7280 N. Nevada Lane

Final Drainage Report

ALL TERRAIN ENGINEERING PROJECT NO: 24020

EL PASO COUNTY PROJECT # - PPR-2411

OCTOBER 2024

PREPARED FOR:

Greener Pastures, LLC

Contact: Jeff Weisburg

4450 Mark Dabling Blvd

Colorado Springs, CO 80907

PREPARED BY:

ALL TERRAIN ENGINEERING LLC

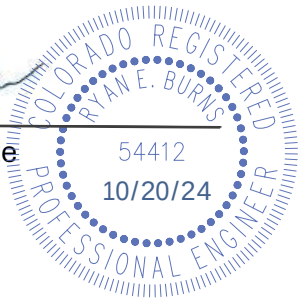
CONTACT: RYAN BURNS

RBURNS@ALLTERRAINENG.COM

(203) 577-8656

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 El Paso County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.



Ryan Burns, PE Date

State of Colorado No. 54412

For and on behalf of All Terrain Engineering LLC

DEVELOPER'S STATEMENT

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

10/21/2024

Owner/Developer Date

Business Name: Greener Pastures LLC

By: Jeff Weisburg

Title: Developer/Owner

Address: 4450 Mark Dabling Blvd, Colorado Springs, CO 80907

EL PASO COUNTY STATEMENT

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

Gilbert LaForce, P.E. Digitally signed by Gilbert LaForce, P.E.
Reason: Authorized signatory as County Engineer designee
Date: 2025.02.06 11:42:16-07'00' 2/6/2025

~~For City Engineer~~
ECM Administrator/County Engineer Date

Conditions of Approval:

Table of Contents

Appendices

I. General Purpose, Location & Description

a. Purpose

The purpose of this Drainage Letter 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. This is being prepared to support the zone change request. No new development or imperviousness is proposed with this project. No changes to existing or historic drainage patterns are proposed with this letter or zone change.

b. Location

7280 N. Nevada Lane is located south of Woodmen Road, East of Black Forest Road and West of Sand Creek, as shown on the enclosed vicinity map. It occupies 4.984 acres in the Sand Creek Drainage basin in part of the Northwest quarter of the Northeast Quarter of Section 8, Township 13 South, Range 65 West of the 6th P.M. in El Paso County. The Assessor's Parcel No. is 5308000074. It is an unplatted parcel for which a zone change is being processed, which is the reason for this drainage letter. The site is bounded on the South by California Drive, on the East by Nevada Lane, on the West by Omaha Lane, and on the North by unplatted property.

A vicinity map is presented in Appendix A.

c. Description of Property

The site was developed in stages and includes a private residence in the SE corner, multiple structures, equipment and material storage areas, hardscaped area, and gravel. The residence in the SE corner was built prior to 2008, and therefore exempt from water quality or detention requirements. The remainder of the site was developed post 2008, and therefore this drainage letter documents how water quality treatment is provided for the post 2008 developed areas, and also how the developed flows are routed through the site and downstream to adequate outfalls.

d. Floodplain Statement

This subdivision is not within the limits of a designated flood plain or flood hazard area, as identified on FEMA panel no. 08041C0533 G, dated December 7, 2018, a copy of which is enclosed for reference.

Drainage Basins

a. Major Basin Description

The site is located within the Sand Creek Drainage Basin. The site's drainage characteristics were previously studied in the following reports:

1. "Sand Creek Drainage Basin Planning Study" prepared by Kiowa Engineering, September 1992

A small area from the unplated lot to the north of the site is tributary to the site. No other offsite areas are tributary to the site. Runoff generally sheet flows across the site from North to South and continues south and west along the Existing dirt streets. See below for the historic basin description.

b. Historic Subbasin Description

For the purposes of this report, the historic drainage patterns of and affecting the site, were analyzed to understand if the developed/proposed conditions have altered these patterns or flows and what if any improvements are required to safely route the flows through the site and to the downstream outfall.

In the historic condition the site was considered to be range land/undeveloped.

Basin H1, is 6.03 acres in area (same area as existing/proposed basins O1, O2, A-D), and runoff generated (Q5 = 1.5 cfs, Q100 = 10.1 cfs), sheet flows from a high-point north of the site, south to the site's northern boundary, and continue across the site from north to south until they reach California Drive. Flows continue south of the Site and are routed to Sand Creek approximately 3,800' away in undefined drainage paths, according to the Sand Creek DBPS.

Basin H2, is 0.86 acres (same area as existing/proposed Basin E), and slopes from north to south. Runoff generated Q5 = 0.3 cfs, and Q100 = 1.8 cfs sheet flows to the sites southern boundary at deign point 2 and continue per the historic undefined drainage paths to Sand Creek, approximately 3,800' away, according to the Sand Creek DBPS.

c. Proposed Subbasin Descriptions

The proposed site has been divided into 5 subbasins for analysis (A-E) & two off-site basins O1 & O2. A drainage map is presented in the Appendix. See below for existing/proposed basin descriptions:

Basin O1 is 0.96 acres in area and includes a portion of the unplated parcel to the north. The parcels imperviousness and land coverages were determined by a site visit and through aerial imagery. Basin O1 consists of undeveloped range land, and material storage areas that are largely unvegetated. The material storage areas have been characterized as "railyard" areas with an imperviousness of 40%. Runoff generated, Q5 = 0.6 cfs, Q100 = 2.3 cfs, sheet flows south through landscaped and range-land areas to the sites northern boundary at design point (DP) 1. Runoff continues through Basin A per the patterns identified below, and combines with Basin A runoff @ DP 2. See Basin A Description.

Basin O2 is 0.94 acres in area and includes a portion of the unplated parcel to the north. The parcels imperviousness and land coverages were determined by a site visit and through aerial imagery. Basin O2 consists of undeveloped range land, and material storage areas that are largely unvegetated. The material storage areas have been characterized as "railyard" areas with an imperviousness of 40%. Runoff generated, Q5 = 0.3 cfs, Q100 = 1.7 cfs, sheet flows south to the site's northern boundary at design point 3. Runoff continues through Basin B per the patterns identified below, and combines with Basin B runoff @ DP 4. See Basin B Description.

This drainage report accommodates the existing conditions of the tributary areas of the parcel to the north at the time this report was generated. If the lot to the north develops in the future, it is expected that they will manage their developed flows on-site and release at no more than the rates identified in this report.

Basin A is 1.75 Acres in area, located in the northern and western portion of the site. Basin A consists of undeveloped range land, material stockpiles and unvegetated areas characterized as rail-yard areas, roof areas and a small portion of hardscape. Runoff Q5 = 1.2 cfs, Q100 = 4.2 cfs from this basin generally sheet flows south and towards the existing flat bottom, grass lined swale central to the basin. This swale collects the flows from the east and the west and carries them south to design point 2 where they combine with Flows from Basin O1, DP2 Q5 = 1.6 cfs, Q100 = 5.5 cfs. The swale becomes wider as you approach the southern limits of basin A. An existing swale calc is included in appendix C, showing the swale is stable and has adequate capacity to convey the 100-yr design flows. Flows are spread-out at DP2 with a level spreader, 50' in width and continue south across the grass buffer and Basin C's range land which provides water quality treatment for the entire tributary area. Flows continue south across basin C to DP5 where they combine with flows from DP 2. See basin C description below.

Basin B is 1.20 acres in area and consists primarily of unvegetated and earthen storage areas characterized as "rail-yards" with an imperviousness of 40%. Basin B also includes landscaped areas, grass/lawn areas, roofs, and small areas of hardscape. Runoff generated Q5 = 1.4 cfs, Q100 = 3.8 cfs, sheet flows south and west, where intercepted by a landscaped berm/swale, which directs flows to the west and to DP 4 at the north boundary of basin D, where they combine with flows from basin O2 (Q5 = 1.4 cfs, Q100 = 4.0 cfs). An existing swale calc is included in appendix C, showing the swale is stable and has adequate capacity to convey the 100-yr design flows. Flows then continue in the proposed swale re-alignment to a proposed 60' wide level spreader which discharges to the proposed grass buffer and receiving pervious area which provides water quality treatment for the entire tributary area. Flows continue south across basin D to DP6 where they combine with flows from DP 4. See basin D description below.

Basin C is 0.82 acres in area and consists of range land. Runoff generated, Q5 = 0.2 cfs, and Q100 = 1.7 cfs, sheet flows south and west to design point 5 across the existing range land and designated grass buffer area downstream of the proposed 50' wide level spreader. Developed flows from Basin A and treated flows from Basin O1 are spread out and distributed across the 50' level spreader prior to combining with Basin flows at the outfall point, DP 5, Q5 = 1.6 cfs & Q100 = 6.1 cfs.

Treated flows from DP 5 will exit the site in a sheet flow condition (not concentrated), across the site's southern boundary, to California Drive, which is assumed to be consistent with the historic flow quantities, characteristics, & patterns. No negative downstream effects are anticipated as a result of this proposed development and the downstream outfall is appropriate and has adequate capacity to handle the proposed flows and conditions.

Once flows leave the site, they travel South and West, across the California Drive and Utah Lane road benches. It appears the roads act as level spreaders in the existing conditions, as no defined flows paths have been found, and no road-side ditches exist to date. Flows are then directed to the South and continue per historic patterns to Sand Creek. It is our opinion that this condition is adequately handling the existing and proposed flows from the site, and are appropriate for the area which is rural in nature, and highly vegetated.

Basin D is 0.36 acres, and consists of hardscaped areas, landscaped areas, and undeveloped rangeland. Runoff generated Q5 = 0.1 cfs, Q100 = 0.8 cfs sheet flows south, across the designated grass buffer area

(5,200 s.f. minimum), below the proposed 60' wide level spreader to California Drive at DP6, where flows combine with flow from DP4 from basins O2 & C, Q5 = 1.4 cfs & Q100 = 4.1 cfs.

Basin E is 0.86 acres, and consists of hardscaped areas, a private residence, landscaped areas, and grass. This basin was developed prior to 2008 and is considered exempt from detention and water quality requirements and is not considered to be a part of this development. Runoff generated Q5 = 1.2 cfs, Q100 = 3.0 cfs sheet flows south to design point 7 at California Drive. Flows are then directed to the South and continue per historic patterns to Sand Creek.

Once flows from design point 5 and 6, Basin C & D, leave the site, they travel South and West, across the California Drive and Wyoming Lane road benches. It appears the roads act as level spreaders in the existing conditions, as no defined flows paths have been found, and no road-side ditches exist to date. Flows are then directed to the South and continue per historic patterns to Sand Creek. It is our opinion that this condition is adequately handling the existing and proposed flows from the site, and are appropriate for the area which is rural in nature, and highly vegetated.

A flow comparison between the developed/proposed condition and the historic condition is included below to show that the total developed flows (proposed condition) leaving the site is consistent with the historic condition. For the purposes of this analysis, proposed Basin E, and historic basin H2, were analyzed separately, as this area of the site is not subject to water quality or detention requirements, as it was developed as a private residence prior to County detention and water quality requirements, and is considered exempt and not a part of this project. A flow comparison of Basin E and H2 has been included for information only.

