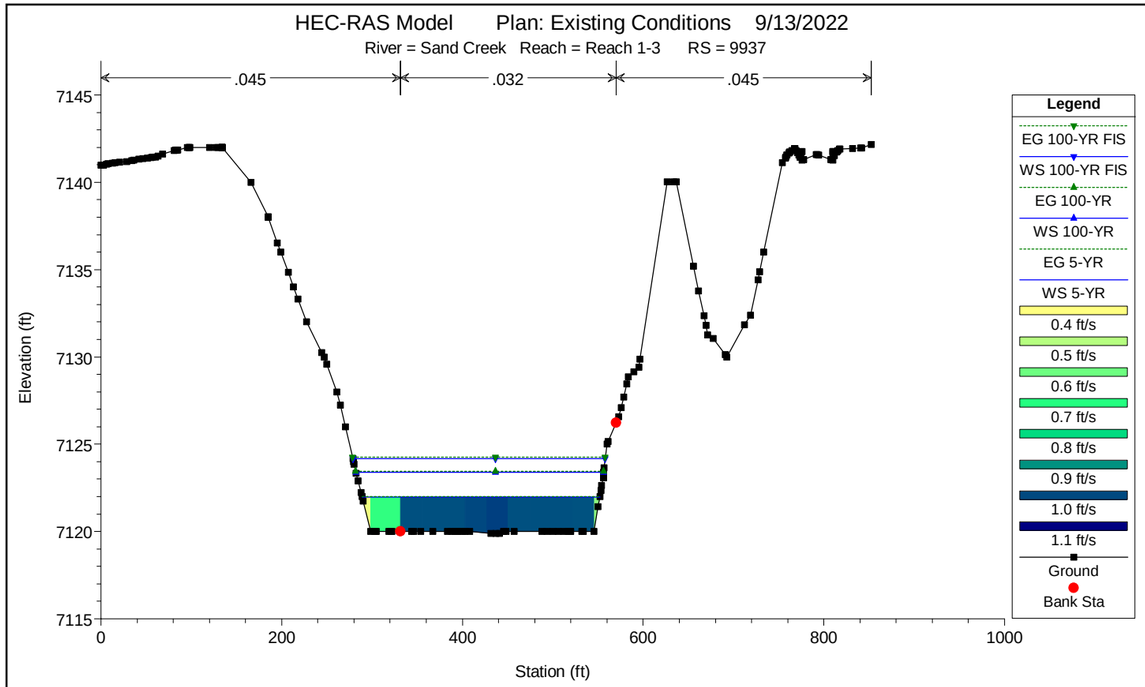

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 11505
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

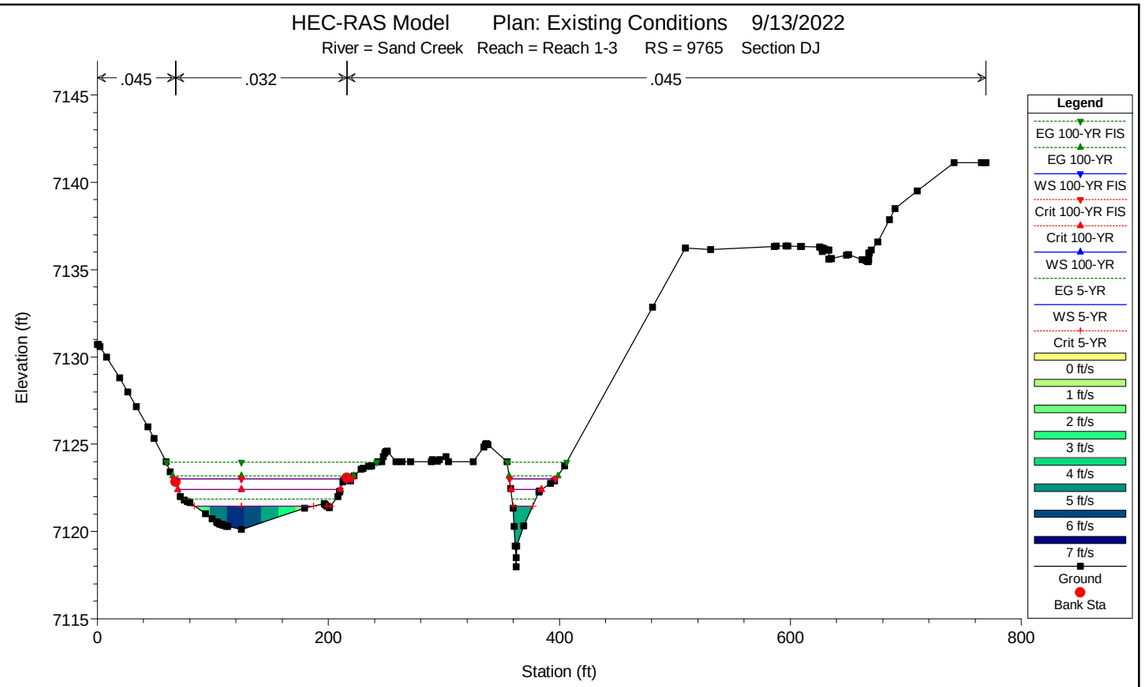

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 11182
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

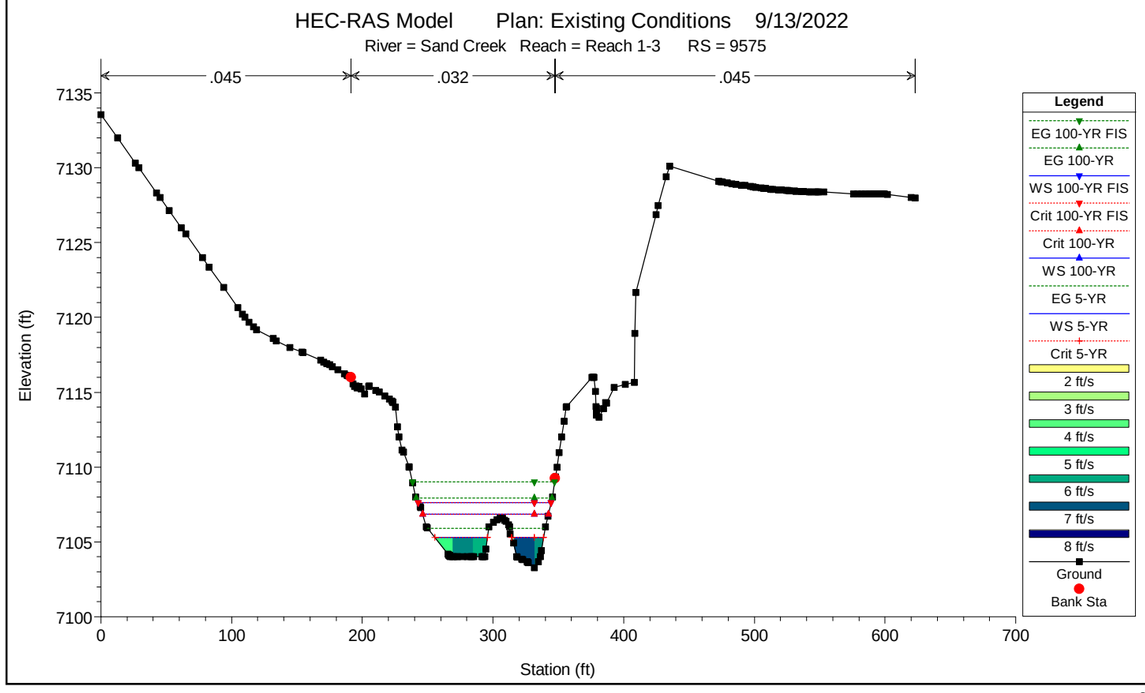

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 10899 Section DM
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

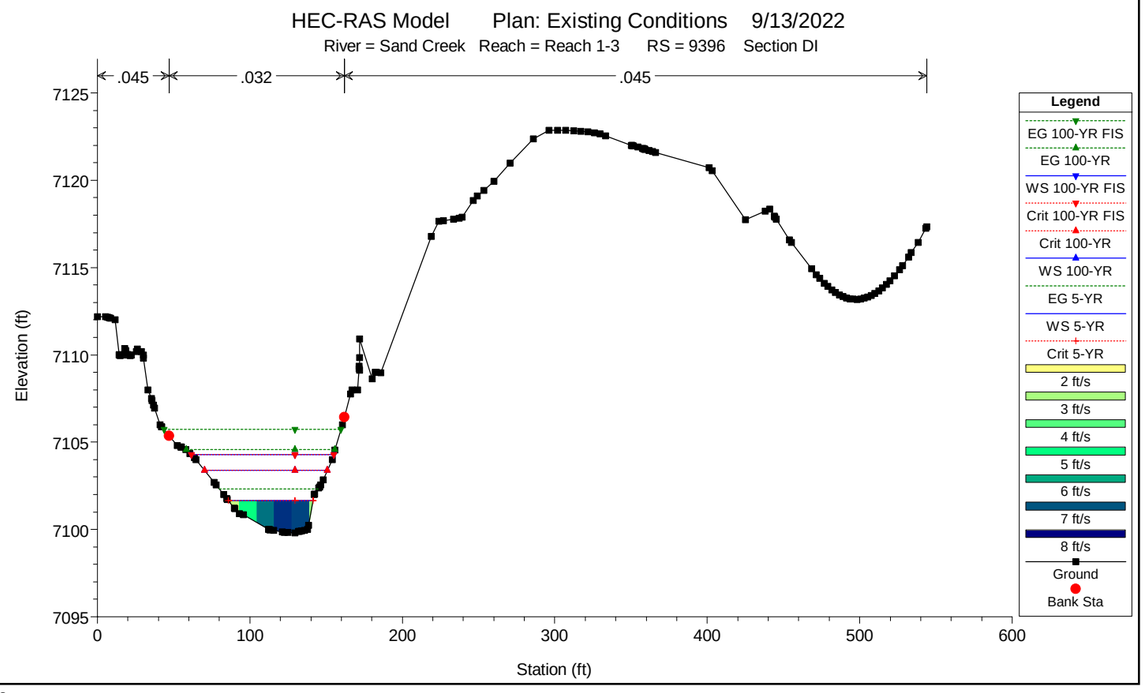

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 10454 Section DL
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

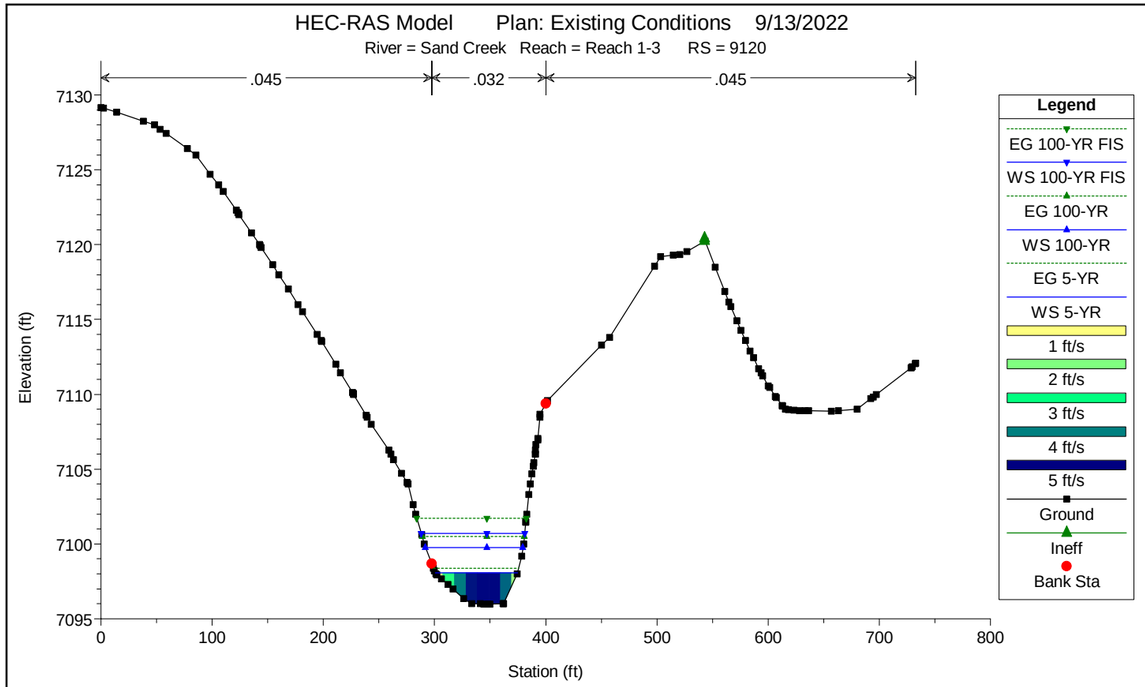

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 10157 Section DK
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

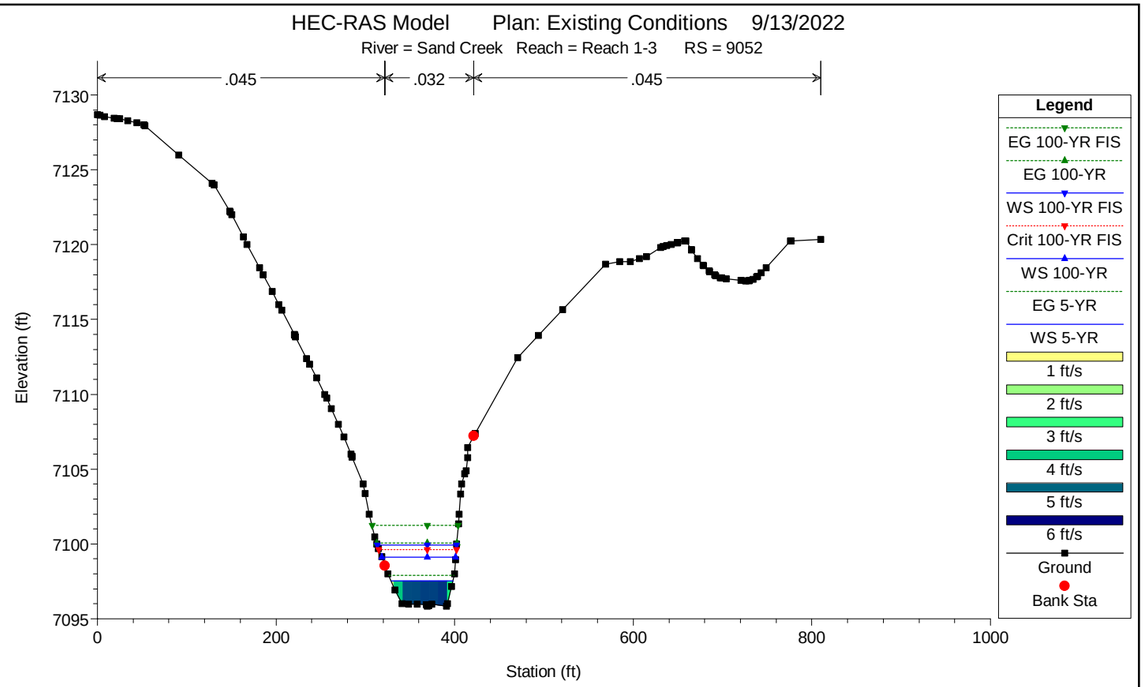

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 9937
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.4 ft/s
0.5 ft/s
0.6 ft/s
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
Ground
Bank Sta

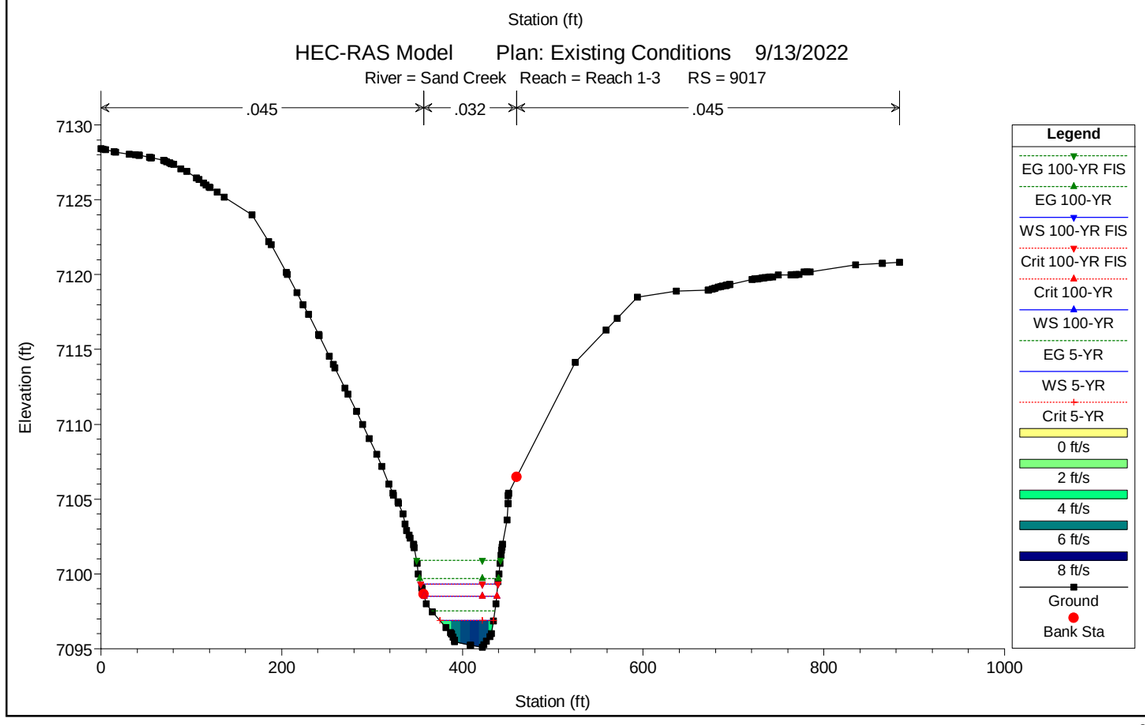

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 9765 Section DJ
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

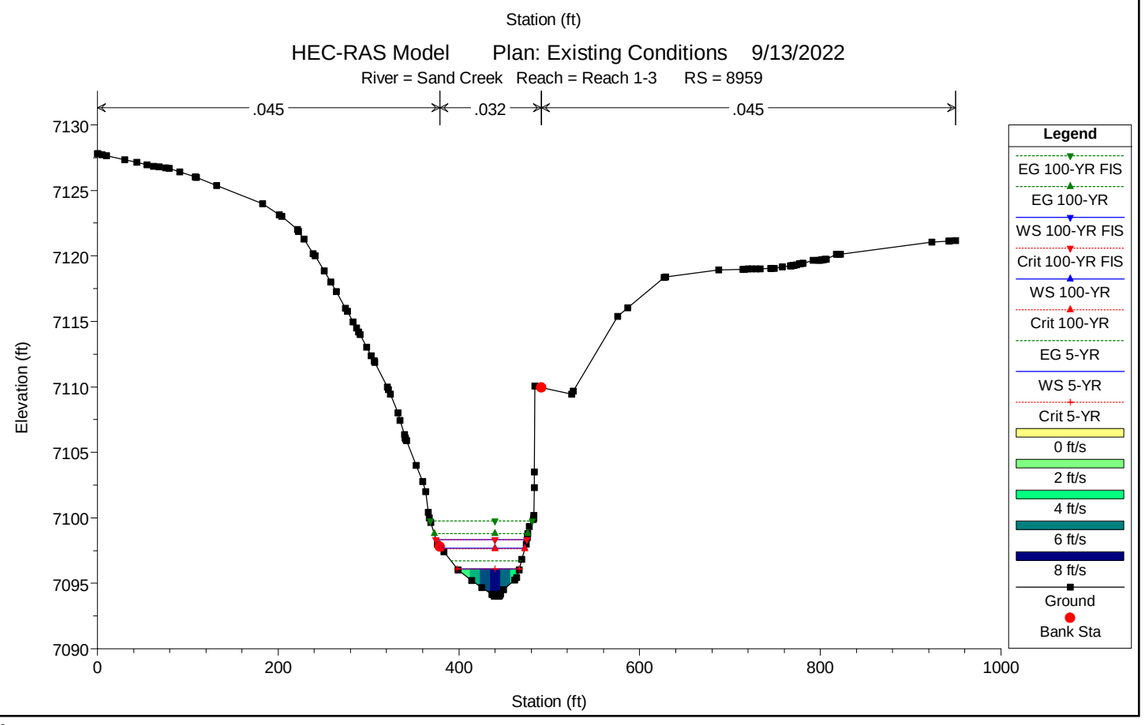

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 9575
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

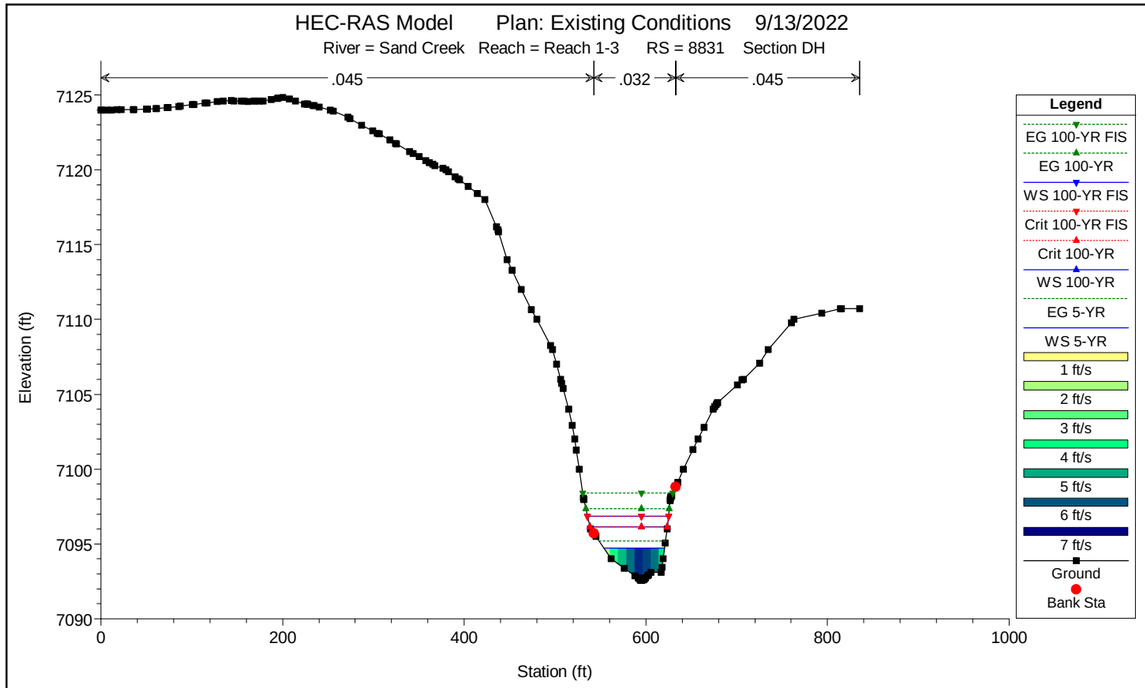

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 9396 Section DI
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

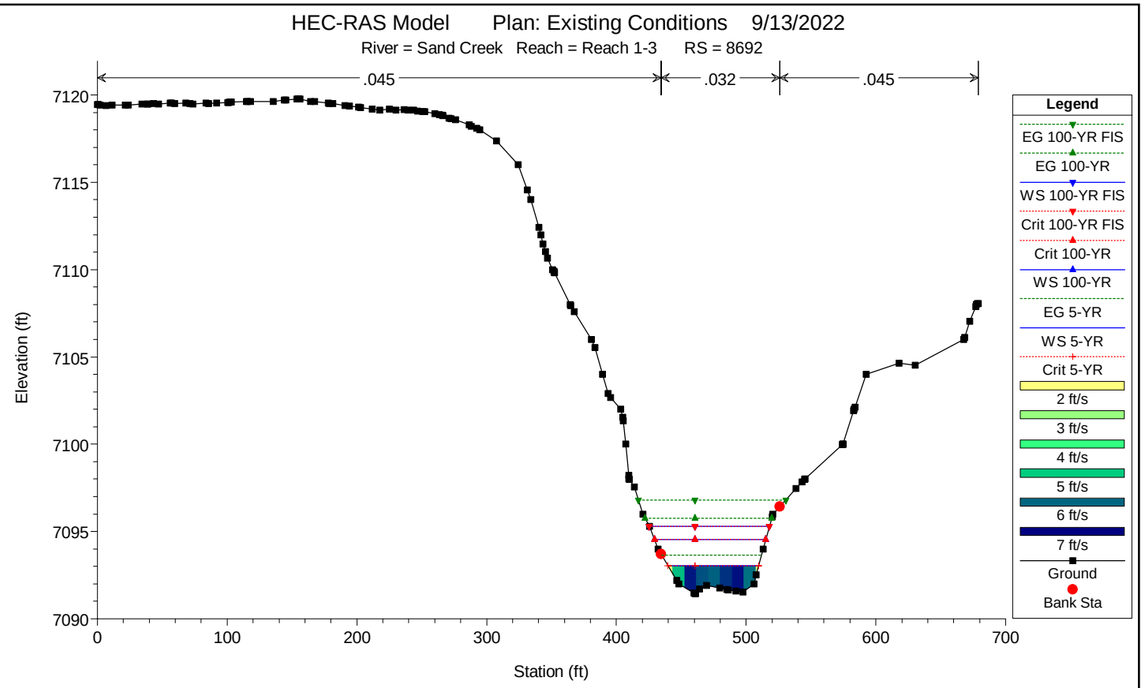

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 9120
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

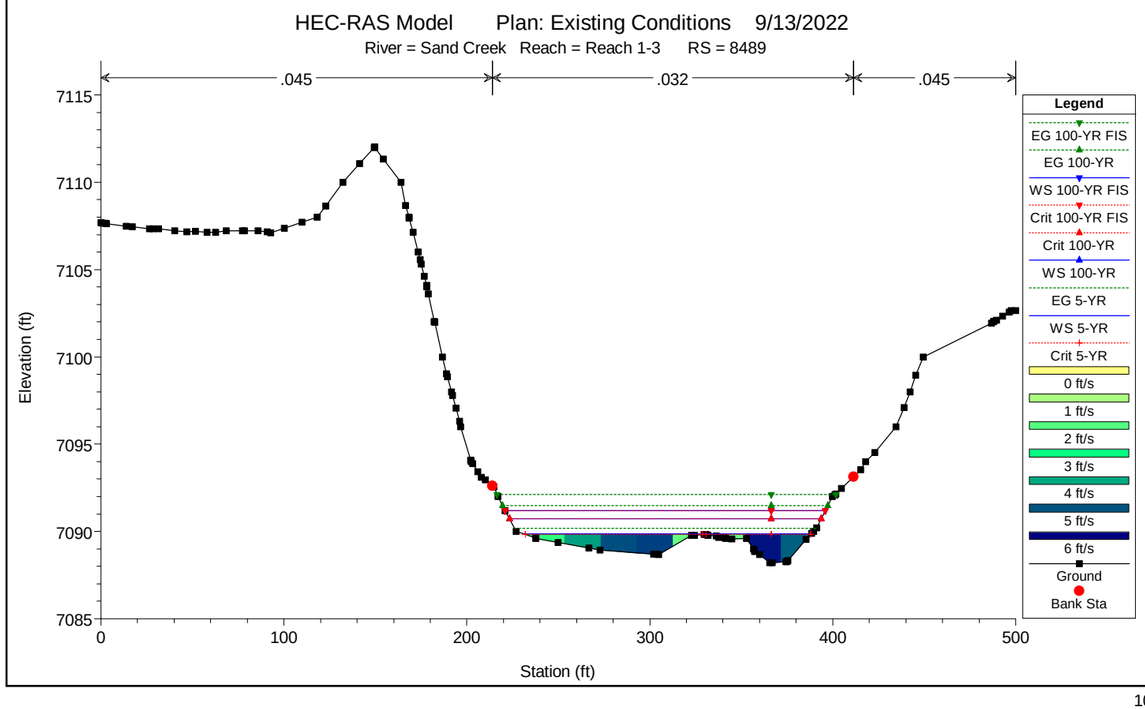

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 9052
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

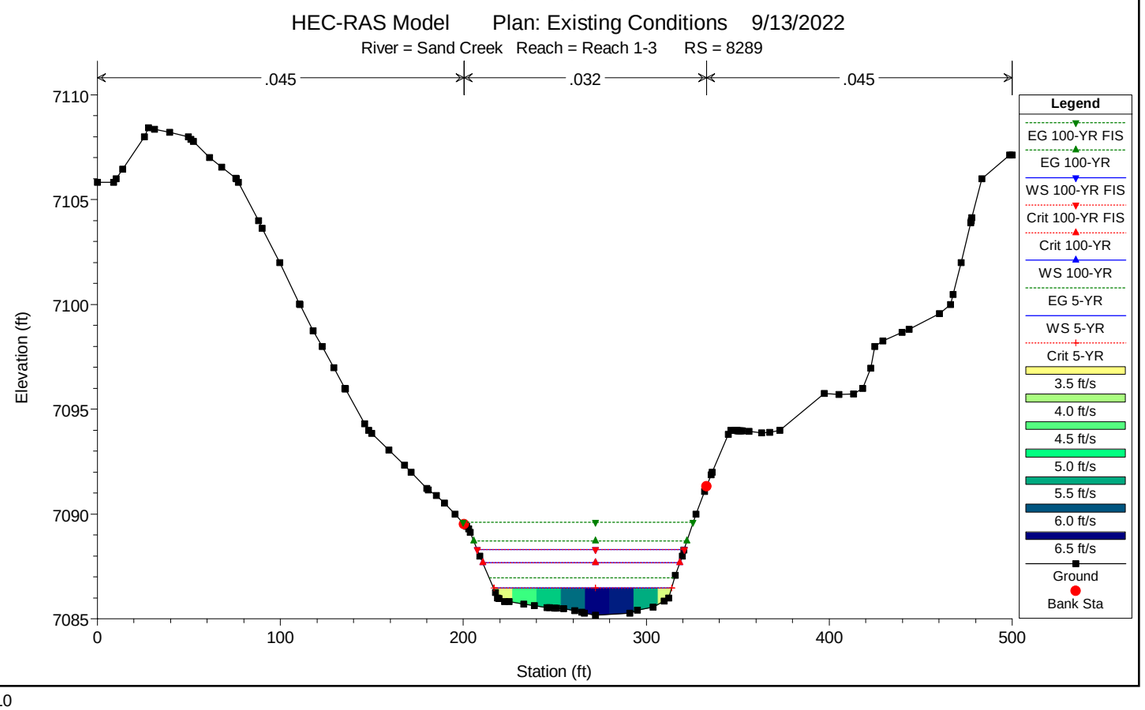

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 9017
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

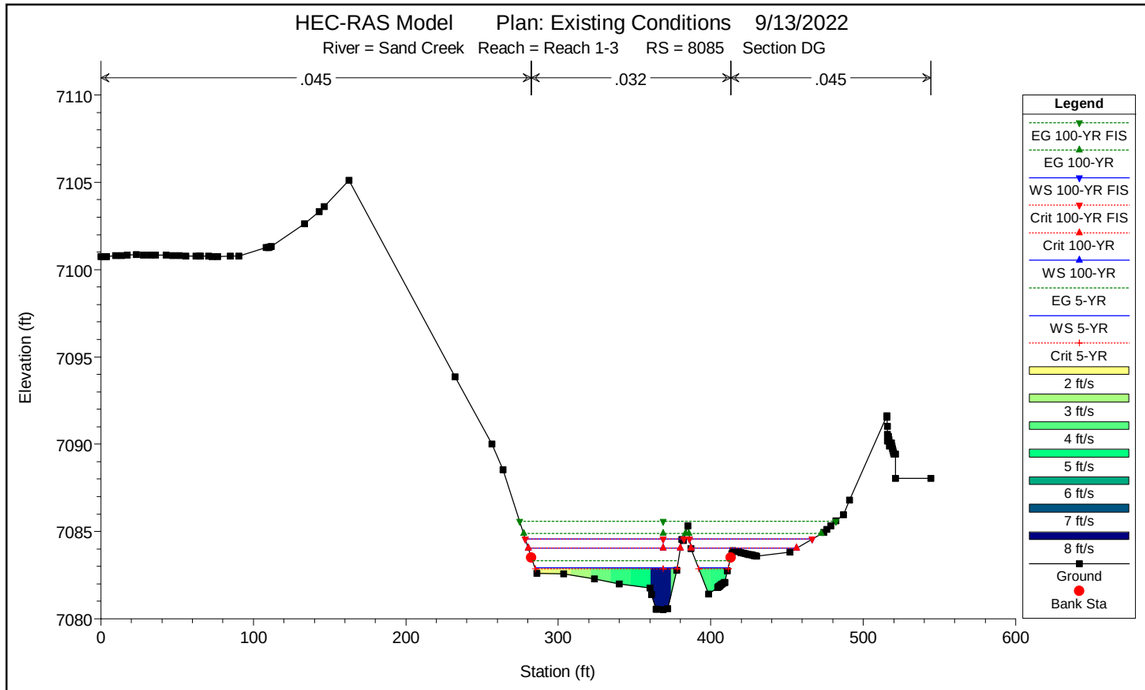

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 8959
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

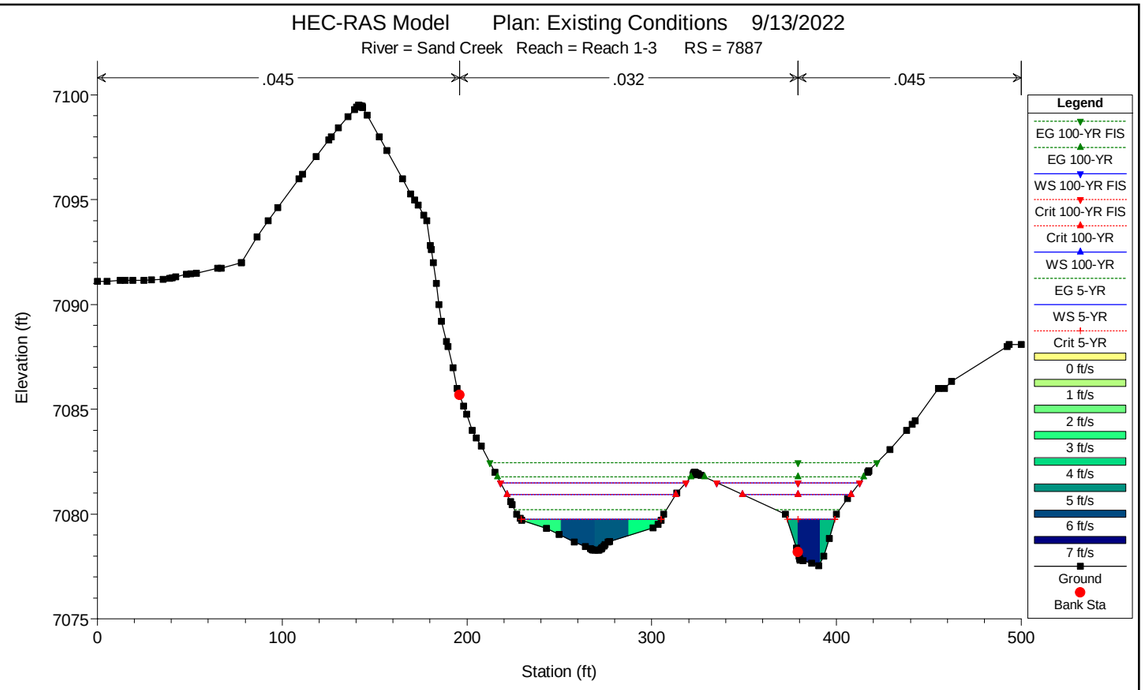

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 8831 Section DH
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

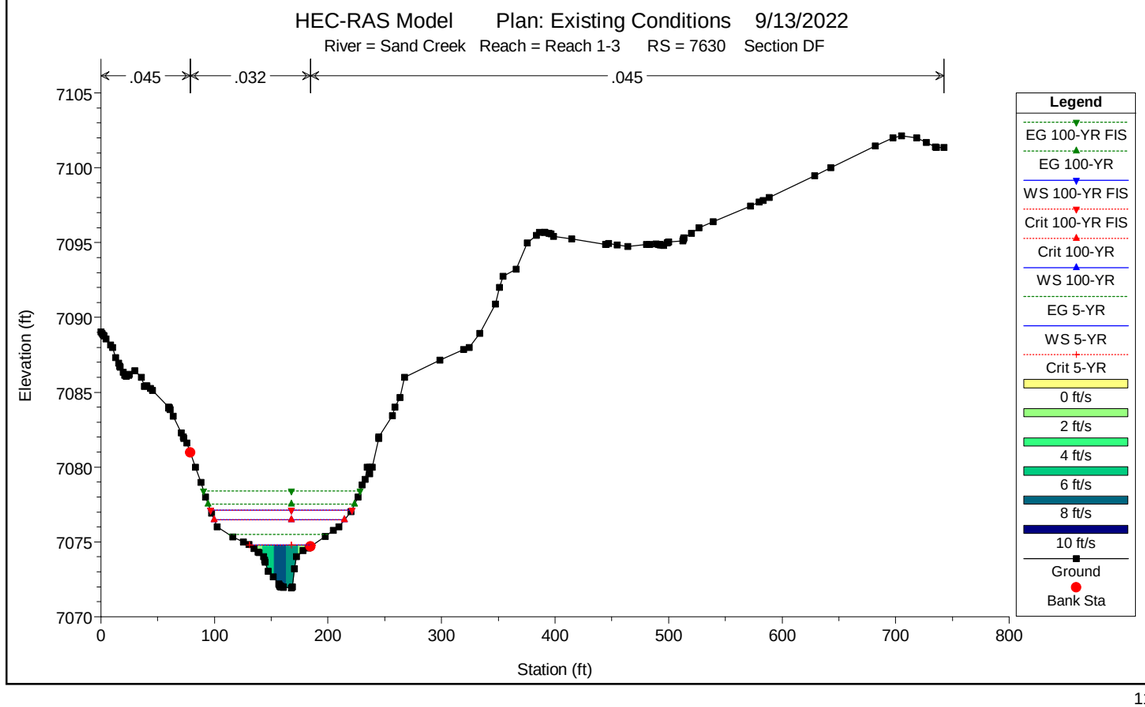

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 8692
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

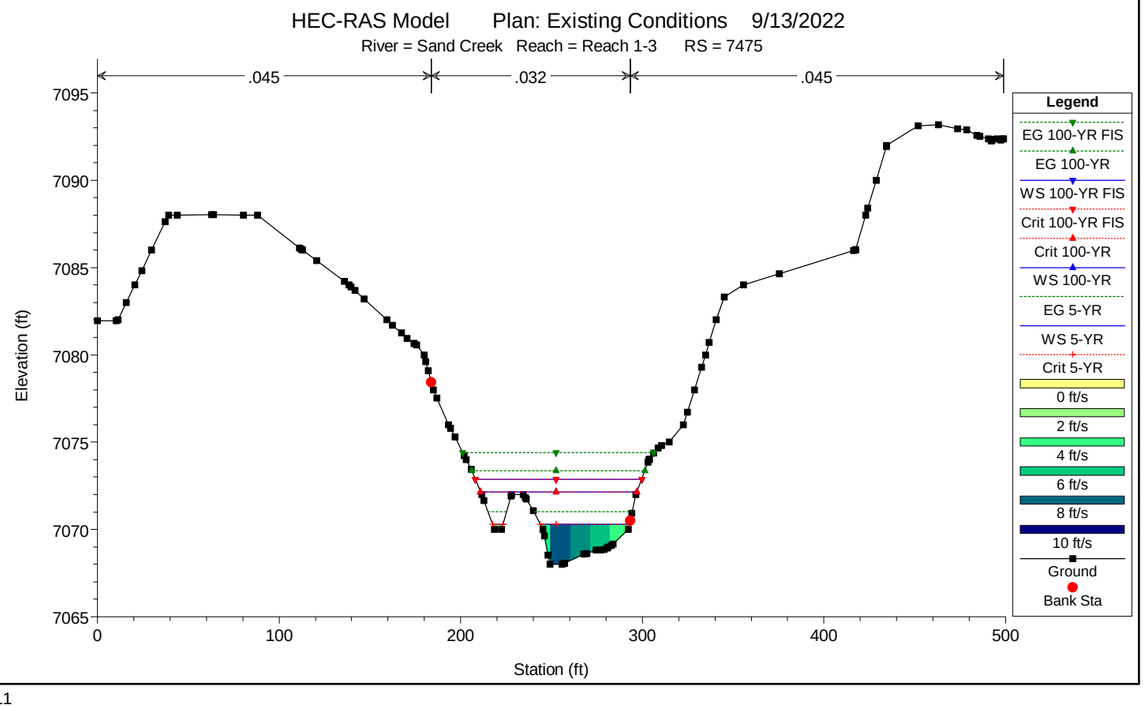

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 8489
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

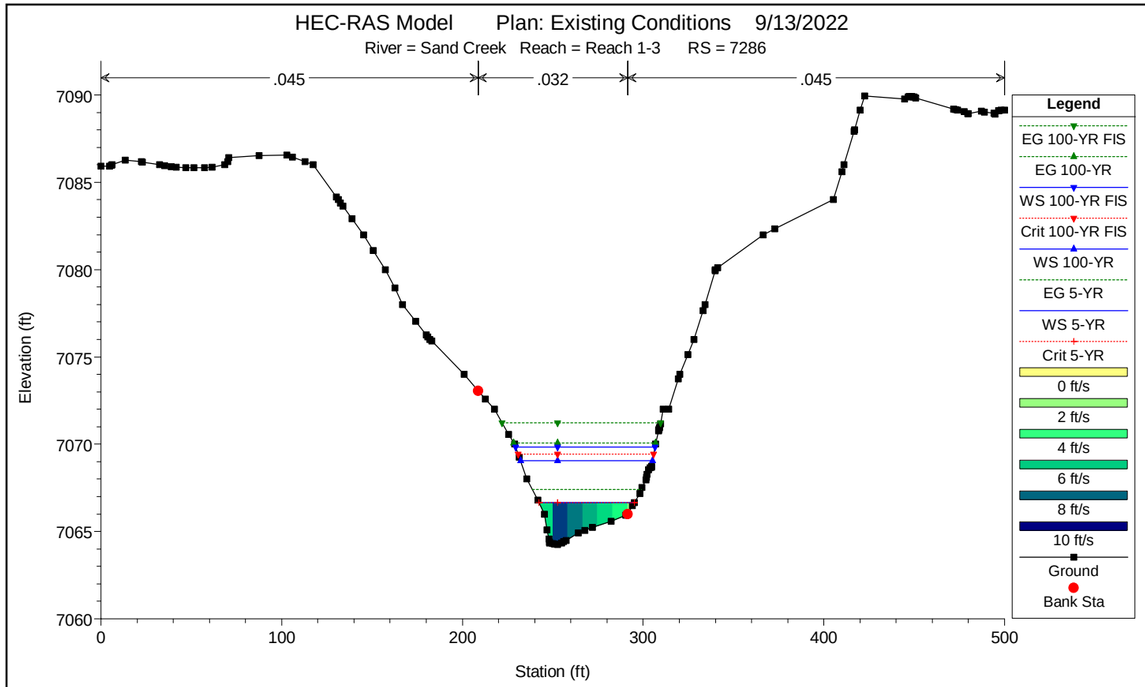

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 8289
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
6.5 ft/s
Ground
Bank Sta

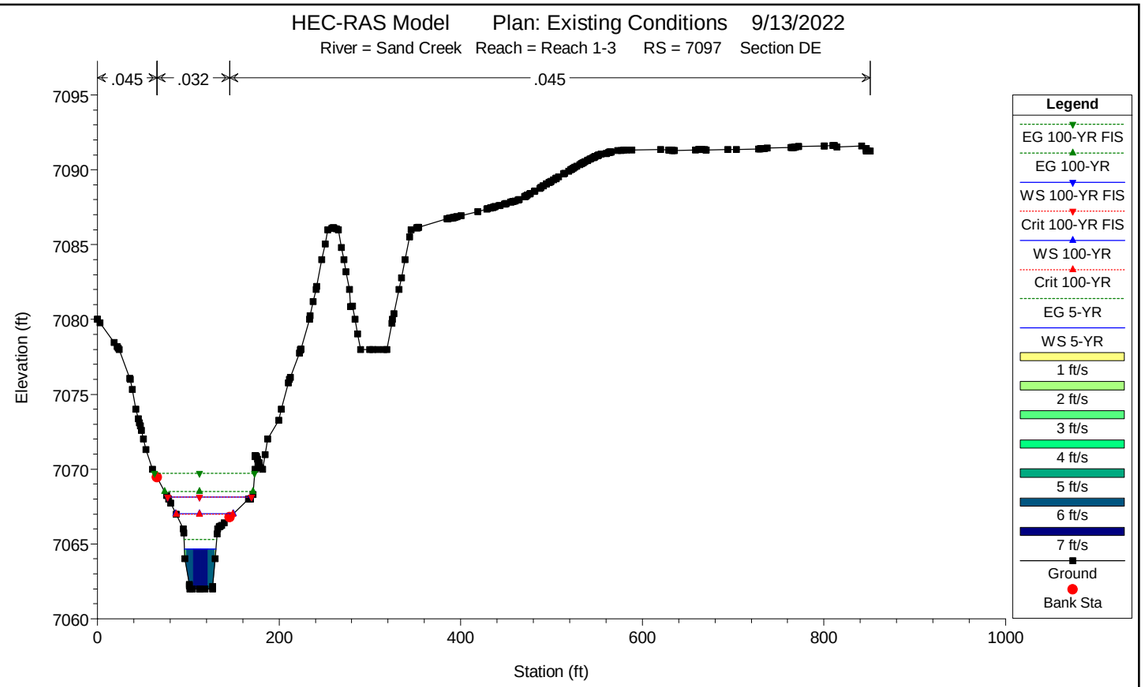

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 8085 Section DG
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

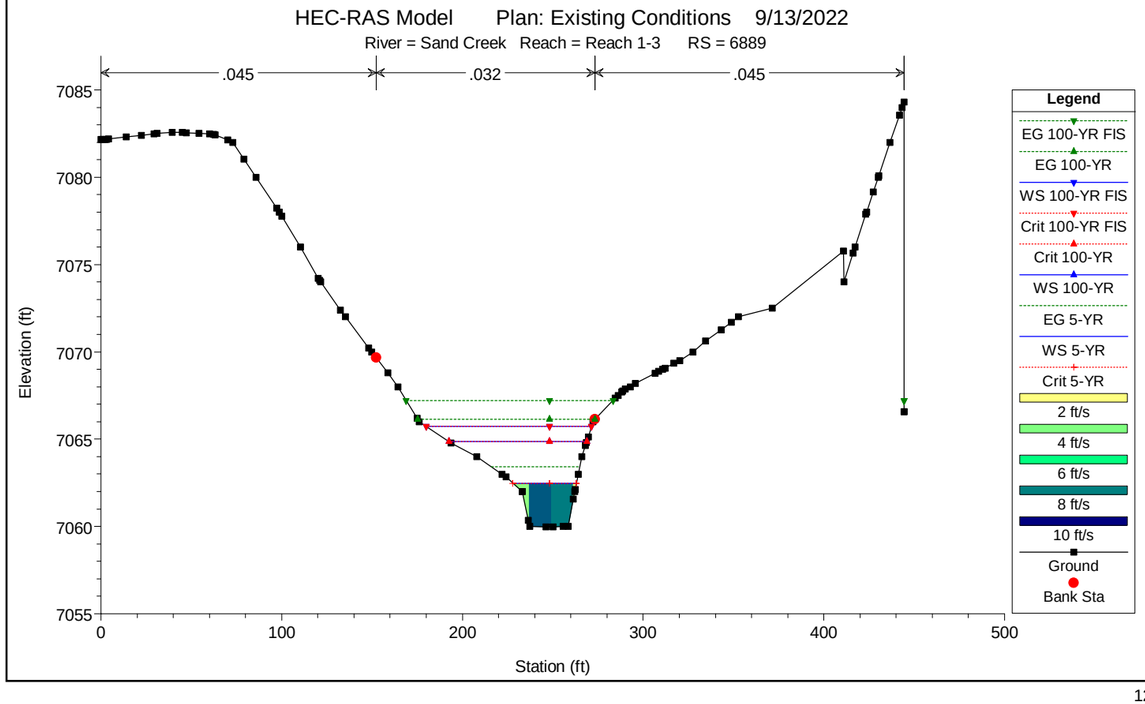

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 7887
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

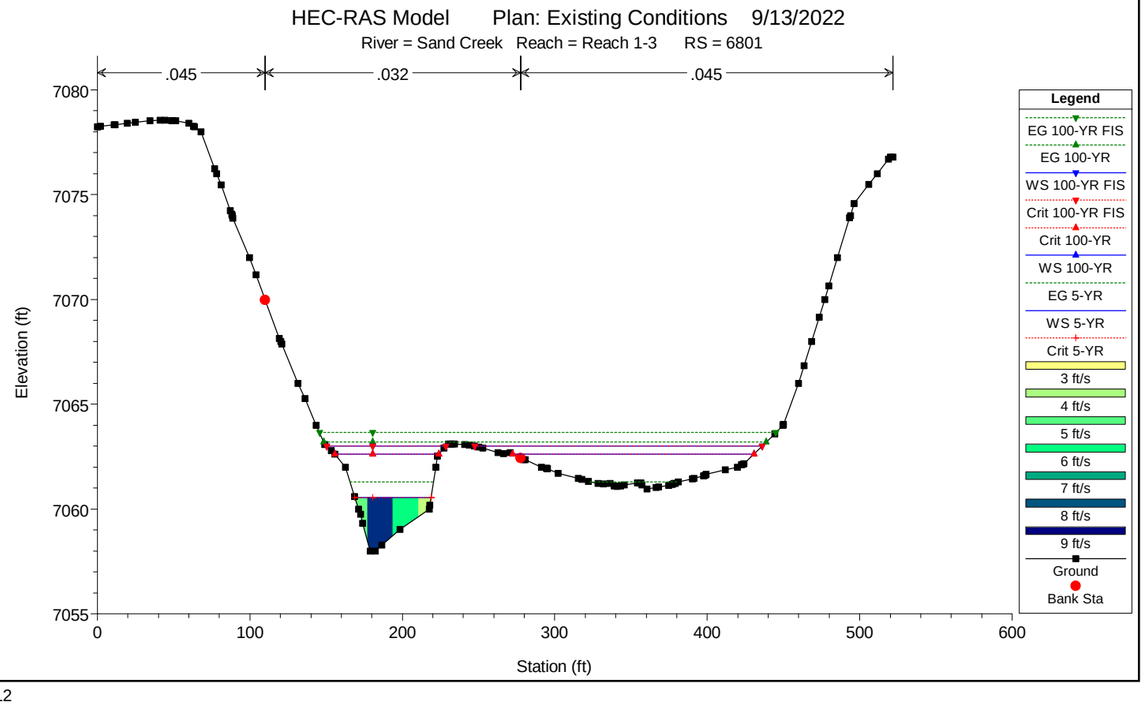

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 7630 Section DF
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

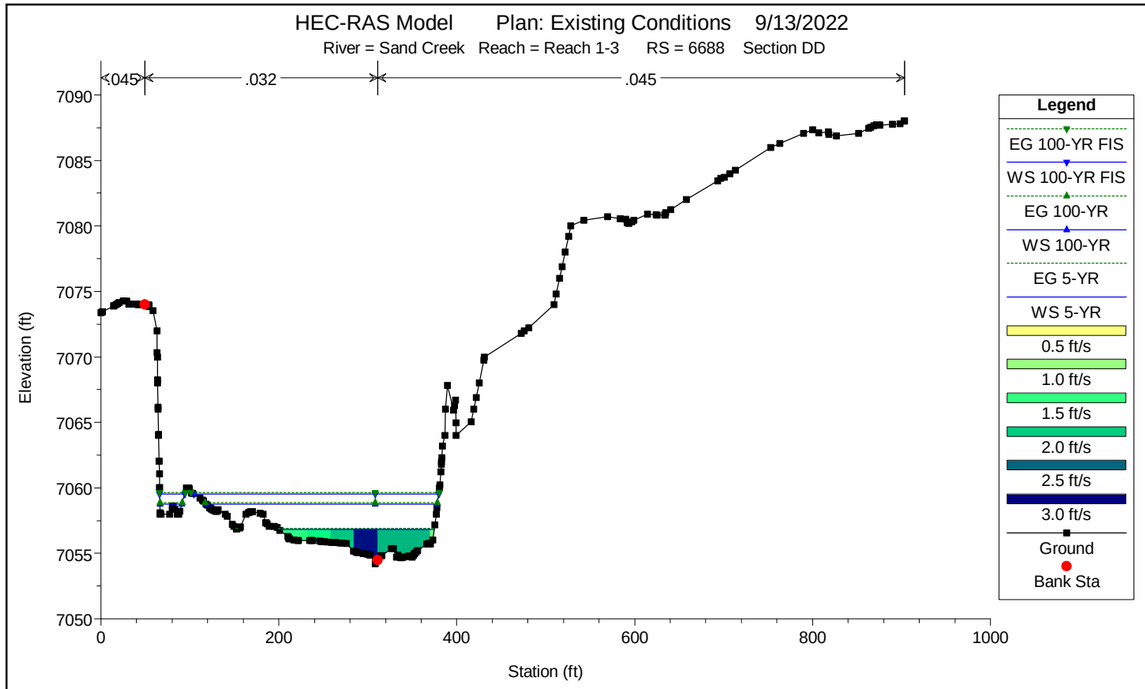

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 7475
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

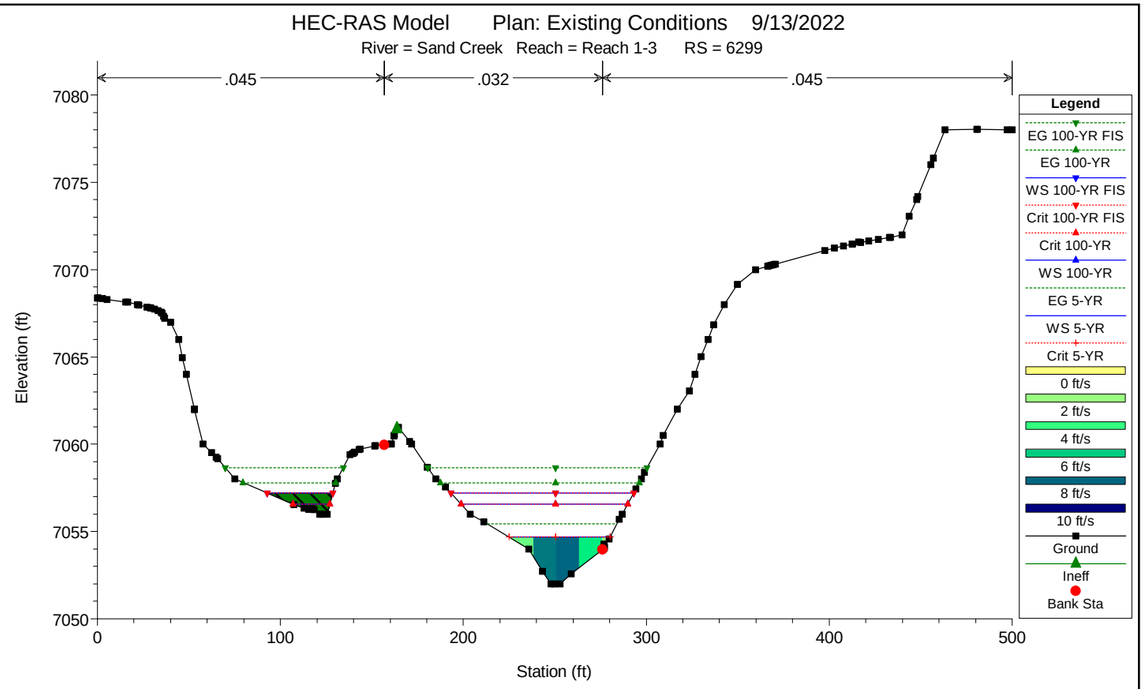

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 7286
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

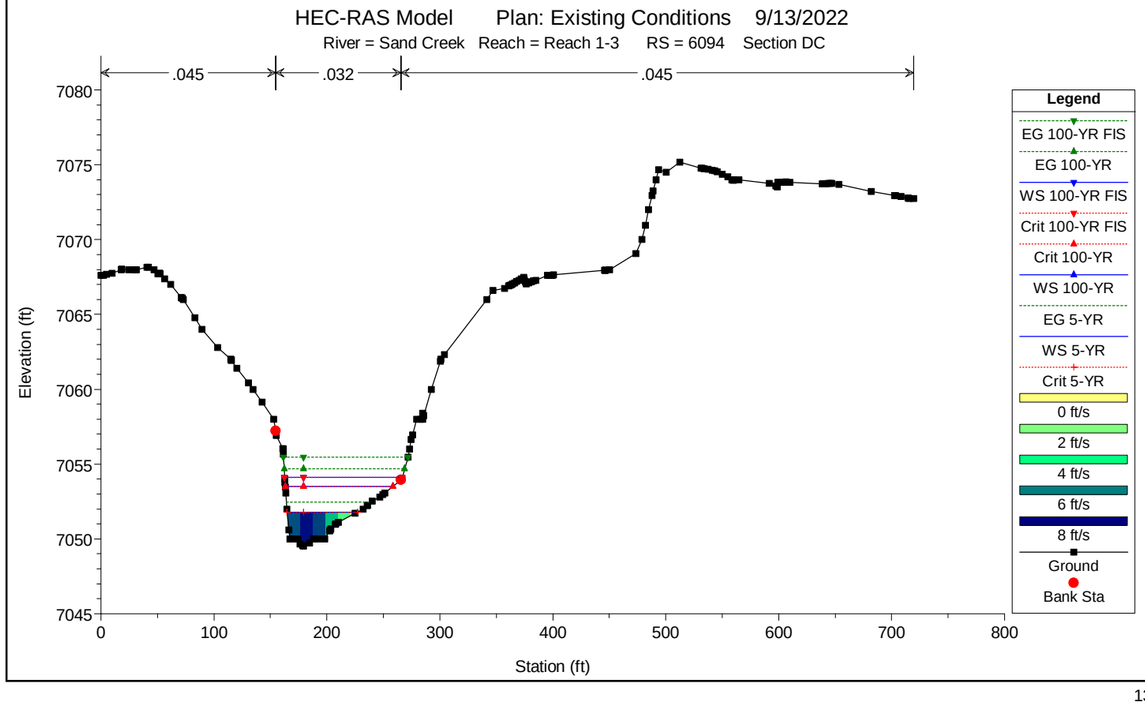

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 7097 Section DE
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

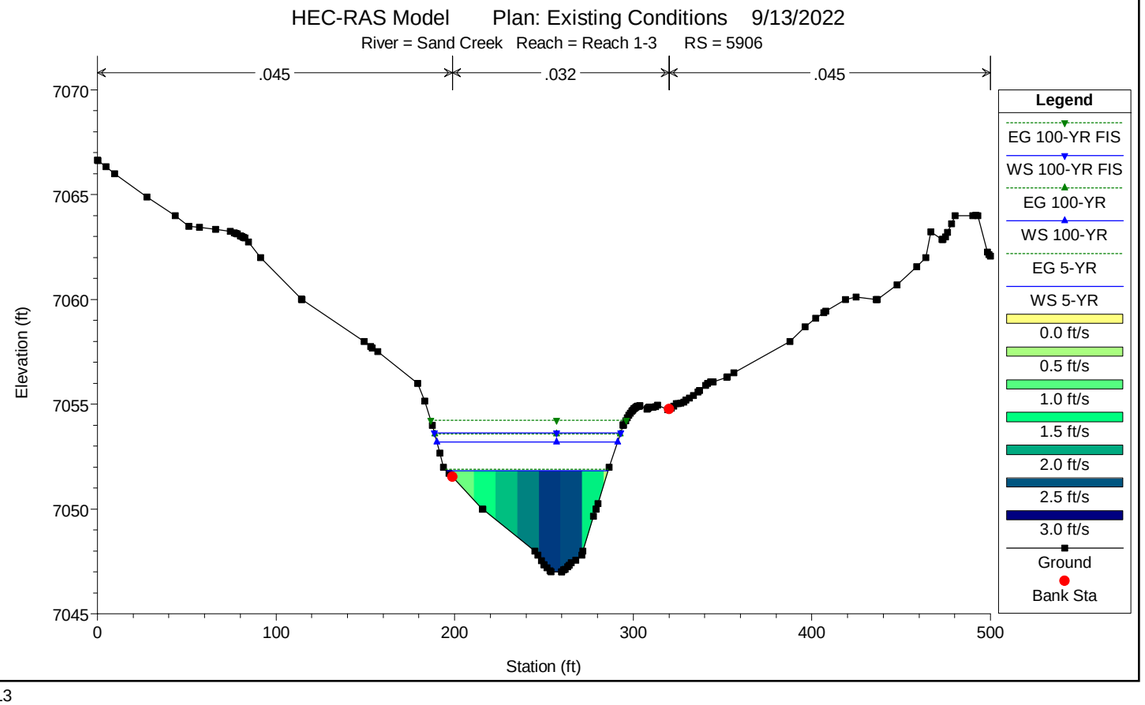

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 6889
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

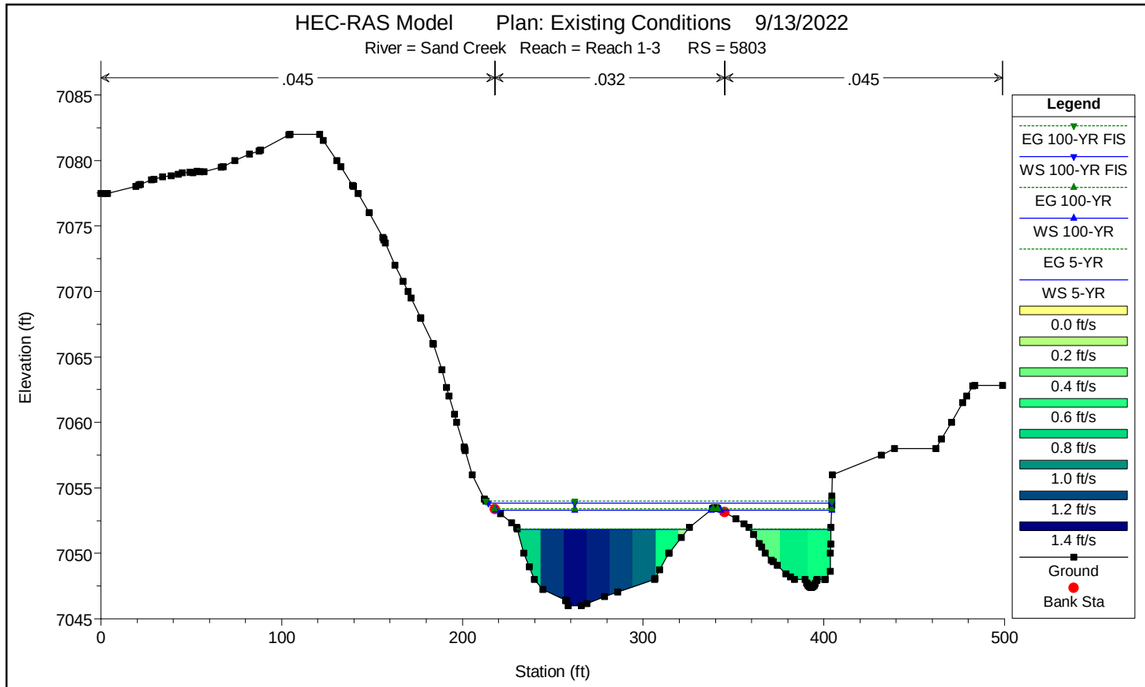

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 6801
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

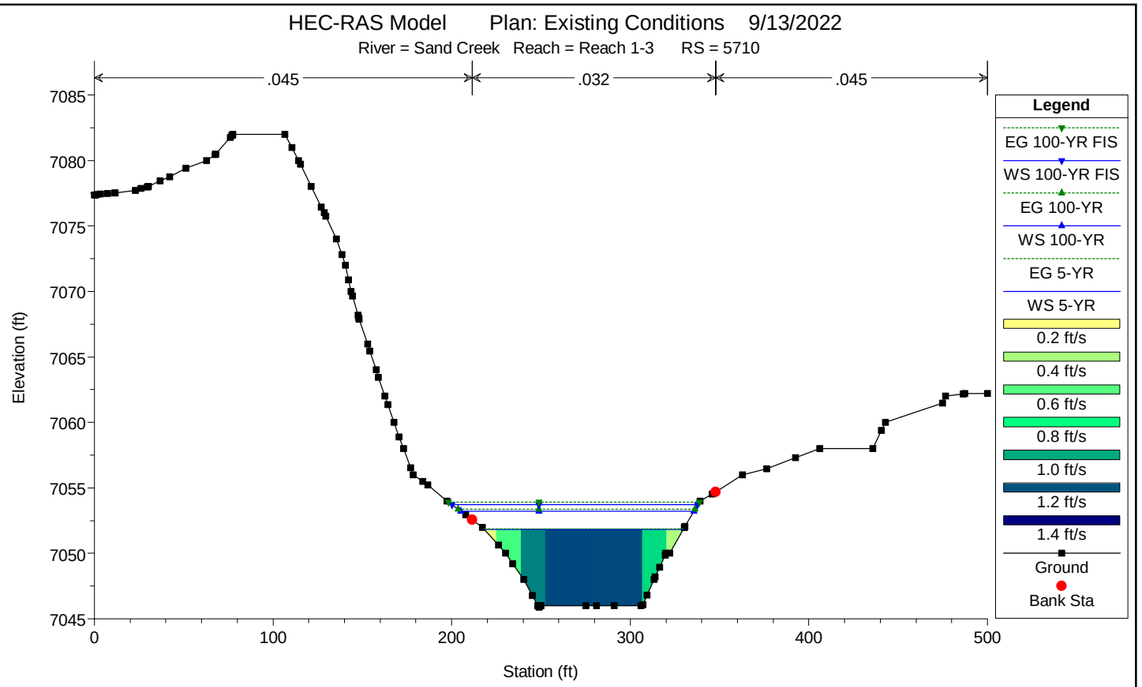

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 6688 Section DD
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

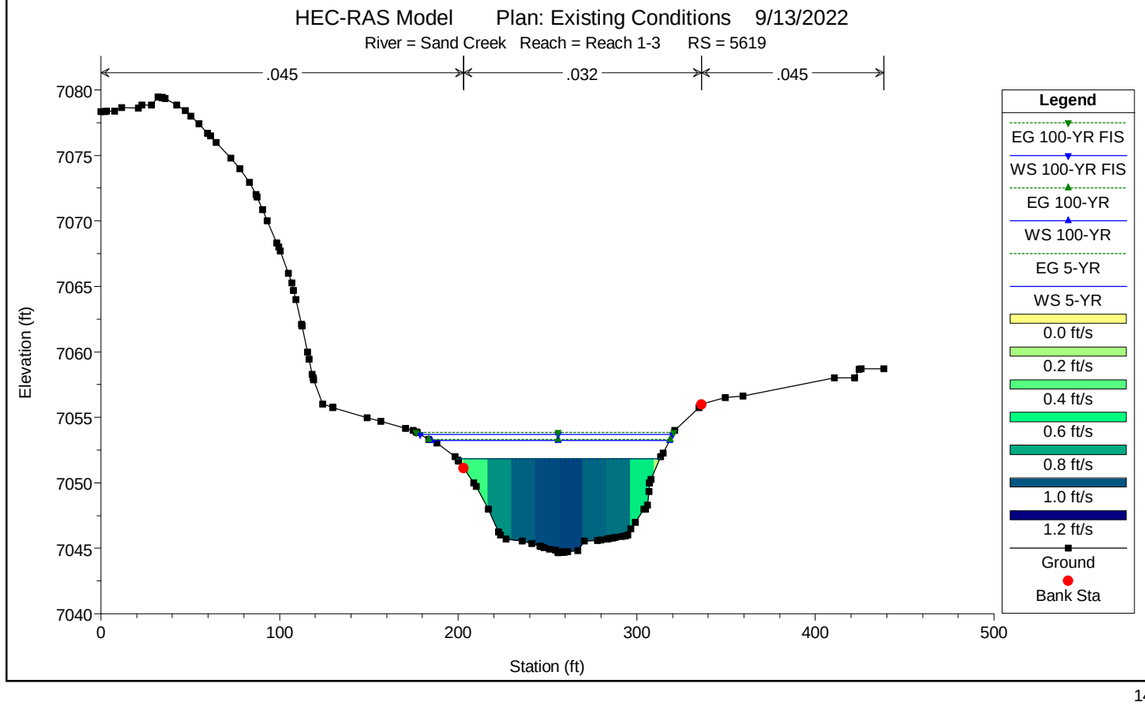

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 6299
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

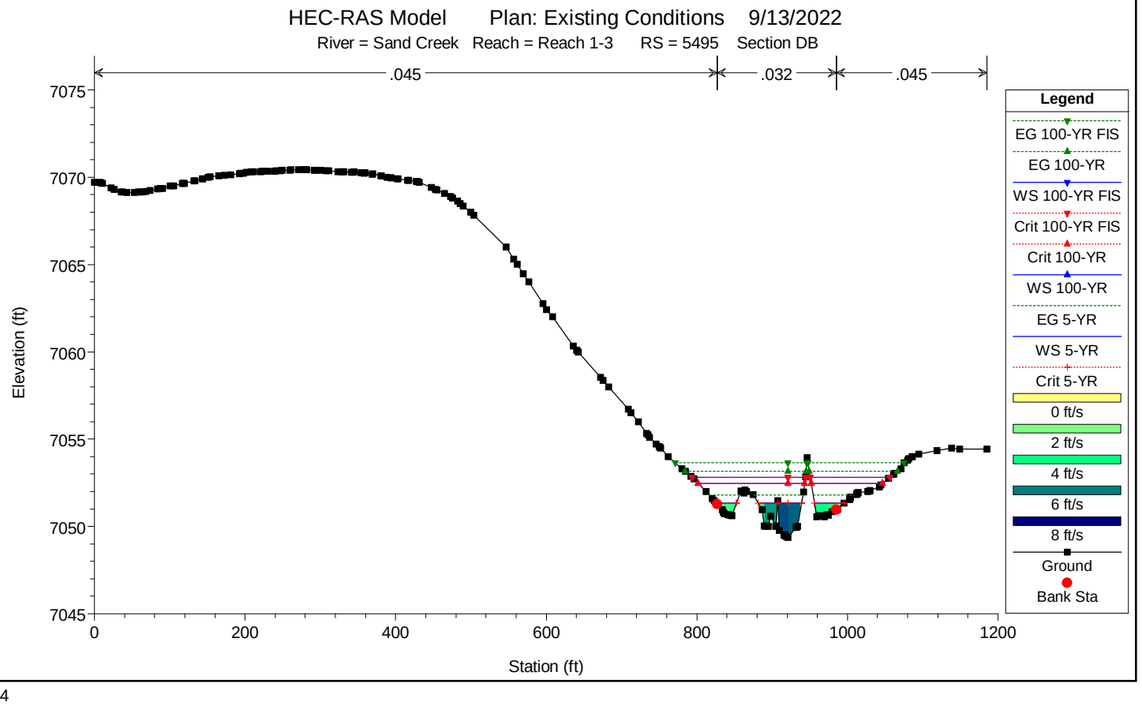

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 6094 Section DC
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

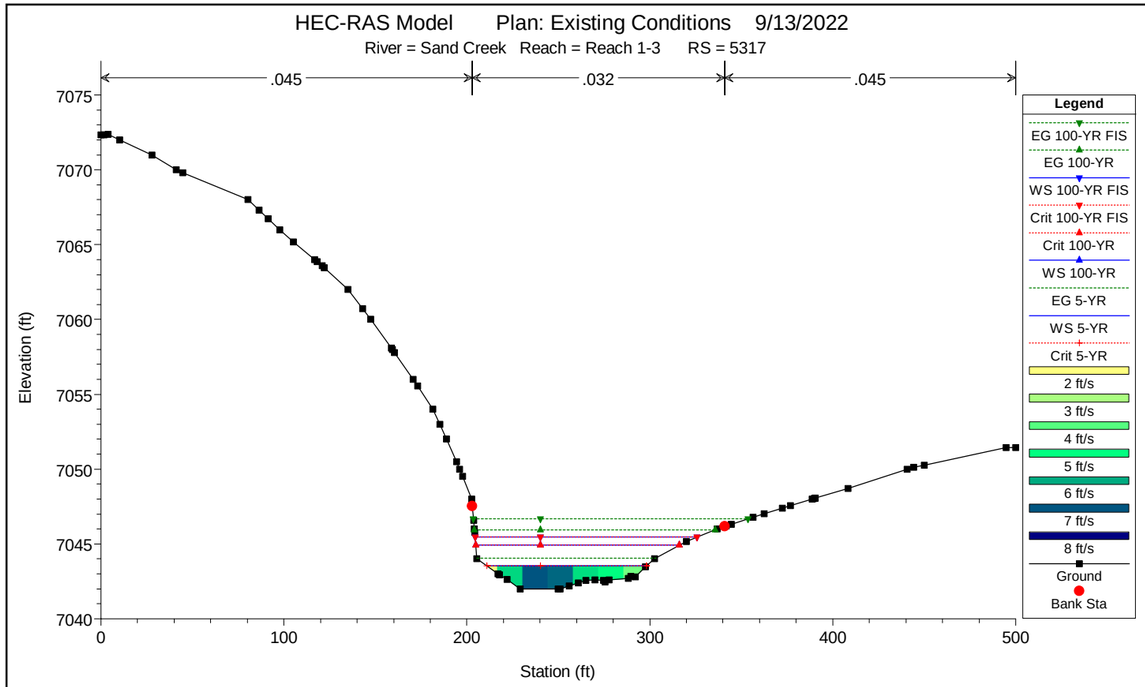

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 5906
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

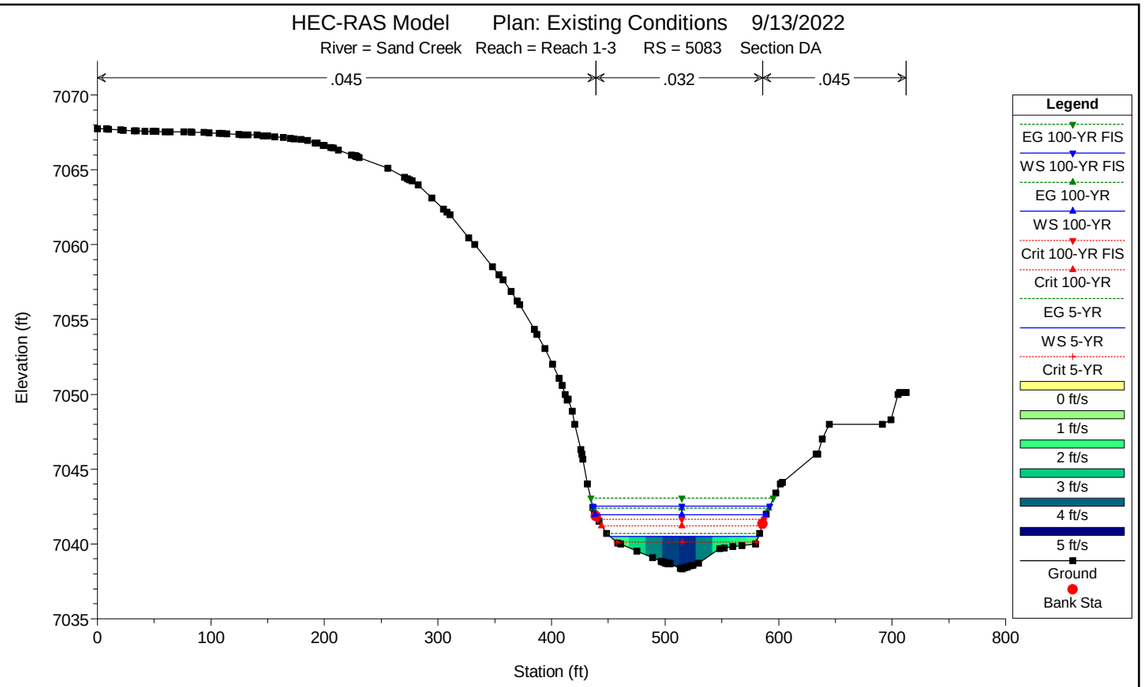

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 5803
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Bank Sta

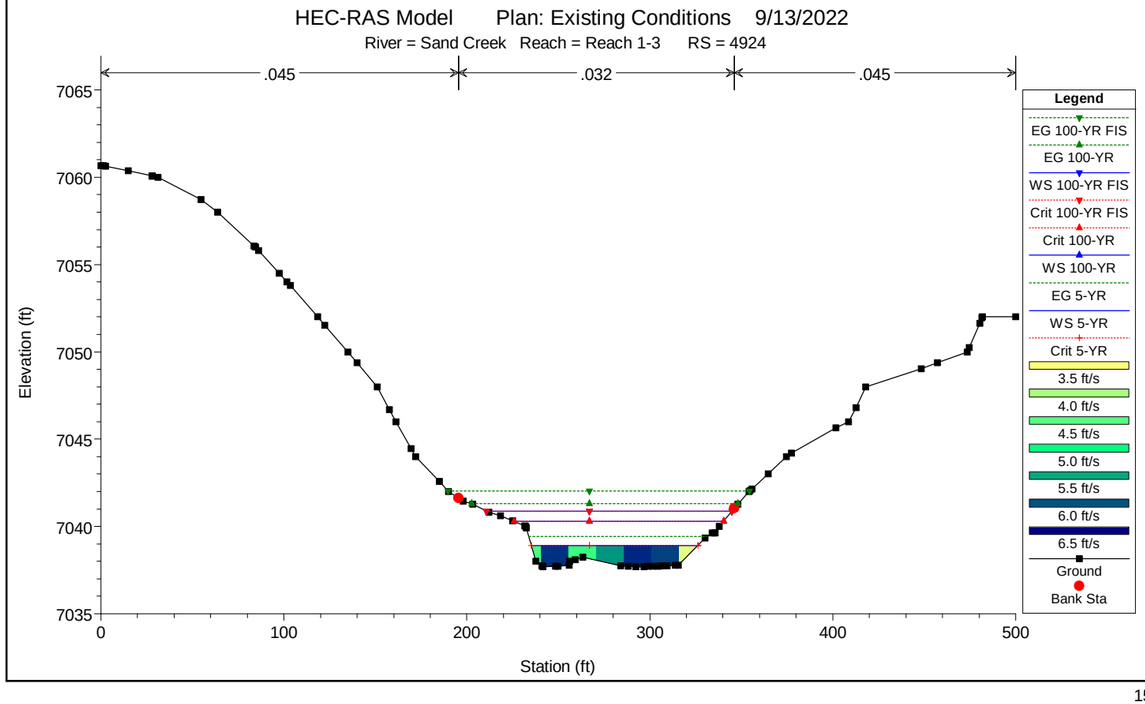

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 5710
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Bank Sta

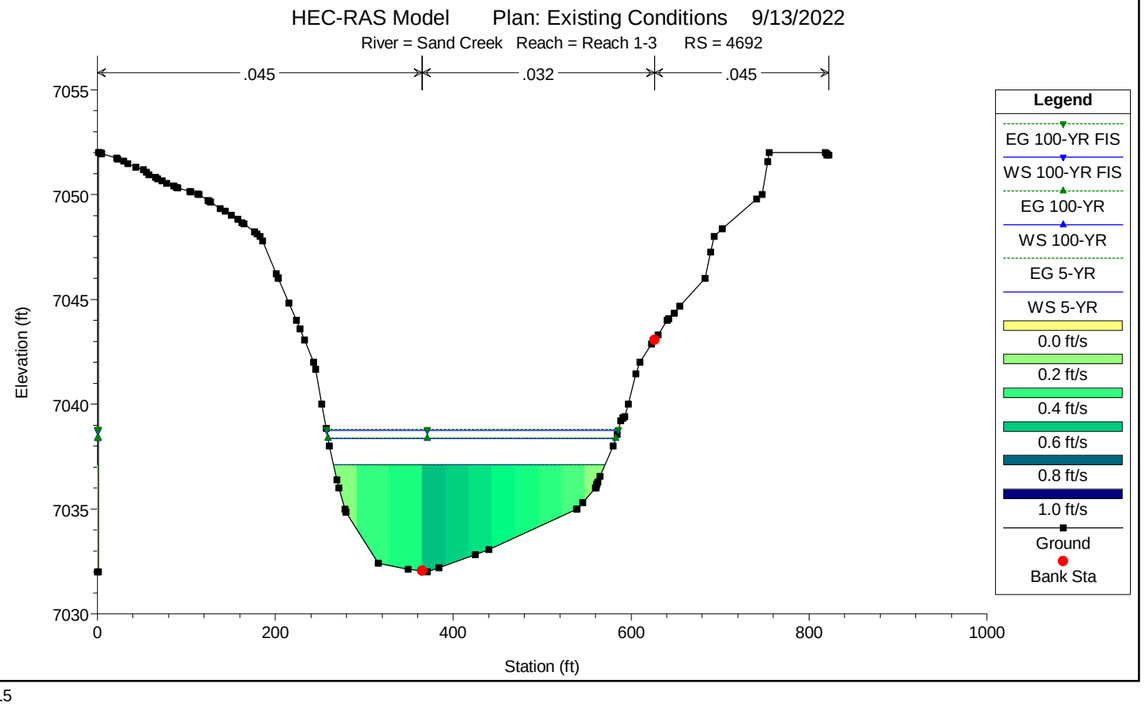

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 5619
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Bank Sta

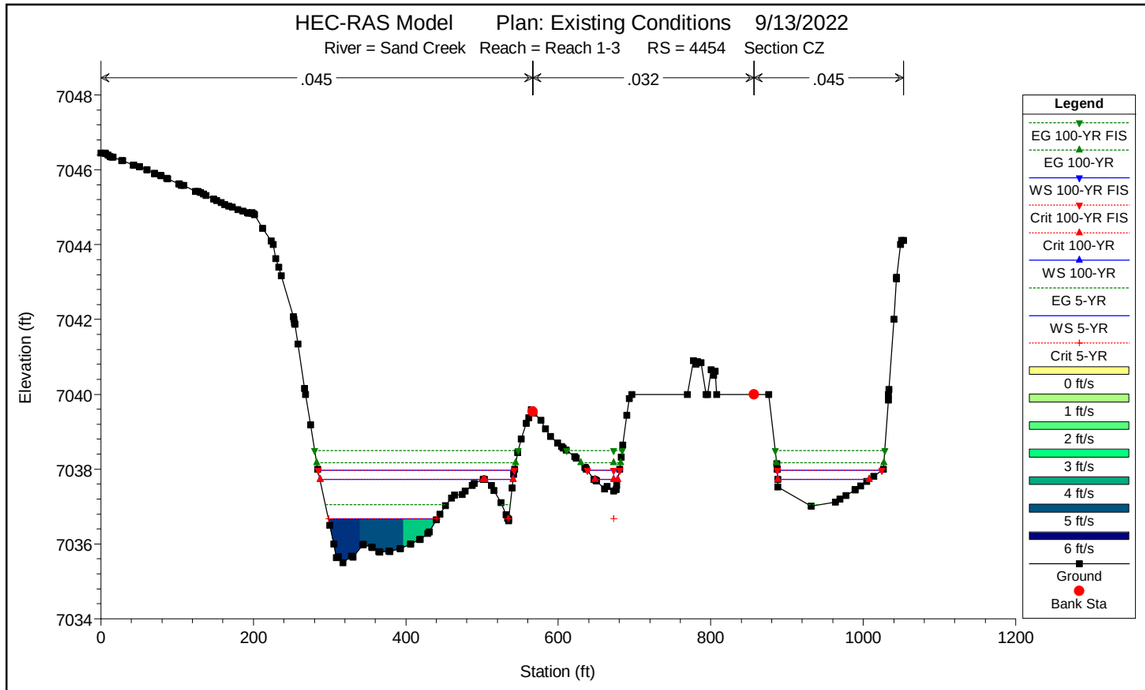

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 5495 Section DB
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

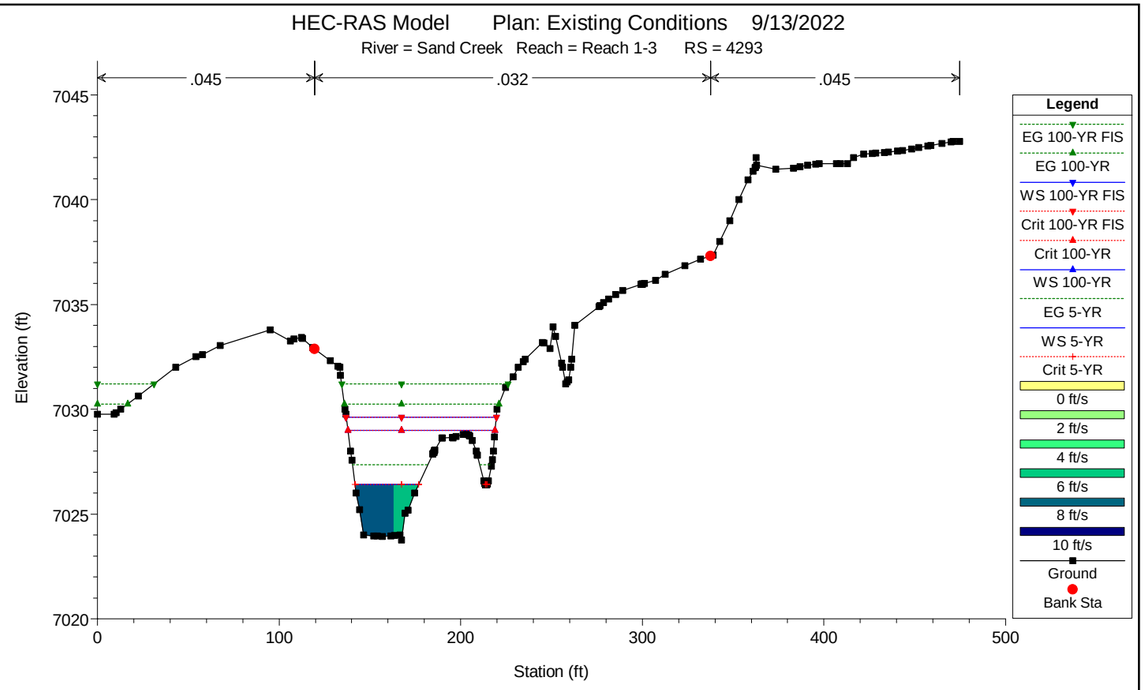

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 5317
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

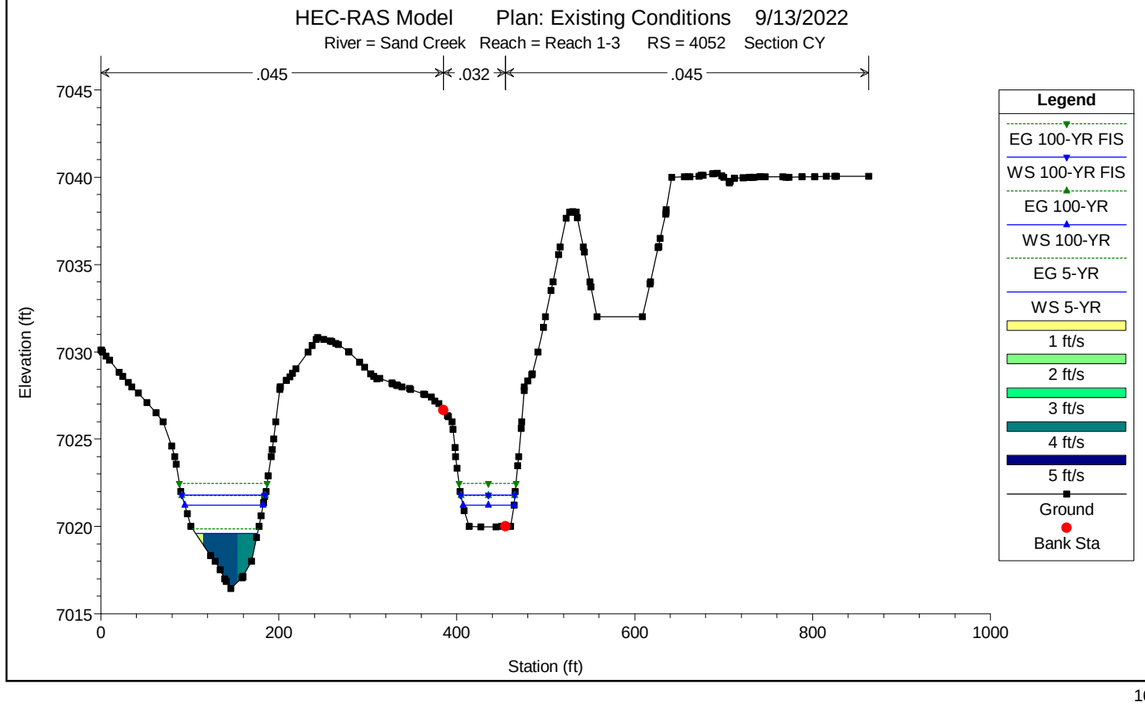

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 5083 Section DA
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
Crit 100-YR FIS
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

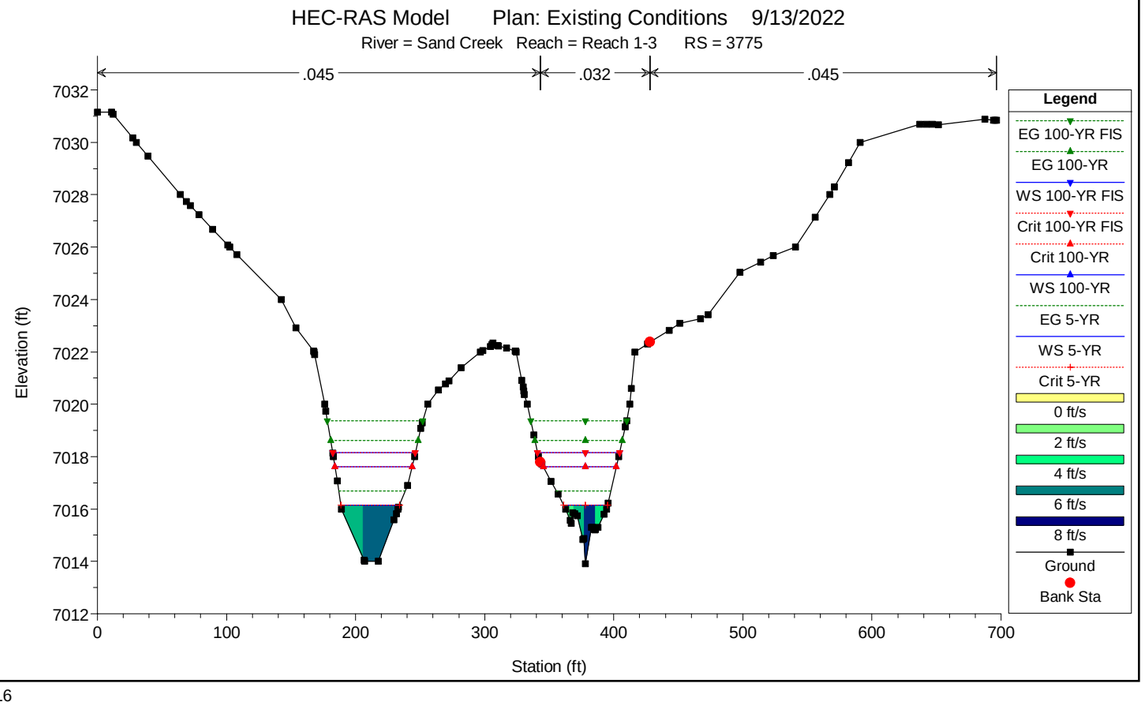

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 4924
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
6.5 ft/s
Ground
Bank Sta

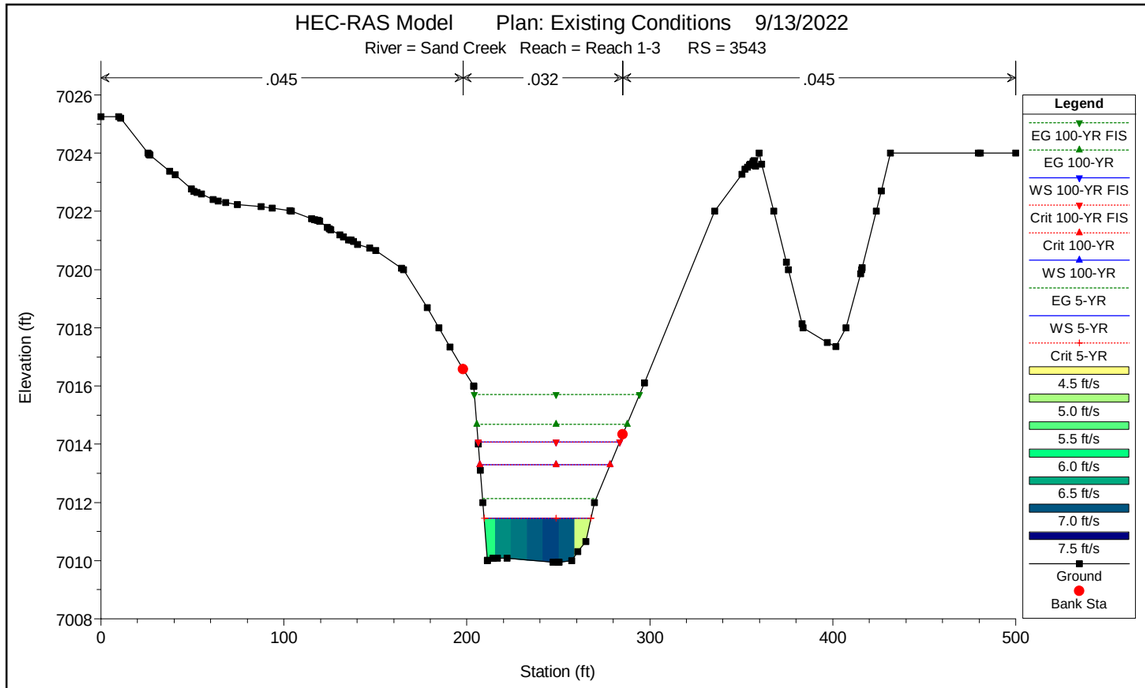

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 4692
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

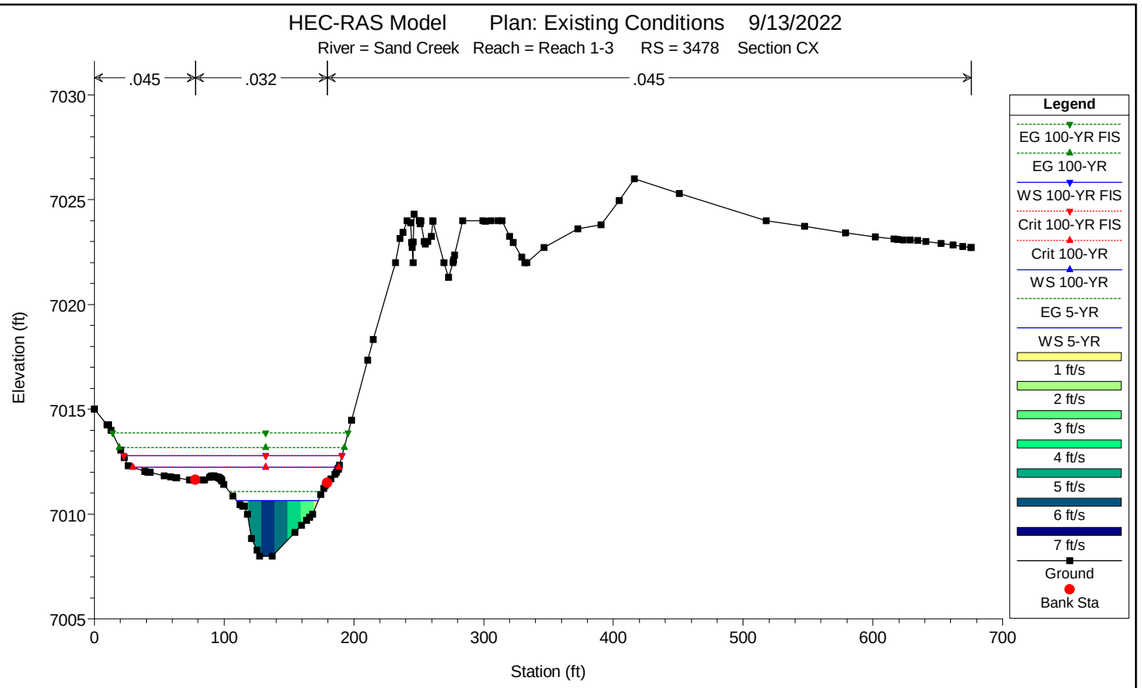

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 4454 Section CZ
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

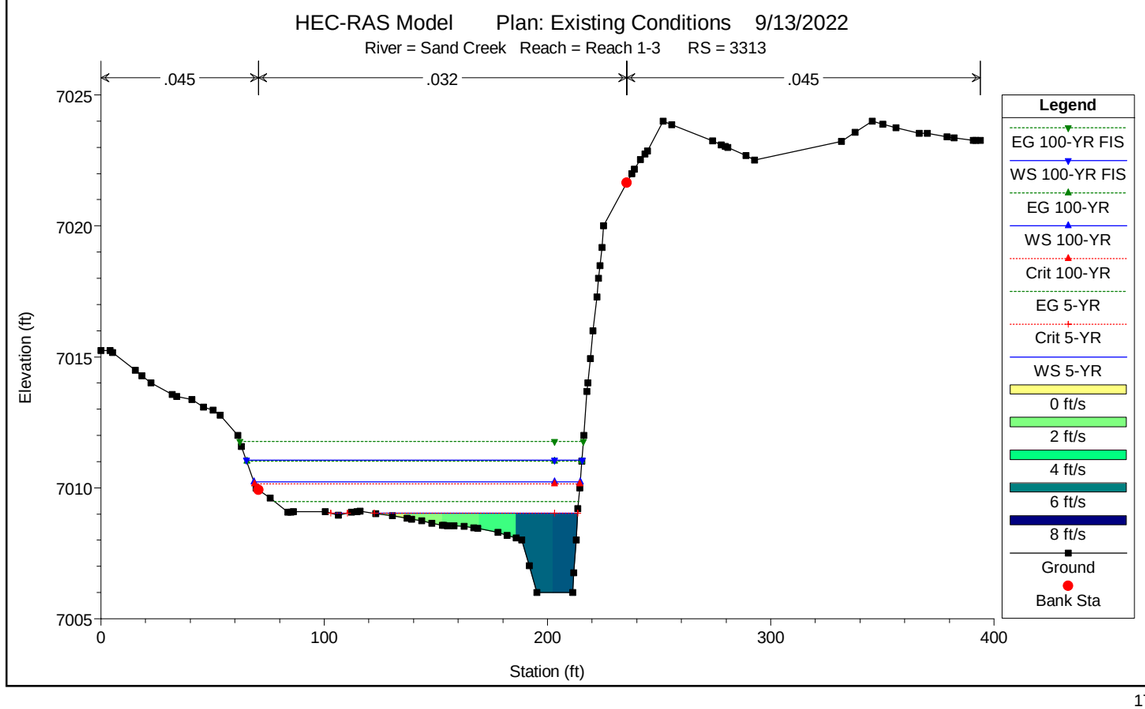

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 4293
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

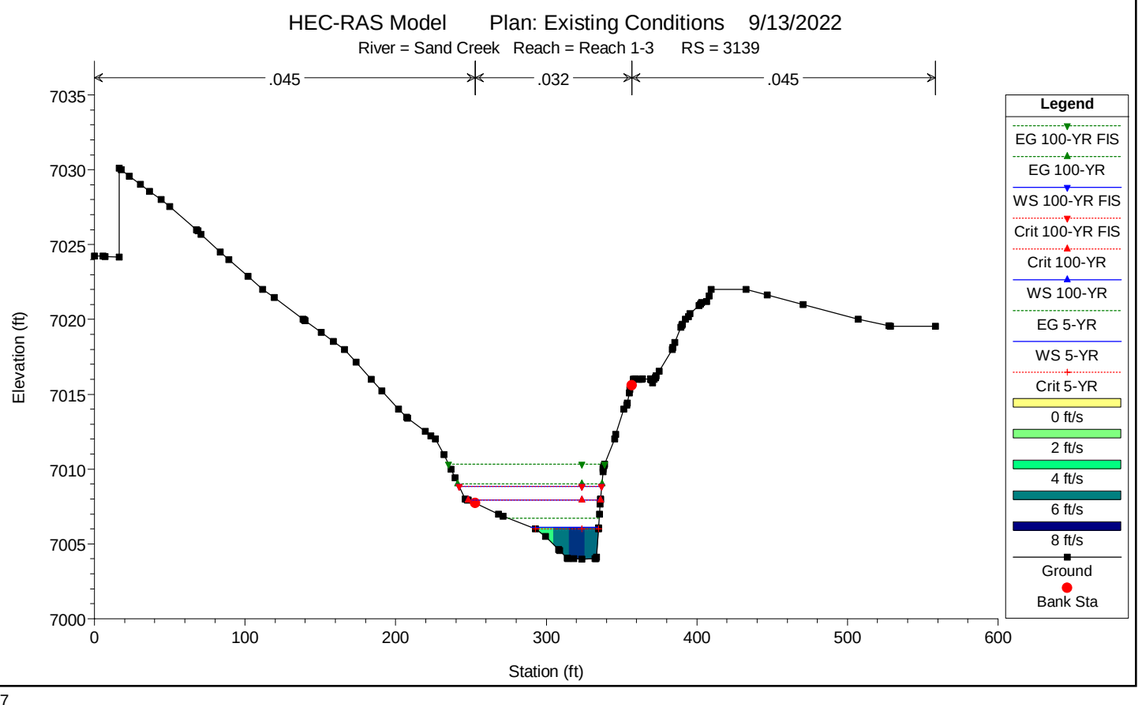

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 4052 Section CY
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

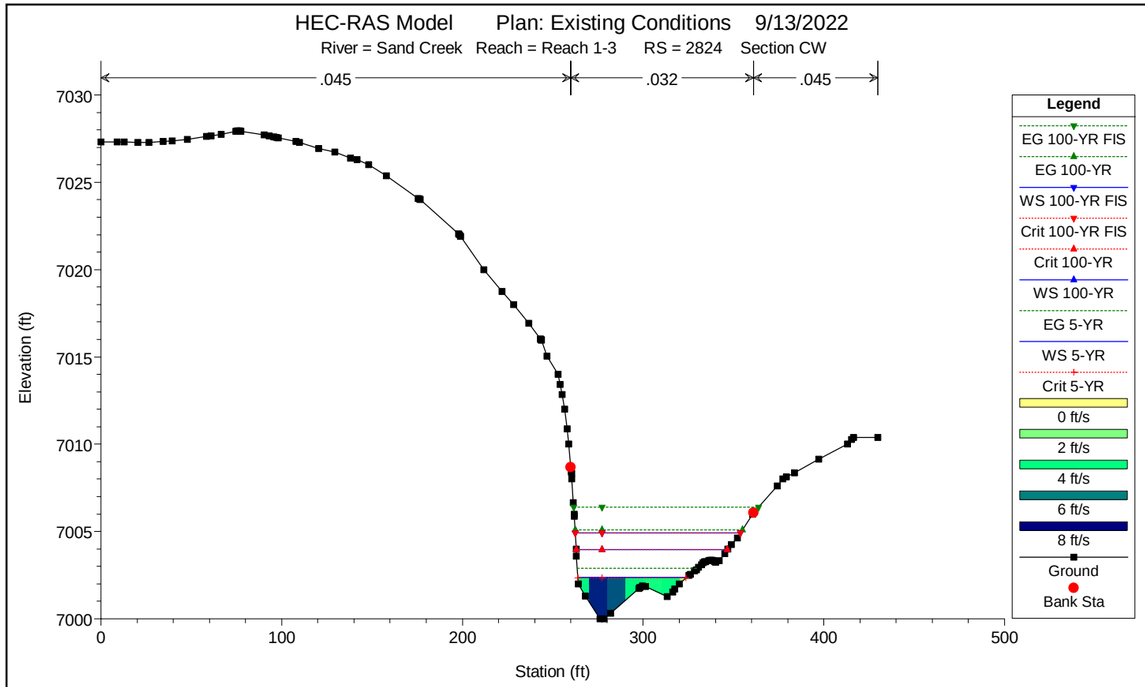

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 3775
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

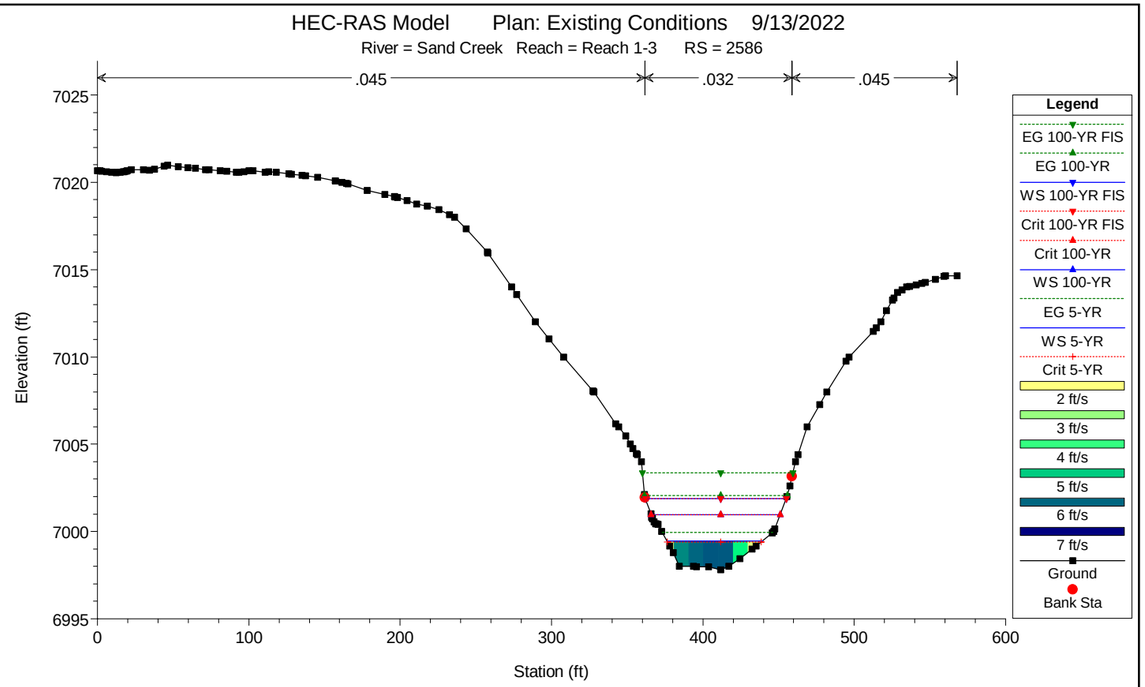

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 3543
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
6.5 ft/s
7.0 ft/s
7.5 ft/s
Ground
Bank Sta

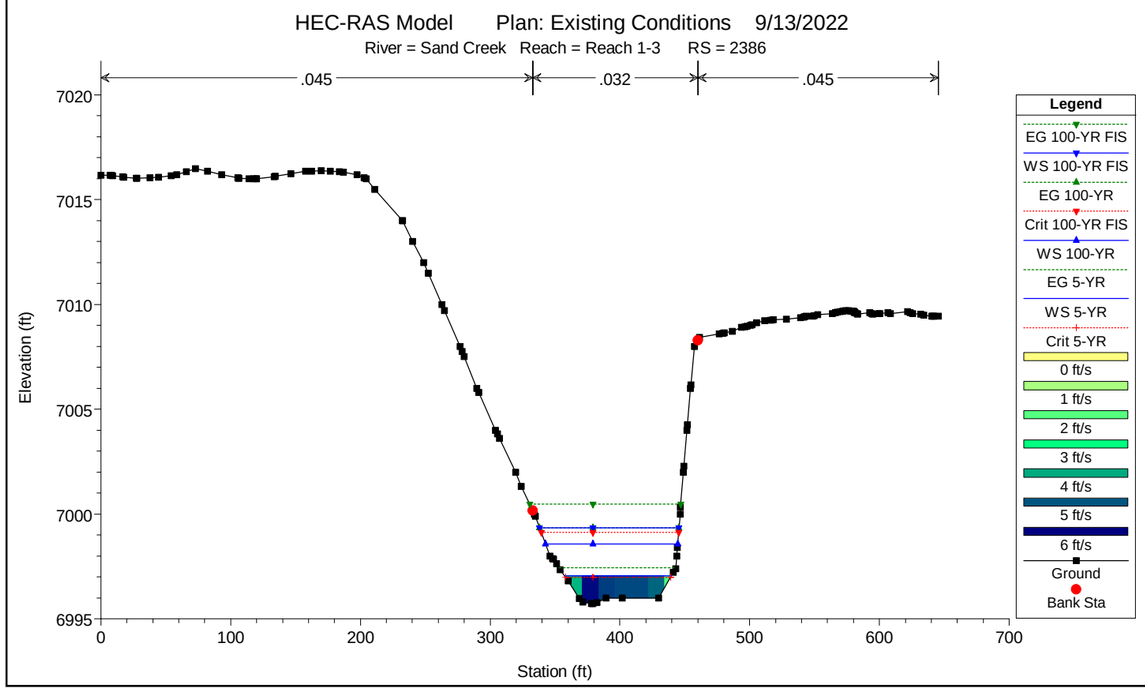

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 3478 Section CX
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

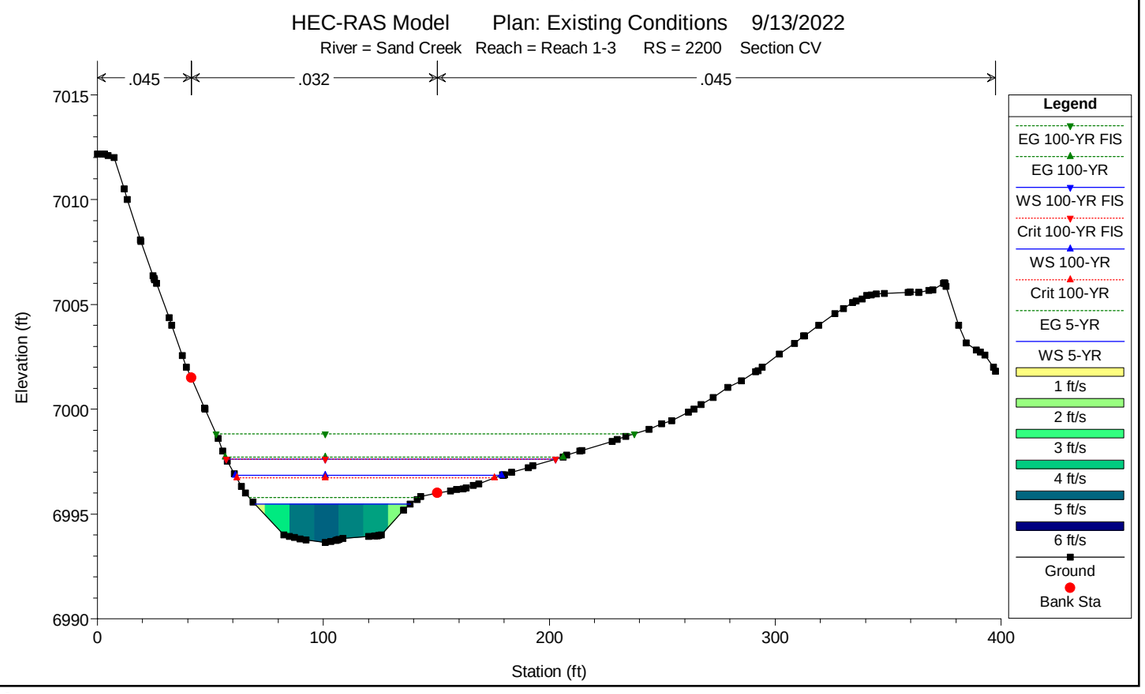

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 3313
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
Crit 5-YR
WS 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

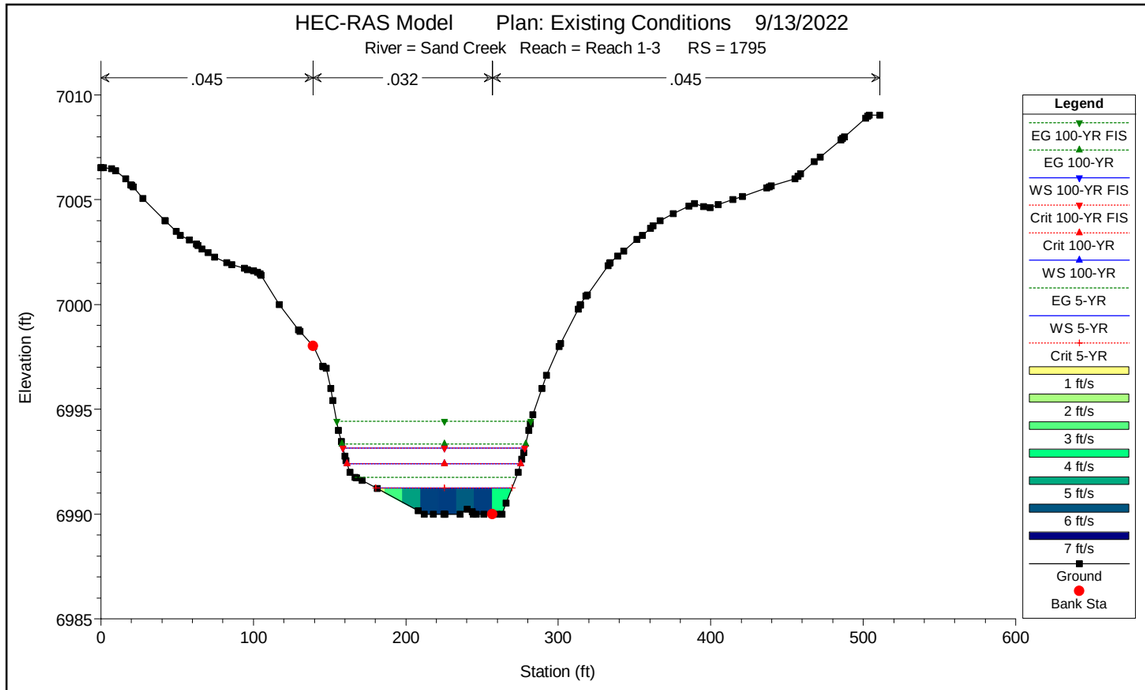

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 3139
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

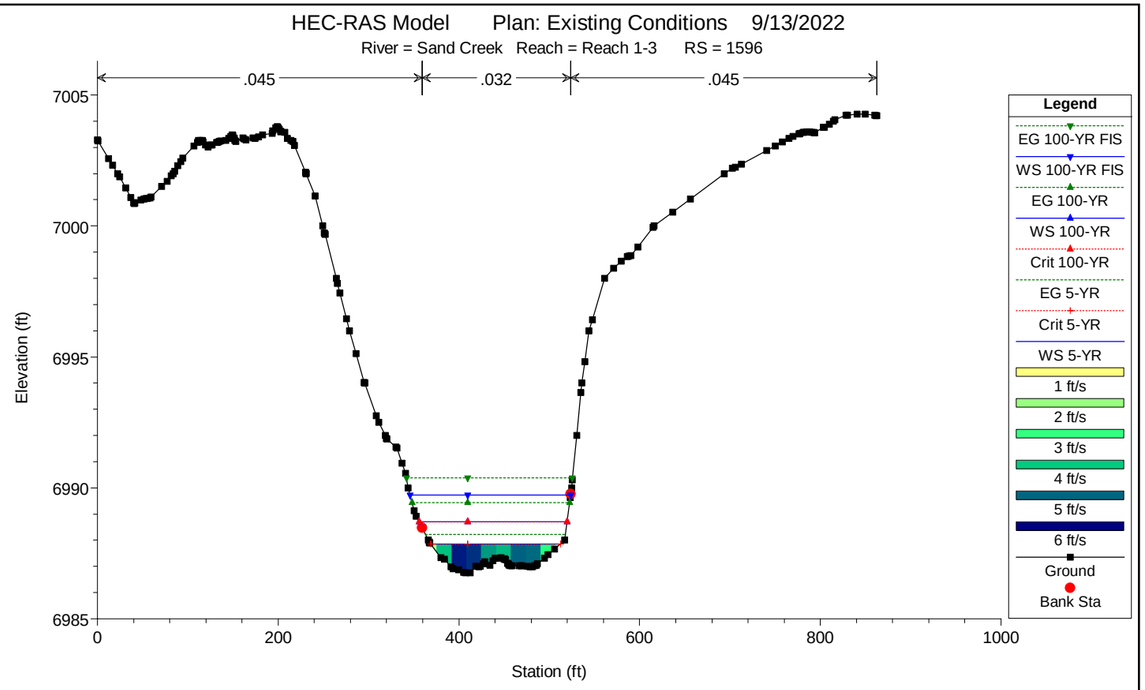

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 2824 Section CW
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

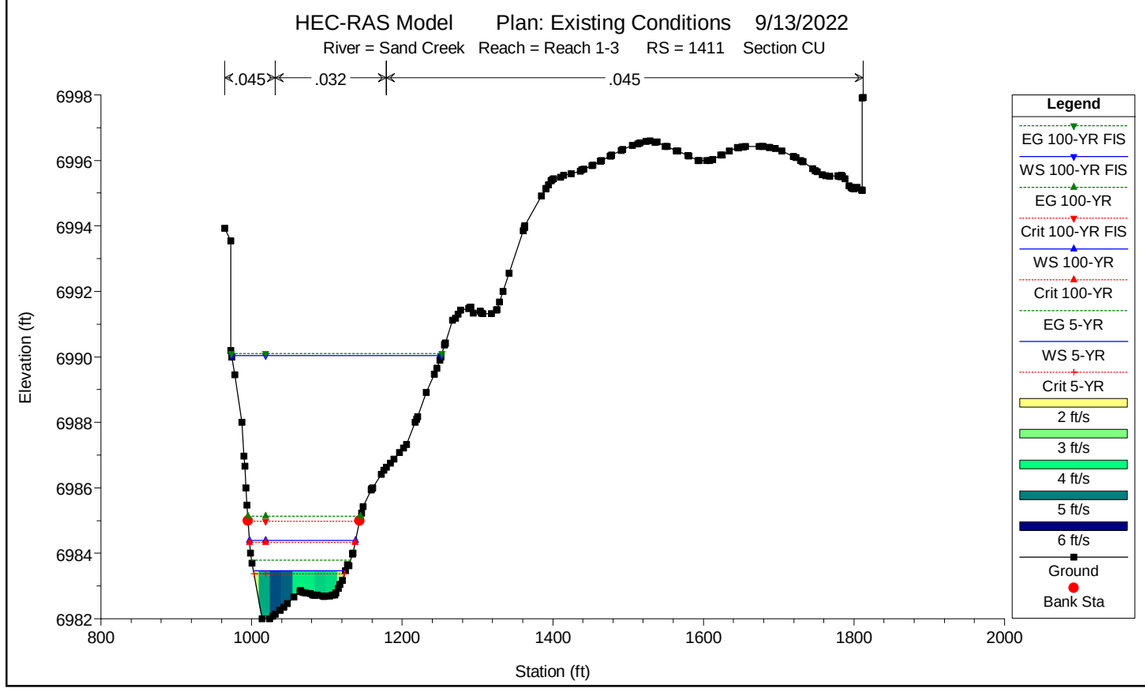

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 2586
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 2386
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
Crit 100-YR FIS
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 2200 Section CV
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

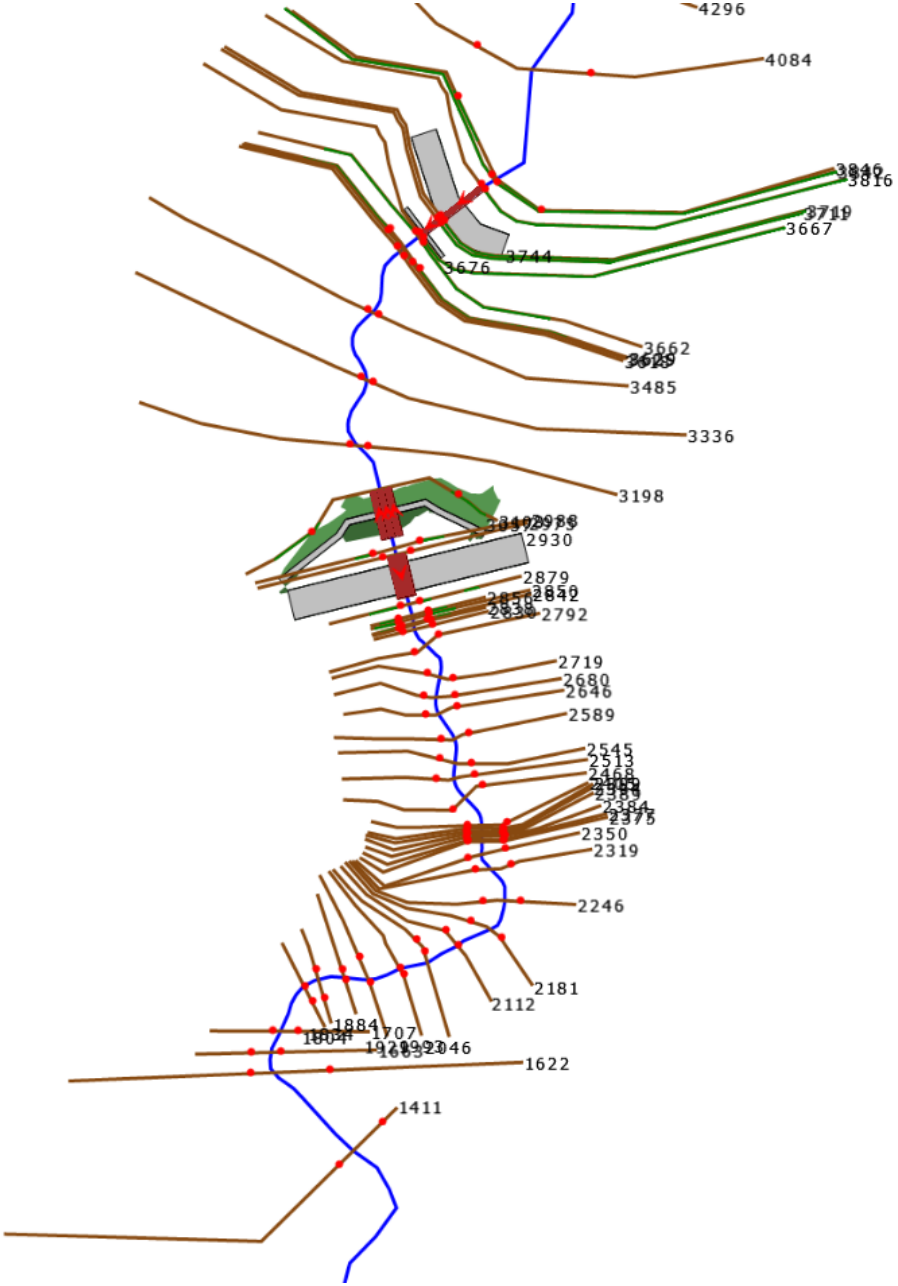

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 1795
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
EG 100-YR
WS 100-YR FIS
Crit 100-YR FIS
Crit 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 1596
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
Crit 5-YR
WS 5-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

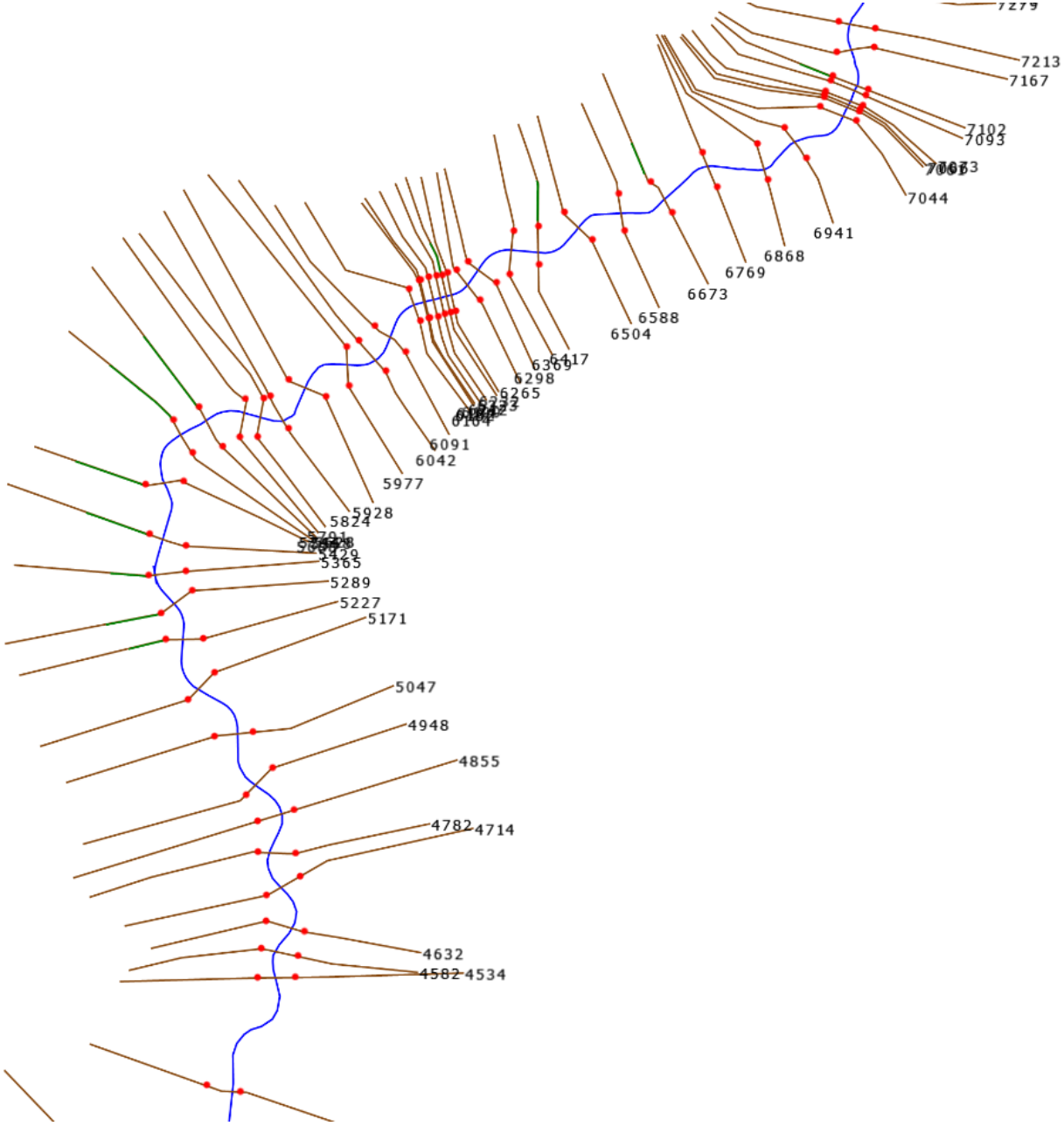

HEC-RAS Model Plan: Existing Conditions 9/13/2022
River = Sand Creek Reach = Reach 1-3 RS = 1411 Section CU
.045
.032
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR FIS
WS 100-YR FIS
EG 100-YR
Crit 100-YR FIS
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

# Appendix C

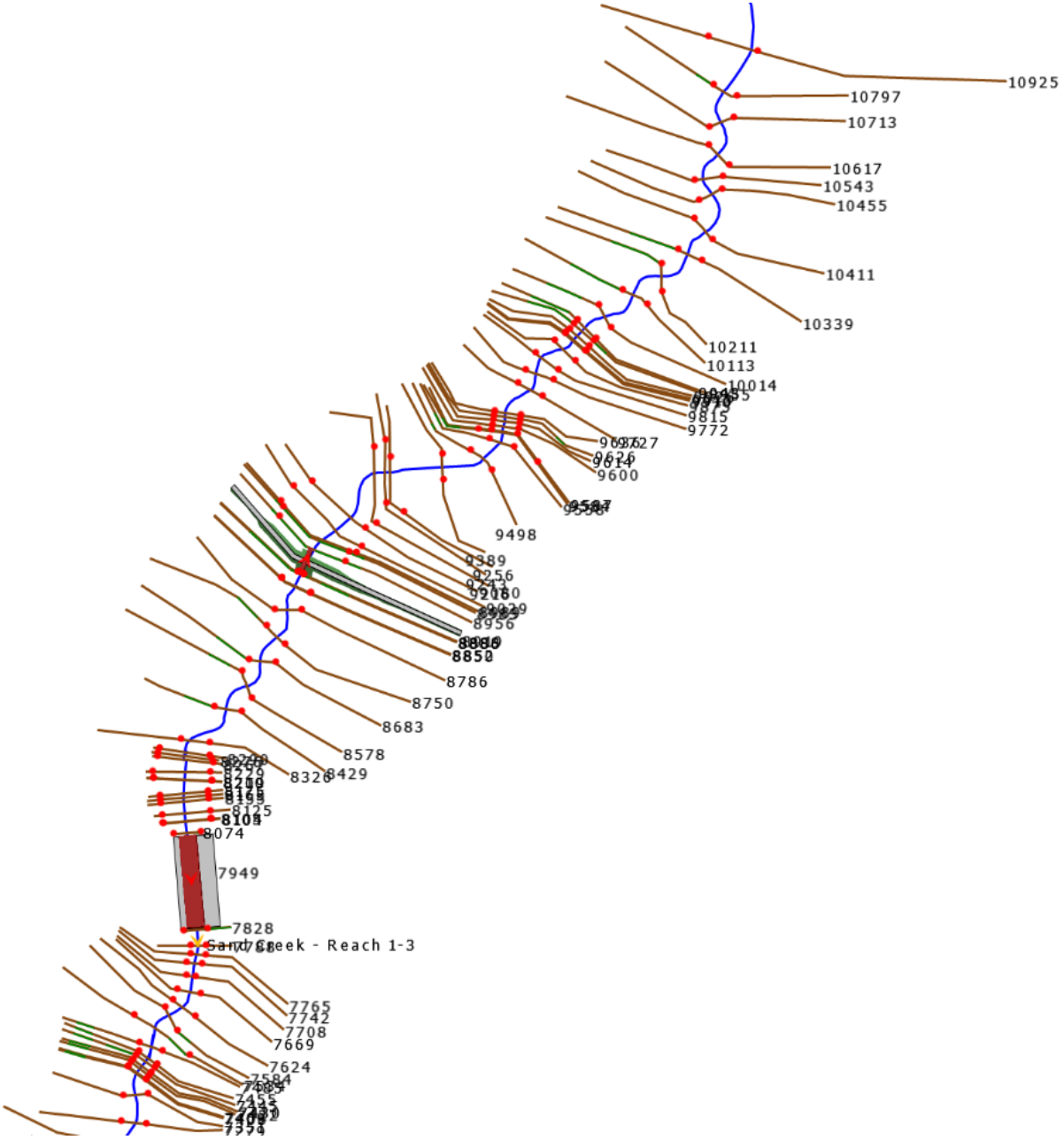
# Proposed Conditions Hydraulic Modeling



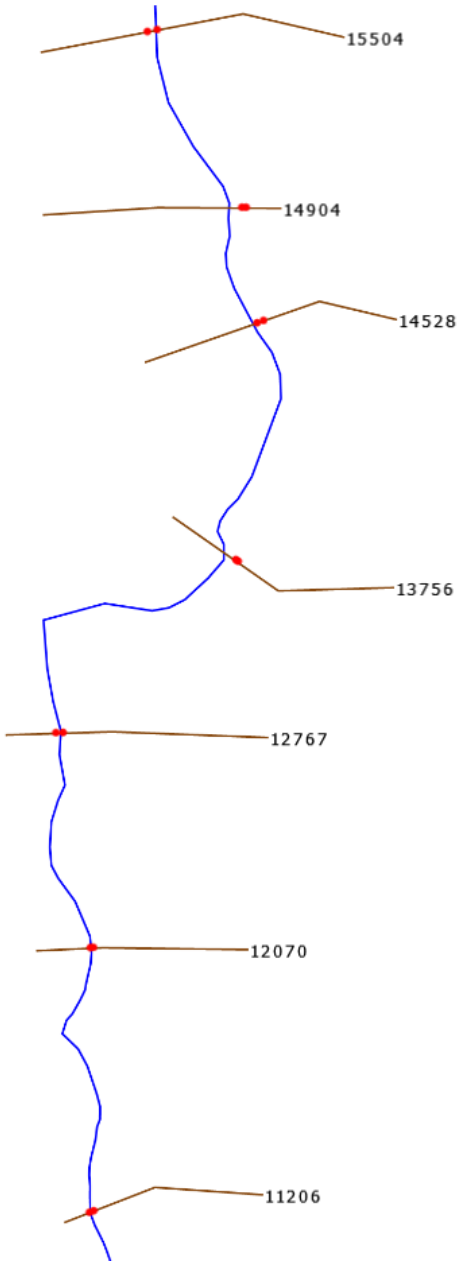

Created with GeoHECRAS v4.0.0.2094




Created with GeoHECRAS v4.0.0.2094




Created with GeoHECRAS v4.0.0.2094




Created with GeoHECRAS v4.0.0.2094

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 15504 | 2-YR | 154.80 | 7230.74 | 7232.04 | | 7232.09 | 0.009932 | 2.30 | 102.88 | 113.20 | 0.38 |
| Reach 1-3 | 15504 | 5-YR | 475.50 | 7230.74 | 7232.94 | | 7233.06 | 0.010525 | 3.49 | 209.44 | 123.38 | 0.43 |
| Reach 1-3 | 15504 | 10-YR | 773.90 | 7230.74 | 7233.63 | | 7233.78 | 0.009574 | 4.05 | 297.45 | 131.22 | 0.43 |
| Reach 1-3 | 15504 | 25-YR | 1022.90 | 7230.74 | 7234.11 | | 7234.28 | 0.009338 | 4.45 | 360.95 | 136.70 | 0.44 |
| Reach 1-3 | 15504 | 50-YR | 1389.50 | 7230.74 | 7234.73 | | 7234.94 | 0.009049 | 4.93 | 448.38 | 144.64 | 0.44 |
| Reach 1-3 | 15504 | 100-YR | 1643.00 | 7230.74 | 7235.12 | | 7235.36 | 0.008862 | 5.21 | 506.15 | 149.66 | 0.45 |
| | | | | | | | | | | | | |
| Reach 1-3 | 14904 | 2-YR | 154.80 | 7220.33 | 7221.89 | | 7222.13 | 0.033726 | 4.94 | 54.87 | 66.65 | 0.73 |
| Reach 1-3 | 14904 | 5-YR | 475.50 | 7220.33 | 7222.90 | | 7223.26 | 0.029332 | 6.58 | 134.38 | 88.10 | 0.74 |
| Reach 1-3 | 14904 | 10-YR | 773.90 | 7220.33 | 7223.39 | | 7223.90 | 0.035325 | 8.16 | 179.62 | 97.19 | 0.84 |
| Reach 1-3 | 14904 | 25-YR | 1022.90 | 7220.33 | 7223.75 | | 7224.36 | 0.037769 | 9.11 | 215.34 | 103.82 | 0.89 |
| Reach 1-3 | 14904 | 50-YR | 1389.50 | 7220.33 | 7224.17 | 7223.83 | 7224.94 | 0.041289 | 10.32 | 260.96 | 111.15 | 0.94 |
| Reach 1-3 | 14904 | 100-YR | 1643.00 | 7220.33 | 7224.41 | 7224.12 | 7225.28 | 0.043874 | 11.10 | 288.47 | 115.10 | 0.98 |
| | | | | | | | | | | | | |
| Reach 1-3 | 14528 | 2-YR | 154.80 | 7213.99 | 7215.51 | | 7215.58 | 0.010076 | 2.81 | 97.60 | 112.47 | 0.40 |
| Reach 1-3 | 14528 | 5-YR | 475.50 | 7213.99 | 7216.38 | | 7216.50 | 0.011243 | 4.02 | 233.17 | 173.68 | 0.46 |
| Reach 1-3 | 14528 | 10-YR | 773.90 | 7213.99 | 7216.98 | | 7217.12 | 0.010042 | 4.41 | 341.13 | 184.96 | 0.45 |
| Reach 1-3 | 14528 | 25-YR | 1022.90 | 7213.99 | 7217.39 | | 7217.55 | 0.009696 | 4.72 | 418.76 | 192.68 | 0.45 |
| Reach 1-3 | 14528 | 50-YR | 1389.50 | 7213.99 | 7217.94 | | 7218.11 | 0.009204 | 5.08 | 526.74 | 202.92 | 0.45 |
| Reach 1-3 | 14528 | 100-YR | 1643.00 | 7213.99 | 7218.29 | | 7218.47 | 0.008848 | 5.28 | 599.41 | 209.35 | 0.45 |
| | | | | | | | | | | | | |
| Reach 1-3 | 13756 | 2-YR | 154.80 | 7200.47 | 7202.24 | 7202.14 | 7202.51 | 0.037491 | 5.62 | 53.77 | 65.74 | 0.78 |
| Reach 1-3 | 13756 | 5-YR | 475.50 | 7200.47 | 7203.28 | 7202.95 | 7203.61 | 0.029311 | 6.92 | 138.32 | 88.37 | 0.75 |
| Reach 1-3 | 13756 | 10-YR | 773.90 | 7200.47 | 7203.80 | | 7204.27 | 0.035239 | 8.53 | 185.30 | 100.37 | 0.84 |
| Reach 1-3 | 13756 | 25-YR | 1022.90 | 7200.47 | 7204.14 | 7203.67 | 7204.70 | 0.037251 | 9.39 | 220.71 | 102.89 | 0.88 |
| Reach 1-3 | 13756 | 50-YR | 1389.50 | 7200.47 | 7204.55 | 7204.18 | 7205.24 | 0.041044 | 10.61 | 263.37 | 105.40 | 0.94 |
| Reach 1-3 | 13756 | 100-YR | 1643.00 | 7200.47 | 7204.77 | 7204.42 | 7205.57 | 0.044898 | 11.50 | 286.32 | 106.72 | 0.99 |
| | | | | | | | | | | | | |
| Reach 1-3 | 12767 | 2-YR | 154.80 | 7180.91 | 7182.75 | | 7182.89 | 0.011895 | 3.30 | 64.22 | 65.62 | 0.45 |
| Reach 1-3 | 12767 | 5-YR | 475.50 | 7180.91 | 7183.75 | | 7183.99 | 0.014155 | 4.90 | 178.99 | 144.05 | 0.53 |
| Reach 1-3 | 12767 | 10-YR | 773.90 | 7180.91 | 7184.41 | | 7184.66 | 0.012660 | 5.35 | 286.42 | 175.73 | 0.52 |
| Reach 1-3 | 12767 | 25-YR | 1022.90 | 7180.91 | 7184.80 | | 7185.07 | 0.012360 | 5.70 | 356.07 | 178.30 | 0.52 |
| Reach 1-3 | 12767 | 50-YR | 1389.50 | 7180.91 | 7185.33 | | 7185.61 | 0.011783 | 6.07 | 451.82 | 195.21 | 0.52 |
| Reach 1-3 | 12767 | 100-YR | 1643.00 | 7180.91 | 7185.67 | | 7185.96 | 0.011247 | 6.24 | 523.28 | 217.52 | 0.51 |
| | | | | | | | | | | | | |
| Reach 1-3 | 12070 | 2-YR | 154.80 | 7168.31 | 7170.57 | | 7170.93 | 0.026698 | 5.66 | 44.52 | 39.06 | 0.69 |
| Reach 1-3 | 12070 | 5-YR | 475.50 | 7168.31 | 7172.20 | 7171.58 | 7172.62 | 0.019052 | 7.00 | 133.64 | 67.59 | 0.64 |
| Reach 1-3 | 12070 | 10-YR | 773.90 | 7168.31 | 7172.91 | 7172.37 | 7173.46 | 0.021153 | 8.28 | 183.00 | 70.71 | 0.69 |
| Reach 1-3 | 12070 | 25-YR | 1022.90 | 7168.31 | 7173.48 | 7172.76 | 7174.08 | 0.020900 | 8.92 | 223.86 | 73.18 | 0.70 |
| Reach 1-3 | 12070 | 50-YR | 1389.50 | 7168.31 | 7174.19 | 7173.26 | 7174.88 | 0.021066 | 9.78 | 276.72 | 76.25 | 0.72 |
| Reach 1-3 | 12070 | 100-YR | 1643.00 | 7168.31 | 7174.59 | 7173.61 | 7175.36 | 0.021811 | 10.41 | 307.37 | 77.98 | 0.74 |
| | | | | | | | | | | | | |
| Reach 1-3 | 11206 | 2-YR | 154.80 | 7151.03 | 7153.20 | | 7153.39 | 0.016108 | 4.08 | 65.49 | 69.70 | 0.53 |
| Reach 1-3 | 11206 | 5-YR | 475.50 | 7151.03 | 7154.11 | 7153.76 | 7154.48 | 0.023926 | 6.47 | 145.51 | 104.83 | 0.68 |
| Reach 1-3 | 11206 | 10-YR | 773.90 | 7151.03 | 7154.82 | 7154.32 | 7155.22 | 0.021687 | 7.17 | 232.05 | 139.29 | 0.68 |
| Reach 1-3 | 11206 | 25-YR | 1022.90 | 7151.03 | 7155.17 | 7154.56 | 7155.62 | 0.022584 | 7.80 | 283.28 | 156.41 | 0.70 |
| Reach 1-3 | 11206 | 50-YR | 1389.50 | 7151.03 | 7155.65 | 7155.07 | 7156.14 | 0.023121 | 8.53 | 360.83 | 167.10 | 0.72 |
| Reach 1-3 | 11206 | 100-YR | 1643.00 | 7151.03 | 7155.93 | | 7156.44 | 0.022751 | 8.83 | 407.88 | 169.24 | 0.73 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10925 | 2-YR | 154.80 | 7148.00 | 7149.48 | | 7149.55 | 0.011526 | 2.06 | 75.33 | 87.66 | 0.39 |
| Reach 1-3 | 10925 | 5-YR | 475.50 | 7148.00 | 7150.48 | | 7150.58 | 0.008676 | 2.57 | 185.37 | 124.97 | 0.37 |
| Reach 1-3 | 10925 | 10-YR | 773.90 | 7148.00 | 7150.91 | | 7151.07 | 0.010222 | 3.23 | 239.46 | 129.01 | 0.42 |
| Reach 1-3 | 10925 | 25-YR | 1022.90 | 7148.00 | 7151.27 | | 7151.47 | 0.009899 | 3.57 | 286.78 | 131.86 | 0.42 |
| Reach 1-3 | 10925 | 50-YR | 1389.50 | 7148.00 | 7151.73 | | 7151.98 | 0.009752 | 4.02 | 347.73 | 135.41 | 0.43 |
| Reach 1-3 | 10925 | 100-YR | 1643.00 | 7148.00 | 7152.00 | | 7152.29 | 0.009822 | 4.30 | 385.11 | 137.54 | 0.44 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10797 | 2-YR | 154.80 | 7145.39 | 7147.87 | 7147.17 | 7147.94 | 0.013807 | 2.08 | 75.15 | 102.78 | 0.33 |
| Reach 1-3 | 10797 | 5-YR | 475.50 | 7145.39 | 7148.89 | 7147.91 | 7149.04 | 0.017843 | 3.19 | 161.53 | 145.88 | 0.39 |
| Reach 1-3 | 10797 | 10-YR | 773.90 | 7145.39 | 7149.36 | 7148.42 | 7149.49 | 0.015066 | 3.28 | 286.24 | 156.80 | 0.36 |
| Reach 1-3 | 10797 | 25-YR | 1022.90 | 7145.39 | 7149.73 | 7148.76 | 7149.89 | 0.015558 | 3.61 | 346.27 | 165.52 | 0.37 |
| Reach 1-3 | 10797 | 50-YR | 1389.50 | 7145.39 | 7150.19 | 7148.99 | 7150.38 | 0.016086 | 4.01 | 424.70 | 176.34 | 0.38 |
| Reach 1-3 | 10797 | 100-YR | 1643.00 | 7145.39 | 7150.46 | 7149.14 | 7150.68 | 0.016234 | 4.22 | 474.59 | 182.87 | 0.39 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10713 | 2-YR | 154.80 | 7144.30 | 7146.91 | | 7146.96 | 0.009729 | 1.78 | 105.27 | 138.60 | 0.29 |
| Reach 1-3 | 10713 | 5-YR | 475.50 | 7144.30 | 7147.83 | | 7147.90 | 0.010027 | 2.37 | 252.43 | 203.74 | 0.29 |
| Reach 1-3 | 10713 | 10-YR | 773.90 | 7144.30 | 7148.34 | | 7148.43 | 0.010355 | 2.73 | 358.99 | 211.45 | 0.30 |
| Reach 1-3 | 10713 | 25-YR | 1022.90 | 7144.30 | 7148.70 | | 7148.80 | 0.010418 | 2.95 | 435.69 | 216.58 | 0.30 |
| Reach 1-3 | 10713 | 50-YR | 1389.50 | 7144.30 | 7149.15 | | 7149.27 | 0.010471 | 3.23 | 535.40 | 222.98 | 0.31 |
| Reach 1-3 | 10713 | 100-YR | 1643.00 | 7144.30 | 7149.43 | | 7149.56 | 0.010517 | 3.39 | 597.38 | 225.73 | 0.31 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10617 | 2-YR | 154.80 | 7143.44 | 7145.98 | | 7146.03 | 0.010474 | 1.79 | 89.18 | 109.92 | 0.29 |
| Reach 1-3 | 10617 | 5-YR | 475.50 | 7143.44 | 7146.91 | | 7146.98 | 0.009928 | 2.34 | 267.04 | 223.15 | 0.28 |
| Reach 1-3 | 10617 | 10-YR | 773.90 | 7143.44 | 7147.45 | | 7147.53 | 0.009389 | 2.60 | 389.48 | 233.18 | 0.28 |
| Reach 1-3 | 10617 | 25-YR | 1022.90 | 7143.44 | 7147.82 | | 7147.91 | 0.009079 | 2.77 | 477.16 | 239.99 | 0.28 |
| Reach 1-3 | 10617 | 50-YR | 1389.50 | 7143.44 | 7148.28 | | 7148.38 | 0.008912 | 2.99 | 589.85 | 248.45 | 0.28 |
| Reach 1-3 | 10617 | 100-YR | 1643.00 | 7143.44 | 7148.56 | | 7148.67 | 0.008928 | 3.14 | 658.97 | 253.50 | 0.29 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 10543 | 2-YR | 154.80 | 7142.46 | 7145.30 | | 7145.35 | 0.007542 | 1.72 | 100.89 | 116.17 | 0.28 |
| Reach 1-3 | 10543 | 5-YR | 475.50 | 7142.46 | 7146.21 | | 7146.28 | 0.008291 | 2.39 | 260.23 | 202.50 | 0.29 |
| Reach 1-3 | 10543 | 10-YR | 773.90 | 7142.46 | 7146.75 | | 7146.84 | 0.008355 | 2.74 | 372.09 | 208.06 | 0.30 |
| Reach 1-3 | 10543 | 25-YR | 1022.90 | 7142.46 | 7147.13 | | 7147.23 | 0.008325 | 2.96 | 453.61 | 221.66 | 0.30 |
| Reach 1-3 | 10543 | 50-YR | 1389.50 | 7142.46 | 7147.58 | | 7147.70 | 0.008559 | 3.26 | 556.73 | 234.75 | 0.31 |
| Reach 1-3 | 10543 | 100-YR | 1643.00 | 7142.46 | 7147.84 | | 7147.97 | 0.008865 | 3.47 | 618.24 | 242.46 | 0.32 |
| Reach 1-3 | 10455 | 2-YR | 154.80 | 7142.32 | 7144.95 | | 7144.99 | 0.008321 | 1.68 | 109.94 | 140.01 | 0.27 |
| Reach 1-3 | 10455 | 5-YR | 475.50 | 7142.32 | 7145.84 | | 7145.90 | 0.008485 | 2.22 | 280.43 | 210.09 | 0.27 |
| Reach 1-3 | 10455 | 10-YR | 773.90 | 7142.32 | 7146.37 | | 7146.45 | 0.009012 | 2.60 | 394.91 | 228.57 | 0.28 |
| Reach 1-3 | 10455 | 25-YR | 1022.90 | 7142.32 | 7146.74 | | 7146.83 | 0.009414 | 2.87 | 484.39 | 256.87 | 0.29 |
| Reach 1-3 | 10455 | 50-YR | 1389.50 | 7142.32 | 7147.18 | | 7147.29 | 0.009788 | 3.18 | 604.82 | 290.65 | 0.30 |
| Reach 1-3 | 10455 | 100-YR | 1643.00 | 7142.32 | 7147.43 | | 7147.55 | 0.009856 | 3.33 | 680.22 | 302.06 | 0.30 |
| Reach 1-3 | 10411 | 2-YR | 154.80 | 7141.35 | 7143.74 | | 7143.80 | 0.013419 | 1.94 | 82.20 | 99.62 | 0.32 |
| Reach 1-3 | 10411 | 5-YR | 475.50 | 7141.35 | 7144.61 | | 7144.70 | 0.013372 | 2.61 | 237.26 | 214.02 | 0.33 |
| Reach 1-3 | 10411 | 10-YR | 773.90 | 7141.35 | 7145.06 | | 7145.17 | 0.014343 | 3.05 | 336.69 | 230.61 | 0.34 |
| Reach 1-3 | 10411 | 25-YR | 1022.90 | 7141.35 | 7145.36 | | 7145.49 | 0.015202 | 3.36 | 407.13 | 245.94 | 0.36 |
| Reach 1-3 | 10411 | 50-YR | 1389.50 | 7141.35 | 7145.72 | | 7145.87 | 0.016176 | 3.74 | 500.09 | 266.69 | 0.37 |
| Reach 1-3 | 10411 | 100-YR | 1643.00 | 7141.35 | 7145.94 | | 7146.11 | 0.016651 | 3.96 | 560.22 | 279.42 | 0.38 |
| Reach 1-3 | 10339 | 2-YR | 154.80 | 7140.02 | 7142.69 | | 7142.76 | 0.013445 | 2.11 | 73.26 | 179.77 | 0.35 |
| Reach 1-3 | 10339 | 5-YR | 475.50 | 7140.02 | 7143.67 | | 7143.74 | 0.011375 | 2.57 | 269.61 | 303.29 | 0.31 |
| Reach 1-3 | 10339 | 10-YR | 773.90 | 7140.02 | 7144.09 | | 7144.18 | 0.011412 | 2.85 | 410.27 | 343.98 | 0.32 |
| Reach 1-3 | 10339 | 25-YR | 1022.90 | 7140.02 | 7144.37 | | 7144.46 | 0.011477 | 3.03 | 504.82 | 350.72 | 0.32 |
| Reach 1-3 | 10339 | 50-YR | 1389.50 | 7140.02 | 7144.71 | | 7144.81 | 0.011453 | 3.24 | 627.10 | 358.44 | 0.32 |
| Reach 1-3 | 10339 | 100-YR | 1643.00 | 7140.02 | 7144.93 | | 7145.03 | 0.011407 | 3.36 | 706.29 | 376.77 | 0.32 |
| Reach 1-3 | 10211 | 2-YR | 154.80 | 7138.76 | 7141.54 | | 7141.60 | 0.010939 | 1.93 | 80.09 | 140.59 | 0.31 |
| Reach 1-3 | 10211 | 5-YR | 475.50 | 7138.76 | 7142.52 | | 7142.62 | 0.012244 | 2.67 | 247.55 | 309.95 | 0.33 |
| Reach 1-3 | 10211 | 10-YR | 773.90 | 7138.76 | 7142.95 | | 7143.05 | 0.012167 | 2.95 | 389.50 | 344.31 | 0.33 |
| Reach 1-3 | 10211 | 25-YR | 1022.90 | 7138.76 | 7143.24 | | 7143.34 | 0.011807 | 3.09 | 489.40 | 346.93 | 0.32 |
| Reach 1-3 | 10211 | 50-YR | 1389.50 | 7138.76 | 7143.60 | | 7143.71 | 0.011488 | 3.27 | 616.55 | 350.24 | 0.32 |
| Reach 1-3 | 10211 | 100-YR | 1643.00 | 7138.76 | 7143.83 | | 7143.94 | 0.011343 | 3.38 | 695.10 | 352.26 | 0.32 |
| Reach 1-3 | 10113 | 2-YR | 154.80 | 7137.89 | 7140.38 | | 7140.46 | 0.012510 | 2.24 | 69.07 | 185.20 | 0.39 |
| Reach 1-3 | 10113 | 5-YR | 475.50 | 7137.89 | 7141.40 | | 7141.50 | 0.010658 | 2.68 | 252.87 | 293.00 | 0.34 |
| Reach 1-3 | 10113 | 10-YR | 773.90 | 7137.89 | 7141.83 | | 7141.93 | 0.010915 | 3.00 | 379.73 | 302.29 | 0.34 |
| Reach 1-3 | 10113 | 25-YR | 1022.90 | 7137.89 | 7142.11 | | 7142.22 | 0.011088 | 3.21 | 466.33 | 306.11 | 0.35 |
| Reach 1-3 | 10113 | 50-YR | 1389.50 | 7137.89 | 7142.47 | | 7142.60 | 0.011336 | 3.48 | 576.52 | 310.54 | 0.35 |
| Reach 1-3 | 10113 | 100-YR | 1643.00 | 7137.89 | 7142.69 | | 7142.82 | 0.011500 | 3.65 | 644.45 | 313.24 | 0.36 |
| Reach 1-3 | 10014 | 2-YR | 154.80 | 7136.24 | 7139.09 | | 7139.17 | 0.013519 | 2.24 | 69.32 | 113.82 | 0.36 |
| Reach 1-3 | 10014 | 5-YR | 475.50 | 7136.24 | 7140.07 | | 7140.21 | 0.017395 | 3.20 | 197.95 | 248.41 | 0.40 |
| Reach 1-3 | 10014 | 10-YR | 773.90 | 7136.24 | 7140.50 | | 7140.65 | 0.017925 | 3.59 | 308.29 | 270.92 | 0.41 |
| Reach 1-3 | 10014 | 25-YR | 1022.90 | 7136.24 | 7140.77 | | 7140.94 | 0.018354 | 3.84 | 383.78 | 282.08 | 0.41 |
| Reach 1-3 | 10014 | 50-YR | 1389.50 | 7136.24 | 7141.10 | | 7141.29 | 0.018924 | 4.16 | 478.49 | 288.35 | 0.42 |
| Reach 1-3 | 10014 | 100-YR | 1643.00 | 7136.24 | 7141.31 | | 7141.51 | 0.019171 | 4.35 | 537.80 | 291.66 | 0.43 |
| Reach 1-3 | 9955 | 2-YR | 154.80 | 7135.86 | 7138.11 | 7137.62 | 7138.20 | 0.019818 | 2.37 | 65.30 | 129.12 | 0.41 |
| Reach 1-3 | 9955 | 5-YR | 475.50 | 7135.86 | 7138.80 | 7138.52 | 7138.95 | 0.026172 | 3.46 | 194.87 | 272.40 | 0.47 |
| Reach 1-3 | 9955 | 10-YR | 773.90 | 7135.86 | 7139.10 | 7138.82 | 7139.29 | 0.029762 | 4.04 | 279.52 | 286.11 | 0.51 |
| Reach 1-3 | 9955 | 25-YR | 1022.90 | 7135.86 | 7139.30 | 7139.00 | 7139.51 | 0.031826 | 4.41 | 336.32 | 288.40 | 0.53 |
| Reach 1-3 | 9955 | 50-YR | 1389.50 | 7135.86 | 7139.55 | 7139.21 | 7139.80 | 0.033851 | 4.85 | 409.50 | 291.32 | 0.55 |
| Reach 1-3 | 9955 | 100-YR | 1643.00 | 7135.86 | 7139.70 | 7139.33 | 7139.97 | 0.035552 | 5.14 | 452.15 | 293.02 | 0.57 |
| Reach 1-3 | 9943 | 2-YR | 154.80 | 7135.80 | 7137.42 | 7137.42 | 7137.71 | 0.138584 | 4.31 | 35.90 | 132.56 | 0.99 |
| Reach 1-3 | 9943 | 5-YR | 475.50 | 7135.80 | 7138.27 | 7138.27 | 7138.54 | 0.048588 | 4.47 | 136.62 | 266.18 | 0.67 |
| Reach 1-3 | 9943 | 10-YR | 773.90 | 7135.80 | 7138.50 | 7138.50 | 7138.82 | 0.053712 | 5.20 | 198.62 | 282.71 | 0.73 |
| Reach 1-3 | 9943 | 25-YR | 1022.90 | 7135.80 | 7138.65 | 7138.65 | 7139.01 | 0.056457 | 5.66 | 240.95 | 291.30 | 0.75 |
| Reach 1-3 | 9943 | 50-YR | 1389.50 | 7135.80 | 7138.81 | 7138.81 | 7139.26 | 0.062471 | 6.32 | 289.33 | 295.29 | 0.81 |
| Reach 1-3 | 9943 | 100-YR | 1643.00 | 7135.80 | 7138.92 | 7138.92 | 7139.41 | 0.063551 | 6.62 | 322.72 | 296.66 | 0.82 |
| Reach 1-3 | 9926 | 2-YR | 154.80 | 7131.59 | 7134.43 | | 7134.45 | 0.003128 | 1.34 | 117.35 | 72.82 | 0.18 |
| Reach 1-3 | 9926 | 5-YR | 475.50 | 7131.59 | 7135.57 | | 7135.66 | 0.005068 | 2.38 | 215.02 | 99.43 | 0.25 |
| Reach 1-3 | 9926 | 10-YR | 773.90 | 7131.59 | 7136.15 | | 7136.29 | 0.006776 | 3.11 | 277.45 | 116.29 | 0.29 |
| Reach 1-3 | 9926 | 25-YR | 1022.90 | 7131.59 | 7136.50 | | 7136.69 | 0.008158 | 3.63 | 318.73 | 122.88 | 0.33 |
| Reach 1-3 | 9926 | 50-YR | 1389.50 | 7131.59 | 7136.91 | | 7137.17 | 0.009936 | 4.29 | 371.51 | 136.59 | 0.37 |
| Reach 1-3 | 9926 | 100-YR | 1643.00 | 7131.59 | 7137.16 | | 7137.45 | 0.010802 | 4.64 | 422.25 | 251.39 | 0.39 |
| Reach 1-3 | 9913 | 2-YR | 154.80 | 7131.58 | 7134.42 | | 7134.43 | 0.000846 | 0.88 | 177.18 | 74.75 | 0.10 |
| Reach 1-3 | 9913 | 5-YR | 475.50 | 7131.58 | 7135.56 | | 7135.60 | 0.002116 | 1.78 | 290.09 | 120.47 | 0.16 |
| Reach 1-3 | 9913 | 10-YR | 773.90 | 7131.58 | 7136.14 | | 7136.22 | 0.003077 | 2.36 | 376.09 | 205.37 | 0.20 |
| Reach 1-3 | 9913 | 25-YR | 1022.90 | 7131.58 | 7136.49 | | 7136.59 | 0.003673 | 2.72 | 458.70 | 242.45 | 0.22 |
| Reach 1-3 | 9913 | 50-YR | 1389.50 | 7131.58 | 7136.92 | | 7137.05 | 0.004244 | 3.11 | 567.95 | 261.78 | 0.24 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 9913 | 100-YR | 1643.00 | 7131.58 | 7137.18 | | 7137.32 | 0.004532 | 3.32 | 636.21 | 270.74 | 0.25 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9910 | 2-YR | 154.80 | 7132.63 | 7134.39 | | 7134.42 | 0.004823 | 1.51 | 103.69 | 75.17 | 0.22 |
| Reach 1-3 | 9910 | 5-YR | 475.50 | 7132.63 | 7135.50 | | 7135.59 | 0.006023 | 2.44 | 217.01 | 124.88 | 0.26 |
| Reach 1-3 | 9910 | 10-YR | 773.90 | 7132.63 | 7136.08 | | 7136.20 | 0.006871 | 2.97 | 313.19 | 232.67 | 0.29 |
| Reach 1-3 | 9910 | 25-YR | 1022.90 | 7132.63 | 7136.44 | | 7136.57 | 0.007021 | 3.22 | 398.66 | 243.71 | 0.30 |
| Reach 1-3 | 9910 | 50-YR | 1389.50 | 7132.63 | 7136.88 | | 7137.03 | 0.007087 | 3.50 | 510.11 | 261.40 | 0.31 |
| Reach 1-3 | 9910 | 100-YR | 1643.00 | 7132.63 | 7137.14 | | 7137.30 | 0.007113 | 3.66 | 579.19 | 270.51 | 0.31 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9875 | 2-YR | 154.80 | 7131.85 | 7134.12 | | 7134.19 | 0.009583 | 2.07 | 74.69 | 69.18 | 0.35 |
| Reach 1-3 | 9875 | 5-YR | 475.50 | 7131.85 | 7135.27 | | 7135.35 | 0.007698 | 2.53 | 252.05 | 223.86 | 0.30 |
| Reach 1-3 | 9875 | 10-YR | 773.90 | 7131.85 | 7135.86 | | 7135.95 | 0.007207 | 2.79 | 392.43 | 250.37 | 0.30 |
| Reach 1-3 | 9875 | 25-YR | 1022.90 | 7131.85 | 7136.21 | | 7136.32 | 0.007302 | 3.01 | 483.96 | 259.35 | 0.30 |
| Reach 1-3 | 9875 | 50-YR | 1389.50 | 7131.85 | 7136.65 | | 7136.77 | 0.007625 | 3.32 | 599.13 | 272.53 | 0.31 |
| Reach 1-3 | 9875 | 100-YR | 1643.00 | 7131.85 | 7136.90 | | 7137.03 | 0.007915 | 3.52 | 668.90 | 280.44 | 0.32 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9815 | 2-YR | 154.80 | 7130.14 | 7133.63 | | 7133.69 | 0.007322 | 1.94 | 79.80 | 63.90 | 0.31 |
| Reach 1-3 | 9815 | 5-YR | 475.50 | 7130.14 | 7134.67 | | 7134.81 | 0.011143 | 2.97 | 183.80 | 153.71 | 0.36 |
| Reach 1-3 | 9815 | 10-YR | 773.90 | 7130.14 | 7135.23 | | 7135.40 | 0.012429 | 3.51 | 290.44 | 227.58 | 0.38 |
| Reach 1-3 | 9815 | 25-YR | 1022.90 | 7130.14 | 7135.57 | | 7135.76 | 0.012818 | 3.79 | 372.57 | 248.85 | 0.38 |
| Reach 1-3 | 9815 | 50-YR | 1389.50 | 7130.14 | 7135.98 | | 7136.19 | 0.013169 | 4.12 | 480.20 | 268.72 | 0.39 |
| Reach 1-3 | 9815 | 100-YR | 1643.00 | 7130.14 | 7136.22 | | 7136.44 | 0.013343 | 4.30 | 544.65 | 271.12 | 0.39 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9772 | 2-YR | 154.80 | 7130.91 | 7133.24 | | 7133.31 | 0.010809 | 2.07 | 75.27 | 82.59 | 0.35 |
| Reach 1-3 | 9772 | 5-YR | 475.50 | 7130.91 | 7134.19 | | 7134.30 | 0.011569 | 2.82 | 203.50 | 163.47 | 0.36 |
| Reach 1-3 | 9772 | 10-YR | 773.90 | 7130.91 | 7134.71 | | 7134.85 | 0.012294 | 3.30 | 299.41 | 213.55 | 0.37 |
| Reach 1-3 | 9772 | 25-YR | 1022.90 | 7130.91 | 7135.03 | | 7135.20 | 0.012799 | 3.62 | 372.56 | 237.61 | 0.38 |
| Reach 1-3 | 9772 | 50-YR | 1389.50 | 7130.91 | 7135.43 | | 7135.62 | 0.013252 | 3.98 | 471.21 | 261.72 | 0.39 |
| Reach 1-3 | 9772 | 100-YR | 1643.00 | 7130.91 | 7135.66 | | 7135.86 | 0.013384 | 4.17 | 533.21 | 267.91 | 0.40 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9727 | 2-YR | 154.80 | 7129.87 | 7132.79 | | 7132.85 | 0.009130 | 1.98 | 84.42 | 108.18 | 0.32 |
| Reach 1-3 | 9727 | 5-YR | 475.50 | 7129.87 | 7133.68 | | 7133.78 | 0.011711 | 2.83 | 212.67 | 190.96 | 0.35 |
| Reach 1-3 | 9727 | 10-YR | 773.90 | 7129.87 | 7134.16 | | 7134.29 | 0.012624 | 3.29 | 318.75 | 239.92 | 0.37 |
| Reach 1-3 | 9727 | 25-YR | 1022.90 | 7129.87 | 7134.46 | | 7134.61 | 0.013305 | 3.60 | 391.08 | 244.83 | 0.38 |
| Reach 1-3 | 9727 | 50-YR | 1389.50 | 7129.87 | 7134.83 | | 7135.01 | 0.014067 | 3.97 | 482.10 | 248.97 | 0.40 |
| Reach 1-3 | 9727 | 100-YR | 1643.00 | 7129.87 | 7135.05 | | 7135.24 | 0.014554 | 4.20 | 536.90 | 255.20 | 0.41 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9636 | 2-YR | 154.80 | 7129.38 | 7131.63 | 7131.17 | 7131.70 | 0.018998 | 2.22 | 85.86 | 162.06 | 0.39 |
| Reach 1-3 | 9636 | 5-YR | 475.50 | 7129.38 | 7132.32 | | 7132.41 | 0.019725 | 2.88 | 218.41 | 234.23 | 0.40 |
| Reach 1-3 | 9636 | 10-YR | 773.90 | 7129.38 | 7132.65 | | 7132.78 | 0.023050 | 3.44 | 306.00 | 319.48 | 0.43 |
| Reach 1-3 | 9636 | 25-YR | 1022.90 | 7129.38 | 7132.85 | | 7133.01 | 0.024966 | 3.79 | 372.42 | 323.43 | 0.45 |
| Reach 1-3 | 9636 | 50-YR | 1389.50 | 7129.38 | 7133.08 | | 7133.27 | 0.028392 | 4.28 | 445.96 | 325.83 | 0.49 |
| Reach 1-3 | 9636 | 100-YR | 1643.00 | 7129.38 | 7133.22 | | 7133.44 | 0.029955 | 4.55 | 493.01 | 327.36 | 0.50 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9626 | 2-YR | 154.80 | 7129.34 | 7130.99 | 7130.99 | 7131.27 | 0.139922 | 4.28 | 36.13 | 62.05 | 0.99 |
| Reach 1-3 | 9626 | 5-YR | 475.50 | 7129.34 | 7131.75 | 7131.75 | 7132.07 | 0.062086 | 4.80 | 119.55 | 215.57 | 0.75 |
| Reach 1-3 | 9626 | 10-YR | 773.90 | 7129.34 | 7132.03 | 7132.03 | 7132.40 | 0.062049 | 5.46 | 177.60 | 253.13 | 0.77 |
| Reach 1-3 | 9626 | 25-YR | 1022.90 | 7129.34 | 7132.20 | 7132.20 | 7132.61 | 0.061582 | 5.84 | 225.45 | 294.28 | 0.79 |
| Reach 1-3 | 9626 | 50-YR | 1389.50 | 7129.34 | 7132.43 | 7132.43 | 7132.86 | 0.056423 | 6.09 | 299.98 | 331.02 | 0.77 |
| Reach 1-3 | 9626 | 100-YR | 1643.00 | 7129.34 | 7132.54 | 7132.54 | 7133.01 | 0.058168 | 6.41 | 336.09 | 332.35 | 0.79 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9600 | 2-YR | 154.80 | 7123.43 | 7125.87 | | 7125.91 | 0.007760 | 1.74 | 89.07 | 71.98 | 0.27 |
| Reach 1-3 | 9600 | 5-YR | 475.50 | 7123.43 | 7126.90 | | 7127.02 | 0.009463 | 2.83 | 181.51 | 107.02 | 0.32 |
| Reach 1-3 | 9600 | 10-YR | 773.90 | 7123.43 | 7127.45 | | 7127.63 | 0.011151 | 3.53 | 245.33 | 125.55 | 0.36 |
| Reach 1-3 | 9600 | 25-YR | 1022.90 | 7123.43 | 7127.78 | | 7128.01 | 0.012646 | 4.04 | 288.68 | 136.72 | 0.40 |
| Reach 1-3 | 9600 | 50-YR | 1389.50 | 7123.43 | 7128.12 | | 7128.43 | 0.015296 | 4.75 | 337.82 | 149.36 | 0.44 |
| Reach 1-3 | 9600 | 100-YR | 1643.00 | 7123.43 | 7128.34 | | 7128.70 | 0.016611 | 5.15 | 371.39 | 157.51 | 0.47 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9587 | 2-YR | 154.80 | 7123.38 | 7125.85 | | 7125.87 | 0.001385 | 1.03 | 150.98 | 78.83 | 0.12 |
| Reach 1-3 | 9587 | 5-YR | 475.50 | 7123.38 | 7126.88 | | 7126.93 | 0.003104 | 1.98 | 274.39 | 152.71 | 0.19 |
| Reach 1-3 | 9587 | 10-YR | 773.90 | 7123.38 | 7127.43 | | 7127.52 | 0.004086 | 2.52 | 363.79 | 171.33 | 0.23 |
| Reach 1-3 | 9587 | 25-YR | 1022.90 | 7123.38 | 7127.76 | | 7127.87 | 0.004864 | 2.91 | 422.72 | 192.85 | 0.25 |
| Reach 1-3 | 9587 | 50-YR | 1389.50 | 7123.38 | 7128.11 | | 7128.26 | 0.006198 | 3.46 | 487.76 | 227.01 | 0.29 |
| Reach 1-3 | 9587 | 100-YR | 1643.00 | 7123.38 | 7128.33 | | 7128.51 | 0.006928 | 3.78 | 531.54 | 249.78 | 0.31 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9584 | 2-YR | 154.80 | 7124.71 | 7125.77 | | 7125.85 | 0.021779 | 2.31 | 67.01 | 72.35 | 0.42 |
| Reach 1-3 | 9584 | 5-YR | 475.50 | 7124.71 | 7126.82 | | 7126.92 | 0.017430 | 2.50 | 190.54 | 155.25 | 0.40 |
| Reach 1-3 | 9584 | 10-YR | 773.90 | 7124.71 | 7127.38 | | 7127.50 | 0.014418 | 2.73 | 283.01 | 181.03 | 0.38 |
| Reach 1-3 | 9584 | 25-YR | 1022.90 | 7124.71 | 7127.72 | | 7127.85 | 0.014378 | 2.98 | 343.33 | 211.28 | 0.39 |
| Reach 1-3 | 9584 | 50-YR | 1389.50 | 7124.71 | 7128.06 | | 7128.24 | 0.015044 | 3.41 | 408.82 | 242.19 | 0.41 |
| Reach 1-3 | 9584 | 100-YR | 1643.00 | 7124.71 | 7128.28 | | 7128.48 | 0.015176 | 3.65 | 457.37 | 291.77 | 0.41 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9558 | 2-YR | 154.80 | 7122.44 | 7125.43 | | 7125.48 | 0.009207 | 1.85 | 83.73 | 68.20 | 0.29 |
| Reach 1-3 | 9558 | 5-YR | 475.50 | 7122.44 | 7126.40 | | 7126.54 | 0.011459 | 3.01 | 171.99 | 129.86 | 0.35 |
| Reach 1-3 | 9558 | 10-YR | 773.90 | 7122.44 | 7126.93 | | 7127.12 | 0.013031 | 3.70 | 249.12 | 211.38 | 0.39 |
| Reach 1-3 | 9558 | 25-YR | 1022.90 | 7122.44 | 7127.25 | | 7127.47 | 0.013718 | 4.08 | 320.80 | 277.99 | 0.41 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 9558 | 50-YR | 1389.50 | 7122.44 | 7127.62 | | 7127.85 | 0.013567 | 4.37 | 420.44 | 308.23 | 0.41 |
| Reach 1-3 | 9558 | 100-YR | 1643.00 | 7122.44 | 7127.85 | | 7128.09 | 0.013635 | 4.58 | 489.68 | 318.69 | 0.42 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9498 | 2-YR | 154.80 | 7122.10 | 7124.84 | 7124.09 | 7124.89 | 0.010707 | 1.81 | 87.16 | 98.75 | 0.30 |
| Reach 1-3 | 9498 | 5-YR | 475.50 | 7122.10 | 7125.63 | 7124.75 | 7125.73 | 0.015813 | 2.80 | 211.12 | 217.56 | 0.36 |
| Reach 1-3 | 9498 | 10-YR | 773.90 | 7122.10 | 7126.04 | 7125.27 | 7126.18 | 0.018007 | 3.34 | 302.00 | 243.98 | 0.39 |
| Reach 1-3 | 9498 | 25-YR | 1022.90 | 7122.10 | 7126.32 | 7125.57 | 7126.48 | 0.018767 | 3.64 | 367.26 | 252.60 | 0.40 |
| Reach 1-3 | 9498 | 50-YR | 1389.50 | 7122.10 | 7126.68 | 7125.86 | 7126.86 | 0.019079 | 3.96 | 456.92 | 256.25 | 0.41 |
| Reach 1-3 | 9498 | 100-YR | 1643.00 | 7122.10 | 7126.92 | 7126.04 | 7127.11 | 0.018590 | 4.10 | 520.19 | 268.54 | 0.40 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9389 | 2-YR | 154.80 | 7120.61 | 7122.13 | | 7122.28 | 0.091469 | 3.12 | 49.98 | 69.48 | 0.63 |
| Reach 1-3 | 9389 | 5-YR | 475.50 | 7120.61 | 7122.88 | | 7123.05 | 0.043975 | 3.41 | 143.95 | 143.70 | 0.49 |
| Reach 1-3 | 9389 | 10-YR | 773.90 | 7120.61 | 7123.33 | | 7123.56 | 0.034935 | 3.63 | 210.42 | 151.00 | 0.46 |
| Reach 1-3 | 9389 | 25-YR | 1022.90 | 7120.61 | 7123.64 | | 7123.91 | 0.031908 | 3.82 | 258.72 | 158.59 | 0.45 |
| Reach 1-3 | 9389 | 50-YR | 1389.50 | 7120.61 | 7124.03 | | 7124.36 | 0.029557 | 4.10 | 322.64 | 166.34 | 0.44 |
| Reach 1-3 | 9389 | 100-YR | 1643.00 | 7120.61 | 7124.23 | | 7124.61 | 0.030723 | 4.38 | 355.54 | 173.42 | 0.46 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9256 | 2-YR | 154.80 | 7118.36 | 7120.25 | 7119.62 | 7120.26 | 0.005839 | 0.97 | 161.55 | 198.68 | 0.19 |
| Reach 1-3 | 9256 | 5-YR | 475.50 | 7118.36 | 7120.91 | 7119.97 | 7120.95 | 0.007834 | 1.63 | 298.13 | 210.03 | 0.23 |
| Reach 1-3 | 9256 | 10-YR | 773.90 | 7118.36 | 7121.33 | 7120.20 | 7121.39 | 0.009054 | 2.06 | 386.93 | 217.65 | 0.26 |
| Reach 1-3 | 9256 | 25-YR | 1022.90 | 7118.36 | 7121.62 | 7120.36 | 7121.70 | 0.009759 | 2.34 | 450.15 | 221.94 | 0.28 |
| Reach 1-3 | 9256 | 50-YR | 1389.50 | 7118.36 | 7121.98 | 7120.59 | 7122.09 | 0.010599 | 2.70 | 531.77 | 227.40 | 0.30 |
| Reach 1-3 | 9256 | 100-YR | 1643.00 | 7118.36 | 7122.33 | | 7122.44 | 0.009506 | 2.78 | 611.72 | 232.37 | 0.29 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9243 | 2-YR | 154.80 | 7119.00 | 7119.38 | 7119.38 | 7119.54 | 0.170899 | 3.15 | 49.24 | 158.41 | 0.99 |
| Reach 1-3 | 9243 | 5-YR | 475.50 | 7119.00 | 7119.72 | 7119.72 | 7120.04 | 0.136550 | 4.56 | 104.91 | 169.42 | 1.00 |
| Reach 1-3 | 9243 | 10-YR | 773.90 | 7119.00 | 7119.98 | 7119.98 | 7120.40 | 0.115790 | 5.25 | 149.87 | 180.06 | 0.97 |
| Reach 1-3 | 9243 | 25-YR | 1022.90 | 7119.00 | 7120.16 | 7120.16 | 7120.66 | 0.109054 | 5.74 | 182.09 | 184.06 | 0.97 |
| Reach 1-3 | 9243 | 50-YR | 1389.50 | 7119.00 | 7120.39 | 7120.39 | 7121.00 | 0.101285 | 6.31 | 225.97 | 188.90 | 0.97 |
| Reach 1-3 | 9243 | 100-YR | 1643.00 | 7119.00 | 7121.86 | | 7122.02 | 0.010082 | 3.28 | 524.94 | 219.00 | 0.35 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9216 | 2-YR | 154.80 | 7114.00 | 7118.49 | | 7118.49 | 0.000004 | 0.16 | 981.43 | 237.93 | 0.01 |
| Reach 1-3 | 9216 | 5-YR | 475.50 | 7114.00 | 7119.04 | | 7119.04 | 0.000026 | 0.45 | 1114.42 | 242.83 | 0.04 |
| Reach 1-3 | 9216 | 10-YR | 773.90 | 7114.00 | 7119.41 | | 7119.42 | 0.000054 | 0.67 | 1206.22 | 246.14 | 0.05 |
| Reach 1-3 | 9216 | 25-YR | 1022.90 | 7114.00 | 7119.68 | | 7119.69 | 0.000080 | 0.85 | 1271.47 | 250.35 | 0.06 |
| Reach 1-3 | 9216 | 50-YR | 1389.50 | 7114.00 | 7120.02 | | 7120.03 | 0.000122 | 1.09 | 1357.44 | 256.91 | 0.08 |
| Reach 1-3 | 9216 | 100-YR | 1643.00 | 7114.00 | 7121.95 | | 7121.97 | 0.000063 | 0.94 | 1872.58 | 275.39 | 0.06 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9080 | 2-YR | 155.10 | 7114.00 | 7118.48 | | 7118.49 | 0.000009 | 0.18 | 892.72 | 218.41 | 0.01 |
| Reach 1-3 | 9080 | 5-YR | 480.20 | 7114.00 | 7119.03 | | 7119.04 | 0.000059 | 0.48 | 1013.89 | 223.12 | 0.04 |
| Reach 1-3 | 9080 | 10-YR | 783.10 | 7114.00 | 7119.40 | | 7119.41 | 0.000123 | 0.73 | 1096.83 | 226.27 | 0.05 |
| Reach 1-3 | 9080 | 25-YR | 1035.50 | 7114.00 | 7119.66 | | 7119.67 | 0.000182 | 0.91 | 1155.34 | 228.47 | 0.07 |
| Reach 1-3 | 9080 | 50-YR | 1408.70 | 7114.00 | 7119.99 | | 7120.01 | 0.000276 | 1.16 | 1231.11 | 231.29 | 0.08 |
| Reach 1-3 | 9080 | 100-YR | 1665.90 | 7114.00 | 7121.94 | | 7121.95 | 0.000141 | 1.00 | 1704.14 | 253.19 | 0.06 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9029 | 2-YR | 155.10 | 7117.75 | 7118.47 | | 7118.48 | 0.002859 | 0.91 | 170.43 | 240.30 | 0.19 |
| Reach 1-3 | 9029 | 5-YR | 480.20 | 7117.75 | 7118.98 | | 7119.02 | 0.004516 | 1.64 | 293.98 | 244.42 | 0.26 |
| Reach 1-3 | 9029 | 10-YR | 783.10 | 7117.75 | 7119.31 | | 7119.38 | 0.005345 | 2.09 | 375.82 | 247.12 | 0.29 |
| Reach 1-3 | 9029 | 25-YR | 1035.50 | 7117.75 | 7119.54 | | 7119.63 | 0.005899 | 2.40 | 432.26 | 248.97 | 0.32 |
| Reach 1-3 | 9029 | 50-YR | 1408.70 | 7117.75 | 7119.83 | | 7119.95 | 0.006607 | 2.81 | 503.71 | 251.30 | 0.34 |
| Reach 1-3 | 9029 | 100-YR | 1665.90 | 7117.75 | 7121.89 | | 7121.93 | 0.000867 | 1.61 | 1046.08 | 274.53 | 0.14 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8989 | 2-YR | 155.10 | 7117.73 | 7118.00 | 7118.00 | 7118.12 | 0.122416 | 2.80 | 55.39 | 240.21 | 1.03 |
| Reach 1-3 | 8989 | 5-YR | 480.20 | 7117.73 | 7118.26 | 7118.26 | 7118.51 | 0.089953 | 4.01 | 119.98 | 242.58 | 1.00 |
| Reach 1-3 | 8989 | 10-YR | 783.10 | 7117.73 | 7118.45 | 7118.45 | 7118.80 | 0.081553 | 4.73 | 165.98 | 244.25 | 1.00 |
| Reach 1-3 | 8989 | 25-YR | 1035.50 | 7117.73 | 7118.59 | 7118.59 | 7119.01 | 0.076229 | 5.17 | 200.53 | 245.49 | 1.00 |
| Reach 1-3 | 8989 | 50-YR | 1408.70 | 7117.73 | 7118.80 | 7118.79 | 7119.29 | 0.067100 | 5.62 | 251.06 | 247.30 | 0.97 |
| Reach 1-3 | 8989 | 100-YR | 1665.90 | 7117.73 | 7121.86 | | 7121.89 | 0.000857 | 1.59 | 1060.85 | 282.01 | 0.14 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8983 | 2-YR | 155.10 | 7103.78 | 7107.20 | | 7107.25 | 0.002002 | 1.83 | 84.59 | 24.77 | 0.17 |
| Reach 1-3 | 8983 | 5-YR | 480.20 | 7103.78 | 7110.92 | | 7111.04 | 0.002176 | 2.71 | 176.93 | 24.84 | 0.18 |
| Reach 1-3 | 8983 | 10-YR | 783.10 | 7103.78 | 7113.63 | | 7113.79 | 0.002352 | 3.21 | 244.16 | 24.89 | 0.18 |
| Reach 1-3 | 8983 | 25-YR | 1035.50 | 7103.78 | 7115.61 | | 7115.80 | 0.002293 | 3.51 | 294.71 | 220.10 | 0.18 |
| Reach 1-3 | 8983 | 50-YR | 1408.70 | 7103.78 | 7118.96 | | 7119.17 | 0.001814 | 3.70 | 380.29 | 254.36 | 0.17 |
| Reach 1-3 | 8983 | 100-YR | 1665.90 | 7103.78 | 7121.77 | | 7121.88 | 0.004403 | 2.66 | 647.71 | 282.90 | 0.28 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8956 | 2-YR | 155.10 | 7103.78 | 7107.14 | 7104.85 | 7107.20 | 0.002109 | 1.87 | 83.16 | 24.77 | 0.18 |
| Reach 1-3 | 8956 | 5-YR | 480.20 | 7103.78 | 7110.86 | 7106.05 | 7110.98 | 0.002230 | 2.74 | 175.39 | 24.84 | 0.18 |
| Reach 1-3 | 8956 | 10-YR | 783.10 | 7103.78 | 7113.56 | 7106.92 | 7113.72 | 0.002396 | 3.23 | 242.50 | 24.89 | 0.18 |
| Reach 1-3 | 8956 | 25-YR | 1035.50 | 7103.78 | 7115.55 | 7107.56 | 7115.74 | 0.002336 | 3.53 | 293.06 | 219.44 | 0.18 |
| Reach 1-3 | 8956 | 50-YR | 1408.70 | 7103.78 | 7118.91 | 7108.43 | 7119.12 | 0.001835 | 3.72 | 378.99 | 253.84 | 0.17 |
| Reach 1-3 | 8956 | 100-YR | 1665.90 | 7103.78 | 7121.62 | 7108.98 | 7121.75 | 0.005388 | 2.85 | 606.09 | 281.58 | 0.30 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8919 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 8888 | 2-YR | 155.10 | 7103.58 | 7105.14 | 7105.14 | 7105.92 | 0.056603 | 6.78 | 22.21 | 46.92 | 0.96 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 8888 | 5-YR | 480.20 | 7103.58 | 7106.88 | 7106.88 | 7108.55 | 0.044095 | 9.89 | 47.17 | 47.00 | 0.96 |
| Reach 1-3 | 8888 | 10-YR | 783.10 | 7103.58 | 7108.15 | 7108.15 | 7110.47 | 0.039662 | 11.65 | 65.30 | 47.06 | 0.96 |
| Reach 1-3 | 8888 | 25-YR | 1035.50 | 7103.58 | 7109.09 | 7109.09 | 7111.88 | 0.037201 | 12.78 | 78.71 | 47.10 | 0.96 |
| Reach 1-3 | 8888 | 50-YR | 1408.70 | 7103.58 | 7110.35 | 7110.35 | 7113.76 | 0.034709 | 14.15 | 96.67 | 47.16 | 0.96 |
| Reach 1-3 | 8888 | 100-YR | 1665.90 | 7103.58 | 7111.16 | 7111.16 | 7114.97 | 0.033367 | 14.96 | 108.17 | 47.20 | 0.96 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8886 | 2-YR | 155.10 | 7102.02 | 7104.31 | | 7104.57 | 0.011386 | 3.93 | 38.72 | 46.89 | 0.46 |
| Reach 1-3 | 8886 | 5-YR | 480.20 | 7102.02 | 7104.96 | 7104.96 | 7106.45 | 0.047351 | 9.47 | 49.75 | 46.92 | 0.97 |
| Reach 1-3 | 8886 | 10-YR | 783.10 | 7102.02 | 7106.10 | 7106.10 | 7108.15 | 0.042478 | 11.14 | 68.92 | 46.97 | 0.97 |
| Reach 1-3 | 8886 | 25-YR | 1035.50 | 7102.02 | 7106.93 | 7106.93 | 7109.40 | 0.039782 | 12.22 | 83.11 | 47.01 | 0.97 |
| Reach 1-3 | 8886 | 50-YR | 1408.70 | 7102.02 | 7108.05 | 7108.05 | 7111.08 | 0.037208 | 13.54 | 101.99 | 47.06 | 0.97 |
| Reach 1-3 | 8886 | 100-YR | 1665.90 | 7102.02 | 7108.76 | 7108.76 | 7112.15 | 0.035810 | 14.32 | 114.09 | 47.09 | 0.97 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8852 | 2-YR | 155.10 | 7102.13 | 7104.44 | | 7104.45 | 0.000484 | 0.78 | 217.80 | 165.89 | 0.09 |
| Reach 1-3 | 8852 | 5-YR | 480.20 | 7102.13 | 7105.16 | | 7105.19 | 0.001292 | 1.53 | 338.11 | 170.14 | 0.16 |
| Reach 1-3 | 8852 | 10-YR | 783.10 | 7102.13 | 7105.64 | | 7105.69 | 0.001715 | 1.95 | 426.09 | 192.30 | 0.19 |
| Reach 1-3 | 8852 | 25-YR | 1035.50 | 7102.13 | 7105.98 | | 7106.05 | 0.001952 | 2.22 | 493.90 | 217.14 | 0.20 |
| Reach 1-3 | 8852 | 50-YR | 1408.70 | 7102.13 | 7106.42 | | 7106.51 | 0.002149 | 2.51 | 597.80 | 248.82 | 0.22 |
| Reach 1-3 | 8852 | 100-YR | 1665.90 | 7102.13 | 7106.68 | | 7106.78 | 0.002264 | 2.68 | 664.18 | 264.27 | 0.23 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8850 | 2-YR | 155.10 | 7103.55 | 7104.41 | | 7104.45 | 0.008246 | 1.49 | 104.01 | 167.75 | 0.29 |
| Reach 1-3 | 8850 | 5-YR | 480.20 | 7103.55 | 7105.11 | | 7105.18 | 0.006220 | 1.94 | 223.93 | 183.39 | 0.28 |
| Reach 1-3 | 8850 | 10-YR | 783.10 | 7103.55 | 7105.58 | | 7105.68 | 0.005774 | 2.23 | 314.55 | 203.59 | 0.28 |
| Reach 1-3 | 8850 | 25-YR | 1035.50 | 7103.55 | 7105.90 | | 7106.04 | 0.005596 | 2.43 | 384.07 | 225.42 | 0.28 |
| Reach 1-3 | 8850 | 50-YR | 1408.70 | 7103.55 | 7106.34 | | 7106.50 | 0.005363 | 2.67 | 490.23 | 262.93 | 0.28 |
| Reach 1-3 | 8850 | 100-YR | 1665.90 | 7103.55 | 7106.59 | | 7106.77 | 0.005281 | 2.81 | 557.52 | 265.04 | 0.29 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8786 | 2-YR | 155.10 | 7101.10 | 7103.81 | | 7103.86 | 0.010258 | 1.85 | 95.06 | 191.55 | 0.30 |
| Reach 1-3 | 8786 | 5-YR | 480.20 | 7101.10 | 7104.66 | | 7104.71 | 0.008389 | 2.16 | 312.09 | 265.75 | 0.27 |
| Reach 1-3 | 8786 | 10-YR | 783.10 | 7101.10 | 7105.17 | | 7105.23 | 0.007798 | 2.36 | 450.22 | 269.91 | 0.26 |
| Reach 1-3 | 8786 | 25-YR | 1035.50 | 7101.10 | 7105.53 | | 7105.59 | 0.007657 | 2.52 | 545.72 | 272.66 | 0.26 |
| Reach 1-3 | 8786 | 50-YR | 1408.70 | 7101.10 | 7105.99 | | 7106.06 | 0.007491 | 2.72 | 672.09 | 276.24 | 0.26 |
| Reach 1-3 | 8786 | 100-YR | 1665.90 | 7101.10 | 7106.25 | | 7106.33 | 0.007640 | 2.88 | 743.97 | 278.23 | 0.27 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8750 | 2-YR | 155.10 | 7100.37 | 7103.04 | | 7103.08 | 0.009028 | 1.76 | 103.16 | 206.84 | 0.27 |
| Reach 1-3 | 8750 | 5-YR | 480.20 | 7100.37 | 7103.87 | | 7103.94 | 0.010688 | 2.46 | 249.18 | 229.50 | 0.30 |
| Reach 1-3 | 8750 | 10-YR | 783.10 | 7100.37 | 7104.34 | | 7104.44 | 0.011944 | 2.93 | 339.83 | 252.23 | 0.32 |
| Reach 1-3 | 8750 | 25-YR | 1035.50 | 7100.37 | 7104.67 | | 7104.79 | 0.012622 | 3.23 | 405.36 | 267.67 | 0.33 |
| Reach 1-3 | 8750 | 50-YR | 1408.70 | 7100.37 | 7105.09 | | 7105.25 | 0.013678 | 3.65 | 495.89 | 281.18 | 0.35 |
| Reach 1-3 | 8750 | 100-YR | 1665.90 | 7100.37 | 7105.34 | | 7105.51 | 0.013732 | 3.82 | 566.53 | 282.83 | 0.36 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8683 | 2-YR | 155.10 | 7099.61 | 7102.35 | | 7102.40 | 0.008831 | 1.75 | 97.16 | 241.95 | 0.27 |
| Reach 1-3 | 8683 | 5-YR | 480.20 | 7099.61 | 7103.14 | | 7103.20 | 0.009533 | 2.31 | 293.09 | 264.91 | 0.28 |
| Reach 1-3 | 8683 | 10-YR | 783.10 | 7099.61 | 7103.60 | | 7103.67 | 0.009634 | 2.59 | 415.32 | 268.24 | 0.29 |
| Reach 1-3 | 8683 | 25-YR | 1035.50 | 7099.61 | 7103.91 | | 7103.99 | 0.009772 | 2.80 | 499.76 | 270.41 | 0.29 |
| Reach 1-3 | 8683 | 50-YR | 1408.70 | 7099.61 | 7104.31 | | 7104.41 | 0.009949 | 3.05 | 608.02 | 273.10 | 0.30 |
| Reach 1-3 | 8683 | 100-YR | 1665.90 | 7099.61 | 7104.55 | | 7104.66 | 0.010071 | 3.21 | 674.91 | 274.79 | 0.30 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8578 | 2-YR | 155.10 | 7099.09 | 7101.70 | | 7101.74 | 0.007846 | 1.58 | 122.63 | 238.84 | 0.25 |
| Reach 1-3 | 8578 | 5-YR | 480.20 | 7099.09 | 7102.44 | | 7102.49 | 0.008739 | 2.12 | 304.41 | 248.92 | 0.27 |
| Reach 1-3 | 8578 | 10-YR | 783.10 | 7099.09 | 7102.86 | | 7102.93 | 0.009821 | 2.50 | 408.61 | 252.04 | 0.29 |
| Reach 1-3 | 8578 | 25-YR | 1035.50 | 7099.09 | 7103.14 | | 7103.22 | 0.010530 | 2.77 | 480.05 | 254.23 | 0.30 |
| Reach 1-3 | 8578 | 50-YR | 1408.70 | 7099.09 | 7103.50 | | 7103.60 | 0.011376 | 3.10 | 571.54 | 257.01 | 0.31 |
| Reach 1-3 | 8578 | 100-YR | 1665.90 | 7099.09 | 7103.73 | | 7103.85 | 0.011606 | 3.28 | 632.37 | 258.85 | 0.32 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8429 | 2-YR | 155.10 | 7098.29 | 7100.73 | | 7100.81 | 0.015293 | 2.28 | 69.88 | 164.15 | 0.40 |
| Reach 1-3 | 8429 | 5-YR | 480.20 | 7098.29 | 7101.42 | 7100.98 | 7101.55 | 0.015142 | 3.15 | 191.78 | 227.60 | 0.43 |
| Reach 1-3 | 8429 | 10-YR | 783.10 | 7098.29 | 7101.80 | | 7101.94 | 0.014100 | 3.50 | 278.38 | 231.88 | 0.43 |
| Reach 1-3 | 8429 | 25-YR | 1035.50 | 7098.29 | 7102.06 | | 7102.23 | 0.013444 | 3.71 | 340.07 | 233.40 | 0.43 |
| Reach 1-3 | 8429 | 50-YR | 1408.70 | 7098.29 | 7102.47 | | 7102.64 | 0.011565 | 3.85 | 434.67 | 235.71 | 0.41 |
| Reach 1-3 | 8429 | 100-YR | 1665.90 | 7098.29 | 7102.50 | | 7102.74 | 0.015363 | 4.47 | 441.80 | 235.88 | 0.48 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8326 | 2-YR | 155.10 | 7096.32 | 7098.41 | 7098.41 | 7098.84 | 0.013934 | 5.57 | 29.84 | 35.34 | 1.00 |
| Reach 1-3 | 8326 | 5-YR | 480.20 | 7096.32 | 7099.25 | 7099.25 | 7099.72 | 0.012631 | 4.98 | 89.61 | 96.87 | 0.95 |
| Reach 1-3 | 8326 | 10-YR | 783.10 | 7096.32 | 7099.61 | 7099.61 | 7100.24 | 0.011774 | 6.06 | 124.54 | 99.67 | 0.97 |
| Reach 1-3 | 8326 | 25-YR | 1035.50 | 7096.32 | 7099.88 | 7099.88 | 7100.62 | 0.010932 | 6.69 | 151.99 | 101.87 | 0.97 |
| Reach 1-3 | 8326 | 50-YR | 1408.70 | 7096.32 | 7100.19 | 7100.19 | 7101.12 | 0.011119 | 7.64 | 183.69 | 109.60 | 1.01 |
| Reach 1-3 | 8326 | 100-YR | 1665.90 | 7096.32 | 7100.64 | 7100.64 | 7101.39 | 0.007135 | 7.11 | 258.28 | 195.05 | 0.84 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8290 | 2-YR | 155.10 | 7097.00 | 7097.90 | | 7097.97 | 0.006102 | 2.21 | 70.21 | 88.46 | 0.44 |
| Reach 1-3 | 8290 | 5-YR | 480.20 | 7097.00 | 7098.50 | | 7098.73 | 0.009227 | 3.83 | 125.37 | 94.21 | 0.59 |
| Reach 1-3 | 8290 | 10-YR | 783.10 | 7097.00 | 7098.89 | | 7099.25 | 0.010750 | 4.80 | 163.19 | 98.00 | 0.66 |
| Reach 1-3 | 8290 | 25-YR | 1035.50 | 7097.00 | 7099.17 | | 7099.63 | 0.011692 | 5.44 | 190.20 | 100.62 | 0.70 |
| Reach 1-3 | 8290 | 50-YR | 1408.70 | 7097.00 | 7099.52 | | 7100.12 | 0.012713 | 6.23 | 226.12 | 104.00 | 0.74 |
| Reach 1-3 | 8290 | 100-YR | 1665.90 | 7097.00 | 7099.73 | | 7100.43 | 0.013409 | 6.72 | 248.01 | 106.00 | 0.77 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 8276 | 2-YR | 155.10 | 7097.00 | 7097.80 | 7097.52 | 7097.88 | 0.007642 | 2.27 | 68.41 | 98.16 | 0.48 |
| Reach 1-3 | 8276 | 5-YR | 480.20 | 7097.00 | 7098.37 | 7098.01 | 7098.60 | 0.010226 | 3.81 | 126.12 | 103.33 | 0.61 |
| Reach 1-3 | 8276 | 10-YR | 783.10 | 7097.00 | 7098.75 | 7098.36 | 7099.10 | 0.011376 | 4.71 | 166.10 | 106.92 | 0.67 |
| Reach 1-3 | 8276 | 25-YR | 1035.50 | 7097.00 | 7099.02 | 7098.62 | 7099.46 | 0.012050 | 5.31 | 194.89 | 109.44 | 0.70 |
| Reach 1-3 | 8276 | 50-YR | 1408.70 | 7097.00 | 7099.37 | 7098.96 | 7099.93 | 0.012698 | 6.03 | 233.57 | 112.73 | 0.74 |
| Reach 1-3 | 8276 | 100-YR | 1665.90 | 7097.00 | 7099.57 | 7099.17 | 7100.23 | 0.013252 | 6.49 | 256.77 | 114.66 | 0.76 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8267 | 2-YR | 155.10 | 7097.00 | 7097.51 | 7097.51 | 7097.71 | 0.039749 | 3.62 | 42.84 | 105.00 | 1.00 |
| Reach 1-3 | 8267 | 5-YR | 480.20 | 7097.00 | 7097.97 | 7097.97 | 7098.39 | 0.031384 | 5.23 | 91.84 | 108.53 | 1.00 |
| Reach 1-3 | 8267 | 10-YR | 783.10 | 7097.00 | 7098.29 | 7098.29 | 7098.88 | 0.028787 | 6.13 | 127.68 | 111.23 | 1.01 |
| Reach 1-3 | 8267 | 25-YR | 1035.50 | 7097.00 | 7098.54 | 7098.54 | 7099.23 | 0.026896 | 6.67 | 155.25 | 113.28 | 1.00 |
| Reach 1-3 | 8267 | 50-YR | 1408.70 | 7097.00 | 7098.86 | 7098.86 | 7099.69 | 0.025351 | 7.34 | 191.91 | 115.95 | 1.01 |
| Reach 1-3 | 8267 | 100-YR | 1665.90 | 7097.00 | 7099.06 | 7099.06 | 7099.99 | 0.024397 | 7.71 | 215.98 | 117.67 | 1.00 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8229 | 2-YR | 155.10 | 7091.00 | 7094.18 | | 7094.19 | 0.000280 | 0.90 | 172.77 | 82.65 | 0.11 |
| Reach 1-3 | 8229 | 5-YR | 480.20 | 7091.00 | 7095.09 | | 7095.15 | 0.000860 | 1.91 | 251.59 | 89.99 | 0.20 |
| Reach 1-3 | 8229 | 10-YR | 783.10 | 7091.00 | 7095.70 | | 7095.80 | 0.001259 | 2.55 | 307.50 | 94.85 | 0.25 |
| Reach 1-3 | 8229 | 25-YR | 1035.50 | 7091.00 | 7096.12 | | 7096.26 | 0.001526 | 2.97 | 348.18 | 98.24 | 0.28 |
| Reach 1-3 | 8229 | 50-YR | 1408.70 | 7091.00 | 7096.66 | | 7096.85 | 0.001851 | 3.50 | 402.20 | 102.56 | 0.31 |
| Reach 1-3 | 8229 | 100-YR | 1665.90 | 7091.00 | 7096.97 | | 7097.20 | 0.002066 | 3.83 | 434.60 | 105.07 | 0.33 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8210 | 2-YR | 155.10 | 7091.00 | 7094.18 | | 7094.19 | 0.000278 | 0.89 | 174.33 | 84.22 | 0.11 |
| Reach 1-3 | 8210 | 5-YR | 480.20 | 7091.00 | 7095.08 | | 7095.13 | 0.000856 | 1.89 | 253.61 | 91.50 | 0.20 |
| Reach 1-3 | 8210 | 10-YR | 783.10 | 7091.00 | 7095.68 | | 7095.77 | 0.001255 | 2.53 | 309.69 | 96.32 | 0.25 |
| Reach 1-3 | 8210 | 25-YR | 1035.50 | 7091.00 | 7096.09 | | 7096.23 | 0.001521 | 2.95 | 350.51 | 99.69 | 0.28 |
| Reach 1-3 | 8210 | 50-YR | 1408.70 | 7091.00 | 7096.62 | | 7096.81 | 0.001847 | 3.48 | 404.66 | 103.98 | 0.31 |
| Reach 1-3 | 8210 | 100-YR | 1665.90 | 7091.00 | 7096.93 | | 7097.16 | 0.002063 | 3.81 | 437.08 | 106.47 | 0.33 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8209 | 2-YR | 155.10 | 7093.00 | 7094.13 | | 7094.18 | 0.002881 | 1.80 | 86.10 | 83.81 | 0.31 |
| Reach 1-3 | 8209 | 5-YR | 480.20 | 7093.00 | 7094.97 | | 7095.11 | 0.003948 | 3.01 | 159.34 | 90.59 | 0.40 |
| Reach 1-3 | 8209 | 10-YR | 783.10 | 7093.00 | 7095.52 | | 7095.74 | 0.004386 | 3.71 | 211.20 | 95.10 | 0.44 |
| Reach 1-3 | 8209 | 25-YR | 1035.50 | 7093.00 | 7095.92 | | 7096.19 | 0.004623 | 4.16 | 249.16 | 98.27 | 0.46 |
| Reach 1-3 | 8209 | 50-YR | 1408.70 | 7093.00 | 7096.42 | | 7096.76 | 0.004896 | 4.70 | 299.50 | 102.33 | 0.48 |
| Reach 1-3 | 8209 | 100-YR | 1665.90 | 7093.00 | 7096.70 | | 7097.10 | 0.005160 | 5.06 | 329.01 | 104.63 | 0.50 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8175 | 2-YR | 155.10 | 7093.00 | 7093.97 | | 7094.04 | 0.004972 | 2.14 | 72.37 | 81.75 | 0.40 |
| Reach 1-3 | 8175 | 5-YR | 480.20 | 7093.00 | 7094.73 | | 7094.92 | 0.006283 | 3.51 | 136.88 | 87.84 | 0.50 |
| Reach 1-3 | 8175 | 10-YR | 783.10 | 7093.00 | 7095.25 | | 7095.53 | 0.006679 | 4.26 | 183.68 | 92.01 | 0.53 |
| Reach 1-3 | 8175 | 25-YR | 1035.50 | 7093.00 | 7095.62 | | 7095.97 | 0.006905 | 4.75 | 217.82 | 94.93 | 0.55 |
| Reach 1-3 | 8175 | 50-YR | 1408.70 | 7093.00 | 7096.08 | | 7096.53 | 0.007182 | 5.36 | 263.05 | 98.67 | 0.58 |
| Reach 1-3 | 8175 | 100-YR | 1665.90 | 7093.00 | 7096.33 | | 7096.85 | 0.007686 | 5.80 | 287.33 | 100.62 | 0.60 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8165 | 2-YR | 155.10 | 7093.00 | 7093.89 | 7093.55 | 7093.98 | 0.006634 | 2.34 | 66.16 | 81.14 | 0.46 |
| Reach 1-3 | 8165 | 5-YR | 480.20 | 7093.00 | 7094.62 | 7094.11 | 7094.84 | 0.007890 | 3.77 | 127.32 | 86.97 | 0.55 |
| Reach 1-3 | 8165 | 10-YR | 783.10 | 7093.00 | 7095.12 | 7094.50 | 7095.44 | 0.008211 | 4.56 | 171.85 | 90.97 | 0.58 |
| Reach 1-3 | 8165 | 25-YR | 1035.50 | 7093.00 | 7095.48 | 7094.80 | 7095.88 | 0.008313 | 5.05 | 205.06 | 93.85 | 0.60 |
| Reach 1-3 | 8165 | 50-YR | 1408.70 | 7093.00 | 7095.94 | 7095.19 | 7096.44 | 0.008476 | 5.65 | 249.12 | 97.53 | 0.62 |
| Reach 1-3 | 8165 | 100-YR | 1665.90 | 7093.00 | 7096.15 | | 7096.74 | 0.009339 | 6.18 | 269.43 | 99.18 | 0.66 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8155 | 2-YR | 155.10 | 7093.00 | 7093.55 | 7093.55 | 7093.80 | 0.037138 | 3.99 | 38.90 | 78.37 | 1.00 |
| Reach 1-3 | 8155 | 5-YR | 480.20 | 7093.00 | 7094.11 | 7094.11 | 7094.62 | 0.029657 | 5.72 | 83.90 | 82.88 | 1.00 |
| Reach 1-3 | 8155 | 10-YR | 783.10 | 7093.00 | 7094.51 | 7094.51 | 7095.20 | 0.027014 | 6.66 | 117.52 | 86.06 | 1.01 |
| Reach 1-3 | 8155 | 25-YR | 1035.50 | 7093.00 | 7094.79 | 7094.79 | 7095.62 | 0.025794 | 7.27 | 142.43 | 88.35 | 1.01 |
| Reach 1-3 | 8155 | 50-YR | 1408.70 | 7093.00 | 7095.19 | 7095.19 | 7096.16 | 0.023919 | 7.92 | 177.77 | 91.49 | 1.00 |
| Reach 1-3 | 8155 | 100-YR | 1665.90 | 7093.00 | 7095.73 | | 7096.56 | 0.015310 | 7.27 | 229.09 | 95.88 | 0.83 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8125 | 2-YR | 155.10 | 7087.00 | 7091.15 | | 7091.16 | 0.000168 | 0.88 | 176.76 | 59.20 | 0.09 |
| Reach 1-3 | 8125 | 5-YR | 480.20 | 7087.00 | 7092.77 | | 7092.82 | 0.000437 | 1.70 | 283.30 | 72.17 | 0.15 |
| Reach 1-3 | 8125 | 10-YR | 783.10 | 7087.00 | 7093.79 | | 7093.86 | 0.000599 | 2.17 | 360.72 | 80.30 | 0.18 |
| Reach 1-3 | 8125 | 25-YR | 1035.50 | 7087.00 | 7094.50 | | 7094.59 | 0.000694 | 2.47 | 419.58 | 85.96 | 0.20 |
| Reach 1-3 | 8125 | 50-YR | 1408.70 | 7087.00 | 7095.42 | | 7095.55 | 0.000785 | 2.80 | 502.86 | 93.39 | 0.21 |
| Reach 1-3 | 8125 | 100-YR | 1665.90 | 7087.00 | 7096.01 | | 7096.15 | 0.000824 | 2.98 | 559.05 | 98.09 | 0.22 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8105 | 2-YR | 155.10 | 7087.00 | 7091.15 | | 7091.16 | 0.000169 | 0.88 | 176.52 | 59.17 | 0.09 |
| Reach 1-3 | 8105 | 5-YR | 480.20 | 7087.00 | 7092.76 | | 7092.81 | 0.000440 | 1.70 | 282.67 | 72.14 | 0.15 |
| Reach 1-3 | 8105 | 10-YR | 783.10 | 7087.00 | 7093.77 | | 7093.85 | 0.000604 | 2.18 | 359.80 | 80.27 | 0.18 |
| Reach 1-3 | 8105 | 25-YR | 1035.50 | 7087.00 | 7094.48 | | 7094.58 | 0.000700 | 2.47 | 418.48 | 85.93 | 0.20 |
| Reach 1-3 | 8105 | 50-YR | 1408.70 | 7087.00 | 7095.41 | | 7095.53 | 0.000792 | 2.81 | 501.51 | 93.37 | 0.21 |
| Reach 1-3 | 8105 | 100-YR | 1665.90 | 7087.00 | 7095.99 | | 7096.13 | 0.000831 | 2.99 | 557.65 | 98.07 | 0.22 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8104 | 2-YR | 155.10 | 7089.00 | 7091.12 | | 7091.15 | 0.000882 | 1.45 | 106.94 | 58.95 | 0.19 |
| Reach 1-3 | 8104 | 5-YR | 480.20 | 7089.00 | 7092.72 | | 7092.80 | 0.001141 | 2.27 | 211.33 | 71.77 | 0.23 |
| Reach 1-3 | 8104 | 10-YR | 783.10 | 7089.00 | 7093.72 | | 7093.84 | 0.001258 | 2.72 | 287.43 | 79.83 | 0.25 |
| Reach 1-3 | 8104 | 25-YR | 1035.50 | 7089.00 | 7094.42 | | 7094.56 | 0.001306 | 3.00 | 345.45 | 85.46 | 0.26 |
| Reach 1-3 | 8104 | 50-YR | 1408.70 | 7089.00 | 7095.35 | | 7095.52 | 0.001326 | 3.29 | 427.88 | 92.88 | 0.27 |
| Reach 1-3 | 8104 | 100-YR | 1665.90 | 7089.00 | 7095.93 | | 7096.12 | 0.001317 | 3.44 | 483.77 | 97.59 | 0.27 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 8074 | 2-YR | 155.10 | 7089.00 | 7091.05 | 7089.90 | 7091.11 | 0.001831 | 1.99 | 78.10 | 46.36 | 0.27 |
| Reach 1-3 | 8074 | 5-YR | 480.20 | 7089.00 | 7092.59 | 7090.82 | 7092.73 | 0.002247 | 3.02 | 159.18 | 58.61 | 0.32 |
| Reach 1-3 | 8074 | 10-YR | 783.10 | 7089.00 | 7093.56 | 7091.45 | 7093.76 | 0.002173 | 3.62 | 216.21 | 64.86 | 0.33 |
| Reach 1-3 | 8074 | 25-YR | 1035.50 | 7089.00 | 7094.22 | 7091.90 | 7094.48 | 0.002178 | 4.05 | 255.50 | 67.50 | 0.34 |
| Reach 1-3 | 8074 | 50-YR | 1408.70 | 7089.00 | 7095.09 | 7092.48 | 7095.42 | 0.002194 | 4.59 | 306.64 | 69.00 | 0.36 |
| Reach 1-3 | 8074 | 100-YR | 1665.90 | 7089.00 | 7095.64 | 7092.79 | 7096.01 | 0.002200 | 4.92 | 338.82 | 69.00 | 0.36 |
| Reach 1-3 | 7949 | | Culvert | | | | | | | | | |
| Reach 1-3 | 7828 | 2-YR | 146.52 | 7088.70 | 7090.77 | 7089.65 | 7090.84 | 0.000724 | 2.06 | 71.01 | 42.66 | 0.28 |
| Reach 1-3 | 7828 | 5-YR | 512.38 | 7088.70 | 7092.00 | 7090.77 | 7092.25 | 0.001424 | 4.03 | 126.99 | 53.82 | 0.43 |
| Reach 1-3 | 7828 | 10-YR | 847.50 | 7088.70 | 7092.65 | 7091.44 | 7093.10 | 0.001909 | 5.39 | 157.31 | 59.58 | 0.52 |
| Reach 1-3 | 7828 | 25-YR | 1108.89 | 7088.70 | 7093.05 | 7091.89 | 7093.67 | 0.002270 | 6.32 | 175.48 | 60.60 | 0.57 |
| Reach 1-3 | 7828 | 50-YR | 1497.55 | 7088.70 | 7093.51 | 7092.47 | 7094.41 | 0.002805 | 7.59 | 197.21 | 60.61 | 0.65 |
| Reach 1-3 | 7828 | 100-YR | 1763.93 | 7088.70 | 7093.78 | 7092.84 | 7094.88 | 0.003189 | 8.43 | 209.35 | 60.61 | 0.70 |
| Reach 1-3 | 7788 | 2-YR | 146.52 | 7088.52 | 7090.75 | | 7090.77 | 0.001648 | 1.25 | 127.14 | 78.45 | 0.15 |
| Reach 1-3 | 7788 | 5-YR | 512.38 | 7088.52 | 7092.00 | | 7092.08 | 0.003168 | 2.35 | 231.51 | 88.50 | 0.23 |
| Reach 1-3 | 7788 | 10-YR | 847.50 | 7088.52 | 7092.71 | | 7092.83 | 0.004112 | 3.04 | 295.54 | 94.13 | 0.27 |
| Reach 1-3 | 7788 | 25-YR | 1108.89 | 7088.52 | 7093.14 | | 7093.31 | 0.004705 | 3.48 | 337.54 | 97.66 | 0.29 |
| Reach 1-3 | 7788 | 50-YR | 1497.55 | 7088.52 | 7093.70 | | 7093.92 | 0.005439 | 4.04 | 392.69 | 102.10 | 0.32 |
| Reach 1-3 | 7788 | 100-YR | 1763.93 | 7088.52 | 7094.02 | | 7094.29 | 0.005890 | 4.38 | 426.53 | 104.75 | 0.33 |
| Reach 1-3 | 7765 | 2-YR | 146.52 | 7088.50 | 7090.72 | | 7090.74 | 0.001285 | 1.28 | 130.26 | 81.51 | 0.15 |
| Reach 1-3 | 7765 | 5-YR | 512.38 | 7088.50 | 7091.94 | | 7092.02 | 0.002603 | 2.45 | 239.81 | 96.53 | 0.23 |
| Reach 1-3 | 7765 | 10-YR | 847.50 | 7088.50 | 7092.62 | | 7092.75 | 0.003423 | 3.17 | 307.58 | 102.20 | 0.28 |
| Reach 1-3 | 7765 | 25-YR | 1108.89 | 7088.50 | 7093.05 | | 7093.21 | 0.003944 | 3.64 | 352.01 | 105.75 | 0.30 |
| Reach 1-3 | 7765 | 50-YR | 1497.55 | 7088.50 | 7093.59 | | 7093.81 | 0.004604 | 4.24 | 410.00 | 110.19 | 0.33 |
| Reach 1-3 | 7765 | 100-YR | 1763.93 | 7088.50 | 7093.90 | | 7094.17 | 0.005015 | 4.60 | 445.50 | 112.82 | 0.35 |
| Reach 1-3 | 7742 | 2-YR | 146.52 | 7088.50 | 7090.63 | | 7090.69 | 0.004401 | 2.02 | 79.36 | 65.03 | 0.27 |
| Reach 1-3 | 7742 | 5-YR | 512.38 | 7088.50 | 7091.74 | | 7091.91 | 0.007069 | 3.57 | 166.03 | 86.97 | 0.37 |
| Reach 1-3 | 7742 | 10-YR | 847.50 | 7088.50 | 7092.36 | | 7092.62 | 0.008450 | 4.45 | 222.72 | 96.29 | 0.42 |
| Reach 1-3 | 7742 | 25-YR | 1108.89 | 7088.50 | 7092.75 | | 7093.07 | 0.009278 | 5.01 | 261.04 | 102.13 | 0.45 |
| Reach 1-3 | 7742 | 50-YR | 1497.55 | 7088.50 | 7093.23 | | 7093.64 | 0.010325 | 5.71 | 312.28 | 110.99 | 0.48 |
| Reach 1-3 | 7742 | 100-YR | 1763.93 | 7088.50 | 7093.52 | | 7093.98 | 0.010974 | 6.15 | 344.86 | 117.47 | 0.50 |
| Reach 1-3 | 7708 | 2-YR | 146.52 | 7088.50 | 7090.40 | | 7090.45 | 0.012364 | 2.08 | 94.10 | 96.63 | 0.27 |
| Reach 1-3 | 7708 | 5-YR | 512.38 | 7088.50 | 7091.46 | | 7091.56 | 0.014868 | 3.07 | 209.19 | 117.45 | 0.32 |
| Reach 1-3 | 7708 | 10-YR | 847.50 | 7088.50 | 7092.05 | | 7092.20 | 0.016633 | 3.66 | 280.37 | 123.69 | 0.34 |
| Reach 1-3 | 7708 | 25-YR | 1108.89 | 7088.50 | 7092.42 | | 7092.61 | 0.017757 | 4.05 | 327.05 | 127.57 | 0.36 |
| Reach 1-3 | 7708 | 50-YR | 1497.55 | 7088.50 | 7092.89 | | 7093.13 | 0.019206 | 4.54 | 387.50 | 131.95 | 0.38 |
| Reach 1-3 | 7708 | 100-YR | 1763.93 | 7088.50 | 7093.16 | | 7093.44 | 0.020165 | 4.84 | 423.95 | 134.20 | 0.40 |
| Reach 1-3 | 7669 | 2-YR | 146.52 | 7087.30 | 7089.96 | | 7090.02 | 0.009665 | 2.01 | 78.80 | 105.60 | 0.32 |
| Reach 1-3 | 7669 | 5-YR | 512.38 | 7087.30 | 7091.04 | | 7091.14 | 0.007692 | 2.76 | 215.15 | 142.99 | 0.32 |
| Reach 1-3 | 7669 | 10-YR | 847.50 | 7087.30 | 7091.62 | | 7091.75 | 0.007842 | 3.25 | 298.67 | 147.99 | 0.34 |
| Reach 1-3 | 7669 | 25-YR | 1108.89 | 7087.30 | 7091.98 | | 7092.14 | 0.008044 | 3.57 | 352.50 | 152.06 | 0.35 |
| Reach 1-3 | 7669 | 50-YR | 1497.55 | 7087.30 | 7092.42 | | 7092.63 | 0.008430 | 3.99 | 421.34 | 157.01 | 0.37 |
| Reach 1-3 | 7669 | 100-YR | 1763.93 | 7087.30 | 7092.68 | | 7092.92 | 0.008756 | 4.26 | 462.14 | 158.93 | 0.38 |
| Reach 1-3 | 7624 | 2-YR | 146.52 | 7086.89 | 7089.44 | | 7089.52 | 0.013314 | 2.14 | 68.38 | 65.48 | 0.37 |
| Reach 1-3 | 7624 | 5-YR | 512.38 | 7086.89 | 7090.52 | | 7090.66 | 0.016063 | 3.18 | 191.43 | 144.70 | 0.39 |
| Reach 1-3 | 7624 | 10-YR | 847.50 | 7086.89 | 7091.05 | | 7091.24 | 0.017899 | 3.81 | 275.05 | 168.45 | 0.42 |
| Reach 1-3 | 7624 | 25-YR | 1108.89 | 7086.89 | 7091.39 | | 7091.61 | 0.018694 | 4.17 | 334.66 | 187.68 | 0.43 |
| Reach 1-3 | 7624 | 50-YR | 1497.55 | 7086.89 | 7091.82 | | 7092.08 | 0.019308 | 4.59 | 420.46 | 212.63 | 0.44 |
| Reach 1-3 | 7624 | 100-YR | 1763.93 | 7086.89 | 7092.08 | | 7092.35 | 0.019266 | 4.80 | 476.18 | 216.16 | 0.45 |
| Reach 1-3 | 7584 | 2-YR | 146.52 | 7086.36 | 7089.00 | | 7089.05 | 0.010119 | 1.84 | 82.51 | 111.31 | 0.30 |
| Reach 1-3 | 7584 | 5-YR | 512.38 | 7086.36 | 7090.04 | | 7090.13 | 0.010701 | 2.58 | 261.19 | 207.95 | 0.30 |
| Reach 1-3 | 7584 | 10-YR | 847.50 | 7086.36 | 7090.56 | | 7090.66 | 0.011476 | 3.00 | 369.12 | 213.09 | 0.32 |
| Reach 1-3 | 7584 | 25-YR | 1108.89 | 7086.36 | 7090.88 | | 7091.01 | 0.011904 | 3.27 | 439.05 | 216.36 | 0.33 |
| Reach 1-3 | 7584 | 50-YR | 1497.55 | 7086.36 | 7091.30 | | 7091.45 | 0.012397 | 3.60 | 530.36 | 220.51 | 0.34 |
| Reach 1-3 | 7584 | 100-YR | 1763.93 | 7086.36 | 7091.55 | | 7091.72 | 0.012703 | 3.80 | 586.44 | 222.93 | 0.35 |
| Reach 1-3 | 7534 | 2-YR | 146.52 | 7085.85 | 7088.45 | | 7088.51 | 0.011368 | 2.01 | 72.74 | 125.00 | 0.33 |
| Reach 1-3 | 7534 | 5-YR | 512.38 | 7085.85 | 7089.45 | | 7089.52 | 0.014099 | 2.20 | 241.93 | 209.26 | 0.34 |
| Reach 1-3 | 7534 | 10-YR | 847.50 | 7085.85 | 7089.92 | | 7090.02 | 0.014696 | 2.60 | 341.93 | 213.89 | 0.34 |
| Reach 1-3 | 7534 | 25-YR | 1108.89 | 7085.85 | 7090.23 | | 7090.35 | 0.015107 | 2.86 | 407.23 | 216.85 | 0.35 |
| Reach 1-3 | 7534 | 50-YR | 1497.55 | 7085.85 | 7090.61 | | 7090.76 | 0.015723 | 3.21 | 491.29 | 220.62 | 0.36 |
| Reach 1-3 | 7534 | 100-YR | 1763.93 | 7085.85 | 7090.84 | | 7091.01 | 0.016093 | 3.42 | 542.94 | 222.89 | 0.37 |
| Reach 1-3 | 7485 | 2-YR | 146.52 | 7085.30 | 7087.81 | | 7087.88 | 0.014770 | 2.18 | 67.14 | 100.56 | 0.36 |
| Reach 1-3 | 7485 | 5-YR | 512.38 | 7085.30 | 7088.59 | | 7088.72 | 0.019760 | 3.20 | 219.00 | 209.43 | 0.41 |
| Reach 1-3 | 7485 | 10-YR | 847.50 | 7085.30 | 7088.99 | | 7089.15 | 0.022533 | 3.79 | 302.86 | 214.13 | 0.44 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 7485 | 25-YR | 1108.89 | 7085.30 | 7089.24 | | 7089.43 | 0.024167 | 4.16 | 356.99 | 217.14 | 0.46 |
| Reach 1-3 | 7485 | 50-YR | 1497.55 | 7085.30 | 7089.56 | | 7089.79 | 0.025933 | 4.62 | 427.24 | 220.85 | 0.48 |
| Reach 1-3 | 7485 | 100-YR | 1763.93 | 7085.30 | 7089.75 | | 7090.02 | 0.026994 | 4.90 | 470.27 | 223.09 | 0.50 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7455 | 2-YR | 146.52 | 7085.01 | 7087.35 | | 7087.46 | 0.013005 | 2.69 | 54.50 | 55.05 | 0.48 |
| Reach 1-3 | 7455 | 5-YR | 512.38 | 7085.01 | 7088.24 | | 7088.37 | 0.008120 | 3.20 | 204.99 | 234.20 | 0.41 |
| Reach 1-3 | 7455 | 10-YR | 847.50 | 7085.01 | 7088.58 | | 7088.75 | 0.009350 | 3.84 | 276.05 | 241.80 | 0.46 |
| Reach 1-3 | 7455 | 25-YR | 1108.89 | 7085.01 | 7088.79 | | 7089.00 | 0.010174 | 4.26 | 321.02 | 246.52 | 0.48 |
| Reach 1-3 | 7455 | 50-YR | 1497.55 | 7085.01 | 7089.06 | | 7089.33 | 0.011022 | 4.77 | 380.97 | 252.65 | 0.51 |
| Reach 1-3 | 7455 | 100-YR | 1763.93 | 7085.01 | 7089.21 | | 7089.52 | 0.011719 | 5.11 | 415.54 | 256.13 | 0.54 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7445 | 2-YR | 146.52 | 7085.12 | 7086.85 | 7086.85 | 7087.16 | 0.082062 | 4.49 | 32.66 | 86.31 | 0.99 |
| Reach 1-3 | 7445 | 5-YR | 512.38 | 7085.12 | 7087.87 | 7087.87 | 7088.20 | 0.029739 | 4.91 | 134.96 | 239.60 | 0.69 |
| Reach 1-3 | 7445 | 10-YR | 847.50 | 7085.12 | 7088.15 | 7088.15 | 7088.56 | 0.033623 | 5.82 | 194.20 | 246.61 | 0.75 |
| Reach 1-3 | 7445 | 25-YR | 1108.89 | 7085.12 | 7088.32 | 7088.32 | 7088.79 | 0.035777 | 6.36 | 231.35 | 250.92 | 0.79 |
| Reach 1-3 | 7445 | 50-YR | 1497.55 | 7085.12 | 7088.52 | 7088.52 | 7089.10 | 0.040137 | 7.17 | 274.58 | 255.85 | 0.85 |
| Reach 1-3 | 7445 | 100-YR | 1763.93 | 7085.12 | 7088.67 | 7088.67 | 7089.29 | 0.039514 | 7.44 | 308.93 | 259.72 | 0.85 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7430 | 2-YR | 146.52 | 7081.82 | 7083.58 | 7083.58 | 7083.91 | 0.090885 | 4.63 | 31.63 | 50.84 | 1.04 |
| Reach 1-3 | 7430 | 5-YR | 512.38 | 7081.82 | 7084.44 | 7084.44 | 7085.06 | 0.058497 | 6.36 | 83.89 | 71.89 | 0.95 |
| Reach 1-3 | 7430 | 10-YR | 847.50 | 7081.82 | 7084.99 | 7084.99 | 7085.74 | 0.047661 | 7.14 | 130.06 | 112.77 | 0.90 |
| Reach 1-3 | 7430 | 25-YR | 1108.89 | 7081.82 | 7085.38 | 7085.38 | 7086.11 | 0.038540 | 7.25 | 179.07 | 133.53 | 0.84 |
| Reach 1-3 | 7430 | 50-YR | 1497.55 | 7081.82 | 7085.80 | 7085.80 | 7086.56 | 0.034246 | 7.63 | 237.24 | 145.81 | 0.81 |
| Reach 1-3 | 7430 | 100-YR | 1763.93 | 7081.82 | 7085.91 | 7085.91 | 7086.83 | 0.039417 | 8.41 | 254.35 | 148.64 | 0.88 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7422 | 2-YR | 146.52 | 7080.12 | 7082.79 | | 7082.84 | 0.005401 | 1.74 | 85.03 | 65.39 | 0.25 |
| Reach 1-3 | 7422 | 5-YR | 512.38 | 7080.12 | 7083.90 | | 7084.05 | 0.008570 | 3.20 | 178.22 | 105.60 | 0.35 |
| Reach 1-3 | 7422 | 10-YR | 847.50 | 7080.12 | 7084.47 | | 7084.69 | 0.010571 | 4.06 | 242.00 | 120.93 | 0.40 |
| Reach 1-3 | 7422 | 25-YR | 1108.89 | 7080.12 | 7084.76 | | 7085.06 | 0.012464 | 4.68 | 279.01 | 128.84 | 0.45 |
| Reach 1-3 | 7422 | 50-YR | 1497.55 | 7080.12 | 7085.10 | | 7085.50 | 0.015305 | 5.52 | 324.26 | 137.54 | 0.50 |
| Reach 1-3 | 7422 | 100-YR | 1763.93 | 7080.12 | 7085.30 | | 7085.78 | 0.016952 | 6.02 | 352.54 | 146.99 | 0.53 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7409 | 2-YR | 146.52 | 7080.12 | 7082.78 | | 7082.80 | 0.001129 | 1.08 | 137.92 | 82.59 | 0.12 |
| Reach 1-3 | 7409 | 5-YR | 512.38 | 7080.12 | 7083.90 | | 7083.97 | 0.003051 | 2.30 | 257.94 | 121.52 | 0.22 |
| Reach 1-3 | 7409 | 10-YR | 847.50 | 7080.12 | 7084.46 | | 7084.58 | 0.004303 | 3.01 | 337.46 | 181.41 | 0.26 |
| Reach 1-3 | 7409 | 25-YR | 1108.89 | 7080.12 | 7084.77 | | 7084.92 | 0.005155 | 3.46 | 397.03 | 207.27 | 0.29 |
| Reach 1-3 | 7409 | 50-YR | 1497.55 | 7080.12 | 7085.13 | | 7085.33 | 0.006169 | 3.99 | 474.00 | 214.82 | 0.32 |
| Reach 1-3 | 7409 | 100-YR | 1763.93 | 7080.12 | 7085.35 | | 7085.57 | 0.006696 | 4.29 | 522.06 | 218.75 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7406 | 2-YR | 146.52 | 7081.53 | 7082.70 | | 7082.78 | 0.031863 | 2.35 | 63.57 | 75.76 | 0.39 |
| Reach 1-3 | 7406 | 5-YR | 512.38 | 7081.53 | 7083.80 | | 7083.94 | 0.025058 | 3.31 | 181.47 | 122.62 | 0.39 |
| Reach 1-3 | 7406 | 10-YR | 847.50 | 7081.53 | 7084.37 | | 7084.55 | 0.024329 | 3.80 | 269.62 | 184.52 | 0.40 |
| Reach 1-3 | 7406 | 25-YR | 1108.89 | 7081.53 | 7084.69 | | 7084.89 | 0.024322 | 4.09 | 332.33 | 208.64 | 0.41 |
| Reach 1-3 | 7406 | 50-YR | 1497.55 | 7081.53 | 7085.06 | | 7085.29 | 0.024296 | 4.41 | 412.06 | 216.37 | 0.42 |
| Reach 1-3 | 7406 | 100-YR | 1763.93 | 7081.53 | 7085.29 | | 7085.54 | 0.024098 | 4.58 | 462.07 | 220.42 | 0.42 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7351 | 2-YR | 146.52 | 7079.22 | 7081.82 | | 7081.87 | 0.009928 | 1.82 | 87.14 | 110.22 | 0.29 |
| Reach 1-3 | 7351 | 5-YR | 512.38 | 7079.22 | 7082.88 | | 7082.98 | 0.011959 | 2.76 | 242.94 | 190.60 | 0.32 |
| Reach 1-3 | 7351 | 10-YR | 847.50 | 7079.22 | 7083.38 | | 7083.51 | 0.013790 | 3.32 | 353.14 | 245.90 | 0.35 |
| Reach 1-3 | 7351 | 25-YR | 1108.89 | 7079.22 | 7083.69 | | 7083.84 | 0.014250 | 3.59 | 433.36 | 266.00 | 0.36 |
| Reach 1-3 | 7351 | 50-YR | 1497.55 | 7079.22 | 7084.08 | | 7084.24 | 0.014426 | 3.88 | 538.48 | 270.81 | 0.36 |
| Reach 1-3 | 7351 | 100-YR | 1763.93 | 7079.22 | 7084.32 | | 7084.49 | 0.014590 | 4.06 | 602.72 | 273.94 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7279 | 2-YR | 146.52 | 7078.10 | 7080.97 | | 7081.03 | 0.013635 | 1.93 | 83.68 | 113.61 | 0.32 |
| Reach 1-3 | 7279 | 5-YR | 512.38 | 7078.10 | 7082.06 | | 7082.13 | 0.011545 | 2.57 | 286.07 | 287.33 | 0.30 |
| Reach 1-3 | 7279 | 10-YR | 847.50 | 7078.10 | 7082.54 | | 7082.63 | 0.011059 | 2.84 | 426.18 | 292.14 | 0.30 |
| Reach 1-3 | 7279 | 25-YR | 1108.89 | 7078.10 | 7082.84 | | 7082.93 | 0.011081 | 3.03 | 514.03 | 294.92 | 0.31 |
| Reach 1-3 | 7279 | 50-YR | 1497.55 | 7078.10 | 7083.22 | | 7083.33 | 0.011270 | 3.29 | 626.45 | 298.44 | 0.32 |
| Reach 1-3 | 7279 | 100-YR | 1763.93 | 7078.10 | 7083.45 | | 7083.57 | 0.011469 | 3.46 | 694.45 | 300.55 | 0.32 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7213 | 2-YR | 146.52 | 7077.30 | 7080.40 | | 7080.45 | 0.006290 | 1.76 | 90.31 | 117.26 | 0.27 |
| Reach 1-3 | 7213 | 5-YR | 512.38 | 7077.30 | 7081.50 | | 7081.57 | 0.007088 | 2.47 | 313.74 | 298.97 | 0.28 |
| Reach 1-3 | 7213 | 10-YR | 847.50 | 7077.30 | 7081.97 | | 7082.05 | 0.007629 | 2.83 | 458.15 | 307.67 | 0.30 |
| Reach 1-3 | 7213 | 25-YR | 1108.89 | 7077.30 | 7082.24 | | 7082.34 | 0.008215 | 3.09 | 543.09 | 310.33 | 0.31 |
| Reach 1-3 | 7213 | 50-YR | 1497.55 | 7077.30 | 7082.59 | | 7082.70 | 0.008974 | 3.43 | 650.19 | 313.67 | 0.33 |
| Reach 1-3 | 7213 | 100-YR | 1763.93 | 7077.30 | 7082.79 | | 7082.92 | 0.009450 | 3.64 | 714.57 | 315.67 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7167 | 2-YR | 146.52 | 7077.47 | 7080.02 | | 7080.08 | 0.010656 | 1.84 | 79.69 | 67.93 | 0.30 |
| Reach 1-3 | 7167 | 5-YR | 512.38 | 7077.47 | 7081.08 | | 7081.16 | 0.011300 | 2.63 | 278.20 | 283.49 | 0.31 |
| Reach 1-3 | 7167 | 10-YR | 847.50 | 7077.47 | 7081.51 | | 7081.61 | 0.012391 | 3.05 | 411.52 | 323.88 | 0.33 |
| Reach 1-3 | 7167 | 25-YR | 1108.89 | 7077.47 | 7081.76 | | 7081.87 | 0.013167 | 3.31 | 491.06 | 326.32 | 0.34 |
| Reach 1-3 | 7167 | 50-YR | 1497.55 | 7077.47 | 7082.05 | | 7082.19 | 0.014372 | 3.67 | 588.50 | 329.04 | 0.36 |
| Reach 1-3 | 7167 | 100-YR | 1763.93 | 7077.47 | 7082.23 | | 7082.38 | 0.015164 | 3.89 | 646.32 | 330.64 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7102 | 2-YR | 146.52 | 7076.78 | 7079.13 | | 7079.22 | 0.016175 | 2.50 | 58.54 | 63.53 | 0.46 |
| Reach 1-3 | 7102 | 5-YR | 512.38 | 7076.78 | 7079.79 | 7079.57 | 7080.08 | 0.025696 | 4.55 | 136.27 | 210.07 | 0.65 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 7102 | 10-YR | 847.50 | 7076.78 | 7080.09 | 7080.09 | 7080.45 | 0.027585 | 5.36 | 217.35 | 295.48 | 0.70 |
| Reach 1-3 | 7102 | 25-YR | 1108.89 | 7076.78 | 7080.25 | 7080.25 | 7080.65 | 0.029516 | 5.87 | 263.25 | 307.47 | 0.73 |
| Reach 1-3 | 7102 | 50-YR | 1497.55 | 7076.78 | 7080.44 | 7080.44 | 7080.90 | 0.030732 | 6.40 | 325.30 | 320.12 | 0.76 |
| Reach 1-3 | 7102 | 100-YR | 1763.93 | 7076.78 | 7080.57 | 7080.57 | 7081.05 | 0.031052 | 6.69 | 364.85 | 327.93 | 0.77 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7093 | 2-YR | 146.52 | 7076.86 | 7078.59 | 7078.59 | 7078.86 | 0.141923 | 4.24 | 34.59 | 60.99 | 0.99 |
| Reach 1-3 | 7093 | 5-YR | 512.38 | 7076.86 | 7079.48 | 7079.48 | 7079.74 | 0.047787 | 4.48 | 154.91 | 305.87 | 0.67 |
| Reach 1-3 | 7093 | 10-YR | 847.50 | 7076.86 | 7079.70 | 7079.70 | 7080.02 | 0.053709 | 5.23 | 223.67 | 319.94 | 0.73 |
| Reach 1-3 | 7093 | 25-YR | 1108.89 | 7076.86 | 7079.84 | 7079.84 | 7080.19 | 0.057352 | 5.70 | 266.72 | 328.09 | 0.76 |
| Reach 1-3 | 7093 | 50-YR | 1497.55 | 7076.86 | 7079.99 | 7079.99 | 7080.42 | 0.063578 | 6.35 | 317.80 | 329.86 | 0.81 |
| Reach 1-3 | 7093 | 100-YR | 1763.93 | 7076.86 | 7080.09 | 7080.09 | 7080.57 | 0.065753 | 6.68 | 351.20 | 331.01 | 0.83 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7073 | 2-YR | 146.52 | 7072.92 | 7075.09 | | 7075.16 | 0.014543 | 2.08 | 70.40 | 65.29 | 0.35 |
| Reach 1-3 | 7073 | 5-YR | 512.38 | 7072.92 | 7076.10 | | 7076.30 | 0.018670 | 3.56 | 152.20 | 110.31 | 0.44 |
| Reach 1-3 | 7073 | 10-YR | 847.50 | 7072.92 | 7076.53 | | 7076.84 | 0.024389 | 4.62 | 206.88 | 143.29 | 0.52 |
| Reach 1-3 | 7073 | 25-YR | 1108.89 | 7072.92 | 7076.79 | | 7077.17 | 0.027281 | 5.23 | 246.03 | 157.57 | 0.56 |
| Reach 1-3 | 7073 | 50-YR | 1497.55 | 7072.92 | 7077.12 | | 7077.60 | 0.029915 | 5.92 | 301.53 | 175.92 | 0.60 |
| Reach 1-3 | 7073 | 100-YR | 1763.93 | 7072.92 | 7077.34 | | 7077.85 | 0.030312 | 6.24 | 340.57 | 189.36 | 0.61 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7066 | 2-YR | 146.52 | 7072.86 | 7075.10 | | 7075.11 | 0.001822 | 1.10 | 132.86 | 65.32 | 0.14 |
| Reach 1-3 | 7066 | 5-YR | 512.38 | 7072.86 | 7076.12 | | 7076.20 | 0.005297 | 2.43 | 235.60 | 153.21 | 0.25 |
| Reach 1-3 | 7066 | 10-YR | 847.50 | 7072.86 | 7076.55 | | 7076.70 | 0.007968 | 3.26 | 311.70 | 194.67 | 0.31 |
| Reach 1-3 | 7066 | 25-YR | 1108.89 | 7072.86 | 7076.82 | | 7077.01 | 0.009565 | 3.76 | 367.39 | 220.01 | 0.34 |
| Reach 1-3 | 7066 | 50-YR | 1497.55 | 7072.86 | 7077.18 | | 7077.41 | 0.010923 | 4.27 | 453.77 | 268.14 | 0.37 |
| Reach 1-3 | 7066 | 100-YR | 1763.93 | 7072.86 | 7077.40 | | 7077.65 | 0.011350 | 4.51 | 517.48 | 292.31 | 0.38 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7061 | 2-YR | 146.52 | 7074.14 | 7074.84 | | 7075.07 | 0.061517 | 3.79 | 38.70 | 63.32 | 0.85 |
| Reach 1-3 | 7061 | 5-YR | 512.38 | 7074.14 | 7075.83 | | 7076.13 | 0.025435 | 4.55 | 130.07 | 154.48 | 0.64 |
| Reach 1-3 | 7061 | 10-YR | 847.50 | 7074.14 | 7076.26 | | 7076.62 | 0.024173 | 5.22 | 209.57 | 208.81 | 0.65 |
| Reach 1-3 | 7061 | 25-YR | 1108.89 | 7074.14 | 7076.56 | | 7076.92 | 0.021755 | 5.44 | 277.37 | 244.82 | 0.63 |
| Reach 1-3 | 7061 | 50-YR | 1497.55 | 7074.14 | 7076.98 | | 7077.33 | 0.018009 | 5.53 | 391.98 | 296.00 | 0.59 |
| Reach 1-3 | 7061 | 100-YR | 1763.93 | 7074.14 | 7077.24 | | 7077.58 | 0.015980 | 5.54 | 471.95 | 311.67 | 0.57 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7044 | 2-YR | 146.52 | 7071.83 | 7074.57 | | 7074.63 | 0.011669 | 1.99 | 73.53 | 65.56 | 0.33 |
| Reach 1-3 | 7044 | 5-YR | 512.38 | 7071.83 | 7075.76 | | 7075.82 | 0.008586 | 2.36 | 335.79 | 371.43 | 0.28 |
| Reach 1-3 | 7044 | 10-YR | 847.50 | 7071.83 | 7076.25 | | 7076.31 | 0.007779 | 2.50 | 517.98 | 375.56 | 0.27 |
| Reach 1-3 | 7044 | 25-YR | 1108.89 | 7071.83 | 7076.57 | | 7076.63 | 0.007343 | 2.59 | 638.71 | 378.31 | 0.26 |
| Reach 1-3 | 7044 | 50-YR | 1497.55 | 7071.83 | 7076.99 | | 7077.06 | 0.006876 | 2.70 | 799.29 | 382.11 | 0.25 |
| Reach 1-3 | 7044 | 100-YR | 1763.93 | 7071.83 | 7077.25 | | 7077.33 | 0.006643 | 2.77 | 900.17 | 384.48 | 0.25 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6941 | 2-YR | 146.52 | 7070.47 | 7073.44 | | 7073.51 | 0.010173 | 2.11 | 69.40 | 63.80 | 0.36 |
| Reach 1-3 | 6941 | 5-YR | 512.38 | 7070.47 | 7074.80 | | 7074.92 | 0.009497 | 2.91 | 232.83 | 285.22 | 0.33 |
| Reach 1-3 | 6941 | 10-YR | 847.50 | 7070.47 | 7075.44 | | 7075.55 | 0.008068 | 3.05 | 415.74 | 290.61 | 0.31 |
| Reach 1-3 | 6941 | 25-YR | 1108.89 | 7070.47 | 7075.80 | | 7075.91 | 0.007808 | 3.20 | 521.00 | 293.63 | 0.31 |
| Reach 1-3 | 6941 | 50-YR | 1497.55 | 7070.47 | 7076.26 | | 7076.38 | 0.007565 | 3.39 | 657.11 | 297.64 | 0.30 |
| Reach 1-3 | 6941 | 100-YR | 1763.93 | 7070.47 | 7076.54 | | 7076.67 | 0.007441 | 3.51 | 741.48 | 300.23 | 0.30 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6868 | 2-YR | 146.52 | 7069.50 | 7072.63 | | 7072.72 | 0.011818 | 2.31 | 63.32 | 62.60 | 0.41 |
| Reach 1-3 | 6868 | 5-YR | 512.38 | 7069.50 | 7073.95 | | 7074.12 | 0.012833 | 3.33 | 170.03 | 128.74 | 0.39 |
| Reach 1-3 | 6868 | 10-YR | 847.50 | 7069.50 | 7074.63 | | 7074.83 | 0.012841 | 3.82 | 294.61 | 225.15 | 0.39 |
| Reach 1-3 | 6868 | 25-YR | 1108.89 | 7069.50 | 7075.04 | | 7075.24 | 0.012011 | 3.98 | 392.51 | 241.44 | 0.38 |
| Reach 1-3 | 6868 | 50-YR | 1497.55 | 7069.50 | 7075.55 | | 7075.75 | 0.011094 | 4.15 | 517.20 | 245.43 | 0.37 |
| Reach 1-3 | 6868 | 100-YR | 1763.93 | 7069.50 | 7075.85 | | 7076.06 | 0.010709 | 4.26 | 592.36 | 247.98 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6769 | 2-YR | 146.52 | 7068.73 | 7071.60 | | 7071.66 | 0.009530 | 2.02 | 72.36 | 64.18 | 0.34 |
| Reach 1-3 | 6769 | 5-YR | 512.38 | 7068.73 | 7072.88 | | 7072.99 | 0.010004 | 2.84 | 223.11 | 152.79 | 0.32 |
| Reach 1-3 | 6769 | 10-YR | 847.50 | 7068.73 | 7073.53 | | 7073.67 | 0.010515 | 3.31 | 327.20 | 167.57 | 0.33 |
| Reach 1-3 | 6769 | 25-YR | 1108.89 | 7068.73 | 7073.94 | | 7074.10 | 0.010922 | 3.63 | 399.17 | 183.26 | 0.34 |
| Reach 1-3 | 6769 | 50-YR | 1497.55 | 7068.73 | 7074.45 | | 7074.64 | 0.011443 | 4.02 | 498.64 | 206.39 | 0.36 |
| Reach 1-3 | 6769 | 100-YR | 1763.93 | 7068.73 | 7074.76 | | 7074.97 | 0.011545 | 4.23 | 565.49 | 220.35 | 0.36 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6673 | 2-YR | 146.52 | 7067.90 | 7070.63 | | 7070.69 | 0.010553 | 1.91 | 76.65 | 105.51 | 0.31 |
| Reach 1-3 | 6673 | 5-YR | 512.38 | 7067.90 | 7071.90 | | 7072.00 | 0.010332 | 2.67 | 242.32 | 181.58 | 0.30 |
| Reach 1-3 | 6673 | 10-YR | 847.50 | 7067.90 | 7072.56 | | 7072.67 | 0.009811 | 2.98 | 364.53 | 190.74 | 0.30 |
| Reach 1-3 | 6673 | 25-YR | 1108.89 | 7067.90 | 7072.95 | | 7073.08 | 0.009862 | 3.21 | 440.60 | 196.52 | 0.30 |
| Reach 1-3 | 6673 | 50-YR | 1497.55 | 7067.90 | 7073.44 | | 7073.58 | 0.010142 | 3.52 | 536.55 | 200.46 | 0.31 |
| Reach 1-3 | 6673 | 100-YR | 1763.93 | 7067.90 | 7073.73 | | 7073.89 | 0.010296 | 3.70 | 596.02 | 202.86 | 0.32 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6588 | 2-YR | 146.52 | 7067.13 | 7069.74 | | 7069.80 | 0.010543 | 1.86 | 78.83 | 70.24 | 0.30 |
| Reach 1-3 | 6588 | 5-YR | 512.38 | 7067.13 | 7070.88 | | 7071.00 | 0.013791 | 2.98 | 198.56 | 124.26 | 0.34 |
| Reach 1-3 | 6588 | 10-YR | 847.50 | 7067.13 | 7071.50 | | 7071.67 | 0.015076 | 3.58 | 288.37 | 165.43 | 0.37 |
| Reach 1-3 | 6588 | 25-YR | 1108.89 | 7067.13 | 7071.90 | | 7072.09 | 0.014986 | 3.85 | 359.28 | 192.90 | 0.37 |
| Reach 1-3 | 6588 | 50-YR | 1497.55 | 7067.13 | 7072.40 | | 7072.61 | 0.014472 | 4.12 | 458.53 | 199.65 | 0.37 |
| Reach 1-3 | 6588 | 100-YR | 1763.93 | 7067.13 | 7072.70 | | 7072.92 | 0.014208 | 4.27 | 519.06 | 202.19 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6504 | 2-YR | 146.52 | 7066.40 | 7068.90 | | 7068.95 | 0.009951 | 1.75 | 89.70 | 106.84 | 0.28 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 6504 | 5-YR | 512.38 | 7066.40 | 7070.02 | | 7070.08 | 0.008760 | 2.32 | 279.58 | 188.98 | 0.27 |
| Reach 1-3 | 6504 | 10-YR | 847.50 | 7066.40 | 7070.66 | | 7070.74 | 0.008275 | 2.61 | 403.56 | 194.56 | 0.27 |
| Reach 1-3 | 6504 | 25-YR | 1108.89 | 7066.40 | 7071.08 | | 7071.17 | 0.008173 | 2.81 | 484.37 | 198.11 | 0.27 |
| Reach 1-3 | 6504 | 50-YR | 1497.55 | 7066.40 | 7071.57 | | 7071.68 | 0.008432 | 3.11 | 583.32 | 202.33 | 0.28 |
| Reach 1-3 | 6504 | 100-YR | 1763.93 | 7066.40 | 7071.86 | | 7071.99 | 0.008654 | 3.30 | 642.85 | 204.76 | 0.29 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6417 | 2-YR | 146.52 | 7065.42 | 7067.76 | | 7067.83 | 0.016527 | 2.13 | 68.72 | 82.32 | 0.37 |
| Reach 1-3 | 6417 | 5-YR | 512.38 | 7065.42 | 7068.94 | | 7069.07 | 0.015522 | 3.03 | 195.56 | 174.94 | 0.36 |
| Reach 1-3 | 6417 | 10-YR | 847.50 | 7065.42 | 7069.59 | | 7069.76 | 0.015825 | 3.55 | 278.01 | 198.85 | 0.37 |
| Reach 1-3 | 6417 | 25-YR | 1108.89 | 7065.42 | 7069.97 | | 7070.17 | 0.016515 | 3.91 | 345.79 | 205.00 | 0.38 |
| Reach 1-3 | 6417 | 50-YR | 1497.55 | 7065.42 | 7070.43 | | 7070.66 | 0.016591 | 4.26 | 441.48 | 208.44 | 0.39 |
| Reach 1-3 | 6417 | 100-YR | 1763.93 | 7065.42 | 7070.71 | | 7070.95 | 0.016587 | 4.46 | 499.67 | 210.51 | 0.39 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6369 | 2-YR | 146.52 | 7064.37 | 7067.28 | | 7067.32 | 0.007479 | 1.59 | 92.38 | 87.75 | 0.26 |
| Reach 1-3 | 6369 | 5-YR | 512.38 | 7064.37 | 7068.41 | | 7068.49 | 0.009367 | 2.45 | 239.34 | 143.46 | 0.28 |
| Reach 1-3 | 6369 | 10-YR | 847.50 | 7064.37 | 7068.99 | | 7069.11 | 0.010787 | 2.98 | 330.40 | 209.50 | 0.31 |
| Reach 1-3 | 6369 | 25-YR | 1108.89 | 7064.37 | 7069.36 | | 7069.49 | 0.011182 | 3.25 | 406.63 | 211.94 | 0.32 |
| Reach 1-3 | 6369 | 50-YR | 1497.55 | 7064.37 | 7069.81 | | 7069.97 | 0.011505 | 3.56 | 503.58 | 215.08 | 0.33 |
| Reach 1-3 | 6369 | 100-YR | 1763.93 | 7064.37 | 7070.08 | | 7070.26 | 0.011666 | 3.75 | 562.76 | 216.98 | 0.33 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6298 | 2-YR | 146.52 | 7064.05 | 7066.40 | | 7066.49 | 0.019941 | 2.40 | 61.27 | 62.92 | 0.42 |
| Reach 1-3 | 6298 | 5-YR | 512.38 | 7064.05 | 7067.53 | | 7067.65 | 0.015888 | 3.04 | 218.97 | 178.62 | 0.37 |
| Reach 1-3 | 6298 | 10-YR | 847.50 | 7064.05 | 7068.09 | | 7068.23 | 0.015381 | 3.42 | 320.87 | 183.68 | 0.37 |
| Reach 1-3 | 6298 | 25-YR | 1108.89 | 7064.05 | 7068.42 | | 7068.58 | 0.015908 | 3.72 | 381.62 | 186.64 | 0.38 |
| Reach 1-3 | 6298 | 50-YR | 1497.55 | 7064.05 | 7068.81 | | 7069.01 | 0.017093 | 4.15 | 455.50 | 190.19 | 0.40 |
| Reach 1-3 | 6298 | 100-YR | 1763.93 | 7064.05 | 7069.04 | | 7069.27 | 0.017872 | 4.42 | 500.14 | 192.30 | 0.41 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6265 | 2-YR | 146.52 | 7063.23 | 7065.90 | | 7065.98 | 0.012685 | 2.20 | 66.66 | 64.40 | 0.38 |
| Reach 1-3 | 6265 | 5-YR | 512.38 | 7063.23 | 7066.66 | | 7066.94 | 0.031828 | 4.26 | 133.23 | 140.83 | 0.57 |
| Reach 1-3 | 6265 | 10-YR | 847.50 | 7063.23 | 7067.05 | 7066.78 | 7067.46 | 0.041090 | 5.34 | 198.18 | 185.65 | 0.64 |
| Reach 1-3 | 6265 | 25-YR | 1108.89 | 7063.23 | 7067.31 | 7067.11 | 7067.77 | 0.043853 | 5.85 | 249.05 | 203.15 | 0.67 |
| Reach 1-3 | 6265 | 50-YR | 1497.55 | 7063.23 | 7067.61 | | 7068.14 | 0.047045 | 6.46 | 310.73 | 206.28 | 0.69 |
| Reach 1-3 | 6265 | 100-YR | 1763.93 | 7063.23 | 7067.80 | | 7068.37 | 0.048278 | 6.79 | 349.59 | 208.24 | 0.70 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6232 | 2-YR | 146.52 | 7063.38 | 7065.39 | | 7065.48 | 0.018407 | 2.57 | 60.97 | 114.61 | 0.50 |
| Reach 1-3 | 6232 | 5-YR | 512.38 | 7063.38 | 7066.13 | | 7066.28 | 0.014018 | 3.34 | 170.05 | 188.56 | 0.48 |
| Reach 1-3 | 6232 | 10-YR | 847.50 | 7063.38 | 7066.49 | | 7066.71 | 0.014657 | 3.93 | 239.59 | 200.92 | 0.51 |
| Reach 1-3 | 6232 | 25-YR | 1108.89 | 7063.38 | 7066.71 | | 7066.97 | 0.015639 | 4.38 | 285.16 | 208.00 | 0.53 |
| Reach 1-3 | 6232 | 50-YR | 1497.55 | 7063.38 | 7066.98 | | 7067.31 | 0.016101 | 4.83 | 343.16 | 210.30 | 0.55 |
| Reach 1-3 | 6232 | 100-YR | 1763.93 | 7063.38 | 7067.15 | | 7067.52 | 0.016648 | 5.13 | 377.05 | 211.63 | 0.57 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6223 | 2-YR | 146.52 | 7063.07 | 7064.84 | 7064.84 | 7065.11 | 0.140119 | 4.17 | 35.11 | 94.97 | 0.98 |
| Reach 1-3 | 6223 | 5-YR | 512.38 | 7063.07 | 7065.62 | 7065.62 | 7066.01 | 0.074076 | 5.27 | 112.56 | 153.07 | 0.82 |
| Reach 1-3 | 6223 | 10-YR | 847.50 | 7063.07 | 7065.98 | 7065.98 | 7066.43 | 0.066348 | 5.89 | 175.59 | 195.41 | 0.81 |
| Reach 1-3 | 6223 | 25-YR | 1108.89 | 7063.07 | 7066.18 | 7066.18 | 7066.68 | 0.066364 | 6.36 | 214.80 | 201.16 | 0.83 |
| Reach 1-3 | 6223 | 50-YR | 1497.55 | 7063.07 | 7066.40 | 7066.40 | 7067.01 | 0.070836 | 7.08 | 260.11 | 207.46 | 0.87 |
| Reach 1-3 | 6223 | 100-YR | 1763.93 | 7063.07 | 7066.54 | 7066.54 | 7067.21 | 0.071568 | 7.44 | 290.07 | 209.48 | 0.88 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6212 | 2-YR | 146.52 | 7060.43 | 7062.21 | 7062.21 | 7062.49 | 0.140896 | 4.18 | 35.05 | 62.77 | 0.99 |
| Reach 1-3 | 6212 | 5-YR | 512.38 | 7060.43 | 7062.98 | 7062.98 | 7063.49 | 0.091328 | 5.80 | 93.90 | 104.76 | 0.91 |
| Reach 1-3 | 6212 | 10-YR | 847.50 | 7060.43 | 7063.43 | 7063.43 | 7064.04 | 0.077439 | 6.49 | 146.43 | 126.51 | 0.88 |
| Reach 1-3 | 6212 | 25-YR | 1108.89 | 7060.43 | 7063.71 | 7063.71 | 7064.37 | 0.072861 | 6.95 | 182.03 | 134.34 | 0.87 |
| Reach 1-3 | 6212 | 50-YR | 1497.55 | 7060.43 | 7063.99 | 7063.99 | 7064.81 | 0.077075 | 7.82 | 220.72 | 140.44 | 0.92 |
| Reach 1-3 | 6212 | 100-YR | 1763.93 | 7060.43 | 7064.21 | 7064.21 | 7065.09 | 0.073523 | 8.13 | 252.69 | 148.43 | 0.91 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6199 | 2-YR | 146.52 | 7057.41 | 7059.80 | | 7059.85 | 0.009719 | 1.81 | 81.09 | 68.66 | 0.29 |
| Reach 1-3 | 6199 | 5-YR | 512.38 | 7057.41 | 7060.91 | | 7061.06 | 0.012343 | 3.13 | 169.63 | 90.04 | 0.37 |
| Reach 1-3 | 6199 | 10-YR | 847.50 | 7057.41 | 7061.48 | | 7061.73 | 0.015046 | 4.02 | 224.22 | 100.92 | 0.42 |
| Reach 1-3 | 6199 | 25-YR | 1108.89 | 7057.41 | 7061.82 | | 7062.13 | 0.017091 | 4.62 | 259.10 | 107.34 | 0.46 |
| Reach 1-3 | 6199 | 50-YR | 1497.55 | 7057.41 | 7062.20 | | 7062.63 | 0.020549 | 5.46 | 301.99 | 119.18 | 0.51 |
| Reach 1-3 | 6199 | 100-YR | 1763.93 | 7057.41 | 7062.42 | | 7062.94 | 0.022635 | 5.97 | 329.39 | 126.19 | 0.54 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6184 | 2-YR | 146.52 | 7057.42 | 7059.78 | | 7059.80 | 0.001222 | 0.97 | 151.17 | 70.51 | 0.11 |
| Reach 1-3 | 6184 | 5-YR | 512.38 | 7057.42 | 7060.88 | | 7060.95 | 0.003521 | 2.15 | 260.90 | 120.90 | 0.21 |
| Reach 1-3 | 6184 | 10-YR | 847.50 | 7057.42 | 7061.45 | | 7061.57 | 0.005076 | 2.87 | 333.05 | 132.10 | 0.26 |
| Reach 1-3 | 6184 | 25-YR | 1108.89 | 7057.42 | 7061.79 | | 7061.94 | 0.006170 | 3.34 | 378.60 | 138.71 | 0.29 |
| Reach 1-3 | 6184 | 50-YR | 1497.55 | 7057.42 | 7062.17 | | 7062.39 | 0.007803 | 3.98 | 433.78 | 146.32 | 0.33 |
| Reach 1-3 | 6184 | 100-YR | 1763.93 | 7057.42 | 7062.40 | | 7062.66 | 0.008839 | 4.38 | 467.58 | 150.79 | 0.35 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6182 | 2-YR | 146.52 | 7058.72 | 7059.70 | | 7059.78 | 0.039798 | 2.34 | 62.61 | 67.63 | 0.43 |
| Reach 1-3 | 6182 | 5-YR | 512.38 | 7058.72 | 7060.74 | | 7060.92 | 0.033327 | 3.53 | 160.56 | 117.46 | 0.44 |
| Reach 1-3 | 6182 | 10-YR | 847.50 | 7058.72 | 7061.29 | | 7061.53 | 0.033627 | 4.18 | 229.66 | 131.38 | 0.47 |
| Reach 1-3 | 6182 | 25-YR | 1108.89 | 7058.72 | 7061.61 | | 7061.90 | 0.035089 | 4.63 | 272.89 | 137.74 | 0.48 |
| Reach 1-3 | 6182 | 50-YR | 1497.55 | 7058.72 | 7061.97 | | 7062.34 | 0.038746 | 5.27 | 323.81 | 144.87 | 0.52 |
| Reach 1-3 | 6182 | 100-YR | 1763.93 | 7058.72 | 7062.19 | | 7062.61 | 0.040940 | 5.65 | 355.02 | 149.07 | 0.54 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 6164 | 2-YR | 146.52 | 7056.45 | 7059.30 | | 7059.37 | 0.013759 | 2.07 | 72.57 | 85.40 | 0.33 |
| Reach 1-3 | 6164 | 5-YR | 512.38 | 7056.45 | 7060.42 | | 7060.52 | 0.013539 | 2.89 | 219.26 | 176.25 | 0.34 |
| Reach 1-3 | 6164 | 10-YR | 847.50 | 7056.45 | 7060.99 | | 7061.12 | 0.013615 | 3.30 | 335.89 | 227.58 | 0.34 |
| Reach 1-3 | 6164 | 25-YR | 1108.89 | 7056.45 | 7061.31 | | 7061.46 | 0.014190 | 3.60 | 415.75 | 265.53 | 0.35 |
| Reach 1-3 | 6164 | 50-YR | 1497.55 | 7056.45 | 7061.68 | | 7061.85 | 0.014726 | 3.92 | 515.69 | 270.83 | 0.37 |
| Reach 1-3 | 6164 | 100-YR | 1763.93 | 7056.45 | 7061.91 | | 7062.09 | 0.015021 | 4.11 | 576.25 | 273.15 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6091 | 2-YR | 146.52 | 7055.75 | 7058.22 | | 7058.29 | 0.016189 | 2.13 | 68.78 | 69.42 | 0.38 |
| Reach 1-3 | 6091 | 5-YR | 512.38 | 7055.75 | 7059.34 | | 7059.46 | 0.015959 | 2.99 | 214.80 | 196.48 | 0.37 |
| Reach 1-3 | 6091 | 10-YR | 847.50 | 7055.75 | 7059.87 | | 7060.02 | 0.016780 | 3.49 | 335.62 | 270.98 | 0.38 |
| Reach 1-3 | 6091 | 25-YR | 1108.89 | 7055.75 | 7060.19 | | 7060.35 | 0.016606 | 3.71 | 426.70 | 304.52 | 0.38 |
| Reach 1-3 | 6091 | 50-YR | 1497.55 | 7055.75 | 7060.55 | | 7060.72 | 0.016546 | 3.97 | 539.41 | 314.47 | 0.39 |
| Reach 1-3 | 6091 | 100-YR | 1763.93 | 7055.75 | 7060.76 | | 7060.94 | 0.016746 | 4.14 | 604.76 | 316.82 | 0.39 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6042 | 2-YR | 146.52 | 7054.55 | 7057.65 | | 7057.71 | 0.008888 | 1.87 | 78.38 | 70.35 | 0.31 |
| Reach 1-3 | 6042 | 5-YR | 512.38 | 7054.55 | 7058.74 | | 7058.84 | 0.009928 | 2.73 | 256.23 | 243.81 | 0.33 |
| Reach 1-3 | 6042 | 10-YR | 847.50 | 7054.55 | 7059.22 | | 7059.35 | 0.011245 | 3.25 | 381.39 | 290.07 | 0.35 |
| Reach 1-3 | 6042 | 25-YR | 1108.89 | 7054.55 | 7059.51 | | 7059.65 | 0.011929 | 3.55 | 471.38 | 332.12 | 0.36 |
| Reach 1-3 | 6042 | 50-YR | 1497.55 | 7054.55 | 7059.84 | | 7060.01 | 0.012780 | 3.91 | 587.64 | 353.42 | 0.38 |
| Reach 1-3 | 6042 | 100-YR | 1763.93 | 7054.55 | 7060.03 | | 7060.20 | 0.013370 | 4.14 | 652.68 | 355.12 | 0.39 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5977 | 2-YR | 146.52 | 7054.61 | 7057.17 | | 7057.22 | 0.010109 | 1.78 | 84.07 | 85.55 | 0.29 |
| Reach 1-3 | 5977 | 5-YR | 512.38 | 7054.61 | 7058.19 | | 7058.29 | 0.012640 | 2.74 | 261.69 | 286.49 | 0.32 |
| Reach 1-3 | 5977 | 10-YR | 847.50 | 7054.61 | 7058.61 | | 7058.73 | 0.014192 | 3.21 | 391.11 | 336.91 | 0.35 |
| Reach 1-3 | 5977 | 25-YR | 1108.89 | 7054.61 | 7058.87 | | 7059.00 | 0.014982 | 3.48 | 484.22 | 385.22 | 0.36 |
| Reach 1-3 | 5977 | 50-YR | 1497.55 | 7054.61 | 7059.19 | | 7059.33 | 0.015364 | 3.76 | 617.73 | 432.20 | 0.37 |
| Reach 1-3 | 5977 | 100-YR | 1763.93 | 7054.61 | 7059.38 | | 7059.52 | 0.015243 | 3.88 | 699.58 | 434.08 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5928 | 2-YR | 146.52 | 7053.68 | 7055.92 | | 7055.98 | 0.017666 | 2.08 | 70.75 | 81.05 | 0.37 |
| Reach 1-3 | 5928 | 5-YR | 512.38 | 7053.68 | 7056.89 | | 7056.99 | 0.015844 | 2.79 | 266.81 | 348.40 | 0.35 |
| Reach 1-3 | 5928 | 10-YR | 847.50 | 7053.68 | 7057.32 | | 7057.42 | 0.014702 | 3.02 | 428.04 | 397.15 | 0.34 |
| Reach 1-3 | 5928 | 25-YR | 1108.89 | 7053.68 | 7057.58 | | 7057.68 | 0.014400 | 3.18 | 534.86 | 427.17 | 0.34 |
| Reach 1-3 | 5928 | 50-YR | 1497.55 | 7053.68 | 7057.90 | | 7058.01 | 0.014199 | 3.38 | 678.71 | 465.85 | 0.35 |
| Reach 1-3 | 5928 | 100-YR | 1763.93 | 7053.68 | 7058.10 | | 7058.21 | 0.014074 | 3.50 | 772.35 | 491.39 | 0.35 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5824 | 2-YR | 146.52 | 7052.15 | 7055.14 | | 7055.19 | 0.007316 | 1.73 | 85.57 | 79.90 | 0.27 |
| Reach 1-3 | 5824 | 5-YR | 512.38 | 7052.15 | 7056.01 | | 7056.09 | 0.010321 | 2.63 | 296.73 | 323.29 | 0.31 |
| Reach 1-3 | 5824 | 10-YR | 847.50 | 7052.15 | 7056.41 | | 7056.51 | 0.011590 | 3.07 | 436.00 | 371.26 | 0.34 |
| Reach 1-3 | 5824 | 25-YR | 1108.89 | 7052.15 | 7056.65 | | 7056.76 | 0.012341 | 3.33 | 529.41 | 399.91 | 0.35 |
| Reach 1-3 | 5824 | 50-YR | 1497.55 | 7052.15 | 7056.95 | | 7057.08 | 0.013071 | 3.64 | 654.41 | 428.55 | 0.36 |
| Reach 1-3 | 5824 | 100-YR | 1763.93 | 7052.15 | 7057.13 | | 7057.27 | 0.013562 | 3.83 | 732.70 | 448.42 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5791 | 2-YR | 146.52 | 7052.28 | 7054.75 | | 7054.81 | 0.012414 | 1.92 | 76.55 | 81.65 | 0.32 |
| Reach 1-3 | 5791 | 5-YR | 512.38 | 7052.28 | 7055.45 | | 7055.55 | 0.017810 | 2.90 | 259.32 | 339.38 | 0.38 |
| Reach 1-3 | 5791 | 10-YR | 847.50 | 7052.28 | 7055.79 | | 7055.91 | 0.019167 | 3.32 | 388.39 | 399.25 | 0.40 |
| Reach 1-3 | 5791 | 25-YR | 1108.89 | 7052.28 | 7056.01 | | 7056.14 | 0.019465 | 3.53 | 478.91 | 425.72 | 0.40 |
| Reach 1-3 | 5791 | 50-YR | 1497.55 | 7052.28 | 7056.30 | | 7056.43 | 0.019494 | 3.78 | 605.89 | 464.96 | 0.41 |
| Reach 1-3 | 5791 | 100-YR | 1763.93 | 7052.28 | 7056.47 | | 7056.62 | 0.019094 | 3.89 | 690.90 | 482.61 | 0.41 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5744 | 2-YR | 146.52 | 7051.51 | 7054.48 | | 7054.52 | 0.007781 | 1.66 | 92.54 | 233.38 | 0.26 |
| Reach 1-3 | 5744 | 5-YR | 512.38 | 7051.51 | 7055.16 | | 7055.21 | 0.007409 | 2.10 | 364.26 | 452.43 | 0.27 |
| Reach 1-3 | 5744 | 10-YR | 847.50 | 7051.51 | 7055.51 | | 7055.56 | 0.007202 | 2.30 | 526.71 | 480.14 | 0.27 |
| Reach 1-3 | 5744 | 25-YR | 1108.89 | 7051.51 | 7055.74 | | 7055.80 | 0.007008 | 2.41 | 637.04 | 499.83 | 0.27 |
| Reach 1-3 | 5744 | 50-YR | 1497.55 | 7051.51 | 7056.04 | | 7056.10 | 0.006569 | 2.51 | 787.61 | 504.77 | 0.26 |
| Reach 1-3 | 5744 | 100-YR | 1763.93 | 7051.51 | 7056.23 | | 7056.30 | 0.006325 | 2.57 | 883.21 | 507.03 | 0.26 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5688 | 2-YR | 143.88 | 7051.38 | 7053.85 | | 7053.92 | 0.010674 | 2.04 | 72.18 | 219.55 | 0.34 |
| Reach 1-3 | 5688 | 5-YR | 533.15 | 7051.38 | 7054.59 | | 7054.66 | 0.009243 | 2.49 | 317.84 | 431.68 | 0.35 |
| Reach 1-3 | 5688 | 10-YR | 890.80 | 7051.38 | 7054.97 | | 7055.04 | 0.008489 | 2.72 | 482.11 | 439.88 | 0.34 |
| Reach 1-3 | 5688 | 25-YR | 1171.00 | 7051.38 | 7055.21 | | 7055.29 | 0.008169 | 2.86 | 589.55 | 445.79 | 0.34 |
| Reach 1-3 | 5688 | 50-YR | 1589.80 | 7051.38 | 7055.53 | | 7055.62 | 0.007900 | 3.06 | 731.21 | 453.79 | 0.34 |
| Reach 1-3 | 5688 | 100-YR | 1880.40 | 7051.38 | 7055.72 | | 7055.83 | 0.007735 | 3.18 | 822.11 | 458.82 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5628 | 2-YR | 143.88 | 7050.55 | 7053.43 | | 7053.47 | 0.007004 | 1.63 | 95.74 | 283.41 | 0.25 |
| Reach 1-3 | 5628 | 5-YR | 533.15 | 7050.55 | 7054.26 | | 7054.30 | 0.005290 | 1.94 | 410.09 | 424.62 | 0.23 |
| Reach 1-3 | 5628 | 10-YR | 890.80 | 7050.55 | 7054.64 | | 7054.69 | 0.005553 | 2.21 | 571.79 | 427.81 | 0.25 |
| Reach 1-3 | 5628 | 25-YR | 1171.00 | 7050.55 | 7054.88 | | 7054.94 | 0.005769 | 2.40 | 675.02 | 429.83 | 0.25 |
| Reach 1-3 | 5628 | 50-YR | 1589.80 | 7050.55 | 7055.19 | | 7055.27 | 0.006039 | 2.63 | 809.12 | 432.43 | 0.26 |
| Reach 1-3 | 5628 | 100-YR | 1880.40 | 7050.55 | 7055.39 | | 7055.48 | 0.006138 | 2.77 | 895.01 | 434.10 | 0.27 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5568 | 2-YR | 143.88 | 7049.82 | 7052.52 | | 7052.58 | 0.011823 | 1.96 | 73.32 | 188.81 | 0.33 |
| Reach 1-3 | 5568 | 5-YR | 533.15 | 7049.82 | 7053.42 | | 7053.52 | 0.012765 | 2.94 | 260.34 | 361.74 | 0.37 |
| Reach 1-3 | 5568 | 10-YR | 890.80 | 7049.82 | 7053.78 | | 7053.90 | 0.012570 | 3.26 | 398.51 | 387.58 | 0.38 |
| Reach 1-3 | 5568 | 25-YR | 1171.00 | 7049.82 | 7054.01 | | 7054.14 | 0.012341 | 3.44 | 488.44 | 389.50 | 0.38 |
| Reach 1-3 | 5568 | 50-YR | 1589.80 | 7049.82 | 7054.31 | | 7054.46 | 0.012076 | 3.67 | 606.73 | 392.00 | 0.38 |
| Reach 1-3 | 5568 | 100-YR | 1880.40 | 7049.82 | 7054.50 | | 7054.66 | 0.011904 | 3.81 | 681.72 | 393.58 | 0.38 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 5429 | 2-YR | 143.88 | 7048.55 | 7050.99 | | 7051.07 | 0.018607 | 2.32 | 62.07 | 134.51 | 0.41 |
| Reach 1-3 | 5429 | 5-YR | 533.15 | 7048.55 | 7051.97 | | 7052.06 | 0.016378 | 2.91 | 281.80 | 355.57 | 0.37 |
| Reach 1-3 | 5429 | 10-YR | 890.80 | 7048.55 | 7052.35 | | 7052.46 | 0.016360 | 3.22 | 419.57 | 358.73 | 0.38 |
| Reach 1-3 | 5429 | 25-YR | 1171.00 | 7048.55 | 7052.60 | | 7052.71 | 0.016347 | 3.41 | 508.80 | 360.75 | 0.38 |
| Reach 1-3 | 5429 | 50-YR | 1589.80 | 7048.55 | 7052.92 | | 7053.05 | 0.016283 | 3.65 | 626.02 | 363.41 | 0.38 |
| Reach 1-3 | 5429 | 100-YR | 1880.40 | 7048.55 | 7053.13 | | 7053.27 | 0.016209 | 3.79 | 700.18 | 365.08 | 0.38 |
| Reach 1-3 | 5365 | 2-YR | 143.88 | 7047.14 | 7049.90 | | 7049.99 | 0.015298 | 2.49 | 57.89 | 121.22 | 0.45 |
| Reach 1-3 | 5365 | 5-YR | 533.15 | 7047.14 | 7050.92 | | 7051.05 | 0.015205 | 3.21 | 262.20 | 345.08 | 0.41 |
| Reach 1-3 | 5365 | 10-YR | 890.80 | 7047.14 | 7051.33 | | 7051.46 | 0.015334 | 3.55 | 406.33 | 361.74 | 0.41 |
| Reach 1-3 | 5365 | 25-YR | 1171.00 | 7047.14 | 7051.59 | | 7051.73 | 0.014951 | 3.71 | 502.70 | 363.88 | 0.41 |
| Reach 1-3 | 5365 | 50-YR | 1589.80 | 7047.14 | 7051.94 | | 7052.09 | 0.014469 | 3.92 | 630.59 | 366.71 | 0.40 |
| Reach 1-3 | 5365 | 100-YR | 1880.40 | 7047.14 | 7052.17 | | 7052.31 | 0.014111 | 4.03 | 712.62 | 368.51 | 0.40 |
| Reach 1-3 | 5289 | 2-YR | 143.88 | 7046.36 | 7048.96 | | 7049.04 | 0.015877 | 2.24 | 64.33 | 153.89 | 0.39 |
| Reach 1-3 | 5289 | 5-YR | 533.15 | 7046.36 | 7050.01 | | 7050.11 | 0.014882 | 2.89 | 275.77 | 335.37 | 0.36 |
| Reach 1-3 | 5289 | 10-YR | 890.80 | 7046.36 | 7050.52 | | 7050.61 | 0.012411 | 2.98 | 445.16 | 339.59 | 0.33 |
| Reach 1-3 | 5289 | 25-YR | 1171.00 | 7046.36 | 7050.80 | | 7050.90 | 0.012332 | 3.15 | 541.68 | 341.98 | 0.33 |
| Reach 1-3 | 5289 | 50-YR | 1589.80 | 7046.36 | 7051.17 | | 7051.28 | 0.012220 | 3.37 | 669.16 | 345.10 | 0.33 |
| Reach 1-3 | 5289 | 100-YR | 1880.40 | 7046.36 | 7051.40 | | 7051.52 | 0.012189 | 3.51 | 748.92 | 347.04 | 0.34 |
| Reach 1-3 | 5227 | 2-YR | 143.88 | 7045.43 | 7048.08 | | 7048.13 | 0.011378 | 1.94 | 74.27 | 123.93 | 0.32 |
| Reach 1-3 | 5227 | 5-YR | 533.15 | 7045.43 | 7049.19 | | 7049.28 | 0.011649 | 2.70 | 268.44 | 237.12 | 0.32 |
| Reach 1-3 | 5227 | 10-YR | 890.80 | 7045.43 | 7049.70 | | 7049.81 | 0.012641 | 3.17 | 421.73 | 326.02 | 0.34 |
| Reach 1-3 | 5227 | 25-YR | 1171.00 | 7045.43 | 7049.99 | | 7050.10 | 0.012732 | 3.37 | 515.51 | 328.40 | 0.34 |
| Reach 1-3 | 5227 | 50-YR | 1589.80 | 7045.43 | 7050.37 | | 7050.50 | 0.012641 | 3.60 | 641.03 | 331.58 | 0.34 |
| Reach 1-3 | 5227 | 100-YR | 1880.40 | 7045.43 | 7050.60 | | 7050.74 | 0.012567 | 3.74 | 720.28 | 333.56 | 0.34 |
| Reach 1-3 | 5171 | 2-YR | 143.88 | 7044.55 | 7046.77 | | 7046.84 | 0.015446 | 2.06 | 69.74 | 64.62 | 0.35 |
| Reach 1-3 | 5171 | 5-YR | 533.15 | 7044.55 | 7047.92 | | 7048.02 | 0.014410 | 2.89 | 252.31 | 246.86 | 0.34 |
| Reach 1-3 | 5171 | 10-YR | 890.80 | 7044.55 | 7048.51 | | 7048.62 | 0.012418 | 3.10 | 424.91 | 338.92 | 0.33 |
| Reach 1-3 | 5171 | 25-YR | 1171.00 | 7044.55 | 7048.86 | | 7048.96 | 0.011197 | 3.16 | 543.68 | 341.47 | 0.32 |
| Reach 1-3 | 5171 | 50-YR | 1589.80 | 7044.55 | 7049.29 | | 7049.40 | 0.010424 | 3.30 | 691.08 | 344.60 | 0.31 |
| Reach 1-3 | 5171 | 100-YR | 1880.40 | 7044.55 | 7049.54 | | 7049.66 | 0.010232 | 3.41 | 778.64 | 346.44 | 0.31 |
| Reach 1-3 | 5047 | 2-YR | 143.88 | 7042.80 | 7045.34 | | 7045.39 | 0.010939 | 1.85 | 80.05 | 95.18 | 0.30 |
| Reach 1-3 | 5047 | 5-YR | 533.15 | 7042.80 | 7046.46 | | 7046.55 | 0.011715 | 2.68 | 230.61 | 145.30 | 0.31 |
| Reach 1-3 | 5047 | 10-YR | 890.80 | 7042.80 | 7046.99 | | 7047.13 | 0.013826 | 3.29 | 310.41 | 153.75 | 0.35 |
| Reach 1-3 | 5047 | 25-YR | 1171.00 | 7042.80 | 7047.33 | | 7047.51 | 0.015049 | 3.68 | 363.43 | 164.32 | 0.37 |
| Reach 1-3 | 5047 | 50-YR | 1589.80 | 7042.80 | 7047.75 | | 7047.97 | 0.016192 | 4.12 | 471.26 | 310.73 | 0.39 |
| Reach 1-3 | 5047 | 100-YR | 1880.40 | 7042.80 | 7048.00 | | 7048.24 | 0.016421 | 4.33 | 553.64 | 335.30 | 0.39 |
| Reach 1-3 | 4948 | 2-YR | 143.88 | 7041.66 | 7044.21 | | 7044.26 | 0.011460 | 1.90 | 76.00 | 67.48 | 0.31 |
| Reach 1-3 | 4948 | 5-YR | 533.15 | 7041.66 | 7045.51 | | 7045.58 | 0.008567 | 2.41 | 326.76 | 333.85 | 0.27 |
| Reach 1-3 | 4948 | 10-YR | 890.80 | 7041.66 | 7046.03 | | 7046.10 | 0.008108 | 2.62 | 502.30 | 338.06 | 0.27 |
| Reach 1-3 | 4948 | 25-YR | 1171.00 | 7041.66 | 7046.34 | | 7046.42 | 0.008255 | 2.81 | 606.33 | 340.48 | 0.27 |
| Reach 1-3 | 4948 | 50-YR | 1589.80 | 7041.66 | 7046.73 | | 7046.82 | 0.008435 | 3.04 | 740.61 | 343.59 | 0.28 |
| Reach 1-3 | 4948 | 100-YR | 1880.40 | 7041.66 | 7046.98 | | 7047.07 | 0.008511 | 3.18 | 825.24 | 345.54 | 0.28 |
| Reach 1-3 | 4855 | 2-YR | 143.88 | 7040.34 | 7043.52 | | 7043.58 | 0.008364 | 1.89 | 75.99 | 64.64 | 0.31 |
| Reach 1-3 | 4855 | 5-YR | 533.15 | 7040.34 | 7044.84 | | 7044.95 | 0.009618 | 2.83 | 256.39 | 270.83 | 0.32 |
| Reach 1-3 | 4855 | 10-YR | 890.80 | 7040.34 | 7045.36 | | 7045.48 | 0.010422 | 3.27 | 412.06 | 326.00 | 0.33 |
| Reach 1-3 | 4855 | 25-YR | 1171.00 | 7040.34 | 7045.66 | | 7045.79 | 0.010691 | 3.50 | 511.04 | 328.89 | 0.34 |
| Reach 1-3 | 4855 | 50-YR | 1589.80 | 7040.34 | 7046.05 | | 7046.20 | 0.010795 | 3.75 | 641.54 | 332.66 | 0.35 |
| Reach 1-3 | 4855 | 100-YR | 1880.40 | 7040.34 | 7046.30 | | 7046.46 | 0.010762 | 3.89 | 724.67 | 335.03 | 0.35 |
| Reach 1-3 | 4782 | 2-YR | 143.88 | 7040.04 | 7042.96 | | 7043.01 | 0.007205 | 1.77 | 81.18 | 65.33 | 0.28 |
| Reach 1-3 | 4782 | 5-YR | 533.15 | 7040.04 | 7044.17 | | 7044.26 | 0.009236 | 2.72 | 278.87 | 292.98 | 0.31 |
| Reach 1-3 | 4782 | 10-YR | 890.80 | 7040.04 | 7044.65 | | 7044.76 | 0.010145 | 3.15 | 432.84 | 334.05 | 0.32 |
| Reach 1-3 | 4782 | 25-YR | 1171.00 | 7040.04 | 7044.96 | | 7045.07 | 0.010169 | 3.33 | 536.48 | 336.57 | 0.33 |
| Reach 1-3 | 4782 | 50-YR | 1589.80 | 7040.04 | 7045.38 | | 7045.50 | 0.009842 | 3.52 | 678.35 | 339.93 | 0.32 |
| Reach 1-3 | 4782 | 100-YR | 1880.40 | 7040.04 | 7045.64 | | 7045.77 | 0.009581 | 3.62 | 769.43 | 342.08 | 0.32 |
| Reach 1-3 | 4714 | 2-YR | 143.88 | 7039.78 | 7042.35 | | 7042.40 | 0.011215 | 1.88 | 76.49 | 66.66 | 0.31 |
| Reach 1-3 | 4714 | 5-YR | 533.15 | 7039.78 | 7043.42 | | 7043.52 | 0.013435 | 2.85 | 273.00 | 324.83 | 0.34 |
| Reach 1-3 | 4714 | 10-YR | 890.80 | 7039.78 | 7043.91 | | 7044.01 | 0.012136 | 3.04 | 435.58 | 330.25 | 0.33 |
| Reach 1-3 | 4714 | 25-YR | 1171.00 | 7039.78 | 7044.26 | | 7044.36 | 0.010896 | 3.09 | 551.67 | 332.94 | 0.31 |
| Reach 1-3 | 4714 | 50-YR | 1589.80 | 7039.78 | 7044.74 | | 7044.84 | 0.009566 | 3.16 | 710.40 | 336.73 | 0.30 |
| Reach 1-3 | 4714 | 100-YR | 1880.40 | 7039.78 | 7045.04 | | 7045.14 | 0.008884 | 3.21 | 813.24 | 339.36 | 0.29 |
| Reach 1-3 | 4632 | 2-YR | 143.88 | 7039.10 | 7041.54 | | 7041.58 | 0.009647 | 1.77 | 100.14 | 132.34 | 0.30 |
| Reach 1-3 | 4632 | 5-YR | 533.15 | 7039.10 | 7042.74 | | 7042.79 | 0.007240 | 2.17 | 361.23 | 308.47 | 0.26 |
| Reach 1-3 | 4632 | 10-YR | 890.80 | 7039.10 | 7043.35 | | 7043.41 | 0.006072 | 2.29 | 551.79 | 314.44 | 0.24 |
| Reach 1-3 | 4632 | 25-YR | 1171.00 | 7039.10 | 7043.76 | | 7043.82 | 0.005598 | 2.38 | 680.18 | 318.41 | 0.24 |
| Reach 1-3 | 4632 | 50-YR | 1589.80 | 7039.10 | 7044.29 | | 7044.35 | 0.005203 | 2.52 | 849.29 | 323.57 | 0.23 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 4632 | 100-YR | 1880.40 | 7039.10 | 7044.62 | | 7044.69 | 0.005023 | 2.61 | 956.30 | 326.77 | 0.23 |
| | | | | | | | | | | | | |
| Reach 1-3 | 4582 | 2-YR | 143.88 | 7038.10 | 7041.23 | | 7041.25 | 0.004627 | 1.47 | 125.89 | 148.33 | 0.23 |
| Reach 1-3 | 4582 | 5-YR | 533.15 | 7038.10 | 7042.45 | | 7042.49 | 0.005008 | 2.03 | 385.37 | 286.58 | 0.23 |
| Reach 1-3 | 4582 | 10-YR | 890.80 | 7038.10 | 7043.09 | | 7043.14 | 0.004696 | 2.23 | 574.30 | 296.68 | 0.22 |
| Reach 1-3 | 4582 | 25-YR | 1171.00 | 7038.10 | 7043.51 | | 7043.57 | 0.004539 | 2.35 | 699.77 | 300.91 | 0.22 |
| Reach 1-3 | 4582 | 50-YR | 1589.80 | 7038.10 | 7044.05 | | 7044.12 | 0.004432 | 2.52 | 863.30 | 306.35 | 0.22 |
| Reach 1-3 | 4582 | 100-YR | 1880.40 | 7038.10 | 7044.39 | | 7044.46 | 0.004379 | 2.63 | 966.48 | 309.73 | 0.22 |
| | | | | | | | | | | | | |
| Reach 1-3 | 4534 | 2-YR | 143.88 | 7038.20 | 7041.03 | 7040.12 | 7041.04 | 0.003952 | 1.22 | 148.55 | 158.03 | 0.18 |
| Reach 1-3 | 4534 | 5-YR | 533.15 | 7038.20 | 7042.25 | 7040.83 | 7042.28 | 0.003860 | 1.68 | 433.79 | 274.52 | 0.18 |
| Reach 1-3 | 4534 | 10-YR | 890.80 | 7038.20 | 7042.90 | | 7042.94 | 0.003915 | 1.93 | 613.24 | 280.19 | 0.19 |
| Reach 1-3 | 4534 | 25-YR | 1171.00 | 7038.20 | 7043.32 | | 7043.36 | 0.003949 | 2.09 | 732.24 | 284.04 | 0.19 |
| Reach 1-3 | 4534 | 50-YR | 1589.80 | 7038.20 | 7043.86 | | 7043.91 | 0.004025 | 2.30 | 886.48 | 289.35 | 0.20 |
| Reach 1-3 | 4534 | 100-YR | 1880.40 | 7038.20 | 7044.19 | | 7044.25 | 0.004063 | 2.42 | 983.83 | 292.80 | 0.20 |
| | | | | | | | | | | | | |
| Reach 1-3 | 4296 | 2-YR | 133.68 | 7036.56 | 7038.42 | 7038.42 | 7038.70 | 0.069431 | 4.18 | 31.98 | 61.97 | 1.02 |
| Reach 1-3 | 4296 | 5-YR | 512.29 | 7036.56 | 7039.20 | 7039.20 | 7039.77 | 0.103042 | 6.19 | 89.48 | 85.70 | 0.95 |
| Reach 1-3 | 4296 | 10-YR | 863.82 | 7036.56 | 7039.72 | 7039.72 | 7040.42 | 0.096477 | 7.00 | 137.62 | 101.33 | 0.91 |
| Reach 1-3 | 4296 | 25-YR | 1143.60 | 7036.56 | 7040.03 | 7040.03 | 7040.83 | 0.094939 | 7.55 | 170.71 | 108.76 | 0.91 |
| Reach 1-3 | 4296 | 50-YR | 1561.30 | 7036.56 | 7040.44 | 7040.44 | 7041.35 | 0.090970 | 8.16 | 217.23 | 116.99 | 0.90 |
| Reach 1-3 | 4296 | 100-YR | 1848.80 | 7036.56 | 7040.68 | 7040.68 | 7041.67 | 0.091206 | 8.58 | 244.84 | 121.59 | 0.91 |
| | | | | | | | | | | | | |
| Reach 1-3 | 4084 | 2-YR | 133.68 | 7033.29 | 7036.36 | | 7036.36 | 0.000036 | 0.24 | 566.22 | 226.36 | 0.03 |
| Reach 1-3 | 4084 | 5-YR | 512.29 | 7033.29 | 7037.58 | | 7037.58 | 0.000142 | 0.61 | 858.49 | 272.31 | 0.06 |
| Reach 1-3 | 4084 | 10-YR | 863.82 | 7033.29 | 7038.26 | | 7038.27 | 0.000217 | 0.84 | 1082.94 | 355.74 | 0.07 |
| Reach 1-3 | 4084 | 25-YR | 1143.60 | 7033.29 | 7038.71 | | 7038.73 | 0.000257 | 0.97 | 1245.09 | 359.20 | 0.08 |
| Reach 1-3 | 4084 | 50-YR | 1561.30 | 7033.29 | 7039.32 | | 7039.34 | 0.000297 | 1.13 | 1462.74 | 363.80 | 0.09 |
| Reach 1-3 | 4084 | 100-YR | 1848.80 | 7033.29 | 7039.70 | | 7039.72 | 0.000316 | 1.22 | 1601.49 | 366.71 | 0.09 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3846 | 2-YR | 133.68 | 7033.20 | 7035.98 | 7035.98 | 7036.30 | 0.086669 | 4.53 | 29.51 | 126.87 | 1.02 |
| Reach 1-3 | 3846 | 5-YR | 512.29 | 7033.20 | 7036.87 | 7036.87 | 7037.40 | 0.070822 | 5.86 | 87.35 | 166.03 | 1.01 |
| Reach 1-3 | 3846 | 10-YR | 863.82 | 7033.20 | 7037.34 | 7037.34 | 7038.02 | 0.067538 | 6.60 | 130.89 | 189.44 | 1.02 |
| Reach 1-3 | 3846 | 25-YR | 1143.60 | 7033.20 | 7037.61 | 7037.61 | 7038.43 | 0.063023 | 7.23 | 158.14 | 203.00 | 1.01 |
| Reach 1-3 | 3846 | 50-YR | 1561.30 | 7033.20 | 7037.99 | 7037.99 | 7038.98 | 0.057218 | 7.96 | 196.22 | 221.91 | 1.00 |
| Reach 1-3 | 3846 | 100-YR | 1848.80 | 7033.20 | 7038.22 | 7038.22 | 7039.33 | 0.055822 | 8.45 | 218.78 | 233.23 | 1.01 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3842 | 2-YR | 133.68 | 7014.12 | 7016.81 | | 7016.94 | 0.000171 | 2.89 | 47.59 | 18.21 | 0.31 |
| Reach 1-3 | 3842 | 5-YR | 512.29 | 7014.12 | 7020.69 | | 7021.01 | 0.000127 | 4.52 | 121.23 | 19.69 | 0.31 |
| Reach 1-3 | 3842 | 10-YR | 863.82 | 7014.12 | 7023.44 | | 7023.88 | 0.000112 | 5.36 | 176.64 | 20.73 | 0.31 |
| Reach 1-3 | 3842 | 25-YR | 1143.60 | 7014.12 | 7025.35 | | 7025.89 | 0.000105 | 5.88 | 217.11 | 21.46 | 0.31 |
| Reach 1-3 | 3842 | 50-YR | 1561.30 | 7014.12 | 7030.09 | | 7030.57 | 0.000060 | 5.64 | 322.90 | 23.26 | 0.25 |
| Reach 1-3 | 3842 | 100-YR | 1848.80 | 7014.12 | 7033.27 | | 7033.74 | 0.000046 | 5.55 | 398.87 | 32.43 | 0.22 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3816 | 2-YR | 133.68 | 7014.12 | 7016.60 | 7015.69 | 7016.91 | 0.000460 | 4.49 | 30.17 | 12.34 | 0.50 |
| Reach 1-3 | 3816 | 5-YR | 512.29 | 7014.12 | 7020.20 | 7017.94 | 7020.96 | 0.000340 | 7.02 | 75.42 | 12.83 | 0.50 |
| Reach 1-3 | 3816 | 10-YR | 863.82 | 7014.12 | 7022.73 | 7019.54 | 7023.81 | 0.000302 | 8.34 | 108.40 | 13.17 | 0.50 |
| Reach 1-3 | 3816 | 25-YR | 1143.60 | 7014.12 | 7024.51 | 7020.66 | 7025.81 | 0.000283 | 9.15 | 132.00 | 13.41 | 0.50 |
| Reach 1-3 | 3816 | 50-YR | 1561.30 | 7014.12 | 7029.39 | 7022.17 | 7030.51 | 0.000146 | 8.49 | 199.13 | 14.08 | 0.38 |
| Reach 1-3 | 3816 | 100-YR | 1848.80 | 7014.12 | 7032.62 | 7023.12 | 7033.68 | 0.000108 | 8.29 | 245.21 | 14.51 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3744 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 3719 | 2-YR | 133.68 | 7013.40 | 7014.97 | 7014.97 | 7015.75 | 0.002127 | 7.11 | 18.96 | 12.21 | 1.00 |
| Reach 1-3 | 3719 | 5-YR | 512.29 | 7013.40 | 7017.23 | 7017.23 | 7019.16 | 0.001592 | 11.15 | 46.86 | 12.51 | 1.01 |
| Reach 1-3 | 3719 | 10-YR | 863.82 | 7013.40 | 7018.82 | 7018.82 | 7021.55 | 0.001413 | 13.26 | 67.01 | 12.72 | 1.00 |
| Reach 1-3 | 3719 | 25-YR | 1143.60 | 7013.40 | 7019.95 | 7019.95 | 7023.23 | 0.001317 | 14.52 | 81.47 | 12.87 | 1.00 |
| Reach 1-3 | 3719 | 50-YR | 1561.30 | 7013.40 | 7021.44 | 7021.44 | 7025.49 | 0.001239 | 16.15 | 100.78 | 13.06 | 1.00 |
| Reach 1-3 | 3719 | 100-YR | 1848.80 | 7013.40 | 7022.42 | 7022.42 | 7026.93 | 0.001186 | 17.05 | 113.59 | 13.19 | 1.00 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3711 | 2-YR | 133.68 | 7002.83 | 7005.31 | 7004.39 | 7005.62 | 0.000461 | 4.49 | 30.04 | 12.24 | 0.50 |
| Reach 1-3 | 3711 | 5-YR | 512.29 | 7002.83 | 7008.90 | 7006.66 | 7009.67 | 0.000341 | 7.02 | 74.66 | 12.58 | 0.50 |
| Reach 1-3 | 3711 | 10-YR | 863.82 | 7002.83 | 7011.44 | 7008.25 | 7012.52 | 0.000303 | 8.35 | 106.87 | 12.82 | 0.50 |
| Reach 1-3 | 3711 | 25-YR | 1143.60 | 7002.83 | 7013.21 | 7009.37 | 7014.52 | 0.000284 | 9.17 | 129.75 | 12.99 | 0.50 |
| Reach 1-3 | 3711 | 50-YR | 1561.30 | 7002.83 | 7018.10 | 7010.87 | 7019.22 | 0.000146 | 8.51 | 194.36 | 13.46 | 0.38 |
| Reach 1-3 | 3711 | 100-YR | 1848.80 | 7002.83 | 7021.32 | 7011.84 | 7022.39 | 0.000108 | 8.31 | 238.25 | 13.77 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3676 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 3667 | 2-YR | 133.68 | 7002.61 | 7004.18 | 7004.18 | 7004.96 | 0.002121 | 7.10 | 18.93 | 12.15 | 1.00 |
| Reach 1-3 | 3667 | 5-YR | 512.29 | 7002.61 | 7006.44 | 7006.44 | 7008.37 | 0.001591 | 11.15 | 46.61 | 12.36 | 1.01 |
| Reach 1-3 | 3667 | 10-YR | 863.82 | 7002.61 | 7008.05 | 7008.05 | 7010.77 | 0.001401 | 13.23 | 66.65 | 12.52 | 1.00 |
| Reach 1-3 | 3667 | 25-YR | 1143.60 | 7002.61 | 7009.15 | 7009.15 | 7012.44 | 0.001328 | 14.56 | 80.49 | 12.62 | 1.00 |
| Reach 1-3 | 3667 | 50-YR | 1561.30 | 7002.61 | 7010.65 | 7010.65 | 7014.71 | 0.001240 | 16.16 | 99.61 | 12.77 | 1.00 |
| Reach 1-3 | 3667 | 100-YR | 1848.80 | 7002.61 | 7011.61 | 7011.61 | 7016.15 | 0.001194 | 17.09 | 111.90 | 12.86 | 1.00 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 3662 | 2-YR | 133.68 | 7001.15 | 7004.40 | | 7004.45 | 0.001185 | 1.88 | 71.24 | 70.35 | 0.20 |
| Reach 1-3 | 3662 | 5-YR | 512.29 | 7001.15 | 7005.24 | | 7005.71 | 0.007146 | 5.51 | 93.18 | 80.94 | 0.51 |
| Reach 1-3 | 3662 | 10-YR | 863.82 | 7001.15 | 7006.06 | | 7006.95 | 0.010274 | 7.57 | 114.60 | 93.40 | 0.63 |
| Reach 1-3 | 3662 | 25-YR | 1143.60 | 7001.15 | 7007.60 | | 7008.45 | 0.006628 | 7.42 | 155.51 | 119.42 | 0.54 |
| Reach 1-3 | 3662 | 50-YR | 1561.30 | 7001.15 | 7010.59 | | 7011.29 | 0.003172 | 6.73 | 236.68 | 344.75 | 0.40 |
| Reach 1-3 | 3662 | 100-YR | 1848.80 | 7001.15 | 7011.00 | | 7011.90 | 0.003823 | 7.62 | 248.10 | 410.48 | 0.44 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3629 | 2-YR | 133.68 | 7001.51 | 7004.41 | 7002.20 | 7004.42 | 0.000424 | 0.63 | 211.69 | 306.80 | 0.07 |
| Reach 1-3 | 3629 | 5-YR | 512.29 | 7001.51 | 7005.43 | 7003.02 | 7005.47 | 0.001853 | 1.68 | 304.59 | 511.88 | 0.16 |
| Reach 1-3 | 3629 | 10-YR | 863.82 | 7001.51 | 7006.49 | 7003.50 | 7006.57 | 0.002099 | 2.15 | 401.40 | 583.34 | 0.18 |
| Reach 1-3 | 3629 | 25-YR | 1143.60 | 7001.51 | 7008.06 | 7003.80 | 7008.13 | 0.001335 | 2.10 | 544.06 | 598.75 | 0.15 |
| Reach 1-3 | 3629 | 50-YR | 1561.30 | 7001.51 | 7011.00 | 7004.19 | 7011.05 | 0.000657 | 1.92 | 811.08 | 626.52 | 0.11 |
| Reach 1-3 | 3629 | 100-YR | 1848.80 | 7001.51 | 7011.53 | 7004.41 | 7011.60 | 0.000759 | 2.15 | 859.68 | 631.48 | 0.12 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3625 | 2-YR | 133.68 | 7003.41 | 7004.39 | | 7004.41 | 0.001930 | 1.25 | 188.59 | 303.87 | 0.23 |
| Reach 1-3 | 3625 | 5-YR | 512.29 | 7003.41 | 7005.44 | | 7005.46 | 0.001374 | 1.74 | 637.40 | 512.42 | 0.22 |
| Reach 1-3 | 3625 | 10-YR | 863.82 | 7003.41 | 7006.53 | | 7006.54 | 0.000594 | 1.53 | 1251.00 | 583.71 | 0.15 |
| Reach 1-3 | 3625 | 25-YR | 1143.60 | 7003.41 | 7008.10 | | 7008.11 | 0.000188 | 1.13 | 2182.62 | 599.15 | 0.09 |
| Reach 1-3 | 3625 | 50-YR | 1561.30 | 7003.41 | 7011.03 | | 7011.04 | 0.000052 | 0.83 | 3979.80 | 626.85 | 0.05 |
| Reach 1-3 | 3625 | 100-YR | 1848.80 | 7003.41 | 7011.58 | | 7011.58 | 0.000056 | 0.90 | 4322.15 | 631.90 | 0.06 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3618 | 2-YR | 133.68 | 7002.58 | 7004.38 | | 7004.40 | 0.002747 | 1.59 | 199.35 | 299.14 | 0.21 |
| Reach 1-3 | 3618 | 5-YR | 512.29 | 7002.58 | 7005.43 | | 7005.45 | 0.002256 | 1.98 | 645.91 | 505.72 | 0.21 |
| Reach 1-3 | 3618 | 10-YR | 863.82 | 7002.58 | 7006.53 | | 7006.54 | 0.000916 | 1.58 | 1253.50 | 574.31 | 0.14 |
| Reach 1-3 | 3618 | 25-YR | 1143.60 | 7002.58 | 7008.10 | | 7008.11 | 0.000276 | 1.09 | 2170.76 | 589.50 | 0.08 |
| Reach 1-3 | 3618 | 50-YR | 1561.30 | 7002.58 | 7011.03 | | 7011.04 | 0.000074 | 0.75 | 3939.04 | 617.35 | 0.05 |
| Reach 1-3 | 3618 | 100-YR | 1848.80 | 7002.58 | 7011.58 | | 7011.58 | 0.000079 | 0.81 | 4276.24 | 622.48 | 0.05 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3485 | 2-YR | 133.68 | 7002.22 | 7003.97 | | 7004.00 | 0.003744 | 1.82 | 164.41 | 247.64 | 0.25 |
| Reach 1-3 | 3485 | 5-YR | 512.29 | 7002.22 | 7005.12 | | 7005.15 | 0.002746 | 2.21 | 581.63 | 468.44 | 0.23 |
| Reach 1-3 | 3485 | 10-YR | 863.82 | 7002.22 | 7006.42 | | 7006.43 | 0.000834 | 1.57 | 1275.53 | 570.14 | 0.14 |
| Reach 1-3 | 3485 | 25-YR | 1143.60 | 7002.22 | 7008.07 | | 7008.08 | 0.000248 | 1.07 | 2229.50 | 585.92 | 0.08 |
| Reach 1-3 | 3485 | 50-YR | 1561.30 | 7002.22 | 7011.03 | | 7011.03 | 0.000069 | 0.75 | 4002.92 | 615.35 | 0.04 |
| Reach 1-3 | 3485 | 100-YR | 1848.80 | 7002.22 | 7011.57 | | 7011.57 | 0.000075 | 0.81 | 4338.81 | 620.77 | 0.05 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3336 | 2-YR | 133.68 | 7001.71 | 7003.43 | | 7003.45 | 0.003805 | 1.80 | 163.19 | 254.68 | 0.25 |
| Reach 1-3 | 3336 | 5-YR | 512.29 | 7001.71 | 7004.82 | | 7004.84 | 0.001765 | 1.86 | 712.10 | 576.97 | 0.19 |
| Reach 1-3 | 3336 | 10-YR | 863.82 | 7001.71 | 7006.35 | | 7006.35 | 0.000415 | 1.18 | 1608.22 | 594.18 | 0.10 |
| Reach 1-3 | 3336 | 25-YR | 1143.60 | 7001.71 | 7008.05 | | 7008.05 | 0.000150 | 0.88 | 2632.84 | 610.76 | 0.06 |
| Reach 1-3 | 3336 | 50-YR | 1561.30 | 7001.71 | 7011.02 | | 7011.02 | 0.000049 | 0.65 | 4486.65 | 637.45 | 0.04 |
| Reach 1-3 | 3336 | 100-YR | 1848.80 | 7001.71 | 7011.56 | | 7011.56 | 0.000054 | 0.71 | 4833.77 | 642.31 | 0.04 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3198 | 2-YR | 133.68 | 7001.27 | 7002.61 | | 7002.67 | 0.008949 | 2.29 | 104.61 | 203.58 | 0.37 |
| Reach 1-3 | 3198 | 5-YR | 512.29 | 7001.27 | 7004.71 | | 7004.71 | 0.000513 | 1.06 | 1004.50 | 508.40 | 0.10 |
| Reach 1-3 | 3198 | 10-YR | 863.82 | 7001.27 | 7006.31 | | 7006.31 | 0.000216 | 0.90 | 1840.70 | 535.82 | 0.07 |
| Reach 1-3 | 3198 | 25-YR | 1143.60 | 7001.27 | 7008.03 | | 7008.04 | 0.000100 | 0.74 | 2784.98 | 558.26 | 0.05 |
| Reach 1-3 | 3198 | 50-YR | 1561.30 | 7001.27 | 7011.01 | | 7011.01 | 0.000039 | 0.59 | 4501.75 | 593.56 | 0.03 |
| Reach 1-3 | 3198 | 100-YR | 1848.80 | 7001.27 | 7011.55 | | 7011.56 | 0.000044 | 0.65 | 4824.91 | 600.00 | 0.04 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3103 | 2-YR | 133.68 | 7001.02 | 7002.58 | 7001.46 | 7002.58 | 0.000208 | 0.37 | 362.56 | 356.62 | 0.06 |
| Reach 1-3 | 3103 | 5-YR | 512.29 | 7001.02 | 7004.68 | 7001.77 | 7004.69 | 0.000115 | 0.53 | 965.38 | 385.86 | 0.05 |
| Reach 1-3 | 3103 | 10-YR | 863.82 | 7001.02 | 7006.29 | 7001.96 | 7006.30 | 0.000089 | 0.61 | 1426.82 | 405.88 | 0.05 |
| Reach 1-3 | 3103 | 25-YR | 1143.60 | 7001.02 | 7008.02 | 7002.10 | 7008.03 | 0.000057 | 0.59 | 1923.29 | 435.13 | 0.04 |
| Reach 1-3 | 3103 | 50-YR | 1561.30 | 7001.02 | 7011.00 | 7002.29 | 7011.01 | 0.000034 | 0.56 | 2786.96 | 474.67 | 0.03 |
| Reach 1-3 | 3103 | 100-YR | 1848.80 | 7001.02 | 7011.54 | 7002.40 | 7011.55 | 0.000041 | 0.62 | 3040.07 | 478.81 | 0.04 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3057 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 2988 | 2-YR | 133.68 | 7001.00 | 7002.23 | | 7002.25 | 0.002344 | 1.17 | 113.74 | 104.61 | 0.19 |
| Reach 1-3 | 2988 | 5-YR | 512.29 | 7001.00 | 7003.83 | | 7003.89 | 0.002075 | 1.93 | 264.05 | 117.77 | 0.20 |
| Reach 1-3 | 2988 | 10-YR | 863.82 | 7001.00 | 7004.95 | | 7005.03 | 0.001931 | 2.32 | 369.08 | 126.56 | 0.21 |
| Reach 1-3 | 2988 | 25-YR | 1143.60 | 7001.00 | 7005.84 | | 7005.94 | 0.001706 | 2.50 | 453.23 | 130.73 | 0.20 |
| Reach 1-3 | 2988 | 50-YR | 1561.30 | 7001.00 | 7006.95 | | 7007.07 | 0.001600 | 2.78 | 556.93 | 132.49 | 0.20 |
| Reach 1-3 | 2988 | 100-YR | 1848.80 | 7001.00 | 7007.77 | | 7007.90 | 0.001458 | 2.89 | 633.79 | 133.68 | 0.20 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2975 | 2-YR | 101.60 | 7000.89 | 7002.18 | 7001.38 | 7002.22 | 0.003758 | 1.50 | 67.94 | 53.21 | 0.23 |
| Reach 1-3 | 2975 | 5-YR | 398.70 | 7000.89 | 7003.74 | 7002.10 | 7003.85 | 0.004294 | 2.63 | 151.65 | 53.97 | 0.28 |
| Reach 1-3 | 2975 | 10-YR | 676.70 | 7000.89 | 7004.83 | 7002.61 | 7005.00 | 0.004166 | 3.21 | 210.83 | 54.48 | 0.29 |
| Reach 1-3 | 2975 | 25-YR | 931.20 | 7000.89 | 7005.70 | 7003.02 | 7005.90 | 0.004039 | 3.62 | 258.17 | 54.87 | 0.29 |
| Reach 1-3 | 2975 | 50-YR | 1282.90 | 7000.89 | 7006.77 | 7003.53 | 7007.03 | 0.003891 | 4.06 | 317.26 | 55.34 | 0.30 |
| Reach 1-3 | 2975 | 100-YR | 1562.40 | 7000.89 | 7007.56 | 7003.89 | 7007.86 | 0.003776 | 4.36 | 361.07 | 55.68 | 0.30 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2930 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 2879 | 2-YR | 101.60 | 7000.82 | 7001.79 | | 7001.88 | 0.012749 | 2.23 | 42.52 | 55.63 | 0.41 |
| Reach 1-3 | 2879 | 5-YR | 398.70 | 7000.82 | 7002.77 | | 7003.10 | 0.016163 | 4.11 | 89.76 | 62.82 | 0.53 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 2879 | 10-YR | 676.70 | 7000.82 | 7003.48 | | 7003.97 | 0.015861 | 5.04 | 123.93 | 68.21 | 0.55 |
| Reach 1-3 | 2879 | 25-YR | 931.20 | 7000.82 | 7004.01 | | 7004.65 | 0.016096 | 5.74 | 149.40 | 72.62 | 0.57 |
| Reach 1-3 | 2879 | 50-YR | 1282.90 | 7000.82 | 7004.61 | | 7005.47 | 0.016948 | 6.63 | 178.25 | 77.86 | 0.61 |
| Reach 1-3 | 2879 | 100-YR | 1562.40 | 7000.82 | 7005.01 | | 7006.05 | 0.017864 | 7.28 | 197.46 | 81.38 | 0.63 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2856 | 2-YR | 101.60 | 7000.50 | 7001.39 | | 7001.47 | 0.029128 | 2.32 | 43.93 | 59.73 | 0.47 |
| Reach 1-3 | 2856 | 5-YR | 398.70 | 7000.50 | 7002.38 | | 7002.60 | 0.025422 | 3.80 | 107.48 | 68.53 | 0.51 |
| Reach 1-3 | 2856 | 10-YR | 676.70 | 7000.50 | 7003.21 | | 7003.48 | 0.019057 | 4.26 | 163.05 | 74.70 | 0.47 |
| Reach 1-3 | 2856 | 25-YR | 931.20 | 7000.50 | 7003.79 | | 7004.13 | 0.017728 | 4.71 | 202.47 | 79.07 | 0.47 |
| Reach 1-3 | 2856 | 50-YR | 1282.90 | 7000.50 | 7004.45 | | 7004.87 | 0.017571 | 5.32 | 246.54 | 84.04 | 0.48 |
| Reach 1-3 | 2856 | 100-YR | 1562.40 | 7000.50 | 7004.88 | | 7005.38 | 0.017949 | 5.78 | 275.95 | 87.53 | 0.49 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2850 | 2-YR | 101.60 | 7000.17 | 7000.90 | 7000.90 | 7001.12 | 0.153404 | 3.77 | 27.11 | 62.22 | 1.00 |
| Reach 1-3 | 2850 | 5-YR | 398.70 | 7000.17 | 7002.28 | | 7002.46 | 0.019308 | 3.43 | 120.55 | 72.85 | 0.45 |
| Reach 1-3 | 2850 | 10-YR | 676.70 | 7000.17 | 7003.15 | | 7003.36 | 0.014181 | 3.81 | 184.94 | 79.38 | 0.41 |
| Reach 1-3 | 2850 | 25-YR | 931.20 | 7000.17 | 7003.75 | | 7004.01 | 0.013223 | 4.21 | 229.82 | 83.91 | 0.41 |
| Reach 1-3 | 2850 | 50-YR | 1282.90 | 7000.17 | 7004.42 | | 7004.75 | 0.013162 | 4.75 | 279.74 | 88.94 | 0.42 |
| Reach 1-3 | 2850 | 100-YR | 1562.40 | 7000.17 | 7004.86 | | 7005.26 | 0.013472 | 5.16 | 313.05 | 92.30 | 0.43 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2842 | 2-YR | 101.60 | 6997.59 | 7000.70 | | 7000.71 | 0.000426 | 0.67 | 156.06 | 61.73 | 0.07 |
| Reach 1-3 | 2842 | 5-YR | 398.70 | 6997.59 | 7002.32 | | 7002.36 | 0.001369 | 1.62 | 264.58 | 72.77 | 0.13 |
| Reach 1-3 | 2842 | 10-YR | 676.70 | 6997.59 | 7003.18 | | 7003.25 | 0.002080 | 2.24 | 330.13 | 78.92 | 0.17 |
| Reach 1-3 | 2842 | 25-YR | 931.20 | 6997.59 | 7003.78 | | 7003.89 | 0.002640 | 2.71 | 378.76 | 83.22 | 0.19 |
| Reach 1-3 | 2842 | 50-YR | 1282.90 | 6997.59 | 7004.46 | | 7004.61 | 0.003330 | 3.27 | 434.83 | 87.83 | 0.22 |
| Reach 1-3 | 2842 | 100-YR | 1562.40 | 6997.59 | 7004.91 | | 7005.10 | 0.003837 | 3.66 | 473.30 | 90.85 | 0.24 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2838 | 2-YR | 101.60 | 6999.13 | 7000.69 | | 7000.71 | 0.003233 | 1.18 | 86.44 | 61.60 | 0.17 |
| Reach 1-3 | 2838 | 5-YR | 398.70 | 6999.13 | 7002.28 | | 7002.35 | 0.003828 | 2.11 | 194.22 | 73.73 | 0.22 |
| Reach 1-3 | 2838 | 10-YR | 676.70 | 6999.13 | 7003.13 | | 7003.24 | 0.004536 | 2.72 | 259.78 | 80.26 | 0.24 |
| Reach 1-3 | 2838 | 25-YR | 931.20 | 6999.13 | 7003.72 | | 7003.87 | 0.005119 | 3.17 | 308.70 | 84.80 | 0.27 |
| Reach 1-3 | 2838 | 50-YR | 1282.90 | 6999.13 | 7004.39 | | 7004.59 | 0.005836 | 3.72 | 366.62 | 89.89 | 0.29 |
| Reach 1-3 | 2838 | 100-YR | 1562.40 | 6999.13 | 7004.83 | | 7005.08 | 0.006351 | 4.10 | 407.36 | 93.30 | 0.31 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2830 | 2-YR | 101.60 | 6997.58 | 7000.66 | | 7000.68 | 0.002521 | 1.08 | 96.79 | 65.67 | 0.15 |
| Reach 1-3 | 2830 | 5-YR | 398.70 | 6997.58 | 7002.25 | | 7002.31 | 0.004100 | 1.99 | 210.86 | 77.94 | 0.20 |
| Reach 1-3 | 2830 | 10-YR | 676.70 | 6997.58 | 7003.10 | | 7003.19 | 0.005083 | 2.56 | 279.83 | 84.81 | 0.22 |
| Reach 1-3 | 2830 | 25-YR | 931.20 | 6997.58 | 7003.69 | | 7003.82 | 0.005782 | 2.96 | 331.48 | 89.73 | 0.24 |
| Reach 1-3 | 2830 | 50-YR | 1282.90 | 6997.58 | 7004.35 | | 7004.52 | 0.006564 | 3.43 | 392.90 | 95.25 | 0.26 |
| Reach 1-3 | 2830 | 100-YR | 1562.40 | 6997.58 | 7004.80 | | 7005.00 | 0.007086 | 3.75 | 436.23 | 98.96 | 0.28 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2792 | 2-YR | 101.60 | 6997.53 | 7000.58 | | 7000.59 | 0.002137 | 1.00 | 106.26 | 71.66 | 0.14 |
| Reach 1-3 | 2792 | 5-YR | 398.70 | 6997.53 | 7002.11 | | 7002.16 | 0.003613 | 1.87 | 226.84 | 85.47 | 0.18 |
| Reach 1-3 | 2792 | 10-YR | 676.70 | 6997.53 | 7002.93 | | 7003.01 | 0.004477 | 2.39 | 299.89 | 93.06 | 0.21 |
| Reach 1-3 | 2792 | 25-YR | 931.20 | 6997.53 | 7003.50 | | 7003.61 | 0.005094 | 2.77 | 354.57 | 98.36 | 0.23 |
| Reach 1-3 | 2792 | 50-YR | 1282.90 | 6997.53 | 7004.15 | | 7004.29 | 0.005780 | 3.20 | 419.61 | 104.24 | 0.25 |
| Reach 1-3 | 2792 | 100-YR | 1562.40 | 6997.53 | 7004.58 | | 7004.75 | 0.006239 | 3.49 | 465.45 | 108.18 | 0.26 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2719 | 2-YR | 101.60 | 6997.47 | 7000.43 | | 7000.44 | 0.002207 | 1.03 | 110.89 | 83.05 | 0.14 |
| Reach 1-3 | 2719 | 5-YR | 398.70 | 6997.47 | 7001.88 | | 7001.92 | 0.003485 | 1.83 | 244.07 | 98.15 | 0.18 |
| Reach 1-3 | 2719 | 10-YR | 676.70 | 6997.47 | 7002.64 | | 7002.71 | 0.004375 | 2.34 | 321.42 | 104.44 | 0.21 |
| Reach 1-3 | 2719 | 25-YR | 931.20 | 6997.47 | 7003.17 | | 7003.27 | 0.004993 | 2.70 | 378.29 | 108.95 | 0.23 |
| Reach 1-3 | 2719 | 50-YR | 1282.90 | 6997.47 | 7003.77 | | 7003.90 | 0.005733 | 3.13 | 444.83 | 114.29 | 0.25 |
| Reach 1-3 | 2719 | 100-YR | 1562.40 | 6997.47 | 7004.17 | | 7004.33 | 0.006237 | 3.43 | 491.61 | 117.95 | 0.26 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2680 | 2-YR | 101.60 | 6997.33 | 7000.34 | | 7000.35 | 0.002230 | 1.00 | 112.11 | 88.75 | 0.14 |
| Reach 1-3 | 2680 | 5-YR | 398.70 | 6997.33 | 7001.74 | | 7001.78 | 0.003561 | 1.78 | 251.74 | 106.87 | 0.18 |
| Reach 1-3 | 2680 | 10-YR | 676.70 | 6997.33 | 7002.46 | | 7002.53 | 0.004516 | 2.28 | 331.83 | 114.89 | 0.21 |
| Reach 1-3 | 2680 | 25-YR | 931.20 | 6997.33 | 7002.97 | | 7003.06 | 0.005181 | 2.64 | 392.49 | 122.42 | 0.23 |
| Reach 1-3 | 2680 | 50-YR | 1282.90 | 6997.33 | 7003.54 | | 7003.66 | 0.005921 | 3.06 | 464.06 | 129.44 | 0.25 |
| Reach 1-3 | 2680 | 100-YR | 1562.40 | 6997.33 | 7003.92 | | 7004.07 | 0.006404 | 3.34 | 514.85 | 134.20 | 0.26 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2646 | 2-YR | 101.60 | 6997.18 | 7000.27 | | 7000.28 | 0.002031 | 1.00 | 111.56 | 92.29 | 0.14 |
| Reach 1-3 | 2646 | 5-YR | 398.70 | 6997.18 | 7001.62 | | 7001.66 | 0.003224 | 1.75 | 258.75 | 118.66 | 0.18 |
| Reach 1-3 | 2646 | 10-YR | 676.70 | 6997.18 | 7002.32 | | 7002.39 | 0.004003 | 2.22 | 344.87 | 126.61 | 0.21 |
| Reach 1-3 | 2646 | 25-YR | 931.20 | 6997.18 | 7002.81 | | 7002.90 | 0.004545 | 2.55 | 407.94 | 130.43 | 0.22 |
| Reach 1-3 | 2646 | 50-YR | 1282.90 | 6997.18 | 7003.36 | | 7003.48 | 0.005211 | 2.95 | 480.55 | 135.12 | 0.24 |
| Reach 1-3 | 2646 | 100-YR | 1562.40 | 6997.18 | 7003.73 | | 7003.87 | 0.005667 | 3.23 | 531.21 | 138.31 | 0.25 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2589 | 2-YR | 101.60 | 6996.89 | 7000.15 | | 7000.17 | 0.001966 | 1.04 | 113.46 | 97.65 | 0.15 |
| Reach 1-3 | 2589 | 5-YR | 398.70 | 6996.89 | 7001.45 | | 7001.49 | 0.003143 | 1.77 | 270.94 | 139.84 | 0.19 |
| Reach 1-3 | 2589 | 10-YR | 676.70 | 6996.89 | 7002.11 | | 7002.17 | 0.003774 | 2.19 | 365.75 | 144.66 | 0.21 |
| Reach 1-3 | 2589 | 25-YR | 931.20 | 6996.89 | 7002.58 | | 7002.66 | 0.004252 | 2.50 | 433.86 | 148.15 | 0.22 |
| Reach 1-3 | 2589 | 50-YR | 1282.90 | 6996.89 | 7003.10 | | 7003.20 | 0.004838 | 2.86 | 511.49 | 152.39 | 0.24 |
| Reach 1-3 | 2589 | 100-YR | 1562.40 | 6996.89 | 7003.45 | | 7003.57 | 0.005248 | 3.12 | 565.34 | 155.27 | 0.25 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2545 | 2-YR | 101.60 | 6997.22 | 7000.05 | | 7000.07 | 0.002796 | 1.05 | 108.60 | 99.60 | 0.15 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 2545 | 5-YR | 398.70 | 6997.22 | 7001.29 | | 7001.33 | 0.004256 | 1.81 | 258.67 | 135.31 | 0.19 |
| Reach 1-3 | 2545 | 10-YR | 676.70 | 6997.22 | 7001.92 | | 7001.99 | 0.005232 | 2.28 | 346.14 | 141.99 | 0.22 |
| Reach 1-3 | 2545 | 25-YR | 931.20 | 6997.22 | 7002.36 | | 7002.45 | 0.006001 | 2.63 | 409.21 | 146.77 | 0.24 |
| Reach 1-3 | 2545 | 50-YR | 1282.90 | 6997.22 | 7002.84 | | 7002.96 | 0.006930 | 3.04 | 481.95 | 157.17 | 0.26 |
| Reach 1-3 | 2545 | 100-YR | 1562.40 | 6997.22 | 7003.17 | | 7003.31 | 0.007505 | 3.32 | 535.49 | 169.35 | 0.27 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2513 | 2-YR | 101.60 | 6996.86 | 6999.97 | | 6999.99 | 0.002317 | 1.00 | 109.44 | 103.63 | 0.15 |
| Reach 1-3 | 2513 | 5-YR | 398.70 | 6996.86 | 7001.16 | | 7001.20 | 0.003827 | 1.74 | 261.23 | 144.07 | 0.19 |
| Reach 1-3 | 2513 | 10-YR | 676.70 | 6996.86 | 7001.76 | | 7001.82 | 0.004723 | 2.18 | 349.16 | 149.70 | 0.22 |
| Reach 1-3 | 2513 | 25-YR | 931.20 | 6996.86 | 7002.17 | | 7002.25 | 0.005433 | 2.51 | 411.58 | 153.57 | 0.24 |
| Reach 1-3 | 2513 | 50-YR | 1282.90 | 6996.86 | 7002.62 | | 7002.73 | 0.006354 | 2.92 | 481.59 | 157.80 | 0.26 |
| Reach 1-3 | 2513 | 100-YR | 1562.40 | 6996.86 | 7002.92 | | 7003.06 | 0.006992 | 3.20 | 530.10 | 160.68 | 0.27 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2468 | 2-YR | 101.60 | 6997.15 | 6999.80 | | 6999.83 | 0.005871 | 1.33 | 81.44 | 105.57 | 0.23 |
| Reach 1-3 | 2468 | 5-YR | 398.70 | 6997.15 | 7000.91 | | 7000.97 | 0.006735 | 1.98 | 238.69 | 175.99 | 0.24 |
| Reach 1-3 | 2468 | 10-YR | 676.70 | 6997.15 | 7001.48 | | 7001.55 | 0.007045 | 2.31 | 341.77 | 184.98 | 0.25 |
| Reach 1-3 | 2468 | 25-YR | 931.20 | 6997.15 | 7001.87 | | 7001.95 | 0.007484 | 2.57 | 413.67 | 188.77 | 0.26 |
| Reach 1-3 | 2468 | 50-YR | 1282.90 | 6997.15 | 7002.27 | | 7002.38 | 0.008320 | 2.92 | 491.46 | 192.79 | 0.28 |
| Reach 1-3 | 2468 | 100-YR | 1562.40 | 6997.15 | 7002.55 | | 7002.68 | 0.008912 | 3.16 | 545.02 | 195.51 | 0.29 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2405 | 2-YR | 101.60 | 6997.08 | 6999.15 | 6998.79 | 6999.21 | 0.018374 | 2.02 | 50.28 | 68.72 | 0.42 |
| Reach 1-3 | 2405 | 5-YR | 398.70 | 6997.08 | 7000.07 | | 7000.23 | 0.025979 | 3.27 | 132.18 | 126.50 | 0.46 |
| Reach 1-3 | 2405 | 10-YR | 676.70 | 6997.08 | 7000.65 | 6999.90 | 7000.84 | 0.023706 | 3.69 | 220.87 | 181.71 | 0.45 |
| Reach 1-3 | 2405 | 25-YR | 931.20 | 6997.08 | 7000.98 | | 7001.20 | 0.025070 | 4.12 | 286.16 | 214.50 | 0.46 |
| Reach 1-3 | 2405 | 50-YR | 1282.90 | 6997.08 | 7001.33 | | 7001.59 | 0.026026 | 4.54 | 361.81 | 218.30 | 0.48 |
| Reach 1-3 | 2405 | 100-YR | 1562.40 | 6997.08 | 7001.54 | | 7001.83 | 0.027859 | 4.91 | 407.89 | 220.56 | 0.50 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2399 | 2-YR | 101.60 | 6997.08 | 6998.73 | 6998.73 | 6998.96 | 0.157073 | 3.77 | 26.93 | 61.00 | 1.00 |
| Reach 1-3 | 2399 | 5-YR | 398.70 | 6997.08 | 6999.39 | 6999.39 | 6999.91 | 0.118376 | 5.79 | 68.87 | 66.27 | 1.00 |
| Reach 1-3 | 2399 | 10-YR | 676.70 | 6997.08 | 6999.89 | 6999.89 | 7000.55 | 0.092351 | 6.55 | 107.00 | 99.74 | 0.94 |
| Reach 1-3 | 2399 | 25-YR | 931.20 | 6997.08 | 7000.32 | 7000.32 | 7000.94 | 0.065539 | 6.53 | 160.59 | 147.15 | 0.83 |
| Reach 1-3 | 2399 | 50-YR | 1282.90 | 6997.08 | 7000.70 | 7000.70 | 7001.34 | 0.056620 | 6.84 | 224.67 | 192.71 | 0.79 |
| Reach 1-3 | 2399 | 100-YR | 1562.40 | 6997.08 | 7000.94 | 7000.94 | 7001.58 | 0.053268 | 7.07 | 272.63 | 215.43 | 0.78 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2384 | 2-YR | 101.60 | 6993.53 | 6996.04 | | 6996.07 | 0.003727 | 1.17 | 86.74 | 68.52 | 0.18 |
| Reach 1-3 | 2384 | 5-YR | 398.70 | 6993.53 | 6997.03 | | 6997.13 | 0.008439 | 2.51 | 161.85 | 91.07 | 0.30 |
| Reach 1-3 | 2384 | 10-YR | 676.70 | 6993.53 | 6997.51 | | 6997.68 | 0.011978 | 3.42 | 207.81 | 102.17 | 0.37 |
| Reach 1-3 | 2384 | 25-YR | 931.20 | 6993.53 | 6997.84 | | 6998.09 | 0.014585 | 4.09 | 244.51 | 114.17 | 0.42 |
| Reach 1-3 | 2384 | 50-YR | 1282.90 | 6993.53 | 6998.20 | | 6998.55 | 0.017908 | 4.89 | 287.67 | 128.69 | 0.47 |
| Reach 1-3 | 2384 | 100-YR | 1562.40 | 6993.53 | 6998.46 | | 6998.88 | 0.019723 | 5.39 | 322.24 | 140.49 | 0.50 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2377 | 2-YR | 101.60 | 6993.46 | 6996.05 | | 6996.05 | 0.000508 | 0.64 | 159.06 | 67.88 | 0.07 |
| Reach 1-3 | 2377 | 5-YR | 398.70 | 6993.46 | 6997.04 | | 6997.08 | 0.002298 | 1.71 | 247.56 | 111.07 | 0.17 |
| Reach 1-3 | 2377 | 10-YR | 676.70 | 6993.46 | 6997.53 | | 6997.61 | 0.003873 | 2.44 | 306.16 | 130.26 | 0.22 |
| Reach 1-3 | 2377 | 25-YR | 931.20 | 6993.46 | 6997.88 | | 6998.00 | 0.005092 | 2.96 | 354.51 | 144.41 | 0.26 |
| Reach 1-3 | 2377 | 50-YR | 1282.90 | 6993.46 | 6998.25 | | 6998.43 | 0.006739 | 3.61 | 412.14 | 175.28 | 0.30 |
| Reach 1-3 | 2377 | 100-YR | 1562.40 | 6993.46 | 6998.52 | | 6998.74 | 0.007754 | 4.02 | 465.70 | 225.29 | 0.32 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2375 | 2-YR | 101.60 | 6994.97 | 6996.01 | | 6996.05 | 0.008856 | 1.53 | 66.32 | 69.02 | 0.27 |
| Reach 1-3 | 2375 | 5-YR | 398.70 | 6994.97 | 6996.95 | | 6997.07 | 0.012637 | 2.85 | 154.49 | 124.68 | 0.36 |
| Reach 1-3 | 2375 | 10-YR | 676.70 | 6994.97 | 6997.41 | | 6997.59 | 0.014791 | 3.57 | 218.30 | 148.69 | 0.41 |
| Reach 1-3 | 2375 | 25-YR | 931.20 | 6994.97 | 6997.76 | | 6997.97 | 0.015798 | 4.04 | 279.51 | 231.86 | 0.43 |
| Reach 1-3 | 2375 | 50-YR | 1282.90 | 6994.97 | 6998.19 | | 6998.40 | 0.014082 | 4.20 | 387.20 | 253.44 | 0.42 |
| Reach 1-3 | 2375 | 100-YR | 1562.40 | 6994.97 | 6998.50 | | 6998.71 | 0.012752 | 4.26 | 466.06 | 256.83 | 0.40 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2350 | 2-YR | 101.60 | 6993.08 | 6995.85 | | 6995.88 | 0.005419 | 1.37 | 81.87 | 111.65 | 0.24 |
| Reach 1-3 | 2350 | 5-YR | 398.70 | 6993.08 | 6996.74 | | 6996.79 | 0.007887 | 2.11 | 262.43 | 249.41 | 0.27 |
| Reach 1-3 | 2350 | 10-YR | 676.70 | 6993.08 | 6997.20 | | 6997.27 | 0.008422 | 2.44 | 382.26 | 263.12 | 0.28 |
| Reach 1-3 | 2350 | 25-YR | 931.20 | 6993.08 | 6997.56 | | 6997.63 | 0.008459 | 2.64 | 476.51 | 267.16 | 0.28 |
| Reach 1-3 | 2350 | 50-YR | 1282.90 | 6993.08 | 6997.99 | | 6998.08 | 0.008349 | 2.85 | 593.81 | 272.11 | 0.29 |
| Reach 1-3 | 2350 | 100-YR | 1562.40 | 6993.08 | 6998.31 | | 6998.40 | 0.008225 | 2.99 | 679.98 | 275.96 | 0.29 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2319 | 2-YR | 101.60 | 6993.33 | 6995.65 | | 6995.68 | 0.007141 | 1.49 | 74.55 | 109.82 | 0.27 |
| Reach 1-3 | 2319 | 5-YR | 398.70 | 6993.33 | 6996.48 | | 6996.54 | 0.009302 | 2.21 | 259.81 | 269.06 | 0.29 |
| Reach 1-3 | 2319 | 10-YR | 676.70 | 6993.33 | 6996.95 | | 6997.01 | 0.008993 | 2.45 | 388.34 | 278.55 | 0.29 |
| Reach 1-3 | 2319 | 25-YR | 931.20 | 6993.33 | 6997.31 | | 6997.38 | 0.008599 | 2.61 | 490.24 | 282.56 | 0.28 |
| Reach 1-3 | 2319 | 50-YR | 1282.90 | 6993.33 | 6997.76 | | 6997.84 | 0.008108 | 2.77 | 617.98 | 288.15 | 0.28 |
| Reach 1-3 | 2319 | 100-YR | 1562.40 | 6993.33 | 6998.09 | | 6998.17 | 0.007782 | 2.88 | 711.85 | 292.63 | 0.28 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2246 | 2-YR | 101.60 | 6993.16 | 6995.16 | | 6995.17 | 0.007113 | 1.18 | 118.41 | 220.87 | 0.25 |
| Reach 1-3 | 2246 | 5-YR | 398.70 | 6993.16 | 6995.90 | | 6995.94 | 0.008017 | 1.70 | 294.42 | 251.16 | 0.25 |
| Reach 1-3 | 2246 | 10-YR | 676.70 | 6993.16 | 6996.41 | | 6996.45 | 0.007418 | 1.93 | 426.50 | 274.02 | 0.24 |
| Reach 1-3 | 2246 | 25-YR | 931.20 | 6993.16 | 6996.81 | | 6996.86 | 0.006849 | 2.06 | 538.64 | 286.85 | 0.24 |
| Reach 1-3 | 2246 | 50-YR | 1282.90 | 6993.16 | 6997.29 | | 6997.35 | 0.006276 | 2.21 | 681.53 | 298.57 | 0.23 |
| Reach 1-3 | 2246 | 100-YR | 1562.40 | 6993.16 | 6997.64 | | 6997.70 | 0.005965 | 2.31 | 785.85 | 304.98 | 0.23 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 2181 | 2-YR | 101.60 | 6992.99 | 6994.50 | 6994.29 | 6994.53 | 0.017569 | 1.69 | 83.40 | 183.24 | 0.47 |
| Reach 1-3 | 2181 | 5-YR | 398.70 | 6992.99 | 6995.34 | | 6995.38 | 0.010600 | 1.80 | 252.50 | 218.08 | 0.29 |
| Reach 1-3 | 2181 | 10-YR | 676.70 | 6992.99 | 6995.93 | | 6995.98 | 0.008260 | 1.96 | 388.72 | 245.00 | 0.26 |
| Reach 1-3 | 2181 | 25-YR | 931.20 | 6992.99 | 6996.38 | | 6996.43 | 0.007171 | 2.08 | 501.80 | 258.43 | 0.24 |
| Reach 1-3 | 2181 | 50-YR | 1282.90 | 6992.99 | 6996.91 | | 6996.97 | 0.006306 | 2.21 | 643.10 | 274.56 | 0.23 |
| Reach 1-3 | 2181 | 100-YR | 1562.40 | 6992.99 | 6997.28 | | 6997.35 | 0.005867 | 2.30 | 746.00 | 282.66 | 0.23 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2112 | 2-YR | 101.60 | 6992.58 | 6993.72 | | 6993.73 | 0.007951 | 1.14 | 107.66 | 141.87 | 0.20 |
| Reach 1-3 | 2112 | 5-YR | 398.70 | 6992.58 | 6994.80 | | 6994.83 | 0.006054 | 1.59 | 286.88 | 184.90 | 0.19 |
| Reach 1-3 | 2112 | 10-YR | 676.70 | 6992.58 | 6995.47 | | 6995.51 | 0.005534 | 1.83 | 417.83 | 209.18 | 0.19 |
| Reach 1-3 | 2112 | 25-YR | 931.20 | 6992.58 | 6995.96 | | 6996.01 | 0.005256 | 1.98 | 524.67 | 227.56 | 0.19 |
| Reach 1-3 | 2112 | 50-YR | 1282.90 | 6992.58 | 6996.53 | | 6996.59 | 0.004901 | 2.13 | 657.69 | 236.59 | 0.19 |
| Reach 1-3 | 2112 | 100-YR | 1562.40 | 6992.58 | 6996.91 | | 6996.98 | 0.004779 | 2.24 | 749.57 | 240.41 | 0.19 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2046 | 2-YR | 101.60 | 6991.97 | 6993.20 | | 6993.24 | 0.007146 | 2.00 | 76.05 | 97.26 | 0.32 |
| Reach 1-3 | 2046 | 5-YR | 398.70 | 6991.97 | 6994.35 | | 6994.43 | 0.006182 | 2.93 | 212.73 | 139.16 | 0.34 |
| Reach 1-3 | 2046 | 10-YR | 676.70 | 6991.97 | 6995.03 | | 6995.13 | 0.005916 | 3.40 | 313.56 | 158.18 | 0.35 |
| Reach 1-3 | 2046 | 25-YR | 931.20 | 6991.97 | 6995.52 | | 6995.64 | 0.005823 | 3.73 | 394.90 | 172.03 | 0.35 |
| Reach 1-3 | 2046 | 50-YR | 1282.90 | 6991.97 | 6996.09 | | 6996.23 | 0.005729 | 4.10 | 498.22 | 188.14 | 0.36 |
| Reach 1-3 | 2046 | 100-YR | 1562.40 | 6991.97 | 6996.47 | | 6996.63 | 0.005768 | 4.36 | 571.71 | 198.77 | 0.36 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1993 | 2-YR | 101.60 | 6991.29 | 6992.86 | | 6992.88 | 0.006104 | 1.85 | 90.03 | 93.62 | 0.29 |
| Reach 1-3 | 1993 | 5-YR | 398.70 | 6991.29 | 6994.01 | | 6994.08 | 0.006859 | 3.03 | 214.80 | 123.02 | 0.35 |
| Reach 1-3 | 1993 | 10-YR | 676.70 | 6991.29 | 6994.68 | | 6994.78 | 0.007163 | 3.66 | 303.69 | 140.27 | 0.37 |
| Reach 1-3 | 1993 | 25-YR | 931.20 | 6991.29 | 6995.17 | | 6995.29 | 0.007346 | 4.09 | 375.41 | 153.13 | 0.38 |
| Reach 1-3 | 1993 | 50-YR | 1282.90 | 6991.29 | 6995.74 | | 6995.89 | 0.007378 | 4.53 | 467.41 | 167.66 | 0.39 |
| Reach 1-3 | 1993 | 100-YR | 1562.40 | 6991.29 | 6996.12 | | 6996.28 | 0.007331 | 4.79 | 531.93 | 173.75 | 0.40 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1929 | 2-YR | 101.60 | 6991.32 | 6992.56 | | 6992.58 | 0.003750 | 1.40 | 90.09 | 99.99 | 0.23 |
| Reach 1-3 | 1929 | 5-YR | 398.70 | 6991.32 | 6993.65 | | 6993.72 | 0.004631 | 2.45 | 210.40 | 119.88 | 0.29 |
| Reach 1-3 | 1929 | 10-YR | 676.70 | 6991.32 | 6994.28 | | 6994.39 | 0.005161 | 3.06 | 290.04 | 130.66 | 0.32 |
| Reach 1-3 | 1929 | 25-YR | 931.20 | 6991.32 | 6994.74 | | 6994.88 | 0.005503 | 3.49 | 352.02 | 138.23 | 0.34 |
| Reach 1-3 | 1929 | 50-YR | 1282.90 | 6991.32 | 6995.29 | | 6995.47 | 0.005789 | 3.96 | 430.05 | 147.13 | 0.36 |
| Reach 1-3 | 1929 | 100-YR | 1562.40 | 6991.32 | 6995.65 | | 6995.85 | 0.006060 | 4.30 | 483.46 | 152.96 | 0.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1884 | 2-YR | 101.60 | 6991.07 | 6992.28 | | 6992.32 | 0.009504 | 2.26 | 73.26 | 95.07 | 0.37 |
| Reach 1-3 | 1884 | 5-YR | 398.70 | 6991.07 | 6993.31 | | 6993.42 | 0.010028 | 3.57 | 180.42 | 111.41 | 0.43 |
| Reach 1-3 | 1884 | 10-YR | 676.70 | 6991.07 | 6993.91 | | 6994.06 | 0.010561 | 4.31 | 249.64 | 119.42 | 0.46 |
| Reach 1-3 | 1884 | 25-YR | 931.20 | 6991.07 | 6994.34 | | 6994.54 | 0.010986 | 4.84 | 302.67 | 125.18 | 0.48 |
| Reach 1-3 | 1884 | 50-YR | 1282.90 | 6991.07 | 6994.87 | | 6995.11 | 0.011124 | 5.39 | 370.34 | 132.19 | 0.49 |
| Reach 1-3 | 1884 | 100-YR | 1562.40 | 6991.07 | 6995.20 | | 6995.48 | 0.011617 | 5.82 | 414.50 | 136.61 | 0.51 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1834 | 2-YR | 101.60 | 6990.69 | 6991.93 | | 6991.97 | 0.005448 | 1.61 | 74.46 | 98.97 | 0.28 |
| Reach 1-3 | 1834 | 5-YR | 398.70 | 6990.69 | 6992.91 | | 6993.01 | 0.006705 | 2.77 | 184.18 | 117.49 | 0.34 |
| Reach 1-3 | 1834 | 10-YR | 676.70 | 6990.69 | 6993.46 | | 6993.61 | 0.007779 | 3.51 | 250.51 | 125.15 | 0.39 |
| Reach 1-3 | 1834 | 25-YR | 931.20 | 6990.69 | 6993.85 | | 6994.05 | 0.008600 | 4.05 | 300.76 | 131.44 | 0.42 |
| Reach 1-3 | 1834 | 50-YR | 1282.90 | 6990.69 | 6994.36 | | 6994.61 | 0.008886 | 4.58 | 369.20 | 137.24 | 0.43 |
| Reach 1-3 | 1834 | 100-YR | 1562.40 | 6990.69 | 6994.64 | | 6994.94 | 0.009824 | 5.07 | 407.50 | 140.41 | 0.46 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1804 | 2-YR | 101.60 | 6990.58 | 6991.74 | | 6991.78 | 0.006411 | 1.85 | 77.25 | 100.74 | 0.31 |
| Reach 1-3 | 1804 | 5-YR | 398.70 | 6990.58 | 6992.68 | | 6992.78 | 0.007731 | 3.04 | 183.90 | 120.67 | 0.37 |
| Reach 1-3 | 1804 | 10-YR | 676.70 | 6990.58 | 6993.20 | | 6993.34 | 0.008764 | 3.75 | 248.27 | 127.57 | 0.41 |
| Reach 1-3 | 1804 | 25-YR | 931.20 | 6990.58 | 6993.57 | | 6993.75 | 0.009559 | 4.28 | 296.16 | 132.25 | 0.44 |
| Reach 1-3 | 1804 | 50-YR | 1282.90 | 6990.58 | 6994.08 | | 6994.30 | 0.009472 | 4.74 | 365.75 | 141.81 | 0.45 |
| Reach 1-3 | 1804 | 100-YR | 1562.40 | 6990.58 | 6994.32 | | 6994.60 | 0.010736 | 5.28 | 402.00 | 153.49 | 0.48 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1707 | 2-YR | 128.60 | 6989.35 | 6990.10 | 6990.10 | 6990.36 | 0.040207 | 4.21 | 34.67 | 74.60 | 0.96 |
| Reach 1-3 | 1707 | 5-YR | 480.40 | 6989.35 | 6990.82 | 6990.82 | 6991.33 | 0.031184 | 6.28 | 97.81 | 101.55 | 0.97 |
| Reach 1-3 | 1707 | 10-YR | 763.80 | 6989.35 | 6991.22 | 6991.22 | 6991.87 | 0.028562 | 7.19 | 140.86 | 111.64 | 0.97 |
| Reach 1-3 | 1707 | 25-YR | 1005.40 | 6989.35 | 6991.52 | 6991.52 | 6992.25 | 0.026937 | 7.77 | 175.04 | 118.22 | 0.97 |
| Reach 1-3 | 1707 | 50-YR | 1368.30 | 6989.35 | 6991.84 | 6991.84 | 6992.77 | 0.028724 | 8.85 | 214.25 | 127.80 | 1.02 |
| Reach 1-3 | 1707 | 100-YR | 1585.20 | 6989.35 | 6992.10 | 6992.10 | 6993.04 | 0.025470 | 8.96 | 249.51 | 134.94 | 0.98 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1663 | 2-YR | 128.60 | 6987.76 | 6988.46 | | 6988.63 | 0.023713 | 3.40 | 41.21 | 73.65 | 0.75 |
| Reach 1-3 | 1663 | 5-YR | 480.40 | 6987.76 | 6989.10 | 6989.10 | 6989.61 | 0.029082 | 6.00 | 96.27 | 103.68 | 0.93 |
| Reach 1-3 | 1663 | 10-YR | 763.80 | 6987.76 | 6989.51 | 6989.51 | 6990.14 | 0.026498 | 6.87 | 140.69 | 117.58 | 0.93 |
| Reach 1-3 | 1663 | 25-YR | 1005.40 | 6987.76 | 6989.78 | 6989.78 | 6990.52 | 0.025896 | 7.50 | 173.50 | 123.52 | 0.94 |
| Reach 1-3 | 1663 | 50-YR | 1368.30 | 6987.76 | 6990.15 | 6990.15 | 6991.01 | 0.024843 | 8.24 | 220.63 | 132.14 | 0.95 |
| Reach 1-3 | 1663 | 100-YR | 1585.20 | 6987.76 | 6990.34 | 6990.34 | 6991.27 | 0.024638 | 8.64 | 245.98 | 135.45 | 0.96 |
| | | | | | | | | | | | | |
| Reach 1-3 | 1622 | 2-YR | 128.60 | 6986.76 | 6987.48 | 6987.40 | 6987.59 | 0.026847 | 2.63 | 48.93 | 123.35 | 0.74 |
| Reach 1-3 | 1622 | 5-YR | 480.40 | 6986.76 | 6987.98 | | 6988.24 | 0.025942 | 4.08 | 117.64 | 150.00 | 0.81 |
| Reach 1-3 | 1622 | 10-YR | 763.80 | 6986.76 | 6988.25 | | 6988.61 | 0.025152 | 4.86 | 157.81 | 155.30 | 0.84 |
| Reach 1-3 | 1622 | 25-YR | 1005.40 | 6986.76 | 6988.44 | 6988.31 | 6988.89 | 0.024702 | 5.39 | 188.18 | 158.80 | 0.85 |
| Reach 1-3 | 1622 | 50-YR | 1368.30 | 6986.76 | 6988.70 | 6988.57 | 6989.26 | 0.023975 | 6.04 | 230.52 | 163.57 | 0.87 |
| Reach 1-3 | 1622 | 100-YR | 1585.20 | 6986.76 | 6988.84 | 6988.72 | 6989.47 | 0.023672 | 6.38 | 254.11 | 166.17 | 0.88 |

