FINAL DRAINAGE REPORT
FOR
NORTHGATE SUBARU
208 GLENEAGLE GATE VIEW
COLORADO SPRINGS, COLORADO

(LOT 1-3 ACADEMY GATEWAY SUBDIVISION FILING NO. 2)

JUNE 2025

Prepared For:
TKA PROPERTIES, LLP
Attn: Kevin Quinn
17225 Burt Street
Omaha, NE 68118
402.964.4291

Prepared By:

TERRA NOVA ENGINEERING, INC.
Attn: Dane Frank
721 S. 23RD Street
Colorado Springs, CO 80904
719.635.6422

TNE Job No. 2326.00
County Project No. SF2510 and PPR2514

FINAL DRAINAGE REPORT
FOR
NORTHGATE SUBARU

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APPENDICIES

FINAL DRAINAGE REPORT
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DESIGN ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____
Dane Frank, P.E. 50207 Date
On behalf of Terra Nova Engineering, Inc.

OWNER/DEVELOPER'S STATEMENT:

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

_____ _____
Authorized Signature Date

_____
Printed Name, Title

_____
Business Name

_____
Address

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:

FINAL DRAINAGE REPORT
FOR
NORTHGATE SUBARU

PURPOSE

The purpose of this Final Drainage Report (FDR) is to identify and analyze the proposed drainage patterns, determine proposed runoff quantities, size drainage structures for conveyance of developed runoff, and present solutions to drainage impacts on-site and off-site resulting from this development. The site has been previously platted. The site has been previously studied in the following reports:

Preliminary/Final Drainage Report For Academy Gateway Subdivision Filing No. 1, Prepared By Classic Consulting Engineers & Surveyors, Dated March 2017 (County File Number SF1618)

Drainage Letter Addendum For Academy Gateway Subdivision No. 1, Prepared By Classic Consulting Engineers & Surveyors, Dated August 11, 2017 (County File Number CDR175)

GENERAL DESCRIPTION

This FDR is an analysis of approximately 10.15 acres of undeveloped land located at 208 Gleneagle Gate View. The site includes two separate parcels that are divided by an existing street. The site is being developed as an auto dealership, with one parcel having the dealership and the other parcel being a parking lot. The site is in the northwest quarter of Section 6, Township 12 South, Range 66 West and the northeast quarter of Section 1, Township 1 South, Range 67 West of the 6th Principal Meridian within El Paso County. The parcels are bounded to the north by BLDG 13710 GLENEAGLE EXECUTIVE OFFICE CONDOMINIUMS ADDENDUM RECP #205186526 and Lot 3 Academy Gateway Sub Fil No 1, to the east by Struthers Road, to the south by TR C ACADEMY GATEWAY SUB FIL NO 1 IMP ONLY LOCATED 62063-00-004 and LOT 2 ACADEMY GATEWAY SUB FIL NO 1, and to the west by THAT PT LY WITHIN AFA BOUNDARY SEC 1-12-67 ALL SECS 2, 3, 4-12-67 E2E2 EX W2NW4NE4NE4 SEC 5-12-67 ALL SECS 9, 10, 11, 12, 13, 14, 15, 16, 22, 23, 24-12-67 E2,

SW4 SEC 21-12-67 THAT PT LY WITHIN AFA BOUNDARY SECS 7, 18, 19, 20-12-66 EX THAT PT PLATTED TO TRUENORTH COMMONS FIL NO 1 (See vicinity map in appendix).

The northwest portion of the site lies within the Black Forest Drainage Basin and the southeast portion of the site lies within the Smith Creek Drainage Basin. Both basins drain to Monument Creek, which is southwest of the site. The northern parcel of the site currently drains to the west. The southern portion of the site has previously been graded to drain to a stormwater detention pond located immediately south of the site across Gleneagle Gate View.

Soils for this project are delineated by the map in the appendix as 27% Kettle-Rock outcrop complex (42) and 73% Pring coarse sandy loam (71). Soils in the study area are shown as mapped by NRCS in the "Soils Survey of El Paso County Area" and contains soils of Hydrologic Group B.

The site is currently undeveloped with mostly grass surfaces. The entire site has previously been overlot graded. The north portion of the site drains to the west, with an average slope of 5.3%. The south portion of the site drains to the south, with an average slope of 8.8%.

EXISTING DRAINAGE CONDITIONS

There are five drainage basins, three of which are offsite. Drainage from the southern portion of the site and Gleneagle Gate View are currently mixed. See attached Existing Drainage Map (in appendix).

Basin OS-Z is 1.53 acres and drains to Design Point Z at the south point in the basin. This basin is the My Place Hotel lot. This basin is offsite and runoff from this basin flows onto Gleneagle Gate View and into basin OS-Y. Basin OS-Z has flows of Q_5 = 6.2 cfs and Q_{100} = 11.5 cfs.

Basin OS-Y is 1.57 acres and drains to Design Point Y south of the site. This basin is portions of Struthers Road and Gleneagle Gate View. This basin is offsite and runoff from this basin flows into a curb inlet at the design point. Basin OS-Y has flows of Q_5 = 6.0 cfs and Q_{100} = 11.3 cfs.

Combined flows at Design Point Y are Q_5 = 12.3 cfs and Q_{100} = 22.8 cfs.

Basin EX-A is 4.12 acres and drains to Design Point A on the west side of the site. This basin is the northern portion of the site. Runoff flows off the site and onto the adjacent property. Basin EX-A has flows of Q_5 = 1.3 cfs and Q_{100} = 8.4 cfs.

Basin EX-B is 6.86 acres and drains to Design Point B at the south corner of the site. This basin includes the southern portion of the site and a portion of Gleneagle Gate View. Runoff flows into a curb inlet in Gleneagle Gate View. Basin EX-B has flows of Q_5 = 3.8 cfs and Q_{100} = 15.7 cfs.

There is existing storm pipe and curb inlets in Gleneagle Gate View. One of these storm pipes stubs into the northern portion of the site for a future connection. The March 2017 FDR shows the existing storm sewer system was designed to take the runoff from the entire site.

There is an existing full spectrum detention extended detention basin (called Detention Facility A) located south of the site across Gleneagle Gate View. Runoff from a portion of the site currently drains into this pond through the existing storm sewer system. As of April 2025 this pond appears to be working as intended. The March 2017 FDR shows the pond was designed to take the runoff from the entire site (the drainage maps and calculations show the basins and flow rates). The summation of the original design flows for the site are included in the surface routing summary and proposed drainage map in this report.

PROPOSED DRAINAGE CONDITIONS

Runoff in the developed conditions consists of 21 basins; 18 onsite basins and three offsite basins. Below is a description of the runoff in the developed conditions and how it will be safely routed, treated, and detained. See appendix for calculations.

Offsite Basins

Basin OS-X is 0.60 acres and drains to Design Point X on the northeast side of the site. This basin is offsite and runoff from this basin flows onto the site and into basin PR-1. This basin

includes part of Struthers Road that drains onto the site. Basin OS-X has flows of Q_5 = 2.4 cfs and Q_{100} = 4.5 cfs.

Basin OS-Y is 1.17 acres and drains to Design Point Y south of the site. This basin is offsite and runoff from this basin flows into the storm sewer system that drains the site. This basin includes a portion of Gleneagle Gate View that wraps around the site. Basin OS-Y has flows of Q_5 = 4.5 cfs and Q_{100} = 8.4 cfs.

Basin OS-Z is 1.53 acres and drains to Design Point Z in Gleneagle Gate View. This basin is offsite and runoff from this basin flows into Gleneagle Gate View. This basin is the existing hotel lot. Basin OS-Z has flows of Q_5 = 6.2 cfs and Q_{100} = 11.5 cfs.

Onsite Basins

Basin PR-1 is 1.59 acres and drains to Design Point 1 near the west side of the north lot. Basin PR-1 is the northern portion of a paved parking area. Basin PR-1 has flows of Q_5 = 6.7 cfs and Q_{100} = 12.4 cfs.

Basin PR-2 is 0.12 acres and drains to Design Point 2 and into Gleneagle Gate View. Basin PR-2 is a portion of an existing street. Basin PR-2 has flows of Q_5 = 0.6 cfs and Q_{100} = 1.0 cfs.

Basin PR-3 is 1.24 acres and drains to Design Point 3 near the west side of the north lot. Basin PR-3 is the southern portion of a paved parking area. Basin PR-3 has flows of Q_5 = 5.3 cfs and Q_{100} = 9.7 cfs.

Basin PR-4 is 0.10 acres and drains to Design Point 4 in Gleneagle Gate View. Basin PR-4 is a strip of landscaping and driveway on the southeast edge of the north lot. Basin PR-4 has flows of Q_5 = 0.2 cfs and Q_{100} = 0.4 cfs.

Basin PR-5 is 0.10 acres and drains to Design Point 5 at the south edge of the north lot. Basin PR-4 is a corner of paved parking area in the north lot. Basin PR-5 has flows of Q_5 = 0.5 cfs and Q_{100} = 0.8 cfs.

Basin PR-6 is 1.02 acres and drains to Design Point 6 on the west side of the north lot. Basin PR-6 is an undeveloped/landscaping area that drains off the site to the west. Basin PR-6 has flows of Q_5 = 0.5 cfs and Q_{100} = 3.1 cfs.

Basin PR-7 is 1.88 acres and drains to Design Point 7 south of the site. Basin PR-7 is a portion of Gleneagle Gate View and onsite landscaping areas that drain into the existing storm sewer system that drain the site. Basin PR-7 has flows of Q_5 = 2.1 cfs and Q_{100} = 6.7 cfs.

Basin PR-8 is 0.45 acres and drains to Design Point 8 near the east corner of the north lot. Basin PR-8 is an undeveloped/landscaping area that drains into Gleneagle Gate View. Basin PR-8 has flows of Q_5 = 0.3 cfs and Q_{100} = 1.2 cfs.

Basin PR-9 is 0.58 acres and drains to Design Point 9 near the west side of the south lot. Basin PR-9 is primarily parking lot on the west part of the south lot. Basin PR-6 has flows of Q_5 = 2.0 cfs and Q_{100} = 3.8 cfs.

Basin PR-10 is 0.20 acres and drains to Design Point 10 on the north part of the south lot. Basin PR-10 is primarily parking lot on the north part of the south lot. Basin PR-10 has flows of Q_5 = 0.9 cfs and Q_{100} = 1.7 cfs.

Basin PR-11 is 0.14 acres and drains to Design Point 11 on the north part of the south lot. Basin PR-11 is primarily parking lot on the north part of the south lot. Basin PR-11 has flows of Q_5 = 0.7 cfs and Q_{100} = 1.2 cfs.

Basin PR-12 is 0.71 acres and drains to Design Point 12 in the middle of the south lot. Basin PR-12 is part of the main building roof. Basin PR-12 has flows of Q_5 = 3.3 cfs and Q_{100} = 5.9 cfs.

Basin PR-13 is 0.52 acres and drains to Design Point 13 in the middle of the south lot. Basin PR-13 is part of the main building roof. Basin PR-13 has flows of Q_5 = 2.4 cfs and Q_{100} = 4.3

cfs.

Basin PR-14 is 0.16 acres and drains to Design Point 14 on the west part of the south lot. Basin PR-14 is primarily parking lot on the west part of the south lot. Basin PR-14 has flows of Q_5 = 0.7 cfs and Q_{100} = 1.7 cfs.

Basin PR-15 is 0.19 acres and drains to Design Point 15 on the west part of the south lot. Basin PR-15 is primarily parking lot on the west part of the south lot. Basin PR-5 has flows of Q_5 = 0.8 cfs and Q_{100} = 1.5 cfs.

Basin PR-16 is 1.18 acres and drains to Design Point 16 on the east side of the south lot. Basin PR-16 is primarily parking lot and the car wash building on the east part of the south lot. Basin PR-16 has flows of Q_5 = 4.7 cfs and Q_{100} = 8.9 cfs.

Basin PR-17 is 0.63 acres and drains to Design Point 17 on the south side of the south lot. Basin PR-17 is parking lot on the south part of the south lot. Basin PR-17 has flows of Q_5 = 2.7 cfs and Q_{100} = 4.9 cfs.

Basin PR-18 is 0.27 acres and drains to Design Point 18 on the south side of the south lot. Basin PR-18is primarily parking lot on the south part of the south lot. Basin PR-18 has flows of Q_5 = 1.1 cfs and Q_{100} = 2.0 cfs.

Drainage from the north lot is primarily collected in a series of curb inlets and carried by storm pipe to the existing storm sewer system in Gleneagle Gate View. A section of the existing storm sewer is being replaced to allow gravity flow in the proposed storm sewer. One storm sewer run drains the entire lot.

Drainage from the south lot is primarily collected by storm inlets and roof drains, and carried by storm pipe to the existing storm sewer system in Gleneagle Gate View. There are four storm sewer runs. The west and east runs collect runoff from the storm inlets, and two central runs connect to the building roof drains.