The developed portions of the site and their tributary areas are contained within proposed basins O1, O2, A-D, and encompasses the same area analyzed within historic basin H1. The total developed flow leaving the site in the proposed condition (excluding basin E) is the summation of flows from DP 5 & 6, and as shown below, has remained consistent with the historic condition flows in quantity, characteristics, and pattern. An increase in the proposed 5-year flows of 1.5 cfs is anticipated, however, no negative effects to downstream properties are expected, as the 5-year peak flow leaving the site is over 6 times less than the 100-yr historic flows, which have been proved to be stable across the site and downstream of the site. See the table below:

Flow Comparison			
Condition	**Basin/DP**	**Q5 (cfs)**	**Q100 (cfs)**
EX/PROPOSED	DP 5 + 6	3.0	10.2
HISTORIC	H1	1.5	10.1
EX/PROPOSED	DP 7*	1.2	3.0
HISTORIC	H2*	0.3	1.8

*This basin contains a private residence, not part of the proposed Commercial development, and is not subject to detention or water quality requirements

Drainage Design Criteria

a. Development Criteria Reference

Storm drainage analysis and design criteria for this project were taken from the "City of Colorado Springs/El Paso County Drainage Criteria Manual" Volumes 1 and 2 (EPCDCM), dated October 12, 1994, the "Urban Storm Drainage Criteria Manual" Volumes 1 to 3 (USDCM) and Chapter 6 and Section 3.2.1 of Chapter 13 of the "Colorado Springs Drainage Criteria Manual" (CSDCM), dated May 2014, as adopted by El Paso County.

b. Hydrologic Criteria

All hydrologic data was obtained from the "El Paso Drainage Criteria Manual" Volumes 1 and 2, and 3. On-site drainage improvements were designed based on the 5 year (minor) storm event and the 100-year (major) storm event. Runoff was calculated using the Rational Method, and rainfall intensities for the 5-year and the 100-year storm return frequencies were obtained from Table 6-2 of the CSDCM. One hour point rainfall data for the storm events is identified in the chart below. Runoff coefficients were determined based on proposed land use and from data in Table 6-6 from the CSDCM. Time of concentrations were developed using equations from CSDCM. All runoff calculations and applicable charts and graphs are included in the Appendices.

c. Hydraulic Criteria

The Rational Method and USDCM's SF-2 and SF-3 forms were used to determine the runoff from the minor and major storms on the site. Autodesk Hydraflow express was used to size any proposed channels or swales. Swales were sized based on the peak 100-year flows with the minimum and maximum swale slopes. Per criteria velocities were checked to be less than 5 ft/s in the existing/proposed swales. All hydraulic calculations are presented in Appendix C.

Drainage Facility Design

a. General Concept

The site was previously developed and a system of swales, berms, and grass buffers have been created to convey stormwater runoff from North to South across the site, to the low side of the site along the southern boundary including the off-site flows from the north. This system of berms and swales is designed to provide water quality treatment and reduce peak flows, by lengthening flow paths and promoting infiltration for the developed and impervious areas of the site (excluding Basin E, as it was developed pre-2008, and is exempt from Water quality and detention requirements).

b. Water Quality & Detention

Water quality for basins O1, O2, A, B, & C is provided for the site through runoff reduction and filtration. Mile High Flood Districts, UD-BMP, Runoff Reduction Workbook was used to model the sites infiltration for the water quality requirements, see the appendix. The sites' underlying soils are hydrologic type A, which have a high infiltration rate. All developed flows and impervious areas are directed over receiving pervious areas and grass buffers as described in the basin descriptions above. In order to ensure flows are distributed across the entire grass buffer areas, level spreaders are proposed just upstream of each buffer and RPA.

Basin C is undeveloped and provides water quality treatment & the required WQCV for Basin A and flow reaching design point 2 by dispersing flows over a 50' wide level spreader which outfalls directly to a 4,000 sf grass buffer and receiving pervious area. Basin D includes a 60' wide level spreader that disperses flows across its entire width and outfalls directly to a 5,200 sf grass buffer and RPA that provides water quality treatment and the required WQCV for basins B & D.

The offsite tributary areas of basins O1 and O2 were also analyzed in their existing condition at the time this report was prepared, and it was found that no additional water quality treatment is required, as the developed flows from those basins travel across existing grass buffers prior to reaching the sites' northern boundary and provide the required WQCV upstream of our site. The flows reaching the site from the parcel to the north are considered treated.

This design ensures all developed flows are adequately treated by infiltration. A 100% water quality volume reduction was achieved for the developed flows from Basins O1, O2, A, B, C & D, as shown in the UD-BMP Runoff Reduction workbook included in the appendix.

No detention is proposed for the site as the developed flows are generally consistent with the historic flow rates and the existing downstream outfall and conveyance is adequate. No negative downstream effects to property or stormwater infrastructure or conveyances are anticipated as a result of this proposed development. To ensure the outfall remains stable in the long term, level spreaders were added upstream of the Basin C and D outfalls to ensure the flows are spread out into a sheet flow condition, are non-erosive, and leave the site in a consistent manner with the historic condition.

c. Major Drainageways

There are no major drainageways that traverse the site.

d. Grading & Erosion Control Plan

Due to the project disturbance area (prior construction, not associated with this plan or report), a separate Grading and Erosion Control plan has been prepared. The Grading and Erosion Control Plan has been submitted in conjunction with this drainage letter. The GEC plan will become the guiding document for all proposed improvements on-site, including swales, berms, grass buffers, and level spreaders.

e. Four Step Method

Step 1 – Reducing Runoff Volumes: The site has been designed such that all impervious areas are routed over receiving pervious areas. All flows are conveyed overland over pervious areas, on generally mild and flat slopes, over top of hydrologic Type A soils. A runoff-reduction (UD-BMP V3.07) spreadsheet is presented in Appendix B.

Step 2 – Treat and slowly release the WQCV: The Water Quality Capture Volume for the "post 2008" areas of the site (Basins A-D) is completely infiltrated. A 100% Water Quality Volume Reduction for these basins was achieved per MHFD UD-BMP V3.07.

Step 3 – Stabilize stream channels: No evidence of downstream erosion has been observed between the site's outfall and the Sand Creek and to our knowledge the site has generally been in it's present day condition for approximately a decade or more. Furthermore, the proposed site condition flows are reasonably consistent with the historic flow rates (0.1 cfs for the 100-year), therefore, no mitigation is required, as the flows are consistent with the historic condition. To ensure the long term stability of the site and the downstream outfall, level spreaders are proposed to ensure flows leaving the site are non-erosive, and not concentrated.

Flows leaving the site continue approximately 3,800 feet across public and private property to reach the Creek, and per the DBPS, no specific path is identified. However, it appears a series of private ponds, surrounded by dense vegetation and tree stands, intercept flows prior to reaching the Sand Creek. There are no known improved or engineered drainage conveyances directly downstream of the site.

Step 4 – Consider the need for source controls: To our knowledge only natural and earthen materials are stored on-site. Storage areas are covered. No construction of industrial or commercial uses is proposed or associated with this project All developed areas are existing.

f. Drainage Basin & Bridge Fees

Drainage and Bridge fees will be due at the time of plating. This report does not propose to subdivide or plat the site, therefore no drainage fees are due.

II. Summary

7280 N. Nevada Lane remains consistent with pre-development drainage conditions with the construction of the recommended drainage improvements. The proposed development will not adversely affect downstream stormwater infrastructure or surrounding properties. This report meets the latest El Paso County Drainage criteria.

III. References

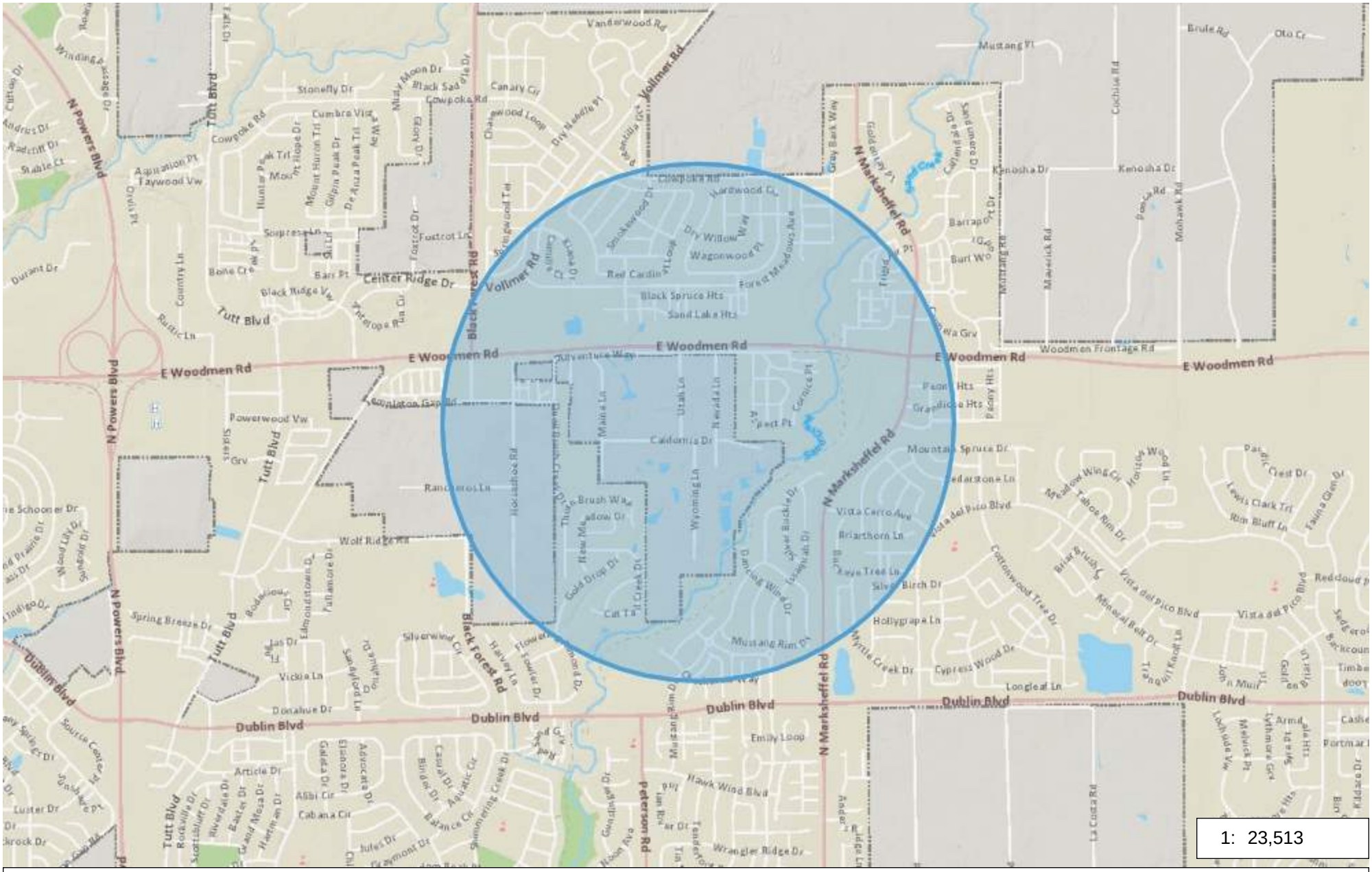
1. "El Paso County and City of Colorado Springs Drainage Criteria Manual, Vol I & II".

