PRELIMINARY/FINAL DRAINAGE REPORT
FOR
LOTS 1 – 4
SOUTH ACADEMY HIGHLANDS FILING NO. 4

January 2022

Prepared for:
UTW ACADEMY DEVELOPMENT LLC
C/O SNR DENTON
ONE METROPOLITAN SQUARE
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ST. LOUIS, MO 63102

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Job no. 2186.90

PRELIMINARY/FINAL DRAINAGE REPORT FOR
LOTS 1 - 4 SOUTH ACADEMY HIGHLANDS FILING NO. 4

DRAINAGE REPORT STATEMENT

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

Kyle R Campbell, Colorado P.E. #29794 — Date: 5/11/22

COLORADO LICENSED KYLE RAYE CAMPBELL 29794 PROFESSIONAL ENGINEER

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

Business Name: UTW Academy Development, LLC

By:

Title: Jeffrey P. Otto, Authorized Signer

Address: 211 N. Broadway, Suite 3000

St. Louis, MO 63102

CITY OF FOUNTAIN:

Benjamin E. Sheets — For the City Engineer

5/12/22 — Date

Conditions:

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PURPOSE

This document is the Preliminary/Final Drainage Report for Lots 1-4 South Academy Highlands Filing No. 4, a re-plat of Lots 7, Lot 8, & Tract J of South Academy Highlands Filing No. 1. The purpose of this report is to identify onsite and offsite drainage patterns and general storm sewer infrastructure to support the lot development in accordance with all applicable previous reports and master drainage plans. This report accompanies a Final Plat submittal and storm sewer infrastructure plans. Site specific future Final Drainage Reports for each lot will be completed at the time of lot development.

GENERAL DESCRIPTION

Lots 1 through 4 are planned for future commercial single user developments with a portion of each lot being 'undevelopable' slope area draining to the west. Lot 1 is 1.341 acres, Lot 2 is 1.549 acres, Lot 3 is 1.303 acres, and Lot 4 is 1.970 acres. They are zoned PUD per the Overall Development Plan for South Academy Highlands and have been previously platted as Lot 7, Lot 8, and Tract J of South Academy Highlands Filing No. 1. A Re-Plat will be submitted in the future, along with site specific development plans for each lot. These four lots are located north of Venetucci Blvd. and S. Academy Blvd. intersection, and south-west of the signalized intersection (Wal-Mart Heights and Venetucci Blvd.) of the South Academy Highlands development. The site is located in the west half of Section 4, Township 15 South, Range 66 West of the Sixth Principal Meridian in the City of Fountain, County of El Paso, State of Colorado. The site is bounded on the north by unplatted El Paso County land, to the east by South Academy Highlands Filing No. 1 (Venetucci Blvd.) and Filing 1A (inline retail), to the south by South Academy Blvd. right-of-way, and to the west by existing Stratmoor South Subdivision Filing 3. The proposed site will contain four retail buildings; three fast food restaurants and an auto supply store. A retaining wall is required along the west edge of the developable area. The average soil condition of the proposed site reflects Hydrologic Group 'A' (Schamber-Razor complex) as determined by the "Web Soil Survey," prepared by the Natural Resources Conservation Service (see map in Appendix).

EXISTING DRAINAGE CONDITIONS

The site is located within the Fishers Canyon Drainage Basin and as been overlot graded with the South Academy Highlands Filing No. 1 infrastructure construction. This site has been previously studied as part of the "Preliminary/Final Drainage Report for South Academy Highlands Filing No. 1," by Classic Consulting Engineers & Surveyors, LLC, revised August 2013. The proposed drainage patterns are in accordance with the previous approved report and the existing South Academy Highlands storm system discharges into an existing downstream full spectrum detention/water quality facility prior to releasing to the existing downstream Fishers Canyon Channel. Therefore, on-site storm water quality and detention is not required. This downstream facility is referred to as Private Detention and Storm Water Quality Facility 'T' within the Filing No. 1 report, and is a full spectrum detention, extended detention basin (EDB) storm water quality facility, including forebays, a micropool, and an outlet structure constructed to the criteria outlined within the City of Colorado Springs/El Paso County Drainage Criteria Manual and with full spectrum detention per the Urban Drainage and Flood Control District (UDFCD, now Mile High District) criteria. Maintenance of the pond components (inlets, outlet box/pipe, forebays, etc.) and aesthetic maintenance and ownership of the pond is by the South Academy Highlands Metro District. Pond 'T' was designed and constructed to detain and treat the developed flows for all of the South Academy Highlands Phase 1 development, including future and planned commercial parcels (Filing No. 1 Basins C, D, G, I, J, & Y). The proposed site was modeled as Basin I in the previous Filing No. 1 drainage report. Per the report, "A Private 30" RCP storm pipe (Pipe 8) has been provided into the site from Venetucci Blvd. to convey these developed and interim flows. Prior to development of this basin (interim condition), the runoff from the proposed over lot grading will sheet flow north to a temporary sediment basin 'A'. The interim runoff to the sediment basin is Q_5 = 4.1 cfs and Q_{100} = 10.8 cfs. The 8" pvc outfall pipe from the sediment basin is to connect to the provided 30" stub."

An Existing Conditions Map in included in the Appendix and shows two drainage basins, EX-1 and EX-2. Basin EX-1 (Q_5 = 1.2 cfs and Q_{100} = 9.3 cfs) is 3.69 acres and has been graded as a flat 'pad' with the runoff sheet flowing to the north into temporary sediment basin constructed with Filing No. 1. The

undeveloped runoff collects in the sediment basin and outfalls into the existing 30" storm sewer stub provided from the adjacent Wal-Mart Heights and Venetucci Blvd. intersection. Basin EX-2 (Q_5 = 1.1 cfs and Q_{100} = 8.9 cfs) is 2.37 acres of native seed vegetated slope established with Filing No. 1 and draining to the east.

