

See comments from  
engineering in blue

# PRELIMINARY/FINAL DRAINAGE REPORT FOR ROMENS SUBDIVISION

OCTOBER 2020

Prepared for:

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

Prepared By:

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

Replace

PCD FILE NO's: SP-20-      
SF-20-

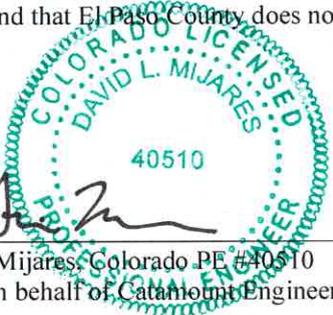
PRELIMINARY/FINAL DRAINAGE REPORT  
ROMENS SUBDIVISION

**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.

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

Date 5.26.22

**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.

\_\_\_\_\_  
Jennifer Irvine, PE  
County Engineer/ECM Administrator

\_\_\_\_\_  
Date

Conditions: Revise to Joshua Palmer, PE

# **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 6<sup>th</sup> 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 on 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. The stock pond was not used in hydrologic calculations. 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.

Coordinate with State Engineer's office in regards to water rights issues. Please submit any correspondence.

Per ECM table 3-1 in appendix L 5 acre lots typically have 7% impervious coverage. A 10-20% impervious value might require detention because of runoff increase and an ESQCP permit which may trigger water quality. Revise to use 7% for calculations.

and as agricultural land. A 1 acre developed area was assumed for each lot located in respective basins. 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 the erosiveness 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 overtopped. It is noteworthy to mention that the flows computed by both models are lower than you would expect if you used the rational method. 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 500cfs value was noted on the drainage map from the adjacent parcel drainage report titled "Peyton Pines Drainage Study", prepared by JR Engineering, dated 1973. However, there are calculations to support that value.

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

Basin B (9.51 Acres) represents portions of the proposed residential lots 6 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.

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.

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 sheetflow into undeveloped and vegetated portions of lots and infiltrates into the ground.

Provide an analysis for the culvert. Identify if the road overtops and what the depth is.

Provide additional details about the 500 cfs value and the point where the previous drainage report identified that runoff. It is unclear whether it is upstream or downstream of the site.

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 outfalling 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 to the criteria established in the El Paso County Drainage Criteria Manual Volumes 1 and 2, as revised May 2014.

The rational method for drainage basin study areas of less than 100 acres was utilized in the on-site analysis. For the Rational Method, flows were calculated for the 2, 5, 10, 25, 50, and 100-year recurrence intervals. The average runoff coefficients, ‘C’ values, are taken from Table 6-6 and the Intensity-Duration-Frequency curves are taken from Figure 6-5 of the City Drainage Criteria Manual. Time of concentration for overland flow and storm drain or gutter flow are calculated per Section 3.2 of the City Drainage Criteria Manual. Calculations for the Rational Method are shown in the Appendix of this report.

**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.

Include how much the development is increasing the runoff in the site.

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.

Type B (Collector or Minor Arterial with Roadside Ditch)	Flow must not encroach upon street shoulder area.	Same as Type A (Local with Roadside Ditch) above.	Requires culvert. Flow shall not encroach upon street shoulder.	Requires culvert. Depth of flow shall not exceed 6 inches at the street shoulder.
--	---	---	---	---

**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



RANCH HAND ROAD

HOPPER ROAD

BRADSHAW ROAD

BRADSHAW LANE

SITE

CLEESE COURT

LOVACA DRIVE



ROMENS SUBDIVISION

VICINITY MAP

SCALE:  
NOT TO SCALE

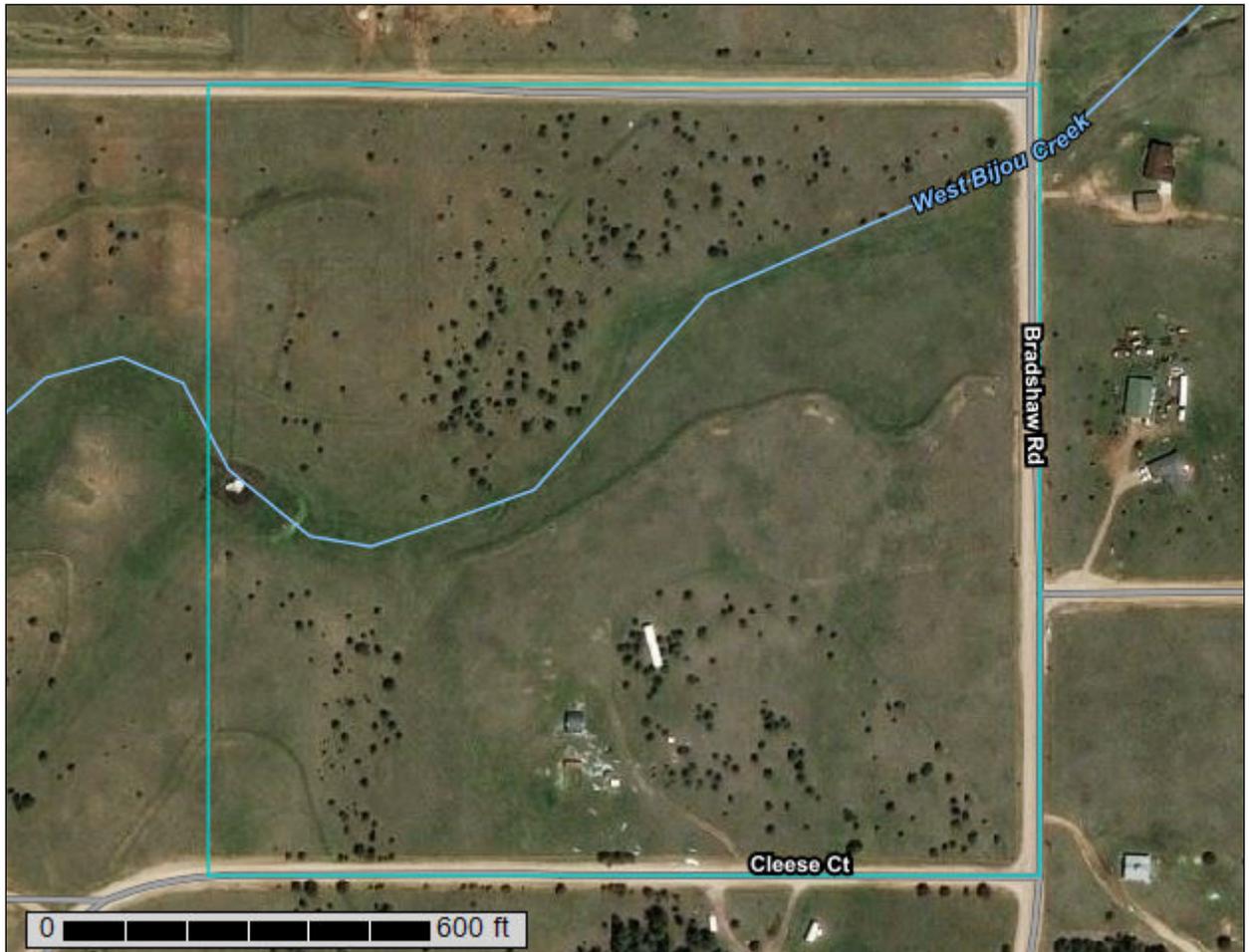
JOB NO.:  
**20-248**

DATE:  
10/12/20

SHEET: 1 OF 1

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

## Romens Subdivision



# 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](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

---

<b>Preface</b> .....	2
<b>Soil Map</b> .....	5
Soil Map.....	6
Legend.....	7
Map Unit Descriptions.....	8
El Paso County Area, Colorado.....	10
15—Brussett loam, 3 to 5 percent slopes.....	10
66—Peyton sandy loam, 1 to 5 percent slopes.....	11
67—Peyton sandy loam, 5 to 9 percent slopes.....	12

# Soil Map

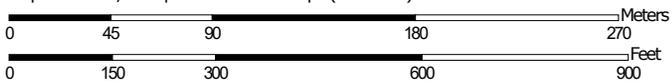
---

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.



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

## Custom Soil Resource Report

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

## Custom Soil Resource Report

*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



104°30'17"W 39°5'18"N



## Legend

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

- |                                    |  |  |
|------------------------------------|--|--|
| <b>SPECIAL FLOOD HAZARD AREAS</b>  |  | Without Base Flood Elevation (BFE)<br><i>Zone A, V, A99</i>  |
|                                    |  | With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>   |
|                                    |  | Regulatory Floodway  |
| <b>OTHER AREAS OF FLOOD HAZARD</b> |  | 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 <i>Zone X</i> |
|                                    |  | Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>  |
|                                    |  | Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>  |
|                                    |  | Area with Flood Risk due to Levee <i>Zone D</i>  |
| <b>OTHER AREAS</b>                 |  | NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>   |
|                                    |  | Effective LOMRs  |
| <b>GENERAL STRUCTURES</b>          |  | Area of Undetermined Flood Hazard <i>Zone D</i>  |
|                                    |  | Channel, Culvert, or Storm Sewer   |
|                                    |  | Levee, Dike, or Floodwall  |
| <b>OTHER FEATURES</b>              |  | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation  |
|                                    |  | 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation  |
|                                    |  | Coastal Transect   |
|                                    |  | Base Flood Elevation Line (BFE)  |
|                                    |  | Limit of Study   |
|                                    |  | Jurisdiction Boundary  |
| <b>MAP PANELS</b>                  |  | Coastal Transect Baseline  |
|                                    |  | Profile Baseline   |
|                                    |  | Hydrographic Feature   |
|                                    |  | Digital Data Available   |
|                                    |  | No Digital Data Available  |
|                                    |  | Unmapped   |



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.