2. Urban Storm Drainage Criteria Manual (Volumes 1, 2, and 3), prepared by Mile High Flood District, Revised August 2018, September 2017, and January 2021.

3. Sand Creek Drainage Basin Planning Study, prepared Kiowa Engineering Corporation, January 1993, revised March 1996.

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

City of Colorado Springs



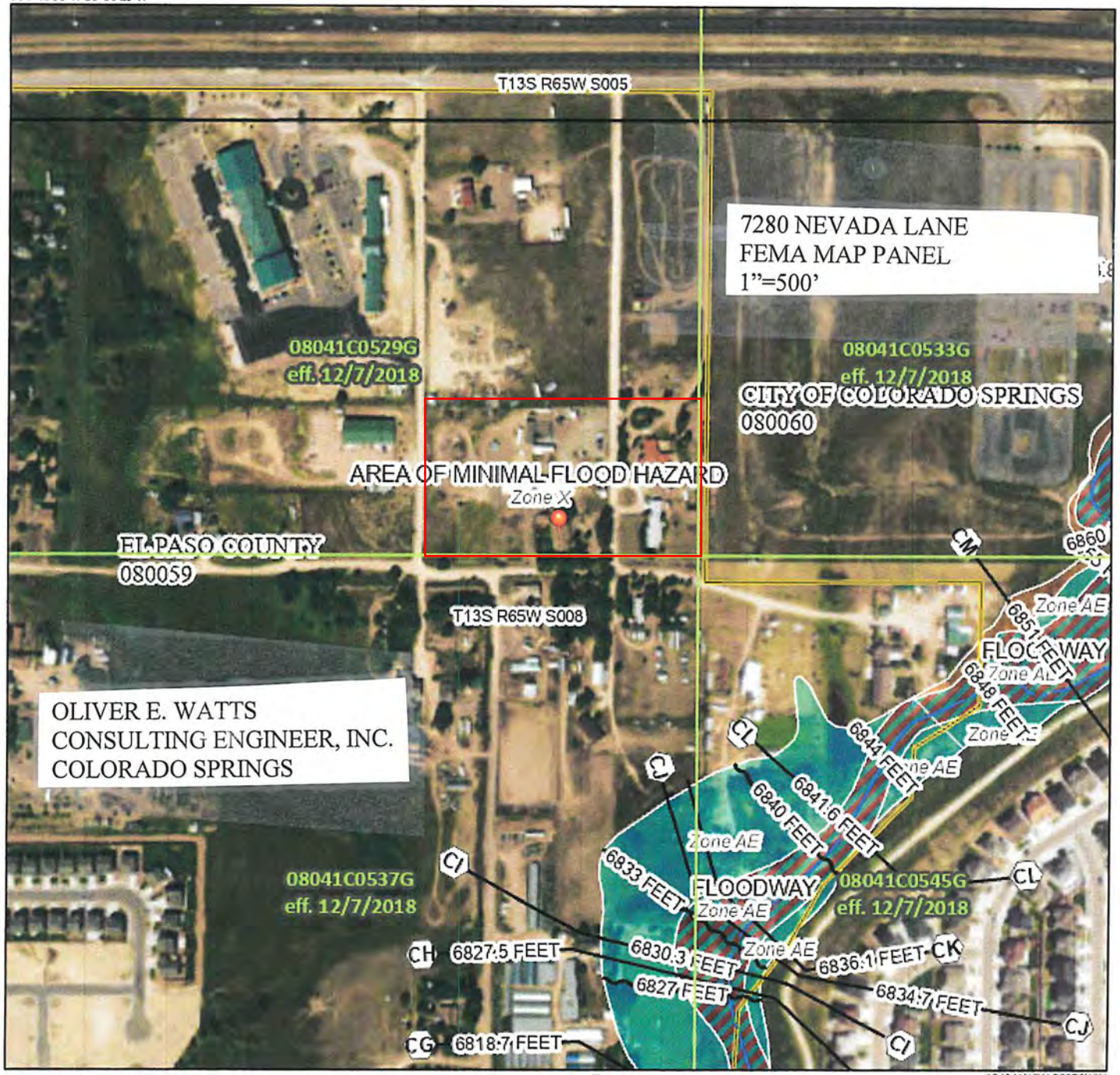
0.7 0 0.37 0.7 Miles

NAD_1983_StatePlane_Colorado_Central_FIPS_0502_Feet

National Flood Hazard Layer FIRMette

FEMA

104°41'38"W 38°56'29"N



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

1:6,000

104°41'1"W 38°56'1"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

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

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

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

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

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

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

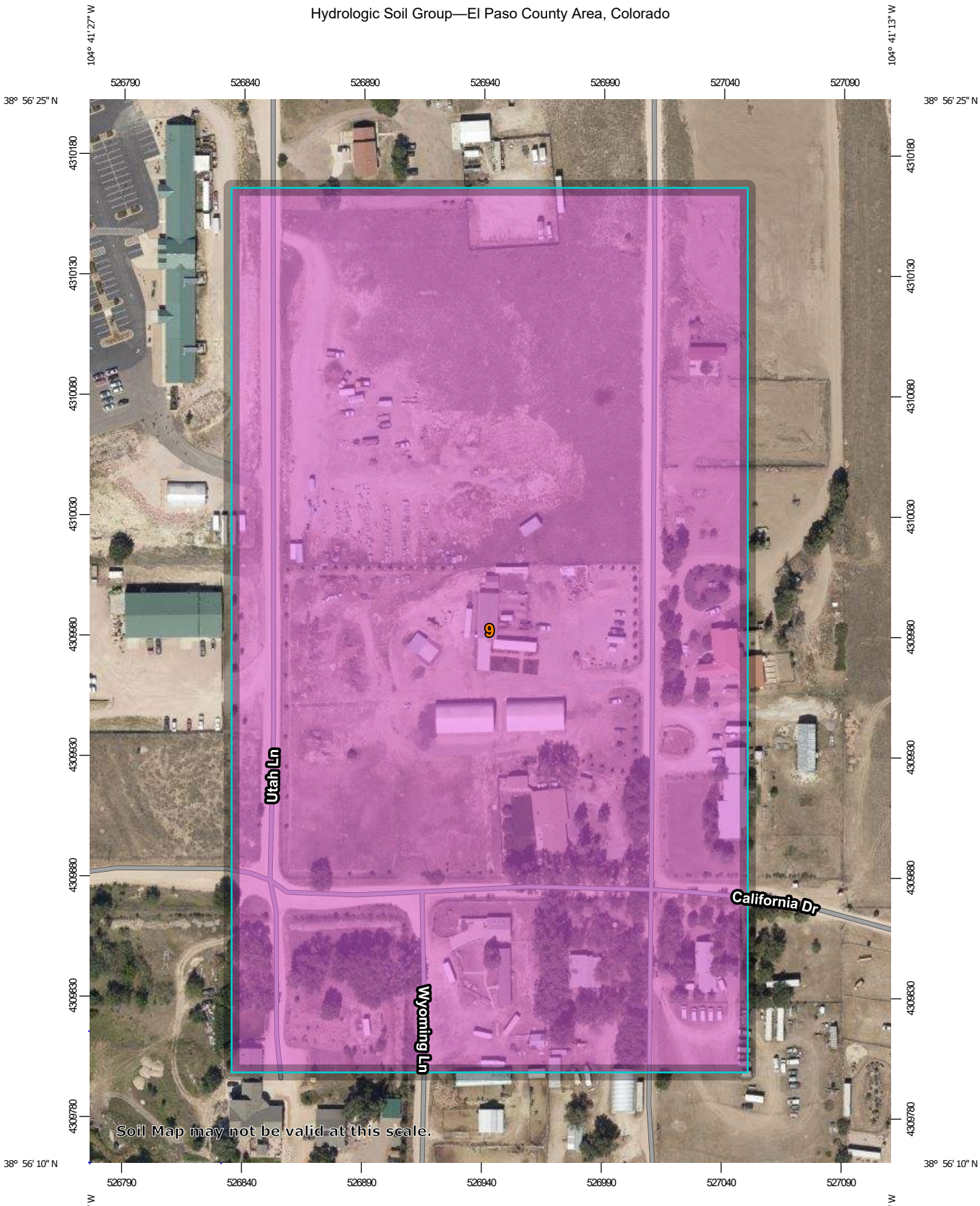
N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/30/2023 at 4:55 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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



Map Scale: 1:2,150 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

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
9	Blakeland-Fluvaquentic Haplaquolls	A	19.6	100.0%
Totals for Area of Interest			**19.6**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B – HYDROLOGIC CALCULATIONS

COMPOSITE % IMPERVIOUS CALCULATIONS - HISTROIC CONDITIONS

Subdivision: 7280 NEVADA LN
Location: Colorado Springs

Project Name: 7280 NEVADA
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 9/17/24

Basin ID	Total Area (ac)	HISTORIC (2%)				Basins Total Weighted C		Basins Total Weighted % Imp.
		C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	
H1	6.03	0.09	0.36	6.03	2.0%	0.09	0.36	2.0%
H2	0.86	0.09	0.36	0.86	2.0%	0.09	0.36	2.0%
Total	**6.89**							**2.0%**

STANDARD FORM SF-2 - HISTORIC CONDITIONS
TIME OF CONCENTRATION

Subdivision: 7280 NEVADA LN
Location: Colorado Springs

Project Name: 7280 NEVADA
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 9/17/24

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	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)
H1	6.03	A	2%	0.09	0.36	300	5.5%	18.0	470	5.5%	5.0	1.2	6.7	24.7	770.0	29.3	24.7
H2	0.86	A	2%	0.09	0.36	200	4.5%	15.7	0	5.5%	5.0	1.2	0.0	15.7	200.0	25.7	15.7

NOTES:

$$t_c = t_i + t_t$$

Where:

t_c = computed time of concentration (minutes)

t_i = overland (initial) flow time (minutes)

t_t = channelized flow time (minutes).

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$ Equation 6-4

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 6-3

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

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).

Equation 6-5

$$t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

Where:

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).