More recently than the Filing No. 1 FDR, a study was completed for the northern Venetucci Blvd. roadway extension to B Street – "Venetucci Boulevard Extension Drainage & Water Quality Improvements – Preliminary/Final Drainage Report," by Matrix Design Group, dated May 22, 2019. This study makes reference to and correlates with the South Academy Highlands Filing No. 1 report. The roadway extension and new study area within the Matrix report are outside of the proposed South Academy Highlands Filing No. 4 development. Therefore, accordance to the Filing 1 report is all that is warranted.

PROPOSED DRAINAGE CONDITIONS

As previously mentioned, the proposed Lots 1-4 South Academy Highlands Filing No. 4 were previously platted and studied as Lot 7, Lot 8 and Tract J of South Academy Highlands Filing No. 1. The proposed condition drainage patterns do not differ from those set forth with the Filing No. 1 report and downstream infrastructure. As such, the Developed Conditions Map from that Filing No. 1 report is located in the Appendix of this report. Also in the Appendix is a site-specific Developed Conditions Map for Lots 1-4 and corresponding details below. This report is only establishing the western drive aisle and storm infrastructure including 'stubs' into each of the 4 Lots. Future Final Drainage Reports/Letters will be required for each individual lot development that details site specific private storm system extensions and collection locations. These details are not known at this time and therefore the 'stubs' are provided off the proposed Private storm main within this western drive aisle. General basin calculations are included for these developable areas to ensure pipe capacities. The proposed Private storm sewer will connect to the existing 30" RCP stub that was provided at the intersection of Wal-Mart Heights and Venetucci Blvd. The proposed Private storm sewer will be maintained by the lot owner(s). A detailed description of the developed flows is as follows:

Design Point 1 (Q_5 = 3.3 cfs, Q_{100}= 6.5 cfs) consists of runoff from Basin K, 0.83 acres of Lot 4 development. A future Final Drainage Repot for Lot 4 will be completed that will detail the collection system and connection to this 18" storm stub (Pipe 1) provided with the storm sewer main and rear drive aisle construction. Pipe 1 connects to the inlet at DP-2.

Design Point 2 (Q_5 = 0.7 cfs, Q_{100}= 1.3 cfs) consists of runoff from Basin H, 0.16 acres of rear drive aisle and back of Lot 4 development. This runoff will drain over the asphalt and along the curb and gutter to a proposed 10.0' CDOT Type R curb (at-grade) inlet. Pipe 2 (Private 18" RCP, Q_5 = 4.0 cfs, Q_{100}= 7.8 cfs) conveys the intercepted runoff and that from Pipe 1 to the north within the rear drive aisle.

Design Point 3 (Q_5 = 2.3 cfs, Q_{100}= 4.5 cfs) consists of runoff from Basin J, 0.57 acres of Lot 3 development. A future Final Drainage Repot for Lot 3 will be completed that will detail the collection system and connection to this 18" storm stub (Pipe 3) provided with the storm sewer main and rear drive aisle construction. Pipe 3 connects to the inlet at DP-4.

Design Point 4 (Q_5 = 0.6 cfs, Q_{100}= 1.3 cfs) consists of runoff from Basin G, 0.16 acres of rear drive aisle and back of Lot 3 development. This runoff will drain over the asphalt and along the curb and gutter to a proposed 5.0' CDOT Type R curb (at-grade) inlet. Pipe 4 (Private 24" RCP, Q_5 = 6.9 cfs, Q_{100}= 13.4 cfs) conveys the intercepted runoff and that from Pipes 2 & 3 to the north within the rear drive aisle.

Design Point 5 (Q_5 = 2.7 cfs, Q_{100}= 5.3 cfs) consists of runoff from Basin F, 0.65 acres of Lot 2 development. A future Final Drainage Repot for Lot 2 will be completed that will detail the collection system and connection to this 18" storm stub (Pipe 5) provided with the storm sewer main and rear drive aisle construction. Pipe 5 connects to the inlet at DP-6.

Design Point 6 (Q_5 = 0.9 cfs, Q_{100}= 1.7 cfs) consists of runoff from Basin E, 0.20 acres of rear drive aisle and back of Lot 2 development. This runoff will drain over the asphalt and along the curb and gutter to a proposed 10.0' CDOT Type R curb (at-grade) inlet. Pipe 6 (Private 18" RCP, Q_5 = 3.6 cfs, Q_{100}= 7.0 cfs) conveys the intercepted runoff and that from Pipe 5 to the west to a junction manhole with Pipe 4.

Pipe 7 (Private 30" RCP, Q_5 = 10.2 cfs, Q_{100}= 19.9 cfs) conveys the combined runoff from this manhole to the north within the rear drive aisle.

Design Point 7 (Q_5 = 0.5 cfs, Q_{100}= 1.1 cfs) consists of runoff from Basin D, 0.15 acres of rear drive aisle and back of Lot 1 development. This runoff will drain over the asphalt and along the curb and gutter to a proposed 5.0' CDOT Type R curb (at-grade) inlet. Pipe 8 (18" RCP) conveys the intercepted runoff to the storm main in the rear drive aisle. Pipe 9 (Private 30" RCP, Q_5 = 10.6 cfs, Q_{100}= 20.7 cfs) conveys the combined runoff from this manhole (Pipes 7 & 8) to the north within the rear drive aisle.

