DRAINAGE LETTER
for
FALCON SHERIFF SUBSTATION

Tract B of Tract 36 Woodmen Hills Filing No. 11
10262 Royal County Down Road
Falcon, Colorado

October 5, 2023

PCD File No: PPR-22-059

Prepared for:

El Paso County

Prepared by:

Drexel, Barrell & Co.
3 South Seventh Street
Colorado Springs, CO 80905
Contact: Tim McConnell, P.E.
(719) 260-0887

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APPENDICES

DRAINAGE LETTER
for
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1.0 CERTIFICATION STATEMENTS

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 city/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.

SIGNATURE (Affix Seal): _____ 10/5/23

For and on behalf of Drexel, Barrett & Co. Date
Katherine Varnum, P.E. #53459

Developer's Statement

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

_____

Authorized Signature Date
El Paso County

El Paso County

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

_____

Joshua Palmer, P.E. Date
County Engineer / ECM Administrator

Conditions:

DRAINAGE LETTER

for

FALCON SHERIFF SUBSTATION

2.0 PURPOSE

The purpose of this letter is to supplement the Preliminary and Final Drainage Report for Woodmen Hills Fire Station, by Land Development Consultants, Inc. (June 23, 2009) with regards to the development of Tract B of Tract 36, Woodmen Hills Filing No. 11, in order to establish that the development is in conformance with the approved drainage design.

Runoff patterns, drainage facilities and the ability to safely pass developed runoff to historic downstream facilities shall be presented.

3.0 GENERAL SITE DESCRIPTION

Location

The Falcon Sheriff Substation is located at Tract B, Tract 36 Woodmen Hills Filing No. 11 in Falcon, El Paso County, Colorado. The property is bounded by to the north by Stapleton Drive, to the west by tract 1 of Woodmen Hills Filing No. 11, to the south by Royal County Down Road, and to the east by Tract A, Tract 36 Woodmen Hills Filing No. 11, which serves as the Falcon Fire Station District 1.

The site was previously studied as part of the Preliminary and Final Drainage Report for Woodmen Hills Fire Station, by Land Development Consultants, Inc. (June 23, 2009)

Existing Site & Proposed Development

Tract B is currently undeveloped, with the exception of the drive aisle, along the eastern boundary. Overlot rough grading was completed at some point in the past, with the overall development of Woodmen Hills Filing No. 11. The western boundary is the top of an adjacent drainage channel, identified as Tract 1, Woodmen Hills Filing No. 11. Vegetation consists of sparse growth of native grasses.

The proposed development is the development of a sheriff substation, along with associated parking, drive aisles and landscaping. The proposed area of disturbance is roughly 1.32 acres.

Soils

According to the Soil Survey of El Paso County Area, Colorado, prepared by the U.S. Department of Agriculture Soil Conservation Service, the sire is underlain by the Columbine gravelly sandy loam (Soil No. 19), a hydrologic type A soil. See appendix for Soils map.

Climate

This area of El Paso County can be described as the foothills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in the spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

Floodplain Statement

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel 08041C0553G (December 7, 2018), and 08041C0551G (December 7, 2018) no portion of the site lies within any flood zones.

4.0 DRAINAGE CRITERIA

The drainage analysis has been prepared in accordance with the current El Paso County Drainage Criteria Manual. Calculations were performed to determine runoff quantities during the 5-year and 100-year frequency storms for existing and developed conditions using the Rational Method as required for basins containing less than 100 acres.

5.0 EXISTING CONDITION

The existing condition is as described in the Preliminary and Final Drainage Report for Woodmen Hills Fire Station, by Land Development Consultants, (approved July 6, 2009), and referenced by the drainage map excerpt in the appendix.

Basins A and B represent Tract B and the following table lists basin data:

BASIN	AREA (AC)	C5	C100	Q5 (cfs)	Q100 (cfs)
A	0.52	0.20	0.20	0.4	0.7
B	1.81	0.15	0.20	1.0	2.2

Basin A, located along the western boundary drains westerly directly into the existing drainage way.

Flows from Basin B currently sheet flow to the southwest ultimately overtopping the curb and becoming gutter flow easterly along Royal County Down Road, towards an existing 10' sump inlet at the intersection with Meridian Ranch Road.

Flows generated by the offsite flow off Stapleton Road (Basin OS-1), and the fire station (Basins C) are captured and treated for water quality in a porous landscape detention facility, that then discharged into the existing public storm system in Royal County Down Road. Flows reach the existing golf course channel and ultimately reach Woodmen Hills Regional Pond 1.

Basin D discharges directly out to Meridian Ranch Road, where it is captured by the existing storm system at the intersection with Royal County Down Road.

6.0 DEVELOPED CONDITION

The proposed development consists of the sheriff substation and associated parking and landscaping. The proposed grading will primarily route flows to the southeast where they will be directed towards the existing porous landscape detention (PLD) water quality facility. This existing facility is functioning as intended.

See below for basin/design point table and description:

RUNOFF & DESIGN POINT SUMMARY				
BASIN	**DP**	**AREA (AC)**	**Q5**	**Q100**
OS1	1	0.47	0.5	1.2
A		0.35	1.6	2.9
	2	0.83	1.8	3.4
B	3	0.09	0.3	0.6
C		0.24	1.1	2.0
	4	0.33	1.1	2.0
D	5	0.30	1.4	2.5
E	6	0.26	1.0	1.8
F		0.05	0.1	0.2
	7	1.77	4.8	8.9
OS-EX		0.20	0.2	0.4
C-EX		2.30	6.9	12.5
	8	4.28	10.9	20.0
OS2	9	0.86	1.0	2.5

Basin OS-1 is located in the open space to the north of the proposed site improvements. This area will remain undisturbed. Flows of Q_5= 0.5 cfs and Q_{100}= 1.2cfs generally travel to the south as overland flow towards **Design Point 1.**

The proposed northern parking lot additions make up the entirety of **Basin A** and will direct flows to the southeast of the basin at rates of Q_5= 1.6cfs and Q_{100}= 2.9cfs. These flows combine with DP1 flows and are captured by the existing parking lot chase to the southeast at **Design Point 2.**

Basin B is located on the westerly side of the proposed building. This outdoor patio and landscaped area will drain directly into the adjacent drive aisle at rates of Q_5= 0.3cfs and Q_{100}= 0.6cfs and travel to the southeast towards **Design Point 3.**

Basin C consists of the drive aisle and parking along the western side of the building. This area drains (Q_5= 1.1cfs and Q_{100}= 2.0cfs) to the south and combines with DP3 at a low point (**Design Point 4**) where a proposed private Type 16 combo sump inlet will capture flows in their entirety. Flows continue to the southeast via private 12" RCP storm sewer.

Basin D covers the building. Roof drains are anticipated to connect directly to the proposed storm sewer at **Design Point 5**, directing all flow to the east towards the existing water quality facility. A 5'x5' Type VL riprap pad will be provided at the storm sewer

outfall to aid in energy dissipation, without impeding existing swale flows from the fire station chase.

Basin E consists of the southern portion of the site. Flows generated by this basin (Q_5= 1.0cfs and Q_{100}= 1.8cfs) will travel as overland and curb and gutter flow to the east and north towards **Design Point 6** and an existing low point in the access drive.

Basin F covers the landscaped area on the east side of the proposed building. Flow rates of Q_5= 0.1cfs and Q_{100}= 0.2cfs will travel directly to the east towards the access drive.

Design Point 7 represents all flows associated with this project site development that will reach the existing water quality facility. These flows of Q_5= 4.8cfs and Q_{100}= 8.9cfs, are understandably greater when compared to the existing rates established by the previous report (Q_5= 1.0cfs and Q_{100}= 2.2cfs) given the developed condition.

Basin OS-EX represents that portion of the offsite OS-1 basin considered in the existing condition, generating flows of Q_5= 0.2cfs and Q_{100}= 0.4cfs that currently flow onsite into existing basin C-EX.

Basin C-EX represents the existing fire station, and associated improvements. Flows generated by this basin travel via curb and concrete chase towards the existing PLD facility, and **Design Point 8**.

Offsite basin OS2, runs the entire length of the western boundary of the site alongside the existing open drainage channel, and will remain unchanged generating flows of Q_5= 1.0cfs and Q_{100}= 2.5cfs

The existing PLD facility - while not technically oversized to accommodate the development of this adjacent site – was sized assuming 100% imperviousness for the entirety of the fire station site. Once the impervious ratio is corrected, and the tributary area adjusted to include this development, the PLD facility is still within capacity to accommodate these additional flows. Minor grading will occur on the westerly edge to safely receive the proposed storm sewer flows. The facility sizing and underdrain will remain the same with the current outlet structure accommodating the additional flows.

Flows reaching the existing PLD facility at **Design Point 8** (Q_5= 10.9cfs and Q_{100}= 20.0cfs) are less than those anticipated by the original Woodmen Hills Filing No. 11 Design basin AA10 (Q_5= 12.1cfs and Q_{100}= 22.6cfs). Therefore, the existing 24" RCP outfall is assumed to be sufficiently sized to accommodate these developed flows.

Onsite detention for this development is not required as the site was included in the drainage design for Woodmen Hills Filing No. 11 and accounted for in the sizing of the downstream Woodmen Hills Pond #1. See appendix for drainage report and map excerpts.