USGS The National Map: Orthoimagery. Data refreshed April 2020

0 250 500 1,000 1,500 2,000 Feet 1:6,000

104°29'39"W 39°4'50"N

## EXISTING HYDROLOGY

BASIN	AREA TOTAL (Acres)	C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	CONVEYANCE TC			CONVEYANCE TC				TT	INTENSITY						TOTAL FLOWS							
								Length (ft)	Height (ft)	TI (min)	Length (ft)	Height (ft)	C <sub>v</sub>	Slope (%)	Velocity (fps)	TC (min)	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)
<b>A-E</b>	4.94	<b>0.04</b>	<b>0.10</b>	<b>0.18</b>	<b>0.27</b>	<b>0.32</b>	<b>0.37</b>	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	<b>0.4</b>	<b>1.2</b>	<b>2.6</b>	<b>4.4</b>	<b>5.8</b>	<b>7.6</b>
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>B-E</b>	9.51	<b>0.04</b>	<b>0.10</b>	<b>0.18</b>	<b>0.27</b>	<b>0.32</b>	<b>0.37</b>	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	<b>1.0</b>	<b>2.8</b>	<b>5.9</b>	<b>10.0</b>	<b>13.2</b>	<b>17.1</b>
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																						
<b>C-E</b>	8.34	<b>0.04</b>	<b>0.10</b>	<b>0.18</b>	<b>0.27</b>	<b>0.32</b>	<b>0.37</b>	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	<b>0.7</b>	<b>2.1</b>	<b>4.4</b>	<b>7.5</b>	<b>10.0</b>	<b>12.9</b>
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																						
<b>D-E</b>	6.47	<b>0.07</b>	<b>0.13</b>	<b>0.21</b>	<b>0.29</b>	<b>0.34</b>	<b>0.39</b>	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	<b>1.0</b>	<b>2.3</b>	<b>4.2</b>	<b>6.9</b>	<b>9.0</b>	<b>11.5</b>
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																						
<b>E-E</b>	9.27	<b>0.05</b>	<b>0.11</b>	<b>0.19</b>	<b>0.28</b>	<b>0.33</b>	<b>0.38</b>	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	<b>1.2</b>	<b>3.1</b>	<b>6.1</b>	<b>10.2</b>	<b>13.4</b>	<b>17.3</b>
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

## PROPOSED HYDROLOGY

BASIN	AREA TOTAL (Acres)	C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	CONVEYANCE TC							TT TOTAL	INTENSITY						TOTAL FLOWS							
								Length (ft)	Height (ft)	TI (min)	Length (ft)	Height (ft)	C <sub>v</sub>	Slope (%)		Velocity (fps)	TC (min)	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)
<b>A-P</b>	4.94	<b>0.06</b>	<b>0.12</b>	<b>0.20</b>	<b>0.29</b>	<b>0.34</b>	<b>0.38</b>	100	2	14.9	515	18	5	3.5%	0.9	9.2	24.1	2.2	2.8	3.3	3.7	4.2	4.7	<b>0.7</b>	<b>1.7</b>	<b>3.2</b>	<b>5.3</b>	<b>7.0</b>	<b>8.9</b>
RESIDENTIAL	1.00	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	3.83	0.03	0.09	0.17	0.26	0.31	0.36																						
<b>B-P</b>	9.51	<b>0.06</b>	<b>0.13</b>	<b>0.20</b>	<b>0.29</b>	<b>0.34</b>	<b>0.39</b>	100	4	11.8	435	26	5	6.0%	1.2	5.9	17.8	2.6	3.3	3.8	4.4	4.9	5.5	<b>1.6</b>	<b>3.9</b>	<b>7.4</b>	<b>12.0</b>	<b>15.8</b>	<b>20.1</b>
RESIDENTIAL	2.00	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	7.26	0.03	0.09	0.17	0.26	0.31	0.36																						
<b>C-P</b>	8.34	<b>0.06</b>	<b>0.12</b>	<b>0.20</b>	<b>0.29</b>	<b>0.34</b>	<b>0.38</b>	100	4	11.9	660	30	5	4.5%	1.1	10.3	22.2	2.3	2.9	3.4	3.9	4.4	4.9	<b>1.2</b>	<b>3.0</b>	<b>5.7</b>	<b>9.3</b>	<b>12.3</b>	<b>15.7</b>
RESIDENTIAL	1.50	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	6.64	0.03	0.09	0.17	0.26	0.31	0.36																						
<b>D-P</b>	6.47	<b>0.08</b>	<b>0.14</b>	<b>0.21</b>	<b>0.30</b>	<b>0.35</b>	<b>0.40</b>	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	<b>1.1</b>	<b>2.5</b>	<b>4.5</b>	<b>7.2</b>	<b>9.4</b>	<b>11.9</b>
RESIDENTIAL	0.50	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	5.65	0.03	0.09	0.17	0.26	0.31	0.36																						
<b>E-P</b>	9.27	<b>0.07</b>	<b>0.14</b>	<b>0.21</b>	<b>0.30</b>	<b>0.35</b>	<b>0.39</b>	100	4	11.7	380	23	5	6.1%	1.2	5.1	16.9	2.7	3.3	3.9	4.5	5.0	5.6	<b>1.8</b>	<b>4.2</b>	<b>7.7</b>	<b>12.3</b>	<b>16.1</b>	<b>20.4</b>
RESIDENTIAL	2.00	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	6.85	0.03	0.09	0.17	0.26	0.31	0.36																						

Calculated by: DLM  
Date: 10/11/2020

DESIGN POINT	AREA TOTAL (Acres)	WEIGHTED						TT	INTENSITY						TOTAL FLOWS					
		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)
<b>DP-EX</b>	<b>38.53</b>	<b>0.05</b>	<b>0.11</b>	<b>0.19</b>	<b>0.28</b>	<b>0.32</b>	<b>0.37</b>	30.1	2.0	2.5	2.9	3.3	3.7	4.2	<b>3.9</b>	<b>10.4</b>	<b>20.9</b>	<b>35.1</b>	<b>46.5</b>	<b>59.8</b>
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													
<b>DP-PR</b>	<b>38.53</b>	<b>0.07</b>	<b>0.13</b>	<b>0.21</b>	<b>0.29</b>	<b>0.34</b>	<b>0.39</b>	24.8	2.2	2.8	3.2	3.7	4.2	4.6	<b>5.7</b>	<b>13.8</b>	<b>25.6</b>	<b>41.5</b>	<b>54.5</b>	<b>69.5</b>
A-P	4.94	0.06	0.12	0.20	0.29	0.34	0.38													
B-P	9.51	0.06	0.13	0.20	0.29	0.34	0.39													
C-P	8.34	0.06	0.12	0.20	0.29	0.34	0.38													
D-P	6.47	0.08	0.14	0.21	0.30	0.35	0.40													
E-P	9.27	0.07	0.14	0.21	0.30	0.35	0.39													

Calculated by: DLM  
Date: 10/11/2020

# HYDRAULIC CALCULATIONS

## 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

***Design Storm: 1-Hour Rain Depth	WQCV Event	1.19	inches
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		

**Designer:** David Miajres  
**Company:** Catamount Engineering  
**Date:** October 13, 2020  
**Project:** Romens Subdivision  
**Location:** Peyton, CO

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)	0.220	0.360	0.310	0.430	0.530										
Receiving Pervious Area (RPA, acres)	4.720	9.150	8.030	6.040	8.740										
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, %)	4.5%	3.8%	3.7%	6.6%	5.7%										
Receiving Pervious Area (RPA, %)	95.5%	96.2%	96.3%	93.4%	94.3%										
Separate Pervious Area (SPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%										
A <sub>e</sub> (RPA / UIA)	21.455	25.417	25.903	14.047	16.491										
I <sub>a</sub> Check	0.040	0.040	0.040	0.070	0.060										
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										
<b>f / I for Optional User Defined Storm CUHP:</b>															
IRF for WQCV Event:	0.17	0.17	0.17	0.31	0.26										
IRF for 10-Year Event:	0.18	0.18	0.18	0.31	0.26										
IRF for 100-Year Event:	0.18	0.18	0.18	0.32	0.28										
<b>IRF for Optional User Defined Storm CUHP:</b>															
Total Site Imperviousness: I <sub>total</sub>	4.5%	3.8%	3.7%	6.6%	5.7%										
Effective Imperviousness for WQCV Event:	0.8%	0.7%	0.6%	2.0%	1.5%										
Effective Imperviousness for 10-Year Event:	0.8%	0.7%	0.7%	2.0%	1.5%										
Effective Imperviousness for 100-Year Event:	0.8%	0.7%	0.7%	2.1%	1.6%										
<b>Effective Imperviousness for Optional User Defined Storm CUHP:</b>															