Southeast of the site in Tract C Academy Gateway Sub Fil No 1 is an existing private regional detention pond (FSD EDB) that was designed to treat runoff from the site, plus other lots. The pond design is included in the Preliminary/Final Drainage Report for Academy Gateway Subdivision Filing No.1, dated March 2017, prepared by Classic Consulting. The plans for this pond are included in Construction Plans, Academy Gateway Subdivision Filing No. 1, dated 10/17/16, by Classic Consulting. The pond design has Q_5 = 54 cfs and Q_{100} = 93 cfs flowing into the pond from the storm sewer. The proposed design for the site has Q_5 = 47.7 cfs and Q_{100} = 91.1 cfs flowing into the pond from the storm sewer. Therefore, the pond has sufficient capacity to provide water quality treatment and detention for the site. As of April 2025 this pond appears to be working as intended.

In an effort to protect receiving water and as part of the "four-step process to minimize adverse impacts of urbanization" this site was analyzed in the following manner:

1. Reduce Runoff- The proposed impervious areas on the site are surrounded by landscaping and green space areas. Additionally, the new improvements and impervious areas on the site are being routed to the existing EDB. These items will reduce the volume of runoff using ponding and infiltration.
2. Stabilize Drainageways- There are no existing drainageways onsite, and no swales are proposed
3. Provide Water Quality Capture Volume (WQCV)- The existing EDB was sized and designed to sufficiently capture the required WQCV and slowly release it though the orifice plate, thereby allowing solids and contaminants to settle out. There are two on-site basins (PR-6 and PR-8) whose runoff is not treated in the existing EDB. These are landscaping areas. These areas are excluded per the ECM 1.7.1.B.7, "sites with land disturbance to undeveloped land that will remain undeveloped".
4. Consider Need for Industrial and Commercial BMPs- The proposed development is a auto dealer with a maintenance area and a car wash; therefore, BMPs associated with auto maintenance and washing are recommended.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the El Paso County Storm Drainage Design Criteria Manual - Volumes 1 & 2, latest editions. The Rational Method was used to estimate storm water runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County Storm Drainage Design Criteria Manual – Volumes 1 & 2, latest editions. The pertinent data sheets are included in the appendix of this report.

FLOODPLAIN STATEMENT

No portion of this site is within a designated F.E.M.A. floodplain, as determined by Flood Insurance Rate Map No. 08041C0290 G, dated December 7, 2018 (see appendix).

WATER QUALITY

The existing private regional detention pond south of the site provides water quality treatment for most of the proposed development.

Runoff from basins PR-6 and PR-8 is not captured by the existing pond. Both basins are landscaping areas that flow away from the site and pond. These basins are using the exclusion of Exemption ECM I.7.1.B.7 - land disturbance to undeveloped land that will remain undeveloped. See the Water Quality Treatment Summary Table in the appendix for details.

CONSTRUCTION COST OPINION

Public Reimbursable

None

Public Non-Reimbursable

None

Private Non-Reimbursable

1. 12” HDPE Pipe	322 LF	$ 60	$ 19,320
2. 15” HDPE Pipe	518 LF	$ 70	$ 36,260
3. 18” HDPE Pipe	231 LF	$ 80	$ 18,480
4. 24” HDPE Pipe	673 LF	$ 90	$ 60,570
4. 24” RCP Pipe	32 LF	$ 105	$ 3,360
5. 30” RCP Pipe	308 LF	$ 132	$ 40,656
6. 5’ Type R Curb Inlet	3 EA	$ 10,800	$ 32,400
7. 5’ Type R Curb Inlet – Drop Inlet	1 EA	$ 20,000	$ 20,000
8. 10’ Type R Curb Inlet	2 EA	$ 10,997	$ 21,994
9. 15’ Type R Curb Inlet	2 EA	$ 14,873	$ 29,746
10. Double Type 13 Area Inlet	4 EA	$ 7,000	$ 28,000
11. Storm Manhole	3 EA	$ 8,946	$ 26,838
		Total	**$ 337,624**

DRAINAGE FEES

Existing Tracts C, D, and E are being platted as part of this development, so drainage fees will be due for them.

Tract C is 2.22 acres. Tract D is 6.03 acres. Tract E is 4.12 acres. All three tracts are zoned CS. The basin boundary for Black Forest Drainage Basin and Smith Creek Drainage Basin runs though Tracts D and E. 4.13 acres of the site is in the Black Forest Drainage Basin and 5.92 acres of the site is in the Smith Creek Drainage Basin.

2025 Black Forest Drainage Basin drainage fees due prior to final plat recordation are as follows:

FEE TYPE	% IMP.	PARCEL AREA	MOD.	FEE PER IMP. AC.	SUBTOTAL
DRAINAGE FEES:	70% x	4.13 acres x	100% x	$26,695 =	$77,175
BRIDGE FEES:	70% x	4.13 acres x	100% x	$ 727 =	$ 2,102
				TOTAL	**$79,277**

2025 Smith Creek Drainage Basin drainage fees due prior to final plat recordation are as follows:

FEE TYPE	% IMP.	PARCEL AREA	MOD.	FEE PER IMP. AC.	SUBTOTAL
DRAINAGE FEES:	75% x	5.92 acres x	100% x	$10,883 =	$48,321
BRIDGE FEES:	75% x	5.92 acres x	100% x	$ 1,460 =	$ 6,482
				TOTAL	**$54,803**

MAINTENANCE

The proposed storm sewers are private and will be maintained by the property owner.

SUMMARY

Development of this site will not adversely affect the surrounding development. Site runoff and storm drain appurtenances from the development will not adversely affect the downstream and surrounding developments and will be safely routed to the existing extended detention basin to the allowable pre-developed rates while slowly treating the water quality capture volume.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Dane Frank, P.E.
Project Engineer

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BIBLIOGRAPHY

El Paso County Drainage Criteria Manual-Volumes 1 & 2, latest edition

El Paso County Board Resolution No 15-042 (Adoption of Chapter 6 and Section 3.2.1 Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014, Hydrology and Full Spectrum Detention)

Smith Creek Drainage Basin Planning Study, City of Colorado Springs, County of El Paso, State of Colorado, Prepared By J R Engineering, Dated August 2002

Black Forest Drainage Basin Planning Study, Prepared By Wilson & Company, Dated May 1989

Preliminary/Final Drainage Report For Academy Gateway Subdivision Filing No. 1, Prepared By Classic Consulting Engineers & Surveyors, Dated March 2017

Drainage Letter Addendum For Academy Gateway Subdivision No. 1, Prepared By Classic Consulting Engineers & Surveyors, Dated August 11, 2017

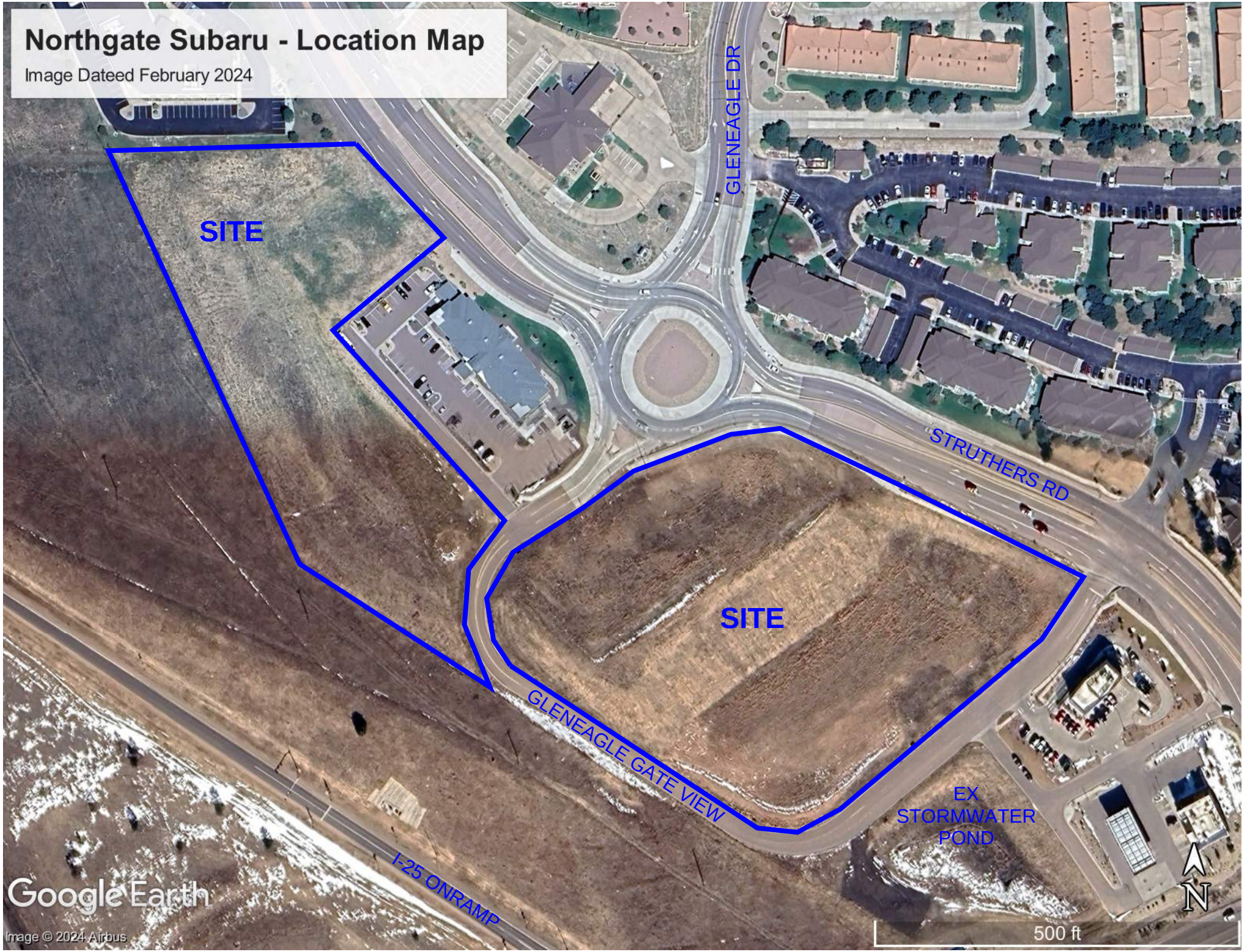
Construction Plans, Academy Gateway Subdivision Filing No. 1, Prepared By Classic Consulting, Dated 10/17/16

VICINITY MAP

2326.00 Northgate Subaru
Vicinity Map

El Paso County - Community: Area Overview

North is up ^^^


Northgate Subaru - Location Map
Image Dateed February 2024
SITE
GLENEAGLE DR
STRUTHERS RD
SITE
GLENEAGLE GATE VIEW
EX
STORMWATER
POND
I-25 ONRAMP
Google Earth
Image © 2024 Airbus
N
500 ft

NRCS SOILS MAP

Soil Map—El Paso County Area, Colorado
(Northgate Subaru)

Map Scale: 1:2,630 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 35 70 140 210

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 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 21, Aug 24, 2023

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
42	Kettle-Rock outcrop complex	3.2	27.3%
71	Pring coarse sandy loam, 3 to 8 percent slopes	8.5	72.7%
Totals for Area of Interest		**11.7**	**100.0%**

El Paso County Area, Colorado

42—Kettle-Rock outcrop complex

Map Unit Setting

National map unit symbol: 368j
Elevation: 6,800 to 7,700 feet
Frost-free period: 110 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 60 percent
Rock outcrop: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kettle

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

E - 0 to 16 inches: gravelly loamy sand
Bt - 16 to 40 inches: gravelly sandy loam
C - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 8 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 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: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

R - 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 60 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 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: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Minor Components

Pleasant

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

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

FEMA FIRM MAP

HYDROLOGIC CALCULATIONS

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

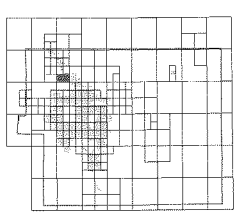
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 66 WEST, AND TOWNSHIP 12 SOUTH, RANGE 67 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A — Cross section line
23 — 23 — Transect line
97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4752000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 0290G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 290 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0290	G
EL PASO COUNTY	080059	0290	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 08041C0290G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

NORTHGATE SUBARU
AREA RUNOFF COEFFICIENT (C) SUMMARY

EXISTING

		DEVELOPED / IMPERVIOUS			*UNDEVELOPED / NON-IMPERVIOUS*			*WEIGHTED*		*WEIGHTED CA*	
BASIN	**TOTAL AREA**	**AREA**	**C5**	**C100**	**AREA**	**C5**	**C100**	**C5**	**C100**	**CA5**	**CA100**
	(Acres)	***(Acres)***			***(Acres)***						
OS-Z	1.53	1.38	0.90	0.96	0.15	0.08	0.35	0.82	0.90	1.25	1.38
OS-Y	1.17	0.99	0.90	0.96	0.18	0.08	0.35	0.77	0.87	0.91	1.01
OS-X	0.60	0.51	0.90	0.96	0.09	0.08	0.35	0.78	0.87	0.47	0.52
EX-A	4.12	0.08	0.90	0.96	4.04	0.08	0.35	0.10	0.36	0.40	1.49
EX-B	6.86	0.75	0.90	0.96	6.11	0.08	0.35	0.17	0.42	1.16	2.86

