PRELIMINARY/FINAL DRAINAGE REPORT
FOR
ROMENS SUBDIVISION

OCTOBER 2020

Prepared for:

ADELAIDA ROMENS TRUSTEE,
5135 Coneflower Lane
Colorado Springs, CO 80917-1316

Prepared By:

CATAMOUNT ENGINEERING
321 W. Henrietta Ave, Suite A
Woodland Park, CO 80863
719-426-2124

FILE NO: SF-2228

PRELIMINARY/FINAL DRAINAGE REPORT
ROMENS SUBDIVISION

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

Certification Statement:
This report and plan for the preliminary and final drainage design for the ROMENS SUBDIVISION was prepared by me (or under my direct supervision) in accordance with the provisions of City of Colorado Springs/El Paso County Drainage Criteria Manual Volumes 1 and 2 Drainage Design and Technical Criteria for the owners thereof. I understand that El Paso County does not and will not assume liability for drainage facilities designed by others.

COLORADO LICENSED
DAVID L. MIJARES
40510
PROFESSIONAL ENGINEER

David L. Mijares, Colorado PE #40510
For and on behalf of Catamount Engineering

5.5.2023
Date

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

ADELADIA ROMENS, hereby certifies that the drainage facilities for ROMENS SUBDIVISION shall be constructed according to the design presented in this report. I understand that El Paso County does not and will not assume liability for the drainage facilities designed and or certified by my engineer and that the El Paso County reviews drainage plans pursuant to Colorado Revised Statues, Title 30, Article 28; but cannot, on behalf of ROMENS SUBDIVISION, guarantee that final drainage design review will absolve ADELADIA ROMENS and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Adelaida Romens
Business Name

By: _____

Title: _____

Address: 5135 Coneflower Lane

Colorado Springs, CO 80917-1316

El Paso County:
Filed in accordance with the requirements of the El Paso County land Development Code and the Drainage Criteria manual Volumes 1 and 2, and the El Paso County Engineering Criteria Manual, latest revision.

_____ _____
Joshua Palmer, PE Date
County Engineer/ECM Administrator

Conditions:

PRELIMINARY/FINAL DRAINAGE REPORT for ROMENS SUBDIVISION

PURPOSE

The purpose of this drainage report is to identify existing drainage patterns, quantify developed storm water runoff, and establish outfall scenarios from the proposed development.

GENERAL LOCATION AND DESCRIPTION

The subject 36.539 acres consists of unplatted land to be developed into 7 rural residential lots (RR-5 zoning) located within the NE ¼ of the NE ¼ of Section 24, Township 11 South, Range 64 West of the 6th principal meridian in unincorporated El Paso County. The parcel is bounded to the north by Hopper Road right-of-way, to the east by Bradshaw Road right-of-way, to the south Cleese Court, and to the west by the Hybar Subdivision. The existing access to the parcel is from Cleese Court, a gravel county local roadway.

The parcel is located within the Bijou Creek drainage basin. The West Bijou Creek bisects the parcel and flows from west to east. The northerly portion of the parcel sheet flows south to West Bijou Creek within the RR-5 zoned parcel at slopes between 2% and 9%. The southerly portion of the parcel sheet flows north to West Bijou Creek within the parcel at slopes between 2% and 13%.

Existing soils on the site consist of Brusset loam, hydrologic soil group B, and Peyton sandy loam, hydrologic soil group B as determined by the Natural Resources Conservation Service Web Soil Survey. The site is vegetated with native grasses. Sparse shrub and tree cover are evident.

No portion of the site lies within an F.E.M.A. designated floodplain per FIRM 08041C0350 G and 08041C0375 G effective December 07, 2018. A firmette exhibiting the parcel has been included in the appendix of this report.

DRAINAGE CONDITIONS

No existing studies containing the site have been identified. The parcel exists along a ~1,550lf reach of West Bijou Creek which bisects the parcel. The parcel was historically used for agricultural grazing and an existing minor stock pond exists along the western boundary in basins A and B. Correspondence with the State of Colorado Division of Water Resources regarding the existing stock pond has occurred. Upper Black Squirrel Ground Water Management District commissioner, Chris Grimes has determined that the existing stock pond does not appear to have appropriate authorization from the Colorado Ground Water Commission and or/ Division of Water Resources to legally exist.

As part of this Division of Water Resources determination; elimination of the surface water diversion and collection pond via breeching of the structure or installation of an adequately sized culvert at an adequate depth to ensure any future water that might collect in the structure can return to the natural drainage (within 72 hours). The impounding berm will be breeched to meet the requirement eliminating any impounding. The stock pond was not used in hydrologic calculations. Romens Subdivision has obtained the Colorado State Engineer's sufficiency of water finding for both quantity and quality as part of the future final plat application. As the parcel is located along three roadways with defined crowns & roadside ditches on the uphill sides and the western property line is basically on a ridge, no significant offsite runoff enters the parcel. For the purposes of this study, the existing and proposed basins are essentially the same with the exception of the proposed homesites.

The majority of the area within developed basins was modeled as agricultural land. Per ECM Table 3-1 in appendix Single family- 5 acre lots typically have a 7% imperviousness coverage. There will be shared access driveways to each lot. At Bradshaw Road, there is an existing 30" RCP that conveys flows under the roadway to the northeast.

To define a "no build" boundary, a HEC-RAS model of West Bijou Creek through the site has been prepared utilizing flows computed with the use of HydroCad (TR-20) and USGS (Regression Equations) Streamstats hydrologic models. The models yielded peak flow values of 96cfs and 92cfs for the 100yr storm respectively. Velocities in the channel are lower than 5.0ft/s and are therefore considered non-erosive (i.e. – 5ft/s or lower for sandy material). Froude numbers are lower than 1.0 which further substantiates that predictive erosion of the channel is minimal. At the Bradshaw Road crossing there is a 30" RCP culvert pipe that does not have adequate capacity to convey the 100yr flow, therefore the roadway is overtops to a depth 0.48' measured at the shoulder. It is noteworthy to mention that the flows computed by both models are lower than localized rational method calculations. However, since the watershed is ~640acres, the SCS method and the regression equation method is more applicable. Therefore, the higher of the two values (96cfs) was used. A normal depth boundary condition was used for the HEC-RAS modeling of the channels downstream flow. HEC-RAS calculations are provided in the appendix.

Basin A (4.94 Acres) represents portions of the proposed residential lots 1 and 2 and the southerly half of the existing Hopper Road gravel roadway. Runoff generated within the basin will sheet flow southerly to West Bijou Creek.

Basin B (9.51 Acres) represents portions of the proposed residential lots 6 and 7 and the northerly half of the existing Cleese Court gravel roadway. Runoff generated within the basin will sheet flow northerly to West Bijou Creek.

Basin C (8.34 Acres) represents portions of the proposed residential lots 4, 5 and 6 and the northerly half of the existing Cleese Court gravel roadway. Runoff generated within the basin will sheet flow northerly to West Bijou Creek.

Basin D (6.47 Acres) represents portions of the proposed residential lots 4 and 5 and the northerly half of the existing Cleese Court gravel roadway along with the west half of Bradshaw Road (paved). Runoff generated within the basin will sheet flow northerly to West Bijou Creek.

Unresolved from review 1. Revise report to provide addition details about the 500 cfs value that was mentions in the first submittal. Account for all flows going through the property and outfalling at the culvert under Bradshaw Rd.

Basin E (9.27 Acres) represents portions of the proposed residential lots 2 and 3 and the southerly half of the existing Hopper Road gravel roadway along with the west half of Bradshaw Road (paved). Runoff generated within the basin will sheet flow southerly to West Bijou Creek.

Design Point 1 represents combined routed flows from both the existing and proposed basins A, B, C, D, and E. Combined flows at Design Point 1-E of Q_5=10.4 cfs and Q_{100}=59.8 cfs represent the existing basins. Combined flows at Design Point 1-P of Q_5=12.5 cfs and Q_{100}=67.9 cfs represent the proposed basins, showing a small increase of 2.1 cfs in the minor event and 8.1 cfs in the major event. Combined flows are directed to an existing 30-inch diameter drainage culvert, located beneath Bradshaw Road. The small increase in flows is due to the small increase in imperviousness area and are considered minor based on engineering judgement.

The rational methodology was utilized in analyzing on-site basins for development of on-site improvements. The minor increase in impervious area due to homesite development within the 38.53-acre subdivision would not substantially impact historic drainage patterns. Detention is not typically pursued in rural development scenarios unless undetained upstream development would negatively affect the development. A significant portion of runoff generated within typical rural development does not flow directly into County stormwater systems, but leaves improved areas as sheet flow into undeveloped and vegetated portions of lots and infiltrates into the ground.
The site was analyzed for Site-Level Low Impact Development (LID) Design Credit by Impervious Reduction Factor (IRF) exhibiting reductions from proposed building site, assuming a 5,000-sf impervious footprint per lot, and gravel/paved roadways outfall to substantial receiving pervious areas.

See Appendix for Calculations.

WATER QUALITY/4-STEP PROCESS

The development addresses Low Impact Development strategies primarily through the utilization of large impervious areas.

Step 1-Employ Runoff Reduction Practices
Impervious areas generated within the development will flow across pervious disconnected areas prior to discharging into West Bijou Creek located within the site.

Step2-Stabilize Drainageway
West Bijou Creek which runs through the site and reduced runoff due to substantial conveyance across both onsite and offsite pervious area at relatively flat grades will mitigate minor increases in impervious area with 5-acre lot development prior to affecting the drainageways.

Step3-Provide Water Quality Capture Volume
Permanent water quality facility is not proposed for development of 5 acre lots per the requirements of El Paso County Engineering Criteria Manual Section I.7.1B. Runoff reduction (IRF) indicates effective site imperviousness of 1.2%.

Step4-Consider Need for Industrial and Commercial BMP's
A Grading, Erosion Control, and Stormwater Quality Plan and narrative have been submitted concurrently for the development and will be subject to county approval prior to any soil disturbance. The erosion control plan included specific source control BMP's as well as defined overall site management practices for the construction period. No industrial or Commercial density development is proposed.

COST ESTIMATE

No drainage improvements are proposed with development of 5-acre residential lots.

DRAINAGE FEE CALCULATION

The development proposes to plat 36.539 acres within El Paso County, all contained within the Bijou Creek Drainage Basin. The Bijou Creek Drainage Basin has not been studied and no drainage or bridge fees have been adopted.

DRAINAGE METHODOLOGY

This drainage report was prepared in accordance
Drainage Criteria Manual Volumes 1 and 2, as re

The rational method for drainage basin study area
site analysis. For the Rational Method, flows we
year recurrence intervals. The average runoff co
and the Intensity-Duration-Frequency curves are
Criteria Manual. Time of concentration for overl
calculated per Section 3.2 of the City Drainage C
Method are shown in the Appendix of this report.

Explain why there is a 11% increase in runoff because of the development when lots are rural in nature. Increase in flows post development should be negligible and close to what existing amounts are. If flows cannot match existing flows after development, other methods of detention might be required. The downstream channel appears to have erosion and an increase in runoff is not likely to be approved. Provide justification as to whether mitigation is needed for that channel. How long has erosion been a problem in the downstream channel (x-sec 0 x-sec 112)?

SUMMARY

The ROMENS SUBDIVISION development consists of large lot development with minor increases in impervious areas consistent with surrounding development. The development will not adversely affect downstream properties or facilities. Design Point 1 represents a comparison point for the existing and proposed flows prior to crossing of Bradshaw Road. Full development of the proposed parcel would result in an increase in runoff of Q_5 = 2.1cfs and Q_{100} = 8.1cfs, at

Unresolved from review 1. Provide an analysis and discussion about the outfall and whether it meets the definition of a suitable outfall per ECM 3.2.4. If crossflow does not meet criteria the culvert might have to be replaced with the appropriate size. Per DCM table 6-1 minor storm and major storms flows need to be hydraulically adequate. Provide analysis for each storm and provide a recommendation for culvert size if necessary.

REFERENCES:

County of El Paso Drainage Criteria Manual Volumes 1 and 2, revised May 2014

Flood Insurance rate maps 08041C00350 G and 08041C00375 G, December 07, 2018

Natural Resources Conservation Service Web Soil Survey

“Peyton Pines Drainage Study”, prepared by JR Engineering, dated 1973.

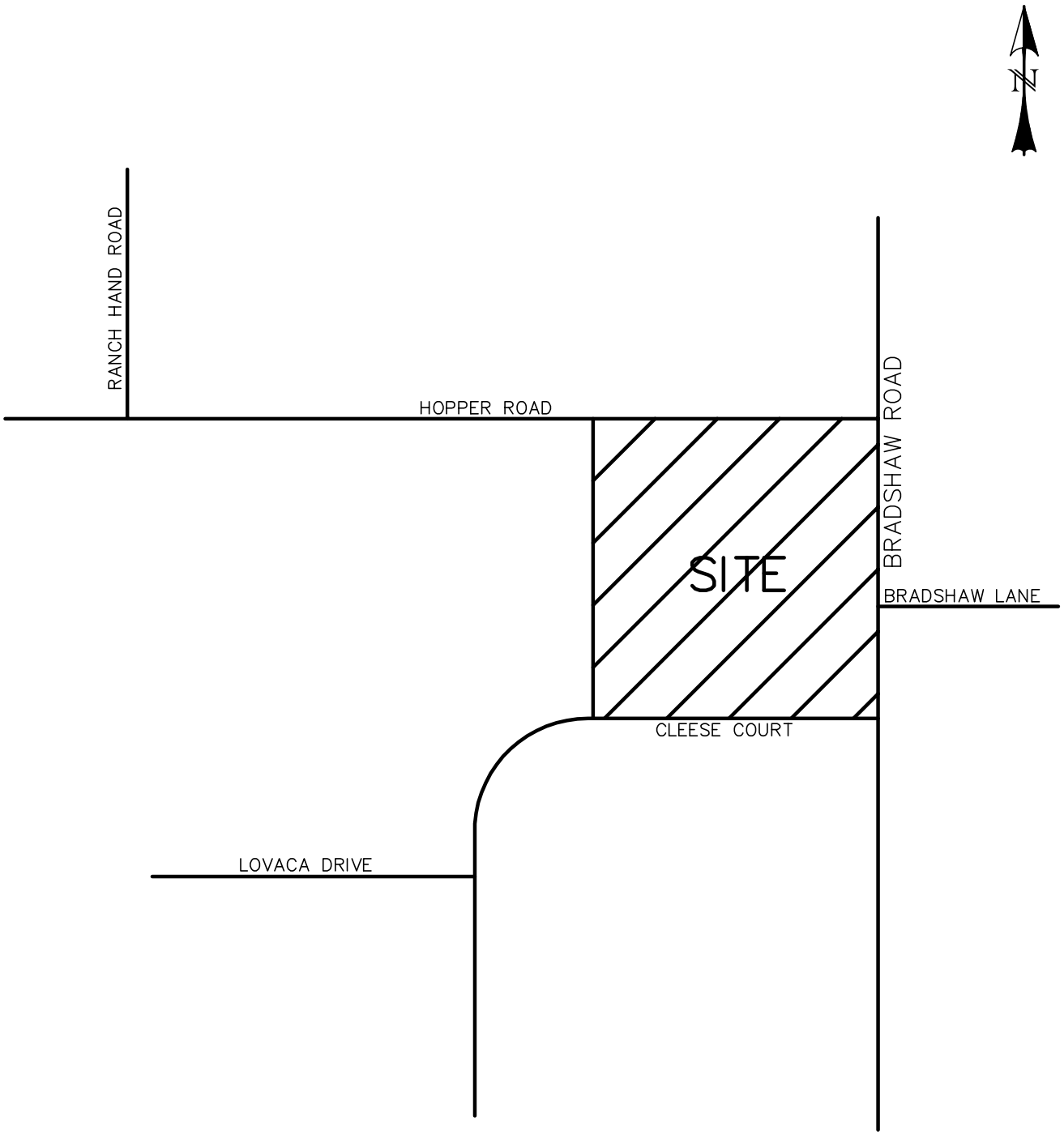
APPENDIX

EXISTING HYDROLOGY

PROPOSED HYDROLOGY

HYDRAULIC CALCULATIONS

DRAINAGE MAPS



CATAMOUNT ENGINEERING PO BOX 692 DIVIDE, CO 80814 (719) 426-2124	ROMENS SUBDIVISION	SCALE: NOT TO SCALE	DATE: 10/12/20
	VICINITY MAP	JOB NO.: 20-248	SHEET: 1 OF 1