HEC-RAS Plan: PROP WSEL River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| | | | | | | | | | | | | |
| Reach 1-3 | 1411 | 2-YR | 128.60 | 6982.00 | 6983.02 | 6982.88 | 6983.11 | 0.017101 | 2.39 | 53.76 | 111.26 | 0.61 |
| Reach 1-3 | 1411 | 5-YR | 480.40 | 6982.00 | 6983.60 | 6983.38 | 6983.85 | 0.017080 | 3.99 | 122.22 | 125.23 | 0.69 |
| Reach 1-3 | 1411 | 10-YR | 763.80 | 6982.00 | 6983.93 | 6983.68 | 6984.28 | 0.017075 | 4.79 | 165.11 | 134.43 | 0.72 |
| Reach 1-3 | 1411 | 25-YR | 1005.40 | 6982.00 | 6984.17 | 6983.89 | 6984.60 | 0.017068 | 5.33 | 197.62 | 137.94 | 0.74 |
| Reach 1-3 | 1411 | 50-YR | 1368.30 | 6982.00 | 6984.48 | 6984.20 | 6985.03 | 0.017071 | 6.00 | 241.66 | 141.72 | 0.76 |
| Reach 1-3 | 1411 | 100-YR | 1585.20 | 6982.00 | 6984.65 | 6984.36 | 6985.26 | 0.017064 | 6.35 | 266.12 | 143.77 | 0.77 |

HEC-RAS Model  Plan: Proposed Conditions - WS Eval  1/23/2023

Sand Creek Reach 1-3

Legend

EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
Ground

Elevation (ft)

7250
7200
7150
7100
7050
7000
6950

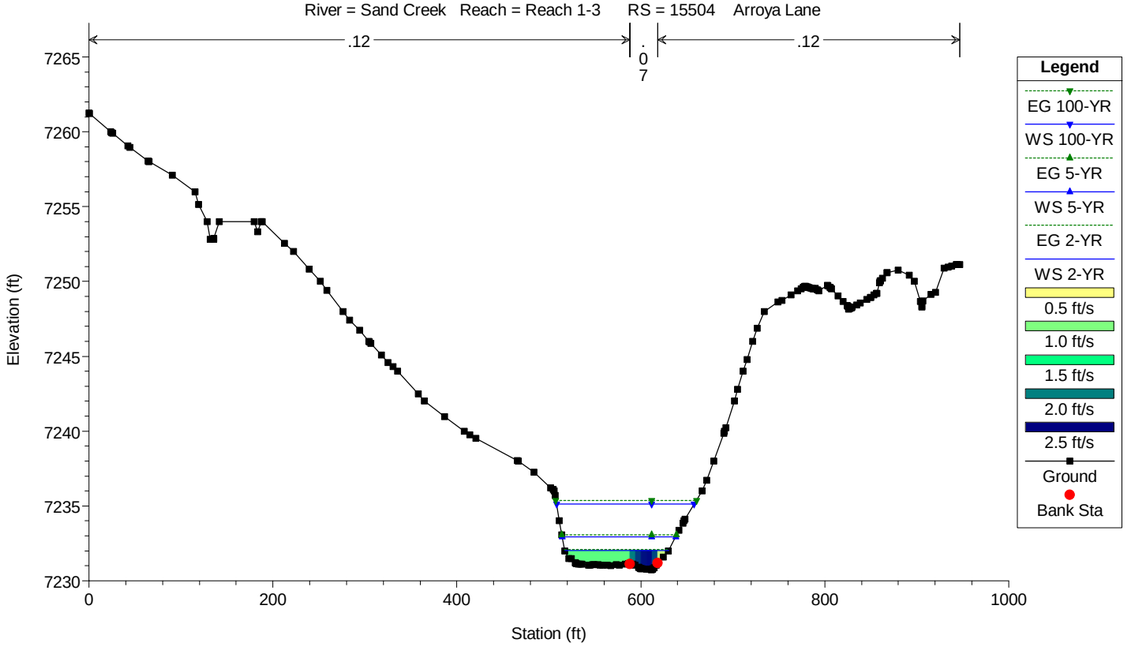
0
2000
4000
6000
8000
10000
12000
14000
16000

Main Channel Distance (ft)

1622
1804
1993
2181
2319
2468
2646
2792
2930 Sterling Ranch R...
3103
3336
3485 Section CY
3618
3744 Pond 1 Culvert #1
4084
4296
4534 Section DA
4714
4855
5047 Section DB
5227
5429
5628
5791
5977
6164 DS of GSB #3
6298
6504
6673
6868
7044 DS of GSB #4
7213
7351 DS of GSB #5
7485
7624
7765
7949 Brairgate Parkway
8209
8429
8683
8786
8956 US of Pond 2 culvert
9216 DS of GSB #6
9389
9558 DS of GSB #7
9727
9875 DS of GSB #8
10014
10211
10411
10543
10713 Section DN
10925 Section DO
11206 Section DP
12070 Section DQ
12767 Section DR
13756 Section DS
14528 Section DT
14904
15504 Arroya Lane

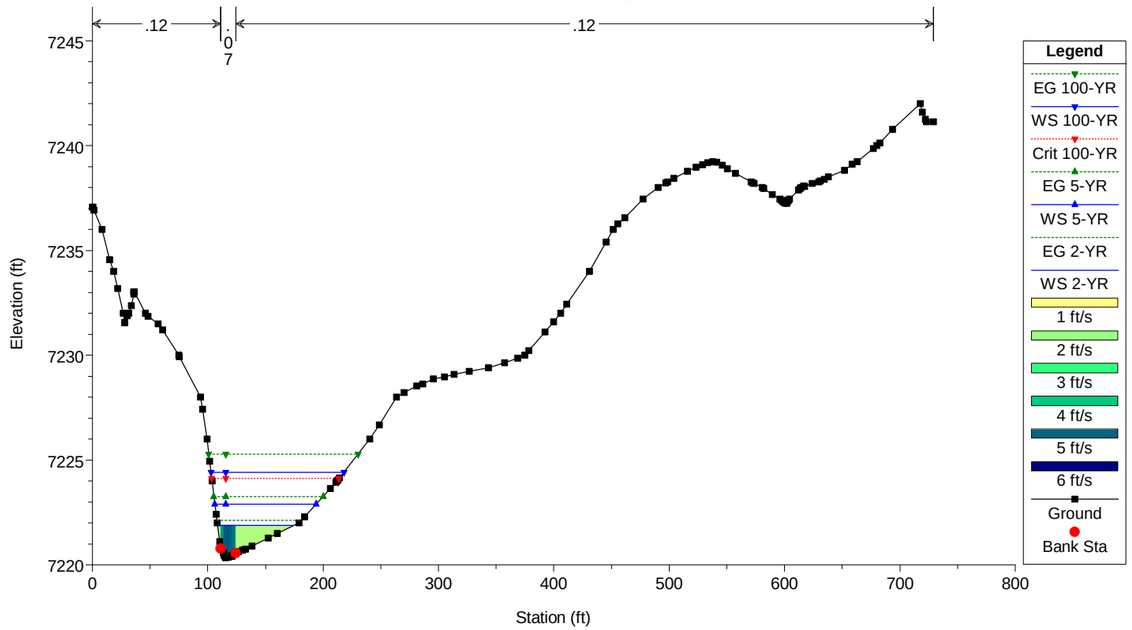
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 15504 Arroya Lane



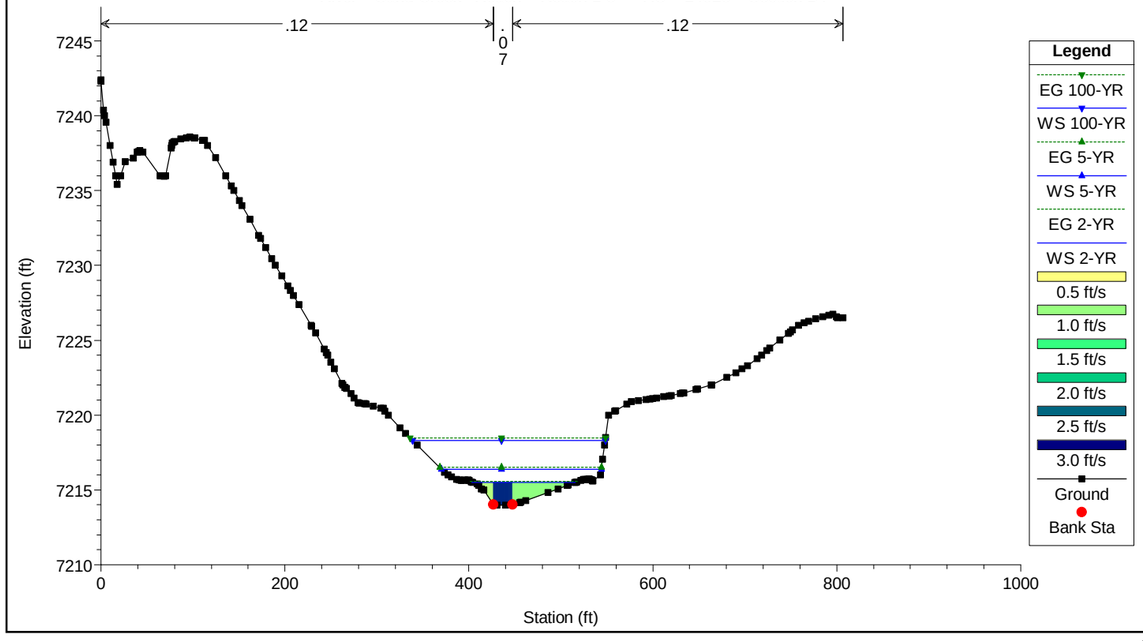

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 14904



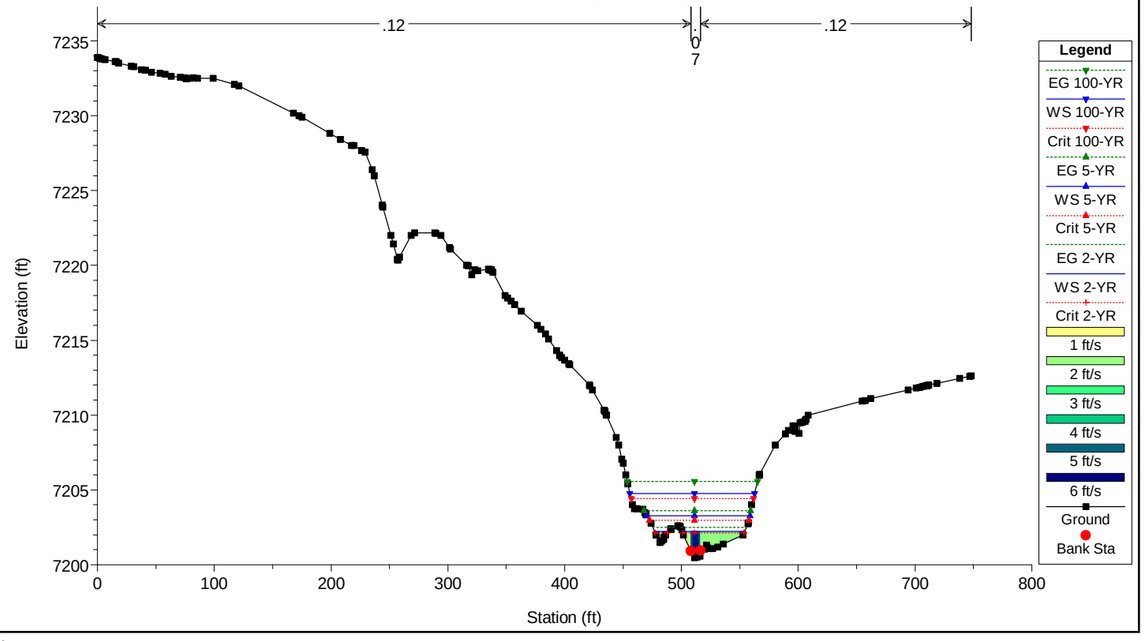

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 14528 Section DT



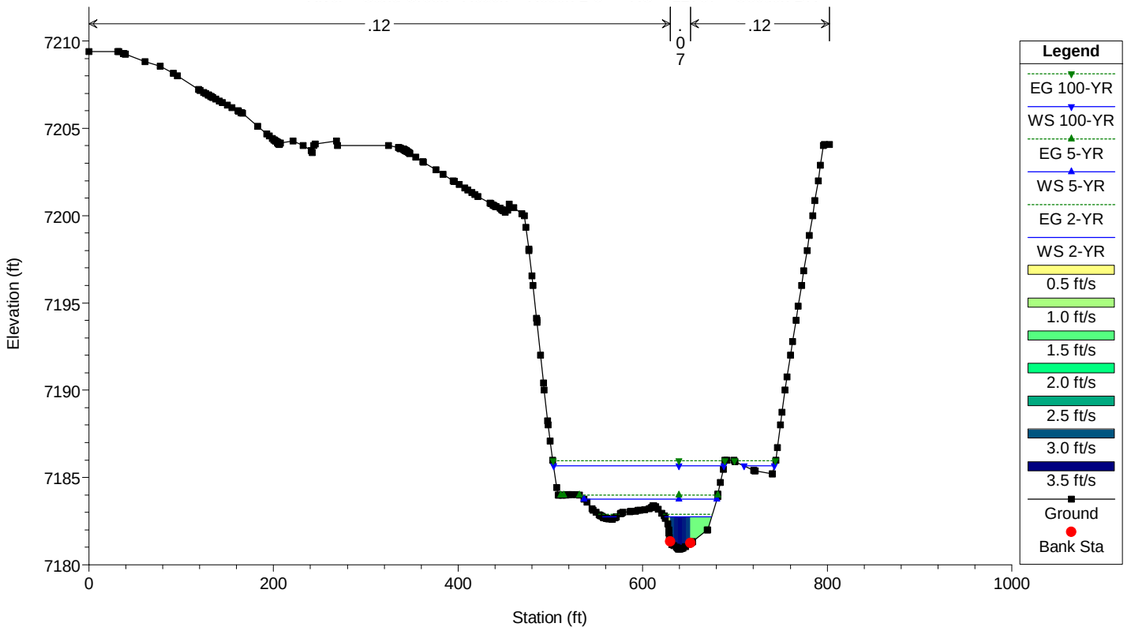

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 13756 Section DS



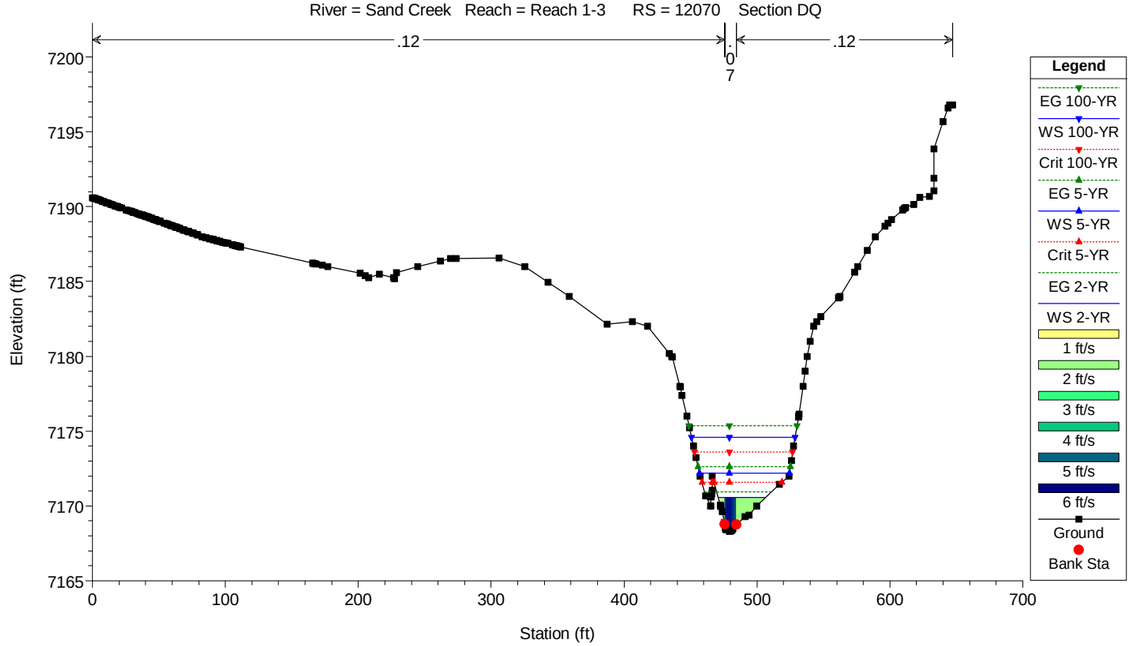
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 12767 Section DR



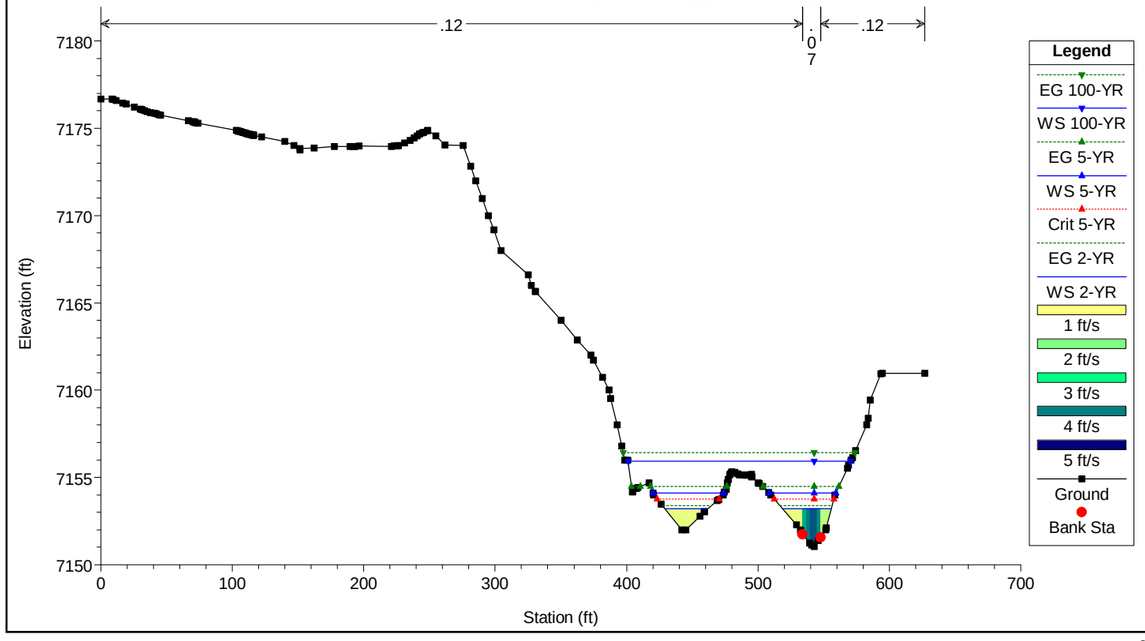

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 12070 Section DQ



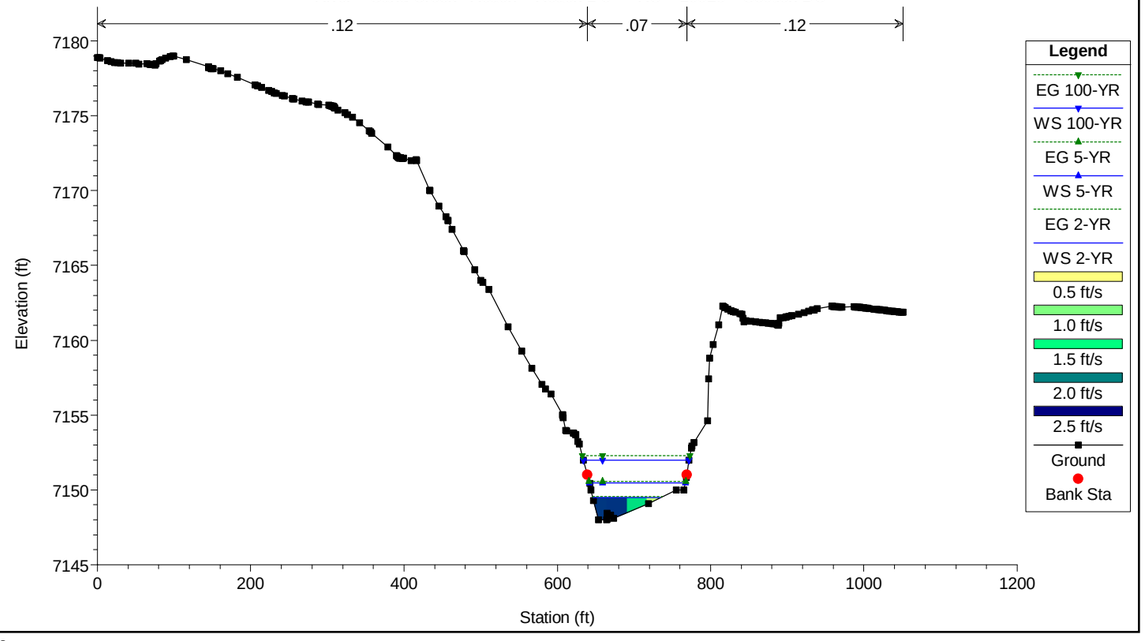

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

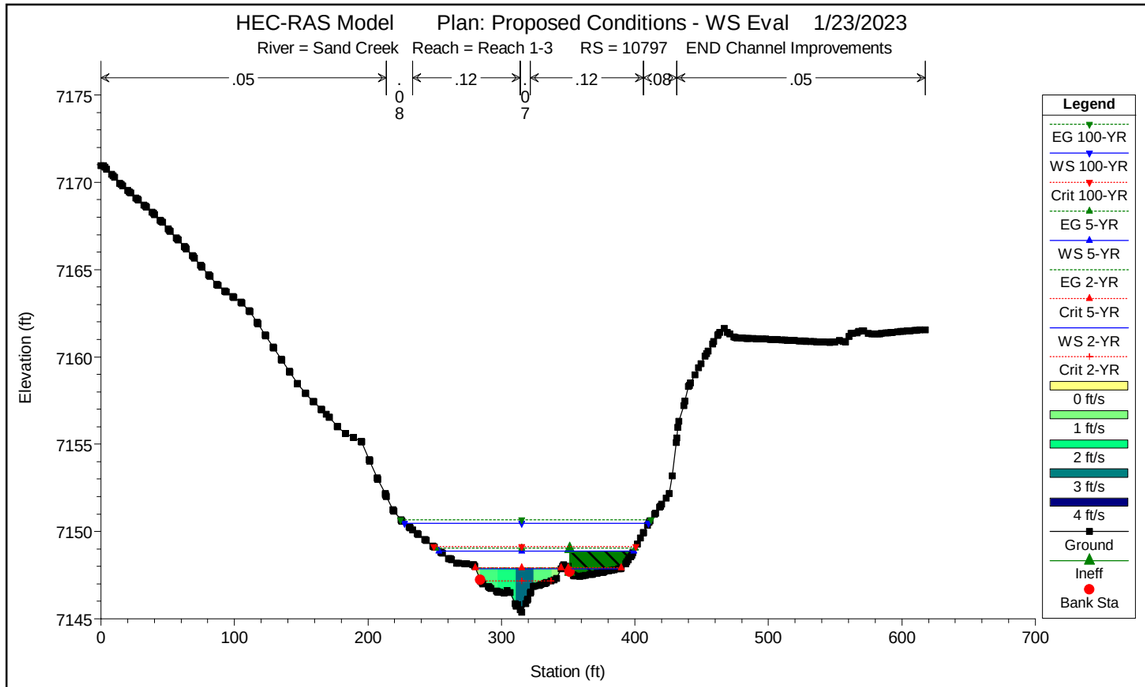
River = Sand Creek Reach = Reach 1-3 RS = 11206 Section DP

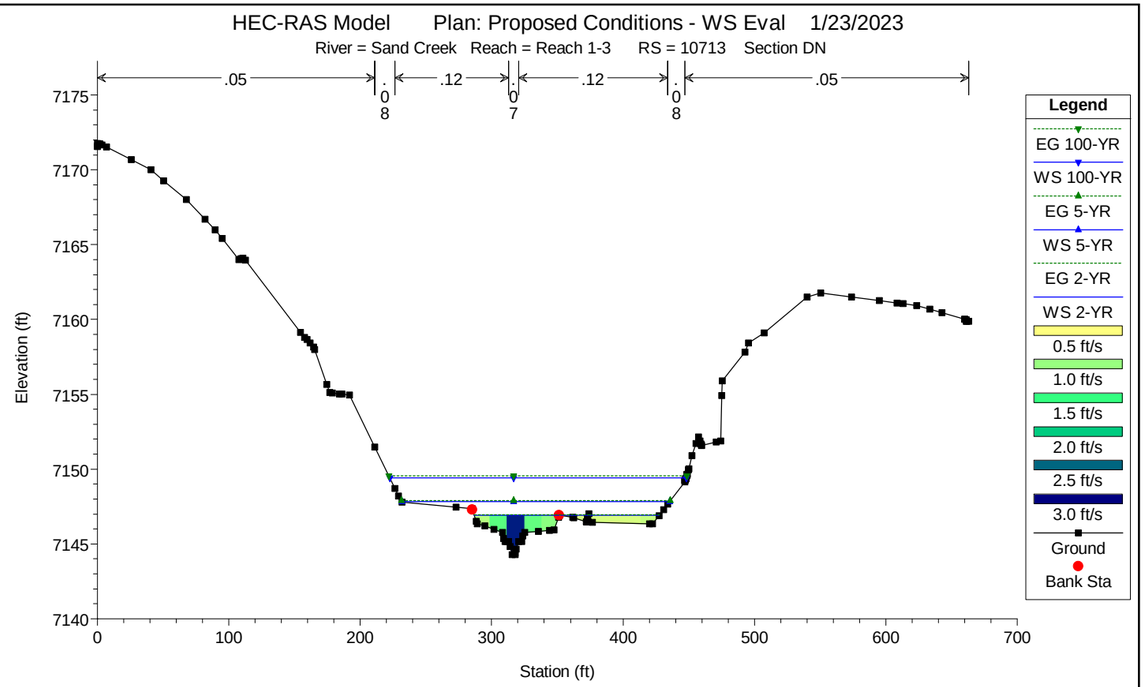


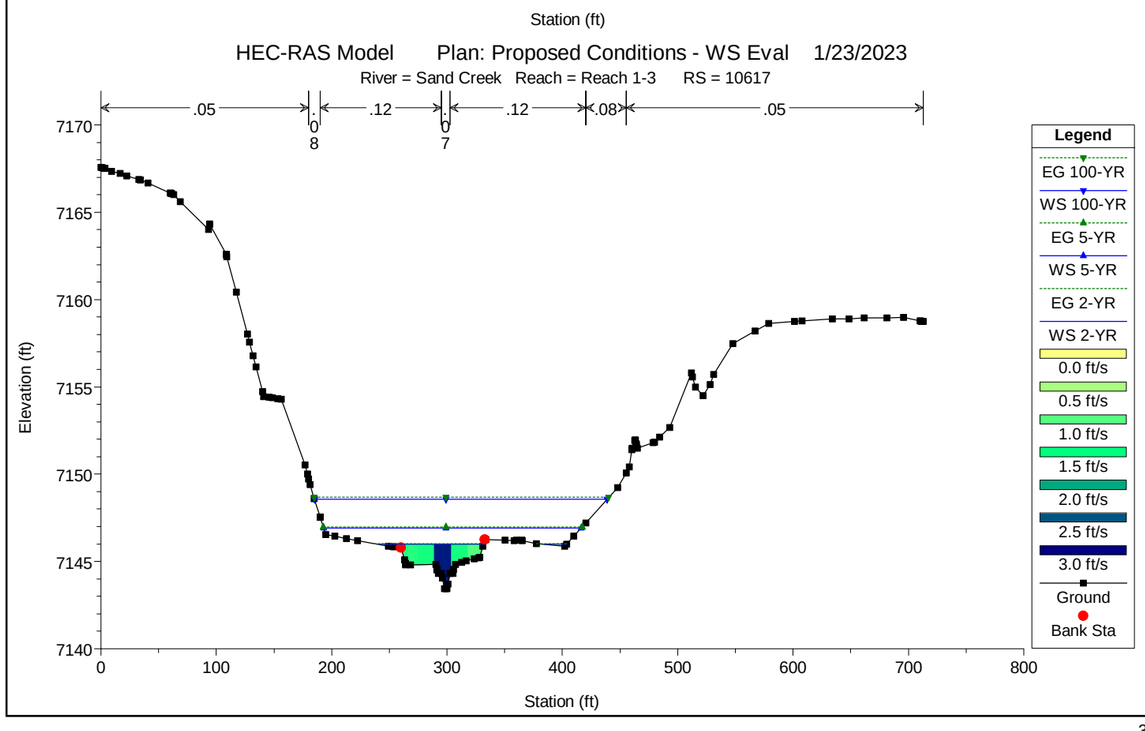

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

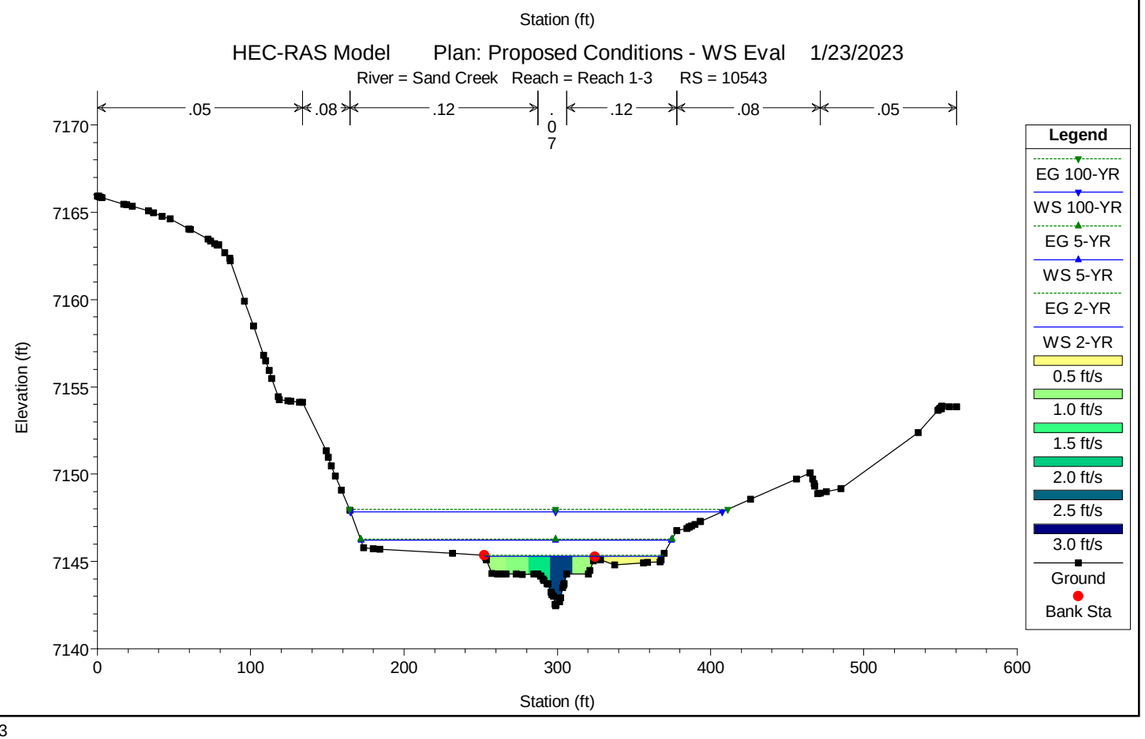
River = Sand Creek Reach = Reach 1-3 RS = 10925 Section DO

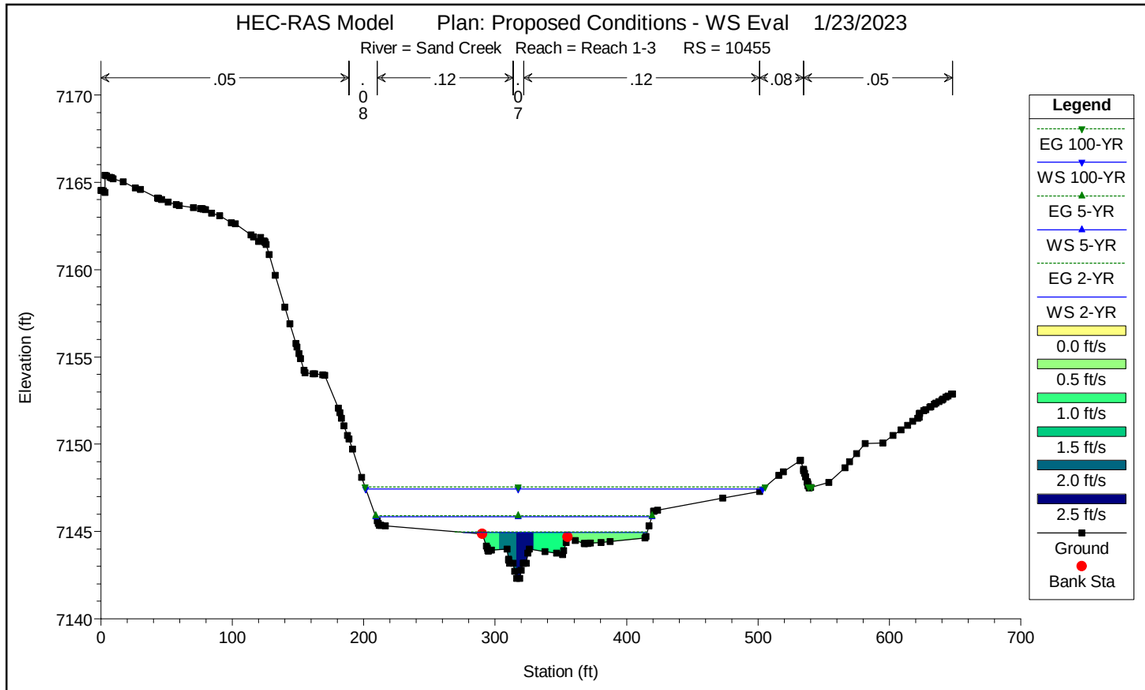


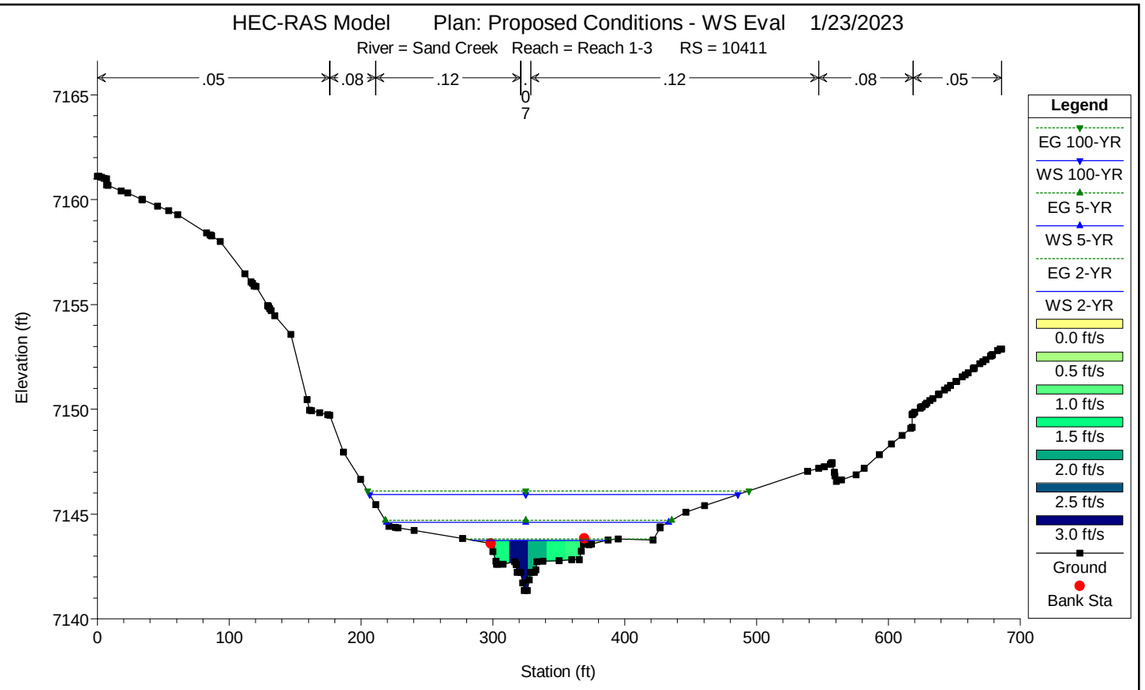

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10797 END Channel Improvements
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
Crit 5-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

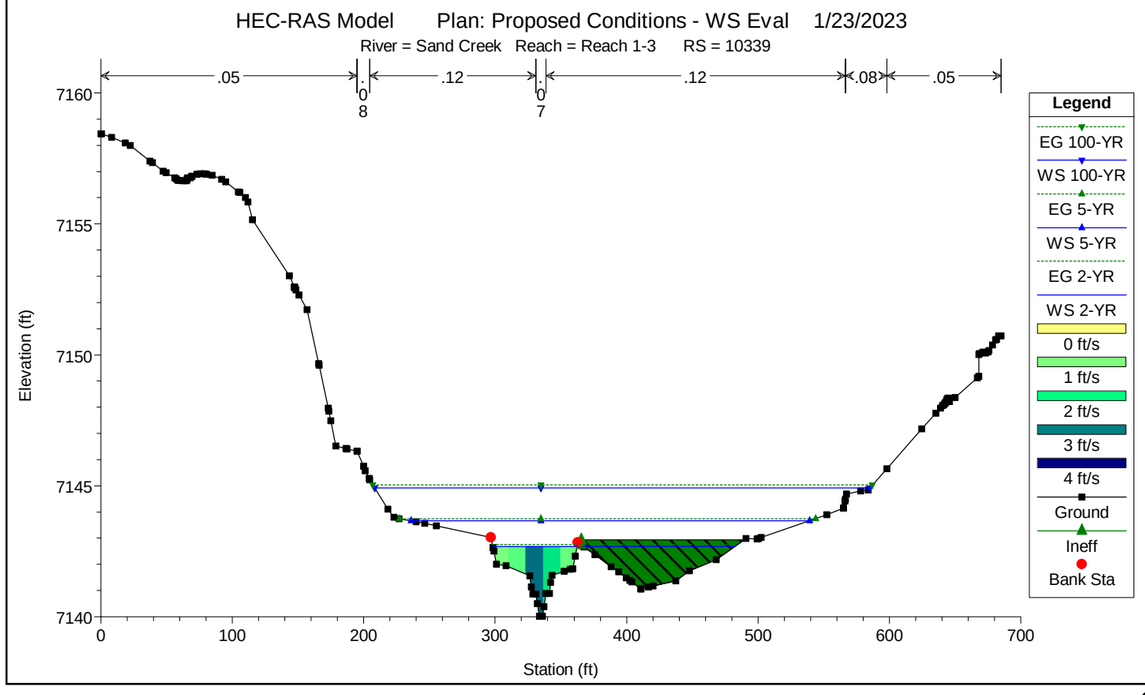

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10713 Section DN
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

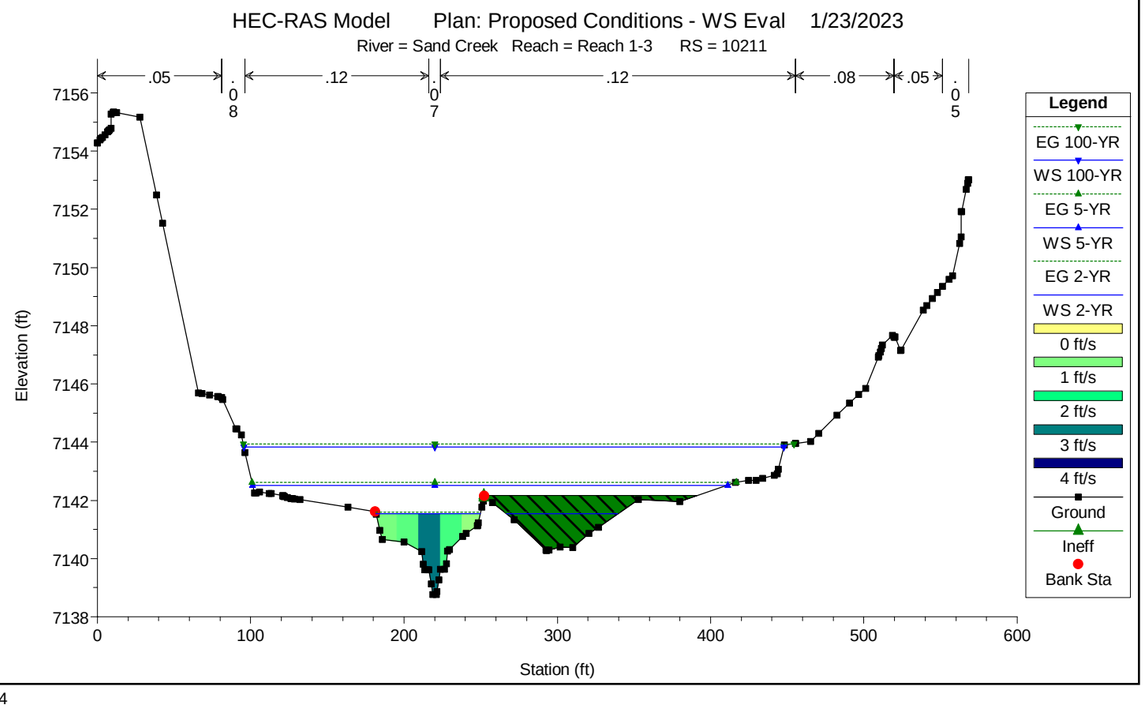

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10617
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

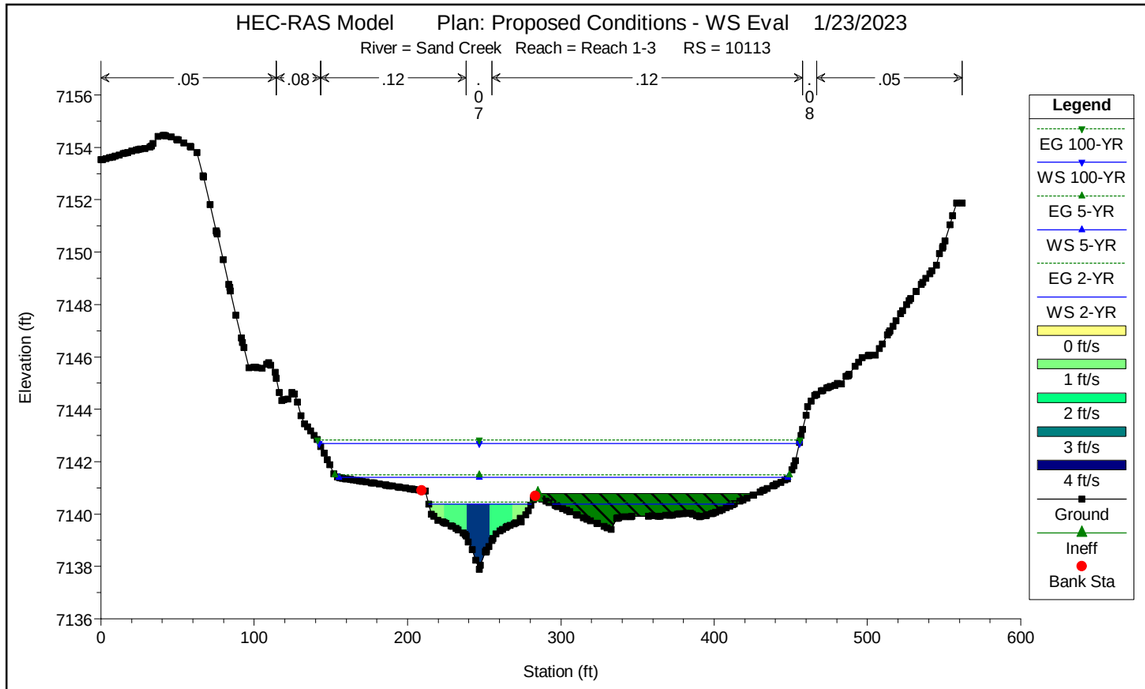

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10543
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

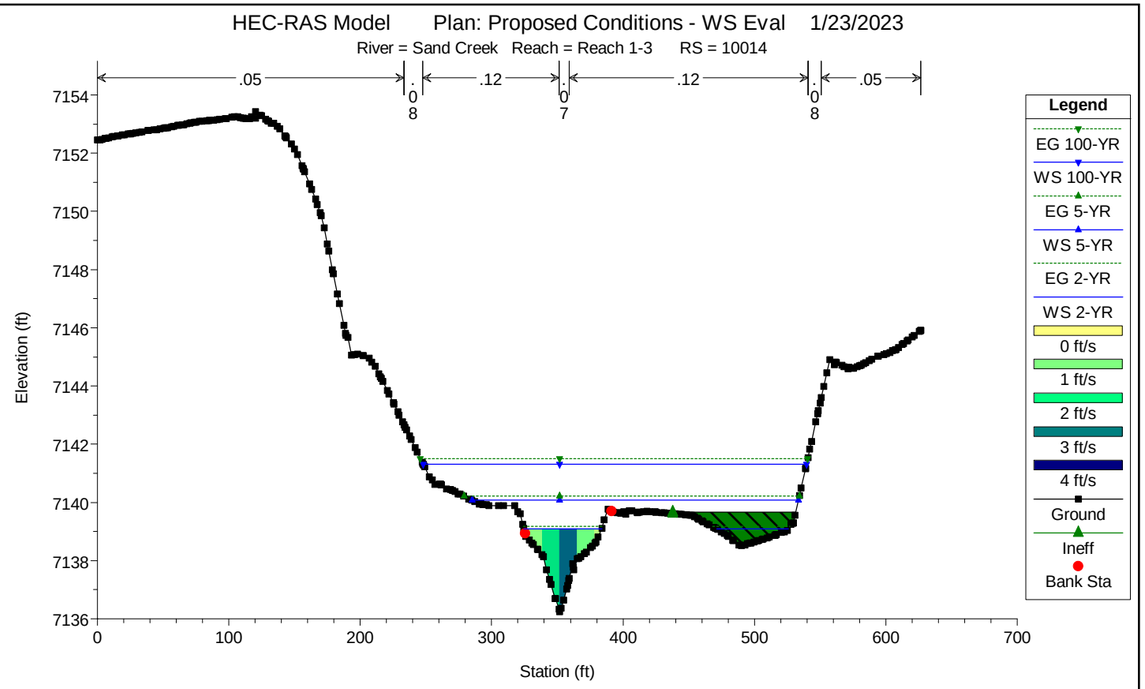

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10455
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

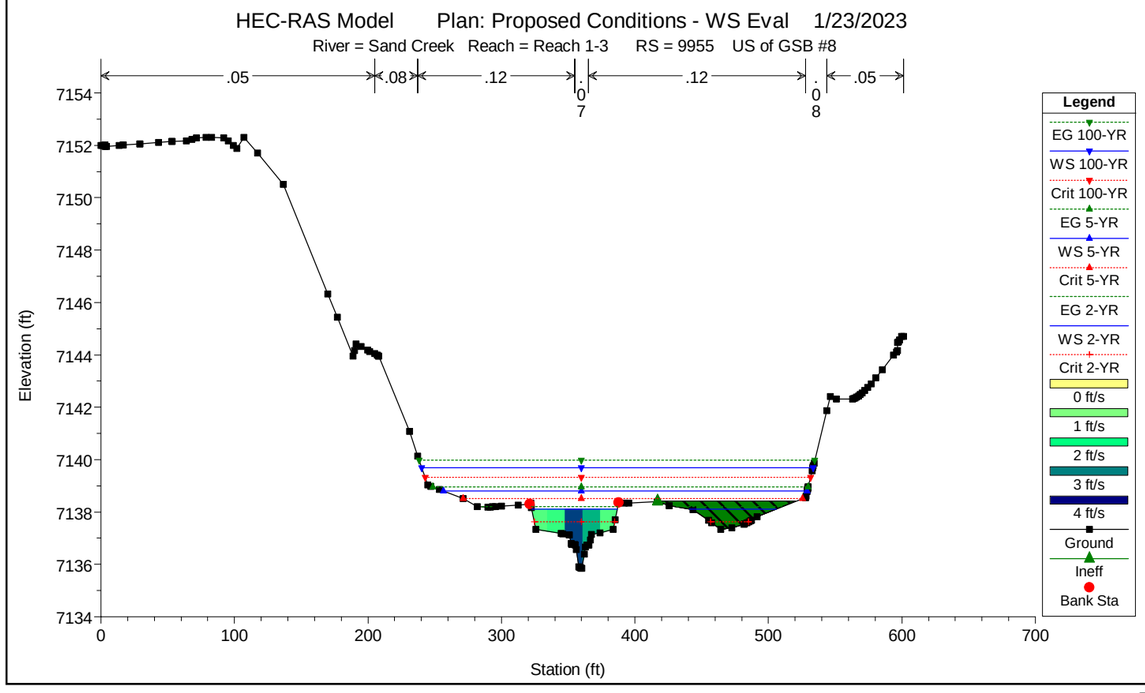

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10411
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

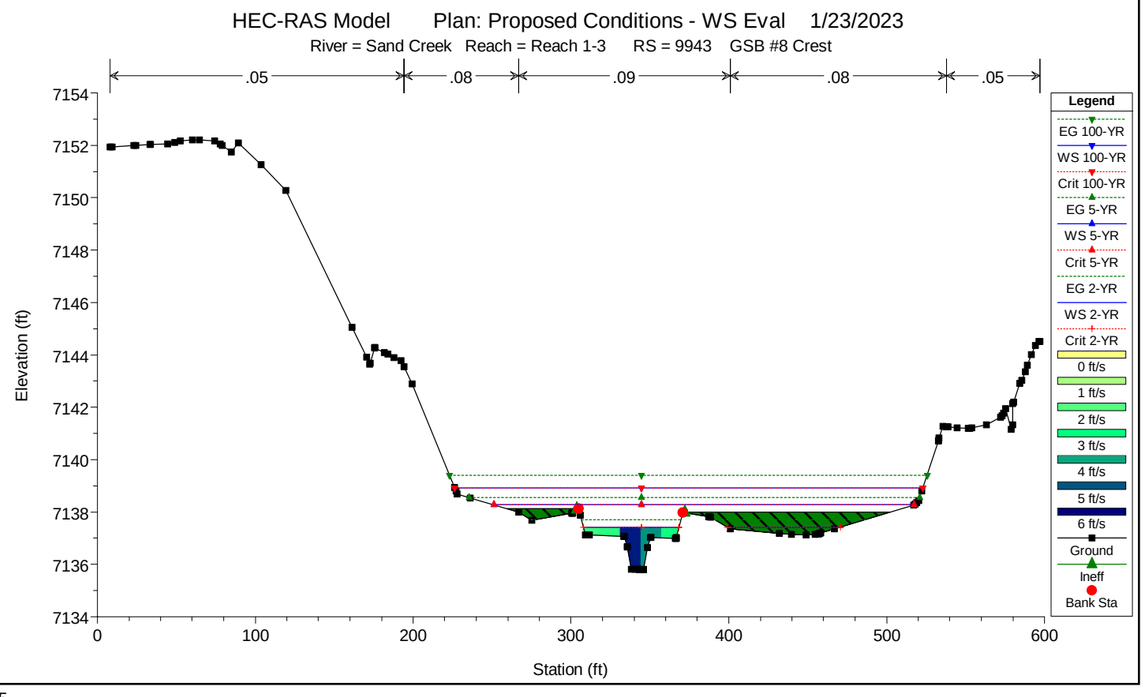

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10339
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10211
.05 .08 .12 .07 .12 .08 .05 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10113
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

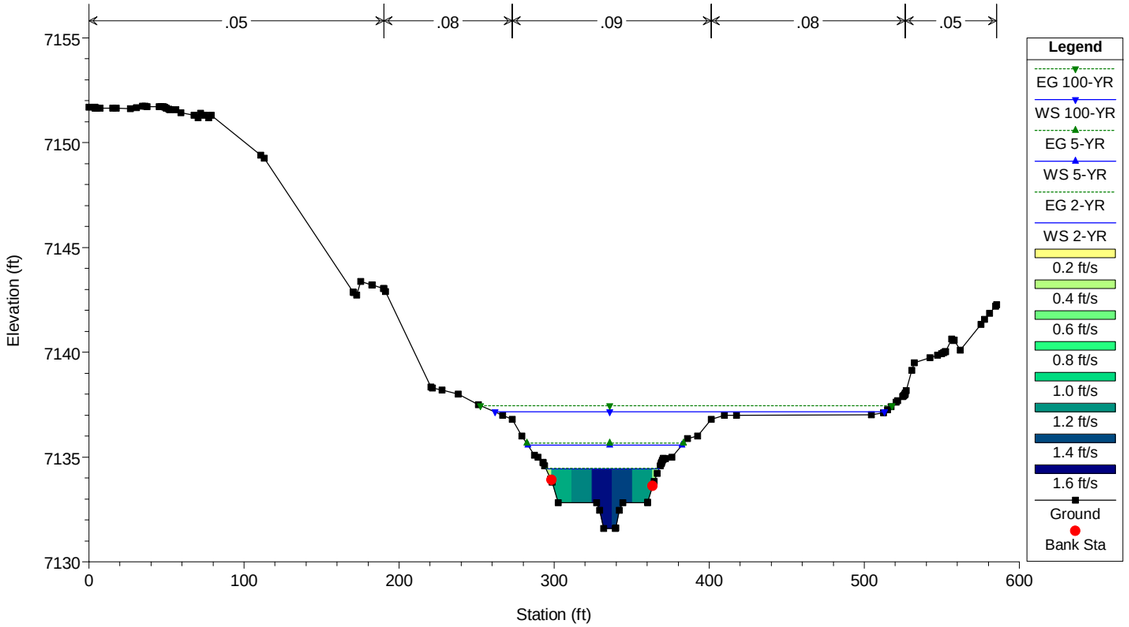

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10014
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9955 US of GSB #8
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9943 GSB #8 Crest
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

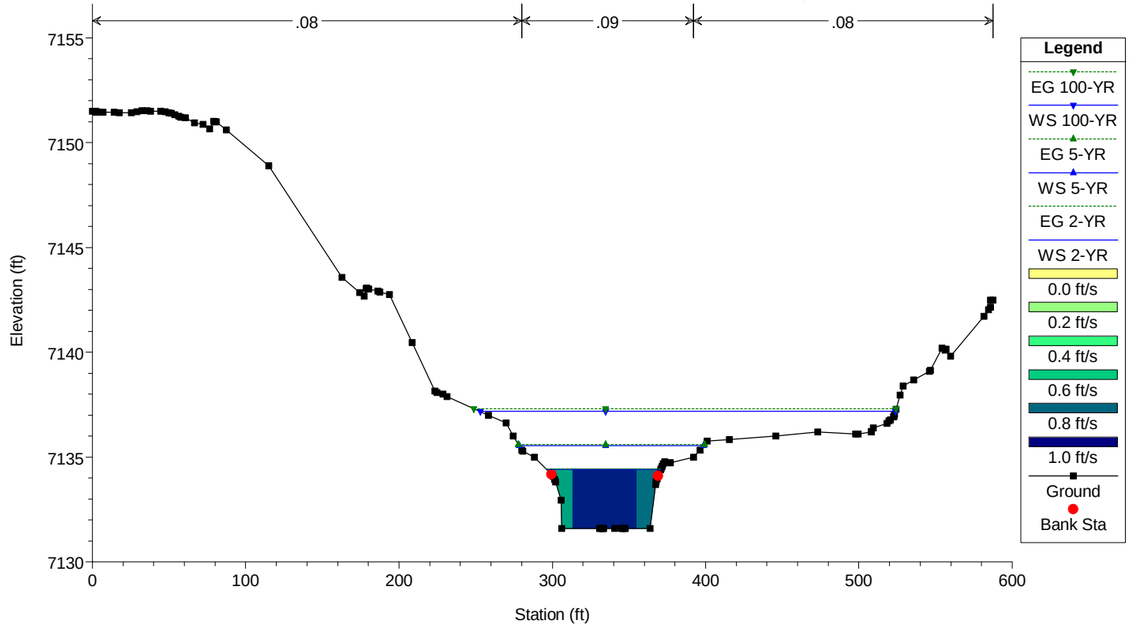
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 9926 GSB #8 Toe



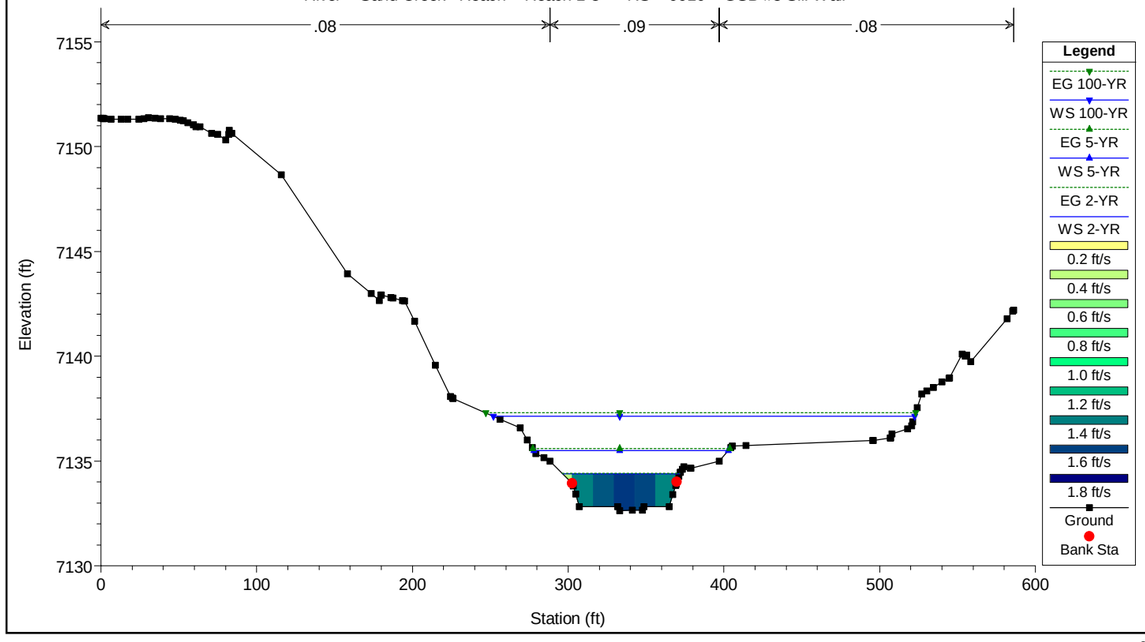

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 9913 GSB #8 Stilling Basin



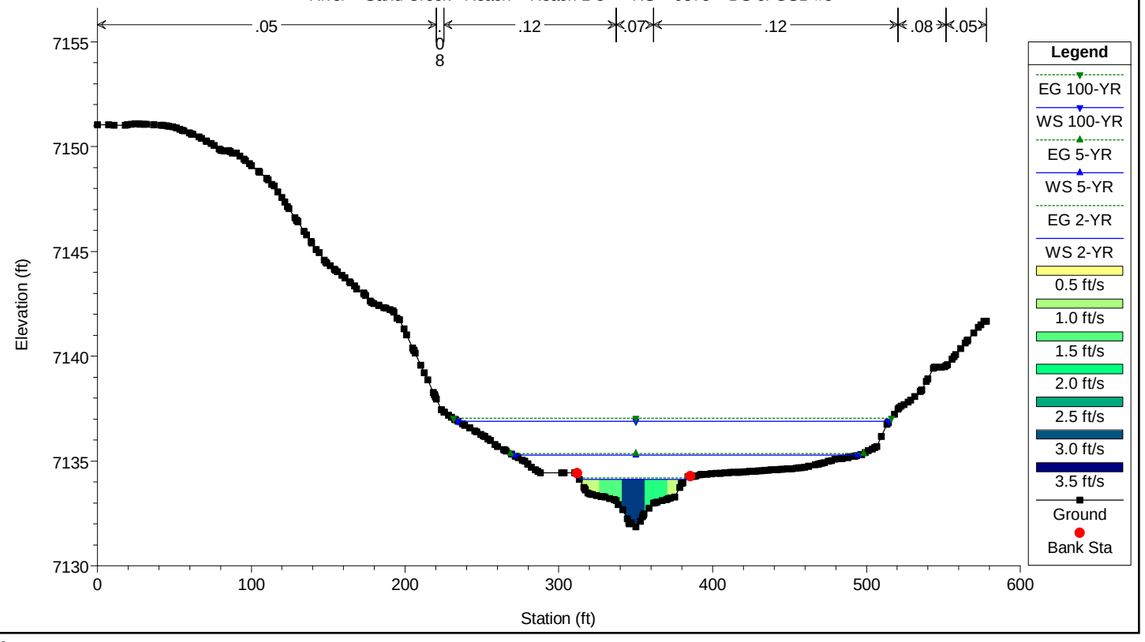

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

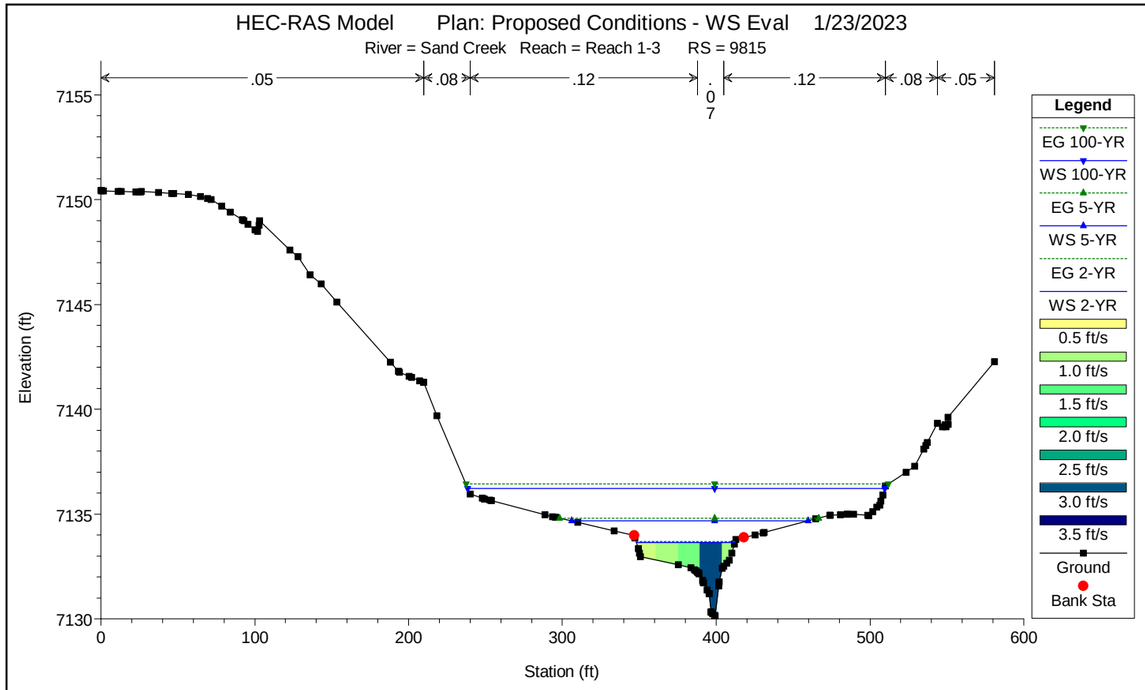
River = Sand Creek Reach = Reach 1-3 RS = 9910 GSB #8 Sill Wall

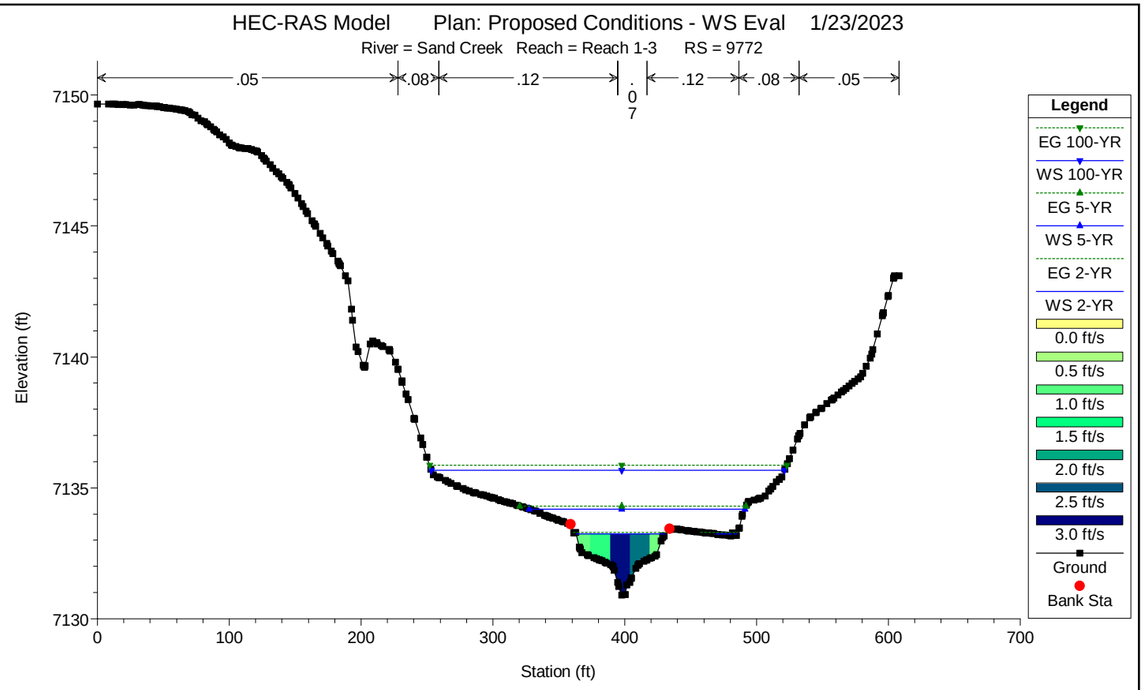


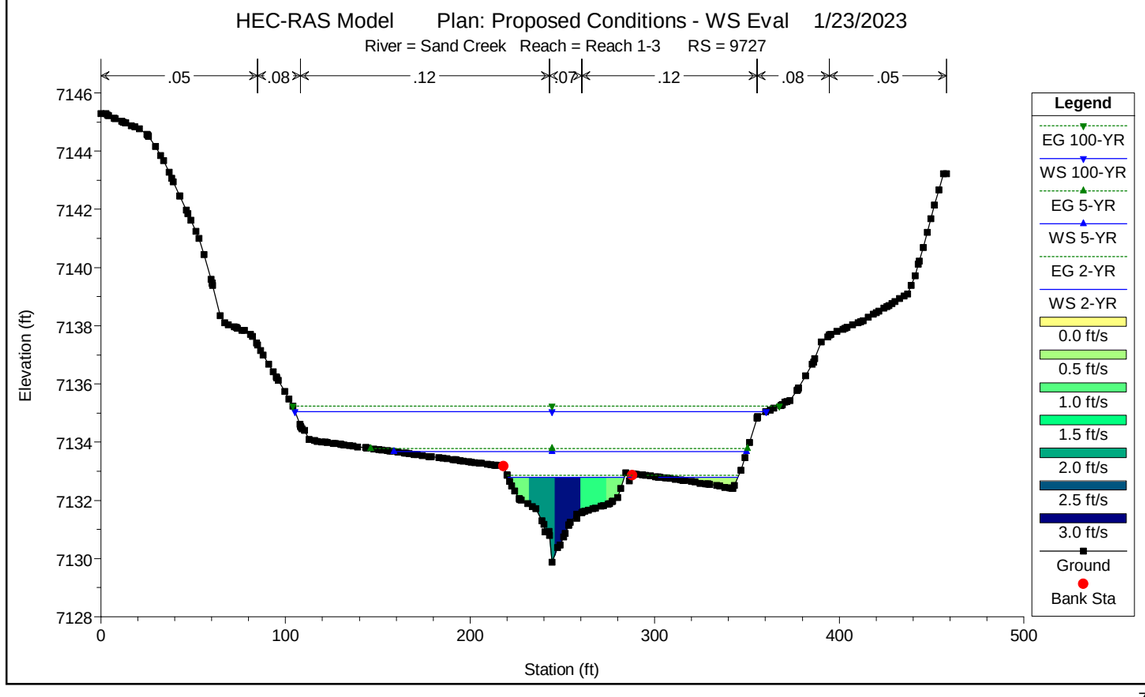

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

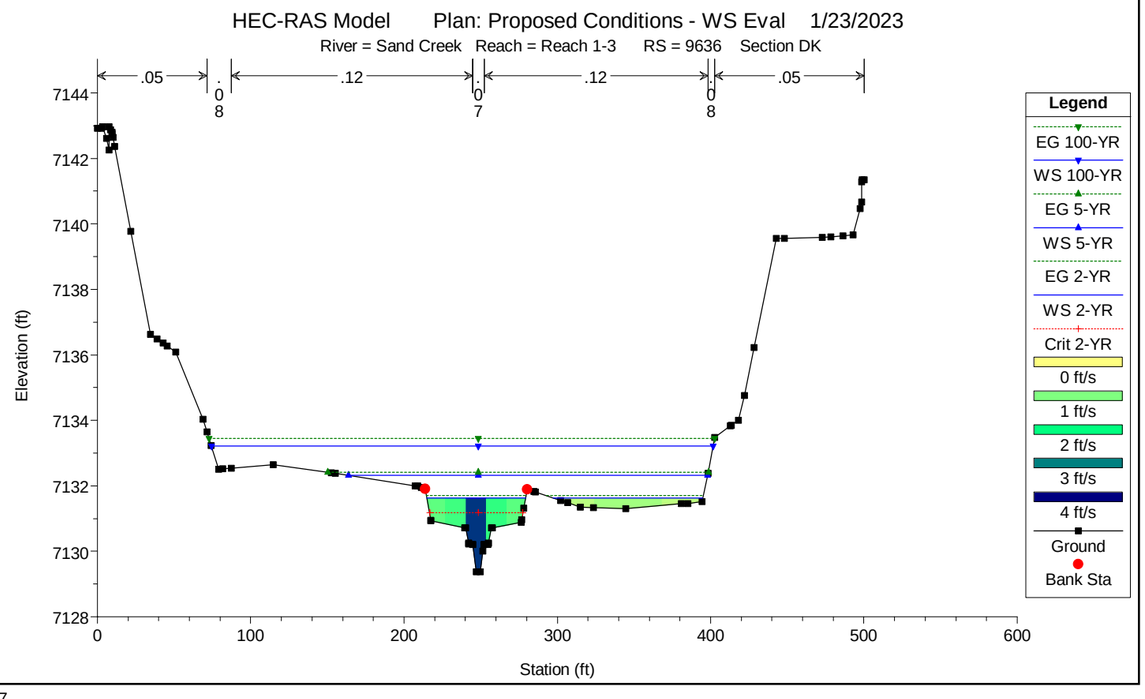
River = Sand Creek Reach = Reach 1-3 RS = 9875 DS of GSB #8

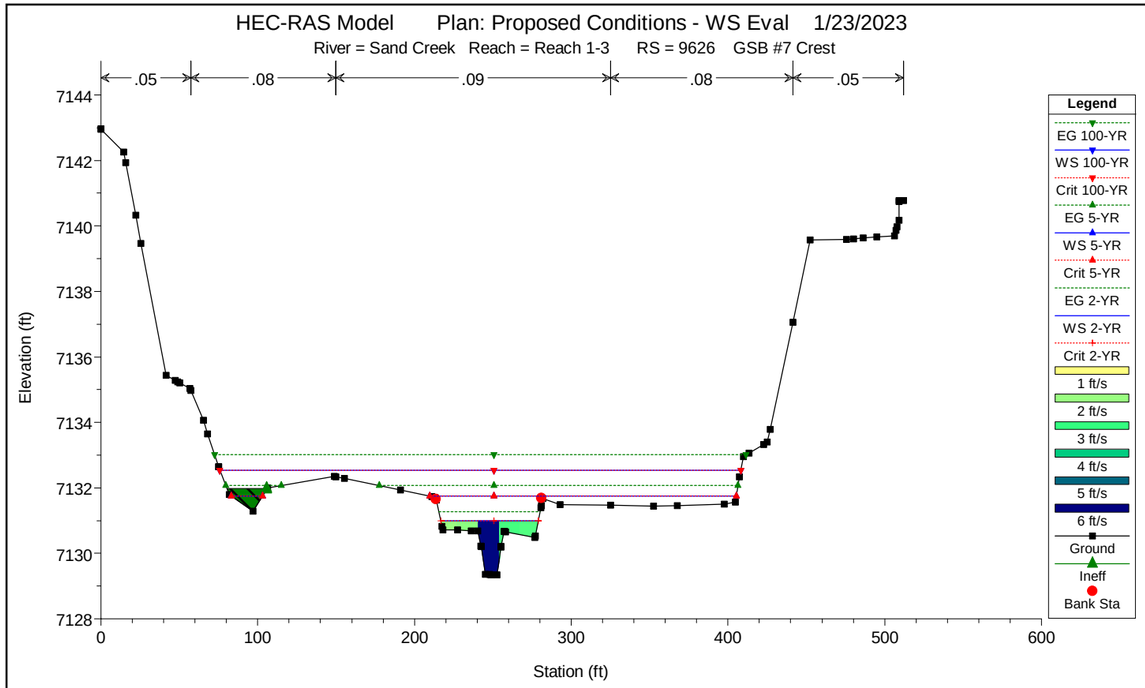


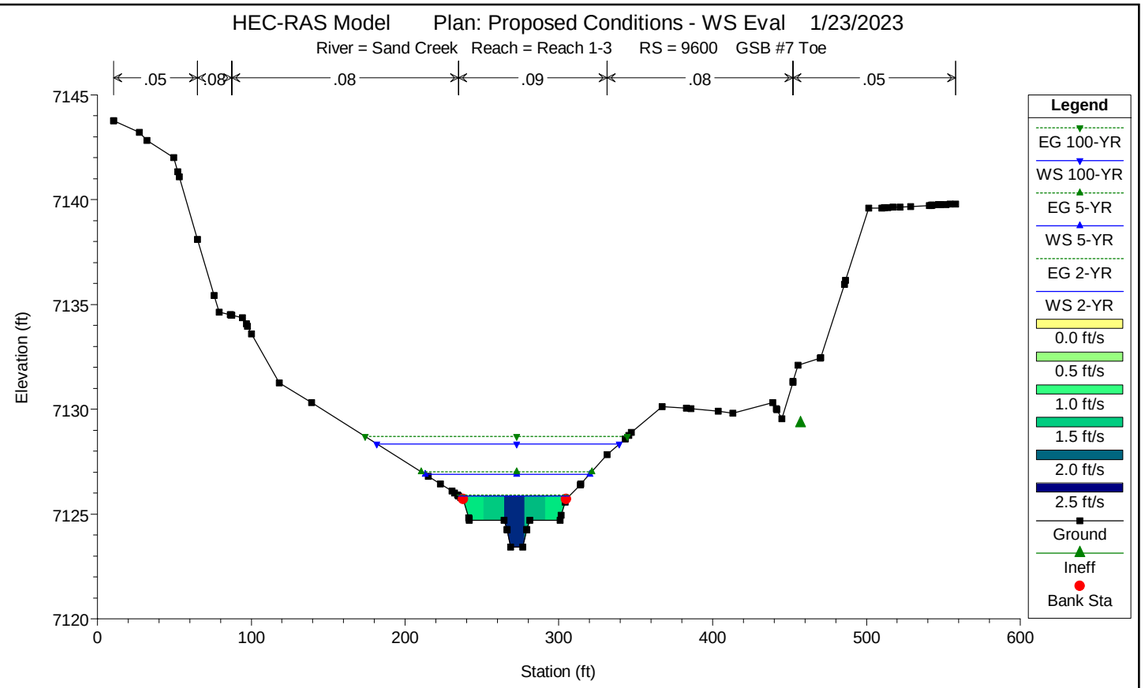

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9815
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

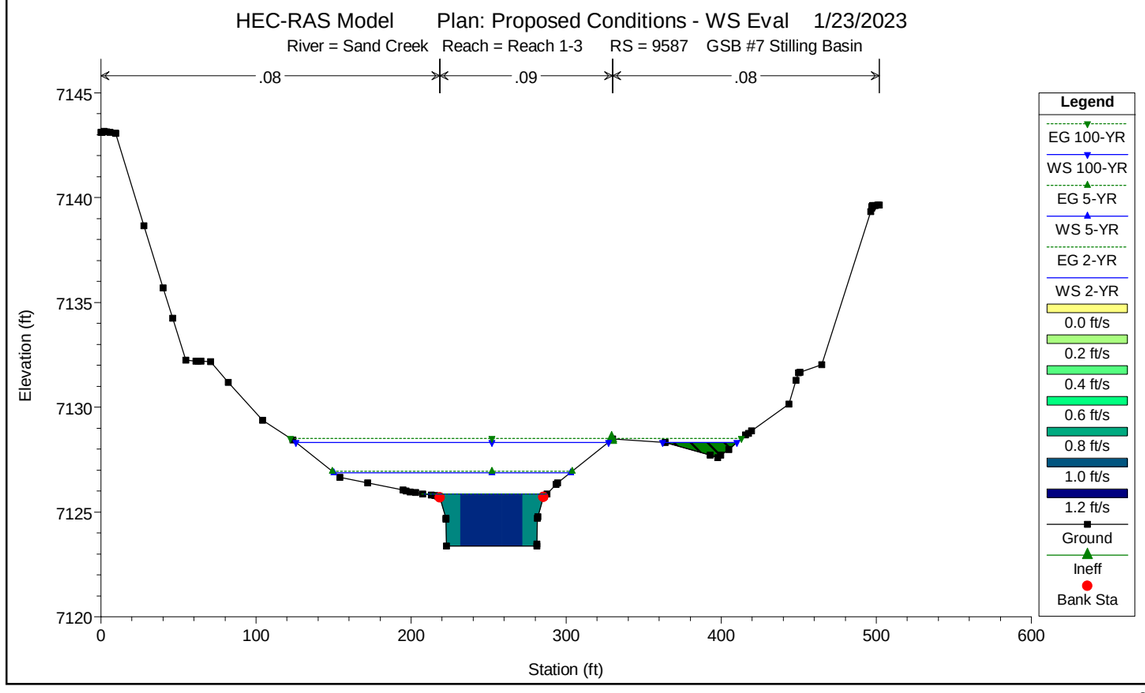

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9772
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

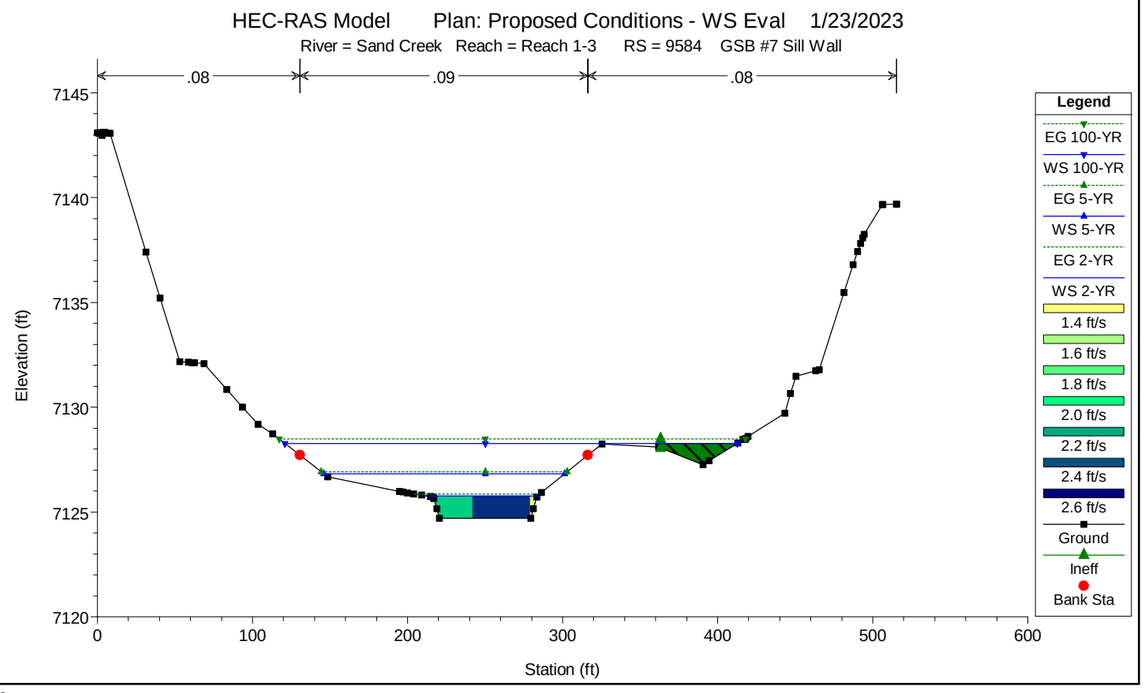

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9727
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

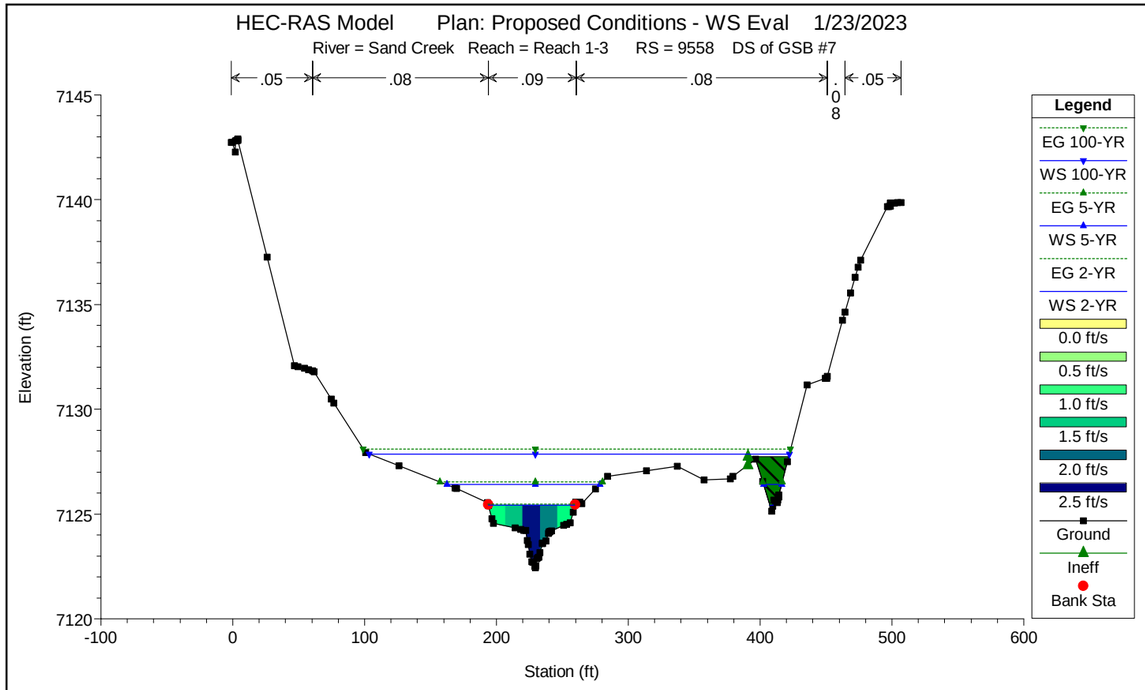

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9636 Section DK
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

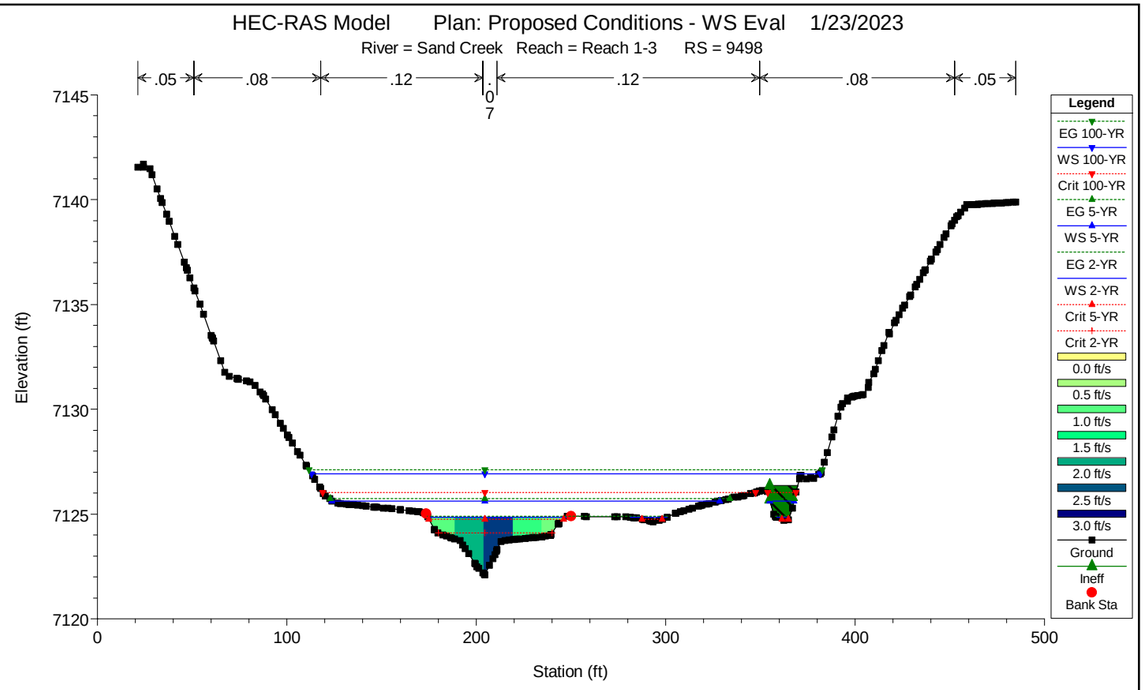

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9626 GSB #7 Crest
.05 .08 .09 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

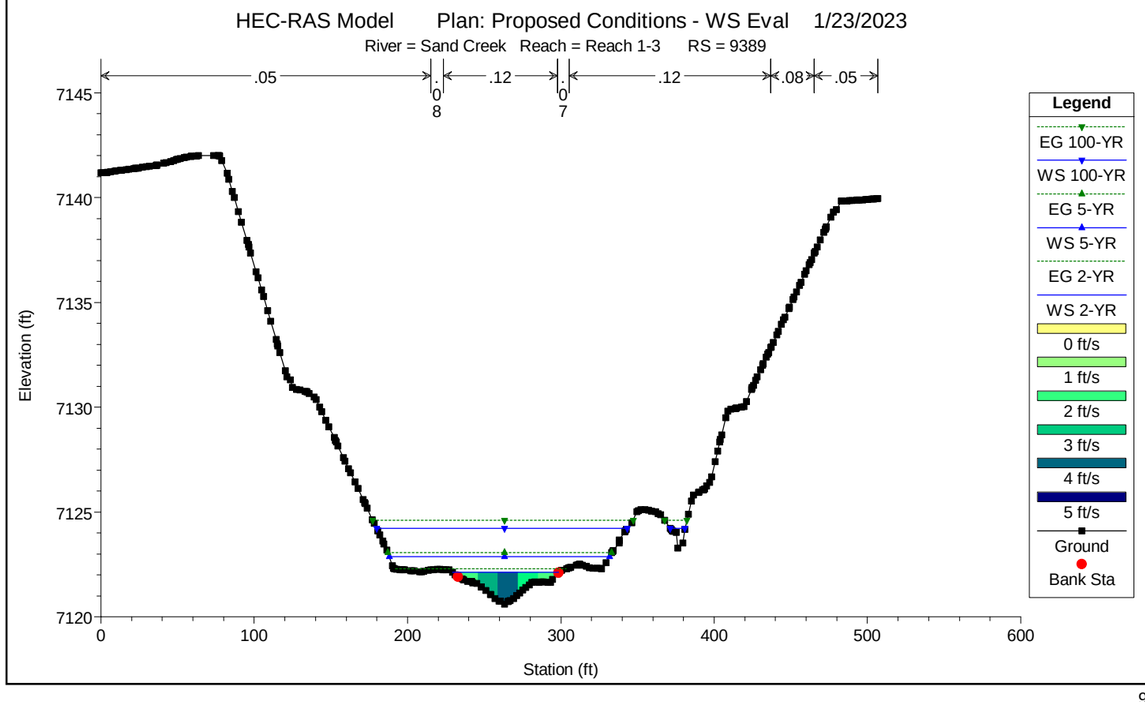

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9600 GSB #7 Toe
.05 .08 .08 .09 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta

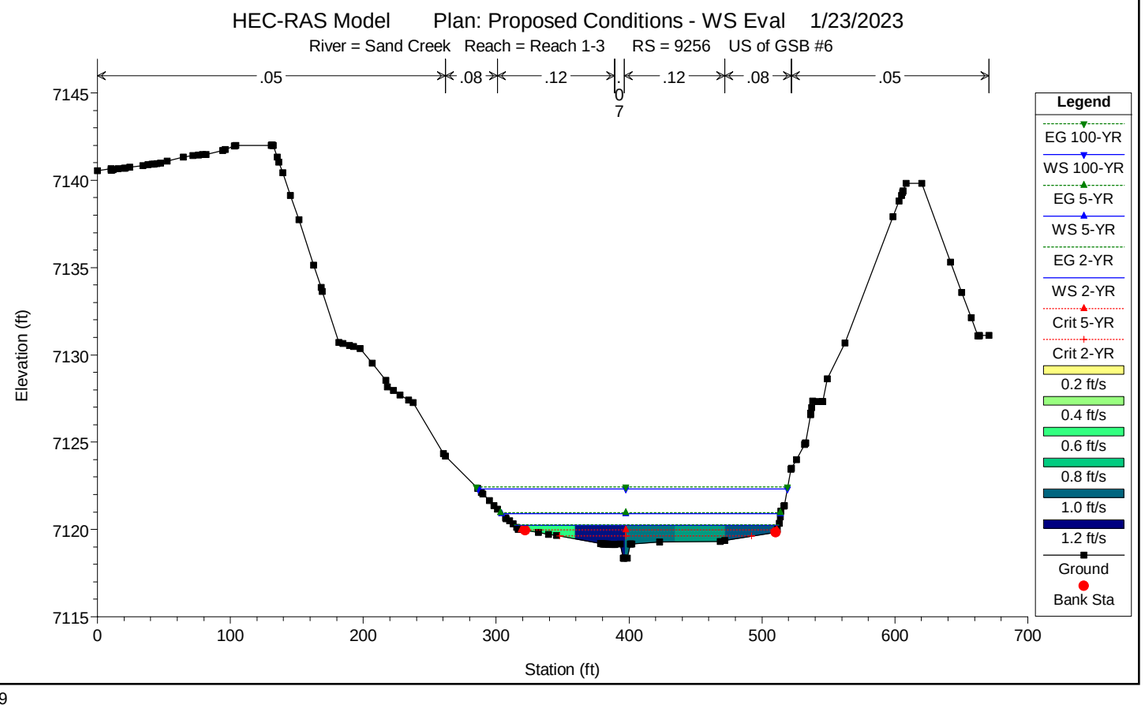

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9587 GSB #7 Stilling Basin
.08 .09 .08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9584 GSB #7 Sill Wall
.08 .09 .08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9558 DS of GSB #7
.05 .08 .09 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta

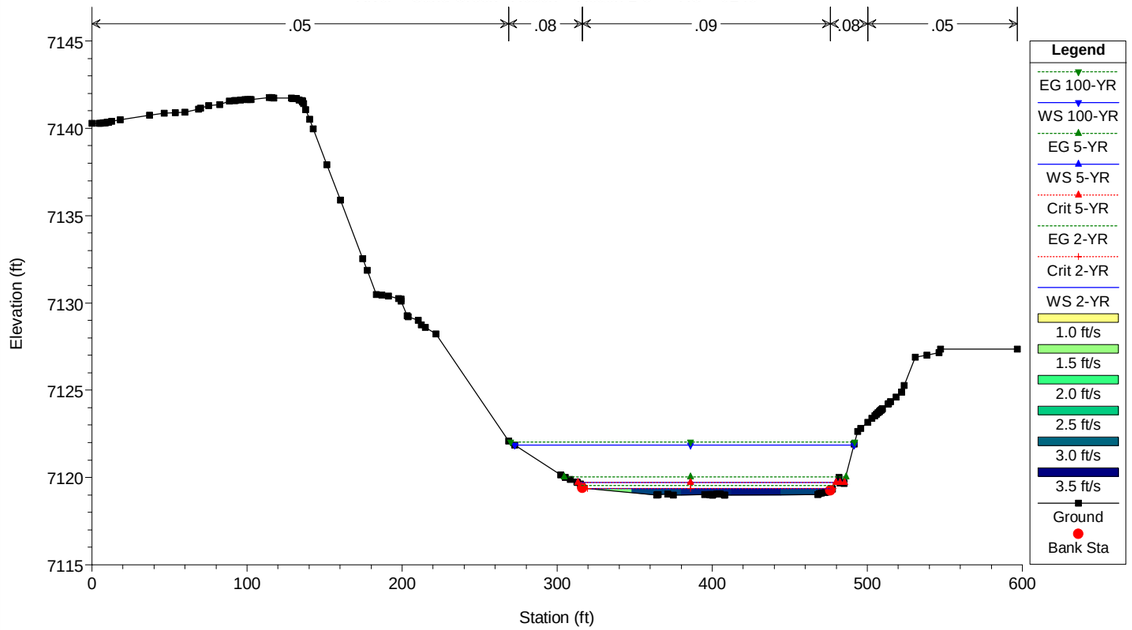

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9498
.05 .08 .12 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9389
.05 .12 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9256 US of GSB #6
.05 .08 .12 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Bank Sta

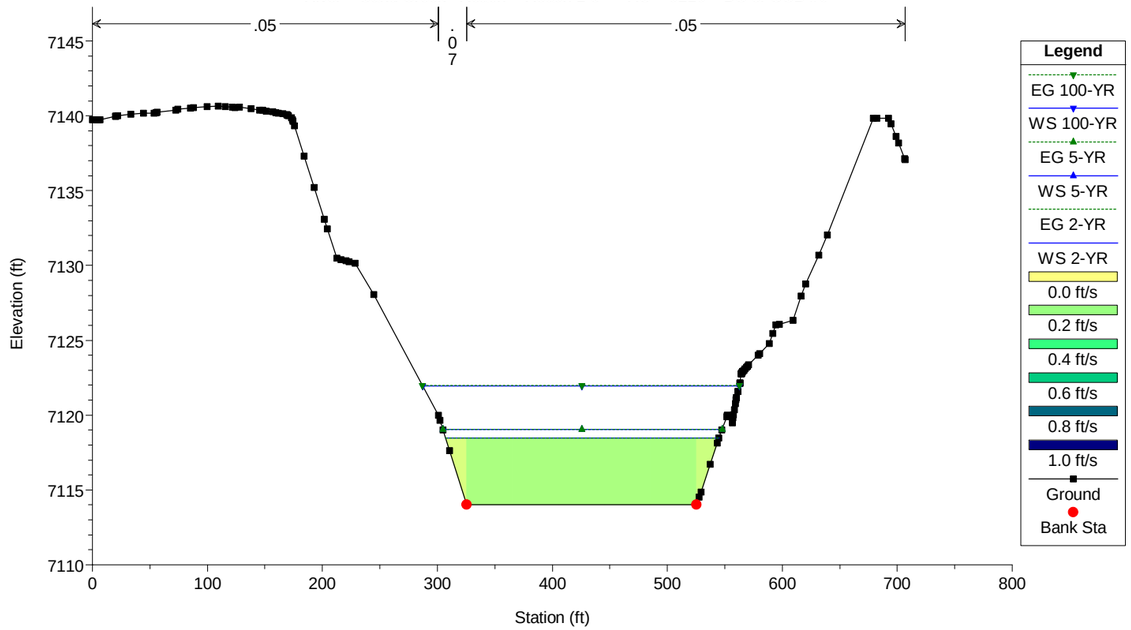
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 9243



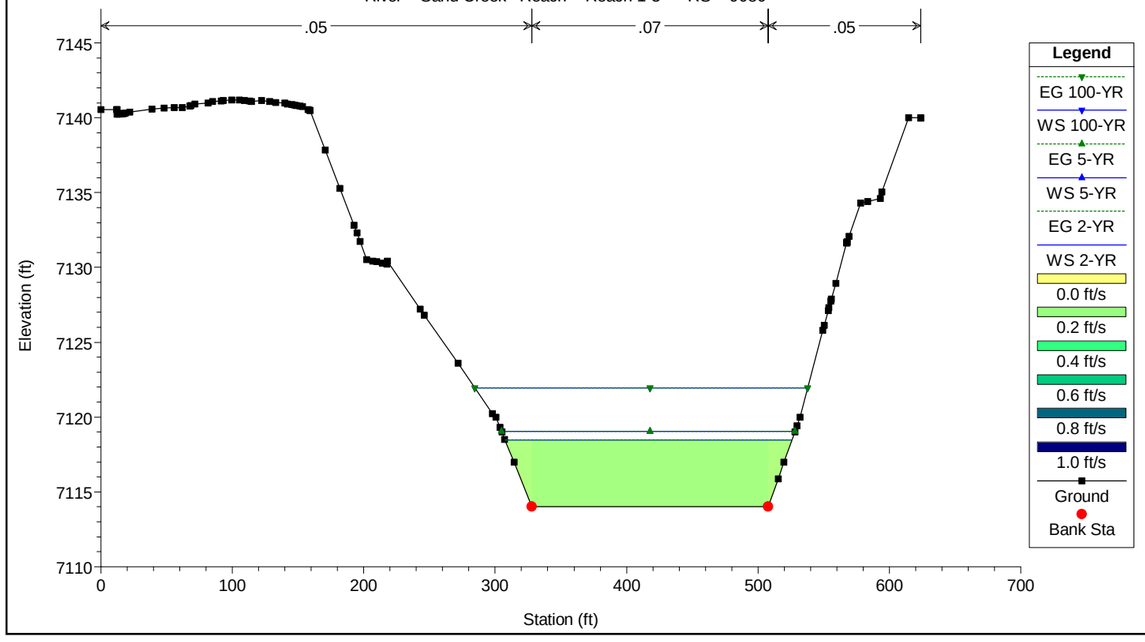

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 9216 DS of GSB #6



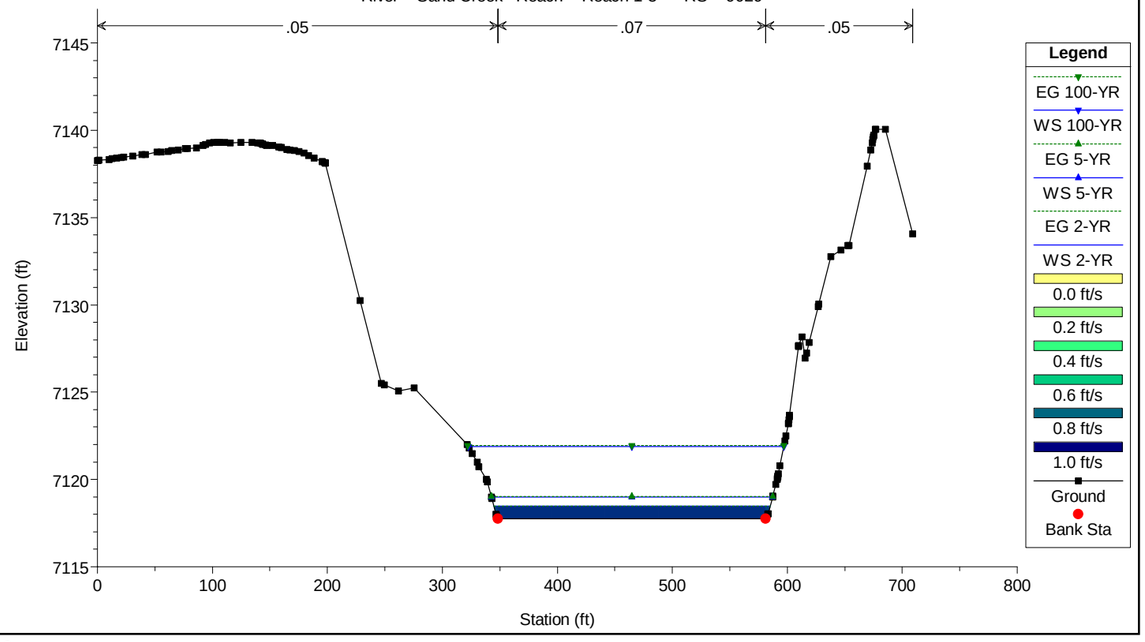

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

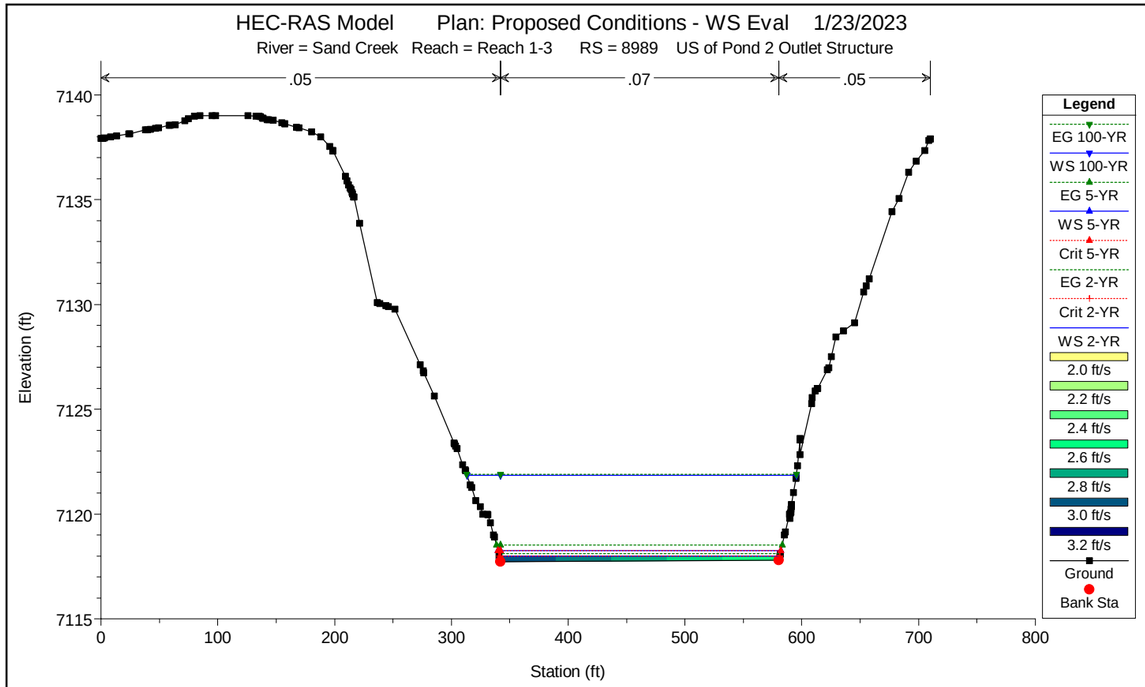
River = Sand Creek Reach = Reach 1-3 RS = 9080

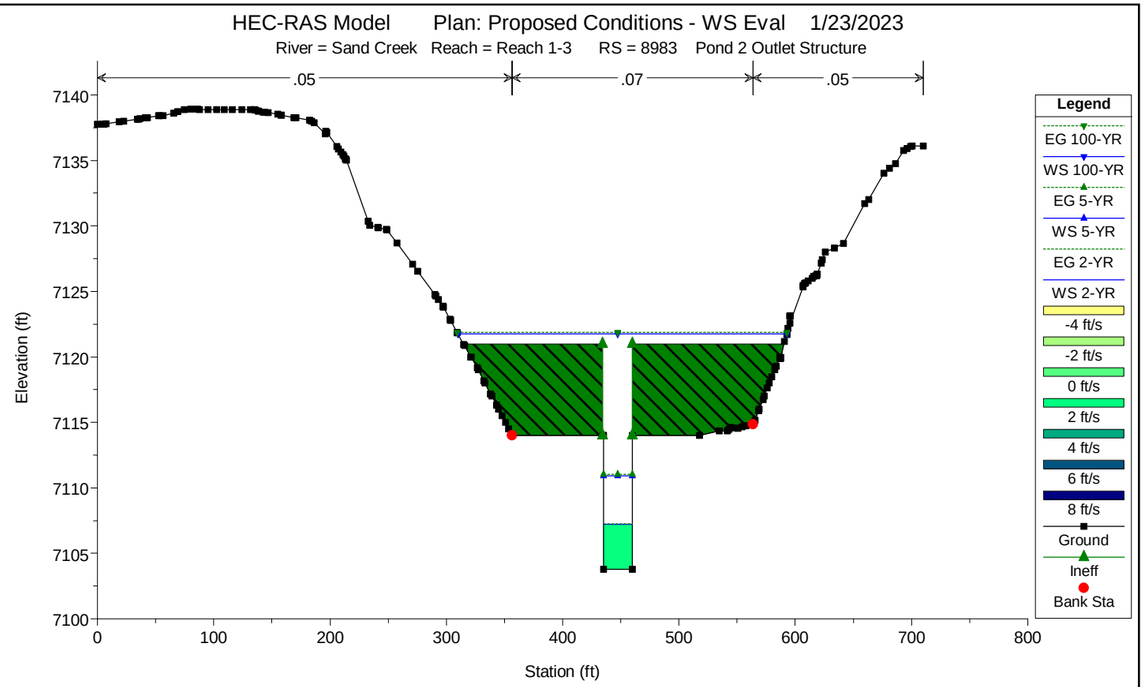


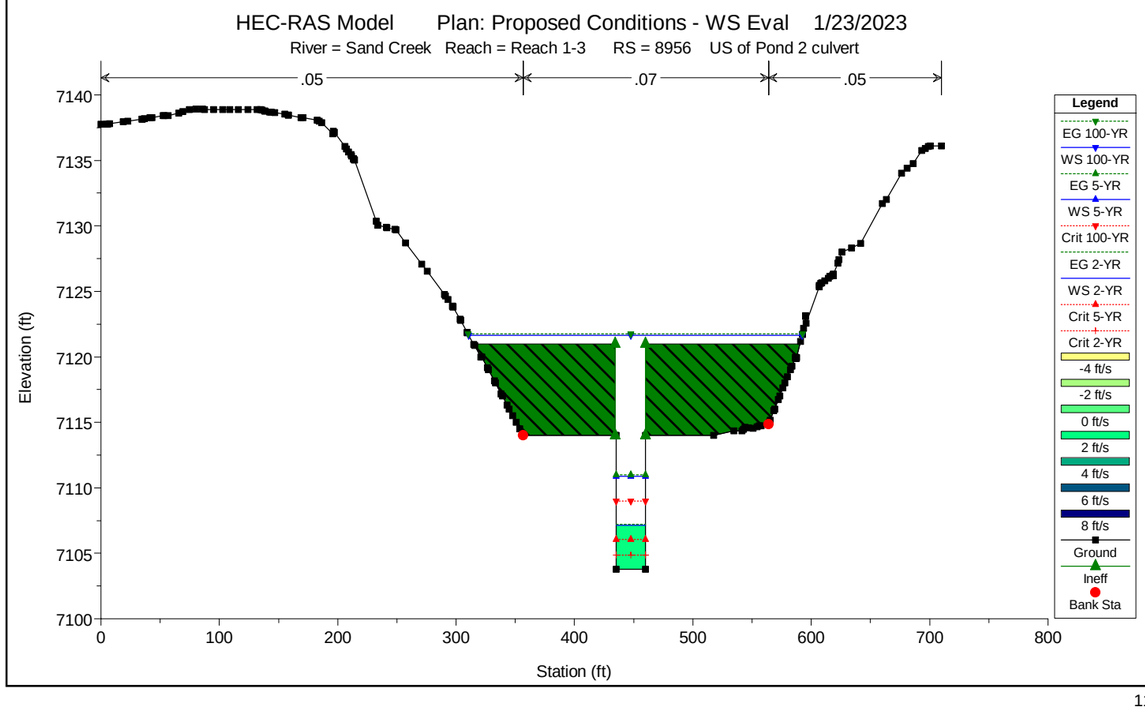

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

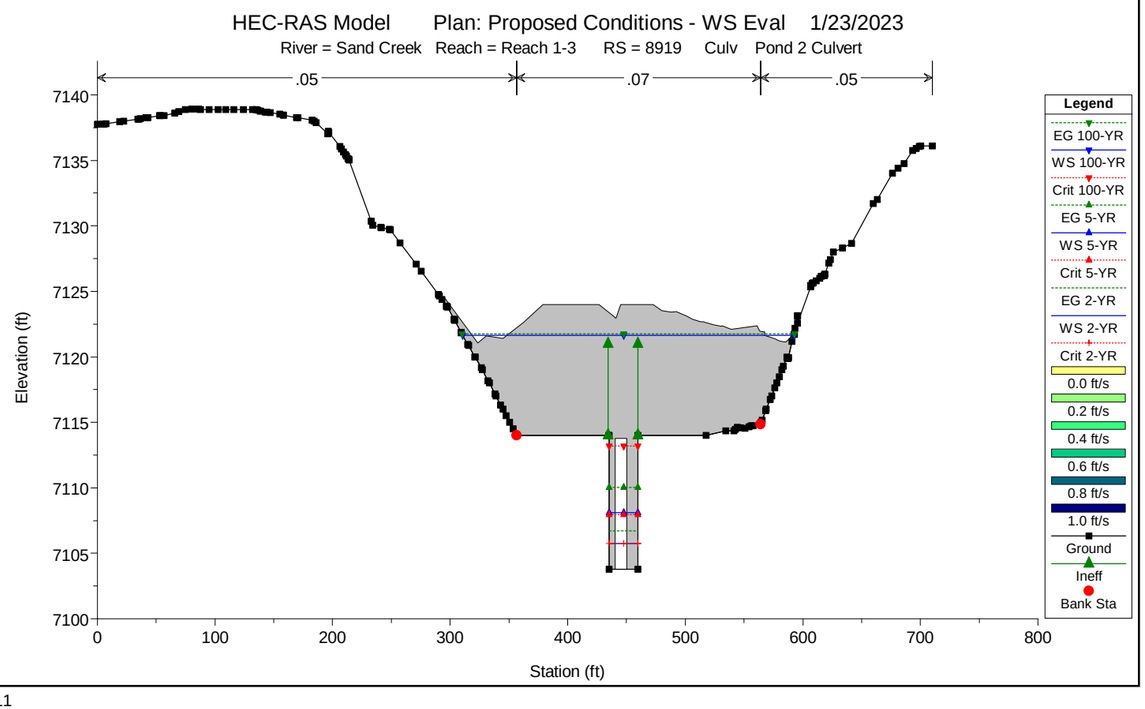
River = Sand Creek Reach = Reach 1-3 RS = 9029




HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8989 US of Pond 2 Outlet Structure
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
2.8 ft/s
3.0 ft/s
3.2 ft/s
Ground
Bank Sta

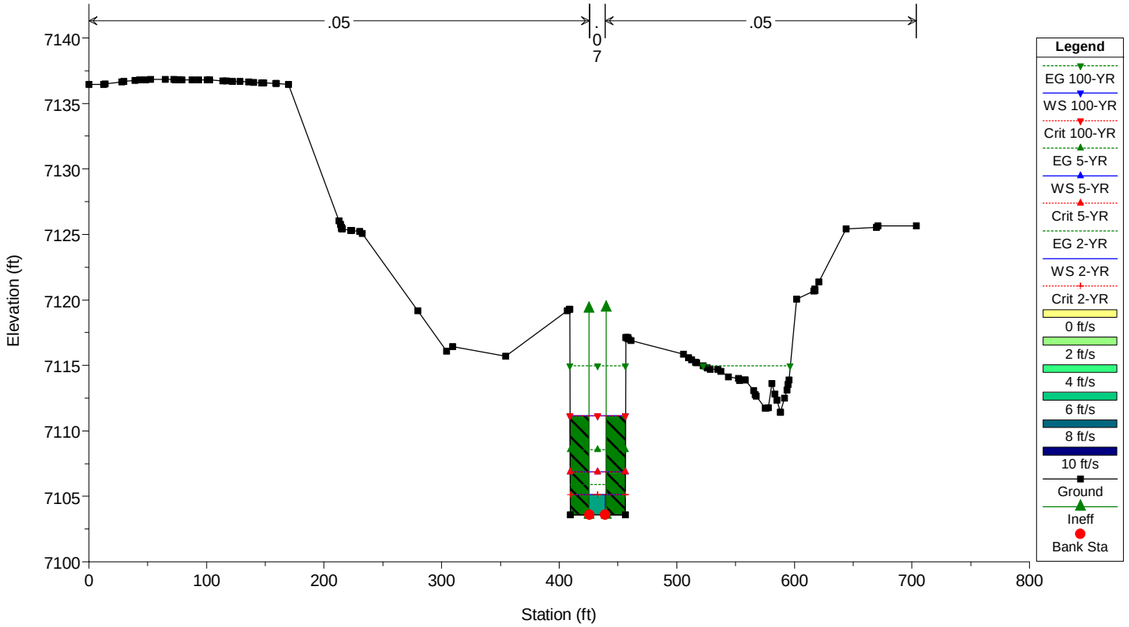

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8983 Pond 2 Outlet Structure
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
-4 ft/s
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8956 US of Pond 2 culvert
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 100-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
-4 ft/s
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8919 Culv Pond 2 Culvert
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

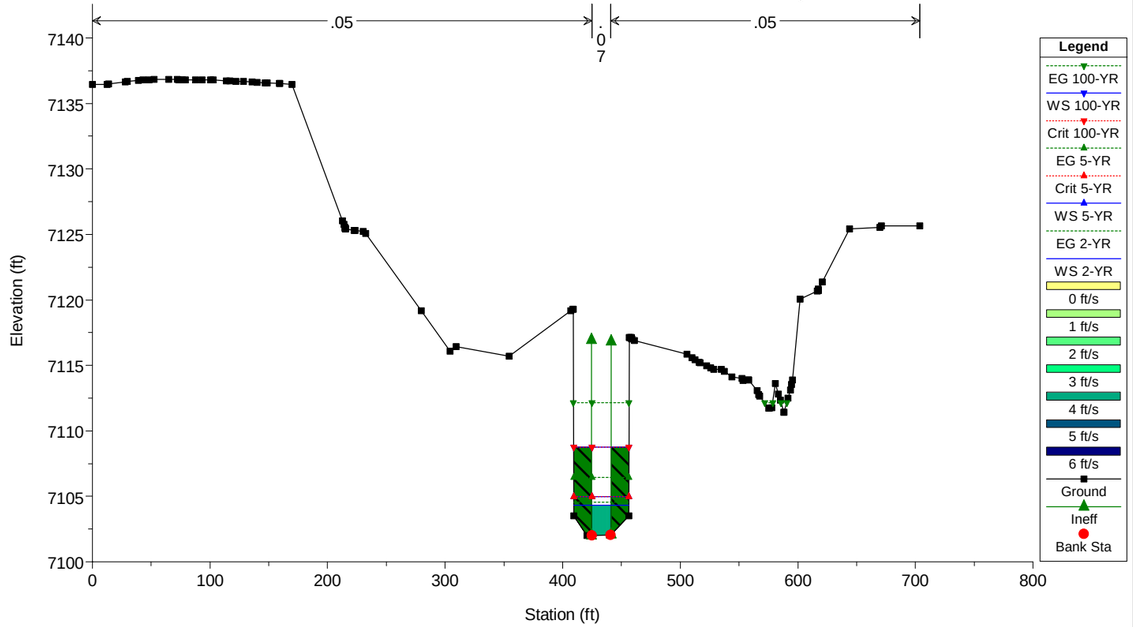
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 8888 DS of Pond 2 Culvert



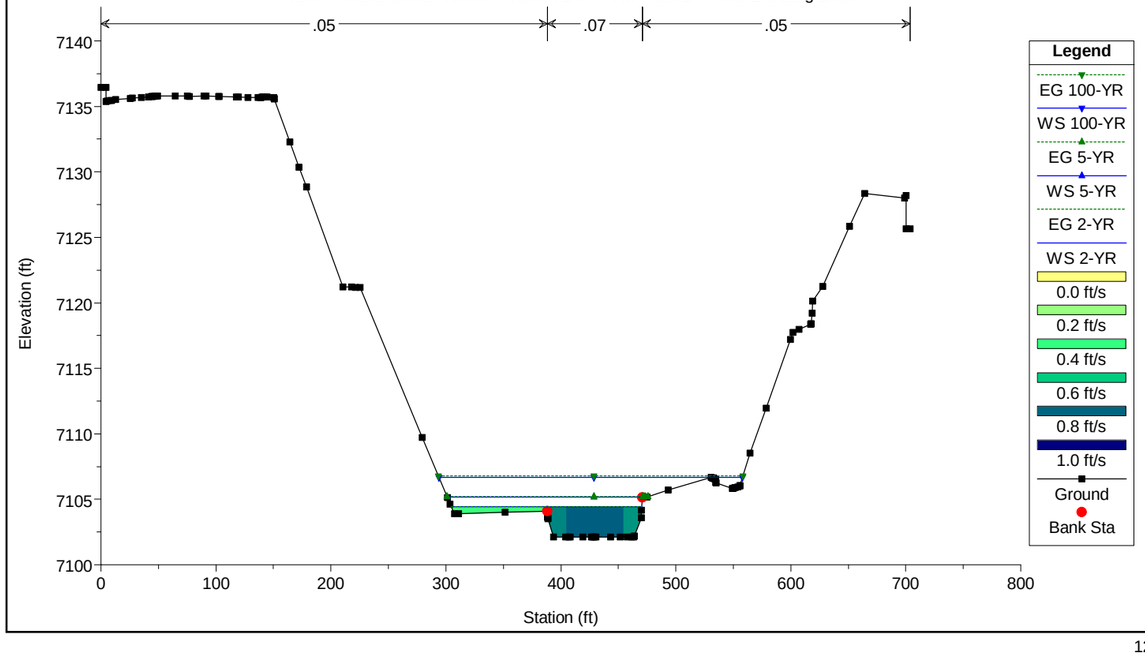

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 8886 Pond 2 Stilling Basin



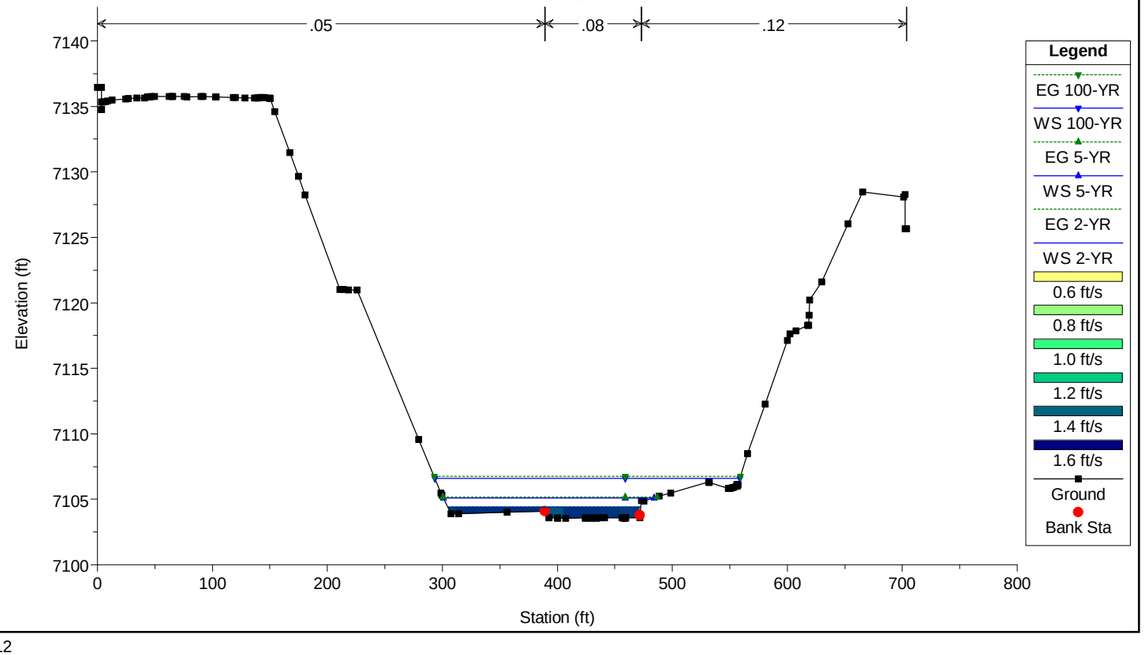

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

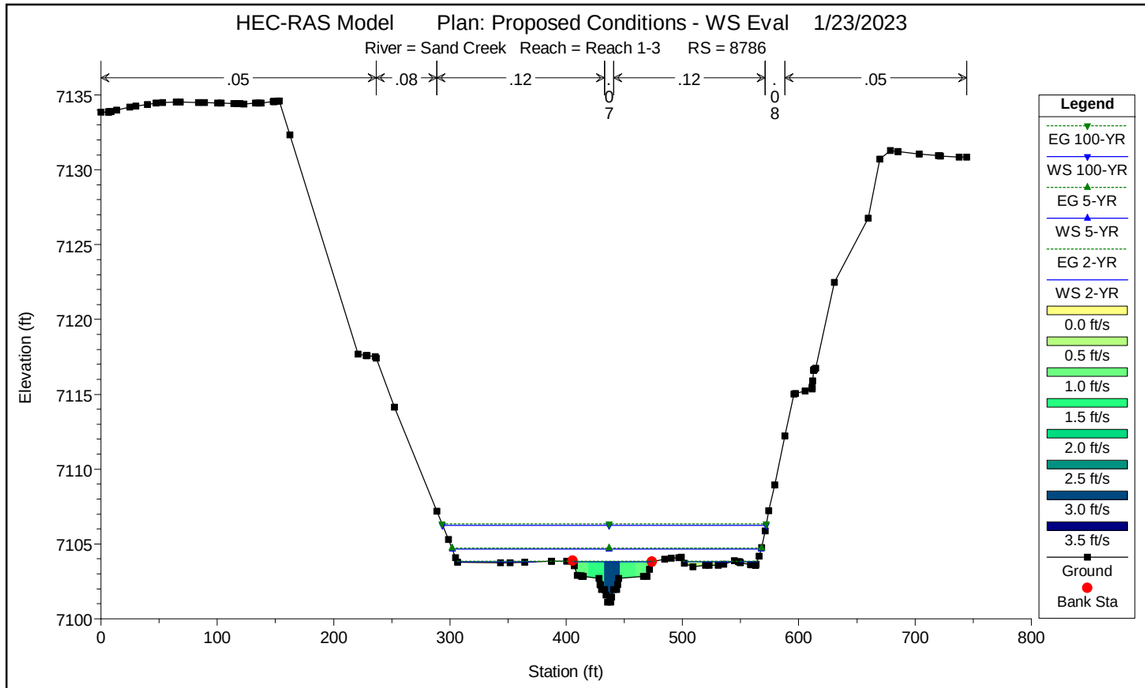
River = Sand Creek Reach = Reach 1-3 RS = 8852 Pond 2 Stilling Basin

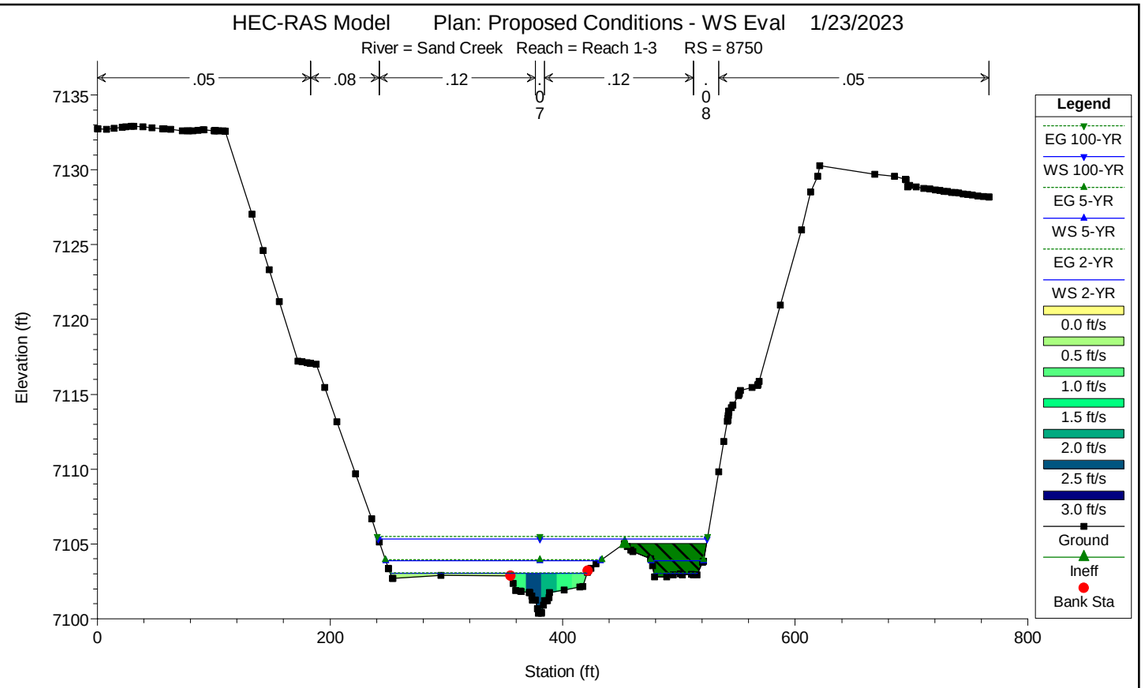


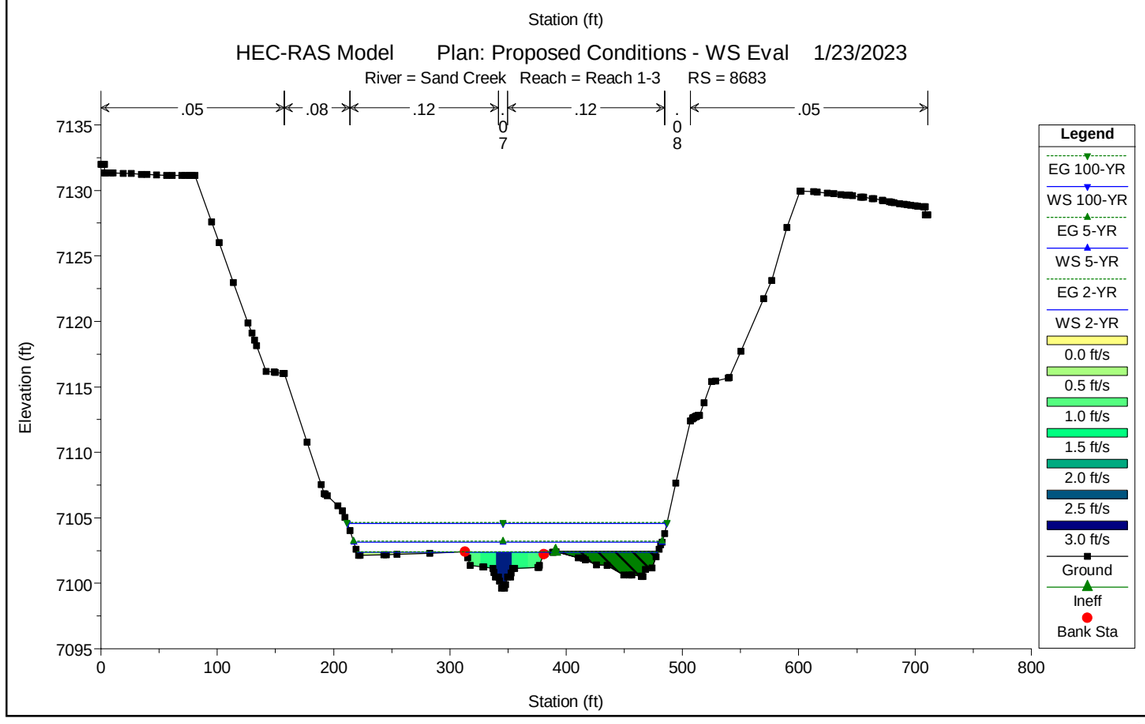

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

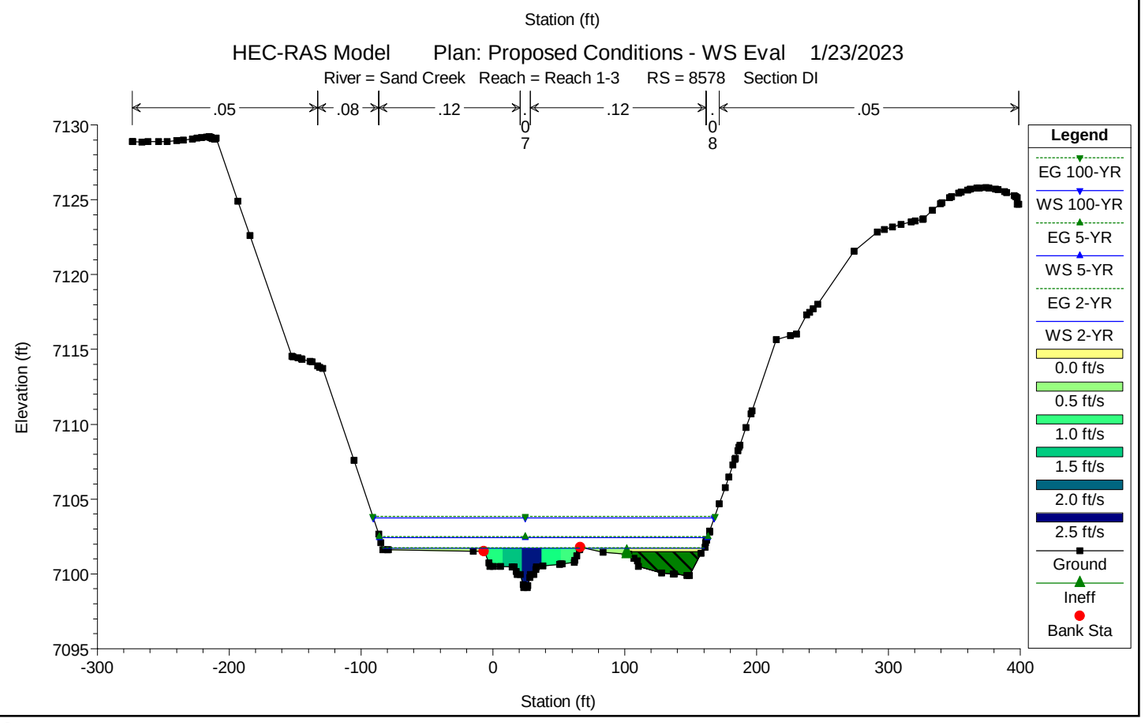
River = Sand Creek Reach = Reach 1-3 RS = 8850 Pond 2 Sill Wall




HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8786
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

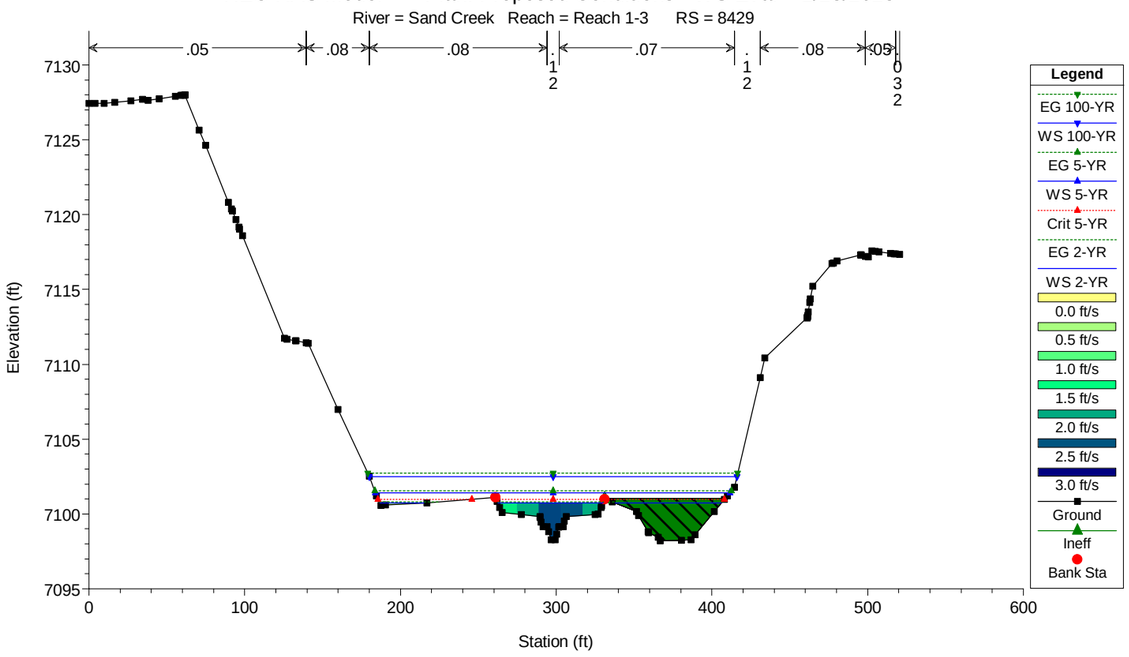

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8750
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8683
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8578 Section DI
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta

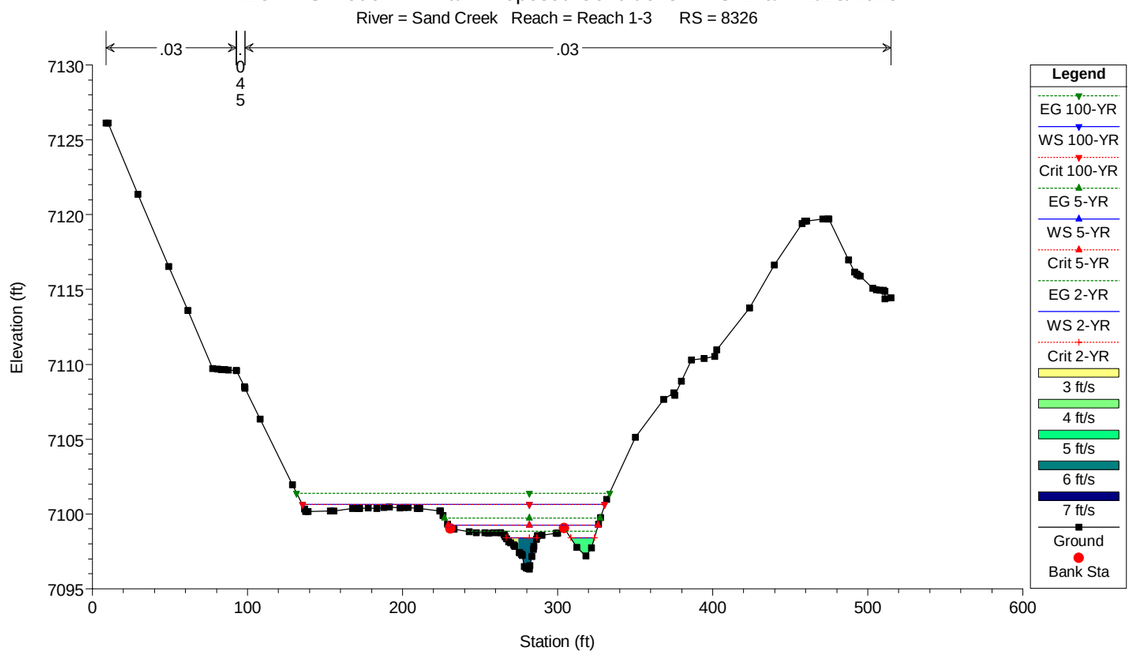
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 8429



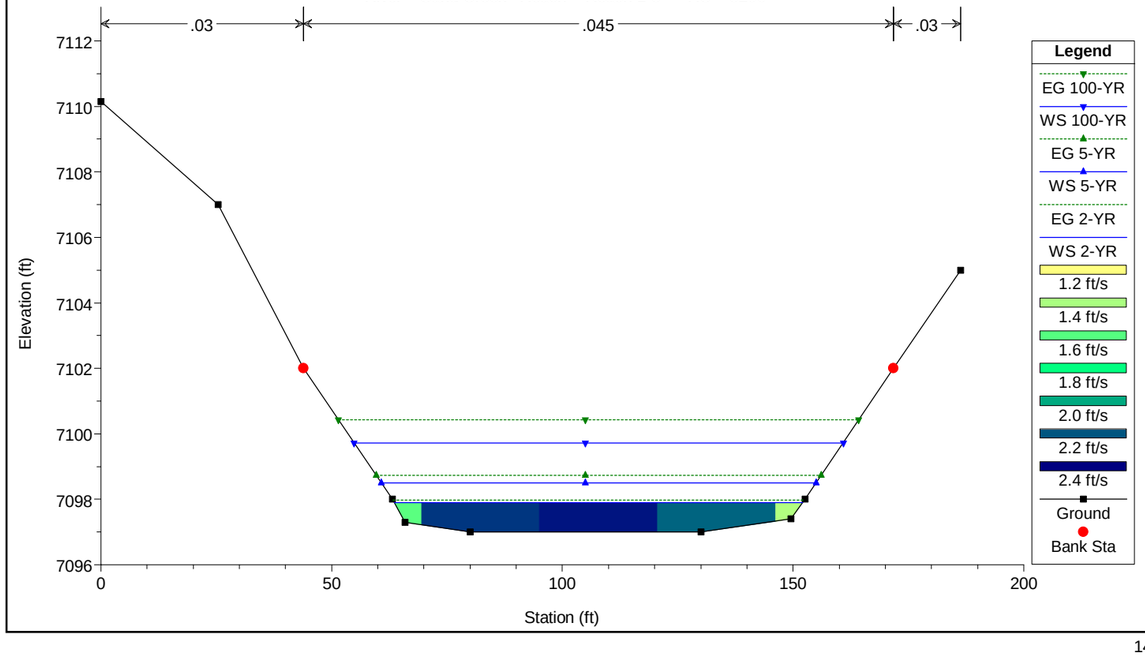

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 8326



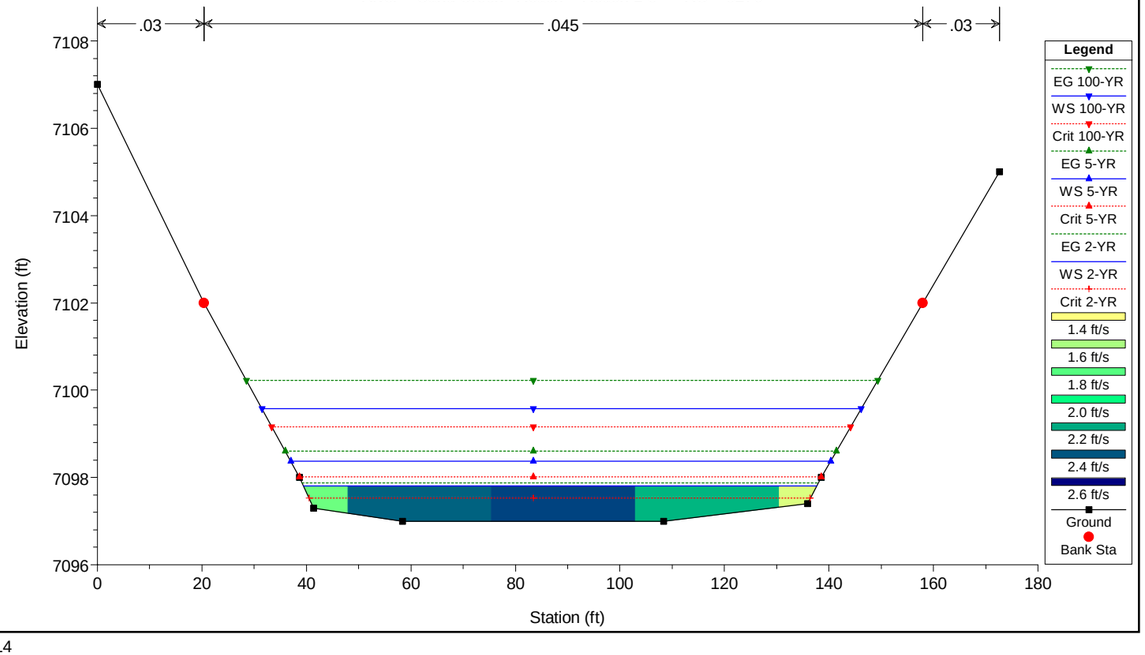

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

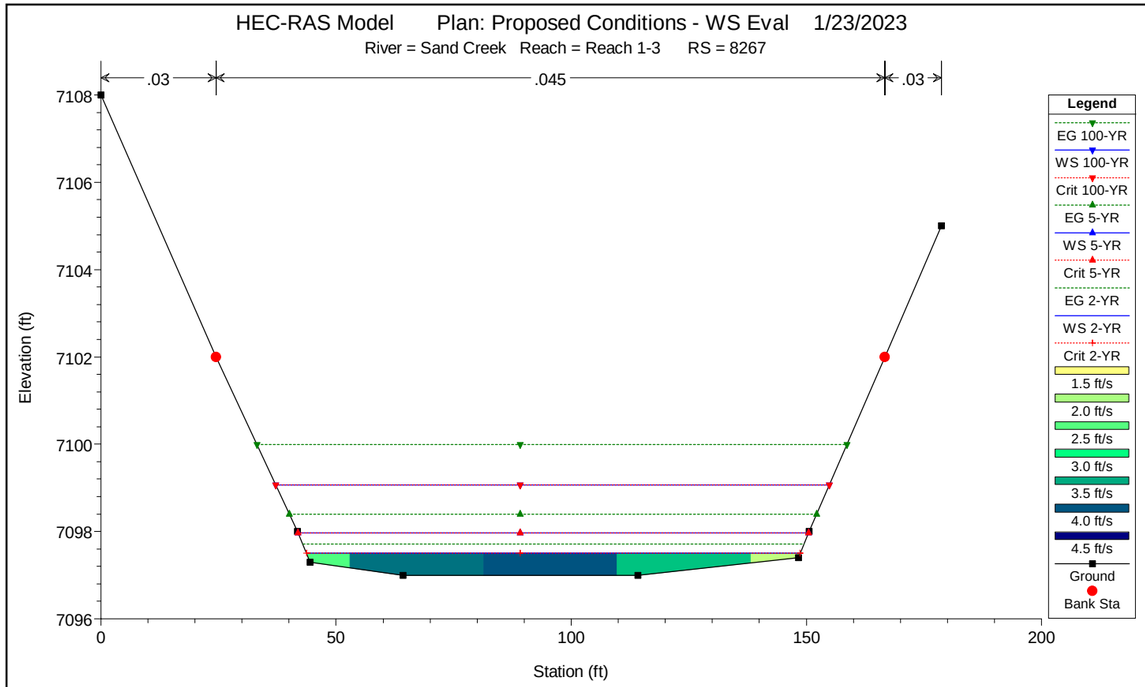
River = Sand Creek Reach = Reach 1-3 RS = 8290

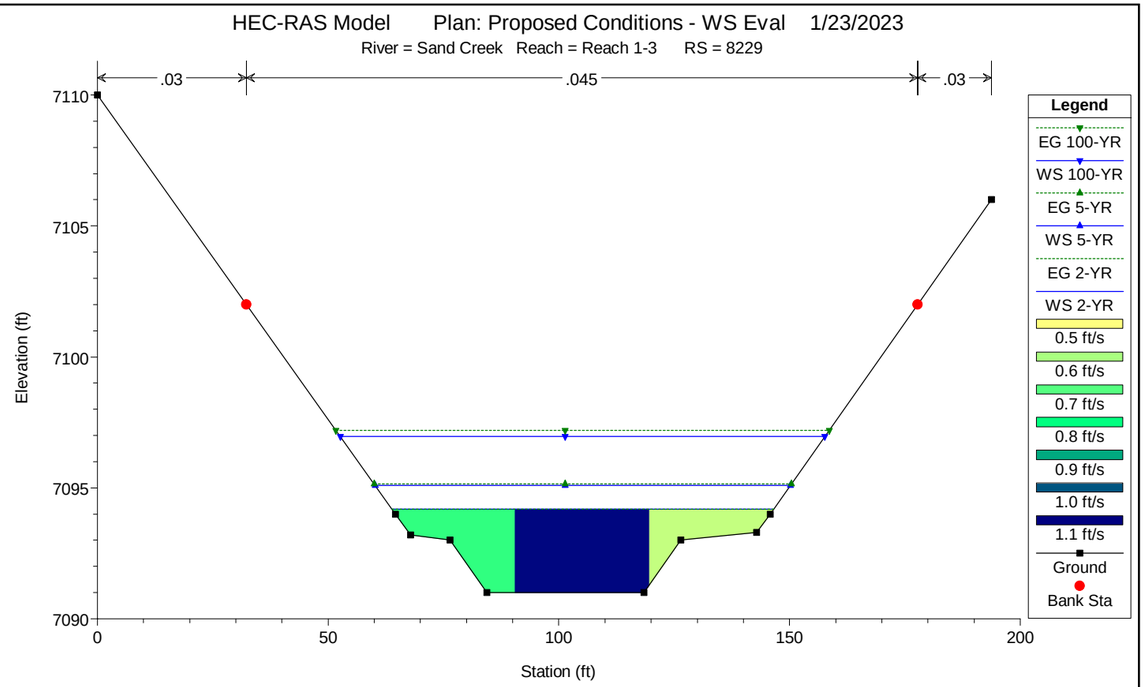


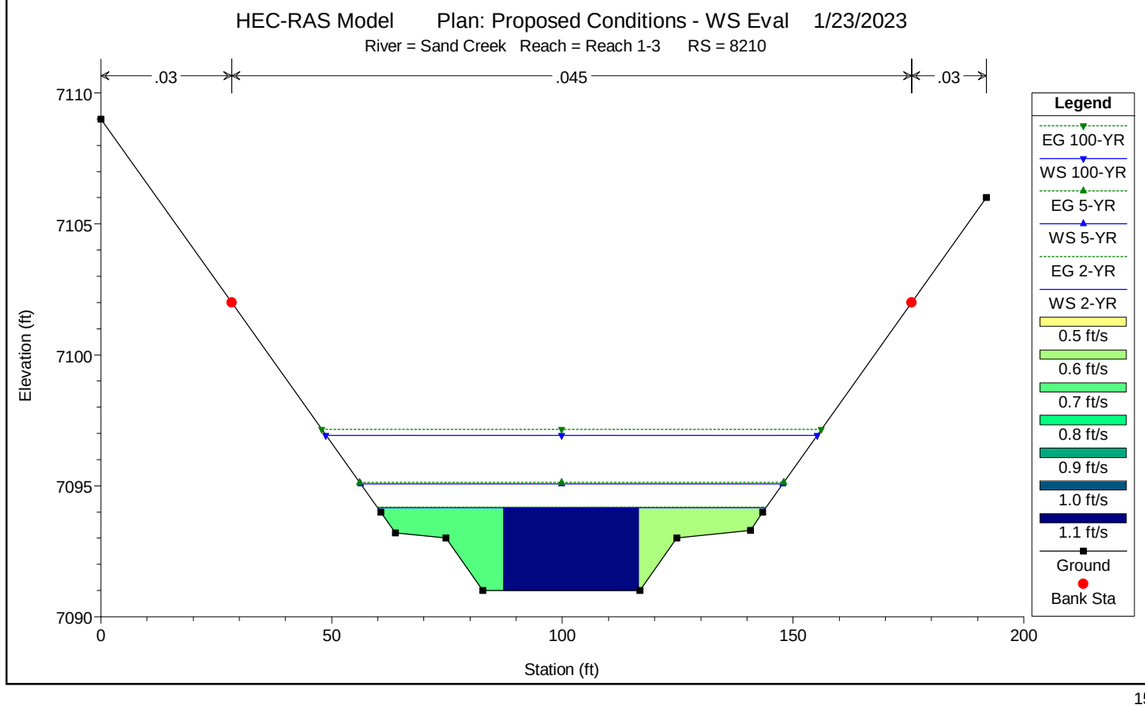

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

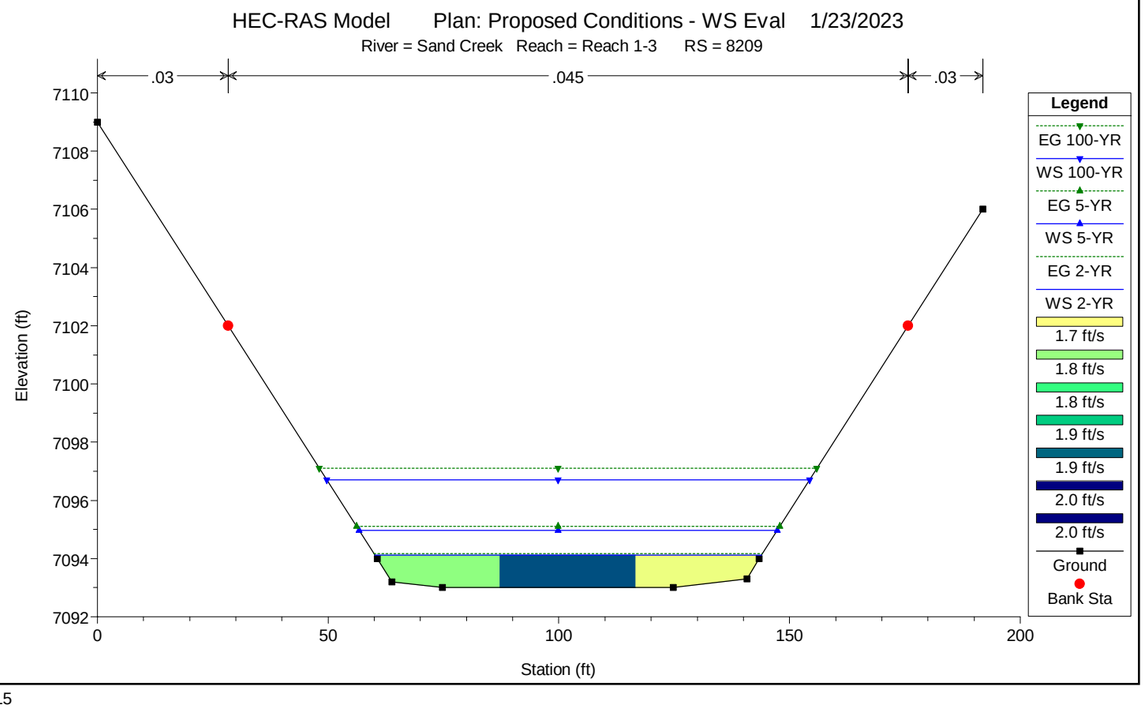
River = Sand Creek Reach = Reach 1-3 RS = 8276

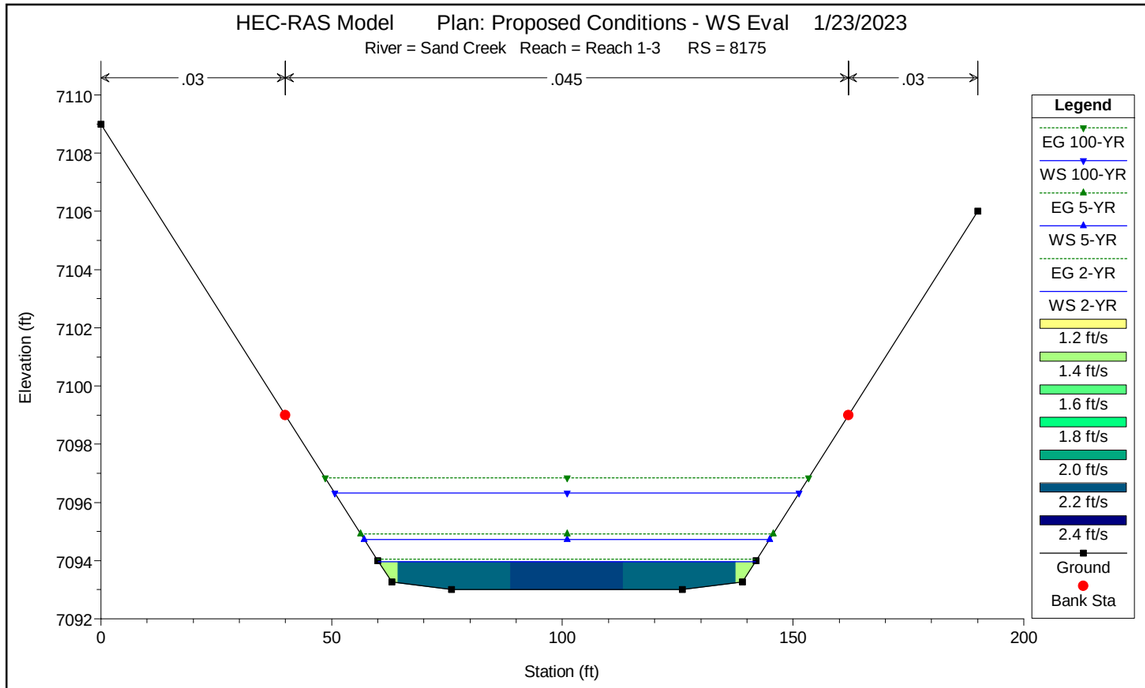


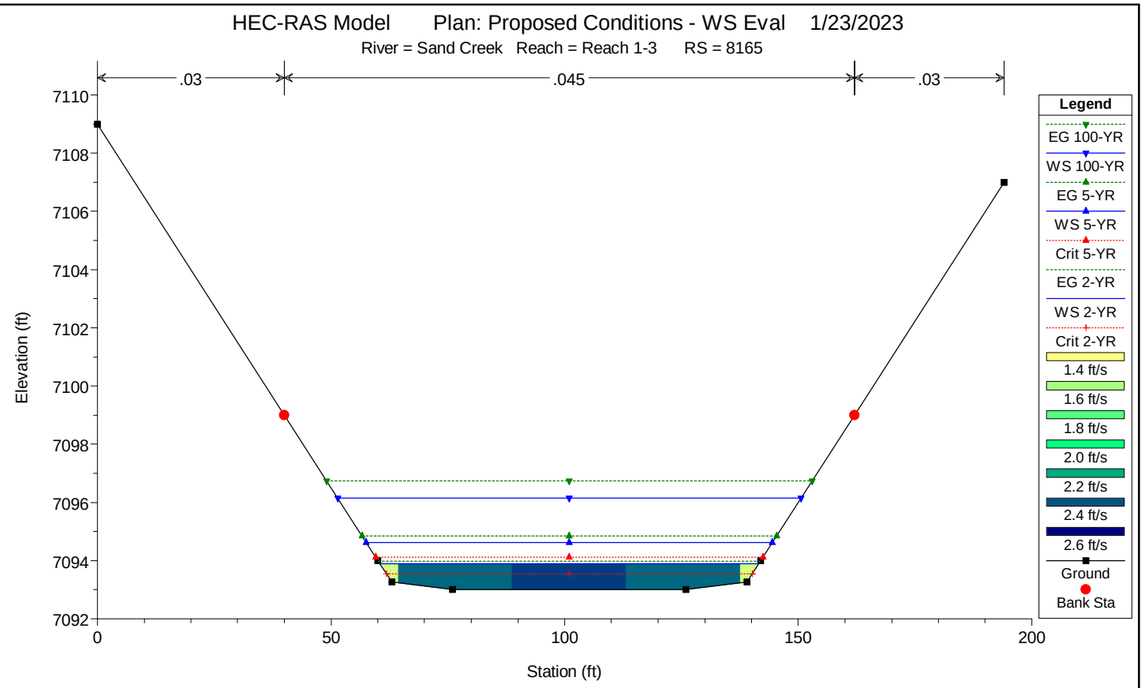

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8267
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

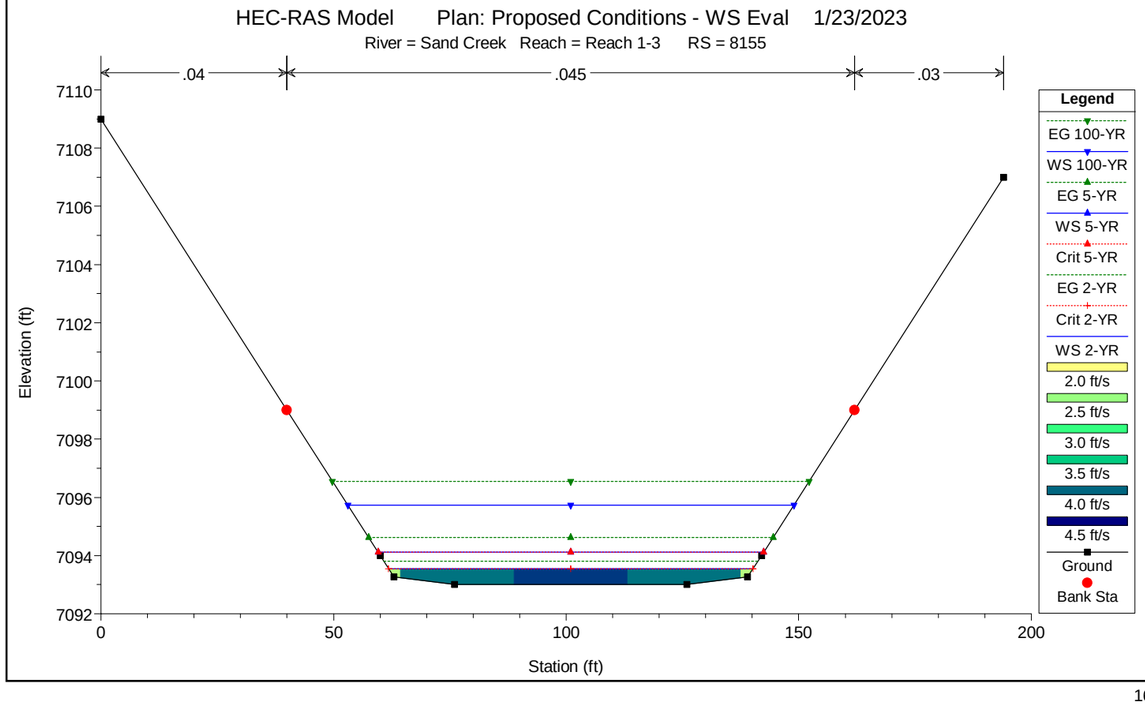

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8229
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
0.6 ft/s
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
Ground
Bank Sta

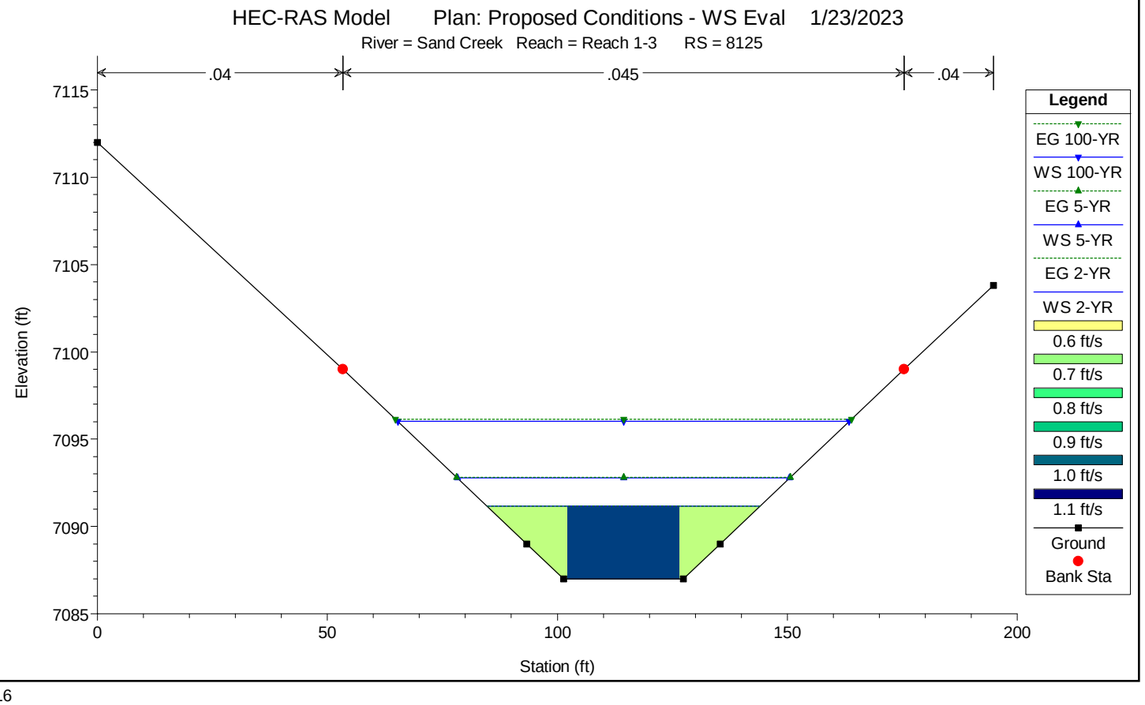

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8210
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
0.6 ft/s
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
Ground
Bank Sta

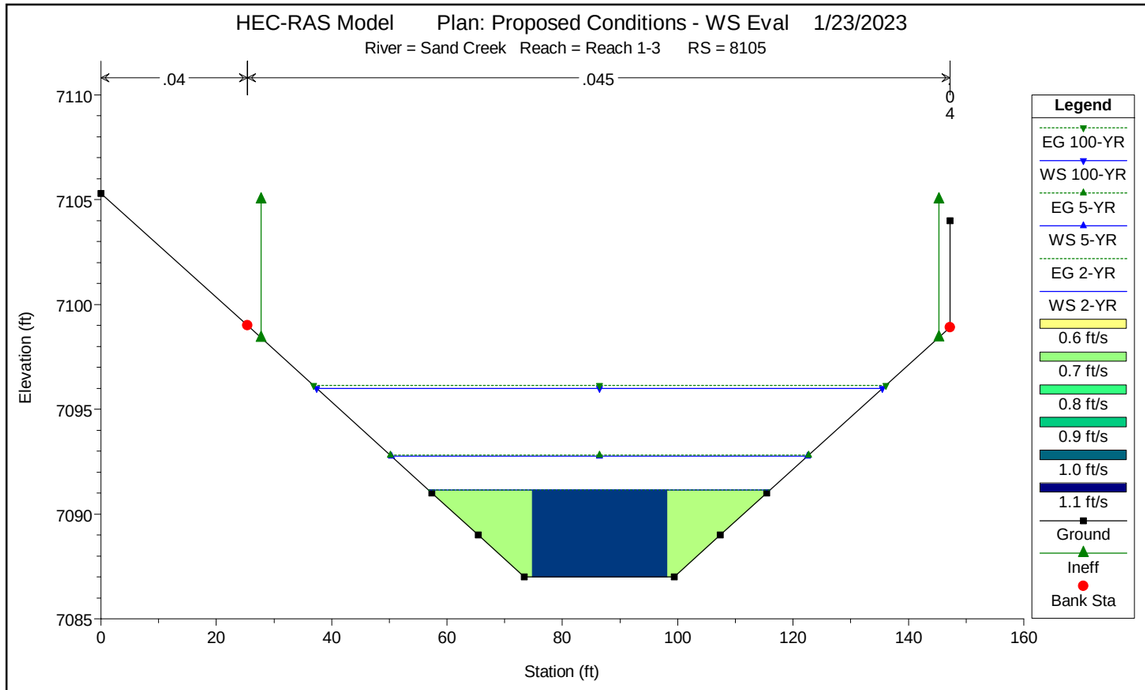

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8209
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.7 ft/s
1.8 ft/s
1.8 ft/s
1.9 ft/s
1.9 ft/s
2.0 ft/s
2.0 ft/s
Ground
Bank Sta

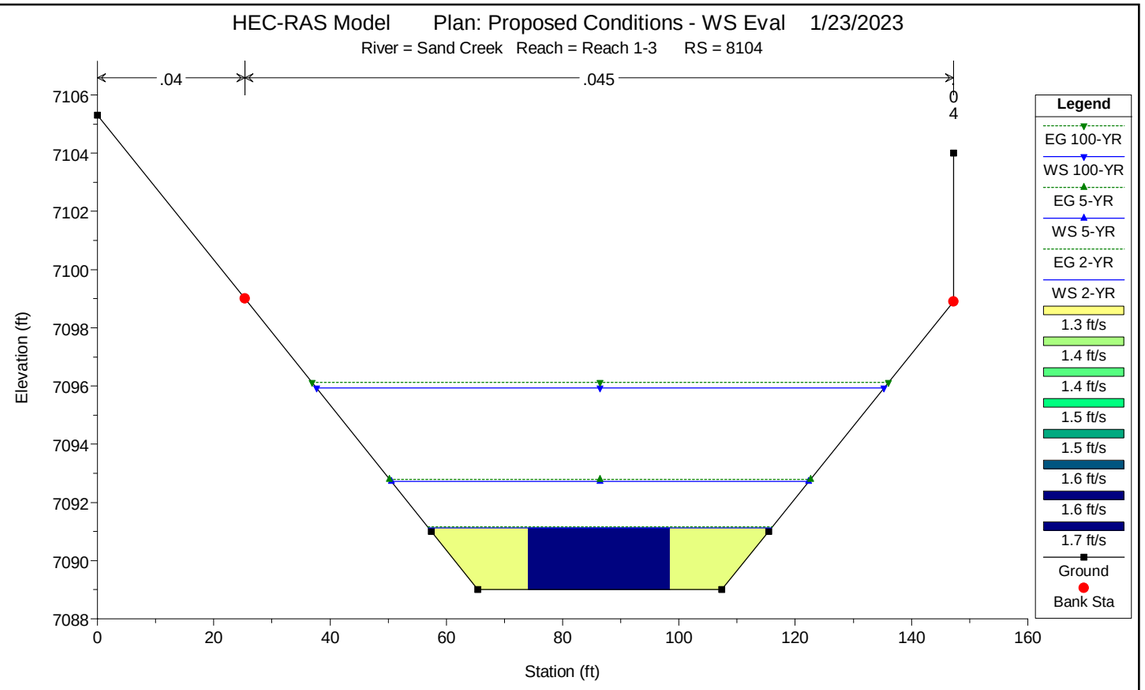

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8175
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
Ground
Bank Sta

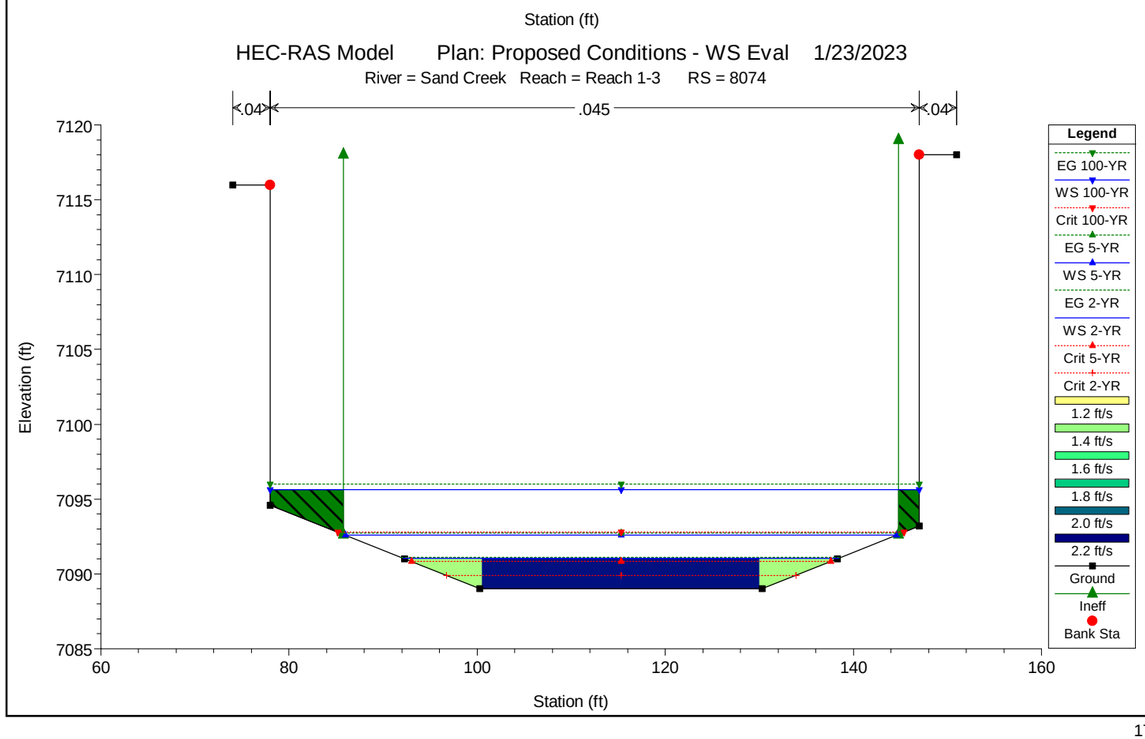

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8165
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
Ground
Bank Sta

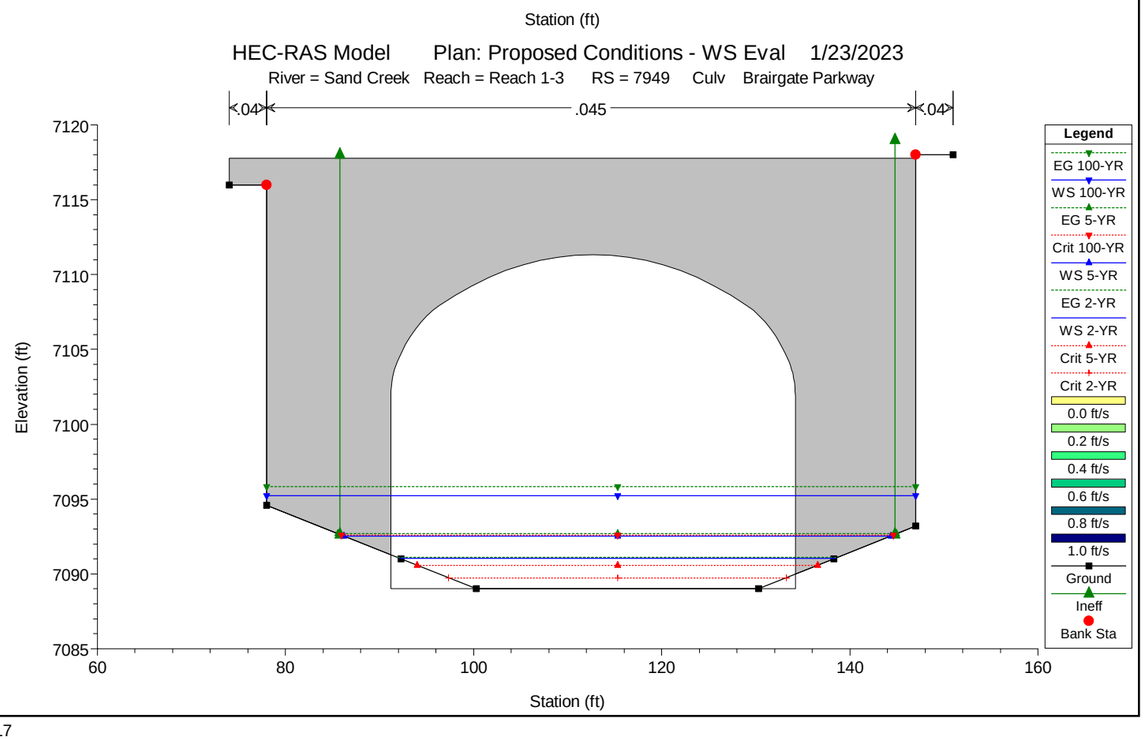

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8155
.04
.045
.03
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

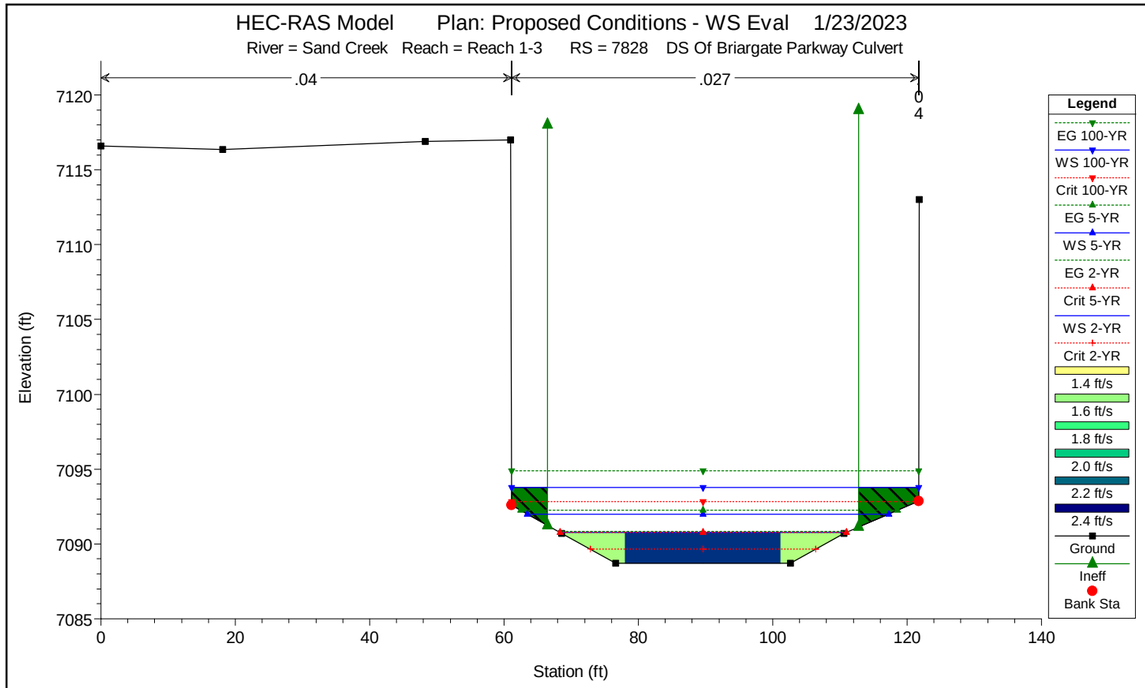

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8125
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.6 ft/s
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
Ground
Bank Sta

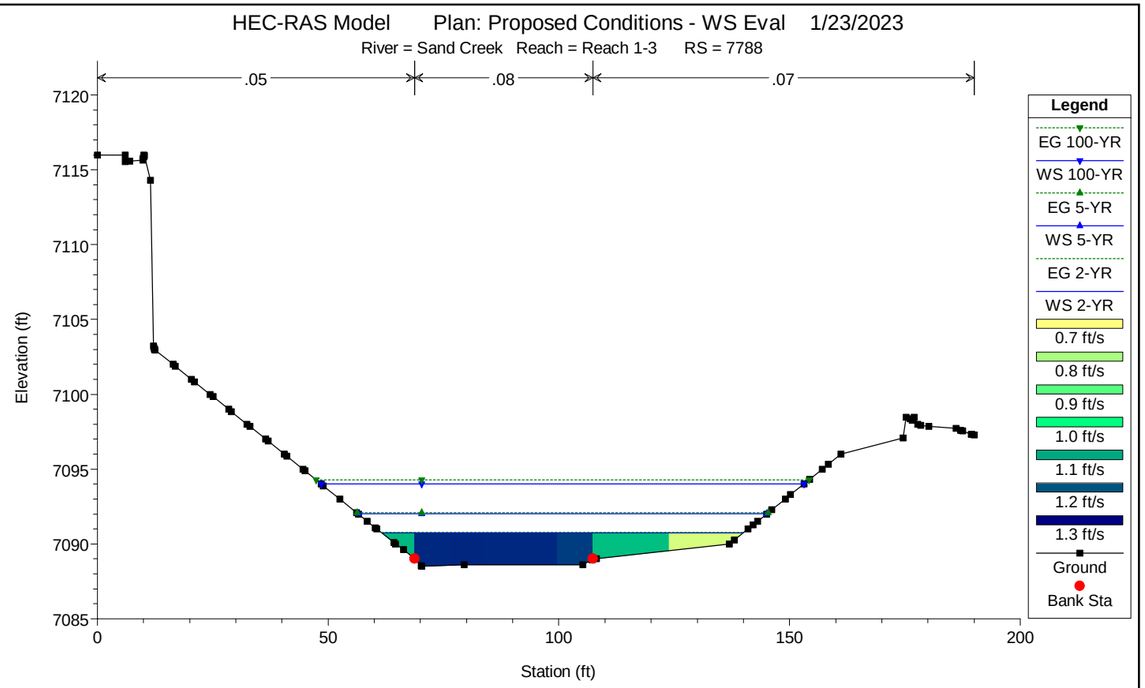

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8105
.04
.045
0
4
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.6 ft/s
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
Ground
Ineff
Bank Sta

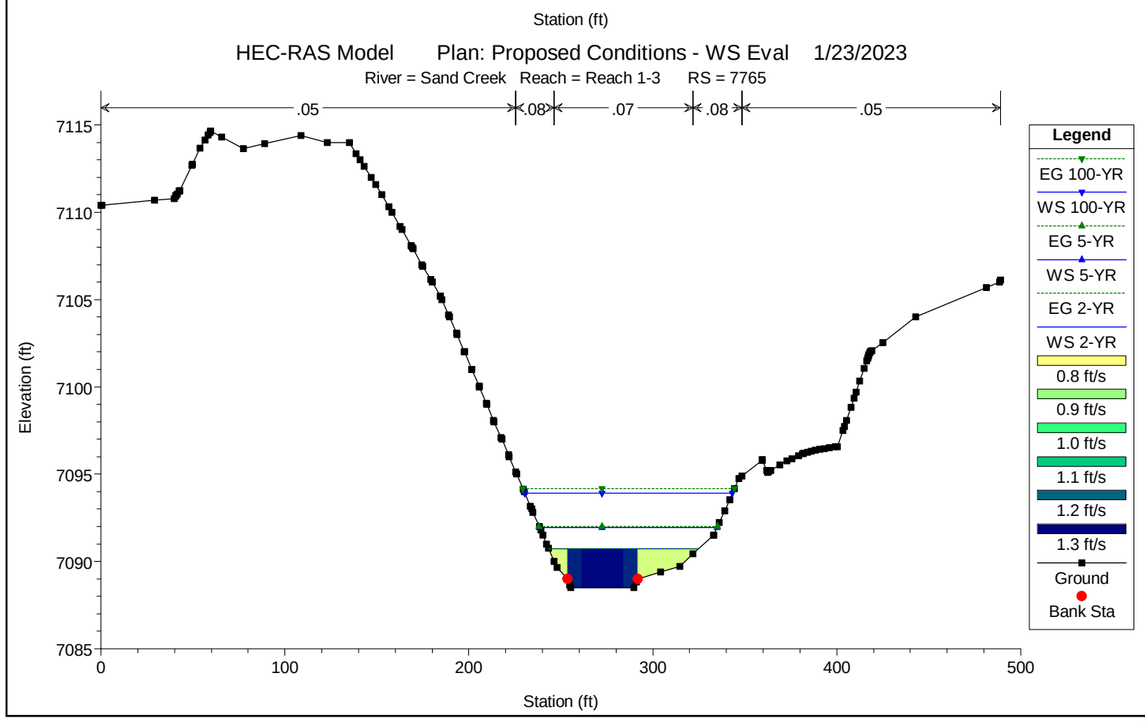

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8104
.04
.045
0
4
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.3 ft/s
1.4 ft/s
1.4 ft/s
1.5 ft/s
1.5 ft/s
1.6 ft/s
1.6 ft/s
1.7 ft/s
Ground
Bank Sta

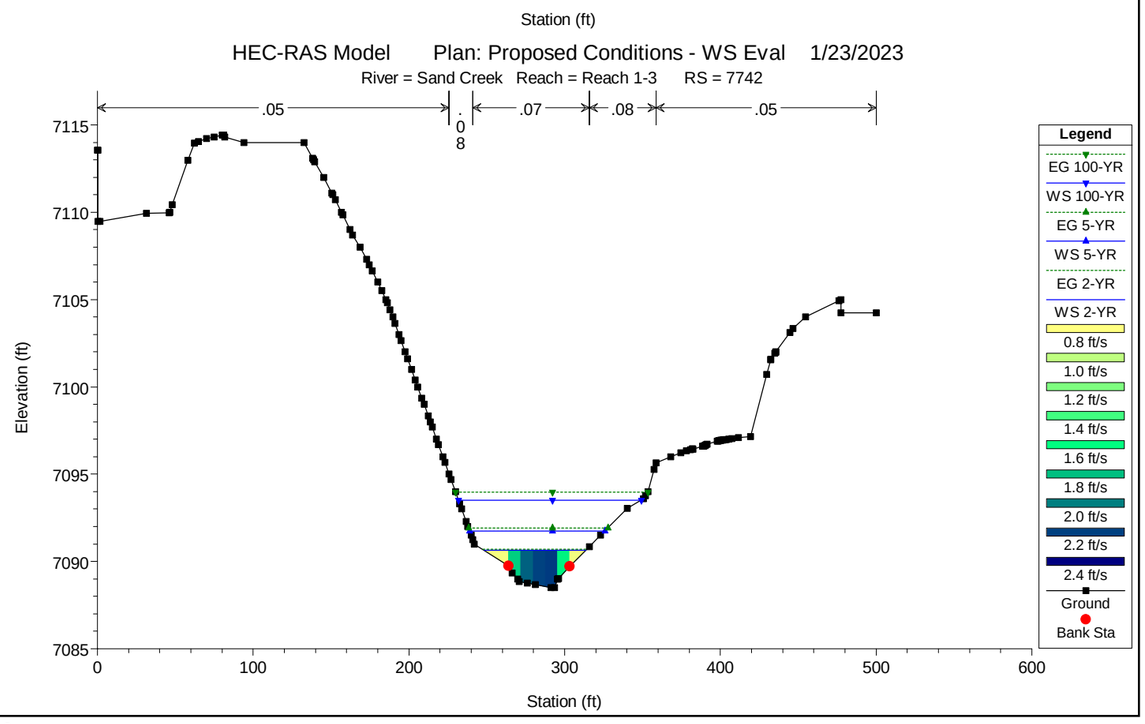

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8074
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
Ground
Ineff
Bank Sta

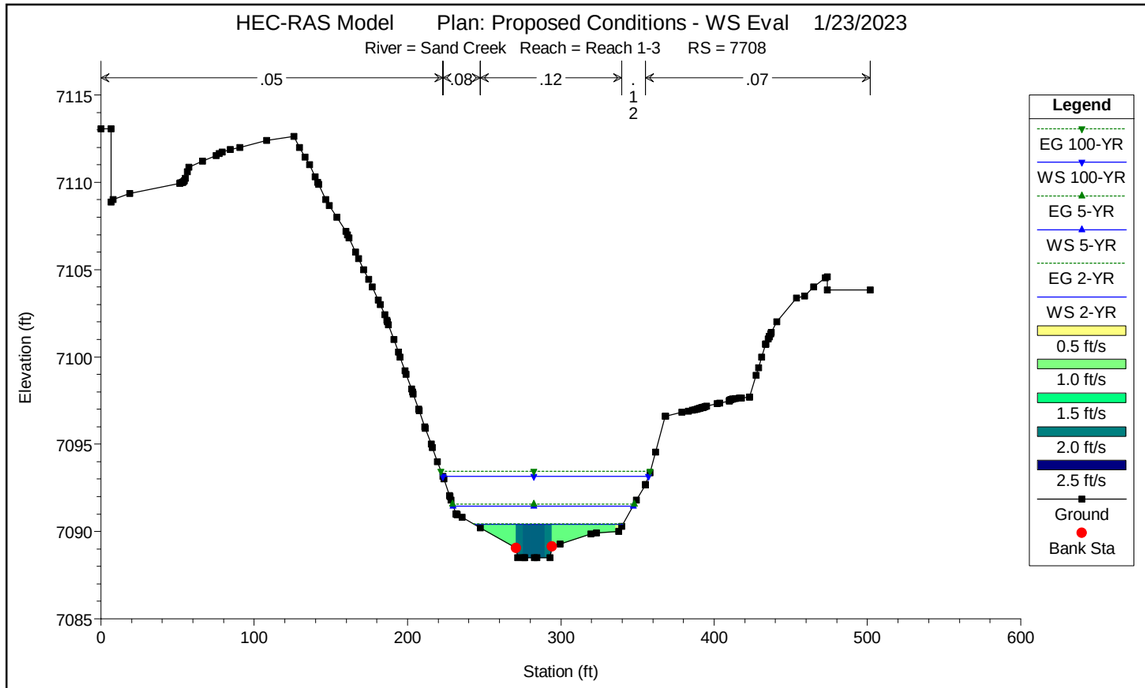

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7949 Culv Brairgate Parkway
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
Crit 100-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

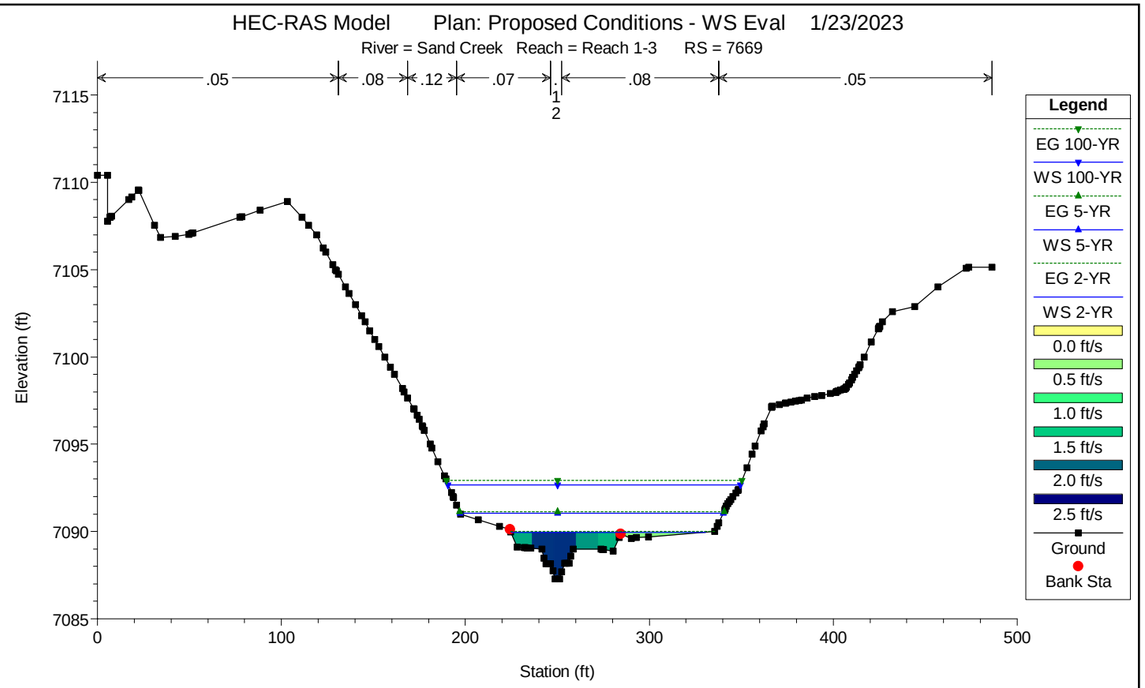

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7828 DS Of Briargate Parkway Culvert
.04
.027
0
4
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
Crit 5-YR
WS 2-YR
Crit 2-YR
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
Ground
Ineff
Bank Sta

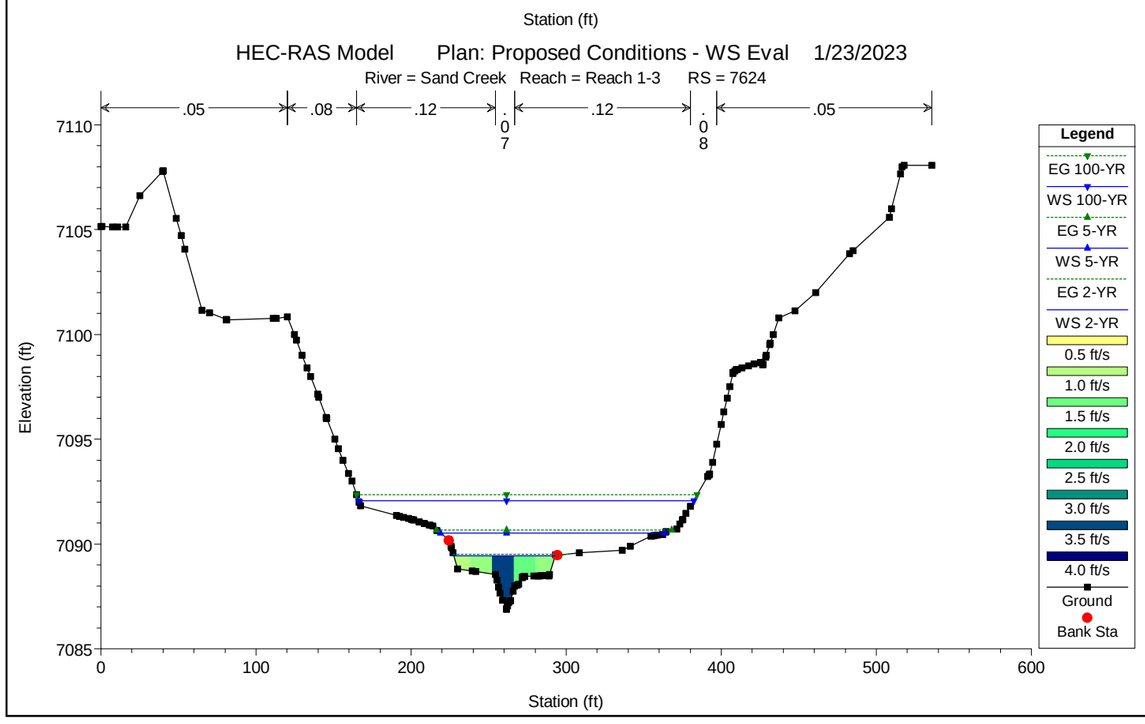

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7788
.05
.08
.07
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
1.2 ft/s
1.3 ft/s
Ground
Bank Sta

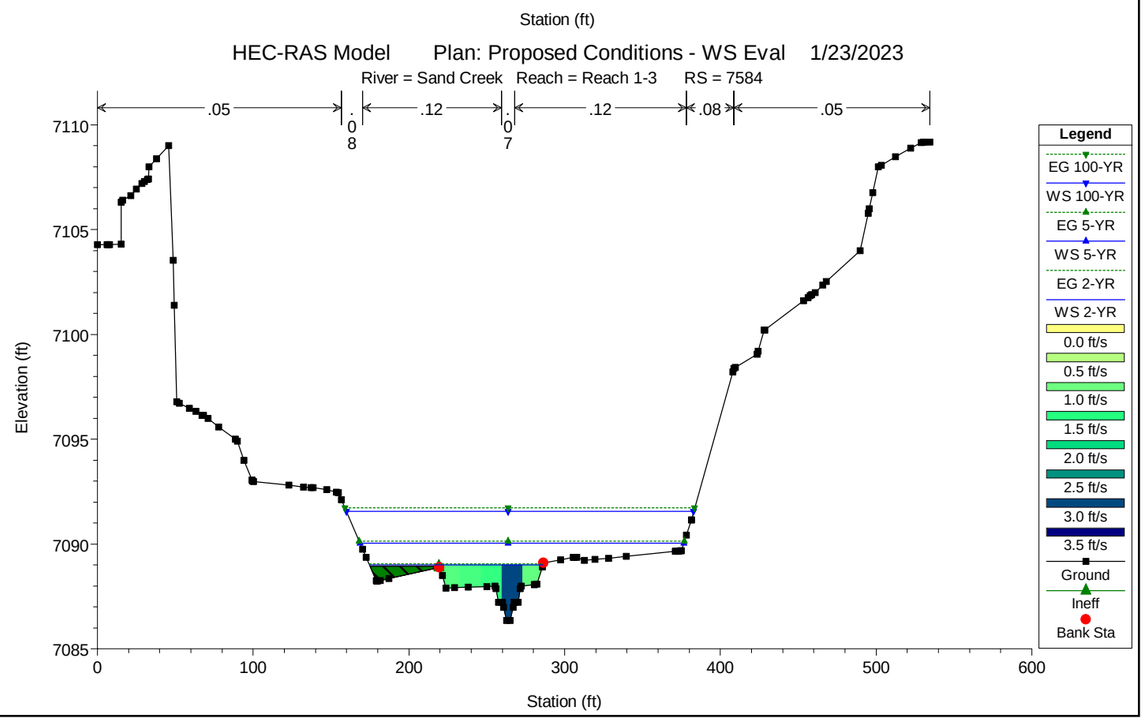

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7765
.05
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
1.2 ft/s
1.3 ft/s
Ground
Bank Sta

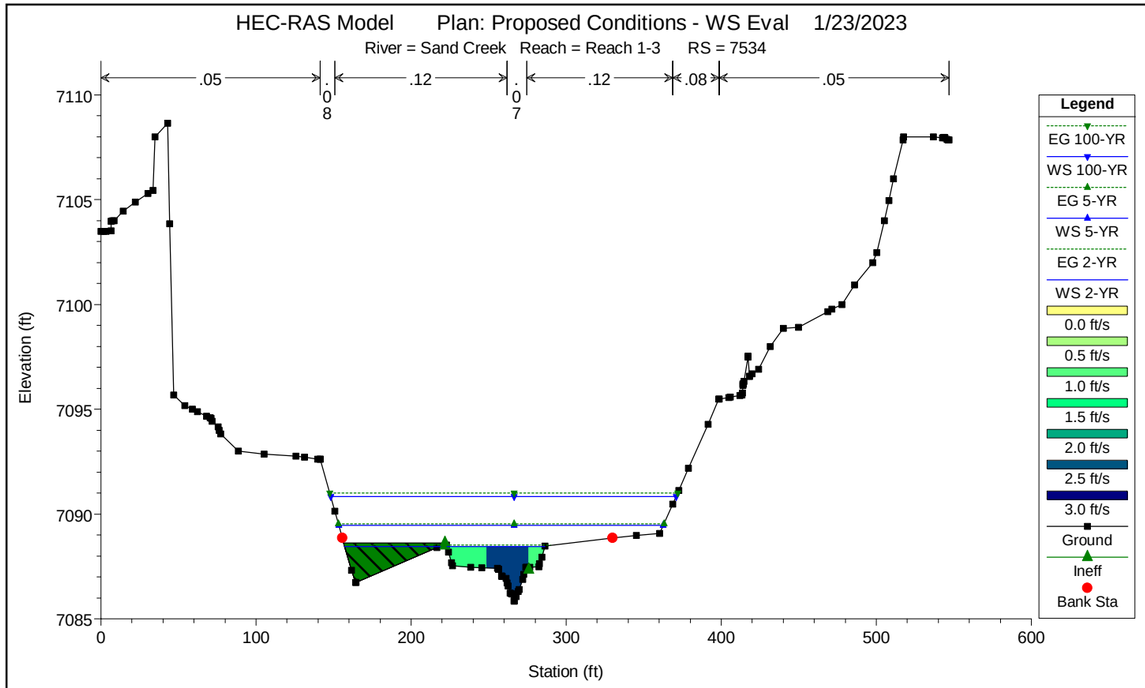

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7742
.05
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
Ground
Bank Sta

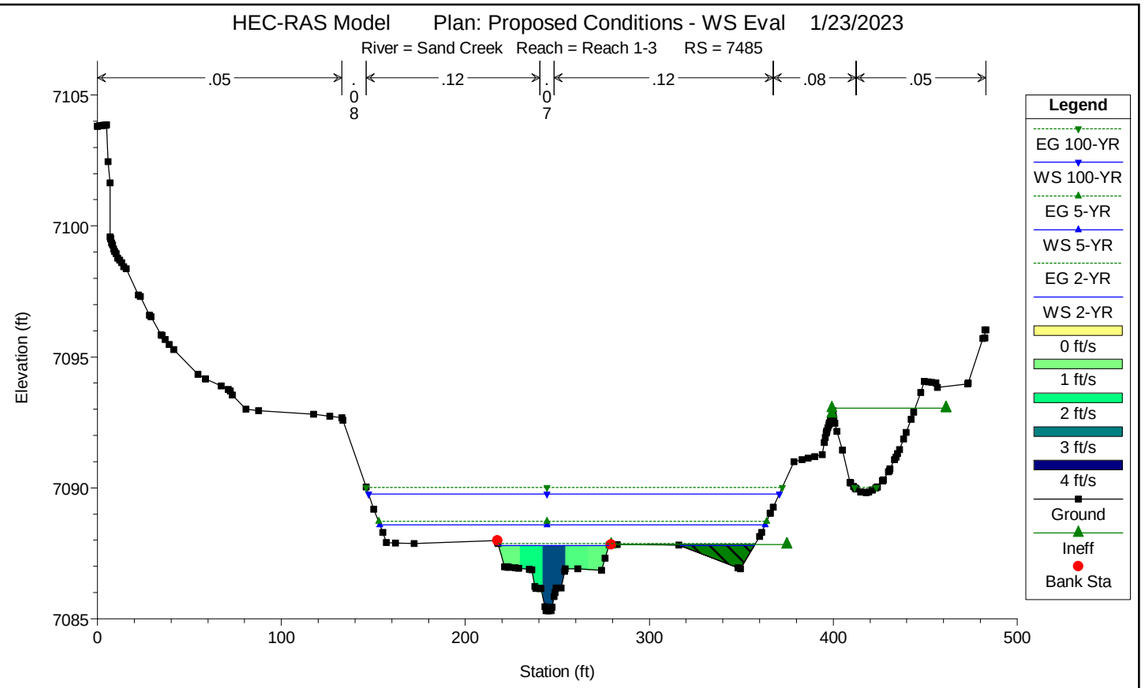

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7708
.05
.08
.12
.12
.07
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

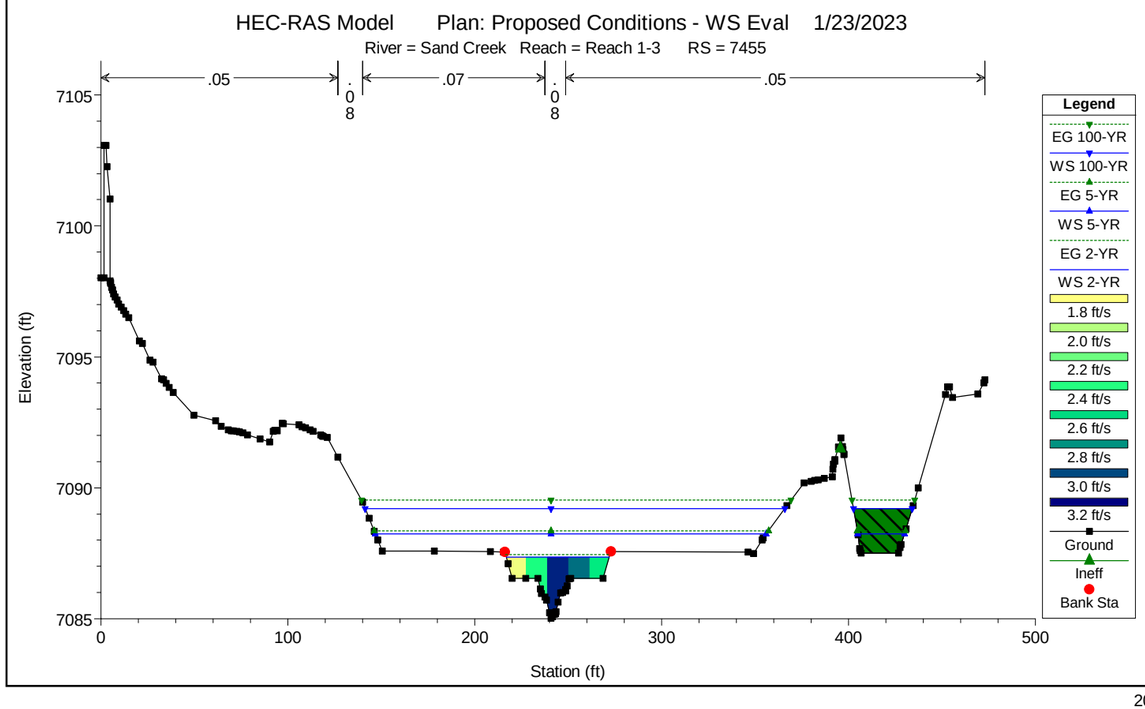

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7669
.05
.08
.12
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

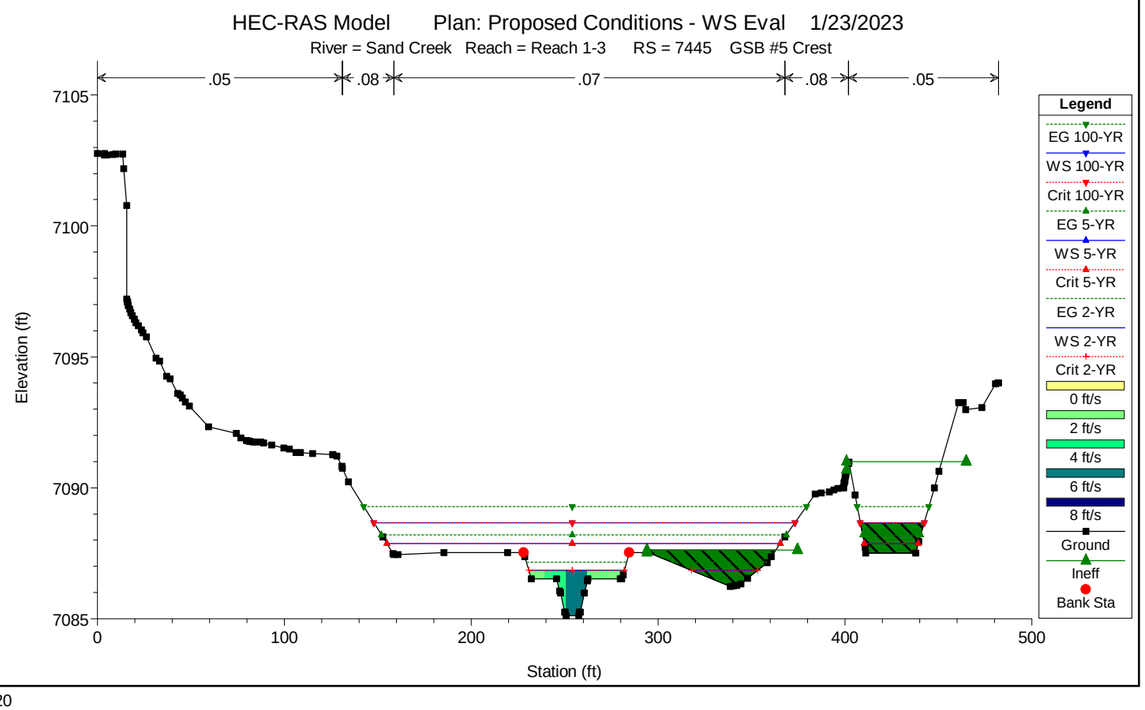

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7624
.05
.08
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7584
.05
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7534
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta

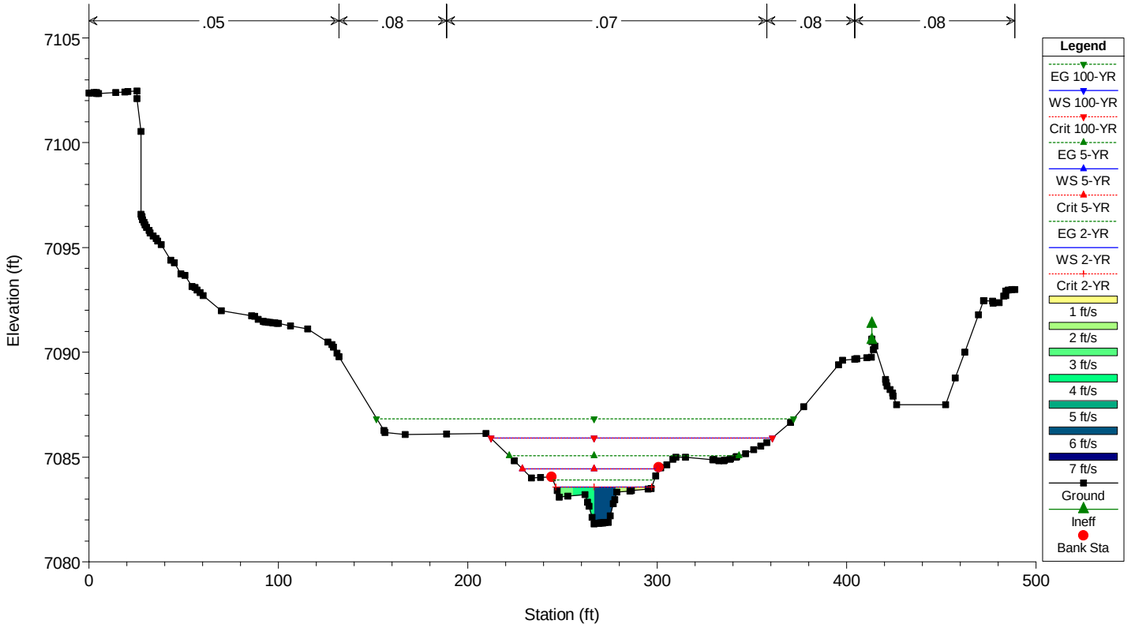

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7485
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7455
.05
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
2.8 ft/s
3.0 ft/s
3.2 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7445 GSB #5 Crest
.05
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

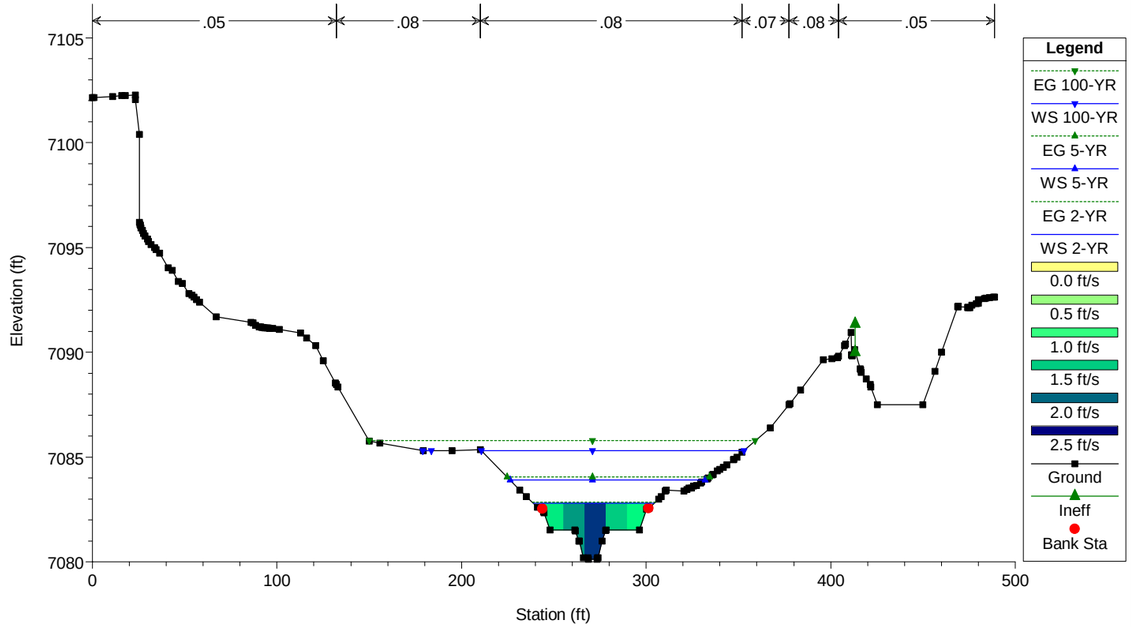
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7430 GSB #5 Mid



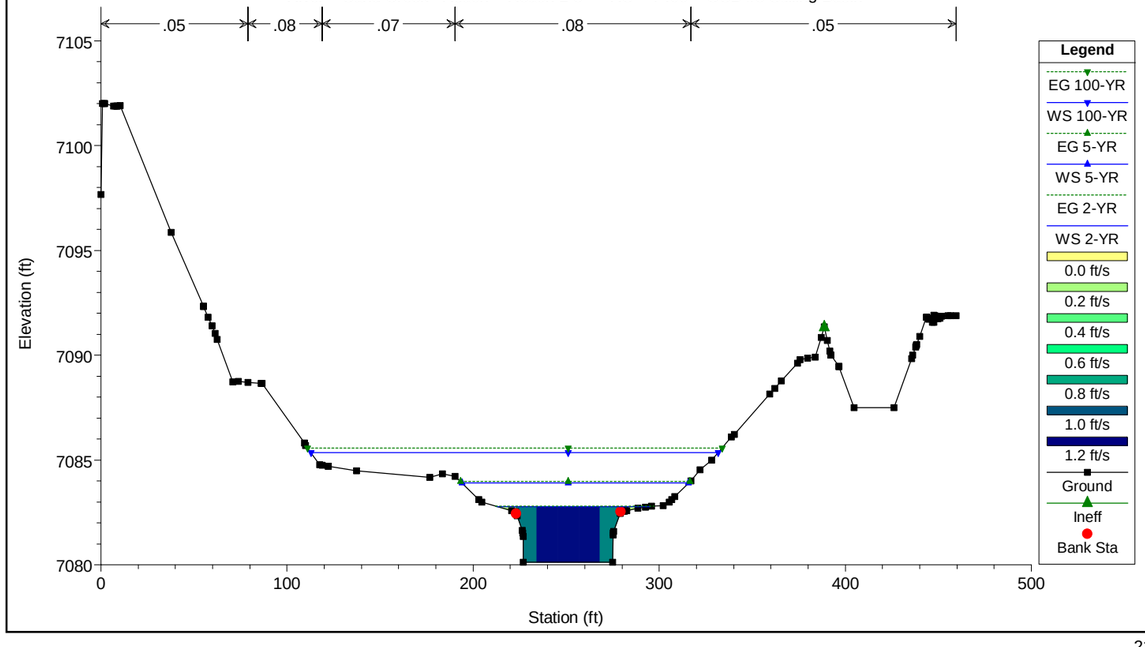

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7422 GSB #5 Toe



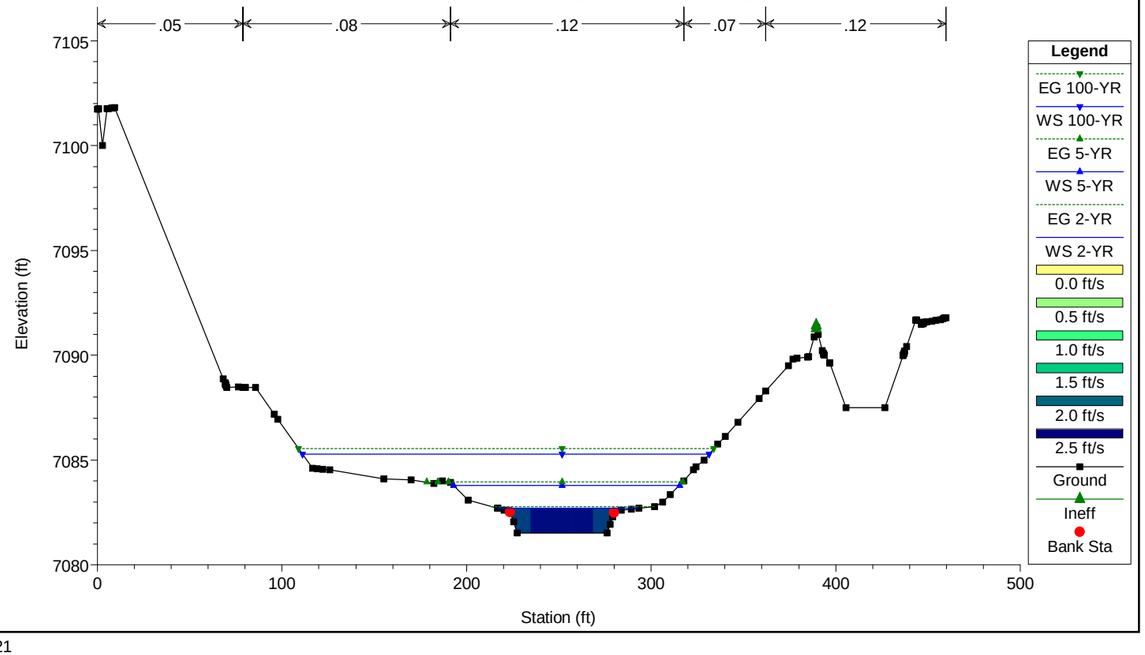

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

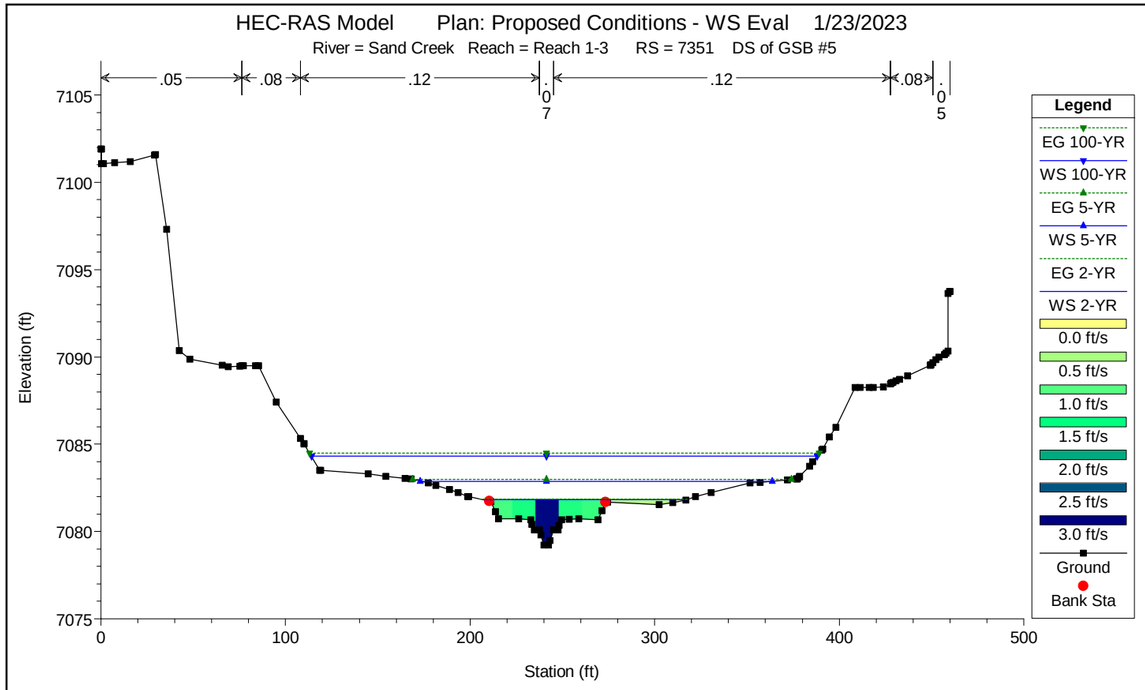
River = Sand Creek Reach = Reach 1-3 RS = 7409 GSB #5 Stilling Basin

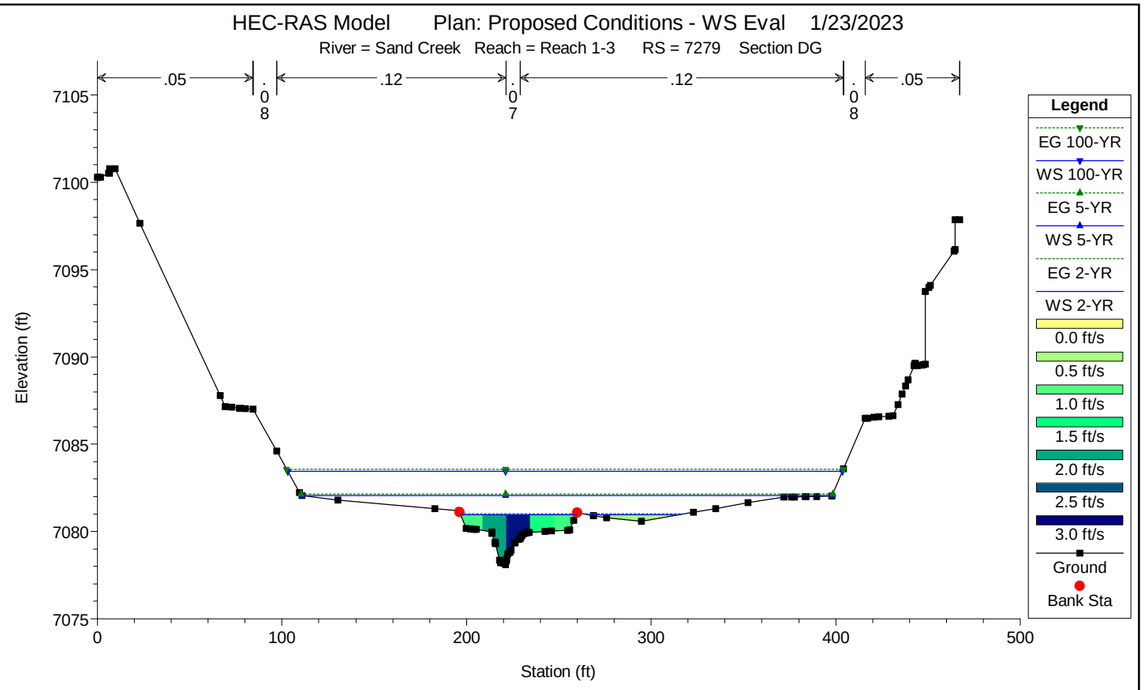


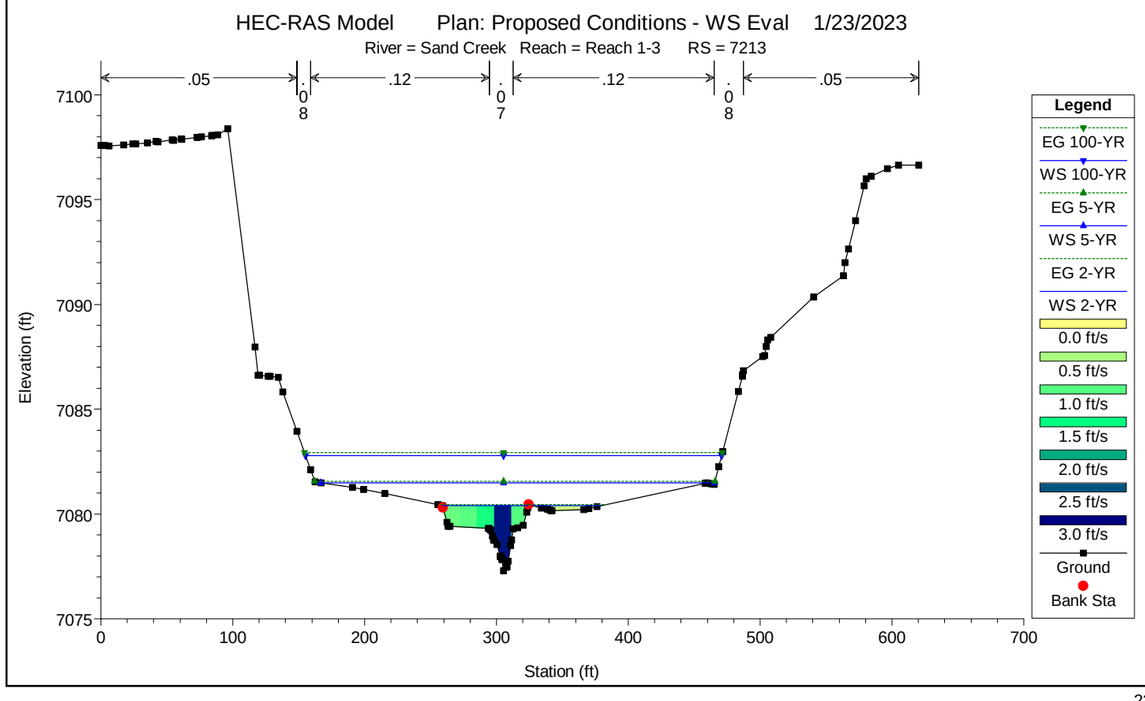

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

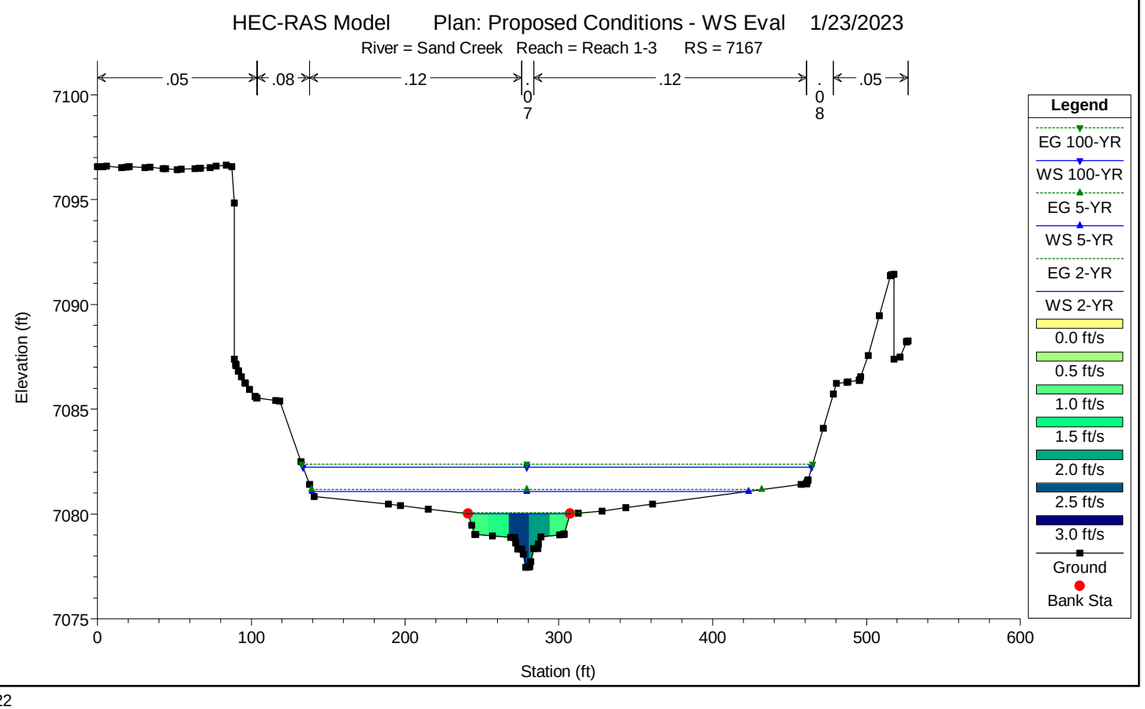
River = Sand Creek Reach = Reach 1-3 RS = 7406 GSB #5 Sill Wall




HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7351 DS of GSB #5
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

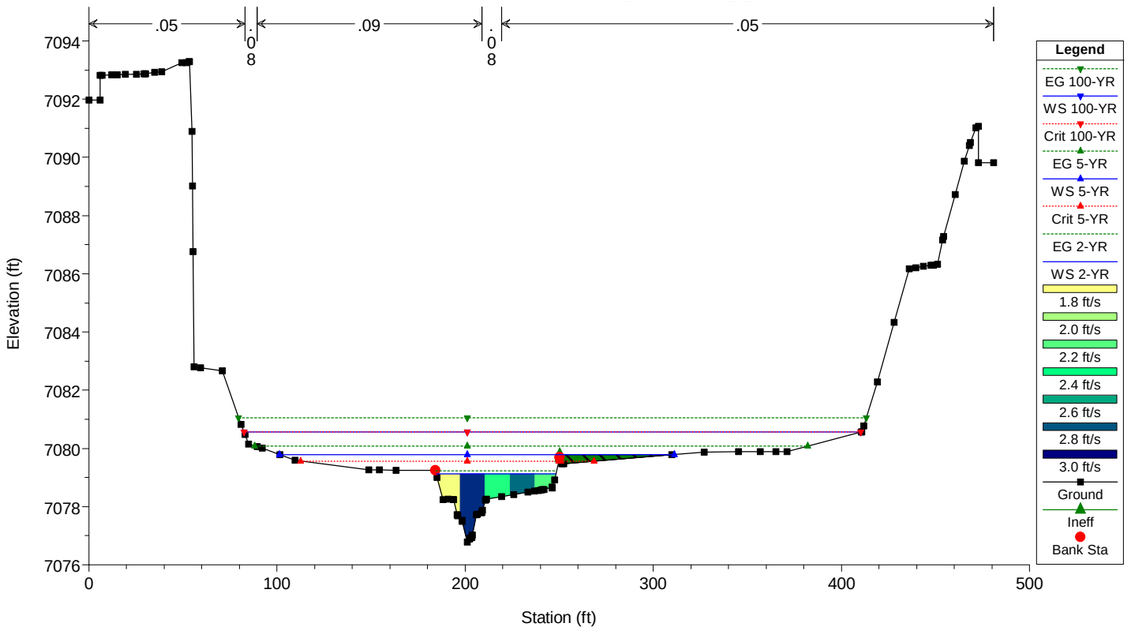

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7279 Section DG
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7213
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7167
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

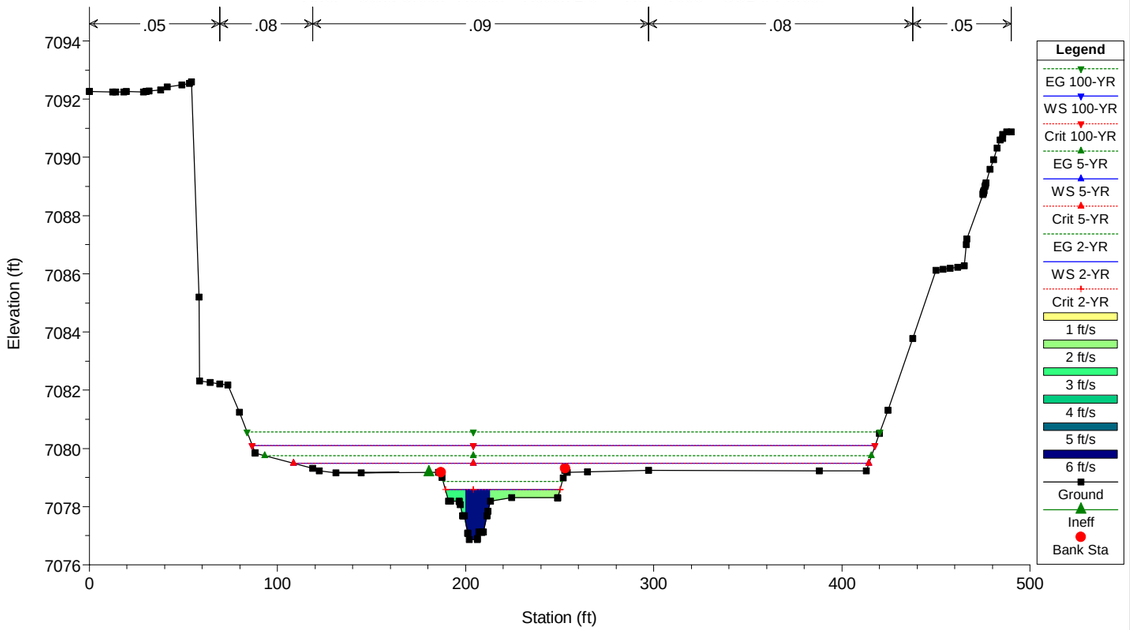
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7102



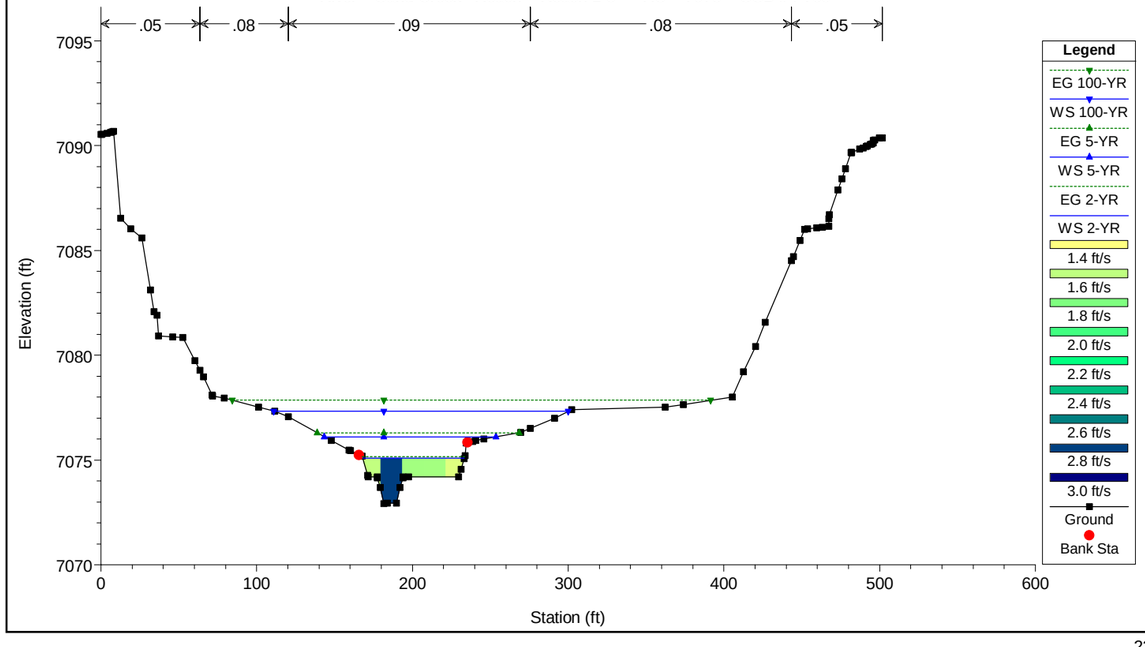

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7093 GSB #4 Crest



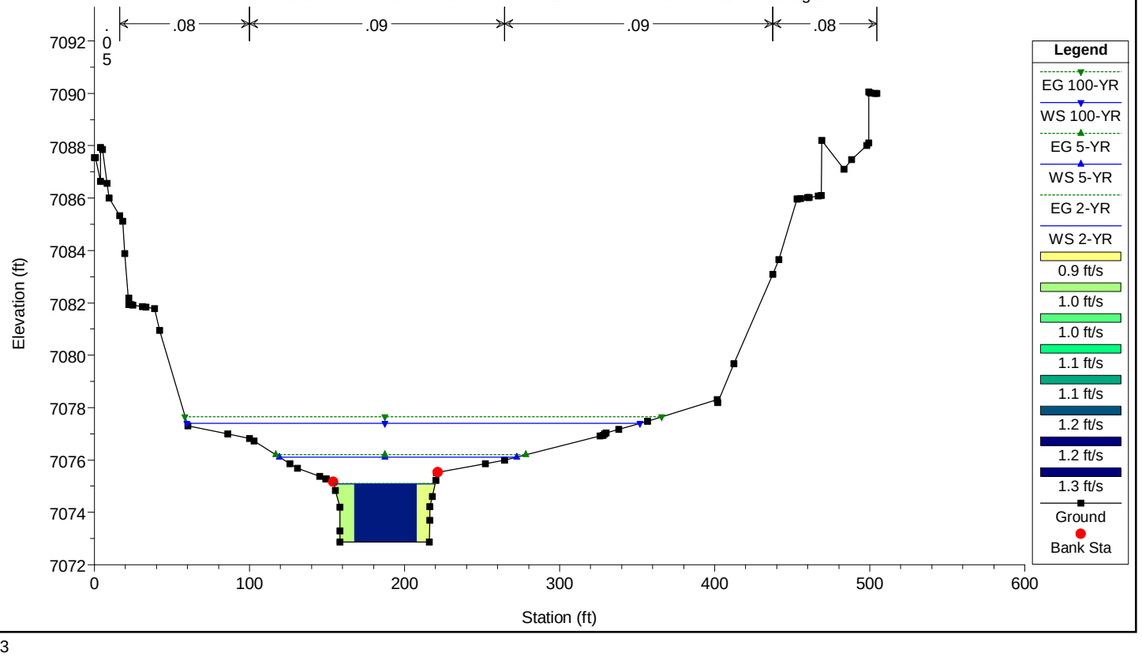

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

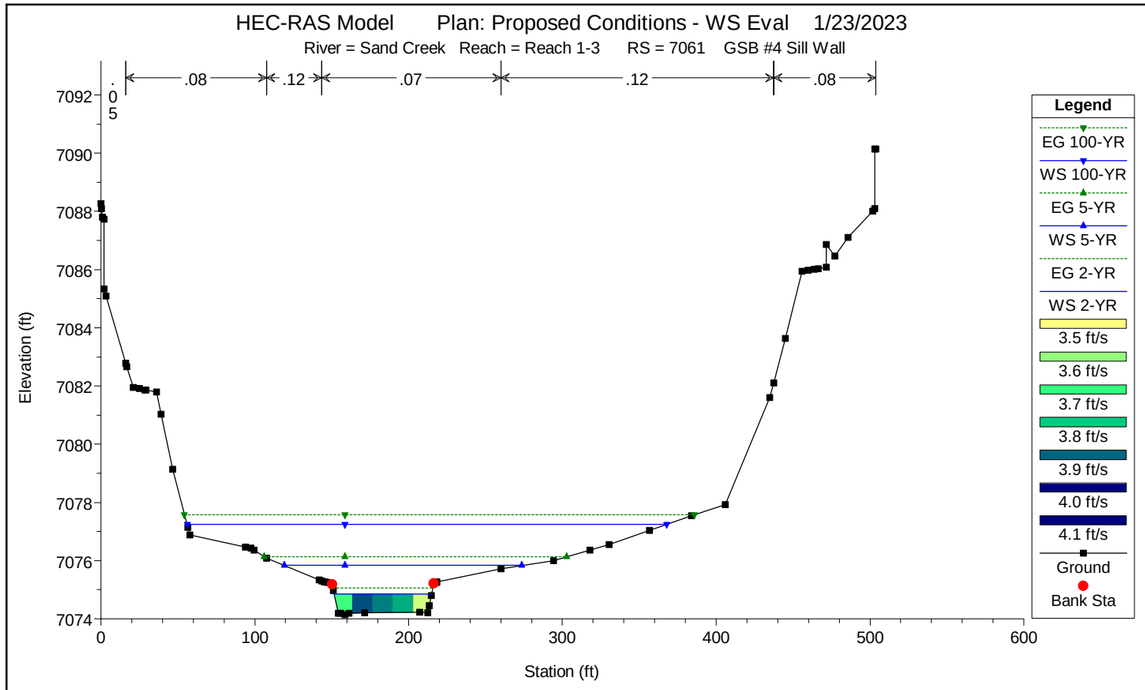
River = Sand Creek Reach = Reach 1-3 RS = 7073 GSB #4 Toe

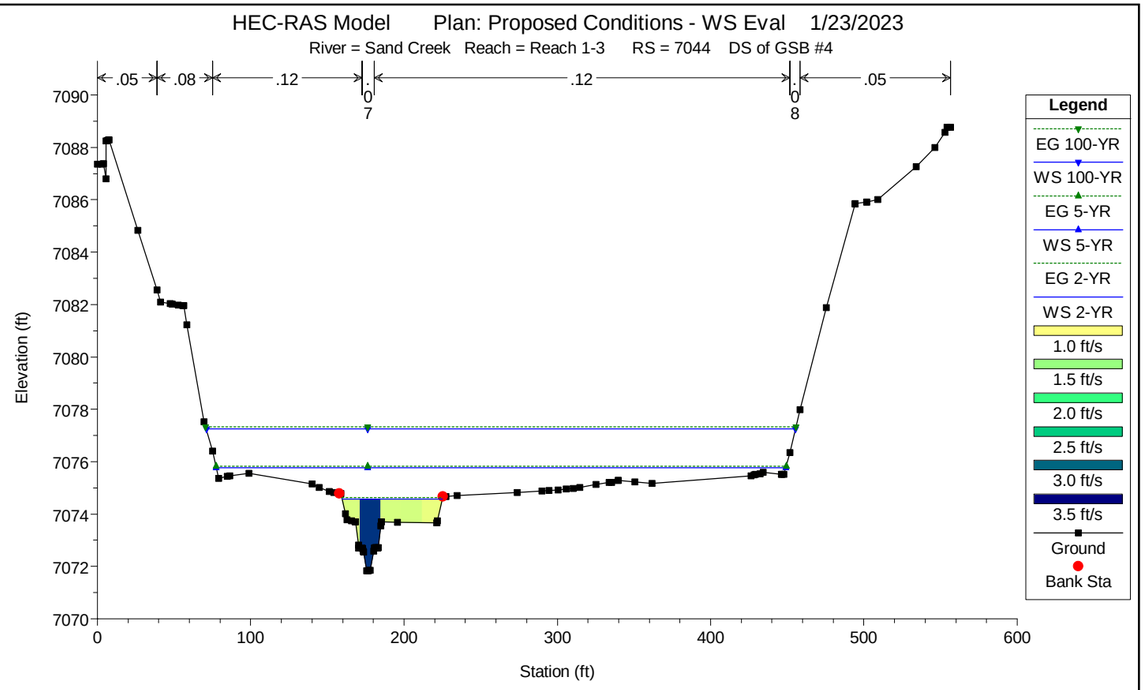


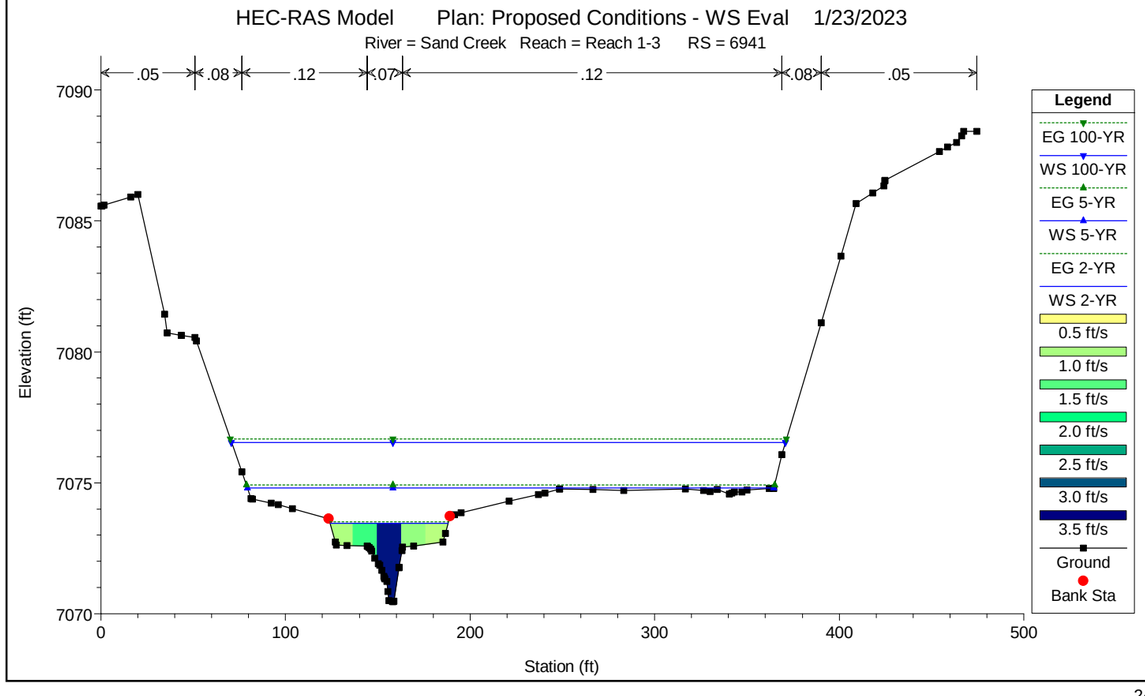

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

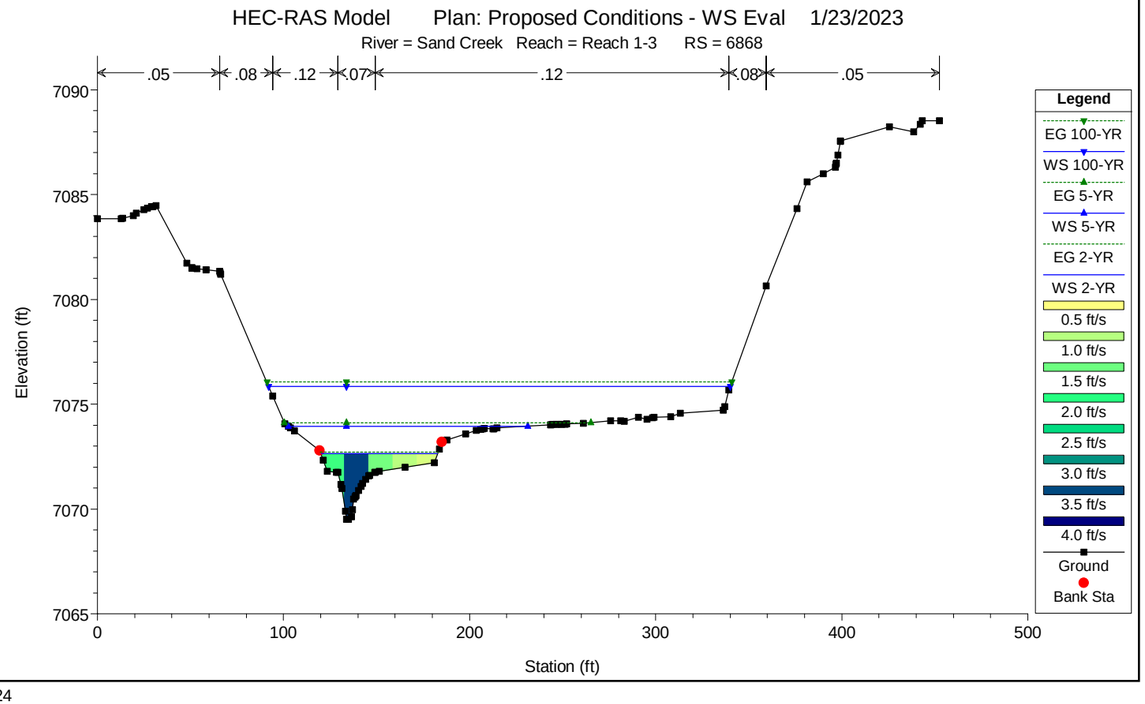
River = Sand Creek Reach = Reach 1-3 RS = 7066 GSB #4 Stilling Basin

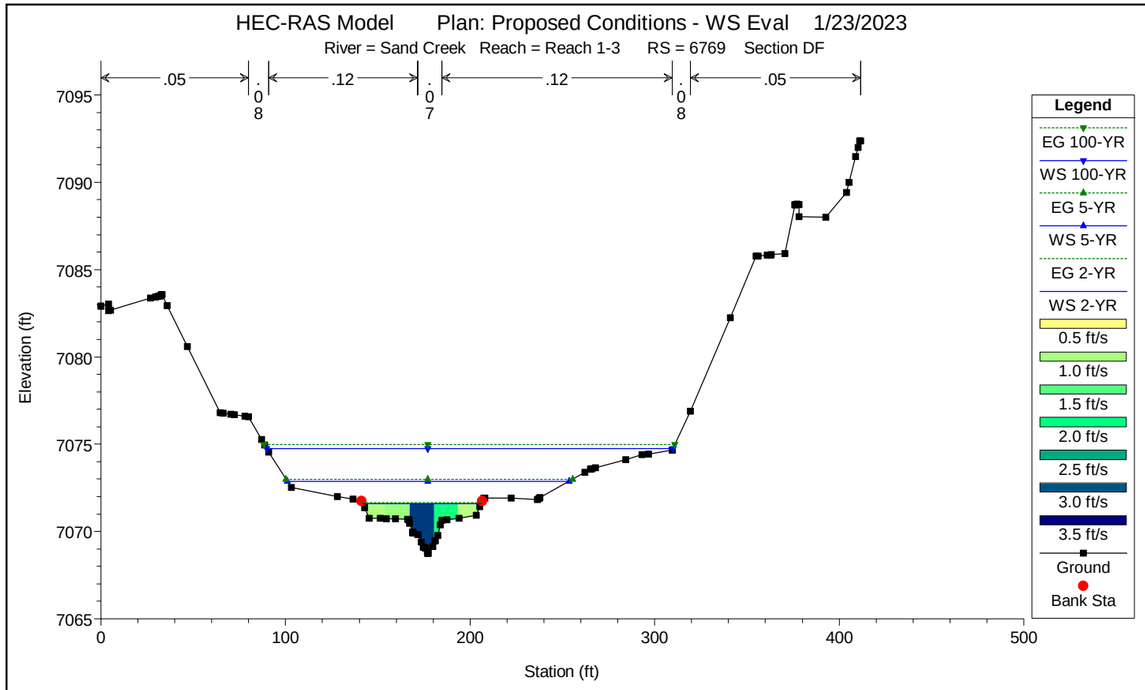


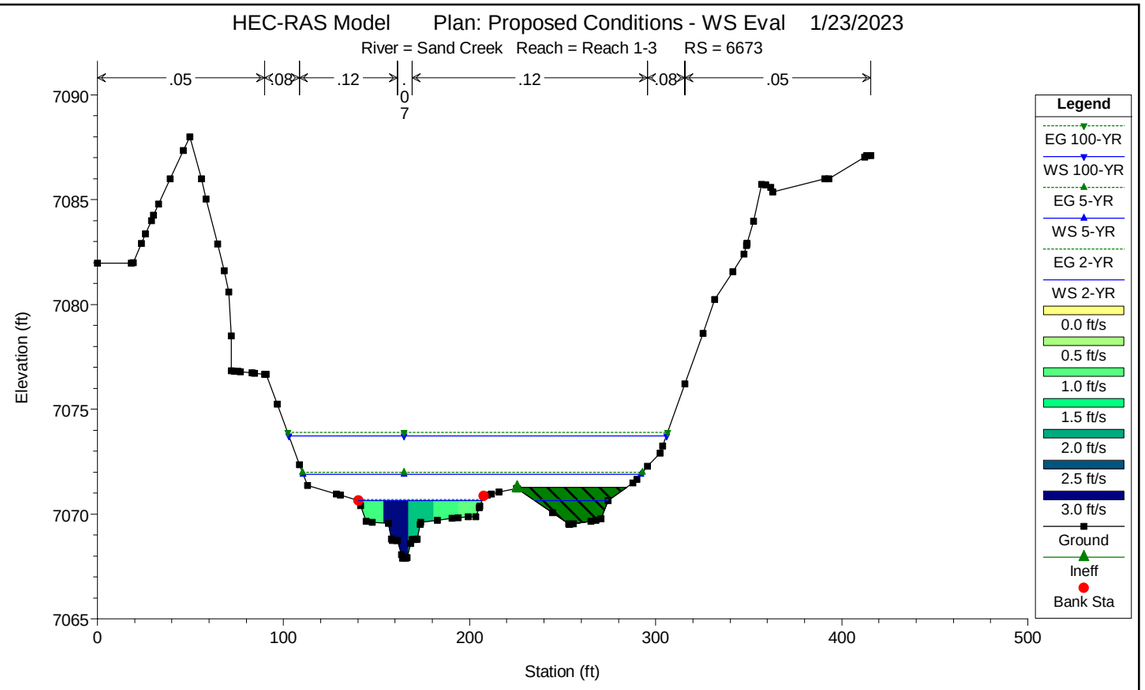

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7061 GSB #4 Sill Wall
.05
.08
.12
.07
.12
.08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
3.5 ft/s
3.6 ft/s
3.7 ft/s
3.8 ft/s
3.9 ft/s
4.0 ft/s
4.1 ft/s
Ground
Bank Sta

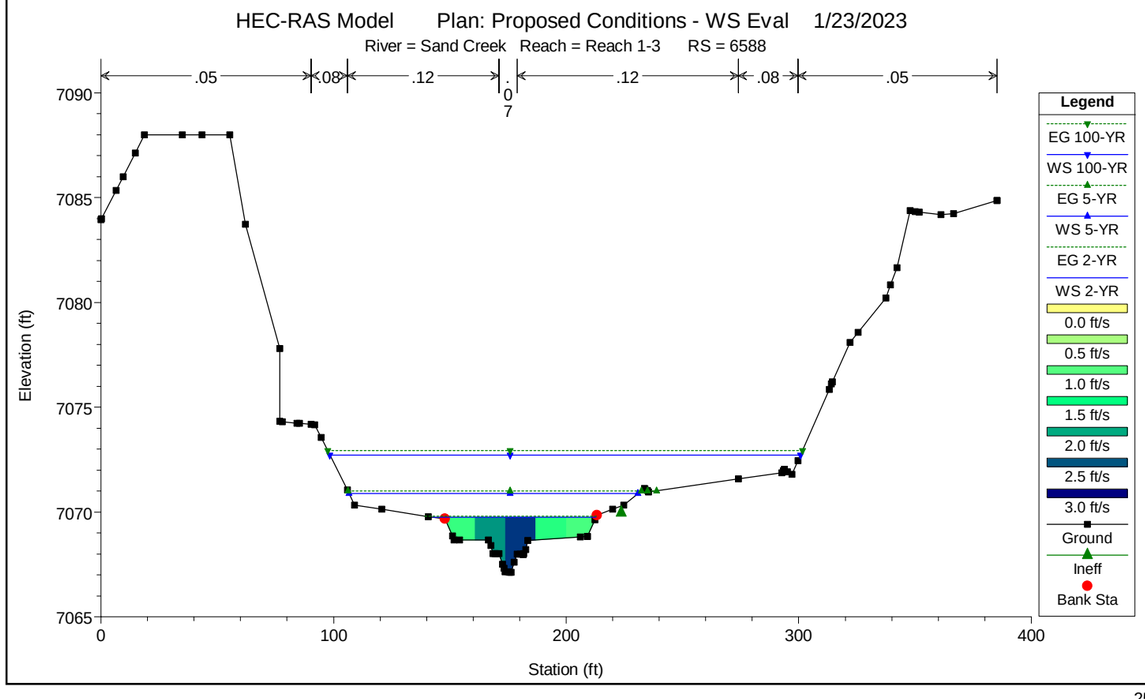

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7044 DS of GSB #4
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

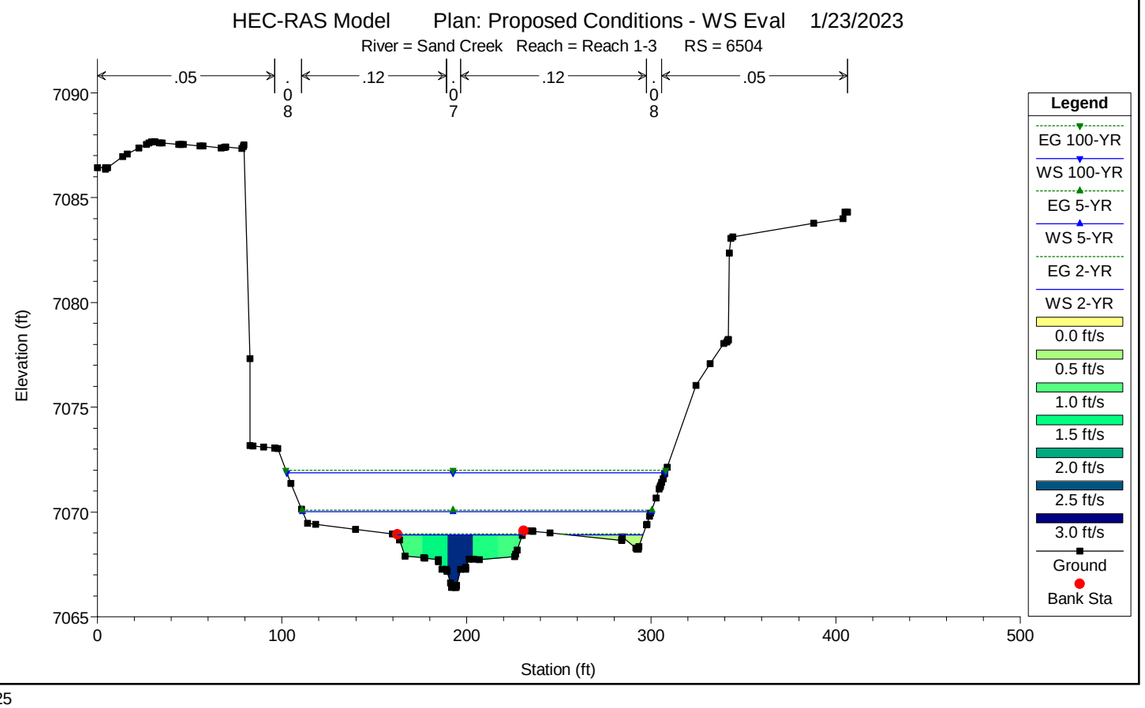

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6941
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

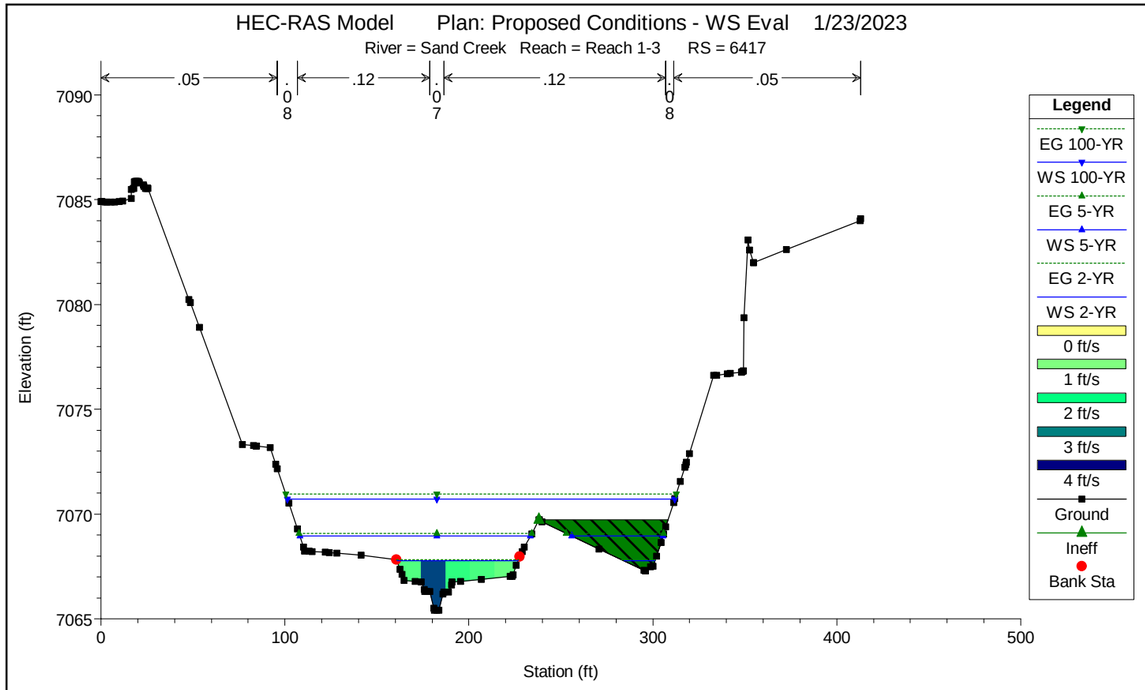

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6868
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

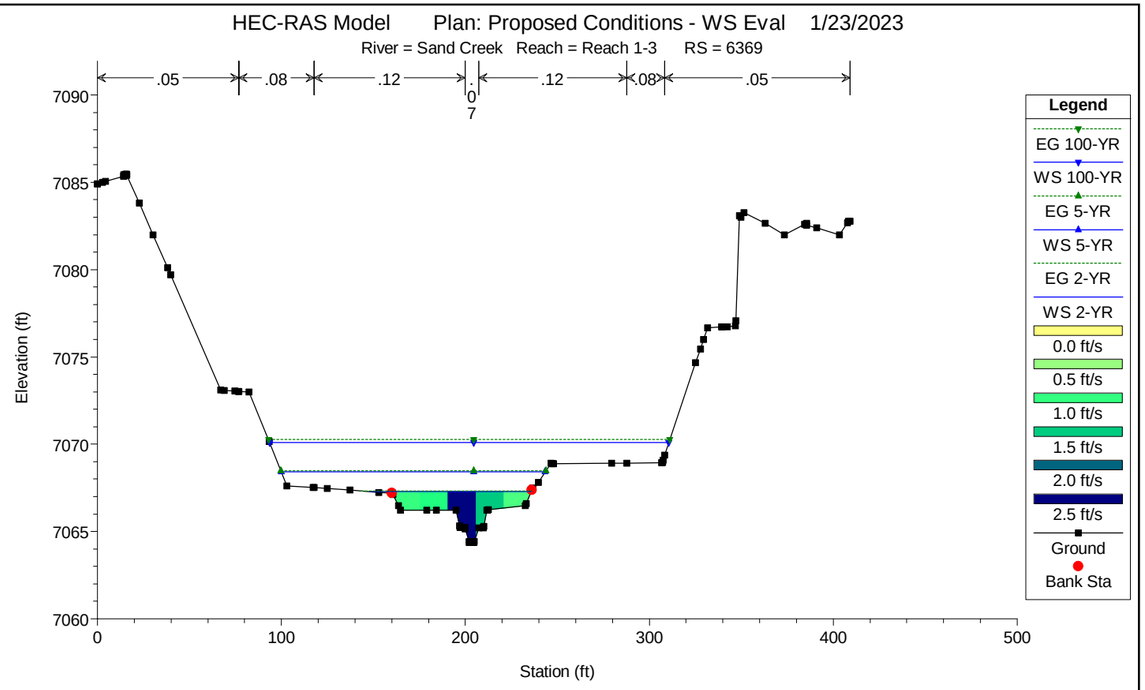

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6769 Section DF
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

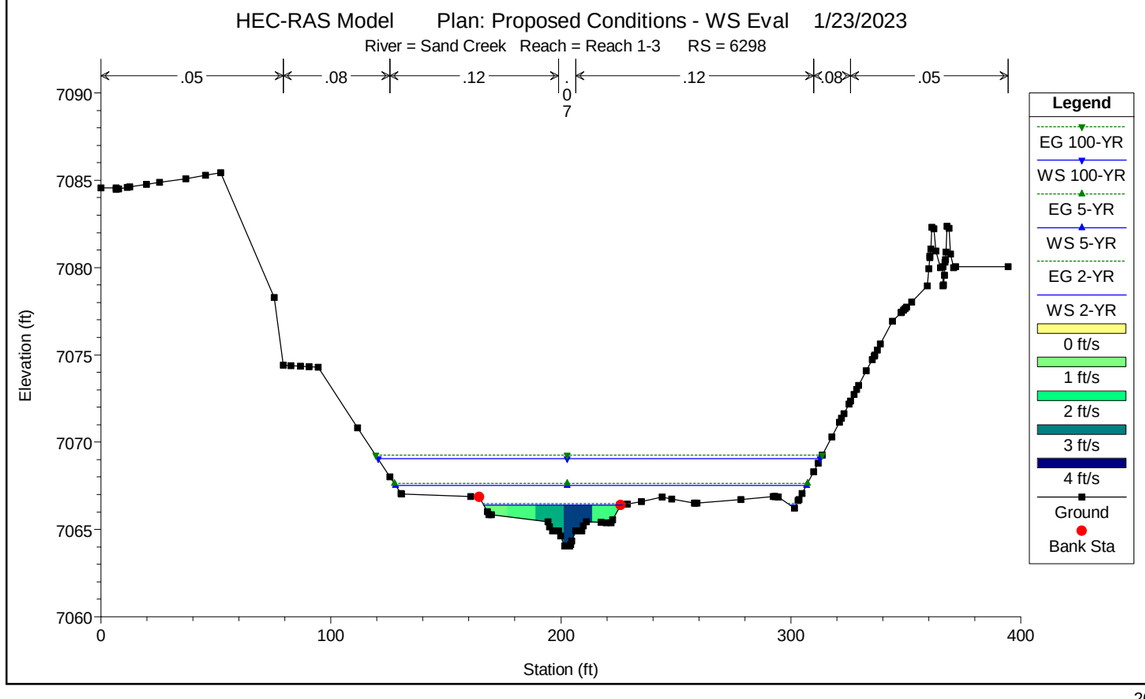

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6673
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta

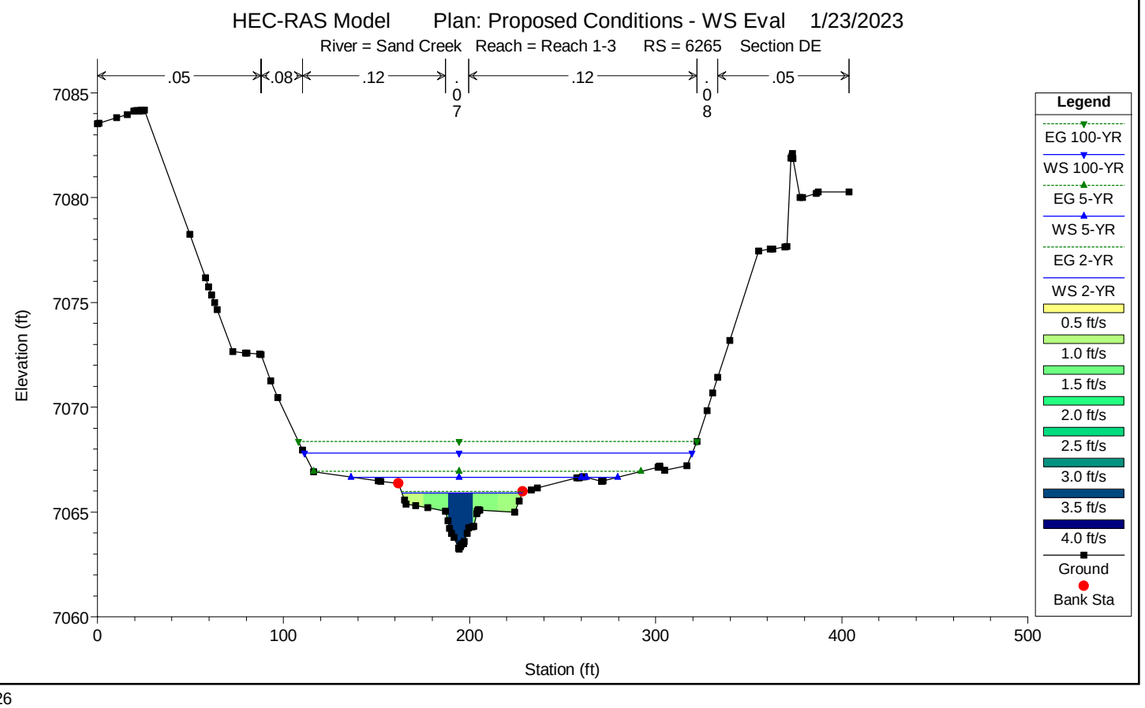

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6588
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6504
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6417
.05
.12
.12
.05
.08
.07
.08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

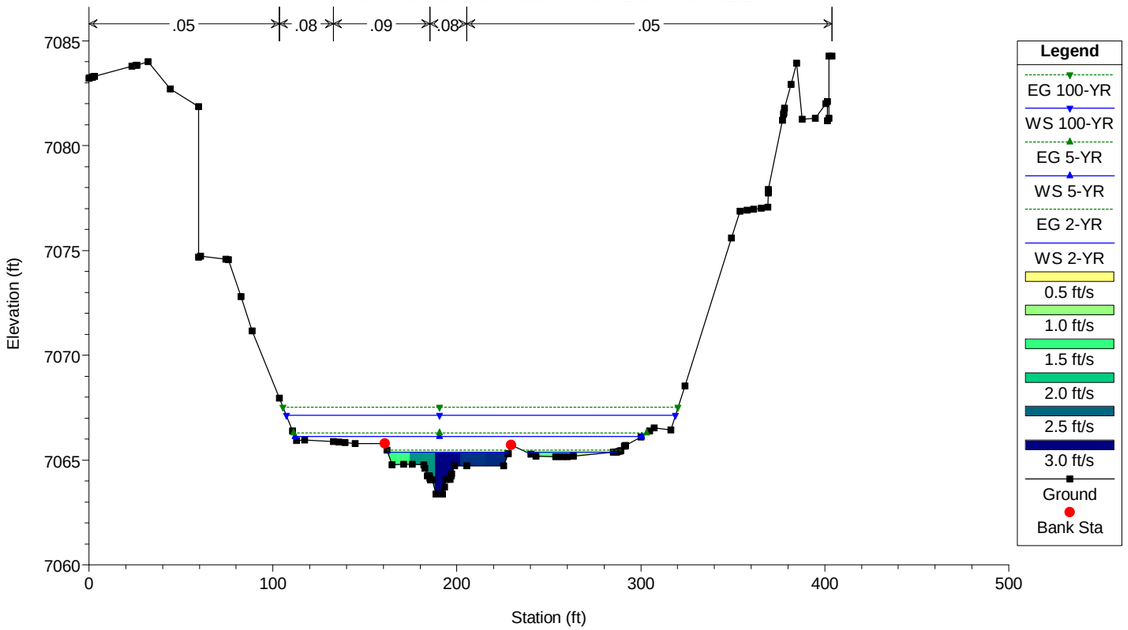

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6369
.05
.08
.12
.12
.08
.05
.07
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6298
.05
.08
.12
.12
.08
.05
.07
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6265 Section DE
.05
.08
.12
.12
.05
.07
.08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

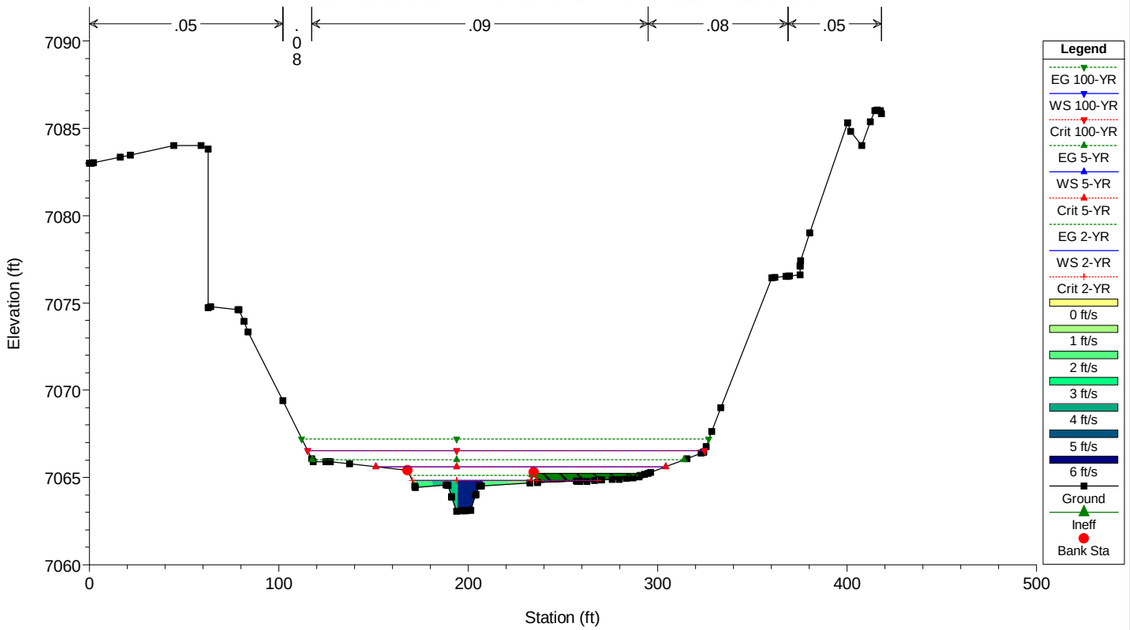
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 6232



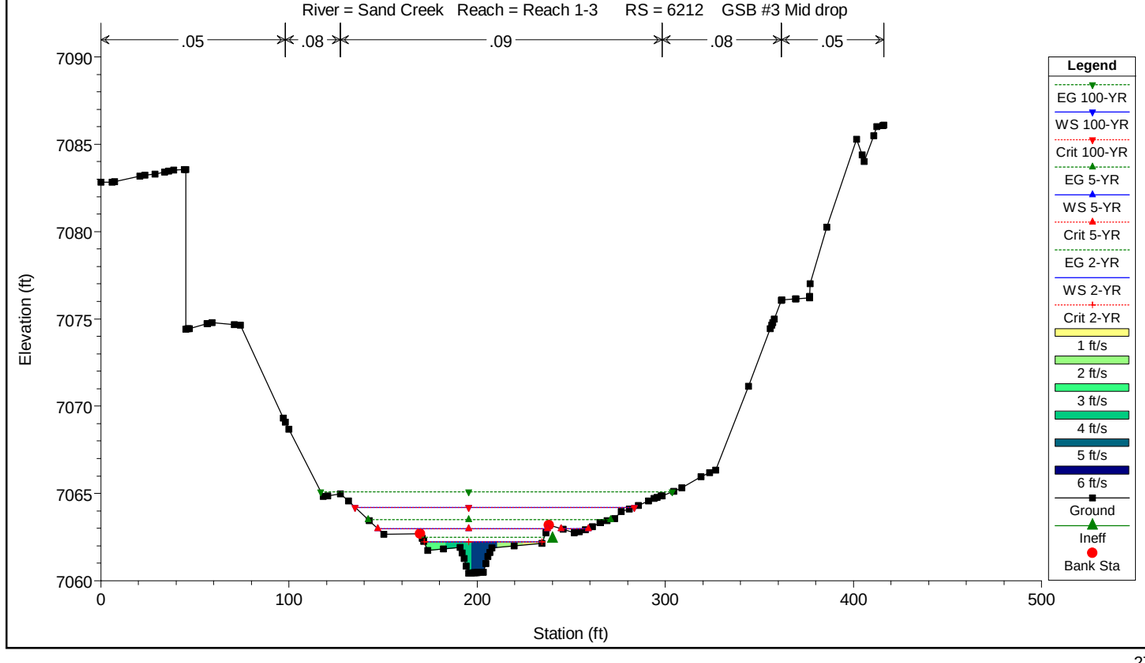

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 6223 GSB #3 Crest



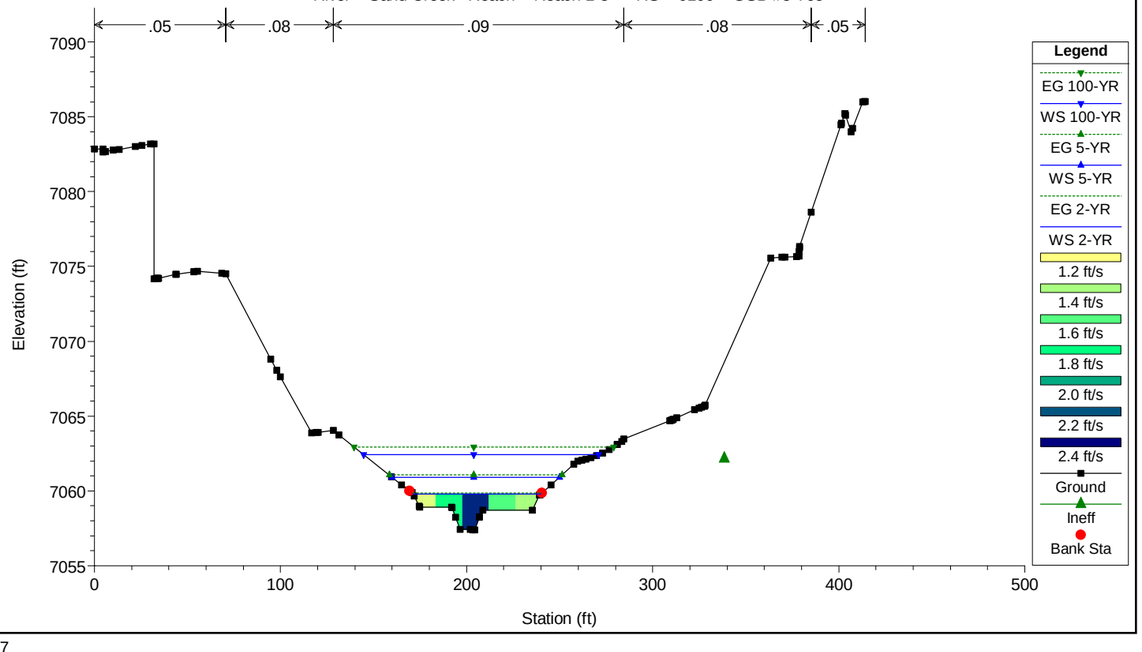

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

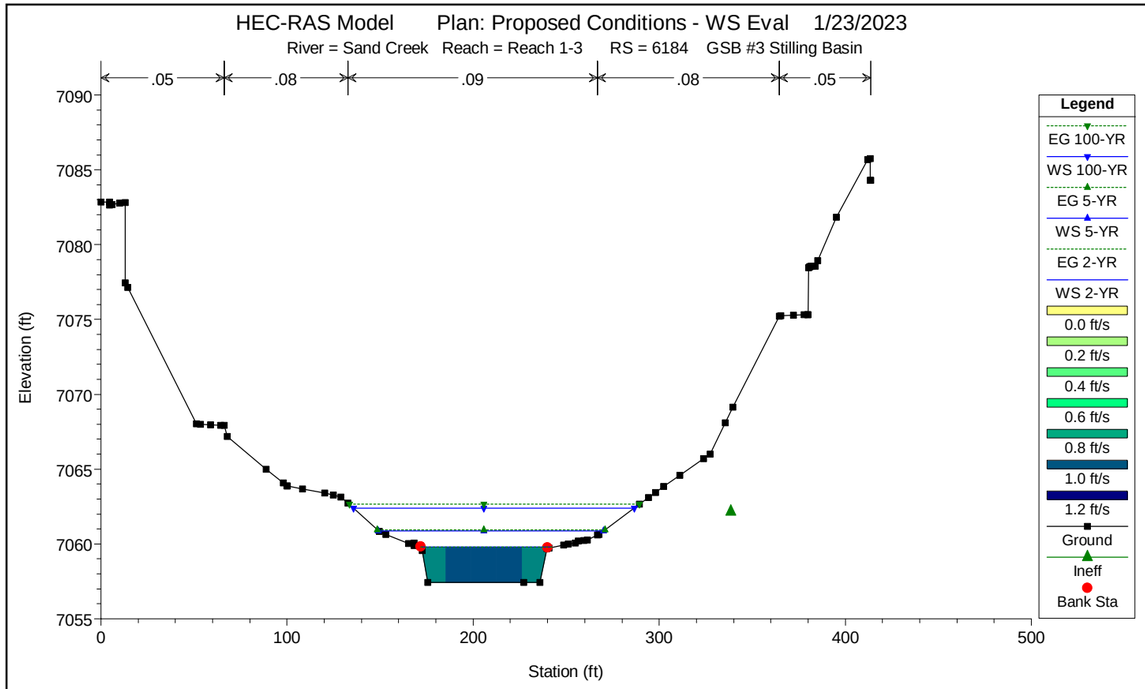
River = Sand Creek Reach = Reach 1-3 RS = 6212 GSB #3 Mid drop

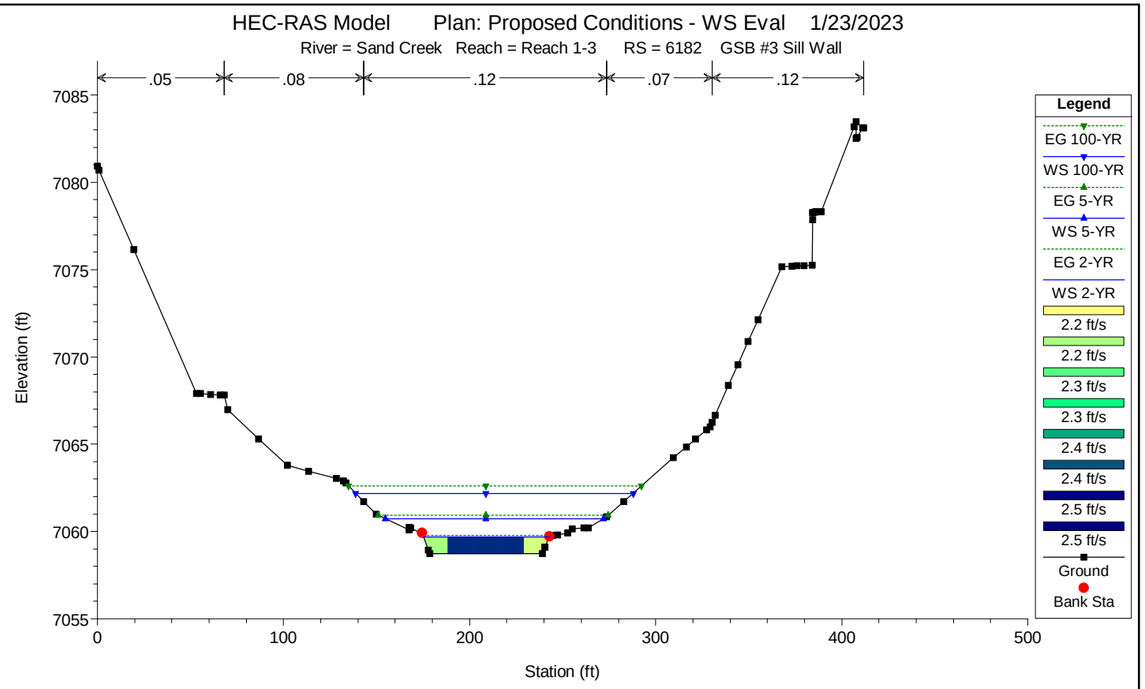


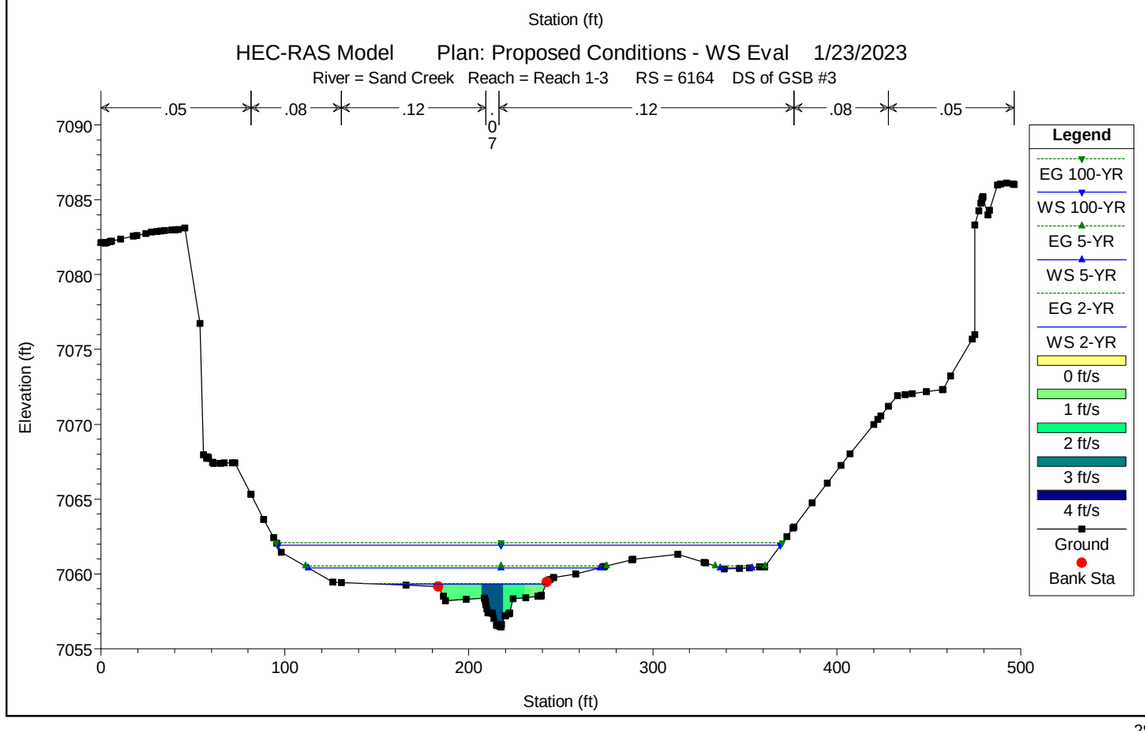

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

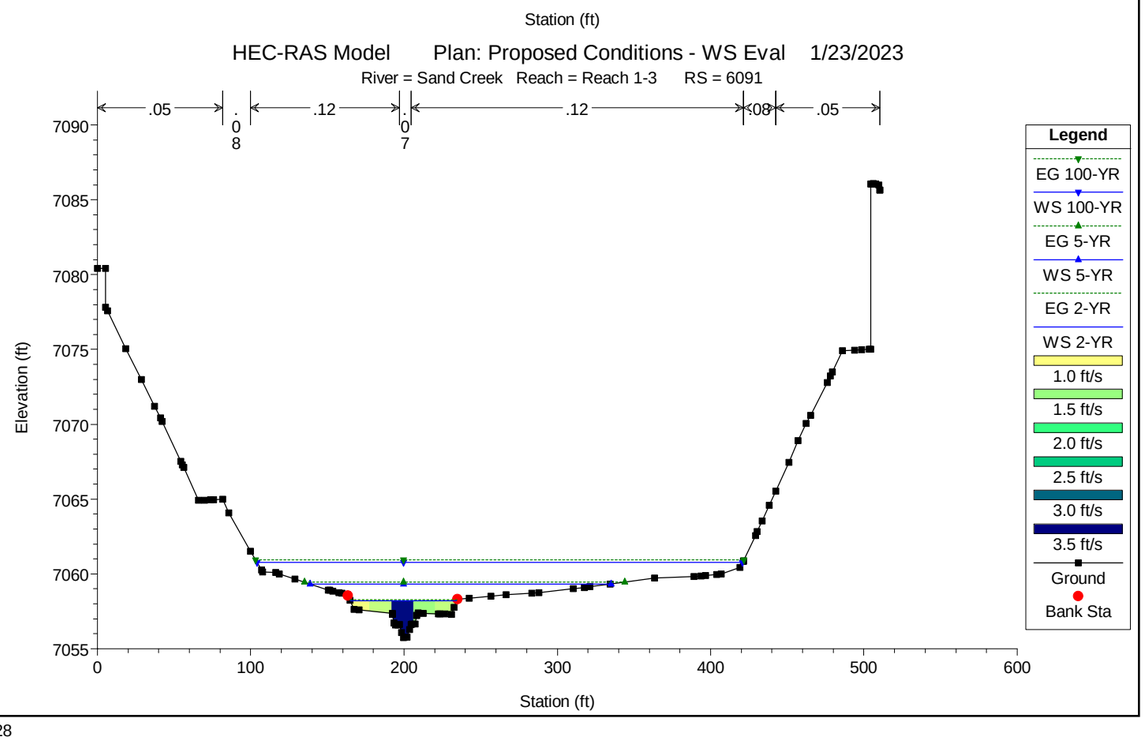
River = Sand Creek Reach = Reach 1-3 RS = 6199 GSB #3 Toe

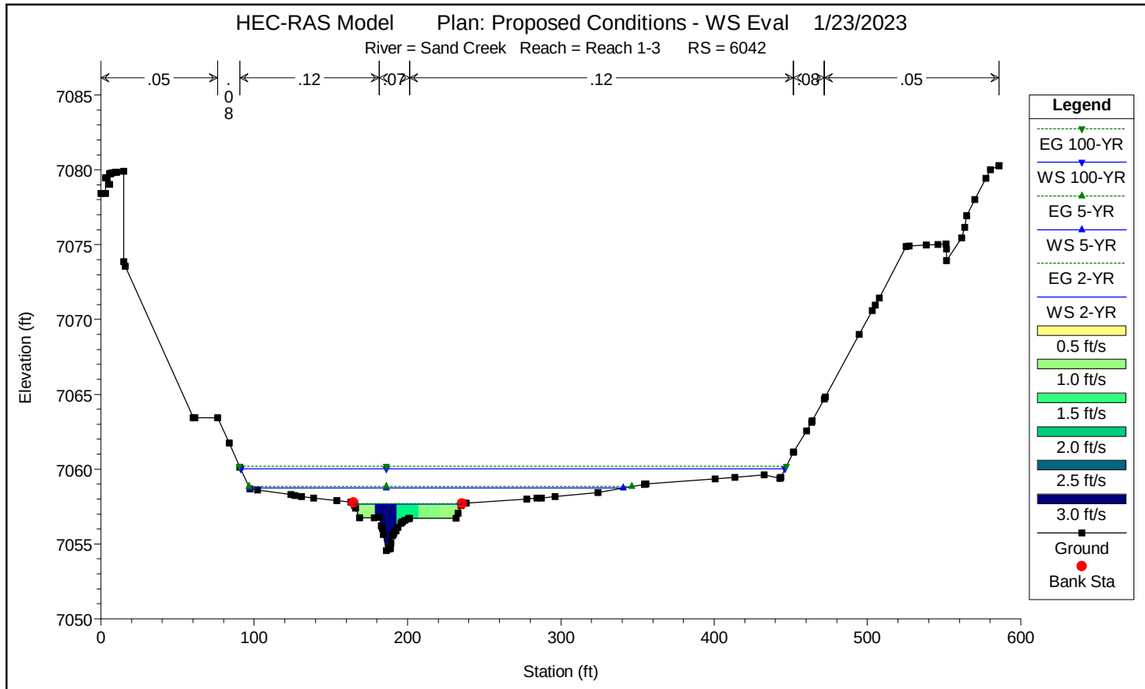


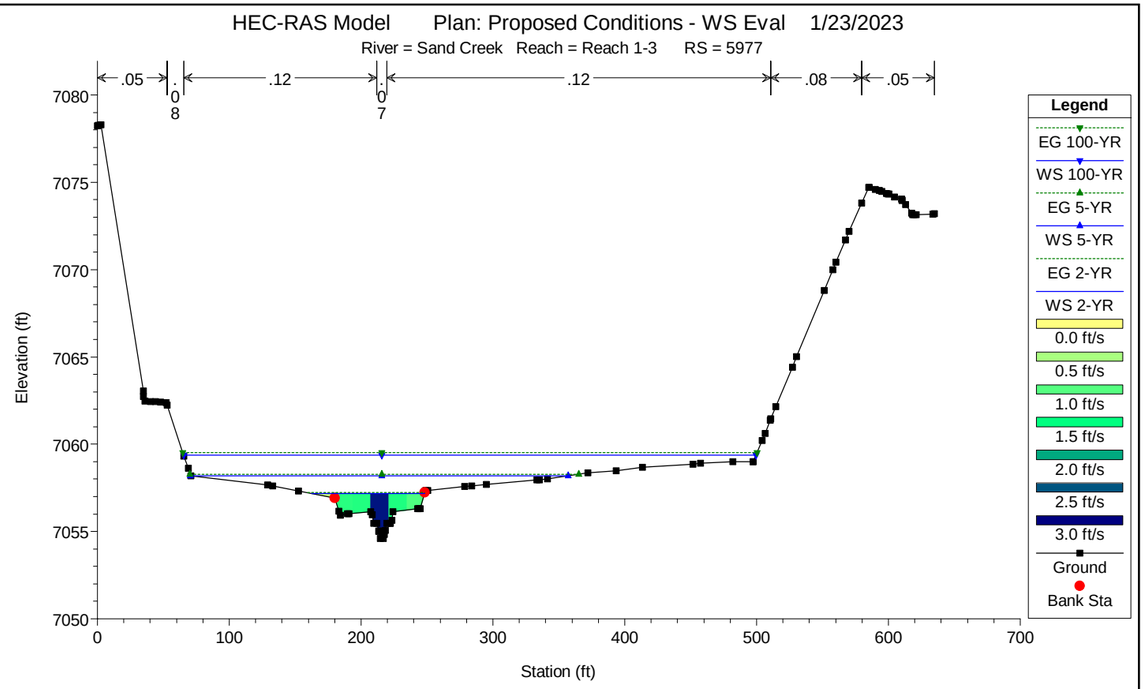

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6184 GSB #3 Stilling Basin
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Ineff
Bank Sta

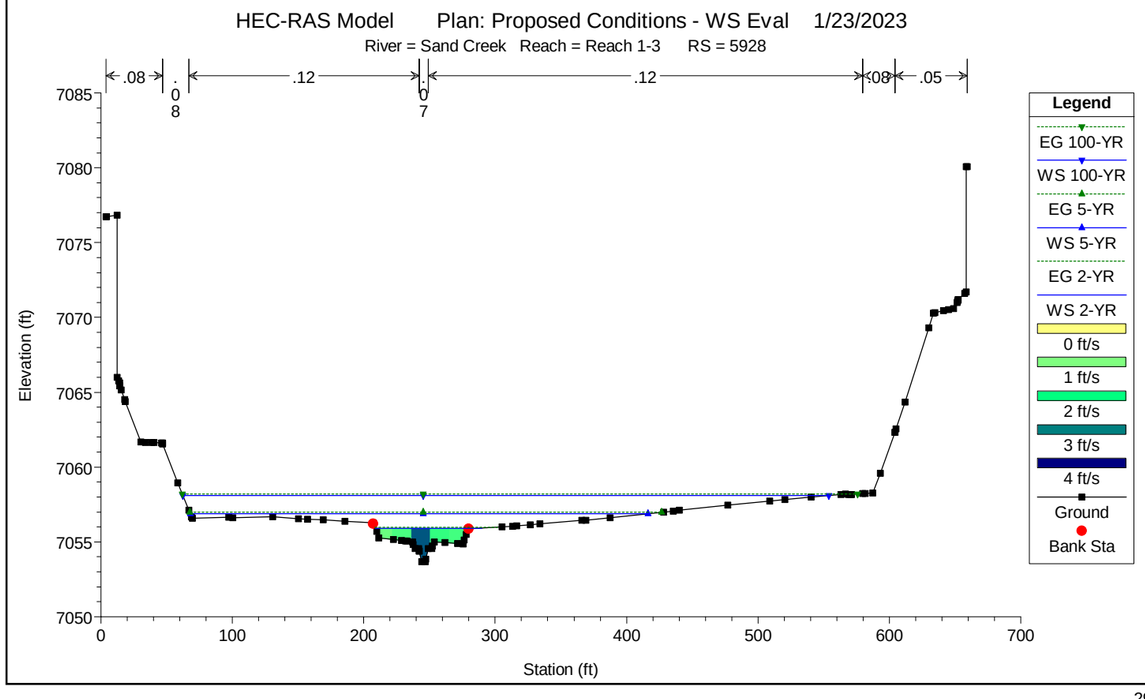

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6182 GSB #3 Sill Wall
.05
.08
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
2.2 ft/s
2.2 ft/s
2.3 ft/s
2.3 ft/s
2.4 ft/s
2.4 ft/s
2.5 ft/s
2.5 ft/s
Ground
Bank Sta

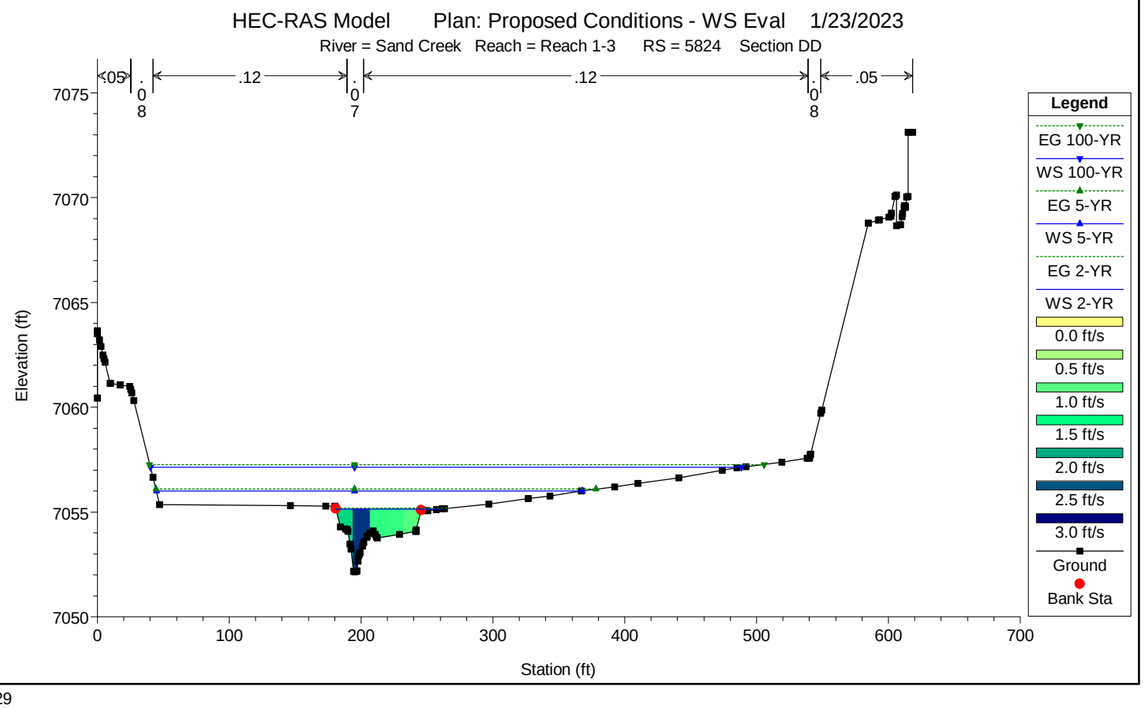

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6164 DS of GSB #3
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

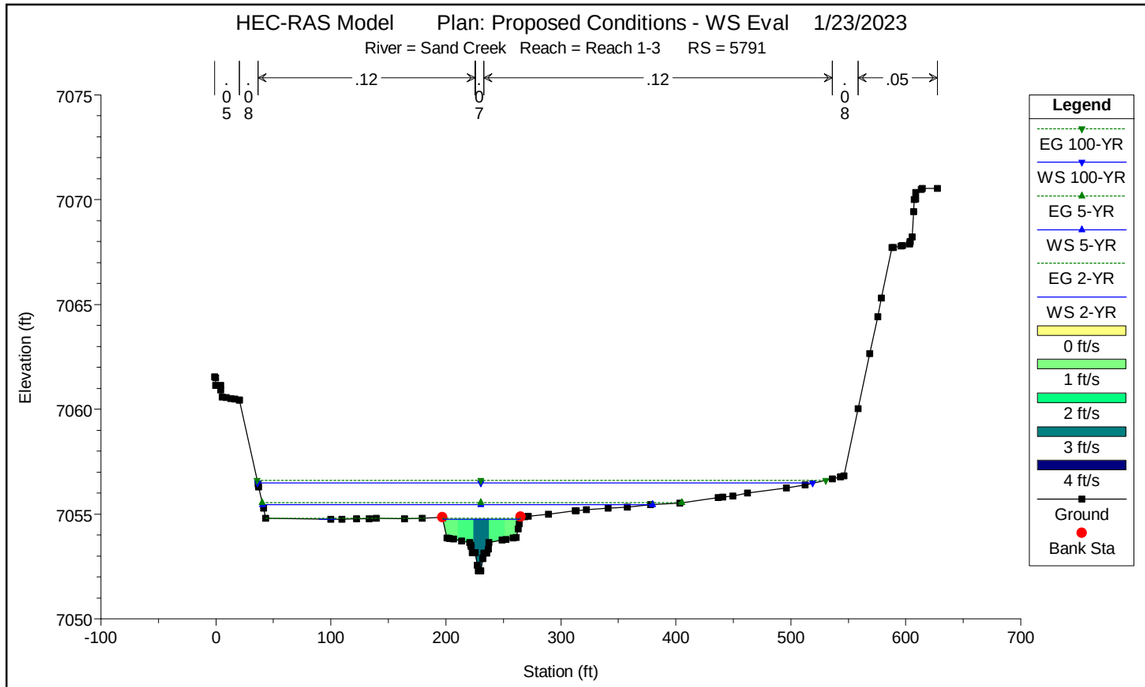

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6091
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

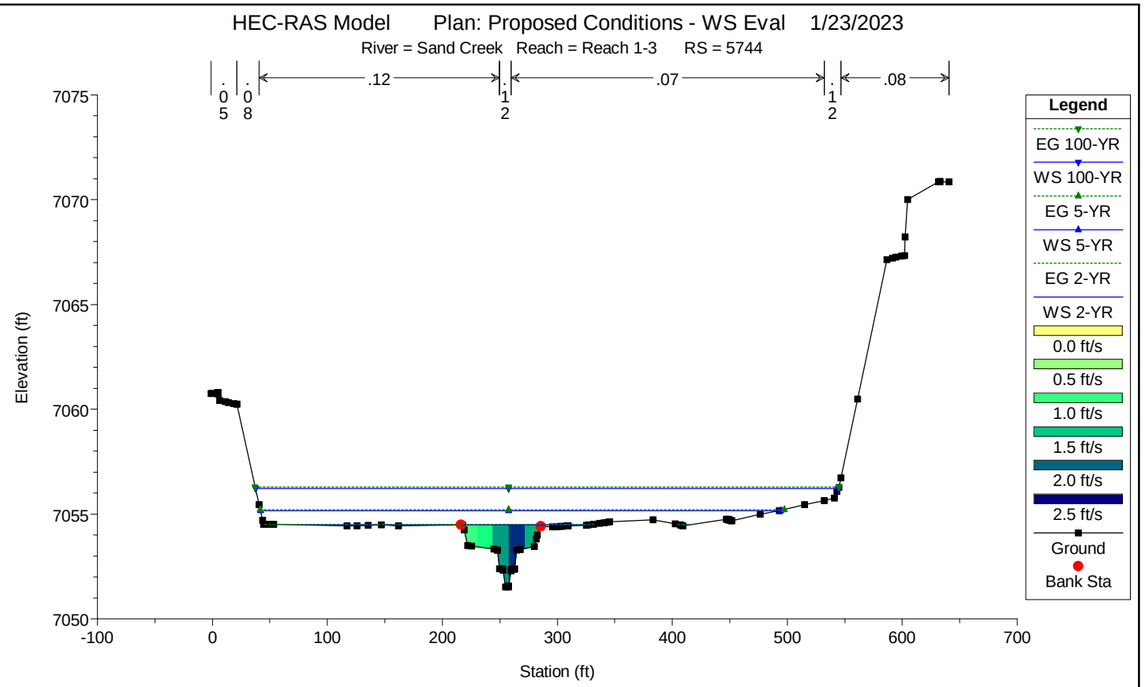

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6042
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

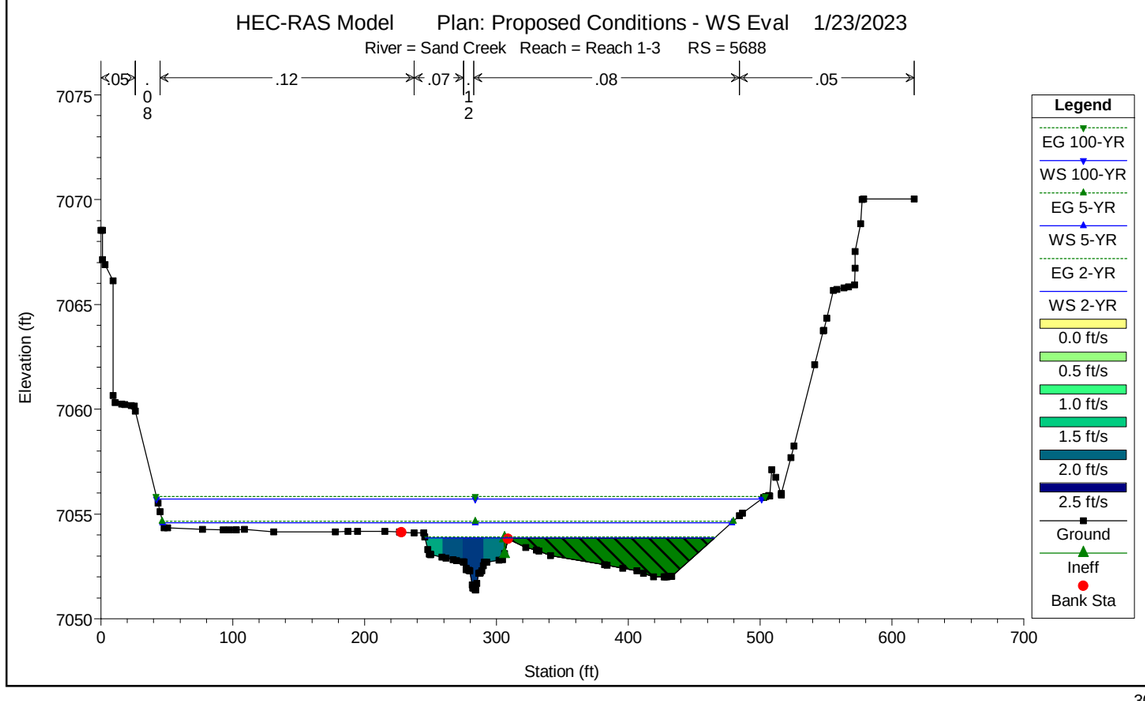

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5977
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

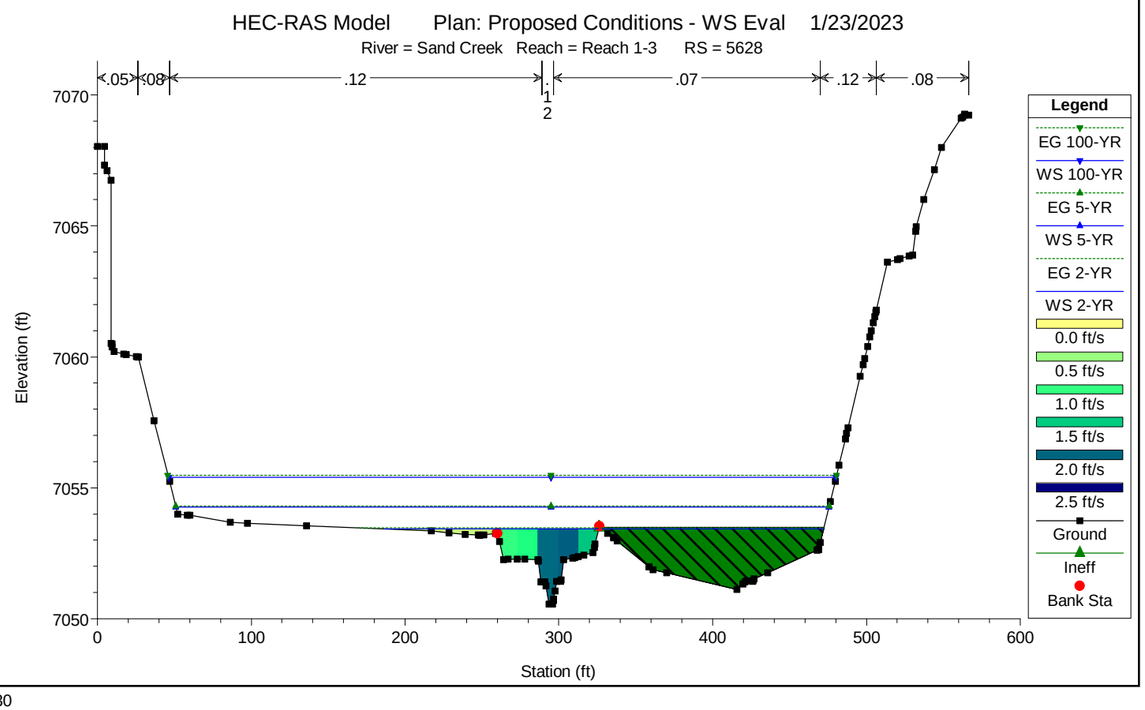

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5928
.08
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5824 Section DD
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5791
.05
.08
.12
.07
.12
.08
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

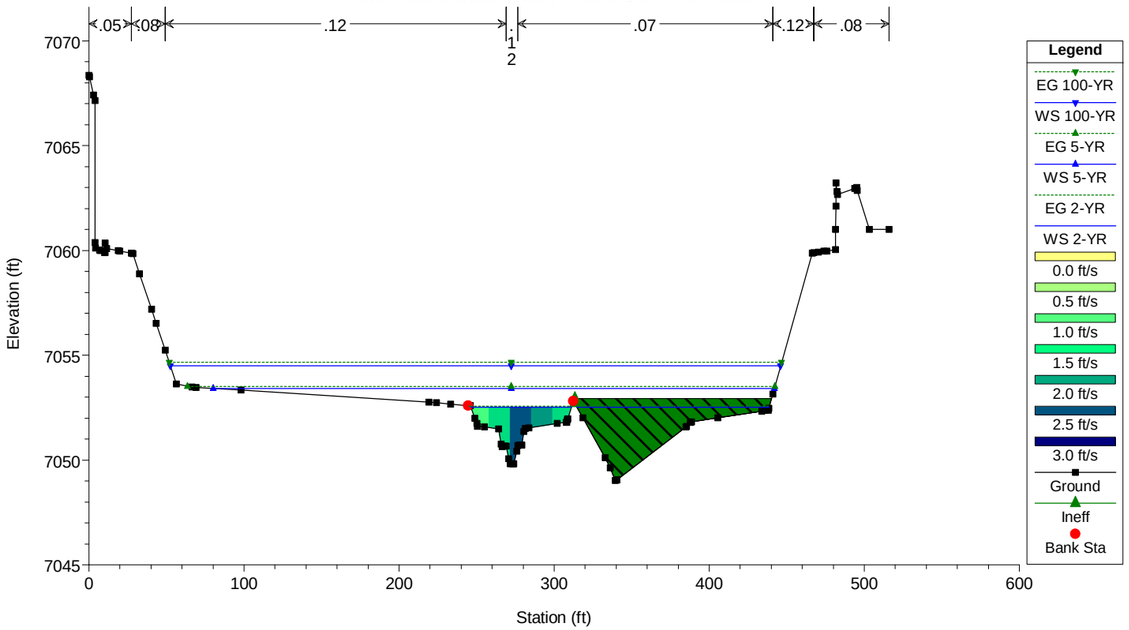

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5744
.05
.08
.12
.07
.08
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5688
.05
.08
.12
.07
.08
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5628
.05
.08
.12
.07
.12
.08
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

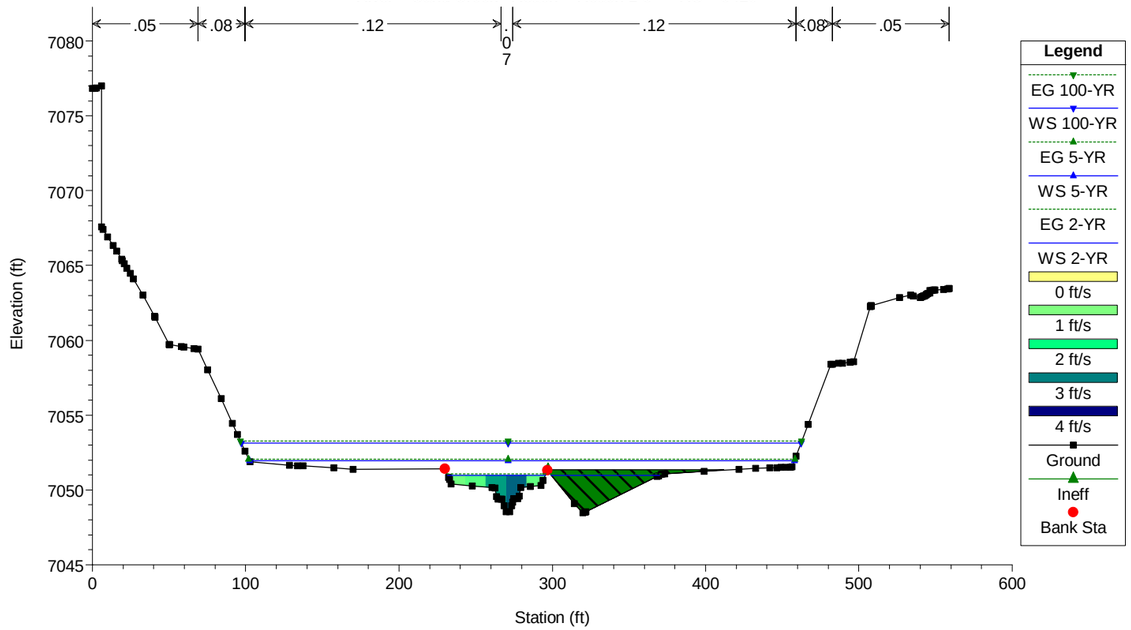
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 5568



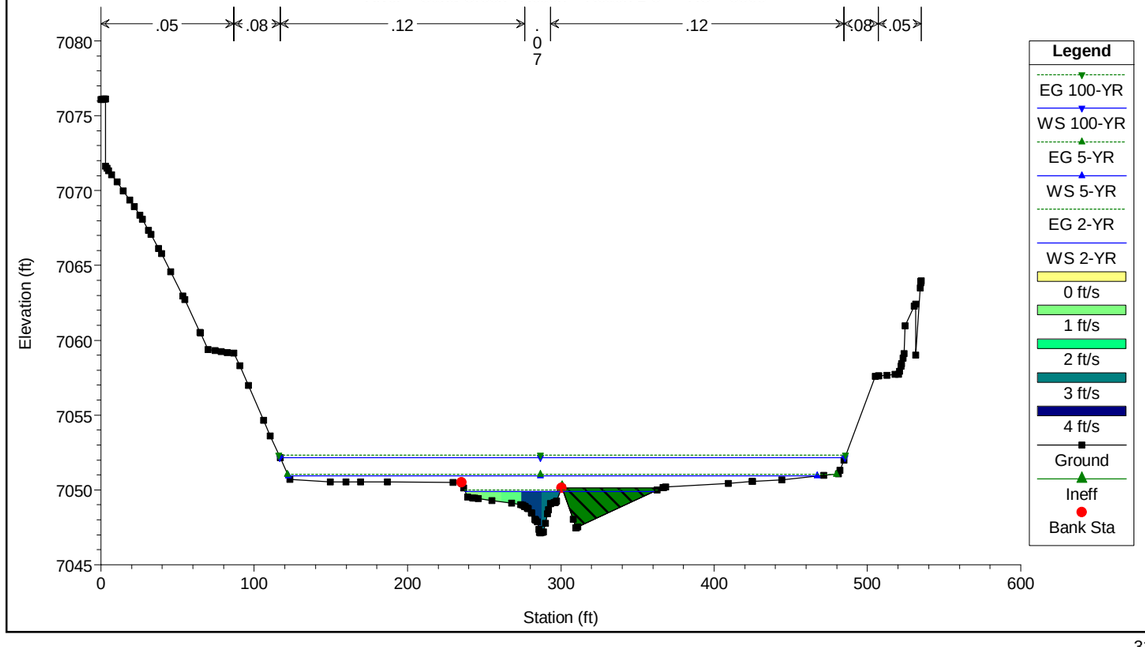

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 5429



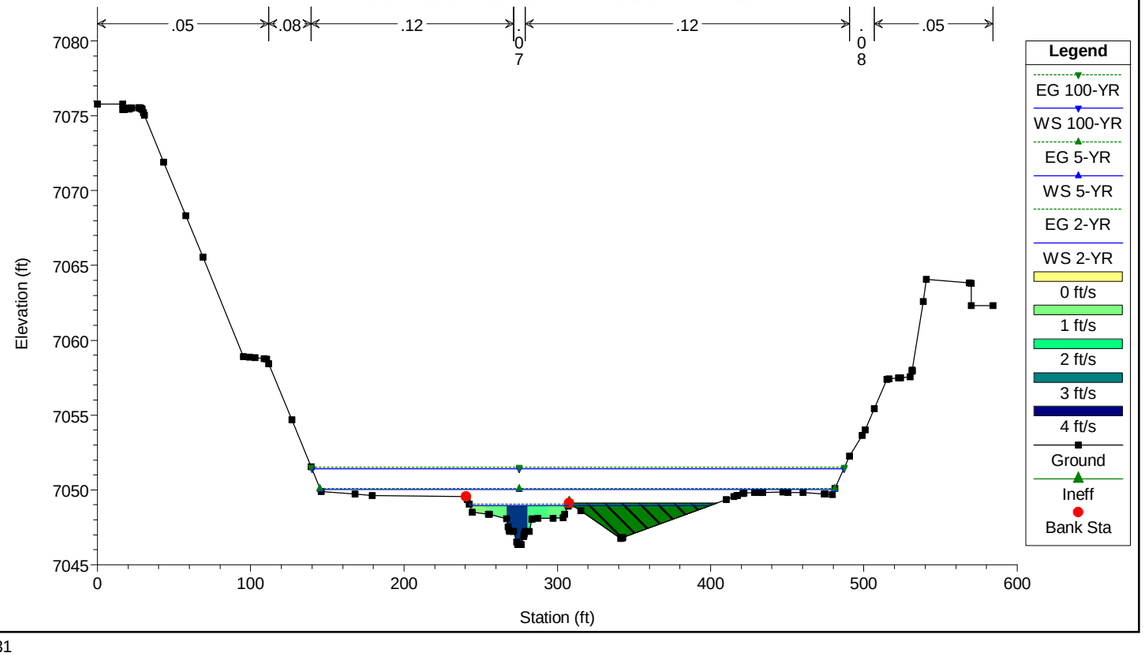

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

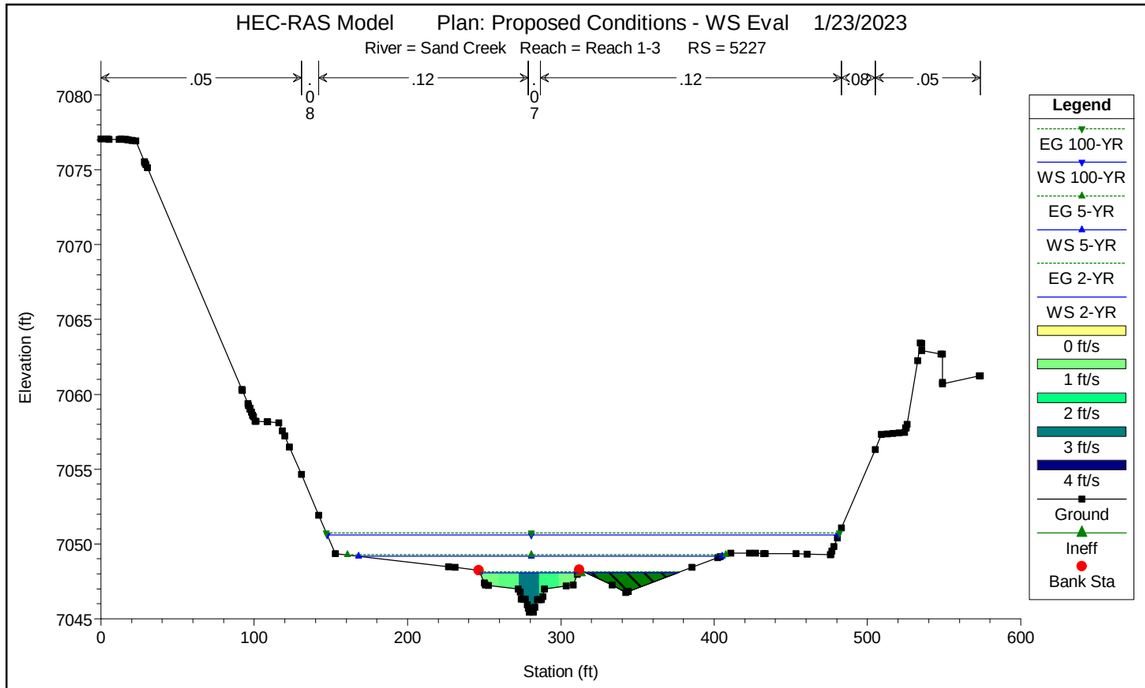
River = Sand Creek Reach = Reach 1-3 RS = 5365

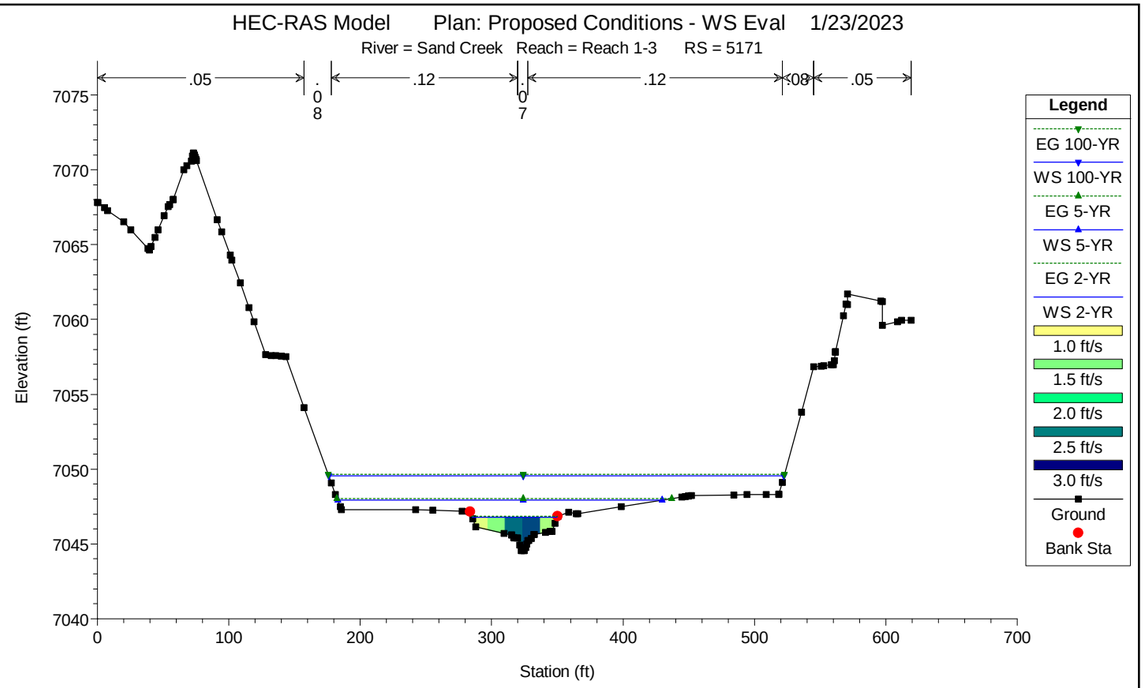


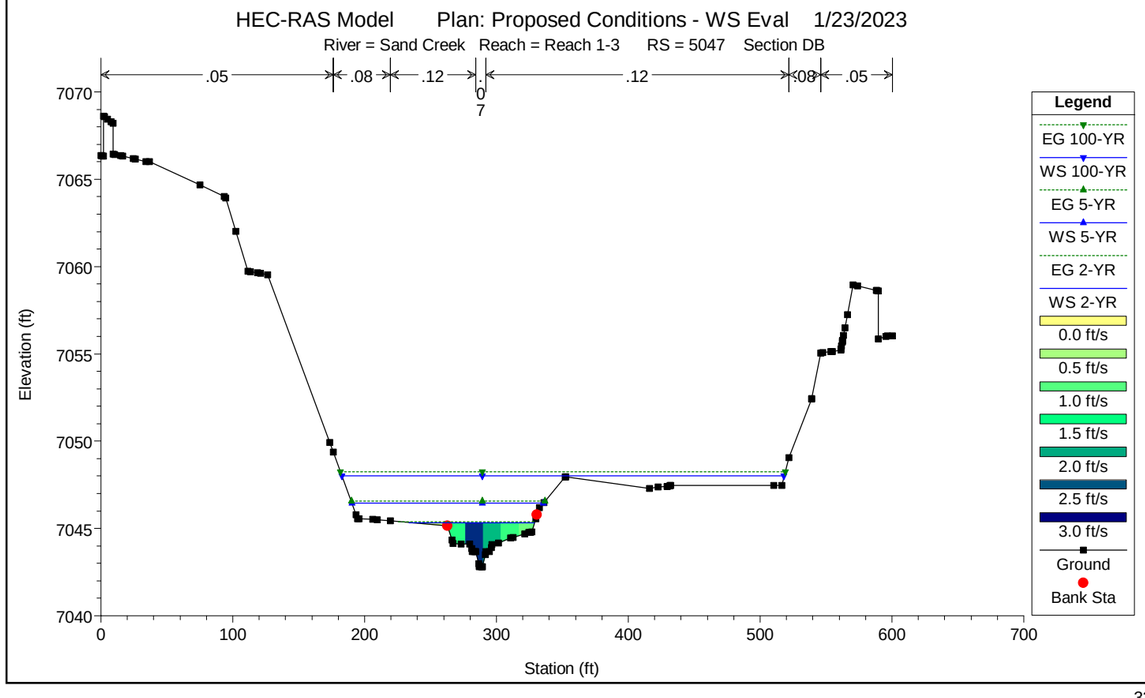

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

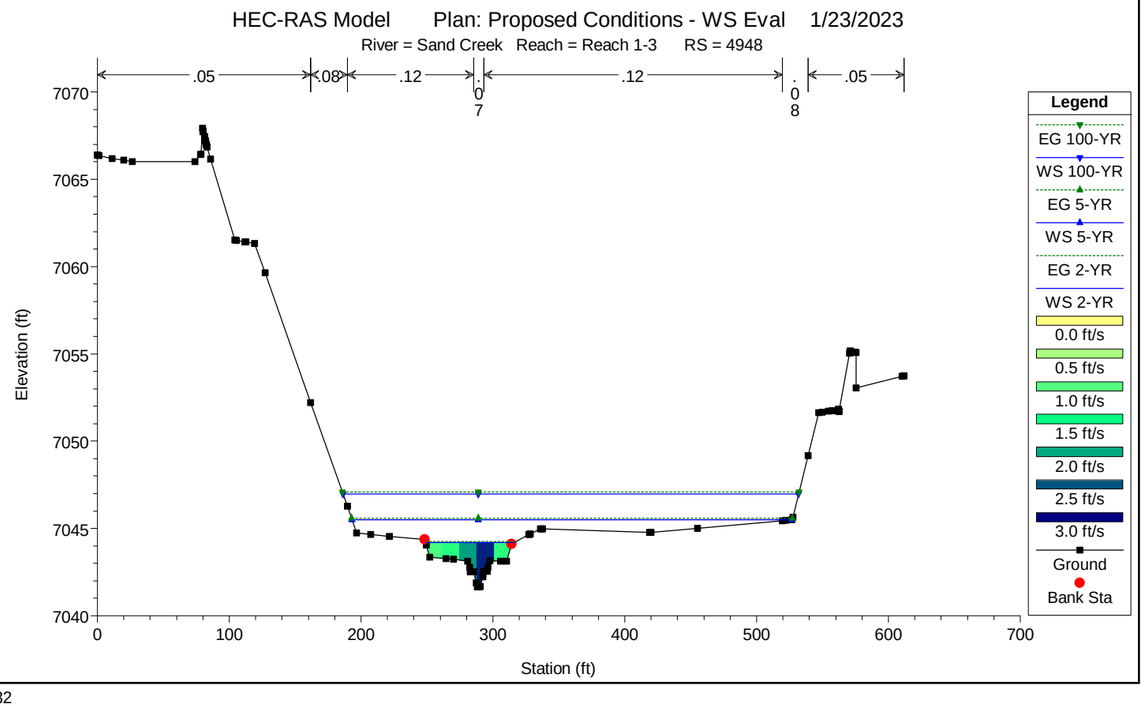
River = Sand Creek Reach = Reach 1-3 RS = 5289

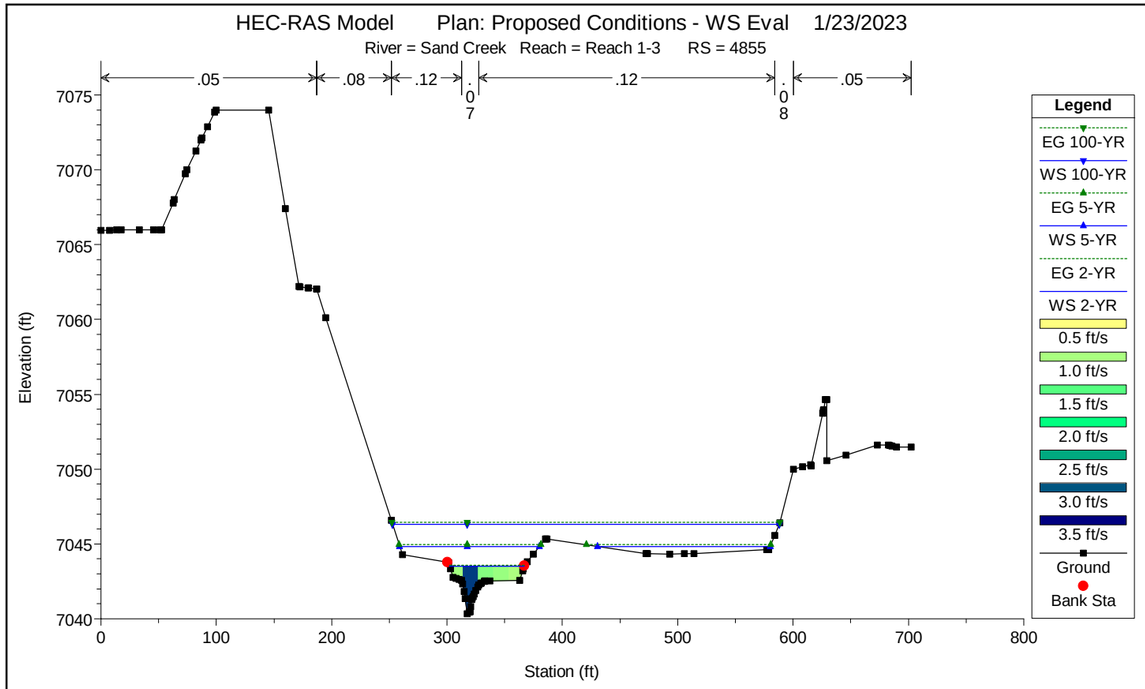


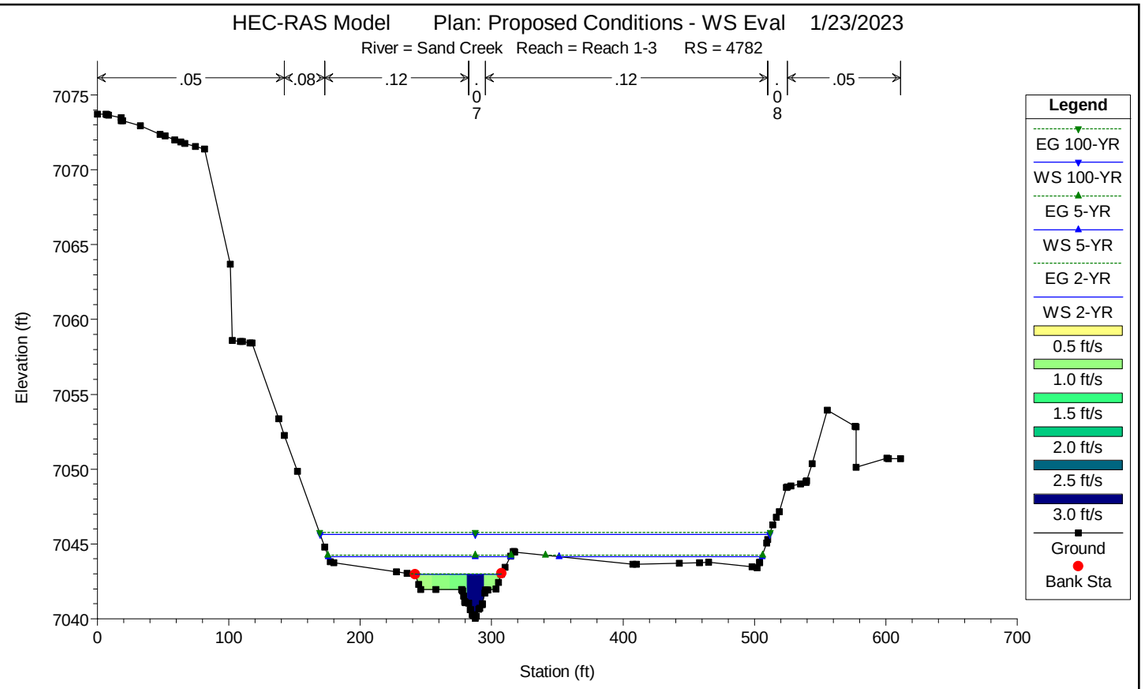

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5227
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