NORTHGATE SUBARU
AREA RUNOFF COEFFICIENT (C) SUMMARY

DEVELOPED

		DEVELOPED / IMPERVIOUS			*UNDEVELOPED / NON-IMPERVIOUS*			*WEIGHTED*		*WEIGHTED CA*	
BASIN	**TOTAL AREA**	**AREA**	**C5**	**C100**	**AREA**	**C5**	**C100**	**C5**	**C100**	**CA5**	**CA100**
	(Acres)	*(Acres)*			*(Acres)*						
OS-Z	1.53	1.38	0.90	0.96	0.15	0.08	0.35	0.82	0.90	1.25	1.38
OS-Y	1.17	0.99	0.90	0.96	0.18	0.08	0.35	0.77	0.87	0.91	1.01
OS-X	0.60	0.51	0.90	0.96	0.09	0.08	0.35	0.78	0.87	0.47	0.52
PR-1	1.59	1.43	0.90	0.96	0.16	0.08	0.35	0.82	0.90	1.30	1.43
PR-2	0.12	0.12	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.11	0.12
PR-3	1.24	1.12	0.90	0.96	0.12	0.08	0.35	0.82	0.90	1.02	1.12
PR-4	0.10	0.03	0.90	0.96	0.07	0.08	0.35	0.33	0.53	0.03	0.05
PR-5	0.10	0.10	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.09	0.10
PR-6	1.02	0.02	0.90	0.96	1.00	0.08	0.35	0.10	0.36	0.10	0.37
PR-7	1.88	0.38	0.90	0.96	1.50	0.08	0.35	0.25	0.47	0.46	0.89
PR-8	0.45	0.05	0.90	0.96	0.40	0.08	0.35	0.17	0.42	0.08	0.19
PR-9	0.58	0.46	0.90	0.96	0.12	0.08	0.35	0.73	0.83	0.42	0.48
PR-10	0.20	0.20	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.18	0.19
PR-11	0.14	0.14	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.13	0.13
PR-12	0.71	0.71	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.64	0.68
PR-13	0.52	0.52	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.47	0.50
PR-14	0.16	0.15	0.90	0.96	0.01	0.08	0.35	0.85	0.92	0.14	0.15
PR-15	0.19	0.18	0.90	0.96	0.01	0.08	0.35	0.86	0.93	0.16	0.18
PR-16	1.18	1.00	0.90	0.96	0.18	0.08	0.35	0.77	0.87	0.91	1.02
PR-17	0.63	0.57	0.90	0.96	0.06	0.08	0.35	0.82	0.90	0.52	0.57
PR-18	0.27	0.23	0.90	0.96	0.04	0.08	0.35	0.78	0.87	0.21	0.23
PR-19	0.28	0.20	0.90	0.96	0.08	0.08	0.35	0.67	0.79	0.19	0.22

Calculated by: DLF

Date: 1/22/2025

Checked by:

NORTHGATE SUBARU
RUNOFF SUMMARY

EXISTING

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_C	*INTENSITY*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Slope** *(ft/ft)*	T_t *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		** For Calcs See Runoff Summary*														
OS-Z	1.53	0.82	0.90	0.82	200	0.02	5.7	0	2%	2.8	0.0	5.7	5.0	8.4	6.2	11.5
OS-Y	1.17	0.77	0.87	0.77	20	0.04	1.7	1300	4%	5.3	4.1	5.8	5.0	8.3	4.5	8.4
OS-X	0.60	0.78	0.87	0.78	20	0.04	1.7	200	50%	1.4	2.4	5.0	5.2	8.7	2.4	4.5
EX-A	4.12	0.10	0.36	0.10	250	0.05	16.9	0	5%	1.1	0.0	16.9	3.3	5.6	1.3	8.4
EX-B	6.86	0.17	0.42	0.17	300	0.08	14.6	250	8%	1.4	2.9	17.6	3.3	5.5	3.8	15.7

NORTHGATE SUBARU
RUNOFF SUMMARY

DEVELOPED

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_C	*INTENSITY*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Slope** *(ft/ft)*	T_t *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		** For Calcs See Runoff Summary*														
OS-Z	1.53	0.82	0.90	0.82	200	0.02	5.7	0	2%	2.8	0.0	5.7	5.0	8.4	6.2	11.5
OS-Y	1.17	0.77	0.87	0.77	20	0.04	1.7	1300	4%	5.3	4.1	5.8	5.0	8.3	4.5	8.4
OS-X	0.60	0.78	0.87	0.78	20	0.04	1.7	200	50%	1.4	2.4	5.0	5.2	8.7	2.4	4.5
PR-1	1.59	0.82	0.90	0.82	100	0.05	3.0	200	5%	4.5	0.7	5.0	5.2	8.7	6.7	12.4
PR-2	0.12	0.90	0.96	0.90	12	0.04	0.8	325	2%	2.8	1.9	5.0	5.2	8.7	0.6	1.0
PR-3	1.24	0.82	0.90	0.82	100	0.04	3.2	95	4%	4.0	0.4	5.0	5.2	8.7	5.3	9.7
PR-4	0.10	0.33	0.53	0.33	25	0.02	5.6	0	2%	1.0	0.0	5.6	5.0	8.4	0.2	0.4
PR-5	0.10	0.90	0.96	0.90	90	0.03	2.4	0	3%	3.5	0.0	5.0	5.2	8.7	0.5	0.8
PR-6	1.02	0.10	0.36	0.10	40	0.10	5.4	0	10%	1.4	0.0	5.4	5.1	8.5	0.5	3.1
PR-7	1.88	0.25	0.47	0.25	25	0.04	4.9	700	4%	4.0	2.9	7.8	4.5	7.6	2.1	6.7
PR-8	0.45	0.17	0.42	0.17	100	0.06	9.3	400	6%	1.7	3.9	13.2	3.7	6.2	0.3	1.2
PR-9	0.58	0.73	0.83	0.73	80	0.02	4.7	300	1.5%	2.4	2.0	6.8	4.7	7.9	2.0	3.8
PR-10	0.20	0.90	0.96	0.90	50	0.02	2.0	80	1.5%	2.4	0.5	5.0	5.2	8.7	0.9	1.7
PR-11	0.14	0.90	0.96	0.90	50	0.02	2.0	110	3%	3.5	0.5	5.0	5.2	8.7	0.7	1.2
PR-12	0.71	0.90	0.96	0.90	75	0.01	3.1	200	1%	2.0	1.7	5.0	5.2	8.7	3.3	5.9
PR-13	0.52	0.90	0.96	0.90	60	0.01	2.8	180	1%	2.0	1.5	5.0	5.2	8.7	2.4	4.3
PR-14	0.16	0.85	0.92	0.85	90	0.04	2.7	0	4%	4.0	0.0	5.0	5.2	8.7	0.7	1.3
PR-15	0.19	0.86	0.93	0.86	90	0.04	2.6	0	4%	4.0	0.0	5.0	5.2	8.7	0.8	1.5
PR-16	1.18	0.77	0.87	0.77	100	0.04	3.7	110	4%	4.0	0.5	5.0	5.2	8.7	4.7	8.9
PR-17	0.63	0.82	0.90	0.82	100	0.04	3.2	150	4%	4.0	0.6	5.0	5.2	8.7	2.7	4.9
PR-18	0.27	0.78	0.87	0.78	100	0.04	3.7	50	4%	4.0	0.2	5.0	5.2	8.7	1.1	2.0

Calculated by: DLF

Date: 1/22/2025

Checked by:

NORTHGATE SUBARU
SURFACE ROUTING SUMMARY

Design Point(s)	*Contributing Basins*	*Area (acres)*	*Flow*	
			Q_5	Q_{100}
Z	OS-Z	1.53	6.2	11.5
Y - existing	OS-Z,OS-Y	2.70	10.7	19.9
Y - proposed	OS-Z,OS-Y,PR-2,PR-4,	2.92	11.4	21.4
X	OS-X	0.60	2.4	4.5
A	EX-A,OS-X	4.72	3.7	12.9
B	EX-B	6.86	3.8	15.7
1	OS-X,PR-1	2.19	9.1	16.9
2	PR-2	0.12	0.6	1.0
3	PR-3	1.24	5.3	9.7
4	PR-4	0.10	0.2	0.4
5	PR-5	0.10	0.5	0.8
6	PR-6	1.02	0.5	3.1
7	PR-7	1.88	2.1	6.7
8	PR-8	0.45	0.3	1.2
9	PR-9	0.58	2.0	3.8
10	PR-10	0.20	0.9	1.7
11	PR-11	0.14	0.7	1.2
12	PR-12	0.71	3.3	5.9
13	PR-13	0.52	2.4	4.3
14	PR-14	0.16	0.7	1.3
15	PR-15	0.19	0.8	1.5
16	PR-16	1.18	4.7	8.9
17	PR-17	0.63	2.7	4.9
18	PR-18	0.27	1.1	2.0
Ω - Existing	OS-Z,OS-Y,EX-B	9.56	12.0	28.3
Ω - Proposed	OS-Z,OS-Y,OS-X,PR-1-5,PR-7, PR-9-18	12.91	47.7	91.1
Ω - Design	Original March 2017 FDR Values (sum of basins A,B,C,OS-1 in ultimate condition)	14.41	54	93

Note: Design Point Ω flows are calculated flows in the existing 36" RCP pipe that discharges into the stormwater pond.

Calculated by: DLF

Date: 1/22/2025

Checked by:

NORTHGATE SUBARU
PIPE ROUTING SUMMARY

Pipe Run #	*Inlet #*	*Contributing Flow Sources*	*5 Year Flow (cfs)*	*100 Year Flow (cfs)*	*Slope*	*Pipe Size & Type*	*Owner*
W1	***-***	OS-X,PR-1,PR-3,PR-5	14.9	27.5	1.0%	30" RCP	Private
W2	***W1***	OS-X,PR-1,PR-3,PR-5	14.9	27.5	1.0%	30" RCP	Private
W3	***W2***	OS-X,PR-1,PR-3	14.4	26.6	1.0%	30" RCP	Private
W4	***W3***	OS-X,PR-1	9.1	16.9	1.0%	24" HDPE	Private
E1	***E1***	PR-9 - PR-18	19.3	35.6	5.0%	24" RCP	Private
E2	***-***	PR-9,PR-13,PR-14,PR-15	6.0	11.0	1.0%	18" HDPE	Private
E3	***E2***	PR-9,PR-14,PR-15	3.5	6.6	1.0%	15" HDPE	Private
E4	***E3***	PR-9,PR-14	2.7	5.1	1.0%	15" HDPE	Private
E5	***E4***	PR-9	2.0	3.8	1.0%	15" HDPE	Private
E6	***-***	PR-13	2.4	4.3	3.5%	15" HDPE	Private
E7	***-***	PR-13	2.4	4.3	3.2%	15" HDPE	Private
E10	***E10***	PR-10,PR-11,PR-12,PR-16,PR-17	12.3	22.6	1.0%	24" HDPE	Private
E11	***E11***	PR-10,PR-11,PR-12,PR-16	9.6	17.6	1.0%	24" HDPE	Private
E12	***-***	PR-10,PR-11,PR-12	4.9	8.7	1.8%	18" HDPE	Private
E13	***E12***	PR-10,PR-11	1.6	2.8	1.0%	12" HDPE	Private
E14	***E13***	PR-10,PR-11	1.6	2.8	1.1%	12" HDPE	Private
E15	***E14***	PR-10	0.9	1.7	1.1%	12" HDPE	Private
E16	***-***	PR-12	3.3	5.9	5.0%	15" HDPE	Private

Note: There is no pipe run E8 or E9. There is no inlet E5-E9.

