



Info Only: Comments from Service
Engineering are in blue text.

CHRIS TEAM SUBDIVISION

FINAL DRAINAGE REPORT

ALL TERRAIN ENGINEERING PROJECT NO: 24019

AUGUST 2024

PREPARED FOR:

CHRIS TEAM LIVING TRUST

CONTACT: CHRISTINE TSCHAMLER

SF2426

PREPARED BY:

ALL TERRAIN ENGINEERING LLC

CONTACT: NICHOLAS Q. JOKERST

NJOKERST@ALLTERRAINENG.COM

(530) 391-7635

It appears that the analysis in the written narrative and maps/aerials is mixed between the Chris Team Subdivision property and parcel 5114006001 to the south. Based on aerials and site visit there is no existing driveway or structures on the applicant's property.

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 to the criteria established by the County for drainage reports and said report is in conformity with the applicable 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.

Please use the current County signature block:

Design 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 to the criteria established by the County for drainage reports and said report is in conformity with the applicable 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.

[Name, P.E. # _____]

Date

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

[Name, Title]

[Business Name]

[Address]

Date

El Paso County:

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

Joshua Palmer, P.E.

County Engineer / ECM Administrator

Date

Conditions:

Nicholas Q. Joke

State of Colorado

For and on beha

DEVELOPER'S

CHRIS TEAM LIV

specified in this

Business Name

By: _____

Title: _____

Address: _____

EL PASO COUN

Filed in accordance with Section 51.1 of the El Paso Land Development Code as amended.

Director of Public Works

Date

Conditions:



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I. General Purpose, Location & Description

a. Purpose & Project Description

The purpose of the Final Drainage Report (FDR) for the CHRIS TEAM SUBDIVISION is to describe the site's onsite and offsite drainage patterns, existing and proposed storm infrastructure, and to safely route developed stormwater to adequate outfalls.

b. Location

CHRIS TEAM SUBDIVISION, referred to as 'the site' herein, is in a portion of the northeast quarter of Section 14, Township 11 South, Range 65 West of the 6th P.M., El Paso County, Colorado. The site is bound by unplatted land to the north, west and east, Gerth Subdivision and Beierle Minor Subdivision (R1) to the south, and Hendriks Subdivision to the north. A vicinity map is presented in Appendix A.

c. Description of Property

The site is approximately 19.18 acres and includes a single residence. Existing vegetation consists of native grasses and dense forest. There will be no land disturbance or site improvements associated with this report. The site is currently unplatted and zoned RR-5. The intention of the project is to plat a minor subdivision of three (3) 5+ acre lots. At this time, no additional development will occur on the property.

In general, the site slopes northeasterly. Onsite elevations range from 7415' - 7450' with slopes ranging 1 – 20%. Per a NRCS soil survey, the site is made up of Type B Elbeth sandy loam. An existing drainage tributary bisects the site and conveys the site's stormwater. Per the Land Survey Plat, an underground telecommunication line runs along the site's northern boundary. Two existing 12" PVC culverts discharge onsite along the western property line. An existing drainage map is presented in Appendix F.

d. Floodplain Statement

Based on FEMA Firm map 08041C0310G dated December 7, 2018, the site is Zone X, which are areas determined to be outside the 0.2% annual chance flood.

II. Drainage Basins

a. Major Basin Description

The site is located within the West Kiowa Creek Drainage Basin. West Kiowa Creek is an unstudied drainage basin and a Drainage Basin Planning Study has not been completed.

b. Existing Subbasin Description

The existing site's drainage patterns are relatively uniform. A tributary bisects the site and conveys stormwater to a low point in the northeast corner of the site. See below for existing basin descriptions:

Per site visit, there is currently no improvements on site.

Basin A is 19.20 acres of dense forest, dirt roads and a single residence. The basin is formed by existing road benches along the site's north, west and eastern boundaries. Offsite culverts convey stormwater along the road bench to the north. Along the site's western boundary, two 12" PVC culverts discharge stormwater into



Note: The culverts should be cleaned out from sediment buildup during construction.

CHRIS If additional survey is not available, something such as streamstats could be used to identify the offsite flow

the onsite tributary. An additional survey would be required to fully quantify the flow from these culverts. However, the existing condition of the culverts and outfall is stable. This historic drainage pattern will remain unchanged. Stormwater flows from Basin A ($Q_5 = 5.0$ cfs $Q_{100} = 24.4$ cfs) collect in a low point at DP2. The low point is densely vegetated and stable. Site photos of the culvert outfall and site low point are presented in Appendix E.

Include a discussion of the existing 12" culvert at the NW corner of the site, as shown on the drainage map

Discuss what happens to flows from this basin. How do they cross the roads and where do they do downstream?

Basin B is 0.49 acres of dirt roads and meadow. Stormwater from this basin ($Q_5 = 0.3$ cfs) collected in a roadside ditch and conveyed to DP3 where it overtops Black Squirrel Road. Additional flow enters this basin from offsite areas to the north. An additional survey of offsite, private property would be required to fully analyze. However, this basin will remain unchanged and follow historic drainage patterns. The existing roadside ditch and culverts will not be affected.

Please describe the ability of the ditch along the west side of Black Squirrel Road to handle the flows from the site and whether improvements will be needed.

Basin C is 0.26 acres of dirt road. Stormwater from this basin ($Q_5 = 0.5$ cfs $Q_{100} = 1.1$ cfs) is collected in a roadside ditch and conveyed to DP1 where two 12" PVC culverts convey the flow to the onsite tributary. Additional flow enters this basin from offsite areas to the west. An additional survey of offsite, private property would be required to fully analyze. However, this basin will remain unchanged and follow historic drainage patterns. The existing roadside ditch and culverts will not be affected.

Provide a basin and description for offsite flows from the south of the project site

c. Proposed Subbasin Description

The project will not disturb any existing drainage basins nor disturbing land. Drainage basins will remain unchanged.

Will still need to assume an increased imperviousness for future home and driveway and what those increase in flows will be.

III. Drainage Design Criteria

a. Development Criteria Reference

The drainage analysis, proposed storm sewer system, and proposed private, full spectrum water quality and detention pond follow the criteria from the "Drainage Criteria Manual County of El Paso, Colorado" Volumes 1 and 2," as amended.

b. Hydrologic Criteria

Hydrologic data was obtained from the NOAA Atlas 14 for the site area. Onsite drainage analysis included the 5-year storm (minor event) and 100-year storm (major event) using 1-hr duration rainfall depths from NOAA Atlas 14. Runoff was calculated per EPCDCM Chapter 5 – Storm Runoff Method of Analysis.

d. Hydraulic Criteria

Hydraulic criteria for channel analysis was obtained from EPCDCM Chapter 10 - Open Channels and Structures.

Outfall tailwater conditions into detention facilities are based on the hydraulic grade line in the pond at the time of concentration of the tributary basin. The hydraulic grade line is adapted from the UD-Detention Drain Time v. Ponding Depth graph presented in Appendix D.

There is no pond and there was no graph provided in appendix D.

IV. Drainage Facility Design

a. General Concept

The site will remain in its existing condition. No stormwater improvements will be made in conjunction with this FDR.

b. Water Quality & Detention

The site will not require water quality and detention. The site is comprised of 5+ acre lots with a total impervious of 7% and is excluded from permanent stormwater quality control measures per the Large Lot Single Family Sites exclusion in Appendix I of the EPC DCM. A PBMP Applicability map is presented in Appendix F.

Appendix I does not relinquish detention requirements. Please address increased flows with future home and driveway construction. See appendix for additional comments.

c. Major Drainage

There are no major drainageways that traverse the site. The existing onsite drainage tributary is stable and will not receive an increase in flows from this project.

Major channel appears to be cutting through the middle of the site.

d. Operations & Maintenance

An Operations and Maintenance Manual will not be required as no stormwater facilities are proposed.

Who will maintain drainage channel?

e. Grading & Erosion Control Plan

A Grading and Erosion Control plan is not required as no land disturbance will occur with this project.

f. Four Step Method

Step 1 – Reducing Runoff Volumes: Existing roof drains route across landscape areas whenever possible to promote infiltration. In addition, a vegetated drainage tributary captures and conveys stormwater to the historic outfall at the northeast corner of the site. An IRF spreadsheet is presented in Appendix B.

Step 2 – Treat and slowly release the WQCV: The site is exempt from permanent water quality per the Large Lot Single Family Site exclusion in Appendix I of the EPC DCM.

Step 3 – Stabilize stream channels: All new and re-development projects are required to construct or participate in the funding of channel stabilization measures. Drainage basin fees paid, at the time of platting, go towards channel stabilization with the drainage basin. However, the site is within the West Kiowa Creek Drainage Basin which does not have established basin or bridge fees.

Step 4 – Consider the need for source controls: No industrial or commercial uses are proposed within this development and therefore no source controls are proposed.

g. Drainage Basin & Bridge Fees

The site is within the West Kiowa Creek Drainage Basin which does not have established basin or bridge fees. Therefore, no drainage fees will be paid at time of platting.



h. Engineer's Opinion of Probable Cost

An OPC will not be provided as there are no improvements associated with this FDR.

V. Summary

CHRIS TEAM SUBDIVISION remains consistent with pre-development drainage conditions. The proposed development will not adversely affect downstream stormwater infrastructure or surrounding developments. This report is in accordance with the latest El Paso County Drainage criteria.

VI. References

1. El Paso County – Drainage Criteria Manual, latest revision.
2. Urban Storm Drainage Criteria Manual, Mile High Flood District, March 2024.

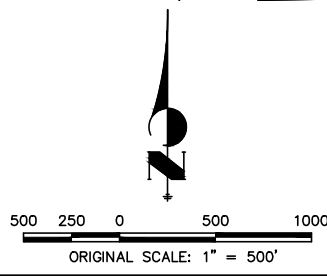
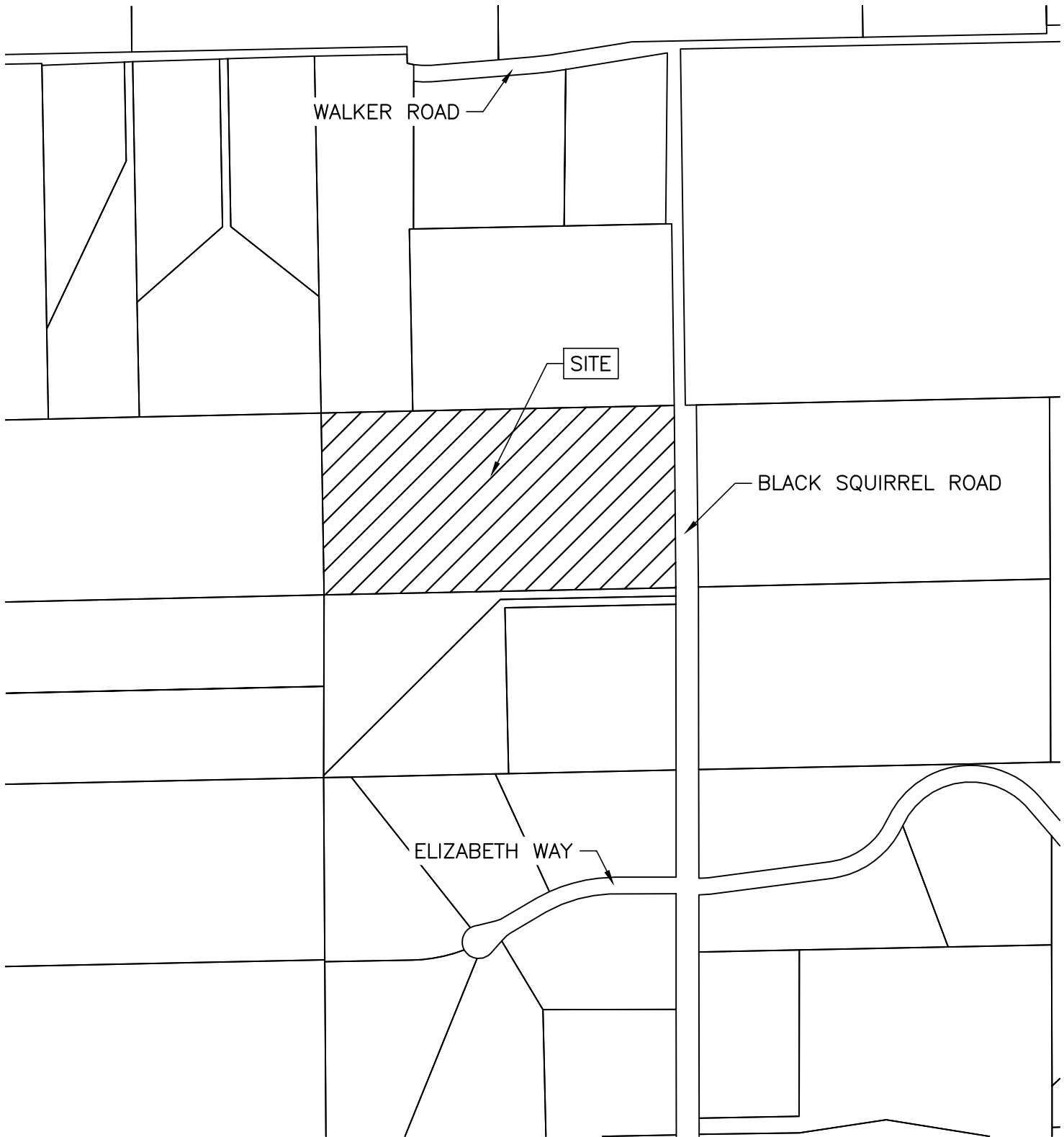
↙ Please include date