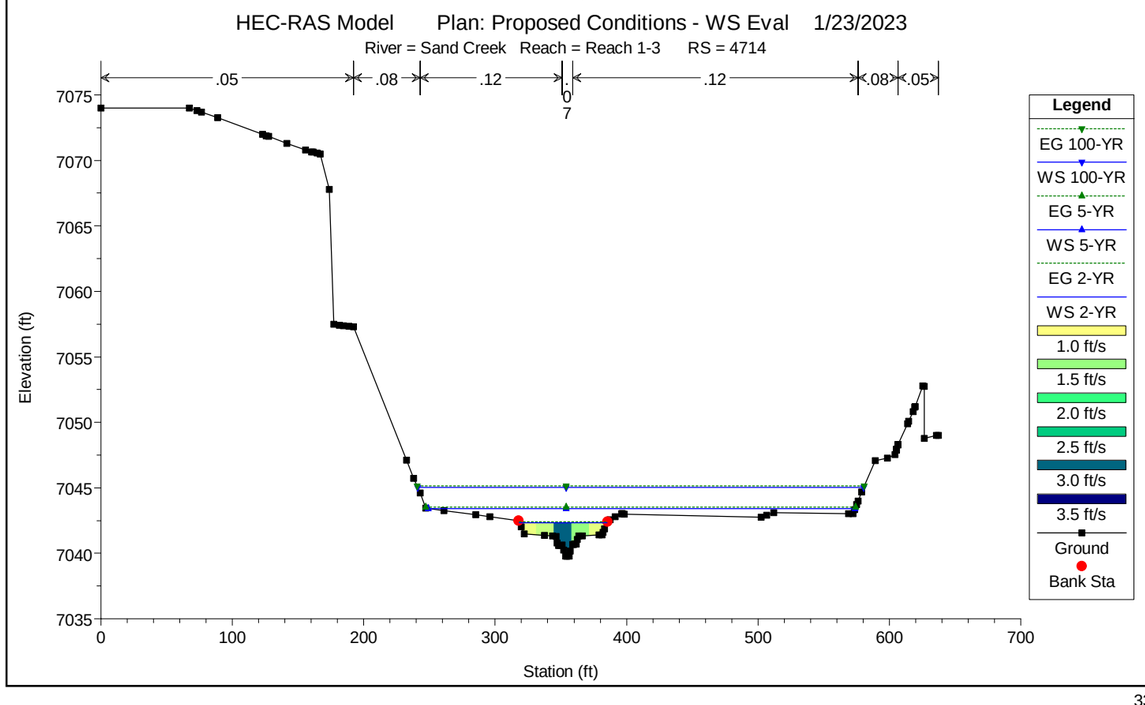

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5171
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

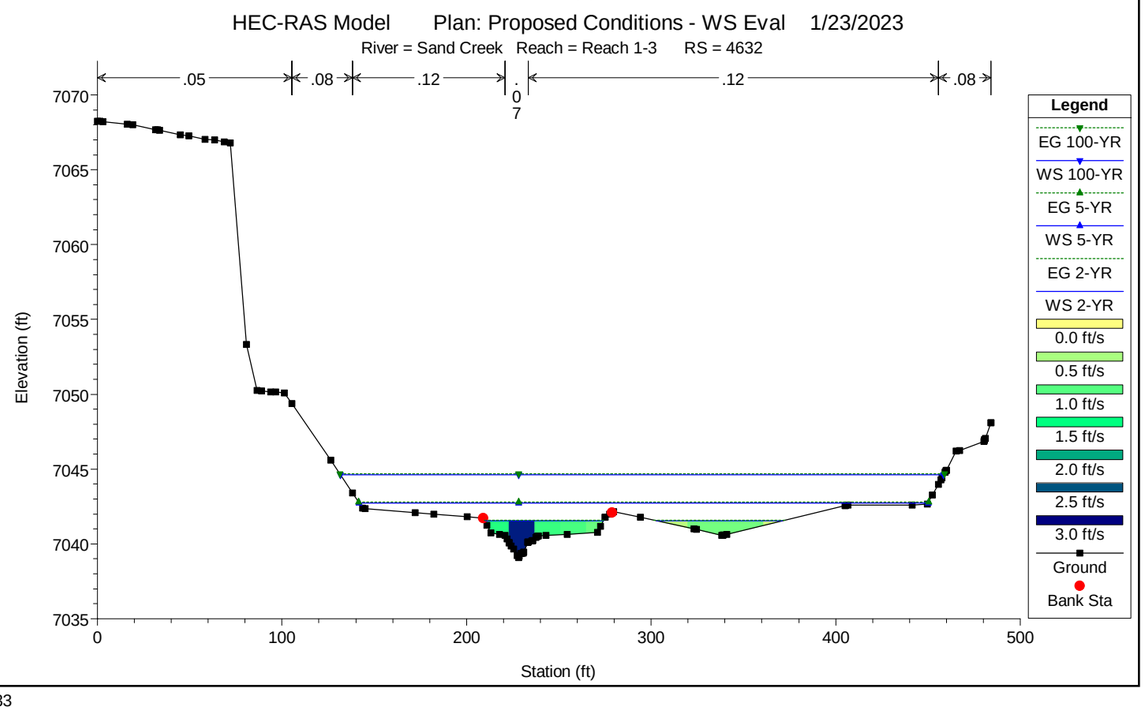

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5047 Section DB
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

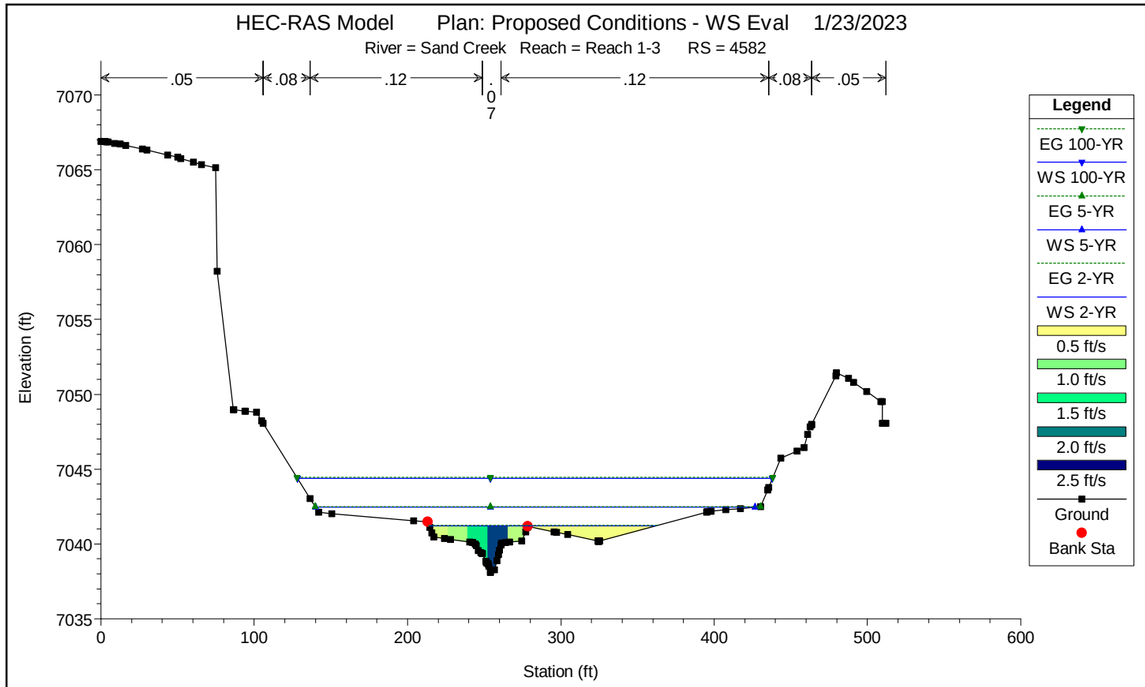

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4948
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

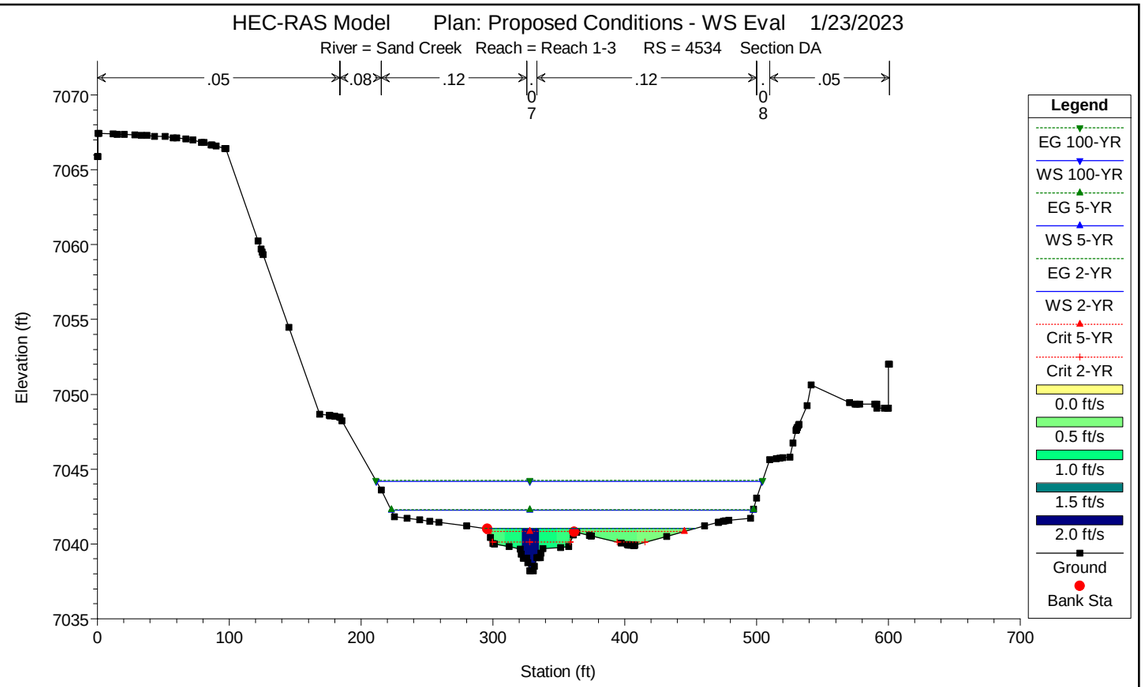

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4855
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

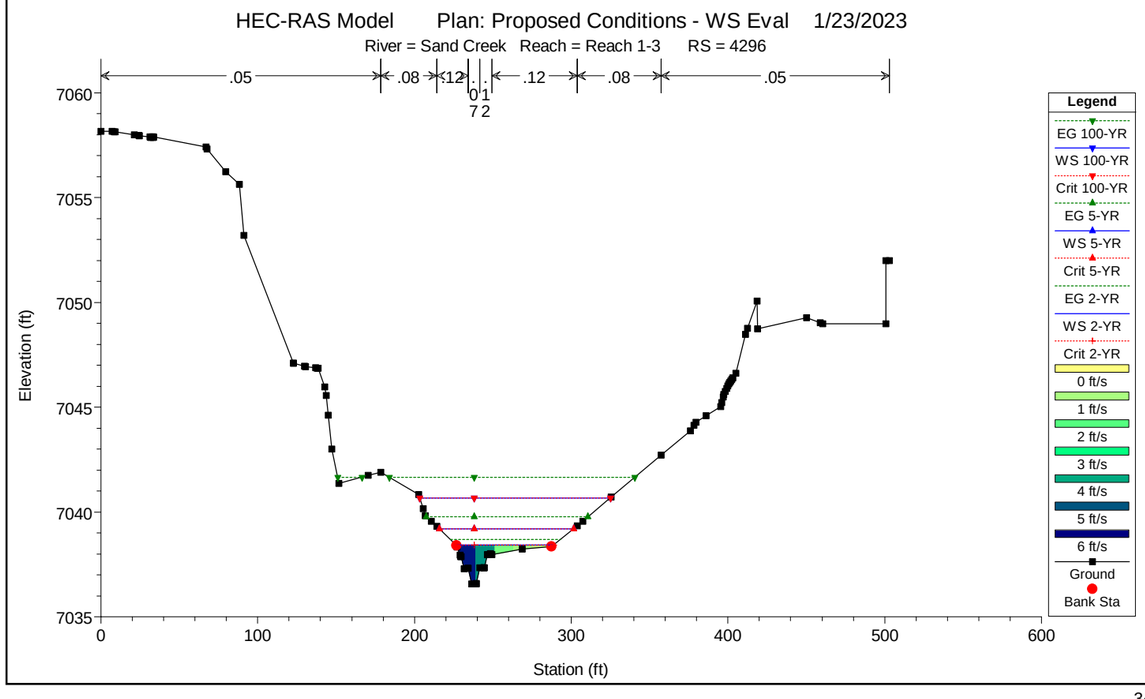

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4782
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

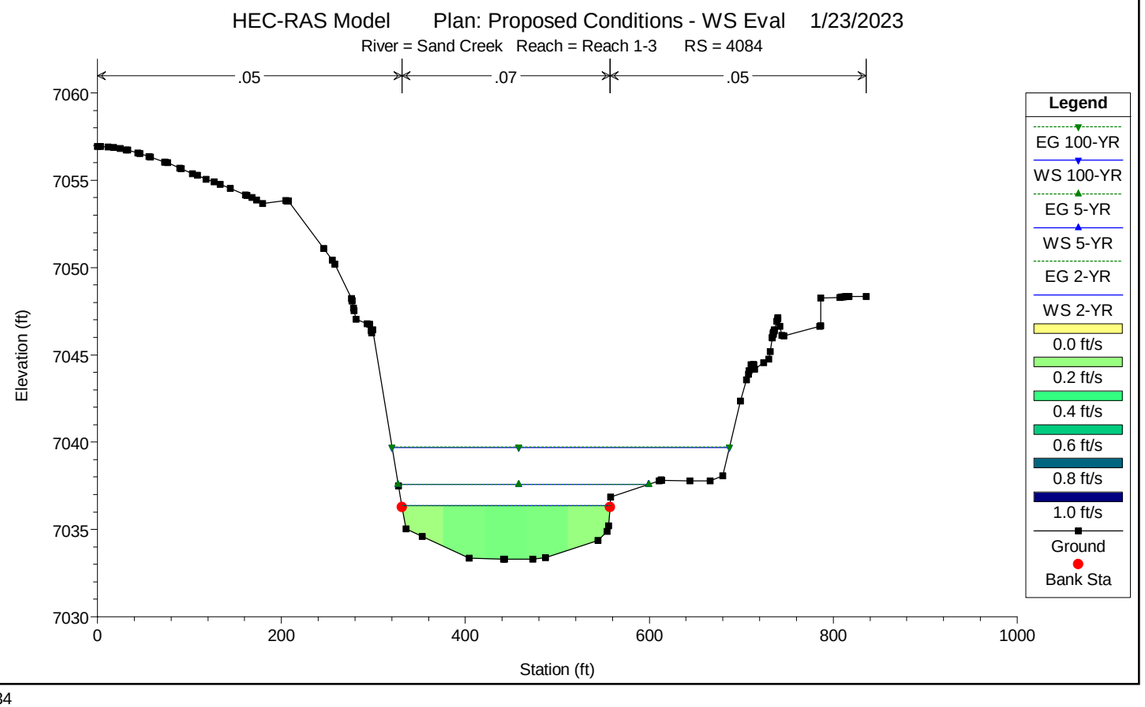

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4714
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

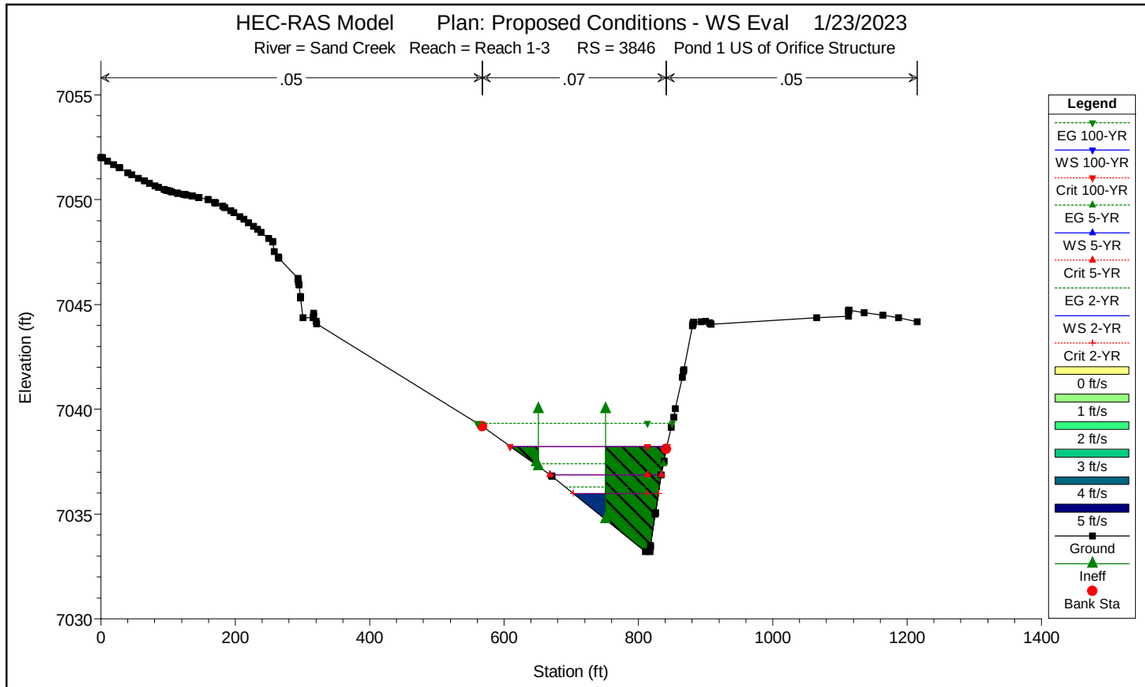

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4632
.05 .08 .12 .07 .12 .08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

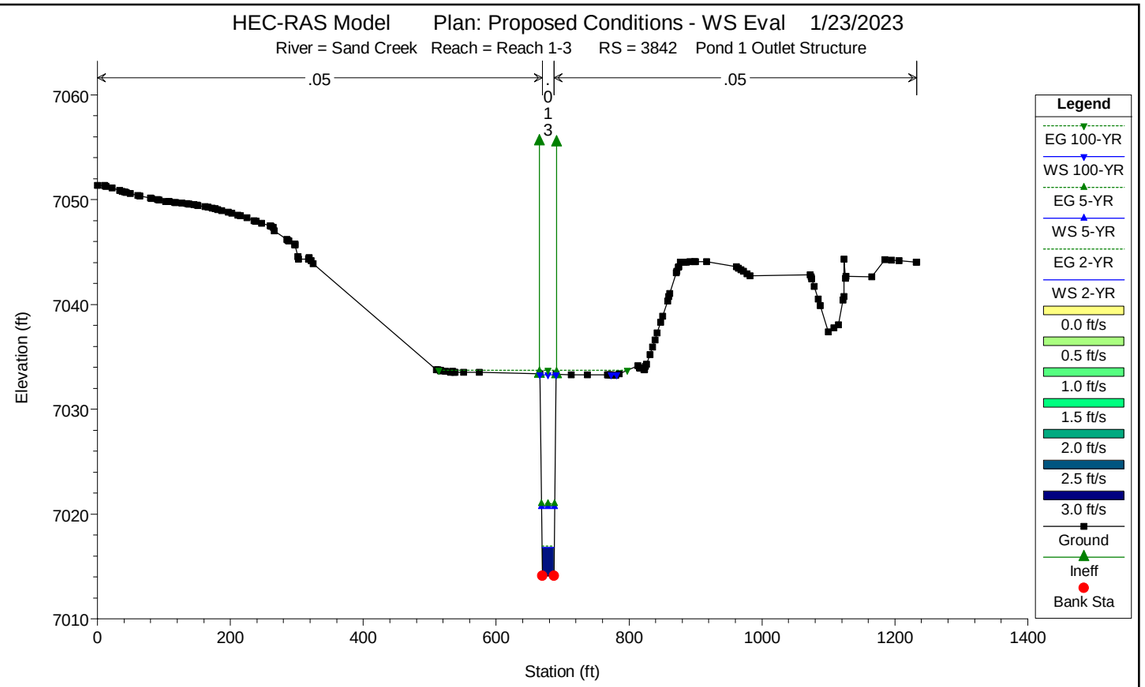

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4582
.05 .08 .12 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

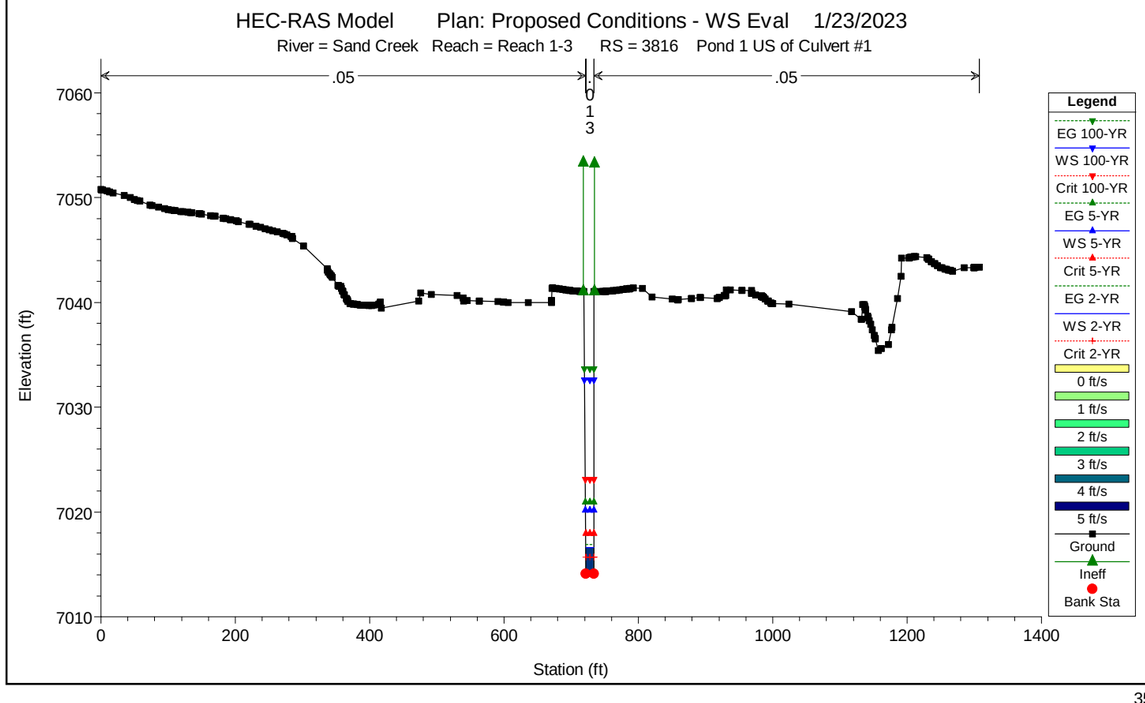

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4534 Section DA
.05 .08 .12 .12 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta

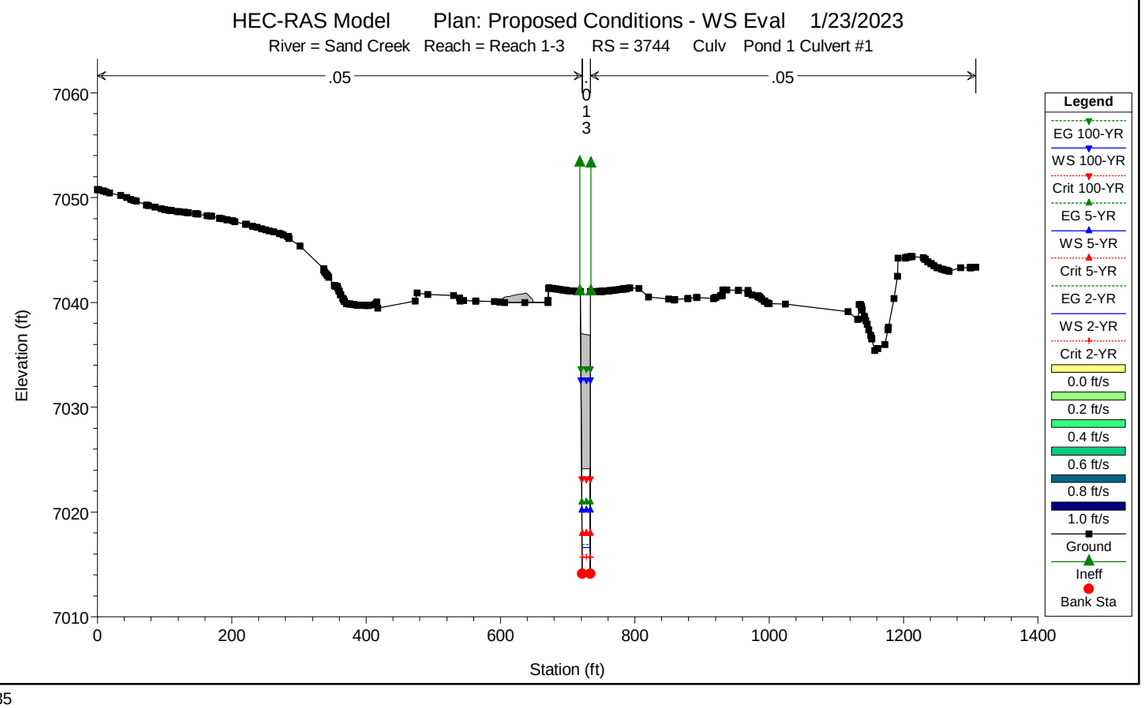

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4296
.05 .08 .12 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4084
.05 .07 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3846 Pond 1 US of Orifice Structure
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

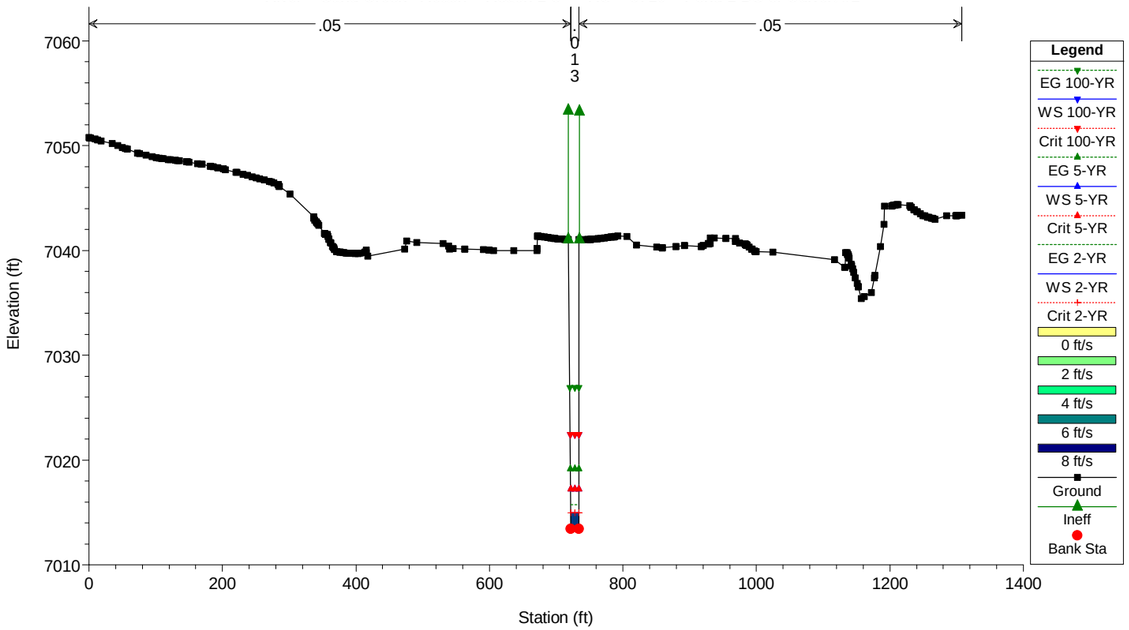

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3842 Pond 1 Outlet Structure
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3816 Pond 1 US of Culvert #1
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3744 Culv Pond 1 Culvert #1
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

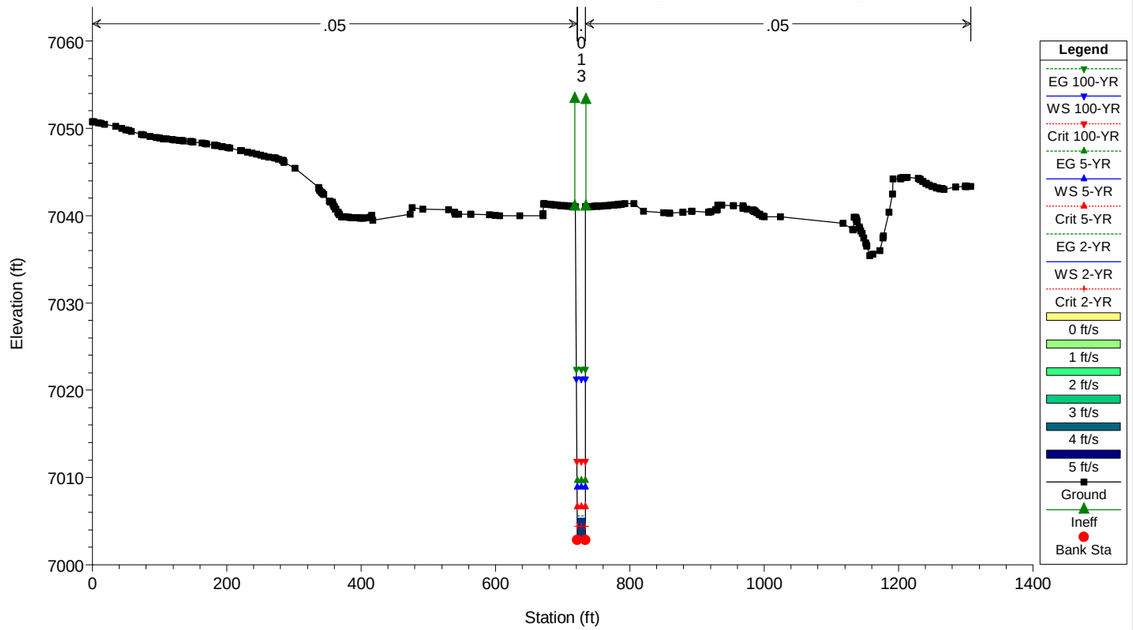
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3719 Pond 1 DS of Culvert #1



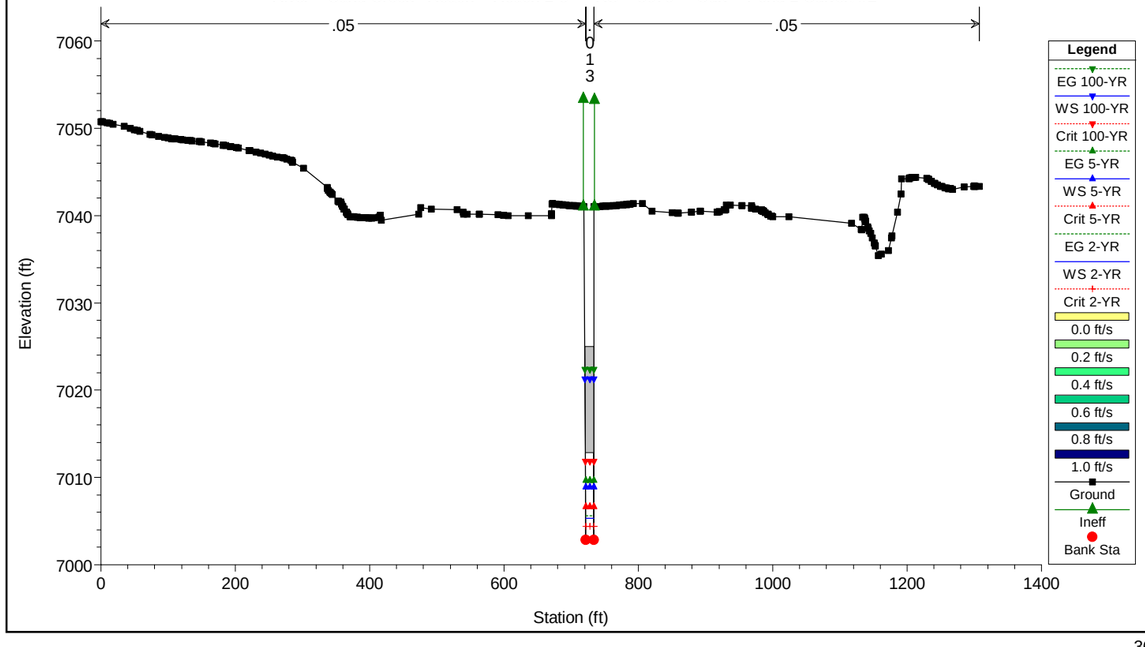

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3711 Pond 1 US of Culvert #2



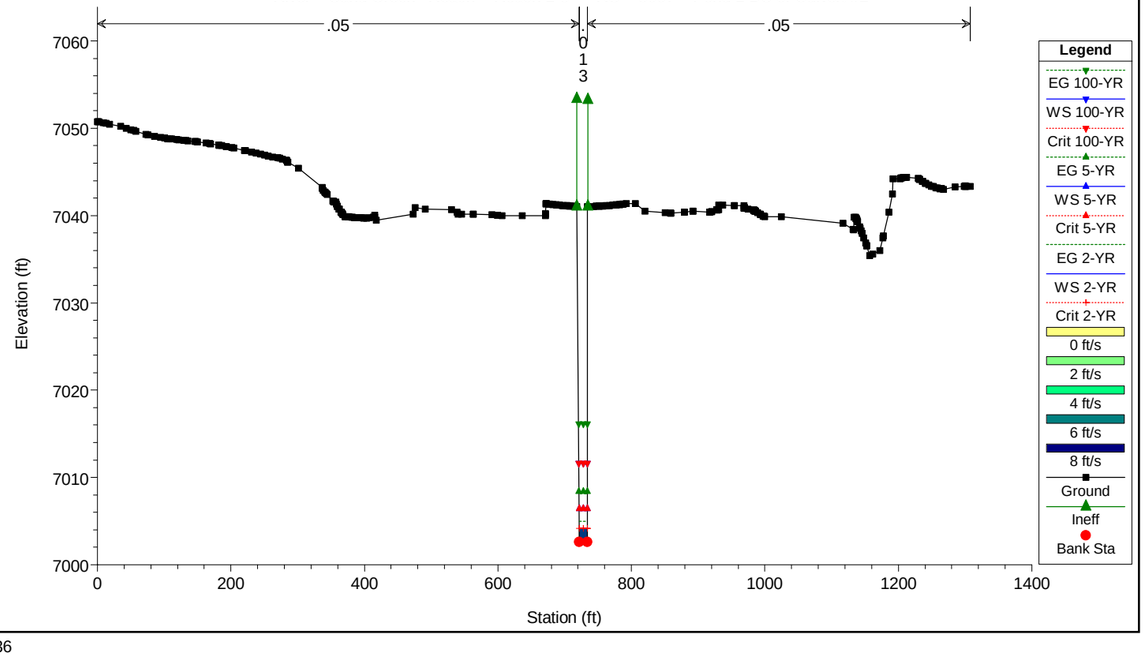

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3676 Culv Pond 1 Culvert #2



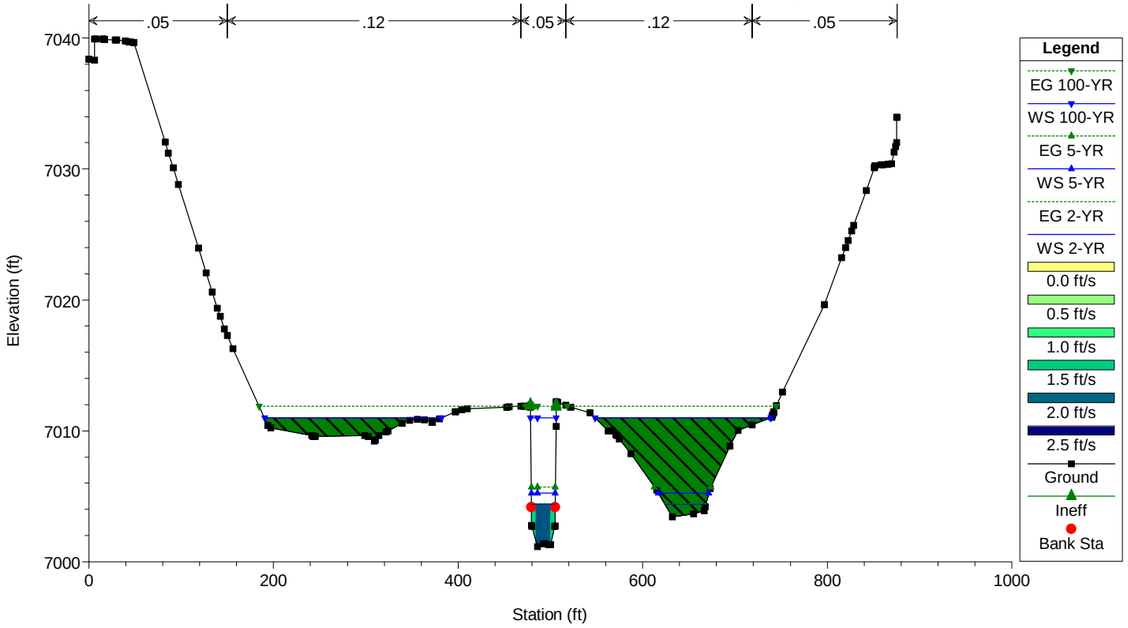

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3667 Pond 1 DS of Culvert #2



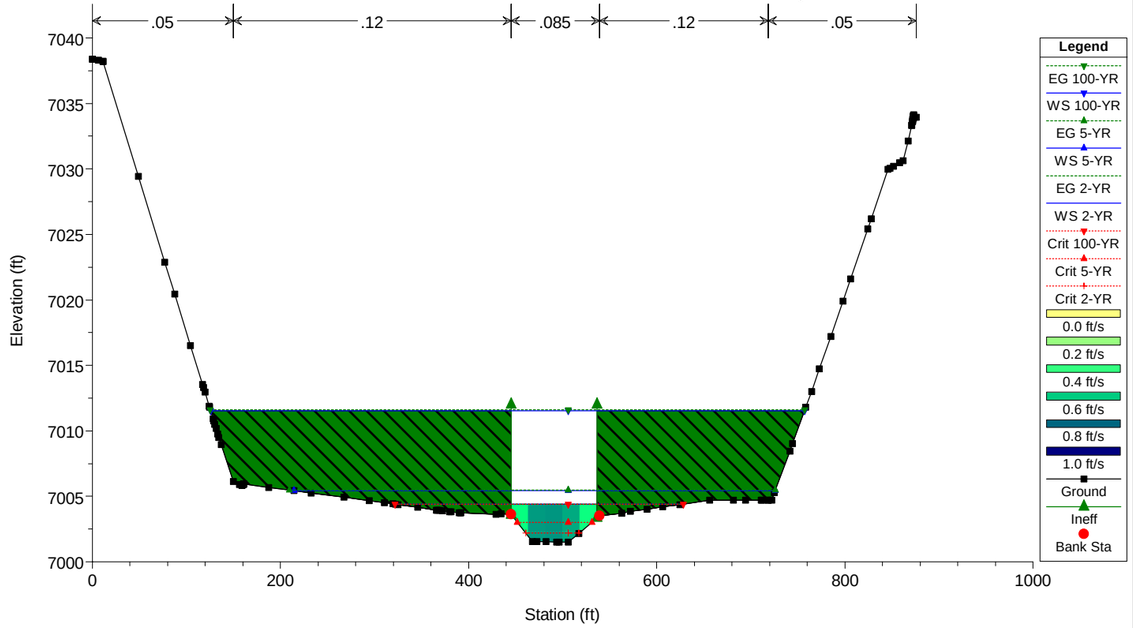
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3662 Pond 1 Stilling Basin



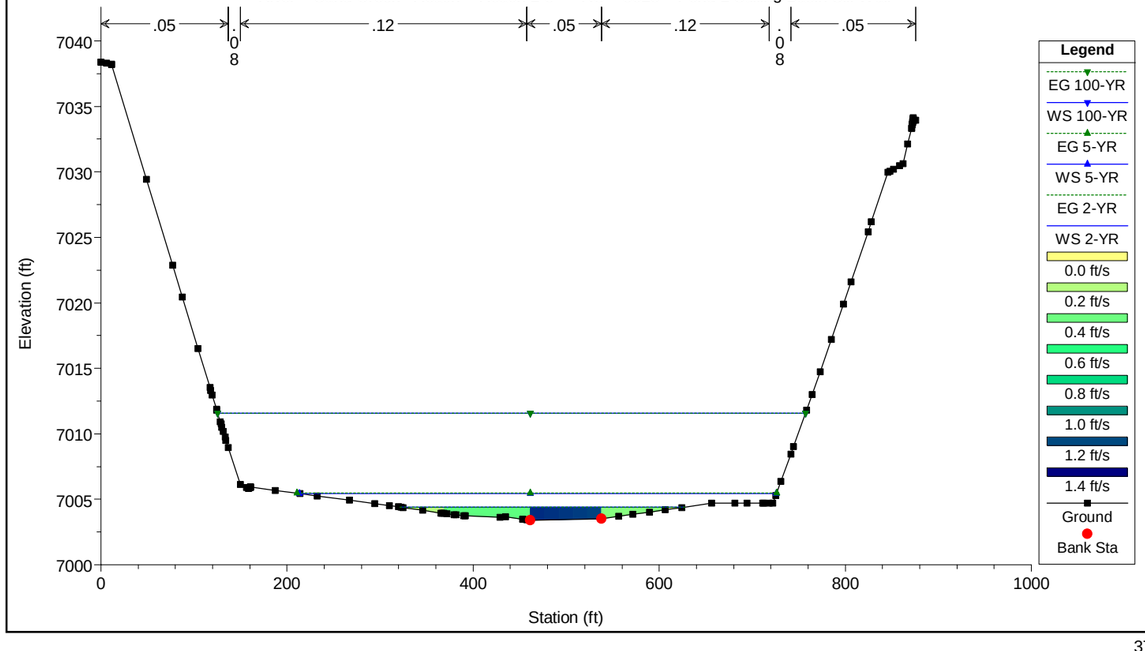

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3629 Pond 1 Stilling Basin



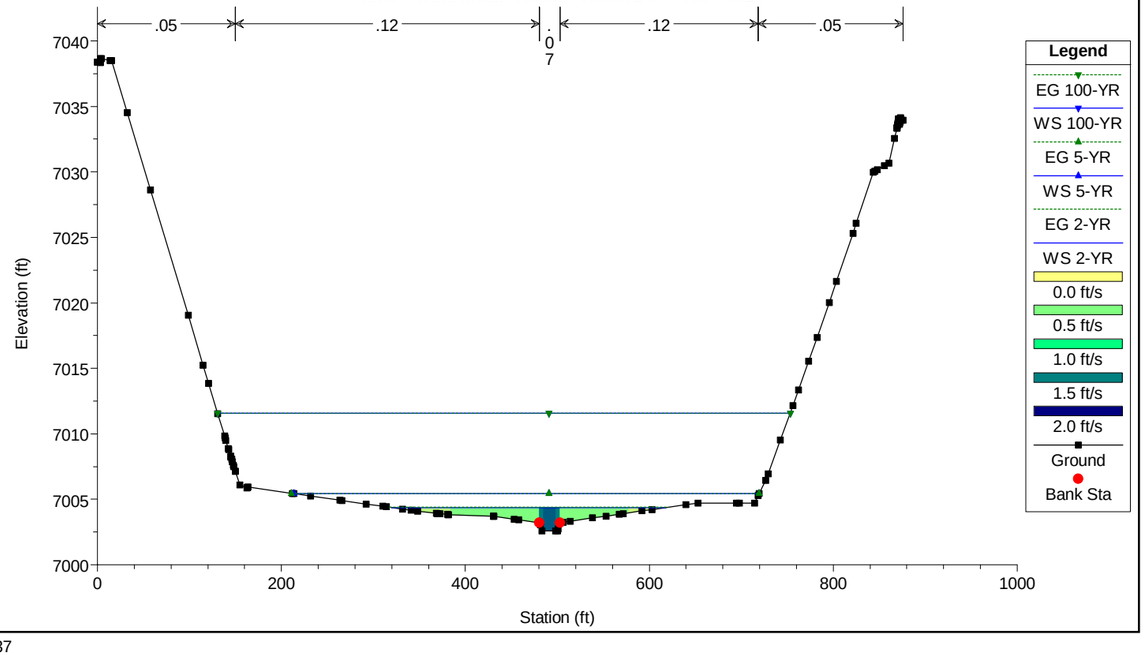

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3625 Pond 1 Stilling Basin Sill Wall



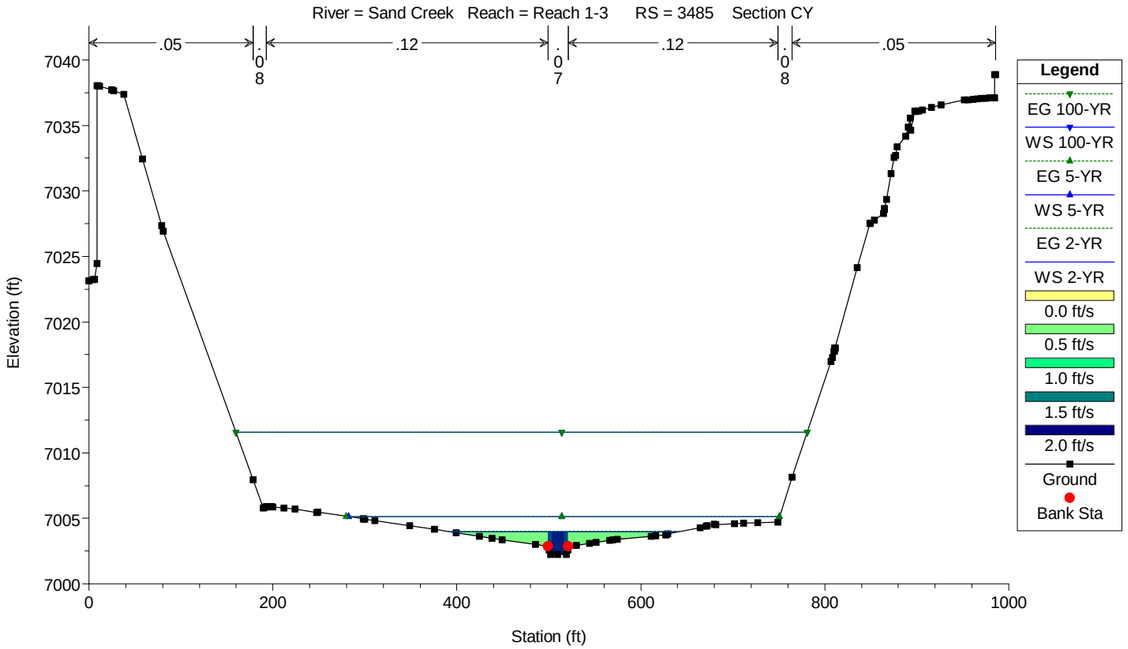

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3618



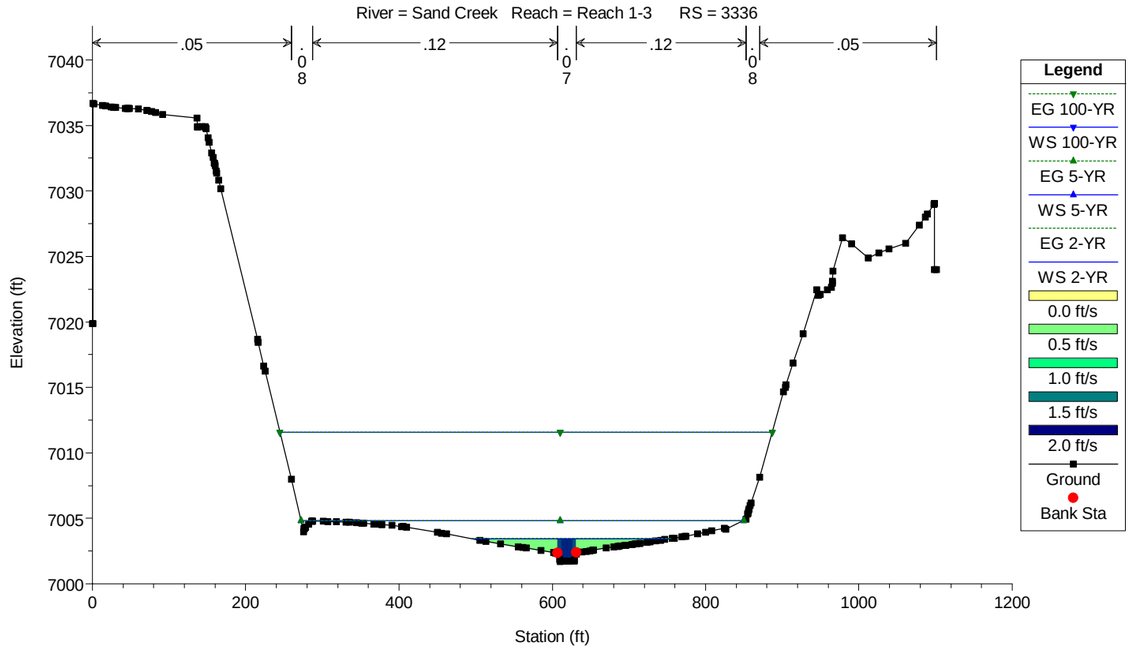
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3485 Section CY



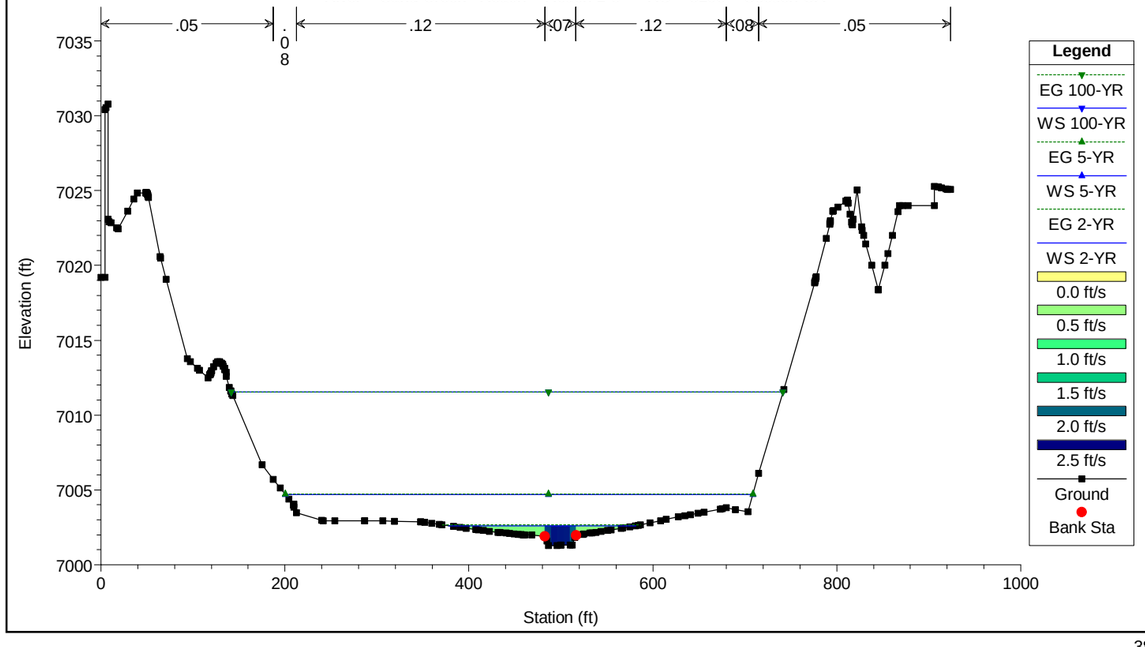

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3336



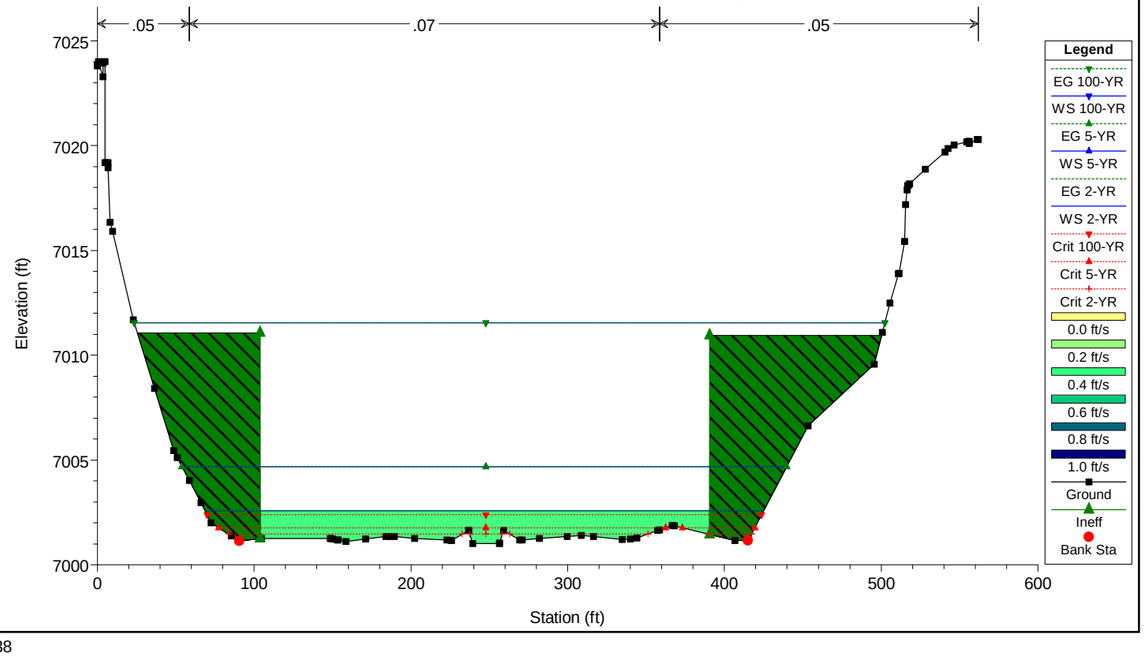

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3198 Section CX



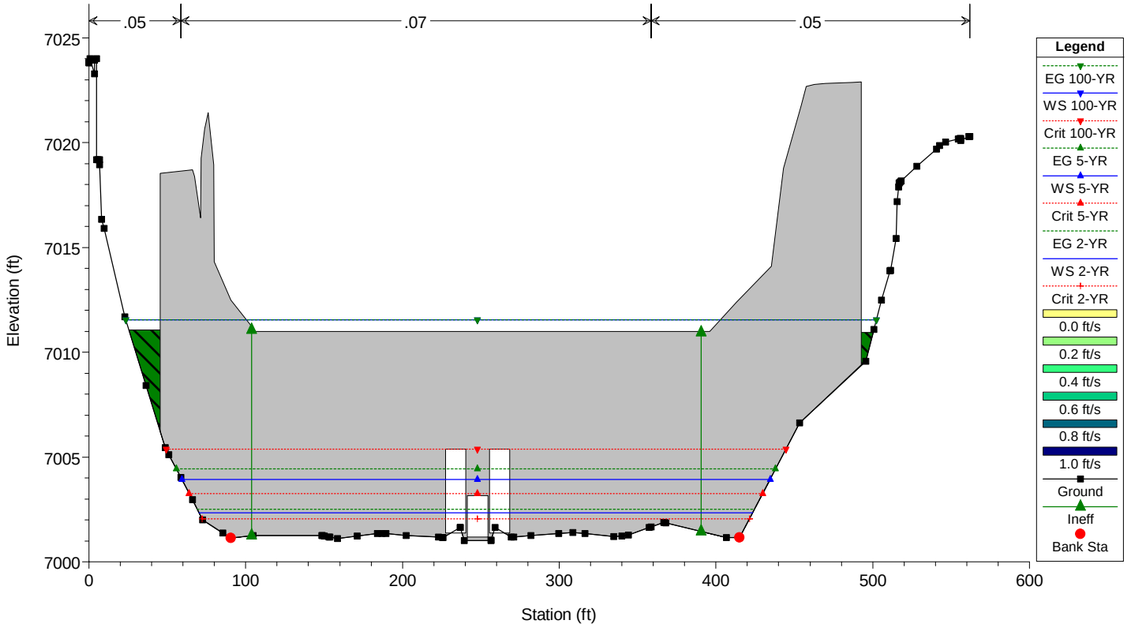

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3103



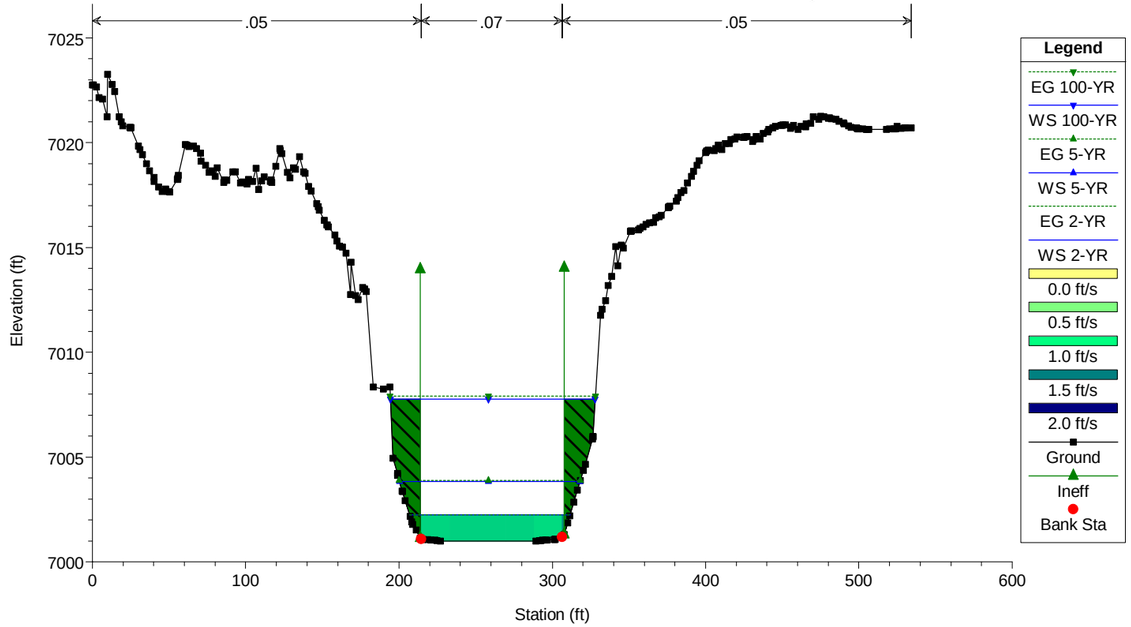
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 3057 Culv



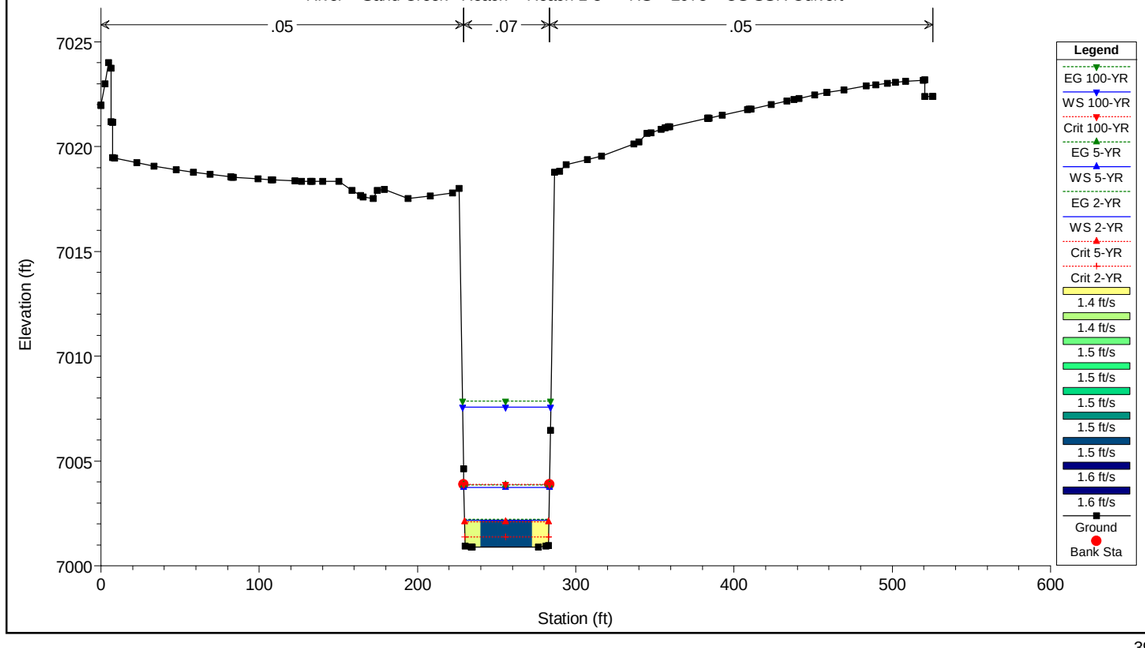

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2988 Pond W-3 Stilling Basin



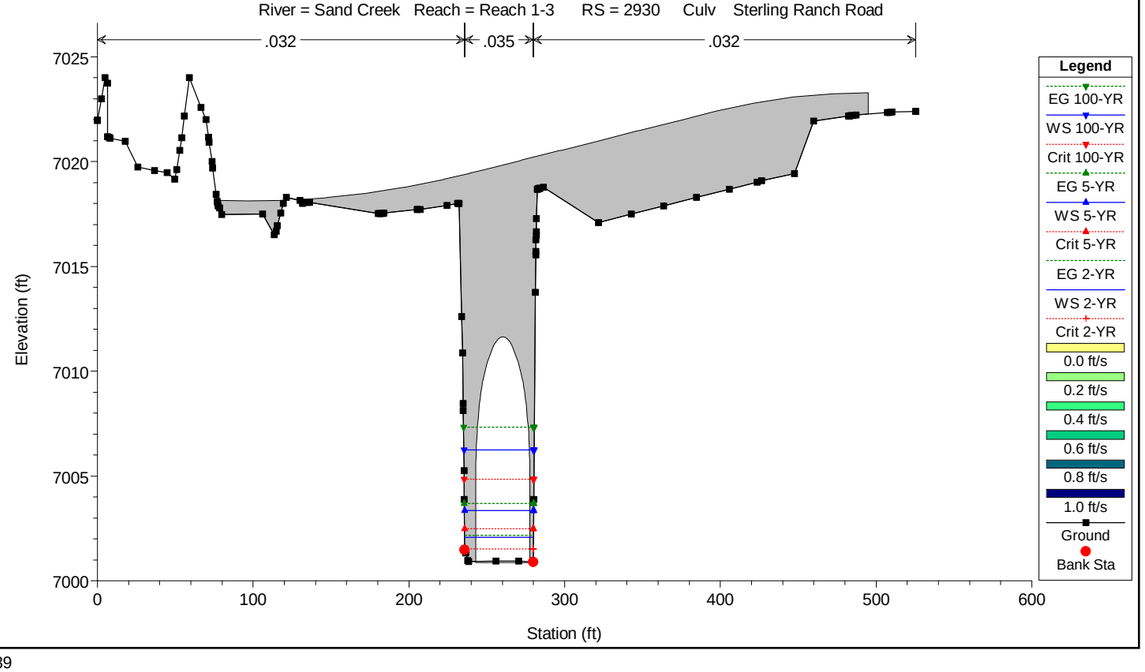

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2975 US SSR Culvert



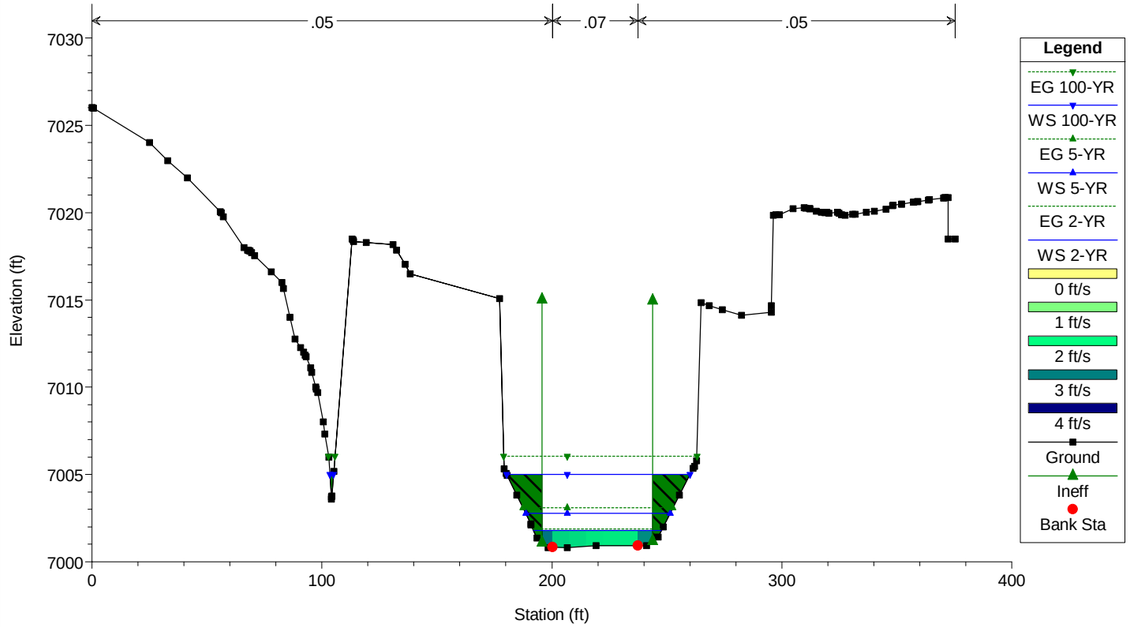

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2930 Culv Sterling Ranch Road



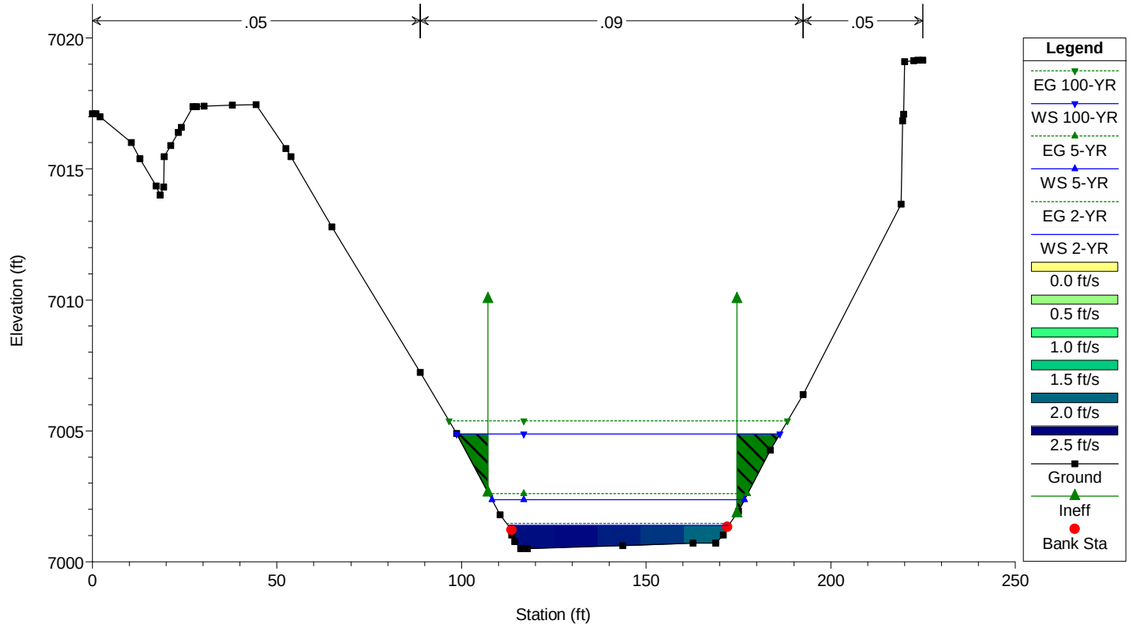
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2879 DS SRR Culvert



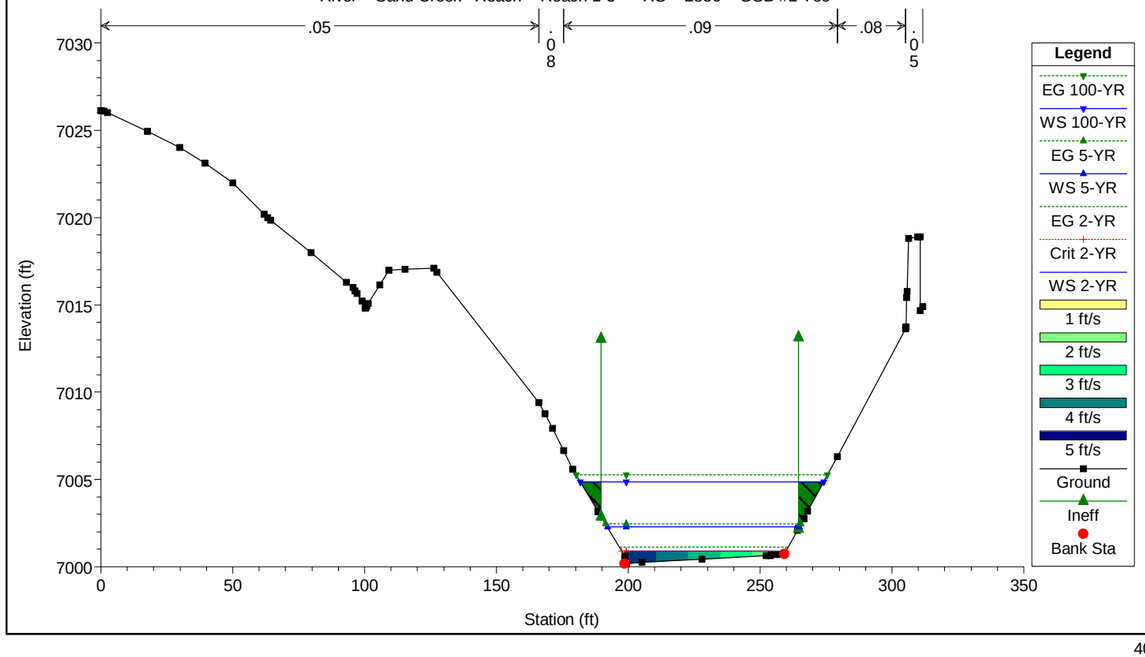

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2856 GSB #2 Crest



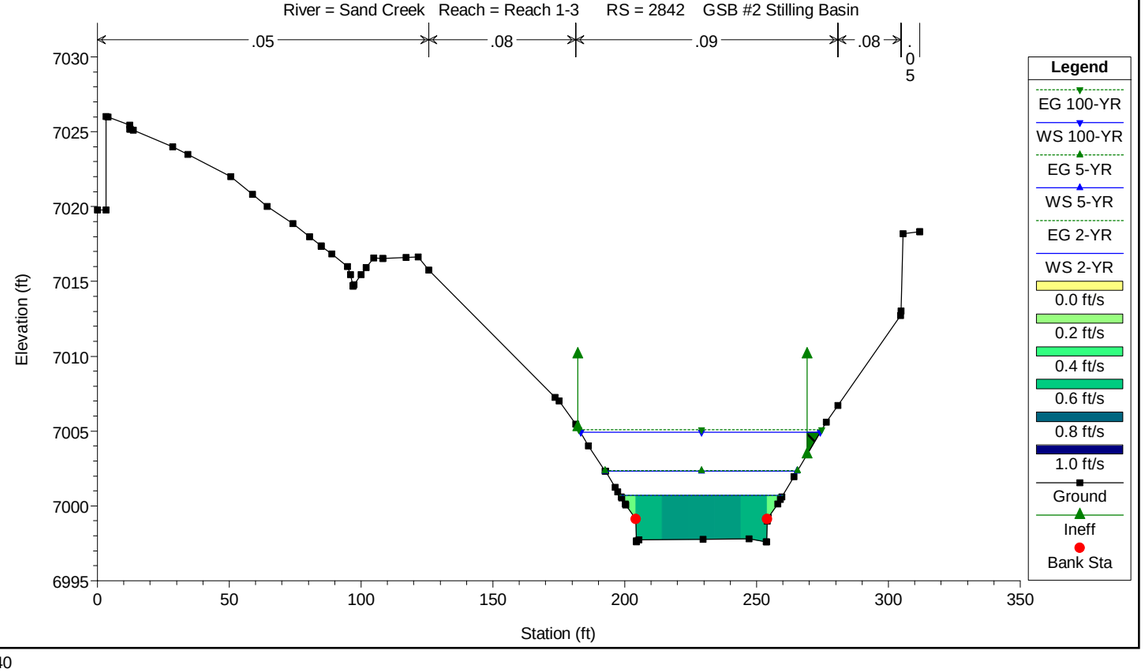

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

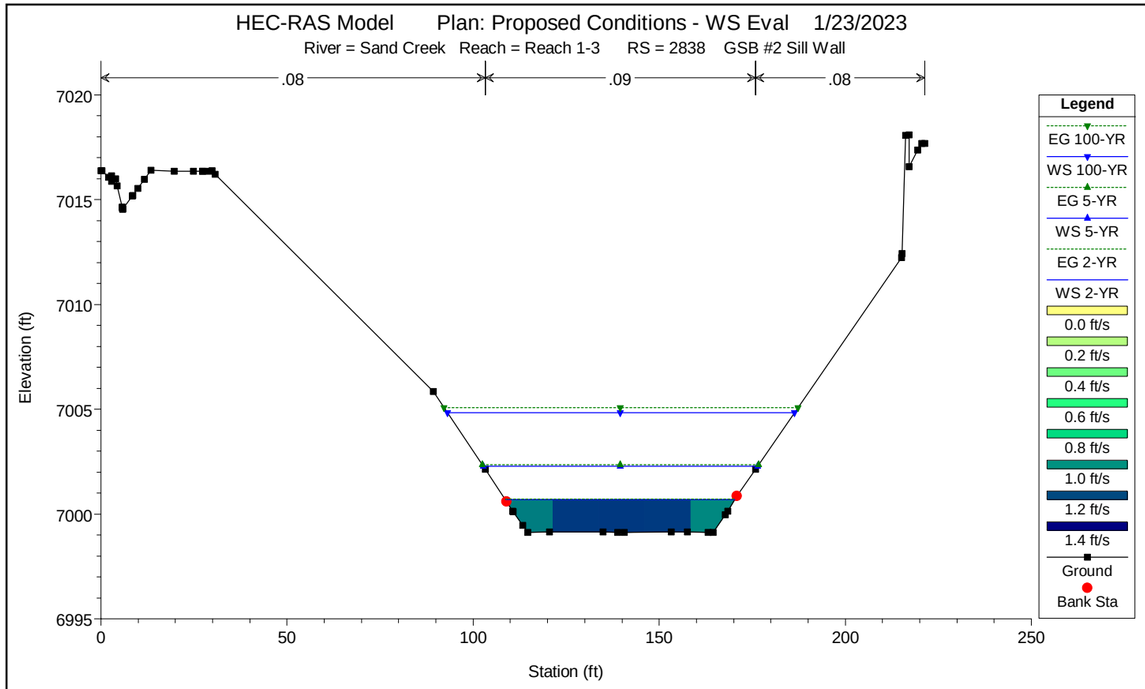
River = Sand Creek Reach = Reach 1-3 RS = 2850 GSB #2 Toe

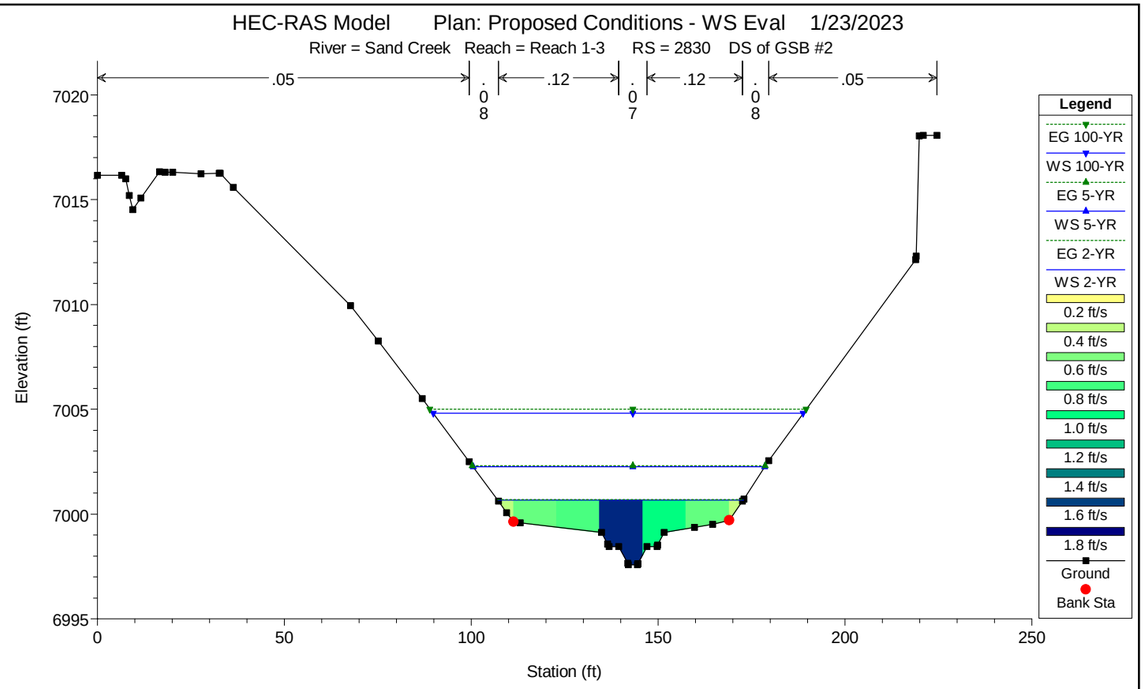


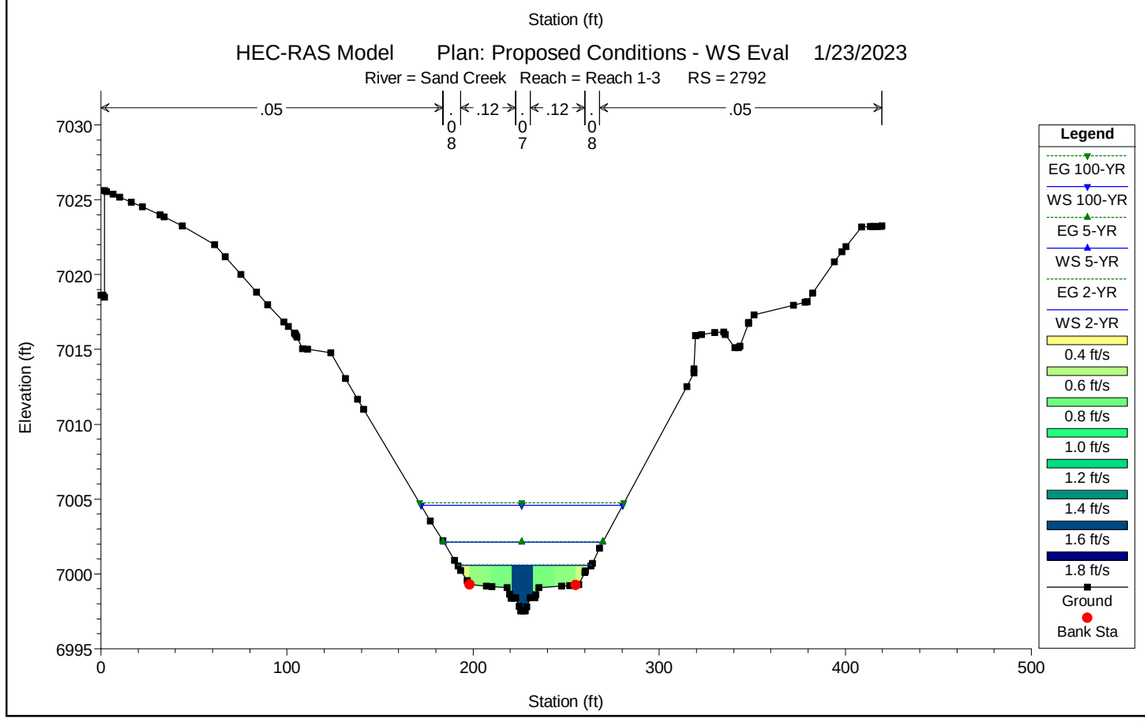

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

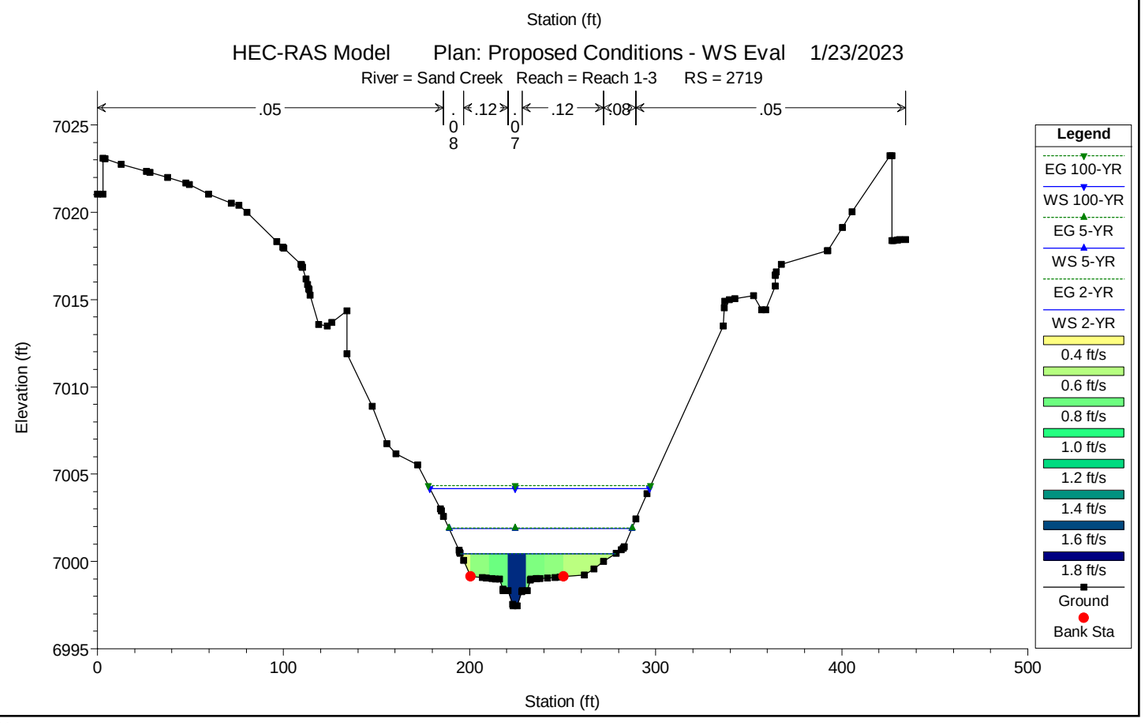
River = Sand Creek Reach = Reach 1-3 RS = 2842 GSB #2 Stilling Basin

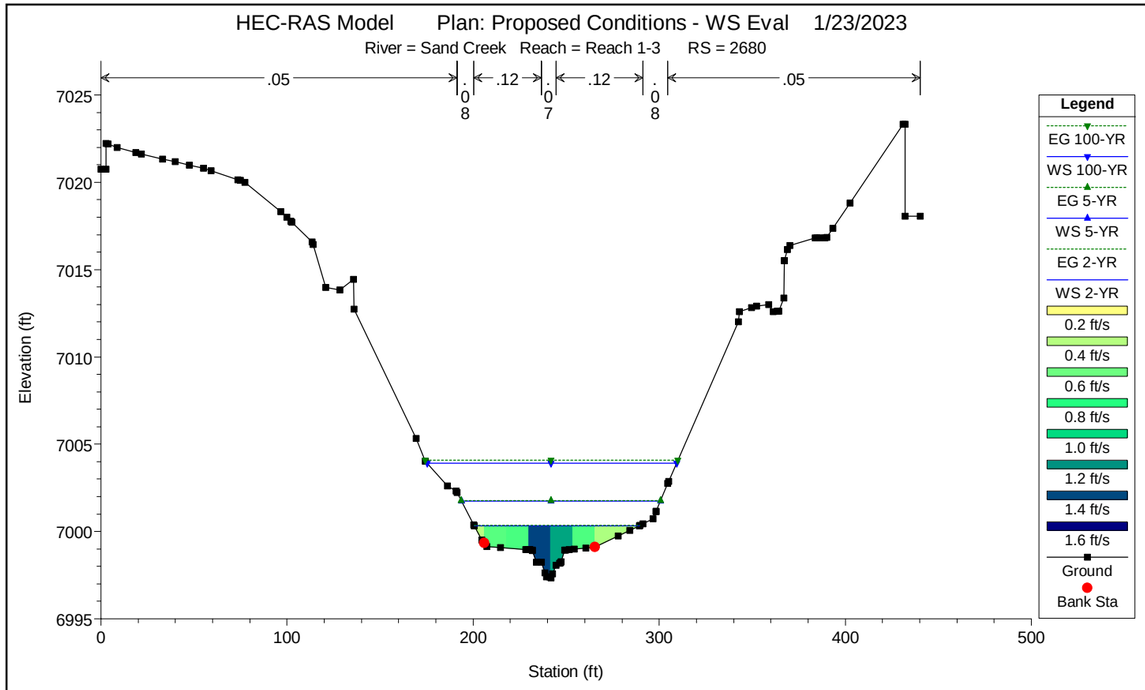


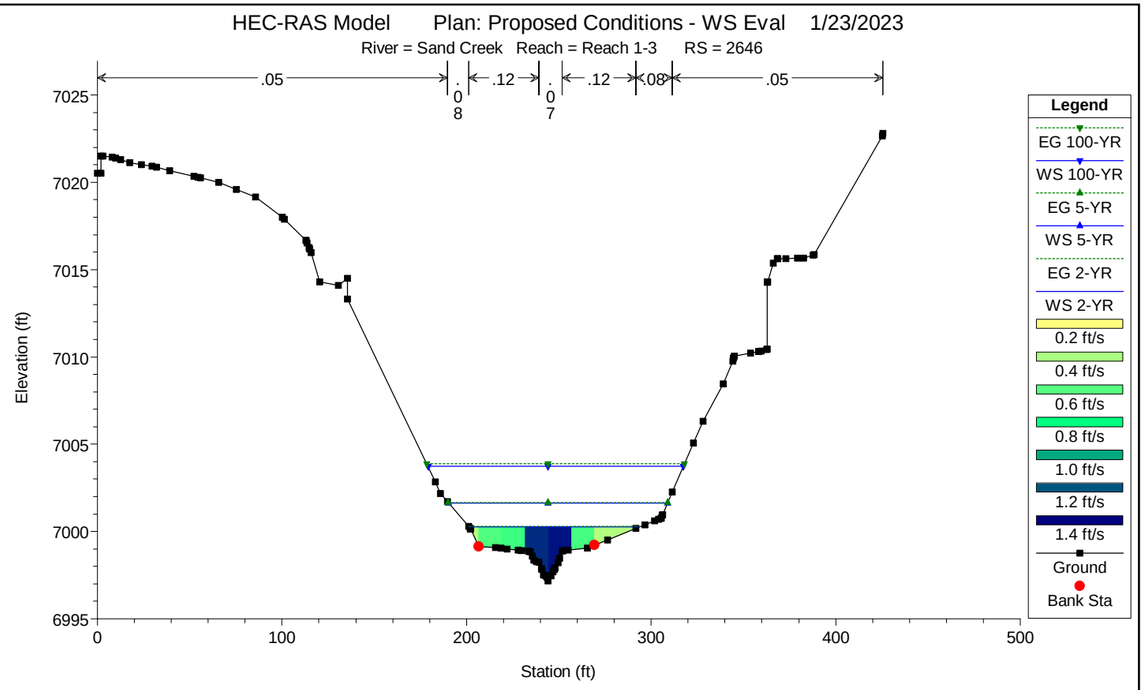

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2838 GSB #2 Sill Wall
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Bank Sta

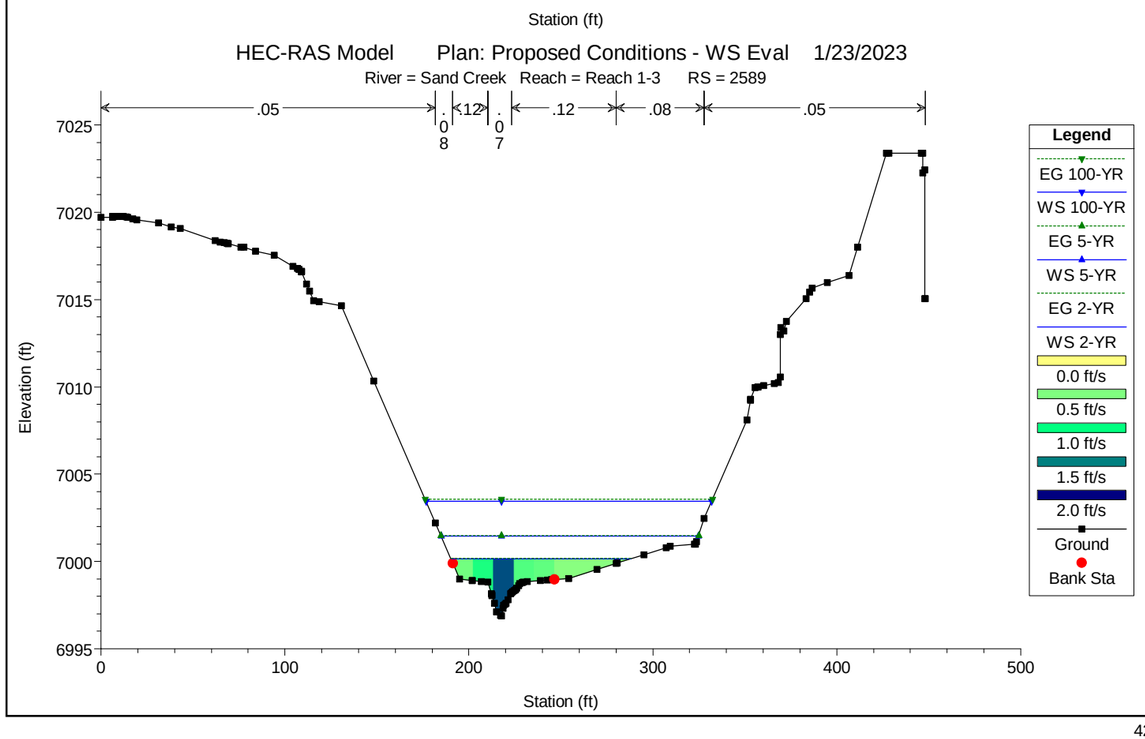

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2830 DS of GSB #2
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
Ground
Bank Sta

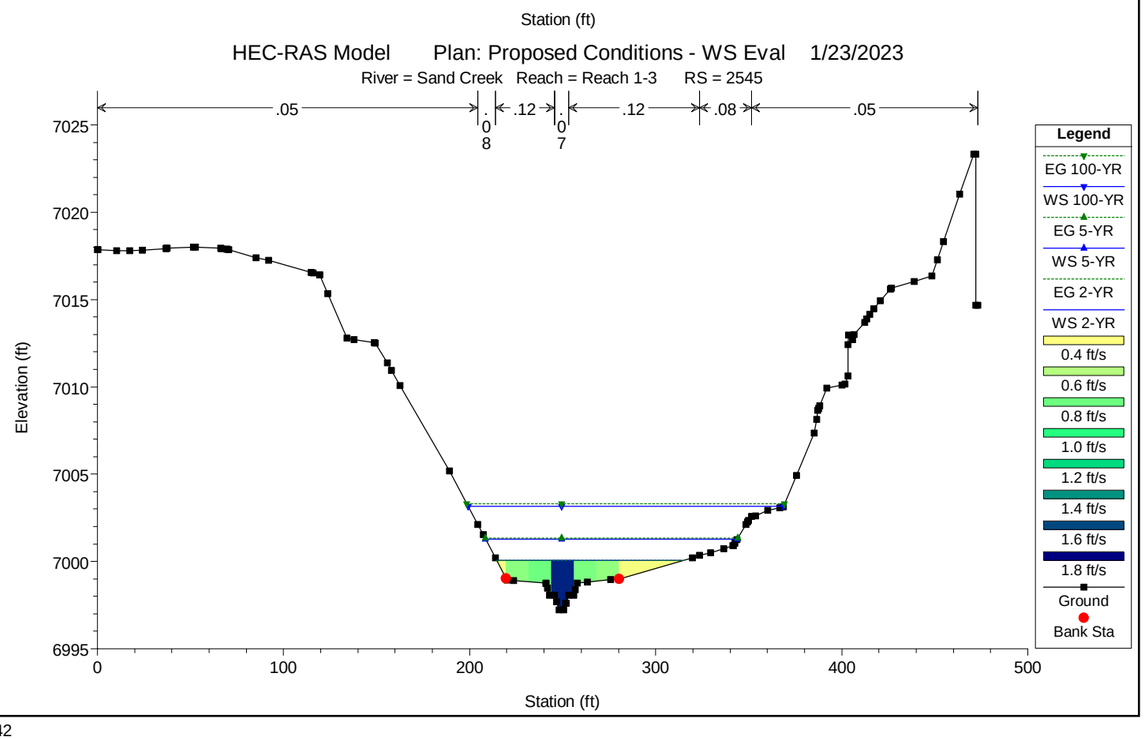

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2792
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2719
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2680
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
Ground
Bank Sta

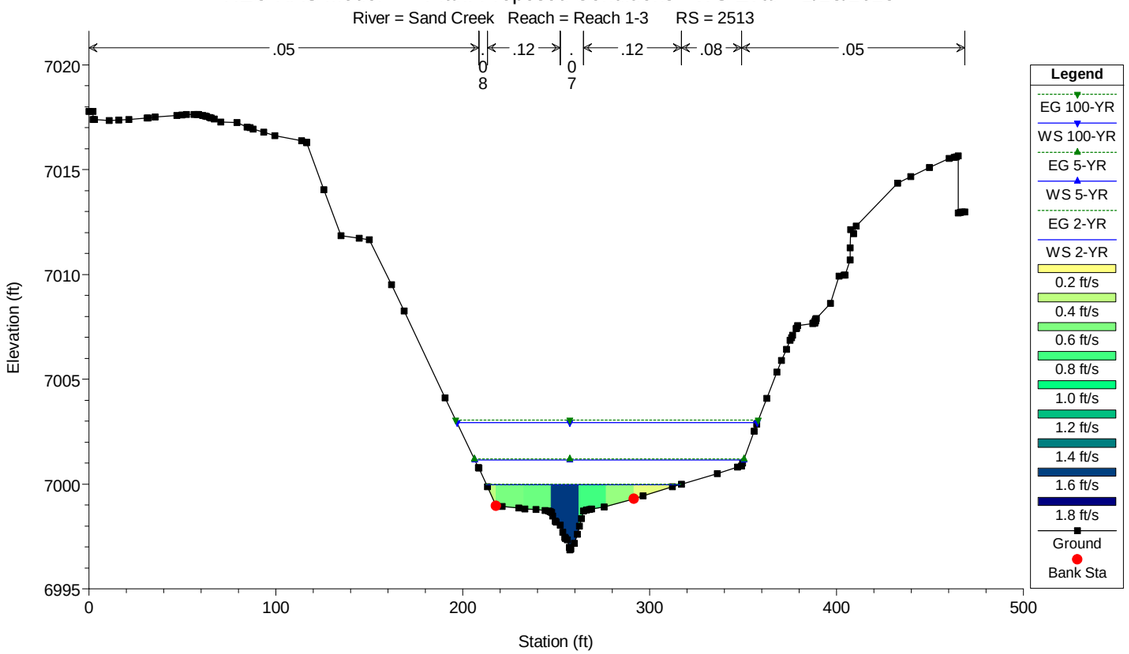

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2646
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2589
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2545
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
Ground
Bank Sta

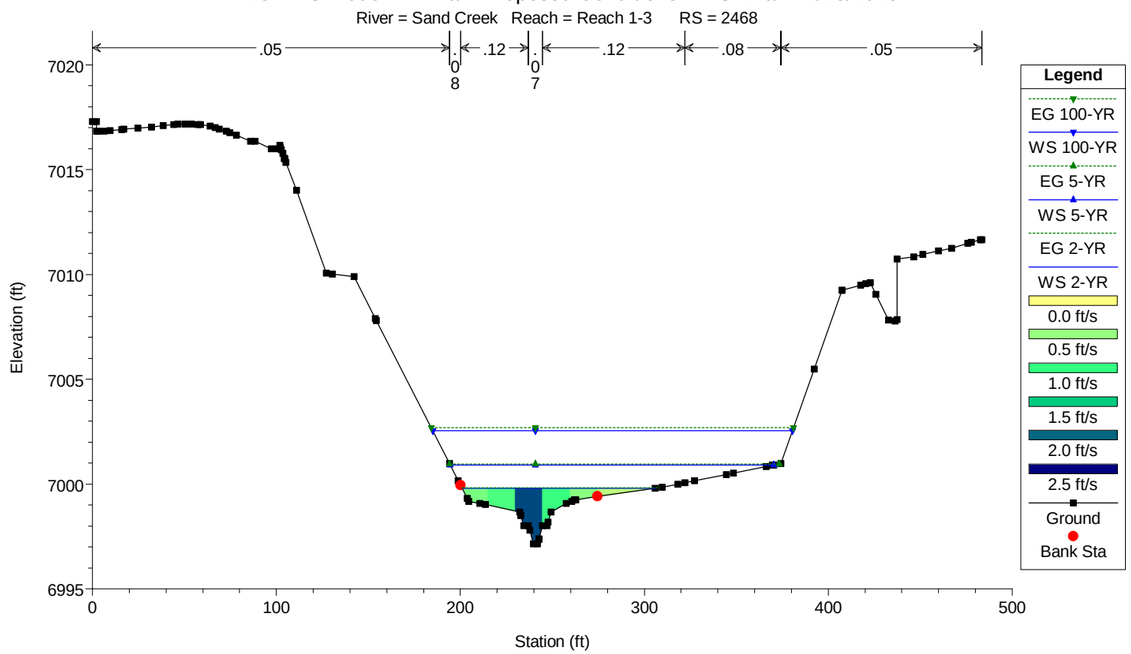
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2513



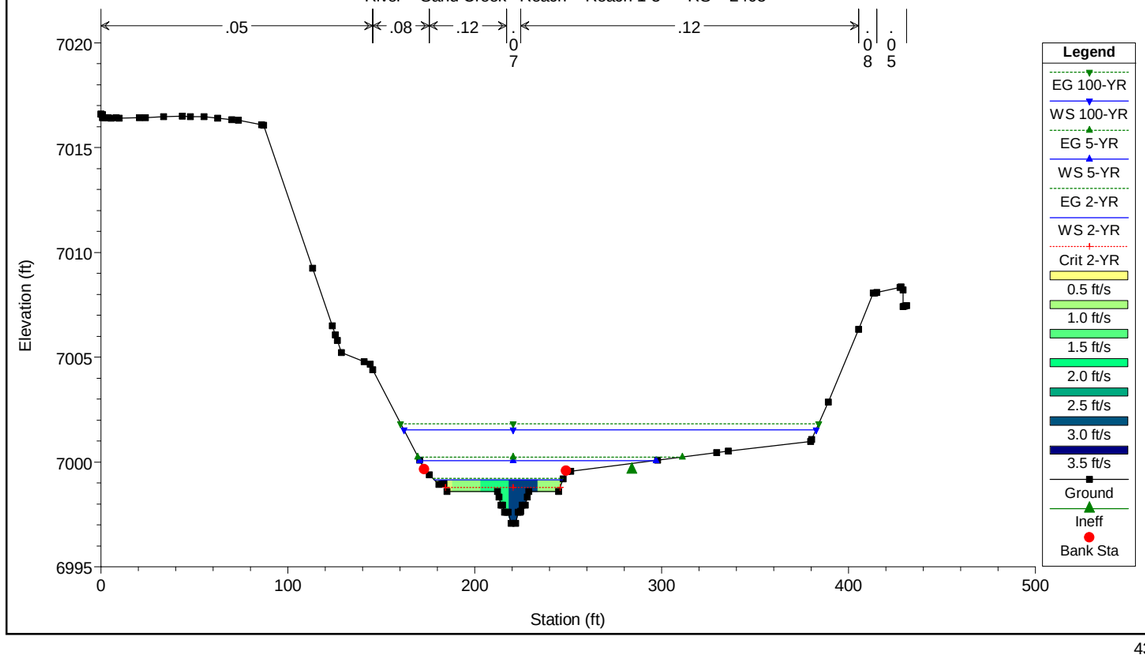

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2468



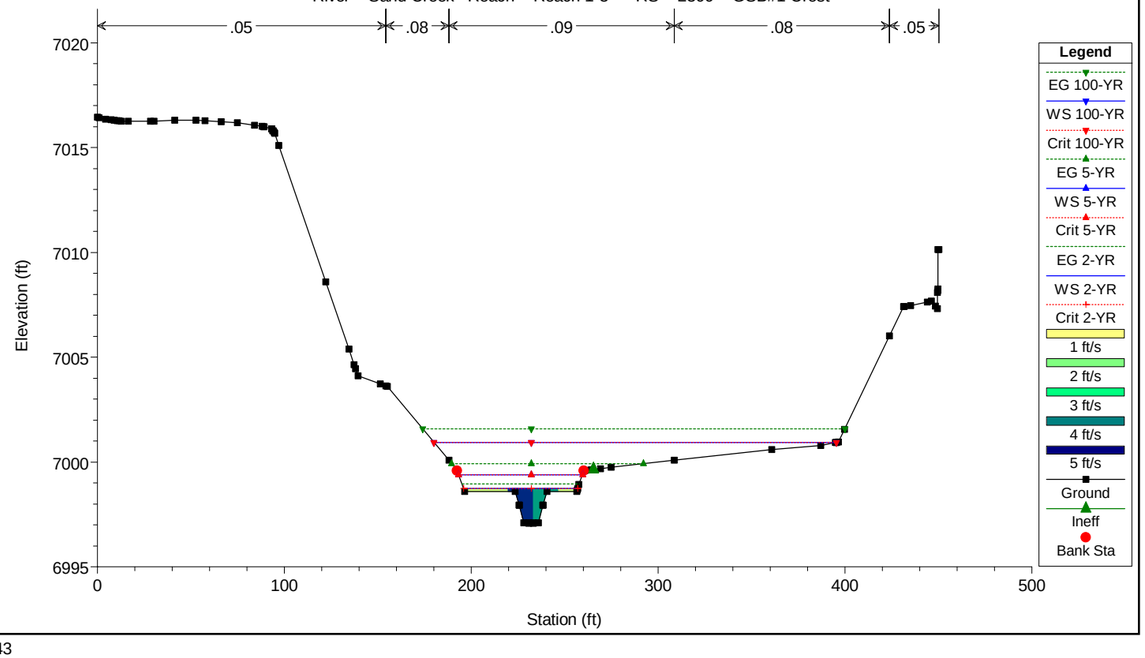

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2405



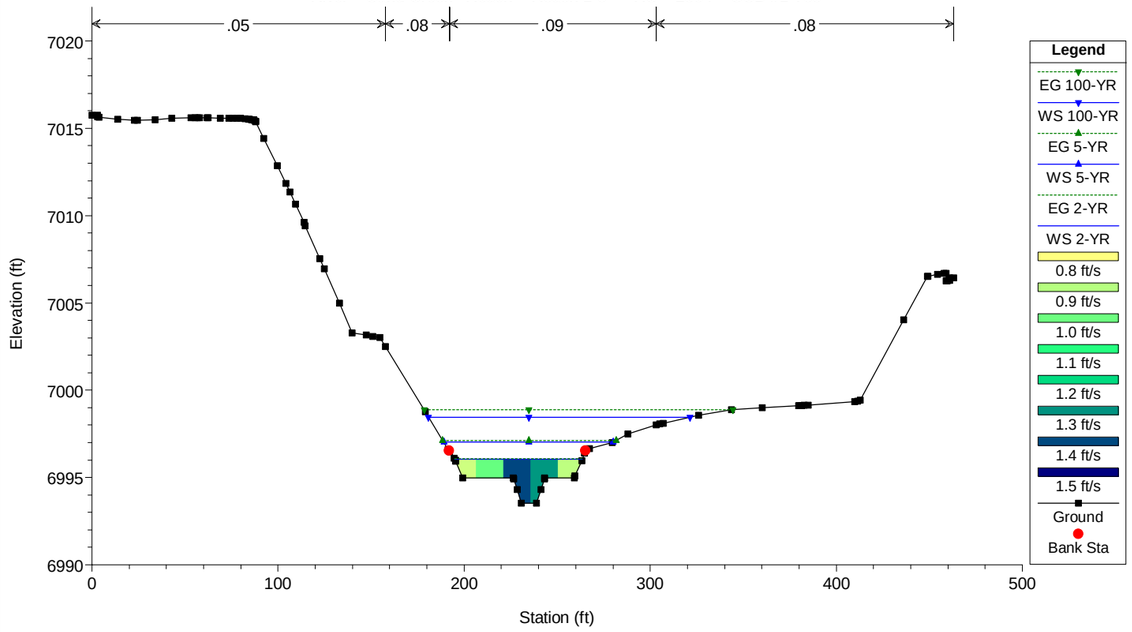

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2399 GSB#1 Crest



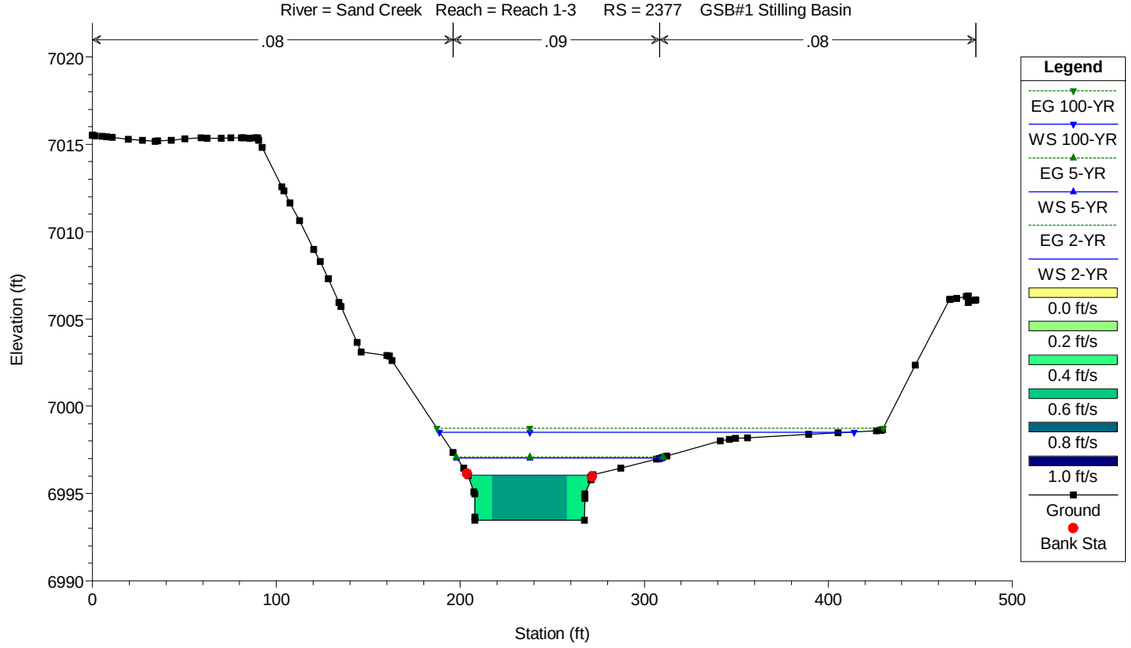
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2384 GSB #1 Toe



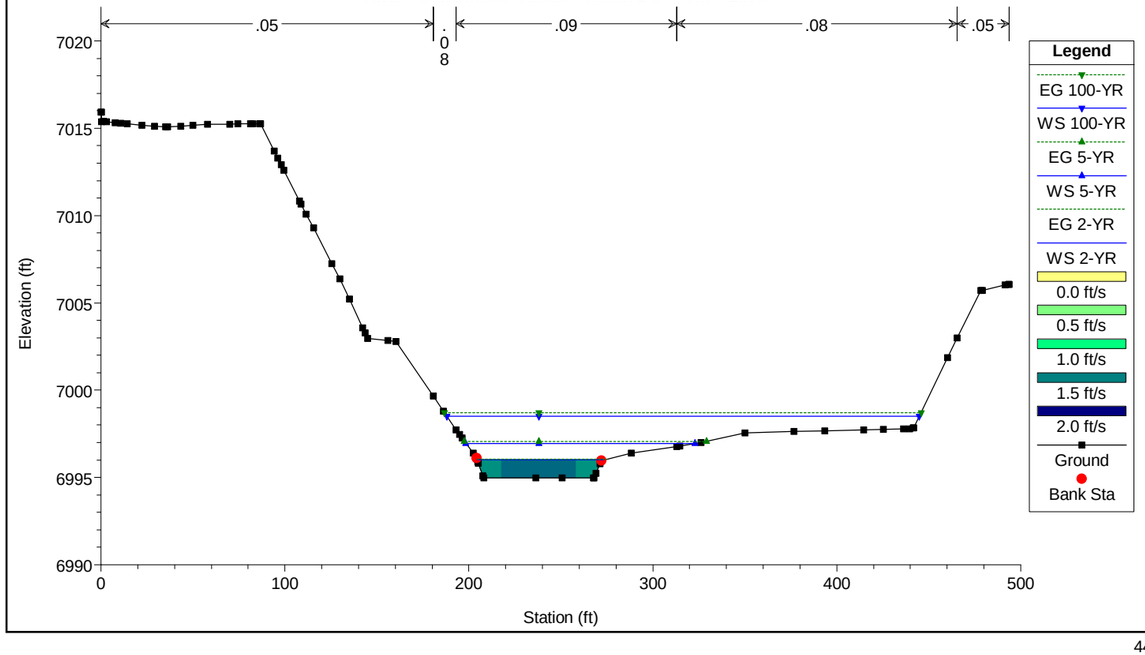

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2377 GSB#1 Stilling Basin



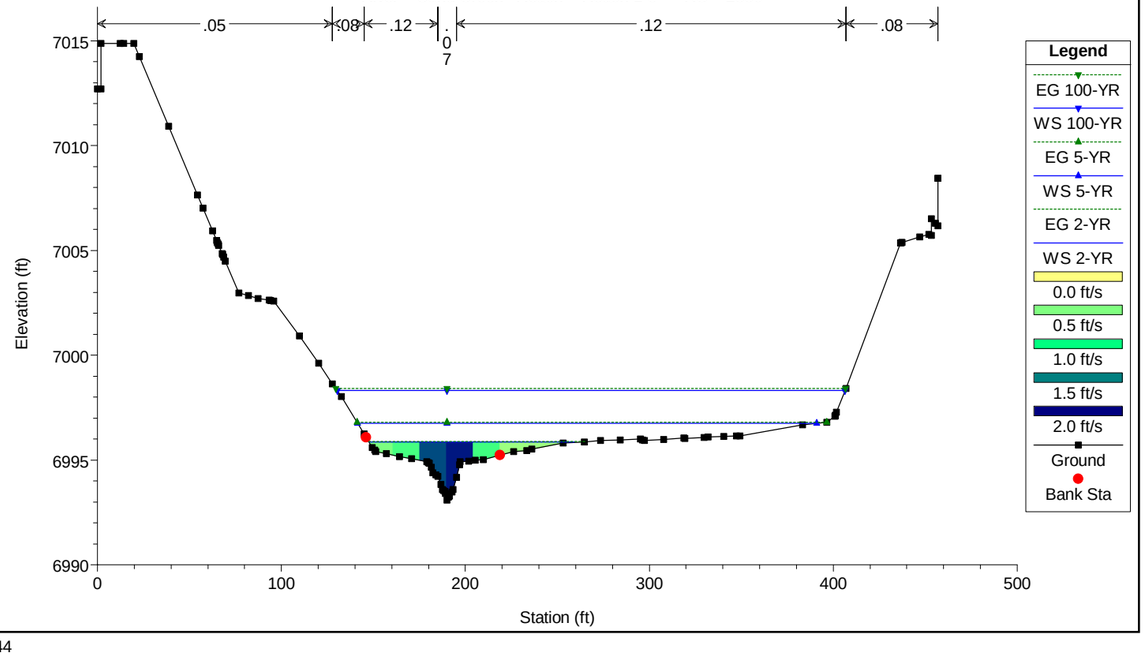

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2375



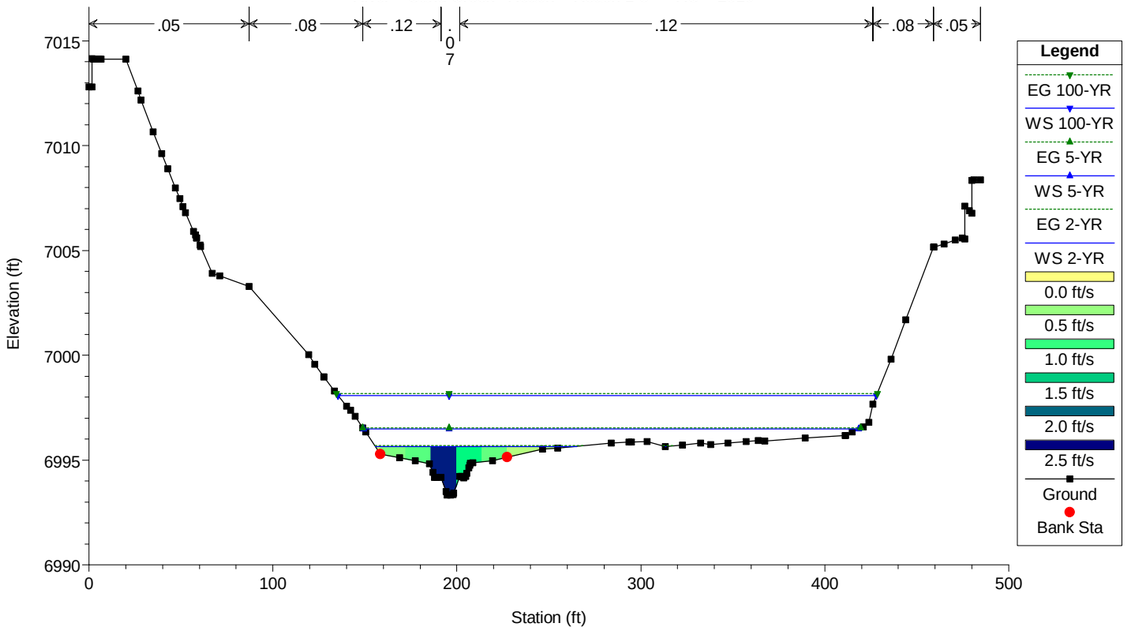

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2350



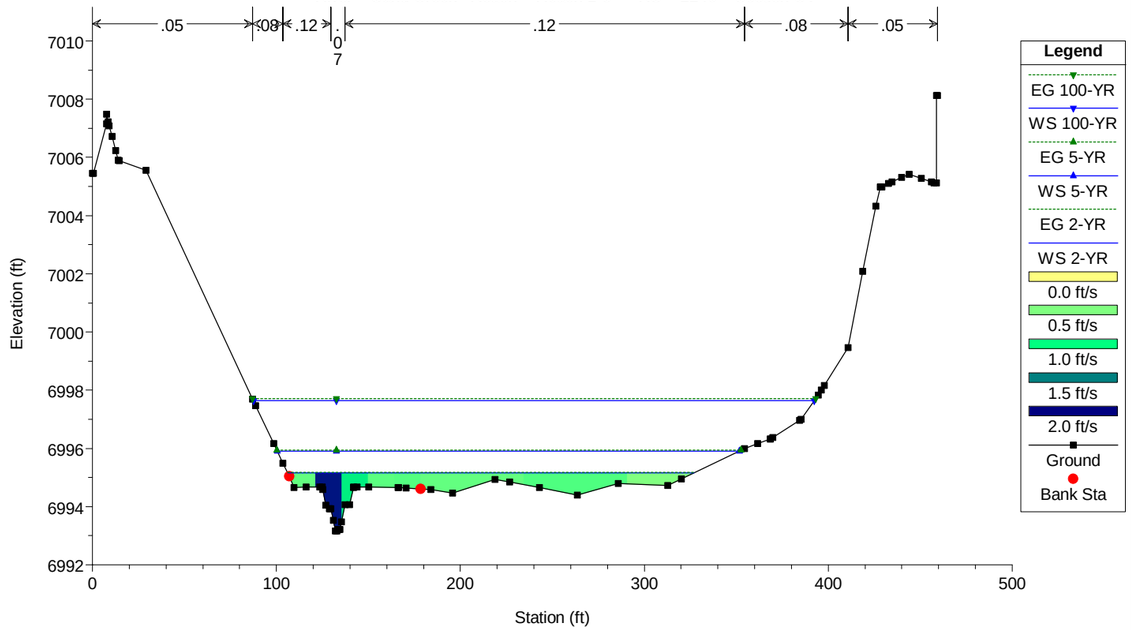
HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2319



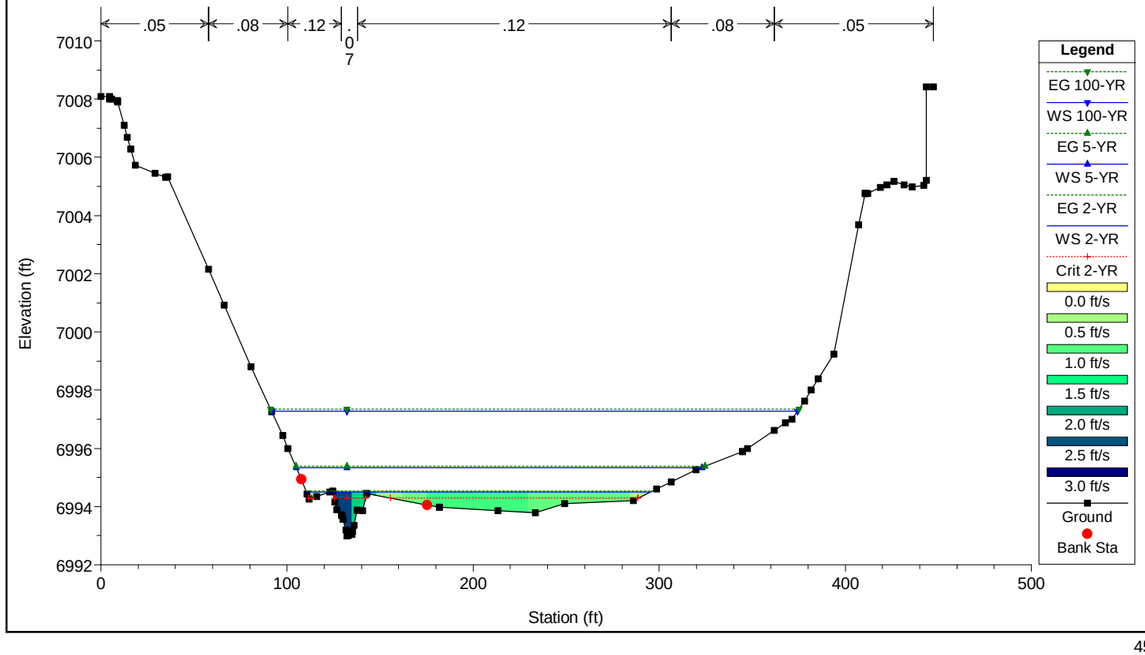

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2246 Section CV



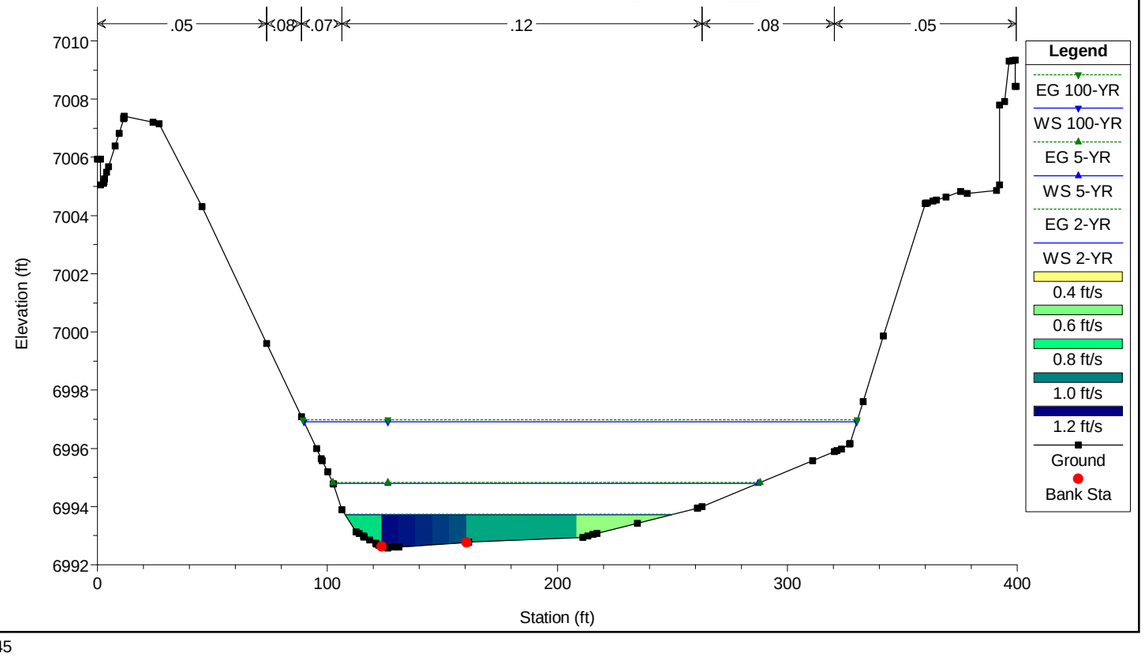

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

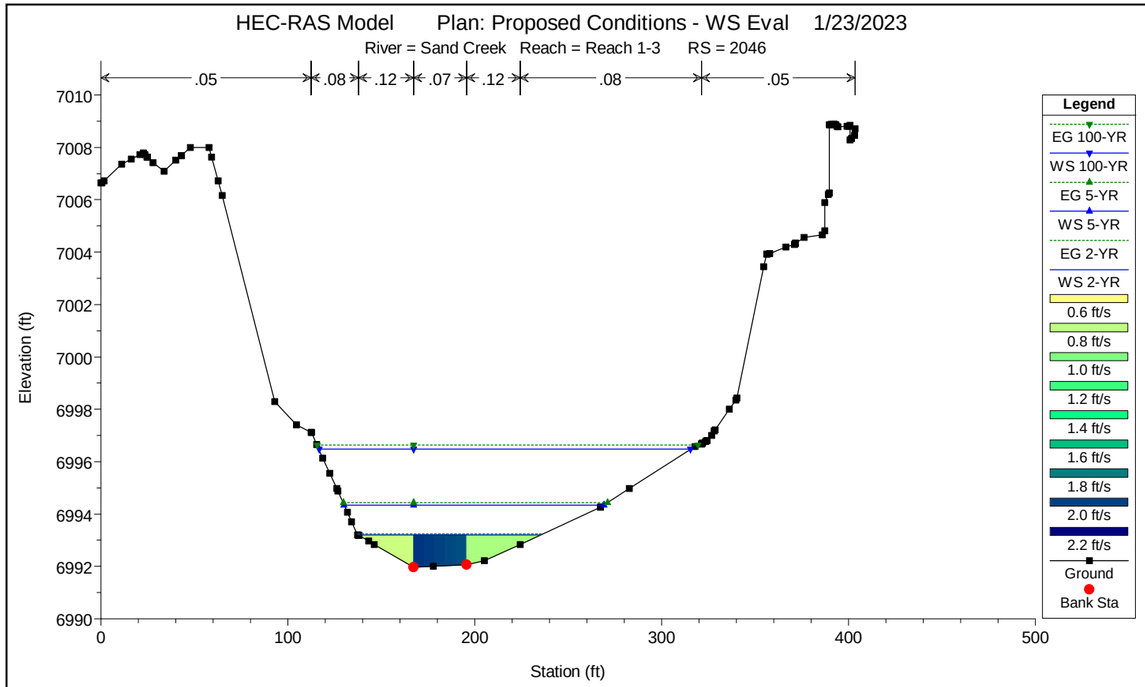
River = Sand Creek Reach = Reach 1-3 RS = 2181

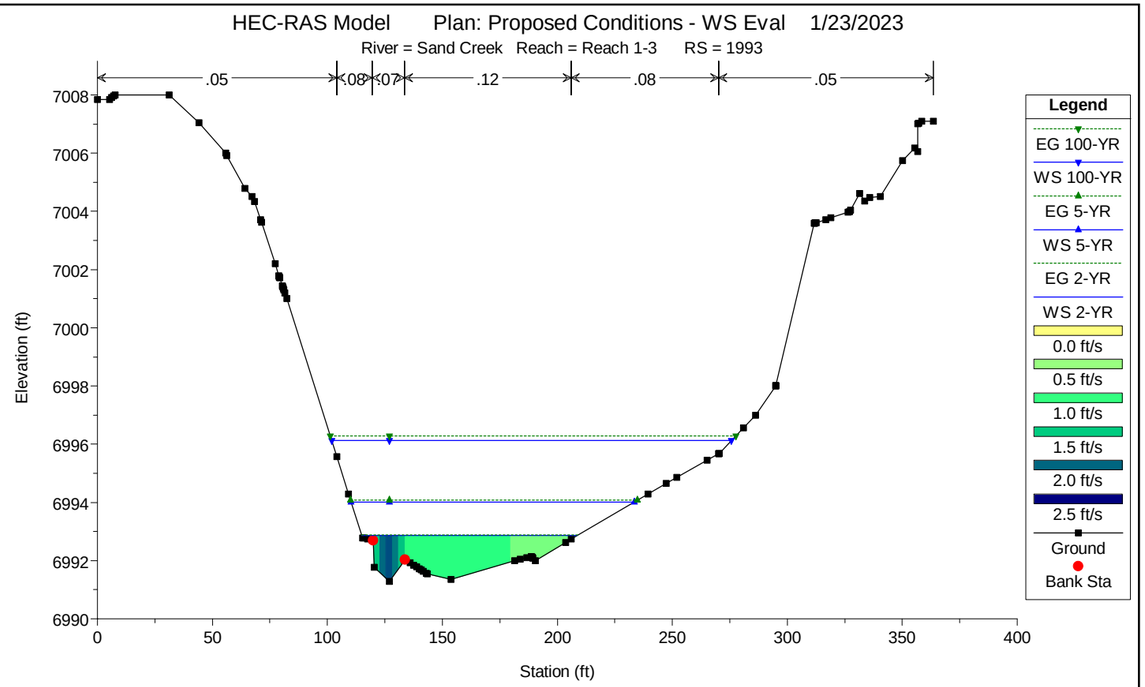


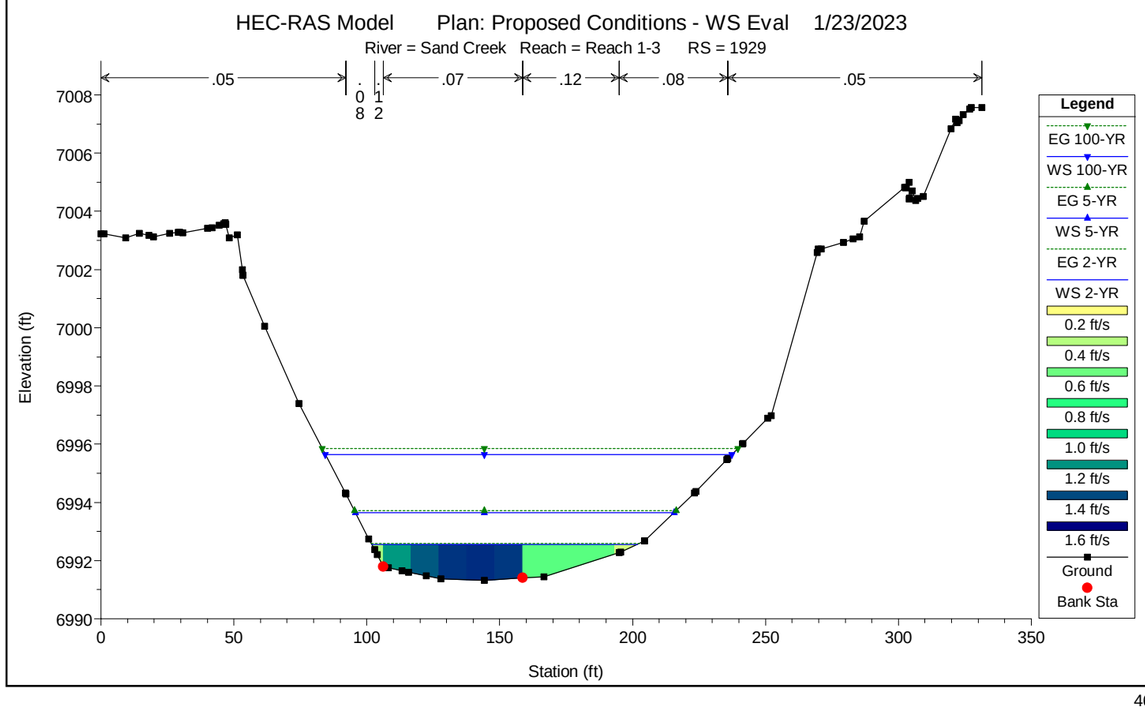

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023

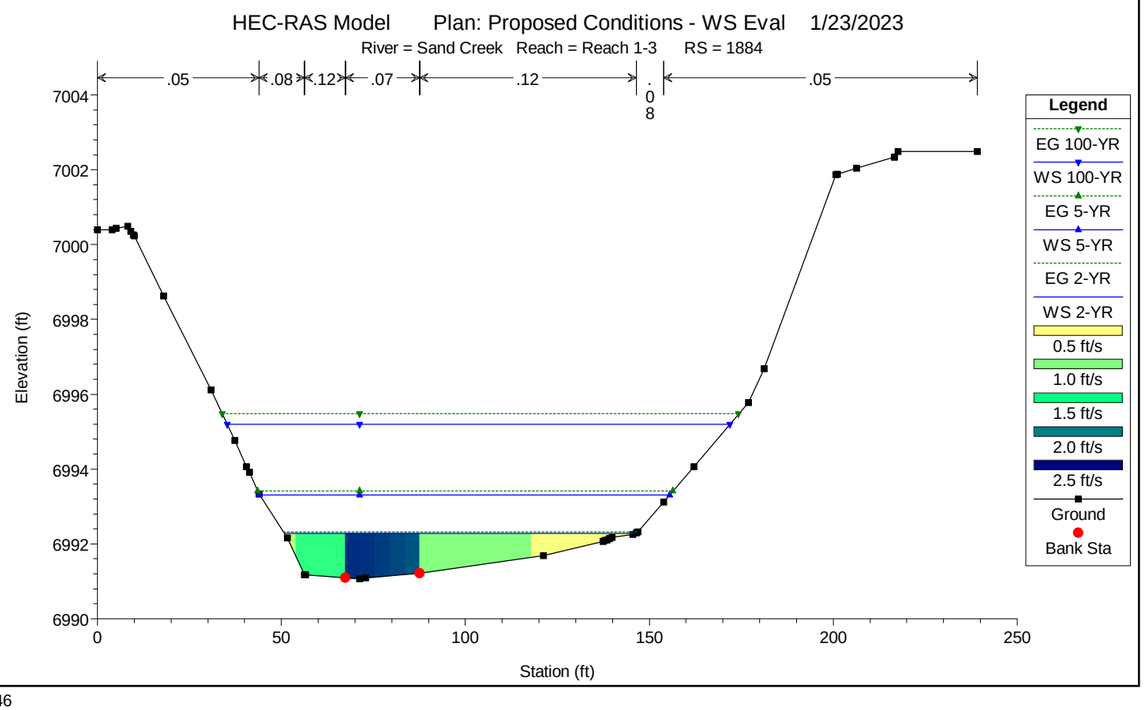
River = Sand Creek Reach = Reach 1-3 RS = 2112

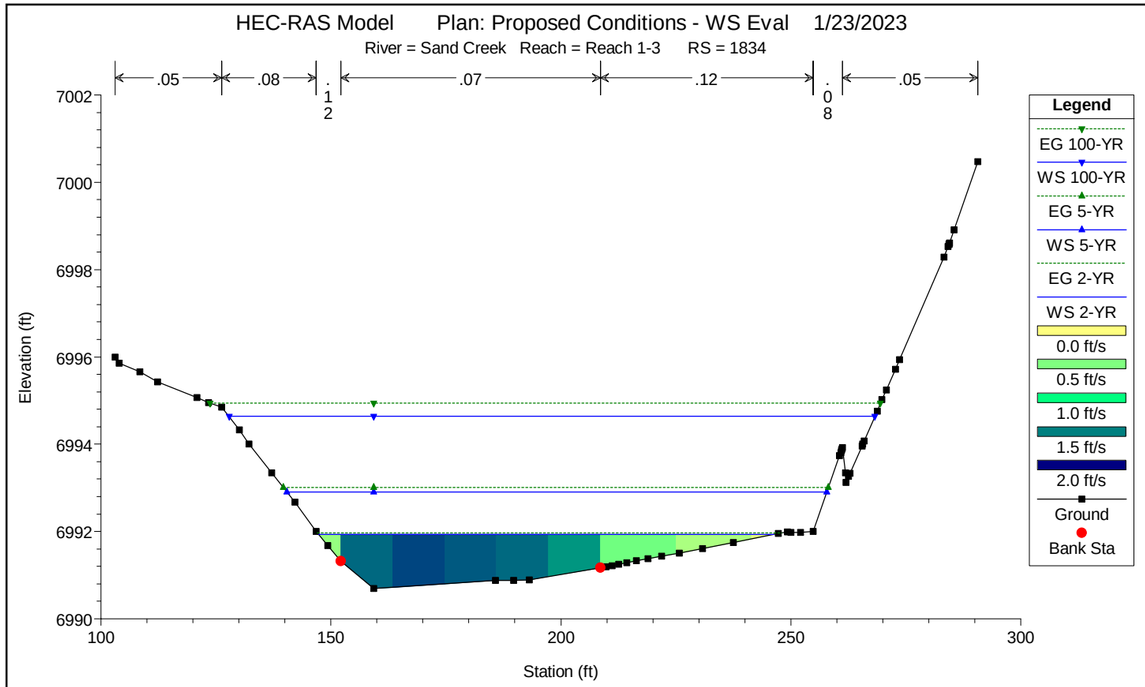


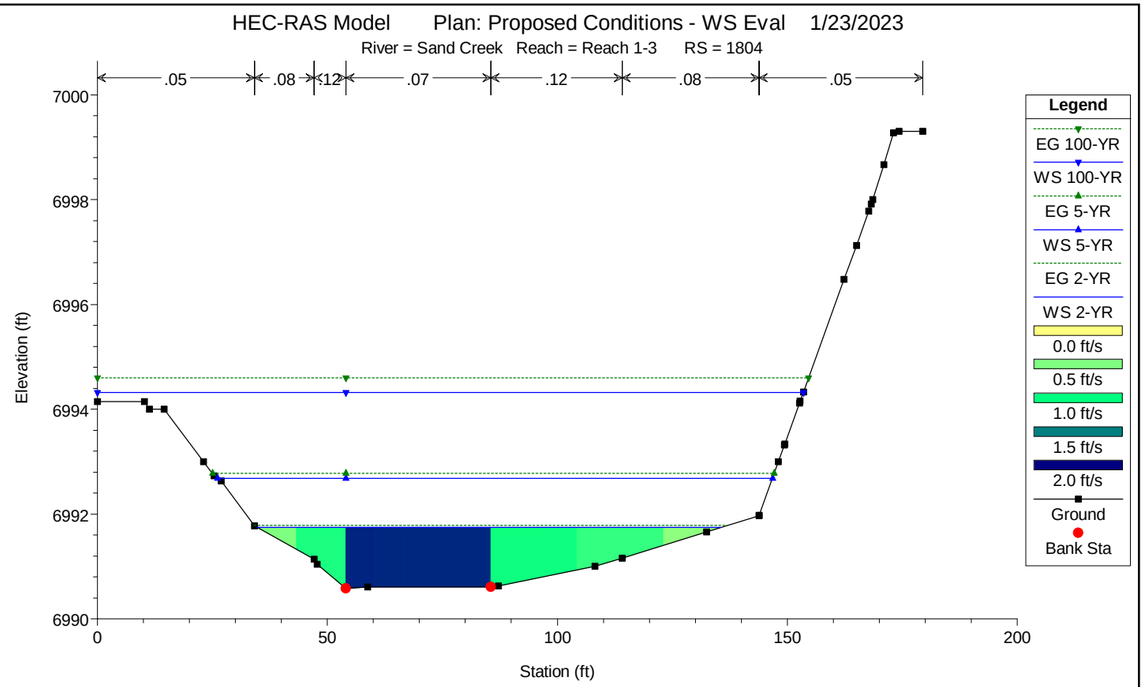

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2046
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
Ground
Bank Sta

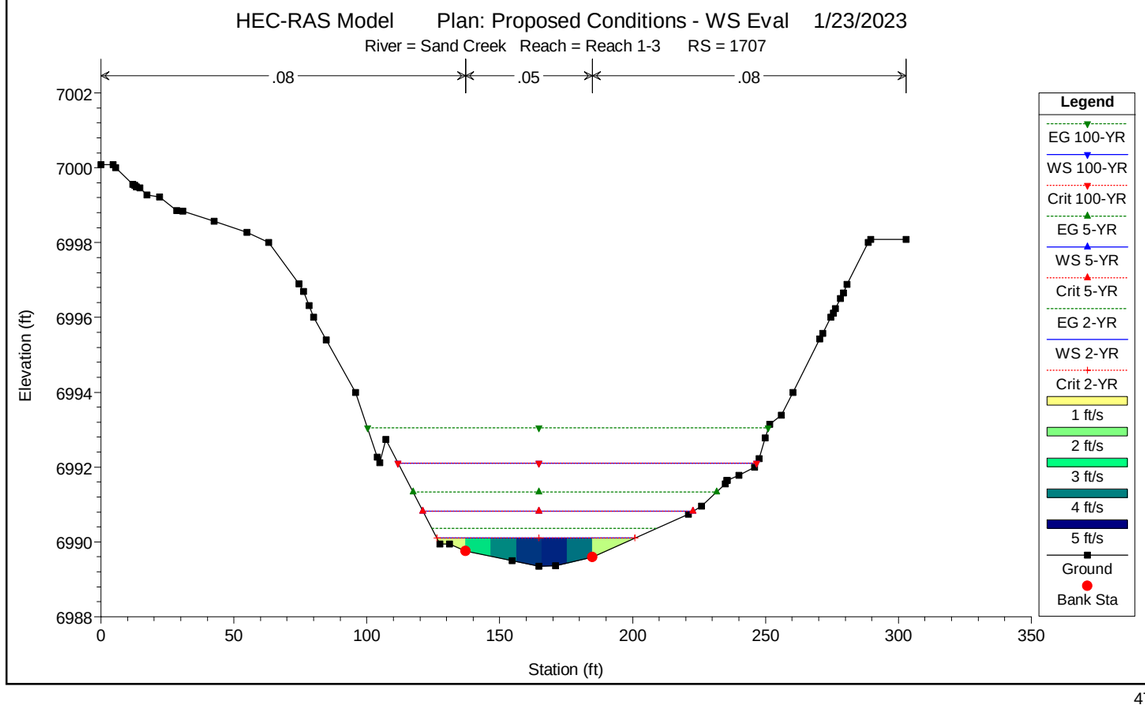

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1993
.05 .08 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

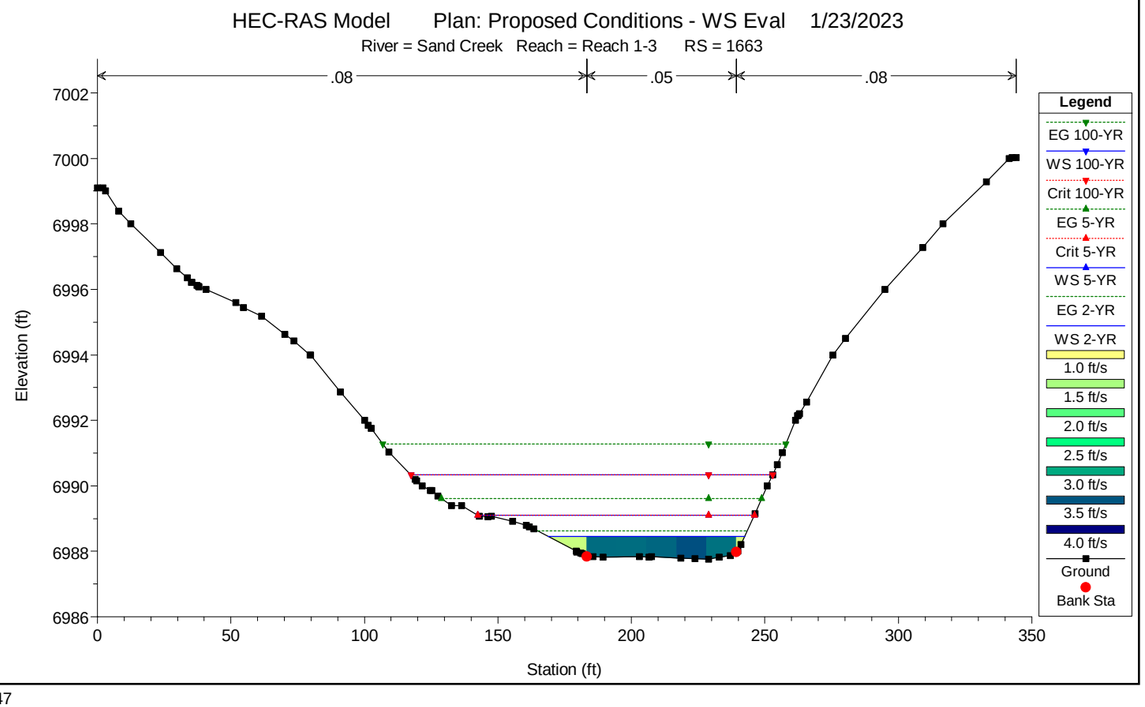

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1929
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
Ground
Bank Sta

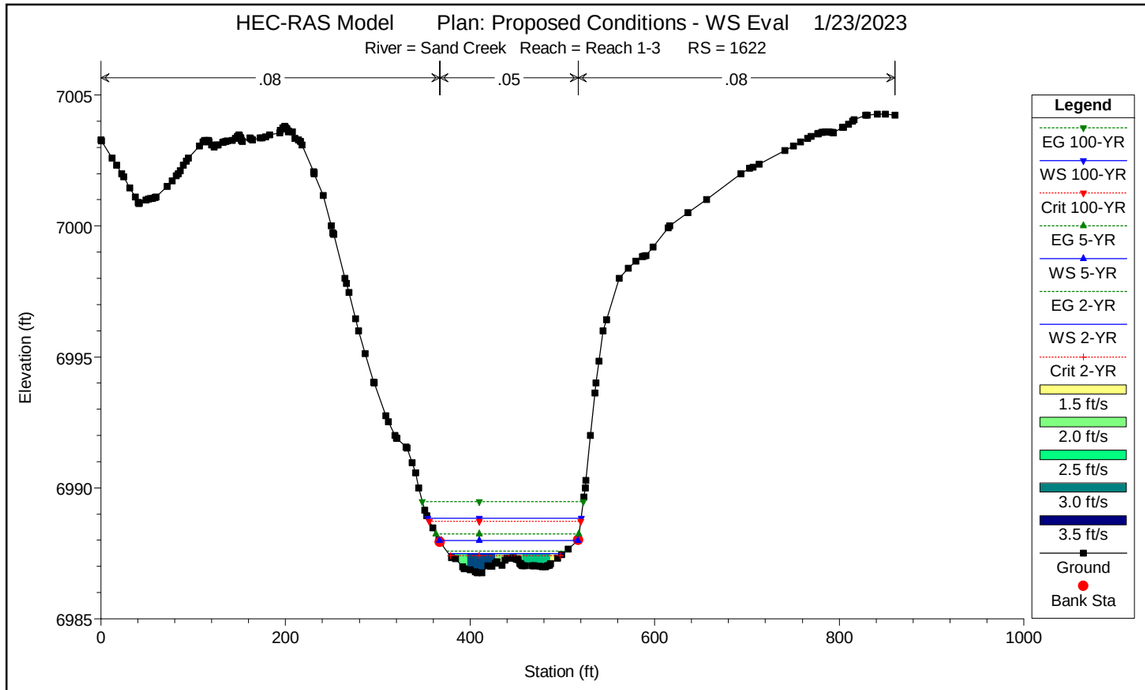

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1884
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

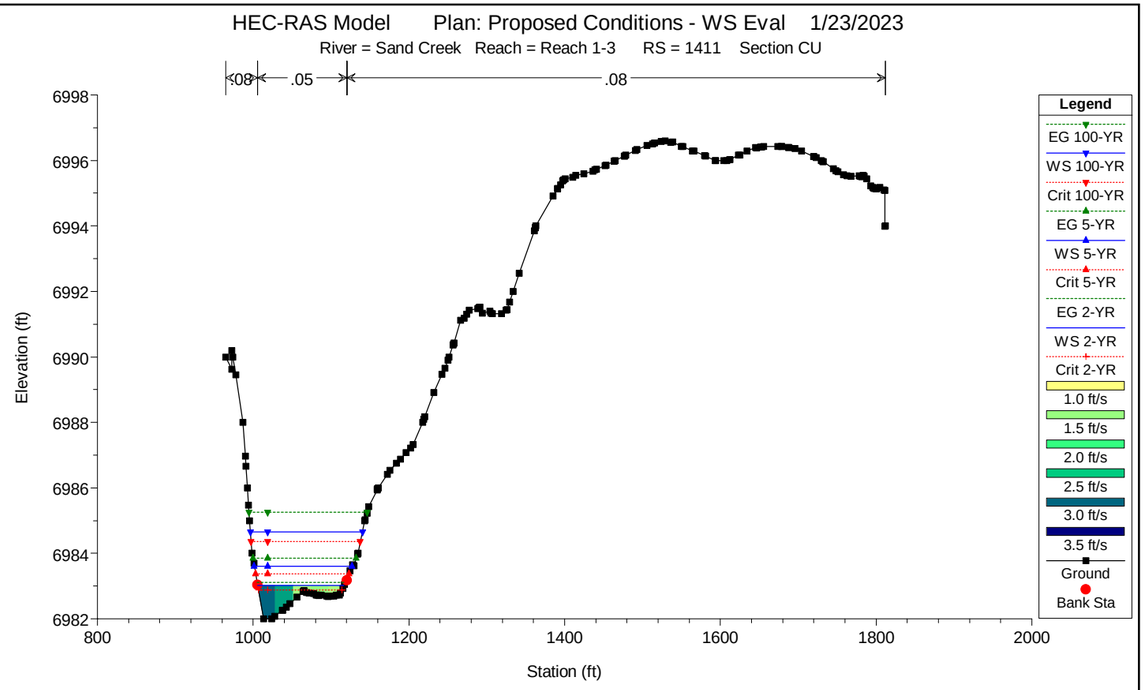

HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1834
.05
.08
.12
.07
.12
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1804
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1707
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1663
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1622
.08
.05
.08
Elevation (ft)
Station (ft)
7005
7000
6995
6990
6985
0
200
400
600
800
1000
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - WS Eval 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1411 Section CU
.08
.05
.08
Elevation (ft)
Station (ft)
6998
6996
6994
6992
6990
6988
6986
6984
6982
800
1000
1200
1400
1600
1800
2000
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| Reach 1-3 | 15504 | 5-YR | 475.50 | 7230.74 | 7232.15 | 7232.07 | 7232.53 | 0.016370 | 6.28 | 115.60 | 114.47 | 0.99 | 1.02 | 1.27 | 0.53 | 1.03 |
| Reach 1-3 | 15504 | 100-YR | 1643.00 | 7230.74 | 7233.40 | 7233.23 | 7234.23 | 0.014852 | 9.52 | 267.70 | 128.61 | 1.06 | 2.01 | 2.31 | 1.16 | 1.92 |
| Reach 1-3 | 15504 | FIS | 2600.00 | 7230.74 | 7234.15 | 7233.95 | 7235.26 | 0.014315 | 11.13 | 367.30 | 137.28 | 1.09 | 2.54 | 2.90 | 1.47 | 2.38 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 14904 | 5-YR | 475.50 | 7220.33 | 7222.53 | 7222.53 | 7223.15 | 0.015138 | 8.48 | 102.93 | 81.19 | 1.04 | 0.81 | 1.95 | 1.07 | 1.19 |
| Reach 1-3 | 14904 | 100-YR | 1643.00 | 7220.33 | 7224.12 | 7224.12 | 7225.24 | 0.015348 | 12.47 | 255.18 | 110.31 | 1.15 | 1.56 | 3.50 | 2.08 | 2.20 |
| Reach 1-3 | 14904 | FIS | 2600.00 | 7220.33 | 7224.97 | 7224.97 | 7226.39 | 0.015561 | 14.44 | 355.24 | 124.17 | 1.20 | 1.97 | 4.37 | 2.63 | 2.76 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 14528 | 5-YR | 475.50 | 7213.99 | 7215.61 | 7215.61 | 7216.19 | 0.017699 | 7.79 | 110.12 | 121.00 | 1.08 | 0.68 | 1.79 | 0.90 | 1.00 |
| Reach 1-3 | 14528 | 100-YR | 1643.00 | 7213.99 | 7216.81 | 7216.81 | 7217.59 | 0.014885 | 10.33 | 310.15 | 181.80 | 1.09 | 1.15 | 2.62 | 1.65 | 1.58 |
| Reach 1-3 | 14528 | FIS | 2600.00 | 7213.99 | 7217.49 | 7217.39 | 7218.40 | 0.013736 | 11.47 | 438.14 | 194.56 | 1.08 | 1.44 | 3.00 | 2.07 | 1.93 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 13756 | 5-YR | 475.50 | 7200.47 | 7202.95 | 7202.95 | 7203.51 | 0.014115 | 8.80 | 109.75 | 85.26 | 1.01 | 0.76 | 2.03 | 1.25 | 1.13 |
| Reach 1-3 | 13756 | 100-YR | 1643.00 | 7200.47 | 7204.42 | 7204.42 | 7205.51 | 0.016804 | 13.27 | 249.53 | 104.59 | 1.20 | 1.93 | 3.93 | 2.81 | 2.48 |
| Reach 1-3 | 13756 | FIS | 2600.00 | 7200.47 | 7205.23 | 7205.23 | 7206.63 | 0.017566 | 15.42 | 335.78 | 109.52 | 1.26 | 2.79 | 4.97 | 3.62 | 3.32 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 12767 | 5-YR | 475.50 | 7180.91 | 7183.26 | 7183.26 | 7183.83 | 0.009512 | 7.03 | 111.53 | 126.85 | 0.83 | 0.22 | 1.31 | 0.80 | 0.52 |
| Reach 1-3 | 12767 | 100-YR | 1643.00 | 7180.91 | 7184.66 | 7184.66 | 7185.47 | 0.009742 | 9.86 | 330.72 | 177.31 | 0.91 | 0.87 | 2.19 | 1.43 | 1.13 |
| Reach 1-3 | 12767 | FIS | 2600.00 | 7180.91 | 7185.26 | 7185.26 | 7186.31 | 0.011117 | 11.68 | 439.51 | 186.90 | 1.00 | 1.39 | 2.92 | 1.66 | 1.62 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 12070 | 5-YR | 475.50 | 7168.31 | 7171.58 | 7171.58 | 7172.44 | 0.011246 | 9.53 | 93.95 | 58.63 | 0.95 | 0.69 | 2.16 | 1.01 | 1.09 |
| Reach 1-3 | 12070 | 100-YR | 1643.00 | 7168.31 | 7173.61 | 7173.61 | 7175.03 | 0.012023 | 13.76 | 233.04 | 73.72 | 1.07 | 1.72 | 3.81 | 2.28 | 2.28 |
| Reach 1-3 | 12070 | FIS | 2600.00 | 7168.31 | 7174.66 | 7174.66 | 7176.52 | 0.012899 | 16.14 | 313.55 | 78.33 | 1.14 | 2.39 | 4.93 | 3.14 | 3.08 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 11206 | 5-YR | 475.50 | 7151.03 | 7153.76 | 7153.76 | 7154.40 | 0.011364 | 8.17 | 111.13 | 92.77 | 0.92 | 0.66 | 1.72 | 0.91 | 0.84 |
| Reach 1-3 | 11206 | 100-YR | 1643.00 | 7151.03 | 7155.48 | 7155.48 | 7156.32 | 0.010130 | 11.00 | 333.11 | 165.83 | 0.95 | 1.13 | 2.61 | 1.20 | 1.26 |
| Reach 1-3 | 11206 | FIS | 2600.00 | 7151.03 | 7156.11 | 7156.11 | 7157.19 | 0.011682 | 12.98 | 439.02 | 173.24 | 1.05 | 1.71 | 3.47 | 1.57 | 1.83 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10925 | 5-YR | 475.50 | 7148.00 | 7149.87 | | 7150.15 | 0.009001 | 4.22 | 112.74 | 104.87 | 0.72 | | 0.60 | | 0.60 |
| Reach 1-3 | 10925 | 100-YR | 1643.00 | 7148.00 | 7150.98 | | 7151.66 | 0.010242 | 6.61 | 248.49 | 129.57 | 0.84 | | 1.22 | | 1.22 |
| Reach 1-3 | 10925 | FIS | 2600.00 | 7148.00 | 7151.60 | 7151.38 | 7152.56 | 0.010090 | 7.90 | 330.21 | 134.40 | 0.88 | 0.18 | 1.59 | 0.18 | 1.54 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10797 | 5-YR | 475.50 | 7145.39 | 7148.14 | 7147.91 | 7148.55 | 0.018364 | 5.17 | 93.64 | 117.85 | 0.78 | 0.29 | 1.55 | 0.52 | 1.40 |
| Reach 1-3 | 10797 | 100-YR | 1643.00 | 7145.39 | 7149.35 | 7149.14 | 7149.97 | 0.017191 | 7.00 | 284.94 | 156.61 | 0.77 | 1.00 | 2.74 | 1.61 | 1.94 |
| Reach 1-3 | 10797 | FIS | 2600.00 | 7145.39 | 7149.94 | 7149.76 | 7150.80 | 0.019038 | 8.34 | 382.70 | 170.55 | 0.83 | 1.52 | 3.74 | 2.33 | 2.66 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10713 | 5-YR | 475.50 | 7144.30 | 7147.27 | | 7147.45 | 0.008697 | 3.75 | 155.78 | 145.09 | 0.54 | | 0.80 | 0.39 | 0.58 |
| Reach 1-3 | 10713 | 100-YR | 1643.00 | 7144.30 | 7148.40 | | 7148.77 | 0.010588 | 5.59 | 371.61 | 212.30 | 0.61 | 0.53 | 1.71 | 1.13 | 1.15 |
| Reach 1-3 | 10713 | FIS | 2600.00 | 7144.30 | 7149.03 | | 7149.50 | 0.010786 | 6.40 | 506.88 | 221.23 | 0.63 | 0.91 | 2.16 | 1.49 | 1.53 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10617 | 5-YR | 475.50 | 7143.44 | 7146.31 | | 7146.56 | 0.010761 | 4.07 | 138.59 | 194.63 | 0.58 | 0.19 | 1.01 | 0.14 | 0.48 |
| Reach 1-3 | 10617 | 100-YR | 1643.00 | 7143.44 | 7147.56 | | 7147.86 | 0.008825 | 5.16 | 414.87 | 235.18 | 0.55 | 0.74 | 1.51 | 0.72 | 0.97 |
| Reach 1-3 | 10617 | FIS | 2600.00 | 7143.44 | 7148.24 | | 7148.60 | 0.008239 | 5.70 | 579.19 | 247.66 | 0.54 | 1.00 | 1.75 | 0.94 | 1.20 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10543 | 5-YR | 475.50 | 7142.46 | 7145.60 | | 7145.83 | 0.008151 | 3.97 | 142.32 | 166.60 | 0.58 | 0.06 | 0.74 | 0.33 | 0.43 |
| Reach 1-3 | 10543 | 100-YR | 1643.00 | 7142.46 | 7146.85 | | 7147.21 | 0.008072 | 5.50 | 392.82 | 213.49 | 0.59 | 0.63 | 1.36 | 0.80 | 0.92 |
| Reach 1-3 | 10543 | FIS | 2600.00 | 7142.46 | 7147.52 | | 7147.97 | 0.008055 | 6.26 | 542.80 | 232.97 | 0.60 | 0.94 | 1.69 | 0.92 | 1.17 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10455 | 5-YR | 475.50 | 7142.32 | 7145.26 | | 7145.44 | 0.008278 | 3.72 | 161.66 | 191.49 | 0.53 | 0.10 | 0.79 | 0.40 | 0.43 |
| Reach 1-3 | 10455 | 100-YR | 1643.00 | 7142.32 | 7146.54 | | 7146.82 | 0.008016 | 5.09 | 434.26 | 241.43 | 0.53 | 0.69 | 1.39 | 0.73 | 0.90 |
| Reach 1-3 | 10455 | FIS | 2600.00 | 7142.32 | 7147.22 | | 7147.57 | 0.008191 | 5.85 | 615.37 | 293.42 | 0.55 | 1.01 | 1.77 | 0.77 | 1.07 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10411 | 5-YR | 475.50 | 7141.35 | 7144.12 | | 7144.36 | 0.011186 | 4.08 | 139.45 | 174.91 | 0.59 | 0.18 | 1.04 | 0.25 | 0.55 |
| Reach 1-3 | 10411 | 100-YR | 1643.00 | 7141.35 | 7145.07 | | 7145.56 | 0.015961 | 6.44 | 338.27 | 230.86 | 0.73 | 1.00 | 2.41 | 1.05 | 1.46 |
| Reach 1-3 | 10411 | FIS | 2600.00 | 7141.35 | 7145.55 | 7145.38 | 7146.21 | 0.018247 | 7.67 | 455.10 | 256.75 | 0.79 | 1.61 | 3.30 | 1.43 | 2.01 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10339 | 5-YR | 475.50 | 7140.02 | 7143.07 | 7142.74 | 7143.41 | 0.013384 | 4.71 | 116.26 | 212.79 | 0.68 | 0.02 | 1.23 | 0.11 | 0.45 |
| Reach 1-3 | 10339 | 100-YR | 1643.00 | 7140.02 | 7144.19 | | 7144.52 | 0.010483 | 5.58 | 444.11 | 347.80 | 0.61 | 0.48 | 1.69 | 0.69 | 0.83 |
| Reach 1-3 | 10339 | FIS | 2600.00 | 7140.02 | 7144.65 | | 7145.04 | 0.011174 | 6.32 | 603.96 | 355.48 | 0.64 | 0.79 | 2.11 | 1.04 | 1.18 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10211 | 5-YR | 475.50 | 7138.76 | 7141.95 | | 7142.24 | 0.010900 | 4.33 | 115.42 | 204.67 | 0.61 | 0.12 | 1.04 | | 0.70 |
| Reach 1-3 | 10211 | 100-YR | 1643.00 | 7138.76 | 7142.99 | | 7143.40 | 0.012565 | 6.05 | 403.46 | 344.68 | 0.67 | 0.80 | 1.99 | 0.56 | 0.92 |
| Reach 1-3 | 10211 | FIS | 2600.00 | 7138.76 | 7143.52 | | 7143.95 | 0.011558 | 6.46 | 586.99 | 349.47 | 0.65 | 1.09 | 2.21 | 0.89 | 1.21 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10113 | 5-YR | 475.50 | 7137.89 | 7140.84 | 7140.52 | 7141.18 | 0.010687 | 4.66 | 109.20 | 218.30 | 0.69 | | 0.94 | 0.04 | 0.33 |
| Reach 1-3 | 10113 | 100-YR | 1643.00 | 7137.89 | 7141.96 | | 7142.33 | 0.009466 | 5.75 | 420.00 | 304.10 | 0.64 | 0.46 | 1.46 | 0.66 | 0.81 |
| Reach 1-3 | 10113 | FIS | 2600.00 | 7137.89 | 7142.51 | | 7142.93 | 0.009290 | 6.36 | 590.03 | 311.09 | 0.64 | 0.72 | 1.76 | 0.96 | 1.10 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 10014 | 5-YR | 475.50 | 7136.24 | 7139.41 | | 7139.86 | 0.016594 | 5.40 | 88.60 | 134.88 | 0.79 | 0.25 | 1.51 | | 1.45 |
| Reach 1-3 | 10014 | 100-YR | 1643.00 | 7136.24 | 7140.60 | 7140.60 | 7141.18 | 0.016511 | 7.03 | 335.31 | 274.27 | 0.78 | 0.60 | 2.56 | 0.95 | 1.26 |
| Reach 1-3 | 10014 | FIS | 2600.00 | 7136.24 | 7141.03 | 7141.03 | 7141.75 | 0.018533 | 8.13 | 459.09 | 287.36 | 0.84 | 1.06 | 3.38 | 1.55 | 1.84 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9955 | 5-YR | 475.50 | 7135.86 | 7138.52 | 7138.52 | 7138.87 | 0.015806 | 4.88 | 120.43 | 254.30 | 0.73 | 0.25 | 1.35 | 0.11 | 0.47 |
| Reach 1-3 | 9955 | 100-YR | 1643.00 | 7135.86 | 7139.33 | 7139.33 | 7139.84 | 0.019177 | 6.90 | 344.78 | 288.74 | 0.82 | 1.04 | 2.60 | 1.09 | 1.43 |
| Reach 1-3 | 9955 | FIS | 2600.00 | 7135.86 | 7139.70 | 7139.70 | 7140.38 | 0.022155 | 8.12 | 452.87 | 293.04 | 0.89 | 1.67 | 3.51 | 1.75 | 2.13 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9943 | 5-YR | 475.50 | 7135.80 | 7138.25 | 7138.25 | 7138.49 | 0.044324 | 4.22 | 130.16 | 263.49 | 0.64 | 0.31 | 3.70 | 0.68 | 1.36 |
| Reach 1-3 | 9943 | 100-YR | 1643.00 | 7135.80 | 7138.84 | 7138.84 | 7139.34 | 0.047045 | 5.53 | 297.12 | 295.61 | 0.70 | 1.73 | 5.64 | 2.39 | 2.95 |
| Reach 1-3 | 9943 | FIS | 2600.00 | 7135.80 | 7139.19 | 7139.19 | 7139.89 | 0.042962 | 5.92 | 403.41 | 299.94 | 0.69 | 2.47 | 6.10 | 3.11 | 3.60 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9926 | 5-YR | 475.50 | 7131.59 | 7135.21 | | 7135.33 | 0.008203 | 2.77 | 180.81 | 92.26 | 0.31 | 0.27 | 1.29 | 0.27 | 1.00 |
| Reach 1-3 | 9926 | 100-YR | 1643.00 | 7131.59 | 7136.55 | | 7137.01 | 0.019995 | 5.73 | 324.87 | 123.84 | 0.51 | 1.61 | 4.80 | 1.45 | 3.25 |
| Reach 1-3 | 9926 | FIS | 2600.00 | 7131.59 | 7137.06 | 7136.36 | 7137.85 | 0.029977 | 7.62 | 397.32 | 243.07 | 0.64 | 2.46 | 8.15 | 0.86 | 3.05 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9913 | 5-YR | 475.50 | 7131.58 | 7135.19 | | 7135.25 | 0.003170 | 2.03 | 247.27 | 111.15 | 0.20 | 0.09 | 0.64 | 0.08 | 0.43 |
| Reach 1-3 | 9913 | 100-YR | 1643.00 | 7131.58 | 7136.57 | | 7136.78 | 0.007808 | 4.01 | 477.91 | 246.24 | 0.33 | 0.66 | 2.22 | 0.37 | 0.94 |
| Reach 1-3 | 9913 | FIS | 2600.00 | 7131.58 | 7137.24 | | 7137.50 | 0.008190 | 4.50 | 652.80 | 272.86 | 0.34 | 0.69 | 2.67 | 0.71 | 1.21 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9910 | 5-YR | 475.50 | 7132.63 | 7135.08 | | 7135.23 | 0.011968 | 3.06 | 167.14 | 111.78 | 0.36 | 0.41 | 1.65 | 0.25 | 1.11 |
| Reach 1-3 | 9910 | 100-YR | 1643.00 | 7132.63 | 7136.46 | | 7136.74 | 0.014646 | 4.67 | 402.95 | 244.56 | 0.43 | 1.28 | 3.27 | 0.74 | 1.50 |
| Reach 1-3 | 9910 | FIS | 2600.00 | 7132.63 | 7137.15 | | 7137.47 | 0.012208 | 4.80 | 581.44 | 270.80 | 0.41 | 1.10 | 3.25 | 1.10 | 1.63 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9875 | 5-YR | 475.50 | 7131.85 | 7134.54 | 7134.17 | 7134.85 | 0.008966 | 4.49 | 112.87 | 146.19 | 0.66 | 0.06 | 0.80 | 0.06 | 0.43 |
| Reach 1-3 | 9875 | 100-YR | 1643.00 | 7131.85 | 7136.20 | | 7136.47 | 0.004812 | 4.88 | 480.04 | 258.88 | 0.49 | 0.37 | 0.92 | 0.43 | 0.56 |
| Reach 1-3 | 9875 | FIS | 2600.00 | 7131.85 | 7136.86 | | 7137.20 | 0.005212 | 5.68 | 656.47 | 278.92 | 0.52 | 0.51 | 1.21 | 0.66 | 0.76 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9815 | 5-YR | 475.50 | 7130.14 | 7134.01 | | 7134.32 | 0.008585 | 4.50 | 106.04 | 80.43 | 0.65 | 0.01 | 0.78 | 0.03 | 0.70 |
| Reach 1-3 | 9815 | 100-YR | 1643.00 | 7130.14 | 7135.26 | 7135.26 | 7135.99 | 0.013299 | 7.30 | 297.91 | 229.69 | 0.78 | 0.54 | 2.23 | 0.54 | 1.07 |
| Reach 1-3 | 9815 | FIS | 2600.00 | 7130.14 | 7135.85 | 7135.85 | 7136.69 | 0.013822 | 8.26 | 445.05 | 263.76 | 0.80 | 0.84 | 2.82 | 1.04 | 1.45 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9772 | 5-YR | 475.50 | 7130.91 | 7133.60 | | 7133.91 | 0.010707 | 4.54 | 116.48 | 128.43 | 0.69 | | 0.89 | 0.20 | 0.60 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| Reach 1-3 | 9772 | 100-YR | 1643.00 | 7130.91 | 7134.76 | 7134.59 | 7135.36 | 0.012827 | 6.82 | 309.40 | 217.18 | 0.76 | 0.44 | 1.99 | 0.91 | 1.14 |
| Reach 1-3 | 9772 | FIS | 2600.00 | 7130.91 | 7135.31 | 7135.21 | 7136.07 | 0.013706 | 7.91 | 440.73 | 254.17 | 0.80 | 0.75 | 2.60 | 1.31 | 1.48 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9727 | 5-YR | 475.50 | 7129.87 | 7133.00 | 7132.88 | 7133.37 | 0.013269 | 5.00 | 108.69 | 127.42 | 0.77 | | 1.08 | 0.26 | 0.70 |
| Reach 1-3 | 9727 | 100-YR | 1643.00 | 7129.87 | 7134.18 | 7134.09 | 7134.76 | 0.013691 | 6.88 | 323.91 | 240.21 | 0.77 | 0.48 | 2.09 | 1.21 | 1.15 |
| Reach 1-3 | 9727 | FIS | 2600.00 | 7129.87 | 7134.69 | 7134.60 | 7135.42 | 0.014980 | 7.99 | 448.53 | 247.47 | 0.82 | 0.97 | 2.76 | 1.74 | 1.69 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9636 | 5-YR | 475.50 | 7129.38 | 7132.05 | | 7132.23 | 0.010624 | 3.85 | 160.79 | 196.39 | 0.58 | 0.04 | 0.90 | 0.39 | 0.54 |
| Reach 1-3 | 9636 | 100-YR | 1643.00 | 7129.38 | 7132.75 | 7132.73 | 7133.24 | 0.020262 | 6.65 | 340.25 | 322.37 | 0.81 | 0.47 | 2.59 | 1.61 | 1.33 |
| Reach 1-3 | 9636 | FIS | 2600.00 | 7129.38 | 7133.12 | 7133.12 | 7133.76 | 0.022893 | 7.77 | 459.34 | 326.27 | 0.88 | 1.04 | 3.45 | 2.31 | 2.01 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9626 | 5-YR | 475.50 | 7129.34 | 7131.74 | 7131.74 | 7132.02 | 0.055418 | 4.50 | 116.69 | 213.48 | 0.71 | 0.09 | 4.31 | 0.88 | 2.07 |
| Reach 1-3 | 9626 | 100-YR | 1643.00 | 7129.34 | 7132.48 | 7132.48 | 7132.96 | 0.042216 | 5.35 | 314.86 | 331.57 | 0.67 | 1.07 | 5.21 | 2.58 | 2.50 |
| Reach 1-3 | 9626 | FIS | 2600.00 | 7129.34 | 7132.83 | 7132.83 | 7133.45 | 0.040405 | 5.82 | 430.84 | 335.51 | 0.67 | 1.87 | 5.86 | 3.32 | 3.23 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9614 | 5-YR | 475.50 | 7126.48 | 7128.87 | 7128.87 | 7129.40 | 0.097952 | 5.84 | 84.96 | 103.52 | 0.93 | 0.19 | 7.34 | 0.91 | 4.99 |
| Reach 1-3 | 9614 | 100-YR | 1643.00 | 7126.48 | 7130.02 | 7130.02 | 7130.68 | 0.061869 | 7.21 | 270.27 | 191.46 | 0.83 | 2.99 | 8.98 | 4.08 | 5.43 |
| Reach 1-3 | 9614 | FIS | 2600.00 | 7126.48 | 7130.51 | 7130.51 | 7131.35 | 0.062272 | 8.19 | 367.29 | 208.75 | 0.86 | 4.40 | 10.91 | 5.40 | 6.82 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9600 | 5-YR | 475.50 | 7123.43 | 7126.83 | | 7126.95 | 0.010102 | 2.87 | 174.17 | 104.67 | 0.33 | 0.34 | 1.43 | 0.36 | 1.04 |
| Reach 1-3 | 9600 | 100-YR | 1643.00 | 7123.43 | 7128.10 | | 7128.50 | 0.018383 | 5.18 | 333.97 | 148.39 | 0.48 | 1.35 | 4.04 | 1.36 | 2.57 |
| Reach 1-3 | 9600 | FIS | 2600.00 | 7123.43 | 7128.56 | | 7129.23 | 0.025970 | 6.68 | 406.17 | 165.54 | 0.59 | 2.27 | 6.45 | 2.23 | 3.96 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9587 | 5-YR | 475.50 | 7123.38 | 7126.81 | | 7126.87 | 0.002964 | 1.91 | 264.62 | 150.53 | 0.19 | 0.11 | 0.57 | 0.10 | 0.32 |
| Reach 1-3 | 9587 | 100-YR | 1643.00 | 7123.38 | 7128.12 | | 7128.31 | 0.005905 | 3.38 | 489.18 | 227.72 | 0.28 | 0.59 | 1.60 | 0.42 | 0.91 |
| Reach 1-3 | 9587 | FIS | 2600.00 | 7123.38 | 7128.61 | | 7128.95 | 0.008524 | 4.35 | 597.88 | 294.28 | 0.34 | 1.03 | 2.57 | 0.30 | 1.07 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9584 | 5-YR | 475.50 | 7124.71 | 7126.73 | | 7126.85 | 0.021540 | 2.68 | 177.47 | 152.36 | 0.44 | | 1.56 | | 1.56 |
| Reach 1-3 | 9584 | 100-YR | 1643.00 | 7124.71 | 7128.01 | | 7128.28 | 0.022448 | 4.11 | 400.37 | 238.30 | 0.49 | 0.21 | 3.01 | 0.21 | 2.86 |
| Reach 1-3 | 9584 | FIS | 2600.00 | 7124.71 | 7128.49 | | 7128.91 | 0.027993 | 5.24 | 508.56 | 300.61 | 0.57 | 0.68 | 4.57 | 0.29 | 2.95 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9558 | 5-YR | 475.50 | 7122.44 | 7126.18 | | 7126.34 | 0.016056 | 3.33 | 146.97 | 115.42 | 0.41 | 0.32 | 2.00 | 0.44 | 1.41 |
| Reach 1-3 | 9558 | 100-YR | 1643.00 | 7122.44 | 7127.44 | | 7127.75 | 0.016736 | 4.70 | 371.96 | 295.93 | 0.46 | 0.96 | 3.40 | 0.70 | 1.43 |
| Reach 1-3 | 9558 | FIS | 2600.00 | 7122.44 | 7127.96 | | 7128.34 | 0.016007 | 5.06 | 523.20 | 322.31 | 0.46 | 1.18 | 3.76 | 0.99 | 1.62 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9498 | 5-YR | 475.50 | 7122.10 | 7125.02 | 7124.75 | 7125.36 | 0.016415 | 4.70 | 109.35 | 140.37 | 0.73 | | 1.32 | 0.19 | 0.85 |
| Reach 1-3 | 9498 | 100-YR | 1643.00 | 7122.10 | 7126.13 | 7126.04 | 7126.68 | 0.017277 | 6.67 | 321.77 | 250.79 | 0.76 | 0.83 | 2.57 | 0.99 | 1.46 |
| Reach 1-3 | 9498 | FIS | 2600.00 | 7122.10 | 7126.70 | 7126.54 | 7127.32 | 0.016220 | 7.33 | 461.69 | 257.21 | 0.75 | 1.28 | 2.99 | 1.33 | 1.81 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9389 | 5-YR | 475.50 | 7120.61 | 7122.59 | 7122.59 | 7122.95 | 0.031049 | 4.99 | 103.88 | 140.21 | 0.80 | 0.74 | 2.37 | 0.46 | 1.43 |
| Reach 1-3 | 9389 | 100-YR | 1643.00 | 7120.61 | 7123.50 | 7123.50 | 7124.28 | 0.029989 | 7.11 | 237.08 | 156.54 | 0.86 | 2.24 | 3.98 | 1.73 | 2.83 |
| Reach 1-3 | 9389 | FIS | 2600.00 | 7120.61 | 7124.07 | 7124.07 | 7125.10 | 0.027349 | 7.95 | 328.93 | 168.18 | 0.85 | 2.83 | 4.60 | 2.19 | 3.32 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9256 | 5-YR | 475.50 | 7118.36 | 7120.57 | 7119.97 | 7120.64 | 0.004675 | 2.13 | 226.93 | 204.92 | 0.35 | 0.11 | 0.34 | 0.13 | 0.32 |
| Reach 1-3 | 9256 | 100-YR | 1643.00 | 7118.36 | 7121.97 | | 7122.13 | 0.003727 | 3.20 | 530.77 | 227.33 | 0.35 | 0.27 | 0.60 | 0.25 | 0.54 |
| Reach 1-3 | 9256 | FIS | 2600.00 | 7118.36 | 7123.40 | | 7123.55 | 0.001959 | 3.11 | 871.00 | 249.11 | 0.27 | 0.23 | 0.49 | 0.23 | 0.43 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9243 | 5-YR | 475.50 | 7119.00 | 7119.73 | 7119.73 | 7120.04 | 0.131026 | 4.49 | 105.74 | 169.55 | 0.98 | 0.97 | 5.33 | 1.47 | 5.10 |
| Reach 1-3 | 9243 | 100-YR | 1643.00 | 7119.00 | 7121.68 | | 7121.87 | 0.010410 | 3.19 | 486.97 | 215.43 | 0.35 | 0.73 | 1.69 | 1.03 | 1.47 |
| Reach 1-3 | 9243 | FIS | 2600.00 | 7119.00 | 7123.26 | | 7123.43 | 0.004158 | 2.76 | 846.78 | 241.54 | 0.24 | 0.57 | 1.09 | 0.53 | 0.91 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9216 | 5-YR | 475.50 | 7114.00 | 7118.78 | | 7118.78 | 0.000013 | 0.47 | 1052.11 | 240.55 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Reach 1-3 | 9216 | 100-YR | 1643.00 | 7114.00 | 7121.80 | | 7121.82 | 0.000027 | 0.95 | 1831.41 | 273.88 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 9216 | FIS | 2600.00 | 7114.00 | 7123.36 | | 7123.38 | 0.000036 | 1.23 | 2269.84 | 293.30 | 0.07 | 0.01 | 0.02 | 0.01 | 0.02 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9080 | 5-YR | 480.20 | 7114.00 | 7118.78 | | 7118.78 | 0.000019 | 0.52 | 957.29 | 220.94 | 0.04 | 0.00 | 0.01 | 0.00 | 0.00 |
| Reach 1-3 | 9080 | 100-YR | 1665.90 | 7114.00 | 7121.80 | | 7121.81 | 0.000040 | 1.06 | 1668.02 | 251.65 | 0.07 | 0.01 | 0.02 | 0.01 | 0.02 |
| Reach 1-3 | 9080 | FIS | 2600.00 | 7114.00 | 7123.35 | | 7123.37 | 0.000051 | 1.34 | 2071.57 | 268.30 | 0.08 | 0.01 | 0.03 | 0.02 | 0.02 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 9029 | 5-YR | 480.20 | 7117.75 | 7118.70 | | 7118.77 | 0.002692 | 2.13 | 226.62 | 242.19 | 0.39 | 0.09 | 0.16 | 0.09 | 0.16 |
| Reach 1-3 | 9029 | 100-YR | 1665.90 | 7117.75 | 7121.76 | | 7121.80 | 0.000249 | 1.69 | 1010.66 | 273.00 | 0.15 | 0.03 | 0.06 | 0.03 | 0.06 |
| Reach 1-3 | 9029 | FIS | 2600.00 | 7117.75 | 7123.31 | | 7123.36 | 0.000196 | 1.86 | 1453.61 | 298.54 | 0.14 | 0.03 | 0.07 | 0.04 | 0.06 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8989 | 5-YR | 480.20 | 7117.73 | 7118.27 | 7118.27 | 7118.51 | 0.022429 | 4.01 | 120.22 | 242.59 | 1.00 | 0.37 | 0.70 | 0.34 | 0.69 |
| Reach 1-3 | 8989 | 100-YR | 1665.90 | 7117.73 | 7121.75 | | 7121.79 | 0.000242 | 1.66 | 1031.42 | 281.20 | 0.15 | 0.03 | 0.06 | 0.03 | 0.06 |
| Reach 1-3 | 8989 | FIS | 2600.00 | 7117.73 | 7123.31 | | 7123.36 | 0.000187 | 1.82 | 1479.78 | 296.81 | 0.14 | 0.03 | 0.06 | 0.03 | 0.06 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8983 | 5-YR | 480.20 | 7103.78 | 7110.88 | | 7110.99 | 0.000554 | 2.73 | 175.79 | 24.84 | 0.18 | | 0.16 | | 0.16 |
| Reach 1-3 | 8983 | 100-YR | 1665.90 | 7103.78 | 7121.66 | | 7121.78 | 0.001301 | 2.82 | 616.96 | 281.94 | 0.30 | 0.05 | 0.20 | 0.05 | 0.17 |
| Reach 1-3 | 8983 | FIS | 2600.00 | 7103.78 | 7123.26 | | 7123.35 | 0.000577 | 2.55 | 1077.59 | 297.43 | 0.22 | 0.07 | 0.14 | 0.07 | 0.12 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8956 | 5-YR | 480.20 | 7103.78 | 7110.86 | 7106.04 | 7110.98 | 0.000558 | 2.74 | 175.39 | 24.84 | 0.18 | | 0.16 | | 0.16 |
| Reach 1-3 | 8956 | 100-YR | 1665.90 | 7103.78 | 7121.62 | 7108.97 | 7121.75 | 0.001377 | 2.87 | 605.26 | 281.55 | 0.31 | 0.05 | 0.21 | 0.05 | 0.17 |
| Reach 1-3 | 8956 | FIS | 2600.00 | 7103.78 | 7123.24 | 7110.78 | 7123.33 | 0.000585 | 2.56 | 1072.80 | 297.27 | 0.22 | 0.07 | 0.14 | 0.07 | 0.12 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8919 | | Culvert | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8888 | 5-YR | 480.20 | 7103.58 | 7106.85 | 7106.85 | 7108.50 | 0.011981 | 10.23 | 46.63 | 47.00 | 1.00 | 2.44 | 2.44 | 2.44 | 2.44 |
| Reach 1-3 | 8888 | 100-YR | 1665.90 | 7103.58 | 7111.09 | 7111.09 | 7114.85 | 0.008998 | 15.44 | 107.17 | 47.20 | 0.99 | 4.22 | 4.22 | 4.22 | 4.22 |
| Reach 1-3 | 8888 | FIS | 2600.00 | 7103.58 | 7113.66 | 7113.66 | 7118.74 | 0.008208 | 17.94 | 143.89 | 81.95 | 1.00 | 5.16 | 5.16 | 5.16 | 5.16 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8886 | 5-YR | 480.20 | 7102.02 | 7104.94 | 7104.94 | 7106.41 | 0.012504 | 9.68 | 49.38 | 46.92 | 1.00 | 2.28 | 2.27 | 2.23 | 2.27 |
| Reach 1-3 | 8886 | 100-YR | 1665.90 | 7102.02 | 7108.71 | 7108.71 | 7112.08 | 0.009454 | 14.64 | 113.27 | 47.09 | 1.00 | 3.95 | 3.94 | 3.90 | 3.94 |
| Reach 1-3 | 8886 | FIS | 2600.00 | 7102.02 | 7111.02 | 7111.02 | 7115.55 | 0.008569 | 16.99 | 152.38 | 47.20 | 1.00 | 4.81 | 4.81 | 4.77 | 4.81 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8852 | 5-YR | 480.20 | 7102.13 | 7104.81 | | 7104.86 | 0.000626 | 1.96 | 278.57 | 168.13 | 0.22 | 0.03 | 0.10 | | 0.06 |
| Reach 1-3 | 8852 | 100-YR | 1665.90 | 7102.13 | 7105.89 | | 7106.10 | 0.001643 | 4.00 | 474.66 | 206.39 | 0.37 | 0.18 | 0.36 | 0.04 | 0.23 |
| Reach 1-3 | 8852 | FIS | 2600.00 | 7102.13 | 7106.51 | | 7106.82 | 0.001983 | 4.89 | 620.59 | 253.16 | 0.42 | 0.29 | 0.51 | 0.08 | 0.30 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8850 | 5-YR | 480.20 | 7103.55 | 7104.69 | | 7104.85 | 0.007027 | 3.32 | 150.29 | 169.55 | 0.56 | 0.30 | 0.48 | 0.14 | 0.39 |
| Reach 1-3 | 8850 | 100-YR | 1665.90 | 7103.55 | 7105.65 | | 7106.07 | 0.007205 | 5.11 | 330.19 | 206.95 | 0.63 | 0.71 | 0.93 | 0.20 | 0.71 |
| Reach 1-3 | 8850 | FIS | 2600.00 | 7103.55 | 7106.23 | | 7106.79 | 0.006809 | 5.86 | 462.96 | 255.86 | 0.63 | 0.89 | 1.12 | 0.25 | 0.77 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8786 | 5-YR | 480.20 | 7101.10 | 7104.10 | | 7104.31 | 0.009760 | 3.96 | 165.08 | 258.17 | 0.57 | 0.19 | 0.89 | 0.22 | 0.39 |
| Reach 1-3 | 8786 | 100-YR | 1665.90 | 7101.10 | 7105.35 | | 7105.56 | 0.006517 | 4.49 | 498.31 | 271.30 | 0.48 | 0.61 | 1.10 | 0.63 | 0.74 |
| Reach 1-3 | 8786 | FIS | 2600.00 | 7101.10 | 7106.02 | | 7106.28 | 0.006110 | 4.95 | 681.54 | 276.50 | 0.47 | 0.81 | 1.28 | 0.84 | 0.94 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8750 | 5-YR | 480.20 | 7100.37 | 7103.36 | | 7103.56 | 0.008654 | 3.83 | 158.49 | 214.41 | 0.53 | 0.27 | 0.85 | 0.05 | 0.49 |
| Reach 1-3 | 8750 | 100-YR | 1665.90 | 7100.37 | 7104.36 | | 7104.81 | 0.013164 | 6.17 | 342.97 | 253.11 | 0.68 | 1.20 | 2.11 | 0.46 | 1.44 |
| Reach 1-3 | 8750 | FIS | 2600.00 | 7100.37 | 7104.88 | | 7105.50 | 0.014860 | 7.31 | 448.68 | 275.56 | 0.73 | 1.81 | 2.86 | 0.76 | 2.00 |
| | | | | | | | | | | | | | | | | |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| Reach 1-3 | 8683 | 5-YR | 480.20 | 7099.61 | 7102.59 | 7102.31 | 7102.83 | 0.010815 | 4.18 | 149.27 | 260.20 | 0.60 | 0.23 | 1.01 | 0.10 | 0.39 |
| Reach 1-3 | 8683 | 100-YR | 1665.90 | 7099.61 | 7103.66 | | 7103.96 | 0.009631 | 5.27 | 433.41 | 268.73 | 0.58 | 0.82 | 1.54 | 0.72 | 0.96 |
| Reach 1-3 | 8683 | FIS | 2600.00 | 7099.61 | 7104.22 | | 7104.59 | 0.009550 | 5.89 | 584.85 | 272.51 | 0.59 | 1.13 | 1.86 | 1.03 | 1.27 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8578 | 5-YR | 480.20 | 7099.09 | 7102.05 | | 7102.17 | 0.006139 | 3.14 | 207.05 | 246.17 | 0.44 | 0.19 | 0.60 | 0.21 | 0.32 |
| Reach 1-3 | 8578 | 100-YR | 1665.90 | 7099.09 | 7102.99 | | 7103.25 | 0.008740 | 4.88 | 442.40 | 253.08 | 0.54 | 0.76 | 1.37 | 0.79 | 0.95 |
| Reach 1-3 | 8578 | FIS | 2600.00 | 7099.09 | 7103.51 | | 7103.87 | 0.009563 | 5.70 | 573.92 | 257.09 | 0.58 | 1.11 | 1.80 | 1.15 | 1.33 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8429 | 5-YR | 480.20 | 7098.29 | 7101.06 | 7100.98 | 7101.42 | 0.012937 | 4.95 | 110.40 | 218.17 | 0.77 | 0.21 | 1.03 | 0.02 | 0.41 |
| Reach 1-3 | 8429 | 100-YR | 1665.90 | 7098.29 | 7102.02 | | 7102.47 | 0.009476 | 6.16 | 330.72 | 233.18 | 0.72 | 0.69 | 1.32 | 0.56 | 0.83 |
| Reach 1-3 | 8429 | FIS | 2600.00 | 7098.29 | 7102.56 | | 7103.10 | 0.008387 | 6.71 | 457.25 | 236.30 | 0.71 | 0.88 | 1.45 | 0.77 | 1.01 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8326 | 5-YR | 480.20 | 7096.32 | 7099.25 | 7099.25 | 7099.72 | 0.012631 | 4.98 | 89.61 | 96.87 | 0.95 | 0.12 | 0.67 | 0.95 | 0.72 |
| Reach 1-3 | 8326 | 100-YR | 1665.90 | 7096.32 | 7100.64 | 7100.64 | 7101.39 | 0.007129 | 7.10 | 258.38 | 195.05 | 0.84 | 0.16 | 0.99 | 1.00 | 0.58 |
| Reach 1-3 | 8326 | FIS | 2600.00 | 7096.32 | 7101.20 | 7101.20 | 7102.10 | 0.006901 | 8.13 | 370.28 | 199.91 | 0.86 | 0.39 | 1.20 | 1.12 | 0.79 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8290 | 5-YR | 480.20 | 7097.00 | 7098.50 | | 7098.73 | 0.009227 | 3.83 | 125.37 | 94.21 | 0.59 | | 0.76 | | 0.76 |
| Reach 1-3 | 8290 | 100-YR | 1665.90 | 7097.00 | 7099.73 | | 7100.43 | 0.013374 | 6.71 | 248.22 | 106.02 | 0.77 | | 1.95 | | 1.95 |
| Reach 1-3 | 8290 | FIS | 2600.00 | 7097.00 | 7100.38 | 7100.06 | 7101.41 | 0.015200 | 8.14 | 319.37 | 112.30 | 0.85 | | 2.68 | | 2.68 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8276 | 5-YR | 480.20 | 7097.00 | 7098.37 | 7098.01 | 7098.60 | 0.010226 | 3.81 | 126.12 | 103.33 | 0.61 | | 0.78 | | 0.78 |
| Reach 1-3 | 8276 | 100-YR | 1665.90 | 7097.00 | 7099.58 | 7099.17 | 7100.23 | 0.013181 | 6.48 | 257.22 | 114.69 | 0.76 | | 1.84 | | 1.84 |
| Reach 1-3 | 8276 | FIS | 2600.00 | 7097.00 | 7100.23 | 7099.86 | 7101.17 | 0.014446 | 7.79 | 333.87 | 120.85 | 0.83 | | 2.48 | | 2.48 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8267 | 5-YR | 480.20 | 7097.00 | 7097.97 | 7097.97 | 7098.39 | 0.031384 | 5.23 | 91.84 | 108.53 | 1.00 | | 1.66 | | 1.66 |
| Reach 1-3 | 8267 | 100-YR | 1665.90 | 7097.00 | 7099.06 | 7099.06 | 7099.99 | 0.024521 | 7.73 | 215.63 | 117.65 | 1.01 | | 2.80 | | 2.80 |
| Reach 1-3 | 8267 | FIS | 2600.00 | 7097.00 | 7099.71 | 7099.71 | 7100.93 | 0.022639 | 8.85 | 293.86 | 123.07 | 1.01 | | 3.36 | | 3.36 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8229 | 5-YR | 480.20 | 7091.00 | 7095.09 | | 7095.15 | 0.000860 | 1.91 | 251.59 | 89.99 | 0.20 | | 0.15 | | 0.15 |
| Reach 1-3 | 8229 | 100-YR | 1665.90 | 7091.00 | 7096.97 | | 7097.20 | 0.002063 | 3.83 | 434.80 | 105.08 | 0.33 | | 0.53 | | 0.53 |
| Reach 1-3 | 8229 | FIS | 2600.00 | 7091.00 | 7098.34 | | 7098.65 | 0.002122 | 4.43 | 586.44 | 116.11 | 0.35 | | 0.66 | | 0.66 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8210 | 5-YR | 480.20 | 7091.00 | 7095.08 | | 7095.13 | 0.000856 | 1.89 | 253.61 | 91.50 | 0.20 | | 0.15 | | 0.15 |
| Reach 1-3 | 8210 | 100-YR | 1665.90 | 7091.00 | 7096.93 | | 7097.16 | 0.002060 | 3.81 | 437.29 | 106.48 | 0.33 | | 0.52 | | 0.52 |
| Reach 1-3 | 8210 | FIS | 2600.00 | 7091.00 | 7098.30 | | 7098.61 | 0.002103 | 4.40 | 590.88 | 117.56 | 0.35 | | 0.65 | | 0.65 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8209 | 5-YR | 480.20 | 7093.00 | 7094.97 | | 7095.11 | 0.003948 | 3.01 | 159.34 | 90.59 | 0.40 | | 0.43 | | 0.43 |
| Reach 1-3 | 8209 | 100-YR | 1665.90 | 7093.00 | 7096.71 | | 7097.10 | 0.005143 | 5.06 | 329.37 | 104.66 | 0.50 | | 1.00 | | 1.00 |
| Reach 1-3 | 8209 | FIS | 2600.00 | 7093.00 | 7098.11 | | 7098.56 | 0.003989 | 5.37 | 484.18 | 115.99 | 0.46 | | 1.03 | | 1.03 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8175 | 5-YR | 480.20 | 7093.00 | 7094.73 | | 7094.92 | 0.006290 | 3.51 | 136.83 | 87.84 | 0.50 | | 0.61 | | 0.61 |
| Reach 1-3 | 8175 | 100-YR | 1665.90 | 7093.00 | 7096.33 | | 7096.85 | 0.007627 | 5.78 | 288.07 | 100.68 | 0.60 | | 1.35 | | 1.35 |
| Reach 1-3 | 8175 | FIS | 2600.00 | 7093.00 | 7097.88 | | 7098.39 | 0.004818 | 5.74 | 452.71 | 113.00 | 0.51 | | 1.19 | | 1.19 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8165 | 5-YR | 480.20 | 7093.00 | 7094.62 | 7094.11 | 7094.84 | 0.007898 | 3.77 | 127.27 | 86.96 | 0.55 | | 0.72 | | 0.72 |
| Reach 1-3 | 8165 | 100-YR | 1665.90 | 7093.00 | 7096.17 | | 7096.75 | 0.009119 | 6.13 | 271.56 | 99.36 | 0.65 | | 1.54 | | 1.54 |
| Reach 1-3 | 8165 | FIS | 2600.00 | 7093.00 | 7097.80 | | 7098.34 | 0.005082 | 5.85 | 444.62 | 112.43 | 0.52 | | 1.24 | | 1.24 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8155 | 5-YR | 480.20 | 7093.00 | 7094.11 | 7094.11 | 7094.62 | 0.029657 | 5.72 | 83.90 | 82.88 | 1.00 | | 1.87 | | 1.87 |
| Reach 1-3 | 8155 | 100-YR | 1665.90 | 7093.00 | 7095.56 | 7095.43 | 7096.52 | 0.019178 | 7.83 | 212.87 | 94.51 | 0.92 | | 2.68 | | 2.68 |
| Reach 1-3 | 8155 | FIS | 2600.00 | 7093.00 | 7097.72 | | 7098.28 | 0.005405 | 5.97 | 435.43 | 111.77 | 0.53 | | 1.30 | | 1.30 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8125 | 5-YR | 480.20 | 7087.00 | 7092.55 | | 7092.60 | 0.000512 | 1.80 | 267.39 | 70.39 | 0.16 | | 0.12 | | 0.12 |
| Reach 1-3 | 8125 | 100-YR | 1665.90 | 7087.00 | 7095.90 | | 7096.04 | 0.000870 | 3.04 | 547.90 | 97.17 | 0.23 | | 0.30 | | 0.30 |
| Reach 1-3 | 8125 | FIS | 2600.00 | 7087.00 | 7097.85 | | 7098.04 | 0.000897 | 3.45 | 753.17 | 112.81 | 0.24 | | 0.37 | | 0.37 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8105 | 5-YR | 480.20 | 7087.00 | 7092.54 | | 7092.59 | 0.000516 | 1.80 | 266.67 | 70.34 | 0.16 | | 0.12 | | 0.12 |
| Reach 1-3 | 8105 | 100-YR | 1665.90 | 7087.00 | 7095.88 | | 7096.02 | 0.000878 | 3.05 | 546.40 | 97.15 | 0.23 | | 0.30 | | 0.30 |
| Reach 1-3 | 8105 | FIS | 2600.00 | 7087.00 | 7097.83 | | 7098.02 | 0.000903 | 3.46 | 751.61 | 112.83 | 0.24 | | 0.37 | | 0.37 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8104 | 5-YR | 480.20 | 7089.00 | 7092.48 | | 7092.57 | 0.001449 | 2.47 | 194.56 | 69.87 | 0.26 | | 0.25 | | 0.25 |
| Reach 1-3 | 8104 | 100-YR | 1665.90 | 7089.00 | 7095.81 | | 7096.01 | 0.001409 | 3.53 | 472.15 | 96.63 | 0.28 | | 0.42 | | 0.42 |
| Reach 1-3 | 8104 | FIS | 2600.00 | 7089.00 | 7097.78 | | 7098.00 | 0.001265 | 3.84 | 677.18 | 112.38 | 0.28 | | 0.47 | | 0.47 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 8074 | 5-YR | 480.20 | 7089.00 | 7092.32 | 7090.82 | 7092.49 | 0.003022 | 3.35 | 143.42 | 56.43 | 0.37 | | 0.47 | | 0.47 |
| Reach 1-3 | 8074 | 100-YR | 1665.90 | 7089.00 | 7095.50 | 7092.79 | 7095.89 | 0.002382 | 5.04 | 330.84 | 69.00 | 0.37 | | 0.82 | | 0.82 |
| Reach 1-3 | 8074 | FIS | 2600.00 | 7089.00 | 7097.31 | 7093.80 | 7097.86 | 0.002281 | 5.94 | 437.75 | 69.00 | 0.38 | | 1.04 | | 1.04 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7949 | | Culvert | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7828 | 5-YR | 512.38 | 7088.70 | 7091.37 | 7090.77 | 7091.79 | 0.003393 | 5.24 | 97.87 | 48.09 | 0.63 | | 0.44 | | 0.44 |
| Reach 1-3 | 7828 | 100-YR | 1763.93 | 7088.70 | 7092.84 | 7092.84 | 7094.60 | 0.006906 | 10.62 | 166.03 | 60.55 | 0.99 | | 1.53 | | 1.53 |
| Reach 1-3 | 7828 | FIS | 2600.00 | 7088.70 | 7093.90 | 7093.90 | 7096.17 | 0.006333 | 12.09 | 215.07 | 60.61 | 0.99 | | 1.81 | | 1.81 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7788 | 5-YR | 512.38 | 7088.52 | 7091.42 | | 7091.55 | 0.001723 | 3.06 | 181.49 | 83.83 | 0.32 | 0.13 | 0.30 | 0.18 | 0.23 |
| Reach 1-3 | 7788 | 100-YR | 1763.93 | 7088.52 | 7093.30 | | 7093.70 | 0.002728 | 5.42 | 352.85 | 98.90 | 0.44 | 0.36 | 0.80 | 0.53 | 0.60 |
| Reach 1-3 | 7788 | FIS | 2600.00 | 7088.52 | 7094.14 | | 7094.70 | 0.003107 | 6.46 | 438.65 | 105.67 | 0.48 | 0.49 | 1.07 | 0.71 | 0.80 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7765 | 5-YR | 512.38 | 7088.50 | 7091.39 | | 7091.52 | 0.001325 | 3.11 | 188.17 | 91.24 | 0.32 | 0.11 | 0.24 | 0.12 | 0.17 |
| Reach 1-3 | 7765 | 100-YR | 1763.93 | 7088.50 | 7093.27 | | 7093.63 | 0.002069 | 5.44 | 375.24 | 107.55 | 0.44 | 0.30 | 0.61 | 0.38 | 0.45 |
| Reach 1-3 | 7765 | FIS | 2600.00 | 7088.50 | 7094.11 | | 7094.62 | 0.002346 | 6.46 | 468.98 | 114.53 | 0.48 | 0.41 | 0.82 | 0.52 | 0.59 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7742 | 5-YR | 512.38 | 7088.50 | 7091.00 | | 7091.43 | 0.006301 | 5.51 | 105.47 | 75.67 | 0.67 | 0.25 | 0.82 | 0.25 | 0.55 |
| Reach 1-3 | 7742 | 100-YR | 1763.93 | 7088.50 | 7092.31 | 7092.31 | 7093.47 | 0.009738 | 9.47 | 217.85 | 95.52 | 0.90 | 1.02 | 2.06 | 0.79 | 1.38 |
| Reach 1-3 | 7742 | FIS | 2600.00 | 7088.50 | 7093.05 | 7093.05 | 7094.44 | 0.009298 | 10.54 | 292.45 | 106.84 | 0.91 | 1.28 | 2.40 | 0.96 | 1.58 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7708 | 5-YR | 512.38 | 7088.50 | 7090.83 | | 7091.08 | 0.012845 | 4.85 | 137.54 | 107.96 | 0.56 | 0.71 | 1.82 | 0.85 | 1.02 |
| Reach 1-3 | 7708 | 100-YR | 1763.93 | 7088.50 | 7092.15 | | 7092.74 | 0.015759 | 7.27 | 292.87 | 124.74 | 0.67 | 1.92 | 3.52 | 2.09 | 2.30 |
| Reach 1-3 | 7708 | FIS | 2600.00 | 7088.50 | 7092.69 | | 7093.53 | 0.017894 | 8.50 | 361.88 | 130.39 | 0.73 | 2.66 | 4.59 | 2.82 | 3.08 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7669 | 5-YR | 512.38 | 7087.30 | 7090.47 | | 7090.72 | 0.006768 | 4.24 | 138.18 | 124.40 | 0.58 | 0.08 | 0.70 | 0.27 | 0.47 |
| Reach 1-3 | 7669 | 100-YR | 1763.93 | 7087.30 | 7091.90 | | 7092.35 | 0.005685 | 5.90 | 340.51 | 151.11 | 0.59 | 0.44 | 1.09 | 0.68 | 0.79 |
| Reach 1-3 | 7669 | FIS | 2600.00 | 7087.30 | 7092.47 | | 7093.07 | 0.006066 | 6.83 | 428.56 | 157.35 | 0.63 | 0.64 | 1.38 | 0.88 | 1.02 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7624 | 5-YR | 512.38 | 7086.89 | 7089.85 | 7089.71 | 7090.26 | 0.015686 | 5.22 | 106.43 | 114.27 | 0.78 | | 1.35 | 0.23 | 0.91 |
| Reach 1-3 | 7624 | 100-YR | 1763.93 | 7086.89 | 7091.05 | 7091.05 | 7091.88 | 0.019399 | 7.93 | 274.96 | 168.42 | 0.87 | 0.42 | 3.08 | 1.35 | 1.97 |
| Reach 1-3 | 7624 | FIS | 2600.00 | 7086.89 | 7091.56 | 7091.56 | 7092.58 | 0.020140 | 8.96 | 368.93 | 198.01 | 0.90 | 0.64 | 3.84 | 1.96 | 2.33 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 7584 | 5-YR | 512.38 | 7086.36 | 7089.48 | | 7089.73 | 0.009505 | 4.16 | 147.87 | 177.72 | 0.57 | 0.31 | 0.98 | 0.10 | 0.49 |
| Reach 1-3 | 7584 | 100-YR | 1763.93 | 7086.36 | 7090.60 | | 7091.03 | 0.011571 | 6.09 | 378.49 | 213.53 | 0.64 | 1.10 | 1.99 | 0.85 | 1.27 |
| Reach 1-3 | 7584 | FIS | 2600.00 | 7086.36 | 7091.12 | | 7091.64 | 0.011861 | 6.82 | 489.61 | 218.70 | 0.66 | 1.43 | 2.42 | 1.23 | 1.65 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| Reach 1-3 | 7534 | 5-YR | 512.38 | 7085.85 | 7088.93 | | 7089.15 | 0.014175 | 3.76 | 136.48 | 184.38 | 0.75 | 0.03 | 0.69 | 0.04 | 0.65 |
| Reach 1-3 | 7534 | 100-YR | 1763.93 | 7085.85 | 7090.02 | | 7090.41 | 0.013491 | 5.12 | 362.02 | 214.80 | 0.66 | 0.47 | 1.56 | 0.80 | 1.41 |
| Reach 1-3 | 7534 | FIS | 2600.00 | 7085.85 | 7090.50 | | 7091.01 | 0.013776 | 5.85 | 467.43 | 219.56 | 0.67 | 0.69 | 2.01 | 1.16 | 1.82 |
| Reach 1-3 | 7485 | 5-YR | 512.38 | 7085.30 | 7088.30 | | 7088.55 | 0.010959 | 4.37 | 157.25 | 205.91 | 0.61 | 0.25 | 1.06 | 0.31 | 0.52 |
| Reach 1-3 | 7485 | 100-YR | 1763.93 | 7085.30 | 7089.32 | | 7089.76 | 0.013244 | 6.28 | 374.94 | 218.10 | 0.69 | 1.09 | 2.12 | 1.16 | 1.41 |
| Reach 1-3 | 7485 | FIS | 2600.00 | 7085.30 | 7089.83 | | 7090.36 | 0.013173 | 6.95 | 487.29 | 224.23 | 0.69 | 1.45 | 2.53 | 1.52 | 1.78 |
| Reach 1-3 | 7455 | 5-YR | 512.38 | 7085.01 | 7088.15 | | 7088.32 | 0.004929 | 3.68 | 185.15 | 232.10 | 0.49 | 0.17 | 0.54 | 0.18 | 0.27 |
| Reach 1-3 | 7455 | 100-YR | 1763.93 | 7085.01 | 7089.00 | | 7089.46 | 0.008375 | 6.14 | 367.76 | 251.31 | 0.67 | 0.70 | 1.35 | 0.69 | 0.87 |
| Reach 1-3 | 7455 | FIS | 2600.00 | 7085.01 | 7089.34 | | 7090.01 | 0.010264 | 7.36 | 445.18 | 259.08 | 0.76 | 1.05 | 1.87 | 1.04 | 1.25 |
| Reach 1-3 | 7445 | 5-YR | 512.38 | 7085.12 | 7087.88 | 7087.88 | 7088.20 | 0.029482 | 4.89 | 135.27 | 239.63 | 0.69 | 0.65 | 2.86 | 0.46 | 1.18 |
| Reach 1-3 | 7445 | 100-YR | 1763.93 | 7085.12 | 7088.67 | 7088.67 | 7089.28 | 0.038885 | 7.37 | 308.27 | 259.65 | 0.85 | 2.63 | 5.67 | 2.40 | 3.31 |
| Reach 1-3 | 7445 | FIS | 2600.00 | 7085.12 | 7089.03 | 7089.03 | 7089.81 | 0.040836 | 8.32 | 392.06 | 268.88 | 0.89 | 3.57 | 6.88 | 3.33 | 4.29 |
| Reach 1-3 | 7430 | 5-YR | 512.38 | 7081.82 | 7084.45 | 7084.45 | 7085.06 | 0.057728 | 6.33 | 84.28 | 71.97 | 0.94 | 1.28 | 4.98 | | 4.18 |
| Reach 1-3 | 7430 | 100-YR | 1763.93 | 7081.82 | 7085.91 | 7085.91 | 7086.83 | 0.039344 | 8.41 | 254.49 | 148.67 | 0.88 | 3.09 | 6.93 | 2.15 | 4.18 |
| Reach 1-3 | 7430 | FIS | 2600.00 | 7081.82 | 7086.65 | 7086.65 | 7087.47 | 0.028411 | 8.32 | 398.78 | 217.37 | 0.77 | 1.86 | 6.29 | 2.55 | 3.24 |
| Reach 1-3 | 7422 | 5-YR | 512.38 | 7080.12 | 7083.43 | | 7083.68 | 0.004677 | 4.13 | 131.55 | 90.01 | 0.50 | 0.15 | 0.60 | 0.07 | 0.42 |
| Reach 1-3 | 7422 | 100-YR | 1763.93 | 7080.12 | 7084.48 | 7084.41 | 7085.46 | 0.011218 | 8.39 | 243.90 | 121.38 | 0.83 | 0.74 | 2.18 | 0.66 | 1.40 |
| Reach 1-3 | 7422 | FIS | 2600.00 | 7080.12 | 7085.12 | 7085.12 | 7086.32 | 0.011233 | 9.50 | 327.49 | 138.08 | 0.86 | 0.97 | 2.63 | 0.94 | 1.65 |
| Reach 1-3 | 7409 | 5-YR | 512.38 | 7080.12 | 7083.50 | | 7083.61 | 0.001246 | 2.71 | 212.24 | 112.44 | 0.27 | 0.05 | 0.23 | 0.05 | 0.14 |
| Reach 1-3 | 7409 | 100-YR | 1763.93 | 7080.12 | 7084.83 | | 7085.21 | 0.003099 | 5.42 | 410.55 | 208.92 | 0.45 | 0.16 | 0.82 | 0.30 | 0.38 |
| Reach 1-3 | 7409 | FIS | 2600.00 | 7080.12 | 7085.20 | | 7085.79 | 0.004545 | 6.93 | 489.47 | 216.09 | 0.56 | 0.33 | 1.31 | 0.51 | 0.63 |
| Reach 1-3 | 7406 | 5-YR | 512.38 | 7081.53 | 7083.06 | 7083.06 | 7083.56 | 0.033673 | 5.84 | 97.36 | 104.85 | 0.85 | 0.56 | 3.06 | 0.73 | 1.95 |
| Reach 1-3 | 7406 | 100-YR | 1763.93 | 7081.53 | 7084.41 | 7084.41 | 7085.15 | 0.024451 | 7.70 | 277.62 | 187.87 | 0.81 | 1.07 | 4.28 | 2.05 | 2.25 |
| Reach 1-3 | 7406 | FIS | 2600.00 | 7081.53 | 7084.91 | 7084.91 | 7085.74 | 0.023306 | 8.37 | 378.69 | 213.30 | 0.81 | 1.52 | 4.80 | 2.39 | 2.58 |
| Reach 1-3 | 7351 | 5-YR | 512.38 | 7079.22 | 7082.24 | | 7082.51 | 0.010699 | 4.36 | 139.79 | 138.31 | 0.59 | 0.19 | 1.10 | 0.34 | 0.67 |
| Reach 1-3 | 7351 | 100-YR | 1763.93 | 7079.22 | 7083.34 | 7083.23 | 7083.94 | 0.015970 | 7.08 | 343.17 | 240.45 | 0.75 | 0.65 | 2.74 | 1.14 | 1.42 |
| Reach 1-3 | 7351 | FIS | 2600.00 | 7079.22 | 7083.79 | 7083.71 | 7084.49 | 0.016806 | 7.94 | 459.15 | 267.29 | 0.78 | 0.96 | 3.34 | 1.62 | 1.80 |
| Reach 1-3 | 7279 | 5-YR | 512.38 | 7078.10 | 7081.41 | | 7081.67 | 0.012541 | 4.38 | 143.09 | 166.36 | 0.61 | 0.08 | 1.22 | 0.39 | 0.67 |
| Reach 1-3 | 7279 | 100-YR | 1763.93 | 7078.10 | 7082.59 | | 7082.93 | 0.010907 | 5.70 | 440.59 | 292.60 | 0.60 | 0.66 | 1.86 | 0.87 | 1.02 |
| Reach 1-3 | 7279 | FIS | 2600.00 | 7078.10 | 7083.05 | | 7083.45 | 0.010862 | 6.26 | 576.74 | 296.89 | 0.61 | 0.94 | 2.16 | 1.16 | 1.31 |
| Reach 1-3 | 7213 | 5-YR | 512.38 | 7077.30 | 7080.96 | | 7081.15 | 0.005269 | 3.75 | 181.06 | 204.61 | 0.49 | 0.09 | 0.59 | 0.17 | 0.29 |
| Reach 1-3 | 7213 | 100-YR | 1763.93 | 7077.30 | 7082.07 | | 7082.39 | 0.006921 | 5.50 | 489.44 | 308.65 | 0.57 | 0.45 | 1.25 | 0.59 | 0.68 |
| Reach 1-3 | 7213 | FIS | 2600.00 | 7077.30 | 7082.49 | | 7082.88 | 0.007815 | 6.30 | 618.38 | 312.68 | 0.61 | 0.69 | 1.61 | 0.85 | 0.96 |
| Reach 1-3 | 7167 | 5-YR | 512.38 | 7077.47 | 7080.66 | | 7080.86 | 0.007315 | 3.78 | 172.36 | 216.88 | 0.49 | 0.14 | 0.83 | 0.16 | 0.36 |
| Reach 1-3 | 7167 | 100-YR | 1763.93 | 7077.47 | 7081.55 | | 7081.96 | 0.012378 | 6.15 | 424.34 | 324.35 | 0.66 | 0.84 | 2.09 | 0.66 | 1.01 |
| Reach 1-3 | 7167 | FIS | 2600.00 | 7077.47 | 7081.98 | | 7082.43 | 0.012256 | 6.68 | 563.79 | 328.35 | 0.66 | 1.13 | 2.39 | 0.97 | 1.31 |
| Reach 1-3 | 7102 | 5-YR | 512.38 | 7076.78 | 7079.61 | 7079.54 | 7080.06 | 0.023497 | 5.48 | 109.57 | 167.22 | 0.83 | 0.38 | 1.98 | | 1.13 |
| Reach 1-3 | 7102 | 100-YR | 1763.93 | 7076.78 | 7080.59 | 7080.59 | 7081.10 | 0.015620 | 6.76 | 371.75 | 328.79 | 0.78 | 1.06 | 2.26 | 0.65 | 1.10 |
| Reach 1-3 | 7102 | FIS | 2600.00 | 7076.78 | 7080.86 | 7080.86 | 7081.54 | 0.017429 | 7.76 | 461.73 | 331.71 | 0.85 | 1.46 | 2.81 | 1.01 | 1.51 |
| Reach 1-3 | 7093 | 5-YR | 512.38 | 7076.86 | 7079.48 | 7079.48 | 7079.70 | 0.040238 | 4.11 | 154.76 | 305.84 | 0.61 | 0.69 | 3.47 | 0.64 | 1.27 |
| Reach 1-3 | 7093 | 100-YR | 1763.93 | 7076.86 | 7080.02 | 7080.02 | 7080.51 | 0.051832 | 5.78 | 326.18 | 330.15 | 0.73 | 2.30 | 6.18 | 2.52 | 3.19 |
| Reach 1-3 | 7093 | FIS | 2600.00 | 7076.86 | 7080.30 | 7080.30 | 7080.94 | 0.049662 | 6.19 | 418.35 | 333.32 | 0.73 | 3.02 | 6.77 | 3.24 | 3.88 |
| Reach 1-3 | 7073 | 5-YR | 512.38 | 7072.92 | 7076.06 | | 7076.26 | 0.020384 | 3.66 | 147.04 | 105.48 | 0.46 | 0.53 | 2.46 | 0.13 | 1.76 |
| Reach 1-3 | 7073 | 100-YR | 1763.93 | 7072.92 | 7077.14 | 7076.91 | 7077.77 | 0.040125 | 6.88 | 304.03 | 176.79 | 0.70 | 2.40 | 7.51 | 1.96 | 4.29 |
| Reach 1-3 | 7073 | FIS | 2600.00 | 7072.92 | 7077.68 | 7077.68 | 7078.39 | 0.038460 | 7.52 | 424.49 | 283.73 | 0.70 | 2.57 | 8.50 | 1.64 | 3.58 |
| Reach 1-3 | 7066 | 5-YR | 512.38 | 7072.86 | 7076.07 | | 7076.16 | 0.005663 | 2.48 | 228.37 | 148.68 | 0.26 | 0.18 | 1.00 | 0.10 | 0.53 |
| Reach 1-3 | 7066 | 100-YR | 1763.93 | 7072.86 | 7077.22 | | 7077.52 | 0.014342 | 4.92 | 464.22 | 273.65 | 0.43 | 0.80 | 3.52 | 0.83 | 1.50 |
| Reach 1-3 | 7066 | FIS | 2600.00 | 7072.86 | 7077.67 | | 7078.06 | 0.017164 | 5.77 | 597.00 | 308.37 | 0.48 | 1.34 | 4.67 | 1.26 | 2.06 |
| Reach 1-3 | 7061 | 5-YR | 512.38 | 7074.14 | 7075.57 | 7075.57 | 7076.08 | 0.012979 | 5.77 | 95.39 | 115.56 | 0.89 | 0.16 | 1.06 | 0.14 | 0.67 |
| Reach 1-3 | 7061 | 100-YR | 1763.93 | 7074.14 | 7076.77 | 7076.77 | 7077.43 | 0.009219 | 7.50 | 330.83 | 274.11 | 0.84 | 0.41 | 1.44 | 0.49 | 0.69 |
| Reach 1-3 | 7061 | FIS | 2600.00 | 7074.14 | 7077.21 | 7077.21 | 7077.96 | 0.009236 | 8.35 | 460.12 | 309.39 | 0.86 | 0.61 | 1.69 | 0.64 | 0.86 |
| Reach 1-3 | 7044 | 5-YR | 512.38 | 7071.83 | 7075.10 | 7074.66 | 7075.39 | 0.010718 | 4.43 | 137.13 | 180.49 | 0.62 | 0.12 | 1.06 | 0.17 | 0.51 |
| Reach 1-3 | 7044 | 100-YR | 1763.93 | 7071.83 | 7076.40 | | 7076.61 | 0.006258 | 4.62 | 576.03 | 376.82 | 0.48 | 0.42 | 1.12 | 0.50 | 0.60 |
| Reach 1-3 | 7044 | FIS | 2600.00 | 7071.83 | 7076.96 | | 7077.18 | 0.005422 | 4.77 | 787.36 | 381.83 | 0.45 | 0.54 | 1.16 | 0.61 | 0.70 |
| Reach 1-3 | 6941 | 5-YR | 512.38 | 7070.47 | 7074.02 | | 7074.37 | 0.009299 | 4.74 | 113.43 | 101.64 | 0.65 | 0.12 | 0.93 | 0.08 | 0.64 |
| Reach 1-3 | 6941 | 100-YR | 1763.93 | 7070.47 | 7075.77 | | 7076.06 | 0.005179 | 5.18 | 511.69 | 293.36 | 0.50 | 0.51 | 1.08 | 0.38 | 0.56 |
| Reach 1-3 | 6941 | FIS | 2600.00 | 7070.47 | 7076.34 | | 7076.67 | 0.005176 | 5.67 | 679.95 | 298.34 | 0.50 | 0.66 | 1.26 | 0.56 | 0.73 |
| Reach 1-3 | 6868 | 5-YR | 512.38 | 7069.50 | 7073.14 | | 7073.58 | 0.012344 | 5.35 | 96.45 | 70.32 | 0.78 | 0.13 | 1.11 | | 1.04 |
| Reach 1-3 | 6868 | 100-YR | 1763.93 | 7069.50 | 7074.74 | 7074.74 | 7075.49 | 0.011840 | 7.49 | 320.61 | 238.94 | 0.76 | 0.85 | 2.22 | 0.46 | 0.99 |
| Reach 1-3 | 6868 | FIS | 2600.00 | 7069.50 | 7075.26 | 7075.21 | 7076.10 | 0.012147 | 8.30 | 446.34 | 243.17 | 0.77 | 1.16 | 2.67 | 0.86 | 1.38 |
| Reach 1-3 | 6769 | 5-YR | 512.38 | 7068.73 | 7072.13 | | 7072.47 | 0.009672 | 4.68 | 118.99 | 119.46 | 0.64 | 0.11 | 0.98 | 0.14 | 0.60 |
| Reach 1-3 | 6769 | 100-YR | 1763.93 | 7068.73 | 7073.53 | | 7074.13 | 0.011292 | 6.87 | 328.26 | 167.72 | 0.69 | 0.90 | 2.12 | 0.88 | 1.37 |
| Reach 1-3 | 6769 | FIS | 2600.00 | 7068.73 | 7074.14 | | 7074.89 | 0.011904 | 7.83 | 437.81 | 191.70 | 0.72 | 1.31 | 2.69 | 1.08 | 1.69 |
| Reach 1-3 | 6673 | 5-YR | 512.38 | 7067.90 | 7071.19 | | 7071.49 | 0.010309 | 4.44 | 121.66 | 160.38 | 0.60 | 0.17 | 1.08 | 0.10 | 0.75 |
| Reach 1-3 | 6673 | 100-YR | 1763.93 | 7067.90 | 7072.85 | 7072.19 | 7073.19 | 0.007137 | 5.36 | 420.22 | 195.21 | 0.52 | 0.73 | 1.48 | 0.66 | 0.95 |
| Reach 1-3 | 6673 | FIS | 2600.00 | 7067.90 | 7073.45 | | 7073.88 | 0.007520 | 6.07 | 539.48 | 200.58 | 0.54 | 0.98 | 1.83 | 0.95 | 1.25 |
| Reach 1-3 | 6588 | 5-YR | 512.38 | 7067.13 | 7070.15 | | 7070.50 | 0.013207 | 4.77 | 113.70 | 101.07 | 0.66 | 0.21 | 1.31 | 0.13 | 0.92 |
| Reach 1-3 | 6588 | 100-YR | 1763.93 | 7067.13 | 7071.36 | 7071.31 | 7072.23 | 0.019877 | 7.98 | 265.84 | 156.21 | 0.84 | 1.58 | 3.46 | 0.68 | 2.10 |
| Reach 1-3 | 6588 | FIS | 2600.00 | 7067.13 | 7072.01 | 7071.99 | 7072.94 | 0.017886 | 8.56 | 380.06 | 195.58 | 0.81 | 2.02 | 3.82 | 0.92 | 2.16 |
| Reach 1-3 | 6504 | 5-YR | 512.38 | 7066.40 | 7069.44 | | 7069.63 | 0.007635 | 3.68 | 172.04 | 183.12 | 0.49 | 0.13 | 0.82 | 0.29 | 0.45 |
| Reach 1-3 | 6504 | 100-YR | 1763.93 | 7066.40 | 7070.95 | | 7071.22 | 0.006029 | 4.72 | 460.45 | 197.07 | 0.46 | 0.62 | 1.21 | 0.75 | 0.87 |
| Reach 1-3 | 6504 | FIS | 2600.00 | 7066.40 | 7071.65 | | 7071.98 | 0.005822 | 5.24 | 600.04 | 203.01 | 0.46 | 0.81 | 1.42 | 0.95 | 1.07 |
| Reach 1-3 | 6417 | 5-YR | 512.38 | 7065.42 | 7068.17 | 7067.97 | 7068.60 | 0.018819 | 5.28 | 101.92 | 133.74 | 0.78 | 0.18 | 1.67 | 0.10 | 1.13 |
| Reach 1-3 | 6417 | 100-YR | 1763.93 | 7065.42 | 7069.52 | 7069.37 | 7070.30 | 0.018775 | 7.63 | 269.36 | 196.40 | 0.81 | 1.62 | 3.23 | 0.90 | 2.39 |
| Reach 1-3 | 6417 | FIS | 2600.00 | 7065.42 | 7070.09 | 7070.09 | 7071.06 | 0.019306 | 8.66 | 370.67 | 205.90 | 0.83 | 2.27 | 4.00 | 0.57 | 2.15 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| Reach 1-3 | 6369 | 5-YR | 512.38 | 7064.37 | 7067.84 | | 7068.03 | 0.006720 | 3.58 | 159.75 | 137.83 | 0.47 | 0.18 | 0.73 | 0.09 | 0.48 |
| Reach 1-3 | 6369 | 100-YR | 1763.93 | 7064.37 | 7069.07 | | 7069.55 | 0.010497 | 5.97 | 346.17 | 209.95 | 0.61 | 1.03 | 1.94 | 0.18 | 1.07 |
| Reach 1-3 | 6369 | FIS | 2600.00 | 7064.37 | 7069.64 | | 7070.21 | 0.010612 | 6.66 | 467.87 | 213.93 | 0.62 | 1.38 | 2.34 | 0.55 | 1.44 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6298 | 5-YR | 512.38 | 7064.05 | 7066.99 | 7066.79 | 7067.34 | 0.014253 | 4.92 | 123.85 | 163.29 | 0.69 | 0.05 | 1.38 | 0.29 | 0.67 |
| Reach 1-3 | 6298 | 100-YR | 1763.93 | 7064.05 | 7068.35 | | 7068.79 | 0.011118 | 6.14 | 368.98 | 186.03 | 0.63 | 0.88 | 2.02 | 1.13 | 1.37 |
| Reach 1-3 | 6298 | FIS | 2600.00 | 7064.05 | 7068.87 | | 7069.44 | 0.012002 | 7.03 | 466.29 | 190.70 | 0.67 | 1.27 | 2.56 | 1.57 | 1.82 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6265 | 5-YR | 512.38 | 7063.23 | 7066.14 | 7066.14 | 7066.75 | 0.022793 | 6.26 | 82.48 | 73.43 | 0.99 | | 1.75 | 0.13 | 1.58 |
| Reach 1-3 | 6265 | 100-YR | 1763.93 | 7063.23 | 7067.62 | 7067.62 | 7068.34 | 0.016172 | 7.58 | 311.83 | 206.34 | 0.81 | 0.94 | 2.70 | 0.95 | 1.52 |
| Reach 1-3 | 6265 | FIS | 2600.00 | 7063.23 | 7068.07 | 7068.07 | 7068.95 | 0.017523 | 8.60 | 406.50 | 211.02 | 0.85 | 1.45 | 3.42 | 1.50 | 2.10 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6232 | 5-YR | 512.38 | 7063.38 | 7065.98 | | 7066.20 | 0.008641 | 3.98 | 142.50 | 184.98 | 0.60 | 0.06 | 0.73 | 0.34 | 0.41 |
| Reach 1-3 | 6232 | 100-YR | 1763.93 | 7063.38 | 7066.87 | | 7067.41 | 0.011541 | 6.25 | 318.78 | 209.34 | 0.73 | 0.69 | 1.61 | 0.92 | 1.09 |
| Reach 1-3 | 6232 | FIS | 2600.00 | 7063.38 | 7067.20 | 7067.12 | 7067.99 | 0.013589 | 7.39 | 388.95 | 212.09 | 0.81 | 1.07 | 2.18 | 1.35 | 1.55 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6223 | 5-YR | 512.38 | 7063.07 | 7065.61 | 7065.61 | 7066.00 | 0.075480 | 5.30 | 111.22 | 152.15 | 0.83 | 0.47 | 5.95 | 1.66 | 3.43 |
| Reach 1-3 | 6223 | 100-YR | 1763.93 | 7063.07 | 7066.52 | 7066.52 | 7067.18 | 0.068421 | 7.23 | 285.78 | 209.31 | 0.86 | 3.37 | 9.26 | 4.65 | 5.81 |
| Reach 1-3 | 6223 | FIS | 2600.00 | 7063.07 | 7066.92 | 7066.92 | 7067.74 | 0.066254 | 7.95 | 369.00 | 212.55 | 0.87 | 4.75 | 10.58 | 6.05 | 7.15 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6212 | 5-YR | 512.38 | 7060.43 | 7062.98 | 7062.98 | 7063.49 | 0.091843 | 5.81 | 93.70 | 104.64 | 0.91 | 1.62 | 7.17 | 0.73 | 5.10 |
| Reach 1-3 | 6212 | 100-YR | 1763.93 | 7060.43 | 7064.21 | 7064.21 | 7065.09 | 0.073523 | 8.13 | 252.69 | 148.43 | 0.91 | 5.48 | 11.24 | 4.23 | 7.77 |
| Reach 1-3 | 6212 | FIS | 2600.00 | 7060.43 | 7064.78 | 7064.78 | 7065.82 | 0.068990 | 9.04 | 341.81 | 166.23 | 0.91 | 6.70 | 12.96 | 5.30 | 8.81 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6199 | 5-YR | 512.38 | 7057.41 | 7060.62 | | 7060.82 | 0.020155 | 3.64 | 143.86 | 84.42 | 0.46 | 0.40 | 2.44 | 0.47 | 2.12 |
| Reach 1-3 | 6199 | 100-YR | 1763.93 | 7057.41 | 7062.15 | | 7062.77 | 0.030034 | 6.54 | 296.15 | 117.54 | 0.62 | 2.02 | 6.48 | 1.82 | 4.69 |
| Reach 1-3 | 6199 | FIS | 2600.00 | 7057.41 | 7062.76 | | 7063.64 | 0.035434 | 7.90 | 372.83 | 135.34 | 0.69 | 3.05 | 8.97 | 2.59 | 6.05 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6184 | 5-YR | 512.38 | 7057.42 | 7060.56 | | 7060.65 | 0.005209 | 2.44 | 223.72 | 111.45 | 0.25 | 0.13 | 0.95 | 0.16 | 0.64 |
| Reach 1-3 | 6184 | 100-YR | 1763.93 | 7057.42 | 7062.12 | | 7062.42 | 0.011156 | 4.72 | 425.24 | 145.16 | 0.39 | 0.98 | 3.10 | 1.08 | 2.01 |
| Reach 1-3 | 6184 | FIS | 2600.00 | 7057.42 | 7062.76 | | 7063.19 | 0.013556 | 5.69 | 522.89 | 157.86 | 0.44 | 1.52 | 4.31 | 1.63 | 2.77 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6182 | 5-YR | 512.38 | 7058.72 | 7060.01 | 7060.01 | 7060.58 | 0.045857 | 6.06 | 86.08 | 81.93 | 0.96 | 0.23 | 3.50 | 0.50 | 2.99 |
| Reach 1-3 | 6182 | 100-YR | 1763.93 | 7058.72 | 7061.41 | 7061.41 | 7062.33 | 0.030039 | 8.15 | 245.65 | 133.77 | 0.89 | 1.69 | 4.91 | 2.03 | 3.43 |
| Reach 1-3 | 6182 | FIS | 2600.00 | 7058.72 | 7062.00 | 7062.00 | 7063.09 | 0.028075 | 9.02 | 328.13 | 145.46 | 0.89 | 2.27 | 5.62 | 2.58 | 3.94 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6164 | 5-YR | 512.38 | 7056.45 | 7059.80 | 7059.57 | 7060.10 | 0.012330 | 4.63 | 129.24 | 126.76 | 0.63 | 0.36 | 1.28 | 0.09 | 0.78 |
| Reach 1-3 | 6164 | 100-YR | 1763.93 | 7056.45 | 7061.13 | 7060.80 | 7061.61 | 0.011792 | 6.33 | 369.81 | 244.89 | 0.64 | 1.13 | 2.19 | 0.47 | 1.11 |
| Reach 1-3 | 6164 | FIS | 2600.00 | 7056.45 | 7061.54 | | 7062.15 | 0.013774 | 7.39 | 476.00 | 269.30 | 0.70 | 1.58 | 2.90 | 0.80 | 1.51 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6091 | 5-YR | 512.38 | 7055.75 | 7058.66 | 7058.44 | 7059.05 | 0.016986 | 5.05 | 106.88 | 115.19 | 0.75 | 0.03 | 1.47 | 0.17 | 0.98 |
| Reach 1-3 | 6091 | 100-YR | 1763.93 | 7055.75 | 7059.86 | 7059.72 | 7060.53 | 0.018551 | 7.31 | 332.32 | 268.84 | 0.80 | 0.77 | 2.98 | 0.88 | 1.43 |
| Reach 1-3 | 6091 | FIS | 2600.00 | 7055.75 | 7060.36 | 7060.32 | 7061.04 | 0.017020 | 7.76 | 479.38 | 310.21 | 0.78 | 0.96 | 3.26 | 1.21 | 1.64 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 6042 | 5-YR | 512.38 | 7054.55 | 7058.12 | | 7058.42 | 0.009289 | 4.45 | 129.16 | 156.30 | 0.63 | 0.10 | 0.90 | 0.13 | 0.48 |
| Reach 1-3 | 6042 | 100-YR | 1763.93 | 7054.55 | 7059.25 | 7059.04 | 7059.77 | 0.011623 | 6.64 | 389.52 | 293.90 | 0.71 | 0.74 | 1.93 | 0.60 | 0.96 |
| Reach 1-3 | 6042 | FIS | 2600.00 | 7054.55 | 7059.67 | 7059.56 | 7060.30 | 0.012769 | 7.58 | 527.21 | 351.84 | 0.76 | 1.12 | 2.45 | 0.78 | 1.19 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5977 | 5-YR | 512.38 | 7054.61 | 7057.67 | | 7057.92 | 0.009917 | 4.18 | 141.74 | 162.30 | 0.57 | 0.23 | 1.04 | 0.10 | 0.54 |
| Reach 1-3 | 5977 | 100-YR | 1763.93 | 7054.61 | 7058.63 | 7058.55 | 7059.12 | 0.014765 | 6.57 | 397.87 | 339.08 | 0.71 | 0.91 | 2.42 | 0.62 | 1.08 |
| Reach 1-3 | 5977 | FIS | 2600.00 | 7054.61 | 7058.99 | 7058.92 | 7059.59 | 0.016700 | 7.54 | 531.55 | 411.65 | 0.77 | 1.38 | 3.11 | 0.80 | 1.34 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5928 | 5-YR | 512.38 | 7053.68 | 7056.31 | 7056.15 | 7056.68 | 0.018251 | 4.94 | 116.53 | 149.61 | 0.74 | 0.02 | 1.55 | 0.28 | 0.88 |
| Reach 1-3 | 5928 | 100-YR | 1763.93 | 7053.68 | 7057.34 | 7057.26 | 7057.74 | 0.015181 | 6.16 | 436.41 | 399.53 | 0.70 | 0.75 | 2.25 | 0.77 | 1.03 |
| Reach 1-3 | 5928 | FIS | 2600.00 | 7053.68 | 7057.75 | | 7058.17 | 0.014327 | 6.57 | 606.54 | 446.62 | 0.69 | 1.06 | 2.48 | 0.91 | 1.21 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5824 | 5-YR | 512.38 | 7052.15 | 7055.58 | 7055.07 | 7055.81 | 0.007850 | 4.09 | 168.02 | 273.30 | 0.55 | 0.12 | 0.84 | 0.14 | 0.30 |
| Reach 1-3 | 5824 | 100-YR | 1763.93 | 7052.15 | 7056.50 | 7056.29 | 7056.86 | 0.010472 | 5.94 | 469.84 | 381.97 | 0.64 | 0.75 | 1.72 | 0.50 | 0.80 |
| Reach 1-3 | 5824 | FIS | 2600.00 | 7052.15 | 7056.90 | 7056.63 | 7057.31 | 0.010792 | 6.55 | 631.73 | 423.50 | 0.66 | 1.03 | 2.03 | 0.67 | 1.00 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5791 | 5-YR | 512.38 | 7052.28 | 7055.03 | 7055.03 | 7055.36 | 0.016271 | 4.84 | 136.80 | 251.22 | 0.72 | 0.26 | 1.41 | 0.09 | 0.55 |
| Reach 1-3 | 5791 | 100-YR | 1763.93 | 7052.28 | 7055.83 | 7055.83 | 7056.29 | 0.018900 | 6.65 | 403.70 | 405.32 | 0.79 | 1.22 | 2.57 | 0.59 | 1.17 |
| Reach 1-3 | 5791 | FIS | 2600.00 | 7052.28 | 7056.10 | 7056.10 | 7056.68 | 0.022113 | 7.69 | 516.45 | 438.25 | 0.86 | 1.79 | 3.37 | 0.93 | 1.62 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5744 | 5-YR | 512.38 | 7051.51 | 7054.87 | 7054.69 | 7055.00 | 0.005474 | 3.26 | 235.41 | 423.61 | 0.45 | 0.14 | 0.56 | 0.10 | 0.19 |
| Reach 1-3 | 5744 | 100-YR | 1763.93 | 7051.51 | 7055.62 | | 7055.80 | 0.005983 | 4.32 | 577.37 | 489.50 | 0.49 | 0.42 | 0.89 | 0.32 | 0.44 |
| Reach 1-3 | 5744 | FIS | 2600.00 | 7051.51 | 7055.91 | | 7056.15 | 0.006485 | 4.84 | 723.13 | 503.36 | 0.52 | 0.57 | 1.08 | 0.45 | 0.58 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5688 | 5-YR | 533.15 | 7051.38 | 7054.17 | 7054.17 | 7054.46 | 0.011578 | 4.72 | 145.85 | 321.65 | 0.78 | 0.01 | 0.82 | 0.23 | 0.33 |
| Reach 1-3 | 5688 | 100-YR | 1880.40 | 7051.38 | 7055.02 | | 7055.32 | 0.008191 | 5.43 | 506.84 | 441.12 | 0.68 | 0.42 | 1.01 | 0.57 | 0.59 |
| Reach 1-3 | 5688 | FIS | 2600.00 | 7051.38 | 7055.36 | | 7055.68 | 0.007382 | 5.67 | 654.47 | 449.48 | 0.66 | 0.52 | 1.06 | 0.64 | 0.67 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5628 | 5-YR | 533.15 | 7050.55 | 7053.93 | | 7054.04 | 0.003904 | 2.99 | 271.36 | 411.83 | 0.39 | 0.11 | 0.44 | 0.10 | 0.16 |
| Reach 1-3 | 5628 | 100-YR | 1880.40 | 7050.55 | 7054.84 | | 7055.00 | 0.004092 | 3.99 | 654.46 | 429.43 | 0.43 | 0.33 | 0.68 | 0.33 | 0.39 |
| Reach 1-3 | 5628 | FIS | 2600.00 | 7050.55 | 7055.16 | | 7055.37 | 0.004275 | 4.40 | 794.55 | 432.15 | 0.44 | 0.43 | 0.80 | 0.43 | 0.49 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5568 | 5-YR | 533.15 | 7049.82 | 7052.96 | 7052.68 | 7053.35 | 0.013503 | 5.07 | 117.69 | 261.88 | 0.73 | 0.14 | 1.26 | 0.03 | 0.38 |
| Reach 1-3 | 5568 | 100-YR | 1880.40 | 7049.82 | 7053.80 | 7053.80 | 7054.30 | 0.013141 | 6.72 | 407.98 | 387.78 | 0.77 | 0.59 | 1.91 | 0.71 | 0.86 |
| Reach 1-3 | 5568 | FIS | 2600.00 | 7049.82 | 7054.05 | 7054.04 | 7054.64 | 0.013945 | 7.40 | 503.47 | 389.82 | 0.81 | 0.83 | 2.24 | 0.96 | 1.12 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5429 | 5-YR | 533.15 | 7048.55 | 7051.57 | 7051.57 | 7051.91 | 0.014174 | 4.83 | 148.20 | 312.05 | 0.69 | 0.14 | 1.32 | 0.19 | 0.42 |
| Reach 1-3 | 5429 | 100-YR | 1880.40 | 7048.55 | 7052.47 | | 7052.84 | 0.013996 | 6.12 | 460.96 | 359.67 | 0.70 | 0.82 | 2.07 | 0.95 | 1.12 |
| Reach 1-3 | 5429 | FIS | 2600.00 | 7048.55 | 7052.81 | | 7053.21 | 0.013267 | 6.44 | 586.14 | 362.51 | 0.68 | 1.06 | 2.25 | 1.18 | 1.33 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5365 | 5-YR | 533.15 | 7047.14 | 7050.42 | 7050.42 | 7050.87 | 0.014541 | 5.52 | 116.73 | 174.03 | 0.82 | | 1.26 | 0.21 | 0.60 |
| Reach 1-3 | 5365 | 100-YR | 1880.40 | 7047.14 | 7051.38 | 7051.38 | 7051.90 | 0.015246 | 7.16 | 424.36 | 362.14 | 0.82 | 0.78 | 2.21 | 0.92 | 1.11 |
| Reach 1-3 | 5365 | FIS | 2600.00 | 7047.14 | 7051.64 | 7051.64 | 7052.25 | 0.016954 | 7.98 | 517.99 | 364.22 | 0.87 | 1.13 | 2.72 | 1.29 | 1.50 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5289 | 5-YR | 533.15 | 7046.36 | 7049.40 | 7049.40 | 7049.81 | 0.017763 | 5.34 | 119.84 | 170.27 | 0.80 | | 1.53 | 0.29 | 0.78 |
| Reach 1-3 | 5289 | 100-YR | 1880.40 | 7046.36 | 7050.66 | | 7050.98 | 0.010381 | 5.62 | 493.34 | 340.78 | 0.61 | 0.64 | 1.69 | 0.81 | 0.93 |
| Reach 1-3 | 5289 | FIS | 2600.00 | 7046.36 | 7051.00 | | 7051.37 | 0.010692 | 6.11 | 611.14 | 343.68 | 0.62 | 0.87 | 1.97 | 1.05 | 1.18 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5227 | 5-YR | 533.15 | 7045.43 | 7048.67 | | 7048.91 | 0.009009 | 4.14 | 160.51 | 180.47 | 0.56 | 0.12 | 0.96 | 0.28 | 0.50 |
| Reach 1-3 | 5227 | 100-YR | 1880.40 | 7045.43 | 7049.69 | 7049.64 | 7050.19 | 0.014319 | 6.73 | 419.02 | 325.95 | 0.72 | 0.78 | 2.42 | 0.84 | 1.15 |
| Reach 1-3 | 5227 | FIS | 2600.00 | 7045.43 | 7050.04 | | 7050.58 | 0.014230 | 7.20 | 533.97 | 328.87 | 0.72 | 1.07 | 2.72 | 1.14 | 1.44 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5171 | 5-YR | 533.15 | 7044.55 | 7047.23 | 7046.97 | 7047.66 | 0.018216 | 5.28 | 105.70 | 117.72 | 0.76 | 0.04 | 1.70 | 0.19 | 1.02 |
| Reach 1-3 | 5171 | 100-YR | 1880.40 | 7044.55 | 7048.72 | | 7049.05 | 0.009271 | 5.59 | 495.73 | 340.44 | 0.57 | 0.81 | 1.72 | 0.51 | 0.84 |
| Reach 1-3 | 5171 | FIS | 2600.00 | 7044.55 | 7049.26 | | 7049.56 | 0.007278 | 5.49 | 680.99 | 344.39 | 0.52 | 0.87 | 1.59 | 0.64 | 0.90 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 5047 | 5-YR | 533.15 | 7042.80 | 7045.86 | | 7046.11 | 0.010111 | 4.22 | 146.38 | 137.71 | 0.58 | 0.31 | 1.04 | 0.02 | 0.67 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| Reach 1-3 | 5047 | 100-YR | 1880.40 | 7042.80 | 7046.87 | 7046.72 | 7047.59 | 0.018405 | 7.41 | 292.06 | 151.85 | 0.80 | 1.65 | 3.04 | 0.52 | 2.20 |
| Reach 1-3 | 5047 | FIS | 2600.00 | 7042.80 | 7047.20 | 7047.13 | 7048.18 | 0.022166 | 8.70 | 341.97 | 156.96 | 0.89 | 2.38 | 4.11 | 0.84 | 3.00 |
| Reach 1-3 | 4948 | 5-YR | 533.15 | 7041.66 | 7044.83 | | 7045.11 | 0.010093 | 4.36 | 138.23 | 162.94 | 0.58 | 0.18 | 1.10 | 0.09 | 0.53 |
| Reach 1-3 | 4948 | 100-YR | 1880.40 | 7041.66 | 7046.26 | | 7046.49 | 0.006079 | 4.75 | 578.93 | 339.85 | 0.47 | 0.60 | 1.20 | 0.48 | 0.64 |
| Reach 1-3 | 4948 | FIS | 2600.00 | 7041.66 | 7046.64 | | 7046.91 | 0.006423 | 5.23 | 709.10 | 342.87 | 0.49 | 0.77 | 1.42 | 0.66 | 0.83 |
| Reach 1-3 | 4855 | 5-YR | 533.15 | 7040.34 | 7044.13 | | 7044.45 | 0.008687 | 4.54 | 122.99 | 100.22 | 0.60 | 0.10 | 0.93 | 0.15 | 0.66 |
| Reach 1-3 | 4855 | 100-YR | 1880.40 | 7040.34 | 7045.38 | 7045.29 | 7045.92 | 0.011059 | 6.77 | 420.82 | 326.26 | 0.69 | 0.88 | 2.04 | 0.53 | 0.89 |
| Reach 1-3 | 4855 | FIS | 2600.00 | 7040.34 | 7045.75 | | 7046.33 | 0.011339 | 7.32 | 541.75 | 329.78 | 0.70 | 1.12 | 2.35 | 0.80 | 1.16 |
| Reach 1-3 | 4782 | 5-YR | 533.15 | 7040.04 | 7043.59 | | 7043.86 | 0.007174 | 4.19 | 141.44 | 137.41 | 0.54 | 0.14 | 0.83 | 0.05 | 0.46 |
| Reach 1-3 | 4782 | 100-YR | 1880.40 | 7040.04 | 7044.70 | 7044.57 | 7045.15 | 0.010299 | 6.40 | 449.65 | 334.46 | 0.65 | 0.82 | 1.89 | 0.53 | 0.86 |
| Reach 1-3 | 4782 | FIS | 2600.00 | 7040.04 | 7045.04 | 7044.87 | 7045.55 | 0.010831 | 6.99 | 566.58 | 337.30 | 0.68 | 1.08 | 2.22 | 0.79 | 1.13 |
| Reach 1-3 | 4714 | 5-YR | 533.15 | 7039.78 | 7042.77 | | 7043.16 | 0.015249 | 5.04 | 109.03 | 94.33 | 0.71 | 0.14 | 1.46 | 0.15 | 1.09 |
| Reach 1-3 | 4714 | 100-YR | 1880.40 | 7039.78 | 7043.90 | | 7044.35 | 0.013997 | 6.50 | 429.94 | 330.12 | 0.70 | 0.80 | 2.32 | 0.84 | 1.13 |
| Reach 1-3 | 4714 | FIS | 2600.00 | 7039.78 | 7044.40 | | 7044.80 | 0.010580 | 6.27 | 599.22 | 334.05 | 0.62 | 0.92 | 2.08 | 0.96 | 1.18 |
| Reach 1-3 | 4632 | 5-YR | 533.15 | 7039.10 | 7042.01 | | 7042.21 | 0.009081 | 3.96 | 176.35 | 199.00 | 0.58 | 0.08 | 0.81 | 0.41 | 0.50 |
| Reach 1-3 | 4632 | 100-YR | 1880.40 | 7039.10 | 7043.49 | | 7043.69 | 0.005384 | 4.44 | 595.79 | 315.80 | 0.46 | 0.46 | 0.97 | 0.57 | 0.63 |
| Reach 1-3 | 4632 | FIS | 2600.00 | 7039.10 | 7044.08 | | 7044.29 | 0.004464 | 4.51 | 783.93 | 321.59 | 0.43 | 0.52 | 0.96 | 0.63 | 0.68 |
| Reach 1-3 | 4582 | 5-YR | 533.15 | 7038.10 | 7041.73 | | 7041.87 | 0.004781 | 3.37 | 209.86 | 196.90 | 0.45 | 0.04 | 0.51 | 0.27 | 0.32 |
| Reach 1-3 | 4582 | 100-YR | 1880.40 | 7038.10 | 7043.28 | | 7043.46 | 0.004004 | 4.25 | 629.38 | 298.54 | 0.41 | 0.35 | 0.81 | 0.49 | 0.53 |
| Reach 1-3 | 4582 | FIS | 2600.00 | 7038.10 | 7043.90 | | 7044.09 | 0.003514 | 4.40 | 816.60 | 304.81 | 0.39 | 0.43 | 0.85 | 0.56 | 0.59 |
| Reach 1-3 | 4534 | 5-YR | 533.15 | 7038.20 | 7041.55 | 7040.83 | 7041.65 | 0.003851 | 2.83 | 250.17 | 227.32 | 0.36 | 0.06 | 0.46 | 0.23 | 0.26 |
| Reach 1-3 | 4534 | 100-YR | 1880.40 | 7038.20 | 7043.14 | | 7043.28 | 0.003176 | 3.64 | 681.22 | 282.33 | 0.34 | 0.32 | 0.69 | 0.46 | 0.48 |
| Reach 1-3 | 4534 | FIS | 2600.00 | 7038.20 | 7043.77 | | 7043.93 | 0.002946 | 3.88 | 861.23 | 288.44 | 0.34 | 0.40 | 0.75 | 0.54 | 0.55 |
| Reach 1-3 | 4296 | 5-YR | 512.29 | 7036.56 | 7039.20 | 7039.20 | 7039.77 | 0.025760 | 6.19 | 89.48 | 85.70 | 0.95 | 0.64 | 2.08 | 0.68 | 1.67 |
| Reach 1-3 | 4296 | 100-YR | 1848.80 | 7036.56 | 7040.68 | 7040.68 | 7041.67 | 0.022801 | 8.58 | 244.84 | 121.59 | 0.91 | 1.97 | 3.92 | 1.66 | 2.85 |
| Reach 1-3 | 4296 | FIS | 2600.00 | 7036.56 | 7041.26 | 7041.26 | 7042.40 | 0.021617 | 9.35 | 320.40 | 141.01 | 0.90 | 1.94 | 4.50 | 1.97 | 3.05 |
| Reach 1-3 | 4084 | 5-YR | 512.29 | 7033.29 | 7037.49 | | 7037.49 | 0.000039 | 0.62 | 834.01 | 266.74 | 0.06 | 0.00 | 0.01 | 0.00 | 0.01 |
| Reach 1-3 | 4084 | 100-YR | 1848.80 | 7033.29 | 7039.49 | | 7039.52 | 0.000096 | 1.32 | 1527.52 | 365.16 | 0.10 | 0.01 | 0.03 | 0.01 | 0.03 |
| Reach 1-3 | 4084 | FIS | 2600.00 | 7033.29 | 7040.66 | | 7040.69 | 0.000091 | 1.45 | 1956.49 | 374.03 | 0.10 | 0.01 | 0.04 | 0.02 | 0.03 |
| Reach 1-3 | 3846 | 5-YR | 512.29 | 7033.20 | 7036.87 | 7036.87 | 7037.40 | 0.017706 | 5.86 | 87.35 | 166.03 | 1.01 | | 1.17 | | 1.17 |
| Reach 1-3 | 3846 | 100-YR | 1848.80 | 7033.20 | 7038.22 | 7038.22 | 7039.33 | 0.013956 | 8.45 | 218.78 | 233.23 | 1.01 | | 1.91 | | 1.91 |
| Reach 1-3 | 3846 | FIS | 2600.00 | 7033.20 | 7039.80 | | 7040.54 | 0.004486 | 6.89 | 377.33 | 317.58 | 0.63 | | 1.06 | | 1.06 |
| Reach 1-3 | 3842 | 5-YR | 512.29 | 7014.12 | 7020.70 | | 7021.01 | 0.000126 | 4.50 | 121.28 | 19.69 | 0.31 | 0.01 | 0.05 | 0.00 | 0.03 |
| Reach 1-3 | 3842 | 100-YR | 1848.80 | 7014.12 | 7033.28 | | 7033.74 | 0.000045 | 5.52 | 399.11 | 35.16 | 0.22 | 0.01 | 0.05 | 0.00 | 0.02 |
| Reach 1-3 | 3842 | FIS | 2600.00 | 7014.12 | 7039.98 | | 7040.47 | 0.000032 | 5.69 | 570.89 | 493.19 | 0.20 | 0.01 | 0.05 | 0.01 | 0.02 |
| Reach 1-3 | 3816 | 5-YR | 512.29 | 7014.12 | 7020.20 | 7017.95 | 7020.96 | 0.000339 | 7.01 | 75.45 | 12.83 | 0.50 | 0.01 | 0.13 | 0.00 | 0.07 |
| Reach 1-3 | 3816 | 100-YR | 1848.80 | 7014.12 | 7032.63 | 7023.13 | 7033.68 | 0.000107 | 8.27 | 245.34 | 14.52 | 0.34 | 0.01 | 0.12 | 0.00 | 0.03 |
| Reach 1-3 | 3816 | FIS | 2600.00 | 7014.12 | 7039.28 | 7025.41 | 7040.40 | 0.000076 | 8.53 | 344.92 | 95.24 | 0.30 | 0.01 | 0.12 | 0.00 | 0.03 |
| Reach 1-3 | 3744 | | Culvert | | | | | | | | | | | | | |
| Reach 1-3 | 3719 | 5-YR | 512.29 | 7013.40 | 7017.22 | 7017.22 | 7019.15 | 0.001594 | 11.16 | 46.83 | 12.51 | 1.01 | 0.02 | 0.38 | 0.00 | 0.24 |
| Reach 1-3 | 3719 | 100-YR | 1848.80 | 7013.40 | 7022.41 | 7022.41 | 7026.91 | 0.001184 | 17.04 | 113.55 | 13.19 | 1.00 | 0.04 | 0.67 | 0.00 | 0.28 |
| Reach 1-3 | 3719 | FIS | 2600.00 | 7013.40 | 7024.68 | 7024.68 | 7030.35 | 0.001107 | 19.13 | 143.82 | 13.49 | 1.00 | 0.05 | 0.78 | 0.00 | 0.29 |
| Reach 1-3 | 3711 | 5-YR | 512.29 | 7002.83 | 7008.91 | 7006.66 | 7009.67 | 0.000340 | 7.02 | 74.68 | 12.58 | 0.50 | 0.01 | 0.13 | 0.00 | 0.07 |
| Reach 1-3 | 3711 | 100-YR | 1848.80 | 7002.83 | 7021.33 | 7011.85 | 7022.39 | 0.000108 | 8.30 | 238.31 | 13.77 | 0.34 | 0.01 | 0.12 | 0.00 | 0.03 |
| Reach 1-3 | 3711 | FIS | 2600.00 | 7002.83 | 7027.64 | 7014.13 | 7028.81 | 0.000080 | 8.69 | 327.20 | 14.38 | 0.31 | 0.01 | 0.12 | 0.00 | 0.03 |
| Reach 1-3 | 3676 | | Culvert | | | | | | | | | | | | | |
| Reach 1-3 | 3667 | 5-YR | 512.29 | 7002.61 | 7006.44 | 7006.44 | 7008.37 | 0.001588 | 11.15 | 46.62 | 12.36 | 1.00 | 0.02 | 0.38 | 0.00 | 0.24 |
| Reach 1-3 | 3667 | 100-YR | 1848.80 | 7002.61 | 7011.61 | 7011.61 | 7016.14 | 0.001193 | 17.08 | 111.88 | 12.86 | 1.00 | 0.03 | 0.67 | 0.00 | 0.28 |
| Reach 1-3 | 3667 | FIS | 2600.00 | 7002.61 | 7013.91 | 7013.91 | 7019.58 | 0.001106 | 19.14 | 141.63 | 13.08 | 1.00 | 0.04 | 0.78 | 0.00 | 0.28 |
| Reach 1-3 | 3662 | 5-YR | 512.29 | 7001.15 | 7004.61 | | 7005.31 | 0.005541 | 6.67 | 76.85 | 73.06 | 0.68 | 0.01 | 0.93 | 0.01 | 0.90 |
| Reach 1-3 | 3662 | 100-YR | 1848.80 | 7001.15 | 7010.93 | | 7011.84 | 0.001608 | 7.68 | 246.05 | 403.80 | 0.44 | 0.05 | 0.84 | 0.04 | 0.58 |
| Reach 1-3 | 3662 | FIS | 2600.00 | 7001.15 | 7011.32 | 7008.44 | 7012.98 | 0.002773 | 10.36 | 256.80 | 429.70 | 0.59 | 0.09 | 1.51 | 0.08 | 1.03 |
| Reach 1-3 | 3629 | 5-YR | 512.29 | 7001.51 | 7005.00 | 7003.02 | 7005.05 | 0.000825 | 1.93 | 265.09 | 463.34 | 0.20 | | 0.15 | | 0.15 |
| Reach 1-3 | 3629 | 100-YR | 1848.80 | 7001.51 | 7011.50 | 7004.41 | 7011.57 | 0.000215 | 2.16 | 856.79 | 631.19 | 0.12 | | 0.13 | | 0.13 |
| Reach 1-3 | 3629 | FIS | 2600.00 | 7001.51 | 7012.47 | 7005.04 | 7012.48 | 0.000022 | 0.73 | 5019.20 | 640.28 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3625 | 5-YR | 512.29 | 7003.41 | 7005.00 | | 7005.05 | 0.001316 | 2.25 | 425.11 | 463.76 | 0.32 | 0.07 | 0.13 | 0.06 | 0.08 |
| Reach 1-3 | 3625 | 100-YR | 1848.80 | 7003.41 | 7011.55 | | 7011.55 | 0.000016 | 0.76 | 4303.02 | 631.62 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3625 | FIS | 2600.00 | 7003.41 | 7012.47 | | 7012.48 | 0.000022 | 0.93 | 4892.07 | 640.26 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3618 | 5-YR | 512.29 | 7002.58 | 7004.98 | | 7005.04 | 0.001701 | 3.06 | 430.63 | 457.91 | 0.35 | 0.10 | 0.25 | 0.08 | 0.10 |
| Reach 1-3 | 3618 | 100-YR | 1848.80 | 7002.58 | 7011.55 | | 7011.55 | 0.000020 | 0.82 | 4257.09 | 622.19 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3618 | FIS | 2600.00 | 7002.58 | 7012.47 | | 7012.48 | 0.000027 | 1.00 | 4837.77 | 630.95 | 0.06 | 0.01 | 0.02 | 0.01 | 0.01 |
| Reach 1-3 | 3485 | 5-YR | 512.29 | 7002.22 | 7004.78 | | 7004.84 | 0.001575 | 3.07 | 426.89 | 433.07 | 0.34 | 0.09 | 0.24 | 0.08 | 0.10 |
| Reach 1-3 | 3485 | 100-YR | 1848.80 | 7002.22 | 7011.54 | | 7011.55 | 0.000019 | 0.81 | 4323.96 | 620.53 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3485 | FIS | 2600.00 | 7002.22 | 7012.47 | | 7012.48 | 0.000025 | 0.99 | 4903.01 | 629.77 | 0.05 | 0.01 | 0.02 | 0.01 | 0.01 |
| Reach 1-3 | 3336 | 5-YR | 512.29 | 7001.71 | 7004.68 | | 7004.70 | 0.000566 | 2.04 | 633.91 | 517.73 | 0.21 | 0.04 | 0.10 | 0.05 | 0.04 |
| Reach 1-3 | 3336 | 100-YR | 1848.80 | 7001.71 | 7011.54 | | 7011.55 | 0.000014 | 0.71 | 4822.48 | 642.15 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3336 | FIS | 2600.00 | 7001.71 | 7012.47 | | 7012.47 | 0.000019 | 0.88 | 5420.81 | 650.45 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3198 | 5-YR | 512.29 | 7001.27 | 7004.65 | | 7004.66 | 0.000139 | 1.09 | 977.96 | 507.50 | 0.11 | 0.02 | 0.03 | 0.01 | 0.02 |
| Reach 1-3 | 3198 | 100-YR | 1848.80 | 7001.27 | 7011.54 | | 7011.54 | 0.000011 | 0.66 | 4817.29 | 599.85 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3198 | FIS | 2600.00 | 7001.27 | 7012.47 | | 7012.47 | 0.000016 | 0.82 | 5376.90 | 609.22 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 |
| Reach 1-3 | 3103 | 5-YR | 512.29 | 7001.02 | 7004.65 | 7001.77 | 7004.65 | 0.000031 | 0.54 | 955.85 | 385.40 | 0.05 | | 0.01 | | 0.01 |
| Reach 1-3 | 3103 | 100-YR | 1848.80 | 7001.02 | 7011.54 | 7002.40 | 7011.54 | 0.000011 | 0.62 | 3035.87 | 478.75 | 0.04 | 0.00 | 0.01 | 0.00 | 0.00 |
| Reach 1-3 | 3103 | FIS | 2600.00 | 7001.02 | 7012.46 | 7002.68 | 7012.47 | 0.000015 | 0.78 | 3480.66 | 485.10 | 0.04 | 0.00 | 0.01 | 0.00 | 0.01 |
| Reach 1-3 | 3057 | | Culvert | | | | | | | | | | | | | |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| Reach 1-3 | 2988 | 5-YR | 512.29 | 7001.00 | 7003.77 | | 7003.83 | 0.000564 | 1.98 | 258.46 | 117.29 | 0.21 | 0.09 | 0.10 | 0.09 | 0.10 |
| Reach 1-3 | 2988 | 100-YR | 1848.80 | 7001.00 | 7007.74 | | 7007.87 | 0.000375 | 2.93 | 631.03 | 133.64 | 0.20 | 0.15 | 0.16 | 0.15 | 0.16 |
| Reach 1-3 | 2988 | FIS | 2600.00 | 7001.00 | 7010.57 | | 7010.70 | 0.000229 | 2.89 | 897.66 | 149.46 | 0.16 | 0.13 | 0.14 | 0.13 | 0.14 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2975 | 5-YR | 398.70 | 7000.89 | 7003.71 | 7002.10 | 7003.82 | 0.001118 | 2.66 | 149.73 | 53.95 | 0.28 | | 0.18 | | 0.18 |
| Reach 1-3 | 2975 | 100-YR | 1562.40 | 7000.89 | 7007.55 | 7003.89 | 7007.85 | 0.000950 | 4.36 | 360.47 | 55.68 | 0.30 | 0.02 | 0.36 | 0.02 | 0.32 |
| Reach 1-3 | 2975 | FIS | 2600.00 | 7000.89 | 7010.26 | 7005.10 | 7010.67 | 0.000834 | 5.14 | 512.99 | 56.85 | 0.30 | 0.04 | 0.45 | 0.04 | 0.37 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2930 | | Culvert | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2879 | 5-YR | 398.70 | 7000.82 | 7002.45 | | 7002.90 | 0.008564 | 5.28 | 74.43 | 60.40 | 0.75 | 0.82 | 0.83 | 0.78 | 0.83 |
| Reach 1-3 | 2879 | 100-YR | 1562.40 | 7000.82 | 7004.10 | 7004.10 | 7005.71 | 0.011700 | 9.99 | 153.77 | 73.42 | 0.98 | 2.32 | 2.34 | 2.27 | 2.33 |
| Reach 1-3 | 2879 | FIS | 2600.00 | 7000.82 | 7005.39 | 7005.39 | 7007.65 | 0.010460 | 11.83 | 215.85 | 84.44 | 0.98 | 2.92 | 2.94 | 2.87 | 2.92 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2856 | 5-YR | 398.70 | 7000.50 | 7002.18 | | 7002.47 | 0.038527 | 4.32 | 94.37 | 67.04 | 0.61 | 1.24 | 3.70 | 1.39 | 3.43 |
| Reach 1-3 | 2856 | 100-YR | 1562.40 | 7000.50 | 7003.73 | | 7004.71 | 0.053721 | 8.09 | 197.99 | 78.57 | 0.81 | 6.10 | 10.30 | 7.01 | 9.77 |
| Reach 1-3 | 2856 | FIS | 2600.00 | 7000.50 | 7004.66 | 7004.39 | 7006.22 | 0.059821 | 10.17 | 260.93 | 85.75 | 0.89 | 10.19 | 14.94 | 11.22 | 14.34 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2850 | 5-YR | 398.70 | 7000.17 | 7001.55 | 7001.55 | 7002.07 | 0.111722 | 5.87 | 69.37 | 67.25 | 0.99 | 2.91 | 7.66 | 2.75 | 7.13 |
| Reach 1-3 | 2850 | 100-YR | 1562.40 | 7000.17 | 7003.47 | | 7004.37 | 0.050787 | 7.78 | 208.98 | 81.81 | 0.79 | 5.13 | 9.58 | 6.21 | 8.76 |
| Reach 1-3 | 2850 | FIS | 2600.00 | 7000.17 | 7004.50 | | 7005.81 | 0.050313 | 9.41 | 285.90 | 89.57 | 0.82 | 8.08 | 12.72 | 9.28 | 11.88 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2842 | 5-YR | 398.70 | 6997.59 | 7001.50 | | 7001.56 | 0.002796 | 2.03 | 207.56 | 67.18 | 0.19 | 0.21 | 0.62 | 0.21 | 0.51 |
| Reach 1-3 | 2842 | 100-YR | 1562.40 | 6997.59 | 7003.61 | | 7003.93 | 0.008315 | 4.72 | 364.60 | 81.98 | 0.34 | 1.13 | 2.88 | 1.20 | 2.22 |
| Reach 1-3 | 2842 | FIS | 2600.00 | 6997.59 | 7004.68 | | 7005.25 | 0.012030 | 6.35 | 453.98 | 89.34 | 0.43 | 2.04 | 4.93 | 2.51 | 3.82 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2838 | 5-YR | 398.70 | 6999.13 | 7001.40 | | 7001.54 | 0.012715 | 3.05 | 132.12 | 66.96 | 0.37 | 0.31 | 1.66 | 0.21 | 1.55 |
| Reach 1-3 | 2838 | 100-YR | 1562.40 | 6999.13 | 7003.36 | | 7003.87 | 0.019350 | 5.83 | 278.48 | 82.02 | 0.51 | 1.61 | 4.89 | 1.46 | 4.05 |
| Reach 1-3 | 2838 | FIS | 2600.00 | 6999.13 | 7004.35 | | 7005.17 | 0.023504 | 7.43 | 363.60 | 89.63 | 0.58 | 2.66 | 7.38 | 2.48 | 5.86 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2830 | 5-YR | 398.70 | 6997.58 | 7001.36 | | 7001.49 | 0.003085 | 2.87 | 144.56 | 71.10 | 0.33 | 0.16 | 0.44 | 0.16 | 0.39 |
| Reach 1-3 | 2830 | 100-YR | 1562.40 | 6997.58 | 7003.33 | | 7003.77 | 0.005548 | 5.52 | 299.22 | 86.69 | 0.47 | 0.62 | 1.47 | 0.60 | 1.18 |
| Reach 1-3 | 2830 | FIS | 2600.00 | 6997.58 | 7004.32 | | 7005.04 | 0.006975 | 7.05 | 389.78 | 94.98 | 0.54 | 0.99 | 2.27 | 0.96 | 1.76 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2792 | 5-YR | 398.70 | 6997.53 | 7001.27 | | 7001.37 | 0.002631 | 2.67 | 157.88 | 77.82 | 0.31 | 0.16 | 0.39 | 0.18 | 0.33 |
| Reach 1-3 | 2792 | 100-YR | 1562.40 | 6997.53 | 7003.18 | | 7003.56 | 0.004764 | 5.12 | 323.58 | 95.39 | 0.44 | 0.57 | 1.27 | 0.62 | 0.99 |
| Reach 1-3 | 2792 | FIS | 2600.00 | 6997.53 | 7004.16 | | 7004.77 | 0.005965 | 6.51 | 421.39 | 104.39 | 0.50 | 0.89 | 1.95 | 0.96 | 1.48 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2719 | 5-YR | 398.70 | 6997.47 | 7001.10 | | 7001.19 | 0.002536 | 2.64 | 170.08 | 91.73 | 0.30 | 0.15 | 0.37 | 0.21 | 0.29 |
| Reach 1-3 | 2719 | 100-YR | 1562.40 | 6997.47 | 7002.91 | | 7003.23 | 0.004501 | 4.94 | 349.35 | 106.60 | 0.43 | 0.52 | 1.16 | 0.77 | 0.91 |
| Reach 1-3 | 2719 | FIS | 2600.00 | 6997.47 | 7003.82 | | 7004.36 | 0.005660 | 6.27 | 451.10 | 114.78 | 0.49 | 0.79 | 1.78 | 1.19 | 1.37 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2680 | 5-YR | 398.70 | 6997.33 | 7001.00 | | 7001.09 | 0.002535 | 2.55 | 175.35 | 100.39 | 0.30 | 0.14 | 0.35 | 0.17 | 0.27 |
| Reach 1-3 | 2680 | 100-YR | 1562.40 | 6997.33 | 7002.73 | | 7003.04 | 0.004586 | 4.80 | 363.78 | 119.52 | 0.42 | 0.42 | 1.13 | 0.70 | 0.86 |
| Reach 1-3 | 2680 | FIS | 2600.00 | 6997.33 | 7003.62 | | 7004.11 | 0.005711 | 6.07 | 474.85 | 130.47 | 0.48 | 0.66 | 1.72 | 1.10 | 1.29 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2646 | 5-YR | 398.70 | 6997.18 | 7000.92 | | 7001.01 | 0.002291 | 2.53 | 178.21 | 109.98 | 0.30 | 0.10 | 0.31 | 0.13 | 0.23 |
| Reach 1-3 | 2646 | 100-YR | 1562.40 | 6997.18 | 7002.61 | | 7002.89 | 0.003936 | 4.61 | 381.48 | 128.84 | 0.41 | 0.40 | 0.95 | 0.57 | 0.72 |
| Reach 1-3 | 2646 | FIS | 2600.00 | 6997.18 | 7003.48 | | 7003.92 | 0.004885 | 5.80 | 496.17 | 136.11 | 0.47 | 0.67 | 1.44 | 0.90 | 1.10 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2589 | 5-YR | 398.70 | 6996.89 | 7000.79 | | 7000.88 | 0.002215 | 2.59 | 183.01 | 119.28 | 0.31 | 0.06 | 0.30 | 0.14 | 0.21 |
| Reach 1-3 | 2589 | 100-YR | 1562.40 | 6996.89 | 7002.43 | | 7002.68 | 0.003504 | 4.43 | 412.24 | 146.97 | 0.40 | 0.27 | 0.83 | 0.50 | 0.61 |
| Reach 1-3 | 2589 | FIS | 2600.00 | 6996.89 | 7003.28 | | 7003.66 | 0.004217 | 5.48 | 539.31 | 153.88 | 0.45 | 0.43 | 1.22 | 0.80 | 0.91 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2545 | 5-YR | 398.70 | 6997.22 | 7000.68 | | 7000.77 | 0.002949 | 2.61 | 178.63 | 123.07 | 0.32 | 0.15 | 0.38 | 0.15 | 0.27 |
| Reach 1-3 | 2545 | 100-YR | 1562.40 | 6997.22 | 7002.23 | | 7002.50 | 0.004868 | 4.64 | 390.39 | 145.31 | 0.43 | 0.48 | 1.09 | 0.64 | 0.81 |
| Reach 1-3 | 2545 | FIS | 2600.00 | 6997.22 | 7003.01 | | 7003.44 | 0.006022 | 5.82 | 509.73 | 163.48 | 0.49 | 0.73 | 1.65 | 0.91 | 1.16 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2513 | 5-YR | 398.70 | 6996.86 | 7000.60 | | 7000.68 | 0.002478 | 2.45 | 182.91 | 130.63 | 0.31 | 0.12 | 0.30 | 0.10 | 0.22 |
| Reach 1-3 | 2513 | 100-YR | 1562.40 | 6996.86 | 7002.09 | | 7002.35 | 0.004210 | 4.37 | 399.61 | 152.83 | 0.41 | 0.40 | 0.90 | 0.50 | 0.68 |
| Reach 1-3 | 2513 | FIS | 2600.00 | 6996.86 | 7002.84 | | 7003.25 | 0.005326 | 5.52 | 516.41 | 159.86 | 0.47 | 0.63 | 1.39 | 0.84 | 1.07 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2468 | 5-YR | 398.70 | 6997.15 | 7000.40 | | 7000.52 | 0.004871 | 2.92 | 157.10 | 144.02 | 0.41 | 0.07 | 0.49 | 0.17 | 0.33 |
| Reach 1-3 | 2468 | 100-YR | 1562.40 | 6997.15 | 7001.88 | | 7002.12 | 0.005157 | 4.28 | 416.90 | 188.94 | 0.43 | 0.31 | 0.99 | 0.55 | 0.71 |
| Reach 1-3 | 2468 | FIS | 2600.00 | 6997.15 | 7002.61 | | 7002.96 | 0.005801 | 5.16 | 557.26 | 196.12 | 0.47 | 0.48 | 1.37 | 0.86 | 1.02 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2405 | 5-YR | 398.70 | 6997.08 | 6999.86 | | 7000.09 | 0.010282 | 3.84 | 108.10 | 107.24 | 0.58 | 0.06 | 0.86 | 0.11 | 0.64 |
| Reach 1-3 | 2405 | 100-YR | 1562.40 | 6997.08 | 7001.18 | | 7001.65 | 0.012297 | 6.05 | 330.06 | 216.73 | 0.65 | 0.57 | 2.03 | 0.70 | 1.16 |
| Reach 1-3 | 2405 | FIS | 2600.00 | 6997.08 | 7001.53 | 7001.50 | 7002.36 | 0.019514 | 8.21 | 406.16 | 220.48 | 0.83 | 1.12 | 3.64 | 1.52 | 2.24 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2399 | 5-YR | 398.70 | 6997.08 | 6999.38 | 6999.38 | 6999.91 | 0.124367 | 5.88 | 67.81 | 66.14 | 1.02 | | 7.88 | | 7.88 |
| Reach 1-3 | 2399 | 100-YR | 1562.40 | 6997.08 | 7000.93 | 7000.93 | 7001.51 | 0.047494 | 6.67 | 271.58 | 215.32 | 0.74 | 1.97 | 7.48 | 1.98 | 3.73 |
| Reach 1-3 | 2399 | FIS | 2600.00 | 6997.08 | 7001.39 | 7001.39 | 7002.17 | 0.050148 | 7.64 | 371.53 | 223.00 | 0.78 | 2.79 | 9.31 | 3.45 | 5.20 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2394 | 5-YR | 398.70 | 6995.80 | 6998.11 | 6998.11 | 6998.62 | 0.119014 | 5.75 | 69.36 | 67.75 | 1.00 | | 7.53 | | 7.53 |
| Reach 1-3 | 2394 | 100-YR | 1562.40 | 6995.80 | 6999.72 | 6999.72 | 7000.50 | 0.057768 | 7.46 | 236.96 | 154.06 | 0.82 | 2.57 | 9.30 | 2.35 | 5.52 |
| Reach 1-3 | 2394 | FIS | 2600.00 | 6995.80 | 7000.48 | 7000.48 | 7001.30 | 0.046189 | 7.91 | 376.05 | 213.32 | 0.76 | 3.13 | 9.60 | 2.82 | 5.06 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2389 | 5-YR | 398.70 | 6994.62 | 6996.92 | 6996.92 | 6997.44 | 0.117053 | 5.76 | 69.46 | 69.14 | 1.00 | 0.58 | 7.52 | 0.84 | 7.27 |
| Reach 1-3 | 2389 | 100-YR | 1562.40 | 6994.62 | 6998.46 | 6998.46 | 6999.48 | 0.072588 | 8.31 | 202.37 | 109.65 | 0.91 | 3.59 | 11.56 | 3.12 | 8.30 |
| Reach 1-3 | 2389 | FIS | 2600.00 | 6994.62 | 6999.50 | 6999.50 | 7000.49 | 0.047009 | 8.39 | 346.99 | 177.77 | 0.78 | 3.83 | 10.53 | 2.61 | 5.70 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2384 | 5-YR | 398.70 | 6993.53 | 6996.73 | | 6996.86 | 0.014166 | 2.94 | 135.88 | 79.23 | 0.38 | 0.09 | 1.62 | 0.06 | 1.50 |
| Reach 1-3 | 2384 | 100-YR | 1562.40 | 6993.53 | 6998.02 | | 6998.61 | 0.032434 | 6.34 | 264.72 | 120.28 | 0.63 | 1.49 | 6.29 | 1.49 | 4.42 |
| Reach 1-3 | 2384 | FIS | 2600.00 | 6993.53 | 6998.40 | 6998.40 | 6999.58 | 0.055840 | 8.99 | 314.76 | 138.02 | 0.84 | 3.23 | 12.16 | 2.98 | 7.89 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2377 | 5-YR | 398.70 | 6993.46 | 6996.74 | | 6996.80 | 0.003243 | 1.91 | 216.10 | 98.15 | 0.19 | 0.06 | 0.59 | 0.07 | 0.43 |
| Reach 1-3 | 2377 | 100-YR | 1562.40 | 6993.46 | 6998.12 | | 6998.40 | 0.010895 | 4.50 | 390.59 | 155.77 | 0.38 | 0.67 | 2.87 | 0.71 | 1.67 |
| Reach 1-3 | 2377 | FIS | 2600.00 | 6993.46 | 6998.39 | | 6999.03 | 0.023014 | 6.81 | 438.52 | 198.56 | 0.55 | 1.60 | 6.44 | 1.29 | 3.12 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2375 | 5-YR | 398.70 | 6994.97 | 6996.54 | | 6996.76 | 0.031436 | 3.83 | 109.14 | 96.66 | 0.55 | 0.41 | 2.94 | 0.50 | 2.21 |
| Reach 1-3 | 2375 | 100-YR | 1562.40 | 6994.97 | 6997.52 | 6997.52 | 6998.30 | 0.062814 | 7.56 | 233.96 | 153.78 | 0.85 | 2.74 | 9.69 | 3.03 | 5.95 |
| Reach 1-3 | 2375 | FIS | 2600.00 | 6994.97 | 6998.24 | 6998.24 | 6998.94 | 0.042318 | 7.36 | 399.84 | 253.98 | 0.73 | 2.83 | 8.43 | 2.57 | 4.15 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2350 | 5-YR | 398.70 | 6993.08 | 6996.30 | | 6996.44 | 0.005964 | 3.26 | 161.48 | 215.20 | 0.48 | 0.04 | 0.53 | 0.15 | 0.28 |
| Reach 1-3 | 2350 | 100-YR | 1562.40 | 6993.08 | 6997.33 | | 6997.62 | 0.008754 | 5.12 | 417.17 | 264.63 | 0.58 | 0.34 | 1.33 | 0.69 | 0.86 |
| Reach 1-3 | 2350 | FIS | 2600.00 | 6993.08 | 6998.01 | | 6998.36 | 0.008319 | 5.72 | 599.80 | 272.36 | 0.57 | 0.50 | 1.62 | 1.00 | 1.14 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2319 | 5-YR | 398.70 | 6993.33 | 6995.98 | | 6996.20 | 0.010339 | 3.99 | 130.80 | 225.97 | 0.62 | 0.22 | 0.83 | 0.17 | 0.37 |
| Reach 1-3 | 2319 | 100-YR | 1562.40 | 6993.33 | 6997.08 | | 6997.36 | 0.009234 | 5.13 | 424.88 | 279.89 | 0.58 | 0.51 | 1.37 | 0.72 | 0.87 |
| Reach 1-3 | 2319 | FIS | 2600.00 | 6993.33 | 6997.81 | | 6998.12 | 0.007732 | 5.47 | 633.05 | 288.88 | 0.55 | 0.58 | 1.50 | 0.95 | 1.06 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Shear LOB | Shear Chan | Shear ROB | Shear Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) | (lb/sq ft) |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2246 | 5-YR | 398.70 | 6993.16 | 6995.47 | | 6995.55 | 0.007248 | 2.73 | 189.89 | 233.72 | 0.48 | 0.10 | 0.45 | 0.33 | 0.37 |
| Reach 1-3 | 2246 | 100-YR | 1562.40 | 6993.16 | 6996.63 | | 6996.80 | 0.006503 | 3.84 | 488.72 | 281.21 | 0.46 | 0.32 | 0.87 | 0.67 | 0.70 |
| Reach 1-3 | 2246 | FIS | 2600.00 | 6993.16 | 6997.46 | | 6997.67 | 0.005141 | 4.14 | 732.67 | 301.74 | 0.42 | 0.39 | 0.95 | 0.75 | 0.78 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2181 | 5-YR | 398.70 | 6992.99 | 6994.81 | | 6994.94 | 0.015439 | 3.44 | 141.60 | 196.64 | 0.74 | | 0.65 | 0.72 | 0.69 |
| Reach 1-3 | 2181 | 100-YR | 1562.40 | 6992.99 | 6996.23 | | 6996.41 | 0.006454 | 3.78 | 463.03 | 253.91 | 0.46 | 0.26 | 0.84 | 0.72 | 0.73 |
| Reach 1-3 | 2181 | FIS | 2600.00 | 6992.99 | 6997.16 | | 6997.37 | 0.004687 | 4.02 | 713.14 | 280.52 | 0.41 | 0.32 | 0.88 | 0.73 | 0.74 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2112 | 5-YR | 398.70 | 6992.58 | 6994.25 | | 6994.32 | 0.005522 | 2.49 | 189.38 | 165.50 | 0.35 | 0.37 | 0.54 | 0.35 | 0.39 |
| Reach 1-3 | 2112 | 100-YR | 1562.40 | 6992.58 | 6995.91 | | 6996.05 | 0.003969 | 3.41 | 512.96 | 225.20 | 0.33 | 0.51 | 0.80 | 0.52 | 0.56 |
| Reach 1-3 | 2112 | FIS | 2600.00 | 6992.58 | 6996.90 | | 6997.09 | 0.003359 | 3.75 | 746.87 | 240.30 | 0.32 | 0.55 | 0.89 | 0.62 | 0.65 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 2046 | 5-YR | 398.70 | 6991.97 | 6993.65 | | 6993.90 | 0.006971 | 4.91 | 124.24 | 114.24 | 0.68 | 0.43 | 0.71 | 0.37 | 0.47 |
| Reach 1-3 | 2046 | 100-YR | 1562.40 | 6991.97 | 6995.33 | | 6995.73 | 0.005230 | 6.81 | 362.33 | 166.62 | 0.66 | 0.72 | 1.08 | 0.59 | 0.71 |
| Reach 1-3 | 2046 | FIS | 2600.00 | 6991.97 | 6996.32 | | 6996.80 | 0.004637 | 7.64 | 542.14 | 194.56 | 0.65 | 0.83 | 1.24 | 0.69 | 0.81 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1993 | 5-YR | 398.70 | 6991.29 | 6993.36 | | 6993.52 | 0.006017 | 4.61 | 140.92 | 106.59 | 0.62 | 0.19 | 0.63 | 0.50 | 0.49 |
| Reach 1-3 | 1993 | 100-YR | 1562.40 | 6991.29 | 6995.06 | | 6995.42 | 0.005932 | 7.19 | 357.93 | 150.12 | 0.68 | 0.56 | 1.22 | 0.87 | 0.88 |
| Reach 1-3 | 1993 | FIS | 2600.00 | 6991.29 | 6996.08 | | 6996.53 | 0.005323 | 8.10 | 523.89 | 173.01 | 0.68 | 0.68 | 1.42 | 1.00 | 1.00 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1929 | 5-YR | 398.70 | 6991.32 | 6993.09 | | 6993.24 | 0.003442 | 3.47 | 145.97 | 110.40 | 0.48 | 0.14 | 0.35 | 0.23 | 0.28 |
| Reach 1-3 | 1929 | 100-YR | 1562.40 | 6991.32 | 6994.68 | | 6995.10 | 0.004151 | 5.99 | 343.88 | 137.27 | 0.59 | 0.37 | 0.84 | 0.57 | 0.65 |
| Reach 1-3 | 1929 | FIS | 2600.00 | 6991.32 | 6995.64 | | 6996.22 | 0.004246 | 7.19 | 481.96 | 152.80 | 0.62 | 0.50 | 1.11 | 0.74 | 0.83 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1884 | 5-YR | 398.70 | 6991.07 | 6992.68 | | 6992.97 | 0.010106 | 5.71 | 113.55 | 101.92 | 0.81 | 0.75 | 0.98 | 0.60 | 0.70 |
| Reach 1-3 | 1884 | 100-YR | 1562.40 | 6991.07 | 6994.13 | | 6994.79 | 0.010382 | 8.98 | 275.84 | 122.31 | 0.92 | 1.34 | 1.94 | 1.37 | 1.46 |
| Reach 1-3 | 1884 | FIS | 2600.00 | 6991.07 | 6995.02 | | 6995.90 | 0.009870 | 10.42 | 390.70 | 134.25 | 0.93 | 1.61 | 2.39 | 1.70 | 1.79 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1834 | 5-YR | 398.70 | 6990.69 | 6992.33 | | 6992.57 | 0.006123 | 4.23 | 117.76 | 111.41 | 0.62 | 0.20 | 0.55 | 0.26 | 0.40 |
| Reach 1-3 | 1834 | 100-YR | 1562.40 | 6990.69 | 6993.55 | | 6994.30 | 0.009141 | 7.78 | 261.45 | 126.55 | 0.84 | 0.64 | 1.51 | 0.98 | 1.17 |
| Reach 1-3 | 1834 | FIS | 2600.00 | 6990.69 | 6994.25 | 6994.12 | 6995.38 | 0.010347 | 9.68 | 354.19 | 136.06 | 0.93 | 0.95 | 2.17 | 1.46 | 1.67 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1804 | 5-YR | 398.70 | 6990.58 | 6992.05 | | 6992.33 | 0.009181 | 5.18 | 109.93 | 112.32 | 0.76 | 0.42 | 0.82 | 0.47 | 0.56 |
| Reach 1-3 | 1804 | 100-YR | 1562.40 | 6990.58 | 6993.19 | 6993.08 | 6993.96 | 0.012176 | 8.81 | 246.28 | 127.37 | 0.97 | 1.10 | 1.96 | 1.41 | 1.47 |
| Reach 1-3 | 1804 | FIS | 2600.00 | 6990.58 | 6993.97 | 6993.81 | 6994.99 | 0.011343 | 10.15 | 350.67 | 137.38 | 0.98 | 1.36 | 2.38 | 1.79 | 1.80 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1707 | 5-YR | 480.40 | 6989.35 | 6990.79 | 6990.79 | 6991.28 | 0.012597 | 6.15 | 94.90 | 100.66 | 0.96 | 0.56 | 1.01 | 0.47 | 0.74 |
| Reach 1-3 | 1707 | 100-YR | 1585.20 | 6989.35 | 6992.01 | 6992.01 | 6992.90 | 0.010246 | 8.68 | 237.51 | 133.63 | 0.97 | 0.93 | 1.60 | 0.85 | 1.14 |
| Reach 1-3 | 1707 | FIS | 2600.00 | 6989.35 | 6992.61 | 6992.61 | 6993.89 | 0.011525 | 10.61 | 320.97 | 145.48 | 1.06 | 1.14 | 2.23 | 1.33 | 1.58 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1663 | 5-YR | 480.40 | 6987.76 | 6989.01 | 6989.01 | 6989.57 | 0.014826 | 6.35 | 86.60 | 94.76 | 1.03 | 0.47 | 1.10 | 0.51 | 0.84 |
| Reach 1-3 | 1663 | 100-YR | 1585.20 | 6987.76 | 6990.27 | 6990.27 | 6991.15 | 0.009946 | 8.42 | 236.56 | 134.20 | 0.95 | 0.80 | 1.52 | 0.73 | 1.09 |
| Reach 1-3 | 1663 | FIS | 2600.00 | 6987.76 | 6990.99 | 6990.99 | 6992.14 | 0.009572 | 9.82 | 338.69 | 146.87 | 0.97 | 1.09 | 1.90 | 0.92 | 1.37 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1622 | 5-YR | 480.40 | 6986.76 | 6987.86 | 6987.86 | 6988.22 | 0.017410 | 4.81 | 99.86 | 143.49 | 1.02 | | 0.76 | | 0.76 |
| Reach 1-3 | 1622 | 100-YR | 1585.20 | 6986.76 | 6988.71 | 6988.71 | 6989.45 | 0.012924 | 6.95 | 231.72 | 163.70 | 1.00 | 0.32 | 1.22 | 0.28 | 1.14 |
| Reach 1-3 | 1622 | FIS | 2600.00 | 6986.76 | 6989.73 | | 6990.40 | 0.005951 | 6.65 | 406.62 | 177.65 | 0.74 | 0.38 | 0.94 | 0.31 | 0.85 |
| | | | | | | | | | | | | | | | | |
| Reach 1-3 | 1411 | 5-YR | 480.40 | 6982.00 | 6983.37 | 6983.37 | 6983.78 | 0.016346 | 5.16 | 93.68 | 119.99 | 1.01 | 0.17 | 0.83 | 0.10 | 0.80 |
| Reach 1-3 | 1411 | 100-YR | 1585.20 | 6982.00 | 6984.35 | 6984.35 | 6985.19 | 0.011788 | 7.44 | 223.21 | 140.15 | 0.98 | 0.54 | 1.32 | 0.48 | 1.17 |
| Reach 1-3 | 1411 | FIS | 2600.00 | 6982.00 | 6990.04 | 6985.00 | 6990.11 | 0.000175 | 2.35 | 1397.28 | 286.43 | 0.15 | 0.03 | 0.08 | 0.04 | 0.05 |

# Mixed Flow analysis for GSB Design

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 15504 | 5-YR | 475.50 | 7230.74 | 7232.15 | 7232.07 | 7232.53 | 0.016370 | 6.28 | 115.60 | 114.47 | 0.99 |
| Reach 1-3 | 15504 | 100-YR | 1643.00 | 7230.74 | 7233.40 | 7233.23 | 7234.23 | 0.014852 | 9.52 | 267.70 | 128.61 | 1.06 |
| Reach 1-3 | 15504 | FIS | 2600.00 | 7230.74 | 7234.15 | 7233.95 | 7235.26 | 0.014315 | 11.13 | 367.30 | 137.28 | 1.09 |
| | | | | | | | | | | | | |
| Reach 1-3 | 14904 | 5-YR | 475.50 | 7220.33 | 7222.53 | 7222.53 | 7223.15 | 0.015138 | 8.48 | 102.93 | 81.19 | 1.04 |
| Reach 1-3 | 14904 | 100-YR | 1643.00 | 7220.33 | 7224.12 | 7224.12 | 7225.24 | 0.015348 | 12.47 | 255.18 | 110.31 | 1.15 |
| Reach 1-3 | 14904 | FIS | 2600.00 | 7220.33 | 7224.97 | 7224.97 | 7226.39 | 0.015561 | 14.44 | 355.24 | 124.17 | 1.20 |
| | | | | | | | | | | | | |
| Reach 1-3 | 14528 | 5-YR | 475.50 | 7213.99 | 7215.53 | 7215.61 | 7216.21 | 0.021955 | 8.39 | 100.88 | 114.80 | 1.19 |
| Reach 1-3 | 14528 | 100-YR | 1643.00 | 7213.99 | 7216.52 | 7216.81 | 7217.71 | 0.024976 | 12.46 | 258.81 | 176.42 | 1.38 |
| Reach 1-3 | 14528 | FIS | 2600.00 | 7213.99 | 7217.49 | 7217.39 | 7218.40 | 0.013736 | 11.47 | 438.14 | 194.56 | 1.08 |
| | | | | | | | | | | | | |
| Reach 1-3 | 13756 | 5-YR | 475.50 | 7200.47 | 7202.95 | 7202.95 | 7203.51 | 0.014115 | 8.80 | 109.75 | 85.26 | 1.01 |
| Reach 1-3 | 13756 | 100-YR | 1643.00 | 7200.47 | 7204.42 | 7204.42 | 7205.51 | 0.016804 | 13.27 | 249.53 | 104.59 | 1.20 |
| Reach 1-3 | 13756 | FIS | 2600.00 | 7200.47 | 7205.23 | 7205.23 | 7206.63 | 0.017566 | 15.42 | 335.78 | 109.52 | 1.26 |
| | | | | | | | | | | | | |
| Reach 1-3 | 12767 | 5-YR | 475.50 | 7180.91 | 7182.75 | 7183.26 | 7184.05 | 0.027997 | 10.13 | 64.28 | 65.67 | 1.37 |
| Reach 1-3 | 12767 | 100-YR | 1643.00 | 7180.91 | 7184.11 | 7184.66 | 7185.90 | 0.023649 | 13.76 | 234.27 | 173.88 | 1.39 |
| Reach 1-3 | 12767 | FIS | 2600.00 | 7180.91 | 7184.67 | 7185.26 | 7186.67 | 0.023818 | 15.46 | 333.66 | 177.42 | 1.43 |
| | | | | | | | | | | | | |
| Reach 1-3 | 12070 | 5-YR | 475.50 | 7168.31 | 7171.58 | 7171.58 | 7172.44 | 0.011246 | 9.53 | 93.95 | 58.63 | 0.95 |
| Reach 1-3 | 12070 | 100-YR | 1643.00 | 7168.31 | 7173.61 | 7173.61 | 7175.03 | 0.012023 | 13.76 | 233.04 | 73.72 | 1.07 |
| Reach 1-3 | 12070 | FIS | 2600.00 | 7168.31 | 7174.66 | 7174.66 | 7176.52 | 0.012899 | 16.14 | 313.55 | 78.33 | 1.14 |
| | | | | | | | | | | | | |
| Reach 1-3 | 11206 | 5-YR | 475.50 | 7151.03 | 7153.13 | 7153.76 | 7155.13 | 0.045693 | 13.37 | 60.33 | 66.59 | 1.76 |
| Reach 1-3 | 11206 | 100-YR | 1643.00 | 7151.03 | 7154.41 | 7155.48 | 7157.32 | 0.043587 | 18.69 | 178.32 | 118.16 | 1.88 |
| Reach 1-3 | 11206 | FIS | 2600.00 | 7151.03 | 7155.08 | 7156.11 | 7158.31 | 0.041755 | 20.88 | 269.20 | 145.86 | 1.90 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10925 | 5-YR | 475.50 | 7148.00 | 7149.87 | 7149.60 | 7150.15 | 0.009001 | 4.22 | 112.74 | 104.87 | 0.72 |
| Reach 1-3 | 10925 | 100-YR | 1643.00 | 7148.00 | 7150.98 | 7150.75 | 7151.66 | 0.010242 | 6.61 | 248.49 | 129.57 | 0.84 |
| Reach 1-3 | 10925 | FIS | 2600.00 | 7148.00 | 7151.60 | 7151.38 | 7152.56 | 0.010090 | 7.90 | 330.21 | 134.40 | 0.88 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10797 | 5-YR | 475.50 | 7145.39 | 7148.14 | 7147.91 | 7148.55 | 0.018364 | 5.17 | 93.64 | 117.85 | 0.78 |
| Reach 1-3 | 10797 | 100-YR | 1643.00 | 7145.39 | 7149.35 | 7149.14 | 7149.97 | 0.017191 | 7.00 | 284.94 | 156.61 | 0.77 |
| Reach 1-3 | 10797 | FIS | 2600.00 | 7145.39 | 7149.94 | 7149.76 | 7150.80 | 0.019038 | 8.34 | 382.70 | 170.55 | 0.83 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10713 | 5-YR | 475.50 | 7144.30 | 7147.27 | | 7147.45 | 0.008697 | 3.75 | 155.78 | 145.09 | 0.54 |
| Reach 1-3 | 10713 | 100-YR | 1643.00 | 7144.30 | 7148.40 | | 7148.77 | 0.010588 | 5.59 | 371.61 | 212.30 | 0.61 |
| Reach 1-3 | 10713 | FIS | 2600.00 | 7144.30 | 7149.03 | | 7149.50 | 0.010786 | 6.40 | 506.88 | 221.23 | 0.63 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10617 | 5-YR | 475.50 | 7143.44 | 7146.31 | | 7146.56 | 0.010761 | 4.07 | 138.59 | 194.63 | 0.58 |
| Reach 1-3 | 10617 | 100-YR | 1643.00 | 7143.44 | 7147.56 | | 7147.86 | 0.008825 | 5.16 | 414.87 | 235.18 | 0.55 |
| Reach 1-3 | 10617 | FIS | 2600.00 | 7143.44 | 7148.24 | | 7148.60 | 0.008239 | 5.70 | 579.19 | 247.66 | 0.54 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10543 | 5-YR | 475.50 | 7142.46 | 7145.60 | | 7145.83 | 0.008151 | 3.97 | 142.32 | 166.60 | 0.58 |
| Reach 1-3 | 10543 | 100-YR | 1643.00 | 7142.46 | 7146.85 | | 7147.21 | 0.008072 | 5.50 | 392.82 | 213.49 | 0.59 |
| Reach 1-3 | 10543 | FIS | 2600.00 | 7142.46 | 7147.52 | | 7147.97 | 0.008055 | 6.26 | 542.80 | 232.97 | 0.60 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10455 | 5-YR | 475.50 | 7142.32 | 7145.26 | | 7145.44 | 0.008278 | 3.72 | 161.66 | 191.49 | 0.53 |
| Reach 1-3 | 10455 | 100-YR | 1643.00 | 7142.32 | 7146.54 | | 7146.82 | 0.008016 | 5.09 | 434.26 | 241.43 | 0.53 |
| Reach 1-3 | 10455 | FIS | 2600.00 | 7142.32 | 7147.22 | | 7147.57 | 0.008191 | 5.85 | 615.37 | 293.42 | 0.55 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10411 | 5-YR | 475.50 | 7141.35 | 7144.12 | | 7144.36 | 0.011186 | 4.08 | 139.45 | 174.91 | 0.59 |
| Reach 1-3 | 10411 | 100-YR | 1643.00 | 7141.35 | 7145.07 | | 7145.56 | 0.015961 | 6.44 | 338.27 | 230.86 | 0.73 |
| Reach 1-3 | 10411 | FIS | 2600.00 | 7141.35 | 7145.55 | 7145.38 | 7146.21 | 0.018247 | 7.67 | 455.10 | 256.75 | 0.79 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10339 | 5-YR | 475.50 | 7140.02 | 7143.07 | 7142.74 | 7143.41 | 0.013384 | 4.71 | 116.26 | 212.79 | 0.68 |
| Reach 1-3 | 10339 | 100-YR | 1643.00 | 7140.02 | 7144.19 | | 7144.52 | 0.010483 | 5.58 | 444.11 | 347.80 | 0.61 |
| Reach 1-3 | 10339 | FIS | 2600.00 | 7140.02 | 7144.65 | | 7145.04 | 0.011174 | 6.32 | 603.96 | 355.48 | 0.64 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10211 | 5-YR | 475.50 | 7138.76 | 7141.95 | | 7142.24 | 0.010900 | 4.33 | 115.42 | 204.67 | 0.61 |
| Reach 1-3 | 10211 | 100-YR | 1643.00 | 7138.76 | 7142.99 | | 7143.40 | 0.012565 | 6.05 | 403.46 | 344.68 | 0.67 |
| Reach 1-3 | 10211 | FIS | 2600.00 | 7138.76 | 7143.52 | | 7143.95 | 0.011558 | 6.46 | 586.99 | 349.47 | 0.65 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10113 | 5-YR | 475.50 | 7137.89 | 7140.84 | 7140.52 | 7141.18 | 0.010687 | 4.66 | 109.20 | 218.30 | 0.69 |
| Reach 1-3 | 10113 | 100-YR | 1643.00 | 7137.89 | 7141.96 | | 7142.33 | 0.009466 | 5.75 | 420.00 | 304.10 | 0.64 |
| Reach 1-3 | 10113 | FIS | 2600.00 | 7137.89 | 7142.51 | | 7142.93 | 0.009290 | 6.36 | 590.03 | 311.09 | 0.64 |
| | | | | | | | | | | | | |
| Reach 1-3 | 10014 | 5-YR | 475.50 | 7136.24 | 7139.41 | | 7139.86 | 0.016594 | 5.40 | 88.60 | 134.88 | 0.79 |
| Reach 1-3 | 10014 | 100-YR | 1643.00 | 7136.24 | 7140.60 | 7140.60 | 7141.18 | 0.016511 | 7.03 | 335.31 | 274.27 | 0.78 |
| Reach 1-3 | 10014 | FIS | 2600.00 | 7136.24 | 7141.03 | 7141.03 | 7141.75 | 0.018533 | 8.13 | 459.09 | 287.36 | 0.84 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9955 | 5-YR | 475.50 | 7135.86 | 7138.52 | 7138.52 | 7138.87 | 0.015806 | 4.88 | 120.43 | 254.30 | 0.73 |
| Reach 1-3 | 9955 | 100-YR | 1643.00 | 7135.86 | 7139.17 | 7139.33 | 7139.89 | 0.028362 | 8.03 | 298.12 | 286.86 | 0.99 |
| Reach 1-3 | 9955 | FIS | 2600.00 | 7135.86 | 7139.58 | 7139.70 | 7140.40 | 0.027873 | 8.86 | 418.32 | 291.67 | 1.00 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 9943 | 5-YR | 475.50 | 7135.80 | 7138.14 | 7138.25 | 7138.53 | 0.074404 | 5.18 | 103.24 | 251.71 | 0.82 |
| Reach 1-3 | 9943 | 100-YR | 1643.00 | 7135.80 | 7138.71 | 7138.84 | 7139.37 | 0.071473 | 6.53 | 260.99 | 294.12 | 0.85 |
| Reach 1-3 | 9943 | FIS | 2600.00 | 7135.80 | 7139.04 | 7139.19 | 7139.92 | 0.064379 | 6.91 | 357.13 | 298.06 | 0.83 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9926 | 5-YR | 475.50 | 7131.59 | 7135.21 | 7133.84 | 7135.33 | 0.008203 | 2.77 | 180.81 | 92.26 | 0.31 |
| Reach 1-3 | 9926 | 100-YR | 1643.00 | 7131.59 | 7136.55 | 7135.46 | 7137.01 | 0.019995 | 5.73 | 324.87 | 123.84 | 0.51 |
| Reach 1-3 | 9926 | FIS | 2600.00 | 7131.59 | 7135.54 | 7136.36 | 7138.13 | 0.158534 | 13.20 | 211.54 | 98.72 | 1.37 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9913 | 5-YR | 475.50 | 7131.58 | 7135.19 | | 7135.25 | 0.003170 | 2.03 | 247.27 | 111.15 | 0.20 |
| Reach 1-3 | 9913 | 100-YR | 1643.00 | 7131.58 | 7136.57 | | 7136.78 | 0.007808 | 4.01 | 477.91 | 246.24 | 0.33 |
| Reach 1-3 | 9913 | FIS | 2600.00 | 7131.58 | 7137.24 | 7135.65 | 7137.50 | 0.008190 | 4.50 | 652.80 | 272.86 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9910 | 5-YR | 475.50 | 7132.63 | 7135.08 | | 7135.23 | 0.011968 | 3.06 | 167.14 | 111.78 | 0.36 |
| Reach 1-3 | 9910 | 100-YR | 1643.00 | 7132.63 | 7136.46 | | 7136.74 | 0.014646 | 4.67 | 402.95 | 244.56 | 0.43 |
| Reach 1-3 | 9910 | FIS | 2600.00 | 7132.63 | 7137.15 | | 7137.47 | 0.012208 | 4.80 | 581.44 | 270.80 | 0.41 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9875 | 5-YR | 475.50 | 7131.85 | 7134.54 | 7134.17 | 7134.85 | 0.008966 | 4.49 | 112.87 | 146.19 | 0.66 |
| Reach 1-3 | 9875 | 100-YR | 1643.00 | 7131.85 | 7136.20 | | 7136.47 | 0.004812 | 4.88 | 480.04 | 258.88 | 0.49 |
| Reach 1-3 | 9875 | FIS | 2600.00 | 7131.85 | 7136.86 | | 7137.20 | 0.005212 | 5.68 | 656.47 | 278.92 | 0.52 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9815 | 5-YR | 475.50 | 7130.14 | 7134.01 | | 7134.32 | 0.008585 | 4.50 | 106.04 | 80.43 | 0.65 |
| Reach 1-3 | 9815 | 100-YR | 1643.00 | 7130.14 | 7135.26 | 7135.26 | 7135.99 | 0.013299 | 7.30 | 297.91 | 229.69 | 0.78 |
| Reach 1-3 | 9815 | FIS | 2600.00 | 7130.14 | 7135.85 | 7135.85 | 7136.69 | 0.013822 | 8.26 | 445.05 | 263.76 | 0.80 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9772 | 5-YR | 475.50 | 7130.91 | 7133.60 | | 7133.91 | 0.010707 | 4.54 | 116.48 | 128.43 | 0.69 |
| Reach 1-3 | 9772 | 100-YR | 1643.00 | 7130.91 | 7134.76 | 7134.59 | 7135.36 | 0.012827 | 6.82 | 309.40 | 217.18 | 0.76 |
| Reach 1-3 | 9772 | FIS | 2600.00 | 7130.91 | 7135.31 | 7135.21 | 7136.07 | 0.013706 | 7.91 | 440.73 | 254.17 | 0.80 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9727 | 5-YR | 475.50 | 7129.87 | 7133.00 | 7132.88 | 7133.37 | 0.013269 | 5.00 | 108.69 | 127.42 | 0.77 |
| Reach 1-3 | 9727 | 100-YR | 1643.00 | 7129.87 | 7134.18 | 7134.09 | 7134.76 | 0.013691 | 6.88 | 323.91 | 240.21 | 0.77 |
| Reach 1-3 | 9727 | FIS | 2600.00 | 7129.87 | 7134.69 | 7134.60 | 7135.42 | 0.014980 | 7.99 | 448.53 | 247.47 | 0.82 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9636 | 5-YR | 475.50 | 7129.38 | 7132.05 | | 7132.23 | 0.010624 | 3.85 | 160.79 | 196.39 | 0.58 |
| Reach 1-3 | 9636 | 100-YR | 1643.00 | 7129.38 | 7132.75 | 7132.73 | 7133.24 | 0.020262 | 6.65 | 340.25 | 322.37 | 0.81 |
| Reach 1-3 | 9636 | FIS | 2600.00 | 7129.38 | 7133.12 | 7133.12 | 7133.76 | 0.022893 | 7.77 | 459.34 | 326.27 | 0.88 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9626 | 5-YR | 475.50 | 7129.34 | 7131.74 | 7131.74 | 7132.02 | 0.055418 | 4.50 | 116.69 | 213.48 | 0.71 |
| Reach 1-3 | 9626 | 100-YR | 1643.00 | 7129.34 | 7132.48 | 7132.48 | 7132.96 | 0.042216 | 5.35 | 314.86 | 331.57 | 0.67 |
| Reach 1-3 | 9626 | FIS | 2600.00 | 7129.34 | 7132.80 | 7132.83 | 7133.45 | 0.043402 | 5.98 | 421.17 | 335.20 | 0.69 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9614 | 5-YR | 475.50 | 7126.48 | 7128.29 | 7128.87 | 7130.21 | 0.756662 | 11.11 | 42.81 | 62.44 | 2.36 |
| Reach 1-3 | 9614 | 100-YR | 1643.00 | 7126.48 | 7129.32 | 7130.02 | 7131.67 | 0.325567 | 13.01 | 148.42 | 159.10 | 1.79 |
| Reach 1-3 | 9614 | FIS | 2600.00 | 7126.48 | 7129.78 | 7130.51 | 7132.22 | 0.260819 | 13.75 | 224.96 | 172.90 | 1.67 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9600 | 5-YR | 475.50 | 7123.43 | 7126.83 | 7125.69 | 7126.95 | 0.010102 | 2.87 | 174.17 | 104.67 | 0.33 |
| Reach 1-3 | 9600 | 100-YR | 1643.00 | 7123.43 | 7128.10 | 7127.21 | 7128.50 | 0.018383 | 5.18 | 333.97 | 148.39 | 0.48 |
| Reach 1-3 | 9600 | FIS | 2600.00 | 7123.43 | 7127.31 | 7127.99 | 7129.45 | 0.138781 | 12.05 | 228.19 | 120.85 | 1.28 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9587 | 5-YR | 475.50 | 7123.38 | 7126.81 | | 7126.87 | 0.002964 | 1.91 | 264.62 | 150.53 | 0.19 |
| Reach 1-3 | 9587 | 100-YR | 1643.00 | 7123.38 | 7128.12 | | 7128.31 | 0.005905 | 3.38 | 489.18 | 227.72 | 0.28 |
| Reach 1-3 | 9587 | FIS | 2600.00 | 7123.38 | 7128.61 | 7127.23 | 7128.95 | 0.008524 | 4.35 | 597.88 | 294.28 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9584 | 5-YR | 475.50 | 7124.71 | 7126.73 | | 7126.85 | 0.021540 | 2.68 | 177.47 | 152.36 | 0.44 |
| Reach 1-3 | 9584 | 100-YR | 1643.00 | 7124.71 | 7128.01 | | 7128.28 | 0.022448 | 4.11 | 400.37 | 238.30 | 0.49 |
| Reach 1-3 | 9584 | FIS | 2600.00 | 7124.71 | 7128.49 | | 7128.91 | 0.027993 | 5.24 | 508.56 | 300.61 | 0.57 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9558 | 5-YR | 475.50 | 7122.44 | 7126.18 | | 7126.34 | 0.016056 | 3.33 | 146.97 | 115.42 | 0.41 |
| Reach 1-3 | 9558 | 100-YR | 1643.00 | 7122.44 | 7127.44 | | 7127.75 | 0.016736 | 4.70 | 371.96 | 295.93 | 0.46 |
| Reach 1-3 | 9558 | FIS | 2600.00 | 7122.44 | 7127.96 | | 7128.34 | 0.016007 | 5.06 | 523.20 | 322.31 | 0.46 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9498 | 5-YR | 475.50 | 7122.10 | 7125.02 | 7124.75 | 7125.36 | 0.016415 | 4.70 | 109.35 | 140.37 | 0.73 |
| Reach 1-3 | 9498 | 100-YR | 1643.00 | 7122.10 | 7126.13 | 7126.04 | 7126.68 | 0.017277 | 6.67 | 321.77 | 250.79 | 0.76 |
| Reach 1-3 | 9498 | FIS | 2600.00 | 7122.10 | 7126.70 | 7126.54 | 7127.32 | 0.016220 | 7.33 | 461.69 | 257.21 | 0.75 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9389 | 5-YR | 475.50 | 7120.61 | 7122.59 | 7122.59 | 7122.95 | 0.031049 | 4.99 | 103.88 | 140.21 | 0.80 |
| Reach 1-3 | 9389 | 100-YR | 1643.00 | 7120.61 | 7123.50 | 7123.50 | 7124.28 | 0.029989 | 7.11 | 237.08 | 156.54 | 0.86 |
| Reach 1-3 | 9389 | FIS | 2600.00 | 7120.61 | 7124.07 | 7124.07 | 7125.10 | 0.027349 | 7.95 | 328.93 | 168.18 | 0.85 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9256 | 5-YR | 475.50 | 7118.36 | 7120.57 | 7119.98 | 7120.64 | 0.004675 | 2.13 | 226.93 | 204.92 | 0.35 |
| Reach 1-3 | 9256 | 100-YR | 1643.00 | 7118.36 | 7121.97 | 7120.73 | 7122.13 | 0.003727 | 3.20 | 530.77 | 227.33 | 0.35 |
| Reach 1-3 | 9256 | FIS | 2600.00 | 7118.36 | 7123.40 | 7121.18 | 7123.55 | 0.001959 | 3.11 | 871.00 | 249.11 | 0.27 |
| | | | | | | | | | | | | |
| Reach 1-3 | 9243 | 5-YR | 475.50 | 7119.00 | 7119.73 | 7119.73 | 7120.04 | 0.131026 | 4.49 | 105.74 | 169.55 | 0.98 |
| Reach 1-3 | 9243 | 100-YR | 1643.00 | 7119.00 | 7121.68 | | 7121.87 | 0.010410 | 3.19 | 486.97 | 215.43 | 0.35 |
| Reach 1-3 | 9243 | FIS | 2600.00 | 7119.00 | 7123.26 | | 7123.43 | 0.004158 | 2.76 | 846.78 | 241.54 | 0.24 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 9216 | 5-YR | 475.50 | 7114.00 | 7118.78 | 7114.56 | 7118.78 | 0.000013 | 0.47 | 1052.11 | 240.55 | 0.04 |
| Reach 1-3 | 9216 | 100-YR | 1643.00 | 7114.00 | 7121.80 | | 7121.82 | 0.000027 | 0.95 | 1831.41 | 273.88 | 0.06 |
| Reach 1-3 | 9216 | FIS | 2600.00 | 7114.00 | 7123.36 | | 7123.38 | 0.000036 | 1.23 | 2269.84 | 293.30 | 0.07 |
| Reach 1-3 | 9080 | 5-YR | 480.20 | 7114.00 | 7118.78 | | 7118.78 | 0.000019 | 0.52 | 957.29 | 220.94 | 0.04 |
| Reach 1-3 | 9080 | 100-YR | 1665.90 | 7114.00 | 7121.80 | | 7121.81 | 0.000040 | 1.06 | 1668.02 | 251.65 | 0.07 |
| Reach 1-3 | 9080 | FIS | 2600.00 | 7114.00 | 7123.35 | | 7123.37 | 0.000051 | 1.34 | 2071.57 | 268.30 | 0.08 |
| Reach 1-3 | 9029 | 5-YR | 480.20 | 7117.75 | 7118.70 | | 7118.77 | 0.002692 | 2.13 | 226.62 | 242.19 | 0.39 |
| Reach 1-3 | 9029 | 100-YR | 1665.90 | 7117.75 | 7121.76 | | 7121.80 | 0.000249 | 1.69 | 1010.66 | 273.00 | 0.15 |
| Reach 1-3 | 9029 | FIS | 2600.00 | 7117.75 | 7123.31 | | 7123.36 | 0.000196 | 1.86 | 1453.61 | 298.54 | 0.14 |
| Reach 1-3 | 8989 | 5-YR | 480.20 | 7117.73 | 7118.27 | 7118.27 | 7118.51 | 0.022429 | 4.01 | 120.22 | 242.59 | 1.00 |
| Reach 1-3 | 8989 | 100-YR | 1665.90 | 7117.73 | 7121.75 | | 7121.79 | 0.000242 | 1.66 | 1031.42 | 281.20 | 0.15 |
| Reach 1-3 | 8989 | FIS | 2600.00 | 7117.73 | 7123.31 | | 7123.36 | 0.000187 | 1.82 | 1479.78 | 296.81 | 0.14 |
| Reach 1-3 | 8983 | 5-YR | 480.20 | 7103.78 | 7110.88 | 7106.04 | 7110.99 | 0.000554 | 2.73 | 175.79 | 24.84 | 0.18 |
| Reach 1-3 | 8983 | 100-YR | 1665.90 | 7103.78 | 7121.66 | | 7121.78 | 0.001301 | 2.82 | 616.96 | 281.94 | 0.30 |
| Reach 1-3 | 8983 | FIS | 2600.00 | 7103.78 | 7123.26 | | 7123.35 | 0.000577 | 2.55 | 1077.59 | 297.43 | 0.22 |
| Reach 1-3 | 8956 | 5-YR | 480.20 | 7103.78 | 7110.86 | 7106.04 | 7110.98 | 0.000558 | 2.74 | 175.39 | 24.84 | 0.18 |
| Reach 1-3 | 8956 | 100-YR | 1665.90 | 7103.78 | 7121.62 | 7108.97 | 7121.75 | 0.001377 | 2.87 | 605.26 | 281.55 | 0.31 |
| Reach 1-3 | 8956 | FIS | 2600.00 | 7103.78 | 7123.24 | 7110.78 | 7123.33 | 0.000585 | 2.56 | 1072.80 | 297.27 | 0.22 |
| Reach 1-3 | 8919 | | Culvert | | | | | | | | | |
| Reach 1-3 | 8888 | 5-YR | 480.20 | 7103.58 | 7106.85 | 7106.85 | 7108.50 | 0.011981 | 10.23 | 46.63 | 47.00 | 1.00 |
| Reach 1-3 | 8888 | 100-YR | 1665.90 | 7103.58 | 7111.09 | 7111.09 | 7114.85 | 0.008998 | 15.44 | 107.17 | 47.20 | 0.99 |
| Reach 1-3 | 8888 | FIS | 2600.00 | 7103.58 | 7113.66 | 7113.66 | 7118.74 | 0.008208 | 17.94 | 143.89 | 81.95 | 1.00 |
| Reach 1-3 | 8886 | 5-YR | 480.20 | 7102.02 | 7103.70 | 7104.94 | 7108.16 | 0.079386 | 16.86 | 28.36 | 46.86 | 2.30 |
| Reach 1-3 | 8886 | 100-YR | 1665.90 | 7102.02 | 7106.35 | 7108.71 | 7114.39 | 0.040339 | 22.63 | 73.30 | 46.98 | 1.92 |
| Reach 1-3 | 8886 | FIS | 2600.00 | 7102.02 | 7108.03 | 7111.02 | 7118.20 | 0.033014 | 25.46 | 101.67 | 47.06 | 1.83 |
| Reach 1-3 | 8852 | 5-YR | 480.20 | 7102.13 | 7104.81 | 7103.23 | 7104.86 | 0.000626 | 1.96 | 278.57 | 168.13 | 0.22 |
| Reach 1-3 | 8852 | 100-YR | 1665.90 | 7102.13 | 7103.11 | 7104.69 | 7111.37 | 0.326797 | 23.06 | 72.23 | 77.70 | 4.22 |
| Reach 1-3 | 8852 | FIS | 2600.00 | 7102.13 | 7103.38 | 7105.22 | 7115.40 | 0.349217 | 27.81 | 93.49 | 79.77 | 4.53 |
| Reach 1-3 | 8850 | 5-YR | 480.20 | 7103.55 | 7104.69 | | 7104.85 | 0.007027 | 3.32 | 150.29 | 169.55 | 0.56 |
| Reach 1-3 | 8850 | 100-YR | 1665.90 | 7103.55 | 7104.33 | 7105.25 | 7109.93 | 0.438719 | 20.19 | 90.03 | 167.20 | 4.12 |
| Reach 1-3 | 8850 | FIS | 2600.00 | 7103.55 | 7104.43 | 7105.75 | 7113.84 | 0.612921 | 26.02 | 107.29 | 167.88 | 4.98 |
| Reach 1-3 | 8786 | 5-YR | 480.20 | 7101.10 | 7104.10 | | 7104.31 | 0.009760 | 3.96 | 165.08 | 258.17 | 0.57 |
| Reach 1-3 | 8786 | 100-YR | 1665.90 | 7101.10 | 7105.35 | 7104.72 | 7105.56 | 0.006517 | 4.49 | 498.31 | 271.30 | 0.48 |
| Reach 1-3 | 8786 | FIS | 2600.00 | 7101.10 | 7106.02 | 7105.09 | 7106.28 | 0.006110 | 4.95 | 681.54 | 276.50 | 0.47 |
| Reach 1-3 | 8750 | 5-YR | 480.20 | 7100.37 | 7103.36 | | 7103.56 | 0.008654 | 3.83 | 158.49 | 214.41 | 0.53 |
| Reach 1-3 | 8750 | 100-YR | 1665.90 | 7100.37 | 7104.36 | | 7104.81 | 0.013164 | 6.17 | 342.97 | 253.11 | 0.68 |
| Reach 1-3 | 8750 | FIS | 2600.00 | 7100.37 | 7104.88 | | 7105.50 | 0.014860 | 7.31 | 448.68 | 275.56 | 0.73 |
| Reach 1-3 | 8683 | 5-YR | 480.20 | 7099.61 | 7102.59 | 7102.31 | 7102.83 | 0.010815 | 4.18 | 149.27 | 260.20 | 0.60 |
| Reach 1-3 | 8683 | 100-YR | 1665.90 | 7099.61 | 7103.66 | | 7103.96 | 0.009631 | 5.27 | 433.41 | 268.73 | 0.58 |
| Reach 1-3 | 8683 | FIS | 2600.00 | 7099.61 | 7104.22 | | 7104.59 | 0.009550 | 5.89 | 584.85 | 272.51 | 0.59 |
| Reach 1-3 | 8578 | 5-YR | 480.20 | 7099.09 | 7102.05 | | 7102.17 | 0.006139 | 3.14 | 207.05 | 246.17 | 0.44 |
| Reach 1-3 | 8578 | 100-YR | 1665.90 | 7099.09 | 7102.99 | | 7103.25 | 0.008740 | 4.88 | 442.40 | 253.08 | 0.54 |
| Reach 1-3 | 8578 | FIS | 2600.00 | 7099.09 | 7103.51 | | 7103.87 | 0.009563 | 5.70 | 573.92 | 257.09 | 0.58 |
| Reach 1-3 | 8429 | 5-YR | 480.20 | 7098.29 | 7101.06 | 7100.98 | 7101.42 | 0.012937 | 4.95 | 110.40 | 218.17 | 0.77 |
| Reach 1-3 | 8429 | 100-YR | 1665.90 | 7098.29 | 7102.02 | | 7102.47 | 0.009476 | 6.16 | 330.72 | 233.18 | 0.72 |
| Reach 1-3 | 8429 | FIS | 2600.00 | 7098.29 | 7102.56 | | 7103.10 | 0.008387 | 6.71 | 457.25 | 236.30 | 0.71 |
| Reach 1-3 | 8326 | 5-YR | 480.20 | 7096.32 | 7099.25 | 7099.25 | 7099.72 | 0.012631 | 4.98 | 89.61 | 96.87 | 0.95 |
| Reach 1-3 | 8326 | 100-YR | 1665.90 | 7096.32 | 7100.64 | 7100.64 | 7101.39 | 0.007129 | 7.10 | 258.38 | 195.05 | 0.84 |
| Reach 1-3 | 8326 | FIS | 2600.00 | 7096.32 | 7101.20 | 7101.20 | 7102.10 | 0.006901 | 8.13 | 370.28 | 199.91 | 0.86 |
| Reach 1-3 | 8290 | 5-YR | 480.20 | 7097.00 | 7098.50 | 7098.08 | 7098.73 | 0.009227 | 3.83 | 125.37 | 94.21 | 0.59 |
| Reach 1-3 | 8290 | 100-YR | 1665.90 | 7097.00 | 7098.85 | 7099.32 | 7100.56 | 0.053060 | 10.50 | 158.70 | 97.56 | 1.45 |
| Reach 1-3 | 8290 | FIS | 2600.00 | 7097.00 | 7099.76 | 7100.05 | 7101.42 | 0.031189 | 10.33 | 251.79 | 106.35 | 1.18 |
| Reach 1-3 | 8276 | 5-YR | 480.20 | 7097.00 | 7098.37 | 7098.01 | 7098.60 | 0.010226 | 3.81 | 126.12 | 103.33 | 0.61 |
| Reach 1-3 | 8276 | 100-YR | 1665.90 | 7097.00 | 7099.58 | 7099.17 | 7100.23 | 0.013181 | 6.48 | 257.22 | 114.69 | 0.76 |
| Reach 1-3 | 8276 | FIS | 2600.00 | 7097.00 | 7100.23 | 7099.86 | 7101.17 | 0.014446 | 7.79 | 333.87 | 120.85 | 0.83 |
| Reach 1-3 | 8267 | 5-YR | 480.20 | 7097.00 | 7097.97 | 7097.97 | 7098.39 | 0.031384 | 5.23 | 91.84 | 108.53 | 1.00 |
| Reach 1-3 | 8267 | 100-YR | 1665.90 | 7097.00 | 7099.06 | 7099.06 | 7099.99 | 0.024521 | 7.73 | 215.63 | 117.65 | 1.01 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 8267 | FIS | 2600.00 | 7097.00 | 7099.71 | 7099.71 | 7100.93 | 0.022639 | 8.85 | 293.86 | 123.07 | 1.01 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8229 | 5-YR | 480.20 | 7091.00 | 7095.09 | 7092.71 | 7095.15 | 0.000860 | 1.91 | 251.59 | 89.99 | 0.20 |
| Reach 1-3 | 8229 | 100-YR | 1665.90 | 7091.00 | 7096.97 | 7094.43 | 7097.20 | 0.002063 | 3.83 | 434.80 | 105.08 | 0.33 |
| Reach 1-3 | 8229 | FIS | 2600.00 | 7091.00 | 7098.34 | 7095.25 | 7098.65 | 0.002122 | 4.43 | 586.44 | 116.11 | 0.35 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8210 | 5-YR | 480.20 | 7091.00 | 7095.08 | | 7095.13 | 0.000856 | 1.89 | 253.61 | 91.50 | 0.20 |
| Reach 1-3 | 8210 | 100-YR | 1665.90 | 7091.00 | 7096.93 | | 7097.16 | 0.002060 | 3.81 | 437.29 | 106.48 | 0.33 |
| Reach 1-3 | 8210 | FIS | 2600.00 | 7091.00 | 7098.30 | | 7098.61 | 0.002103 | 4.40 | 590.88 | 117.56 | 0.35 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8209 | 5-YR | 480.20 | 7093.00 | 7094.97 | | 7095.11 | 0.003948 | 3.01 | 159.34 | 90.59 | 0.40 |
| Reach 1-3 | 8209 | 100-YR | 1665.90 | 7093.00 | 7096.71 | | 7097.10 | 0.005143 | 5.06 | 329.37 | 104.66 | 0.50 |
| Reach 1-3 | 8209 | FIS | 2600.00 | 7093.00 | 7098.11 | | 7098.56 | 0.003989 | 5.37 | 484.18 | 115.99 | 0.46 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8175 | 5-YR | 480.20 | 7093.00 | 7094.73 | | 7094.92 | 0.006290 | 3.51 | 136.83 | 87.84 | 0.50 |
| Reach 1-3 | 8175 | 100-YR | 1665.90 | 7093.00 | 7096.33 | | 7096.85 | 0.007627 | 5.78 | 288.07 | 100.68 | 0.60 |
| Reach 1-3 | 8175 | FIS | 2600.00 | 7093.00 | 7097.88 | | 7098.39 | 0.004818 | 5.74 | 452.71 | 113.00 | 0.51 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8165 | 5-YR | 480.20 | 7093.00 | 7094.62 | 7094.11 | 7094.84 | 0.007898 | 3.77 | 127.27 | 86.96 | 0.55 |
| Reach 1-3 | 8165 | 100-YR | 1665.90 | 7093.00 | 7096.17 | | 7096.75 | 0.009119 | 6.13 | 271.56 | 99.36 | 0.65 |
| Reach 1-3 | 8165 | FIS | 2600.00 | 7093.00 | 7097.80 | | 7098.34 | 0.005082 | 5.85 | 444.62 | 112.43 | 0.52 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8155 | 5-YR | 480.20 | 7093.00 | 7094.11 | 7094.11 | 7094.62 | 0.029657 | 5.72 | 83.90 | 82.88 | 1.00 |
| Reach 1-3 | 8155 | 100-YR | 1665.90 | 7093.00 | 7095.56 | 7095.43 | 7096.52 | 0.019178 | 7.83 | 212.87 | 94.51 | 0.92 |
| Reach 1-3 | 8155 | FIS | 2600.00 | 7093.00 | 7097.72 | | 7098.28 | 0.005405 | 5.97 | 435.43 | 111.77 | 0.53 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8125 | 5-YR | 480.20 | 7087.00 | 7092.55 | 7088.97 | 7092.60 | 0.000512 | 1.80 | 267.39 | 70.39 | 0.16 |
| Reach 1-3 | 8125 | 100-YR | 1665.90 | 7087.00 | 7095.90 | | 7096.04 | 0.000870 | 3.04 | 547.90 | 97.17 | 0.23 |
| Reach 1-3 | 8125 | FIS | 2600.00 | 7087.00 | 7097.85 | | 7098.04 | 0.000897 | 3.45 | 753.17 | 112.81 | 0.24 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8105 | 5-YR | 480.20 | 7087.00 | 7092.54 | | 7092.59 | 0.000516 | 1.80 | 266.67 | 70.34 | 0.16 |
| Reach 1-3 | 8105 | 100-YR | 1665.90 | 7087.00 | 7095.88 | | 7096.02 | 0.000878 | 3.05 | 546.40 | 97.15 | 0.23 |
| Reach 1-3 | 8105 | FIS | 2600.00 | 7087.00 | 7097.83 | | 7098.02 | 0.000903 | 3.46 | 751.61 | 112.83 | 0.24 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8104 | 5-YR | 480.20 | 7089.00 | 7092.48 | | 7092.57 | 0.001449 | 2.47 | 194.56 | 69.87 | 0.26 |
| Reach 1-3 | 8104 | 100-YR | 1665.90 | 7089.00 | 7095.81 | | 7096.01 | 0.001409 | 3.53 | 472.15 | 96.63 | 0.28 |
| Reach 1-3 | 8104 | FIS | 2600.00 | 7089.00 | 7097.78 | | 7098.00 | 0.001265 | 3.84 | 677.18 | 112.38 | 0.28 |
| | | | | | | | | | | | | |
| Reach 1-3 | 8074 | 5-YR | 480.20 | 7089.00 | 7092.32 | 7090.82 | 7092.49 | 0.003022 | 3.35 | 143.42 | 56.43 | 0.37 |
| Reach 1-3 | 8074 | 100-YR | 1665.90 | 7089.00 | 7095.50 | 7092.79 | 7095.89 | 0.002382 | 5.04 | 330.84 | 69.00 | 0.37 |
| Reach 1-3 | 8074 | FIS | 2600.00 | 7089.00 | 7097.31 | 7093.80 | 7097.86 | 0.002281 | 5.94 | 437.75 | 69.00 | 0.38 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7949 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 7828 | 5-YR | 512.38 | 7088.70 | 7091.37 | 7090.77 | 7091.79 | 0.003393 | 5.24 | 97.87 | 48.09 | 0.63 |
| Reach 1-3 | 7828 | 100-YR | 1763.93 | 7088.70 | 7092.84 | 7092.84 | 7094.60 | 0.006906 | 10.62 | 166.03 | 60.55 | 0.99 |
| Reach 1-3 | 7828 | FIS | 2600.00 | 7088.70 | 7093.90 | 7093.90 | 7096.17 | 0.006333 | 12.09 | 215.07 | 60.61 | 0.99 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7788 | 5-YR | 512.38 | 7088.52 | 7091.42 | | 7091.55 | 0.001723 | 3.06 | 181.49 | 83.83 | 0.32 |
| Reach 1-3 | 7788 | 100-YR | 1763.93 | 7088.52 | 7093.30 | 7091.69 | 7093.70 | 0.002728 | 5.42 | 352.85 | 98.90 | 0.44 |
| Reach 1-3 | 7788 | FIS | 2600.00 | 7088.52 | 7094.14 | 7092.43 | 7094.70 | 0.003107 | 6.46 | 438.65 | 105.67 | 0.48 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7765 | 5-YR | 512.38 | 7088.50 | 7091.39 | | 7091.52 | 0.001325 | 3.11 | 188.17 | 91.24 | 0.32 |
| Reach 1-3 | 7765 | 100-YR | 1763.93 | 7088.50 | 7093.27 | | 7093.63 | 0.002069 | 5.44 | 375.24 | 107.55 | 0.44 |
| Reach 1-3 | 7765 | FIS | 2600.00 | 7088.50 | 7094.11 | | 7094.62 | 0.002346 | 6.46 | 468.98 | 114.53 | 0.48 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7742 | 5-YR | 512.38 | 7088.50 | 7091.00 | | 7091.43 | 0.006301 | 5.51 | 105.47 | 75.67 | 0.67 |
| Reach 1-3 | 7742 | 100-YR | 1763.93 | 7088.50 | 7092.31 | 7092.31 | 7093.47 | 0.009738 | 9.47 | 217.85 | 95.52 | 0.90 |
| Reach 1-3 | 7742 | FIS | 2600.00 | 7088.50 | 7093.05 | 7093.05 | 7094.44 | 0.009298 | 10.54 | 292.45 | 106.84 | 0.91 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7708 | 5-YR | 512.38 | 7088.50 | 7090.83 | | 7091.08 | 0.012845 | 4.85 | 137.54 | 107.96 | 0.56 |
| Reach 1-3 | 7708 | 100-YR | 1763.93 | 7088.50 | 7092.15 | 7091.69 | 7092.74 | 0.015759 | 7.27 | 292.87 | 124.74 | 0.67 |
| Reach 1-3 | 7708 | FIS | 2600.00 | 7088.50 | 7091.69 | 7092.24 | 7093.71 | 0.065594 | 13.55 | 236.84 | 119.91 | 1.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7669 | 5-YR | 512.38 | 7087.30 | 7090.47 | | 7090.72 | 0.006768 | 4.24 | 138.18 | 124.40 | 0.58 |
| Reach 1-3 | 7669 | 100-YR | 1763.93 | 7087.30 | 7091.90 | | 7092.35 | 0.005685 | 5.90 | 340.51 | 151.11 | 0.59 |
| Reach 1-3 | 7669 | FIS | 2600.00 | 7087.30 | 7092.47 | 7091.81 | 7093.07 | 0.006066 | 6.83 | 428.56 | 157.35 | 0.63 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7624 | 5-YR | 512.38 | 7086.89 | 7089.85 | 7089.71 | 7090.26 | 0.015686 | 5.22 | 106.43 | 114.27 | 0.78 |
| Reach 1-3 | 7624 | 100-YR | 1763.93 | 7086.89 | 7091.05 | 7091.05 | 7091.88 | 0.019399 | 7.93 | 274.96 | 168.42 | 0.87 |
| Reach 1-3 | 7624 | FIS | 2600.00 | 7086.89 | 7091.56 | 7091.56 | 7092.58 | 0.020140 | 8.96 | 368.93 | 198.01 | 0.90 |
| | | | | | | | | | | | | |
| Reach 1-3 | 7584 | 5-YR | 512.38 | 7086.36 | 7089.48 | | 7089.73 | 0.009505 | 4.16 | 147.87 | 177.72 | 0.57 |
| Reach 1-3 | 7584 | 100-YR | 1763.93 | 7086.36 | 7090.60 | 7090.28 | 7091.03 | 0.011571 | 6.09 | 378.49 | 213.53 | 0.64 |
| Reach 1-3 | 7584 | FIS | 2600.00 | 7086.36 | 7091.12 | 7090.69 | 7091.64 | 0.011861 | 6.82 | 489.61 | 218.70 | 0.66 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 7534 | 5-YR | 512.38 | 7085.85 | 7088.93 | | 7089.15 | 0.014175 | 3.76 | 136.48 | 184.38 | 0.75 |
| Reach 1-3 | 7534 | 100-YR | 1763.93 | 7085.85 | 7090.02 | | 7090.41 | 0.013491 | 5.12 | 362.02 | 214.80 | 0.66 |
| Reach 1-3 | 7534 | FIS | 2600.00 | 7085.85 | 7090.50 | | 7091.01 | 0.013776 | 5.85 | 467.43 | 219.56 | 0.67 |
| Reach 1-3 | 7485 | 5-YR | 512.38 | 7085.30 | 7088.30 | | 7088.55 | 0.010959 | 4.37 | 157.25 | 205.91 | 0.61 |
| Reach 1-3 | 7485 | 100-YR | 1763.93 | 7085.30 | 7089.32 | | 7089.76 | 0.013244 | 6.28 | 374.94 | 218.10 | 0.69 |
| Reach 1-3 | 7485 | FIS | 2600.00 | 7085.30 | 7089.83 | | 7090.36 | 0.013173 | 6.95 | 487.29 | 224.23 | 0.69 |
| Reach 1-3 | 7455 | 5-YR | 512.38 | 7085.01 | 7088.15 | | 7088.32 | 0.004929 | 3.68 | 185.15 | 232.10 | 0.49 |
| Reach 1-3 | 7455 | 100-YR | 1763.93 | 7085.01 | 7089.00 | | 7089.46 | 0.008375 | 6.14 | 367.76 | 251.31 | 0.67 |
| Reach 1-3 | 7455 | FIS | 2600.00 | 7085.01 | 7089.34 | | 7090.01 | 0.010264 | 7.36 | 445.18 | 259.08 | 0.76 |
| Reach 1-3 | 7445 | 5-YR | 512.38 | 7085.12 | 7087.88 | 7087.88 | 7088.20 | 0.029482 | 4.89 | 135.27 | 239.63 | 0.69 |
| Reach 1-3 | 7445 | 100-YR | 1763.93 | 7085.12 | 7088.67 | 7088.67 | 7089.28 | 0.038885 | 7.37 | 308.27 | 259.65 | 0.85 |
| Reach 1-3 | 7445 | FIS | 2600.00 | 7085.12 | 7089.03 | 7089.03 | 7089.81 | 0.040836 | 8.32 | 392.06 | 268.88 | 0.89 |
| Reach 1-3 | 7430 | 5-YR | 512.38 | 7081.82 | 7083.68 | 7084.44 | 7086.72 | 0.695591 | 13.99 | 36.63 | 51.63 | 2.93 |
| Reach 1-3 | 7430 | 100-YR | 1763.93 | 7081.82 | 7085.07 | 7085.91 | 7087.99 | 0.179042 | 14.18 | 138.78 | 121.87 | 1.76 |
| Reach 1-3 | 7430 | FIS | 2600.00 | 7081.82 | 7085.60 | 7086.65 | 7088.58 | 0.143870 | 14.87 | 208.91 | 140.43 | 1.65 |
| Reach 1-3 | 7422 | 5-YR | 512.38 | 7080.12 | 7082.05 | 7082.68 | 7084.27 | 0.138369 | 11.96 | 42.85 | 52.69 | 2.34 |
| Reach 1-3 | 7422 | 100-YR | 1763.93 | 7080.12 | 7083.25 | 7084.41 | 7086.98 | 0.075843 | 15.66 | 117.29 | 75.48 | 1.99 |
| Reach 1-3 | 7422 | FIS | 2600.00 | 7080.12 | 7083.89 | 7085.12 | 7087.78 | 0.056082 | 16.34 | 177.08 | 105.29 | 1.80 |
| Reach 1-3 | 7409 | 5-YR | 512.38 | 7080.12 | 7083.50 | 7081.64 | 7083.61 | 0.001246 | 2.71 | 212.24 | 112.44 | 0.27 |
| Reach 1-3 | 7409 | 100-YR | 1763.93 | 7080.12 | 7082.45 | 7083.68 | 7086.05 | 0.067594 | 15.23 | 115.80 | 55.81 | 1.86 |
| Reach 1-3 | 7409 | FIS | 2600.00 | 7080.12 | 7083.15 | 7084.49 | 7087.10 | 0.051945 | 16.19 | 174.09 | 104.34 | 1.71 |
| Reach 1-3 | 7406 | 5-YR | 512.38 | 7081.53 | 7083.06 | 7083.06 | 7083.56 | 0.033673 | 5.84 | 97.36 | 104.85 | 0.85 |
| Reach 1-3 | 7406 | 100-YR | 1763.93 | 7081.53 | 7084.22 | 7084.41 | 7085.19 | 0.034244 | 8.70 | 243.17 | 173.02 | 0.95 |
| Reach 1-3 | 7406 | FIS | 2600.00 | 7081.53 | 7084.18 | 7084.91 | 7086.40 | 0.079828 | 13.15 | 236.47 | 169.98 | 1.44 |
| Reach 1-3 | 7351 | 5-YR | 512.38 | 7079.22 | 7082.24 | | 7082.51 | 0.010699 | 4.36 | 139.79 | 138.31 | 0.59 |
| Reach 1-3 | 7351 | 100-YR | 1763.93 | 7079.22 | 7083.34 | 7083.23 | 7083.94 | 0.015970 | 7.08 | 343.17 | 240.45 | 0.75 |
| Reach 1-3 | 7351 | FIS | 2600.00 | 7079.22 | 7083.79 | 7083.71 | 7084.49 | 0.016806 | 7.94 | 459.15 | 267.29 | 0.78 |
| Reach 1-3 | 7279 | 5-YR | 512.38 | 7078.10 | 7081.41 | | 7081.67 | 0.012541 | 4.38 | 143.09 | 166.36 | 0.61 |
| Reach 1-3 | 7279 | 100-YR | 1763.93 | 7078.10 | 7082.59 | | 7082.93 | 0.010907 | 5.70 | 440.59 | 292.60 | 0.60 |
| Reach 1-3 | 7279 | FIS | 2600.00 | 7078.10 | 7083.05 | | 7083.45 | 0.010862 | 6.26 | 576.74 | 296.89 | 0.61 |
| Reach 1-3 | 7213 | 5-YR | 512.38 | 7077.30 | 7080.96 | | 7081.15 | 0.005269 | 3.75 | 181.06 | 204.61 | 0.49 |
| Reach 1-3 | 7213 | 100-YR | 1763.93 | 7077.30 | 7082.07 | | 7082.39 | 0.006921 | 5.50 | 489.44 | 308.65 | 0.57 |
| Reach 1-3 | 7213 | FIS | 2600.00 | 7077.30 | 7082.49 | | 7082.88 | 0.007815 | 6.30 | 618.38 | 312.68 | 0.61 |
| Reach 1-3 | 7167 | 5-YR | 512.38 | 7077.47 | 7080.66 | | 7080.86 | 0.007315 | 3.78 | 172.36 | 216.88 | 0.49 |
| Reach 1-3 | 7167 | 100-YR | 1763.93 | 7077.47 | 7081.55 | | 7081.96 | 0.012378 | 6.15 | 424.34 | 324.35 | 0.66 |
| Reach 1-3 | 7167 | FIS | 2600.00 | 7077.47 | 7081.98 | | 7082.43 | 0.012256 | 6.68 | 563.79 | 328.35 | 0.66 |
| Reach 1-3 | 7102 | 5-YR | 512.38 | 7076.78 | 7079.61 | 7079.54 | 7080.06 | 0.023497 | 5.48 | 109.57 | 167.22 | 0.83 |
| Reach 1-3 | 7102 | 100-YR | 1763.93 | 7076.78 | 7080.59 | 7080.59 | 7081.10 | 0.015620 | 6.76 | 371.75 | 328.79 | 0.78 |
| Reach 1-3 | 7102 | FIS | 2600.00 | 7076.78 | 7080.86 | 7080.86 | 7081.54 | 0.017429 | 7.76 | 461.73 | 331.71 | 0.85 |
| Reach 1-3 | 7093 | 5-YR | 512.38 | 7076.86 | 7079.48 | 7079.48 | 7079.70 | 0.040238 | 4.11 | 154.76 | 305.84 | 0.61 |
| Reach 1-3 | 7093 | 100-YR | 1763.93 | 7076.86 | 7079.74 | 7080.02 | 7080.72 | 0.144097 | 8.70 | 235.74 | 322.35 | 1.19 |
| Reach 1-3 | 7093 | FIS | 2600.00 | 7076.86 | 7079.98 | 7080.30 | 7081.14 | 0.129189 | 9.00 | 312.65 | 329.68 | 1.15 |
| Reach 1-3 | 7073 | 5-YR | 512.38 | 7072.92 | 7074.63 | 7075.25 | 7077.05 | 0.995374 | 12.50 | 41.00 | 61.59 | 2.70 |
| Reach 1-3 | 7073 | 100-YR | 1763.93 | 7072.92 | 7076.42 | 7076.91 | 7077.96 | 0.126848 | 10.22 | 191.74 | 137.24 | 1.18 |
| Reach 1-3 | 7073 | FIS | 2600.00 | 7072.92 | 7076.96 | 7077.68 | 7078.67 | 0.113894 | 11.14 | 274.25 | 167.12 | 1.16 |
| Reach 1-3 | 7066 | 5-YR | 512.38 | 7072.86 | 7076.07 | 7074.20 | 7076.16 | 0.005663 | 2.48 | 228.37 | 148.68 | 0.26 |
| Reach 1-3 | 7066 | 100-YR | 1763.93 | 7072.86 | 7077.22 | 7076.22 | 7077.52 | 0.014342 | 4.92 | 464.22 | 273.65 | 0.43 |
| Reach 1-3 | 7066 | FIS | 2600.00 | 7072.86 | 7077.67 | 7076.99 | 7078.06 | 0.017164 | 5.77 | 597.00 | 308.37 | 0.48 |
| Reach 1-3 | 7061 | 5-YR | 512.38 | 7074.14 | 7075.57 | 7075.57 | 7076.08 | 0.012979 | 5.77 | 95.39 | 115.56 | 0.89 |
| Reach 1-3 | 7061 | 100-YR | 1763.93 | 7074.14 | 7076.77 | 7076.77 | 7077.43 | 0.009219 | 7.50 | 330.83 | 274.11 | 0.84 |
| Reach 1-3 | 7061 | FIS | 2600.00 | 7074.14 | 7077.21 | 7077.21 | 7077.96 | 0.009236 | 8.35 | 460.12 | 309.39 | 0.86 |
| Reach 1-3 | 7044 | 5-YR | 512.38 | 7071.83 | 7074.31 | 7074.67 | 7075.57 | 0.067823 | 9.00 | 56.92 | 63.50 | 1.68 |
| Reach 1-3 | 7044 | 100-YR | 1763.93 | 7071.83 | 7076.40 | 7075.95 | 7076.61 | 0.006258 | 4.62 | 576.03 | 376.82 | 0.48 |
| Reach 1-3 | 7044 | FIS | 2600.00 | 7071.83 | 7076.96 | 7076.25 | 7077.18 | 0.005422 | 4.77 | 787.36 | 381.83 | 0.45 |
| Reach 1-3 | 6941 | 5-YR | 512.38 | 7070.47 | 7074.02 | 7073.61 | 7074.37 | 0.009299 | 4.74 | 113.43 | 101.64 | 0.65 |
| Reach 1-3 | 6941 | 100-YR | 1763.93 | 7070.47 | 7075.77 | | 7076.06 | 0.005179 | 5.18 | 511.69 | 293.36 | 0.50 |
| Reach 1-3 | 6941 | FIS | 2600.00 | 7070.47 | 7076.34 | | 7076.67 | 0.005176 | 5.67 | 679.95 | 298.34 | 0.50 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 6868 | 5-YR | 512.38 | 7069.50 | 7073.14 | | 7073.58 | 0.012344 | 5.35 | 96.45 | 70.32 | 0.78 |
| Reach 1-3 | 6868 | 100-YR | 1763.93 | 7069.50 | 7074.74 | 7074.74 | 7075.49 | 0.011840 | 7.49 | 320.61 | 238.94 | 0.76 |
| Reach 1-3 | 6868 | FIS | 2600.00 | 7069.50 | 7075.26 | 7075.21 | 7076.10 | 0.012147 | 8.30 | 446.34 | 243.17 | 0.77 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6769 | 5-YR | 512.38 | 7068.73 | 7072.13 | | 7072.47 | 0.009672 | 4.68 | 118.99 | 119.46 | 0.64 |
| Reach 1-3 | 6769 | 100-YR | 1763.93 | 7068.73 | 7073.53 | 7073.21 | 7074.13 | 0.011292 | 6.87 | 328.26 | 167.72 | 0.69 |
| Reach 1-3 | 6769 | FIS | 2600.00 | 7068.73 | 7074.14 | | 7074.89 | 0.011904 | 7.83 | 437.81 | 191.70 | 0.72 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6673 | 5-YR | 512.38 | 7067.90 | 7071.19 | | 7071.49 | 0.010309 | 4.44 | 121.66 | 160.38 | 0.60 |
| Reach 1-3 | 6673 | 100-YR | 1763.93 | 7067.90 | 7072.85 | 7072.19 | 7073.19 | 0.007137 | 5.36 | 420.22 | 195.21 | 0.52 |
| Reach 1-3 | 6673 | FIS | 2600.00 | 7067.90 | 7073.45 | | 7073.88 | 0.007520 | 6.07 | 539.48 | 200.58 | 0.54 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6588 | 5-YR | 512.38 | 7067.13 | 7070.15 | | 7070.50 | 0.013207 | 4.77 | 113.70 | 101.07 | 0.66 |
| Reach 1-3 | 6588 | 100-YR | 1763.93 | 7067.13 | 7071.36 | 7071.31 | 7072.23 | 0.019877 | 7.98 | 265.84 | 156.21 | 0.84 |
| Reach 1-3 | 6588 | FIS | 2600.00 | 7067.13 | 7072.01 | 7071.99 | 7072.94 | 0.017886 | 8.56 | 380.06 | 195.58 | 0.81 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6504 | 5-YR | 512.38 | 7066.40 | 7069.44 | | 7069.63 | 0.007635 | 3.68 | 172.04 | 183.12 | 0.49 |
| Reach 1-3 | 6504 | 100-YR | 1763.93 | 7066.40 | 7070.95 | | 7071.22 | 0.006029 | 4.72 | 460.45 | 197.07 | 0.46 |
| Reach 1-3 | 6504 | FIS | 2600.00 | 7066.40 | 7071.65 | | 7071.98 | 0.005822 | 5.24 | 600.04 | 203.01 | 0.46 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6417 | 5-YR | 512.38 | 7065.42 | 7068.17 | 7067.97 | 7068.60 | 0.018819 | 5.28 | 101.92 | 133.74 | 0.78 |
| Reach 1-3 | 6417 | 100-YR | 1763.93 | 7065.42 | 7069.52 | 7069.37 | 7070.30 | 0.018775 | 7.63 | 269.36 | 196.40 | 0.81 |
| Reach 1-3 | 6417 | FIS | 2600.00 | 7065.42 | 7070.09 | 7070.09 | 7071.06 | 0.019306 | 8.66 | 370.67 | 205.90 | 0.83 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6369 | 5-YR | 512.38 | 7064.37 | 7067.84 | | 7068.03 | 0.006720 | 3.58 | 159.75 | 137.83 | 0.47 |
| Reach 1-3 | 6369 | 100-YR | 1763.93 | 7064.37 | 7069.07 | | 7069.55 | 0.010497 | 5.97 | 346.17 | 209.95 | 0.61 |
| Reach 1-3 | 6369 | FIS | 2600.00 | 7064.37 | 7069.64 | 7069.16 | 7070.21 | 0.010612 | 6.66 | 467.87 | 213.93 | 0.62 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6298 | 5-YR | 512.38 | 7064.05 | 7066.99 | 7066.79 | 7067.34 | 0.014253 | 4.92 | 123.85 | 163.29 | 0.69 |
| Reach 1-3 | 6298 | 100-YR | 1763.93 | 7064.05 | 7068.35 | | 7068.79 | 0.011118 | 6.14 | 368.98 | 186.03 | 0.63 |
| Reach 1-3 | 6298 | FIS | 2600.00 | 7064.05 | 7068.87 | | 7069.44 | 0.012002 | 7.03 | 466.29 | 190.70 | 0.67 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6265 | 5-YR | 512.38 | 7063.23 | 7066.14 | 7066.14 | 7066.75 | 0.022793 | 6.26 | 82.48 | 73.43 | 0.99 |
| Reach 1-3 | 6265 | 100-YR | 1763.93 | 7063.23 | 7067.62 | 7067.62 | 7068.34 | 0.016172 | 7.58 | 311.83 | 206.34 | 0.81 |
| Reach 1-3 | 6265 | FIS | 2600.00 | 7063.23 | 7068.07 | 7068.07 | 7068.95 | 0.017523 | 8.60 | 406.50 | 211.02 | 0.85 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6232 | 5-YR | 512.38 | 7063.38 | 7065.98 | 7065.73 | 7066.20 | 0.008641 | 3.98 | 142.50 | 184.98 | 0.60 |
| Reach 1-3 | 6232 | 100-YR | 1763.93 | 7063.38 | 7066.34 | 7066.71 | 7067.59 | 0.036706 | 9.44 | 210.95 | 193.07 | 1.27 |
| Reach 1-3 | 6232 | FIS | 2600.00 | 7063.38 | 7066.71 | 7067.12 | 7068.18 | 0.034782 | 10.37 | 286.17 | 208.04 | 1.26 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6223 | 5-YR | 512.38 | 7063.07 | 7065.61 | 7065.61 | 7066.00 | 0.075480 | 5.30 | 111.22 | 152.15 | 0.83 |
| Reach 1-3 | 6223 | 100-YR | 1763.93 | 7063.07 | 7066.52 | 7066.52 | 7067.18 | 0.068421 | 7.23 | 285.78 | 209.31 | 0.86 |
| Reach 1-3 | 6223 | FIS | 2600.00 | 7063.07 | 7066.92 | 7066.92 | 7067.74 | 0.066254 | 7.95 | 369.00 | 212.55 | 0.87 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6212 | 5-YR | 512.38 | 7060.43 | 7062.43 | 7062.98 | 7064.15 | 0.595070 | 10.51 | 48.75 | 64.48 | 2.13 |
| Reach 1-3 | 6212 | 100-YR | 1763.93 | 7060.43 | 7063.53 | 7064.21 | 7065.76 | 0.269324 | 12.57 | 158.78 | 130.36 | 1.65 |
| Reach 1-3 | 6212 | FIS | 2600.00 | 7060.43 | 7064.01 | 7064.78 | 7066.42 | 0.222034 | 13.38 | 224.36 | 141.43 | 1.56 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6199 | 5-YR | 512.38 | 7057.41 | 7060.62 | 7059.81 | 7060.82 | 0.020155 | 3.64 | 143.86 | 84.42 | 0.46 |
| Reach 1-3 | 6199 | 100-YR | 1763.93 | 7057.41 | 7062.15 | 7061.38 | 7062.77 | 0.030034 | 6.54 | 296.15 | 117.54 | 0.62 |
| Reach 1-3 | 6199 | FIS | 2600.00 | 7057.41 | 7061.36 | 7062.10 | 7063.90 | 0.167687 | 13.00 | 211.37 | 98.47 | 1.40 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6184 | 5-YR | 512.38 | 7057.42 | 7060.56 | | 7060.65 | 0.005209 | 2.44 | 223.72 | 111.45 | 0.25 |
| Reach 1-3 | 6184 | 100-YR | 1763.93 | 7057.42 | 7062.12 | | 7062.42 | 0.011156 | 4.72 | 425.24 | 145.16 | 0.39 |
| Reach 1-3 | 6184 | FIS | 2600.00 | 7057.42 | 7062.76 | 7061.29 | 7063.19 | 0.013556 | 5.69 | 522.89 | 157.86 | 0.44 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6182 | 5-YR | 512.38 | 7058.72 | 7060.01 | 7060.01 | 7060.58 | 0.045857 | 6.06 | 86.08 | 81.93 | 0.96 |
| Reach 1-3 | 6182 | 100-YR | 1763.93 | 7058.72 | 7061.41 | 7061.41 | 7062.33 | 0.030039 | 8.15 | 245.65 | 133.77 | 0.89 |
| Reach 1-3 | 6182 | FIS | 2600.00 | 7058.72 | 7062.00 | 7062.00 | 7063.09 | 0.028075 | 9.02 | 328.13 | 145.46 | 0.89 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6164 | 5-YR | 512.38 | 7056.45 | 7059.80 | 7059.57 | 7060.10 | 0.012330 | 4.63 | 129.24 | 126.76 | 0.63 |
| Reach 1-3 | 6164 | 100-YR | 1763.93 | 7056.45 | 7061.13 | 7060.80 | 7061.61 | 0.011792 | 6.33 | 369.81 | 244.89 | 0.64 |
| Reach 1-3 | 6164 | FIS | 2600.00 | 7056.45 | 7060.80 | 7061.34 | 7062.39 | 0.043717 | 11.38 | 294.81 | 212.30 | 1.22 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6091 | 5-YR | 512.38 | 7055.75 | 7058.66 | 7058.44 | 7059.05 | 0.016986 | 5.05 | 106.88 | 115.19 | 0.75 |
| Reach 1-3 | 6091 | 100-YR | 1763.93 | 7055.75 | 7059.86 | 7059.72 | 7060.53 | 0.018551 | 7.31 | 332.32 | 268.84 | 0.80 |
| Reach 1-3 | 6091 | FIS | 2600.00 | 7055.75 | 7060.36 | 7060.32 | 7061.04 | 0.017020 | 7.76 | 479.38 | 310.21 | 0.78 |
| | | | | | | | | | | | | |
| Reach 1-3 | 6042 | 5-YR | 512.38 | 7054.55 | 7058.12 | | 7058.42 | 0.009289 | 4.45 | 129.16 | 156.30 | 0.63 |
| Reach 1-3 | 6042 | 100-YR | 1763.93 | 7054.55 | 7059.25 | 7059.04 | 7059.77 | 0.011623 | 6.64 | 389.52 | 293.90 | 0.71 |
| Reach 1-3 | 6042 | FIS | 2600.00 | 7054.55 | 7059.67 | 7059.56 | 7060.30 | 0.012769 | 7.58 | 527.21 | 351.84 | 0.76 |
| | | | | | | | | | | | | |
| Reach 1-3 | 5977 | 5-YR | 512.38 | 7054.61 | 7057.67 | | 7057.92 | 0.009917 | 4.18 | 141.74 | 162.30 | 0.57 |
| Reach 1-3 | 5977 | 100-YR | 1763.93 | 7054.61 | 7058.63 | 7058.55 | 7059.12 | 0.014765 | 6.57 | 397.87 | 339.08 | 0.71 |
| Reach 1-3 | 5977 | FIS | 2600.00 | 7054.61 | 7058.99 | 7058.92 | 7059.59 | 0.016700 | 7.54 | 531.55 | 411.65 | 0.77 |
| | | | | | | | | | | | | |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 5928 | 5-YR | 512.38 | 7053.68 | 7056.31 | 7056.15 | 7056.68 | 0.018251 | 4.94 | 116.53 | 149.61 | 0.74 |
| Reach 1-3 | 5928 | 100-YR | 1763.93 | 7053.68 | 7057.34 | 7057.26 | 7057.74 | 0.015181 | 6.16 | 436.41 | 399.53 | 0.70 |
| Reach 1-3 | 5928 | FIS | 2600.00 | 7053.68 | 7057.75 | | 7058.17 | 0.014327 | 6.57 | 606.54 | 446.62 | 0.69 |
| Reach 1-3 | 5824 | 5-YR | 512.38 | 7052.15 | 7055.58 | 7055.07 | 7055.81 | 0.007850 | 4.09 | 168.02 | 273.30 | 0.55 |
| Reach 1-3 | 5824 | 100-YR | 1763.93 | 7052.15 | 7056.50 | 7056.29 | 7056.86 | 0.010472 | 5.94 | 469.84 | 381.97 | 0.64 |
| Reach 1-3 | 5824 | FIS | 2600.00 | 7052.15 | 7056.90 | 7056.63 | 7057.31 | 0.010792 | 6.55 | 631.73 | 423.50 | 0.66 |
| Reach 1-3 | 5791 | 5-YR | 512.38 | 7052.28 | 7055.03 | 7055.03 | 7055.36 | 0.016271 | 4.84 | 136.80 | 251.22 | 0.72 |
| Reach 1-3 | 5791 | 100-YR | 1763.93 | 7052.28 | 7055.83 | 7055.83 | 7056.29 | 0.018900 | 6.65 | 403.70 | 405.32 | 0.79 |
| Reach 1-3 | 5791 | FIS | 2600.00 | 7052.28 | 7056.10 | 7056.10 | 7056.68 | 0.022113 | 7.69 | 516.45 | 438.25 | 0.86 |
| Reach 1-3 | 5744 | 5-YR | 512.38 | 7051.51 | 7054.87 | 7054.69 | 7055.00 | 0.005474 | 3.26 | 235.41 | 423.61 | 0.45 |
| Reach 1-3 | 5744 | 100-YR | 1763.93 | 7051.51 | 7055.62 | 7055.26 | 7055.80 | 0.005983 | 4.32 | 577.37 | 489.50 | 0.49 |
| Reach 1-3 | 5744 | FIS | 2600.00 | 7051.51 | 7055.91 | 7055.51 | 7056.15 | 0.006485 | 4.84 | 723.13 | 503.36 | 0.52 |
| Reach 1-3 | 5688 | 5-YR | 533.15 | 7051.38 | 7054.17 | 7054.17 | 7054.46 | 0.011578 | 4.72 | 145.85 | 321.65 | 0.78 |
| Reach 1-3 | 5688 | 100-YR | 1880.40 | 7051.38 | 7055.02 | | 7055.32 | 0.008191 | 5.43 | 506.84 | 441.12 | 0.68 |
| Reach 1-3 | 5688 | FIS | 2600.00 | 7051.38 | 7055.36 | | 7055.68 | 0.007382 | 5.67 | 654.47 | 449.48 | 0.66 |
| Reach 1-3 | 5628 | 5-YR | 533.15 | 7050.55 | 7053.93 | 7053.67 | 7054.04 | 0.003904 | 2.99 | 271.36 | 411.83 | 0.39 |
| Reach 1-3 | 5628 | 100-YR | 1880.40 | 7050.55 | 7054.84 | | 7055.00 | 0.004092 | 3.99 | 654.46 | 429.43 | 0.43 |
| Reach 1-3 | 5628 | FIS | 2600.00 | 7050.55 | 7055.16 | | 7055.37 | 0.004275 | 4.40 | 794.55 | 432.15 | 0.44 |
| Reach 1-3 | 5568 | 5-YR | 533.15 | 7049.82 | 7052.96 | 7052.68 | 7053.35 | 0.013503 | 5.07 | 117.69 | 261.88 | 0.73 |
| Reach 1-3 | 5568 | 100-YR | 1880.40 | 7049.82 | 7053.80 | 7053.80 | 7054.30 | 0.013141 | 6.72 | 407.98 | 387.78 | 0.77 |
| Reach 1-3 | 5568 | FIS | 2600.00 | 7049.82 | 7054.05 | 7054.04 | 7054.64 | 0.013945 | 7.40 | 503.47 | 389.82 | 0.81 |
| Reach 1-3 | 5429 | 5-YR | 533.15 | 7048.55 | 7051.57 | 7051.57 | 7051.91 | 0.014174 | 4.83 | 148.20 | 312.05 | 0.69 |
| Reach 1-3 | 5429 | 100-YR | 1880.40 | 7048.55 | 7052.47 | 7052.32 | 7052.84 | 0.013996 | 6.12 | 460.96 | 359.67 | 0.70 |
| Reach 1-3 | 5429 | FIS | 2600.00 | 7048.55 | 7052.81 | | 7053.21 | 0.013267 | 6.44 | 586.14 | 362.51 | 0.68 |
| Reach 1-3 | 5365 | 5-YR | 533.15 | 7047.14 | 7050.35 | 7050.42 | 7050.88 | 0.017619 | 5.96 | 103.82 | 160.28 | 0.91 |
| Reach 1-3 | 5365 | 100-YR | 1880.40 | 7047.14 | 7051.38 | 7051.38 | 7051.90 | 0.015246 | 7.16 | 424.36 | 362.14 | 0.82 |
| Reach 1-3 | 5365 | FIS | 2600.00 | 7047.14 | 7051.64 | 7051.64 | 7052.25 | 0.016954 | 7.98 | 517.99 | 364.22 | 0.87 |
| Reach 1-3 | 5289 | 5-YR | 533.15 | 7046.36 | 7049.33 | 7049.40 | 7049.82 | 0.021189 | 5.73 | 108.85 | 168.29 | 0.87 |
| Reach 1-3 | 5289 | 100-YR | 1880.40 | 7046.36 | 7050.66 | 7050.39 | 7050.98 | 0.010381 | 5.62 | 493.34 | 340.78 | 0.61 |
| Reach 1-3 | 5289 | FIS | 2600.00 | 7046.36 | 7051.00 | 7050.64 | 7051.37 | 0.010692 | 6.11 | 611.14 | 343.68 | 0.62 |
| Reach 1-3 | 5227 | 5-YR | 533.15 | 7045.43 | 7048.67 | 7048.33 | 7048.91 | 0.009009 | 4.14 | 160.51 | 180.47 | 0.56 |
| Reach 1-3 | 5227 | 100-YR | 1880.40 | 7045.43 | 7049.69 | 7049.64 | 7050.19 | 0.014319 | 6.73 | 419.02 | 325.95 | 0.72 |
| Reach 1-3 | 5227 | FIS | 2600.00 | 7045.43 | 7050.04 | | 7050.58 | 0.014230 | 7.20 | 533.97 | 328.87 | 0.72 |
| Reach 1-3 | 5171 | 5-YR | 533.15 | 7044.55 | 7047.23 | 7046.97 | 7047.66 | 0.018216 | 5.28 | 105.70 | 117.72 | 0.76 |
| Reach 1-3 | 5171 | 100-YR | 1880.40 | 7044.55 | 7048.72 | | 7049.05 | 0.009271 | 5.59 | 495.73 | 340.44 | 0.57 |
| Reach 1-3 | 5171 | FIS | 2600.00 | 7044.55 | 7049.26 | | 7049.56 | 0.007278 | 5.49 | 680.99 | 344.39 | 0.52 |
| Reach 1-3 | 5047 | 5-YR | 533.15 | 7042.80 | 7045.86 | | 7046.11 | 0.010111 | 4.22 | 146.38 | 137.71 | 0.58 |
| Reach 1-3 | 5047 | 100-YR | 1880.40 | 7042.80 | 7046.87 | 7046.72 | 7047.59 | 0.018405 | 7.41 | 292.06 | 151.85 | 0.80 |
| Reach 1-3 | 5047 | FIS | 2600.00 | 7042.80 | 7047.20 | 7047.13 | 7048.18 | 0.022166 | 8.70 | 341.97 | 156.96 | 0.89 |
| Reach 1-3 | 4948 | 5-YR | 533.15 | 7041.66 | 7044.83 | | 7045.11 | 0.010093 | 4.36 | 138.23 | 162.94 | 0.58 |
| Reach 1-3 | 4948 | 100-YR | 1880.40 | 7041.66 | 7046.26 | | 7046.49 | 0.006079 | 4.75 | 578.93 | 339.85 | 0.47 |
| Reach 1-3 | 4948 | FIS | 2600.00 | 7041.66 | 7046.64 | | 7046.91 | 0.006423 | 5.23 | 709.10 | 342.87 | 0.49 |
| Reach 1-3 | 4855 | 5-YR | 533.15 | 7040.34 | 7044.13 | | 7044.45 | 0.008687 | 4.54 | 122.99 | 100.22 | 0.60 |
| Reach 1-3 | 4855 | 100-YR | 1880.40 | 7040.34 | 7045.38 | 7045.29 | 7045.92 | 0.011059 | 6.77 | 420.82 | 326.26 | 0.69 |
| Reach 1-3 | 4855 | FIS | 2600.00 | 7040.34 | 7045.75 | | 7046.33 | 0.011339 | 7.32 | 541.75 | 329.78 | 0.70 |
| Reach 1-3 | 4782 | 5-YR | 533.15 | 7040.04 | 7043.59 | | 7043.86 | 0.007174 | 4.19 | 141.44 | 137.41 | 0.54 |
| Reach 1-3 | 4782 | 100-YR | 1880.40 | 7040.04 | 7044.70 | 7044.57 | 7045.15 | 0.010299 | 6.40 | 449.65 | 334.46 | 0.65 |
| Reach 1-3 | 4782 | FIS | 2600.00 | 7040.04 | 7045.04 | 7044.87 | 7045.55 | 0.010831 | 6.99 | 566.58 | 337.30 | 0.68 |
| Reach 1-3 | 4714 | 5-YR | 533.15 | 7039.78 | 7042.77 | | 7043.16 | 0.015249 | 5.04 | 109.03 | 94.33 | 0.71 |
| Reach 1-3 | 4714 | 100-YR | 1880.40 | 7039.78 | 7043.90 | | 7044.35 | 0.013997 | 6.50 | 429.94 | 330.12 | 0.70 |
| Reach 1-3 | 4714 | FIS | 2600.00 | 7039.78 | 7044.40 | | 7044.80 | 0.010580 | 6.27 | 599.22 | 334.05 | 0.62 |
| Reach 1-3 | 4632 | 5-YR | 533.15 | 7039.10 | 7042.01 | | 7042.21 | 0.009081 | 3.96 | 176.35 | 199.00 | 0.58 |
| Reach 1-3 | 4632 | 100-YR | 1880.40 | 7039.10 | 7043.49 | | 7043.69 | 0.005384 | 4.44 | 595.79 | 315.80 | 0.46 |
| Reach 1-3 | 4632 | FIS | 2600.00 | 7039.10 | 7044.08 | | 7044.29 | 0.004464 | 4.51 | 783.93 | 321.59 | 0.43 |
| Reach 1-3 | 4582 | 5-YR | 533.15 | 7038.10 | 7041.73 | | 7041.87 | 0.004781 | 3.37 | 209.86 | 196.90 | 0.45 |
| Reach 1-3 | 4582 | 100-YR | 1880.40 | 7038.10 | 7043.28 | | 7043.46 | 0.004004 | 4.25 | 629.38 | 298.54 | 0.41 |
| Reach 1-3 | 4582 | FIS | 2600.00 | 7038.10 | 7043.90 | | 7044.09 | 0.003514 | 4.40 | 816.60 | 304.81 | 0.39 |

HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 4534 | 5-YR | 533.15 | 7038.20 | 7041.55 | 7040.83 | 7041.65 | 0.003851 | 2.83 | 250.17 | 227.32 | 0.36 |
| Reach 1-3 | 4534 | 100-YR | 1880.40 | 7038.20 | 7043.14 | | 7043.28 | 0.003176 | 3.64 | 681.22 | 282.33 | 0.34 |
| Reach 1-3 | 4534 | FIS | 2600.00 | 7038.20 | 7043.77 | | 7043.93 | 0.002946 | 3.88 | 861.23 | 288.44 | 0.34 |
| | | | | | | | | | | | | |
| Reach 1-3 | 4296 | 5-YR | 512.29 | 7036.56 | 7039.20 | 7039.20 | 7039.77 | 0.025760 | 6.19 | 89.48 | 85.70 | 0.95 |
| Reach 1-3 | 4296 | 100-YR | 1848.80 | 7036.56 | 7040.68 | 7040.68 | 7041.67 | 0.022801 | 8.58 | 244.84 | 121.59 | 0.91 |
| Reach 1-3 | 4296 | FIS | 2600.00 | 7036.56 | 7041.26 | 7041.26 | 7042.40 | 0.021617 | 9.35 | 320.40 | 141.01 | 0.90 |
| | | | | | | | | | | | | |
| Reach 1-3 | 4084 | 5-YR | 512.29 | 7033.29 | 7037.49 | 7034.22 | 7037.49 | 0.000039 | 0.62 | 834.01 | 266.74 | 0.06 |
| Reach 1-3 | 4084 | 100-YR | 1848.80 | 7033.29 | 7039.49 | 7035.10 | 7039.52 | 0.000096 | 1.32 | 1527.52 | 365.16 | 0.10 |
| Reach 1-3 | 4084 | FIS | 2600.00 | 7033.29 | 7040.66 | 7035.43 | 7040.69 | 0.000091 | 1.45 | 1956.49 | 374.03 | 0.10 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3846 | 5-YR | 512.29 | 7033.20 | 7036.87 | 7036.87 | 7037.40 | 0.017706 | 5.86 | 87.35 | 166.03 | 1.01 |
| Reach 1-3 | 3846 | 100-YR | 1848.80 | 7033.20 | 7038.22 | 7038.22 | 7039.33 | 0.013956 | 8.45 | 218.78 | 233.23 | 1.01 |
| Reach 1-3 | 3846 | FIS | 2600.00 | 7033.20 | 7039.80 | | 7040.54 | 0.004486 | 6.89 | 377.33 | 317.58 | 0.63 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3842 | 5-YR | 512.29 | 7014.12 | 7014.94 | 7017.12 | 7035.26 | 0.129803 | 36.17 | 14.28 | 17.50 | 7.03 |
| Reach 1-3 | 3842 | 100-YR | 1848.80 | 7014.12 | 7033.28 | 7021.19 | 7033.74 | 0.000045 | 5.52 | 399.11 | 35.16 | 0.22 |
| Reach 1-3 | 3842 | FIS | 2600.00 | 7014.12 | 7039.98 | | 7040.47 | 0.000032 | 5.69 | 570.89 | 493.19 | 0.20 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3816 | 5-YR | 512.29 | 7014.12 | 7015.43 | 7017.95 | 7031.98 | 0.057072 | 32.64 | 15.80 | 12.18 | 5.03 |
| Reach 1-3 | 3816 | 100-YR | 1848.80 | 7014.12 | 7032.63 | 7023.13 | 7033.68 | 0.000107 | 8.27 | 245.34 | 14.52 | 0.34 |
| Reach 1-3 | 3816 | FIS | 2600.00 | 7014.12 | 7039.28 | 7025.41 | 7040.40 | 0.000076 | 8.53 | 344.92 | 95.24 | 0.30 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3744 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 3719 | 5-YR | 512.29 | 7013.40 | 7015.26 | 7017.22 | 7023.46 | 0.017733 | 22.99 | 22.50 | 12.25 | 2.97 |
| Reach 1-3 | 3719 | 100-YR | 1848.80 | 7013.40 | 7019.05 | 7022.41 | 7030.53 | 0.005622 | 27.20 | 69.96 | 12.75 | 2.02 |
| Reach 1-3 | 3719 | FIS | 2600.00 | 7013.40 | 7024.68 | 7024.68 | 7030.35 | 0.001107 | 19.13 | 143.82 | 13.49 | 1.00 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3711 | 5-YR | 512.29 | 7002.83 | 7004.08 | 7006.66 | 7022.22 | 0.066442 | 34.17 | 15.06 | 12.12 | 5.39 |
| Reach 1-3 | 3711 | 100-YR | 1848.80 | 7002.83 | 7021.33 | 7011.85 | 7022.39 | 0.000108 | 8.30 | 238.31 | 13.77 | 0.34 |
| Reach 1-3 | 3711 | FIS | 2600.00 | 7002.83 | 7027.64 | 7014.13 | 7028.81 | 0.000080 | 8.69 | 327.20 | 14.38 | 0.31 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3676 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 3667 | 5-YR | 512.29 | 7002.61 | 7004.27 | 7006.44 | 7014.59 | 0.025959 | 25.77 | 20.00 | 12.16 | 3.53 |
| Reach 1-3 | 3667 | 100-YR | 1848.80 | 7002.61 | 7008.18 | 7011.61 | 7020.04 | 0.005929 | 27.64 | 68.28 | 12.53 | 2.07 |
| Reach 1-3 | 3667 | FIS | 2600.00 | 7002.61 | 7013.91 | 7013.91 | 7019.58 | 0.001106 | 19.14 | 141.63 | 13.08 | 1.00 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3662 | 5-YR | 512.29 | 7001.15 | 7002.32 | 7003.93 | 7014.10 | 0.451689 | 27.53 | 18.61 | 22.17 | 5.30 |
| Reach 1-3 | 3662 | 100-YR | 1848.80 | 7001.15 | 7003.89 | 7007.04 | 7019.57 | 0.177607 | 31.76 | 58.20 | 63.20 | 3.73 |
| Reach 1-3 | 3662 | FIS | 2600.00 | 7001.15 | 7005.03 | 7008.44 | 7018.76 | 0.092660 | 29.73 | 87.54 | 78.23 | 2.85 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3629 | 5-YR | 512.29 | 7001.51 | 7005.00 | 7003.02 | 7005.05 | 0.000825 | 1.93 | 265.09 | 463.34 | 0.20 |
| Reach 1-3 | 3629 | 100-YR | 1848.80 | 7001.51 | 7011.50 | 7004.41 | 7011.57 | 0.000215 | 2.16 | 856.79 | 631.19 | 0.12 |
| Reach 1-3 | 3629 | FIS | 2600.00 | 7001.51 | 7012.47 | 7005.04 | 7012.48 | 0.000022 | 0.73 | 5019.20 | 640.28 | 0.04 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3625 | 5-YR | 512.29 | 7003.41 | 7005.00 | | 7005.05 | 0.001316 | 2.25 | 425.11 | 463.76 | 0.32 |
| Reach 1-3 | 3625 | 100-YR | 1848.80 | 7003.41 | 7011.55 | | 7011.55 | 0.000016 | 0.76 | 4303.02 | 631.62 | 0.05 |
| Reach 1-3 | 3625 | FIS | 2600.00 | 7003.41 | 7012.47 | | 7012.48 | 0.000022 | 0.93 | 4892.07 | 640.26 | 0.05 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3618 | 5-YR | 512.29 | 7002.58 | 7004.98 | | 7005.04 | 0.001701 | 3.06 | 430.63 | 457.91 | 0.35 |
| Reach 1-3 | 3618 | 100-YR | 1848.80 | 7002.58 | 7011.55 | | 7011.55 | 0.000020 | 0.82 | 4257.09 | 622.19 | 0.05 |
| Reach 1-3 | 3618 | FIS | 2600.00 | 7002.58 | 7012.47 | | 7012.48 | 0.000027 | 1.00 | 4837.77 | 630.95 | 0.06 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3485 | 5-YR | 512.29 | 7002.22 | 7004.78 | | 7004.84 | 0.001575 | 3.07 | 426.89 | 433.07 | 0.34 |
| Reach 1-3 | 3485 | 100-YR | 1848.80 | 7002.22 | 7011.54 | | 7011.55 | 0.000019 | 0.81 | 4323.96 | 620.53 | 0.05 |
| Reach 1-3 | 3485 | FIS | 2600.00 | 7002.22 | 7012.47 | | 7012.48 | 0.000025 | 0.99 | 4903.01 | 629.77 | 0.05 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3336 | 5-YR | 512.29 | 7001.71 | 7004.68 | | 7004.70 | 0.000566 | 2.04 | 633.91 | 517.73 | 0.21 |
| Reach 1-3 | 3336 | 100-YR | 1848.80 | 7001.71 | 7011.54 | | 7011.55 | 0.000014 | 0.71 | 4822.48 | 642.15 | 0.04 |
| Reach 1-3 | 3336 | FIS | 2600.00 | 7001.71 | 7012.47 | | 7012.47 | 0.000019 | 0.88 | 5420.81 | 650.45 | 0.05 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3198 | 5-YR | 512.29 | 7001.27 | 7004.65 | | 7004.66 | 0.000139 | 1.09 | 977.96 | 507.50 | 0.11 |
| Reach 1-3 | 3198 | 100-YR | 1848.80 | 7001.27 | 7011.54 | | 7011.54 | 0.000011 | 0.66 | 4817.29 | 599.85 | 0.04 |
| Reach 1-3 | 3198 | FIS | 2600.00 | 7001.27 | 7012.47 | | 7012.47 | 0.000016 | 0.82 | 5376.90 | 609.22 | 0.04 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3103 | 5-YR | 512.29 | 7001.02 | 7004.65 | 7001.77 | 7004.65 | 0.000031 | 0.54 | 955.85 | 385.40 | 0.05 |
| Reach 1-3 | 3103 | 100-YR | 1848.80 | 7001.02 | 7011.54 | 7002.40 | 7011.54 | 0.000011 | 0.62 | 3035.87 | 478.75 | 0.04 |
| Reach 1-3 | 3103 | FIS | 2600.00 | 7001.02 | 7012.46 | 7002.68 | 7012.47 | 0.000015 | 0.78 | 3480.66 | 485.10 | 0.04 |
| | | | | | | | | | | | | |
| Reach 1-3 | 3057 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 2988 | 5-YR | 512.29 | 7001.00 | 7003.77 | | 7003.83 | 0.000564 | 1.98 | 258.46 | 117.29 | 0.21 |
| Reach 1-3 | 2988 | 100-YR | 1848.80 | 7001.00 | 7007.74 | | 7007.87 | 0.000375 | 2.93 | 631.03 | 133.64 | 0.20 |

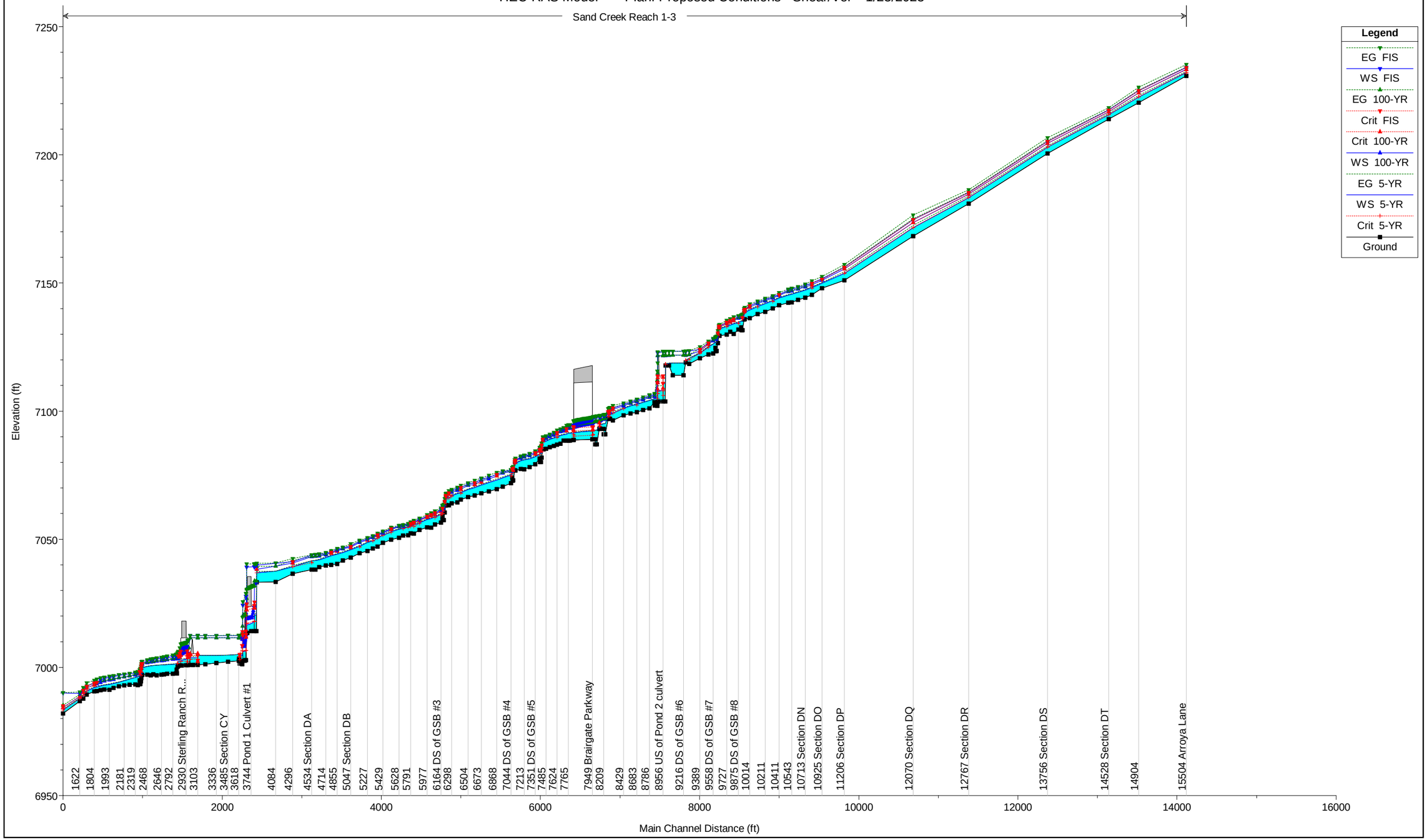
HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

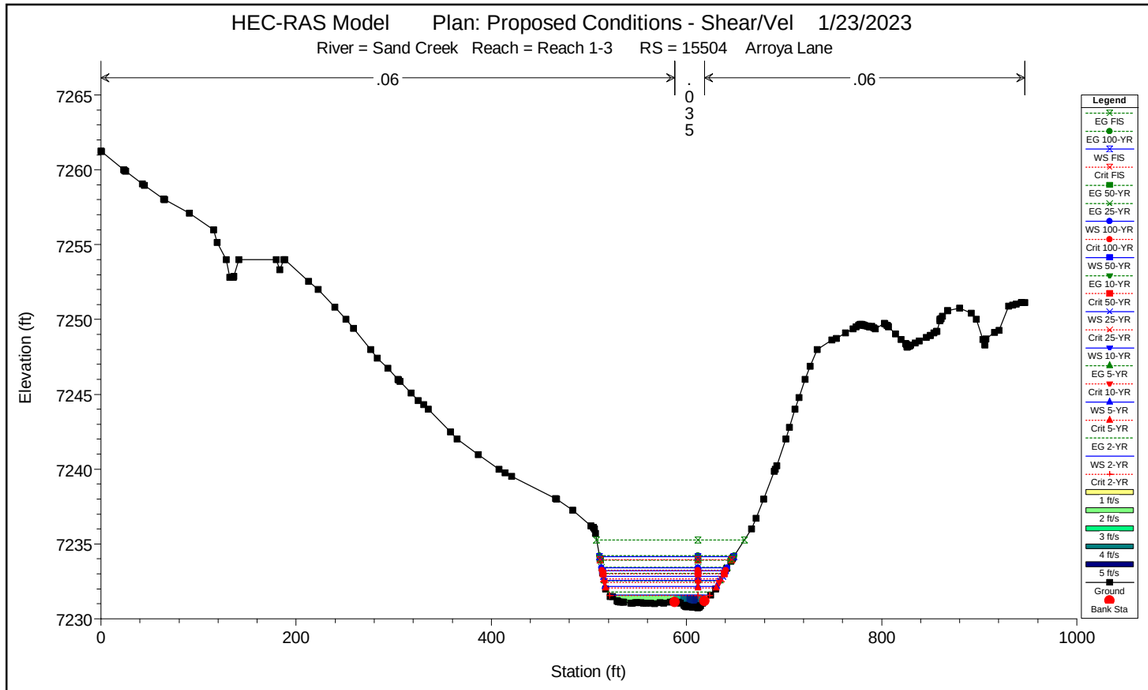
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 2988 | FIS | 2600.00 | 7001.00 | 7010.57 | | 7010.70 | 0.000229 | 2.89 | 897.66 | 149.46 | 0.16 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2975 | 5-YR | 398.70 | 7000.89 | 7003.71 | 7002.10 | 7003.82 | 0.001118 | 2.66 | 149.73 | 53.95 | 0.28 |
| Reach 1-3 | 2975 | 100-YR | 1562.40 | 7000.89 | 7007.55 | 7003.89 | 7007.85 | 0.000950 | 4.36 | 360.47 | 55.68 | 0.30 |
| Reach 1-3 | 2975 | FIS | 2600.00 | 7000.89 | 7010.26 | 7005.10 | 7010.67 | 0.000834 | 5.14 | 512.99 | 56.85 | 0.30 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2930 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| Reach 1-3 | 2879 | 5-YR | 398.70 | 7000.82 | 7002.45 | | 7002.90 | 0.008564 | 5.28 | 74.43 | 60.40 | 0.75 |
| Reach 1-3 | 2879 | 100-YR | 1562.40 | 7000.82 | 7004.10 | 7004.10 | 7005.71 | 0.011700 | 9.99 | 153.77 | 73.42 | 0.98 |
| Reach 1-3 | 2879 | FIS | 2600.00 | 7000.82 | 7005.39 | 7005.39 | 7007.65 | 0.010460 | 11.83 | 215.85 | 84.44 | 0.98 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2856 | 5-YR | 398.70 | 7000.50 | 7002.18 | | 7002.47 | 0.038527 | 4.32 | 94.37 | 67.04 | 0.61 |
| Reach 1-3 | 2856 | 100-YR | 1562.40 | 7000.50 | 7002.75 | 7003.36 | 7004.98 | 0.199976 | 12.12 | 132.42 | 71.30 | 1.47 |
| Reach 1-3 | 2856 | FIS | 2600.00 | 7000.50 | 7003.38 | 7004.39 | 7006.90 | 0.225359 | 15.29 | 174.47 | 75.97 | 1.63 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2850 | 5-YR | 398.70 | 7000.17 | 7001.55 | 7001.55 | 7002.07 | 0.111722 | 5.87 | 69.37 | 67.25 | 0.99 |
| Reach 1-3 | 2850 | 100-YR | 1562.40 | 7000.17 | 7003.47 | 7003.09 | 7004.37 | 0.050787 | 7.78 | 208.98 | 81.81 | 0.79 |
| Reach 1-3 | 2850 | FIS | 2600.00 | 7000.17 | 7004.50 | 7004.06 | 7005.81 | 0.050313 | 9.41 | 285.90 | 89.57 | 0.82 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2842 | 5-YR | 398.70 | 6997.59 | 7001.50 | 6999.01 | 7001.56 | 0.002796 | 2.03 | 207.56 | 67.18 | 0.19 |
| Reach 1-3 | 2842 | 100-YR | 1562.40 | 6997.59 | 7003.61 | | 7003.93 | 0.008315 | 4.72 | 364.60 | 81.98 | 0.34 |
| Reach 1-3 | 2842 | FIS | 2600.00 | 6997.59 | 7004.68 | | 7005.25 | 0.012030 | 6.35 | 453.98 | 89.34 | 0.43 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2838 | 5-YR | 398.70 | 6999.13 | 7001.40 | | 7001.54 | 0.012715 | 3.05 | 132.12 | 66.96 | 0.37 |
| Reach 1-3 | 2838 | 100-YR | 1562.40 | 6999.13 | 7003.36 | | 7003.87 | 0.019350 | 5.83 | 278.48 | 82.02 | 0.51 |
| Reach 1-3 | 2838 | FIS | 2600.00 | 6999.13 | 7004.35 | | 7005.17 | 0.023504 | 7.43 | 363.60 | 89.63 | 0.58 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2830 | 5-YR | 398.70 | 6997.58 | 7001.36 | | 7001.49 | 0.003085 | 2.87 | 144.56 | 71.10 | 0.33 |
| Reach 1-3 | 2830 | 100-YR | 1562.40 | 6997.58 | 7003.33 | | 7003.77 | 0.005548 | 5.52 | 299.22 | 86.69 | 0.47 |
| Reach 1-3 | 2830 | FIS | 2600.00 | 6997.58 | 7004.32 | | 7005.04 | 0.006975 | 7.05 | 389.78 | 94.98 | 0.54 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2792 | 5-YR | 398.70 | 6997.53 | 7001.27 | | 7001.37 | 0.002631 | 2.67 | 157.88 | 77.82 | 0.31 |
| Reach 1-3 | 2792 | 100-YR | 1562.40 | 6997.53 | 7003.18 | | 7003.56 | 0.004764 | 5.12 | 323.58 | 95.39 | 0.44 |
| Reach 1-3 | 2792 | FIS | 2600.00 | 6997.53 | 7004.16 | | 7004.77 | 0.005965 | 6.51 | 421.39 | 104.39 | 0.50 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2719 | 5-YR | 398.70 | 6997.47 | 7001.10 | | 7001.19 | 0.002536 | 2.64 | 170.08 | 91.73 | 0.30 |
| Reach 1-3 | 2719 | 100-YR | 1562.40 | 6997.47 | 7002.91 | | 7003.23 | 0.004501 | 4.94 | 349.35 | 106.60 | 0.43 |
| Reach 1-3 | 2719 | FIS | 2600.00 | 6997.47 | 7003.82 | | 7004.36 | 0.005660 | 6.27 | 451.10 | 114.78 | 0.49 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2680 | 5-YR | 398.70 | 6997.33 | 7001.00 | | 7001.09 | 0.002535 | 2.55 | 175.35 | 100.39 | 0.30 |
| Reach 1-3 | 2680 | 100-YR | 1562.40 | 6997.33 | 7002.73 | | 7003.04 | 0.004586 | 4.80 | 363.78 | 119.52 | 0.42 |
| Reach 1-3 | 2680 | FIS | 2600.00 | 6997.33 | 7003.62 | | 7004.11 | 0.005711 | 6.07 | 474.85 | 130.47 | 0.48 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2646 | 5-YR | 398.70 | 6997.18 | 7000.92 | | 7001.01 | 0.002291 | 2.53 | 178.21 | 109.98 | 0.30 |
| Reach 1-3 | 2646 | 100-YR | 1562.40 | 6997.18 | 7002.61 | | 7002.89 | 0.003936 | 4.61 | 381.48 | 128.84 | 0.41 |
| Reach 1-3 | 2646 | FIS | 2600.00 | 6997.18 | 7003.48 | | 7003.92 | 0.004885 | 5.80 | 496.17 | 136.11 | 0.47 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2589 | 5-YR | 398.70 | 6996.89 | 7000.79 | | 7000.88 | 0.002215 | 2.59 | 183.01 | 119.28 | 0.31 |
| Reach 1-3 | 2589 | 100-YR | 1562.40 | 6996.89 | 7002.43 | | 7002.68 | 0.003504 | 4.43 | 412.24 | 146.97 | 0.40 |
| Reach 1-3 | 2589 | FIS | 2600.00 | 6996.89 | 7003.28 | | 7003.66 | 0.004217 | 5.48 | 539.31 | 153.88 | 0.45 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2545 | 5-YR | 398.70 | 6997.22 | 7000.68 | | 7000.77 | 0.002949 | 2.61 | 178.63 | 123.07 | 0.32 |
| Reach 1-3 | 2545 | 100-YR | 1562.40 | 6997.22 | 7002.23 | | 7002.50 | 0.004868 | 4.64 | 390.39 | 145.31 | 0.43 |
| Reach 1-3 | 2545 | FIS | 2600.00 | 6997.22 | 7003.01 | | 7003.44 | 0.006022 | 5.82 | 509.73 | 163.48 | 0.49 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2513 | 5-YR | 398.70 | 6996.86 | 7000.60 | | 7000.68 | 0.002478 | 2.45 | 182.91 | 130.63 | 0.31 |
| Reach 1-3 | 2513 | 100-YR | 1562.40 | 6996.86 | 7002.09 | | 7002.35 | 0.004210 | 4.37 | 399.61 | 152.83 | 0.41 |
| Reach 1-3 | 2513 | FIS | 2600.00 | 6996.86 | 7002.84 | | 7003.25 | 0.005326 | 5.52 | 516.41 | 159.86 | 0.47 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2468 | 5-YR | 398.70 | 6997.15 | 7000.40 | | 7000.52 | 0.004871 | 2.92 | 157.10 | 144.02 | 0.41 |
| Reach 1-3 | 2468 | 100-YR | 1562.40 | 6997.15 | 7001.88 | | 7002.12 | 0.005157 | 4.28 | 416.90 | 188.94 | 0.43 |
| Reach 1-3 | 2468 | FIS | 2600.00 | 6997.15 | 7002.61 | | 7002.96 | 0.005801 | 5.16 | 557.26 | 196.12 | 0.47 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2405 | 5-YR | 398.70 | 6997.08 | 6999.86 | | 7000.09 | 0.010282 | 3.84 | 108.10 | 107.24 | 0.58 |
| Reach 1-3 | 2405 | 100-YR | 1562.40 | 6997.08 | 7001.18 | | 7001.65 | 0.012297 | 6.05 | 330.06 | 216.73 | 0.65 |
| Reach 1-3 | 2405 | FIS | 2600.00 | 6997.08 | 7001.53 | 7001.50 | 7002.36 | 0.019514 | 8.21 | 406.16 | 220.48 | 0.83 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2399 | 5-YR | 398.70 | 6997.08 | 6999.38 | 6999.38 | 6999.91 | 0.124367 | 5.88 | 67.81 | 66.14 | 1.02 |
| Reach 1-3 | 2399 | 100-YR | 1562.40 | 6997.08 | 7000.93 | 7000.93 | 7001.51 | 0.047494 | 6.67 | 271.58 | 215.32 | 0.74 |
| Reach 1-3 | 2399 | FIS | 2600.00 | 6997.08 | 7001.39 | 7001.39 | 7002.17 | 0.050148 | 7.64 | 371.53 | 223.00 | 0.78 |
| | | | | | | | | | | | | |
| Reach 1-3 | 2394 | 5-YR | 398.70 | 6995.80 | 6997.81 | 6998.11 | 6998.83 | 0.353806 | 8.11 | 49.18 | 64.99 | 1.64 |
| Reach 1-3 | 2394 | 100-YR | 1562.40 | 6995.80 | 6999.01 | 6999.72 | 7000.92 | 0.201643 | 11.29 | 148.31 | 105.44 | 1.44 |
| Reach 1-3 | 2394 | FIS | 2600.00 | 6995.80 | 6999.85 | 7000.48 | 7001.66 | 0.127899 | 11.47 | 258.08 | 165.03 | 1.22 |
| | | | | | | | | | | | | |

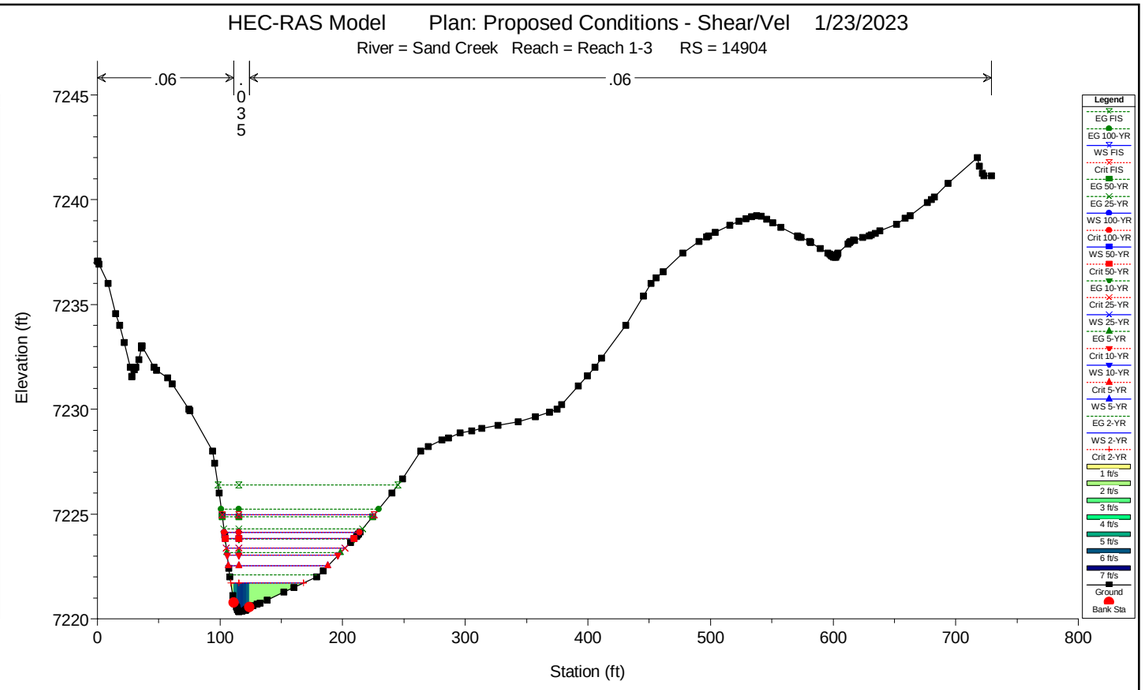
HEC-RAS Plan: PROP - Shear River: Sand Creek Reach: Reach 1-3 (Continued)

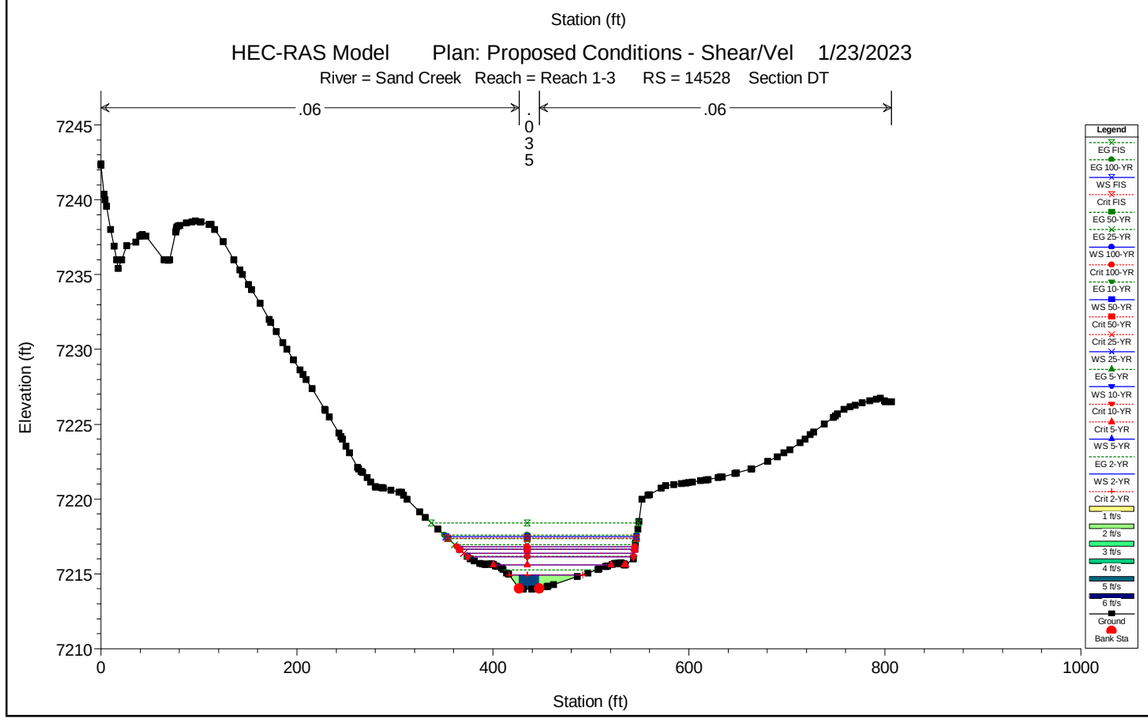
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 2389 | 5-YR | 398.70 | 6994.62 | 6996.76 | 6996.91 | 6997.48 | 0.205702 | 6.82 | 58.47 | 67.21 | 1.28 |
| Reach 1-3 | 2389 | 100-YR | 1562.40 | 6994.62 | 6997.80 | 6998.46 | 6999.91 | 0.218676 | 11.82 | 137.31 | 87.14 | 1.51 |
| Reach 1-3 | 2389 | FIS | 2600.00 | 6994.62 | 6998.67 | 6999.50 | 7000.97 | 0.148987 | 12.53 | 225.94 | 118.14 | 1.32 |
| Reach 1-3 | 2384 | 5-YR | 398.70 | 6993.53 | 6996.73 | 6995.76 | 6996.86 | 0.014166 | 2.94 | 135.88 | 79.23 | 0.38 |
| Reach 1-3 | 2384 | 100-YR | 1562.40 | 6993.53 | 6996.77 | 6997.38 | 6998.74 | 0.200807 | 11.25 | 139.44 | 81.04 | 1.44 |
| Reach 1-3 | 2384 | FIS | 2600.00 | 6993.53 | 6997.52 | 6998.40 | 7000.08 | 0.171631 | 12.99 | 209.16 | 102.64 | 1.41 |
| Reach 1-3 | 2377 | 5-YR | 398.70 | 6993.46 | 6996.74 | | 6996.80 | 0.003243 | 1.91 | 216.10 | 98.15 | 0.19 |
| Reach 1-3 | 2377 | 100-YR | 1562.40 | 6993.46 | 6998.12 | 6996.27 | 6998.40 | 0.010895 | 4.50 | 390.59 | 155.77 | 0.38 |
| Reach 1-3 | 2377 | FIS | 2600.00 | 6993.46 | 6998.39 | 6997.58 | 6999.03 | 0.023014 | 6.81 | 438.52 | 198.56 | 0.55 |
| Reach 1-3 | 2375 | 5-YR | 398.70 | 6994.97 | 6996.54 | | 6996.76 | 0.031436 | 3.83 | 109.14 | 96.66 | 0.55 |
| Reach 1-3 | 2375 | 100-YR | 1562.40 | 6994.97 | 6997.52 | 6997.52 | 6998.30 | 0.062814 | 7.56 | 233.96 | 153.78 | 0.85 |
| Reach 1-3 | 2375 | FIS | 2600.00 | 6994.97 | 6998.24 | 6998.24 | 6998.94 | 0.042318 | 7.36 | 399.84 | 253.98 | 0.73 |
| Reach 1-3 | 2350 | 5-YR | 398.70 | 6993.08 | 6996.30 | | 6996.44 | 0.005964 | 3.26 | 161.48 | 215.20 | 0.48 |
| Reach 1-3 | 2350 | 100-YR | 1562.40 | 6993.08 | 6997.33 | 6996.92 | 6997.62 | 0.008754 | 5.12 | 417.17 | 264.63 | 0.58 |
| Reach 1-3 | 2350 | FIS | 2600.00 | 6993.08 | 6998.01 | 6997.40 | 6998.36 | 0.008319 | 5.72 | 599.80 | 272.36 | 0.57 |
| Reach 1-3 | 2319 | 5-YR | 398.70 | 6993.33 | 6995.98 | | 6996.20 | 0.010339 | 3.99 | 130.80 | 225.97 | 0.62 |
| Reach 1-3 | 2319 | 100-YR | 1562.40 | 6993.33 | 6997.08 | | 6997.36 | 0.009234 | 5.13 | 424.88 | 279.89 | 0.58 |
| Reach 1-3 | 2319 | FIS | 2600.00 | 6993.33 | 6997.81 | | 6998.12 | 0.007732 | 5.47 | 633.05 | 288.88 | 0.55 |
| Reach 1-3 | 2246 | 5-YR | 398.70 | 6993.16 | 6995.47 | | 6995.55 | 0.007248 | 2.73 | 189.89 | 233.72 | 0.48 |
| Reach 1-3 | 2246 | 100-YR | 1562.40 | 6993.16 | 6996.63 | | 6996.80 | 0.006503 | 3.84 | 488.72 | 281.21 | 0.46 |
| Reach 1-3 | 2246 | FIS | 2600.00 | 6993.16 | 6997.46 | | 6997.67 | 0.005141 | 4.14 | 732.67 | 301.74 | 0.42 |
| Reach 1-3 | 2181 | 5-YR | 398.70 | 6992.99 | 6994.81 | | 6994.94 | 0.015439 | 3.44 | 141.60 | 196.64 | 0.74 |
| Reach 1-3 | 2181 | 100-YR | 1562.40 | 6992.99 | 6996.23 | | 6996.41 | 0.006454 | 3.78 | 463.03 | 253.91 | 0.46 |
| Reach 1-3 | 2181 | FIS | 2600.00 | 6992.99 | 6997.16 | | 6997.37 | 0.004687 | 4.02 | 713.14 | 280.52 | 0.41 |
| Reach 1-3 | 2112 | 5-YR | 398.70 | 6992.58 | 6994.25 | | 6994.32 | 0.005522 | 2.49 | 189.38 | 165.50 | 0.35 |
| Reach 1-3 | 2112 | 100-YR | 1562.40 | 6992.58 | 6995.91 | | 6996.05 | 0.003969 | 3.41 | 512.96 | 225.20 | 0.33 |
| Reach 1-3 | 2112 | FIS | 2600.00 | 6992.58 | 6996.90 | | 6997.09 | 0.003359 | 3.75 | 746.87 | 240.30 | 0.32 |
| Reach 1-3 | 2046 | 5-YR | 398.70 | 6991.97 | 6993.65 | | 6993.90 | 0.006971 | 4.91 | 124.24 | 114.24 | 0.68 |
| Reach 1-3 | 2046 | 100-YR | 1562.40 | 6991.97 | 6995.33 | | 6995.73 | 0.005230 | 6.81 | 362.33 | 166.62 | 0.66 |
| Reach 1-3 | 2046 | FIS | 2600.00 | 6991.97 | 6996.32 | | 6996.80 | 0.004637 | 7.64 | 542.14 | 194.56 | 0.65 |
| Reach 1-3 | 1993 | 5-YR | 398.70 | 6991.29 | 6993.36 | | 6993.52 | 0.006017 | 4.61 | 140.92 | 106.59 | 0.62 |
| Reach 1-3 | 1993 | 100-YR | 1562.40 | 6991.29 | 6995.06 | | 6995.42 | 0.005932 | 7.19 | 357.93 | 150.12 | 0.68 |
| Reach 1-3 | 1993 | FIS | 2600.00 | 6991.29 | 6996.08 | | 6996.53 | 0.005323 | 8.10 | 523.89 | 173.01 | 0.68 |
| Reach 1-3 | 1929 | 5-YR | 398.70 | 6991.32 | 6993.09 | | 6993.24 | 0.003442 | 3.47 | 145.97 | 110.40 | 0.48 |
| Reach 1-3 | 1929 | 100-YR | 1562.40 | 6991.32 | 6994.68 | | 6995.10 | 0.004151 | 5.99 | 343.88 | 137.27 | 0.59 |
| Reach 1-3 | 1929 | FIS | 2600.00 | 6991.32 | 6995.64 | | 6996.22 | 0.004246 | 7.19 | 481.96 | 152.80 | 0.62 |
| Reach 1-3 | 1884 | 5-YR | 398.70 | 6991.07 | 6992.68 | | 6992.97 | 0.010106 | 5.71 | 113.55 | 101.92 | 0.81 |
| Reach 1-3 | 1884 | 100-YR | 1562.40 | 6991.07 | 6994.13 | | 6994.79 | 0.010382 | 8.98 | 275.84 | 122.31 | 0.92 |
| Reach 1-3 | 1884 | FIS | 2600.00 | 6991.07 | 6995.02 | | 6995.90 | 0.009870 | 10.42 | 390.70 | 134.25 | 0.93 |
| Reach 1-3 | 1834 | 5-YR | 398.70 | 6990.69 | 6992.33 | | 6992.57 | 0.006123 | 4.23 | 117.76 | 111.41 | 0.62 |
| Reach 1-3 | 1834 | 100-YR | 1562.40 | 6990.69 | 6993.55 | | 6994.30 | 0.009141 | 7.78 | 261.45 | 126.55 | 0.84 |
| Reach 1-3 | 1834 | FIS | 2600.00 | 6990.69 | 6994.25 | 6994.12 | 6995.38 | 0.010347 | 9.68 | 354.19 | 136.06 | 0.93 |
| Reach 1-3 | 1804 | 5-YR | 398.70 | 6990.58 | 6992.05 | | 6992.33 | 0.009181 | 5.18 | 109.93 | 112.32 | 0.76 |
| Reach 1-3 | 1804 | 100-YR | 1562.40 | 6990.58 | 6993.19 | 6993.08 | 6993.96 | 0.012176 | 8.81 | 246.28 | 127.37 | 0.97 |
| Reach 1-3 | 1804 | FIS | 2600.00 | 6990.58 | 6993.97 | 6993.81 | 6994.99 | 0.011343 | 10.15 | 350.67 | 137.38 | 0.98 |
| Reach 1-3 | 1707 | 5-YR | 480.40 | 6989.35 | 6990.79 | 6990.79 | 6991.28 | 0.012597 | 6.15 | 94.90 | 100.66 | 0.96 |
| Reach 1-3 | 1707 | 100-YR | 1585.20 | 6989.35 | 6992.01 | 6992.01 | 6992.90 | 0.010246 | 8.68 | 237.51 | 133.63 | 0.97 |
| Reach 1-3 | 1707 | FIS | 2600.00 | 6989.35 | 6992.61 | 6992.61 | 6993.89 | 0.011525 | 10.61 | 320.97 | 145.48 | 1.06 |
| Reach 1-3 | 1663 | 5-YR | 480.40 | 6987.76 | 6988.60 | 6989.10 | 6990.07 | 0.064971 | 10.05 | 52.00 | 77.73 | 2.00 |
| Reach 1-3 | 1663 | 100-YR | 1585.20 | 6987.76 | 6989.54 | 6990.26 | 6991.90 | 0.040217 | 13.37 | 144.14 | 118.24 | 1.80 |
| Reach 1-3 | 1663 | FIS | 2600.00 | 6987.76 | 6990.14 | 6990.99 | 6992.88 | 0.032855 | 14.78 | 220.18 | 132.07 | 1.71 |
| Reach 1-3 | 1622 | 5-YR | 480.40 | 6986.76 | 6987.79 | 6987.86 | 6988.24 | 0.024467 | 5.39 | 89.16 | 139.48 | 1.19 |
| Reach 1-3 | 1622 | 100-YR | 1585.20 | 6986.76 | 6988.21 | 6988.71 | 6989.90 | 0.049243 | 10.41 | 152.82 | 154.72 | 1.82 |
| Reach 1-3 | 1622 | FIS | 2600.00 | 6986.76 | 6988.52 | 6989.31 | 6991.17 | 0.054804 | 13.08 | 200.87 | 160.24 | 2.01 |
| Reach 1-3 | 1411 | 5-YR | 480.40 | 6982.00 | 6983.34 | 6983.37 | 6983.78 | 0.018379 | 5.34 | 90.34 | 119.39 | 1.06 |
| Reach 1-3 | 1411 | 100-YR | 1585.20 | 6982.00 | 6984.33 | 6984.35 | 6985.19 | 0.012411 | 7.56 | 219.52 | 139.83 | 1.00 |
| Reach 1-3 | 1411 | FIS | 2600.00 | 6982.00 | 6990.04 | 6985.00 | 6990.11 | 0.000175 | 2.35 | 1397.28 | 286.43 | 0.15 |

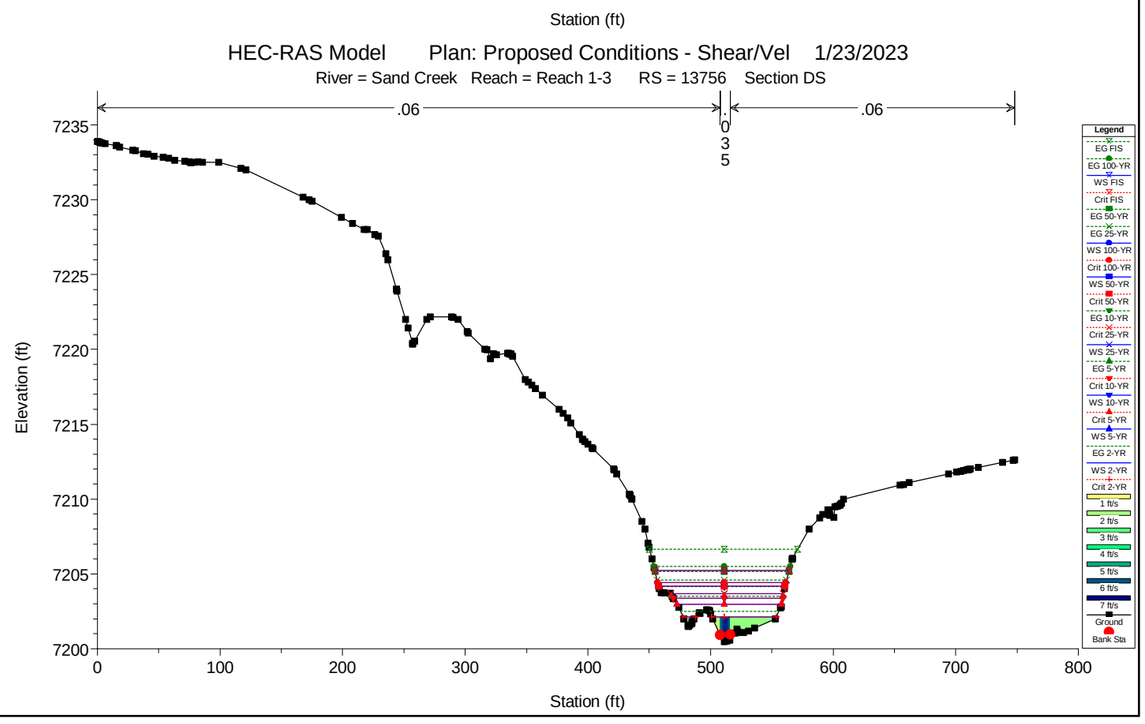
HEC-RAS Model  Plan: Proposed Conditions - Shear/Vel  1/23/2023




HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 15504 Arroya Lane
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

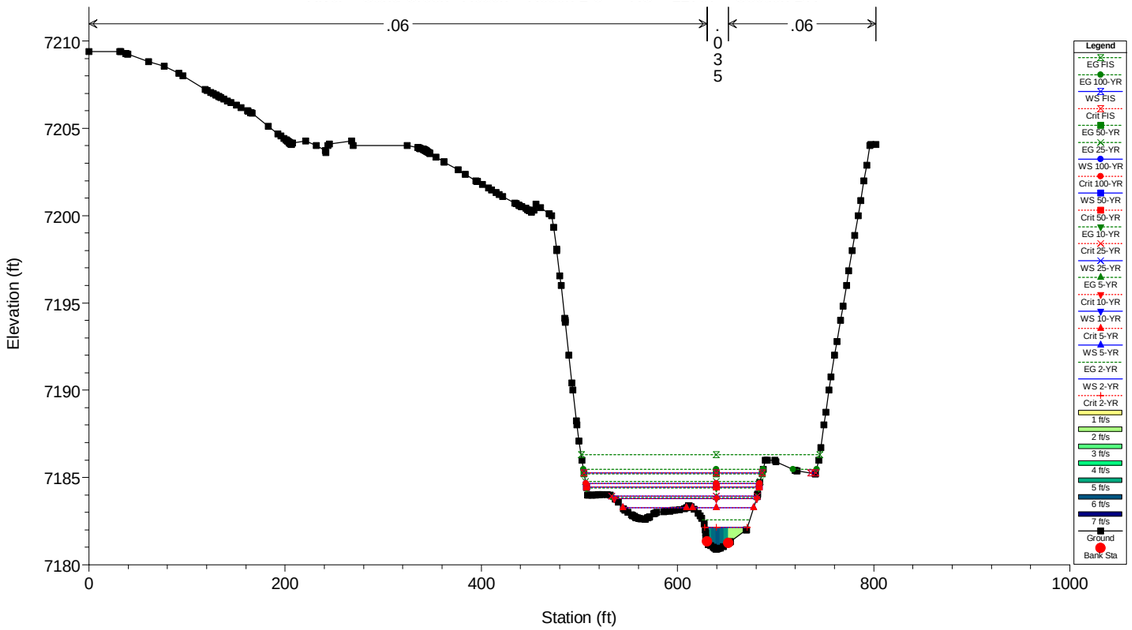

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 14904
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 14528 Section DT
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 13756 Section DS
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

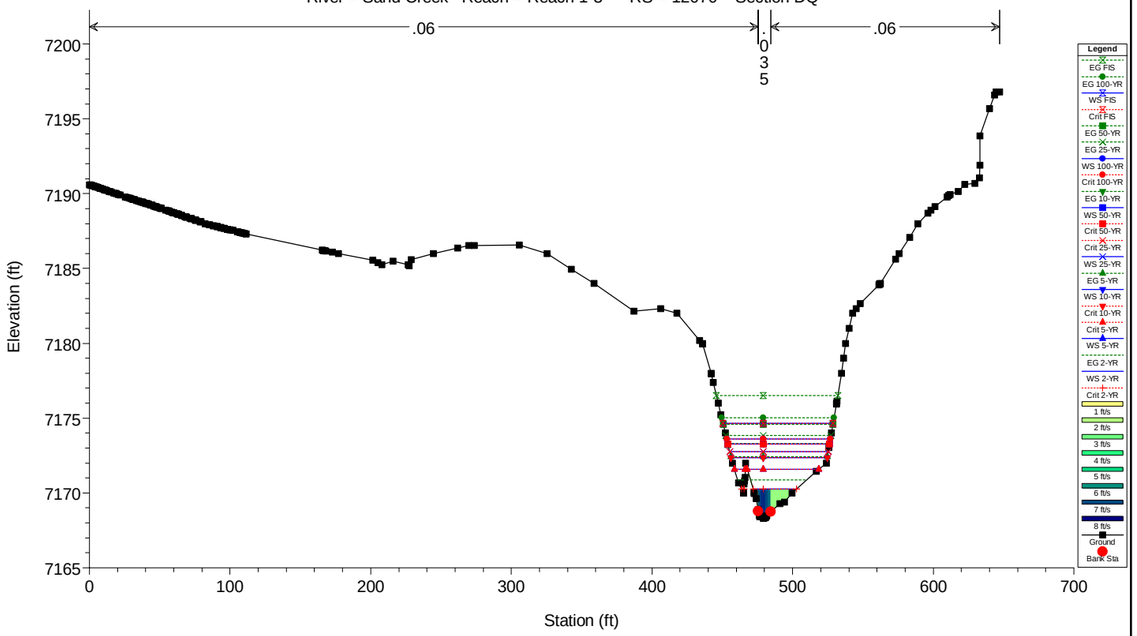
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 12767 Section DR



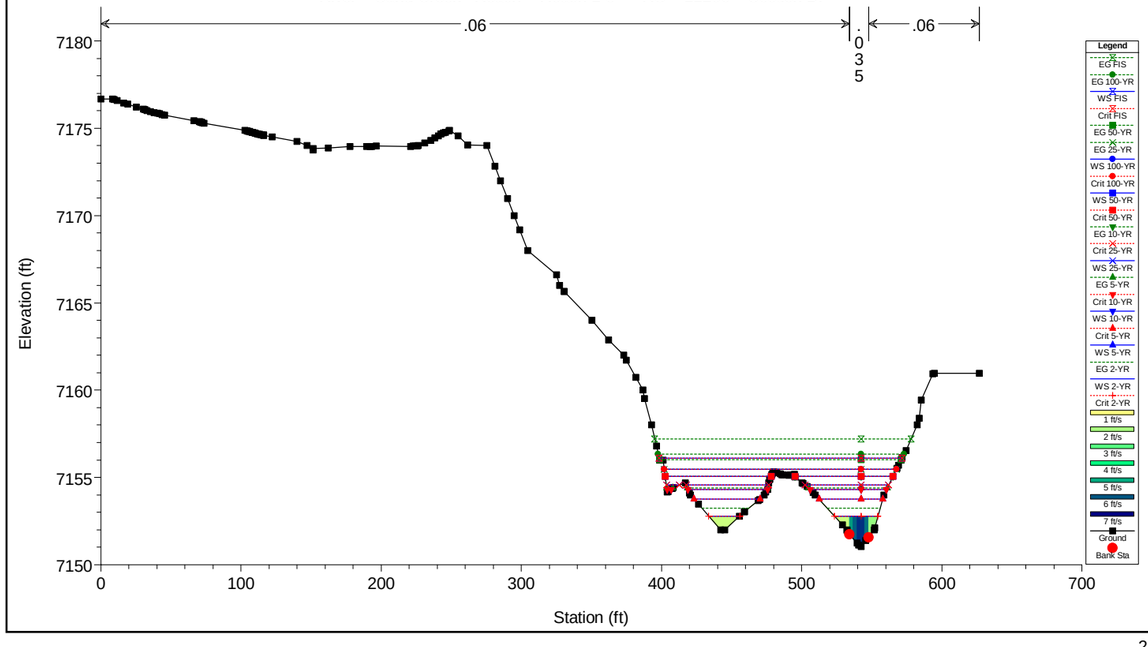

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 12070 Section DQ



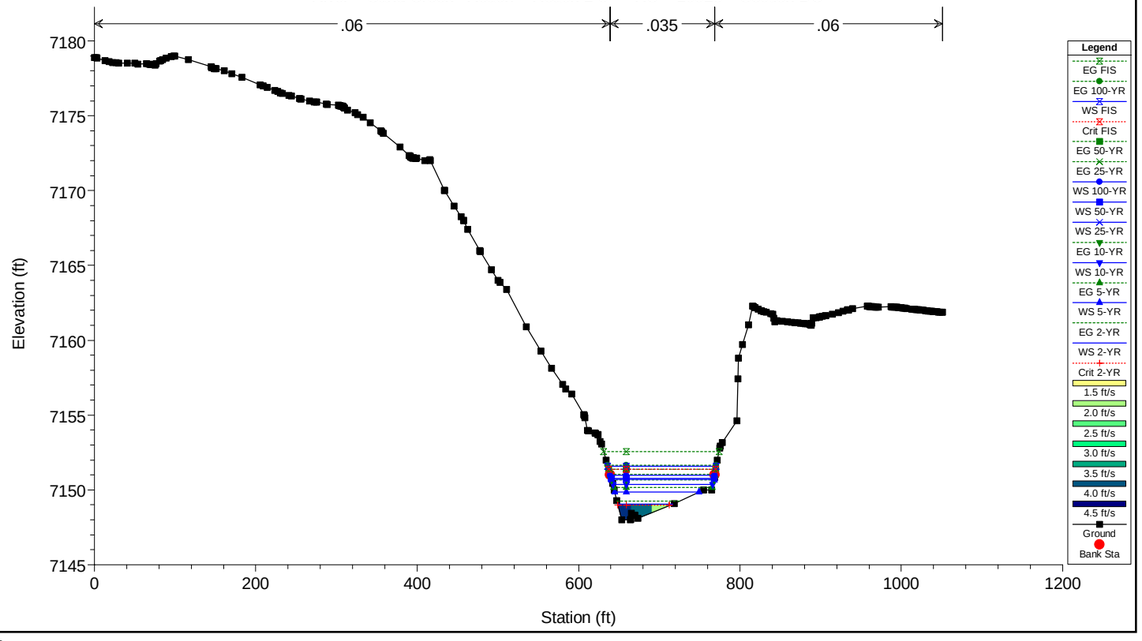

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 11206 Section DP



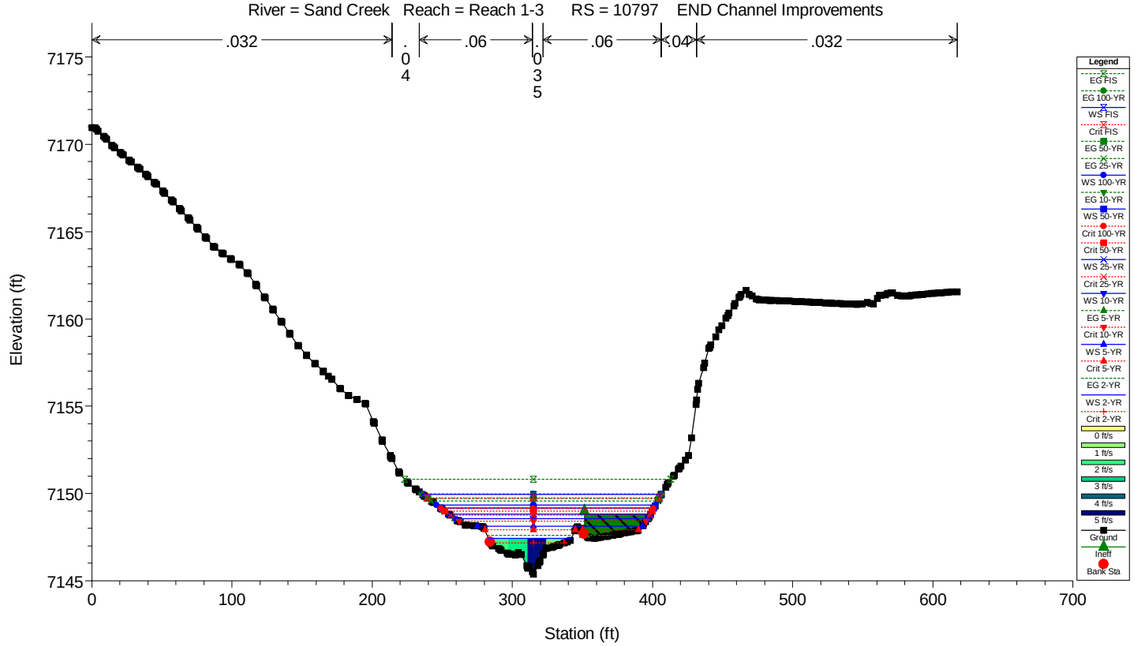

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 10925 Section DO



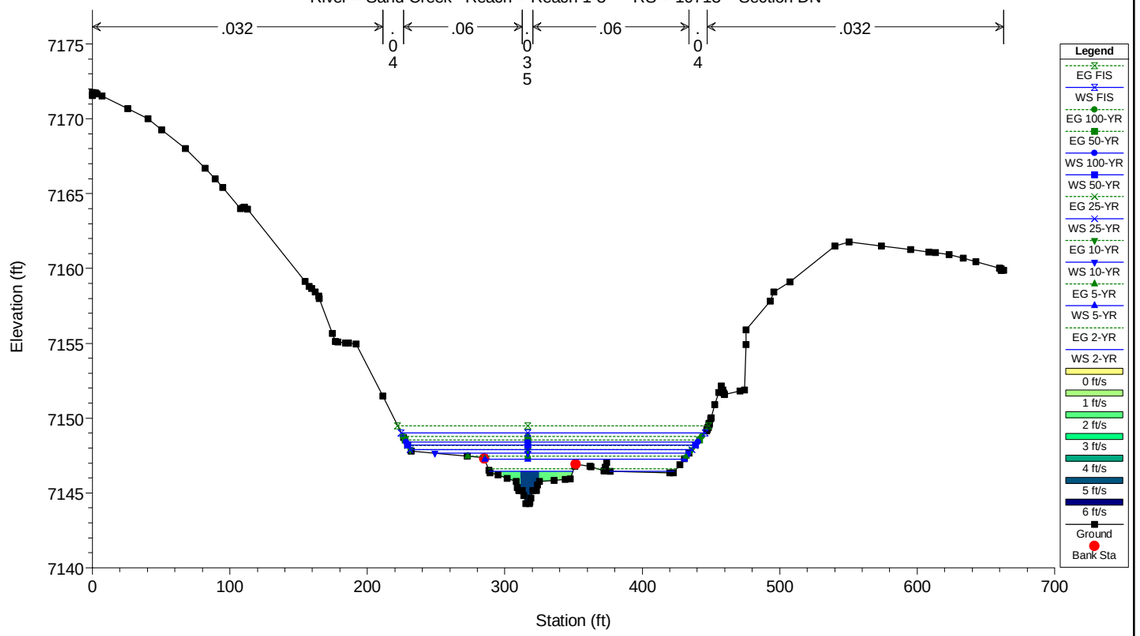
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 10797 END Channel Improvements



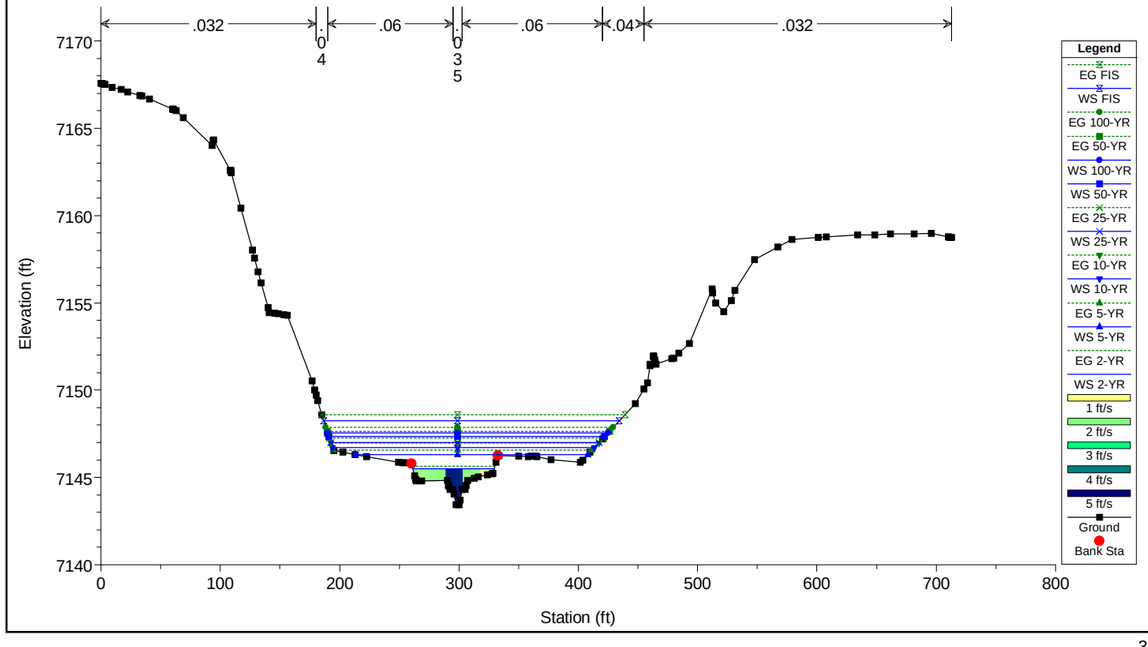

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 10713 Section DN



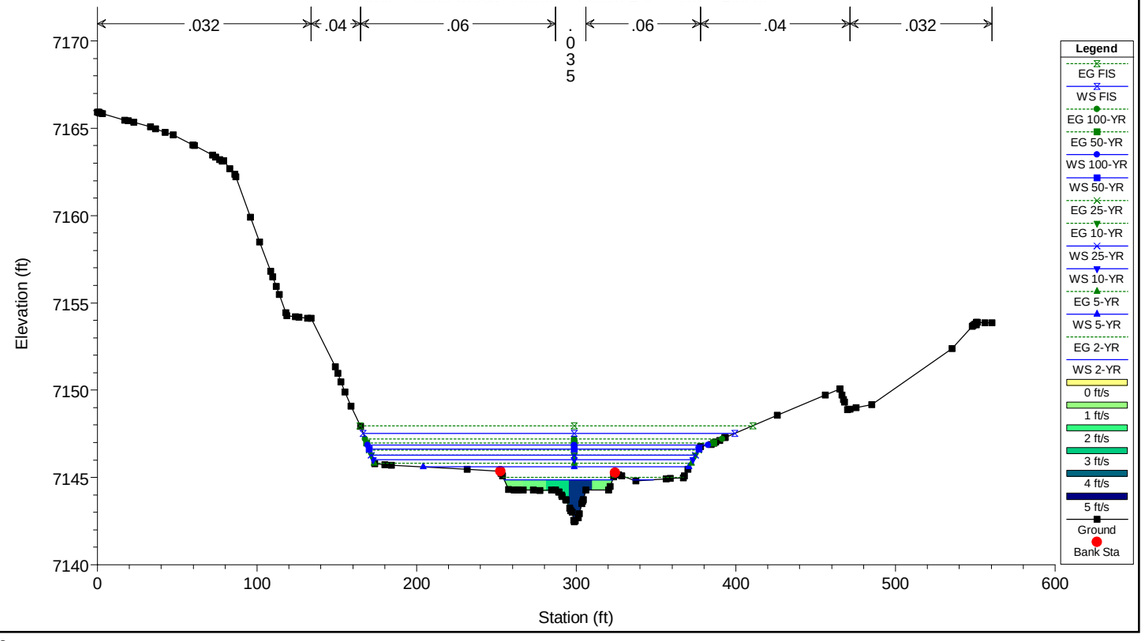

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

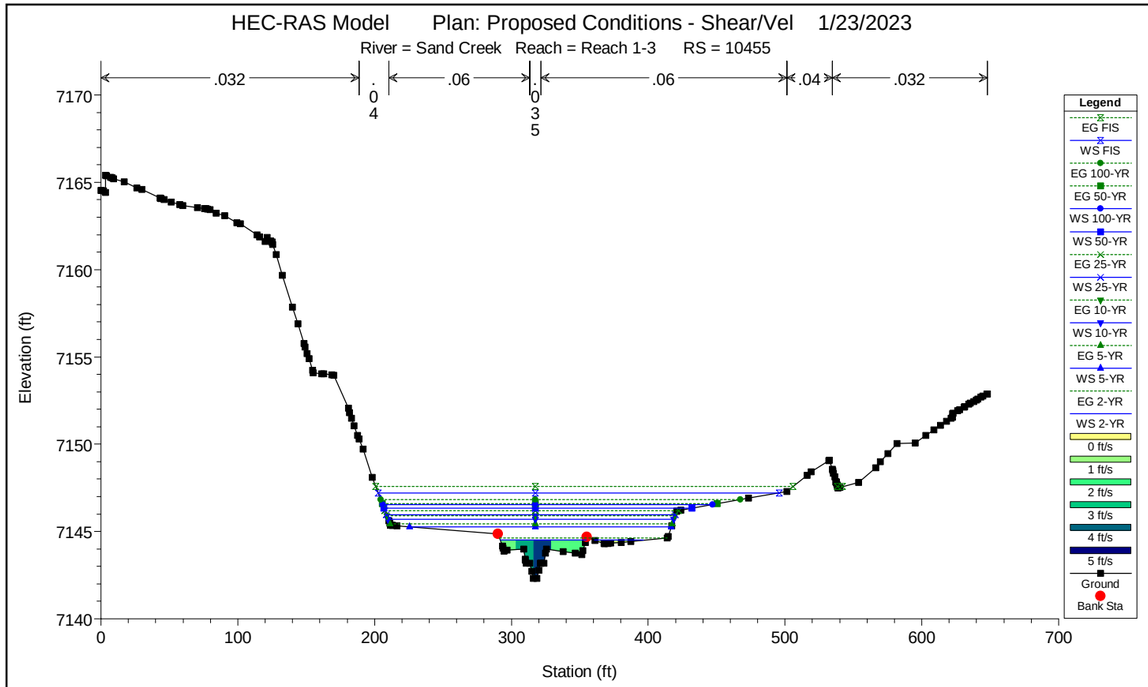
River = Sand Creek Reach = Reach 1-3 RS = 10617

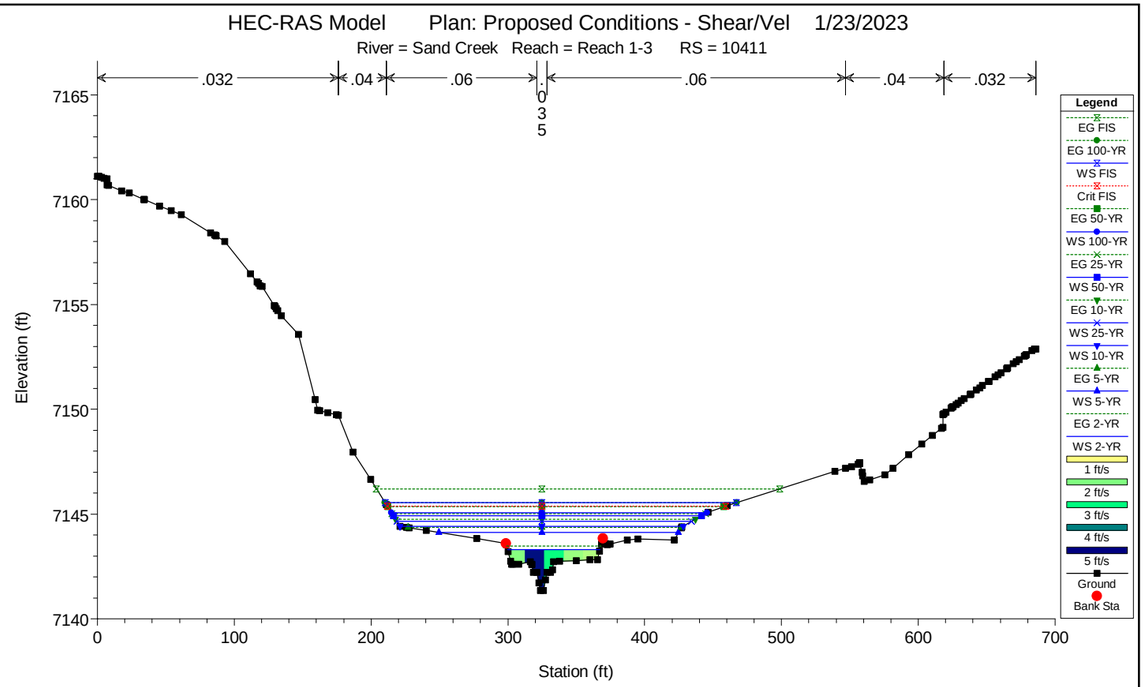


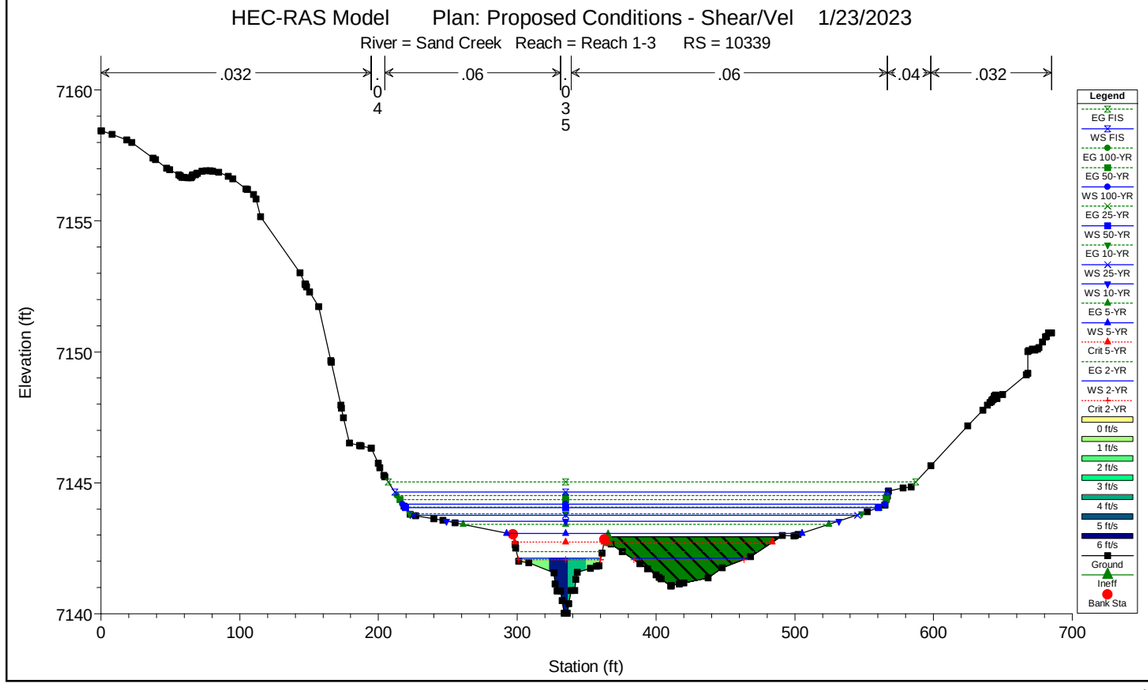

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

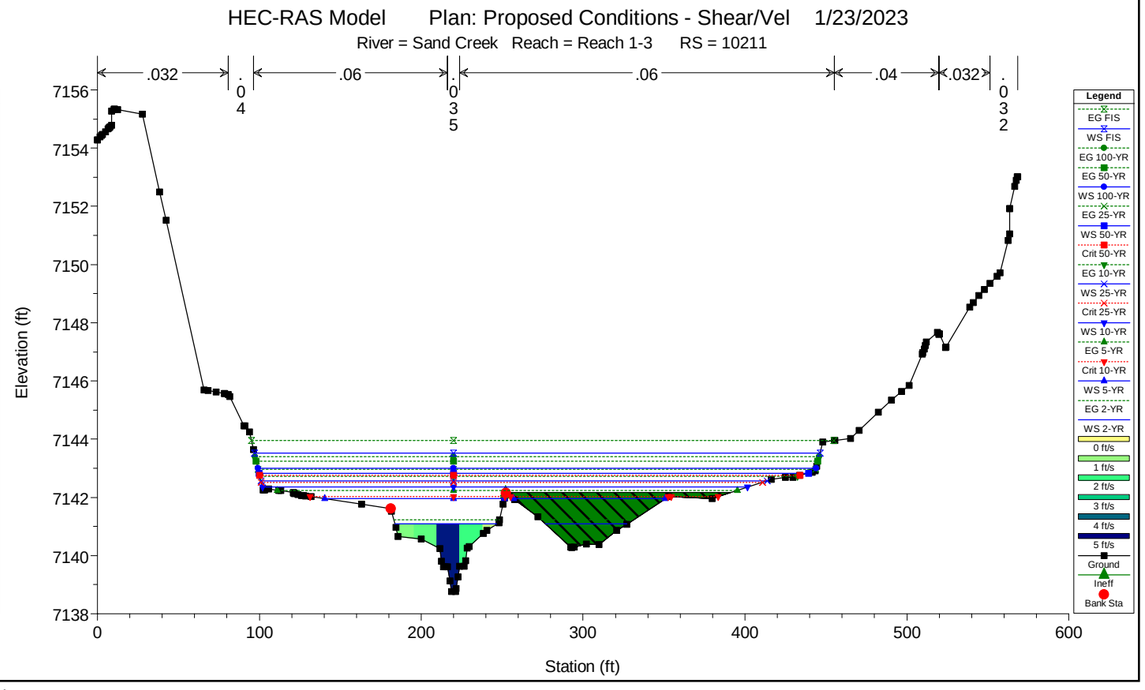
River = Sand Creek Reach = Reach 1-3 RS = 10543

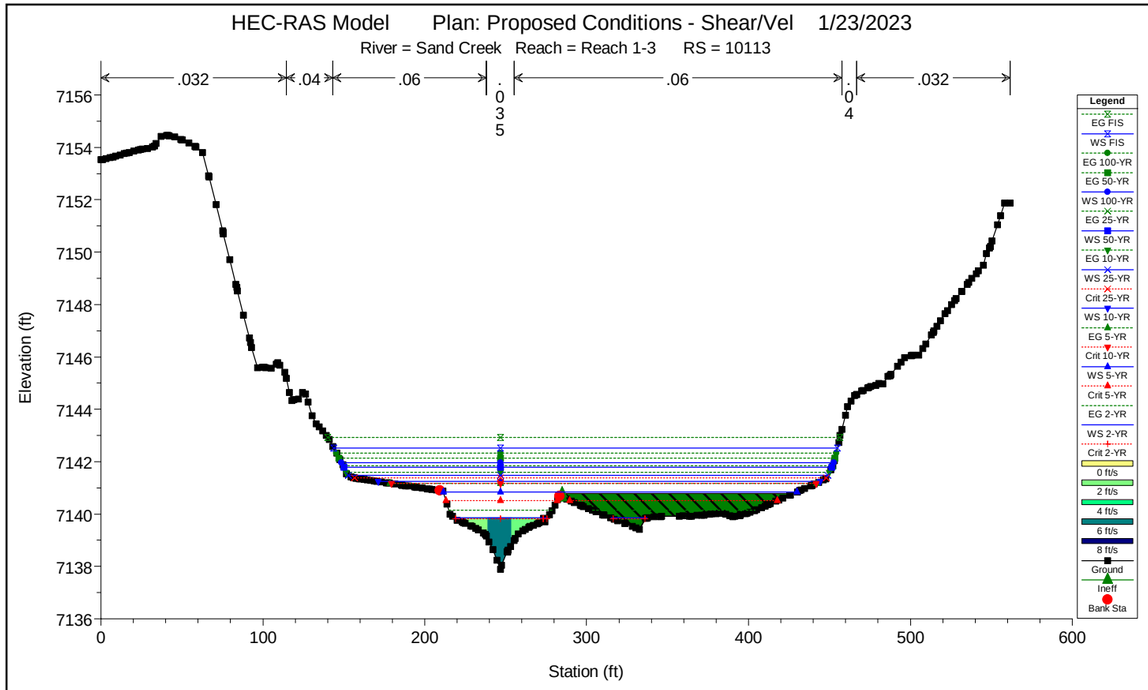


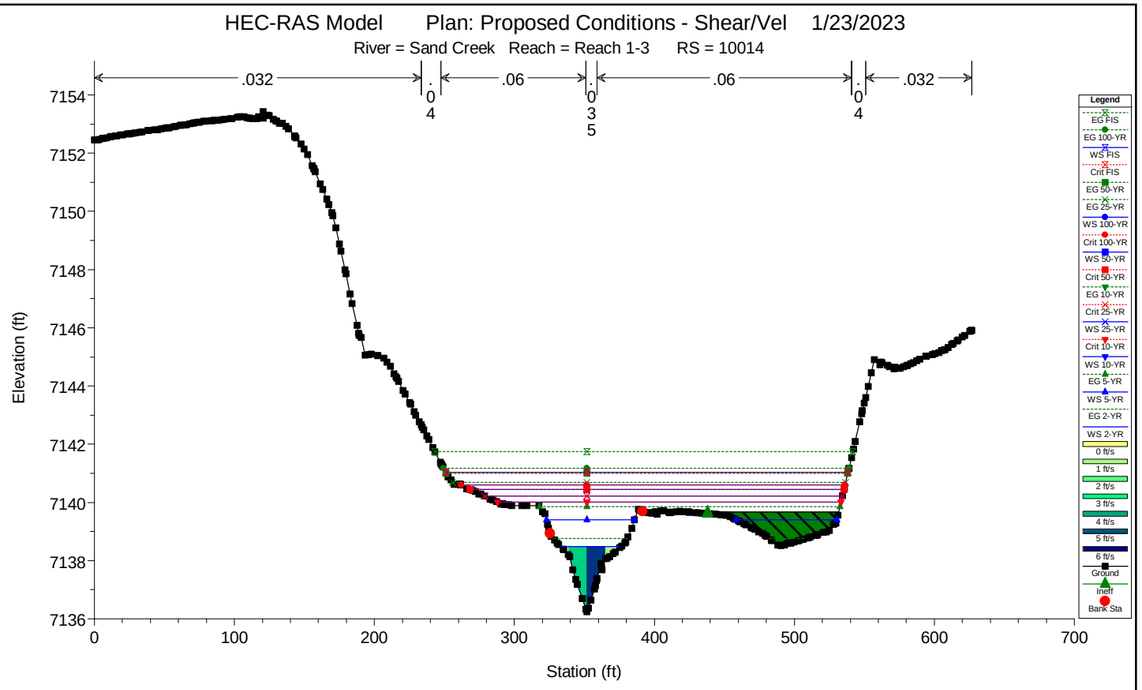

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10455
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

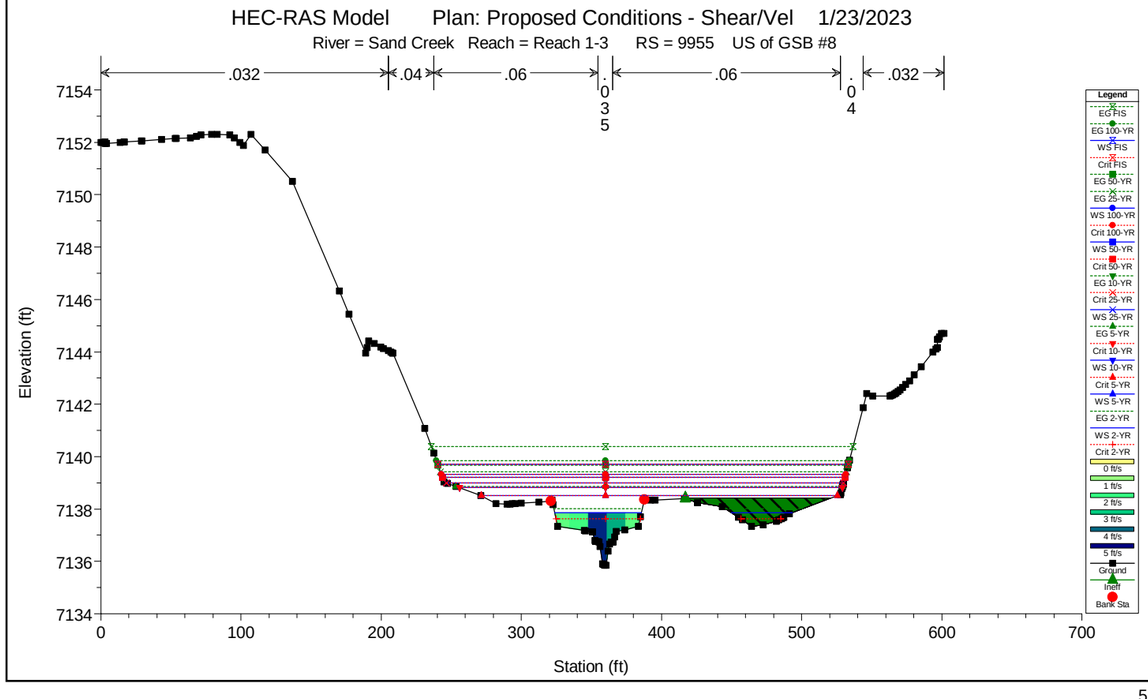

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10411
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

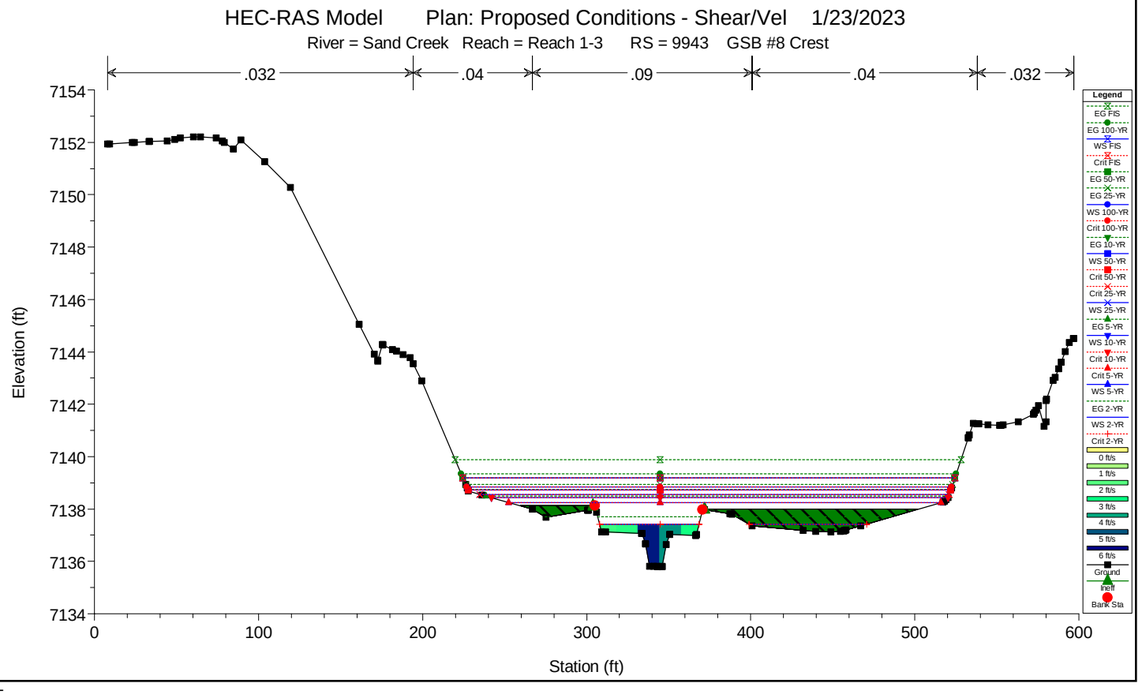

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10339
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
Crit 5-YR
WS 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

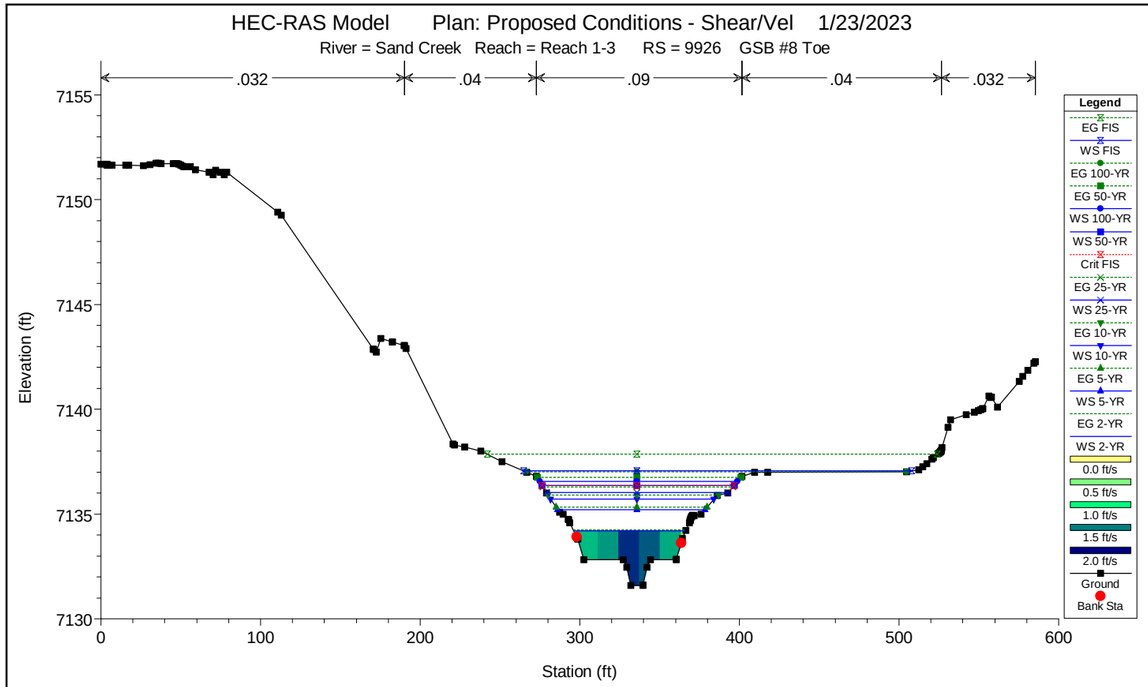

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10211
.032
.04
.06
.035
.06
.04
.032
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

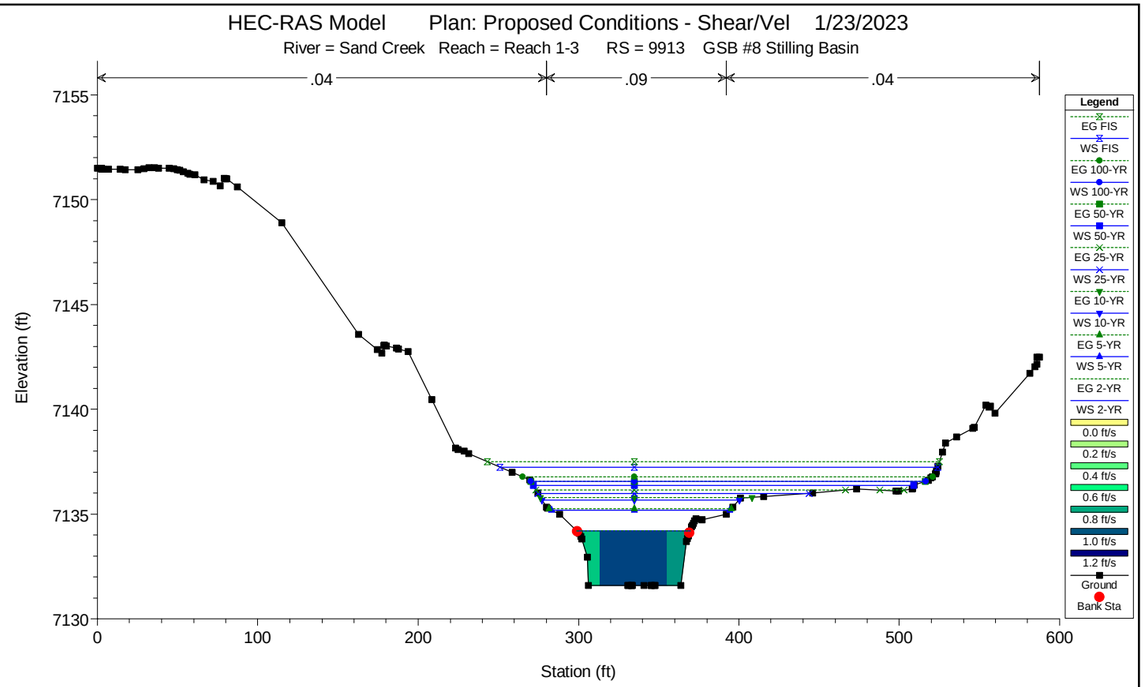

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10113
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

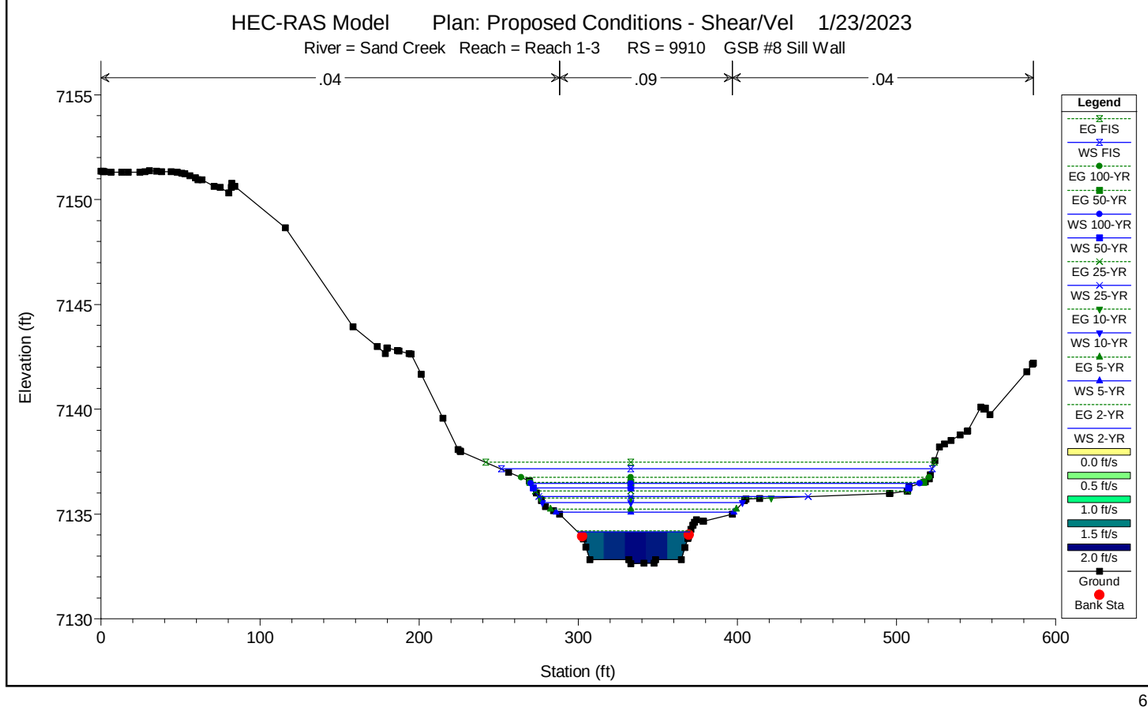

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10014
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
Crit 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

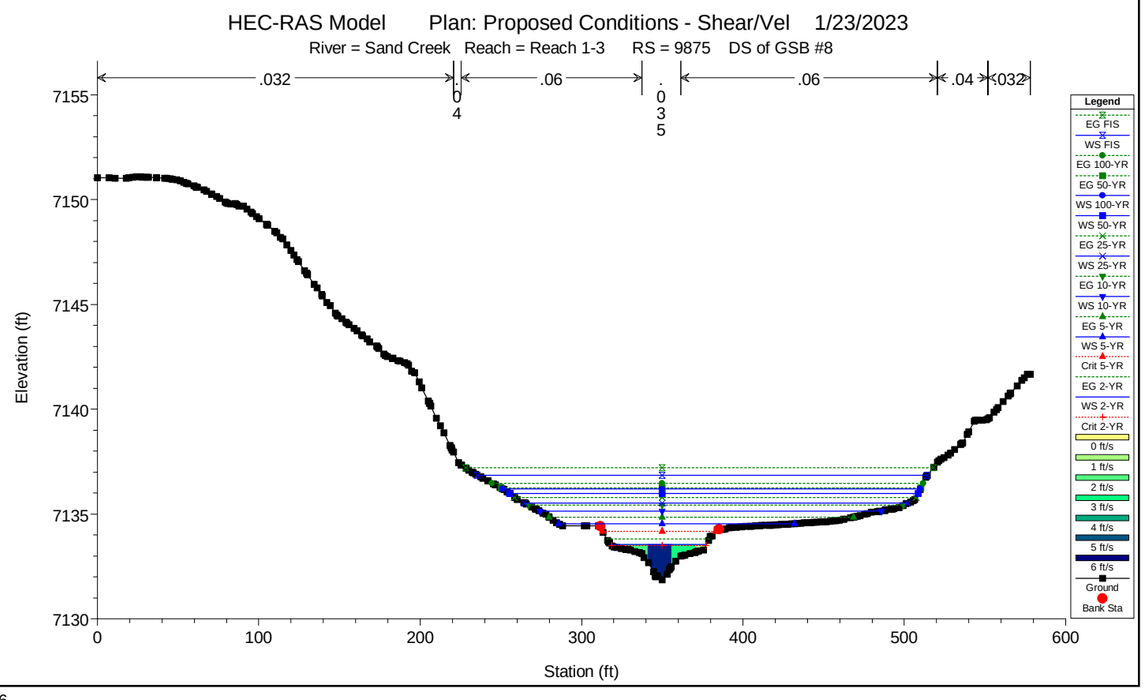

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9955 US of GSB #8
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

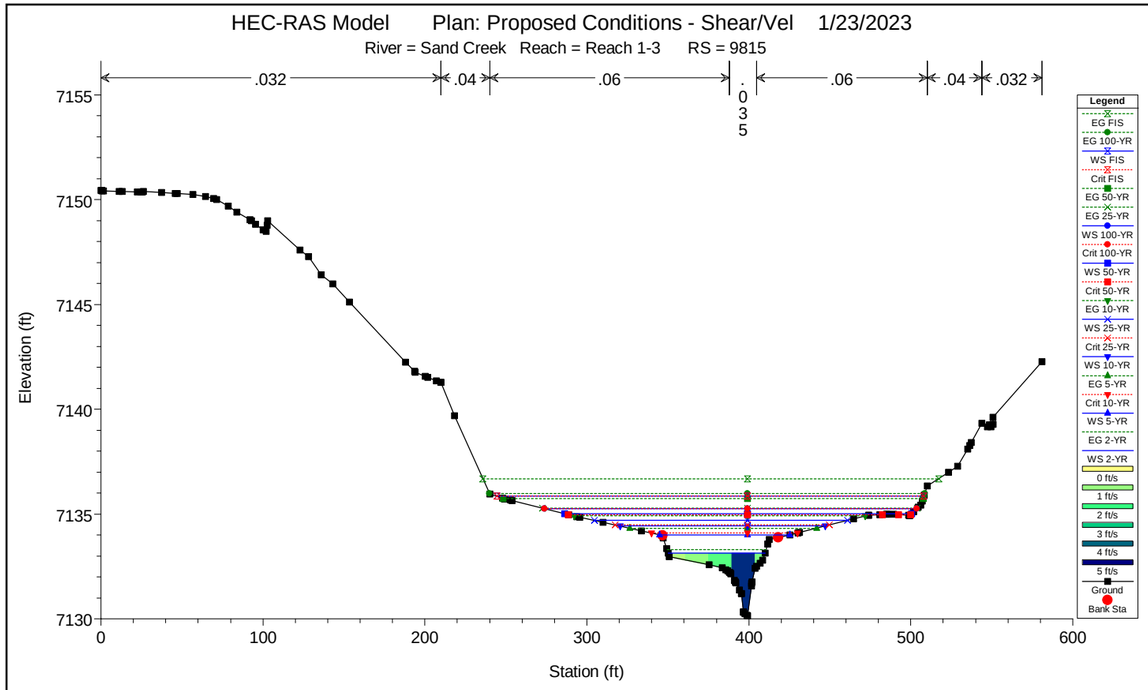

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9943 GSB #8 Crest
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

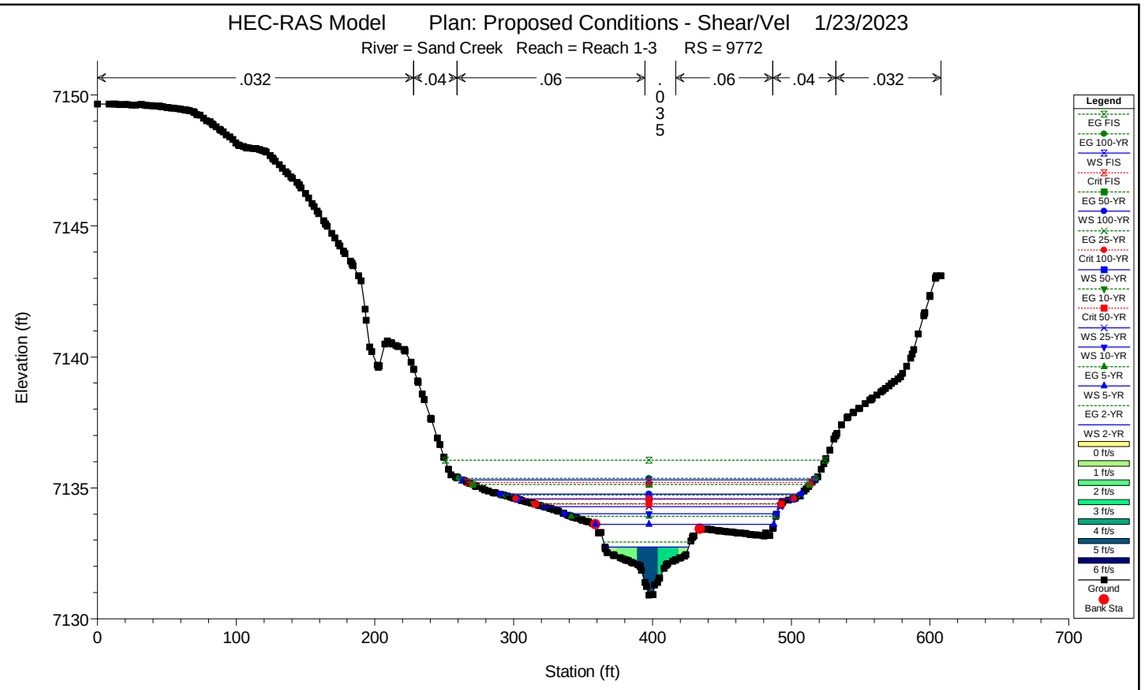

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9926 GSB #8 Toe
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
Crit FIS
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta

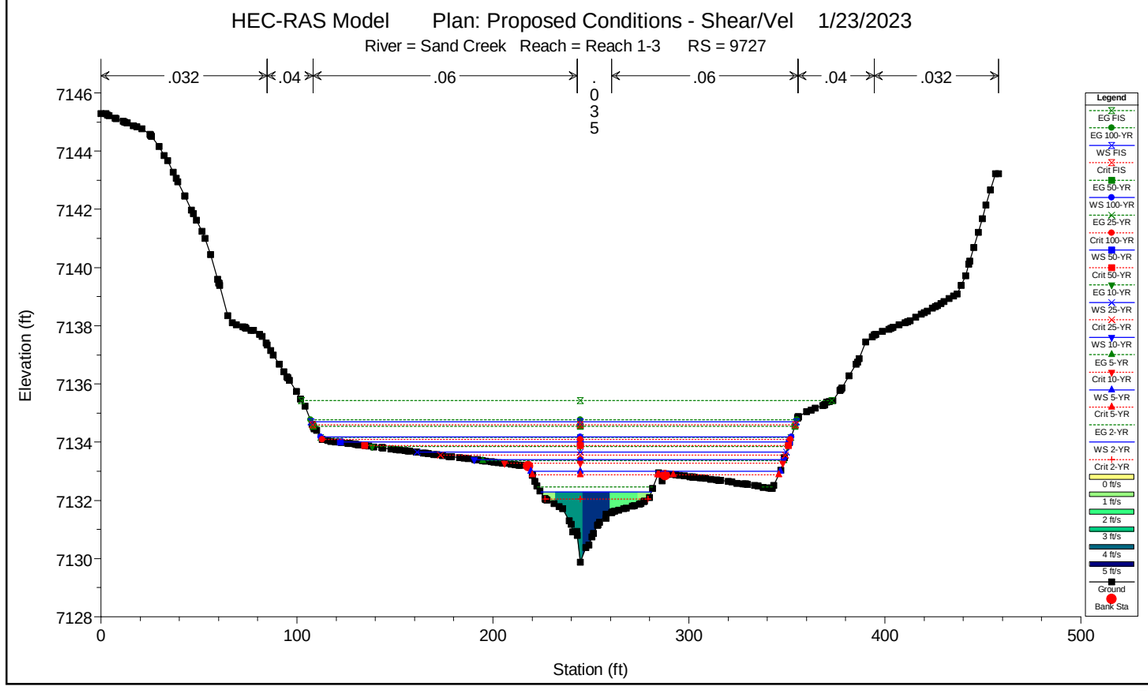

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9913 GSB #8 Stilling Basin
.04
.09
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Bank Sta

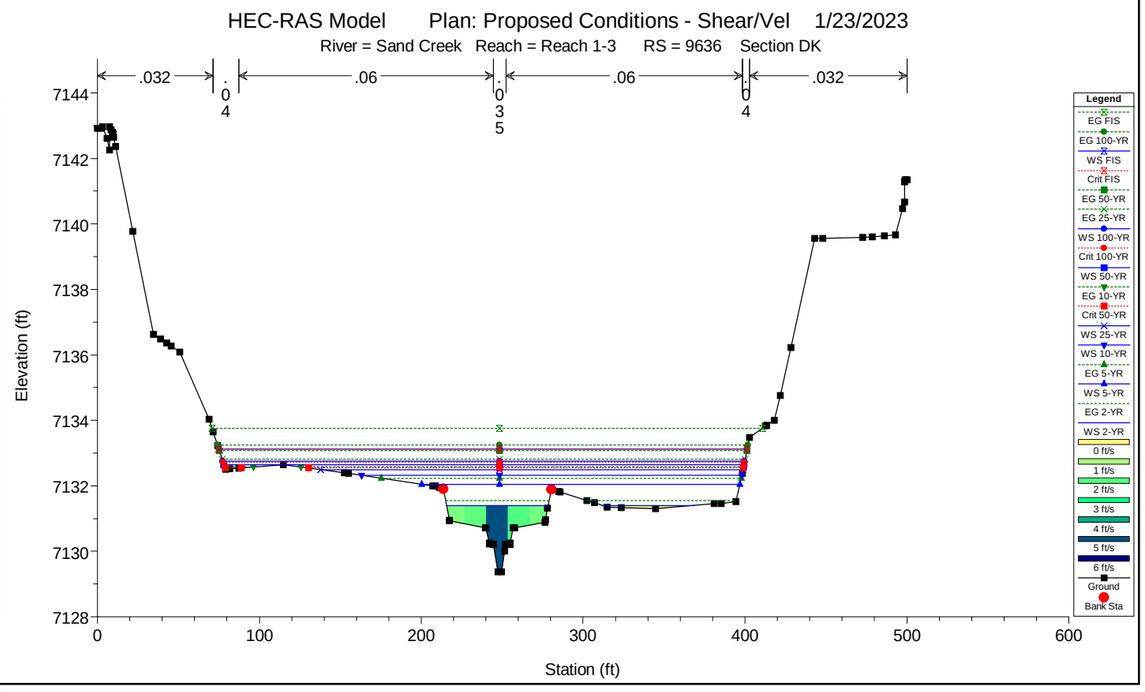

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9910 GSB #8 Sill Wall
.04
.09
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta

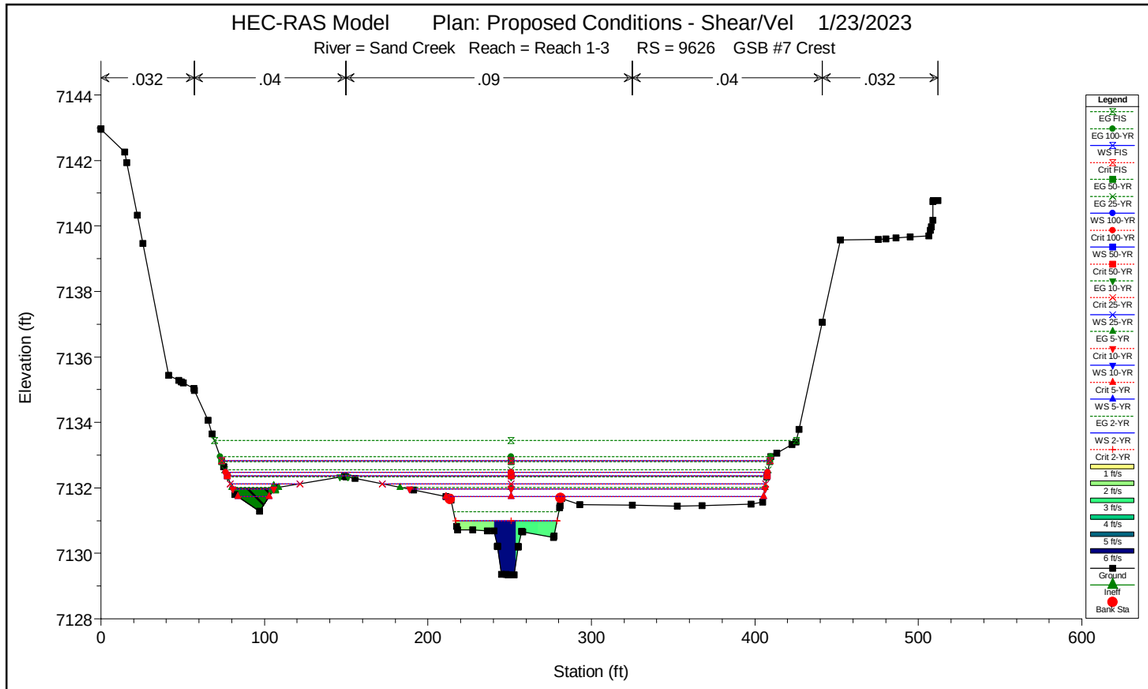

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9875 DS of GSB #8
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

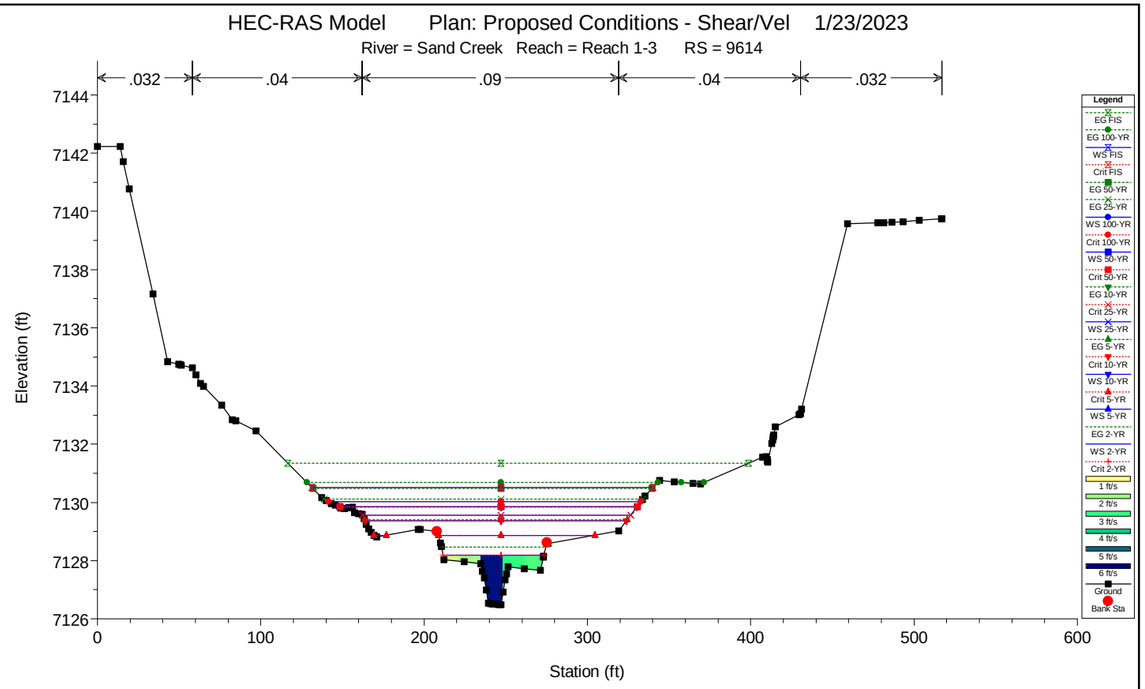

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9815
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

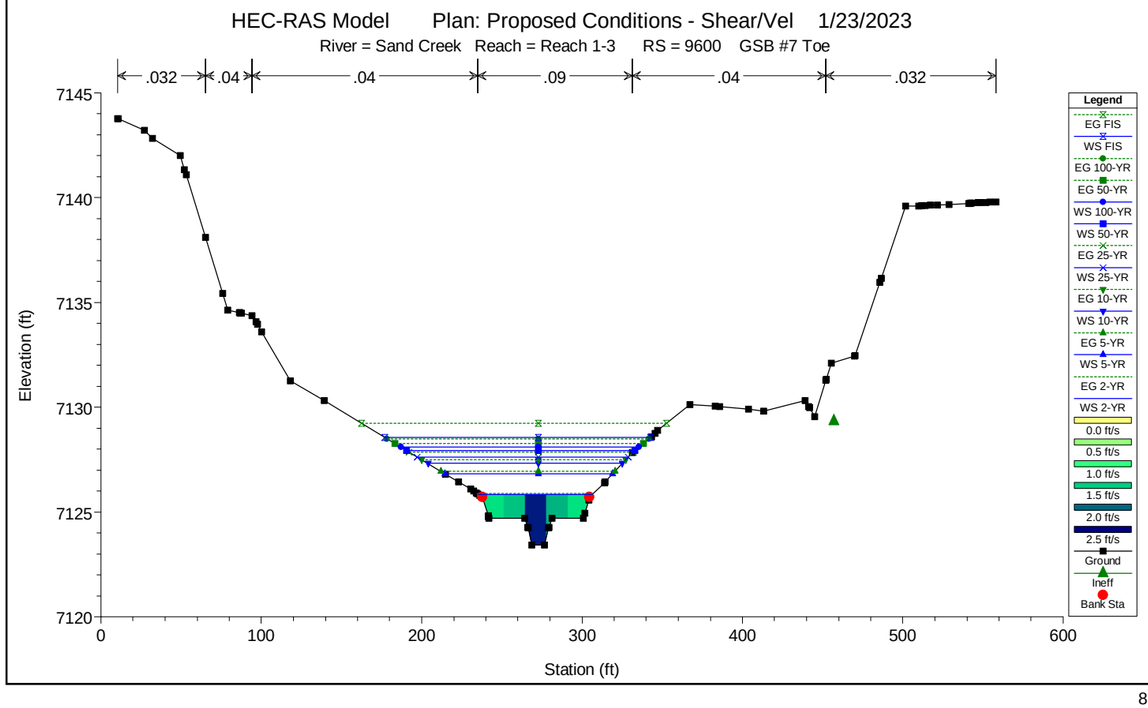

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9772
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

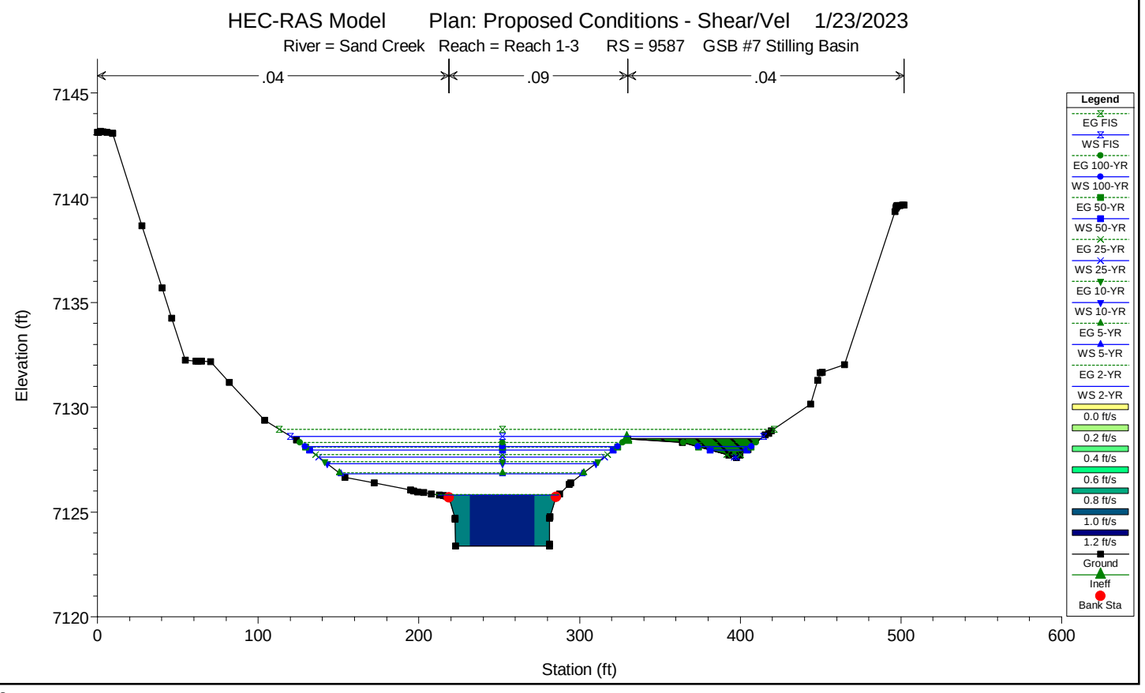

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9727
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
EG 25-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

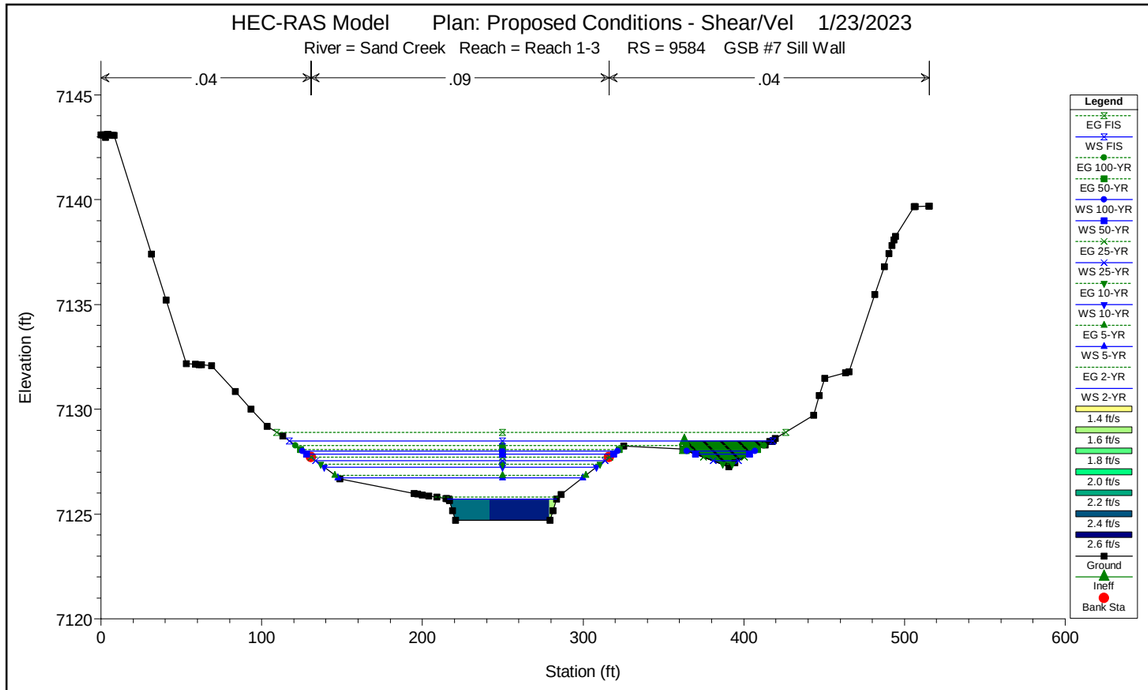

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9636 Section DK
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

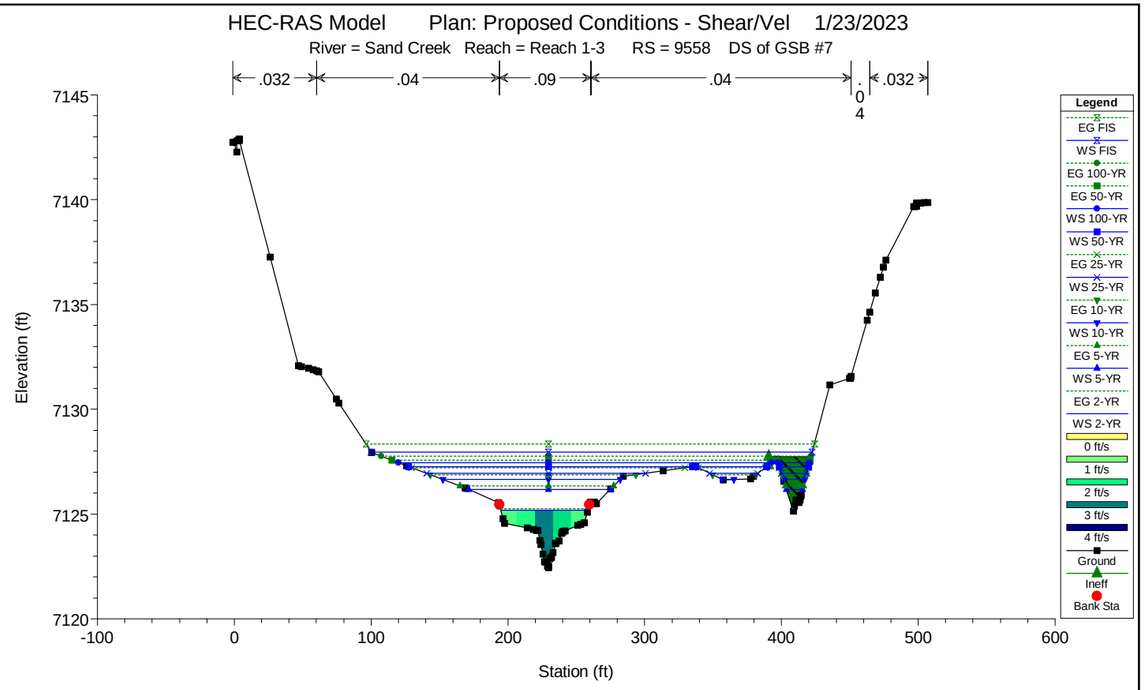

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9626 GSB #7 Crest
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

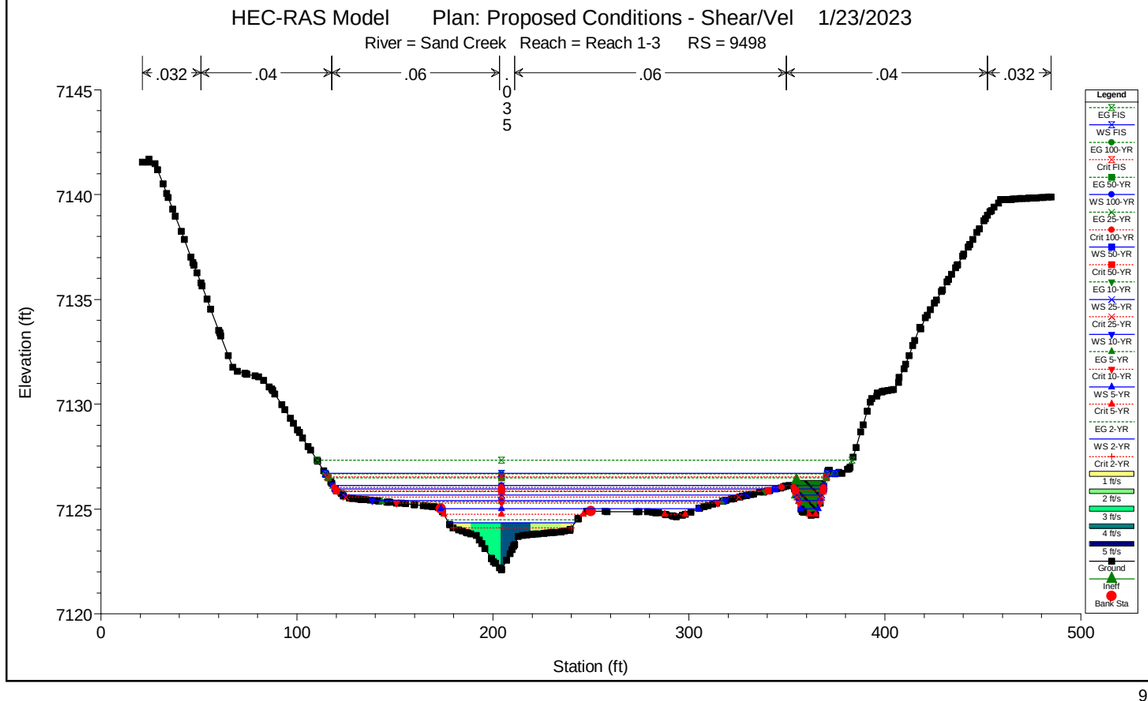

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9614
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

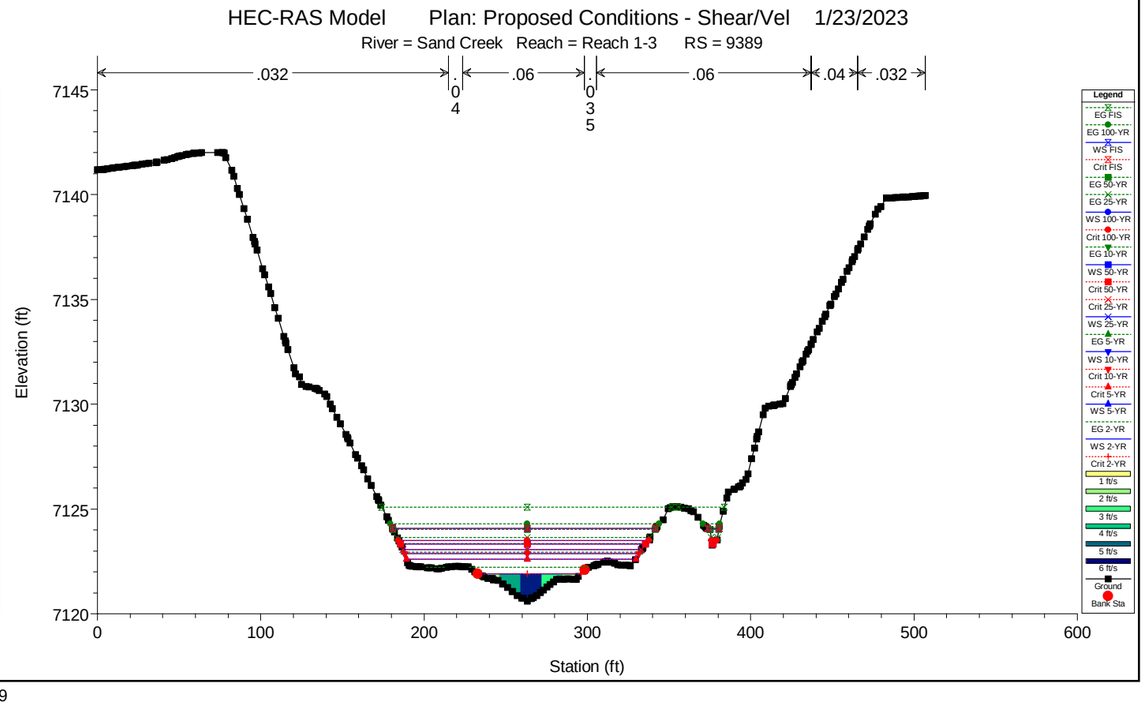

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9600 GSB #7 Toe
.032
.04
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta

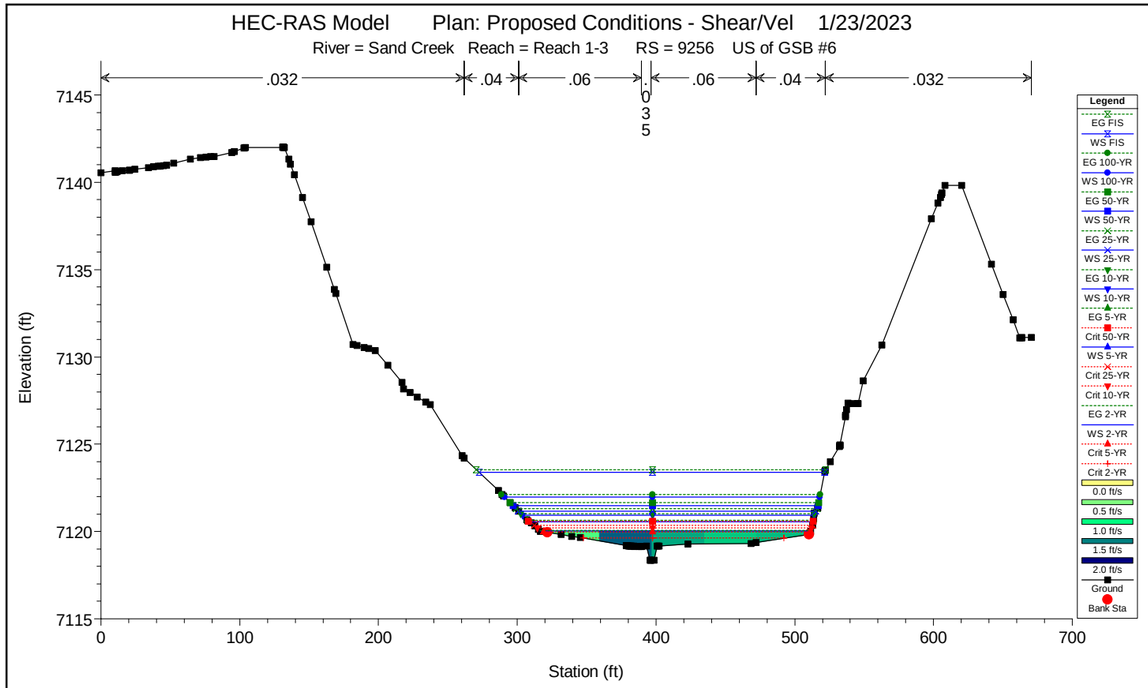

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9587 GSB #7 Stilling Basin
.04
.09
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Ineff
Bank Sta

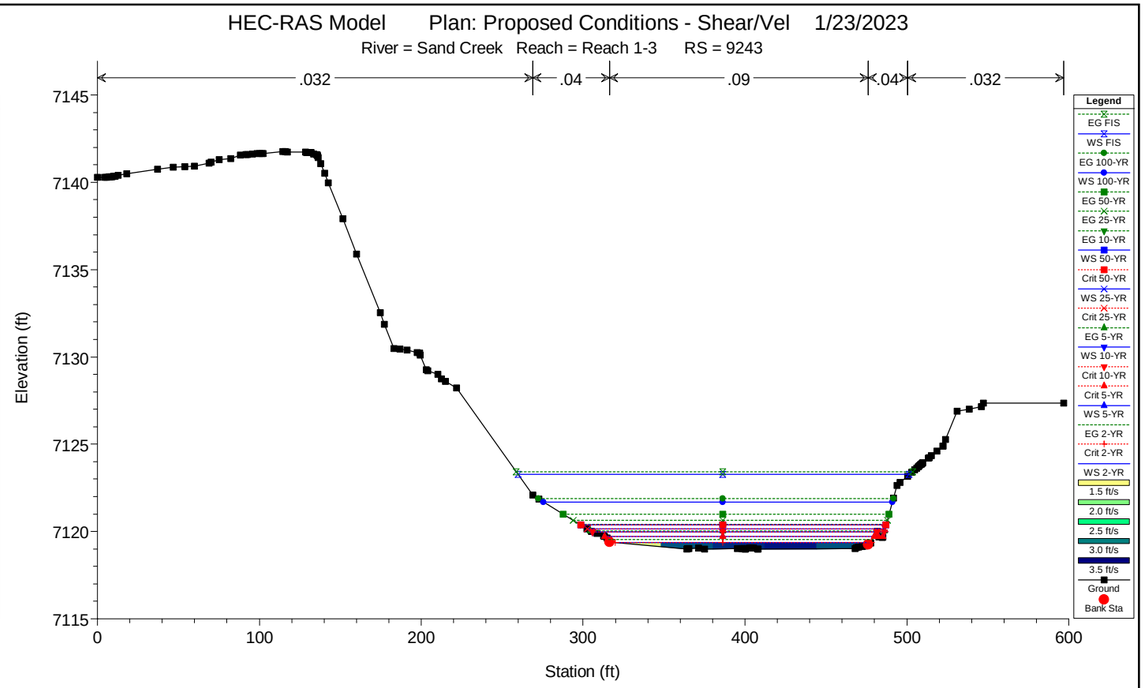

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9584 GSB #7 Sill Wall
.04
.09
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
Ground
Ineff
Bank Sta

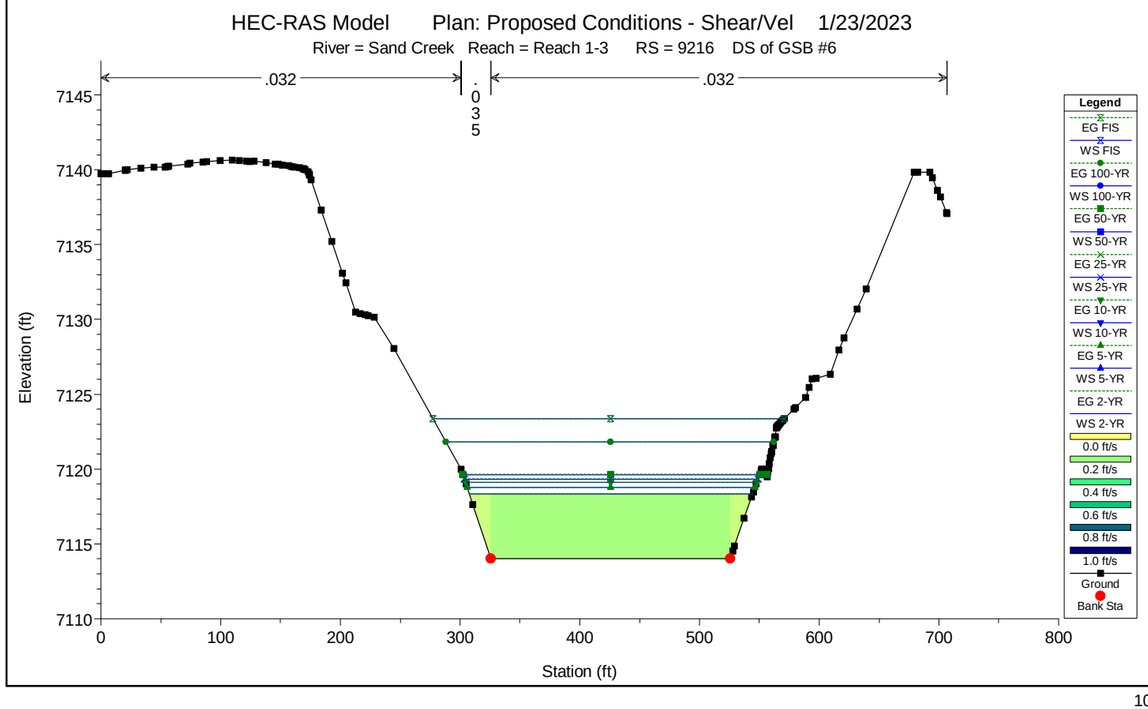

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9558 DS of GSB #7
.032
.04
.09
.04
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

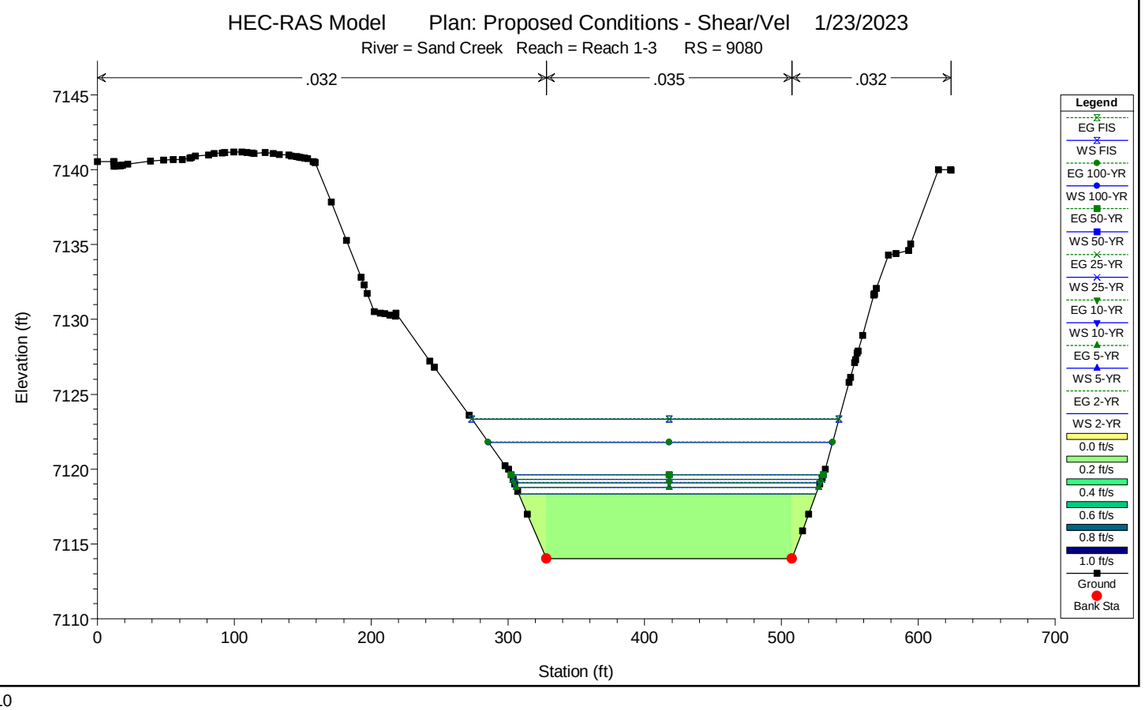

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9498
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

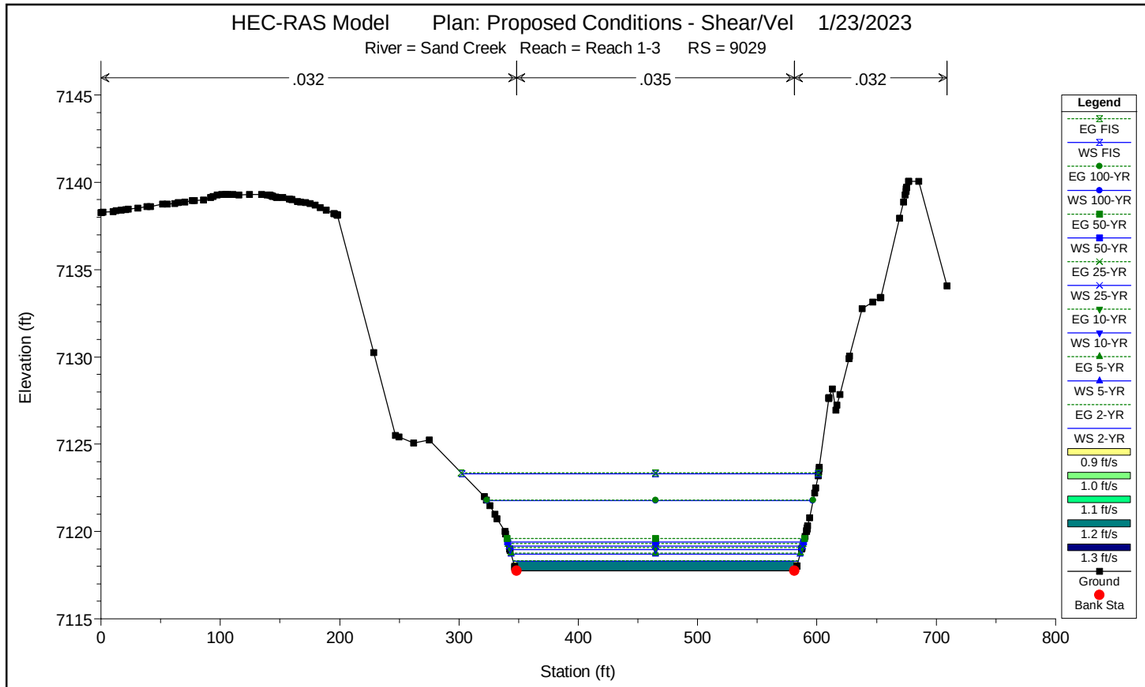

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9389
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

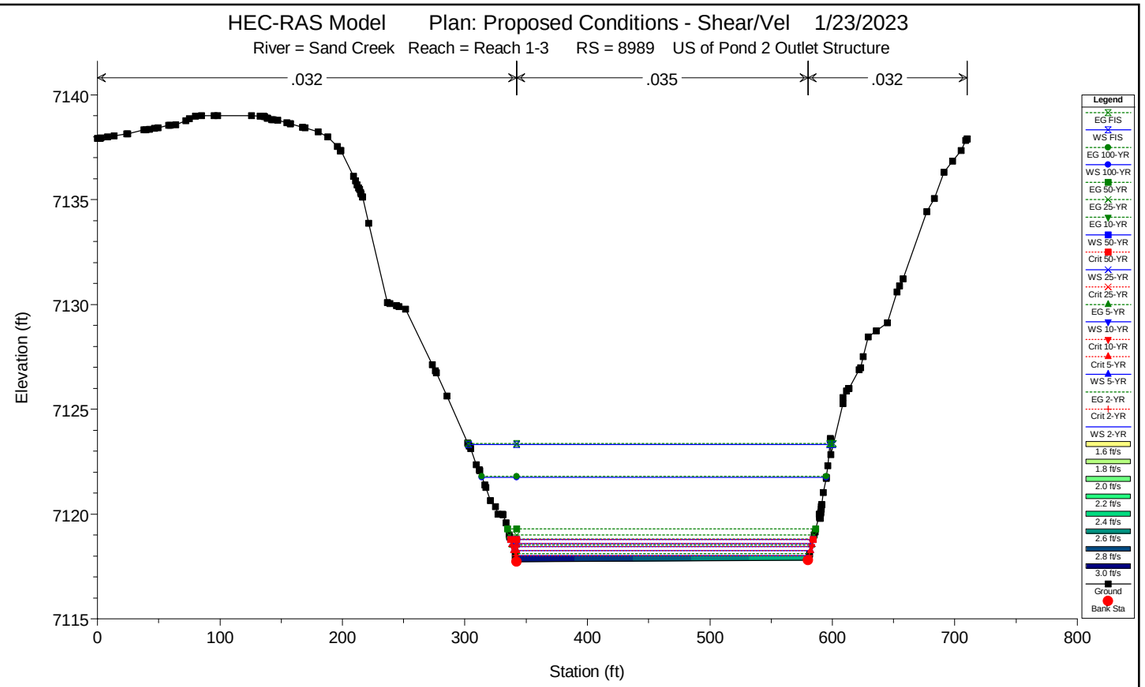

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9256 US of GSB #6
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
Crit 50-YR
WS 5-YR
Crit 25-YR
Crit 10-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta

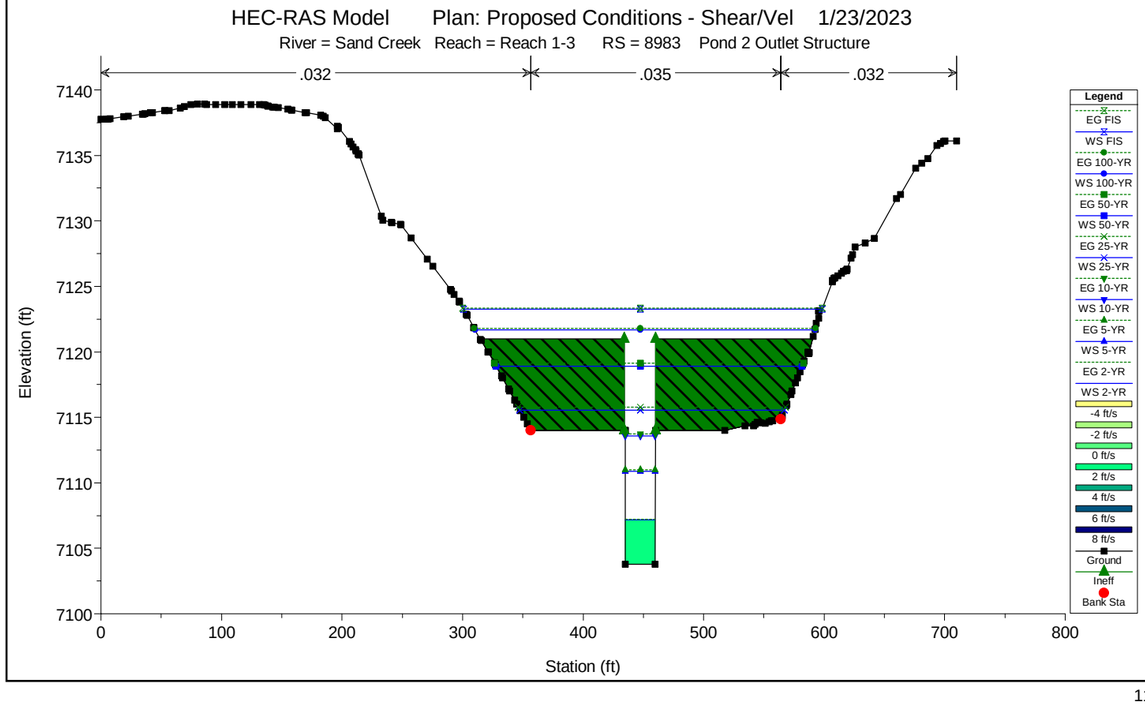

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9243
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
EG 25-YR
EG 10-YR
WS 50-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

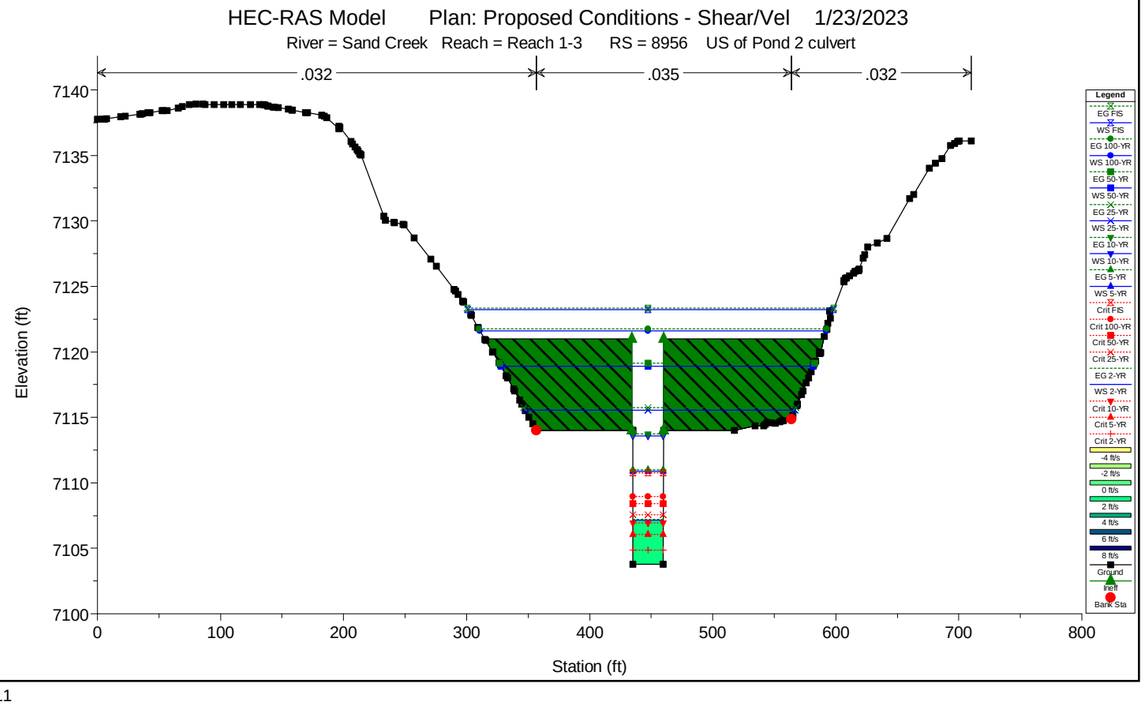

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9216 DS of GSB #6
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

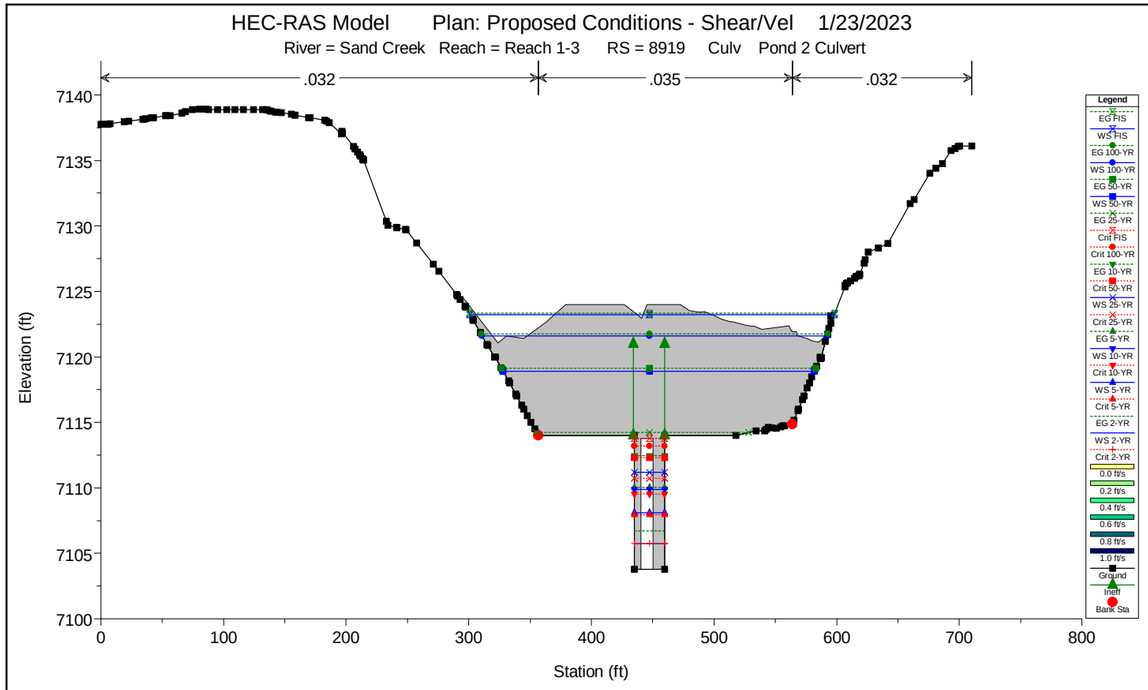

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9080
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

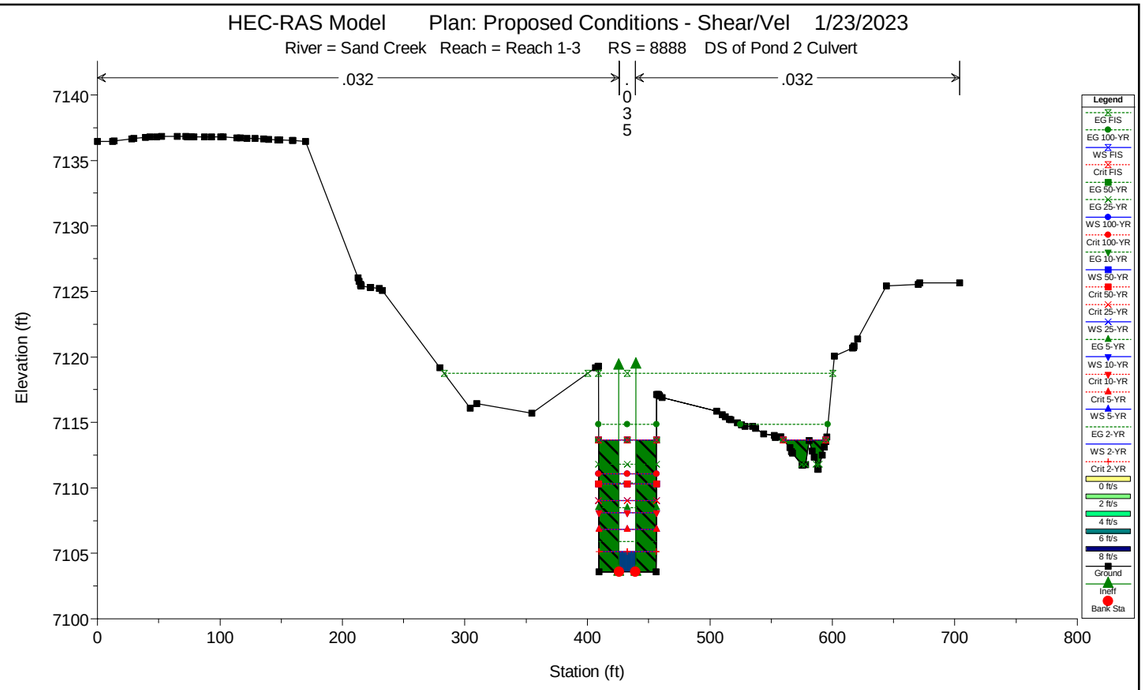

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9029
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.9 ft/s
1.0 ft/s
1.1 ft/s
1.2 ft/s
1.3 ft/s
Ground
Bank Sta

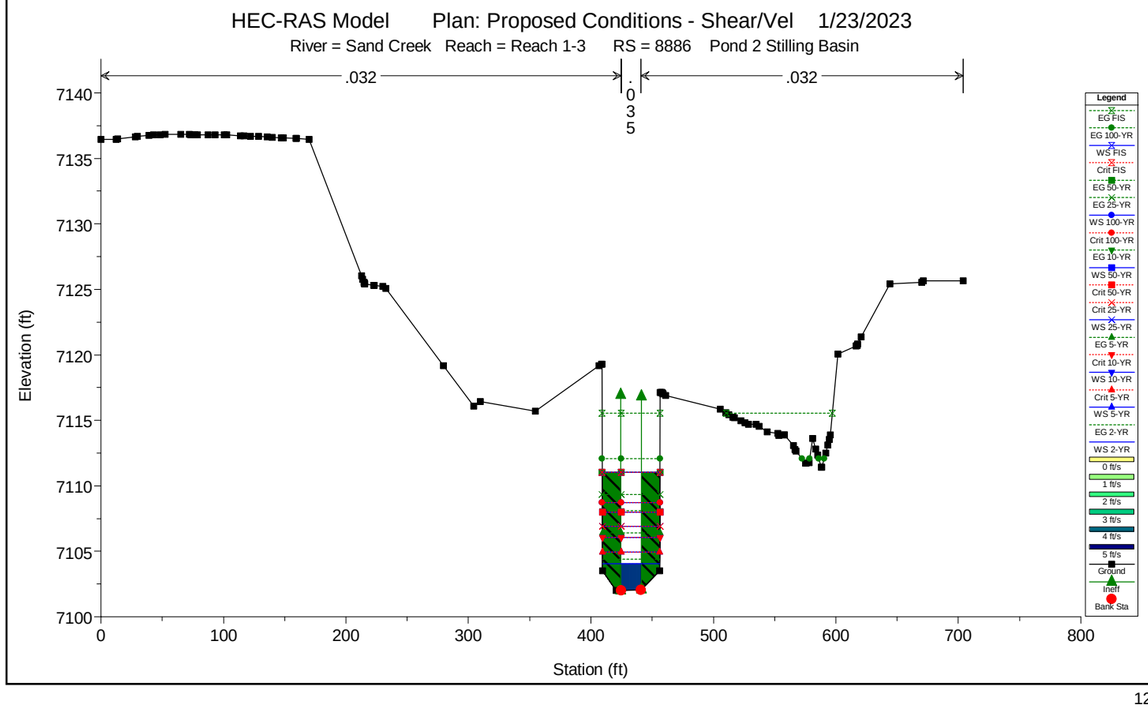

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8989 US of Pond 2 Outlet Structure
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
EG 25-YR
EG 10-YR
WS 50-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
2.8 ft/s
3.0 ft/s
Ground
Bank Sta

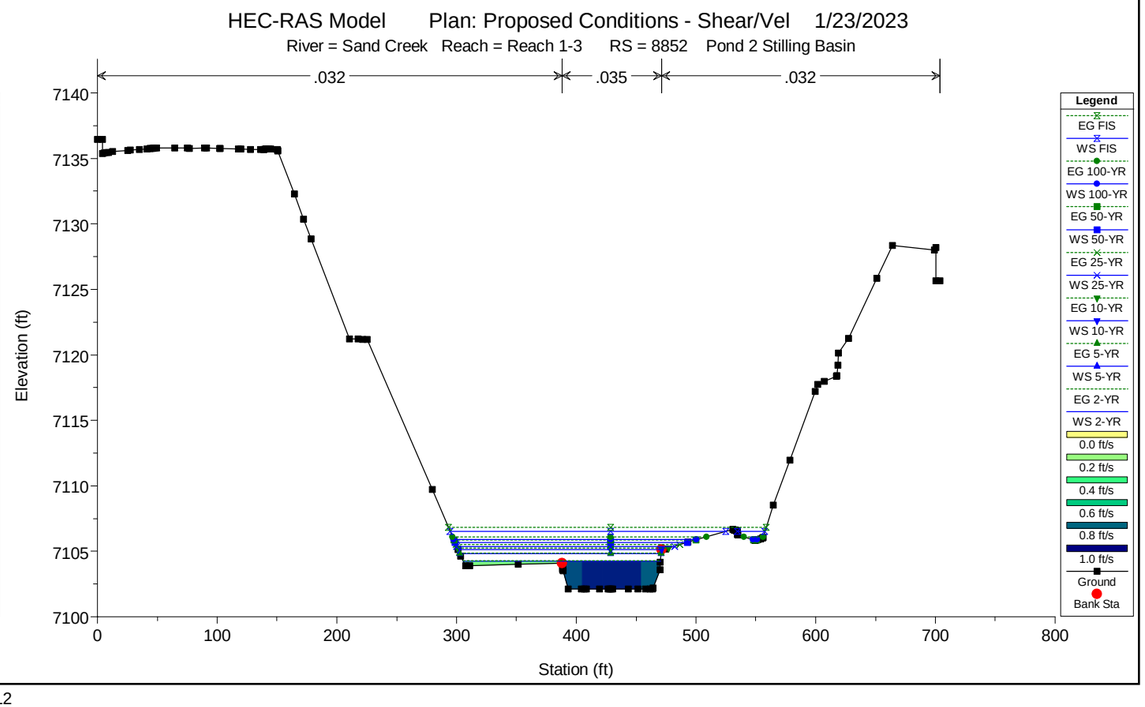

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8983 Pond 2 Outlet Structure
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
-4 ft/s
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

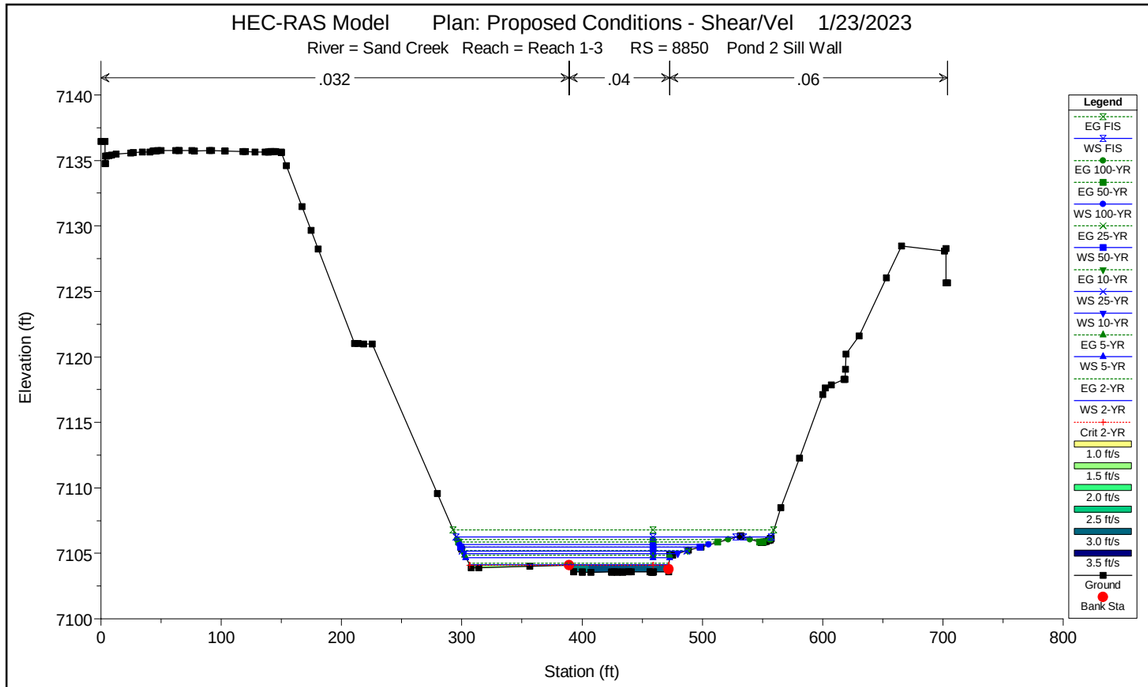

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8956 US of Pond 2 culvert
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit FIS
Crit 100-YR
Crit 50-YR
Crit 25-YR
EG 2-YR
WS 2-YR
Crit 10-YR
Crit 5-YR
Crit 2-YR
-4 ft/s
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

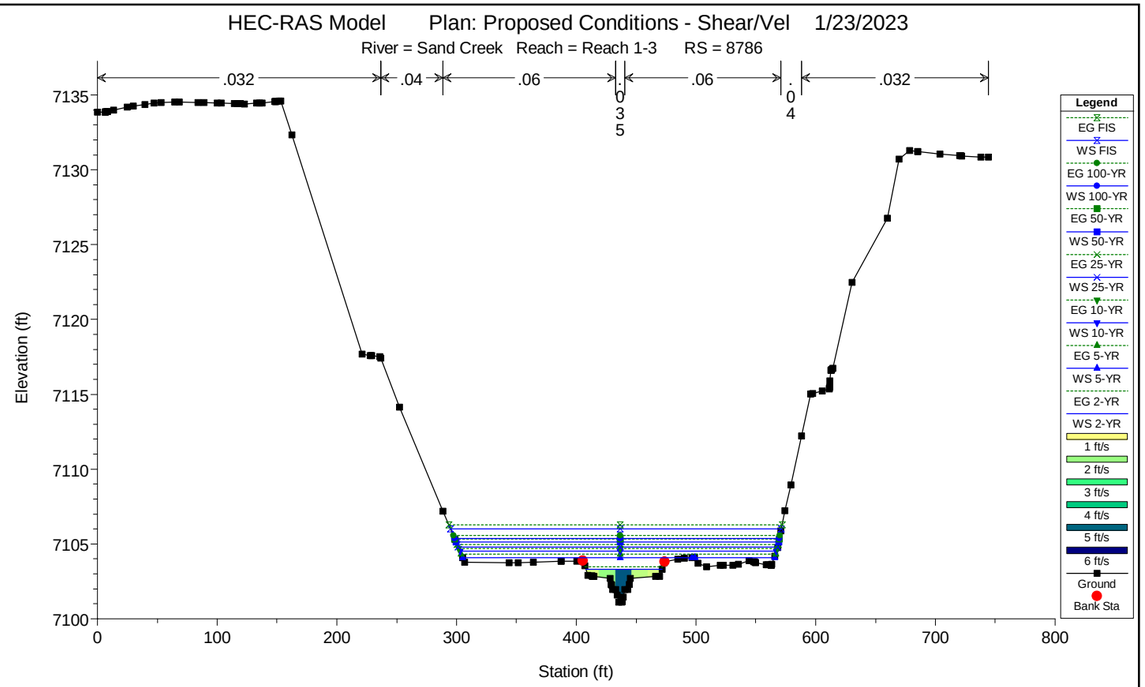

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8919 Culv Pond 2 Culvert
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
Crit FIS
Crit 100-YR
EG 10-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

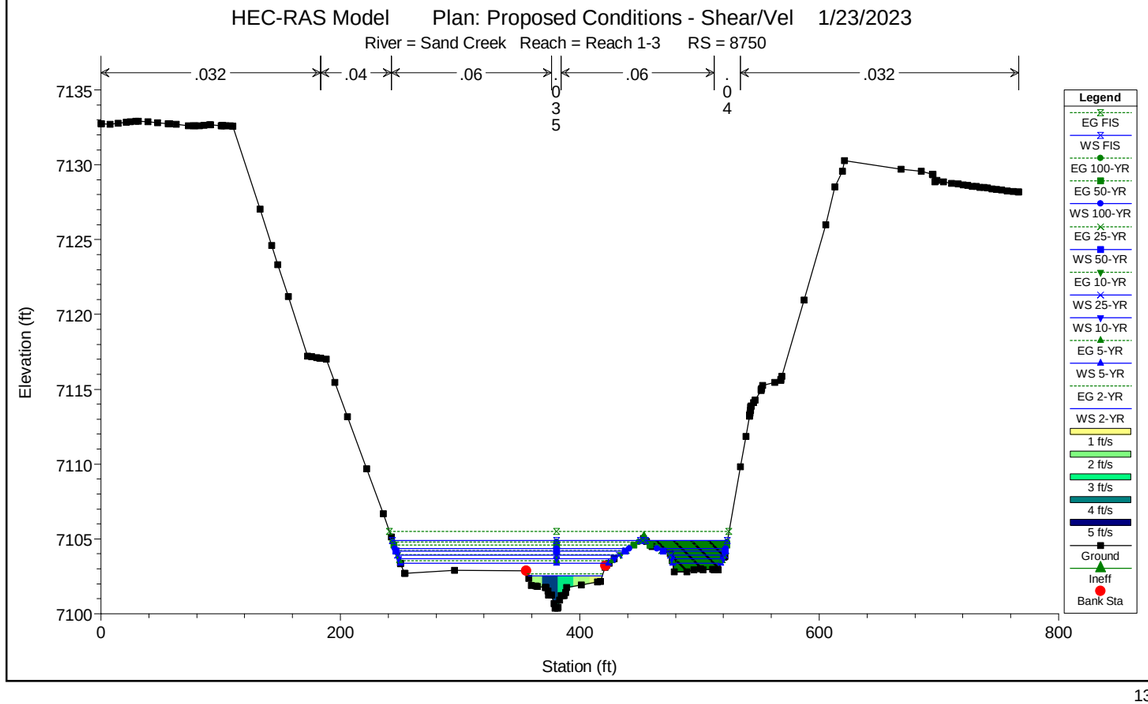

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8888 DS of Pond 2 Culvert
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

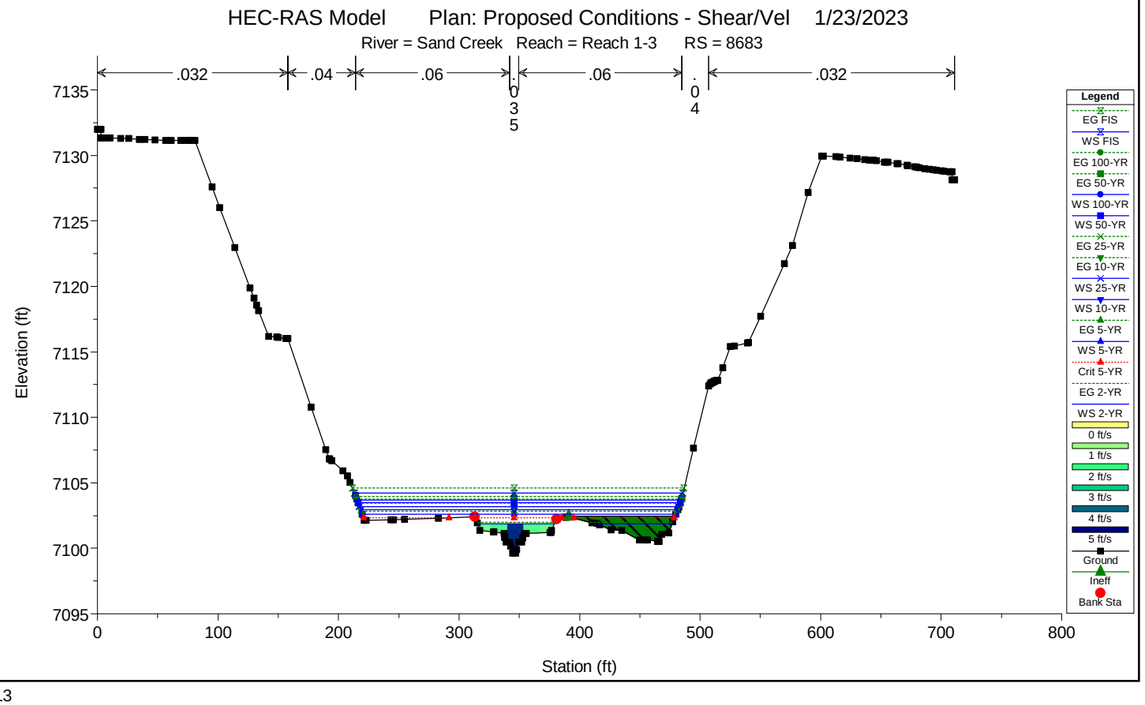

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8886 Pond 2 Stilling Basin
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

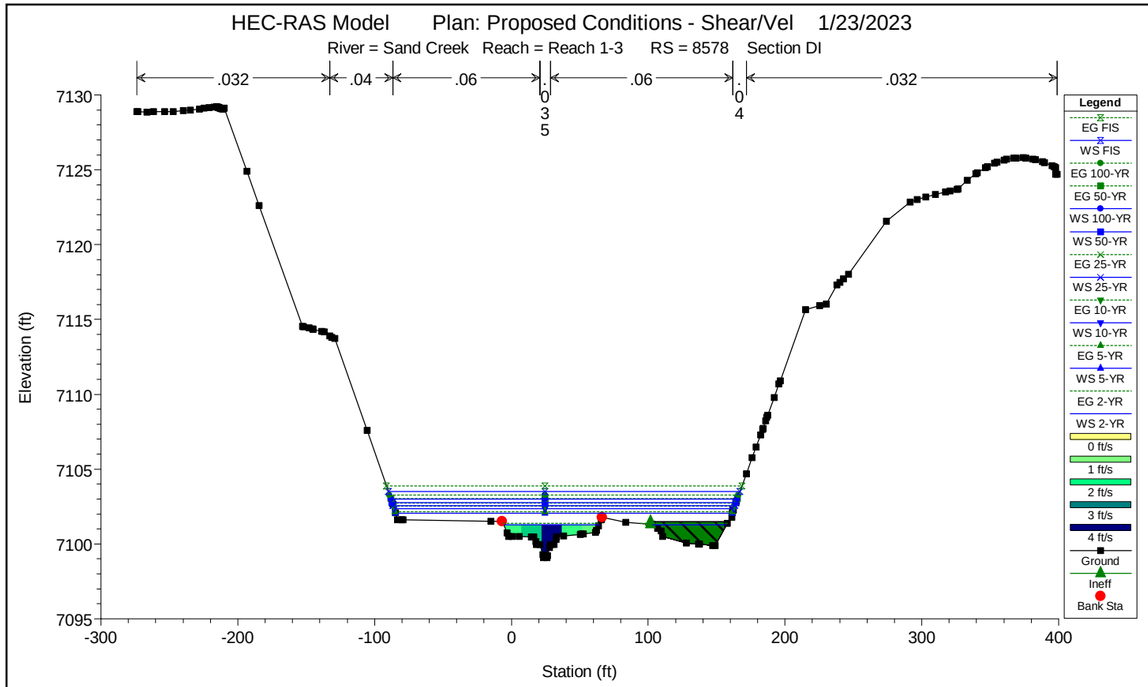

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8852 Pond 2 Stilling Basin
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

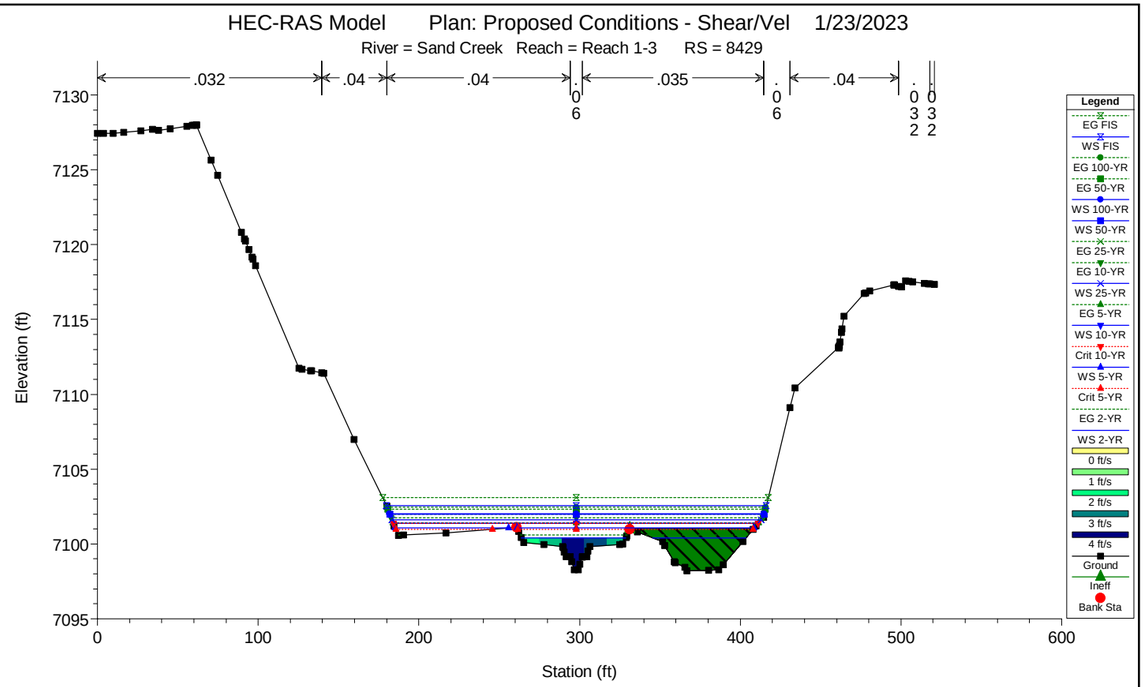

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8850 Pond 2 Sill Wall
.032
.04
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

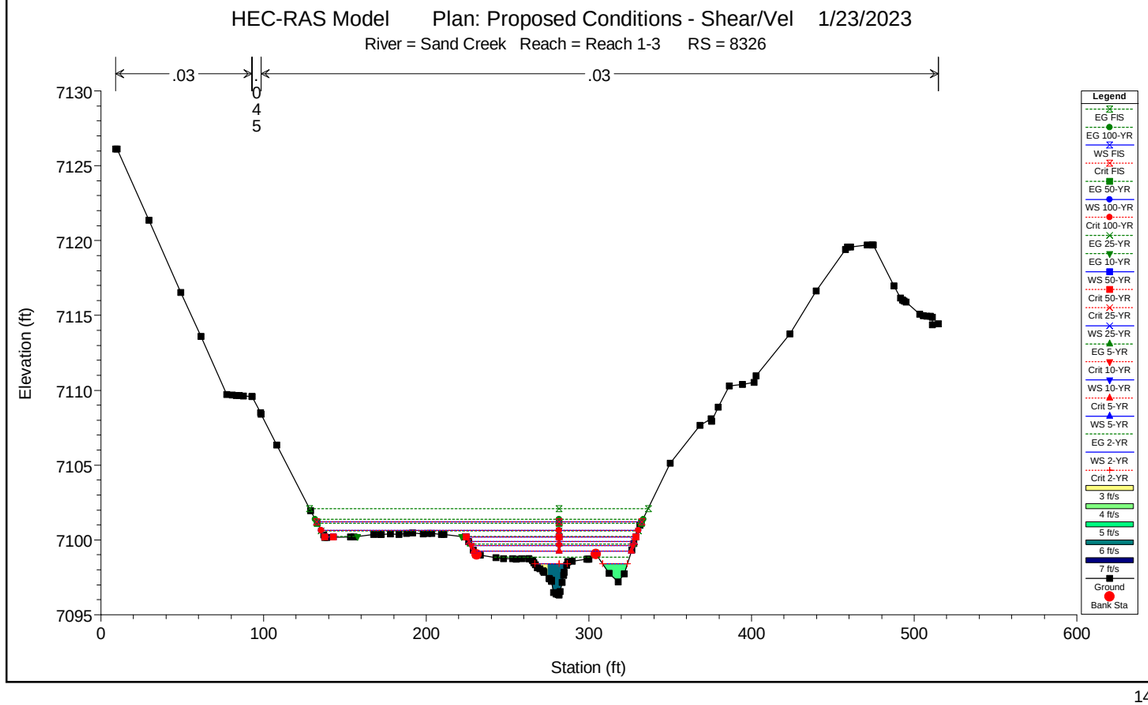

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8786
.032
.04
.06
.035
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

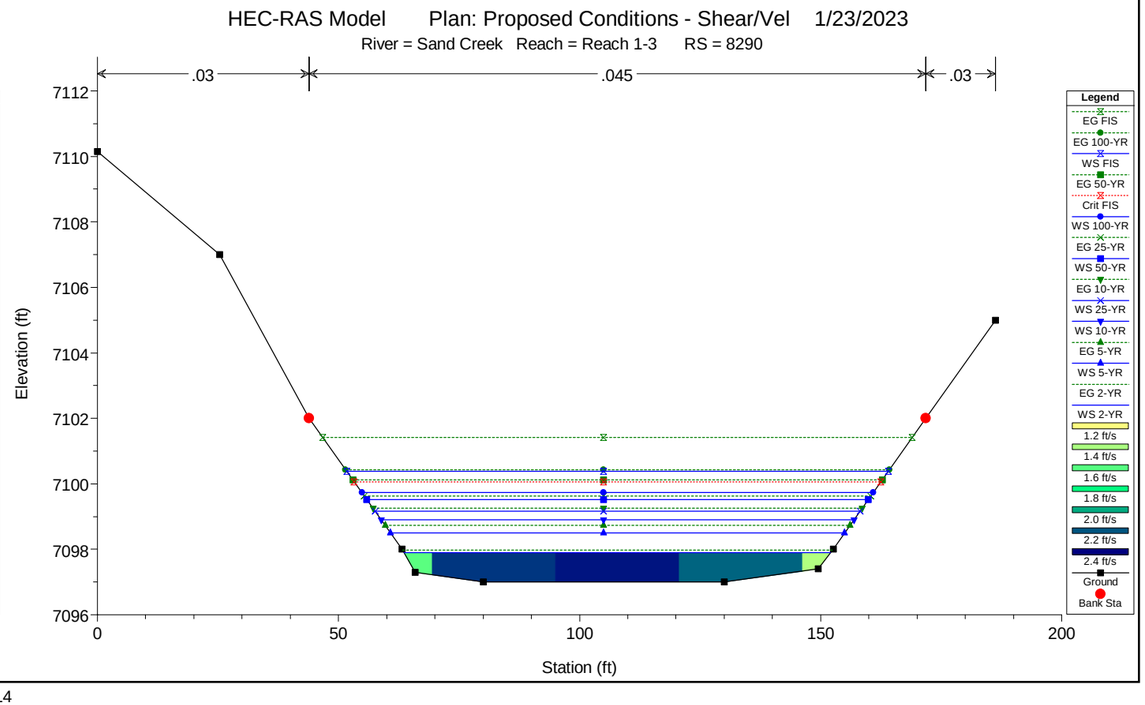

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8750
.032
.04
.06
.035
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

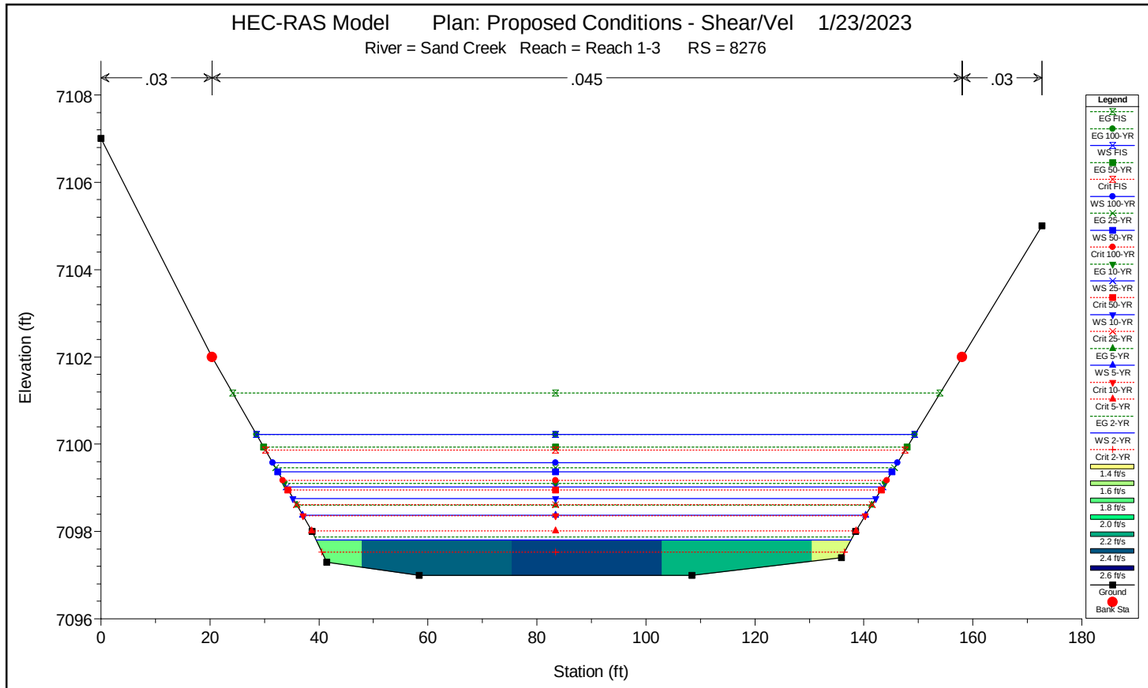

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8683
.032
.04
.06
.035
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

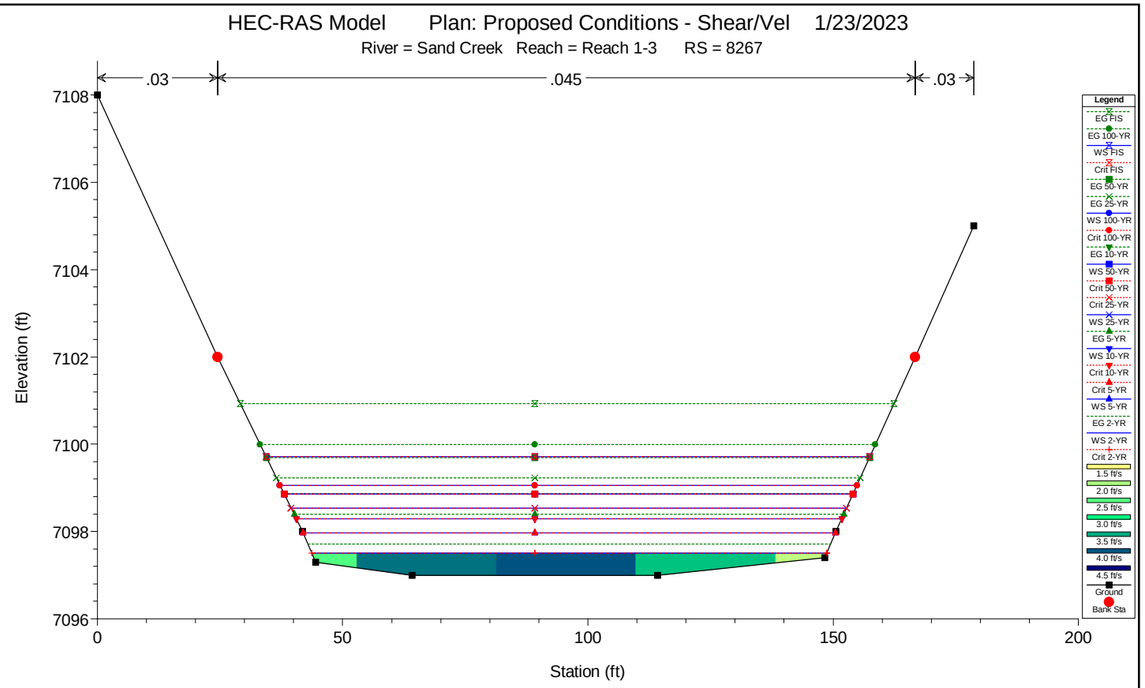

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8578
Section DI
.032
.04
.06
.035
.06
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

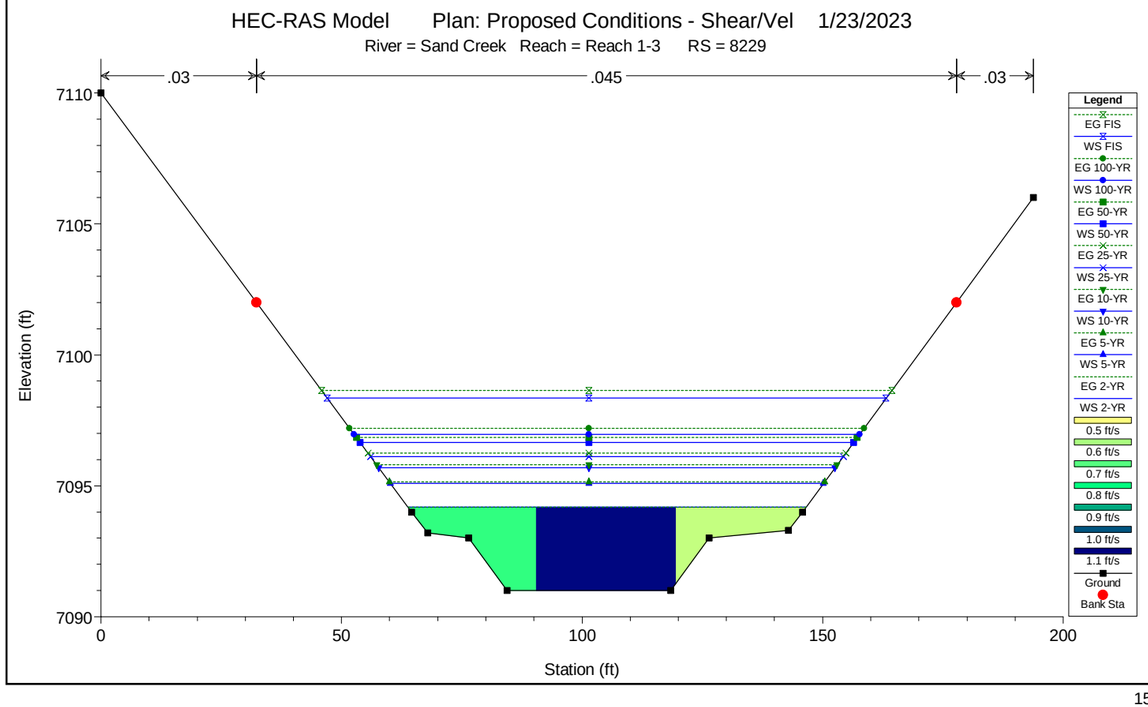

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8429
.032
.04
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
EG 10-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

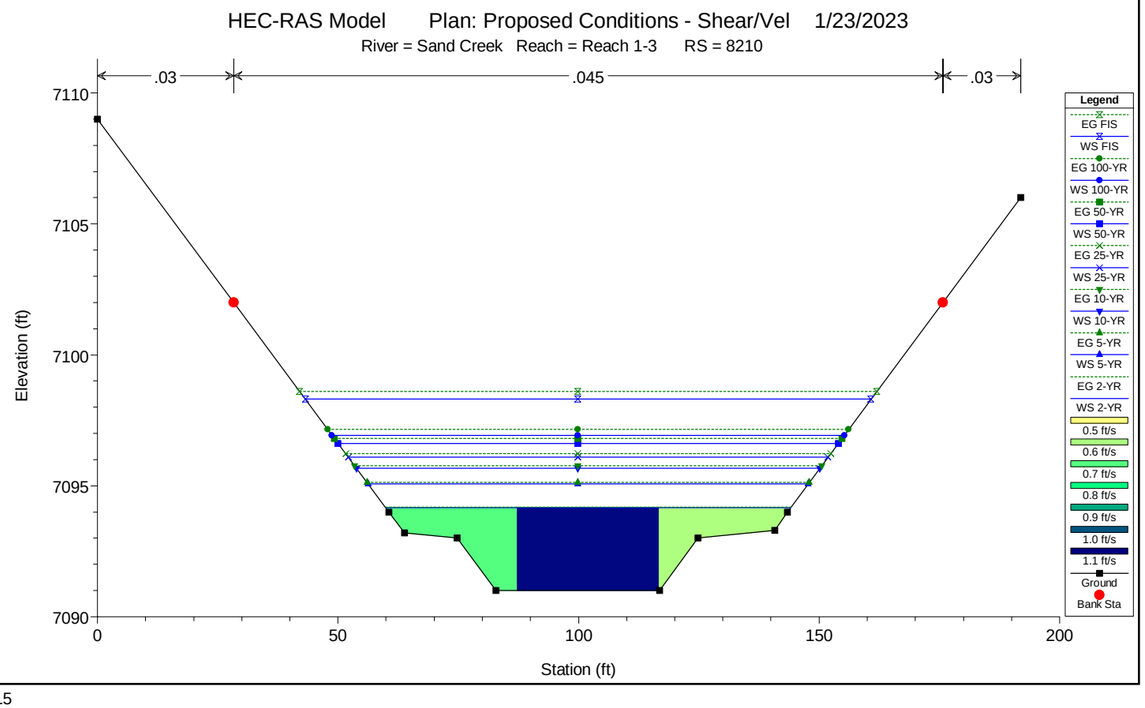

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8326
.03
.03
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
Crit 100-YR
EG 25-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

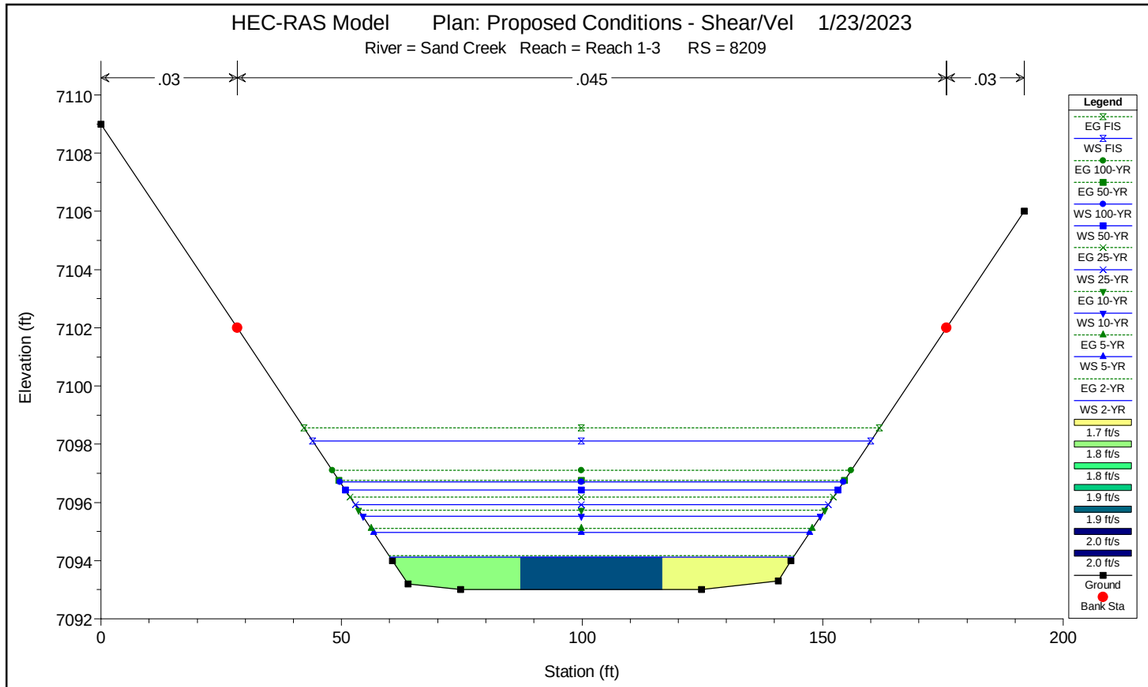

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8290
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
Crit FIS
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
Ground
Bank Sta

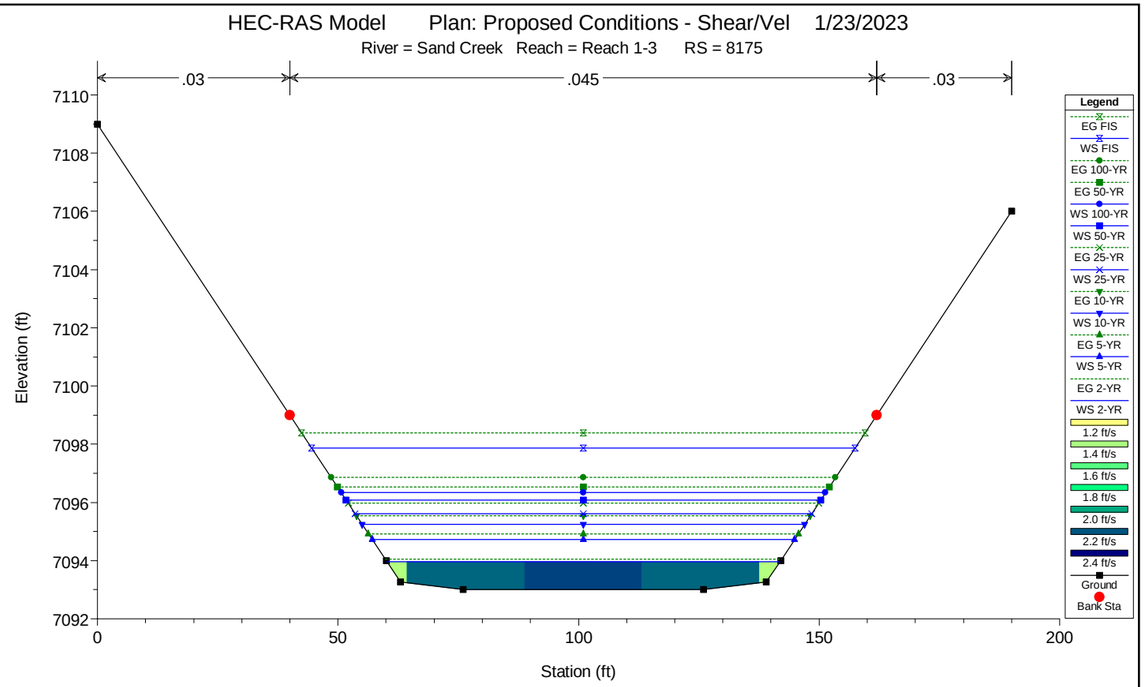

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8276
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit FIS
Crit 100-YR
Crit 50-YR
Crit 25-YR
Crit 10-YR
Crit 5-YR
Crit 2-YR
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
Ground
Bank Sta

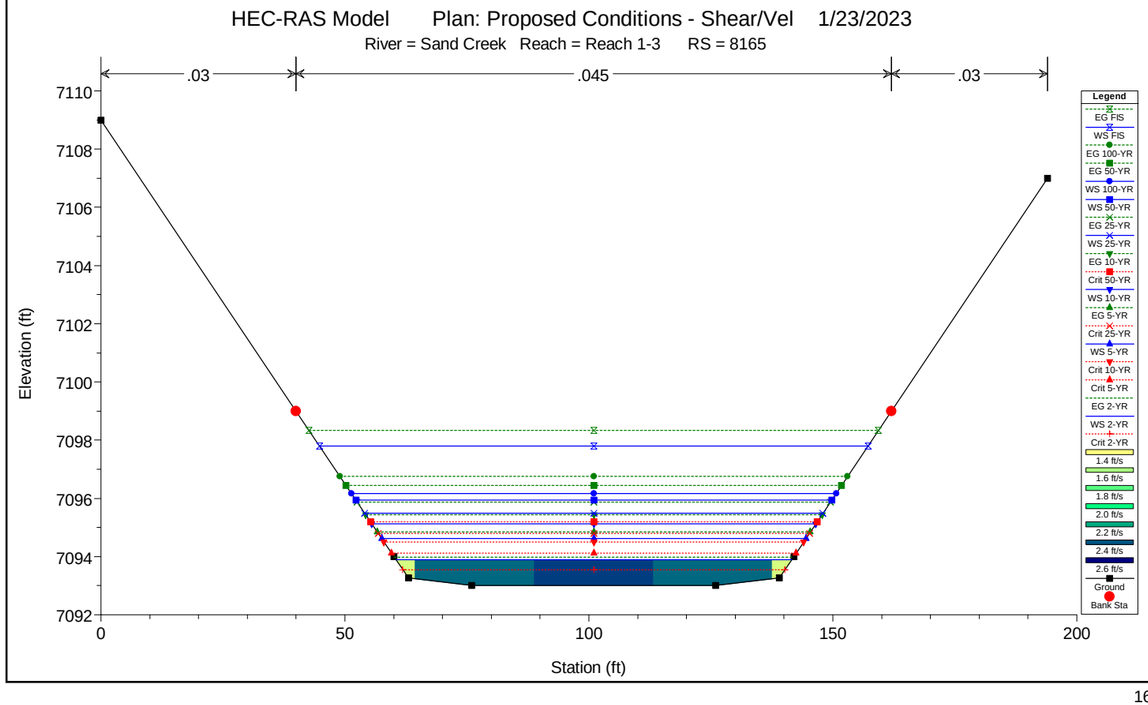

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8267
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit FIS
Crit 100-YR
Crit 50-YR
Crit 25-YR
Crit 10-YR
Crit 5-YR
Crit 2-YR
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

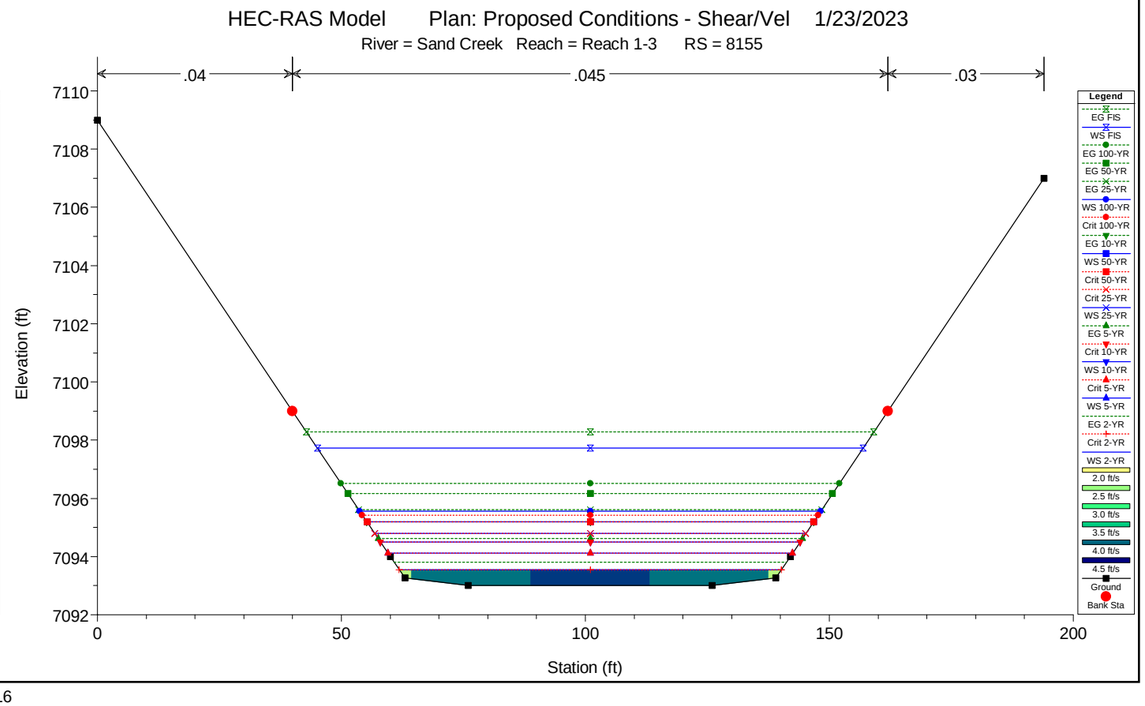

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8229
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
0.6 ft/s
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8210
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
0.6 ft/s
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8209
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.7 ft/s
1.8 ft/s
1.8 ft/s
1.9 ft/s
1.9 ft/s
2.0 ft/s
2.0 ft/s
Ground
Bank Sta

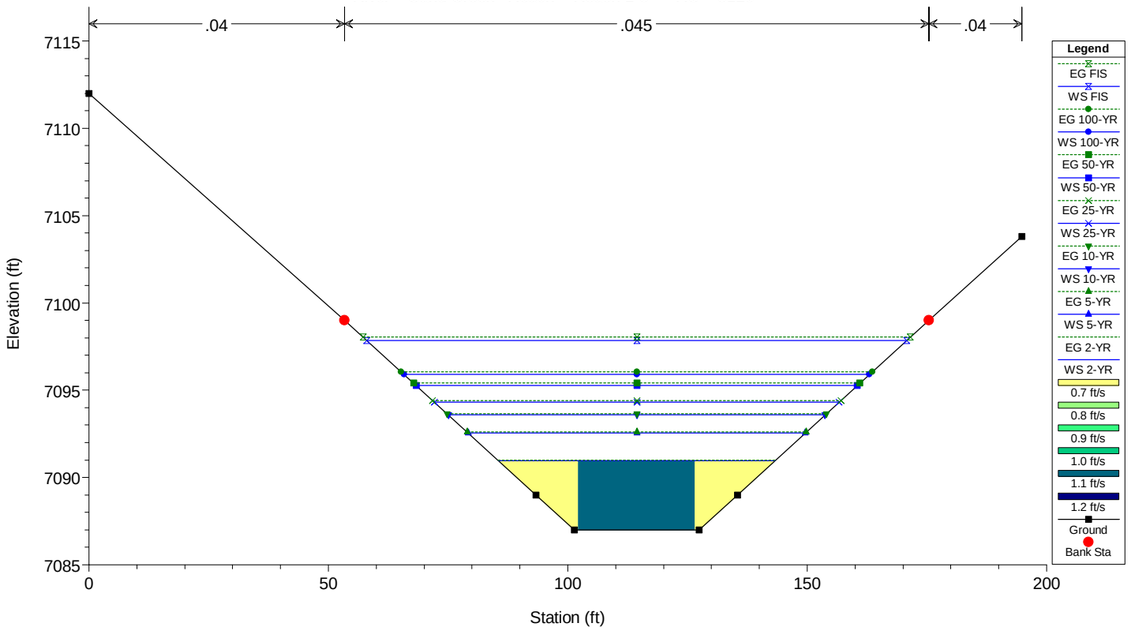

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8175
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8165
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
Crit 50-YR
WS 10-YR
EG 5-YR
Crit 25-YR
WS 5-YR
Crit 10-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8155
.04
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

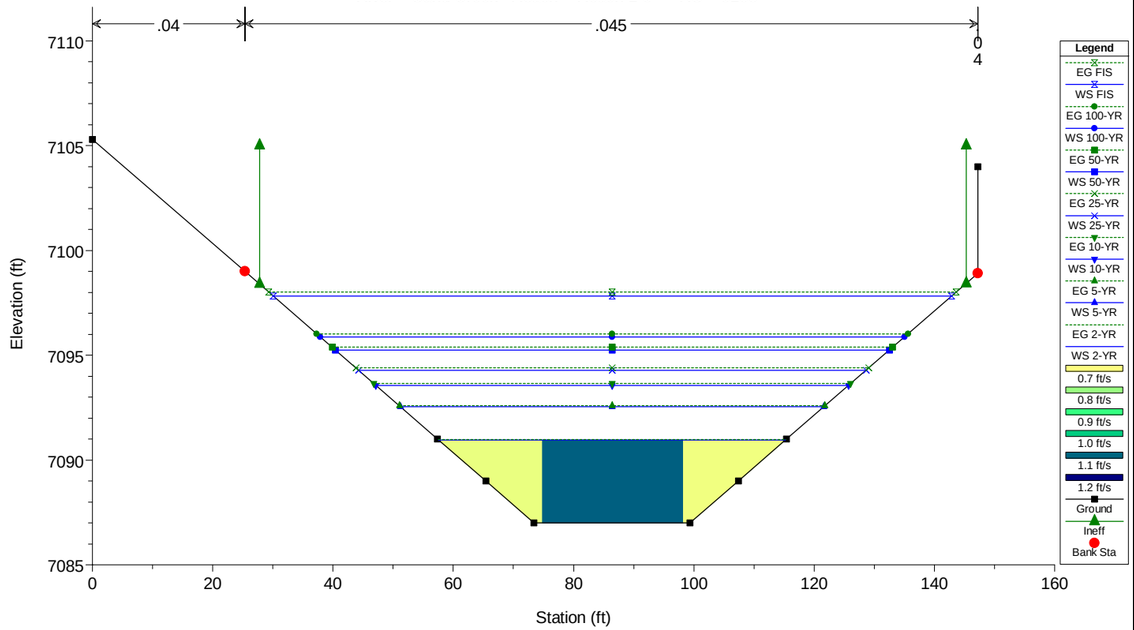
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 8125



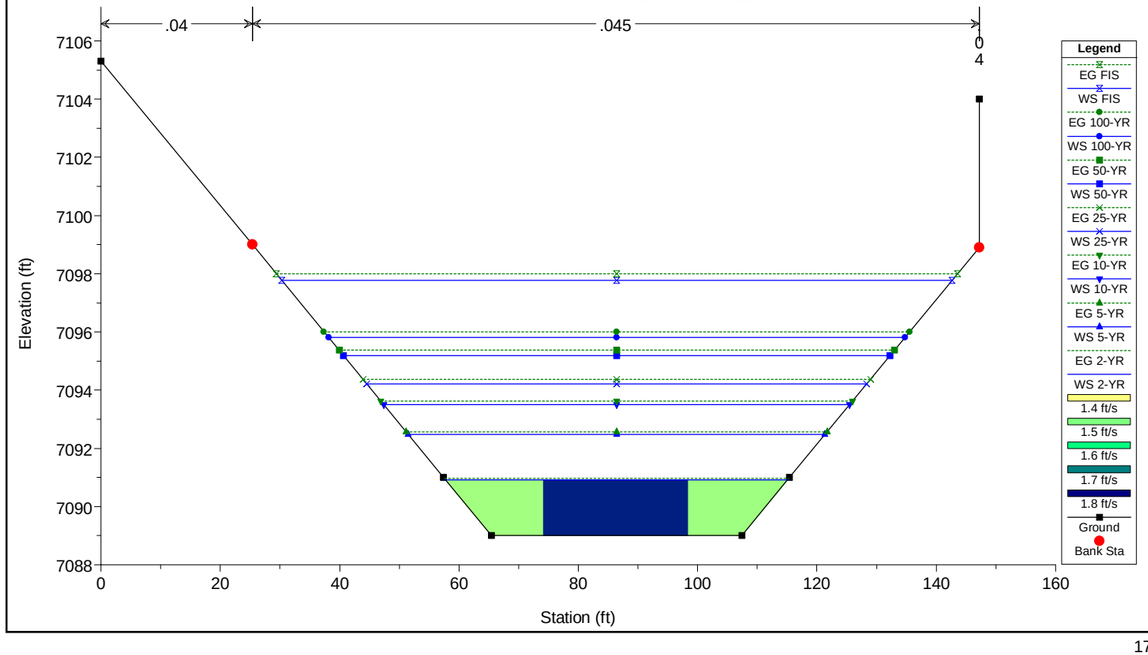

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 8105



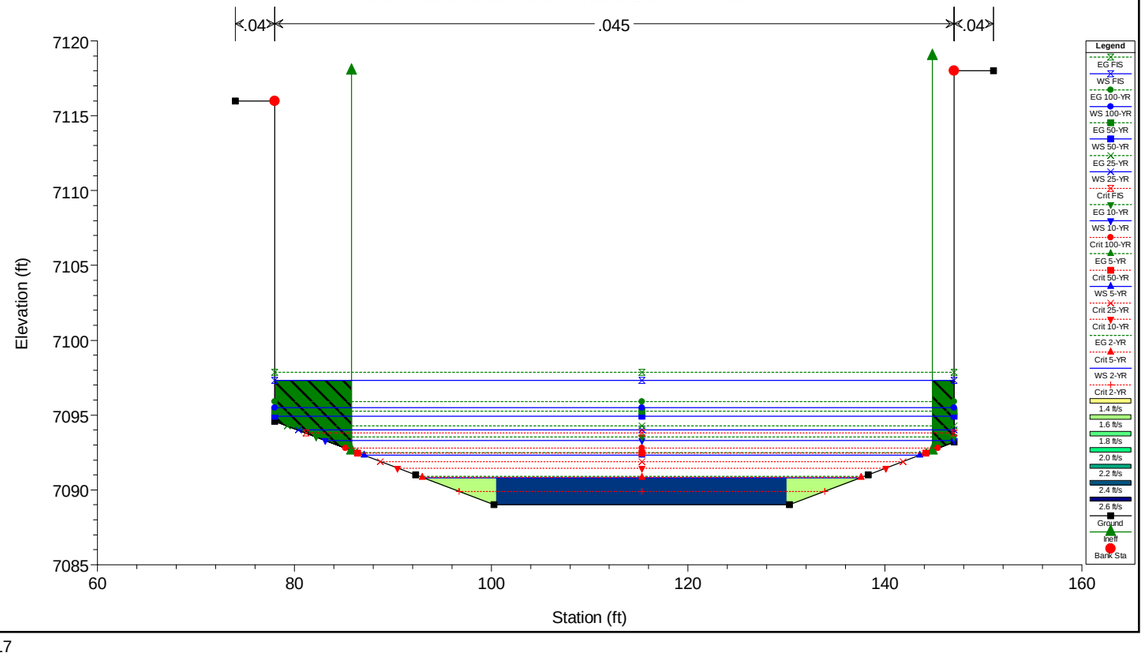

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

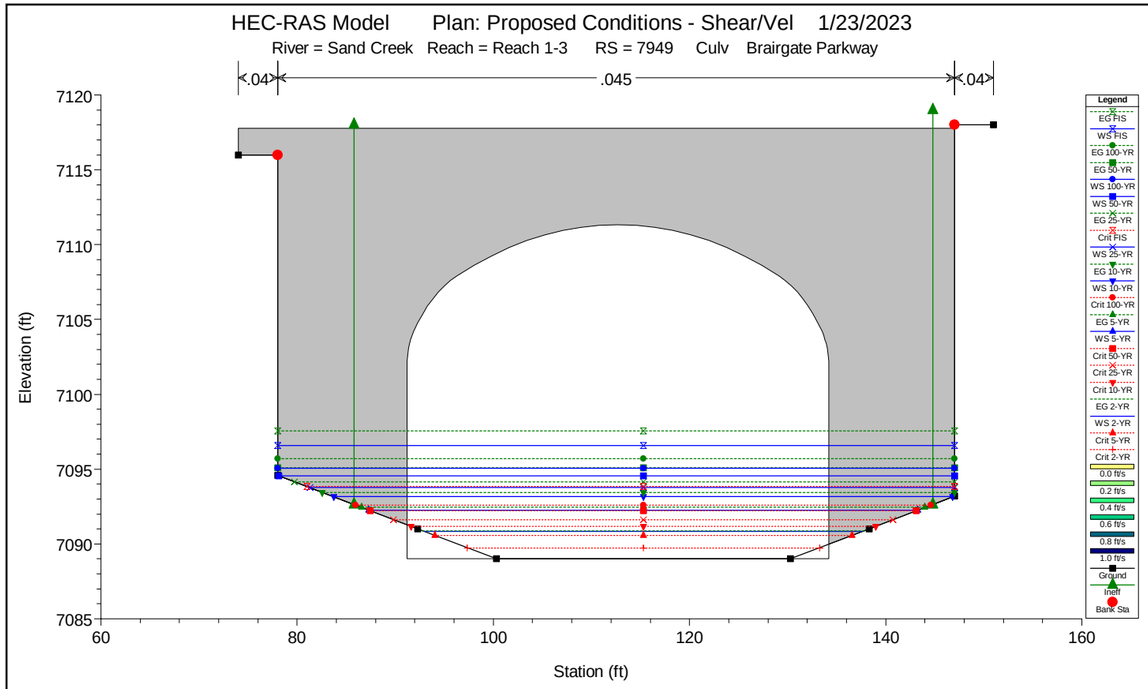
River = Sand Creek Reach = Reach 1-3 RS = 8104

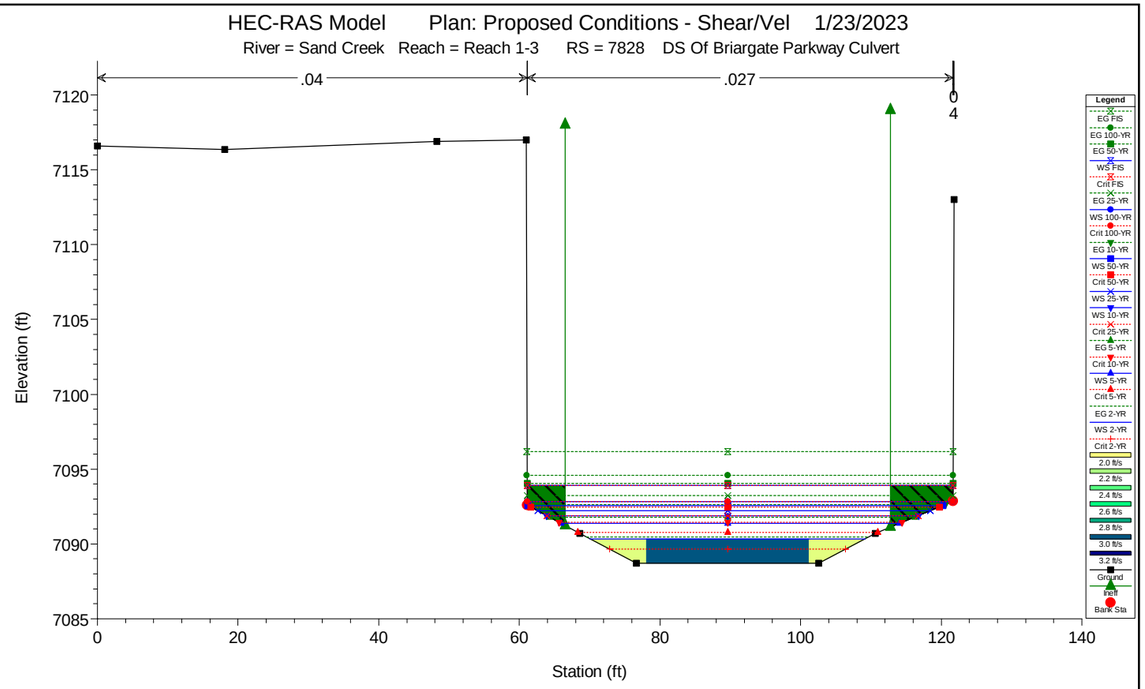


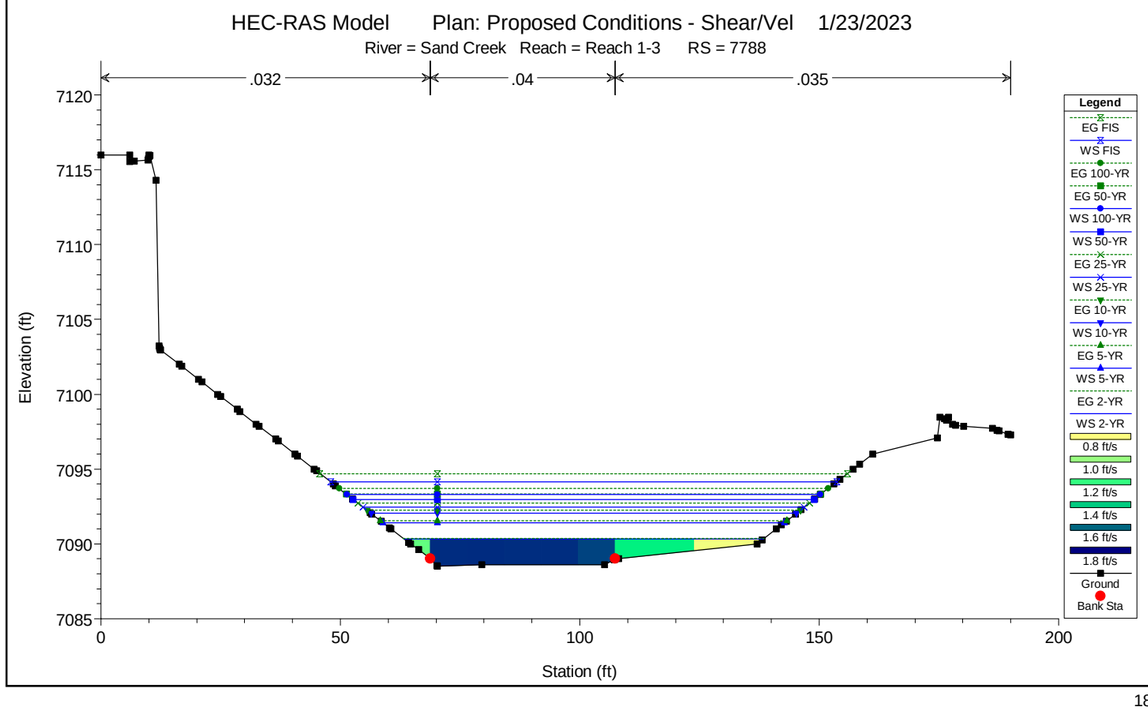

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

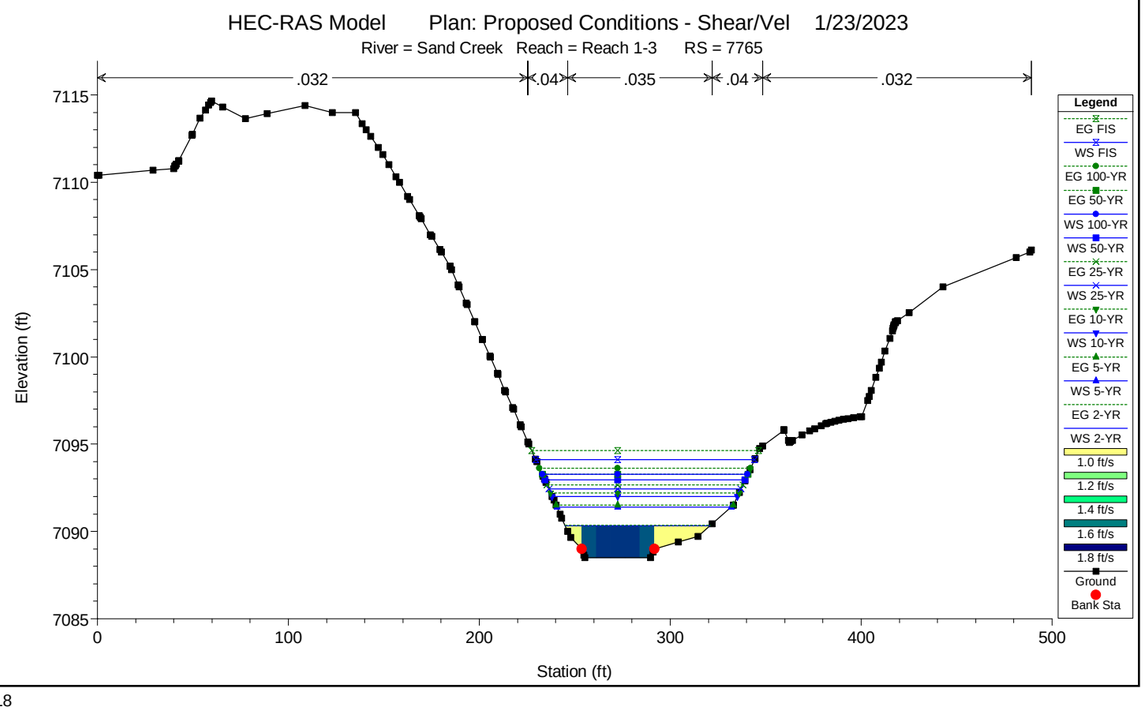
River = Sand Creek Reach = Reach 1-3 RS = 8074

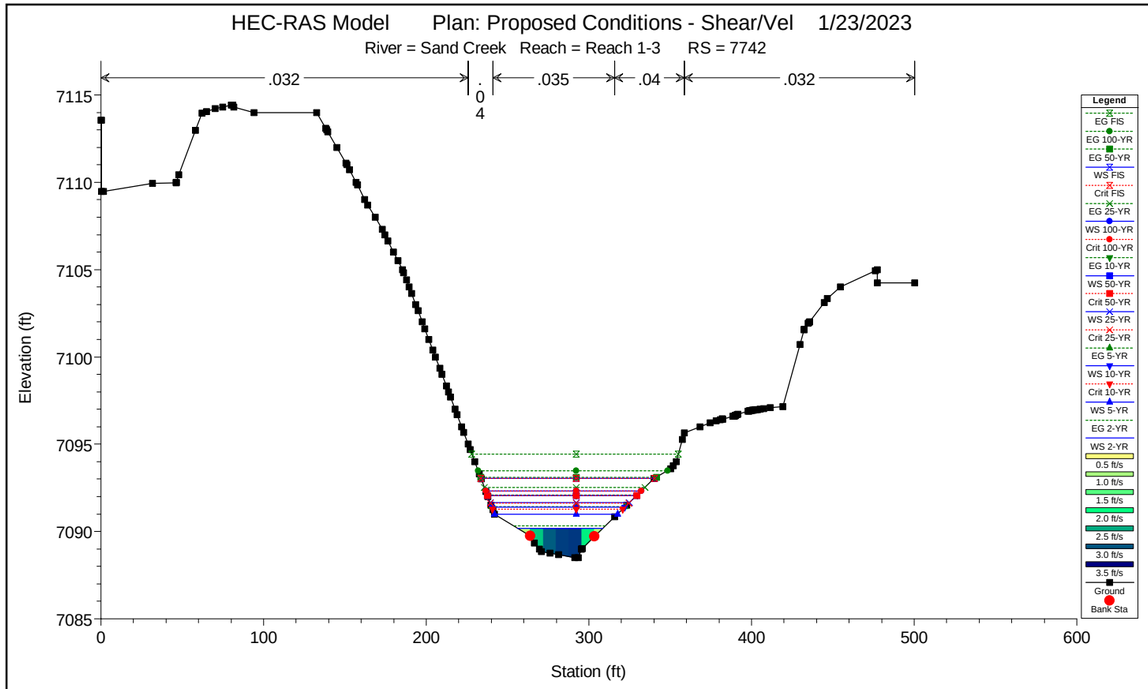


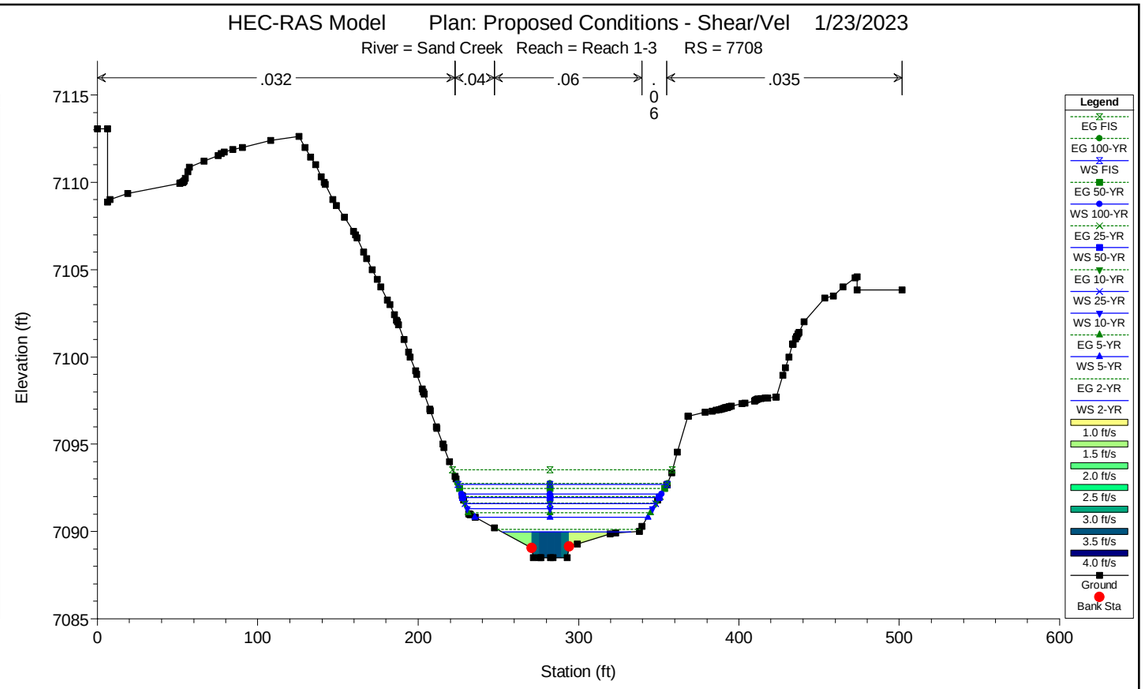

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7949 Culv Brairgate Parkway
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
Crit FIS
WS 25-YR
EG 10-YR
WS 10-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 50-YR
Crit 25-YR
Crit 10-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

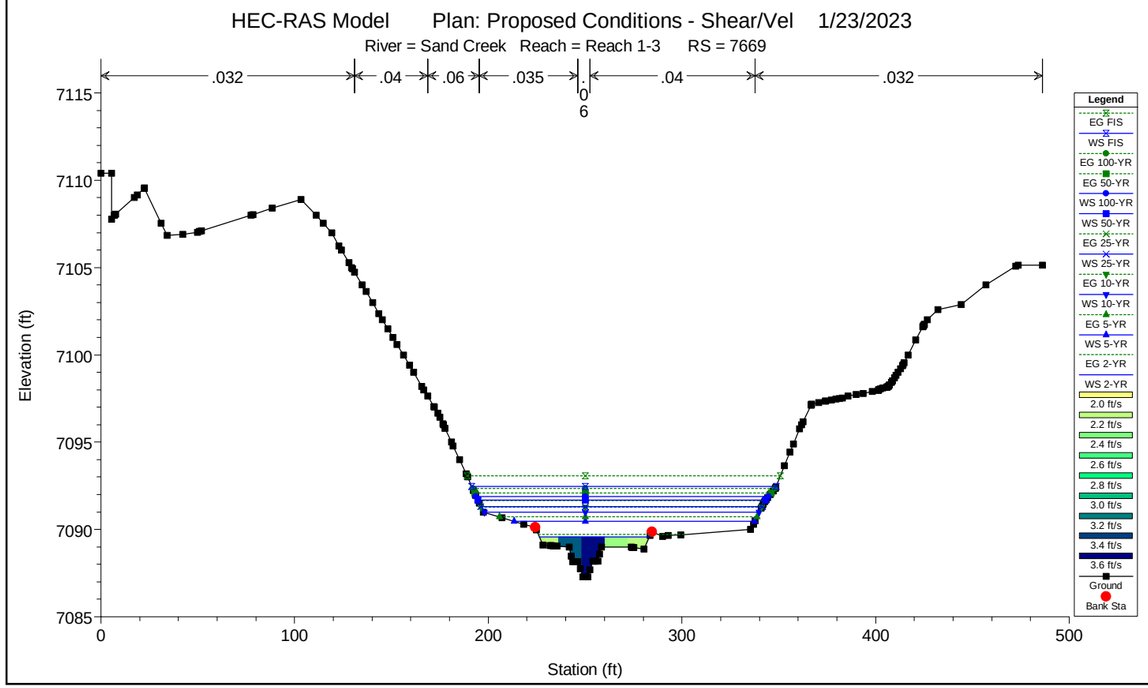

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7828 DS Of Briargate Parkway Culvert
.04
.027
0
4
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
WS 25-YR
WS 10-YR
Crit 25-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
2.8 ft/s
3.0 ft/s
3.2 ft/s
Ground
Ineff
Bank Sta

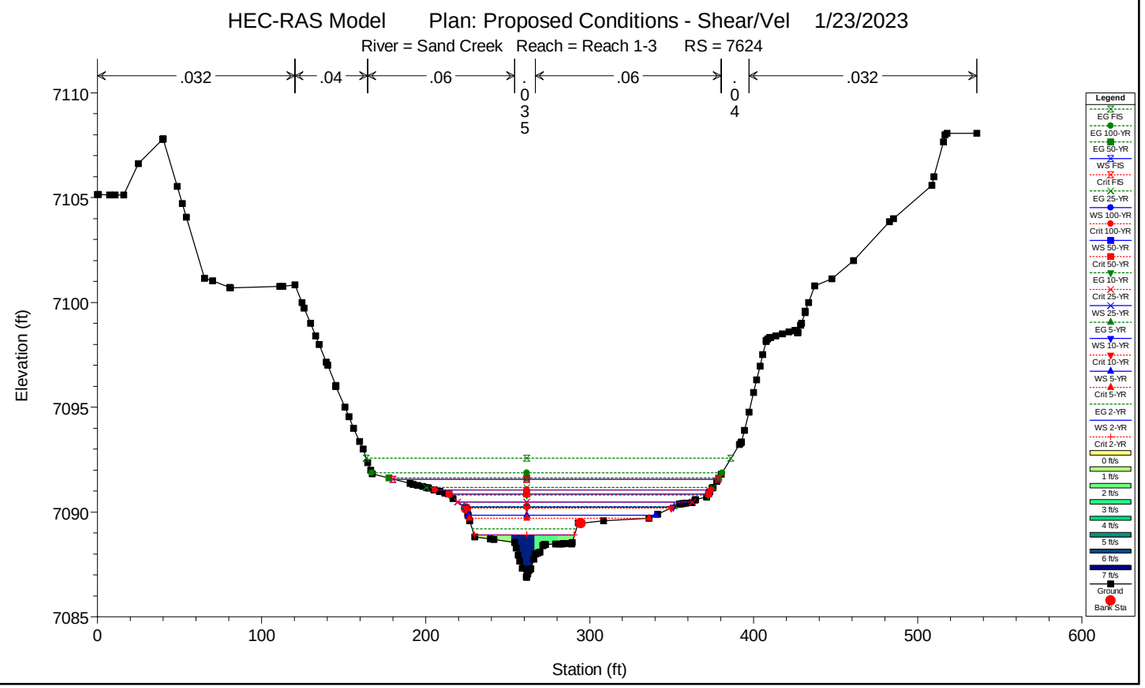

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7788
.032
.04
.035
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
Ground
Bank Sta

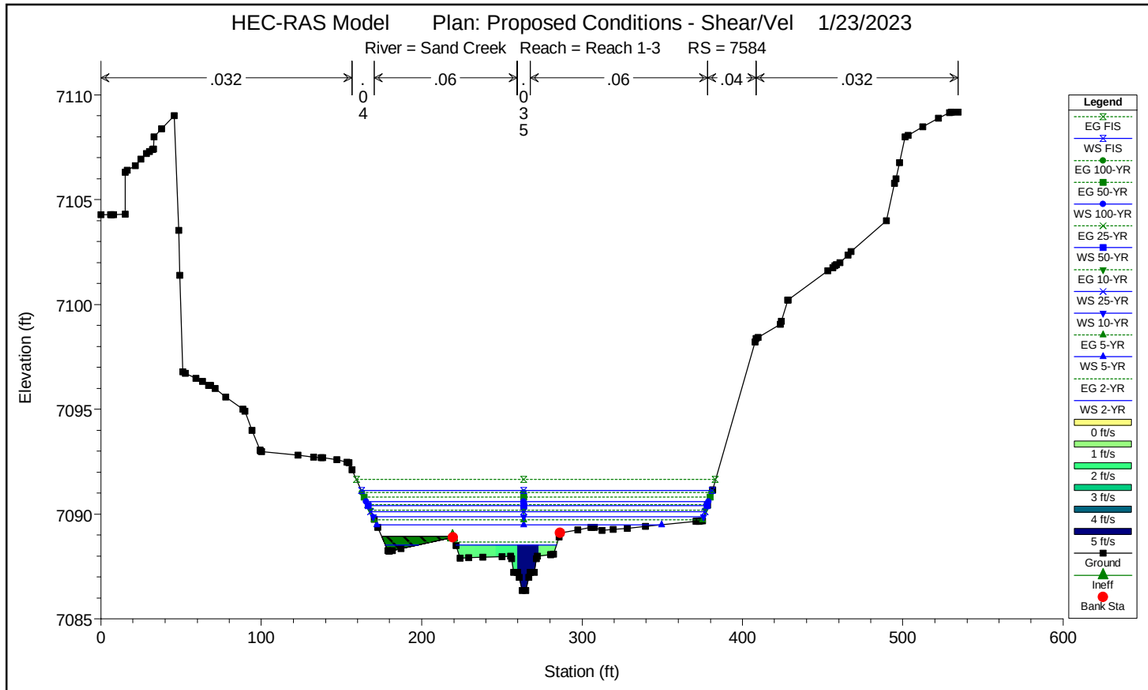

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7765
.032
.04
.035
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
Ground
Bank Sta

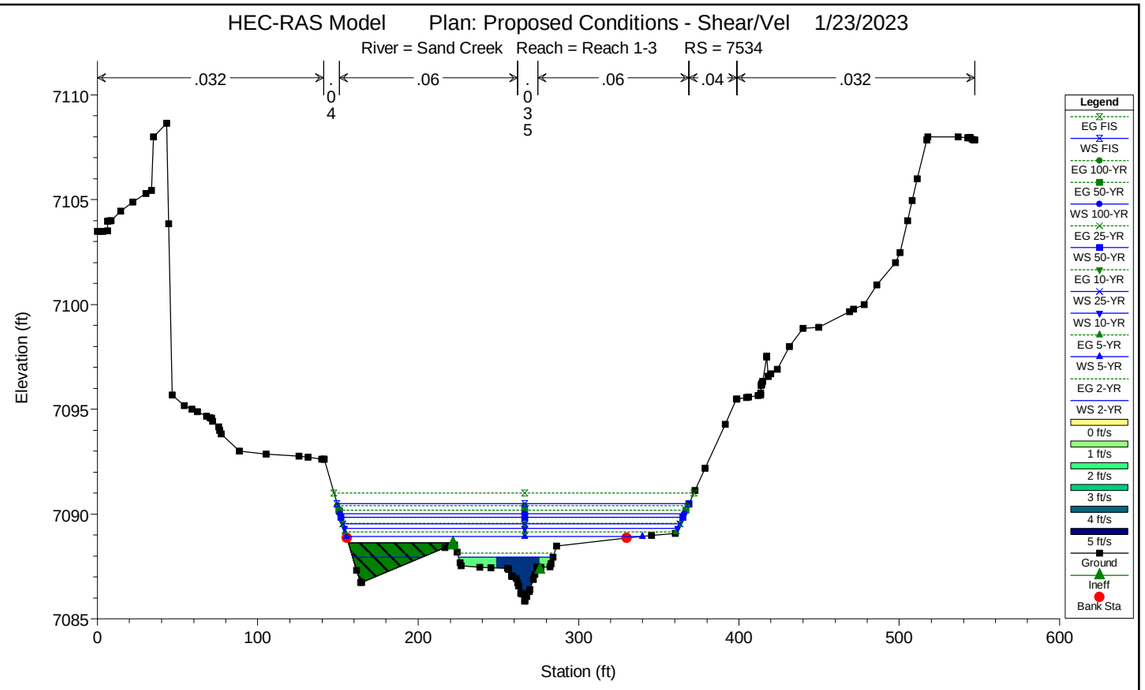

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7742
.032
.035
.04
.032
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

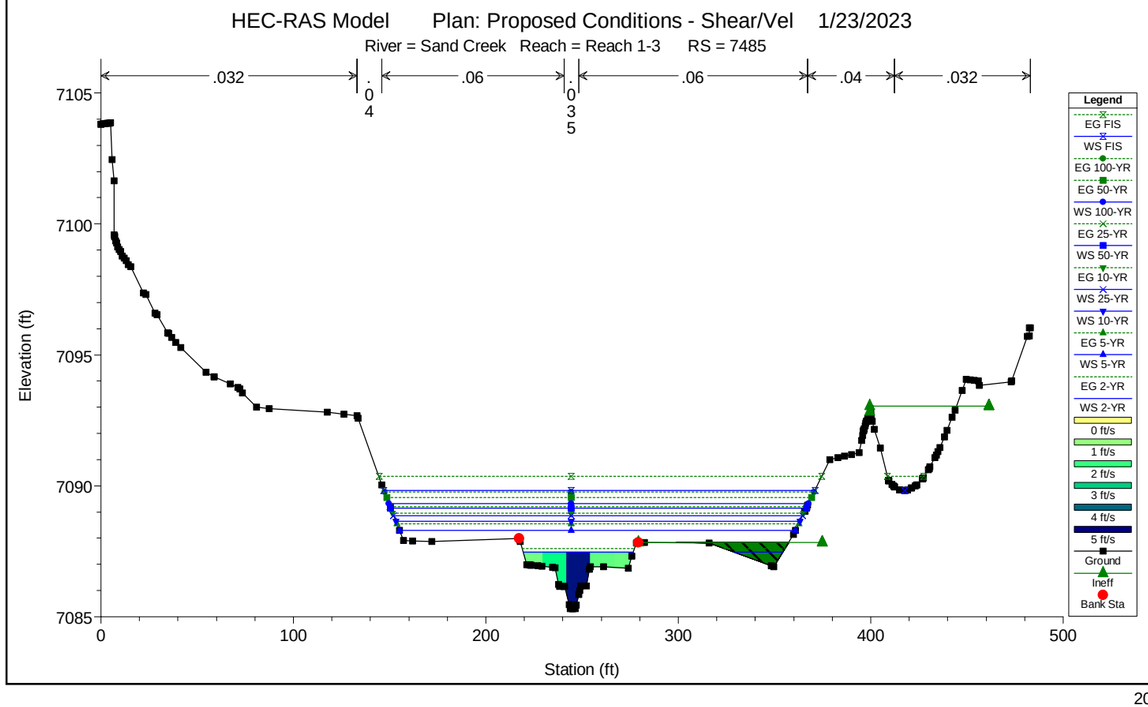

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7708
.032
.04
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

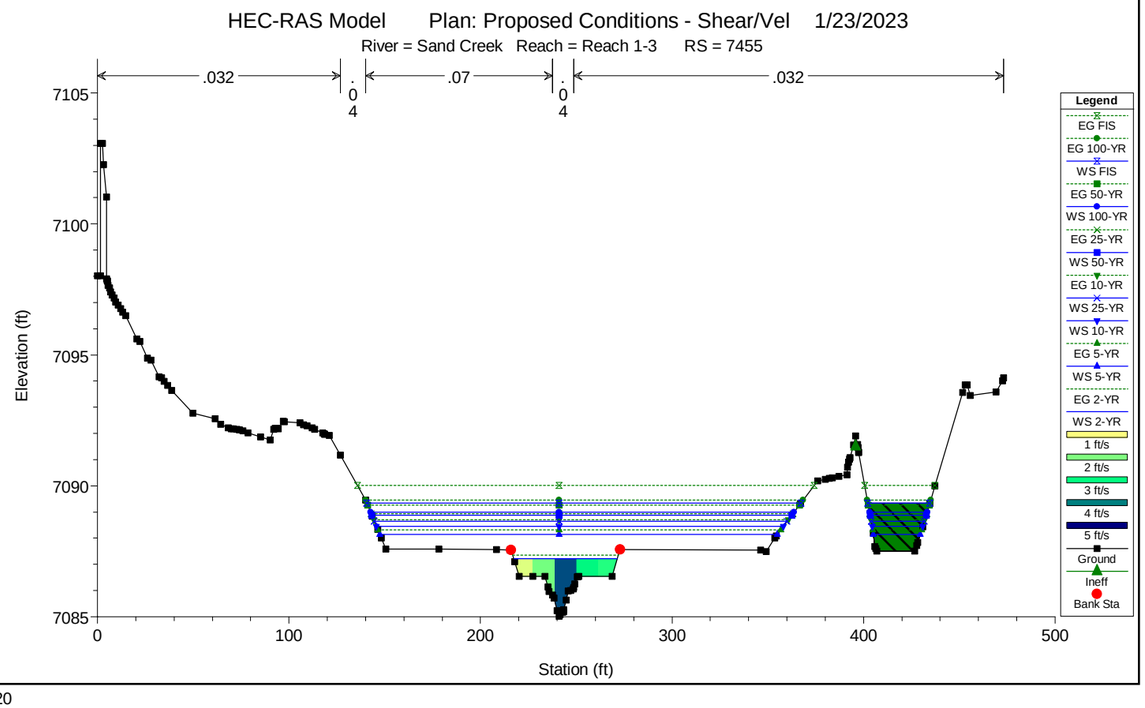

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7669
.032
.04
.06
.035
.04
.032
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
2.8 ft/s
3.0 ft/s
3.2 ft/s
3.4 ft/s
3.6 ft/s
Ground
Bank Sta

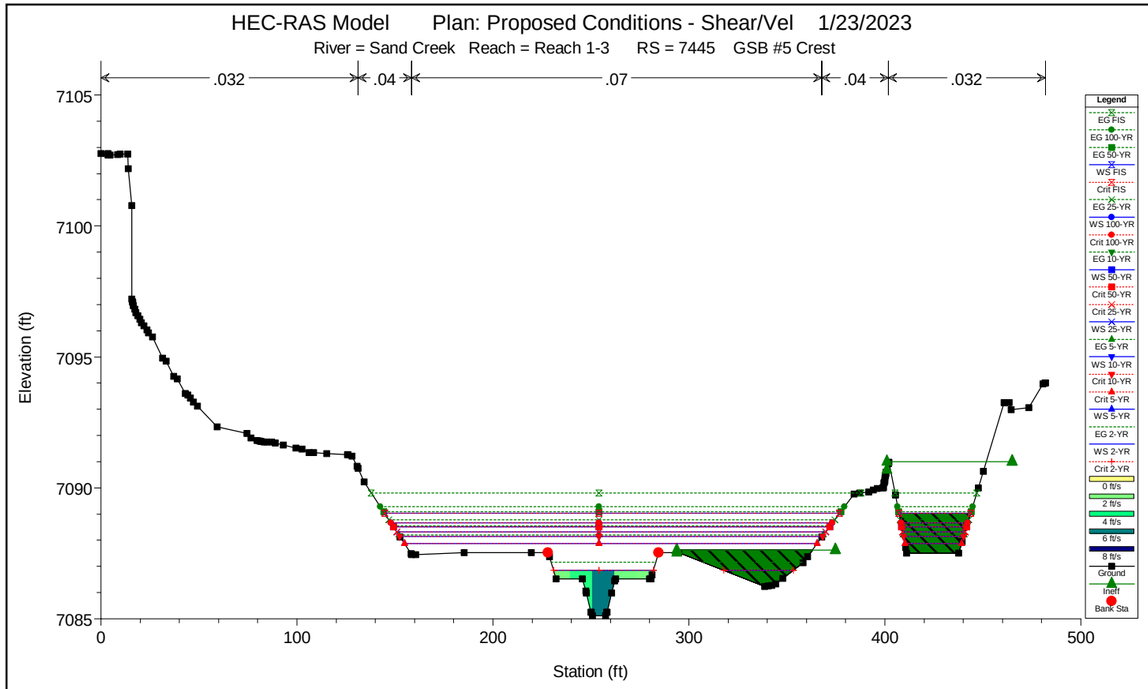

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7624
.032
.04
.06
.06
.032
.035
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

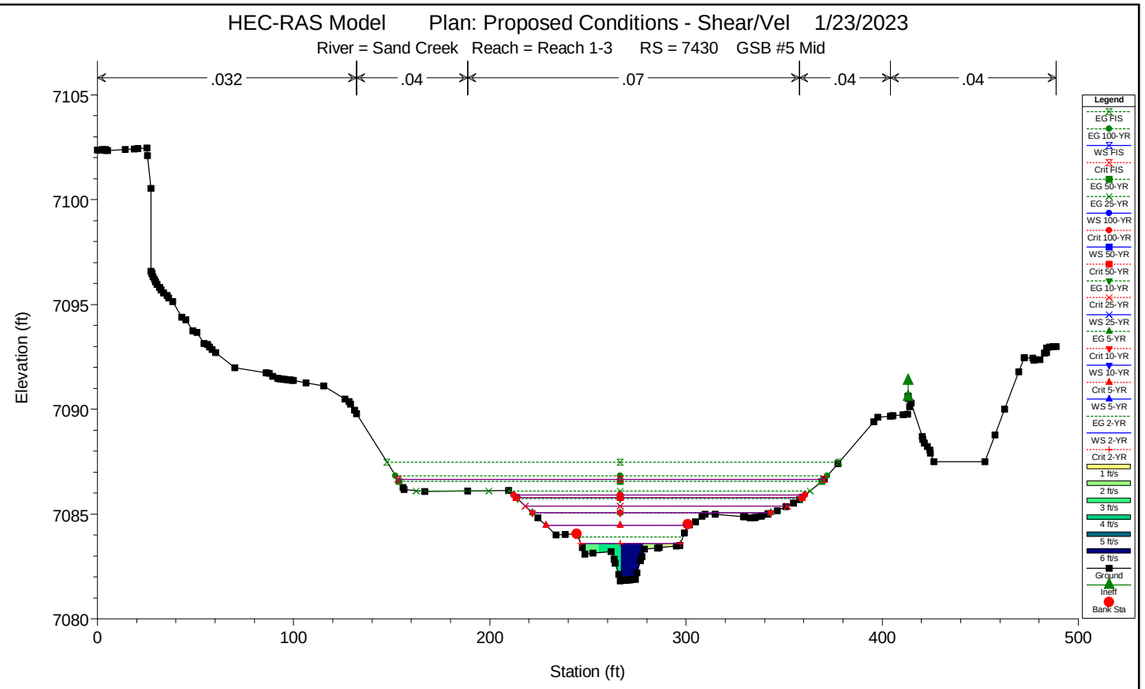

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7584
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

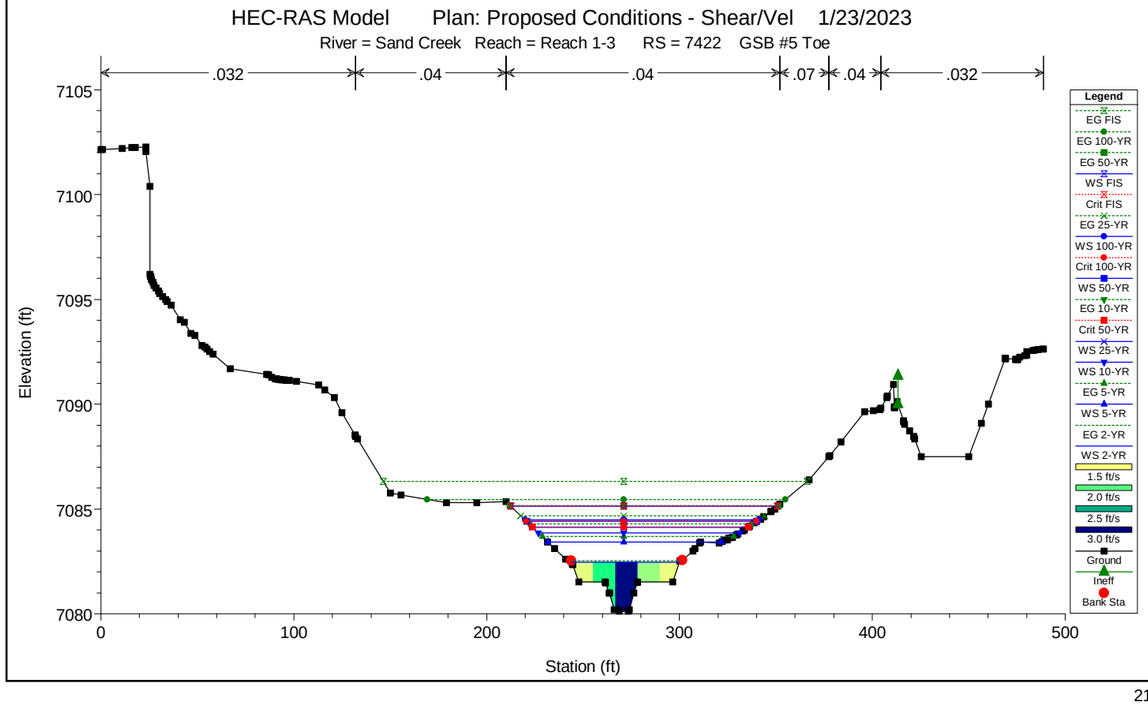

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7534
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

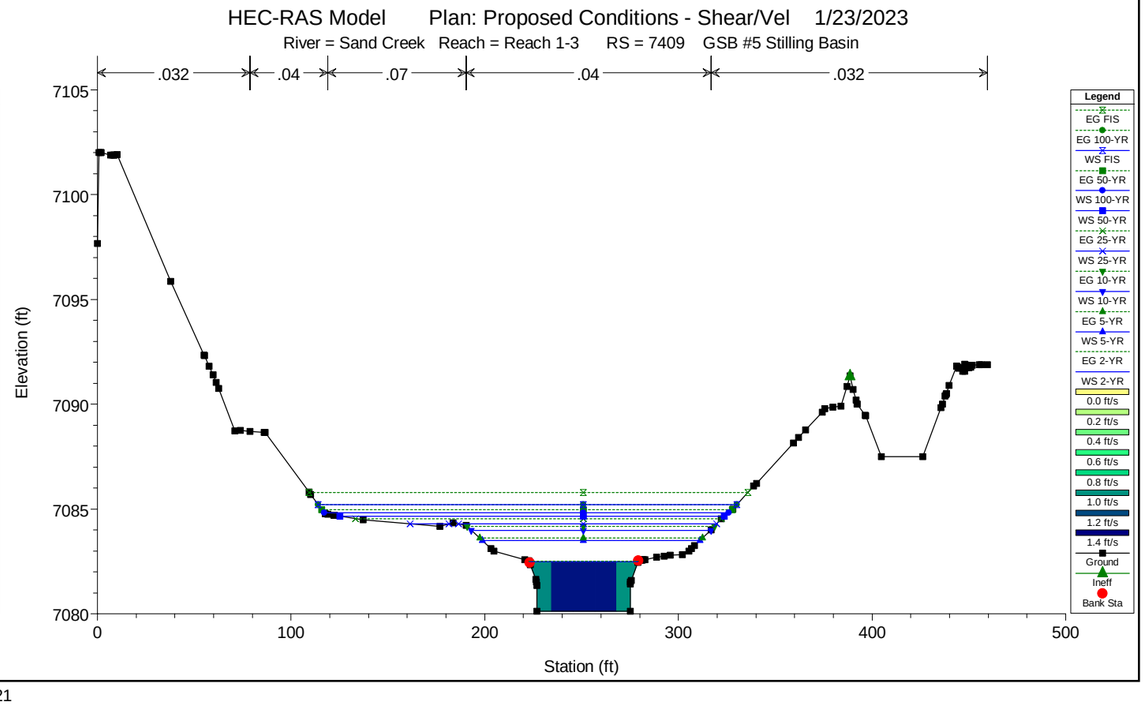

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7485
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7455
.032
.04
.07
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7445 GSB #5 Crest
.032
.04
.07
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

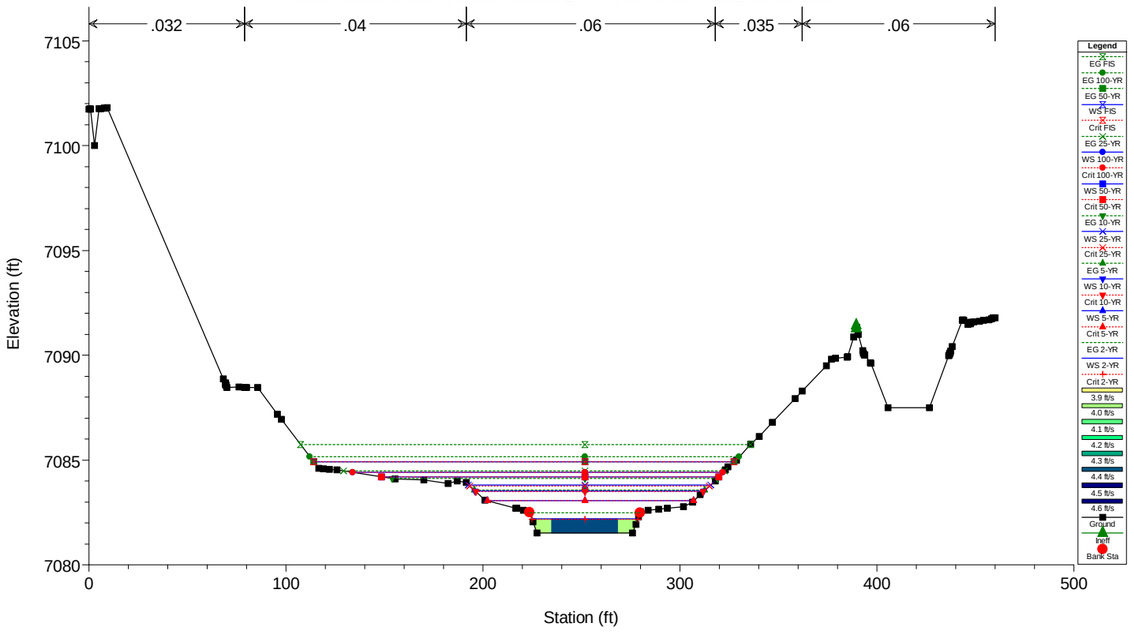

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7430 GSB #5 Mid
.032
.04
.07
.04
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7422 GSB #5 Toe
.032
.04
.04
.07
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7409 GSB #5 Stilling Basin
.032
.04
.07
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Ineff
Bank Sta

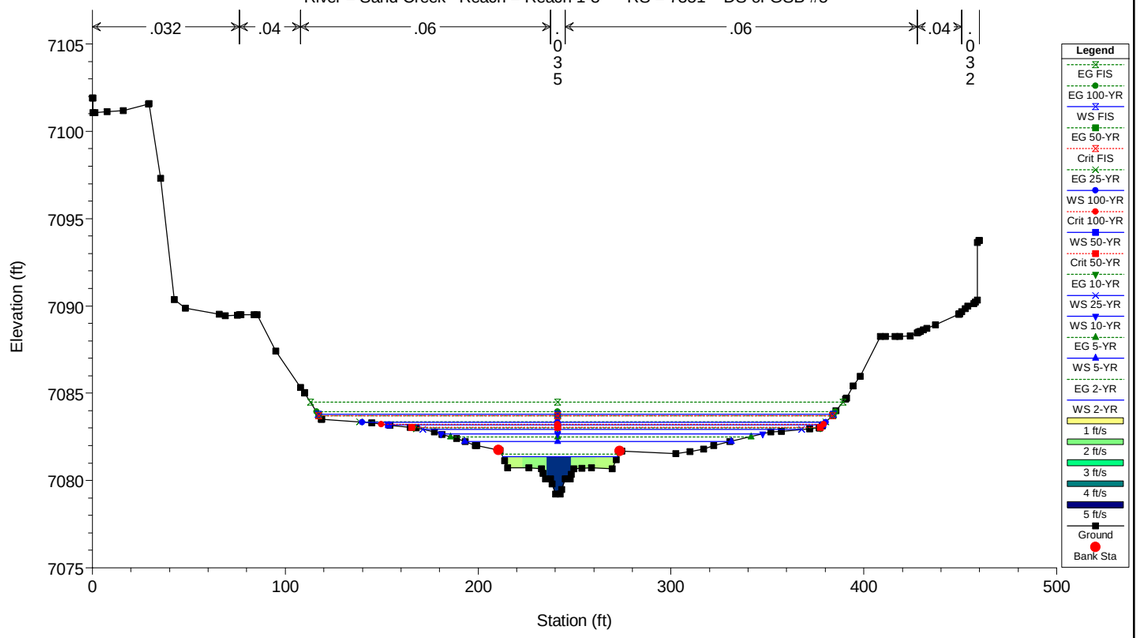
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7406 GSB #5 Sill Wall



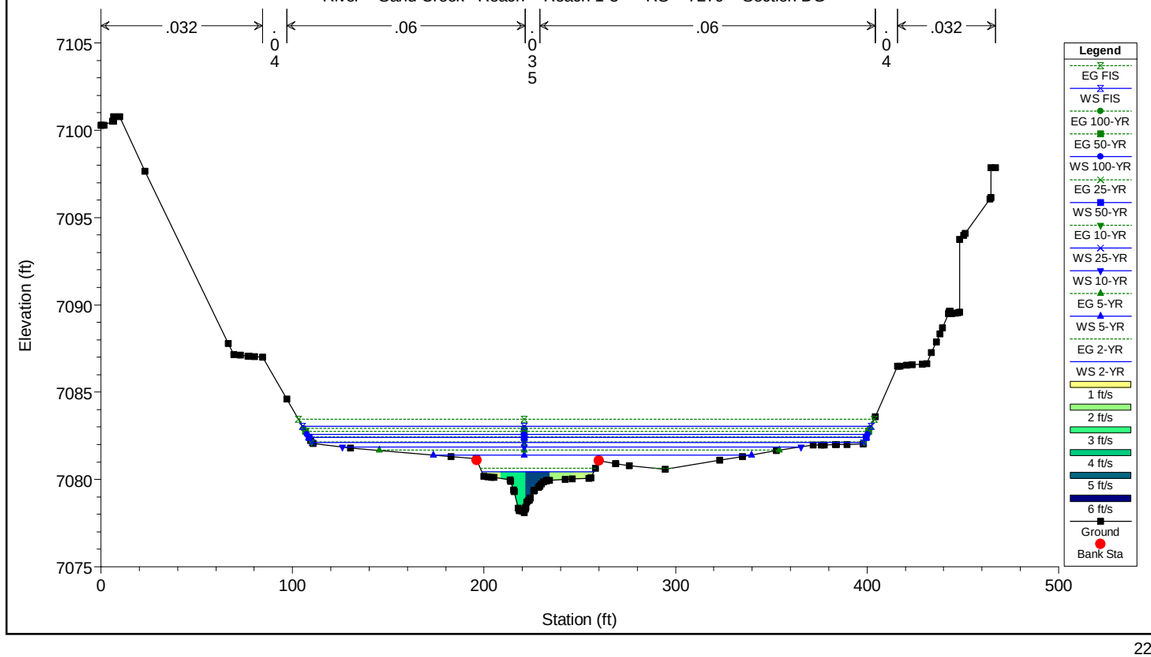

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7351 DS of GSB #5



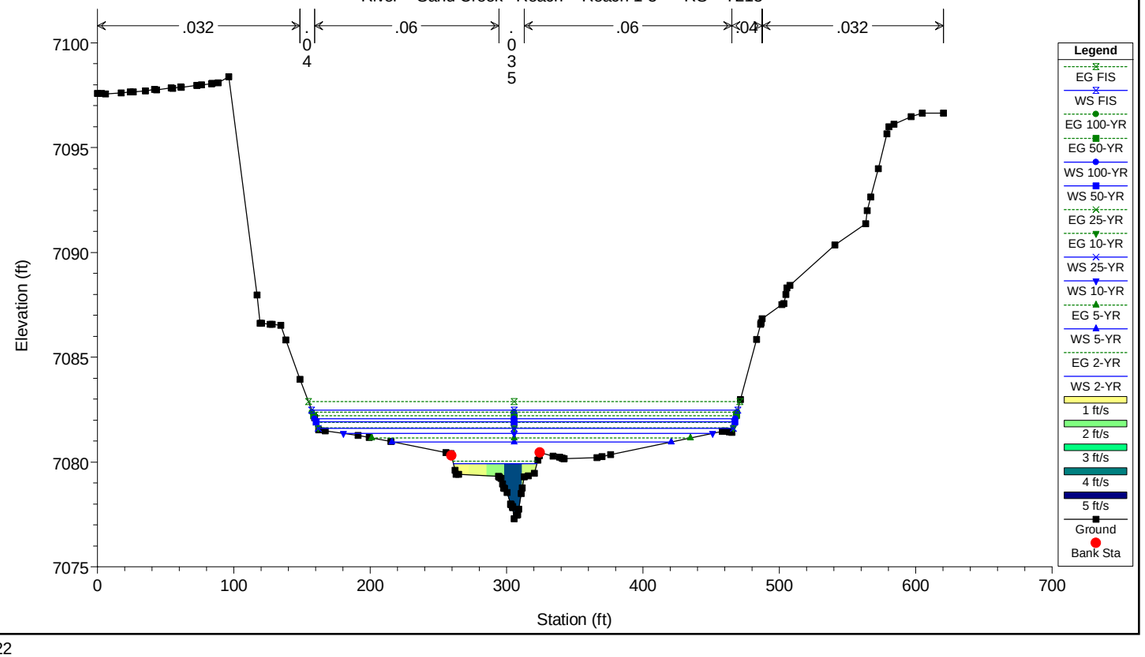

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7279 Section DG



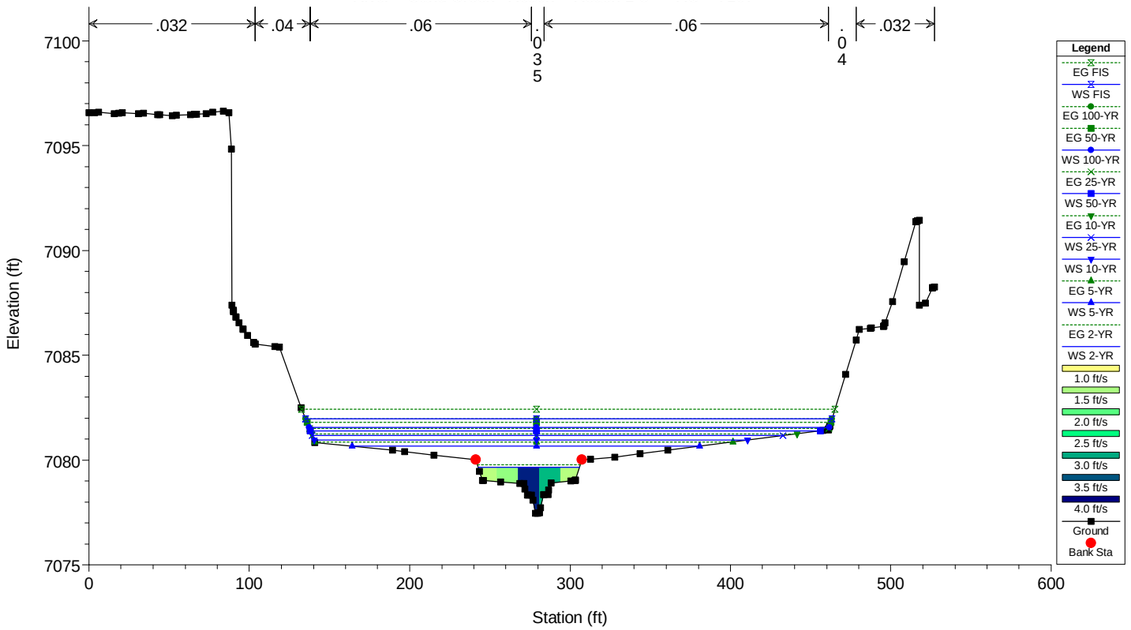

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7213



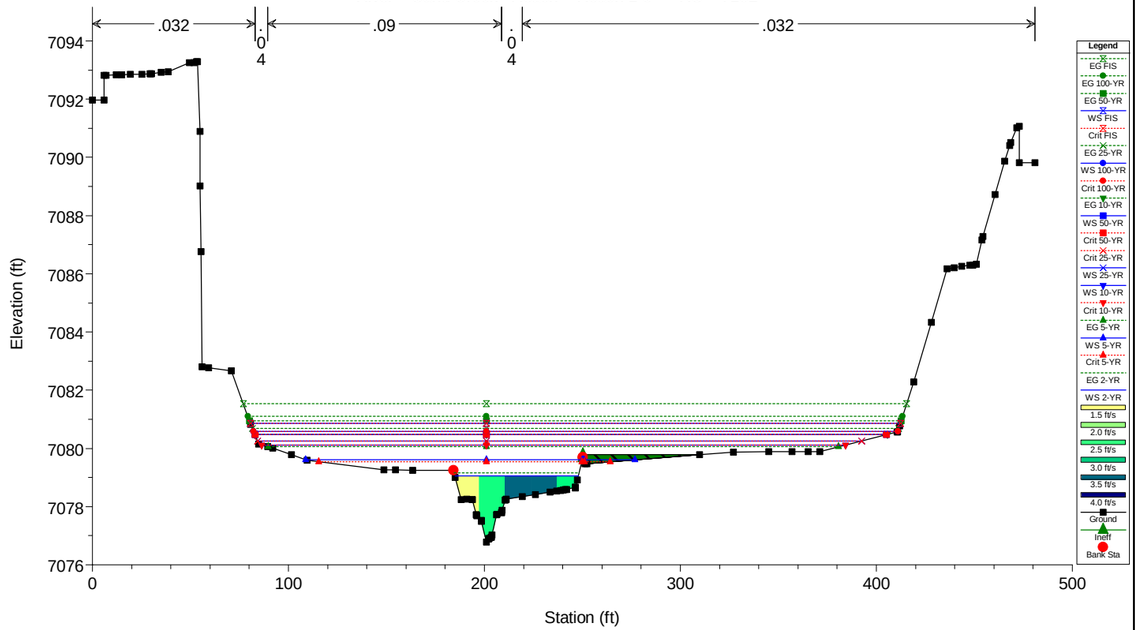
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7167



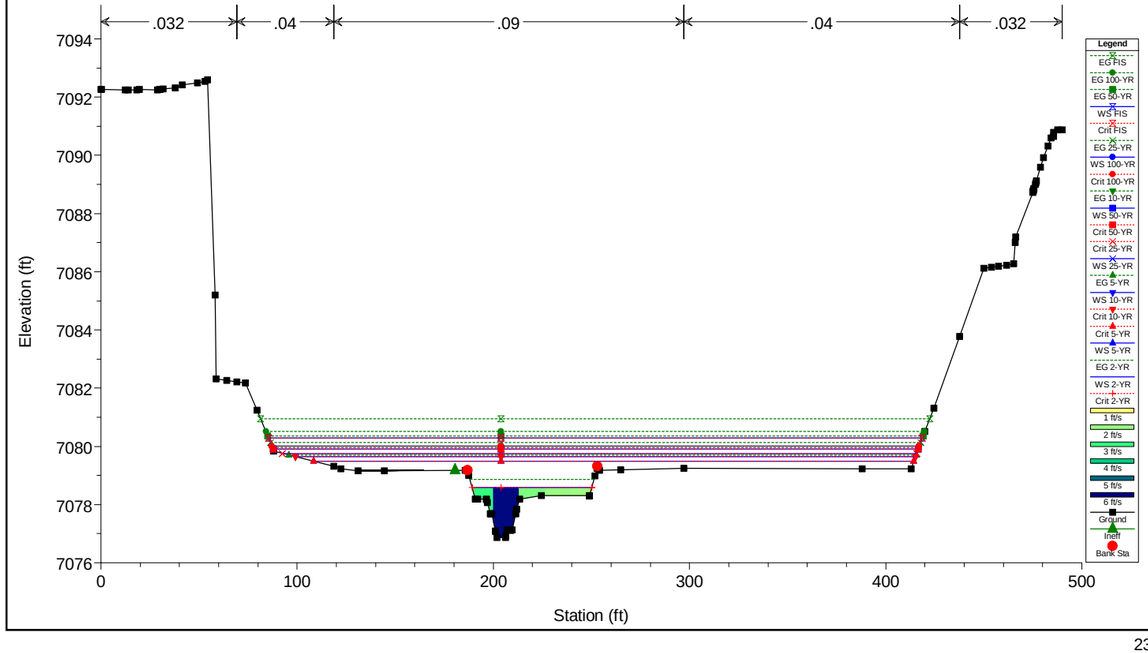

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 7102



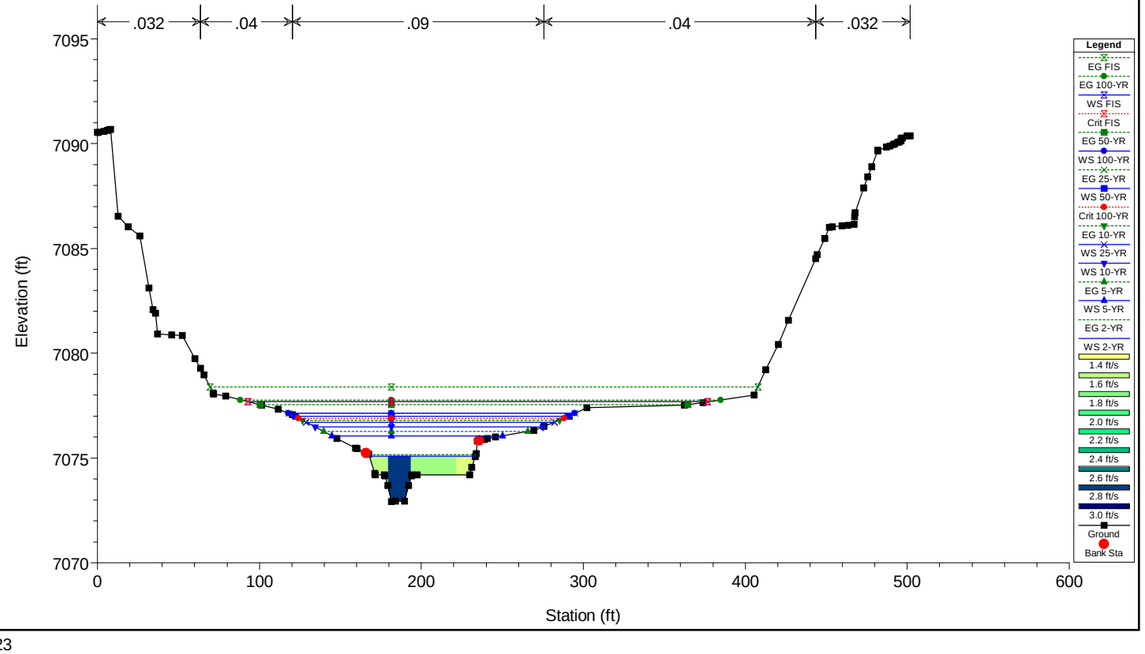

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

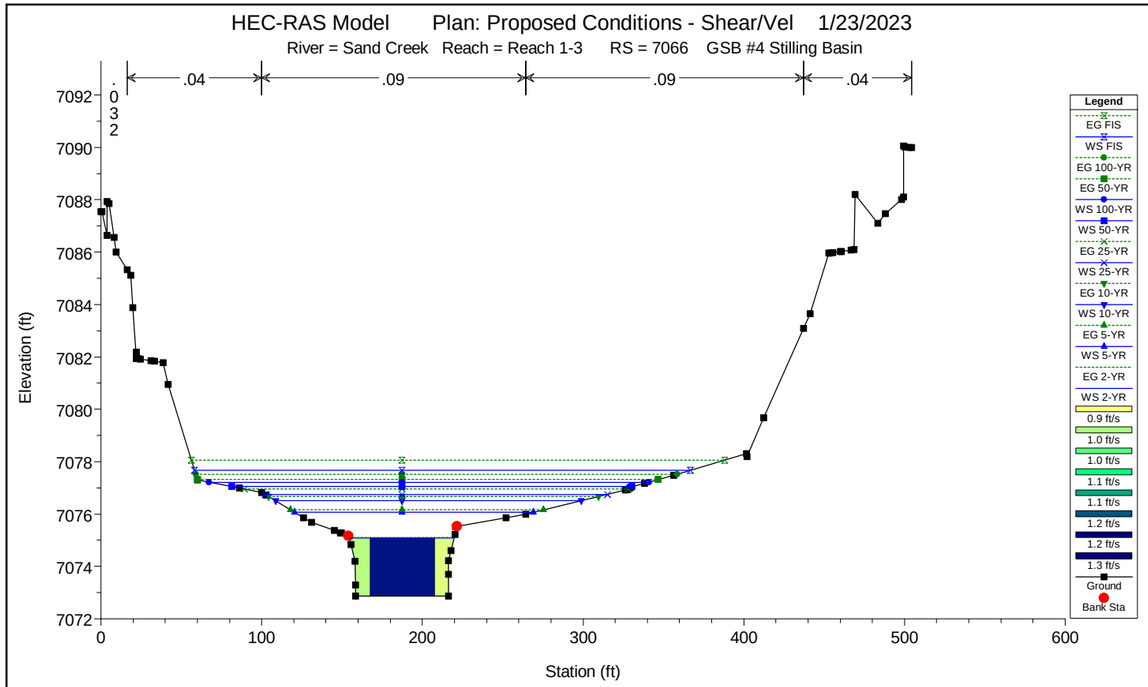
River = Sand Creek Reach = Reach 1-3 RS = 7093 GSB #4 Crest

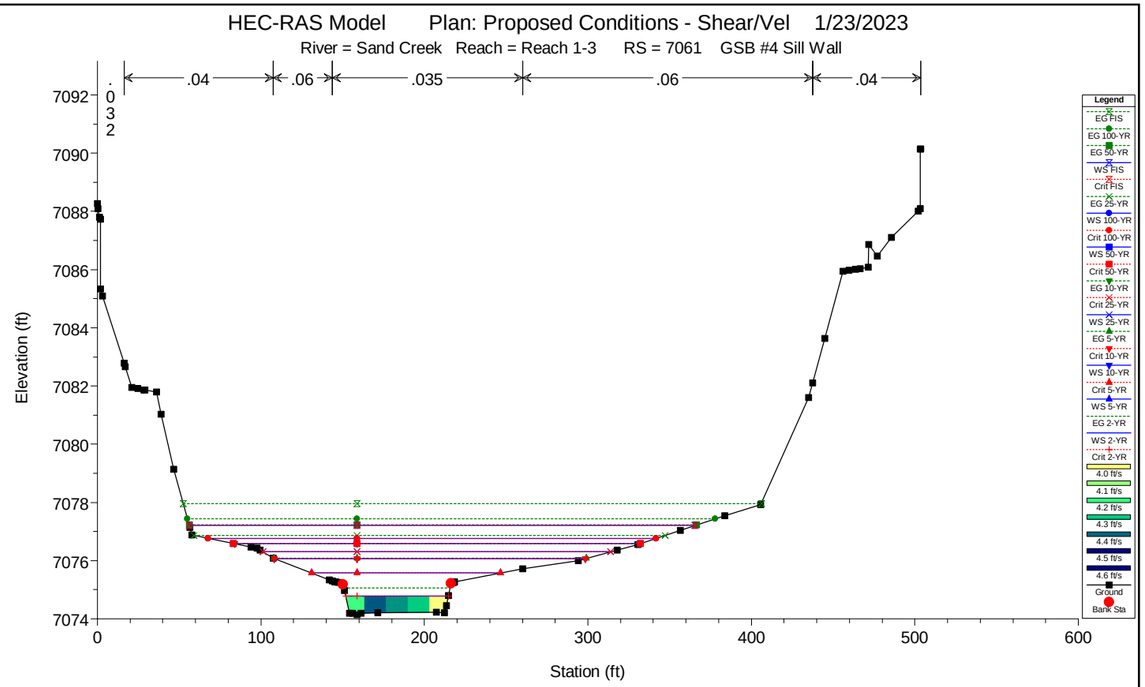


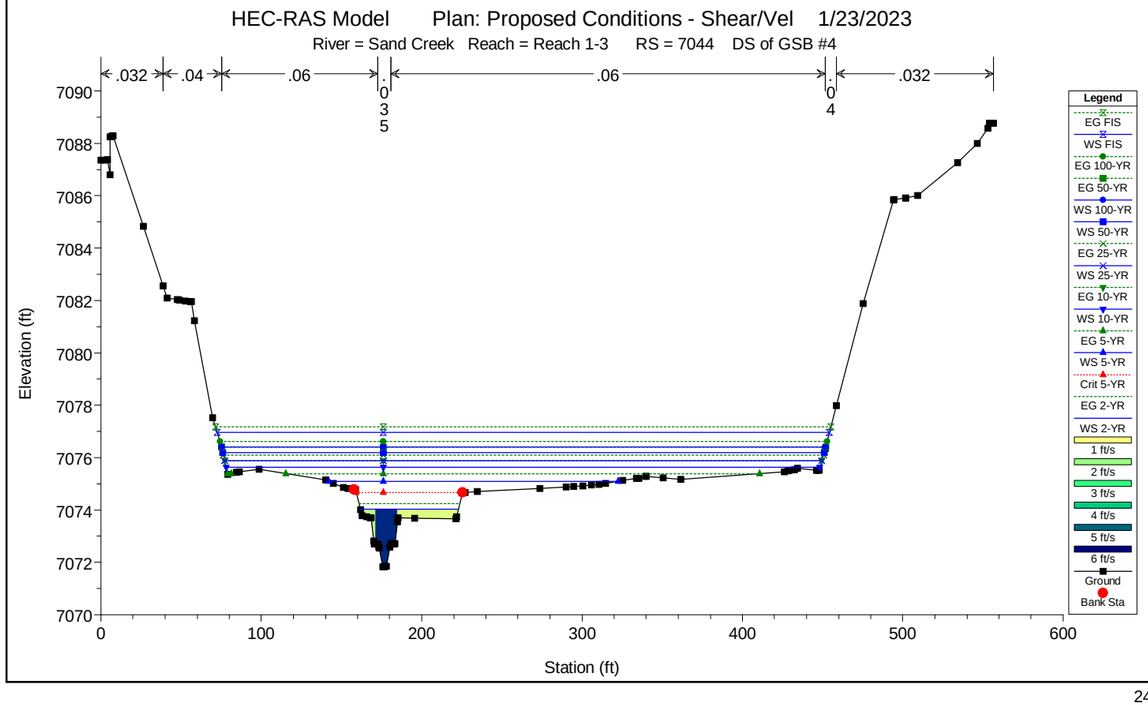

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

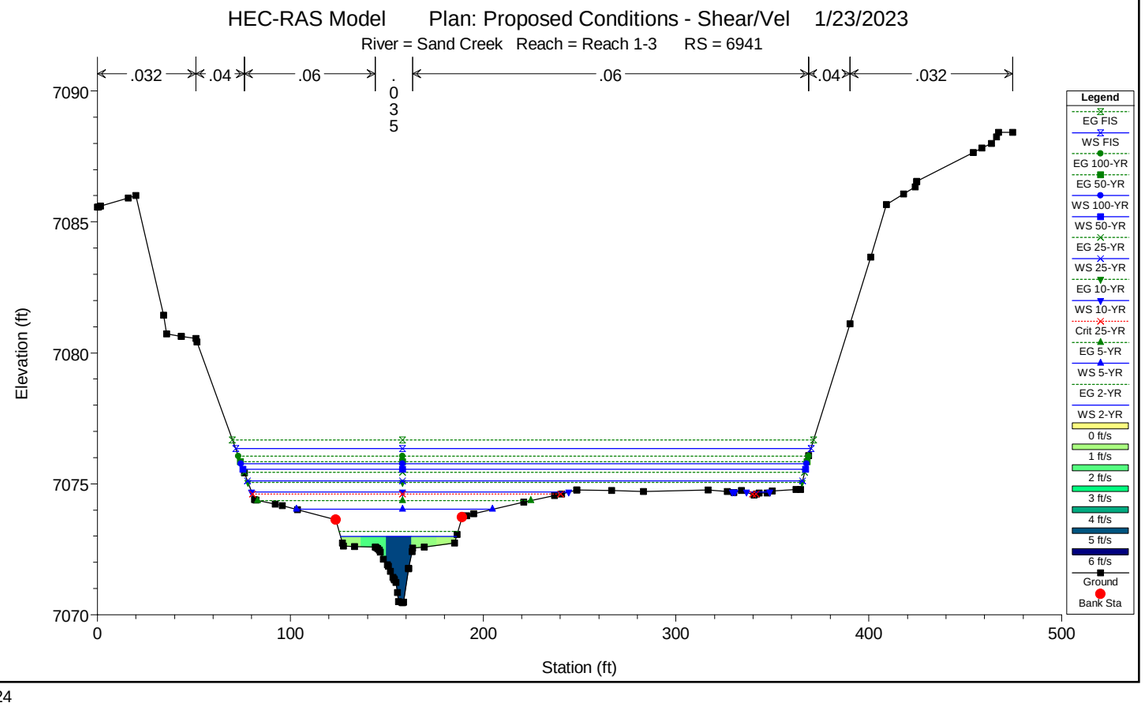
River = Sand Creek Reach = Reach 1-3 RS = 7073 GSB #4 Toe

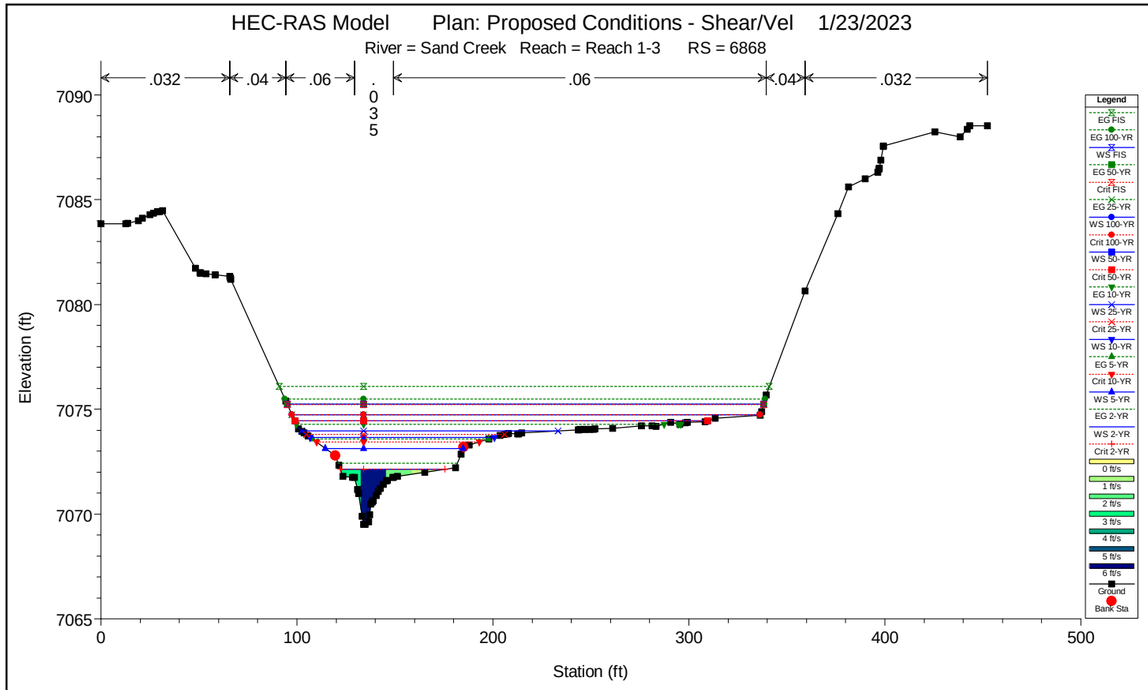


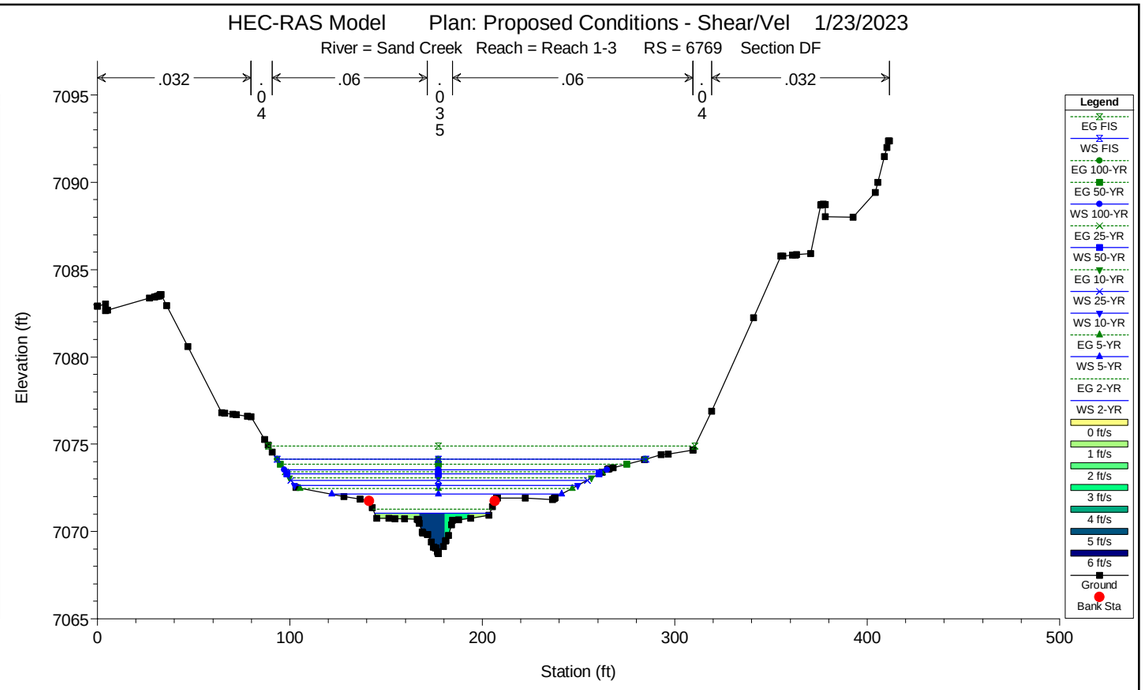

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7066 GSB #4 Stilling Basin
.04
.09
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.9 ft/s
1.0 ft/s
1.0 ft/s
1.1 ft/s
1.1 ft/s
1.2 ft/s
1.2 ft/s
1.3 ft/s
Ground
Bank Sta

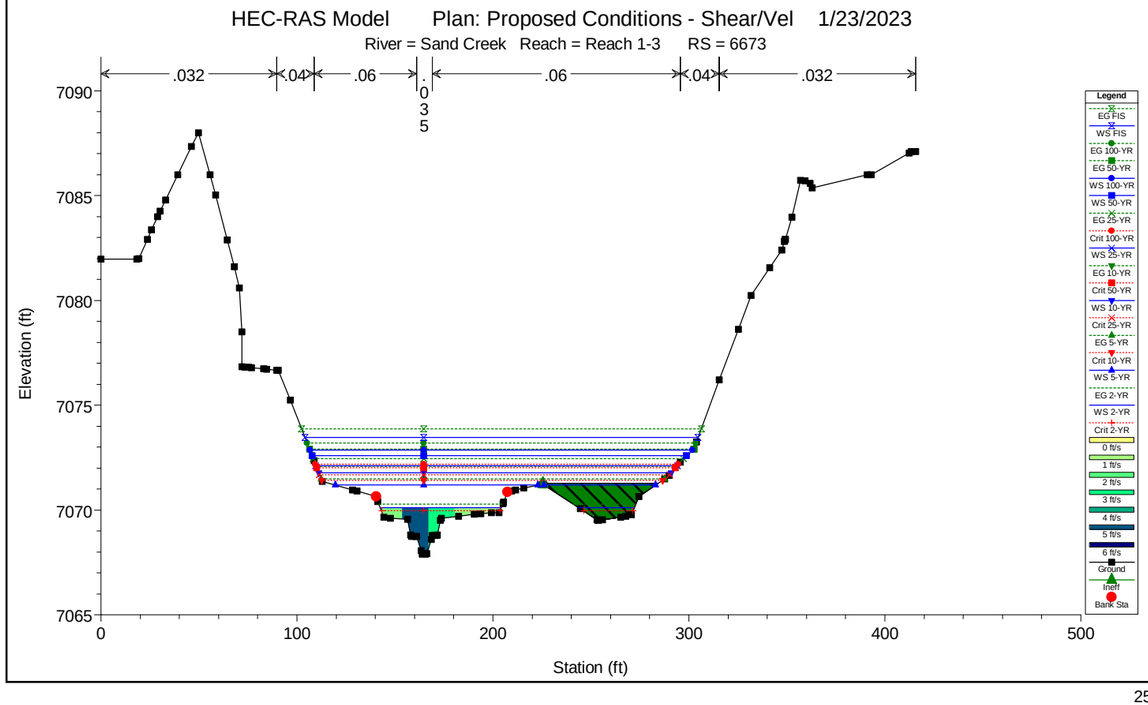

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7061 GSB #4 Sill Wall
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
4.0 ft/s
4.1 ft/s
4.2 ft/s
4.3 ft/s
4.4 ft/s
4.5 ft/s
4.6 ft/s
Ground
Bank Sta

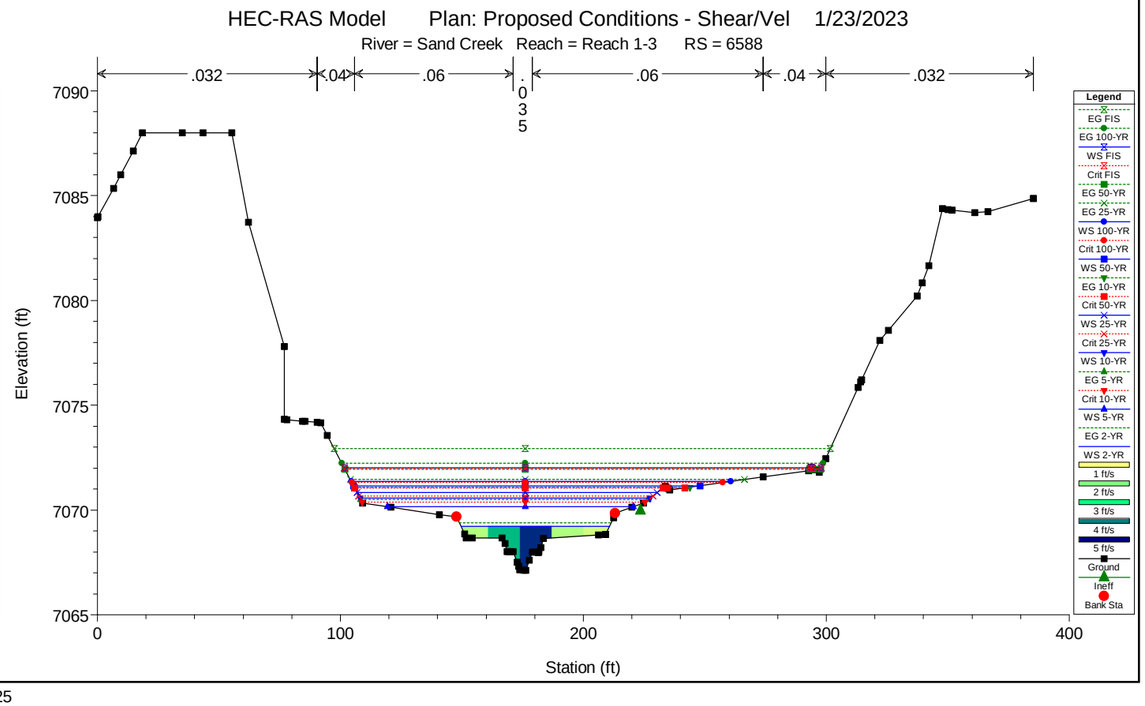

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7044 DS of GSB #4
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

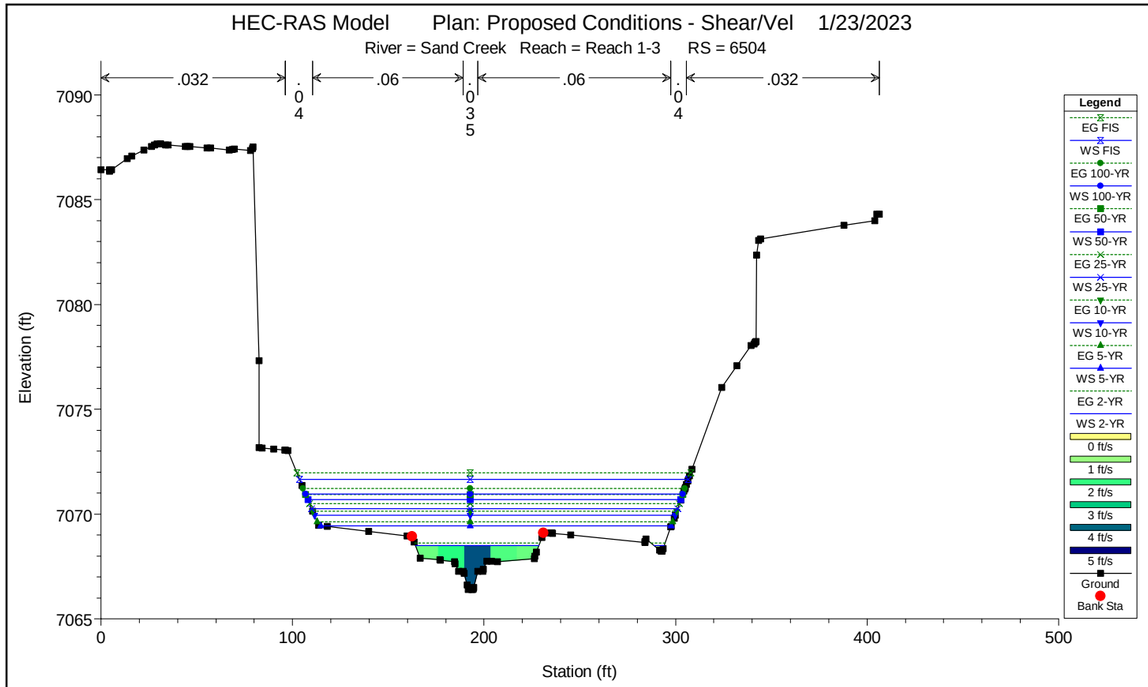

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6941
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
Crit 25-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

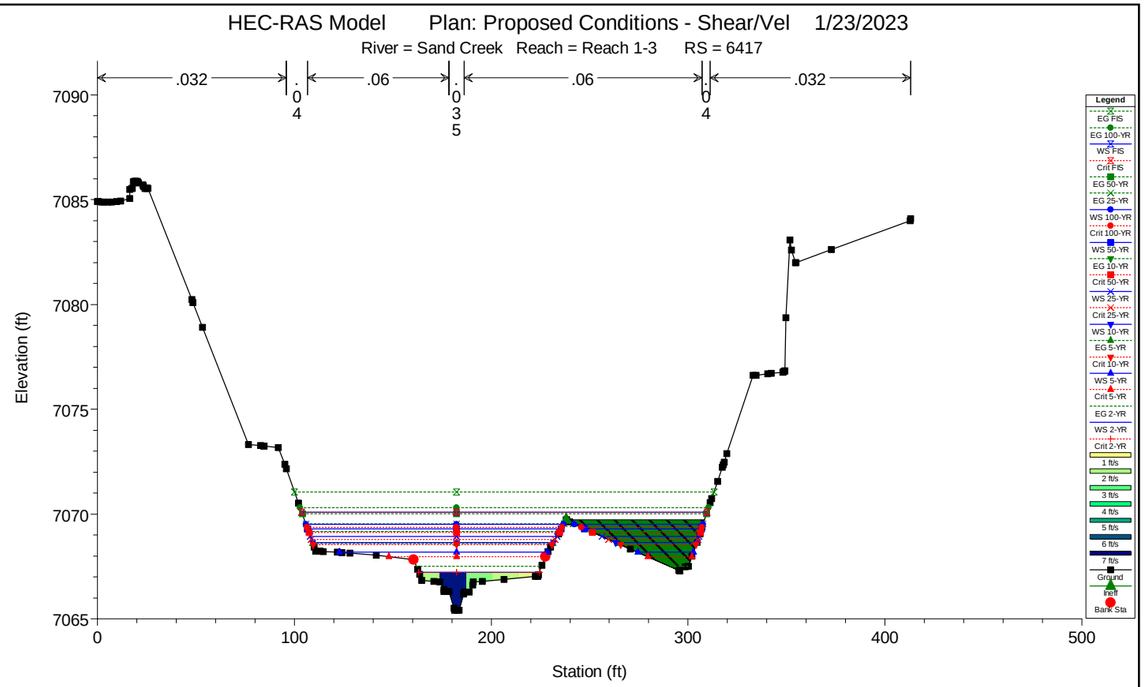

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6868
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

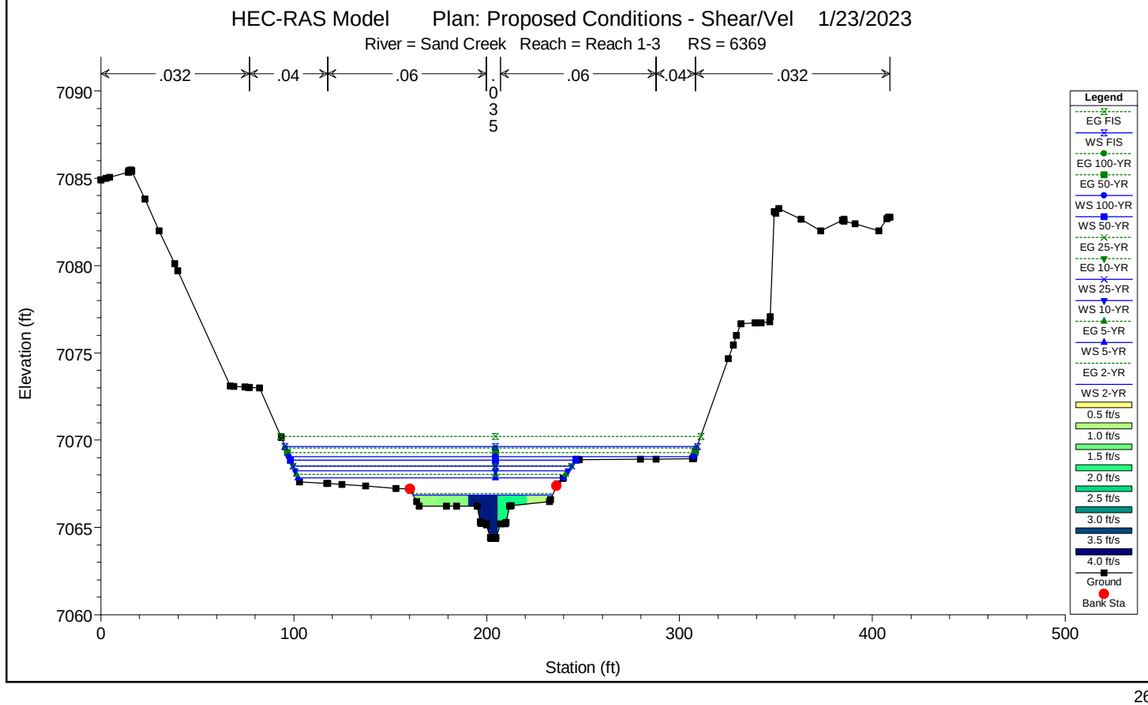

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6769 Section DF
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

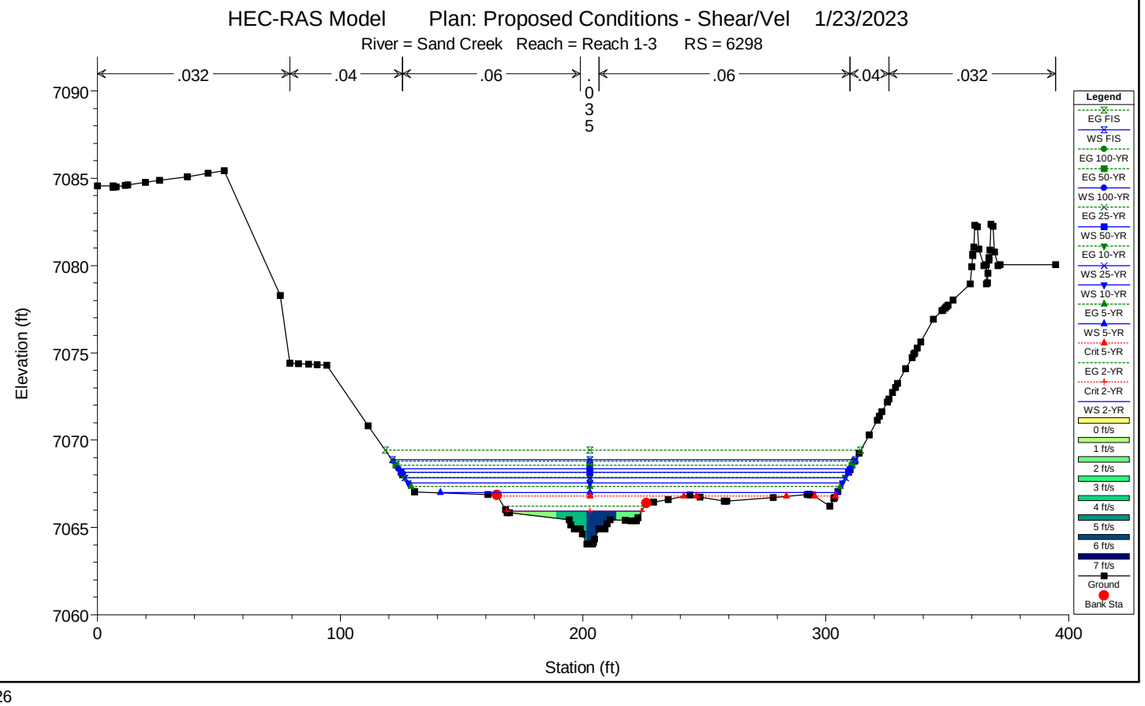

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6673
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
Crit 100-YR
WS 25-YR
EG 10-YR
Crit 50-YR
WS 10-YR
Crit 25-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

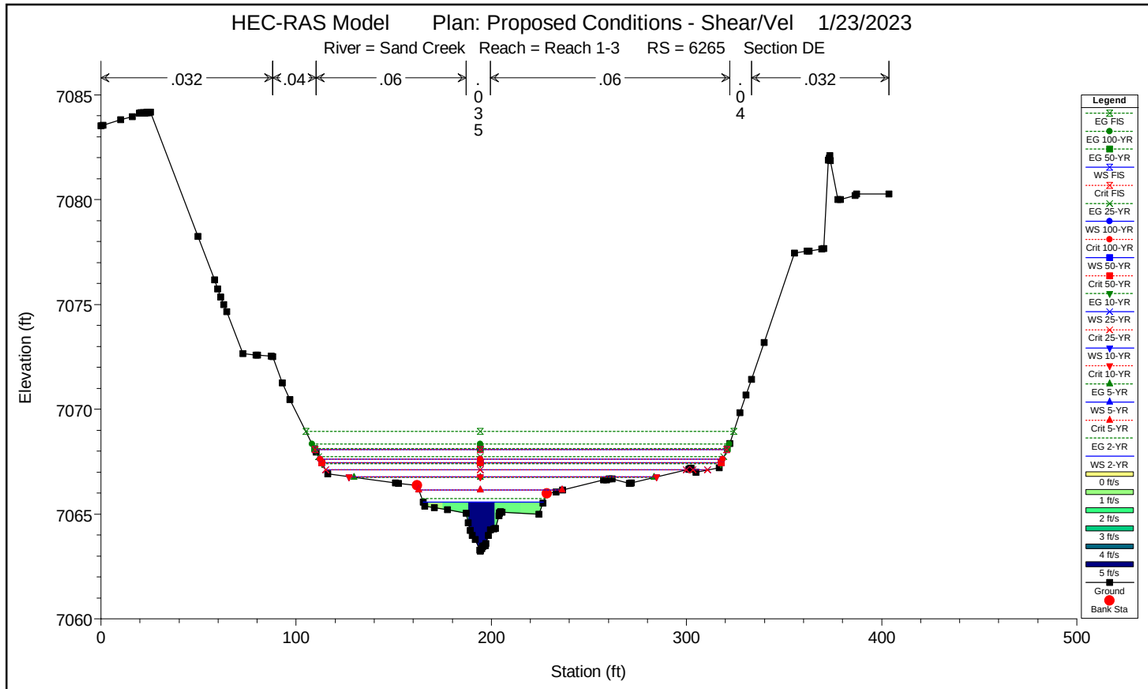

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6588
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

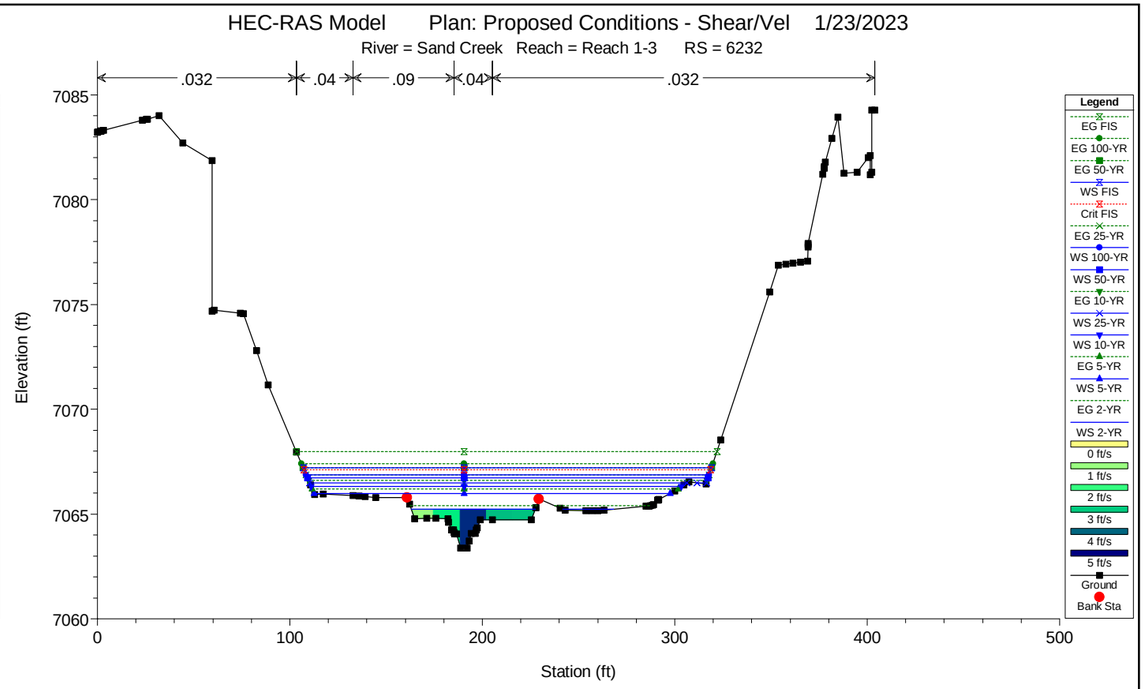

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6504
.032
.04
.06
.06
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

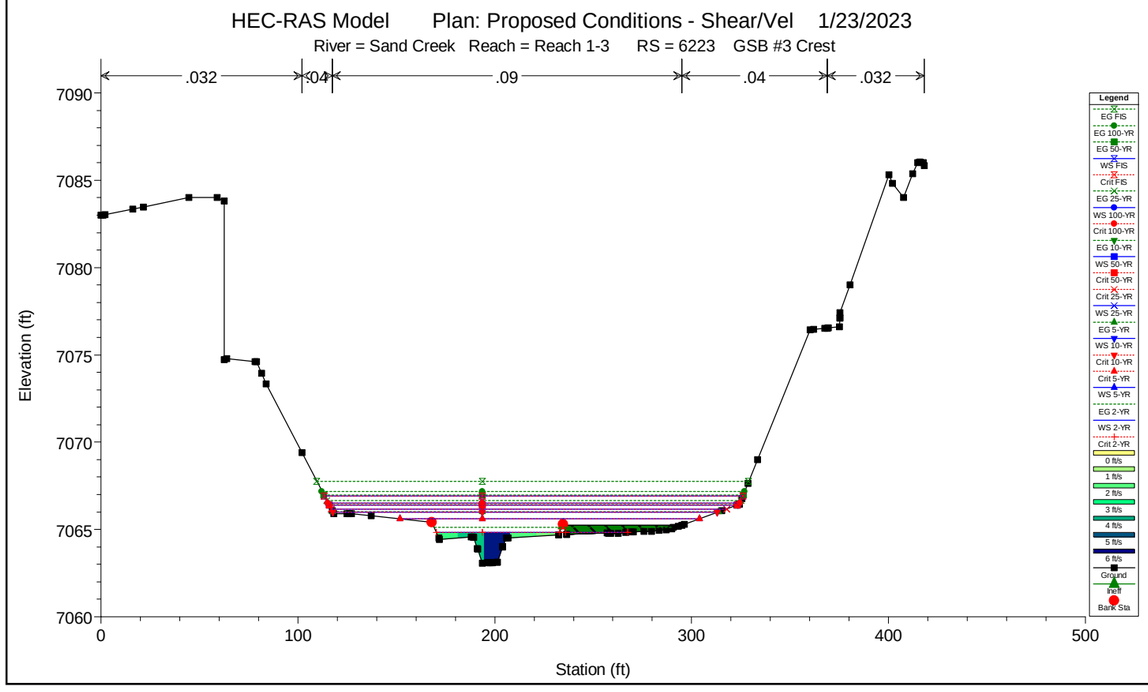

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6417
.032
.04
.06
.06
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Levee
Bank Sta

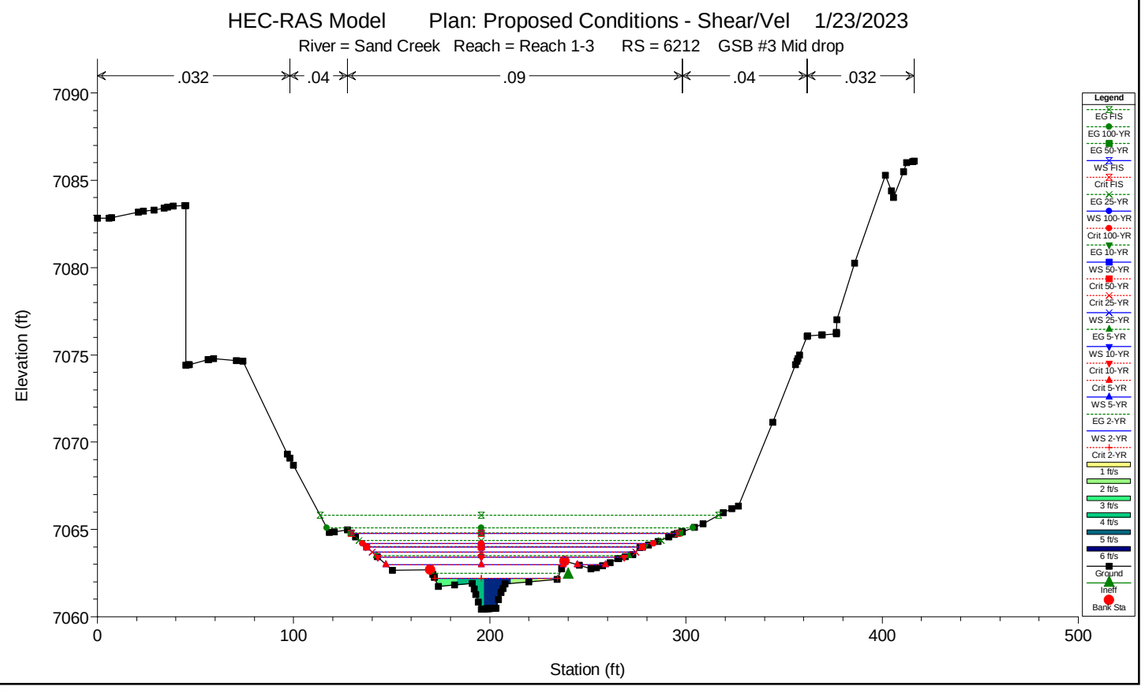

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6369
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