7.0 FOUR STEP PROCESS

This project conforms to the El Paso County Four Step Process. The process for this site focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainage ways, and implementing long-term source controls.

1. ***Employ Runoff Reduction Practices*:** Proposed impervious areas on this site (roofs, asphalt/sidewalk) will sheet flow across landscaped ground as much as possible to slow runoff and increase time of concentration prior to being conveyed to the proposed public streets and storm sewer system. This will minimize directly connected impervious areas within the project site.

2. ***Implement BMP's that provide a Water Quality Capture Volume with slow release*:** Runoff from this project will be routed through onsite storm sewer to an existing water quality basin located at the southeast corner of the adjacent property. This will allow for the runoff to be treated for water quality before discharging into the offsite storm system.

3. ***Stabilize Drainage Ways*:** No drainage ways exist within the project boundaries. Runoff will enter the storm sewer system and be directed towards the existing water quality basin located at the southeast corner of the adjacent property, this will allow for flow rate reduction and protection of downstream facilities.

4. ***Implement Site Specific and Other Source Control BMP's*:** Standard commercial source control will be utilized in order to minimize potential pollutants entering the storm system. Example source control measures consist of: indoor storage of household chemicals; and trash receptacles in common areas.

8.0 DRAINAGE & BRIDGE FEES

Drainage and bridge fees are not required as the site has been previously platted.

9.0 SUMMARY

Development of TR B Tract 36 Woodmen Hills Filing No. 11 will not adversely affect surrounding or downstream developments. Downstream Woodmen Hills Pond #1 was sized to accommodate this area in the developed condition for both water quality and detention and appears to be functioning as intended. The onsite PLD facility, and downstream storm system are functioning as designed and are adequate to accommodate the additional flow generated by the development without downstream impact.

10.0 REFERENCES

The sources of information used in the development of this study are listed below:

1. El Paso County Drainage Criteria Manual, 10-31-2018.

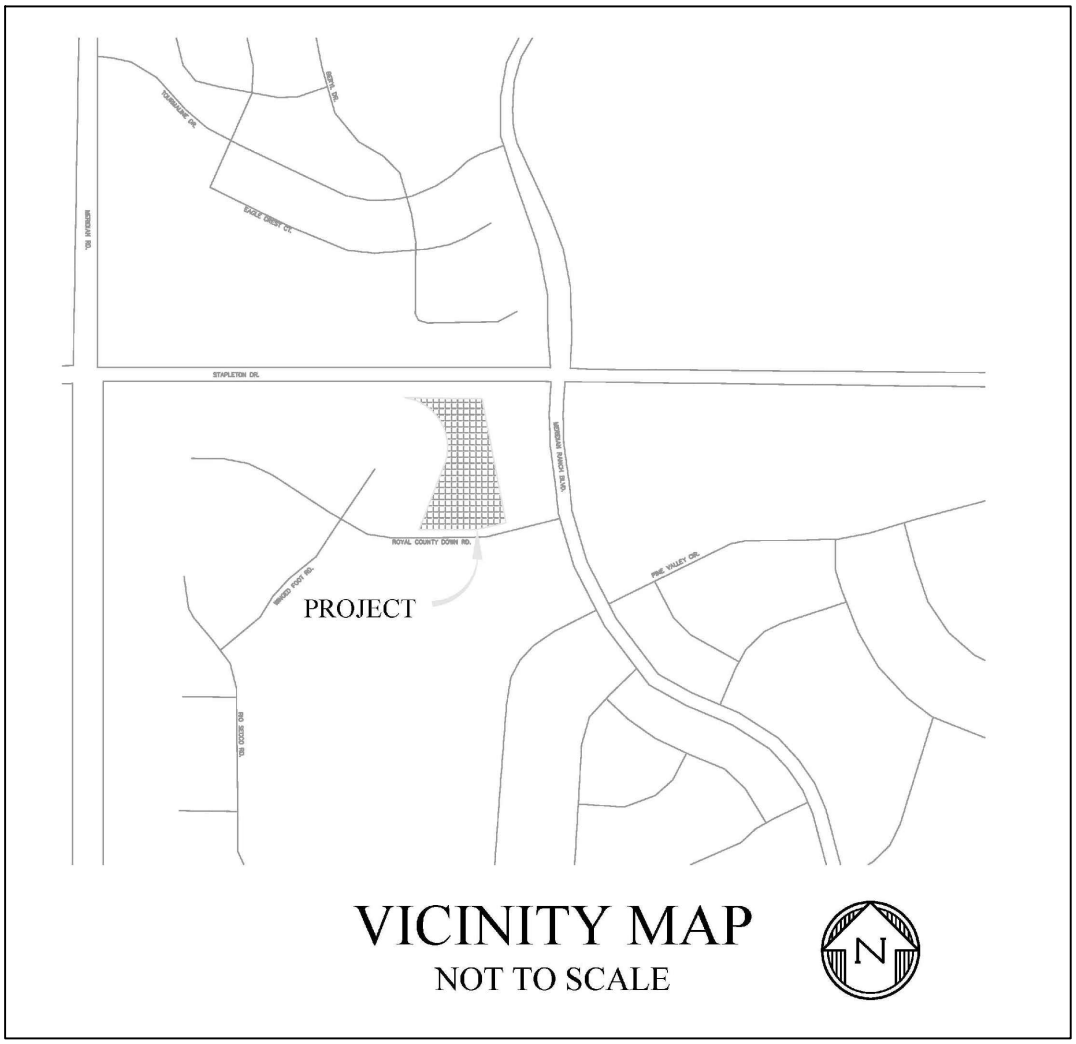
2. Final Drainage Report for Woodmen Hills Filing No. 11 (URS) 11-27-2002.

3. Final Drainage Report for Woodmen Hills Filing No. 10 (URS) 04-03-2001

4. Final Drainage Report for Woodmen Hills Filing No. 6 (URS Greiner, Inc.) 09-27-1998

5. Final Drainage Report for Woodmen Hills Fire Station (Land Development Consultants) 07-06-2009

Appendix



VICINITY MAP

NOT TO SCALE

FALCON SHERIFF SUBSTATION
FALCON, CO
VICINITY MAP

Drexel, Barrell & Co.
Engineers • Surveyors

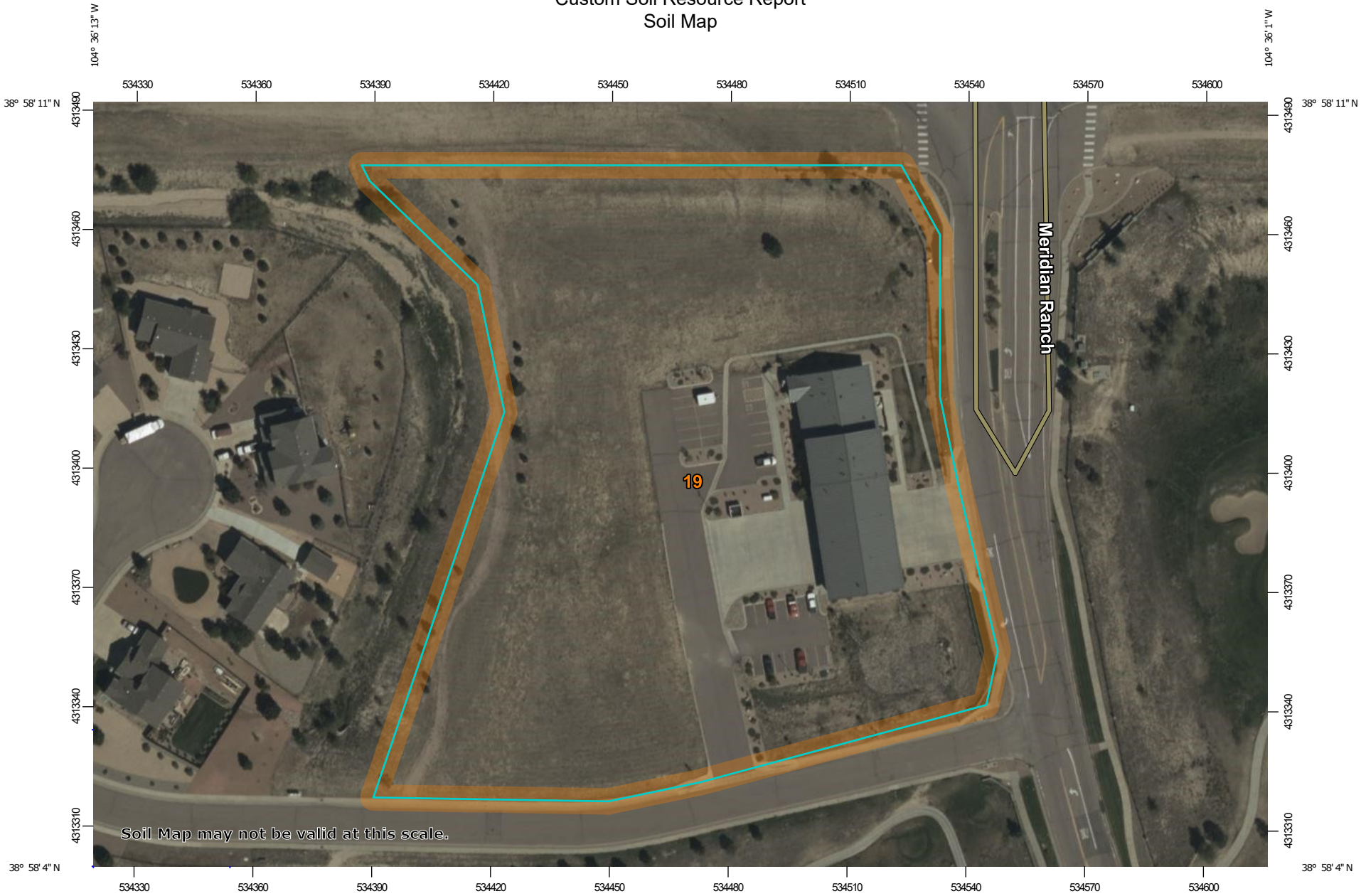
DATE:

JOB NO: **21653-00CSCV**

DWG. NO. **VMAP**

SHEET 1 OF 1

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,360 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	4.9	100.0%
Totals for Area of Interest		**4.9**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

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

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

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

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

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Flood plains, fan terraces, fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

National Flood Hazard Layer FIRMette

FEMA

104°36'27"W 38°58'21"N

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

1:6,000

104°35'50"W 38°57'53"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 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 8/22/2023 at 12:41 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.

