Ascent Church

Final Drainage Report

ATE Response: Addressed.

PCD File No: PPR265

All Terrain Engineering Project No: 25023

February 2026

Prepared for:

Ascent Church

Attn: Jason Schott

Contact: (720) 724-3435

jschott@theascentchurch.com

Prepared by:

All Terrain Engineering LLC

Contact: Nicholas Q. Jokerst

njokerst@allterraineng.com

(530) 391-7635

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.

_____

Nicholas Q. Jokerst, PE Date

State of Colorado No. 59273

For and on behalf of All Terrain Engineering LLC

DEVELOPER'S STATEMENT

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

_____

Jason Schott Date

EL PASO COUNTY ONLY

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, PE Date
County Engineer/ECM Administrator
Conditions:

Joshua J. Palmer, P.E.

ATE Response: Addressed.

Table of Contents

Appendices

I. General Purpose, Location & Description

a. Purpose & Project Description

The purpose of the Final Drainage Report (FDR) for the Ascent Church 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.

The Ascent Church project proposes a 21,750 sq. ft. addition to the existing church. To support the addition, a fire access road, drainage infrastructure and a full spectrum water quality and detention pond are proposed. Due to the volume of excavation required for the addition's construction, off-site grading will occur on the adjacent northern property to distribute the excess fill. Coordination is ongoing with the property owner to facilitate this offsite earthwork.

b. Location

Ascent Church, referred to as 'the site' herein, is Lot 1 of the Tri-Lakes subdivision. The site is bound by Palmer Ridge Highschool to the north, Microscope Way to the west, Woodmoor Road to the east and Deer Creek Road to the south. Surrounding platted developments include Woodmoor Business/Technological Park to the west, Woodmoor Oaks to the east and Patriot Place Subdivision to the south. A vicinity map is presented in Appendix A.

c. Description of Property

The site is approximately 7.27 acres. The current property includes a large parking lot, an existing church & open space. The total disturbed area associated with the project activities is 2.42 acres.

In general, the site slopes south and west. Onsite elevations range from 7140' - 7190' with slopes ranging 1 – 5%. Per an NRCS soil survey, the site is made up of Type Kettle gravelly loamy sand and Pring coarse sandy loam. There are no major drainageways that traverse the site. On-site, existing utilities include water, sewer, irrigation, storm sewer, gas, electric and communications. An existing drainage map is presented in Appendix F.

The ultimate receiving waters for the site are Crystal Creek and Dirty Woman Creek.

d. Floodplain Statement

Based on FEMA Firm map 08041C0276G 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 Crystal Creek Drainage Basin and the Dirty Woman Creek Drainage Basin. The DBPS found that the because of the extent of existing development, the differences in the existing and future flow conditions were minimal. The reached in the upper end of the basin shows no difference between the existing and future flow conditions. The difference in flow rates further south is generated by the potential

future development along the Interstate 25 corridor and within the general area of the Town of Monument. The DBPS recommends providing stormwater management facilities which will at least maintain and/or enhance water quality characteristics of the basin. Excerpts from the DBPS are presented in Appendix E.

b. Existing Subbasin Description

The existing site's drainage patterns are generally to the south. However, a portion of the site drains southeast towards Woodmoor Lake while the remaining site area drains southwest towards Crystal Creek. The areas described below are within the area tributary to Crystal Creek. The existing basin descriptions below are for site areas that will be disturbed in the proposed condition. Onsite areas that will remain in their existing condition and will not be disturbed are not included in the existing subbasin analysis.

Basin EX1 is 1.54 acres of onsite and offsite undeveloped area. The offsite portion of this basin is part of Palmer Ridge Highschool. Basin EX1 stormwater (Q_5 = 0.6 cfs Q_{100} = 4.0 cfs) sheet flows north & offsite towards DP1. DP1 (Q_5 = 0.6 cfs Q_{100} = 4.0 cfs) represents the northern boundary of Basin EX1. At DP1, an existing, unnamed drainage conveys Basin EX1 flow to Crystal Creek. Offsite survey is being completed to better define this offsite area and drainage. Once available, the EX1 basin description will be updated.

Basin EX2 is 2.5 acres of the existing church, parking lot and undeveloped area. Basin EX2 stormwater (Q_5 = 3.2 cfs Q_{100} = 9.1 cfs) flows west across the basin towards Microscope Way. Existing roadside ditches on the east side of Microscope Way captured basin EX2 stormwater and convey it to DP2 (Q_5 = 3.2 cfs Q_{100} = 9.1 cfs). At DP2, an existing 20" CMP culvert conveys the stormwater under Microscope Way and to Lot 12 Woodmoor Business/Technological Park. Stormwater continues overland to Crystal Creek which runs along the west side of Woodmoor Business/Technological Park. A hydraulic analysis of the existing DP2 swale is presented in Appendix B. Imagery of the downstream outfall for DP2 is provided in Appendix E.

c. Proposed Subbasin Description

Proposed basins are delineated based upon the proposed site improvements and gradi
divided into 5 proposed basins.

All Terrain: addressed, see revised basin description. Please note, design did not change, However, we have received the corresponding topo & updated the offsite grading to tie in.

Basin 1 is 0.67 acres of on-site and off-site undeveloped area. The proposed disturbanc
place excess fill from the site's building excavation. Existing drainage patterns will be ma
completion of grading of the offsite area. However, additional survey is required to accomplish this. Once survey has been completed, an updated design and analysis for this area will be presented. Basin 1 stormwater (Q_5 = 0.2 cfs Q_{100} = 1.5 cfs) will follow historic drainage patterns to DP1 (Q_5 = 0.2 cfs Q_{100} = 1.5 cfs). At DP1, an existing, unnamed drainage conveys Basin EX1 flow to Crystal Creek. Basin EX1 is excluded from water quality and detention per EPC ECM Appendix I, Section I.7.1.B.7.

Basin 2 is 0.30 acres of rooftop, paved area and undeveloped area. Basin 2 stormwater (Q_5 = 0.8 cfs Q_{100} = 1.7 cfs) is conveyed to DP2 in a grass-lined swale. At DP2, a 12" PVC culvert (private) conveys stormwater under the loading dock to a grass-lined swale along the fire access road before discharging into the full spectrum water quality and detention pond. Hydraulic calculations for the culvert and fire access road swale are presented in Appendix C.

Basin 3 is 1.33 acres of rooftop, paved area and undeveloped area. Basin 3 stormwater (Q_5 = 2.2 cfs Q_{100} = 6.0 cfs) is conveyed to DP3 (Q_5 = 2.8 cfs Q_{100} = 7.1 cfs) via sheet flow and a grass-lined swale. DP3 represents the site's full spectrum water quality and detention pond. Hydraulic calculations for the culvert and fire access road swale are presented in Appendix C.

Basin 4 is 0.11 acres of the fire access road, pond maintenance road and undeveloped area. Basin 4 stormwater (Q_5 = 0.1 cfs Q_{100} = 0.3 cfs) is captured by a roadside ditch along the east side of Microscope Way and conveyed to DP5 (Q_5 = 3.2 cfs Q_{100} = 9.7 cfs). Basin 4 follows historic drainage patterns. At DP5, the existing 20" CMP culvert will be replaced with a 30" x 19" HERCP according to the Deer Creek Roadway Improvement Plans. Per the Deer Creek Roadway Improvement Plan, the anticipated flow at the proposed 30" x 19" culvert is Q_5 = 4.36 cfs Q_{100} = 12.83 cfs. Therefore, the site discharge is in compliance with the culvert design. The culvert only receives stormwater flow from the site & the east side of Microscope Way north of the high point. Basin 4 is not detained in the onsite water quality and detention pond. Basin 4 is excluded per EPC ECM Appendix I, Section I.7.1.C.1a.

Basin 5 is 0.28 acres of Microscope Way & offsite, undeveloped area. Basin 5 stormwater (Q_5 = 0.6 cfs Q_{100} = 1.5 cfs) is captured by the existing roadside ditch on the east side of Microsc
See Basin 4 for DP5 details. Basin 5 is delineated to provide an accurate flow
culvert design from the Deer Creek Roadway Improvement Plans. Basin 5 wi
and will not be detained in the onsite water quality and detention pond.

All Terrain: Addressed. However, those improvements are discussed in the basin 6 description.

Discuss improvements that were made with phase 1 that require treatment

Basin EX2 is 1.64 acres of the existing church, parking lot and undeveloped area. Basin EX2 will follow the drainage patterns of existing Basin EX2. Basin EX2 area is reduced n the proposed condition as a portion of the existing basin is redirected to the proposed water quality and detention pond. The remaining Basin EX2 area will remain undisturbed and follow existing drainage patterns to Ex DP2/Pr DP5. In the proposed condition, Basin EX2 stormwater is Q_5 = 2.7 cfs Q_{100} = 6.3 cfs.

Discuss the increase in impervious for the site
increas
terms c

All Terrain: Addressed. See table and discussion regarding existing v. proposed flow quantities.

Drainage Design Criteria

a. Development Criteria Reference

The drainage analysis follows the criteria from the "Drainag
Volumes 1 and 2," as amended.

b. Hydrologic Criteria

Onsite drainage analysis included the 5-year storm (minor event) and 100-year storm (major event). Runoff is calculated per EPCDCM Chapter 5 – Storm Runoff Method of Analysis.

d. Hydraulic Criteria

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

III. Drainage Facility Design

a. General Concept

The proposed site will construct a 21, 750 square foot building addition. Water quality & detention will be provided for the building addition and disturbed areas not meeting any EPC Water Quality exclusions. The existing site area, outside the limits of disturbance, will remain as is and will not be detained in the onsite water quality and detention pond.

b. Water Quality & Detention

c. Water quality and detention for Basins 2 -3 is provided in an onsite, private, full spectrum detention pond located along Microscope Way. A total of 1.63 acres at 48.8% composite imperviousness will be detained. The WQCV is 0.028 ac-ft, the EURV is 0.057 ac-ft, and the 100-year volume is 0.065 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 72 and 88 hours, respectively. A private, Type L riprap low tailwater basin is located at the outfall into the pond and a 2.0' Type L riprap trickle channel conveys flow towards the private outlet structure. A 10' access and maintenance road is provided to the bottom of the pond to facilitate future maintenance of the pond facilities. A 10' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Microscope Way. The spillway and downstream outfall will be lined with Type L riprap. The pond outlet structure discharges into private 12" RCP storm sewer that discharges to the roadside ditch/30" x 19" HERCP culvert along Microscope Way. Pond design calculations are presented in Appendix D.

d. Operations & Maintenance

An Operations and Maintenance Manual will be provided on subsequent submittals.

e. Grading & Erosion Control Plan

Since the grading activities will exceed 1 acre, a Grading and Erosion Control plan is required. The GEC Plan, SWMP and associated documents will be provided on subsequent submittals.

f. Four Step Method

Step 1 – Reducing Runoff Volumes: Roof drains will discharge to landscaped areas. Implementation of landscaping and open space throughout the site will help slow runoff and increase infiltration. Additionally, grass-lined swales are used as the primary stormwater conveyance method. Grass-lined swales allow for infiltration and reduce runoff velocities compared to storm sewer.

Step 2 – Treat and slowly release the WQCV: Water quality treatment is provided for Basin 2 and Basin 3. The water quality volume will be captured and released over a period of 40 hours.

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 was previously platted in 1994 and will not pay drainage basin fees because of this project.

Se

All Terrain: Addressed. Step 1 - 4 numbering sequence updated to match Appendix I.7.2

All Terrain: Addressed. Step 1 - 4 numbering sequence updated to match Appendix I.7.2

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e road
side ditches and swales. Address if channels, ditches, and swales are stable around the site or need improvement

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

g. Drainage Basin & Bridge Fees

The site is within the Crystal Creek and Dirty Woman Creek Drainage Basin. Drainage basin and bridge fees are due at time of platting. As the site was platted in 1994, drainage basin and bridge fees were previously paid for the site.

h. Engineer's Opinion of Probable Cost

An OPC will be provided on subsequent submittals.

Provide cost of pond

All Terrain: Addressed. Pond cost & Fae added to appendix D.

FAE

IV. Summary

Ascent Church 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.

V. References

1. El Paso County – Drainage Criteria Manual, 2018 as amended.
2. Urban Storm Drainage Criteria Manual, Mile High Flood District, March 2024.
3. Federal Emergency Management Agency, Flood Map Service Center - https://msc.fema.gov/portal/home, September 2024.
4. Web Soil Survey, Natural Resources Conservation Service - https://websoilsurvey.nrcs.usda.gov/app/, September 2024.

APPENDIX A – VICINITY MAP, FEMA MAP, NRCS WEB SOIL SURVEY

ASCENT CHURCH EXPANSION

VICINITY MAP

N

500 250 0 500 1000

ORIGINAL SCALE: 1" = 500'

VICINITY MAP	
ASCENT CHURCH	
JOB NO. 25023	
LOCATION: EPC	SHEET
02/09/2026	

ALL TERRAIN ENGINEERING
1004 WEST VAN BUREN STREET
COLORADO SPRINGS, CO 80907

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Map Scale: 1:1,170 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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 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 23, Aug 29, 2025

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

Date(s) aerial images were photographed: Jul 23, 2024—Aug 4, 2024

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
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	B	0.0	0.4%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	4.9	99.6%
Totals for Area of Interest			**5.0**	**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.

APPENDIX B – HYDROLOGIC CALCULATIONS

Subdivision:	Ascent Church
Location:	El Paso County
Project Name:	Ascent Church
Project Number:	25023
Calculated By:	NQJ
Checked By:	REB
Date:	2/10/2026

EXISTING CONDITIONS - BASIN SUMMARY TABLE

Sub-basin	Area (ac)	Impervious	C_5	C_{100}	t_c (min)	$Q_{5\text{-YR}}$ (cfs)	$Q_{100\text{-YR}}$ (cfs)
EX1	1.54	2%	0.09	0.36	9.2	0.6	4.0
EX2	2.50	21%	0.32	0.53	9.2	3.5	9.5

EXISTING CONDITIONS - DESIGN POINT SUMMARY TABLE

DP#	$Q_{5\text{-YR}}$	$Q_{100\text{-YR}}$
1	0.6	4.0
2	3.5	9.5

COMPOSITE % IMPERVIOUS CALCULATIONS - EXISTING CONDITIONS

Subdivision: Ascent Church
Location: El Paso County

Project Name: Ascent Church
Project No.: 25023.00
Calculated By: NQJ
Checked By:
Date: 2/10/26

		Gravel Drives				Paved				Roofs				Undeveloped				Weighted C_5 & C_{100}		Basins Total Weighted % Imp.
Basin ID	Total Area (ac)	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}	Area (ac)	% Imp.	C_5	C_{100}	
EX1	1.54	0.59	0.70	0.00	80.0%	0.90	0.96	0.00	100.0%	0.73	0.81	0.00	90.0%	0.09	0.36	1.54	2.0%	0.09	0.36	2.0%
EX2	2.50	0.59	0.70	0.00	80.0%	0.90	0.96	0.48	100.0%	0.73	0.81	0.31	7.0%	0.09	0.36	1.71	2.0%	0.32	0.53	21.4%
Total	**4.04**																			**14.0%**

STANDARD FORM SF-2 - EXISTING CONDITIONS
TIME OF CONCENTRATION

Subdivision: Ascent Church
Location: El Paso County

Project Name: Ascent Church
Project No.: 24031.00
Calculated By: NQJ
Checked By:
Date: 2/10/26

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Weighted C_5	Weighted C_{100}	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)
EX1	1.54	B	0.09	0.36	2.0%	33	2.0%	8.3	265	11.3%	15.0	5.0	0.9	9.2	298.0	27.1	9.2
EX2	2.50	B	0.32	0.53	21.4%	95	5.0%	8.0	430	10.0%	20.0	6.3	1.1	9.2	525.0	24.2	9.2

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)

Eq

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_o^{0.33}}$$

Equation 6-3

Where:

t_i = overland (initial) flow time (minutes)
C_5 = 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)

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

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

Equation 6-4

$$t_t = \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

Equation 6-5

Where:

t_t = channelized flow time (travel time, min)
L_t = waterway length (ft)
S_t = waterway slope (ft/ft)
V_t = travel time velocity (ft/sec) = $K\sqrt{S_t}$
K = NRCS conveyance factor (see Table 6-2)

t_c =

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_t = slope of the channelized flow path (ft/ft)

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: Ascent Church
Location: El Paso County
Design Storm: 5-Year

Project Name: Ascent Church
Project No.: 25023.00
Calculated By: NQJ
Checked By: REB
Date: 2/10/26

DESCRIPTION	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)	tc (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)	
	1	EX1	1.54	0.09	9.2	0.14	4.25	0.6															Basin EX1 drains NW to DP1, DP1 represents the full length of Basin EX1's northern limit
	2	EX2	2.50	0.32	9.2	0.81	4.26	3.5															Basin EX2 drains to DP2, DP2 is conveyed under Microscope Way in an existing 20" CMP culvert

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

STANDARD FORM SF-3 - EXISTING CONDITIONS

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Ascent Church
Location: El Paso County
Design Storm: 100-Year

Project Name: Ascent Church
Project No.: 25023.00
Calculated By: NQJ
Checked By: REB
Date: 2/10/26

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)	tc (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)	
	1	EX1	1.54	0.36	9.2	0.55	7.14	4.0															Basin EX1 drains NW to DP1, DP1 represents the full length of Basin EX1's northern limit
	2	EX2	2.50	0.53	9.2	1.33	7.16	9.5															Basin EX2 drains to DP2, DP2 is conveyed under Microscope Way in an existing 20" CMP culvert

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

Subdivision:	Ascent Church
Location:	El Paso County
Project Name:	Ascent Church
Project Number:	25023
Calculated By:	NQJ
Checked By:	REB
Date:	2/10/2026

PROPOSED CONDITIONS - BASIN SUMMARY TABLE

Sub-basin	Area (ac)	Impervious	C_5	C_{100}	t_c (min)	$Q_{5\text{-YR}}$ (cfs)	$Q_{100\text{-YR}}$ (cfs)
1	0.67	2%	0.09	0.36	12.6	0.2	1.5
2	0.30	58%	0.51	0.66	5.5	0.8	1.7
3	1.33	34%	0.32	0.52	5.1	2.2	6.0
4	0.11	2%	0.09	0.36	6.3	0.1	0.3
5	0.28	44%	0.44	0.62	5.0	0.6	1.5
EX2	1.64	47%	0.45	0.62	13.2	2.7	6.3

PROPOSED CONDITIONS - DESIGN POINT SUMMARY TABLE

DP#	$Q_{5\text{-YR}}$	$Q_{100\text{-YR}}$
1	0.2	1.5
2	0.8	1.7
3	2.8	7.1
4	0.1	0.3
5	3.2	9.7

COMPOSITE % IMPERVIOUS CALCULATIONS - PROPOSED CONDITIONS

Subdivision: Ascent Church
Location: El Paso County

Project Name: Ascent Church
Project No.: 25023.00
Calculated By: NQJ
Checked By:
Date: 2/10/26

		Gravel Drives				Paved				Roofs				Undeveloped				Weighted C_5 & C_{100}		Basins Total Weighted % Imp.
Basin ID	Total Area (ac)	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}	Area (ac)	% Imp.	C_5	C_{100}	
1	0.67	0.59	0.70	0.00	80.0%	0.90	0.96	0.00	100.0%	0.73	0.81	0.00	90.0%	0.09	0.36	0.67	2.0%	0.09	0.36	2.0%
2	0.30	0.59	0.70	0.03	80.0%	0.90	0.96	0.05	100.0%	0.73	0.81	0.11	90.0%	0.09	0.36	0.11	2.0%	0.51	0.66	58.4%
3	1.33	0.59	0.70	0.10	80.0%	0.90	0.96	0.00	100.0%	0.73	0.81	0.40	90.0%	0.09	0.36	0.83	2.0%	0.32	0.52	34.3%
4	0.11	0.59	0.70	0.00	80.0%	0.90	0.96	0.00	100.0%	0.73	0.81	0.00	90.0%	0.09	0.36	0.11	2.0%	0.09	0.36	2.0%
5	0.28	0.59	0.70	0.00	80.0%	0.90	0.96	0.12	100.0%	0.73	0.81	0.00	90.0%	0.09	0.36	0.16	2.0%	0.44	0.62	44.0%
EX2	1.64	0.59	0.70	0.00	80.0%	0.90	0.96	0.48	100.0%	0.73	0.81	0.31	90.0%	0.09	0.36	0.85	2.0%	0.45	0.62	47.3%
Pond (2 &3)	**1.63**																			**38.8%**
Total	**4.33**																			**35.7%**

STANDARD FORM SF-2 - PROPOSED CONDITIONS
TIME OF CONCENTRATION

Subdivision: Ascent Church
Location: El Paso County

Project Name: Ascent Church
Project No.: 24031.00
Calculated By: NQJ
Checked By:
Date: 2/10/26

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Weighted C_5	Weighted C_{100}	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)
1	0.67	B	0.09	0.36	2.0%	35	2.0%	8.6	240	2.0%	7.0	1.0	4.0	12.6	275.0	28.7	12.6
2	0.30	B	0.51	0.66	58.4%	63	14.0%	3.5	116	2.0%	7.0	1.0	2.0	5.5	179.0	16.9	5.5
3	1.33	B	0.32	0.52	34.3%	41	12.0%	4.0	320	9.5%	15.0	4.6	1.2	5.1	361.0	21.4	5.1
4	0.11	B	0.09	0.36	2.0%	16	2.0%	5.8	88	10.0%	10.0	3.2	0.5	6.3	104.0	26.2	6.3
5	0.28	B	0.44	0.62	44.0%	13	2.0%	3.4	165	2.5%	15.0	2.4	1.2	4.6	178.0	19.7	5.0
EX2	1.64	B	0.45	0.62	47.3%	60	0.5%	11.5	252	12.0%	7.0	2.4	1.7	13.2	312.0	18.7	13.2

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)

Eq $$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_o^{0.33}}$$ Equation 6-3

Where:

t_i = overland (initial) flow time (minutes)
C_5 = 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)

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

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

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) = $K\sqrt{S_o}$
K = NRCS conveyance factor (see Table 6-2)

Equation 6-4 $$t_t = \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$ Equation 6-5

t_t =

t_t = 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_t = slope of the channelized flow path (ft/ft)