United States Department of Agriculture

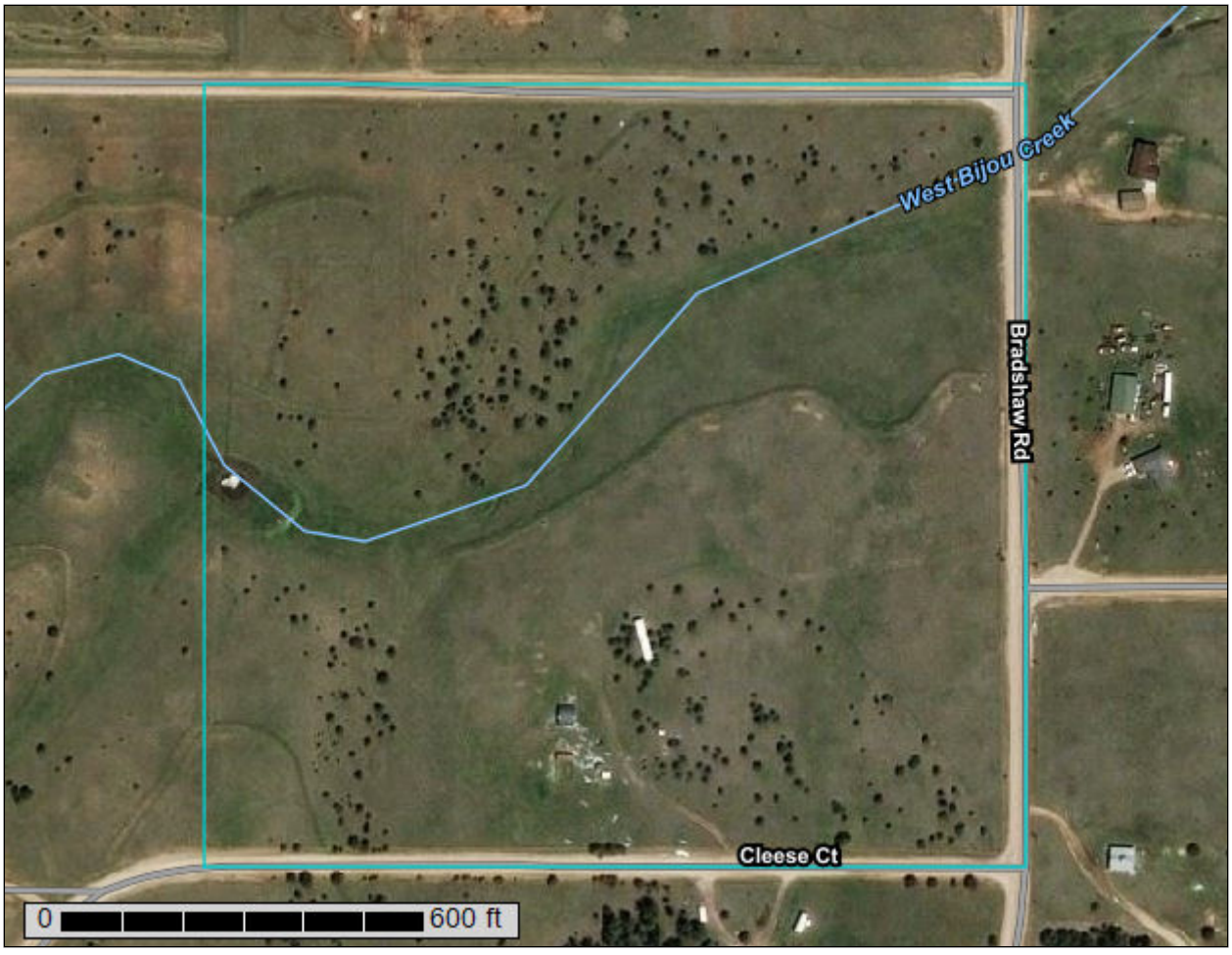
NRCS

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

Romens Subdivision



October 11, 2020

Preface

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

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

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

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

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

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

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

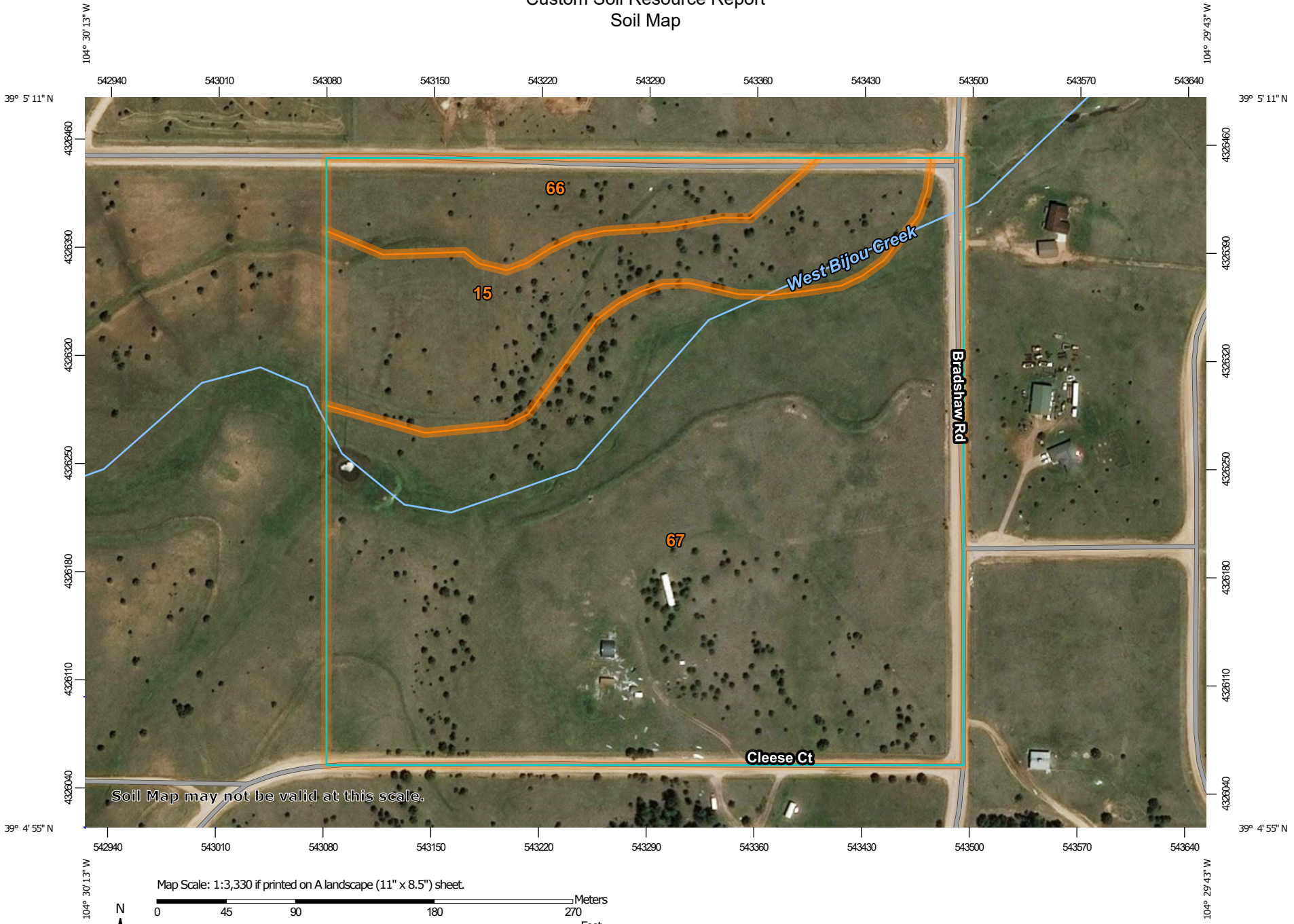
alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington,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

Contents

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,330 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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

Map Unit Descriptions

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

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

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

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

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

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

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

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

El Paso County Area, Colorado

15—Brussett loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 367k
Elevation: 7,200 to 7,500 feet
Frost-free period: 115 to 125 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Brussett and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brussett

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits

Typical profile

A - 0 to 8 inches: loam
BA - 8 to 12 inches: loam
Bt - 12 to 26 inches: clay loam
Bk - 26 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

66—Peyton sandy loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 369c
Elevation: 6,800 to 7,600 feet
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Peyton and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

Setting

Landform: Flats, hills
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam
Bt - 12 to 25 inches: sandy clay loam
BC - 25 to 35 inches: sandy loam
C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

67—Peyton sandy loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369d
Elevation: 6,800 to 7,600 feet
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 115 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam
Bt - 12 to 25 inches: sandy clay loam
BC - 25 to 35 inches: sandy loam
C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Pleasant

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

Other soils

Percent of map unit:
Hydric soil rating: No

National Flood Hazard Layer FIRMette

FEMA

104°30'17"W 39°5'18"N

104°29'39"W 39°4'50"N

Feet

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

1:6,000

Legend

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

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

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

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

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

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

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/11/2020 at 2:30 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

											CONVEYANCE TC						TT	INTENSITY						TOTAL FLOWS					
BASIN	**AREA TOTAL (Acres)**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**Length (ft)**	**Height (ft)**	**TI (min)**	**Length (ft)**	**Height (ft)**	**C_V**	**Slope (%)**	**Velocity (fps)**	**TC (min)**	**TOTAL (min)**	**I_2 (in/hr)**	**I_5 (in/hr)**	**I_{10} (in/hr)**	**I_{25} (in/hr)**	**I_{50} (in/hr)**	**I_{100} (in/hr)**	**Q_2 (c.f.s.)**	**Q_5 (c.f.s.)**	**Q_{10} (c.f.s.)**	**Q_{25} (c.f.s.)**	**Q_{50} (c.f.s.)**	**Q_{100} (c.f.s.)**
A-E	4.94	**0.04**	**0.10**	**0.18**	**0.27**	**0.32**	**0.37**	300	7	25.0	310	13	5	4.2%	1.0	5.0	30.1	2.0	2.5	2.9	3.3	3.7	4.2	**0.4**	**1.2**	**2.6**	**4.4**	**5.8**	**7.6**
GRAVEL	0.11	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	4.83	0.03	0.09	0.17	0.26	0.31	0.36																						
B-E	9.51	**0.04**	**0.10**	**0.18**	**0.27**	**0.32**	**0.37**	300	14	19.9	225	16	5	7.1%	1.3	2.8	22.7	2.3	2.9	3.4	3.9	4.4	4.9	**1.0**	**2.8**	**5.9**	**10.0**	**13.2**	**17.1**
GRAVEL	0.25	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	9.26	0.03	0.09	0.17	0.26	0.31	0.36																						
C-E	8.34	**0.04**	**0.10**	**0.18**	**0.27**	**0.32**	**0.37**	300	12	20.9	505	20	5	4.0%	1.0	8.5	29.4	2.0	2.5	2.9	3.4	3.8	4.2	**0.7**	**2.1**	**4.4**	**7.5**	**10.0**	**12.9**
GRAVEL	0.20	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	8.14	0.03	0.09	0.17	0.26	0.31	0.36																						
D-E	6.47	**0.07**	**0.13**	**0.21**	**0.29**	**0.34**	**0.39**	275	11	19.5	415	20	5	4.8%	1.1	6.3	25.8	2.2	2.7	3.2	3.6	4.1	4.5	**1.0**	**2.3**	**4.2**	**6.9**	**9.0**	**11.5**
PAVED	0.32	0.89	0.90	0.92	0.94	0.95	0.96																						
AGRICULTURE	6.15	0.03	0.09	0.17	0.26	0.31	0.36																						
E-E	9.27	**0.05**	**0.11**	**0.19**	**0.28**	**0.33**	**0.38**	300	14	19.7	180	13	5	7.2%	1.3	2.2	21.9	2.4	3.0	3.4	3.9	4.4	5.0	**1.2**	**3.1**	**6.1**	**10.2**	**13.4**	**17.3**
GRAVEL	0.42	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	8.85	0.03	0.09	0.17	0.26	0.31	0.36																						

Calculated by: DLM

Date: 10/11/2020

											CONVEYANCE TC						TT	INTENSITY						TOTAL FLOWS					
BASIN	**AREA TOTAL (Acres)**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**Length (ft)**	**Height (ft)**	**TI (min)**	**Length (ft)**	**Height (ft)**	**C_V**	**Slope (%)**	**Velocity (fps)**	**TC (min)**	**TOTAL (min)**	**I_2 (in/hr)**	**I_5 (in/hr)**	**I_{10} (in/hr)**	**I_{25} (in/hr)**	**I_{50} (in/hr)**	**I_{100} (in/hr)**	**Q_2 (c.f.s.)**	**Q_5 (c.f.s.)**	**Q_{10} (c.f.s.)**	**Q_{25} (c.f.s.)**	**Q_{50} (c.f.s.)**	**Q_{100} (c.f.s.)**
A-P	4.94	**0.05**	**0.11**	**0.19**	**0.28**	**0.32**	**0.37**	100	2	15.1	515	18	5	3.5%	0.9	9.2	24.3	2.2	2.8	3.3	3.7	4.2	4.7	**0.5**	**1.5**	**3.0**	**5.1**	**6.7**	**8.7**
RESIDENTIAL	0.35	0.12	0.20	0.27	0.35	0.40	0.44																						
GRAVEL	0.11	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	4.48	0.03	0.09	0.17	0.26	0.31	0.36																						
B-P	9.51	**0.05**	**0.11**	**0.19**	**0.28**	**0.33**	**0.37**	100	4	12.0	435	26	5	6.0%	1.2	5.9	17.9	2.6	3.3	3.8	4.3	4.9	5.5	**1.2**	**3.4**	**6.8**	**11.4**	**15.1**	**19.5**
RESIDENTIAL	0.67	0.12	0.20	0.27	0.35	0.40	0.44																						
GRAVEL	0.25	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	8.59	0.03	0.09	0.17	0.26	0.31	0.36																						
C-P	8.34	**0.05**	**0.11**	**0.19**	**0.28**	**0.33**	**0.37**	100	4	12.0	660	30	5	4.5%	1.1	10.3	22.3	2.3	2.9	3.4	3.9	4.4	4.9	**1.0**	**2.7**	**5.3**	**9.0**	**11.9**	**15.3**
RESIDENTIAL	0.58	0.12	0.20	0.27	0.35	0.40	0.44																						
GRAVEL	0.20	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	7.56	0.03	0.09	0.17	0.26	0.31	0.36																						
D-P	6.47	**0.08**	**0.14**	**0.21**	**0.30**	**0.35**	**0.40**	100	2	14.7	685	35	5	5.1%	1.1	10.1	24.8	2.2	2.8	3.2	3.7	4.2	4.6	**1.1**	**2.5**	**4.5**	**7.2**	**9.3**	**11.9**
RESIDENTIAL	0.45	0.12	0.20	0.27	0.35	0.40	0.44																						
PAVED	0.32	0.89	0.90	0.92	0.94	0.95	0.96																						
AGRICULTURE	5.70	0.03	0.09	0.17	0.26	0.31	0.36																						
E-P	9.27	**0.06**	**0.12**	**0.20**	**0.28**	**0.33**	**0.38**	100	4	11.9	380	23	5	6.1%	1.2	5.1	17.0	2.7	3.3	3.9	4.4	5.0	5.6	**1.5**	**3.7**	**7.1**	**11.7**	**15.4**	**19.8**
RESIDENTIAL	0.65	0.12	0.20	0.27	0.35	0.40	0.44																						
GRAVEL	0.42	0.57	0.59	0.63	0.66	0.68	0.70																						
AGRICULTURE	8.20	0.03	0.09	0.17	0.26	0.31	0.36																						

Calculated by: DLM

Date: 5/5/2023

		WEIGHTED						TT	INTENSITY						TOTAL FLOWS					
DESIGN POINT	**AREA TOTAL (Acres)**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**TOTAL (min)**	**I_2 (in/hr)**	**I_5 (in/hr)**	**I_{10} (in/hr)**	**I_{25} (in/hr)**	**I_{50} (in/hr)**	**I_{100} (in/hr)**	**Q_2 (c.f.s.)**	**Q_5 (c.f.s.)**	**Q_{10} (c.f.s.)**	**Q_{25} (c.f.s.)**	**Q_{50} (c.f.s.)**	**Q_{100} (c.f.s.)**
DP-EX	**38.53**	**0.05**	**0.11**	**0.19**	**0.28**	**0.32**	**0.37**	30.1	2.0	2.5	2.9	3.3	3.7	4.2	**3.9**	**10.4**	**20.9**	**35.1**	**46.5**	**59.8**
A-E	4.94	0.04	0.10	0.18	0.27	0.32	0.37													
B-E	9.51	0.04	0.10	0.18	0.27	0.32	0.37													
C-E	8.34	0.04	0.10	0.18	0.27	0.32	0.37													
D-E	6.47	0.07	0.13	0.21	0.29	0.34	0.39													
E-E	9.27	0.05	0.11	0.19	0.28	0.33	0.38													
DP-PR	**38.53**	**0.06**	**0.12**	**0.19**	**0.28**	**0.33**	**0.38**	24.8	2.2	2.8	3.2	3.7	4.2	4.6	**4.9**	**12.5**	**24.2**	**40.1**	**52.9**	**67.9**
A-P	4.94	0.05	0.11	0.19	0.28	0.32	0.37													
B-P	9.51	0.05	0.11	0.19	0.28	0.33	0.37													
C-P	8.34	0.05	0.11	0.19	0.28	0.33	0.37													
D-P	6.47	0.08	0.14	0.21	0.30	0.35	0.40													
E-P	9.27	0.06	0.12	0.20	0.28	0.33	0.38													

Calculated by: DLM

Date: 5/5/2023

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

			Designer:	**David Miajres**
			Company:	**Catamount Engineering**
***Design Storm: 1-Hour Rain Depth	WQCV Event	1.19	inches	**Date:** **January 19, 2023**
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.50	inches	**Project:** **Romens Subdivision**
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches	**Location:** **Peyton, CO**
Optional User Defined Storm	CUHP			
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event			
Max Intensity for Optional User Defined Storm	0			

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	A	B	C	D	E									
Receiving Pervious Area Soil Type	Loam	Loam	Loam	Loam	Loam									
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	4.940	9.510	8.340	6.470	9.270									
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000	0.000	0.000	0.000									
Unconnected Impervious Area (UIA, acres)	0.345	0.666	0.584	0.453	0.649									
Receiving Pervious Area (RPA, acres)	4.595	8.844	7.756	6.017	8.621									
Separate Pervious Area (SPA, acres)	0.000	0.000	0.000	0.000	0.000									
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C	C	C									

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	4.940	9.510	8.340	6.470	9.270									
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%									
Unconnected Impervious Area (UIA, %)	7.0%	7.0%	7.0%	7.0%	7.0%									
Receiving Pervious Area (RPA, %)	93.0%	93.0%	93.0%	93.0%	93.0%									
Separate Pervious Area (SPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%									
A_R (RPA / UIA)	13.319	13.286	13.286	13.286	13.286									
I_a Check	0.070	0.070	0.070	0.070	0.070									
f / I for WQCV Event:	0.4	0.4	0.4	0.4	0.4									
f / I for 10-Year Event:	0.4	0.4	0.4	0.4	0.4									
f / I for 100-Year Event:	0.2	0.2	0.2	0.2	0.2									
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.31	0.31	0.31	0.31	0.31									
IRF for 10-Year Event:	0.31	0.31	0.31	0.31	0.31									
IRF for 100-Year Event:	0.32	0.32	0.32	0.32	0.32									
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	7.0%	7.0%	7.0%	7.0%	7.0%									
Effective Imperviousness for WQCV Event:	2.1%	2.1%	2.1%	2.1%	2.1%									
Effective Imperviousness for 10-Year Event:	2.1%	2.1%	2.1%	2.1%	2.1%									
Effective Imperviousness for 100-Year Event:	2.3%	2.3%	2.3%	2.3%	2.3%									
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	67.1%	67.1%	67.1%	67.1%	67.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-Year Event CREDIT**: Reduce Detention By:	97.2%	97.1%	97.1%	97.2%	97.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	94.9%	94.8%	94.9%	94.9%	94.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