PROJECT INFORMATION

PROJECT: Falcon Sheriff Substation
PROJECT NO: 21653-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Letter
DATE: 8/22/2023

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Native Vegetation		0.25		0.35	0
Roof		0.90		0.95	90
Concrete Drives and Walks		0.90		0.95	100
Streets: Paved		0.90		0.95	100
Streets: Gravel		0.80		0.85	80

*C-Values and Basin Imperviousness based on Table 5-1, El Paso County Drainage Criteria Manual

DEVELOPED CONIDTION

SUB-BASIN	SURFACE DESIGNATION	AREA ACRE	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	% IMPERV
A	Native Vegetation	0.00		0.25		0.35	0
	Roof	0.00		0.90		0.95	90
	Concrete Drives and Walks	0.00		0.90		0.95	100
	Streets: Paved	0.35		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.90		0.95	100%
TOTAL A		0.35					
B	Native Vegetation	0.02		0.25		0.35	0
	Roof	0.00		0.90		0.95	90
	Concrete Drives and Walks	0.07		0.90		0.95	100
	Streets: Paved	0.00		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.76		0.82	78%
TOTAL B		0.09					
C	Native Vegetation	0.00		0.25		0.35	0
	Roof	0.00		0.90		0.95	90
	Concrete Drives and Walks	0.00		0.90		0.95	100
	Streets: Paved	0.24		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.90		0.95	100%
TOTAL C		0.24					

PROJECT INFORMATION

PROJECT: Falcon Sheriff Substation
PROJECT NO: 21653-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Letter
DATE: 8/22/2023

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Native Vegetation		0.25		0.35	0
Roof		0.90		0.95	90
Concrete Drives and Walks		0.90		0.95	100
Streets: Paved		0.90		0.95	100
Streets: Gravel		0.80		0.85	80

*C-Values and Basin Imperviousness based on Table 5-1, El Paso County Drainage Criteria Manual

D	Native Vegetation	0.00		0.25		0.35	0
	Roof	0.25		0.90		0.95	90
	Concrete Drives and Walks	0.06		0.90		0.95	100
	Streets: Paved	0.00		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.90		0.95	92%
TOTAL D		0.30					
E	Native Vegetation	0.07		0.25		0.35	0
	Roof	0.00		0.90		0.95	90
	Concrete Drives and Walks	0.19		0.90		0.95	100
	Streets: Paved	0.00		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.73		0.79	73%
TOTAL E		0.26					
F	Native Vegetation	0.04		0.25		0.35	0
	Roof	0.00		0.90		0.95	90
	Concrete Drives and Walks	0.01		0.90		0.95	100
	Streets: Paved	0.00		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.38		0.47	20%
TOTAL F		0.05					
OS1	Native Vegetation	0.47		0.25		0.35	0
	Roof	0.00		0.90		0.95	90
	Concrete Drives and Walks	0.00		0.90		0.95	100
	Streets: Paved	0.00		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.25		0.35	0%
TOTAL OS1		0.47					

PROJECT INFORMATION

PROJECT: Falcon Sheriff Substation
PROJECT NO: 21653-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Letter
DATE: 8/22/2023

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Native Vegetation		0.25		0.35	0
Roof		0.90		0.95	90
Concrete Drives and Walks		0.90		0.95	100
Streets: Paved		0.90		0.95	100
Streets: Gravel		0.80		0.85	80

*C-Values and Basin Imperviousness based on Table 5-1, El Paso County Drainage Criteria Manual

OS2	Native Vegetation	0.86		0.25		0.35	0
	Roof	0.00		0.90		0.95	90
	Concrete Drives and Walks	0.00		0.90		0.95	100
	Streets: Paved	0.00		0.90		0.95	100
	Streets: Gravel	0.00		0.80		0.85	80
	WEIGHTED AVERAGE			0.25		0.35	0%
TOTAL OS2		0.86					
OS-EX	*Native Vegetation*	*0.20*		*0.20*		*0.25*	*0*
FIRE STATION	*Roof*	*0.00*		*0.90*		*0.95*	*90*
	Concrete Drives and Walks	*0.00*		*0.90*		*0.95*	*100*
	Streets: Paved	*0.00*		*0.90*		*0.95*	*100*
	Streets: Gravel	*0.00*		*0.80*		*0.85*	*80*
	WEIGHTED AVERAGE			*0.20*		*0.25*	*0%*
TOTAL OS-EX		*0.20*					
C-EX	*Native Vegetation*	*0.90*		*0.20*		*0.25*	*0*
FIRE STATION	*Roof*	*0.00*		*0.90*		*0.95*	*90*
	Concrete Drives and Walks	*0.00*		*0.90*		*0.95*	*100*
	Streets: Paved	*1.40*		*0.90*		*0.95*	*100*
	Streets: Gravel	*0.00*		*0.80*		*0.85*	*80*
	WEIGHTED AVERAGE			*0.63*		*0.68*	*61%*
TOTAL C-EX		*2.30*					

Tributary to Existing PLD	4.28	0.63	0.68	59%

PROJECT INFORMATION

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Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED TIME OF CONCENTRATION

SUB-BASIN DATA							INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)				TIME OF CONCENTRATION		FINAL t_c
BASIN	DESIGN PT:	C_5	C_{100}	AREA	*COMP*		LENGTH	SLOPE	t_i	LENGTH	SLOPE	VEL.	t_t	COMP.	MINIMUM	
				Ac			Ft	%	Min	Ft	%	FPS	Min	t_c	t_c	Min
OS1	1	0.25	0.35	0.47	0.12	0.16	70	4.8	7.9	167	5.2	8.3	0.3	8.2	5.0	**8.2**
A		0.90	0.95	0.35	0.32	0.34	50	1.0	2.6	144	1.9	5.2	0.5	3.1	5.0	**5.0**
DP1+A	2	0.50	0.57	0.83	0.42	0.47	From DP1			144	1.9	5.2	0.5	8.7	5.0	**8.7**
B	3	0.76	0.82	0.09	0.07	0.07	50	0.5	5.7					5.7	5.0	**5.7**
C		0.90	0.95	0.24	0.21	0.23	35	0.5	2.8	140	1.4	4.8	0.5	3.3	5.0	**5.0**
DP3+C	4	0.72	0.76	0.33	0.24	0.25	From DP3			140	1.4	4.8	0.5	6.2	5.0	**6.2**
D	5	0.90	0.95	0.30	0.27	0.29	55	1.2	2.6					2.6	5.0	**5.0**
E	6	0.73	0.79	0.26	0.19	0.21	75	2.1	4.7	171	1.8	5.2	0.5	5.3	5.0	**5.3**
F		0.38	0.47	0.05	0.02	0.03	50	1.1	9.3					9.3	5.0	**9.3**
DP2+DP4+DP5+DP6+F	7	0.64	0.70	1.77	1.14	1.24	From Basin F							9.3	5.0	**9.3**
OS-EX		0.20	0.25	0.20	0.04	0.05	40	2.0	8.4					8.4	6.0	**8.4**
C-EX		0.63	0.68	2.30	1.44	1.56	100	5.0	5.2	600	5.0	8.3	1.2	6.4	6.0	**6.4**
DP7+OS-EX+C-EX	8	0.61	0.67	4.28			From OS-EX			600	5.0	8.3	1.2	9.7	5.0	**9.7**
OS2	9	0.25	0.35	0.86	0.21	0.30	40	15.2	4.1	200	10.5	8.7	0.4	4.4	6.0	**6.0**

PROJECT INFORMATION

PROJECT: Falcon Sheriff Substation
PROJECT NO: 21653-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
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DATE: 8/22/2023

Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED TIME OF CONCENTRATION

SUB-BASIN DATA							INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)				TIME OF CONCENTRATION		FINAL t_c
BASIN	DESIGN PT:	C_5	C_{100}	AREA	*COMP*		LENGTH	SLOPE	t_i	LENGTH	SLOPE	VEL.	t_t	COMP.	MINIMUM	
				Ac			Ft	%	Min	Ft	%	FPS	Min	t_c	t_c	Min
OS1	1	0.25	0.35	0.47	0.12	0.16	70	4.8	7.9	167	5.2	8.3	0.3	8.2	5.0	**8.2**
A		0.90	0.95	0.35	0.32	0.34	50	1.0	2.6	144	1.9	5.2	0.5	3.1	5.0	**5.0**
DP1+A	2	0.50	0.57	0.83	0.42	0.47	From DP1			144	1.9	5.2	0.5	8.7	5.0	**8.7**
B	3	0.76	0.82	0.09	0.07	0.07	50	0.5	5.7					5.7	5.0	**5.7**
C		0.90	0.95	0.24	0.21	0.23	35	0.5	2.8	140	1.4	4.8	0.5	3.3	5.0	**5.0**
DP3+C	4	0.72	0.76	0.33	0.24	0.25	From DP3			140	1.4	4.8	0.5	6.2	5.0	**6.2**
D		0.90	0.95	0.30	0.27	0.29	55	1.2	2.6					2.6	5.0	**5.0**
DP4+D	5	0.67	0.71	0.63	0.42	0.45	From DP4			45	0.1	4.2	0.2	6.4	5.0	**6.4**
E	6	0.73	0.79	0.26	0.19	0.21	75	2.1	4.7	171	1.8	5.2	0.5	5.3	5.0	**5.3**
F		0.38	0.47	0.05	0.02	0.03	50	20.0	3.5					3.5	5.0	**5.0**
DP2+DP5+DP6+F	7	0.59	0.65	1.77	1.05	1.15	From DP2			210	1.9	5.2	0.7	9.4	5.0	**9.4**
OS-EX		0.20	0.25	0.20	0.04	0.05	40	2.0	8.4					8.4	6.0	**8.4**
C-EX		0.63	0.68	2.30	1.44	1.56	100	5.0	5.2	600	5.0	8.3	1.2	6.4	6.0	**6.4**
DP7+OS-EX+C-EX	8	0.59	0.64	4.28			From OS-EX			600	5.0	8.3	1.2	9.7	5.0	**9.7**
OS2	9	0.25	0.35	0.86	0.21	0.30	40	15.2	4.1	200	10.5	8.7	0.4	4.4	6.0	**6.0**

PROJECT INFORMATION

PROJECT: Falcon Sheriff Substation
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DESIGN BY: KGV
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AGENCY: El Paso County
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DATE: 8/22/2023

Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED RUNOFF — 5 YR STORM — P1= 1.50

			DIRECT RUNOFF				
BASIN (S)	**DESIGN POINT**	**AREA (AC)**	**RUNOFF COEFF**	**t_c (MIN)**	**C * A**	**I (IN/HR)**	**Q (CFS)**
OS1	1	0.47	0.25	8.2	0.12	4.42	**0.5**
A		0.35	0.90	5.0	0.32	5.17	**1.6**
	2	0.83	0.50	8.7	0.42	4.34	**1.8**
B	3	0.09	0.76	5.7	0.07	4.96	**0.3**
C		0.24	0.90	5.0	0.21	5.17	**1.1**
	4	0.33	0.72	6.2	0.24	4.84	**1.1**
D		0.30	0.90	5.0	0.27	5.17	**1.4**
	5	0.63	0.67	6.4	0.42	4.80	**2.0**
E	6	0.26	0.73	5.3	0.19	5.09	**1.0**
F		0.05	0.38	5.0	0.02	5.17	**0.1**
	7	1.77	0.59	9.4	1.05	4.23	**4.4**
OS-EX		0.20	0.20	8.4	0.04	4.38	**0.2**
C-EX		2.30	0.63	6.4	1.44	4.80	**6.9**
	8	4.28	0.59	9.7	2.53	4.18	**10.6**
OS2	9	0.86	0.25	6.0	0.21	4.90	**1.0**

PROJECT INFORMATION

PROJECT: Falcon Sheriff Substation
PROJECT NO: 21653-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Letter
DATE: 8/22/2023

Drexel, Barrell & Co.

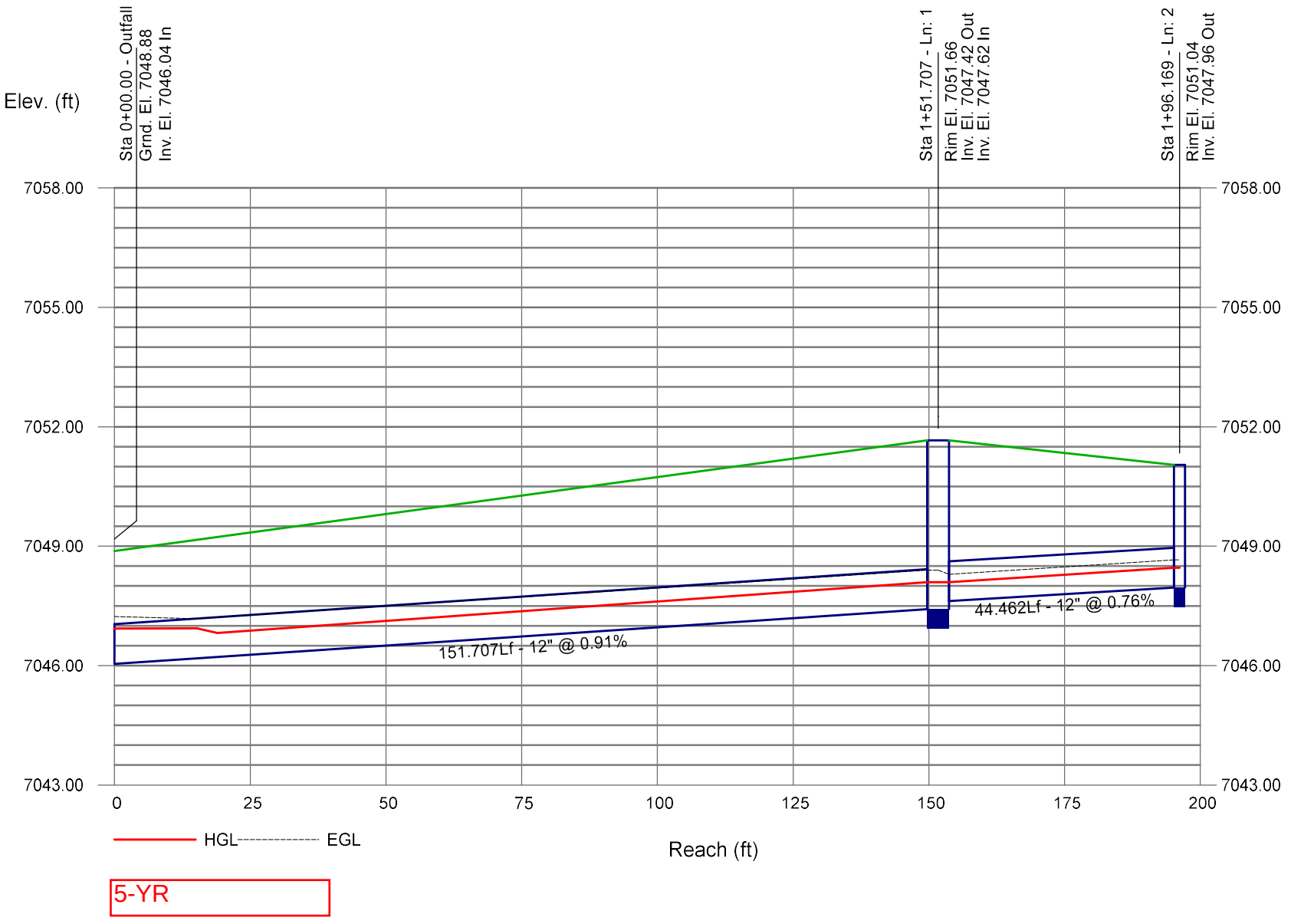
RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED RUNOFF 100 YR STORM P1= 2.52

			DIRECT RUNOFF				
BASIN (S)	**DESIGN POINT**	**AREA (AC)**	**RUNOFF COEFF**	**t_c (MIN)**	**C * A**	**I (IN/HR)**	**Q (CFS)**
OS1	1	0.47	0.35	8.2	0.16	7.43	**1.2**
A		0.35	0.95	5.0	0.34	8.68	**2.9**
	2	0.83	0.57	8.7	0.47	7.29	**3.4**
B	3	0.09	0.82	5.7	0.07	8.33	**0.6**
C		0.24	0.95	5.0	0.23	8.68	**2.0**
	4	0.33	0.76	6.2	0.25	8.13	**2.0**
D		0.30	0.95	5.0	0.29	8.68	**2.5**
	5	0.63	0.71	6.4	0.45	8.06	**3.6**
E	6	0.26	0.79	5.3	0.21	8.55	**1.8**
F		0.05	0.47	5.0	0.03	8.68	**0.2**
	7	1.77	0.65	9.4	1.15	7.10	**8.2**
OS-EX		0.20	0.25	8.4	0.05	7.36	**0.4**
C-EX		2.30	0.68	6.4	1.56	8.06	**12.5**
	8	4.28	0.64	9.7	2.76	7.02	**19.4**
OS2	9	0.86	0.35	6.0	0.30	8.22	**2.5**