**APPENDIX A – VICINITY MAP, FEMA MAP, NRCS WEB SOIL SURVEY & NOAA
ATLAS 14**

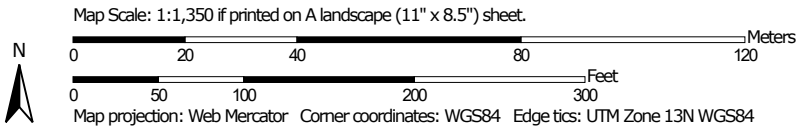
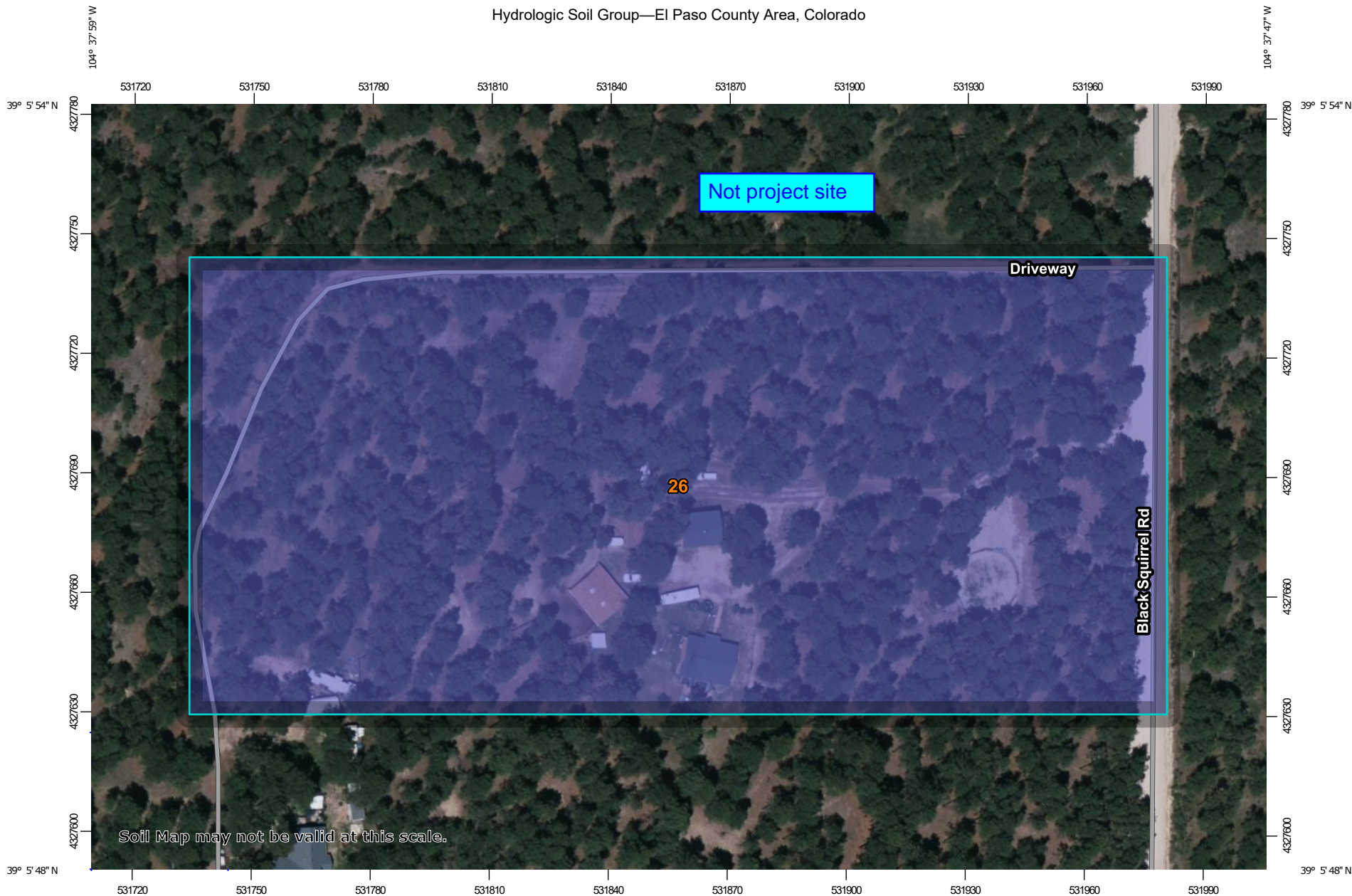
CHRIS TEAM SUBDIVISION

VICINITY MAP




VICINITY MAP		 ALL ENGINEERING 1004 WEST VAN BUREN STREET COLORADO SPRINGS, CO 80907
CHRIS TEAM SUBDIVISION		
JOB NO. 24019		
LOCATION: EPC	SHEET	
08/27/2024		

Hydrologic Soil Group—El Paso County Area, Colorado



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

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 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
26	Elbeth sandy loam, 8 to 15 percent slopes	B	7.0	100.0%
Totals for Area of Interest			7.0	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

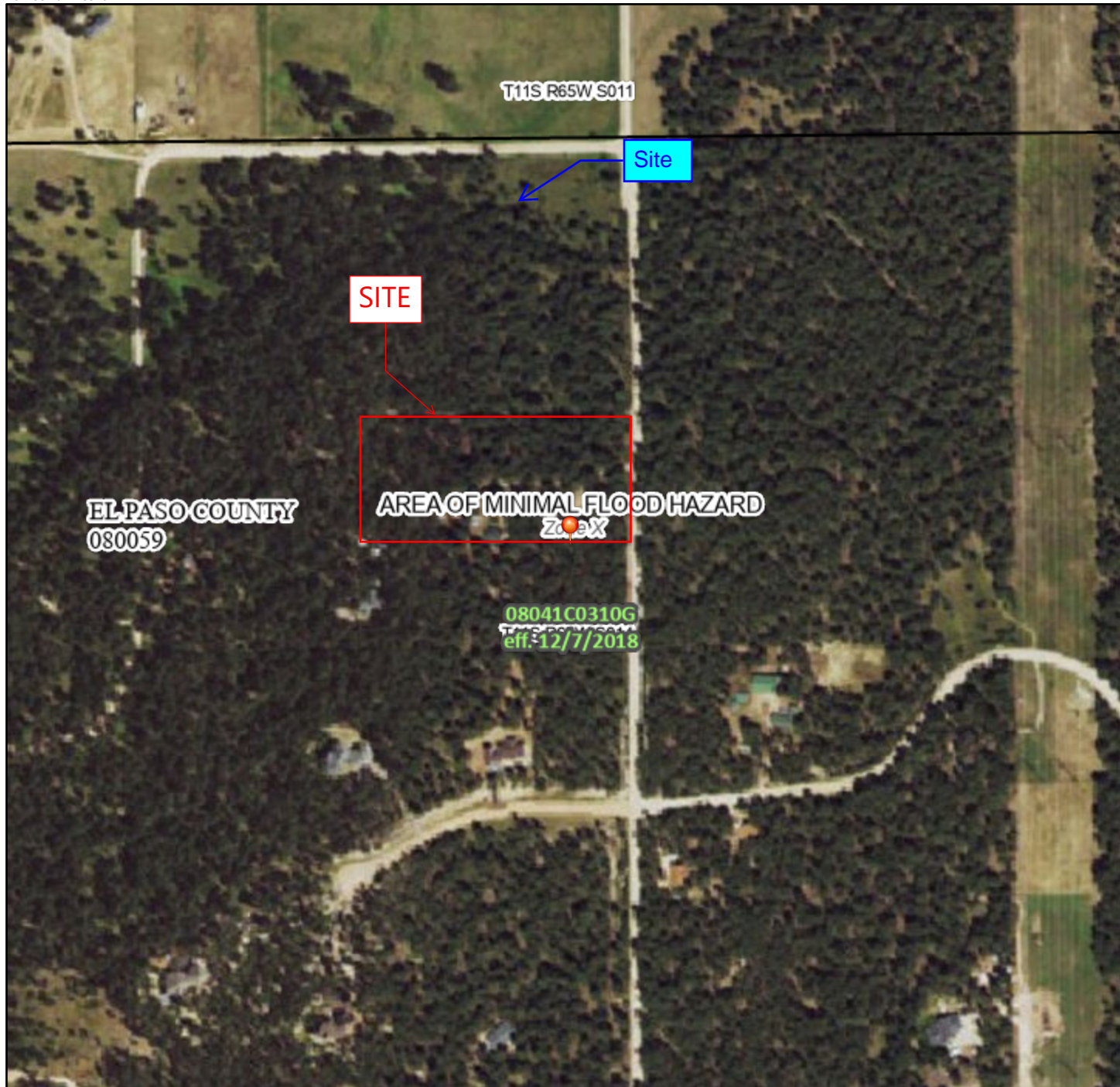
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

National Flood Hazard Layer FIRMMette



104°38'10"W 39°6'4"N



Legend

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

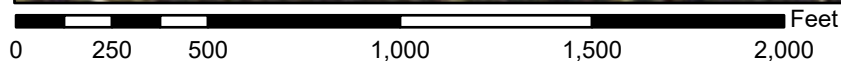
SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <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>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		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 **8/27/2024 at 11:59 AM** 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.



1:6,000

104°37'32"W 39°5'36"N

Basemap Imagery Source: USGS National Map 2023



NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado Springs, Colorado, USA*
Latitude: 39.0977°, Longitude: -104.6314°
Elevation: 7471 ft**