Table 6-2. NRCS Conveyance factors, K

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

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

STANDARD FORM SF-3 - HISTORIC CONDITIONS

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: 7280 NEVADA LN
Location: Colorado Springs
Design Storm: 5-Year

Project Name: 7280 NEVADA
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 9/17/24

		DIRECT RUNOFF							TOTAL RUNOFF				STREET/SWALE			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	H1	6.03	0.09	24.7	0.54	2.77	1.5															Runoff sheet flows south to DP 1 @ site boundary
	2	H2	0.86	0.09	15.7	0.08	3.45	0.3															Runoff sheet flows south to DP 2 @ site boundary

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

STANDARD FORM SF-3 - HISTORIC CONDITIONS

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: 7280 NEVADA LN
Location: Colorado Springs
Design Storm: 100-Year

Project Name: 7280 NEVADA
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 9/17/24

		DIRECT RUNOFF							TOTAL RUNOFF				STREET			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	H1	6.03	0.36	24.7	2.17	4.66	10.1															Runoff sheet flows south to DP 1 @ site boundary
	2	H2	0.86	0.36	15.7	0.31	5.80	1.8															Runoff sheet flows south to DP 2 @ site boundary

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

COMPOSITE % IMPERVIOUS CALCULATIONS - PROPOSED CONDITIONS

Subdivision: 7280 NEVADA LN
Location: Colorado Springs

Project Name: 7280 NEVADA LN
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 10/19/24

Basin ID	Total Area (ac)	PAVED (100% Imp.)				ROOFS (90%)				RAIL-YARD (40%)				PASTURE/MEADOW (0%)				Basins Total Weighted C		Basins Total Weighted % Imp.
		C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	
A	1.75	0.90	0.96	0.01	0.6%	0.73	0.81	0.10	5.1%	0.30	0.50	0.71	16.2%	0.08	0.35	0.93	0.0%	0.21	0.44	21.9%
B	1.20	0.90	0.96	0.02	1.7%	0.73	0.81	0.14	10.5%	0.30	0.50	0.90	30.0%	0.08	0.35	0.14	0.0%	0.33	0.53	42.2%
C	0.82	0.90	0.96	0.00	0.0%	0.73	0.81	0.00	0.0%	0.30	0.50	0.00	0.0%	0.08	0.35	0.82	0.0%	0.08	0.35	0.0%
D	0.36	0.90	0.96	0.01	1.4%	0.73	0.81	0.00	0.0%	0.30	0.50	0.00	0.0%	0.08	0.35	0.36	0.0%	0.09	0.36	1.4%
E	0.86	0.90	0.96	0.15	17.4%	0.73	0.81	0.08	8.4%	0.30	0.50	0.43	20.0%	0.08	0.35	0.20	0.0%	0.39	0.57	45.8%
O1	0.96	0.90	0.96	0.00	0.0%	0.73	0.81	0.00	0.0%	0.30	0.50	0.51	21.3%	0.08	0.35	0.45	0.0%	0.20	0.43	21.3%
O2	0.94	0.90	0.96	0.00	0.0%	0.73	0.81	0.01	0.8%	0.30	0.50	0.03	1.1%	0.08	0.35	0.91	0.0%	0.09	0.36	1.9%
Total	**6.89**																			**21.9%**
Total (excluding E)	**6.03**																			**18.5%**

STANDARD FORM SF-2 - PROPOSED CONDITIONS
TIME OF CONCENTRATION

Subdivision: 7280 NEVADA LN
Location: Colorado Springs

Project Name: 7280 NEVADA LN
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 10/19/24

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (ft)	S_o (%)	t_i (min)	L_t (ft)	S_t (%)	K	VEL. (ft/s)	t_t (min)	COMP. t_c (min)	TOTAL LENGTH (ft)	Urbanized t_c (min)	t_c (min)
A	1.75	A	21.9%	0.21	0.44	85	1.2%	13.9	290	3.0%	7.0	1.2	4.0	17.9	375.0	24.6	17.9
B	1.20	A	42.2%	0.33	0.53	100	2.1%	10.8	340	2.1%	10.0	1.4	3.9	14.7	440.0	21.5	14.7
C	0.82	A	0.0%	0.08	0.35	100	3.0%	12.8	130	1.6%	7.0	0.9	2.4	15.3	230.0	27.9	15.3
D	0.36	A	1.4%	0.09	0.36	100	2.5%	13.5	140	2.5%	7.0	1.1	2.1	15.6	240.0	27.4	15.6
E	0.86	A	45.8%	0.39	0.57	100	2.0%	10.1	250	2.0%	7.0	1.0	4.2	14.4	350.0	20.1	14.4
O1	0.96	A	21.3%	0.20	0.43	300	5.5%	16.1	70	5.5%	7.0	1.6	0.7	16.8	370.0	22.8	16.8
O2	0.94	A	1.9%	0.09	0.36	300	6.5%	17.0	149	6.5%	2.5	0.6	3.9	20.9	449.0	26.7	20.9

NOTES:

$$t_c = t_i + t_t$$

Where:

t_c = computed time of concentration (minutes)

t_i = overland (initial) flow time (minutes)

t_t = channelized flow time (minutes).

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

Where:

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

Equation 6-2

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

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).

Equation 6-4

$$t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

Where:

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).

Equation 6-3

Equation 6-5

Table 6-2. NRCS Conveyance factors, K

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

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

STANDARD FORM SF-3 - PROPOSED CONDITIONS

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: 7280 NEVADA LN
Location: Colorado Springs
Design Storm: 5-Year

Project Name: 7280 NEVADA
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 9/17/24

		DIRECT RUNOFF							TOTAL RUNOFF				STREET/SWALE			PIPE				TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	REMARKS
	1	O1	0.96	0.20	16.8	0.19	3.35	0.6					0.6	0.19	3					305	0.7	7.6	RUNOFF FROM BASION O1, OVERLAND FLOW SOUTH TO SITE'S N BOUNDARY @ DP 1. COMBINES W/ BASIN A FLOWS IN SWALE @ DP 2/PROPOSED LEVEL SPREADER
		A	1.75	0.21	17.9	0.37	3.25	1.2															RUNOFF FROM BASIN A, OVERLAND/SWALE FLOW TO DP 2 (COMBINES W/ BASIN O1 @ DP2/PROPOSED LEVEL SPREADER)
	2								24.4	0.56	2.79	1.6	1.6	0.56	3					222	0.7	5.5	COMBINED FLOW @ DP 2, OVERLAND FLOWS TO DP6 AND COMBINES WITH FLOWS FROM BASINS C
		C	0.82	0.08	15.3	0.07	3.49	0.2															RUNOFF FROM BASIN C, OVERLAND/SWALE FLOW TO DP 45(COMBINES W/ BASIN A,B,O1,O2 @ DP 5)
	5								29.9	0.62	2.49	1.6											COMBINED FLOW IN SWALE @ DP5 (BASINS A-C, O1, & O2)
	3	O2	0.94	0.09	20.9	0.09	3.02	0.3					0.3	0.09	2.1					300	0.6	8.9	RUNOFF FROM BASION O2, OVERLAND FLOW SOUTH TO SITE'S N BOUNDARY @ DP 3. COMBINES W/ BASIN B FLOWS IN SWALE @ DP 4
		B	1.20	0.33	14.7	0.40	3.55	1.4															RUNOFF FROM BASIN B, OVERLAND/SWALE FLOW TO DP 4 (COMBINES W/ BASIN O2 @ DP4)
	4								29.8	0.49	2.92	1.4	1.4	0.49	2.5					210	0.6	5.7	COMBINED FLOW @ DP 4/LEVEL SPREADER(BASINS O2, B), CONTINUES OVERLAND TO DP6
		D	0.36	0.09	15.6	0.03	3.47	0.1															RUNOFF FROM BASIN D, OVERLAND FLOW TO BASIN BOUNDARY AND OFFSITE @ DP6, COMBINES W/ FLOWS FROM DP4
	6								35.5	0.52	2.69	1.4											COMBINED FLOW @ DP6 FROM BASIN O2, B, & D TO CALIFORNIA DRIVE
	7	E	0.86	0.39	14.4	0.34	3.59	1.2															RUNOFF FROM BASIN E, OVERLAND FLOW TO BASIN BOUNDARYAND OFFSITE @ DP7

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: 7280 NEVADA LN
Location: Colorado Springs
Design Storm: 100-Year

Project Name: 7280 NEVADA
Project No.: 24020.00
Calculated By: REB
Checked By:
Date: 9/17/24

		DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			
STREET	Design Point	Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	REMARKS
	1	O1	0.96	0.43	16.8	0.41	5.62	2.3					2.3	0.41	3					305	0.7	7.6	RUNOFF FROM BASION O1, OVERLAND FLOW SOUTH TO SITE'S N BOUNDARY @ DP 1. COMBINES W/ BASIN A FLOWS IN SWALE @ DP 2/PROPOSED LEVEL SPREADER
		A	1.75	0.44	17.9	0.77	5.46	4.2															RUNOFF FROM BASIN A, OVERLAND/SWALE FLOW TO DP 2 (COMBINES W/ BASIN O1 @ DP2/PROPOSED LEVEL SPREADER)
	2								24.4	1.18	4.69	5.5	5.5	1.18	3					222	0.7	5.5	COMBINED FLOW @ DP 2, OVERLAND FLOWS TO DP6 AND COMBINES WITH FLOWS FROM BASINS C
		C	0.82	0.35	15.3	0.29	5.87	1.7															RUNOFF FROM BASIN C, OVERLAND/SWALE FLOW TO DP 45(COMBINES W/ BASIN A,B,O1,O2 @ DP 5)
	5								29.9	1.47	4.17	6.1											COMBINED FLOW IN SWALE @ DP5 (BASINS A-C, O1, & O2)
	3	O2	0.94	0.36	20.9	0.34	5.08	1.7					1.7	0.34	2.1					300	0.6	8.9	RUNOFF FROM BASION O2, OVERLAND FLOW SOUTH TO SITE'S N BOUNDARY @ DP 3. COMBINES W/ BASIN B FLOWS IN SWALE @ DP 4
		B	1.20	0.53	14.7	0.63	5.96	3.8															RUNOFF FROM BASIN B, OVERLAND/SWALE FLOW TO DP 4 (COMBINES W/ BASIN O2 @ DP4)
	4								29.8	0.97	4.18	4.0	4.0	0.97	2.5					210	0.6	5.7	COMBINED FLOW @ DP 4/LEVEL SPREADER(BASINS O2, B), CONTINUES OVERLAND TO DP6
		D	0.36	0.36	15.6	0.13	5.82	0.8															RUNOFF FROM BASIN D, OVERLAND FLOW TO BASIN BOUNDARY AND OFFSITE @ DP6, COMBINES W/ FLOWS FROM DP4
	6								35.5	1.10	3.74	4.1											COMBINED FLOW @ DP6 FROM BASIN O2, B, & D TO CALIFORNIA DRIVE
	7	E	0.86	0.57	14.4	0.49	6.02	3.0															RUNOFF FROM BASIN E, OVERLAND FLOW TO BASIN BOUNDARYAND OFFSITE @ DP7