**LID / EFFECTIVE IMPERVIOUSNESS CREDITS**

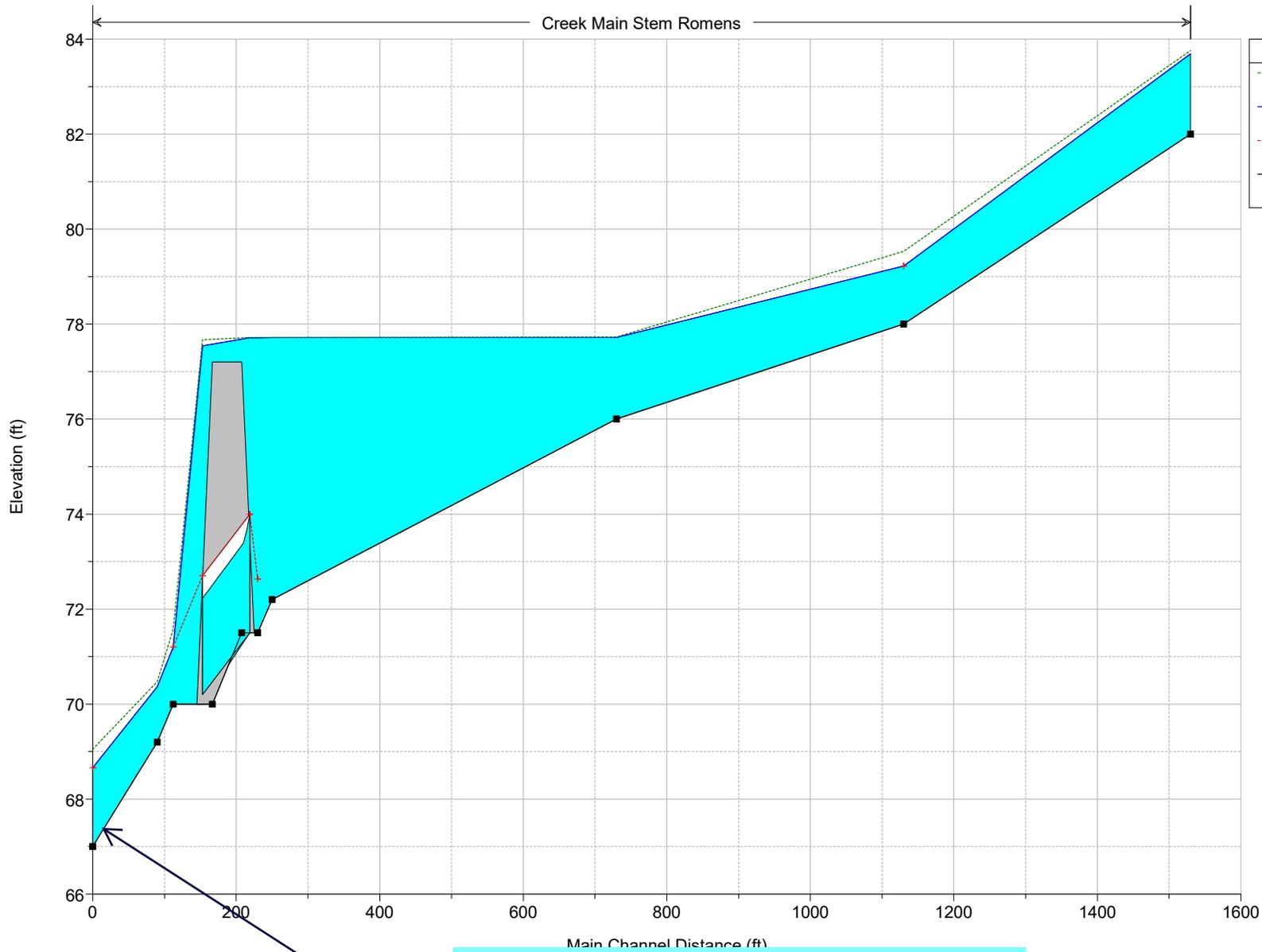
WQCV Event CREDIT: Reduce Detention By:	81.5%	81.7%	81.7%	67.2%	72.1%	N/A									
10-Year Event CREDIT**: Reduce Detention By:	149.7%	175.0%	178.7%	99.3%	113.5%	N/A									
100-Year Event CREDIT**: Reduce Detention By:	148.5%	173.6%	177.3%	96.9%	111.4%	N/A									
User Defined CUHP CREDIT: Reduce Detention By:															

Total Site Imperviousness:	4.8%
Total Site Effective Imperviousness for WQCV Event:	1.1%
Total Site Effective Imperviousness for 10-Year Event:	1.1%
Total Site Effective Imperviousness for 100-Year Event:	1.2%
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

The narrative and the inputs do not match. The narrative mentions 1 acre of developed area which is significantly more than the inputs. Revise to use 7% per ECM appendix L.

Creek Main Stem Romens



Legend	
EG PF 1	(dashed green line)
WS PF 1	(solid blue line)
Crit PF 1	(dashed red line)
Ground	(solid black line with square markers)

provide the downstream boundary condition used and describe in the narrative.

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

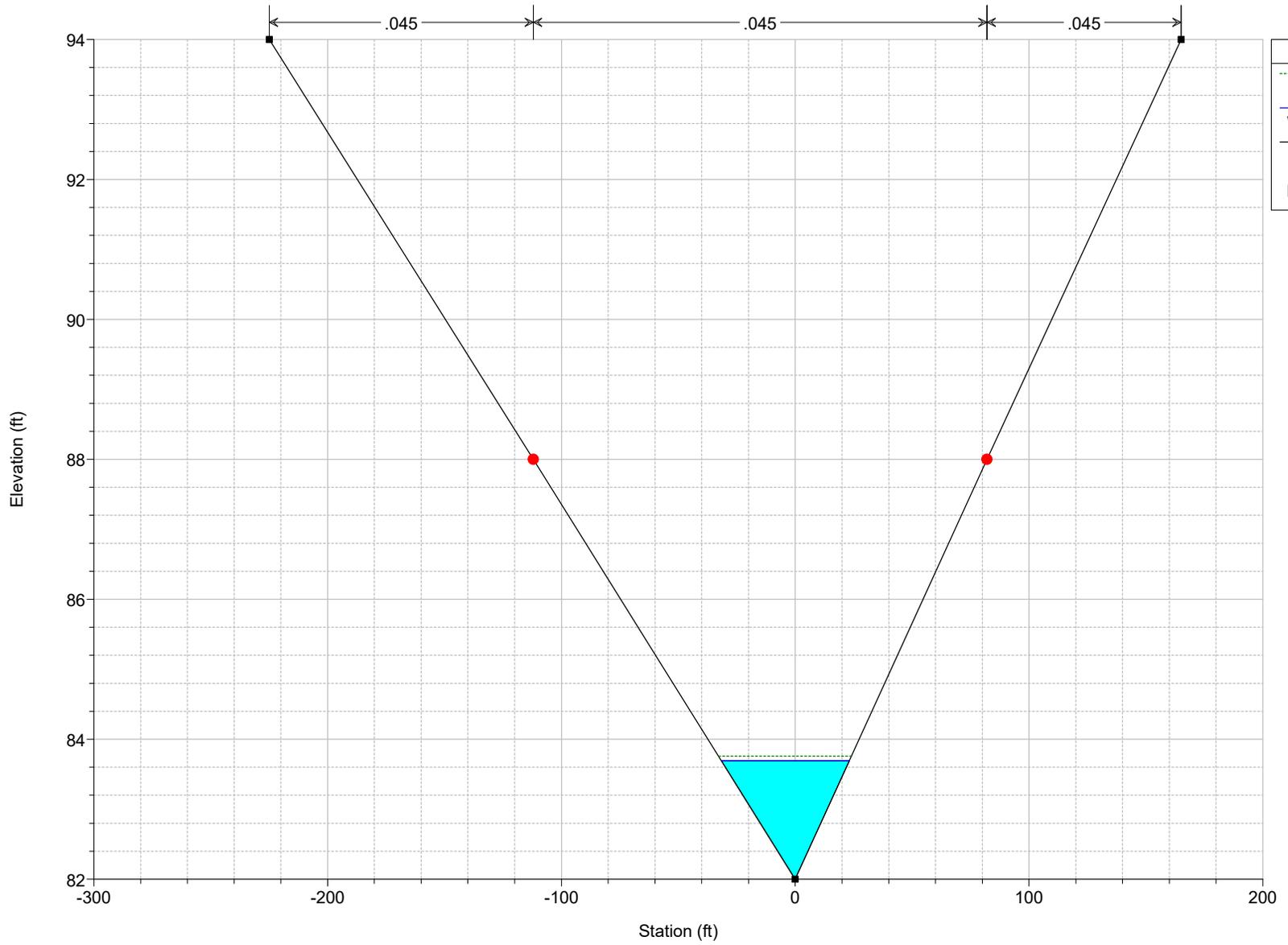
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Romens	1530	PF 1	96.00	82.00	83.69		83.76	0.004925	2.07	46.35	54.75	0.40
Romens	1130	PF 1	96.00	78.00	79.22	79.22	79.53	0.035944	4.49	21.37	35.06	1.01
Romens	730	PF 1	96.00	76.00	77.67		77.69	0.001103	1.00	95.76	109.52	0.19
Romens	250	PF 1	96.00	72.20	77.67		77.68	0.000005	0.17	593.23	191.24	0.02
Romens	230	PF 1	96.00	73.00	77.67	73.76	77.67	0.000028	0.45	211.35	151.96	0.04
Romens	171		Culvert									
Romens	112	PF 1	96.00	71.90	72.80	72.73	73.06	0.026181	4.15	23.15	33.73	0.88
Romens	90	PF 1	96.00	71.40	72.11	72.11	72.36	0.038355	4.00	24.00	49.28	1.01
Romens	0	PF 1	96.00	67.00	68.66	68.66	69.05	0.033963	5.02	19.12	25.22	1.02

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

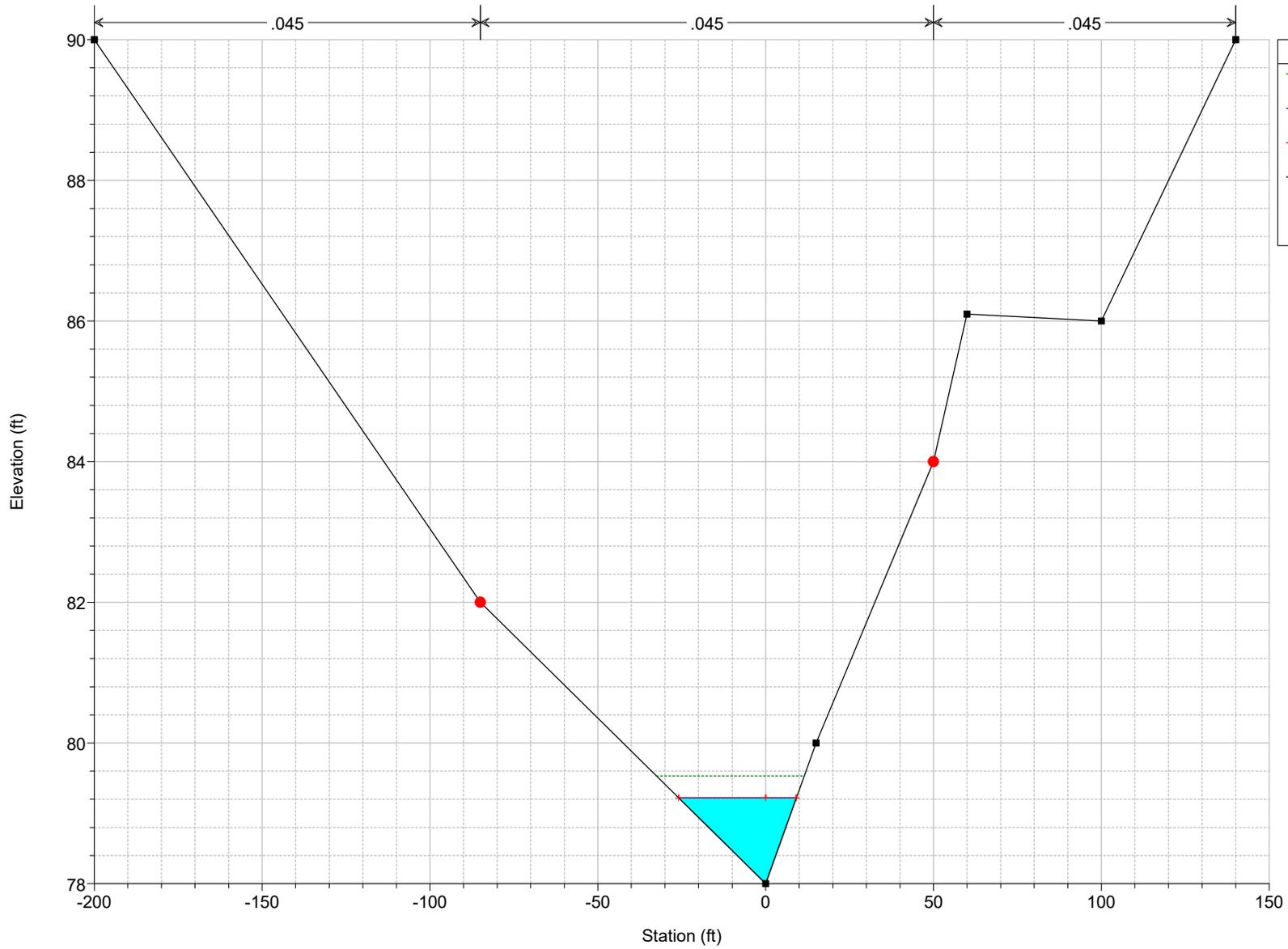
E.G. Elev (ft)	70.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.045	
W.S. Elev (ft)	70.37	Reach Len. (ft)	90.00	90.00	90.00
Crit W.S. (ft)		Flow Area (sq ft)		37.22	
E.G. Slope (ft/ft)	0.008723	Area (sq ft)		37.22	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	48.50	Top 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	