Design Point 8 (Q_5 = 3.9 cfs, Q_{100}= 7.6 cfs) consists of runoff from Basin C, 0.94 acres of Lot 1 development. A future Final Drainage Repot for Lot 1 will be completed that will detail the collection system and connection to this 24" storm stub (Pipe 10) provided with the storm sewer main and rear drive aisle construction. Pipe 10 connects to a junction manhole with Pipes 9 & 11.

Design Point 9 (Q_5 = 0.7 cfs, Q_{100}= 1.4 cfs) consists of runoff from Basin B, 0.19 acres of main entrance and rear drive aisle within Lot 1. This runoff will drain over the asphalt and along the curb and gutter to a proposed 10.0' CDOT Type R curb (at-grade) inlet. Pipe 11 (Private 18") conveys the intercepted runoff to a junction manhole with Pipes 9 & 10. This manhole connects with the existing 30" RCP stub (Pipe 12) from Venetucci Blvd. and South Academy Highlands Filing No. 1 infrastructure. Pipe 12 is the existing Private 30" RCP and contains fully developed flow rates of Q_5 = 14.8 cfs and Q_{100}= 28.8 cfs. The previously approved Filing No. 1 drainage report assumed a fully developed condition flow rate in this 30" RCP of Q_5 = 17.5 cfs and Q_{100}= 32.8 cfs, higher than the actual developed conditions of Lots 1-4 Filing No. 4. The previously approved report and infrastructure accounted for the same acreage of proposed Lots 1-4 commercial development in the downstream storm sewer main and full spectrum detention and storm water quality facility 'T' located prior to Fisher's Canyon drainage way. As previously discussed, this facility was designed and installed per all applicable criteria and no improvements are required based upon the development of Lots 1-4. As there have been no change to the tributary area, land use, drainage patterns, and a slight decrease in runoff rates, there is no need for additional analysis of the existing downstream infrastructure and the development of Lots 1-4

South Academy Highlands Filing No. 4 will not hinder adjacent properties or downstream storm sewer facilities.

Four (4) new temporary sediment basins are proposed (one for each lot) to replace the larger existing temporary sediment basin that exists within Basins B & C. Temporary sediment basin relocation design is shown on the site grading plan and construction drawings.

Design Point 10 (Q_5 = 0.2 cfs, Q_{100}= 0.5 cfs) consists of runoff from Basin A, 0.07 acres of existing Venetucci Blvd. and proposed entrance into the Lots 1-4 development. This runoff drains onto the existing roadway and drains to downstream facilities and ultimately to the downstream Pond 'T'. As this runoff is very minor and the proposed storm system effectively intercepts the proposed development drainage, additional downstream analysis is not warranted.

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, Revised January 2021. The Rational Method was used to estimate stormwater runoff (5-year and 100-year recurrence intervals) to the proposed inlets, storm sewer pipes, and provided 30" storm sewer stub for the entire Lots 1 – 4 Filing No. 4 development. The UDFCD UD-Inlet workbook per Mile High Flood District (previously the Urban Drainage and Flood Control District) was used to size the proposed storm inlets. Hydraulic Grade Line (HGL) calculations for the 100-year storm event were calculated using UD-Sewer 2009 per Mile High Flood District and at no times is the 100-year line within 1.0' to the finished ground of the storm alignments. A Site-Level Low Impact Development form (IRF form) is included in the Appendix and was completed using the UD-BMP workbook from Mile High Flood District and shows a composite imperviousness of 88.1% for the 3.85 acres of developed runoff within Pipe 12.

WATER QUALITY SUMMARY

The City of Fountain has required the Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainage ways,

and implementing long-term source controls. The Four Step Process pertains to management of smaller, frequently occurring storm events, as opposed to larger storms for which drainage and flood control infrastructure are sized. Implementation of these four steps helps to achieve stormwater permit requirements. This site adheres to this Four Step Process as follows:

1. This site is an approved PUD zoned commercial/retail site. In general, most roof drains are intended to drains across landscaping where feasible, and parking areas contain landscaping to minimize directly connected impervious areas.
2. Permanent BMPs for the overall South Academy Highlands commercial development have been implemented in initial development of the property in the form of Detention and Stormwater Quality Pond T located within Tract K Filing No. 1, later re-platted as a part of Lot 1 South Academy Highlands Filing No. 2.
3. Stormwater drainage from the subject property is being routed through a stormwater detention /stormwater quality treatment facility prior to being released to the historic drainage path as described in the previously approved reports. Developed flows will be required to adhere to release rates established within the previously approved reports and all stormwater discharge to downstream facilities will be required to employ energy dissipation measures to ensure no adverse effect to downstream facilities.
4. A site-specific stormwater quality and erosion control plan and narrative will be submitted and approved by City Engineering prior to any disturbance within the project area. Details such as site-specific source control construction BMP's will be detailed in the Grading and Erosion Control plan and in the Stormwater Management Narrative to protect receiving waters. Upon construction of the proposed development, temporary BMP's will be installed and maintained as required.

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 08041C0743G effective date, December 7, 2018 (See Appendix).

DRAINAGE FEES

The proposed Lots 1-4 of South Academy Highlands Filing No. 4 has already been platted. A future Re-Plat will be completed along with lot specific Site Development Plans. South Academy Highlands is within the Fishers Canyon Drainage Basin, which is not a formally recognized basin with the City of Fountain's fee structure. Therefore, there are no required basin fees associated with the proposed site.