Calculated by: DLF
Date: 1/22/2025
Checked by:

NORTHGATE SUBARU
WATER QUALITY TREATMENT SUMMARY TABLE

Basin ID	*Total Area*	*Total Proposed Disturbed Area*	*Area Trib to Pond 1*	*Disturbed Area Treated via Runoff Reduction*	*Disturbed Area Excluded from WQ per ECM App I.7.1.C.1*	*Disturbed Area Excluded from WQ per ECM App I.7.1.B.#*	*Applicable WQ Exclusions (App I.7.1.B.#)*
	(ac)	*(ac)*	*(ac)*	*(ac)*	*(ac)*	*(ac)*	
OS-Z	1.53	0.00	1.53	-	-	-	-
OS-Y	1.17	0.00	1.17	-	-	-	-
OS-X	0.60	0.00	0.60	-	-	-	-
PR-1	1.59	1.59	1.59	-	-	-	-
PR-2	0.12	0.12	0.12	-	-	-	-
PR-3	1.24	1.24	1.24	-	-	-	-
PR-4	0.10	0.10	0.10	-	-	-	-
PR-5	0.10	0.10	0.10	-	-	-	-
PR-6	1.02	1.02	-	-	-	1.0	I.7.1.B.7
PR-7	1.88	1.88	1.88	-	-	-	-
PR-8	0.45	0.45	-	-	-	0.45	I.7.1.B.7
PR-9	0.58	0.58	0.58	-	-	-	-
PR-10	0.20	0.20	0.20	-	-	-	-
PR-11	0.14	0.14	0.14	-	-	-	-
PR-12	0.71	0.71	0.71	-	-	-	-
PR-13	0.52	0.52	0.52	-	-	-	-
PR-14	0.16	0.16	0.16	-	-	-	-
PR-15	0.19	0.19	0.19	-	-	-	-
PR-16	1.18	1.18	1.18	-	-	-	-
PR-17	0.63	0.63	0.63	-	-	-	-
PR-18	0.27	0.27	0.27	-	-	-	-
PR-19	0.28	0.28	0.28	-	-	-	-
		TOTALS:	13.19	0.00	0.00	1.47	-

Calculated by: DLF
Date: 1/22/2025
Checked by:

HYDRAULIC CALCULATIONS

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project: **2326.00 Northgate Subaru** Location: West Lot - Carry Curb Capacity (need Q=17 cfs)

By: Dane Frank Date: 1/16/2025

Chk By: Date: version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

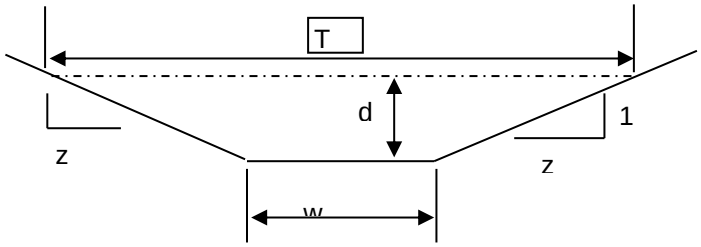
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	0
z (sideslope)=	50
b (btm width, ft)=	0
d (depth, ft)=	0.5
S (slope, ft/ft)	0.01
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.5	6.25	25.50	0.25	4.47601532	27.9751	4.476015	27.9751	T =	25
								Dm =	0.250
				Sc low =	0.0040	Sc high =	0.0040		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0028	0.0052	0.0028	0.0052		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project: **2326.00 Northgate Subaru** Location: East Lot - Carry Curb Capacity (need Q=9 cfs)

By: Dane Frank Date: 1/16/2025

Chk By: Date: version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

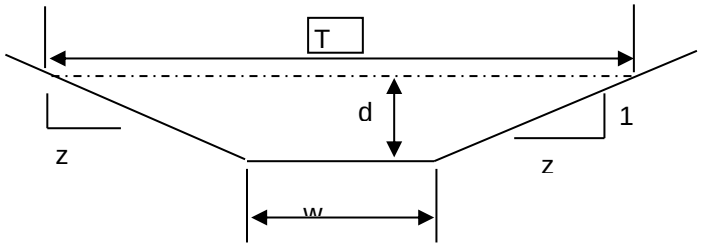
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	0
z (sideslope)=	25
b (btm width, ft)=	0
d (depth, ft)=	0.5
S (slope, ft/ft)	0.014
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.5	3.13	13.01	0.24	5.22597587	16.3312	5.225976	16.3312	T =	12.5
								Dm =	0.250
				Sc low =	0.0041	Sc high =	0.0041		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0029	0.0054	0.0029	0.0054		

s_c = critical slope ft / ft

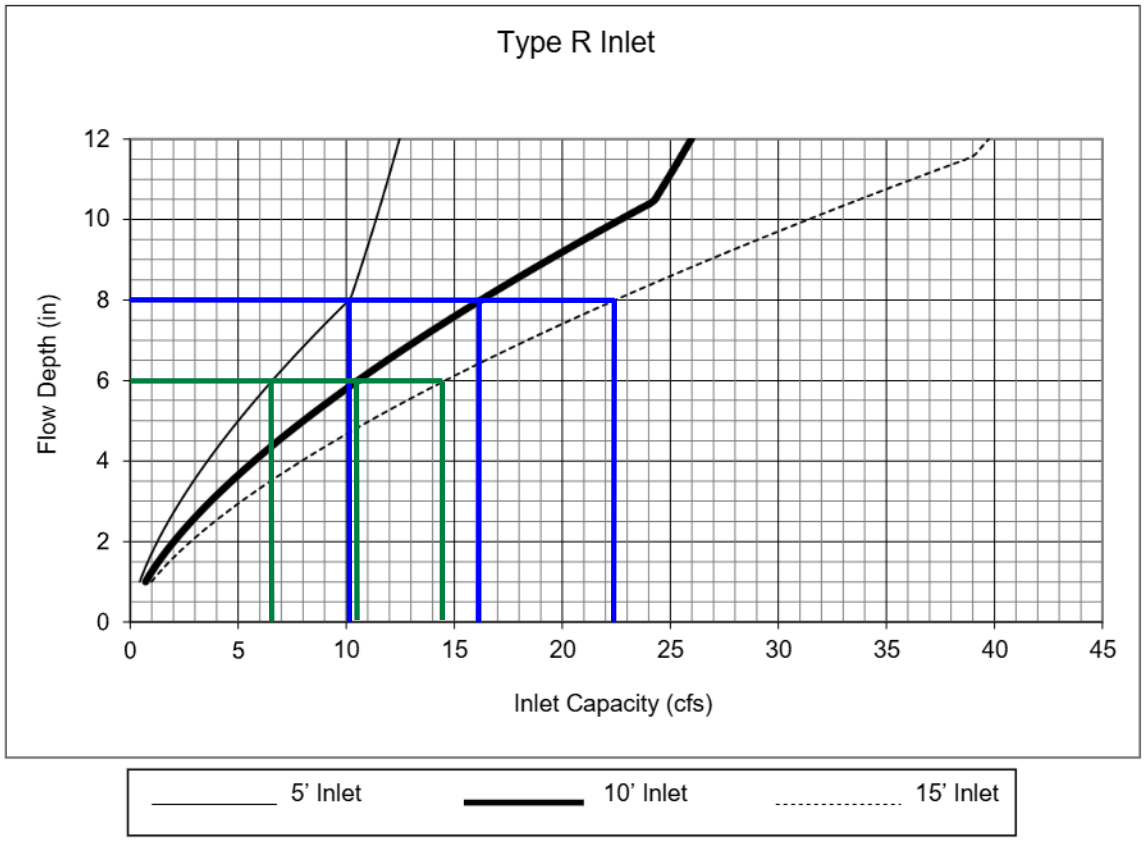
T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

2326.00 Northgate Subaru

Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



West Lot (8" curb)
Inlet #W1 needs Q=0.8 cfs, need 5' inlet
Inlet #W2 needs Q=9.7 cfs, need 5' inlet
Inlet #W3 needs Q=16.9 cfs, need 15' inlet

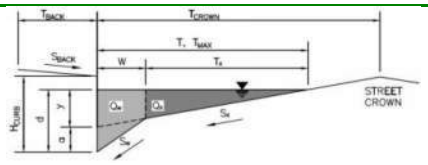
East Lot (6" curb)
Inlet #E1 needs Q=2.0cfs, need 5' inlet
Inlet #E3 needs Q=1.5cfs, need 5' inlet
Inlet #E4 needs Q=3.8cfs, need 5' inlet
Inlet #E10 needs Q=4.9cfs, need 5' inlet
Inlet #E11 needs Q=8.9cfs, need 10' inlet

Notes:
1. The standard inlet parameters must apply to use this chart.

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project:
Inlet ID: **Inlet 1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.001	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	8.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.030	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

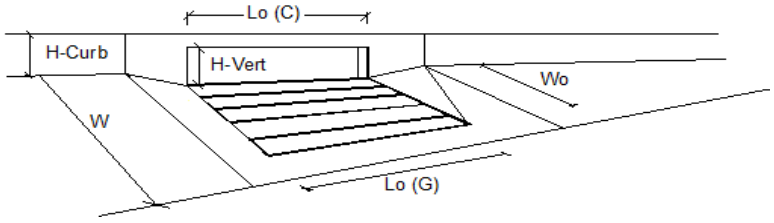
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.0	8.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**32.1**	**32.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 14.90 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 27.40 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



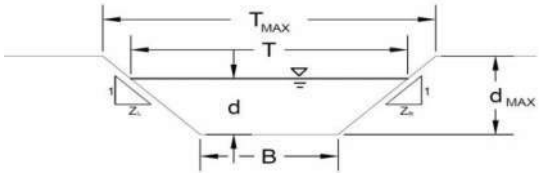
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	7	7	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**14.9**	**27.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

AREA INLET IN A SWALE

Northgate Subaru

INLET #E2



This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0140	ft/ft
Bottom Width	B =	0.00	ft
Warning 01 Left Side Slope	Z1 =	0.00	ft/ft
Right Side Sloe	Z2 =	25.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**30.00**	**30.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.50**	**0.50**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**16.4**	**16.4**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.50**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.8**	**1.5**	**cfs**
Water Depth	d =	**0.16**	**0.20**	**ft**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

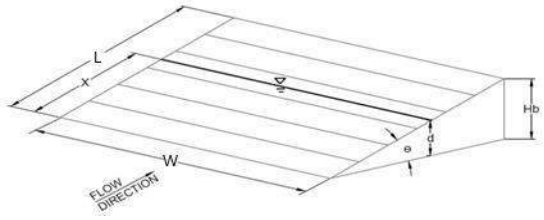
AREA INLET IN A SWALE

Northgate Subaru

INLET #E2

Inlet Design Information (Input)

Type of Inlet: User-Defined — Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.33	ft
Length of Grate	L =	4.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

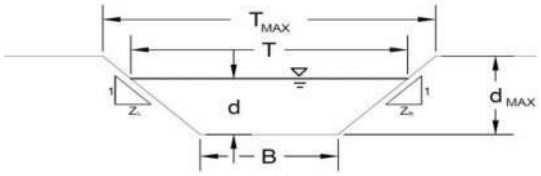
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.16	0.20	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.5**	**2.1**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Warning 01: Sideslope steepness exceeds USDCM Volume I recommendation.

AREA INLET IN A SWALE

Northgate Subaru

INLET #E12



This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0140	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	20.00	ft/ft
Right Side Sloe	Z2 =	14.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**12.00**	**12.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.50**	**0.50**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**9.0**	**9.0**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.35**	**0.35**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.7**	**1.2**	**cfs**
Water Depth	d =	**0.14**	**0.17**	**ft**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

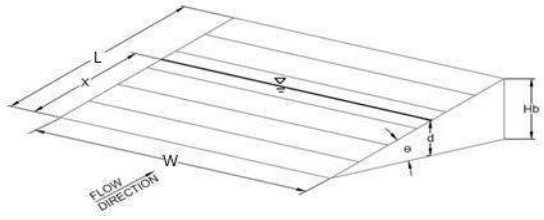
AREA INLET IN A SWALE

Northgate Subaru

INLET #E12

Inlet Design Information (Input)

Type of Inlet: User-Defined — Inlet Type = User-Defined



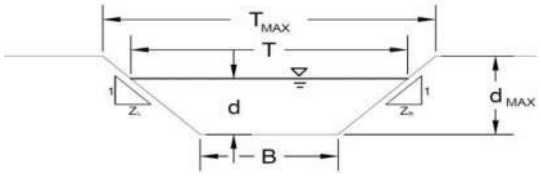
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.33	ft
Length of Grate	L =	4.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.14	0.17	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.1**	**1.5**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

AREA INLET IN A SWALE

Northgate Subaru

INLET #E13



This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0140	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	20.00	ft/ft
Right Side Sloe	Z2 =	14.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**12.00**	**12.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.50**	**0.50**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**9.0**	**9.0**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.35**	**0.35**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.7**	**1.2**	**cfs**
Water Depth	d =	**0.14**	**0.17**	**ft**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

AREA INLET IN A SWALE

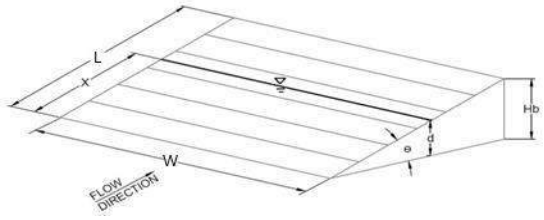
Northgate Subaru

INLET #E13

Inlet Design Information (Input)

Type of Inlet: User-Defined

Inlet Type = User-Defined



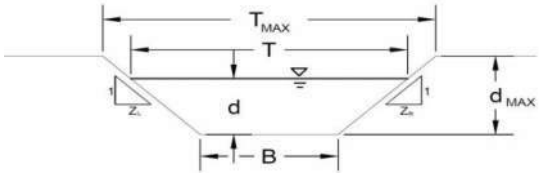
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.33	ft
Length of Grate	L =	4.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.14	0.17	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.1**	**1.5**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

AREA INLET IN A SWALE

Northgate Subaru

INLET #E14



This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0140	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	20.00	ft/ft
Warning 01 Right Side Sloe	Z2 =	0.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ◉ **Paved**

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**40.00**	**40.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.00**	**1.00**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**82.6**	**82.6**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**1.00**	**1.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.9**	**1.7**	**cfs**
Water Depth	d =	**0.18**	**0.23**	**ft**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

AREA INLET IN A SWALE

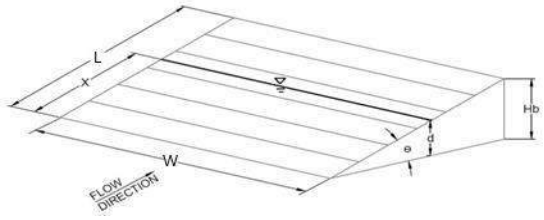
Northgate Subaru

INLET #E14

Inlet Design Information (Input)

Type of Inlet: User-Defined

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.33	ft
Length of Grate	L =	4.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.18	0.23	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.8**	**2.6**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Warning 01: Sideslope steepness exceeds USDCM Volume I recommendation.