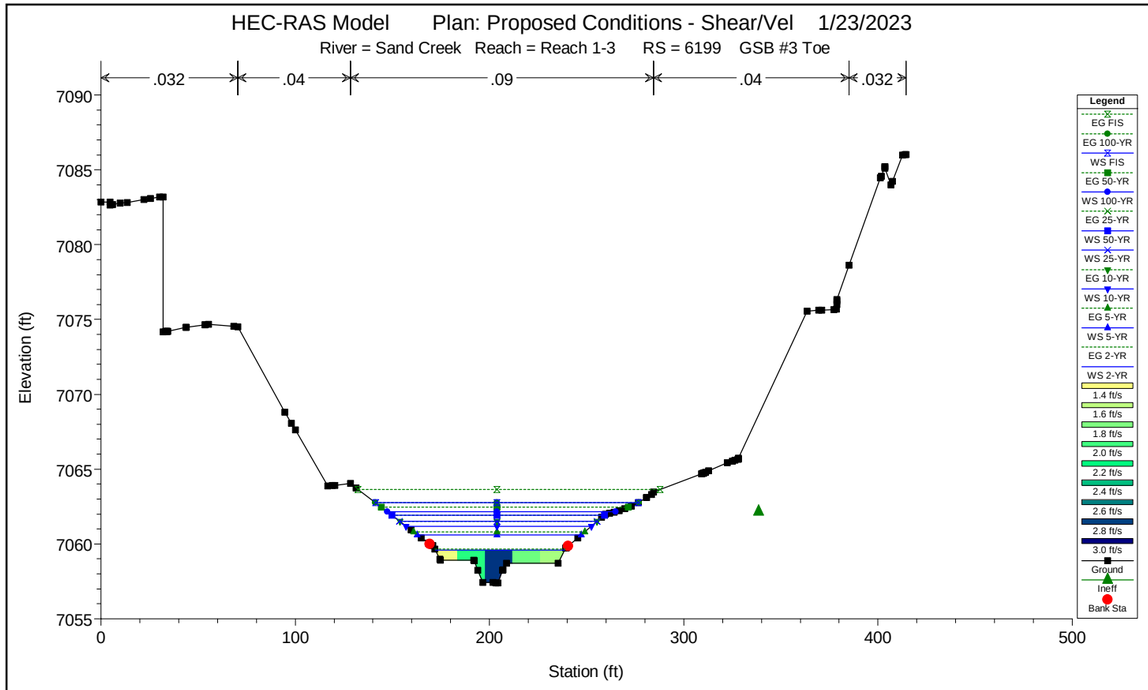

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6298
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

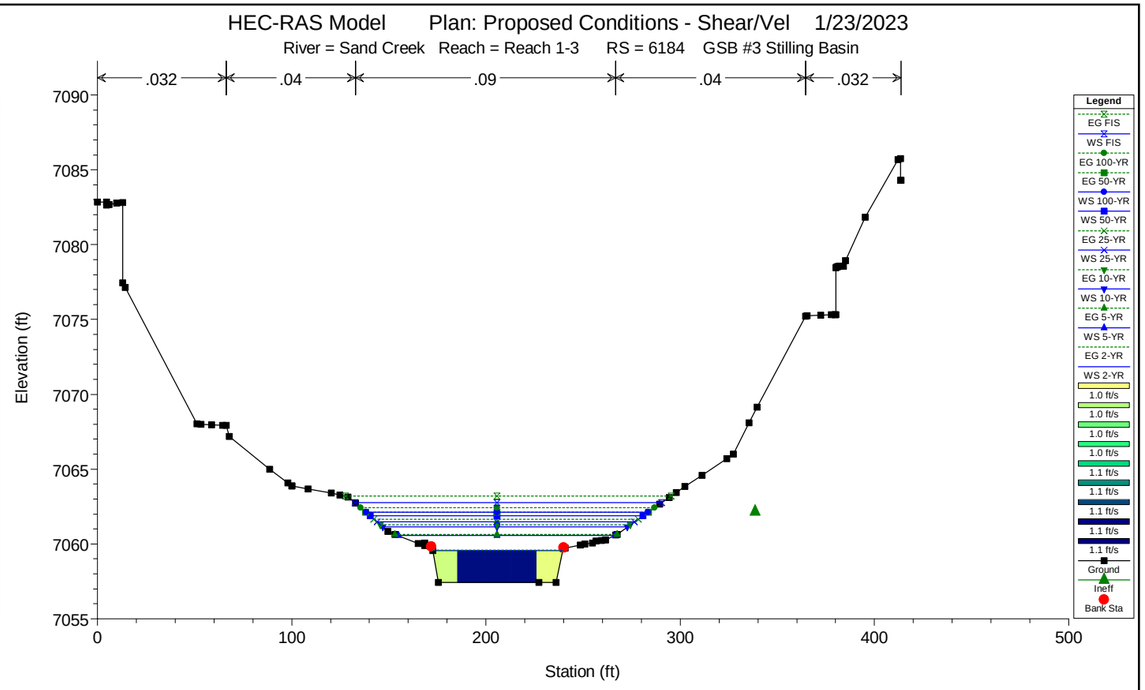

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6265 Section DE
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
Crit 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

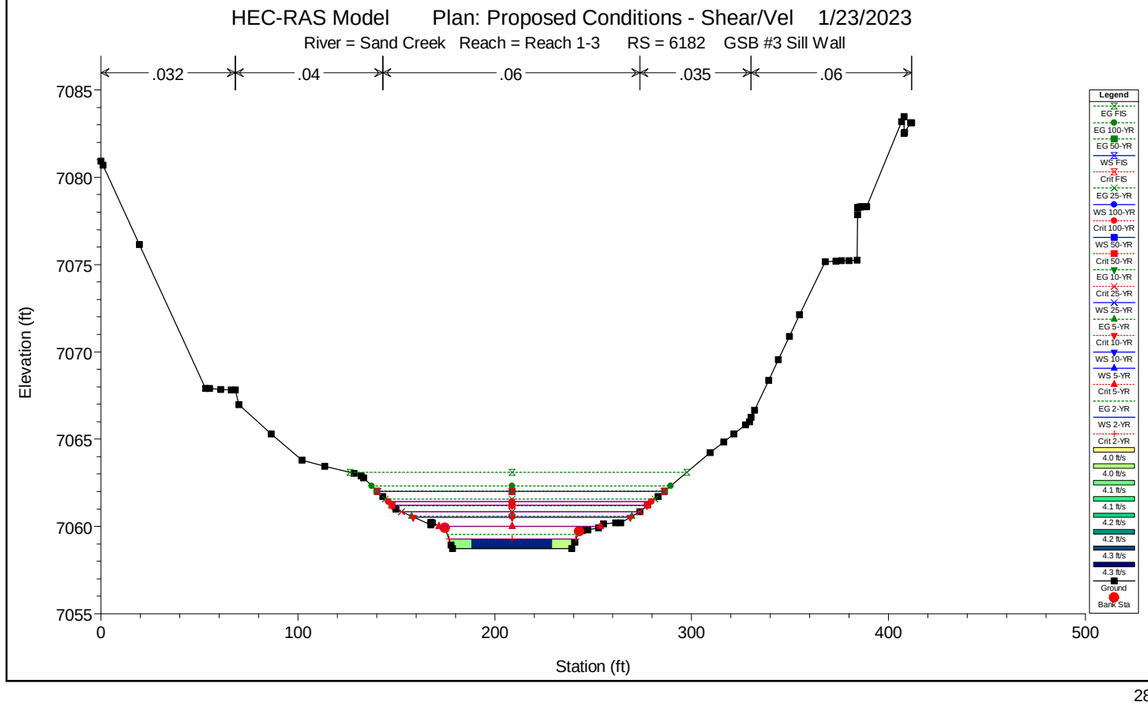

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6232
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

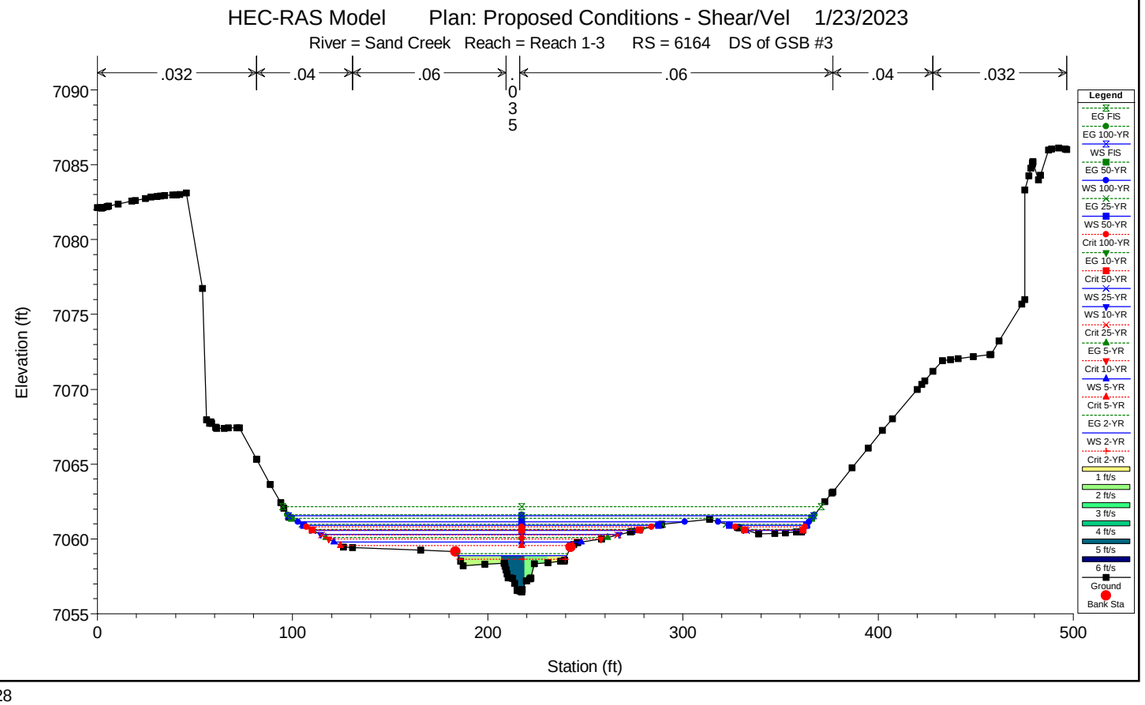

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6223 GSB #3 Crest
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

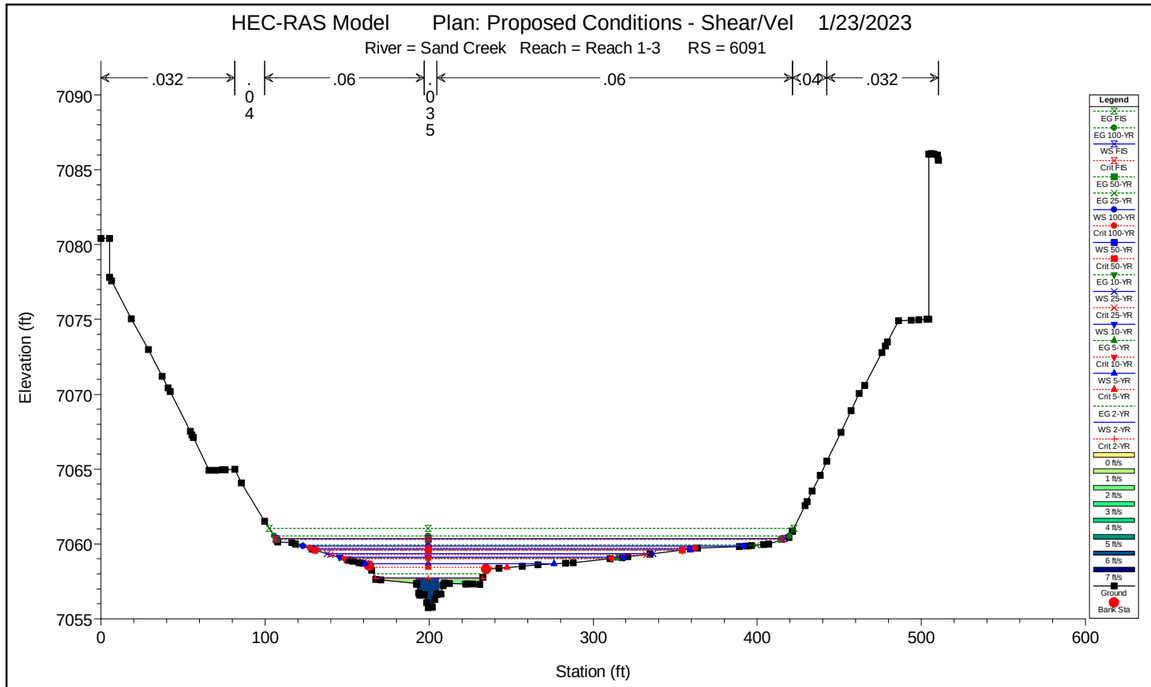

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6212 GSB #3 Mid drop
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

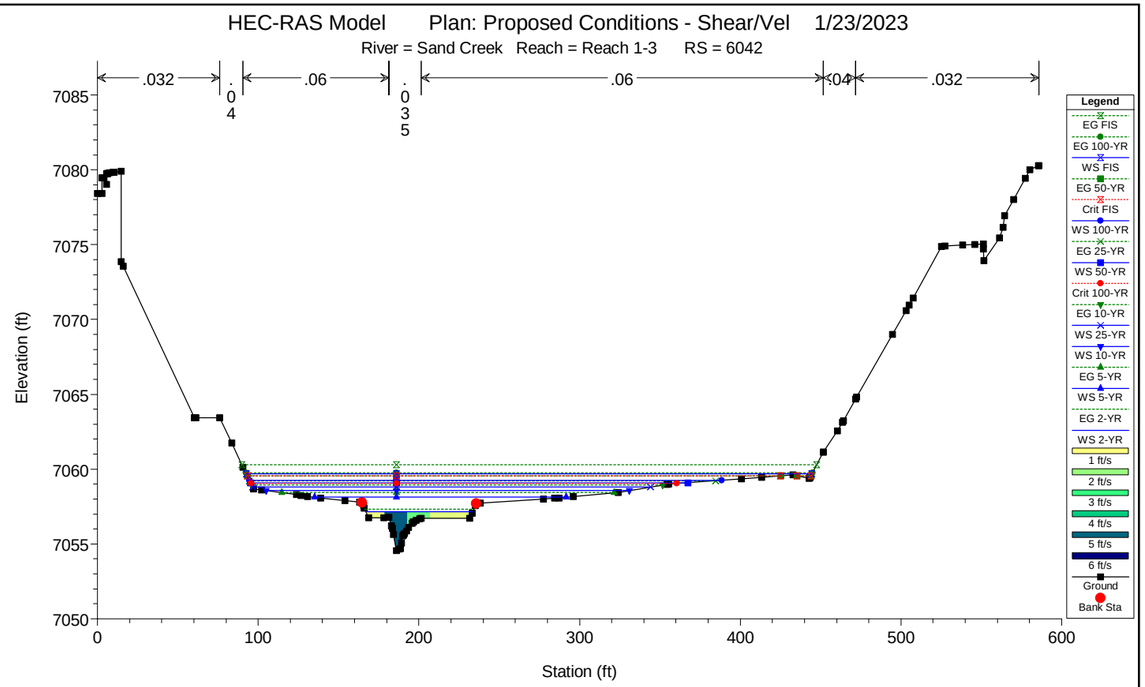

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6199 GSB #3 Toe
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
2.8 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta

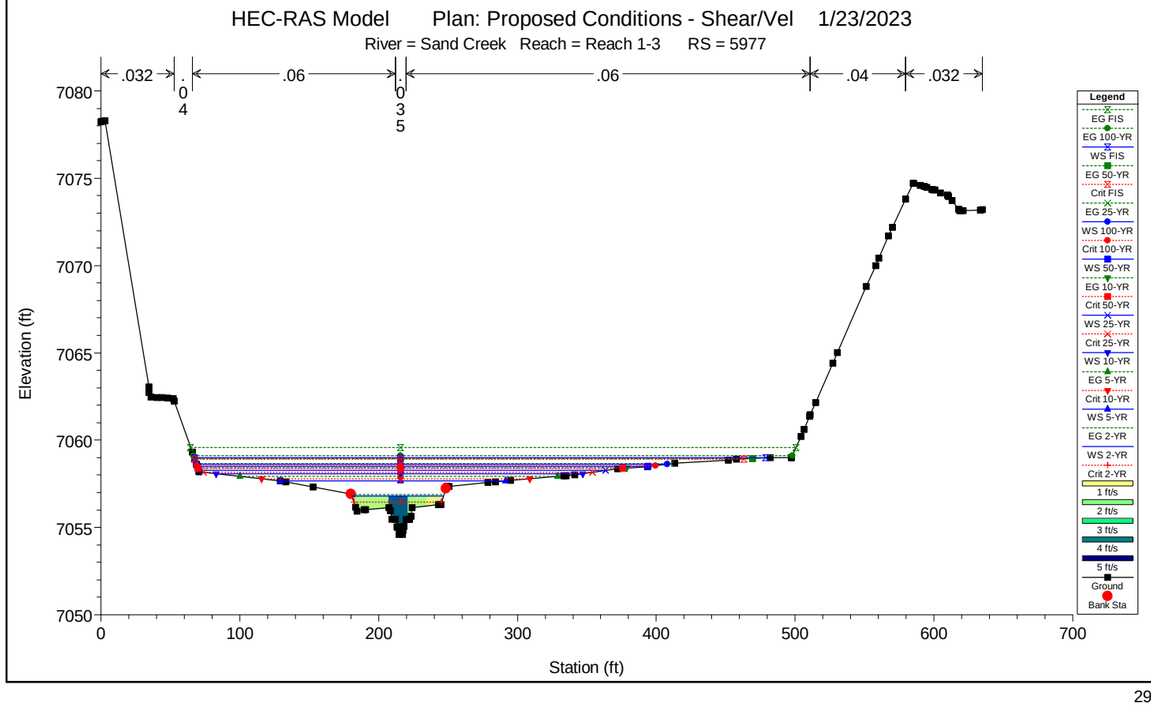

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6184 GSB #3 Stilling Basin
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.0 ft/s
1.0 ft/s
1.0 ft/s
1.1 ft/s
1.1 ft/s
1.1 ft/s
1.1 ft/s
Ground
Ineff
Bank Sta

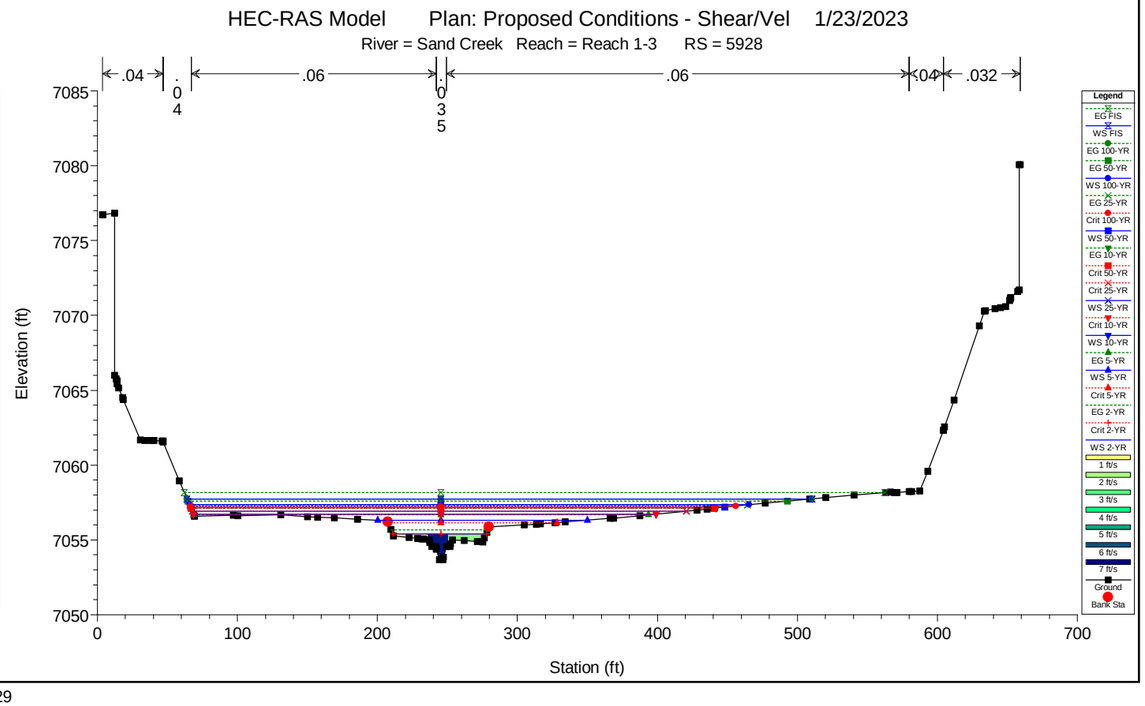

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6182 GSB #3 Sill Wall
.032
.04
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
4.0 ft/s
4.0 ft/s
4.1 ft/s
4.1 ft/s
4.2 ft/s
4.2 ft/s
4.3 ft/s
4.3 ft/s
Ground
Bank Sta

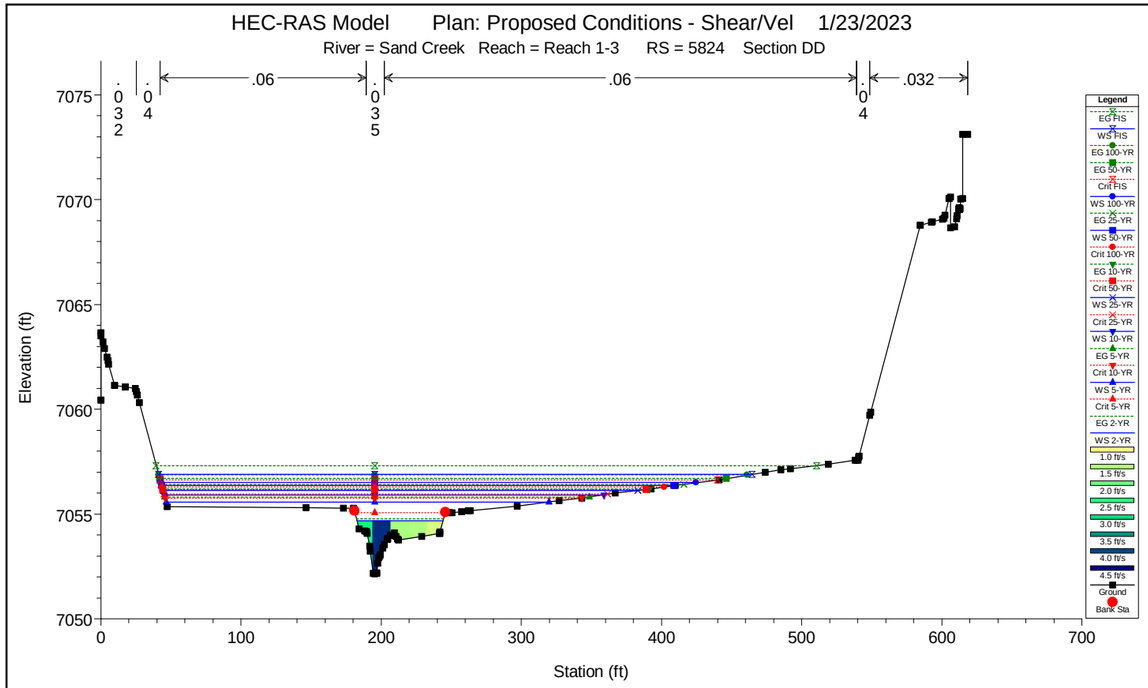

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6164 DS of GSB #3
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
Crit 100-YR
EG 10-YR
Crit 50-YR
WS 25-YR
WS 10-YR
Crit 25-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

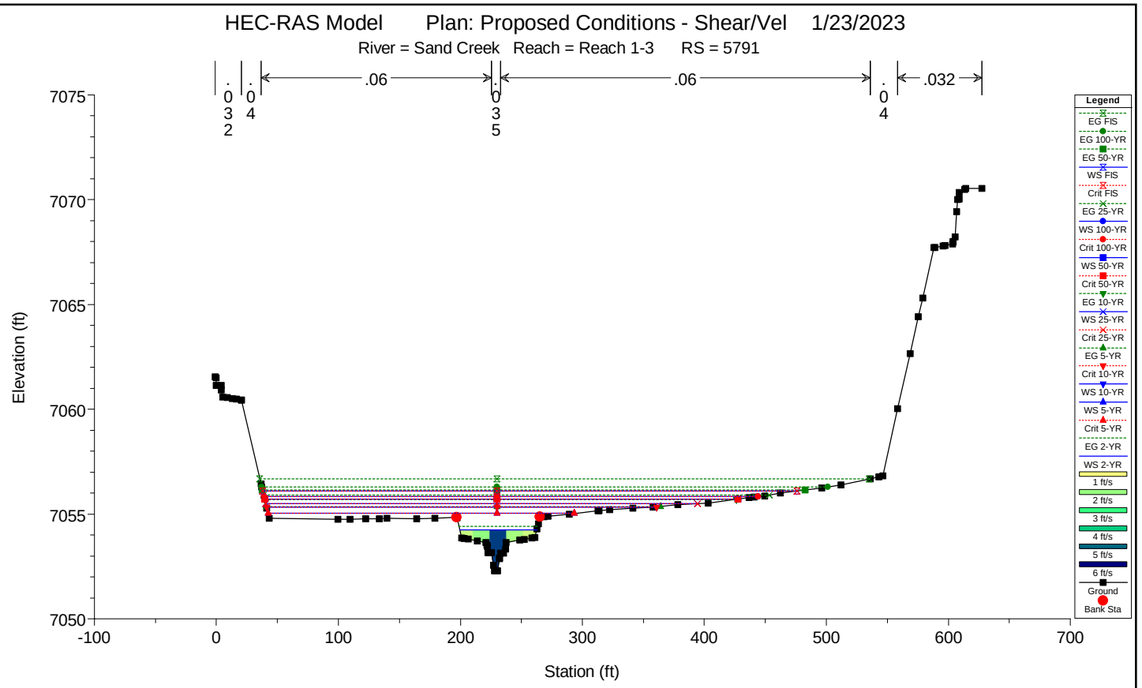

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6091
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

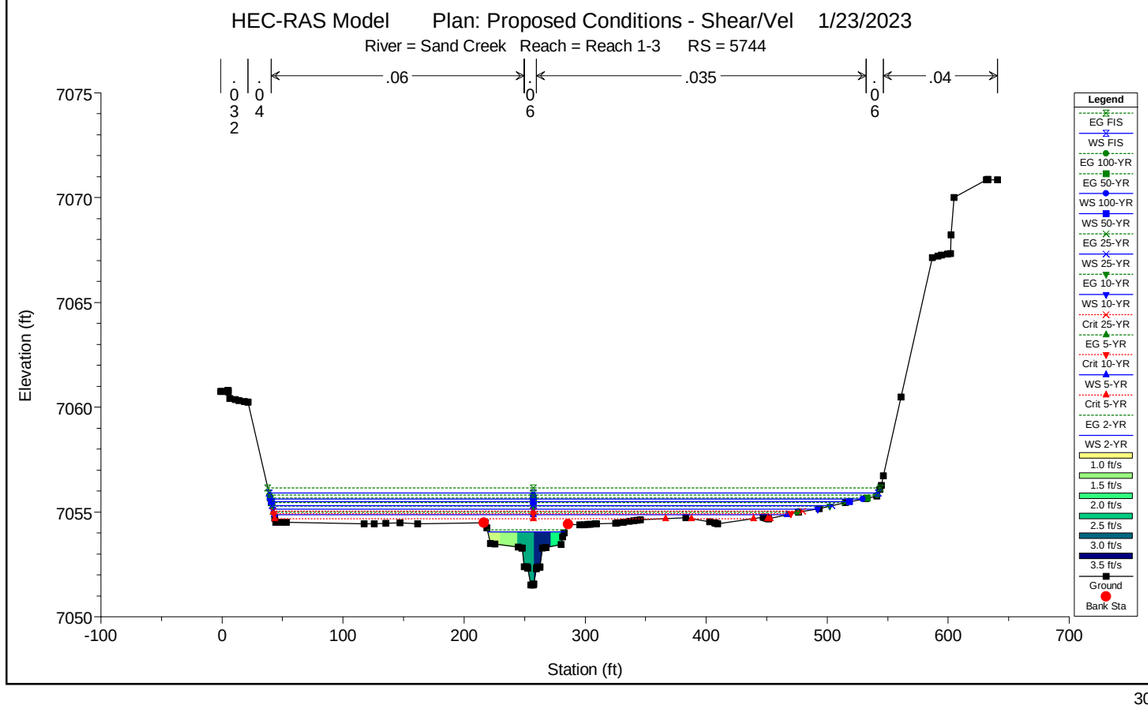

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6042
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
Crit FIS
WS 100-YR
EG 25-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

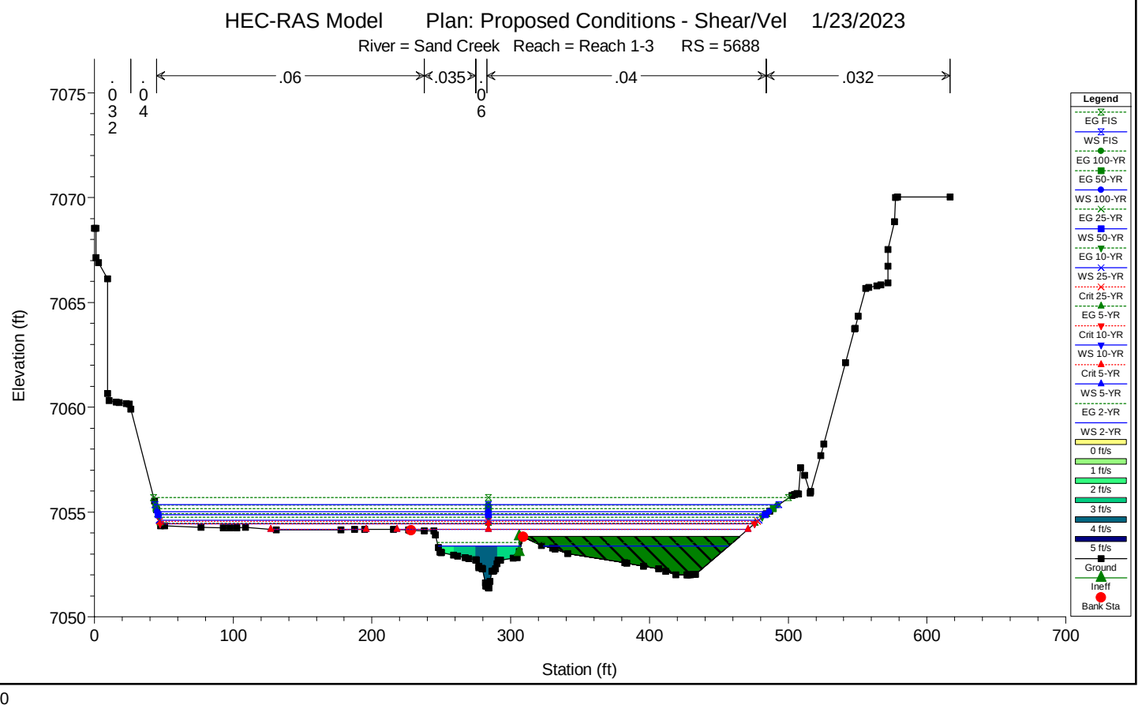

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5977
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5928
.04
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
Crit 100-YR
WS 50-YR
EG 10-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
Crit 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5824 Section DD
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
Crit FIS
WS 100-YR
EG 25-YR
WS 50-YR
Crit 100-YR
EG 10-YR
Crit 50-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

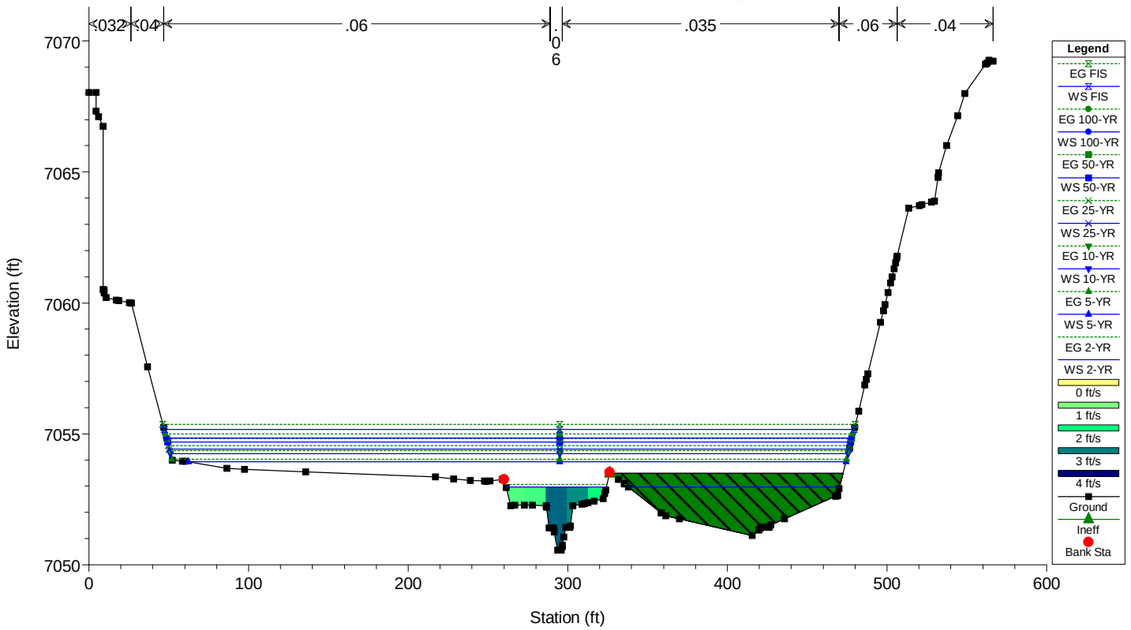

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5791
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5744
.04
.06
.035
.06
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
Crit 25-YR
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5688
.04
.06
.035
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

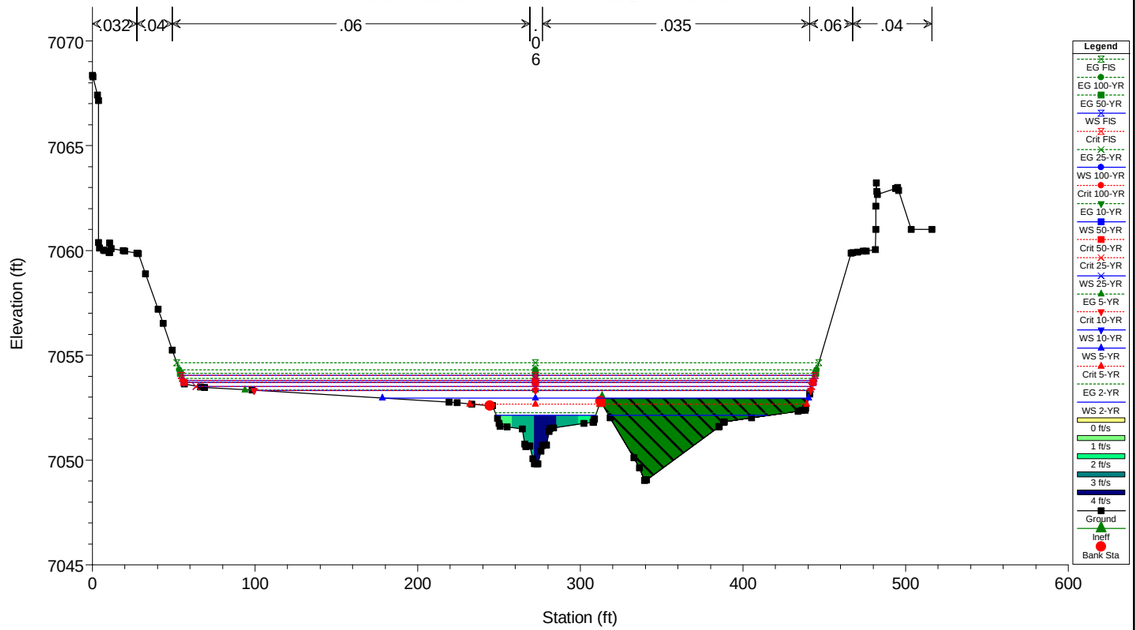
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 5628



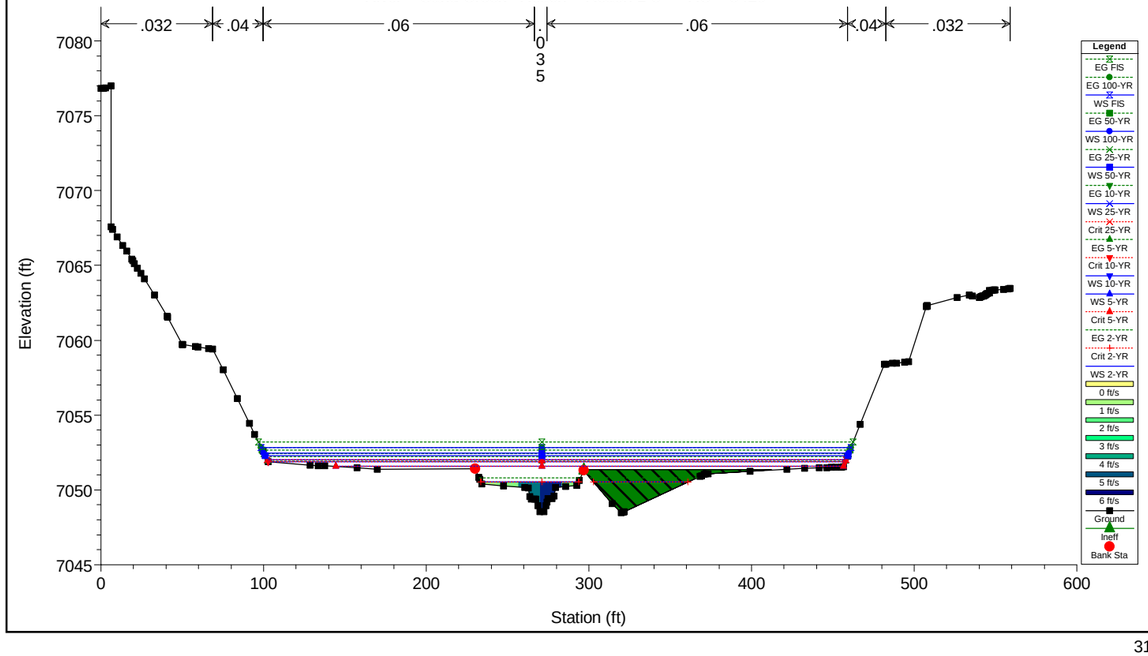

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 5568



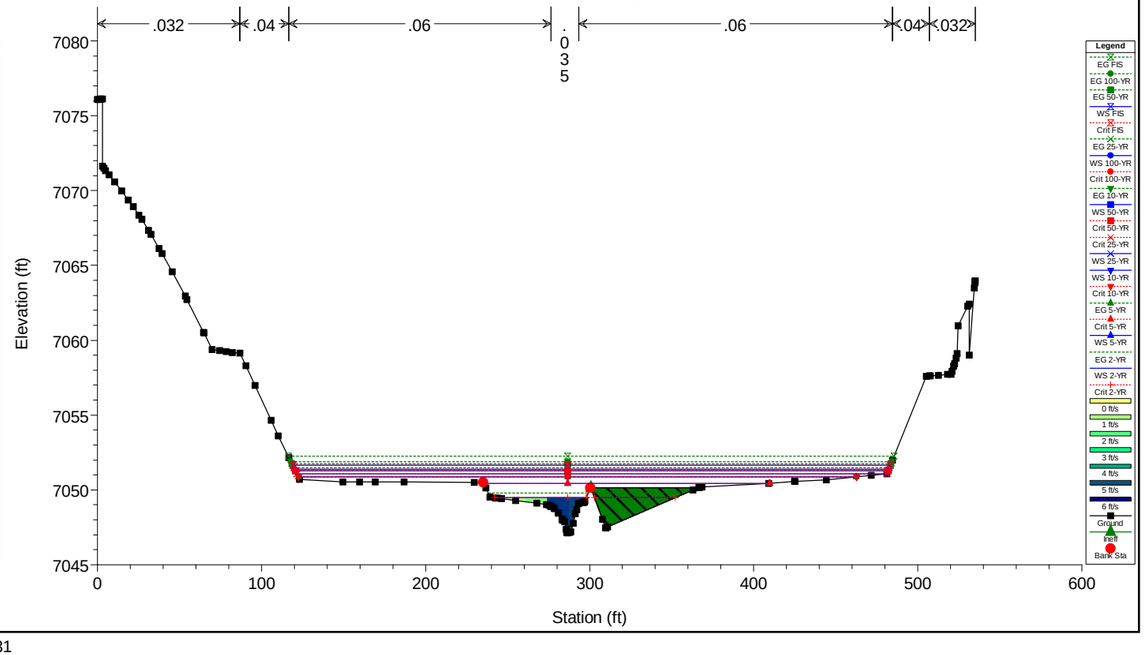

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

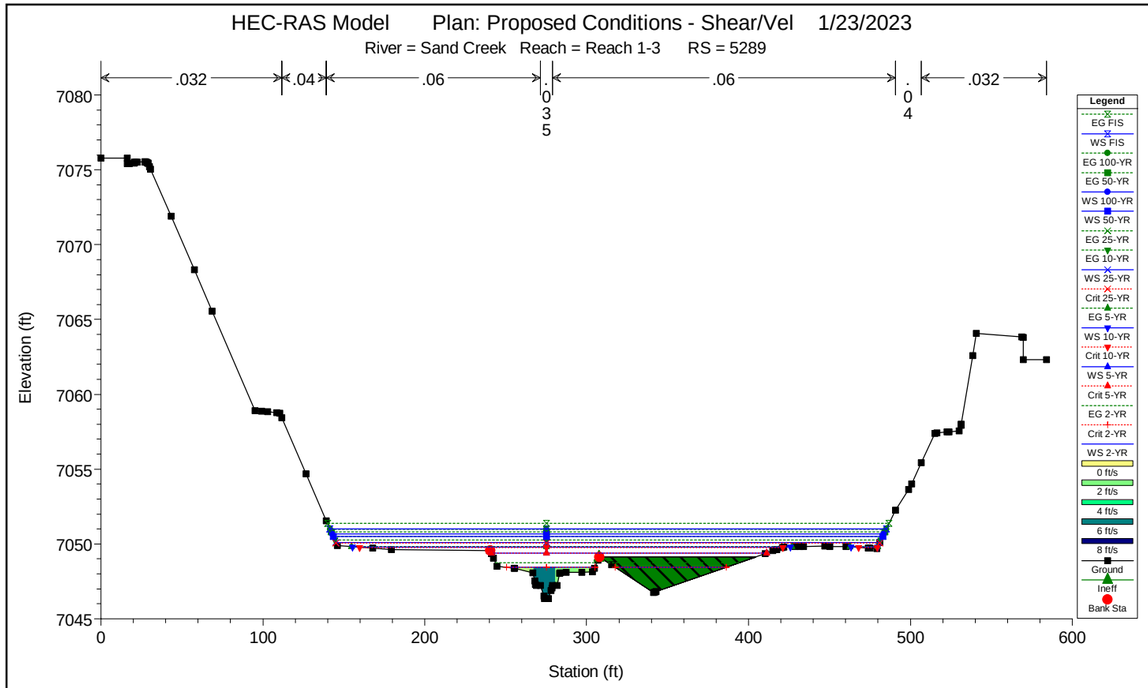
River = Sand Creek Reach = Reach 1-3 RS = 5429

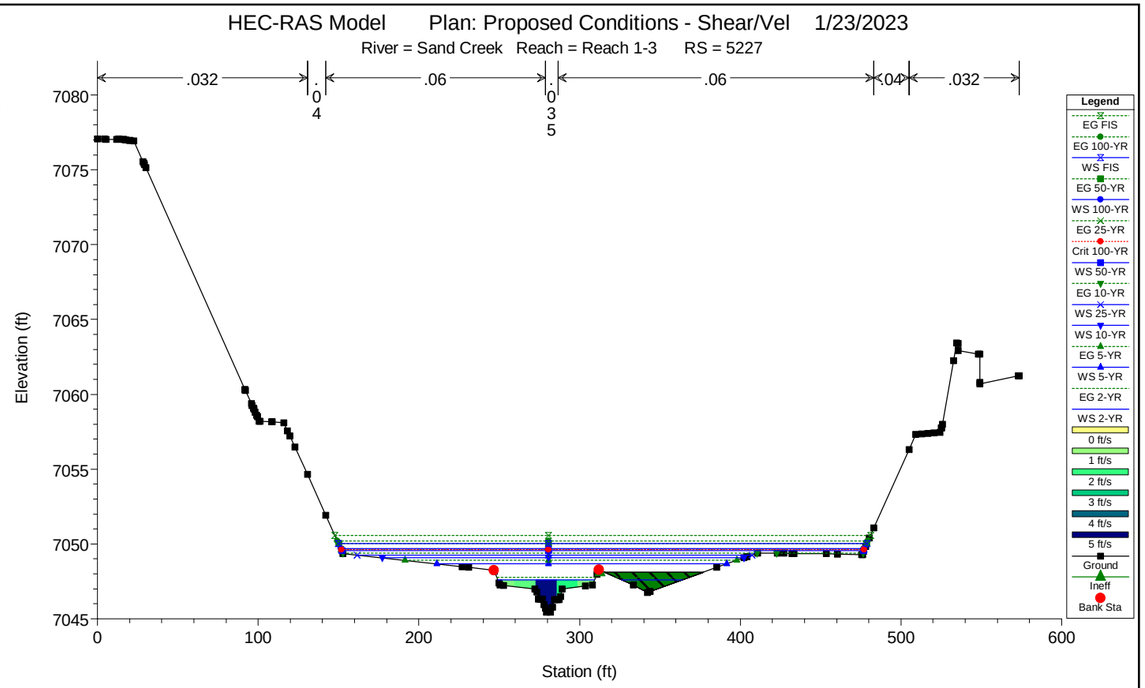


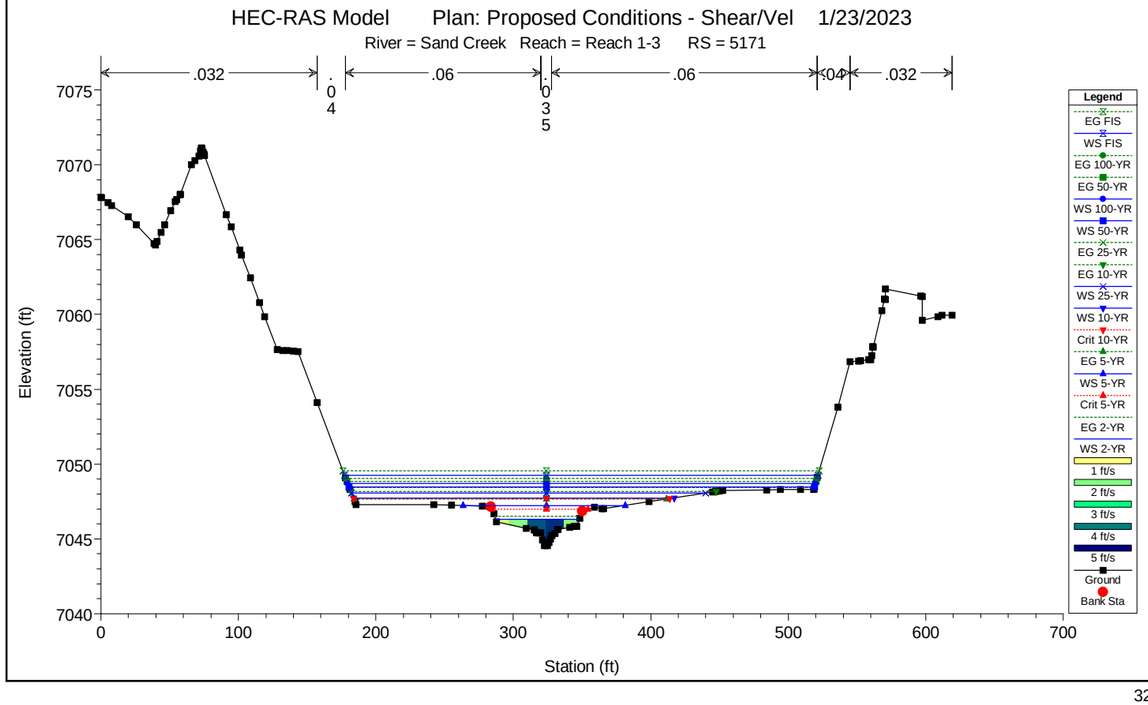

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

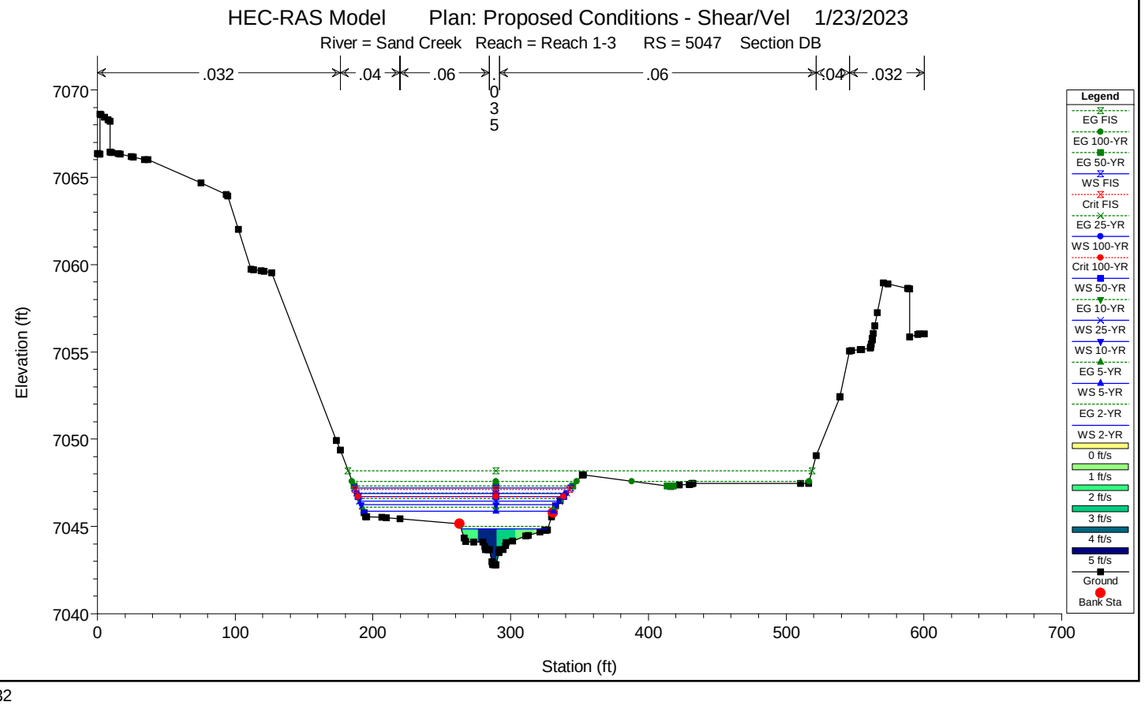
River = Sand Creek Reach = Reach 1-3 RS = 5365

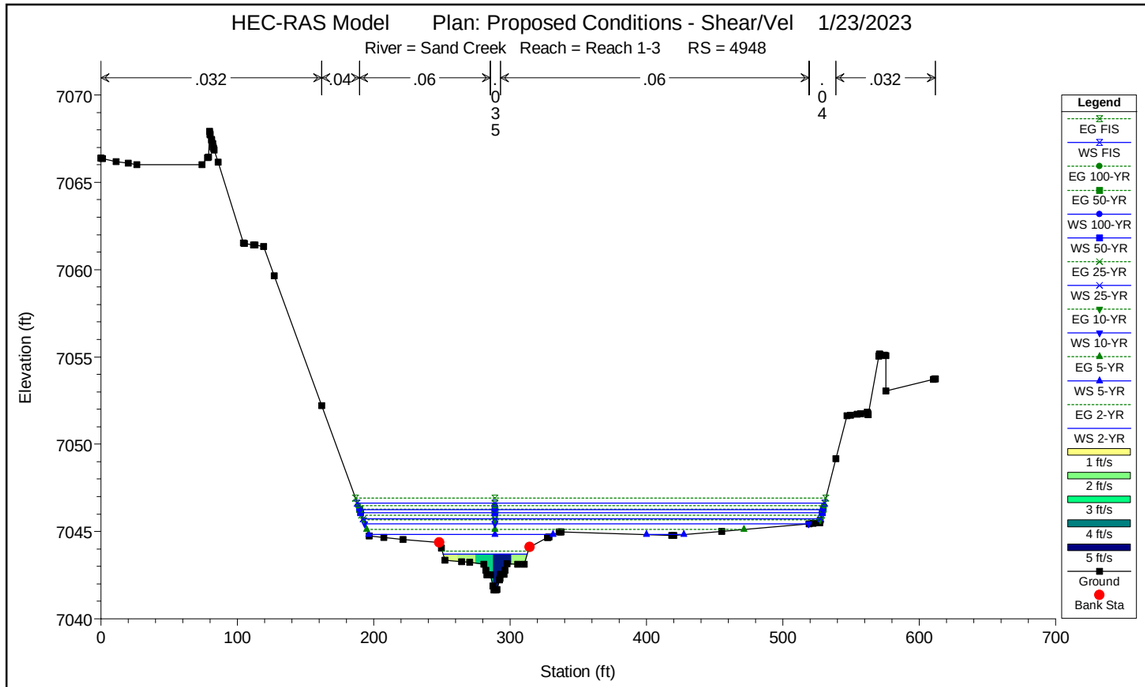


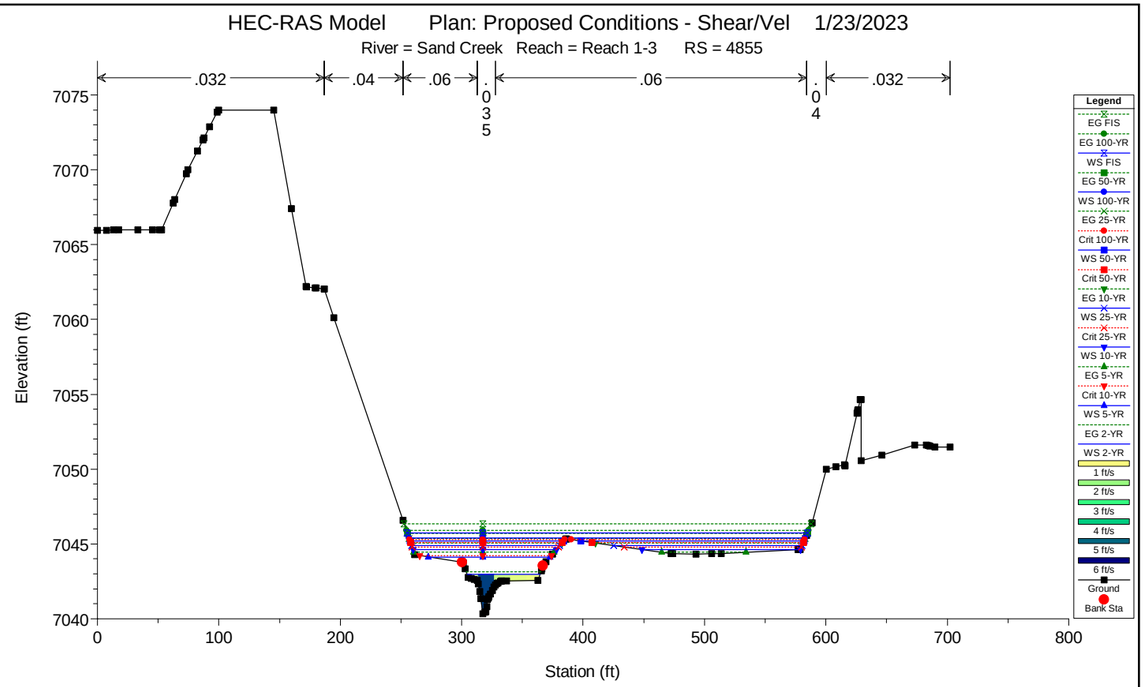

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5289
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
EG 10-YR
WS 25-YR
Crit 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

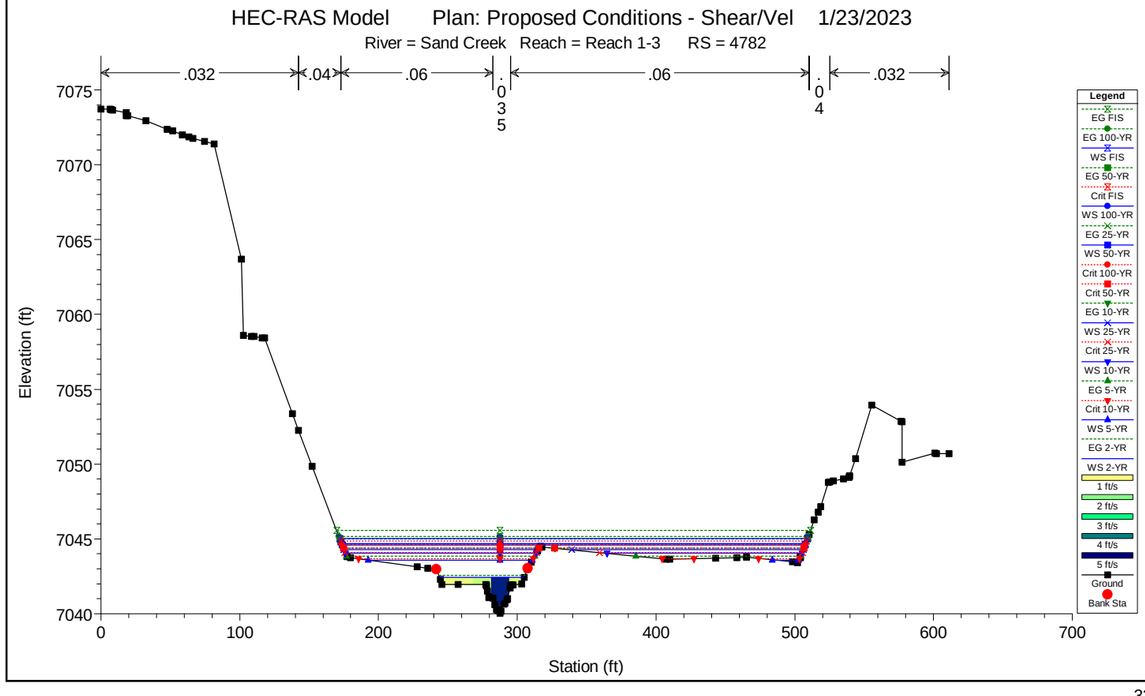

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5227
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
WS 100-YR
EG 25-YR
Crit 100-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

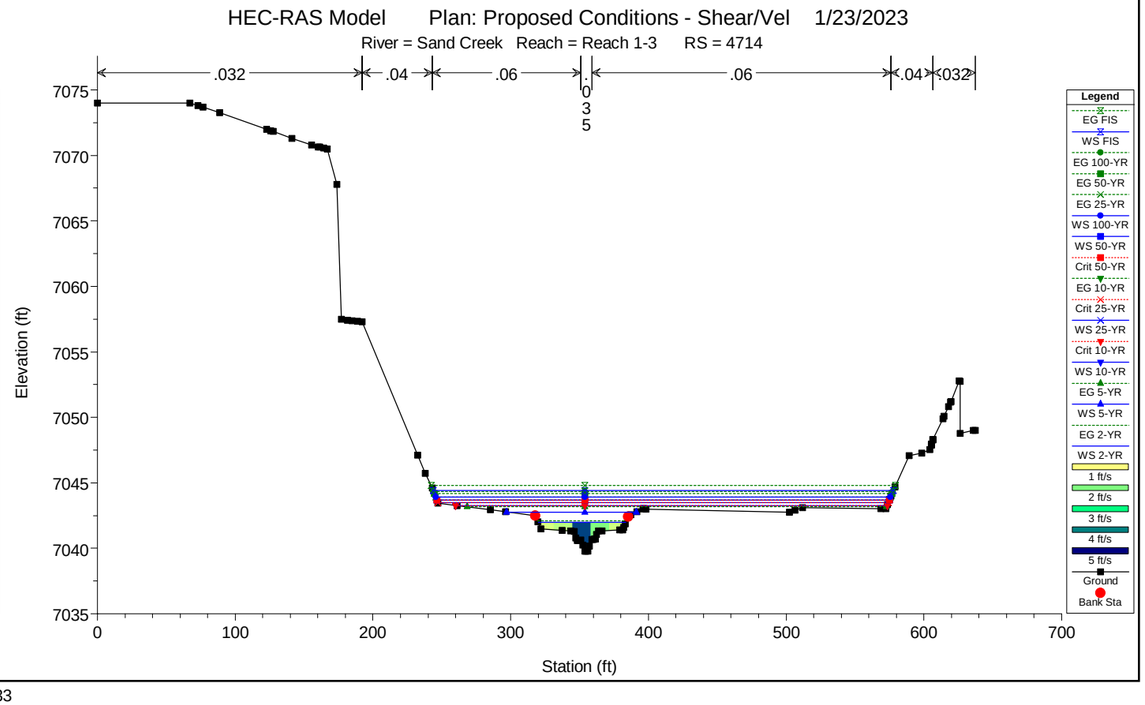

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5171
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
EG 10-YR
WS 25-YR
WS 10-YR
Crit 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

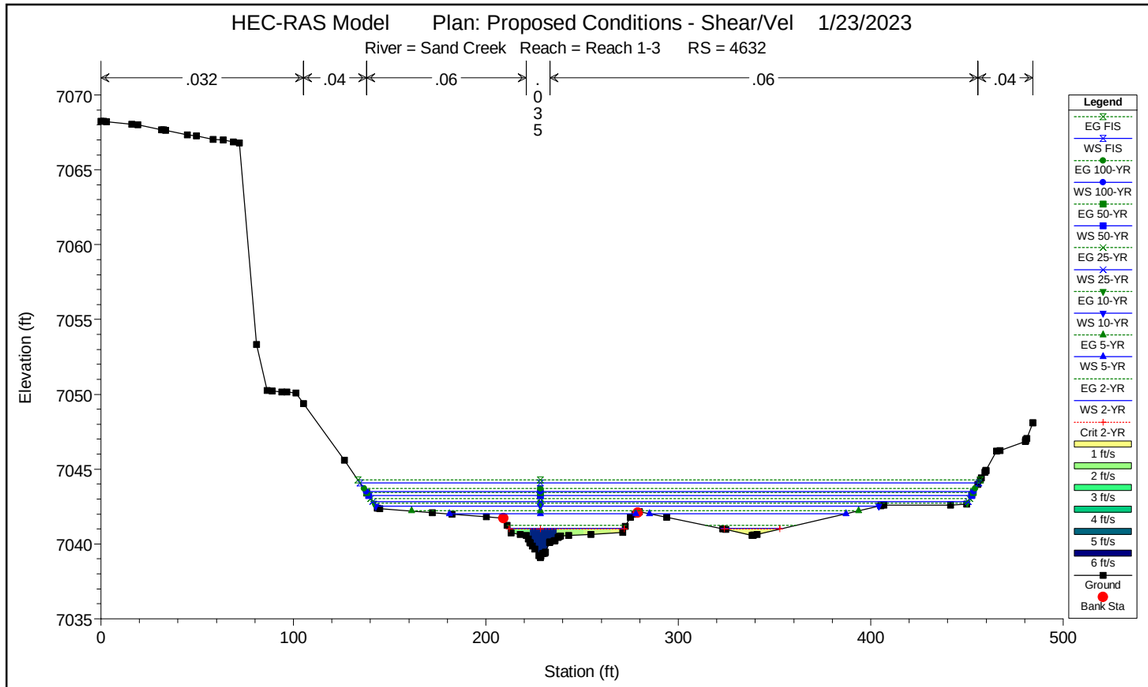

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5047 Section DB
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

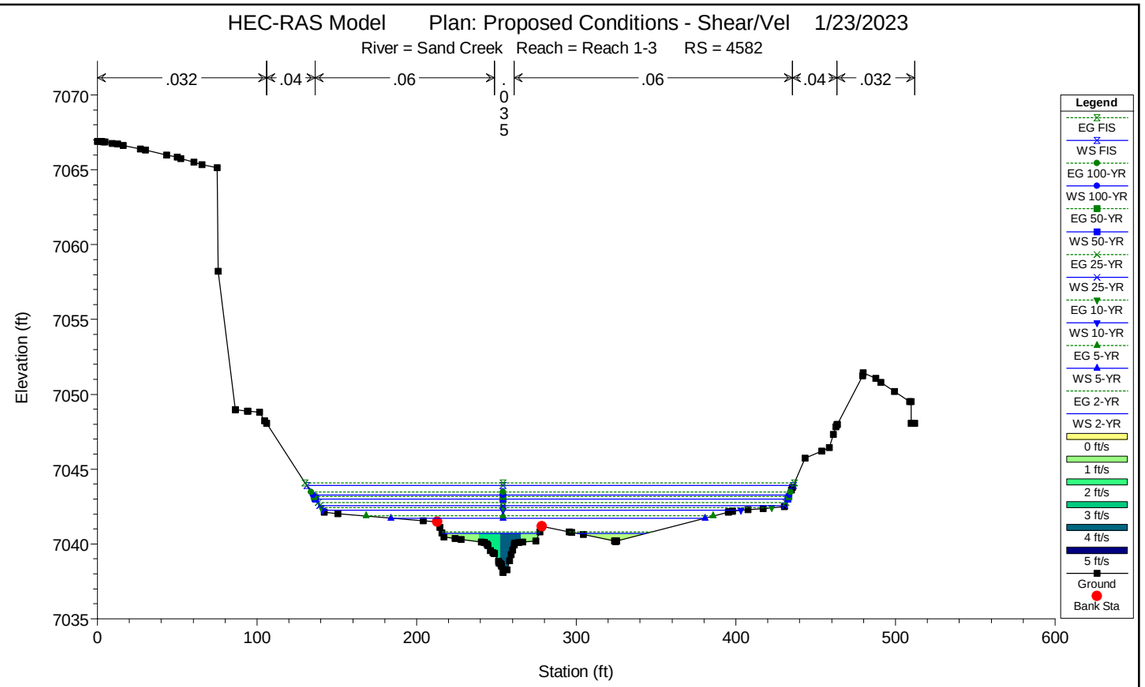

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4948
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

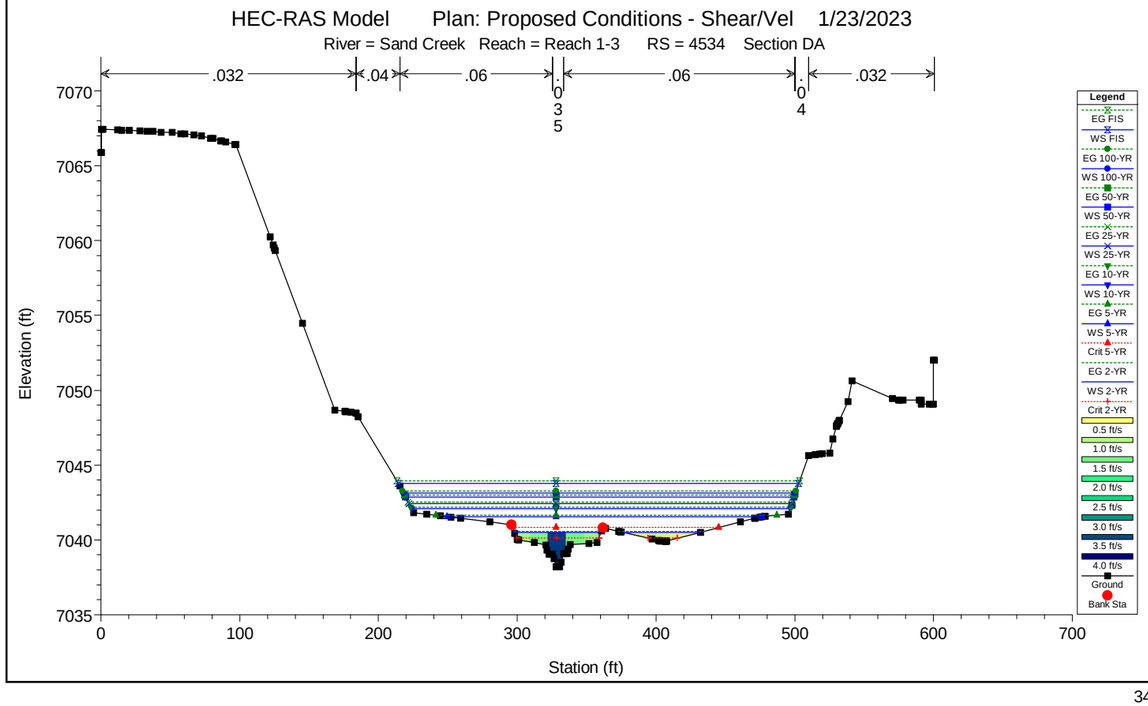

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4855
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
WS 100-YR
EG 25-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

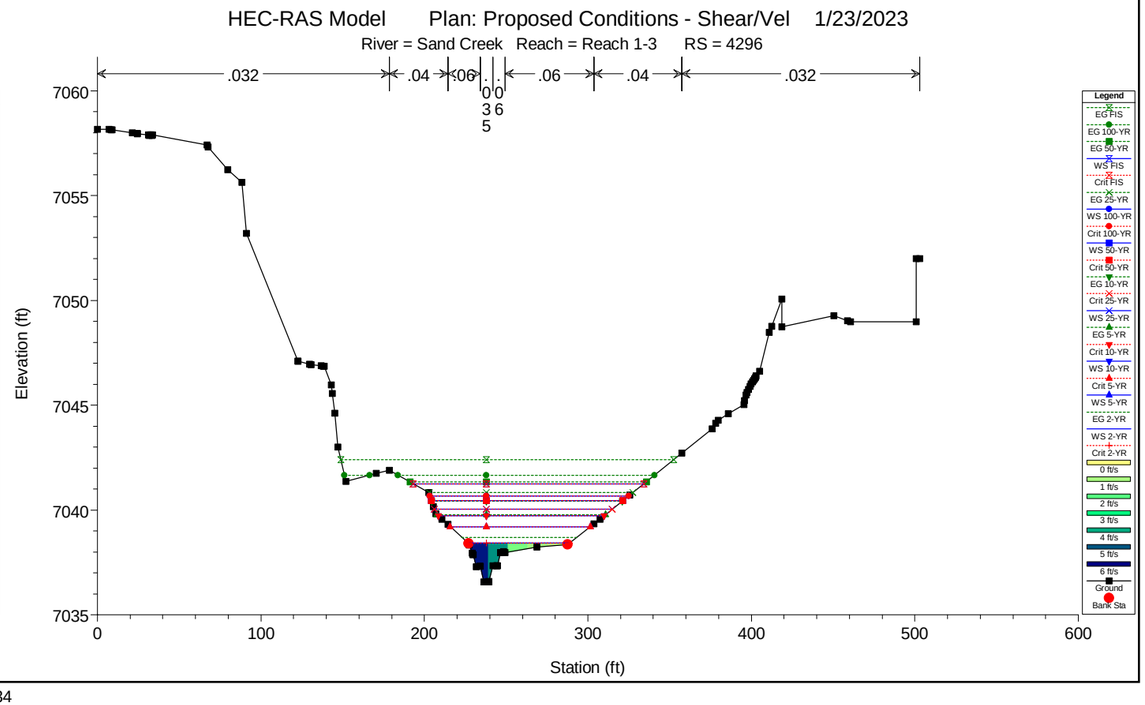

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4782
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
Crit FIS
WS 100-YR
EG 25-YR
WS 50-YR
Crit 100-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

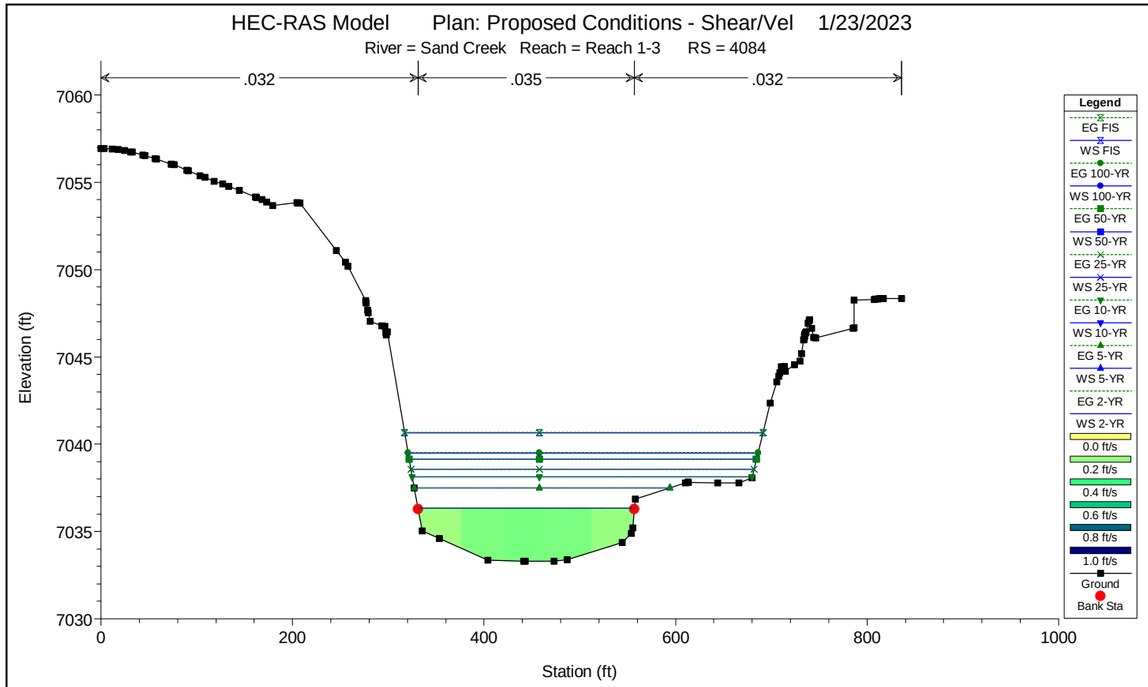

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4714
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
EG 25-YR
WS 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
Crit 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

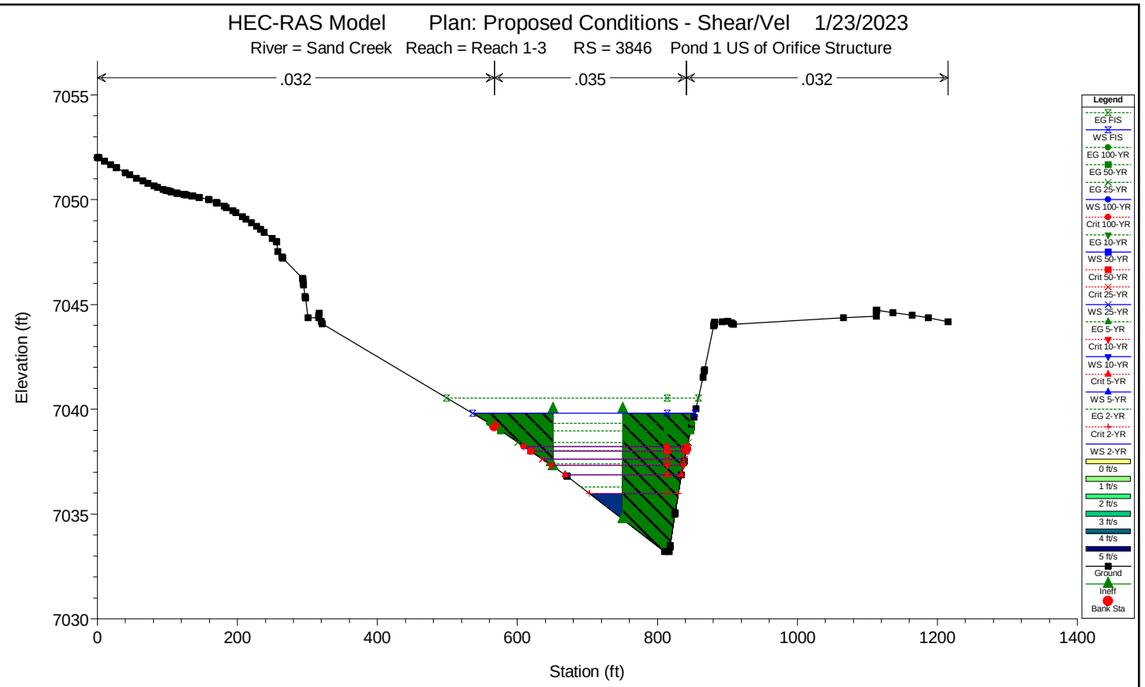

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4632
.032
.04
.06
.035
.06
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

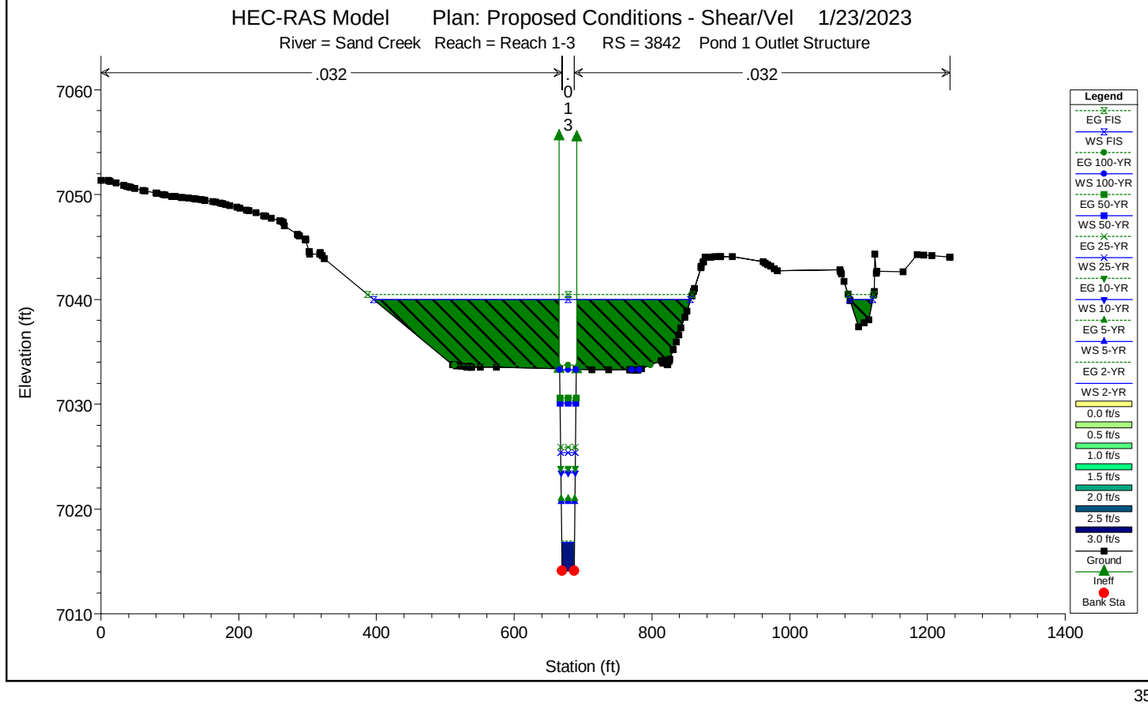

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4582
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

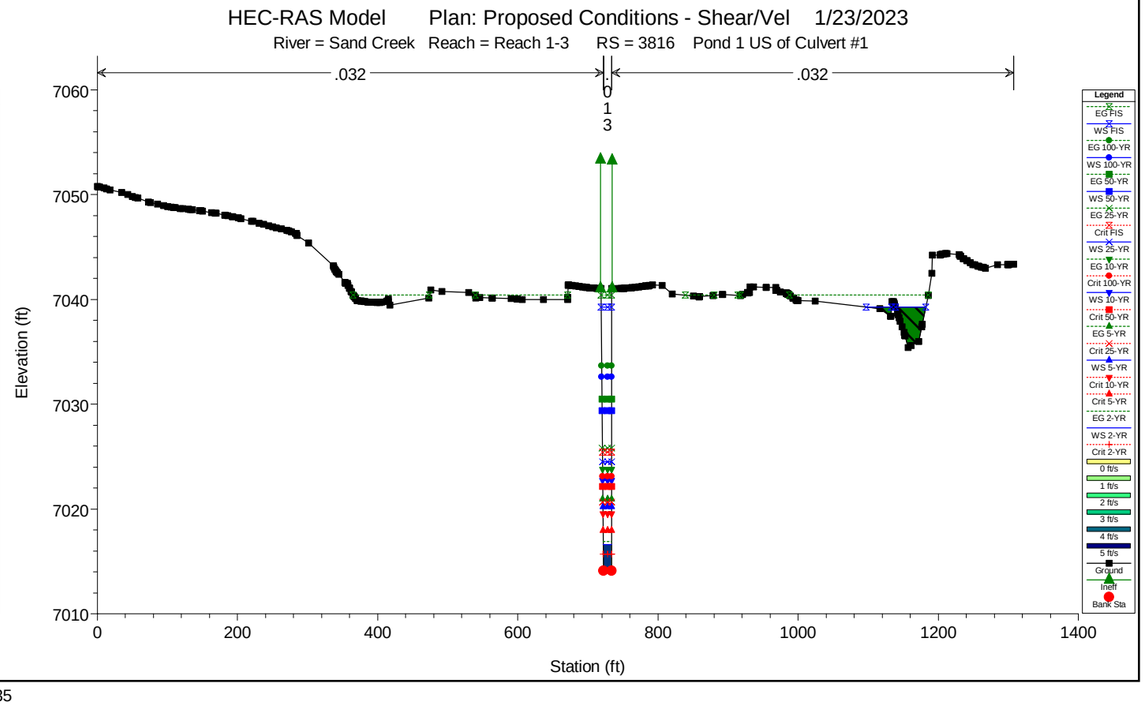

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4534 Section DA
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

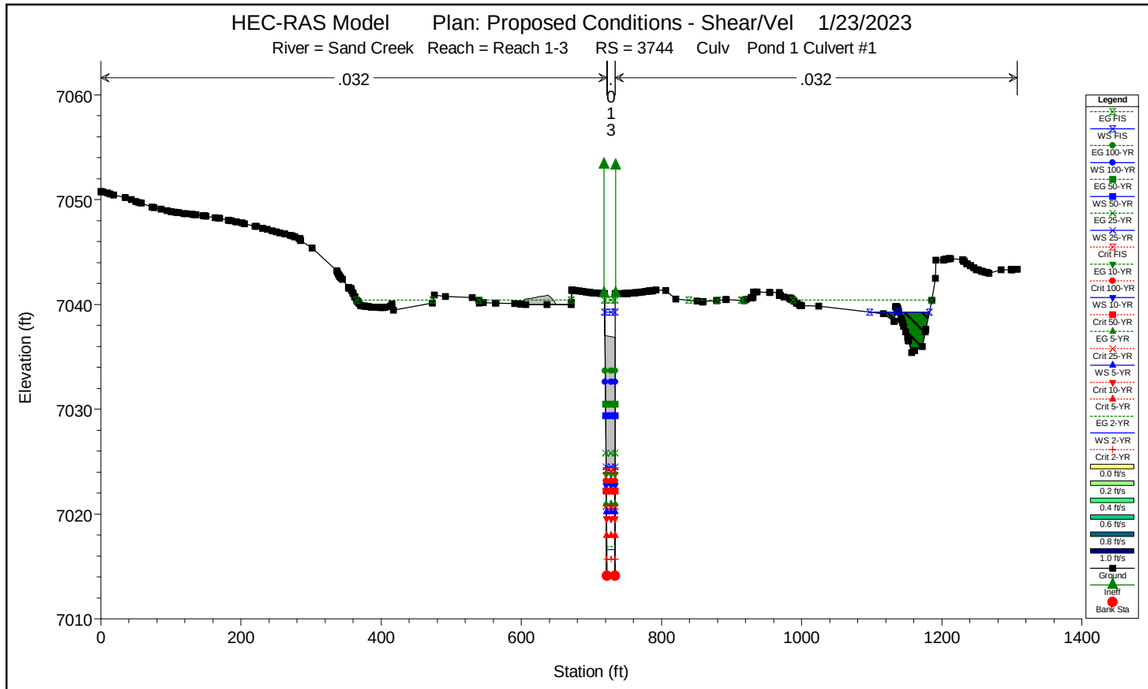

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4296
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

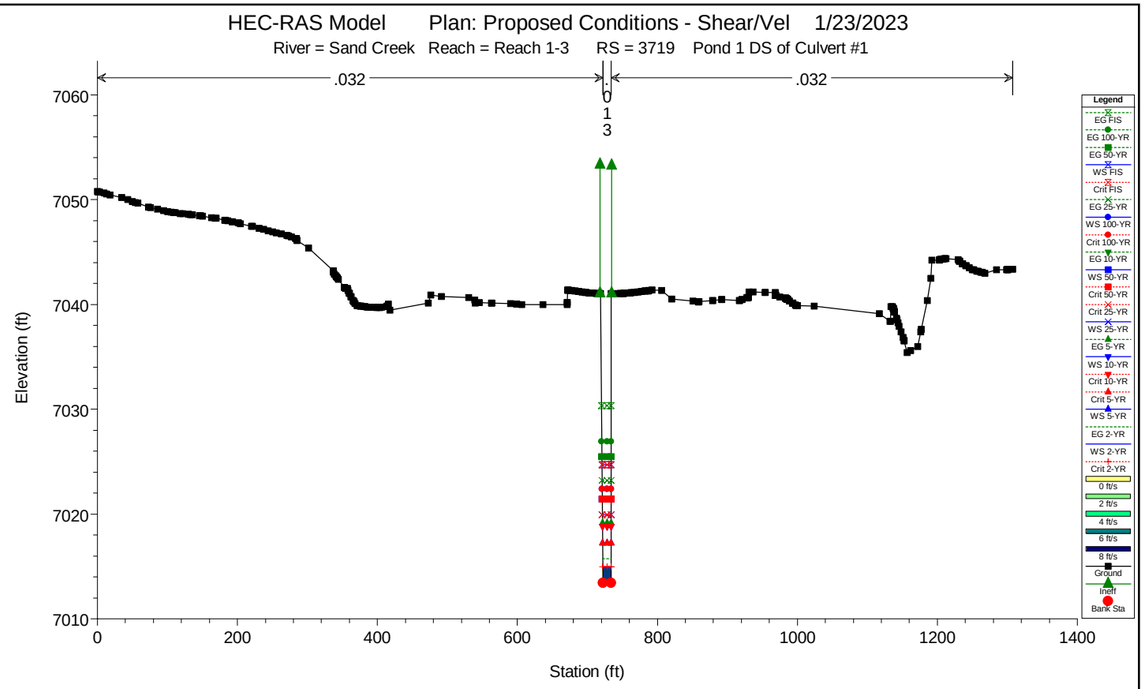

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4084
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

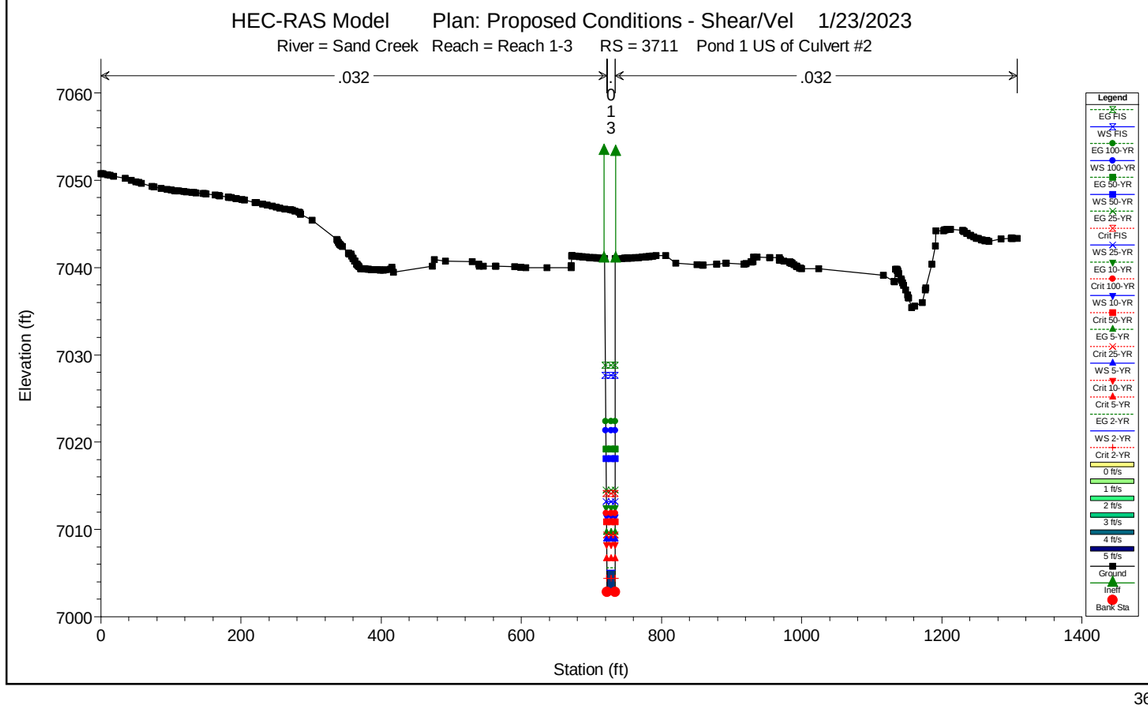

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3846 Pond 1 US of Orifice Structure
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

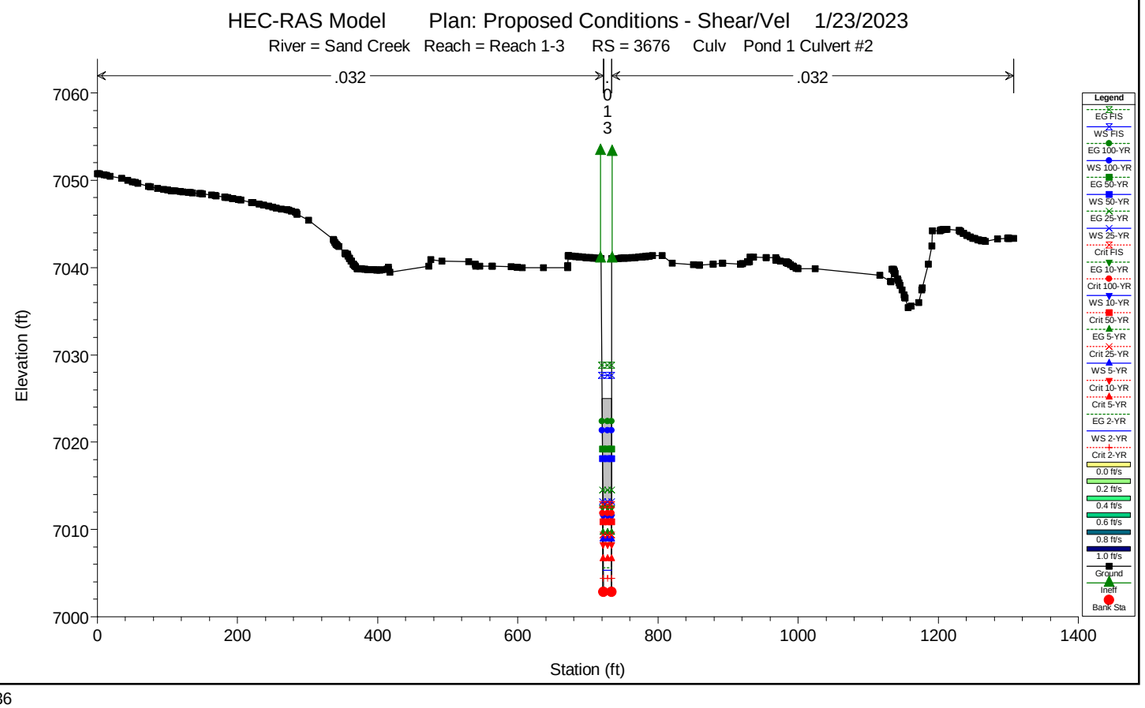

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3842 Pond 1 Outlet Structure
.032
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta

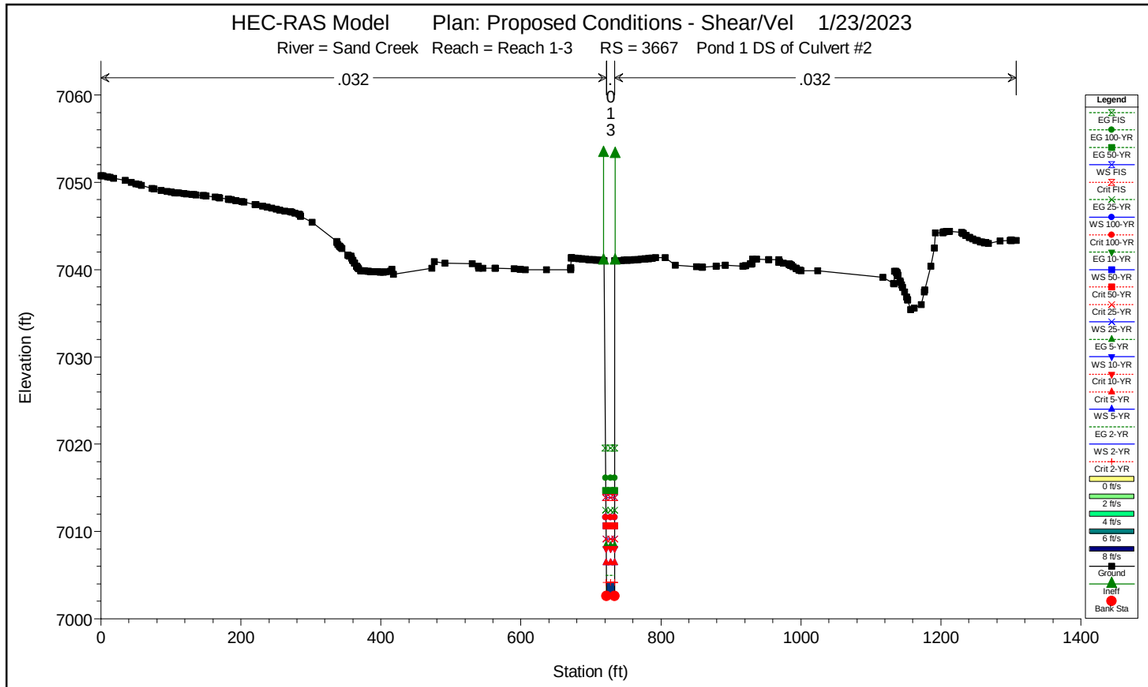

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3816 Pond 1 US of Culvert #1
.032
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
Crit FIS
WS 25-YR
EG 10-YR
Crit 100-YR
WS 10-YR
Crit 50-YR
EG 5-YR
Crit 25-YR
WS 5-YR
Crit 10-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

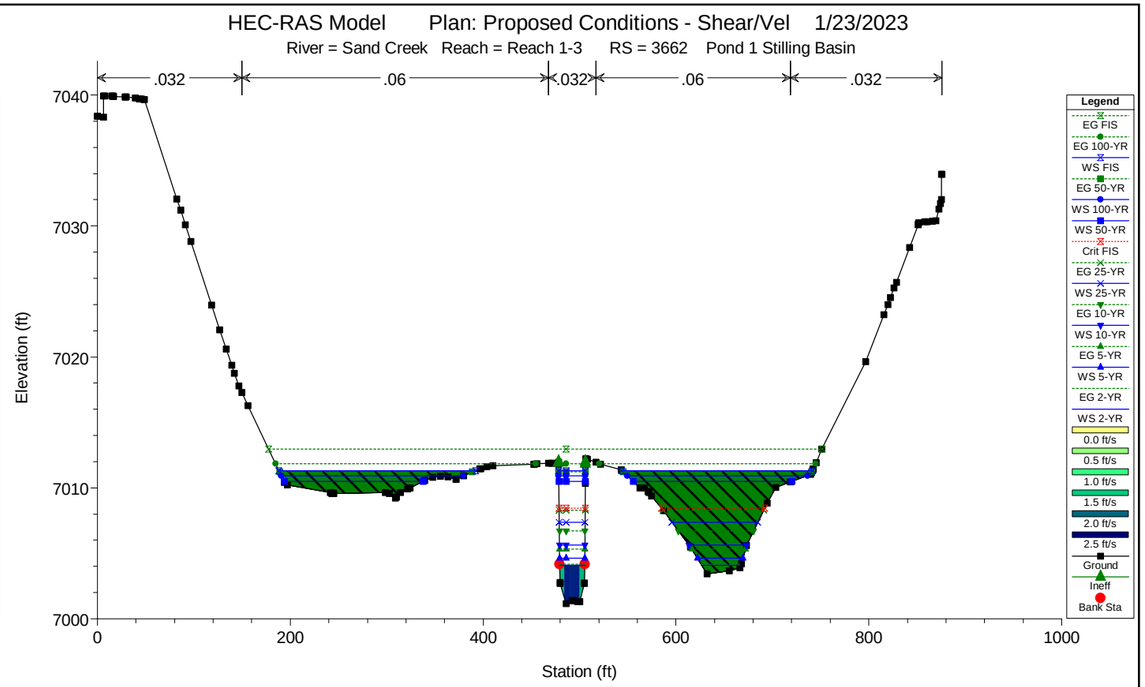

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3744 Culv Pond 1 Culvert #1
.032
.032
0
1
3
Elevation (ft)
Station (ft)
Legend

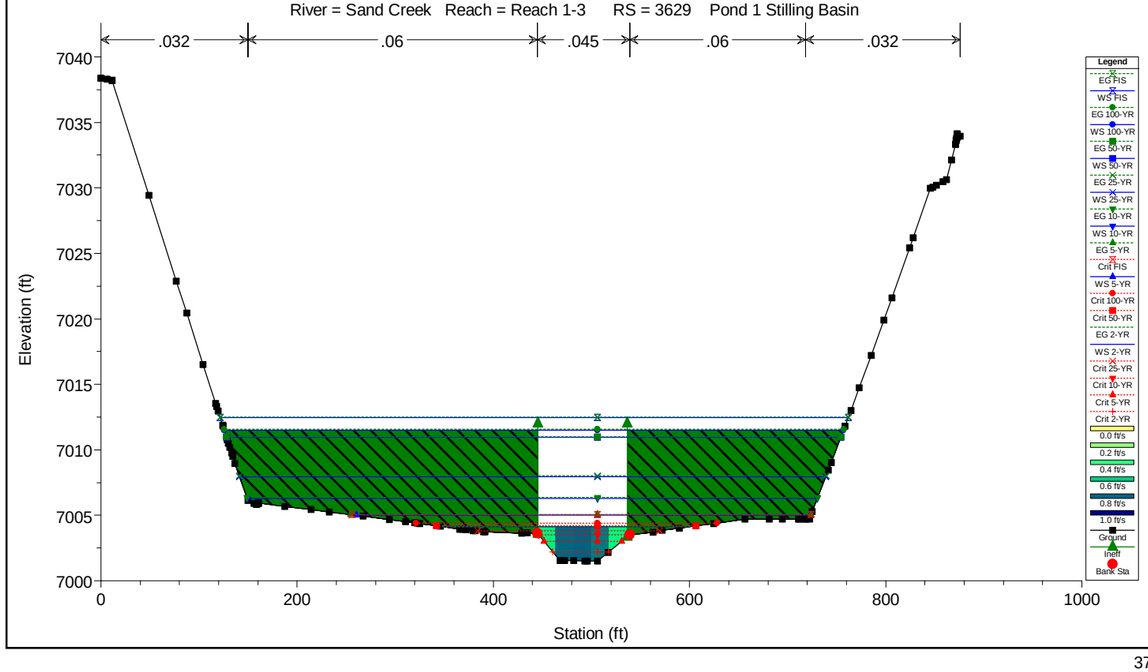

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3719 Pond 1 DS of Culvert #1
.032
.032
0
1
3
Elevation (ft)
Station (ft)
Legend

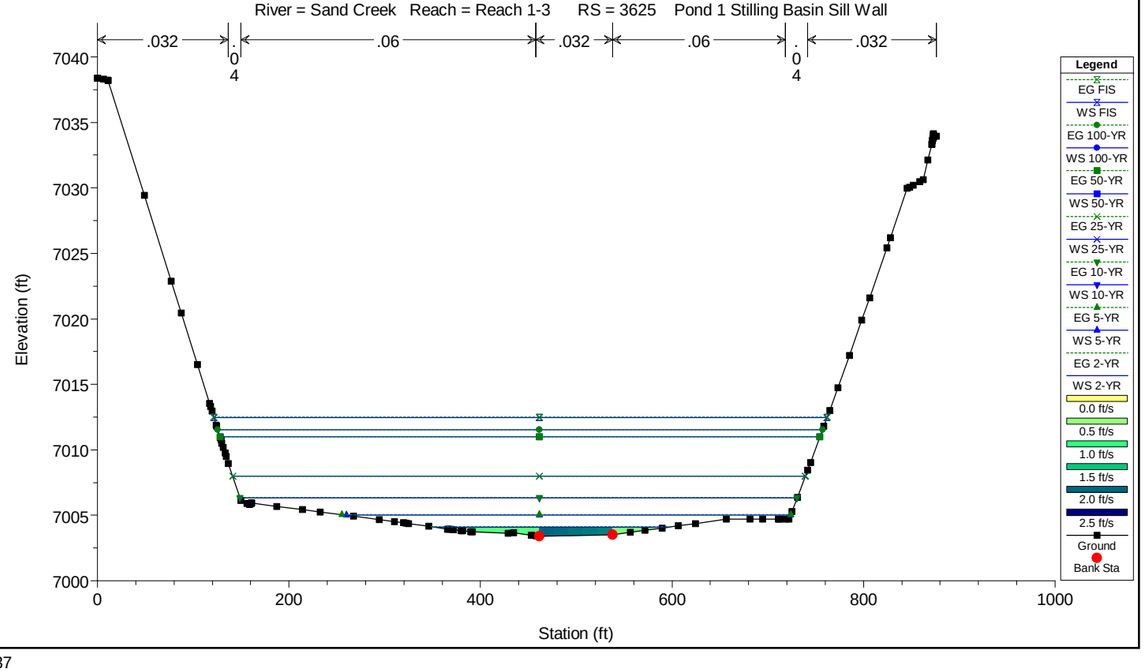

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3711 Pond 1 US of Culvert #2
.032
.032
0
1
3
Elevation (ft)
Station (ft)
Legend

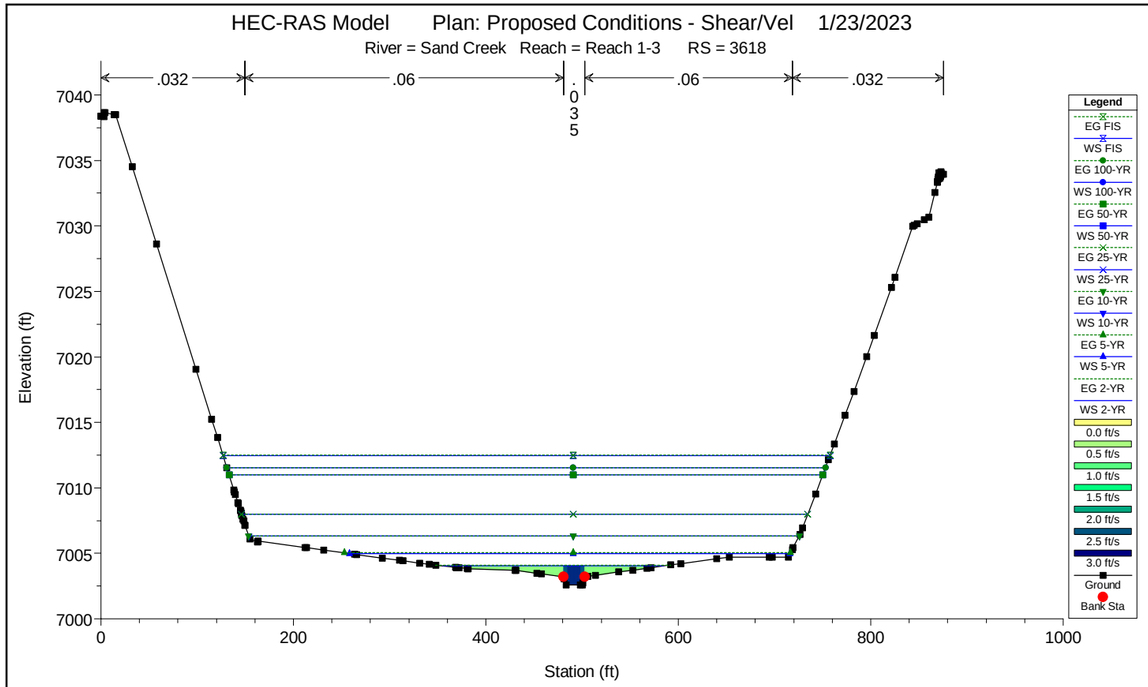

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3676 Culv Pond 1 Culvert #2
.032
.032
0
1
3
Elevation (ft)
Station (ft)
Legend

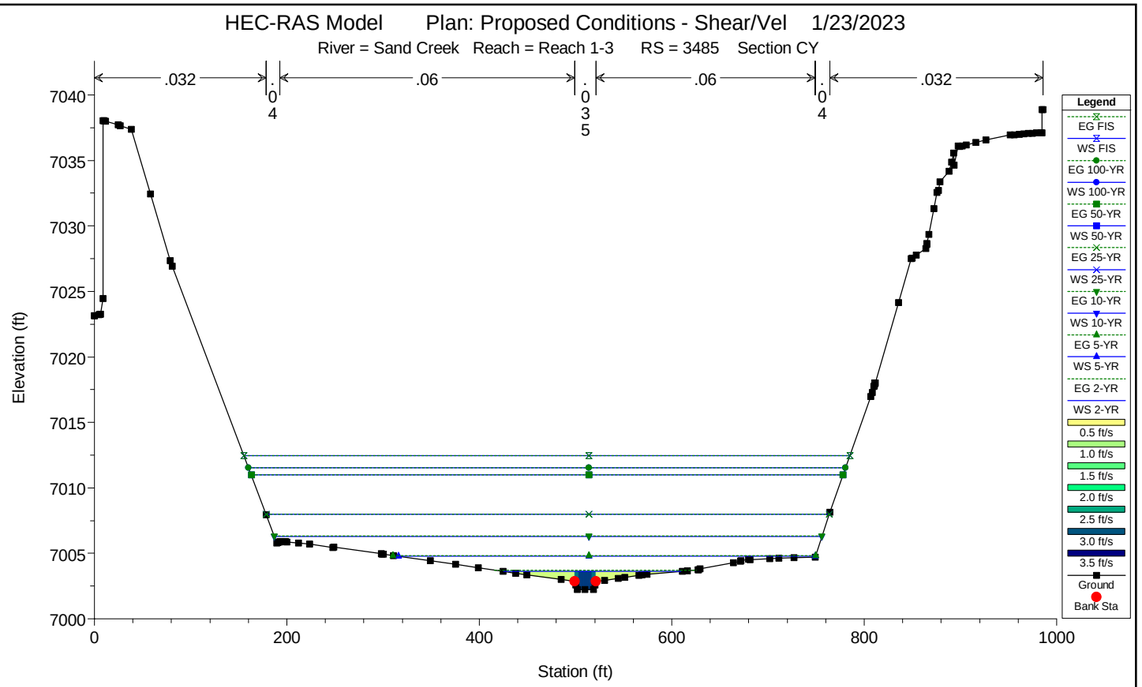

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3667 Pond 1 DS of Culvert #2
.032
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
EG 50-YR
WS FIS
Crit FIS
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

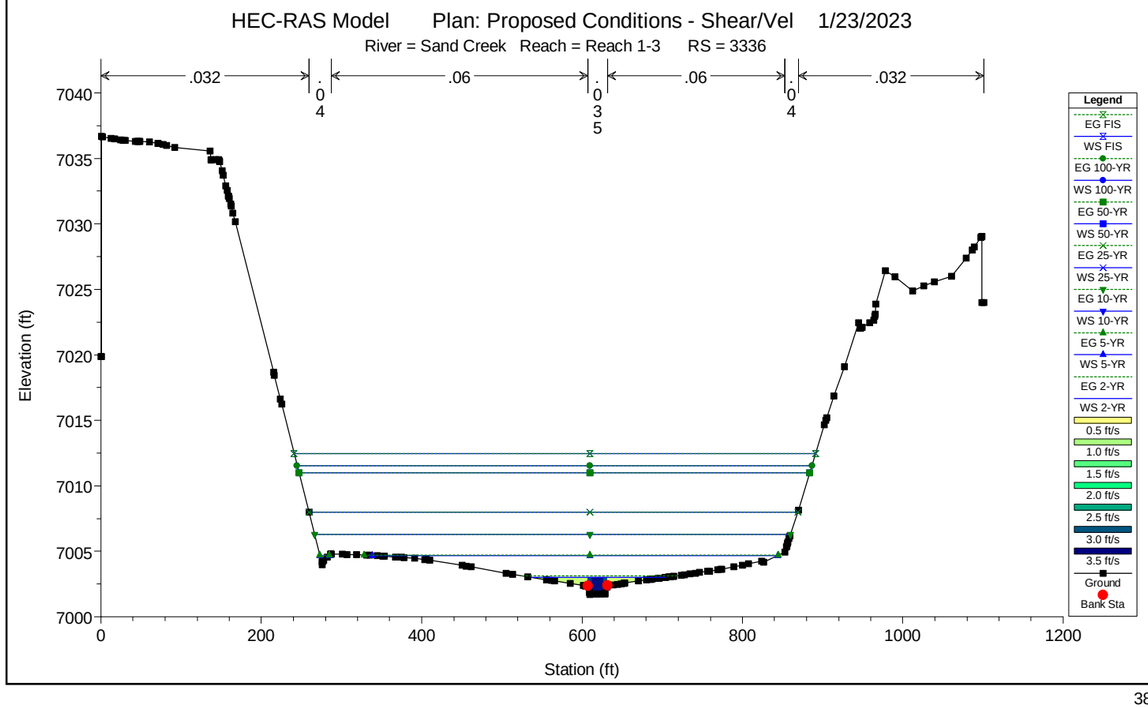

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3662 Pond 1 Stilling Basin
.032
.06
.032
.06
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
EG 50-YR
WS 100-YR
WS 50-YR
Crit FIS
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta

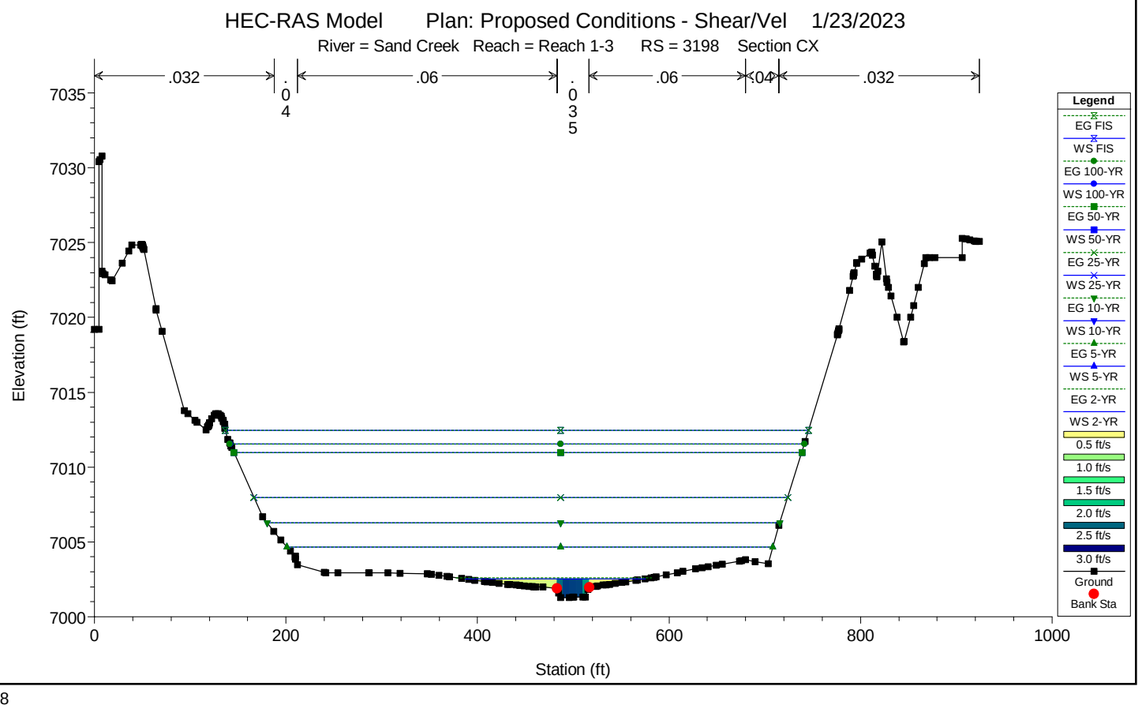

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3629 Pond 1 Stilling Basin
.032
.06
.045
.06
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
Crit FIS
WS 5-YR
Crit 100-YR
Crit 50-YR
EG 2-YR
WS 2-YR
Crit 25-YR
Crit 10-YR
Crit 5-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

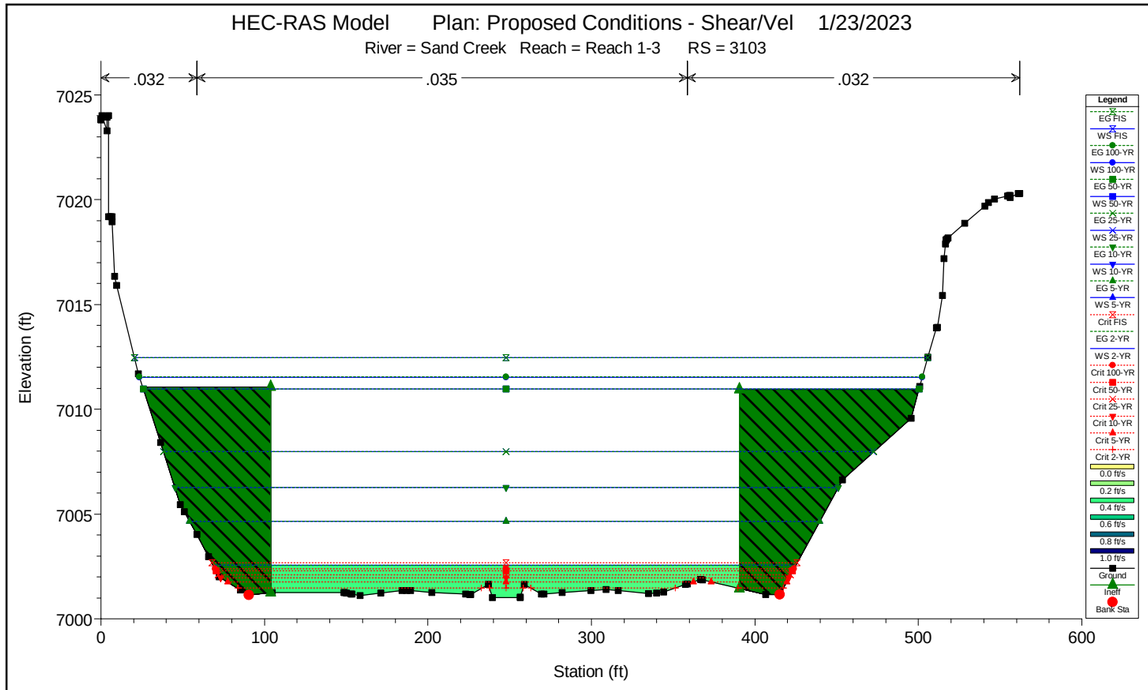

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3625 Pond 1 Stilling Basin Sill Wall
.032
.04
.06
.032
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

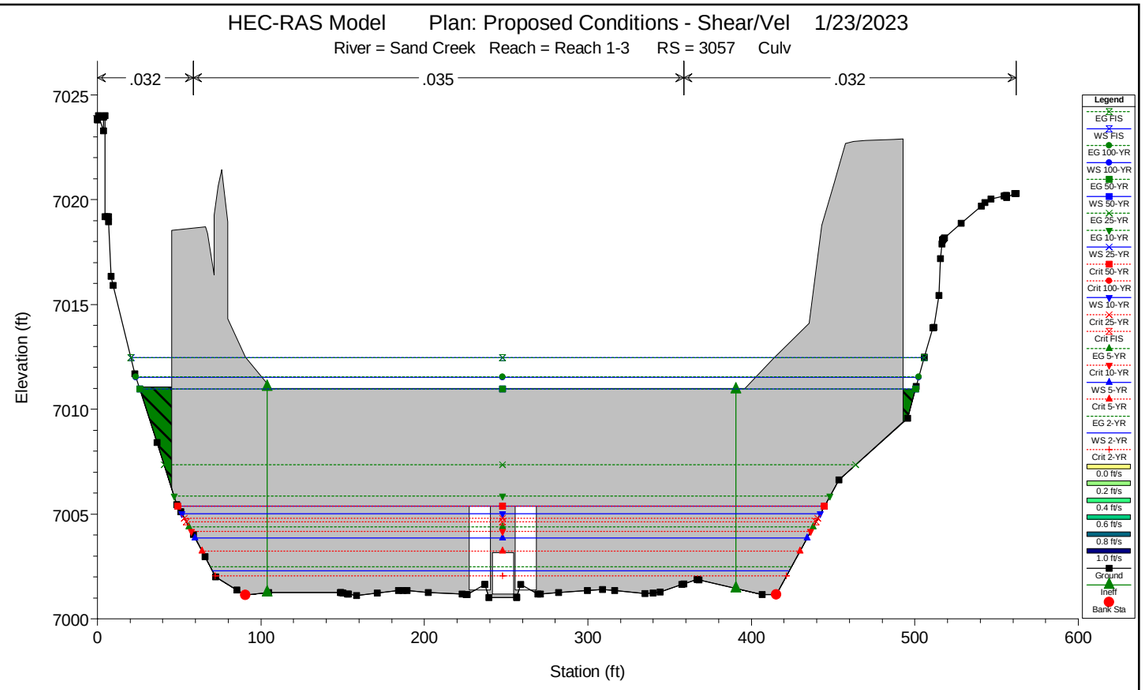

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3618
.032
.06
.035
.06
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

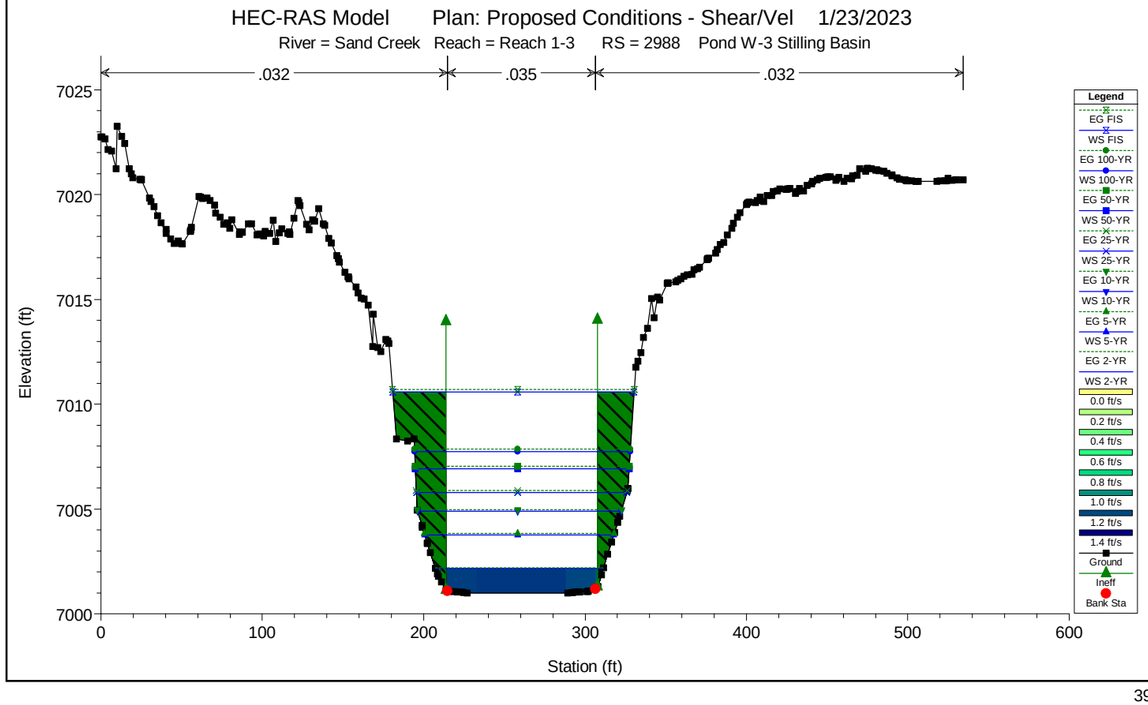

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3485 Section CY
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

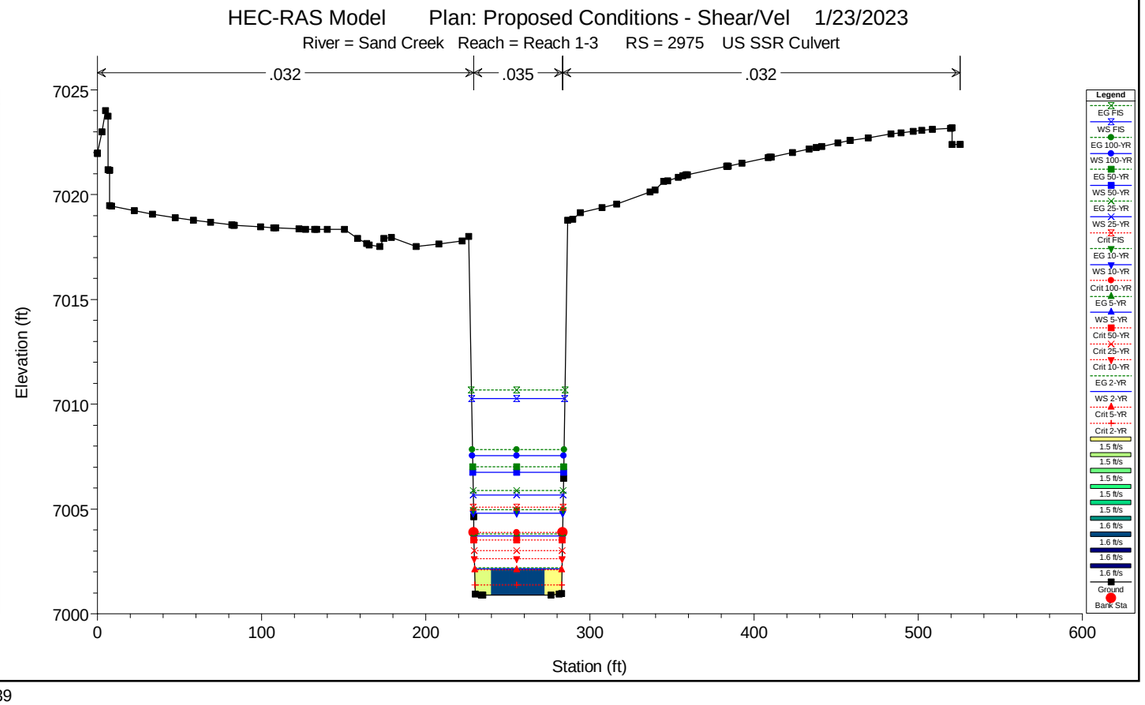

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3336
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

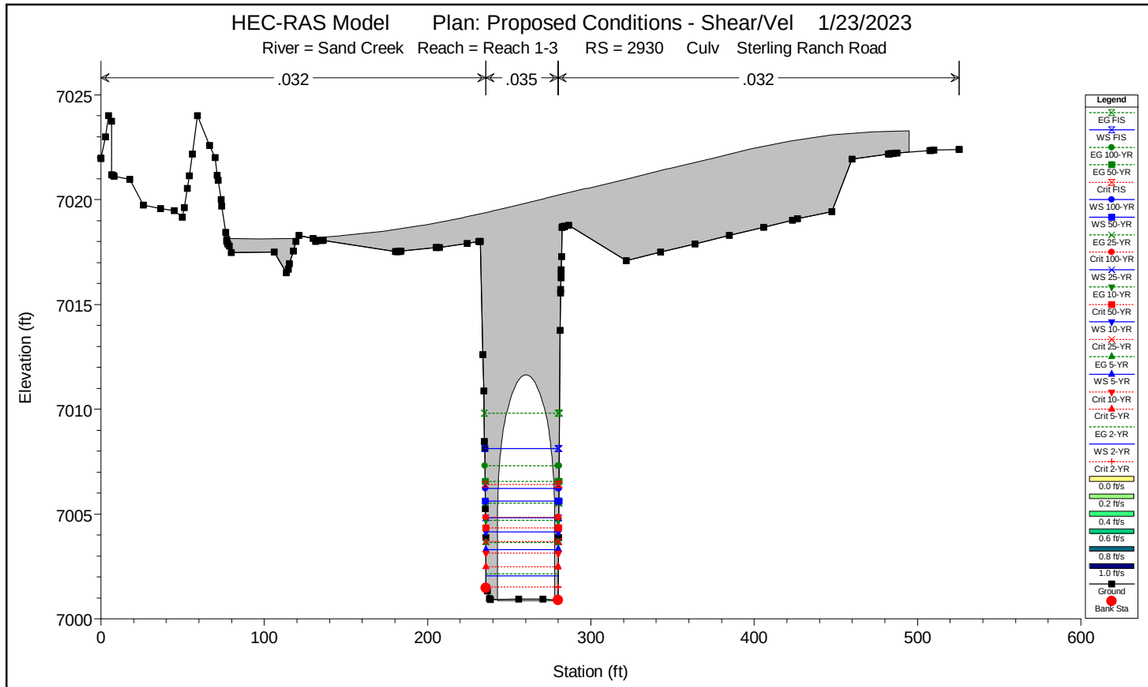

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3198 Section CX
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

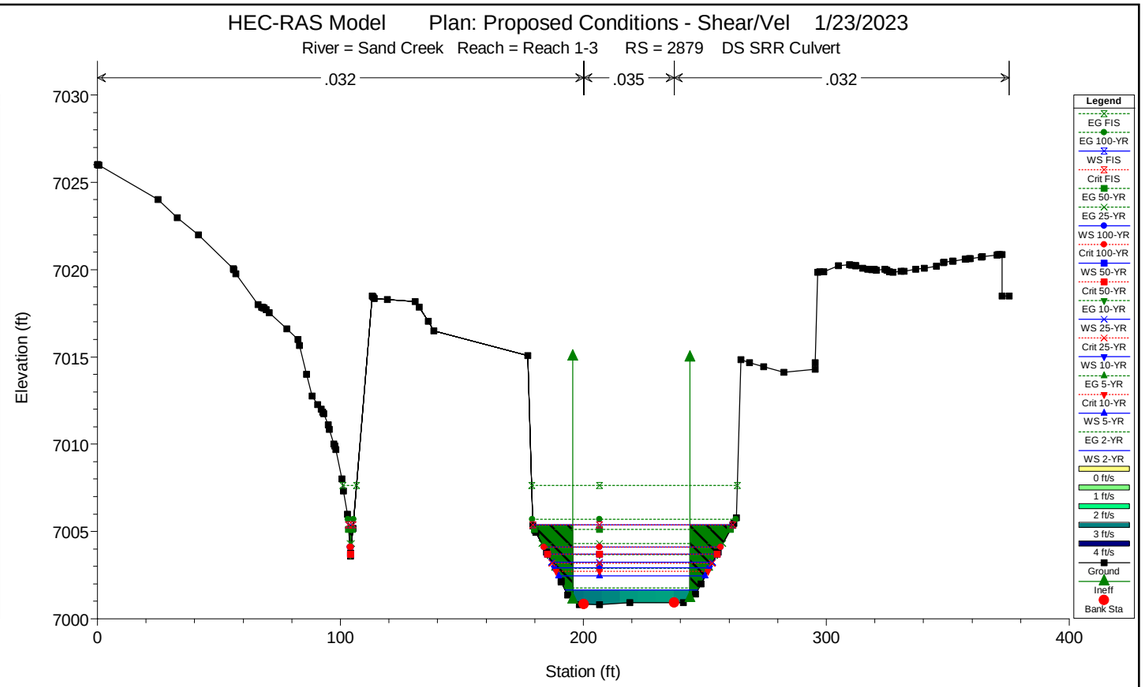

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3103
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
Crit FIS
EG 2-YR
WS 2-YR
Crit 100-YR
Crit 50-YR
Crit 25-YR
Crit 10-YR
Crit 5-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

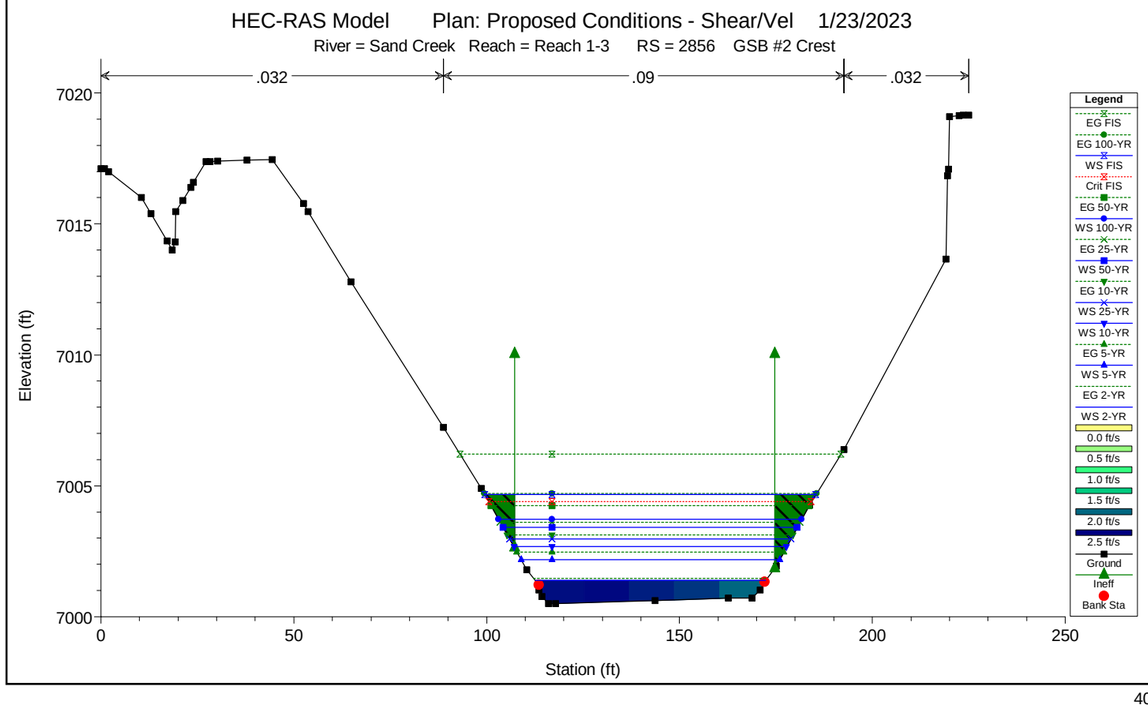

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3057 Culv
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
Crit 50-YR
Crit 100-YR
WS 10-YR
Crit 25-YR
Crit FIS
EG 5-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

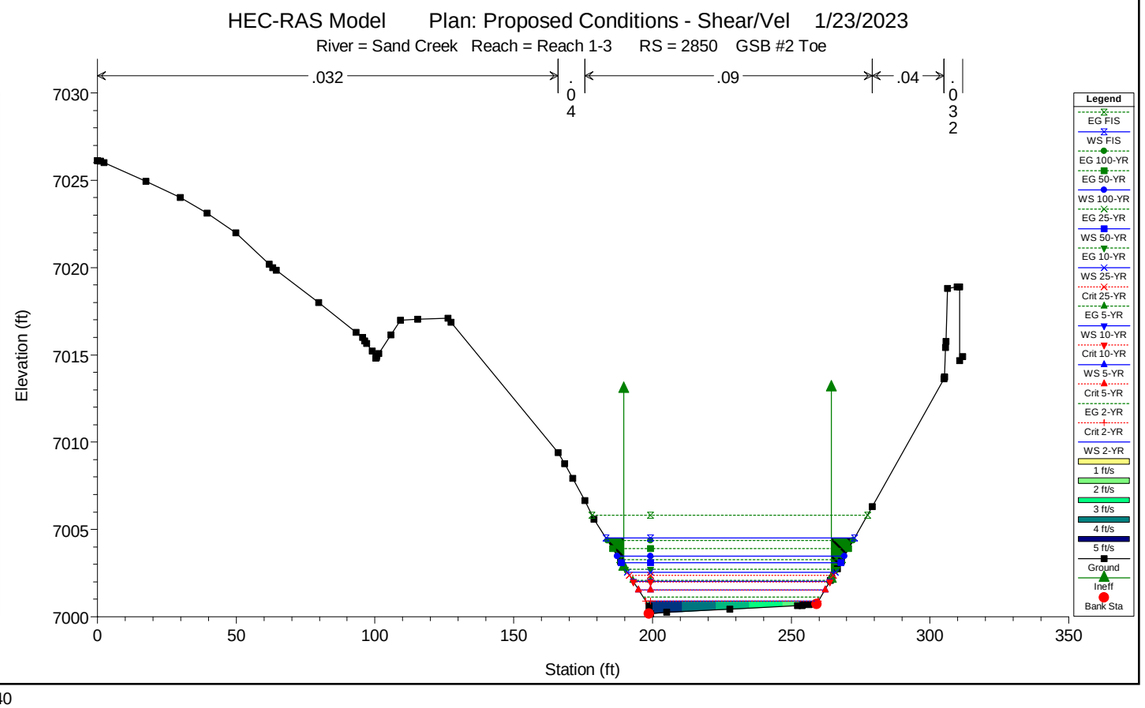

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2988 Pond W-3 Stilling Basin
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Ineff
Bank Sta

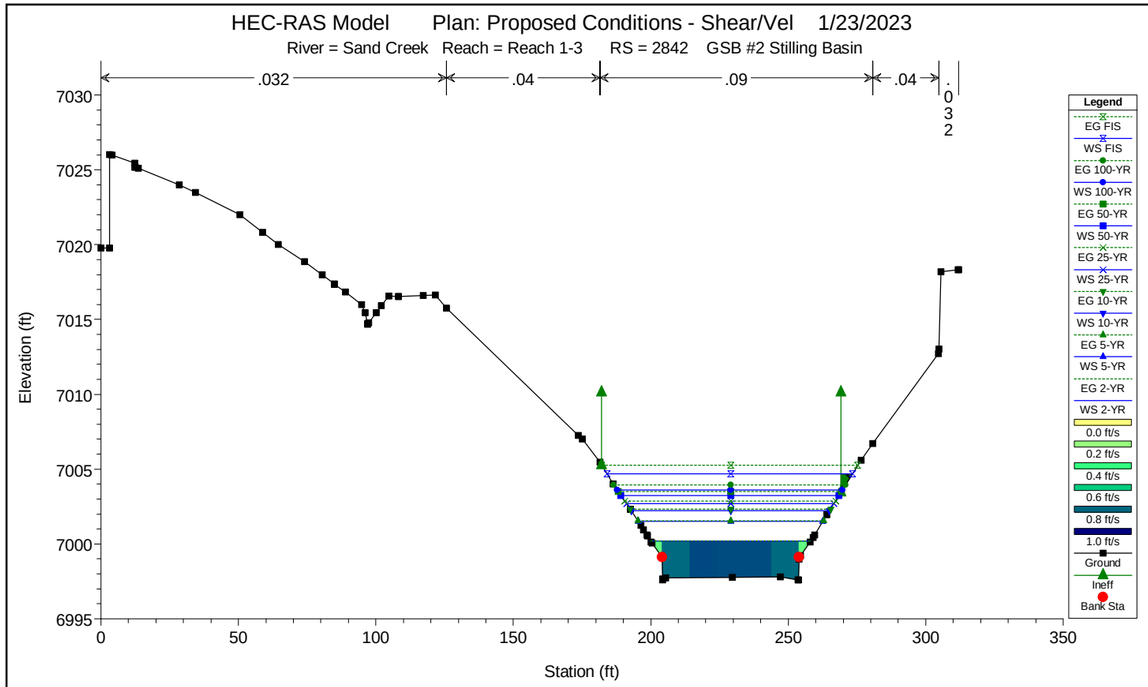

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2975 US SSR Culvert
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
Crit FIS
EG 10-YR
WS 10-YR
Crit 100-YR
EG 5-YR
WS 5-YR
Crit 50-YR
Crit 25-YR
Crit 10-YR
EG 2-YR
WS 2-YR
Crit 5-YR
Crit 2-YR
1.5 ft/s
1.5 ft/s
1.5 ft/s
1.5 ft/s
1.5 ft/s
1.6 ft/s
1.6 ft/s
1.6 ft/s
1.6 ft/s
Ground
Bank Sta

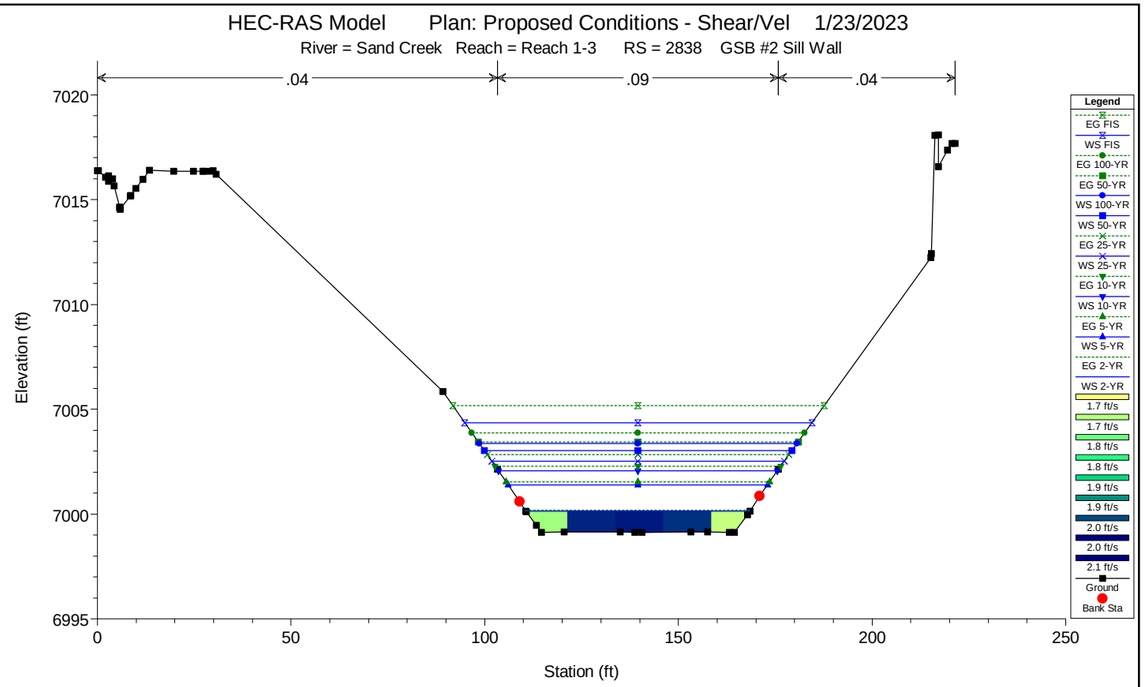

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2930 Culv Sterling Ranch Road
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
Crit FIS
WS 100-YR
WS 50-YR
EG 25-YR
Crit 100-YR
WS 25-YR
EG 10-YR
Crit 50-YR
WS 10-YR
Crit 25-YR
EG 5-YR
WS 5-YR
Crit 10-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

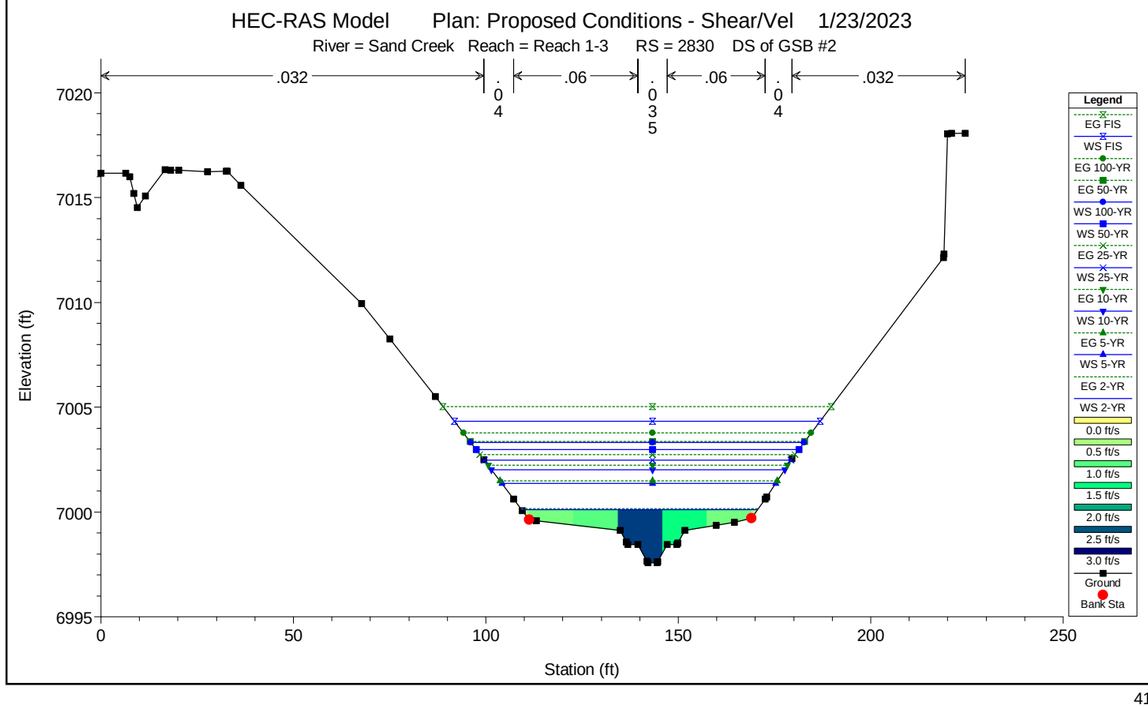

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2879 DS SRR Culvert
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
Crit 10-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

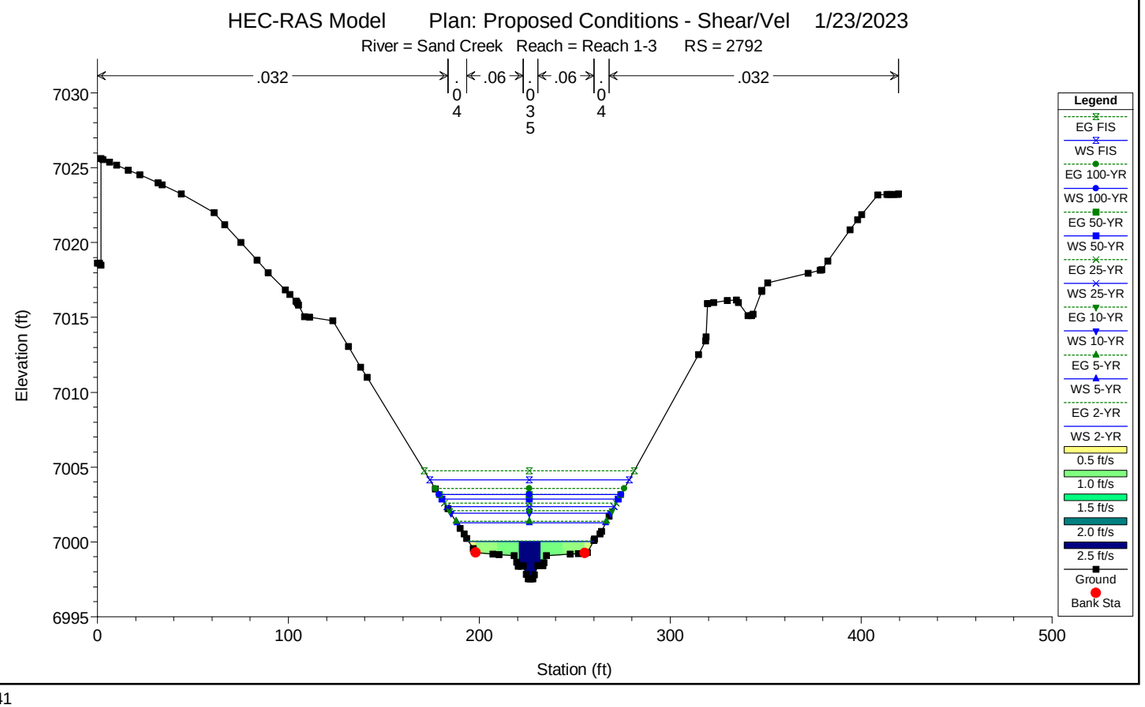

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2856 GSB #2 Crest
.032
.09
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2850 GSB #2 Toe
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2842 GSB #2 Stilling Basin
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

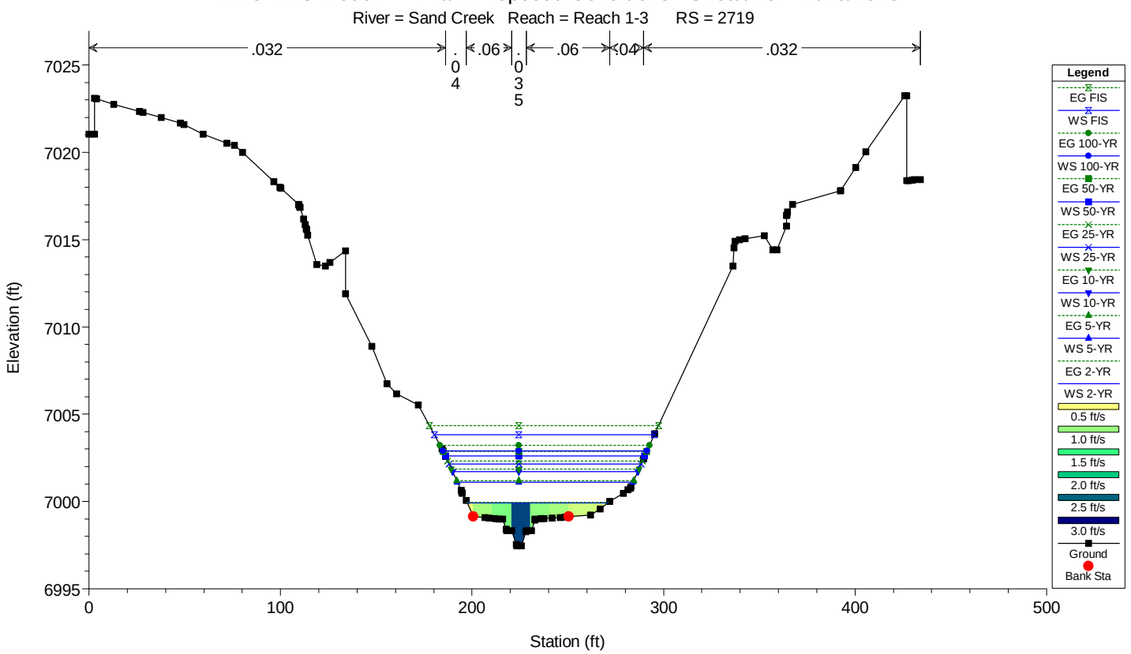

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2838 GSB #2 Sill Wall
.04
.09
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.7 ft/s
1.7 ft/s
1.8 ft/s
1.8 ft/s
1.9 ft/s
1.9 ft/s
2.0 ft/s
2.0 ft/s
2.1 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2830 DS of GSB #2
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2792
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

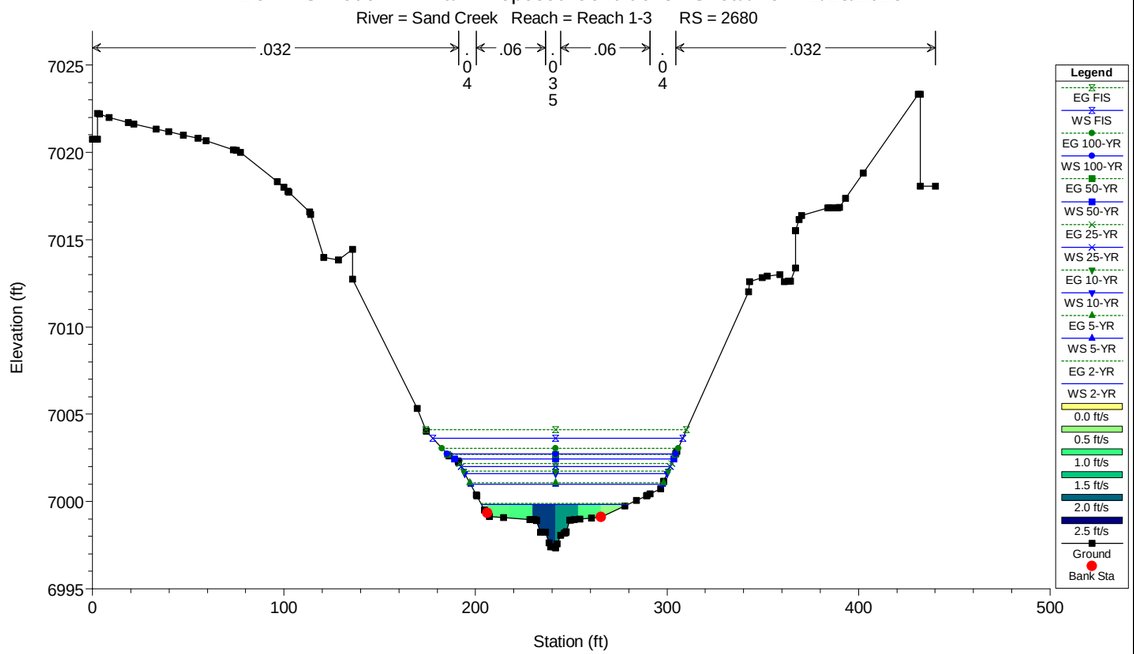
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2719



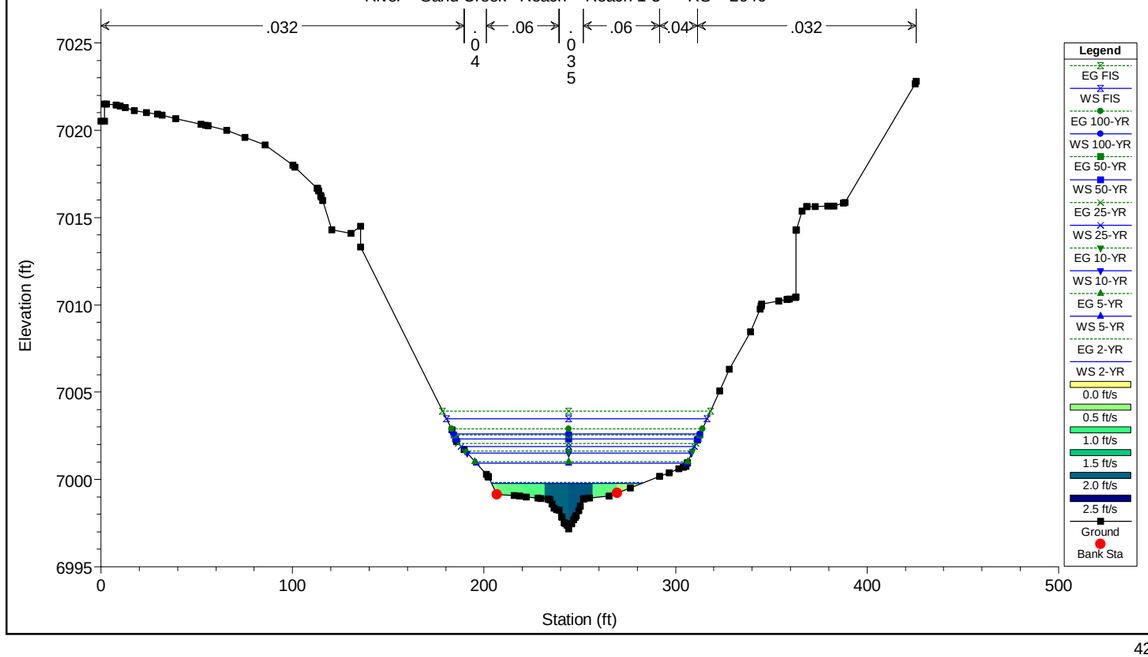

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 2680



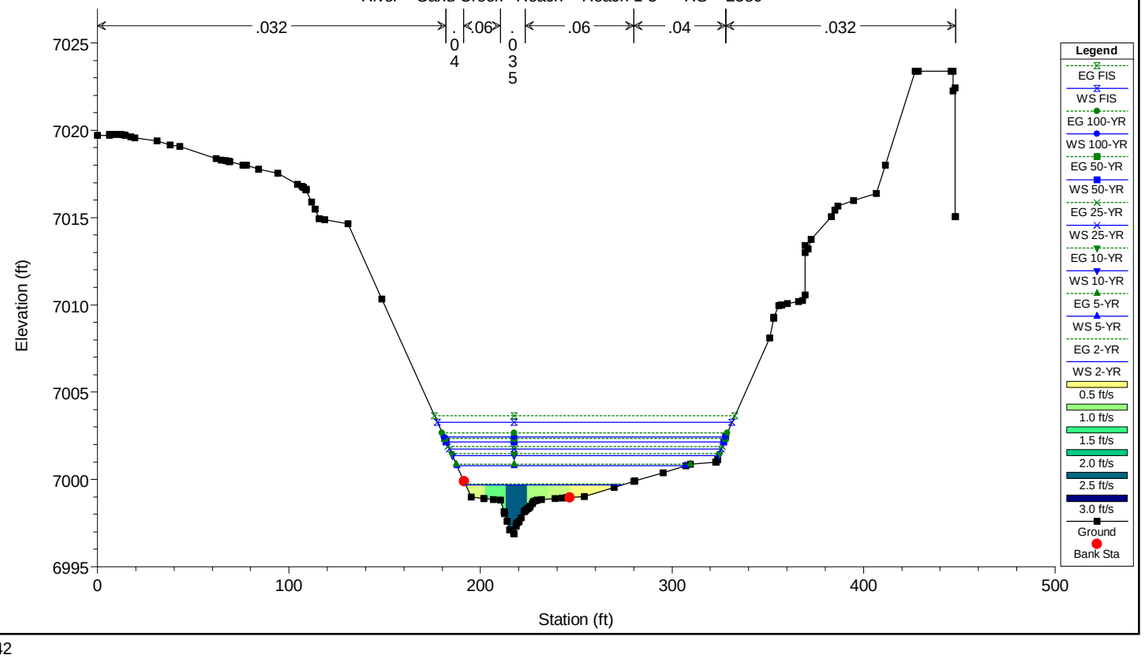

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

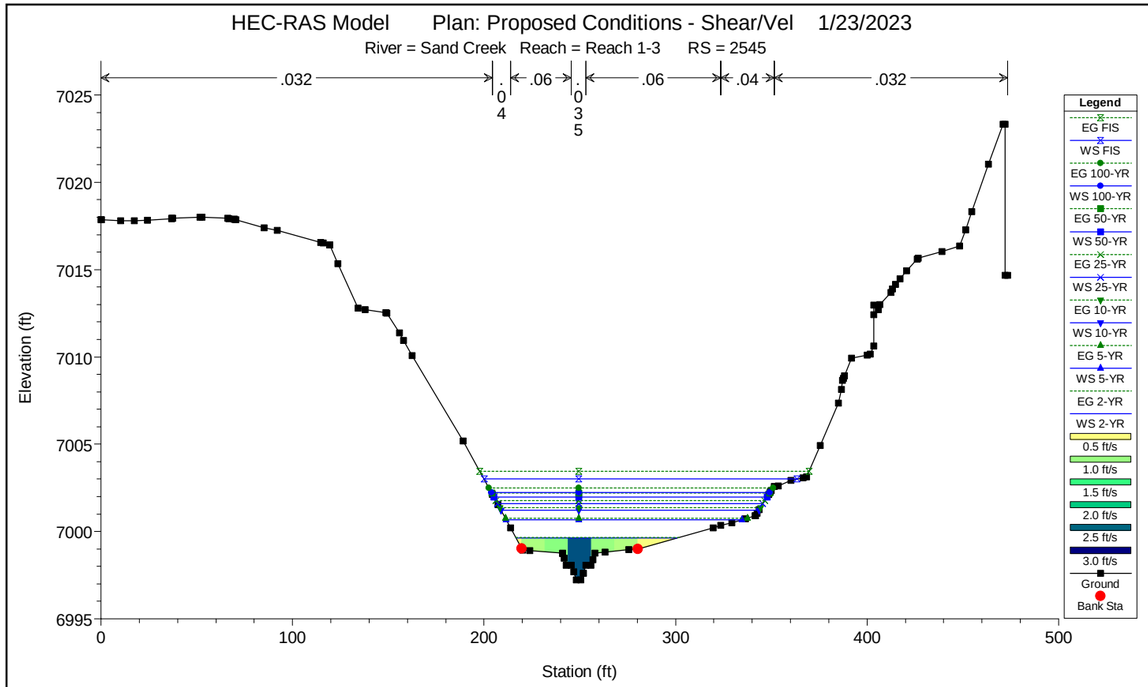
River = Sand Creek Reach = Reach 1-3 RS = 2646

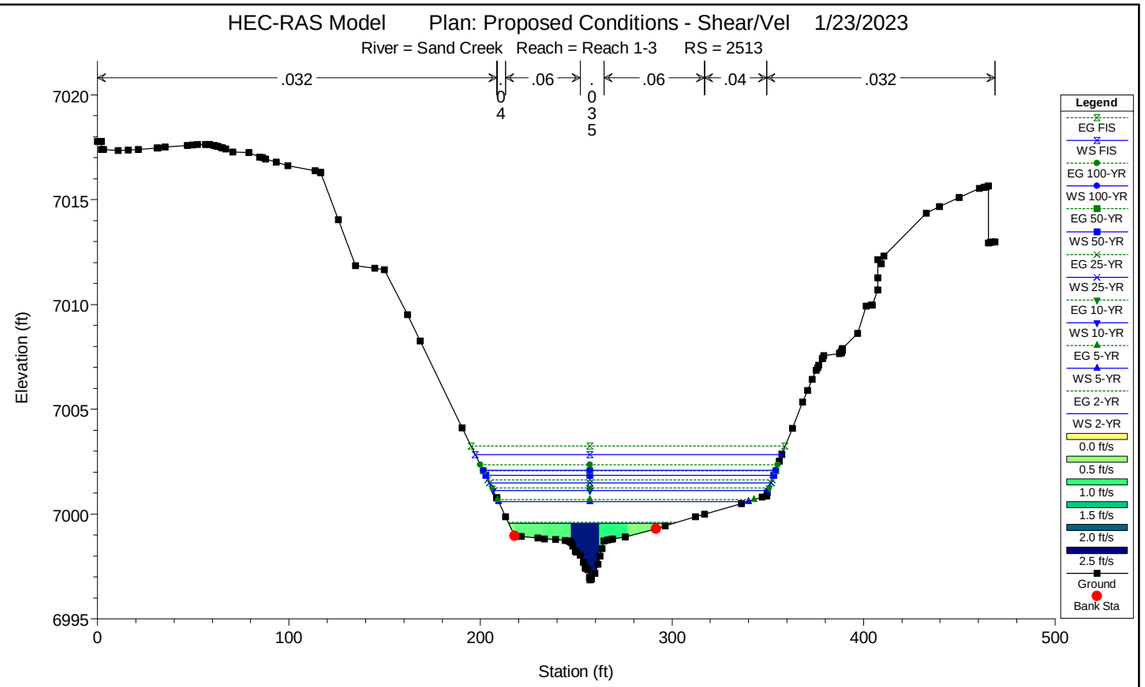


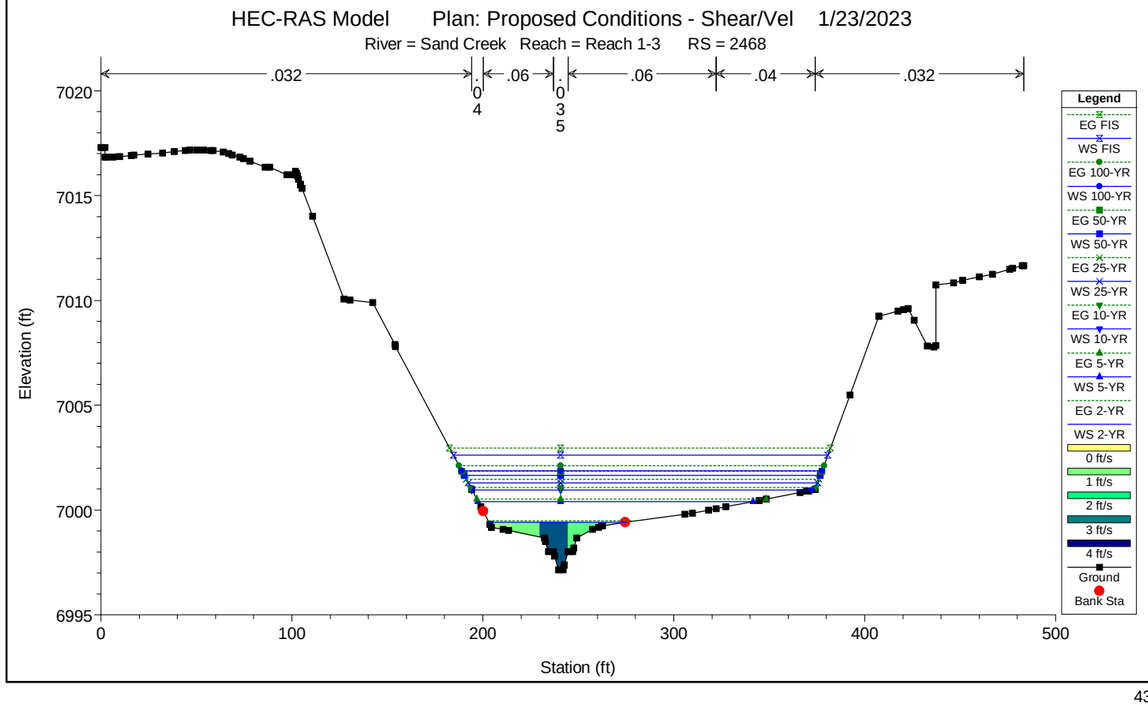

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

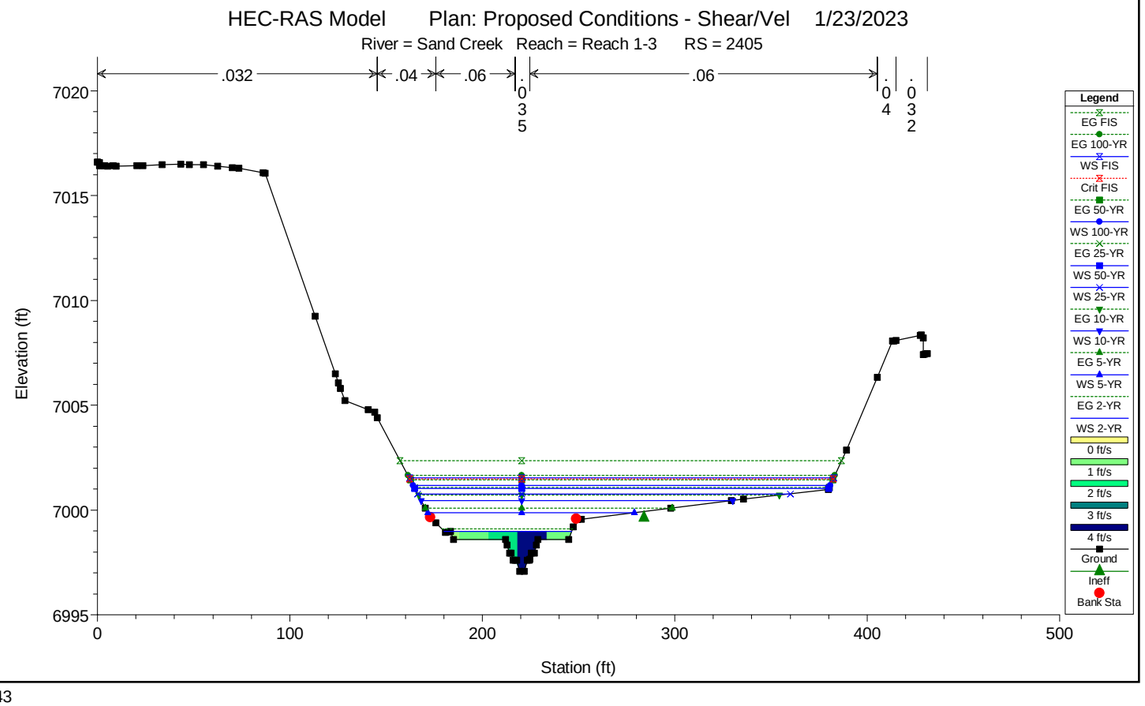
River = Sand Creek Reach = Reach 1-3 RS = 2589

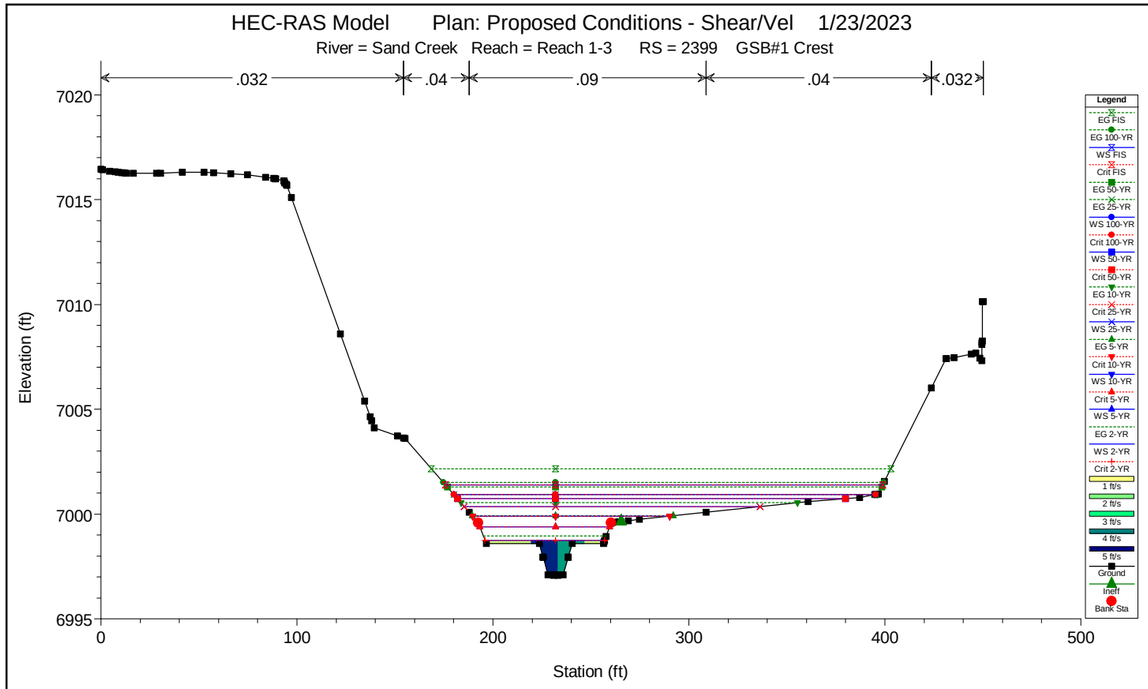


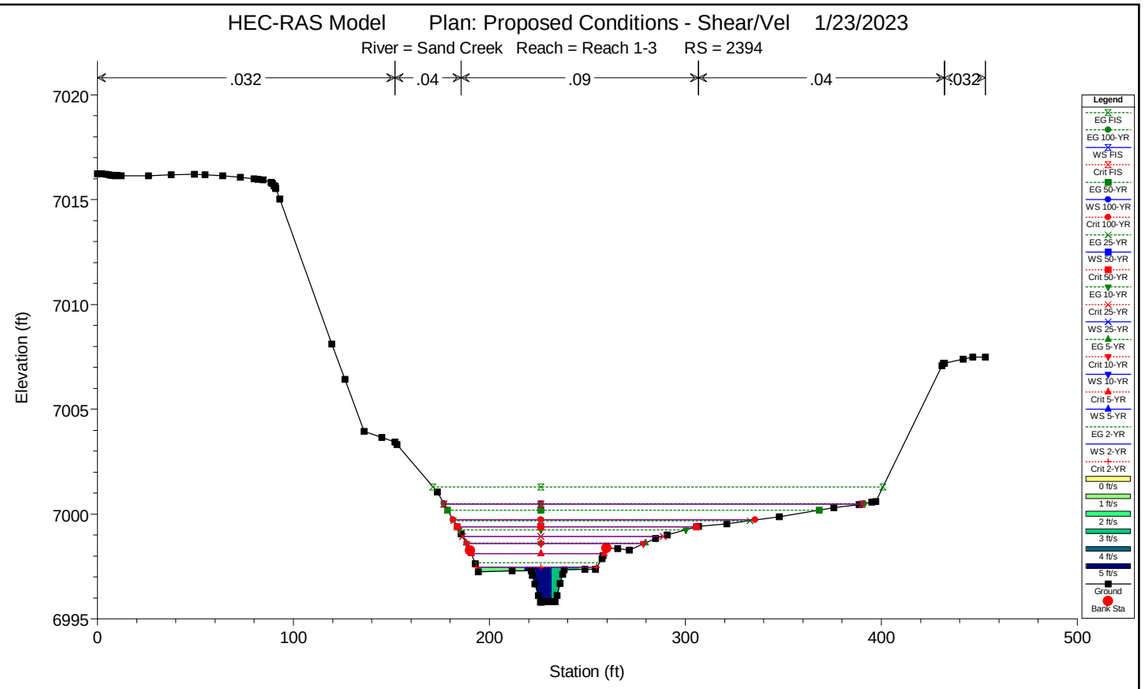

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2545
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

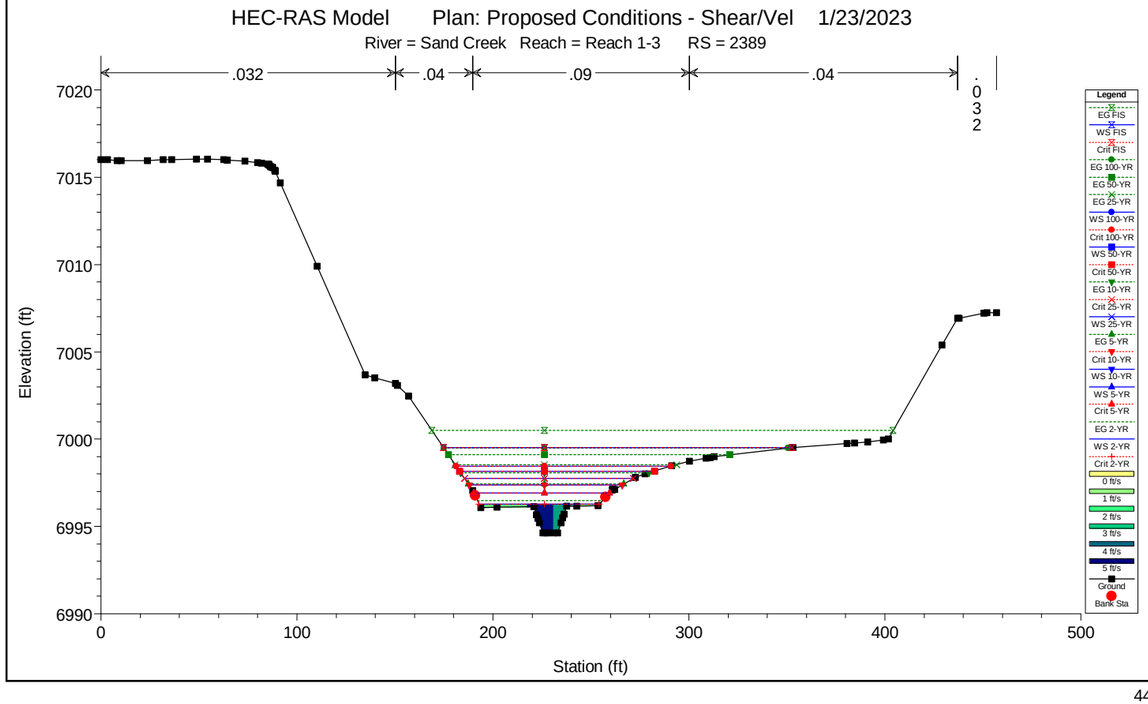

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2513
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

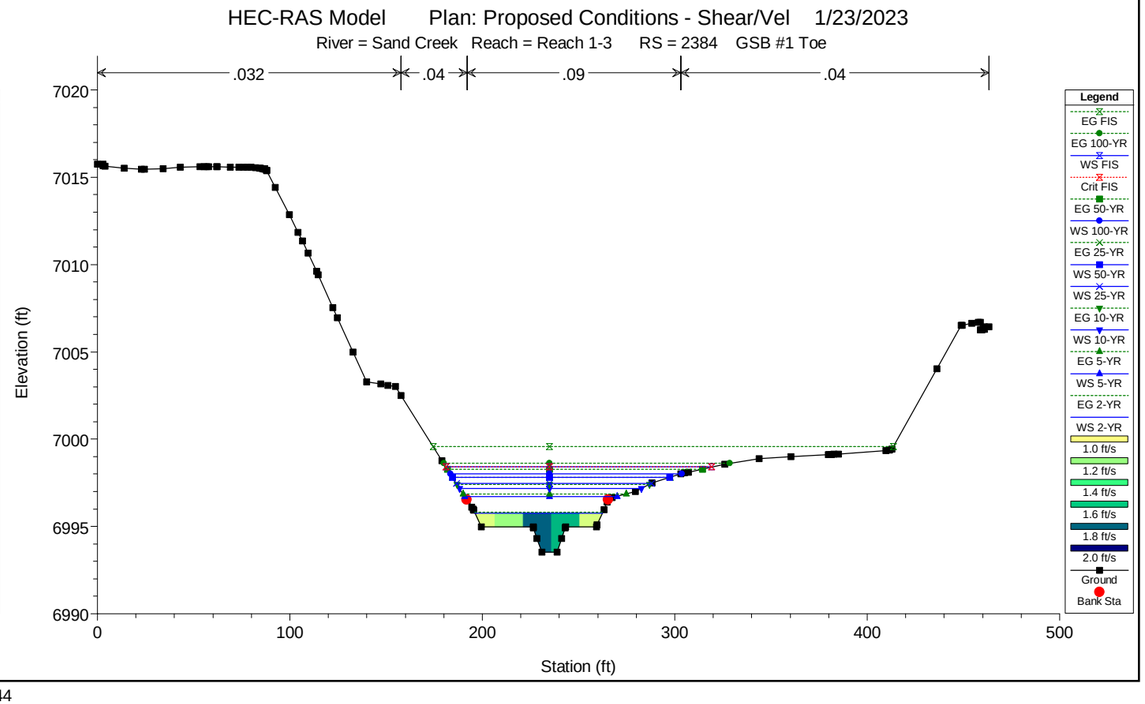

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2468
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

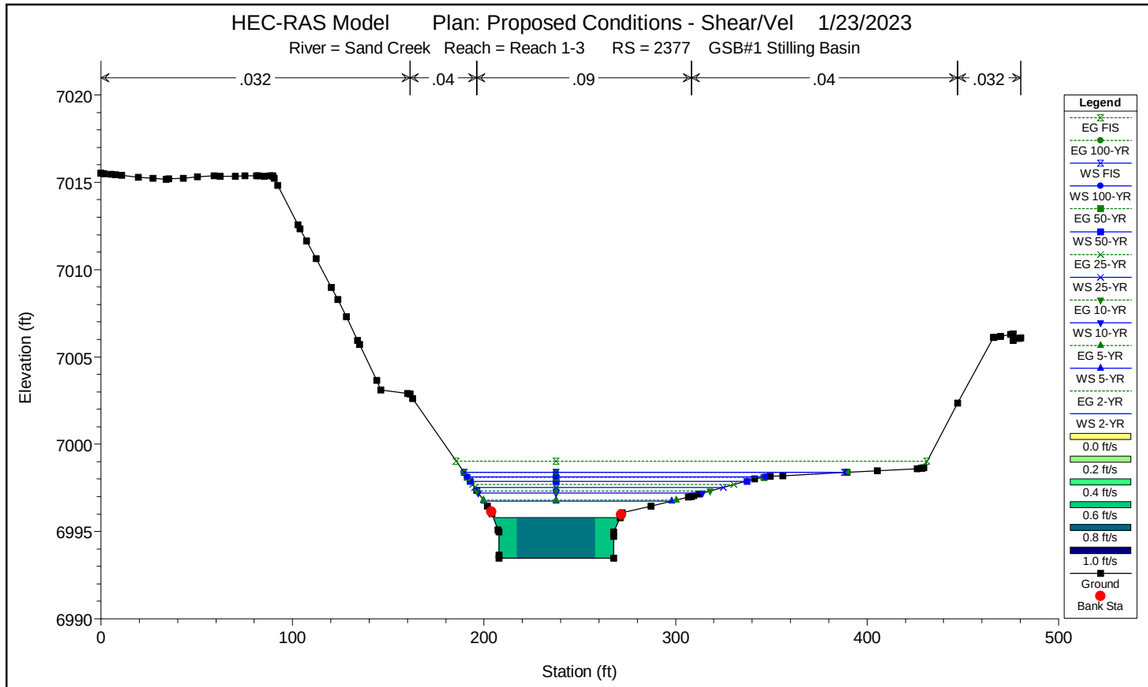

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2405
.032
.04
.06
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

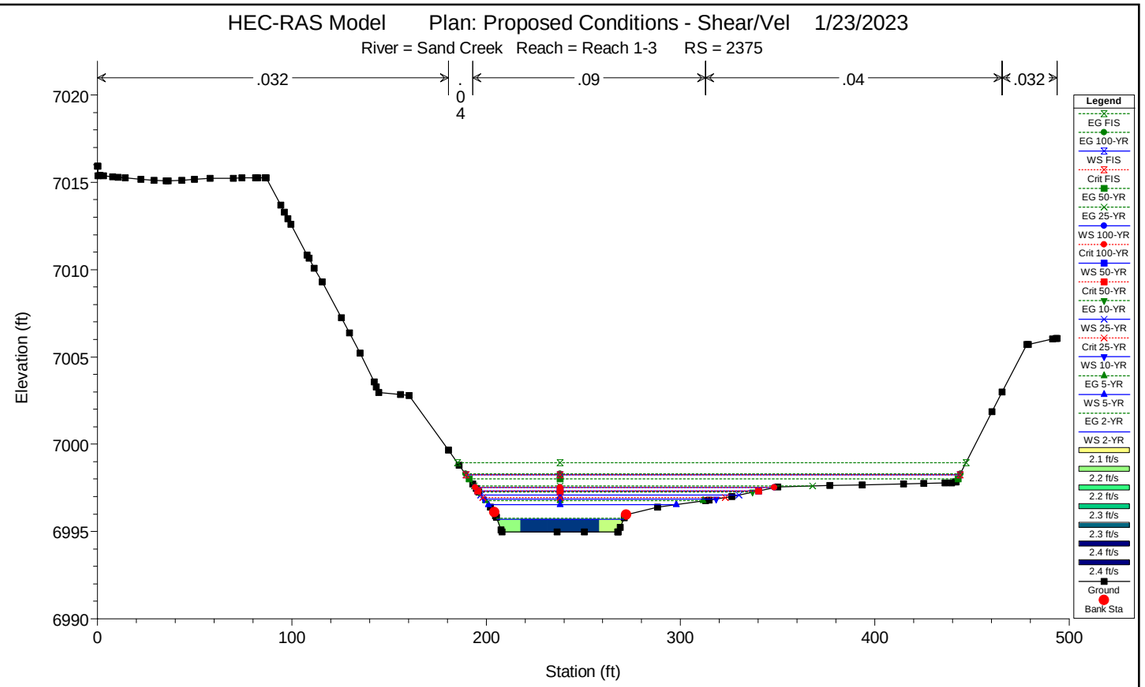

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2399 GSB#1 Crest
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

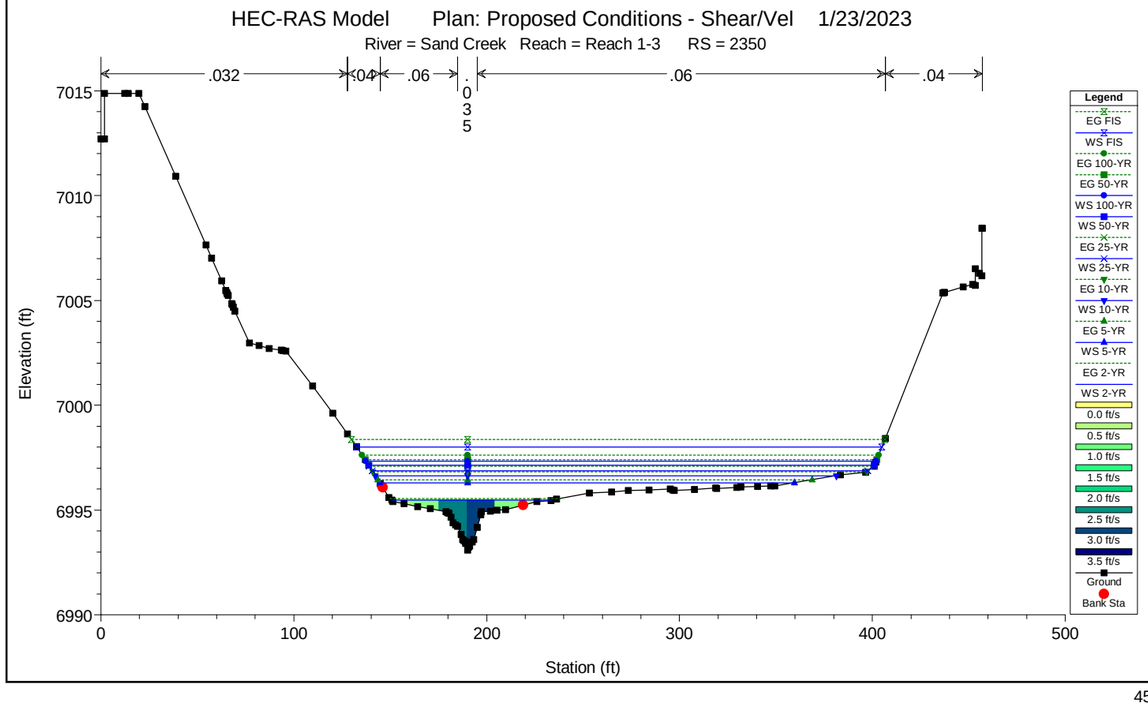

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2394
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
Crit 100-YR
EG 25-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

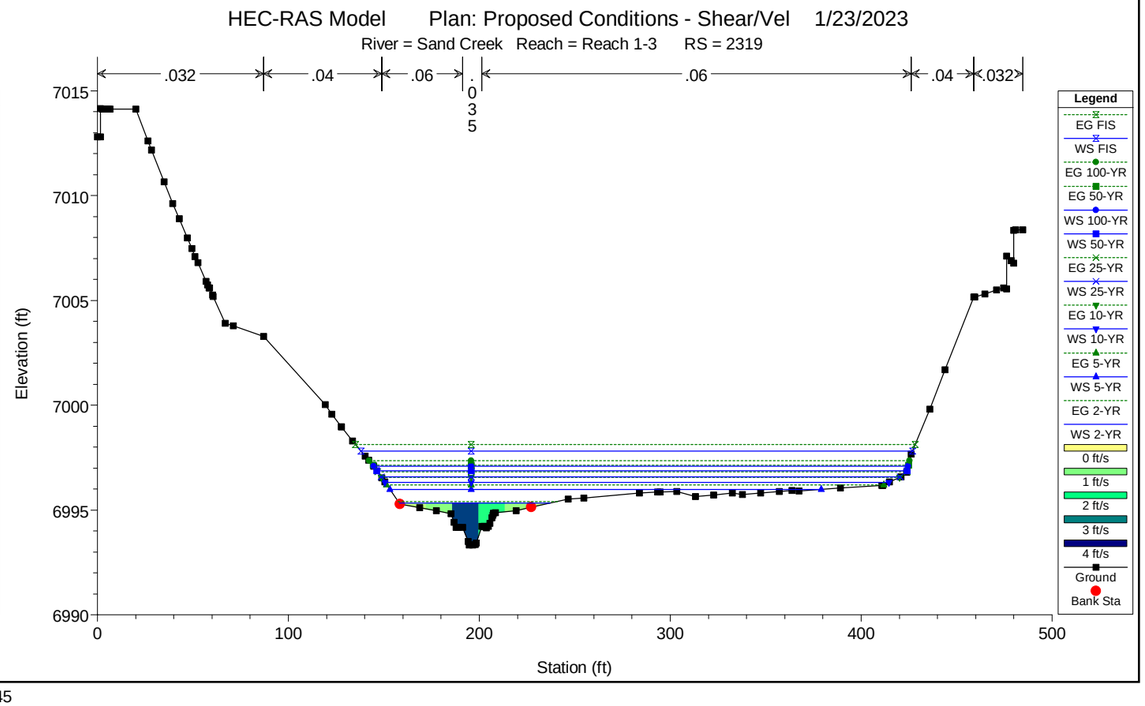

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2389
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
EG 100-YR
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
Crit 25-YR
WS 25-YR
EG 5-YR
Crit 10-YR
WS 10-YR
WS 5-YR
Crit 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

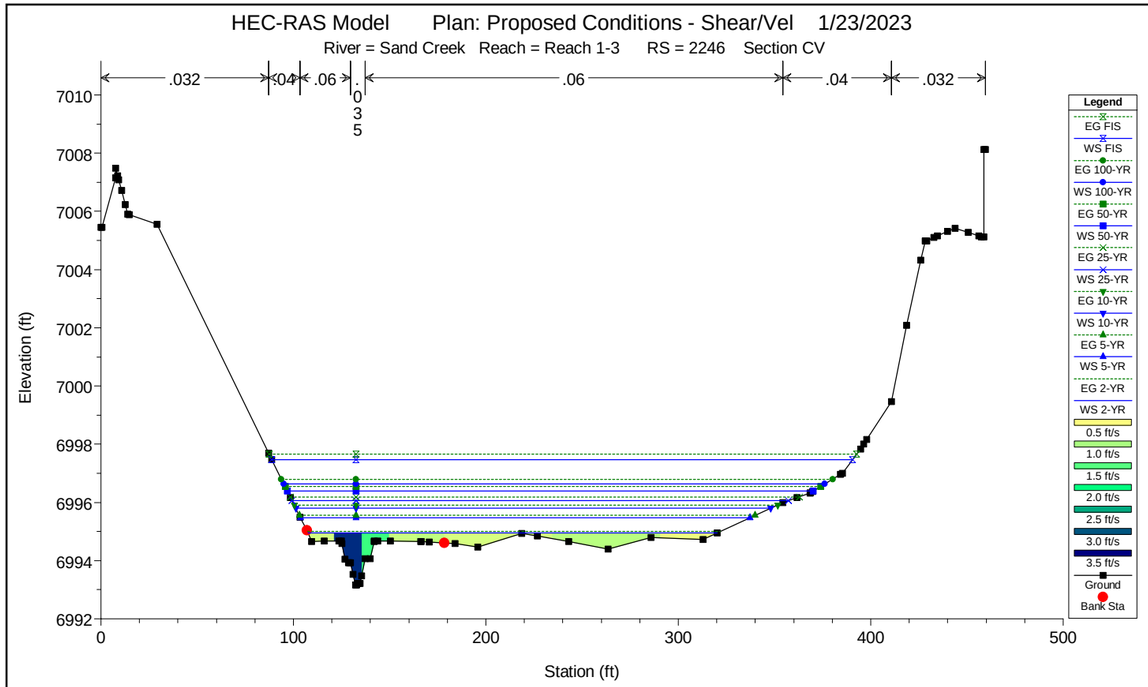

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2384 GSB #1 Toe
.032
.04
.09
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
Ground
Bank Sta

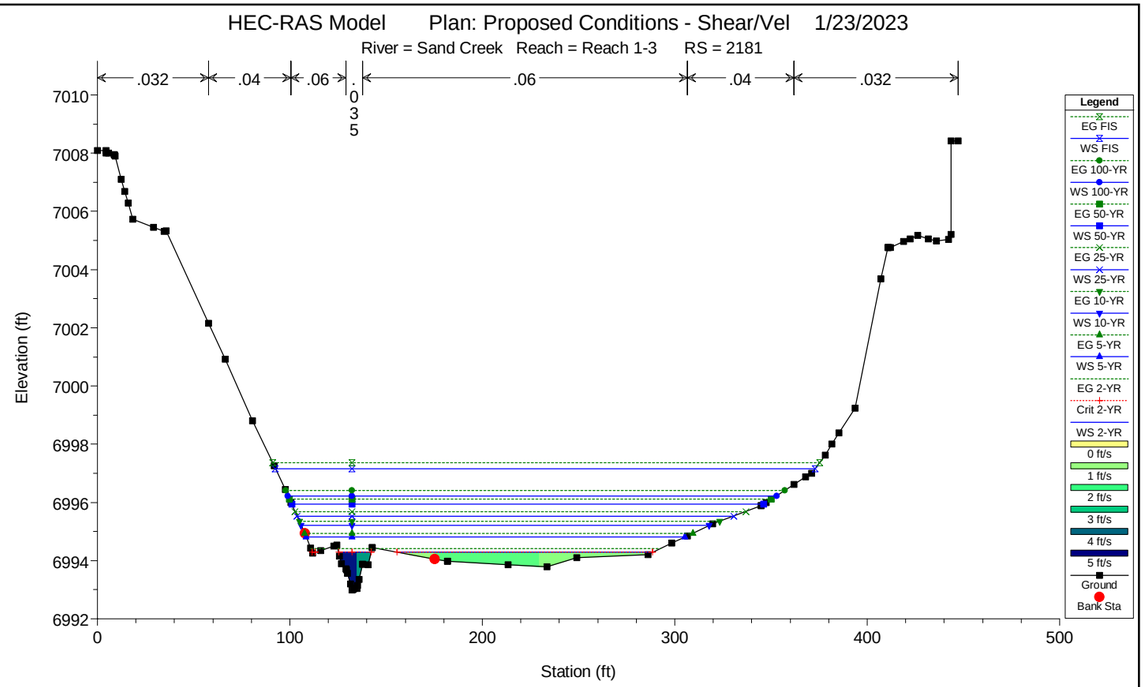

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2377 GSB#1 Stilling Basin
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

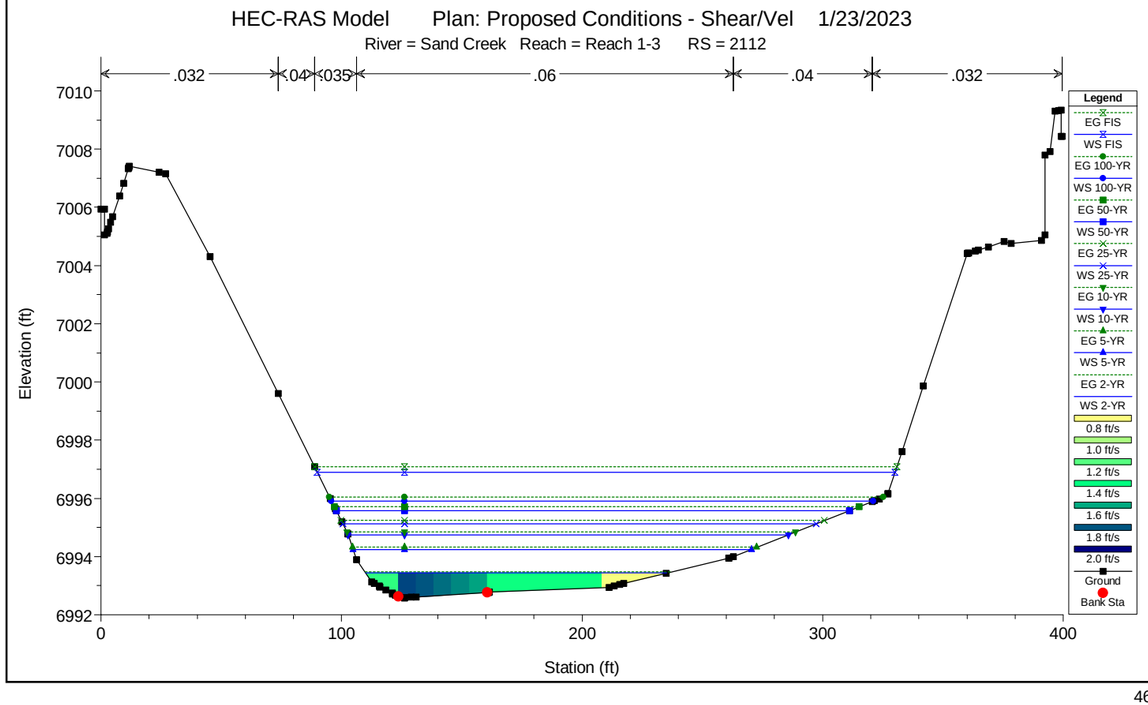

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2375
.032
.04
.09
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
WS 50-YR
Crit 50-YR
EG 10-YR
WS 25-YR
Crit 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
2.1 ft/s
2.2 ft/s
2.2 ft/s
2.3 ft/s
2.3 ft/s
2.4 ft/s
2.4 ft/s
Ground
Bank Sta

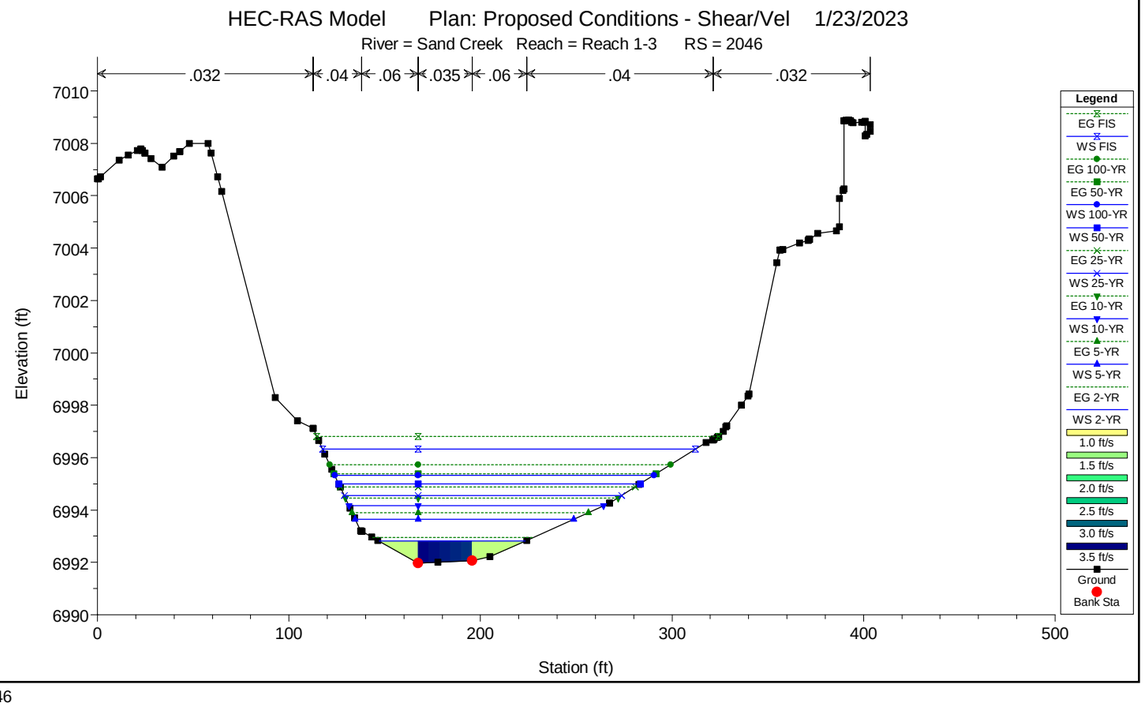

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2350
.032
.04
.06
.06
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

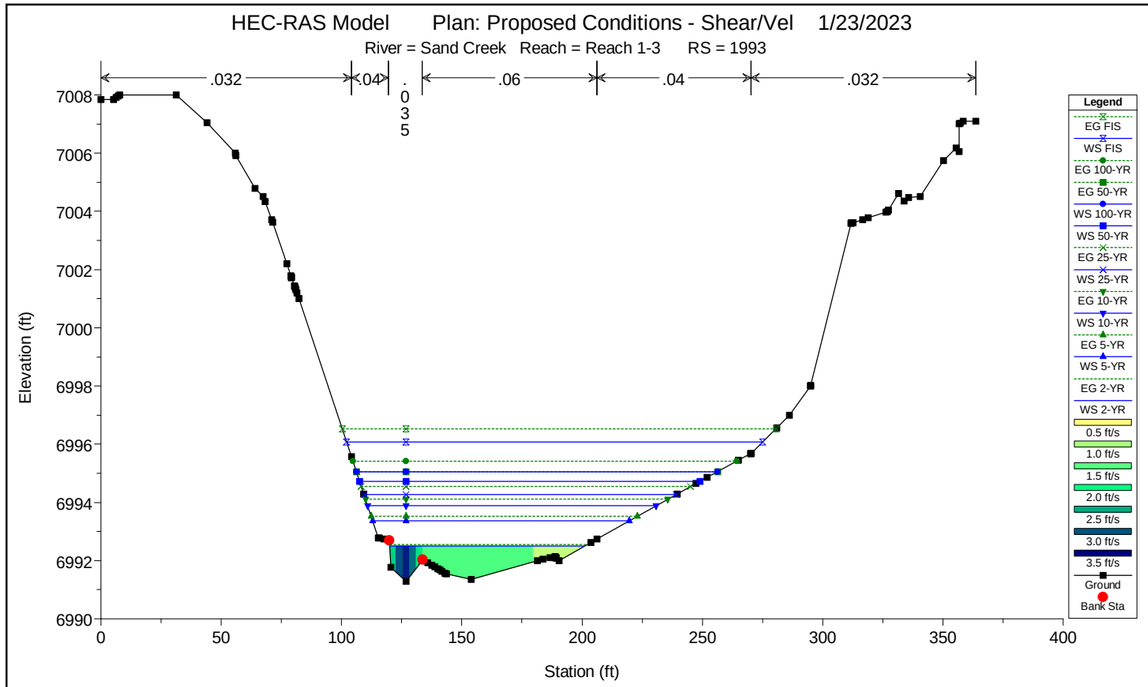

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2319
.032
.04
.06
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

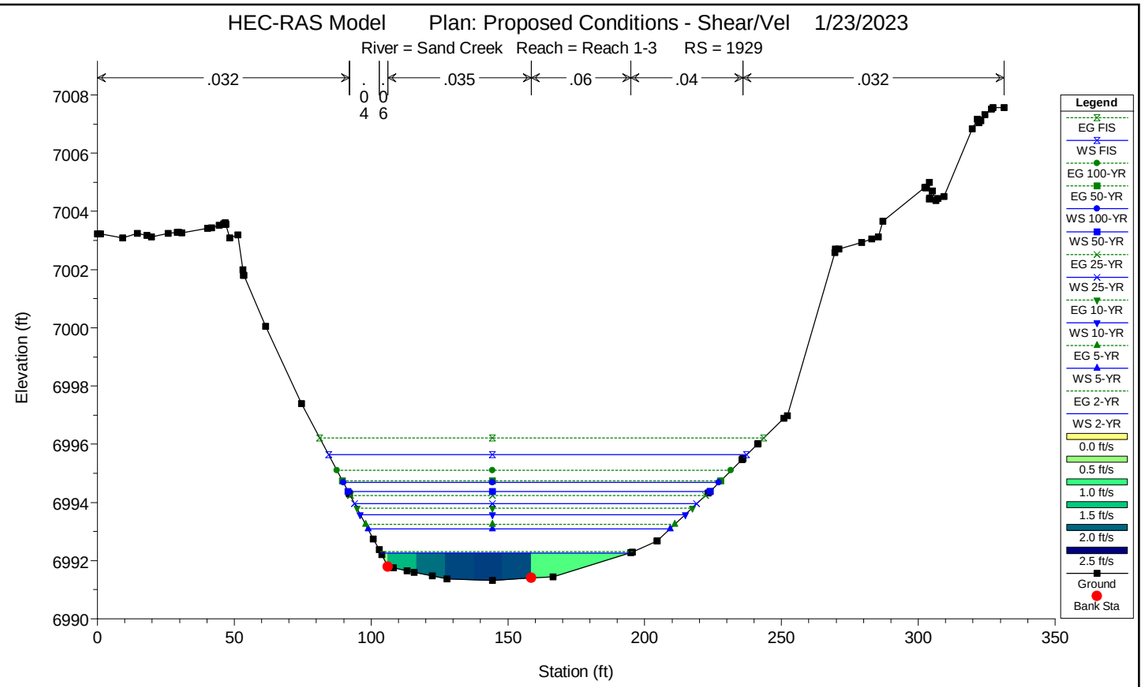

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2246 Section CV
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

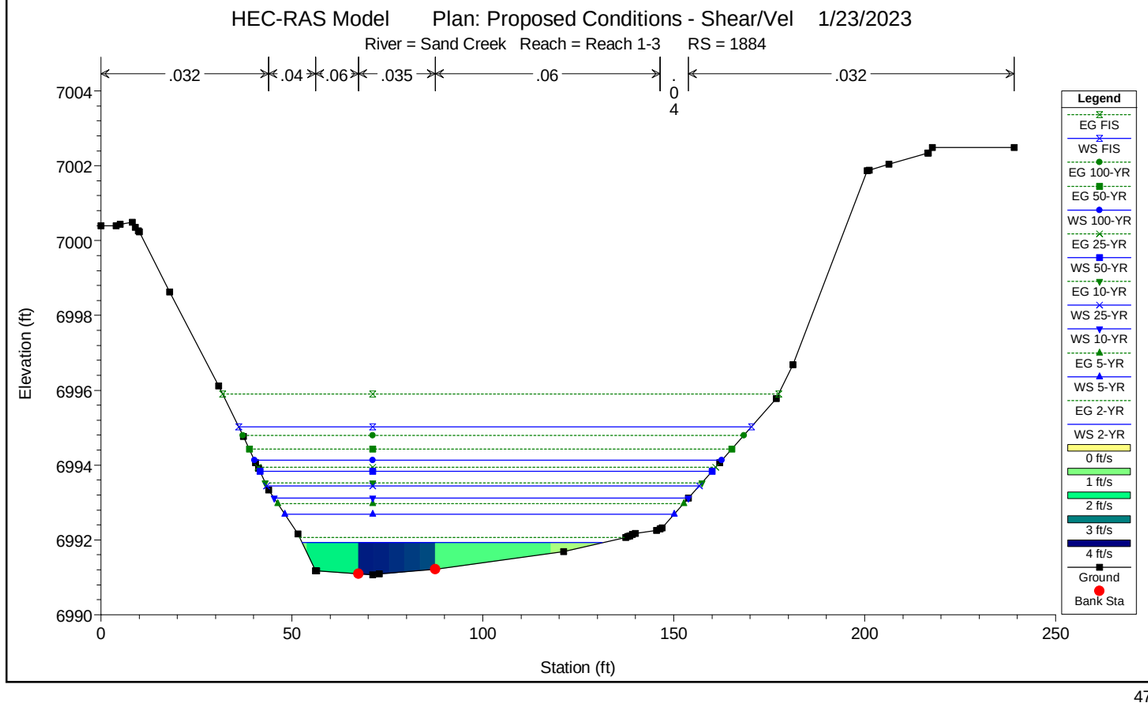

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2181
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
Crit 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

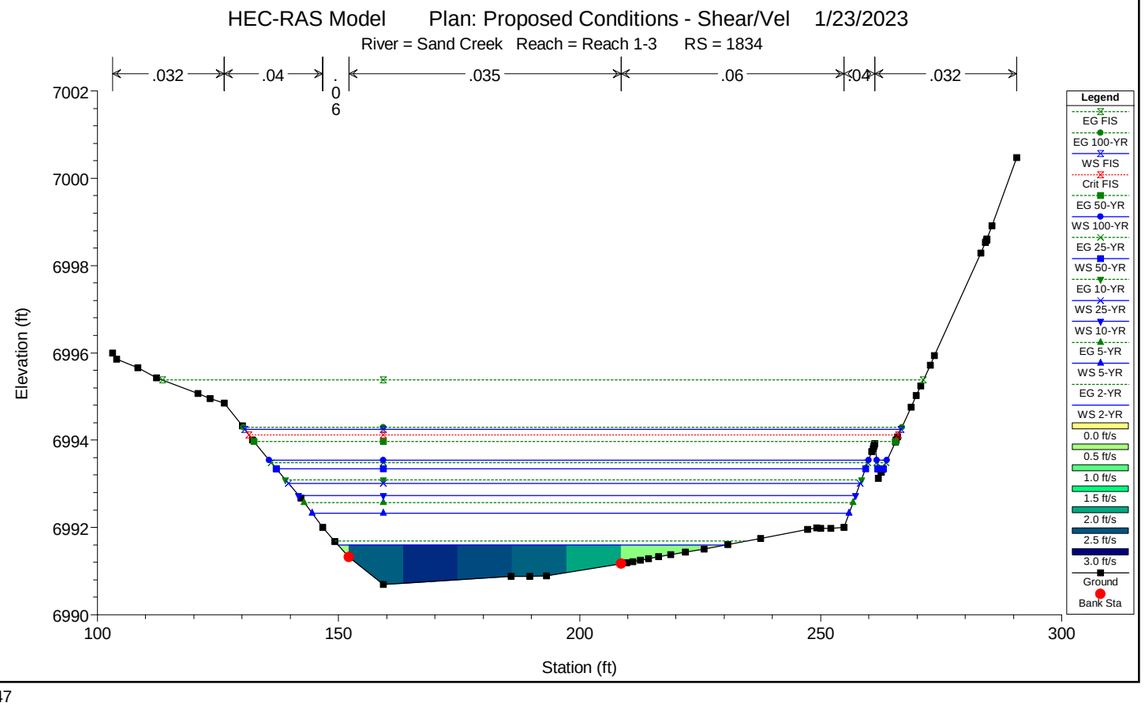

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2112
.032 .04 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
WS 100-YR
EG 50-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
1.6 ft/s
1.8 ft/s
2.0 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2046
.032 .04 .06 .035 .06 .04 .032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1993
.032
.04
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

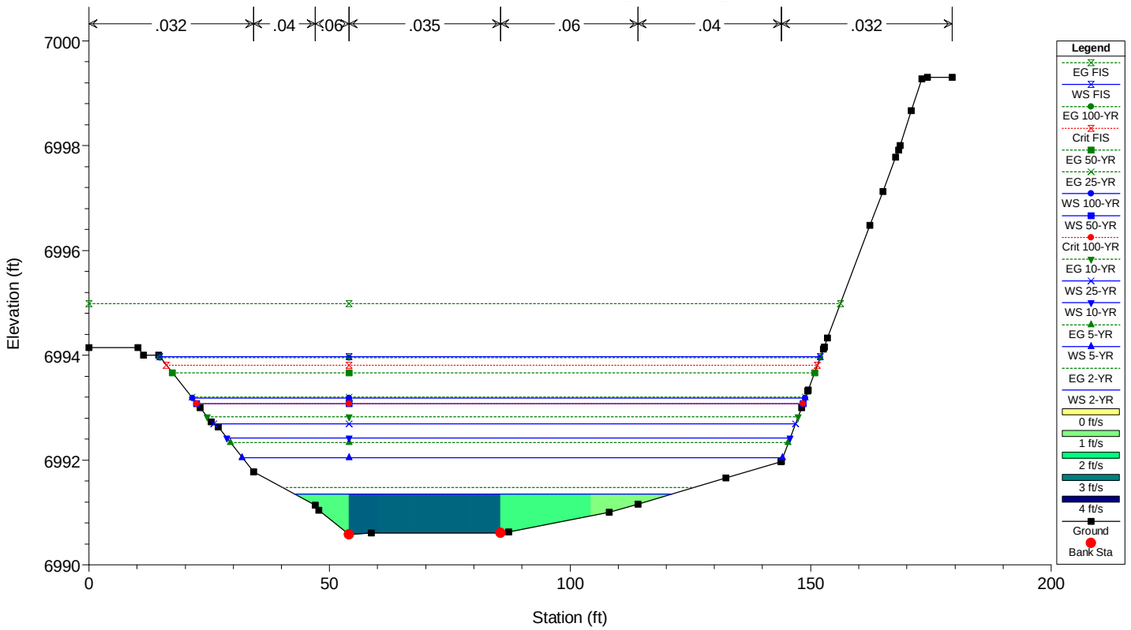

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1929
.032
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
WS 50-YR
EG 25-YR
WS 25-YR
EG 10-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1884
.032
.04
.06
.035
.06
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
EG 100-YR
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1834
.032
.04
.035
.06
.04
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
EG 100-YR
WS FIS
Crit FIS
EG 50-YR
WS 100-YR
EG 25-YR
WS 50-YR
EG 10-YR
WS 25-YR
WS 10-YR
EG 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

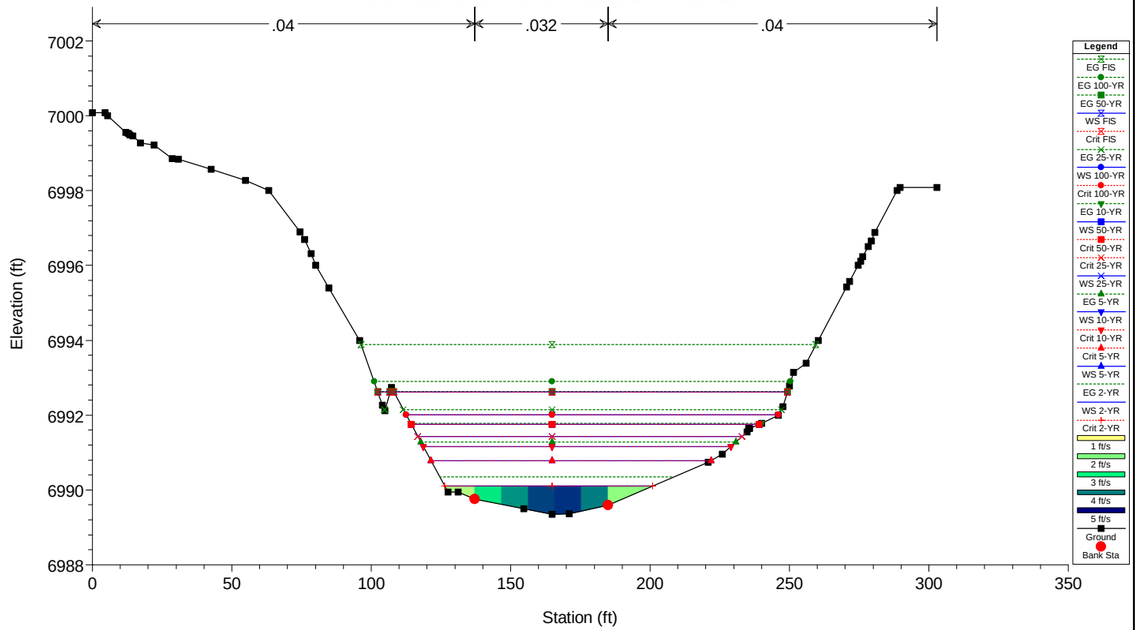
HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 1804



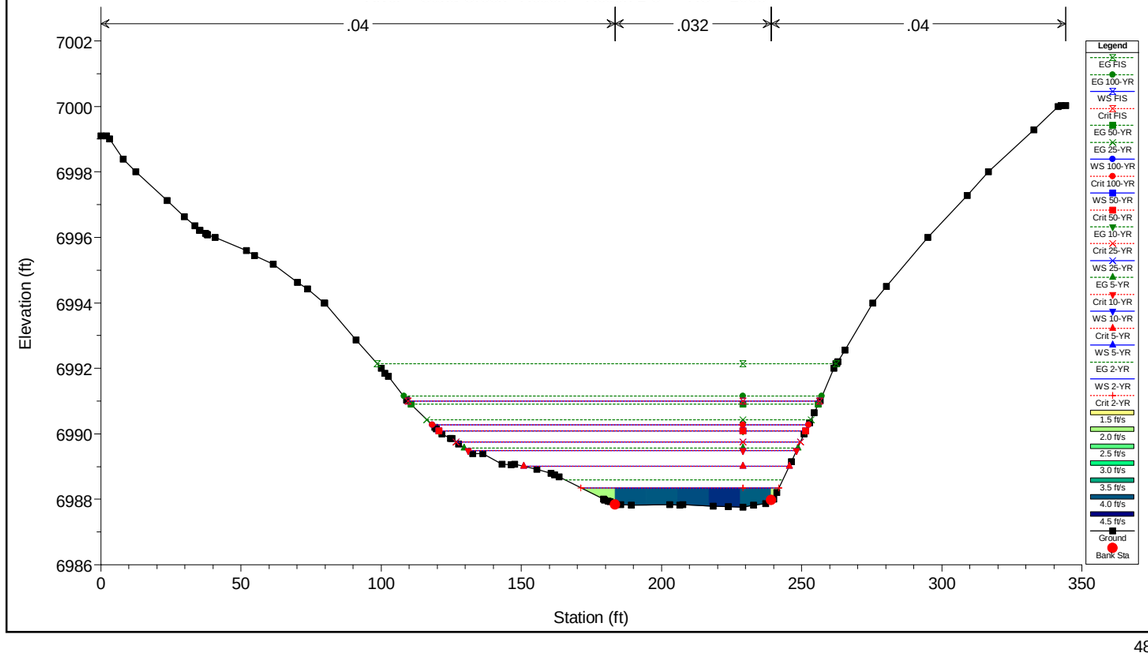

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

River = Sand Creek Reach = Reach 1-3 RS = 1707



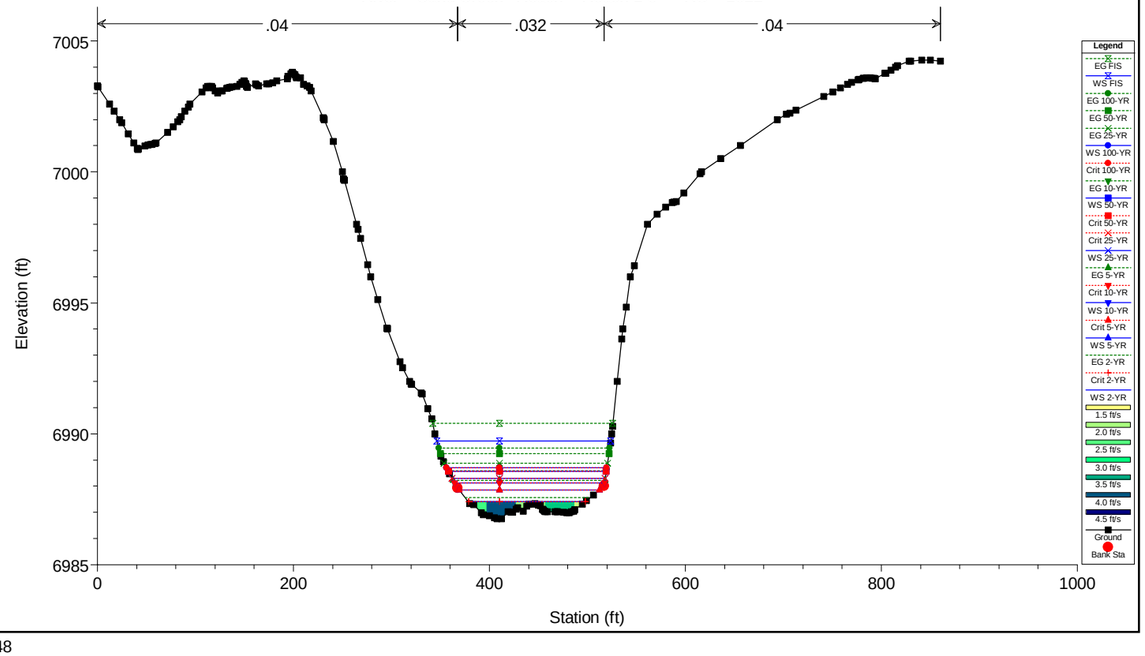

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

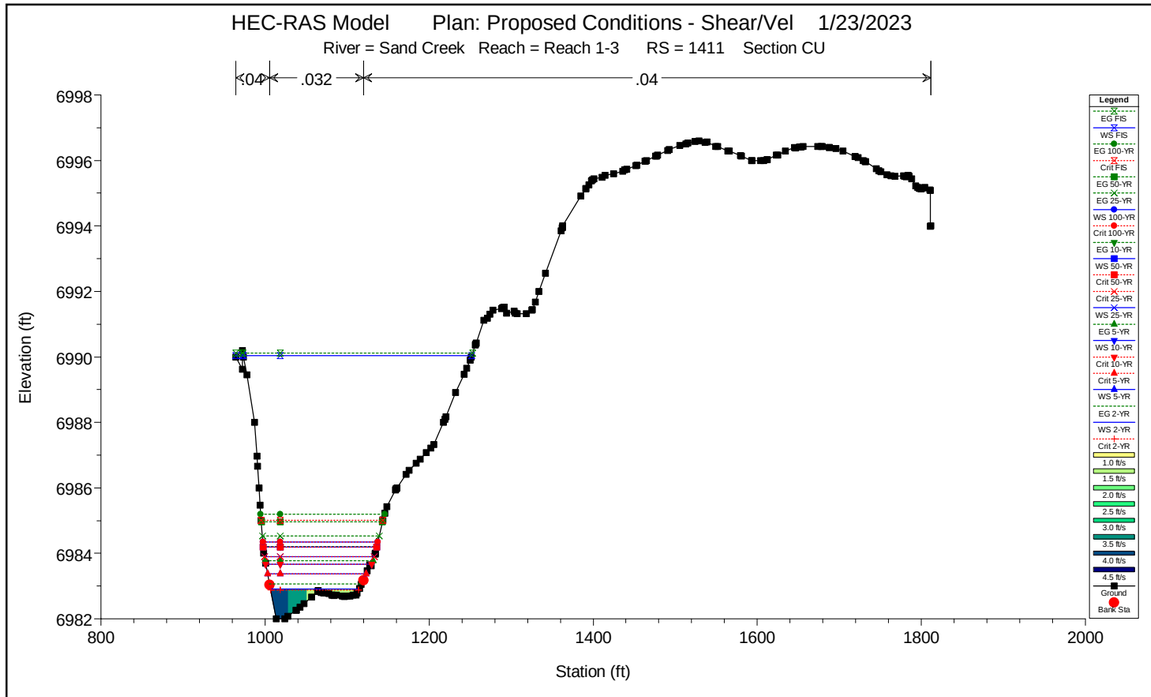
River = Sand Creek Reach = Reach 1-3 RS = 1663

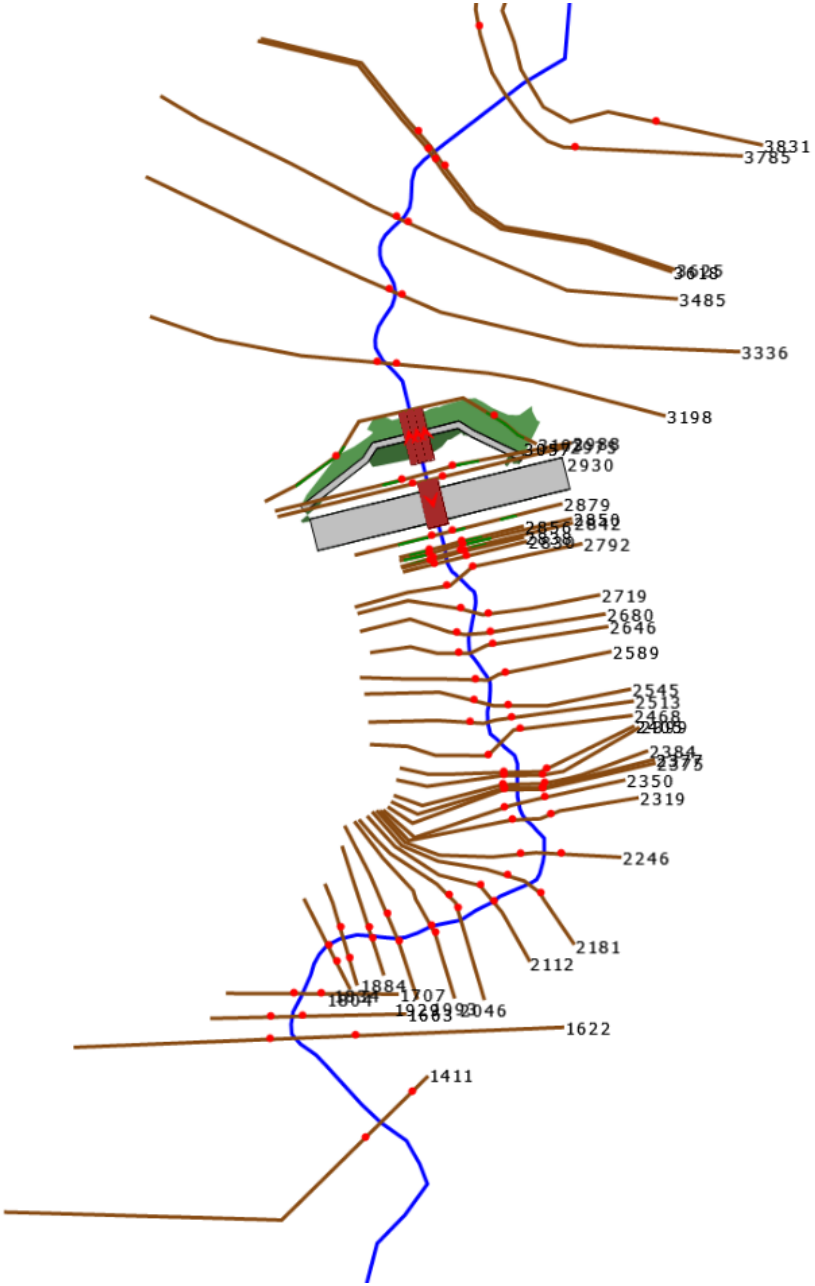



HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023

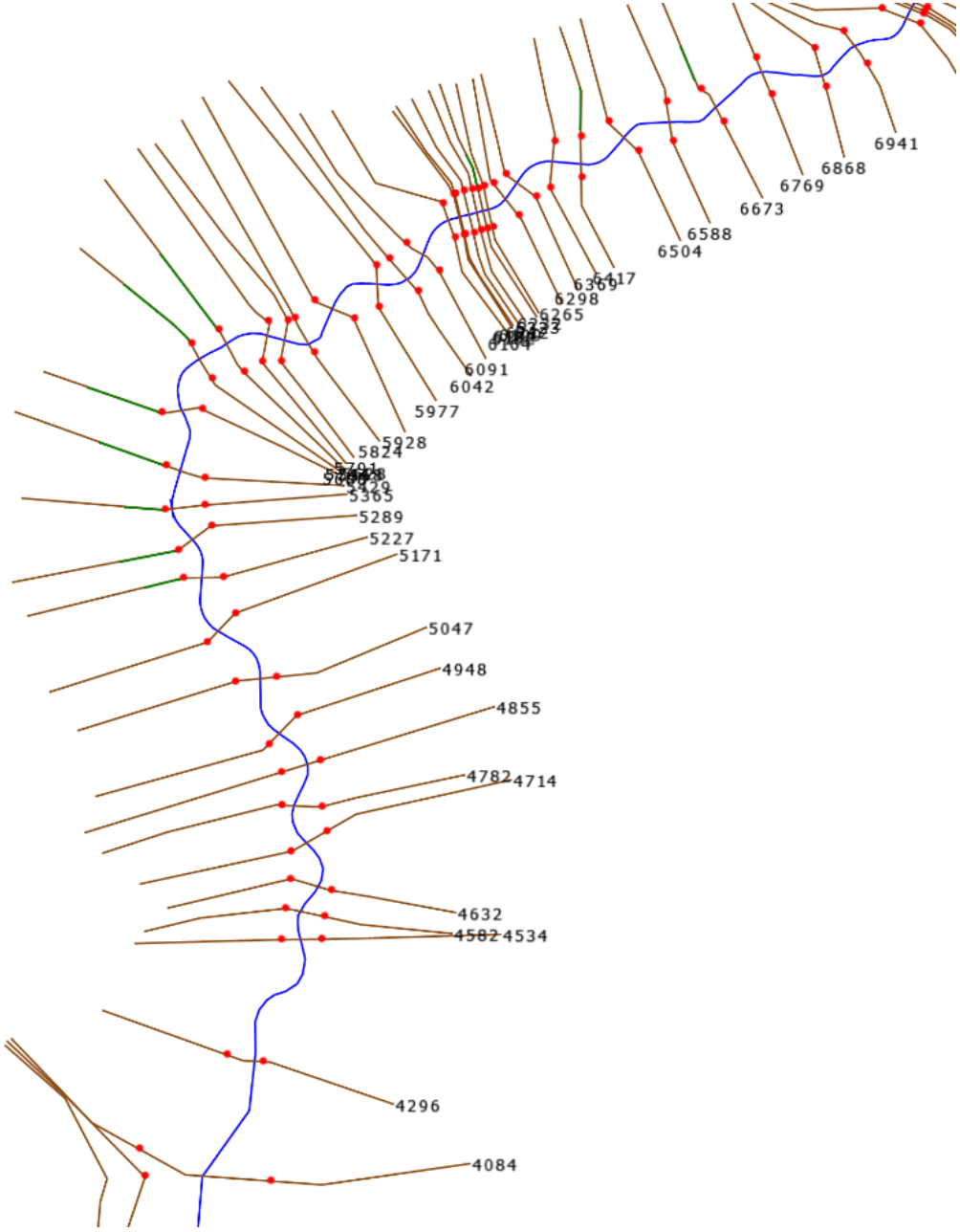
River = Sand Creek Reach = Reach 1-3 RS = 1622



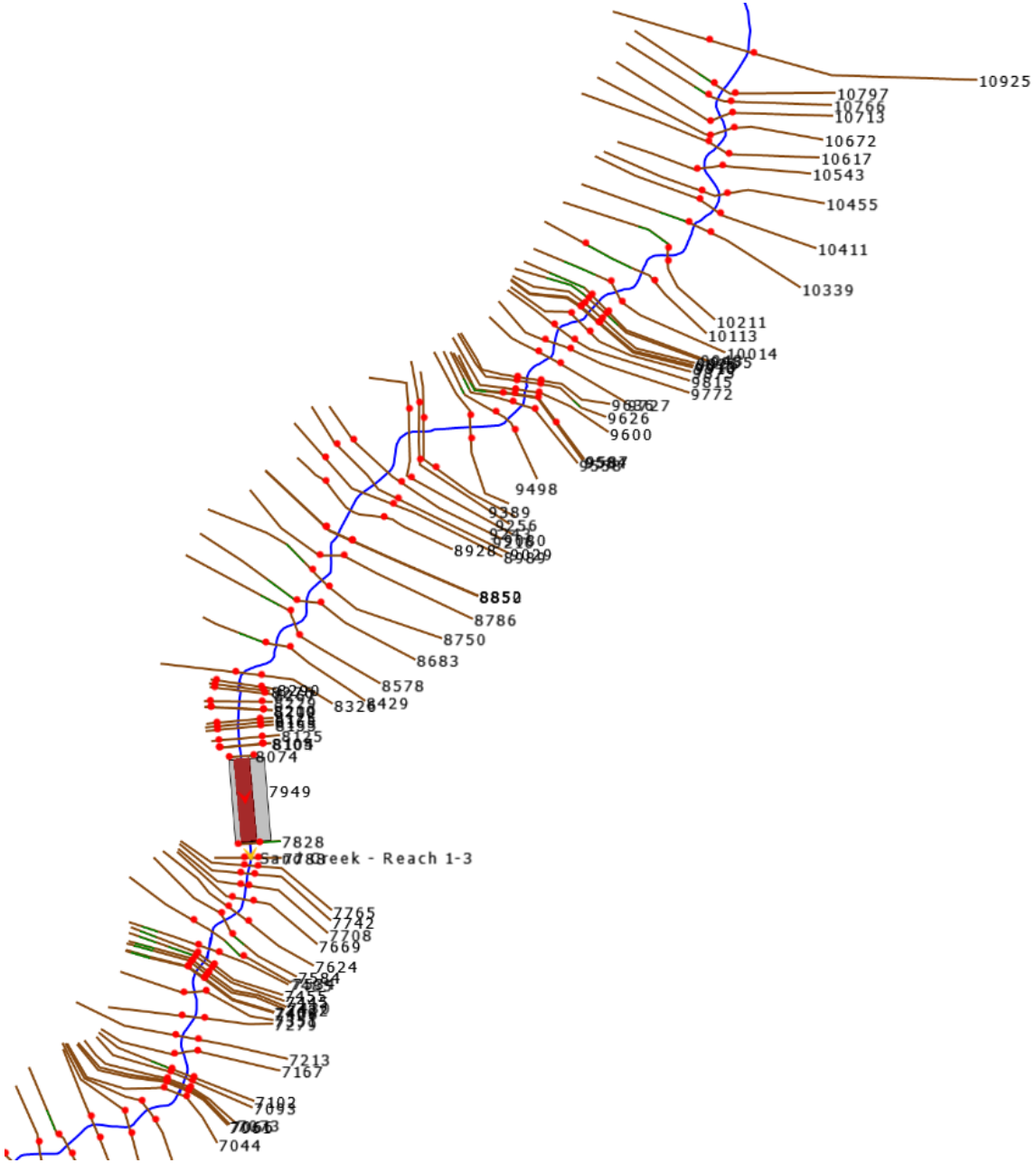

HEC-RAS Model Plan: Proposed Conditions - Shear/Vel 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1411 Section CU
.04
.032
.04
Elevation (ft)
Station (ft)
6998
6996
6994
6992
6990
6988
6986
6984
6982
800
1000
1200
1400
1600
1800
2000
Legend
EG FIS
WS FIS
EG 100-YR
Crit FIS
EG 50-YR
EG 25-YR
WS 100-YR
Crit 100-YR
EG 10-YR
WS 50-YR
Crit 50-YR
Crit 25-YR
WS 25-YR
EG 5-YR
WS 10-YR
Crit 10-YR
Crit 5-YR
WS 5-YR
EG 2-YR
WS 2-YR
Crit 2-YR
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta



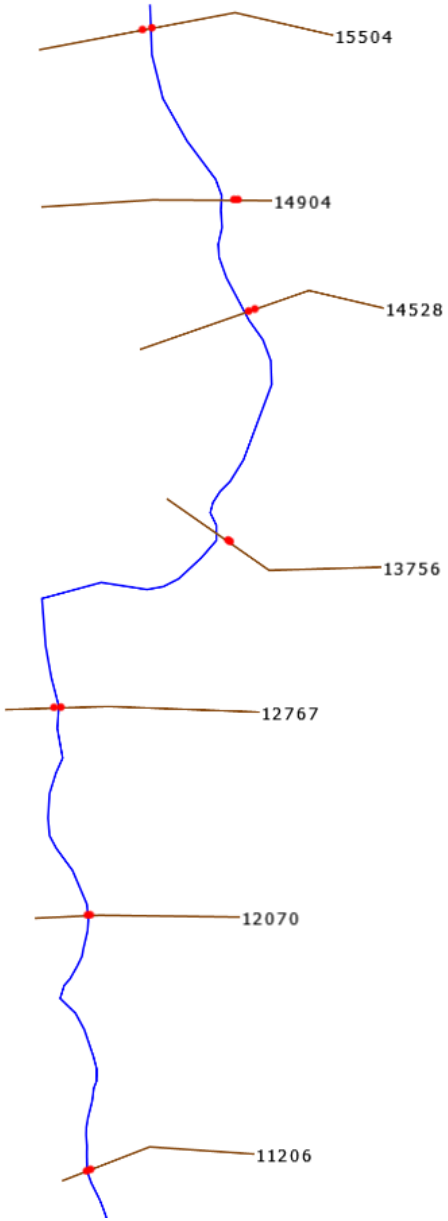

Created with GeoHECRAS v4.0.0.2094




Created with GeoHECRAS v4.0.0.2094




Created with GeoHECRAS v4.0.0.2094




Created with GeoHECRAS v4.0.0.2094

HEC-RAS Plan: PROP - FIS River: Sand Creek Reach: Reach 1-3 Profile: FIS

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 15504 | FIS | 2600.00 | 7230.74 | 7236.42 | | 7236.74 | 0.008586 | 6.14 | 712.56 | 170.93 | 0.46 |
| Reach 1-3 | 14904 | FIS | 2600.00 | 7220.33 | 7225.18 | 7224.97 | 7226.40 | 0.051165 | 13.50 | 381.79 | 127.61 | 1.09 |
| Reach 1-3 | 14528 | FIS | 2600.00 | 7213.99 | 7219.45 | | 7219.67 | 0.007976 | 5.87 | 854.11 | 230.25 | 0.44 |
| Reach 1-3 | 13756 | FIS | 2600.00 | 7200.47 | 7205.43 | 7205.23 | 7206.65 | 0.058175 | 14.43 | 357.94 | 110.76 | 1.16 |
| Reach 1-3 | 12767 | FIS | 2600.00 | 7180.91 | 7186.82 | | 7187.13 | 0.009908 | 6.80 | 797.97 | 245.88 | 0.50 |
| Reach 1-3 | 12070 | FIS | 2600.00 | 7168.31 | 7175.85 | 7174.66 | 7176.90 | 0.024037 | 12.38 | 409.60 | 83.51 | 0.80 |
| Reach 1-3 | 11206 | FIS | 2600.00 | 7151.03 | 7156.85 | | 7157.43 | 0.021837 | 9.77 | 570.09 | 180.02 | 0.73 |
| Reach 1-3 | 10925 | FIS | 2600.00 | 7148.00 | 7152.89 | | 7153.31 | 0.010047 | 5.19 | 511.92 | 146.11 | 0.47 |
| Reach 1-3 | 10797 | FIS | 2600.00 | 7145.39 | 7151.40 | 7149.76 | 7151.68 | 0.015819 | 4.80 | 654.87 | 200.83 | 0.39 |
| Reach 1-3 | 10766 | FIS | 2600.00 | 7144.56 | 7150.92 | | 7151.19 | 0.015206 | 4.89 | 666.86 | 207.34 | 0.40 |
| Reach 1-3 | 10713 | FIS | 2600.00 | 7144.42 | 7150.21 | | 7150.41 | 0.012360 | 4.10 | 764.94 | 231.44 | 0.35 |
| Reach 1-3 | 10672 | FIS | 2600.00 | 7143.57 | 7149.76 | | 7149.96 | 0.009751 | 4.21 | 806.86 | 247.19 | 0.35 |
| Reach 1-3 | 10617 | FIS | 2600.00 | 7143.37 | 7149.29 | | 7149.47 | 0.011352 | 3.97 | 811.07 | 256.89 | 0.33 |
| Reach 1-3 | 10543 | FIS | 2600.00 | 7142.42 | 7148.47 | | 7148.68 | 0.011762 | 4.40 | 767.37 | 259.87 | 0.37 |
| Reach 1-3 | 10455 | FIS | 2600.00 | 7141.88 | 7147.58 | | 7147.77 | 0.010731 | 4.03 | 779.33 | 300.67 | 0.35 |
| Reach 1-3 | 10411 | FIS | 2600.00 | 7141.96 | 7146.89 | | 7147.16 | 0.018412 | 5.03 | 694.09 | 290.46 | 0.45 |
| Reach 1-3 | 10339 | FIS | 2600.00 | 7140.17 | 7145.97 | | 7146.13 | 0.011496 | 4.12 | 924.90 | 390.42 | 0.36 |
| Reach 1-3 | 10211 | FIS | 2600.00 | 7138.89 | 7144.56 | | 7144.75 | 0.011698 | 4.74 | 845.69 | 370.25 | 0.41 |
| Reach 1-3 | 10113 | FIS | 2600.00 | 7137.89 | 7143.49 | | 7143.62 | 0.011758 | 3.07 | 899.94 | 326.13 | 0.31 |
| Reach 1-3 | 10014 | FIS | 2600.00 | 7136.24 | 7141.94 | | 7142.19 | 0.020116 | 4.94 | 725.37 | 301.55 | 0.44 |
| Reach 1-3 | 9955 | FIS | 2600.00 | 7135.86 | 7140.19 | 7139.70 | 7140.55 | 0.038751 | 5.97 | 598.07 | 298.75 | 0.60 |
| Reach 1-3 | 9943 | FIS | 2600.00 | 7135.80 | 7139.25 | 7139.25 | 7139.92 | 0.071985 | 7.78 | 419.98 | 300.61 | 0.90 |
| Reach 1-3 | 9926 | FIS | 2600.00 | 7131.59 | 7137.96 | | 7138.30 | 0.011452 | 5.33 | 637.40 | 286.56 | 0.41 |
| Reach 1-3 | 9913 | FIS | 2600.00 | 7131.58 | 7137.97 | | 7138.15 | 0.005251 | 3.92 | 862.47 | 297.77 | 0.28 |
| Reach 1-3 | 9910 | FIS | 2600.00 | 7132.63 | 7137.94 | | 7138.13 | 0.007210 | 4.13 | 807.37 | 298.69 | 0.32 |
| Reach 1-3 | 9875 | FIS | 2600.00 | 7131.85 | 7137.68 | | 7137.86 | 0.008711 | 4.14 | 897.36 | 301.86 | 0.34 |
| Reach 1-3 | 9815 | FIS | 2600.00 | 7130.14 | 7136.97 | | 7137.23 | 0.013818 | 4.87 | 754.04 | 288.83 | 0.41 |
| Reach 1-3 | 9772 | FIS | 2600.00 | 7130.91 | 7136.39 | | 7136.64 | 0.013857 | 4.77 | 732.67 | 278.79 | 0.41 |
| Reach 1-3 | 9727 | FIS | 2600.00 | 7129.87 | 7135.72 | | 7135.98 | 0.016089 | 4.92 | 717.47 | 276.63 | 0.43 |
| Reach 1-3 | 9636 | FIS | 2600.00 | 7129.38 | 7133.68 | | 7133.98 | 0.034211 | 5.37 | 644.86 | 337.18 | 0.55 |
| Reach 1-3 | 9626 | FIS | 2600.00 | 7129.34 | 7132.88 | 7132.88 | 7133.49 | 0.063676 | 7.42 | 449.04 | 336.10 | 0.84 |
| Reach 1-3 | 9600 | FIS | 2600.00 | 7123.43 | 7128.92 | | 7129.48 | 0.022439 | 6.58 | 468.91 | 178.46 | 0.55 |
| Reach 1-3 | 9587 | FIS | 2600.00 | 7123.38 | 7128.94 | | 7129.21 | 0.009500 | 4.79 | 696.21 | 307.49 | 0.37 |
| Reach 1-3 | 9584 | FIS | 2600.00 | 7124.71 | 7128.89 | | 7129.18 | 0.016507 | 4.43 | 632.55 | 315.92 | 0.45 |
| Reach 1-3 | 9558 | FIS | 2600.00 | 7122.44 | 7128.54 | | 7128.79 | 0.012213 | 4.86 | 714.32 | 330.58 | 0.41 |
| Reach 1-3 | 9498 | FIS | 2600.00 | 7122.10 | 7127.64 | 7126.54 | 7127.88 | 0.018086 | 4.58 | 717.43 | 276.25 | 0.41 |
| Reach 1-3 | 9389 | FIS | 2600.00 | 7120.61 | 7124.97 | | 7125.48 | 0.029075 | 4.97 | 491.90 | 195.20 | 0.46 |
| Reach 1-3 | 9256 | FIS | 2600.00 | 7118.36 | 7123.89 | | 7124.00 | 0.005203 | 2.73 | 993.22 | 258.84 | 0.23 |
| Reach 1-3 | 9243 | FIS | 2600.00 | 7119.00 | 7123.68 | | 7123.80 | 0.003948 | 2.87 | 949.75 | 249.96 | 0.24 |
| Reach 1-3 | 9216 | FIS | 2600.00 | 7114.00 | 7123.74 | | 7123.76 | 0.000077 | 1.19 | 2384.15 | 300.87 | 0.07 |
| Reach 1-3 | 9080 | FIS | 2600.00 | 7114.00 | 7123.73 | | 7123.75 | 0.000163 | 1.23 | 2173.73 | 272.38 | 0.07 |
| Reach 1-3 | 9029 | FIS | 2600.00 | 7117.75 | 7123.68 | | 7123.72 | 0.000599 | 1.70 | 1564.05 | 304.59 | 0.12 |
| Reach 1-3 | 8989 | FIS | 2600.00 | 7117.73 | 7123.66 | | 7123.70 | 0.000582 | 1.67 | 1584.26 | 301.54 | 0.12 |
| Reach 1-3 | 8928 | FIS | 2600.00 | 7121.00 | 7122.77 | 7122.77 | 7123.54 | 0.007432 | 7.18 | 375.02 | 246.75 | 0.98 |
| Reach 1-3 | 8852 | FIS | 2600.00 | 7102.13 | 7107.49 | | 7107.63 | 0.002438 | 3.11 | 880.44 | 270.97 | 0.24 |
| Reach 1-3 | 8850 | FIS | 2600.00 | 7103.55 | 7107.38 | | 7107.61 | 0.005176 | 3.24 | 768.30 | 271.54 | 0.29 |
| Reach 1-3 | 8786 | FIS | 2600.00 | 7101.10 | 7107.04 | | 7107.16 | 0.008195 | 3.36 | 967.15 | 284.32 | 0.28 |
| Reach 1-3 | 8750 | FIS | 2600.00 | 7100.37 | 7106.12 | | 7106.32 | 0.013509 | 4.28 | 788.37 | 287.95 | 0.36 |
| Reach 1-3 | 8683 | FIS | 2600.00 | 7099.61 | 7105.31 | | 7105.46 | 0.010461 | 3.69 | 885.82 | 280.05 | 0.32 |
| Reach 1-3 | 8578 | FIS | 2600.00 | 7099.09 | 7104.43 | | 7104.60 | 0.012802 | 3.88 | 813.45 | 264.23 | 0.34 |
| Reach 1-3 | 8429 | FIS | 2600.00 | 7098.29 | 7103.09 | | 7103.41 | 0.015440 | 5.12 | 582.45 | 239.87 | 0.50 |
| Reach 1-3 | 8326 | FIS | 2600.00 | 7096.32 | 7101.20 | 7101.20 | 7102.10 | 0.006901 | 8.13 | 370.28 | 199.91 | 0.86 |
| Reach 1-3 | 8290 | FIS | 2600.00 | 7097.00 | 7100.38 | 7100.06 | 7101.41 | 0.015200 | 8.14 | 319.37 | 112.30 | 0.85 |
| Reach 1-3 | 8276 | FIS | 2600.00 | 7097.00 | 7100.23 | 7099.86 | 7101.17 | 0.014446 | 7.79 | 333.87 | 120.85 | 0.83 |
| Reach 1-3 | 8267 | FIS | 2600.00 | 7097.00 | 7099.71 | 7099.71 | 7100.93 | 0.022639 | 8.85 | 293.86 | 123.07 | 1.01 |
| Reach 1-3 | 8229 | FIS | 2600.00 | 7091.00 | 7098.35 | | 7098.66 | 0.002108 | 4.42 | 587.80 | 116.20 | 0.35 |
| Reach 1-3 | 8210 | FIS | 2600.00 | 7091.00 | 7098.32 | | 7098.62 | 0.002089 | 4.39 | 592.31 | 117.66 | 0.34 |
| Reach 1-3 | 8209 | FIS | 2600.00 | 7093.00 | 7098.13 | | 7098.57 | 0.003948 | 5.35 | 485.88 | 116.11 | 0.46 |
| Reach 1-3 | 8175 | FIS | 2600.00 | 7093.00 | 7097.90 | | 7098.40 | 0.004752 | 5.72 | 454.86 | 113.16 | 0.50 |
| Reach 1-3 | 8165 | FIS | 2600.00 | 7093.00 | 7097.82 | | 7098.35 | 0.005005 | 5.82 | 446.93 | 112.59 | 0.51 |
| Reach 1-3 | 8155 | FIS | 2600.00 | 7093.00 | 7097.74 | | 7098.29 | 0.005316 | 5.94 | 437.88 | 111.95 | 0.53 |
| Reach 1-3 | 8125 | FIS | 2600.00 | 7087.00 | 7097.87 | | 7098.06 | 0.000890 | 3.44 | 755.43 | 112.97 | 0.23 |
| Reach 1-3 | 8105 | FIS | 2600.00 | 7087.00 | 7097.85 | | 7098.04 | 0.000896 | 3.45 | 753.87 | 112.99 | 0.24 |
| Reach 1-3 | 8104 | FIS | 2600.00 | 7089.00 | 7097.80 | | 7098.02 | 0.001252 | 3.83 | 679.54 | 112.54 | 0.27 |
| Reach 1-3 | 8074 | FIS | 2600.00 | 7089.00 | 7097.34 | 7093.80 | 7097.88 | 0.002257 | 5.92 | 439.19 | 69.00 | 0.38 |
| Reach 1-3 | 7949 | | Culvert | | | | | | | | | |
| Reach 1-3 | 7828 | FIS | 2600.00 | 7088.70 | 7094.36 | 7093.90 | 7096.24 | 0.004610 | 10.99 | 236.57 | 60.61 | 0.86 |
| Reach 1-3 | 7788 | FIS | 2600.00 | 7088.52 | 7094.88 | | 7095.27 | 0.007128 | 5.32 | 519.08 | 111.63 | 0.37 |
| Reach 1-3 | 7765 | FIS | 2600.00 | 7088.50 | 7094.73 | | 7095.12 | 0.006179 | 5.62 | 541.89 | 119.69 | 0.40 |
| Reach 1-3 | 7742 | FIS | 2600.00 | 7088.50 | 7094.27 | | 7094.90 | 0.012430 | 7.24 | 437.06 | 125.69 | 0.55 |
| Reach 1-3 | 7708 | FIS | 2600.00 | 7088.50 | 7093.89 | | 7094.28 | 0.022368 | 5.62 | 523.76 | 139.68 | 0.43 |
| Reach 1-3 | 7669 | FIS | 2600.00 | 7087.30 | 7093.37 | | 7093.70 | 0.009660 | 5.00 | 573.51 | 164.19 | 0.41 |
| Reach 1-3 | 7624 | FIS | 2600.00 | 7086.89 | 7092.78 | | 7093.11 | 0.019079 | 5.32 | 631.57 | 224.91 | 0.45 |
| Reach 1-3 | 7584 | FIS | 2600.00 | 7086.36 | 7092.24 | | 7092.45 | 0.013480 | 4.35 | 741.29 | 229.47 | 0.36 |
| Reach 1-3 | 7534 | FIS | 2600.00 | 7085.85 | 7091.47 | | 7091.70 | 0.017138 | 3.99 | 684.93 | 229.01 | 0.39 |
| Reach 1-3 | 7485 | FIS | 2600.00 | 7085.30 | 7090.28 | | 7090.63 | 0.029483 | 5.64 | 589.40 | 247.31 | 0.53 |

HEC-RAS Plan: PROP - FIS River: Sand Creek Reach: Reach 1-3 Profile: FIS (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 7455 | FIS | 2600.00 | 7085.01 | 7089.66 | | 7090.08 | 0.012977 | 5.94 | 516.84 | 266.51 | 0.58 |
| Reach 1-3 | 7445 | FIS | 2600.00 | 7085.12 | 7089.04 | 7089.04 | 7089.82 | 0.041658 | 8.42 | 393.99 | 269.09 | 0.90 |
| Reach 1-3 | 7430 | FIS | 2600.00 | 7081.82 | 7086.64 | 7086.64 | 7087.50 | 0.030071 | 8.54 | 396.02 | 217.12 | 0.80 |
| Reach 1-3 | 7422 | FIS | 2600.00 | 7080.12 | 7085.90 | | 7086.50 | 0.018940 | 6.98 | 468.05 | 211.59 | 0.58 |
| Reach 1-3 | 7409 | FIS | 2600.00 | 7080.12 | 7085.97 | | 7086.26 | 0.007748 | 4.99 | 660.10 | 229.62 | 0.37 |
| Reach 1-3 | 7406 | FIS | 2600.00 | 7081.53 | 7085.91 | | 7086.22 | 0.023499 | 5.02 | 602.74 | 231.75 | 0.43 |
| Reach 1-3 | 7351 | FIS | 2600.00 | 7079.22 | 7084.96 | | 7085.18 | 0.014902 | 4.53 | 782.52 | 281.90 | 0.38 |
| Reach 1-3 | 7279 | FIS | 2600.00 | 7078.10 | 7084.06 | | 7084.22 | 0.011983 | 3.91 | 881.27 | 306.28 | 0.33 |
| Reach 1-3 | 7213 | FIS | 2600.00 | 7077.30 | 7083.35 | | 7083.52 | 0.010560 | 4.19 | 892.89 | 321.14 | 0.36 |
| Reach 1-3 | 7167 | FIS | 2600.00 | 7077.47 | 7082.73 | | 7082.92 | 0.016555 | 4.42 | 813.10 | 335.13 | 0.39 |
| Reach 1-3 | 7102 | FIS | 2600.00 | 7076.78 | 7080.84 | 7080.84 | 7081.47 | 0.035048 | 7.69 | 454.45 | 331.49 | 0.84 |
| Reach 1-3 | 7093 | FIS | 2600.00 | 7076.86 | 7080.38 | 7080.38 | 7080.98 | 0.069798 | 7.52 | 444.91 | 334.23 | 0.88 |
| Reach 1-3 | 7073 | FIS | 2600.00 | 7072.92 | 7078.03 | | 7078.52 | 0.025006 | 6.45 | 530.79 | 331.70 | 0.57 |
| Reach 1-3 | 7066 | FIS | 2600.00 | 7072.86 | 7078.08 | | 7078.35 | 0.010921 | 4.88 | 729.28 | 332.82 | 0.39 |
| Reach 1-3 | 7061 | FIS | 2600.00 | 7074.14 | 7077.98 | | 7078.28 | 0.012058 | 5.58 | 717.47 | 353.96 | 0.51 |
| Reach 1-3 | 7044 | FIS | 2600.00 | 7071.83 | 7077.99 | | 7078.07 | 0.006156 | 2.97 | 1184.56 | 390.23 | 0.25 |
| Reach 1-3 | 6941 | FIS | 2600.00 | 7070.47 | 7077.31 | | 7077.45 | 0.007234 | 3.83 | 974.79 | 307.30 | 0.30 |
| Reach 1-3 | 6868 | FIS | 2600.00 | 7069.50 | 7076.64 | | 7076.87 | 0.010322 | 4.64 | 790.90 | 254.95 | 0.37 |
| Reach 1-3 | 6769 | FIS | 2600.00 | 7068.73 | 7075.58 | | 7075.82 | 0.011294 | 4.64 | 748.57 | 228.35 | 0.36 |
| Reach 1-3 | 6673 | FIS | 2600.00 | 7067.90 | 7074.53 | | 7074.73 | 0.010731 | 4.21 | 760.06 | 209.34 | 0.33 |
| Reach 1-3 | 6588 | FIS | 2600.00 | 7067.13 | 7073.52 | | 7073.77 | 0.013650 | 4.68 | 686.23 | 209.05 | 0.37 |
| Reach 1-3 | 6504 | FIS | 2600.00 | 7066.40 | 7072.65 | | 7072.82 | 0.009254 | 3.81 | 806.62 | 211.38 | 0.30 |
| Reach 1-3 | 6417 | FIS | 2600.00 | 7065.42 | 7071.45 | | 7071.74 | 0.016586 | 4.96 | 658.69 | 216.03 | 0.40 |
| Reach 1-3 | 6369 | FIS | 2600.00 | 7064.37 | 7070.82 | | 7071.04 | 0.012090 | 4.23 | 724.12 | 222.20 | 0.34 |
| Reach 1-3 | 6298 | FIS | 2600.00 | 7064.05 | 7069.67 | | 7069.97 | 0.019992 | 5.16 | 621.50 | 197.90 | 0.44 |
| Reach 1-3 | 6265 | FIS | 2600.00 | 7063.23 | 7068.31 | | 7068.99 | 0.050615 | 7.62 | 457.17 | 213.42 | 0.73 |
| Reach 1-3 | 6232 | FIS | 2600.00 | 7063.38 | 7067.58 | | 7068.11 | 0.018191 | 5.96 | 469.17 | 215.20 | 0.61 |
| Reach 1-3 | 6223 | FIS | 2600.00 | 7063.07 | 7066.95 | 7066.95 | 7067.78 | 0.071436 | 8.32 | 375.43 | 212.79 | 0.91 |
| Reach 1-3 | 6212 | FIS | 2600.00 | 7060.43 | 7064.78 | 7064.78 | 7065.82 | 0.068412 | 9.01 | 342.87 | 166.47 | 0.91 |
| Reach 1-3 | 6199 | FIS | 2600.00 | 7057.41 | 7063.02 | | 7063.76 | 0.027759 | 7.29 | 408.68 | 141.22 | 0.62 |
| Reach 1-3 | 6184 | FIS | 2600.00 | 7057.42 | 7063.01 | | 7063.39 | 0.011570 | 5.42 | 562.59 | 162.87 | 0.41 |
| Reach 1-3 | 6182 | FIS | 2600.00 | 7058.72 | 7062.75 | | 7063.33 | 0.046558 | 6.67 | 441.61 | 160.16 | 0.59 |
| Reach 1-3 | 6164 | FIS | 2600.00 | 7056.45 | 7062.50 | | 7062.73 | 0.015828 | 4.63 | 741.08 | 279.32 | 0.39 |
| Reach 1-3 | 6091 | FIS | 2600.00 | 7055.75 | 7061.31 | | 7061.53 | 0.017401 | 4.62 | 780.91 | 322.71 | 0.40 |
| Reach 1-3 | 6042 | FIS | 2600.00 | 7054.55 | 7060.52 | | 7060.74 | 0.014780 | 4.71 | 829.29 | 359.68 | 0.42 |
| Reach 1-3 | 5977 | FIS | 2600.00 | 7054.61 | 7059.87 | | 7060.03 | 0.015476 | 4.24 | 913.36 | 438.96 | 0.38 |
| Reach 1-3 | 5928 | FIS | 2600.00 | 7053.68 | 7058.59 | | 7058.72 | 0.013687 | 3.78 | 1029.47 | 528.83 | 0.35 |
| Reach 1-3 | 5824 | FIS | 2600.00 | 7052.15 | 7057.60 | | 7057.76 | 0.014782 | 4.33 | 956.04 | 501.99 | 0.39 |
| Reach 1-3 | 5791 | FIS | 2600.00 | 7052.28 | 7056.92 | | 7057.08 | 0.018835 | 4.22 | 914.99 | 512.15 | 0.41 |
| Reach 1-3 | 5744 | FIS | 2600.00 | 7051.51 | 7056.66 | | 7056.76 | 0.006679 | 2.89 | 1104.60 | 510.62 | 0.27 |
| Reach 1-3 | 5688 | FIS | 2600.00 | 7051.38 | 7056.16 | | 7056.29 | 0.007461 | 3.44 | 1026.13 | 469.56 | 0.34 |
| Reach 1-3 | 5628 | FIS | 2600.00 | 7050.55 | 7055.83 | | 7055.94 | 0.006347 | 3.06 | 1085.09 | 437.77 | 0.28 |
| Reach 1-3 | 5568 | FIS | 2600.00 | 7049.82 | 7054.93 | | 7055.11 | 0.011654 | 4.12 | 848.11 | 397.07 | 0.39 |
| Reach 1-3 | 5429 | FIS | 2600.00 | 7048.55 | 7053.58 | | 7053.74 | 0.016002 | 4.09 | 866.99 | 368.80 | 0.38 |
| Reach 1-3 | 5365 | FIS | 2600.00 | 7047.14 | 7052.66 | | 7052.82 | 0.013523 | 4.29 | 894.61 | 372.48 | 0.40 |
| Reach 1-3 | 5289 | FIS | 2600.00 | 7046.36 | 7051.92 | | 7052.06 | 0.012026 | 3.80 | 929.15 | 351.39 | 0.34 |
| Reach 1-3 | 5227 | FIS | 2600.00 | 7045.43 | 7051.13 | | 7051.29 | 0.012474 | 4.04 | 896.18 | 337.93 | 0.35 |
| Reach 1-3 | 5171 | FIS | 2600.00 | 7044.55 | 7050.06 | | 7050.20 | 0.010389 | 3.73 | 958.93 | 350.20 | 0.32 |
| Reach 1-3 | 5047 | FIS | 2600.00 | 7042.80 | 7048.55 | | 7048.81 | 0.015922 | 4.63 | 737.92 | 339.85 | 0.39 |
| Reach 1-3 | 4948 | FIS | 2600.00 | 7041.66 | 7047.52 | | 7047.64 | 0.008606 | 3.47 | 1015.22 | 349.86 | 0.29 |
| Reach 1-3 | 4855 | FIS | 2600.00 | 7040.34 | 7046.87 | | 7047.04 | 0.010463 | 4.16 | 914.93 | 339.51 | 0.35 |
| Reach 1-3 | 4782 | FIS | 2600.00 | 7040.04 | 7046.25 | | 7046.39 | 0.008957 | 3.82 | 979.04 | 346.97 | 0.32 |
| Reach 1-3 | 4714 | FIS | 2600.00 | 7039.78 | 7045.70 | | 7045.81 | 0.007963 | 3.35 | 1039.32 | 345.07 | 0.28 |
| Reach 1-3 | 4632 | FIS | 2600.00 | 7039.10 | 7045.31 | | 7045.39 | 0.004911 | 2.84 | 1183.59 | 333.44 | 0.23 |
| Reach 1-3 | 4582 | FIS | 2600.00 | 7038.10 | 7045.07 | | 7045.16 | 0.004491 | 2.90 | 1181.33 | 316.64 | 0.23 |
| Reach 1-3 | 4534 | FIS | 2600.00 | 7038.20 | 7044.87 | | 7044.95 | 0.004341 | 2.73 | 1184.20 | 299.77 | 0.21 |
| Reach 1-3 | 4296 | FIS | 2600.00 | 7036.56 | 7041.60 | 7041.25 | 7042.45 | 0.057996 | 8.12 | 372.77 | 166.47 | 0.74 |
| Reach 1-3 | 4084 | FIS | 2600.00 | 7033.29 | 7042.06 | | 7042.07 | 0.000157 | 1.08 | 2487.77 | 384.73 | 0.07 |
| Reach 1-3 | 3831 | FIS | 2600.00 | 7032.08 | 7042.05 | | 7042.05 | 0.000029 | 0.51 | 5200.74 | 627.72 | 0.03 |
| Reach 1-3 | 3785 | FIS | 2600.00 | 7039.97 | 7041.40 | 7041.40 | 7041.99 | 0.007652 | 6.31 | 434.21 | 379.57 | 0.96 |
| Reach 1-3 | 3625 | FIS | 2600.00 | 7003.41 | 7012.50 | | 7012.51 | 0.000074 | 1.11 | 4908.33 | 640.50 | 0.07 |
| Reach 1-3 | 3618 | FIS | 2600.00 | 7002.58 | 7012.50 | | 7012.51 | 0.000103 | 0.98 | 4854.41 | 631.20 | 0.06 |
| Reach 1-3 | 3485 | FIS | 2600.00 | 7002.22 | 7012.49 | | 7012.49 | 0.000099 | 0.99 | 4913.78 | 629.94 | 0.05 |
| Reach 1-3 | 3336 | FIS | 2600.00 | 7001.71 | 7012.48 | | 7012.48 | 0.000073 | 0.88 | 5426.21 | 650.52 | 0.05 |
| Reach 1-3 | 3198 | FIS | 2600.00 | 7001.27 | 7012.47 | | 7012.47 | 0.000061 | 0.81 | 5377.79 | 609.23 | 0.04 |
| Reach 1-3 | 3103 | FIS | 2600.00 | 7001.02 | 7012.45 | 7002.68 | 7012.46 | 0.000057 | 0.78 | 3478.53 | 485.07 | 0.04 |
| Reach 1-3 | 3057 | | Culvert | | | | | | | | | |
| Reach 1-3 | 2988 | FIS | 2600.00 | 7001.00 | 7010.59 | | 7010.72 | 0.000900 | 2.87 | 898.86 | 149.49 | 0.16 |
| Reach 1-3 | 2975 | FIS | 2600.00 | 7000.89 | 7010.26 | 7005.09 | 7010.67 | 0.003326 | 5.13 | 513.05 | 56.85 | 0.30 |
| Reach 1-3 | 2930 | | Culvert | | | | | | | | | |
| Reach 1-3 | 2879 | FIS | 2600.00 | 7000.82 | 7006.11 | | 7007.90 | 0.022275 | 9.54 | 250.82 | 86.95 | 0.74 |
| Reach 1-3 | 2856 | FIS | 2600.00 | 7000.50 | 7006.13 | | 7006.94 | 0.020557 | 7.34 | 360.13 | 98.05 | 0.55 |
| Reach 1-3 | 2850 | FIS | 2600.00 | 7000.17 | 7006.15 | | 7006.78 | 0.015412 | 6.54 | 408.98 | 101.57 | 0.48 |
| Reach 1-3 | 2842 | FIS | 2600.00 | 6997.59 | 7006.22 | | 7006.55 | 0.005468 | 4.89 | 587.36 | 100.64 | 0.30 |
| Reach 1-3 | 2838 | FIS | 2600.00 | 6999.13 | 7006.13 | | 7006.53 | 0.007986 | 5.29 | 534.88 | 103.78 | 0.36 |
| Reach 1-3 | 2830 | FIS | 2600.00 | 6997.58 | 7006.11 | | 7006.43 | 0.008562 | 4.70 | 572.65 | 109.86 | 0.31 |

HEC-RAS Plan: PROP - FIS River: Sand Creek Reach: Reach 1-3 Profile: FIS (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Reach 1-3 | 2792 | FIS | 2600.00 | 6997.53 | 7005.85 | | 7006.13 | 0.007523 | 4.36 | 610.05 | 119.79 | 0.29 |
| Reach 1-3 | 2719 | FIS | 2600.00 | 6997.47 | 7005.36 | | 7005.62 | 0.007720 | 4.33 | 637.50 | 128.78 | 0.30 |
| Reach 1-3 | 2680 | FIS | 2600.00 | 6997.33 | 7005.06 | | 7005.30 | 0.007713 | 4.15 | 673.07 | 143.59 | 0.29 |
| Reach 1-3 | 2646 | FIS | 2600.00 | 6997.18 | 7004.83 | | 7005.05 | 0.007011 | 4.07 | 688.08 | 147.75 | 0.29 |
| Reach 1-3 | 2589 | FIS | 2600.00 | 6996.89 | 7004.48 | | 7004.68 | 0.006505 | 3.91 | 730.31 | 163.76 | 0.28 |
| Reach 1-3 | 2545 | FIS | 2600.00 | 6997.22 | 7004.15 | | 7004.36 | 0.008920 | 4.09 | 705.49 | 178.12 | 0.31 |
| Reach 1-3 | 2513 | FIS | 2600.00 | 6996.86 | 7003.83 | | 7004.06 | 0.008884 | 4.06 | 679.74 | 169.54 | 0.31 |
| Reach 1-3 | 2468 | FIS | 2600.00 | 6997.15 | 7003.37 | | 7003.58 | 0.010665 | 3.91 | 709.51 | 203.63 | 0.32 |
| Reach 1-3 | 2405 | FIS | 2600.00 | 6997.08 | 7002.14 | | 7002.58 | 0.034259 | 6.09 | 542.74 | 227.05 | 0.56 |
| Reach 1-3 | 2399 | FIS | 2600.00 | 6997.08 | 7001.49 | 7001.49 | 7002.30 | 0.054615 | 8.17 | 395.57 | 224.57 | 0.82 |
| Reach 1-3 | 2384 | FIS | 2600.00 | 6993.53 | 6999.36 | | 6999.92 | 0.021150 | 6.48 | 482.37 | 234.99 | 0.54 |
| Reach 1-3 | 2377 | FIS | 2600.00 | 6993.46 | 6999.48 | | 6999.75 | 0.008347 | 4.71 | 699.46 | 250.81 | 0.35 |
| Reach 1-3 | 2375 | FIS | 2600.00 | 6994.97 | 6999.48 | | 6999.71 | 0.009824 | 4.42 | 724.84 | 267.64 | 0.37 |
| Reach 1-3 | 2350 | FIS | 2600.00 | 6993.08 | 6999.32 | | 6999.44 | 0.007666 | 3.37 | 964.93 | 288.04 | 0.28 |
| Reach 1-3 | 2319 | FIS | 2600.00 | 6993.33 | 6999.12 | | 6999.23 | 0.007008 | 3.21 | 1021.58 | 306.19 | 0.27 |
| Reach 1-3 | 2246 | FIS | 2600.00 | 6993.16 | 6998.73 | | 6998.81 | 0.005271 | 2.61 | 1127.87 | 323.94 | 0.22 |
| Reach 1-3 | 2181 | FIS | 2600.00 | 6992.99 | 6998.41 | | 6998.50 | 0.005064 | 2.59 | 1076.43 | 302.13 | 0.22 |
| Reach 1-3 | 2112 | FIS | 2600.00 | 6992.58 | 6998.06 | | 6998.16 | 0.004647 | 2.59 | 1032.46 | 251.83 | 0.20 |
| Reach 1-3 | 2046 | FIS | 2600.00 | 6991.97 | 6997.62 | | 6997.82 | 0.005490 | 4.96 | 819.27 | 230.88 | 0.37 |
| Reach 1-3 | 1993 | FIS | 2600.00 | 6991.29 | 6997.27 | | 6997.48 | 0.007262 | 5.54 | 740.83 | 191.22 | 0.41 |
| Reach 1-3 | 1929 | FIS | 2600.00 | 6991.32 | 6996.74 | | 6997.04 | 0.006573 | 5.23 | 660.14 | 170.85 | 0.40 |
| Reach 1-3 | 1884 | FIS | 2600.00 | 6991.07 | 6996.22 | | 6996.62 | 0.012461 | 7.01 | 561.14 | 148.73 | 0.55 |
| Reach 1-3 | 1834 | FIS | 2600.00 | 6990.69 | 6995.57 | | 6996.02 | 0.011363 | 6.32 | 547.43 | 162.08 | 0.52 |
| Reach 1-3 | 1804 | FIS | 2600.00 | 6990.58 | 6995.24 | | 6995.64 | 0.011292 | 6.27 | 545.08 | 157.25 | 0.51 |
| Reach 1-3 | 1707 | FIS | 2600.00 | 6989.35 | 6992.93 | 6992.93 | 6994.10 | 0.023245 | 10.29 | 367.51 | 149.70 | 0.98 |
| Reach 1-3 | 1663 | FIS | 2600.00 | 6987.76 | 6991.10 | 6991.10 | 6992.33 | 0.023796 | 10.14 | 354.92 | 148.53 | 0.99 |
| Reach 1-3 | 1622 | FIS | 2600.00 | 6986.76 | 6989.97 | | 6990.53 | 0.010731 | 6.08 | 450.42 | 180.45 | 0.64 |
| Reach 1-3 | 1411 | FIS | 2600.00 | 6982.00 | 6990.04 | 6985.02 | 6990.12 | 0.000473 | 2.47 | 1397.28 | 286.43 | 0.16 |

HEC-RAS Model  Plan: PROP - FIS  1/23/2023

Sand Creek Reach 1-3

Legend

EG FIS

WS FIS

Crit FIS

Ground

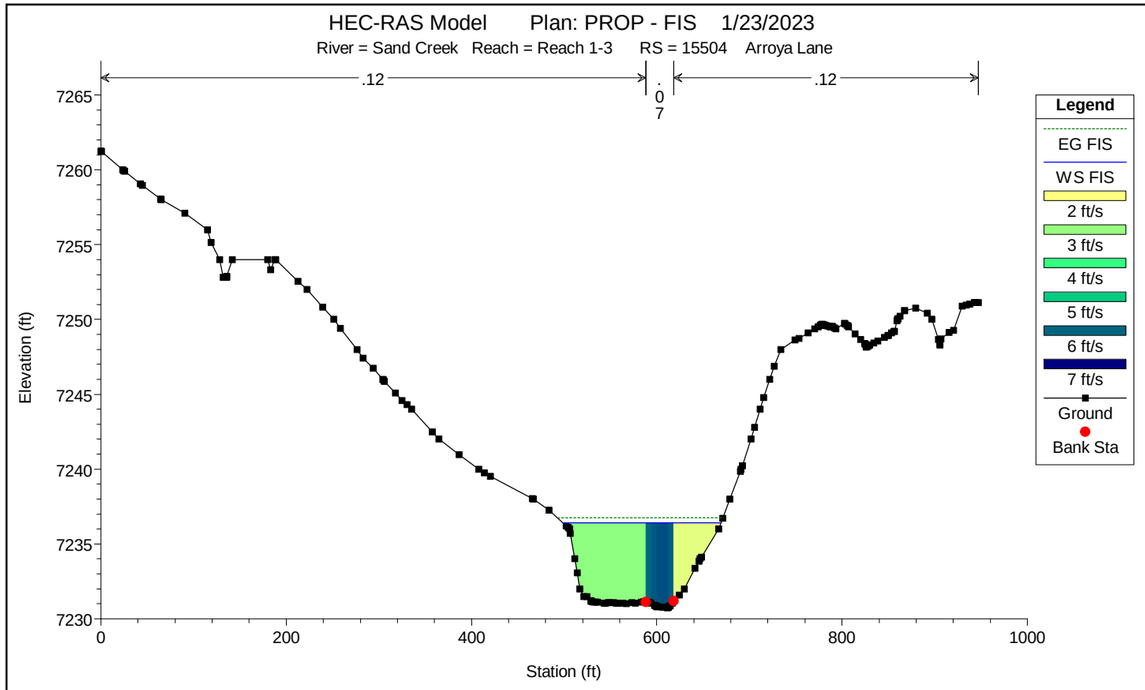
Elevation (ft)

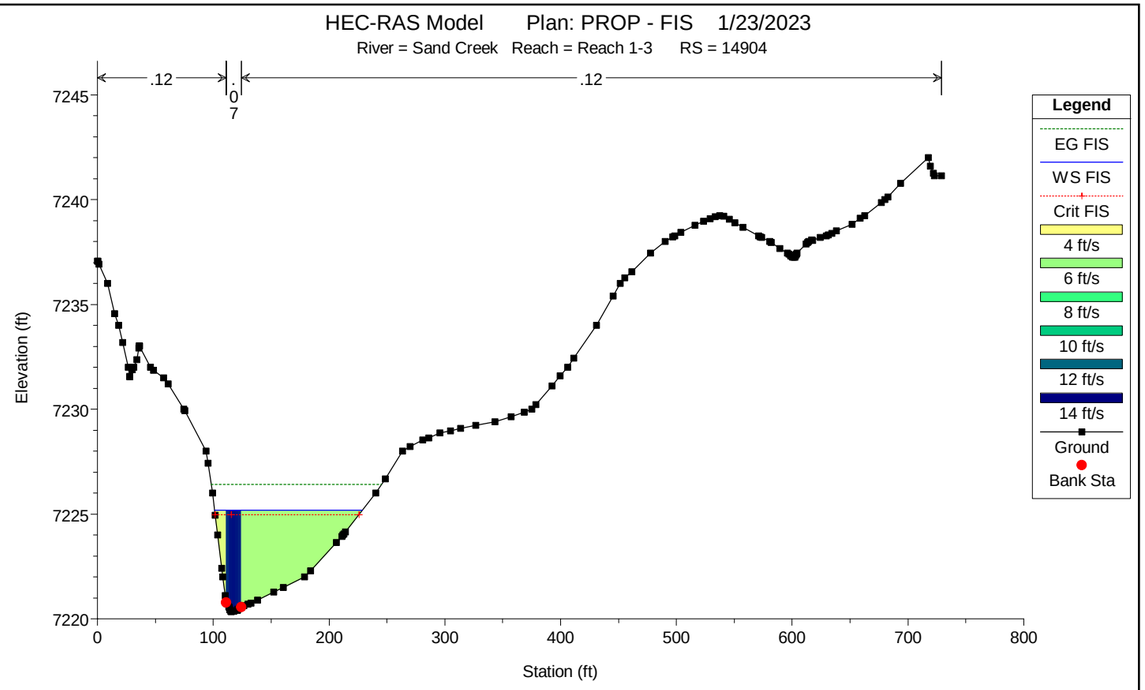
7250
7200
7150
7100
7050
7000
6950

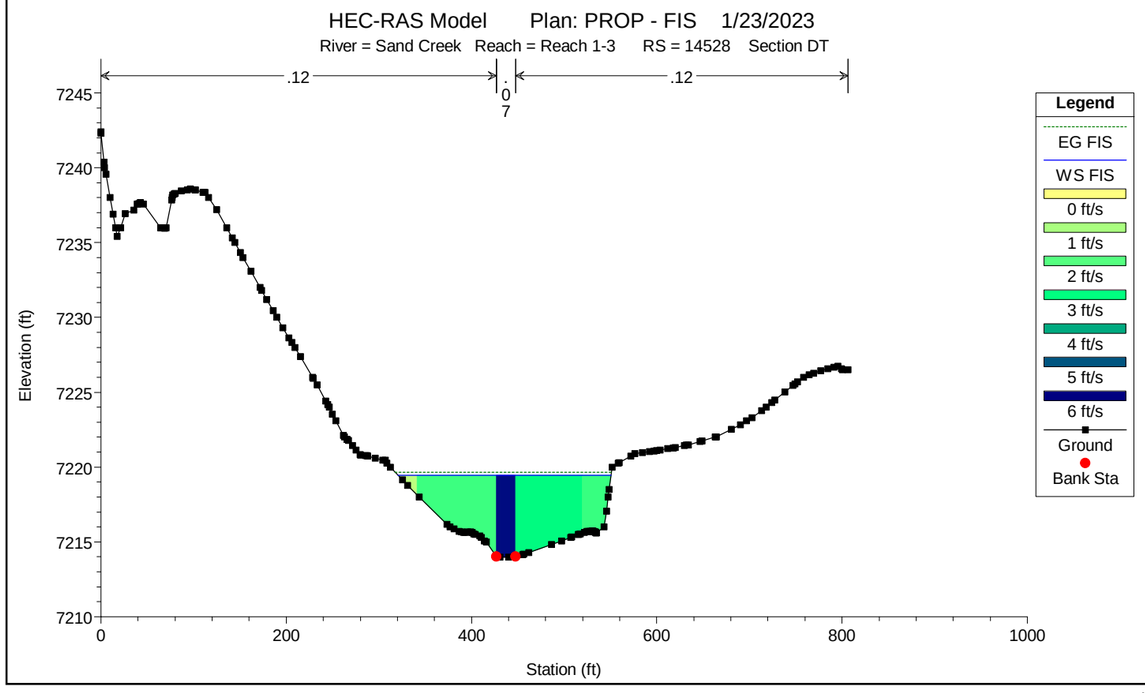
1622 1804 1993 2181 2319 2468 2646 2792 2930 Sterling Ranch R... 3103 3336 3485 Section CY 3618 3785 4084 4296 4534 Section DA 4714 4855 5047 Section DB 5227 5365 5568 5688 5824 Section DD 5977 6164 DS of GSB #3 6298 6504 6673 6868 7044 DS of GSB #4 7213 7351 DS of GSB #5 7485 7624 7765 7949 Brairgate Parkway 8209 8429 8683 8786 8928 9080 9216 DS of GSB #6 9389 9558 DS of GSB #7 9727 9875 DS of GSB #8 10014 10211 10411 10543 10672 10925 Section DO 11206 Section DP 12070 Section DQ 12767 Section DR 13756 Section DS 14528 Section DT 14904 15504 Arroya Lane

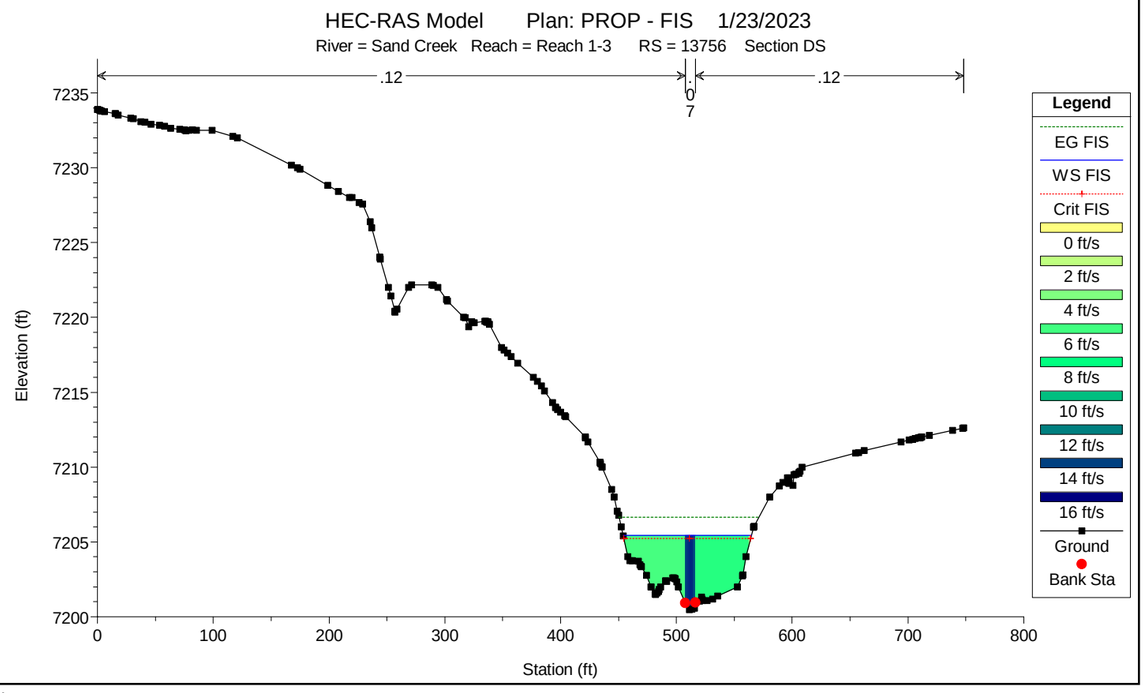
0 2000 4000 6000 8000 10000 12000 14000 16000

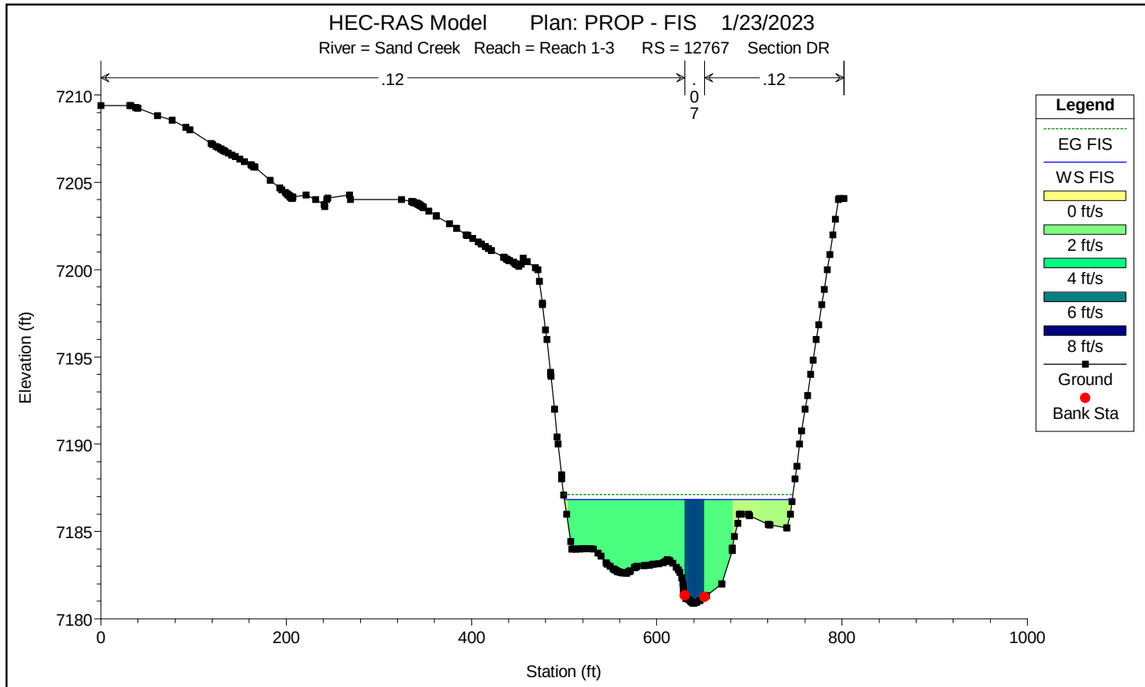
Main Channel Distance (ft)

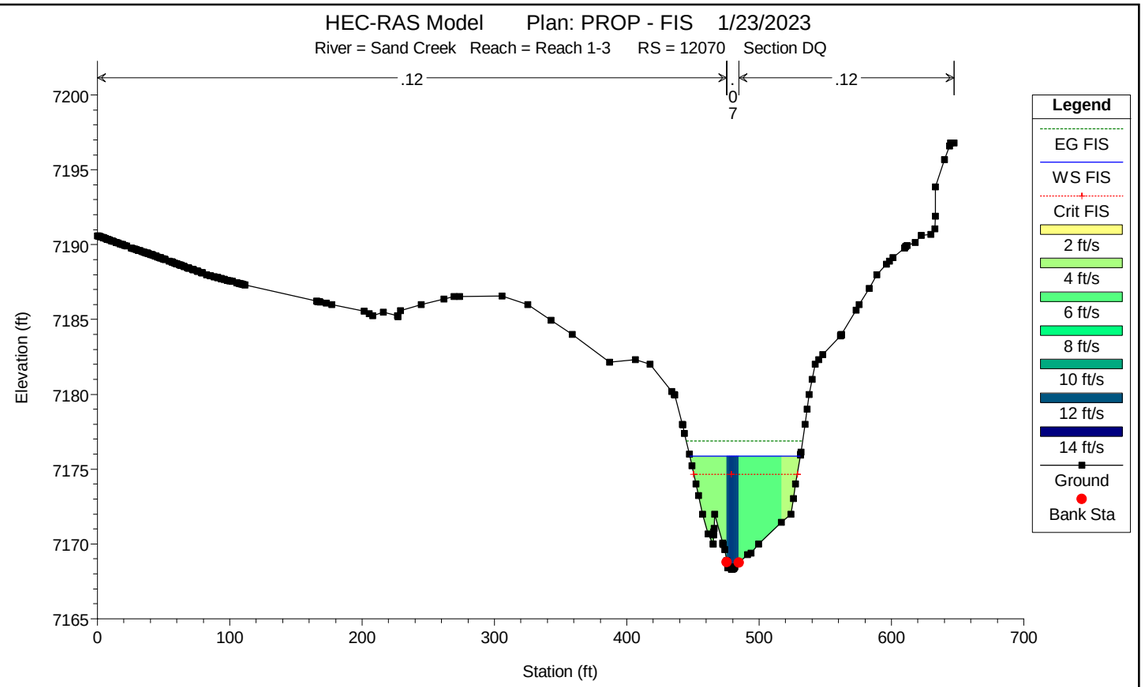

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 15504 Arroya Lane
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

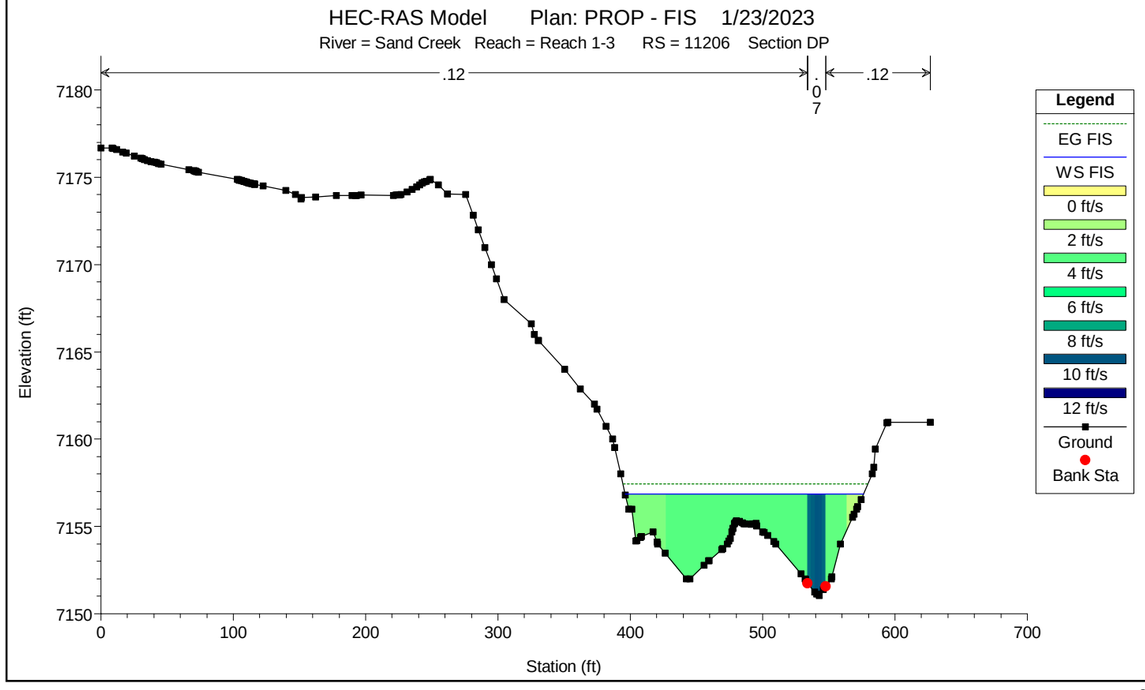

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 14904
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

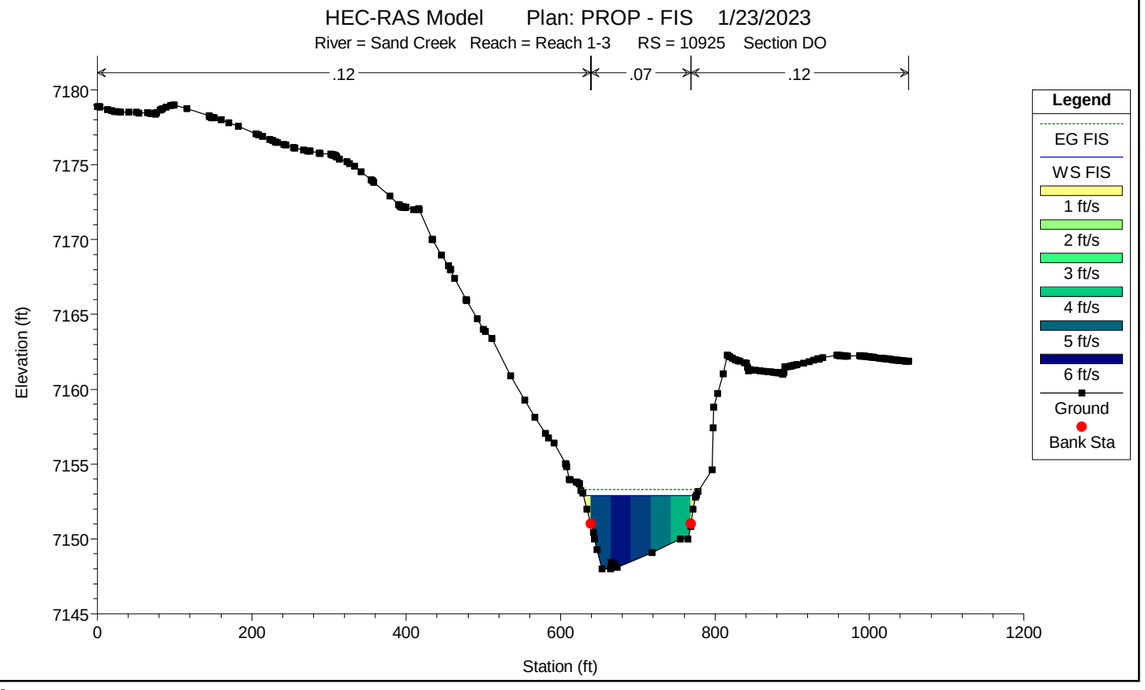

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 14528 Section DT
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

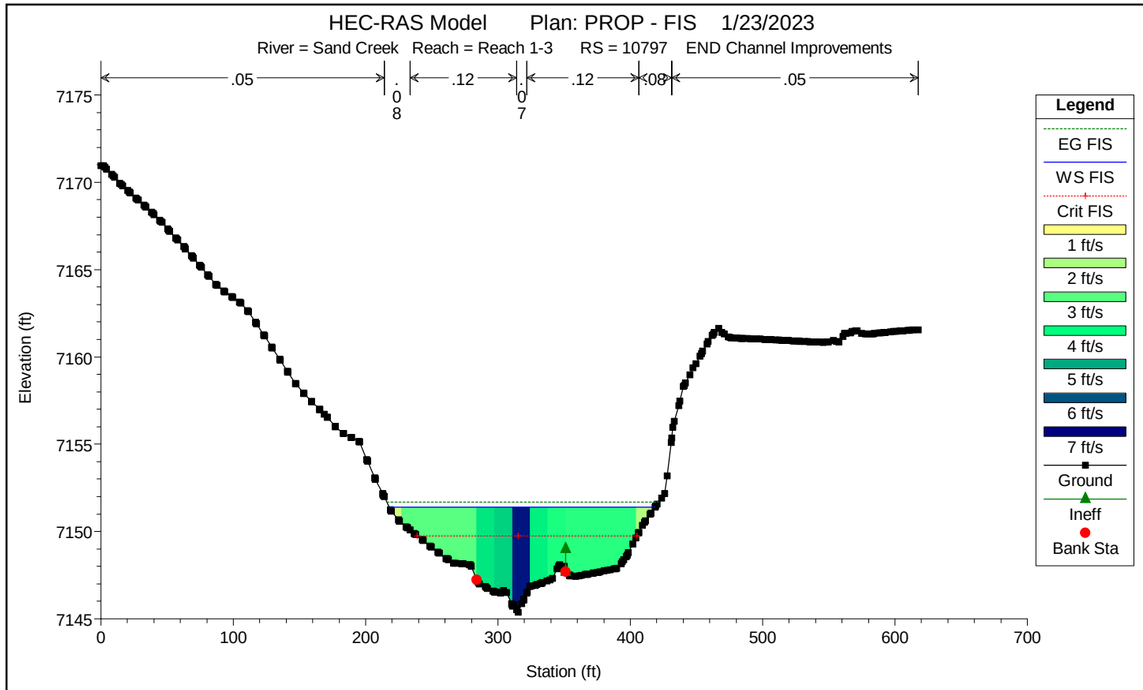

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 13756 Section DS
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

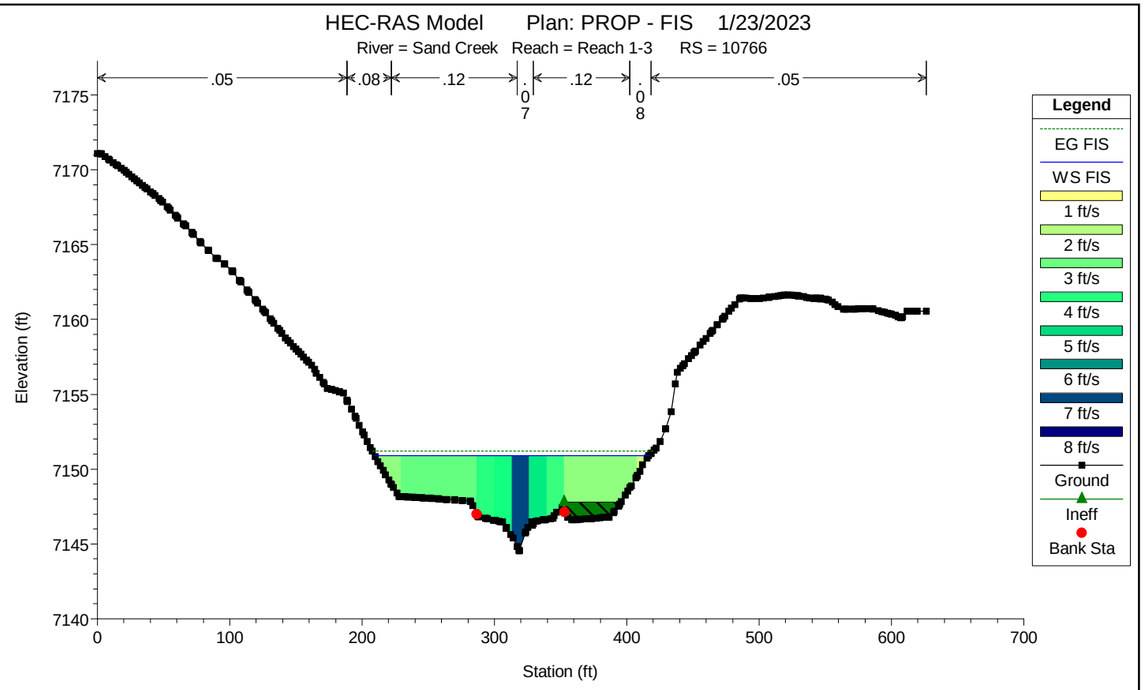

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 12767 Section DR
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

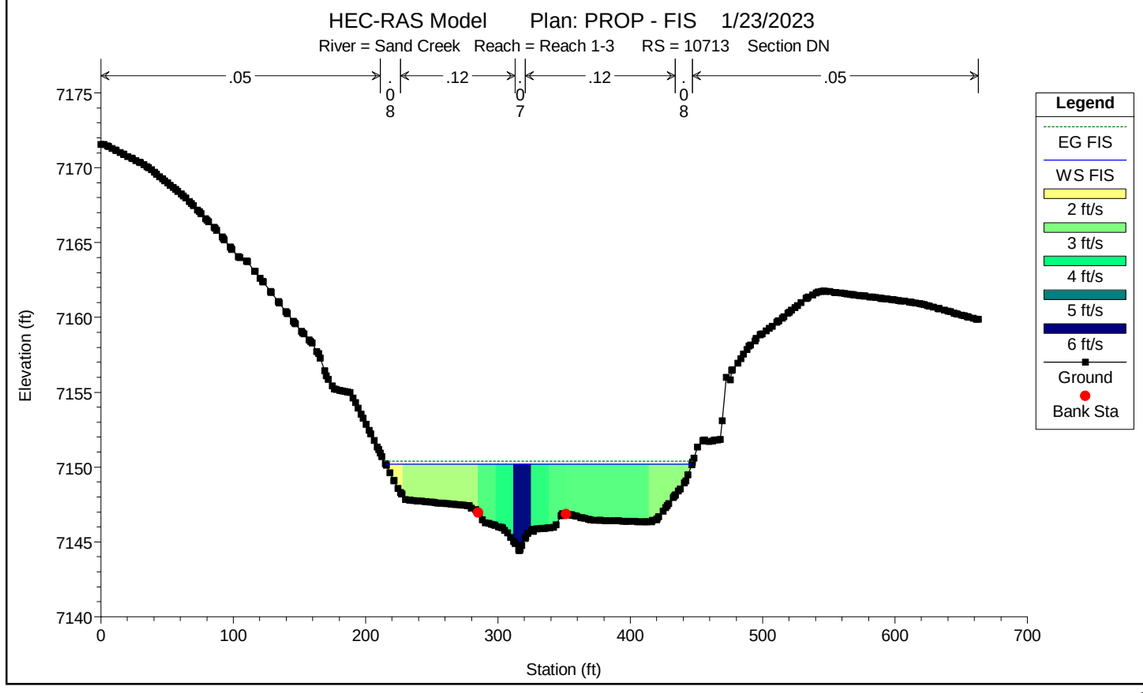

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 12070 Section DQ
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

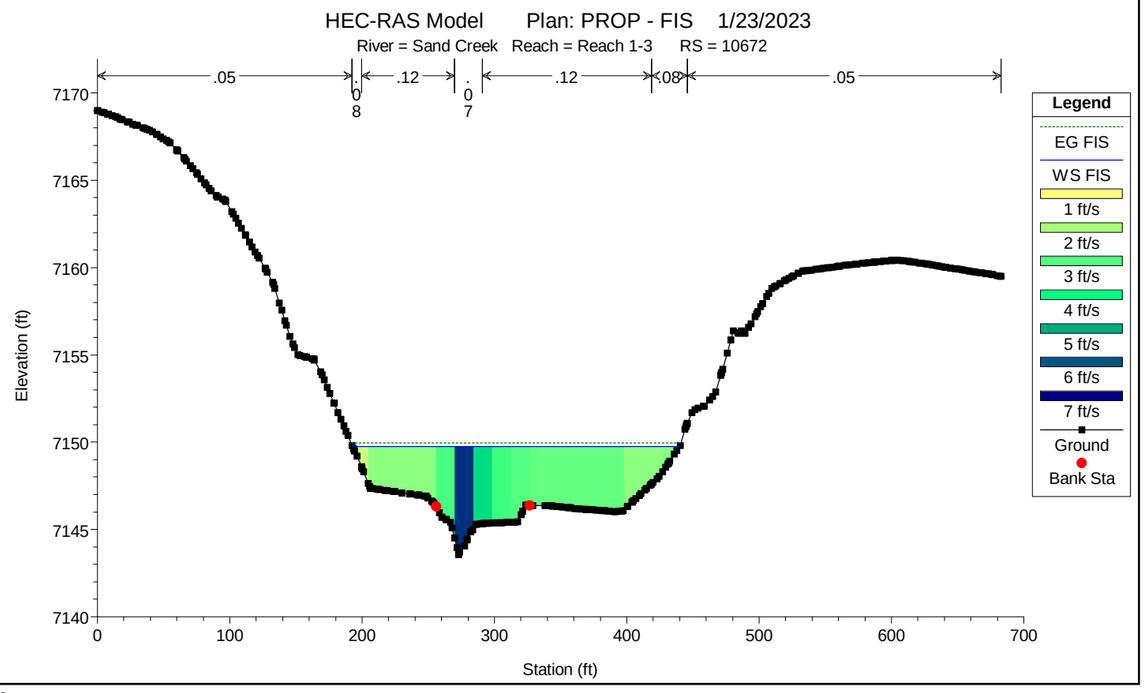

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 11206 Section DP
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

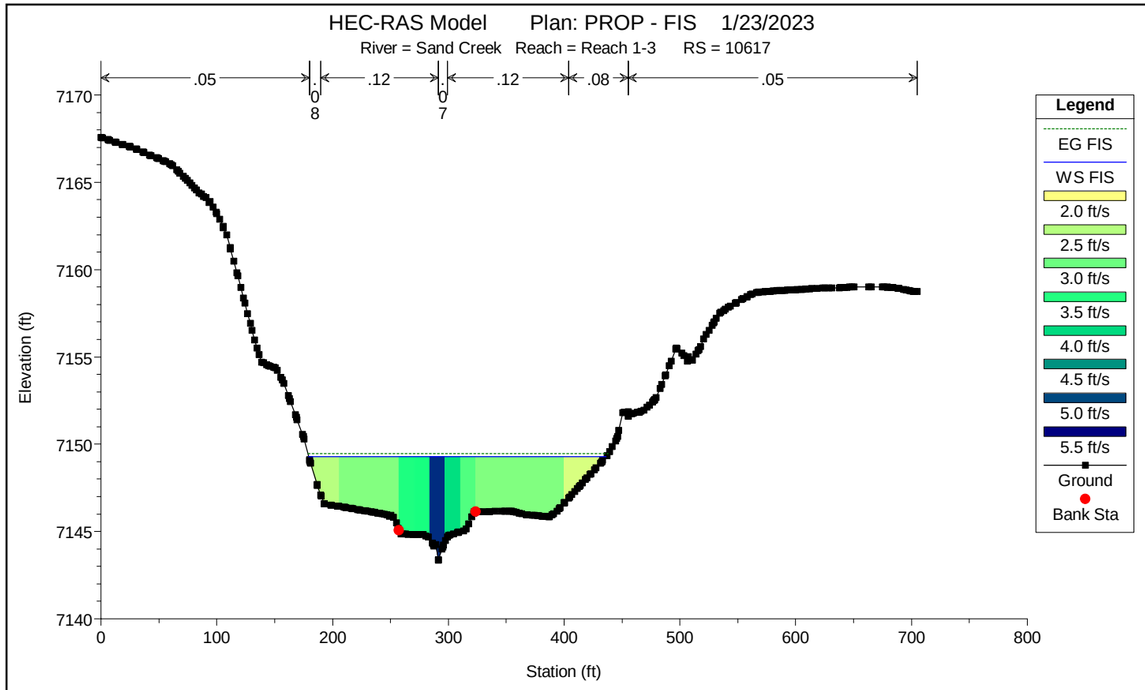

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10925 Section DO
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

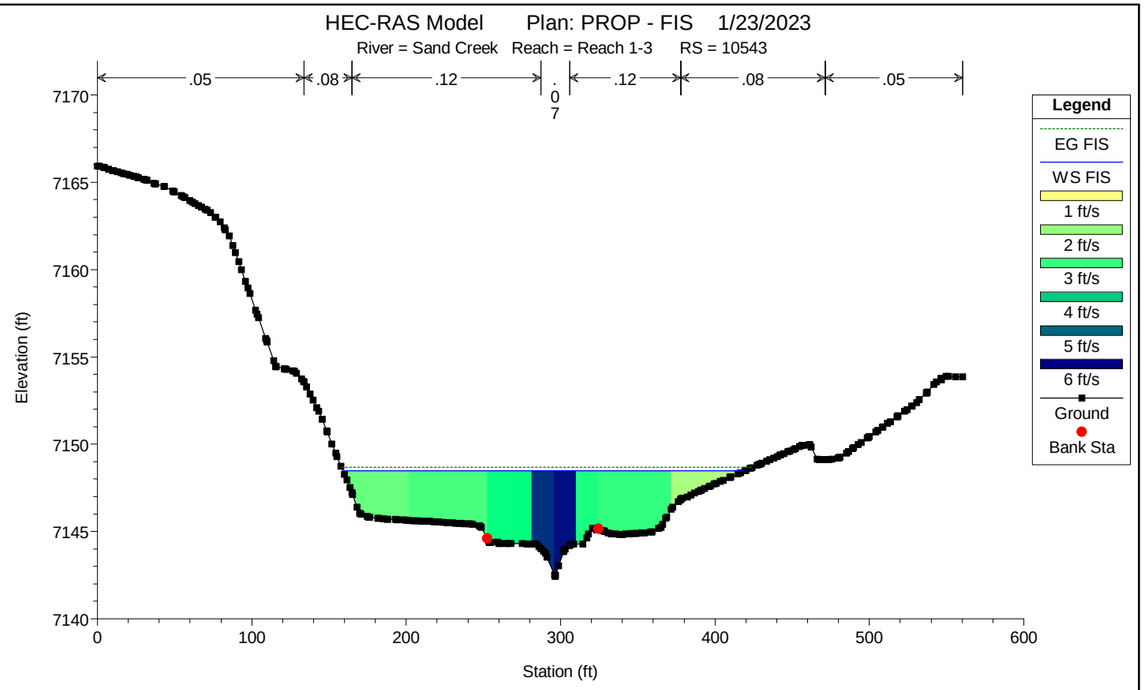

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10797 END Channel Improvements
.05
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta

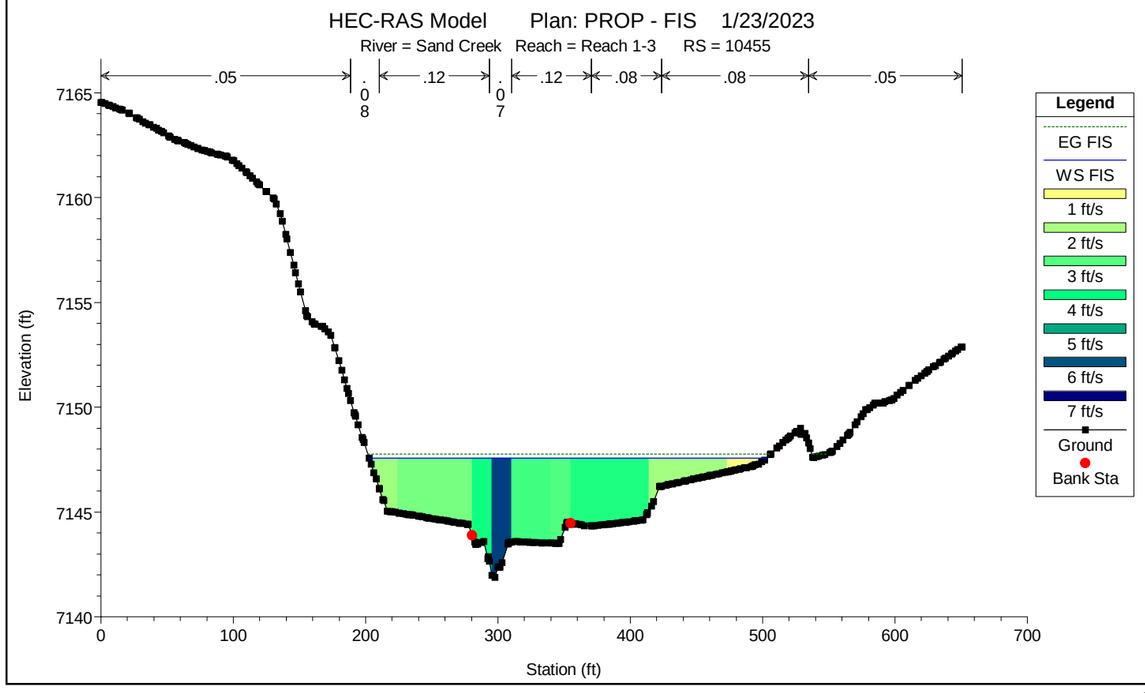

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10766
.05
.08
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta

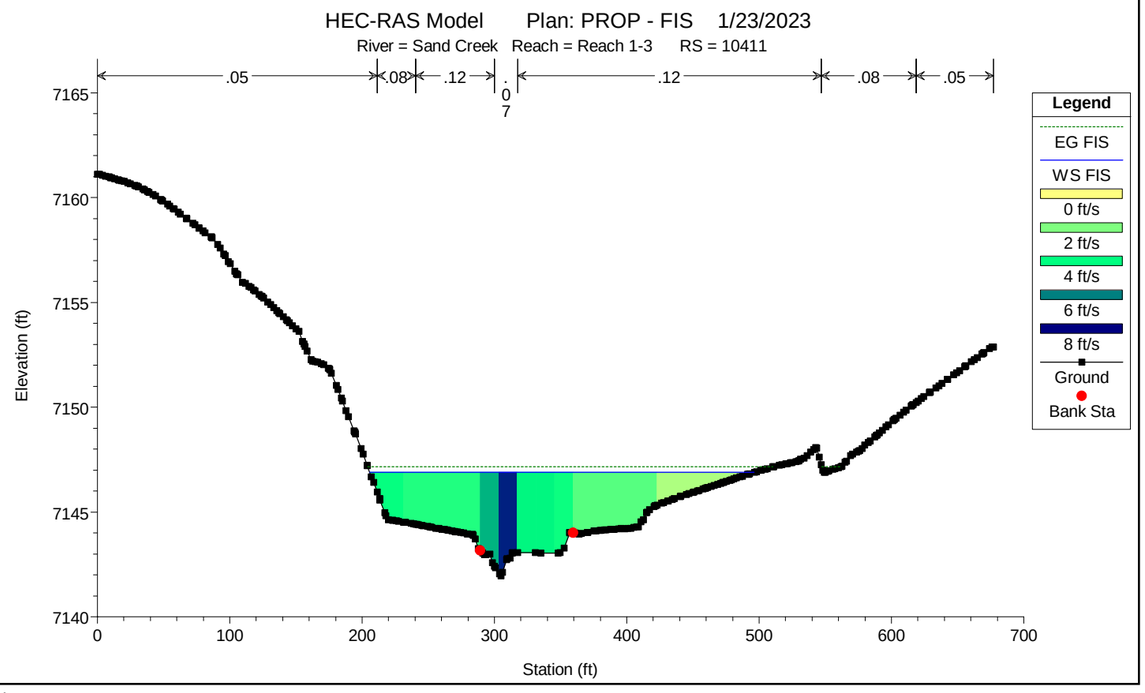

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10713 Section DN
.05
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

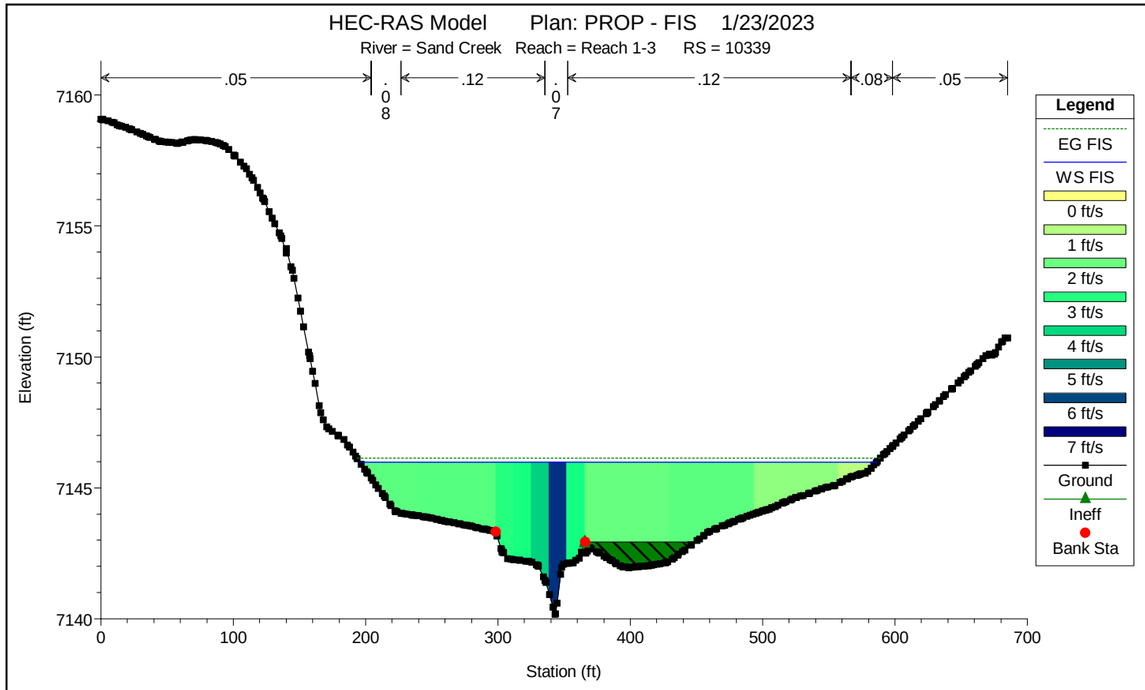

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10672
.05
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

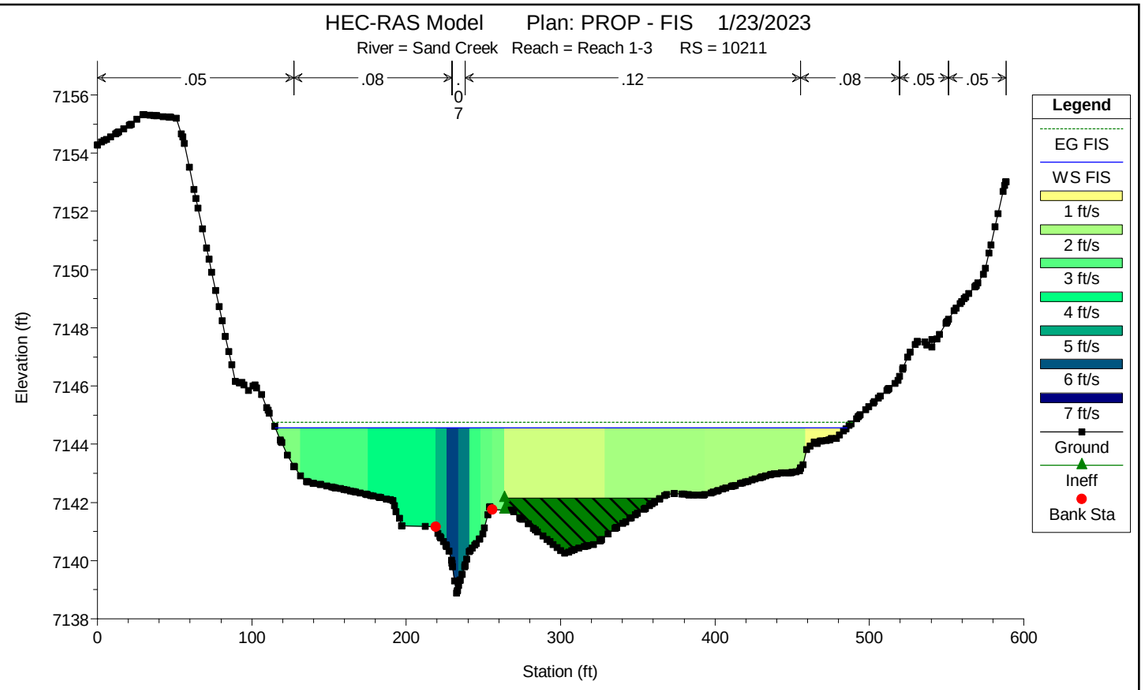

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10617
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
Ground
Bank Sta

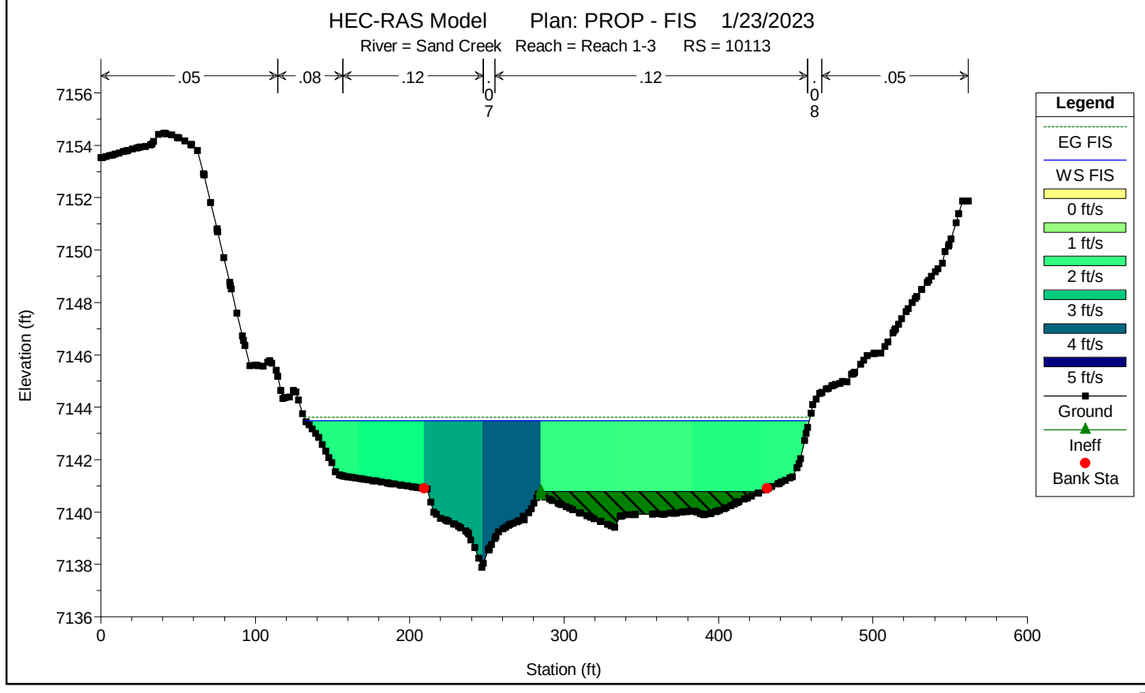

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10543
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

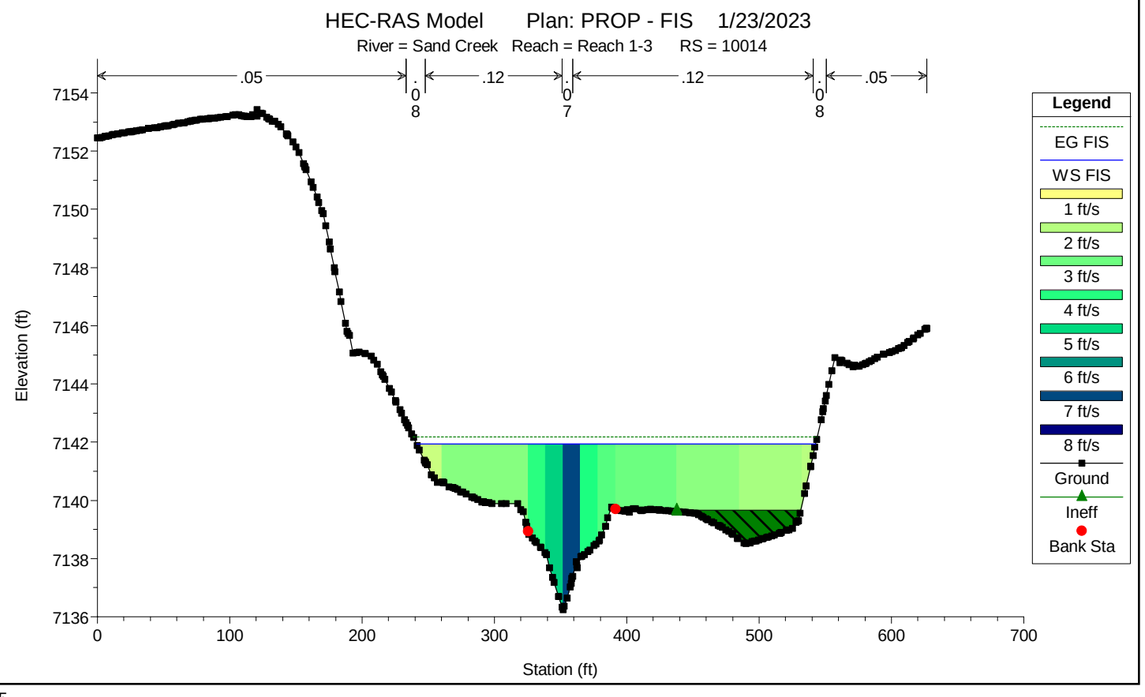

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10455
.05
.08
.12
.07
.12
.08
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

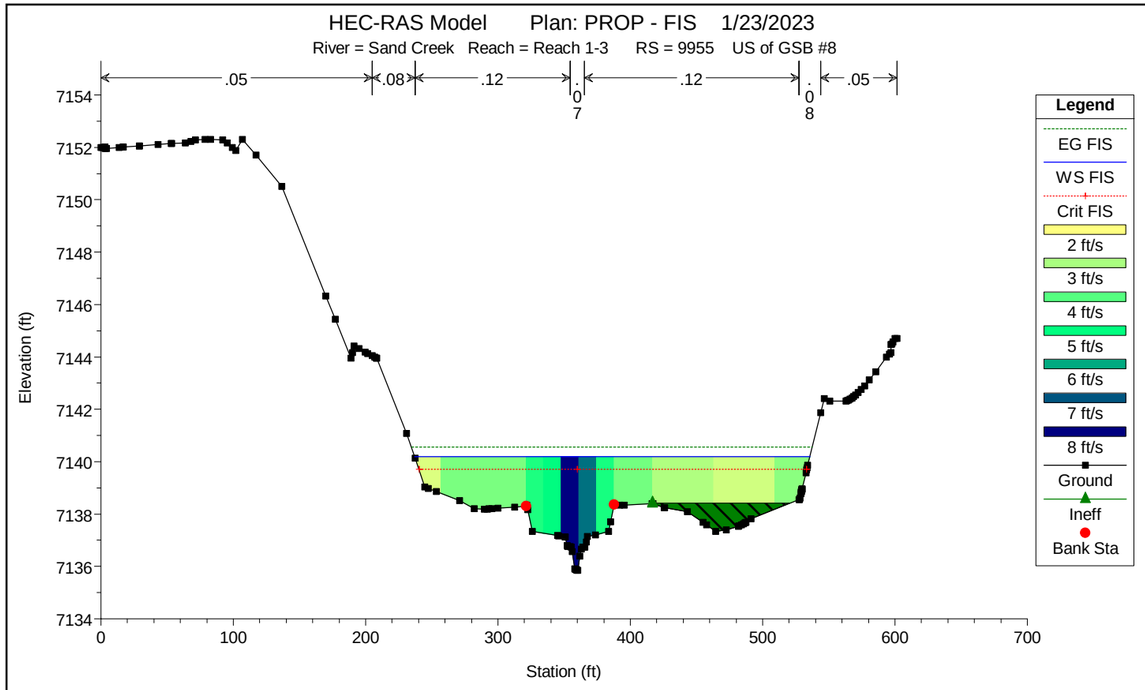

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10411
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

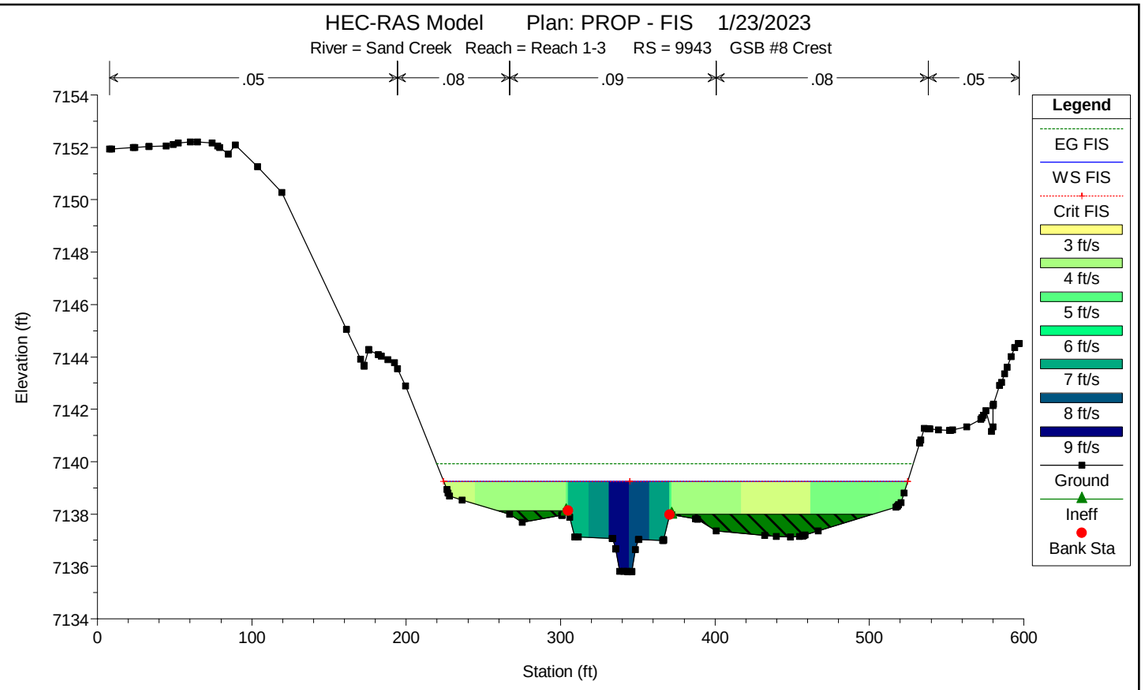

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10339
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta

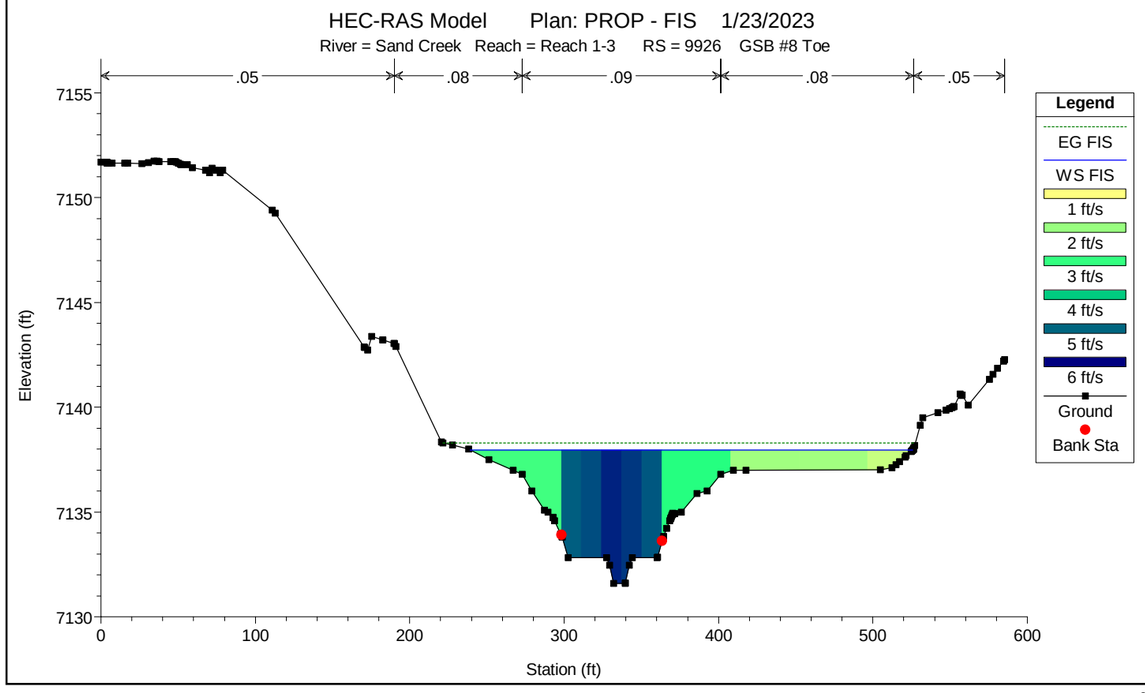

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10211
.05
.08
.07
.12
.08
.05
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta

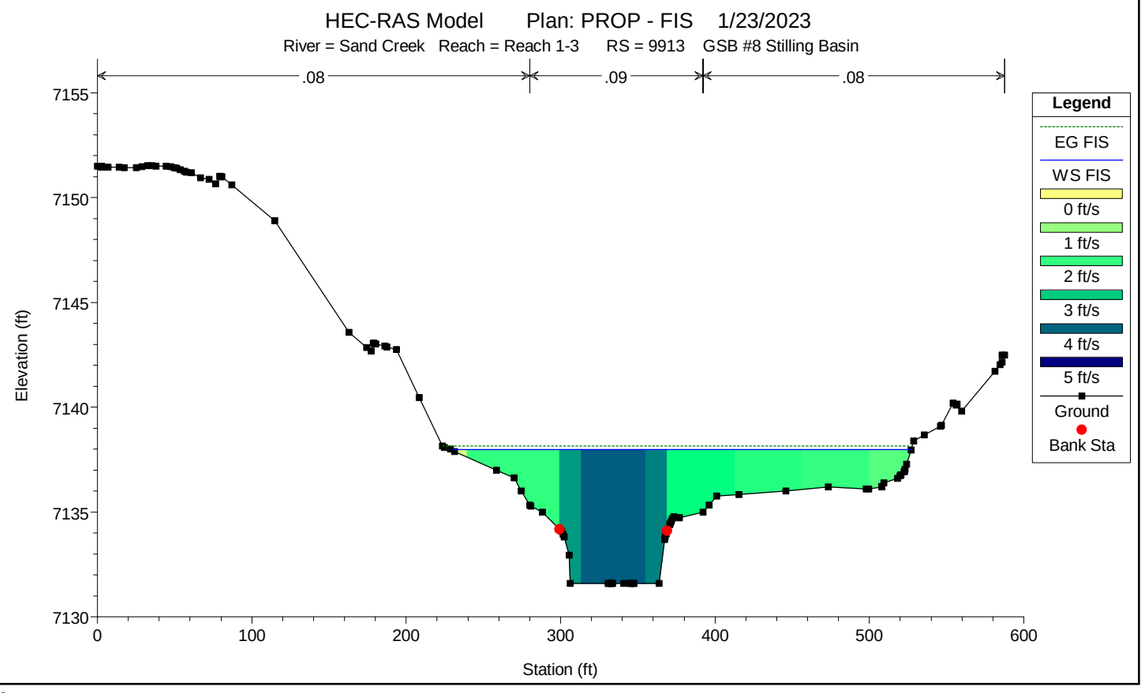

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10113
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta

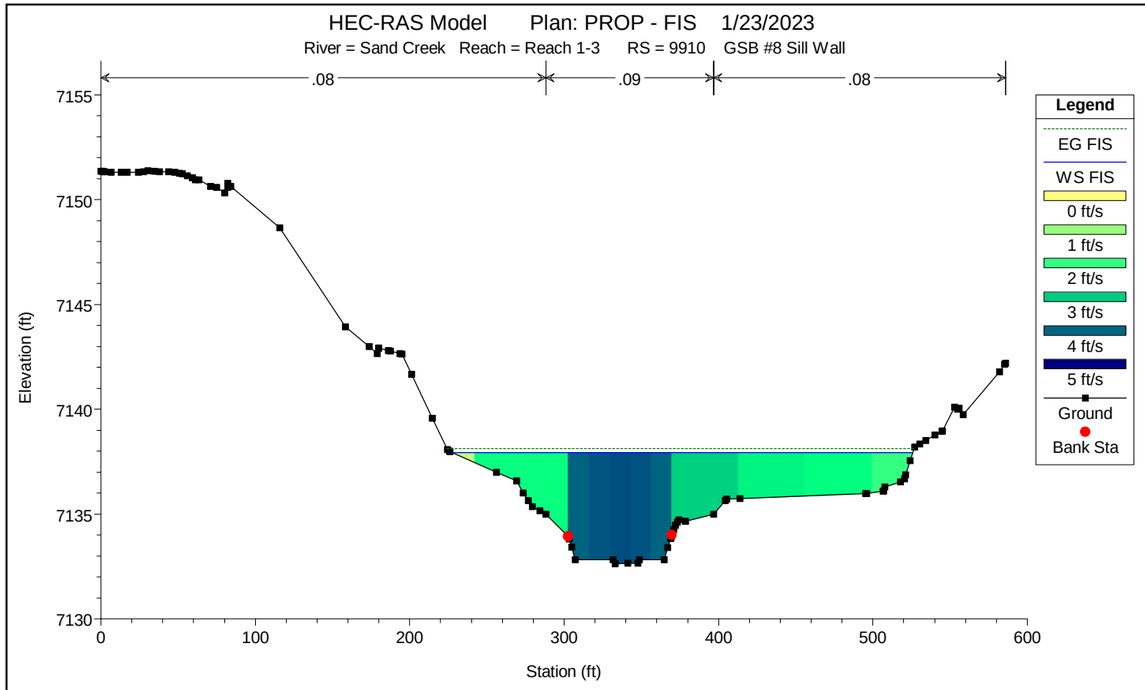

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 10014
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta

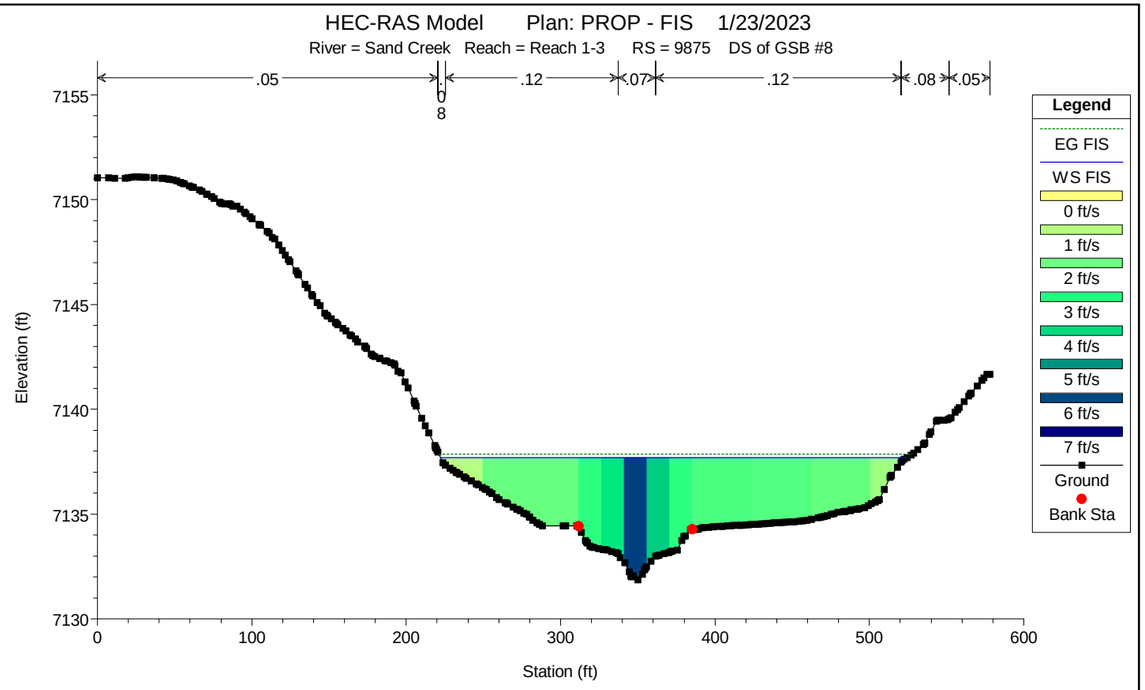

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9955 US of GSB #8
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta

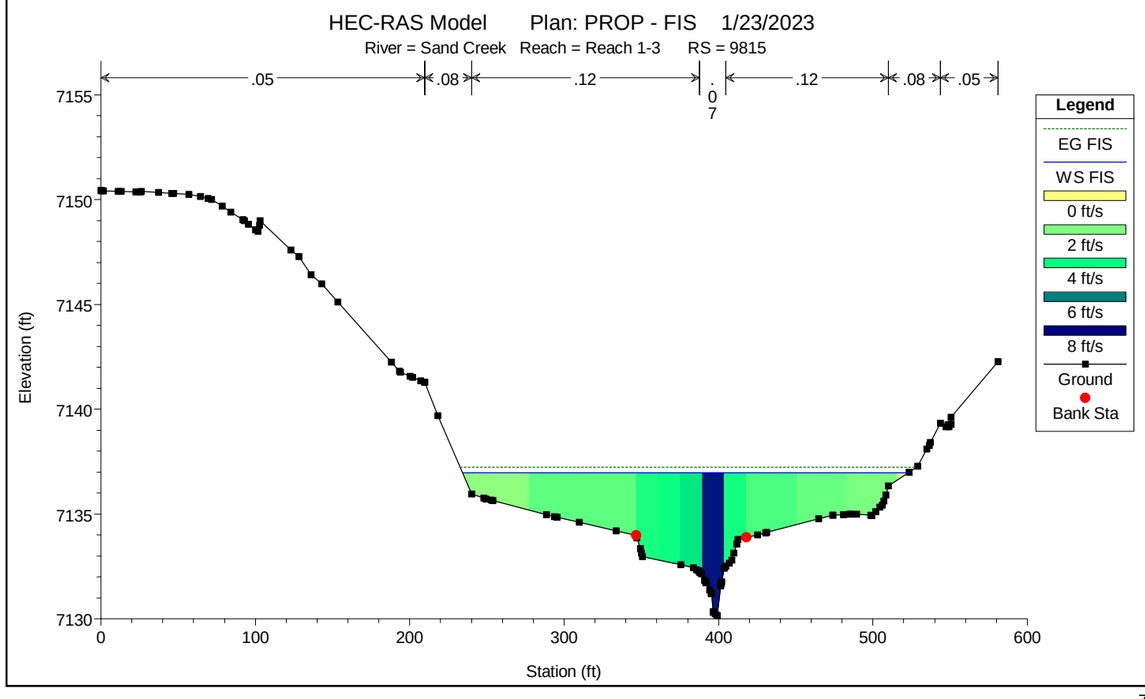

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9943 GSB #8 Crest
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Ineff
Bank Sta

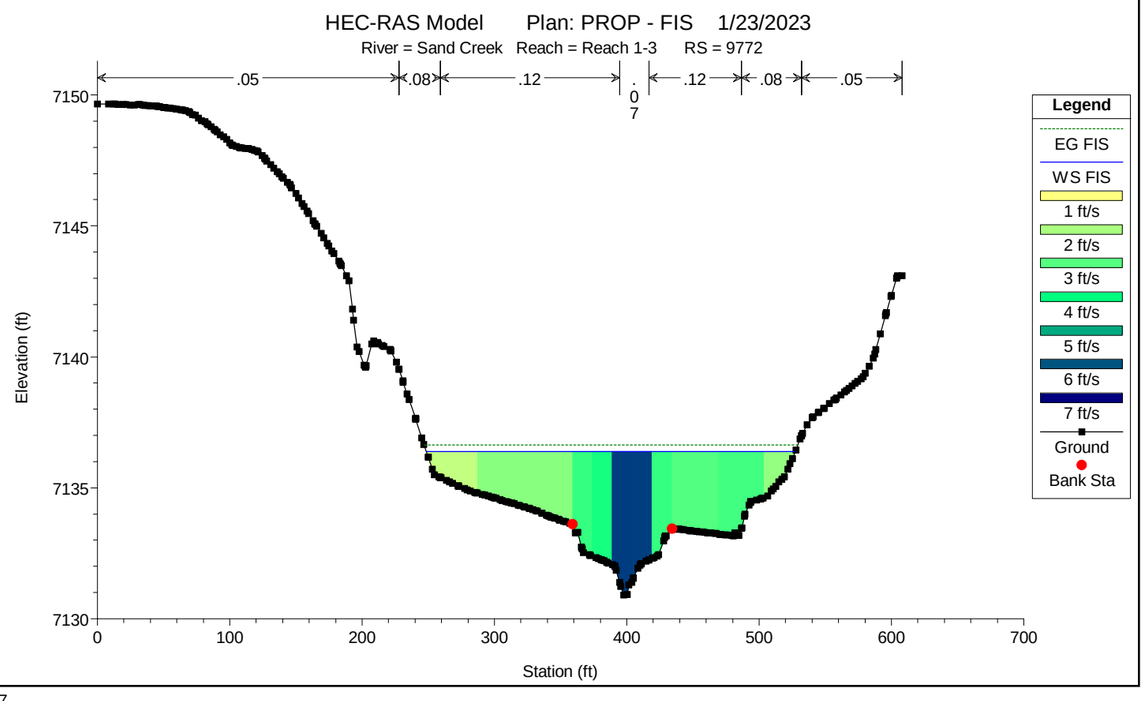

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9926 GSB #8 Toe
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