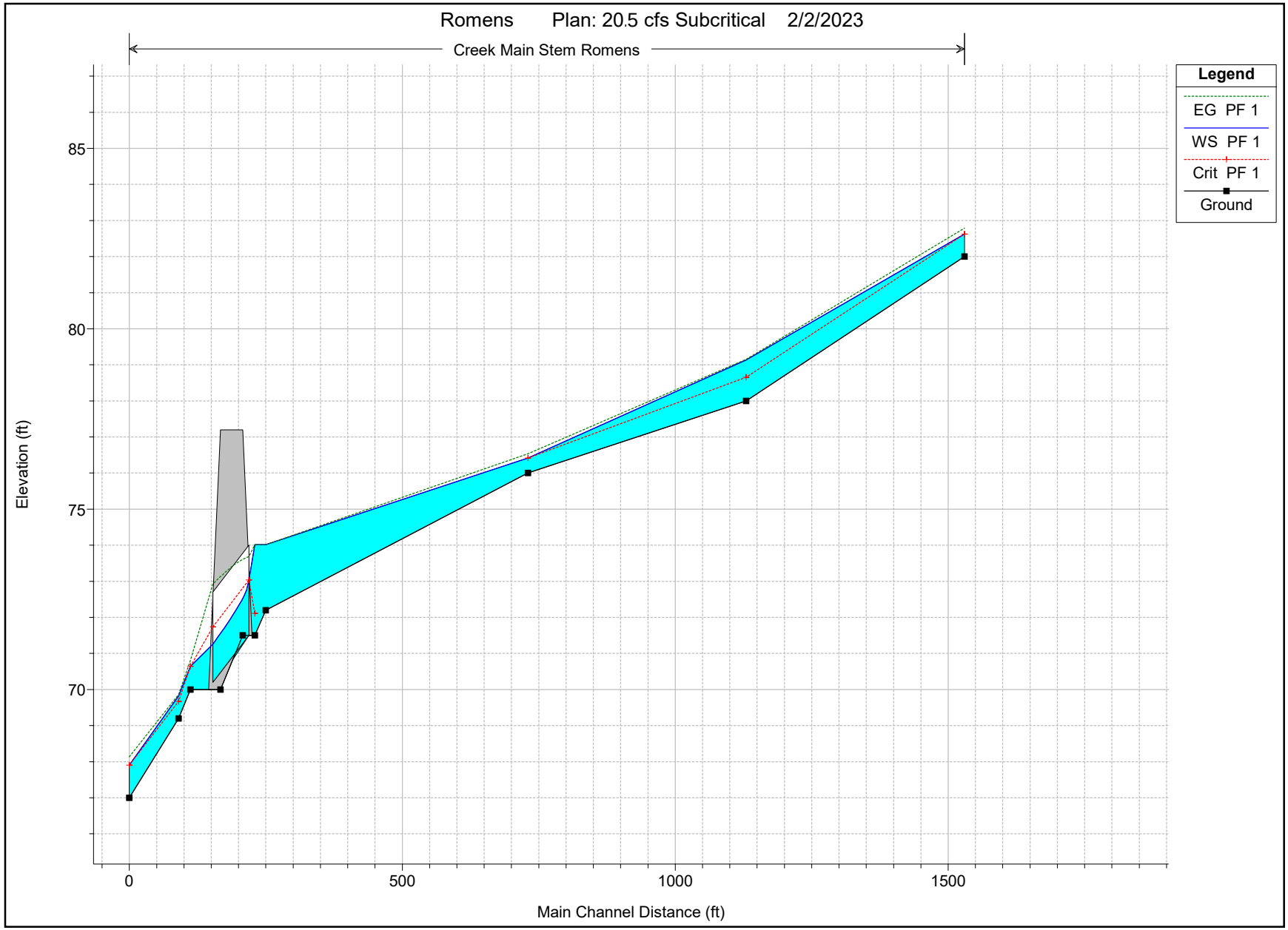
Total Site Imperviousness:	**7.0%**
Total Site Effective Imperviousness for WQCV Event:	**2.1%**
Total Site Effective Imperviousness for 10-Year Event:	**2.1%**
Total Site Effective Imperviousness for 100-Year Event:	**2.3%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

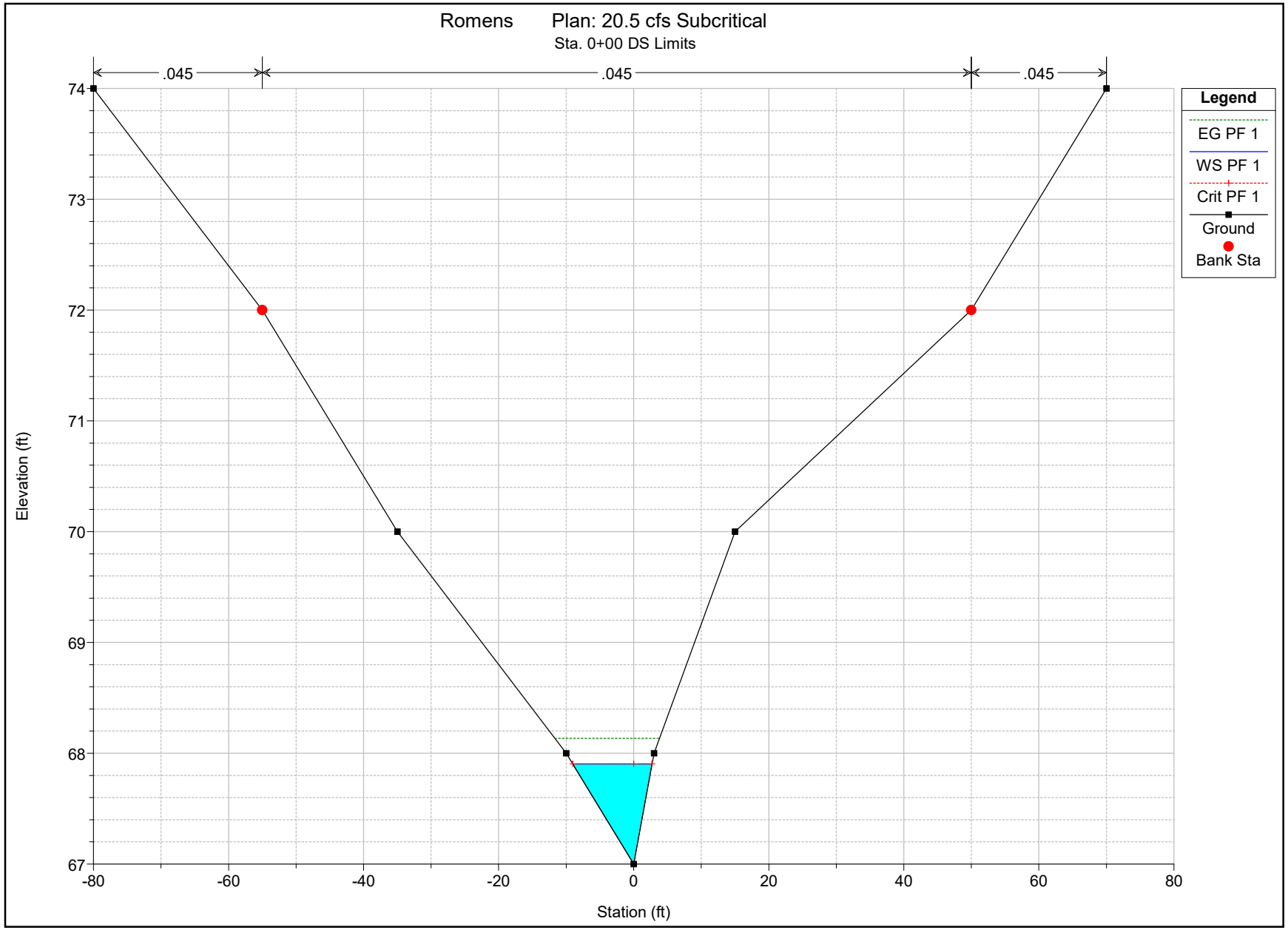
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

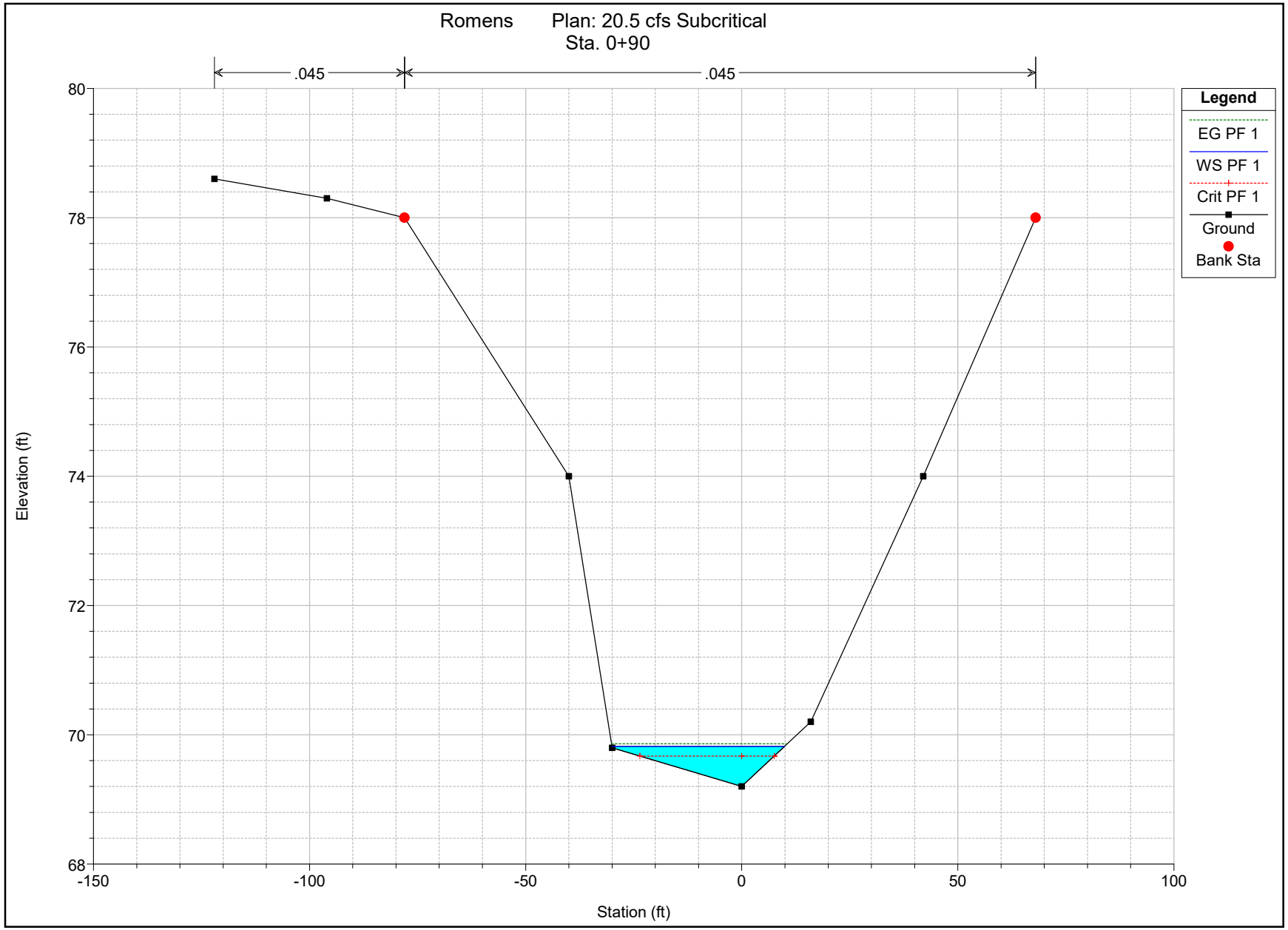
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

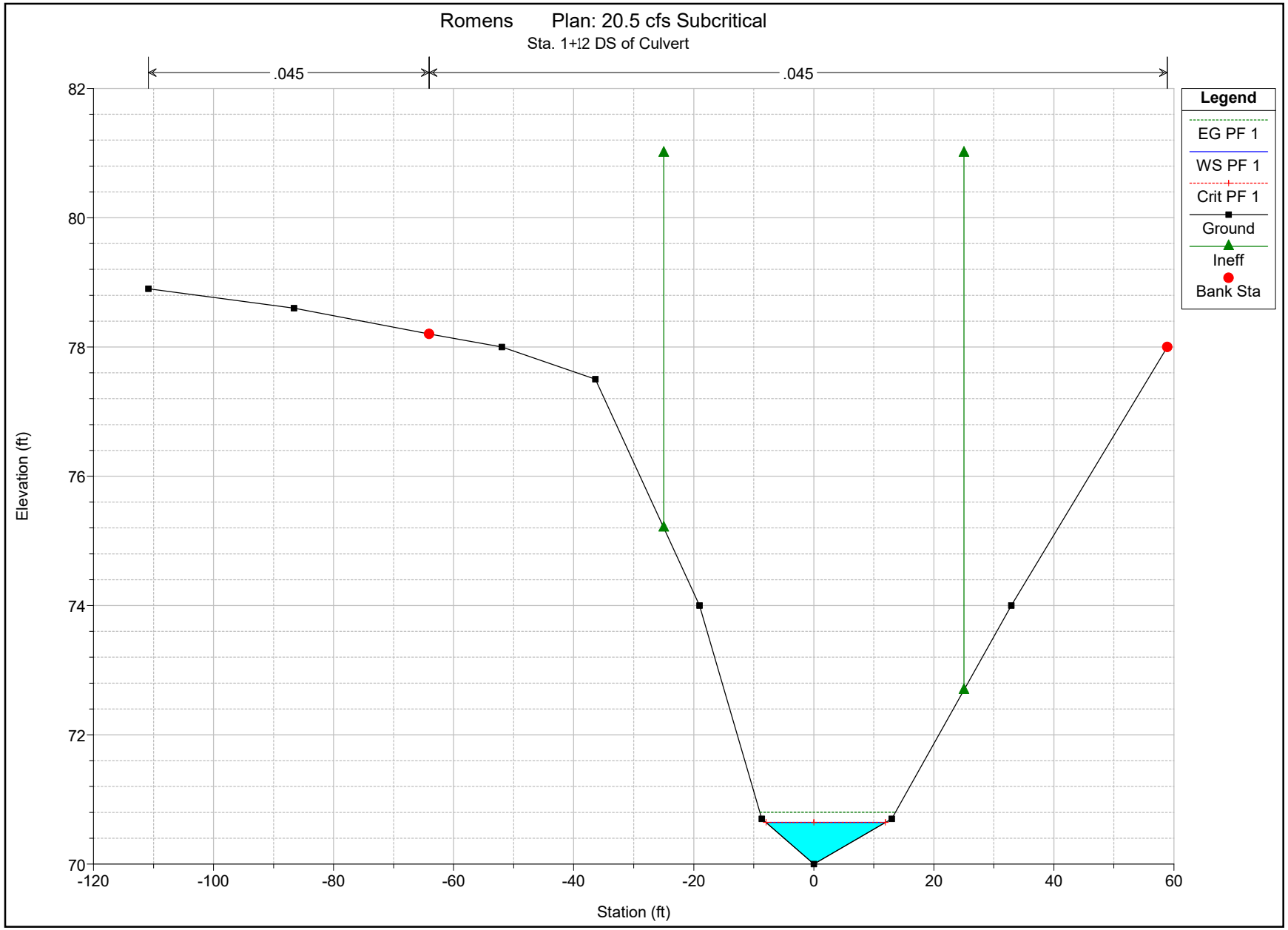

Romens Plan: 20.5 cfs Subcritical 2/2/2023
Creek Main Stem Romens
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
85
80
75
70
0
500
1000
1500
Main Channel Distance (ft)

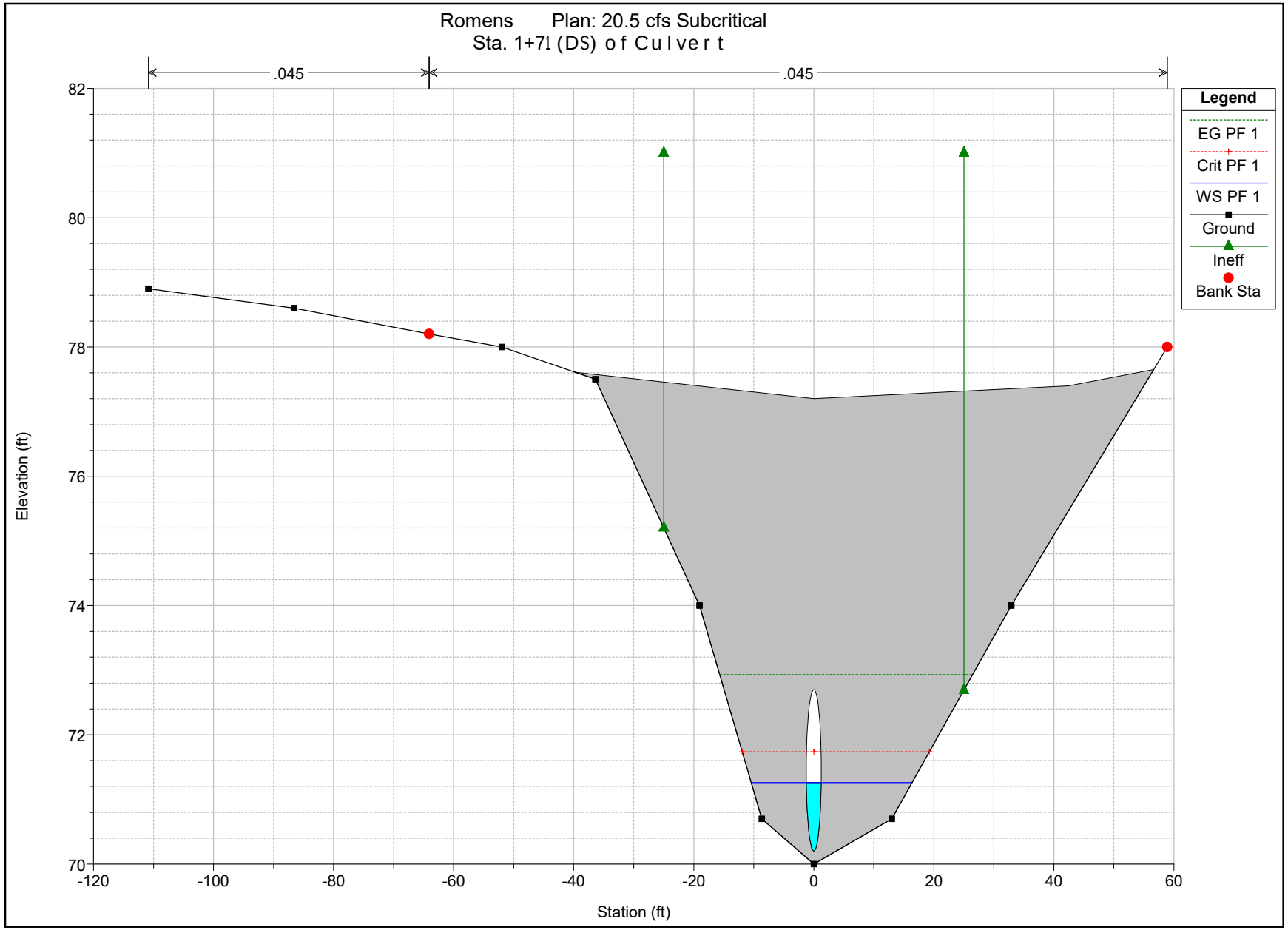
HEC-RAS Plan: 96cfs River: Creek Main Stem Reach: Romens Profile: PF 1