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 - PROPOSED CONDITIONS

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Ascent Church
Location: El Paso County
Design Storm: 5-Year

Project Name: Ascent Church
Project No.: 25023.00
Calculated By: NQJ
Checked By: REB
Date: 2/10/26

DESCRIPTION	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	tc (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)	
	1	1	0.67	0.09	12.6	0.06	3.78	0.2															Basin 1 follows historic drainage patterns to DP1
	2	2	0.30	0.51	5.5	0.15	5.03	0.8					0.8	0.153	12					316	5.3	1.0	Basin 2 captured in drainage swale & conveyed to DP2, conveyed by 12" PVC culvert to Basin 3 drainage swale, continues to DP3
		3	1.33	0.32	5.1	0.43	5.13	2.2															Basin 3 captured in WQ & detention pond @ DP3
	3								6.5	0.58	4.78	2.8											Combined Basin 2 & 3 flow @ DP3/WQ & detention pond
	4	4	0.11	0.09	6.3	0.01	4.83	0.1					0.1	0.01	2.5					160	1.7	1.6	Basin 4 flow @ DP4, roadside ditch flow to DP5
		EX2	1.64	0.45	13.2	0.73	3.71	2.7															Basin EX2 follows historic drainage patterns to DP5
		5	0.28	0.44	5.0	0.12	5.17	0.6															Basin 5 flow @ DP5
	5								13.2	0.87	3.71	3.2											Combined WQ & detention pond discharge, Basin 4, 5 & EX2 flow @ DP5, captured by 30" x 19" HERCP & conveyed west under Microscope Way

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

STANDARD FORM SF-3 - PROPOSED CONDITIONS

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Ascent Church
Location: El Paso County
Design Storm: 100-Year

Project Name: Ascent Church
Project No.: 25023.00
Calculated By: NQJ
Checked By: REB
Date: 2/10/26

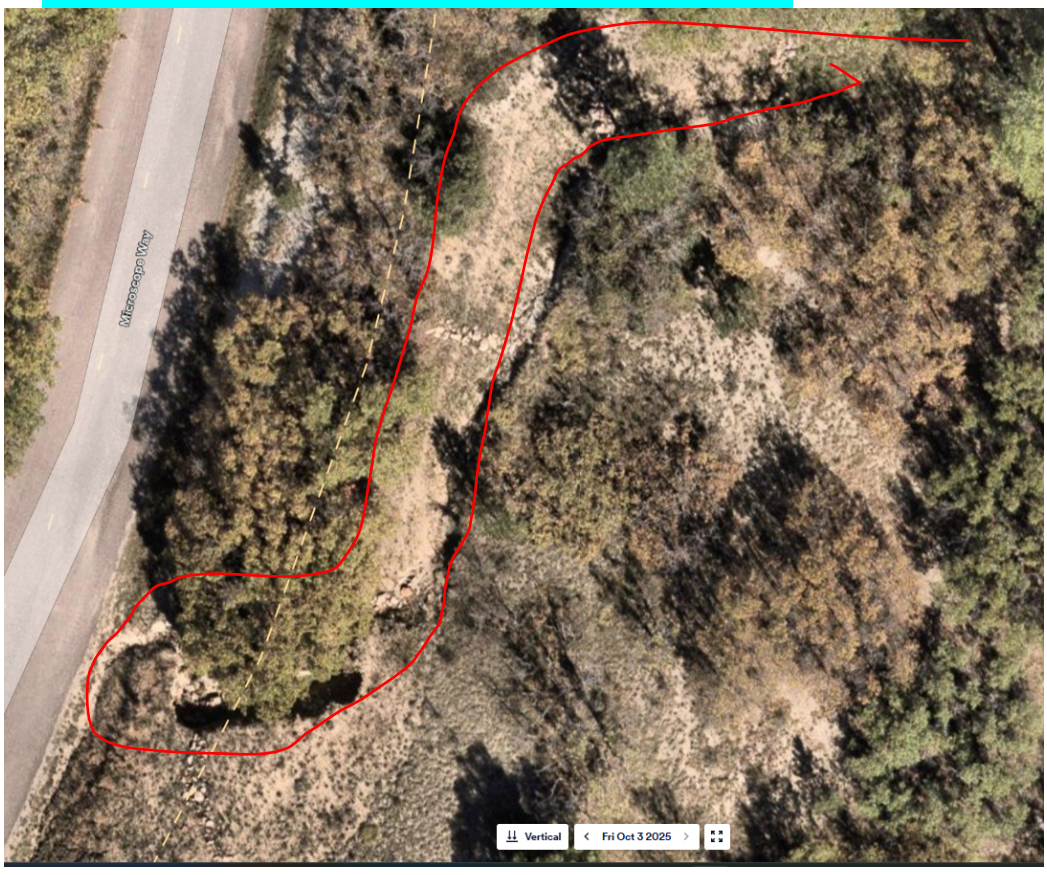
		DIRECT RUNOFF							TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			
STREET	Design Point	Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	REMARKS
	1	1	0.67	0.36	12.6	0.24	6.35	1.5															Basin 1 follows historic drainage patterns to DP1
	2	2	0.30	0.66	5.5	0.20	8.44	1.7					1.7	0.2	12					316	5.3	1.0	Basin 2 captured in drainage swale & conveyed to DP2, conveyed by 12" PVC culvert to Basin 3 drainage swale, continues to DP3
		3	1.33	0.52	5.1	0.69	8.62	6.0															Basin 3 captured in WQ & detention pond @ DP3
	3								6.5	0.89	8.02	7.1											Combined Basin 2 & 3 flow @ DP3/WQ & detention pond
	4	4	0.11	0.36	6.3	0.04	8.11	0.3					0.3	0.04	2.5					160	1.7	1.6	Basin 4 flow @ DP4, roadside ditch flow to DP5
		EX2	1.64	0.62	13.2	1.02	6.23	6.3															Basin EX2 follows historic drainage patterns to DP5
		5	0.28	0.62	5.0	0.17	8.68	1.5															Basin 5 flow @ DP5
	5								13.2	1.23	6.23	9.7											Combined WQ & detention pond discharge, Basin 4, 5 & EX2 flow @ DP5, captured by 30" x 19" HERCP & conveyed west under Microscope Way

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

APPENDIX C – HYDRAULIC CALCULATIONS

Eastern swale needs to be analyzed and improved

All Terrain: addressed.



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Feb 10 2026

Microscope Way Swale DP4 (Q100 = 0.3 cfs)

Triangular

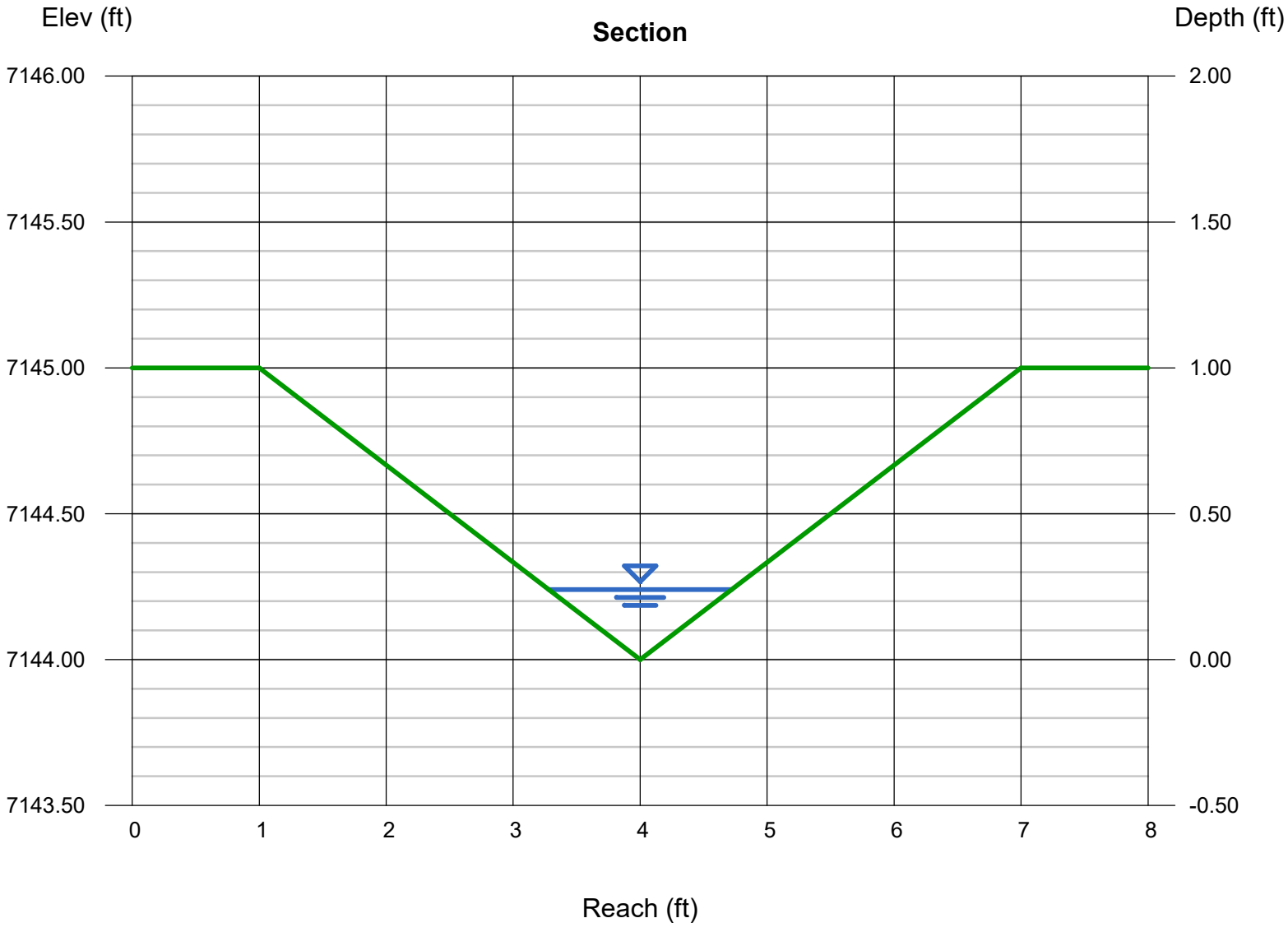
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 7144.00
Slope (%)	= 2.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.30

Highlighted

Depth (ft)	= 0.24
Q (cfs)	= 0.300
Area (sqft)	= 0.17
Velocity (ft/s)	= 1.74
Wetted Perim (ft)	= 1.52
Crit Depth, Yc (ft)	= 0.23
Top Width (ft)	= 1.44
EGL (ft)	= 0.29



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Feb 11 2026

Microscope Way Swale Ex DP2 (Q100 = 9.1 cfs)

Triangular

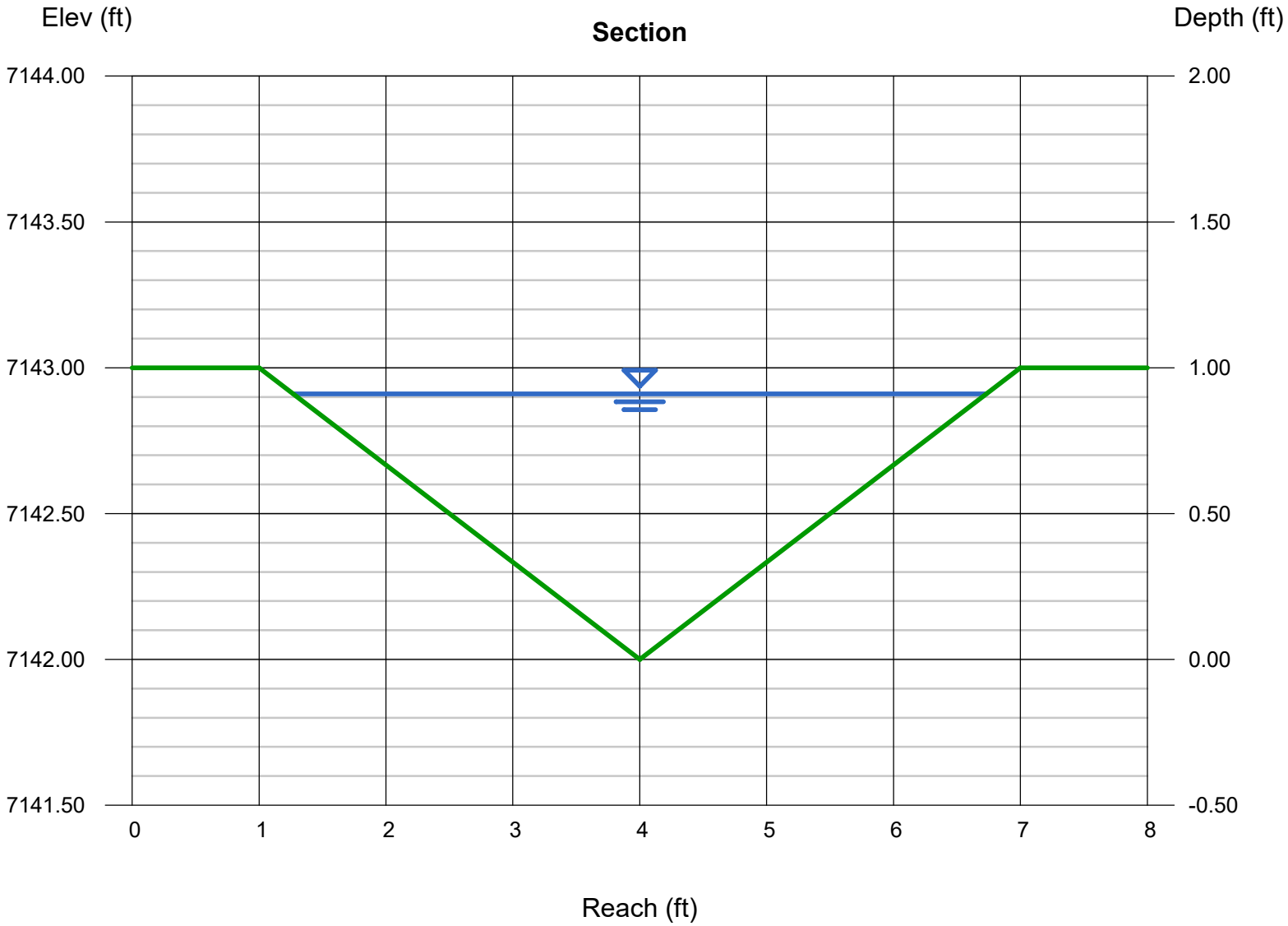
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 7142.00
Slope (%)	= 1.70
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.10

Highlighted

Depth (ft)	= 0.91
Q (cfs)	= 9.100
Area (sqft)	= 2.48
Velocity (ft/s)	= 3.66
Wetted Perim (ft)	= 5.76
Crit Depth, Yc (ft)	= 0.90
Top Width (ft)	= 5.46
EGL (ft)	= 1.12



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Feb 10 2026

Fire Road Swale (Q100 = 2.3 cfs - Basin 2 flow & fire road flow area within Basin 3)

Triangular

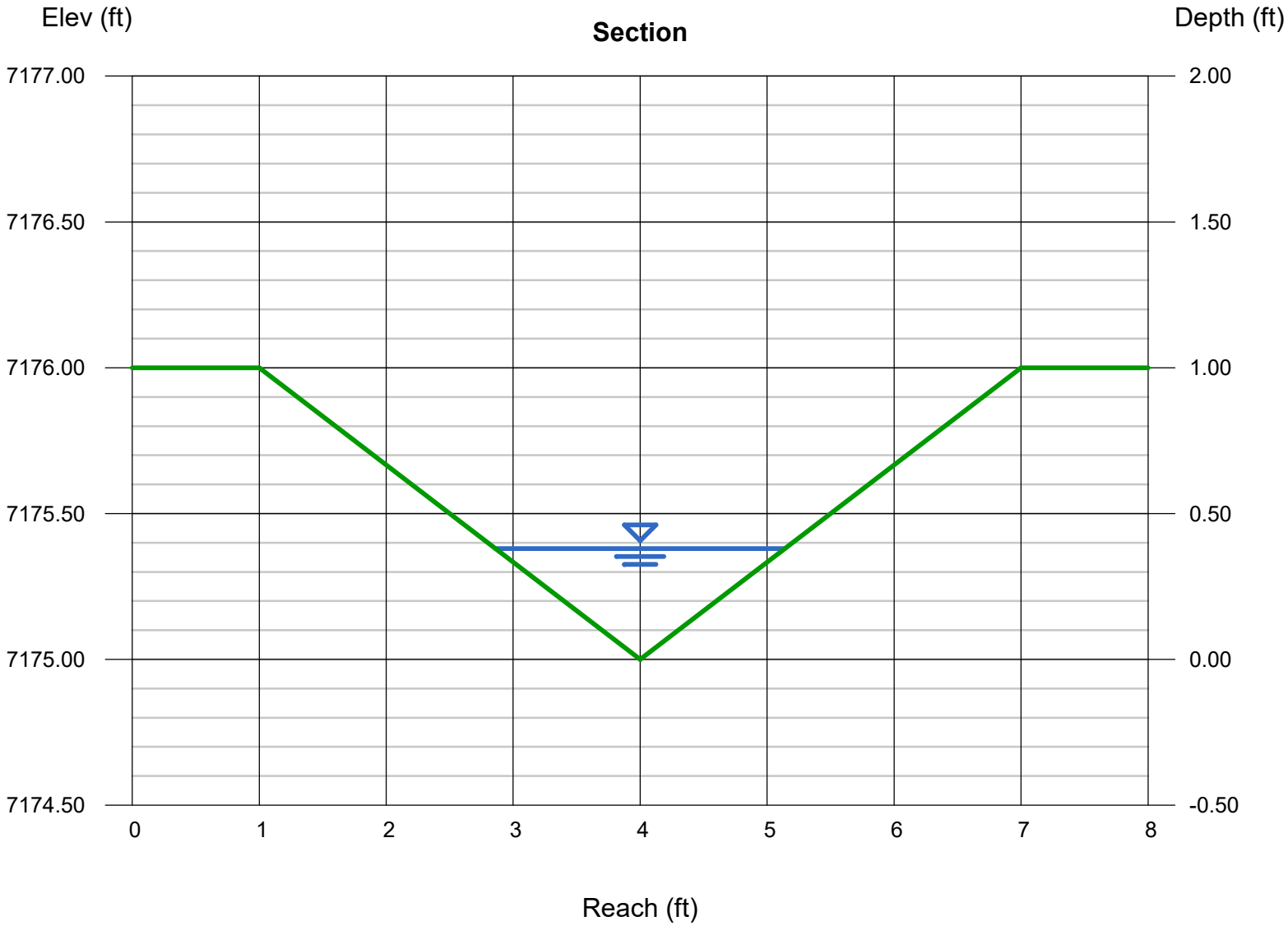
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 7175.00
Slope (%)	= 12.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.30

Highlighted

Depth (ft)	= 0.38
Q (cfs)	= 2.300
Area (sqft)	= 0.43
Velocity (ft/s)	= 5.31
Wetted Perim (ft)	= 2.40
Crit Depth, Yc (ft)	= 0.52
Top Width (ft)	= 2.28
EGL (ft)	= 0.82



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Feb 10 2026

Pond Rundown (Q100 = DP3)

Triangular

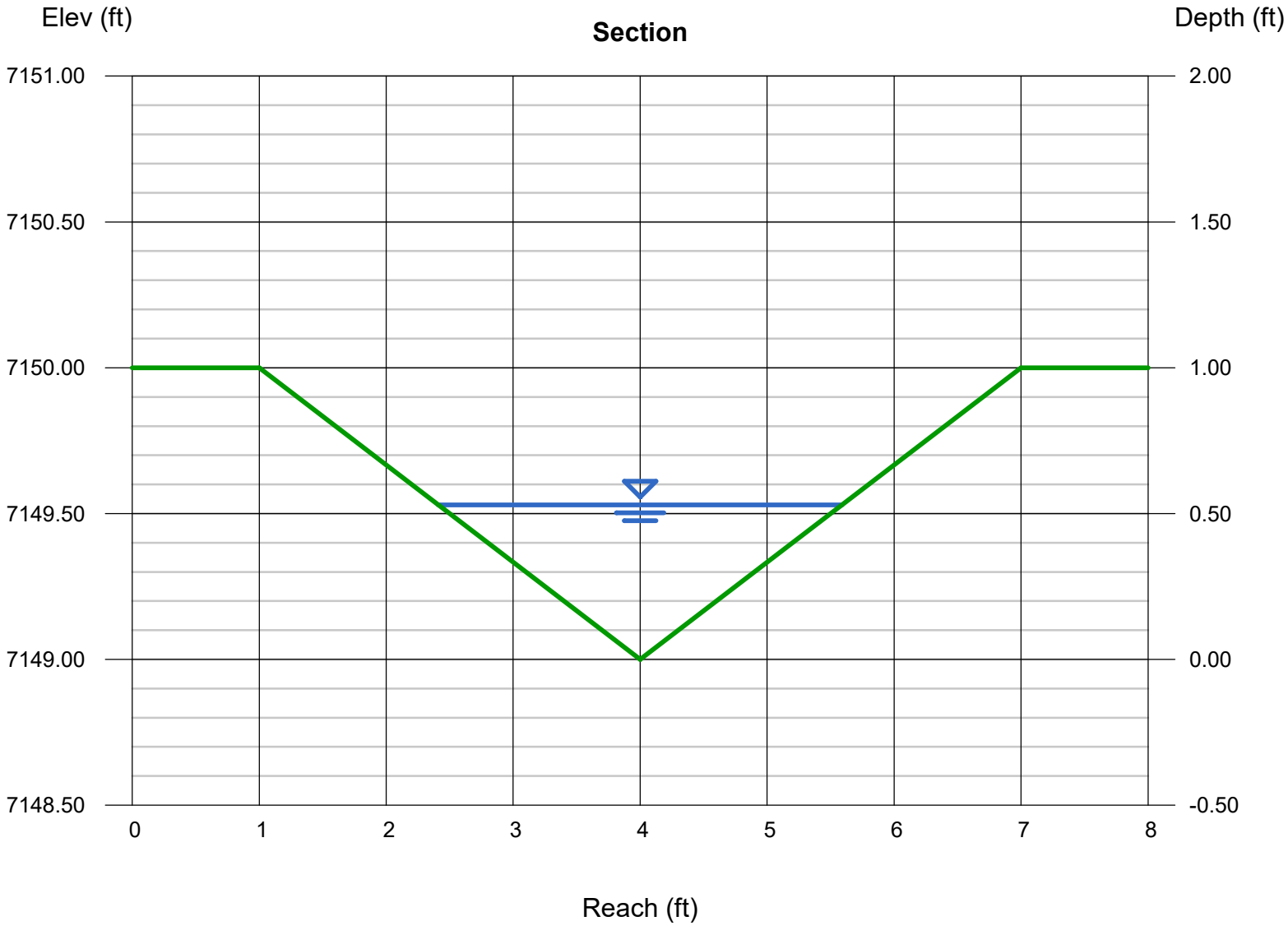
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 7149.00
Slope (%)	= 25.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.10