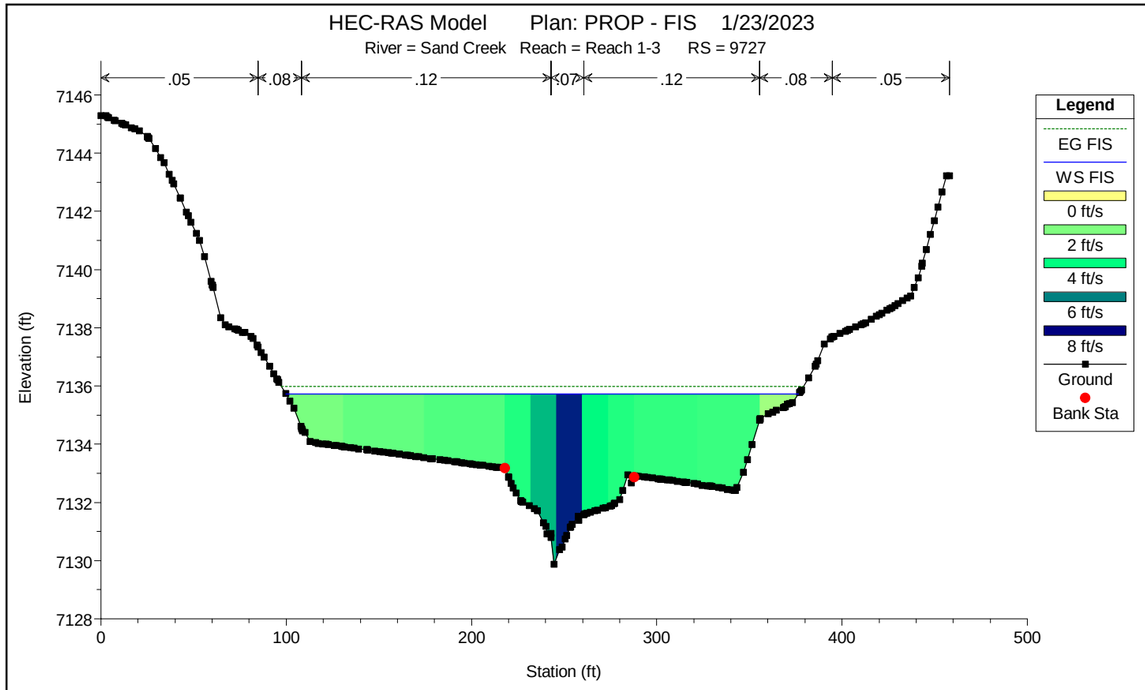

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9913 GSB #8 Stilling Basin
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

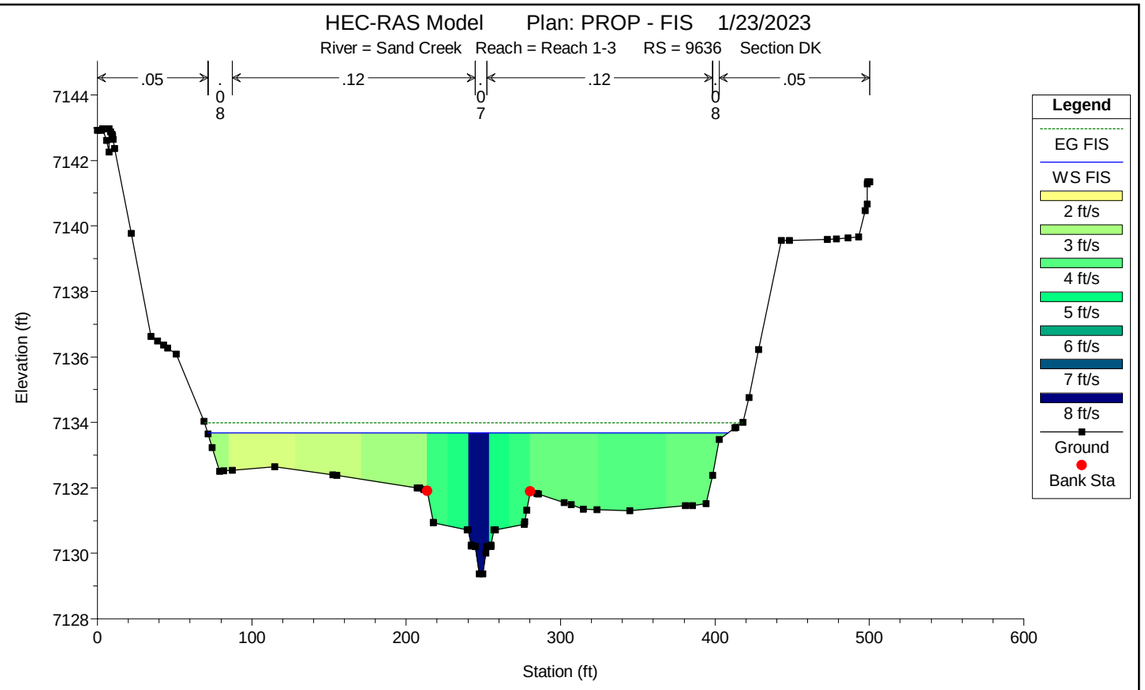

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9910 GSB #8 Sill Wall
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

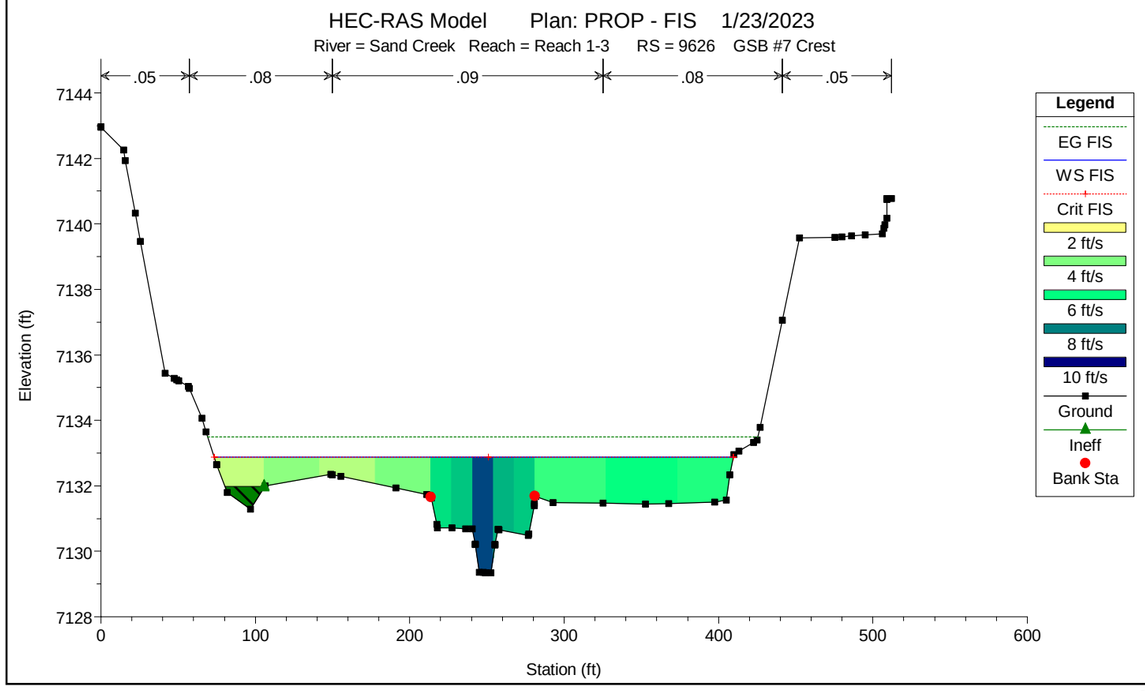

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9875 DS of GSB #8
.05
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

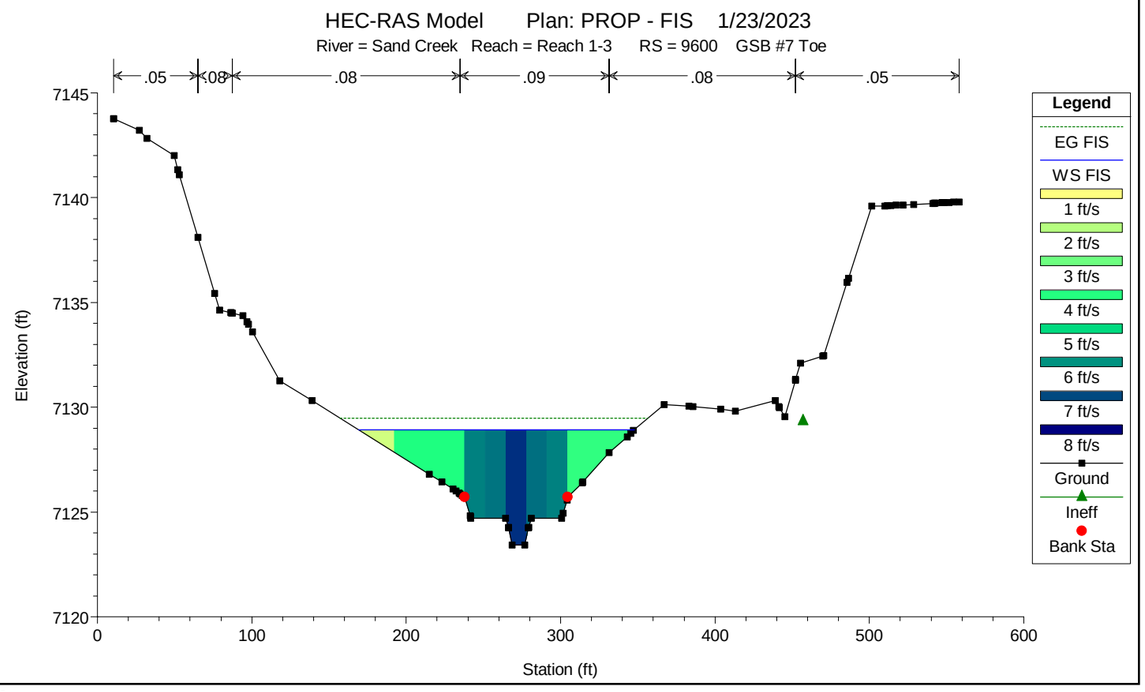

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9815
.05
.08
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

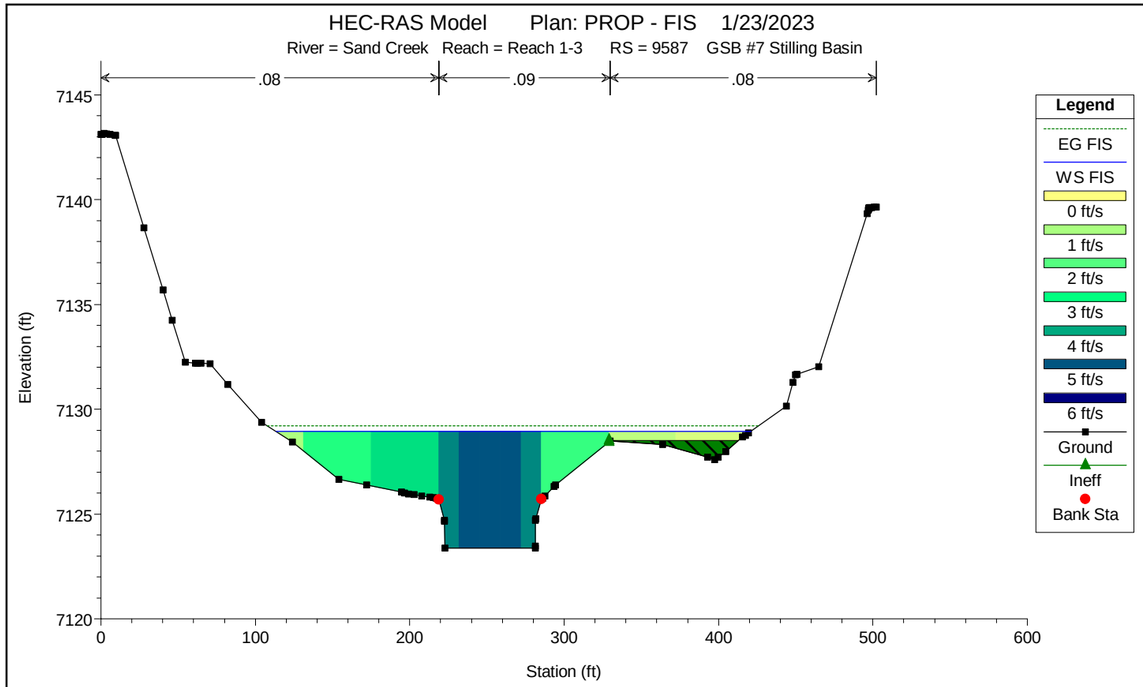

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9772
.05
.08
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

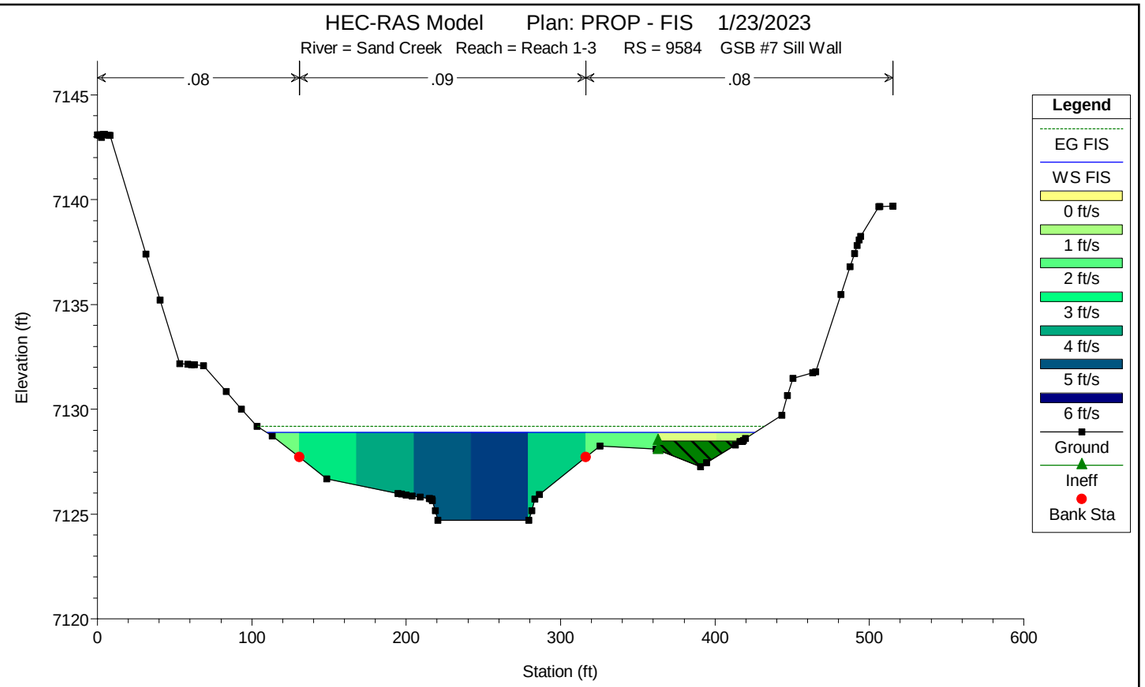

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9727
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

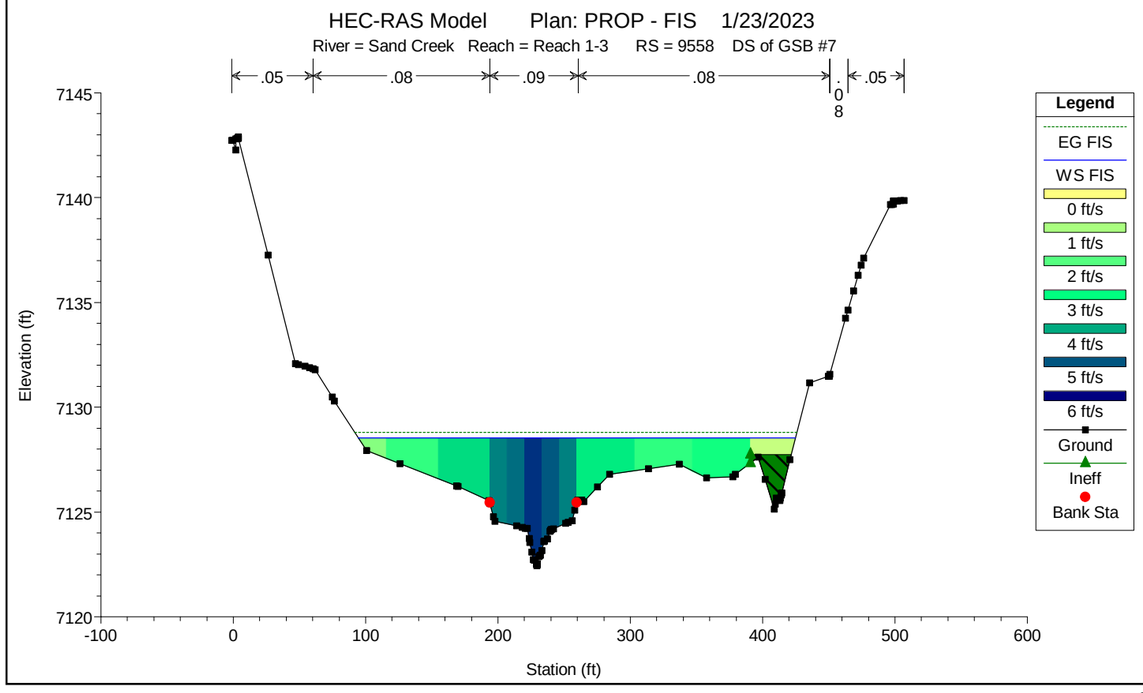

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9636 Section DK
.05
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

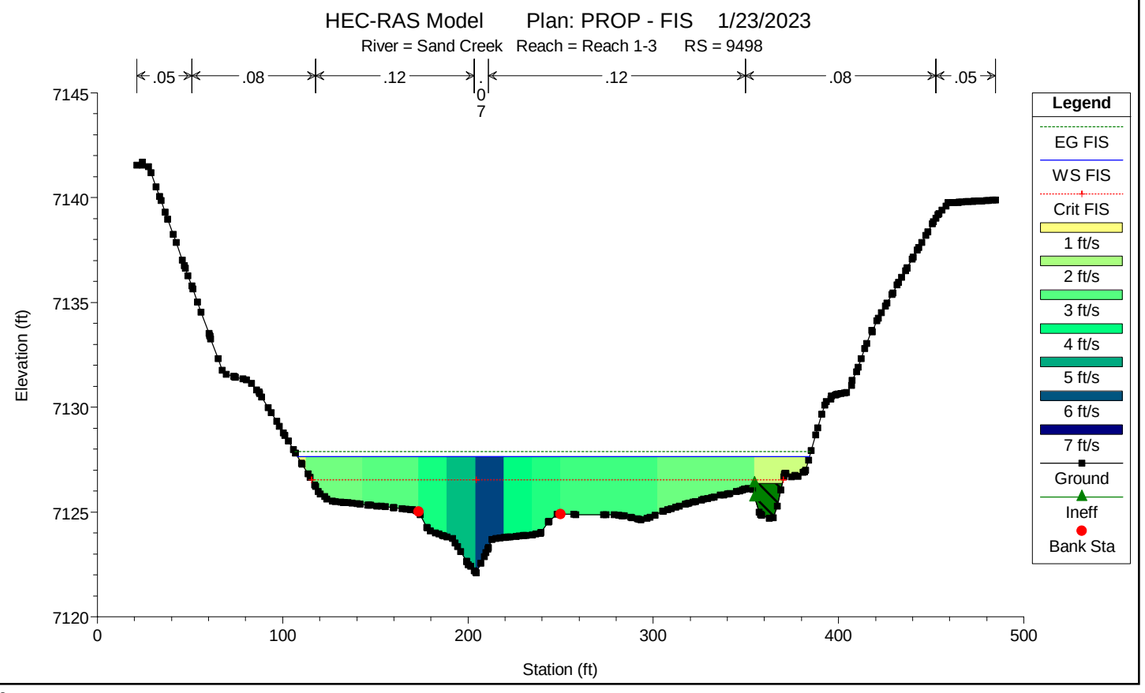

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9626 GSB #7 Crest
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

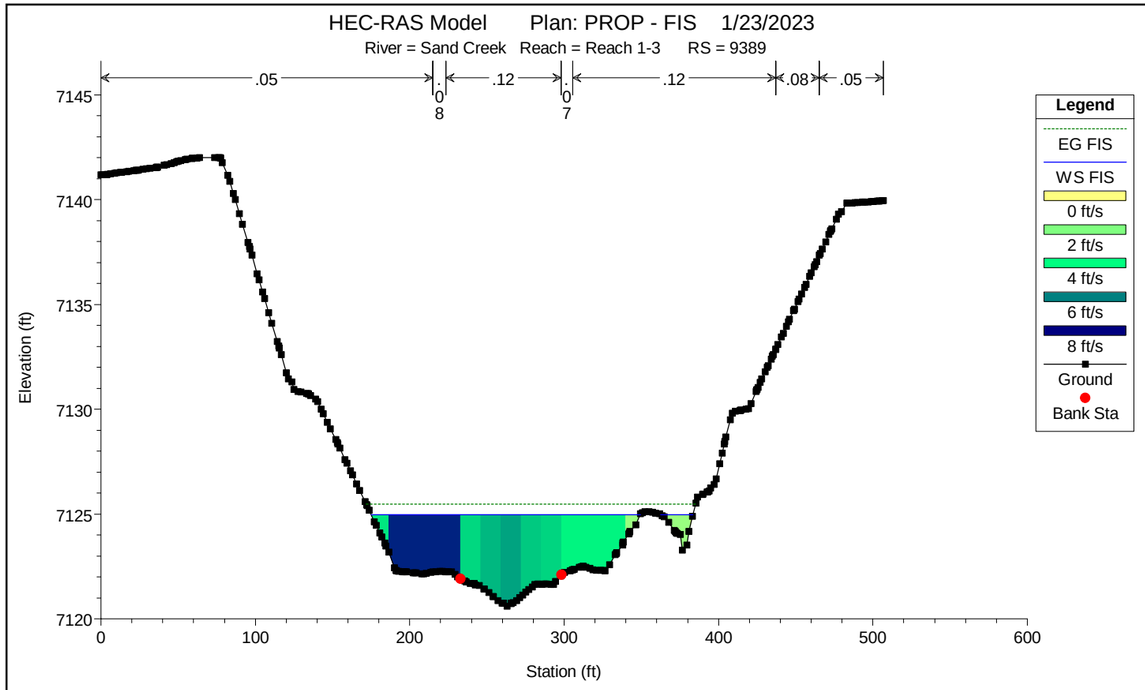

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9600 GSB #7 Toe
.05
.08
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta

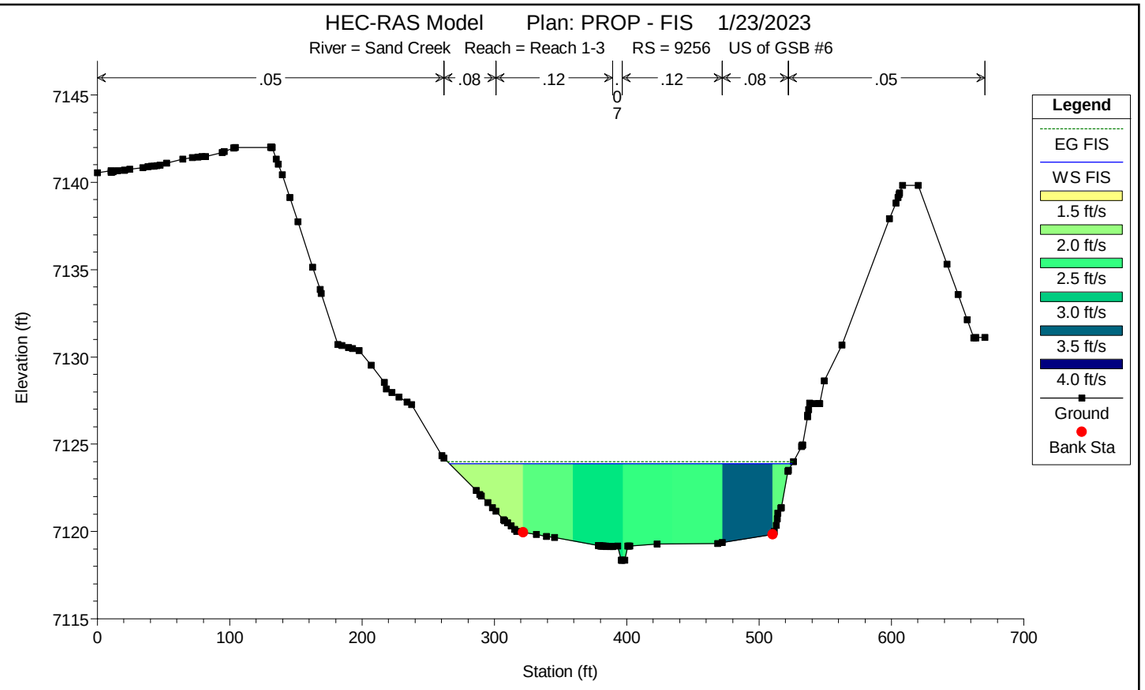

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9587 GSB #7 Stilling Basin
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

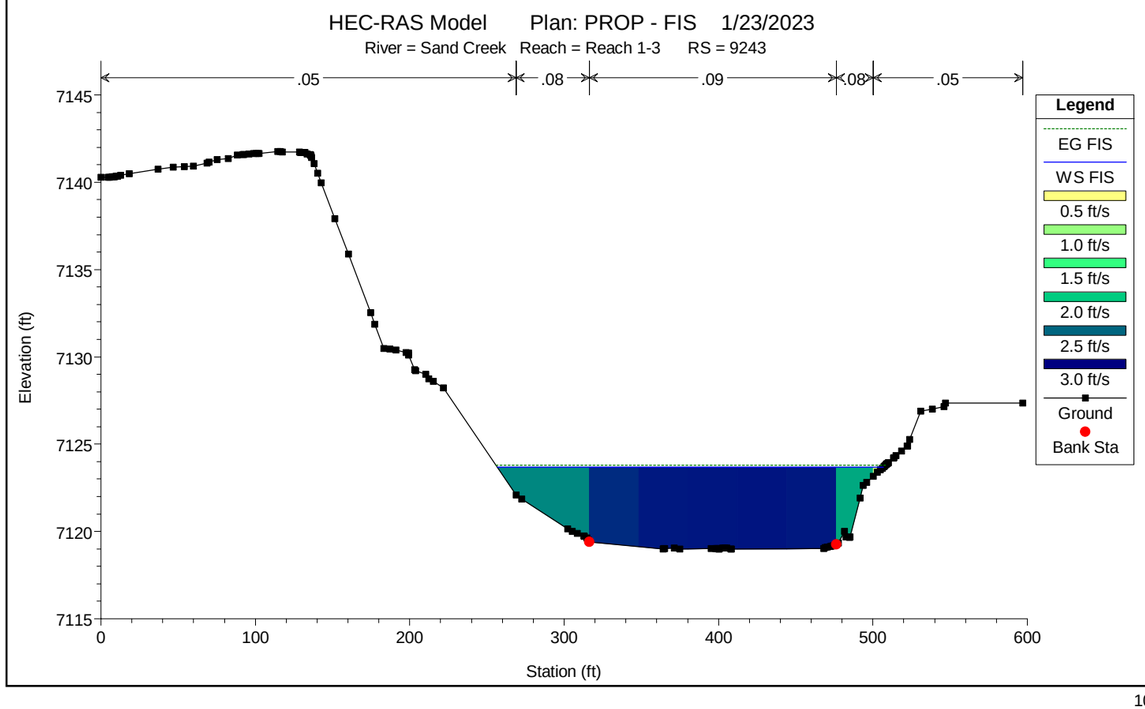

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9584 GSB #7 Sill Wall
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

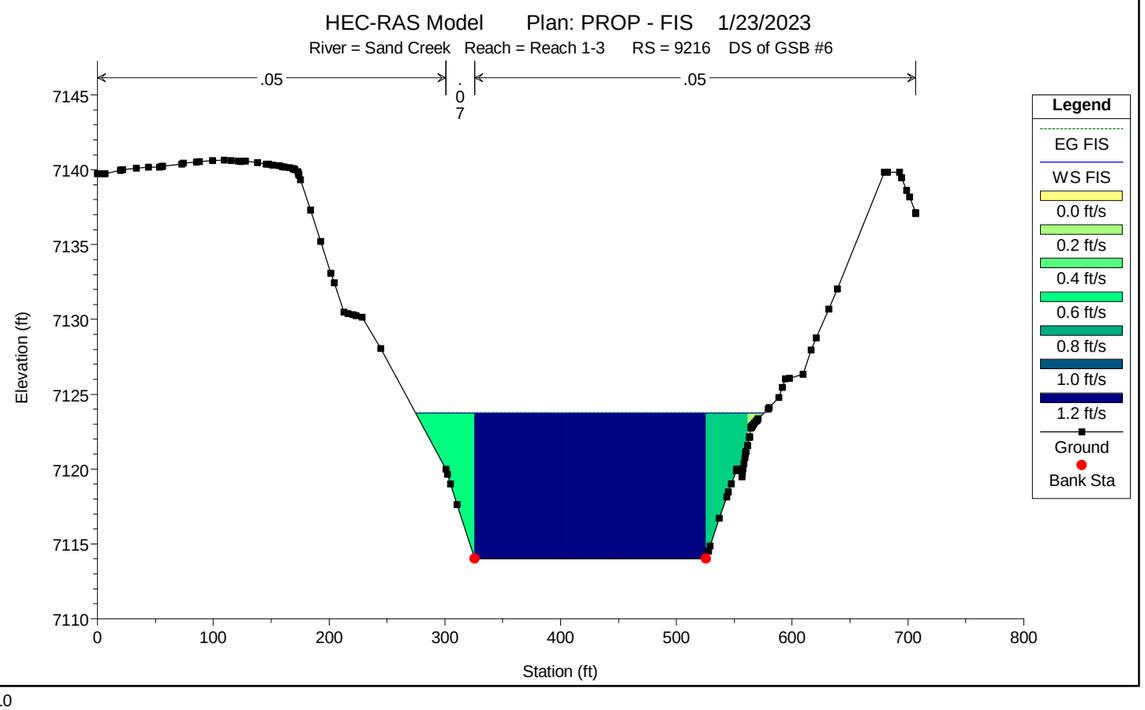

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9558 DS of GSB #7
.05
.08
.09
.08
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

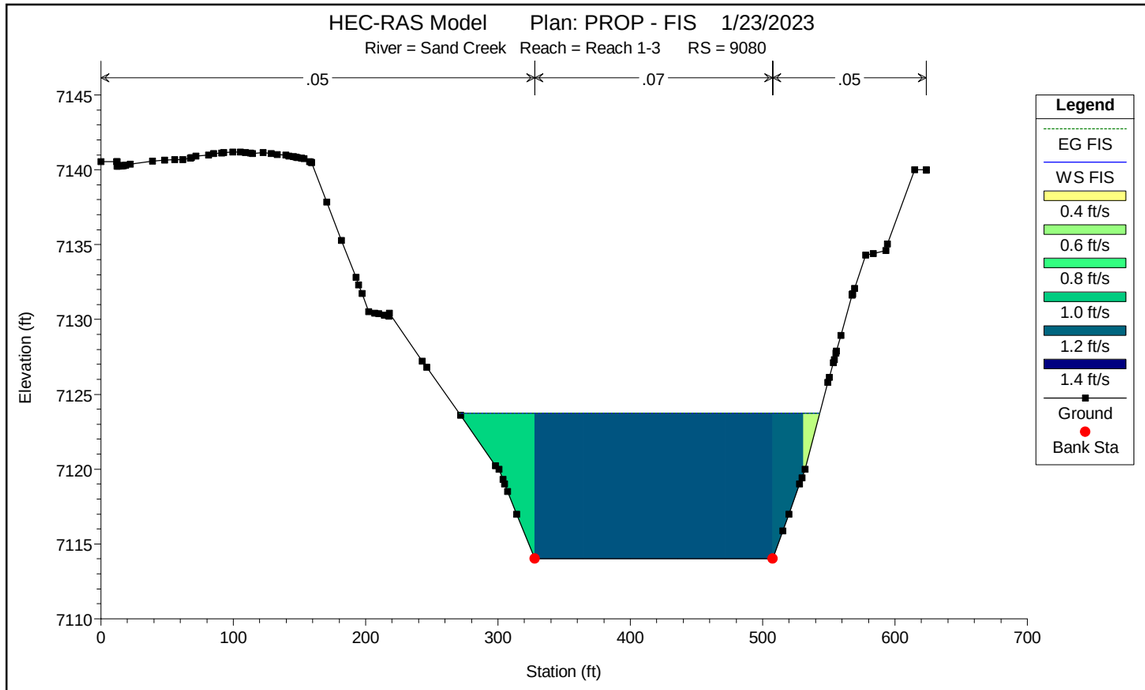

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9498
.05
.08
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta

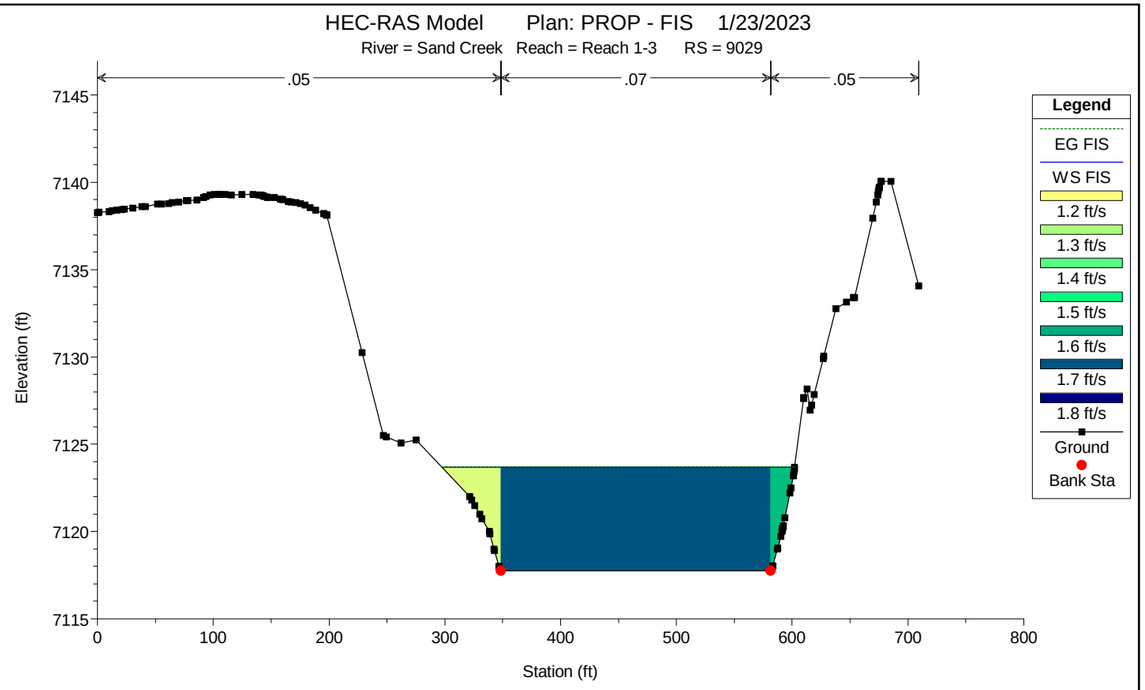

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9389
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

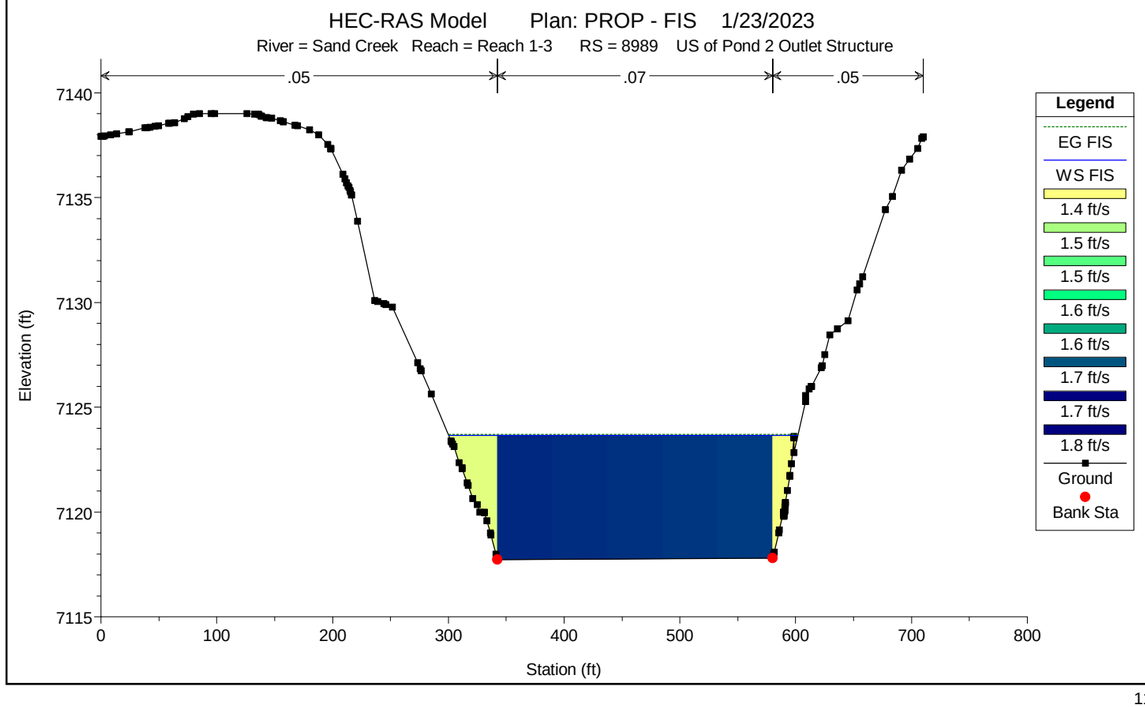

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9256 US of GSB #6
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

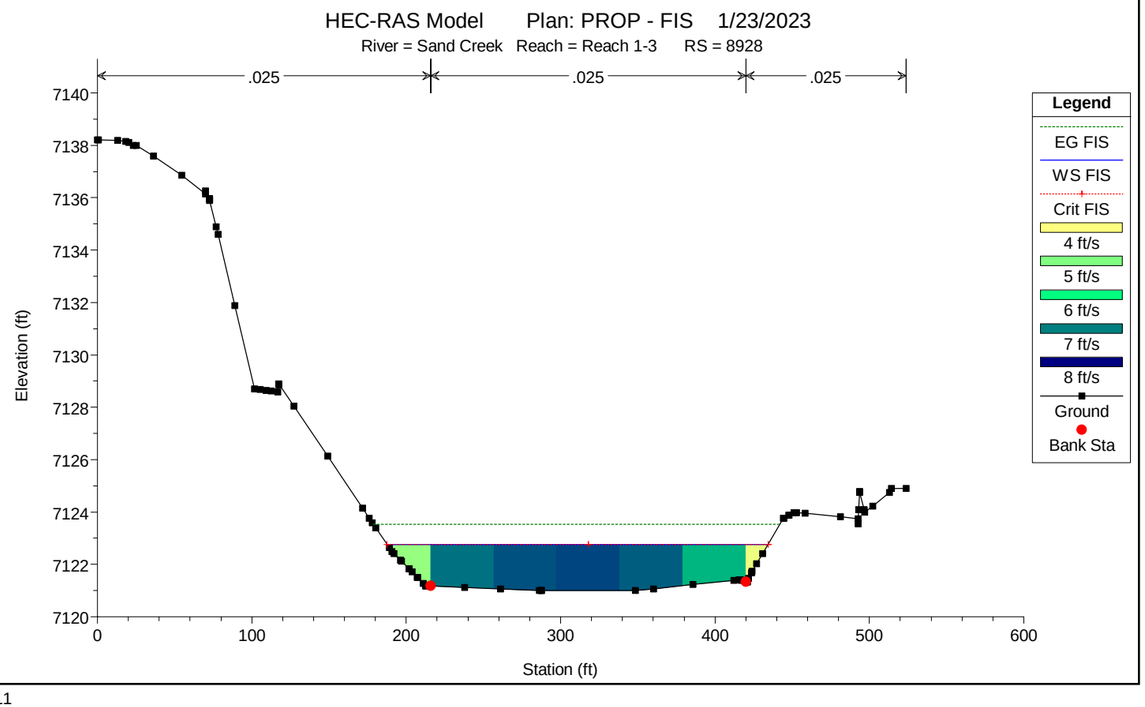

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9243
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

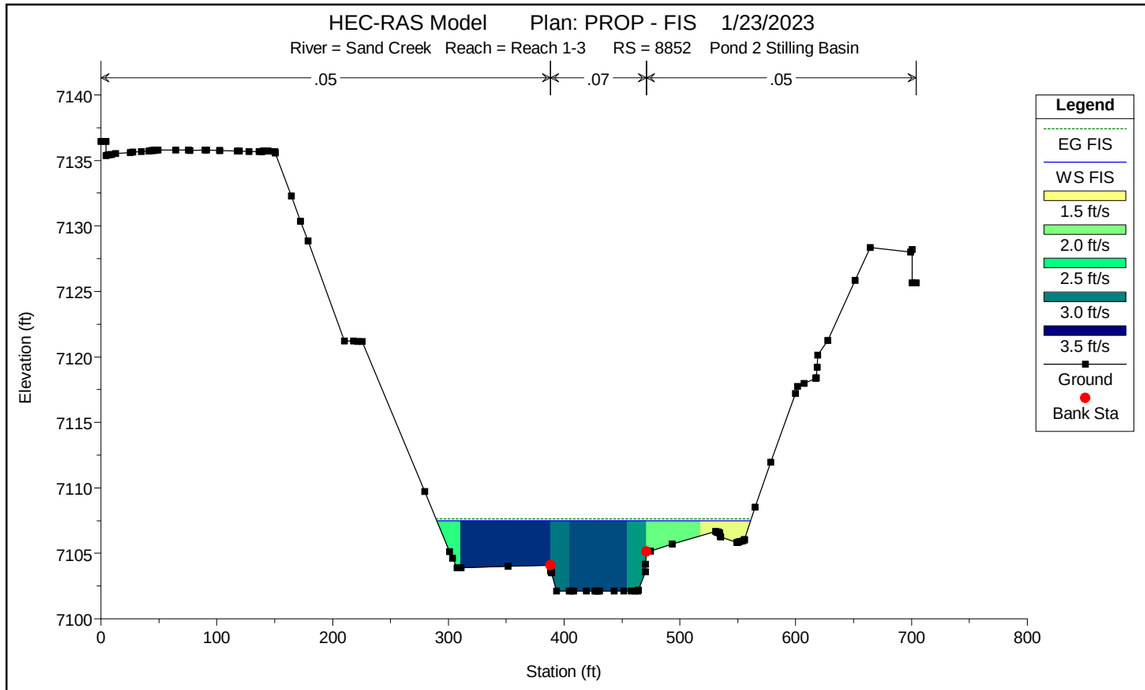

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9216 DS of GSB #6
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Bank Sta

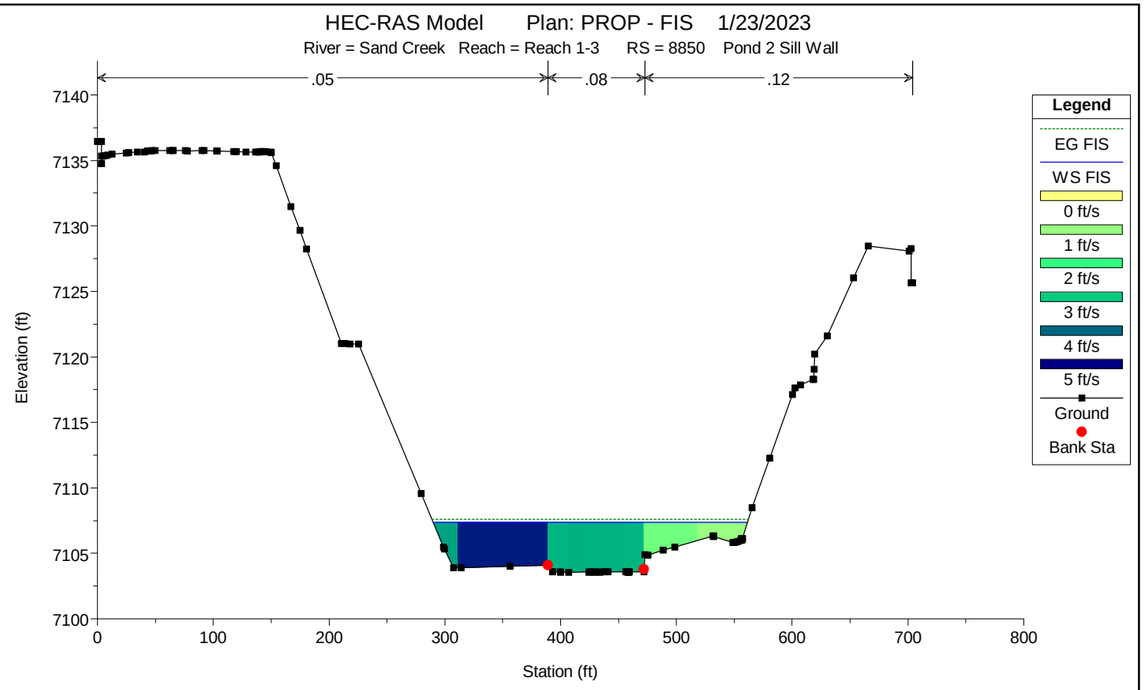

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9080
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Bank Sta

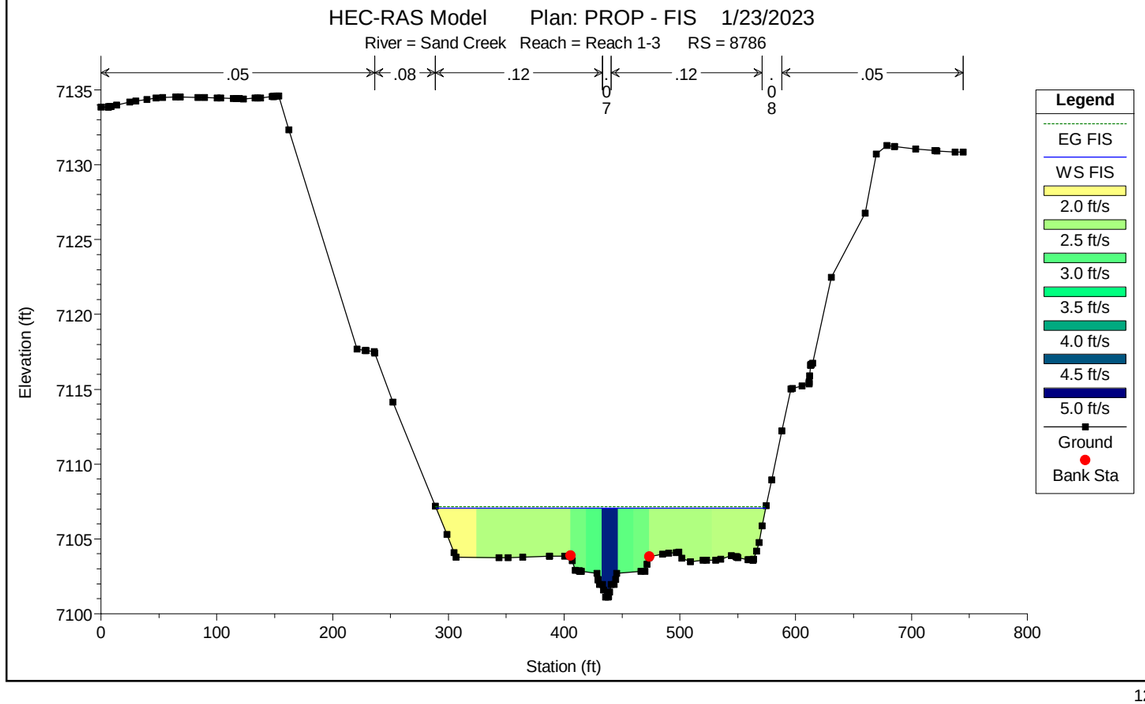

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 9029
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.2 ft/s
1.3 ft/s
1.4 ft/s
1.5 ft/s
1.6 ft/s
1.7 ft/s
1.8 ft/s
Ground
Bank Sta

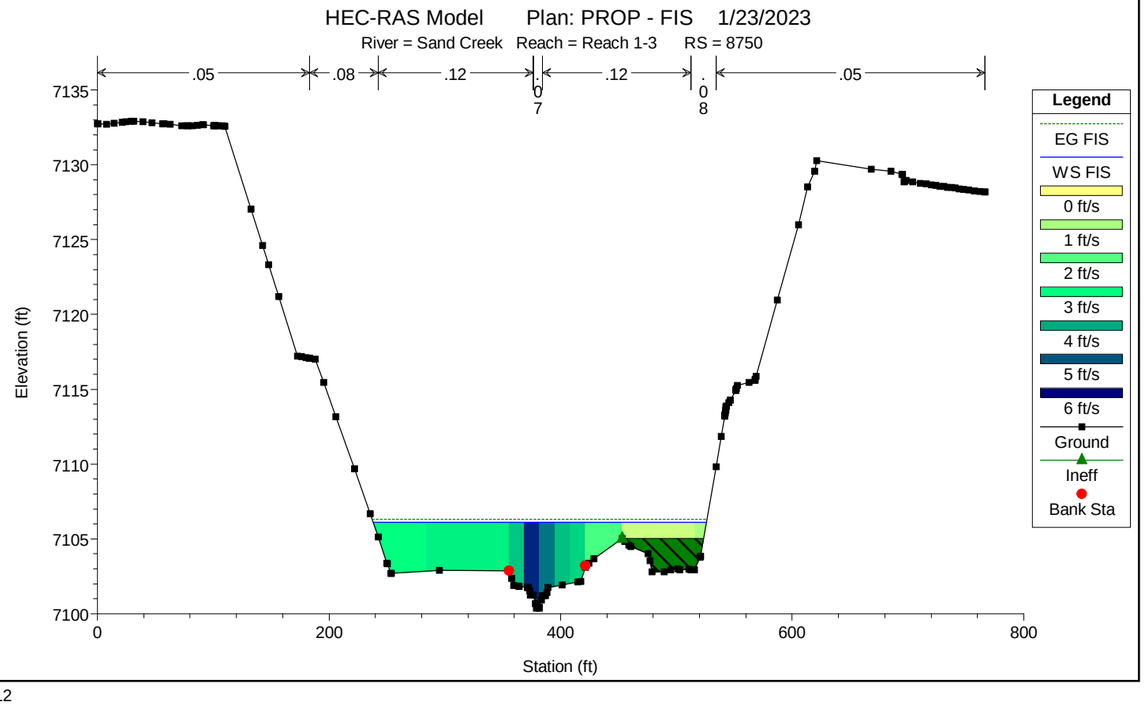

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8989 US of Pond 2 Outlet Structure
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.4 ft/s
1.5 ft/s
1.5 ft/s
1.6 ft/s
1.6 ft/s
1.7 ft/s
1.7 ft/s
1.8 ft/s
Ground
Bank Sta

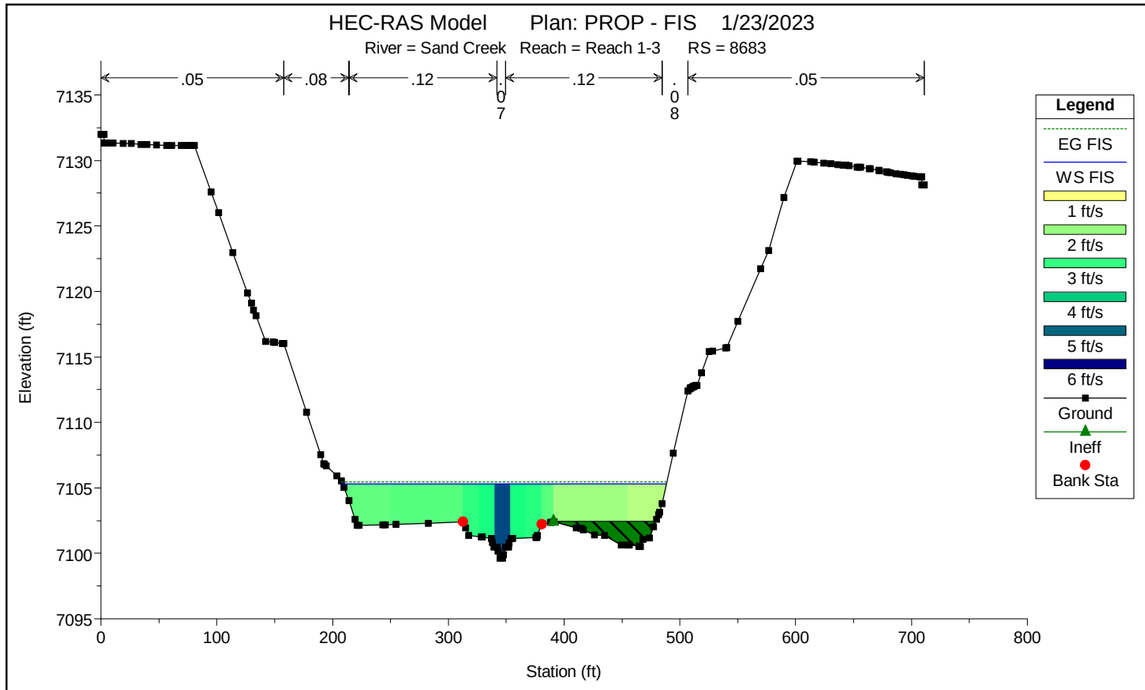

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8928
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

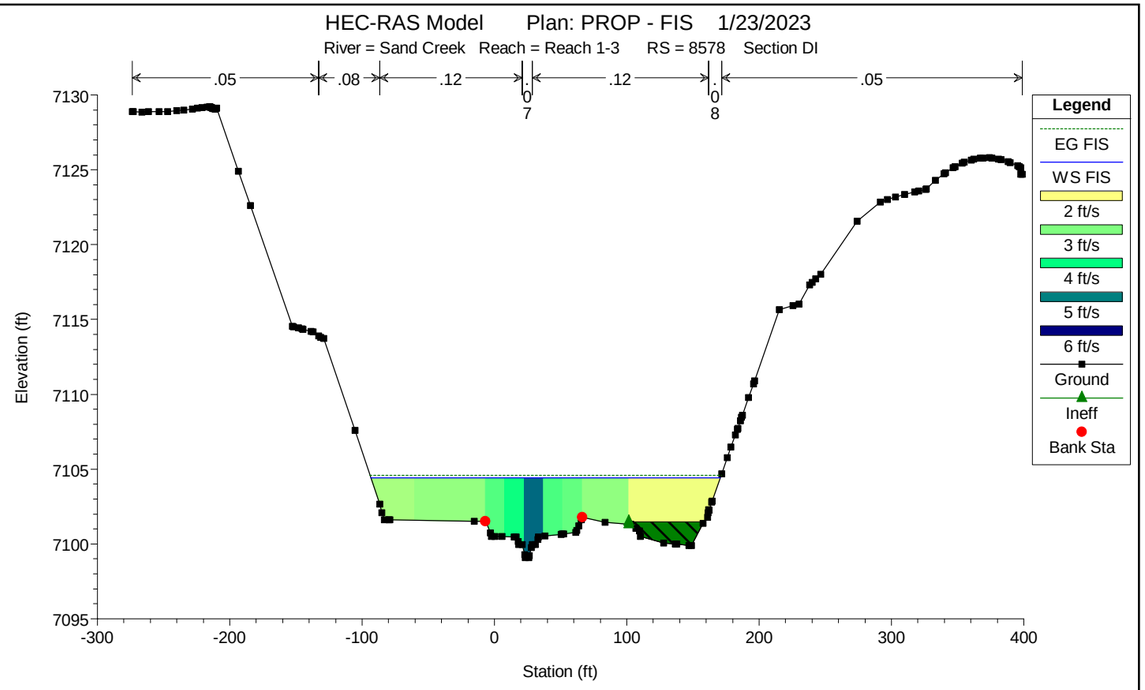

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8852 Pond 2 Stilling Basin
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

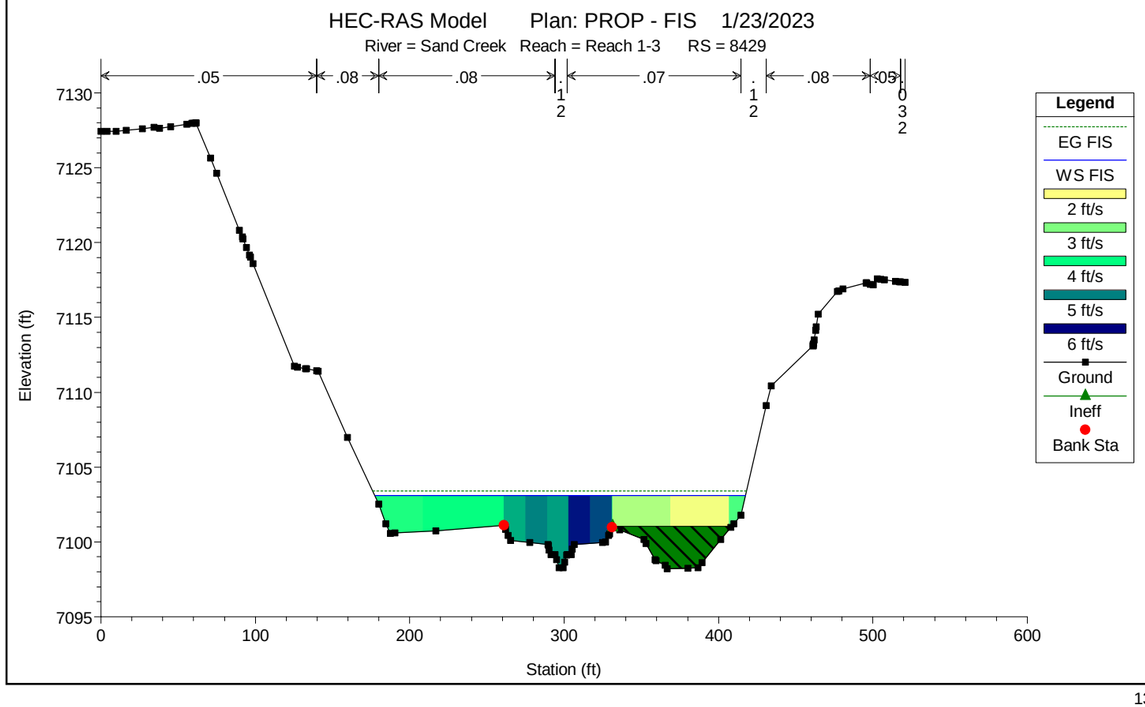

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8850 Pond 2 Sill Wall
.05
.08
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

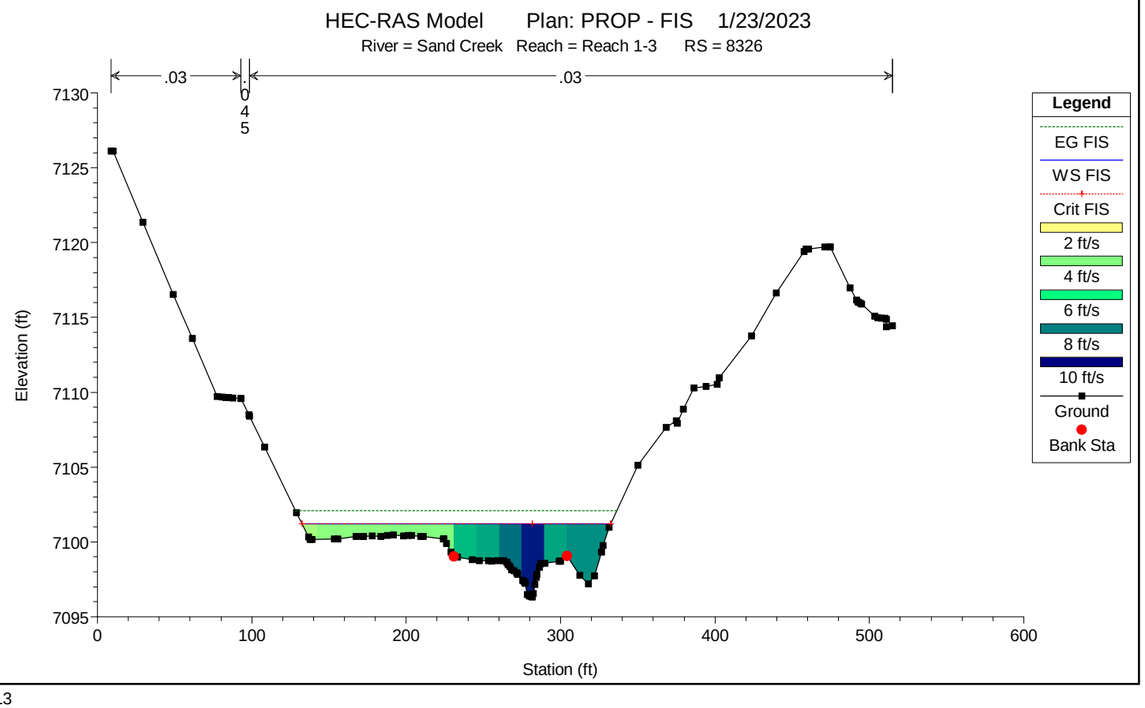

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8786
.05
.08
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
Ground
Bank Sta

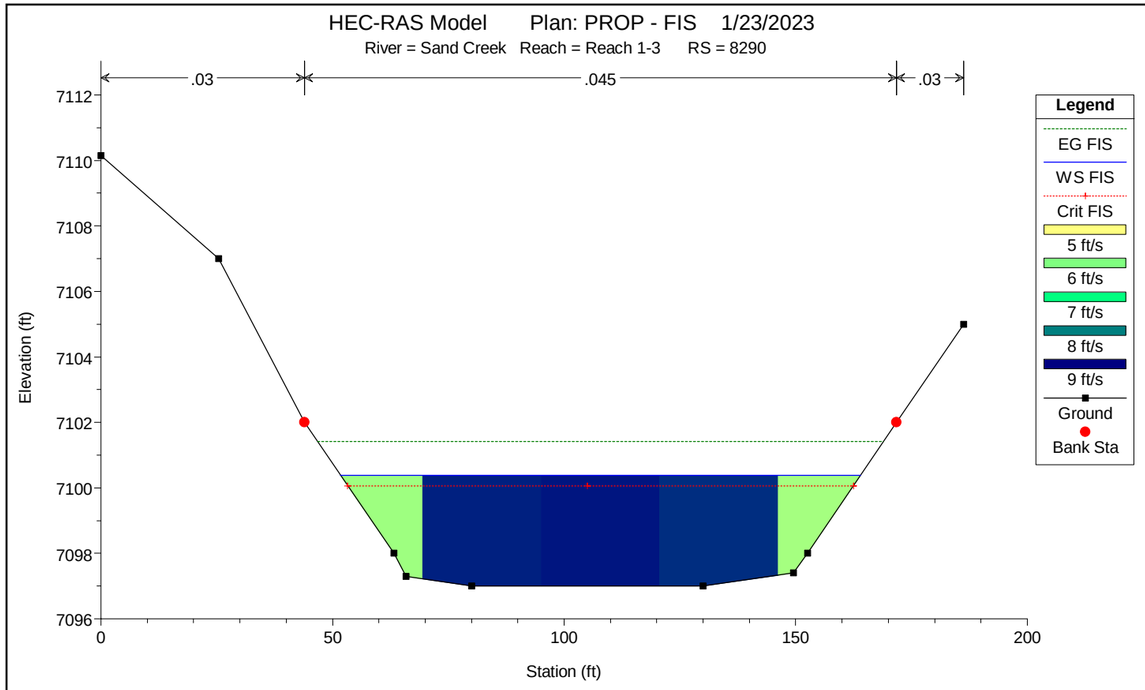

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8750
.05
.08
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

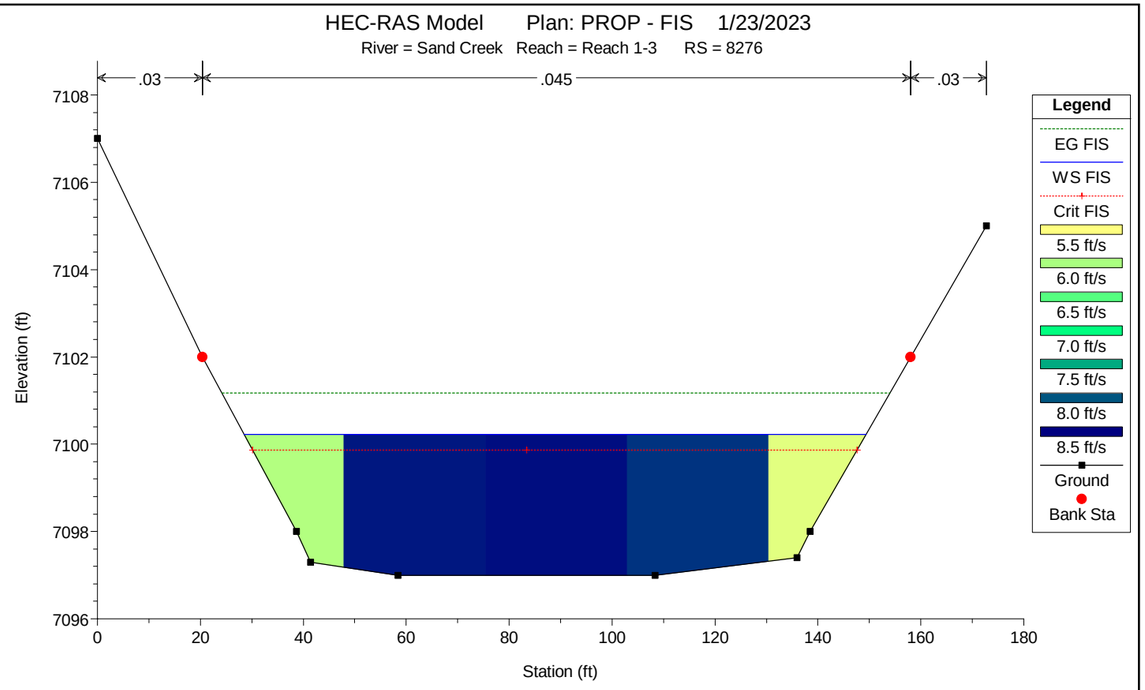

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8683
.05
.08
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

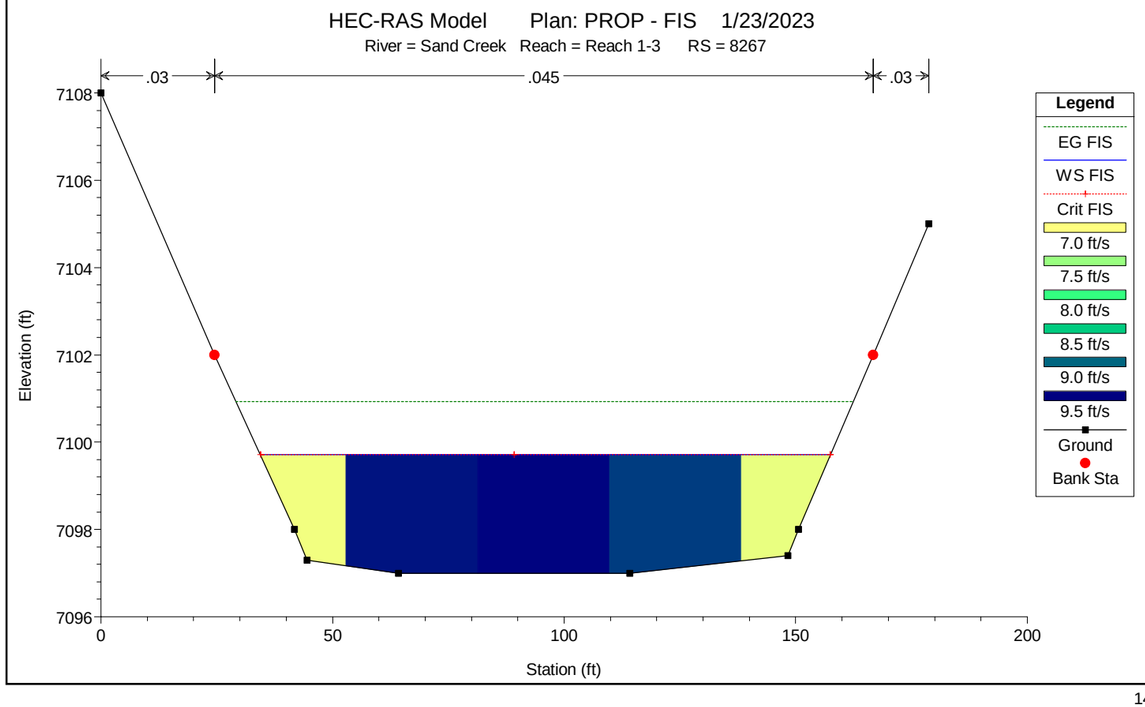

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8578 Section DI
.05
.08
.12
.12
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

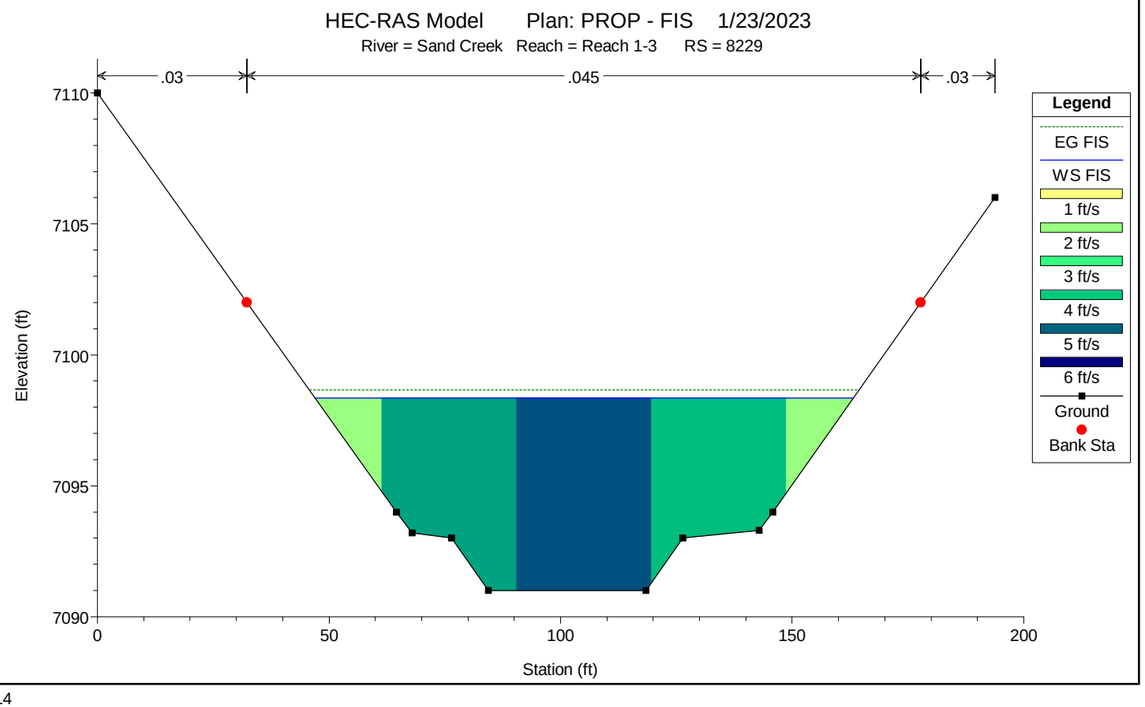

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8429
.05
.08
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

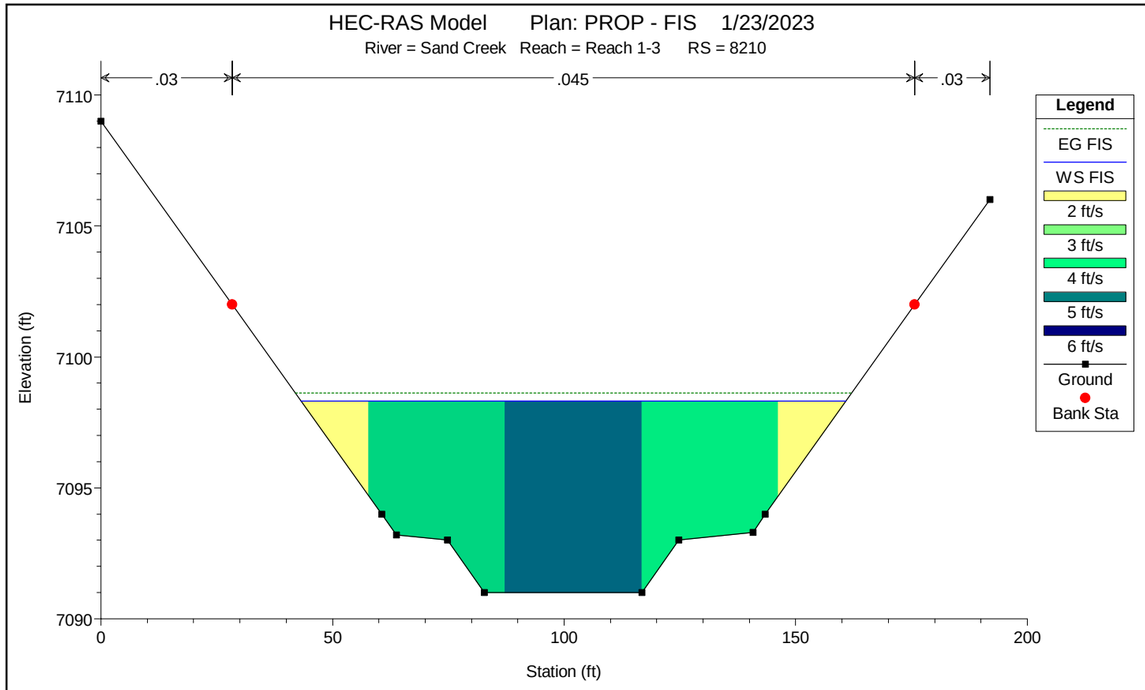

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8326
.03
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

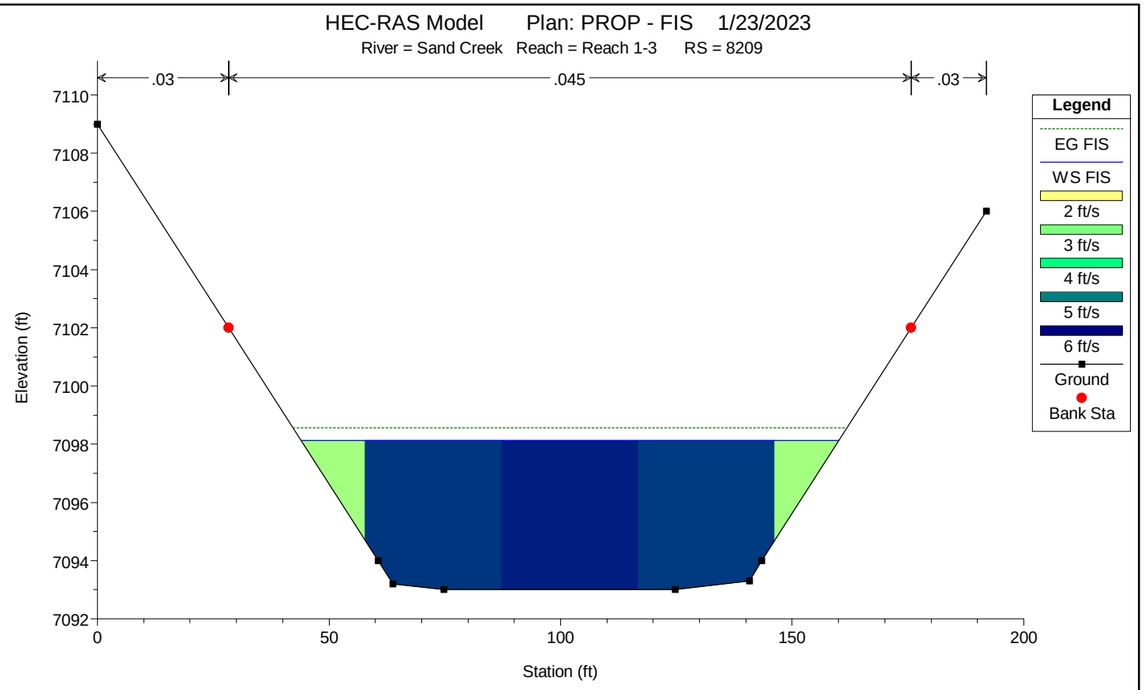

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8290
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

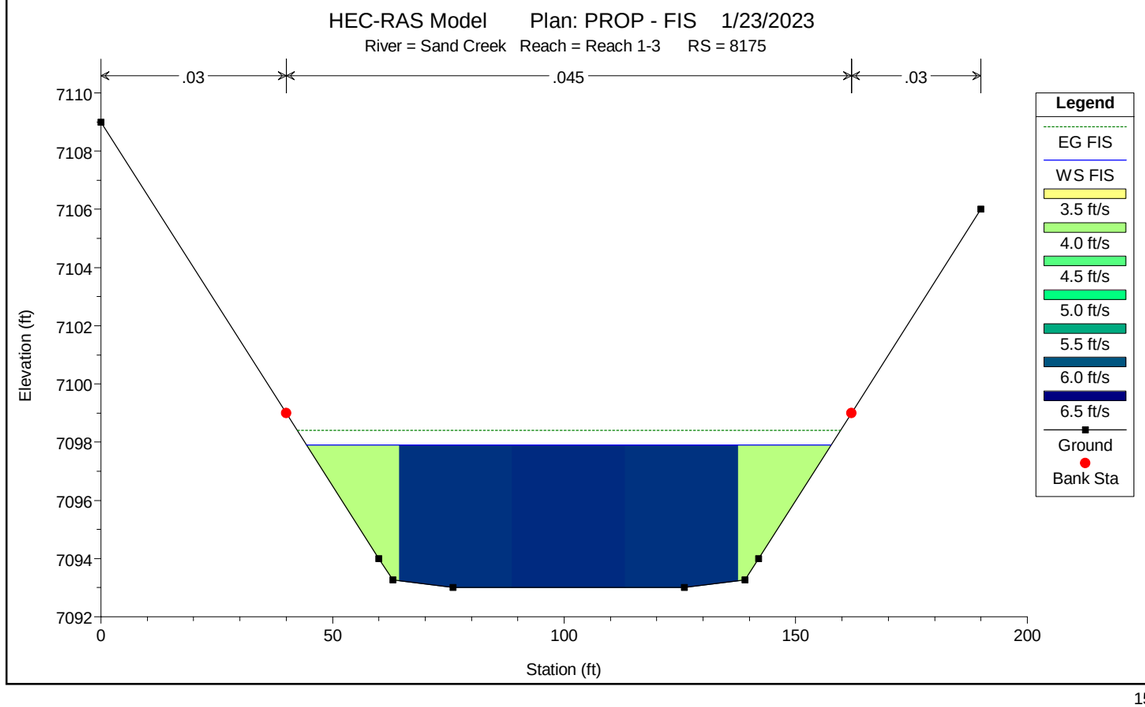

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8276
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
5.5 ft/s
6.0 ft/s
6.5 ft/s
7.0 ft/s
7.5 ft/s
8.0 ft/s
8.5 ft/s
Ground
Bank Sta

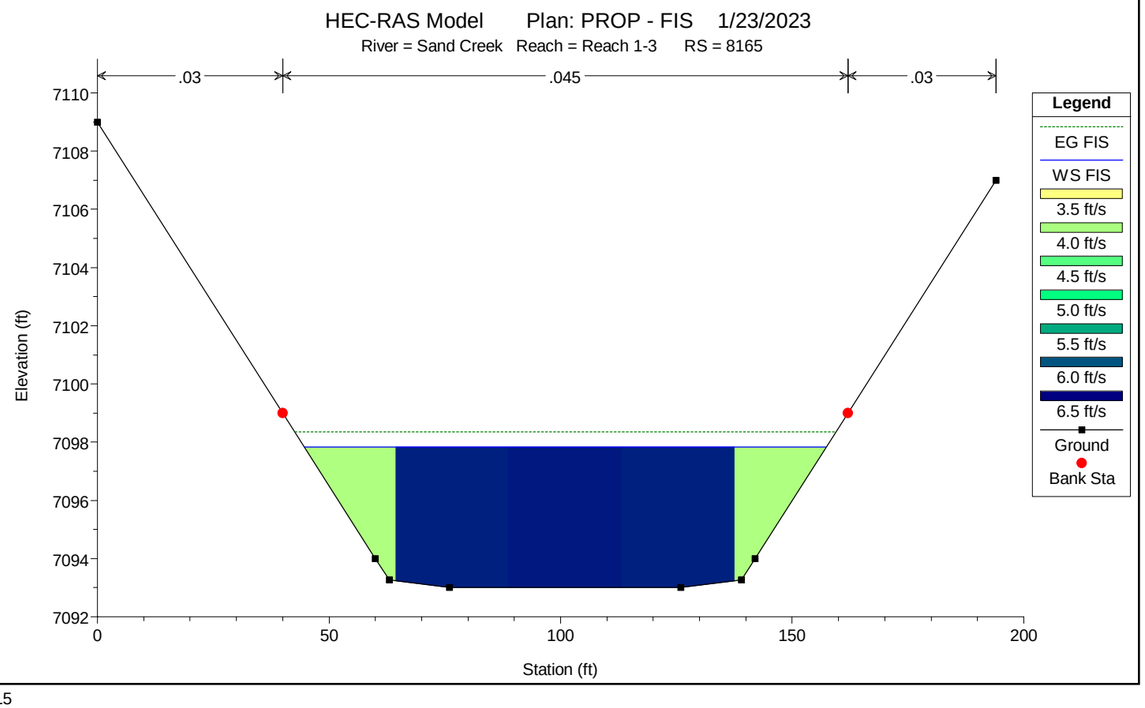

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8267
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
7.0 ft/s
7.5 ft/s
8.0 ft/s
8.5 ft/s
9.0 ft/s
9.5 ft/s
Ground
Bank Sta

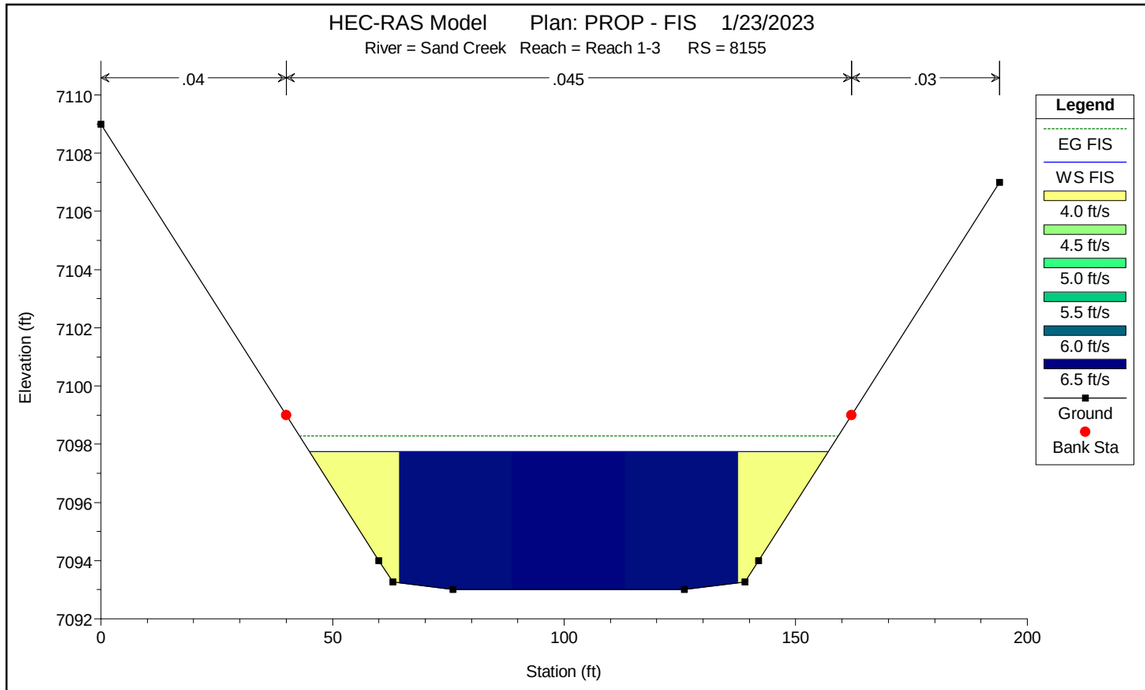

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8229
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

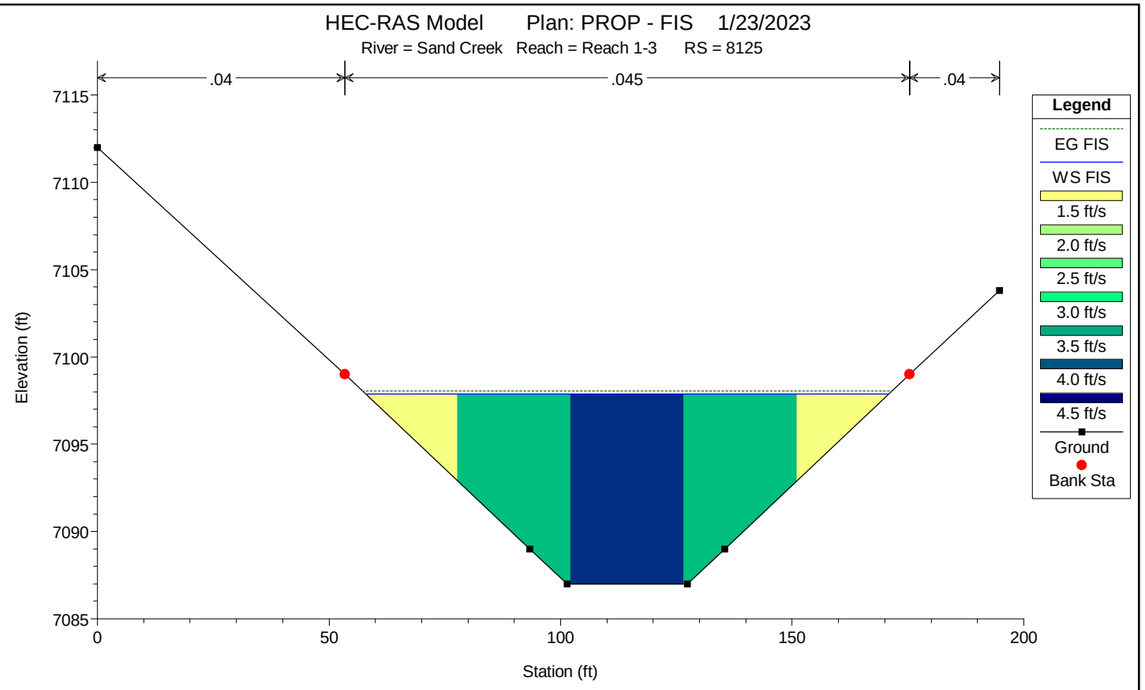

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8210
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

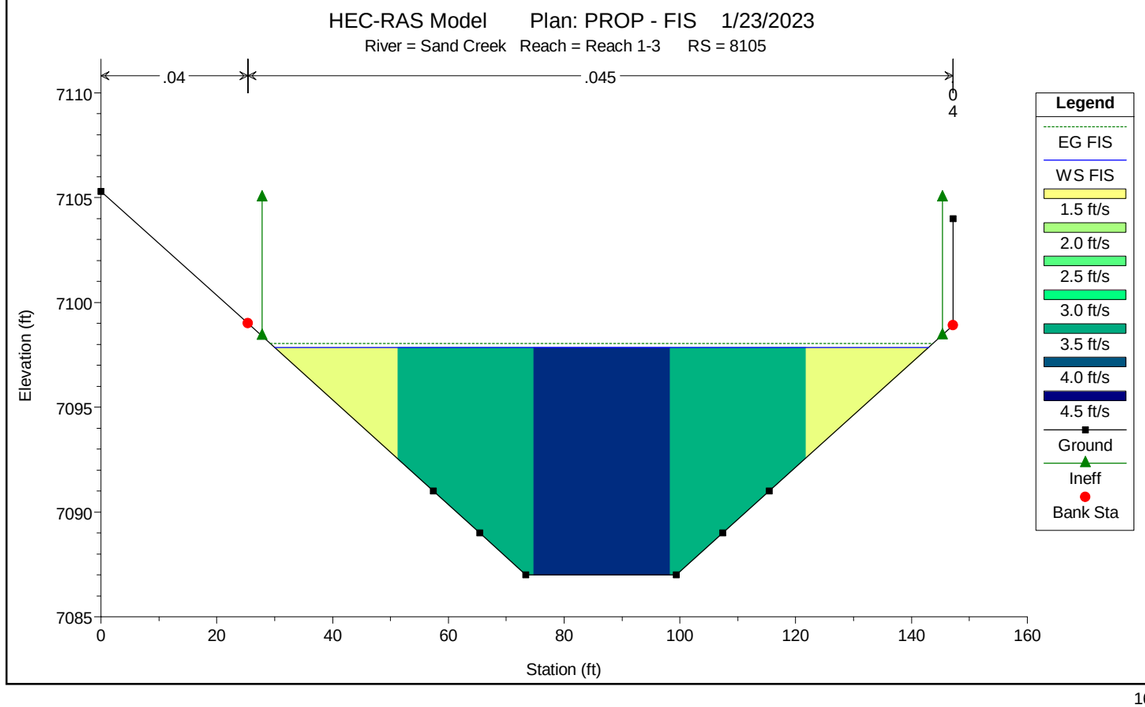

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8209
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

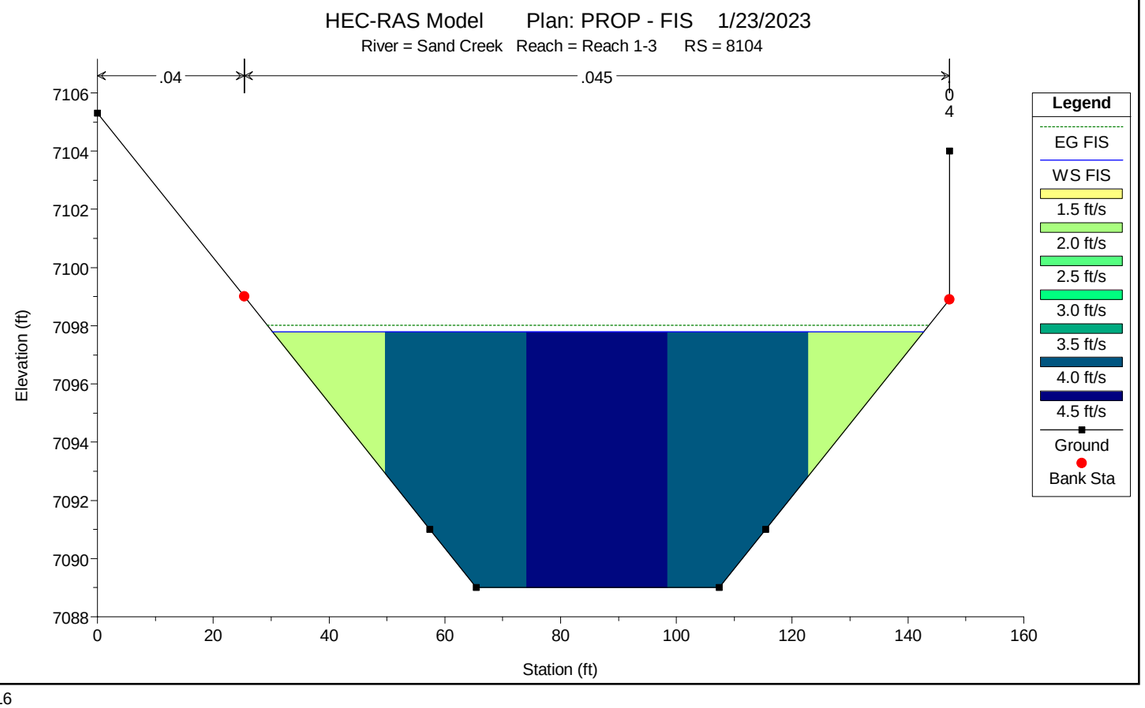

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8175
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
6.5 ft/s
Ground
Bank Sta

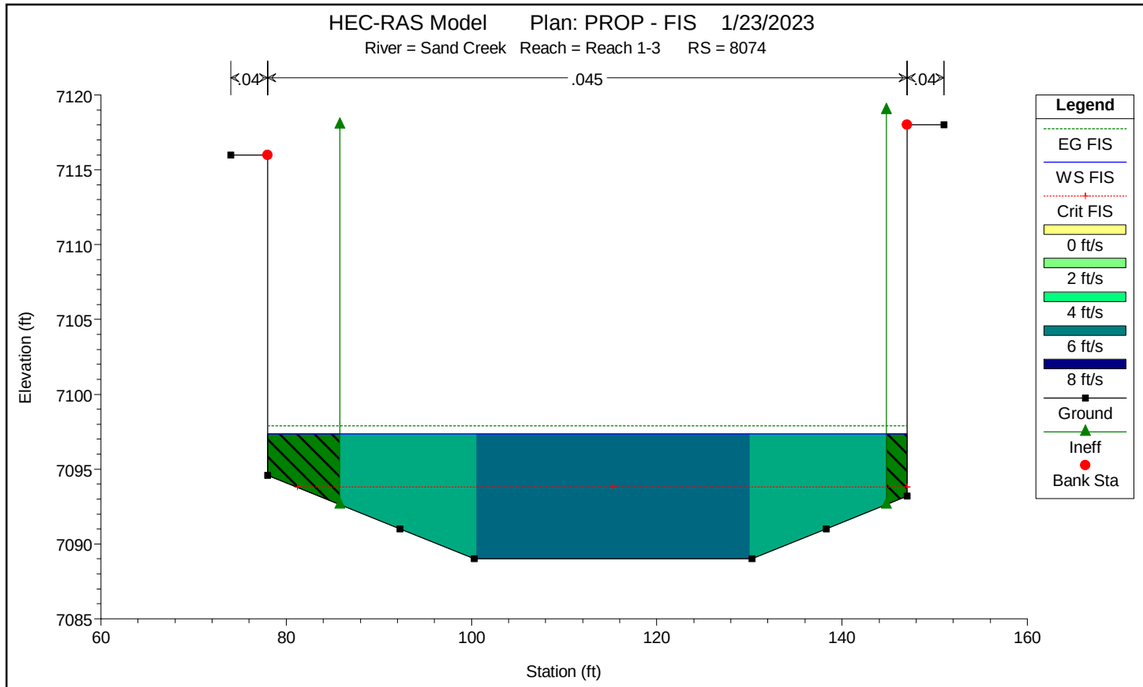

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8165
.03
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
6.5 ft/s
Ground
Bank Sta

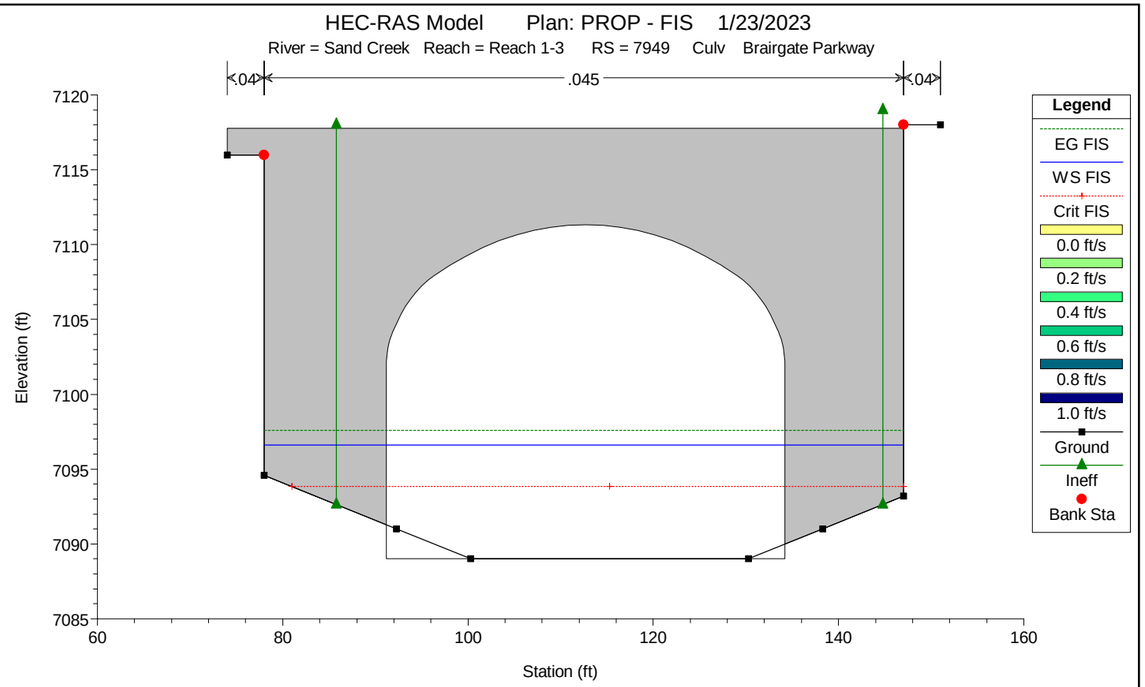

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8155
.04
.045
.03
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
6.5 ft/s
Ground
Bank Sta

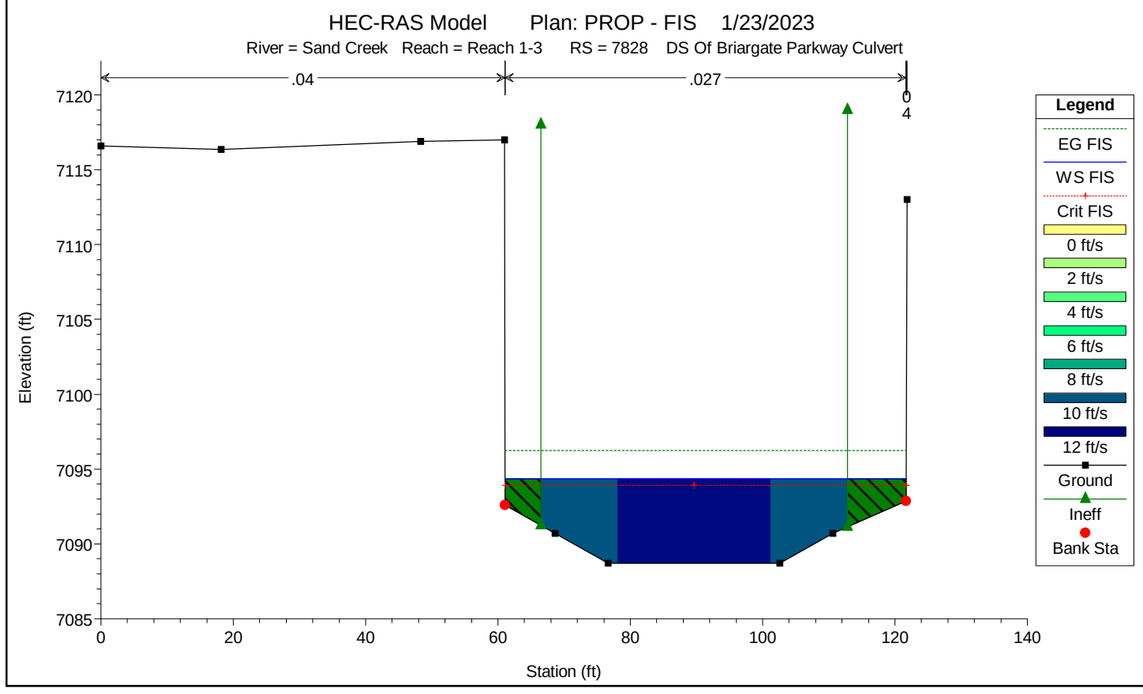

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8125
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

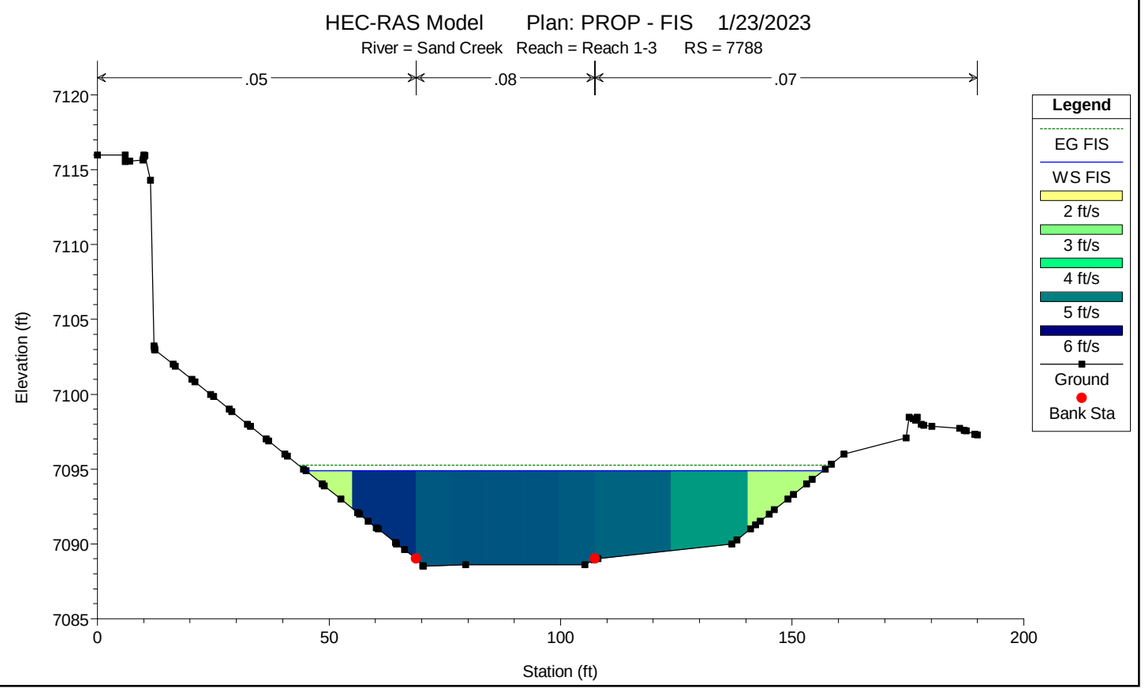

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8105
.04
.045
0
4
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Ineff
Bank Sta

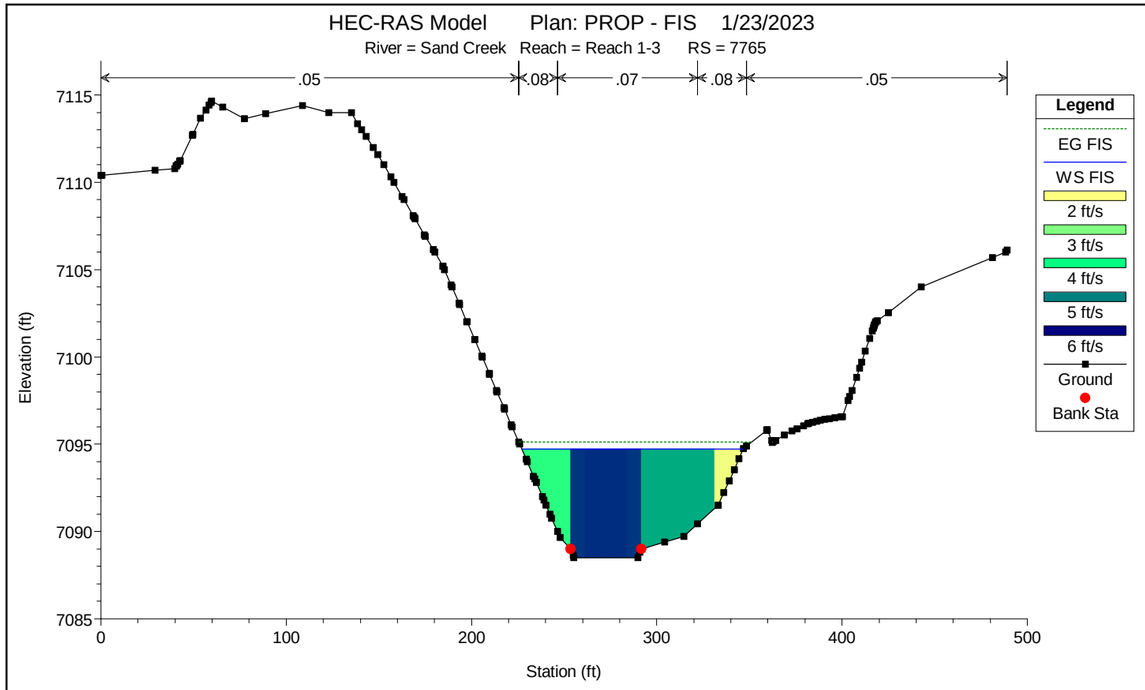

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8104
.04
.045
0
4
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

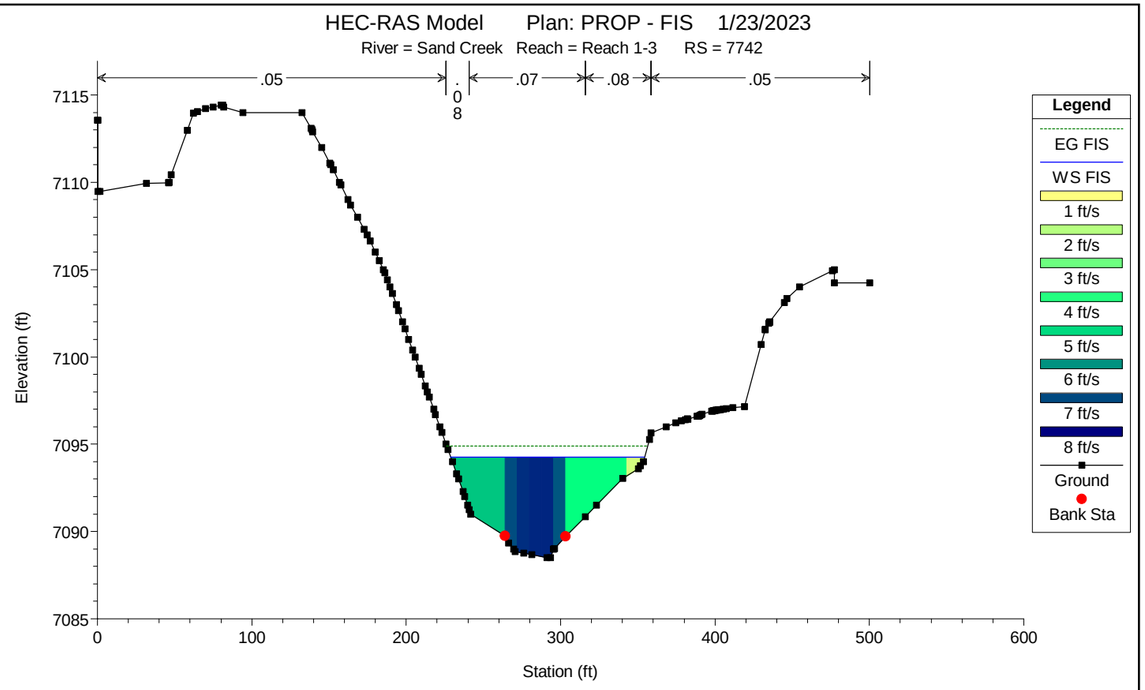

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 8074
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

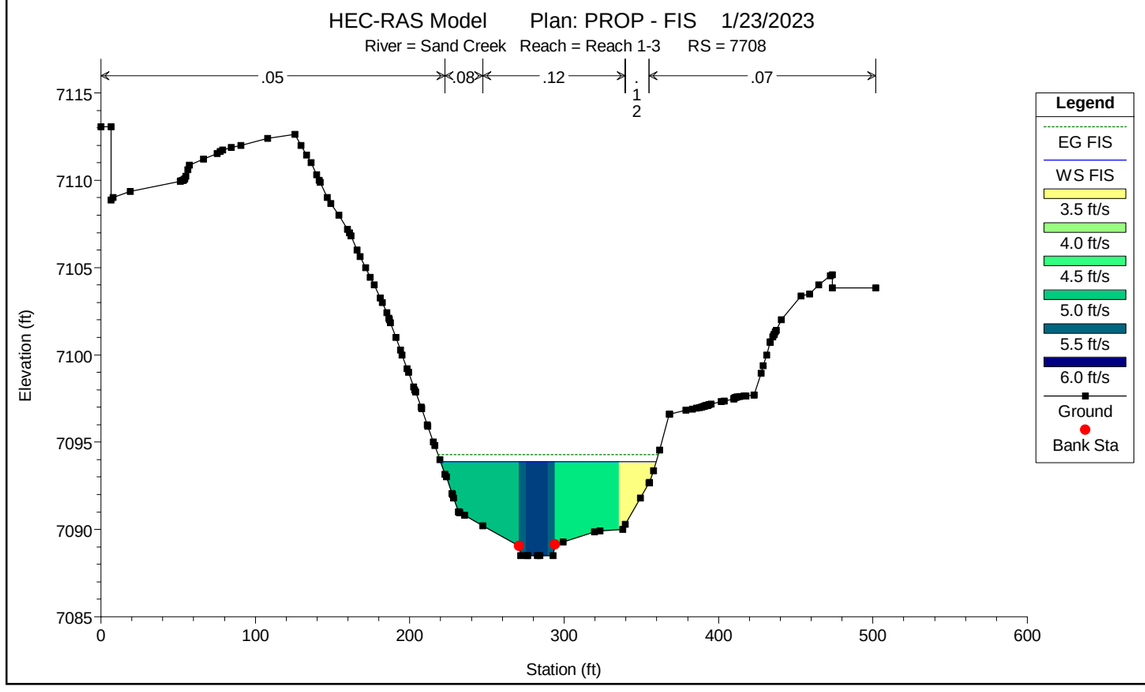

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7949 Culv Brairgate Parkway
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

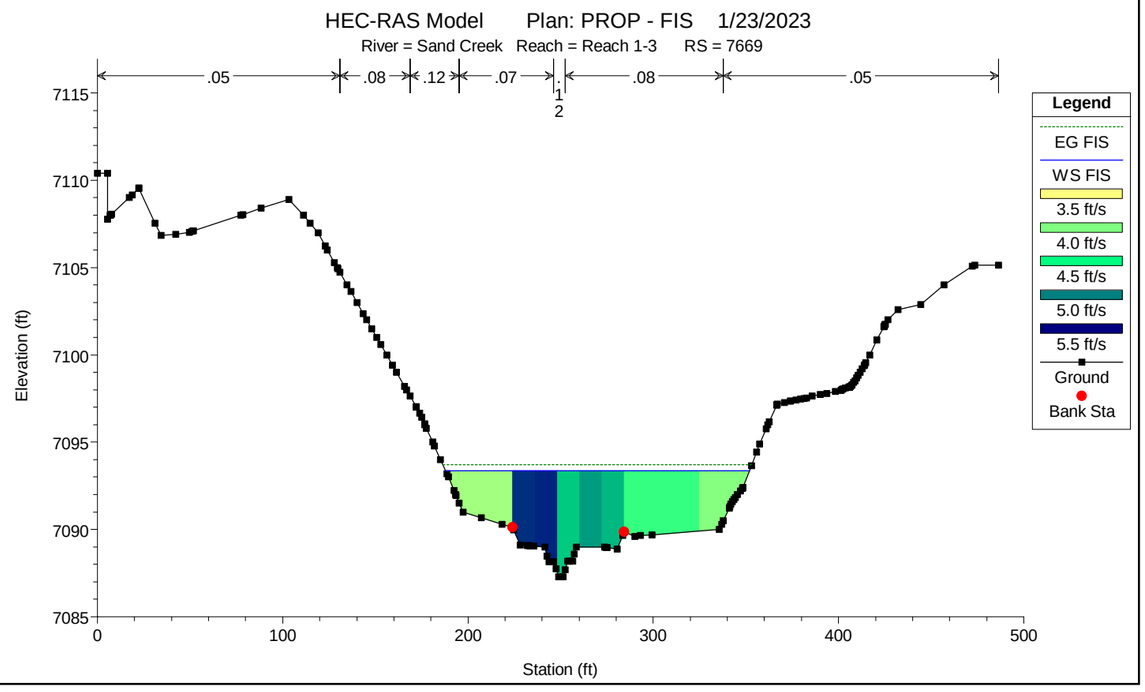

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7828 DS Of Briargate Parkway Culvert
.04
.027
0
4
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

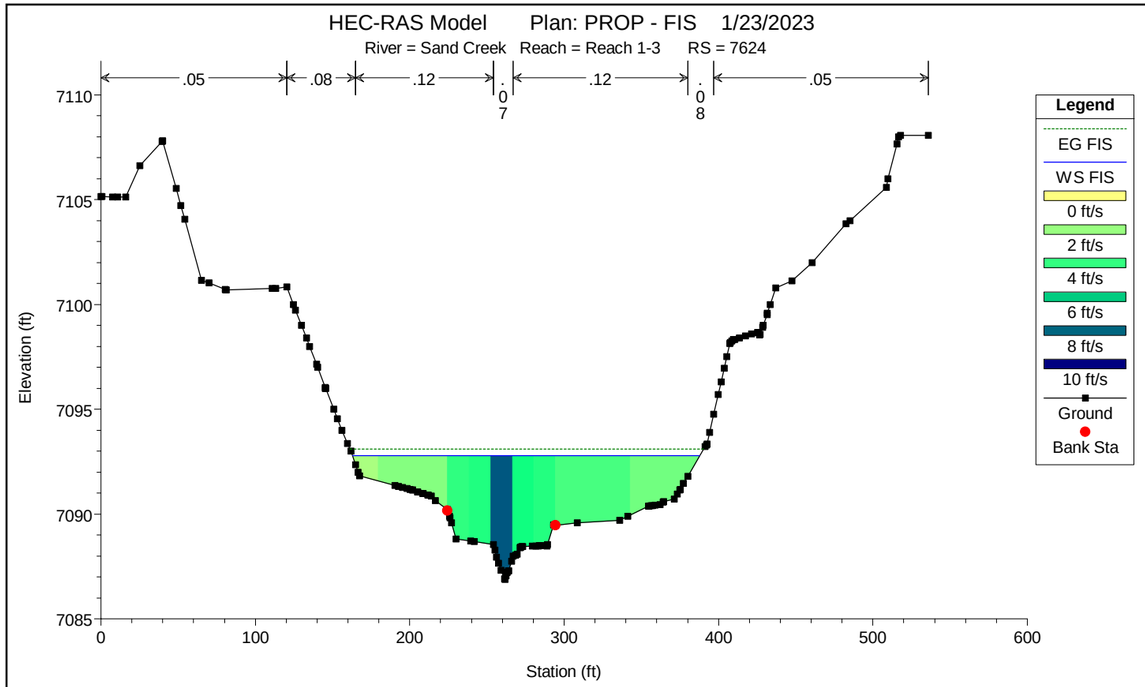

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7788
.05
.08
.07
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

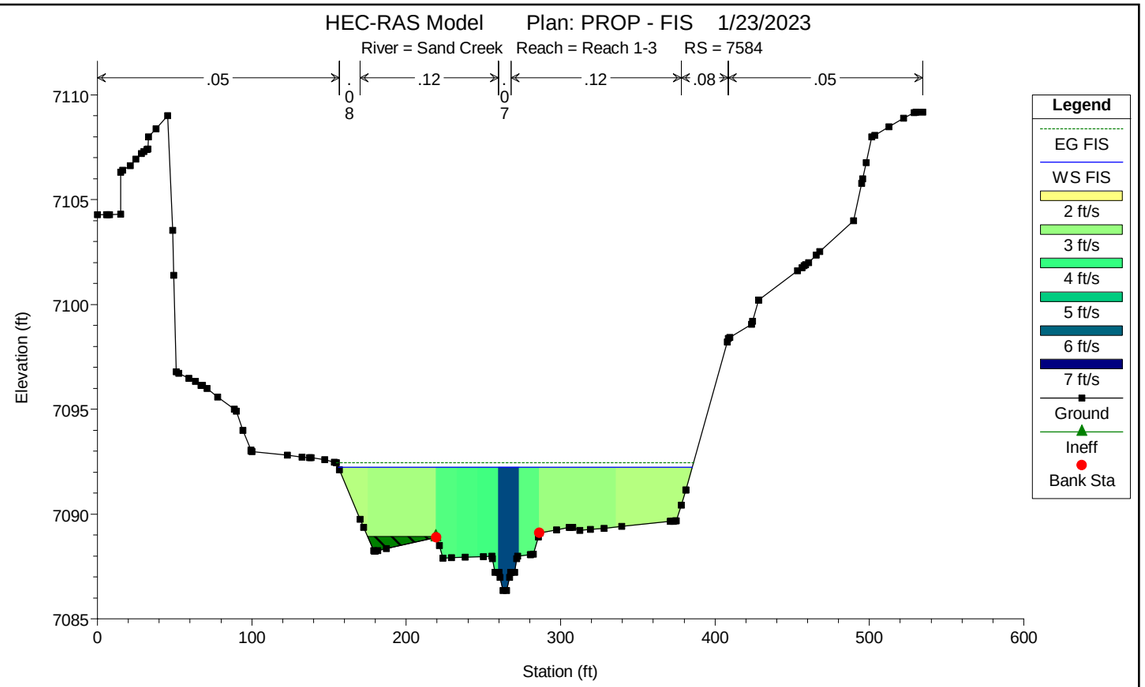

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7765
.05
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

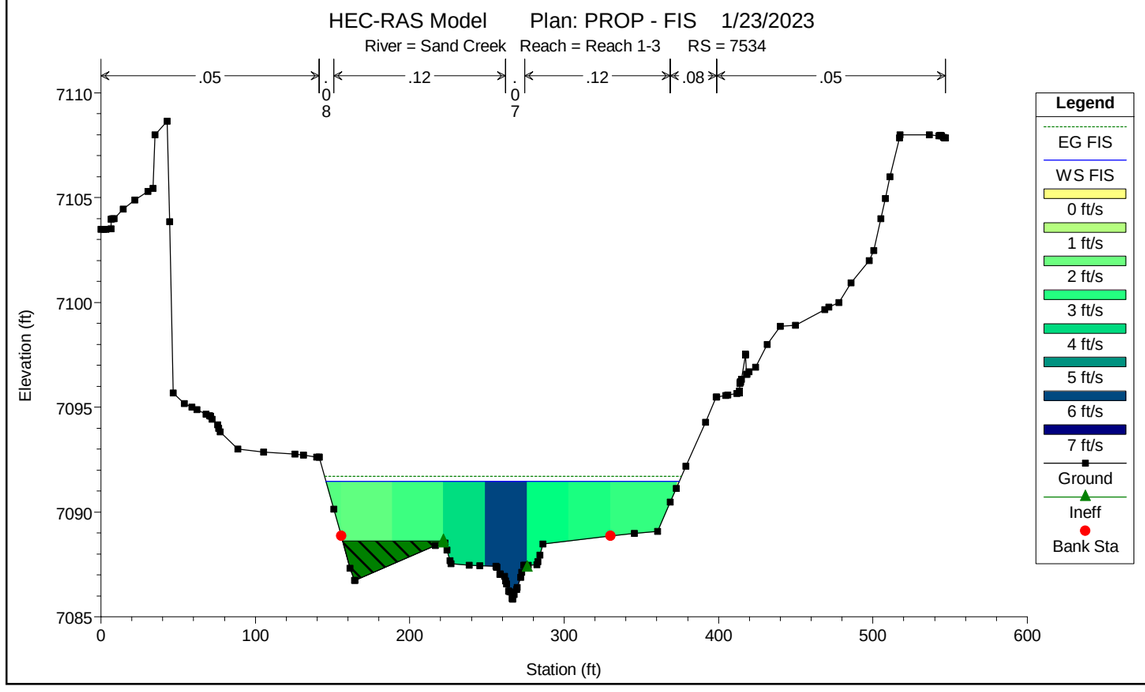

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7742
.05
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

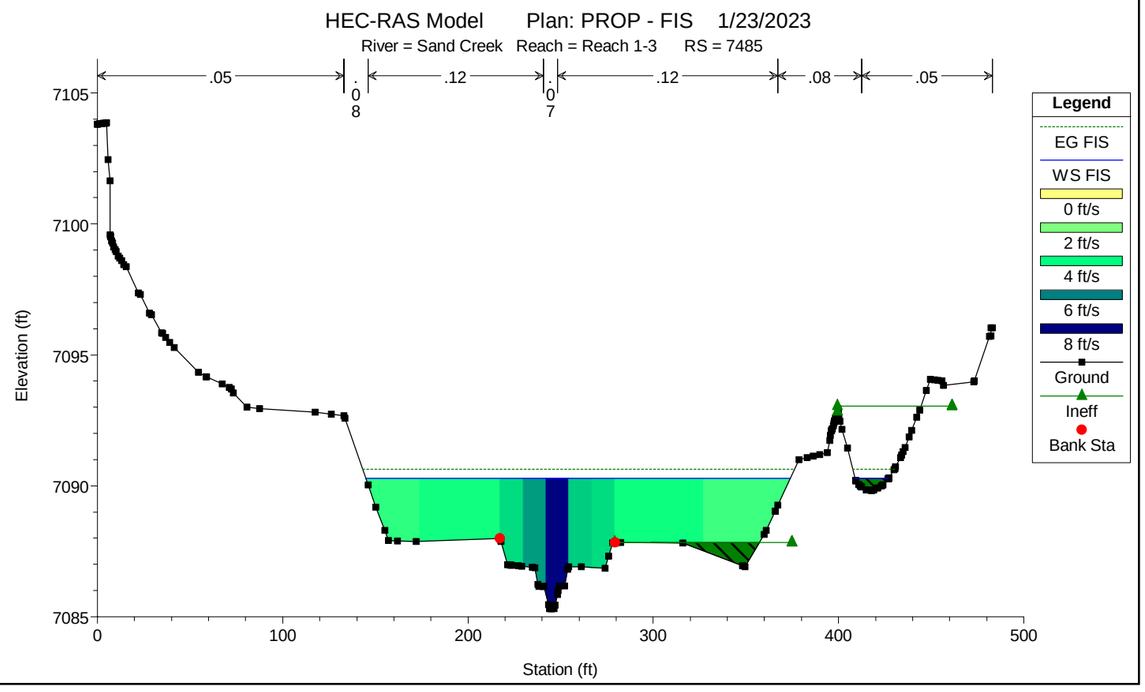

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7708
.05
.08
.12
.07
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
Ground
Bank Sta

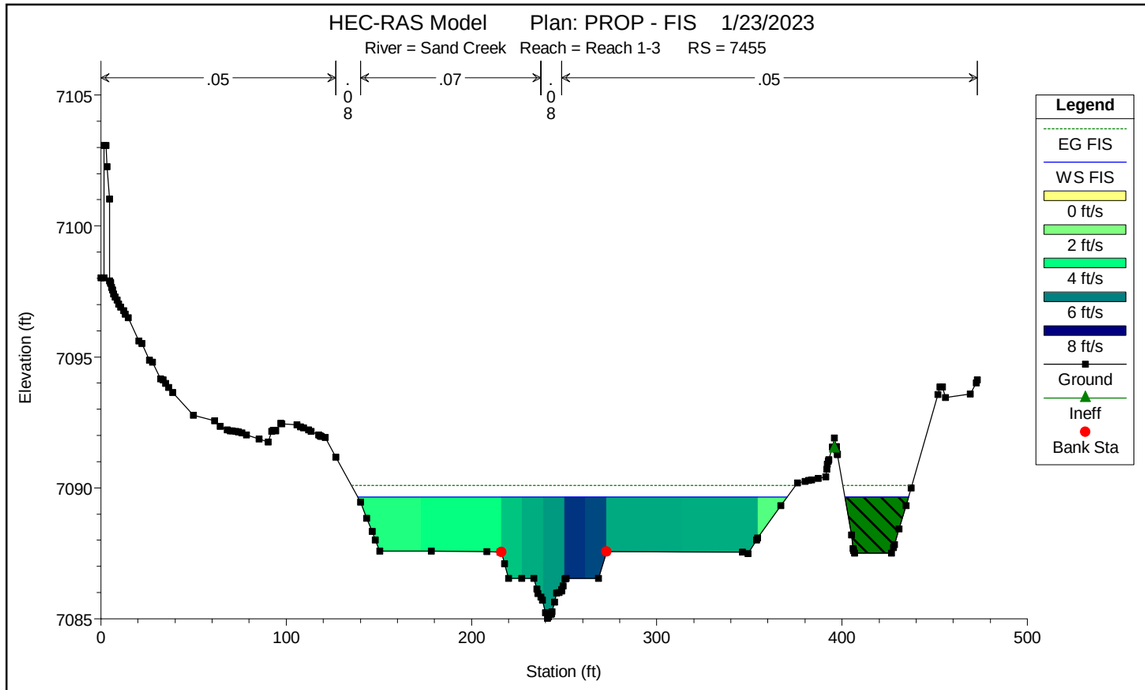

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7669
.05
.08
.12
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
Ground
Bank Sta

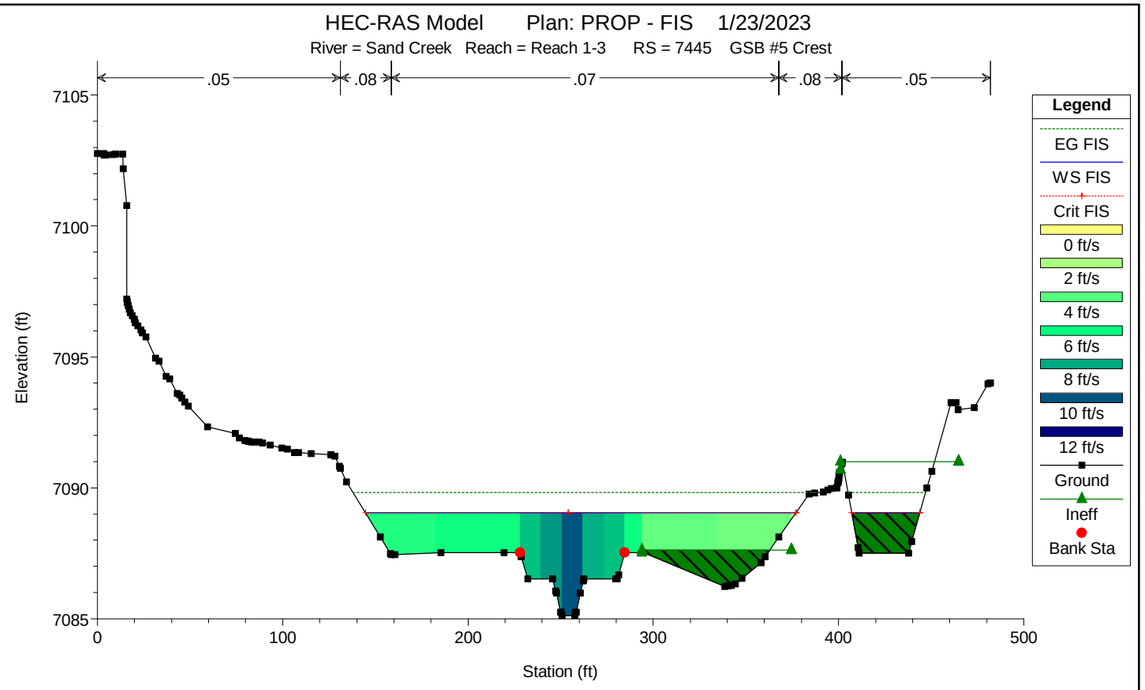

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7624
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

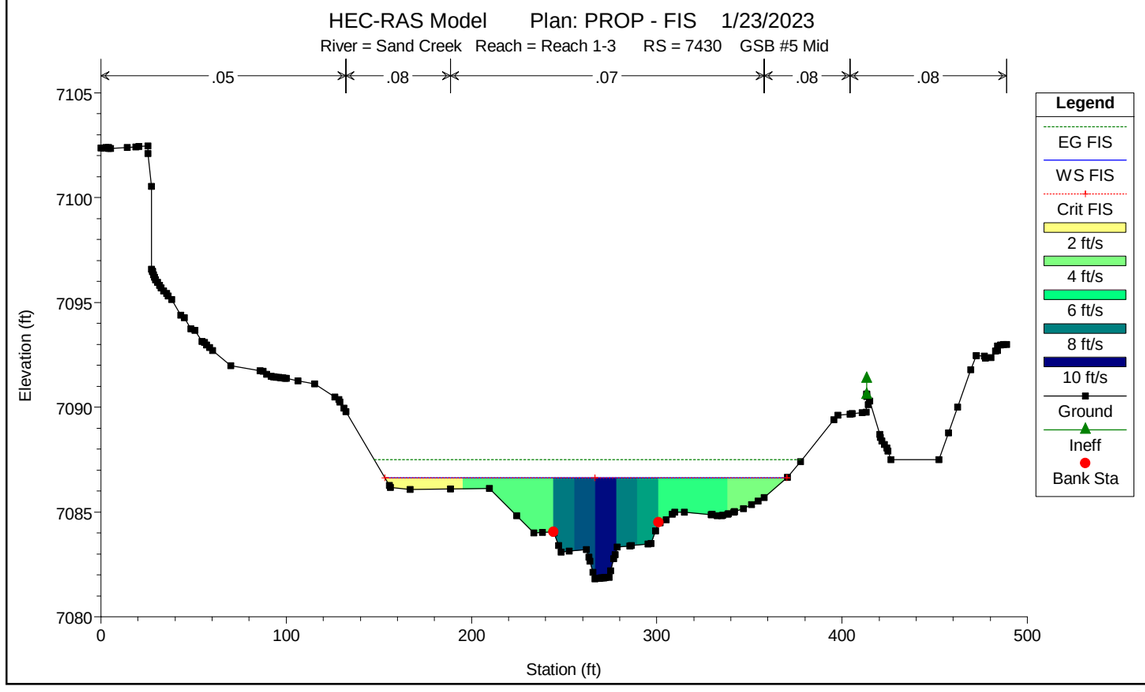

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7584
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta

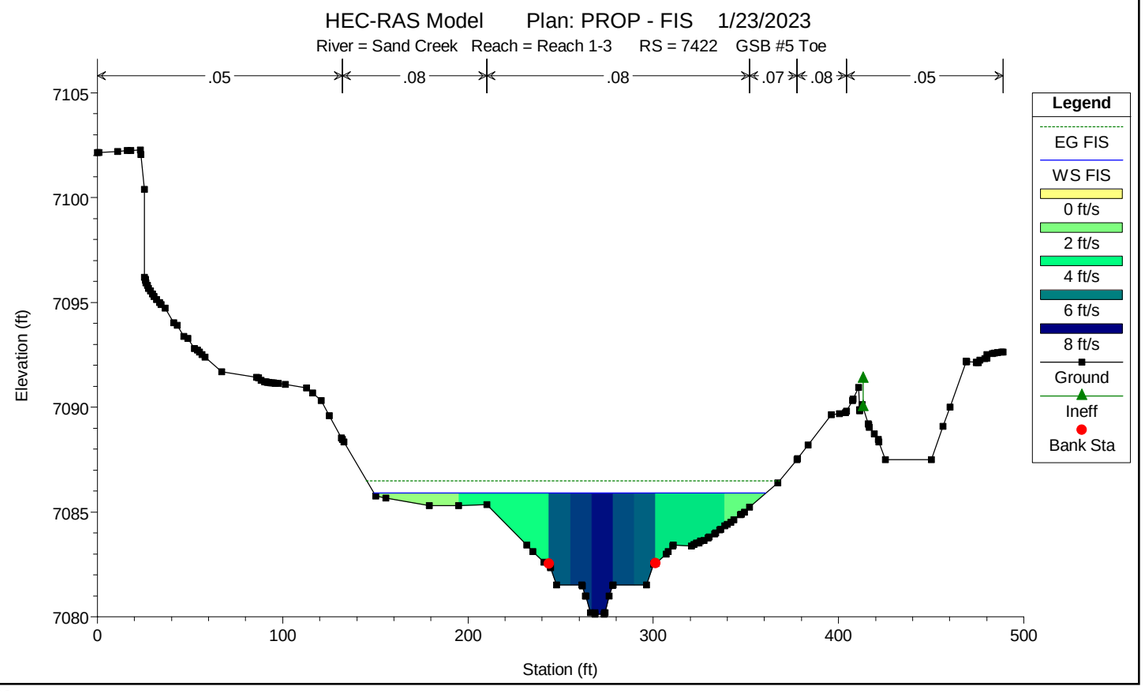

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7534
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta

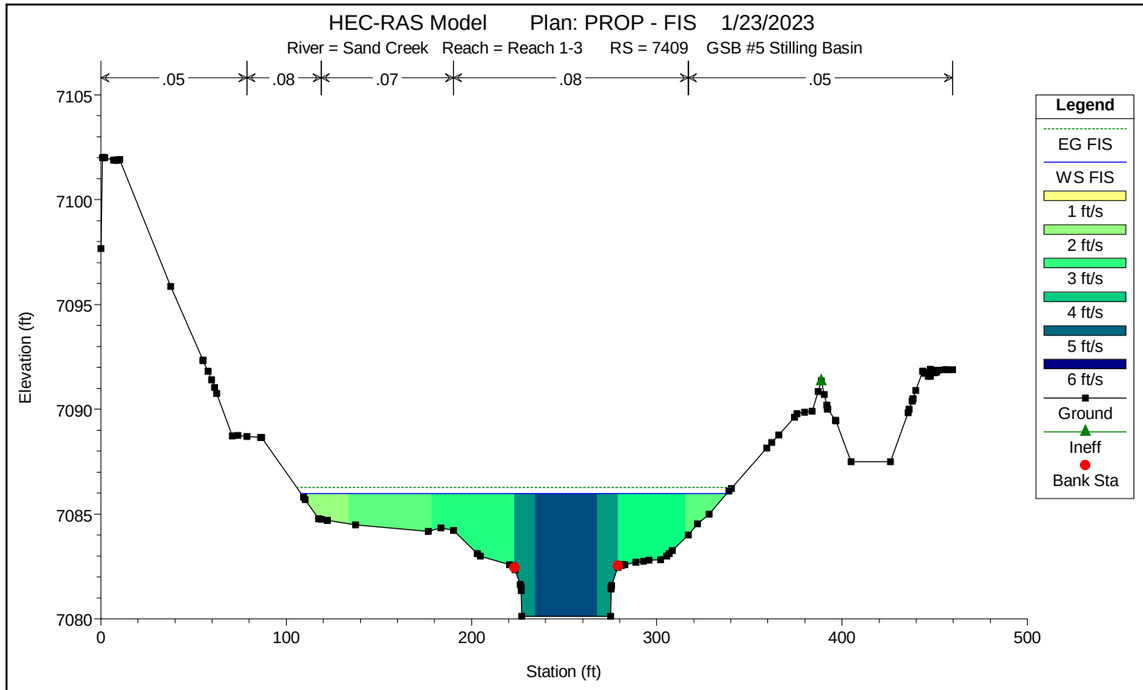

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7485
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

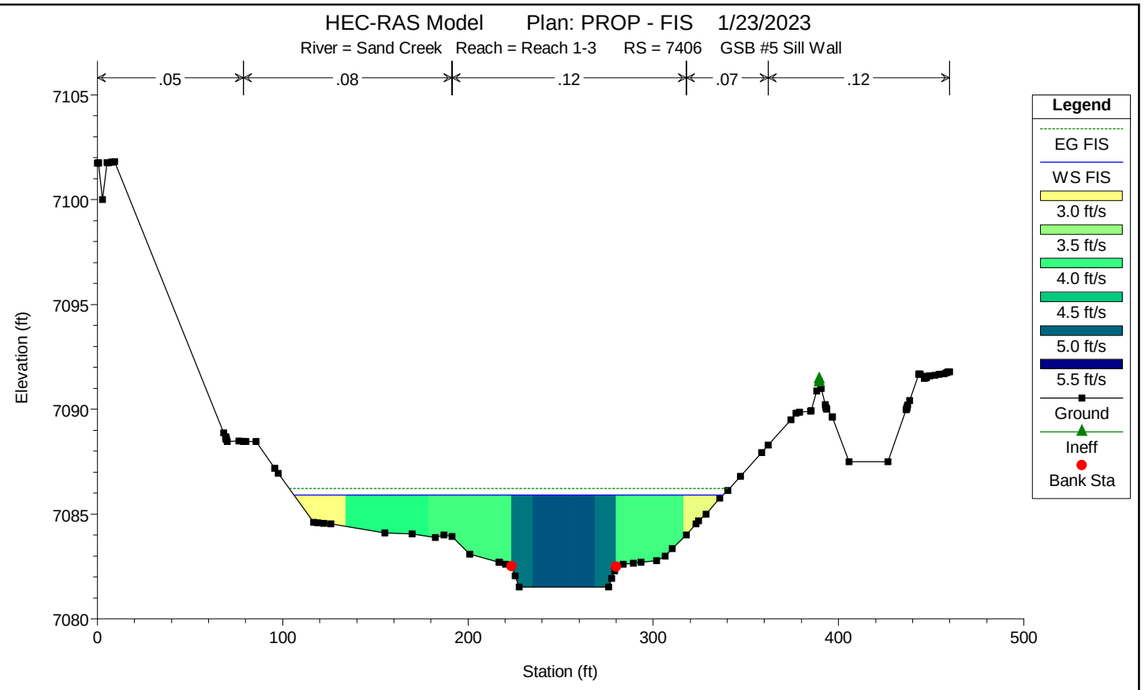

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7455
.05
.08
.07
.08
.05
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

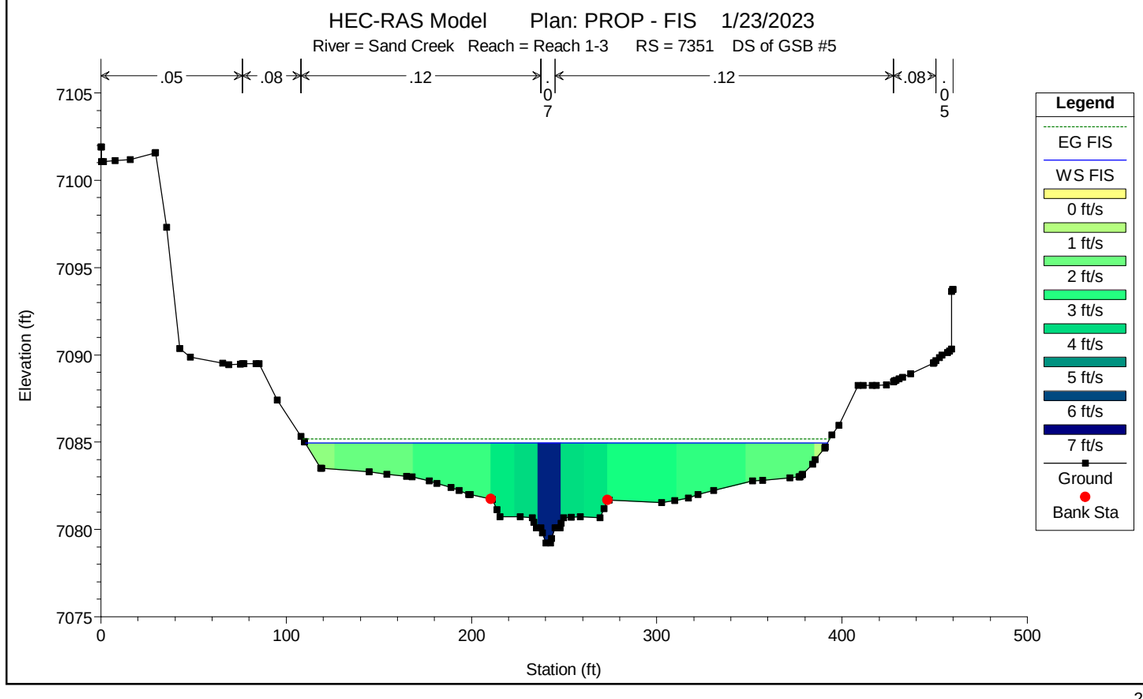

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7445 GSB #5 Crest
.05
.08
.07
.08
.05
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

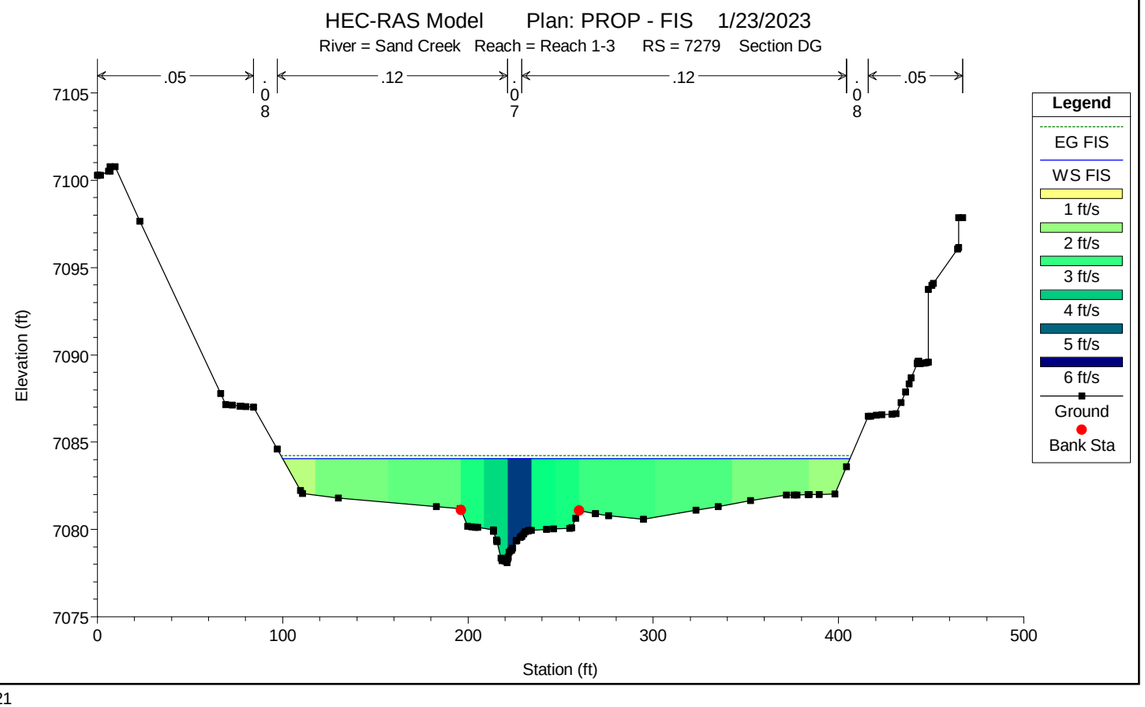

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7430 GSB #5 Mid
.05
.08
.07
.08
.08
Legend
EG FIS
WS FIS
Crit FIS
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

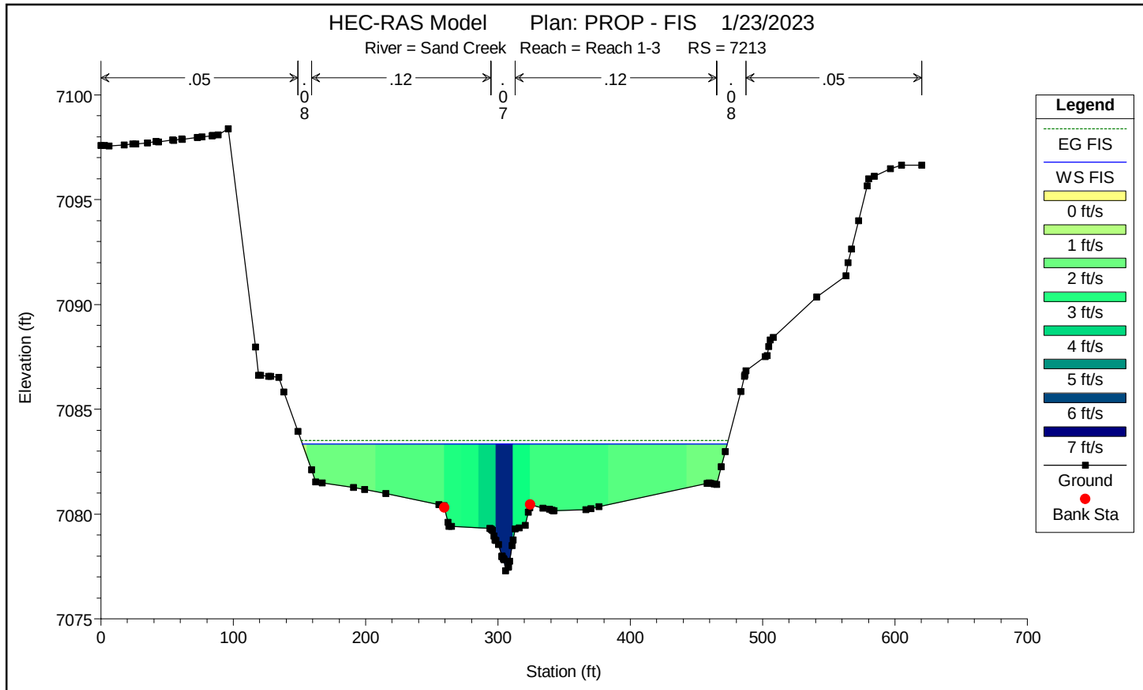

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7422 GSB #5 Toe
.05
.08
.08
.07
.08
.05
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

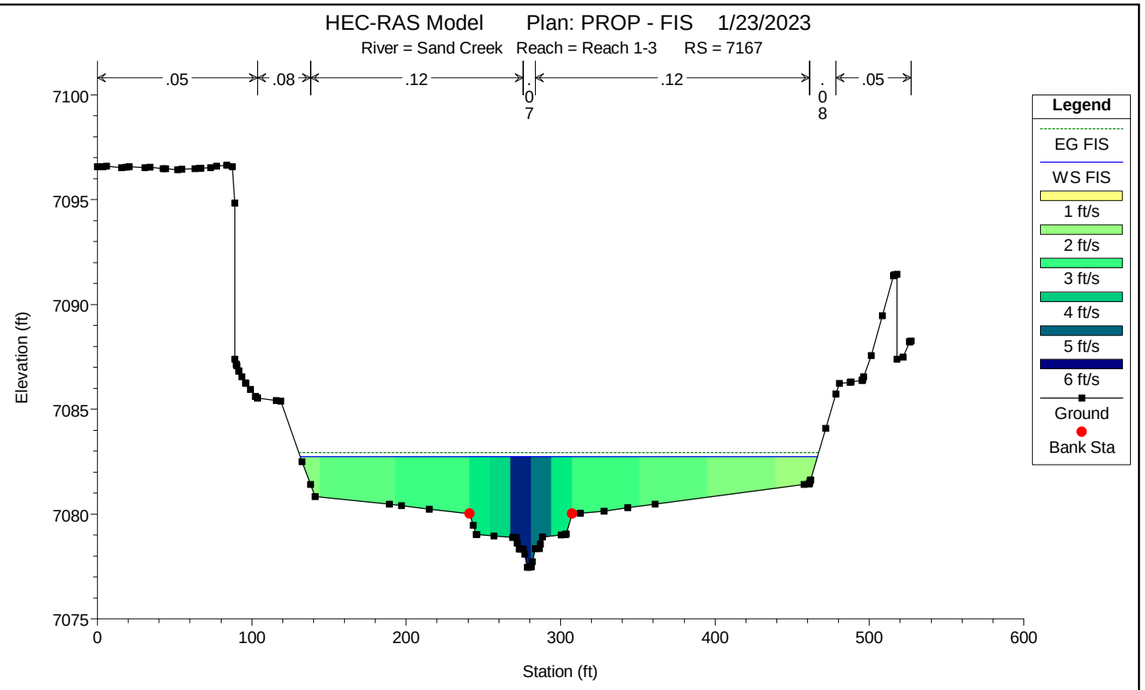

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7409 GSB #5 Stilling Basin
.05
.08
.07
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

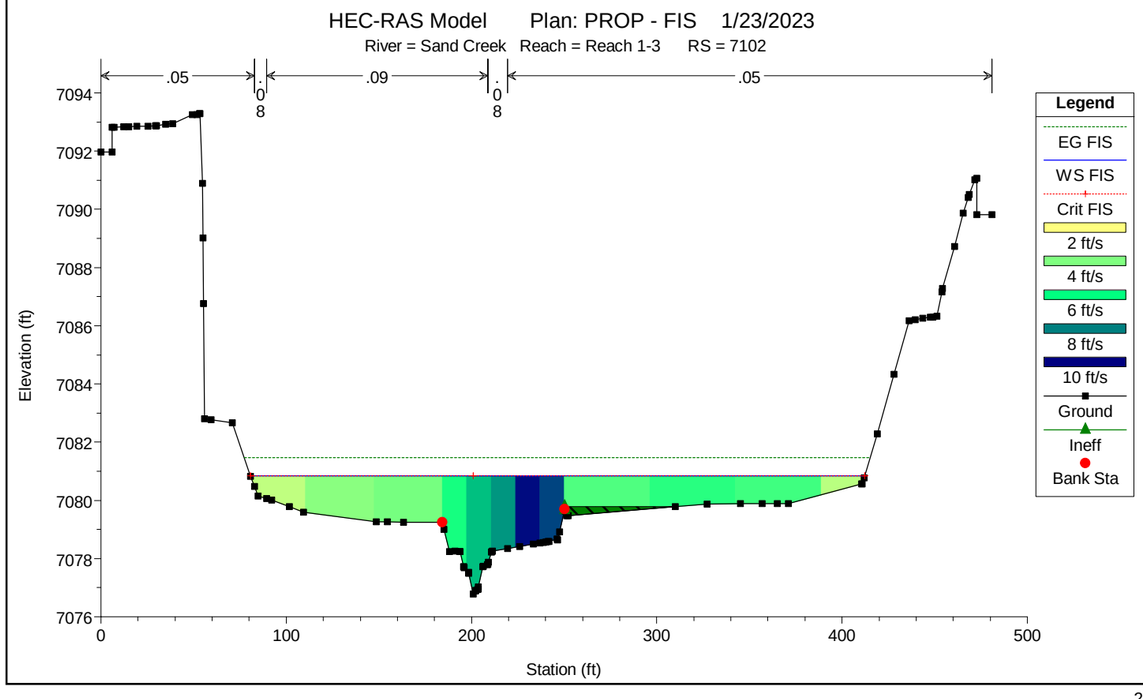

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7406 GSB #5 Sill Wall
.05
.08
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
Ground
Ineff
Bank Sta

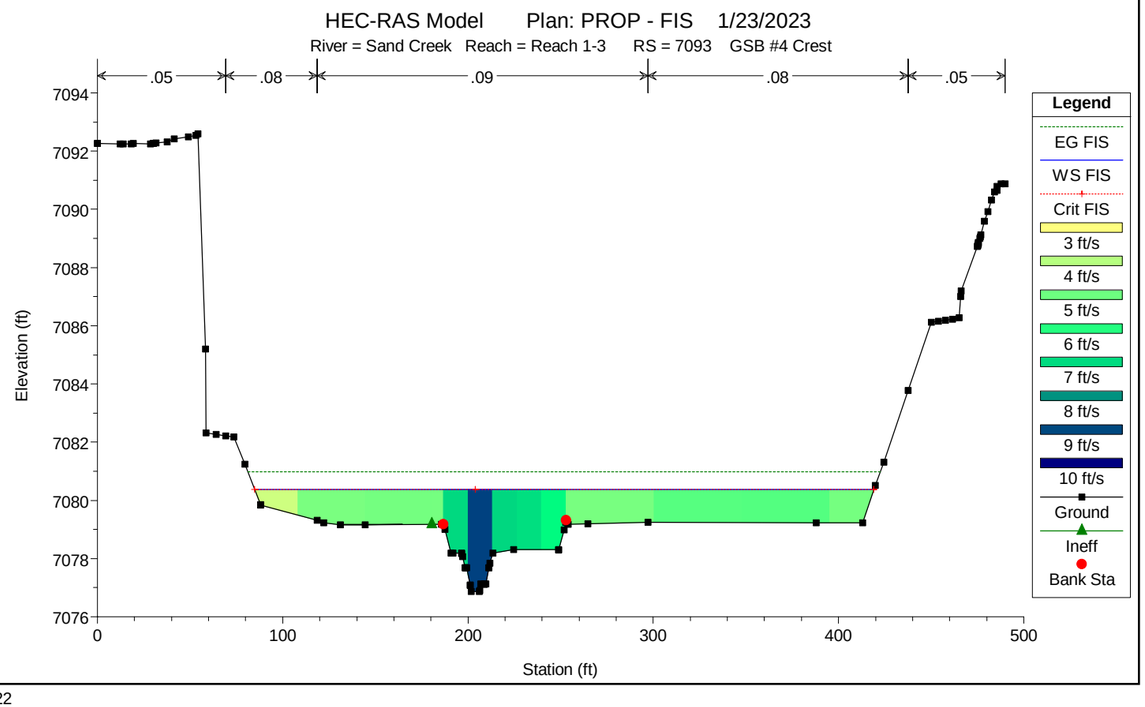

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7351 DS of GSB #5
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

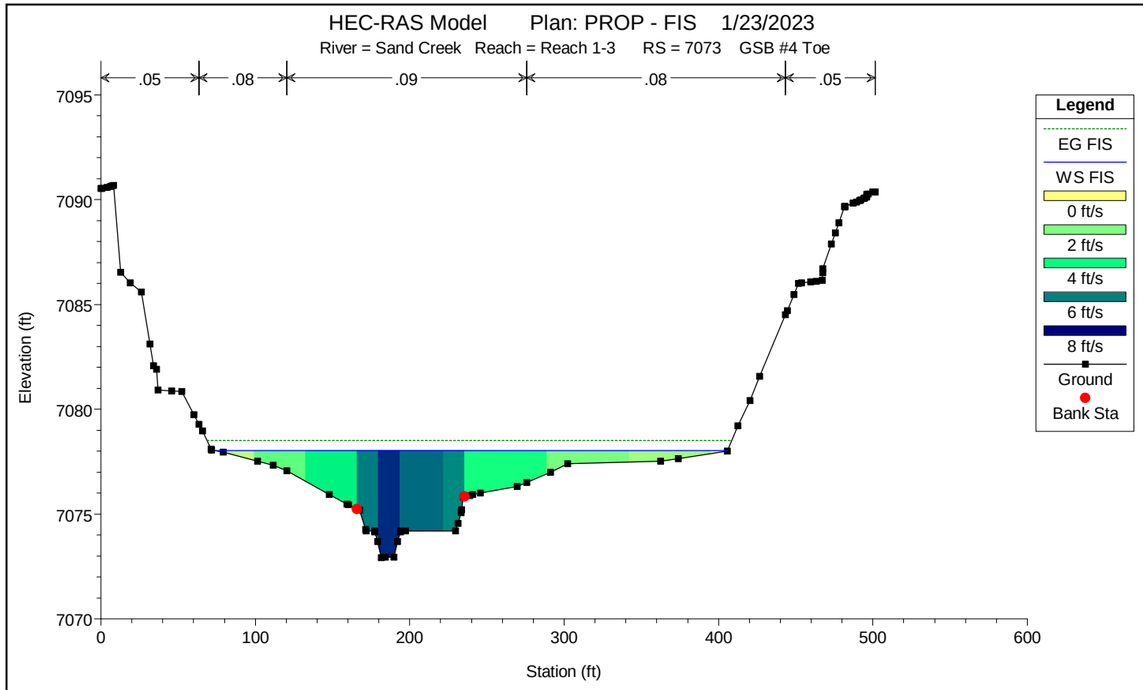

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7279 Section DG
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

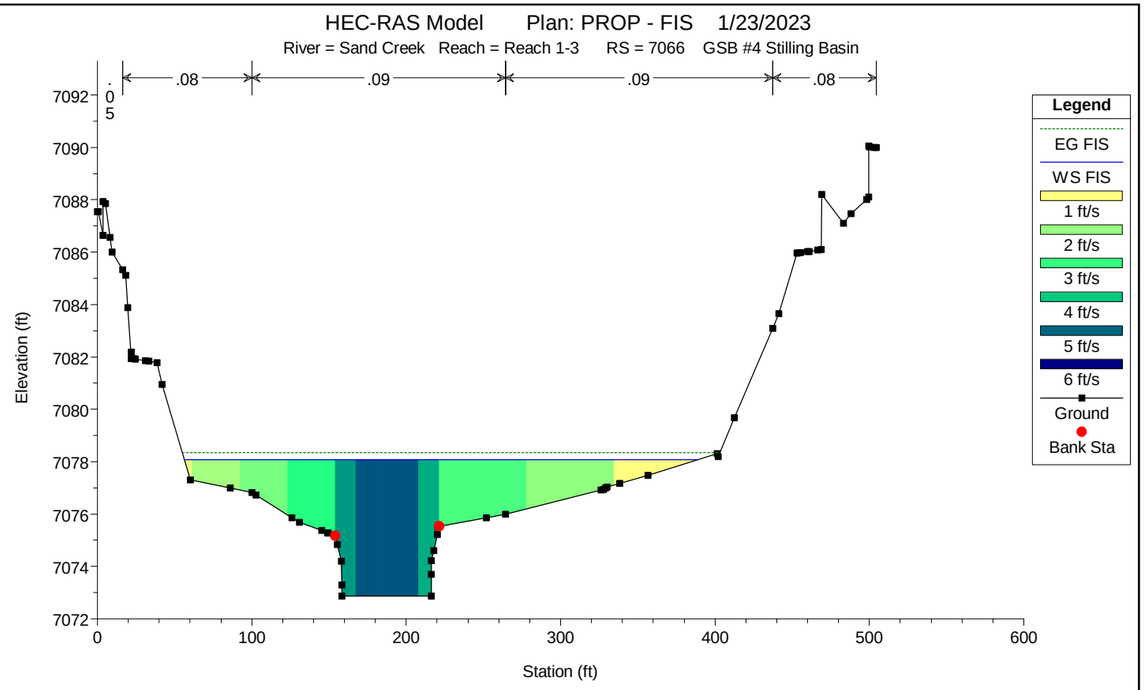

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7213
.05
.12
.12
.05
.08
.07
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

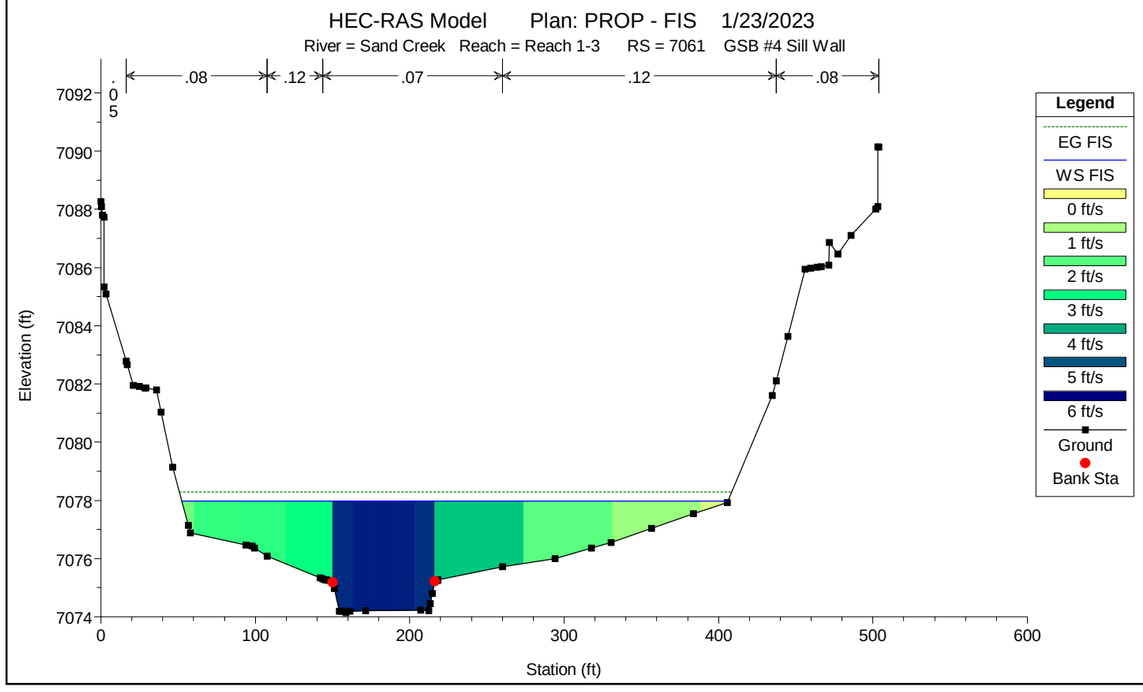

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7167
.05
.08
.12
.12
.05
.07
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

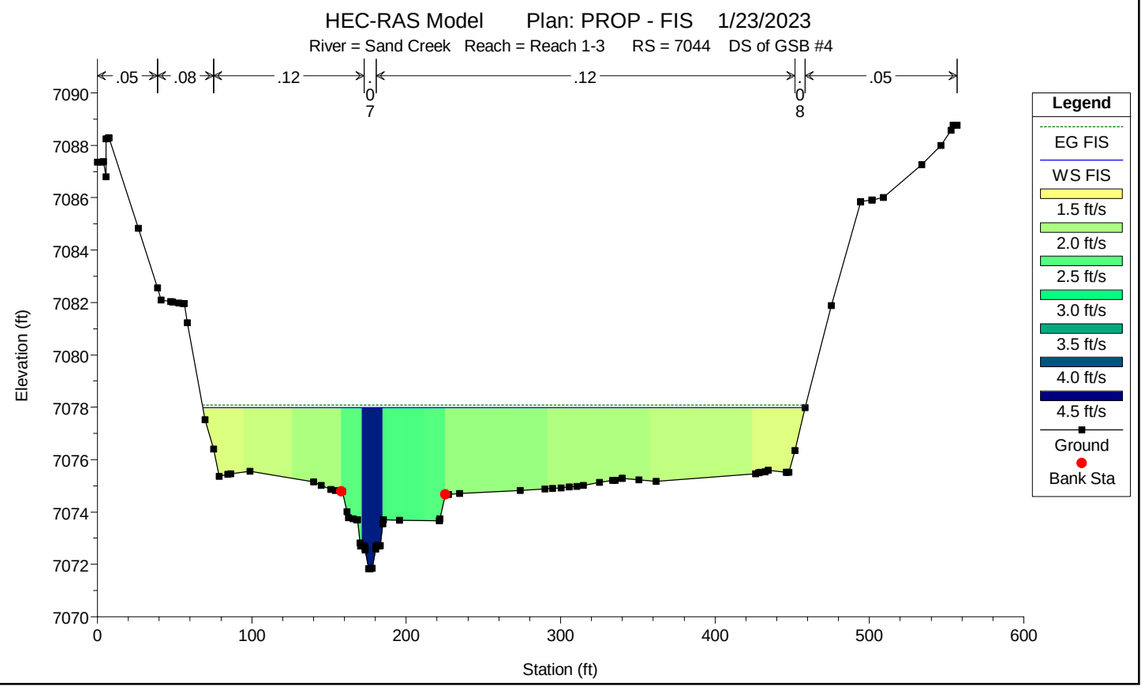

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7102
.05
.09
.05
.08
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

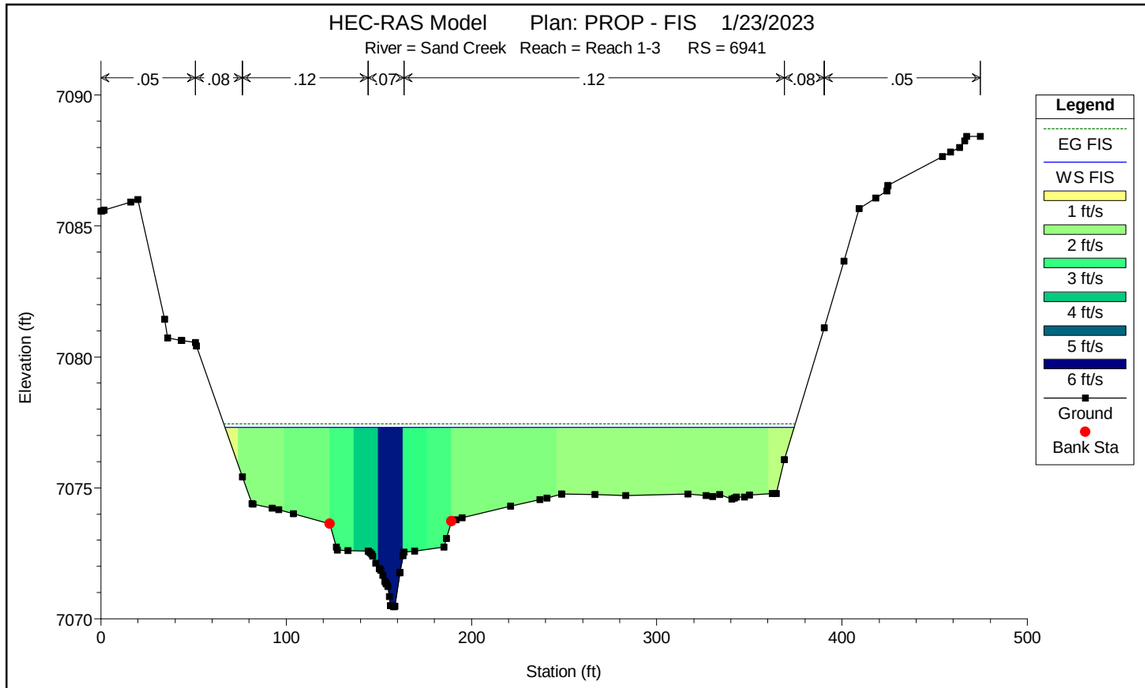

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7093 GSB #4 Crest
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Ineff
Bank Sta

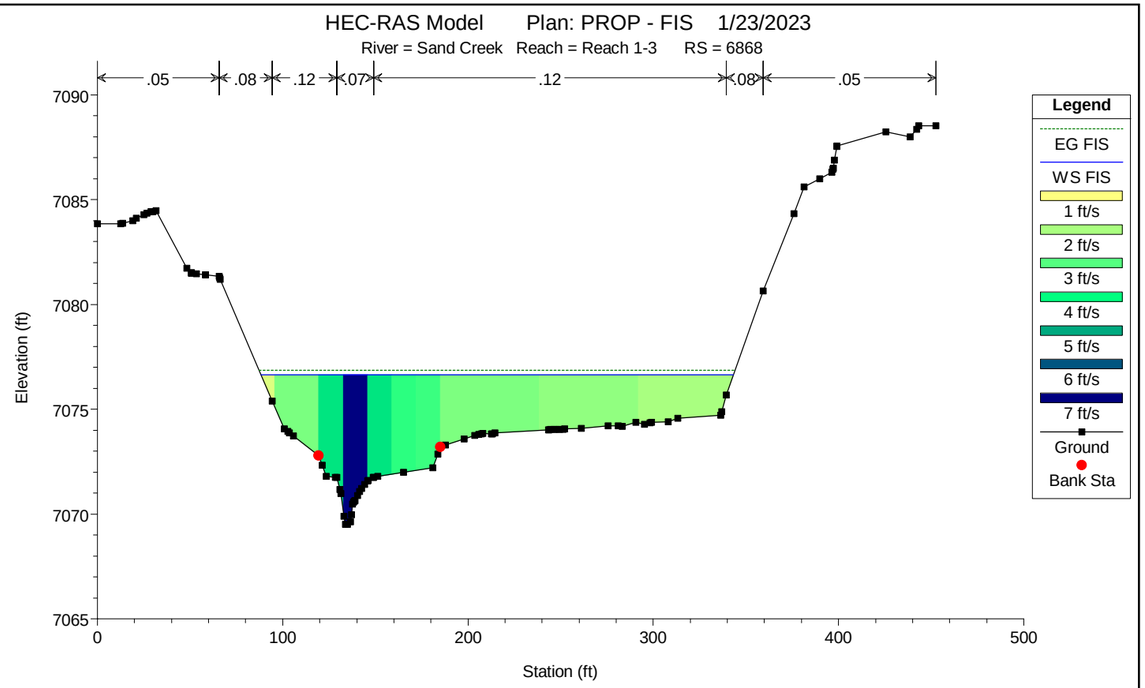

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7073 GSB #4 Toe
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

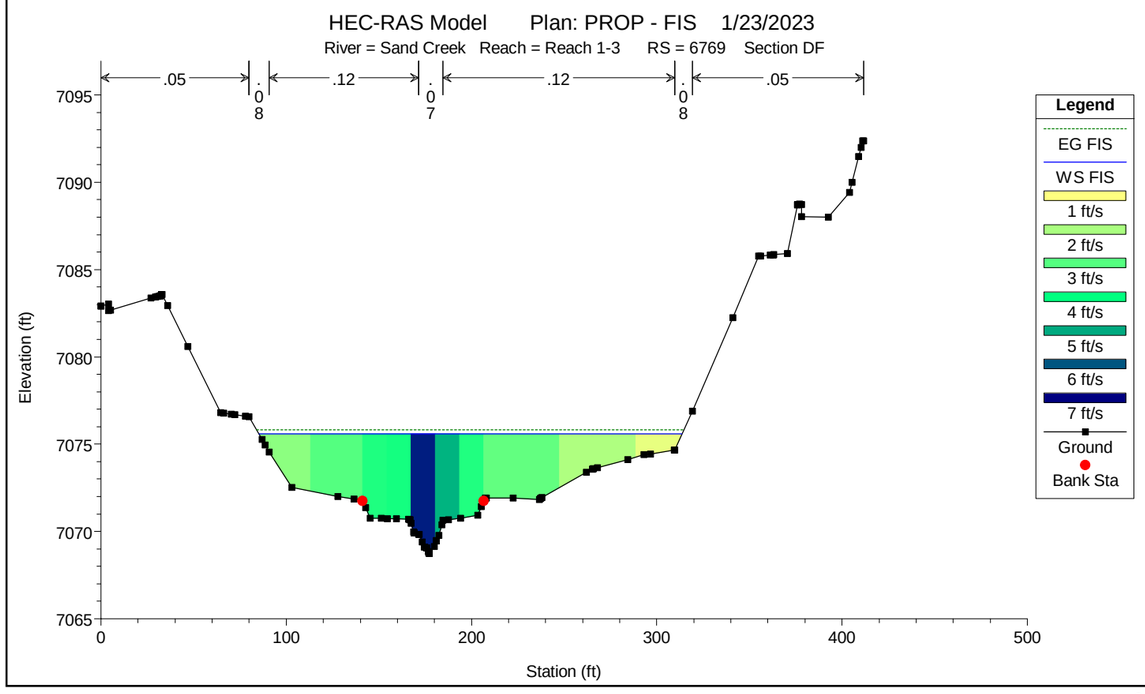

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7066 GSB #4 Stilling Basin
.05
.08
.09
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

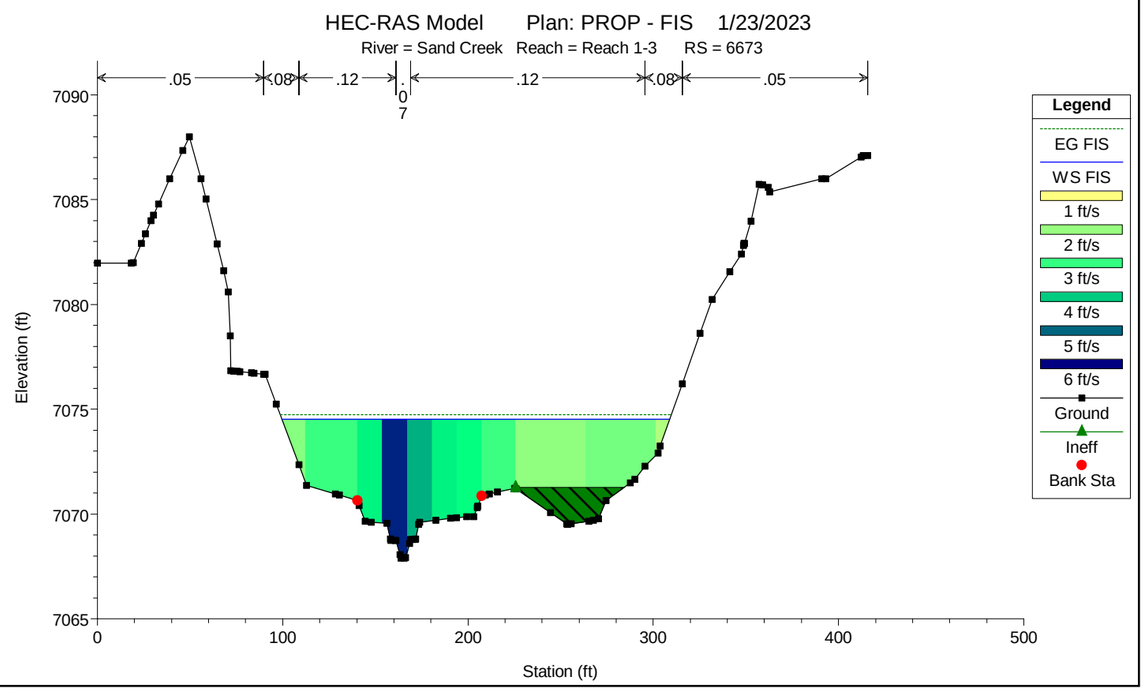

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7061 GSB #4 Sill Wall
.05
.08
.12
.07
.12
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

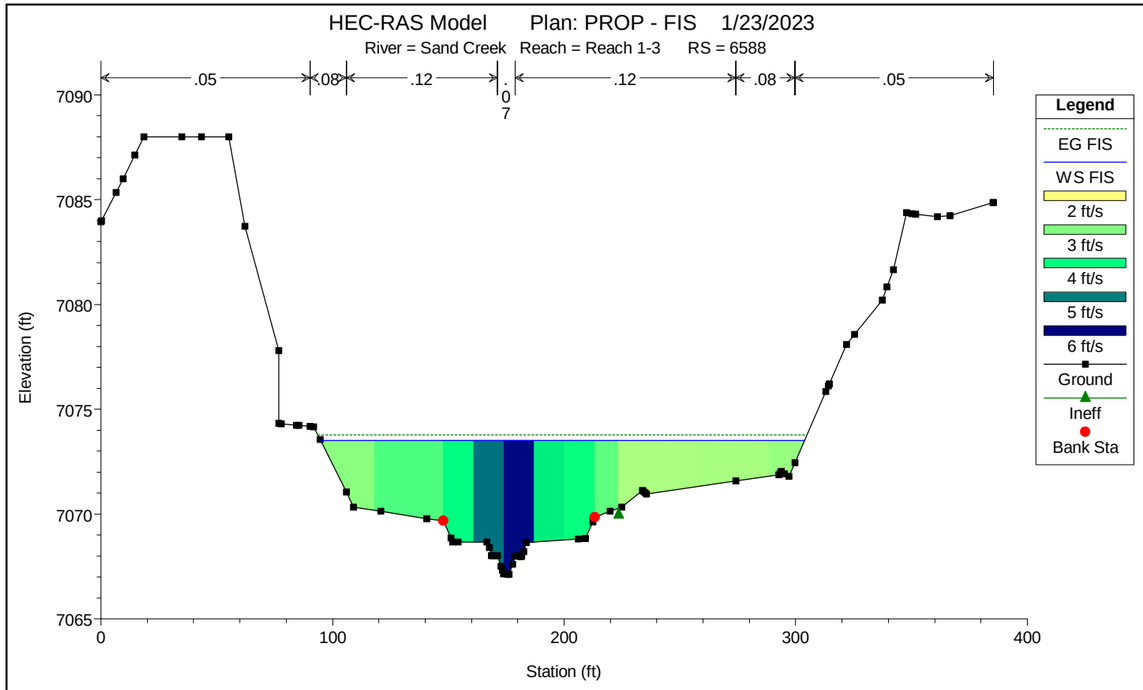

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 7044 DS of GSB #4
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

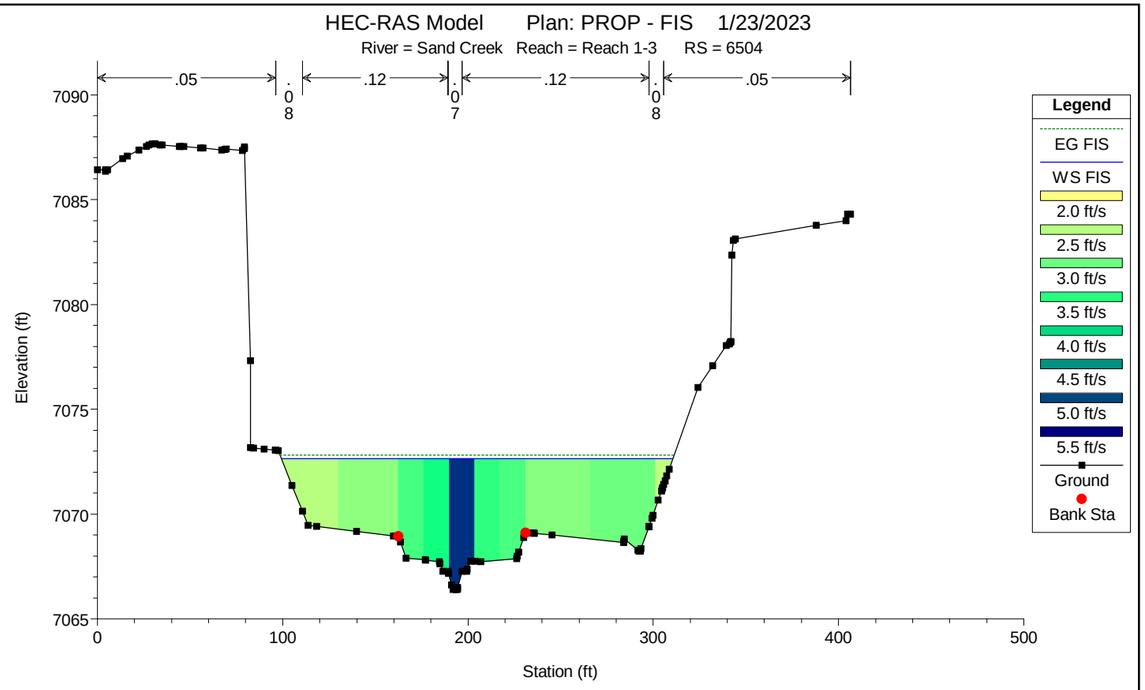

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6941
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

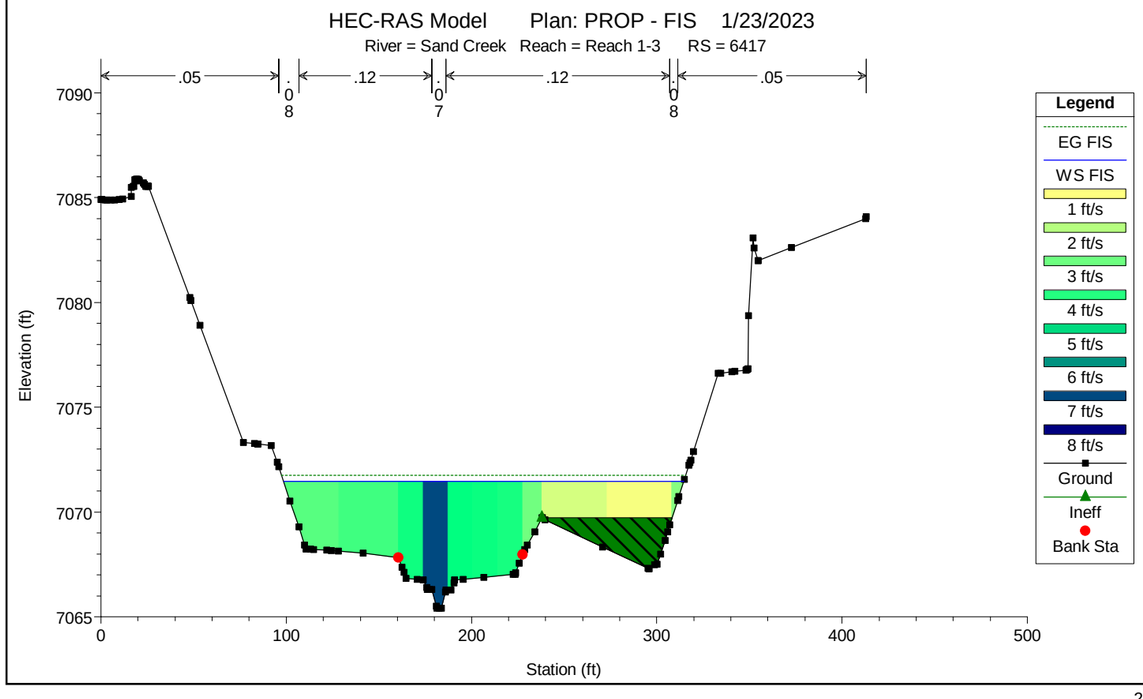

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6868
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

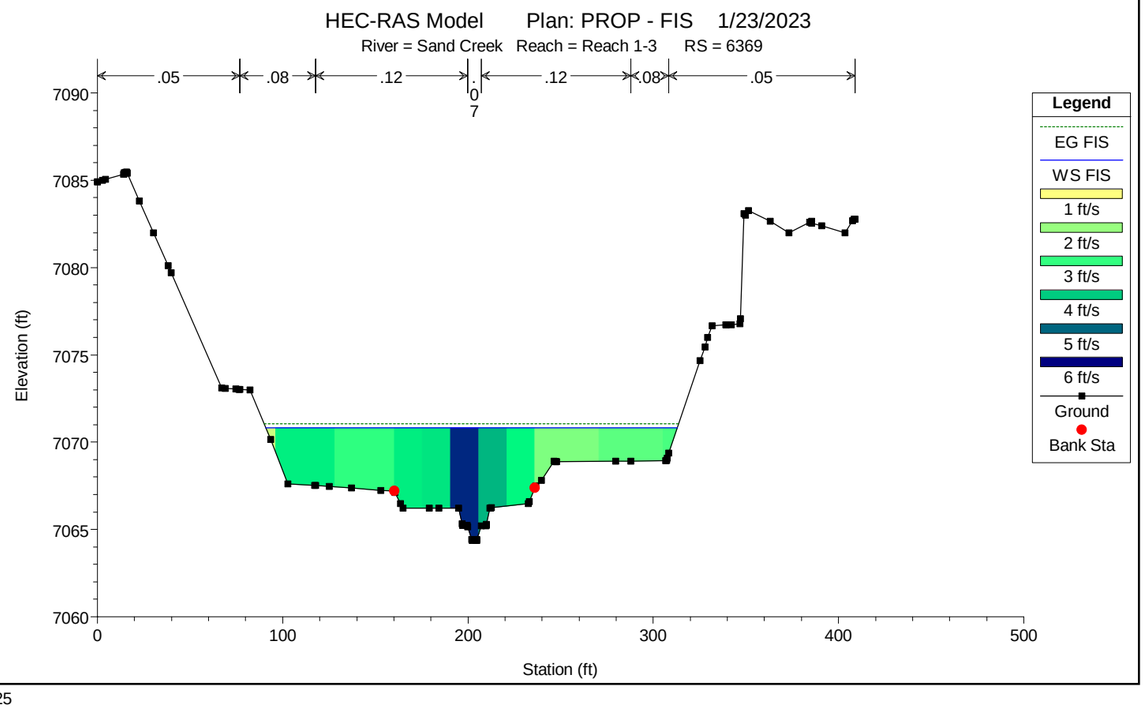

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6769 Section DF
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

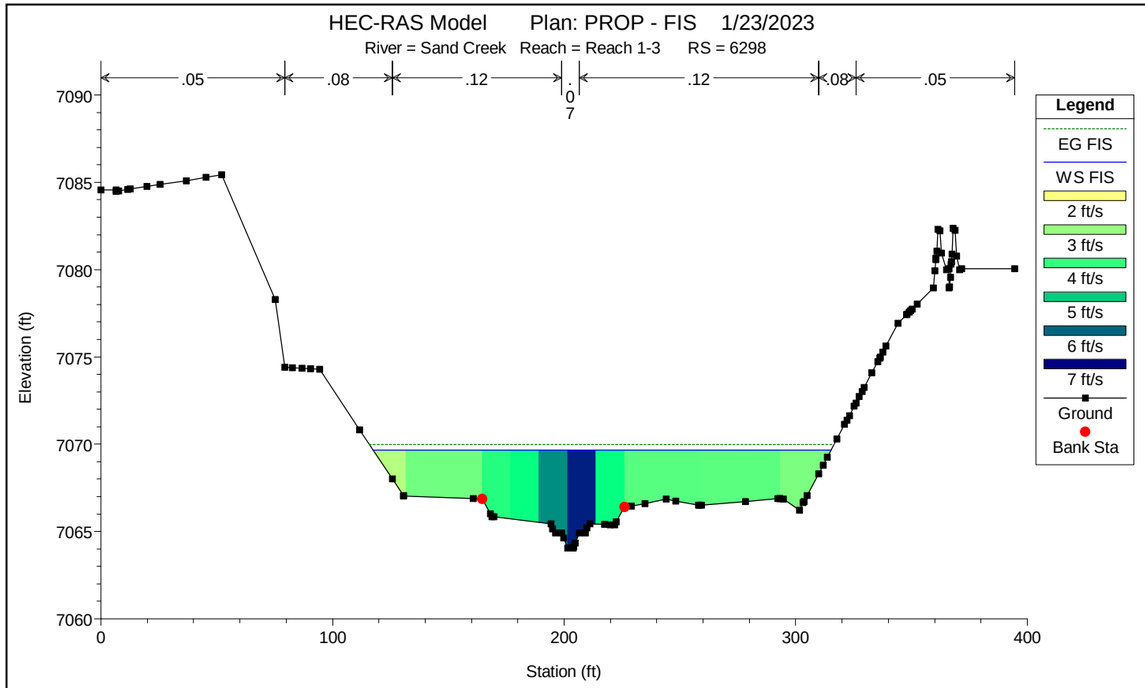

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6673
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

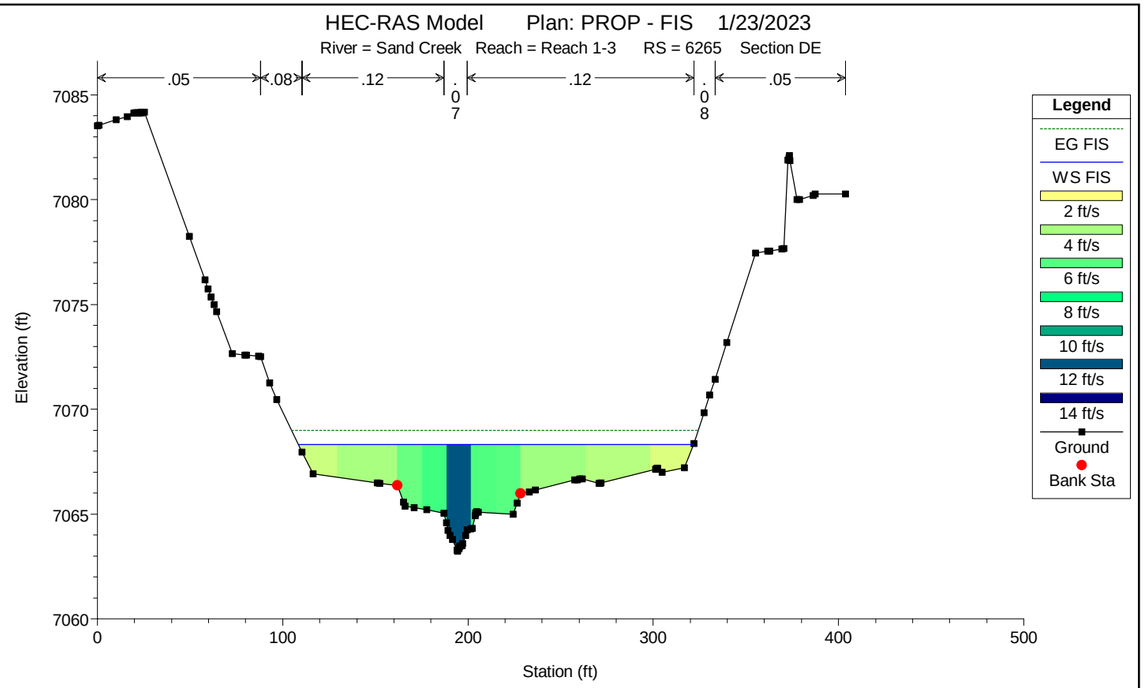

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6588
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

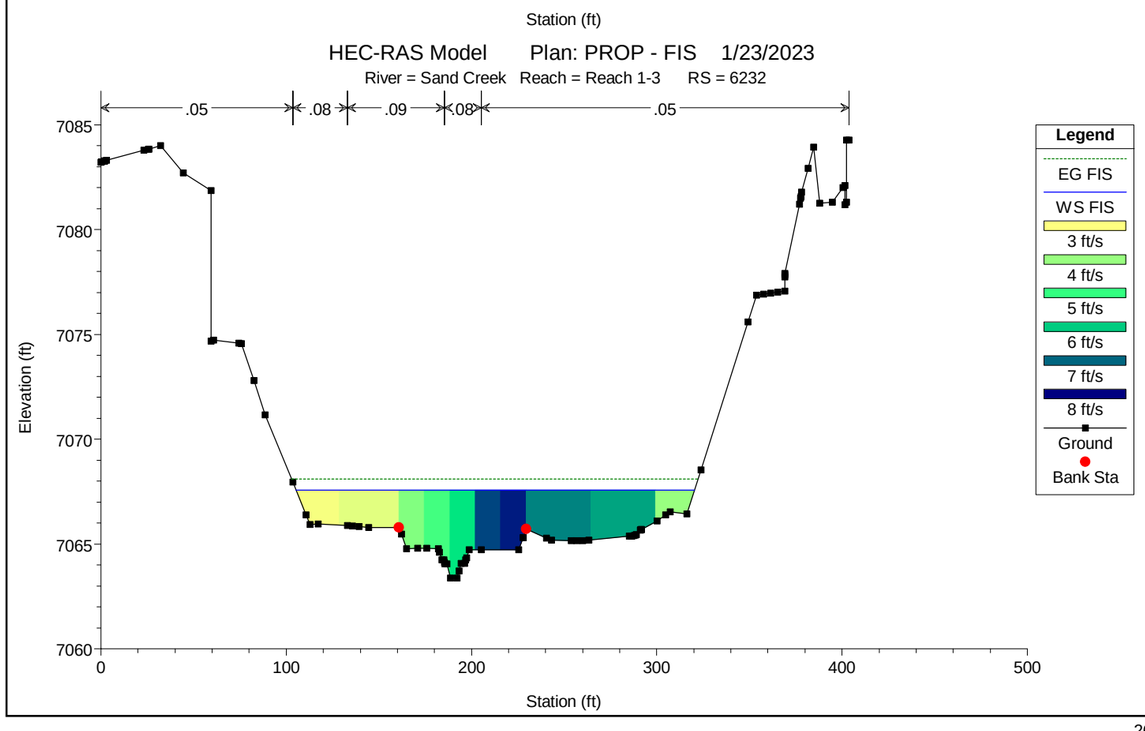

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6504
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
Ground
Bank Sta

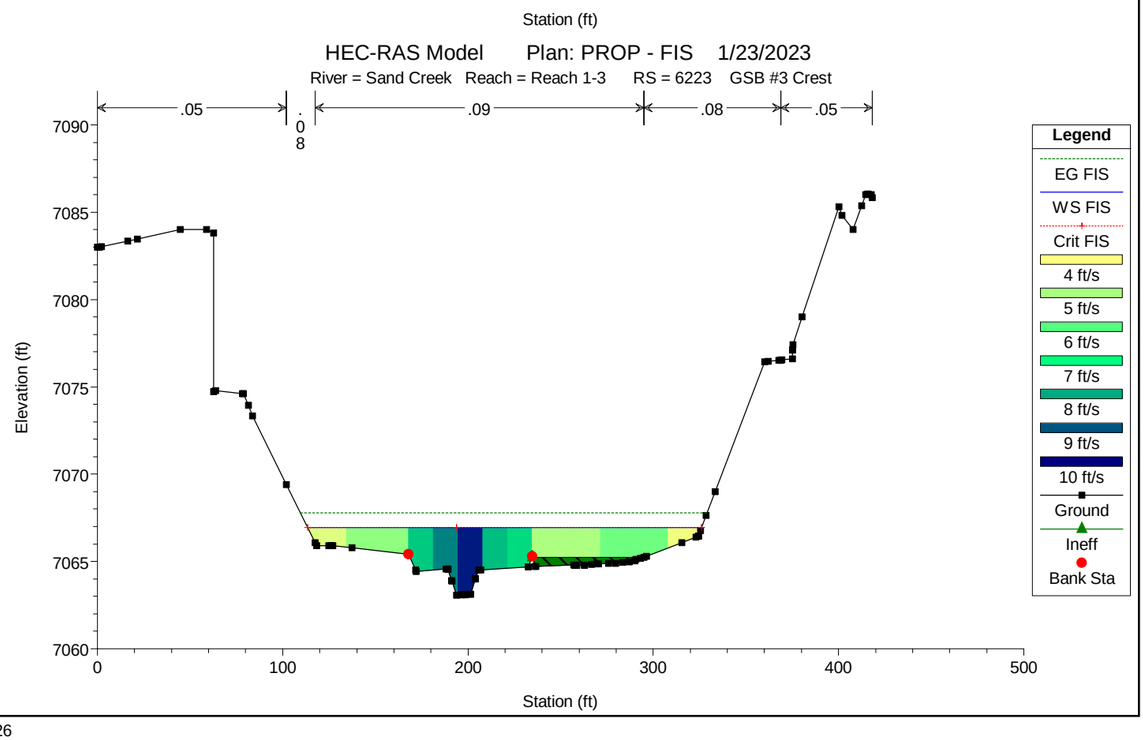

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6417
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta

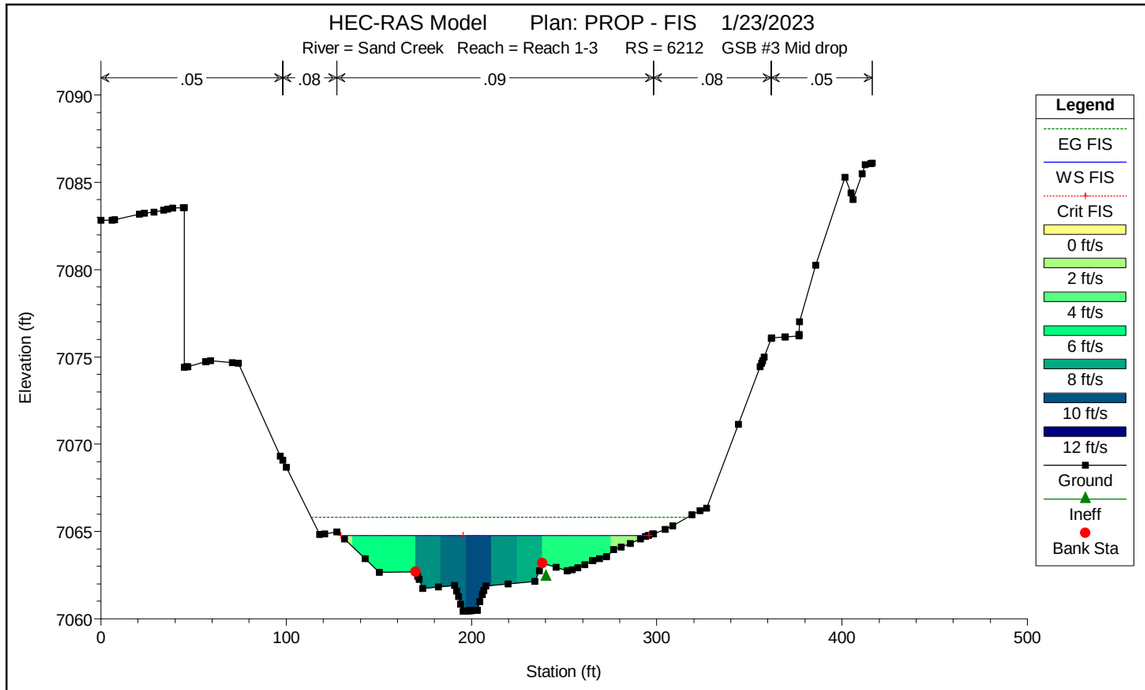

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6369
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

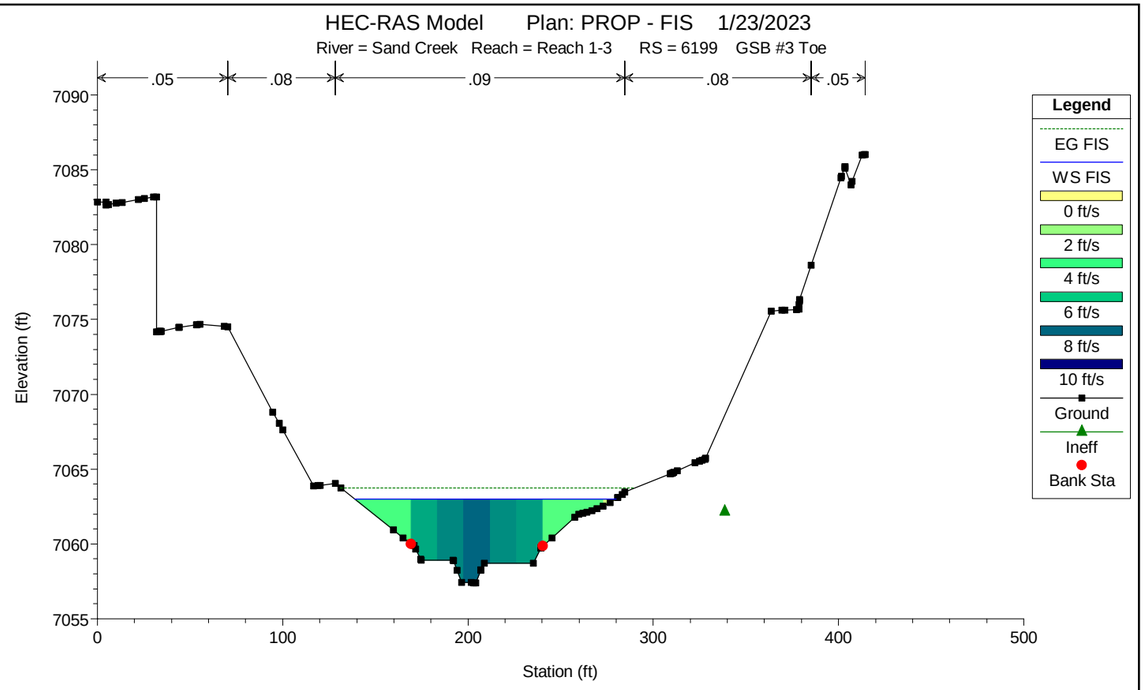

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6298
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

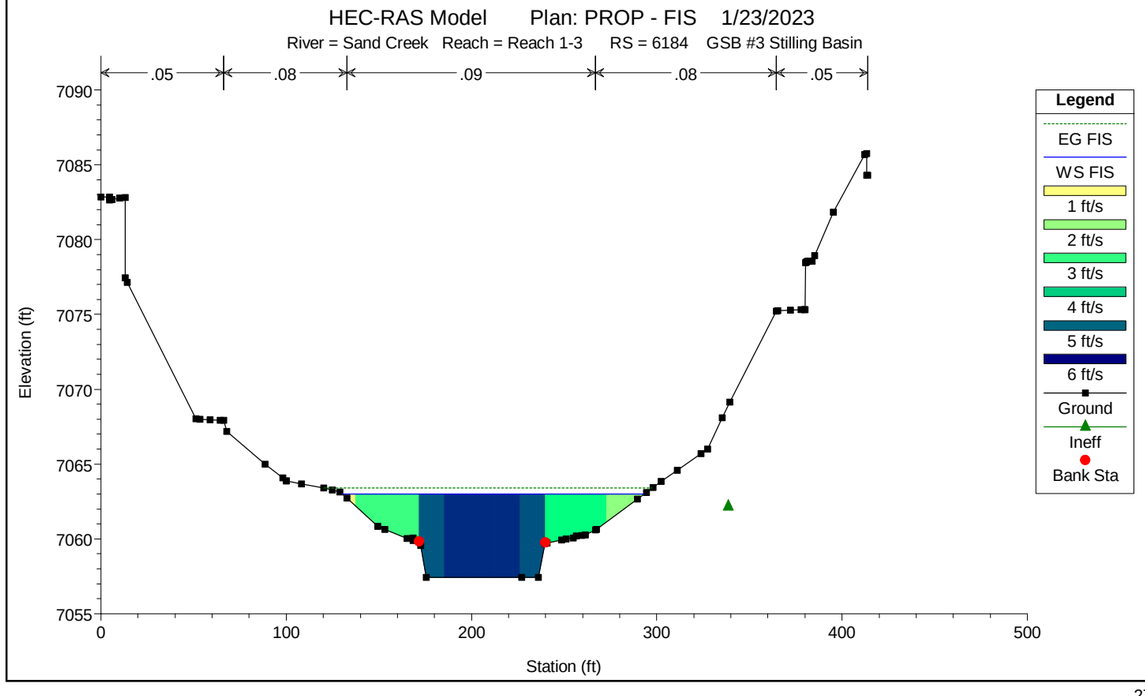

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6265 Section DE
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

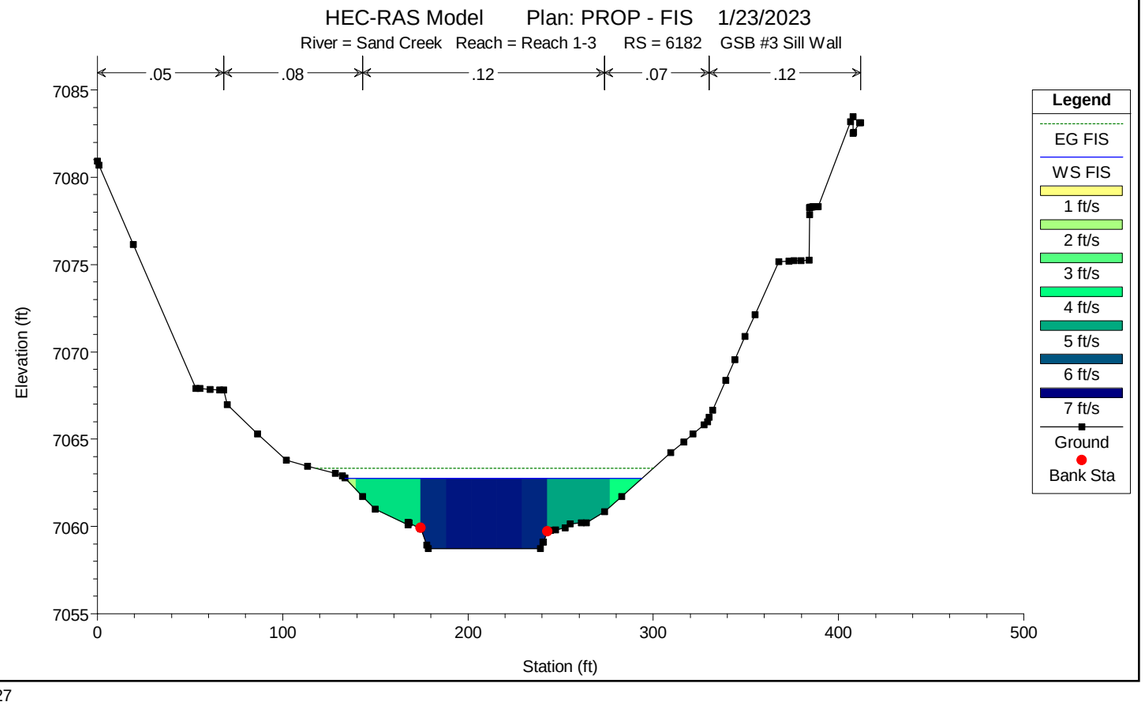

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6232
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

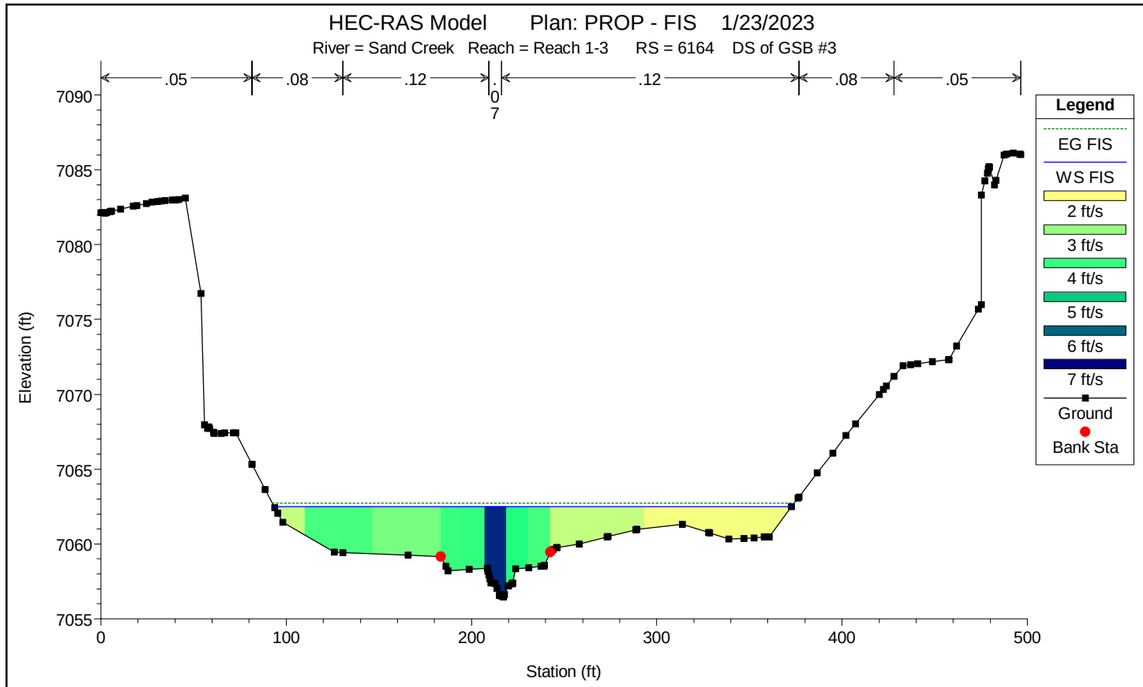

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6223 GSB #3 Crest
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Ineff
Bank Sta

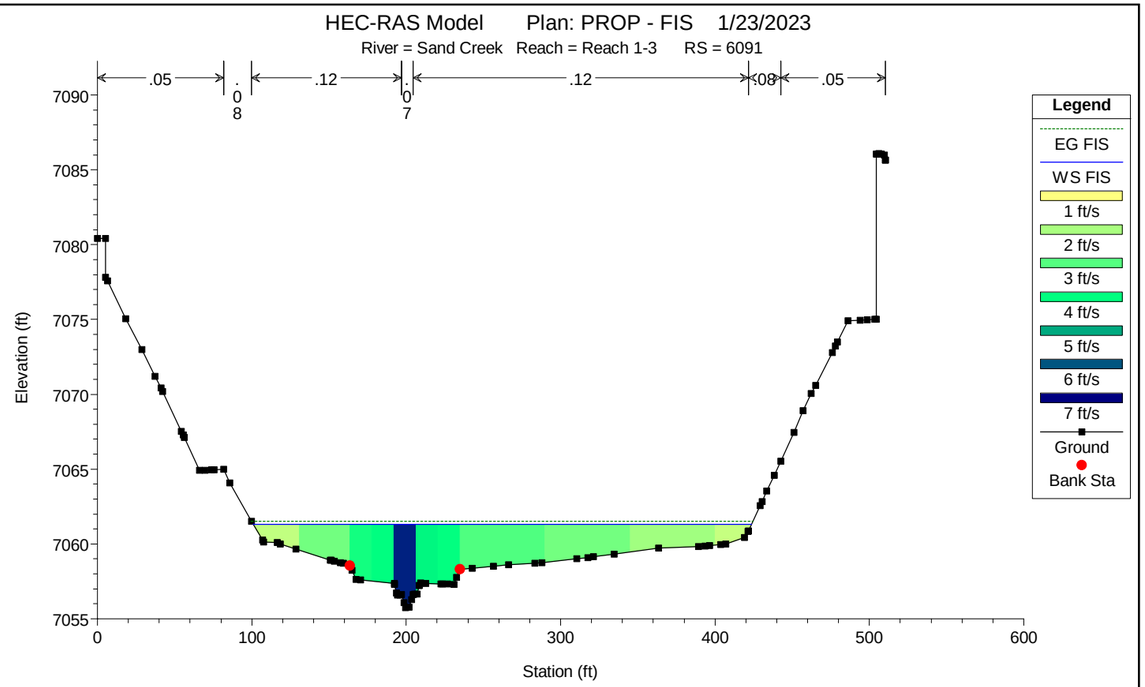

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6212 GSB #3 Mid drop
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

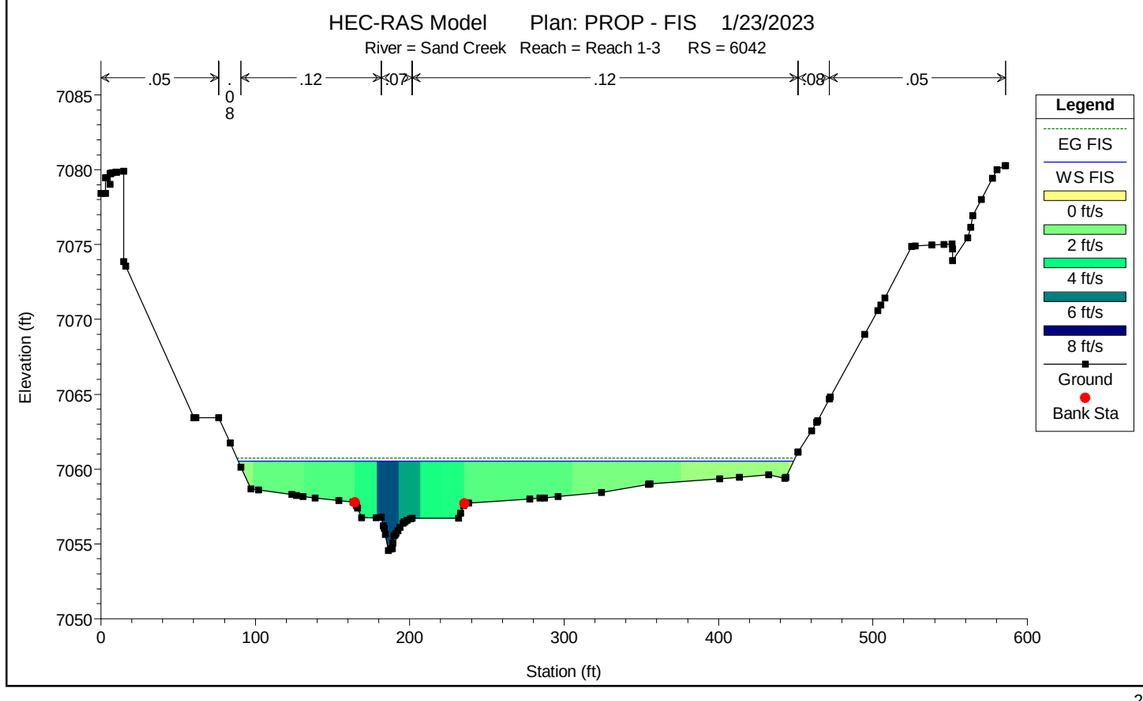

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6199 GSB #3 Toe
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

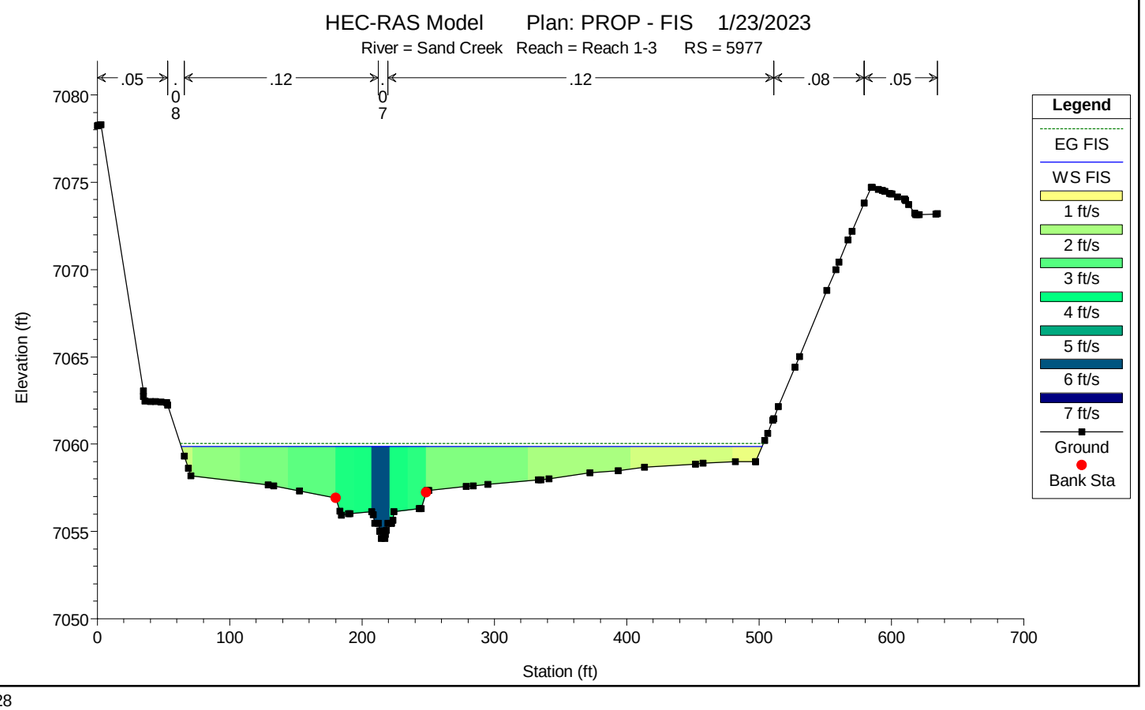

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6184 GSB #3 Stilling Basin
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

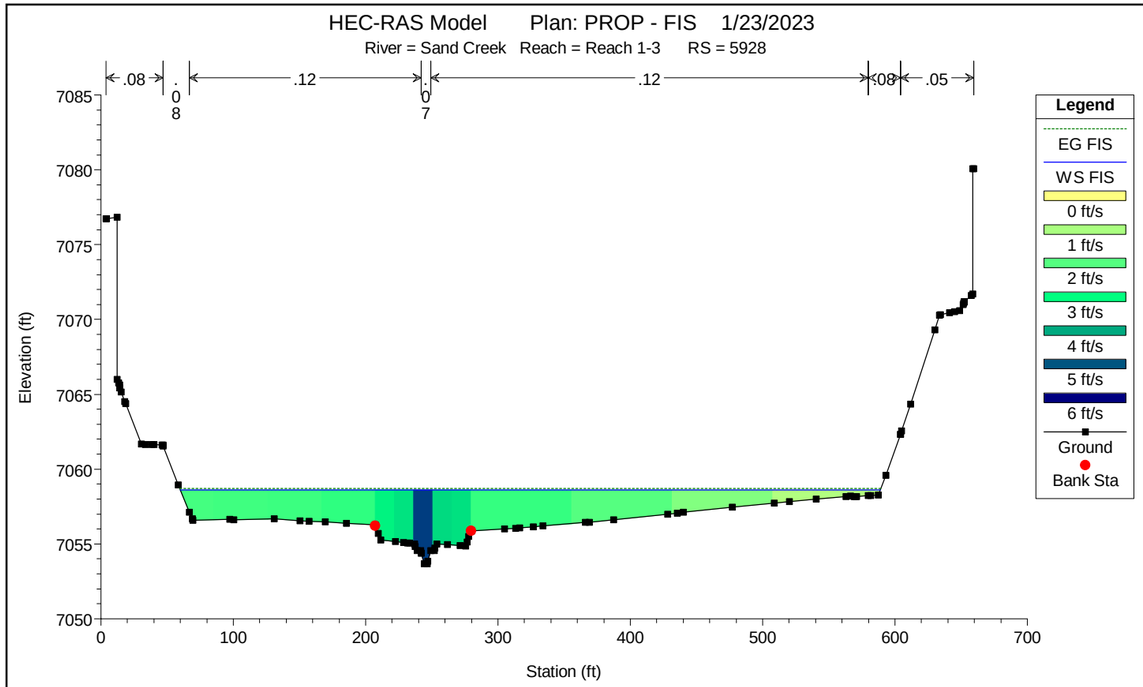

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6182 GSB #3 Sill Wall
.05
.08
.12
.07
.12
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

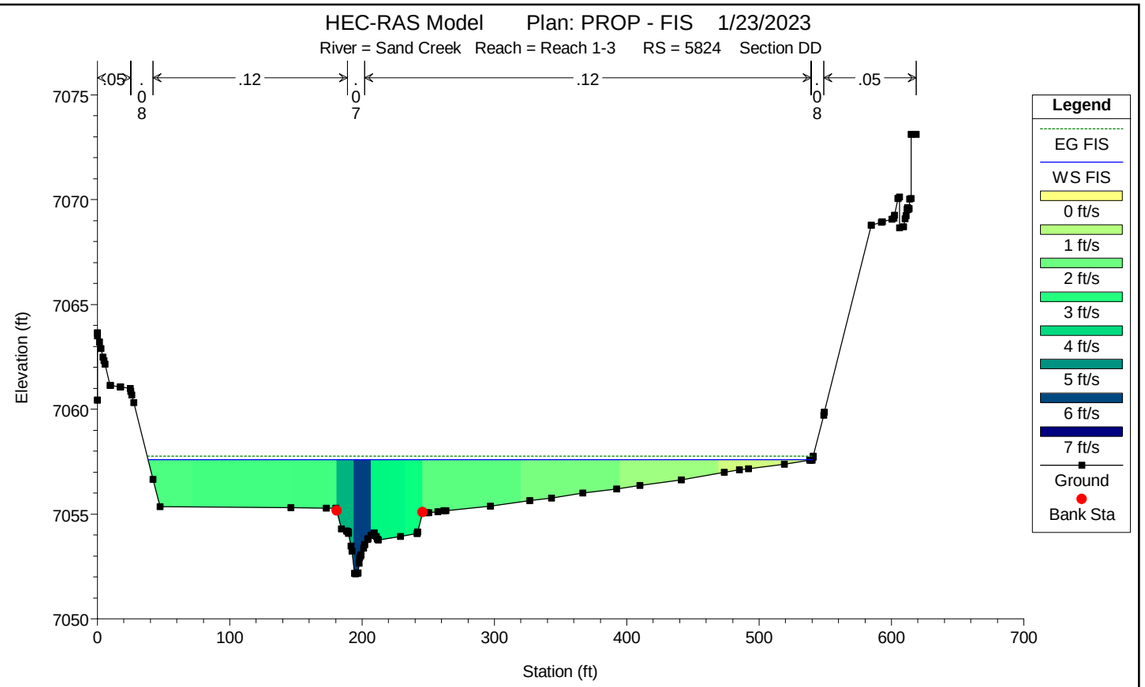

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6164 DS of GSB #3
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

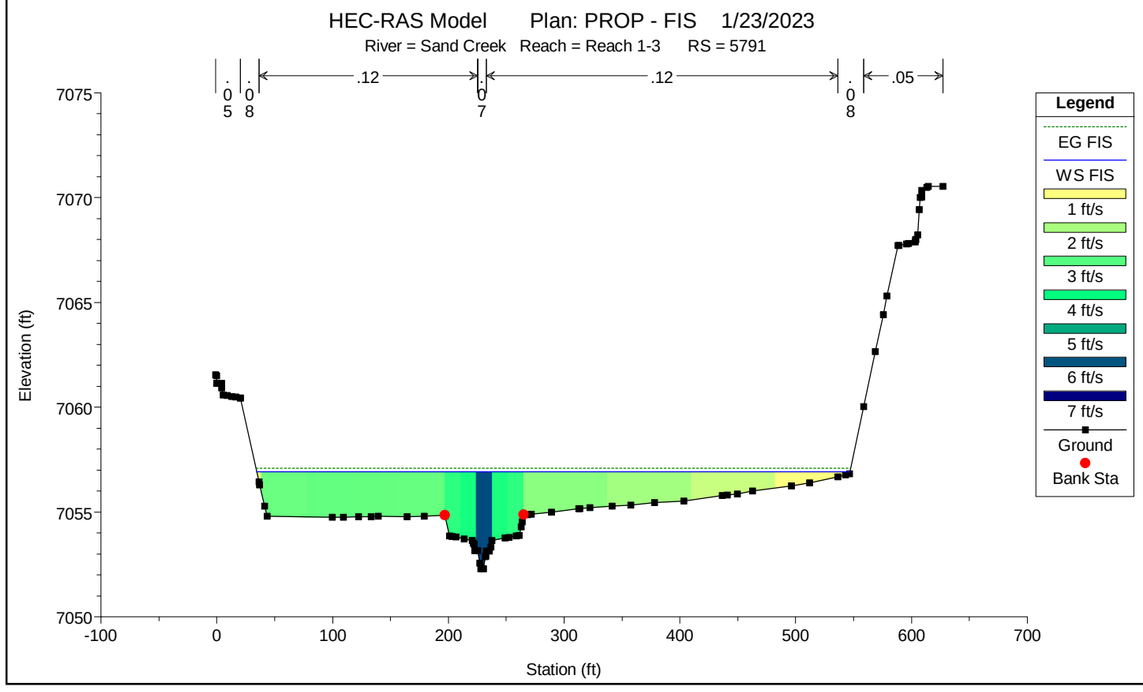

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6091
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

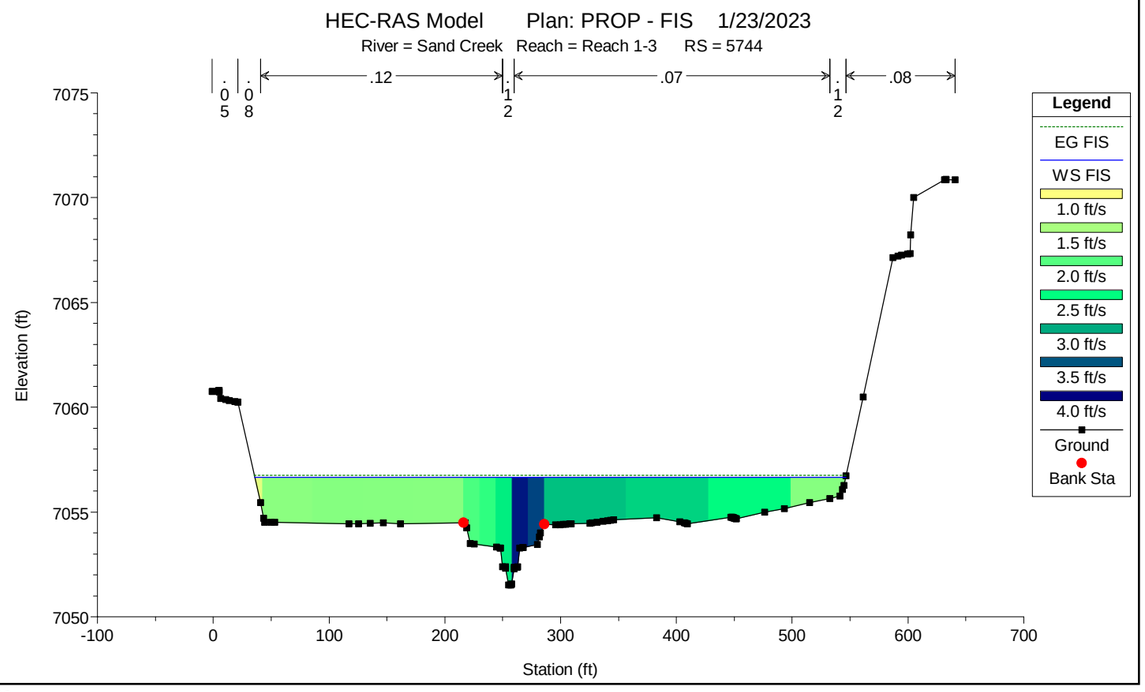

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 6042
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

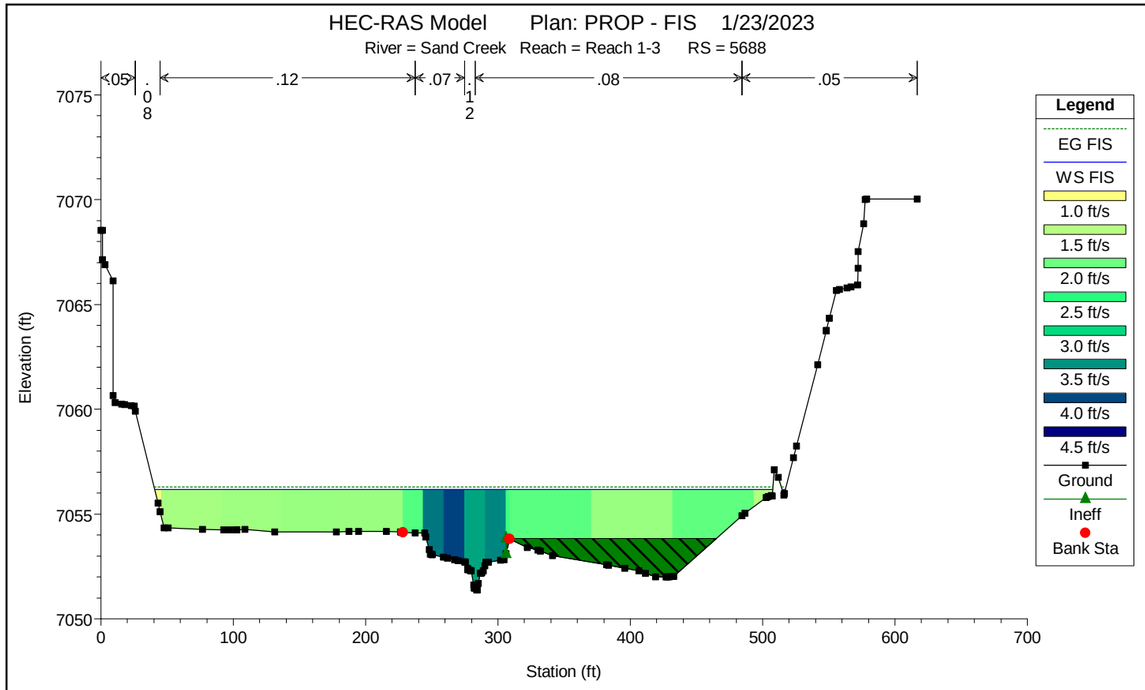

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5977
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

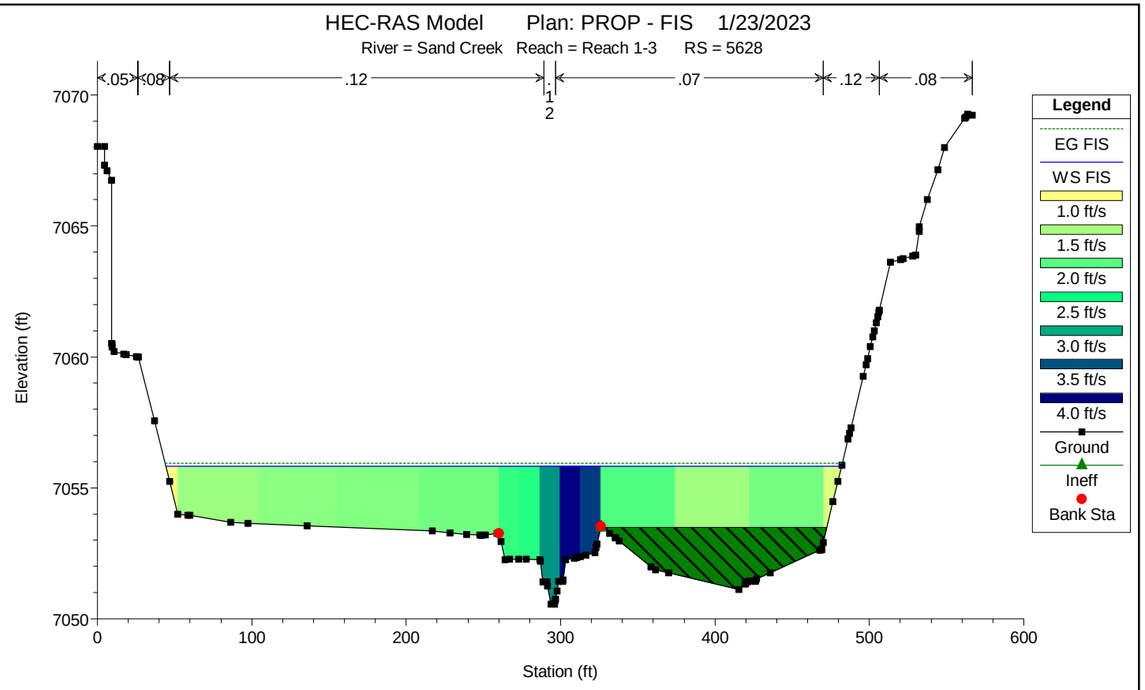

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5928
.08
.12
.12
.08
.05
.08
.07
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

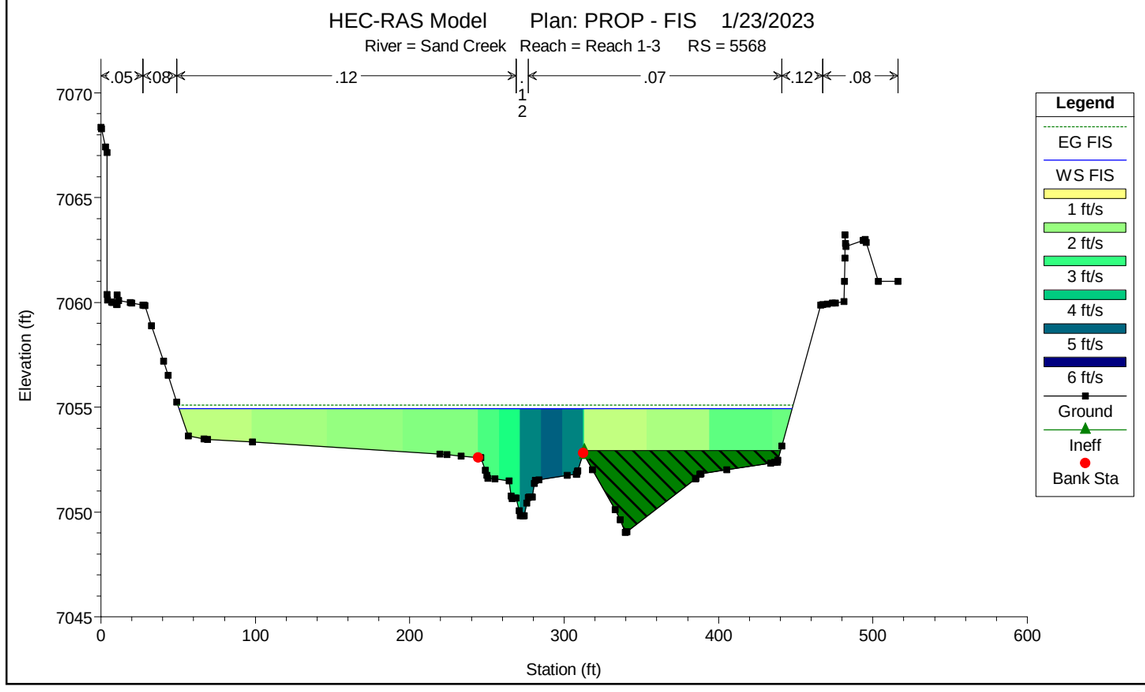

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5824 Section DD
.05
.12
.12
.05
.08
.07
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

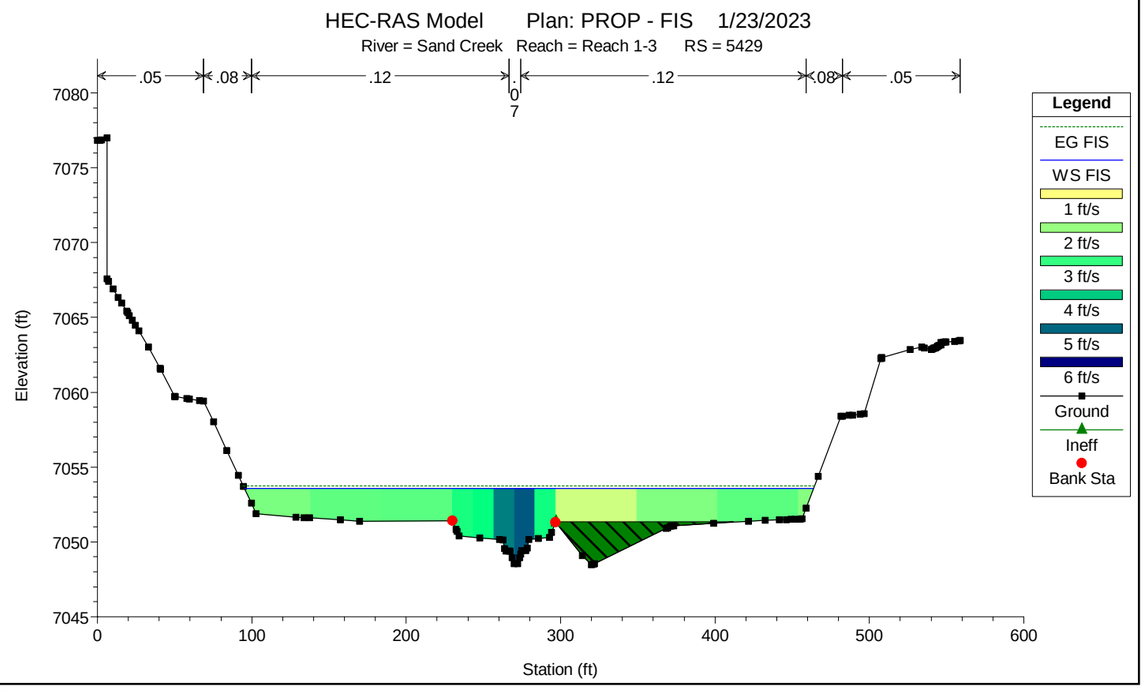

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5791
.05
.08
.12
.12
.08
.05
.07
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

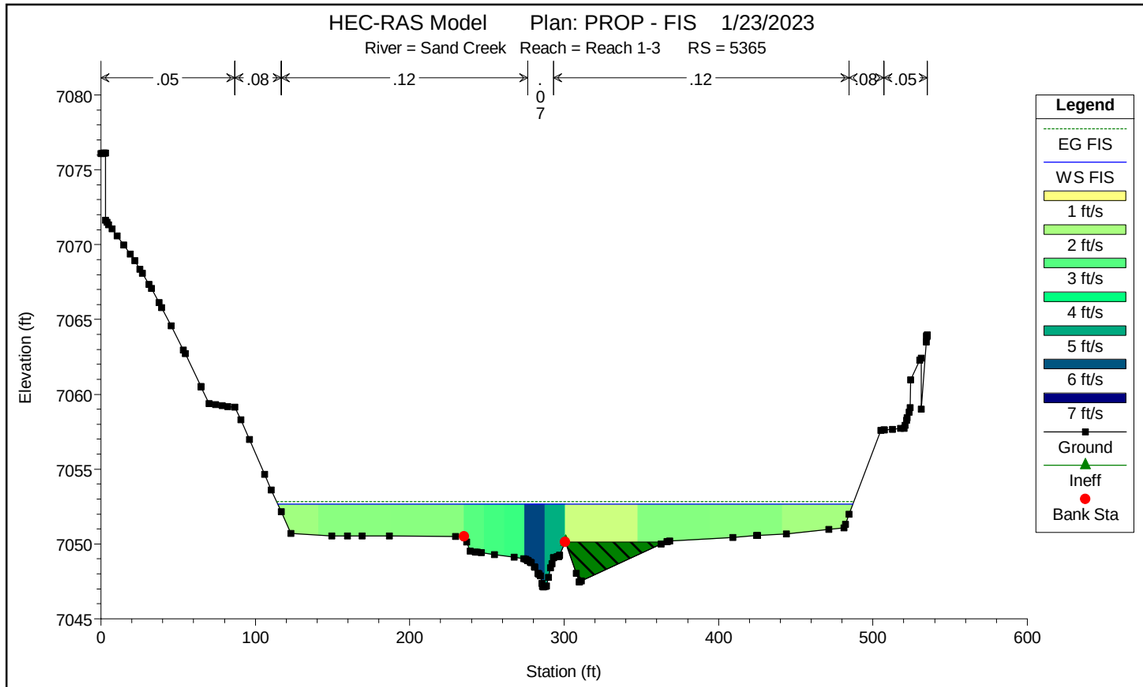

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5744
.05
.08
.12
.07
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

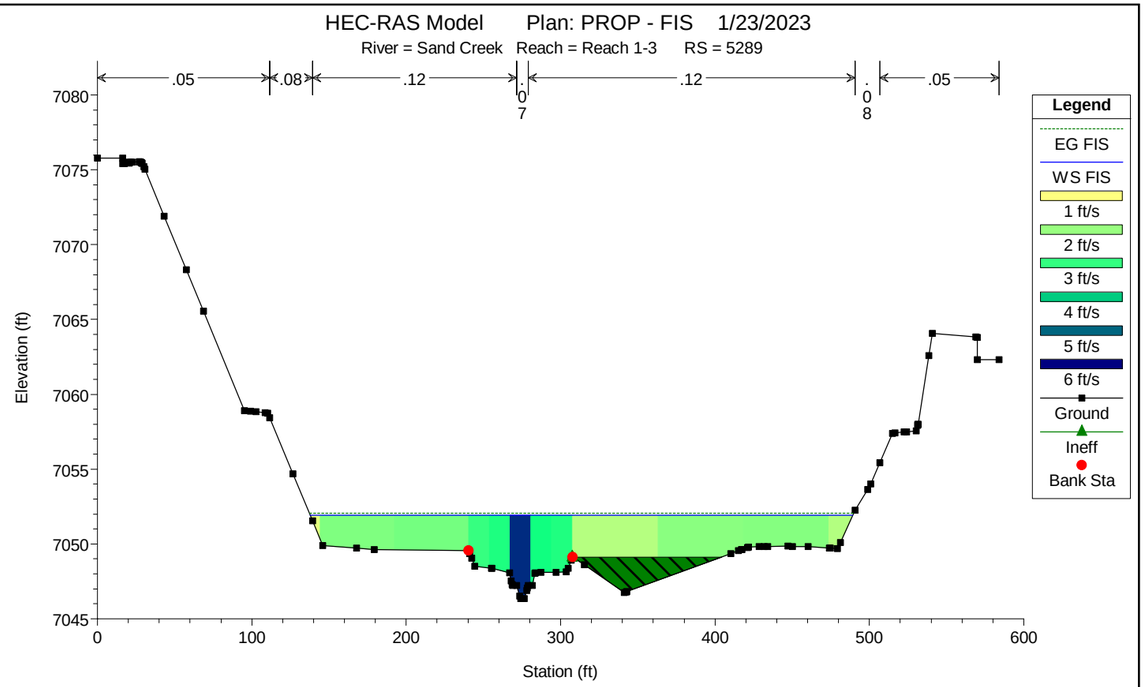

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5688
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Ineff
Bank Sta

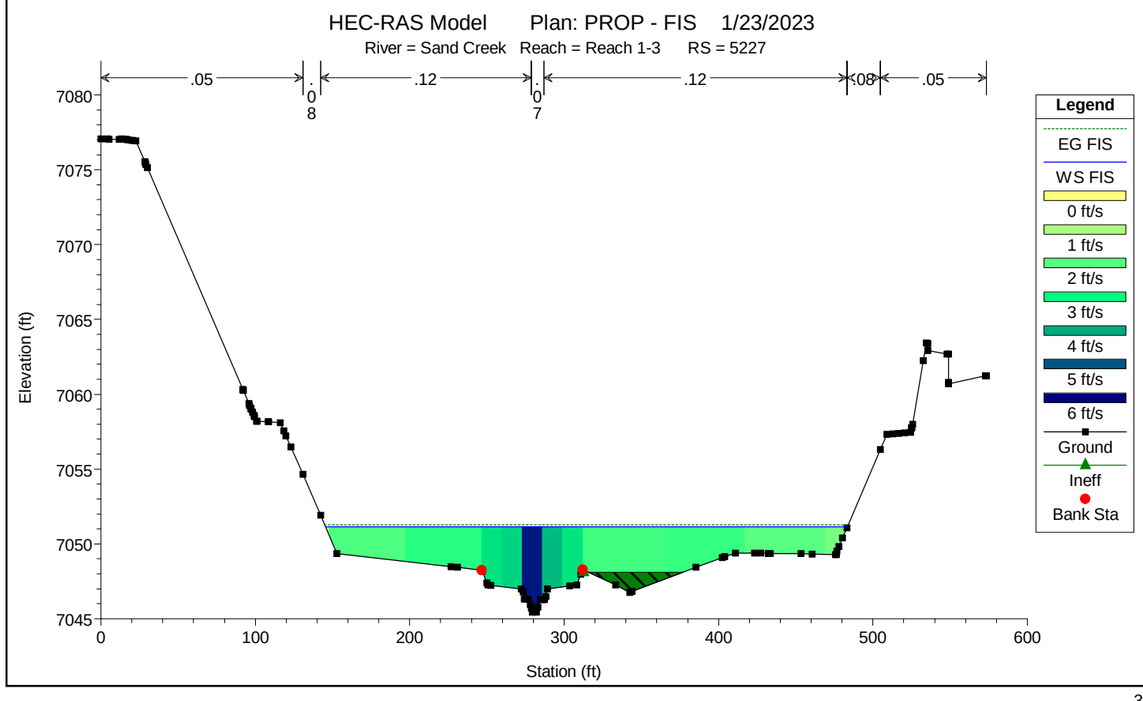

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5628
.05
.08
.12
.07
.12
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Ineff
Bank Sta

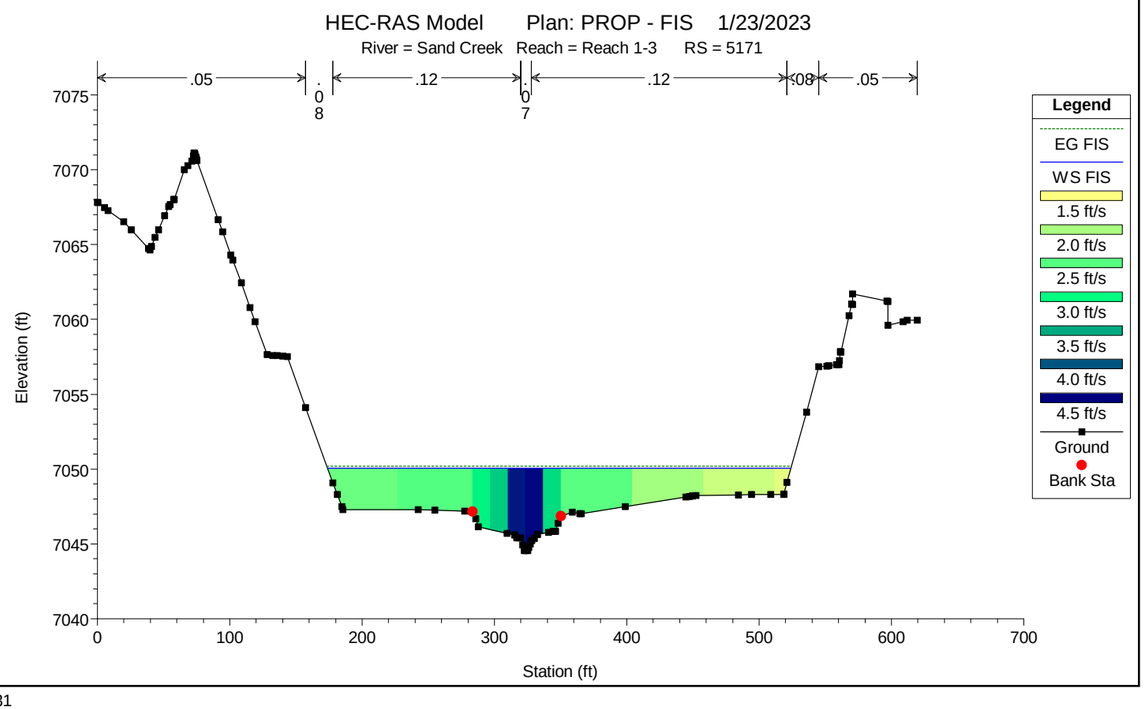

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5568
.05
.08
.12
.07
.12
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

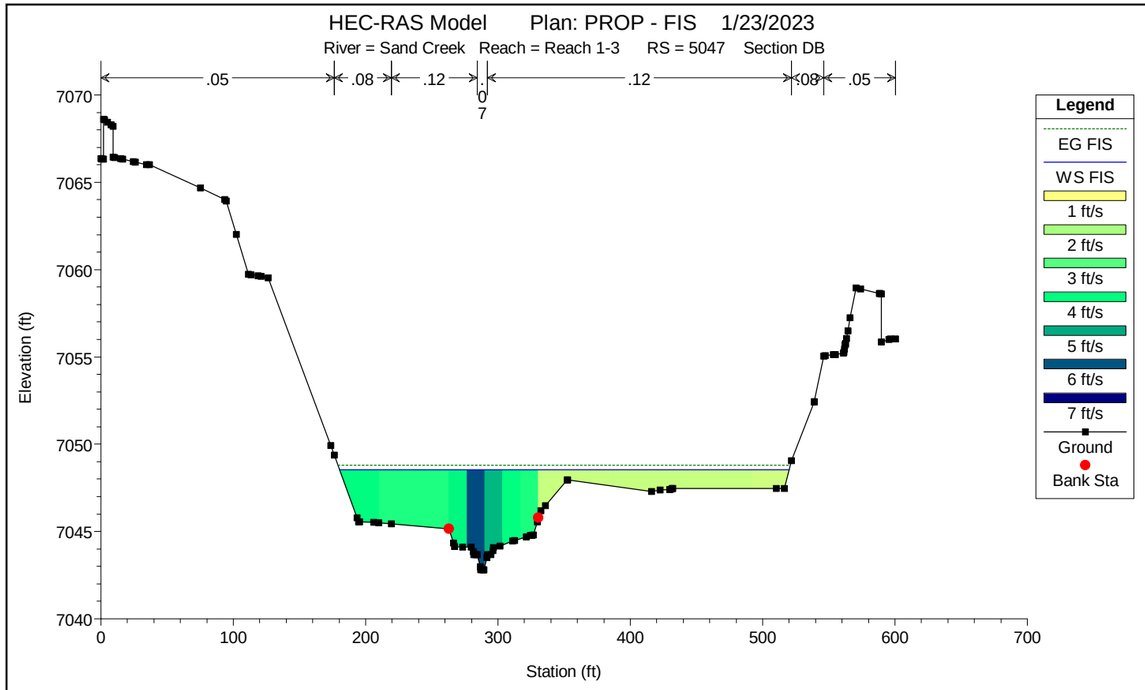

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5429
.05
.08
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

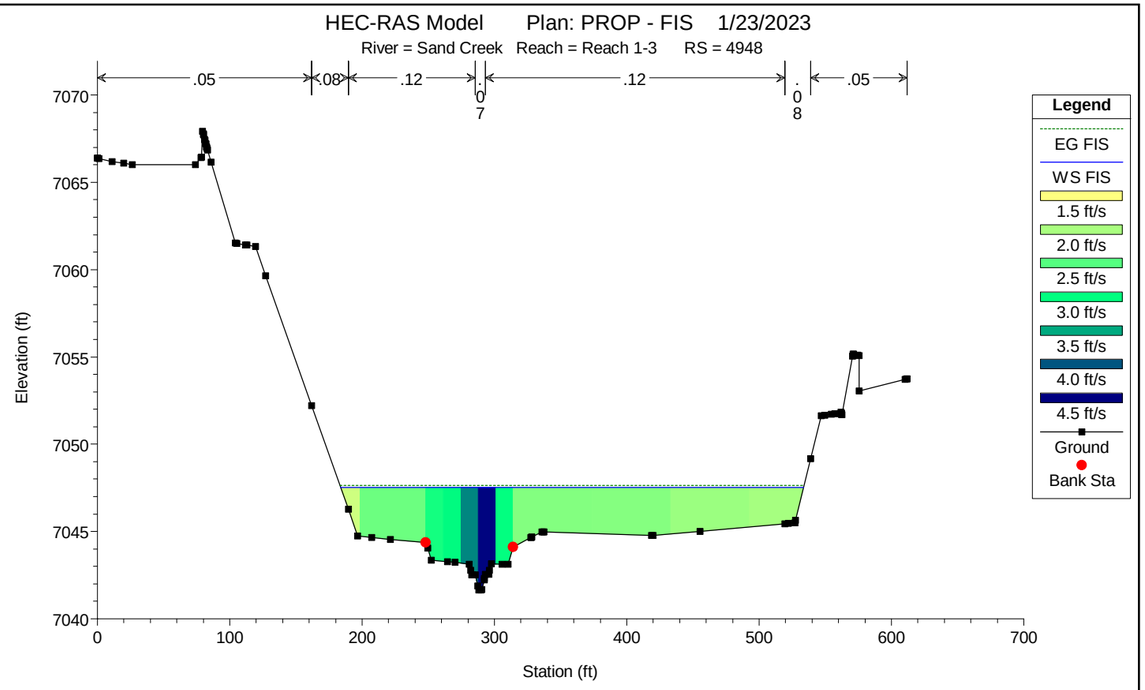

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5365
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta

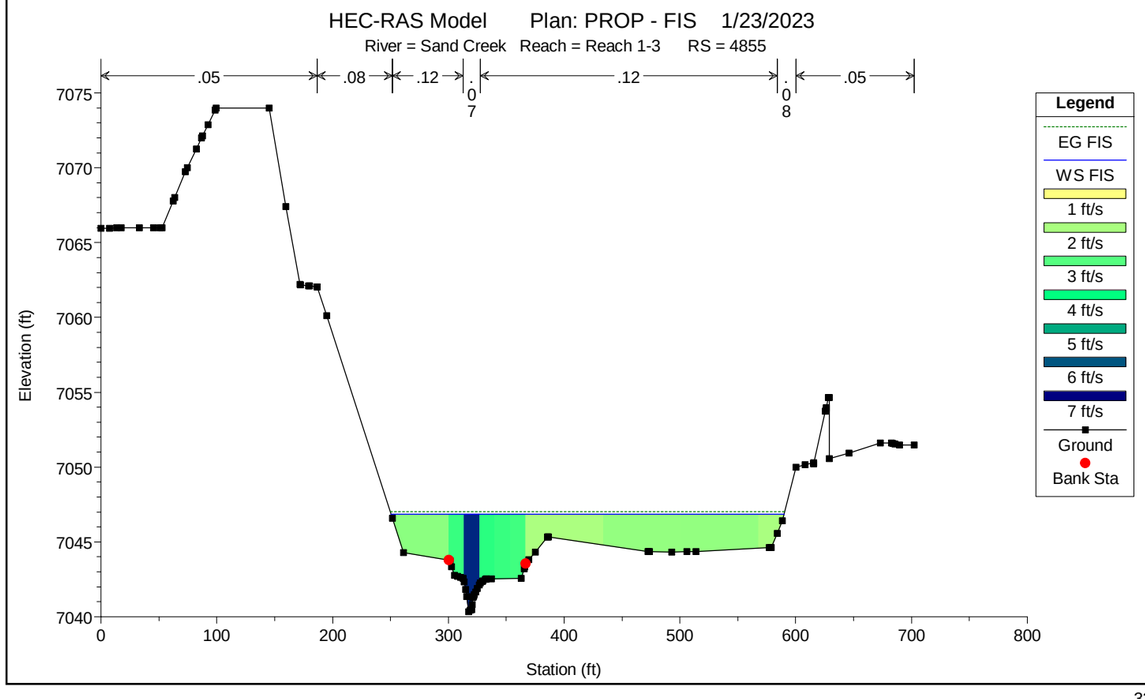

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5289
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

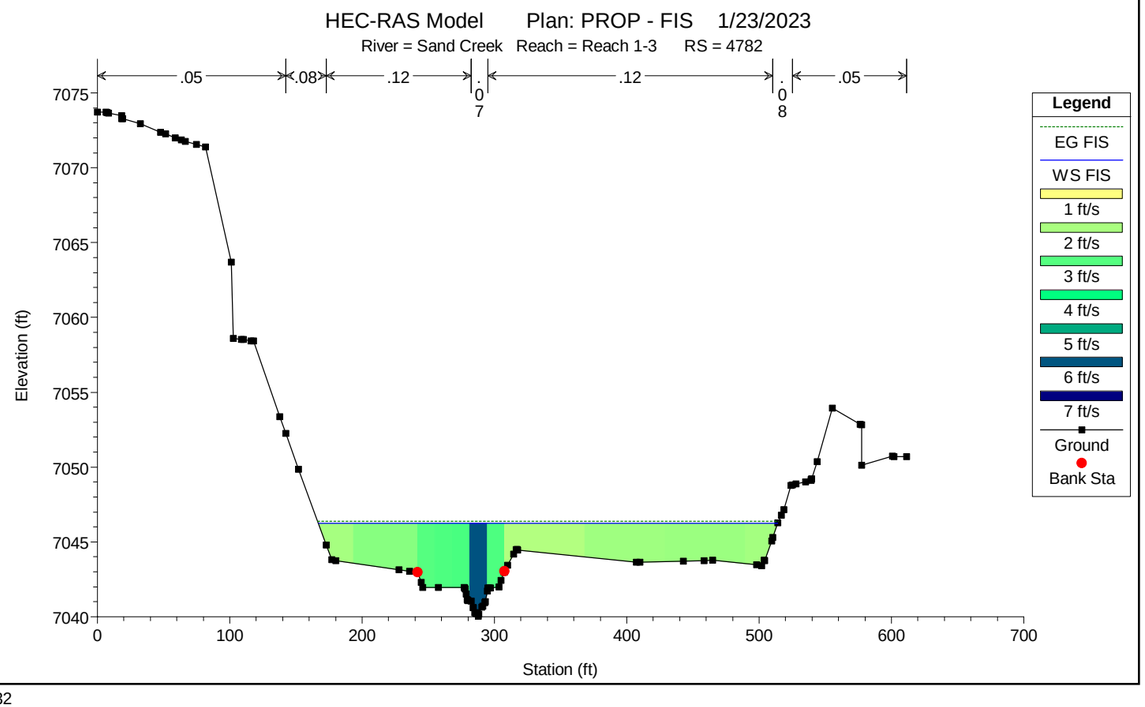

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5227
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

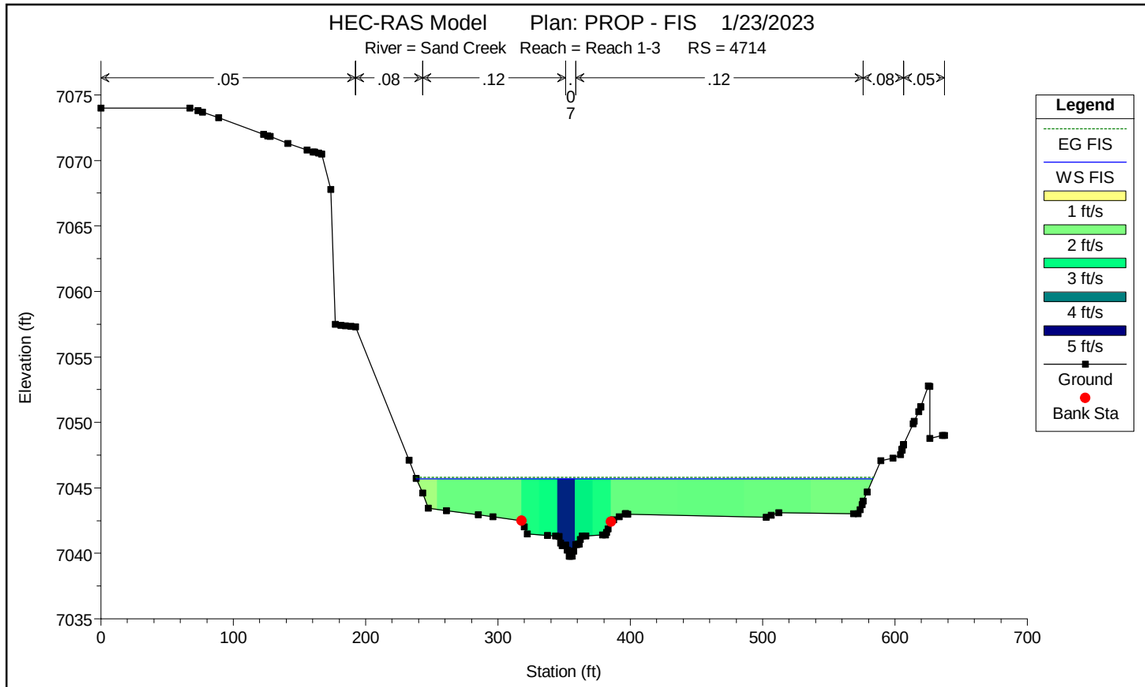

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5171
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

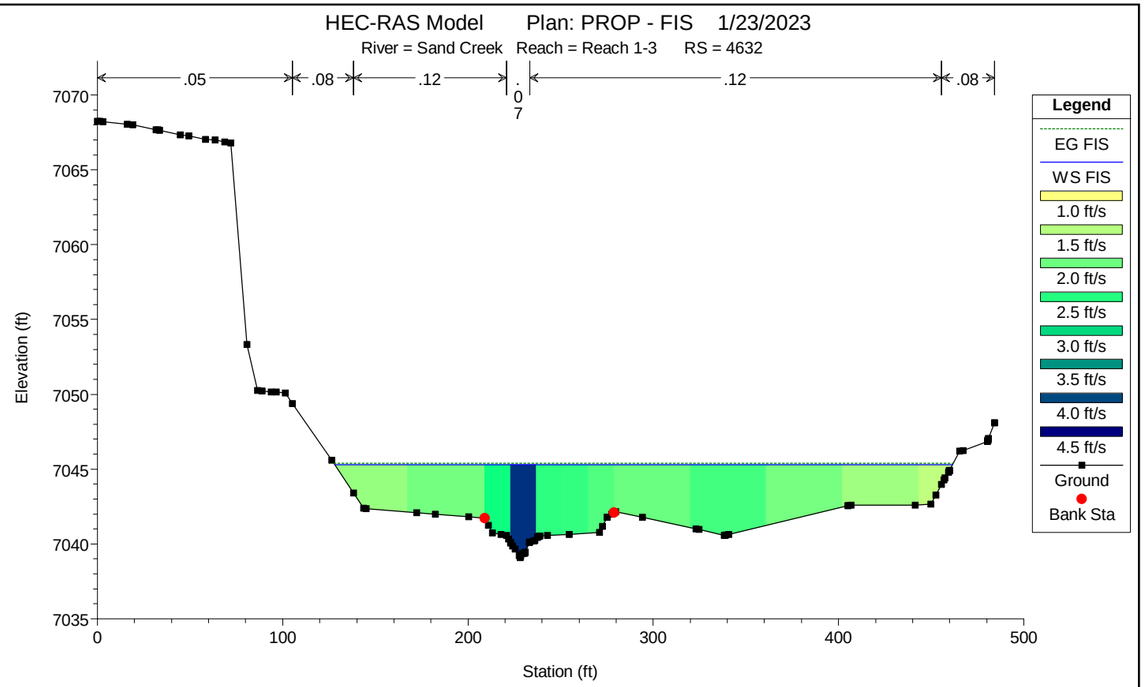

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 5047 Section DB
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

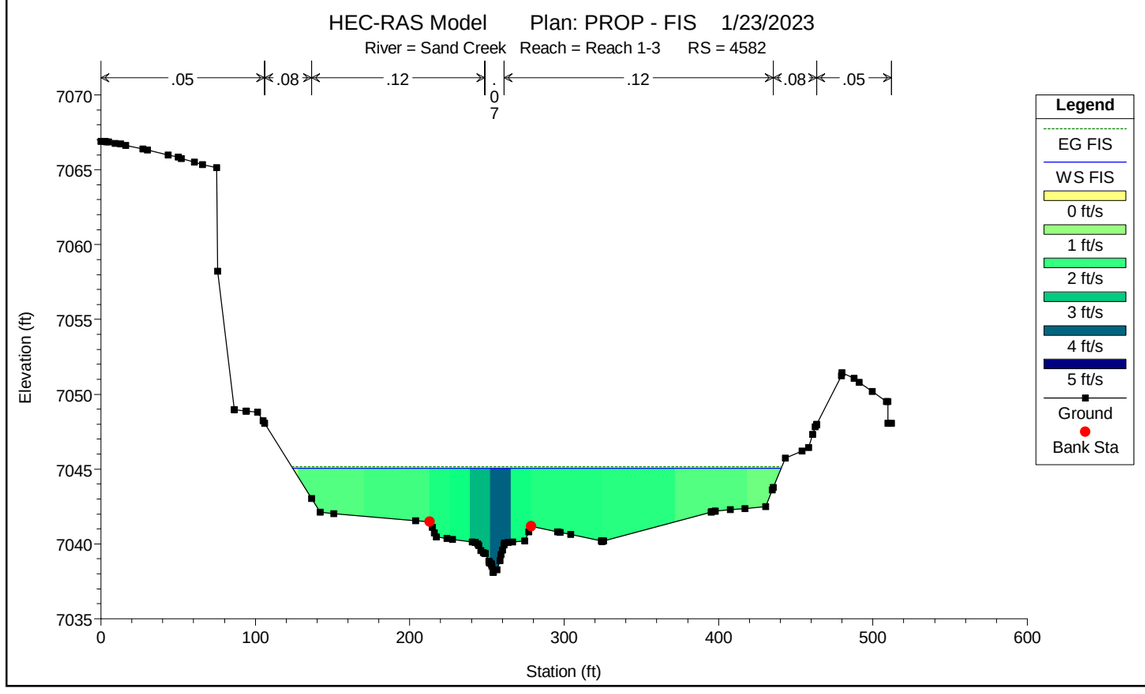

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4948
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

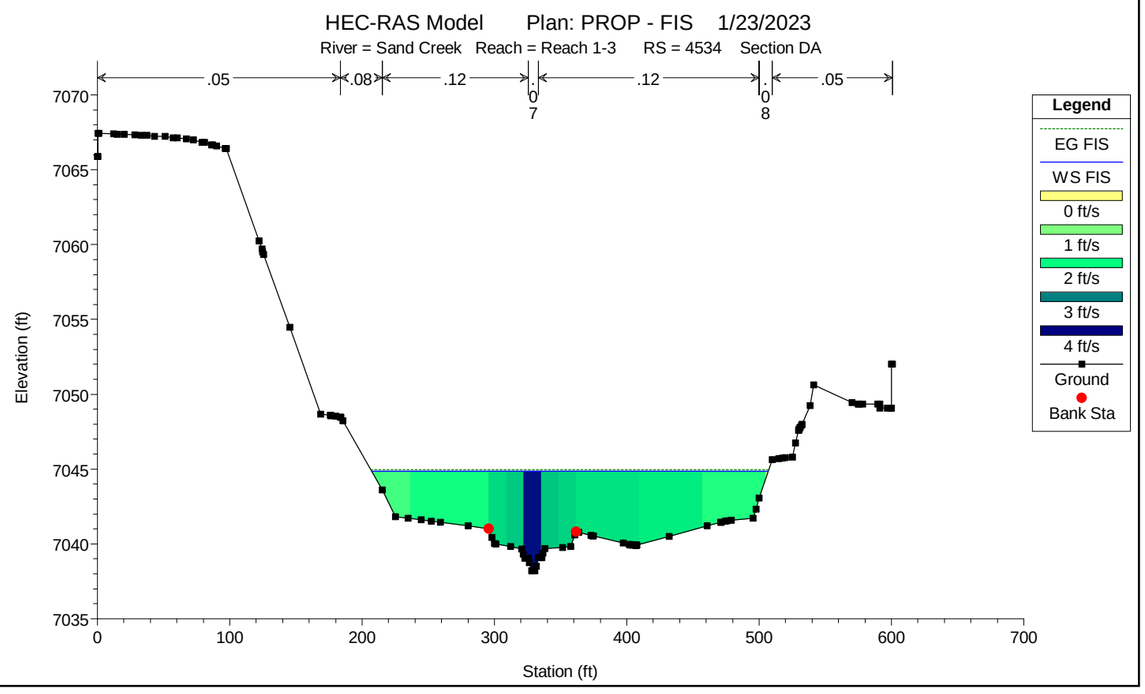

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4855
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

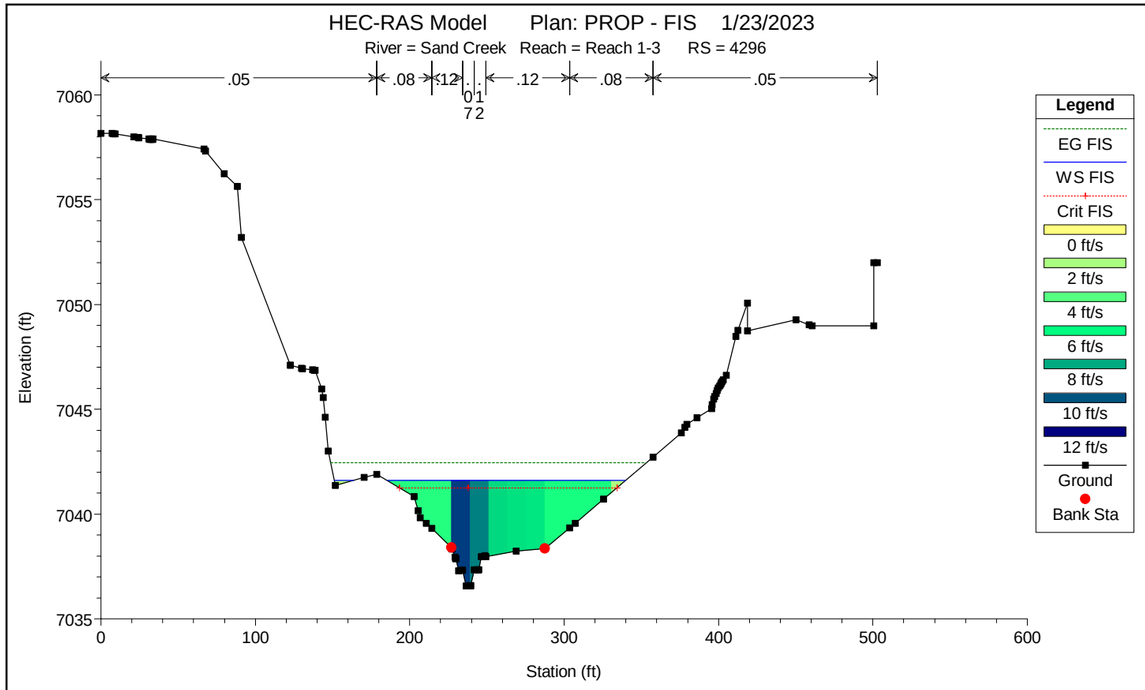

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4782
.05 .08 .12 .07 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

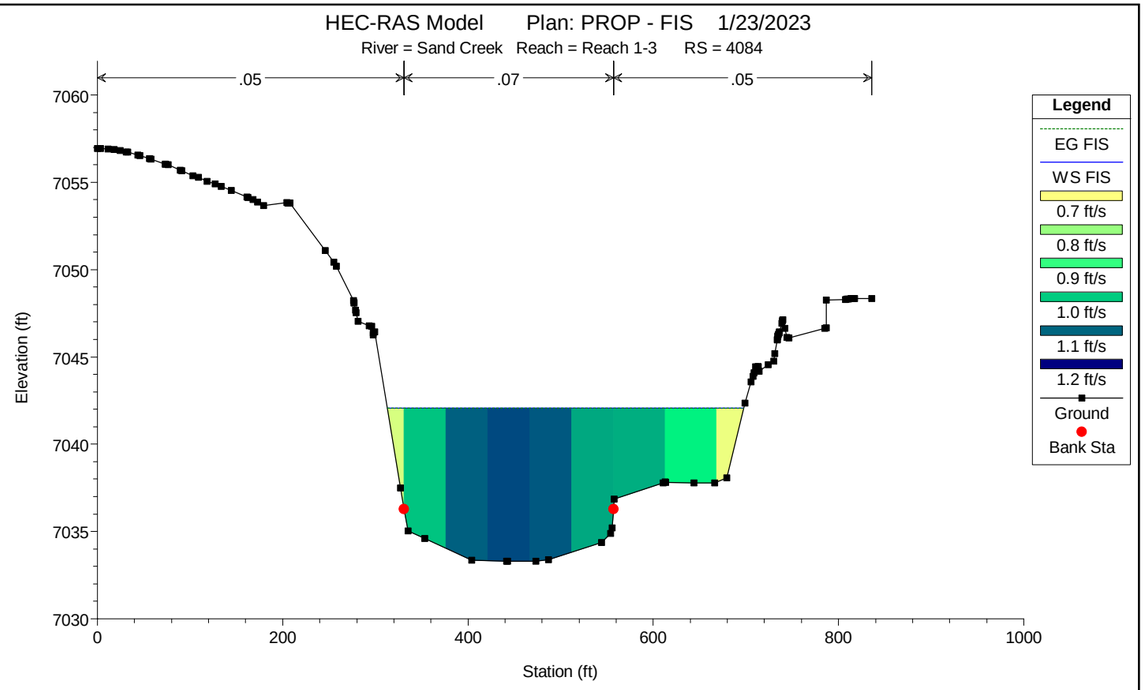

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4714
.05 .08 .12 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

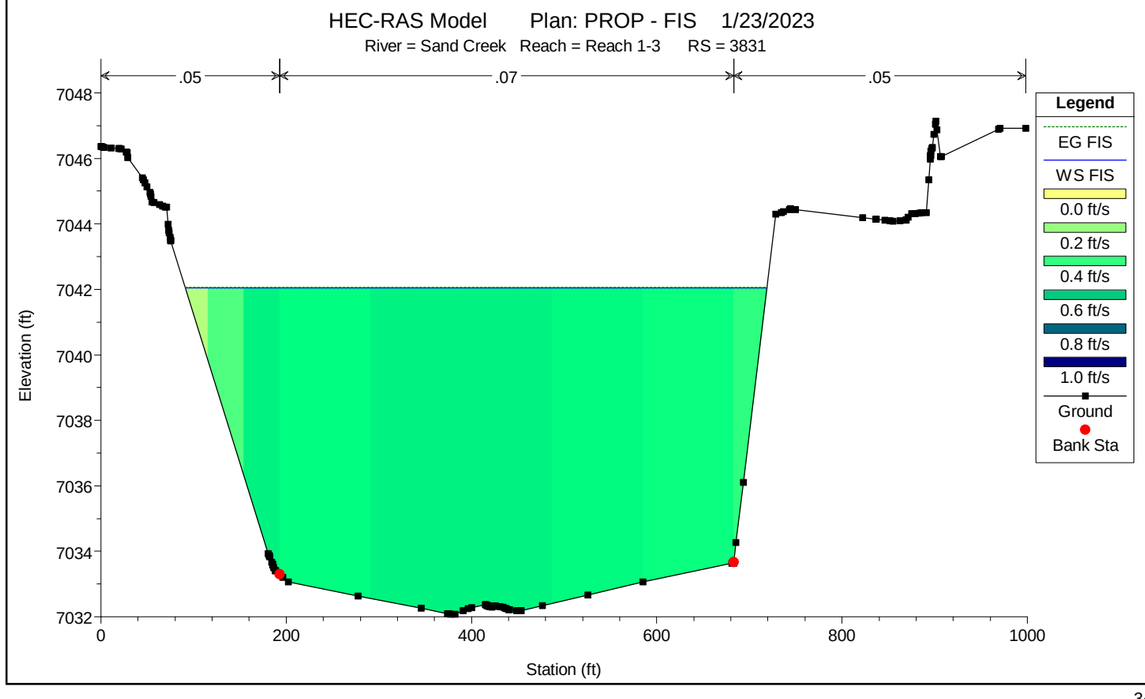

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4632
.05 .08 .12 .12 .08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

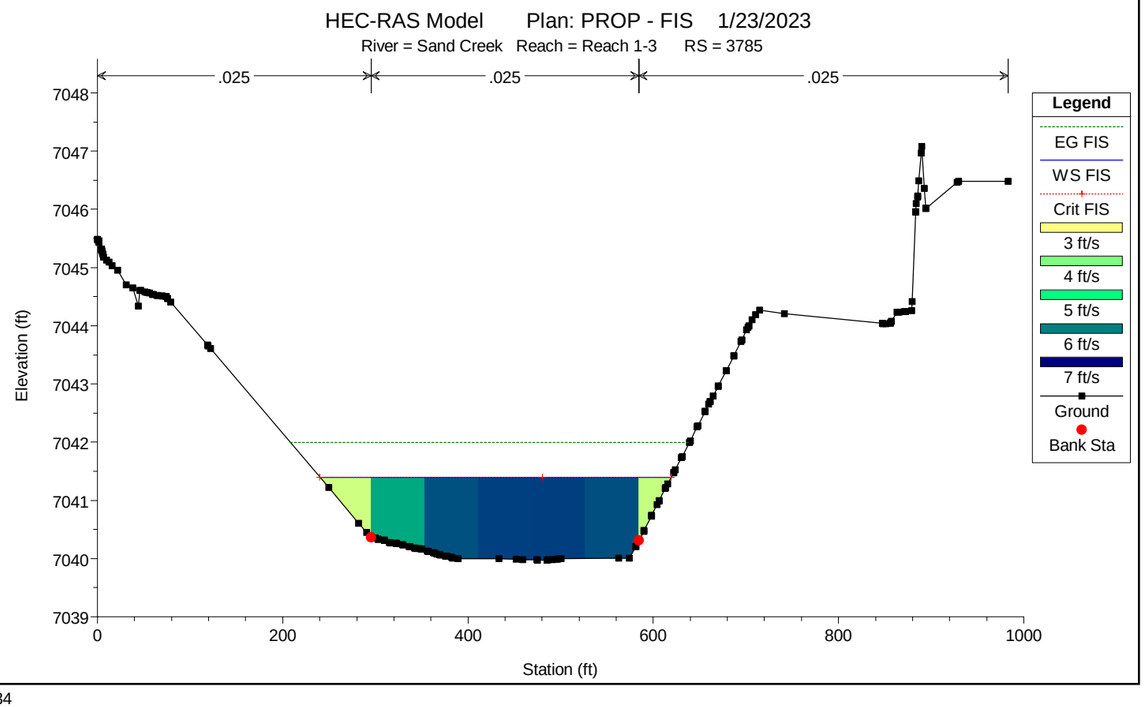

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4582
.05 .08 .12 .12 .08 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

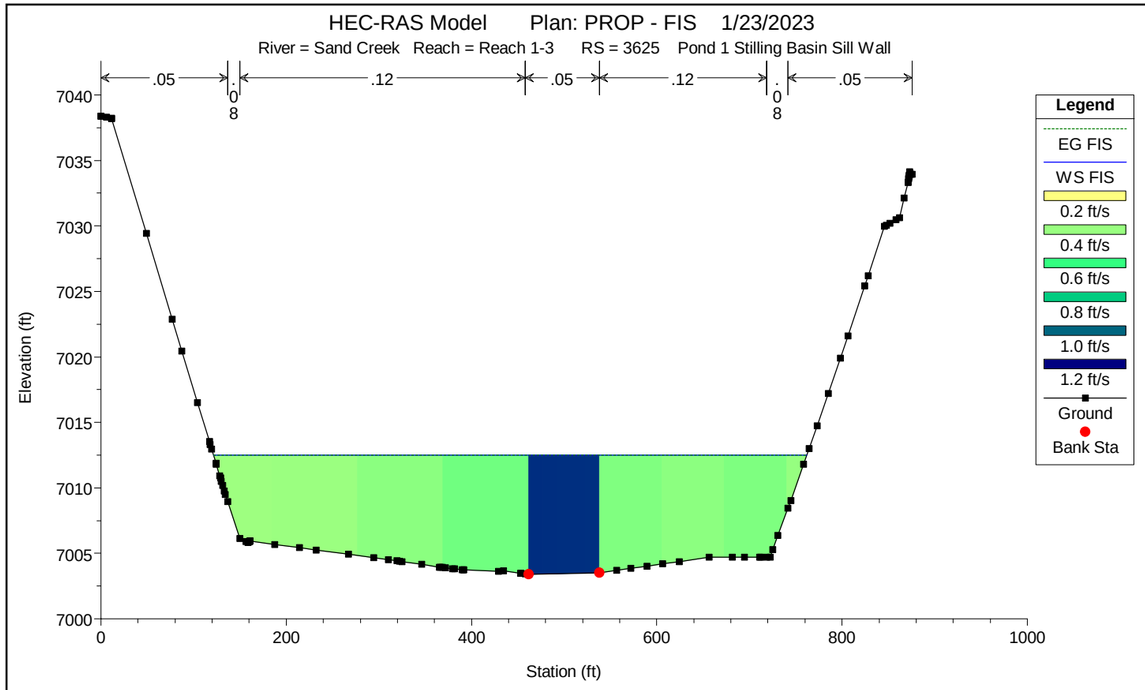

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4534 Section DA
.05 .08 .12 .12 .05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

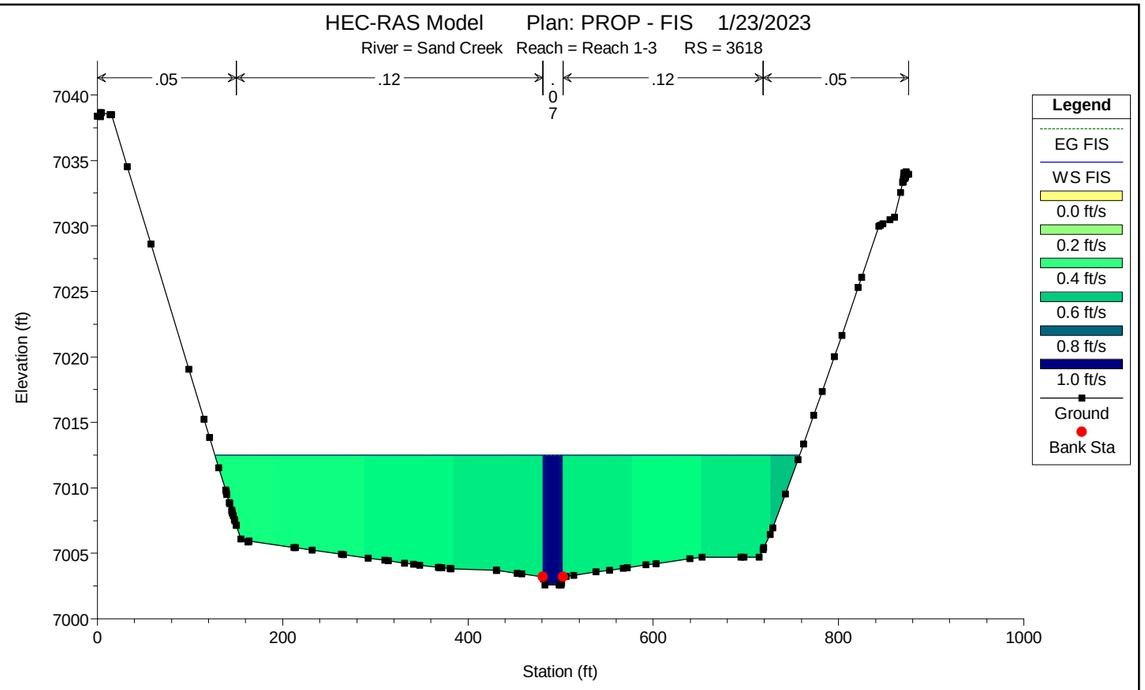

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4296
.05
.08
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

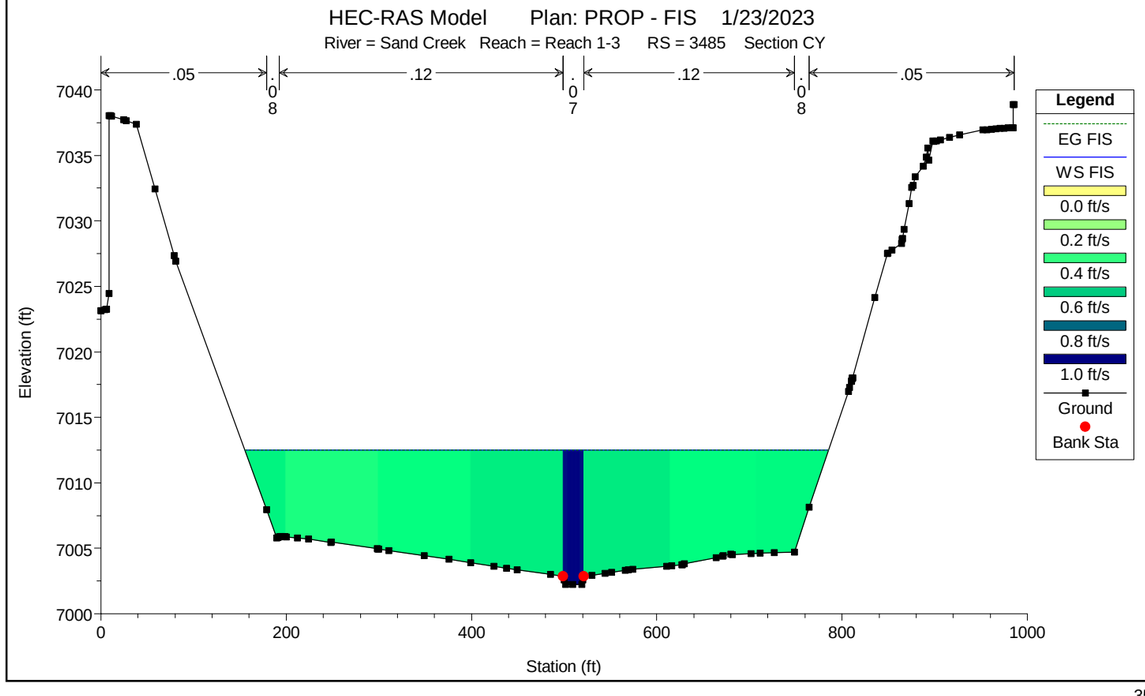

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 4084
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.7 ft/s
0.8 ft/s
0.9 ft/s
1.0 ft/s
1.1 ft/s
1.2 ft/s
Ground
Bank Sta

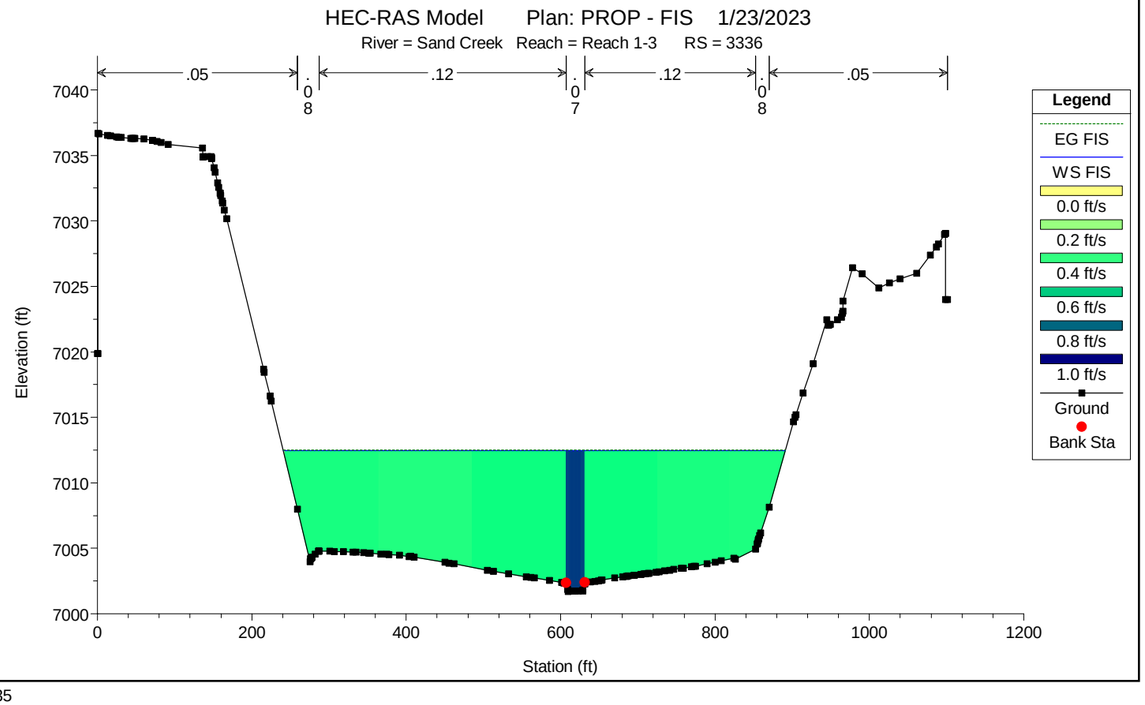

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3831
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

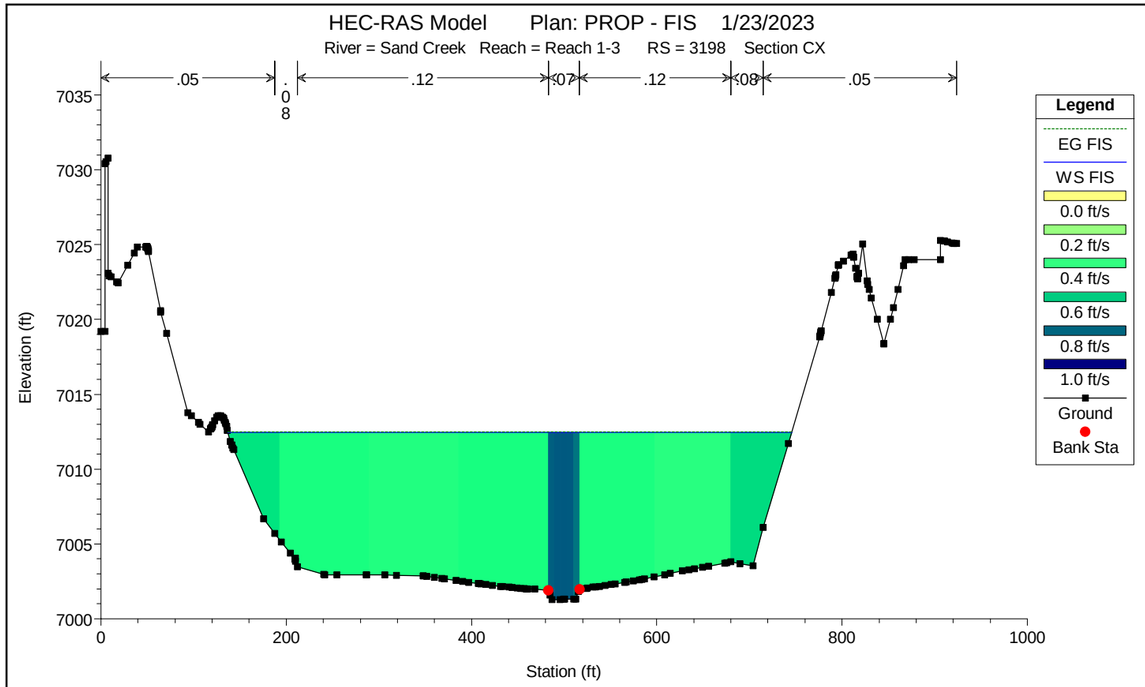

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3785
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

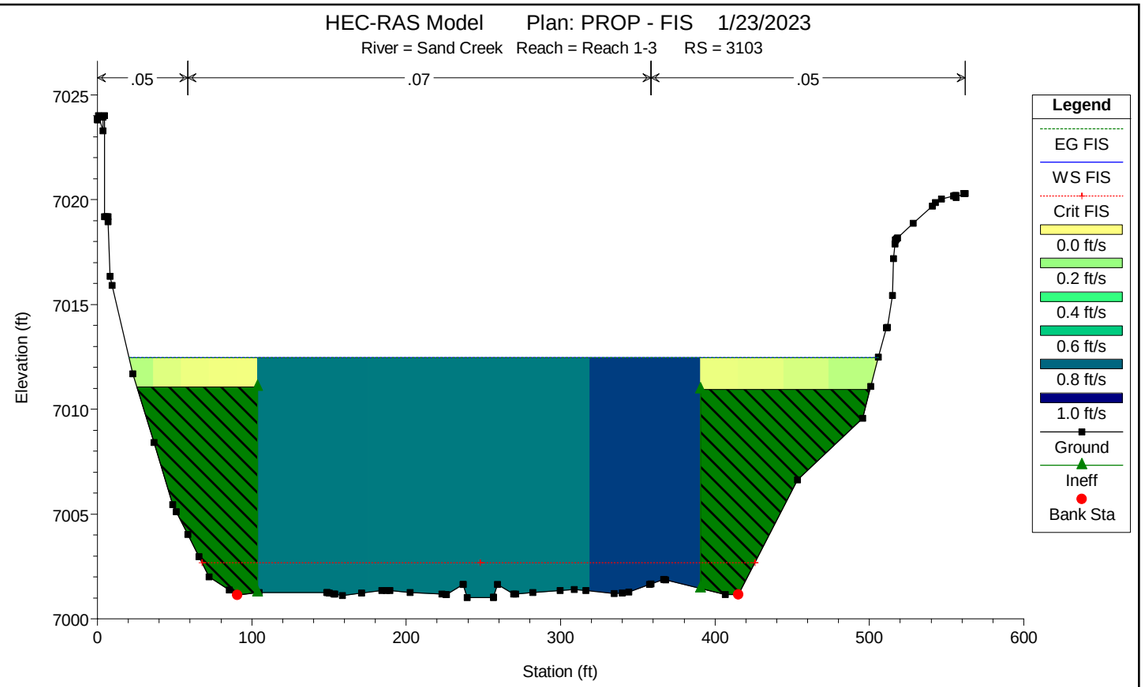

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3625 Pond 1 Stilling Basin Sill Wall
.05
.12
.05
.12
.05
0.08
0.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Bank Sta

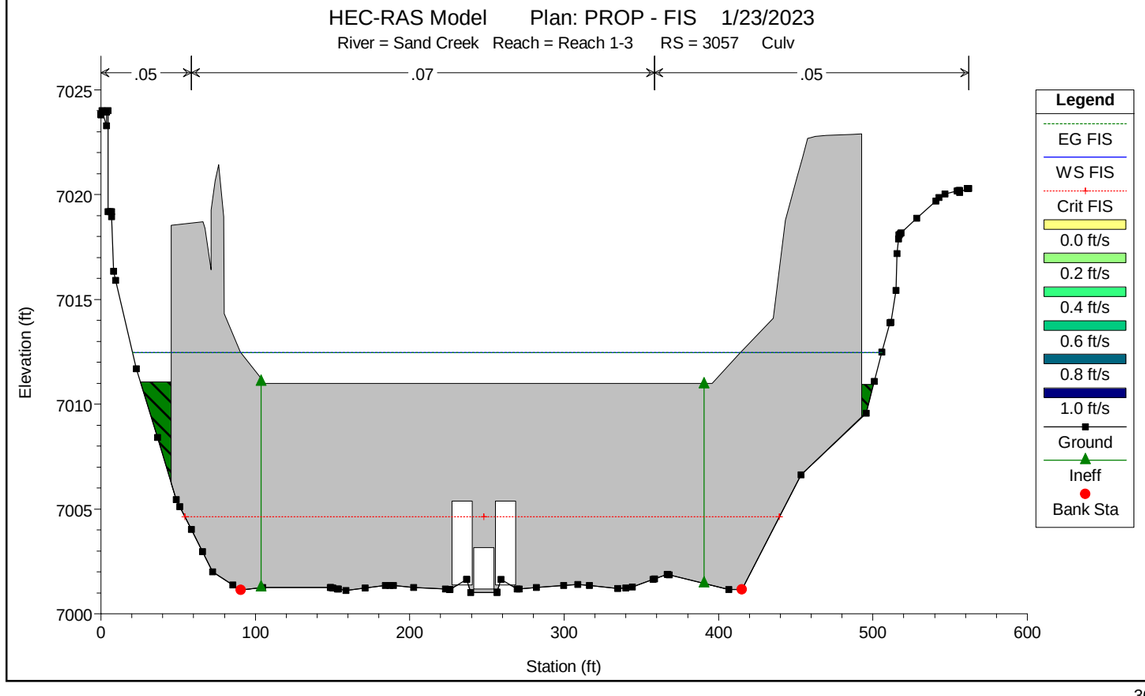

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3618
.05
.12
.12
.05
0.07
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

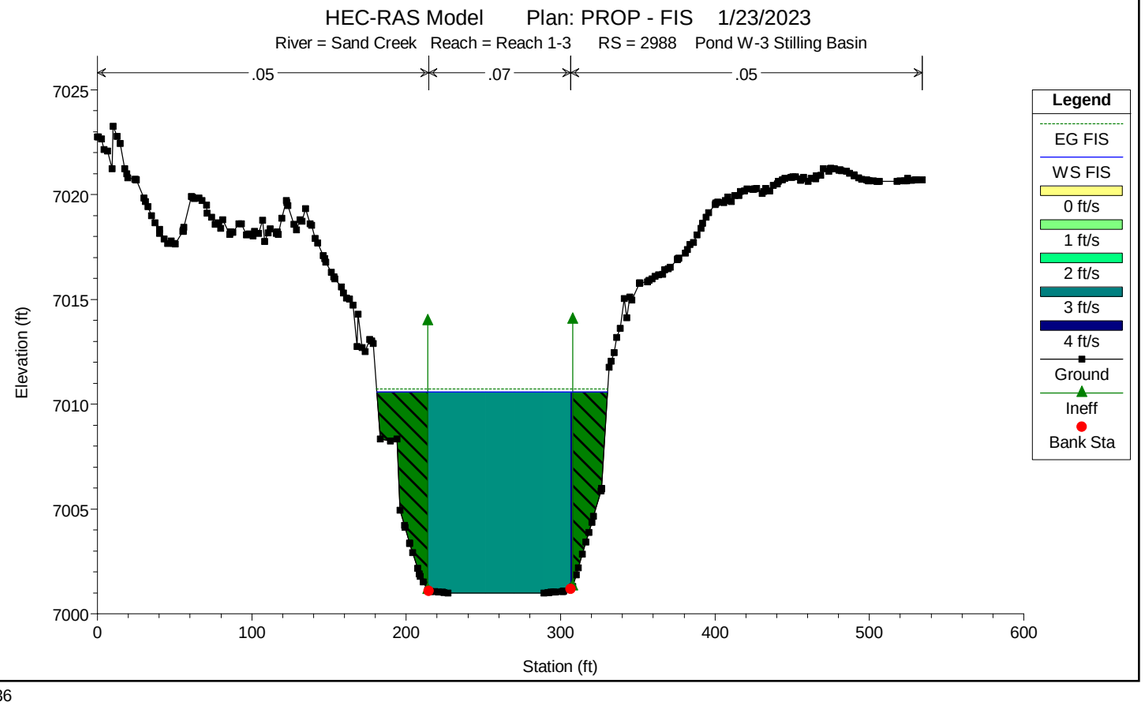

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3485 Section CY
.05
.12
.12
.05
0.08
0.07
0.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

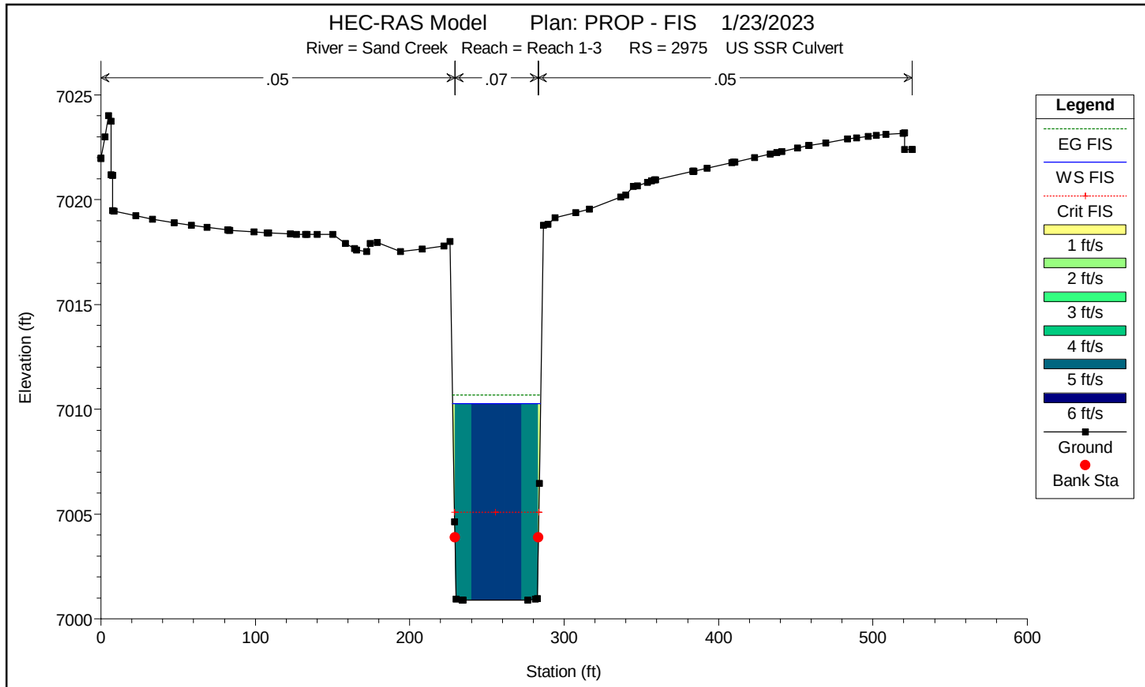

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3336
.05
.12
.12
.05
0.08
0.07
0.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

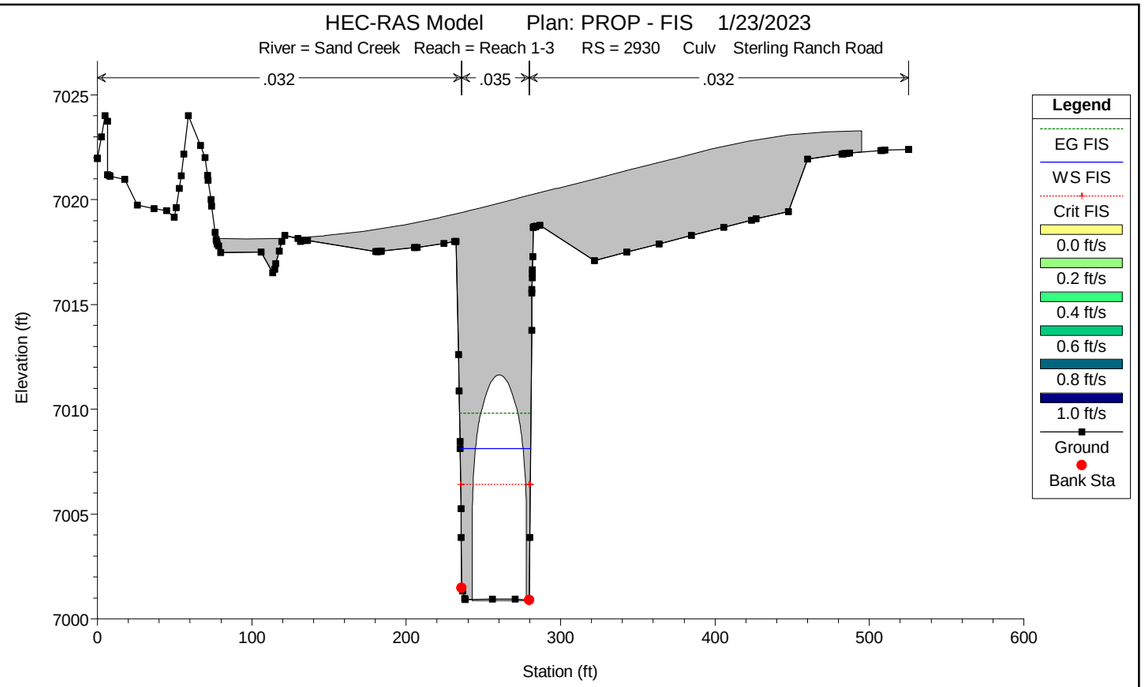

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3198 Section CX
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

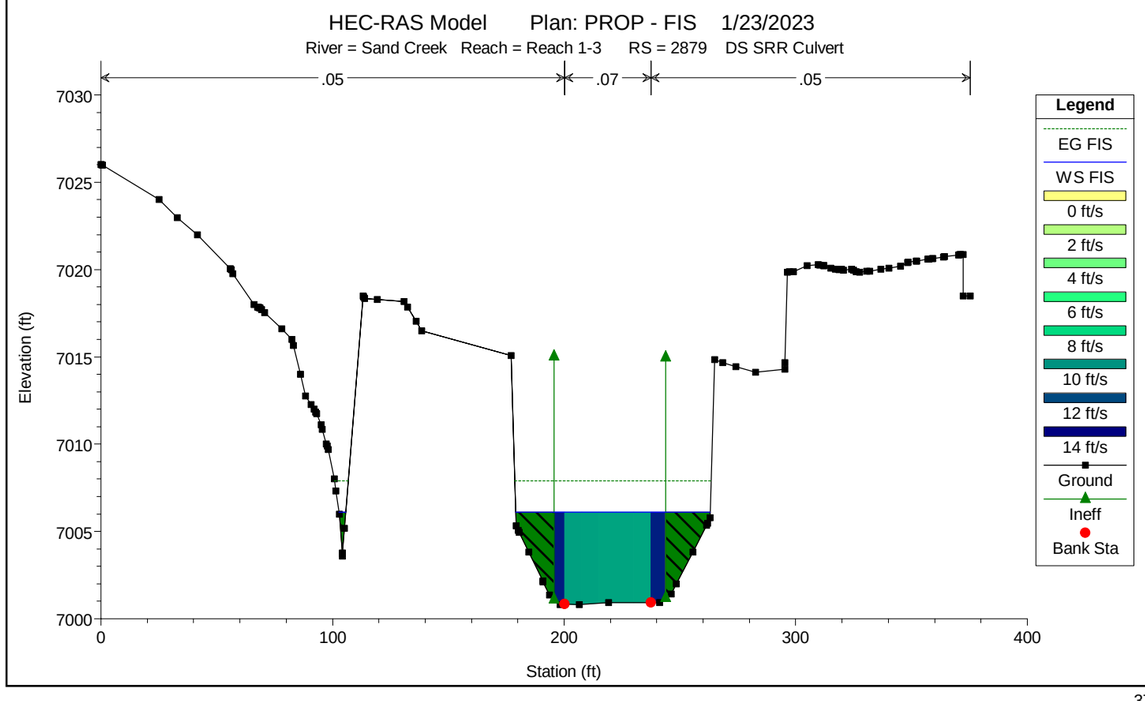

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3103
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

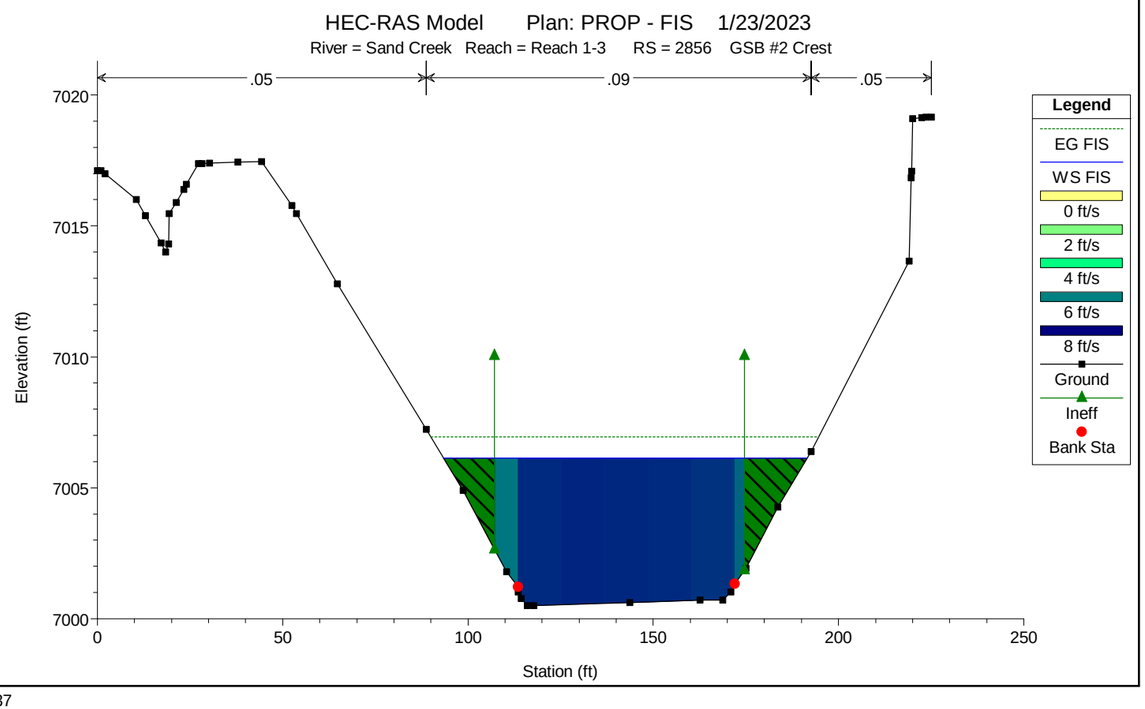

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 3057 Culv
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Ineff
Bank Sta

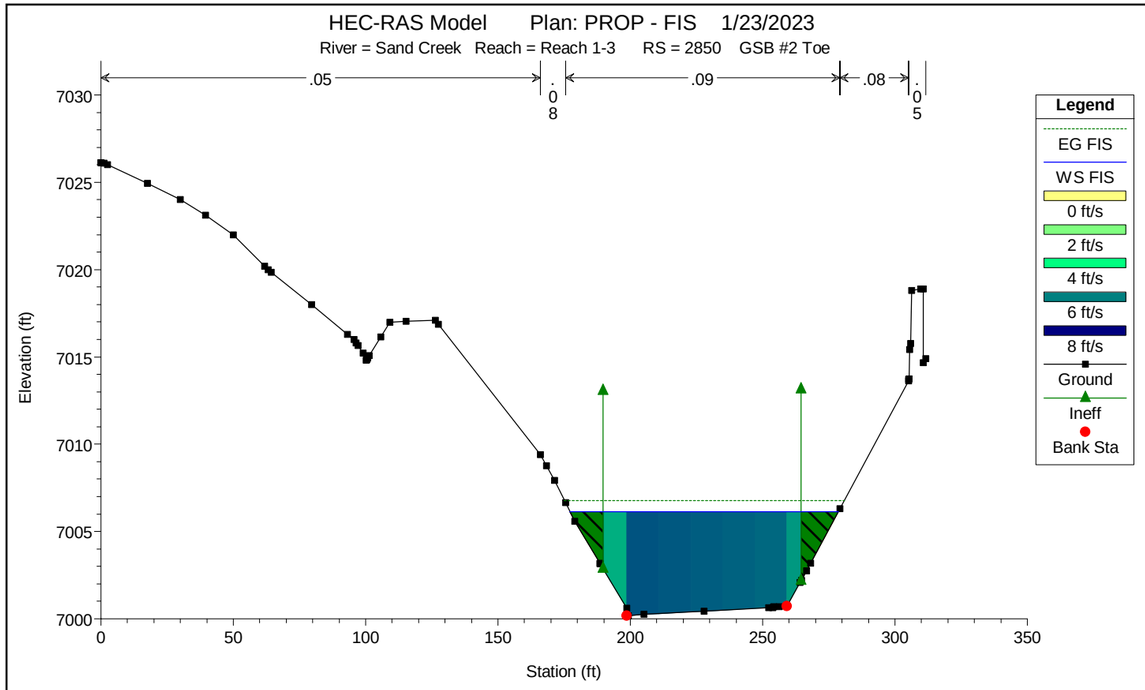

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2988 Pond W-3 Stilling Basin
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta

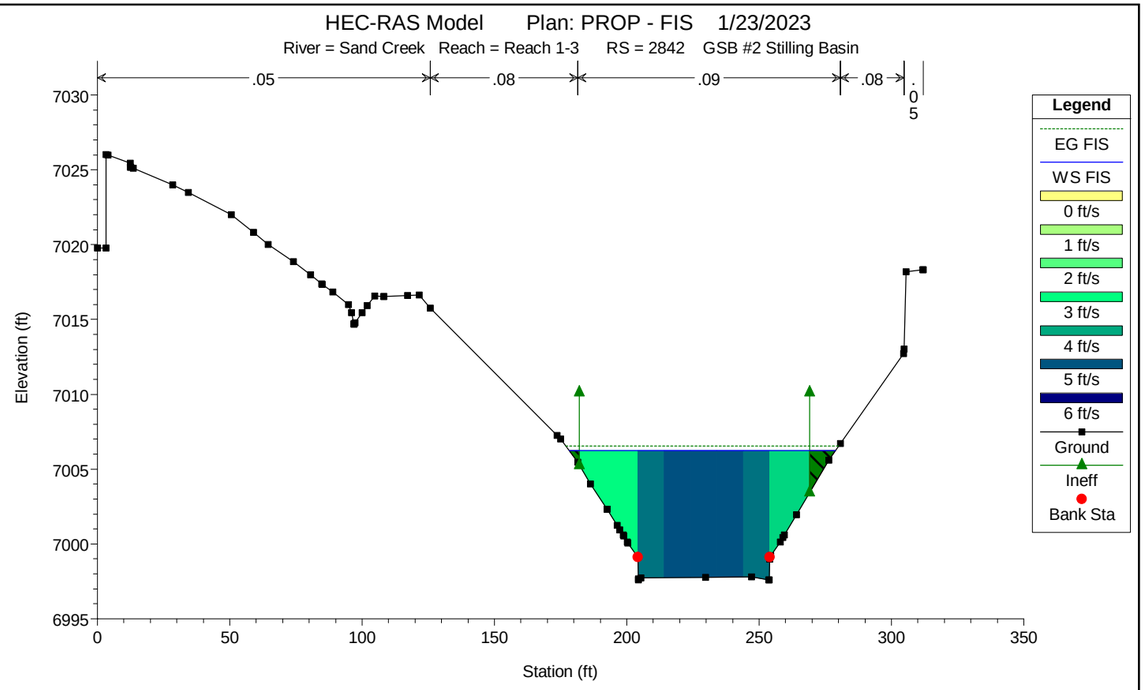

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2975 US SSR Culvert
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

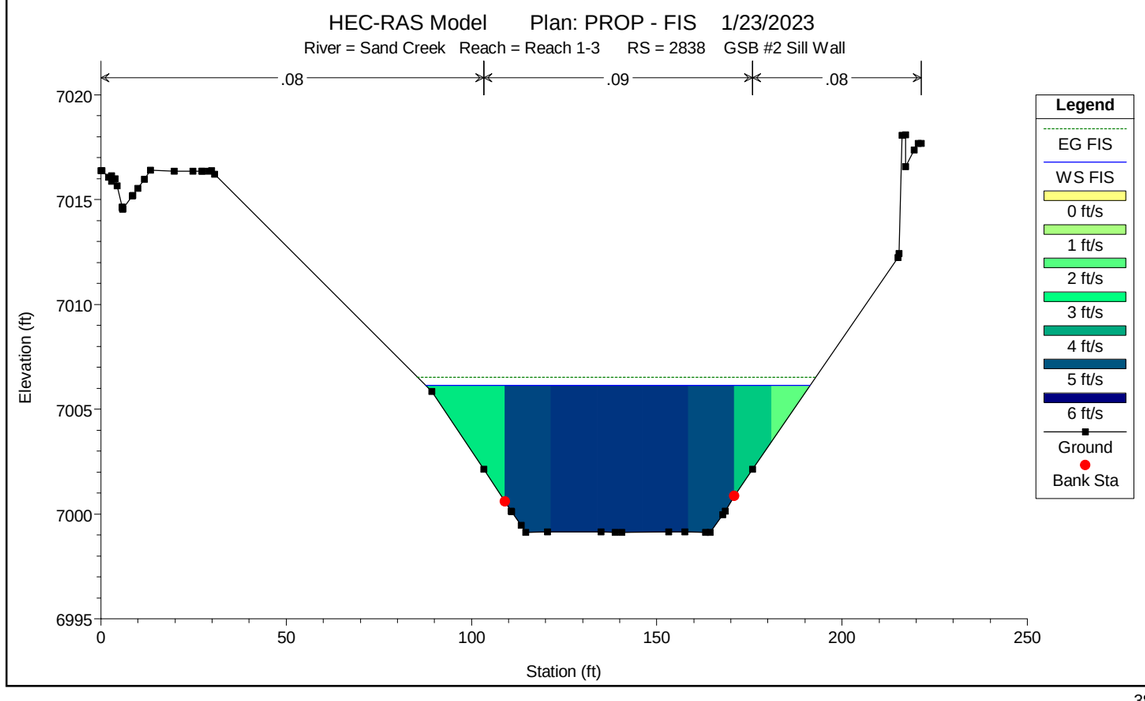

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2930 Culv Sterling Ranch Road
.032
.035
.032
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

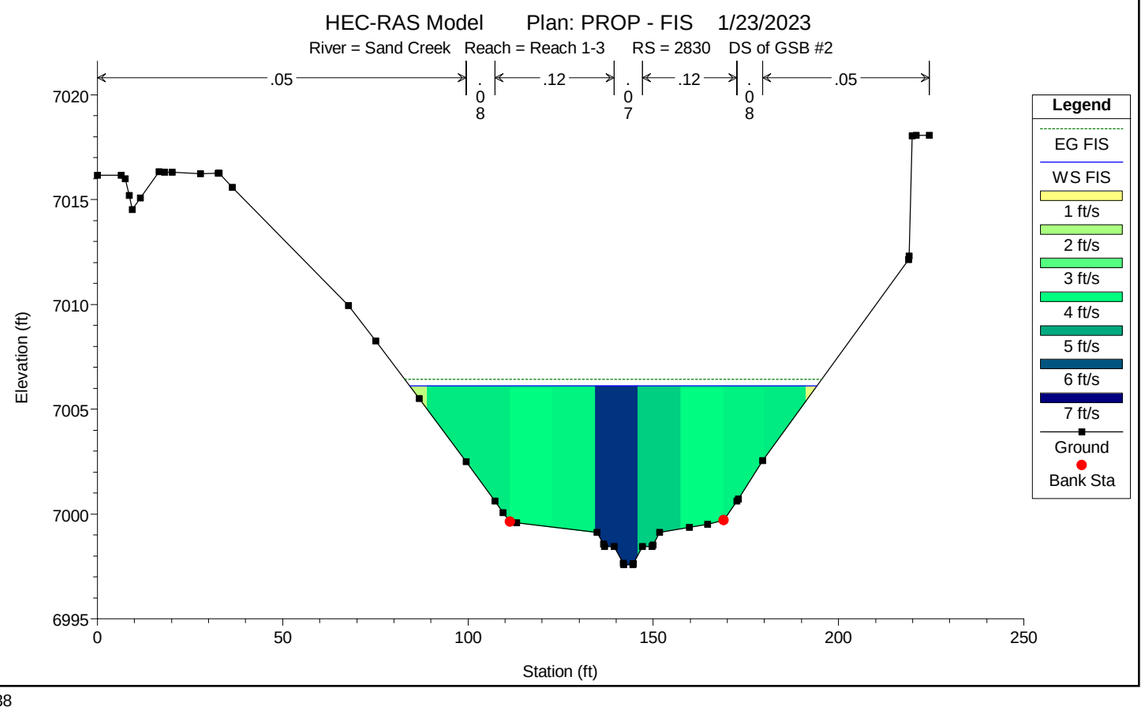

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2879 DS SRR Culvert
.05
.07
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Ineff
Bank Sta

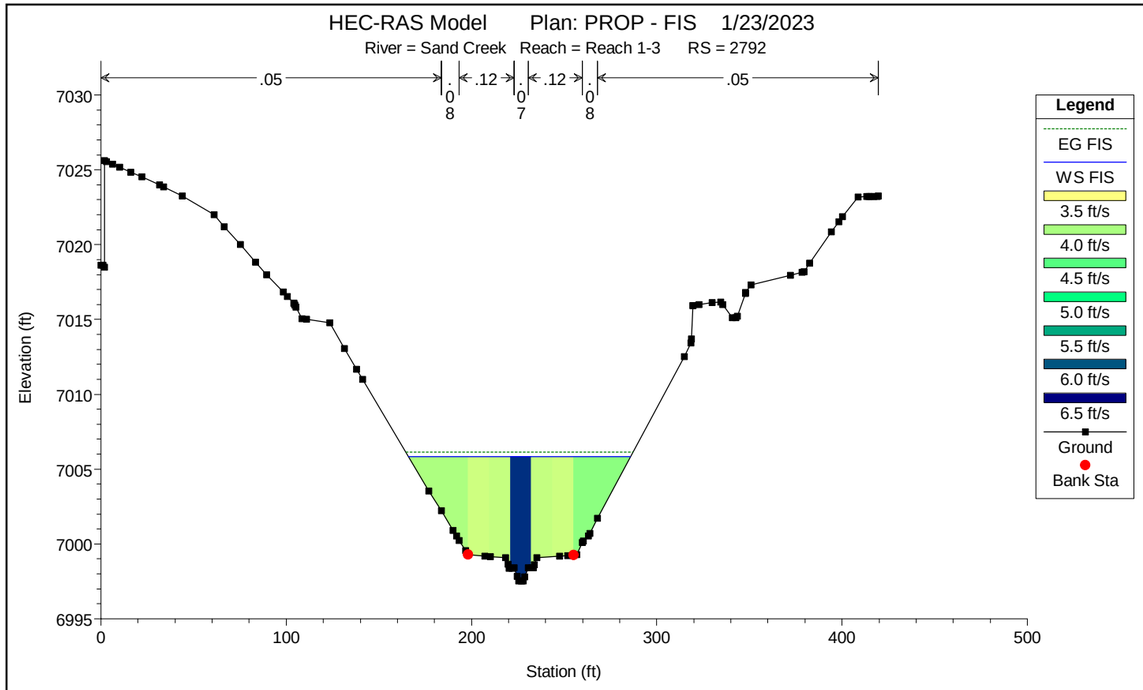

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2856 GSB #2 Crest
.05
.09
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

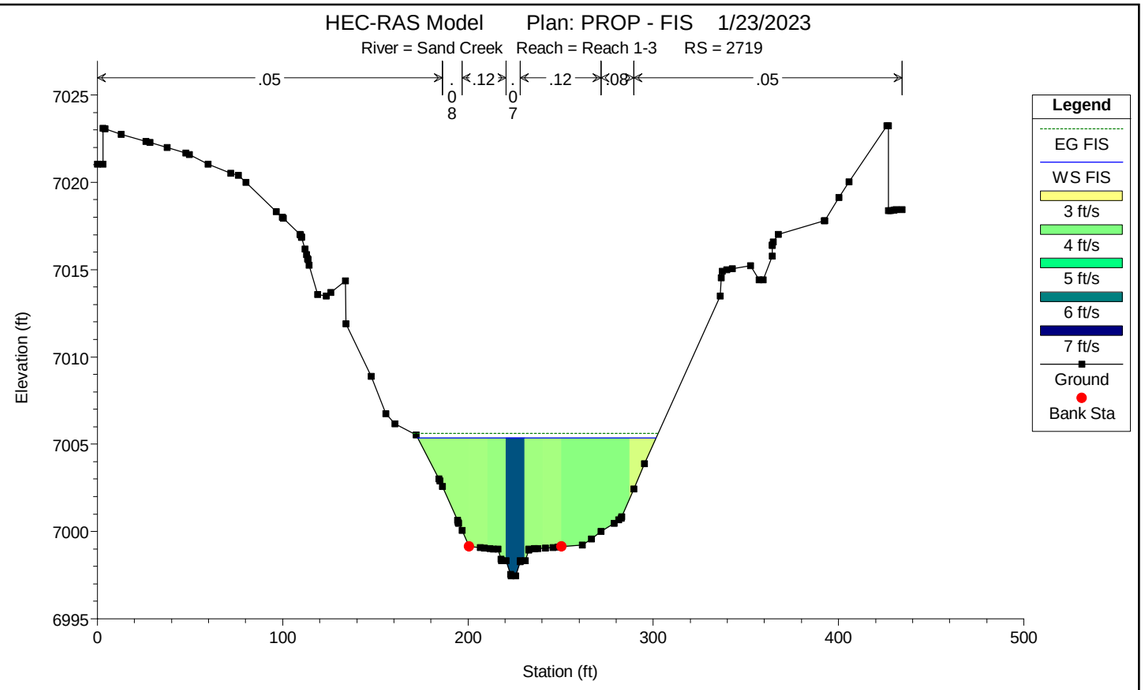

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2850 GSB #2 Toe
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

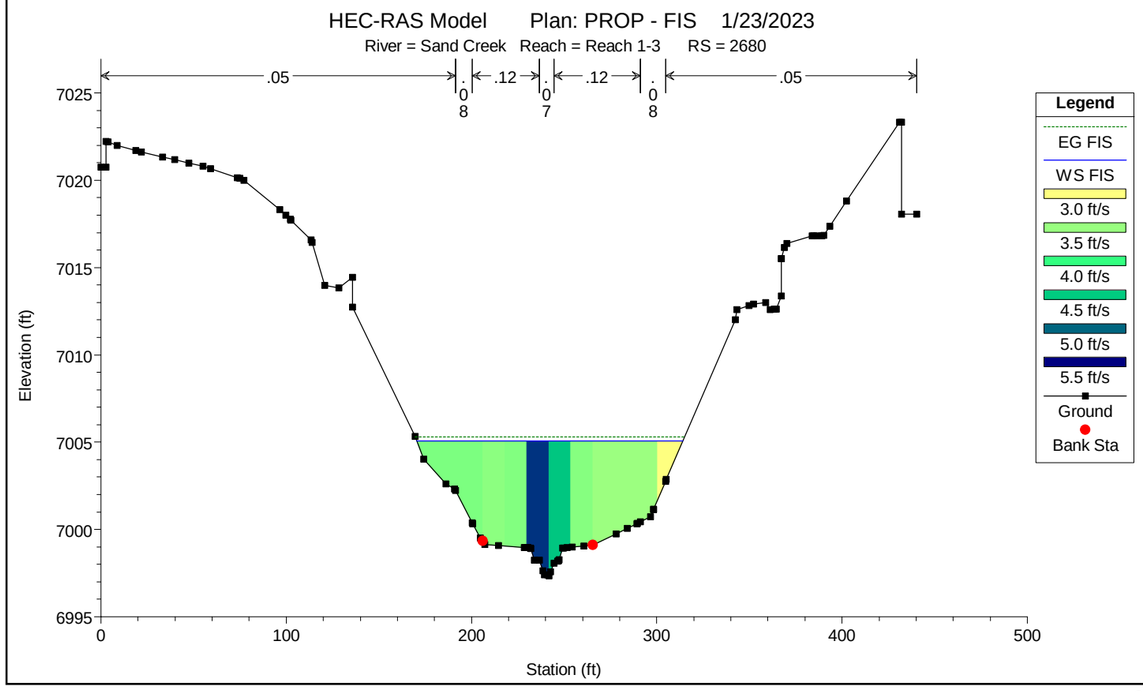

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2842 GSB #2 Stilling Basin
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta

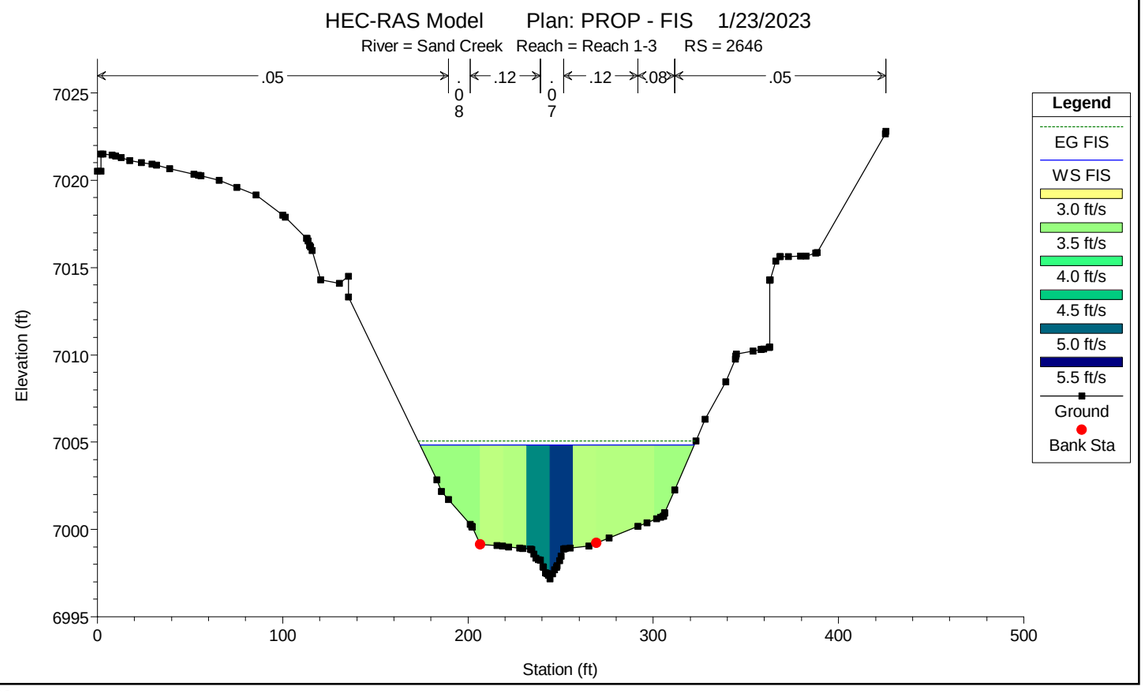

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2838 GSB #2 Sill Wall
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

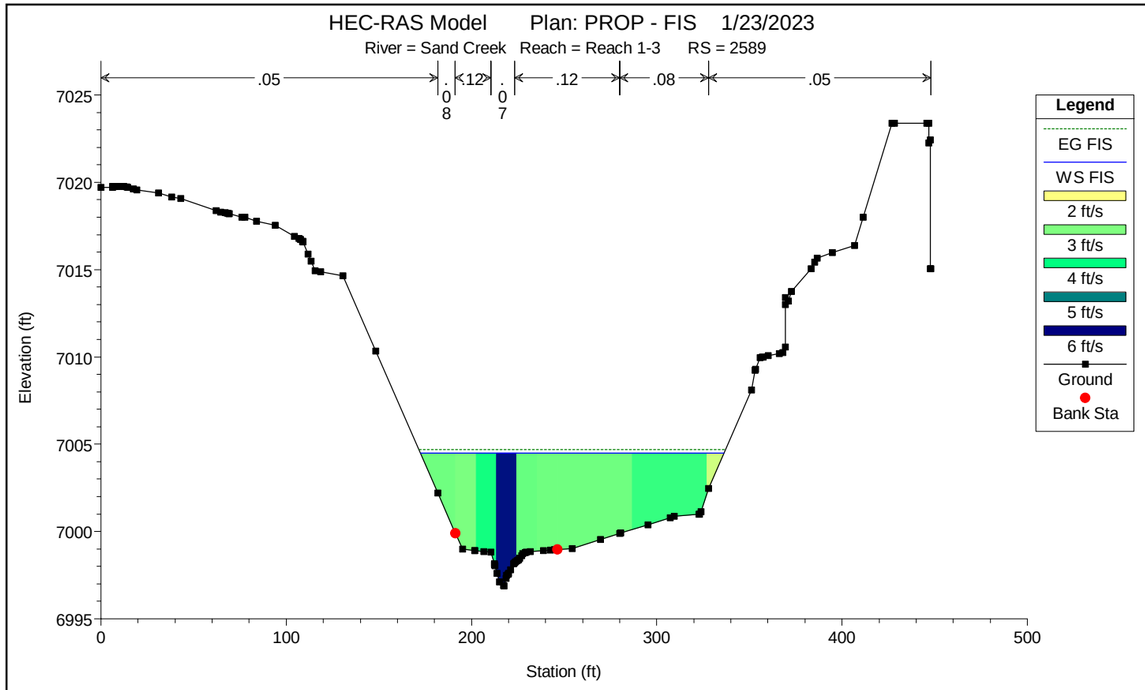

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2830 DS of GSB #2
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

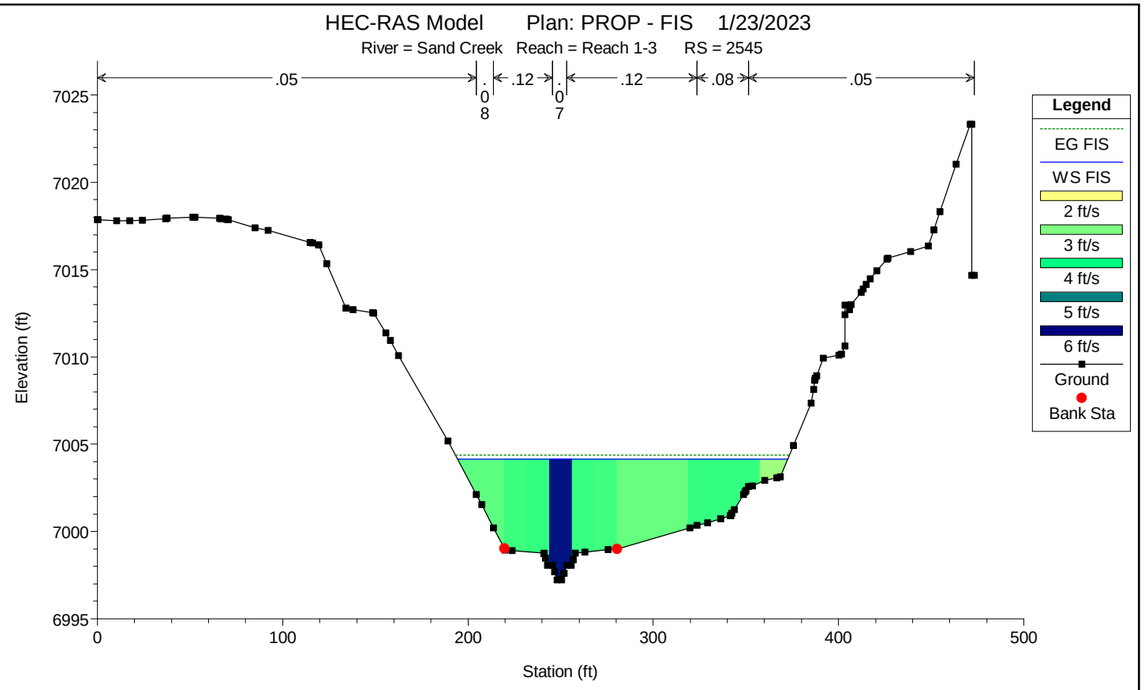

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2792
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
6.5 ft/s
Ground
Bank Sta

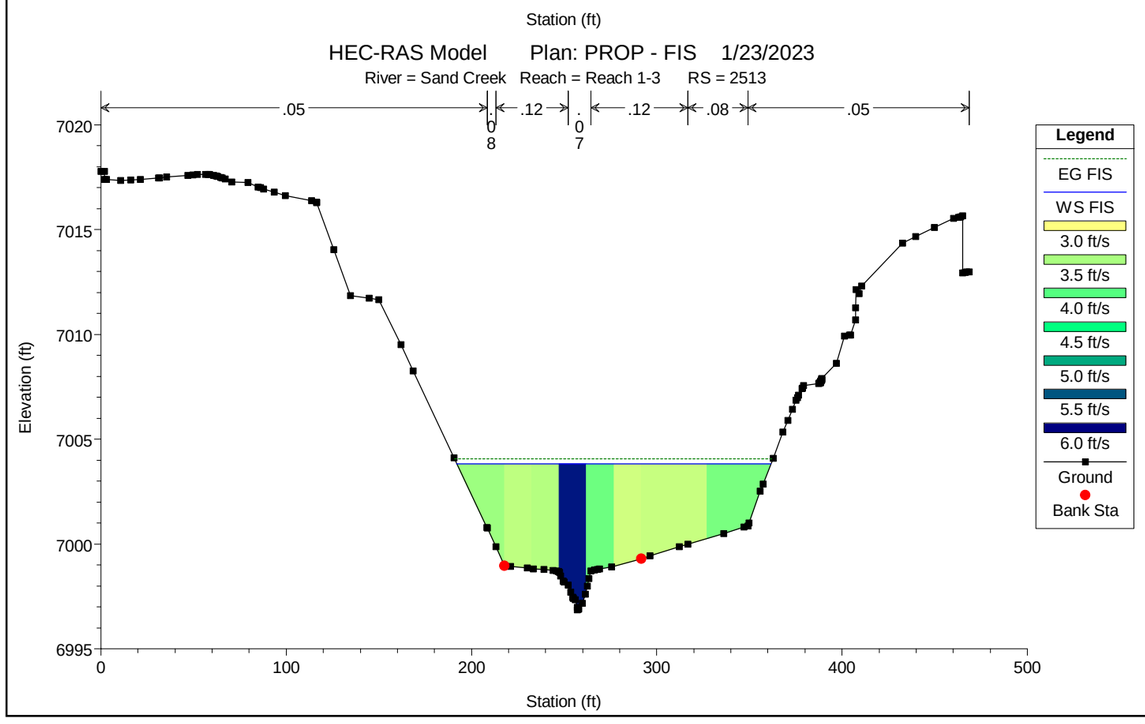

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2719
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

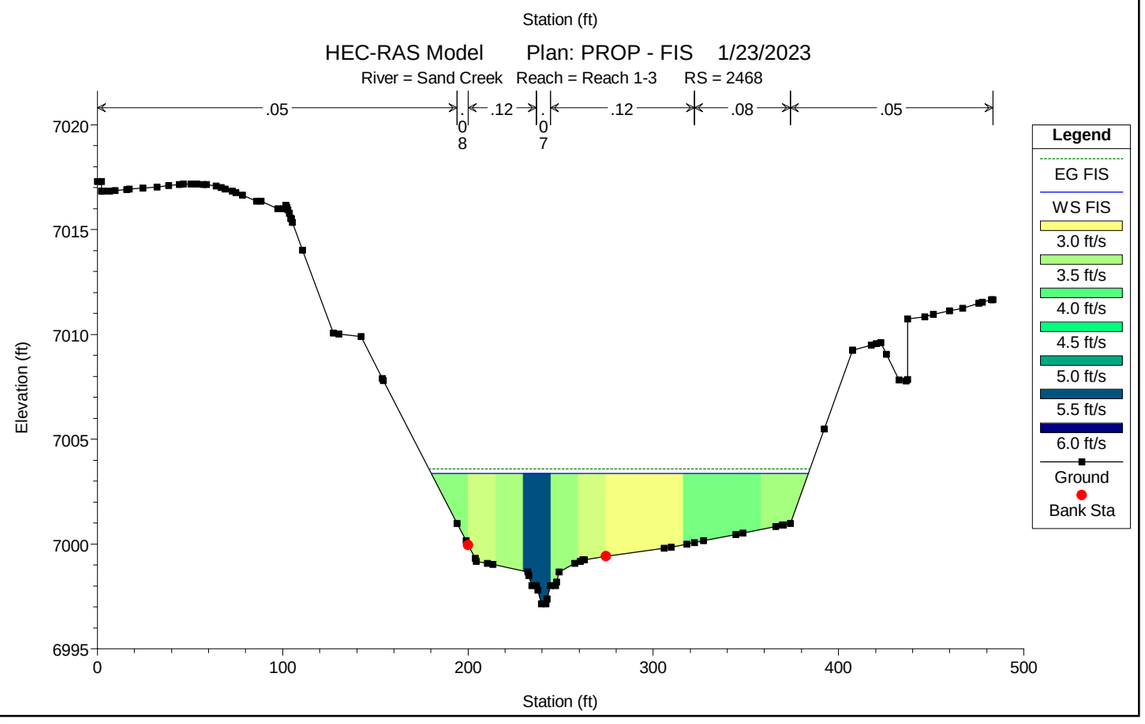

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2680
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
Ground
Bank Sta