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

APPENDIX C – HYDRAULIC CALCULATIONS

Channel Report

DP-2 EXISTING SWALE Q-100

Trapezoidal

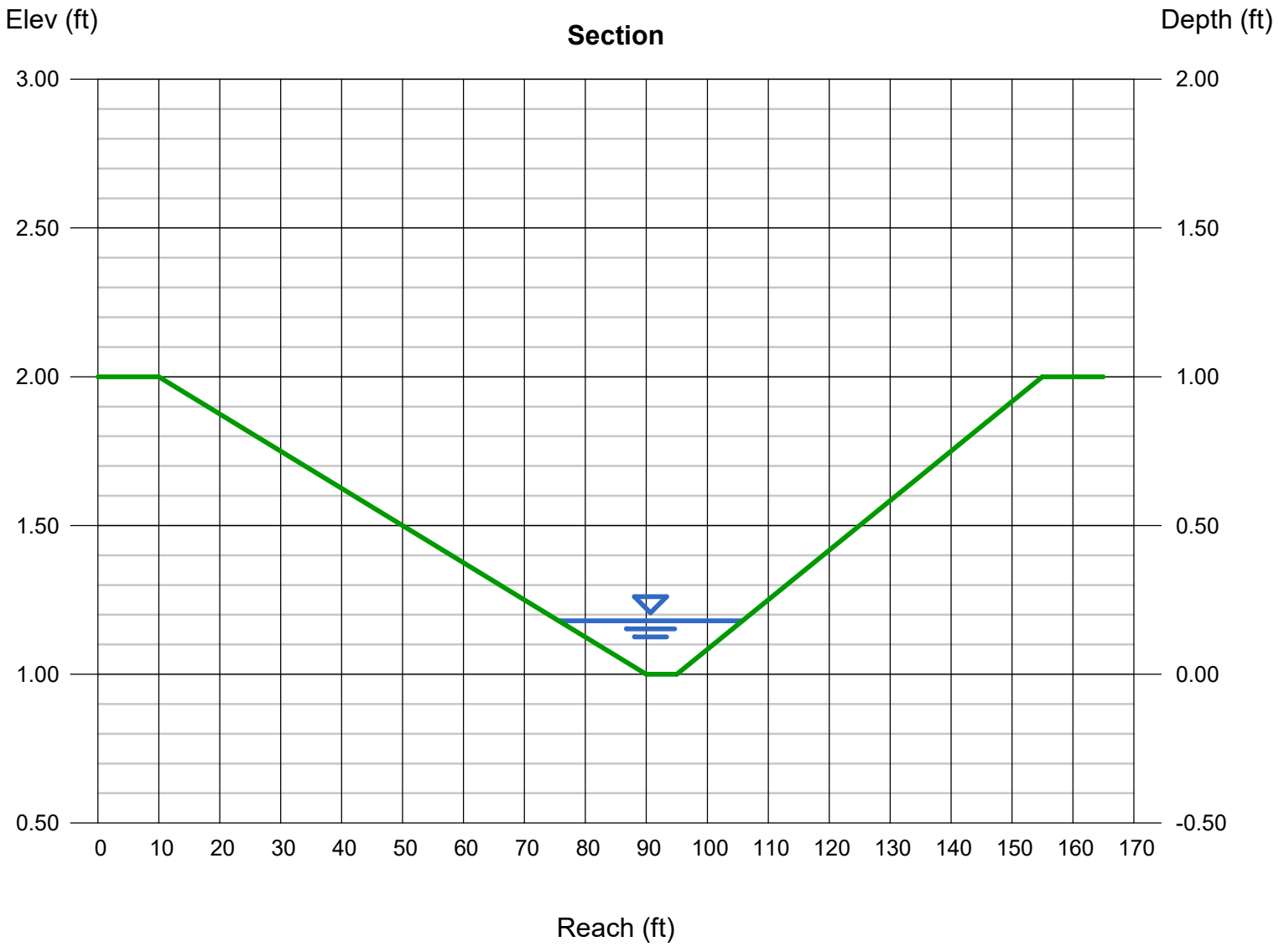
Bottom Width (ft)	= 5.00
Side Slopes (z:1)	= 80.00, 60.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 3.40
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 5.50

Highlighted

Depth (ft)	= 0.18
Q (cfs)	= 5.500
Area (sqft)	= 3.17
Velocity (ft/s)	= 1.74
Wetted Perim (ft)	= 30.20
Crit Depth, Yc (ft)	= 0.18
Top Width (ft)	= 30.20
EGL (ft)	= 0.23



Weir Report

DP2 - Level Spreader Q-100

Rectangular Weir

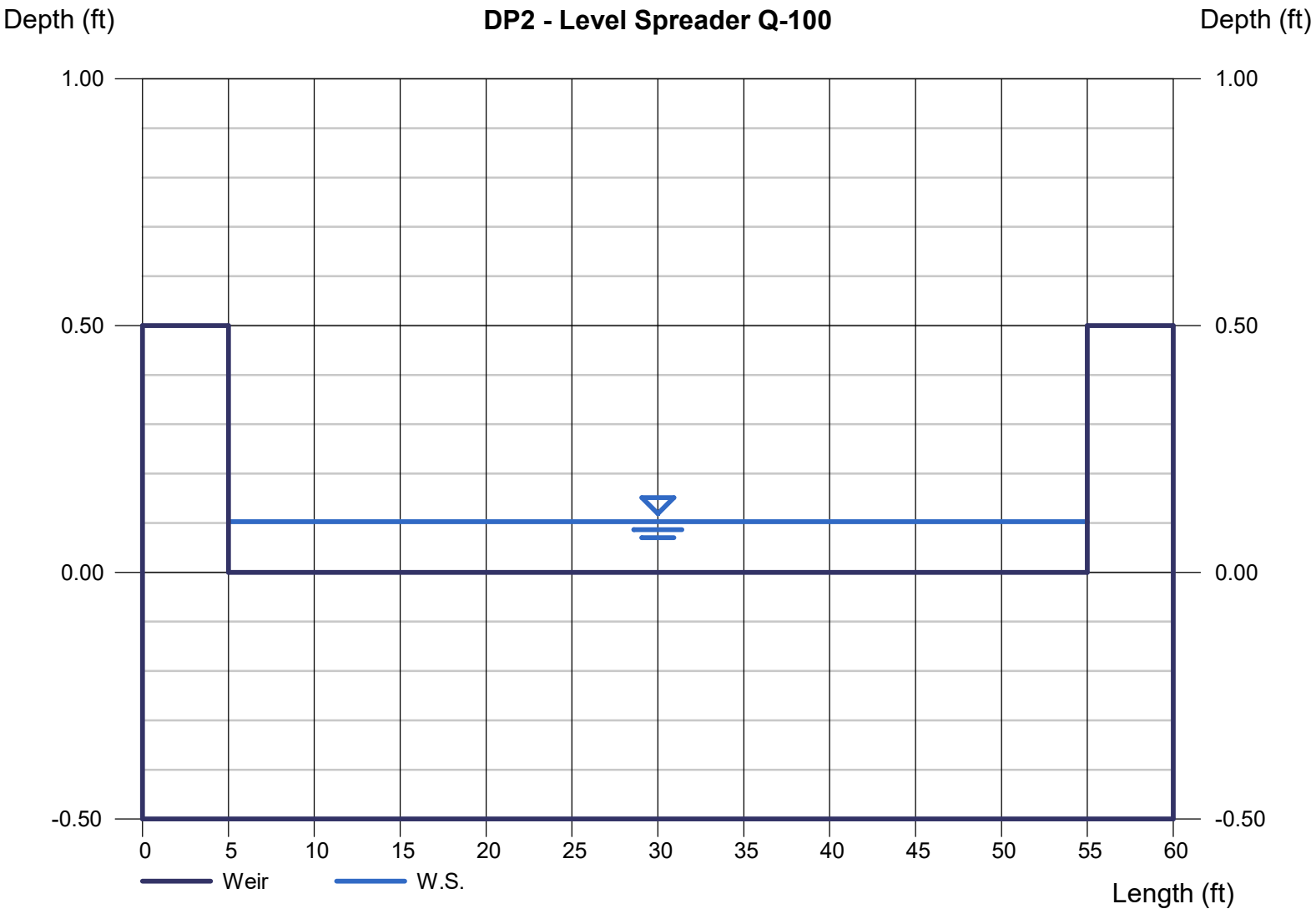
Crest	= Sharp
Bottom Length (ft)	= 50.00
Total Depth (ft)	= 0.50

Calculations

Weir Coeff. Cw	= 3.33
Compute by:	Known Q
Known Q (cfs)	= 5.50

Highlighted

Depth (ft)	= 0.10
Q (cfs)	= 5.500
Area (sqft)	= 5.14
Velocity (ft/s)	= 1.07
Top Width (ft)	= 50.00



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Oct 19 2024

DP-4 EX SWALE Q-100

Triangular

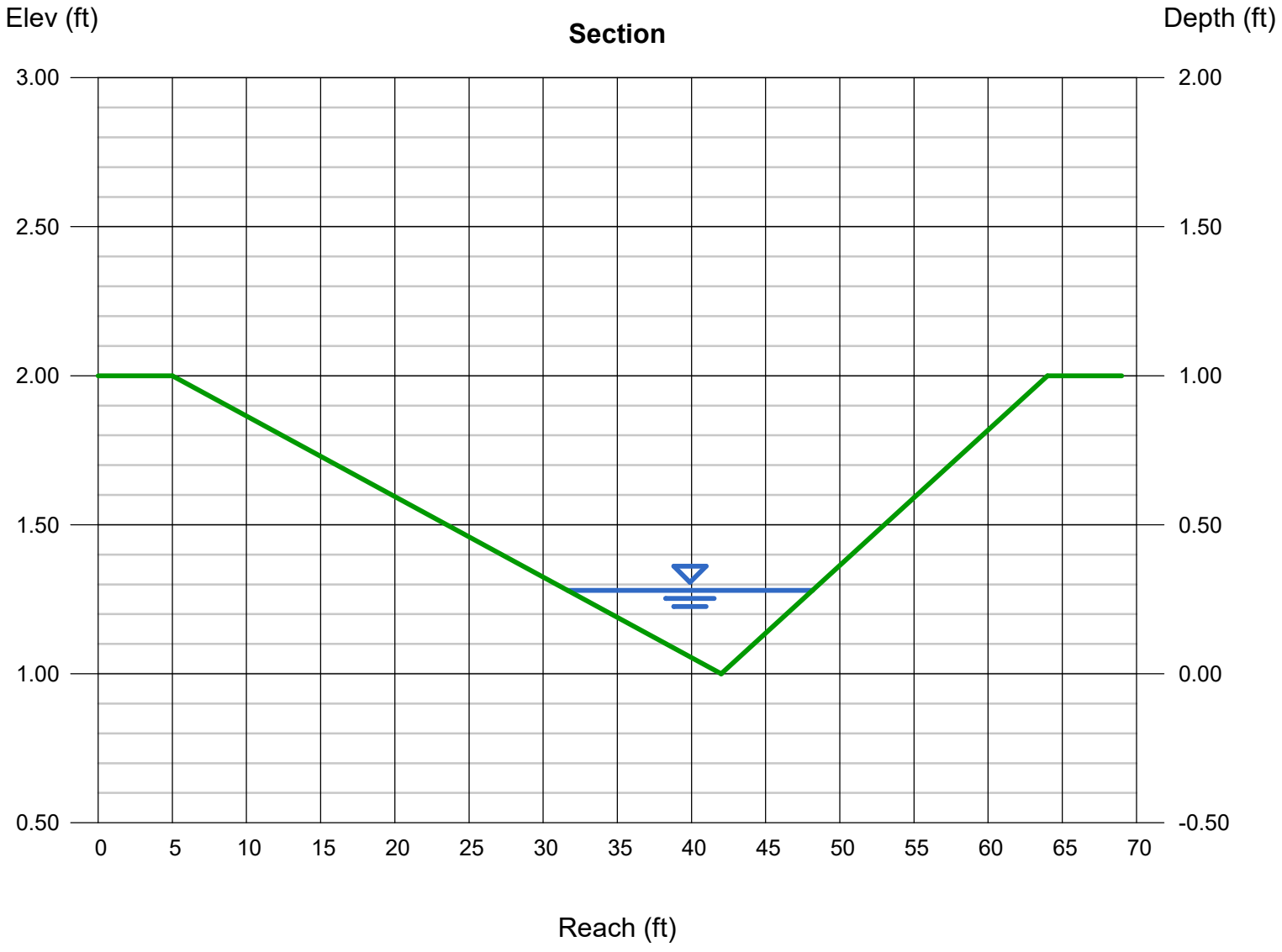
Side Slopes (z:1)	= 37.00, 22.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.88
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.00