Highlighted

Depth (ft)	= 0.53
Q (cfs)	= 7.100
Area (sqft)	= 0.84
Velocity (ft/s)	= 8.43
Wetted Perim (ft)	= 3.35
Crit Depth, Yc (ft)	= 0.81
Top Width (ft)	= 3.18
EGL (ft)	= 1.63



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Feb 10 2026

Riprap Lined Pond Trickle Channel (Q100 = 1% of 100-year Peak Inflow = 0.35 cfs)

Triangular

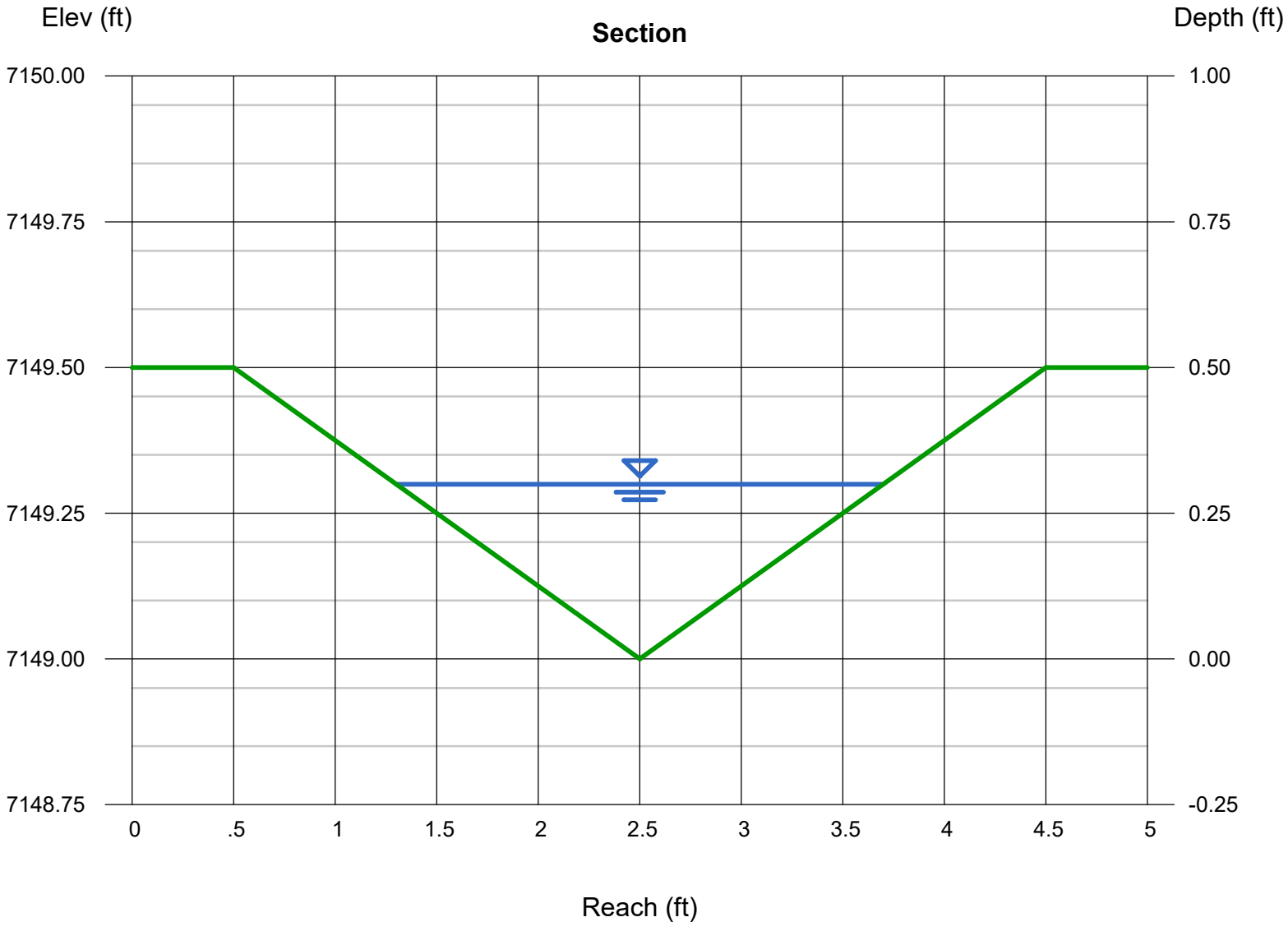
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 7149.00
Slope (%)	= 0.75
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.35

Highlighted

Depth (ft)	= 0.30
Q (cfs)	= 0.350
Area (sqft)	= 0.36
Velocity (ft/s)	= 0.97
Wetted Perim (ft)	= 2.47
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 2.40
EGL (ft)	= 0.31



Culvert Report

Loading Dock Culvert DP2 (Q100 = 1.7 cfs)

Invert Elev Dn (ft)	=	7174.01
Pipe Length (ft)	=	75.54
Slope (%)	=	0.56
Invert Elev Up (ft)	=	7174.43
Rise (in)	=	12.0
Shape	=	Circular
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

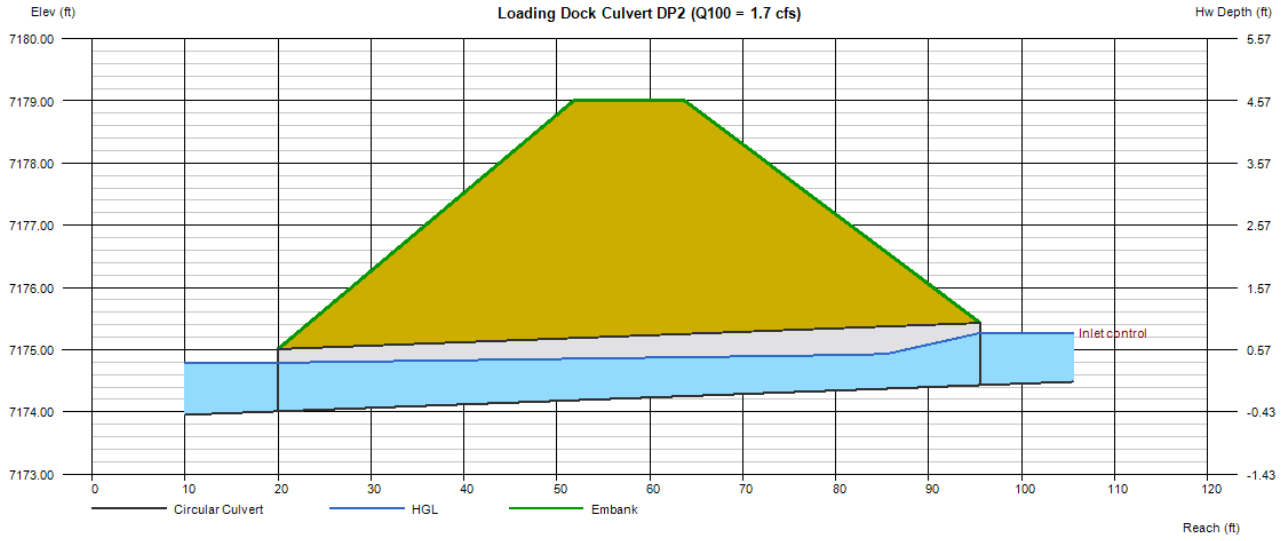
Top Elevation (ft)	=	7179.00
Top Width (ft)	=	12.00
Crest Width (ft)	=	13.00

Calculations

Qmin (cfs)	=	0.50
Qmax (cfs)	=	2.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.75
Qpipe (cfs)	=	1.75
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.66
Veloc Up (ft/s)	=	3.85
HGL Dn (ft)	=	7174.79
HGL Up (ft)	=	7174.99
Hw Elev (ft)	=	7175.27
Hw/D (ft)	=	0.84
Flow Regime	=	Inlet Control



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Feb 10 2026

Pond Outlet Pipe (Q100, Pond_out = 2.0 cfs)

Circular

Diameter (ft)	= 1.00
Invert Elev (ft)	= 7144.50
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.00

Highlighted

Depth (ft)	= 0.54
Q (cfs)	= 2.000
Area (sqft)	= 0.43
Velocity (ft/s)	= 4.60
Wetted Perim (ft)	= 1.65
Crit Depth, Yc (ft)	= 0.61
Top Width (ft)	= 1.00
EGL (ft)	= 0.87

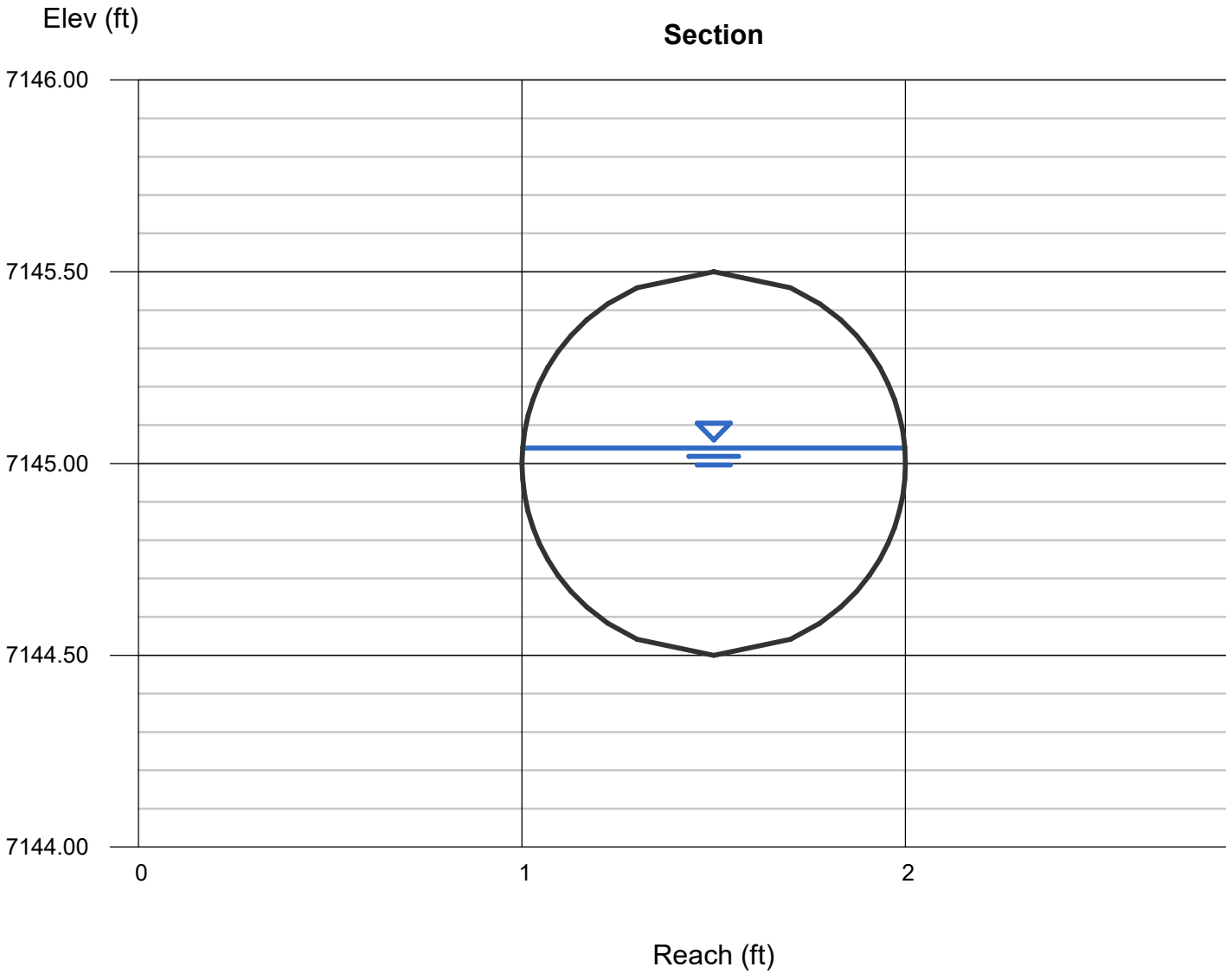


Figure 13-12c. Emergency Spillway Protection

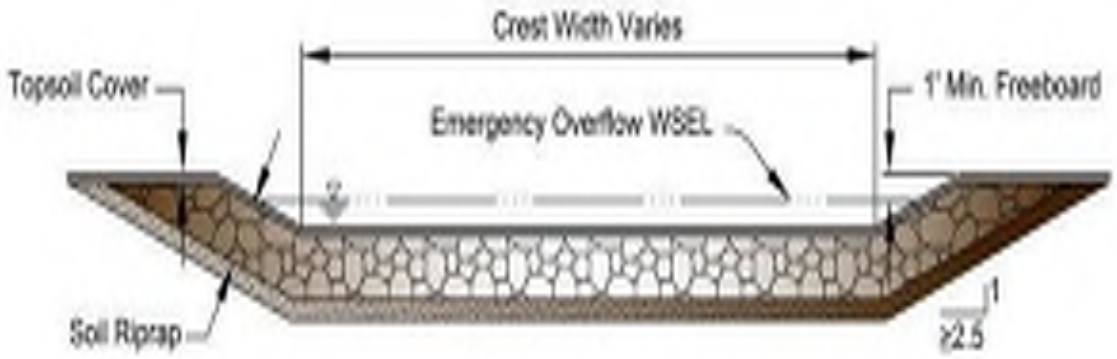
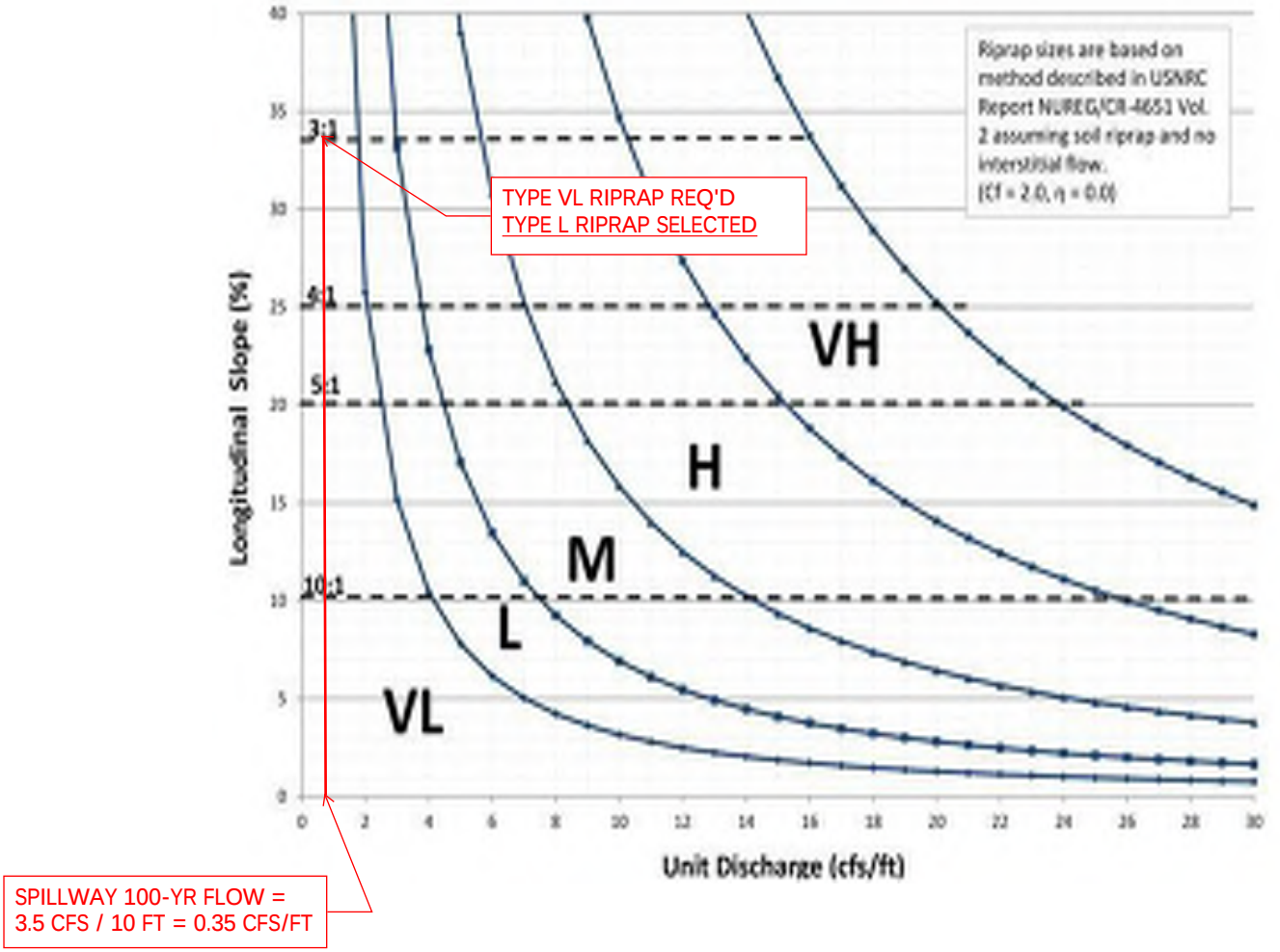


Figure 13-12d. Riprap Types for Emergency Spillway Protection



ALL TERRAIN ENGINEERING

Ascent Church - Riprap Sizing

Location	Ss	Velocity (ft/s)	Slope (ft/ft)	d_{50} (calc) (in)	d_{50} (selected) (in)	Designation	Depth
Loading Dock Culvert Outfall	2.5	2.66	0.12	1.4	9"	TYPE L	18"
Pond Rundown	2.5	8.43	0.25	5.1	9"	TYPE L	18"
Pond Discharge Pipe Outfall	2.5	4.8	0.33	3.0	9"	TYPE L	18"
Pond Trickle Channel	2.5	0.97	0.02	0.4	9"	TYPE L	18"

$$\frac{VS^{0.17}}{(S_s-1)^{0.66}} = 1.0$$

Where:

V = mean channel flow velocity, in fps;

S = longitudinal channel slope, in feet per foot (ft/ft); and

S_s = specific gravity of stone (minimum S_s = 2.50)

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)

MHFD USDCM Figure 8-34

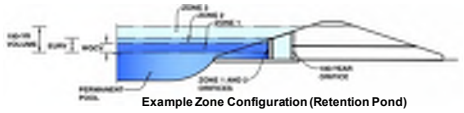
APPENDIX D – WATER QUALITY & DETENTION

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Ascent Church

Basin ID: Basin 2 & 3



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	1.63	acres
Watershed Length =	480	ft
Watershed Length to Centroid =	220	ft
Watershed Slope =	0.060	ft/ft
Watershed Imperviousness =	48.80%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.028	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.085	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 0.9 in.) =	0.051	acre-feet	0.90 inches
5-yr Runoff Volume (P1 = 1.2 in.) =	0.076	acre-feet	1.20 inches
10-yr Runoff Volume (P1 = 1.46 in.) =	0.104	acre-feet	1.46 inches
25-yr Runoff Volume (P1 = 1.86 in.) =	0.162	acre-feet	1.86 inches
50-yr Runoff Volume (P1 = 2.18 in.) =	0.202	acre-feet	2.18 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.252	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.4 in.) =	0.370	acre-feet	3.40 inches
Approximate 2-yr Detention Volume =	0.048	acre-feet	
Approximate 5-yr Detention Volume =	0.070	acre-feet	
Approximate 10-yr Detention Volume =	0.097	acre-feet	
Approximate 25-yr Detention Volume =	0.119	acre-feet	
Approximate 50-yr Detention Volume =	0.130	acre-feet	
Approximate 100-yr Detention Volume =	0.150	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.028	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.057	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.065	acre-feet
Total Detention Basin Volume =	0.150	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