* source: ESRI Maps
 ** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

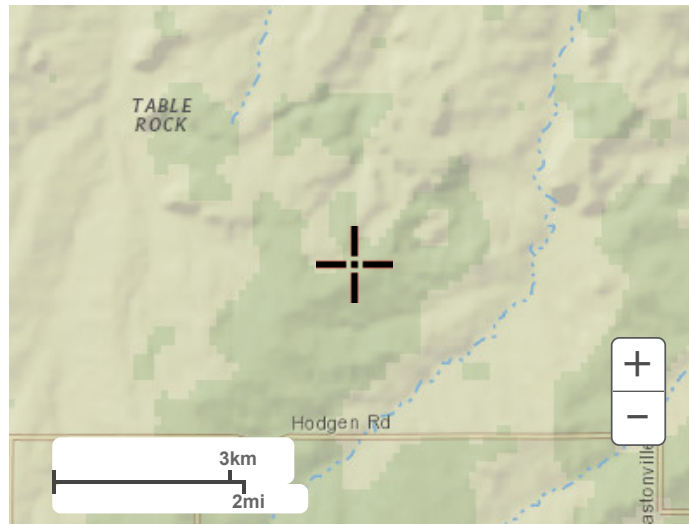
PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.240 (0.188-0.306)	0.291 (0.228-0.371)	0.379 (0.296-0.485)	0.456 (0.355-0.587)	0.570 (0.431-0.764)	0.662 (0.489-0.898)	0.760 (0.542-1.05)	0.864 (0.592-1.23)	1.01 (0.665-1.47)	1.12 (0.720-1.65)
10-min	0.351 (0.276-0.448)	0.425 (0.334-0.544)	0.554 (0.433-0.710)	0.668 (0.519-0.860)	0.834 (0.631-1.12)	0.970 (0.716-1.32)	1.11 (0.794-1.54)	1.26 (0.866-1.80)	1.48 (0.973-2.15)	1.64 (1.05-2.42)
15-min	0.428 (0.336-0.547)	0.519 (0.407-0.663)	0.676 (0.529-0.866)	0.815 (0.633-1.05)	1.02 (0.770-1.36)	1.18 (0.873-1.60)	1.36 (0.969-1.88)	1.54 (1.06-2.19)	1.80 (1.19-2.63)	2.00 (1.28-2.95)
30-min	0.607 (0.477-0.775)	0.736 (0.577-0.940)	0.957 (0.749-1.23)	1.15 (0.896-1.48)	1.44 (1.09-1.92)	1.67 (1.23-2.26)	1.91 (1.36-2.65)	2.17 (1.48-3.08)	2.52 (1.66-3.68)	2.81 (1.80-4.14)
60-min	0.768 (0.603-0.981)	0.922 (0.724-1.18)	1.20 (0.935-1.53)	1.44 (1.12-1.86)	1.81 (1.38-2.44)	2.12 (1.57-2.88)	2.45 (1.75-3.40)	2.80 (1.92-3.99)	3.30 (2.18-4.82)	3.70 (2.37-5.45)
2-hr	0.928 (0.735-1.18)	1.11 (0.877-1.40)	1.43 (1.13-1.82)	1.73 (1.36-2.21)	2.19 (1.68-2.93)	2.57 (1.92-3.48)	2.98 (2.15-4.13)	3.43 (2.38-4.87)	4.07 (2.72-5.92)	4.59 (2.97-6.72)
3-hr	1.01 (0.805-1.28)	1.20 (0.953-1.51)	1.55 (1.22-1.95)	1.87 (1.47-2.38)	2.38 (1.84-3.18)	2.81 (2.11-3.80)	3.29 (2.39-4.54)	3.81 (2.66-5.39)	4.56 (3.06-6.62)	5.17 (3.36-7.54)
6-hr	1.18 (0.941-1.46)	1.38 (1.10-1.72)	1.76 (1.41-2.21)	2.14 (1.70-2.69)	2.73 (2.13-3.64)	3.24 (2.46-4.36)	3.81 (2.80-5.24)	4.44 (3.13-6.26)	5.36 (3.64-7.75)	6.12 (4.02-8.88)
12-hr	1.37 (1.11-1.70)	1.60 (1.29-1.98)	2.04 (1.64-2.54)	2.47 (1.97-3.07)	3.14 (2.47-4.14)	3.72 (2.85-4.95)	4.36 (3.23-5.95)	5.08 (3.61-7.10)	6.12 (4.19-8.77)	6.97 (4.62-10.0)
24-hr	1.61 (1.31-1.97)	1.88 (1.53-2.31)	2.40 (1.94-2.94)	2.88 (2.32-3.55)	3.62 (2.86-4.72)	4.26 (3.28-5.60)	4.95 (3.69-6.68)	5.72 (4.10-7.91)	6.81 (4.70-9.69)	7.71 (5.16-11.0)
2-day	1.88 (1.54-2.27)	2.22 (1.81-2.69)	2.82 (2.30-3.43)	3.37 (2.74-4.12)	4.20 (3.33-5.38)	4.88 (3.78-6.34)	5.62 (4.22-7.49)	6.42 (4.63-8.79)	7.55 (5.25-10.6)	8.46 (5.71-12.0)
3-day	2.05 (1.69-2.47)	2.43 (2.00-2.93)	3.10 (2.54-3.75)	3.70 (3.02-4.50)	4.59 (3.66-5.84)	5.32 (4.14-6.86)	6.10 (4.59-8.07)	6.94 (5.02-9.44)	8.11 (5.66-11.4)	9.04 (6.14-12.8)
4-day	2.20 (1.82-2.64)	2.60 (2.15-3.13)	3.31 (2.72-3.99)	3.94 (3.22-4.77)	4.87 (3.89-6.17)	5.63 (4.39-7.23)	6.44 (4.86-8.48)	7.30 (5.31-9.90)	8.51 (5.97-11.9)	9.48 (6.46-13.4)
7-day	2.60 (2.16-3.10)	3.03 (2.51-3.61)	3.77 (3.12-4.50)	4.43 (3.65-5.32)	5.41 (4.35-6.80)	6.22 (4.88-7.92)	7.08 (5.39-9.26)	8.00 (5.86-10.8)	9.29 (6.56-12.9)	10.3 (7.09-14.5)
10-day	2.97 (2.48-3.52)	3.42 (2.85-4.05)	4.20 (3.49-5.00)	4.90 (4.05-5.86)	5.93 (4.79-7.41)	6.78 (5.35-8.59)	7.68 (5.87-10.0)	8.63 (6.35-11.6)	9.98 (7.08-13.8)	11.0 (7.63-15.5)
20-day	3.99 (3.36-4.68)	4.60 (3.86-5.40)	5.61 (4.70-6.61)	6.48 (5.40-7.67)	7.71 (6.25-9.49)	8.69 (6.90-10.9)	9.70 (7.46-12.5)	10.7 (7.96-14.2)	12.2 (8.70-16.6)	13.3 (9.26-18.5)
30-day	4.81 (4.06-5.61)	5.55 (4.69-6.48)	6.76 (5.70-7.92)	7.77 (6.51-9.15)	9.17 (7.44-11.2)	10.2 (8.15-12.7)	11.3 (8.74-14.4)	12.4 (9.23-16.3)	13.9 (9.96-18.8)	15.0 (10.5-20.7)
45-day	5.80 (4.93-6.73)	6.70 (5.68-7.77)	8.13 (6.88-9.46)	9.29 (7.82-10.9)	10.9 (8.83-13.1)	12.0 (9.60-14.8)	13.2 (10.2-16.6)	14.3 (10.7-18.7)	15.8 (11.4-21.2)	16.8 (11.9-23.2)
60-day	6.63 (5.65-7.65)	7.63 (6.49-8.82)	9.22 (7.82-10.7)	10.5 (8.85-12.2)	12.2 (9.91-14.6)	13.4 (10.7-16.3)	14.6 (11.3-18.3)	15.7 (11.8-20.4)	17.2 (12.4-23.0)	18.2 (12.9-25.0)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

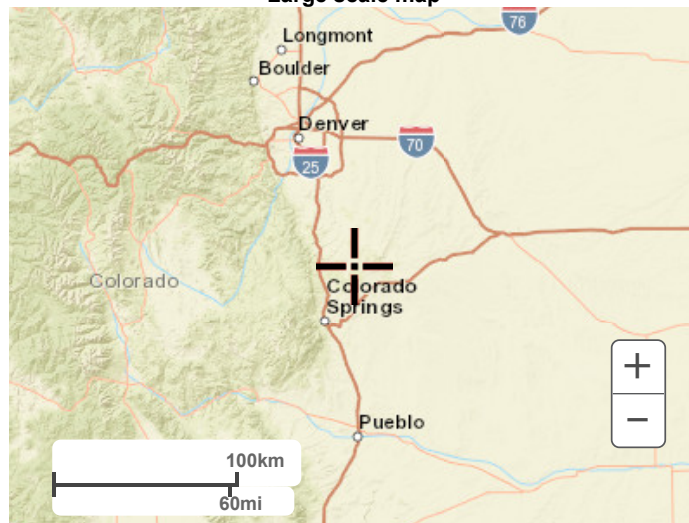
PF graphical



Large scale terrain



Large scale map



Large scale aerial



APPENDIX B – HYDROLOGIC CALCULATIONS

Subdivision: Black Squirrel Road
Location: El Paso County
Project Name: Black Squirrel Road
Project Number: 24019
Calculated By: NQJ
Checked By:
Date: 8/27/2024

EX DRAINAGE CALCS - BASIN SUMMARY TABLE							
Tributary Sub-basin	Area (acres)	Percent Impervious	C ₅	C ₁₀₀	t _c (min)	Q ₅ (cfs)	Q ₁₀₀ (cfs)
A	19.20	9%	0.14	0.39	43.2	5.0	24.4
B	0.49	44%	0.37	0.55	23.9	0.3	1.3
C	0.26	80%	0.59	0.70	15.2	0.5	1.1

DESIGN POINT SUMMARY TABLE		
DP#	Q _{5-YR}	Q _{100-YR}
1	0.5	1.1
2	5.4	25.0
3	0.3	1.3

COMPOSITE % IMPERVIOUS CALCULATIONS - EXISTING CONDITIONS

Subdivision: Black Squirrel Road
 Location: El Paso County

Project Name: Black Squirrel Road
 Project No.: 24019.00
 Calculated By: NQJ
 Checked By: _____
 Date: 8/27/24

No existing imperviousness
observed on the site.

Basin ID	Total Area (ac)	Gravel Drives				Roofs				Forest				Weighted C ₅ & C ₁₀₀		Basins Total Weighted % Imp.
		C ₅	C ₁₀₀	Area (ac)	% Imp.	C ₅	C ₁₀₀	Area (ac)	% Imp.	C ₅	C ₁₀₀	Area (ac)	% Imp.	C ₅	C ₁₀₀	
A	19.20	0.59	0.70	1.32	80.0%	0.73	0.81	0.33	90.0%	0.09	0.36	17.55	0.0%	0.14	0.39	7.0%
B	0.49	0.59	0.70	0.27	80.0%	0.73	0.81	0.00	90.0%	0.09	0.36	0.22	0.0%	0.37	0.55	44.0%
C	0.26	0.59	0.70	0.26	80.0%	0.73	0.81	0.00	90.0%	0.09	0.36	0.00	0.0%	0.59	0.70	80.0%
Total	19.95															8.9%

Need to provide proposed conditions hydrology calculations. Assume a 10% imperviousness for 5 acre+ lots or show/estimate house footprint, driveway, etc.

STANDARD FORM SF-2 - EXISTING CONDITIONS TIME OF CONCENTRATION

Subdivision: Black Squirrel Road
 Location: El Paso County

Project Name: Black Squirrel Road
 Project No.: 24019.00
 Calculated By: NQJ
 Checked By: _____
 Date: 8/27/24

Note: Rural areas can have an initial length of up to 300 feet

SUB-BASIN DATA					INITIAL/OVERLAND (T _i)			TRAVEL TIME (T _t)					t _c CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Weighted C _s	Impervious (%)	L (ft)	S _o (%)	t _i (min)	L _t (ft)	S _t (%)	K	VEL. (ft/s)	t _t (min)	COMP. t _c (min)	TOTAL LENGTH (ft)	Urbanized t _c (min)	t _c (min)
A	19.20	B	0.14	8.9%	100	5.0%	10.2	1540	1.8%	2.5	0.3	76.5	86.8	1640.0	43.2	43.2
B	0.49	B	0.37	44%	17	2.0%	4.4	1058	4.7%	2.5	0.5	32.6	37.0	1075.0	23.9	23.9
C	0.26	B	0.59	80%	11	2.0%	2.4	635	3.5%	2.5	0.5	22.6	25.1	646.0	15.2	15.2

NOTES:

$$t_c = t_i + t_t$$

Where:

t_c = computed time of concentration (minutes)

t_i = overland (initial) flow time (minutes)

t_t = channelized flow time (minutes).

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$

Where:

t_t = channelized flow time (travel time, min)
 L_t = waterway length (ft)
 S_o = waterway slope (ft/ft)
 V_t = travel time velocity (ft/sec) = K√S_o
 K = NRCS conveyance factor (see Table 6-2).

$$\text{Eq } t_i = \frac{0.395(1.1 - C_s)\sqrt{L_i}}{S_o^{0.33}}$$

Where:

t_i = overland (initial) flow time (minutes)
 C_s = runoff coefficient for 5-year frequency (from Table 6-4)
 L_i = length of overland flow (ft)
 S_o = average slope along the overland flow path (ft/ft).

$$\text{Equation 6-4 } t_c = 1.49 S_o^{-0.165} (L_t + 17L_i) + \frac{L_t}{60(14i + 9)\sqrt{S_o}}$$

∴

t_c = minimum time of concentration for first design point when less than t_c from Equation 6-1.
 L_t = length of channelized flow path (ft)
 i = imperviousness (expressed as a decimal)
 S_o = slope of the channelized flow path (ft/ft).

Equation 6-3

Equation 6-5

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

Use a minimum t_c value of 5 minutes for urbanized areas and a minimum t_c value of 10 minutes for areas that are not considered urban. Use minimum values even when calculations result in a lesser time of concentration.

STANDARD FORM SF-3 - EXISTING CONDITIONS
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Black Squirrel Road
Location: El Paso County
Design Storm: 5-Year

Project Name: Black Squirrel Road
Project No.: 24019.00
Calculated By: NQJ
Checked By: _____
Date: 8/27/24

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t _c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
	2	A	19.20	0.14	43.2	2.60	1.94	5.0															BASIN A HISTORIC FLOW, CONVEYED IN EXISTING CHANNEL TO DP2
	3	B	0.26	0.37	23.9	0.09	2.82	0.3															BASIN B HISTORIC FLOW, CONVEYED IN ROADSIDE DITCHES/CULVERTS TO DP3
	1	C	0.26	0.59	15.2	0.15	3.50	0.5															BASIN C HISTORIC FLOW TO EX 12" PVC CULVERTS @ DP1, FLOWS ONSITE TO DP2
	2								58.4	2.75	1.48	5.4											TOTAL FLOW AT DP2

Notes:
Street and Pipe C*A values are determined by Q/I using the catchment's intensity value.