CONSTRUCTION COST OPINION

Private Drainage Facilities Non-reimbursable

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	5.0' CDOT Type R Inlet	2 EACH	$7,440/EA	$ 14,880.00
2.	10' CDOT Type R Inlet	3 EACH	$8,136/EA	$ 24,408.00
3.	Type II Manhole	4 EACH	$6,619/EA	$ 26,476.00
4.	18" RCP Storm Drain	282 LF	$67/LF	$ 18,894.00
5.	24" RCP Storm Drain	150 LF	$81/LF	$ 12,150.00
6.	30" RCP Storm Drain	332 LF	$100/LF	$ 33,200.00
SUB-TOTAL				$ 130,008.00
10% ENGINEERING				$ 13,000.80
5% CONTINGENCIES				$ 6,500.40
TOTAL				**$ 149,509.20**

Classic Consulting Engineers & Surveyors cannot and does not guarantee that the construction cost will not vary from these opinions of probable construction costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular.

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SUMMARY

All drainage facilities were sized using the current City of Fountain Drainage Criteria and will safely discharge all developed runoff to the existing 30" storm stub provided from Venetucci Blvd. (Filing No. 1). An existing regional full spectrum detention and water quality facility will treat the runoff prior to releasing below historic rates into the existing Fishers Canyon Channel. The total developed runoff to the existing 30" storm stub is less than the allowable anticipated runoff calculated with the original South Academy Highlands Filing No. 1 drainage report. Therefore, the proposed development is in compliance with the master drainage study. Future Final Drainage Reports/Letters will be required for each individual lot development that details site specific private storm system extensions and collection locations. All of the proposed storm sewer is Private and will be maintained by the lot owner(s). Construction of Lots 1-4 of Filing No. 4 will not adversely affect any surrounding development or downstream facilities.

PREPARED BY:

Classic Consulting Engineers & Surveyors, LLC

Matthew Larson
Project Engineer

mal/2186.90/REPORTS/PDR-SAH-FIL.4.doc

REFERENCES

1. City of Colorado Springs/El Paso County Drainage Criteria Manual Vol. 1 dated May 2014, revised January 2021.

2. Drainage Criteria Manual Vol. 2, dated May 2014, revised December 2020.

3. "Fishers Canyon Drainage Basin Planning Study," by Muller Engineering Company, dated July 16, 1991.

4. "Preliminary/Final Drainage Report for South Academy Highlands Filing No. 1," by Classic Consulting Engineers & Surveyors, LLC, revised August 2013.

5. "Final Drainage Report for Lots 1 & 2 South Academy Highlands Filing No. 1A," by Classic Consulting Engineers & Surveyors, LLC, January 2015.

6. "Final Drainage Report for Lot 1 South Academy Highlands Filing No. 2," by Classic Consulting Engineers & Surveyors, LLC, March 2015.

7. "Venetucci Boulevard Extension Drainage & Water Quality Improvements – Preliminary/Final Drainage Report," by Matrix Design Group dated May 22, 2019.

APPENDIX

VICINITY MAP

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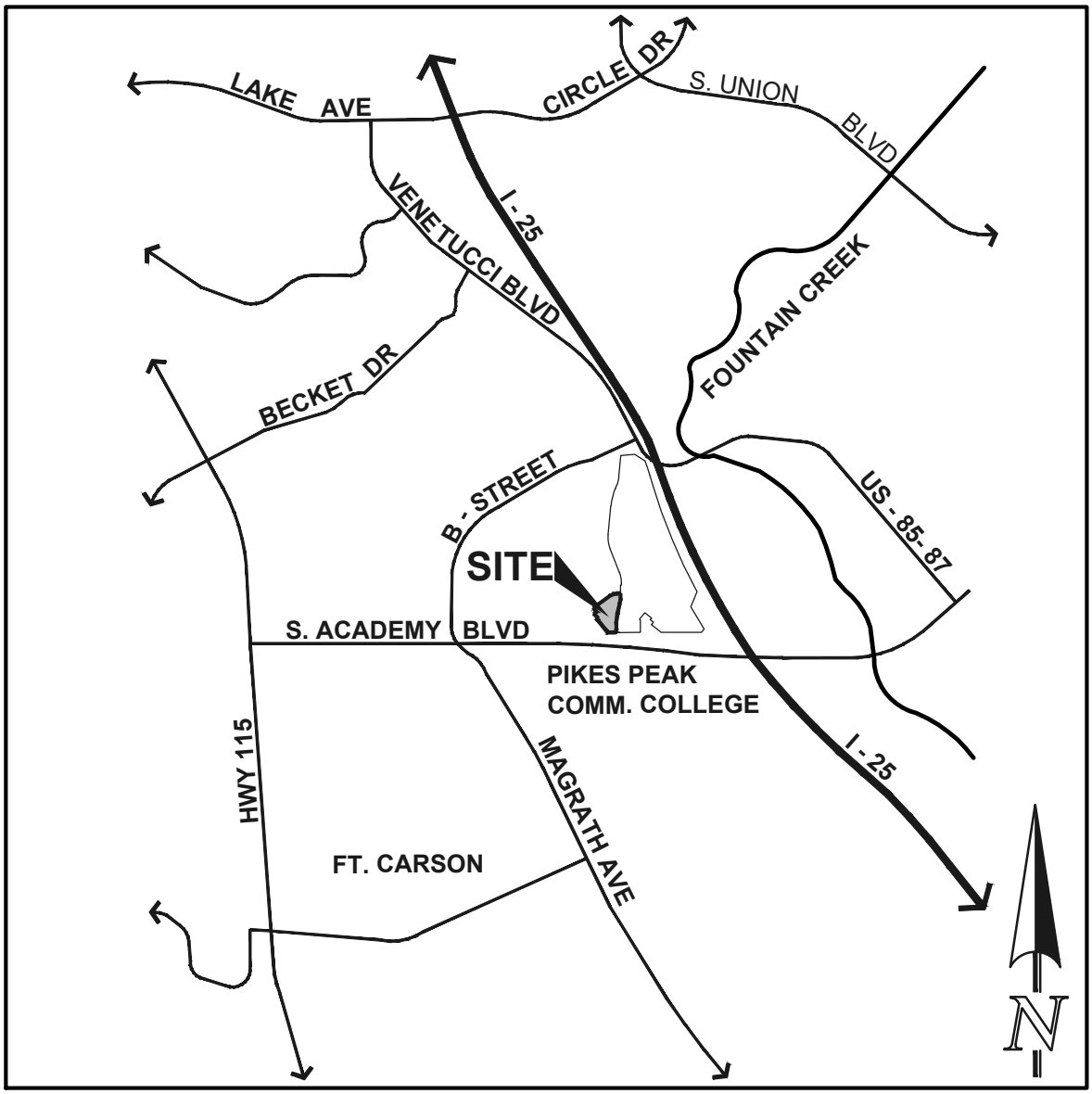