PREVIOUS REPORT PAGES

NEW DOC

PRELIMINARY/FINAL DRAINAGE REPORT
FOR
ACADEMY GATEWAY SUBDIVISION FILING NO. 1

March 2017

Prepared for:
Academy Gateway II, LLC.
403 South Tejon Street
Colorado Springs, CO 80903
(719 338-3639

Prepared by:
Classic Consulting Engineers & Surveyors, LLC
619 N. Cascade Avenue, Suite 200
Colorado Springs, CO 80903
(719) 785-0790

CCES Job no. 2507.00

EL Paso County Job No. SF-16-018

CLASSIC CONSULTING ENGINEERS & SURVEYORS

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APPENDICES

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

Basin EX-2 (Q_5 = 2 cfs, Q_{100}= 7 cfs) outfalls as sheet flow into the existing roadside swale on the north side of Northgate Blvd. where Basin EX-3 (Q_5 = 11 cfs, Q_{100}= 20 cfs) street flows outfall to DP EX-2 (Q_5 = 8 cfs, Q_{100}= 21 cfs). This is the existing release at the far southeast corner of the site.

Based upon conversations and meetings with El Paso County, a regional stormwater management design effort is underway to alleviate the flooding at the intersection of Gleneagle and North Gate. Classic Consulting has been provided schematic design for this effort which predominantly is focused on existing developed flows from north and east of the Academy Gateway development. A storm sewer system is proposed from the intersection of Gleneagle and Struthers to a proposed facility location in the Interstate 25 easement on USAFA property. As the preliminary design involves public storm pipe being installed under this development's Phase 1 Struthers Road street improvements, it is proposed that this development install said storm facilities (design by El Paso County) at the time of Phase 1 development in order to eliminate the reconstruction of the street improvements. The Developer will provide funds for the participation in the remaining Struthers Road improvements to be agreed to in a separate Development Agreement.

Currently minimal flows from adjacent Struthers Road enter the site (minor direct sheet flow along the north area and an existing roadside ditch minimize any street drainage entering the site). Once development takes place, these existing street flows will remain in Struthers Road. Struthers Road roadway improvements were proposed to be built in their entirety along the frontage at one time in conjunction with the first lot development but with the impending round-a-bout construction, the northerly half of the street will remain in its existing condition to minimize round-a-bout cost without demolishing improvements.

PROPOSED DRAINAGE CONDITIONS

An On-site Basin Map is included in the appendix of this report. Design Points 1-8 describe on-site basin runoff and proposed facilities to intercept those flows. As no specific site development layouts are finalized at this time, a conservative approach to land use and flow generation was taken to ensure adequate facility sizing.

Design Point 1 (Q_5 = 6 cfs, Q_{100}= 19 cfs - proposed) and (Q_5 = 26 cfs, Q_{100}= 47 cfs - ultimate) is the runoff from the far northerly basin that includes proposed Lot 3 (Preliminary Plan Lots 9-11) and the

westerly area not to be developed at this time. These flows are directed in a southwesterly direction to Design Point 1 where a private 24" storm pipe will intercept all of the ultimate developed flows. Dependent upon site design (and subsequent detailed drainage reports with site development), can be used to intercept these flows. This system will likely consist of several on-site inlets to be sized with future reports. Once site drainage patterns are understood, an equivalent 14' sump inlet could intercept the flows but realistically it will be a series of smaller inlets. The upstream storm drain will be designed to also accommodate the fully developed condition of Basin A and will be detailed in future reports once land uses are known and grading and collection points are identified on Lot 3. A private easement has been provided on the Plat. The collected flow from Design Point 1 will be routed south within Academy Gate View.

Design Point 2 (Q_5 = 5 cfs, Q_{100}= 8 cfs) is the proposed developed flow from Basin B which is predominately the paved surface of Academy Gate View. A proposed private 5' Type R sump inlet will intercept these flows in their entirety.

Design Point 3 (Q_5 = 2 cfs, Q_{100}= 15 cfs - proposed) and (Q_5 = 32 cfs, Q_{100}= 57 cfs - ultimate) consists of runoff from Basin C, 6.89 acres of future commercial development to be left undeveloped at this time. This un-detained and un-treated "historic" runoff will be collected by a proposed private 5' Type R sump inlet and conveyed downstream to Detention Facility A. It is assumed future developed flows will be routed into the private street and then collected by the proposed inlet or routed into the back of the inlet. The ultimate development of Basin C has estimated very conservatively (assuming 100% imperviousness). As proposed site development takes place, reanalysis of the storm systems and pond will be required to confirm flow generation and system capacity.

Design Point 4 (Q_5 = 10 cfs, Q_{100}= 18 cfs) consists of runoff from Basin D, 2.16 acres of proposed commercial development at the intersection of Gleneagle and Struthers. Dependent upon site design, an equivalent 5' Type R inlet (or other collection facility) can be used to intercept these flows and convey them to Detention Facility A

Design Point 5 (Q_5 = 3 cfs, Q_{100}= 6 cfs) consists of runoff from Basin OS-1, 0.84 acres of existing Struthers Road along the west curbline along with the added right turn lane. A 15' Type R inlet at grade inlet will be used to intercept these flows and convey them to Detention Facility A. This inlet will intercept (Q_5 = 3 cfs, Q_{100}= 5 cfs) with a flow-by of (Q_5 = 0 cfs, Q_{100}= 1 cfs). These previously untreated flows will be

routed to the proposed Facility A which results in a significant enhancement of the overall drainage situation.

Design Point 6 (Q_5 = 22 cfs, Q_{100}= 67 cfs) consists of the combined runoff from all of the upstream basins based upon the current proposed development of 3 commercial lots and the construction of the private road, Academy Gate View. These cumulative flows are routed to the proposed Detention facility A which is described below.

Detention Facility A is a proposed EURV Extended Detention/Water Quality Facility per the Urban Drainage and Flood Control District (UDFCD). This facility is to be owned and maintained by the developer until such time that the proposed El Paso County Regional Facility located southwest of this site is built. At that time this facility may be removed assuming the interior lots needing "specialized" water quality have provided such. The facility sizing spreadsheet is located in the Appendix of this report, along with pond volume calculations, and pond modeling results via Urban Drainage spreadsheets.

A tributary area of 17.39 acres onsite and 0.84 acres offsite (OS-1) at a composite 33.7% imperviousness was used in determining the Excess Urban Runoff Volume (EURV) of 0.63 acre-feet. This volume is established in the proposed pond under the top of the outlet box opening (within the orifice plate of the outlet box). The proposed tributary runoff is from the proposed 3 commercial lots as well as the remaining undeveloped parcels and the proposed private roadway which in the interim results in a lower imperviousness due to the undeveloped area reaching the pond. Treatment of existing Struthers Road intercepted flows is proposed which enhances stormwater quality treatment for the exisiting roadway and offsets any nominal increase in imperviousness as a result of the added public street improvements.

The bottom of the detention basin is at an elevation of 6718.00 with a 2.5' deep micro-pool bottom elevation of 6715, and initial surcharge of 6". EURV provided at elevation 6721.31. A 4'x4' wide outlet box is proposed with at top of box elevation at 6721.50. For a EURV Facility, the outlet box orifice holes within the front plate is to drain the EURV in 72 hours. The latest UDFCD sizing spreadsheets have been used and are included in the Appendix of this report. Three orifice holes with the following diameters are required: 13/16", 1-15/16" and 2". A 2.5' deep concrete micropool is to be installed within the wingwalls of the outlet box. A removable trash screen of 12" in width will be placed in front of the orifice plate to help prevent the orifice holes from clogging. The proposed 18" outfall from the outlet box with a restrictor

plate 11" from the invert of the pipe will convey Q5= 0.3 cfs and Q_{100}= 14 cfs) to the adjacent Air Force Academy property with at a peak time of 53 minutes. This is less than or equal to the historic EX-2 Basin of only (Q_5 = 2 cfs and Q_{100} = 17 cfs) even with the Basin A diversion. This facility adequately treats the entire tributary developed runoff and detains the release to below historic and allowable rates to the adjacent Air Force Academy property. There are no adverse impacts to the downstream channel or storm sewer facilities caused by the pond improvements and development described within this report. Due to the over-detaining of proposed flows, monitoring of this facility's release and functionality will be performed as future platting and site development takes place. Ultimately the fully developed discharge for this 11 lot development will be connected into the proposed El Paso County storm system that will run adjacent to North Gate Boulevard, eliminating the need for any on-site stormwater detention, while stormwater quality treatment will remain.

Design Point 7 (Q_5 = 0.3 cfs, Q_{100}= 14 cfs) consists of the release from Detention Facility A

Design Point 8 (Q_5 = 4 cfs, Q_{100}= 20 cfs) and **Design Point 8A** (Q_5 = 8 cfs, Q_{100}= 16 cfs) consists of the release from Detention Facility A, flows from Basin F and Basin OS-2. Basin F is 0.69 acres of landscape slope and the existing Donala pump station facility. Basin OS-2 is 2.28 acres of existing Struthers Road and North Gate Blvd that enters the existing ditch along the north portion of North Gate Blvd. **Design Point 8** represents the release into the ditch section at the peak 100 year time of the pond release at 53 minutes. Design Point 8 is the total release into the existing roadside ditch while the pond is releasing the maximum flow. **Design Point 8A** represents the release into the ditch section at the peak 100 year time of Basin OS-1 at 10.4 minutes. Design Point 8A is the total release into the existing roadside ditch while Basin OS-1 is contributing its maximum flow. At the time of 10.4 minutes the water surface elevation in the pond is only approximately 1.3 feet above its micro-pool elevation and release is controlled by the orifice plate holes. Release of flows from the pond is negligable. In both scenarios this is less than the historic EX-2 Basin of only (Q_5 = 8 cfs and Q_{100} = 21 cfs). A comparison of existing and proposed conditions is as follows:

Design Point	Q_5	Q_{100}
EX-2	8 cfs	21 cfs
DP 8	4 cfs	20 cfs
DP 8A	8 cfs	16 cfs

The released flows from the pond will discharge into a proposed concrete chase section that outfalls into the face of the proposed Northgate curb & gutter. These flows travel west (as current conditions reflect) and discharge into an existing rip rap pad area that appears to have been installed with the recnet CDOT improvements. As no visible issues are apparent directly downstream and flows are less than existing, no impacts downstream are anticipated.

Upon full buildout, the USAFA will also experience reduced directing tributary flows from Basins EX-1, EX-4, EX-5 and EX-6 as development will require flows to be routed south instead of west as it currently discharges.

EROSION CONTROL PLAN

Complete construction drawings along with estimates of guaranteed funds are being concurrently submitted with this Final Drainage Report for Academy Gateway Subdivision Filing No. 1. All grading and erosion control is per the current El Paso County Drainage Criteria Manual and regulations.

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994. Stormwater quality analysis and Extended Detention Basin (EDB) design are per the Urban Drainage and Flood Control District Manual and UD-BMP Version 3.01 and UD-Detention 3.07 spreadsheet. The Rational Method was used to estimate stormwater runoff to the proposed inlets and storm sewer pipes and for comparison purposes to the runoff rates found within the previous reports and existing conditions section of this report.

FLOODPLAIN STATEMENT

No portion of this site is located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C 0287F effective date, March 17, 1997 (See Appendix).