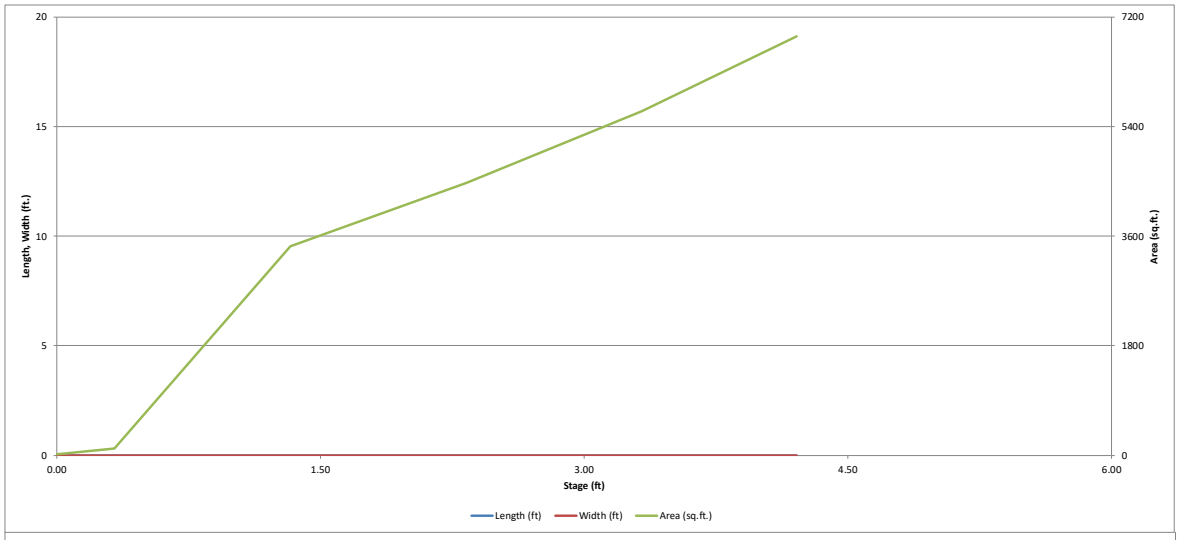
7144.67

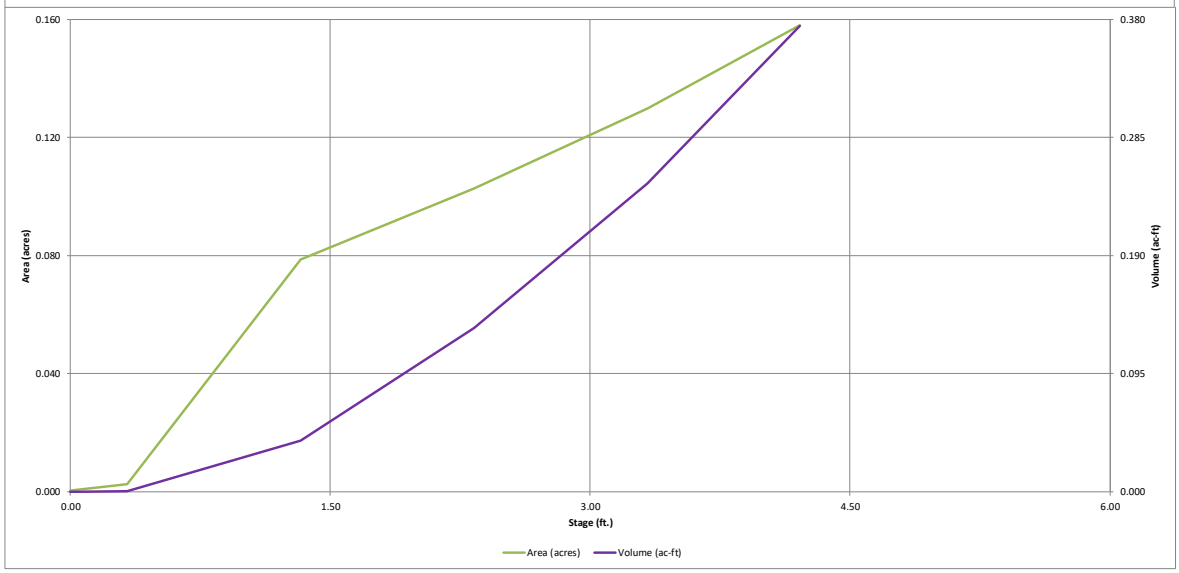
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	20	0.000		
7145	--	0.33	--	--	--	108	0.002	21	0.000
7146	--	1.33	--	--	--	3,428	0.079	1,789	0.041
7147	--	2.33	--	--	--	4,478	0.103	5,742	0.132
7148	--	3.33	--	--	--	5,655	0.130	10,809	0.248
7148.88	--	4.21	--	--	--	6,885	0.158	16,326	0.375

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



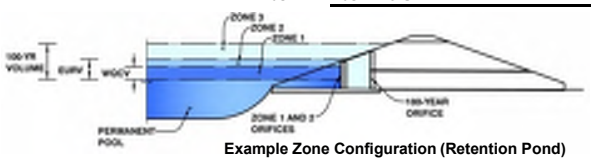


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Ascent Church**

Basin ID: **Basin 2 & 3**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.15	0.028	Orifice Plate
Zone 2 (EURV)	1.85	0.057	Circular Orifice
Zone 3 (100-year)	2.51	0.065	Weir&Pipe (Restrict)
Total (all zones)		0.150	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.111E-03	ft^2
Depth at top of Zone using Orifice Plate =	1.25	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	0.16	sq. inches (diameter = 7/16 inch)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.45	0.85					
Orifice Area (sq. inches)	0.16	0.16	0.16					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Circular	Not Selected			Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	1.15	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.00	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	1.85	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.02	N/A	feet
Vertical Orifice Diameter =	0.56	N/A	inches				

Calculated Parameters for Vertical Orifice

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	2.25	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.25	N/A	feet
Overflow Weir Front Edge Length =	3.00	N/A	feet	Overflow Weir Slope Length =	3.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	34.23	N/A	
Horiz. Length of Weir Sides =	3.00	N/A	feet	Overflow Grate Open Area w/o Debris =	6.26	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	3.13	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.18	N/A	ft^2
Outlet Pipe Diameter =	12.00	N/A	inches	Outlet Orifice Centroid =	0.17	N/A	feet
Restrictor Plate Height Above Pipe Invert =	3.40		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.12	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	2.80	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.30	feet
Spillway Crest Length =	10.00	feet	Stage at Top of Freeboard =	4.10	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.15	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	0.36	acre-ft

Calculated Parameters for Spillway

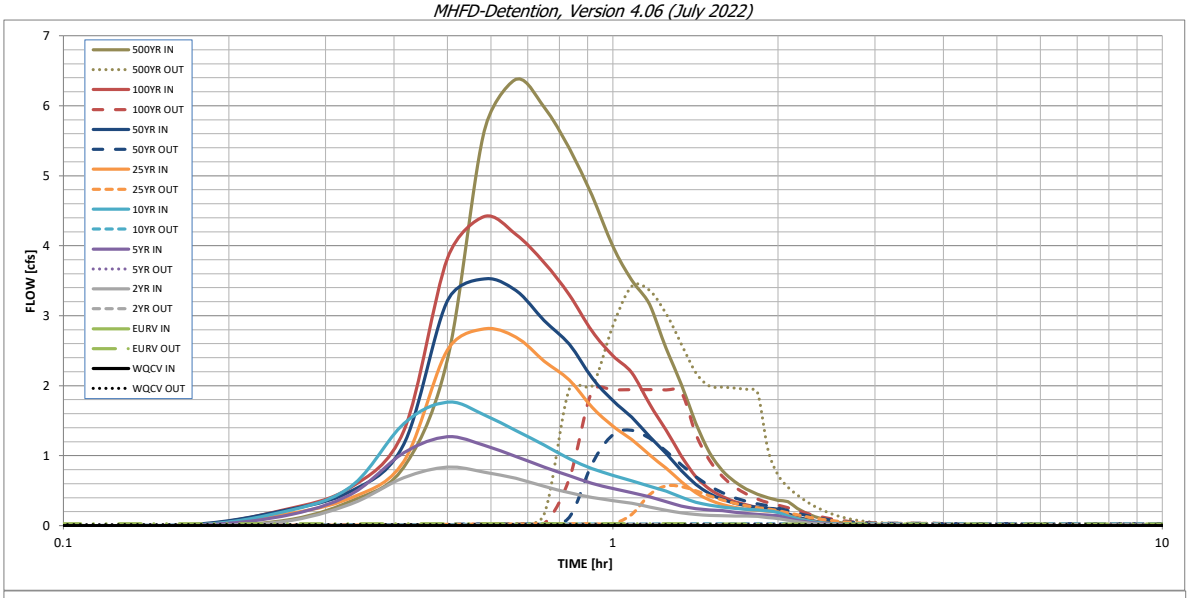
Routed Hydrograph Results

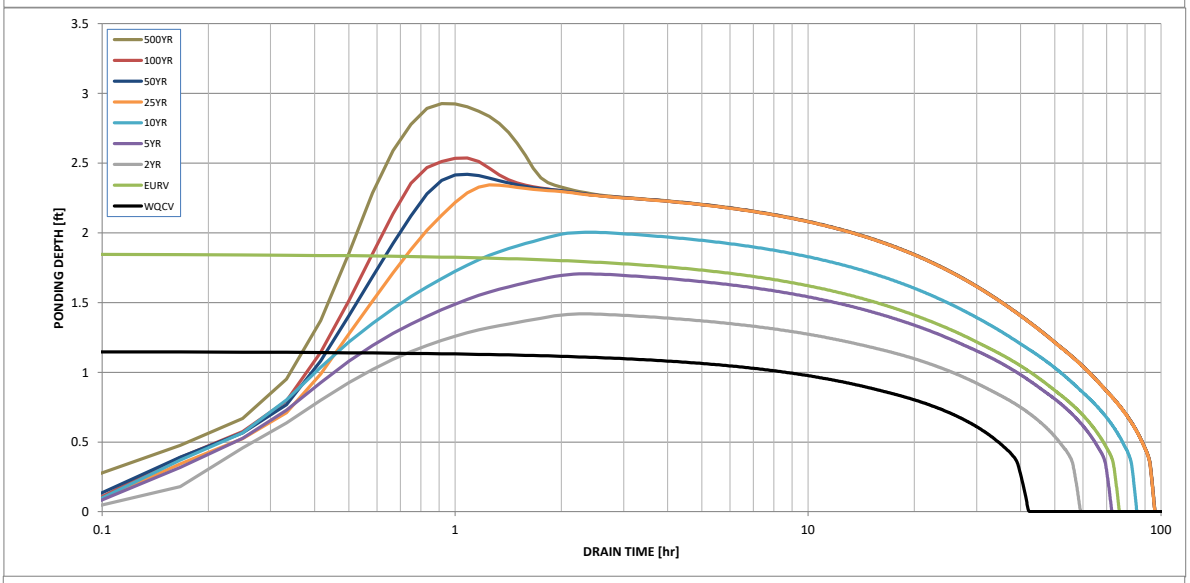
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

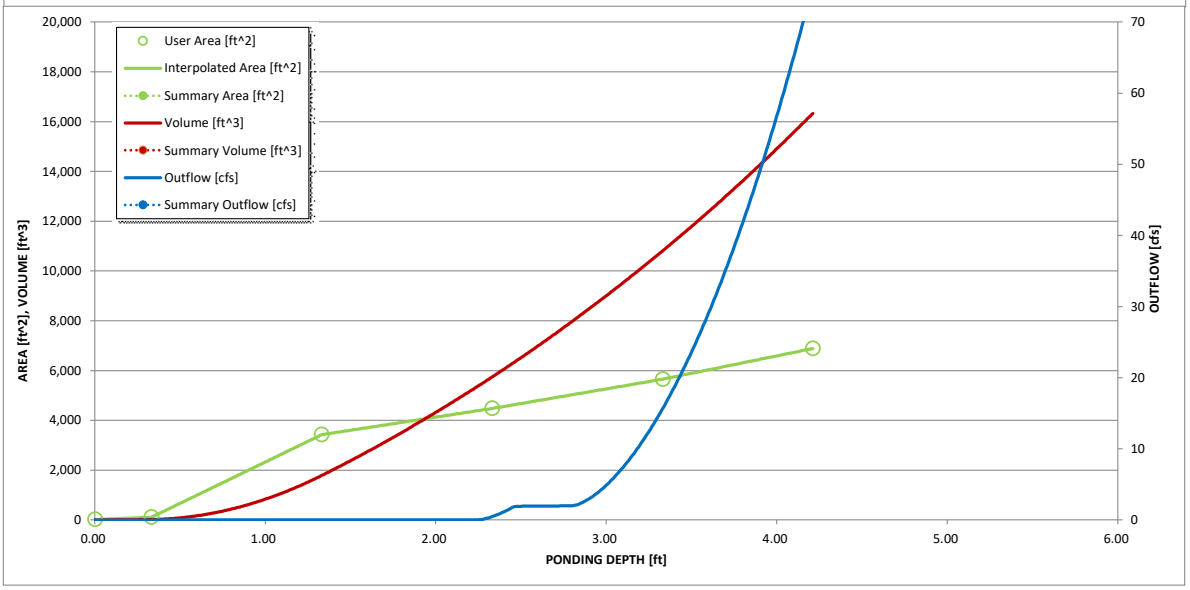
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.90	1.20	1.46	1.86	2.18	2.52	3.40
CUHP Runoff Volume (acre-ft) =	0.028	0.085	0.051	0.076	0.104	0.162	0.202	0.252	0.370
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.051	0.076	0.104	0.162	0.202	0.252	0.370
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.1	0.4	1.3	1.7	2.3	3.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.09	0.27	0.77	1.06	1.40	2.20
Peak Inflow Q (cfs) =	N/A	N/A	0.8	1.3	1.8	2.8	3.5	4.4	6.4
Peak Outflow Q (cfs) =	0.0	0.0	0.0	0.0	0.0	0.6	1.4	1.9	3.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.1	0.5	0.8	0.8	1.0
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.1	0.2	0.3	0.3
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	67	53	64	75	83	80	78	73
Time to Drain 99% of Inflow Volume (hours) =	**40**	72	56	69	81	89	88	87	85
Maximum Ponding Depth (ft) =	1.15	1.85	1.42	1.70	2.00	2.34	2.42	2.54	2.93
Area at Maximum Ponding Depth (acres) =	0.06	0.09	0.08	0.09	0.09	0.10	0.10	0.11	0.12
Maximum Volume Stored (acre-ft) =	0.028	0.085	0.047	0.072	0.099	0.133	0.140	0.153	0.197

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.07
	0:15:00	0.00	0.00	0.05	0.13	0.19	0.15	0.21	0.22	0.35
	0:20:00	0.00	0.00	0.31	0.44	0.55	0.40	0.49	0.55	0.84
	0:25:00	0.00	0.00	0.69	1.04	1.46	0.92	1.16	1.36	2.37
	0:30:00	0.00	0.00	0.84	1.27	1.77	2.51	3.21	3.82	5.64
	0:35:00	0.00	0.00	0.76	1.15	1.58	2.81	3.53	4.42	6.38
	0:40:00	0.00	0.00	0.68	0.99	1.36	2.70	3.36	4.16	5.98
	0:45:00	0.00	0.00	0.56	0.84	1.15	2.35	2.93	3.76	5.39
	0:50:00	0.00	0.00	0.47	0.71	0.95	2.08	2.59	3.30	4.72
	0:55:00	0.00	0.00	0.40	0.60	0.81	1.69	2.11	2.78	3.99
	1:00:00	0.00	0.00	0.36	0.53	0.72	1.42	1.79	2.43	3.51
	1:05:00	0.00	0.00	0.32	0.47	0.64	1.23	1.55	2.18	3.16
	1:10:00	0.00	0.00	0.27	0.41	0.56	1.01	1.27	1.74	2.54
	1:15:00	0.00	0.00	0.22	0.34	0.49	0.82	1.03	1.37	2.02
	1:20:00	0.00	0.00	0.18	0.28	0.41	0.63	0.79	0.99	1.47
	1:25:00	0.00	0.00	0.16	0.24	0.34	0.47	0.59	0.70	1.04
	1:30:00	0.00	0.00	0.15	0.23	0.29	0.37	0.46	0.52	0.79
	1:35:00	0.00	0.00	0.14	0.21	0.27	0.30	0.38	0.42	0.63
	1:40:00	0.00	0.00	0.14	0.19	0.25	0.26	0.32	0.34	0.52
	1:45:00	0.00	0.00	0.14	0.17	0.23	0.24	0.28	0.30	0.45
	1:50:00	0.00	0.00	0.13	0.16	0.22	0.22	0.26	0.26	0.40
	1:55:00	0.00	0.00	0.12	0.15	0.21	0.21	0.24	0.24	0.36
	2:00:00	0.00	0.00	0.10	0.14	0.19	0.20	0.23	0.22	0.34
	2:05:00	0.00	0.00	0.08	0.10	0.14	0.14	0.17	0.16	0.25
	2:10:00	0.00	0.00	0.06	0.08	0.10	0.10	0.12	0.12	0.18
	2:15:00	0.00	0.00	0.04	0.05	0.07	0.08	0.09	0.09	0.13
	2:20:00	0.00	0.00	0.03	0.04	0.05	0.05	0.06	0.06	0.09
	2:25:00	0.00	0.00	0.02	0.03	0.03	0.04	0.04	0.04	0.06
	2:30:00	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.04
	2:35:00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.03
	2:40:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.
The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

2880 International Circle, Suite 110
Colorado Springs, CO 80910
Phone: 719-520-6300
Email: Stormwater@elpasoco.com
publicworks.elpasoco.com/stormwater/

EL PASO COUNTY
PCM APPLICABILITY FORM

EPC Project Number: _____

This form is to be used by the Engineer of Record to determine if the proposed construction activities are eligible for an exclusion to stormwater quality permanent control measure (PCM) requirements. All "applicable construction activity" within El Paso County (EPC) must comply with the post-construction stormwater management criteria. Reference ECM Appendix I for information about PCMs.

Note that this form only addresses stormwater quality for the site. Even if the site is fully excluded from needing a stormwater quality PCM, the site may still need to address stormwater detention (per DCMv1 Chap 1.5 and ECM Chap 3.2.8.B). However, if the site requires stormwater detention, then it must also address stormwater quality (per DCMv2 Chap 4.1 and ECM Appendix I.7.3). Refer to the Reference Information pages below for more guidance.

Part I. Project Summary			
Project Name:	ASCENT CHURCH		
Is Stormwater Detention Required?	☒ Yes ☐ No	**Is Water Quality Treatment Required? (i.e.: non-excluded disturbance >1ac)**	☒ Yes ☐ No
Is an ESQCP Required? If "No," Check Applicable Reason	☒ Yes ☐ No	☐ Not an Applicable Construction Activity ☐ Oil & Gas ☐ R-Factor	
Engineer of Record Email Address:	NJOKERST@ALLTERRAINENG.COM		

Part II. PCM Exclusions

Note: Questions A through K directly correlate to Part I.E.4.a.i (A) to (K) on page 27 of the 2016 CDPS Statewide Standard MS4 General Permit COR090000 (i.e.: the MS4 Permit), as amended. Document exclusions that apply to the whole project or parts of it.

Questions	Excluded Acreage	Yes	No	Notes
A. Is this project a "Pavement Management Site?"			X	This exclusion applies to the maintenance, rehabilitation, and reconstruction of pavement on existing roads, bridges, bike lanes, and parking along roads. Areas used primarily for parking (i.e.: separate lots not along roadway) or access to parking are not included. No increase in impervious area is allowable.
B. Review two options below to see if project is an "Excluded Roadway Development."				Does not include sidewalks. Does include curb & gutter.
• Does the project include improvements to an existing roadway that adds < 1 acre of paved or gravel area per mile of roadway?			X	If selected, list the proposed additional acreage per mile in Part IV Notes below.
• Does the project include improvements to an existing roadway that adds ≤ 8.25 ft of paved width at any location?			X	If selected, list the proposed additional width in Part IV Notes below.

2880 International Circle, Suite 110
Colorado Springs, CO 80910
Phone: 719-520-6300
Email: Stormwater@elpasoco.com
publicworks.elpasoco.com/stormwater/

EL PASO COUNTY
PCM APPLICABILITY FORM

EPC Project Number: _____

Part II. PCM Exclusions (continued)				
Questions	**Excluded Acreage**	**Yes**	**No**	**Notes**
C. Does the project include "Excluded Existing Roadway Areas?"			X	For redevelopment of existing roadways. This exclusion only excludes the original roadway area, it does NOT apply to the entire project. This exclusion applies only when the proposed project will expand the existing roadway width by <2x on average. If selected, list the proposed expanded width in Part IV Notes below.
D. Is the project considered an Aboveground or Underground Utilities activity?			X	Activity can not permanently alter the terrain, ground cover, or drainage patterns from existing conditions.
E. Is the project considered a "Large Lot Single-Family Site"? *This exclusion only pertains to the lots and does not include roadways.*			X	Must be a single-family residential lot or agricultural zoned land with ≥ 2.5 acres per dwelling and total lot impervious area < 10%. If "Yes," notate the percent impervious below in Part IV: 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 80th percentile stormwater runoff event, and the 80th percentile event must be infiltrated.*			X	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?	0.67			Project must be on land with no human made structures such as buildings or pavement. The proposed development must return the disturbed area to its historical condition. See CDPHE's "Standard MS4 Permit FAQ" for more detail on how this exclusion applies.
H. Is the project a Stream Stabilization Site?			X	
I. Is the project a Bike or Pedestrian Trail?			X	Bike lanes for roadways are not included in this exclusion but may qualify if attached to a larger roadway activity that is excluded in A, B or C above. Pedestrian trails (e.g. sidewalks) that are attached to a roadway do not apply.
J. Is the project Oil and Gas Exploration?			X	Activities and facilities associated with oil and gas exploration are excluded.
K. Is the project in a County Growth Area?				El Paso County does not apply this exclusion.

If any exclusions above apply (via a "Yes" for any row), runoff from those areas is excluded from stormwater quality treatment requirements. All runoff from remaining non-excluded disturbed areas will need to be treated by a stormwater quality PCM, unless remaining area is <1ac. If remaining area is >1ac, select at least one Design Standard on the next page.

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EL PASO COUNTY
PCM APPLICABILITY FORM

EPC Project Number: _____

Part III: PCM Information		
Questions	**Yes**	**No**
1. Which of the following Design Standard(s) will the project utilize? *(If a PCM is required, you must select at least one. See Control Measure Requirements identified in MS4 Permit Part I.E.4.a.iv on page 29.)*		
A. Water Quality Capture Volume (WQCV) Standard	X	
B. Pollutant Removal Standard - 80% Total Suspended Solids Removal (TSS) *(must treat runoff to <30mg/L of TSS)*		
C. Runoff Reduction Standard		
D. Applicable Development Site Draining to a Regional WQCV Control Measure *(no conveyance via "Waters of the State")*		
E. Applicable Development Site Draining to a Regional WQCV Facility *(conveyance allowable via "Waters of the State," if the 8 conditions in the MS4 permit are met and documented in the drainage report)*		
F. Constrained Redevelopment Sites Standard *(must be pre-approved by ECM Administrator)*		
G. Previous Permit Term Standard		
2. Will any of the PCMs be located within any other jurisdiction besides EPC?		X

Part IV: Notes

Provide info regarding all applicable PCM(s) and PCM Exclusion(s) including location, PCM name(s)/number(s), and additional relevant filings or reports or maintenance agreements, etc. Attach an additional sheet if you need more space. Attaching a detailed summary table would replace the need for any notes here.

A full spectrum water quality & detention pond will be constructed on-site to capture & treat stormwater from proposed drainage basins 2 & 3.

Basin 1 (0.67 acres) is excluded from WQ & detention per EPC ECM Appendix I, Section I.7.1.B.7.