VICINITY MAP

N.T.S.

SOILS MAP (N.C.S SURVEY)

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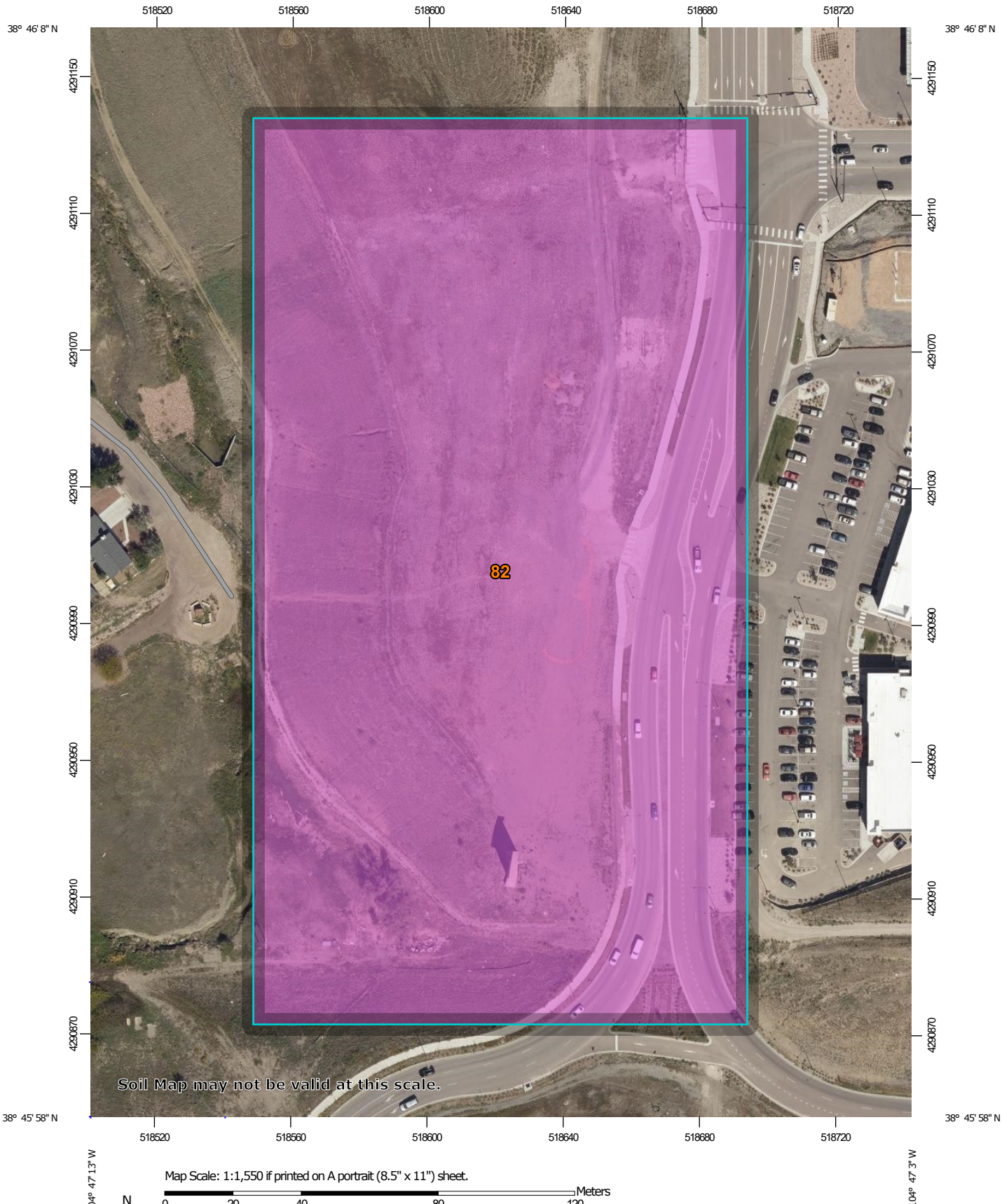
Hydrologic Soil Group—El Paso County Area, Colorado
(SAH FILING 4)



Map Scale: 1:1,550 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
82	Schamber-Razor complex, 8 to 50 percent slopes	A	9.5	100.0%
Totals for Area of Interest			**9.5**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

F.E.M.A. MAP

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National Flood Hazard Layer FIRMette

FEMA

104°47'27"W 38°46'11"N

104°46'50"W 38°45'43"N

Feet 1:6,000

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

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

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/2/2021 at 11:01 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

CALCULATIONS

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JOB NAME: ***South Academy Highlands Filing No. 4***
JOB NUMBER: ***2186.90***
DATE: ***01/30/22***
CALCULATED BY: ***MAL***