Highlighted

Depth (ft)	= 0.28
Q (cfs)	= 4.000
Area (sqft)	= 2.31
Velocity (ft/s)	= 1.73
Wetted Perim (ft)	= 16.53
Crit Depth, Yc (ft)	= 0.26
Top Width (ft)	= 16.52
EGL (ft)	= 0.33



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Oct 19 2024

DP-4 PROPOSED SWALE (RE-ALIGNMENT) Q-100

Trapezoidal

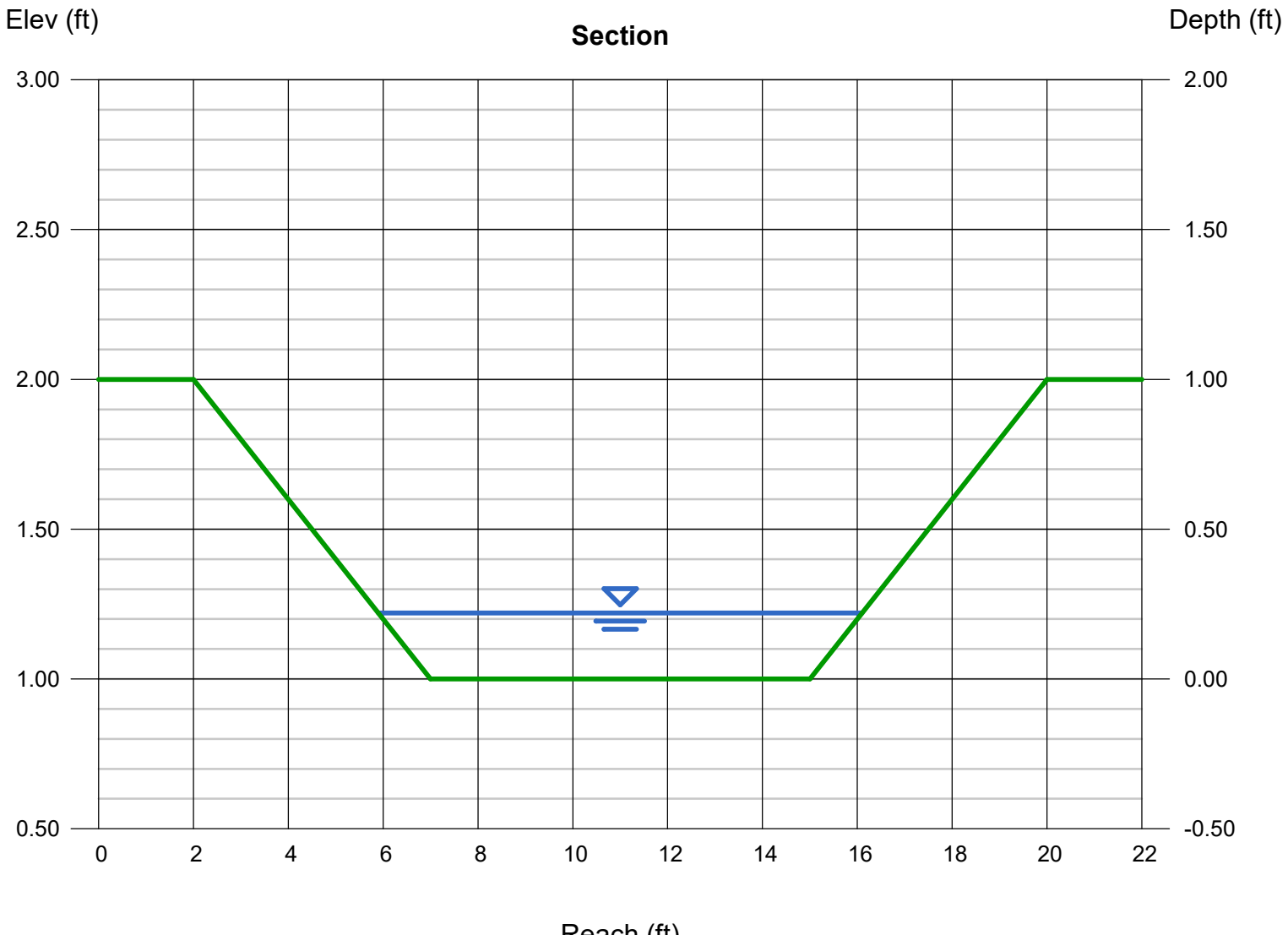
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.00

Highlighted

Depth (ft)	= 0.22
Q (cfs)	= 4.000
Area (sqft)	= 2.00
Velocity (ft/s)	= 2.00
Wetted Perim (ft)	= 10.24
Crit Depth, Yc (ft)	= 0.20
Top Width (ft)	= 10.20
EGL (ft)	= 0.28



Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Oct 19 2024

DP4 - Level Spreader Q-100

Rectangular Weir

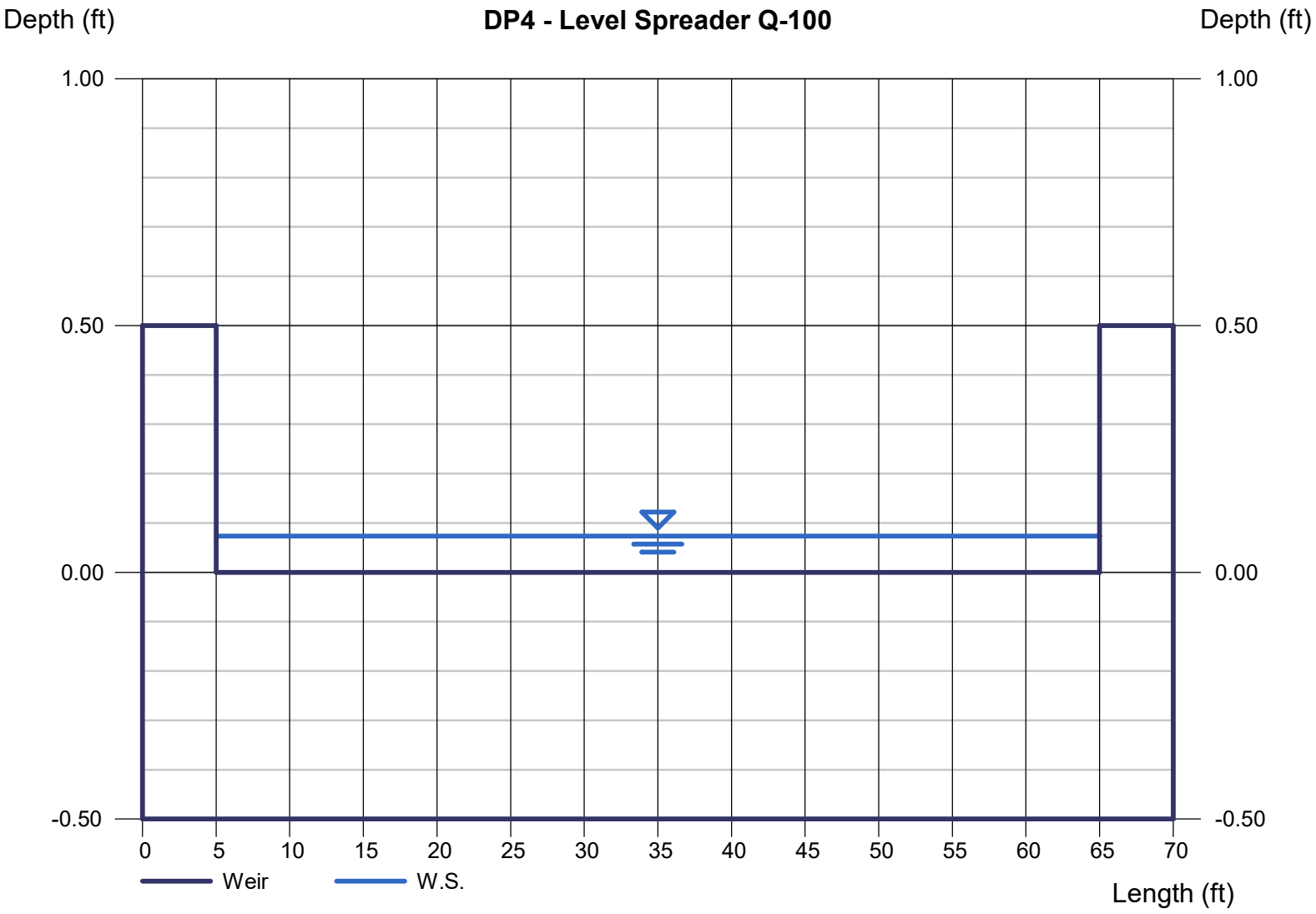
Crest	= Sharp
Bottom Length (ft)	= 60.00
Total Depth (ft)	= 0.50

Calculations

Weir Coeff. Cw	= 3.33
Compute by:	Known Q
Known Q (cfs)	= 4.00

Highlighted

Depth (ft)	= 0.07
Q (cfs)	= 4.000
Area (sqft)	= 4.42
Velocity (ft/s)	= 0.91
Top Width (ft)	= 60.00



APPENDIX D – WATER QUALITY

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: Ryan Burns
Company: All Terrain Engineering
Date: October 21, 2024
Project: 7280 Nevada Ln
Location: El Paso County

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA								
Area ID	O1	A	B & D	O2								
Downstream Design Point ID	1	2	6	3								
Downstream BMP Type	None	None	None	None								
DCIA (ft^2)	--	--	--	--								
UIA (ft^2)	8,910	16,694	22,278	778								
RPA (ft^2)	2,200	4,000	5,200	225								
SPA (ft^2)	--	--	--	--								
HSG A (%)	100%	100%	100%	100%								
HSG B (%)	0%	0%	0%	0%								
HSG C/D (%)	0%	0%	0%	0%								
Average Slope of RPA (ft/ft)	0.058	0.030	0.028	0.065								
UIA:RPA Interface Width (ft)	45.00	50.00	60.00	25.00								