Basin 4 (0.11) is excluded from WQ & detention per EPC ECM Appendix I, Section I.7.1.C.1a.

Basin EX2 and 5 remain undisturbed & are therefore excluded from WQ & detention requirements.

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EL PASO COUNTY
PCM APPLICABILITY FORM

EPC Project Number: _____

Part V: Signatures

Applicant: This PCM Applicability Form was prepared under my direction and supervision and is correct to the best of my knowledge and belief. It was prepared along with the project design, construction plans, drainage report, specifications, and maintenance and access agreements as required. And it has been reviewed for compliance with the Post Construction Stormwater Management criteria and MS4 Permit requirements.

COLORADO LICENSED NICHOLAS QUINN JOHNSTON PE0059273 02/10/26 PROFESSIONAL ENGINEER

_____ _____ 02/10/2026

Signature and Stamp of Engineer of Record — Date

(If the project is not an Applicable Construction Activity, this line can be signed by the Applicant or their rep, they do not have to be an engineer)

_____

El Paso County: This PCM 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

Reference Information:

If a PCM is required, then these additional documents will also need to be submitted:

- PCM Maintenance Agreement
- PCM O&M Manual
- MHFD Detention Basin Design Workbook*
- Proof of Submittal of: Notice of Intent to Construct a Non-Jurisdictional Water Impoundment Structure*

*Not required for all PCMs, check ECM Appendix I for requirements

The following are screenshots of example Water Quality Treatment Summary Tables. The Excel versions can be found at the EPC DPW Stormwater website linked below. These are optional tables that can be used to summarize water quality treatment and applicable exclusions. Select the table that best suits the project based on the number of basins, PCMs, and/or exclusions. A PDF of the selected table(s) can be attached to this form and/or to the Drainage Report. It is helpful to also include a basic overview map with color shading or hatch patterns that shows areas tributary to each type of PCM (pond, runoff reduction, etc.) and those areas that are not captured by a PCM, with the applicable exclusion(s) labeled.

https://publicworks.elpasoco.com/stormwater/

Water Quality Treatment Summary Table		
Basin ID(s)	**PCM Tributary Area (ac)**	**PCM ID**
A1 - A5	4	Pond 1
B1 - B3	3.25	Pond 2
C, D	5.5	Runoff Reduction
E	10	Excluded*

* Excluded based on ECM App I.7.1.B.5

Water Quality Treatment Summary Table							
Basin ID	**Total Area (ac)**	**Total Proposed Disturbed Area (ac)**	**Area Trib to Pond A (ac)**	**Disturbed Area Treated via Runoff Reduction (ac)**	**Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)**	**Disturbed Area Excluded from WQ per ECM App I.7.1.B.# (ac)**	**Applicable WQ Exclusions (App I.7.1.B.#)**
A	4.50	4.50	4.50				
B	1.25	1.25		1.25			
C	6.00	4.00				4.00	ECM App I.7.1.B.5
D	2.50	2.50	1.00		0.50	1.00	ECM App I.7.1.B.7
E	3.00		3.00				
F	8.25						
Total	25.50	12.25	8.50	1.25	0.50	5.00	

Min Required Area to Receive WQ Treatment	**Total Proposed Disturbed Area (ac)**	**Total Proposed Treated Area (ac)**	**Total Proposed Disturbed Area Excluded from WQ (ac)**	**Net Treatment (ac)**
6.75	12.25	9.75	5.50	3.00

Design Standard D, definition of "Waters of the State of Colorado" per MS4 Permit:

> *"Any and all surface waters and subsurface waters which are contained in or flow in or through this state, but does not include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed. This definition can include water courses that are usually dry."*
>
> The following website shows Waters of the State of Colorado:
>
> https://cdphe.maps.arcgis.com/apps/Viewer/index.html?appid=f1541d2f21834642ba1551c674fd4a79

Design Standard E, additional info from the MS4 Permit:

> *Before discharging to a water of the state, at least 20 percent of the upstream imperviousness of the applicable development site must be disconnected from the storm drainage system and drain through a receiving pervious area control measure comprising a footprint of at least 10 percent of the upstream disconnected impervious area of the applicable development site. The control measure must be designed in accordance with a design manual identified by the permittee. In addition, the stream channel between the discharge point of the applicable development site and the regional WQCV facility must be stabilized.*
>
> Below are the 8 conditions that must be met:
>
> *1) The regional WQCV facility must be implemented, functional, and maintained following good engineering, hydrologic and pollution control practices.*
>
> *2) The regional WQCV facility must be designed and maintained for 100% WQCV for its entire drainage area.*
>
> *3) The regional WQCV facility must have capacity to accommodate the drainage from the applicable development site.*
>
> *4) The regional WQCV facility be designed and built to comply with all assumptions for the development activities planned by the permittee within its drainage area, including the imperviousness of its drainage area and the applicable development site.*
>
> *5) Evaluation of the minimum drain time shall be based on the pollutant removal mechanism and functionality of the facility. Consideration of drain time shall include maintaining vegetation necessary for operation of the facility (e.g., wetland vegetation).*
>
> *6) The permittee shall meet the requirements in Parts I.E.4.a.v. and vii. and Part I.E.4.b. for the regional WQCV facility consistent with requirements and actions for control measures.*
>
> *7) The regional WQCV facility must be subject to the permittee's authority consistent with requirements and actions for a Control Measure in accordance with Part I.E.4.a.iv.*
>
> *8) Regional Facilities must be designed and implemented with flood control or water quality as the primary use. Recreational ponds and reservoirs may not be considered Regional Facilities. Water bodies listed by name in surface water quality classifications and standards regulations (5 CCR 1002-32 through 5 CCR 1002-38) may not be considered regional facilities.*

APPENDIX E – REFENCE MATERIAL

Approved
El Paso County
Planning Commission
This 21 day of July 19 93
Barbara E. Smith
Chairman
Elaine Nelson, Secretary

DIRTY WOMAN CREEK
and
CRYSTAL CREEK
DRAINAGE BASIN PLANNING STUDY

PRELIMINARY DESIGN REPORT

Prepared for:

El Paso County Department of Public Works
Stormwater Management Division
3105 North Stone
Colorado Springs, CO 80907

Prepared by:

Kiowa Engineering Corporation
419 West Bijou Street
Colorado Springs, CO 80905-1308

KIOWA Project No. 91.07.17
D22/R191

February 1993
Revised April 1993
Revised May 1993
Revised June 1993

storms is also included in the *Criteria Manual*. Rainfall depths shown in the criteria manual are based on *National Oceanographic and Atmospheric Administration (NOAA) Atlas 2*. Rainfall depths used in the model are 4.40 inches and 2.88 inches for the 24-hour and 2-hour, 100-year storms respectively. It was determined through analysis that the 2-hour storm was the critical storm. The rainfall depth for the 2-hour, 10-year storm used in the analysis is 1.94 inches. The use of the 2-hour storm is consistent with the ongoing FEMA Restudy of Dirty Woman and Crystal Creeks.

The *City/County Criteria* was subsequently changed during the course of this study to exclude the use of the 2-hour storm and AMC-III. Because the hydrology was completed under then current criteria, the decision was made to utilize the 2-hour storm hydrology. The use of this storm type is comparable to the previous studies by CWCB and FEMA. The soil and basin conditions of Dirty Woman and Crystal Creeks lends itself to the use of the AMC-III condition. The relatively small size of the drainage basins, under 6 square miles, lends itself to the use of AMC-III. The AMC-III provides a method to better depict the infiltration rates during intense rain events. These were all factors in utilizing the 2-hour storm hydrology.

Hydrologic Modeling

The hydrologic model consists of 95 sub-basins linked by drainageways or "reaches". Presented on Exhibit 1 (in map pocket) is the Hydrologic Basin Map which shows the sub-basins analyzed.. Hydrographs are accumulated at design points along the major drainages. A hydrologic flow chart was developed and is presented in Figure 4. Both the existing and future development condition hydrologic models are based on the current configuration of both Dirty Woman and Crystal Creeks and their tributary drainages.

The hydrologic model for the basin is based upon the 1-inch to 200-foot topographic mapping prepared by Landmark Mapping, Ltd. for this project. Basin areas, lengths, slopes, and flow patterns were determined using these maps.

Results

The results of the hydrologic analysis have been presented in several formats. A basin hydrologic map which contains the basin boundary, regional basins, channel routing scheme, sub-basin locations, and design points is shown on Exhibit 1 which is contained in a map pocket attached to this report. Flood discharge profiles for the various storm types analyzed are shown on Figures 5 through 7. Summarized on Table 1 is the sub-basin peak discharge information. Presented on Table 2 are the peak discharges for the key design points in the basin.

The flows generated by the 2-hour storm were greater than those generated by the 24-hour storm for both drainage basins. The decision was made in the technical review meetings to use the 2-hour storm for this drainage basin planning study.

The differences in the existing and future flow conditions were minimal. The reaches in the upper end of the basin show no difference between the existing and future flow conditions. The difference between flow rates is generated by the potential future development along the Interstate 25 corridor and within the general area of the Town of Monument. The hydraulic analysis and drainageway planning utilized the future condition flow rates due to the small difference between future and existing flow rates. The use of the future flow rates will prevent proposed structures from becoming hydraulically inadequate as development in the basin proceeds.

V. EVALUATION OF CONCEPTUAL ALTERNATIVES

Introduction

Alternative drainageway improvement concepts have been examined that address the existing and future stormwater management needs of the basin. Alternatives have been identified for each reach of the Dirty Woman and Crystal Creek drainageways. Quantitative and qualitative comparisons were presented, and a recommendation made as to which concepts were most feasible to advance to preliminary design and eventually to implementation. The majority of the alternative analysis is presented in the *Development of Alternatives* report.

The general planning goals to be achieved during the alternative evaluation phase were:

1. Identify stormwater facilities which will reduce existing floodplains and flooding problems within urbanized areas;

2. Provide stormwater management within developing areas of the basin in order to reduce the detrimental effects of runoff and sedimentation from disturbed areas;

3. Provide stormwater facilities which preserve and/or enhance the existing drainageway and areas adjacent to the drainageway which provide an environmental resource in the area;

4. Identify facilities which will minimize future operations and maintenance costs; and

5. Provide stormwater management facilities which will at least maintain and/or enhance the water quality characteristics of the basin.

The *City/County Drainage Criteria Manual* was used as a guide in the conceptual sizing of facilities. Planning goals were developed through the agency/individual coordination process. Common and/or mutual goals of the interested agencies were identified prior to the initiation of the alternative evaluation phase.

Evaluation Parameters

Coordination meetings were held throughout the planning process in order to discuss the overall goals of the study and to solicit specific concerns from governmental agencies, individuals, and private community groups. One result of this coordination effort was the

disturbance), moderate (30 to 60 percent disturbance), and major (greater than 60 percent disturbance).

Conclusions

Based upon the concept evaluation discussed and summarized in the Development of Alternatives report, the following findings were established:

1. Regional detention, except that currently being provided by Lake Woodmoor, is not feasible from the flood control and peak flow reduction standpoints. The storage behind man-made embankments (roadways and ponds), in combination with the floodplain overbank storage is providing a sufficient amount of long-term stormwater storage in the basin(s). On site detention for new commercial or residential areas within the Town of Monument is desirable from the localized erosion and water quality control viewpoints. On site detention and its effect upon peak discharges in Dirty Woman or Crystal creeks is not significant.

2. Feasible channel section alternatives for the mainstem of Dirty Woman and Crystal creeks range from the floodplain preservation, or "do nothing" alternate to selective riprap bank linings. The feasibility of channelization concepts decreases within the upper reaches of the basin(s).

3. Habitat disturbances due to channelization of the Dirty Woman and Crystal creeks would be significant and would have to be replaced elsewhere along the drainageways. In some locations the channelization of runoff could have the effect of "drying up" the natural base flow and thereby having a negative impact upon the vegetative and wildlife habitat.

4. Long-term maintenance concerns make the implementation of a 100-year or 10-year contiguous channelization concept difficult. The acquisition of property along the drainages would have to occur if a channelized concept was advanced to implementation.

Detention

This plan does not recommend detention as a basin-wide flood control measure. The difference between the future and existing flow rates is minimal and the downstream structures don't warrant reducing the peak flow. However, on site detention may be used, as approved by the County or Town, to reduce the local storm sewer costs along with providing water quality benefits to the site and the basin. The Town of Monument currently has an on site detention policy in effect. All developed flows within the Town of Monument must be reduced to the existing flow rate. The overall impacts of on-site detention on the major drainages should be evaluated throughout the Town.

Water Quality

Improvement of stormwater quality has become an important issue in drainage basin planning. Many pollutants are naturally associated with sediments that enter sensitive receiving waters. The pollutants are naturally occurring compounds that are carried to the drainageways in storm runoff. Other pollutants are the result of urbanization such as lawn chemicals, oil and grease, pet feces, lawn clippings and other items. Many pollutants can be limited by programs such as erosion control at construction sites, educational programs to inform the public as to the proper use of lawn chemicals, oil recycling programs and street sweeping programs. Even with these programs in place, erosion along the drainageways can generate large quantities of sediment that can settle out along the downstream channel bottoms.

Various methods of water quality enhancement have been identified for use in this preliminary design. Channels are lined to prevent erosion, selective improvements are placed to prevent erosion, and drop/check structures are used to control channel grade. On site detention facilities should be designed not only to reduce flows to historic rates but probably more importantly to improve the stormwater quality. General criteria for designing and sizing a water quality pond can be found in the Urban Drainage and Flood Control District's December 1989 *Flood Hazard News*. The article outlining criteria is called "Sizing a Capture Volume for Stormwater Quality Enhancement," by Urbonas, Guo and Tucker.

Trails

In areas where routine maintenance of the drainageways is necessary, a trail for that purpose should be provided. These maintenance trails, while few in number in this basin, should be evaluated for potential multi-purpose use. The multi-use trails could include hiking, biking