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED)

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LANDSCAPE/UNDEVELOPED AREAS			WEIGHTED		**WEIGHTED CA**		**USE**
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**	
A	0.07	0.05	0.90	0.95	0.02	0.08	0.35	0.67	0.78	**0.05**	**0.05**	**Drive Aisle**
B	0.19	0.15	0.90	0.95	0.04	0.08	0.35	0.73	0.82	**0.14**	**0.16**	**Drive Aisle**
C	0.94	0.85	0.90	0.95	0.09	0.08	0.35	0.82	0.89	**0.77**	**0.84**	**LOT 1**
D	0.15	0.12	0.90	0.95	0.03	0.08	0.35	0.74	0.83	**0.11**	**0.12**	**Drive Aisle**
E	0.20	0.18	0.90	0.95	0.02	0.08	0.35	0.82	0.89	**0.16**	**0.18**	**Drive Aisle**
F	0.65	0.59	0.90	0.95	0.06	0.08	0.35	0.82	0.89	**0.54**	**0.58**	**LOT 2**
G	0.16	0.14	0.90	0.95	0.02	0.08	0.35	0.80	0.88	**0.13**	**0.14**	**Drive Aisle**
H	0.16	0.15	0.90	0.95	0.01	0.08	0.35	0.85	0.91	**0.14**	**0.15**	**Drive Aisle**
J	0.57	0.50	0.90	0.95	0.07	0.08	0.35	0.80	0.88	**0.46**	**0.50**	**LOT 3**
K	0.83	0.71	0.90	0.95	0.12	0.08	0.35	0.78	0.86	**0.65**	**0.72**	**LOT 4**
Q	2.06	0.00	0.90	0.95	2.06	0.08	0.35	0.08	0.35	**0.16**	**0.72**	**EX. SLOPE**
EX-1	3.69	0.00	0.90	0.95	3.69	0.08	0.35	0.08	0.35	**0.30**	**1.29**	**EXIST**
EX-2	2.37	0.00	0.90	0.95	2.37	0.08	0.35	0.08	0.35	**0.19**	**0.83**	**EXIST**

JOB NAME:	***South Academy Highlands Filing No. 4***
JOB NUMBER:	***2186.90***
DATE:	***01/30/22***
CALC'D BY:	***MAL***

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
A	0.05	0.05	0.9	10	0.15	1.0	40	1.5%	4.3	0.2	5.0	5.10	9.07	**0.2**	**0.5**
B	0.14	0.16	0.9	10	0.15	1.0	190	1.5%	4.3	0.7	5.0	5.10	9.07	**0.7**	**1.4**
C	0.77	0.84	0.9	10	0.15	1.0	190	1.5%	4.3	0.7	5.0	5.10	9.07	**3.9**	**7.6**
D	0.11	0.12	0.9	10	0.15	1.0	120	1.5%	4.3	0.5	5.0	5.10	9.07	**0.6**	**1.1**
E	0.16	0.18	0.9	10	0.15	1.0	130	1.5%	4.3	0.5	5.0	5.10	9.07	**0.8**	**1.6**
F	0.54	0.58	0.9	10	0.15	1.0	220	1.5%	4.3	0.9	5.0	5.10	9.07	**2.7**	**5.3**
G	0.13	0.14	0.9	10	0.15	1.0	120	1.5%	4.3	0.5	5.0	5.10	9.07	**0.7**	**1.3**
H	0.14	0.15	0.9	10	0.15	1.0	210	1.5%	4.3	0.8	5.0	5.10	9.07	**0.7**	**1.3**
J	0.46	0.50	0.9	10	0.15	1.0	200	1.5%	4.3	0.8	5.0	5.10	9.07	**2.3**	**4.5**
K	0.65	0.72	0.9	10	0.15	1.0	230	1.5%	4.3	0.9	5.0	5.10	9.07	**3.3**	**6.5**
Q	0.16	0.72	0.08	75	26	5.1	360	4.4%	7.3	0.8	5.9	4.87	8.66	**0.8**	**6.2**
EX-1	0.30	1.29	0.08	50	2	8.5	500	2.0%	4.9	1.7	10.2	4.07	7.23	**1.2**	**9.3**
EX-2	0.19	0.83	0.08	10	3.33	1.9	90	33.0%	20.1	0.1	2.0	6.06	10.77	**1.1**	**8.9**

JOB NAME:	*South Academy Highlands Filing No. 4*
JOB NUMBER:	*2186.90*
DATE:	*01/30/22*
CALCULATED BY:	*MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Outfall
					I(5)	I(100)	Q(5)	Q(100)	
1	BASIN K	0.65	0.72	5.0	5.10	9.07	**3.3**	**6.5**	STUB
2	BASIN H	0.14	0.15	5.0	5.10	9.07	**0.7**	**1.3**	10.0' Type R At-Grade Inlet
3	BASIN J	0.46	0.50	5.0	5.10	9.07	**2.3**	**4.5**	STUB
4	BASIN G + FLOW-BY DP-2	0.13	0.14	5.0	5.10	9.07	**0.6**	**1.3**	5.0' Type R At-Grade Inlet
5	BASIN F	0.54	0.58	5.0	5.10	9.07	**2.7**	**5.3**	STUB
6	BASIN E + FLOW-BY DP-4	0.17	0.19	5.0	5.10	9.07	**0.9**	**1.7**	10.0' Type R At-Grade Inlet
7	BASIN D + FLOW-BY DP-6	0.11	0.13	5.0	5.10	9.07	**0.5**	**1.1**	5.0' Type R At-Grade Inlet
8	BASIN C	0.77	0.84	5.0	5.10	9.07	**3.9**	**7.6**	STUB
9	BASIN B + FLOW-BY DP-7	0.14	0.16	5.0	5.10	9.07	**0.7**	**1.4**	10.0' Type R St-Grade Inlet
10	BASIN A + FLOW-BY DP-9	0.05	0.05	5.0	5.10	9.07	**0.2**	**0.5**	SURFACE