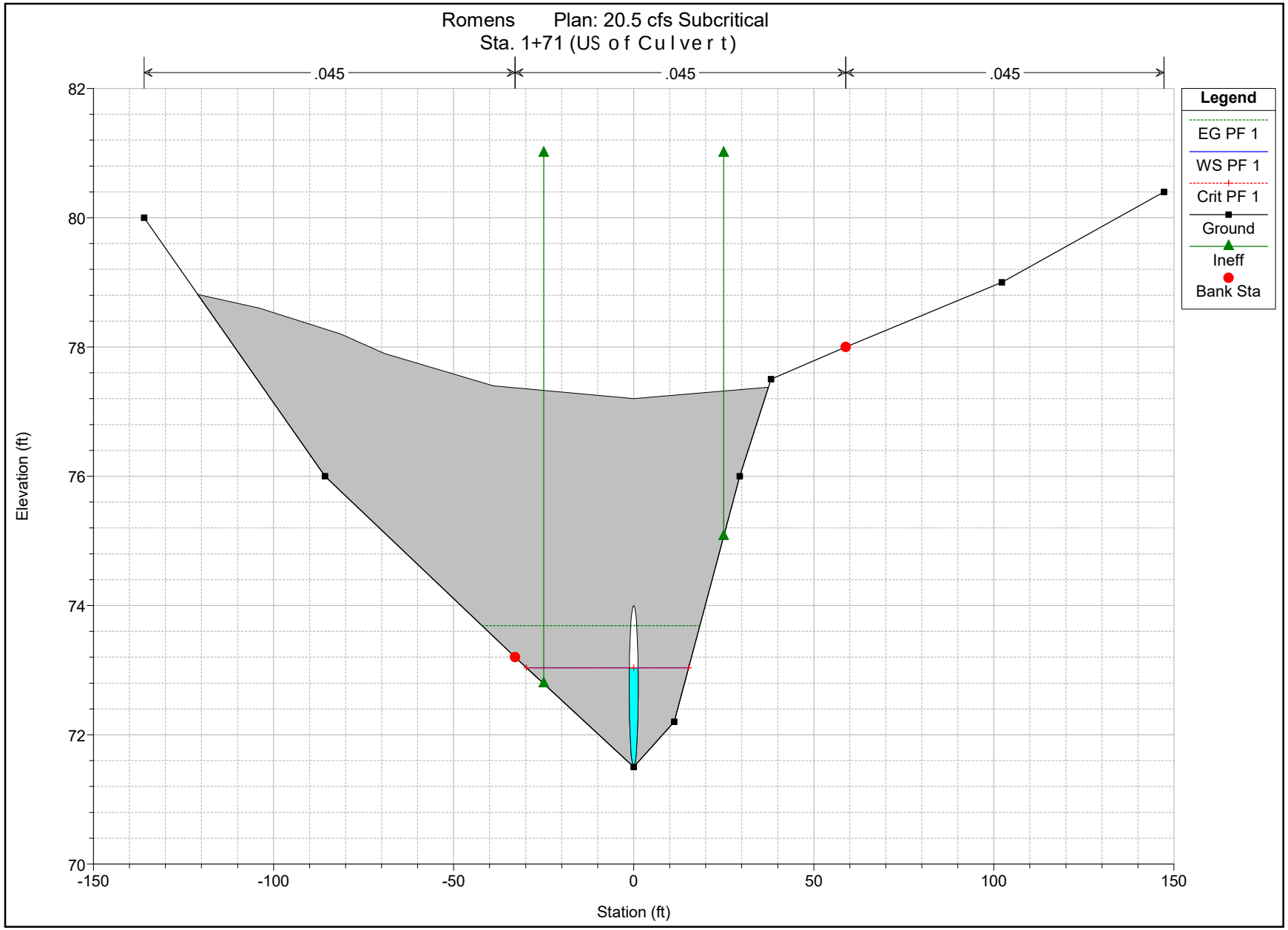
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Romens	1530	PF 1	20.50	82.00	82.63	82.63	82.79	0.044758	3.22	6.36	20.29	1.01
Romens	1130	PF 1	20.50	78.00	79.13	78.66	79.15	0.002454	1.12	18.37	32.50	0.26
Romens	730	PF 1	20.50	76.00	76.41	76.41	76.53	0.047126	2.77	7.40	30.83	1.00
Romens	250	PF 1	20.50	72.20	74.01		74.02	0.000101	0.29	70.69	86.63	0.06
Romens	230	PF 1	20.50	71.50	74.01	72.11	74.01	0.000029	0.26	78.91	68.19	0.03
Romens	171		Culvert									
Romens	112	PF 1	20.50	70.00	70.64	70.64	70.80	0.042937	3.21	6.39	19.89	1.00
Romens	90	PF 1	20.50	69.20	69.82	69.67	69.86	0.011028	1.61	12.70	39.98	0.50
Romens	0	PF 1	20.50	67.00	67.90	67.90	68.14	0.040388	3.86	5.30	11.74	1.01

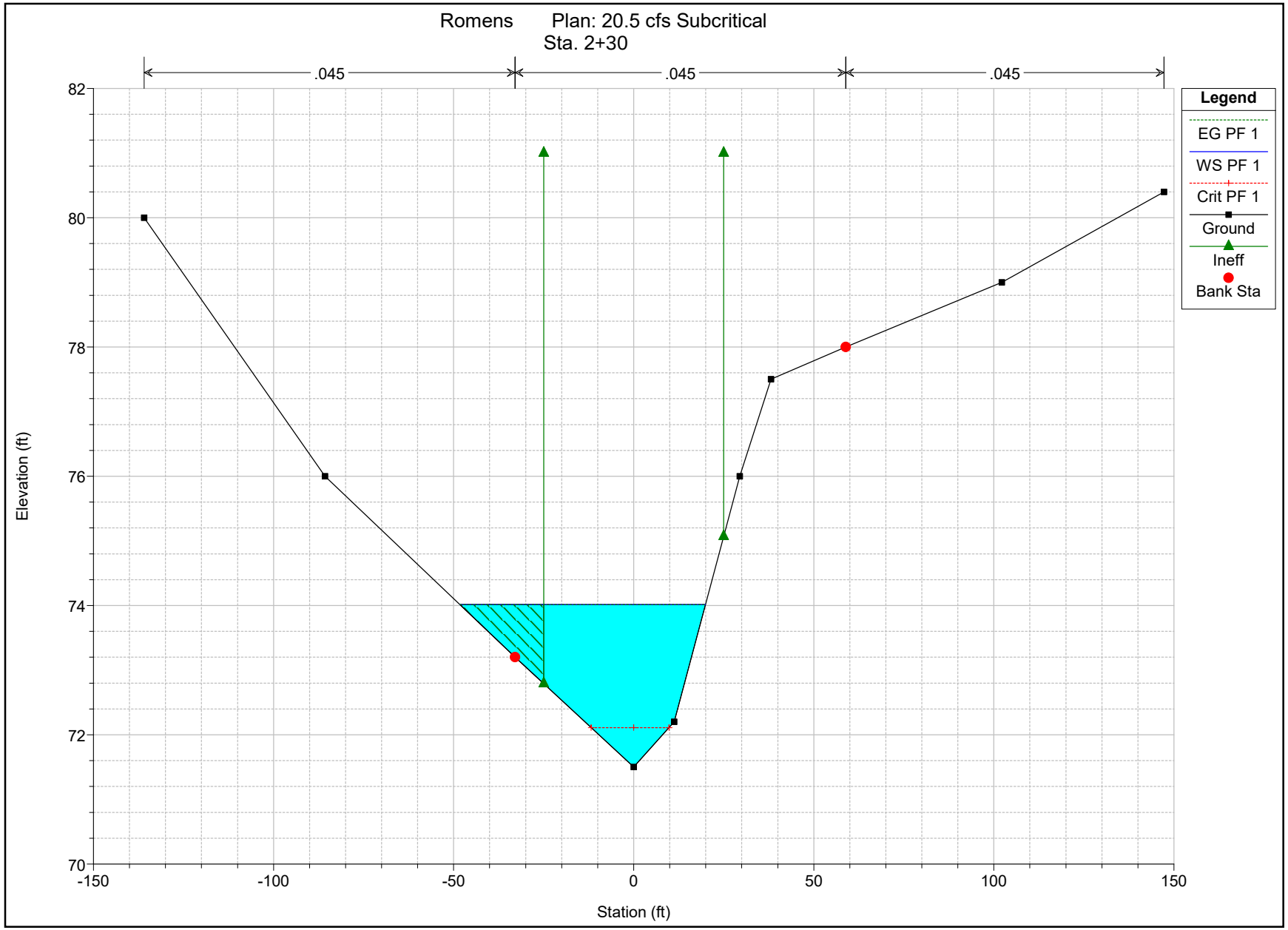

Romens
Plan: 20.5 cfs Subcritical
Sta. 0+00 DS Limits
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
74
73
72
71
70
69
68
67
-80
-60
-40
-20
0
20
40
60
80

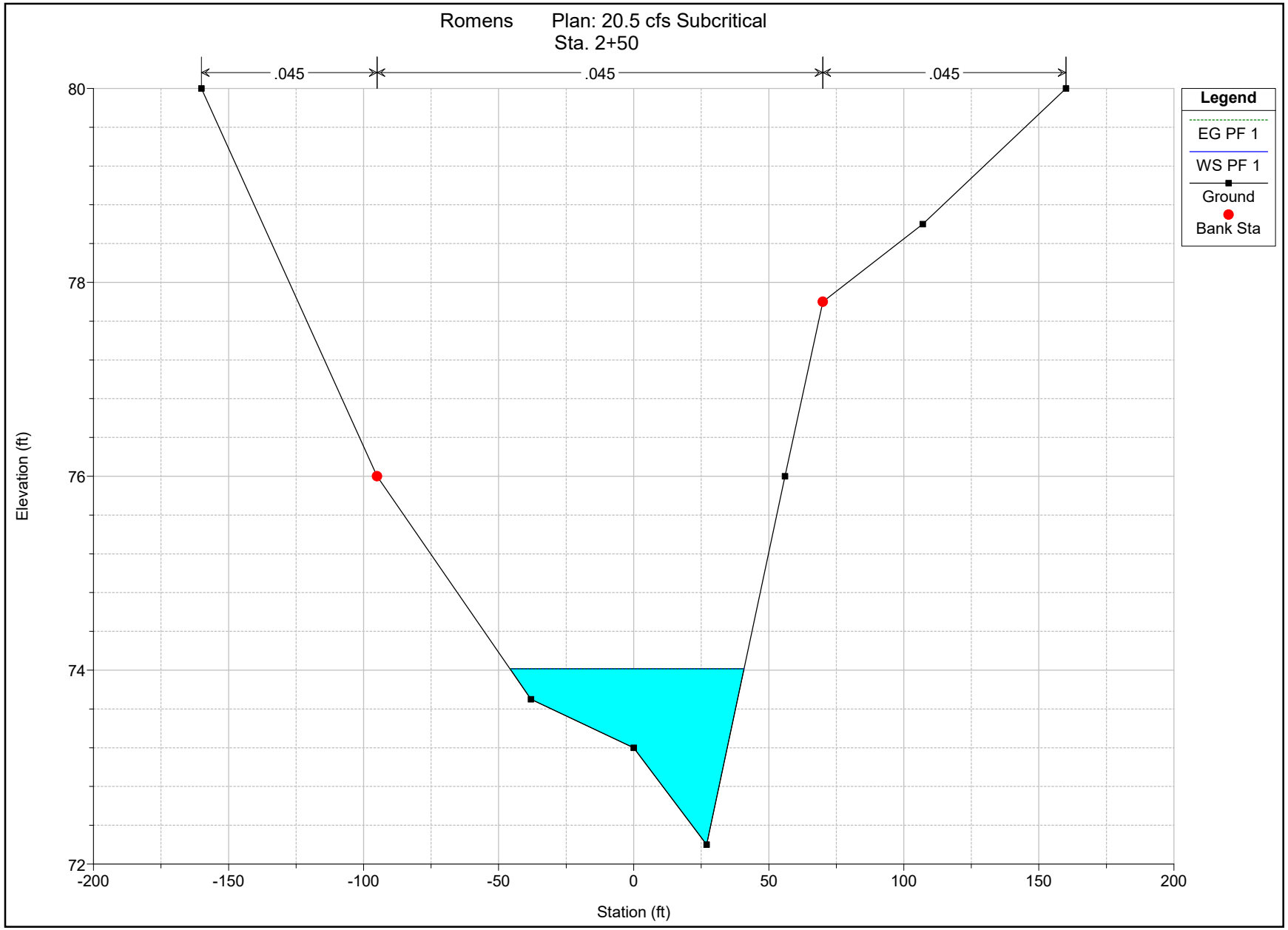

Romens Plan: 20.5 cfs Subcritical
Sta. 0+90
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
80
78
76
74
72
70
68
-150
-100
-50
0
50
100

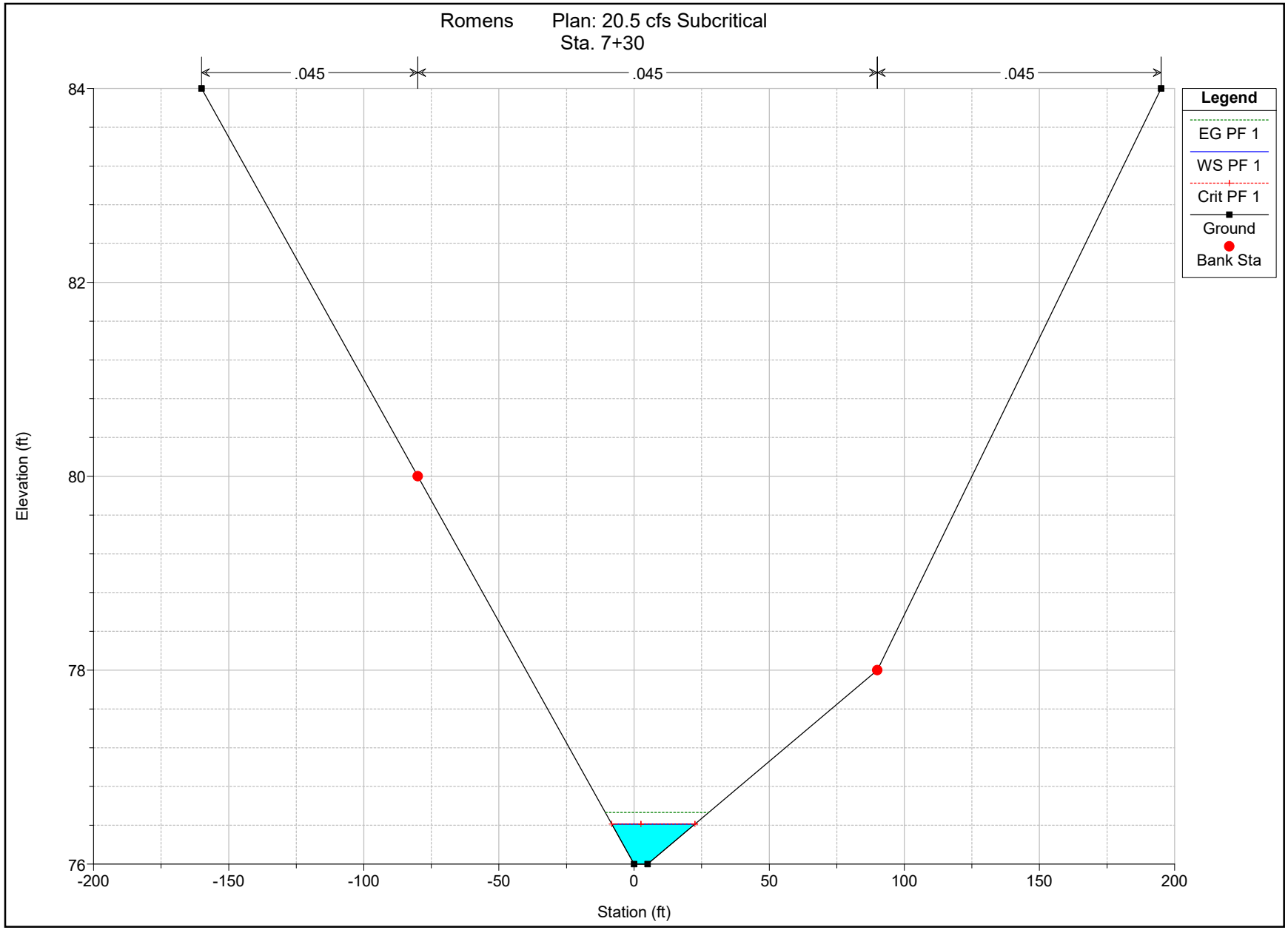

Romens Plan: 20.5 cfs Subcritical
Sta. 1+12 DS of Culvert
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-120
-100
-80
-60
-40
-20
0
20
40
60