Provide the table for the other cross sections.

Romens Plan: 96cfs Subcritical 10/12/2020

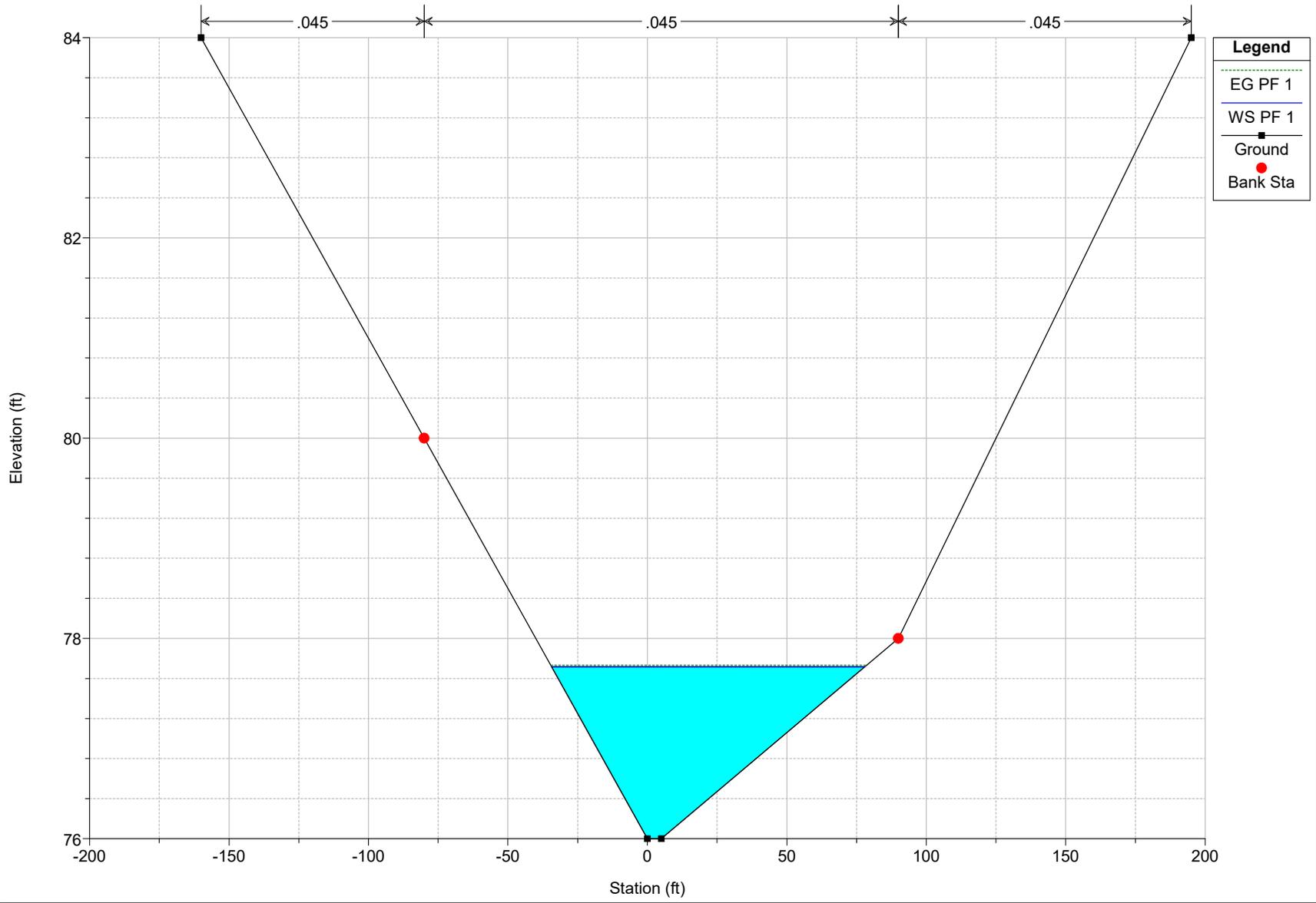


Romens Plan: 96cfs Subcritical 10/12/2020

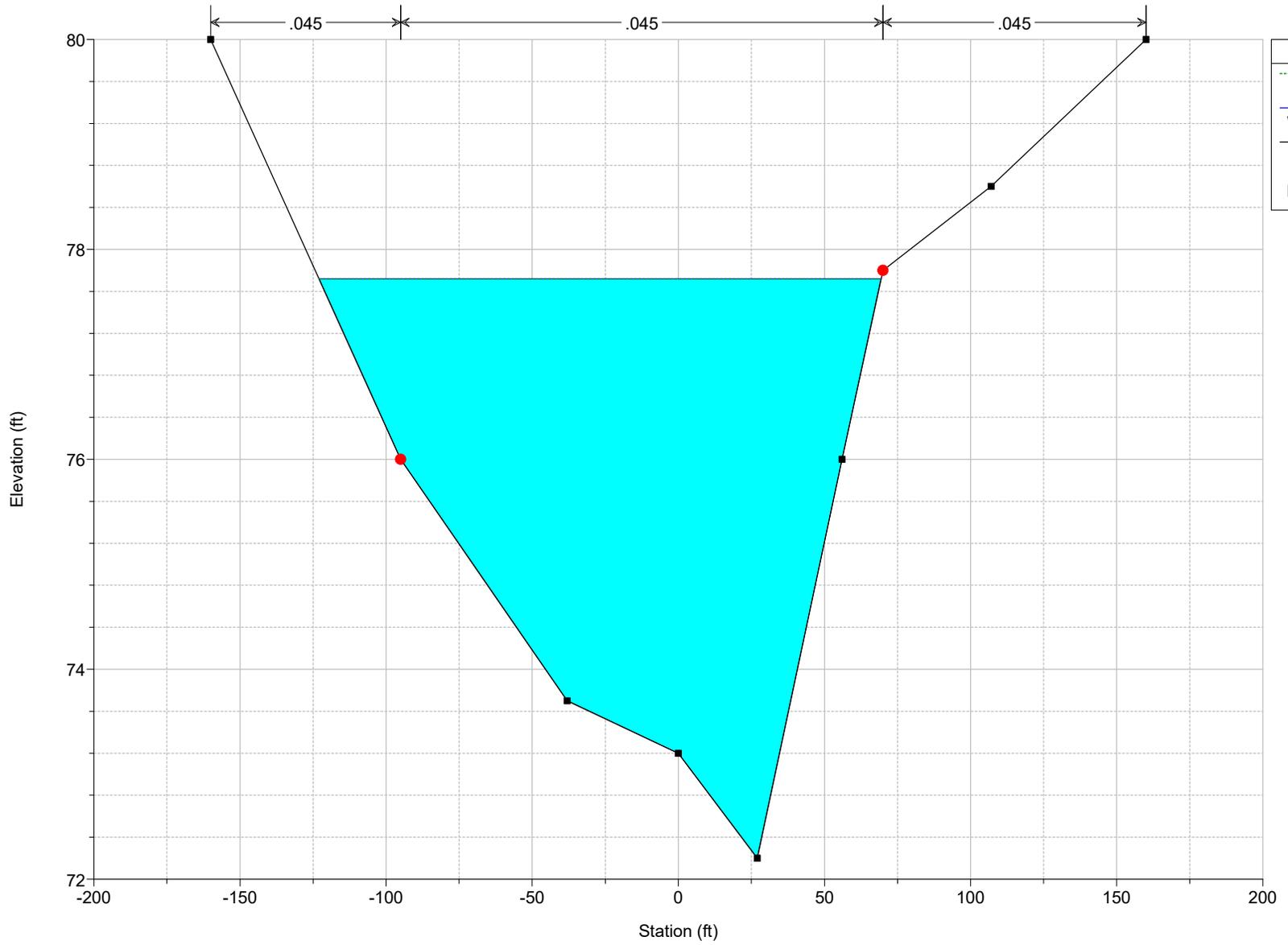


Legend	
EG PF 1	(Green dashed line)
WS PF 1	(Blue solid line)
Crit PF 1	(Red dashed line)
Ground	(Black solid line with square markers)
Bank Sta	(Red solid circle)