JOB NAME *Academy Gateway Subd. Fil. No. 1*
JOB NUMBER *2507.00*
DATE *10/02/16*
CALCULATED BY *KRC*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY - ULTIMATE

		IMPERVIOUS AREA / STREETS							LANDSCAPE/UNDEVELOPED AREAS							WEIGHTED						WEIGHTED CA					
BASIN	TOTAL AREA (AC)	AREA (AC)	C(2)	C(5)	C(10)	C(25)	C(50)	C(100)	AREA (AC)	C(2)	C(5)	C(10)	C(25)	C(50)	C(100)	C(2)	C(5)	C(10)	C(25)	C(50)	C(100)	CA(2)	CA(5)	CA(10)	CA(25)	CA(50)	CA(100)
A	5.68	5.69	0.89	0.90	0.92	0.94	0.95	0.96	0.00	0.02	0.08	0.15	0.25	0.30	0.35	0.89	0.90	0.92	0.94	0.95	0.96	5.06	5.12	5.24	5.35	5.41	5.46
B	0.95	0.99	0.89	0.90	0.92	0.94	0.95	0.96	0.00	0.02	0.08	0.15	0.25	0.30	0.35	0.89	0.90	0.92	0.94	0.95	0.96	0.88	0.89	0.91	0.93	0.94	0.95
C	6.89	6.89	0.89	0.90	0.92	0.94	0.95	0.96	0.00	0.02	0.08	0.15	0.25	0.30	0.35	0.89	0.90	0.92	0.94	0.95	0.96	6.13	6.20	6.34	6.48	6.55	6.61
D	2.16	2.16	0.89	0.90	0.92	0.94	0.95	0.96	0.00	0.02	0.08	0.15	0.25	0.30	0.35	0.89	0.90	0.92	0.94	0.95	0.96	1.92	1.94	1.99	2.03	2.05	2.07
E	1.66	1.66	0.89	0.90	0.92	0.94	0.95	0.96	0.00	0.02	0.08	0.15	0.25	0.30	0.35	0.89	0.90	0.92	0.94	0.95	0.96	1.48	1.49	1.53	1.56	1.58	1.59

JOB NAME: *Academy Gateway Subd. Fil. No. 1*
JOB NUMBER: *2507.00*
DATE: *11/11/06*
CALC'D BY: *KRC*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY - ULTIMATE

BASIN	WEIGHTED						OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY						TOTAL FLOWS					
	CA(2)	CA(5)	CA(10)	CA(25)	CA(50)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(2) (in/hr)	I(5) (in/hr)	I(10) (in/hr)	I(25) (in/hr)	I(50) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(5) (cfs)	Q(10) (cfs)	Q(25) (cfs)	Q(50) (cfs)	Q(100) (cfs)
A	5.06	5.12	5.24	5.35	5.41	5.46	0.08	150	15	10.5	0	0.0%	0.0	0.0	10.5	3.24	4.06	4.73	5.41	6.08	6.81	16	21	25	29	33	37
B	0.88	0.89	0.91	0.93	0.94	0.95	0.08	0	0	5.0	0	0.0%	0.0	0.0	5.0	4.12	5.17	6.03	6.89	7.75	8.68	4	5	6	6	7	8
C	6.13	6.20	6.34	6.48	6.55	6.61	0.08	150	8	13.0	0	0.0%	0.0	0.0	13.0	2.98	3.74	4.36	4.98	5.61	6.27	18	23	28	32	37	42
D	1.92	1.94	1.99	2.03	2.05	2.07	0.08	0	0	5.0	0	0.0%	0.0	0.0	5.0	4.12	5.17	6.03	6.89	7.75	8.68	8	10	12	14	16	18
E	1.48	1.49	1.53	1.56	1.58	1.59	0.08	0	0	5.0	0	0.0%	0.0	0.0	5.0	4.12	5.17	6.03	6.89	7.75	8.68	6	8	9	11	12	14

JOB NAME:	*Academy Gateway Subd. Fil. No. 1*
JOB NUMBER:	*2507.00*
DATE:	*10/02/16*
CALCULATED BY:	*KRC*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY - ULTIMATE

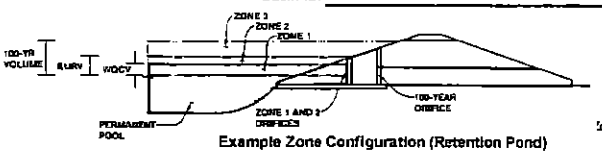
Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow	
					I(5)	I(100)	Q(5)	Q(100)
1	A	5.12	5.46	5.0	5.17	8.68	26	47
2	B	0.89	0.95	5.0	5.17	8.68	5	8
3	C	6.20	6.61	5.0	5.17	8.68	32	57
4	D	1.94	2.07	5.0	5.17	8.68	10	18
5	A, B, C, D AND E	15.64	16.68	5.0	5.17	8.68	81	145

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project:

Basin ID:



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.75	0.247	Orifice Plate
Zone 2 (EURV)	3.81	0.389	Orifice Plate
Zone 3 (100-year)	5.22	0.666	Weir&Pipe (Restrict)
		1.303	Total

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	4.00	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	16.00	inches
Orifice Plate: Orifice Area per Row =	N/A	inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.30	2.60	3.90				
Orifice Area (sq. inches)	0.52	2.95	3.14					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.00	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Slope =	4.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	5.00	N/A	feet
Over Flow Weir Slope Length =	4.12	N/A	feet
Grate Open Area / 100-yr Orifice Area =	11.45	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	11.54	N/A	ft^2
Overflow Grate Open Area w/ Debris =	5.77	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	10.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.01	N/A	ft^2
Outlet Orifice Centroid =	0.48	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.68	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.50	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	37.00	feet
Spillway End Slopes =	3.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

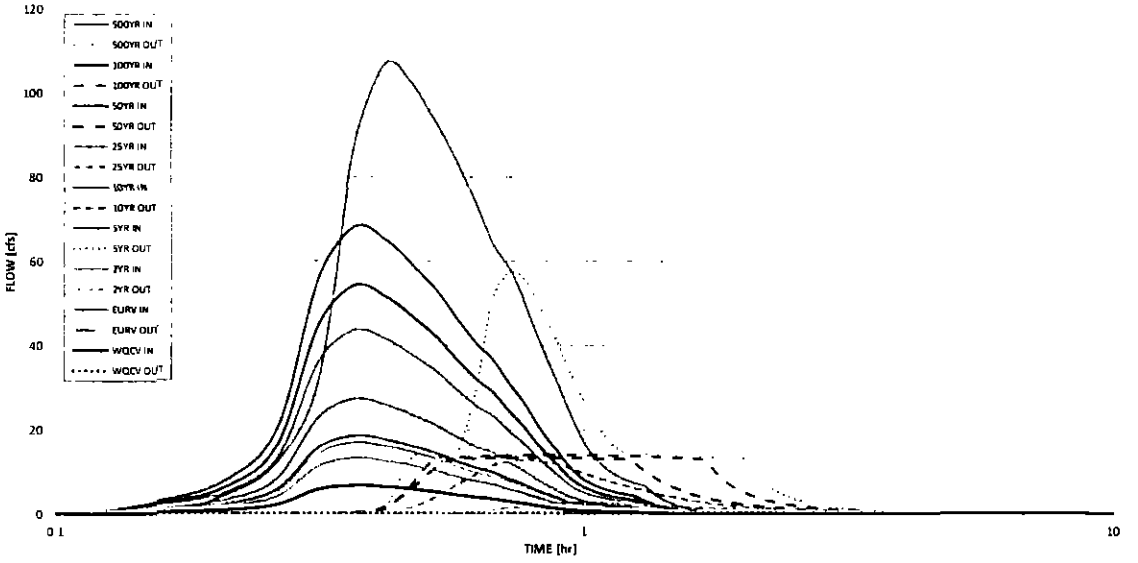
Spillway Design Flow Depth=	0.70	feet
Stage at Top of Freeboard =	8.20	feet
Basin Area at Top of Freeboard =	0.66	acres

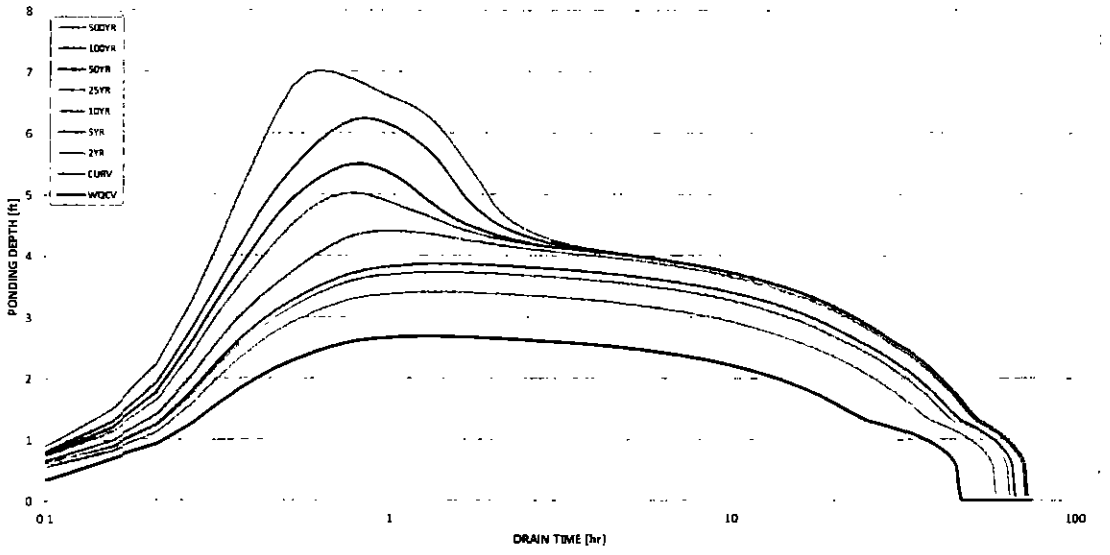
Routed Hydrograph Results

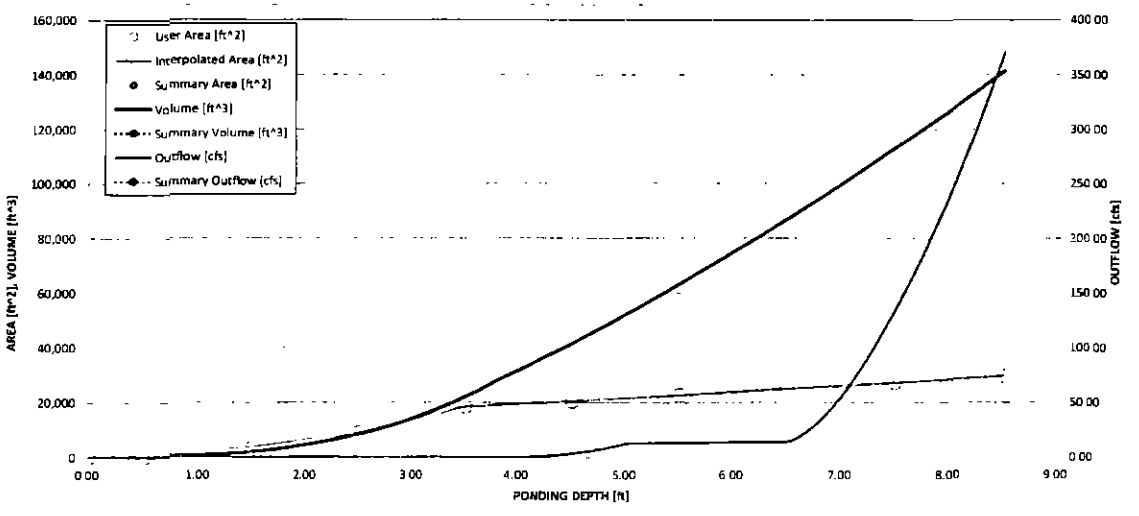
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.50
Calculated Runoff Volume (acre-ft) =	0.247	0.636	0.493	0.696	1.030	1.649	2.059	2.596	4.092
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.247	0.635	0.493	0.696	1.029	1.649	2.058	2.595	4.092
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.03	0.32	0.97	1.34	1.78	2.90
Predevelopment Peak Q (cfs) =	0.0	0.0	0.3	0.6	5.8	17.7	24.4	32.4	52.9
Peak Inflow Q (cfs) =	6.7	17.0	13.2	18.6	27.3	43.5	54.2	68.1	106.6
Peak Outflow Q (cfs) =	0.2	0.3	0.3	0.3	2.6	12.7	13.3	14.0	57.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.5	0.5	0.7	0.5	0.4	1.1
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.2	1.1	1.1	1.2	1.2
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	40	50	47	51	50	47	45	43	38
Time to Drain 99% of Inflow Volume (hours) =	44	59	54	61	63	59	57	54	49
Maximum Ponding Depth (ft) =	2.69	3.74	3.41	3.87	4.41	5.02	5.50	6.24	7.02
Area at Maximum Ponding Depth (acres) =	0.25	0.44	0.41	0.44	0.47	0.50	0.52	0.56	0.60
Maximum Volume Stored (acre-ft) =	0.230	0.604	0.468	0.666	0.906	1.205	1.444	1.843	2.294

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







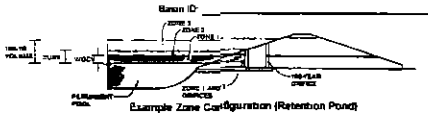
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: _____