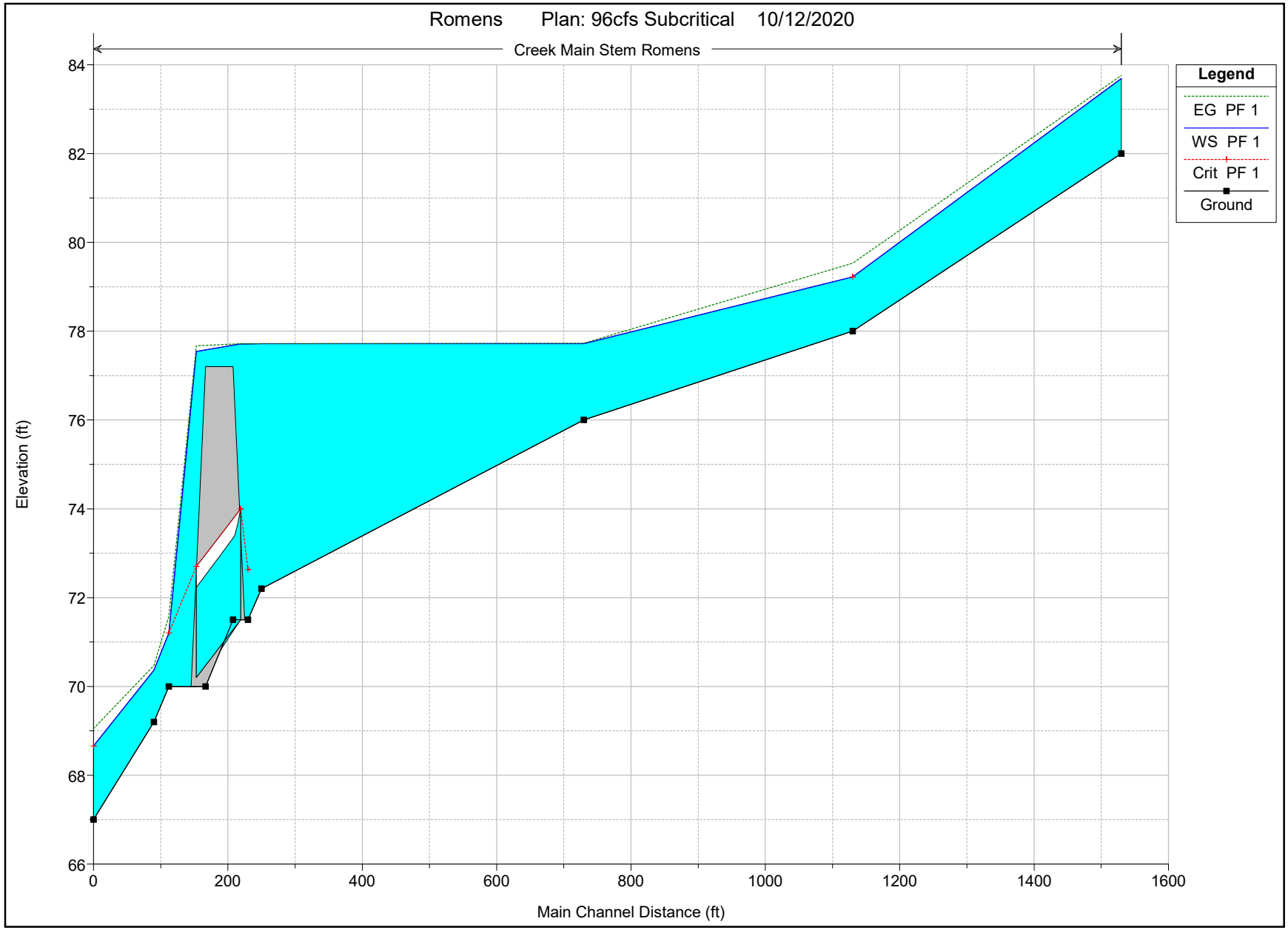

Romens Plan: 20.5 cfs Subcritical
Sta. 1+71 (DS) of Culvert
.045
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-120
-100
-80
-60
-40
-20
0
20
40
60


Romens Plan: 20.5 cfs Subcritical
Sta. 1+71 (US of Culvert)
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-150
-100
-50
0
50
100
150


Romens Plan: 20.5 cfs Subcritical
Sta. 2+30
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-150
-100
-50
0
50
100
150


Romens Plan: 20.5 cfs Subcritical
Sta. 2+50
.045
.045
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
80
78
76
74
72
-200
-150
-100
-50
0
50
100
150
200
Station (ft)


Romens
Plan: 20.5 cfs Subcritical
Sta. 7+30
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
84
82
80
78
76
-200
-150
-100
-50
0
50
100
150
200
Station (ft)



-NORMAL DEPTH BOUNDARY CONDITION

Plan: 500subcritical Creek Main Stem Romens RS: 0 Profile: PF 1

E.G. Elev (ft)	70.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.71	Wt. n-Val.		0.045	
W.S. Elev (ft)	70.09	Reach Len. (ft)			
Crit W.S. (ft)	70.09	Flow Area (sq ft)		74.09	
E.G. Slope (ft/ft)	0.026672	Area (sq ft)		74.09	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	52.47	Top Width (ft)		52.47	
Vel Total (ft/s)	6.75	Avg. Vel. (ft/s)		6.75	
Max Chl Dpth (ft)	3.09	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	3061.6	Conv. (cfs)		3061.6	
Length Wtd. (ft)		Wetted Per. (ft)		52.93	
Min Ch El (ft)	67.00	Shear (lb/sq ft)		2.33	
Alpha	1.00	Stream Power (lb/ft s)		15.73	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CULVERT OUTPUT TABLE

Plan: 96cfs Creek Main Stem Romens RS: 90 Profile: PF 1

E.G. Elev (ft)	70.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.045	
W.S. Elev (ft)	70.37	Reach Len. (ft)	90.00	90.00	90.00
Crit W.S. (ft)		Flow Area (sq ft)		37.22	
E.G. Slope (ft/ft)	0.008723	Area (sq ft)		37.22	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	48.50	Top Width (ft)		48.50	
Vel Total (ft/s)	2.58	Avg. Vel. (ft/s)		2.58	
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)		0.77	
Conv. Total (cfs)	1027.9	Conv. (cfs)		1027.9	
Length Wtd. (ft)	90.00	Wetted Per. (ft)		48.67	
Min Ch El (ft)	69.20	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		1.07	
Frctn Loss (ft)	1.38	Cum Volume (acre-ft)		0.06	
C & E Loss (ft)	0.03	Cum SA (acres)		0.08	

Plan: 500subcritical Creek Main Stem Romens RS: 112 Profile: PF 1

E.G. Elev (ft)	74.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.045	
W.S. Elev (ft)	73.96	Reach Len. (ft)	22.00	22.00	22.00
Crit W.S. (ft)	73.96	Flow Area (sq ft)		69.94	
E.G. Slope (ft/ft)	0.025354	Area (sq ft)		72.79	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	51.40	Top Width (ft)		51.40	
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)		7.15	
Max Chl Dpth (ft)	2.06	Hydr. Depth (ft)		1.59	
Conv. Total (cfs)	3140.1	Conv. (cfs)		3140.1	
Length Wtd. (ft)	22.00	Wetted Per. (ft)		44.11	
Min Ch El (ft)	71.90	Shear (lb/sq ft)		2.51	
Alpha	1.00	Stream Power (lb/ft s)		17.94	
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)		0.20	
C & E Loss (ft)	0.05	Cum SA (acres)		0.15	

Plan: 500subcritical Creek Main Stem Romens RS: 230 Profile: PF 1

E.G. Elev (ft)	79.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.045	
W.S. Elev (ft)	79.49	Reach Len. (ft)	118.00	118.00	118.00
Crit W.S. (ft)	74.87	Flow Area (sq ft)		302.49	
E.G. Slope (ft/ft)	0.000228	Area (sq ft)	322.02	426.17	46.99
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	247.71	Top Width (ft)	96.71	91.80	59.20
Vel Total (ft/s)	1.65	Avg. Vel. (ft/s)		1.65	
Max Chl Dpth (ft)	6.49	Hydr. Depth (ft)		6.05	
Conv. Total (cfs)	33079.6	Conv. (cfs)		33079.6	
Length Wtd. (ft)	118.00	Wetted Per. (ft)		50.19	
Min Ch El (ft)	73.00	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.60	
C & E Loss (ft)		Cum SA (acres)	0.13	0.35	0.08

Plan: 500subcritical Creek Main Stem Romens RS: 250 Profile: PF 1

E.G. Elev (ft)	79.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.045	0.045	0.045
W.S. Elev (ft)	79.54	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)	101.69	877.78	66.14
E.G. Slope (ft/ft)	0.000028	Area (sq ft)	101.69	877.78	66.14
Q Total (cfs)	500.00	Flow (cfs)	25.78	463.42	10.80
Top Width (ft)	294.99	Top Width (ft)	57.49	165.00	72.50
Vel Total (ft/s)	0.48	Avg. Vel. (ft/s)	0.25	0.53	0.16
Max Chl Dpth (ft)	7.34	Hydr. Depth (ft)	1.77	5.32	0.91
Conv. Total (cfs)	95135.3	Conv. (cfs)	4905.2	88176.1	2054.1
Length Wtd. (ft)	20.00	Wetted Per. (ft)	57.60	165.43	72.52
Min Ch El (ft)	72.20	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.15	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.10	0.90	0.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.17	0.40	0.11

Plan: 500subcritical Creek Main Stem Romens RS: 730 Profile: PF 1

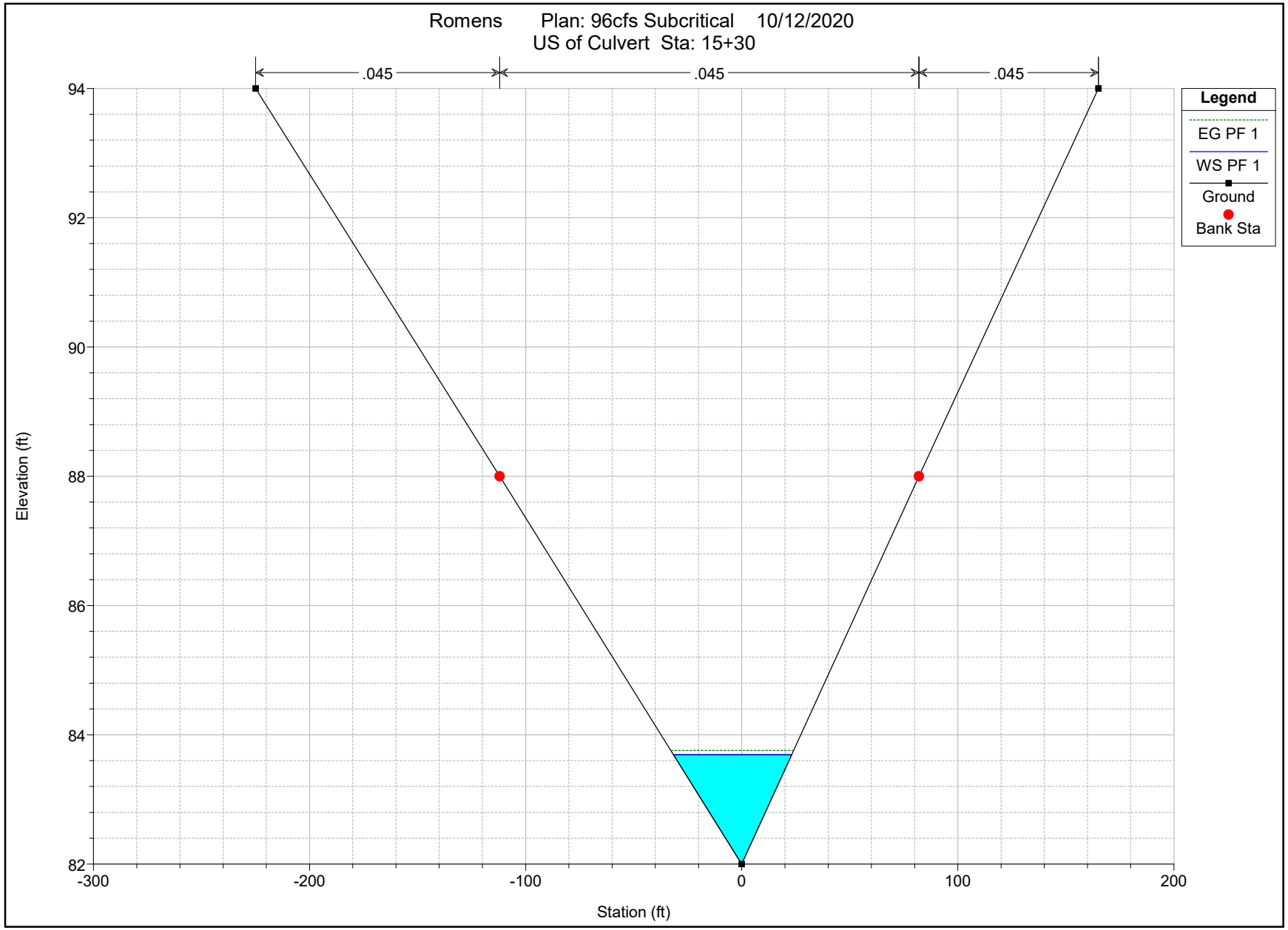
E.G. Elev (ft)	79.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.045	0.045
W.S. Elev (ft)	79.56	Reach Len. (ft)	480.00	480.00	480.00
Crit W.S. (ft)		Flow Area (sq ft)		361.65	21.21
E.G. Slope (ft/ft)	0.000564	Area (sq ft)		361.65	21.21
Q Total (cfs)	500.00	Flow (cfs)		485.94	14.06
Top Width (ft)	188.39	Top Width (ft)		161.14	27.25
Vel Total (ft/s)	1.31	Avg. Vel. (ft/s)		1.34	0.66
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)		2.24	0.78
Conv. Total (cfs)	21053.0	Conv. (cfs)		20460.9	592.1
Length Wtd. (ft)	480.00	Wetted Per. (ft)		161.25	27.29
Min Ch El (ft)	76.00	Shear (lb/sq ft)		0.08	0.03
Alpha	1.04	Stream Power (lb/ft s)		0.11	0.02
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.66	7.73	0.51
C & E Loss (ft)	0.01	Cum SA (acres)	0.48	2.20	0.66

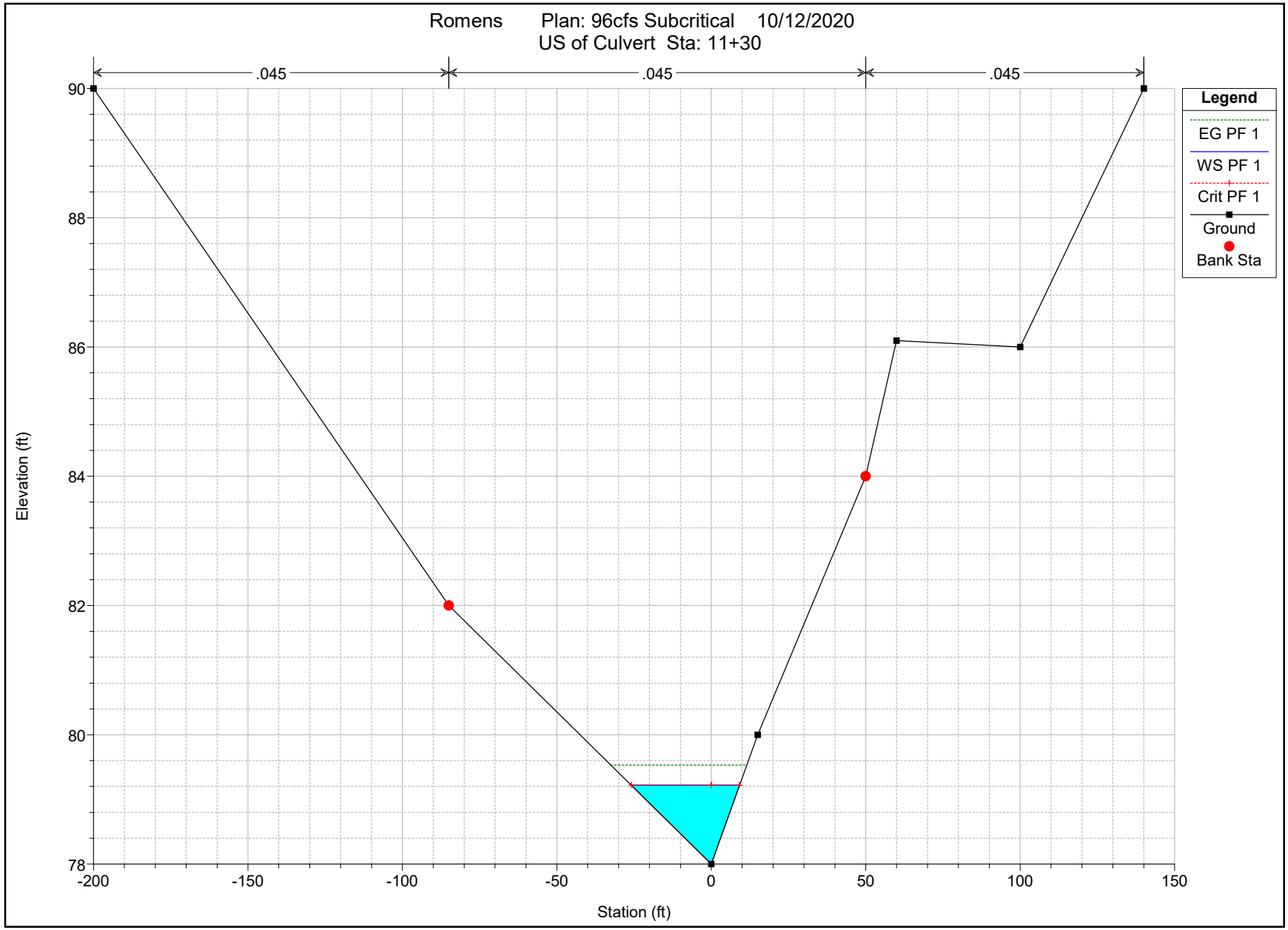
Plan: 500subcritical Creek Main Stem Romens RS: 1130 Profile: PF 1