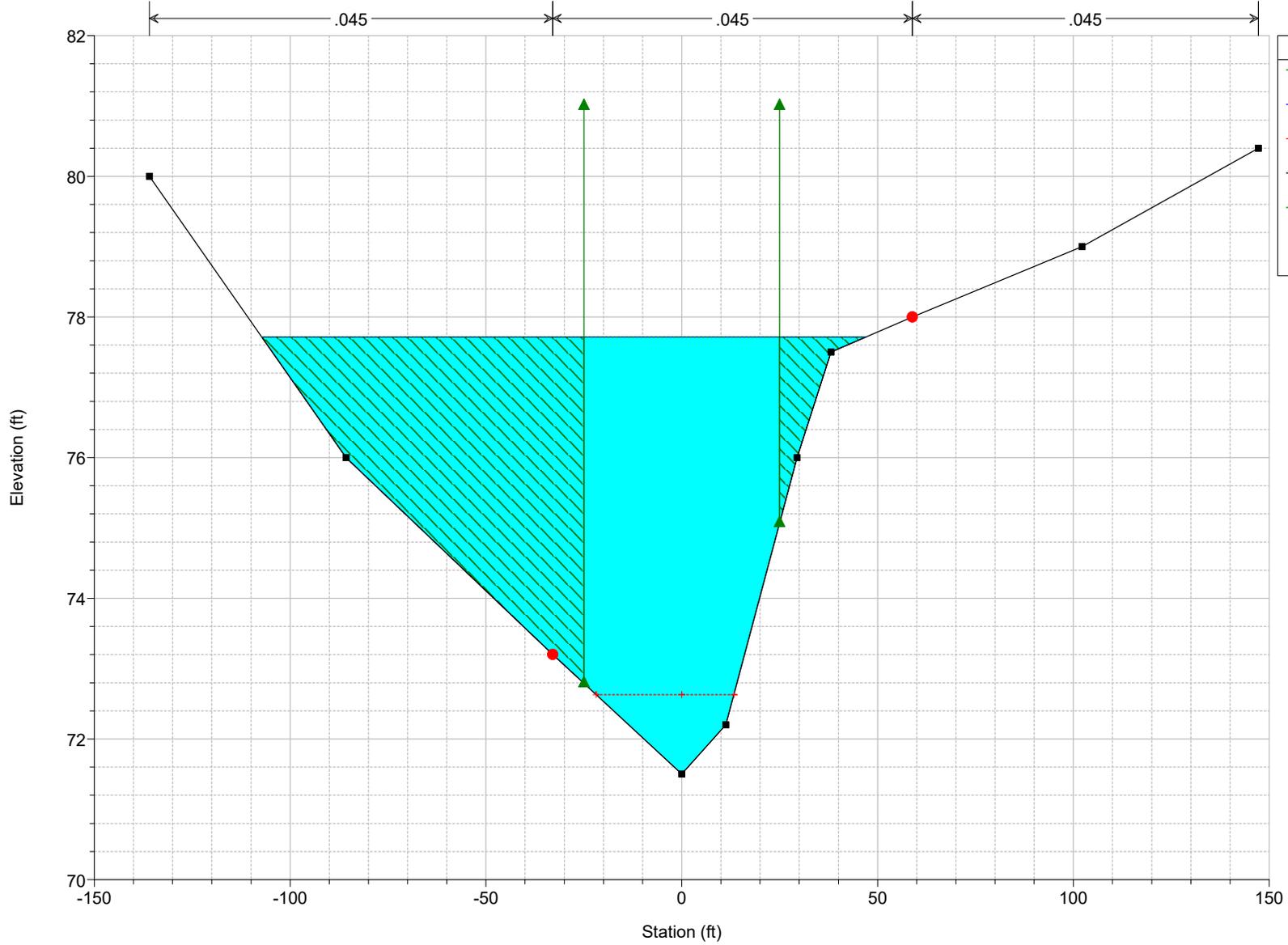
Romens Plan: 96cfs Subcritical 10/12/2020



Romens Plan: 96cfs Subcritical 10/12/2020

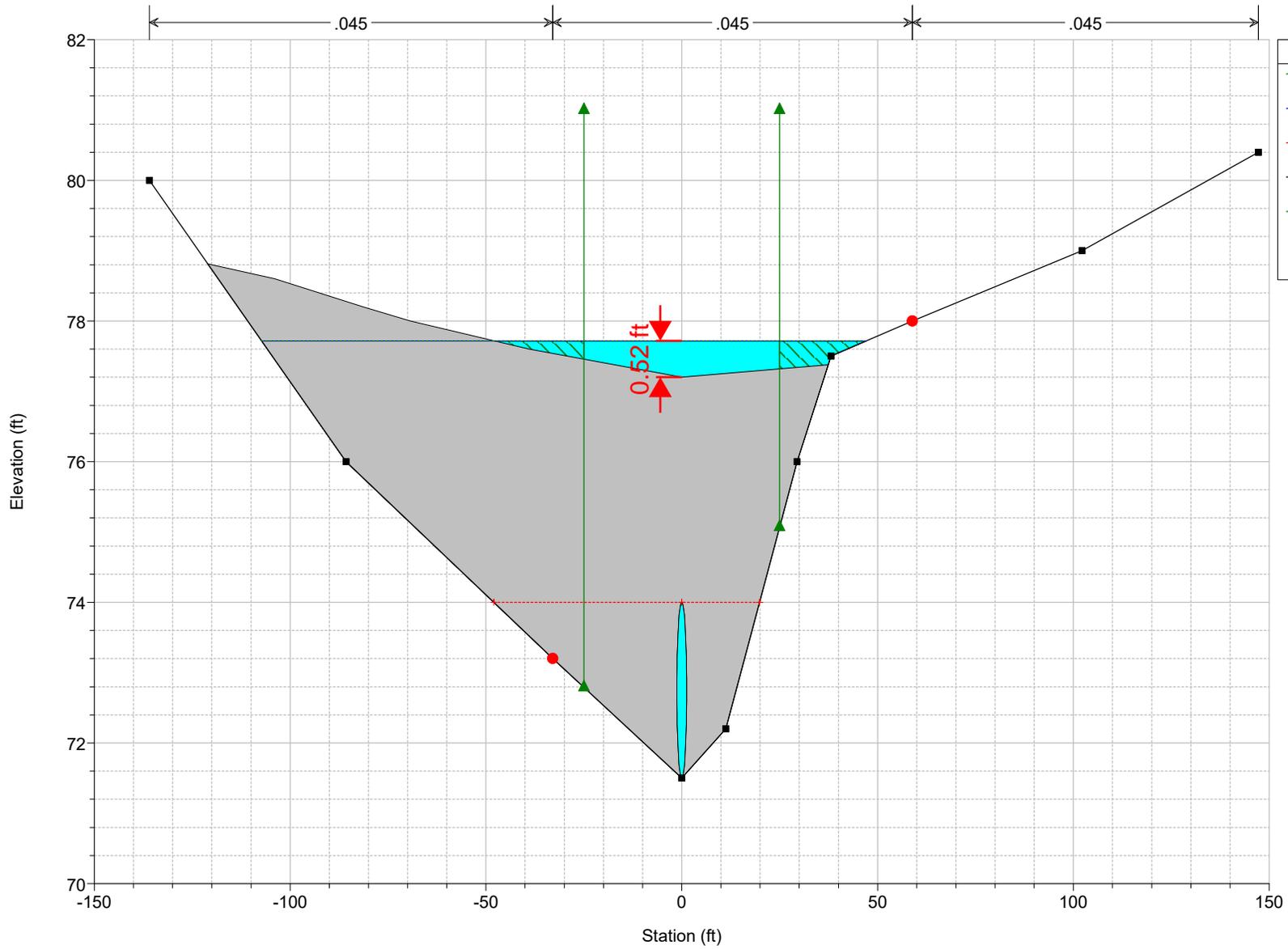


Romens Plan: 96cfs Subcritical 10/12/2020  
US of Culvert



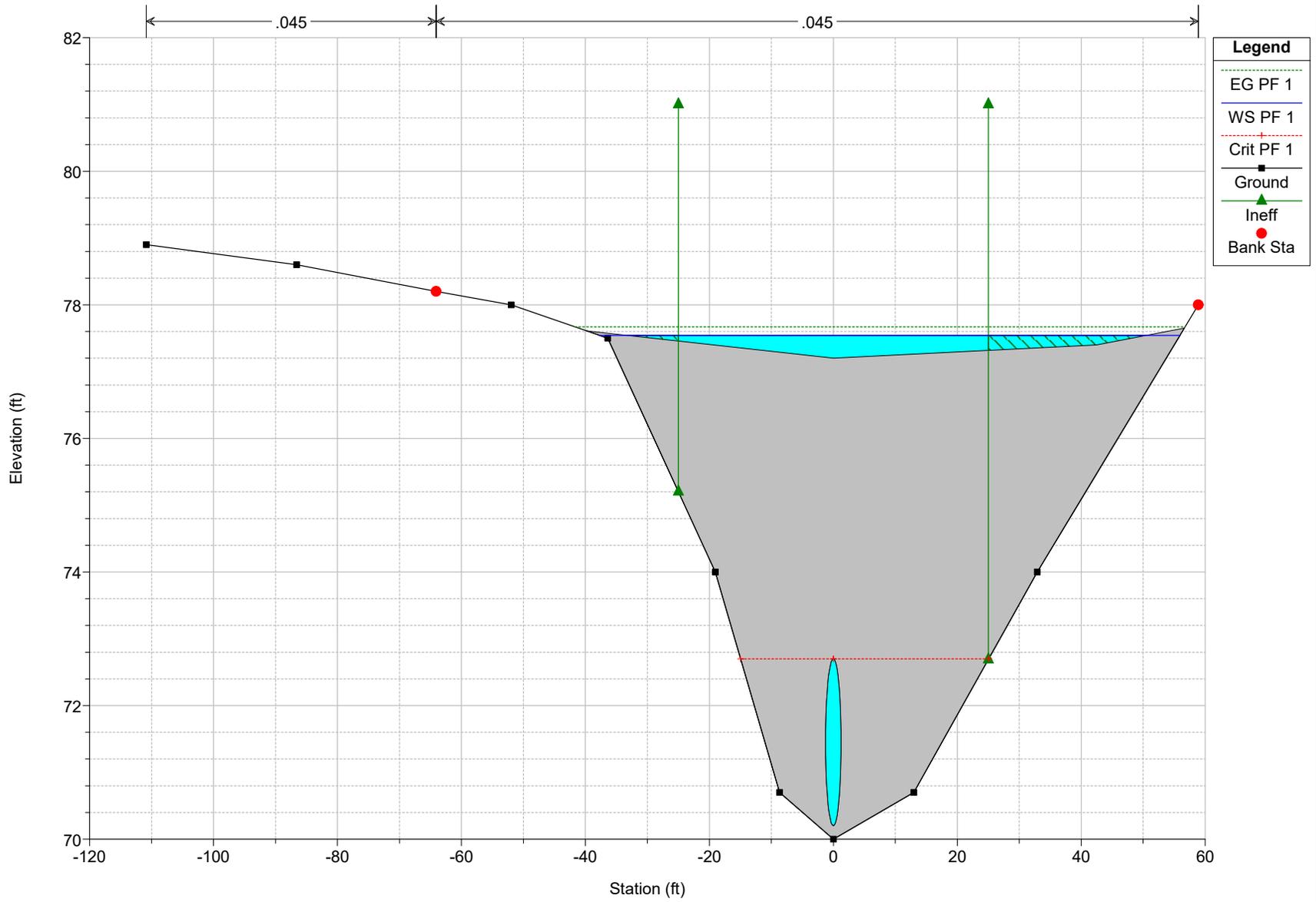
- Legend**
- EG PF 1
  - WS PF 1
  - Crit PF 1
  - Ground
  - Ineff
  - Bank Sta