CALCULATED RUNOFF RESULTS

Area ID	O1	A	B & D	O2								
UIA:RPA Area (ft^2)	11,110	20,694	27,478	1,003								
L / W Ratio	5.49	8.28	7.63	1.60								
UIA / Area	0.8020	0.8067	0.8108	0.7757								
Runoff (in)	0.00	0.00	0.00	0.00								
Runoff (ft^3)	0	0	0	0								
Runoff Reduction (ft^3)	371	696	928	32								

CALCULATED WQCV RESULTS

Area ID	O1	A	B & D	O2								
WQCV (ft^3)	371	696	928	32								
WQCV Reduction (ft^3)	371	696	928	32								
WQCV Reduction (%)	100%	100%	100%	100%								
Untreated WQCV (ft^3)	0	0	0	0								

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

Downstream Design Point ID	1	2	6	3								
DCIA (ft^2)	0	0	0	0								
UIA (ft^2)	8,910	16,694	22,278	778								
RPA (ft^2)	2,200	4,000	5,200	225								
SPA (ft^2)	0	0	0	0								
Total Area (ft^2)	11,110	20,694	27,478	1,003								
Total Impervious Area (ft^2)	8,910	16,694	22,278	778								
WQCV (ft^3)	371	696	928	32								
WQCV Reduction (ft^3)	371	696	928	32								
WQCV Reduction (%)	100%	100%	100%	100%								
Untreated WQCV (ft^3)	0	0	0	0								

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

Total Area (ft^2)	60,285
Total Impervious Area (ft^2)	48,660
WQCV (ft^3)	2,028
WQCV Reduction (ft^3)	2,028
WQCV Reduction (%)	100%
Untreated WQCV (ft^3)	0

APPENDIX E – REFERENCE MATERIAL

MATCH SHT 46 B

MATCH SHT 46

MATCH SHT 44 A

MATCH STA 696 + 10 SHT 45

MATCH STA 684 + 50 SRT 43

THIS DRAWING IS A MASTER PLANNING SHEET REPRESENTING PRELIMINARY AND CONCEPTUAL ENGINEERING. IT SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

IMPROVED GRASSLINED CHANNEL
BW=20', d=2', S=1.9%
Q100 = 180 cfs

NEW 4'H x 8'W CBC
10-YR. CAPACITY

STA 696+00 CHECK

PROVIDE OUTLET STRUCTURE

MAINTAIN EX. EMBANKMENTS

OI-POND-66

OI-POND-67

OI-POND-68

FOR CHANNEL DATA, SEE SHT 42

REACH SC-7

STA 690+00 CHECK

PRESERVE EX FLOODPLAIN & VEGETATION

EL PASO CO. C.L.F. OF F.

STA 686+00 CHECK

CHANNEL IMPROVEMENTS		
SEGMENT NO.	BOTTOM WIDTH (FT)	CHANNEL TYPE
148-1	N/A	SELECTIVE RIPRAP LININGS AND GRADE CONTROL
148-2		

FOR PROFILE SEE SHEET P-12

OLIVER E. WATTS
CONSULTING ENGINEER, INC.
COLORADO SPRINGS

7280 NEVADA LANE
SAND CREEK DRAINAGE MAP
1"=200'

0' 200' 400'

Kiowa Engineering Corporation
418 W. Bijou Street
Colorado Springs, Colorado

SAND CREEK DRAINAGE BASIN PLANNING STUDY
PRELIMINARY DESIGN PLANS

Project No 90-0
Date: 9-92
Design: RMW
Drawn: EAK
Check: RMW
Revisions:

44

FOR INFORMATION ONLY

MOUNTAIN SPRINGS CHURCH
7345 ADVENTURE WAY

WOODMAN-UTAH LLC
C/O VANTAGE HOMES CORP
7425 ADVENTURE WAY

PROPERTY LINE = 430.00'

PROPERTY LINE = 528.43'

0 NEVADA LANE

TRACT IN NW4NE4 SEC 08-13-65 AS FOLS, COM AT A PT ON N LN OF SD SEC THAT IS 280.0 FT W OF NE COR OF SD NW4NE4, RUN SLY 430.0 FT FOR POB, TH ANG R AND RUN WLY 528.43 FT M/L, ANG L AND RUN SLY 430.0 FT, ANG L + RUN ELY 528.43 FT M/L, TH NLY 430.0 FT TO POB SUBJ TO NON-EXCLUSIVE EASEMENTS OVER ELY 15.0 FT AND OVER WLY 7.5 FT, TOG WITH EASEMENT BY BK 2825-320, TOG WITH PRIVATE ROAD KNOWN AS NEVADA LANE

3 Rail Wood \Entry Fence w/ Metal Gate

Mulch Mounds Landscaped Area w/ Boulders

GRAVEL DRIVEWAY

4 Strand Wire Fence

UTILITY EASEMENT

DRAINAGE EASEMENT

UTAH LANE

NEVADA LANE

6' TALL OPAQUE PRIVACY FENCE - 16'L

6' TALL OPAQUE PRIVACY FENCE - 180'L

25' BUILDING SETBACK

EASEMENT

GRAVEL DRIVE (34,700 SQ.FT.)

Parking Area w/ 30 Cu. Yd. Dumpster

AREA NOT USED

Palletized Material Storage

Parking Area

SHED: NOT TO BE USED BY SUNFLOWER LANDSCAPES

25' BUILDING SETBACK

Conex Boxes (2)

Continuous Metal Fence

PROPERTY LINE = 528.43'

WOODMAN-UTAH LLC
C/O VANTAGE HOMES CORP
7525 ADVENTURE WAY

BSK INVESTMENTS LLC
7340 UTAH LANE

GREENER PASTURES LLC
7280 ADVENTURE WAY

Approved
By:Craig Dossey, Executive Director
Date: 07/09/2019
El Paso County Planning & Community Development

NORTH

0 20 40 80
Scale: 1" = 40' - 0"

PLOT PLAN

O NEVADA LANE
COLORADO SPRINGS, COLORADO

DATE: Feb 21th 2019

FILE NO: VA 182

FOR INFORMATION ONLY

WOODMAN-UTAH LLC
C/O VANTAGE HOMES CORP
7425 ADVENTURE WAY

MOUNTAIN SPRINGS CHURCH
7345 ADVENTURE WAY

PROPERTY LINE = 430.00'

PROPERTY LINE = 528.43'

Native Landscape
w/ Xeric Plants and
Grasses

3 Rail Wood
\Entry Fence
w/ Metal Gate

Mulch Mounds
Landscaped Area
w/ Boulders

Native Landscape
w/ Xeric Plants and
Grasses

GRAVEL DRIVEWAY

4 Strand
Wire Fence

0 NEVADA LANE

TRACT IN NW4NE4 SEC 08-13-65 AS FOLS, COM AT A PT ON
N LN OF SD SEC THAT IS 280.0 FT W OF NE COR OF SD
NW4NE4, RUN SLY 430.0 FT FOR POB, TH ANG R AND RUN WLY
528.43 FT M/L, ANG L AND RUN SLY 430.0 FT, ANG L + RUN
ELY 528.43 FT M/L, TH NLY 430.0 FT TO POB SUBJ TO
NON-EXCLUSIVE EASEMENTS OVER ELY 15.0 FT AND OVER WLY
7.5 FT, TOG WITH EASEMENT BY BK 2825-320, TOG WITH
PRIVATE ROAD KNOWN AS NEVADA LANE

UTILITY
EASEMENT

DRAINAGE
EASEMENT

UTAH LANE

NEVADA LANE

Parking Area
w/ 30 Cu. Yd. Dumpster

6' TALL OPAQUE
PRIVACY FENCE - 16'L

6' TALL OPAQUE
PRIVACY FENCE - 180'L

25' BUILDING
SETBACK

EASEMENT

GRAVEL
DRIVE
(34,700 SQ.FT.)

AREA
NOT USED

Native Landscape
w/ Xeric Plants and
Grasses

Parking Area

Palletized
Material Storage

SHED: NOT TO BE
USED BY
SUNFLOWER
LANDSCAPES

PROPERTY LINE = 430.00'

PROPERTY LINE = 528.43'

25' BUILDING SETBACK

Conex Boxes (2)

6' TALL OPAQUE
PRIVACY FENCE - 181'L

Native Landscape
w/ Xeric Plants and
Grasses

6' Continuous Opaque
Metal Fence

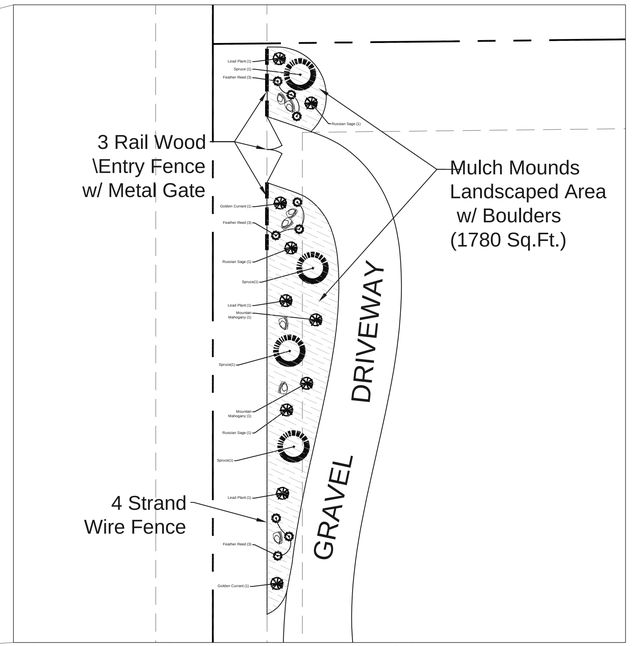
BSK INVESTMENTS LLC
7340 UTAH LANE

GREENER PASTURES LLC
7280 ADVENTURE WAY

WOODMAN-UTAH LLC
C/O VANTAGE HOMES CORP
7525 ADVENTURE WAY

NORTH

0 20 40 80
Scale: 1" = 40' - 0"



PLANTING PLAN - ENLARGEMENT
SCALE: 1" = 20'-0"

Tree Schedule		
Common Name	Size	Qty
Spruce	8'H	4
	TOTAL:	4

Shrub Schedule		
Common Name	Size	Qty
Lead Plant	#5	3
Russian Sage	#5	3
Golden Currant	#5	2
Mountain Mahogany	#5	2
	TOTAL:	10

Ornamental Grasses Schedule		
Common Name	Size	Qty
Feather Reed	#5	9
	TOTAL:	9

NOTES:
- Soil amendments @ minimum 1 cyds/100sf
- Agile Boulders in sizes of 2'-4'
- Roll-top metal edging to be used on all planting and rock beds
- Mulch (Gorilla Hair) = 1780s.f.
- Rolled Metal Edging = 320'L