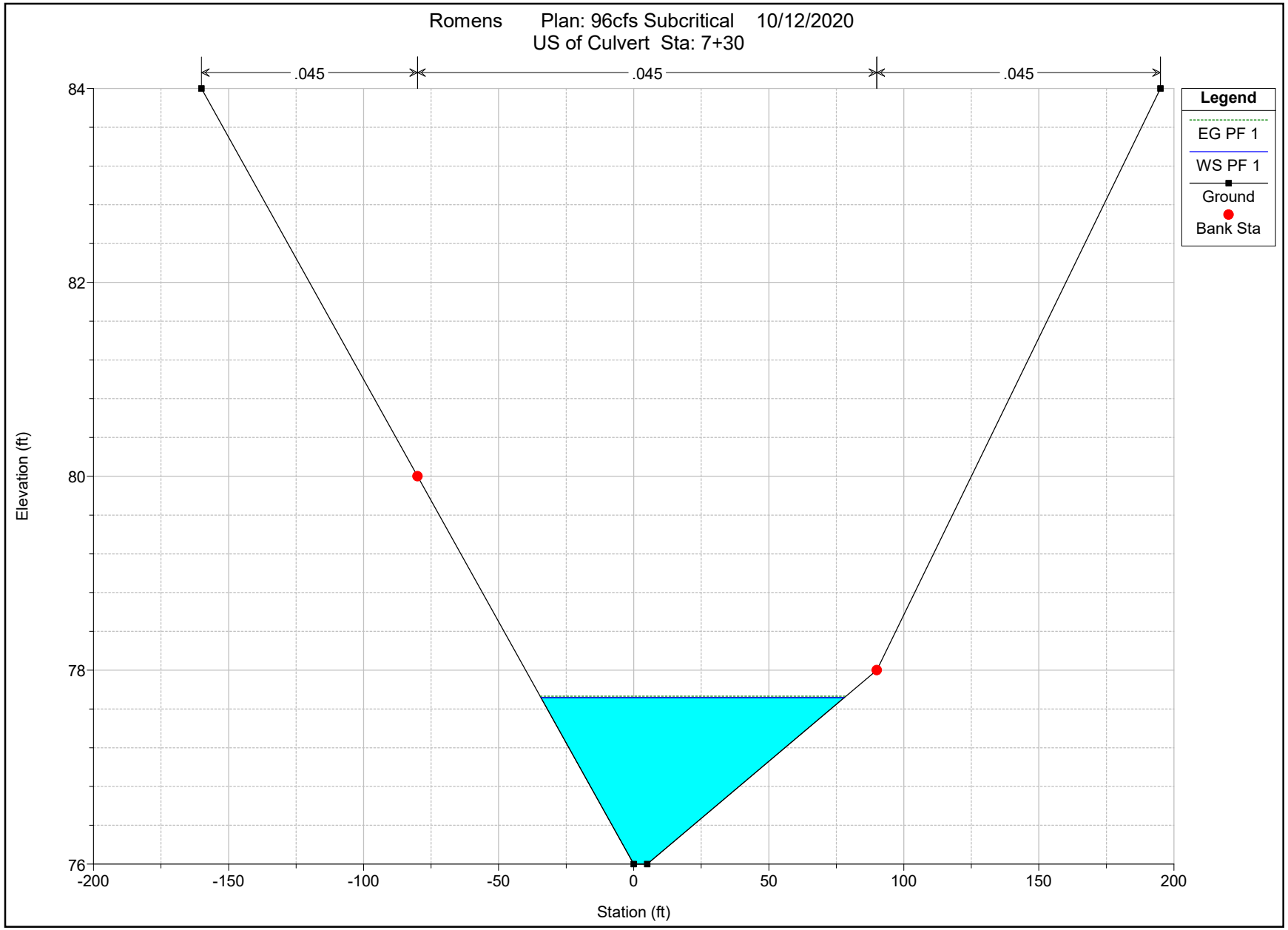
E.G. Elev (ft)	80.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.		0.045	
W.S. Elev (ft)	80.36	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	80.36	Flow Area (sq ft)		80.31	
E.G. Slope (ft/ft)	0.028798	Area (sq ft)		80.31	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	68.37	Top Width (ft)		68.37	
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)		6.23	
Max Chl Dpth (ft)	2.36	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	2946.4	Conv. (cfs)		2946.4	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		68.58	
Min Ch El (ft)	78.00	Shear (lb/sq ft)		2.11	
Alpha	1.00	Stream Power (lb/ft s)		13.11	
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	0.66	9.76	0.60
C & E Loss (ft)	0.17	Cum SA (acres)	0.48	3.26	0.79

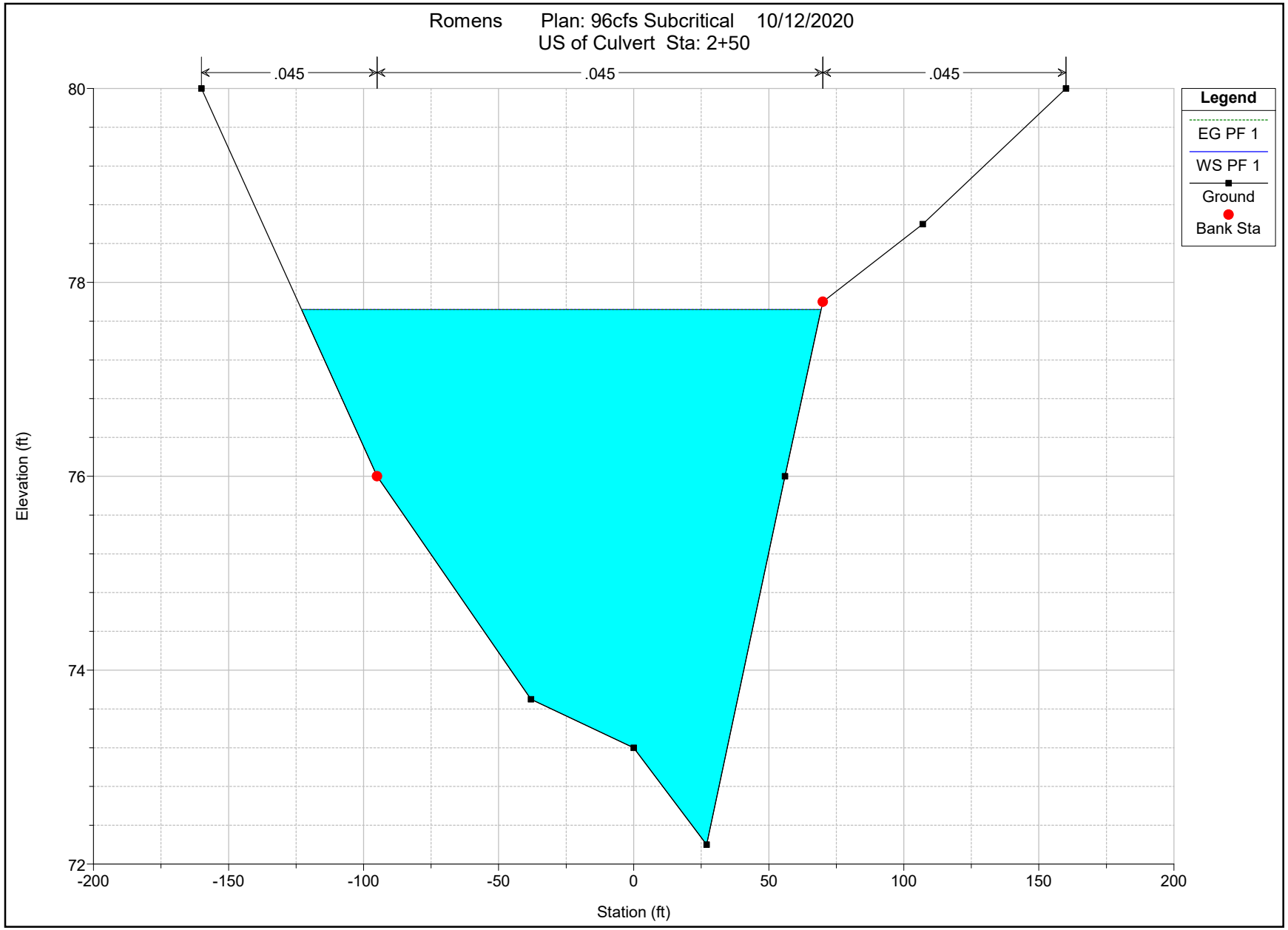
Plan: 500subcritical Creek Main Stem Romens RS: 1530 Profile: PF 1

E.G. Elev (ft)	85.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.045	
W.S. Elev (ft)	85.08	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)		Flow Area (sq ft)		153.75	
E.G. Slope (ft/ft)	0.005459	Area (sq ft)		153.75	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	99.71	Top Width (ft)		99.71	
Vel Total (ft/s)	3.25	Avg. Vel. (ft/s)		3.25	
Max Chl Dpth (ft)	3.08	Hydr. Depth (ft)		1.54	
Conv. Total (cfs)	6767.5	Conv. (cfs)		6767.5	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		99.91	
Min Ch El (ft)	82.00	Shear (lb/sq ft)		0.52	
Alpha	1.00	Stream Power (lb/ft s)		1.71	
Frctn Loss (ft)	4.24	Cum Volume (acre-ft)	0.66	10.84	0.60
C & E Loss (ft)	0.04	Cum SA (acres)	0.48	4.03	0.79


Romens Plan: 96cfs Subcritical 10/12/2020
US of Culvert Sta: 15+30
.045
.045
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
94
92
90
88
86
84
82
-300
-200
-100
0
100
200
Station (ft)


Romens Plan: 96cfs Subcritical 10/12/2020
US of Culvert Sta: 11+30
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
90
88
86
84
82
80
78
-200
-150
-100
-50
0
50
100
150