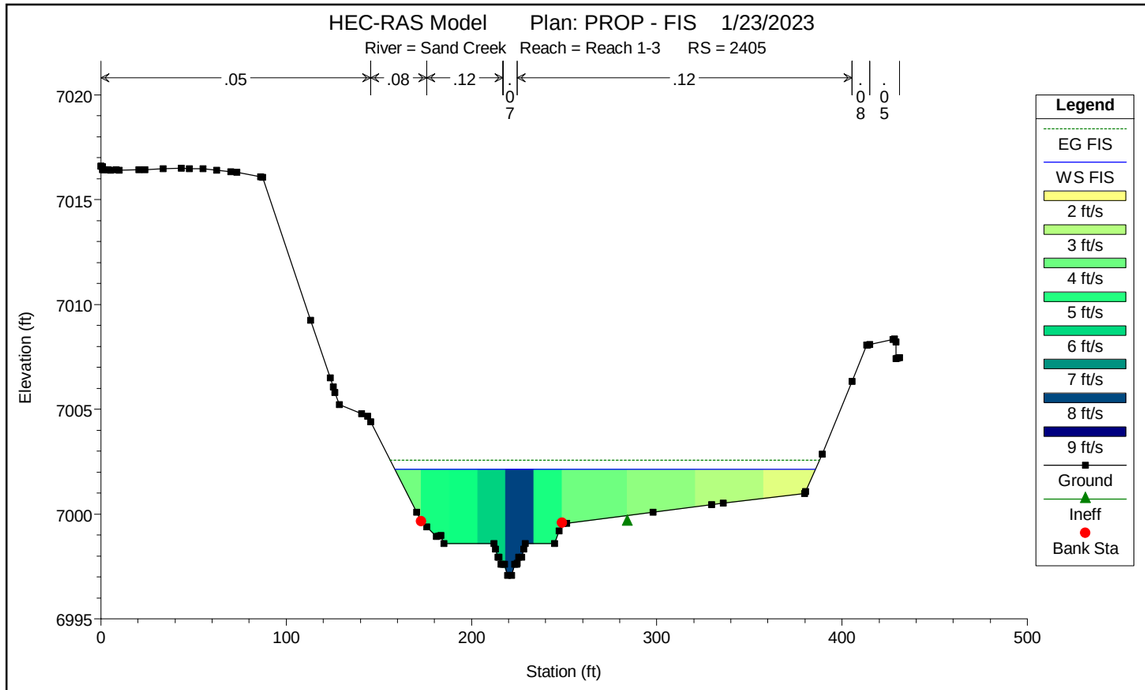

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2646
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
Ground
Bank Sta

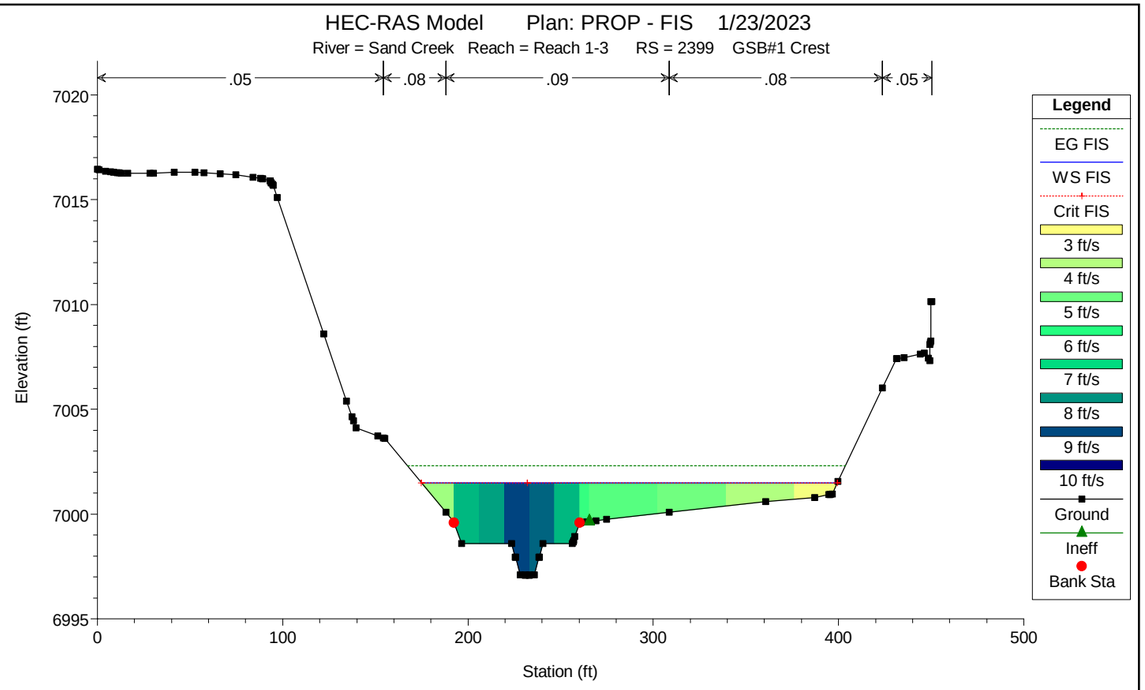

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2589
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

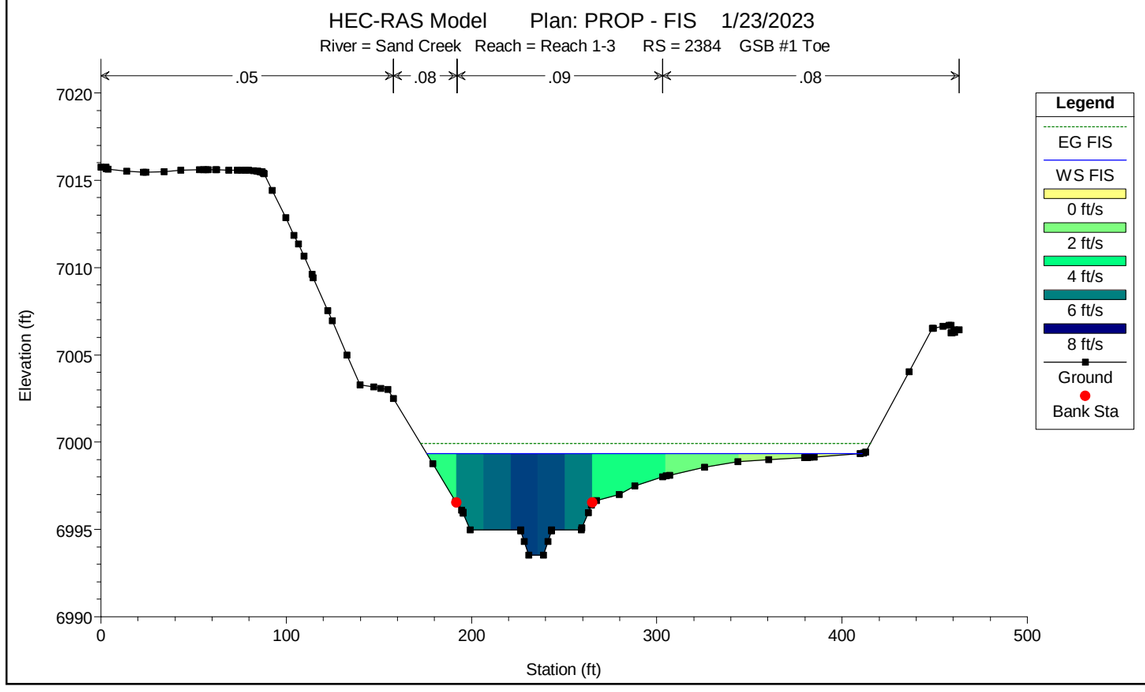

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2545
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

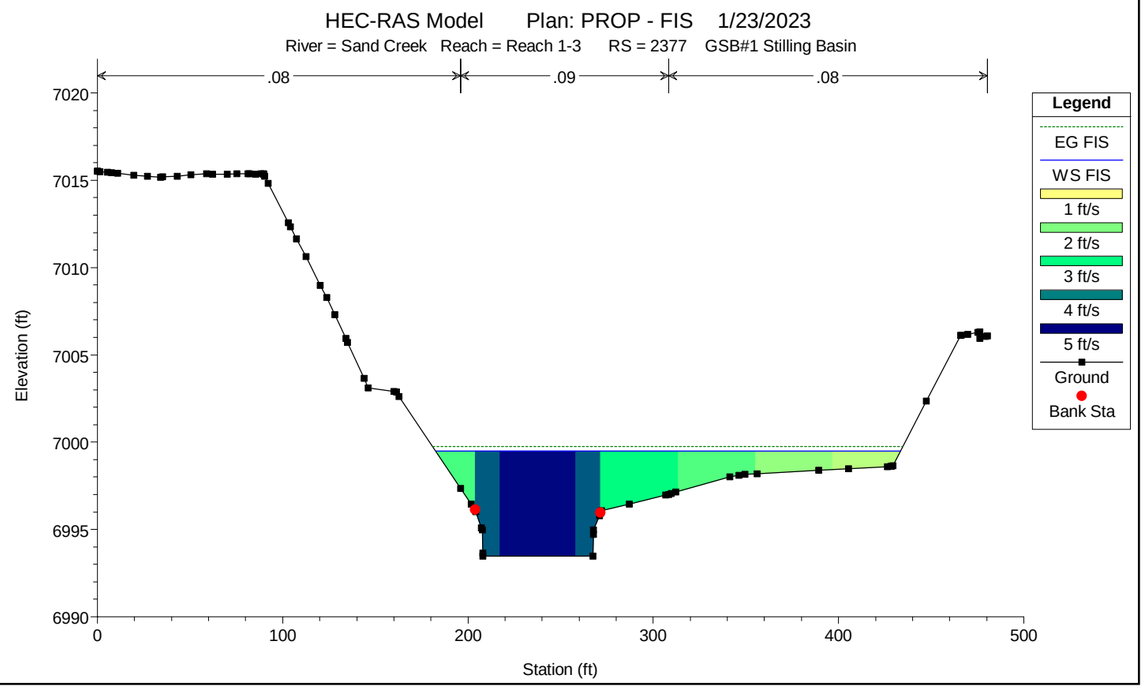

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2513
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
Ground
Bank Sta

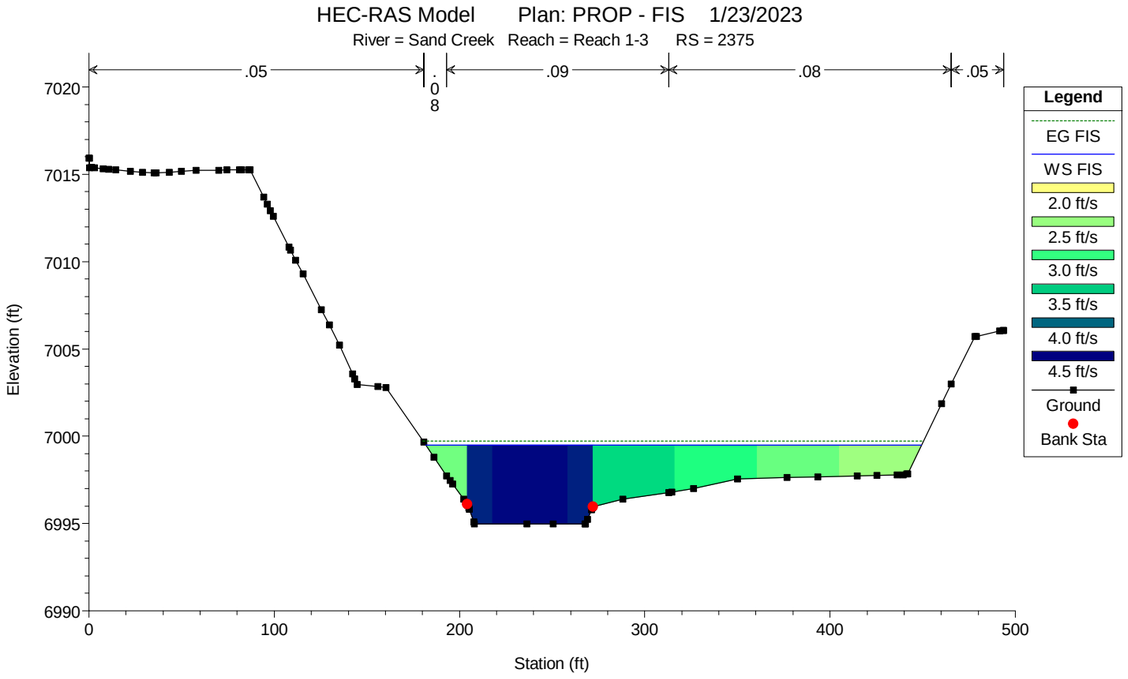

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2468
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
5.5 ft/s
6.0 ft/s
Ground
Bank Sta

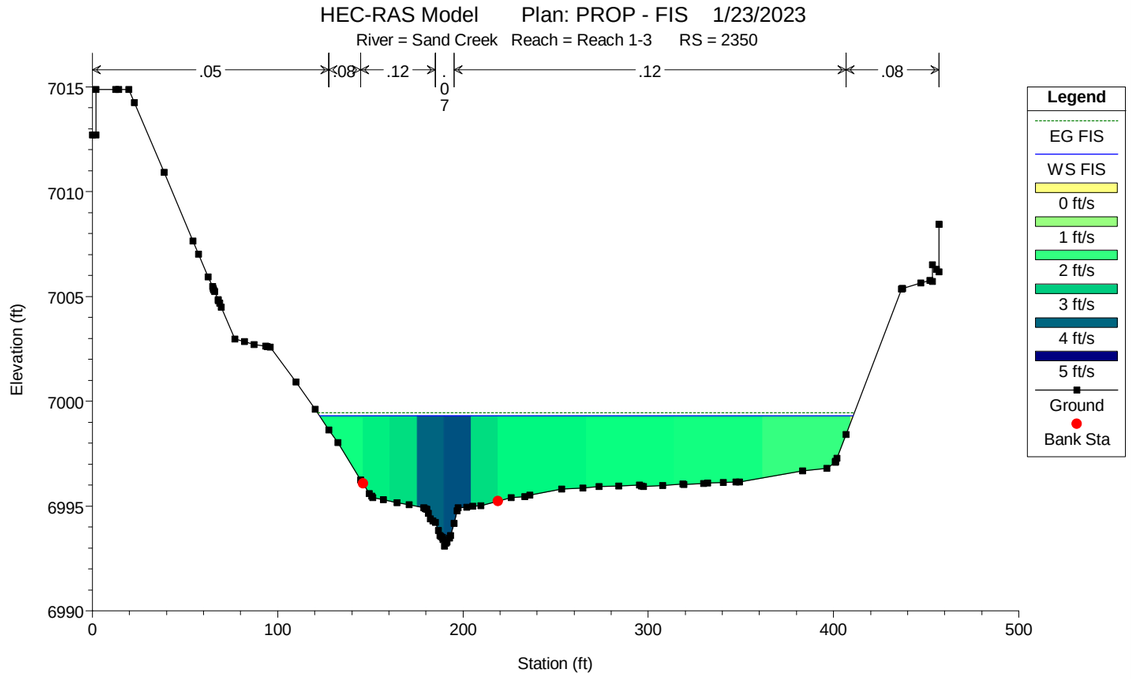

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2405
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Ineff
Bank Sta

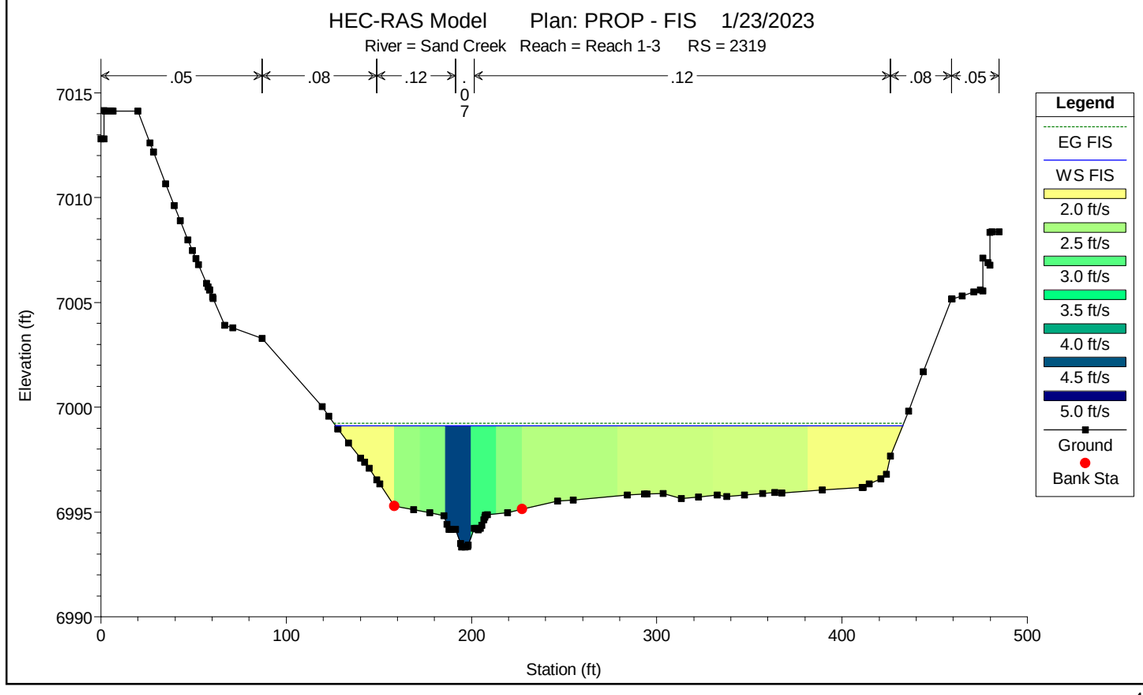

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2399 GSB#1 Crest
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Ineff
Bank Sta

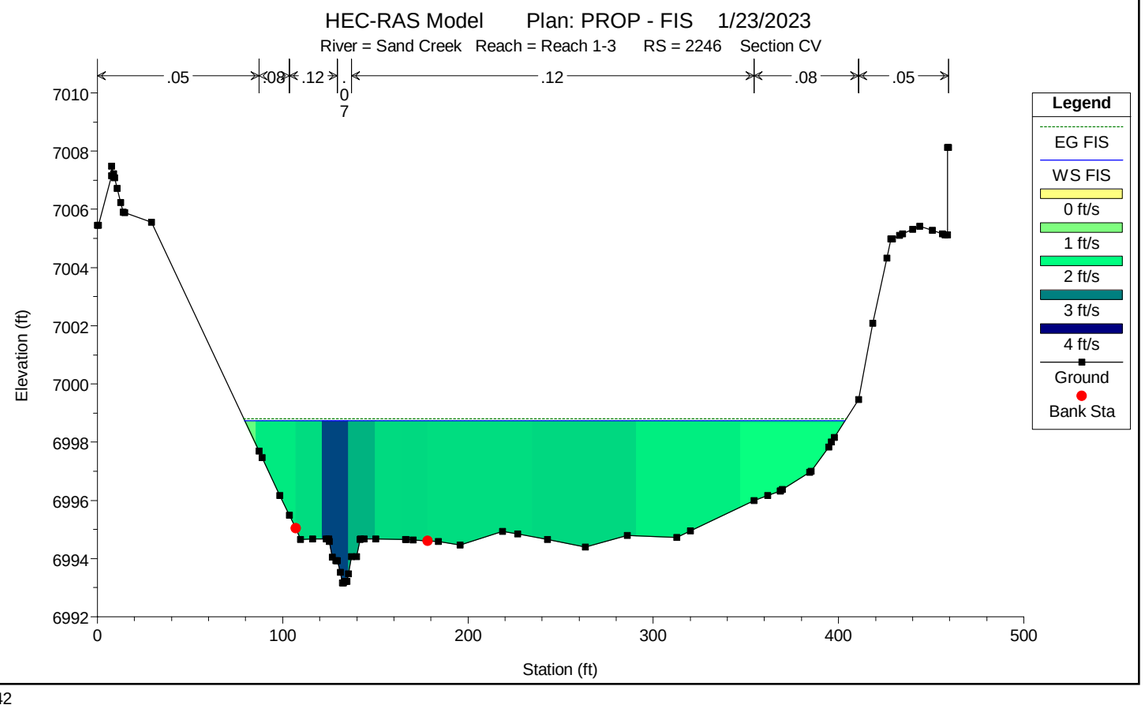

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2384 GSB #1 Toe
.05
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

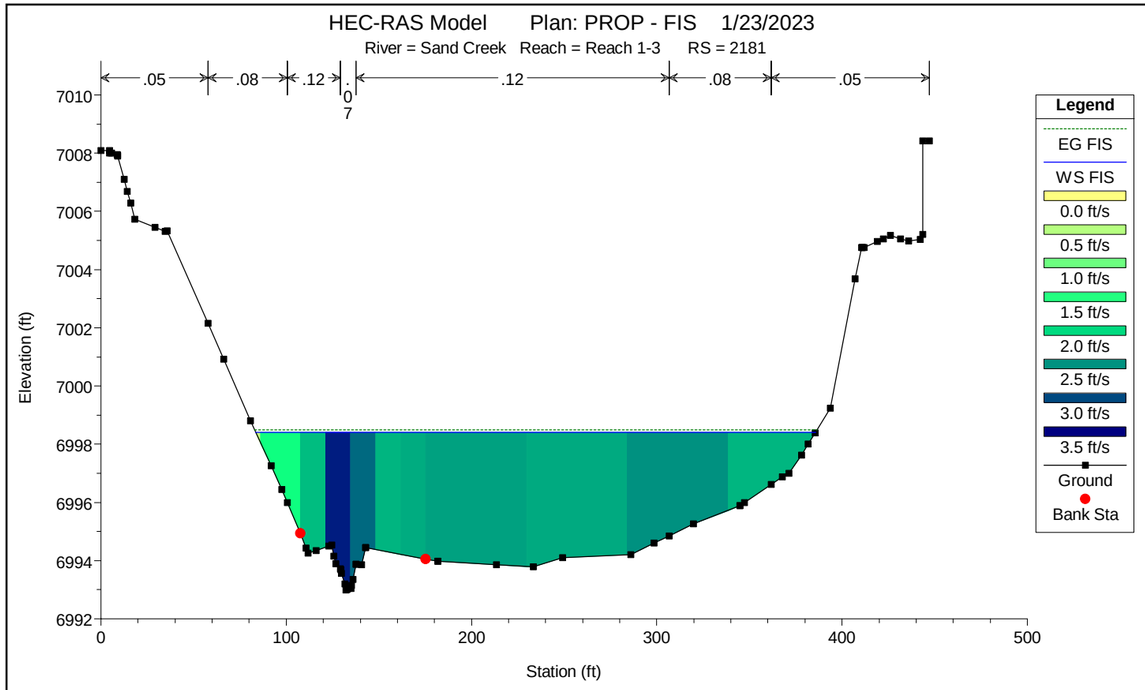

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2377 GSB#1 Stilling Basin
.08
.09
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

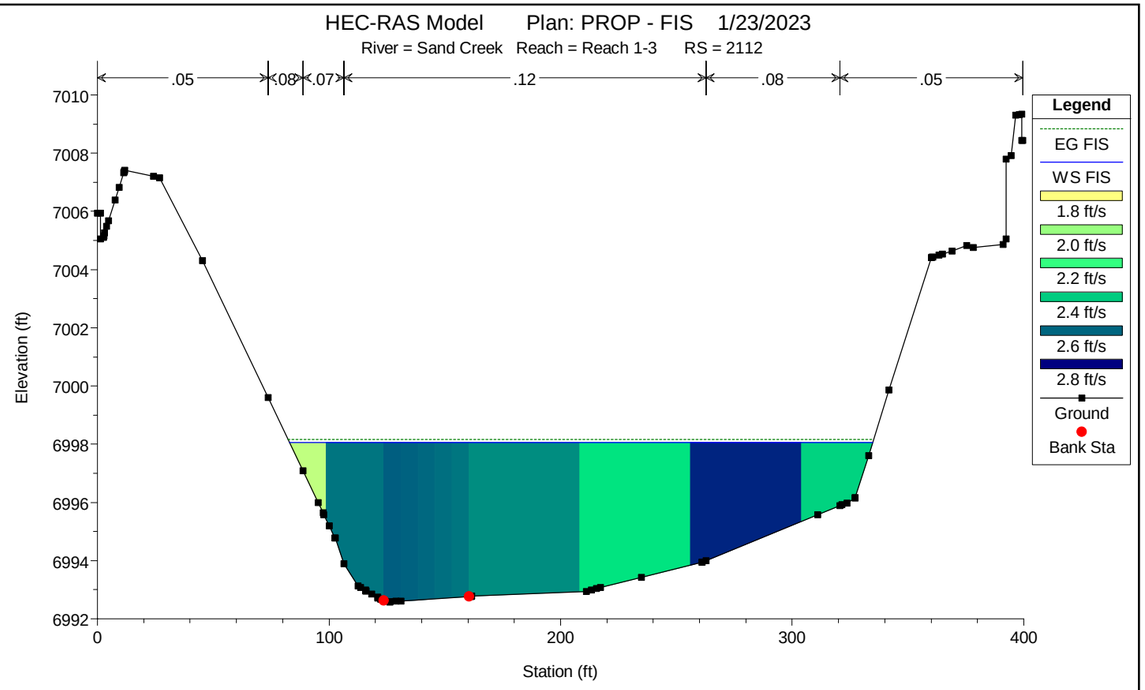

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2375
.05
.08
.09
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

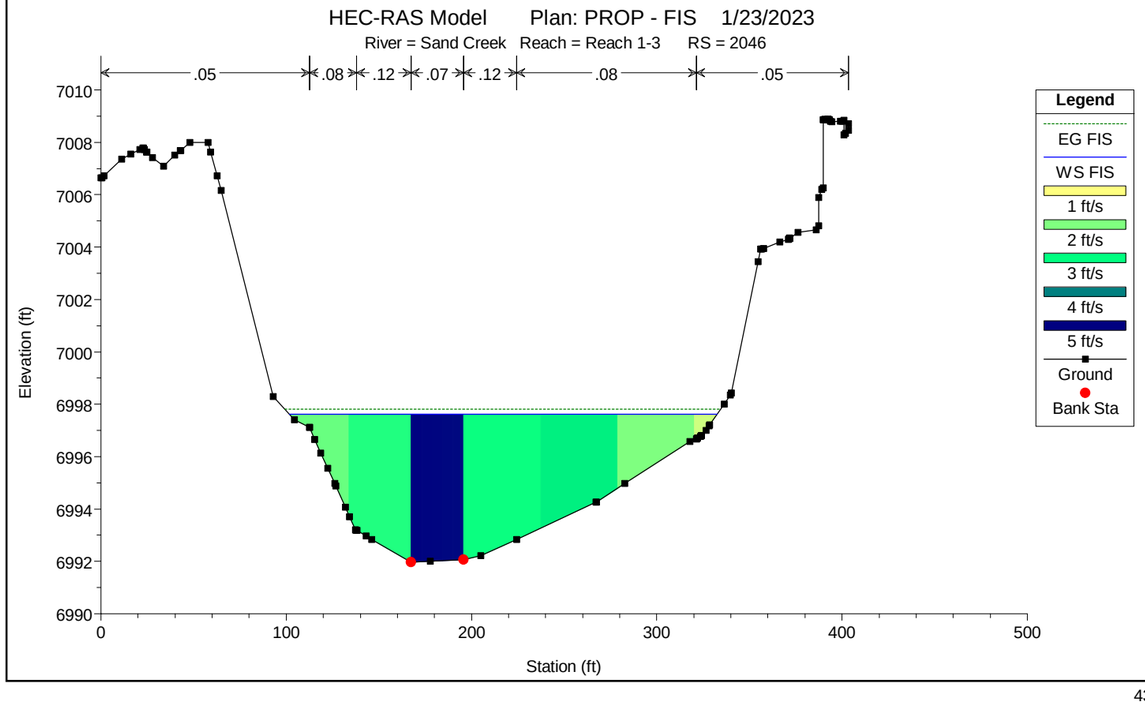

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2350
.05
.08
.12
.12
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

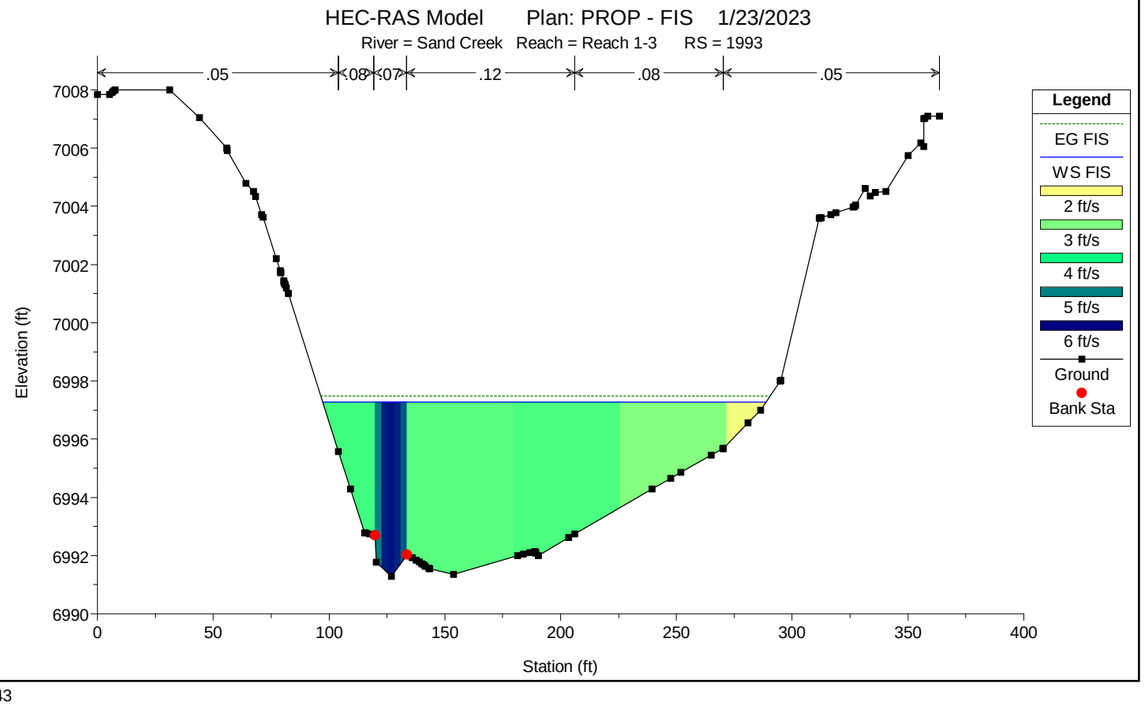

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2319
.05
.08
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
Ground
Bank Sta

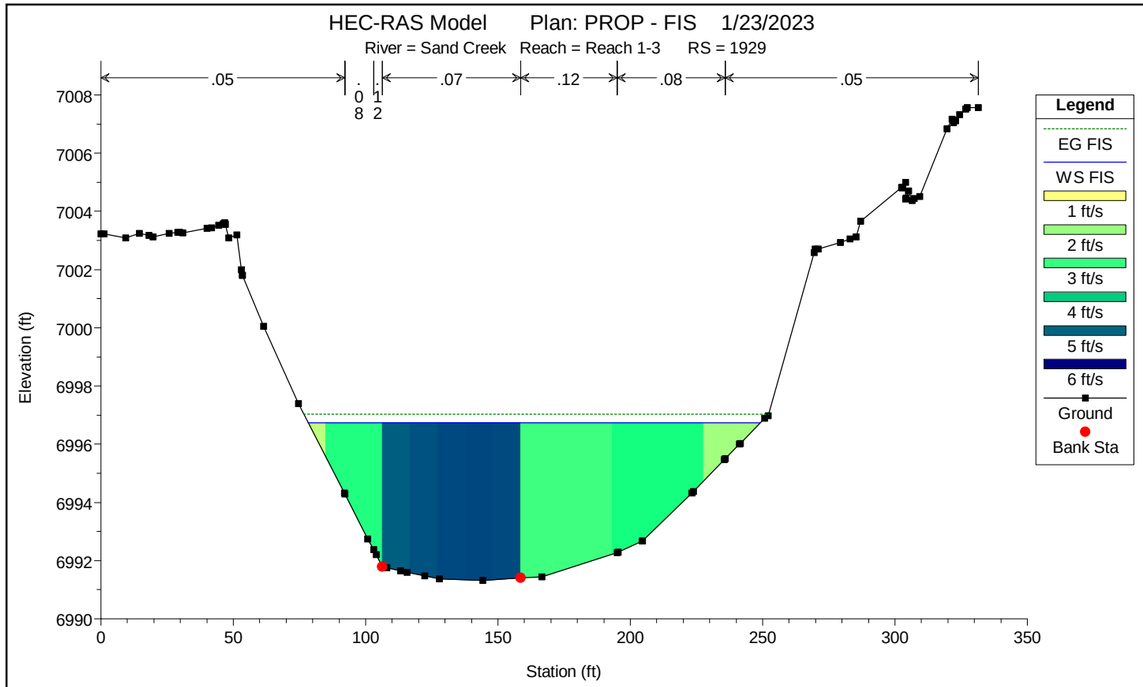

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2246 Section CV
.05
.08
.12
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

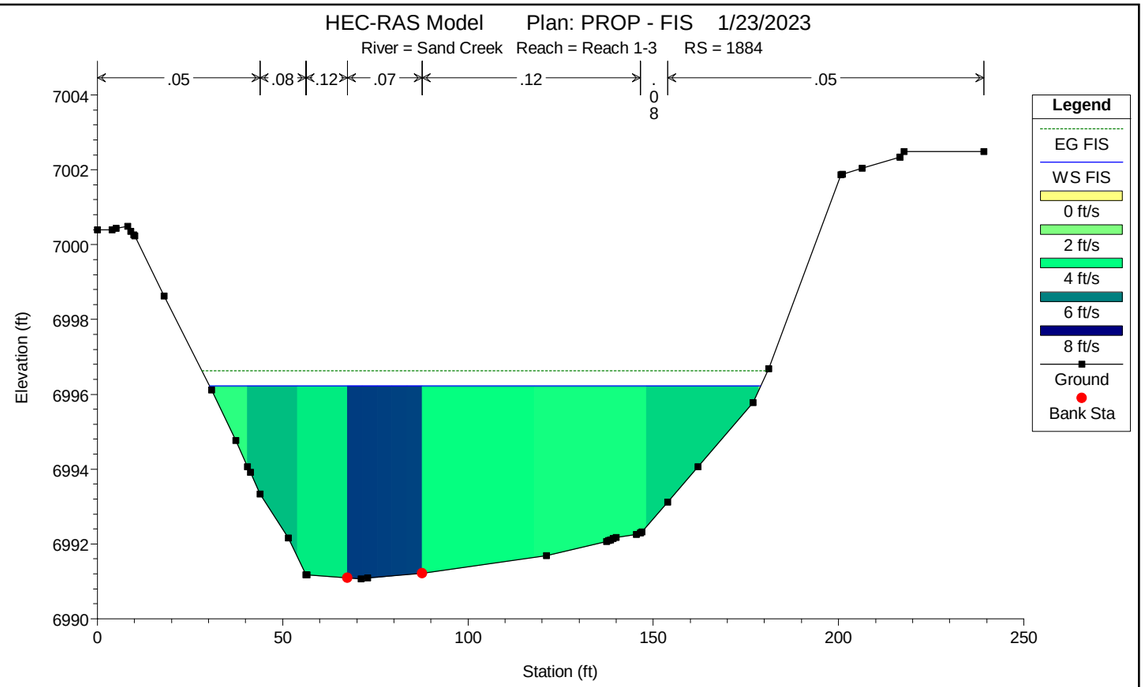

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2181
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

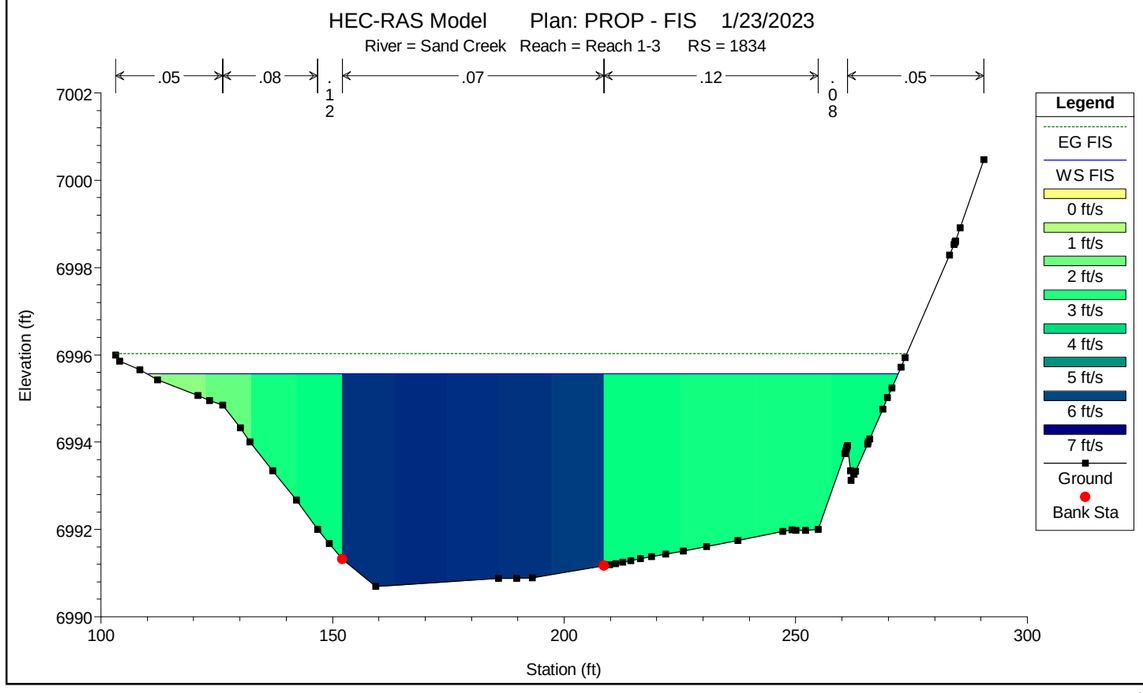

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2112
.05
.08
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1.8 ft/s
2.0 ft/s
2.2 ft/s
2.4 ft/s
2.6 ft/s
2.8 ft/s
Ground
Bank Sta

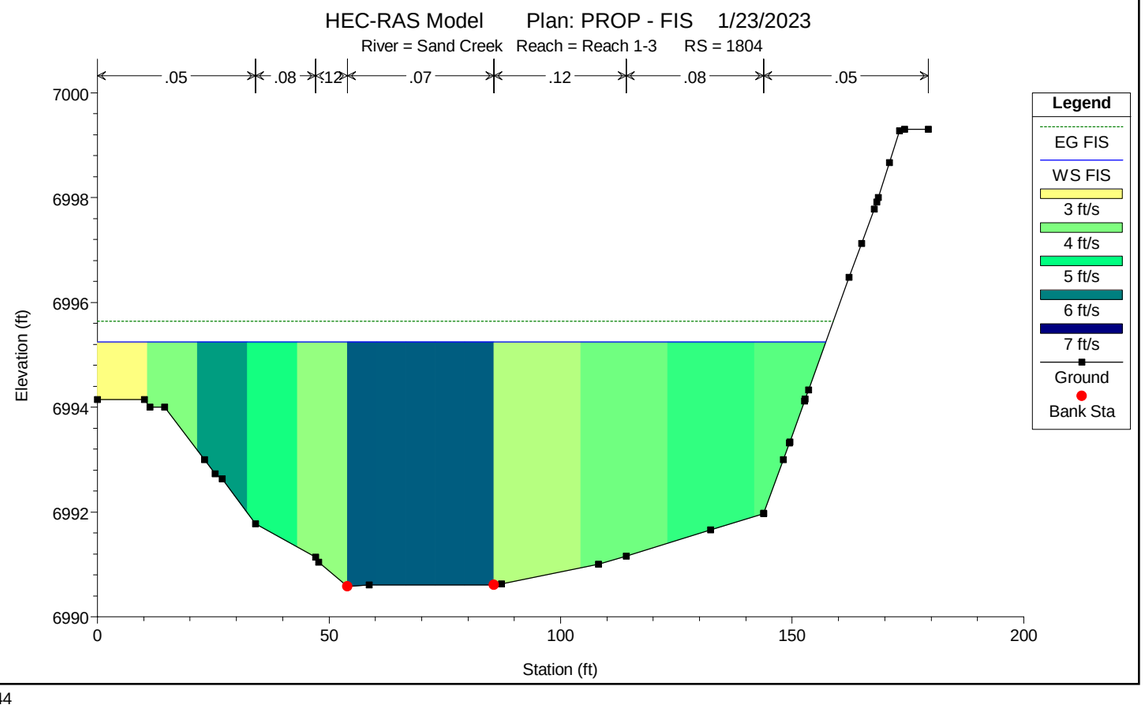

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 2046
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

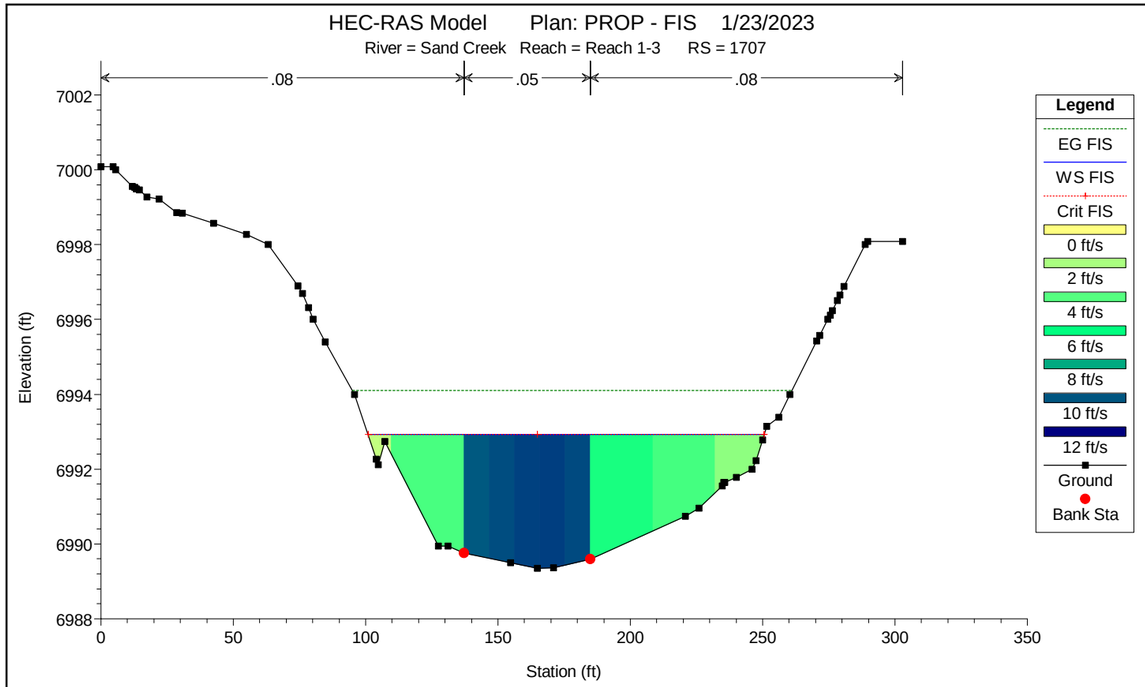

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1993
.05
.08
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

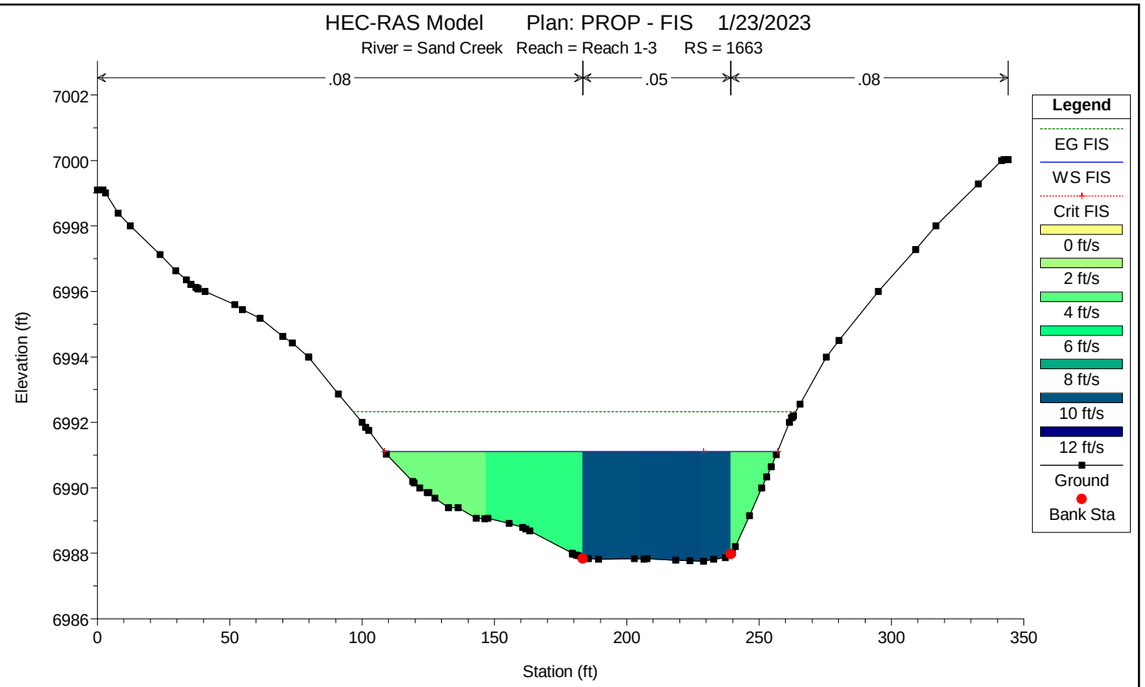

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1929
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

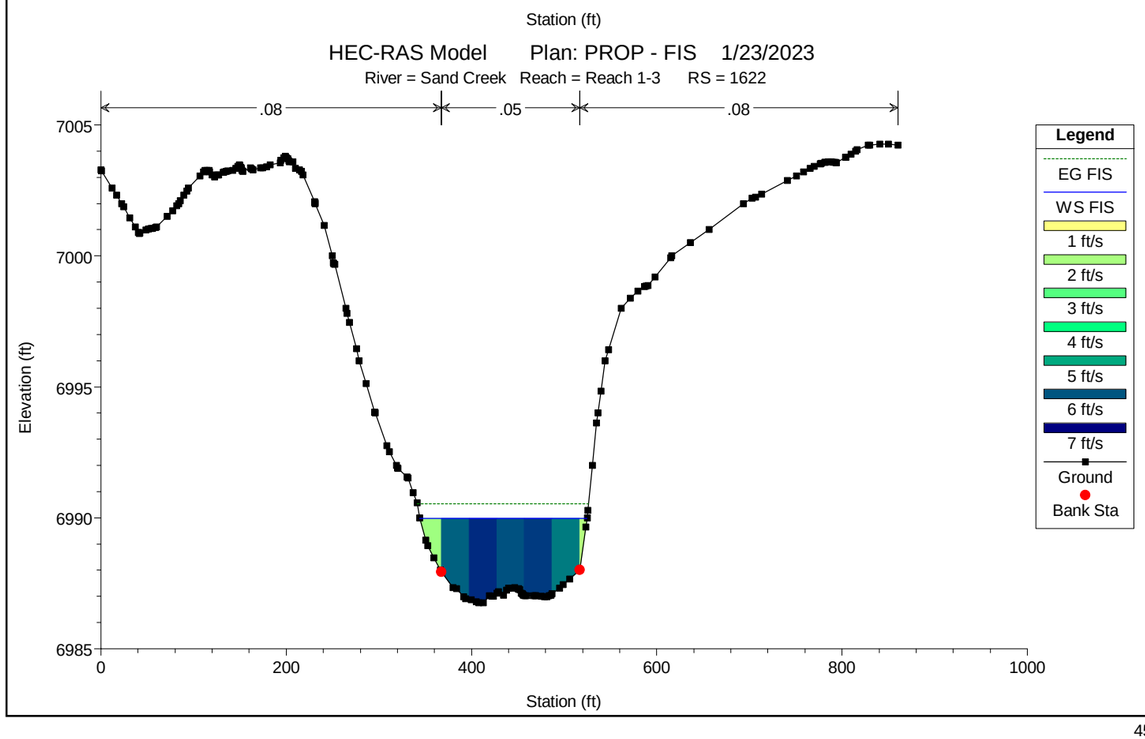

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1884
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

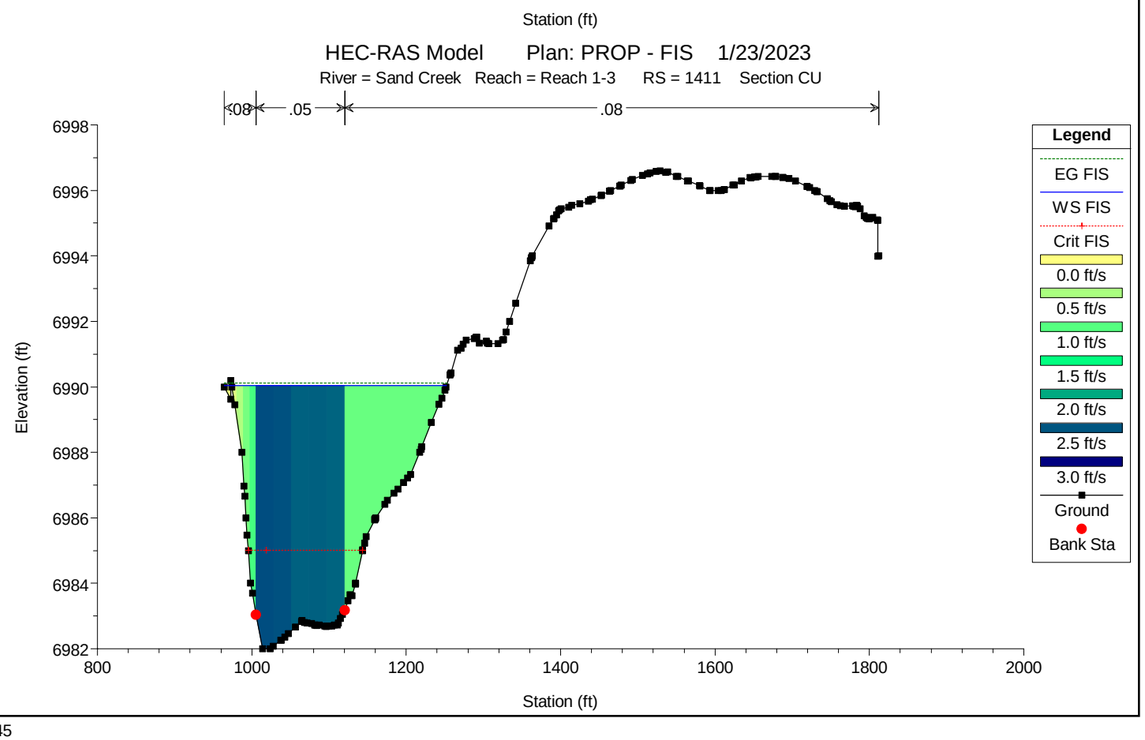

HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1834
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1804
.05
.08
.12
.07
.12
.08
.05
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1707
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1663
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1622
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: PROP - FIS 1/23/2023
River = Sand Creek Reach = Reach 1-3 RS = 1411 Section CU
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
EG FIS
WS FIS
Crit FIS
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta

Subdivision: Sterling Ranch
Project Name: Sand Creek Channel Improvements
Project No.: 25188.04
Calculated By: DJV
Date: January 20, 2023

1) GSB Rock Sizing Calculations

| | | GSB #1 | GSB #2 | GSB #3 | GSB #4 | GSB #5 | GSB #6 | GSB #7 | GSB #8 |
|---|---|---|---|---|---|---|---|---|---|
| [1] | $Q_{100}$ (cfs): | 1562.4 | 1562.4 | 1763.9 | 1763.9 | 1763.9 | 1665.9 | 1643.0 | 1643.0 |
| [2] | $V_c$ (ft/s) | 11.82 | 7.78 | 12.57 | 10.22 | 15.66 | 3.19 | 13.01 | 6.53 |
| [3] | S (ft/ft) | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| [4] | Rock Sizing Parameter | 6.99 | 4.60 | 7.44 | 6.05 | 9.26 | 1.89 | 7.70 | 3.86 |
| [5] | Design Diameter (in): | 48 | 36 | 42 | 36 | 48 | 36 | 48 | 42 |

[1] Channel total flow rate, $Q_{100}$
[2] Critical velocity in drop from HEC-RAS
[3] GSB slope
[4] Rock Sizing Parameter: $R_p = \frac{V_c S^{0.17}}{(S_s\text{-}1)^{0.66}}$ Vc from HEC-RAS model
*Assumed Ss=2.55
[5] Design rock size

**Table HS-5—Boulder Sizes for Various Rock Sizing Parameters**

| Rock Sizing Parameter, $R_p$ | Ungrouted Boulders | | Grouted Boulders * | |
|---|---|---|---|---|
| | Minimum Dimensions of Boulder, $D_r$ | Boulder Classification | Minimum Dimensions of Boulder, $D_r$ | Boulder Classification |
| Less than 4.50 | 18 inches | B18 | 18 inches | B18 |
| 4.50 to 4.99 | 24 inches | B24 | 18 inches | B18 |
| 5.00 to 5.59 | 30 inches | B30 | 24 inches | B24 |
| 5.60 to 6.39 | 36 inches | B36 | 30 inches | B30 |
| 6.40 to 6.99 | 42 inches | B42 | 36 inches | B36 |
| 7.00 to 7.49 | 48 inches | B48 | 42 inches | B42 |
| 7.50 to 8.00 | n/a | n/a | 48 inches | B48 |

* Grouted to no less than ½ the height (+1"/- 0"), no more than ⅓ (+0"/- 1") of boulder height.

Rock Sizing Parameters based on MHFD DCM Volume 2

Subdivision: Sterling Ranch
Project Name: Sand Creek Channel Improvements
Project No.: 25188.04
Calculated By: DJV
Date: January 20, 2023

2) GSB Stilling Basin Calculations

| | | GSB #1 | GSB #2 | GSB #3 | GSB #4 | GSB #5 | GSB #6 | GSB #7 | GSB #8 |
|---|---|---|---|---|---|---|---|---|---|
| [1] | Crest STA: | 23+99.00 | 28+56.00 | 62+23.00 | 70+93.00 | 74+45.00 | 92+56.00 | 96+26.00 | 99+43.00 |
| [2] | $Q_{100}$ (cfs): | 1562.4 | 1562.4 | 1763.9 | 1763.9 | 1763.9 | 1665.9 | 1643.0 | 1643.0 |
| [3] | $V_1$ (ft/s) | 11.25 | 7.78 | 6.54 | 10.22 | 15.66 | 0.95 | 5.18 | 5.73 |
| [4] | $Fr_1$: | 1.44 | 0.79 | 0.62 | 1.18 | 1.99 | 0.06 | 0.48 | 0.51 |
| [5] | $y_1$ (ft): | 3.24 | 3.30 | 4.74 | 3.50 | 3.13 | 7.80 | 4.67 | 4.96 |
| [6] | $y_2$ (ft)(w/o basin): | 3.85 | 3.23 | 3.45 | 3.16 | 3.55 | 2.68 | 3.14 | 3.04 |
| | | | | | | | | | |
| [7] | $L/y_2$: | 4.00 | 4.00 | 4.00 | 4.00 | 4.30 | 4.00 | 4.00 | 4.00 |
| [8] | L (ft): | 15.40 | 12.92 | 13.80 | 12.64 | 15.27 | 10.72 | 12.56 | 12.16 |
| [9] | 0.60L* (ft): | 9.24 | 7.75 | 8.28 | 7.58 | 9.16 | 6.43 | 7.54 | 7.30 |
| [10] | Design Length* (ft): | 10.00 | 10.00 | 15.00 | 12.00 | 15.00 | 15.00 | 15.00 | 15.00 |

[1] Sand Creek ℄ Station
[2] Channel total flow rate, $Q_{100}$
[3] Supercritical velocity from HEC-RAS @ Toe
[4] Supercritical Froude Number from HEC-RAS @ Toe
[5] Supercritical depth from HEC-RAS @ Toe
[6] Sequent depth from HEC-RAS @ crest
[7] Values from Figure "Length in Terms of Sequent Depth of Jumps in Horizontal Channels", USBR, 1955.
[8] Jump Length: Row [7]*Row [6]
[9] Stilling basin to contain minimum of 60% of the hydraulic jump. 60% of Jump Length. 0.60*Row [8].
[10] Proposed stilling basin length.

| | |
|---|---|
| Subdivision: | Sterling Ranch |
| Project Name: | Sand Creek Channel Improvements |
| Project No.: | 25188.04 |
| Calculated By: | DJV |
| Date: | January 20, 2023 |

3) GSB Seepage Calculations

| | | GSB #1 | GSB #2 | GSB #3 | GSB #4 | GSB #5 | GSB #6 | GSB #7 | GSB #8 |
|---|---|---|---|---|---|---|---|---|---|
| [1] | WSEL (ft): | 7000.93 | 7002.75 | 7066.52 | 7079.74 | 7088.67 | 7121.97 | 7132.48 | 7138.71 |
| [2] | Crest Elev (ft): | 6997.08 | 7000.50 | 7063.07 | 7076.86 | 7085.12 | 7119.00 | 7129.34 | 7135.80 |
| [3] | Sill Elev (ft): | 6994.97 | 6999.13 | 7058.72 | 7074.14 | 7081.53 | 7114.00 | 7124.71 | 7132.63 |
| [4] | Drop Height (ft): | 2.11 | 1.37 | 4.35 | 2.72 | 3.59 | 5.00 | 4.63 | 3.17 |
| [5] | U/S Boulder Apron STA: | 24+07.00 | 28+64.00 | 62+31.00 | 71+05.00 | 74+57.00 | 92+51.00 | 96+34.00 | 99+51.00 |
| [6] | Crest STA: | 23+99.00 | 28+56.00 | 62+23.00 | 70+93.00 | 74+45.00 | 92+43.00 | 96+26.00 | 99+43.00 |
| [7] | Toe STA: | 23+84.00 | 28+50.00 | 61+99.00 | 70+73.00 | 74+22.00 | 92+16.00 | 96+00.00 | 99+26.00 |
| [8] | Sill STA: | 23+75.00 | 28+38.00 | 61+82.00 | 70+61.00 | 74+06.00 | | 95+84.00 | 99+10.00 |
| [9] | Total Length (ft): | 32.0 | 26.0 | 49.00 | 44.00 | 51.00 | 35.00 | 50.00 | 41.00 |
| [10] | Boulder Diameter (ft): | 4.0 | 3.0 | 3.5 | 3.0 | 4.0 | 3.0 | 4.0 | 3.5 |
| [11a] | Minimum Seepage Cutoff Depth (ft): | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| [11b] | Cutoff Wall depth (ft): | 6.0 | 8.0 | 10.0 | 14.0 | 15.0 | 13.0 | 10 | 16 |
| [12] | Sill Diameter (ft): | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 |
| [13] | $L_V$ (ft)= | 18.0 | 21.0 | 25.5 | 33.0 | 36.0 | 31.0 | 27.0 | 38.5 |
| [14] | $L_H$ (ft)= | 36.00 | 29.00 | 52.50 | 47.00 | 55.00 | 38.00 | 54.00 | 44.50 |
| [15] | $H_S$ (ft)= | 5.96 | 3.62 | 7.80 | 5.60 | 7.14 | 7.97 | 7.77 | 6.08 |
| [16] | $C_W$= | 5.0 | 8.5 | 5.5 | 8.7 | 7.6 | 5.5 | 5.8 | 8.8 |

[1] Water surface elevation at drop crest from HEC-RAS
[2] Finish grade Elevation at drop crest
[3] Finish grade Elevation at top of sill wall
[4] Total drop height along flow path crest to toe Row[2]-Row[3]
[5] Sand Creek ℄ Station
[6] Sand Creek ℄ Station
[7] Sand Creek ℄ Station
[8] Sand Creek ℄ Station
[9] Total Horizontal length along drop Row[5]-Row[7]
[10] Grouted boulder $D_{50}$
[11a] Minimum Seepage Cutoff Depth. Max of 0.80*Hd or 4'.
[11b] Sheet Pile Cutoff Wall depth below grouted boulders
[12] Sill wall boulder diameter
[13] Vertical Distance for Lane's Creep Method Row[9]+2*Row[10]+Row[11]
[14] Horizontal Distance for Lane's Creep Method Row[8]+Row[9]
[15] Differential Head between analysis points for Lane's Creep Method
[16] Creep Ratio (Row[13]/3+Row[12])/Row[14]

**Table 8-3. Lane's Weighted Creep: Recommended Minimum Ratios**

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

Subdivision: Sterling Ranch
Project Name: Sand Creek Channel Improvements
Project No.: 25188.04
Calculated By: DJV
Date: January 20, 2023

4) GSB Bouyancy Calculations

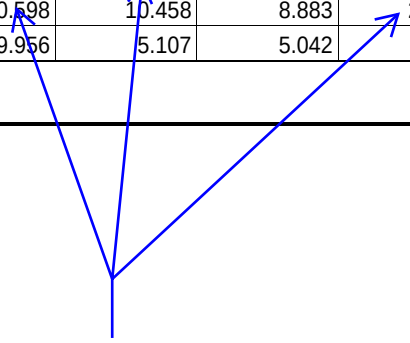
| | | GSB #1 | GSB #2 | GSB #3 | GSB #4 | GSB #5 | GSB #6 | GSB #7 | GSB #8 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| [1] | U/S Boulder Apron STA: | 24+07.00 | 28+64.00 | 62+31.00 | 71+05.00 | 74+57.00 | 92+51.00 | 96+34.00 | 99+51.00 |
| [2] | Toe STA: | 23+84.00 | 28+50.00 | 61+99.00 | 70+73.00 | 74+22.00 | 92+16.00 | 96+00.00 | 99+26.00 |
| [3] | Sill STA: | 23+75.00 | 28+38.00 | 61+82.00 | 70+61.00 | 74+06.00 | | 95+84.00 | 99+10.00 |
| [4] | Total Length (ft): | 32.0 | 26.0 | 49.00 | 44.00 | 51.00 | 35.00 | 50.00 | 41.00 |
| [5] | Boulder Diameter (ft): | 4.0 | 3.0 | 3.5 | 3.0 | 4.0 | 3.0 | 4.0 | 3.5 |
| [6] | GSB Area (sf): | 1,943 | 1,691 | 1,816 | 2,716 | 2,972 | 2,440 | 2156.0 | 2707.0 |
| [7] | Sill Diameter (ft): | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 |
| | | | | | | | | | |
| [8] | Total GSB Volume (cu ft): | 7,772 | 5,073 | 6,356 | 8,148 | 11,888 | 7,320 | 8,624 | 9,475 |
| [9] | Total GSB Weight (lbs): | 1,165,800 | 760,950 | 953,400 | 1,222,200 | 1,783,200 | 1,098,000 | 1,293,600 | 1,421,175 |
| [10] | Displaced Water Weight (lbs): | 484,973 | 316,555 | 396,614 | 508,435 | 741,811 | 456,768 | 538,138 | 591,209 |
| [11] | Bouyant Force (lbs): | -680,827 | -444,395 | -556,786 | -713,765 | -1,041,389 | -641,232 | -755,462 | -829,966 |

[1] Sand Creek ℄ Station
[2] Sand Creek ℄ Station
[3] Sand Creek ℄ Station
[4] Total Horizontal length along drop Row[1]-Row[3]
[5] Grouted boulder $D_{50}$
[6] Area of GSB structure
[7] Sill wall boulder diameter
[8] GSB volume Row[5]*Row[6]
[9] GSB Weight Row[8]*150 pcf (150 psf assumed for combined boulder/grout)
[10] Displaced Water Weight Row[8]*62.4 pcf
[11] Net Buoyant Force, (negative values denote stablity) Row[9]-Row[10]

Subdivision: Sterling Ranch
Project Name: Sand Creek Channel Improvements
Project No.: 25188.04
Calculated By: DJV
Date: January 20, 2023

5) GSB Shear Stress Calculations

| | | GSB #1 | GSB #2 | GSB #3 | GSB #4 | GSB #5 | GSB #6 | GSB #7 | GSB #8 |
|---|---|---|---|---|---|---|---|---|---|
| [1] | Crest STA: | 23+99.00 | 28+56.00 | 62+23.00 | 70+93.00 | 74+45.00 | 92+43.00 | 96+26.00 | 99+43.00 |
| [2] | Toe STA: | 23+84.00 | 28+50.00 | 61+99.00 | 70+73.00 | 74+22.00 | 92+16.00 | 96+00.00 | 99+26.00 |
| [3] | Sill STA: | 23+75.00 | 28+38.00 | 61+82.00 | 70+61.00 | 74+06.00 | +.00 | 95+84.00 | 99+10.00 |
| [4] | Depth at Crest (ft): | 3.85 | 2.25 | 3.45 | 2.88 | 3.55 | 2.68 | 3.14 | 2.91 |
| [5] | Depth at Toe (ft): | 3.24 | 3.30 | 4.74 | 3.50 | 3.13 | 7.80 | 4.67 | 4.96 |
| [6] | Depth at Sill (ft): | 2.54 | 4.23 | 2.69 | 2.63 | 2.69 | | 3.30 | 3.83 |
| [7] | EGL Slope at Crest: | 0.047494 | 0.199976 | 0.068421 | 0.144097 | 0.038885 | 0.010410 | 0.042216 | 0.071473 |
| [8] | EGL Slope at Toe: | 0.200807 | 0.050787 | 0.030034 | 0.126848 | 0.075843 | 0.000027 | 0.018383 | 0.019995 |
| [9] | EGL Slope at Sill: | 0.062814 | 0.019350 | 0.030039 | 0.009219 | 0.034244 | | 0.022448 | 0.014646 |
| [10] | Shear Stress at Crest (lbs/ft$^2$): | 11.410 | 28.077 | 14.730 | 25.896 | 8.614 | 1.741 | 8.272 | 12.978 |
| [11] | Shear Stress at Toe (lbs/ft$^2$): | 40.598 | 10.458 | 8.883 | 27.704 | 14.813 | 0.013 | 5.357 | 6.189 |
| [12] | Shear Stress at Sill (lbs/ft$^2$): | 9.956 | 5.107 | 5.042 | 1.513 | 5.748 | | 4.622 | 3.500 |
| [13] | Shear Stress at Flood Plain (lbs/ft2): | | | | | | | | |




JR Engineering: These numbers have been double-checked and are correct. These areas are grouted boulder and are armored enough to withstand these forces.

[1] Sand Creek ℄ Station
[2] Sand Creek ℄ Station
[3] Sand Creek ℄ Station
[4] 100-Year flow depth at ℄ from HEC-RAS
[5] 100-Year flow depth at ℄ from HEC-RAS
[6] 100-Year flow depth at ℄ from HEC-RAS
[7] Energy Grade Line slope from HEC-RAS
[8] Energy Grade Line slope from HEC-RAS
[9] Energy Grade Line slope from HEC-RAS
[10] Shear Stress: 62.4*Row[4]*Row[7]
[11] Shear Stress: 62.4*Row[5]*Row[8]
[12] Shear Stress: 62.4*Row[6]*Row[9]
[13] Calculated from Maximum Depth in the Flood Terrace & E.G. Slope

| | |
|---|---|
| Subdivision: | Sterling Ranch |
| Project Name: | Sand Creek Channel Improvements |
| Project No.: | 25188.04 |
| Calculated By: | DJV |
| Date: | January 20, 2023 |

6) GSB Shear Stress Calculations

| | | GSB #1 | GSB #2 | GSB #3 | GSB #4 | GSB #5 | GSB #6 | GSB #7 | GSB #8 |
|---|---|---|---|---|---|---|---|---|---|
| [1] | GSB STA: | 23+99.00 | 28+56.00 | 62+23.00 | 70+93.00 | 74+45.00 | 92+56.00 | 96+26.00 | 99+43.00 |
| [2] | Froude Number: | 1.44 | 0.79 | 0.62 | 1.18 | 1.99 | 0.06 | 0.48 | 0.51 |
| [3] | Coefficient of Pressure Fluctuation, $C_P$: | < 0.4 | < 0.4 | < 0.4 | < 0.4 | < 0.4 | < 0.4 | < 0.4 | < 0.4 |

[1] Sand Creek. Location of highest Froude Number on drop.

[2] Froude Number from HEC-RAS model, mixed-flow analysis.

[3] Coefficient of Pressure Fluctuation, $C_P$ from Figure HS-4, UDFCD DCM Chapter 8, for toe of jump at base. Maximum recommended value is 0.7.

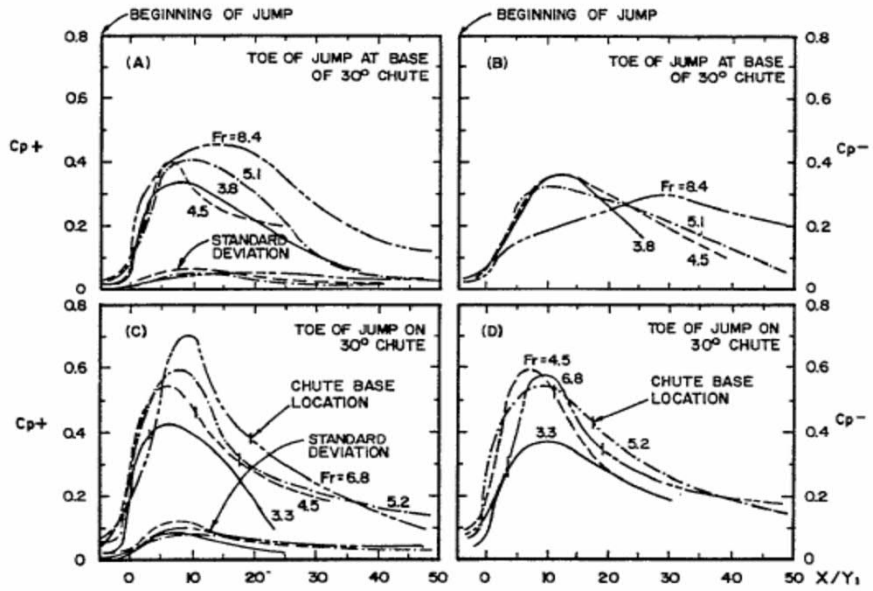
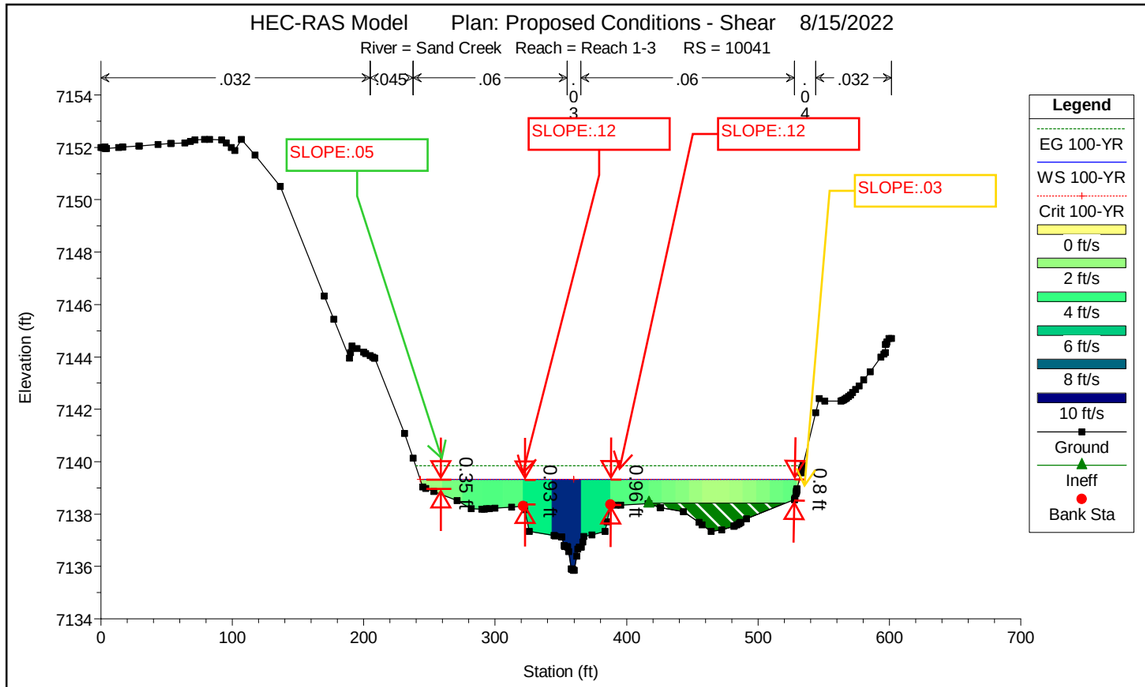


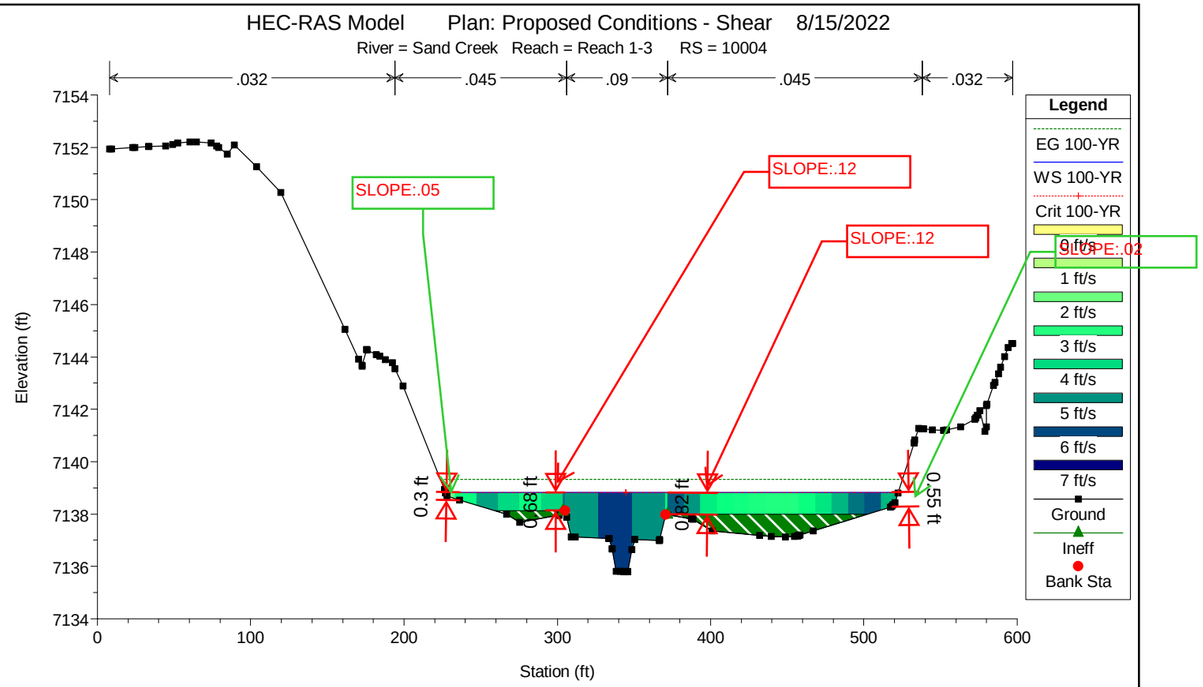

**Figure HS-4—Coefficient of Pressure Fluctuation, $C_p$, at a Hydraulic Jump**

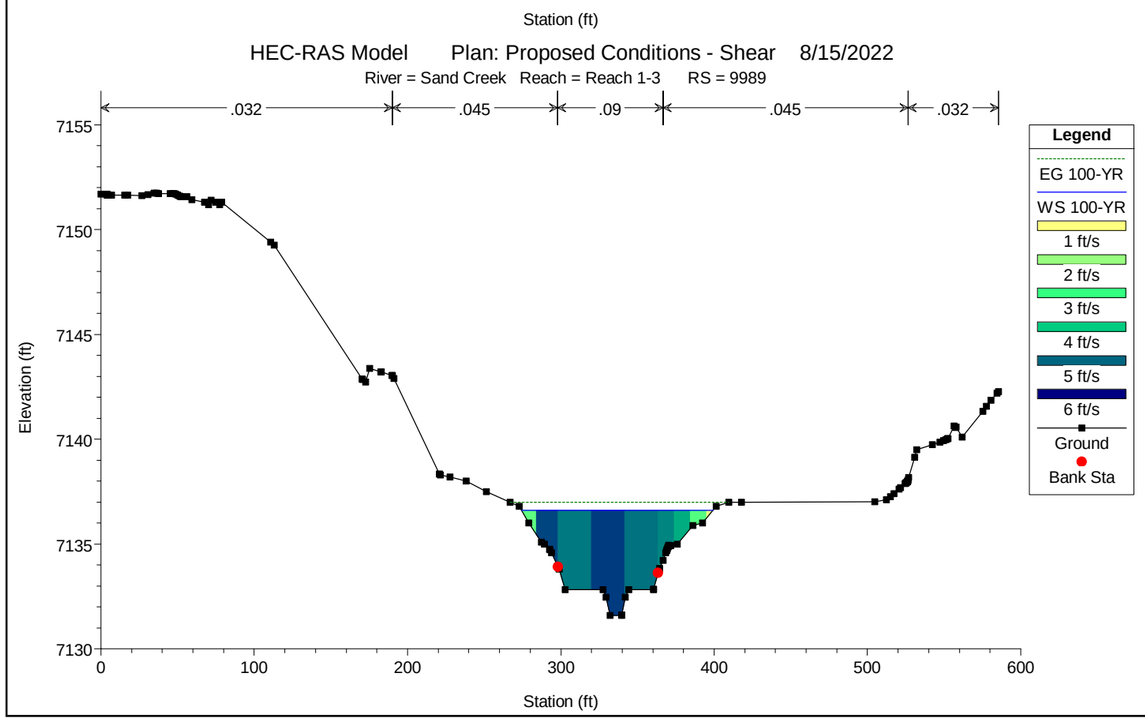
Subdivision: Sterling Ranch
Project Name: Sand Creek Channel Improvements
Project No.: 25188.04
Calculated By: DJV
Date: January 20, 2023

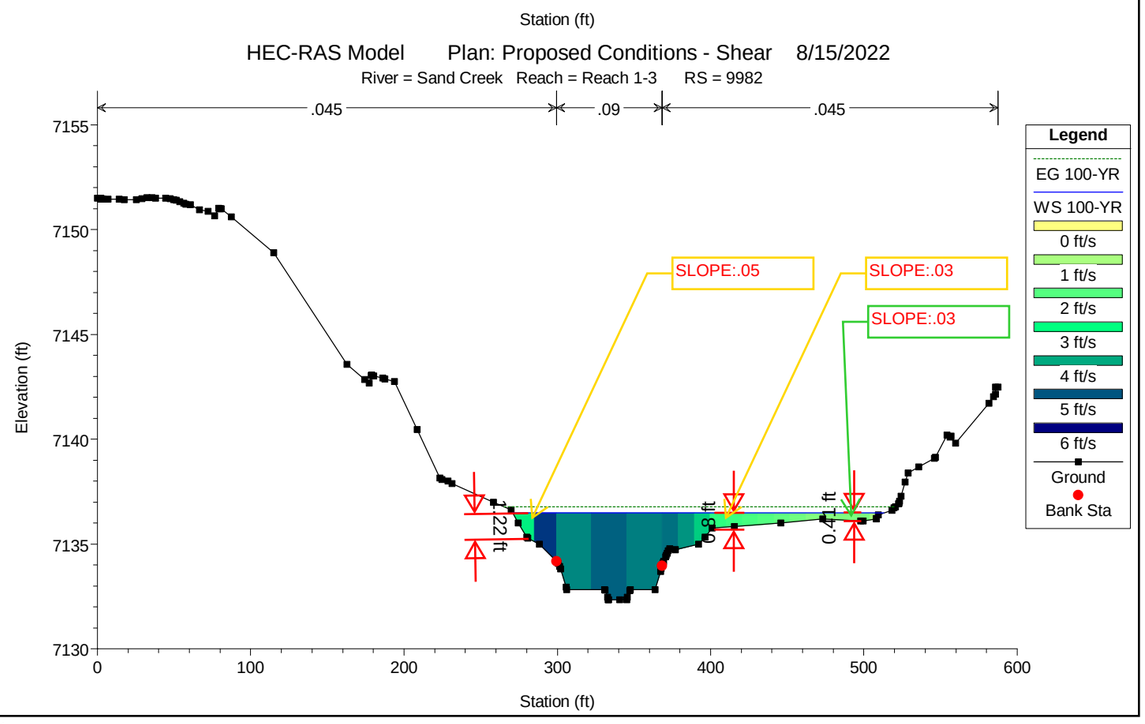
| | POINT # | FLOW DEPTH (FT) | SLOPE (FT/FT) | SHEAR (LB/FT^2) |
|---|---|---|---|---|
| RS 10041 | 1 | 0.35 | 0.05 | 1.09 |
| | 2 | 0.93 | 0.12 | 6.96 |
| | 3 | 0.96 | 0.12 | 7.19 |
| | 4 | 0.8 | 0.03 | 1.50 |
| RS 10004 | 1 | 0.3 | 0.05 | 0.94 |
| | 2 | 0.68 | 0.12 | 5.09 |
| | 3 | 0.82 | 0.12 | 6.14 |
| | 4 | 0.55 | 0.02 | 0.69 |
| RS 9982 | 1 | 1.22 | 0.05 | 3.81 |
| | 2 | 0.8 | 0.03 | 1.50 |
| | 3 | 0.41 | 0.03 | 0.77 |
| RS 9981 | 1 | 0.75 | 0.03 | 1.40 |
| | 2 | 0.49 | 0.03 | 0.92 |
| RS 9693 | 1 | 0.29 | 0.12 | 2.17 |
| | 2 | 0.8 | 0.12 | 5.99 |
| | 3 | 0.98 | 0.02 | 1.22 |
| RS 9660 | 1 | 1.33 | 0.12 | 9.96 |
| RS 9648 | 1 | 0.75 | 0.08 | 3.74 |
| RS 9641 | 1 | 0.78 | 0.08 | 3.89 |
| RS 7538 | 1 | 1.09 | 0.13 | 8.84 |
| | 2 | 0.87 | 0.075 | 4.07 |
| RS 7515 | 1 | 0.83 | 0.19 | 9.84 |
| | 2 | 0.68 | 0.1 | 4.24 |
| RS 7457 | 1 | 0.33 | 0.04 | 0.82 |
| | 2 | 0.51 | 0.095 | 3.02 |
| RS 7146 | 1 | 0.72 | 0.0175 | 0.79 |
| RS 7132 | 1 | 0.71 | 0.083 | 3.68 |
| RS 7124 | 1 | 0.71 | 0.085 | 3.77 |
| | 2 | 0.61 | 0.08 | 3.05 |
| RS 7118 | 1 | 0.55 | 0.085 | 2.92 |
| | 2 | 0.63 | 0.08 | 3.14 |
| RS 6281 | 1 | 0.55 | 0.12 | 4.12 |
| | 2 | 1 | 0.15 | 9.36 |
| | 3 | 0.42 | 0.15 | 3.93 |
| RS 6266 | 1 | 0.74 | 0.14 | 6.46 |
| RS 6253 | 1 | 1.47 | 0.13 | 11.92 |
| | 2 | 0.56 | 0.15 | 5.24 |
| RS 6242 | 1 | 1.19 | 0.13 | 9.65 |
| | 2 | 0.92 | 0.14 | 8.04 |
| RS 2396 | 1 | 1.41 | 0.01 | 0.88 |
| | 2 | 0.9 | 0.01 | 0.56 |
| | 3 | 0.51 | 0.01 | 0.32 |
| RS 2387 | 1 | 1.24 | 0.12 | 9.29 |
| | 2 | 0.73 | 0.047 | 2.14 |
| | 3 | 0.25 | 0.057 | 0.89 |
| RS 2362 | 1 | 0.87 | 0.075 | 4.07 |
| | 2 | 0.44 | 0.055 | 1.51 |
| | 3 | 0.77 | 0.05 | 2.40 |
| RS 2359 | 1 | 1.15 | 0.075 | 5.38 |
| | 2 | 0.74 | 0.055 | 2.54 |
| | 3 | 0.77 | 0.05 | 2.40 |

Update stations? (not found in modeling)



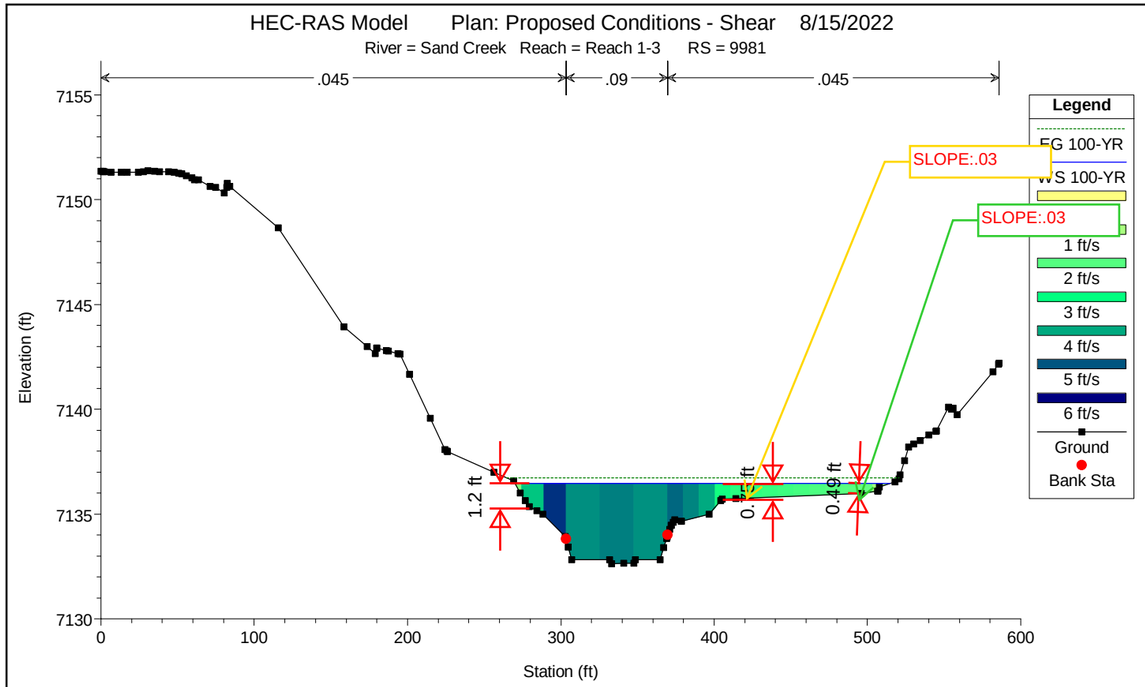



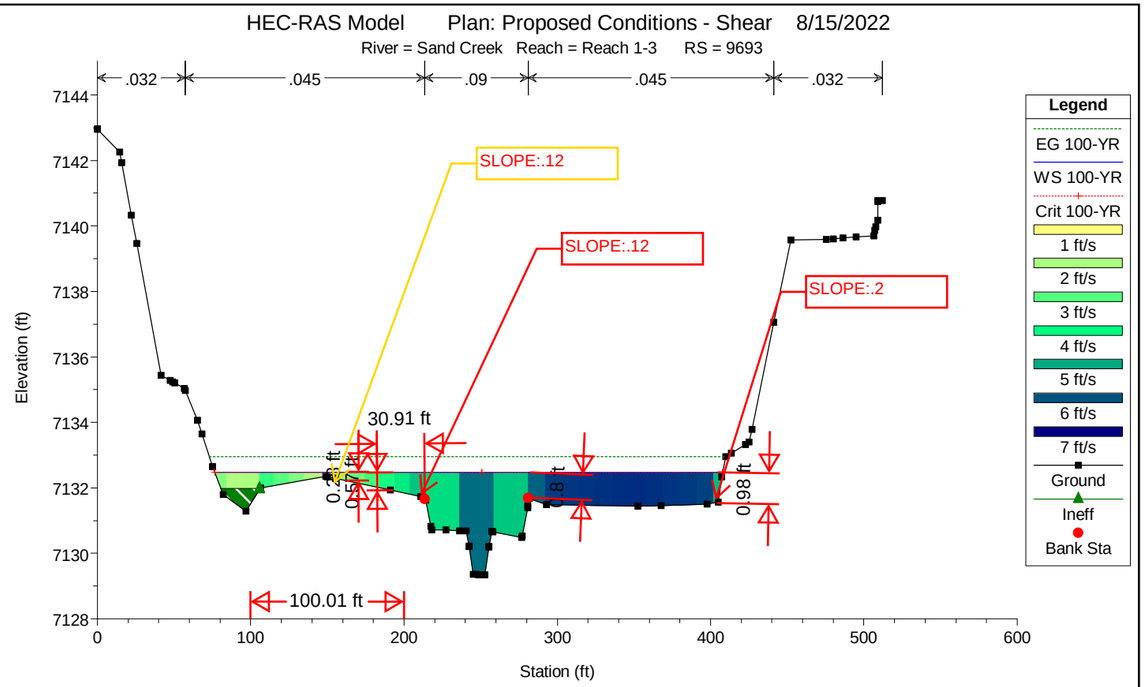



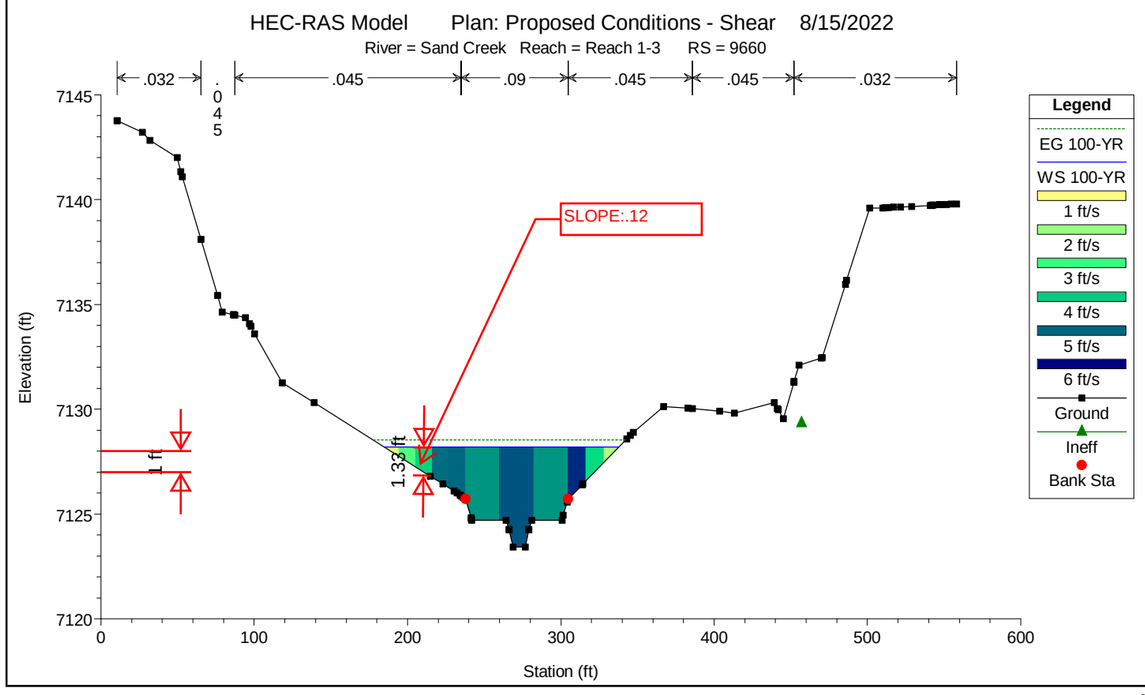

1

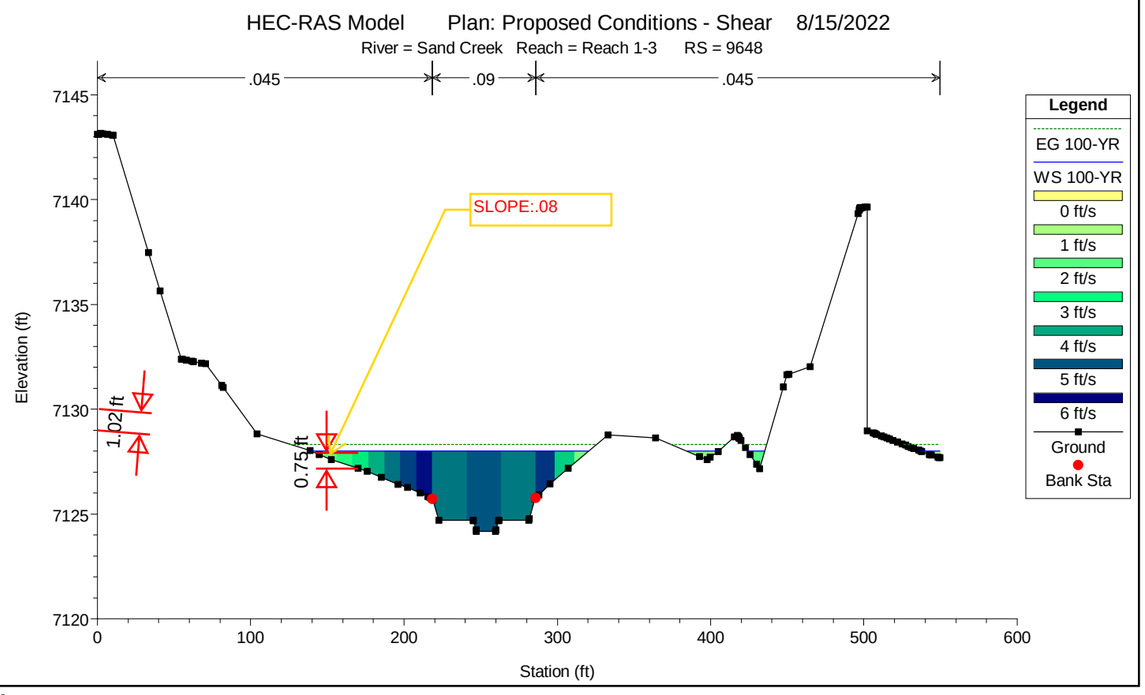
Update?

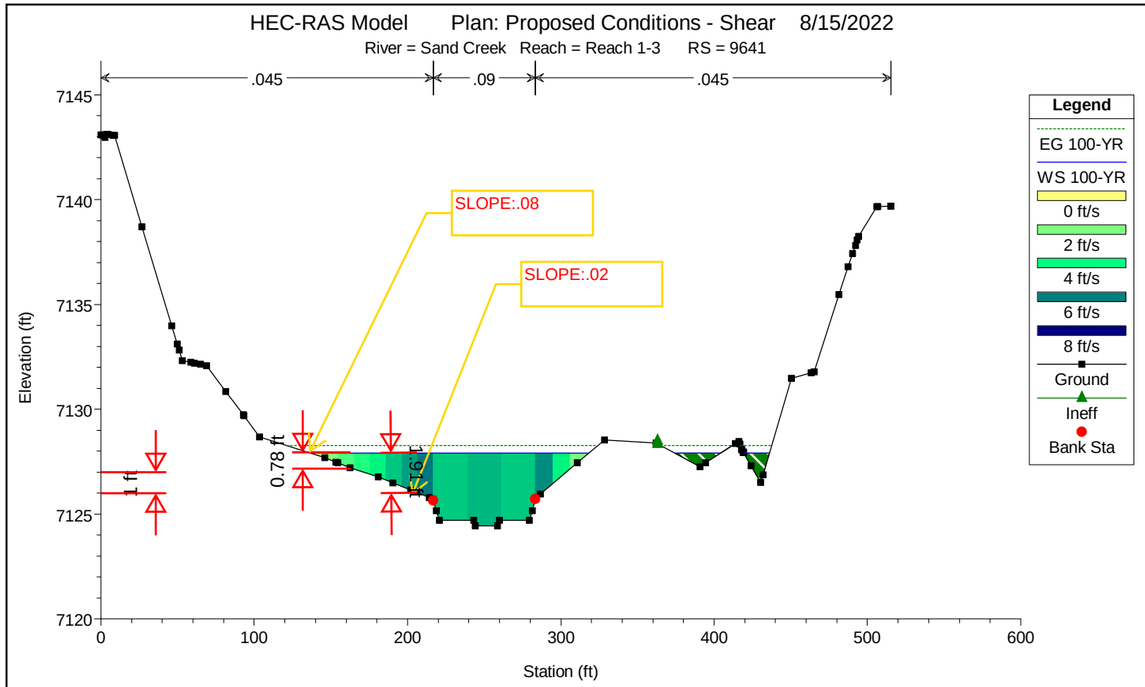
JR Engineering: Cross-sections have been updated to match latest model stationing

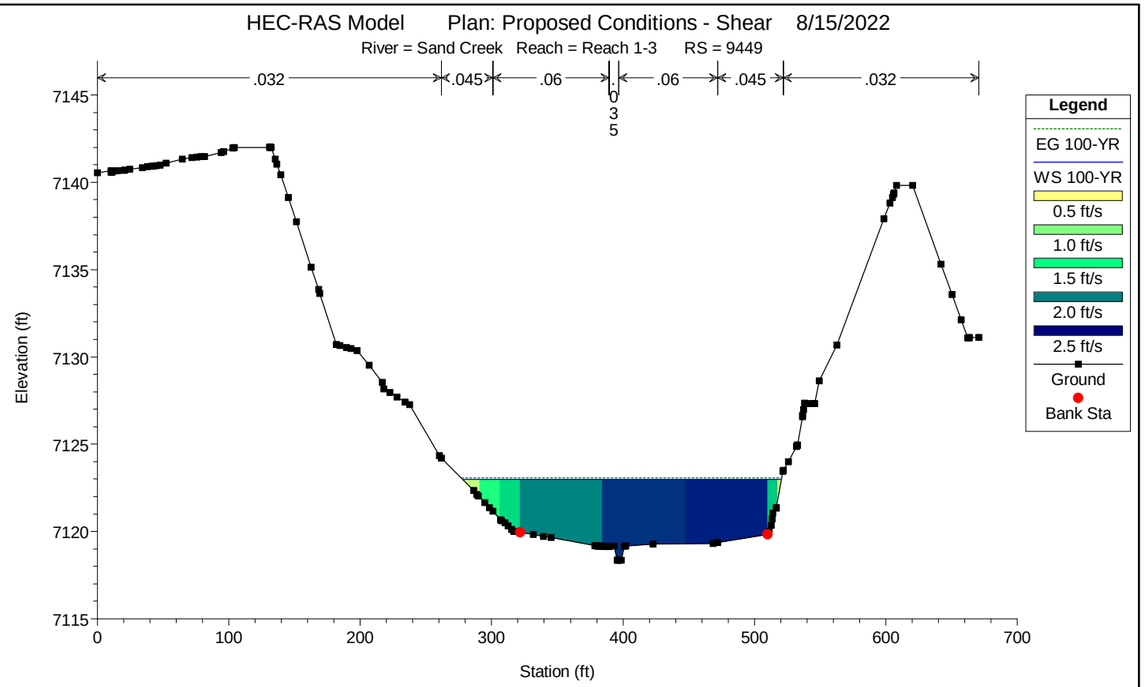

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 9981
.045
.09
.045
SLOPE:.03
SLOPE:.03
1.2 ft
0.49 ft
Legend
EG 100-YR
WS 100-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

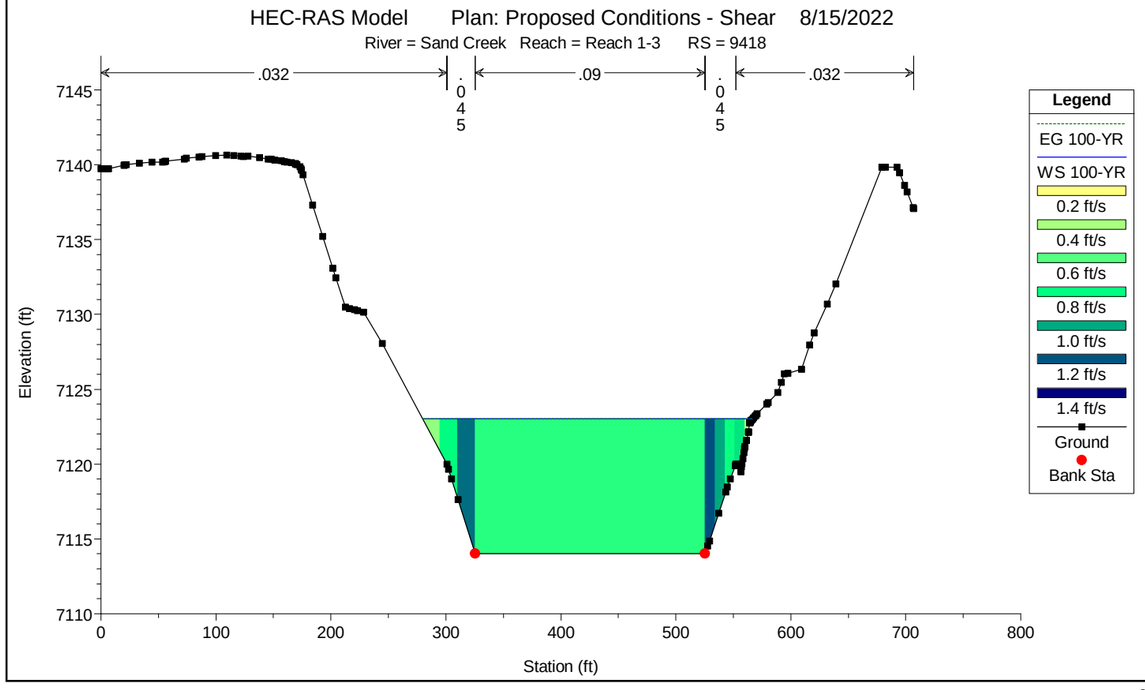

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 9693
.032
.045
.09
.045
.032
SLOPE:.12
SLOPE:.12
SLOPE:.2
30.91 ft
100.01 ft
0.98 ft
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

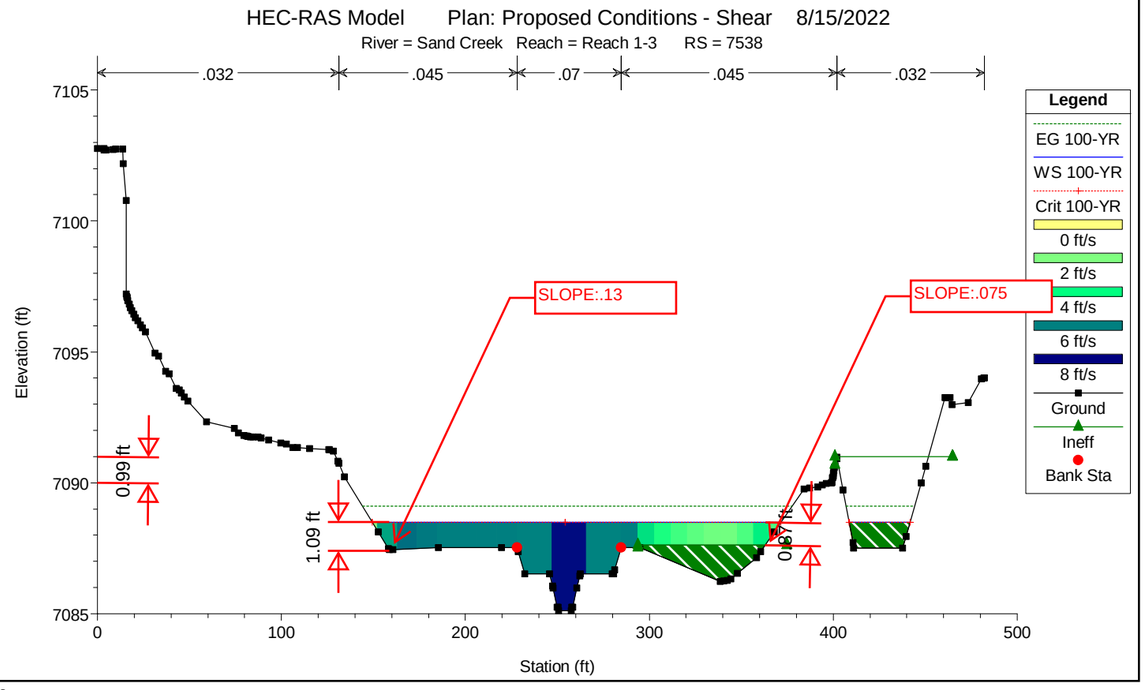

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 9660
.032
.045
.09
.045
.045
.032
SLOPE:.12
1.33 ft
Legend
EG 100-YR
WS 100-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

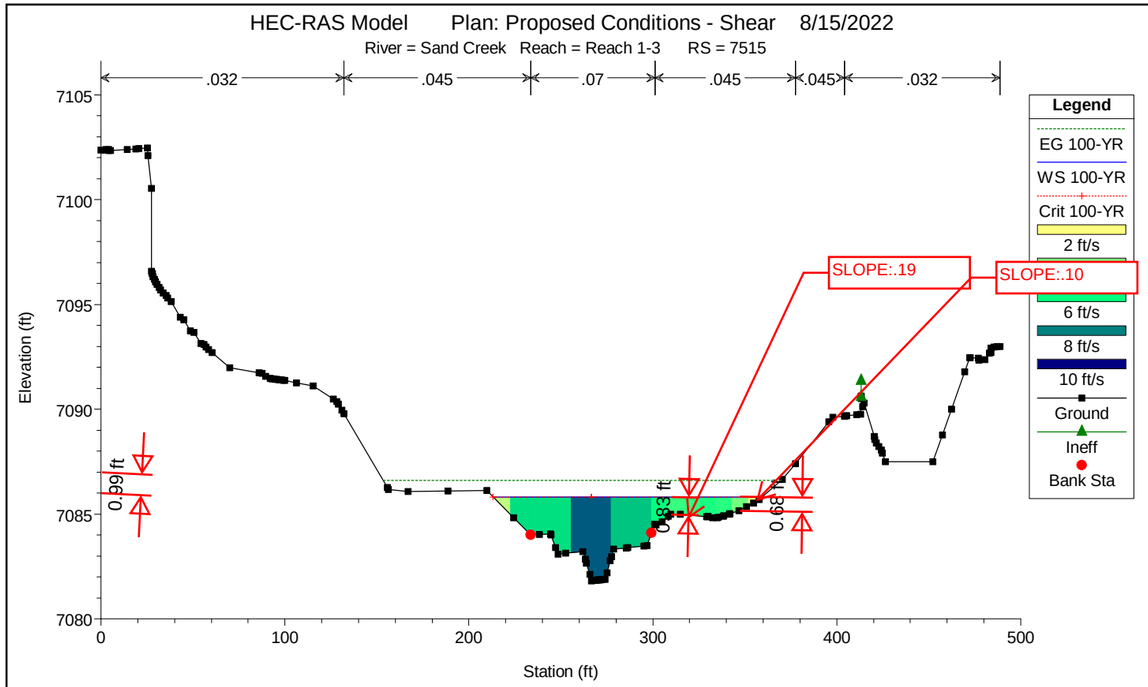

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 9648
.045
.09
.045
SLOPE:.08
1.02 ft
0.75 ft
Legend
EG 100-YR
WS 100-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

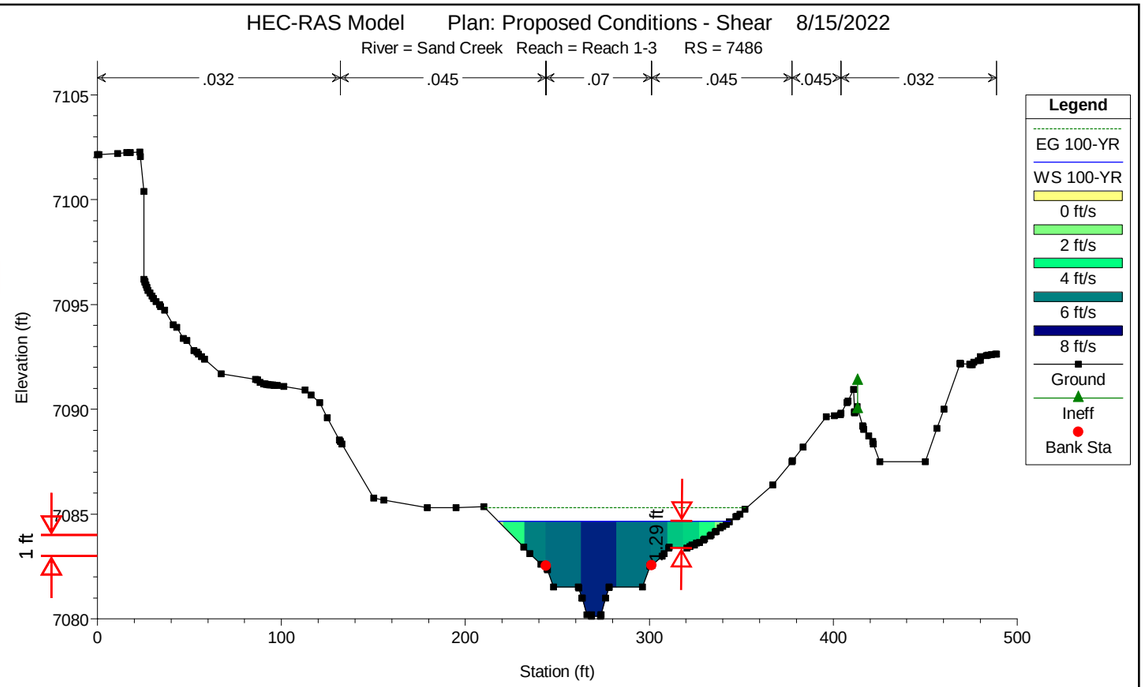

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 9641
.045
.09
.045
SLOPE:.08
SLOPE:.02
0.78 ft
1 ft
1.91 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

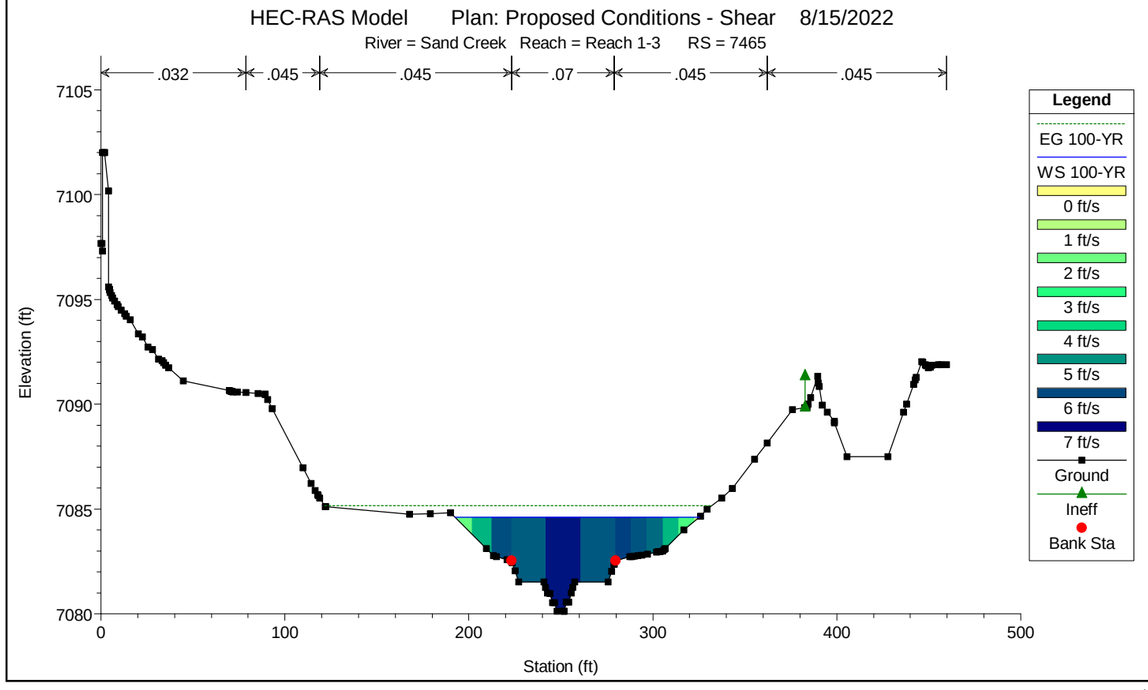

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 9449
.032
.045
.06
.035
.06
.045
.032
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta

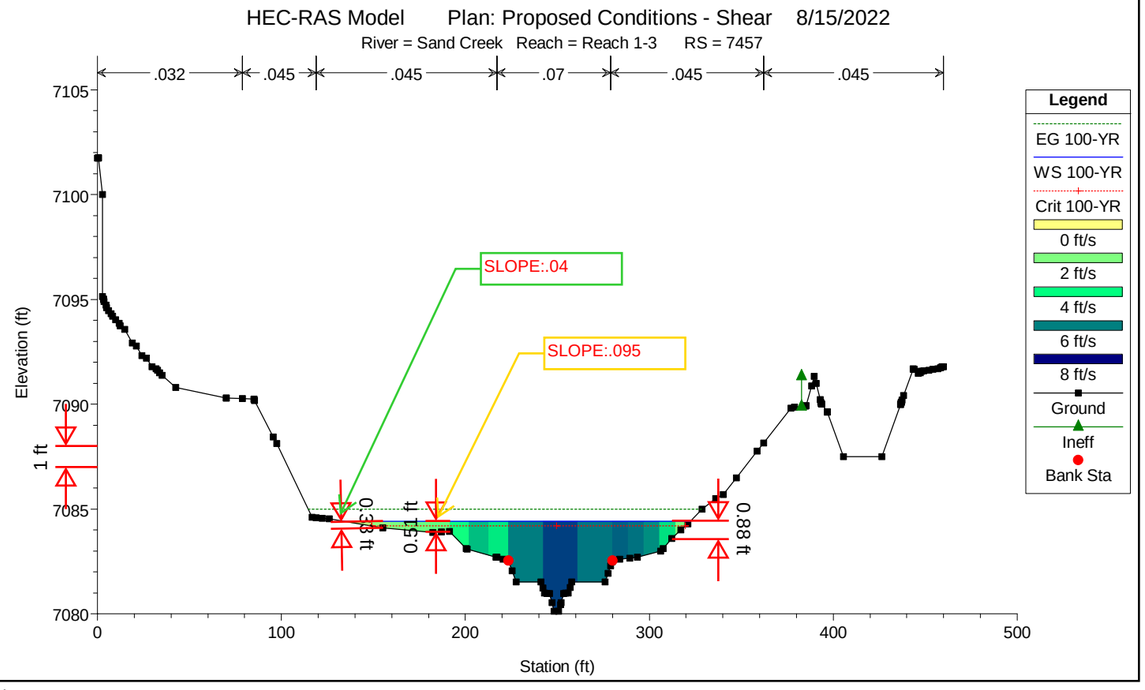

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 9418
.032
.045
.09
.045
.032
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
1.4 ft/s
Ground
Bank Sta

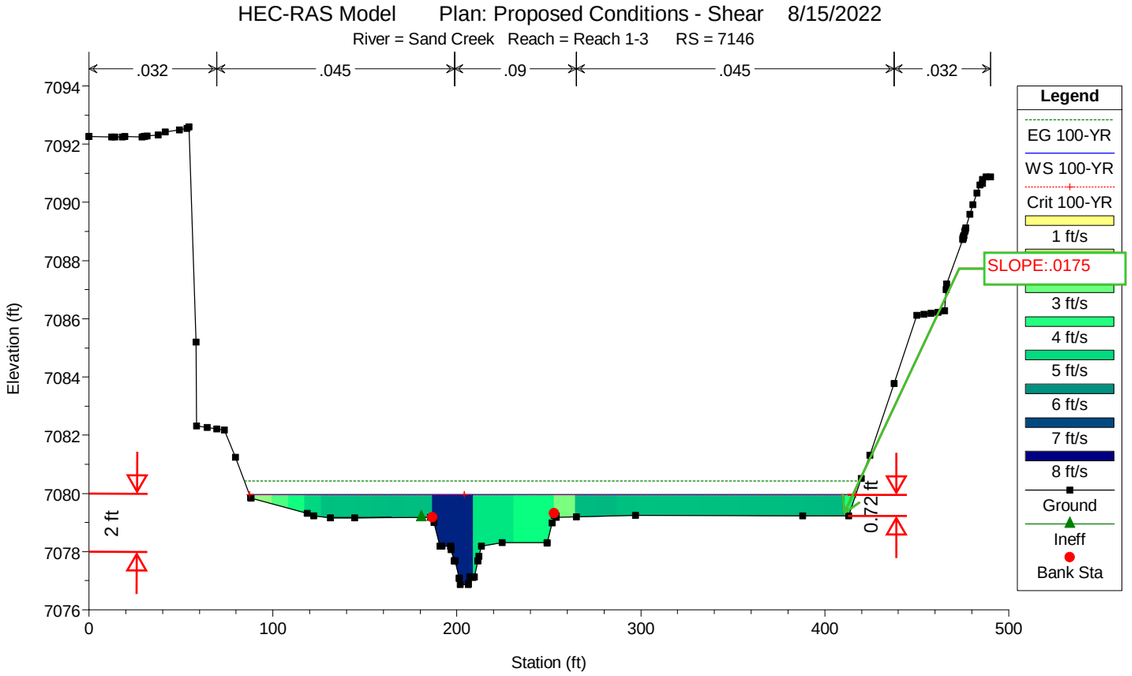

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7538
.032
.045
.07
.045
.032
SLOPE:.13
SLOPE:.075
0.99 ft
1.09 ft
0.96 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

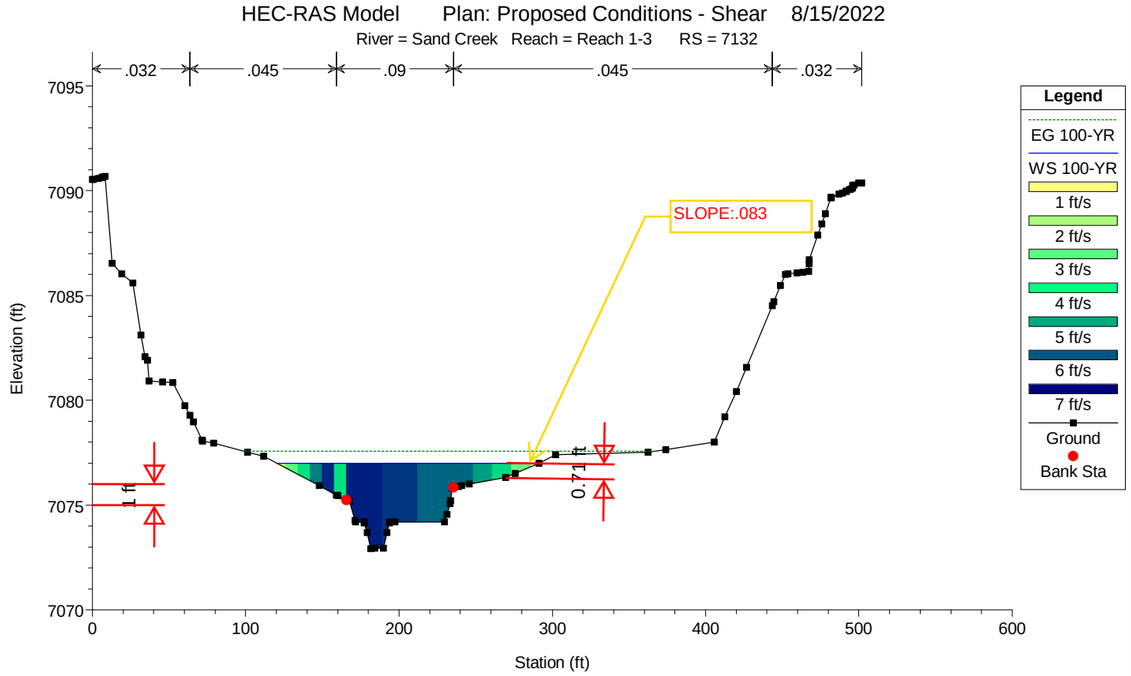

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7515
.032
.045
.07
.045
.045
.032
SLOPE:.19
SLOPE:.10
0.99 ft
0.83 ft
0.89 ft
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
2 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

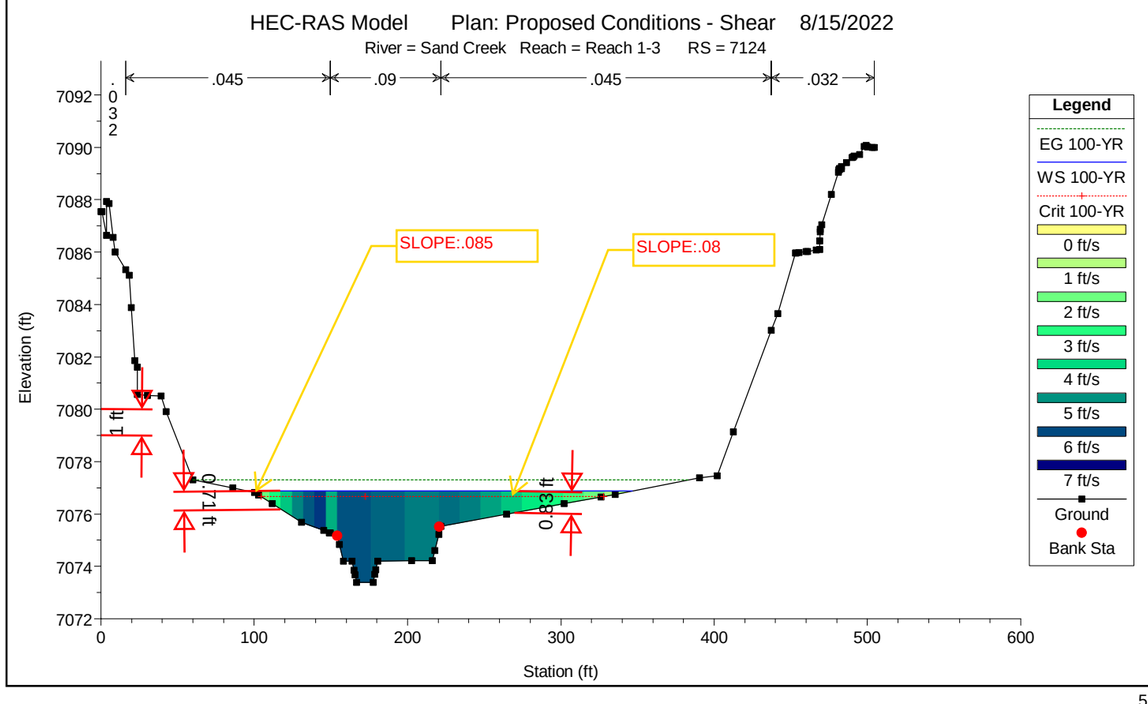

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7486
.032
.045
.07
.045
.045
.032
1 ft
1.29 ft
Legend
EG 100-YR
WS 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

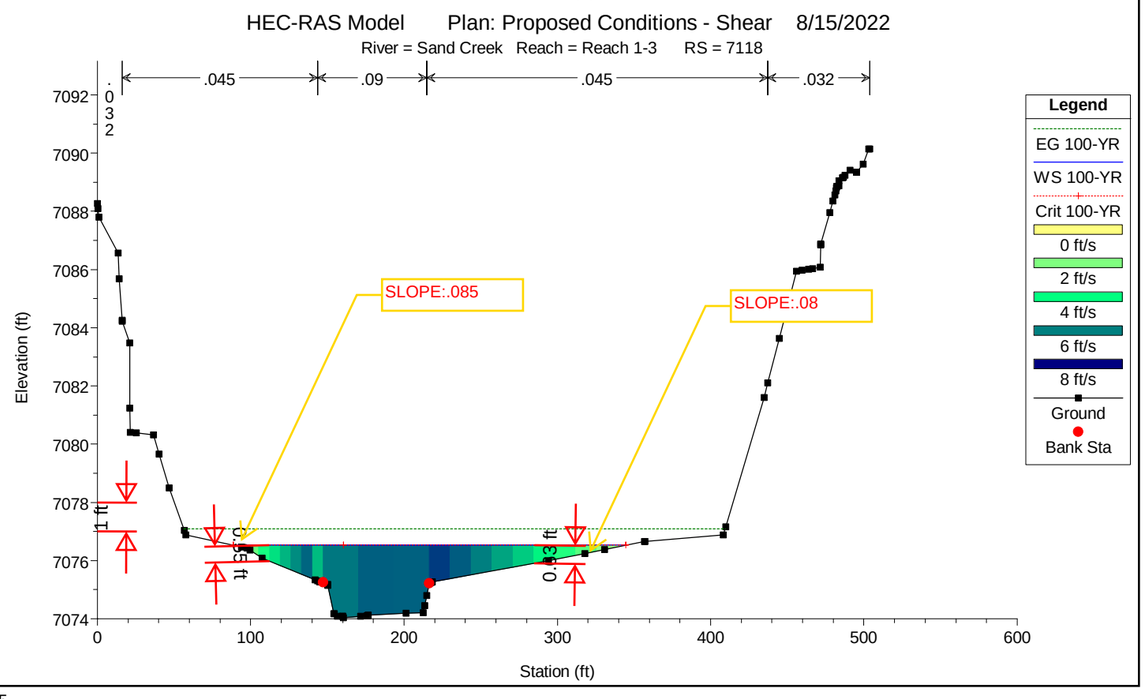

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7465
.032
.045
.045
.07
.045
.045
Legend
EG 100-YR
WS 100-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

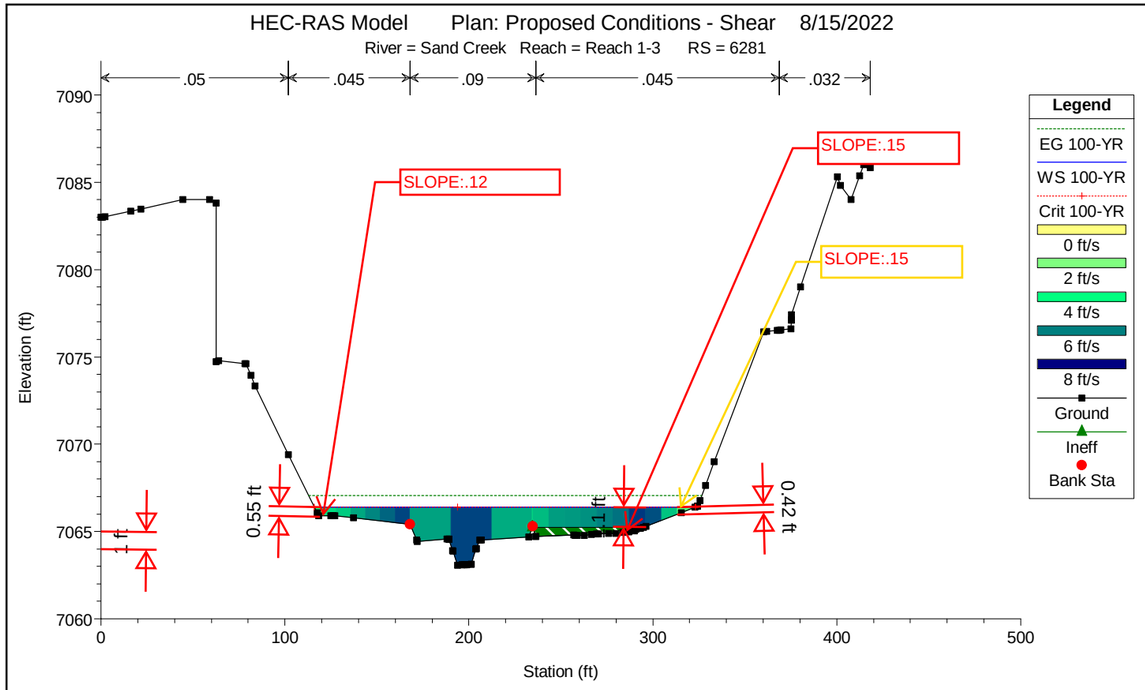

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7457
.032
.045
.045
.07
.045
.045
SLOPE:.04
SLOPE:.095
1 ft
0.38 ft
0.57 ft
0.88 ft
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

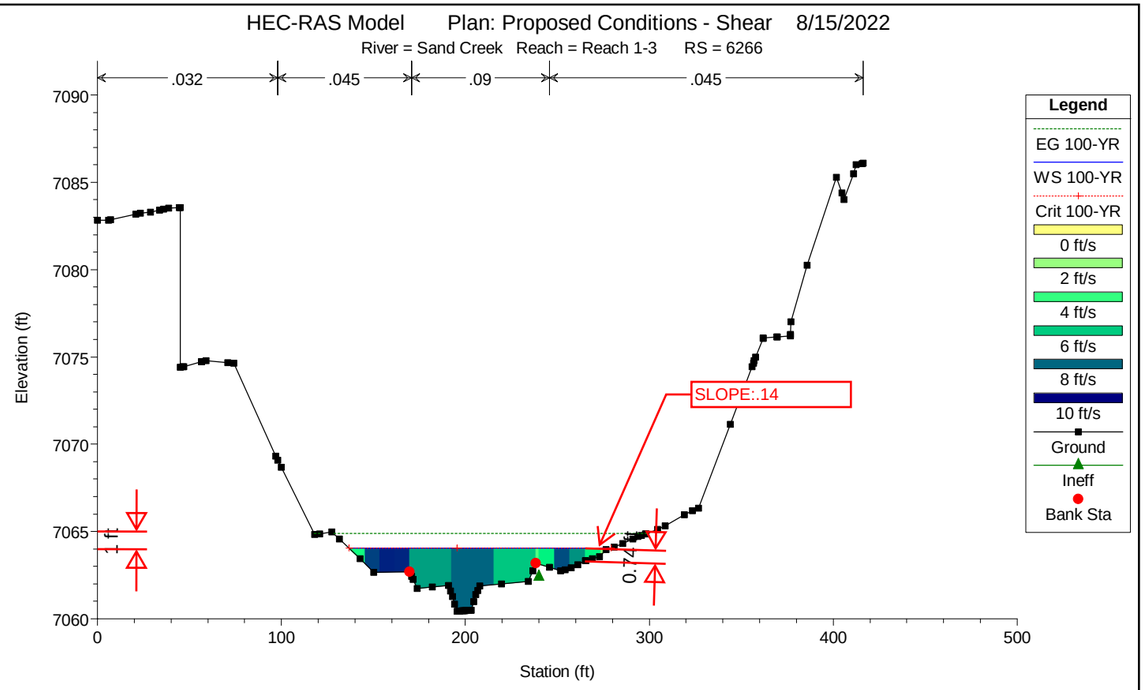

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7146
.032
.045
.09
.045
.032
SLOPE:.0175
2 ft
0.72 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
1 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta

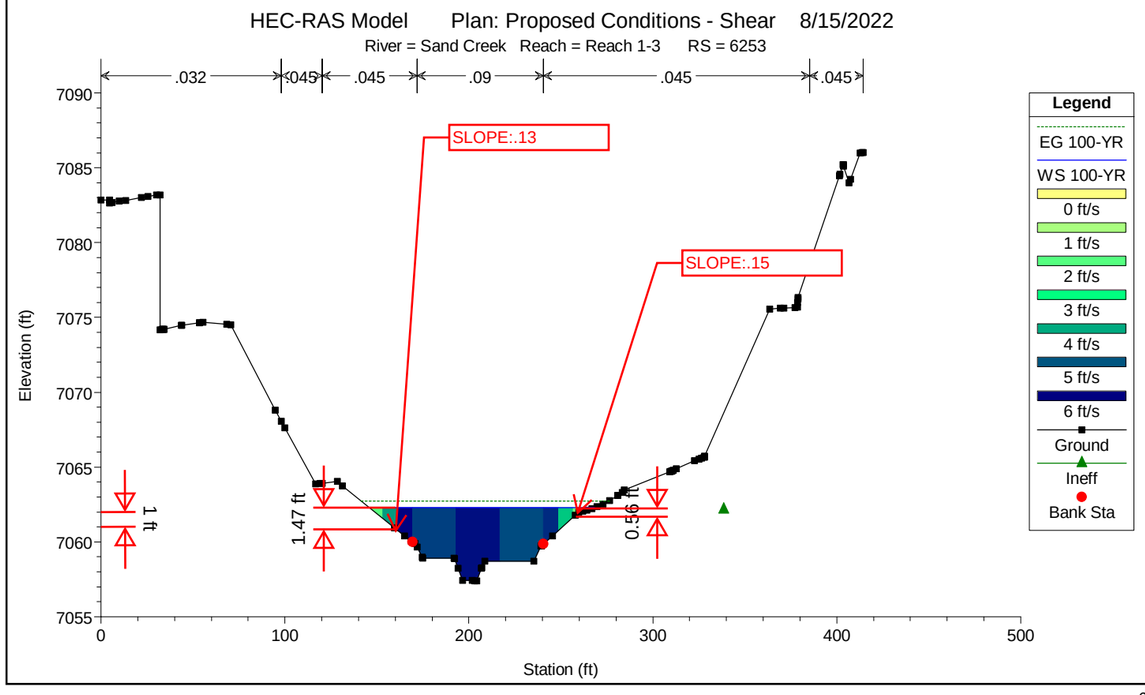

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7132
.032
.045
.09
.045
.032
SLOPE:.083
1 ft
0.71 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

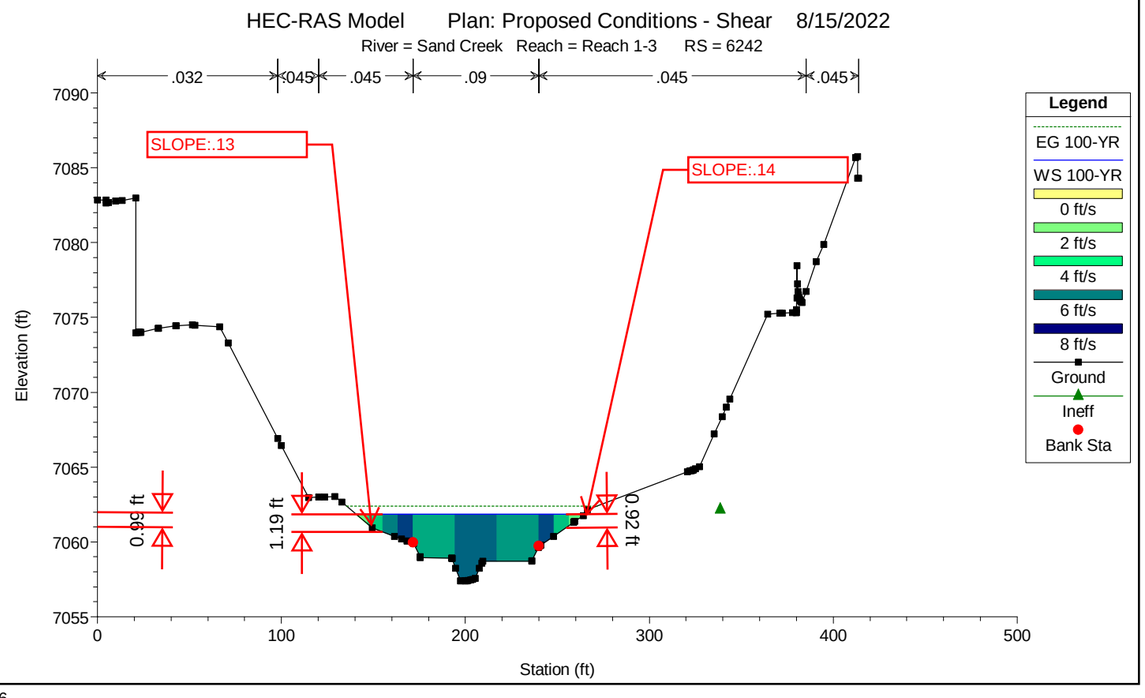

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7124
.032
.045
.09
.045
.032
SLOPE:.085
SLOPE:.08
1 ft
0.71 ft
0.83 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 7118
.032
.045
.09
.045
.032
SLOPE:.085
SLOPE:.08
1 ft
0.35 ft
0.43 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 6281
.05
.045
.09
.045
.032
SLOPE:.12
SLOPE:.15
SLOPE:.15
0.55 ft
1 ft
0.42 ft
1 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

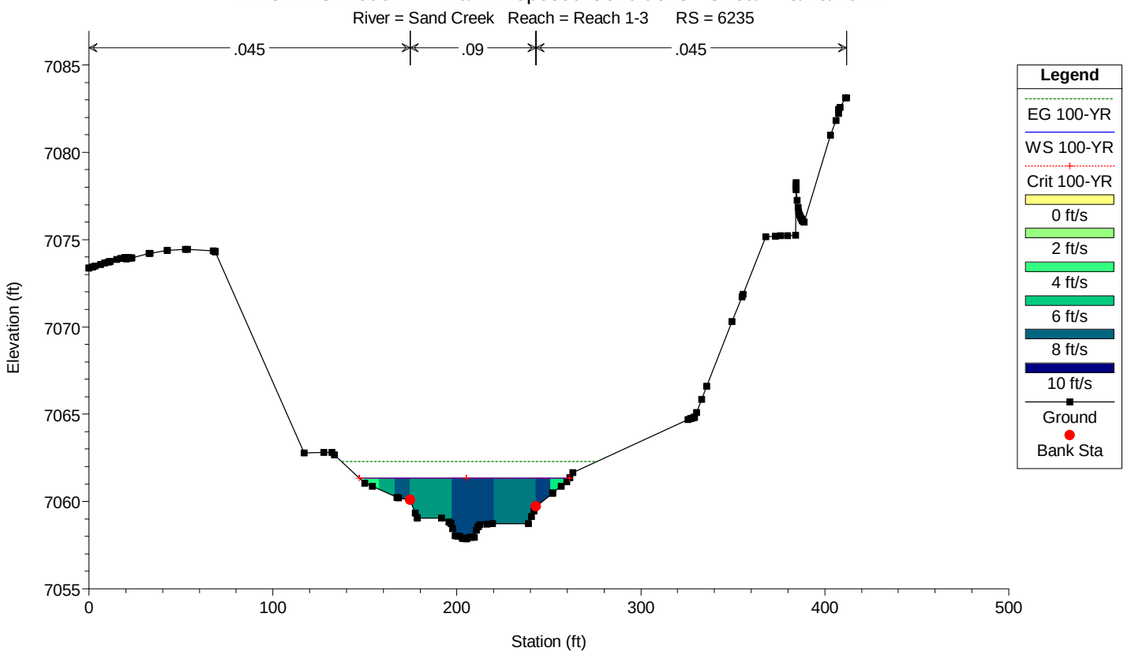

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 6266
.032
.045
.09
.045
SLOPE:.14
1 ft
0.72 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 6253
.032
.045
.045
.09
.045
.045
SLOPE:.13
SLOPE:.15
1 ft
1.47 ft
0.59 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 6242
.032
.045
.045
.09
.045
.045
SLOPE:.13
SLOPE:.14
0.99 ft
1.19 ft
0.92 ft
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta

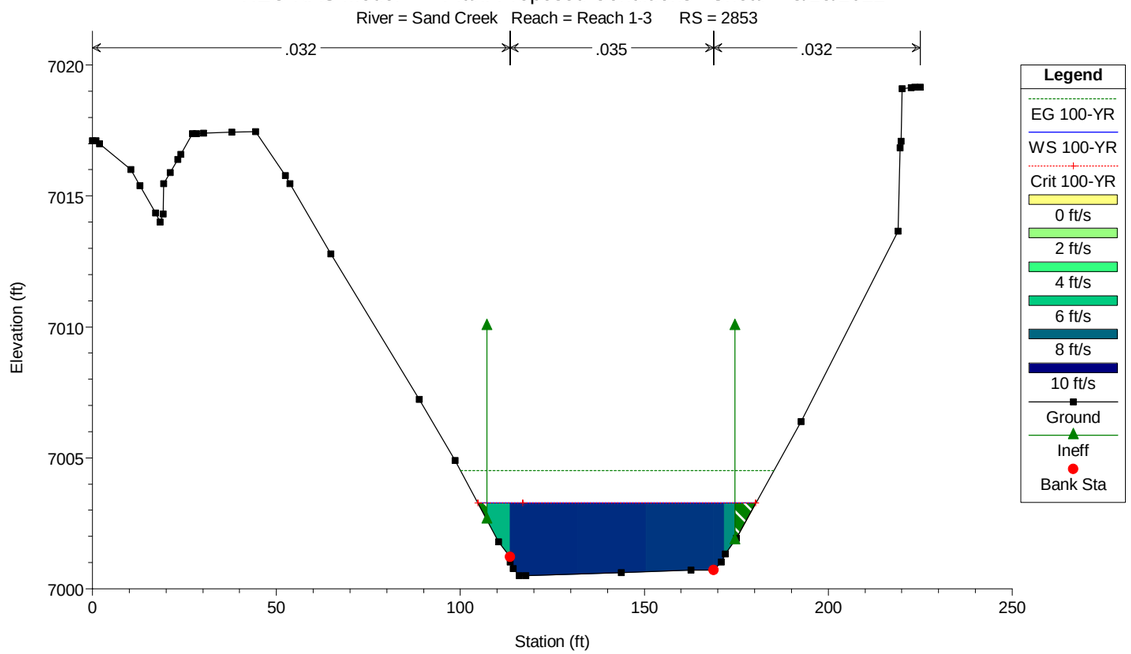
HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022

River = Sand Creek Reach = Reach 1-3 RS = 6235



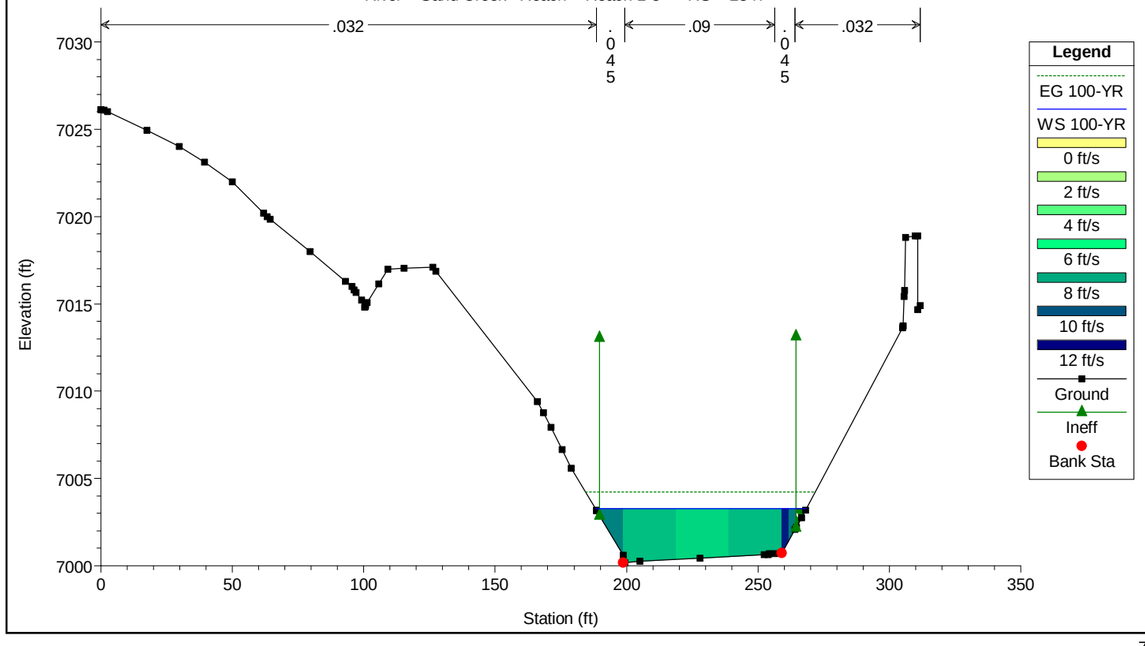

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022

River = Sand Creek Reach = Reach 1-3 RS = 2853



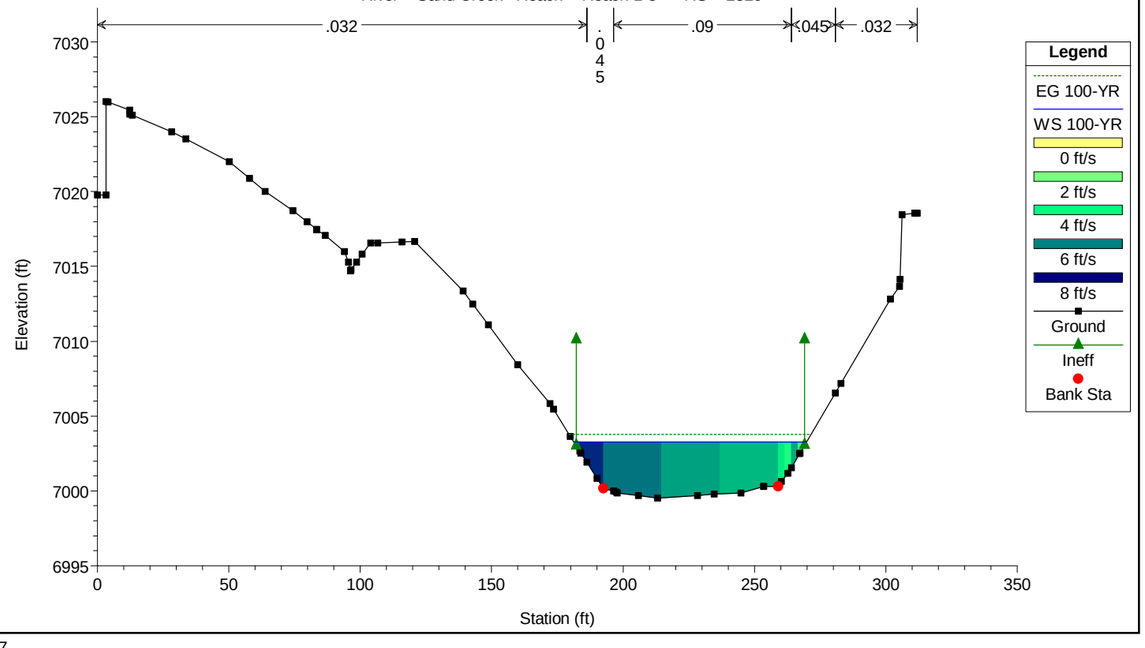

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022

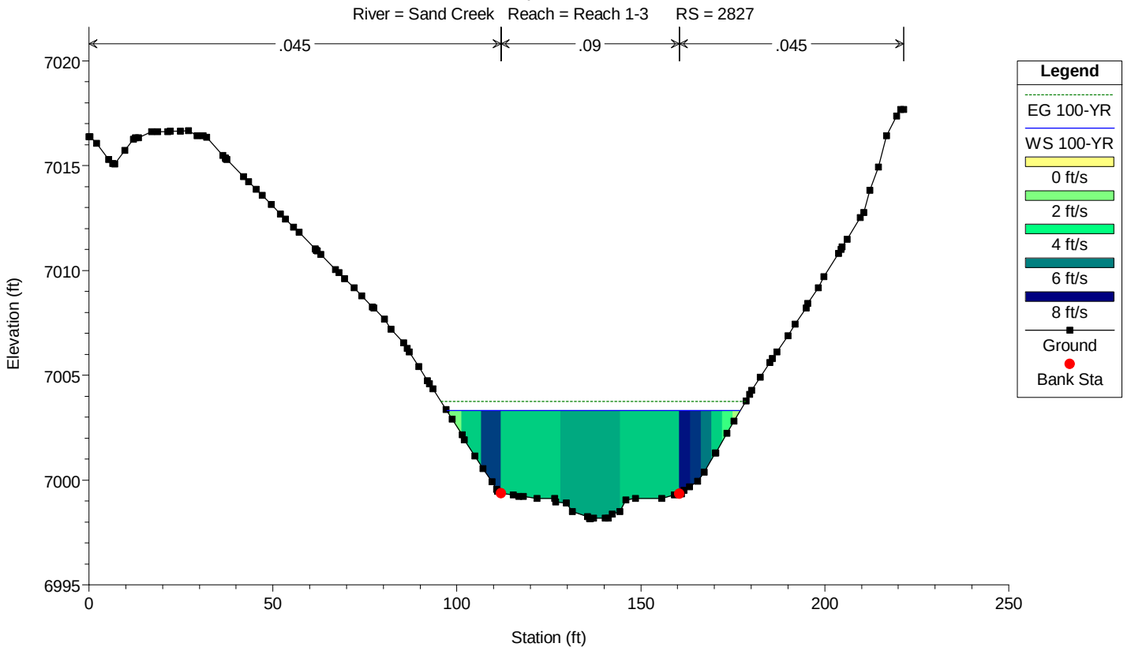
River = Sand Creek Reach = Reach 1-3 RS = 2847

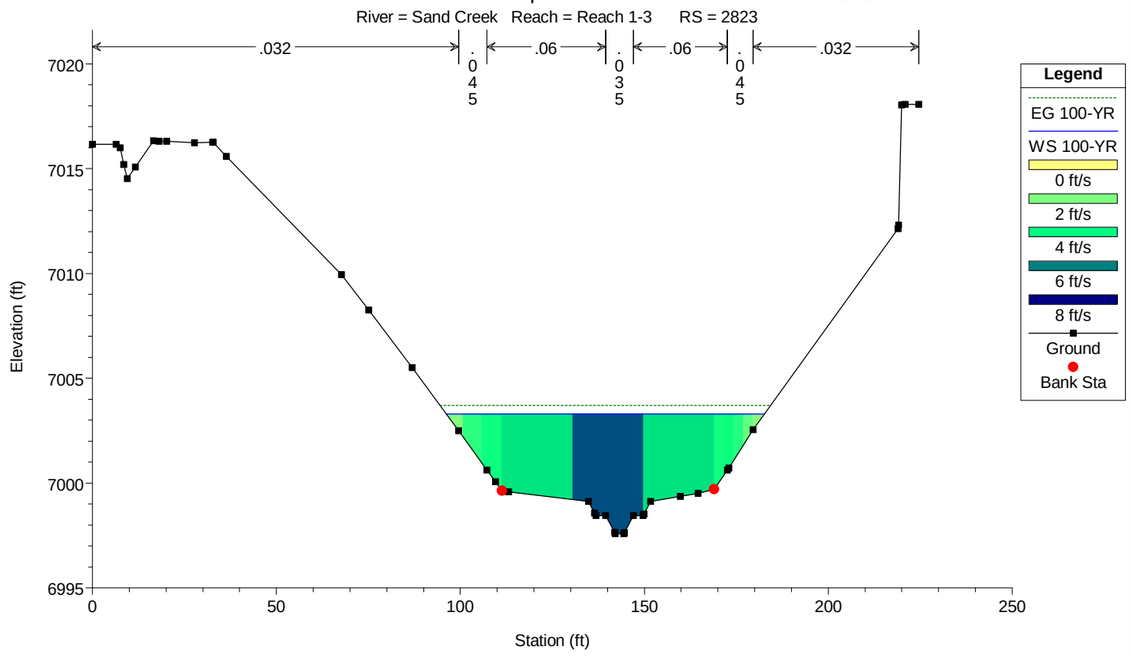


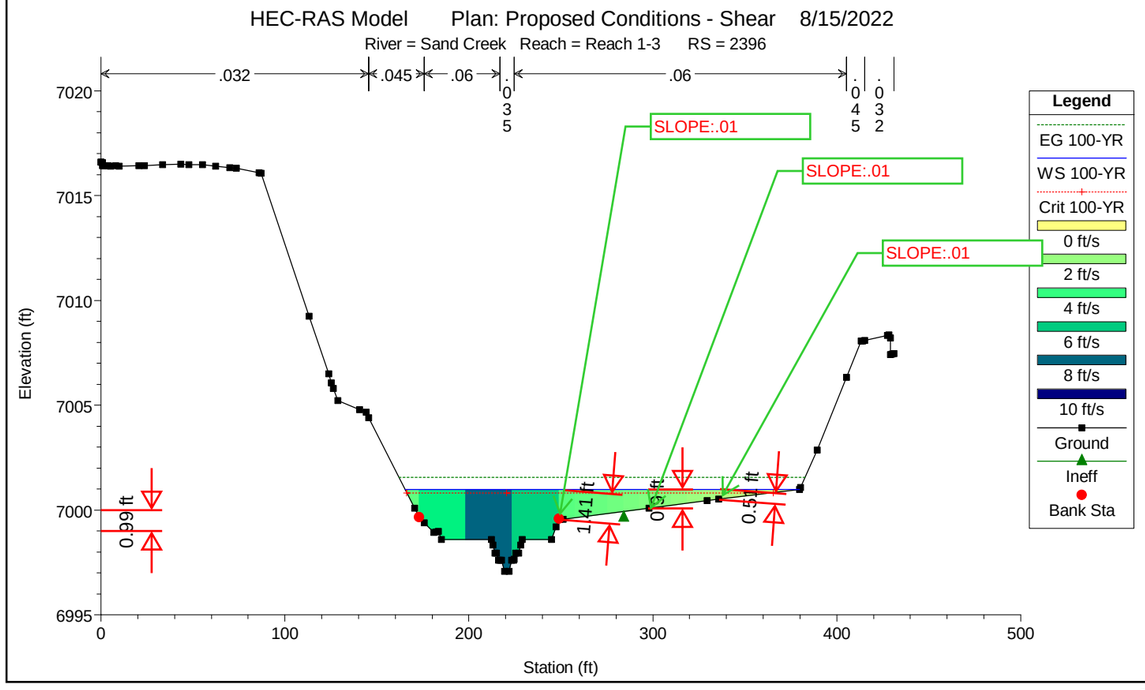

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022

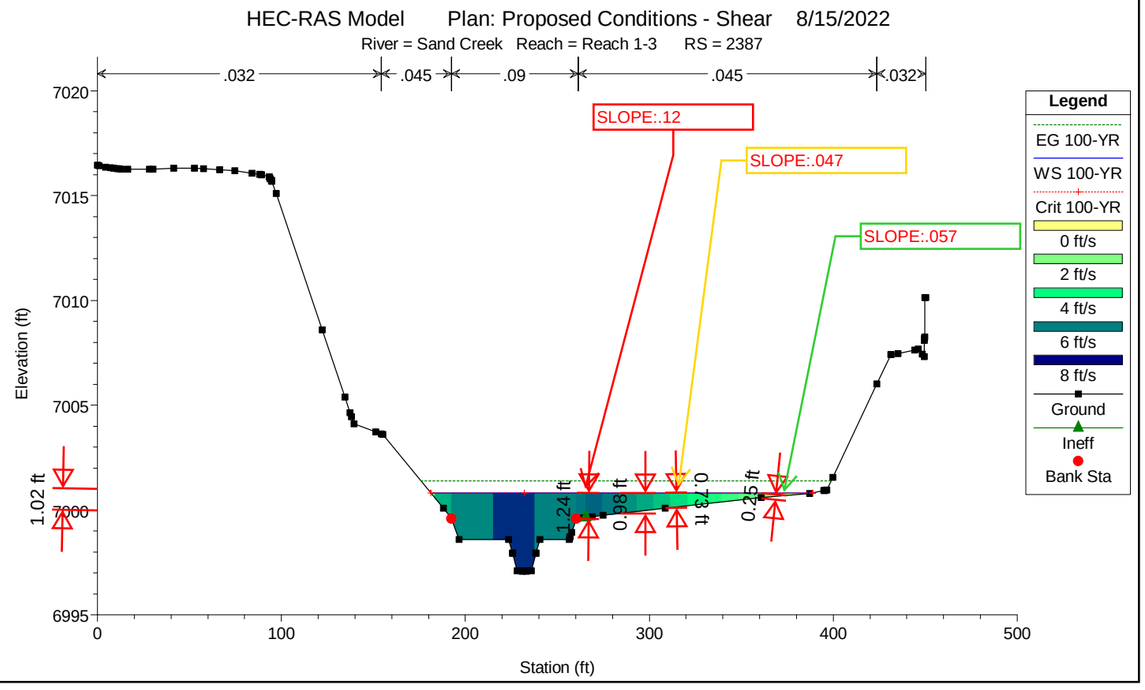
River = Sand Creek Reach = Reach 1-3 RS = 2829

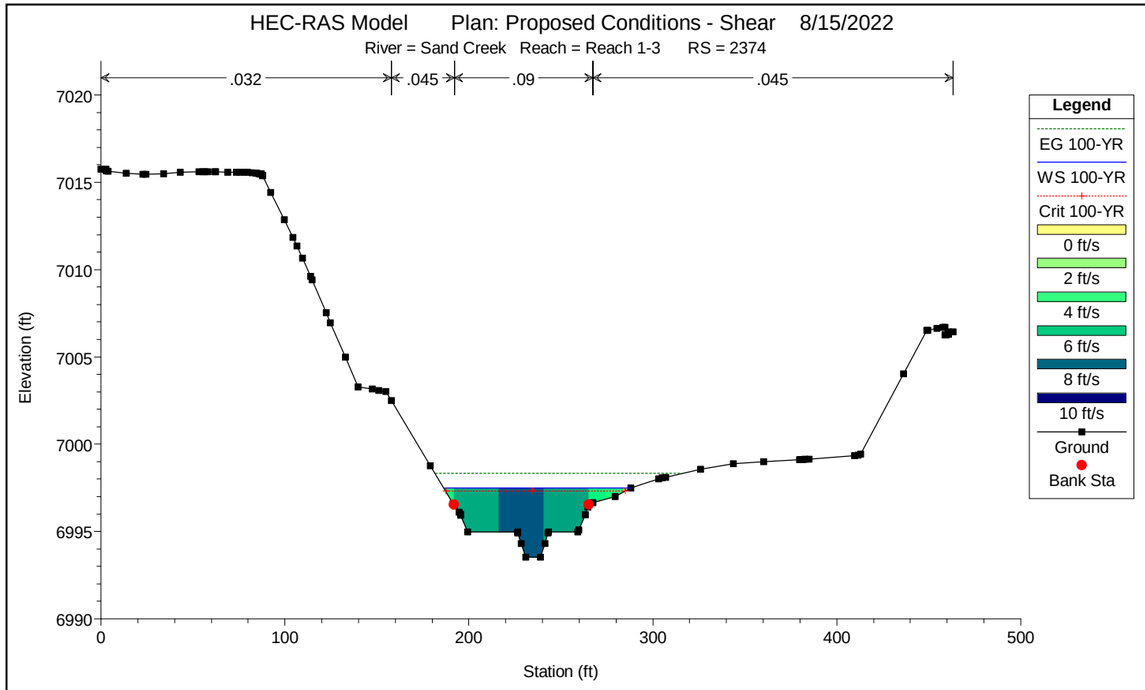


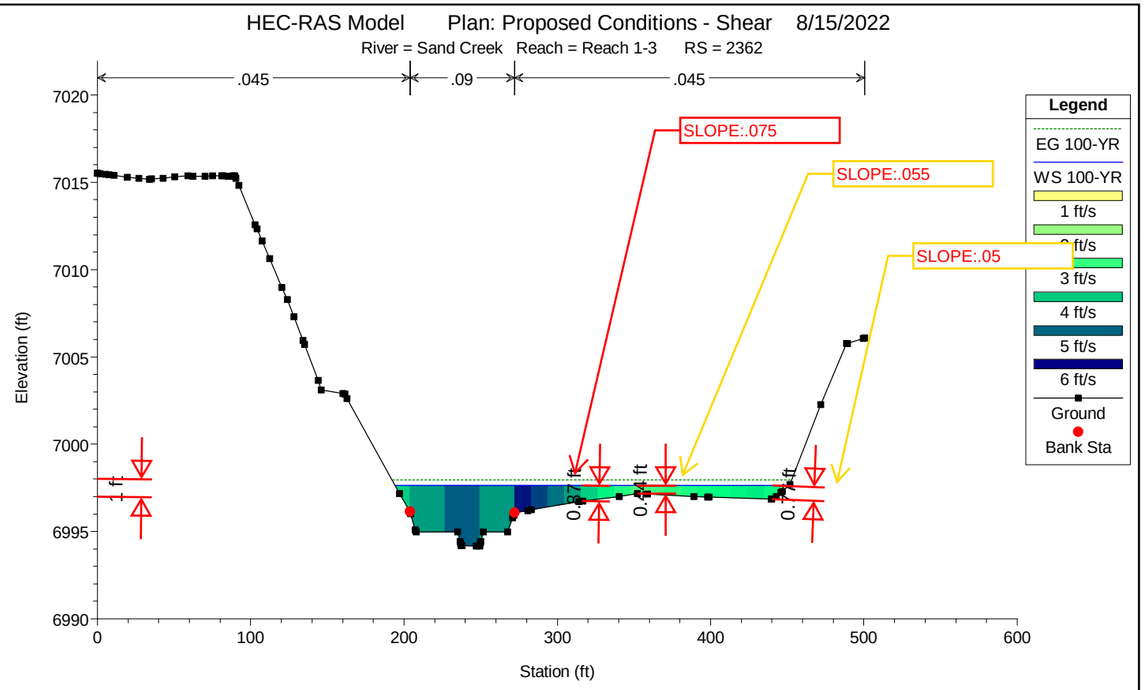

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 2827
.045
.09
.045
Legend
EG 100-YR
WS 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

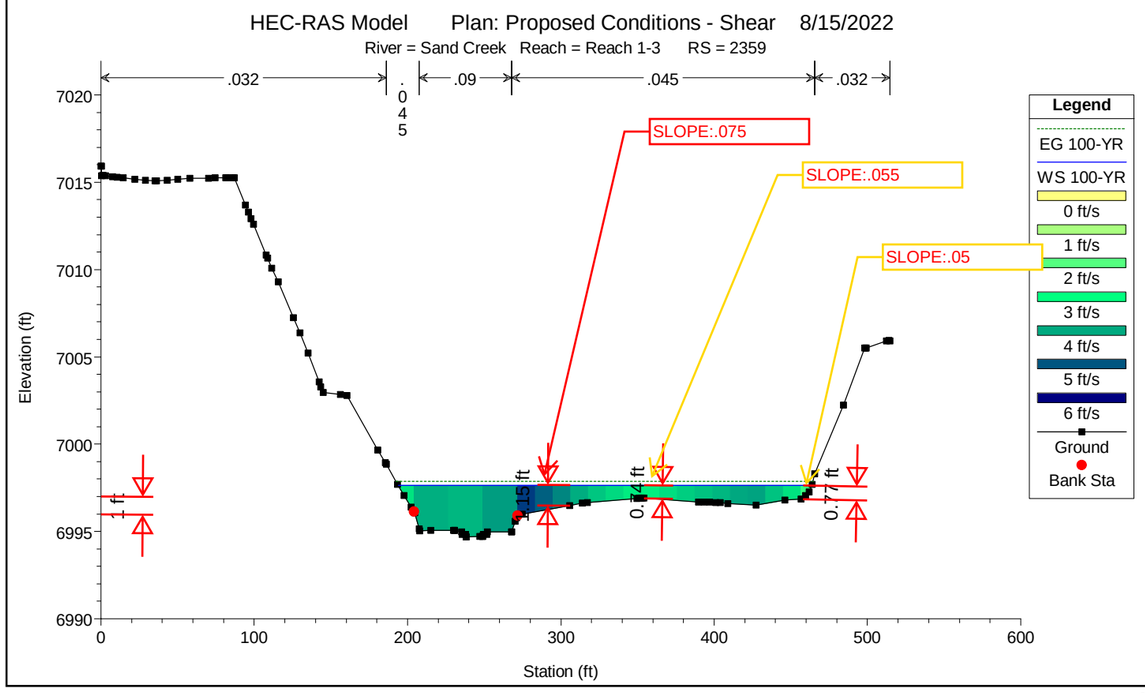

HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 2823
.032
.045
.06
.035
.06
.045
.032
Legend
EG 100-YR
WS 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 2396
.032
.045
.06
.035
.06
.045
.032
SLOPE:.01
SLOPE:.01
SLOPE:.01
0.99 ft
1.41 ft
0.9 ft
0.51 ft
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 2387
.032
.045
.09
.045
.032
SLOPE:.12
SLOPE:.047
SLOPE:.057
1.02 ft
1.24 ft
0.98 ft
0.78 ft
0.25 ft
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 2374
.032
.045
.09
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
Crit 100-YR
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 2362
.045
.09
.045
SLOPE:.075
SLOPE:.055
SLOPE:.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
1 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


HEC-RAS Model Plan: Proposed Conditions - Shear 8/15/2022
River = Sand Creek Reach = Reach 1-3 RS = 2359
.032
.045
.09
.045
.032
SLOPE:.075
SLOPE:.055
SLOPE:.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

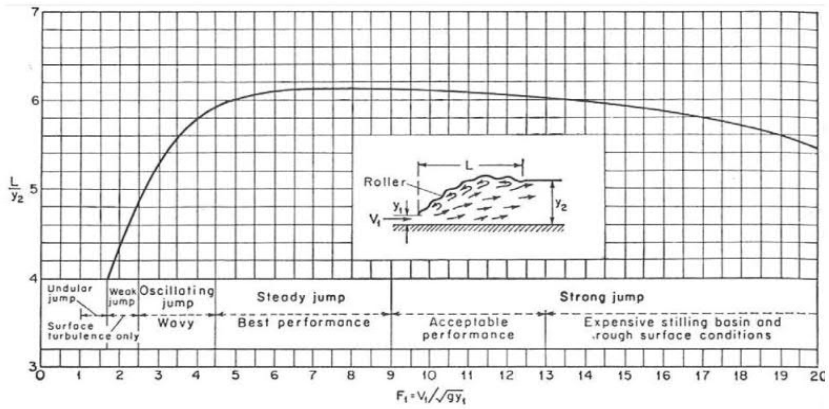
## Grouted Boulder Stilling Basin Calculations for SRMD Pond #1 & 2 Outfalls

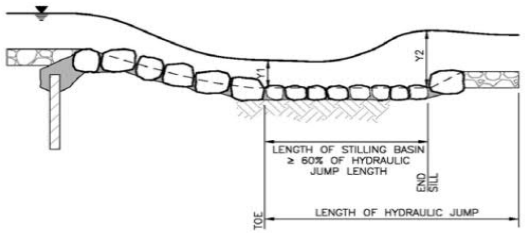
Pond 1 (Lower)

| | Q | Froude (From StormCAD) | Velocity (from StormCAD) | Y2 (from HEC) | L (from chart) | Y1(from HEC) | L (from calc) |
|---|---|---|---|---|---|---|---|
| 2-Yr | 142 | 1.68 | 10.24 | 1.2 | 4.8 | 0.59 | 4.010722837 |
| 5-Yr | 513 | 1.699 | 15.83 | 3.06 | 12.24 | 1.17 | 8.175549096 |
| 10-Yr | 560 | 1.694 | 16.27 | 4.21 | 16.84 | 1.6 | 11.10031821 |
| 25-Yr | 1155 | 1.62 | 20.1 | 4.97 | 19.88 | 1.91 | 11.83886596 |
| 50-Yr | 1591 | 1.563 | 21.85 | 6.34 | 25.36 | 2.37 | 13.34018799 |
| 100-Yr | 1875 | 1.529 | 22.73 | 7.17 | 28.68 | 2.68 | 14.17446829 |

Pond 2 (Upper)

| | Q | Froude (From StormCAD) | Velocity (from StormCAD) | Y2 (from HEC) | L (from chart) | Y1(from HEC) | L (from calc) |
|---|---|---|---|---|---|---|---|
| 2-Yr | 155 | 1.501 | 10.4 | 0.89 | 3.56 | 0.64 | 3.205845838 |
| 5-Yr | 480 | 1.524 | 15.38 | 1.58 | 6.32 | 1.3 | 6.81071213 |
| 10-Yr | 783 | 1.395 | 16.99 | 2 | 8 | 1.52 | 6.003354922 |
| 25-Yr | 1036 | 1.345 | 18.21 | 2.3 | 9.2 | 1.62 | 5.588541897 |
| 50-Yr | 1409 | 1.281 | 19.52 | 2.74 | 10.96 | 1.72 | 4.832937184 |
| 100-Yr | 1665 | 1.309 | 20.87 | 3.03 | 12.12 | 1.78 | 5.499838345 |




### Length of hydraulic jump [ edit ]

Length of a hydraulic jump is often hard to measure in the field and during laboratory investigations due to the sudden changes in surface turbulence, in addition to the formation of roller and eddies.[9] The length of a hydraulic jump is often an important factor to know when considering the design of structures like settling basins. Comprehensive studies are applying six-legged components for the bed lining of stilling basins. The results imply that appropriate settings of the elements can decrease the length of the hydraulic jump, the length of stilling basin, the conjugated depth, and consequently reduce the scour depth downstream of the basin.[10] The equation derived for length is based on experimental data, and relates the length to the upstream Froude number.

(1) $L = 220 \times y_1 \times \tanh \frac{Fr_1 - 1}{22}$ [11]

## Existing Stock Pond 1 Proposed Outlet Structure

| | | | | | | |
|---|---|---|---|---|---|---|
| width | 25 | area | 625 | open area x 70% | 218.75 | 0.25 |
| length | 25 | blockage | 0.5 | | | |
| perimeter | 100 | blockage | 0 | avail perm. | 100 | |

| Elev (ft) | Head (ft) | Orifice | Weir |
|---|---|---|---|
| 7036 | 0 | 0 | 0 |
| 7036.25 | 0.25 | 526.6381 | 38.75 |
| 7036.5 | 0.5 | 744.7787 | 109.6016 |
| 7036.75 | 0.75 | 912.1639 | 201.3509 |
| 7037 | 1 | 1053.276 | 310 |
| 7037.25 | 1.25 | 1177.599 | 433.2382 |
| 7037.5 | 1.5 | 1289.995 | 569.5064 |
| 7037.75 | 1.75 | 1393.353 | 717.66 |
| 7038 | 2 | 1489.557 | 876.8124 |
| 7038.25 | 2.25 | 1579.914 | 1046.25 |
| 7038.5 | 2.5 | 1665.376 | 1225.383 |
| 7038.75 | 2.75 | 1746.661 | 1413.711 |
| 7039 | 3 | 1824.328 | 1610.807 |
| 7039.25 | 3.25 | 1898.821 | 1816.296 |
| 7039.5 | 3.5 | 1970.499 | 2029.849 |
| 7039.75 | 3.75 | 2039.66 | 2251.172 |
| 7040 | 4 | 2106.552 | 2480 |
| 7040.25 | 4.25 | 2171.384 | 2716.096 |
| 7040.5 | 4.5 | 2234.336 | 2959.242 |
| 7040.75 | 4.75 | 2295.562 | 3209.239 |
| 7041 | 5 | 2355.197 | 3465.905 |
| 7041.25 | 5.25 | 2413.359 | 3729.071 |
| 7041.5 | 5.5 | 2470.152 | 3998.579 |
| 7041.75 | 5.75 | 2525.667 | 4274.285 |
| 7042 | 6 | 2579.989 | 4556.051 |
| 7042.25 | 6.25 | 2633.19 | 4843.75 |
| 7042.5 | 6.5 | 2685.338 | 5137.262 |
| 7042.75 | 6.75 | 2736.492 | 5436.474 |
| 7043 | 7 | 2786.707 | 5741.28 |
| 7043.25 | 7.25 | 2836.033 | 6051.579 |
| 7043.5 | 7.5 | 2884.516 | 6367.275 |
| 7043.75 | 7.75 | 2932.197 | 6688.277 |
| 7044 | 8 | 2979.115 | 7014.499 |
| 7044.25 | 8.25 | 3025.305 | 7345.859 |
| 7044.5 | 8.5 | 3070.801 | 7682.279 |
| 7044.75 | 8.75 | 3115.633 | 8023.683 |
| 7045 | 9 | 3159.828 | 8370 |
| 7045.25 | 9.25 | 3203.414 | 8721.161 |
| 7045.5 | 9.5 | 3246.415 | 9077.1 |
| 7045.75 | 9.75 | 3288.854 | 9437.753 |
| 7046 | 10 | 3330.752 | 9803.061 |
| 7046.25 | 10.25 | 3372.129 | 10172.96 |
| 7046.5 | 10.5 | 3413.005 | 10547.41 |
| 7046.75 | 10.75 | 3453.397 | 10926.33 |
| 7047 | 11 | 3493.322 | 11309.69 |
| 7047.25 | 11.25 | 3532.796 | 11697.43 |
| 7047.5 | 11.5 | 3571.833 | 12089.5 |
| 7047.75 | 11.75 | 3610.449 | 12485.86 |
| 7048 | 12 | 3648.656 | 12886.46 |

## Existing Stock Pond 2 Proposed Outlet Structure

| | | | | | |
|---|---|---|---|---|---|
| width | 25 | area | 625 | open area x 70% | 218.75 |
| length | 25 | blockage | 0.5 | | |
| perimeter | 100 | blockage | 0 | avail perm. | 100 |

| Elev (ft) | Head (ft) | Orifice | Weir |
|---|---|---|---|
| 7117.75 | 0 | 0 | 0 |
| 7118 | 0.25 | 526.6381 | 38.75 |
| 7118.25 | 0.5 | 744.7787 | 109.6016 |
| 7118.5 | 0.75 | 912.1639 | 201.3509 |
| 7118.75 | 1 | 1053.276 | 310 |
| 7119 | 1.25 | 1177.599 | 433.2382 |
| 7119.25 | 1.5 | 1289.995 | 569.5064 |
| 7119.5 | 1.75 | 1393.353 | 717.66 |
| 7119.75 | 2 | 1489.557 | 876.8124 |
| 7120 | 2.25 | 1579.914 | 1046.25 |
| 7120.25 | 2.5 | 1665.376 | 1225.383 |
| 7120.5 | 2.75 | 1746.661 | 1413.711 |
| 7120.75 | 3 | 1824.328 | 1610.807 |
| 7121 | 3.25 | 1898.821 | 1816.296 |
| 7121.25 | 3.5 | 1970.499 | 2029.849 |
| 7121.5 | 3.75 | 2039.66 | 2251.172 |
| 7121.75 | 4 | 2106.552 | 2480 |
| 7122 | 4.25 | 2171.384 | 2716.096 |
| 7122.25 | 4.5 | 2234.336 | 2959.242 |
| 7122.5 | 4.75 | 2295.562 | 3209.239 |
| 7122.75 | 5 | 2355.197 | 3465.905 |
| 7123 | 5.25 | 2413.359 | 3729.071 |
| 7123.25 | 5.5 | 2470.152 | 3998.579 |
| 7123.5 | 5.75 | 2525.667 | 4274.285 |
| 7123.75 | 6 | 2579.989 | 4556.051 |
| 7124 | 6.25 | 2633.19 | 4843.75 |
| 7124.25 | 6.5 | 2685.338 | 5137.262 |
| 7124.5 | 6.75 | 2736.492 | 5436.474 |
| 7124.75 | 7 | 2786.707 | 5741.28 |
| 7125 | 7.25 | 2836.033 | 6051.579 |
| 7125.25 | 7.5 | 2884.516 | 6367.275 |
| 7125.5 | 7.75 | 2932.197 | 6688.277 |
| 7125.75 | 8 | 2979.115 | 7014.499 |
| 7126 | 8.25 | 3025.305 | 7345.859 |
| 7126.25 | 8.5 | 3070.801 | 7682.279 |
| 7126.5 | 8.75 | 3115.633 | 8023.683 |
| 7126.75 | 9 | 3159.828 | 8370 |
| 7127 | 9.25 | 3203.414 | 8721.161 |
| 7127.25 | 9.5 | 3246.415 | 9077.1 |
| 7127.5 | 9.75 | 3288.854 | 9437.753 |
| 7127.75 | 10 | 3330.752 | 9803.061 |
| 7128 | 10.25 | 3372.129 | 10172.96 |
| 7128.25 | 10.5 | 3413.005 | 10547.41 |
| 7128.5 | 10.75 | 3453.397 | 10926.33 |
| 7128.75 | 11 | 3493.322 | 11309.69 |
| 7129 | 11.25 | 3532.796 | 11697.43 |
| 7129.25 | 11.5 | 3571.833 | 12089.5 |
| 7129.5 | 11.75 | 3610.449 | 12485.86 |
| 7129.75 | 12 | 3648.656 | 12886.46 |

**Scenario: 5-YR**
**Current Time Step: 0.000 h**
**Conduit FlexTable: Combined Pipe/Node Report**

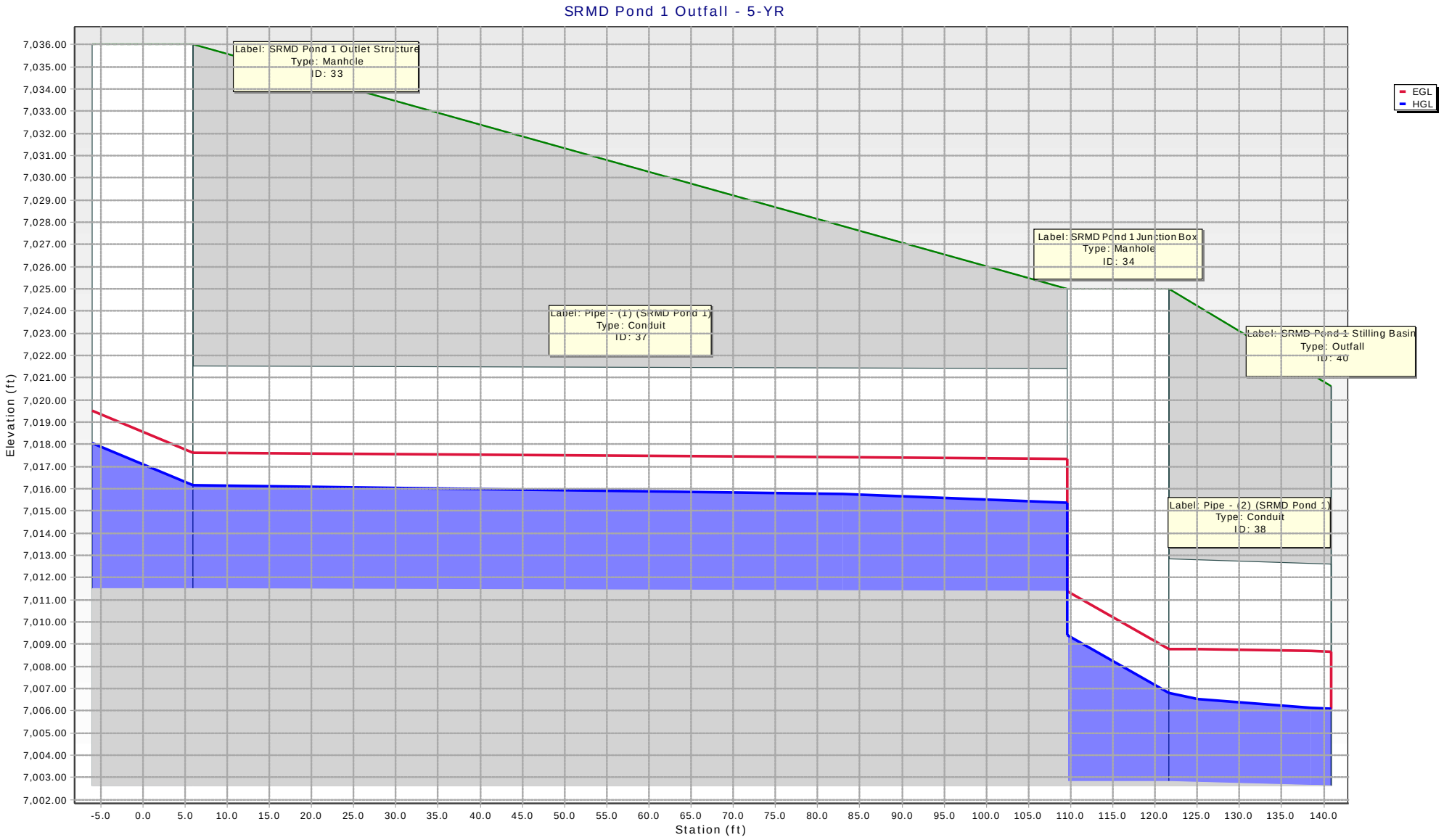
| Upstream Structure | Label | Flow (cfs) | Capacity (Full Flow) (cfs) | Rise (ft) | Span (ft) | Length (User Defined) (ft) | Slope (Calculated) (ft/ft) | Invert (Start) (ft) | Invert (Stop) (ft) | Elevation Ground (Start) (ft) | Elevation Ground (Stop) (ft) | HGL (In) (ft) | HGL (Out) (ft) | Energy Grade Line (In) (ft) | Energy Grade Line (Out) (ft) | Velocity (ft/s) | Manning's n | Upstream Structure Headloss Coefficient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRMD Pond 1 Outlet Structure | Pipe - (1) (SRMD Pond 1) | 537.00 | 860.07 | 10.0 | 12.0 | 115.6 | 0.001 | 7,011.52 | 7,011.40 | 7,036.02 | 7,025.01 | 7,016.18 | 7,015.37 | 7,017.61 | 7,017.35 | 7.59 | 0.013 | 1.320 |
| SRMD Pond 1 Junction Box | Pipe - (2) (SRMD Pond 1) | 537.00 | 2,450.71 | 10.0 | 12.0 | 25.3 | 0.008 | 7,002.83 | 7,002.62 | 7,025.01 | 7,020.64 | 7,006.80 | 7,006.09 | 7,008.78 | 7,008.68 | 16.06 | 0.013 | 1.320 |
| SRMD Pond 2 Outlet Structure | Pipe - (3) (SRMD Pond 2) | 487.00 | 1,333.67 | 10.0 | 10.0 | 87.2 | 0.004 | 7,101.02 | 7,100.67 | 7,117.76 | 7,124.81 | 7,105.21 | 7,104.66 | 7,107.31 | 7,106.98 | 12.29 | 0.013 | 1.320 |

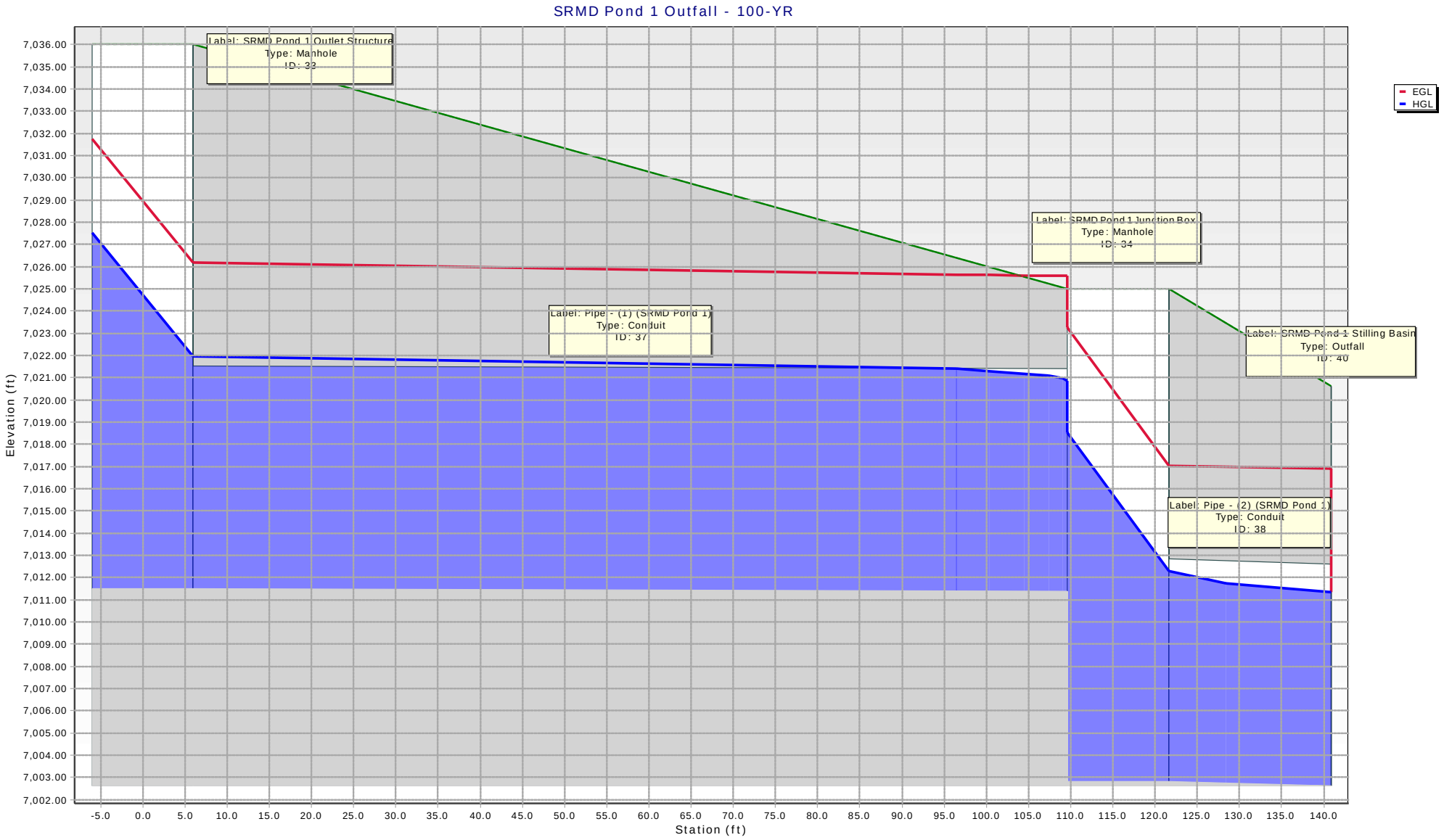
X:\2510000.all\2518804\StormCAD\2518804 StormCAD.stsw

**Scenario: 100-YR**
**Current Time Step: 0.000 h**
**Conduit FlexTable: Combined Pipe/Node Report**

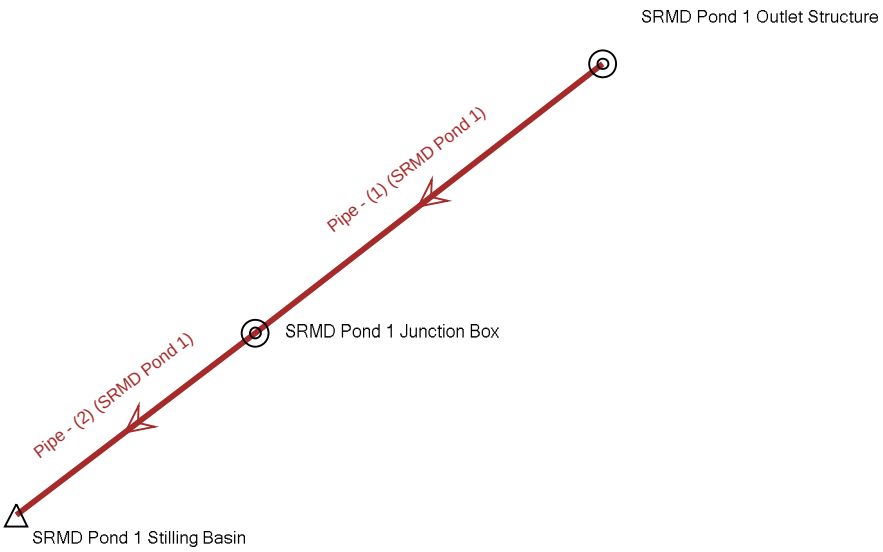
| Upstream Structure | Label | Flow (cfs) | Capacity (Full Flow) (cfs) | Rise (ft) | Span (ft) | Length (User Defined) (ft) | Slope (Calculated) (ft/ft) | Invert (Start) (ft) | Invert (Stop) (ft) | Elevation Ground (Start) (ft) | Elevation Ground (Stop) (ft) | HGL (In) (ft) | HGL (Out) (ft) | Energy Grade Line (In) (ft) | Energy Grade Line (Out) (ft) | Velocity (ft/s) | Manning's n | Upstream Structure Headloss Coefficient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRMD Pond 1 Outlet Structure | Pipe - (1) (SRMD Pond 1) | 1,978.00 | 860.07 | 10.0 | 12.0 | 115.6 | 0.001 | 7,011.52 | 7,011.40 | 7,036.02 | 7,025.01 | 7,021.97 | 7,020.85 | 7,026.19 | 7,025.58 | 16.48 | 0.013 | 1.320 |
| SRMD Pond 1 Junction Box | Pipe - (2) (SRMD Pond 1) | 1,978.00 | 2,450.71 | 10.0 | 12.0 | 25.3 | 0.008 | 7,002.83 | 7,002.62 | 7,025.01 | 7,020.64 | 7,012.29 | 7,011.35 | 7,017.01 | 7,016.89 | 23.02 | 0.013 | 1.320 |
| SRMD Pond 2 Outlet Structure | Pipe - (3) (SRMD Pond 2) | 1,649.00 | 1,333.67 | 10.0 | 10.0 | 87.2 | 0.004 | 7,101.02 | 7,100.67 | 7,117.76 | 7,124.81 | 7,111.04 | 7,110.12 | 7,115.26 | 7,114.85 | 16.49 | 0.013 | 1.320 |

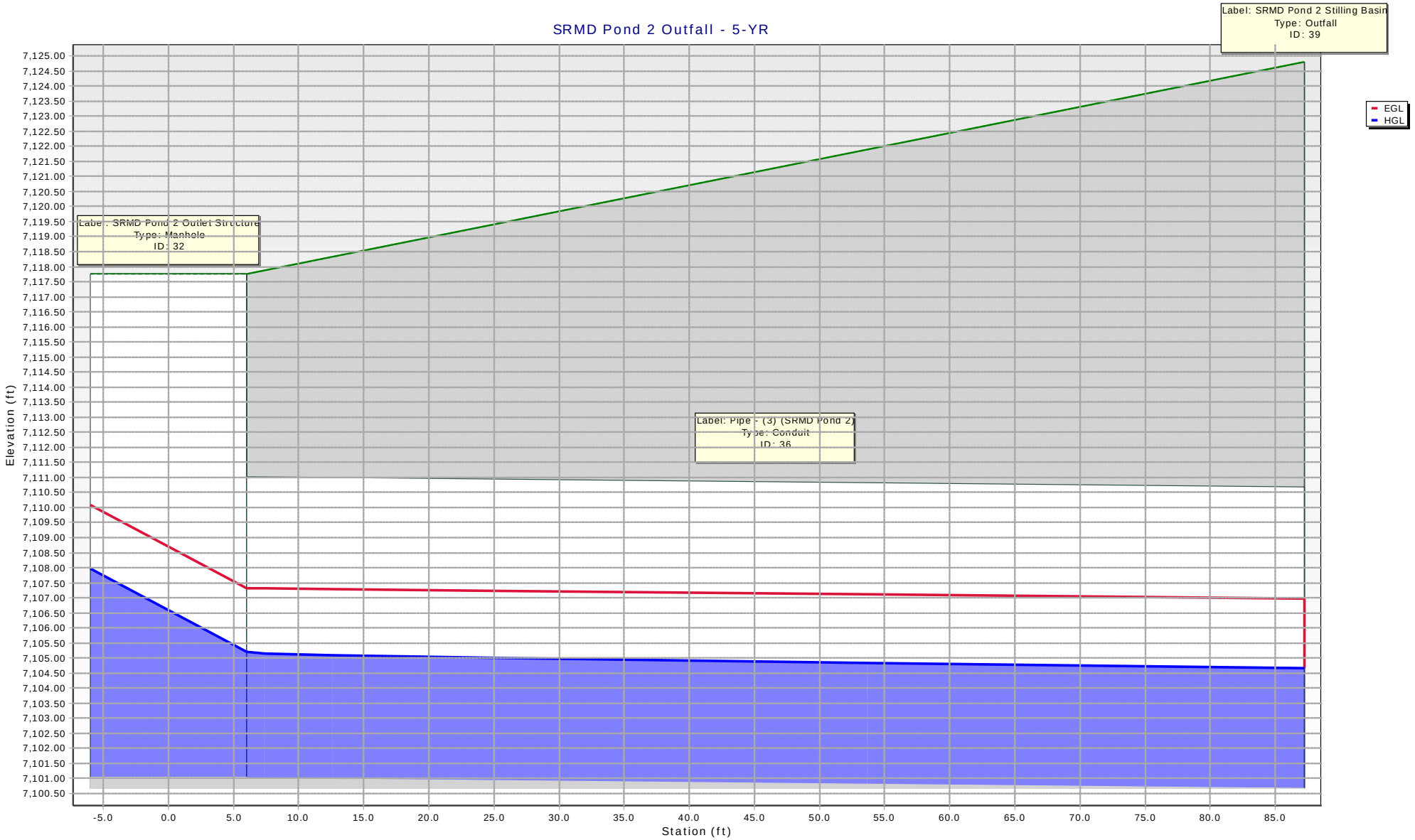
X:\2510000.all\2518804\StormCAD\2518804 StormCAD.stsw

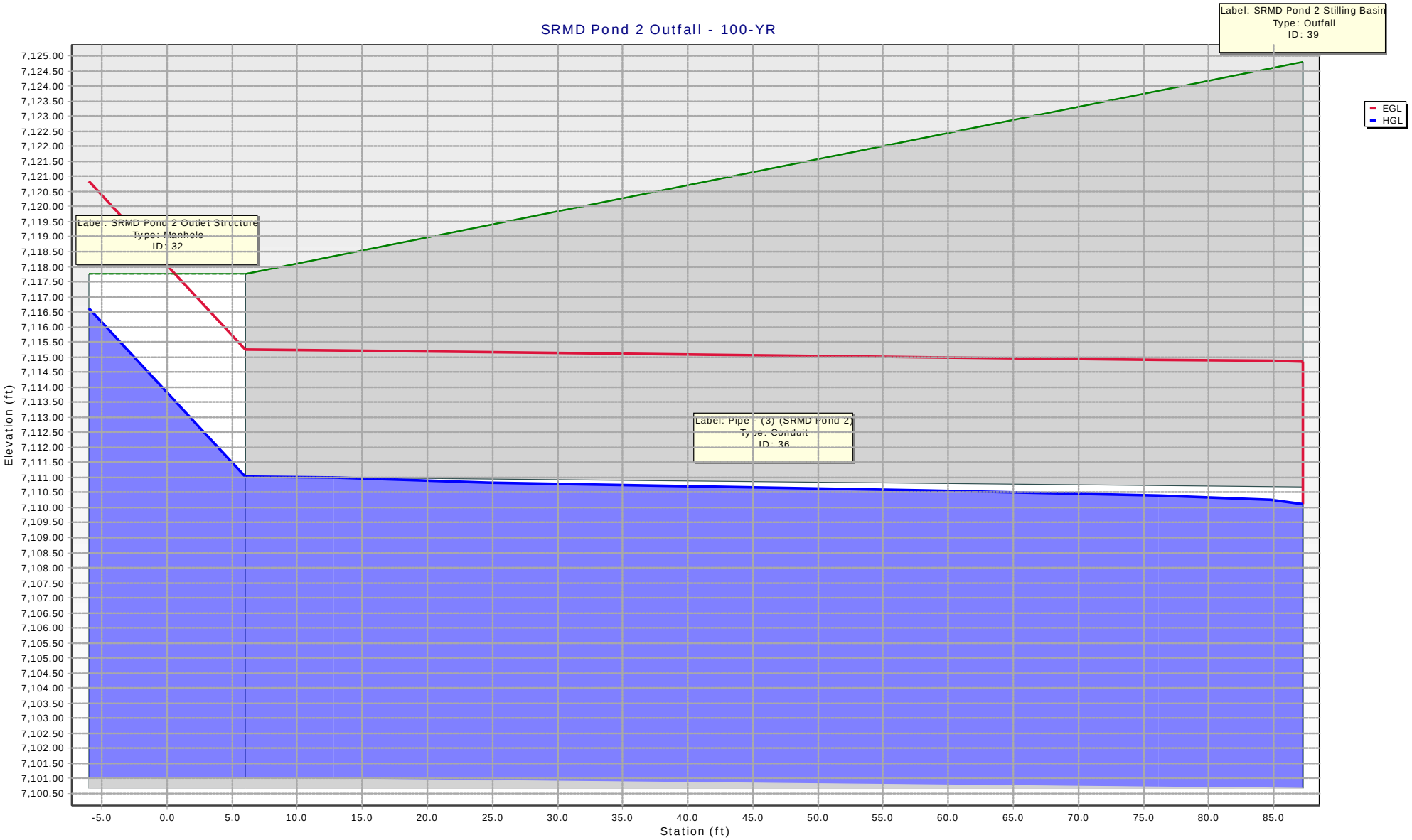

SRMD Pond 1 Outfall - 5-YR
Label: SRMD Pond 1 Outlet Structure
Type: Manhole
ID: 33
Label: SRMD Pond 1 Junction Box
Type: Manhole
ID: 34
Label: Pipe - (1) (SRMD Pond 1)
Type: Conduit
ID: 37
Label: SRMD Pond 1 Stilling Basin
Type: Outfall
ID: 40
Label: Pipe - (2) (SRMD Pond 1)
Type: Conduit
ID: 38
EGL
HGL
Elevation (ft)
7,036.00
7,035.00
7,034.00
7,033.00
7,032.00
7,031.00
7,030.00
7,029.00
7,028.00
7,027.00
7,026.00
7,025.00
7,024.00
7,023.00
7,022.00
7,021.00
7,020.00
7,019.00
7,018.00
7,017.00
7,016.00
7,015.00
7,014.00
7,013.00
7,012.00
7,011.00
7,010.00
7,009.00
7,008.00
7,007.00
7,006.00
7,005.00
7,004.00
7,003.00
7,002.00
-5.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0
115.0
120.0
125.0
130.0
135.0
140.0
Station (ft)


SRMD Pond 1 Outfall - 100-YR
Label: SRMD Pond 1 Outlet Structure
Type: Manhole
ID: 33
Label: SRMD Pond 1 Junction Box
Type: Manhole
ID: 34
Label: Pipe - (1) (SRMD Pond 1)
Type: Conduit
ID: 37
Label: SRMD Pond 1 Stilling Basin
Type: Outfall
ID: 40
Label: Pipe - (2) (SRMD Pond 1)
Type: Conduit
ID: 38
EGL
HGL
Elevation (ft)
7,036.00
7,035.00
7,034.00
7,033.00
7,032.00
7,031.00
7,030.00
7,029.00
7,028.00
7,027.00
7,026.00
7,025.00
7,024.00
7,023.00
7,022.00
7,021.00
7,020.00
7,019.00
7,018.00
7,017.00
7,016.00
7,015.00
7,014.00
7,013.00
7,012.00
7,011.00
7,010.00
7,009.00
7,008.00
7,007.00
7,006.00
7,005.00
7,004.00
7,003.00
7,002.00
-5.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0
115.0
120.0
125.0
130.0
135.0
140.0
Station (ft)

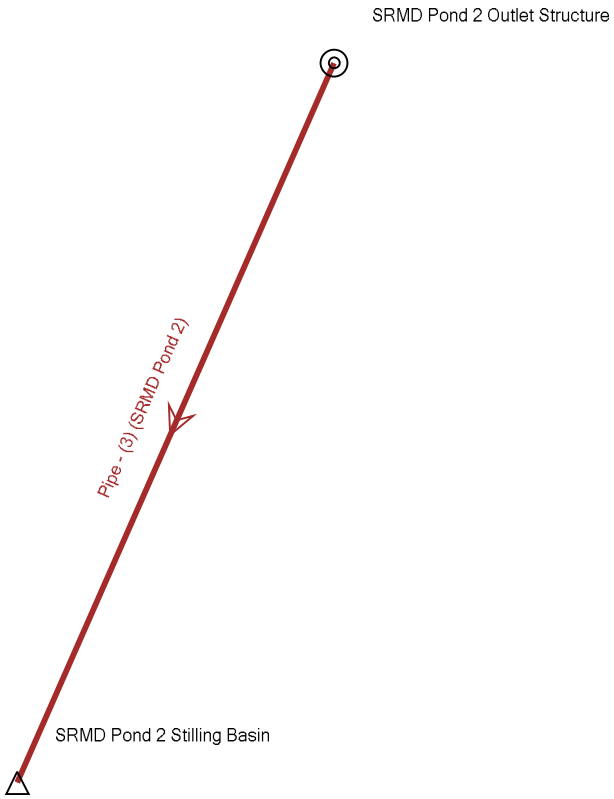
# Scenario: 100-YR




SRMD Pond 2 Outfall - 5-YR
Label: SRMD Pond 2 Stilling Basin
Type: Outfall
ID: 39
Label: SRMD Pond 2 Outlet Structure
Type: Manhole
ID: 32
Label: Pipe - (3) (SRMD Pond 2)
Type: Conduit
ID: 36
EGL
HGL
Elevation (ft)
Station (ft)
7,125.00
7,124.50
7,124.00
7,123.50
7,123.00
7,122.50
7,122.00
7,121.50
7,121.00
7,120.50
7,120.00
7,119.50
7,119.00
7,118.50
7,118.00
7,117.50
7,117.00
7,116.50
7,116.00
7,115.50
7,115.00
7,114.50
7,114.00
7,113.50
7,113.00
7,112.50
7,112.00
7,111.50
7,111.00
7,110.50
7,110.00
7,109.50
7,109.00
7,108.50
7,108.00
7,107.50
7,107.00
7,106.50
7,106.00
7,105.50
7,105.00
7,104.50
7,104.00
7,103.50
7,103.00
7,102.50
7,102.00
7,101.50
7,101.00
7,100.50
-5.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0


SRMD Pond 2 Outfall - 100-YR
Label: SRMD Pond 2 Stilling Basin
Type: Outfall
ID: 39
EGL
HGL
Label: SRMD Pond 2 Outlet Structure
Type: Manhole
ID: 32
Label: Pipe - (3) (SRMD Pond 2)
Type: Conduit
ID: 36
Elevation (ft)
7,125.00
7,124.50
7,124.00
7,123.50
7,123.00
7,122.50
7,122.00
7,121.50
7,121.00
7,120.50
7,120.00
7,119.50
7,119.00
7,118.50
7,118.00
7,117.50
7,117.00
7,116.50
7,116.00
7,115.50
7,115.00
7,114.50
7,114.00
7,113.50
7,113.00
7,112.50
7,112.00
7,111.50
7,111.00
7,110.50
7,110.00
7,109.50
7,109.00
7,108.50
7,108.00
7,107.50
7,107.00
7,106.50
7,106.00
7,105.50
7,105.00
7,104.50
7,104.00
7,103.50
7,103.00
7,102.50
7,102.00
7,101.50
7,101.00
7,100.50
-5.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
Station (ft)

# Scenario: 100-YR



# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

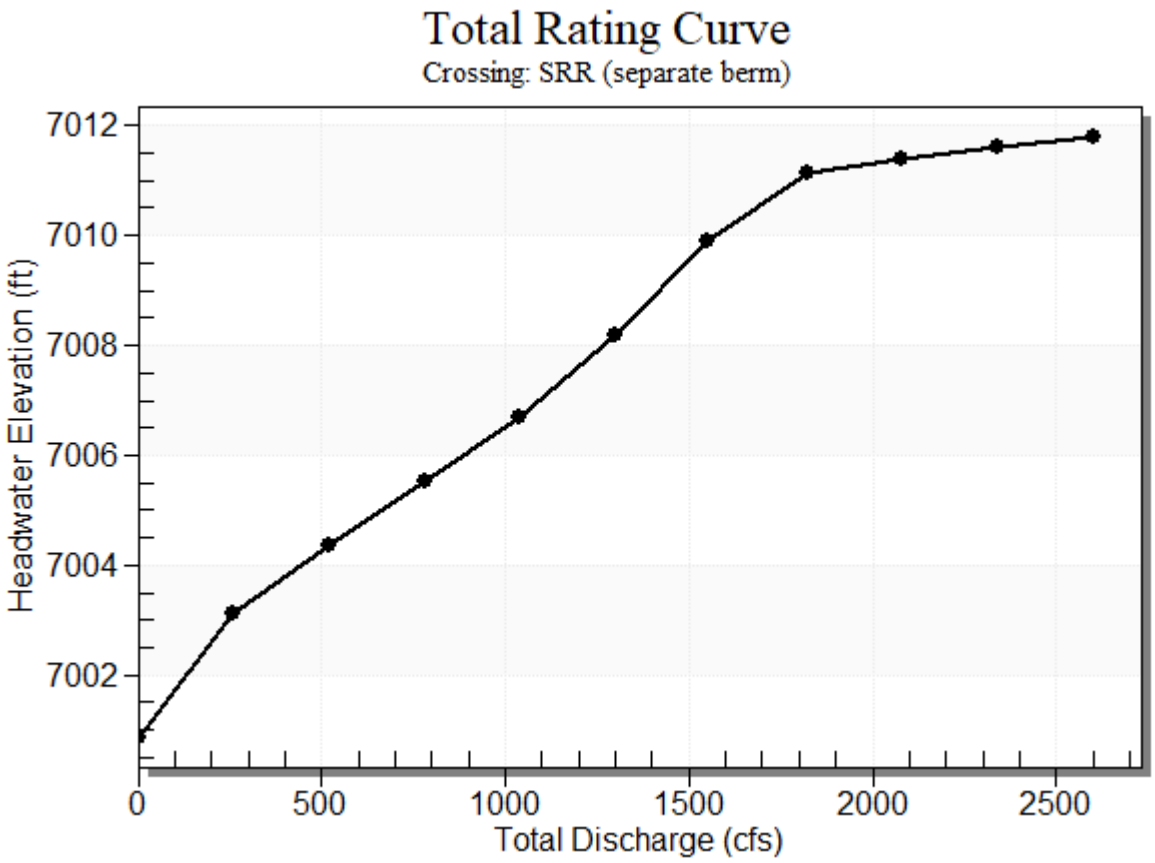
Design Flow: 1550 cfs

Maximum Flow: 2600 cfs

**Table 1 - Summary of Culvert Flows at Crossing: SRR (separate berm)**

| Headwater Elevation (ft) | Total Discharge (cfs) | Culvert 1 Discharge (cfs) | Culvert 2 (low flow) Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 7000.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| 7003.13 | 260.00 | 151.32 | 108.64 | 0.00 | 3 |
| 7004.37 | 520.00 | 339.63 | 180.32 | 0.00 | 4 |
| 7005.52 | 780.00 | 552.62 | 227.38 | 0.00 | 4 |
| 7006.71 | 1040.00 | 773.45 | 266.59 | 0.00 | 4 |
| 7008.18 | 1300.00 | 994.87 | 305.19 | 0.00 | 4 |
| 7009.91 | 1550.00 | 1205.48 | 344.57 | 0.00 | 4 |
| 7011.14 | 1820.00 | 1333.23 | 369.90 | 115.89 | 7 |
| 7011.40 | 2080.00 | 1359.45 | 375.23 | 344.67 | 5 |
| 7011.62 | 2340.00 | 1380.22 | 379.47 | 580.03 | 5 |
| 7011.81 | 2600.00 | 1398.22 | 383.17 | 817.61 | 4 |
| 7010.88 | 1672.34 | 1307.58 | 364.76 | 0.00 | Overtopping |

**Rating Curve Plot for Crossing: SRR (separate berm)**



## Table 2 - Culvert Summary Table: Culvert 1

| Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | Tailwater Depth (ft) | Outlet Velocity (ft/s) | Tailwater Velocity (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 7000.88 | 0.000 | 0.000 | 0-NF | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 260.00 | 151.32 | 7003.13 | 1.745 | 1.751 | 3-M2t | 1.225 | 1.017 | 1.177 | 1.738 | 4.944 | 2.537 |
| 520.00 | 339.63 | 7004.37 | 2.954 | 2.998 | 3-M2t | 2.077 | 1.743 | 2.032 | 2.593 | 6.429 | 3.216 |
| 780.00 | 552.62 | 7005.52 | 4.097 | 4.143 | 3-M2t | 2.886 | 2.412 | 2.703 | 3.264 | 7.863 | 3.673 |
| 1040.00 | 773.45 | 7006.71 | 5.326 | 5.184 | 3-M2t | 3.644 | 3.018 | 3.274 | 3.835 | 9.085 | 4.027 |
| 1300.00 | 994.87 | 7008.18 | 6.800 | 6.142 | 7-M2t | 4.000 | 3.569 | 3.780 | 4.341 | 10.124 | 4.318 |
| 1550.00 | 1205.48 | 7009.91 | 8.531 | 4.111 | 5-M2t | 4.000 | 4.000 | 3.780 | 4.781 | 0.000 | 4.558 |
| 1820.00 | 1333.23 | 7011.14 | 9.756 | 4.548 | 5-M2t | 4.000 | 4.000 | 3.780 | 5.218 | 10.124 | 4.786 |
| 2080.00 | 1359.45 | 7011.40 | 10.024 | 4.939 | 5-M2t | 4.000 | 4.000 | 3.780 | 5.609 | 10.124 | 4.982 |
| 2340.00 | 1380.22 | 7011.62 | 10.241 | 5.306 | 5-M2t | 4.000 | 4.000 | 3.780 | 5.976 | 10.124 | 5.159 |
| 2600.00 | 1398.22 | 7011.81 | 10.431 | 5.652 | 5-M2t | 4.000 | 4.000 | 3.780 | 6.322 | 10.124 | 5.322 |

**********

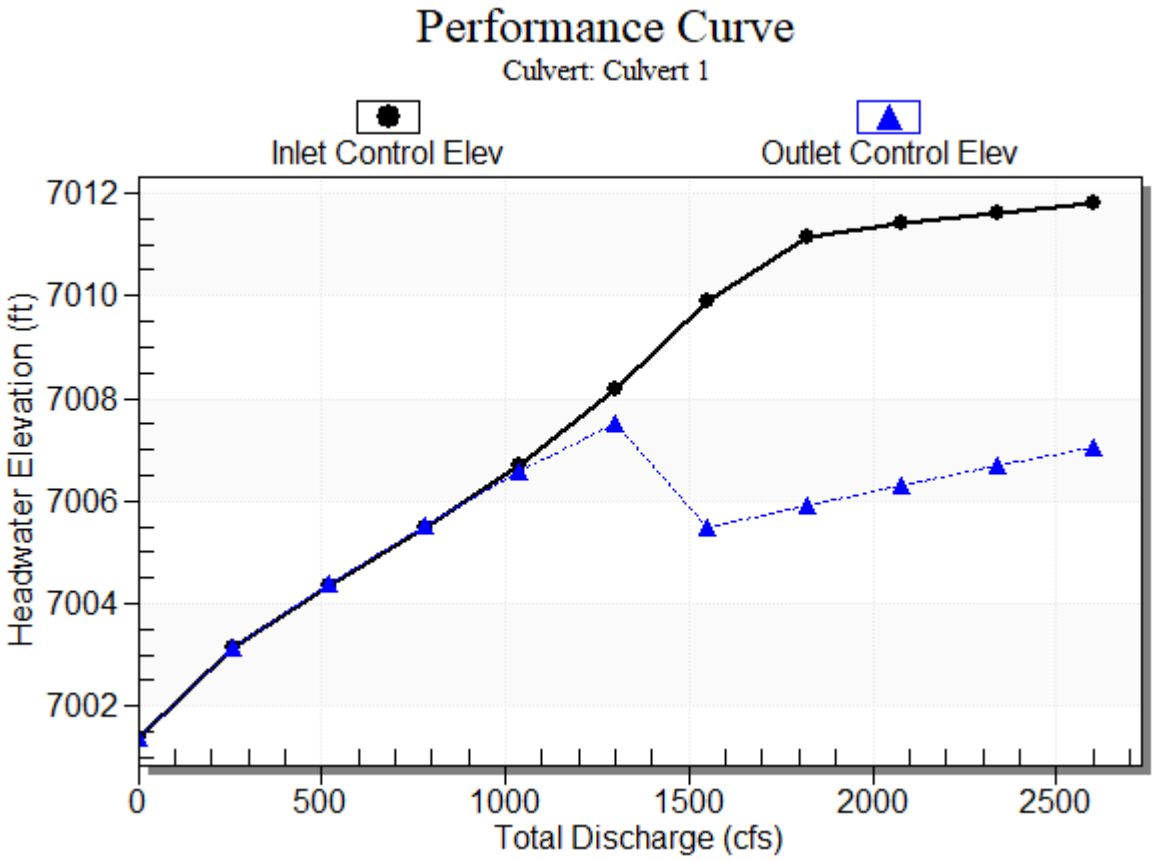
Straight Culvert

Inlet Elevation (invert): 7001.38 ft,  Outlet Elevation (invert): 7001.27 ft

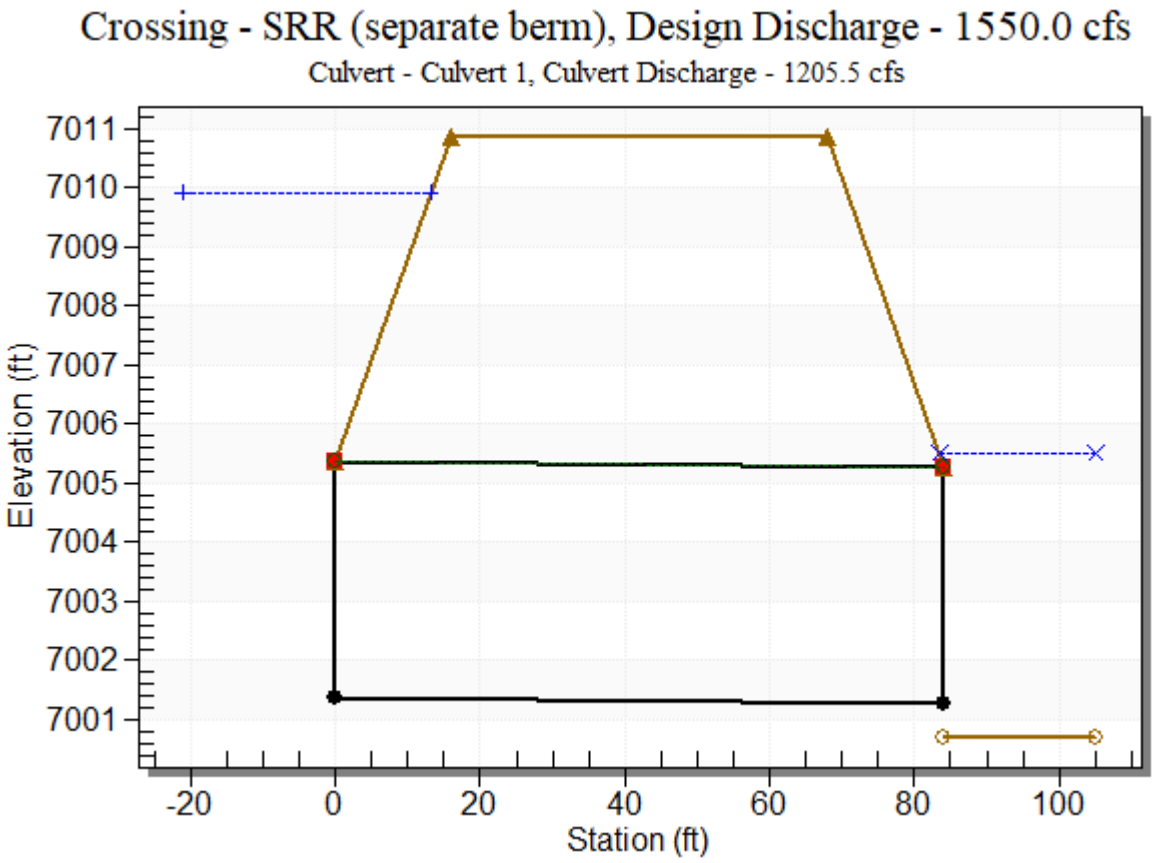
Culvert Length: 84.00 ft,  Culvert Slope: 0.0013

**********

**Culvert Performance Curve Plot: Culvert 1**



**Water Surface Profile Plot for Culvert: Culvert 1**




**Site Data - Culvert 1**

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 7001.38 ft

Outlet Station: 84.00 ft

Outlet Elevation: 7001.27 ft

Number of Barrels: 2

**Culvert Data Summary - Culvert 1**

Barrel Shape: Concrete Box

Barrel Span: 13.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

## Table 3 - Culvert Summary Table: Culvert 2 (low flow)

| Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | Tailwater Depth (ft) | Outlet Velocity (ft/s) | Tailwater Velocity (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 7000.88 | 0.000 | 0.000 | 0-NF | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 260.00 | 108.64 | 7003.13 | 2.213 | 2.235 | 7-M1t | 1.340 | 1.294 | 1.738 | 1.738 | 4.808 | 2.537 |
| 520.00 | 180.32 | 7004.37 | 3.494 | 3.860 | 4-FFf | 1.865 | 1.815 | 2.000 | 2.593 | 6.935 | 3.216 |
| 780.00 | 227.38 | 7005.52 | 4.644 | 5.380 | 4-FFf | 2.000 | 2.000 | 2.000 | 3.264 | 8.745 | 3.673 |
| 1040.00 | 266.59 | 7006.71 | 5.825 | 6.807 | 4-FFf | 2.000 | 2.000 | 2.000 | 3.835 | 10.253 | 4.027 |
| 1300.00 | 305.19 | 7008.18 | 7.300 | 8.288 | 4-FFf | 2.000 | 2.000 | 2.000 | 4.341 | 11.738 | 4.318 |
| 1550.00 | 344.57 | 7009.91 | 9.031 | 9.860 | 4-FFf | 2.000 | 2.000 | 2.000 | 4.781 | 13.253 | 4.558 |
| 1820.00 | 369.90 | 7011.14 | 10.255 | 11.097 | 4-FFf | 2.000 | 2.000 | 2.000 | 5.218 | 14.227 | 4.786 |
| 2080.00 | 375.23 | 7011.40 | 10.524 | 11.663 | 4-FFf | 2.000 | 2.000 | 2.000 | 5.609 | 14.432 | 4.982 |
| 2340.00 | 379.47 | 7011.62 | 10.740 | 12.172 | 4-FFf | 2.000 | 2.000 | 2.000 | 5.976 | 14.595 | 5.159 |
| 2600.00 | 383.17 | 7011.81 | 10.931 | 12.642 | 4-FFf | 2.000 | 2.000 | 2.000 | 6.322 | 14.737 | 5.322 |

**********

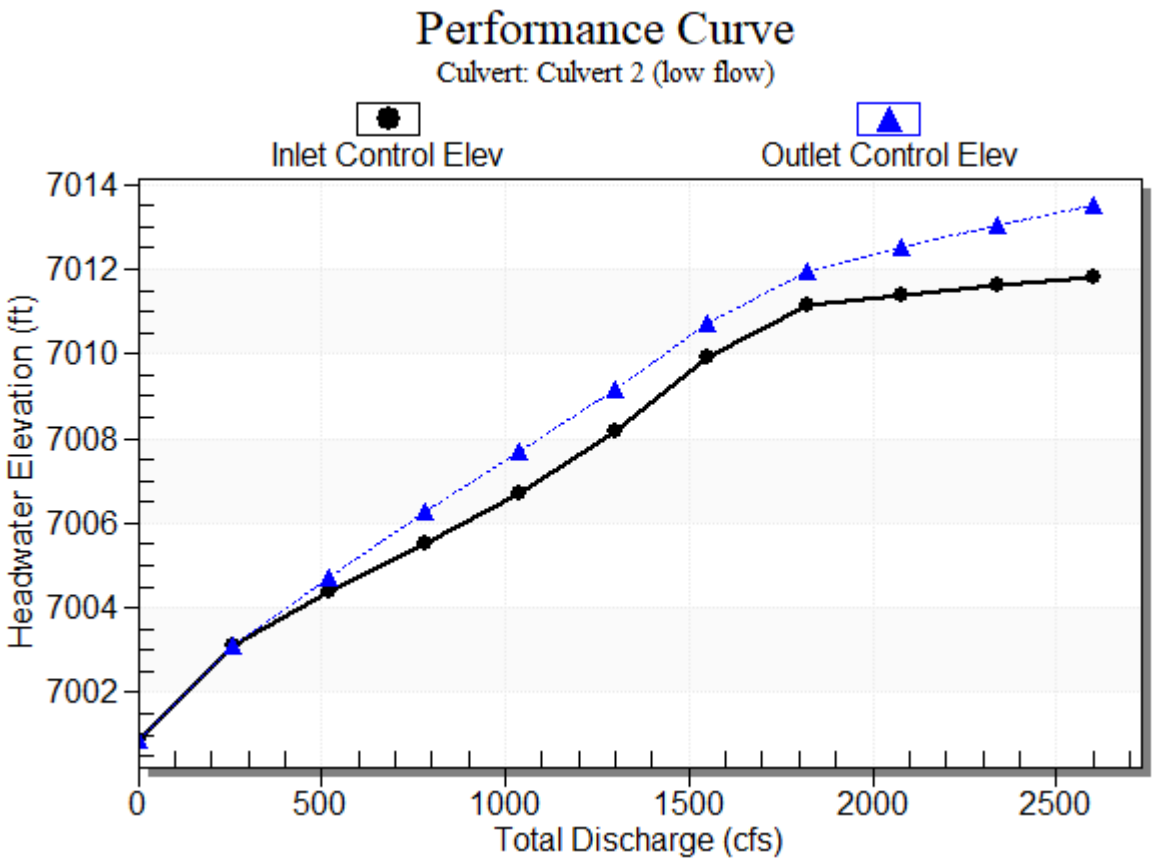
Straight Culvert

Inlet Elevation (invert): 7000.88 ft,  Outlet Elevation (invert): 7000.71 ft

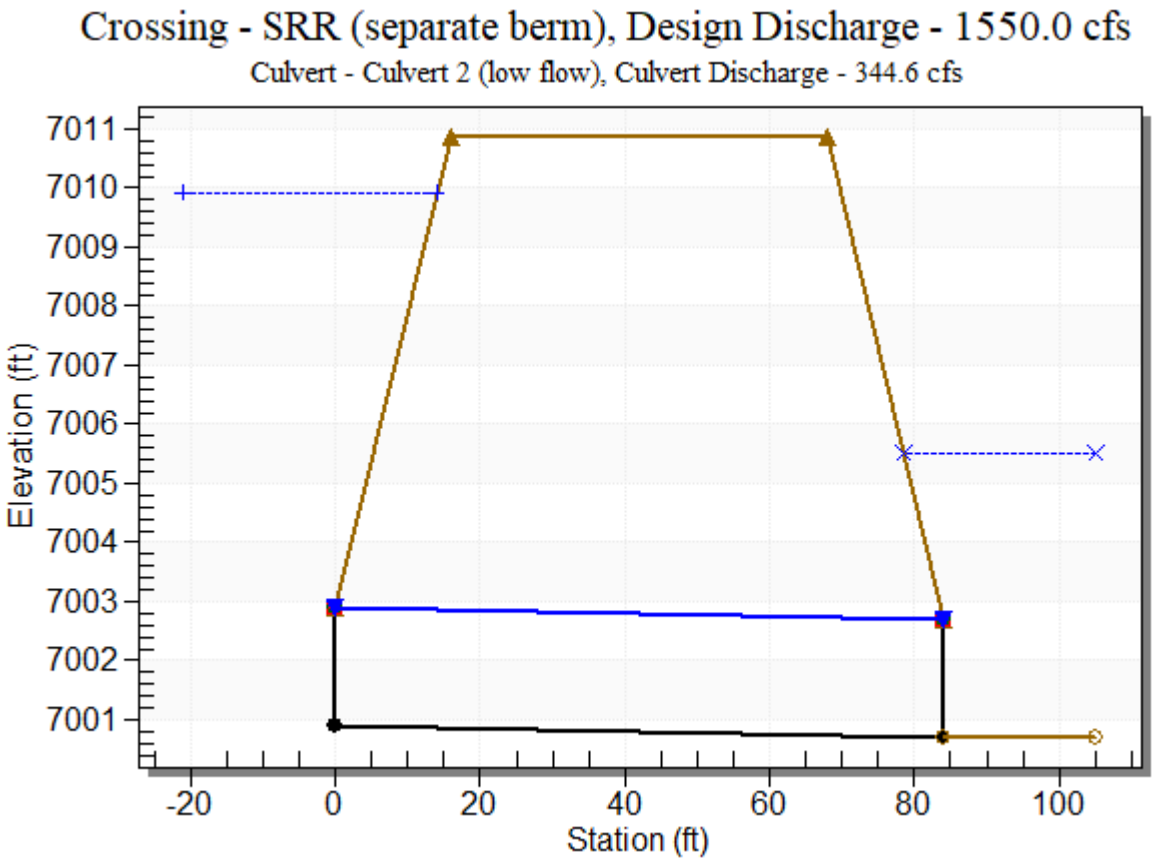
Culvert Length: 84.00 ft,  Culvert Slope: 0.0020

**********

**Culvert Performance Curve Plot: Culvert 2 (low flow)**



**Water Surface Profile Plot for Culvert: Culvert 2 (low flow)**




**Site Data - Culvert 2 (low flow)**

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 7000.88 ft

Outlet Station: 84.00 ft

Outlet Elevation: 7000.71 ft

Number of Barrels: 1

**Culvert Data Summary - Culvert 2 (low flow)**

Barrel Shape: Concrete Box

Barrel Span: 13.00 ft

Barrel Rise: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

**Table 4 - Downstream Channel Rating Curve (Crossing: SRR (separate berm))**

| Flow (cfs) | Water Surface Elev (ft) | Depth (ft) | Velocity (ft/s) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 0.00 | 7000.71 | 0.00 | 0.00 | 0.00 | 0.00 |
| 260.00 | 7002.45 | 1.74 | 2.54 | 0.22 | 0.36 |
| 520.00 | 7003.30 | 2.59 | 3.22 | 0.32 | 0.38 |
| 780.00 | 7003.97 | 3.26 | 3.67 | 0.41 | 0.39 |
| 1040.00 | 7004.55 | 3.84 | 4.03 | 0.48 | 0.40 |
| 1300.00 | 7005.05 | 4.34 | 4.32 | 0.54 | 0.41 |
| 1550.00 | 7005.49 | 4.78 | 4.56 | 0.60 | 0.41 |
| 1820.00 | 7005.93 | 5.22 | 4.79 | 0.65 | 0.42 |
| 2080.00 | 7006.32 | 5.61 | 4.98 | 0.70 | 0.42 |
| 2340.00 | 7006.69 | 5.98 | 5.16 | 0.75 | 0.43 |
| 2600.00 | 7007.03 | 6.32 | 5.32 | 0.79 | 0.43 |

## Tailwater Channel Data - SRR (separate berm)

Tailwater Channel Option:  Trapezoidal Channel

Bottom Width:  52.00 ft

Side Slope (H:V):  4.00 (_:1)

Channel Slope:  0.0020

Channel Manning's n:  0.0350

Channel Invert Elevation:  7000.71 ft

## Roadway Data for Crossing: SRR (separate berm)

Roadway Profile Shape:  Constant Roadway Elevation

Crest Length:  300.00 ft

Crest Elevation:  7010.88 ft

Roadway Surface:  Paved

Roadway Top Width:  52.00 ft

# Appendix D

# Reference Material

5 | SMOOTH STONES RESTORATION PLLC

To: Tristin Bonser, PE JR Engineering

From: David Bidelspach, 5 Smooth Stones Restoration, PLLC

CC:

Date: April 6th, 2021

**Re: Sand Creek Channel Stabilization Project; El Paso County - General Guidelines for Geomorphic Assessment / Design and Performance Standards**

Five Smooth Stones Restoration (5SSR) was tasked with developing general guidelines for geomorphic assessment and conceptual design for the drainage referred to as Sand Creek adjacent to the current private development within El Paso County, Colorado. The location of Sand Creek limits and development is shown below in Error! Reference source not found.. This memo discusses the geomorphic findings from field survey and site visit along with general guidelines used to develop the suggested parameters for the reaches within the Sand Creek.

## Background

Development is currently on going adjacent to the site. Most of the infrastructure for the development is near completion and it also appears most development drainage systems to Sand Creek, such as culverts and detention basins have been installed.

Development flows were provided to 5SSR from JR Engineering from The Sand Creek Basing Planning Study of $Q_{10}$ = 700cfs and $Q_{100}$ = 2,620 cfs and used for the evaluation of performance standards for the site.

Drainage Areas and current watershed uses using USGS StreamStats (https://streamstats.usgs.gov) and used for initial investigation for regional curve comparisons and existing conditions evaluation.

## Project Objectives

5SSR identified five objectives to direct the project study for Sand Creek channels. The objectives of the study are:

1. Preform geomorphic assessment of current conditions
2. Identify potential future conditions
3. Provide MCDA Alternative Analysis for Design Options
4. Provide design dimensions (Performance Standards) for a multi-stage channel to handle proposed development flows for different Alternatives.
5. Improve the riparian functions of stability, habitat, and aesthetics.

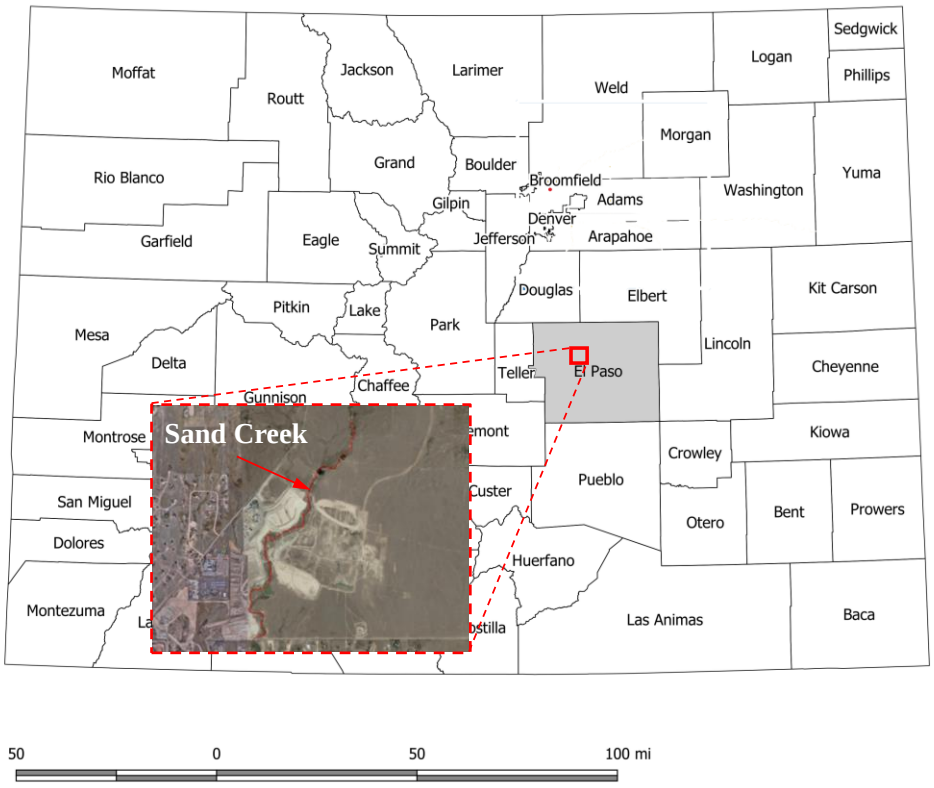



Figure 1 – Project Location Map

Figure 2 – Project Site Location Map

## Geomorphic Assessment

A geomorphic survey and assessment were performed in March 10th, 2021 on approximately 9000ft of Sand Creek. Data collection consisted of visual inspection, photo documentation, profile, pattern and cross-sections for the entire length of the project of Sand Creek, Error! Reference source not found.. Data from this assessment were used to evaluate existing conditions of the project area, informing stable slope angles, channel dimensions, trajectory and current function. Existing dimension, pattern, and profile data was analyzed and provided as separate items attached to this memo.

The site consists of multiple ponds and detection structures that have impacted stream function and process. Vegetation is very limited on the project other than presence of willows in the lower laying areas with the typical shrubs on the upper riparian zones. The upper section of the reach (Figure 3, Figure 6) has good floodplain connection leading into the ponds with minimal erosion impacts in a more of a semi confined valley with low bank heights being in the 2-3ft range. Downstream of the second pond, there is a significate change in bed elevation and we start to see the valley become more confined with more upper terrace erosion and down valley migration tendencies, Figure 4, Figure 7. It is theorized that at one point the steam had an active head cut and incision occurred, then over time the channel carved new floodplain to balance equilibrium. And some point the ponds were installed and changed the how the valley functioned to how it sits today. Near the Development a blockage of a road, Figure 5, has affected the hydrology and downstream there is another large pond. Towards the end of the reach, we still see channel migration into high terrace banks but do appear to have more floodplain access and less confinement.

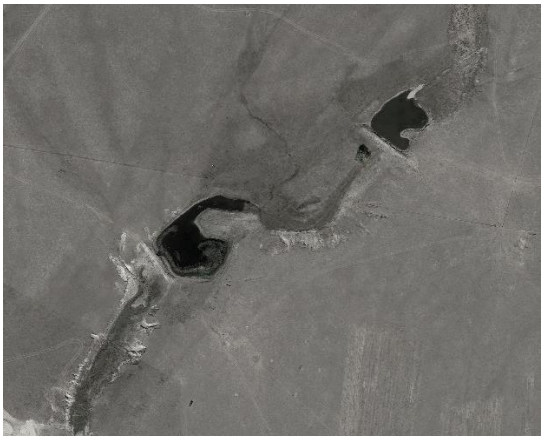


Figure 3, 4 – Upper Reach Ponds and Down Valley Migration Example

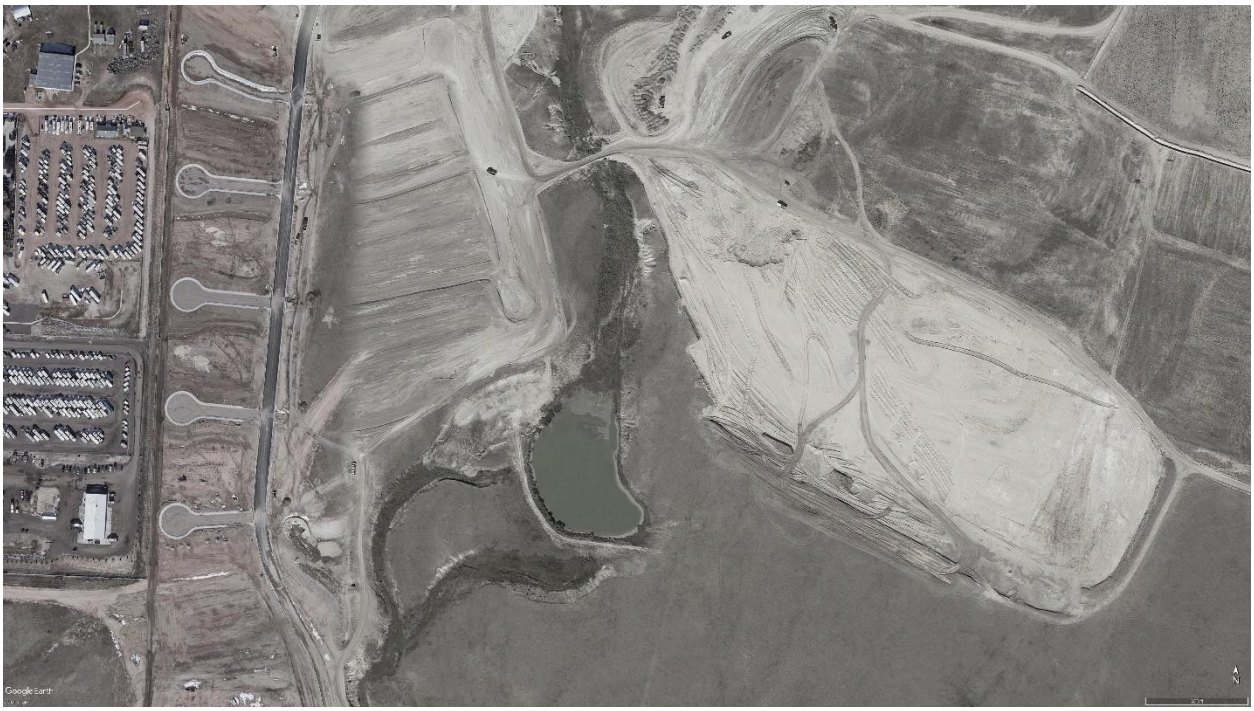


Figure 5 – Road Detention and Pond #3

Existing cross-sections though the site show increased channel incision (disconnection from floodplains) and low bank heights reaching as high as 12ft. the average slope thought the reach is 0.016 ft/ft. The existing channel sinuosity, or stream length/valley length, is nearly 1.2.

Figure 6 – Start of Reach – Unconfined

Figure 7 – DW Pond #2 Confined Valley

Figure 8 – Willows in Riparian Zone

Figure 9 – Confined Valley, Limited Bank Erosion

Figure 10 – Down Valley Migration

Figure 11 – Headcut

Figure 12 – High Terrace with open floodplain towards end of project

## Bankfull Channel Dimensions

USGS StreamStats (https://streamstats.usgs.gov) was used to evaluate the drainage area, in square miles (A) and mean annual rainfall, in inches per year, for the reaches. The mean annual rainfall and drainage area used for upper and lower limits are 19.84 inches/year and 2.6 square miles at the start and 3.4 square miles at the end of the project reach. From the existing conditions survey, cross-sections were analyzed using in field bankfull calls thought the reach and are listed in the table below:

Table 1 - Existing Bankfull Dimensions

| | XS STA | Area (sq mi) | WBKF (ft) | DBKF | ABKF (sq ft) | W/D | Entrenchment Ratio | Stream Type |
|---|---|---|---|---|---|---|---|---|
| 1 | 97 | 2.62 | 15.6 | 0.58 | 9 | 27 | 1.46 | B |
| 6 | 927 | 2.75 | 24.9 | 0.33 | 8.09 | 75 | <5 | C |
| 7 | 1725 | 2.86 | 16.7 | 0.59 | 9.84 | 28 | 1.61 | B |
| 13 | 4770 | 3.21 | 20.5 | 0.62 | 12.7 | 33 | 1.52 | B |
| 17 | 6612 | 3.35 | 29.2 | 0.36 | 10.6 | 81.11 | 1.72 | B |
| 21 | 9940 | 3.48 | 22.2 | 0.71 | 15.9 | 31.27 | 2.78 | C |

From this data, a local mini-regional curve was also used to evaluate the validity of 1) compared to expected watershed response factor (WRF) using the Southwest Regional Curve intercept graph and 2) compared to other local curves collected thought the front range for suggested bankfull areas. Typically, there is a high correlation between the bankfull cross-sectional area and the associated drainage area. This is evident for this mini-regional curve.

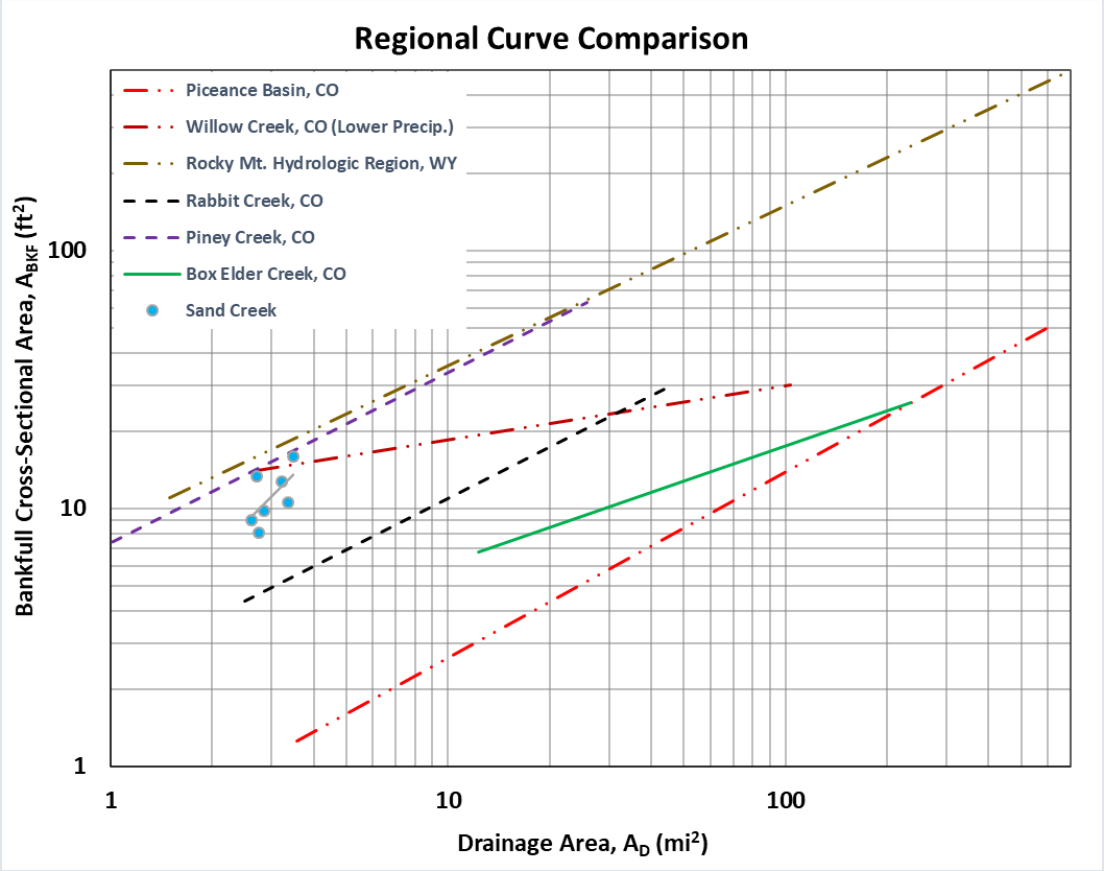



Figure 13 – Regional Curve Comparison.

Using the Southwest Regional Curve Intercept graph (Error! Reference source not found.) to relate the mean annual rainfall to the cross-sectional area y-intercept, a.k.a. watershed response factor (WRF), along with field observations and measurements, a WRF of 7.9 was used to calculate the recommended bankfull cross-sectional area, $A_{BKF}$, for the reaches.

$$A_{BKF} = WRF * DA^{0.67}$$

Reference design bankfull width-to-depth ratios ($WDR_{BKF}$) between 18 and 22 should be evaluated for the channel design. The WDR is defined as the bankfull width ($W_{BKF}$) divided by the mean depth of the bankfull cross-section $d_{BKF}$.

$$WDR = \frac{W_{BKF}}{d_{BKF}}$$

Using the WDR the recommended design bankfull widths can be calculated using:

$$W_{BKF} = \sqrt{WDR * A_{BKF}}$$

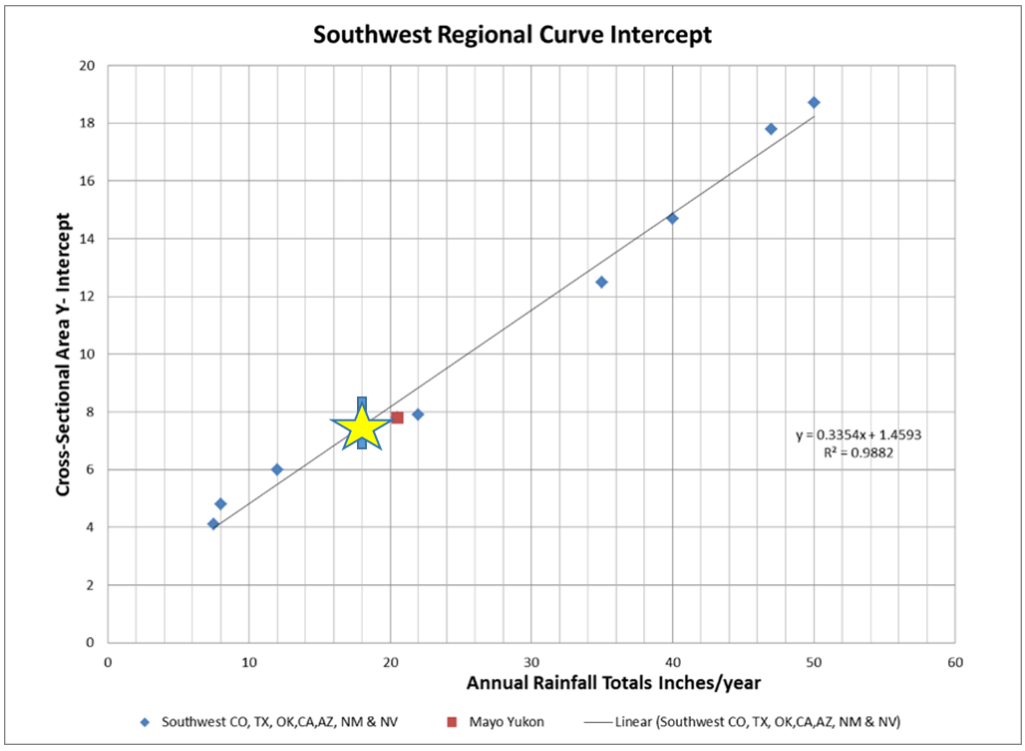



Figure 14 – Southwest Regional Curve Intercept.

Bankfull cross-sectional areas ranging from approximately 8 to 15 square feet were observed on-site with a degree of uncertainty, but for the most part fell within range of what we would expect.

MCDA Alternative Analysis

## Design Alternatives Analysis

The design alternative analysis was done using the Multi-Criterial Decision Analysis (MCDA), the MCDA is a scoring system that compares the different design alternatives based on the goals and objectives of the project. For Sand Creek the goals are to reduce maintenance, enhance ecosystem and habitat, reduce sediment transport, and increase channel stability while reducing the risk of further degradation. For this project four alternatives are considered:

**Alternative 1: Do nothing**

The do-nothing alternative sees what is going to happen if no action it is taken for stream restoration, for Sand Creek these means further erosion of the banks, movement of the channel trajectory overtime, and increase in risk of damaging private property with increased flows dure to the proposed development. The initial capital cost for this alternative is nothing but the maintenance cost would be the maximum potential cost.

**Alternative 2: Priority II restauration with 700ft with floodplain**

The priority II restoration main objective is to widen the floodplain at the existing channel elevation to reduce shear stress. For Sand Creek this means that the channel width/floodplain would be about 700ft in order maintain shear stress to about 1.2 $lbf/ft^2$, the increase of the channel width will happen in 4 stages (Inner berm, Bankfull, Flood Terrace, and Floodplain) (Figure 5). Priority II restauration produces very stable streams however it requires more floodplain grading, some structures and periodic maintenance making this this alternative more expensive compared to priority I or II. Priority III restoration for Sand Creek comes with a few challenges, one of them being the confinement of the channel between two urban areas, limiting the channel width to about 200 to 300 ft, making the shear stress grader than 1.2 $lbf/ft^2$, due to the higher shear stress the channel restauration would requiring more structures to stabilize the banks to reduce the risk of bank erosion. The initial capital construction, design and permitting cost for this 10,800ft reach would be 4.9 Million dollars with the low maintenance cost of less $2,000/year.

**Alternative 3: Priority II four stages channel with 1-2ft floodplain drops.**

Alternative 3 restoration for Sand Creek it is the same as alternative 2 with the difference that instead of increasing the floodplain width to 700ft, alternative 3 will take into consideration the current channel dimensions and fit the channel design with 4 stages with 1 – 2 ft drops, however, due to the constrains of the channel dimensions, more structure would be needed to stabilize banks. 5SSR's assumption is that is some areas the available floodplain width may only be 200ft. With an approximate 200ft floodplain this would require channel slope of .006 ft/ft to obtain 1.2lb/ft and would also require around 100 - 1ft riffle drops to make up for the project reach. The design could have a riffle/drop structure as close as every 100ft. This alternative also has assumed 2 smaller stock ponds and 1 larger pond online with Sand Creek will remain with the proposed development. This alternative requires less floodplain grading than Alternative 2 but will be more costly due to importing more boulders for structures and

grade control. The initial capital construction, design and permitting cost for this 10,800ft reach would be 6.3 Million dollars with the low maintenance cost of less $2,500/year.

**Alternative 4: Priority II/III channel realignment as needed and rip rap floodplain protection and bank stabilization.**

This alternative prioritizes the most vulnerable places along the channel and proposes realignment of the channel where bank erosion could be a risk for private property. In places where stabilization its needed, the banks would be stabilized using sill joint planted rip rap, coir and transplants. This alternative is not ideal however address the main issues of bank erosion of the channel. This alternative would allow the maximum floodplain slope to increase to .016 ft/ft average slope with ~200ft flood width and no drop structures. The applied shear of less than 3psf for this alternative would be higher than the natural stable reference threshold shear for vegetated floodplains in the region. The initial capital construction, design and permitting cost for this 10,800ft reach would be 9.1 Million dollars with the low maintenance cost of less $3,600/year.

Table 2: MCDA matrix table

| | | | | |
|---|---|---|---|---|
| | | | | |
| Option #1 | Concept Option Description | | | |
| Do nothing | 2 | Sustainability and Robustness | Reduce Maintenance | |
| 4 | 1 | Minimize the need for future maintenance | | |
| 4 | 2 | Habiatat Improvements | Ecosystem and Habitat Enhancements | |
| 5 | 3 | Ecological Resiliency | | |
| 4 | 3 | Floodplain Restoration and Connectivity | | |
| 1 | 1 | Reduction of Bank Erosion and Lateral Bank Migration | Sediment Reduction and Stabilization | |
| 1 | 2 | Minimize Vertical Instabilty by adding needed grade control | | |
| 1 | 2 | Sustainable Sediment Transport Balance | | |
| 3 | 2 | No Increase in Liability to Funders | Risk Reduction | |
| 1 | 4 | No Rise in Flood Stage or Flood Stage Reduction (No CLOMR and LOMR project requirements) | | |
| 1 | 5 | Protect and not disturb the cultural resource area. | | |
| 1 | 5 | Engineering Design Life Spand and Risk Reduction | | |
| 1 | 4 | Minimize disturbance as required by permit conditions of the existing USACE NWP 27 and the Preble's Mouse | | |
| 115 | MCDA Matrix Score | | | |
| 4 | MCDA RANKING | | | |
| Option #2 | | | | |
| Priority II - Stabilize Banks with Coir, River NCD Structures and Regrade Floodplain to 700ft | | | | |
| 1 | 2 | Sustainability and Robustness | Reduce Maintenance | |
| 1 | 1 | Minimize the need for future maintenance | | |
| 2 | 2 | Habiatat Improvements | Ecosystem and Habitat Enhancements | |
| 1 | 3 | Ecological Resiliency | | |
| 1 | 3 | Floodplain Restoration and Connectivity | | |
| 1 | 1 | Reduction of Bank Erosion and Lateral Bank Migration | Sediment Reduction and Stabilization | |
| 1 | 2 | Minimize Vertical Instabilty by adding needed grade control | | |
| 1 | 2 | Sustainable Sediment Transport Balance | | |
| 1 | 2 | No Increase in Liability to Funders | Risk Reduction | |
| 1 | 4 | No Rise in Flood Stage or Flood Stage Reduction (No CLOMR and LOMR project requirements) | | |
| 3 | 5 | Protect and not disturb the cultural resource area. | | |
| 1 | 5 | Engineering Design Life Spand and Risk Reduction | | |
| 4 | 4 | Minimize disturbance as required by permit conditions of the existing USACE NWP 27 and the Preble's Mouse | | |
| 60 | MCDA Matrix Score | | | |
| 1 | MCDA RANKING | | | |
| Option #3 | | | | |
| Priority II - Stabilize Banks with Coir, River NCD Structures and Regrade Floodplain 1-2ft drops to fit into design | | | | |
| 2 | 2 | Sustainability and Robustness | Reduce Maintenance | |
| 2 | 1 | Minimize the need for future maintenance | | |
| 2 | 2 | Habiatat Improvements | Ecosystem and Habitat Enhancements | |
| 3 | 3 | Ecological Resiliency | | |
| 3 | 3 | Floodplain Restoration and Connectivity | | |
| 3 | 3 | Reduction of Bank Erosion and Lateral Bank Migration | Sediment Reduction and Stabilization | |
| 3 | 3 | Minimize Vertical Instabilty by adding needed grade control | | |
| 2 | 2 | Sustainable Sediment Transport Balance | | |
| 3 | 3 | No Increase in Liability to Funders | Risk Reduction | |
| 1 | 2 | No Rise in Flood Stage or Flood Stage Reduction (No CLOMR and LOMR project requirements) | | |
| 2 | 2 | Protect and not disturb the cultural resource area. | | |
| 4 | 3 | Engineering Design Life Spand and Risk Reduction | | |
| 2 | 3 | Minimize disturbance as required by permit conditions of the existing USACE NWP 27 and the Preble's Mouse | | |
| 92 | MCDA Matrix Score | | | |
| 2 | MCDA RANKING | | | |
| Option #4 | | | | |
| Priority III - Realignment as needed stabilize banks with sill joint planted rip rap, coir and transplants | | | | |
| 3 | 2 | Sustainability and Robustness | Reduce Maintenance | |
| 3 | 2 | Minimize the need for future maintenance | | |
| 3 | 2 | Habiatat Improvements | Ecosystem and Habitat Enhancements | |
| 3 | 3 | Ecological Resiliency | | |
| 4 | 3 | Floodplain Restoration and Connectivity | | |
| 3 | 3 | Reduction of Bank Erosion and Lateral Bank Migration | Sediment Reduction and Stabilization | |
| 3 | 3 | Minimize Vertical Instabilty by adding needed grade control | | |
| 2 | 2 | Sustainable Sediment Transport Balance | | |
| 3 | 3 | No Increase in Liability to Funders | Risk Reduction | |
| 1 | 2 | No Rise in Flood Stage or Flood Stage Reduction (No CLOMR and LOMR project requirements) | | |
| 2 | 2 | Protect and not disturb the cultural resource area. | | |
| 4 | 3 | Engineering Design Life Spand and Risk Reduction | | |
| 2 | 3 | Minimize disturbance as required by permit conditions of the existing USACE NWP 27 and the Preble's Mouse | | |
| 97 | MCDA Matrix Score | | | |
| 3 | MCDA RANKING | | | |

## Performance Standards and Design Recommendations

Reference dimensionless ratios, based on the valley type, channel slopes, and region, informed the recommended pattern design of each of the reaches based on the proposed bankfull width. Pool-to-pool spacing recommended to be between 4.5 to 6.0 times the $W_{BKF}$. Radius of curvatures are recommended to be 2.5 to 3.5 times $W_{BKF}$. Riffle lengths are recommended to be between 1.5 to 2.5 times $W_{BKF}$. Meander wavelengths are recommended to be between 9 and 12 times $W_{BKF}$. Channel belt widths are recommended to be between 2 and 3.5 times $W_{BKF}$. For Sand Creek, it is recommended that a multi stage channel be designed that includes an Inner Berm feature, Bankfull Feature, Floodplain Terrace, and a 10 and 100-year bench to handle flood flows and reducing shear stresses to around 1.2 lb/sqft.

## Bankfull Design

Using the existing conditions site values as well as regional curve information from other locations it is determined to size the channel with a bankfull area of 14sq ft, bankfull width of 17ft and mean depth of 0.71 ft. The low flow should account for 33% of the bankfull area.

## Floodplain Design

The area for flood terraces for each of the reaches is recommended to be designed to approximately 300% of the $A_{BKF}$. The flood terrace width-to-depth ratio ($WDR_{FLTR}$) is recommended to be three times that of the $WDR_{BKF}$.

JRE provided 100-year flows for each of the reaches for the ultimate buildout condition. Floodplain widths and depths were designed to accommodate the estimated 100-year peak flood assuming a 100-year design shear stress not to exceed 1.2 pounds per square foot. Discharge and velocity estimates were calculated assuming a manning's "n" of 0.055. Width required for this alternative would require close to 700ft of floodplain, which is most likely not an option. Other design alternatives such as using drop structures to manage the slope was evaluated to keep the shear at 1.2 assuming a maximum width of 200ft. The alterative of looking at the max shear based on a 200ft floodplain width was also evaluated for consideration of design for a steeper slope.

## Drop Structures Evaluation

The use of drop structures maybe required to reduce channel slope where proposed corridor widths make it implausible to construct a floodplain wide enough to convey the 100-year discharge while staying below the 100-year design shear stress. The concepts evaluated for using drops in each of these reaches will need to be further evaluated to ensure that the channel designs fit the landscape. The concepts should also be optimized, potentially reducing the required channel/floodplain corridor.

## Design Considerations

100-year floodplain design assumes that vegetation at each of the reaches can provide stability up to an applied shear stress of 1.2 psf. Bank stabilization can be used to reduce risk to areas that the applied shear stress nears, exceeds, or is expected to exceed 1.2 psf.

Common treatment methods based on shear are listed as follows:

- 0 – 1 psf - Treatment Seed and Straw with Riparian Plantings
- 1 –1.4 psf – Treatment Floodplain Coir Matting / Seed and Straw with Riparian Plantings
- 1.5 – 2.5 psf - Treatment Floodplain Boulder/ Log Sills, Floodplain Coir Matting / Seed and Straw with Riparian Plantings
- 2.6 – 4.0 psf - Treatment Floodplain Vegetated Rip-Rap, Floodplain Coir Matting / Seed and Straw with Riparian Plantings

Riffle grade control structures are being recommended to stabilize channel grade throughout the design. Where cascade riffles are not utilized, augmenting each of the riffles with 4 to 8-inch riprap is recommended to reduce the risk of scour at the riffles. This is particularly important at regions downstream of "clear water" discharge points or where threshold riffle design, a riffle with minimal movement, is required. The 4-8-inch riprap will be stable in-place for all design discharges that have an applied shear stress less than 1.2 psf. **Figure 15** shows the Shield's/Rosgen Entrainment Function used for sizing particles for applied shear stress.

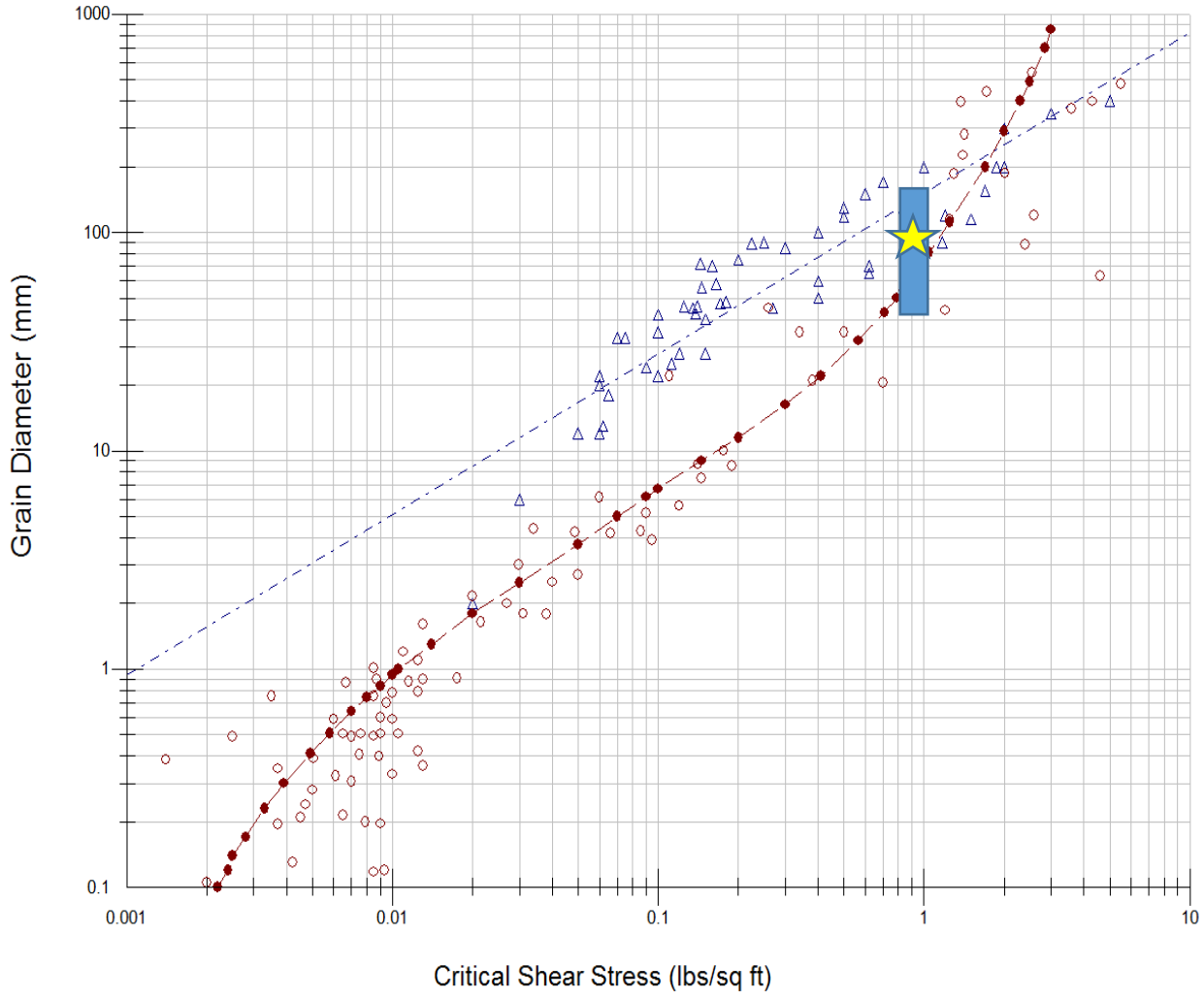



*Figure 15: Shield's/Rosgen Entrainment Function. The red trendline shows the Shields function, while the blue trendline shows Rosgen function.*

Joint planted riprap is recommended at the terminus of the project reach for scour protection at the catchment pond. The in-line pond outlet structure design required for the successful implementation of Alternatives 2-4 has not been investigated at this time. This report is to serve as a conceptual reconnaissance level geomorphic assessment. The later design process will require a greater detail of investigation and analysis. The 5SSR team has assumed that the

## Potential Structures In-streams Structures

### Gravel Constructed Riffle

Gravel constructed riffles utilize immobile gravel in the riffle section of the channel. Gravel armors the channel, increases channel roughness, provides grade control, and promotes macroinvertebrate habitat. Gravel augmented riffles promote channel stability in high shear stress situations within perennial channels. All gravel riffles would designed to a threshold shear of 1.2psf with gravel having a D50 exceeding 100mm and a D84 exceeding 180mm.

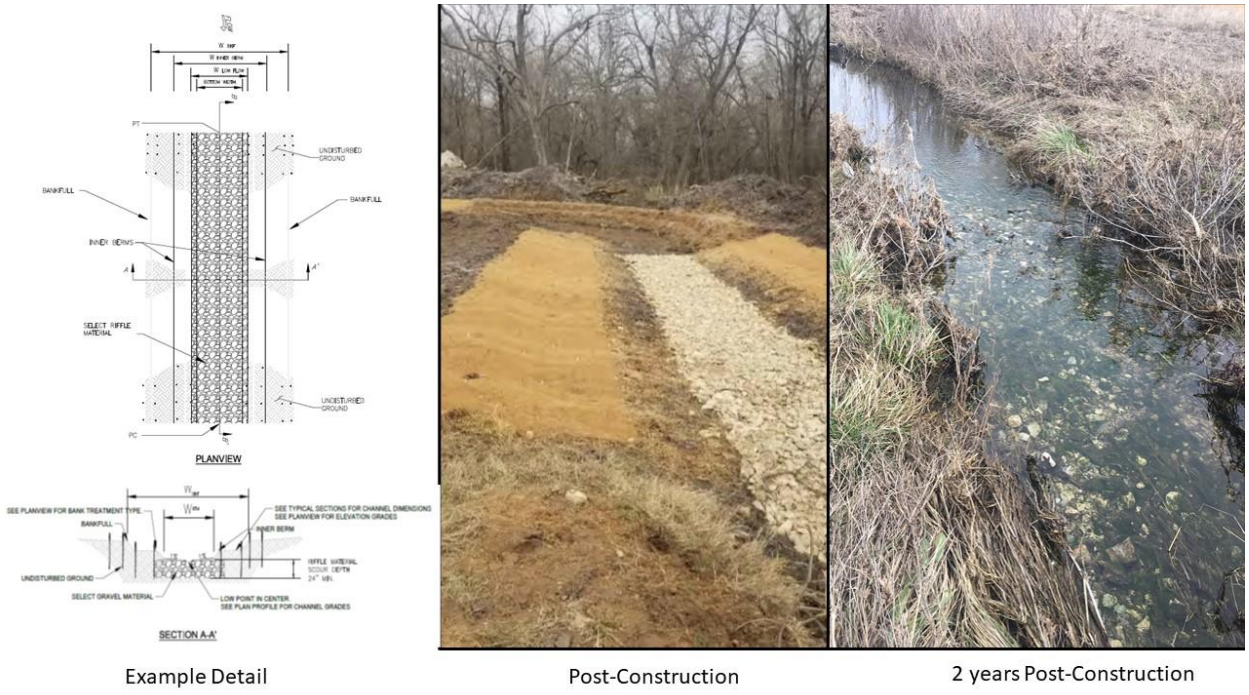



*Figure 1: Gravel Constructed Riffle*

**Toe wood Bank Stabilization**

Toe wood structures incorporate native woody material into a submerged undercut bank to replicate natural stream banks. The structure consists of large woody debris such as logs, branches, brush, and roots buried at the bankfull bench. The bottom layer consists of woody debris and soil as fill. Root wads are placed to cantilever foundation logs; the root wads protrude from the stream bank, protecting it from the shearing force of flow. Filler materials such as small logs, limbs, and tree branches are placed on the second layer. The top layer consists of backfill with overlying coir-wrapped soil lifts and live stakes. Toe

wood can be placed along the geomorphic channel streambanks. When placed in the outside meander bank, toe wood helps protect it from lateral migration and subsequent bank erosion while promoting revegetation. Toe wood is also a cost-effective stream stabilization method, as it reuses woody material harvested from site clearing. There is a possibility with later design phases that the wood toe stabilization could be substituted by hay bales for cost reduction or coir lifts if wood is unavailable.

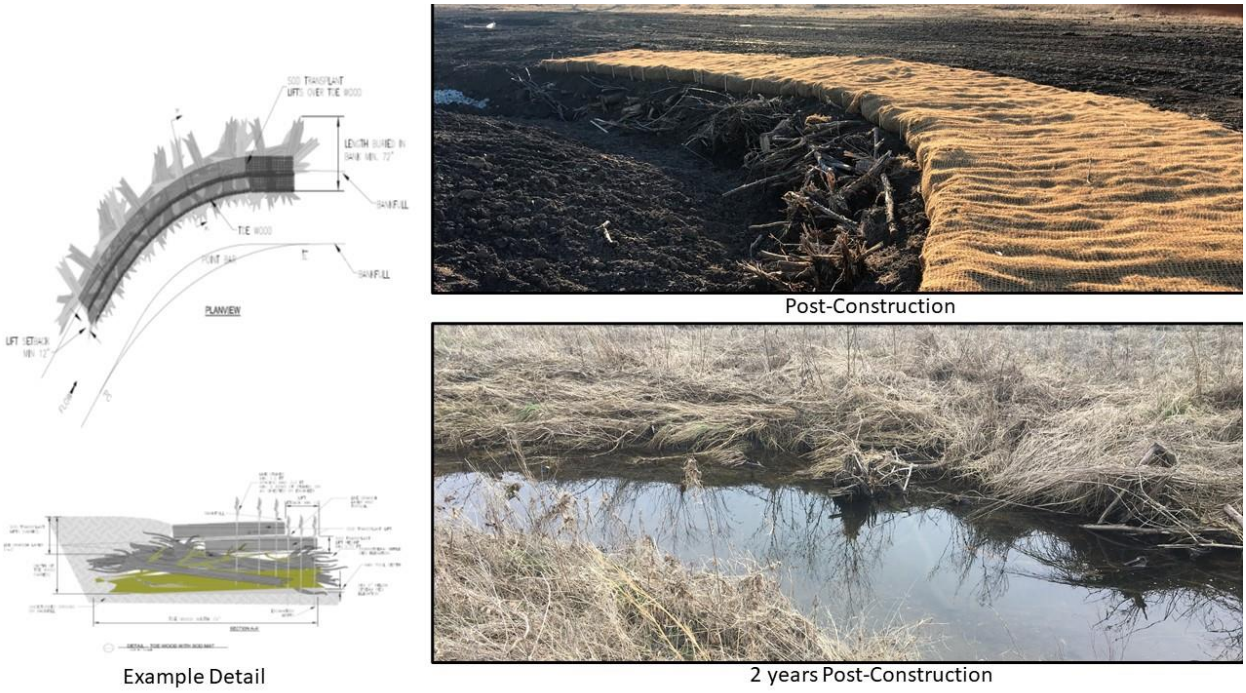



*Figure 2: Toe Wood and Bank Stabilization*

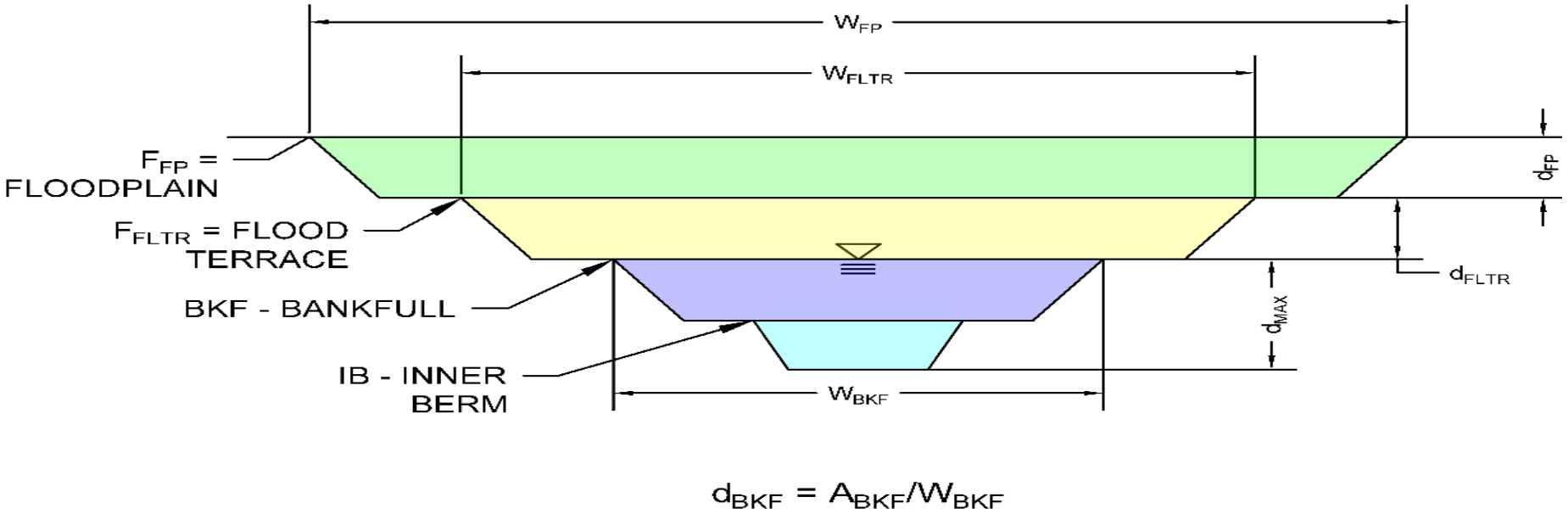



*Figure 18 Typical riffle (tangent section) channel cross-section and channel acronyms.*

Table 3: Performance Standard

| Reach # | Rainfall | Reach Name | Watershed Area | Existing Reach Drop | Existing Reach Length | Existing Reach Slope | Regional Relationship | Assumed Bankfull Velocity | Design Bankfull XS Area | Design Bankfull WDR | Design Bankfull XS Width | Design Pool-Pool Spacing Ratio | Design Pool-Pool Spacing | % Flood Terrace Channel | Design Flood Terrace Area | Design Flood Terrace WDR | Design Flood Terrace Width | Depth for Offset | % Low Flow Channel | Design Inner Berm | Design Inner Berm WDR | Design Inner Berm Width | 100-yr Design Discharge | 100-yr Design Shear Stress | 100-yr Design Average Depth | 100-yr Floodplain Velocity | 100-yr Floodplain Area | 100-yr Floodplain Width | Min Riffle Substrate D84 | Min Riffle Substrate D50 | Min. Design Scour Depth of Riffles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 19.84 | R1 | 2.4 | 46.47 | 2286 | 0.020 | 8.11 | 3 | 14.59 | 20 | 17.08 | 4 | 68.32 | 3 | 43.76 | 60 | 51.24 | 0.85 | 0.3 | 4.38 | 16 | 8.37 | 2620 | 1.2 | 0.95 | 3.41 | 768.01 | 811.83 | 6.84 | 3.71 | 17.11 |
| 2 | 19.84 | R2 | 2.9 | 59.51 | 3840 | 0.015 | 8.11 | 3 | 16.56 | 20 | 18.20 | 4 | 72.79 | 3 | 49.68 | 60 | 54.59 | 0.91 | 0.3 | 4.97 | 16 | 8.92 | 2620 | 1.2 | 1.24 | 3.57 | 733.39 | 591.01 | 6.84 | 3.71 | 17.11 |
| 3 | 19.84 | R3 | 3.4 | 43 | 3600 | 0.012 | 8.11 | 3 | 18.42 | 20 | 19.19 | 4 | 76.78 | 3 | 55.26 | 60 | 57.58 | 0.96 | 0.3 | 7.74 | 16 | 11.13 | 2620 | 1.2 | 1.61 | 3.73 | 701.63 | 435.79 | 6.84 | 3.71 | 17.11 |
| ALT 1 | 19.84 | ALT 3 | 2.4 | 43 | 3600 | 0.016 | 8.11 | 3 | 14.59 | 20 | 17.08 | 5 | 85.40 | 3 | 43.76 | 60 | 51.24 | 0.85 | 0.3 | 4.38 | 16 | 8.37 | 2620 | 1.2 | 1.20 | 3.55 | 737.38 | 613.50 | 6.84 | 3.71 | 17.11 |
| ALT 3 | 19.84 | ALT 3 | 2.4 | 43 | 3600 | 0.006 | 8.11 | 3 | 14.59 | 20 | 17.08 | 5 | 85.40 | 3 | 43.76 | 60 | 51.24 | 0.85 | 0.3 | 4.38 | 16 | 8.37 | 2620 | 1.2 | 3.13 | 4.18 | 626.56 | 200.00 | 6.84 | 3.71 | 17.11 |
| ALT 4 | 19.84 | ALT 4 | 2.4 | 43 | 3600 | 0.016 | 8.11 | 3 | 14.59 | 20 | 17.08 | 4 | 68.32 | 3 | 43.76 | 60 | 51.24 | 0.85 | 0.3 | 4.38 | 16 | 8.37 | 2620 | 2.26 | 2.26 | 5.43 | 482.49 | 213.15 | 10.90 | 7.18 | 27.24 |

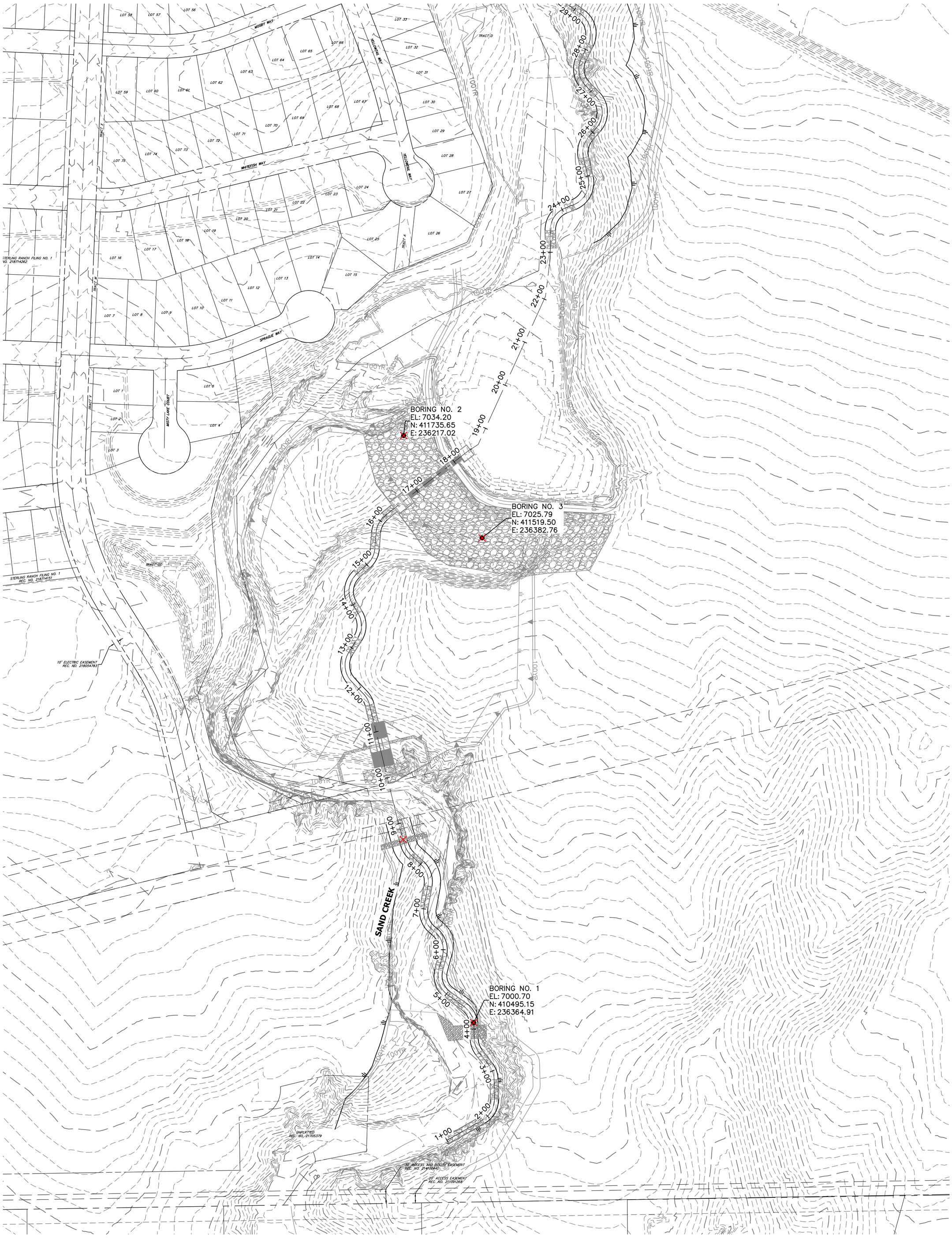
Table 4: Channel alternatives

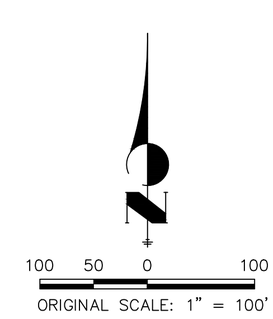
| WS (ft) | Depth Y (ft) | XS Area (ft2) | Top Width (ft) | V (ft/s) | Hydraulic Depth (ft) | Hydraulic Radius (ft) | Shear Stress | Stream Power | Slope (ft/ft) | Q (cfs) | Alternative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 97.33 | 0.68 | 4.32 | 12.90 | 1.01 | 0.33 | 0.33 | 0.13 | 0.13 | 0.006 | 4.36 | IB-ALT3 |
| 98.00 | 1.35 | 14.29 | 16.85 | 1.85 | 0.85 | 0.83 | 0.32 | 0.59 | 0.006 | 26.44 | BKF-ALT3 |
| 98.96 | 2.31 | 66.83 | 57.62 | 2.30 | 1.16 | 1.15 | 0.43 | 1.00 | 0.006 | 153.52 | FLD TERRACE ALT3 |
| 100.03 | 3.38 | 267.60 | 191.36 | 2.62 | 1.40 | 1.39 | 0.52 | 1.37 | 0.006 | 700.00 | Q10 - ALT3 |
| 101.74 | 5.09 | 603.92 | 201.55 | 4.34 | 3.00 | 2.97 | 1.12 | 4.87 | 0.006 | 2620.00 | Q100 -ALT3 |
| 99.66 | 3.02 | 198.45 | 189.28 | 3.53 | 1.05 | 1.04 | 1.05 | 3.69 | 0.016 | 700.00 | Q10 - ALT4 |
| 100.94 | 4.30 | 445.58 | 196.98 | 5.88 | 2.26 | 2.25 | 2.26 | 13.28 | 0.016 | 2620.00 | Q100 - ALT4 |
| 99.38 | 2.73 | 313.05 | 593.57 | 2.24 | 0.53 | 0.53 | 0.53 | 1.18 | 0.016 | 700.00 | Q10 - Alt 2 |
| 100.01 | 3.37 | 692.92 | 597.18 | 3.78 | 1.16 | 1.16 | 1.16 | 4.38 | 0.016 | 2620.00 | Q100 Alt 2 |

# SAND CREEK RESTORATION

## STERLING RANCH, CO

## GEOTECHNICAL BORING LOCATIONS




GEOTECHNICAL BORING
LOCATIONS
SAND CREEK RESTORATION
JOB NO. 25188.04
1/28/22
SHEET 1 OF 3

J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

# SAND CREEK RESTORATION

## STERLING RANCH, CO

## GEOTECHNICAL BORING LOCATIONS

100 50 0 100

ORIGINAL SCALE: 1" = 100'

GEOTECHNICAL BORING
LOCATIONS
SAND CREEK RESTORATION
JOB NO. 25188.04
1/28/22
SHEET 2 OF 3


J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

# SAND CREEK RESTORATION

## STERLING RANCH, CO

## GEOTECHNICAL BORING LOCATIONS

100 50 0 100

ORIGINAL SCALE: 1" = 100'

GEOTECHNICAL BORING
LOCATIONS
SAND CREEK RESTORATION
JOB NO. 25188.04
1/28/22
SHEET 3 OF 3


J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

# SUBSURFACE SOIL INVESTIGATION
# STERLING RANCH
# SAND CREEK CHANNEL IMPROVEMENTS
# COLORADO SPRINGS, COLORADO

Prepared for

**C&C Land**
20 Boulder Crescent 2nd Floor
Colorado Springs, Colorado 80903

Attn: Chaz Collins

April 5, 2022

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Stuart Wood
Geologist

Reviewed by:

Austin M. Nossokoff P.E.

AMN/el

Encl.

Entech Job No. 211647
AAprojects/2021/211647 ssi

## Table of Contents

**1.0 INTRODUCTION ..... 1**
**2.0 PROJECT AND SITE DESCRIPTION ..... 2**
**3.0 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING ..... 2**
**4.0 SUBSURFACE CONDITIONS ..... 3**
4.1 Soil and Rock ..... 3
4.2 Groundwater ..... 4
**5.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS ..... 5**
5.1 Shallow Foundation Parameters ..... 5
5.2 Bearing Capacity/Lateral Pressures ..... 6
5.3 Concrete ..... 7
5.4 Structural Fill ..... 7
5.5 Winter Construction ..... 7
5.6 Construction Observations ..... 8
**6.0 CLOSURE ..... 8**

**TABLE**

Table 1: Summary of Laboratory Test Results

**FIGURES**

Figure 1: Site Vicinity Map
Figure 2A: Site Plan/Test Boring Map
Figure 2B: Site Plan/Test Boring Map
Figure 2C: Site Plan/Test Boring Map

**APPENDICES**

Appendix A: Test Boring Logs
Appendix B: Laboratory Test Results

# SUBSURFACE SOIL INVESTIGATION
# STERLING RANCH
# SAND CREEK CHANNEL IMPROVEMENTS
# COLORADO SPRINGS, COLORADO

## 1.0 INTRODUCTION

C&C Land is planning the construction of four drop structures and improvements to two pond embankments along Sand Creek in the Sterling Ranch Subdivision. The project site is located east of Vollmer Road and northeast of the proposed Marksheffel Drive in Colorado Springs, Colorado. A Vicinity Map is presented in Figure 1. The Site Plan/Test Boring Location Map, Figure 2 indicates the approximate project location and test boring locations.

This report describes the subsurface conditions encountered in test borings drilled in the vicinity of the proposed drop structures and embankment dams and provides recommendations for design and construction. The subsurface investigation for the channel improvements consisted of drilling eight borings placed along the channel, one in the vicinity of each drop structure and two at each proposed embankment location, collecting samples of soil from the borings, performing laboratory tests on selected samples and conducting a geotechnical evaluation of the investigation findings. Drilling and subsurface investigation activities for the test borings were performed by Entech Engineering, Inc. (Entech). The contents of this report, including the geotechnical evaluation and recommendations, are subject to the limitations and assumptions presented in Section 6.

## 2.0 PROJECT AND SITE DESCRIPTION

It is Entech's understanding that the project will consist of the construction of four drop structures and pond embankment improvements for 2 holding ponds and associated channel improvements. Adjacent properties consist of future residential parcels and existing residential parcels. At the time of drilling, water was flowing in the channel. The channel flows to the southwest towards Colorado Springs.

## 3.0 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

The subsurface conditions on this site were investigated by drilling eight exploratory test borings. Four of the test borings were placed adjacent to the proposed location of each drop structure and two were placed adjacent to two separate pond embankment locations. The locations of the test borings are indicated on the Site/Test Boring Location Map, Figure 2. Test boring locations were staked by JR Engineering. Test Boring No. 6 was moved to the top of the embankment. The test borings were advanced with a power-driven continuous-flight auger-drilling rig to depths of 15 to 30 feet. Samples were obtained during drilling using the Standard Penetration Test, ASTM D-1586, utilizing a California sampler. Results of the Standard Penetration Testing (SPT) are included on the boring logs in terms of N-values expressed in blows per foot (bpf). Soil samples recovered from the borings were visually classified in the field and described on the boring logs. The field classifications were later verified using laboratory testing and grouped by soil type. The soil types (identified by number) are included on the boring logs. The Test Boring Logs are presented in Appendix A.

Water content testing (ASTM D-2216) was performed on samples recovered from the borings and the results are shown on the boring logs. Grain-Size Analysis (ASTM D-422) and Atterberg Limits testing (ASTM D-4318) were performed on selected samples to assist in classifying the materials encountered in the borings. Volume change testing was performed on selected samples using Swell/Consolidation and FHA swell tests in order to evaluate potential expansion/compression characteristics of the soil. Soluble sulfate testing was performed on samples of soil to evaluate the potential for below grade degradation of concrete due to sulfate attack. The laboratory testing results are summarized on Table 1 and are presented in Appendix B.

## 4.0 SUBSURFACE CONDITIONS

Two soil types and one bedrock type were encountered in the borings drilled for the proposed drop structures and embankments: Soil Type 1: native slightly silty to silty to clayey sand and silty to very silty sand fill (SM, SM-SW, SC), Soil Type 2: native sandy to very sandy clay (CL), and Soil Type 3: slightly silty to very silty sandstone bedrock (SM, SM-SW). The soil was classified using the results of the laboratory testing and the Unified Soil Classification System (USCS). Observations for groundwater presence were made in each of the boreholes following completion of drilling.

### 4.1 Soil and Rock

Soil Type 1 classifies as native slightly silty to silty to clayey sand and silty to very silty sand fill (SM, SM-SW, SC). The fill soils are from an existing earthen dam at Test Boring No. 6. The sand was encountered in all of the test borings from the existing ground surface and at 3 feet bgs in Test Boring No. 3 and extending to depths of 4 to 19 feet below ground surface (bgs). Standard Penetration Testing resulted in N-values of 4 to 26 bpf, indicating loose to medium dense states. Water content and grain size testing resulted in approximately 6 to 20 percent water content and approximately 11 to 40 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing on the sand resulted in no values. Swell/Consolidation Testing on a sample of silty sand from Test Boring No. 1 and 8 at depths of 10 and 15 feet resulted in volume changes of 0.1 and 0.0 percent, respectively, indicating a low potential for expansion or consolidation. FHA swell testing on a sample of the very clayey sand resulted in a swell pressure of 120 psf, indicating low expansion potential. Sulfate testing performed on samples of the sand resulted in less than 0.01 percent sulfate by weight, indicating the sand exhibits negligible potential for concrete degradation due to below grade sulfate attack.

Soil Type 2 classifies as a native sandy to very sandy clay (CL). The clay was encountered in Test Boring Nos.3 and 6 at the ground surface in Test Boring No. 3 and 19 feet bgs in Test Boring No. 6 and extending to 3 or up to 24 feet bgs. Standard Penetration Testing resulted in N-values of 9 and 14, indicating firm consistencies. Water content and grain size testing resulted in approximately 18 to 25 percent water content and 52.5 to 76.5 percent of the soil size particles passing the No. 200 sieve.

Soil Type 3 classifies as slightly silty to very silty sandstone bedrock (SM, SM-SW). The sandstone was encountered in all of the test borings at a depth of 4 to 24 feet bgs and extended to the termination of borings at 15 to 30 feet bgs. Standard Penetration Testing resulted in N-values of 36 to greater than 50 bpf, indicating dense to very dense states. Water content and grain size testing resulted in approximately 11 to 16.5 percent water content and approximately 6 to 24.5 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing on the sandstone resulted in no values. Swell/Consolidation Testing on the sandstone resulted in volume changes of 0.00 to 0.10 percent indicating a low expansion/consolidation potential.

Additional soil descriptions can be seen on the enclosed drill logs. (Appendix A). A summary of the laboratory test results is presented in Table 1. Laboratory results are presented in Appendix B. It should be noted that the soil classification shown on the logs is based on the engineer's visual classification of the samples at the depths indicated. The soil types may vary between samples and locations tested. Also, stratification lines shown on the logs represent the approximate boundary between soil types and the actual transition may be gradual and vary with location.

**4.2 Groundwater**

Groundwater was encountered in all of the test borings at depths ranging from 2.5 to 9 feet bgs, during and subsequent to drilling. Groundwater will impact construction of the channel improvements and excavations during installation of drop structures and embankment improvements. Dewatering techniques will be required. Creek flow will vary due to variations in rainfall, drainage and other factors not readily apparent at this time. It should be noted that groundwater levels observed at the time of the subsurface investigation could change due to seasonal variations, changes in land runoff characteristics, and future development of nearby areas.

## 5.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

*The following discussion is based on the subsurface conditions encountered in the borings drilled for the channel improvements to be constructed at the location previously described. If subsurface conditions different from those described herein are encountered during construction or if the project elements change from those described, Entech Engineering, Inc. should be notified so that the evaluation and recommendations presented below can be reviewed and revised if necessary.*

Subsurface conditions in the channel improvement area consist of silty and clayey sands with some clay lenses overlying silty sandstone bedrock. The bedrock was encountered at 4 to 24 feet bgs in the test borings. It should be noted that Test Boring No. 6 was drilled on top of the existing embankment, which is where the bedrock was encountered at 24 feet. Water was encountered between 2.5 and 9 feet in the test borings. Water was flowing in the channel at the time of the investigation. SPT N-values measured in the soils and bedrock indicated overall medium dense to very dense states with some loose pockets generally encountered near the groundwater table.

Any newly placed fill should be placed according to the "Structural Fill" paragraph. Prior to placing the structural fill, the surface should be scarified, moisture-conditioned and compacted. The structural fill should be moisture-conditioned to within ± 2% of its optimum moisture content to aid in compaction. Density tests should be performed to verify compaction with the first density test performed at subgrade and then when 12 to 18 inches of fill have been placed.

Sheet pile walls constructed in the channel should extend into the bedrock. Concrete cutoff walls should extend into bedrock or be installed over stabilized subgrade.

### 5.1 Shallow Foundation Parameters

Structures associated with the channel improvements can be supported with shallow foundations resting on native medium dense sand soils, imported structural fill, and sandstone bedrock. It should be noted that due to the shallow groundwater on this site, extensive subgrade improvements are anticipated to support shallow foundations, if installed. The drop structure walls should bear on native medium dense sand soils, imported structural fill, and undisturbed sandstone. Provided the above recommendations are followed an allowable bearing pressure of

2400 for the native medium dense sand soils and imported structural fill and 3500 psf is recommended for the sandstone bedrock.

Entech should observe excavated subgrades to evaluate if the exposed conditions are consistent with those described in this report. Entech should also provide recommendations for overexcavation depth and other subgrade improvements, if necessary, and the need for drain systems and stabilization methods based on the excavation conditions observed at that time.

**5.2 Bearing Capacity/Lateral Pressures**

The following values are recommended for use in designing below grade foundation walls subjected to unbalanced lateral loads and/or retaining walls that may be associate with this project.

Recommended Design Values – Lateral Loading*

| | |
|---|---|
| Equivalent fluid density for lateral earth pressure (active case), pcf (sand) | 45 |
| Equivalent fluid density for lateral earth pressure (active case), pcf (saturated) | 110 |
| Equivalent fluid density for lateral earth pressure (passive case), pcf | 250 |
| Soil density (loose sand and gravel), psf | 115 |
| Soil density (compacted sand and gravel), psf | 125 |
| Angle of Internal Friction (loose sand), degrees | 28 |
| Angle of Internal Friction (compacted sand), degrees | 34 |
| Coefficient of sliding between concrete and sand/gravel | 0.35 |

*Note: The passive pressure should be evaluated for site-specific conditions. The above lateral loading design values are for non-expansive, granular backfill conditions with level backslope angles and no surcharge loads. If wall backfill is submerged, water pressures must be taken into account as additional wall loading. If the backfill slope angles are greater than zero degrees, if the backfill is surcharged, or if the backfill is not free draining, the design values must be adjusted to account for additional lateral loading.

Site granular materials should be approved prior to hauling or placement. Granular backfill material should be compacted to a minimum of 95% of its maximum Modified Proctor Dry Density (ASTM D-1557). Granular backfill should be placed at a moisture content of ±2% of its optimum

moisture content. Density tests should be taken on the backfill to verify compaction, at 1-foot intervals.

### 5.3 Concrete

Type II cement is recommended for concrete at this site. To further avoid concrete degradation during construction it is recommended that concrete not be placed on frozen or wet ground. Care should be taken to prevent the accumulation or ponding of water in the foundation excavation prior to the placement of concrete. If standing water is present in the foundation excavation, it should be removed by ditching to sumps and pumping the water away from the foundation area prior to concrete placement. If concrete is placed during periods of cold temperatures, the concrete must be kept from freezing. This may require covering the concrete with insulated blankets and adding heat to prohibit freezing.

### 5.4 Structural Fill

Areas to receive fill should have all topsoil, organic material or debris removed. Fill must be properly benched. The surface should be scarified and moisture conditioned to within ±2 percent of its optimum moisture content and compacted to 95 percent of its maximum Modified Proctor Dry Density (ASTM D-1557) for granular soils and 95 percent of its maximum Standard Proctor Dry Density (ASTM D-698) prior to placing new fill. New fill should be placed in thin lifts not to exceed 6 inches after compaction while maintaining at least 95 percent (95 percent for cohesive) of its maximum Modified Proctor Dry Density (ASTM D-1557). Standard (ASTM D-698 cohesive) fill materials should be placed at a moisture content conducive to compaction, usually ±2 percent of Proctor optimum moisture content. The placement and compaction of fill should be observed and tested by Entech Engineering, Inc. Any imported soils should be approved by Entech Engineering, Inc. prior to being hauled to the site.

### 5.5 Winter Construction

In the event construction of the planned facility occurs during winter, foundations and subgrades should be protected from freezing conditions. Concrete should not be placed on frozen soil and once concrete has been placed, it should not be allowed to freeze. Similarly, once exposed, the subgrade should not be allowed to freeze. During site grading and subgrade preparation, care should be taken to avoid burial of snow, ice or frozen material within the planned construction area.

### 5.6 Construction Observations

It is recommended that Entech observe and document the following activities during construction.

- Excavated subgrades and subgrade preparation.
- Placement of drains (if installed).
- Placement/compaction of fill material.

## 6.0 CLOSURE

The subsurface investigation, geotechnical evaluation and recommendations presented in this report are intended for use by C&C Land with application to the planned channel improvements in Sand Creek northeast of proposed Markheffel Road in northeastern Colorado Springs, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in same locality and under similar conditions. No other warranty, expressed or implied is made. During final design and/or construction, if conditions are encountered which appear different from those described in this report, Entech Engineering, Inc. requests that it be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

If there are any questions regarding the information provided herein or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.

# TABLE

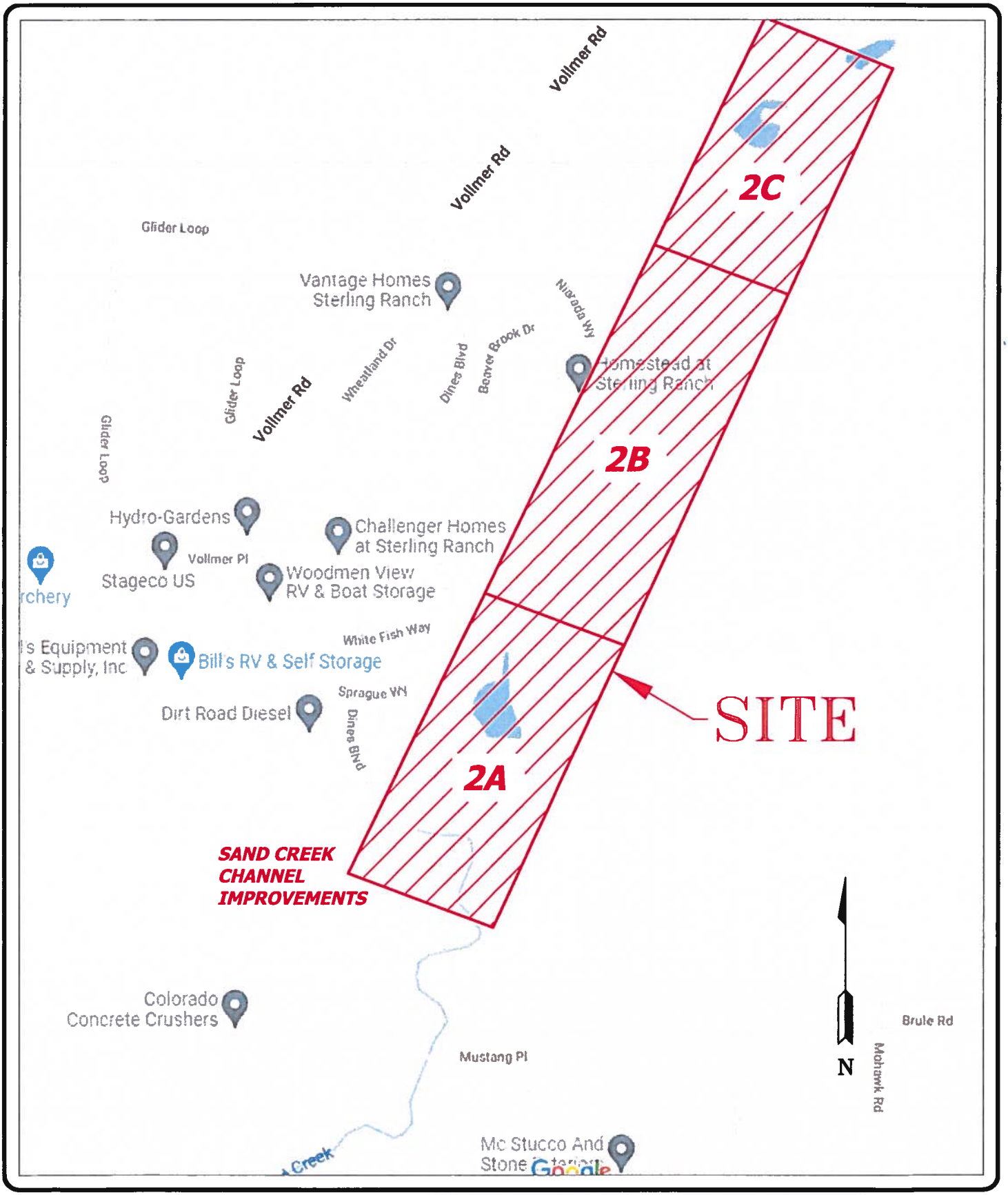
# TABLE 1

## SUMMARY OF LABORATORY TEST RESULTS

CLIENT C&C LAND
PROJECT CHANNEL IMPROVEMENTS
JOB NO. 211647

| SOIL TYPE | TEST BORING NO. | DEPTH (FT) | WATER (%) | DRY DENSITY (PCF) | PASSING NO. 200 SIEVE (%) | LIQUID LIMIT (%) | PLASTIC INDEX (%) | SULFATE (WT %) | FHA SWELL (PSF) | SWELL/ CONSOL (%) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| 1 | 1 | 10 | 12.3 | 109.3 | 34.9 | NV | NP | | | -0.1 | SM | SAND, SILTY |
| 1 | 2 | 5 | | | 33.5 | | | | 120 | | SM | SAND, SILTY |
| 1 | 5 | 2-3 | | | 40.1 | NV | NP | <0.01 | | | SM | SAND, VERY SILTY |
| 2 | 3 | 2-3 | | | 76.5 | | | | | | CL | CLAY, SANDY |
| 2 | 6 | 20 | | | 52.5 | | | | | | CL | CLAY, VERY SANDY |
| 3 | 1 | 15 | | | 41.4 | NV | NP | | | | SM | SANDSTONE, VERY SILTY |
| 3 | 4 | 20 | | | 24.5 | NV | NP | | | | SM | SANDSTONE, SILTY |
| 3 | 6 | 25 | 16.5 | 112.3 | 11.8 | | | | | 0.1 | SM-SW | SANDSTONE, SLIGHTLY SILTY |
| 3 | 7 | 5 | | | 6.0 | | | | | | SM-SW | SANDSTONE, SLIGHTLY SILTY |
| 3 | 8 | 15 | 8.3 | 119.1 | 10.0 | | | | | 0.0 | SM-SW | SANDSTONE, SLIGHTLY SILTY |

# FIGURES




ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907
(719) 531-5599

VICINITY MAP
SAND CREEK CHANNEL IMPROVEMENTS
EL PASO COUNTY, CO
FOR: C & C LAND

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| JHR | 3/28/22 | AMN | 3-31-22 |

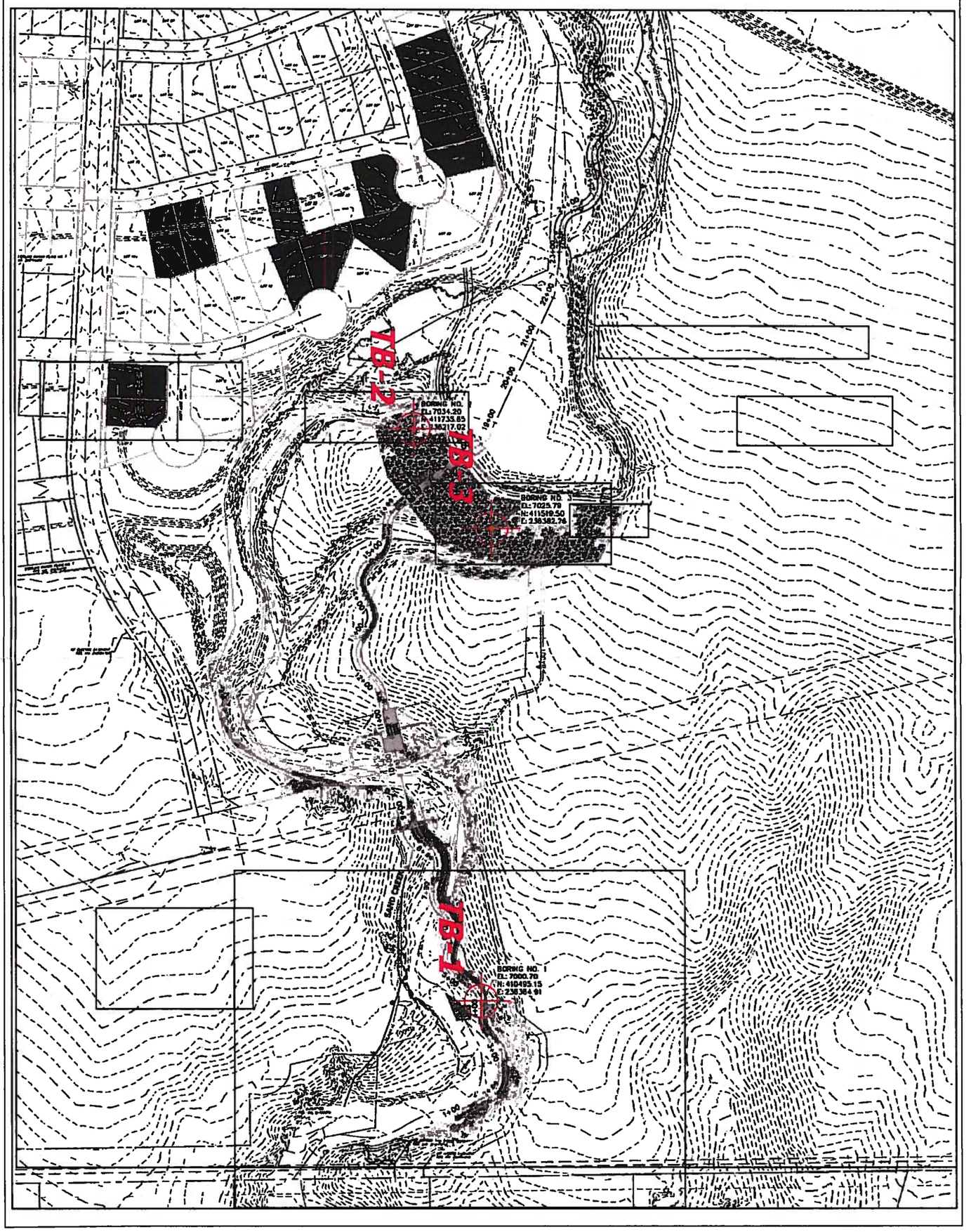
JOB NO.: 211647

FIG NO.: 1

TB-2- APPROXIMATE TEST BORING LOCATION AND NUMBER

STERLING RANCH, CO

# GEOTECHNICAL BORING LOCATIONS




N

| | |
|---|---|
| DRAWN BY: | JDR |
| APPROVED BY: | AMH |
| CHECKED BY: | |
| DATE: | 9/24/2022 |
| SCALE: | AS SHOWN |
| JOB NO.: | 211047 |
| FIGURE NO.: | 2A |

SITE PLAN/TEST BORING MAP
SAND CREEK CHANNEL IMPROVEMENTS
EL PASO COUNTY, CO
FOR: C & C LAND

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

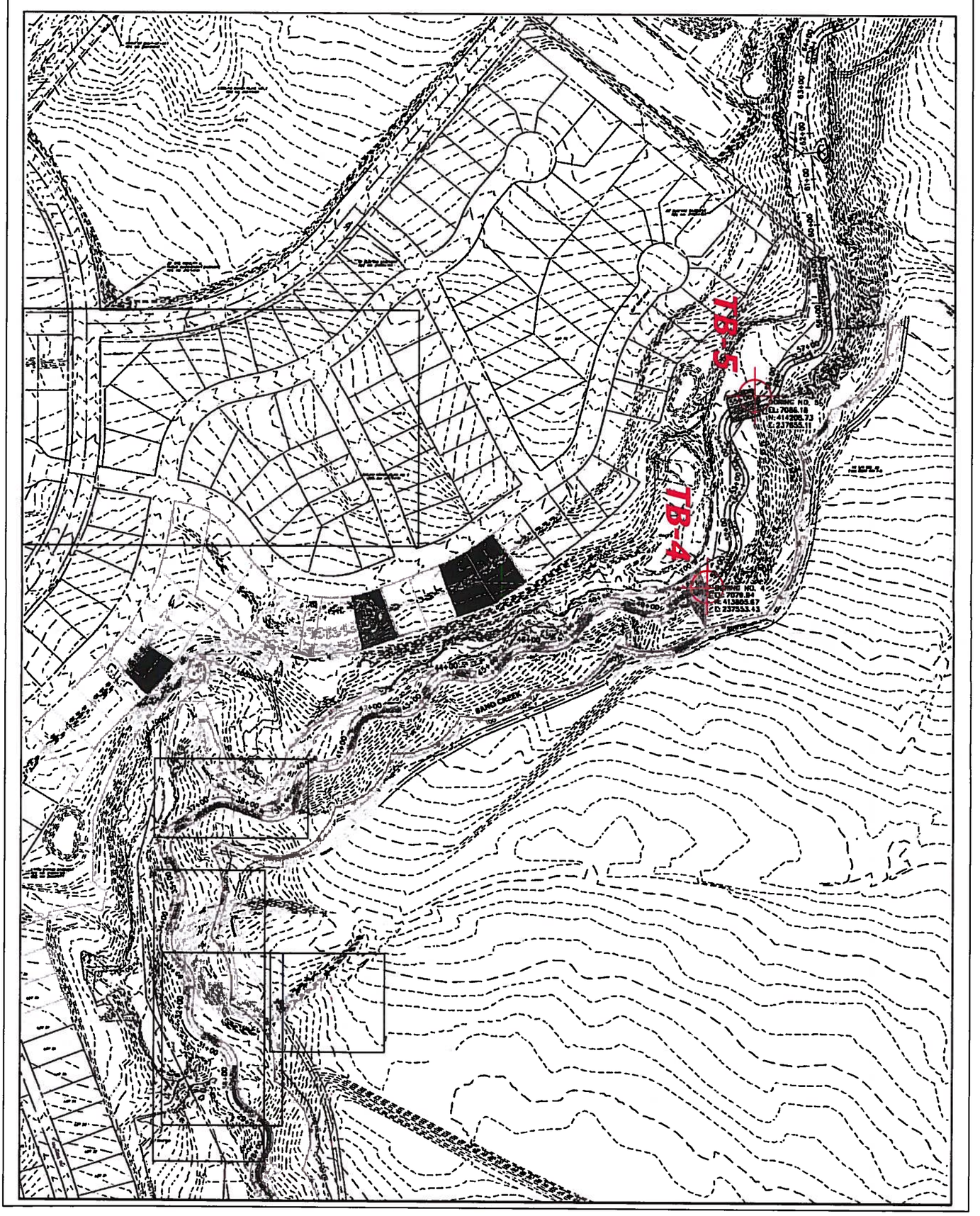
| REVISIONS | BY |
|---|---|
| | |

# SAND CREEK RESTORATION

## STERLING RANCH, CO

## GEOTECHNICAL BORING LOCATIONS

TB-2- APPROXIMATE TEST BORING LOCATION AND NUMBER




SITE PLAN/TEST BORING MAP
SAND CREEK CHANNEL IMPROVEMENTS
EL PASO COUNTY, CO
FOR: C & C LAND

DRAWN BY: JEB
DESIGNED BY: ABH
CHECKED BY:
DATE: 9/24/2002
SCALE: AS SHOWN
JOB NO.: 211647
FIGURE NO.: 2B


ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

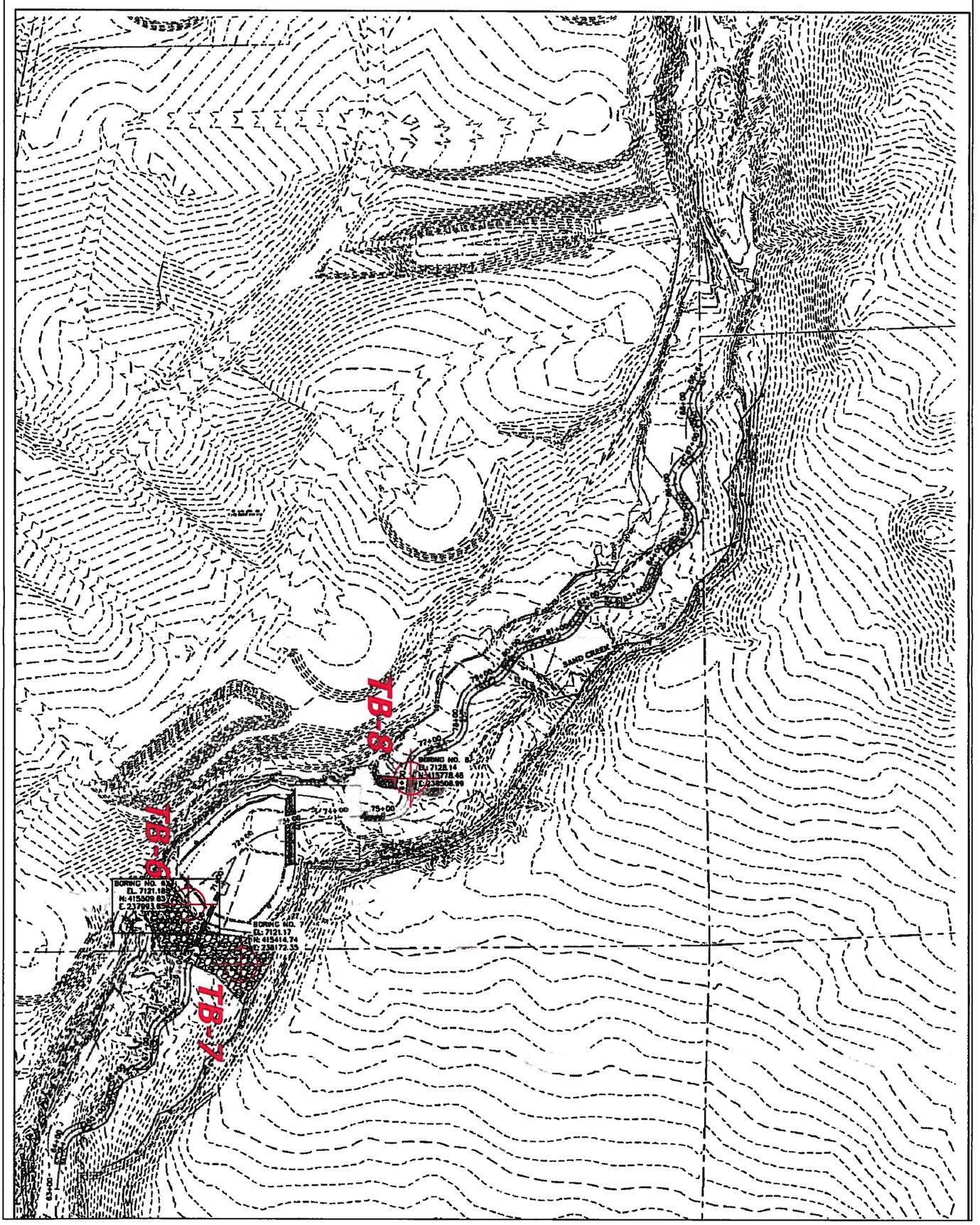

REVISIONS BY

# SAND CREEK RESTORATION

## STERLING RANCH, CO

## GEOTECHNICAL BORING LOCATIONS

TB-2- APPROXIMATE TEST BORING LOCATION AND NUMBER




N

SITE PLAN/TEST BORING MAP
SAND CREEK CHANNEL IMPROVEMENTS
EL PASO COUNTY, CO
FOR: C & C LAND


ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599


| | |
|---|---|
| DRAWN BY: | JEB |
| DESIGNED BY: | AMH |
| CHECKED BY: | |
| DATE: | 9/24/2022 |
| SCALE: | AS SHOWN |
| JOB NO.: | 211647 |
| FINISH NO.: | |

2C

REVISIONS | BY

# APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 2/26/2022
Job # 211647

REMARKS

WATER @ 5', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 9 | 7.1 | 1 | SAND, SLIGHTLY SILTY TO SILTY, FINE TO COARSE GRAINED, TAN TO GRAY BROWN, LOOSE TO DENSE, MOIST |
| 5 | | | 7 | 12.8 | 1 | |
| 10 | | | 36 | 10.6 | 3 | WEATHERED TO FORMATIONAL SANDSTONE, VERY SILTY, FINE GRAINED, GRAY BROWN, VERY DENSE, MOIST |
| 15 | | | 50/7" | 12.5 | 3 | |
| 20 | | | 50/4" | 11.6 | 3 | |

TEST BORING NO. 2
DATE DRILLED 2/26/2022
CLIENT C&C LAND
LOCATION CHANNEL IMPROVEMENTS

REMARKS

WATER @ 9', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 22 | 3.5 | 1 | SAND, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST |
| 5 | | | 22 | 11.4 | 1 | |
| 10 | | | 29 | 2.4 | 1 | |
| 15 | | | 50/3" | 12.2 | 3 | SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST |
| 20 | | | 50/4" | 16.5 | 3 | |

**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | |

JOB NO.: 211647
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 2/26/2022
Job # 211647

REMARKS

WATER @ 2.5', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | 9 | 17.6 | 2 |
| 5 | | | 7 | 20.1 | 1 |
| 10 | | | 50/4" | 12.8 | 3 |
| 15 | | | 50/3" | 12.9 | 3 |
| 20 | | | | | |

CLAY, SANDY WITH ORGANICS, BLACK, FIRM, MOIST

SAND, VERY SILTY, FINE GRAINED, BROWN, LOOSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST

TEST BORING NO. 4
DATE DRILLED 2/26/2022
CLIENT C&C LAND
LOCATION CHANNEL IMPROVEMENTS

REMARKS

WATER @ 4', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | 11 | 6.7 | 1 |
| 5 | | | 13 | 10.6 | 1 |
| 10 | | | 10 | 10.3 | 1 |
| 15 | | | 8 | 12.5 | 1 |
| 20 | | | 50/3" | 18.9 | 3 |
| 25 | | | 50/3" | 11.4 | 3 |

SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO LOOSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST

**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|

JOB NO.: 211647
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 2/26/2022
Job # 211647

REMARKS

WATER @ 2.5', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 9 | 29.2 | 1 | SAND, VERY SILTY, FINE TO MEDIUM GRAINED, GRAY BROWN, LOOSE TO MEDIUM DENSE, MOIST |
| 5 | | | 50/5" | 15.6 | 3 | SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST |
| 10 | | | 50/2" | 13.2 | 3 | |
| 15 | | | 50/5" | 11.3 | 3 | |
| 20 | | | | | | |

TEST BORING NO. 6
DATE DRILLED 2/26/2022
CLIENT C&C LAND
LOCATION CHANNEL IMPROVEMENTS

REMARKS

WATER @ 7', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 21 | 9.0 | 1A | FILL 0-14', SAND, SILTY TO VERY SILTY, FINE TO COARSE GRAINED, BROWN TO BLACK, MEDIUM DENSE TO LOOSE, MOIST |
| 5 | | | 20 | 11.9 | 1A | |
| 10 | | | 6 | 15.7 | 1A | |
| 15 | | | 11 | 8.7 | 1 | BLACK LENS SAND, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST |
| 20 | | | 14 | 24.9 | 2 | CLAY, VERY SANDY, BLACK, FIRM, MOIST |
| 25 | | | 50/7" | 15.8 | 3 | SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST |
| 30 | | | 50/1" | 10.6 | 3 | |

**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|

JOB NO.: 211647
FIG NO.: A- 3

TEST BORING NO. 7
DATE DRILLED 2/26/2022
Job # 211647

REMARKS

WATER @ 3.5', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | 16 | 14.0 | 1 |
| | | | 50/7" | 11.9 | 3 |
| 10 | | | 50/6" | 11.4 | 3 |
| 15 | | | 50/4" | 14.7 | 3 |
| 20 | | | | | |

SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST

SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

TEST BORING NO. 8
DATE DRILLED 2/26/2022
CLIENT C&C LAND
LOCATION CHANNEL IMPROVEMENTS

REMARKS

WATER @ 4.5', 2/28/22

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | 12 | 22.2 | 1 |
| 5 | | | 6 | 10.8 | 1 |
| 10 | | | | | |
| 15 | | | 50/4" | 11.4 | 3 |
| 20 | | | 50/5" | 11.2 | 3 |

SAND, SILTY TO CLAYEY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST

SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

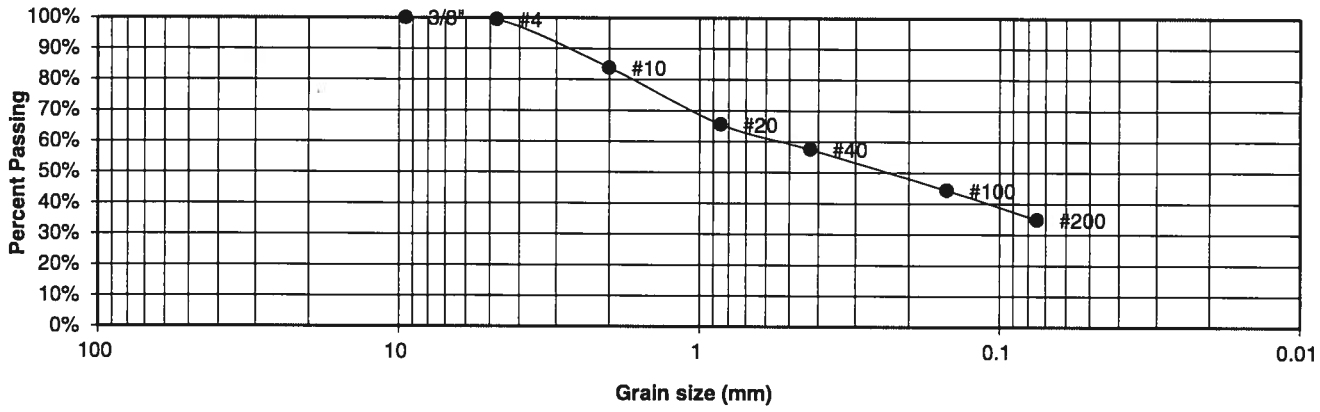
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|

JOB NO.: 211647
FIG NO.: A- 4

# APPENDIX B: Laboratory Test Results

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM | CLIENT | C&C LAND |
| SOIL TYPE # | 1 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 1 | JOB NO. | 211647 |
| DEPTH (FT) | 10 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 99.3% |
| 10 | 83.9% |
| 20 | 65.5% |
| 40 | 57.5% |
| 100 | 44.4% |
| 200 | 34.9% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | NP |
| Liquid Limit | NV |
| Plastic Index | NP |

Swell

| | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |


**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

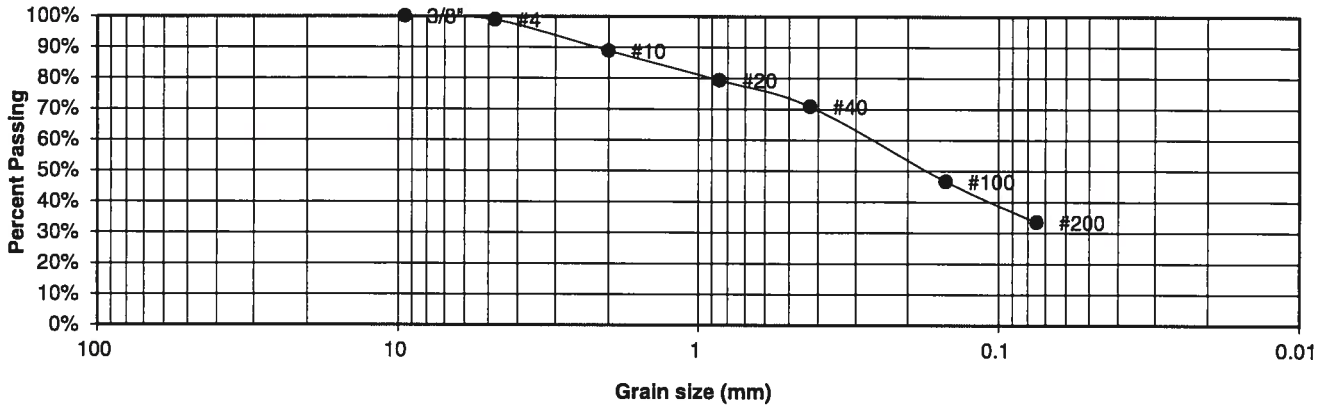
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 4-1-22 |

JOB NO.: 211647

FIG NO.: B-1

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM | CLIENT | C&C LAND |
| SOIL TYPE # | 1 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 2 | JOB NO. | 211647 |
| DEPTH (FT) | 5 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 98.9% |
| 10 | 88.8% |
| 20 | 79.3% |
| 40 | 70.8% |
| 100 | 46.7% |
| 200 | 33.5% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | |
| Liquid Limit | |
| Plastic Index | |

Swell

| | |
|---|---|
| Moisture at start | 12.2% |
| Moisture at finish | 19.7% |
| Moisture increase | 7.6% |
| Initial dry density (pcf) | 104 |
| Swell (psf) | 120 |


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

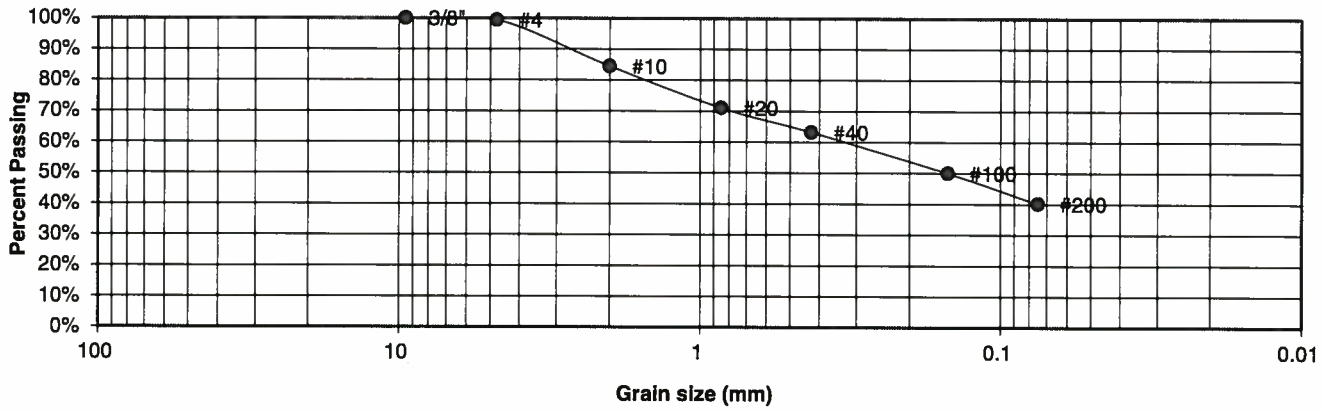
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 4-1-22 |

JOB NO.: 211647

FIG NO.: B-2

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM | CLIENT | C&C LAND |
| SOIL TYPE # | 1 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 5 | JOB NO. | 211647 |
| DEPTH (FT) | 2-3 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 99.4% |
| 10 | 84.5% |
| 20 | 71.0% |
| 40 | 63.2% |
| 100 | 50.0% |
| 200 | 40.1% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | NP |
| Liquid Limit | NV |
| Plastic Index | NP |

Swell

| | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |


**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

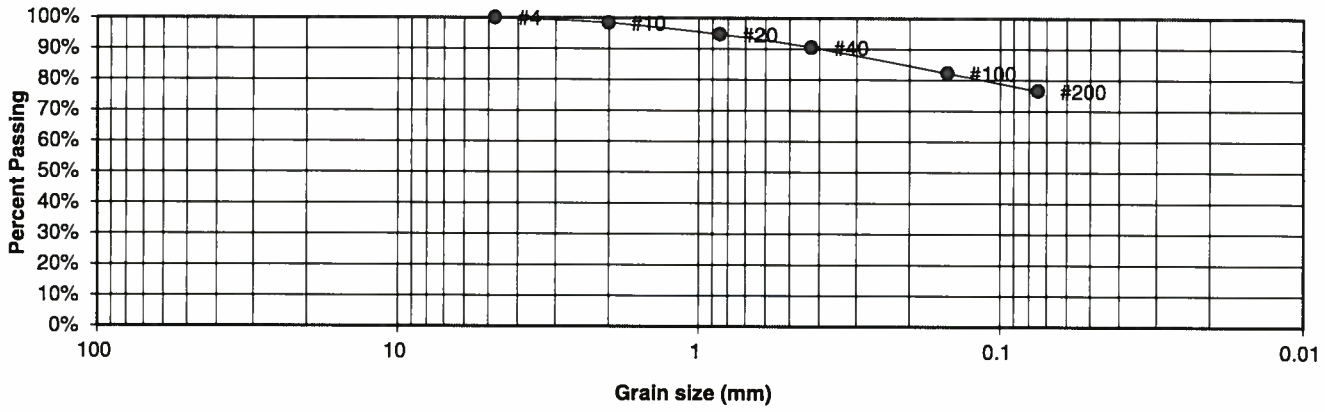
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 4-1-22 |

JOB NO.: 211647

FIG NO.: B-3

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | C&C LAND |
| SOIL TYPE # | 2 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 3 | JOB NO. | 211647 |
| DEPTH (FT) | 2-3 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | 100.0% |
| 10 | 98.4% |
| 20 | 94.7% |
| 40 | 90.5% |
| 100 | 82.3% |
| 200 | 76.5% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

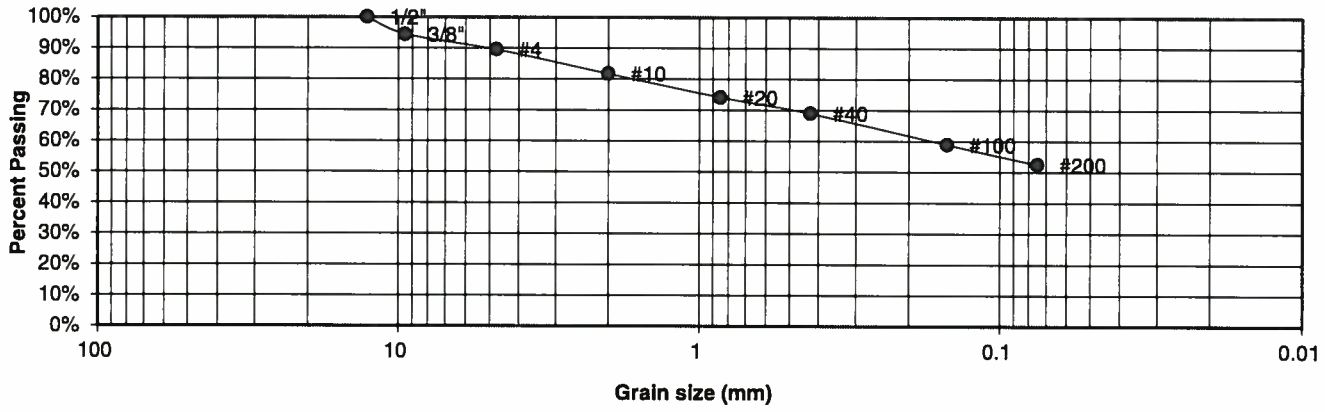
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 4-1-22 |

JOB NO.: 211647

FIG NO.: B-4

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | C&C LAND |
| SOIL TYPE # | 2 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 6 | JOB NO. | 211647 |
| DEPTH (FT) | 20 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | 100.0% |
| 3/8" | 94.4% |
| 4 | 89.5% |
| 10 | 81.7% |
| 20 | 74.1% |
| 40 | 69.0% |
| 100 | 59.0% |
| 200 | 52.5% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

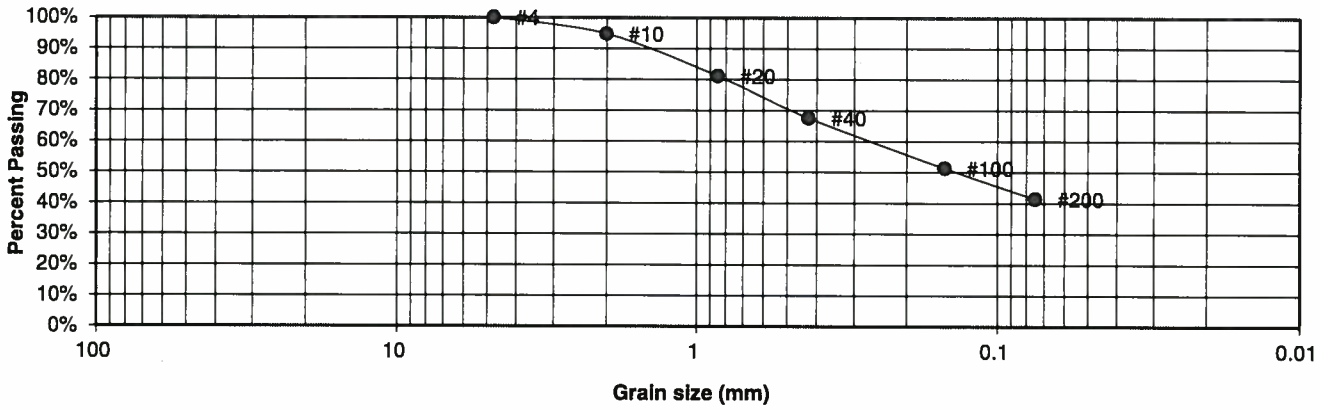
| DRAWN: | DATE: | CHECKED: SW | DATE: 4-1-22 |
|---|---|---|---|

JOB NO.: 211647

FIG NO.: B-5

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM | CLIENT | C&C LAND |
| SOIL TYPE # | 3 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 1 | JOB NO. | 211647 |
| DEPTH (FT) | 15 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | 100.0% |
| 10 | 94.7% |
| 20 | 81.1% |
| 40 | 67.5% |
| 100 | 51.4% |
| 200 | 41.4% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | NP |
| Liquid Limit | NV |
| Plastic Index | NP |

Swell

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

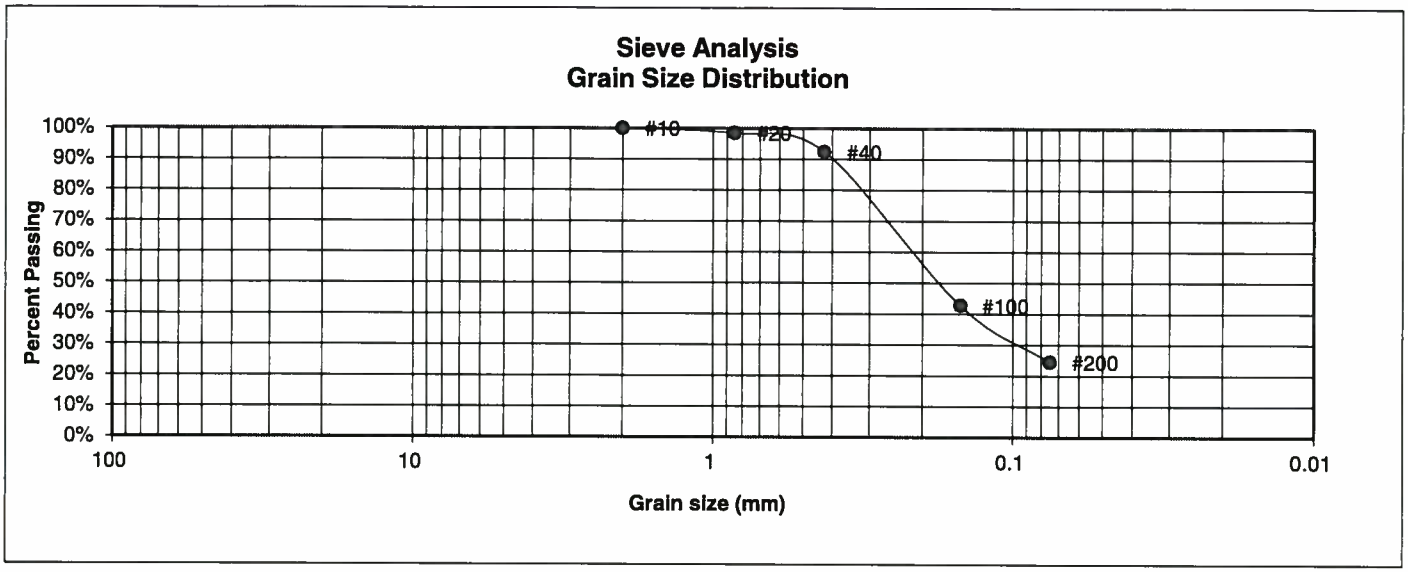

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 4-1-22 |

JOB NO.: 211647

FIG NO.: B-6

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM | CLIENT | C&C LAND |
| SOIL TYPE # | 3 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 4 | JOB NO. | 211647 |
| DEPTH (FT) | 20 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | 100.0% |
| 20 | 98.4% |
| 40 | 92.4% |
| 100 | 42.7% |
| 200 | 24.5% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | NP |
| Liquid Limit | NV |
| Plastic Index | NP |

Swell

| | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

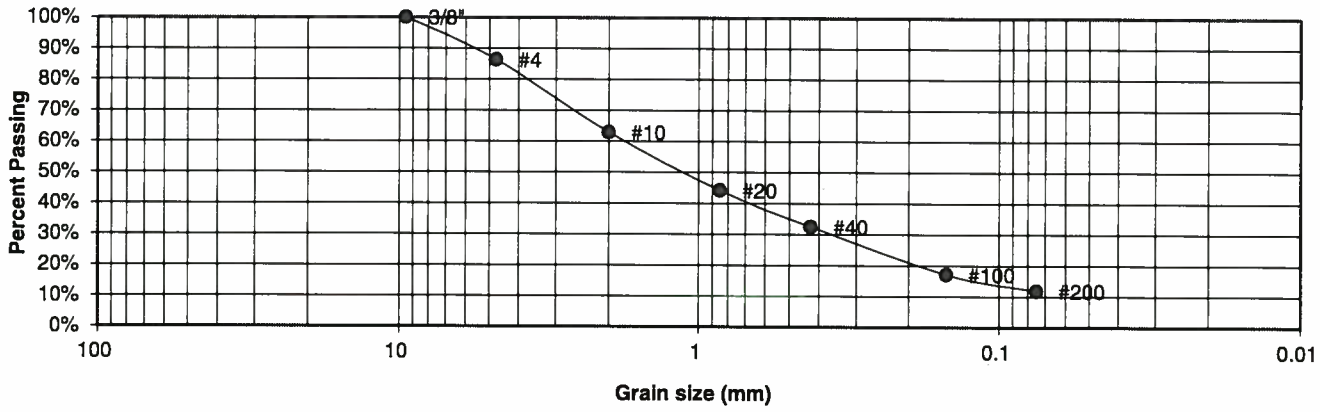
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 4-1-22 |

JOB NO.: 211647

FIG NO.: B-7

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM-SW | CLIENT | C&C LAND |
| SOIL TYPE # | 3 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 6 | JOB NO. | 211647 |
| DEPTH (FT) | 25 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 86.4% |
| 10 | 62.9% |
| 20 | 44.2% |
| 40 | 32.5% |
| 100 | 17.1% |
| 200 | 11.8% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

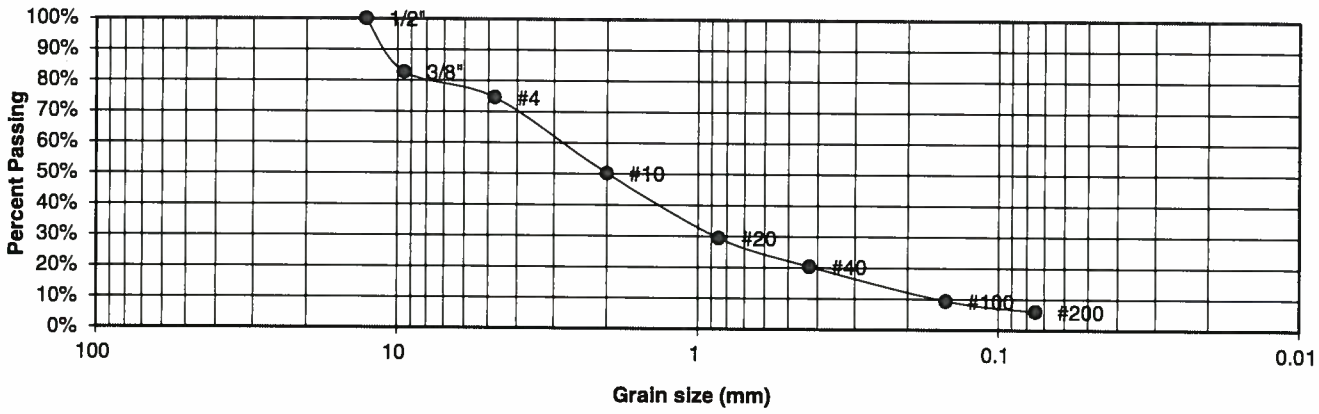
| DRAWN: | DATE: | CHECKED: SW | DATE: 4-1-22 |
|---|---|---|---|

JOB NO.: 211647

FIG NO.: B-8

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM-SW | CLIENT | C&C LAND |
| SOIL TYPE # | 3 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 7 | JOB NO. | 211647 |
| DEPTH (FT) | 5 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | 100.0% |
| 3/8" | 82.7% |
| 4 | 74.5% |
| 10 | 50.2% |
| 20 | 29.4% |
| 40 | 20.4% |
| 100 | 9.3% |
| 200 | 6.0% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

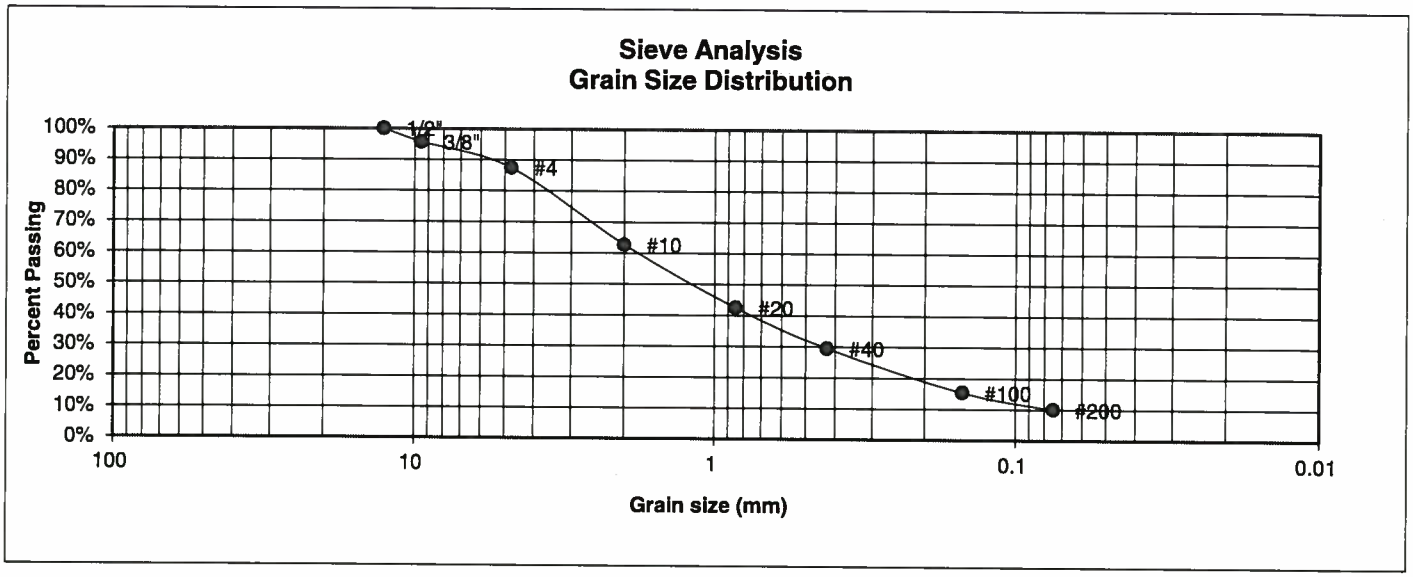

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 4-1-22 |
|---|---|---|---|

JOB NO.: 211647

FIG NO.: B-9

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SM-SW | CLIENT | C&C LAND |
| SOIL TYPE # | 3 | PROJECT | CHANNEL IMPROVEMENTS |
| TEST BORING # | 8 | JOB NO. | 211647 |
| DEPTH (FT) | 15 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | 100.0% |
| 3/8" | 95.7% |
| 4 | 87.4% |
| 10 | 62.7% |
| 20 | 42.5% |
| 40 | 29.5% |
| 100 | 15.4% |
| 200 | 10.0% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 4-1-22 |
|---|---|---|---|

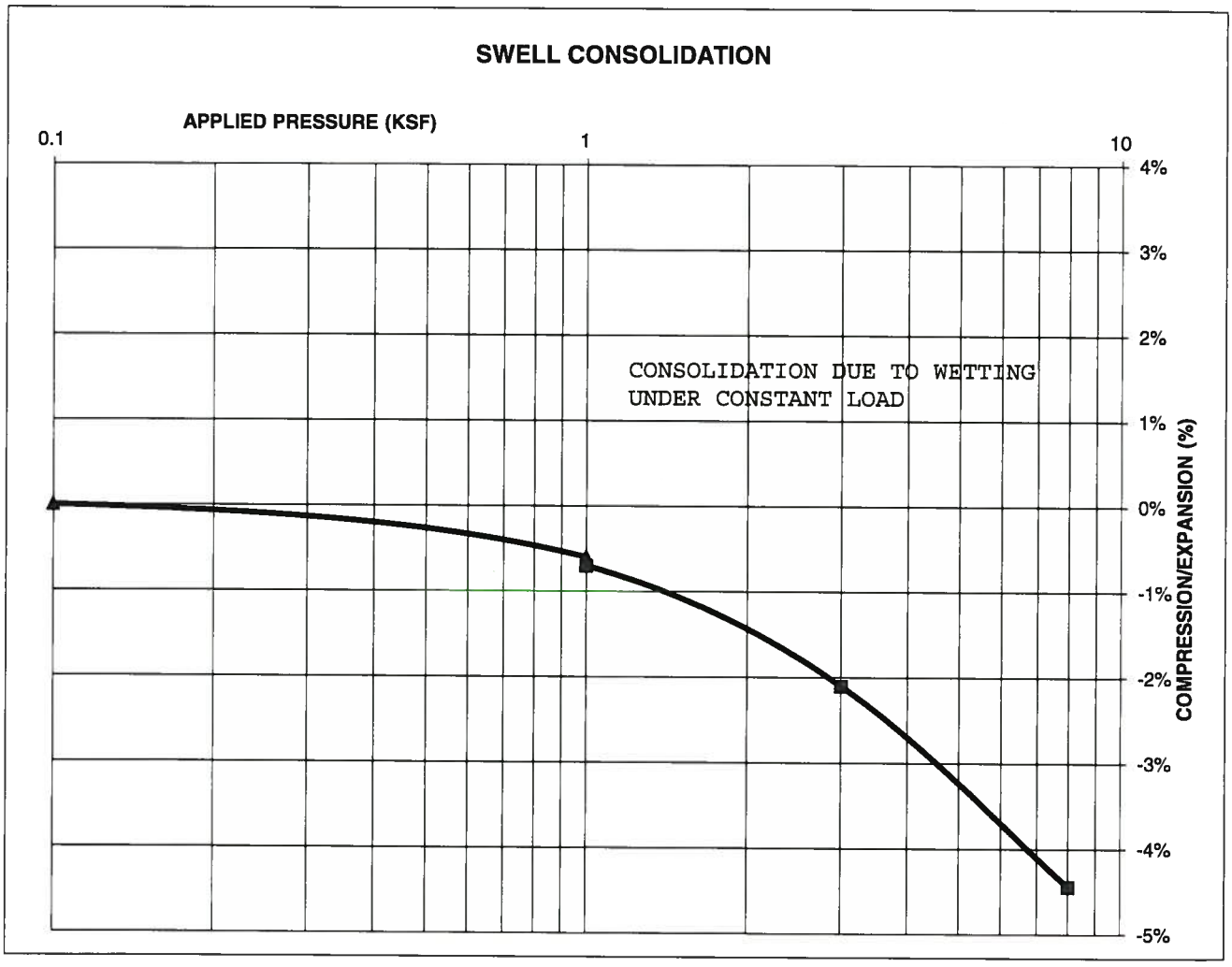
JOB NO.: 211647

FIG NO.: B-10

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 1 | DEPTH(ft) | 10 |
| DESCRIPTION | SM | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 109 |
| NATURAL MOISTURE CONTENT | | | 12.3% |
| SWELL/CONSOLIDATION (%) | | | -0.1% |

JOB NO. 211647
CLIENT C&C LAND
PROJECT CHANNEL IMPROVEMENTS




**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

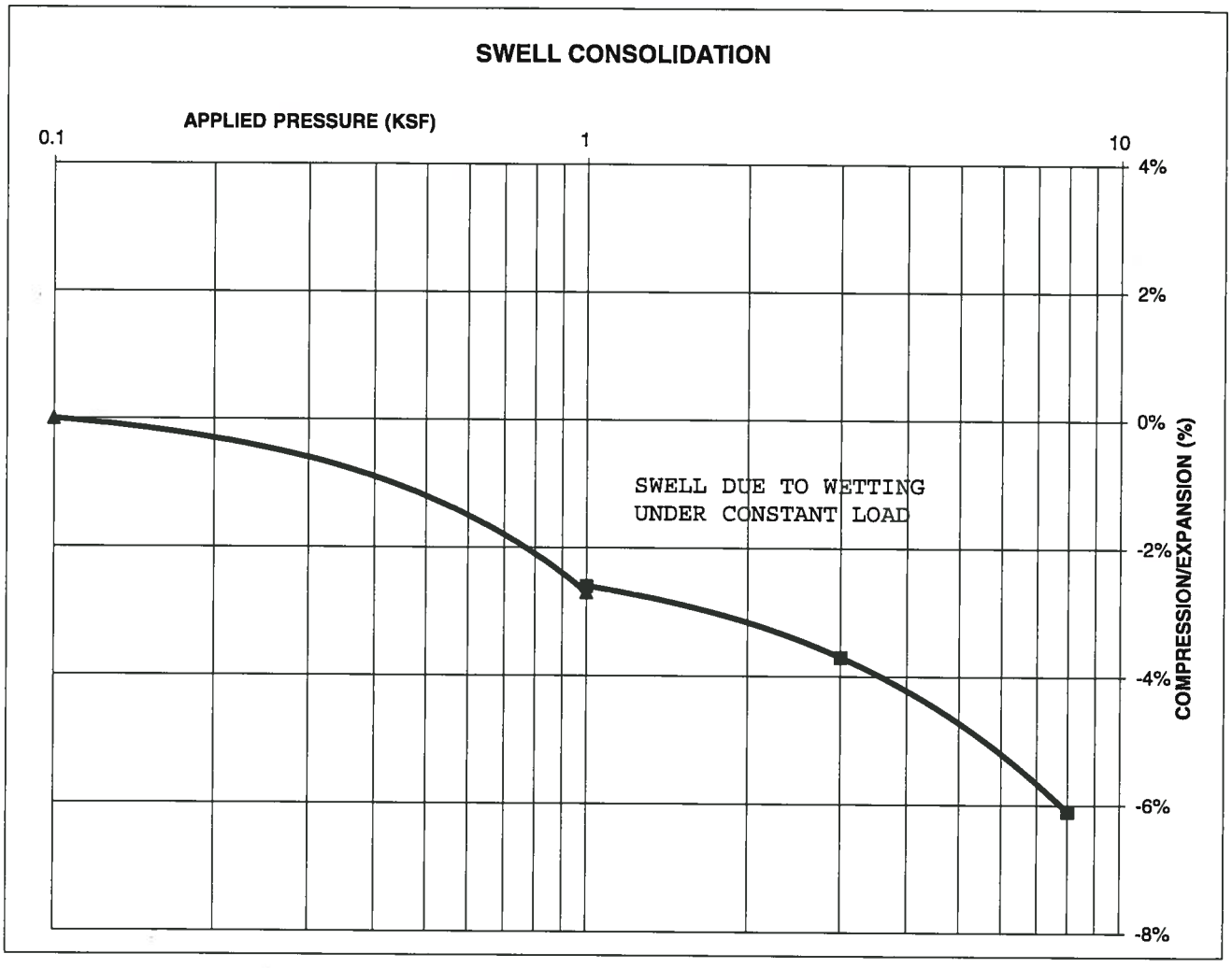
| DRAWN: | DATE: | CHECKED: SW | DATE: 4-1-22 |
|---|---|---|---|

JOB NO.: 211647
FIG NO.: B-11

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 6 | DEPTH(ft) | 25 |
| DESCRIPTION | SM-SW | SOIL TYPE | 3 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 112 |
| NATURAL MOISTURE CONTENT | | | 16.5% |
| SWELL/CONSOLIDATION (%) | | | 0.1% |

JOB NO. 211647
CLIENT C&C LAND
PROJECT CHANNEL IMPROVEMENTS




**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

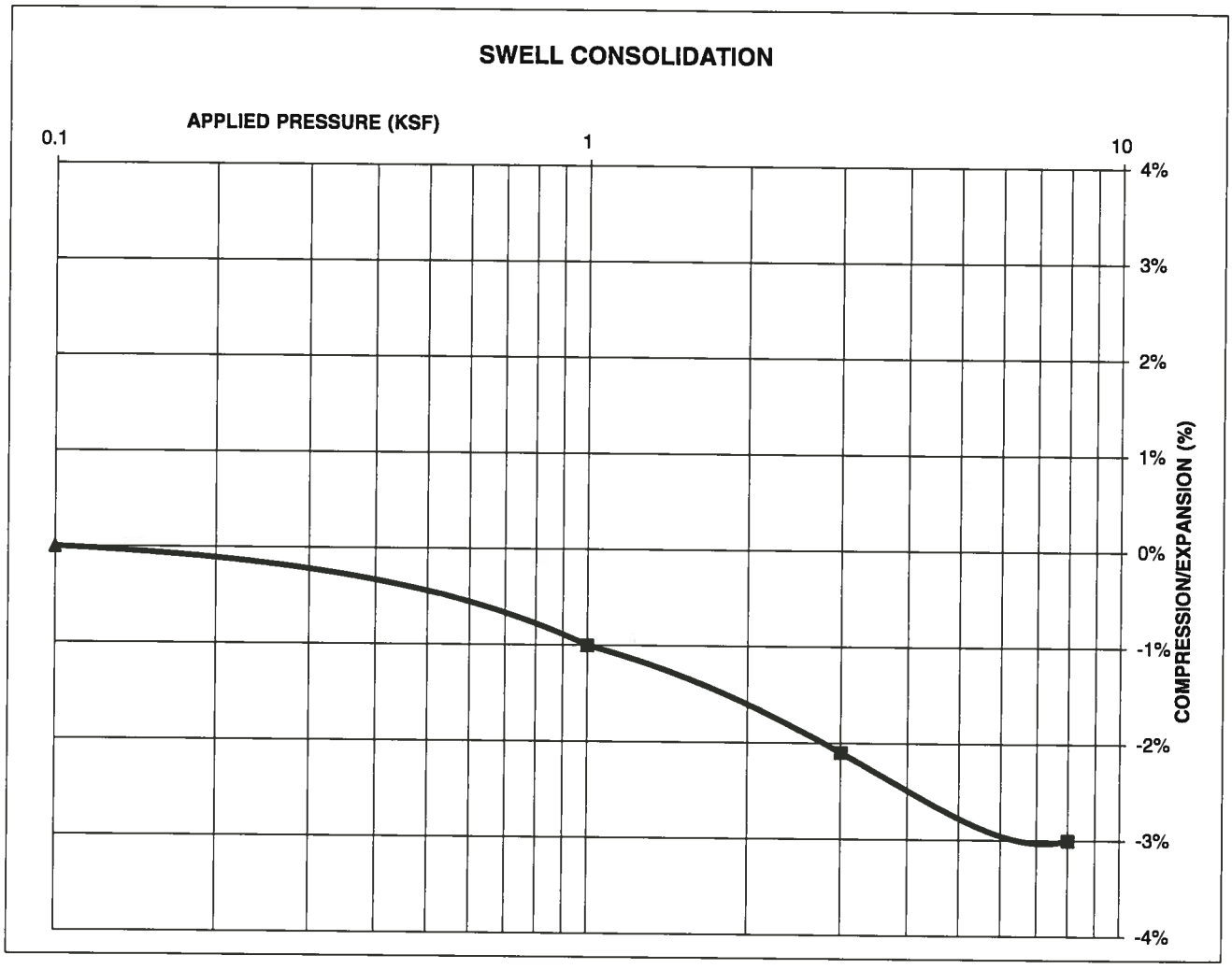
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 4-1-22 |

JOB NO.: 211647
FIG NO.: B-12

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 8 | DEPTH(ft) | 15 |
| DESCRIPTION | SM-SW | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 119 |
| NATURAL MOISTURE CONTENT | | | 8.3% |
| SWELL/CONSOLIDATION (%) | | | 0.0% |

JOB NO. 211647
CLIENT C&C LAND
PROJECT CHANNEL IMPROVEMENTS




**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 4-1-22 |
|---|---|---|---|

JOB NO.: 211647
FIG NO.: B-13

| | | | |
|---|---|---|---|
| CLIENT | C&C LAND | JOB NO. | 211647 |
| PROJECT | CHANNEL IMPROVEMENTS | DATE | 3/4/2022 |
| LOCATION | CHANNEL IMPROVEMENTS | TEST BY | BL |

| BORING NUMBER | DEPTH, (ft) | SOIL TYPE NUMBER | UNIFIED CLASSIFICATION | WATER SOLUBLE SULFATE, (wt%) |
|---|---|---|---|---|
| TB-1 | 10 | 1 | SM | 0.00 |
| TB-4 | 20 | 3 | SM | 0.00 |
| TB-5 | 2-3 | 1 | SM | <0.01 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

QC BLANK PASS

**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST**
**SULFATE RESULTS**

| DRAWN: | DATE: | CHECKED: SW | DATE: 4-1-22 |
|---|---|---|---|

JOB NO.: 211647

FIG NO.: B-14

# MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT FOR STERLING RANCH

**Prepared For:**
**SR Land, LLC**
**20 Boulder Crescent, 2nd Floor**
**Colorado Springs, CO 80903**
**(719) 491-3024**

**January 20th, 2023**
**Project No. 25188.04**

**Prepared By:**
**JR Engineering, LLC**
**5475 Tech Center Drive**
**Colorado Springs, CO 80919**
**(303)-267-6240**
**Contact: Mike Bramlett, PE**

Detention spreadsheet's stage-area and stage-discharge curves from the Retreat at Timber Ridge Filing 1 Final Drainage Report.