DP 1 should also account for off site flow being conveyed through the culverts.

STANDARD FORM SF-3 - EXISTING CONDITIONS
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project Name: Black Squirrel Road
Project No.: 24019.00
Calculated By: NQJ
Checked By: _____
Date: 8/27/24

Subdivision: Black Squirrel Road
Location: El Paso County
Design Storm: 100-Year

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	I (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
	2	A	19.20	0.39	43.2	7.51	3.25	24.4															BASIN A HISTORIC FLOW, CONVEYED IN EXISTING CHANNEL TO DP2
	3	B	0.49	0.55	23.9	0.27	4.74	1.3															BASIN B HISTORIC FLOW, CONVEYED IN ROADSIDE DITCHES/CULVERTS TO DP3
	1	C	0.26	0.70	15.2	0.18	5.88	1.1															BASIN C HISTORIC FLOW TO EX 12" PVC CULVERTS @ DP1, FLOWS ONSITE TO DP2
	2								43.2	7.69	3.25	25.0											TOTAL FLOW AT DP2

Notes:
Street and Pipe C*A values are determined by Q/i using the catchment's intensity value.

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: NQJ
Company: ALL TERRAIN ENGINEERING
Date: August 29, 2024
Project: 18412-18440 BLACK SQUIRREL ROAD
Location: EL PASO COUNTY

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth = 0.60 inches
 Depth of Average Runoff Producing Storm, d_e = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	SPA	UIA:RPA																	
Area ID	1-SPA	1-UIA:RPA																	
Downstream Design Point ID	1	1																	
Downstream BMP Type	None	None																	
DCIA (ft ²)	--	--																	
UIA (ft ²)	--	14,209																	
RPA (ft ²)	--	28,000																	
SPA (ft ²)	80,000	--																	
HSG A (%)	0%	0%																	
HSG B (%)	100%	100%																	
HSG C/D (%)	0%	0%																	
Average Slope of RPA (ft/ft)	--	0.040																	
UIA:RPA Interface Width (ft)	--	75.00																	

CALCULATED RUNOFF RESULTS

Area ID	1-SPA	1-UIA:RPA																	
UIA:RPA Area (ft ²)	--	42,209																	
L / W Ratio	--	7.50																	
UIA / Area	--	0.3366																	
Runoff (in)	0.00	0.00																	
Runoff (ft ³)	0	0																	
Runoff Reduction (ft ³)	4000	592																	

CALCULATED WQCV RESULTS

Area ID	1-SPA	1-UIA:RPA																	
WQCV (ft ³)	0	592																	
WQCV Reduction (ft ³)	0	592																	
WQCV Reduction (%)	0%	100%																	
Untreated WQCV (ft ³)	0	0																	

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	1	1																	
DCIA (ft ²)	0	0																	
UIA (ft ²)	14,209	14,209																	
RPA (ft ²)	28,000	28,000																	
SPA (ft ²)	80,000	80,000																	
Total Area (ft ²)	122,209	122,209																	
Total Impervious Area (ft ²)	14,209	14,209																	
WQCV (ft ³)	592	592																	
WQCV Reduction (ft ³)	592	592																	
WQCV Reduction (%)	100%	100%																	
Untreated WQCV (ft ³)	0	0																	

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft ²)	244,418
Total Impervious Area (ft ²)	28,418
WQCV (ft ³)	592
WQCV Reduction (ft ³)	592
WQCV Reduction (%)	100%
Untreated WQCV (ft ³)	0



APPENDIX C – HYDRAULIC CALCULATIONS

Channel Report

CHANNEL SECTION 1 (Q100 = 25.0 cfs)

User-defined

Invert Elev (ft) = 7435.02
Slope (%) = 2.00
N-Value = 0.030

Highlighted

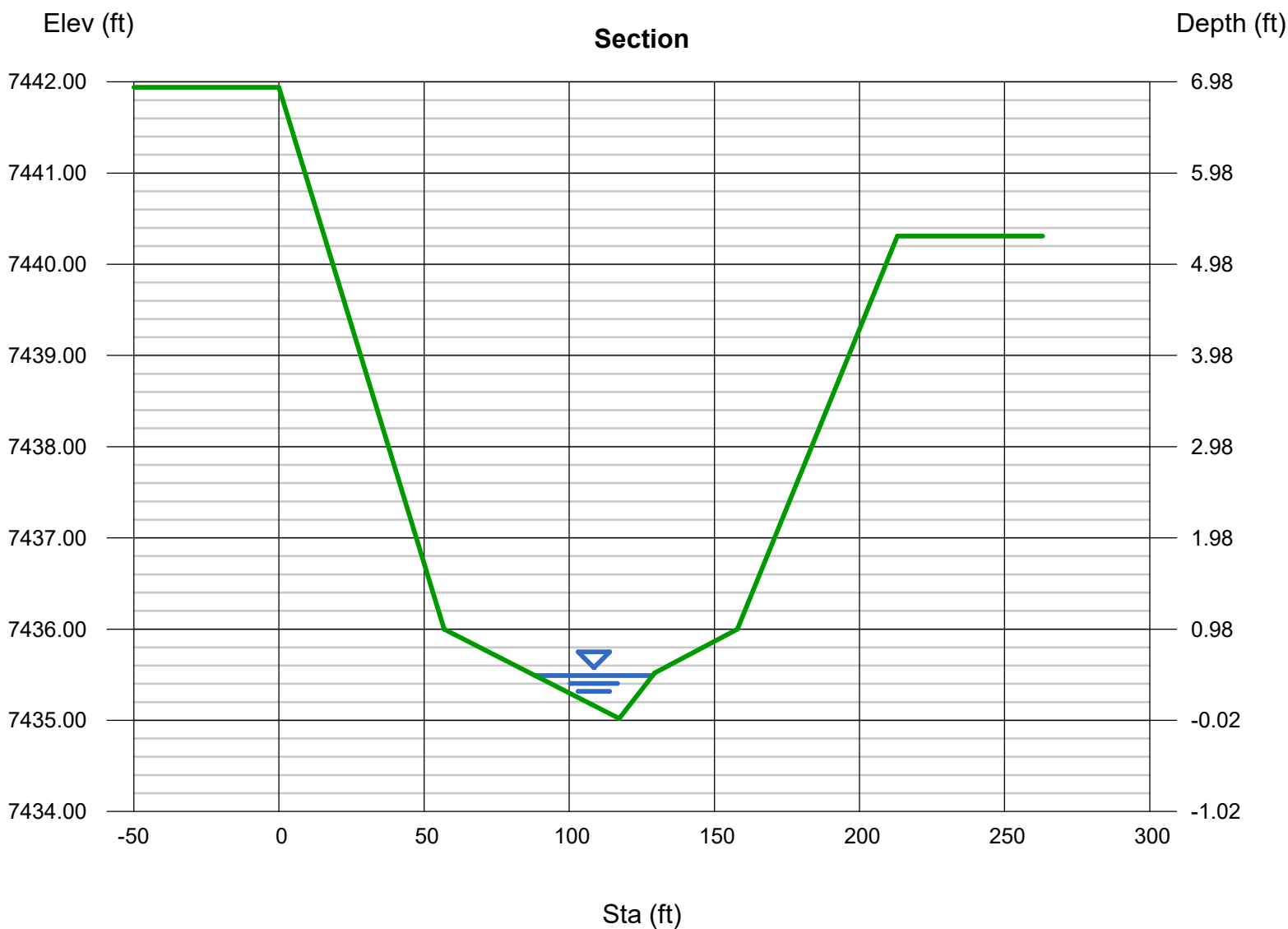
Depth (ft) = 0.47
Q (cfs) = 25.00
Area (sqft) = 9.51
Velocity (ft/s) = 2.63
Wetted Perim (ft) = 40.45
Crit Depth, Yc (ft) = 0.47
Top Width (ft) = 40.44
EGL (ft) = 0.58

Calculations

Compute by: Known Q
Known Q (cfs) = 25.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 7441.94)-(56.94, 7436.00, 0.030)-(117.21, 7435.02, 0.030)-(129.46, 7435.52, 0.030)-(157.89, 7436.00, 0.030)-(213.09, 7440.31, 0.030)



Channel Report

CHANNEL SECTION 2 (Q100 = 25.0 cfs)

User-defined

Invert Elev (ft) = 7430.00
Slope (%) = 0.60
N-Value = 0.030

Highlighted

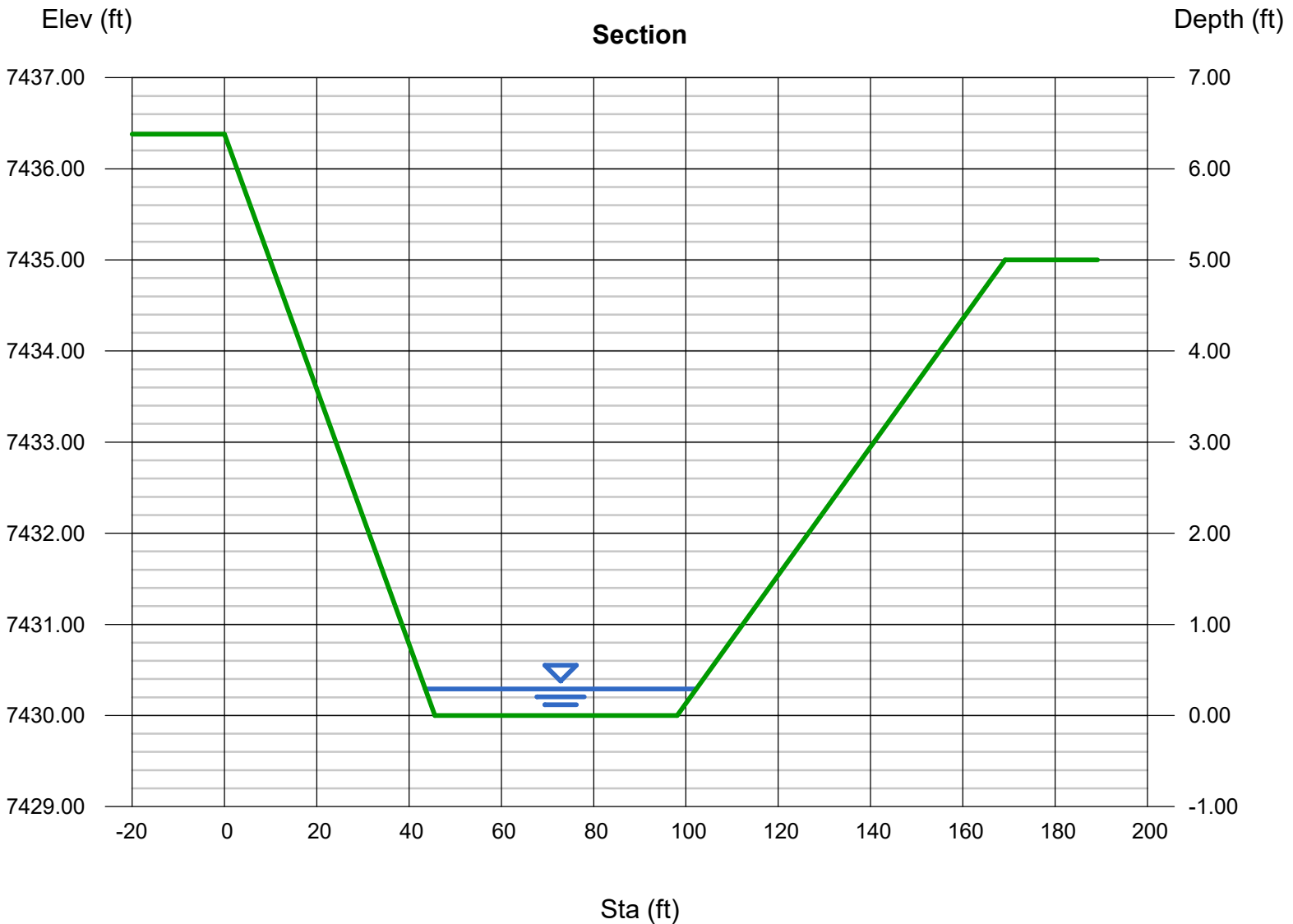
Depth (ft) = 0.29
Q (cfs) = 25.00
Area (sqft) = 16.13
Velocity (ft/s) = 1.55
Wetted Perim (ft) = 58.73
Crit Depth, Yc (ft) = 0.19
Top Width (ft) = 58.69
EGL (ft) = 0.33

Calculations

Compute by: Known Q
Known Q (cfs) = 25.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 7436.38)-(45.58, 7430.00, 0.030)-(98.08, 7430.00, 0.030)-(169.15, 7435.00, 0.030)