Romens Plan: 96cfs Subcritical 10/12/2020
US of Culvert Sta: 7+30
.045
.045
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
84
82
80
78
76
-200
-150
-100
-50
0
50
100
150
200
Station (ft)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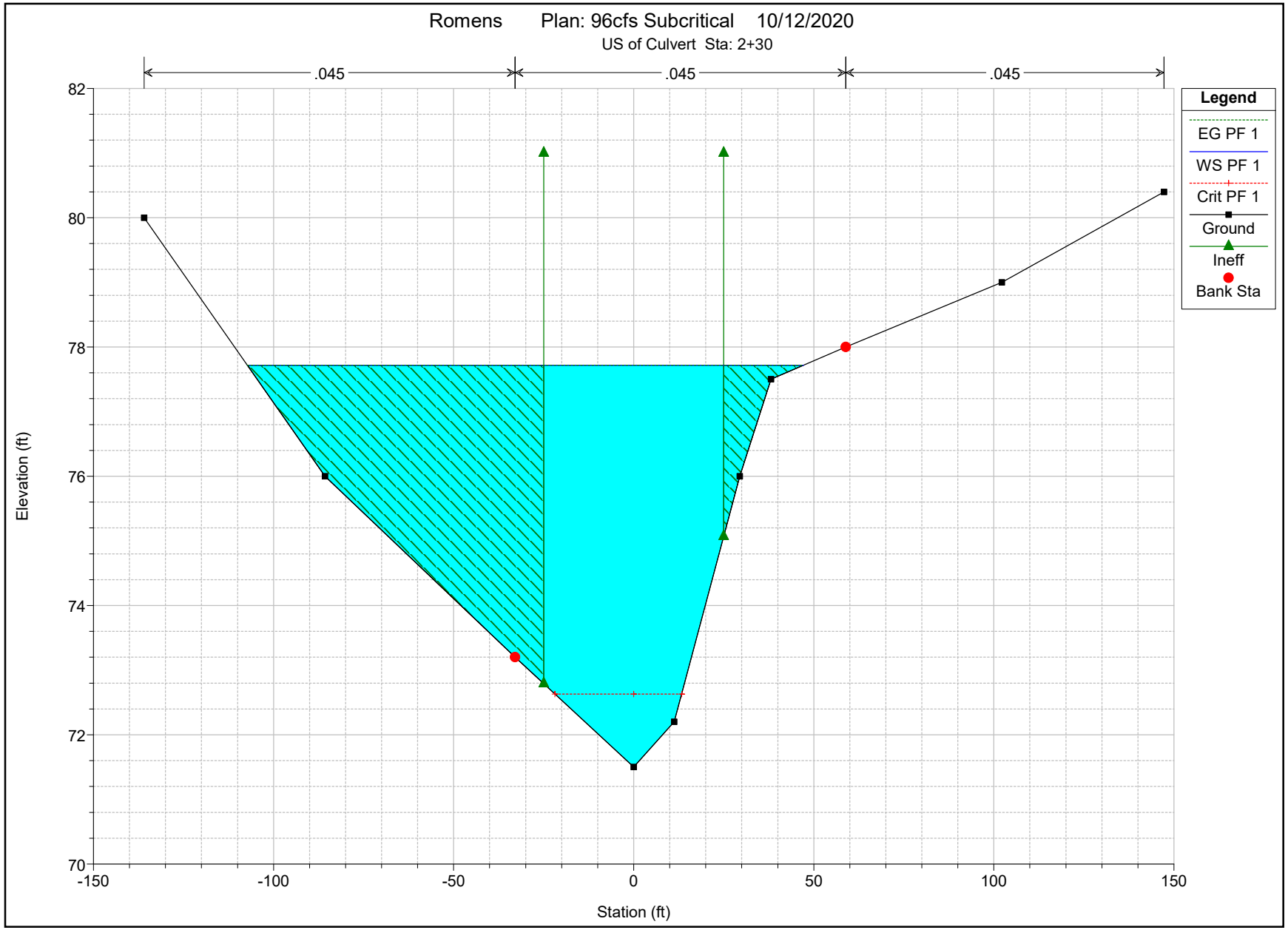
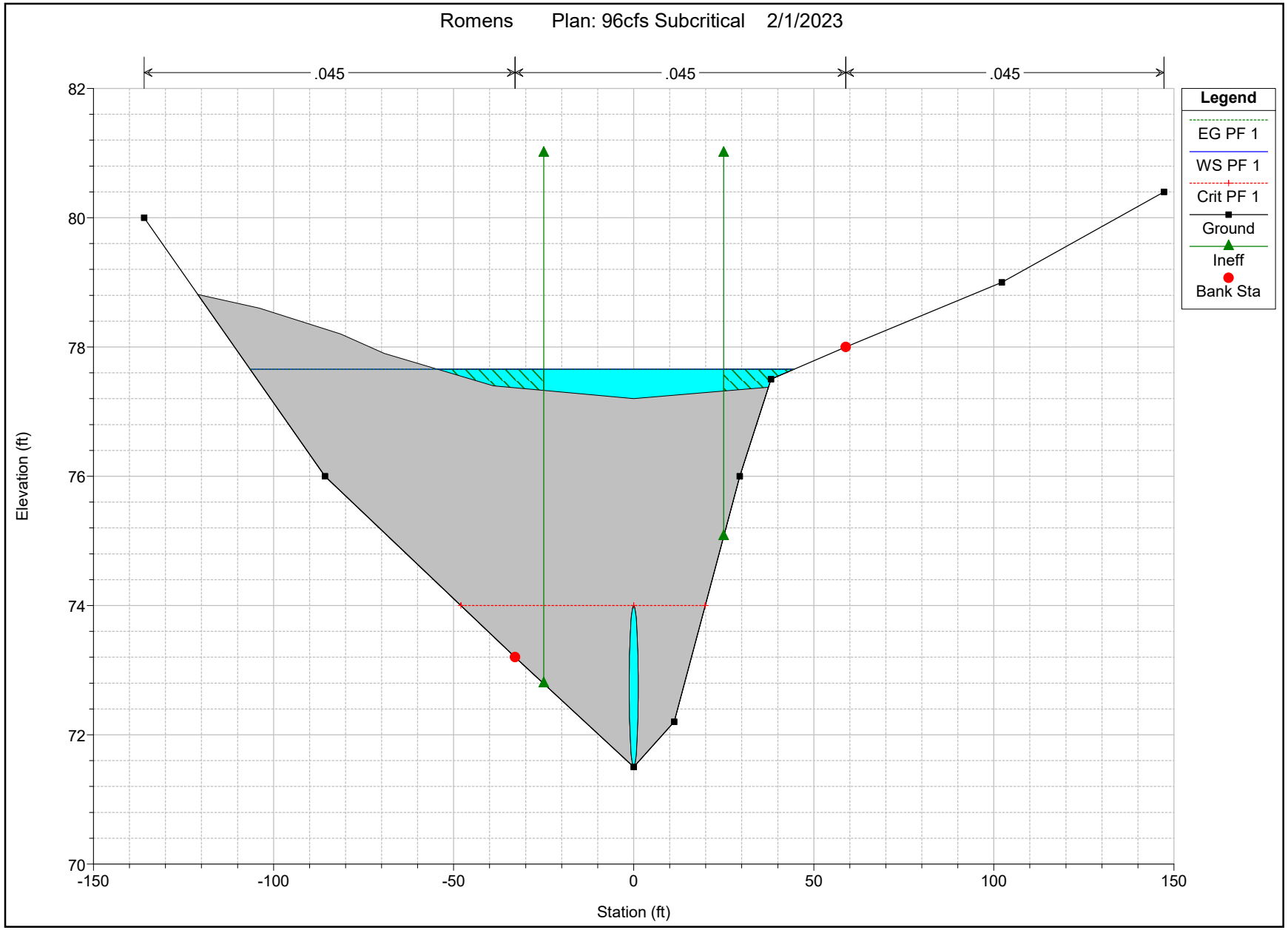
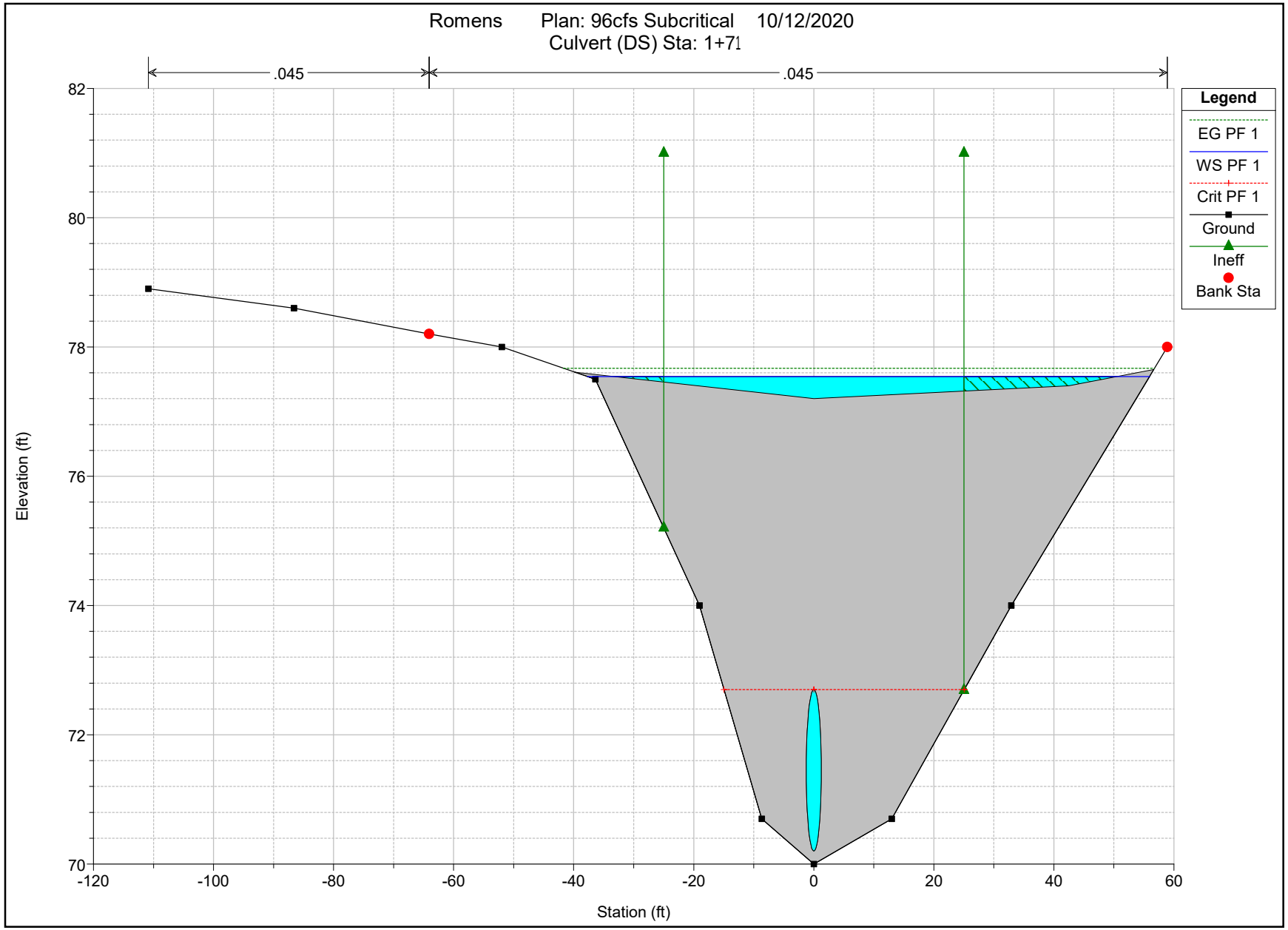
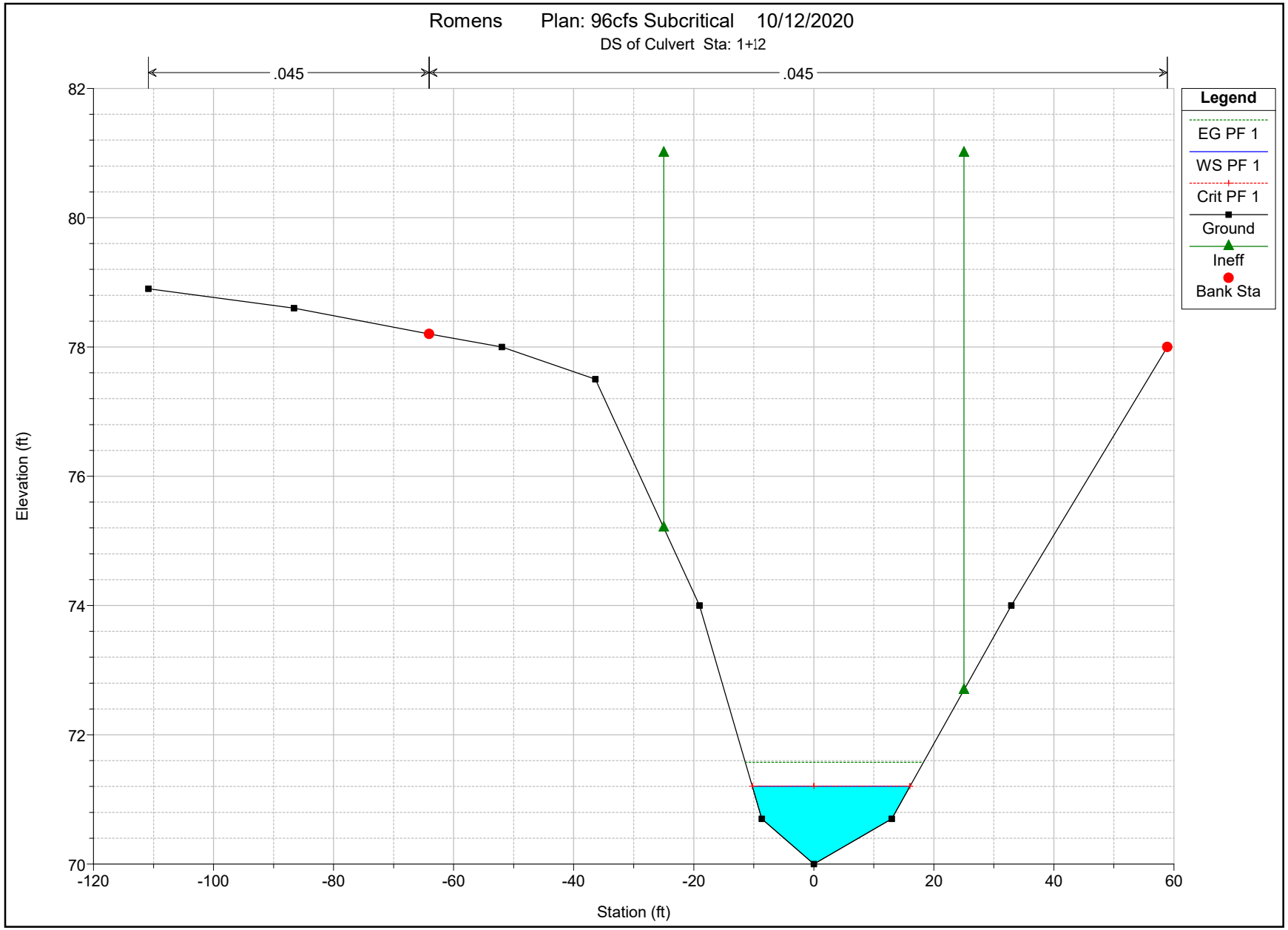
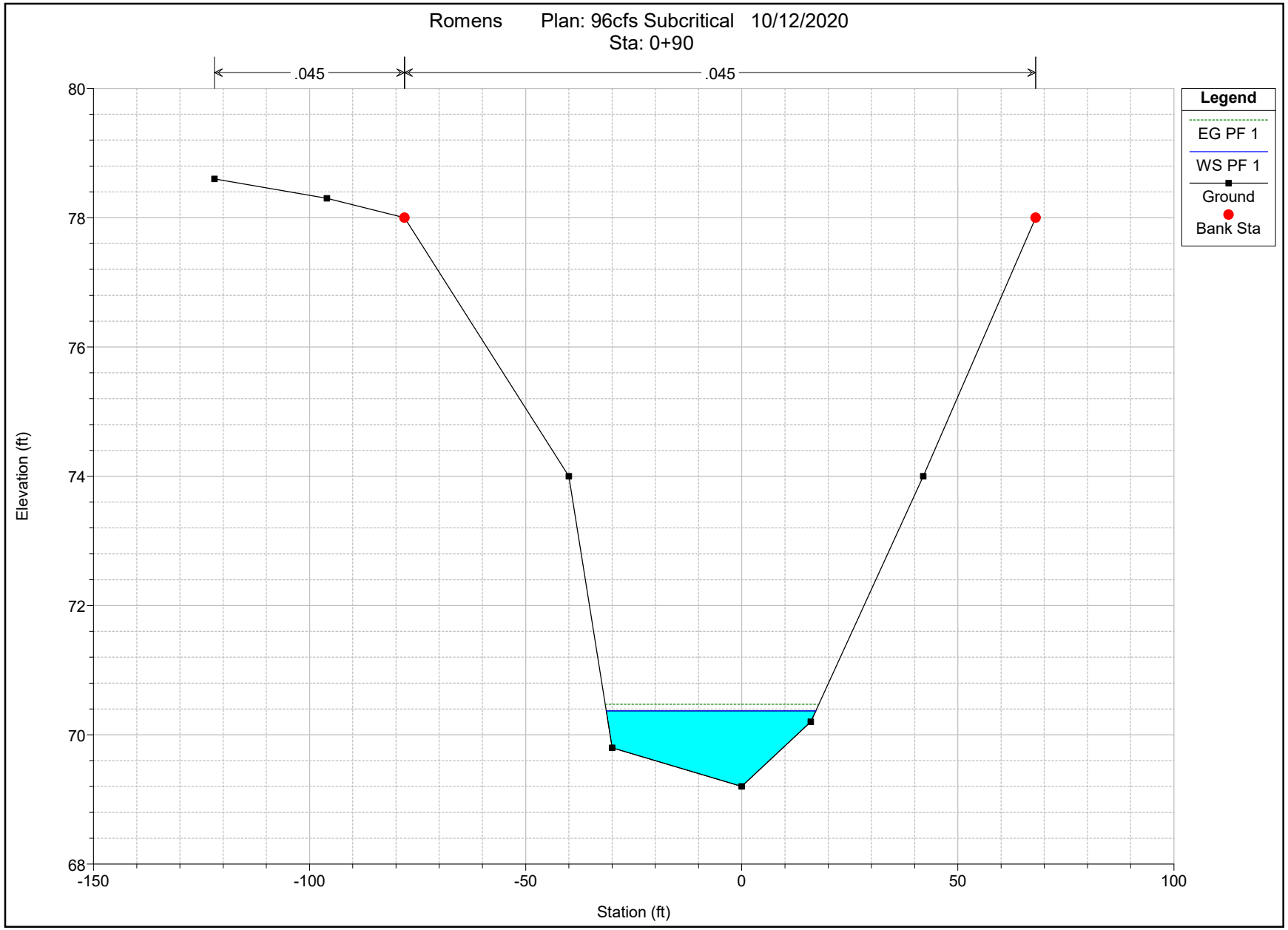
US of Culvert Sta: 2+50
.045
.045
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
80
78
76
74
72
-200
-150
-100
-50
0
50
100
150
200
Station (ft)

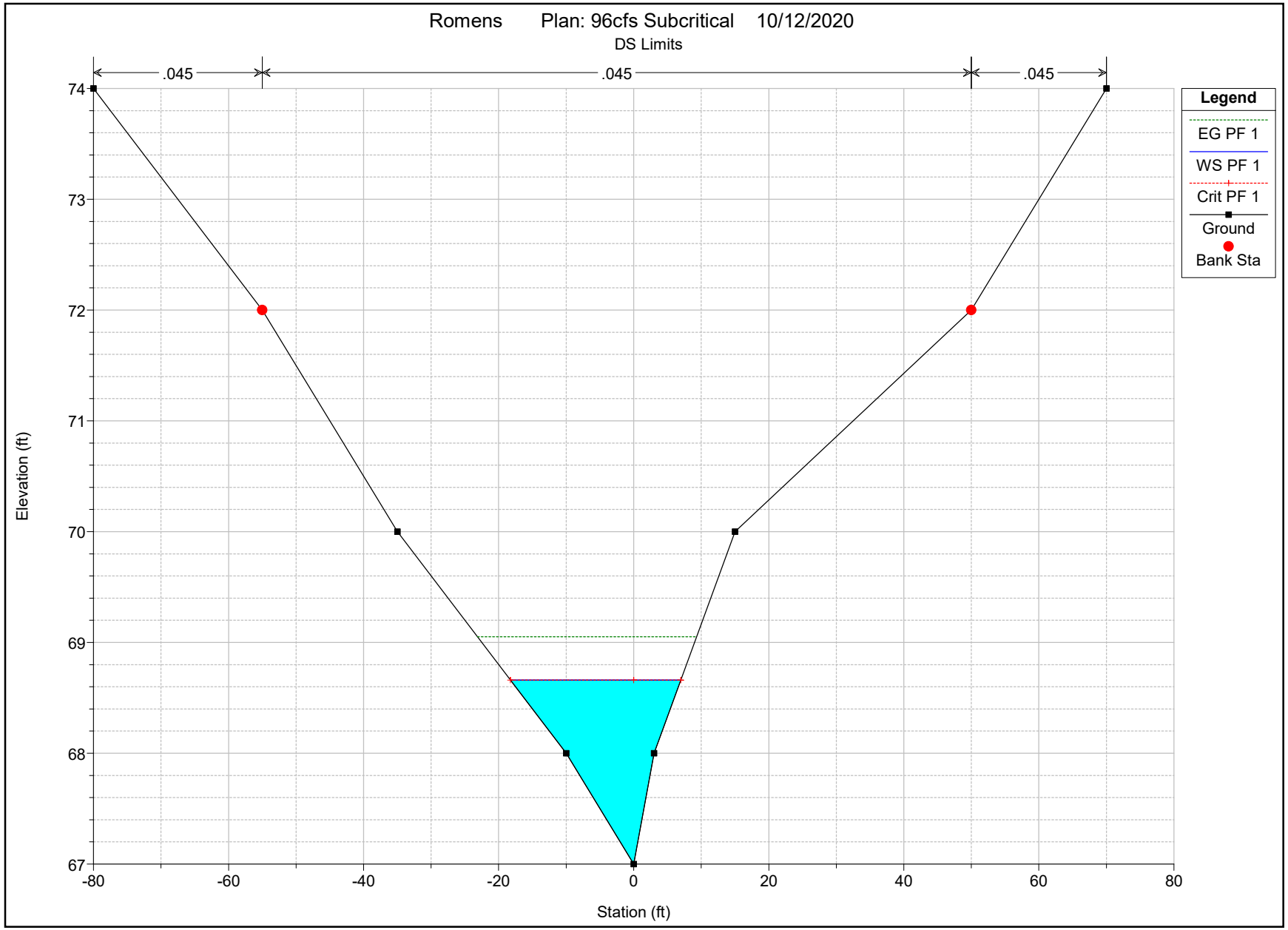

Romens Plan: 96cfs Subcritical 10/12/2020
US of Culvert Sta: 2+30
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-150
-100
-50
0
50
100
150


Romens Plan: 96cfs Subcritical 2/1/2023
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-150
-100
-50
0
50
100
150


Romens Plan: 96cfs Subcritical 10/12/2020
Culvert (DS) Sta: 1+71
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-120
-100
-80
-60
-40
-20
0
20
40
60


Romens Plan: 96cfs Subcritical 10/12/2020
DS of Culvert Sta: 1+12
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
82
80
78
76
74
72
70
-120
-100
-80
-60
-40
-20
0
20
40
60


Romens Plan: 96cfs Subcritical 10/12/2020
Sta: 0+90
.045
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
80
78
76
74
72
70
68
-150
-100
-50
0
50
100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DS Limits
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
74
73
72
71
70
69
68
67
-80
-60
-40
-20
0
20
40
60
80

Subcatchment 1S: (new Subcat)

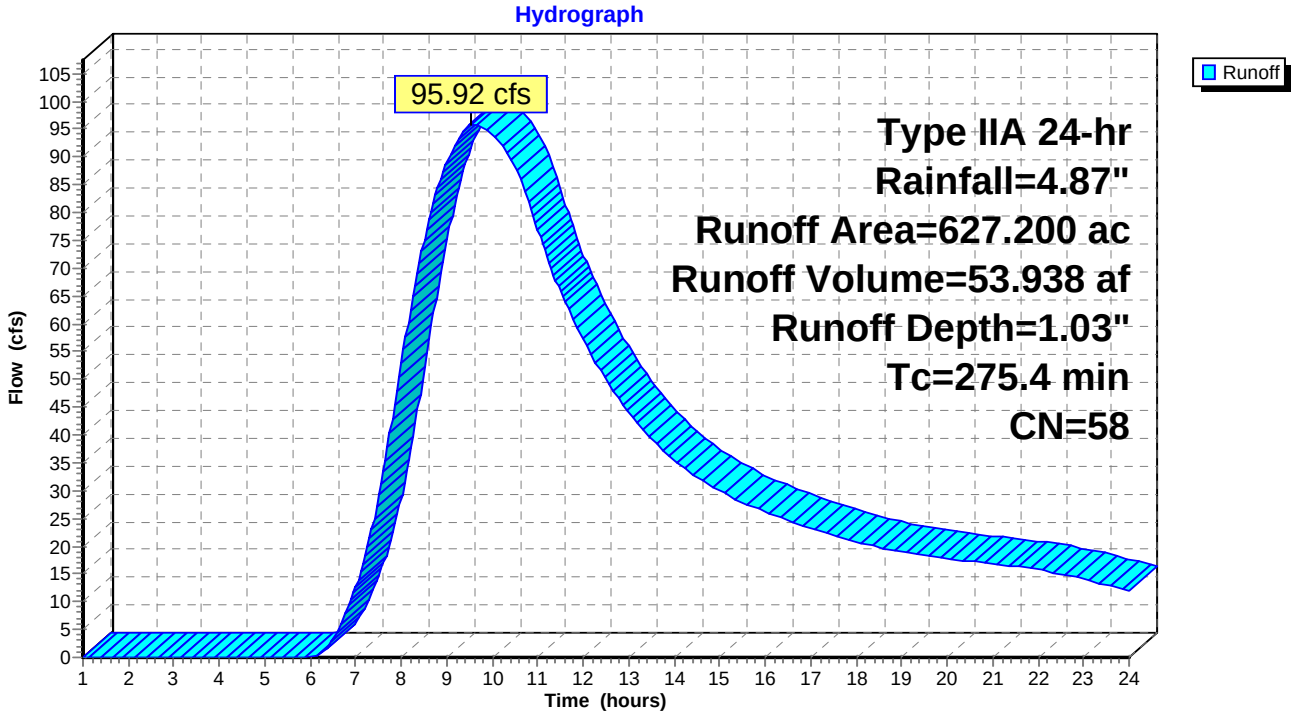
Runoff = 95.92 cfs @ 9.52 hrs, Volume= 53.938 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IIA 24-hr Rainfall=4.87"