Romens Plan: 96cfs Subcritical 10/12/2020

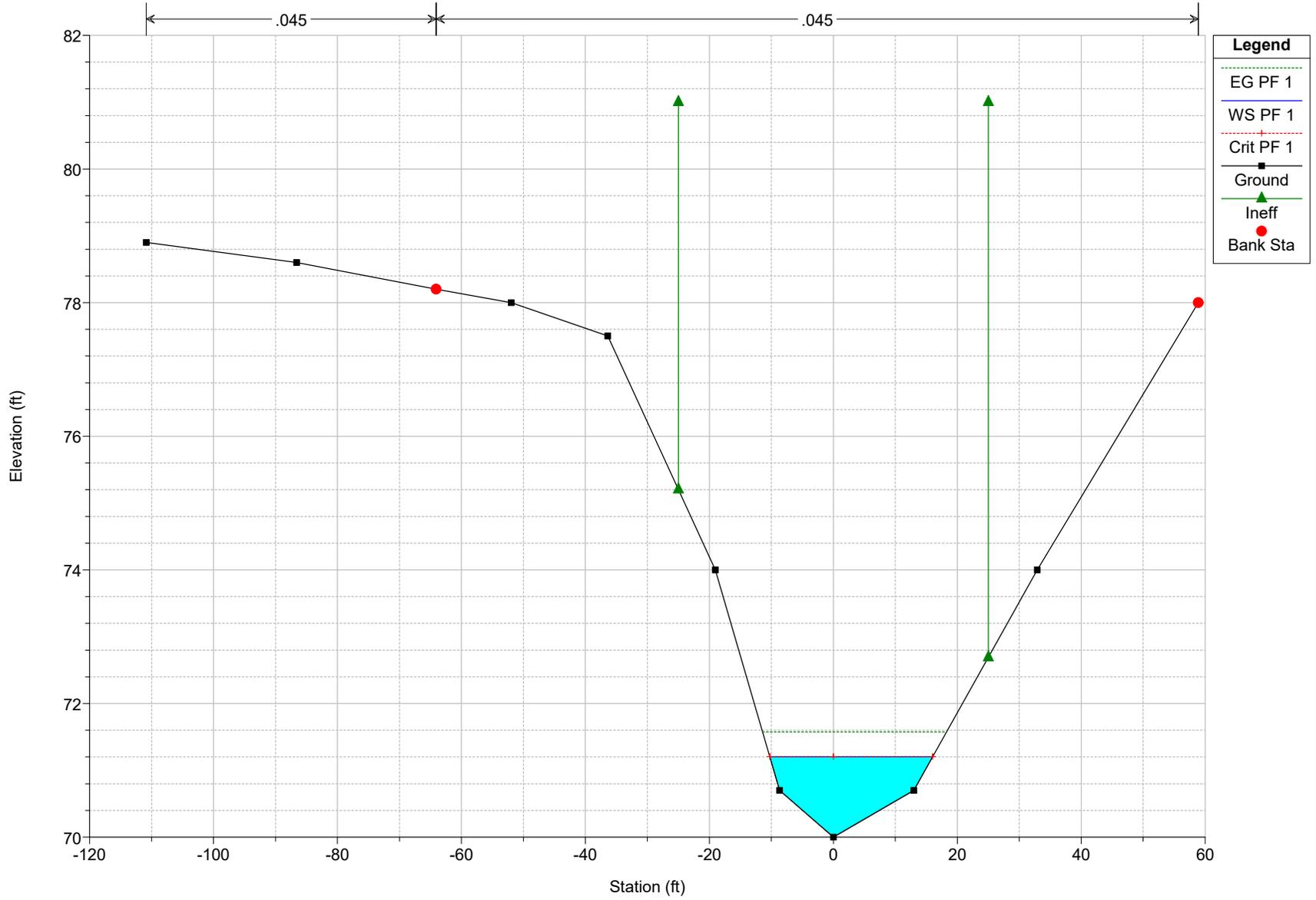


- Legend**
- EG PF 1
  - WS PF 1
  - Crit PF 1
  - Ground
  - Ineff
  - Bank Sta

Romens Plan: 96cfs Subcritical 10/12/2020

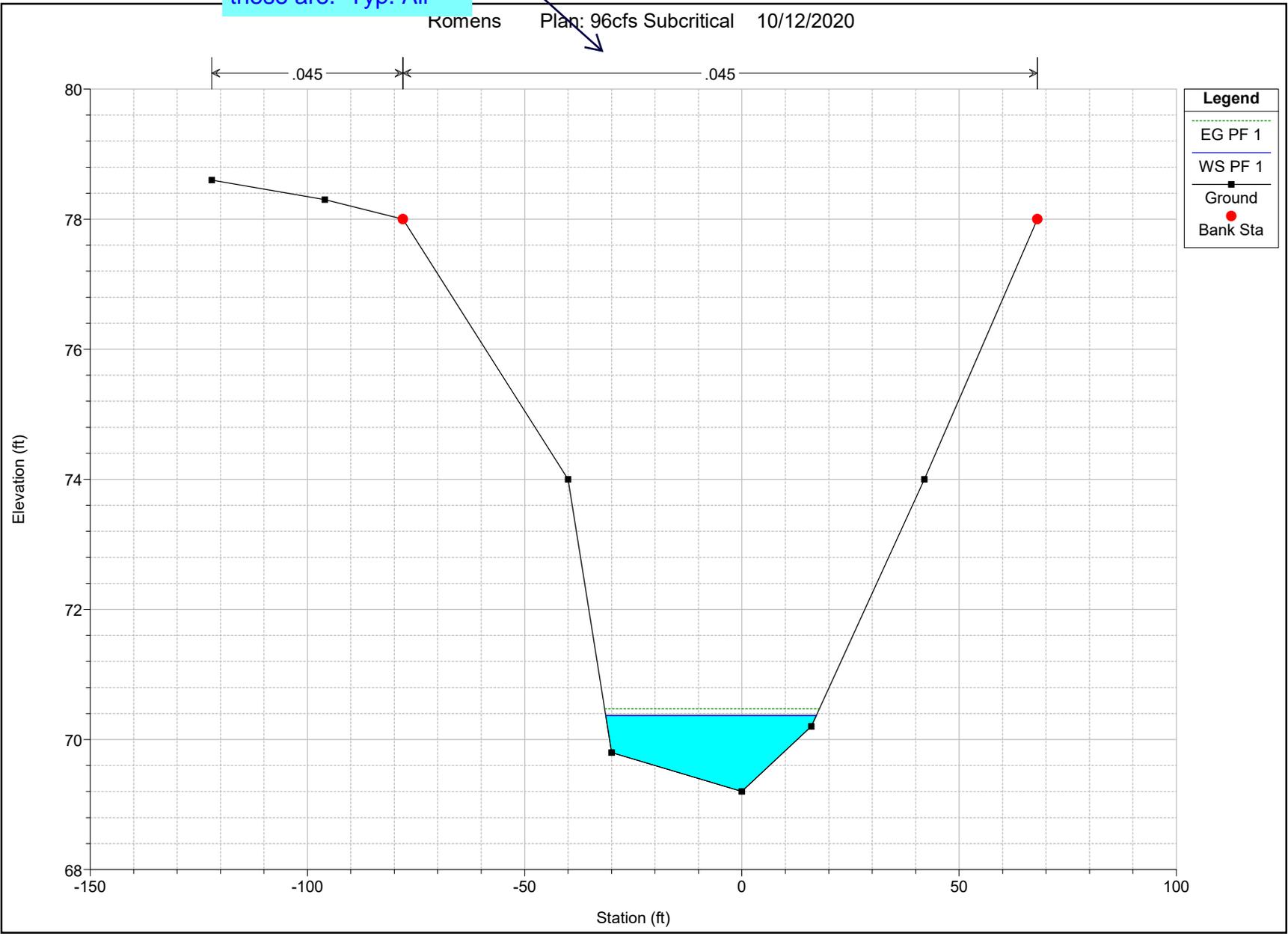


Romens Plan: 96cfs Subcritical 10/12/2020  
DS of CULVERT



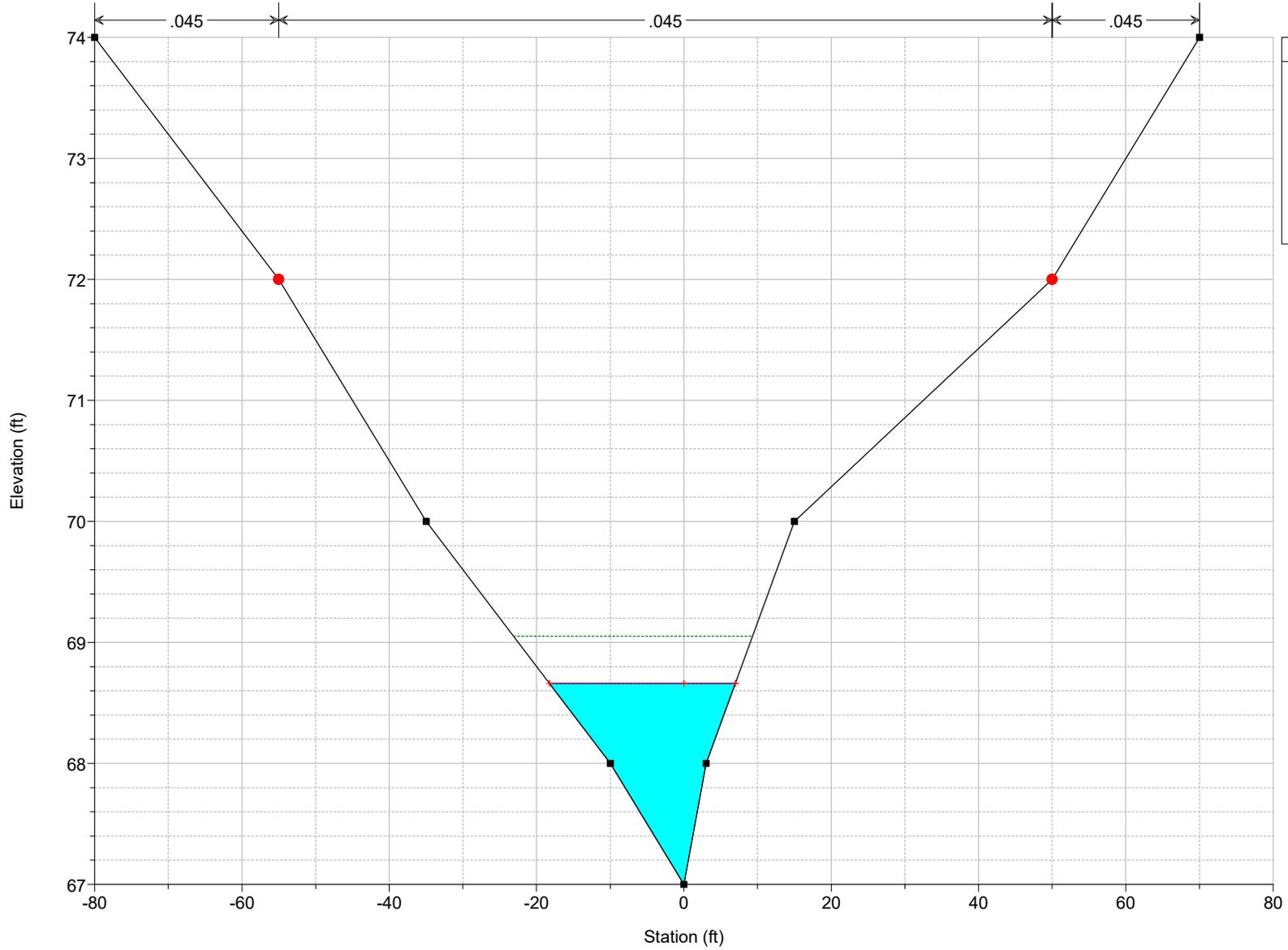
Provide label identify which cross section these are. Typ. All

Romens Plan: 96cfs Subcritical 10/12/2020



Romens Plan: 96cfs Subcritical 10/12/2020