Channel Report

CHANNEL SECTION 3 (Q100 = 25.0 cfs)

User-defined

Invert Elev (ft) = 7424.00
Slope (%) = 0.49
N-Value = 0.030

Highlighted

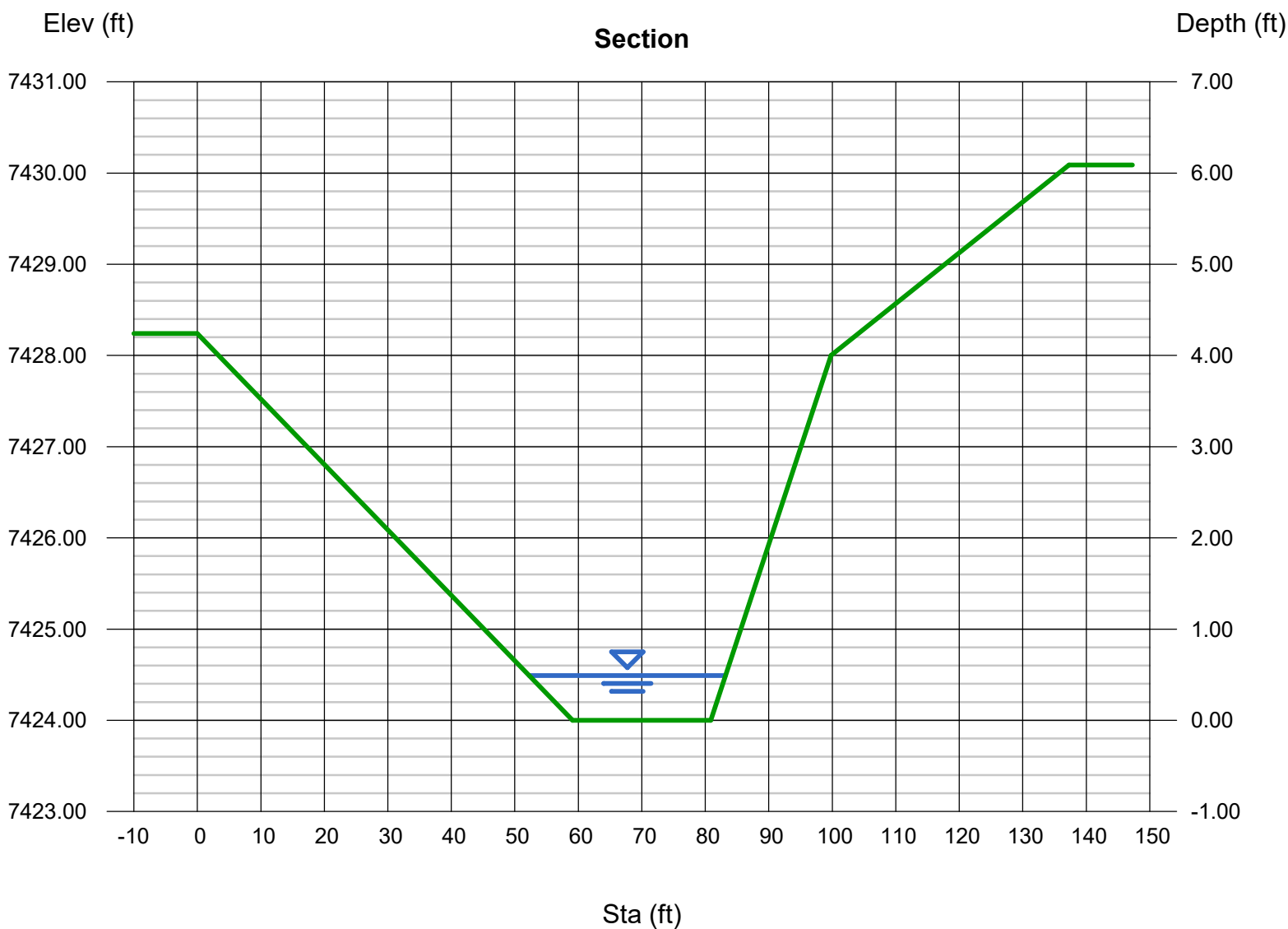
Depth (ft) = 0.49
Q (cfs) = 25.00
Area (sqft) = 12.91
Velocity (ft/s) = 1.94
Wetted Perim (ft) = 30.98
Crit Depth, Yc (ft) = 0.33
Top Width (ft) = 30.92
EGL (ft) = 0.55

Calculations

Compute by: Known Q
Known Q (cfs) = 25.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 7428.24)-(59.11, 7424.00, 0.030)-(80.87, 7424.00, 0.030)-(99.81, 7428.00, 0.030)-(137.27, 7430.09, 0.030)





APPENDIX D – WATER QUALITY & DETENTION

Post Construction Stormwater Management Applicability Evaluation Form

This form is to be used by the Engineer of Record to evaluate applicable construction activities to determine if the activities are eligible for an exclusion to permanent stormwater quality management requirements. Additionally Part III of the form is used to identify and document which allowable control measure design standard is used for the structure.

Part I. Project Information	
1. Project Name:	
2. El Paso County Project #:	3. ESQCP #:
4. Project Location:	Project Location in MS4 Permit Area (Y or N):
5. Project Description:	
If project is located within the El Paso County MS4 Permit Area, please provide copy of this completed form to the Stormwater Quality Coordinator for reporting purposes; and save completed form with project file.	

Part II. Exclusion Evaluation: Determine if Post-Construction Stormwater Management exclusion criteria are met. Note: Questions A thru K directly correlate to the MS4 permit Part I.E.4.a.i (A) thru (K). If Yes, to any of the following questions, then mark Not Applicable in Part III, Question 2.				
Questions	Yes	No	Not Applicable	Notes:
A. Is this project a "Pavement Management Site" as defined in Permit Part I E.4.a.i. (A)?				This exclusion applies to "roadways" only. Areas used primarily for parking or access to parking are not included.
B. Is the project "Excluded Roadway Development"?				
• Does the site add less than 1 acre of paved area per mile?				
• Does the site add 8.25 feet or less of paved width at any location to the existing roadway?				
C. Does the project increase the width of the existing roadway by less than 2 times the existing width?				For redevelopment of existing roadways, only the area of the existing roadway is excluded from post-construction requirements when the site does not increase the width by two times or more. <i>This exclusion only excludes the original roadway area it does NOT apply to entire project.</i>
D. Is the project considered an aboveground and Underground Utilities activity?				Activity can NOT permanently alter the terrain, ground cover or drainage patterns from those present prior to the activity
E. Is the project considered a "Large Lot Single-Family Site"?				Must be a single-residential lot or agricultural zoned land, ≥ 2.5 acres per dwelling and total lot impervious area < 10 percent.

Questions (cont'd)	Yes	No	Not Applicable	Notes
F. Do Non-Residential or Non-Commercial Infiltration Conditions exist? Post-development surface conditions do not result in concentrated stormwater flow or surface water discharge during an 80 th percentile stormwater runoff event.				Exclusion does not apply to residential or commercial sites for buildings. A site specific study is required and must show: rainfall and soil conditions; allowable slopes; surface conditions; and ratios of imperviousness area to pervious area.
G. Is the project land disturbance to Undeveloped Land where undeveloped land remains undeveloped following the activity?				Project must be on land with no human made structures such as buildings or pavement.
H. Is the project a Stream Stabilization Site?				Standalone stream stabilization projects are excluded.
I. Is the project a bike or pedestrian trail?				Bike lanes for roadways are not included in this exclusion, but may qualify if part of larger roadway activity is excluded in A, B or C above.
J. Is the project Oil and Gas Exploration?				Activities and facilities associated with oil and gas exploration are excluded.
K. Is the project in a County Growth Area?				Note, El Paso County does not apply this exclusion. All Applicable Construction Activity in El Paso County must comply the Post-Construction Stormwater Management criteria.

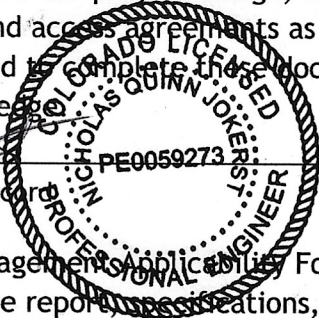
Part III. Post Construction (Permanent) Stormwater Control Determination		
Questions	Yes	No
1. Is project an Applicable Construction Activity?		
2. Do any of the Exclusions (A-K in Part II) apply?		
<p>If the project is an Applicable Construction Activity and no Exclusions apply then Post-Construction (Permanent) Stormwater Management is required. Complete the applicable sections of Part IV below and then coordinate signatures for form and place in project file.</p> <p>If the project is not an Applicable Construction Activity, or Exclusion(s) apply then Post-Construction (Permanent) Stormwater Management is NOT required. Coordinate signatures for form and place in project file.</p>		

Part IV: Onsite PWQ Requirements, Documentation and Considerations	Yes	No
1. Check which Design Standard(s) the project will utilize. Standards align with Control Measure Requirements identified in permit Part I.E.4.a.iv.		
A. Water Quality Capture Volume (WQCV) Standard		
B. Pollutant Removal/80% Total Suspended Solids Removal (TSS)		
C. Runoff Reduction Standard	X	
D. Applicable Development Site Draining to a Regional WQCV Control Measure		
E. Applicable Development Site Draining to a Regional WQCV Facility		
F. Constrained Redevelopment Sites Standard		
G. Previous Permit Term Standard		
2. Will any of the project permanent stormwater control measure(s) be maintained by another MS4? If Yes, you must obtain a structure specific maintenance agreement with the other MS4 prior to advertisement.		
3. Will any of the project permanent stormwater control measures be maintained by a private entity or quasi-governmental agency (e.g. HOA or Special District, respectively)? If Yes, a Private Detention Basin/Stormwater Quality Best Management Practice Maintenance Agreement and Easement must be recorded with the El Paso County Clerk and Recorder.		

Part V Notes (attach an additional sheet if you need more space)

Project design is complete to include the project design, construction plans, drainage report, specifications, and maintenance and access agreements as required. The engineering, drainage considerations and information used to complete these documents is complete, true, and accurate to the best of my belief and knowledge.

Signature and Stamp of Engineer of Record



08/29/2024
Date

Post-Construction Stormwater Management Applicability Form has been reviewed and the project design, construction plans, drainage report, specifications, and maintenance and access agreements as required, have been reviewed for compliance with the Post Construction Stormwater Management process and MS4 Permit requirements.

Signature of El Paso County Project Engineer

Date



APPENDIX E – REFERENCE MATERIAL

Figure 1: Looking SW from Black Squirrel Road to the site low point



Figure 2: Same location at Figure 1, looking NE across Black Squirrel Road



Figure 3: From Black Squirrel Road, looking towards low point



Figure 4: From dirt road along north PL, looking upstream of low point



Figure 5: From dirt road along west PL, looking down drainage tributary



Figure 6: Same location as Figure 5, looking west to offsite/upstream portion of tributary