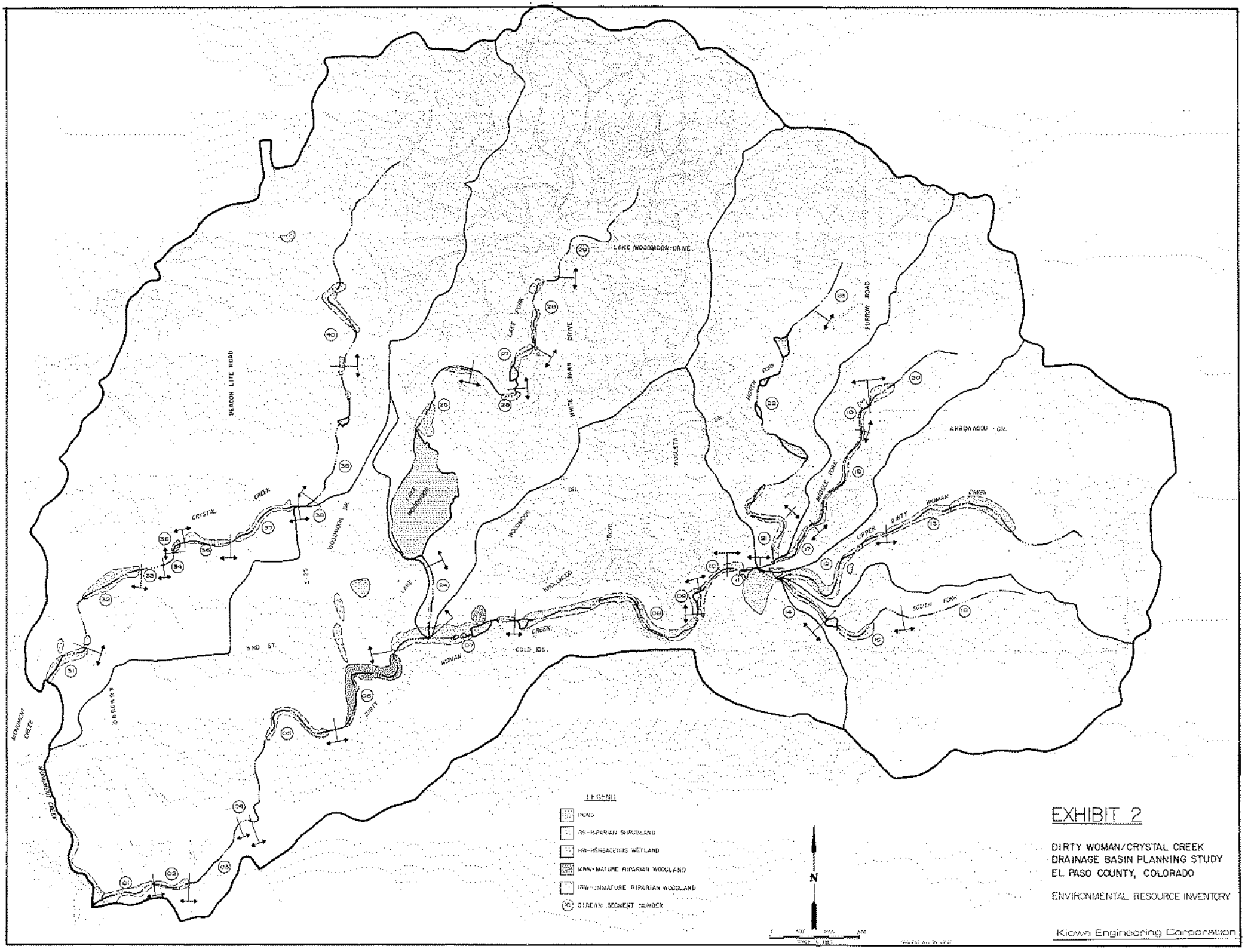


EXHIBIT 2

DIRTY WOMAN/CRYSTAL CREEK
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

ENVIRONMENTAL RESOURCE INVENTORY

Kiowa Engineering Corporation

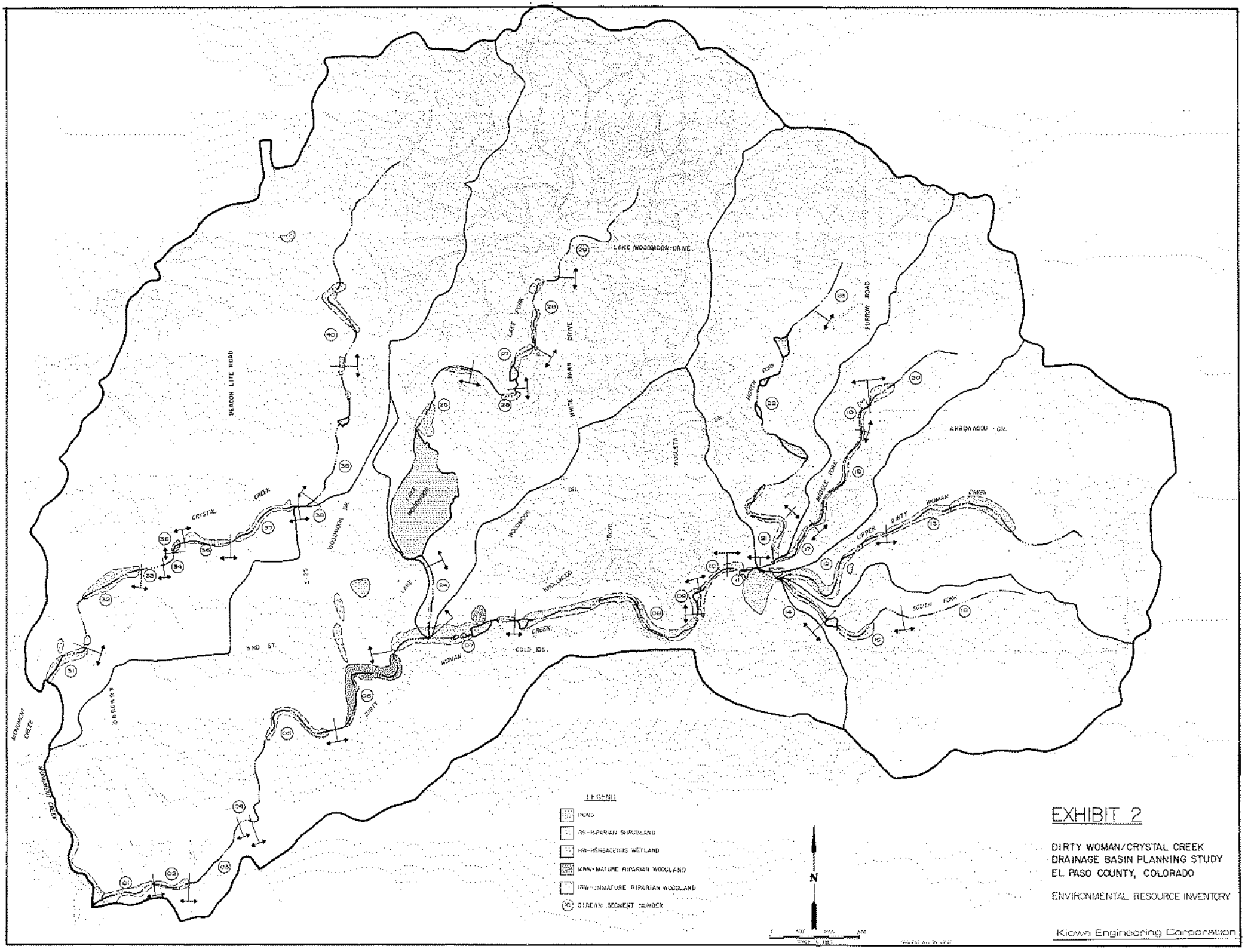


EXHIBIT 2

DIRTY WOMAN/CRYSTAL CREEK
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

ENVIRONMENTAL RESOURCE INVENTORY

Kiowa Engineering Corporation

SHEET NO. INDEX OF SHEETS

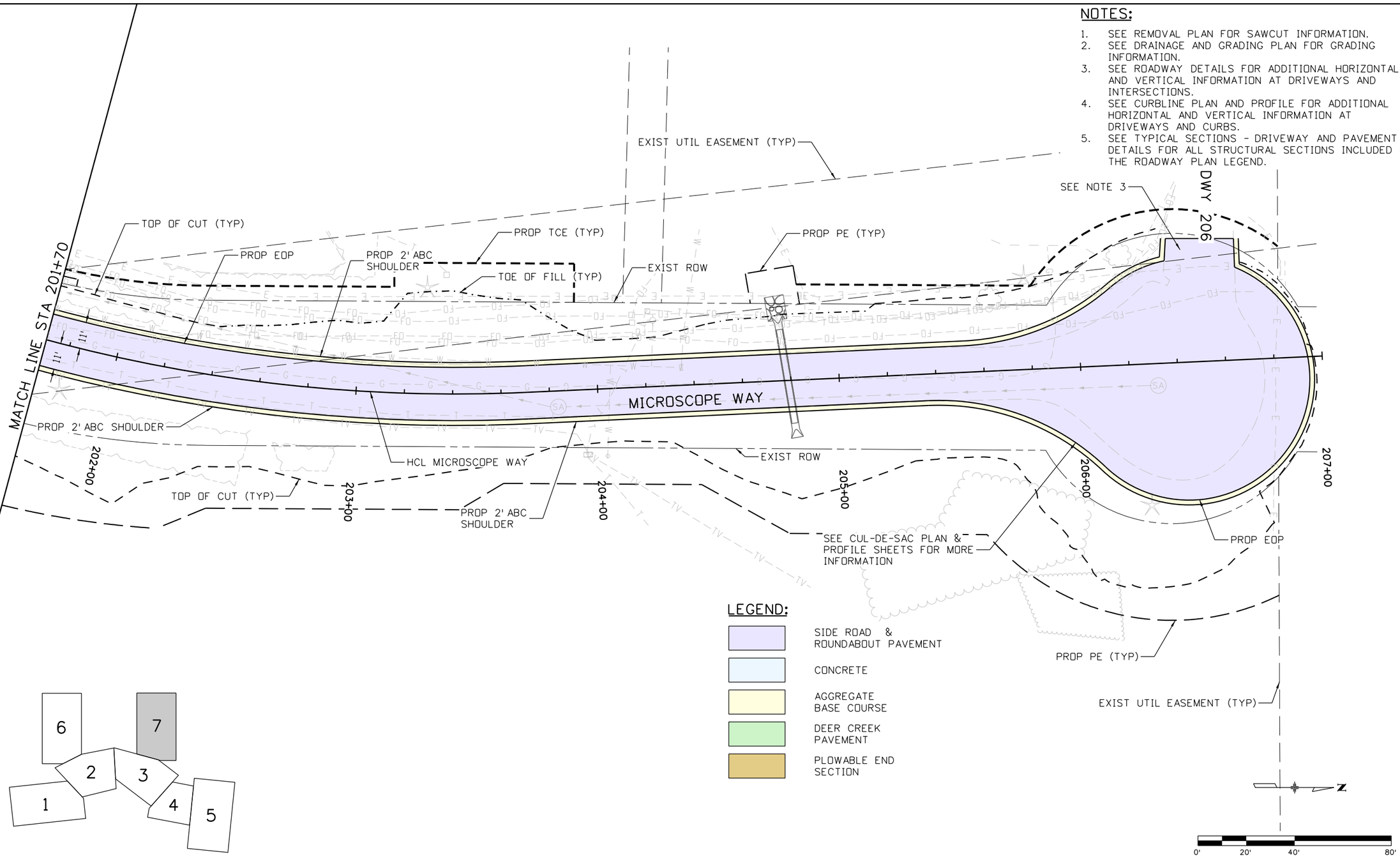
TABULATION OF LENGTH & DESIGN DATA

STATION	FEET ROADWAY			
	DEER CREEK RD	WOODMOOR DR	BASE CAMP RD	MICROSCOPE WAY
BEGIN PROJECT DEER CREEK RD STATION 400+00				
BEGIN PROJECT BASE CAMP RD STATION 100+00				
END PROJECT BASE CAMP RD STATION 107+80			780	
BEGIN PROJECT MICROSCOPE WAY STATION 200+00				
END PROJECT MICROSCOPE WAY STATION 207+00				700
BEGIN PROJECT WOODMOOR DR STATION 300+85				
END PROJECT WOODMOOR DR STATION 304+90		405		
END PROJECT DEER CREEK RD STATION 420+20	2020			
TOTAL	2020	405	780	700
SUMMARY OF PROJECT LENGTH	FEET			MILES
PROJECT GROSS LENGTH	3905			0.74

DESIGN DATA	DEER CREEK RD	WOODMOOR DR	BASE CAMP RD	MICROSCOPE WAY
MINIMUM CENTERLINE RADIUS	260'	300'	100'	100'
MAXIMUM CENTERLINE GRADE	8%	8%	8%	8%
MINIMUM S.S.D.	200'	200'	115'	115'
DESIGN SPEED	30 MPH	30 MPH	20 MPH	20 MPH
e_max	4%	N/A	N/A	N/A
2021 TRAFFIC VOLUME	1,400	4,830	N/A	N/A
DHV TRUCK %	2%	2%	N/A	N/A
2040 TRAFFIC VOLUME	2,270	7,820	N/A	N/A
DHV TRUCK %	2%	2%	N/A	N/A
CLEAR ZONE DISTANCE	14'	14'	7'	7'

NOTES:

1. SEE REMOVAL PLAN FOR SAWCUT INFORMATION.
2. SEE DRAINAGE AND GRADING PLAN FOR GRADING INFORMATION.
3. SEE ROADWAY DETAILS FOR ADDITIONAL HORIZONTAL AND VERTICAL INFORMATION AT DRIVEWAYS AND INTERSECTIONS.
4. SEE CURBLINE PLAN AND PROFILE FOR ADDITIONAL HORIZONTAL AND VERTICAL INFORMATION AT DRIVEWAYS AND CURBS.
5. SEE TYPICAL SECTIONS - DRIVEWAY AND PAVEMENT DETAILS FOR ALL STRUCTURAL SECTIONS INCLUDED IN THE ROADWAY PLAN LEGEND.



LEGEND:

- SIDE ROAD & ROUNDABOUT PAVEMENT
- CONCRETE
- AGGREGATE BASE COURSE
- DEER CREEK PAVEMENT
- PLOWABLE END SECTION

FINAL - NOT FOR CONSTRUCTION

Computer File Information		Index of Revisions		
Print Date: 5/31/2024		Date:	Comments	Init.
File Name: rd_layout_07				
Last Modification Date: 5/31/2024				
Designer: PDC Detailer: JJB Checker: PDC				
11x17 Scale: 1"= 40' Units: Survey Feet				

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3275 Akers Dr
Phone: 719-520-6460
Fax: 719-520-6879

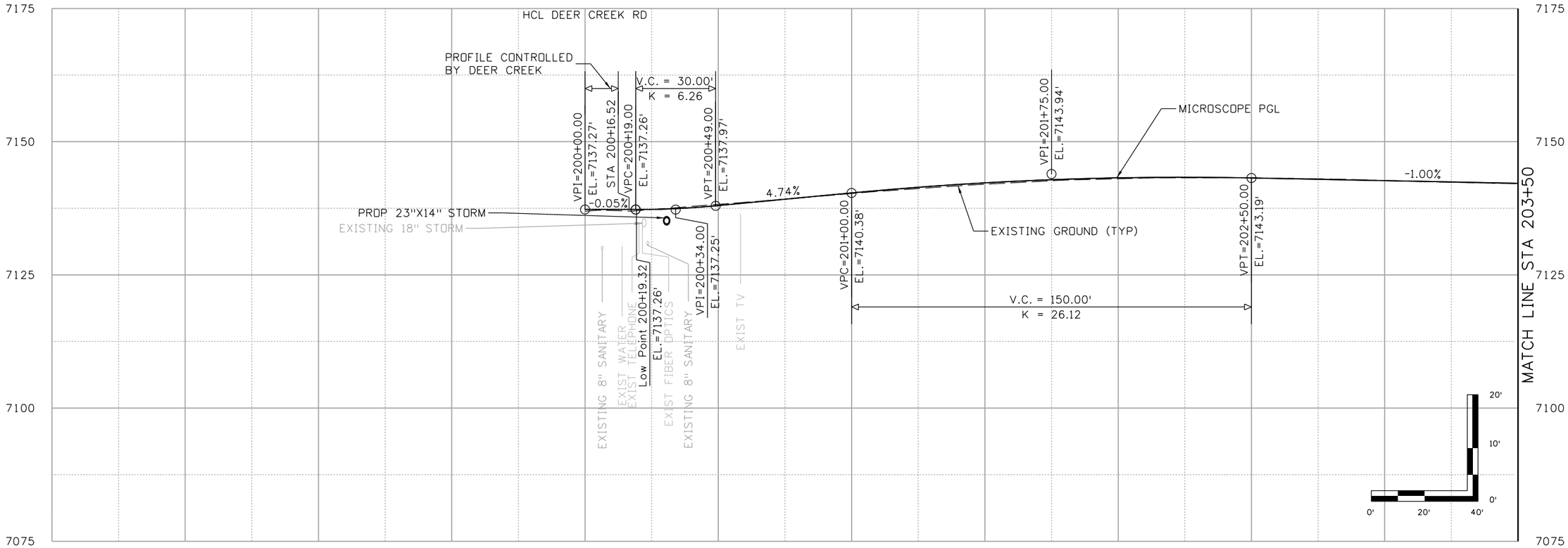
AECOM
2315 Briargate Pkwy #150
Colorado Springs, CO 80920
Phone: 719-531-0001
Fax: 719-531-0007
AECOM #60673398

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

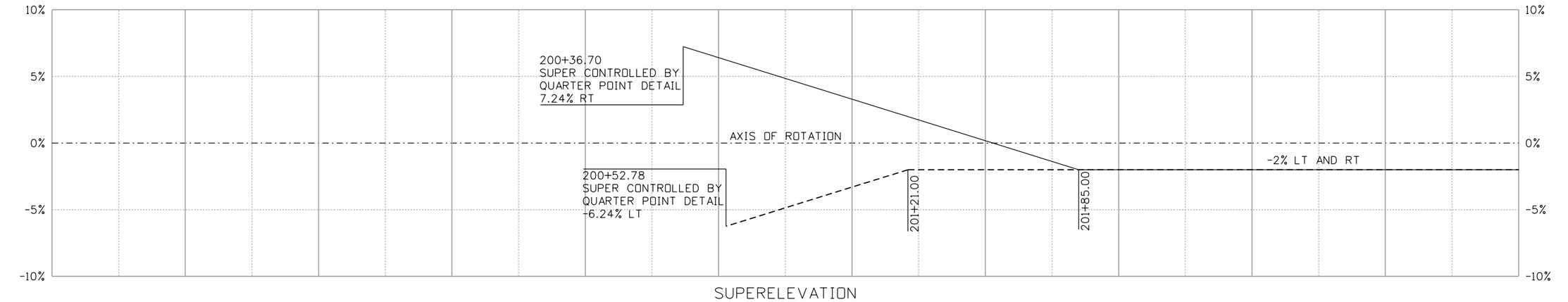
ROADWAY PLAN
STA 201+70 TO STA 207+00

ROADWAY 7 of 7

Sheet Number 036



PROFILE



SUPERELEVATION

FINAL - NOT FOR CONSTRUCTION

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Last Modification Date: 5/31/2024				
Designer: PDC Detailer: JJB Checker: PDC				
11x17 Scale: 1"= 40' Units: Survey Feet				

ElPaso County
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3275 Akers Dr
Phone: 719-520-6460
Fax: 719-520-6879

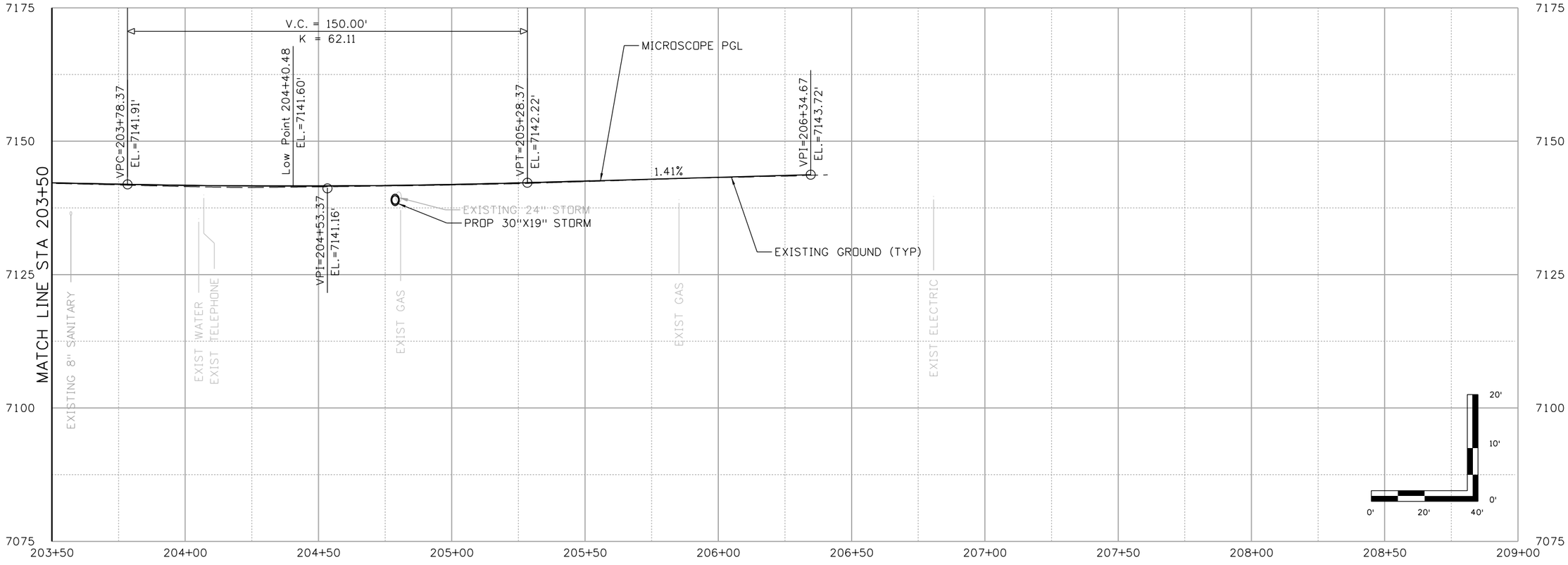
AECOM
2315 Briargate Pkwy #150
Colorado Springs, CO 80920
Phone: 719-531-0001
Fax: 719-531-0007
AECOM #60673398

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

ROADWAY PROFILE
MICROSCOPE WAY

PROFILE 8 of 9

Sheet Number 044



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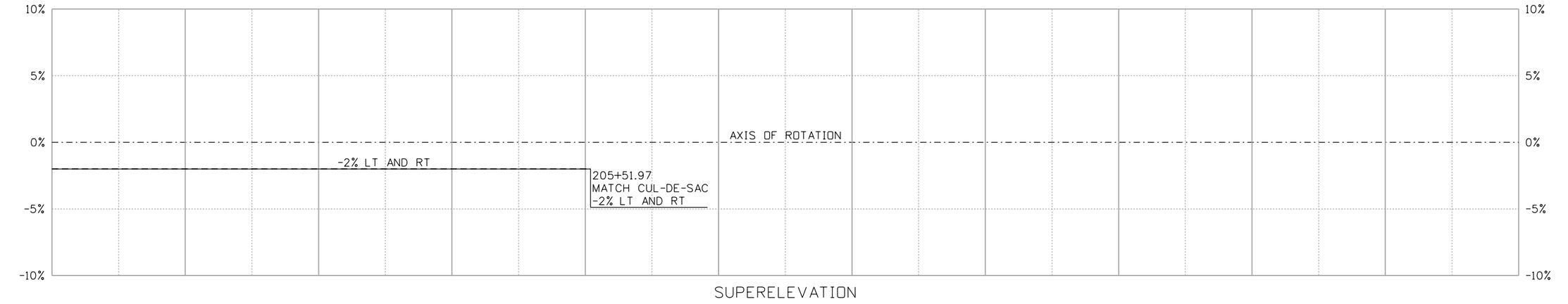

SUPERELEVATION

FINAL - NOT FOR CONSTRUCTION

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Last Modification Date: 5/31/2024				
Designer: PDC Detailer: JJB Checker: PDC				
11x17 Scale: 1"= 40' Units: Survey Feet				

ElPaso County
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3275 Akers Dr
Phone: 719-520-6460
Fax: 719-520-6879

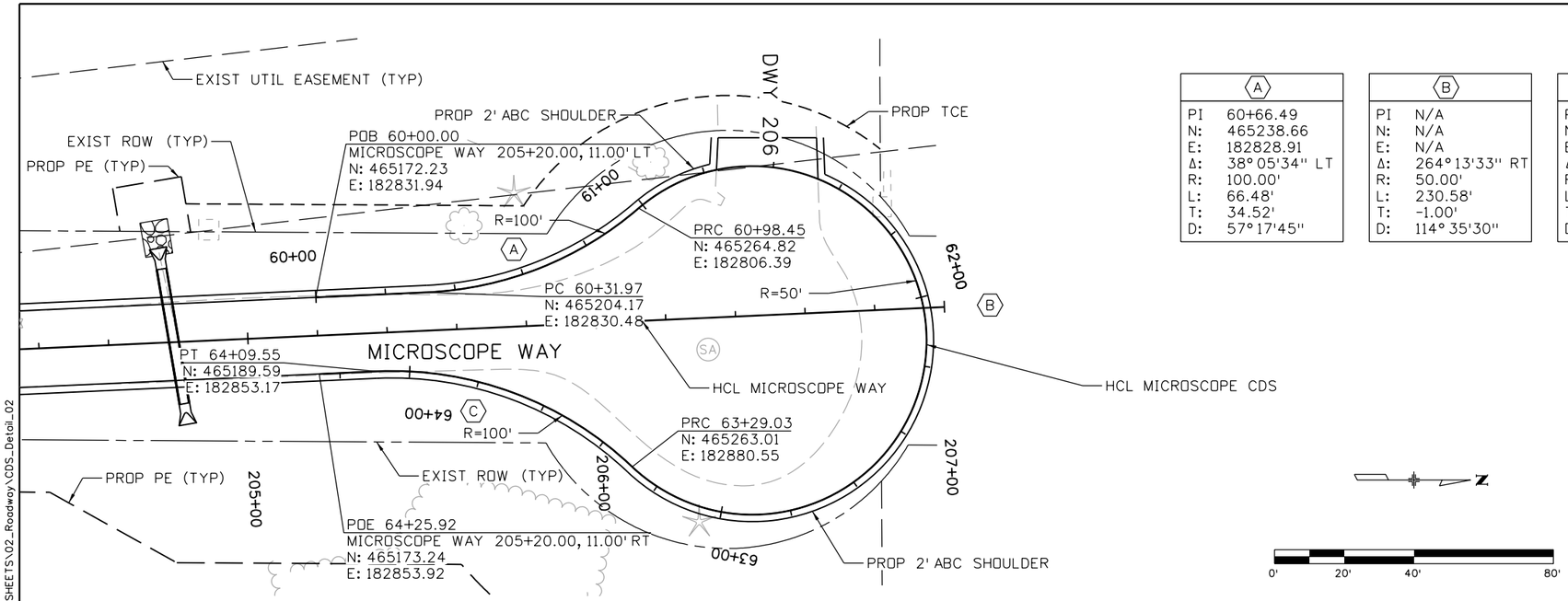
AECOM
2315 Briargate Pkwy #150
Colorado Springs, CO 80920
Phone: 719-531-0001
Fax: 719-531-0007
AECOM #60673398

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

ROADWAY PROFILE
MICROSCOPE WAY

PROFILE 9 of 9

Sheet Number 045



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E:	182828.91
Δ:	38° 05'34" LT
R:	100.00'
L:	66.48'
T:	34.52'
D:	57°17'45"

B	
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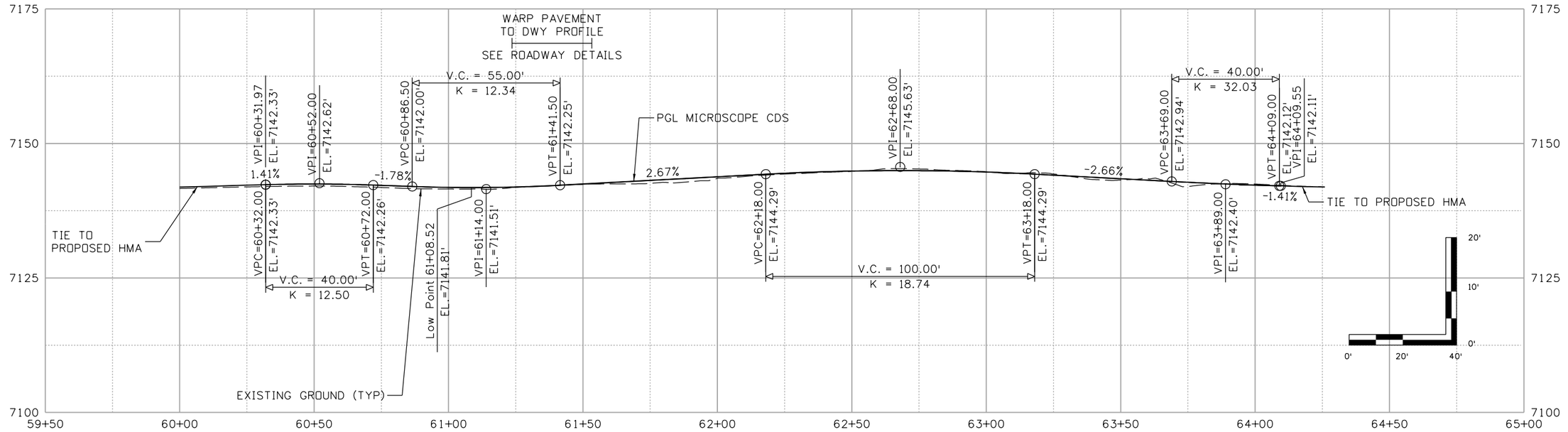
N:	N/A
E:	N/A
Δ:	264°13'33" RT
R:	50.00'
L:	230.58'
T:	-1.00'
D:	114° 35'30"

C	
PI	63+71.62
N:	465232.13
E:	182851.23
Δ:	46° 07'59" LT
R:	100.00'
L:	80.52'
T:	42.58'
D:	57°17'45"

MICROSCOPE CUL-DE-SAC



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Designer: PDC Detailer: JJB Checker: PDC	
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Index of Revisions		
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Fax: 719-520-6879