Basin ID: _____



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB		
Watershed Area =	18.73	acres	Note: L / W Ratio < 1
Watershed Length =	825	ft	L / W Ratio = 0.9
Watershed Slope =	0.080	ft/ft	
Watershed Imperviousness =	30.70%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	100.0%	percent	
Percentage Hydrologic Soil Groups C/D =	0.0%	percent	
Desired WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths =	User Input		
Water Quality Capture Volume (WQCV) =	0.247	acre-feet	Optional User Override 1-hr Precipitation
Excess Urban Runoff Volume (EURV) =	0.636	acre-feet	
2-yr Runoff Volume (P1 = 1.19 in.) =	0.493	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.666	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.000	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	1.649	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.059	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.596	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.5 in.) =	4.092	acre-feet	3.50 inches
Approximate 2-yr Detention Volume =	0.481	acre-feet	
Approximate 5-yr Detention Volume =	0.653	acre-feet	
Approximate 10-yr Detention Volume =	0.829	acre-feet	
Approximate 25-yr Detention Volume =	1.080	acre-feet	
Approximate 50-yr Detention Volume =	1.116	acre-feet	
Approximate 100-yr Detention Volume =	1.303	acre-feet	

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.247	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.389	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.668	acre-feet
Total Detention Basin Volume =	1.303	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

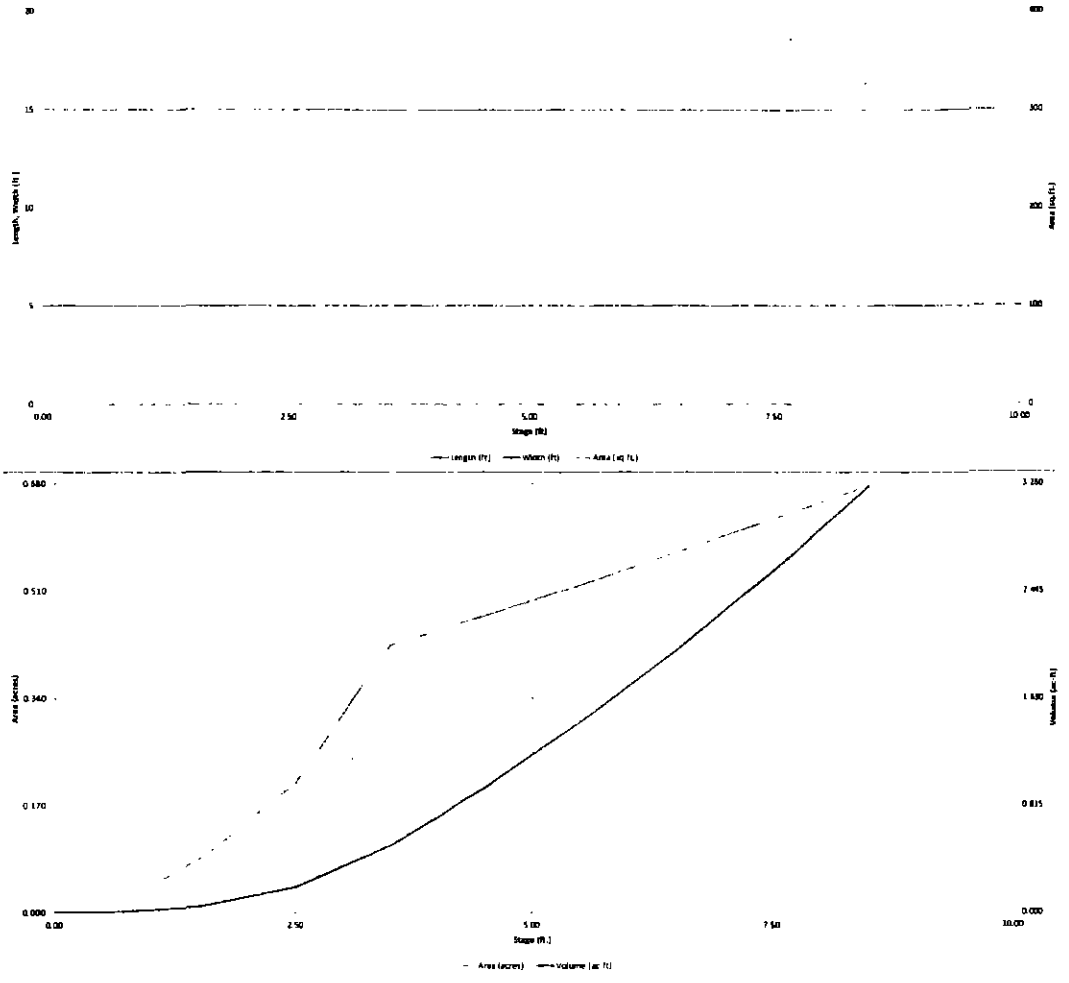
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	-	0.00	-	-	-	75	0.002		
	-	0.50	-	-	-	75	0.002	37	0.001
	-	1.50	-	-	-	3,704	0.085	1,890	0.043
	-	2.50	-	-	-	8,974	0.206	6,268	0.190
	-	3.50	-	-	-	18,504	0.425	22,005	0.505
	-	4.50	-	-	-	20,545	0.472	41,529	0.953
	-	5.50	-	-	-	22,643	0.520	63,124	1.449
	-	6.50	-	-	-	24,821	0.572	86,907	1.995
	-	7.50	-	-	-	27,137	0.623	112,938	2.593
	-	8.50	-	-	-	29,523	0.678	141,268	3.243

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY INTERIM

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)
1	A	1.60	2.84	10.5	4.06	6.81	6	19
2	B	0.89	0.95	5.0	5.17	8.68	5	8
3	C	0.55	2.41	13.0	3.74	6.27	2	15
4	D	1.94	2.07	5.0	5.17	8.68	10	18
5	OS-1	0.72	0.78	9.6	4.19	7.04	3	6
6	A, B, C, D, E AND OS-1	5.85	10.64	13.0	3.74	6.27	22	67
7	POND RELEASE	UD-DETENTION WORKSHEET PEAK REALEASE AT 53 MIN.					0.3	14
8	POND RELEASE PEAK TIME, BASIN F & BASIN OS-2	2.24	7.50	53.0	1.63	2.73	4	20
8A	POND RELEASE, BASIN F & BASIN OS-2 PEAK TIME	2.05	2.39	10.4	4.07	6.84	8	16

EXISTING DISCHARGE FLOW FROM LOT 1, ACADEMY VILLAGE FILING NO. 2 TO CONTINUE WEST PER CURRENT CONDITIONS

EXISTING PARKING LOT DISCHARGE

UNITED STATES AIR FORCE ACADEMY PLAT BOOK O-2, PAGE 84

NO DEVELOPED FLOWS ALLOWED TO BE RELEASED ONTO USAFA

DEVELOPED FLOWS TO BE ROUTED TO STORM

LOT 4 ACADEMY VILLAGE FILING NO. 2 RECEPTION NO. 099133453

GLENEAGLE DRIVE (66' ROW)

20' PUBLIC UTILITY AND DRAINAGE EASEMENT (TYP.)

40' PUBLIC UTILITY, DRAINAGE AND ACCESS EASEMENT (TYP.)

TRACT B 0.271 ACRES

LOT 3 1.441 ACRES

TRACT E 4.122 ACRES

A 5.69

TRACT A 1.705 ACRES

GLENEAGLE GATE VIEW (50' PRIVATE ROW)

STRUTHERS ROAD (120' ROW)

LOT 1 RIDGE POINT SUDVISION FILING NO. 1 RECEPTION NO. 099093593

TRACT D 6.010 ACRES

C 6.82

OS-1 0.72 DP 5

20' PUBLIC UTILITY AND DRAINAGE EASEMENT (TYP.)

30' PUBLIC UTILITY EASEMENT RECEPTION NO. 200131248

PROPOSED 15' AT-GRADE INLET

LOT 2 0.985 ACRES

40' PUBLIC UTILITY EASEMENT RECEPTION NO. 200121247

40' PUBLIC UTILITY, DRAINAGE AND ACCESS EASEMENT (TYP.)

30' PUBLIC UTILITY, DRAINAGE AND ACCESS EASEMENT (TYP.)

PROPOSED FUTURE EPC STORM PIPE (TO BE INSTALLED W/ SITE DEVELOPMENT)

D 2.15

LOT 1 1.310 ACRES

20' PUBLIC UTILITY, DRAINAGE AND ACCESS EASEMENT (TYP.)

PROPOSED 24" PRIVATE STORM MAIN

20' PUBLIC UTILITY AND DRAINAGE EASEMENT (TYP.)

TRACT C 2.221 ACRES

DETENTION FACILITY "A"

E 1.66 DP 6

DP 1 DP 2 DP 3 DP 4

PROPOSED 5' SUMP INLETS

PROPOSED 36" PRIVATE STORM MAIN

40' PUBLIC UTILITY EASEMENT RECEPTION NO. 205036419

OS-2 2.29

TRACT F 0.49 ACRES

NORTHGATE BOULEVARD (100' ROW)

PUBLIC UTILITY EASEMENT RECEPTION NO. 200131246

F 0.69 DP 7

PROPOSED 18" PRIVATE STORM MAIN

DP 8 DP 8A

FUTURE CONNECTION TO EPC OUTFALL-STORM

TO FUTURE REGIONAL DET/SWQ FACILITY

UNITED STATES AIR FORCE ACADEMY PLAT BOOK O-2, PAGE 84

B 0.99

PROPOSED DP 8
Q_5 = 4 CFS
Q_{100} = 20 CFS
(WITH DITCH FLOWS BASIN OS-2 AT PEAK RELEASE TIME OF POND AT 53 MINUTES)

PROPOSED DP 8A
Q_5 = 8 CFS
Q_{100} = 16 CFS
(WITH DITCH FLOWS BASIN OS-2 AT PEAK RELEASE TIME OF BASIN OS-2 AT 10.4 MINUTES

N

60 30' 0 60 120

SCALE: 1" = 60'

LEGEND

- EXISTING GROUND CONTOUR 5910
- PROPOSED FINISHED CONTOUR 5910
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- PROPOSED PRIVATE STORM SEWER
- PROPOSED STORM INLET
- LOW POINT/HIGH POINT LP/HP
- BASIN IDENTIFIER D / AREA IN ACRES 1.41
- PIPE RUN X
- DESIGN POINT DP 12

CLASSIC CONSULTING ENGINEERS & SURVEYORS SM

619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

ACADEMY GATEWAY SUBDIVISION
FILING NO. 1
DRAINAGE MAP
DEVELOPED CONDITIONS

CLASSIC CONSULTING ENGINEERS & SURVEYORS

DESIGNED BY	KRC	SCALE		DATE	2-24-17
DRAWN BY	JRH	(H) 1"= 60'		SHEET	1 OF 1
CHECKED BY		(V) 1"= N/A		JOB NO.	2507.00

DRAINAGE MAPS

NORTHGATE SUBARU
COLORADO SPRINGS, CO
EXISTING DRAINAGE MAP
JUNE 2025

PLAT NAME

LOT 1-3 ACADEMY GATEWAY SUBDIVISION FILING NO. 2

NOTES

1. THE SITE IS NOT WITHIN A 100 YEAR FEMA FLOOD PLAIN.
2. THE SITE HAS PREVIOUSLY BEEN OVERLOT GRADED.

N

80' 0 80' 160'

SCALE: 1"=80'