- Pond FSD21 now outfalls directly into DP-73 instead of going through Pond FSD27. Based on the Drainage Report for The Retreat at Timber Ridge, flows from Sub-Basin SC3-21 drain to a future full spectrum detention pond that outfalls directly into Sand Creek.

  A table summarizing the changes in the Full Spectrum Detention Pond's sizing and release rates can be found in **Appendix C**.

The second stated purpose of this MDDP Amendment is to document the differences between the MDDP and this MDDP Amendment. Comparing the MDDP Amendment's proposed conditions model to the MDDP, the median difference in Sub-basin peak flow rates between the two is a 6% decrease in the basin runoff. With the basin parameters carried over as much as possible, some of the differences is due to how the hydrographs were generated in HEC-HMS and SWMM respectively. The MDDP used curve number while the MDDP Amendment used CUHP. The MDDP Amendment also took into account changes basin parameters based on the various accepted Final Drainage Reports. The differences in Sub-basin peak flow rates were not universally higher in CUHP-SWMM, with there being a range from 100% higher to 100% lower. A table comparing the peak flow rates of the Sub-basins can be found in **Appendix C**.

The comparison between the routed hydrographs at the design points of the MDDP Amendment proposed conditions model and MDDP proposed conditions model shows a more consistent change. Peak runoff rates along the main fork are mostly a few percent higher, with a handful further downstream the reach 14 to 16% higher. The East Fork saw a reduction of peak runoff rates around 60% from the previous model. The total volume of water is consistently 10 to 25% lower than the previous model with a exception of a few places. This is due in part to the changes in detention release rates as well as the previously mentioned differences in how the hydrographs were created. The differences between the two models of when peak runoff occurs were typically within 10 to 15 minutes in each basin and at each node. Tables comparing the MDDP Amendment proposed conditions model with the previous one from the MDDP can be found in **Appendix C.**

The last and most crucial comparison is between the updated existing conditions model and the updated proposed conditions model. As seen in Table 1, all of the online and offline detention shows a clear reduction in flows along Sand Creek. The total volume of runoff is very similar in the undeveloped upper portion of the reach at Design Points 74, 75, and 78. As runoff accumulates downstream at Design Points 73, 71, 69, and 63 the volume of runoff drastically increases due to the increased imperviousness of the adjacent developments, but the peak flow rates remain lower than existing due to all of the full spectrum detention ponds along the reach.

As seen in Table 1, Pond W-3 reduces peak flow rates downstream of it at Design Points 60A and 53A to below the pre-development rates seen in the updated existing conditions model. Flows have been reduced from 1969.2 and 2197.2 cfs, respectively, to 1882.2 and 1887.5 cfs. A table comparing the peak runoff rates and the total volume of runoff at the design points can be found in **Appendix C**.

# DRAINAGE FACILITY DESIGN

## General Concept

The third stated purpose of this MDDP Amendment is an evaluation of the required volume for on-line detention at Sterling Ranch Road (Pond W-3). Along with an on-line detention pond, new culverts are proposed at Sterling Ranch Road and Briargate Parkway being designed by others. The amendment also includes revisions to the existing stock pond north of Sterling Ranch Road, the stock ponds north of Briargate Parkway, and improvements to Sand Creek channel.

## Specific Details

Compared to the previous preliminary design of Pond W-3 from the 2018 MDDP, the amount of storage volume has decreased from 78.2 ac-ft. to 50.5 ac-ft. In order to avoid classification as a jurisdictional dam, the maximum ponding depth is 10 feet. The peak release rate has been increased from 1350.6 cfs to 1585.2 cfs. Despite the increase in release rate, peak flow rates along Sand Creek downstream of the pond are lower than existing. The previous MDDP model outfalls at DP 53A, which is defined as the Full Spectrum Pond at Woodmen Drive, and so does the MDDP Amendment SWMM model. The MDDP model over-detains at Pond W-3 in order to reduce flows downstream well below those in the existing conditions. With the goal being to simply reduce flows to less than predevelopment rates, this amount of detention is unnecessary, hence the reduced storage volume and the increased release rate. A complete comparison between existing and proposed conditions of design flows along Sand Creek can be seen below.

**Table 1.**

| Design Point Comparison Summary | | | | | | |
|---|---|---|---|---|---|---|
| Location | Design Point ID | Existing (Updated) | Proposed (MDDP) | Proposed (Amendment) | % Difference Amend vs. MDDP | % Difference Amend vs. EX |
| | | Q100 (cfs) | | | | |
| | DP-74 | 352.3 | 262.8 | 293.8 | 12% | -17% |
| | DP-75 | 970.5 | 950.5 | 887.9 | -7% | -9% |
| | DP-78 | 497.7 | 385.3 | 422.1 | 10% | -15% |
| | DP-73 | 1672 | 1506.7 | 1497.1 | -1% | -10% |
| Sterling Ranch N BNDY | DP-71 | 1734.9 | 1612.2 | 1644.1 | 2% | -5% |
| Briargate Pkwy X'ing | DP-69 | 1988.4 | 1775.7 | 1763.9 | -1% | -11% |
| Sterling Ranch S BNDY | DP-63 | 1980.7 | 1385.1 | 1585.2 | 14% | -20% |
| Marksheffel X'ing | DP-60A | 1969.2 | 1661.8 | 1882.2 | 13% | -4% |
| Sand Creek and Pond 3 | DP-53A | 2197.7 | 1668.9 | 1887.5 | 13% | -14% |
| Near SE Prop Corner | DP-56 | 242.9 | 196.4 | 136.2 | -31% | -44% |

Conceptually, the current preliminary design for Pond W-3 is similar to what was previously shown in the MDDP. Ponding occurs adjacent to Sterling Ranch Road and pass through a 3 barrel box culvert before entering the roadway culvert and continuing downstream. The Sterling Ranch Road culvert is currently proposed to be a Bridgecor arch with a 38'-1" span x 11'x11" rise (by others).

The existing stock pond upstream of Sterling Ranch Road will remain in place, with flows passing through the pond and leaving through an outlet structure. The major change in how the pond functions is the new design does not have a diversion structure along Sand Creek that routes flows around the existing pond. Due the narrow space between the proposed development and the existing stock pond, this portion of channel would require extensive reinforcement due to high shears and velocities. In order to maintain the water right for the pond, an outlet orifice structure maintains a static water surface of 7038 ft and all flows above that elevation pass undetained through the orifice structure and outfall into Pond W-3. An Agridrain system adjacent to the outlet structure controls flows below the static water surface and allow flows to be impounded or released as needed. Adding the existing stock pond as online storage directly upstream of Pond W-3 made a drastic difference in peak flows. The time of peak concentration at Sterling Ranch Road was only about 20 minutes greater, but the additional storage volume attributed to the stock ponds reduced peak flows by 160 cfs and reduced the maximum volume of runoff flowing into Pond W-3 by 1.3 ac-ft.

The proposed channel improvements begin just north of the Sterling Ranch southern property boundary and run north roughly two miles to the northern property boundary. The horizontal

## Existing Conditions Design Point Peak Flow Rate Summary

| Design Point | MDDP | | | | | | MDDP Amendment | | | | | | % Difference | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $Q_2$ (cfs) | $Q_5$ (cfs) | $Q_{10}$ (cfs) | $Q_{25}$ (cfs) | $Q_{50}$ (cfs) | $Q_{100}$ (cfs) | $Q_2$ (cfs) | $Q_5$ (cfs) | $Q_{10}$ (cfs) | $Q_{25}$ (cfs) | $Q_{50}$ (cfs) | $Q_{100}$ (cfs) | $Q_2$ | $Q_5$ | $Q_{10}$ | $Q_{25}$ | $Q_{50}$ | $Q_{100}$ |
| DP-73 | 225.9 | 380.7 | 618 | 957 | 1260.4 | 1582.3 | 171.2 | 503.09 | 791.79 | 1033.04 | 1414.41 | 1672.0 | -32% | 24% | 22% | 7% | 11% | 5% |
| DP-71 | 229.3 | 388.9 | 629.7 | 978.8 | 1277.3 | 1637.9 | 175 | 518.37 | 818.24 | 1068.91 | 1466.2 | 1734.9 | -31% | 25% | 23% | 8% | 13% | 6% |
| DP-69 | 253 | 434.8 | 707.7 | 1100 | 1453.3 | 1870.4 | 189.69 | 579.88 | 923.83 | 1213.68 | 1675.53 | 1988.4 | -33% | 25% | 23% | 9% | 13% | 6% |
| DP-63 | 251.4 | 430.7 | 713.1 | 1113.2 | 1496.2 | 1911.5 | 175.18 | 557.4 | 899.71 | 1192.36 | 1661.58 | 1980.7 | -44% | 23% | 21% | 7% | 10% | 3% |
| DP-10 | 36.5 | 56 | 106.4 | 162.9 | 220.6 | 287.2 | 32.32 | 93.36 | 146.19 | 189.33 | 255.2 | 300.1 | -13% | 40% | 27% | 14% | 14% | 4% |
| DP-9A | 55.3 | 94.3 | 150.3 | 227.7 | 299.5 | 380.5 | 31.89 | 101.87 | 173.68 | 232.21 | 321.39 | 381.1 | -73% | 7% | 13% | 2% | 7% | 0% |
| DP-9 | 52.8 | 88.8 | 142.1 | 214.2 | 281 | 351.4 | 28.73 | 93.68 | 160.49 | 215.19 | 297.14 | 351.7 | -84% | 5% | 11% | 0% | 5% | 0% |
| DP-8A | 7.7 | 15.2 | 27.1 | 44.2 | 60.5 | 78.4 | 0.56 | 17.3 | 31.43 | 42.65 | 59.34 | 70.5 | -1275% | 12% | 14% | -4% | -2% | -11% |
| DP-8 | 24.2 | 45.1 | 77.8 | 124.4 | 169.5 | 220.9 | 1.97 | 50.28 | 115.07 | 167.23 | 245.12 | 297.4 | -1128% | 10% | 32% | 26% | 31% | 26% |
| DP-7 | 32.4 | 57.1 | 97.3 | 156.1 | 213.8 | 277.9 | 22.38 | 82.23 | 143.62 | 194.75 | 273.43 | 326.3 | -45% | 31% | 32% | 20% | 22% | 15% |
| DP-6 | 12.2 | 23.9 | 43.1 | 70.9 | 97 | 125.2 | 7.82 | 24.38 | 46.12 | 63.58 | 89.43 | 106.6 | -56% | 2% | 7% | -12% | -8% | -17% |
| DP-5 | 0.5 | 1.7 | 4.5 | 9.4 | 14.5 | 20.5 | 1.18 | 9.36 | 20.8 | 29.82 | 42.58 | 50.9 | 58% | 82% | 78% | 68% | 66% | 60% |
| DP-4 | 11.6 | 21.5 | 37.5 | 60.9 | 83.1 | 107.4 | 12.95 | 35.87 | 65.46 | 89.09 | 123.98 | 147.0 | 10% | 40% | 43% | 32% | 33% | 27% |
| DP-3 | 1.1 | 1.8 | 2.8 | 4.3 | 5.6 | 7.1 | 0.0 | 0.69 | 1.71 | 2.52 | 3.71 | 4.5 | -10900% | -161% | -64% | -71% | -51% | -57% |
| DP-2 | 4.8 | 7.9 | 12.4 | 18.7 | 24.5 | 30.9 | 0.0 | 4.41 | 10.85 | 15.93 | 23.17 | 27.9 | -47900% | -79% | -14% | -17% | -6% | -11% |
| DP-1 | 5 | 8.2 | 13 | 19.6 | 25.7 | 32.2 | 0.0 | 4.88 | 11.82 | 17.63 | 25.97 | 31.5 | -49900% | -68% | -10% | -11% | 1% | -2% |
| DP-60A | 247.7 | 430.2 | 707.1 | 1113 | 1496.6 | 1913.5 | 167.91 | 546.35 | 886.79 | 1179 | 1649.04 | 1969.2 | -48% | 21% | 20% | 6% | 9% | 3% |
| DP-56 | 23.2 | 42.5 | 71.9 | 115.6 | 157.4 | 202.9 | 0.35 | 40.19 | 96.37 | 141.51 | 207.98 | 242.9 | -6529% | -6% | 25% | 18% | 24% | 16% |
| DP-53A | 262.1 | 454 | 763.2 | 1196.5 | 1609.8 | 2061.5 | 182.68 | 602.01 | 983.58 | 1311.23 | 1837.86 | 2197.7 | -43% | 25% | 22% | 9% | 12% | 6% |

## Existing Conditions Design Point Total Runoff Volume Summary

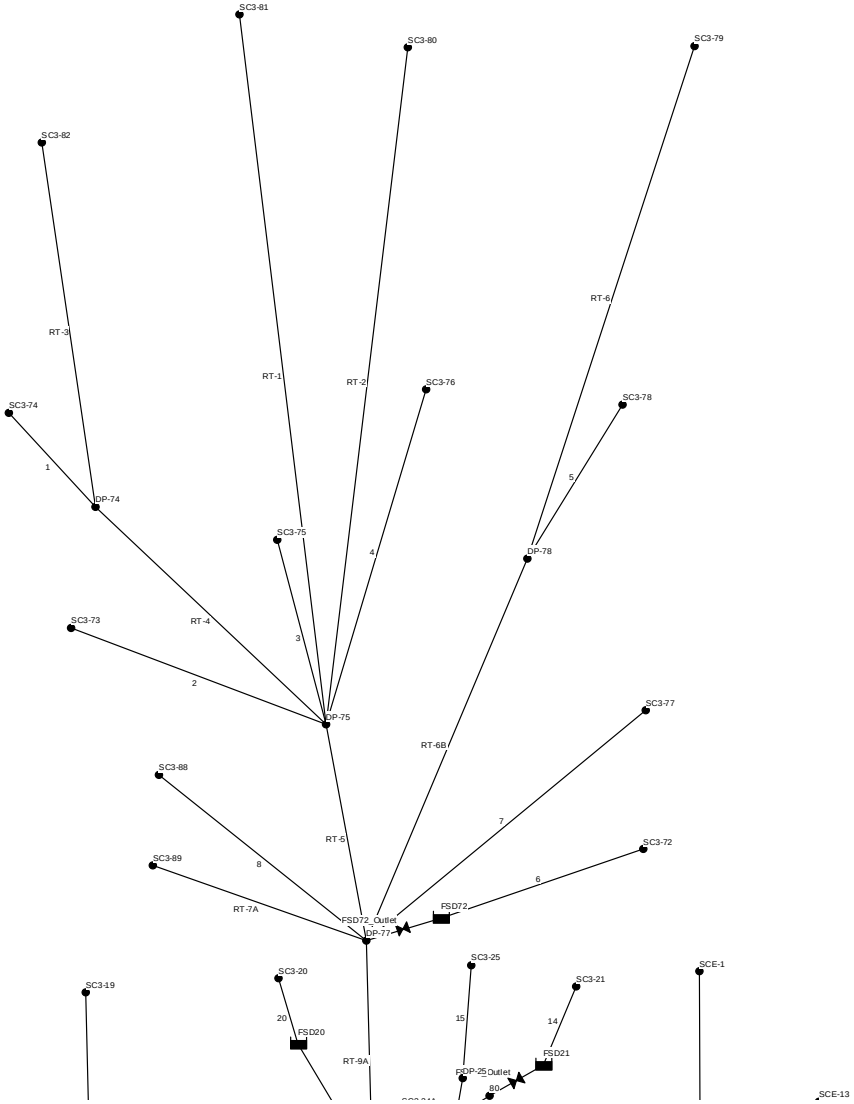
| Design Point | MDDP | | | | | | MDDP Amendment | | | | | | % Difference | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $V_2$ (ac-ft) | $V_5$ (ac-ft) | $V_{10}$ (ac-ft) | $V_{25}$ (ac-ft) | $V_{50}$ (ac-ft) | $V_{100}$ (ac-ft) | $V_2$ (ac-ft) | $V_5$ (ac-ft) | $V_{10}$ (ac-ft) | $V_{25}$ (ac-ft) | $V_{50}$ (ac-ft) | $V_{100}$ (ac-ft) | $V_2$ | $V_5$ | $V_{10}$ | $V_{25}$ | $V_{50}$ | $V_{100}$ |
| DP-73 | 40.4 | 61.5 | 92.1 | 134.3 | 173.1 | 214.9 | 19.9 | 51.9 | 78.6 | 101.0 | 136.3 | 159.9 | -103% | -19% | -17% | -33% | -27% | -34% |
| DP-71 | 42.5 | 64.9 | 97.1 | 141.6 | 182.5 | 226.6 | 20.7 | 54.6 | 82.6 | 106.2 | 143.6 | 168.5 | -105% | -19% | -18% | -33% | -27% | -34% |
| DP-69 | 50.7 | 77.4 | 116.1 | 169.4 | 218.6 | 271.4 | 24.0 | 64.4 | 98.2 | 126.4 | 171.2 | 201.0 | -111% | -20% | -18% | -34% | -28% | -35% |
| DP-63 | 54.1 | 82.5 | 123.8 | 180.8 | 233.3 | 289.9 | 25.9 | 69.7 | 105.9 | 136.3 | 184.4 | 216.4 | -109% | -18% | -17% | -33% | -26% | -34% |
| DP-10 | 7.6 | 11.7 | 17.6 | 25.8 | 33.4 | 41.6 | 5.4 | 12.2 | 17.9 | 22.5 | 29.6 | 34.4 | -41% | 4% | 1% | -15% | -13% | -21% |
| DP-9A | 9.3 | 14.1 | 21.1 | 30.7 | 39.4 | 48.8 | 3.6 | 9.4 | 15.2 | 20.0 | 27.5 | 32.5 | -159% | -50% | -39% | -53% | -43% | -50% |
| DP-9 | 8.4 | 12.7 | 19 | 27.6 | 35.5 | 44 | 3.0 | 8.1 | 13.4 | 17.7 | 24.4 | 28.9 | -181% | -56% | -42% | -56% | -45% | -52% |
| DP-8A | 1.3 | 2.1 | 3.4 | 5.2 | 7 | 8.9 | 0.1 | 1.7 | 3.2 | 4.3 | 6.0 | 7.1 | -2153% | -21% | -8% | -22% | -17% | -25% |
| DP-8 | 4.4 | 7 | 11.1 | 16.8 | 22.3 | 28.4 | 0.2 | 4.9 | 10.3 | 14.5 | 21.0 | 25.3 | -2483% | -43% | -8% | -15% | -6% | -12% |
| DP-7 | 6.1 | 10 | 15.9 | 24.3 | 32.4 | 41.3 | 3.1 | 10.3 | 17.6 | 23.6 | 32.8 | 39.0 | -99% | 3% | 10% | -3% | 1% | -6% |
| DP-6 | 2.4 | 4 | 6.3 | 9.6 | 12.7 | 16 | 1.0 | 2.7 | 4.8 | 6.5 | 9.2 | 10.9 | -142% | -51% | -31% | -47% | -38% | -46% |
| DP-5 | 0.2 | 0.4 | 0.8 | 1.4 | 1.9 | 2.6 | 0.1 | 0.5 | 1.2 | 1.7 | 2.6 | 3.1 | -160% | 26% | 34% | 20% | 26% | 16% |
| DP-4 | 2.6 | 4.2 | 6.7 | 10.2 | 13.5 | 17.2 | 1.6 | 3.7 | 6.5 | 8.7 | 12.0 | 14.2 | -64% | -12% | -3% | -17% | -12% | -21% |
| DP-3 | 0.1 | 0.2 | 0.3 | 0.5 | 0.6 | 0.8 | 0.0 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | -9900% | -231% | -98% | -123% | -79% | -97% |
| DP-2 | 0.6 | 0.9 | 1.4 | 2.1 | 2.7 | 3.4 | 0.0 | 0.3 | 0.7 | 1.0 | 1.5 | 1.8 | -59900% | -236% | -108% | -111% | -82% | -88% |
| DP-1 | 0.6 | 0.9 | 1.3 | 1.9 | 2.5 | 3.1 | 0.0 | 0.2 | 0.6 | 0.9 | 1.4 | 1.7 | -59900% | -263% | -110% | -106% | -83% | -86% |
| DP-60A | 55.3 | 84.4 | 126.4 | 184.8 | 238.5 | 296.6 | 26.1 | 71.2 | 108.6 | 139.6 | 189.0 | 221.9 | -112% | -19% | -16% | -32% | -26% | -34% |
| DP-56 | 4 | 6.3 | 9.9 | 14.9 | 19.8 | 25.1 | 0.1 | 4.0 | 8.7 | 12.6 | 18.2 | 22.0 | -6352% | -58% | -13% | -19% | -9% | -14% |
| DP-53A | 63 | 96.4 | 144.7 | 211.8 | 273.9 | 340.9 | 31.6 | 84.1 | 128.0 | 164.5 | 221.9 | 260.5 | -99% | -15% | -13% | -29% | -23% | -31% |

# APPENDIX C

# PROPOSED CONDITIONS HYDRAULIC CALCULATIONS

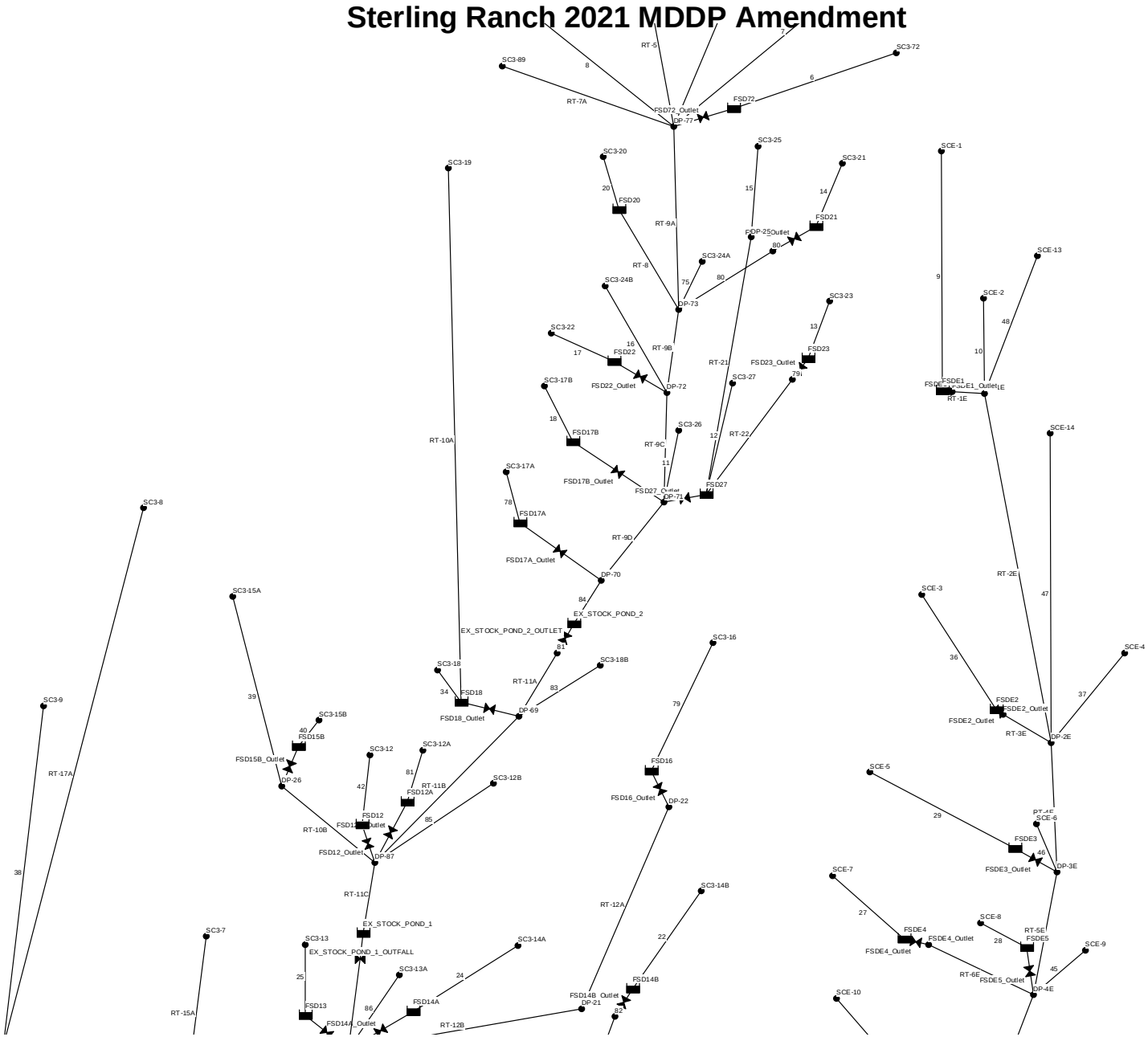
# Sterling Ranch 2021 MDDP Amendment





# Sterling Ranch 2021 MDDP Amendment

01/01/2005 00:05:00



## Existing vs. Proposed Peak Flow Rate Design Point Summary

| Design Point | Existing $Q_2$ (cfs) | Proposed $Q_2$ (cfs) | % Difference | Existing $Q_5$ (cfs) | Proposed $Q_5$ (cfs) | % Difference | Existing $Q_{10}$ (cfs) | Proposed $Q_{10}$ (cfs) | % Difference | Existing $Q_{25}$ (cfs) | Proposed $Q_{25}$ (cfs) | % Difference | Existing $Q_{50}$ (cfs) | Proposed $Q_{50}$ (cfs) | % Difference | Existing $Q_{100}$ (cfs) | Proposed $Q_{100}$ (cfs) | % Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DP-73 | 171.20 | 147.28 | -14% | 503.09 | 442.59 | -12% | 791.79 | 703.56 | -11% | 1033.04 | 919.81 | -11% | 1414.41 | 1257.44 | -11% | 1672.0 | 1497.12 | -10% |
| DP-71 | 175.00 | 149.28 | -15% | 518.37 | 472.6 | -9% | 818.24 | 771.35 | -6% | 1068.91 | 1012.75 | -5% | 1466.2 | 1386.32 | -5% | 1734.9 | 1644.06 | -5% |
| DP-69 | 189.69 | 146.52 | -23% | 579.88 | 512.38 | -12% | 923.83 | 847.5 | -8% | 1213.68 | 1108.89 | -9% | 1675.53 | 1497.55 | -11% | 1988.4 | 1763.93 | -11% |
| DP-63 | 175.18 | 128.57 | -27% | 557.4 | 480.38 | -14% | 899.71 | 763.81 | -15% | 1192.36 | 1005.42 | -16% | 1661.58 | 1368.28 | -18% | 1980.7 | 1585.19 | -20% |
| DP-60A | 167.91 | 135.75 | -19% | 546.35 | 544.14 | 0% | 886.79 | 863.88 | -3% | 1179 | 1138.24 | -3% | 1649.04 | 1569.79 | -5% | 1969.2 | 1882.17 | -4% |
| DP-53A | 182.68 | 135.8 | -26% | 602.01 | 545.87 | -9% | 983.58 | 866.46 | -12% | 1311.23 | 1141.24 | -13% | 1837.86 | 1573.95 | -14% | 2197.7 | 1887.54 | -14% |
| DP-56 | 0.35 | 24.04 | 6769% | 40.19 | 43.91 | 9% | 96.37 | 62.31 | -35% | 141.51 | 79.42 | -44% | 207.98 | 106.6 | -49% | 242.9 | 136.21 | -44% |
| DP-8 | 1.97 | 26.31 | 1236% | 50.28 | 47.57 | -5% | 115.07 | 67.39 | -41% | 167.23 | 84.03 | -50% | 245.12 | 107.24 | -56% | 297.4 | 137.04 | -54% |

## Existing vs. Proposed Total Runoff Volume Design Point Summary

| Design Point | Existing $V_2$ (ac-ft) | Proposed $V_2$ (ac-ft) | % Difference | Existing $V_5$ (ac-ft) | Proposed $V_5$ (ac-ft) | % Difference | Existing $V_{10}$ (ac-ft) | Proposed $V_{10}$ (ac-ft) | % Difference | Existing $V_{25}$ (ac-ft) | Proposed $V_{25}$ (ac-ft) | % Difference | Existing $V_{50}$ (ac-ft) | Proposed $V_{50}$ (ac-ft) | % Difference | Existing $V_{100}$ (ac-ft) | Proposed $V_{100}$ (ac-ft) | % Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DP-73 | 19.9 | 20.62 | 4% | 51.9 | 52.17 | 1% | 78.6 | 78.56 | 0% | 101.0 | 100.66 | 0% | 136.3 | 135.64 | 0% | 159.9 | 158.97 | -1% |
| DP-71 | 20.7 | 26.36 | 27% | 54.6 | 62.30 | 14% | 82.6 | 92.07 | 12% | 106.2 | 117.23 | 10% | 143.6 | 156.82 | 9% | 168.5 | 183.52 | 9% |
| DP-69 | 24.0 | 28.66 | 19% | 64.4 | 70.58 | 10% | 98.2 | 105.26 | 7% | 126.4 | 133.19 | 5% | 171.2 | 177.07 | 3% | 201.0 | 205.92 | 2% |
| DP-63 | 25.9 | 70.28 | 172% | 69.7 | 134.11 | 93% | 105.9 | 187.20 | 77% | 136.3 | 230.78 | 69% | 184.4 | 297.99 | 62% | 216.4 | 343.71 | 59% |
| DP-60A | 26.1 | 98.20 | 276% | 71.2 | 180.14 | 153% | 108.6 | 249.19 | 129% | 139.6 | 305.05 | 118% | 189.0 | 392.82 | 108% | 221.9 | 448.06 | 102% |
| DP-53A | 31.6 | 98.82 | 213% | 84.1 | 181.06 | 115% | 128.0 | 250.42 | 96% | 164.5 | 306.89 | 87% | 221.9 | 392.82 | 77% | 260.5 | 451.12 | 73% |
| DP-56 | 0.1 | 29.15 | 46929% | 4.0 | 42.96 | 977% | 8.7 | 55.85 | 539% | 12.6 | 66.59 | 431% | 18.2 | 83.17 | 357% | 22.0 | 94.21 | 328% |
| DP-8 | 0.2 | 30.23 | 17648% | 4.9 | 45.11 | 825% | 10.3 | 58.62 | 472% | 14.5 | 69.97 | 381% | 21.0 | 87.46 | 317% | 25.3 | 98.82 | 290% |

# MDDP Proposed vs. Amendment Proposed Peak Flow Rate Basin Summary

| Basin | MDDP $Q_2$ (cfs) | Amend $Q_2$ (cfs) | % Difference | MDDP $Q_5$ (cfs) | Amend $Q_5$ (cfs) | % Difference | MDDP $Q_{10}$ (cfs) | Amend $Q_{10}$ (cfs) | % Difference | MDDP $Q_{25}$ (cfs) | Amend $Q_{25}$ (cfs) | % Difference | MDDP $Q_{50}$ (cfs) | Amend $Q_{50}$ (cfs) | % Difference | MDDP $Q_{100}$ (cfs) | Amend $Q_{100}$ (cfs) | % Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SC3-1A | 16.3 | 15.4 | -6% | 23.3 | 32.05 | 38% | 33 | 44.63 | 35% | 45.8 | 54.22 | 18% | 57.1 | 68.02 | 19% | 68.9 | 77.21 | 12% |
| SC3-5A | 40.6 | 48.38 | 19% | 53.7 | 75.2 | 40% | 71 | 95.88 | 35% | 92.4 | 112.35 | 22% | 110.6 | 135.5 | 23% | 129.1 | 150.82 | 17% |
| SC3-5B | 53.8 | 60.26 | 12% | 73 | 97.13 | 33% | 98.5 | 126.36 | 28% | 130.8 | 149 | 14% | 158.6 | 181.48 | 14% | 187 | 203.13 | 9% |
| SC3-6A | 61.4 | 59.98 | -2% | 79.3 | 84.21 | 6% | 102.2 | 106.32 | 4% | 130.1 | 123.77 | -5% | 153.6 | 149.06 | -3% | 177.1 | 165.69 | -6% |
| SC3-6B | 32.9 | 30 | -9% | 43.4 | 47.16 | 9% | 57 | 60.52 | 6% | 73.9 | 70.92 | -4% | 88.2 | 85.96 | -3% | 102.7 | 95.97 | -7% |
| SC3-6C | 53.9 | 52.26 | -3% | 72.5 | 84.02 | 16% | 97.1 | 115.61 | 19% | 128 | 140.03 | 9% | 154.5 | 174.32 | 13% | 181.5 | 196.64 | 8% |
| SC3-7 | 54 | 60.94 | 13% | 69.9 | 87.91 | 26% | 90.3 | 109.28 | 21% | 115.2 | 126.05 | 9% | 136.2 | 150.45 | 10% | 157.2 | 166.71 | 6% |
| SC3-8 | 25.4 | 12.18 | -52% | 42.1 | 56.41 | 34% | 66.7 | 93.96 | 41% | 100.7 | 122.75 | 22% | 132.3 | 166.13 | 26% | 166.2 | 195.44 | 18% |
| SC3-9 | 45.8 | 24.66 | -46% | 71.5 | 73.44 | 3% | 108.6 | 114.01 | 5% | 158.9 | 146.06 | -8% | 204.9 | 193.77 | -5% | 254 | 225.81 | -11% |
| SC3-10 | 7.6 | 2.94 | -61% | 12.3 | 14.36 | 17% | 19.4 | 23.62 | 22% | 29.1 | 30.77 | 6% | 38 | 41.33 | 9% | 47.7 | 48.66 | 2% |
| SC3-11A | 5.3 | 1.99 | -62% | 7.8 | 5.36 | -31% | 11.3 | 8.05 | -29% | 15.9 | 10.06 | -37% | 20 | 13.08 | -35% | 24.3 | 15.09 | -38% |
| SC3-11B | 59.4 | 68 | 14% | 81.3 | 99.65 | 23% | 110.8 | 126.13 | 14% | 148.1 | 146.85 | -1% | 180.5 | 176.93 | -2% | 213.7 | 196.96 | -8% |
| SC3-11C | | 1.37 | | | 5.83 | | | 9.3 | | | 11.93 | | | 15.66 | | | 18.16 | |
| SC3-12 | 77.8 | 47.61 | -39% | 105.6 | 71.53 | -32% | 142.5 | 91.34 | -36% | 189.1 | 106.54 | -44% | 229.1 | 129.44 | -44% | 270 | 144.67 | -46% |
| SC3-12A | | 15.01 | | | 24.03 | | | 31.22 | | | 36.66 | | | 44.86 | | | 50.3 | |
| SC3-12B | | 2.17 | | | 6.35 | | | 9.82 | | | 12.6 | | | 16.83 | | | 19.66 | |
| SC3-13 | 43.9 | 56.24 | 28% | 57.8 | 80.96 | 40% | 76.5 | 100.72 | 32% | 98.5 | 115.86 | 18% | 117.6 | 138.53 | 18% | 136.9 | 153.6 | 12% |
| SC3-13A | | 2.61 | | | 7.62 | | | 11.81 | | | 15.18 | | | 20.28 | | | 23.7 | |
| SC3-14A | 127.6 | 110.65 | -13% | 175.4 | 160.22 | -9% | 239.8 | 203.13 | -15% | 321.9 | 237.5 | -26% | 393.2 | 287.18 | -27% | 466.3 | 320.18 | -31% |
| SC3-14B | 24.6 | 63.13 | 157% | 34.3 | 90 | 162% | 47.4 | 115.58 | 144% | 64.2 | 136.1 | 112% | 79 | 165.72 | 110% | 94.1 | 185.1 | 97% |
| SC3-15A | 21.6 | 13.21 | -39% | 35.5 | 38.41 | 8% | 56.3 | 59.28 | 5% | 85.3 | 76.32 | -11% | 112.1 | 102.43 | -9% | 141 | 119.86 | -15% |
| SC3-15B | 10.8 | 8.38 | -22% | 14 | 12.29 | -12% | 18.2 | 15.45 | -15% | 23.3 | 17.9 | -23% | 27.6 | 21.56 | -22% | 31.9 | 24 | -25% |
| SC3-16 | | 180.7 | | | 266.34 | | | 343.24 | | | 404.73 | | | 493.4 | | | 552.27 | |
| SC3-16A | 84.4 | | 46% | 120.4 | | 53% | 170 | | 41% | 234.8 | | 21% | 292.2 | | 19% | 351.8 | | 11% |
| SC3-16B | 39 | | 46% | 53.7 | | 53% | 73.6 | | 41% | 99 | | 21% | 121.1 | | 19% | 143.8 | | 11% |
| SC3-17A | 41.8 | 25.63 | -39% | 59.6 | 39.59 | -34% | 85.2 | 50.91 | -40% | 119 | 59.5 | -50% | 149.1 | 72.46 | -51% | 180.6 | 81.07 | -55% |
| SC3-17B | | 20.59 | | | 32.3 | | | 41.97 | | | 49.43 | | | 60.7 | | | 68.19 | |
| SC3-18 | 49.3 | 22.75 | -54% | 67.1 | 32.96 | -51% | 91 | 41.34 | -55% | 121.2 | 47.83 | -61% | 147.3 | 57.56 | -61% | 174 | 64.05 | -63% |
| SC3-18B | | 1.53 | | | 4.45 | | | 6.89 | | | 8.86 | | | 11.91 | | | 13.95 | |
| SC3-19 | 28.8 | 28 | -3% | 47.7 | 78.96 | 66% | 75.7 | 120.84 | 60% | 114.4 | 154.22 | 35% | 150.2 | 205.45 | 37% | 188.8 | 239.67 | 27% |
| SC3-20 | 9.9 | 9.29 | -6% | 15.5 | 21.02 | 36% | 23.8 | 30.73 | 29% | 35.1 | 38.5 | 10% | 45.5 | 50.17 | 10% | 56.6 | 57.99 | 2% |
| SC3-21 | 7 | 9.77 | 40% | 10.8 | 20.68 | 91% | 16.3 | 29.45 | 81% | 23.7 | 36.03 | 52% | 30.4 | 45.92 | 51% | 37.5 | 52.53 | 40% |
| SC3-22 | 9.4 | 7.15 | -24% | 14.8 | 16.35 | 10% | 22.5 | 24.05 | 7% | 32.9 | 30.08 | -9% | 42.5 | 39.14 | -8% | 52.6 | 45.22 | -14% |
| SC3-23 | 5.5 | 10.92 | 99% | 8.3 | 22.1 | 166% | 12.4 | 31.23 | 152% | 18 | 38.2 | 112% | 23 | 48.72 | 112% | 28.4 | 55.73 | 96% |
| SC3-24A | 13 | 6.43 | -51% | 20.4 | 15.26 | -25% | 31.1 | 22.51 | -28% | 45.7 | 28.3 | -38% | 59 | 37.09 | -37% | 73.2 | 42.98 | -41% |
| SC3-24B | 3.4 | 1.95 | -43% | 5.3 | 4.78 | -10% | 8.1 | 7.12 | -12% | 11.8 | 8.98 | -24% | 15.2 | 11.76 | -23% | 18.9 | 13.62 | -28% |
| SC3-25 | 5.8 | 5.58 | -4% | 8.9 | 12.02 | 35% | 13.4 | 17.2 | 28% | 19.5 | 21.1 | 8% | 25.1 | 26.97 | 7% | 31 | 30.9 | 0% |
| SC3-26 | 2.5 | 1.66 | -34% | 4 | 4.37 | 9% | 6.2 | 6.61 | 7% | 9.2 | 8.4 | -9% | 12.1 | 11.13 | -8% | 15.1 | 12.95 | -14% |
| SC3-27 | 35.1 | 14.49 | -59% | 51.2 | 27.87 | -46% | 73.8 | 39.1 | -47% | 103.7 | 48.09 | -54% | 130.3 | 61.8 | -53% | 158.3 | 70.95 | -55% |
| SC3-61 | 13.7 | 5.61 | -59% | 22 | 22.4 | 2% | 34.4 | 36.4 | 6% | 51.6 | 47.4 | -8% | 67.6 | 63.67 | -6% | 84.8 | 74.61 | -12% |
| SC3-72 | 12.8 | 9.55 | -25% | 20.2 | 23.84 | 18% | 31.4 | 35.61 | 13% | 46.7 | 44.98 | -4% | 60.9 | 59.19 | -3% | 76 | 68.7 | -10% |
| SC3-73 | 16.4 | 12.16 | -26% | 26.4 | 33.03 | 25% | 41.3 | 50.14 | 21% | 62.1 | 63.84 | 3% | 81.3 | 84.94 | 4% | 102 | 99.04 | -3% |
| SC3-74 | 22.3 | 22.51 | 1% | 36.5 | 53.27 | 46% | 57.3 | 79.1 | 38% | 85.9 | 99.77 | 16% | 112.3 | 131.03 | 17% | 140.7 | 151.94 | 8% |
| SC3-75 | 13.1 | 11.12 | -15% | 21.5 | 26.37 | 23% | 33.7 | 38.98 | 16% | 50.5 | 49.21 | -3% | 66.1 | 64.91 | -2% | 82.8 | 75.41 | -9% |
| SC3-76 | 14.2 | 10.85 | -24% | 23.1 | 27.09 | 17% | 36.4 | 40.54 | 11% | 54.6 | 51.45 | -6% | 71.4 | 68.18 | -5% | 89.6 | 79.38 | -11% |
| SC3-77 | 16.6 | 8.93 | -46% | 27.6 | 27.11 | -2% | 43.8 | 42.16 | -4% | 66.2 | 54.46 | -18% | 87 | 73.59 | -15% | 109.4 | 86.36 | -21% |
| SC3-78 | 28.1 | 32.29 | 15% | 45.3 | 77.46 | 71% | 70.6 | 114.83 | 63% | 106.2 | 144.42 | 36% | 139.1 | 189.21 | 36% | 174.5 | 219.17 | 26% |
| SC3-79 | 34.9 | 32.26 | -8% | 57 | 82.54 | 45% | 89.5 | 123.52 | 38% | 134.3 | 156.01 | 16% | 175.6 | 205.95 | 17% | 220.1 | 239.34 | 9% |
| SC3-80 | 27.3 | 22.36 | -18% | 44.3 | 57.34 | 29% | 69.6 | 86.09 | 24% | 104.5 | 109.14 | 4% | 136.8 | 144.5 | 6% | 171.4 | 168.15 | -2% |
| SC3-81 | 42.6 | 26.67 | -37% | 70.2 | 81 | 15% | 111 | 125.85 | 13% | 167.4 | 162.22 | -3% | 219.6 | 218.65 | 0% | 275.7 | 256.32 | -7% |
| SC3-82 | 20 | 17.01 | -15% | 33.2 | 50.83 | 53% | 52.8 | 79.48 | 51% | 80 | 102.02 | 28% | 105.1 | 136.18 | 30% | 132.3 | 158.98 | 20% |
| SC3-88 | 10.5 | 6.28 | -40% | 17.4 | 18.99 | 9% | 27.6 | 29.44 | 7% | 41.8 | 37.84 | -9% | 54.9 | 50.8 | -7% | 69 | 59.46 | -14% |
| SC3-89 | 6.1 | 2.86 | -53% | 10 | 8.64 | -14% | 15.7 | 13.39 | -15% | 23.6 | 17.14 | -27% | 30.8 | 22.87 | -26% | 38.6 | 26.69 | -31% |
| SCE-1 | 23.3 | 9.82 | -58% | 35.9 | 21.3 | -41% | 53.8 | 30.85 | -43% | 79.1 | 38.58 | -51% | 102.4 | 50.51 | -51% | 127.4 | 58.52 | -54% |
| SCE-2 | 4.4 | 1.42 | -68% | 7 | 3.35 | -52% | 10.8 | 4.95 | -54% | 15.9 | 6.27 | -61% | 20.7 | 8.3 | -60% | 25.7 | 9.66 | -62% |
| SCE-3 | 30.6 | 8.5 | -72% | 45.2 | 16.95 | -63% | 65.9 | 25.2 | -62% | 93.3 | 31.78 | -66% | 118 | 41.56 | -65% | 143.9 | 48.16 | -67% |
| SCE-4 | 13.3 | 4.16 | -69% | 19.6 | 7.52 | -62% | 28.6 | 10.35 | -64% | 40.6 | 12.67 | -69% | 257.8 | 16.29 | -94% | 62.6 | 18.71 | -70% |
| SCE-5 | 100.4 | 71.73 | -29% | 130.6 | 99.51 | -24% | 169.6 | 125.72 | -26% | 217.4 | 146.92 | -32% | 257.8 | 177.83 | -31% | 298.4 | 198.17 | -34% |
| SCE-6 | 1.6 | 0.18 | -89% | 2.5 | 0.55 | -78% | 3.7 | 1.03 | -72% | 5.4 | 1.42 | -74% | 7 | 2 | -71% | 8.6 | 2.39 | -72% |
| SCE-7 | 58.9 | 33.06 | -44% | 75.5 | 46.14 | -39% | 96.6 | 56.71 | -41% | 122.2 | 64.87 | -47% | 143.7 | 77.06 | -46% | 165.2 | 85.19 | -48% |
| SCE-8 | 38.6 | 47.1 | 22% | 48.4 | 61.37 | 27% | 60.7 | 73.41 | 21% | 75.4 | 82.94 | 10% | 87.7 | 97.16 | 11% | 99.9 | 106.61 | 7% |
| SCE-9 | 1.5 | 0.22 | -85% | 2.4 | 0.68 | -72% | 3.6 | 1.27 | -65% | 5.3 | 1.75 | -67% | 6.8 | 2.46 | -64% | 8.5 | 2.94 | -65% |
| SCE-10 | 7.6 | 106.33 | 1299% | 189.4 | 165.76 | -12% | 19.4 | 230.7 | 1089% | 29.1 | 283.77 | 875% | 398.9 | 358.46 | -10% | 467.5 | 407.13 | -13% |
| SCE-11 | 2.3 | 0.77 | -67% | 3.6 | 2.52 | -30% | 5.5 | 4.75 | -14% | 8 | 6.5 | -19% | 10.3 | 8.93 | -13% | 12.8 | 10.51 | -18% |
| SCE-13 | 19.6 | 10.9 | -44% | 31.3 | 25.85 | -17% | 48.7 | 38.21 | -22% | 73.1 | 48.24 | -34% | 95.7 | 63.64 | -34% | 120 | 73.94 | -38% |
| SCE-14 | 13.2 | 8 | -39% | 21.2 | 19.04 | -10% | 33.3 | 28.21 | -15% | 49.9 | 35.59 | -29% | 65.2 | 46.77 | -28% | 81.7 | 54.26 | -34% |
| SCE-15 | 2.2 | 13.6 | 518% | 5.1 | 27.2 | 433% | 10.1 | 38.53 | 281% | 17.7 | 47.35 | 168% | 25.1 | 60.67 | 142% | 35.4 | 69.54 | 96% |

## MDDP Proposed vs. Amendment Proposed Peak Flow Rate Design Point Summary

| Design Point | MDDP $Q_2$ (cfs) | Amend $Q_2$ (cfs) | % Difference | MDDP $Q_5$ (cfs) | Amend $Q_5$ (cfs) | % Difference | MDDP $Q_{10}$ (cfs) | Amend $Q_{10}$ (cfs) | % Difference | MDDP $Q_{25}$ (cfs) | Amend $Q_{25}$ (cfs) | % Difference | MDDP $Q_{50}$ (cfs) | Amend $Q_{50}$ (cfs) | % Difference | MDDP $Q_{100}$ (cfs) | Amend $Q_{100}$ (cfs) | % Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DP-74 | 39.3 | 33.68 | -14% | 65.3 | 94.55 | 45% | 104.8 | 145.74 | 39% | 158.9 | 187.2 | 18% | 209.1 | 251.03 | 20% | 262.8 | 293.76 | 12% |
| DP-75 | 141.2 | 95.13 | -33% | 235.1 | 274.57 | 17% | 376.6 | 427.98 | 14% | 566.6 | 555.2 | -2% | 750.9 | 754.29 | 0% | 950.5 | 887.87 | -7% |
| DP-77 | 209.9 | 144.08 | -31% | 351.9 | 426.57 | 21% | 580.6 | 672.84 | 16% | 886.6 | 877.81 | -1% | 1168.4 | 1201.19 | 3% | 1467.7 | 1423.89 | -3% |
| DP-78 | 59.7 | 52.82 | -12% | 98.4 | 138.33 | 41% | 154 | 210.37 | 37% | 232.6 | 269.64 | 16% | 306.2 | 360.98 | 18% | 385.3 | 422.09 | 10% |
| DP-73 | 207.5 | 147.28 | -29% | 354.3 | 442.59 | 25% | 588.5 | 703.56 | 20% | 897.1 | 919.81 | 3% | 1187.2 | 1257.44 | 6% | 1506.7 | 1497.12 | -1% |
| DP-72 | 206.2 | 148.02 | -28% | 352.5 | 450.59 | 28% | 586.7 | 718.2 | 22% | 897.2 | 939.53 | 5% | 1195.3 | 1285.42 | 8% | 1518.6 | 1527.18 | 1% |
| DP-71 | 205.9 | 149.28 | -27% | 349.3 | 472.6 | 35% | 610.5 | 771.35 | 26% | 932.4 | 1012.75 | 9% | 1226.9 | 1386.32 | 13% | 1612.2 | 1644.06 | 2% |
| DP-70 | 205.3 | 149.57 | -27% | 349.8 | 477.23 | 36% | 614 | 780.47 | 27% | 940.1 | 1025.79 | 9% | 1260.6 | 1405.32 | 11% | 1636.7 | 1666.98 | 2% |
| DP-69 | 212.7 | 146.52 | -31% | 366.6 | 512.38 | 40% | 653.7 | 847.5 | 30% | 1010.6 | 1108.89 | 10% | 1364.1 | 1497.55 | 10% | 1775.7 | 1763.93 | -1% |
| DP-87 | 216.9 | 143.88 | -34% | 374.6 | 533.15 | 42% | 681.9 | 890.76 | 31% | 1072.1 | 1170.95 | 9% | 1471.5 | 1589.82 | 8% | 1905.9 | 1880.39 | -1% |
| DP-68 | 214.6 | 126.27 | -41% | 374.5 | 579.69 | 55% | 714.9 | 994.15 | 39% | 1187.6 | 1327.63 | 12% | 1674.9 | 1837.13 | 10% | 2204.1 | 2160.43 | -2% |
| DP-64 | 85.9 | 89.76 | 4% | 112.1 | 133.15 | 19% | 145.9 | 167.21 | 15% | 187.5 | 194.25 | 4% | 222.6 | 233.42 | 5% | 258 | 259.48 | 1% |
| DP-63 | 154.4 | 128.57 | -17% | 201 | 480.38 | 139% | 375.7 | 763.81 | 103% | 815.9 | 1005.42 | 23% | 1112.1 | 1368.28 | 23% | 1385.1 | 1585.19 | 14% |
| DP-61 | 156.6 | 132.9 | -15% | 223.9 | 535.22 | 139% | 428 | 851.44 | 99% | 928.2 | 1123.05 | 21% | 1287.3 | 1549.17 | 20% | 1620.1 | 1859.67 | 15% |
| DP-60A | 161.6 | 135.75 | -16% | 224.8 | 544.14 | 142% | 439.1 | 863.88 | 97% | 950.4 | 1138.24 | 20% | 1320.5 | 1569.79 | 19% | 1661.8 | 1882.17 | 13% |
| DP-53A | 161.6 | 135.8 | -16% | 225.7 | 545.87 | 142% | 441.8 | 866.46 | 96% | 951.1 | 1141.24 | 20% | 1326 | 1573.95 | 19% | 1668.9 | 1887.54 | 13% |
| DP-1E | 23.9 | 12.41 | -48% | 38.3 | 29.33 | -23% | 70.1 | 43.32 | -38% | 132.8 | 54.71 | -59% | 173 | 72.19 | -58% | 220.9 | 83.88 | -62% |
| DP-2E | 48.9 | 24.93 | -49% | 76.8 | 56.12 | -27% | 123 | 81.89 | -33% | 228.7 | 103.16 | -55% | 319.7 | 135.52 | -58% | 419.4 | 157.2 | -63% |
| DP-3E | 48.5 | 26.73 | -45% | 75.7 | 59.28 | -22% | 122.2 | 86.63 | -29% | 271.1 | 109.01 | -60% | 387.1 | 143.9 | -63% | 500.1 | 176.03 | -65% |
| DP-4E | 48.1 | 28.34 | -41% | 76.2 | 61.94 | -19% | 122.4 | 91.01 | -26% | 286.9 | 114.79 | -60% | 407.3 | 152.57 | -63% | 534.8 | 184.7 | -65% |
| DP-56 | 23.1 | 24.04 | 4% | 35.3 | 43.91 | 24% | 71.5 | 62.31 | -13% | 108.3 | 79.42 | -27% | 152.1 | 106.6 | -30% | 196.4 | 136.21 | -31% |
| DP-8 | 24.1 | 26.31 | 9% | 37.2 | 47.57 | 28% | 73.5 | 67.39 | -8% | 111.3 | 84.03 | -25% | 155.4 | 107.24 | -31% | 200.7 | 137.04 | -32% |
| DP-21 | 0.6 | 8.07 | 1245% | 8.8 | 45.76 | 420% | 17.8 | 92.48 | 420% | 57.1 | 128.9 | 126% | 116.8 | 153.87 | 32% | 174.9 | 200.93 | 15% |
| DP-22 | 0.6 | 8.07 | 1245% | 8.8 | 45.78 | 420% | 17.6 | 92.52 | 426% | 56.8 | 128.94 | 127% | 105.1 | 153.88 | 46% | 156.4 | 191.38 | 22% |
| DP-25 | 5.9 | 5.58 | -5% | 9.1 | 12.02 | 32% | 16.3 | 17.2 | 6% | 35.1 | 21.1 | -40% | 46.4 | 26.97 | -42% | 58.2 | 30.9 | -47% |
| DP-26 | 0.1 | 13.62 | 13520% | 1.1 | 38.87 | 3434% | 3.2 | 59.76 | 1768% | 7.3 | 76.84 | 953% | 9.5 | 102.99 | 984% | 12 | 120.45 | 904% |
| EX_STOCK_POND_1 | | 133.68 | | | 512.29 | | | 863.82 | | | 1143.6 | | | 1561.29 | | | 1848.83 | |
| EX_STOCK_POND_2 | | 149.57 | | | 477.23 | | | 780.47 | | | 1025.79 | | | 1405.32 | | | 1666.98 | |
| FSD14B_Outfall | | 2.57 | | | 20.53 | | | 44.05 | | | 64.95 | | | 98.12 | | | 116.66 | |
| PNDE7 | 46.5 | 31.92 | -31% | 75.4 | 68.33 | -9% | 121.2 | 100.59 | -17% | 285.2 | 126.9 | -56% | 402.4 | 176 | -56% | 548 | 222.77 | -59% |
| PNDW3 | 214.6 | 126.27 | -41% | 374.5 | 579.69 | 55% | 714.9 | 994.15 | 39% | 1187.6 | 1327.63 | 12% | 1674.9 | 1837.12 | 10% | 2204.1 | 2160.43 | -2% |

## MDDP Proposed vs. Amendment Total Runoff Volume Proposed Design Point Summary

| Design Point | MDDP $V_2$ (ac-ft) | Amend $V_2$ (ac-ft) | % Difference | MDDP $V_5$ (ac-ft) | Amend $V_5$ (ac-ft) | % Difference | MDDP $V_{10}$ (ac-ft) | Amend $V_{10}$ (ac-ft) | % Difference | MDDP $V_{25}$ (ac-ft) | Amend $V_{25}$ (ac-ft) | % Difference | MDDP $V_{50}$ (ac-ft) | Amend $V_{50}$ (ac-ft) | % Difference | MDDP $V_{100}$ (ac-ft) | Amend $V_{100}$ (ac-ft) | % Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DP-74 | 5.9 | 3.03 | -49% | 9 | 7.67 | -15% | 13.6 | 11.57 | -15% | 19.8 | 14.82 | -25% | 25.5 | 20.04 | -21% | 31.6 | 23.51 | -26% |
| DP-75 | 22.7 | 11.05 | -51% | 34.5 | 28.82 | -16% | 51.7 | 43.58 | -16% | 75.4 | 56.16 | -26% | 97.1 | 75.80 | -22% | 120.5 | 89.00 | -26% |
| DP-77 | 37.7 | 18.84 | -50% | 57.4 | 48.49 | -16% | 85.9 | 73.04 | -15% | 125.1 | 93.91 | -25% | 161.1 | 126.74 | -21% | 199.9 | 148.53 | -26% |
| DP-78 | 8.9 | 4.91 | -45% | 13.5 | 11.69 | -13% | 20.1 | 17.40 | -13% | 29.3 | 22.25 | -24% | 37.7 | 29.86 | -21% | 46.7 | 34.99 | -25% |
| DP-73 | 40 | 20.62 | -48% | 60.8 | 52.17 | -14% | 91 | 78.56 | -14% | 132.5 | 100.66 | -24% | 170.7 | 135.64 | -21% | 211.7 | 158.97 | -25% |
| DP-72 | 41.3 | 21.30 | -48% | 62.9 | 53.71 | -15% | 94 | 80.71 | -14% | 136.8 | 103.42 | -24% | 176.2 | 139.33 | -21% | 218.5 | 163.26 | -25% |
| DP-71 | 46.3 | 26.36 | -43% | 70 | 62.30 | -11% | 104.3 | 92.07 | -12% | 151.3 | 117.23 | -23% | 194.5 | 156.82 | -19% | 240.8 | 183.52 | -24% |
| DP-70 | 49.5 | 28.45 | -43% | 74.5 | 65.06 | -13% | 110.6 | 95.75 | -13% | 160.1 | 121.53 | -24% | 205.4 | 162.04 | -21% | 254 | 189.35 | -25% |
| DP-69 | 57.5 | 28.66 | -50% | 86.1 | 70.58 | -18% | 127.4 | 105.26 | -17% | 183.8 | 133.19 | -28% | 235.3 | 177.07 | -25% | 290.6 | 205.92 | -29% |
| DP-87 | 66.5 | 35.29 | -47% | 98.9 | 82.55 | -17% | 145.6 | 121.53 | -17% | 209.1 | 153.75 | -26% | 267.1 | 203.16 | -24% | 329.1 | 236.30 | -28% |
| DP-68 | 81.8 | 65.37 | -20% | 123.7 | 126.74 | 2% | 183.9 | 177.99 | -3% | 264.9 | 219.73 | -17% | 338 | 284.79 | -16% | 415.8 | 328.37 | -21% |
| DP-64 | 7 | 7.46 | 7% | 9.1 | 10.10 | 11% | 11.8 | 12.34 | 5% | 15.2 | 14.12 | -7% | 18.1 | 16.79 | -7% | 21.1 | 18.57 | -12% |
| DP-63 | 85.6 | 70.28 | -18% | 129.5 | 134.11 | 4% | 192.3 | 187.20 | -3% | 276.7 | 230.78 | -17% | 352.8 | 297.99 | -16% | 433.5 | 343.71 | -21% |
| DP-61 | 103.7 | 89.61 | -14% | 157.8 | 166.95 | 6% | 235.1 | 232.31 | -1% | 338.4 | 285.10 | -16% | 431.3 | 368.26 | -15% | 529.8 | 420.44 | -21% |
| DP-60A | 111 | 98.20 | -12% | 168.6 | 180.14 | 7% | 250.4 | 249.19 | 0% | 359.5 | 305.05 | -15% | 457.7 | 392.82 | -14% | 561.5 | 448.06 | -20% |
| DP-53A | 112 | 98.82 | -12% | 170 | 181.06 | 7% | 252.6 | 250.42 | -1% | 362.6 | 306.89 | -15% | 461.7 | 392.82 | -15% | 566.5 | 451.12 | -20% |
| DP-1E | 3.1 | 2.48 | -20% | 5.2 | 5.19 | 0% | 8.4 | 7.73 | -8% | 12.7 | 10.00 | -21% | 16.6 | 13.56 | -18% | 20.9 | 15.96 | -24% |
| DP-2E | 6.1 | 6.01 | -1% | 10.4 | 11.66 | 12% | 16.9 | 16.85 | 0% | 25.7 | 21.27 | -17% | 33.7 | 28.17 | -16% | 42.2 | 32.84 | -22% |
| DP-3E | 7 | 13.35 | 91% | 13.7 | 21.45 | 57% | 23.4 | 28.85 | 23% | 36.1 | 34.99 | -3% | 47.4 | 44.81 | -5% | 59.3 | 51.25 | -14% |
| DP-4E | 7.6 | 19.27 | 154% | 15.6 | 29.15 | 87% | 27.2 | 38.05 | 40% | 43 | 45.73 | 6% | 57.2 | 57.39 | 0% | 72 | 65.06 | -10% |
| DP-56 | 7.7 | 29.15 | 279% | 16.1 | 42.96 | 167% | 28.6 | 55.85 | 95% | 51.3 | 66.59 | 30% | 71.7 | 83.17 | 16% | 92.9 | 94.21 | 1% |
| DP-8 | 8 | 30.23 | 278% | 16.7 | 45.11 | 170% | 26.6 | 58.62 | 120% | 53 | 69.97 | 32% | 74 | 87.46 | 18% | 95.9 | 98.82 | 3% |
| DP-21 | 6.3 | 20.50 | 225% | 11.3 | 28.39 | 151% | 18.3 | 35.29 | 93% | 27.5 | 40.82 | 48% | 35.6 | 49.10 | 38% | 44 | 54.93 | 25% |
| DP-22 | 6.3 | 20.53 | 226% | 10.7 | 28.42 | 166% | 16.7 | 35.29 | 111% | 24.6 | 40.82 | 66% | 31.5 | 49.41 | 57% | 38.7 | 54.93 | 42% |
| DP-25 | 1.3 | 0.31 | -76% | 1.9 | 0.61 | -68% | 2.8 | 0.87 | -69% | 4.1 | 1.08 | -74% | 5.2 | 1.42 | -73% | 6.4 | 1.65 | -74% |
| DP-26 | 0.7 | 2.01 | 188% | 0.9 | 4.73 | 425% | 1.2 | 7.03 | 486% | 1.5 | 8.93 | 495% | 1.8 | 11.97 | 565% | 2.1 | 13.99 | 566% |

| Summary of Peak Discharges | | | | | | |
|---|---|---|---|---|---|---|
| Design Point 75 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | 141 | 235 | 377 | 567 | 751 | 951 |
| 2021 Existing Cond. (cfs) | | | | | | 971 |
| 2018 Developed Cond. (cfs) | 141 | 235 | 377 | 567 | 751 | 951 |
| 2022 Developed Cond. (cfs) | 95 | 275 | 428 | 555 | 754 | 888 |
| | | | | | | |
| Design Point 77 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | n/a | n/a | n/a | n/a | n/a | n/a |
| 2021 Existing Cond. (cfs) | | | | | | |
| 2018 Developed Cond. (cfs) | 210 | 352 | 581 | 887 | 1168 | 1468 |
| 2022 Developed Cond. (cfs) | 144 | 427 | 673 | 878 | 1201 | 1424 |
| 1996 DBPS Existing Cond. (cfs) | | | | | | 2193 |
| 1996 DBPS Developed Cond. (cfs) | | | | | | 2262 |
| | | | | | | |
| Design Point 73 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | 226 | 381 | 618 | 957 | 1260 | 1582 |
| 2021 Existing Cond. (cfs) | | | | | | 1672 |
| 2018 Developed Cond. (cfs) | 208 | 354 | 589 | 897 | 1187 | 1507 |
| 2022 Developed Cond. (cfs) | 147 | 443 | 704 | 920 | 1257 | 1497 |
| | | | | | | |
| Design Point 71 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | 229 | 389 | 630 | 979 | 1277 | 1638 |
| 2021 Existing Cond. (cfs) | | | | | | 1735 |
| 2018 Developed Cond. (cfs) | 206 | 349 | 611 | 932 | 1227 | 1612 |
| 2022 Developed Cond. (cfs) | 149 | 473 | 771 | 1013 | 1386 | 1644 |
| | | | | | | |
| Design Point 69 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | 253 | 435 | 708 | 1100 | 1453 | 1870 |
| 2021 Existing Cond. (cfs) | | | | | | 1988 |
| 2018 Developed Cond. (cfs) | 213 | 367 | 654 | 1011 | 1364 | 1776 |
| 2022 Developed Cond. (cfs) | 147 | 512 | 848 | 1109 | 1498 | 1764 |
| | | | | | | |
| Design Point 68 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | n/a | n/a | n/a | n/a | n/a | n/a |
| 2021 Existing Cond. (cfs) | | | | | | |
| 2018 Developed Cond. w/o Pnd (cfs) | 215 | 375 | 715 | 1188 | 1675 | 2204 |
| 2018 Developed w/Pnd (cfs) Pnd W3 | 154 | 200 | 367 | 800 | 1086 | 1351 |
| 2022 Developed Cond. w/ Pnd(cfs) | 126 | 580 | 994 | 1328 | 1837 | 2160 |
| | | | | | | |
| Design Point 63 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | 251 | 431 | 713 | 1113 | 1496 | 1912 |
| 2021 Existing Cond. (cfs) | | | | | | 1981 |
| 2018 Developed Cond. w/o Pnd (cfs) | 213 | 373 | 721 | 1198 | 1705 | 2237 |
| 2018 Developed w/Pnd (cfs) | 154 | 201 | 376 | 816 | 1112 | 1385 |
| 2021 Developed Cond. w/ Pnd(cfs) | 129 | 480 | 764 | 1005 | 1368 | 1585 |
| 2011 Wilson (cfs) | | | 1066 | | | 1791 |
| 1996 DBPS Existing Cond. (cfs) | | | | | | 2508 |
| 1996 DBPS Developed Cond. (cfs) | | | | | | 2689 |
| | | | | | | |
| Design Point 61 | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | n/a | n/a | n/a | n/a | n/a | n/a |
| 2018 Developed Cond. w/o Pnd (cfs) | 214 | 375 | 783 | 1370 | 1967 | 2607 |
| 2018 Developed w/Pnd (cfs) | 157 | 224 | 428 | 928 | 1287 | 1620 |
| 2022 Developed Cond. w/ Pnd(cfs) | 133 | 535 | 851 | 1123 | 1549 | 1860 |
| 2011 Wilson (cfs) | | | 1232 | | | 2087 |
| | | | | | | |
| Design Point 60a | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | 248 | 430 | 707 | 1113 | 1497 | 1914 |
| 2021 Existing Cond. (cfs) | | | | | | 1969 |
| 2018 Developed Cond. w/o Pnd (cfs) | 216 | 378 | 795 | 1395 | 2004 | 2645 |
| 2018 Developed w/Pnd (cfs) | 162 | 225 | 439 | 950 | 1321 | 1662 |
| 2022 Developed Cond. w/ Pnd(cfs) | 136 | 544 | 864 | 1138 | 1570 | 1882 |
| 2011 Wilson (cfs) | | | 1265 | | | 2133 |
| 1996 DBPS Existing Cond. (cfs) | | | | | | 2629 |
| 1996 DBPS Developed Cond. (cfs) | | | | | | 3295 |
| | | | | | | |
| Design Point 53a | | | | | | |
| Storm Event (YR) | 2 | 5 | 10 | 25 | 50 | 100 |
| 2016 Existing Cond. (cfs) | 262 | 454 | 763 | 1197 | 1610 | 2062 |
| 2021 Existing Cond. (cfs) | | | | | | 2198 |
| 2018 Developed Cond. w/o Pnd (cfs) | 215 | 378 | 792 | 1392 | 2009 | 2657 |
| 2018 Developed w/Pnd (cfs) | 162 | 226 | 442 | 951 | 1326 | 1669 |
| 2022 Developed Cond. w/ Pnd(cfs) | 136 | 546 | 866 | 1141 | 1574 | 1888 |

# APPENDIX D

# REFERENCE MATERIAL

# *STERLING RANCH*
# *RETENTION POND VOLUME*

## *(Pond Volume Calculation)*

***BIG POND***

| Elevation | SF | CF | Storage AF | Storage Sum |
|---|---|---|---|---|
| 7028 | 0.00 | - | | 0 |
| 7030 | 53,785.00 | 53,785.00 | 1.23 | 1.23 |
| 7032 | 70,507.00 | 124,292.00 | 2.85 | 4.09 |
| 7034 | 87,672.00 | 158,179.00 | 3.63 | 7.72 |
| 7036 | 109,612.00 | 197,284.00 | 4.53 | 12.25 |

Total = 533,540 CF

Total = 12.25 Ac-ft

At Elevation 7035, the Storage is 9.98 Ac-ft.
At Elevation 7034, the Storage is 7.72 Ac-ft.

Calculated by: VAS

Date: 4/21/2016

Checked by: VAS

# STERLING RANCH

## "BIG POND"

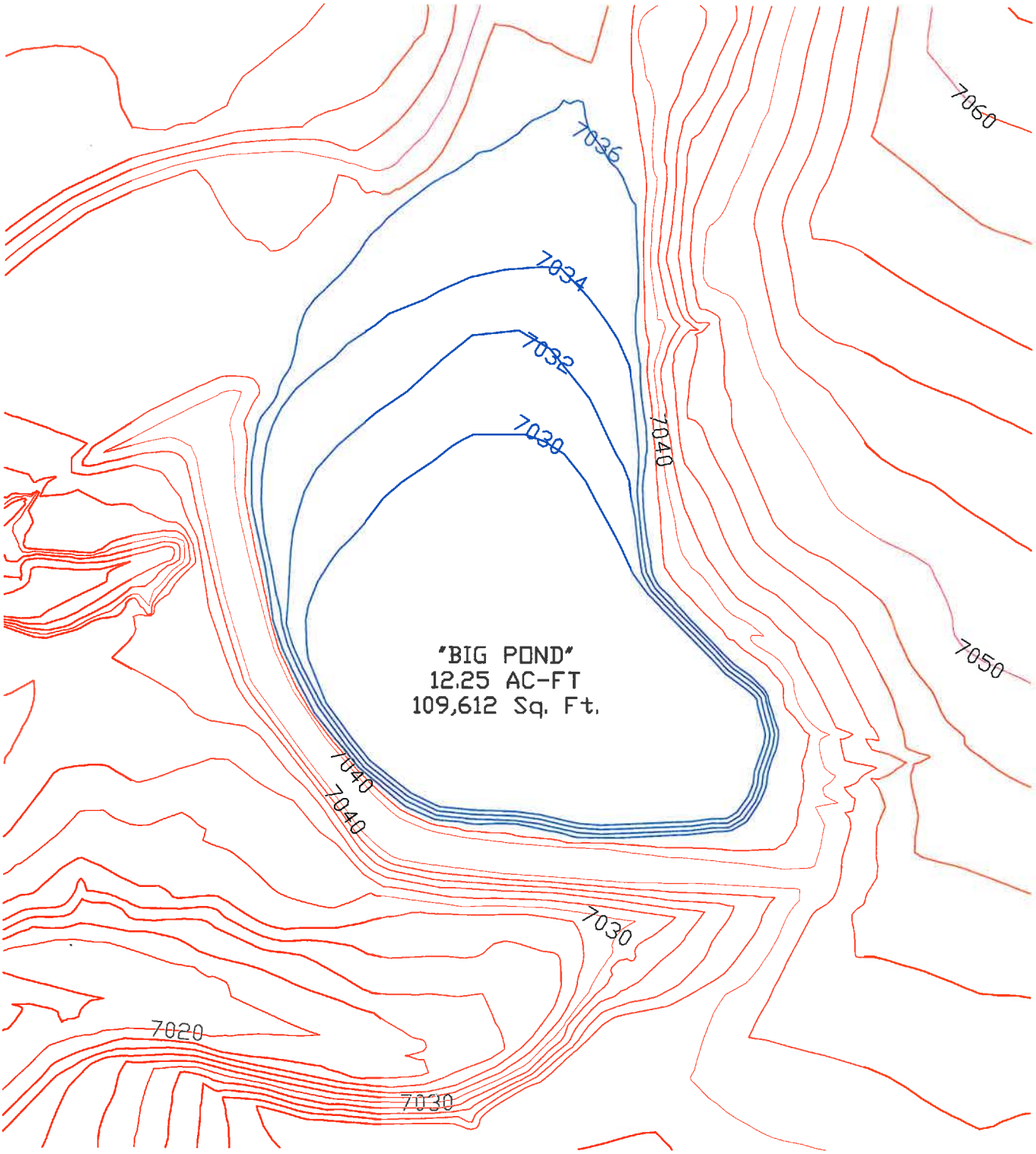



EXHIBIT
STERLING RANCH
JOB NO. 09-001
DATE PREPARED: 4-25-16
DATE REVISED:

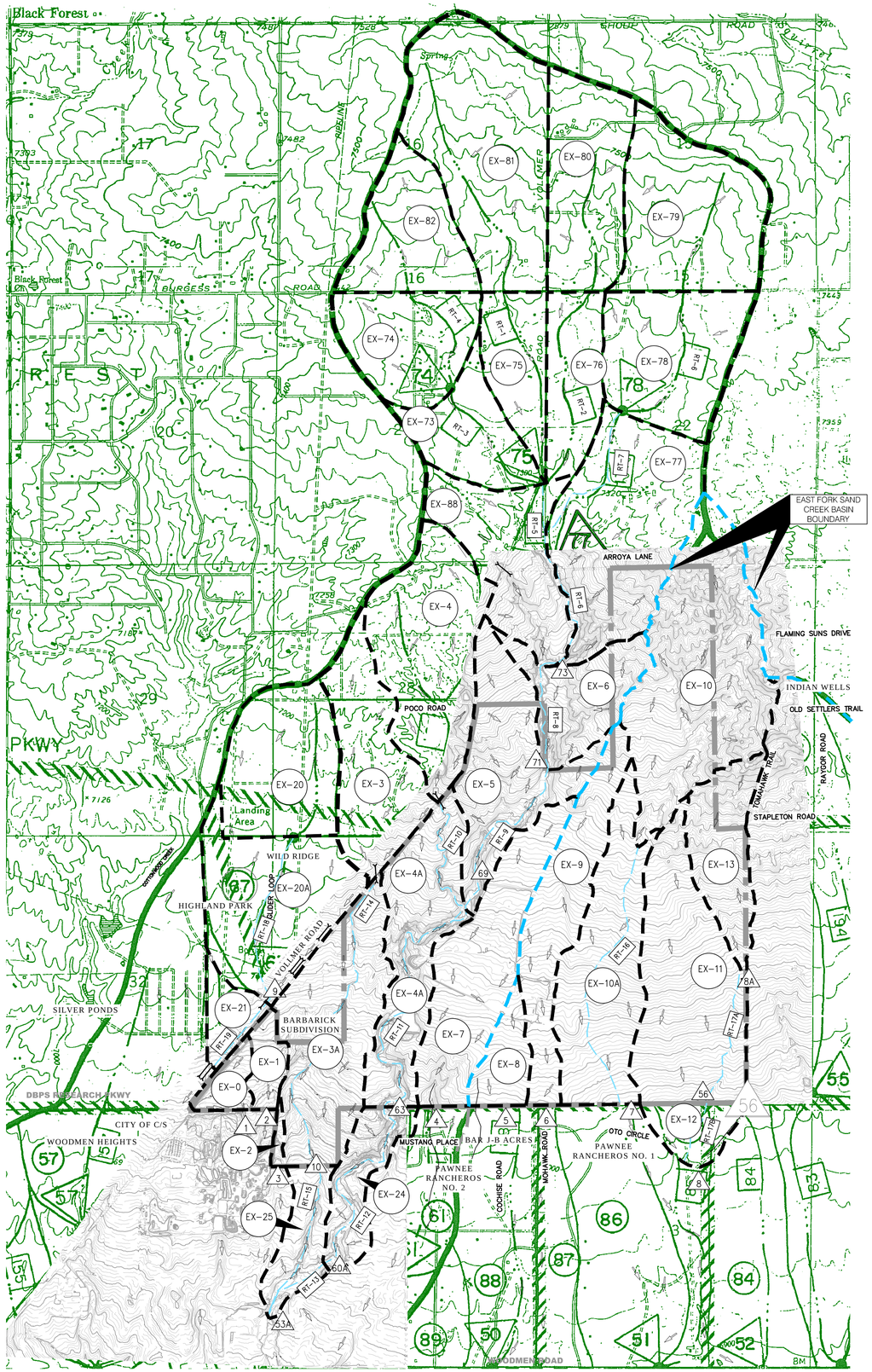

CIVIL CONSULTANTS, INC.

20 BOULDER CRESCENT, STE. 110
COLORADO SPRINGS,
COLORADO 80903

v 719.955.5485
f 719.444.8427

# APPENDIX E

# DRAINAGE MAPS




0 600 1200 2400

Scale in Feet

## LEGEND

BASIN ID – SC3–77

DESIGN POINT – 87

REACH IDENTIFIER – RT–17A

BASIN BOUNDARY –

EAST FORK SAND CREEK BASIN BOUNDARY –

FLOW DIRECTION –

## BASIN SUMMARY

| BASIN | CN | AREA (ACRES) | AREA (SQ MI) | $Q_2$ (CFS) | $Q_5$ (CFS) | $Q_{10}$ (CFS) | $Q_{25}$ (CFS) | $Q_{50}$ (CFS) | $Q_{100}$ (CFS) |
|---|---|---|---|---|---|---|---|---|---|
| EX–0 | 62 | 23.8 | 0.037 | 5.0 | 8.2 | 13.0 | 19.6 | 25.7 | 32.2 |
| EX–1 | 62 | 25.7 | 0.040 | 4.8 | 7.9 | 12.4 | 18.7 | 24.5 | 30.9 |
| EX–2 | 62 | 5.5 | 0.009 | 1.1 | 1.8 | 2.8 | 4.3 | 5.6 | 7.1 |
| EX–3 | 62 | 136.8 | 0.214 | 22.0 | 36.4 | 57.6 | 86.9 | 114.0 | 143.1 |
| EX–3A | 61 | 188.1 | 0.294 | 28.3 | 47.4 | 75.7 | 115.1 | 152.2 | 192.6 |
| EX–4 | 62 | 192.0 | 0.300 | 30.1 | 49.9 | 79.1 | 119.5 | 157.0 | 197.3 |
| EX–4A | 62 | 151.5 | 0.237 | 24.7 | 40.8 | 64.4 | 97.0 | 127.2 | 160.1 |
| EX–5 | 62 | 153.9 | 0.240 | 24.2 | 40.0 | 63.4 | 95.9 | 125.9 | 158.2 |
| EX–6 | 62 | 90.2 | 0.141 | 15.3 | 25.5 | 40.1 | 60.7 | 79.9 | 100.5 |
| EX–7 | 56 | 165.0 | 0.258 | 11.6 | 21.5 | 37.5 | 60.9 | 83.1 | 107.4 |
| EX–8 | 45 | 42.0 | 0.066 | 0.5 | 1.7 | 4.5 | 9.4 | 14.5 | 20.5 |
| EX–9 | 54 | 131.9 | 0.206 | 12.2 | 23.9 | 43.1 | 70.9 | 97.0 | 125.2 |
| EX–10 | 60 | 270.7 | 0.423 | 32.7 | 56.0 | 91.1 | 140.1 | 185.9 | 236.1 |
| EX–10A | 41 | 179.3 | 0.280 | 0.6 | 2.2 | 7.3 | 17.4 | 29.1 | 43.1 |
| EX–11 | 43 | 209.3 | 0.327 | 18.0 | 29.8 | 47.7 | 73.4 | 98.3 | 126.1 |
| EX–12 | 51 | 39.5 | 0.062 | 2.2 | 5.1 | 10.1 | 17.7 | 25.1 | 33.3 |
| EX–13 | 55 | 89.3 | 0.139 | 7.7 | 15.2 | 27.1 | 44.2 | 60.5 | 78.4 |
| EX–20 | 62 | 143.4 | 0.224 | 25.4 | 42.1 | 66.7 | 100.7 | 132.3 | 166.2 |
| EX–20A | 64 | 179.7 | 0.281 | 32.2 | 51.9 | 80.5 | 119.8 | 155.9 | 194.6 |
| EX–21 | 65 | 33.3 | 0.052 | 8.6 | 13.5 | 20.7 | 30.5 | 39.4 | 49.0 |
| EX–24 | 59 | 63.1 | 0.099 | 9.5 | 16.6 | 27.5 | 42.9 | 57.4 | 73.0 |
| EX–25 | 43 | 54.4 | 0.085 | 0.3 | 1.5 | 4.8 | 10.7 | 17.2 | 25.1 |
| EX–73 | 63 | 90.0 | 0.141 | 16.4 | 26.4 | 41.3 | 62.1 | 81.3 | 102.0 |
| EX–74 | 63 | 119.7 | 0.187 | 22.3 | 36.5 | 57.3 | 85.9 | 112.3 | 140.7 |
| EX–75 | 63 | 79.3 | 0.124 | 13.1 | 21.5 | 33.7 | 50.5 | 66.1 | 82.8 |
| EX–76 | 63 | 86.4 | 0.135 | 14.2 | 23.1 | 36.4 | 54.6 | 71.4 | 89.6 |
| EX–77 | 62 | 230.6 | 0.360 | 34.7 | 56.9 | 90.6 | 137.5 | 180.9 | 227.7 |
| EX–78 | 63 | 155.6 | 0.243 | 28.1 | 45.3 | 70.6 | 106.2 | 139.1 | 174.5 |
| EX–79 | 63 | 189.0 | 0.295 | 34.9 | 57.0 | 89.5 | 134.3 | 175.6 | 220.1 |
| EX–80 | 63 | 147.7 | 0.231 | 27.3 | 44.3 | 69.6 | 104.5 | 136.8 | 171.4 |
| EX–81 | 62 | 262.9 | 0.411 | 42.6 | 70.2 | 111.0 | 167.4 | 219.6 | 275.7 |
| EX–82 | 62 | 117.8 | 0.184 | 20.0 | 33.2 | 52.8 | 80.0 | 105.1 | 132.3 |
| EX–88 | 62 | 139.2 | 0.217 | 22.2 | 36.7 | 58.0 | 87.6 | 115.0 | 144.4 |

## DESIGN POINT SUMMARY (PEAK FLOW)

| DESIGN POINT | AREA (SQ MI) | $Q_2$ (CFS) | $Q_5$ (CFS) | $Q_{10}$ (CFS) | $Q_{25}$ (CFS) | $Q_{50}$ (CFS) | $Q_{100}$ (CFS) | LOCATION |
|---|---|---|---|---|---|---|---|---|
| DP–74 | 0.371 | 39.3 | 65.3 | 104.8 | 158.9 | 209.1 | 262.8 | |
| DP–75 | 1.413 | 141.2 | 235.1 | 376.6 | 566.6 | 750.9 | 950.5 | |
| DP–78 | 0.538 | 59.7 | 98.4 | 154.0 | 232.6 | 306.2 | 385.3 | |
| DP–73 | 2.528 | 225.9 | 380.7 | 618.0 | 957.0 | 1260.4 | 1582.3 | |
| DP–71 | 2.669 | 229.3 | 388.9 | 629.7 | 978.8 | 1277.3 | 1637.9 | STERLING RANCH NORTHERN BNDRY |
| DP–69 | 3.209 | 253.0 | 434.8 | 707.7 | 1100.0 | 1453.3 | 1870.4 | |
| DP–63 | 3.446 | 251.4 | 430.7 | 713.1 | 1113.2 | 1496.2 | 1911.5 | STERLING RANCH SOUTHERN BNDRY |
| DP–10 | 0.508 | 36.5 | 56.0 | 106.4 | 162.9 | 220.6 | 287.2 | COLORADO SPRINGS/EL PASO BNDRY |
| DP–9A | 0.557 | 55.3 | 94.3 | 150.3 | 227.7 | 299.5 | 380.5 | VOLLMER/TAHITI DRIVE |
| DP–9 | 0.505 | 52.8 | 88.8 | 142.1 | 214.2 | 281.0 | 351.4 | VOLLMER/LOCHWINNOCH LN |
| DP–8A | 0.139 | 7.7 | 15.2 | 27.1 | 44.2 | 60.5 | 78.4 | D/S STERLING RANCH EASTERN BNDRY |
| DP–8 | 0.528 | 24.2 | 45.1 | 77.8 | 124.4 | 169.5 | 220.9 | D/S STERLING RANCH SOUTHERN BNDRY |
| DP–7 | 0.703 | 32.4 | 57.1 | 97.3 | 156.1 | 213.8 | 277.9 | STERLING RANCH SOUTHERN BNDRY |
| DP–6 | 0.206 | 12.2 | 23.9 | 43.1 | 70.9 | 97.0 | 125.2 | STERLING RANCH SOUTHERN BNDRY |
| DP–5 | 0.066 | 0.5 | 1.7 | 4.5 | 9.4 | 14.5 | 20.5 | STERLING RANCH SOUTHERN BNDRY |
| DP–4 | 0.258 | 11.6 | 21.5 | 37.5 | 60.9 | 83.1 | 107.4 | STERLING RANCH SOUTHERN BNDRY |
| DP–3 | 0.009 | 1.1 | 1.8 | 2.8 | 4.3 | 5.6 | 7.1 | STERLING RANCH SOUTHERN BNDRY |
| DP–2 | 0.040 | 4.8 | 7.9 | 12.4 | 18.7 | 24.5 | 30.9 | STERLING RANCH SOUTHERN BNDRY |
| DP–1 | 0.037 | 5.0 | 8.2 | 13.0 | 19.6 | 25.7 | 32.2 | STERLING RANCH SOUTHERN BNDRY |
| DP–60A | 3.545 | 247.7 | 430.2 | 707.1 | 1113.0 | 1496.6 | 1913.5 | FUTURE MARKSHEFFEL X–ING |
| DP–56 | 0.466 | 23.2 | 42.5 | 71.9 | 115.6 | 157.4 | 202.9 | STERLING RANCH SOUTHERN BNDRY |
| DP–53A | 4.138 | 262.1 | 454.0 | 763.2 | 1196.5 | 1609.8 | 2061.5 | SAND CREEK AND POND 3 |

## DESIGN POINT SUMMARY (VOLUME)

| DESIGN POINT | AREA (SQ MI) | $V_2$ (AC–FT) | $V_5$ (AC–FT) | $V_{10}$ (AC–FT) | $V_{25}$ (AC–FT) | $V_{50}$ (AC–FT) | $V_{100}$ (AC–FT) | LOCATION |
|---|---|---|---|---|---|---|---|---|
| DP–74 | 0.371 | 5.9 | 9.0 | 13.6 | 19.8 | 25.5 | 31.6 | |
| DP–75 | 1.413 | 22.7 | 34.5 | 51.7 | 75.4 | 97.1 | 120.5 | |
| DP–78 | 0.538 | 8.9 | 13.5 | 20.1 | 29.3 | 37.7 | 46.7 | |
| DP–73 | 2.528 | 40.4 | 61.5 | 92.1 | 134.3 | 173.1 | 214.9 | |
| DP–71 | 2.669 | 42.5 | 64.9 | 97.1 | 141.6 | 182.5 | 226.6 | STERLING RANCH NORTHERN BNDRY |
| DP–69 | 3.209 | 50.7 | 77.4 | 116.1 | 169.4 | 218.6 | 271.4 | |
| DP–63 | 3.446 | 54.1 | 82.5 | 123.8 | 180.8 | 233.3 | 289.9 | STERLING RANCH SOUTHERN BNDRY |
| DP–10 | 0.508 | 7.6 | 11.7 | 17.6 | 25.8 | 33.4 | 41.6 | COLORADO SPRINGS/EL PASO BNDRY |
| DP–9A | 0.557 | 9.3 | 14.1 | 21.1 | 30.7 | 39.4 | 48.8 | VOLLMER/TAHITI DRIVE |
| DP–9 | 0.505 | 8.4 | 12.7 | 19.0 | 27.6 | 35.5 | 44.0 | VOLLMER/LOCHWINNOCH LN |
| DP–8A | 0.139 | 1.3 | 2.1 | 3.4 | 5.2 | 7.0 | 8.9 | D/S STERLING RANCH EASTERN BNDRY |
| DP–8 | 0.528 | 4.4 | 7.0 | 11.1 | 16.8 | 22.3 | 28.4 | D/S STERLING RANCH SOUTHERN BNDRY |
| DP–7 | 0.703 | 6.1 | 10.0 | 15.9 | 24.3 | 32.4 | 41.3 | STERLING RANCH SOUTHERN BNDRY |
| DP–6 | 0.206 | 2.4 | 4.0 | 6.3 | 9.6 | 12.7 | 16.0 | STERLING RANCH SOUTHERN BNDRY |
| DP–5 | 0.066 | 0.2 | 0.4 | 0.8 | 1.4 | 1.9 | 2.6 | STERLING RANCH SOUTHERN BNDRY |
| DP–4 | 0.258 | 2.6 | 4.2 | 6.7 | 10.2 | 13.5 | 17.2 | STERLING RANCH SOUTHERN BNDRY |
| DP–3 | 0.009 | 0.1 | 0.2 | 0.3 | 0.5 | 0.6 | 0.8 | STERLING RANCH SOUTHERN BNDRY |
| DP–2 | 0.040 | 0.6 | 0.9 | 1.4 | 2.1 | 2.7 | 3.4 | STERLING RANCH SOUTHERN BNDRY |
| DP–1 | 0.037 | 0.6 | 0.9 | 1.3 | 1.9 | 2.5 | 3.1 | STERLING RANCH SOUTHERN BNDRY |
| DP–60A | 3.545 | 55.3 | 84.4 | 126.4 | 184.8 | 238.5 | 296.6 | FUTURE MARKSHEFFEL X–ING |
| DP–56 | 0.466 | 4.0 | 6.3 | 9.9 | 14.9 | 19.8 | 25.1 | SAND CREEK AND POND 3 |
| DP–53A | 4.138 | 63.0 | 96.4 | 144.7 | 211.8 | 273.9 | 340.9 | SAND CREEK AND POND 3 |

## EFSC DBPS DESIGN POINT SUMMARY (PEAK FLOW)

| DBPS DESIGN POINT | AREA (SQ MI) | $Q_{10}$ (CFS) | $Q_{100}$ (CFS) |
|---|---|---|---|
| DP–50 | 0.32 | 47.0 | 195.7 |
| DP–51 (BASIN 86) | 0.33 | 17.7 | 74.1 |
| DP–52 | 1.67 | 80.5 | 456.5 |
| DP–56 | 0.79 | 63.6 | 265.0 |

Values reported from SCDBPS
(DP 50, 51, 52 Not analyzed as a part of this study)
DBPS Reach 85(Basin91)=Q10=28.8cfs Q100=115.2cfs

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1–800–922–1987


M&S CIVIL CONSULTANTS, INC.
20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485


# 2018 STERLING RANCH MDDP

## EXISTING HYDROLOGIC CONDITIONS MAP

PROJECT NO. 09–002
FILE: \dwg\Eng Exhibits\2018–MDDP–ExistCondWSWrkMap.dwg
DESIGNED BY: DLM
DRAWN BY: DLM
CHECKED BY: VAS
SCALE
HORIZ: NTS
VERT: NTS
DATE: 08–22–18

DM1

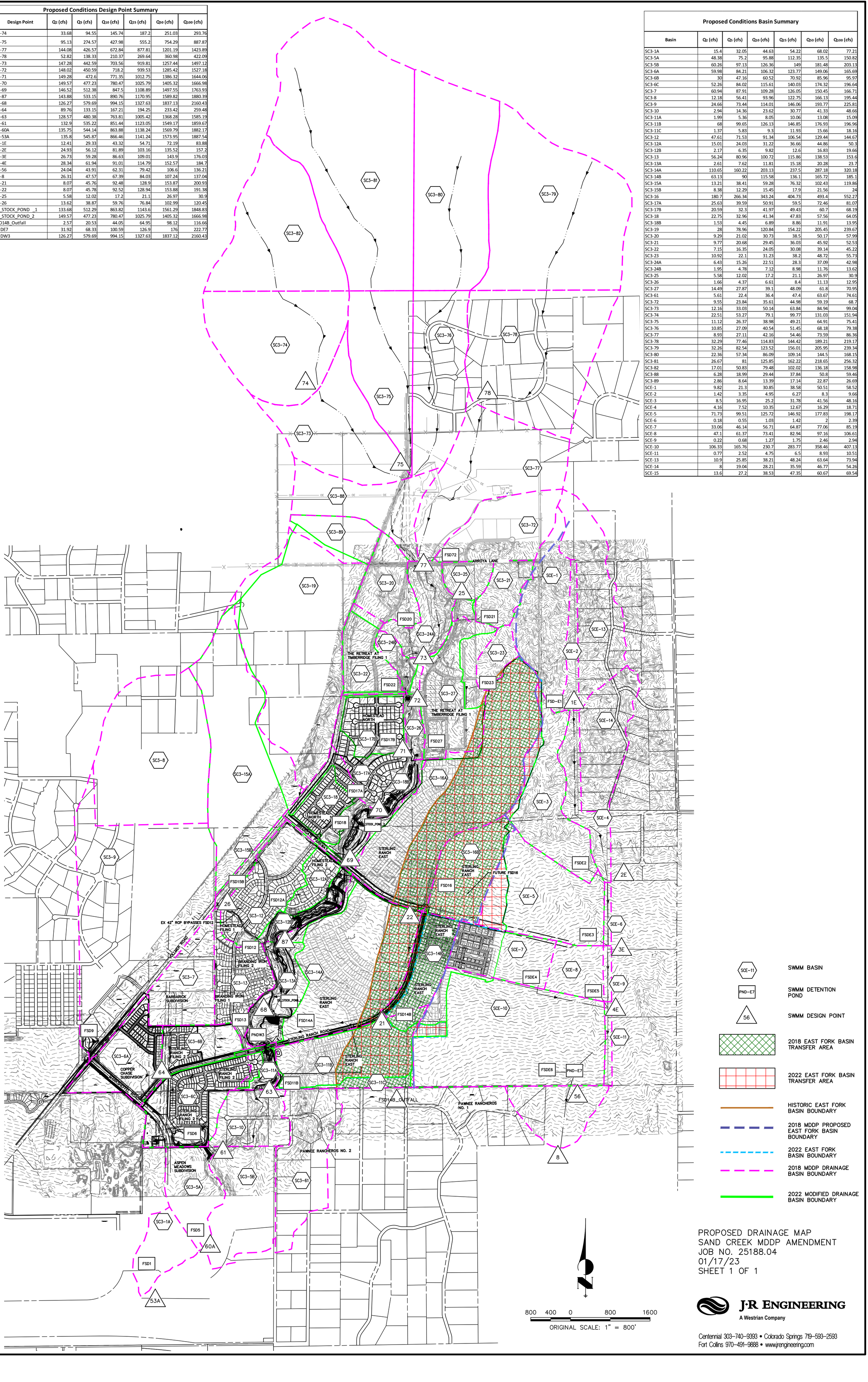
File: Q:\09002A\Sterling Ranch District\dwg\Eng Exhibits\2018 MDDP\2018–MDDP–ExistCondWSWrkMap.dwg Plotstamp: 11/13/2018 1:52 PM

## Proposed Conditions Design Point Summary

| Design Point | $Q_2$ (cfs) | $Q_5$ (cfs) | $Q_{10}$ (cfs) | $Q_{25}$ (cfs) | $Q_{50}$ (cfs) | $Q_{100}$ (cfs) |
|---|---|---|---|---|---|---|
| DP-74 | 33.68 | 94.55 | 145.74 | 187.2 | 251.03 | 293.76 |
| DP-75 | 95.13 | 274.57 | 427.98 | 555.2 | 754.29 | 887.87 |
| DP-77 | 144.08 | 426.57 | 672.84 | 877.81 | 1201.19 | 1423.89 |
| DP-78 | 52.82 | 138.33 | 210.37 | 269.64 | 360.98 | 422.09 |
| DP-73 | 147.28 | 442.59 | 703.56 | 919.81 | 1257.44 | 1497.12 |
| DP-72 | 148.02 | 450.59 | 718.2 | 939.53 | 1285.42 | 1527.18 |
| DP-71 | 149.28 | 472.6 | 771.35 | 1012.75 | 1386.32 | 1644.06 |
| DP-70 | 149.57 | 477.23 | 780.47 | 1025.79 | 1405.32 | 1666.98 |
| DP-69 | 146.52 | 512.38 | 847.5 | 1108.89 | 1497.55 | 1763.93 |
| DP-87 | 143.88 | 533.15 | 890.76 | 1170.95 | 1589.82 | 1880.39 |
| DP-68 | 126.27 | 579.69 | 994.15 | 1327.63 | 1837.13 | 2160.43 |
| DP-64 | 89.76 | 133.15 | 167.21 | 194.25 | 233.42 | 259.48 |
| DP-63 | 128.57 | 480.38 | 763.81 | 1005.42 | 1368.28 | 1585.19 |
| DP-61 | 132.9 | 535.22 | 851.44 | 1123.05 | 1549.17 | 1859.67 |
| DP-60A | 135.75 | 544.14 | 863.88 | 1138.24 | 1569.79 | 1882.17 |
| DP-53A | 135.8 | 545.87 | 866.46 | 1141.24 | 1573.95 | 1887.54 |
| DP-1E | 12.41 | 29.33 | 43.32 | 54.71 | 72.19 | 83.88 |
| DP-2E | 24.93 | 56.12 | 81.89 | 103.16 | 135.52 | 157.2 |
| DP-3E | 26.73 | 59.28 | 86.63 | 109.01 | 143.9 | 176.03 |
| DP-4E | 28.34 | 61.94 | 91.01 | 114.79 | 152.57 | 184.7 |
| DP-56 | 24.04 | 43.91 | 62.31 | 79.42 | 106.6 | 136.21 |
| DP-8 | 26.31 | 47.57 | 67.39 | 84.03 | 107.24 | 137.04 |
| DP-21 | 8.07 | 45.76 | 92.48 | 128.9 | 153.87 | 200.93 |
| DP-22 | 8.07 | 45.78 | 92.52 | 128.94 | 153.88 | 191.38 |
| DP-25 | 5.58 | 12.02 | 17.2 | 21.1 | 26.97 | 30.9 |
| DP-26 | 13.62 | 38.87 | 59.76 | 76.84 | 102.99 | 120.45 |
| EX_STOCK_POND _1 | 133.68 | 512.29 | 863.82 | 1143.6 | 1561.29 | 1848.83 |
| EX_STOCK_POND_2 | 149.57 | 477.23 | 780.47 | 1025.79 | 1405.32 | 1666.98 |
| FSD14B_Outfall | 2.57 | 20.53 | 44.05 | 64.95 | 98.12 | 116.66 |
| PNDE7 | 31.92 | 68.33 | 100.59 | 126.9 | 176 | 222.77 |
| PNDW3 | 126.27 | 579.69 | 994.15 | 1327.63 | 1837.12 | 2160.43 |

## Proposed Conditions Basin Summary

| Basin | $Q_2$ (cfs) | $Q_5$ (cfs) | $Q_{10}$ (cfs) | $Q_{25}$ (cfs) | $Q_{50}$ (cfs) | $Q_{100}$ (cfs) |
|---|---|---|---|---|---|---|
| SC3-1A | 15.4 | 32.05 | 44.63 | 54.22 | 68.02 | 77.21 |
| SC3-5A | 48.38 | 75.2 | 95.88 | 112.35 | 135.5 | 150.82 |
| SC3-5B | 60.26 | 97.13 | 126.36 | 149 | 181.48 | 203.13 |
| SC3-6A | 59.98 | 84.21 | 106.32 | 123.77 | 149.06 | 165.69 |
| SC3-6B | 30 | 47.16 | 60.52 | 70.92 | 85.96 | 95.97 |
| SC3-6C | 52.26 | 84.02 | 115.61 | 140.03 | 174.32 | 196.64 |
| SC3-7 | 60.94 | 87.91 | 109.28 | 126.05 | 150.45 | 166.71 |
| SC3-8 | 12.18 | 56.41 | 93.96 | 122.75 | 166.13 | 195.44 |
| SC3-9 | 24.66 | 73.44 | 114.01 | 146.06 | 193.77 | 225.81 |
| SC3-10 | 2.94 | 14.36 | 23.62 | 30.77 | 41.33 | 48.66 |
| SC3-11A | 1.99 | 5.36 | 8.05 | 10.06 | 13.08 | 15.09 |
| SC3-11B | 68 | 99.65 | 126.13 | 146.85 | 176.93 | 196.96 |
| SC3-11C | 1.37 | 5.83 | 9.3 | 11.93 | 15.66 | 18.16 |
| SC3-12 | 47.61 | 71.53 | 91.34 | 106.54 | 129.44 | 144.67 |
| SC3-12A | 15.01 | 24.03 | 31.22 | 36.66 | 44.86 | 50.3 |
| SC3-12B | 2.17 | 6.35 | 9.82 | 12.6 | 16.83 | 19.66 |
| SC3-13 | 56.24 | 80.96 | 100.72 | 115.86 | 138.53 | 153.6 |
| SC3-13A | 2.61 | 7.62 | 11.81 | 15.18 | 20.28 | 23.7 |
| SC3-14A | 110.65 | 160.22 | 203.13 | 237.5 | 287.18 | 320.18 |
| SC3-14B | 63.13 | 90 | 115.58 | 136.1 | 165.72 | 185.1 |
| SC3-15A | 13.21 | 38.41 | 59.28 | 76.32 | 102.43 | 119.86 |
| SC3-15B | 8.38 | 12.29 | 15.45 | 17.9 | 21.56 | 24 |
| SC3-16 | 180.7 | 266.34 | 343.24 | 404.73 | 493.4 | 552.27 |
| SC3-17A | 25.63 | 39.59 | 50.91 | 59.5 | 72.46 | 81.07 |
| SC3-17B | 20.59 | 32.3 | 41.97 | 49.43 | 60.7 | 68.19 |
| SC3-18 | 22.75 | 32.96 | 41.34 | 47.83 | 57.56 | 64.05 |
| SC3-18B | 1.53 | 4.45 | 6.89 | 8.86 | 11.91 | 13.95 |
| SC3-19 | 28 | 78.96 | 120.84 | 154.22 | 205.45 | 239.67 |
| SC3-20 | 9.29 | 21.02 | 30.73 | 38.5 | 50.17 | 57.99 |
| SC3-21 | 9.77 | 20.68 | 29.45 | 36.03 | 45.92 | 52.53 |
| SC3-22 | 7.15 | 16.35 | 24.05 | 30.08 | 39.14 | 45.22 |
| SC3-23 | 10.92 | 22.1 | 31.23 | 38.2 | 48.72 | 55.73 |
| SC3-24A | 6.43 | 15.26 | 22.51 | 28.3 | 37.09 | 42.98 |
| SC3-24B | 1.95 | 4.78 | 7.12 | 8.98 | 11.76 | 13.62 |
| SC3-25 | 5.58 | 12.02 | 17.2 | 21.1 | 26.97 | 30.9 |
| SC3-26 | 1.66 | 4.37 | 6.61 | 8.4 | 11.13 | 12.95 |
| SC3-27 | 14.49 | 27.87 | 39.1 | 48.09 | 61.8 | 70.95 |
| SC3-61 | 5.61 | 22.4 | 36.4 | 47.4 | 63.67 | 74.61 |
| SC3-72 | 9.55 | 23.84 | 35.61 | 44.98 | 59.19 | 68.7 |
| SC3-73 | 12.16 | 33.03 | 50.14 | 63.84 | 84.94 | 99.04 |
| SC3-74 | 22.51 | 53.27 | 79.1 | 99.77 | 131.03 | 151.94 |
| SC3-75 | 11.12 | 26.37 | 38.98 | 49.21 | 64.91 | 75.41 |
| SC3-76 | 10.85 | 27.09 | 40.54 | 51.45 | 68.18 | 79.38 |
| SC3-77 | 8.93 | 27.11 | 42.16 | 54.46 | 73.59 | 86.36 |
| SC3-78 | 32.29 | 77.46 | 114.83 | 144.42 | 189.21 | 219.17 |
| SC3-79 | 32.26 | 82.54 | 123.52 | 156.01 | 205.95 | 239.34 |
| SC3-80 | 22.36 | 57.34 | 86.09 | 109.14 | 144.5 | 168.15 |
| SC3-81 | 26.67 | 81 | 125.85 | 162.22 | 218.65 | 256.32 |
| SC3-82 | 17.01 | 50.83 | 79.48 | 102.02 | 136.18 | 158.98 |
| SC3-88 | 6.28 | 18.99 | 29.44 | 37.84 | 50.8 | 59.46 |
| SC3-89 | 2.86 | 8.64 | 13.39 | 17.14 | 22.87 | 26.69 |
| SCE-1 | 9.82 | 21.3 | 30.85 | 38.58 | 50.51 | 58.52 |
| SCE-2 | 1.42 | 3.35 | 4.95 | 6.27 | 8.3 | 9.66 |
| SCE-3 | 8.5 | 16.95 | 25.2 | 31.78 | 41.56 | 48.16 |
| SCE-4 | 4.16 | 7.52 | 10.35 | 12.67 | 16.29 | 18.71 |
| SCE-5 | 71.73 | 99.51 | 125.72 | 146.92 | 177.83 | 198.17 |
| SCE-6 | 0.18 | 0.55 | 1.03 | 1.42 | 2 | 2.39 |
| SCE-7 | 33.06 | 46.14 | 56.71 | 64.87 | 77.06 | 85.19 |
| SCE-8 | 47.1 | 61.37 | 73.41 | 82.94 | 97.16 | 106.61 |
| SCE-9 | 0.22 | 0.68 | 1.27 | 1.75 | 2.46 | 2.94 |
| SCE-10 | 106.33 | 165.76 | 230.7 | 283.77 | 358.46 | 407.13 |
| SCE-11 | 0.77 | 2.52 | 4.75 | 6.5 | 8.93 | 10.51 |
| SCE-13 | 10.9 | 25.85 | 38.21 | 48.24 | 63.64 | 73.94 |
| SCE-14 | 8 | 19.04 | 28.21 | 35.59 | 46.77 | 54.26 |
| SCE-15 | 13.6 | 27.2 | 38.53 | 47.35 | 60.67 | 69.54 |




PROPOSED DRAINAGE MAP
SAND CREEK MDDP AMENDMENT
JOB NO. 25188.04
01/17/23
SHEET 1 OF 1


J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

# Channel Design Report

## Sand Creek Stabilization at Aspen Meadows Subdivision Filing No. 1

**Prepared on behalf of:**

COLA
Colorado Land Acquisition

7910 Gateway Boulevard, Ste 102
El Paso, TX 79915

**Prepared by:**

Matrix
Excellence by Design

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

February 11, 2020

wetland and riparian vegetation within and adjacent to the channel. Upland vegetation is included for the more upland areas extending into and out of the floodplain. Minor realignment of the channel will take place in three sections along the project reach: Sta. 85+31 to 88+98, Sta. 103+00 to 104+10, and Sta. 108+00 to 110+20. The project seeks to preserve the existing stable reaches of Sand Creek. To maintain a stable slope in the channel, a series of drop structures are proposed.

### E. Variances

Variances are required for some proposed improvements as described in Section V of this report. A variance request is submitted to the City under separate cover.

### F. Maintenance and Access

It is anticipated that proposed channel improvements will be conveyed to the City for ownership and maintenance upon completion and acceptance. Permanent access for maintenance is shown in the Design Plans on the overall drainage plan (DR01). Access routes are shown to all nine grouted boulder drop structures and to both sheet pile cutoff walls.

### G. Tributary Stormwater Facilities

Not applicable.

## V. Channel, Structure and Utility Crossing Design

### A. Variances to DBPS

Design hydrology was taken from the "Sand Creek Channel Study (North of Woodman Road) Hydrologic Analysis" prepared by M&S Civil in October 2016.

### B. Hydrologic and Hydraulic Criteria

Flows in the project reach have been estimated from various sources, including the FEMA Flood Insurance Study dated December 7, 2018, (FIS) and LOMRs, the Sand Creek Drainage Basin Planning Study (Kiowa, 1996), the Upper Sand Creek Hydrologic Analysis (Wilson, 2011) and USGS and CWCB regression equations. Results from these sources are discussed and summarized in a Technical Memorandum entitled Sand Creek Channel Study (North of Woodmen Road) Hydrologic Analysis) by MS Civil Consultants, Inc. (MS Civil) dated October 2016. The technical memorandum includes an analysis of the upstream watershed based on the newly adopted DCM, which changed the design storm distribution and other hydrologic modeling parameters.

Design flows were based on a combination of sources:

- Major flood flows (10-, 50-, and 100-year) come from the FEMA hydrology
- Minor flood flows are based on the M&S hydrologic study, referencing the existing conditions (2016) for a design point just upstream of Regional Pond 3
- The low flow was determined to be Q= 40 cfs based on a survey of existing conditions, since the design aims to preserve existing healthy conditions. The calculations of the low flow discharge are included in the appendix.

A summary of the design flows are given in the following table:

| **Return Period** | Low Flow | 2-Year | 5-Year | 10-Year | 50-Year | 100-Year |
|---|---|---|---|---|---|---|
| **Flow (cfs)** | 40 | 262 | 454 | 1200 | 2100 | 2600 |
| **Source** | Matrix | M&S | M&S | FEMA | FEMA | FEMA |

*Table 1- Design Hydrology (cfs)*

The primary source of design criteria is the DCM. However, additional criteria provided in the USDCM was also applied.

### C. Site Constraints

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

- The proposed Marksheffel Road Crossing – The proposed channel improvements must tie in to the proposed upstream and downstream extents of the Marksheffel Road Crossing
- Utility crossings between Stations 89+50 and 91+50- The design avoids placing drop structures over the utilities.
- Existing concrete drop structure at Station 85+40 – The channel improvements tie into the invert of this structure.
- Delineated wetlands – Disturbance in these areas is to be minimized.

### D. Major Channel Components/Attributes

The channel improvements consist primarily of grade control drop structures (boulder cross vanes and grouted boulder), earthwork grading, and revegetation. The approach considers two distinct perspectives from the City and from the USACE. Early in the design process the USACE indicated a Regional Permit 37 would be adequate if disturbances were limited, while the City has indicated long-term potential degradation is a high priority. The design components meet the objectives of both the USACE and City by limiting permanent disturbance using small structures and protecting existing vegetation as well as preparing for long-term degradation by burying larger structures. By completely burying the structures, disturbance is considered temporary.

Given the general healthy condition of the channel a design is preferred that provides immediate stabilization as well as protection from perceived long-term channel degradation. To this point, drop structures are proposed at or near existing channel elevations, as well as at anticipated long-term degraded elevations. In order to maintain the current ecological integrity of the project area seven smaller boulder vane drops are recommended for limited disturbance. Nine grouted boulder structures are proposed to be installed, but only five will be placed to address current conditions. Four of the grouted drop structures will be buried in anticipation of long-term degradation.

# FINAL DRAINAGE REPORT
# For
# Aspen Meadows

# Sand Creek
# Drainage Basin

Prepared for:
**City of Colorado Springs**
**Engineering Development Review Division Team**
30 North Nevada Avenue, Suite 401
Colorado Springs, CO 80903

On Behalf of:

**COLA, LLC.**
7910 Gateway Boulevard, Suite 102
El Paso, TX 79915

Prepared by:

Matrix DESIGN GROUP
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
(719) 575-0100
fax (719) 572-0208

January 2019

Project No. 17.886.004

### *D. Four-Step Process*

Per the DCM Chapter 1, Section 4, the City of Colorado Springs require the UDFCD Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing draingeways, and implementing long-term source controls. Stonebridge Development complies with this process in the following ways:

1. Reducing runoff volumes – the runoff reduction worksheet has been completed and can be found in Appendix C. An example of this step would be to provide landscaping in the available open space areas. Majority of runoff generated from this site area is being released/conveyed through overland flow and grassed swales which help to eliminate unnecessary impervious area.
2. These flows eventually discharge into Pond 1 which has been designed to treat the runoff for water quality and release flows at historic rates.
3. The runoff is routed through proposed storm sewer into proposed Pond 1. Downstream from Pond 1, treated release runoff enters existing Sand Creek Channel that conveys flows approximately 2,875 feet downstream, to another existing Detention Facility “Pond 3”.
4. Implementing long-term source controls – source control BMP’s such as temporary sedimentation basins, covering storage/handling areas and implementing containment/control measures, particularly around vehicular activities should be utilized to control potential source contaminants. The specific location(s) of source control areas will be identified within the SWMP as determined by the site superintendent.

### *E. Detention and Water Quality*

Development of the site requires that full spectrum detention be provided to reduce the fully developed flows from the site to pre-project levels. This is due in part to the master planning of the area, as well as consideration of environmental impacts to existing downstream facilities. A full spectrum extended detention basin is proposed to treat the full spectrum of runoff from the single-family development and an extended water quality control volume detention area is proposed to treat runoff to Marksheffel Road. Please refer to Appendix C for UD-detention spreadsheet calculations for Pond 1 and the Marksheffel WQCV treatment pond.

To effectively treat the water quality runoff volume, each pond utilizes a small outlet structure to extend the time required to discharge the full volume of runoff. Treating the water quality volume requires an extended discharge time of 40 hours. This is the time required to achieve removal of a significant amount of total suspended solids (TSS). The ponds will also have low flow trickle channels which drain to a micro pool at the outlet structure, which is in place to promote biological uptake. Pond 1 was designed with a total watershed area of 21.45 Acres and 55.9% imperviousness. The WQCV treatment pond for Marksheffel Road was designed with a watershed of 8.09 Acres (including 5.7 Acres from Sub-basins A12 through A17 and 2.49 Acres from Sub-basins


*Matrix Design Group, Inc., 2019©*

RP-7C and RP-7D), and 91.2% watershed imperviousness. The basins and their structures are sized based on pre-development peak flows as calculated by the UD-Detention spreadsheet from UDFCD. The spreadsheets can be found in Appendix C.

The overall volume requirement calculated for the full spectrum EDB, which includes the water quality control volume, the excess urban runoff volume, and detention for storms from the 5-year (20% probability) to the 100-year (1% probability) is 2.32 acre-ft or 101,234 cubic feet. This total detention volume is slightly higher than the value indicated by UD-Detention (2.25 Acre-ft) in order to account for additional flows to Marksheffel Drive from portions of the development along Marksheffel Drive which cannot be diverted to Pond 1. The EURV volume in the lower portion of the detention volume will allow for low and high probability storms to be released to Sand Creek at rates which approximate pre-development conditions. This also reduces the higher probability storms (i.e. less than 2-year (50% probability)) to a level which is at or near the sediment carrying threshold value for the downstream drainageways. The proposed storm sewer drainage facilities will be publicly owned and maintained by the metro district.

The proposed outfall for Pond 1 must discharge the Q100 (1% probability flow) at 90% of the pre-development rate of 7.2 cfs for the development to comply with city requirements. The peak discharge rate is further decreased (overdetained) to 3.7 cfs to account for the portion of Aspen Meadows which adds a flow of approximately 3.5 cfs over the UD-Detention calculation for pre-development flows to Marksheffel Drive. This is a reduction from the pre-project Q100 discharge for the site which is estimated to be approximately 46 cfs.

The emergency overflow for the pond will be at the 5’ stage and will discharge directly to Sand Creek.

## Channel Improvements

Sand Creek runs directly adjacent to the proposed Aspen Meadows development, running from the northeast to the southwest. Improvements to this channel are one of the conditions of development and Matrix Design Group, Inc. is designing these improvements under a different project and which will be covered under a separate submittal. Based on previous similar rehabilitation projects a rough estimate of stream rehabilitation for Sand Creek ranges from $705 to $1,340 per linear foot of channel improvement. For the 4,250-foot proposed project this means a range of $2,996,250 to $5,695,000 in projected construction costs. In the future, as the designs are refined, we will be able to narrow the cost estimate window.

# VIII. Erosion Control Plan

Per the city of Colorado Springs Drainage Criteria Manual Volume 1, an erosion control plan is required to be included with the drainage analysis. At this time, it is respectfully

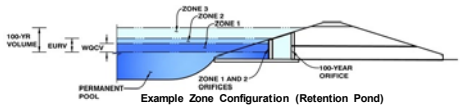

*Matrix Design Group, Inc., 2019©*

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

**Project:** Aspen Meadows

**Basin ID:** SINGLE FAMILY AREA OF 21.45 ACRES




Example Zone Configuration (Retention Pond)

**Required Volume Calculation**

| | | |
|---|---|---|
| Selected BMP Type = | EDB | |
| Watershed Area = | 21.45 | acres |
| Watershed Length = | 1,988 | ft |
| Watershed Slope = | 0.010 | ft/ft |
| Watershed Imperviousness = | 55.90% | percent |
| Percentage Hydrologic Soil Group A = | 95.3% | percent |
| Percentage Hydrologic Soil Group B = | 4.7% | percent |
| Percentage Hydrologic Soil Groups C/D = | 0.0% | percent |
| Desired WQCV Drain Time = | 40.0 | hours |
| Location for 1-hr Rainfall Depths = | User Input | |
| Water Quality Capture Volume (WQCV) = | 0.399 | acre-feet |
| Excess Urban Runoff Volume (EURV) = | 1.420 | acre-feet |
| 2-yr Runoff Volume (P1 = 0.95 in.) = | 0.782 | acre-feet |
| 5-yr Runoff Volume (P1 = 1.23 in.) = | 1.055 | acre-feet |
| 10-yr Runoff Volume (P1 = 1.49 in.) = | 1.348 | acre-feet |
| 25-yr Runoff Volume (P1 = 1.88 in.) = | 1.842 | acre-feet |
| 50-yr Runoff Volume (P1 = 2.21 in.) = | 2.350 | acre-feet |
| 100-yr Runoff Volume (P1 = 2.57 in.) = | 2.959 | acre-feet |
| 500-yr Runoff Volume (P1 = 3.52 in.) = | 4.557 | acre-feet |
| Approximate 2-yr Detention Volume = | 0.738 | acre-feet |
| Approximate 5-yr Detention Volume = | 0.997 | acre-feet |
| Approximate 10-yr Detention Volume = | 1.262 | acre-feet |
| Approximate 25-yr Detention Volume = | 1.682 | acre-feet |
| Approximate 50-yr Detention Volume = | 1.945 | acre-feet |
| Approximate 100-yr Detention Volume = | 2.246 | acre-feet |

| Optional User Override 1-hr Precipitation | |
|---|---|
| 0.95 | inches |
| 1.23 | inches |
| 1.49 | inches |
| 1.88 | inches |
| 2.21 | inches |
| 2.57 | inches |
| 3.52 | inches |

**Stage-Storage Calculation**

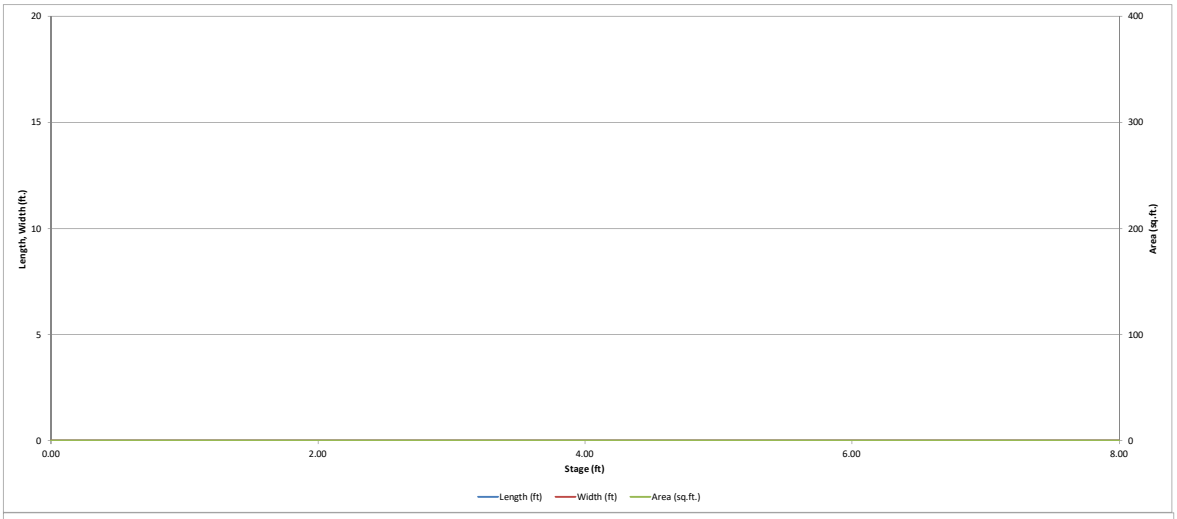
| | | |
|---|---|---|
| Zone 1 Volume (WQCV) = | 0.399 | acre-feet |
| Zone 2 Volume (EURV - Zone 1) = | 1.021 | acre-feet |
| Zone 3 Volume (100-year - Zones 1 & 2) = | 0.825 | acre-feet |
| Total Detention Basin Volume = | 2.246 | acre-feet |
| Initial Surcharge Volume (ISV) = | user | ft^3 |
| Initial Surcharge Depth (ISD) = | user | ft |
| Total Available Detention Depth ($H_{total}$) = | user | ft |
| Depth of Trickle Channel ($H_{TC}$) = | user | ft |
| Slope of Trickle Channel ($S_{TC}$) = | user | ft/ft |
| Slopes of Main Basin Sides ($S_{main}$) = | user | H:V |
| Basin Length-to-Width Ratio ($R_{L/W}$) = | user | |
| Initial Surcharge Area ($A_{ISV}$) = | user | ft^2 |
| Surcharge Volume Length ($L_{ISV}$) = | user | ft |
| Surcharge Volume Width ($W_{ISV}$) = | user | ft |
| Depth of Basin Floor ($H_{FLOOR}$) = | user | ft |
| Length of Basin Floor ($L_{FLOOR}$) = | user | ft |
| Width of Basin Floor ($W_{FLOOR}$) = | user | ft |
| Area of Basin Floor ($A_{FLOOR}$) = | user | ft^2 |
| Volume of Basin Floor ($V_{FLOOR}$) = | user | ft^3 |
| Depth of Main Basin ($H_{MAIN}$) = | user | ft |
| Length of Main Basin ($L_{MAIN}$) = | user | ft |
| Width of Main Basin ($W_{MAIN}$) = | user | ft |
| Area of Main Basin ($A_{MAIN}$) = | user | ft^2 |
| Volume of Main Basin ($V_{MAIN}$) = | user | ft^3 |
| Calculated Total Basin Volume ($V_{total}$) = | user | acre-feet |

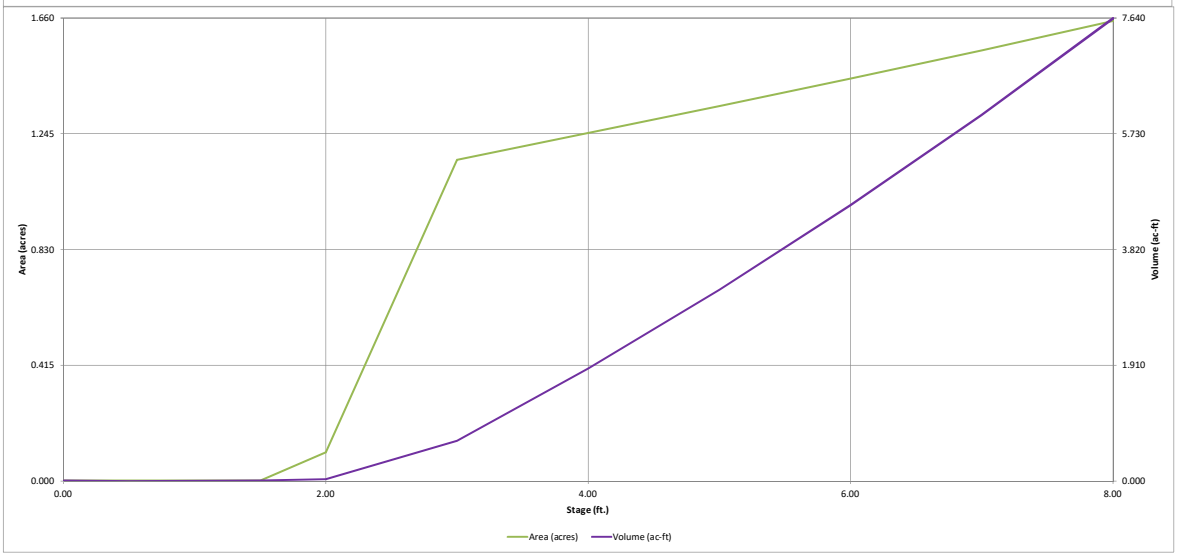
Depth Increment = 0.1 ft

| Stage - Storage Description | Stage (ft) | Optional Override Stage (ft) | Length (ft) | Width (ft) | Area (ft^2) | Optional Override Area (ft^2) | Area (acre) | Volume (ft^3) | Volume (ac-ft) |
|---|---|---|---|---|---|---|---|---|---|
| Top of Micropool | -- | 0.00 | -- | -- | -- | 77 | 0.002 | | |
| | -- | 0.50 | -- | -- | -- | 77 | 0.002 | 38 | 0.001 |
| | -- | 1.50 | -- | -- | -- | 77 | 0.002 | 115 | 0.003 |
| | -- | 2.00 | -- | -- | -- | 4,494 | 0.103 | 1,214 | 0.028 |
| | -- | 3.00 | -- | -- | -- | 50,208 | 1.153 | 28,609 | 0.657 |
| | -- | 4.00 | -- | -- | -- | 54,337 | 1.247 | 80,881 | 1.857 |
| | -- | 5.00 | -- | -- | -- | 58,563 | 1.344 | 137,331 | 3.153 |
| | -- | 6.00 | -- | -- | -- | 62,889 | 1.444 | 198,057 | 4.547 |
| | -- | 7.00 | -- | -- | -- | 67,315 | 1.545 | 263,159 | 6.041 |
| | -- | 8.00 | -- | -- | -- | 71,840 | 1.649 | 332,737 | 7.639 |
| | -- | | -- | -- | -- | | | | |
| | -- | | -- | -- | -- | | | | |
| | -- | | -- | -- | -- | | | |

## DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



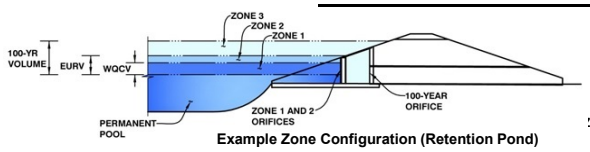



# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

**Project:** Aspen Meadows

**Basin ID:** SINGLE FAMILY AREA OF 21.45 ACRES




Example Zone Configuration (Retention Pond)

| | Stage (ft) | Zone Volume (ac-ft) | Outlet Type |
|---|---|---|---|
| Zone 1 (WQCV) | 2.75 | 0.399 | Orifice Plate |
| Zone 2 (EURV) | 3.65 | 1.021 | Rectangular Orifice |
| Zone 3 (100-year) | 4.31 | 0.825 | Weir&Pipe (Circular) |
| | | 2.246 | Total |

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

| | | | | | |
|---|---|---|---|---|---|
| Underdrain Orifice Invert Depth = | N/A | ft (distance below the filtration media surface) | Underdrain Orifice Area = | N/A | $ft^2$ |
| Underdrain Orifice Diameter = | N/A | inches | Underdrain Orifice Centroid = | N/A | feet |

**Calculated Parameters for Underdrain**

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

| | | | | | |
|---|---|---|---|---|---|
| Invert of Lowest Orifice = | 0.00 | ft (relative to basin bottom at Stage = 0 ft) | WQ Orifice Area per Row = | 6.944E-03 | $ft^2$ |
| Depth at top of Zone using Orifice Plate = | 2.73 | ft (relative to basin bottom at Stage = 0 ft) | Elliptical Half-Width = | N/A | feet |
| Orifice Plate: Orifice Vertical Spacing = | 10.90 | inches | Elliptical Slot Centroid = | N/A | feet |
| Orifice Plate: Orifice Area per Row = | 1.00 | sq. inches (diameter = 1-1/8 inches) | Elliptical Slot Area = | N/A | $ft^2$ |

**Calculated Parameters for Plate**

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

| | Row 1 (required) | Row 2 (optional) | Row 3 (optional) | Row 4 (optional) | Row 5 (optional) | Row 6 (optional) | Row 7 (optional) | Row 8 (optional) |
|---|---|---|---|---|---|---|---|---|
| Stage of Orifice Centroid (ft) | 0.00 | 0.91 | 1.82 | | | | | |
| Orifice Area (sq. inches) | 1.00 | 1.00 | 1.00 | | | | | |

| | Row 9 (optional) | Row 10 (optional) | Row 11 (optional) | Row 12 (optional) | Row 13 (optional) | Row 14 (optional) | Row 15 (optional) | Row 16 (optional) |
|---|---|---|---|---|---|---|---|---|
| Stage of Orifice Centroid (ft) | | | | | | | | |
| Orifice Area (sq. inches) | | | | | | | | |

**User Input: Vertical Orifice (Circular or Rectangular)**

| | Zone 2 Rectangular | Not Selected | |
|---|---|---|---|
| Invert of Vertical Orifice = | 2.75 | N/A | ft (relative to basin bottom at Stage = 0 ft) |
| Depth at top of Zone using Vertical Orifice = | 3.65 | N/A | ft (relative to basin bottom at Stage = 0 ft) |
| Vertical Orifice Height = | 2.00 | N/A | inches |
| Vertical Orifice Width = | 6.67 | | inches |

**Calculated Parameters for Vertical Orifice**

| | Zone 2 Rectangular | Not Selected | |
|---|---|---|---|
| Vertical Orifice Area = | 0.09 | N/A | $ft^2$ |
| Vertical Orifice Centroid = | 0.08 | N/A | feet |

**User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)**

| | Zone 3 Weir | Not Selected | |
|---|---|---|---|
| Overflow Weir Front Edge Height, Ho = | 3.54 | N/A | ft (relative to basin bottom at Stage = 0 ft) |
| Overflow Weir Front Edge Length = | 3.00 | N/A | feet |
| Overflow Weir Slope = | 0.00 | N/A | H:V (enter zero for flat grate) |
| Horiz. Length of Weir Sides = | 3.00 | N/A | feet |
| Overflow Grate Open Area % = | 70% | N/A | %, grate open area/total area |
| Debris Clogging % = | 50% | N/A | % |

**Calculated Parameters for Overflow Weir**

| | Zone 3 Weir | Not Selected | |
|---|---|---|---|
| Height of Grate Upper Edge, $H_t$ = | 3.54 | N/A | feet |
| Over Flow Weir Slope Length = | 3.00 | N/A | feet |
| Grate Open Area / 100-yr Orifice Area = | 16.97 | N/A | should be $\geq 4$ |
| Overflow Grate Open Area w/o Debris = | 6.30 | N/A | $ft^2$ |
| Overflow Grate Open Area w/ Debris = | 3.15 | N/A | $ft^2$ |

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

| | Zone 3 Circular | Not Selected | |
|---|---|---|---|
| Depth to Invert of Outlet Pipe = | 0.30 | N/A | ft (distance below basin bottom at Stage = 0 ft) |
| Circular Orifice Diameter = | 8.25 | N/A | inches |

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

| | Zone 3 Circular | Not Selected | |
|---|---|---|---|
| Outlet Orifice Area = | 0.37 | N/A | $ft^2$ |
| Outlet Orifice Centroid = | 0.34 | N/A | feet |
| Half-Central Angle of Restrictor Plate on Pipe = | N/A | N/A | radians |

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

| | | |
|---|---|---|
| Spillway Invert Stage= | 5.00 | ft (relative to basin bottom at Stage = 0 ft) |
| Spillway Crest Length = | 11.00 | feet |
| Spillway End Slopes = | 4.00 | H:V |
| Freeboard above Max Water Surface = | 1.00 | feet |

**Calculated Parameters for Spillway**

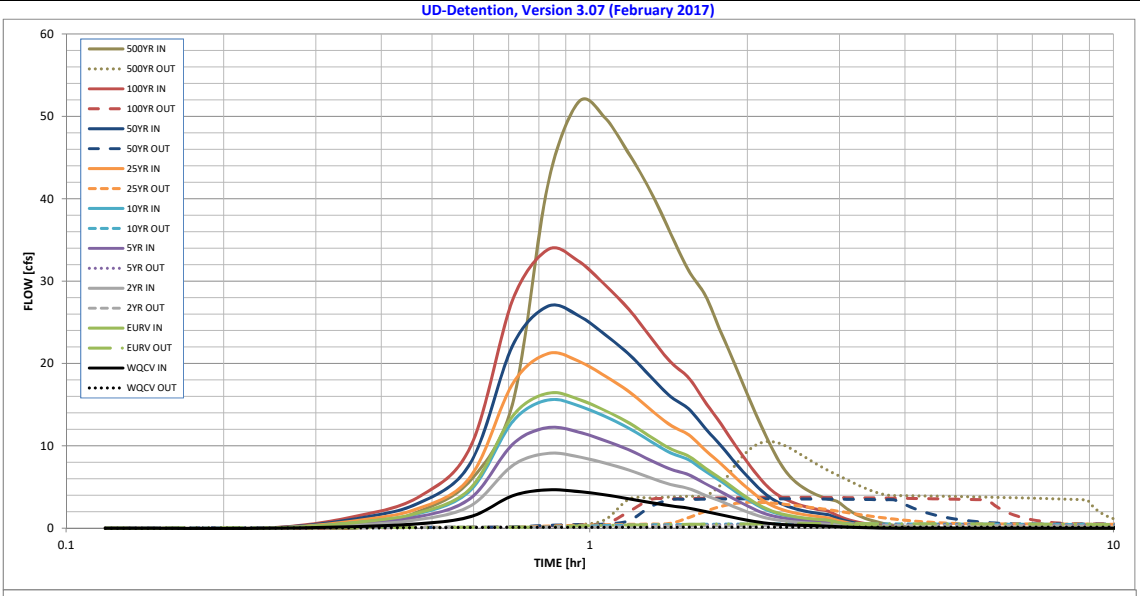
| | | |
|---|---|---|
| Spillway Design Flow Depth= | 0.84 | feet |
| Stage at Top of Freeboard = | 6.84 | feet |
| Basin Area at Top of Freeboard = | 1.53 | acres |

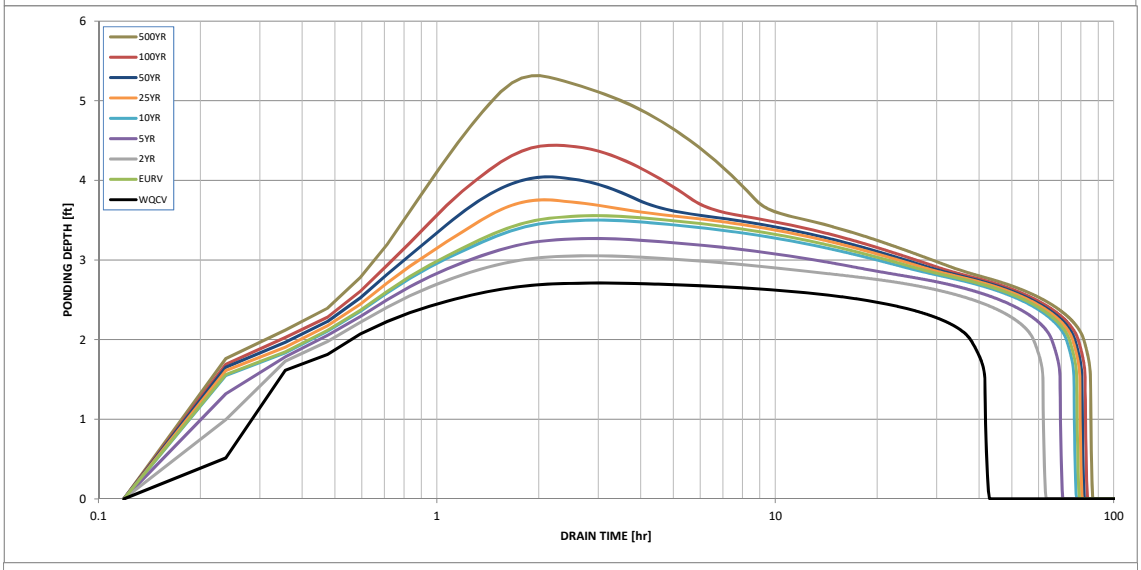
**Routed Hydrograph Results**

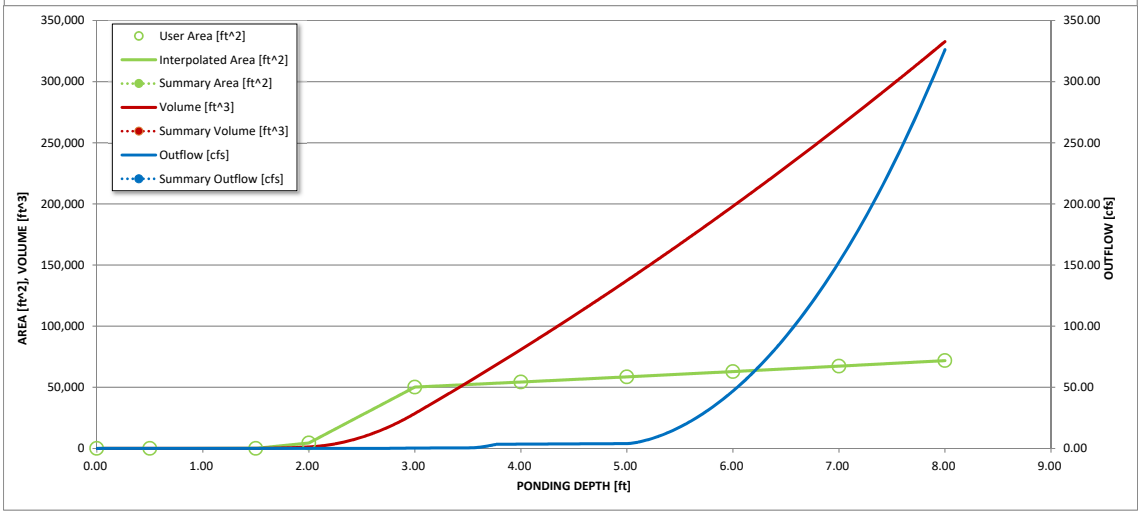
| Design Storm Return Period = | WQCV | EURV | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year | 500 Year |
|---|---|---|---|---|---|---|---|---|---|
| One-Hour Rainfall Depth (in) = | 0.53 | 1.07 | 0.95 | 1.23 | 1.49 | 1.88 | 2.21 | 2.57 | 3.52 |
| Calculated Runoff Volume (acre-ft) = | 0.399 | 1.420 | 0.782 | 1.055 | 1.348 | 1.842 | 2.350 | 2.959 | 4.557 |
| OPTIONAL Override Runoff Volume (acre-ft) = | | | | | | | | | |
| Inflow Hydrograph Volume (acre-ft) = | 0.399 | 1.421 | 0.783 | 1.056 | 1.349 | 1.843 | 2.352 | 2.961 | 4.560 |
| Predevelopment Unit Peak Flow, q (cfs/acre) = | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.14 | 0.33 | 0.82 |
| Predevelopment Peak Q (cfs) = | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.7 | 3.1 | 7.1 | 17.6 |
| Peak Inflow Q (cfs) = | 4.7 | 16.4 | 9.1 | 12.2 | 15.6 | 21.2 | 27.0 | 33.8 | 51.7 |
| Peak Outflow Q (cfs) = | 0.1 | 0.6 | 0.4 | 0.4 | 0.5 | 3.2 | 3.6 | 3.7 | 10.5 |
| Ratio Peak Outflow to Predevelopment Q = | N/A | N/A | N/A | 6.9 | 2.2 | 4.3 | 1.2 | 0.5 | 0.6 |
| Structure Controlling Flow = | Plate | Overflow Grate 1 | Vertical Orifice 1 | Vertical Orifice 1 | Vertical Orifice 1 | Overflow Grate 1 | Outlet Plate 1 | Outlet Plate 1 | Spillway |
| Max Velocity through Grate 1 (fps) = | N/A | 0.01 | N/A | N/A | N/A | 0.4 | 0.5 | 0.5 | 0.5 |
| Max Velocity through Grate 2 (fps) = | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Time to Drain 97% of Inflow Volume (hours) = | 40 | 72 | 59 | 65 | 71 | 73 | 72 | 72 | 70 |
| Time to Drain 99% of Inflow Volume (hours) = | **42** | 76 | 61 | 68 | 75 | 77 | 78 | 78 | 80 |
| Maximum Ponding Depth (ft) = | 2.71 | 3.56 | 3.05 | 3.27 | 3.50 | 3.75 | 4.04 | 4.44 | 5.31 |
| Area at Maximum Ponding Depth (acres) = | 0.85 | 1.20 | 1.16 | 1.18 | 1.20 | 1.22 | 1.25 | 1.29 | 1.38 |
| Maximum Volume Stored (acre-ft) = | 0.367 | 1.305 | 0.715 | 0.971 | 1.245 | 1.548 | 1.907 | 2.415 | 3.574 |

# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)




| S-A-V-D Chart Axis Override | X-axis | Left Y-Axis | Right Y-Axis |
|---|---|---|---|
| minimum bound | | | |
| maximum bound | | | |

# Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

**Storm Inflow Hydrographs** **UD-Detention, Version 3.07 (February 2017)**

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

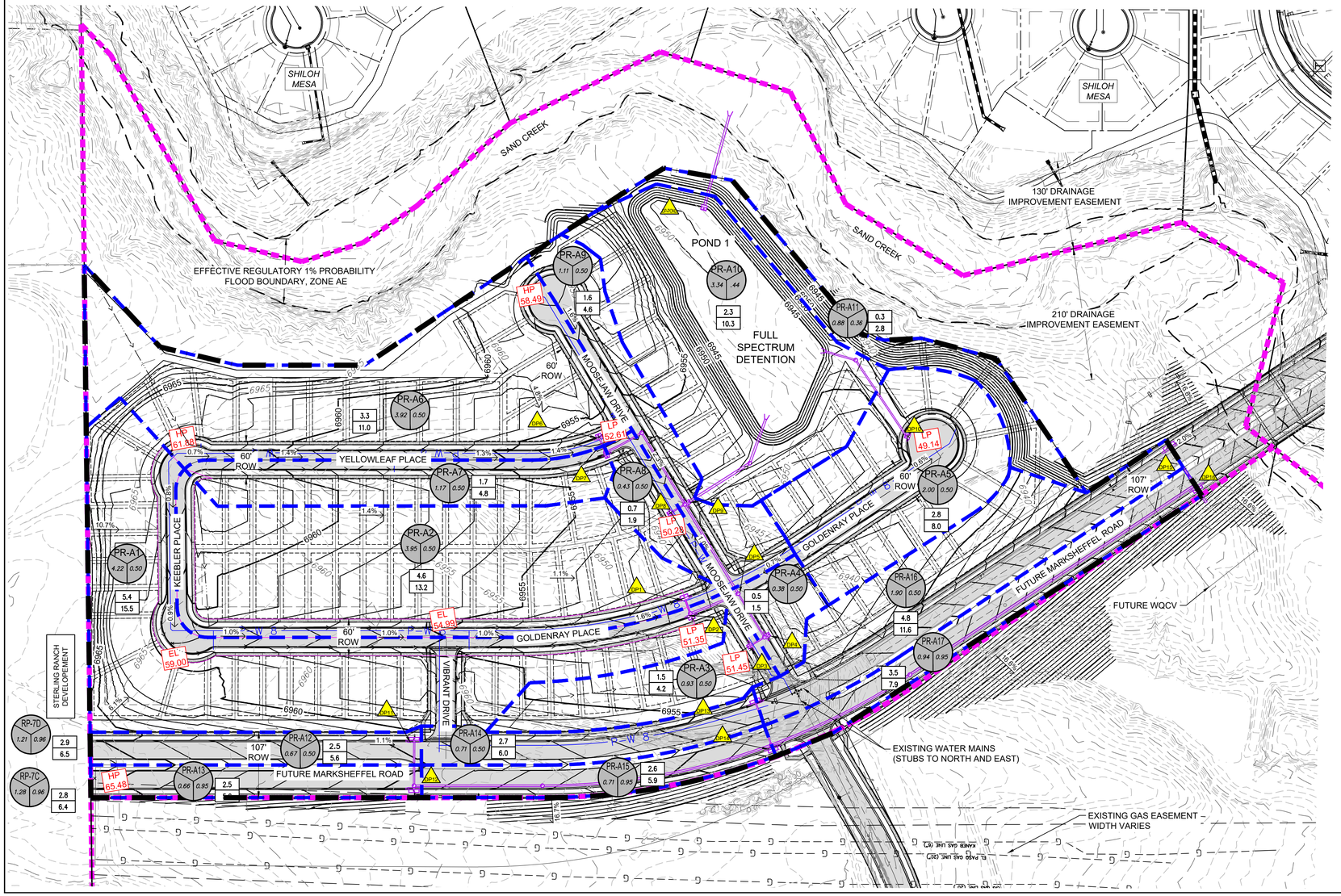
| Time Interval | SOURCE | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK |
|---|---|---|---|---|---|---|---|---|---|---|
| | TIME | WQCV [cfs] | EURV [cfs] | 2 Year [cfs] | 5 Year [cfs] | 10 Year [cfs] | 25 Year [cfs] | 50 Year [cfs] | 100 Year [cfs] | 500 Year [cfs] |
| 7.13 min | 0:00:00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 0:07:08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hydrograph | 0:14:16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Constant | 0:21:23 | 0.21 | 0.71 | 0.40 | 0.54 | 0.68 | 0.91 | 1.15 | 1.43 | 2.13 |
| 0.702 | 0:28:31 | 0.56 | 1.94 | 1.08 | 1.45 | 1.84 | 2.49 | 3.16 | 3.94 | 5.94 |
| | 0:35:39 | 1.44 | 4.97 | 2.78 | 3.72 | 4.73 | 6.40 | 8.11 | 10.13 | 15.25 |
| | 0:42:47 | 3.96 | 13.65 | 7.64 | 10.23 | 12.98 | 17.58 | 22.25 | 27.79 | 41.79 |
| | 0:49:55 | 4.67 | 16.39 | 9.10 | 12.22 | 15.57 | 21.20 | 26.96 | 33.83 | 51.71 |
| | 0:57:02 | 4.45 | 15.68 | 8.68 | 11.68 | 14.89 | 20.30 | 25.83 | 32.45 | 49.83 |
| | 1:04:10 | 4.05 | 14.27 | 7.91 | 10.63 | 13.56 | 18.48 | 23.51 | 29.53 | 45.41 |
| | 1:11:18 | 3.61 | 12.80 | 7.07 | 9.52 | 12.15 | 16.58 | 21.12 | 26.57 | 40.92 |
| | 1:18:26 | 3.10 | 11.10 | 6.11 | 8.25 | 10.54 | 14.41 | 18.39 | 23.18 | 35.82 |
| | 1:25:34 | 2.71 | 9.65 | 5.32 | 7.17 | 9.16 | 12.51 | 16.00 | 20.19 | 31.28 |
| | 1:32:41 | 2.45 | 8.75 | 4.82 | 6.50 | 8.31 | 11.35 | 14.49 | 18.27 | 28.22 |
| | 1:39:49 | 2.01 | 7.28 | 3.99 | 5.39 | 6.90 | 9.46 | 12.10 | 15.27 | 23.68 |
| | 1:46:57 | 1.64 | 5.98 | 3.26 | 4.42 | 5.67 | 7.80 | 9.99 | 12.63 | 19.63 |
| | 1:54:05 | 1.25 | 4.67 | 2.52 | 3.43 | 4.42 | 6.10 | 7.85 | 9.95 | 15.57 |
| | 2:01:13 | 0.92 | 3.53 | 1.88 | 2.58 | 3.34 | 4.65 | 6.00 | 7.65 | 12.05 |
| | 2:08:20 | 0.67 | 2.58 | 1.36 | 1.87 | 2.44 | 3.41 | 4.43 | 5.67 | 9.01 |
| | 2:15:28 | 0.52 | 1.97 | 1.05 | 1.44 | 1.86 | 2.59 | 3.35 | 4.28 | 6.75 |
| | 2:22:36 | 0.43 | 1.61 | 0.86 | 1.18 | 1.52 | 2.11 | 2.72 | 3.46 | 5.42 |
| | 2:29:44 | 0.37 | 1.36 | 0.73 | 1.00 | 1.29 | 1.78 | 2.30 | 2.91 | 4.56 |
| | 2:36:52 | 0.32 | 1.19 | 0.64 | 0.88 | 1.13 | 1.56 | 2.00 | 2.54 | 3.96 |
| | 2:43:59 | 0.29 | 1.07 | 0.58 | 0.79 | 1.01 | 1.40 | 1.80 | 2.28 | 3.54 |
| | 2:51:07 | 0.27 | 0.98 | 0.53 | 0.73 | 0.93 | 1.28 | 1.65 | 2.09 | 3.24 |
| | 2:58:15 | 0.20 | 0.72 | 0.39 | 0.53 | 0.69 | 0.95 | 1.22 | 1.55 | 2.42 |
| | 3:05:23 | 0.14 | 0.53 | 0.29 | 0.39 | 0.50 | 0.69 | 0.89 | 1.12 | 1.75 |
| | 3:12:31 | 0.11 | 0.39 | 0.21 | 0.29 | 0.37 | 0.51 | 0.65 | 0.83 | 1.30 |
| | 3:19:38 | 0.08 | 0.29 | 0.16 | 0.21 | 0.27 | 0.38 | 0.48 | 0.62 | 0.97 |
| | 3:26:46 | 0.06 | 0.21 | 0.11 | 0.15 | 0.20 | 0.27 | 0.35 | 0.45 | 0.71 |
| | 3:33:54 | 0.04 | 0.15 | 0.08 | 0.11 | 0.14 | 0.19 | 0.25 | 0.32 | 0.51 |
| | 3:41:02 | 0.03 | 0.11 | 0.06 | 0.08 | 0.10 | 0.14 | 0.18 | 0.23 | 0.37 |
| | 3:48:10 | 0.02 | 0.07 | 0.04 | 0.05 | 0.07 | 0.10 | 0.13 | 0.16 | 0.26 |
| | 3:55:17 | 0.01 | 0.04 | 0.02 | 0.03 | 0.04 | 0.06 | 0.08 | 0.10 | 0.17 |
| | 4:02:25 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 | 0.03 | 0.04 | 0.06 | 0.10 |
| | 4:09:33 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.04 |
| | 4:16:41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 |
| | 4:23:49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:30:56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:38:04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:45:12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:52:20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:59:28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:06:35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:13:43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:20:51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:27:59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:35:07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:42:14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:49:22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:56:30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:03:38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:10:46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:17:53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:25:01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:32:09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:39:17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:46:25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:53:32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:00:40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:07:48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:14:56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:22:04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:29:11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:36:19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:43:27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:50:35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:57:43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 8:04:50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 8:11:58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 8:19:06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 8:26:14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 8:33:22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Design Point Summary Table | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Design Point | Upstream Area (Acres) | Upstream Q5 (cfs) | Upstream Q100 (cfs) | Subbasins Included | Inlet Name | Inlet Type | Inlet Size (ft) | Outlet Pipe Size/Type | Downstream Design Point |
| DP1 | 4.22 | 4.6 | 13.2 | A2 | A2 | D 10 R | 8 | 24" RCP/HP | D2 |
| DP2 | 8.17 | 10.0 | 28.7 | A1,A2 | A1 | D 10 R | 8 | 30" RCP/HP | D5 |
| DP3 | 0.93 | 1.5 | 4.2 | A3 | A3 | D 10 R | 6 | 18" RCP/HP | D4 |
| DP4 | 1.31 | 2.0 | 5.7 | A3,A4 | A4 | D 10 R | 6 | 18" RCP/HP | D5 |
| DP5 | 9.48 | 12.0 | 34.4 | A1,A2,A3,A4 | D5 | MH | 6 | 30" RCP/HP | D9 |
| DP6 | 3.92 | 3.3 | 11.0 | A6 | A6 | D 10 R | 8 | 24" RCP/HP | D7 |
| DP7 | 5.08 | 5.0 | 15.9 | A6,A7 | A5 | D 10 R | 6 | 24" RCP/HP | D9 |
| DP8 | 0.43 | 0.7 | 1.9 | A8 | A7 | D 10 R | 6 | 18" RCP/HP | D9 |
| DP9 | 16.10 | 19.3 | 56.8 | A1,A2,A3,A4,A6, A7,A8,A9 | A8 | D 10 R | 8 | 36" RCP/HP | D10 |
| DP10 | 2.00 | 2.8 | 8.0 | A5 | A5 | D 10 R | 0 | 0 | 0 |
| DP Pond | 21.45 | 24.4 | 75.1 | A1,A2,A3,A4,A5, A6,A7,A8,A9,A10 | A9 | Detention Outlet Structure | Orifice Plate: 1.02 Sq. In. (Stage 0', .9' & 1.06') Overflow Weir/Grate: L=2', W=2' w/ slope: 0 Overflow Weir/Grate: (Stage: .4' to 6') Structure Outlet Pipe: 18" RCP/HP (10.5" Orifice Plate. | | - |
| Detention Discharge | - | 0.4 | 3.7 | | | | | | Sand Creek |
| DP11 | 1.88 | 5.4 | 12.1 | A12 | A12 | D 10 R | 16 | 18" RCP/HP | D12 |
| DP12 | 3.82 | 10.7 | 24.0 | A12,A13 | A13 | D 10 R | 16 | 24" RCP/HP | D14 |
| DP13 | 0.71 | 2.7 | 6.0 | A14 | A14 | D 10 R | 16 | 18" RCP/HP | D14 |
| DP14 | 5.24 | 16.0 | 36.0 | A12,A13, A14,A15 | A15 | D 10 R | 16 | 30" RCP/HP | D16 |
| DP15 | 1.90 | 4.8 | 11.6 | A16 | A16 | D 10 R | 20 | 18" RCP/HP | D16 |
| DP16 | 8.09 | 24.3 | 55.4 | A12,A13, A14, A15,A16,A17 | A17 | D 10 R | 16 | 30" RCP/HP | Sand Creek |

# ASPEN MEADOWS

## COLORADO SPRINGS, CO

# PROPOSED CONDITIONS MAP




| Basin Summary Table | | | |
|---|---|---|---|
| Aspen Meadows | | | |
| Area ID | Area (Acres) | Q5 (cfs) | Q100 (cfs) |
| RP-7C | 1.28 | 2.8 | 6.4 |
| RP-7D | 1.21 | 2.9 | 6.5 |
| A1 | 4.22 | 5.4 | 15.5 |
| A2 | 3.95 | 4.6 | 13.2 |
| A3 | 0.93 | 1.5 | 4.2 |
| A4 | 0.38 | 0.5 | 1.5 |
| A5 | 2.00 | 2.8 | 8.0 |
| A6 | 3.92 | 3.3 | 11.0 |
| A7 | 1.17 | 1.7 | 4.8 |
| | | | |
| A8 | 0.43 | 0.7 | 1.9 |
| A9 | 1.11 | 1.6 | 4.6 |
| A10 | 3.34 | 2.3 | 10.3 |
| A11 | 0.88 | 0.3 | 2.8 |
| A12 | 0.67 | 2.5 | 5.6 |
| A13 | 0.66 | 2.5 | 5.6 |
| A14 | 0.71 | 2.7 | 6.0 |
| A15 | 0.71 | 2.6 | 5.9 |
| A16 | 1.90 | 4.8 | 11.6 |
| A17 | 0.94 | 3.5 | 7.9 |

NOTES:
1. Spot elevations subject to change with final grading design and construction.

## LEGEND

- SUB-BASIN BOUNDARY
- EXISTING CONTOUR (4900)
- PROPOSED CONTOUR (6970)
- FLOW DIRECTION (XXX)
- LOW POINT AND ELEVATION (LP XX)
- HIGH POINT AND ELEVATION (HP XX)
- SPOT ELEVATION (95.71)
- SWALE
- DESIGN POINT (x)
- SUB BASIN DESIGNATION (XX)
- SUB BASIN RUNOFF COEFFICIENT (XX)
- SUB BASIN AREA (AC.) (X.XX)
- 5-YEAR STORM EVENT PEAK FLOW (CFS) (0.0)
- 100-YEAR STORM EVENT PEAK FLOW (CFS) (0.0)
- PROPERTY LINE
- STORM PIPE

GRAPHIC SCALE

100' 0' 100' 200'

( IN FEET )
1 inch = 100 ft.

Know what's below. Call before you dig.

CONSULTANT:

CIVIL ENGINEER:


Matrix DESIGN GROUP
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208


LANDSCAPE ARCHITECT:


Thomas & Thomas Planning-Urban
614 N. Tejon Street
Colorado Springs, CO 80903
Phone (719)578-8777


PROJECT:

ASPEN MEADOWS
FILING NO.1
DEVELOPMENT PLAN
CITY OF COLORADO SPRINGS
JANUARY 2019

OWNER:


COLA, LLC
555 MIDDLE PARKWAY
COLORADO SPRINGS, CO 80921
(719)459-0807


DEVELOPER:


COLA, LLC
555 MIDDLE PARKWAY
COLORADO SPRINGS, CO 80921
(719)459-0807


CITY PLANNING FILE NO: AR DP XXXXXXXXX

ISSUE: JANUARY, 2019

| DRAWING INFORMATION: | |
|---|---|
| PROJECT NO: | 17.886.004.000 |
| DRAWN BY: | CRAIG DOLD |
| CHECKED BY: | JEFF ODOR |
| APPROVED BY: | JEFF ODOR |
| SHEET TITLE: | |

DRAINAGE REPORT MAP

**DR02**

SHEET 2 OF 3

INNOVATIVE DESIGN. **CLASSIC RESULTS.**

# FINAL DRAINAGE REPORT
# FOR
# RETREAT AT TIMBERRIDGE
# FILING NO. 1

Prepared for:
**TIMBERRIDGE DEVELOPMENT GROUP, LLC**
2138 FLYING HORSE CLUB DRIVE
COLORADO SPRINGS CO 80921
(719) 592-9333

Prepared by:
**CLASSIC CONSULTING**
619 N. CASCADE AVE SUITE 200
COLORADO SPRINGS CO 80903
(719) 785-0790

Job No. 1185.00

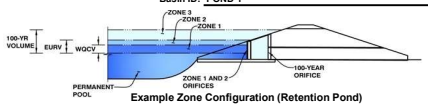
PCD Project No. SF-19-009

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

**UD-Detention, Version 3.07 (February 2017)**

**Project:** RETREAT AT TIMBERRIDGE FILING NO. 1

**Basin ID:** POND 1




**Example Zone Configuration (Retention Pond)**

## Required Volume Calculation

| | | | |
|---|---|---|---|
| Selected BMP Type = | EDB | | |
| Watershed Area = | 29.40 | acres | |
| Watershed Length = | 2,130 | ft | |
| Watershed Slope = | 0.018 | ft/ft | |
| Watershed Imperviousness = | 13.80% | percent | |
| Percentage Hydrologic Soil Group A = | 0.0% | percent | |
| Percentage Hydrologic Soil Group B = | 100.0% | percent | |
| Percentage Hydrologic Soil Groups C/D = | 0.0% | percent | |
| Desired WQCV Drain Time = | 40.0 | hours | |
| Location for 1-hr Rainfall Depths = | User Input | | |
| Water Quality Capture Volume (WQCV) = | 0.214 | acre-feet | |
| Excess Urban Runoff Volume (EURV) = | 0.391 | acre-feet | |
| 2-yr Runoff Volume (P1 = 1.19 in.) = | 0.278 | acre-feet | |
| 5-yr Runoff Volume (P1 = 1.5 in.) = | 0.421 | acre-feet | |
| 10-yr Runoff Volume (P1 = 1.75 in.) = | 0.832 | acre-feet | |
| 25-yr Runoff Volume (P1 = 2 in.) = | 1.922 | acre-feet | |
| 50-yr Runoff Volume (P1 = 2.25 in.) = | 2.610 | acre-feet | |
| 100-yr Runoff Volume (P1 = 2.52 in.) = | 3.508 | acre-feet | |
| 500-yr Runoff Volume (P1 = 3.85 in.) = | 6.448 | acre-feet | |
| Approximate 2-yr Detention Volume = | 0.258 | acre-feet | |
| Approximate 5-yr Detention Volume = | 0.394 | acre-feet | |
| Approximate 10-yr Detention Volume = | 0.720 | acre-feet | |
| Approximate 25-yr Detention Volume = | 0.951 | acre-feet | |
| Approximate 50-yr Detention Volume = | 1.002 | acre-feet | |
| Approximate 100-yr Detention Volume = | 1.268 | acre-feet | |

Optional User Override 1-hr Precipitation

| | |
|---|---|
| 1.19 | inches |
| 1.50 | inches |
| 1.75 | inches |
| 2.00 | inches |
| 2.25 | inches |
| 2.52 | inches |
| 3.85 | inches |

## Stage-Storage Calculation

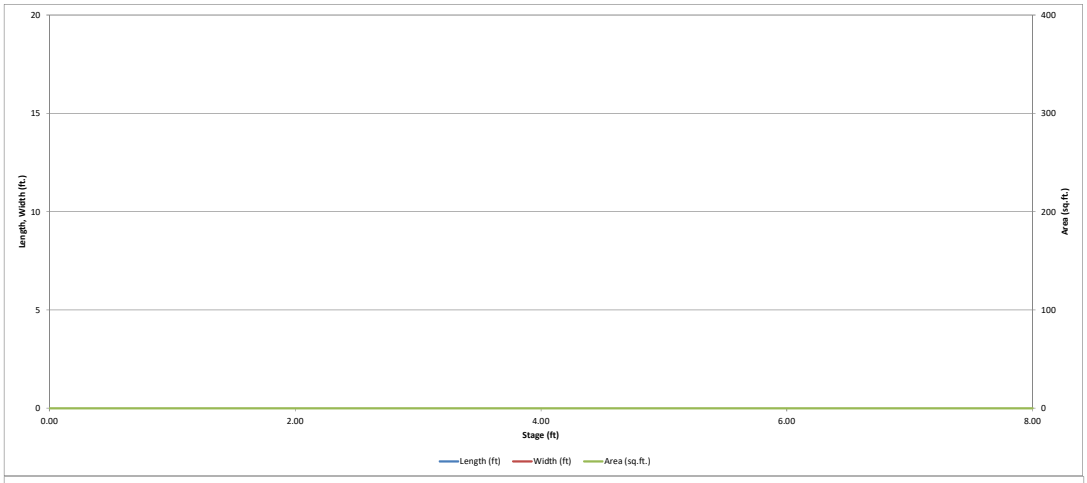
| | | |
|---|---|---|
| Zone 1 Volume (WQCV) = | 0.214 | acre-feet |
| Zone 2 Volume (EURV - Zone 1) = | 0.177 | acre-feet |
| Zone 3 Volume (100-year - Zones 1 & 2) = | 0.877 | acre-feet |
| Total Detention Basin Volume = | 1.268 | acre-feet |
| Initial Surcharge Volume (ISV) = | user | ft^3 |
| Initial Surcharge Depth (ISD) = | user | ft |
| Total Available Detention Depth ($H_{total}$) = | user | ft |
| Depth of Trickle Channel ($H_{TC}$) = | user | ft |
| Slope of Trickle Channel ($S_{TC}$) = | user | ft/ft |
| Slopes of Main Basin Sides ($S_{main}$) = | user | H:V |
| Basin Length-to-Width Ratio ($R_{L/W}$) = | user | |
| Initial Surcharge Area ($A_{ISV}$) = | user | ft^2 |
| Surcharge Volume Length ($L_{ISV}$) = | user | ft |
| Surcharge Volume Width ($W_{ISV}$) = | user | ft |
| Depth of Basin Floor ($H_{FLOOR}$) = | user | ft |
| Length of Basin Floor ($L_{FLOOR}$) = | user | ft |
| Width of Basin Floor ($W_{FLOOR}$) = | user | ft |
| Area of Basin Floor ($A_{FLOOR}$) = | user | ft^2 |
| Volume of Basin Floor ($V_{FLOOR}$) = | user | ft^3 |
| Depth of Main Basin ($H_{MAIN}$) = | user | ft |
| Length of Main Basin ($L_{MAIN}$) = | user | ft |
| Width of Main Basin ($W_{MAIN}$) = | user | ft |
| Area of Main Basin ($A_{MAIN}$) = | user | ft^2 |
| Volume of Main Basin ($V_{MAIN}$) = | user | ft^3 |
| Calculated Total Basin Volume ($V_{total}$) = | user | acre-feet |

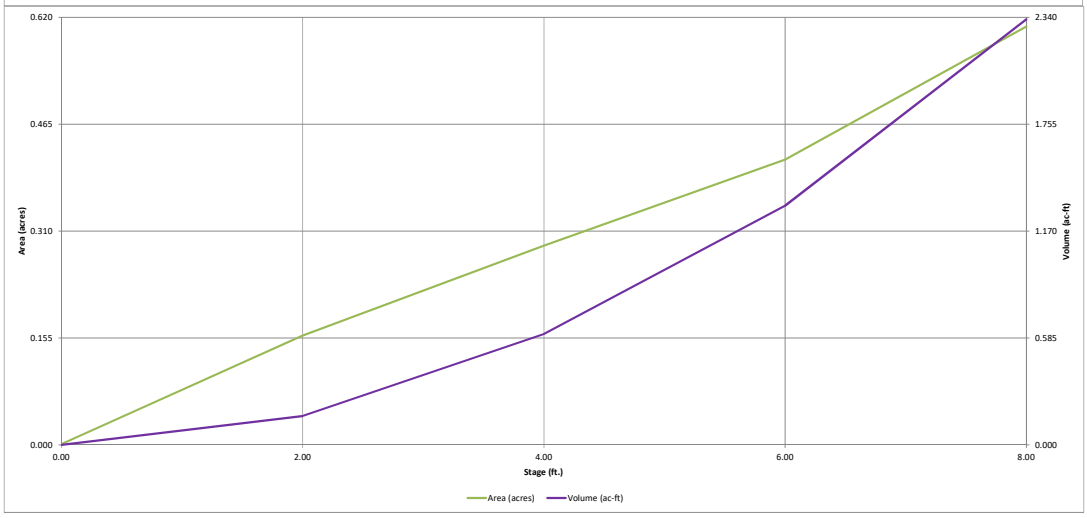
Depth Increment = 1 ft

| Stage - Storage Description | Stage (ft) | Optional Override Stage (ft) | Length (ft) | Width (ft) | Area (ft^2) | Optional Override Area (ft^2) | Area (acre) | Volume (ft^3) | Volume (ac-ft) |
|---|---|---|---|---|---|---|---|---|---|
| **Top of Micropool** | -- | 0.00 | -- | -- | -- | 50 | 0.001 | | |
| | -- | 2.00 | -- | -- | -- | 6,905 | 0.159 | 6,886 | 0.158 |
| | -- | 4.00 | -- | -- | -- | 12,575 | 0.289 | 26,435 | 0.607 |
| | -- | 6.00 | -- | -- | -- | 18,016 | 0.414 | 57,026 | 1.309 |
| | -- | 8.00 | -- | -- | -- | 26,430 | 0.607 | 101,472 | 2.329 |

## DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



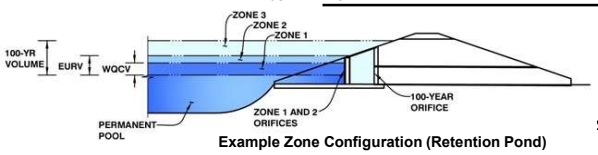



# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

**Project:** RETREAT AT TIMBERRIDGE FILING NO. 1

**Basin ID:** POND 1




Example Zone Configuration (Retention Pond)

| | Stage (ft) | Zone Volume (ac-ft) | Outlet Type |
|---|---|---|---|
| Zone 1 (WQCV) | 2.33 | 0.214 | Orifice Plate |
| Zone 2 (EURV) | 3.18 | 0.177 | Orifice Plate |
| Zone 3 (100-year) | 5.91 | 0.877 | Weir&Pipe (Restrict) |
| | | 1.268 | Total |

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

| | | | | | |
|---|---|---|---|---|---|
| Underdrain Orifice Invert Depth = | N/A | ft (distance below the filtration media surface) | Underdrain Orifice Area = | N/A | $ft^2$ |
| Underdrain Orifice Diameter = | N/A | inches | Underdrain Orifice Centroid = | N/A | feet |

**Calculated Parameters for Underdrain**

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

| | | | | | |
|---|---|---|---|---|---|
| Invert of Lowest Orifice = | 0.00 | ft (relative to basin bottom at Stage = 0 ft) | WQ Orifice Area per Row = | N/A | $ft^2$ |
| Depth at top of Zone using Orifice Plate = | 3.50 | ft (relative to basin bottom at Stage = 0 ft) | Elliptical Half-Width = | N/A | feet |
| Orifice Plate: Orifice Vertical Spacing = | 14.00 | inches | Elliptical Slot Centroid = | N/A | feet |
| Orifice Plate: Orifice Area per Row = | N/A | inches | Elliptical Slot Area = | N/A | $ft^2$ |

**Calculated Parameters for Plate**

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

| | Row 1 (required) | Row 2 (optional) | Row 3 (optional) | Row 4 (optional) | Row 5 (optional) | Row 6 (optional) | Row 7 (optional) | Row 8 (optional) |
|---|---|---|---|---|---|---|---|---|
| Stage of Orifice Centroid (ft) | 0.00 | 1.20 | 2.40 | | | | | |
| Orifice Area (sq. inches) | 1.20 | 1.31 | 1.31 | | | | | |

| | Row 9 (optional) | Row 10 (optional) | Row 11 (optional) | Row 12 (optional) | Row 13 (optional) | Row 14 (optional) | Row 15 (optional) | Row 16 (optional) |
|---|---|---|---|---|---|---|---|---|
| Stage of Orifice Centroid (ft) | | | | | | | | |
| Orifice Area (sq. inches) | | | | | | | | |

**User Input: Vertical Orifice (Circular or Rectangular)**

| | Not Selected | Not Selected | |
|---|---|---|---|
| Invert of Vertical Orifice = | N/A | N/A | ft (relative to basin bottom at Stage = 0 ft) |
| Depth at top of Zone using Vertical Orifice = | N/A | N/A | ft (relative to basin bottom at Stage = 0 ft) |
| Vertical Orifice Diameter = | N/A | N/A | inches |

**Calculated Parameters for Vertical Orifice**

| | Not Selected | Not Selected | |
|---|---|---|---|
| Vertical Orifice Area = | N/A | N/A | $ft^2$ |
| Vertical Orifice Centroid = | N/A | N/A | feet |

**User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)**

| | Zone 3 Weir | Not Selected | |
|---|---|---|---|
| Overflow Weir Front Edge Height, Ho = | 3.50 | N/A | ft (relative to basin bottom at Stage = 0 ft) |
| Overflow Weir Front Edge Length = | 4.00 | N/A | feet |
| Overflow Weir Slope = | 4.00 | N/A | H:V (enter zero for flat grate) |
| Horiz. Length of Weir Sides = | 4.00 | N/A | feet |
| Overflow Grate Open Area % = | 75% | N/A | %, grate open area/total area |
| Debris Clogging % = | 50% | N/A | % |

**Calculated Parameters for Overflow Weir**

| | Zone 3 Weir | Not Selected | |
|---|---|---|---|
| Height of Grate Upper Edge, $H_t$ = | 4.50 | N/A | feet |
| Over Flow Weir Slope Length = | 4.12 | N/A | feet |
| Grate Open Area / 100-yr Orifice Area = | 7.00 | N/A | should be ≥ 4 |
| Overflow Grate Open Area w/o Debris = | 12.37 | N/A | $ft^2$ |
| Overflow Grate Open Area w/ Debris = | 6.18 | N/A | $ft^2$ |

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

| | Zone 3 Restrictor | Not Selected | |
|---|---|---|---|
| Depth to Invert of Outlet Pipe = | 2.50 | N/A | ft (distance below basin bottom at Stage = 0 ft) |
| Outlet Pipe Diameter = | 18.00 | N/A | inches |
| Restrictor Plate Height Above Pipe Invert = | 18.00 | | inches |

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

| | Zone 3 Restrictor | Not Selected | |
|---|---|---|---|
| Outlet Orifice Area = | 1.77 | N/A | $ft^2$ |
| Outlet Orifice Centroid = | 0.75 | N/A | feet |
| Half-Central Angle of Restrictor Plate on Pipe = | 3.14 | N/A | radians |

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

| | | |
|---|---|---|
| Spillway Invert Stage= | 6.30 | ft (relative to basin bottom at Stage = 0 ft) |
| Spillway Crest Length = | 30.00 | feet |
| Spillway End Slopes = | 3.00 | H:V |
| Freeboard above Max Water Surface = | 1.00 | feet |

**Calculated Parameters for Spillway**

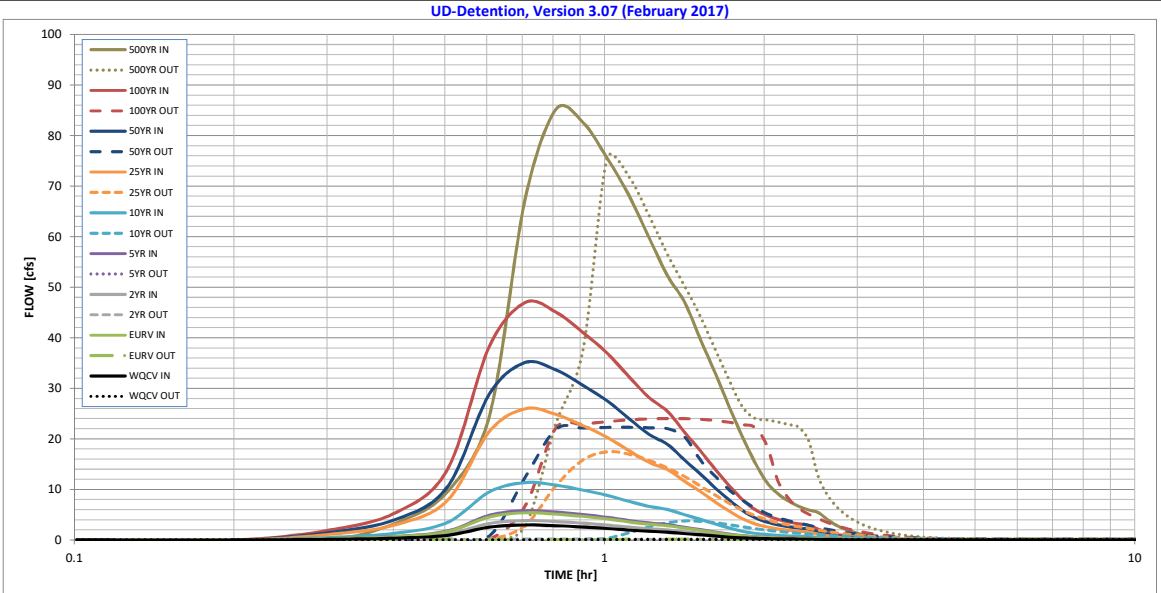
| | | |
|---|---|---|
| Spillway Design Flow Depth= | 0.62 | feet |
| Stage at Top of Freeboard = | 7.92 | feet |
| Basin Area at Top of Freeboard = | 0.60 | acres |

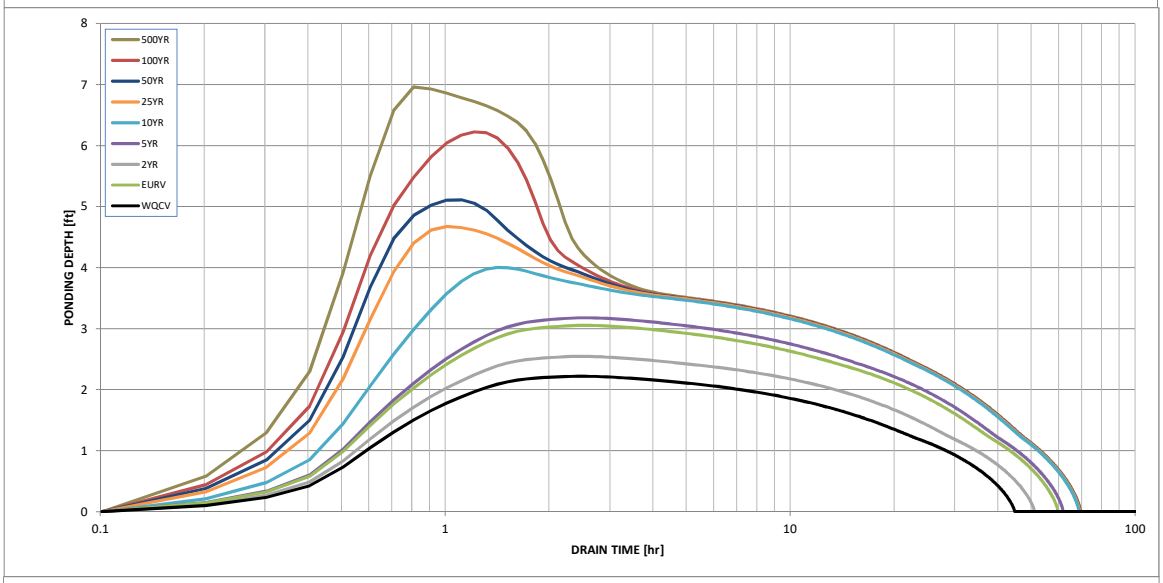
**Routed Hydrograph Results**

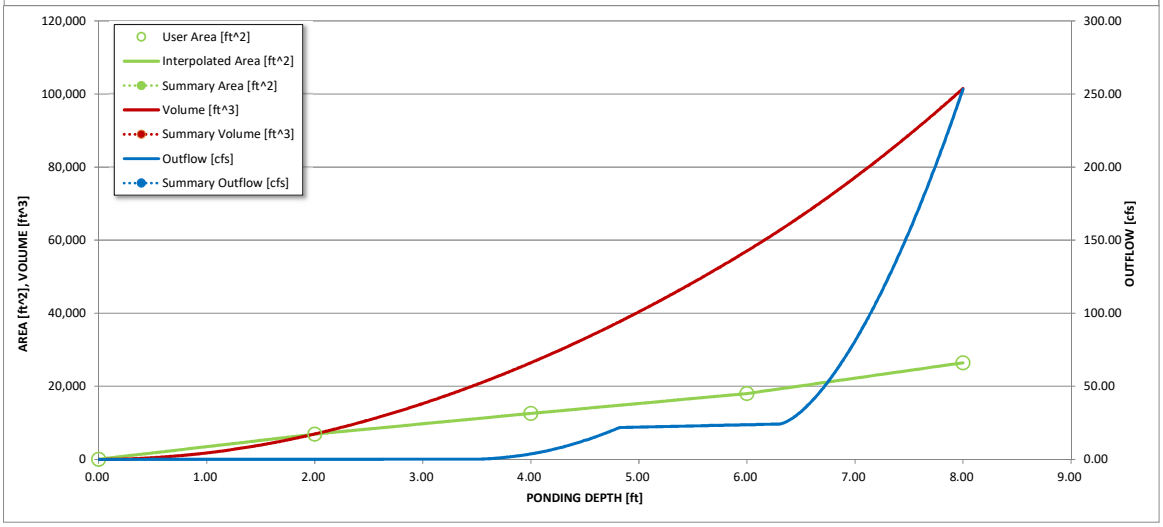
| Design Storm Return Period = | WQCV | EURV | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year | 500 Year |
|---|---|---|---|---|---|---|---|---|---|
| One-Hour Rainfall Depth (in) = | 0.53 | 1.07 | 1.19 | 1.50 | 1.75 | 2.00 | 2.25 | 2.52 | 3.85 |
| Calculated Runoff Volume (acre-ft) = | 0.214 | 0.391 | 0.278 | 0.421 | 0.832 | 1.922 | 2.610 | 3.508 | 6.448 |
| OPTIONAL Override Runoff Volume (acre-ft) = | | | | | | | | | |
| Inflow Hydrograph Volume (acre-ft) = | 0.214 | 0.391 | 0.277 | 0.421 | 0.832 | 1.922 | 2.610 | 3.508 | 6.443 |
| Predevelopment Unit Peak Flow, q (cfs/acre) = | 0.00 | 0.00 | 0.01 | 0.02 | 0.15 | 0.53 | 0.73 | 0.99 | 1.81 |
| Predevelopment Peak Q (cfs) = | 0.0 | 0.0 | 0.3 | 0.479 | 4.5 | 15.5 | 21.5 | 29.2 | 53.1 |
| Peak Inflow Q (cfs) = | 3.0 | 5.4 | 3.8 | 5.8 | 11.3 | 26.0 | 35.1 | 47.0 | 85.1 |
| Peak Outflow Q (cfs) = | 0.1 | 0.2 | 0.1 | 0.172 | 3.8 | 17.5 | 22.3 | 24.0 | 75.6 |
| Ratio Peak Outflow to Predevelopment Q = | N/A | N/A | N/A | 0.4 | 0.8 | 1.1 | 1.0 | 0.8 | 1.4 |
| Structure Controlling Flow = | Plate | Plate | Plate | Plate | Overflow Grate 1 | Overflow Grate 1 | Outlet Plate 1 | Outlet Plate 1 | Spillway |
| Max Velocity through Grate 1 (fps) = | N/A | N/A | N/A | N/A | 0.3 | 1.4 | 1.8 | 1.9 | 2.0 |
| Max Velocity through Grate 2 (fps) = | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Time to Drain 97% of Inflow Volume (hours) = | 41 | 53 | 46 | 55 | 57 | 48 | 44 | 39 | 28 |
| Time to Drain 99% of Inflow Volume (hours) = | **43** | 57 | 49 | 59 | 64 | 60 | 58 | 55 | 47 |
| Maximum Ponding Depth (ft) = | 2.22 | 3.05 | 2.54 | 3.18 | 4.00 | 4.67 | 5.11 | 6.22 | 6.96 |
| Area at Maximum Ponding Depth (acres) = | 0.17 | 0.23 | 0.19 | 0.23 | 0.29 | 0.33 | 0.36 | 0.43 | 0.51 |
| Maximum Volume Stored (acre-ft) = | 0.194 | 0.362 | 0.255 | 0.390 | 0.607 | 0.814 | 0.962 | 1.402 | 1.746 |

# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)




| S-A-V-D Chart Axis Override | X-axis | Left Y-Axis | Right Y-Axis |
|---|---|---|---|
| minimum bound | | | |
| maximum bound | | | |

# Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

**Storm Inflow Hydrographs** **UD-Detention, Version 3.07 (February 2017)**

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

| Time Interval | SOURCE | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK |
|---|---|---|---|---|---|---|---|---|---|---|
| | TIME | WQCV [cfs] | EURV [cfs] | 2 Year [cfs] | 5 Year [cfs] | 10 Year [cfs] | 25 Year [cfs] | 50 Year [cfs] | 100 Year [cfs] | 500 Year [cfs] |
| 6.07 min | 0:00:00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 0:06:04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hydrograph | 0:12:08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Constant | 0:18:13 | 0.13 | 0.24 | 0.17 | 0.26 | 0.50 | 1.12 | 1.49 | 1.97 | 3.37 |
| 0.824 | 0:24:17 | 0.36 | 0.65 | 0.46 | 0.69 | 1.35 | 3.05 | 4.10 | 5.45 | 9.57 |
| | 0:30:21 | 0.92 | 1.66 | 1.19 | 1.78 | 3.47 | 7.83 | 10.53 | 13.99 | 24.58 |
| | 0:36:25 | 2.53 | 4.56 | 3.26 | 4.90 | 9.53 | 21.50 | 28.90 | 38.38 | 67.32 |
| | 0:42:29 | 2.97 | 5.38 | 3.83 | 5.78 | 11.35 | 25.95 | 35.09 | 46.96 | 85.14 |
| | 0:48:34 | 2.82 | 5.12 | 3.65 | 5.51 | 10.84 | 24.85 | 33.63 | 45.09 | 82.62 |
| | 0:54:38 | 2.57 | 4.66 | 3.32 | 5.02 | 9.87 | 22.62 | 30.61 | 41.03 | 75.52 |
| | 1:00:42 | 2.28 | 4.15 | 2.95 | 4.47 | 8.82 | 20.30 | 27.52 | 36.95 | 68.09 |
| | 1:06:46 | 1.95 | 3.57 | 2.53 | 3.85 | 7.63 | 17.65 | 23.98 | 32.28 | 59.76 |
| | 1:12:50 | 1.71 | 3.12 | 2.21 | 3.36 | 6.64 | 15.33 | 20.88 | 28.15 | 52.26 |
| | 1:18:55 | 1.54 | 2.82 | 2.00 | 3.04 | 6.02 | 13.90 | 18.90 | 25.44 | 47.02 |
| | 1:24:59 | 1.26 | 2.32 | 1.64 | 2.50 | 4.98 | 11.59 | 15.79 | 21.29 | 39.62 |
| | 1:31:03 | 1.02 | 1.88 | 1.33 | 2.03 | 4.08 | 9.55 | 13.04 | 17.63 | 32.90 |
| | 1:37:07 | 0.77 | 1.44 | 1.01 | 1.55 | 3.15 | 7.49 | 10.27 | 13.93 | 26.25 |
| | 1:43:11 | 0.56 | 1.06 | 0.74 | 1.15 | 2.36 | 5.70 | 7.87 | 10.73 | 20.40 |
| | 1:49:16 | 0.41 | 0.77 | 0.54 | 0.84 | 1.70 | 4.19 | 5.82 | 7.99 | 15.35 |
| | 1:55:20 | 0.32 | 0.60 | 0.42 | 0.65 | 1.32 | 3.18 | 4.40 | 6.01 | 11.43 |
| | 2:01:24 | 0.27 | 0.50 | 0.35 | 0.54 | 1.08 | 2.59 | 3.56 | 4.84 | 9.13 |
| | 2:07:28 | 0.23 | 0.42 | 0.30 | 0.46 | 0.92 | 2.19 | 3.00 | 4.08 | 7.66 |
| | 2:13:32 | 0.20 | 0.37 | 0.26 | 0.40 | 0.80 | 1.91 | 2.62 | 3.55 | 6.65 |
| | 2:19:37 | 0.18 | 0.33 | 0.24 | 0.36 | 0.72 | 1.71 | 2.35 | 3.18 | 5.93 |
| | 2:25:41 | 0.17 | 0.31 | 0.22 | 0.33 | 0.67 | 1.57 | 2.15 | 2.91 | 5.42 |
| | 2:31:45 | 0.12 | 0.23 | 0.16 | 0.24 | 0.49 | 1.16 | 1.59 | 2.16 | 4.10 |
| | 2:37:49 | 0.09 | 0.17 | 0.12 | 0.18 | 0.36 | 0.85 | 1.16 | 1.57 | 2.96 |
| | 2:43:53 | 0.07 | 0.12 | 0.09 | 0.13 | 0.26 | 0.62 | 0.85 | 1.16 | 2.19 |
| | 2:49:58 | 0.05 | 0.09 | 0.06 | 0.10 | 0.19 | 0.46 | 0.63 | 0.86 | 1.63 |
| | 2:56:02 | 0.03 | 0.06 | 0.04 | 0.07 | 0.14 | 0.33 | 0.46 | 0.63 | 1.20 |
| | 3:02:06 | 0.02 | 0.04 | 0.03 | 0.05 | 0.10 | 0.24 | 0.33 | 0.45 | 0.86 |
| | 3:08:10 | 0.02 | 0.03 | 0.02 | 0.03 | 0.07 | 0.17 | 0.24 | 0.33 | 0.63 |
| | 3:14:14 | 0.01 | 0.02 | 0.01 | 0.02 | 0.05 | 0.12 | 0.17 | 0.23 | 0.44 |
| | 3:20:19 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 0.07 | 0.10 | 0.15 | 0.29 |
| | 3:26:23 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.04 | 0.06 | 0.08 | 0.17 |
| | 3:32:27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.04 | 0.08 |
| | 3:38:31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.02 |
| | 3:44:35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3:50:40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3:56:44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:02:48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:08:52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:14:56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:21:01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:27:05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:33:09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:39:13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:45:17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:51:22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:57:26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:03:30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:09:34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:15:38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:21:43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:27:47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:33:51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:39:55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:45:59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:52:04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:58:08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:04:12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:10:16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:16:20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:22:25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:28:29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:34:33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:40:37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:46:41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:52:46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:58:50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:04:54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:10:58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7:17:02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

**Summary Stage-Area-Volume-Discharge Relationships**

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

| Stage - Storage Description | Stage [ft] | Area [ft^2] | Area [acres] | Volume [ft^3] | Volume [ac-ft] | Total Outflow [cfs] |
|---|---|---|---|---|---|---|
| | 1.00 | 3,443 | 0.079 | 1,729 | 0.040 | 0.04 |
| | 2.00 | 6,871 | 0.158 | 6,886 | 0.158 | 0.10 |
| WQCV | 2.22 | 7,529 | 0.173 | 8,543 | 0.196 | 0.10 |
| 2 YR. | 2.54 | 8,436 | 0.194 | 11,097 | 0.255 | 0.13 |
| | 3.00 | 9,740 | 0.224 | 15,277 | 0.351 | 0.16 |
| EURV | 3.05 | 9,882 | 0.227 | 15,768 | 0.362 | 0.16 |
| 5 YR. | 3.18 | 10,250 | 0.235 | 17,077 | 0.392 | 0.17 |
| | 4.00 | 12,575 | 0.289 | 26,435 | 0.607 | 3.73 |
| | 5.00 | 15,295 | 0.351 | 40,370 | 0.927 | 22.11 |
| | 6.00 | 18,016 | 0.414 | 57,026 | 1.309 | 23.69 |
| 100 YR. | 6.22 | 18,942 | 0.435 | 61,091 | 1.402 | 24.02 |
| | 7.00 | 22,223 | 0.510 | 77,145 | 1.771 | 80.83 |
| | 8.00 | 26,430 | 0.607 | 101,472 | 2.329 | 253.19 |
| | 0.00 | 50 | 0.001 | 0 | 0.000 | 0.00 |

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

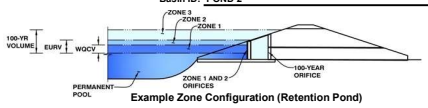
Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

**Project:** RETREAT AT TIMBERRIDGE FILING NO. 1

**Basin ID:** POND 2




**Example Zone Configuration (Retention Pond)**

## Required Volume Calculation

| | | | |
|---|---|---|---|
| Selected BMP Type = | EDB | | |
| Watershed Area = | 100.40 | acres | |
| Watershed Length = | 4,000 | ft | |
| Watershed Slope = | 0.032 | ft/ft | |
| Watershed Imperviousness = | 21.60% | percent | |
| Percentage Hydrologic Soil Group A = | 0.0% | percent | |
| Percentage Hydrologic Soil Group B = | 100.0% | percent | |
| Percentage Hydrologic Soil Groups C/D = | 0.0% | percent | |
| Desired WQCV Drain Time = | 40.0 | hours | |
| Location for 1-hr Rainfall Depths = | User Input | | |
| Water Quality Capture Volume (WQCV) = | 1.022 | acre-feet | |
| Excess Urban Runoff Volume (EURV) = | 2.168 | acre-feet | |
| 2-yr Runoff Volume (P1 = 1.19 in.) = | 1.608 | acre-feet | |
| 5-yr Runoff Volume (P1 = 1.5 in.) = | 2.351 | acre-feet | |
| 10-yr Runoff Volume (P1 = 1.75 in.) = | 3.953 | acre-feet | |
| 25-yr Runoff Volume (P1 = 2 in.) = | 7.552 | acre-feet | |
| 50-yr Runoff Volume (P1 = 2.25 in.) = | 9.864 | acre-feet | |
| 100-yr Runoff Volume (P1 = 2.52 in.) = | 12.887 | acre-feet | |
| 500-yr Runoff Volume (P1 = 3.85 in.) = | 23.106 | acre-feet | |
| Approximate 2-yr Detention Volume = | 1.499 | acre-feet | |
| Approximate 5-yr Detention Volume = | 2.205 | acre-feet | |
| Approximate 10-yr Detention Volume = | 3.488 | acre-feet | |
| Approximate 25-yr Detention Volume = | 4.261 | acre-feet | |
| Approximate 50-yr Detention Volume = | 4.500 | acre-feet | |
| Approximate 100-yr Detention Volume = | 5.494 | acre-feet | |

Optional User Override 1-hr Precipitation

| | |
|---|---|
| 1.19 | inches |
| 1.50 | inches |
| 1.75 | inches |
| 2.00 | inches |
| 2.25 | inches |
| 2.52 | inches |
| 3.85 | inches |

## Stage-Storage Calculation

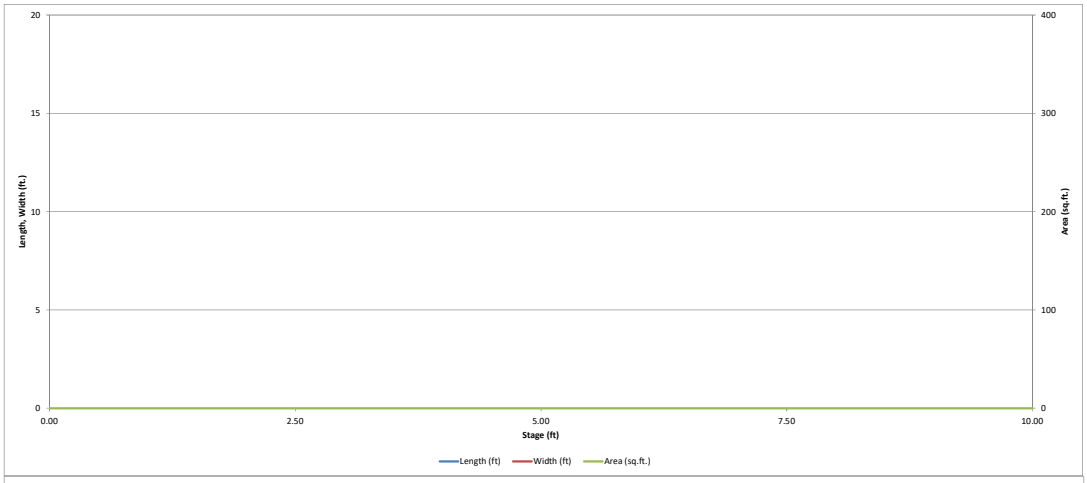
| | | |
|---|---|---|
| Zone 1 Volume (WQCV) = | 1.022 | acre-feet |
| Zone 2 Volume (EURV - Zone 1) = | 1.146 | acre-feet |
| Zone 3 Volume (100-year - Zones 1 & 2) = | 3.327 | acre-feet |
| Total Detention Basin Volume = | 5.494 | acre-feet |
| Initial Surcharge Volume (ISV) = | user | ft^3 |
| Initial Surcharge Depth (ISD) = | user | ft |
| Total Available Detention Depth ($H_{total}$) = | user | ft |
| Depth of Trickle Channel ($H_{TC}$) = | user | ft |
| Slope of Trickle Channel ($S_{TC}$) = | user | ft/ft |
| Slopes of Main Basin Sides ($S_{main}$) = | user | H:V |
| Basin Length-to-Width Ratio ($R_{L/W}$) = | user | |
| Initial Surcharge Area ($A_{ISV}$) = | user | ft^2 |
| Surcharge Volume Length ($L_{ISV}$) = | user | ft |
| Surcharge Volume Width ($W_{ISV}$) = | user | ft |
| Depth of Basin Floor ($H_{FLOOR}$) = | user | ft |
| Length of Basin Floor ($L_{FLOOR}$) = | user | ft |
| Width of Basin Floor ($W_{FLOOR}$) = | user | ft |
| Area of Basin Floor ($A_{FLOOR}$) = | user | ft^2 |
| Volume of Basin Floor ($V_{FLOOR}$) = | user | ft^3 |
| Depth of Main Basin ($H_{MAIN}$) = | user | ft |
| Length of Main Basin ($L_{MAIN}$) = | user | ft |
| Width of Main Basin ($W_{MAIN}$) = | user | ft |
| Area of Main Basin ($A_{MAIN}$) = | user | ft^2 |
| Volume of Main Basin ($V_{MAIN}$) = | user | ft^3 |
| Calculated Total Basin Volume ($V_{total}$) = | user | acre-feet |

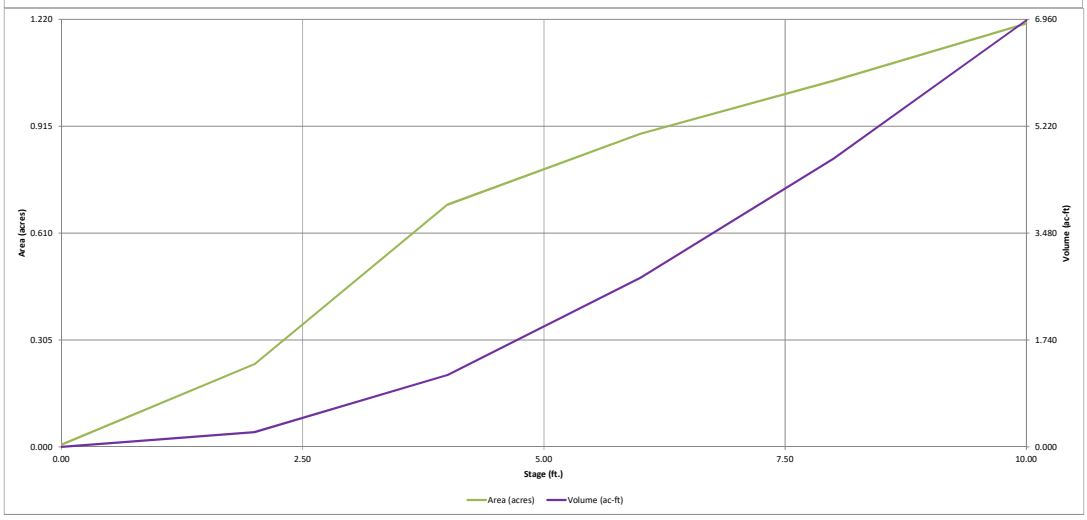
Depth Increment = 2 ft

| Stage - Storage Description | Stage (ft) | Optional Override Stage (ft) | Length (ft) | Width (ft) | Area (ft^2) | Optional Override Area (ft^2) | Area (acre) | Volume (ft^3) | Volume (ac-ft) |
|---|---|---|---|---|---|---|---|---|---|
| **Top of Micropool** | -- | 0.00 | -- | -- | -- | 277 | 0.006 | | |
| **7162** | -- | 2.00 | -- | -- | -- | 10,268 | 0.236 | 10,442 | 0.240 |
| **7164** | -- | 4.00 | -- | -- | -- | 30,108 | 0.691 | 50,921 | 1.169 |
| **7166** | -- | 6.00 | -- | -- | -- | 38,919 | 0.893 | 119,948 | 2.754 |
| **7168** | -- | 8.00 | -- | -- | -- | 45,498 | 1.044 | 204,365 | 4.692 |
| **7170** | -- | 10.00 | -- | -- | -- | 52,628 | 1.208 | 302,491 | 6.944 |

## DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



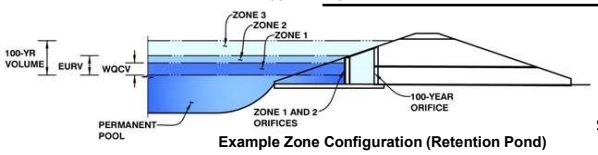



# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

**Project:** RETREAT AT TIMBERRIDGE FILING NO. 1

**Basin ID:** POND 2




Example Zone Configuration (Retention Pond)

| | Stage (ft) | Zone Volume (ac-ft) | Outlet Type |
|---|---|---|---|
| Zone 1 (WQCV) | 3.78 | 1.022 | Orifice Plate |
| Zone 2 (EURV) | 5.32 | 1.146 | Orifice Plate |
| Zone 3 (100-year) | 8.75 | 3.327 | Weir&Pipe (Restrict) |
| | | 5.494 | Total |

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

| | | | | | |
|---|---|---|---|---|---|
| Underdrain Orifice Invert Depth = | N/A | ft (distance below the filtration media surface) | Underdrain Orifice Area = | N/A | $ft^2$ |
| Underdrain Orifice Diameter = | N/A | inches | Underdrain Orifice Centroid = | N/A | feet |

**Calculated Parameters for Underdrain**

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

| | | | | | |
|---|---|---|---|---|---|
| Invert of Lowest Orifice = | 0.00 | ft (relative to basin bottom at Stage = 0 ft) | WQ Orifice Area per Row = | N/A | $ft^2$ |
| Depth at top of Zone using Orifice Plate = | 5.50 | ft (relative to basin bottom at Stage = 0 ft) | Elliptical Half-Width = | N/A | feet |
| Orifice Plate: Orifice Vertical Spacing = | 16.50 | inches | Elliptical Slot Centroid = | N/A | feet |
| Orifice Plate: Orifice Area per Row = | N/A | inches | Elliptical Slot Area = | N/A | $ft^2$ |

**Calculated Parameters for Plate**

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

| | Row 1 (required) | Row 2 (optional) | Row 3 (optional) | Row 4 (optional) | Row 5 (optional) | Row 6 (optional) | Row 7 (optional) | Row 8 (optional) |
|---|---|---|---|---|---|---|---|---|
| Stage of Orifice Centroid (ft) | 0.00 | 1.40 | 2.80 | 4.20 | | | | |
| Orifice Area (sq. inches) | 3.00 | 4.00 | 4.00 | 4.00 | | | | |

| | Row 9 (optional) | Row 10 (optional) | Row 11 (optional) | Row 12 (optional) | Row 13 (optional) | Row 14 (optional) | Row 15 (optional) | Row 16 (optional) |
|---|---|---|---|---|---|---|---|---|
| Stage of Orifice Centroid (ft) | | | | | | | | |
| Orifice Area (sq. inches) | | | | | | | | |

**User Input: Vertical Orifice (Circular or Rectangular)**

| | Not Selected | Not Selected | | | Not Selected | Not Selected | |
|---|---|---|---|---|---|---|---|
| Invert of Vertical Orifice = | N/A | N/A | ft (relative to basin bottom at Stage = 0 ft) | Vertical Orifice Area = | N/A | N/A | $ft^2$ |
| Depth at top of Zone using Vertical Orifice = | N/A | N/A | ft (relative to basin bottom at Stage = 0 ft) | Vertical Orifice Centroid = | N/A | N/A | feet |
| Vertical Orifice Diameter = | N/A | N/A | inches | | | | |

**Calculated Parameters for Vertical Orifice**

**User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)**

| | Zone 3 Weir | Not Selected | | | Zone 3 Weir | Not Selected | |
|---|---|---|---|---|---|---|---|
| Overflow Weir Front Edge Height, Ho = | 5.50 | N/A | ft (relative to basin bottom at Stage = 0 ft) | Height of Grate Upper Edge, $H_t$ = | 6.50 | N/A | feet |
| Overflow Weir Front Edge Length = | 12.00 | N/A | feet | Over Flow Weir Slope Length = | 4.12 | N/A | feet |
| Overflow Weir Slope = | 4.00 | N/A | H:V (enter zero for flat grate) | Grate Open Area / 100-yr Orifice Area = | 6.22 | N/A | should be ≥ 4 |
| Horiz. Length of Weir Sides = | 4.00 | N/A | feet | Overflow Grate Open Area w/o Debris = | 37.11 | N/A | $ft^2$ |
| Overflow Grate Open Area % = | 75% | N/A | %, grate open area/total area | Overflow Grate Open Area w/ Debris = | 18.55 | N/A | $ft^2$ |
| Debris Clogging % = | 50% | N/A | % | | | | |

**Calculated Parameters for Overflow Weir**

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

| | Zone 3 Restrictor | Not Selected | | | Zone 3 Restrictor | Not Selected | |
|---|---|---|---|---|---|---|---|
| Depth to Invert of Outlet Pipe = | 2.50 | N/A | ft (distance below basin bottom at Stage = 0 ft) | Outlet Orifice Area = | 5.97 | N/A | $ft^2$ |
| Outlet Pipe Diameter = | 42.00 | N/A | inches | Outlet Orifice Centroid = | 1.18 | N/A | feet |
| Restrictor Plate Height Above Pipe Invert = | 25.00 | | inches | Half-Central Angle of Restrictor Plate on Pipe = | 1.76 | N/A | radians |

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

| | | | | | |
|---|---|---|---|---|---|
| Spillway Invert Stage= | 9.00 | ft (relative to basin bottom at Stage = 0 ft) | Spillway Design Flow Depth= | 0.96 | feet |
| Spillway Crest Length = | 65.00 | feet | Stage at Top of Freeboard = | 9.96 | feet |
| Spillway End Slopes = | 3.00 | H:V | Basin Area at Top of Freeboard = | 1.20 | acres |
| Freeboard above Max Water Surface = | | feet | | | |

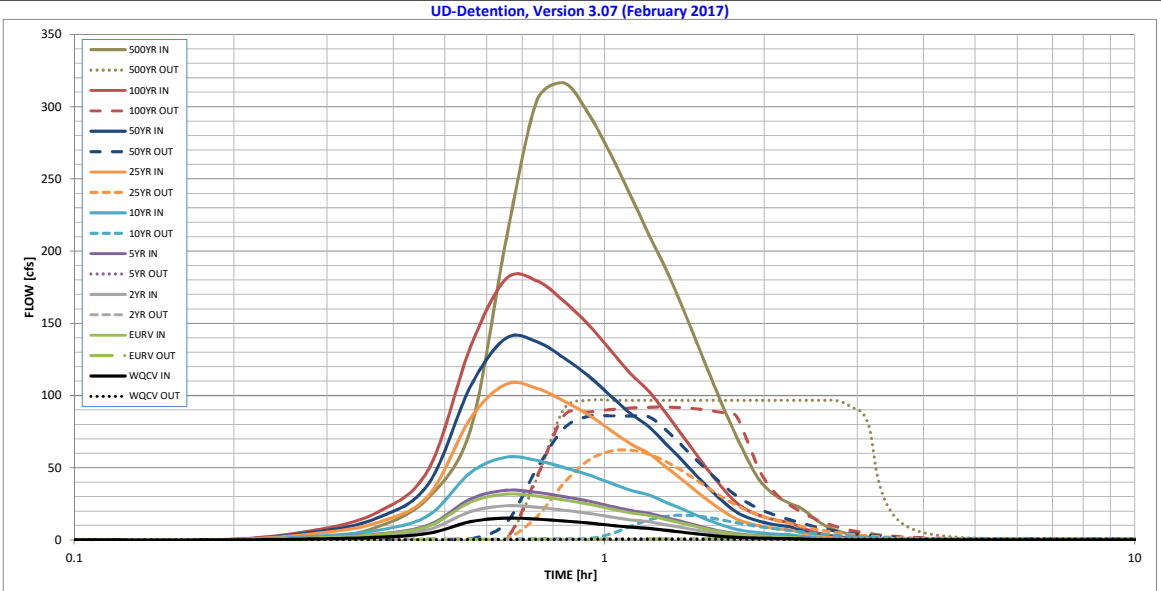
**Calculated Parameters for Spillway**

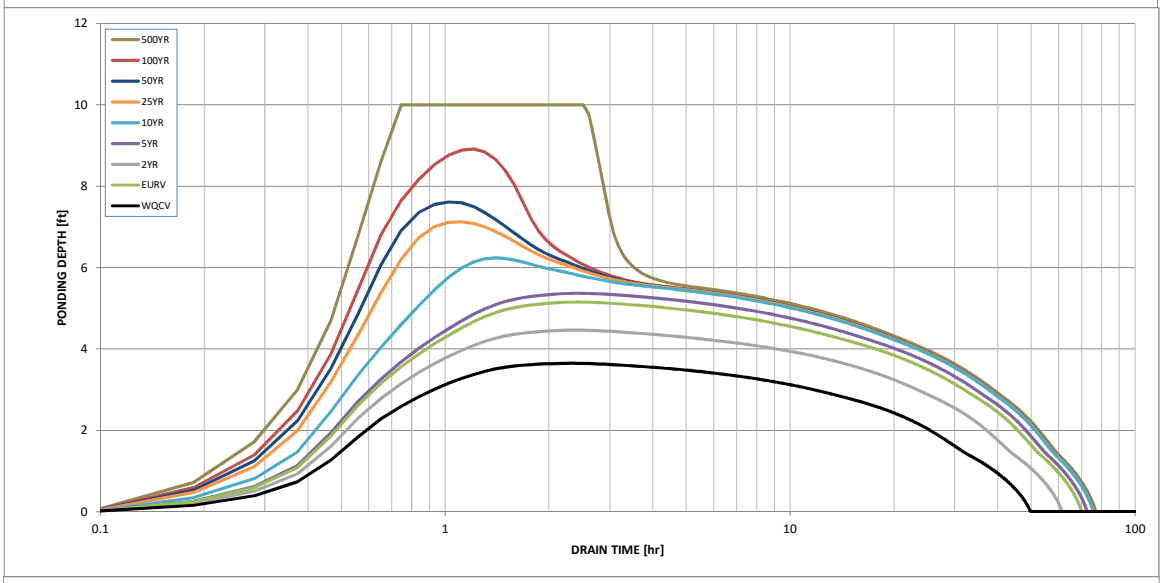
**Routed Hydrograph Results**

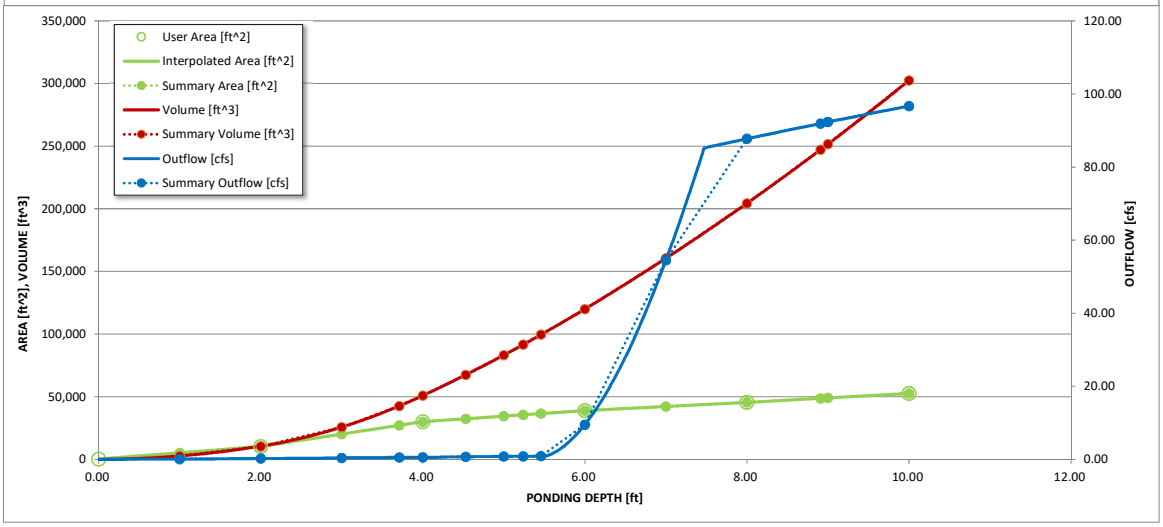
| Design Storm Return Period = | WQCV | EURV | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year | 500 Year |
|---|---|---|---|---|---|---|---|---|---|
| One-Hour Rainfall Depth (in) = | 0.53 | 1.07 | 1.19 | 1.50 | 1.75 | 2.00 | 2.25 | 2.52 | 3.85 |
| Calculated Runoff Volume (acre-ft) = | 1.022 | 2.168 | 1.608 | 2.351 | 3.953 | 7.552 | 9.864 | 12.887 | 23.106 |
| OPTIONAL Override Runoff Volume (acre-ft) = | | | | | | | | | |
| Inflow Hydrograph Volume (acre-ft) = | 1.021 | 2.165 | 1.607 | 2.349 | 3.949 | 7.544 | 9.852 | 12.868 | 23.079 |
| Predevelopment Unit Peak Flow, q (cfs/acre) = | 0.00 | 0.00 | 0.01 | 0.02 | 0.17 | 0.58 | 0.80 | 1.08 | 1.97 |
| Predevelopment Peak Q (cfs) = | 0.0 | 0.0 | 1.0 | 1.800 | 17.0 | 58.0 | 80.3 | 108.7 | 197.5 |
| Peak Inflow Q (cfs) = | 15.1 | 31.7 | 23.6 | 34.3 | 57.3 | 107.8 | 139.7 | 180.8 | 316.4 |
| Peak Outflow Q (cfs) = | 0.5 | 0.8 | 0.7 | 0.858 | 17.1 | 62.2 | 85.9 | 91.9 | 96.7 |
| Ratio Peak Outflow to Predevelopment Q = | N/A | N/A | N/A | 0.5 | 1.0 | 1.1 | 1.1 | 0.8 | 0.5 |
| Structure Controlling Flow = | Plate | Plate | Plate | Plate | Overflow Grate 1 | Overflow Grate 1 | Outlet Plate 1 | Outlet Plate 1 | N/A |
| Max Velocity through Grate 1 (fps) = | N/A | N/A | N/A | N/A | 0.4 | 1.7 | 2.3 | 2.4 | 2.6 |
| Max Velocity through Grate 2 (fps) = | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Time to Drain 97% of Inflow Volume (hours) = | 44 | 59 | 53 | 61 | 59 | 53 | 49 | 46 | 36 |
| Time to Drain 99% of Inflow Volume (hours) = | **47** | 65 | 58 | 68 | 68 | 64 | 62 | 59 | 53 |
| Maximum Ponding Depth (ft) = | 3.65 | 5.15 | 4.46 | 5.37 | 6.24 | 7.13 | 7.61 | 8.91 | 10.00 |
| Area at Maximum Ponding Depth (acres) = | 0.61 | 0.81 | 0.74 | 0.83 | 0.91 | 0.98 | 1.02 | 1.12 | 1.21 |
| Maximum Volume Stored (acre-ft) = | 0.935 | 2.031 | 1.498 | 2.203 | 2.961 | 3.802 | 4.290 | 5.676 | 6.944 |

# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)




| S-A-V-D Chart Axis Override | X-axis | Left Y-Axis | Right Y-Axis |
|---|---|---|---|
| minimum bound | | | |
| maximum bound | | | |

# Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

**Storm Inflow Hydrographs** **UD-Detention, Version 3.07 (February 2017)**

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

| | SOURCE | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK | WORKBOOK |
|---|---|---|---|---|---|---|---|---|---|---|
| Time Interval | TIME | WQCV [cfs] | EURV [cfs] | 2 Year [cfs] | 5 Year [cfs] | 10 Year [cfs] | 25 Year [cfs] | 50 Year [cfs] | 100 Year [cfs] | 500 Year [cfs] |
| 5.59 min | 0:00:00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 0:05:35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hydrograph | 0:11:11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Constant | 0:16:46 | 0.66 | 1.36 | 1.02 | 1.47 | 2.39 | 4.16 | 5.15 | 6.29 | 8.96 |
| 0.894 | 0:22:22 | 1.79 | 3.72 | 2.78 | 4.02 | 6.62 | 11.98 | 15.15 | 19.05 | 29.41 |
| | 0:27:57 | 4.60 | 9.54 | 7.15 | 10.33 | 17.00 | 30.75 | 38.91 | 48.98 | 76.40 |
| | 0:33:32 | 12.62 | 26.20 | 19.62 | 28.34 | 46.61 | 84.16 | 106.36 | 133.64 | 207.45 |
| | 0:39:08 | 15.08 | 31.69 | 23.61 | 34.34 | 57.28 | 107.80 | 139.67 | 180.76 | 304.12 |
| | 0:44:43 | 14.41 | 30.36 | 22.60 | 32.91 | 55.08 | 105.04 | 137.24 | 179.41 | 316.41 |
| | 0:50:19 | 13.12 | 27.63 | 20.57 | 29.95 | 50.14 | 96.17 | 126.02 | 165.31 | 295.56 |
| | 0:55:54 | 11.74 | 24.82 | 18.45 | 26.91 | 45.17 | 86.74 | 113.73 | 149.26 | 267.69 |
| | 1:01:29 | 10.17 | 21.59 | 16.02 | 23.43 | 39.50 | 76.21 | 100.14 | 131.70 | 239.17 |
| | 1:07:05 | 8.85 | 18.78 | 13.92 | 20.39 | 34.47 | 66.69 | 87.69 | 115.40 | 211.69 |
| | 1:12:40 | 8.02 | 17.01 | 12.62 | 18.47 | 31.13 | 59.91 | 78.57 | 103.12 | 187.91 |
| | 1:18:16 | 6.65 | 14.19 | 10.51 | 15.41 | 26.08 | 50.61 | 66.67 | 87.93 | 162.57 |
| | 1:23:51 | 5.45 | 11.71 | 8.65 | 12.72 | 21.60 | 42.06 | 55.47 | 73.24 | 137.38 |
| | 1:29:26 | 4.23 | 9.19 | 6.76 | 10.00 | 17.10 | 33.64 | 44.55 | 59.07 | 113.47 |
| | 1:35:02 | 3.18 | 7.02 | 5.13 | 7.65 | 13.20 | 26.19 | 34.79 | 46.26 | 91.42 |
| | 1:40:37 | 2.30 | 5.17 | 3.75 | 5.65 | 9.85 | 19.76 | 26.35 | 35.18 | 72.36 |
| | 1:46:13 | 1.77 | 3.92 | 2.86 | 4.27 | 7.39 | 14.67 | 19.48 | 25.97 | 55.47 |
| | 1:51:48 | 1.45 | 3.18 | 2.33 | 3.47 | 5.95 | 11.69 | 15.45 | 20.48 | 41.79 |
| | 1:57:23 | 1.23 | 2.69 | 1.97 | 2.92 | 5.01 | 9.80 | 12.94 | 17.11 | 33.89 |
| | 2:02:59 | 1.08 | 2.35 | 1.73 | 2.55 | 4.36 | 8.50 | 11.19 | 14.76 | 28.81 |
| | 2:08:34 | 0.97 | 2.10 | 1.55 | 2.29 | 3.90 | 7.58 | 9.97 | 13.13 | 25.30 |
| | 2:14:10 | 0.89 | 1.93 | 1.42 | 2.10 | 3.57 | 6.92 | 9.09 | 11.96 | 22.77 |
| | 2:19:45 | 0.66 | 1.43 | 1.05 | 1.55 | 2.66 | 5.26 | 6.99 | 9.31 | 18.38 |
| | 2:25:20 | 0.48 | 1.04 | 0.77 | 1.13 | 1.93 | 3.79 | 5.03 | 6.70 | 13.45 |
| | 2:30:56 | 0.35 | 0.77 | 0.56 | 0.83 | 1.42 | 2.81 | 3.74 | 4.97 | 9.80 |
| | 2:36:31 | 0.26 | 0.57 | 0.42 | 0.62 | 1.06 | 2.09 | 2.77 | 3.69 | 7.33 |
| | 2:42:07 | 0.19 | 0.41 | 0.30 | 0.45 | 0.77 | 1.54 | 2.05 | 2.73 | 5.48 |
| | 2:47:42 | 0.13 | 0.29 | 0.21 | 0.32 | 0.56 | 1.11 | 1.48 | 1.98 | 4.07 |
| | 2:53:17 | 0.10 | 0.21 | 0.16 | 0.23 | 0.40 | 0.81 | 1.07 | 1.43 | 2.98 |
| | 2:58:53 | 0.06 | 0.15 | 0.11 | 0.16 | 0.28 | 0.57 | 0.76 | 1.03 | 2.21 |
| | 3:04:28 | 0.04 | 0.09 | 0.07 | 0.10 | 0.18 | 0.38 | 0.51 | 0.69 | 1.57 |
| | 3:10:04 | 0.02 | 0.05 | 0.03 | 0.06 | 0.10 | 0.22 | 0.30 | 0.41 | 1.04 |
| | 3:15:39 | 0.01 | 0.02 | 0.01 | 0.02 | 0.05 | 0.11 | 0.15 | 0.21 | 0.62 |
| | 3:21:14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.05 | 0.07 | 0.31 |
| | 3:26:50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 |
| | 3:32:25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3:38:01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3:43:36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3:49:11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3:54:47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:00:22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:05:58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:11:33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:17:08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:22:44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:28:19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:33:55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:39:30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:45:05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:50:41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4:56:16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:01:52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:07:27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:13:02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:18:38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:24:13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:29:49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:35:24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:40:59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:46:35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:52:10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5:57:46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:03:21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:08:56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:14:32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:20:07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:25:43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:31:18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:36:53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6:42:29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

**Summary Stage-Area-Volume-Discharge Relationships**

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

| Stage - Storage Description | Stage [ft] | Area [ft^2] | Area [acres] | Volume [ft^3] | Volume [ac-ft] | Total Outflow [cfs] |
|---|---|---|---|---|---|---|
| | 1.00 | 5,223 | 0.120 | 2,722 | 0.062 | 0.10 |
| | 2.00 | 10,218 | 0.235 | 10,442 | 0.240 | 0.24 |
| | 3.00 | 20,188 | 0.463 | 25,773 | 0.592 | 0.40 |
| WQCV | 3.71 | 27,231 | 0.625 | 42,607 | 0.978 | 0.52 |
| | 4.00 | 30,108 | 0.691 | 50,921 | 1.169 | 0.56 |
| 2 Yr. | 4.53 | 32,443 | 0.745 | 67,497 | 1.550 | 0.70 |
| | 5.00 | 34,513 | 0.792 | 83,232 | 1.911 | 0.80 |
| EURV | 5.24 | 35,571 | 0.817 | 91,642 | 2.104 | 0.84 |
| 5 Yr. | 5.46 | 36,540 | 0.839 | 99,574 | 2.286 | 0.87 |
| | 6.00 | 38,919 | 0.893 | 119,948 | 2.754 | 9.50 |
| | 7.00 | 42,208 | 0.969 | 160,512 | 3.685 | 54.49 |
| | 8.00 | 45,498 | 1.044 | 204,365 | 4.692 | 87.74 |
| 100 Yr. | 8.91 | 48,742 | 1.119 | 247,244 | 5.676 | 91.93 |
| | 9.00 | 49,063 | 1.126 | 251,645 | 5.777 | 92.33 |
| | 10.00 | 52,628 | 1.208 | 302,491 | 6.944 | 96.70 |

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

## LEGEND

| DESCRIPTION | SYMBOL |
|---|---|
| EXISTING GROUND CONTOUR | 6910 |
| PROPOSED FINISHED CONTOUR | 6910 |
| BASIN BOUNDARY | |
| BASIN IDENTIFIER / AREA IN ACRES | BB / 16.0 |
| DESIGN POINT | 1 |
| EXISTING DIRECTION OF FLOW | |
| PROPOSED DIRECTION OF FLOW | |
| DRAINAGE IMPROVEMENTS | |
| PIPE RUN | 10 |
| WETLAND DELINEATION | |

ARROYA LANE (EXIST. GRAVEL ROAD)

EXIST. 60" CMP CULVERT

FUTURE TIMBERRIDGE RURAL LOTS (2.5 AC. MIN.)

FUTURE TIMBERRIDGE RURAL LOTS (1.0 AC. MIN.)

FUTURE TIMBERRIDGE URBAN LOTS (12,000 SF MIN.)

PROPERTY BOUNDARY

UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)

OS-12 15.0

OS-15 23.4

APPROXIMATE LOCATION 100 YR. FLOODPLAIN (PER LOMR 08-080541P)

APPROXIMATE LOCATION 100 YR. FLOODPLAIN (HEC-RAS CALCULATED)

TEMP. 30" RCP STORM UNTIL FUTURE DEVELOPMENT

FUTURE 30" RCP STORM SYSTEM CONSTRUCTED WITH FUTURE DEVELOPMENT

24" RCP OUTFALL CONSTRUCTED WITH FILING NO. 1 FOR STOCK POND RELEASE

LOCATION OF FUTURE SEDIMENT POND

EXIST. STOCK POND

OS-14 9.1

EXIST. STOCK POND TO BE DRAINED AND REMOVED WITH FUTURE TIMBERRIDGE DEVELOPMENT

OS-13 1.4

FUTURE LP

FUTURE HP

OS-4 3.1

OS-3 2.5

OS-5 20.9

OS-6 1.2

FUTURE SEDIMENT POND NOTES:

PROP. OFF-SITE SEDIMENT POND TO BE CONSTRUCTED PRIOR TO EXIST. STOCK POND IS REMOVED

DRAINAGE ESMT. TO BE ACQUIRED PRIOR TO CONSTRUCTION OF OFF-SITE SEDIMENT POND.

FORMAL OUTLET INSTALLED AND CONNECTED DIRECTLY TO 24" RCP OUTFALL TO ROUTE FLOWS DIRECTLY TO SAND CREEK.

FUTURE OFF-SITE DEVELOPMENT WILL BE REQUIRED TO PROVIDE SWQ TREATMENT FOR CONTINUED RELEASE TO SAND CREEK

NOTE:
FUTURE DEVELOPED FLOW QUANTITIES WITHIN BASINS OS-5, OS-6 & OS-9 EQUAL TO THE PRE-DEVELOPMENT FLOW QUANTITIES WILL BE TREATED AND DETAINED WITHIN POND 2.

LOCATION OF FUTURE SEDIMENT POND

DRAINAGE ESMT. TO BE ACQUIRED PRIOR TO CONSTRUCTION OF OFF-SITE SEDIMENT POND.

SIDE ROAD DITCH NOT WELL DEFINED IN THIS AREA SO FLOWS FROM VOLLMER RD. ENTER PROPERTY

FILING NO. 1 BOUNDARY

PROP. NATURAL BERM 6'-8' HEIGHT @ 5:1 (LOTS 1-7)

RURAL LOTS (2.5 AC. MIN.)

18" CULVERT REQUIRED

24" CULVERT REQUIRED

A 13.8

B 7.7

C 6.7

D1 1.1

D2 2.2

E 3.2

F 0.9

G 7.2

H 2.0

I 3.7

OS-1 1.2

OS-2 0.9

SHEET PILE CHECK STRUCTURE W/ CONC. CAP (SEE UDFCD FIG. 9-26 THRU 9-28)

SELECTIVE RIP-RAP BANK STABILIZATION (TYPE L, 1.5' THICK)

WETLAND DELINEATION PER REPORT BY CORE CONSULTANTS (TYP.)

SELECTIVE RIP-RAP BANK STABILIZATION PROVIDED IN THIS AREA UPON FUTURE LOT DEVELOPMENT

PROP. TRAIL

PERMANENT SEDIMENT BASIN

CHANNEL ACCESS RAMP

PROP. ACCESS ROAD WITHIN ESMT.

VOLLMER ROAD

40' WIDE ROW DEDICATION

EXIST. VOLLMER ROAD SIDE DITCH (TYP.)

ASPEN VALLEY ROAD (RURAL LOCAL)

SAND CREEK REACH SC-9

TRACT A

TRACT B

TRACT E

TRACT F

ELK ANTLER LANE (URBAN LOCAL)

ANTELOPE RAVINE DRIVE (URBAN LOCAL)

POCO ROAD (URBAN LOCAL)

PROPERTY BOUNDARY

UNPLATTED (6 AC. ± RESIDENTIAL)

UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)

PROPOSED POND 1

PRE-DEVELOPMENT
Q2 YR. = 0.30 CFS
Q5 YR. = 0.48 CFS
Q100 YR. = 29.2 CFS

DEVELOPED RELEASE
Q2 YR. = 0.10 CFS
Q5 YR. = 0.17 CFS
Q100 YR. = 24.0 CFS

PROPOSED POND 1

WQCV = 0.214 AC.-FT.
EURV = 0.177 AC.-FT.
100 YR = 0.877 AC.-FT.
TOTAL = 1.268 AC.-FT.

TWO CELL MULTI-PLATE STEEL ARCH CULVERTS (24'X10.33')

10' TYPE R AT-GRADE INLET

15' TYPE R AT-GRADE INLET

5' TYPE R SUMP INLET

10' TYPE R SUMP INLET

36" RCP STORM

DRAINAGE ESMT.

PROP. DUAL 24" RCP CULVERTS

SEE SHEET 3

**NOTE:**
SEE SHEET 3 FOR BASIN AND DEVELOPED FLOW CALCULATIONS

N

100 50 0 100 200

SCALE: 1" = 100'

CLASSIC CONSULTING

619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

# THE RETREAT AT TIMBERRIDGE FILING 1
## FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP
(INCL. FUTURE TIMBERRIDGE DEVELOPED BASINS)

| | | | | |
|---|---|---|---|---|
| DESIGNED BY | MAW | SCALE | DATE | 1-31-19 |
| DRAWN BY | MAW | (H) 1"= 100' | SHEET | 2 OF 5 |
| CHECKED BY | | (V) 1"= N/A | JOB NO. | 2520.00 |

## FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

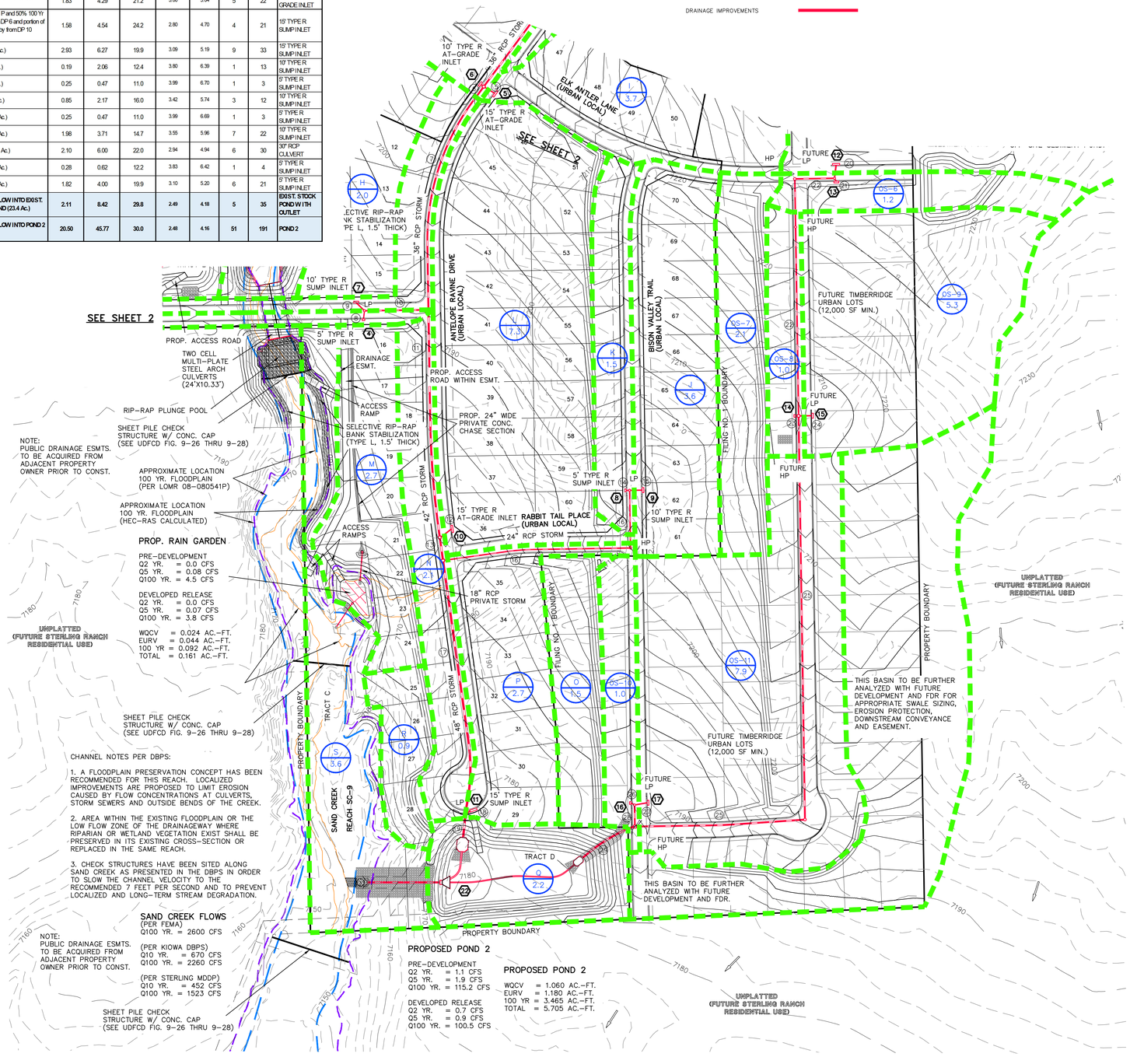
| Design Point(s) | Contributing Basins | Equivalent CA(5) | Equivalent CA(100) | Maximum Tc | Intensity I(5) | Intensity I(100) | Flow Q(5) | Flow Q(100) | Inlet Size |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A (13.8 Ac.), OS-1 (1.2 Ac.) and C (6.7 Ac.) | 3.58 | 9.08 | 31.8 | 2.39 | 4.02 | 9 | 36 | DUAL 24" RCP CULVERTS |
| **2** | **TOTAL INFLOW INTO POND 1 A, B, C and OS-1 (29.4 Ac.)** | **4.66** | **12.16** | **33.8** | **2.30** | **3.86** | **11** | **47** | **POND 1** |
| 3 | No longer used | | | | | | | | |
| 4 | D1 (1.1 Ac.) | 0.74 | 0.87 | 15.2 | 3.50 | 5.88 | 3 | 5 | 5' TYPE R SUMP INLET |
| 5 | OS-4 (3.1 Ac.), I (3.7 Ac.) | 1.61 | 3.17 | 17.7 | 3.28 | 5.50 | 5 | 17 | 15' TYPE R AT-GRADE INLET |
| 6 | OS-3 (2.5 Ac.) | 0.63 | 1.18 | 11.9 | 3.86 | 6.49 | 2 | 8 | 10' TYPE R AT-GRADE INLET |
| 7 | Basin D2, Basin H and 50% of 100 yr Flowby from DP-6 (5.5 Ac) | 1.51 | 2.47 | 27.3 | 2.62 | 4.40 | 4 | 11 | 10' TYPE R SUMP INLET |
| 8 | K (1.5 Ac.) | 0.38 | 0.71 | 12.6 | 3.78 | 6.35 | 1 | 4 | 5' TYPE R SUMP INLET |
| 9 | J and OS-7 (5.7 Ac.) | 1.43 | 2.68 | 16.0 | 3.43 | 5.75 | 5 | 15 | 10' TYPE R SUMP INLET |
| 10 | Flowby from DP-5 and Basin L (7.3 Ac) | 1.83 | 4.29 | 21.2 | 3.00 | 5.04 | 5 | 22 | 15' TYPE R AT-GRADE INLET |
| 11 | Basins N, O, P and 50% 100 Yr. Flowby from DP-6 and portion of 100 Yr Flowby from DP 10 (13.6 Ac) | 1.58 | 4.54 | 24.2 | 2.80 | 4.70 | 4 | 21 | 15' TYPE R SUMP INLET |
| 12 | OS-5 (20.9Ac.) | 2.93 | 6.27 | 19.9 | 3.09 | 5.19 | 9 | 33 | 15' TYPE R SUMP INLET |
| 13 | OS-6 (1.2Ac.) | 0.19 | 2.06 | 12.4 | 3.80 | 6.39 | 1 | 13 | 10' TYPE R SUMP INLET |
| 14 | OS-8 (1.0Ac.) | 0.25 | 0.47 | 11.0 | 3.99 | 6.70 | 1 | 3 | 5' TYPE R SUMP INLET |
| 15 | OS-9 (5.3 Ac.) | 0.85 | 2.17 | 16.0 | 3.42 | 5.74 | 3 | 12 | 10' TYPE R SUMP INLET |
| 16 | OS-10 (1.0 Ac.) | 0.25 | 0.47 | 11.0 | 3.99 | 6.69 | 1 | 3 | 5' TYPE R SUMP INLET |
| 17 | OS-11 (7.9 Ac.) | 1.98 | 3.71 | 14.7 | 3.55 | 5.96 | 7 | 22 | 10' TYPE R SUMP INLET |
| 18 | OS-12 (15.0 Ac.) | 2.10 | 6.00 | 22.0 | 2.94 | 4.94 | 6 | 30 | 30" RCP CULVERT |
| 19 | OS-13 (1.4 Ac.) | 0.28 | 0.62 | 12.2 | 3.83 | 6.42 | 1 | 4 | 5' TYPE R SUMP INLET |
| 20 | OS-14 (9.1 Ac.) | 1.82 | 4.00 | 19.9 | 3.10 | 5.20 | 6 | 21 | 5' TYPE R SUMP INLET |
| **21** | **TOTAL INFLOW INTO EXIST. STOCK POND (23.4 Ac.)** | **2.11** | **8.42** | **29.8** | **2.49** | **4.18** | **5** | **35** | **EXIST. STOCK POND WITH OUTLET** |
| **22** | **TOTAL INFLOW INTO POND 2 (104.8 Ac.)** | **20.50** | **45.77** | **30.0** | **2.48** | **4.16** | **51** | **191** | **POND 2** |

## FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

| BASIN | WEIGHTED CA(2) | CA(5) | CA(10) | CA(25) | CA(50) | CA(100) | OVERLAND C(5) | Length (ft) | Height (ft) | Tc (min) | STREET / CHANNEL FLOW Length (ft) | Slope (%) | Velocity (fps) | Tc (min) | Tc TOTAL (min) | INTENSITY I(2) (in/hr) | I(5) (in/hr) | I(10) (in/hr) | I(25) (in/hr) | I(50) (in/hr) | I(100) (in/hr) | TOTAL FLOWS Q(2) (cfs) | Q(5) (cfs) | Q(100) (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OS-1 | 0.68 | 0.71 | 0.76 | 0.82 | 0.85 | 0.88 | 0.08 | 10 | 0.2 | 4.6 | 1700 | 3.5% | 1.9 | 15.1 | 19.8 | 2.48 | 3.11 | 3.62 | 4.14 | 4.66 | 5.21 | 2 | **2** | **5** |
| OS-2 | 0.02 | 0.07 | 0.14 | 0.23 | 0.27 | 0.32 | 0.08 | 300 | 10.5 | 21.1 | | | | | 21.1 | 2.41 | 3.01 | 3.51 | 4.01 | 4.51 | 5.05 | 0.0 | **0.2** | **1.6** |
| OS-3 | 0.45 | 0.63 | 0.80 | 0.98 | 1.08 | 1.18 | 0.25 | 55 | 1.1 | 9.1 | 600 | 3.0% | 3.5 | 2.9 | 11.9 | 3.08 | 3.86 | 4.51 | 5.15 | 5.80 | 6.49 | 1 | **2** | **8** |
| OS-4 | 0.47 | 0.68 | 0.93 | 1.15 | 1.27 | 1.43 | 0.22 | 200 | 6 | 15.6 | 400 | 3.0% | 3.5 | 1.9 | 17.6 | 2.62 | 3.28 | 3.83 | 4.38 | 4.93 | 5.51 | 1 | **2** | **8** |
| OS-5 | 1.25 | 2.93 | 4.81 | 6.48 | 7.52 | 8.36 | 0.14 | 200 | 8 | 15.5 | 750 | 2.0% | 2.8 | 4.4 | 19.9 | 2.47 | 3.09 | 3.61 | 4.13 | 4.64 | 5.19 | 3 | **9** | **43** |
| OS-6 | 0.08 | 0.19 | 0.29 | 0.38 | 0.44 | 0.49 | 0.16 | 55 | 1.1 | 10.0 | 500 | 3.0% | 3.5 | 2.4 | 12.4 | 3.04 | 3.80 | 4.44 | 5.07 | 5.71 | 6.39 | 0.3 | **1** | **3** |
| OS-7 | 0.38 | 0.53 | 0.67 | 0.82 | 0.90 | 0.99 | 0.25 | 100 | 10 | 7.2 | | | | | 7.2 | 3.69 | 4.63 | 5.40 | 6.17 | 6.94 | 7.77 | 1 | **2** | **8** |
| OS-8 | 0.18 | 0.25 | 0.32 | 0.39 | 0.43 | 0.47 | 0.25 | 55 | 1.1 | 9.1 | 400 | 3.0% | 3.5 | 1.9 | 11.0 | 3.18 | 3.99 | 4.65 | 5.32 | 5.98 | 6.70 | 1 | **1** | **3** |
| OS-9 | 0.37 | 0.85 | 1.27 | 1.70 | 1.96 | 2.17 | 0.16 | 200 | 10 | 14.1 | 400 | 3.0% | 3.5 | 1.9 | 16.0 | 2.73 | 3.42 | 3.99 | 4.56 | 5.13 | 5.74 | 1 | **3** | **12** |
| OS-10 | 0.18 | 0.25 | 0.32 | 0.39 | 0.43 | 0.47 | 0.25 | 55 | 1.1 | 9.1 | 450 | 3.8% | 3.9 | 1.9 | 11.0 | 3.18 | 3.99 | 4.65 | 5.32 | 5.98 | 6.69 | 1 | **1** | **3** |
| OS-11 | 1.42 | 1.98 | 2.53 | 3.08 | 3.40 | 3.71 | 0.25 | 200 | 10 | 12.8 | 450 | 3.8% | 3.9 | 1.9 | 14.7 | 2.84 | 3.55 | 4.14 | 4.74 | 5.33 | 5.96 | 4 | **7** | **22** |
| OS-12 | 0.90 | 2.10 | 3.45 | 4.65 | 5.40 | 6.00 | 0.14 | 300 | 13 | 18.5 | 600 | 2.0% | 2.8 | 3.5 | 22.0 | 2.35 | 2.94 | 3.43 | 3.93 | 4.42 | 4.94 | 2 | **6** | **30** |
| OS-13 | 0.17 | 0.28 | 0.38 | 0.49 | 0.56 | 0.62 | 0.20 | 55 | 1.1 | 9.6 | 450 | 2.0% | 2.8 | 2.7 | 12.2 | 3.05 | 3.83 | 4.46 | 5.10 | 5.74 | 6.42 | 0.5 | **1** | **4** |
| OS-14 | 1.09 | 1.82 | 2.46 | 3.19 | 3.64 | 4.00 | 0.20 | 300 | 12 | 17.8 | 350 | 2.0% | 2.8 | 2.1 | 19.9 | 2.48 | 3.10 | 3.62 | 4.13 | 4.65 | 5.20 | 3 | **6** | **21** |
| OS-15 | 0.70 | 2.11 | 3.98 | 6.08 | 7.25 | 8.42 | 0.09 | 300 | 16 | 18.2 | 1300 | 3.5% | 1.9 | 11.6 | 29.8 | 2.00 | 2.49 | 2.91 | 3.32 | 3.74 | 4.18 | 1 | **5** | **35** |
| OS-16 | 0.23 | 0.69 | 1.31 | 2.00 | 2.39 | 2.77 | 0.09 | 300 | 10 | 21.2 | 600 | 3.5% | 1.9 | 5.3 | 26.6 | 2.13 | 2.66 | 3.11 | 3.55 | 4.00 | 4.47 | 0.5 | **2** | **12** |
| OS-17 | 0.61 | 1.84 | 3.47 | 5.30 | 6.32 | 7.34 | 0.09 | 300 | 9.5 | 21.6 | 650 | 3.5% | 1.9 | 5.8 | 27.4 | 2.10 | 2.62 | 3.05 | 3.49 | 3.93 | 4.39 | 1.3 | **5** | **32** |
| OS-18 | 0.33 | 0.98 | 1.85 | 2.83 | 3.38 | 3.92 | 0.09 | 300 | 10 | 21.2 | 700 | 3.5% | 1.9 | 6.2 | 27.5 | 2.09 | 2.61 | 3.05 | 3.49 | 3.92 | 4.39 | 0.7 | **3** | **17** |
| OS-19 | 0.22 | 0.65 | 1.22 | 1.87 | 2.23 | 2.59 | 0.09 | 300 | 10 | 21.2 | 400 | 3.5% | 1.9 | 3.6 | 24.8 | 2.21 | 2.77 | 3.23 | 3.69 | 4.15 | 4.64 | 0.5 | **2** | **12** |
| OS-20 | 0.75 | 2.26 | 4.27 | 6.53 | 7.78 | 9.04 | 0.09 | 300 | 16 | 18.2 | 1300 | 3.5% | 1.9 | 11.6 | 29.8 | 2.00 | 2.49 | 2.91 | 3.32 | 3.74 | 4.18 | 2 | **6** | **38** |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 0.83 | 1.93 | 3.17 | 4.28 | 4.97 | 5.52 | 0.14 | 300 | 10.5 | 19.9 | 1280 | 3.2% | 1.8 | 11.9 | 31.8 | 1.92 | 2.39 | 2.79 | 3.19 | 3.59 | 4.02 | 2 | **5** | **22** |
| B | 0.46 | 1.08 | 1.77 | 2.39 | 2.77 | 3.08 | 0.14 | 300 | 10.5 | 19.9 | 400 | 2.0% | 1.4 | 4.7 | 24.6 | 2.23 | 2.78 | 3.24 | 3.71 | 4.17 | 4.67 | 1 | **3** | **14** |
| C | 0.40 | 0.94 | 1.54 | 2.08 | 2.41 | 2.68 | 0.14 | 300 | 10.5 | 19.9 | 1100 | 1.5% | 2.4 | 7.5 | 27.3 | 2.10 | 2.62 | 3.06 | 3.49 | 3.93 | 4.40 | 1 | **2** | **12** |
| D1 | 0.72 | 0.74 | 0.78 | 0.83 | 0.85 | 0.87 | 0.08 | 15 | 0.3 | 5.7 | 1400 | 1.5% | 2.4 | 9.5 | 15.2 | 2.80 | 3.50 | 4.08 | 4.67 | 5.25 | 5.88 | 2 | **3** | **5** |
| D2 | 0.96 | 1.07 | 1.18 | 1.30 | 1.36 | 1.43 | 0.25 | 55 | 1.1 | 9.1 | 500 | 2.5% | 3.2 | 2.6 | 11.7 | 3.11 | 3.89 | 4.54 | 5.19 | 5.84 | 6.54 | 3 | **4** | **9** |
| E | 0.19 | 0.45 | 0.74 | 0.99 | 1.15 | 1.28 | 0.14 | 300 | 10.5 | 19.9 | 300 | 2.0% | 1.4 | 3.5 | 23.4 | 2.28 | 2.85 | 3.33 | 3.81 | 4.28 | 4.79 | 0.4 | **1** | **6** |
| F | 0.05 | 0.13 | 0.21 | 0.28 | 0.32 | 0.36 | 0.14 | 300 | 10.5 | 19.9 | | | | | 19.9 | 2.48 | 3.10 | 3.62 | 4.13 | 4.65 | 5.20 | 0.1 | **0.4** | **1.9** |
| G | 0.14 | 0.58 | 1.08 | 1.80 | 2.16 | 2.52 | 0.08 | 70 | 14 | 5.7 | 900 | 2.0% | 1.4 | 10.6 | 16.3 | 2.71 | 3.39 | 3.96 | 4.52 | 5.09 | 5.70 | 0.4 | **2** | **14** |
| H | 0.30 | 0.44 | 0.60 | 0.74 | 0.82 | 0.92 | 0.22 | 100 | 4 | 10.1 | 300 | 3.0% | 3.5 | 1.4 | 11.5 | 3.13 | 3.92 | 4.57 | 5.23 | 5.88 | 6.58 | 1 | **2** | **6** |
| I | 0.67 | 0.93 | 1.18 | 1.44 | 1.59 | 1.74 | 0.25 | 120 | 3 | 12.4 | 550 | 3.5% | 3.7 | 2.4 | 14.9 | 2.82 | 3.53 | 4.12 | 4.71 | 5.30 | 5.93 | 2 | **3** | **10** |
| J | 0.65 | 0.90 | 1.15 | 1.40 | 1.55 | 1.69 | 0.25 | 120 | 3 | 12.4 | 600 | 2.0% | 2.8 | 3.5 | 16.0 | 2.74 | 3.43 | 4.00 | 4.57 | 5.14 | 5.75 | 2 | **3** | **10** |
| K | 0.27 | 0.38 | 0.48 | 0.59 | 0.65 | 0.71 | 0.25 | 55 | 1.1 | 9.1 | 600 | 2.0% | 2.8 | 3.5 | 12.6 | 3.02 | 3.78 | 4.41 | 5.05 | 5.68 | 6.35 | 0.8 | **1** | **4** |
| L | 1.31 | 1.83 | 2.34 | 2.85 | 3.14 | 3.43 | 0.25 | 150 | 4.5 | 13.1 | 850 | 2.5% | 3.2 | 4.5 | 17.6 | 2.62 | 3.28 | 3.83 | 4.38 | 4.93 | 5.51 | 3 | **6** | **19** |
| M | 0.41 | 0.59 | 0.81 | 1.00 | 1.11 | 1.24 | 0.22 | 100 | 4 | 10.1 | 400 | 2.0% | 2.8 | 2.4 | 12.4 | 3.04 | 3.80 | 4.44 | 5.07 | 5.71 | 6.39 | 1 | **2** | **8** |
| N | 0.38 | 0.53 | 0.67 | 0.82 | 0.90 | 0.99 | 0.25 | 55 | 1.1 | 9.1 | 1050 | 2.0% | 2.8 | 6.2 | 15.2 | 2.79 | 3.50 | 4.08 | 4.66 | 5.25 | 5.87 | 1 | **2** | **6** |
| O | 0.27 | 0.38 | 0.48 | 0.59 | 0.65 | 0.71 | 0.25 | 80 | 5 | 7.5 | | | | | 7.5 | 3.64 | 4.56 | 5.32 | 6.08 | 6.84 | 7.66 | 1 | **2** | **5** |
| P | 0.49 | 0.68 | 0.86 | 1.05 | 1.16 | 1.27 | 0.25 | 120 | 3 | 12.4 | 450 | 1.5% | 2.4 | 3.1 | 15.5 | 2.77 | 3.47 | 4.05 | 4.63 | 5.21 | 5.83 | 1 | **2** | **7** |
| Q | 0.13 | 0.31 | 0.51 | 0.68 | 0.79 | 0.88 | 0.14 | 90 | 22 | 5.7 | 300 | 1.5% | 1.2 | 4.1 | 9.8 | 3.32 | 4.16 | 4.85 | 5.54 | 6.24 | 6.98 | 0.4 | **1** | **6** |
| R | 0.16 | 0.23 | 0.29 | 0.35 | 0.39 | 0.42 | 0.25 | 90 | 6 | 7.8 | | | | | 7.8 | 3.59 | 4.50 | 5.26 | 6.01 | 6.76 | 7.56 | 1 | **1** | **3** |
| S | 0.07 | 0.29 | 0.54 | 0.90 | 1.08 | 1.26 | 0.08 | 140 | 14 | 10.2 | 750 | 1.5% | 2.4 | 5.1 | 15.3 | 2.79 | 3.49 | 4.07 | 4.66 | 5.24 | 5.86 | 0.2 | **1.0** | **7** |

## FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

| Pipe Run | Contributing Basins | Equivalent CA(5) | Equivalent CA(100) | Maximum Tc | Intensity I(5) | Intensity I(100) | Flow Q(5) | Flow Q(100) | Pipe Size* |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DP-18 | 2.10 | 6.00 | 23.2 | 2.86 | 4.81 | 6 | 29 | 30" RCP |
| 2 | DP-19 | 0.28 | 0.62 | 12.2 | 3.83 | 6.42 | 1 | 4 | 18" RCP |
| 3 | DP-20 | 1.82 | 4.00 | 19.9 | 3.10 | 5.20 | 6 | 21 | 24" RCP |
| 4 | PR-1, PR-2, PR-3 | 4.20 | 10.62 | 23.9 | 2.82 | 4.73 | 12 | 50 | 36" RCP |
| 5 | Captured from DP-5 | 1.61 | 2.31 | 17.7 | 3.28 | 5.50 | 5 | 13 | 24" RCP |
| 6 | Captured from DP-6 | 0.63 | 0.93 | 11.9 | 3.86 | 6.49 | 2 | 6 | 18" RCP |
| 7 | PR-4, PR-5, PR-6 | 6.43 | 13.86 | 24.4 | 2.79 | 4.68 | 18 | 65 | 36" RCP |
| 8 | DP-4 | 0.74 | 0.87 | 15.2 | 3.50 | 5.88 | 3 | 5 | 18" RCP |
| 9 | DP-7 | 1.51 | 2.47 | 27.3 | 2.62 | 4.40 | 4 | 11 | 24" RCP |
| 10 | PR-8, PR-9 | 2.25 | 3.34 | 27.5 | 2.61 | 4.38 | 6 | 15 | 30" RCP |
| 11 | PR-7, PR-10 | 8.69 | 17.20 | 28.0 | 2.58 | 4.33 | 22 | 75 | 42" RCP |
| 12 | Captured from DP-10 | 1.83 | 2.83 | 21.2 | 3.00 | 5.04 | 5 | 14 | 24" RCP |
| 13 | PR-11, PR-12 | 10.51 | 20.03 | 28.1 | 2.58 | 4.33 | 27 | 87 | 42" RCP |
| 14 | DP-8 | 0.38 | 0.71 | 12.6 | 3.78 | 6.35 | 1 | 4 | 18" RCP |
| 15 | DP-9 | 1.43 | 2.68 | 16.0 | 3.43 | 5.75 | 5 | 15 | 24" RCP |
| 16 | PR-14, PR-15 | 1.80 | 3.38 | 16.4 | 3.39 | 5.69 | 6 | 19 | 24" RCP |
| 17 | PR-13, PR-16 | 12.31 | 23.41 | 28.6 | 2.55 | 4.28 | 31 | 100 | 48" RCP |
| 18 | DP-11 | 1.58 | 4.54 | 24.2 | 2.80 | 4.70 | 4 | 21 | 30" RCP |
| **19** | **PR-17, PR-18 W'LY FOREBAY OUTFALL** | **13.89** | **27.96** | **28.8** | **2.54** | **4.26** | **35** | **119** | **48" RCP** |
| 20 | DP-12 | 2.93 | 6.27 | 19.9 | 3.09 | 5.19 | 9 | 33 | 30" RCP |
| 21 | DP-13 | 0.19 | 2.06 | 12.4 | 3.80 | 6.39 | 1 | 13 | 24" RCP |
| 22 | PR-20, PR-21 | 3.12 | 8.33 | 20.7 | 3.04 | 5.10 | 9 | 42 | 30" RCP |
| 23 | DP-14 | 0.25 | 0.47 | 11.0 | 3.99 | 6.70 | 1 | 3 | 18" RCP |
| 24 | DP-15 | 0.85 | 2.17 | 16.0 | 3.42 | 5.74 | 3 | 12 | 24" RCP |
| 25 | PR-22, PR-23, PR-24 | 4.22 | 10.97 | 22.0 | 2.94 | 4.94 | 12 | 54 | 36" RCP |
| 26 | DP-16 | 0.25 | 0.47 | 11.0 | 3.99 | 6.69 | 1 | 3 | 18" RCP |
| 27 | DP-17 | 1.98 | 3.71 | 14.7 | 3.55 | 5.96 | 7 | 22 | 30" RCP |
| 28 | PR-26, PR-27 | 2.23 | 4.18 | 14.9 | 3.53 | 5.93 | 8 | 25 | 30" RCP |
| **29** | **PR-25, PR-28 E'LY FOREBAY OUTFALL** | **6.44** | **15.16** | **22.3** | **2.92** | **4.91** | **19** | **74** | **42" RCP** |




CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

THE RETREAT AT TIMBERRIDGE FILING 1
FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP
(INCL. FUTURE DEVELOPED TIMBERRIDGE BASINS)

| | | | |
|---|---|---|---|
| DESIGNED BY | MAW | SCALE | DATE 1-31-19 |
| DRAWN BY | MAW | (H) 1"= 100' | SHEET 3 OF 5 |
| CHECKED BY | | (V) 1"= N/A | JOB NO. 2520.00 |

N:\2520\DRAINAGE\REPORTS\FDR\1FINAL\DP\DP_REV.dwg, 3/12/2020 4:23:04 PM, 11.03451

**LEGEND**

| DESCRIPTION | SYMBOL |
|---|---|
| EXISTING GROUND CONTOUR | 6910 |
| PROPOSED FINISHED CONTOUR | 6910 |
| BASIN BOUNDARY | |
| BASIN IDENTIFIER / AREA IN ACRES | BB 16.0 |
| DESIGN POINT | 1 |
| EXISTING DIRECTION OF FLOW | |
| PROPOSED DIRECTION OF FLOW | |
| DRAINAGE IMPROVEMENTS | |
| PIPE RUN | 10 |

ARROYA LANE (EXIST. GRAVEL ROAD)

EXIST. 60" CMP CULVERT

FUTURE TIMBERRIDGE RURAL LOTS (2.5 AC. MIN.)

OS-12 15.0

SECONDARY ACCESS ROAD CONSTRUCTED WITH FILING NO. 1

FUTURE TIMBERRIDGE RURAL LOTS (1.0 AC. MIN.)

PROPERTY BOUNDARY

UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)

OS-20 25.1

TEMP. 30" RCP STORM UNTIL FUTURE DEVELOPMENT

APPROXIMATE LOCATION 100 YR. FLOODPLAIN (PER LOMR 08-080541P)

APPROXIMATE LOCATION 100 YR. FLOODPLAIN (HEC-RAS CALCULATED)

24" RCP OUTFALL CONSTRUCTED WITH FILING NO. 1 FOR STOCK POND RELEASE

EXIST. STOCK POND TO REMAIN UNTIL THIS PHASE OF DEVELOPMENT

TEMP. OUTLET INSTALLED CONNECTED TO PERMANENT 24" RCP OUTFALL DIRECTLY TO SAND CREEK

EXIST. STOCK POND

FUTURE TIMBERRIDGE URBAN LOTS (1.0 AC. MIN.)

OS-19 7.2

PROP. TEMP. SEDIMENT BASIN

FUTURE HP

OS-18 10.9

FUTURE TIMBERRIDGE URBAN LOTS (12,000 SF MIN.)

TSB OUTFALL TO BE ROUTED TO CURB LINE

PROP. TEMP. SEDIMENT BASIN

INSTALL PROP. TEMP. SEDIMENT BASIN AND SILT FENCE TO PROTECT DEVELOPMENT

ACCESS

SEE SHEET 5

FUTURE TIMBERRIDGE RURAL LOTS (2.5 AC. MIN.)

FILING NO. 1 BOUNDARY

18" CULVERT REQUIRED

PROP. NATURAL BERM 6'-8" HEIGHT @ 5:1 (LOTS 1-7)

RURAL LOTS (2.5 AC. MIN.)

OS-2 0.9

SHEET PILE CHECK STRUCTURE W/ CONC. CAP (SEE UDFCD FIG. 9-26 THRU 9-28)

APPROXIMATE LOCATION 100 YR. FLOODPLAIN (PER LOMR 08-080541P)

APPROXIMATE LOCATION 100 YR. FLOODPLAIN (HEC-RAS CALCULATED)

A 13.8

F 0.9

E 3.2

SELECTIVE RIP-RAP BANK STABILIZATION (TYPE L, 1.5' THICK)

SECONDARY ACCESS ROAD CONSTRUCTED WITH FILING NO. 1

UNPLATTED (2 AC. RESIDENTIAL)

OS-1 1.2

EXIST. VOLLMER ROAD ROAD DITCH (TYP.)

VOLLMER ROAD

ASPEN VALLEY ROAD (RURAL LOCAL)

PROP. TRAIL

PERMANENT SEDIMENT BASIN

RURAL LOTS (2.5 AC. MIN.)

PROP. ACCESS ROAD WITHIN ESMT.

B 7.7

G 7.2

CHANNEL ACCESS RAMP

SAND CREEK REACH SC-9 TRACT A

SHEET PILE CHECK STRUCTURE W/ CONC. CAP (SEE UDFCD FIG. 9-26 THRU 9-28)

PROPOSED POND 1

PRE-DEVELOPMENT
Q2 YR. = 0.30 CFS
Q5 YR. = 0.48 CFS
Q100 YR. = 29.2 CFS

DEVELOPED RELEASE
Q2 YR. = 0.10 CFS
Q5 YR. = 0.17 CFS
Q100 YR. = 24.0 CFS

18" CULVERT REQUIRED

24" CULVERT REQUIRED

PROP. TRAIL

ACCESS RAMPS

H 2.0

C 6.7

DRAINAGE ESMT.

PROP. DUAL 24" RCP CULVERTS

TRACT B

TRACT E

10' TYPE R SUMP INLET

SELECTIVE RIP-RAP BANK STABILIZATION (TYPE L, 1.5' THICK)

36" RCP STORM

10' TYPE R AT-GRADE INLET

15' TYPE R AT-GRADE INLET

ELK ANTLER LANE (URBAN LOCAL)

PROPERTY BOUNDARY

3.2

ANTELOPE RAVINE DRIVE (URBAN LOCAL)

5' TYPE R SUMP INLET

DRAINAGE ESMT.

PROP. ACCESS ROAD WITHIN ESMT.

TWO CELL MULTI-PLATE STEEL ARCH CULVERTS (24'X10.33')

POCO ROAD (URBAN LOCAL)

PROPERTY BOUNDARY

D2 2.2

D 1.1

PROPOSED POND 1

WQCV = 0.214 AC.-FT.
EURV = 0.177 AC.-FT.
100 YR = 0.877 AC.-FT.
TOTAL = 1.268 AC.-FT.

UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)

SEE SHEET 5

**NOTE:**
SEE SHEET 3 FOR BASIN AND DEVELOPED FLOW CALCULATIONS

N

100 50 0 100 200

SCALE: 1" = 100'

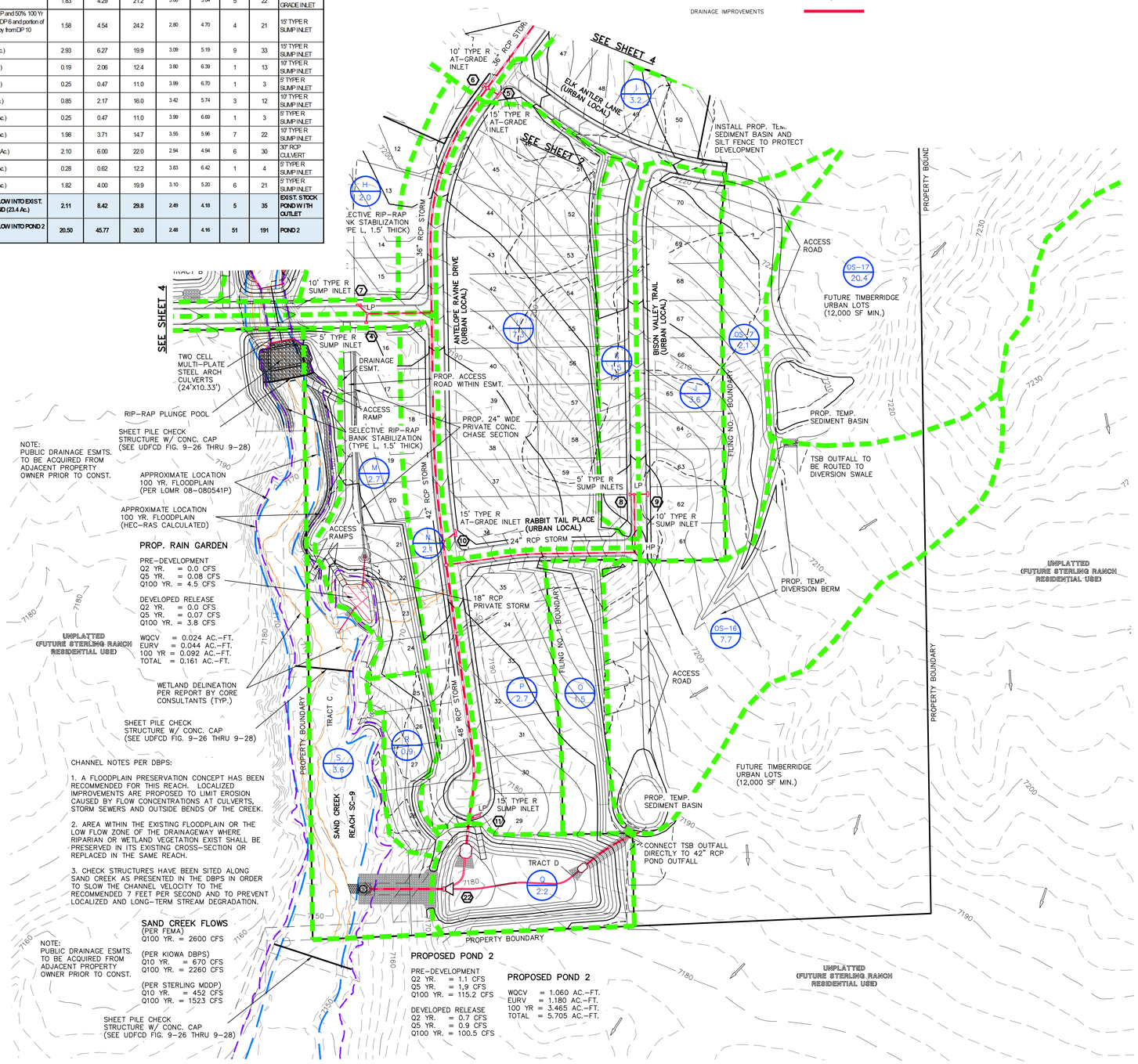
CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

# THE RETREAT AT TIMBERRIDGE FILING 1
## FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP
(FILING NO. 1 GRADING ONLY)

| | | | | |
|---|---|---|---|---|
| DESIGNED BY | MAW | SCALE | DATE | 1-31-19 |
| DRAWN BY | MAW | (H) 1"= 100' | SHEET | 4 OF 5 |
| CHECKED BY | | (V) 1"= N/A | JOB NO. | 1185.00 |

## FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

| Design Point(s) | Contributing Basins | Equivalent CA(5) | Equivalent CA(100) | Maximum Tc | Intensity I(5) | Intensity I(100) | Flow Q(5) | Flow Q(100) | Inlet Size |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A (13.8 Ac.), OS-1 (1.2 Ac.) and C (6.7 Ac.) | 3.58 | 9.08 | 31.8 | 2.39 | 4.02 | 9 | 36 | DUAL 24" RCP CULVERTS |
| **2** | **TOTAL INFLOW INTO POND 1 A, B, C and OS-1 (29.4 Ac.)** | **4.66** | **12.16** | **33.8** | **2.30** | **3.86** | **11** | **47** | **POND 1** |
| 3 | No longer used | | | | | | | | |
| 4 | D1 (1.1 Ac.) | 0.74 | 0.87 | 15.2 | 3.50 | 5.88 | 3 | 5 | 5' TYPE R SUMP INLET |
| 5 | OS-4 (3.1 Ac.), I (3.7 Ac.) | 1.61 | 3.17 | 17.7 | 3.28 | 5.50 | 5 | 17 | 15' TYPE R AT-GRADE INLET |
| 6 | OS-3 (2.5 Ac.) | 0.63 | 1.18 | 11.9 | 3.86 | 6.49 | 2 | 8 | 10' TYPE R AT-GRADE INLET |
| 7 | Basin D2, Basin H and 50% of 100 yr Flowby from DP-6 (5.5 Ac) | 1.51 | 2.47 | 27.3 | 2.62 | 4.40 | 4 | 11 | 10' TYPE R SUMP INLET |
| 8 | K (1.5 Ac.) | 0.38 | 0.71 | 12.6 | 3.78 | 6.35 | 1 | 4 | 5' TYPE R SUMP INLET |
| 9 | J and OS-7 (5.7 Ac.) | 1.43 | 2.68 | 16.0 | 3.43 | 5.75 | 5 | 15 | 10' TYPE R SUMP INLET |
| 10 | Flowby from DP-5 and Basin L (7.3 Ac) | 1.83 | 4.29 | 21.2 | 3.00 | 5.04 | 5 | 22 | 15' TYPE R AT-GRADE INLET |
| 11 | Basins N, O, P and 50% 100 Yr Flowby from DP-6 and portion of 100 Yr Flowby from DP-10 (13.6 Ac) | 1.58 | 4.54 | 24.2 | 2.80 | 4.70 | 4 | 21 | 15' TYPE R SUMP INLET |
| 12 | OS-5 (20.9Ac.) | 2.93 | 6.27 | 19.9 | 3.09 | 5.19 | 9 | 33 | 15' TYPE R SUMP INLET |
| 13 | OS-6 (1.2Ac.) | 0.19 | 2.06 | 12.4 | 3.80 | 6.39 | 1 | 13 | 10' TYPE R SUMP INLET |
| 14 | OS-8 (1.0Ac.) | 0.25 | 0.47 | 11.0 | 3.99 | 6.70 | 1 | 3 | 5' TYPE R SUMP INLET |
| 15 | OS-9 (5.3 Ac.) | 0.85 | 2.17 | 16.0 | 3.42 | 5.74 | 3 | 12 | 10' TYPE R SUMP INLET |
| 16 | OS-10 (1.0 Ac.) | 0.25 | 0.47 | 11.0 | 3.99 | 6.69 | 1 | 3 | 5' TYPE R SUMP INLET |
| 17 | OS-11 (7.9 Ac.) | 1.98 | 3.71 | 14.7 | 3.55 | 5.96 | 7 | 22 | 10' TYPE R SUMP INLET |
| 18 | OS-12 (15.0 Ac.) | 2.10 | 6.00 | 22.0 | 2.94 | 4.94 | 6 | 30 | 30" RCP CULVERT |
| 19 | OS-13 (1.4 Ac.) | 0.28 | 0.62 | 12.2 | 3.83 | 6.42 | 1 | 4 | 5' TYPE R SUMP INLET |
| 20 | OS-14 (9.1 Ac.) | 1.82 | 4.00 | 19.9 | 3.10 | 5.20 | 6 | 21 | 5' TYPE R SUMP INLET |
| **21** | **TOTAL INFLOW INTO EXIST. STOCK POND (23.4 Ac.)** | **2.11** | **8.42** | **29.8** | **2.49** | **4.18** | **5** | **35** | **EXIST. STOCK POND WITH OUTLET** |
| **22** | **TOTAL INFLOW INTO POND 2 (104.8 Ac.)** | **20.50** | **45.77** | **30.0** | **2.48** | **4.16** | **51** | **191** | **POND 2** |




## FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

| BASIN | WEIGHTED CA(2) | CA(5) | CA(10) | CA(25) | CA(50) | CA(100) | OVERLAND C(5) | OVERLAND Length (ft) | OVERLAND Height (ft) | OVERLAND Tc (min) | STREET / CHANNEL FLOW Length (ft) | Slope (%) | Velocity (fps) | Tc TOTAL (min) | INTENSITY I(2) (in/hr) | I(5) (in/hr) | I(10) (in/hr) | I(25) (in/hr) | I(50) (in/hr) | I(100) (in/hr) | TOTAL FLOWS Q(2) (cfs) | Q(5) (cfs) | Q(100) (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OS-1 | 0.68 | 0.71 | 0.76 | 0.82 | 0.85 | 0.88 | 0.08 | 10 | 0.2 | 4.6 | 1700 | 3.5% | 1.9 | 15.1 | 19.8 | 2.48 | 3.11 | 3.62 | 4.14 | 4.66 | 5.21 | 2 | **2** | **5** |
| OS-2 | 0.02 | 0.07 | 0.14 | 0.23 | 0.27 | 0.32 | 0.08 | 300 | 10.5 | 21.1 | | | | 21.1 | 2.41 | 3.01 | 3.51 | 4.01 | 4.51 | 5.05 | 0.0 | **0.2** | **1.6** |
| OS-3 | 0.45 | 0.63 | 0.80 | 0.98 | 1.08 | 1.18 | 0.25 | 55 | 1.1 | 9.1 | 600 | 3.0% | 3.5 | 2.9 | 11.9 | 3.08 | 3.86 | 4.51 | 5.15 | 5.80 | 6.49 | 1 | **2** | **8** |
| OS-4 | 0.47 | 0.68 | 0.93 | 1.15 | 1.27 | 1.43 | 0.22 | 200 | 6 | 15.6 | 400 | 3.0% | 3.5 | 1.9 | 17.6 | 2.62 | 3.28 | 3.83 | 4.38 | 4.93 | 5.51 | 1 | **2** | **8** |
| OS-5 | 1.25 | 2.93 | 4.81 | 6.48 | 7.52 | 8.36 | 0.14 | 200 | 8 | 15.5 | 750 | 2.0% | 2.8 | 4.4 | 19.9 | 2.47 | 3.09 | 3.61 | 4.13 | 4.64 | 5.19 | 3 | **9** | **43** |
| OS-6 | 0.08 | 0.19 | 0.29 | 0.38 | 0.44 | 0.49 | 0.16 | 55 | 1.1 | 10.0 | 500 | 3.0% | 3.5 | 2.4 | 12.4 | 3.04 | 3.80 | 4.44 | 5.07 | 5.71 | 6.39 | 0.3 | **1** | **3** |
| OS-7 | 0.38 | 0.53 | 0.67 | 0.82 | 0.90 | 0.99 | 0.25 | 100 | 10 | 7.2 | | | | 7.2 | 3.69 | 4.63 | 5.40 | 6.17 | 6.94 | 7.77 | 1 | **2** | **8** |
| OS-8 | 0.18 | 0.25 | 0.32 | 0.39 | 0.43 | 0.47 | 0.25 | 55 | 1.1 | 9.1 | 400 | 3.0% | 3.5 | 1.9 | 11.0 | 3.18 | 3.99 | 4.65 | 5.32 | 5.98 | 6.70 | 1 | **1** | **3** |
| OS-9 | 0.37 | 0.85 | 1.27 | 1.70 | 1.96 | 2.17 | 0.16 | 200 | 10 | 14.1 | 400 | 3.0% | 3.5 | 1.9 | 16.0 | 2.73 | 3.42 | 3.99 | 4.56 | 5.13 | 5.74 | 1 | **3** | **12** |
| OS-10 | 0.18 | 0.25 | 0.32 | 0.39 | 0.43 | 0.47 | 0.25 | 55 | 1.1 | 9.1 | 450 | 3.8% | 3.9 | 1.9 | 11.0 | 3.18 | 3.99 | 4.65 | 5.32 | 5.98 | 6.69 | 1 | **1** | **3** |
| OS-11 | 1.42 | 1.98 | 2.53 | 3.08 | 3.40 | 3.71 | 0.25 | 200 | 10 | 12.8 | 450 | 3.8% | 3.9 | 1.9 | 14.7 | 2.84 | 3.55 | 4.14 | 4.74 | 5.33 | 5.96 | 4 | **7** | **22** |
| OS-12 | 0.90 | 2.10 | 3.45 | 4.65 | 5.40 | 6.00 | 0.14 | 300 | 13 | 18.5 | 600 | 2.0% | 2.8 | 3.5 | 22.0 | 2.35 | 2.94 | 3.43 | 3.93 | 4.42 | 4.94 | 2 | **6** | **30** |
| OS-13 | 0.17 | 0.28 | 0.38 | 0.49 | 0.56 | 0.62 | 0.20 | 55 | 1.1 | 9.6 | 450 | 2.0% | 2.8 | 2.7 | 12.2 | 3.05 | 3.83 | 4.46 | 5.10 | 5.74 | 6.42 | 0.5 | **1** | **4** |
| OS-14 | 1.09 | 1.82 | 2.46 | 3.19 | 3.64 | 4.00 | 0.20 | 300 | 12 | 17.8 | 350 | 2.0% | 2.8 | 2.1 | 19.9 | 2.48 | 3.10 | 3.62 | 4.13 | 4.65 | 5.20 | 3 | **6** | **21** |
| OS-15 | 0.70 | 2.11 | 3.98 | 6.08 | 7.25 | 8.42 | 0.09 | 300 | 16 | 18.2 | 1300 | 3.5% | 1.9 | 11.6 | 29.8 | 2.00 | 2.49 | 2.91 | 3.32 | 3.74 | 4.18 | 1 | **5** | **35** |
| OS-16 | 0.23 | 0.69 | 1.31 | 2.00 | 2.39 | 2.77 | 0.09 | 300 | 10 | 21.2 | 600 | 3.5% | 1.9 | 5.3 | 26.6 | 2.13 | 2.66 | 3.11 | 3.55 | 4.00 | 4.47 | 0.5 | **2** | **12** |
| OS-17 | 0.61 | 1.84 | 3.47 | 5.30 | 6.32 | 7.34 | 0.09 | 300 | 9.5 | 21.6 | 650 | 3.5% | 1.9 | 5.8 | 27.4 | 2.10 | 2.62 | 3.05 | 3.49 | 3.93 | 4.39 | 1.3 | **5** | **32** |
| OS-18 | 0.33 | 0.98 | 1.85 | 2.83 | 3.38 | 3.92 | 0.09 | 300 | 10 | 21.2 | 700 | 3.5% | 1.9 | 6.2 | 27.5 | 2.09 | 2.61 | 3.05 | 3.49 | 3.92 | 4.39 | 0.7 | **3** | **17** |
| OS-19 | 0.22 | 0.65 | 1.22 | 1.87 | 2.23 | 2.59 | 0.09 | 300 | 10 | 21.2 | 400 | 3.5% | 1.9 | 3.6 | 24.8 | 2.21 | 2.77 | 3.23 | 3.69 | 4.15 | 4.64 | 0.5 | **2** | **12** |
| OS-20 | 0.75 | 2.26 | 4.27 | 6.53 | 7.78 | 9.04 | 0.09 | 300 | 16 | 18.2 | 1300 | 3.5% | 1.9 | 11.6 | 29.8 | 2.00 | 2.49 | 2.91 | 3.32 | 3.74 | 4.18 | 2 | **6** | **38** |
| | | | | | | | | | | | | | | | | | | | | | | | |
| A | 0.83 | 1.93 | 3.17 | 4.28 | 4.97 | 5.52 | 0.14 | 300 | 10.5 | 19.9 | 1280 | 3.2% | 1.8 | 11.9 | 31.8 | 1.92 | 2.39 | 2.79 | 3.19 | 3.59 | 4.02 | 2 | **5** | **22** |
| B | 0.46 | 1.08 | 1.77 | 2.39 | 2.77 | 3.08 | 0.14 | 300 | 10.5 | 19.9 | 400 | 2.0% | 1.4 | 4.7 | 24.6 | 2.23 | 2.78 | 3.24 | 3.71 | 4.17 | 4.67 | 1 | **3** | **14** |
| C | 0.40 | 0.94 | 1.54 | 2.08 | 2.41 | 2.68 | 0.14 | 300 | 10.5 | 19.9 | 1100 | 1.5% | 2.4 | 7.5 | 27.3 | 2.10 | 2.62 | 3.06 | 3.49 | 3.93 | 4.40 | 1 | **2** | **12** |
| D1 | 0.72 | 0.74 | 0.78 | 0.83 | 0.85 | 0.87 | 0.08 | 15 | 0.3 | 5.7 | 1400 | 1.5% | 2.4 | 9.5 | 15.2 | 2.80 | 3.50 | 4.08 | 4.67 | 5.25 | 5.88 | 2 | **3** | **5** |
| D2 | 0.96 | 1.07 | 1.18 | 1.30 | 1.36 | 1.43 | 0.25 | 55 | 1.1 | 9.1 | 500 | 2.5% | 3.2 | 2.6 | 11.7 | 3.11 | 3.89 | 4.54 | 5.19 | 5.84 | 6.54 | 3 | **4** | **9** |
| E | 0.19 | 0.45 | 0.74 | 0.99 | 1.15 | 1.28 | 0.14 | 300 | 10.5 | 19.9 | 300 | 2.0% | 1.4 | 3.5 | 23.4 | 2.28 | 2.85 | 3.33 | 3.81 | 4.28 | 4.79 | 0.4 | **1** | **6** |
| F | 0.05 | 0.13 | 0.21 | 0.28 | 0.32 | 0.36 | 0.14 | 300 | 10.5 | 19.9 | | | | 19.9 | 2.48 | 3.10 | 3.62 | 4.13 | 4.65 | 5.20 | 0.1 | **0.4** | **1.9** |
| G | 0.14 | 0.56 | 1.08 | 1.80 | 2.16 | 2.52 | 0.08 | 70 | 14 | 5.7 | 900 | 2.0% | 1.4 | 10.6 | 16.3 | 2.71 | 3.39 | 3.96 | 4.52 | 5.09 | 5.70 | 0.4 | **2** | **14** |
| H | 0.30 | 0.44 | 0.60 | 0.74 | 0.82 | 0.92 | 0.22 | 100 | 4 | 10.1 | 300 | 3.0% | 3.5 | 1.4 | 11.5 | 3.13 | 3.92 | 4.57 | 5.23 | 5.88 | 6.58 | 1 | **2** | **6** |
| I | 0.67 | 0.93 | 1.18 | 1.44 | 1.59 | 1.74 | 0.25 | 120 | 3 | 12.4 | 550 | 3.5% | 3.7 | 2.4 | 14.9 | 2.62 | 3.53 | 4.12 | 4.71 | 5.30 | 5.93 | 2 | **3** | **10** |
| J | 0.65 | 0.90 | 1.15 | 1.40 | 1.55 | 1.69 | 0.25 | 120 | 3 | 12.4 | 600 | 2.0% | 2.8 | 3.5 | 16.0 | 2.74 | 3.43 | 4.00 | 4.57 | 5.14 | 5.75 | 2 | **3** | **10** |
| K | 0.27 | 0.38 | 0.48 | 0.59 | 0.65 | 0.71 | 0.25 | 55 | 1.1 | 9.1 | 600 | 2.0% | 2.8 | 3.5 | 12.6 | 3.02 | 3.78 | 4.41 | 5.05 | 5.68 | 6.35 | 0.8 | **1** | **4** |
| L | 1.31 | 1.83 | 2.34 | 2.85 | 3.14 | 3.43 | 0.25 | 150 | 4.5 | 13.1 | 850 | 2.5% | 3.2 | 4.5 | 17.6 | 2.62 | 3.28 | 3.83 | 4.38 | 4.93 | 5.51 | 3 | **6** | **19** |
| M | 0.41 | 0.59 | 0.81 | 1.00 | 1.11 | 1.24 | 0.22 | 100 | 4 | 10.1 | 400 | 2.0% | 2.8 | 2.4 | 12.4 | 3.04 | 3.80 | 4.44 | 5.07 | 5.71 | 6.39 | 1 | **2** | **8** |
| N | 0.38 | 0.53 | 0.67 | 0.82 | 0.90 | 0.99 | 0.25 | 55 | 1.1 | 9.1 | 1050 | 2.0% | 2.8 | 6.2 | 15.2 | 2.79 | 3.50 | 4.06 | 4.66 | 5.25 | 5.87 | 1 | **2** | **6** |
| O | 0.27 | 0.38 | 0.48 | 0.59 | 0.65 | 0.71 | 0.25 | 80 | 5 | 7.5 | | | | 7.5 | 3.64 | 4.56 | 5.32 | 6.08 | 6.84 | 7.66 | 1 | **2** | **5** |
| P | 0.49 | 0.68 | 0.86 | 1.05 | 1.16 | 1.27 | 0.25 | 120 | 3 | 12.4 | 450 | 1.5% | 2.4 | 3.1 | 15.5 | 2.77 | 3.47 | 4.05 | 4.63 | 5.21 | 5.83 | 1 | **2** | **7** |
| Q | 0.13 | 0.31 | 0.51 | 0.68 | 0.79 | 0.88 | 0.14 | 90 | 22 | 5.7 | 300 | 1.5% | 1.2 | 4.1 | 9.8 | 3.32 | 4.16 | 4.85 | 5.54 | 6.24 | 6.98 | 0.4 | **1** | **6** |
| R | 0.16 | 0.23 | 0.29 | 0.35 | 0.39 | 0.42 | 0.25 | 90 | 6 | 7.8 | | | | 7.8 | 3.59 | 4.50 | 5.26 | 6.01 | 6.76 | 7.56 | 1 | **1** | **3** |
| S | 0.07 | 0.29 | 0.54 | 0.90 | 1.08 | 1.26 | 0.08 | 140 | 14 | 10.2 | 750 | 1.5% | 2.4 | 5.1 | 15.3 | 2.79 | 3.49 | 4.07 | 4.66 | 5.24 | 5.86 | 0.2 | **1.0** | **7** |

## FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

| Pipe Run | Contributing Basins | Equivalent CA(5) | Equivalent CA(100) | Maximum Tc | Intensity I(5) | Intensity I(100) | Flow Q(5) | Flow Q(100) | Pipe Size* |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DP-18 | 2.10 | 6.00 | 23.2 | 2.86 | 4.81 | 6 | 29 | 30" RCP |
| 2 | DP-19 | 0.28 | 0.62 | 12.2 | 3.83 | 6.42 | 1 | 4 | 18" RCP |
| 3 | DP-20 | 1.82 | 4.00 | 19.9 | 3.10 | 5.20 | 6 | 21 | 24" RCP |
| 4 | PR-1, PR-2, PR-3 | 4.20 | 10.62 | 23.9 | 2.82 | 4.73 | 12 | 50 | 36" RCP |
| 5 | Captured from DP-5 | 1.61 | 2.31 | 17.7 | 3.28 | 5.50 | 5 | 13 | 24" RCP |
| 6 | Captured from DP-6 | 0.63 | 0.93 | 11.9 | 3.86 | 6.49 | 2 | 6 | 18" RCP |
| 7 | PR-4, PR-5, PR-6 | 6.43 | 13.86 | 24.4 | 2.79 | 4.68 | 18 | 65 | 36" RCP |
| 8 | DP-4 | 0.74 | 0.87 | 15.2 | 3.50 | 5.88 | 3 | 5 | 18" RCP |
| 9 | DP-7 | 1.51 | 2.47 | 27.3 | 2.62 | 4.40 | 4 | 11 | 24" RCP |
| 10 | PR-8, PR-9 | 2.25 | 3.34 | 27.5 | 2.61 | 4.38 | 6 | 15 | 30" RCP |
| 11 | PR-7, PR-10 | 8.69 | 17.20 | 28.0 | 2.58 | 4.33 | 22 | 75 | 42" RCP |
| 12 | Captured from DP-10 | 1.83 | 2.83 | 21.2 | 3.00 | 5.04 | 5 | 14 | 24" RCP |
| 13 | PR-11, PR-12 | 10.51 | 20.03 | 28.1 | 2.58 | 4.33 | 27 | 87 | 42" RCP |
| 14 | DP-8 | 0.38 | 0.71 | 12.6 | 3.78 | 6.35 | 1 | 4 | 18" RCP |
| 15 | DP-9 | 1.43 | 2.68 | 16.0 | 3.43 | 5.75 | 5 | 15 | 24" RCP |
| 16 | PR-14, PR-15 | 1.80 | 3.38 | 16.4 | 3.39 | 5.69 | 6 | 19 | 24" RCP |
| 17 | PR-13, PR-16 | 12.31 | 23.41 | 28.6 | 2.55 | 4.28 | 31 | 100 | 48" RCP |
| 18 | DP-11 | 1.58 | 4.54 | 24.2 | 2.80 | 4.70 | 4 | 21 | 30" RCP |
| **19** | **PR-17, PR-18 W'LY FOREBAY OUTFALL** | **13.89** | **27.96** | **28.8** | **2.54** | **4.26** | **35** | **119** | **48" RCP** |
| 20 | DP-12 | 2.93 | 6.27 | 19.9 | 3.09 | 5.19 | 9 | 33 | 30" RCP |
| 21 | DP-13 | 0.19 | 2.06 | 12.4 | 3.80 | 6.39 | 1 | 13 | 24" RCP |
| 22 | PR-20, PR-21 | 3.12 | 8.33 | 20.7 | 3.04 | 5.10 | 9 | 42 | 30" RCP |
| 23 | DP-14 | 0.25 | 0.47 | 11.0 | 3.99 | 6.70 | 1 | 3 | 18" RCP |
| 24 | DP-15 | 0.85 | 2.17 | 16.0 | 3.42 | 5.74 | 3 | 12 | 24" RCP |
| 25 | PR-22, PR-23, PR-24 | 4.22 | 10.97 | 22.0 | 2.94 | 4.94 | 12 | 54 | 36" RCP |
| 26 | DP-16 | 0.25 | 0.47 | 11.0 | 3.99 | 6.69 | 1 | 3 | 18" RCP |
| 27 | DP-17 | 1.98 | 3.71 | 14.7 | 3.55 | 5.96 | 7 | 22 | 30" RCP |
| 28 | PR-26, PR-27 | 2.23 | 4.18 | 14.9 | 3.53 | 5.93 | 8 | 25 | 30" RCP |
| **29** | **PR-25, PR-28 E'LY FOREBAY OUTFALL** | **6.44** | **15.16** | **22.3** | **2.92** | **4.91** | **19** | **74** | **42" RCP** |


CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)


# THE RETREAT AT TIMBERRIDGE FILING 1
## FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP
(FILING NO. 1 GRADING ONLY)

CLASSIC CONSULTING

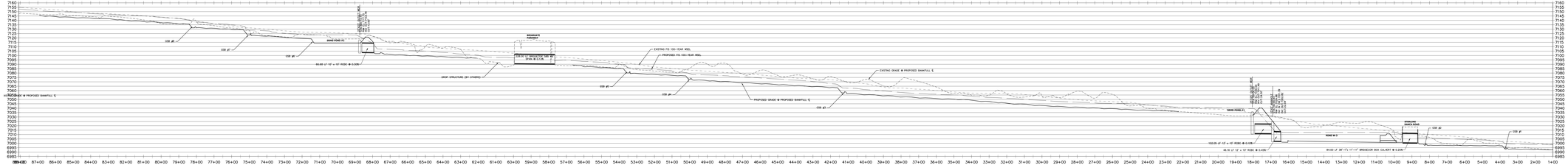
| | | | | | |
|---|---|---|---|---|---|
| DESIGNED BY | MAW | SCALE | | DATE | 1-31-19 |
| DRAWN BY | MAW | (H) 1"= 100' | | SHEET | 5 OF 5 |
| CHECKED BY | | (V) 1"= N/A | | JOB NO. | 1185.00 |

# Appendix E

# Work Map

# SAND CREEK PLAN & PROFILE

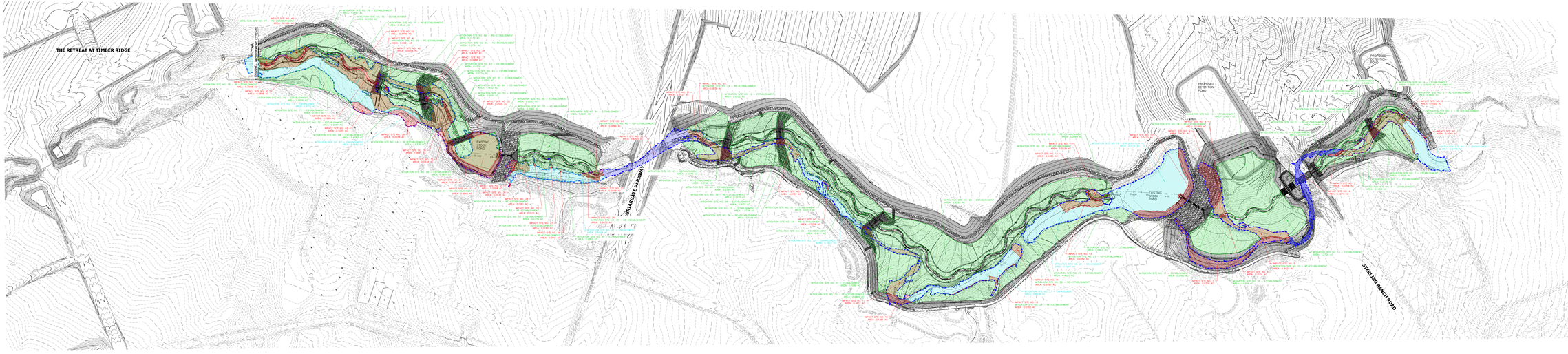
**SAND CREEK MASTER BANKFULL ALIGNMENT PROFILE**
**STA 1+00.00 TO 88+08.39**




HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 100'

BANKFULL PLAN & PROFILE
SAND CREEK RESTORATION
EL PASO COUNTY, COLORADO
DATE: 08/31/2022
SHEET 7 OF 7

# SAND CREEK RESTORATION – WETLANDS EXHIBIT




**LEGEND**

- PERMANENT LOSSES FROM CHANNEL
- PERMANENT LOSSES FROM BRIDGE
- MITIGATION AREAS
- PRESERVED WETLANDS

| Sand Creek Wetlands Disturbance | | |
|---|---|---|
| Totals | Acres | % |
| Total Existing Onsite Wetland | 79.172 | 9.8% |
| Reach 2 Permanent Loss | 10.091 | 1.25% |
| Reach 3 Permanent Loss | 1.256 | 0.16% |
| Reach 2 Permanent Loss | 259.982 | 4.79% |
| Permanent Loss Total | 469.051 | 58.0% |
| Reach 1 Wetlands Preserved | | |
| Reach 2 Wetlands Preserved | 180.876 | 2.23% |
| Reach 3 Wetlands Preserved | | |
| Total Wetlands Preserved | 180.876 | 2.2% |
| Reach 1 Mitigation | 131.787 | 2.43% |
| Reach 2 Mitigation | 184.250 | 3.40% |
| Reach 3 Mitigation | 484.540 | 8.93% |
| Mitigation Total | 1,754.580 | 46.76% |
| Total Mitigation less Permanent Loss | 1,285.529 | 45.58% |
| Mitigation to Permanent Loss Ratio | | 3.74 |

FINAL GRADING TOTALS:

REACH 1 =-30,764 CY CUT
4,603 CY FILL
26,162 NET

REACH 2 =446,436 CY CUT
24,522 CY FILL
421,913 CY NET

REACH 3 =129,691 CY CUT
0 CY FILL
129,228 CY NET

TOTAL= 806,8911 CY CUT
51,587 CY FILL
774,304 CY NET

| Wetlands Impacts Summary | |
|---|---|
| Total Permanent Loss | 30.05% |
| Total Re-Establishment | 7.32% |
| Total Establishment | 26.13% |
| Total Enhancement | 5.73% |
| Total Preservation | 2.31% |
| Total Mitigation | 40.57% |
| Mitigation to Permanent Loss Ratio | 3.77 |

| Permanent Impacts | |
|---|---|
| Impact Area | Acres |
| 1 | 0.056 |
| 2 | 0.006 |
| 3 | 0.006 |
| 4 | 0.016 |
| 5 | 0.347 |
| 6 | 0.014 |
| 7 | 0.014 |
| 8 | 0.018 |
| 9 | 0.347 |
| 10 | 0.016 |
| 11 | 0.347 |
| 12 | 0.016 |
| 13 | 0.347 |
| 14 | 0.252 |
| 15 | 0.252 |
| 16 | 0.073 |
| 17 | 0.252 |
| 18 | 0.252 |
| 19 | 0.252 |
| 20 | 0.252 |
| 21 | 0.073 |
| 22 | 0.252 |
| 23 | 0.252 |
| 24 | 0.252 |
| 25 | 0.252 |
| 26 | 0.252 |
| 27 | 0.016 |
| 28 | 0.016 |
| 29 | 0.347 |
| 30 | 0.252 |
| 31 | 0.252 |
| 32 | 0.252 |
| 33 | 0.252 |
| 34 | 0.252 |
| 35 | 0.252 |
| 36 | 0.252 |
| 37 | 0.252 |
| 38 | 0.252 |
| 39 | 0.252 |
| 40 | 0.252 |
| 41 | 0.252 |
| 42 | 0.252 |
| 43 | 0.252 |
| 44 | 0.252 |
| 45 | 0.252 |
| 46 | 0.252 |
| 47 | 0.252 |
| 48 | 0.252 |
| 49 | 0.252 |
| 50 | 0.252 |
| Total | 10.5702 |

| Enhancement | |
|---|---|
| Mitigation Area | Acres |
| 1 | 0.252 |
| 2A | 0.527 |
| 2C | 0.527 |
| 3C | 0.252 |
| 4C | 0.252 |
| 5C | 1.252 |
| Total | 4.06 |

| Preservation | |
|---|---|
| Mitigation Area | Acres |
| 1 | 2.310 |
| Total | 2.310 |

| Total Mitigation | |
|---|---|
| Mitigation Area | Acres |
| 1 | 0.252(Preservation) |
| 2 | 0.527(Preservation) |
| 3 | 0.252(Re-Establish) |
| 4 | 0.252(Re-Establish) |
| 5 | 0.252(Establish) |
| 6 | 0.252(Re-Establish) |
| 7 | 0.252(Establish) |
| 8 | 0.252(Re-Establish) |
| 9 | 0.252(Establish) |
| 10 | 0.252(Re-Establish) |
| 11 | 0.252(Establish) |
| 12 | 0.252(Re-Establish) |
| 13 | 0.252(Establish) |
| 14 | 1.457(Establish) |
| 15 | 0.252(Establish) |
| 16 | 0.252(Re-Establish) |
| 17 | 1.689(Establish) |
| 18 | 0.252(Establish) |
| 19 | 0.252(Re-Establish) |
| 20 | 0.252(Establish) |
| 21 | 0.252(Re-Establish) |
| 22 | 0.252(Establish) |
| 23 | 0.252(Re-Establish) |
| 24 | 0.252(Establish) |
| 25 | 0.252(Re-Establish) |
| 26 | 0.252(Establish) |
| 27 | 0.252(Re-Establish) |
| 28 | 0.252(Establish) |
| 29 | 0.252(Re-Establish) |
| 30 | 0.252(Establish) |
| 31 | 0.252(Establish) |
| 32 | 0.252(Establish) |
| 33 | 0.252(Establish) |
| 34 | 0.252(Establish) |
| 35 | 0.252(Establish) |
| 36 | 0.252(Establish) |
| 37 | 0.252(Establish) |
| 38 | 0.252(Establish) |
| 39 | 0.252(Establish) |
| 40 | 0.252(Establish) |
| 41 | 0.252(Establish) |
| 42 | 0.252(Establish) |
| 43 | 0.252(Establish) |
| 44 | 0.252(Establish) |
| 45 | 0.252(Establish) |
| 46 | 0.252(Establish) |
| 47 | 0.252(Establish) |
| 48 | 0.252(Establish) |
| 49 | 0.252(Establish) |
| 50 | 0.252(Establish) |
| 51 | 0.252(Establish) |
| 52 | 0.252(Establish) |
| 53 | 0.252(Establish) |
| 54 | 0.252(Establish) |
| 55 | 0.252(Establish) |
| 56 | 0.252(Establish) |
| 57 | 0.252(Establish) |
| 58 | 0.252(Establish) |
| 59 | 0.252(Establish) |
| 60 | 0.252(Establish) |
| 61 | 0.252(Establish) |
| 62 | 0.252(Establish) |
| 63 | 0.252(Establish) |
| 64 | 0.252(Establish) |
| 65 | 0.252(Establish) |
| 66 | 0.252(Establish) |
| 67 | 0.252(Establish) |
| 68 | 0.252(Establish) |
| 69 | 0.252(Establish) |
| 70 | 0.252(Establish) |
| 71 | 0.252(Establish) |
| 72 | 0.252(Establish) |
| 73 | 0.252(Establish) |
| 74 | 0.252(Establish) |
| 75 | 0.252(Establish) |
| 76 | 0.252(Establish) |
| Total | 46.2396 |

| Establishment | |
|---|---|
| Mitigation Area | Acres |
| 1 | 0.252 |
| 5 | 0.252 |
| 7 | 0.252 |
| 9 | 0.252 |
| 11 | 0.252 |
| 13 | 0.252 |
| 14 | 1.457 |
| 15 | 0.252 |
| 17 | 1.689 |
| 18 | 0.252 |
| 20 | 0.252 |
| 22 | 0.252 |
| 24 | 0.252 |
| 25 | 0.252 |
| 26 | 0.252 |
| 28 | 0.252 |
| 29 | 0.252 |
| 30 | 0.252 |
| 31 | 0.252 |
| 32 | 0.252 |
| 33 | 0.252 |
| 34 | 0.252 |
| 35 | 0.252 |
| 36 | 0.252 |
| 37 | 0.252 |
| 38 | 0.252 |
| 39 | 0.252 |
| 40 | 0.252 |
| 41 | 0.252 |
| 42 | 0.252 |
| 43 | 0.252 |
| 44 | 0.252 |
| 45 | 0.252 |
| 46 | 0.252 |
| 47 | 0.252 |
| 48 | 0.252 |
| 49 | 0.252 |
| 50 | 0.252 |
| 51 | 0.252 |
| 52 | 0.252 |
| 53 | 0.252 |
| 54 | 0.252 |
| 55 | 0.252 |
| 56 | 0.252 |
| 57 | 0.252 |
| 58 | 0.252 |
| 59 | 0.252 |
| 60 | 0.252 |
| 61 | 0.252 |
| 62 | 0.252 |
| 63 | 0.252 |
| 64 | 0.252 |
| 65 | 0.252 |
| 66 | 0.252 |
| 67 | 0.252 |
| 68 | 0.252 |
| 69 | 0.252 |
| 70 | 0.252 |
| 71 | 0.252 |
| 72 | 0.252 |
| 73 | 0.252 |
| 74 | 0.252 |
| 75 | 0.252 |
| 76 | 0.252 |
| Total | 26.1708 |

| Re-Establishment | |
|---|---|
| Mitigation Area | Acres |
| 3 | 0.252 |
| 4 | 0.252 |
| 6 | 0.252 |
| 8 | 0.252 |
| 10 | 0.252 |
| 12 | 0.252 |
| 16 | 0.252 |
| 19 | 0.252 |
| 21 | 0.252 |
| 23 | 0.252 |
| 27 | 0.252 |
| 42 | 0.252 |
| 52 | 0.252 |
| 53 | 0.252 |
| 54 | 0.252 |
| 55 | 0.252 |
| 56 | 0.252 |
| 57 | 0.252 |
| 58 | 0.252 |
| 59 | 0.252 |
| 60 | 0.252 |
| 61 | 0.252 |
| 62 | 0.252 |
| 63 | 0.252 |
| 64 | 0.252 |
| 65 | 0.252 |
| 66 | 0.252 |
| 67 | 0.252 |
| 68 | 0.252 |
| 69 | 0.252 |
| 70 | 0.252 |
| 71 | 0.252 |
| 72 | 0.252 |
| 73 | 0.252 |
| 74 | 0.252 |
| 75 | 0.252 |
| 76 | 0.252 |
| Total | 9.324 |

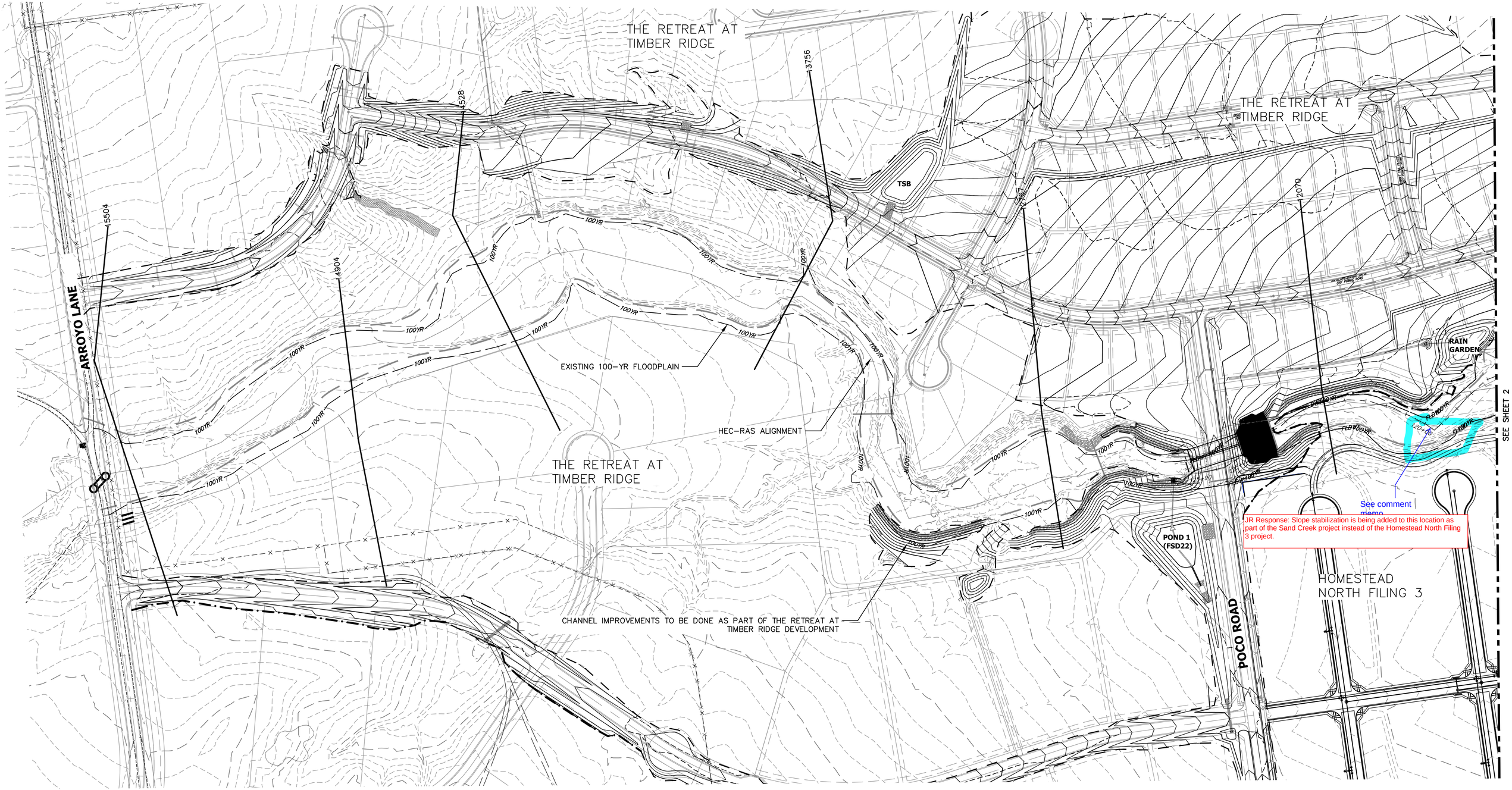
100 50 0 100 200

HORIZONTAL
ORIGINAL SCALE: 1" = 100'

VERTICAL
ORIGINAL SCALE: 1" = 10'

WETLANDS EXHIBIT
SAND CREEK RESTORATION
TOWN OF PARKER, CO
DATE: 06/30/2022
SHEET 1 OF 1

# SAND CREEK RESTORATION WORK MAP




## LEGEND

- HEC-RAS CROSS SECTION
- EXISTING CHANNEL ℄
- PROPOSED CHANNEL ℄
- 100YR — 100-YR FIS
- 100YR — 100-YR DESIGN WSEL
- *100YR* — 100-YR EXISTING WSEL

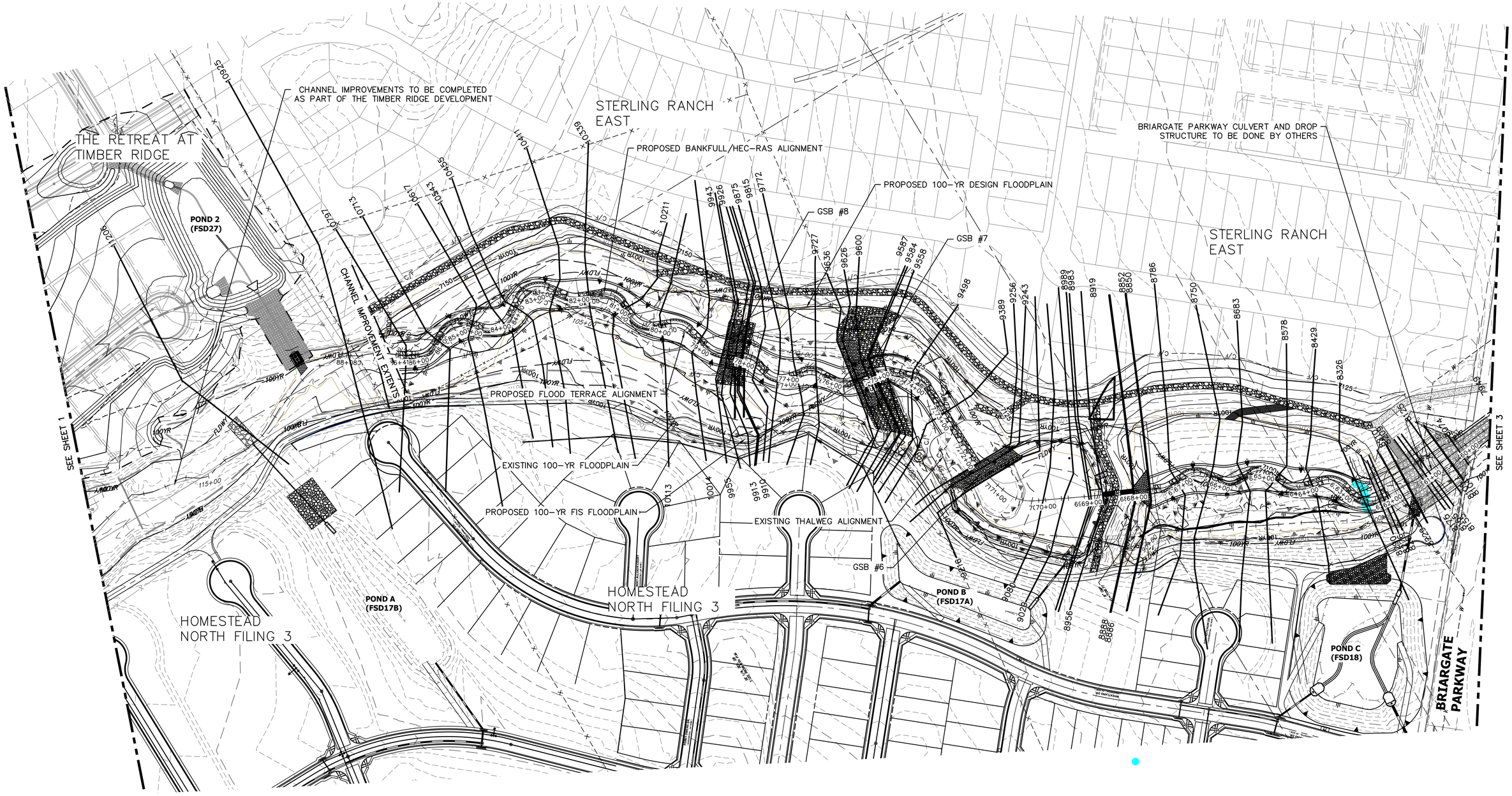
100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

HEC-RAS WORK MAP
SAND CREEK RESTORATION
PROJECT NO: 25188.04
DATE: 09/08/2022
SHEET 1 OF 4

X:\25\10000.all\25188\04\HEC-RAS\HEC RASE Base Files\2022-04-08-Sand Creek HEC Work Map.dwg, Layout1 (2), 1/18/2023 12:13:49 PM, VaughtD

# SAND CREEK RESTORATION WORK MAP




## LEGEND

- HEC-RAS CROSS SECTION
- EXISTING CHANNEL ℄
- PROPOSED CHANNEL ℄
- 100YR — 100-YR FIS
- 100YR — 100-YR DESIGN WSEL
- 100YR — 100-YR EXISTING WSEL

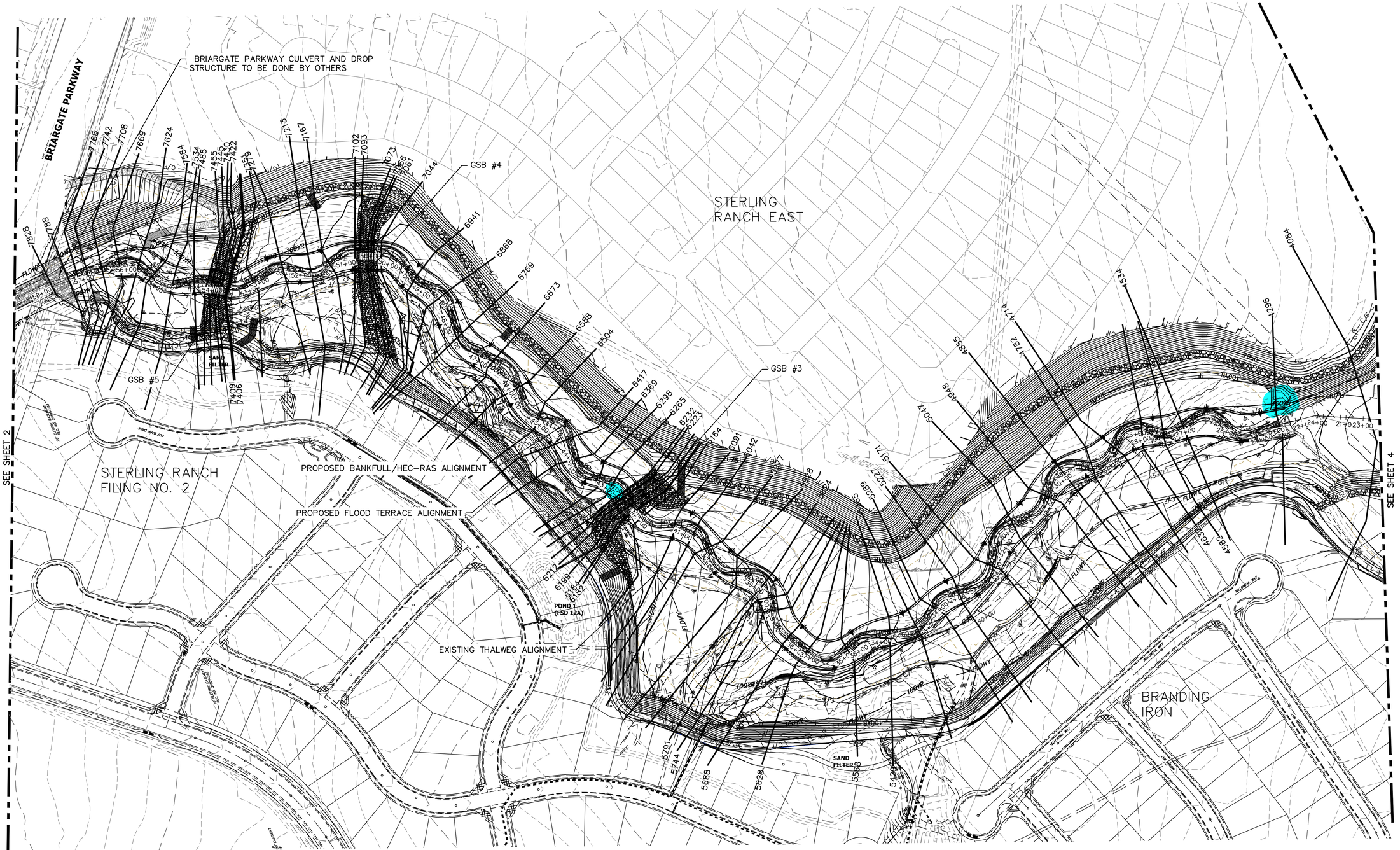
100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

HEC-RAS WORK MAP
SAND CREEK RESTORATION
PROJECT NO: 25188.04
DATE: 09/08/2022
SHEET 2 OF 4

X:\25\10000.all\25188\04\HEC-RAS\HEC RAS Base Files\2022-04-08-Sand Creek HEC Work Map.dwg, Layout1 (3), 11/8/2023 12:14:03 PM, VaughtD

# SAND CREEK RESTORATION WORK MAP




**LEGEND**

- HEC-RAS CROSS SECTION
- EXISTING CHANNEL ℄
- PROPOSED CHANNEL ℄
- 100YR — 100-YR FIS
- **100YR** — 100-YR DESIGN WSEL
- *100YR* — 100-YR EXISTING WSEL

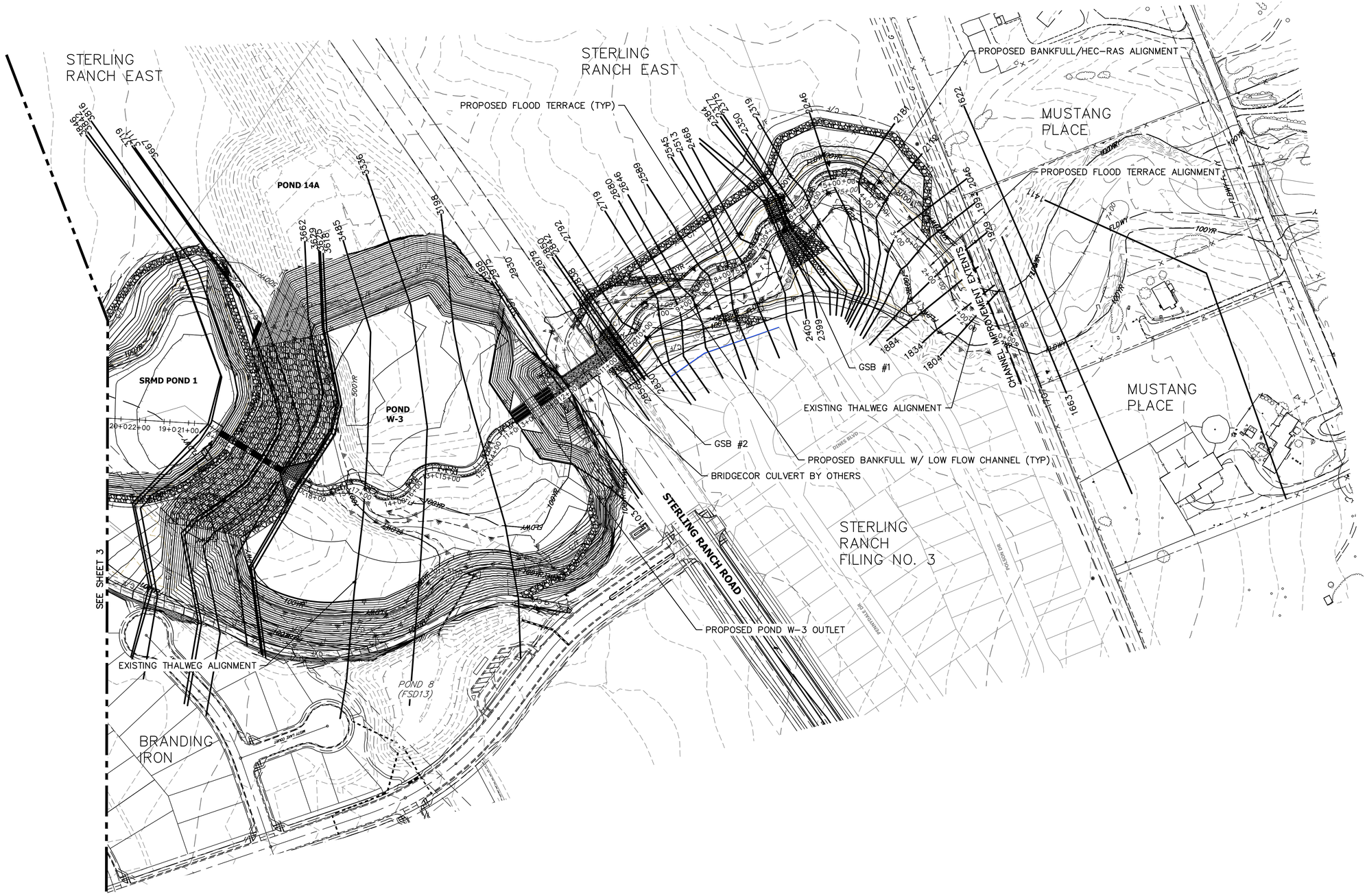
100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

HEC-RAS WORK MAP
SAND CREEK RESTORATION
PROJECT NO: 25188.04
DATE: 09/08/2022
SHEET 3 OF 4

X:\25\10000.all\25188\HEC-RAS\HEC-RASE Base Files\2022-04-06-Sand Creek HEC Work Map.dwg, Layout1 (4), 11/8/2023 12:14:19 PM, VaughtD

# SAND CREEK RESTORATION WORK MAP




**LEGEND**

- HEC-RAS CROSS SECTION
- EXISTING CHANNEL ℄
- PROPOSED CHANNEL ℄
- 100-YR FIS
- 100-YR DESIGN WSEL
- 100-YR EXISTING WSEL

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

HEC-RAS WORK MAP
SAND CREEK RESTORATION
PROJECT NO: 25188.04
DATE: 09/08/2022
SHEET 3 OF 4

X:\25\10000.all\25188\04\HEC-RAS\HEC RASE Base Files\2022-04-08-Sand Creek HEC Work Map.dwg, Layout1 (5), 11/8/2023 12:14:33 PM, VaughtD