AECOM
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Colorado Springs, CO 80920
Phone: 719-531-0001
Fax: 719-531-0007
AECOM #60611261

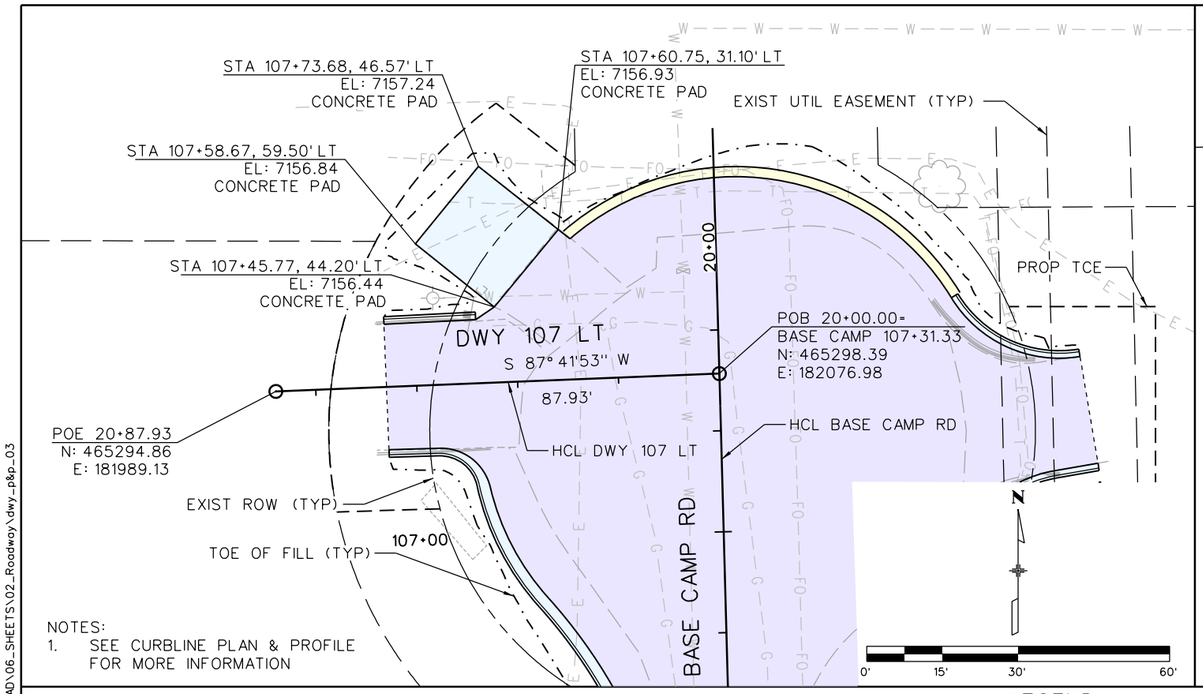
DEER CREEK ROAD INTERSECTION IMPROVEMENTS

CUL-DE-SAC PLAN AND PROFILE
MICROSCOPE CUL-DE-SAC

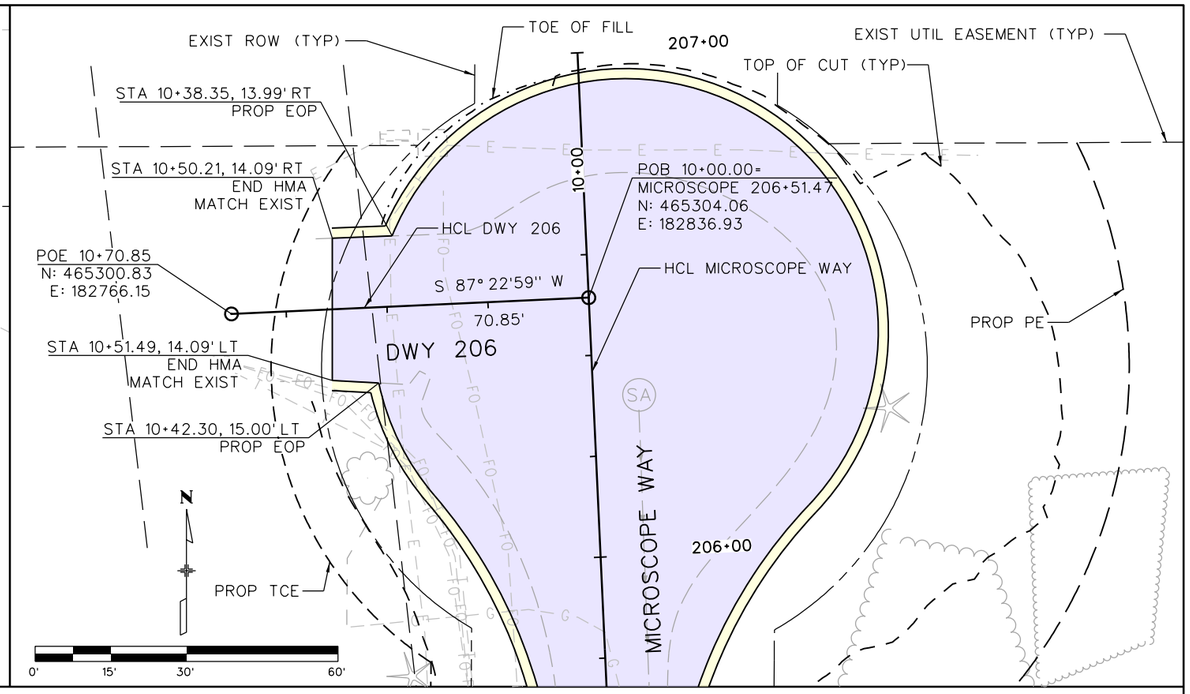
CDS 2 of 2

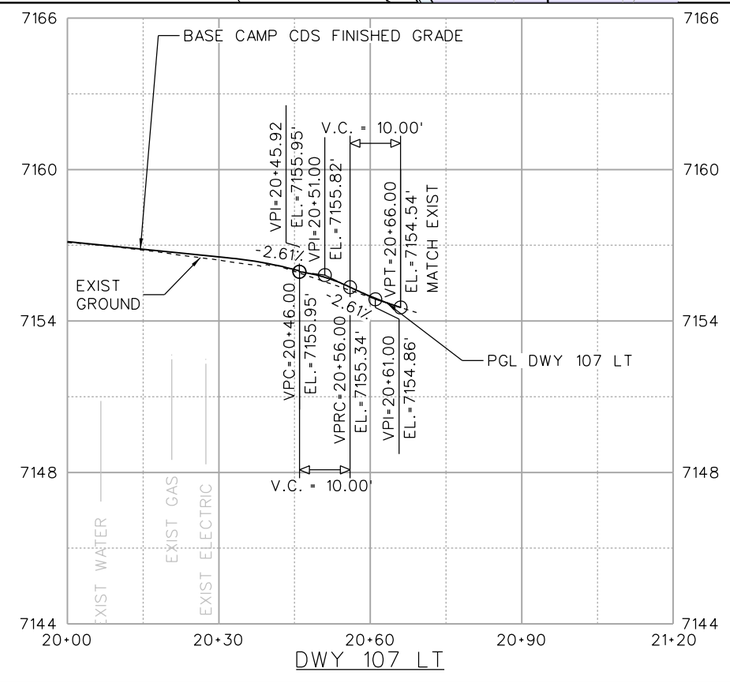
Sheet Number 047

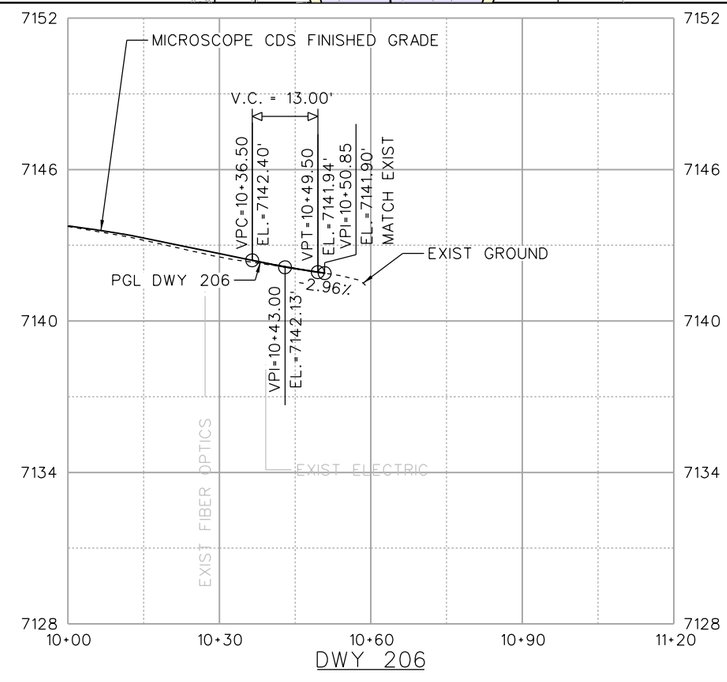
FINAL - NOT FOR CONSTRUCTION



NOTES:
1. SEE CURBLINE PLAN & PROFILE FOR MORE INFORMATION

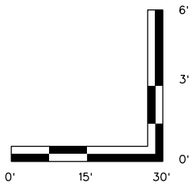






LEGEND:

- SIDE ROAD & ROUNDABOUT PAVEMENT
- CONCRETE
- AGGREGATE BASE COURSE
- DEER CREEK PAVEMENT
- PLOWABLE END SECTION



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AECOM #60673398

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

ROADWAY DETAILS
DWY 107 LT & DWY 206

DETAILS 8 of 9

Sheet Number 070

EL PASO COUNTY

DEPARTMENT OF PUBLIC WORKS
TRANSPORTATION DIVISION

FINAL PLANS OF PROPOSED DEER CREEK ROAD INTERSECTION IMPROVEMENTS

GRADING AND EROSION CONTROL PLAN

June 4, 2024

EPC •17-067-90

Engineer's Statement:

These detailed plans and specifications were prepared under my direction and supervision. Said plans and specifications have been prepared according to the criteria established by the County for detailed roadway, drainage, grading and erosion control plans and specificatons, and said plans and specifications are in conformity with applicable master drainage plans and master transportation plans. Said plans and specifications meet the purposes for which the particular roadway and drainage facilities are designed and are correct to the best of my knowledge and belief. I accept responsiblity for any liability caused by any negligent acts, errors or omissions on my part in preparation of these detailed plans and specifications.

Engineer of Record Signature Date

Owner's Statement:

I, the owner/developer have read and will comply with the requirements of the grading and erosion control plan and all of the requirements specified in these detailed plans and specifications.

Owner Signature Date

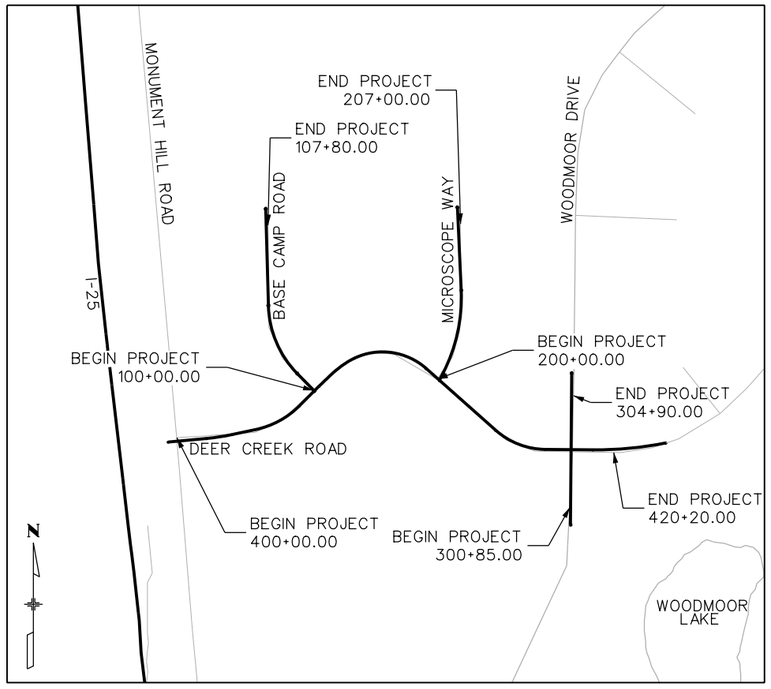
El Paso County:

County plan review is provided only for general conformance with County Design Criteria. The County is not responsible for the accuracy and adequacy of the design, dimensions, and/ or elevations which shall be confirmed at the job site. The County throught the approval of this document assumes no responsibility for completeness and/ or accuracy of this document.

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

In accordance with ECM Section 1.12, these construction documents will be vaild for construction for a period of 2 years from the date signed by the El Paso County Engineer. If construction has not started within those 2 years, the plans will need to be resubmitted for approval, including payment of review fees at the Planning and Community Development Director's discretion.

JOSHUA A PALMER, PE Date
COUNTY ENGINEER/ECM ADMINISTRATOR



PROJECT LOCATION MAP

0 300' 600' 1200'

AECOM
2315 BRIARGATE PARKWAY, SUITE 150
COLORADO SPRINGS, CO 80920
719-531-0001
AECOM •60673398

Sheet Number 072

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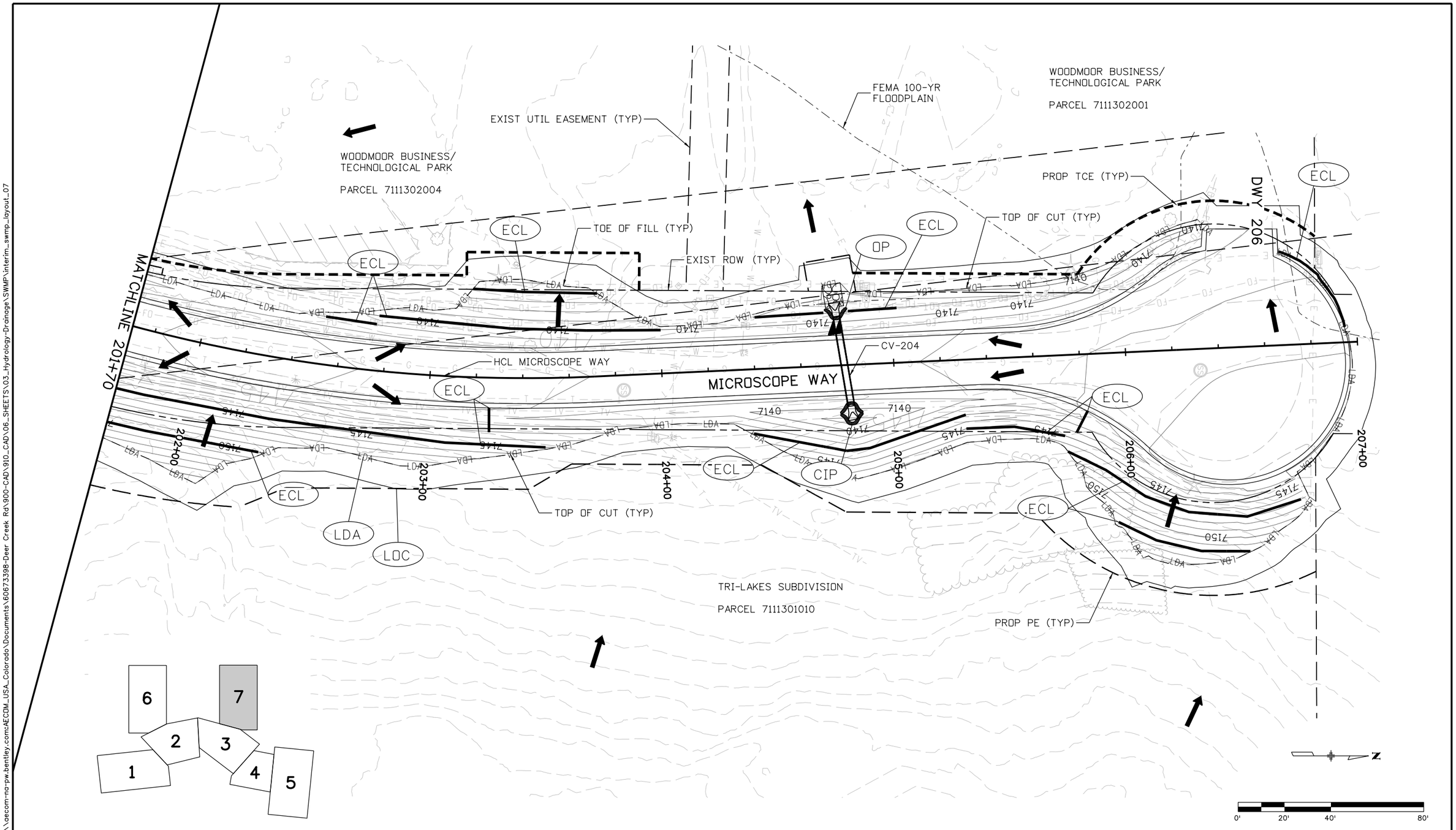

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AECOM #60673398

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

GRADING AND EROSION CONTROL PLAN
INTERIM - STA 201+70 TO STA 206+34.67

SWMP 7 of 7

Sheet Number 093

FEMA 100-YR FLOODPLAIN

WOODMOOR BUSINESS/
TECHNOLOGICAL PARK

PARCEL 7111302001

EXIST UTIL EASEMENT (TYP)

WOODMOOR BUSINESS/
TECHNOLOGICAL PARK

PARCEL 7111302004

TOP OF CUT (TYP)

TOE OF
FILL
(TYP)

EXIST ROW (TYP)

PROP TCE (TYP)

DWY 206

TRM

SM

LDA

LOC

SRB

MATCHLINE 201+70

HCL MICROSCOPE WAY

MICROSCOPE WAY

CV-204

SRB

201+00

202+00

203+00

204+00

205+00

206+00

207+00

SM

TOP OF CUT (TYP)

PROP PE (TYP)

TRI-LAKES SUBDIVISION

PARCEL 7111301010

SM

6 7 2 3 1 4 5

N

0' 20' 40' 80'

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jessica.barr 7:02:54 PM pw:\\aecom-na-pw.bentley.com:AECOM_USA_Colorado\Documents\60673398-Deer Creek Rd\900-CAD\910_CAD\06_SHEETS\03_Hydrology-Drainage\SWMP\final_swmp_layout_07

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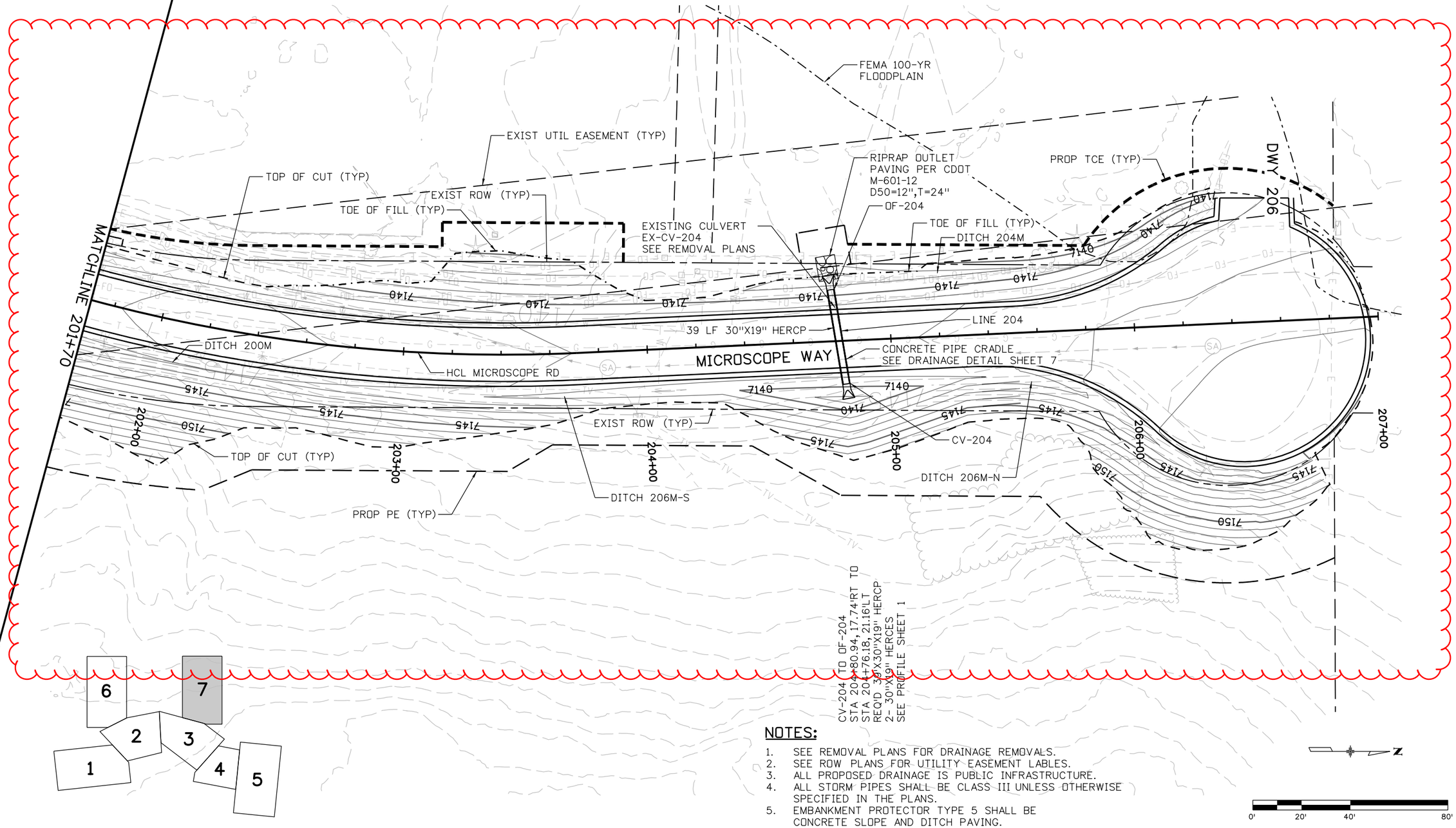
DEER CREEK ROAD INTERSECTION IMPROVEMENTS

GRADING AND EROSION CONTROL PLAN
FINAL - STA 201+70 TO STA 206+34.67

SWMP 7 of 7

Sheet Number 100



NOTES:

1. SEE REMOVAL PLANS FOR DRAINAGE REMOVALS.
2. SEE ROW PLANS FOR UTILITY EASEMENT LABLES.
3. ALL PROPOSED DRAINAGE IS PUBLIC INFRASTRUCTURE.
4. ALL STORM PIPES SHALL BE CLASS III UNLESS OTHERWISE SPECIFIED IN THE PLANS.
5. EMBANKMENT PROTECTOR TYPE 5 SHALL BE CONCRETE SLOPE AND DITCH PAVING.