Storm Sewer Profile

Proj. file: New.stm



MyReport

Line No.	Line ID	Flow Rate (cfs)	Line Size (in)	Line Type	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Up (ft)	HGL Dn (ft)	Minor Loss (ft)	HGL Jnct (ft)	Vel Ave (ft/s)	Line No.	Energy Loss (ft)
1	1	2.50	12	Cir	151.707	7046.04	7047.42	0.91	7048.10 j	7046.93	n/a	7048.10	3.90	1	0.000
2	2	1.40	12	Cir	44.462	7047.62	7047.96	0.76	7048.46	7048.10	0.20	7048.46	3.68	2	0.000

Project File: New.stm 5-YR

Number of lines: 2

Date: 8/22/2023

NOTES: ** Critical depth

Hydraulic Grade Line Computations

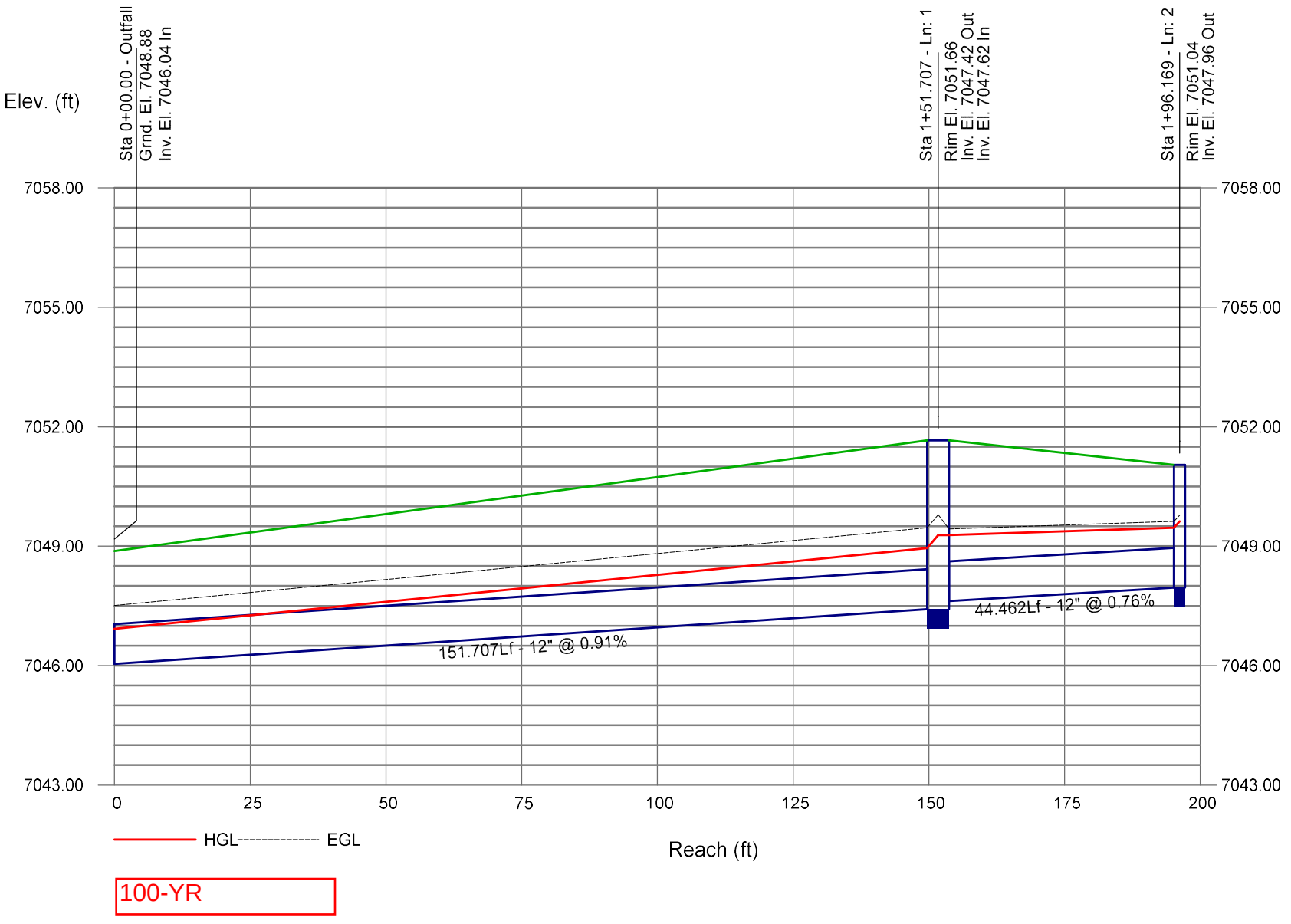
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	2.50	7046.04	7046.93	0.89	0.57	3.39	0.30	7047.23	0.000	151.707	7047.42	7048.10 j	0.68**	0.57	4.42	0.30	7048.40	0.000	0.000	n/a	0.64	0.19
2	12	1.40	7047.62	7048.10	0.48	0.37	3.79	0.20	7048.29	0.000	44.462	7047.96	7048.46	0.50**	0.39	3.56	0.20	7048.66	0.000	0.000	n/a	1.00	0.20

Project File: New.stm 5-YR | Number of lines: 2 | Run Date: 8/22/2023

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: New.stm



MyReport

Line No.	Line ID	Flow Rate (cfs)	Line Size (in)	Line Type	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Up (ft)	HGL Dn (ft)	Minor Loss (ft)	HGL Jnct (ft)	Vel Ave (ft/s)	Line No.	Energy Loss (ft)
1	1	4.50	12	Cir	151.707	7046.04	7047.42	0.91	7048.95	7046.93	0.33	7049.28	5.92	1	1.954
2	2	2.50	12	Cir	44.462	7047.62	7047.96	0.76	7049.46	7049.28	0.16	7049.62	3.18	2	0.187

Project File: New.stm 5-YR

Number of lines: 2

Date: 8/22/2023

NOTES: ** Critical depth

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	4.50	7046.04	7046.93	0.89	0.74	6.11	0.58	7047.51	1.215	151.707	7047.42	7048.95	1.00	0.79	5.73	0.51	7049.46	1.361	1.288	1.954	0.64	0.33
2	12	2.50	7047.62	7049.28	1.00	0.79	3.18	0.16	7049.44	0.420	44.462	7047.96	7049.46	1.00	0.79	3.18	0.16	7049.62	0.420	0.420	0.187	1.00	0.16

Project File: New.stm 5-YR | Number of lines: 2 | Run Date: 8/22/2023

; c = cir e = ellip b = box

Design Procedure Form: Porous Landscape Detention (PLD)

Designer: **Ewald**
Company: **LDC**
Date: **May 13, 2009**
Project: **Woodland Hills Fire Station**
Location: **Stapleton Dr and Meridian Ranch Blvd**

EXCERPT FROM WOODMEN HILLS FIRE STATION DRAINAGE REPORT. USES INCORRECT IMPERVIOUS RATIO (OVERSIZES PLD FACILITY)

1. Basin Storage Volume (I_a = 100% if all paved and roofed areas u/s of PLD) A) Tributary Area's Imperviousness Ratio (i = I_a / 100) B) Contributing Watershed Area Including the PLD (Area) C) Water Quality Capture Volume (WQCV) (WQCV = 0.8 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)) D) Design Volume: Vol_{PLD} = (WQCV / 12) * Area	I_a = 100.00 % i = 1.00 Area = 100,080 square feet WQCV = 0.40 watershed inches Vol = 3,336.0 cubic feet
2. PLD Surface Area (A_{PLD}) and Average Depth (d_{av}) (d_{av}: = (Vol / A_{PLD}), Min=0.5', Max=1.0')	A_{PLD} = 3,340 square feet d_{av} = 1.00 feet
3. Base Course (See Figure PLD-1)	_____ 6" (Min.) Sandy Loam Turf Layer, Plus 18" (Min.) Layer of 25% Peat and 75% Sand Mix, Plus 9" (Min.) Layer of ASSHTO #8 Coarse Aggregate (CDOT Section 703 Specification). _____ Other: _____
5. Draining of porous pavement (Check a, **or** b, **or** c, **answer** d) Based on answers to 5a through 5d, check the appropriate method a) Check box if subgrade is heavy or expansive clay b) Check box if subgrade is silty or clayey sands c) Check box if subgrade is well-draining soils d) Does tributary catchment contain land uses that may have petroleum products, greases, or other chemicals present, such as gas station, hardware store, restaurant, etc.? (yes / no)	a) [ ] b) [ ] c) [X] d) yes [ ] no [x]
	X Infiltration to Subgrade with Permeable Membrane: 5(c) checked **and** 5(d) = no _____ Underdrain with Impermeable Membrane: 5(a) checked **or** 5(d) = yes _____ Underdrain with Permeable Membrane: 5(b) checked **and** 5(d) = no _____ Other: _____

Notes: _____

PLD sizing- WHFS, PLD

PROJECT INFORMATION

PROJECT:	Falcon Sheriff Substation
PROJECT NO:	21653-00
DESIGN BY:	KGV
REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Letter
DATE:	12/7/2022

Drexel, Barrell & Co.