DS Limits



Legend	
EG PF 1	---
WS PF 1	---
Crit PF 1	---
Ground	—■—
Bank Sta	●

### Subcatchment 1S: (new Subcat)

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

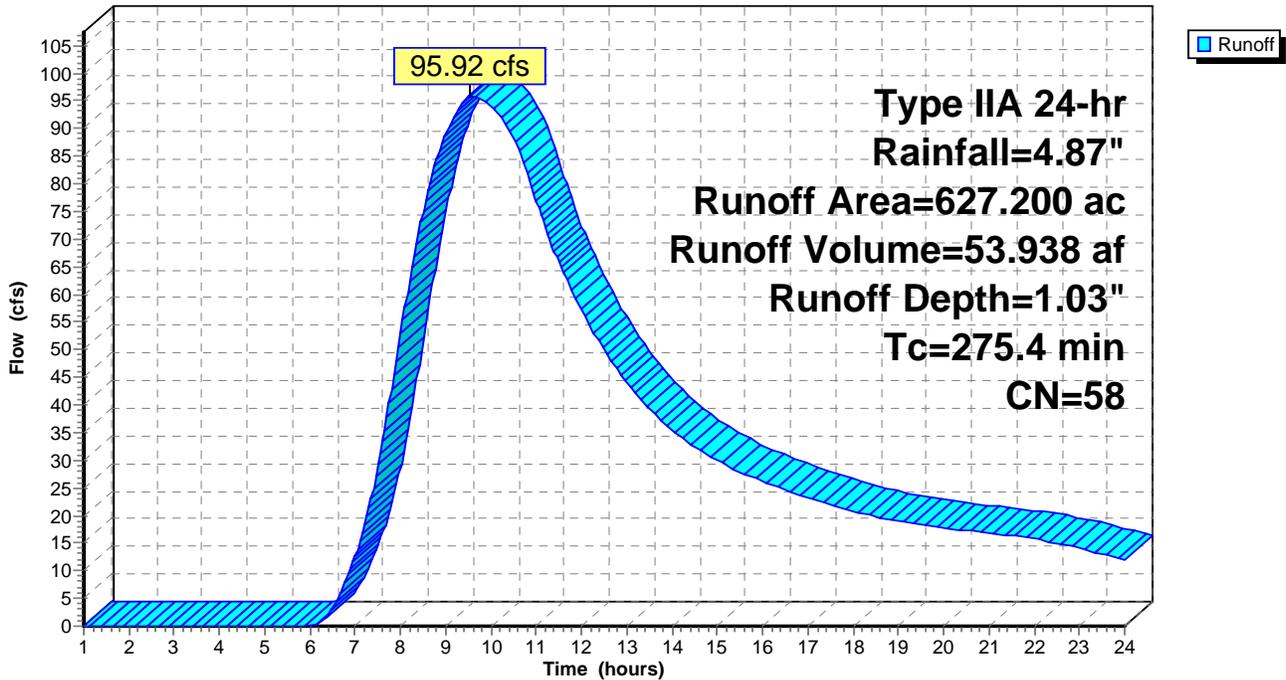
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs  
Type IIA 24-hr Rainfall=4.87"

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)

Hydrograph



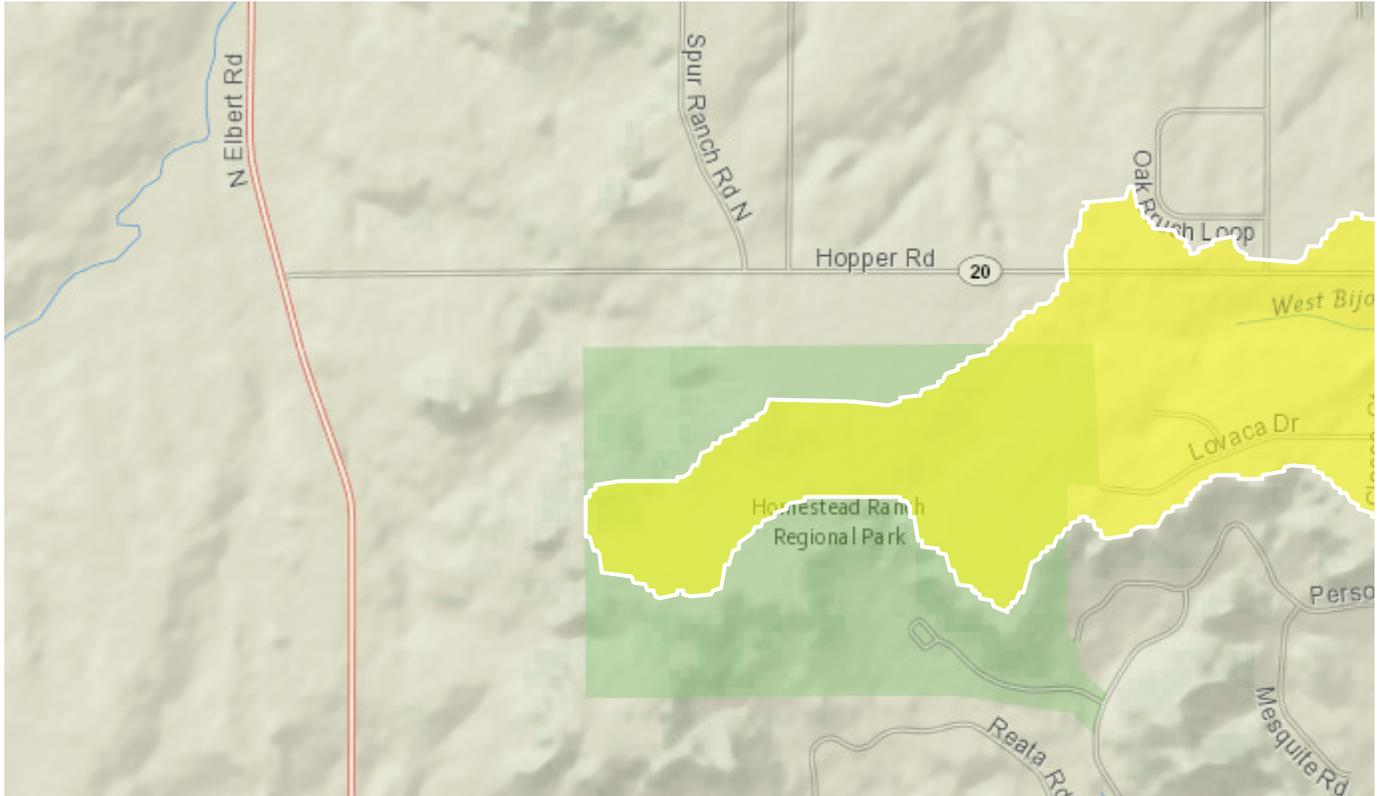
# StreamStats Report

Region ID: CO

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]