Figure 7: Double 12" PVC culverts, downstream



Figure 8: Double 12" PVC culverts, upstream

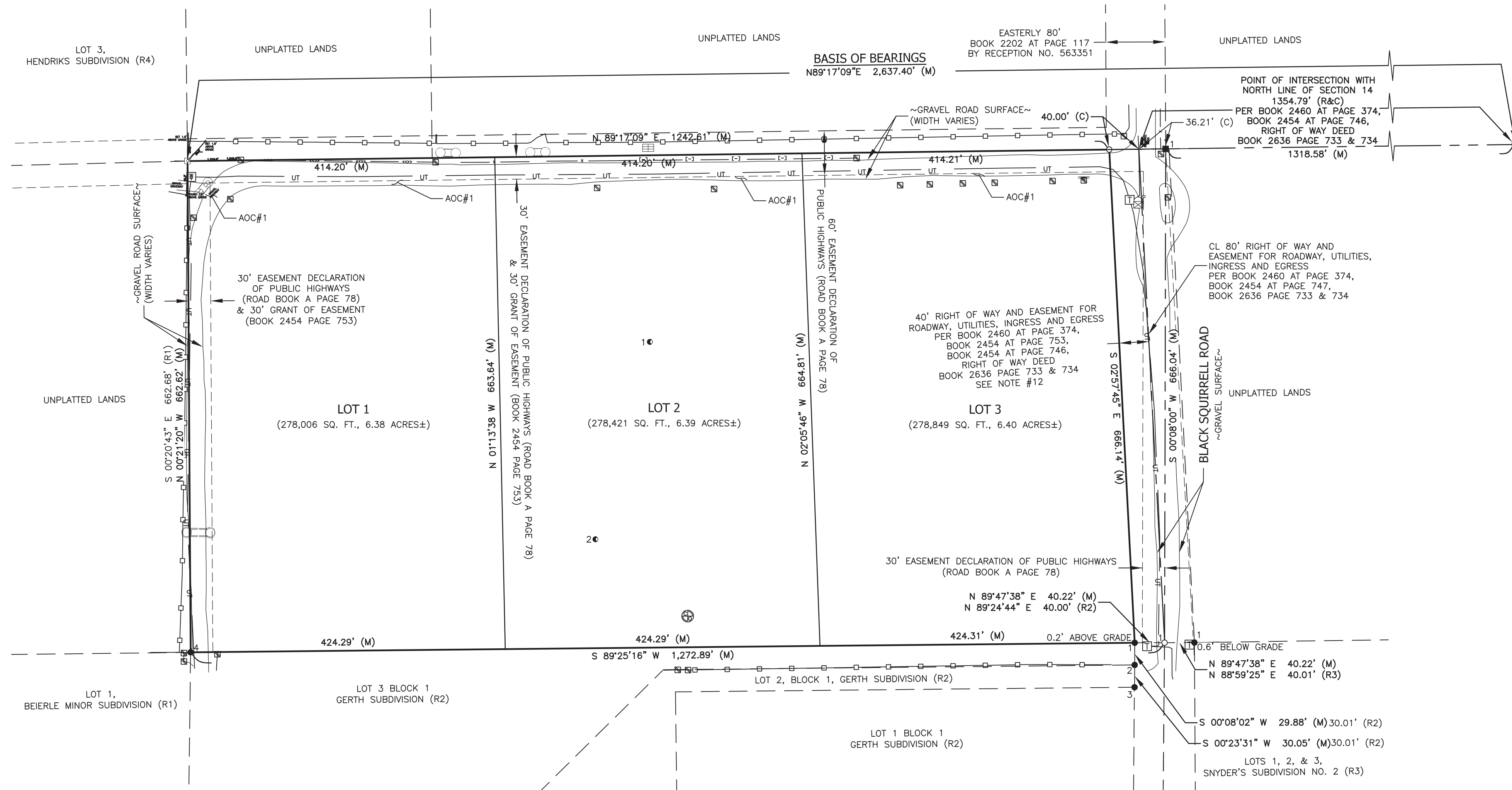
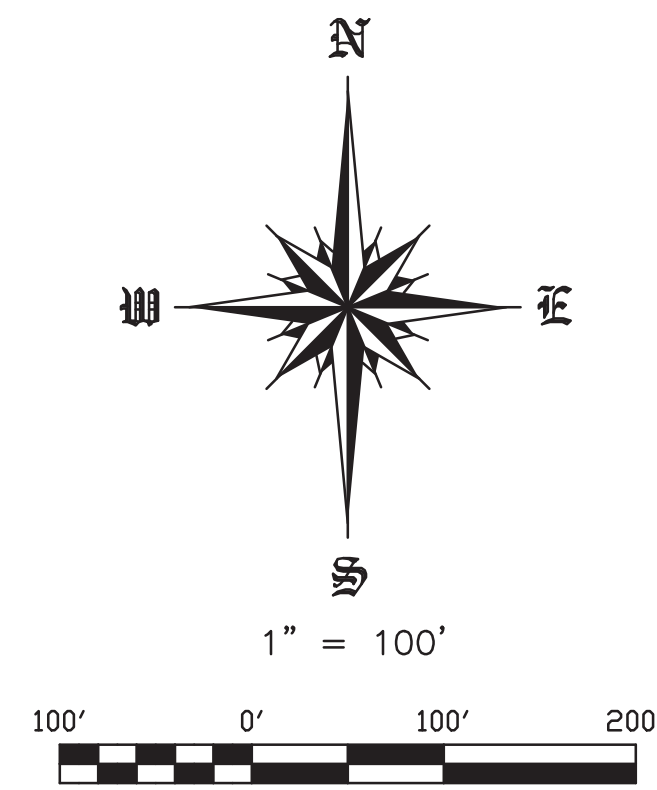


Figure 9: Drainage tributary immediately downstream of 12" PVC culverts



TEAM CHRIS SUBDIVISION

BEING A PART OF THE NORTHEAST QUARTER OF SECTION 14,
TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN,
COUNTY OF EL PASO, STATE OF COLORADO.



AREA(S) OF CONCERN

(AOC#1): Portions of gravel road lies southerly and easterly of said easement, as graphically depicted on this Land Survey Plat, causing an area of concern.

SURVEYOR'S NOTES

- NOTICE: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.
- Any person who knowingly removes, alters or defaces any public land survey monument or land boundary monument or accessory commits a class 2 misdemeanor pursuant to the Colorado Revised Statute 18-4-508.
- The lineal units used in this drawing are U.S. Survey Feet.
- The fieldwork for this survey was completed on May 28, 2024.
- The overall subject parcel contains a net calculated area of 835,271 square feet (19.18 acres) of land, more or less.
- This survey does not constitute a title search by Apex Land Surveying and Mapping, LLC. To determine ownership or easements of record, Apex Land Surveying and Mapping, LLC. relied upon Title Commitment order number RND55116760, with an effective date of 05/24/2024 @ 5:00 P.M. as provided by Land Title Guaranty Company & Old Republic National Title Insurance Company.
- Bearings are based on a portion of the North line of Section 14, T11S, R65W of the Ute P.M., monumented on the west end with a four No. 6 rebar, rehabilitated with 2-1/2" aluminum cap, T11S R65W 1/4 S13S14 2024 PLS 38759, flush with grade, and on the east end with a found No. 6 rebar with 2-1/2" aluminum cap marked 1/4 S11S14 1997 PLS 4842, flush with grade and is assumed to bear N89°17'09"E a measured distance of 2,637.40 feet.
- Any underground or above ground utilities shown hereon have been located from field survey information. Apex Land Surveying and Mapping, LLC. does not guarantee said underground utilities to be shown in their exact location and that said underground utilities are shown in their entirety. Apex Land Surveying and Mapping, LLC. did not physically enter any manholes or inlets to verify size and material. Where additional or more detailed information is required, the client is advised that excavation may be necessary.
- Site Benchmark: Set 60D nail (Elevation=7459.74' NAVD88).
- The purpose of this survey is to determine boundary lines of subject parcel for future minor subdivision.
- Exception No 13 in title commitment stipulates terms, conditions, provisions, burdens and obligations as set forth in right of way recorded July 09, 1967 under Reception No. 563351 under Book 2202 at Page 117. Said right of way and easement for roadway, utilities, ingress and egress purposes over and across the East 80 feet of that part of the west half of the Southeast quarter of Section 11 in Township 11 South, Range 65 West of the 6th P.M., as graphically depicted on this Land Survey Plat.
- Right Of Way Deed per Book 2636 at Page 733 by Reception No. 30371 grants, bargain, sell, and convey the said 80' Strip (40' on either side of centerline) to El Paso County as graphically depicted on this Land Survey Plat. POINT OF INTERSECTION WITH NORTH LINE OF SECTION 14, a distance of 1354.79' (R&C) lands within field measured evidence of intersection of Black Squirrel Road (Gravel road) and private road (gravel road). This document is listed as an "EX" in the vesting deed (Warranty Deed by Reception No. 218044100).
- Abbreviated Legal Description in vesting Warranty Deed by Reception No. 218044100 Has an address listed as 6275 Montabor Dr, Colorado Springs CO 80918. The address listed in this document is the address for Chris team Living trust, not the physical address of subject parcel.
- Exception No. 19-Grant of right of way to mountain view electric association, inc. over a portion of subject property as recorded June 5, 2001 under reception No. 201075608. The evidence in this description does not touch the subject parcel.
- Exception No. 20-Grant of right of way to mountain view electric association, inc. over a portion of subject property as recorded October 2, 2012 under Reception No. 212115628. The evidence in this description does not touch the subject parcel.
- Exception No. 22-Easement granted to public service company of Colorado, for utility, and incidental purposes, by instrument recorded april 21, 1964, in book 2007 at page 850. The evidence in this description does not touch the subject parcel.

LEGEND

- 1 ● FOUND NO. 5 REBAR AS NOTED
- 2 ● FOUND NO. 4 REBAR WITH 1" YELLOW PLASTIC CAP, PLS 15686, FLUSH WITH GRADE
- 3 ● FOUND NO. 4 REBAR WITH 1" YELLOW PLASTIC CAP REMNANTS, 0.2' ABOVE GRADE
- 4 ● FOUND NO. 5 REBAR WITH 1-1/4" ORANGE PLASTIC CAP, PLS 38141, 0.6' BELOW GRADE
- 1 ■ N 1/16 SEC 14 T11S R65W FOUND NO. 6 REBAR WITH 2-1/2" ALUM CAP MARKED E1/16 S11&S14 1997 PLS 4842, FLUSH WITH GRADE
- 2 ■ NE 1/4 SEC 14 T11S R65W FOUND NO. 6 REBAR WITH 2-1/2" ALUM CAP MARKED 1/4 S11&S14 1997 PLS 4842, FLUSH WITH GRADE
- N 1/4 SEC. 14 T11S R65W. FOUND NO. 6 REBAR, REHABILITATED WITH 2-1/2" ALUM CAP, T11S R65W 1/4 S13S14 2024 PLS 38759, FLUSH WITH GRADE
- FOUND NO. 5 REBAR WITH 1-1/4" PURPLE PLASTIC CAP, PLS 38759, FLUSH WITH GRADE
- 10 ○ FOUND NO. 5 REBAR WITH 1-1/2" ALUMINUM CAP, PLS 38759, 0.5' BELOW GRADE
- (R) RECORD VALUE
- (R1) RECORD VALUE (BEIERLE MINOR SUBDIVISION) RECEPTION NO. 216713868
- (R2) RECORD VALUE (GERTH SUBDIVISION) PLAT BOOK X-3 AT PAGE 178
- (R3) RECORD VALUE (SNYDER'S SUBDIVISION NO.2) RECEPTION NO. 1490259
- (R4) RECORD VALUE (HENDRICKS SUBDIVISION) RECEPTION NO. 1178523
- (M) MEASURED VALUE
- (AOC#) AREA OF CONCERN
- BREAK SYMBOL
- 1 ● HEADSTONE
- 2 ● BRICK GRILL
- STORM CULVERT INLET
- ▢ STORM DRAIN INLET
- ⊕ SANITARY SEWER CLEANOUT
- ⊕ TELEPHONE PEDESTAL
- SIGN—"PRIVATE PROPERTY" "PRIVATE DRIVE"
- FENCE POST
- ⊕ MAILBOX CLUSTER
- UT UNDERGROUND TELEPHONE LINE
- WROUGHT-IRON FENCE
- - - BARBED WIRE FENCE REMNANTS
- WIRE MESH FENCE
- x BARBED-WIRE FENCE

DRAFT

DATE: August 23, 2024		REVISIONS	
No.	Remarks	Date	By

APEX
LAND SURVEYING AND MAPPING LLC

APEX Land Surveying and Mapping LLC.

5855 Lehman Drive, Suite 102
Colorado Springs, CO 80918
Phone: 719-318-0377
E-mail: info@apexsurveyor.com
Website: www.apexsurveyor.com



APPENDIX F – DRAINAGE MAPS

CHRIS TEAM SUBDIVISION

EX DRAINAGE MAP

More sub basins need to be shown to accurately delineate the site.

Indicate how flows exit site and show where flows go downstream

Adjust Basin line out to south to what appears to be top of ditch. Is roadside ditch adequate?

Does Black Squirrel Rd have a roadside ditch & is it adequate?