LEGEND

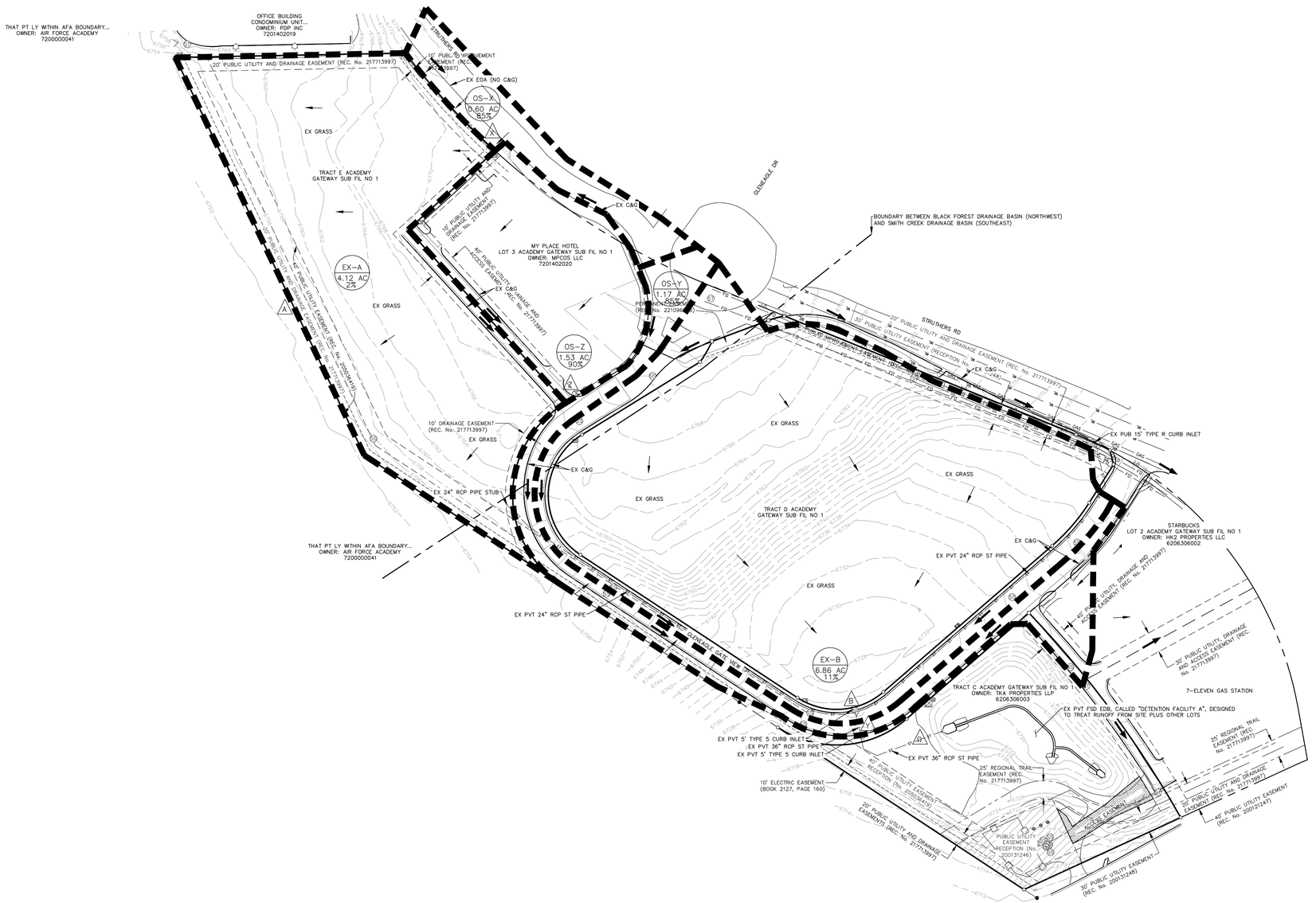
- P-7 / 12.22 / 85% — BASIN DESIGNATION, AREA IN BASIN (AC), PERCENT IMPERVIOUS
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- 62 — PROPOSED GROUND SURFACE CONTOUR
- ROAD AND DITCH FLOW DIRECTION
- GROUND SURFACE FLOW DIRECTION
- ST — ST — ST — STORM SEWER LINE

DRAINAGE SUMMARY

BASIN	AREA TO TAL (Acres)	TOTAL FLOWS Q_5 (c.f.s.)	TOTAL FLOWS Q_{100} (c.f.s.)
OS-Z	1.53	6.2	11.5
OS-Y	1.17	4.5	8.4
OS-X	0.60	2.4	4.5
EX-A	4.12	1.3	8.4
EX-B	6.86	3.8	15.7

DESIGN POINT SUMMARY

Design Point(s)	Contributing Basins	Area (acres)	Flow Q_5	Flow Q_{100}
Z	OS-Z	1.53	6.2	11.5
Y - existing	OS-Z,OS-Y	2.70	10.7	19.9
Y - proposed	OS-Z,OS-Y,PR-2,PR-4,	2.92	11.4	21.4
X	OS-X	0.60	2.4	4.5
A	EX-A,OS-X	4.72	3.7	12.9
B	EX-B	6.86	3.8	15.7
1	OS-X,PR-1	2.19	9.1	16.9
2	PR-2	0.12	0.6	1.0
3	PR-3	1.24	5.3	9.7
4	PR-4	0.10	0.2	0.4
5	PR-5	0.10	0.5	0.8
6	PR-6	1.02	0.5	3.1
7	PR-7	1.88	2.1	6.7
8	PR-8	0.45	0.3	1.2
9	PR-9	0.58	2.0	3.8
10	PR-10	0.20	0.9	1.7
11	PR-11	0.14	0.7	1.2
12	PR-12	0.71	3.3	5.9
13	PR-13	0.52	2.4	4.3
14	PR-14	0.16	0.7	1.3
15	PR-15	0.19	0.8	1.5
16	PR-16	1.18	4.7	8.9
17	PR-17	0.63	2.7	4.9
18	PR-18	0.27	1.1	2.0
Ω - Existing	OS-Z,OS-Y,EX-B	9.56	12.0	28.3
Ω - Proposed	OS-Z,OS-Y,OS-X,PR-1-5,PR-7, PR-9-18	12.91	47.7	91.1
Ω - Design	Original March 2017 FDR Values (sum of basins A,B,C,OS-1 in ultimate condition)	14.41	54	93



REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
TKA PROPERTIES, LLP
ATTN: KEVIN QUINN
17225 BURT ST
OMAHA, NE 68118
402.964.4291

Terra Nova Engineering, Inc.
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tneiinc.com

NORTHGATE SUBARU

EXISTING DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H-SCALE AS NOTED
V-SCALE N/A
JOB NO. 2326.00
DATE ISSUED 06/17/25
SHEET NO. 1 OF 2

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NORTHGATE SUBARU
COLORADO SPRINGS, CO
PROPOSED DRAINAGE MAP
JUNE 2025

PLAT NAME

LOT 1–3 ACADEMY GATEWAY SUBDIVISION FILING NO. 2

NOTES

1. THE SITE IS NOT WITHIN A 100 YEAR FEMA FLOOD PLAIN.
2. OFFSITE GROUND SURFACE CONTOURS ARE FROM COLORADO SPRINGS SPRINGSVIEW GIS (NAD 1983).

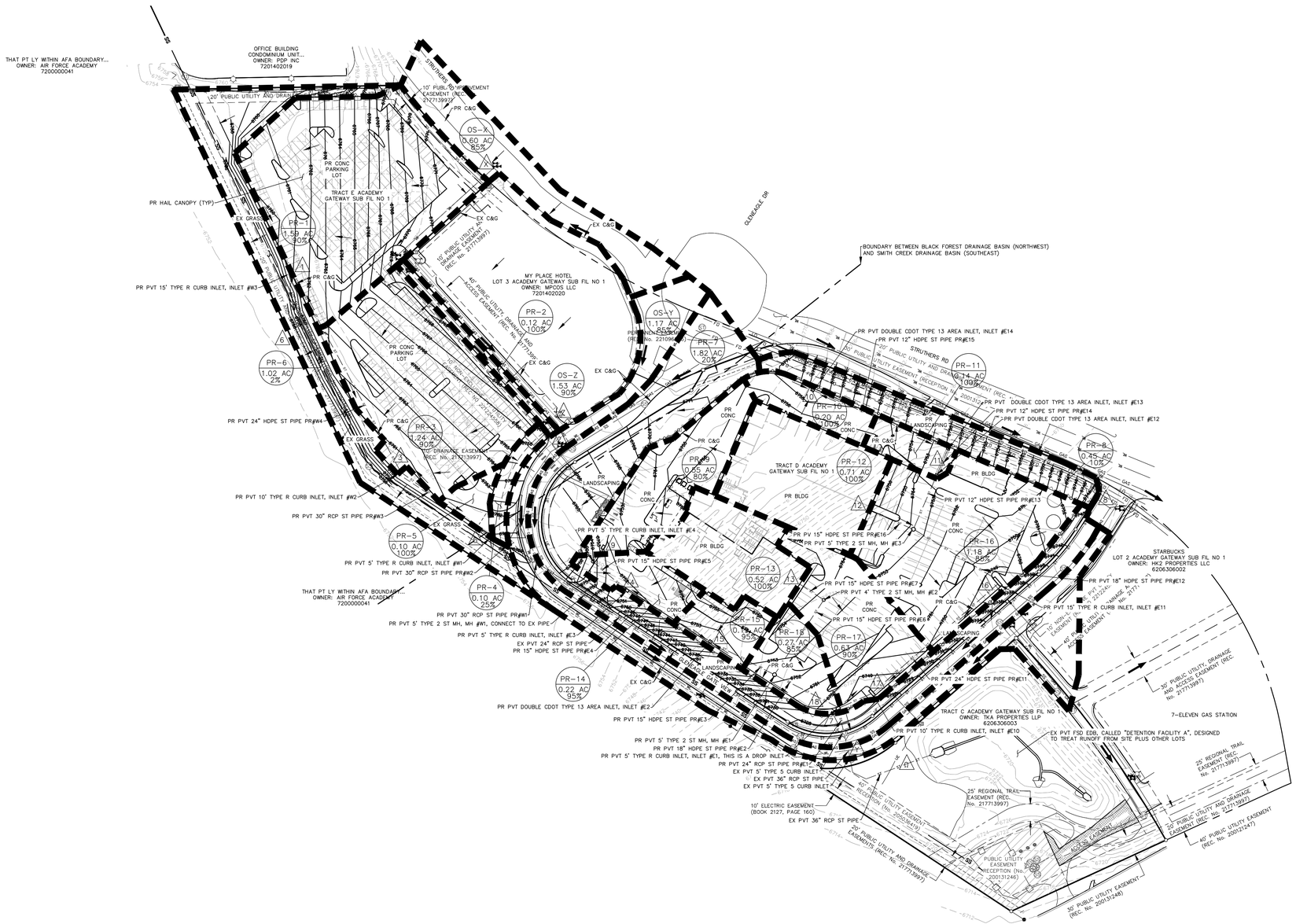
N

80' 0 80' 160'

SCALE: 1"=80'

LEGEND

- P-7 / 12.22 / 95.19% — BASIN DESIGNATION, AREA IN BASIN (AC), PERCENT IMPERVIOUS
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- 62 — PROPOSED GROUND SURFACE CONTOUR
- ROAD AND DITCH FLOW DIRECTION
- GROUND SURFACE FLOW DIRECTION
- ST — ST — ST — STORM SEWER LINE
- RETAINING WALL



DRAINAGE SUMMARY

BASIN	AREA TOTAL (Acres)	TOTAL FLOWS Q_5 (c.f.s.)	TOTAL FLOWS Q_{100} (c.f.s.)
OS-Z	1.53	6.2	11.5
OS-Y	1.17	4.5	8.4
OS-X	0.60	2.4	4.5
PR-1	1.59	6.7	12.4
PR-2	0.12	0.6	1.0
PR-3	1.24	5.3	9.7
PR-4	0.10	0.2	0.4
PR-5	0.10	0.5	0.8
PR-6	1.02	0.5	3.1
PR-7	1.82	2.0	6.5
PR-8	0.45	0.3	1.2
PR-9	0.55	1.9	3.7
PR-10	0.20	0.9	1.7
PR-11	0.14	0.7	1.2
PR-12	0.71	3.3	5.9
PR-13	0.52	2.4	4.3
PR-14	0.22	1.0	1.8
PR-15	0.19	0.8	1.5
PR-16	1.18	4.7	8.9
PR-17	0.63	2.7	4.9
PR-18	0.27	1.1	2.0

DESIGN POINT SUMMARY

Design Point(s)	*Contributing Basins*	*Area (acres)*	*Flow* Q_5	*Flow* Q_{100}
Z	OS-Z	1.53	6.2	11.5
Y - existing	OS-Z,OS-Y	2.70	10.7	19.9
Y - proposed	OS-Z,OS-Y,PR-2,PR-4,	2.92	11.4	21.4
X	OS-X	0.60	2.4	4.5
A	EX-A,OS-X	4.72	3.7	12.9
B	EX-B	6.86	3.8	15.7
1	OS-X,PR-1	2.19	9.1	16.9
2	PR-2	0.12	0.6	1.0
3	PR-3	1.24	5.3	9.7
4	PR-4	0.10	0.2	0.4
5	PR-5	0.10	0.5	0.8
6	PR-6	1.02	0.5	3.1
7	PR-7	1.82	2.0	6.5
8	PR-8	0.45	0.3	1.2
9	PR-9	0.55	1.9	3.7
10	PR-10	0.20	0.9	1.7
11	PR-11	0.14	0.7	1.2
12	PR-12	0.71	3.3	5.9
13	PR-13	0.52	2.4	4.3
14	PR-14	0.22	1.0	1.8
15	PR-15	0.19	0.8	1.5
16	PR-16	1.18	4.7	8.9
17	PR-17	0.63	2.7	4.9
18	PR-18	0.27	1.1	2.0
Ω - Existing	OS-Z,OS-Y,EX-B	9.56	12.0	28.3
Ω - Proposed	OS-Z,OS-Y,OS-X,PR-1-5,PR-7, PR-9-18	12.88	47.8	91.2
Ω - Design	Original March 2017 FDR Values (sum of basins A,B,C,OS-1 in ultimate condition)	14.41	54	93

REVISIONS

NO.	DESCRIPTION	DATE

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www.tnsinc.com

NORTHGATE SUBARU

PROPOSED DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H-SCALE AS NOTED
V-SCALE N/A
JOB NO. 2326.00
DATE ISSUED 06/17/25
SHEET NO. 2 OF 2

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