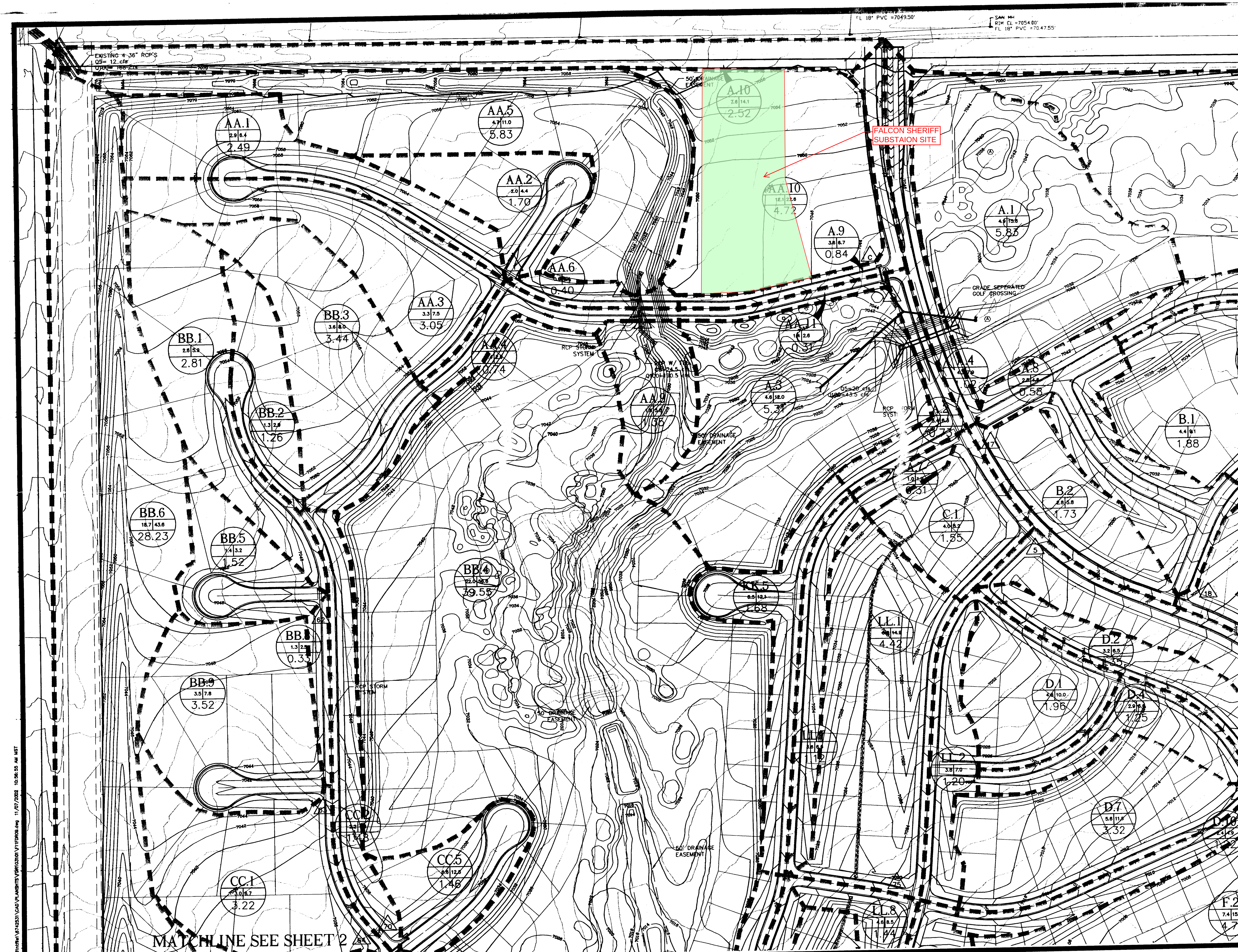
WATER QUALITY CAPTURE VOLUME

Effective Imperviousness of Tributary Area, I_a	58	%
Tributary Area's Imperviousness Ratio ($i=I_a/100$)	0.58	
Contributing Watershed Area	187,744	sf
	4.31	ac
Drain Time	12	hrs
Water Quality Capture Volume (WQCV)	0.18	watershed in
$WQCV= 0.8 * (0.91* i^3 - 1.19 * i^2 + 0.78 * i)$		
Water Quality Capture Volume (WQCV) Design Volume	2874	cf
V_{WQCV} = WQCV / 12 * Area		

Existing facility designed for **3,336 cf**

REVISED FOR NEW WATERSHED AREA AND UPDATED IMPERVIOUS RATIO. WQCV IS LESS THAN ORIGINALLY DESIGNED FOR. PLD IS ADEQUATE TO ACCOMMODATE ADDITIONAL FLOW.

FINAL DRAINAGE PLAN WOODMEN HILLS FILING NO. 11



N

1"=100'

50 0 50 100

LEGEND

- BASIN LABEL (NO. / Q5 Q100 / AREA) (Q5=5 YEAR STORM) (Q100=100 YEAR STORM)
- RATIONAL DESIGN POINT INTERCEPTED INLET FLOW
- HEC-1 DESIGN POINT (MD)
- DESING PT. PIPE ROUTING (A)
- STORM INLET (15 ft.)
- STREET SLOPE (1.5%)
- FLOW ARROW
- MAJOR BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- HIGH POINT/ LOW POINT (HP/LP)
- CURB FLOW
- RCP STORM SYSTEM

URS
9960 FEDERAL DRIVE #300
COLORADO SPRINGS, COLORADO 80921
PHONE: (719) 531-0001
FAX: (719) 531-0007

FIGURE 9
SHEET 1 OF 5

Haegler Ranch Basin

As mentioned before, there will be no development in the Haegler Ranch Basin due to plat restrictions. This area, with any proposed development will need to be studied and a new drainage report produced. Also, Eastonville Road and the crossing at Eastonville Road for the Haegler Ranch Basin will need to be further studied when any proposed development occurs.

Detention

The Woodmen Hills detention pond system will be the source of detention for the Falcon Basin and was approved as part of Woodmen Hills Filings No. 5, 6, 7, 8 and 9. Please refer to the comparison and changes necessary above on the difference between these reports. Also the Bennett Ranch Basin Regional Detention Pond was designed and approved as part of Woodmen Hills Filing No. 10. Please refer to comparison above on the difference between these reports.

The combination of these existing ponds makes it possible to release flows out of the Woodmen Hills subdivision at or below historical levels.

Developed Condition Channel Characteristics

See Figure 13 Construction/River Stationing for the North and South Channels and Figure 14 Construction/River Stationing for the Golf Course Channels for information on station equivalency between HEC-RAS river stationing and Construction stationing.

Falcon Basin

Golf Course Channel

The Falcon DBPS proposed a major channel to be located on the Falcon Basin section of Woodmen Hills Filing No. 11. This major channel is to route flows from offsite basin flows entering Woodmen Hills Filing No. 11 from Falcon Hills via the quadruple 36" RCPs, towards the floodplain located on the border of Woodmen Hills Filing No. 11 and Filing No. 6 (design point EA). This channel has a more natural varying cross-section through the golf course with a minimum depth of 4.7 feet, side slopes of 4:1, minimum bottom width of 5 feet, and a minimum slope of 0.5%. It is designed to carry a maximum flow of 281 cfs, in a 50' drainage easement. Also, a smaller channel, not specified in the Falcon DBPS, is to be located on the southern section of the golf course. It is designed to carry flows from residential basins towards the major golf course channel (see Proposed Design Drainage Characteristics for Falcon Basin for more details on basin areas draining to this channel). This smaller channel also has a "natural" look to it and it is designed to handle 78 cfs. It has a trapezoidal cross-section with a minimum bottom width of 5 feet, minimum depth of 2.71 feet, side slopes of 4:1 in a 30' drainage easement. Please see Appendix E: Channel Calculations.

The golf course channel will start at design point MD (Incoming flows $Q_{5\text{-year}}$= 12 cfs and $Q_{100\text{-year}}$= 168 cfs). The channel will continue east along the proposed Stapleton Drive to

the natural low point where it will turn south towards a 72" RCP under Royal County Road. At this point, the channel will carry flows from Falcon Hills and from basin A.5 in Woodmen Hills Filing No. 11.

The channel will cross under Royal County Road via a 72" RCP. From this point, the channel will enter the golf course area. The channel will have a more "natural" look to it, with varying trapezoidal dimensions. The channel will be a major feature for the golf course design. The channel will continue south towards the beginning of the existing floodplain. At this point, the channel will carry flows from Falcon Hills and Woodmen Hills Filing No. 11.

The channel will enter the floodplain area and will cross under Sand Hills Road via a 4-42" RCPs. At this point, the channel will pick up flows draining towards sump inlets located at the low point of Sand Hills Road (see Proposed Drainage Design Characteristics for Falcon Basin for more details on basin areas draining to this point). The channel will then become part of the floodplain and will continue south, towards design point EA.

At design point EA, the channel will exit Woodmen Hills Filing No. 11 and enter Woodmen Hills Filing No. 6 (Exiting flows $Q_{5\text{-year}}$= 69 cfs and $Q_{100\text{-year}}$= 282 cfs). The channel will continue through Filing No. 6 towards Pond 1 (see Woodmen Hills Filing No. 6 FDR for more details on Pond 1).