Include hydraulic calculations for these culverts in App. C

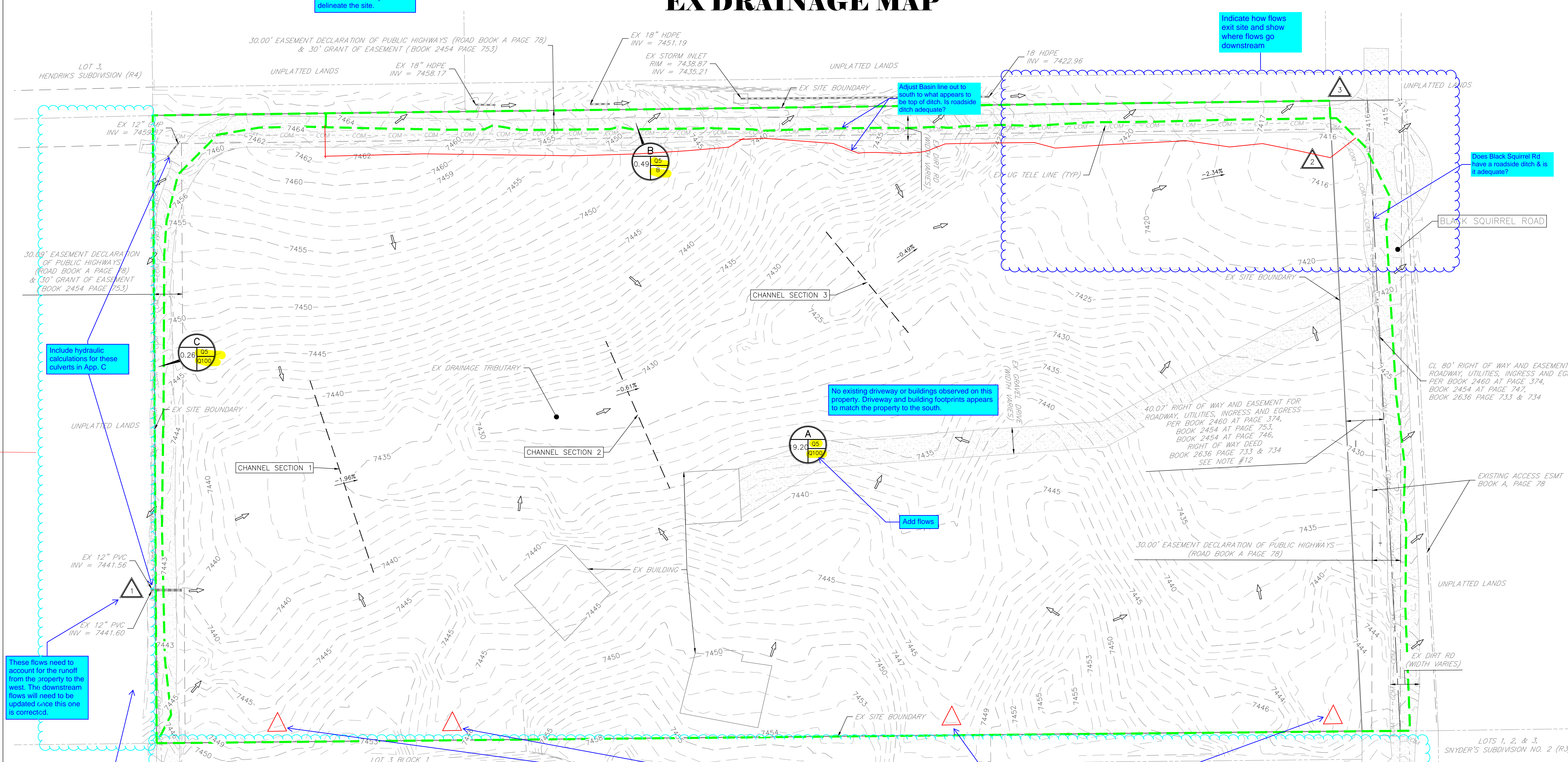
No existing driveway or buildings observed on this property. Driveway and building footprints appears to match the property to the south.

These flows need to account for the runoff from the property to the west. The downstream flows will need to be updated once this one is corrected.

Add flows

Indicate offsite flows from the south. Use streamstats or GIS to determine if survey is not readily available.

Please expand the view to show contours for offsite flows entering from the West and South.



LEGEND

	EXISTING	PROPOSED
SECTION LINE	—	—
BOUNDARY LINE	—	—
PROPERTY LINE	—	—
EASEMENT LINE	—	—
RIGHT OF WAY	—	—
CENTERLINE	—	—
STORM SEWER	—	—
SWALE/WATERWAY FLOWLINE	—	—
INDEX CONTOUR	—	—
INTERMEDIATE CONTOUR	—	—
FLOW DIRECTION	→	→
BASIN ID	ID AC Q5 Q100	△
SUB-BASIN DRAINAGE AREA	—	—

Tributary Sub-basin	Area (acres)	Percent Impervious	C _s	C ₁₀₀	t _c (min)	Q _s (cfs)	Q ₁₀₀ (cfs)
A	19.20	9%	0.14	0.39	43.2	5.0	24.4
B	0.49	44%	0.37	0.55	23.9	0.3	1.3
C	0.26	80%	0.59	0.70	15.2	0.5	1.1

DP#	Q _s -YR	Q ₁₀₀ -YR
1	0.5	1.1
2	5.4	25.0
3	0.3	1.3

EX DRAINAGE MAP

CHRIS TEAM SUBDIVISION

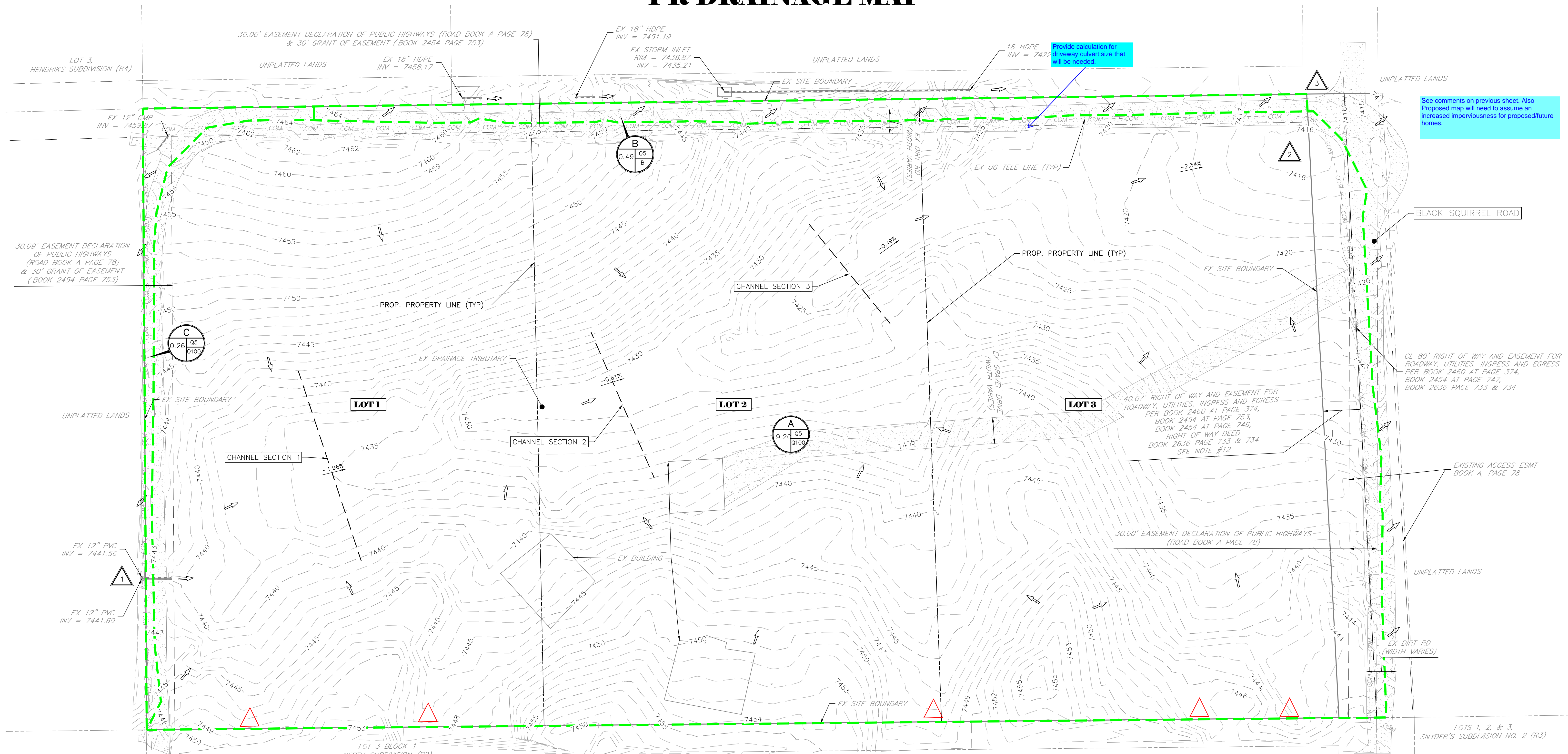
JOB NO. 24019
LOCATION: EPC
08/27/2024

SHEET 1

ALL TERRAIN ENGINEERING



CHRIS TEAM SUBDIVISION PR DRAINAGE MAP



See comments on previous sheet. Also Proposed map will need to assume an increased imperviousness for proposed future homes.

Provide calculation for driveway culvert size that will be needed.

40.07' RIGHT OF WAY AND EASEMENT FOR ROADWAY, UTILITIES, INGRESS AND EGRESS PER BOOK 2460 AT PAGE 374, BOOK 2454 AT PAGE 753, BOOK 2454 AT PAGE 746, RIGHT OF WAY DEED BOOK 2636 PAGE 733 & 734 SEE NOTE #12

EXISTING ACCESS ESMT BOOK A, PAGE 78

LEGEND

	EXISTING	PROPOSED
SECTION LINE	—	—
BOUNDARY LINE	—	—
PROPERTY LINE	—	—
EASEMENT LINE	—	—
RIGHT OF WAY	—	—
CENTERLINE	—	—
STORM SEWER	—	—
SWALE/WATERWAY FLOWLINE	—	—
INDEX CONTOUR	—	—
INTERMEDIATE CONTOUR	—	—
FLOW DIRECTION	→	→
BASIN ID	⊙ AC QS Q100	⊙ AC QS Q100
SUB-BASIN DRAINAGE AREA	—	—

Update tables based on proposed calculations

Tributary Sub-basin	Area (acres)	Percent Impervious	C _s	C ₁₀₀	t _c (min)	Q _s (cfs)	Q ₁₀₀ (cfs)
A	19.20	9%	0.14	0.39	43.2	5.0	24.4
B	0.49	44%	0.37	0.55	23.9	0.3	1.3
C	0.26	80%	0.59	0.70	15.2	0.5	1.1