PII: Prediction Interval-Lower, Plu: 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 <sup>3</sup> /s	117
5 Year Peak Flood	20.5	ft <sup>3</sup> /s	87
10 Year Peak Flood	32.4	ft <sup>3</sup> /s	80
25 Year Peak Flood	52	ft <sup>3</sup> /s	80
50 Year Peak Flood	69.9	ft <sup>3</sup> /s	83
100 Year Peak Flood	92.2	ft <sup>3</sup> /s	88
200 Year Peak Flood	117	ft <sup>3</sup> /s	94
500 Year Peak Flood	155	ft <sup>3</sup> /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>)**

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

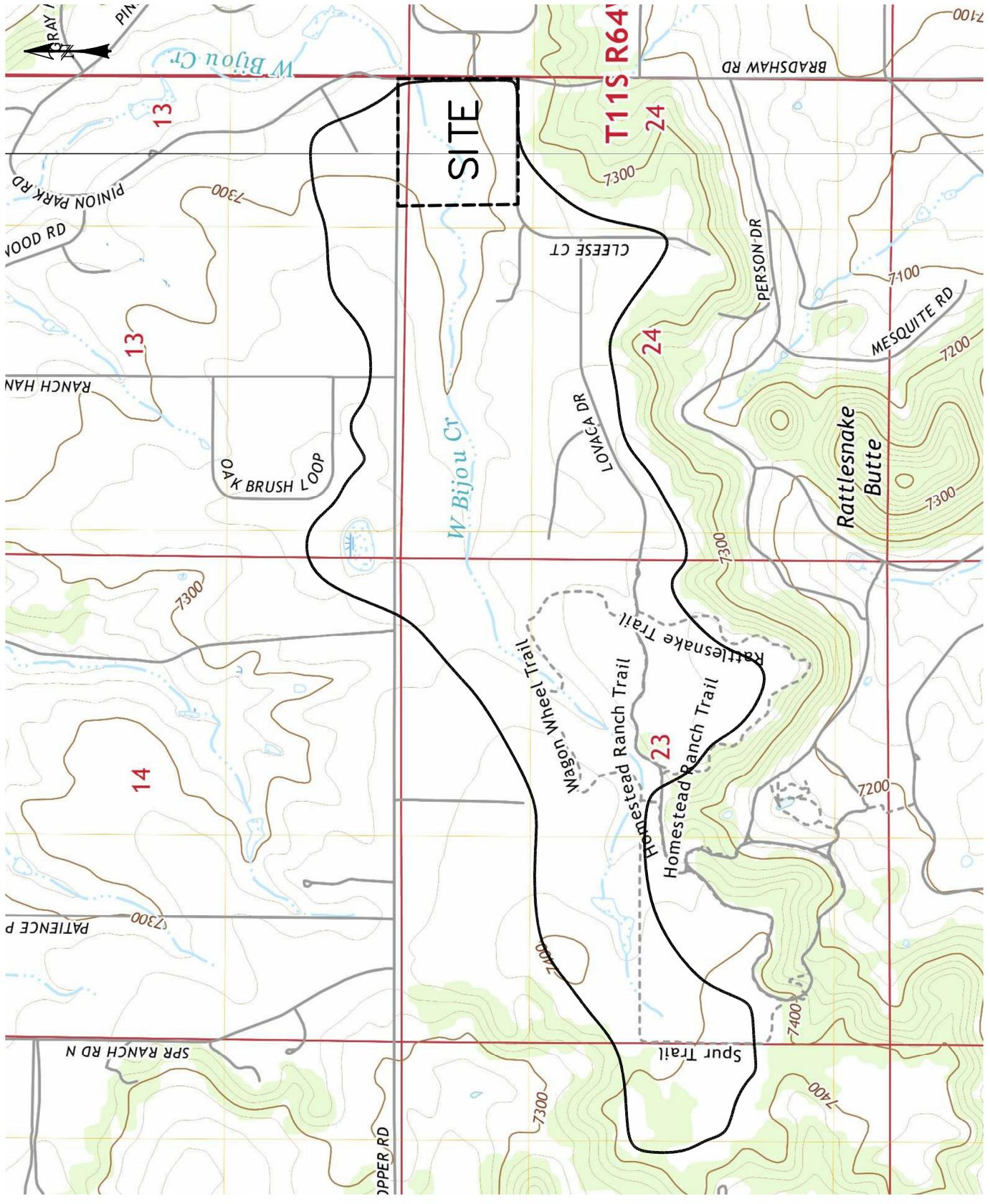
USGS Software Disclaimer: This software has been approved for release by the U.S. Geological Survey (USGS). Although the software has been subjected to rigorous review, the USGS reserves the right to update the software as needed pursuant to further analysis and review. No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the software and related material nor shall the fact of release constitute any such warranty. Furthermore, the software is released on condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from its authorized or unauthorized use.

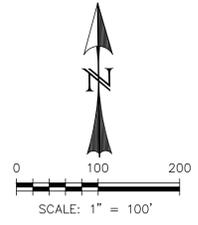
USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.4.0

# DRAINAGE MAPS

ROMENS SUBDIVISION

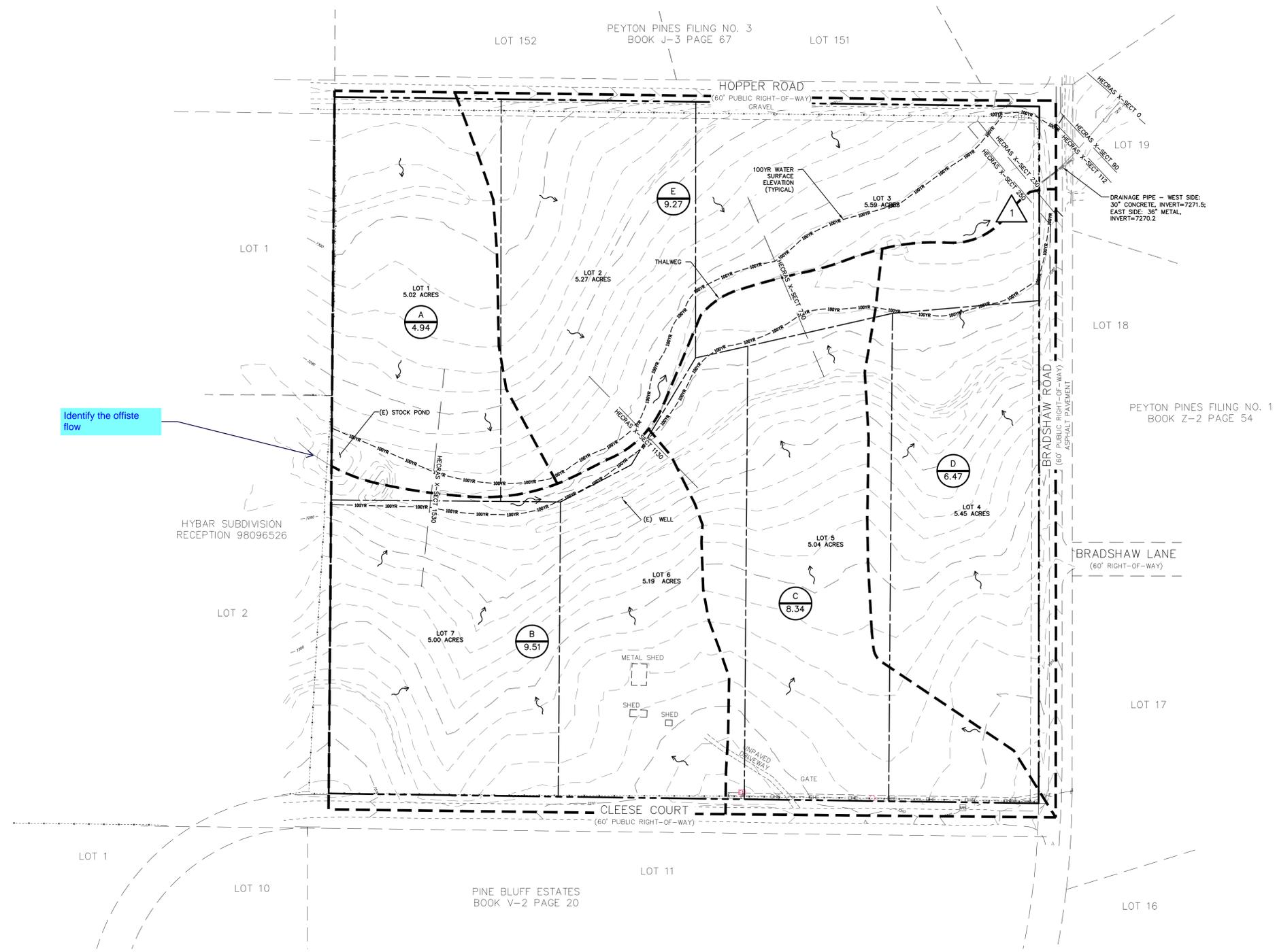




Show time of concentration paths on drainage map.

Identify the offsite flow

Include the offsite flow.



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	1.7	8.9
B-P	9.51	3.9	20.1
C-P	8.34	3.0	15.7
D-P	6.47	2.5	11.9
E-P	9.27	4.2	20.4

DESIGN POINTS			
Design Point	Description	Q5 (CFS)	Q100 (CFS)
1-E	BRADSHAW EXISTING	10.4	59.8
1-P	BRADSHAW PROPOSED	13.8	69.5

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]	0.36
DESIGN POINT IDENTIFIERS	
DRAINAGE BASIN BOUNDARY	
SURFACE SHEET FLOW DIRECTION	
EXISTING MAJOR CONTOUR (10')	
EXISTING MINOR CONTOUR (2')	
EXISTING	(E)
PROPOSED	(P)
FUTURE	(F)
SLOPE/DIRECTION	
(E) STORM SEWER	
(P) BOUNDARY	

REV.	DESCRIPTION	DATE

**811** 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

**CATAMOUNT ENGINEERING**  
321 W. HENRIETTA AVE WOODLAND PARK, CO 80866  
PO BOX 221 (719)426-2124

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

**ROMENS SUBDIVISION**  
**DRAINAGE PLAN**