JOB NAME: *South Academy Highlands Filing No. 4*
JOB NUMBER: *2186.90*
DATE: *04/06/22*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
1	DP-1	0.65	0.72	5.0	5.10	9.07	3.3	6.5	18" RCP
2	PIPE 1 + DP-2	0.78	0.86	5.0	5.10	9.07	4.0	7.8	18" RCP
3	DP-3	0.46	0.50	5.0	5.10	9.07	2.3	4.5	18" RCP
4	PIPE 2 + PIPE 3 + DP-4	1.37	1.50	5.3	5.02	8.92	6.9	13.4	24" RCP
5	DP-5	0.54	0.58	5.0	5.10	9.07	2.7	5.3	18" RCP
6	PIPE 5 + DP-6	0.71	0.77	5.0	5.10	9.07	3.6	7.0	18" RCP
7	PIPE 4 + PIPE 6	2.07	2.27	5.7	4.93	8.77	10.2	19.9	30" RCP
8	DP-7	0.11	0.13	5.0	5.10	9.07	0.5	1.1	18" RCP
9	PIPE 7 + PIPE 8	2.18	2.40	6.0	4.86	8.63	10.6	20.7	30" RCP
10	DP-8	0.77	0.84	5.0	5.10	9.07	3.9	7.6	24" RCP
11	DP-9	0.14	0.16	5.0	5.10	9.07	0.7	1.4	18" RCP
12	PIPE 9 + PIPE 10 + PIPE 11	3.10	3.40	6.4	4.77	8.48	14.8	28.8	EX. 30" RCP

JOB NAME:	*South Academy Highlands Filing No. 4*
JOB NUMBER:	*2186.90*
DATE:	*01/30/22*
CALCULATED BY:	*MAL*

At-Grade Inlet - Flow Routing (DEVELOPED CONDITIONS)

Design Point	TOTAL						INTERCEPTED				FLOW-BY			
	CA5	CA100	I5	I100	Q5	Q100	Q5	Q100	CA5	CA100	Q5	Q100	CA5	CA100
2	0.14	0.15	5.10	9.07	0.7	1.3	0.7	1.3	0.14	0.14	0.0	0.0	0.00	0.00
4	0.13	0.14	5.10	9.07	0.6	1.3	0.6	1.2	0.12	0.13	0.0	0.1	0.01	0.01
6	0.17	0.19	5.10	9.07	0.9	1.7	0.9	1.7	0.18	0.19	0.0	0.0	0.00	0.00
7	0.11	0.13	5.10	9.07	0.5	1.1	0.5	1.1	0.10	0.12	0.0	0.0	0.00	0.00
9	0.14	0.16	5.10	9.07	0.7	1.4	0.7	1.4	0.14	0.15	0.0	0.0	0.00	0.00

JOB NAME:
JOB NUMBER:
DATE:
CALCULATED BY:

FINAL DRAINAGE REPORT ~ PIPE TRAVEL TIMES

PIPE RUN	STREET / CHANNEL FLOW				
	Pipe Diameter *(ft)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	Tc *(min)*
2	1.5	125	1.0%	6.0	0.3
4	2.0	150	1.0%	7.2	0.3
7	2.0	140	1.0%	7.2	0.3
9	2.5	195	1.0%	8.4	0.4

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP2	DP4	DP6	DP7	DP9
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	0.7	0.6	0.9	0.5	0.7
Major Q_{Known} (cfs)	1.3	1.3	1.6	1.1	1.4

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	User-Defined	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.1	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**0.7**	**0.6**	**0.9**	**0.5**	**0.7**
Major Total Design Peak Flow, Q (cfs)	**1.3**	**1.3**	**1.7**	**1.1**	**1.4**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.0	0.1	0.0	0.0	0.0

Minor Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A

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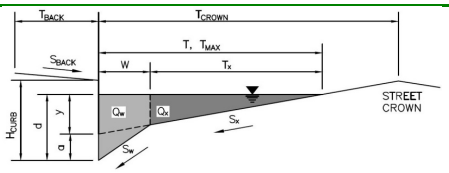
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Enter Your Project Name Here

Inlet ID: DP2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**12.3**	**76.2**	**cfs**

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'

INLET ON A CONTINUOUS GRADE

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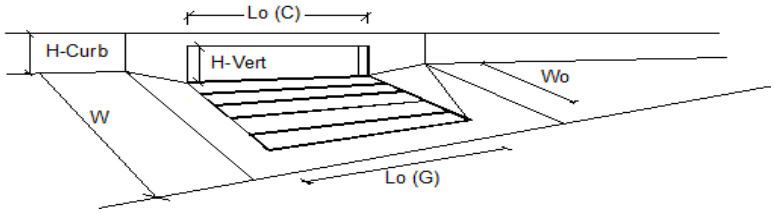


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
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 =**	**0.7**	**1.3**	**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**	**%**

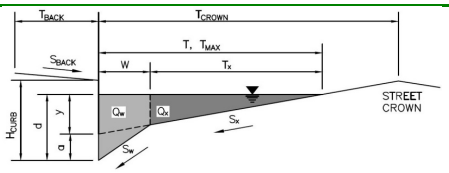
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