DP#	Q _s -YR	Q ₁₀₀ -YR
1	0.5	1.1
2	5.4	25.0
3	0.3	1.3

PR DRAINAGE MAP

CHRIS TEAM SUBDIVISION

JOB NO. 24019

LOCATION: EPC

08/27/2024

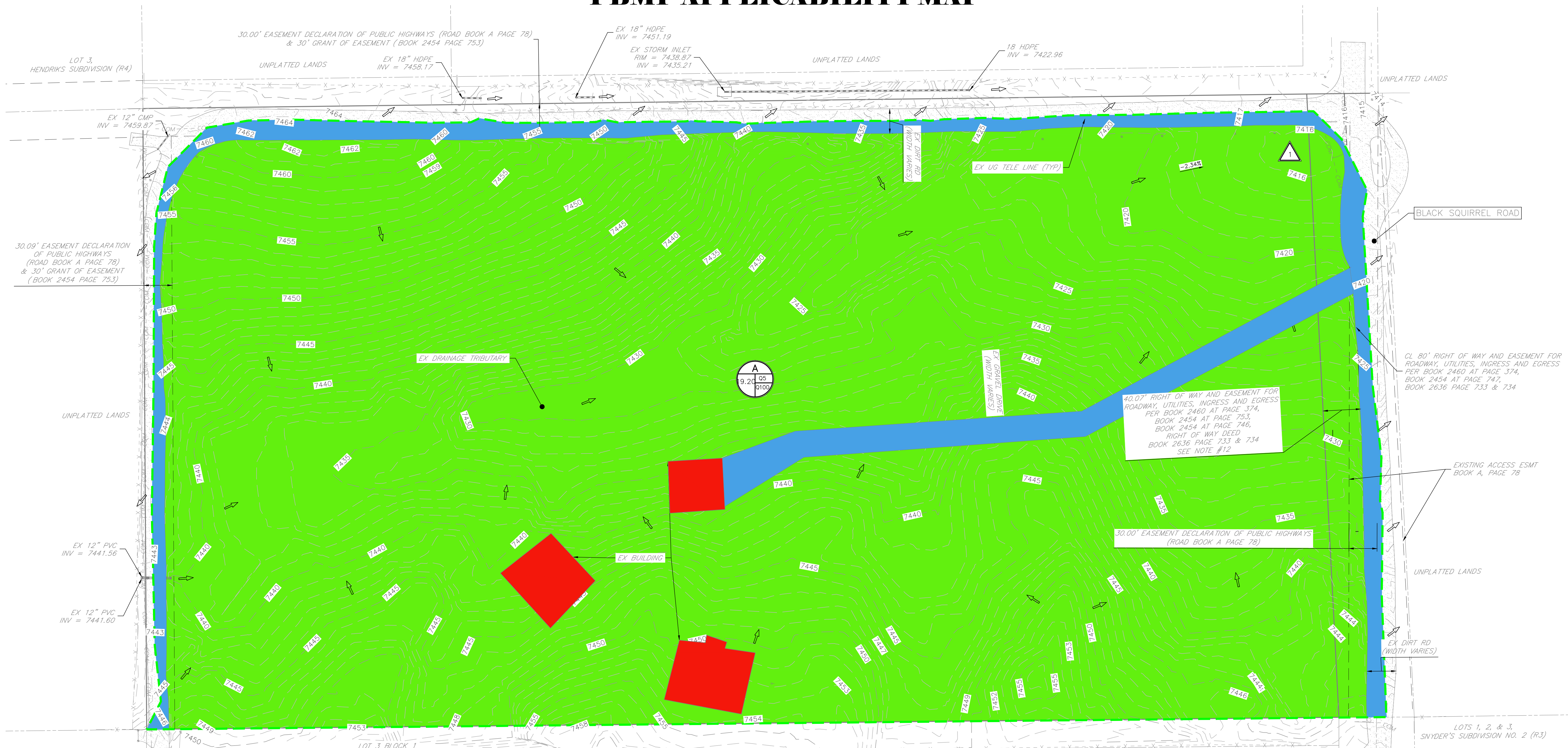
SHEET 1

ALL TERRAIN ENGINEERING



CHRIS TEAM SUBDIVISION

PBMP APPLICABILITY MAP

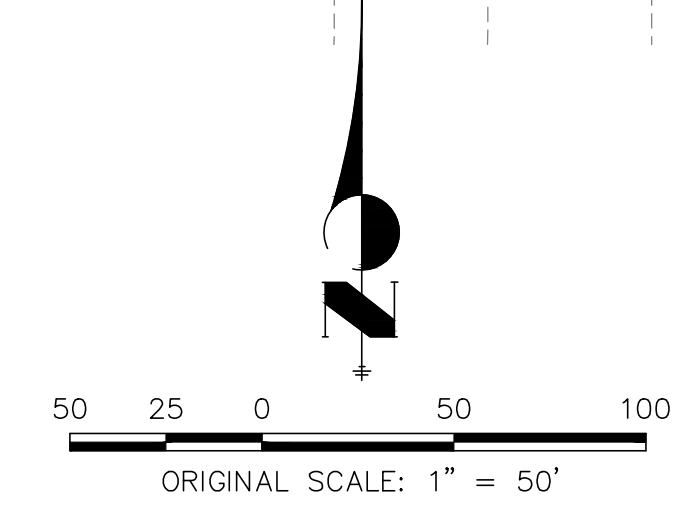


LEGEND

	EXISTING	PROPOSED
SECTION LINE		
BOUNDARY LINE		
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
STORM SEWER		
SWALE/WATERWAY FLOWLINE		
INDEX CONTOUR		
INTERMEDIATE CONTOUR		
FLOW DIRECTION		
BASIN ID		
DESIGN POINT DESIGNATION		
SUB-BASIN DRAINAGE AREA		

PBMP APPLICABILITY LEGEND:

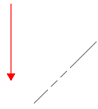
- ROOFS
- GRAVEL
- FOREST/MEADOW



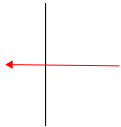
PBMP APPLICABILITY MAP	
CHRIS TEAM SUBDIVISION	
JOB NO. 24019	SHEET 1
LOCATION: EPC	
08/27/2024	

v1_Drainage Report - Final.pdf Markup Summary

Arrow (2)

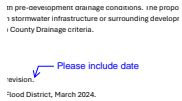


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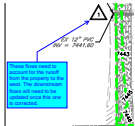
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Callout (16)



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Date: 11/1/2024 8:31:27 AM
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Please include date



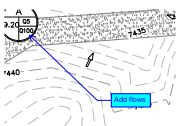
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Date: 11/4/2024 8:12:55 AM
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These flows need to account for the runoff from the property to the west. The downstream flows will need to be updated once this one is corrected.



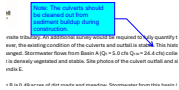
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Date: 11/4/2024 8:04:19 AM
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Site



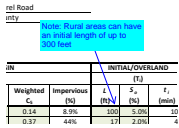
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Author: Joseph Sandstrom
Date: 11/4/2024 8:07:53 AM
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Space:

Add flows



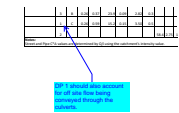
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Author: Joseph Sandstrom
Date: 11/4/2024 4:26:06 PM
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Space:

Note: The culverts should be cleaned out from sediment buildup during construction.



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Date: 11/4/2024 1:10:11 PM
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Note: Rural areas can have an initial length of up to 300 feet



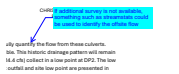
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Page Label: 13
Author: CDurham
Date: 11/4/2024 1:14:45 PM
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Space:

DP 1 should also account for off site flow being conveyed through the culverts.



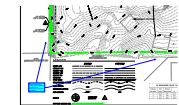
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Date: 11/4/2024 4:24:42 PM
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Space:

Per site visit, there is currently no improvements on site.



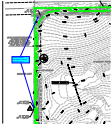
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Author: CDurham
Date: 11/4/2024 2:29:44 PM
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If additional survey is not available, something such as streamstats could be used to identify the offsite flow



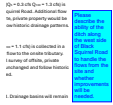
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Please expand the view to show contours for offsite flows entering from the West and South.



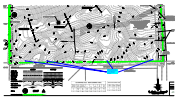
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Include hydraulic calculations for these culverts in App. C



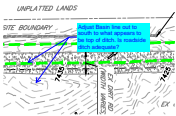
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Page Label: 5
Author: Joseph Sandstrom
Date: 11/4/2024 3:34:31 PM
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Please describe the ability of the ditch along the west side of Black Squirrel Road to handle the flows from the site and whether improvements will be needed.



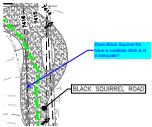
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Indicate offsite flows from the south. Use streamstats or GIS to determine if survey is not readily available.



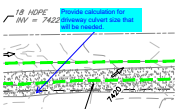
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Date: 11/4/2024 4:06:36 PM
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Adjust Basin line out to south to what appears to be top of ditch. Is roadside ditch adequate?



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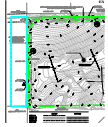
Does Black Squirrel Rd have a roadside ditch & is it adequate?



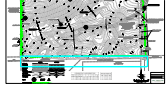
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Provide calculation for driveway culvert size that will be needed.

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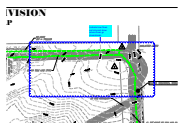


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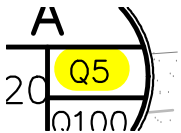
Cloud+ (1)



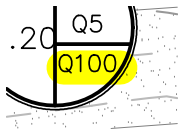
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Indicate how flows exit site and show where flows go downstream

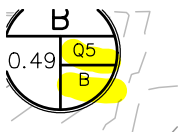
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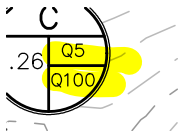
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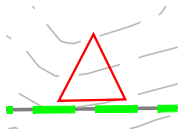
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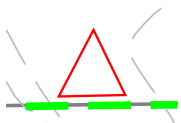
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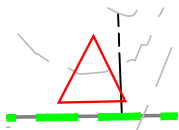
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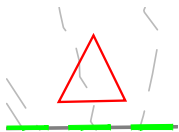
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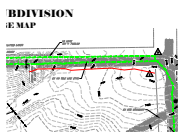


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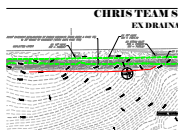


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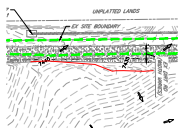
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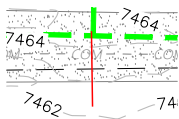
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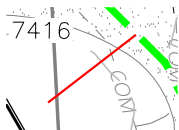
Subject: PolyLine
Page Label: [1] Ex Drn Map
Author: CDurham
Date: 11/4/2024 4:05:15 PM
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Subject: PolyLine
Page Label: [1] Ex Drn Map
Author: CDurham
Date: 11/4/2024 4:04:46 PM
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Author: CDurham
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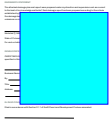
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Author: HaoVo
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Info Only: Comments from Service Engineering are in blue text.

SF2426

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Author: HaoVo
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SF2426



Subject: Text Box
Page Label: 2
Author: Joseph Sandstrom
Date: 10/30/2024 3:00:26 PM
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Subject: Text Box
Page Label: 2
Author: Joseph Sandstrom
Date: 10/30/2024 2:56:54 PM
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Subject: Text Box
Page Label: 1
Author: Joseph Sandstrom
Date: 11/4/2024 7:47:54 AM
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It appears that the analysis in the written narrative and maps/aerials is mixed between the Chris Team Subdivision property and parcel 5114006001 to the south. Based on aerials and site visit there is no existing driveway or structures on the applicant's property.



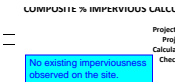
Subject: Text Box
Page Label: 10
Author: Joseph Sandstrom
Date: 11/4/2024 8:04:46 AM
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Not project site



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Author: Joseph Sandstrom
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No existing driveway or buildings observed on this property. Driveway and building footprints appears to match the property to the south.



LUMP SUM % IMPERVIOUS CALC				
ad	% Imp.	C ₁	C ₁₀₀	Area (sq)
1	0.00	0.75	0.81	0.33

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Author: Joseph Sandstrom
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No existing imperviousness observed on the site.

More sub basins need to be shown to accurately delineate the site.

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Author: Joseph Sandstrom
Date: 11/4/2024 10:27:02 AM
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More sub basins need to be shown to accurately delineate the site.

MENT DECLARATION OF PUBLIC HIGHW

Total 0.00 0.00 0.00 0.00

Need to provide proposed conditions hydrology calculations. Assume a 10% imperviousness for 5 acre lots of residential house footprint, driveway, etc.

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Need to provide proposed conditions hydrology calculations. Assume a 10% imperviousness for 5 acre+ lots or show/estimate house footprint, driveway, etc.

Basin C is 0.25 acres of dirt road. Stormwater from this roadside ditch and conveyed to DP1 where two 12" PV Additional flow enters this basin from offsite areas not properly would be required for fully analyze. However, 1 Provide a basin and description for offsite flow from the south of the project site. The project will not be performing any site improvement unchanged.

III. Drainage Design Criteria

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Provide a basin and description for offsite flows from the south of the project site

Basin C is 0.25 acres of dirt road. Stormwater from this roadside ditch and conveyed to DP1 where two 12" PV Additional flow enters this basin from offsite areas not properly would be required for fully analyze. However, 1 Provide a basin and description for offsite flow from the south of the project site. The project will not be performing any site improvement unchanged.

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Include a discussion of the existing 12" culvert at the NW corner of the site, as shown on the drainage map

There is no pond and there was no graph provided in appendix D.

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There is no pond and there was no graph provided in appendix D.

Discuss what happens to flows from this basin. How do they cross the roads and where do they do downstream?

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Discuss what happens to flows from this basin. How do they cross the roads and where do they do downstream?

ly would be required to fully analyze. However, this basic
ge patterns. The existing roadside ditch and culverts will
used Subbasin Description
ject will need to assume an increased
oped. Imperviousness for future home and
driveway and what those increase in
flows will be.
nage Design Criteria
lgment Criteria Reference
image analysis, proposed storm sewer system, and prop
ion should follow the criteria from the "Drainage Criteria H

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Will still need to assume an increased imperviousness for future home and driveway and what those increase in flows will be.

Quality & Protection
will not require water quality and detention. The site is comprised of 5+
feet of fill and is eroded from previous stormwater quality control me
Sandy Site location in Appendix C of the DDC. A BMP Applicability
and
Appendix C BMP Applicability
Requirements. Please address increased flow with
hard home and driveway construction. See
Appendix I for additional information.
in no major drainages that traverse the site. The existing onsite drains
with an increase in flows from this project.

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Appendix I does not relinquish detention requirements. Please address increased flows with future home and driveway construction. See appendix for additional comments.

the site. The existing onsite drainage tributary is s
ject. Major channel appears to be cutting
through the middle of the site.

Subject: Text Box
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Major channel appears to be cutting through the middle of the site.

use the site. The existing onsite drainage tributary is s
ject.
It not be required as no stormwater facilities are prop
Who will maintain drainage channel?
equipped as no land disturbance will occur with this pr

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Who will maintain drainage channel?

ATTED LANDS
See comments on previous sheet. Also
Proposed map will need to assume an
increased imperviousness for proposed/future
homes.

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See comments on previous sheet. Also Proposed map will need to assume an increased imperviousness for proposed/future homes.

Update tables based on proposed calculations

SUMMARY TABLE				DESIGN POINT SUM	
#	L	Q ₁ (cfs)	Q ₂ (cfs)	DNV	Q ₂ (cfs)
1	51.2	5.0	21.0	1	5.1
2				2	5.1

Subject: Text Box
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Author: CDurham
Date: 11/4/2024 4:10:29 PM
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Update tables based on proposed calculations