The smaller channel will route flows from the residential basins (see Proposed Drainage Design Characteristics for Falcon Basin for more details on basin areas draining to this channel) towards the crossing of the major channel under Sand Hills Road. At this point, the flows from the major channel will combine with flows from the smaller channel and enter the floodplain channel area.

Western Channel

The Meridian Road Channel conveys flow from Basin BB.6 south adjacent to Meridian Road (not including Meridian Road r.o.w. flow) to the boundary with Woodmen Hills Filing No. 5 were it turns east and conveys flow to a proposed 42-inch culvert. This culvert conveys flow under Tompkins Road to the existing FEMA floodplain drainage located between Woodmen Hills Filing No. 5 and No. 6. The design flow (100-year) for this channel is 43.6 cfs. The cross section will be a grass lined trapezoidal channel with 6 to 1 side slopes, maximum depth of 4 feet (flow depth range of 0.5-1.0 feet), bottom width of 9 feet, slope ranging from 0.65% to 6.0% with velocities ranging from 7.0 to 3.2 fps See Appendix E for channel calculations.

Bennett Ranch Basin

The approved design of the Bennett Regional Detention Pond in the Woodmen Hills Filing No. 10 included a design of two channels within the Bennett Ranch Basin: the

- **Basin AA.10** (4.72 acres) contains the area for a future Police/Fire Station near Stapleton Drive and Meridian Ranch Boulevard. This basin generates 12.1 cfs for the 5-year storm event and 22.6 cfs for the 100-year event. This flow is conveyed to an inlet at Pipe Design Point A. This flow will be carried through an 18" RCP to the inlet at Design Point 4.

- **Basin A.10** (2.52 acres) contains a portion of Stapleton Drive. This basin generates 7.6 cfs for the 5-year storm event and 14.1 cfs for the 100-year event. This flow is routed through basin A.9 to an inlet at Design Point C.

- **Basin A.9** (0.84 acres) contains a portion of Royal County Down Road and Meridian Ranch Blvd. This basin generates 3.6 cfs for the 5-year storm event and 6.7 cfs for the 100-year event. This flow is conveyed to an inlet at Design Point C.

- **Design Point C** (Q_5=9 cfs and Q_{100}=17 cfs) contains Basin A.9 and AA.10. A 10' sump inlet will intercept 9 cfs for the 5-year storm and 17 cfs for the 100-year storm. This inlet will connect to proposed 24" RCP and release into the proposed golf course channel in Basin A.3.

- **Basin AA.11** (0.31 acres) contains a portion of Royal County Down Road. This basin generates 1.4 cfs for the 5-year storm event and 2.6 cfs for the 100-year event. This flow is conveyed to an inlet at Design Point 4.

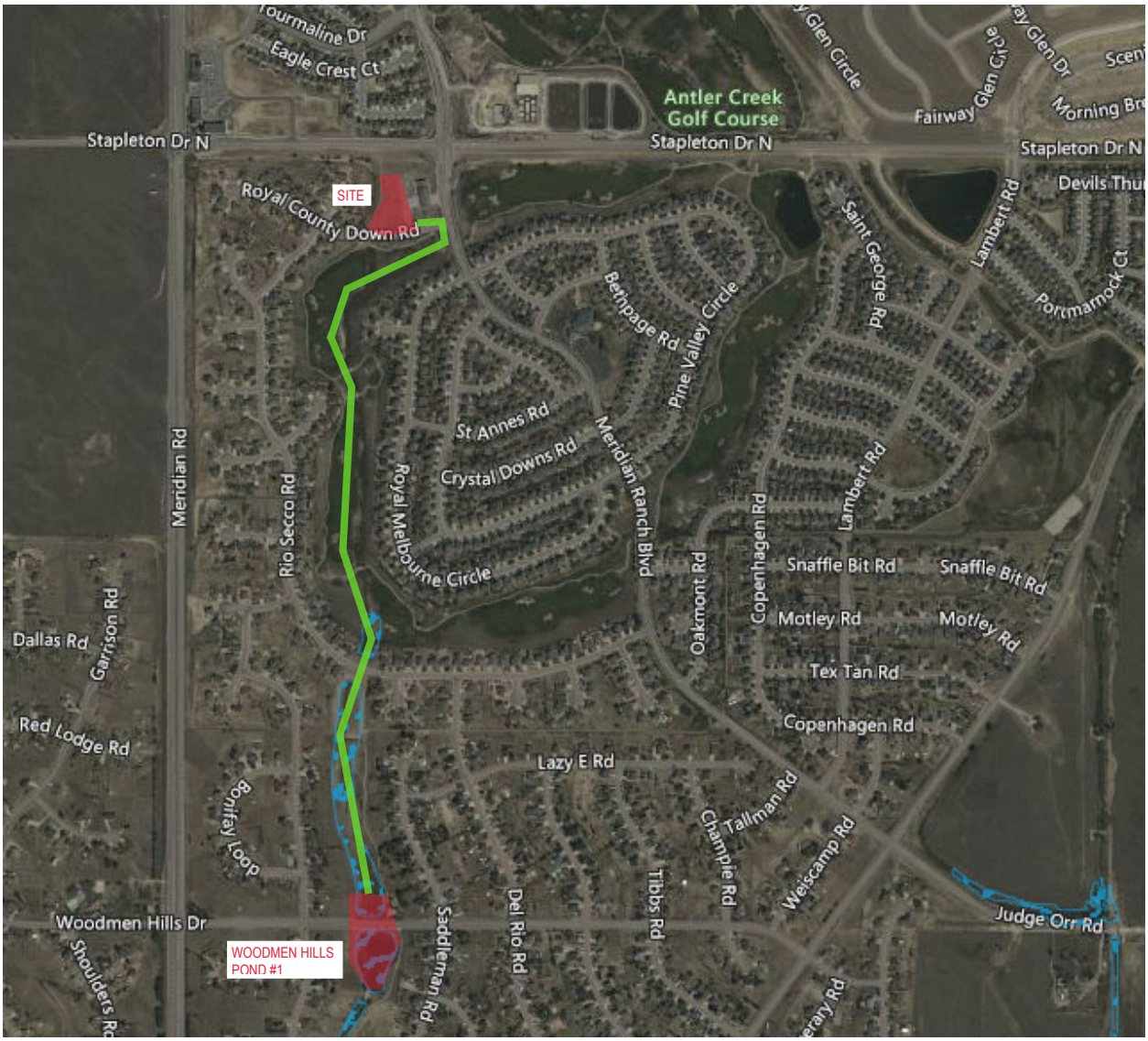
- **Design Point 4** (Q_5=1 cfs and Q_{100}=3 cfs) contains Basin AA.11. A 10' on-grade inlet will intercept 1 cfs for the 5-year storm and 2 cfs for the 100-year storm. This inlet will connect to proposed 24" RCP and release into the proposed golf course channel in Basin A.3.

- **Basin A.3** (5.31 acres) contains a portion of the proposed golf course between Royal County Down Road and Royal Melbourne Circle. This basin generates 4.6 cfs for the 5-year storm event and 12.0 cfs for the 100-year event. This flow is conveyed as channel flow to the confluence of the main golf channel with Basin AA.9.

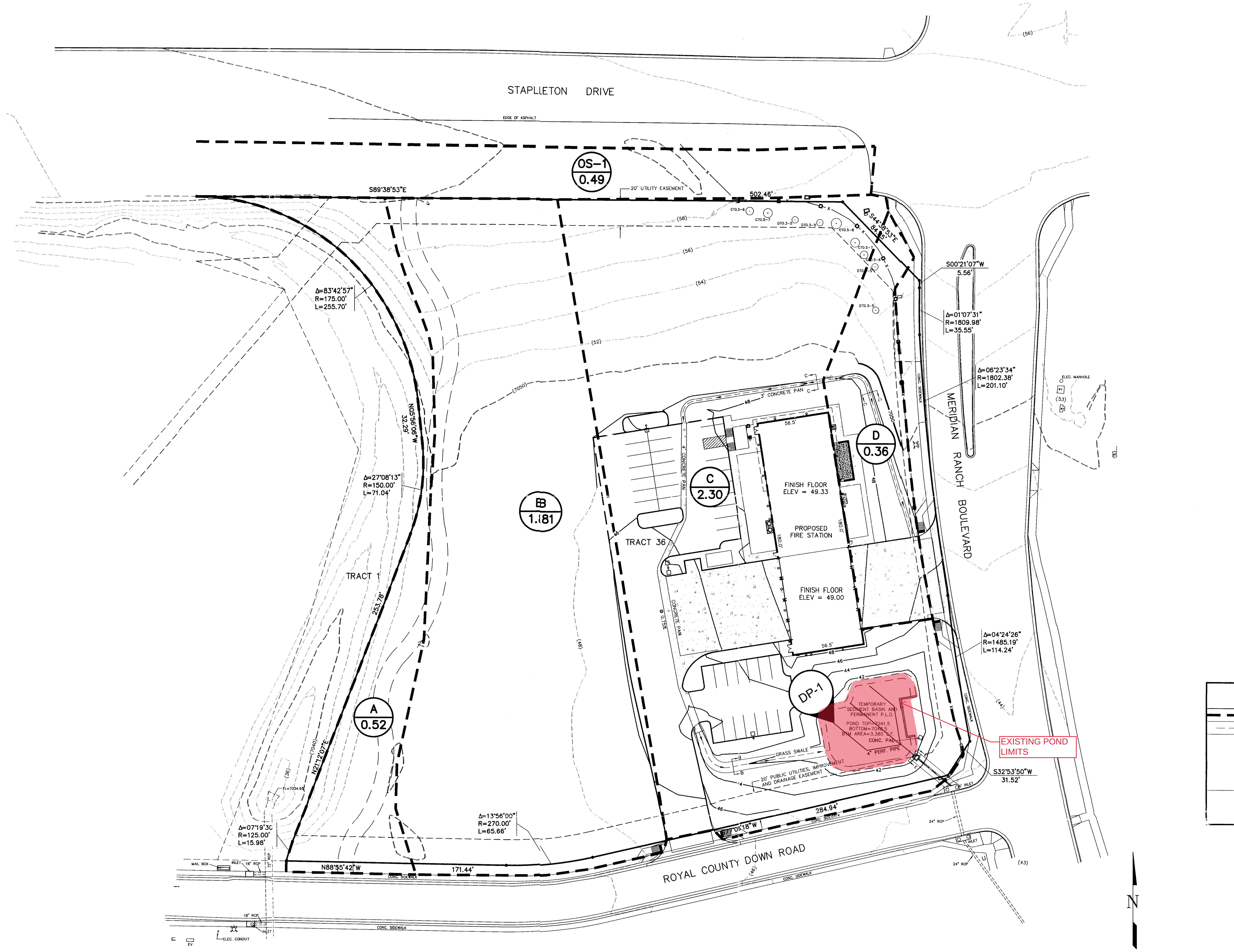
- **Basin BB.4** (39.55 acres) contains a portion of the majority of the golf course channel. This basin generates 22.0 cfs for the 5-year storm event and 56.6 cfs for the 100-year event. This flow is conveyed as channel flow to the proposed set of 48" RCP's under Sand Hills Road to Basin DD.7. See the appendix for channel calculations.