Area (ac)	CN	Description
627.200	58	agricultural

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
275.4					**Direct Entry, 275.4**

Subcatchment 1S: (new Subcat)



StreamStats Report

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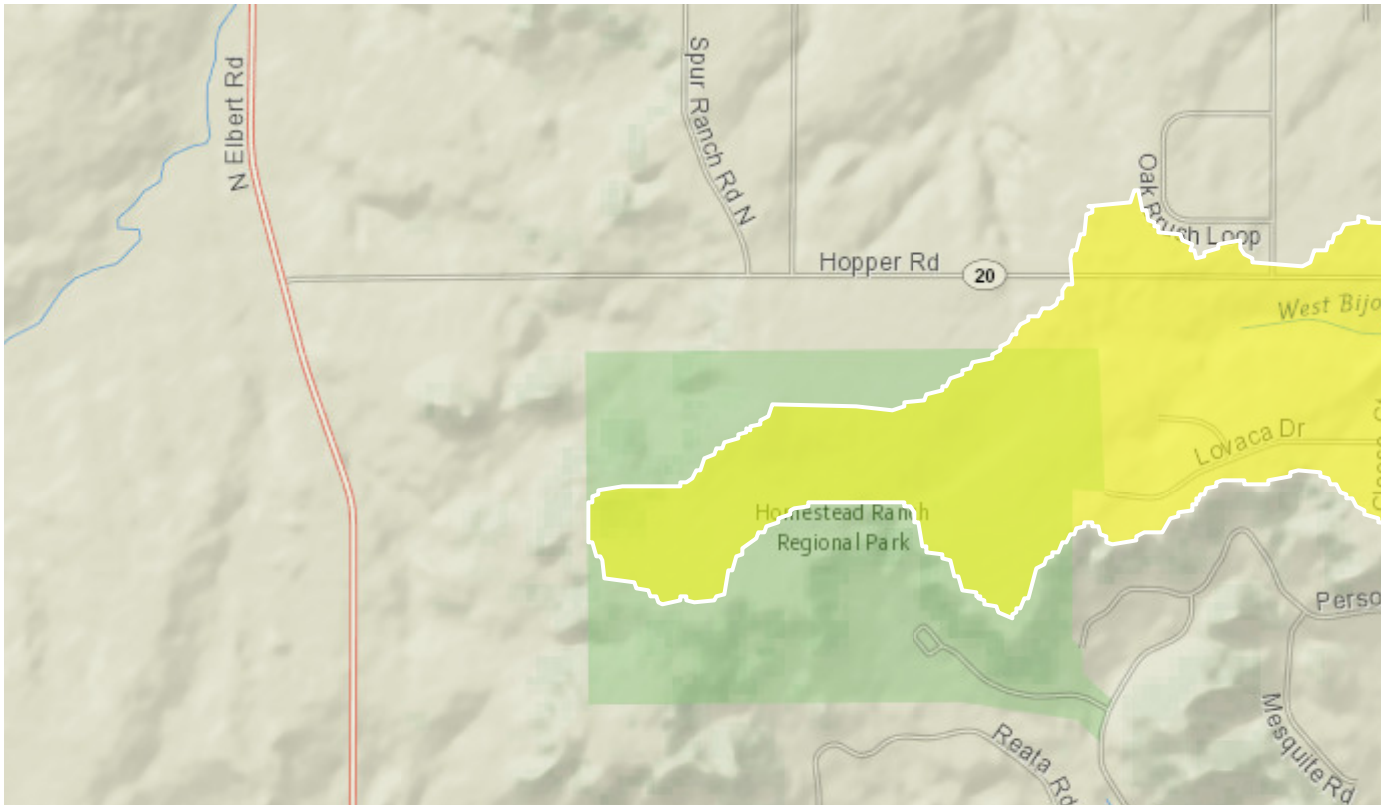
Workspace ID: CO20201010175145313000
Clicked Point (Latitude, Longitude): 39.08557, -104.49740
Time: 2020-10-10 11:51:55 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.98	square miles
I6H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
STATSCLAY	Percentage of clay soils from STATSGO	16.3	percent
OUTLETELEV	Elevation of the stream outlet in feet above NAVD88	7283	feet

Peak-Flow Statistics Parameters[Foothills Region Peak Flow 2016 5099]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.98	square miles	0.6	2850
I6H100Y	6 Hour 100 Year Precipitation	3	inches	2.38	4.89
STATSCLAY	STATSGO Percentage of Clay Soils	16.3	percent	9.87	37.5
OUTLETELEV	Elevation of Gage	7283	feet	4290	8270

Peak-Flow Statistics Flow Report[Foothills Region Peak Flow 2016 5099]

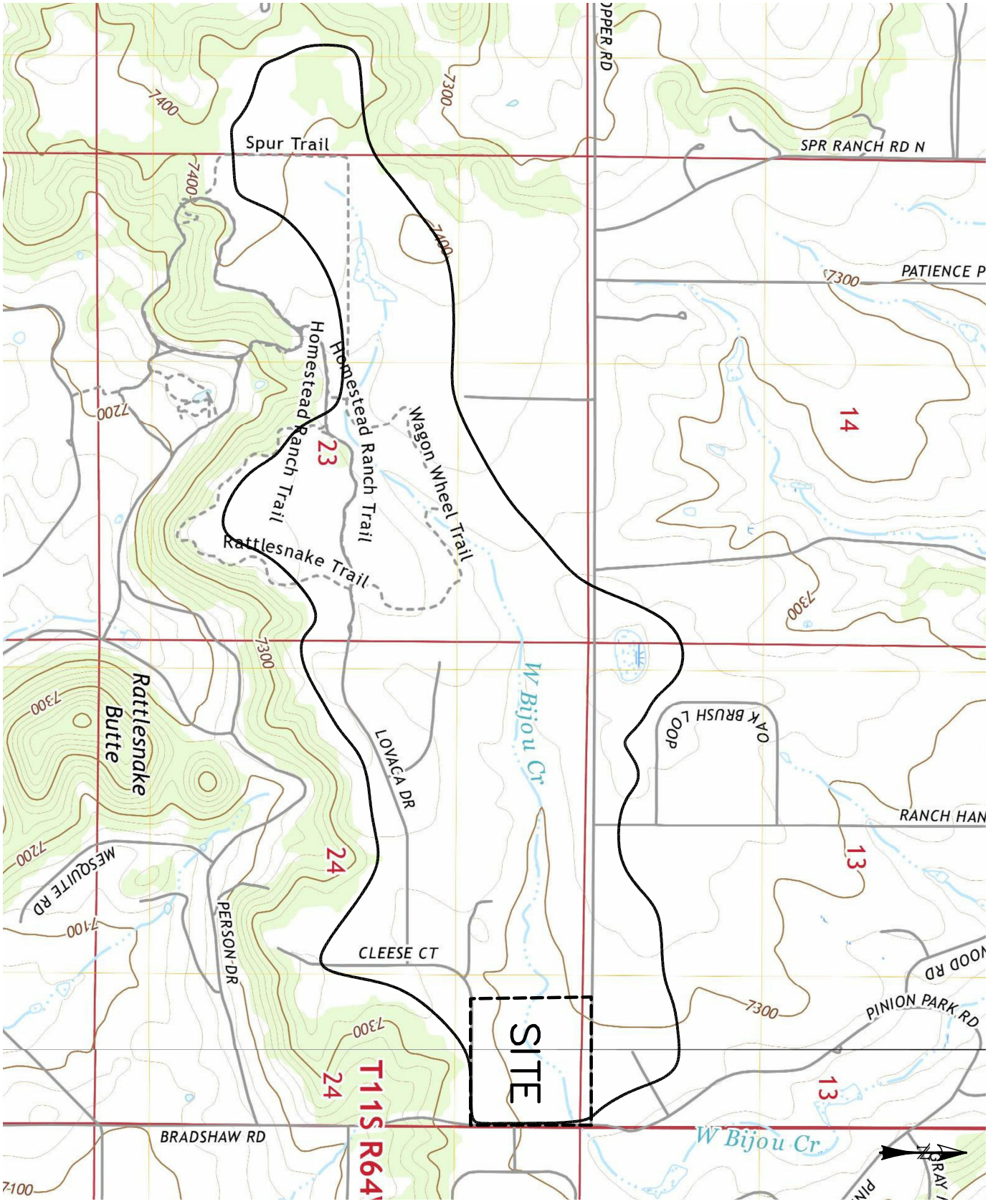
PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
2 Year Peak Flood	8.21	ft^3/s	117
5 Year Peak Flood	20.5	ft^3/s	87
10 Year Peak Flood	32.4	ft^3/s	80
25 Year Peak Flood	52	ft^3/s	80
50 Year Peak Flood	69.9	ft^3/s	83
100 Year Peak Flood	92.2	ft^3/s	88
200 Year Peak Flood	117	ft^3/s	94
500 Year Peak Flood	155	ft^3/s	104

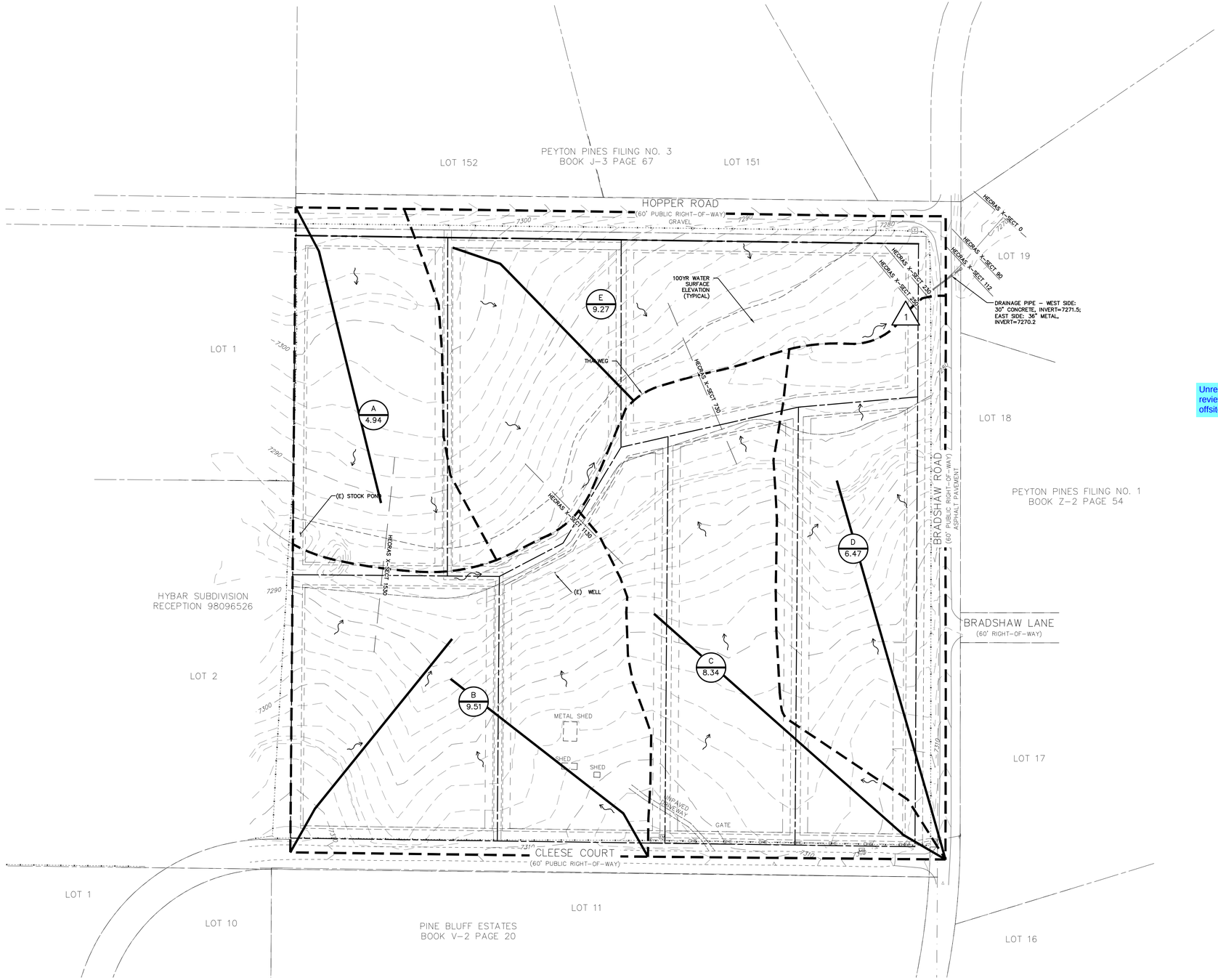
Peak-Flow Statistics Citations

Kohn, M.S., Stevens, M.R., Harden, T.M., Godaire, J.E., Klinger, R.E., and Mommandi, A.,2016, Paleoflood investigations to improve peak-streamflow regional-regression equations for natural streamflow in eastern Colorado, 2015: U.S. Geological Survey Scientific Investigations Report 2016–5099, 58 p. (http://dx.doi.org/10.3133/sir20165099)

Application Version: 4.4.0



CATAMOUNT ENGINEERING PO BOX 692 DIVIDE, CO 80814 (719) 426-2124	ROMENS SUBDIVISION	SCALE: 1"=1500'	DATE: 10/12/20
	WEST BIJOU CREEK USGS WATERSHED MAP	JOB NO.: 20-248	SHEET: 1 OF 1



EXISTING DRAINAGE BASINS			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
A–E	4.94	1.2	7.6
B–E	9.51	2.8	17.1
C–E	8.34	2.1	12.9
D–E	6.47	2.3	11.5
E–E	9.27	3.1	17.3

PROPOSED DRAINAGE BASINS			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
A–P	4.94	1.5	8.7
B–P	9.51	3.4	19.5
C–P	8.34	2.7	15.3
D–P	6.47	2.5	11.9
E–P	9.27	3.7	19.8

Unresolved from review 1. Include the offsite flow.

DESIGN POINTS			
DESIGN POINT	DESCRIPTION	Q5 (CFS)	Q100 (CFS)
1–E	BRADSHAW EXISTING	10.4	59.8
1–P	BRADSHAW PROPOSED	12.5	67.9

NOTE: A "P" SUFFIX REPRESENTS PROPOSED BASINS WHEREAS "E" REPRESENTS EXISTING CONDITIONS. I.E. – EXISTING AND PROPOSED BASINS ARE THE SAME SIZE.

DRAINAGE LEGEND

BASIN IDENTIFIER / BASIN AREA [AC] — F / 0.36
DESIGN POINT IDENTIFIERS — 3
DRAINAGE BASIN BOUNDARY
SURFACE SHEET FLOW DIRECTION
EXISTING MAJOR CONTOUR (10') — 6930
EXISTING MINOR CONTOUR (2')
EXISTING — (E)
PROPOSED — (P)
FUTURE — (F)
SLOPE/DIRECTION — 1.00%
(E) STORM SEWER
(P) BOUNDARY

REV.	DESCRIPTION	DATE

Know what's below. Call 72 hours before you dig. For more details visit: www.call811.com

PREPARED FOR:
ADELAIDA ROMENS

PREPARED UNDER MY DIRECT SUPERVISION FOR AND BEHALF OF CATAMOUNT ENGINEERING.

DAVID L. MIJARES, COLORADO PE #40510 — DATE

CATAMOUNT ENGINEERING
321 W. HENRIETTA AVE PO BOX 221 WOODLAND PARK, CO 80866 (719)429-2124

ROMENS SUBDIVISION

DRAINAGE PLAN

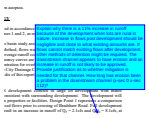
DESIGNED BY:	DRAWN BY:
DLM	DLM
SCALE: 1" = 100'	DATE: 10/11/20
JOB NUMBER	SHEET
20–248	1 OF 1

W:\Catamount Projects\Projects\20-248 Romens Subdivision\DWG\DRAINAGE\20-248.FDR – Drainage Plan – Friday, May 6, 2022 8:52:42 AM – Scott

W:\Catamount Projects\Projects\20-248 Romens Subdivision\DWG\DRAINAGE

Drainage Report - Final_V2_Comments.pdf Markup Summary

Callout (3)

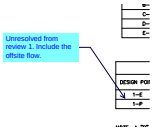


Subject: Callout
Page Label: 6
Author: lpackman
Date: 5/30/2023 10:21:01 AM
Status:
Color:
Layer:
Space:

Explain why there is a 11% increase in runoff because of the development when lots are rural in nature. Increase in flows post development should be negligible and close to what existing amounts are. If flows cannot match existing flows after development, other methods of detention might be required. The downstream channel appears to have erosion and an increase in runoff is not likely to be approved. Provide justification as to whether mitigation is needed for that channel. How long has erosion been a problem in the downstream channel (x-sec 0 x-sec 112)?

Subject: Callout
Page Label: 4
Author: lpackman
Date: 5/25/2023 10:43:32 AM
Status:
Color:
Layer:
Space:

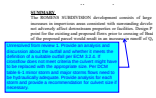
Unresolved from review 1. Revise report to provide addition details about the 500 cfs value that was mentions in the first submittal. Account for all flows going through the property and outfalling at the culvert under Bradshaw Rd.



Subject: Callout
Page Label: 66
Author: lpackman
Date: 5/30/2023 10:34:27 AM
Status:
Color:
Layer:
Space:

Unresolved from review 1. Include the offsite flow.

Text Box (1)



Subject: Text Box
Page Label: 6
Author: lpackman
Date: 5/30/2023 10:20:50 AM
Status:
Color:
Layer:
Space:

Unresolved from review 1. Provide an analysis and discussion about the outfall and whether it meets the definition of a suitable outfall per ECM 3.2.4. If crossflow does not meet criteria the culvert might have to be replaced with the appropriate size. Per DCM table 6-1 minor storm and major storms flows need to be hydraulically adequate. Provide analysis for each storm and provide a recommendation for culvert size if necessary.