FINAL - NOT FOR CONSTRUCTION

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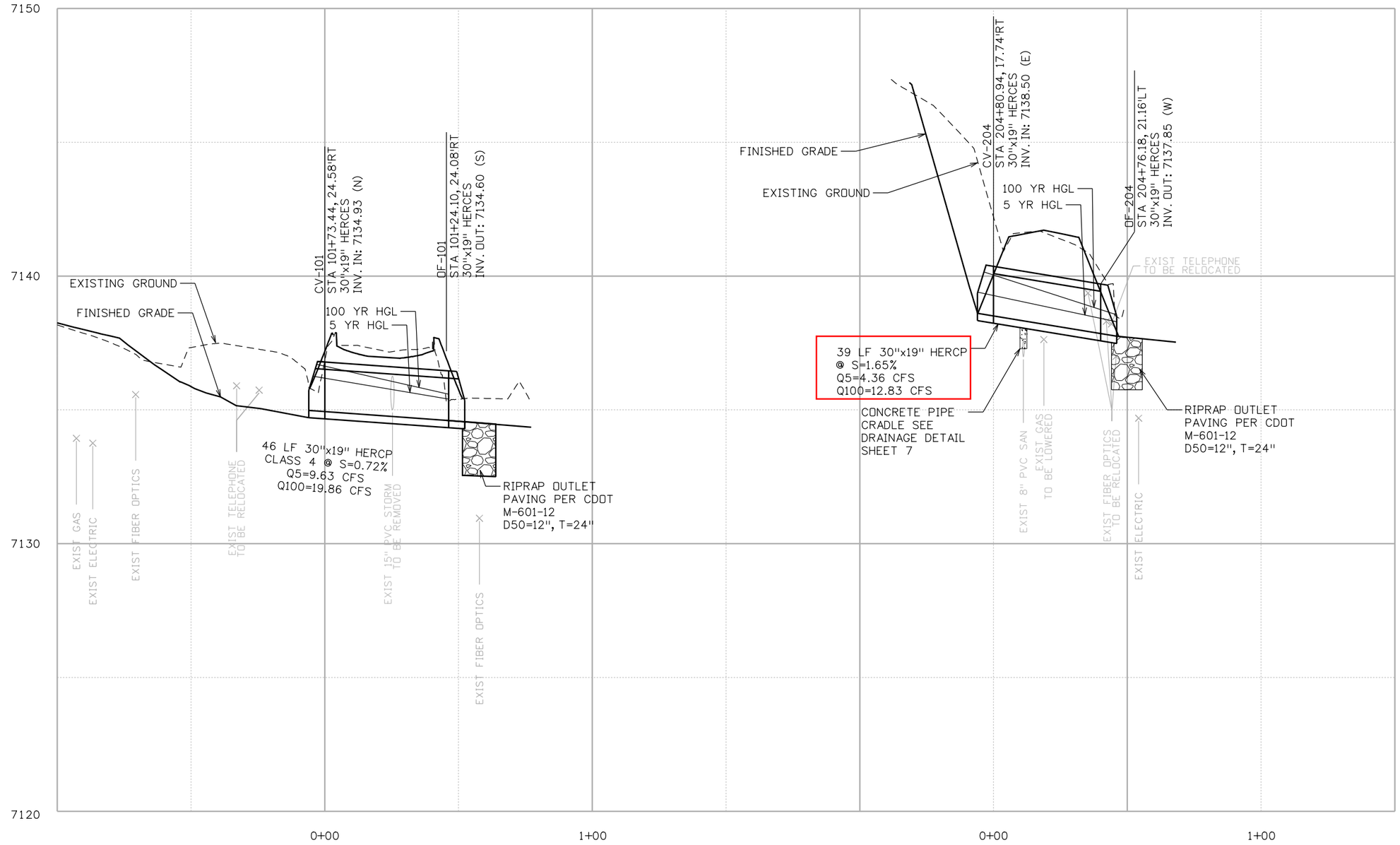
AECOM #60673398

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

DRAINAGE AND GRADING PLAN
STA 201+70 TO STA 206+34.67

DRAINAGE 7 of 7

Sheet Number 107



LINE 101

LINE 204

FINAL - NOT FOR CONSTRUCTION

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File Name: dr_profile_01				
Last Modification Date: 5/29/2024				
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Fax: 719-531-0007
AECOM #60611261

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

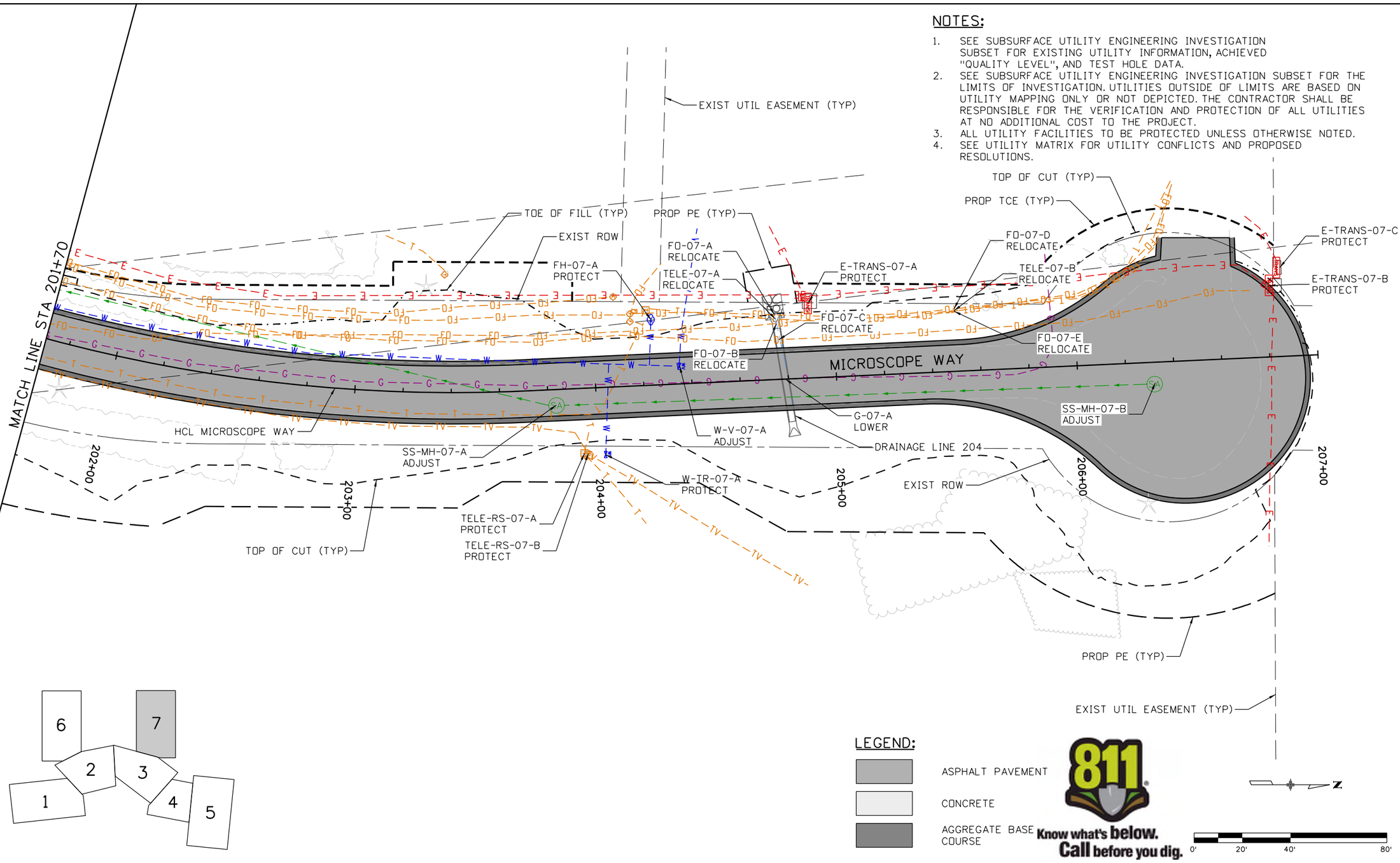
DRAINAGE PROFILE
LINE 101 & LINE 204

DRAINAGE 1 of 5

Sheet Number 108

NOTES:

1. SEE SUBSURFACE UTILITY ENGINEERING INVESTIGATION SUBSET FOR EXISTING UTILITY INFORMATION, ACHIEVED "QUALITY LEVEL", AND TEST HOLE DATA.
2. SEE SUBSURFACE UTILITY ENGINEERING INVESTIGATION SUBSET FOR THE LIMITS OF INVESTIGATION. UTILITIES OUTSIDE OF LIMITS ARE BASED ON UTILITY MAPPING ONLY OR NOT DEPICTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFICATION AND PROTECTION OF ALL UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.
3. ALL UTILITY FACILITIES TO BE PROTECTED UNLESS OTHERWISE NOTED.
4. SEE UTILITY MATRIX FOR UTILITY CONFLICTS AND PROPOSED RESOLUTIONS.



LEGEND:

- ASPHALT PAVEMENT
- CONCRETE
- AGGREGATE BASE COURSE

Know what's below. Call before you dig.

0' 20' 40' 80'

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Computer File Information		Index of Revisions		
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Last Modification Date: 6/3/2024				
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11x17 Scale: 1"= 40' Units: Survey Feet				

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AECOM
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Colorado Springs, CO 80920
Phone: 719-531-0001
Fax: 719-531-0007
AECOM #60673398

DEER CREEK ROAD INTERSECTION IMPROVEMENTS

UTILITY CONFLICT PLAN
STA 201+70 TO STA 207+00

UTILITY 7 of 7

Sheet Number 134

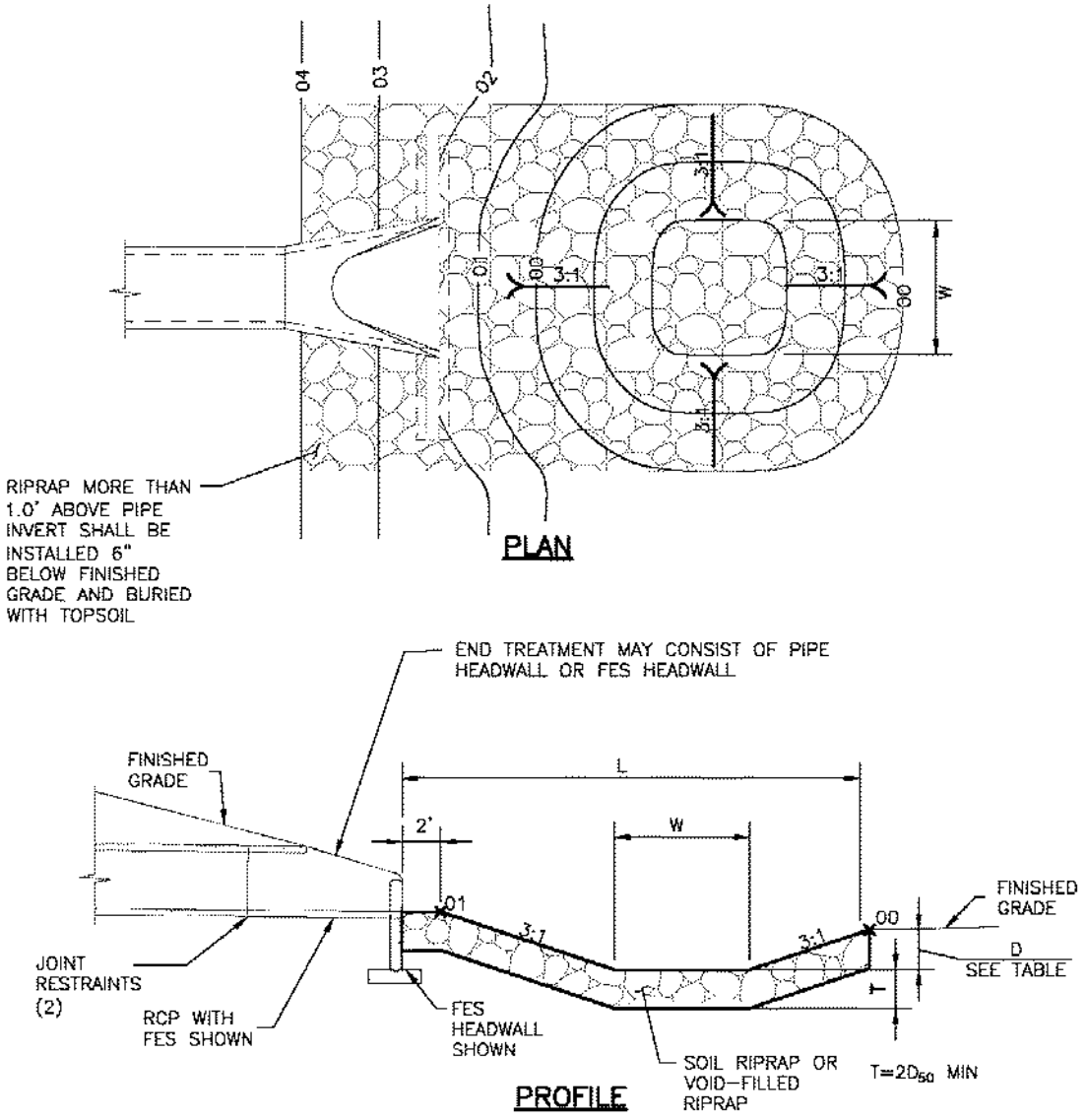

Figure 9-37. Low tailwater riprap basin


Crystal Creek
EX 20" CMP culvert outfall
Microscope Way

APPENDIX F – DRAINAGE MAPS

ASCENT CHURCH

EXISTING DRAINAGE MAP

PALMER RIDGE HIGHSCHOOL
OWNER: LEWIS–PALMER SHOOL DISTRICT 38

EX DRAINAGE ESMT

EX1
1.54 | 0.6 | 4.0

EX2
2.50 | 3.2 | 9.1

EX PL

EX EOA ~21.00'

EX EOA ~24.00'

EX ROOF DRAINS (TYP)

EX BUILDING
FOOTPRINT = 23,635 SQ FT
GROSS FLOOR AREA = 40,786 SQ FT

EX WALK ~5.00'

EX ROOF DRAINS, TYP

EX AREA INLET

EX 20" CMP

EX BUILDING AREA CAPTURED BY ROOF DRAINS & DISCHARGE AT SOUTH END OF BUILDING

EX EOA

WOODSTONE WAY

WOODMOOR DRIVE

MICROSCOPE WAY

LOT 29 WOODMOOR OAKS SCHAFER SHARON M

LOT 35 WOODMOOR OAKS SCHLAUCH WESLEY

LOT 36 WOODMOOR OAKS ORIST MASON MATTHEW

LOT 12 WOODMOOR BUSINESS/TECH PARK

LOT 11 WOODMOOR BUSINESS/TECH PARK

ATE Response: Addressed, DP added at downstream end of swale to account for all tributary flow.

provide a DP

call out detail
These do not appear to be sufficient for this eroding drainage pathway
This will need to be shown on the GEC plan with new stabilization. Drainage map and GEC Plan must show the complete property

ATE Response: Addressed.

Basins appear to be missing

ATE Response: Addressed.

Show the complete property and all basins to include road side ditches and stormwater infrastructure

ATE Response: Addressed.

LEGEND

EXISTING

BOUNDARY L
PROPERTY L
EASEMENT L
RIGHT OF W
STORM SEWE
SWALE/WATE
INDEX CONT
INTERMEDIAT
FLOW DIREC
BASIN ID
DRAINAGE BA
TC PATH

6100

EXISTING CONDITIONS - BASIN SUMMARY TABLE

Sub-basin	Area (ac)	Impervious	C_5	C_{100}	t_c (min)	$Q_{5\text{-YR}}$ (cfs)	$Q_{100\text{-YR}}$ (cfs)
EX1	1.54	2%	0.09	0.36	9.2	0.6	4.0
EX2	2.50	21%	0.32	0.53	9.2	3.5	9.5

EXISTING CONDITIONS - DESIGN POINT SUMMARY TABLE

DP#	$Q_{5\text{-YR}}$	$Q_{100\text{-YR}}$
1	0.6	4.0
2	3.5	9.5

N

30 15 0 30 60

ORIGINAL SCALE: 1" = 30'

EXISTING DRAINAGE MAP

ASCENT CHURCH

JOB NO. 25023
LOCATION: EPC
02/10/2025

SHEET 1

ALL TERRAIN ENGINEERING

ASCENT CHURCH

PROPOSED DRAINAGE MAP

PALMER RIDGE HIGHSCHOOL
OWNER: LEWIS-PALMER SHOOL DISTRICT 38

OFFSITE GRADING
TEMPORARY CONSTRUCTION EASEMENTS & LIMITS OF DISTURBANCE BEING COORDINATED WITH PALMER RIDGE HIGH SCHOOL
2:1 TIE SLOPES TO BE FLATTENED ONCE OFFSITE SURVEY AVAILABLE

LOT 29 WOODMOOR OAKS SCHAFER SHARON M

LOT 12 WOODMOOR BUSINESS/TECH PARK

LOT 11 WOODMOOR BUSINESS/TECH PARK

LOT 35 WOODMOOR OAKS SCHLAUCH WESLEY

LOT 36 WOODMOOR OAKS ORIST MASON MATTHEW

WOODSTONE WAY

WOODMOOR DRIVE

MICROSCOPE WAY

Please consider doing a concrete trickle channel
All Terrain: addressed.
maintenance issues and are not recommended per MHFD Detail T-6.

Assign a name/number to all PCMs and then update all submitted text and drawings accor beling throughout (example: "Pond A" or "Pond 1").
All Terrain: addressed.

All Terrain: addressed.
dimensions

The added parking area
All Terrain: Addressed. See revised calcs and map. This area has been added to basin analysis & detailed as an exclusion area.

provide DP

All Terrain: Addressed. However, DP is placed at end of swale so that total flow entering swale is used for sizing.

Show complete property boundary and all basins
All Terrain: addressed.

call out size and type
Show complete property
Outfall to ditch will require stabilization and repair
Show all on GEC plan
Analyze swale

All Terrain: Addressed. Hydraulic analysis of swale included in Appendix C. Proposed profile & grading included in GEC plan. Riprap sizing for stabilization inlcuded in appendix C.

Ther
All Terrain: addressed.
at the southern end of the parking lot where it discharges

PR 16.00' FIRE ACCESS HS-20

EX DRAINAGE ESMT

PR 12" PVC STM SWR

PR DRN SWALE, TYP

TYPE L RIPRAP

RET WALL

LOADING DOCK

5.00' WALK

PR DRN SWALE

PR ADDITION
FOOTPRINT = 21,750 SQ FT
GROSS FLOOR AREA = 37,897 SQ FT

CONC PATIO

PR STAIRCASE

PR 10.00' MAINT. ROAD

TYPE L RIPRAP RUNDOWN & TYPE L LOW TW BASIN

10.00' POND BERM

PR 4' RIPRAP T.C.

FULL SPETRUM WQ & DET POND

10' TYPE L RIPRAP SPILLWAY

PR 30"X19" HERCP PER DEER CREEK ROADWAY IMP. PLANS (BY OTHERS)

PR OUTLET STRUCT & 12" OUTFALL PIPE W/ FES & TYPE L RIPRAP

PR 5.00' WALK

EX WALK ~5.00'

EX BUILDING
FOOTPRINT = 23,635 SQ FT
GROSS FLOOR AREA = 40,786 SQ FT

EX ROOF DRAINS, TYP

EX AREA INLET

EX BUILDING AREA CAPTURED BY ROOF DRAINS & DISCHARGE AT SOUTH END OF BUILDING

EX EOA ~21.00'

EX EOA ~24.00'

EX EOA

EX PL

1 — 0.67 | 0.2 | 1.5
2 — 0.30 | 0.8 | 1.7
3 — 1.33 | 2.2 | 6.0
4 — 0.11 | 0.1 | 0.3
5 — 0.28 | 0.6 | 1.5
EX2 — 1.64 | 2.7 | 6.3

LEGEND

EXISTING

BOUNDARY LINE
PROPERTY LINE
EASEMENT LINE
RIGHT OF WAY
STORM SEWER
SWALE/WATERWAY FLOWLINE
INDEX CONTOUR
INTERMEDIATE CONTOUR
FLOW DIRECTION
BASIN ID (ID / AC / Q5 / Q100)
DESIGN POINT DESIGNATION
DRAINAGE BASIN
TC PATH

PROPOSED CONDITIONS - BASIN SUMMARY TABLE

Sub-basin	Area (ac)	Impervious	C_5	C_{100}	t_c (min)	$Q_{5\text{-YR}}$ (cfs)	$Q_{100\text{-YR}}$ (cfs)
1	0.67	2%	0.09	0.36	12.6	0.2	1.5
2	0.30	58%	0.51	0.66	5.5	0.8	1.7
3	1.33	34%	0.32	0.52	5.1	2.2	6.0
4	0.11	2%	0.09	0.36	6.3	0.1	0.3
5	0.28	44%	0.44	0.62	5.0	0.6	1.5
EX2	1.64	47%	0.45	0.62	13.2	2.7	6.3

PROPOSED CONDITIONS - DESIGN POINT SUMMARY TABLE

DP#	$Q_{5\text{-YR}}$	$Q_{100\text{-YR}}$
1	0.2	1.5
2	0.8	1.7
3	2.8	7.1
4	0.1	0.3
5	3.2	9.7

30 15 0 30 60
ORIGINAL SCALE: 1" = 30'

PROPOSED DRAINAGE MAP
ASCENT CHURCH
JOB NO. 25023
LOCATION: EPC
02/10/2025
SHEET 1

ALL TERRAIN ENGINEERING