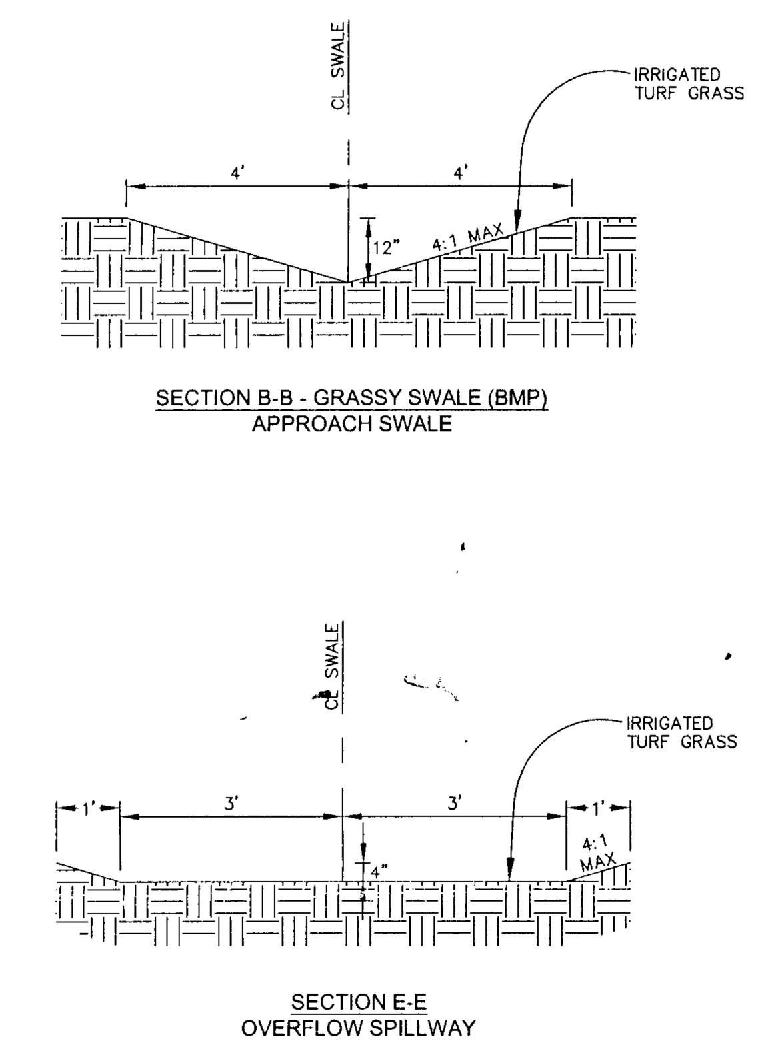
- **Basin DD.7** (8.84 acres) contains ½ acre lots and the golf channel outlet. This basin generates 7.4 cfs for the 5-year storm event and 17.3 cfs for the 100-year event. This flow is conveyed as channel flow to the south into the channel in Woodmen Hills Filing No. 6.

Falcon Sheriff Substation – Runoff Routing to Woodmen Hills Pond #1



MAP UTILIZED FOR EXISTING CONDITION





CONTOUR LEGEND

(6840)	MAJOR CONTOUR
(41)	MINOR CONTOUR
6840	MAJOR CONTOUR
41	MINOR CONTOUR

DRAINAGE PLAN LEGEND

	BASIN BOUNDARY
	CONCENTRATED FLOW PATH
C / 2.31 — BASIN NAME / ACREAGE	DRAINAGE BASIN TAG
DP 5	DESIGN POINT TAG DESIGN POINT DESIGNATION

DFAINAGE BASIN SUMMARY
PROPOSED
BASINS

BASIN	MINOR FLOW (cfs): (5 YR)	MAJOR FLOW (cfs): (100 YR)
OS-1	0.50	0.80
A	0.40	0.70
B	1.00	2.20
C	--	--
D	0.20	0.30
DP-1	3.80	8.00

CALL BEFORE YOU DIG... 1-800-922-1987

48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS FOR LOCATING AND MARKING GAS, ELECTRIC, WATER AND WASTEWATER

REVISIONS			
No.	Description	By	Date
1	COUNTY COMMENTS	KLW	6-22-09

H Scale:	1" = 40'
V Scale:	N/A
Designed By:	DCE
Drawn By:	KLW
Checked By:	DCE
Date:	05/21/09

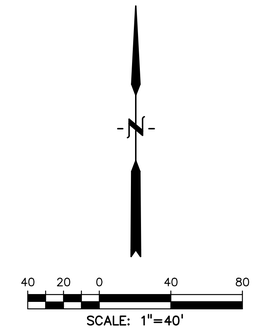
Land Development Consultants, Inc.
Planning · Landscape Architecture
Engineering · Surveying
www.ldc-inc.com · TEL: (719) 528-6133 · FAX: (719) 528-6848
2850 Serendipity Circle West · Colorado Springs, CO 80917

WOODMEN HILLS FIRE STATION
PROPOSED DRAINAGE PLAN

Project No.: 08055

Sheet: 2 of 2

F:\08000\08055 Falcon Station 1 Woodmen hills\Engineering\08055-PRO-DRAINAGE.dwg



LEGEND

- PROPOSED INTERMEDIATE CONTOUR 5522
- PROPOSED INDEX CONTOUR 5520
- *EX. INTERMEDIATE CONTOUR* *5364*
- *EX. INDEX CONTOUR* *5365*
- DIRECTION OF FLOW. .....
- HIGH POINT ..... HP
- LOW POINT ..... LP
- PROPOSED INLET. .....
- PROPOSED MANHOLE .....
- BASIN BOUNDARY
- FIRE STATION BASIN BOUNDARY (FOR REFERENCE)
- FLOW DIRECTION
- DESIGN POINT
- BASIN, AREA (ACRE), C5, C100

RUNOFF & DESIGN POINT SUMMARY

BASIN	DP	AREA (AC)	Q5	Q100
OS1	1	0.47	0.5	1.2
A		0.35	1.6	2.9
	2	0.83	1.8	3.4
B	3	0.09	0.3	0.6
C		0.24	1.1	2.0
	4	0.33	1.1	2.0
D		0.30	1.4	2.5
	5	0.63	2.0	3.6
E	6	0.26	1.0	1.8
F		0.05	0.1	0.2
	7	1.77	4.4	8.2
OS-EX		0.20	0.2	0.4
C-EX		2.30	6.9	12.5
	8	4.28	10.6	19.4
OS2	9	0.86	1.0	2.5

EL PASO COUNTY PCD FILE NO: PPR-22-059

PREPARED BY:

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CLIENT:

EL PASO COUNTY

DRAINAGE MAPPING PLANS FOR:

WOODMEN HILLS SHERIFF SUBSTATION

EL PASO COUNTY, COLORADO

ISSUE	DATE
INITIAL ISSUE	9-13-2022
RESUBMITTAL	10-5-2023

DESIGNED BY:	KGV
DRAWN BY:	CGH
CHECKED BY:	TDM
FILE NAME:	21653-00-DRN

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.

DRAWING SCALE:
HORIZONTAL: 1" = 40'
VERTICAL: N/A

PROPOSED DRAINAGE PLAN

PROJECT NO. 21653-00CSCV

DRAWING NO.

DRN

SHEET: 1 OF 1