PLANTING SCHEDULE

PLOT PLAN / PLANTING PLAN

O NEVADA LANE
COLORADO SPRINGS, COLORADO

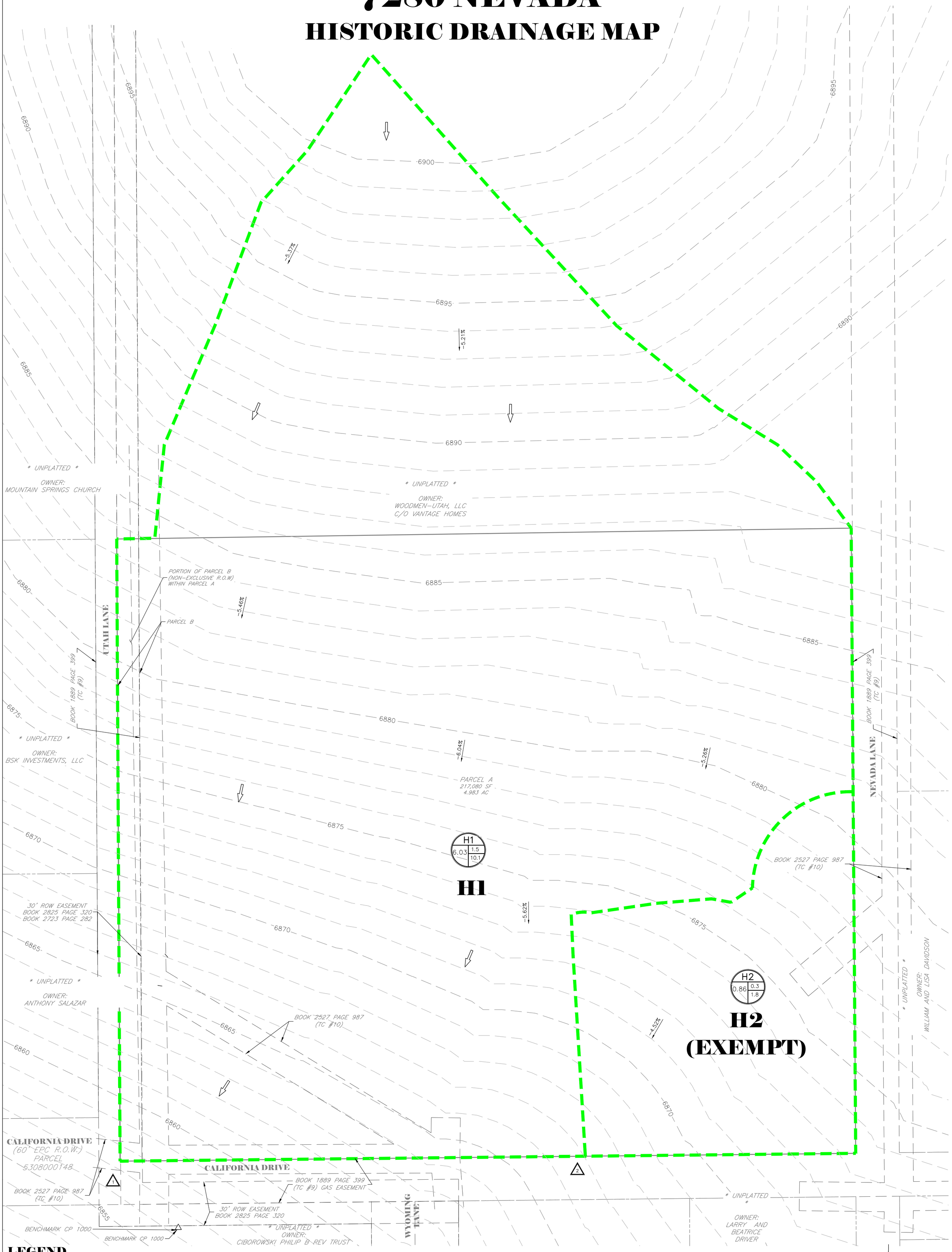
DATE: May 20th 2019

FILE NO: VA 182

APPENDIX F – DRAINAGE MAPS

7280 NEVADA

HISTORIC DRAINAGE MAP



LEGEND

	EXISTING	PROPOSED
SECTION LINE		
BOUNDARY LINE		
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
STORM SEWER		
SWALE/WATERWAY FLOWLINE		
INDEX CONTOUR	6100	6100
INTERMEDIATE CONTOUR		
FLOW DIRECTION		

BASIN ID — ID / AC / Q5 / Q100

DESIGN POINT DESIGNATION — 1

SUB-BASIN DRAINAGE AREA

HISTORIC CONDITIONS - BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
H1	6.03	2%	0.09	0.36	24.7	1.5	10.1
H2	0.86	2%	0.09	0.36	15.7	0.3	1.8

Flow Comparison

Condition	Basin/DP	Q5 (cfs)	Q100 (cfs)
EX/PROPOSED	DP 5 + 6	3.0	10.2
HISTORIC	H1	1.5	10.1
EX/PROPOSED	DP 7*	1.2	3.0
HISTORIC	H2*	0.3	1.8

*This basin contains a private residence, not part of the proposed Commercial development, and is not subject to detention or water quality requirements

DESIGN POINT SUMMARY TABLE

DP#	$Q_{5\text{-YR}}$	$Q_{100\text{-YR}}$
1	1.5	10.1
2	0.3	1.8

N

30 15 0 30 60

ORIGINAL SCALE: 1" = 30'

HISTORIC DRAINAGE MAP

7280 NEVADA

JOB NO. 24020 | SHEET 1

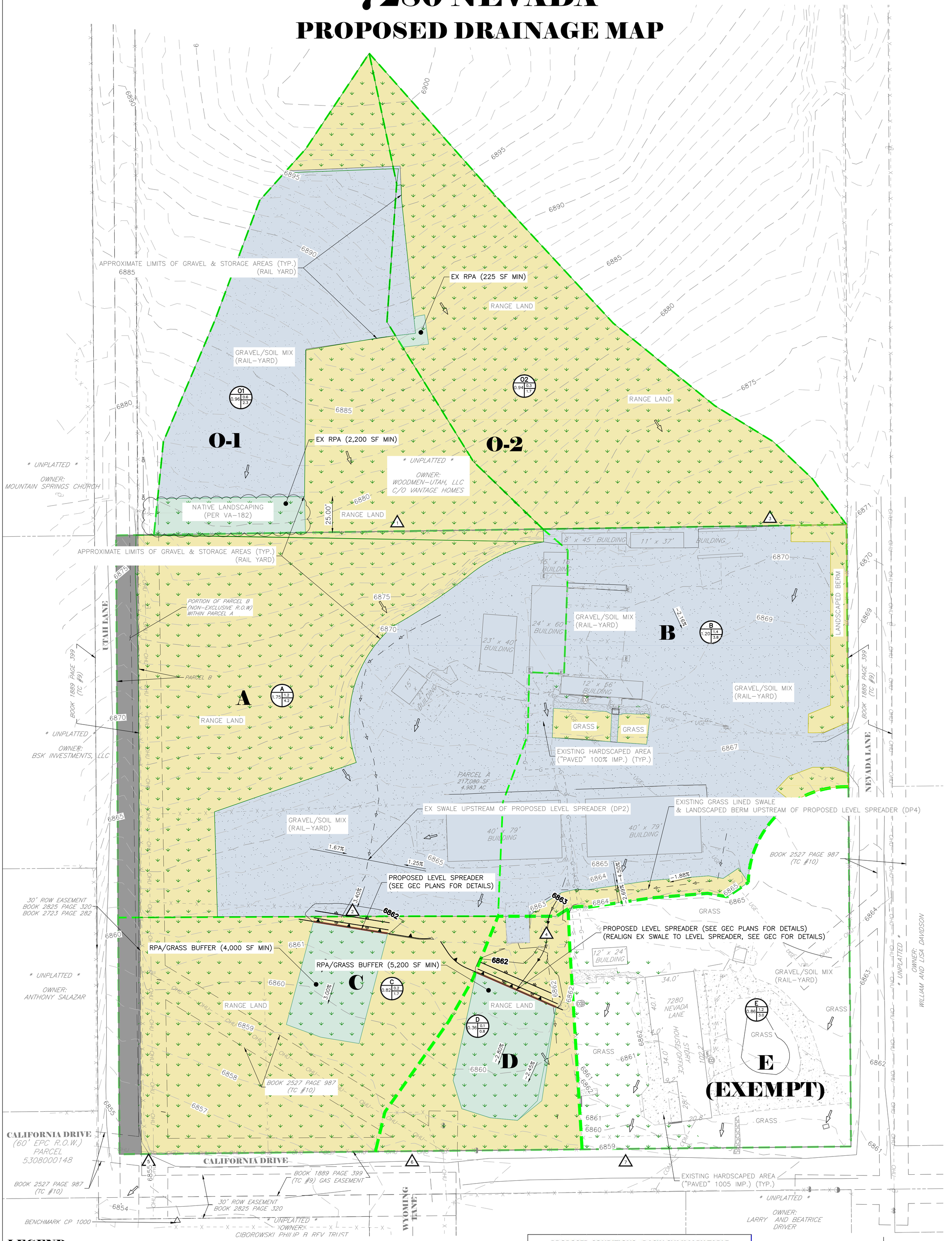
LOCATION: EL PASO COUNTY

09/16/2024

ALL TERRAIN ENGINEERING

7280 NEVADA

PROPOSED DRAINAGE MAP



LEGEND

	EXISTING	PROPOSED
SECTION LINE		
BOUNDARY LINE		
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
STORM SEWER		
SWALE/WATERWAY FLOWLINE		
INDEX CONTOUR	6100	6100
INTERMEDIATE CONTOUR		
FLOW DIRECTION		

BASIN ID (ID / AC / Q5 / Q100)

DESIGN POINT DESIGNATION (1)

SUB-BASIN DRAINAGE AREA

SPA

UIA

RPA

PROPOSED CONDITIONS - BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
A	1.75	22%	0.21	0.44	17.9	1.2	4.2
B	1.20	42%	0.33	0.53	14.7	1.4	3.8
C	0.82	0%	0.08	0.35	15.3	0.2	1.7
D	0.36	1%	0.09	0.36	15.6	0.1	0.8
E	0.86	46%	0.39	0.57	14.4	1.2	3.0
O1	0.96	21%	0.20	0.43	16.8	0.6	2.3
O2	0.94	2%	0.09	0.36	20.9	0.3	1.7

Flow Comparison

Condition	Basin/DP	Q5 (cfs)	Q100 (cfs)
EX/PROPOSED	DP 5 + 6	3.0	10.2
HISTORIC	H1	1.5	10.1
EX/PROPOSED	DP 7*	1.2	3.0
HISTORIC	H2*	0.3	1.8

*This basin contains a private residence, not part of the proposed Commercial development, and is not subject to detention or water quality requirements

DESIGN POINT SUMMARY TABLE

DP#	$Q_{5\text{-YR}}$	$Q_{100\text{-YR}}$
1	0.6	2.3
2	1.6	5.5
3	0.3	1.7
4	1.4	4.0
5	1.6	6.1
6	1.4	4.1
7	1.2	3.0

30 15 0 30 60

ORIGINAL SCALE: 1" = 30'

PROPOSED DRAINAGE MAP

7280 NEVADA

JOB NO. 24020 | SHEET 1

LOCATION: EL PASO COUNTY

10/19/2024

ALL TERRAIN ENGINEERING