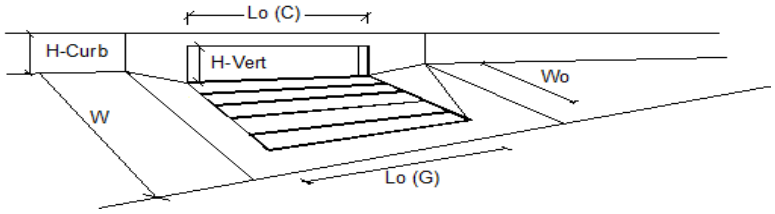
	Minor Storm	Major Storm	
Q_{allow} =	**12.3**	**76.2**	**cfs**

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'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
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 =**	**0.6**	**1.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**94**	**%**

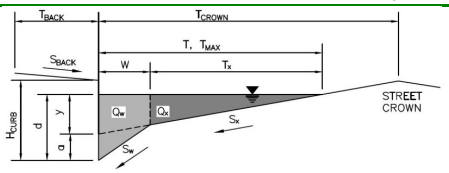
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP6



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

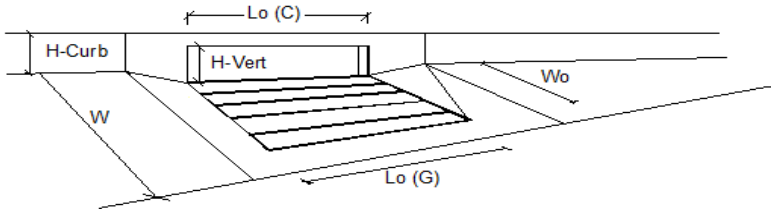
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.3**	**76.2**	**cfs**

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'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
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 =**	**0.9**	**1.7**	**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**	**%**

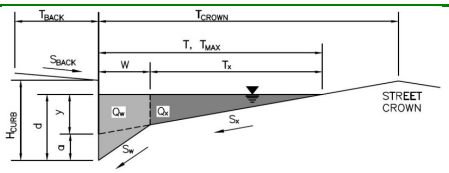
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP7



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

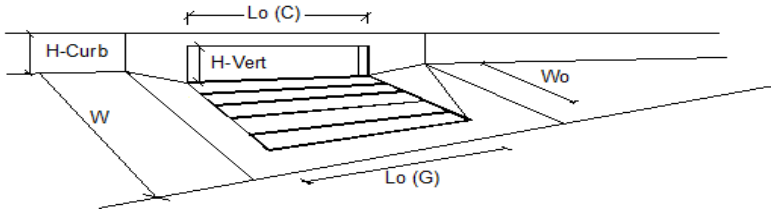
	Minor Storm	Major Storm	
Q_{allow} =	**12.3**	**76.2**	**cfs**

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'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
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 =**	**0.5**	**1.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**98**	**%**

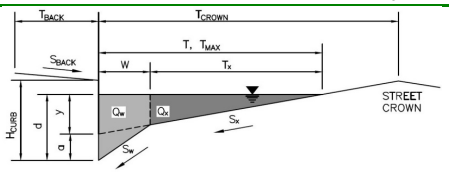
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP9



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	43.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.012	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	43.0	43.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

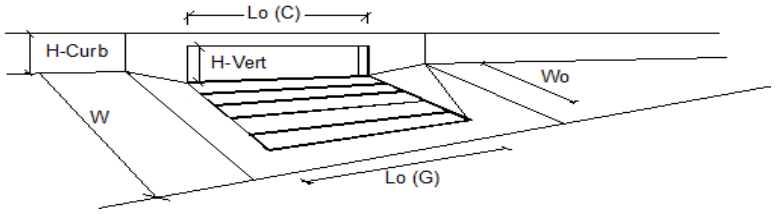
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**19.2**	**72.1**	**cfs**

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'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
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 =**	**0.7**	**1.4**	**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**	**%**

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.53	inches	
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.75	inches	
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches	
Optional User Defined Storm	CUHP			
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event			
Max Intensity for Optional User Defined Storm	0			

Designer:	**Matt Larson**
Company:	**Classic Consulting**
Date:	**January 30, 2022**
Project:	**SOUTH ACADEMY HIGHLANDS FIL. 4**
Location:	**LOTS 1-4**

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**PIPE 12**														
Receiving Pervious Area Soil Type	Sandy Loam														
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	3.850														
Directly Connected Impervious Area (DCIA, acres)	3.390														
Unconnected Impervious Area (UIA, acres)	0.000														
Receiving Pervious Area (RPA, acres)	0.000														
Separate Pervious Area (SPA, acres)	0.460														
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C														

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	3.850														
Directly Connected Impervious Area (DCIA, %)	88.1%														
Unconnected Impervious Area (UIA, %)	0.0%														
Receiving Pervious Area (RPA, %)	0.0%														
Separate Pervious Area (SPA, %)	11.9%														
A_R (RPA / UIA)	0.000														
I_a Check	1.000														
f / I for WQCV Event:	2.0														
f / I for 5-Year Event:	0.5														
f / I for 100-Year Event:	0.3														
f / I for Optional User Defined Storm CUHP:															
IRF for WQCV Event:	1.00														
IRF for 5-Year Event:	1.00														
IRF for 100-Year Event:	1.00														
IRF for Optional User Defined Storm CUHP:															
Total Site Imperviousness: I_{total}	88.1%														
Effective Imperviousness for WQCV Event:	88.1%														
Effective Imperviousness for 5-Year Event:	88.1%														
Effective Imperviousness for 100-Year Event:	88.1%														
Effective Imperviousness for Optional User Defined Storm CUHP:															

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
100-Year Event CREDIT**: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
User Defined CUHP CREDIT: Reduce Detention By:															

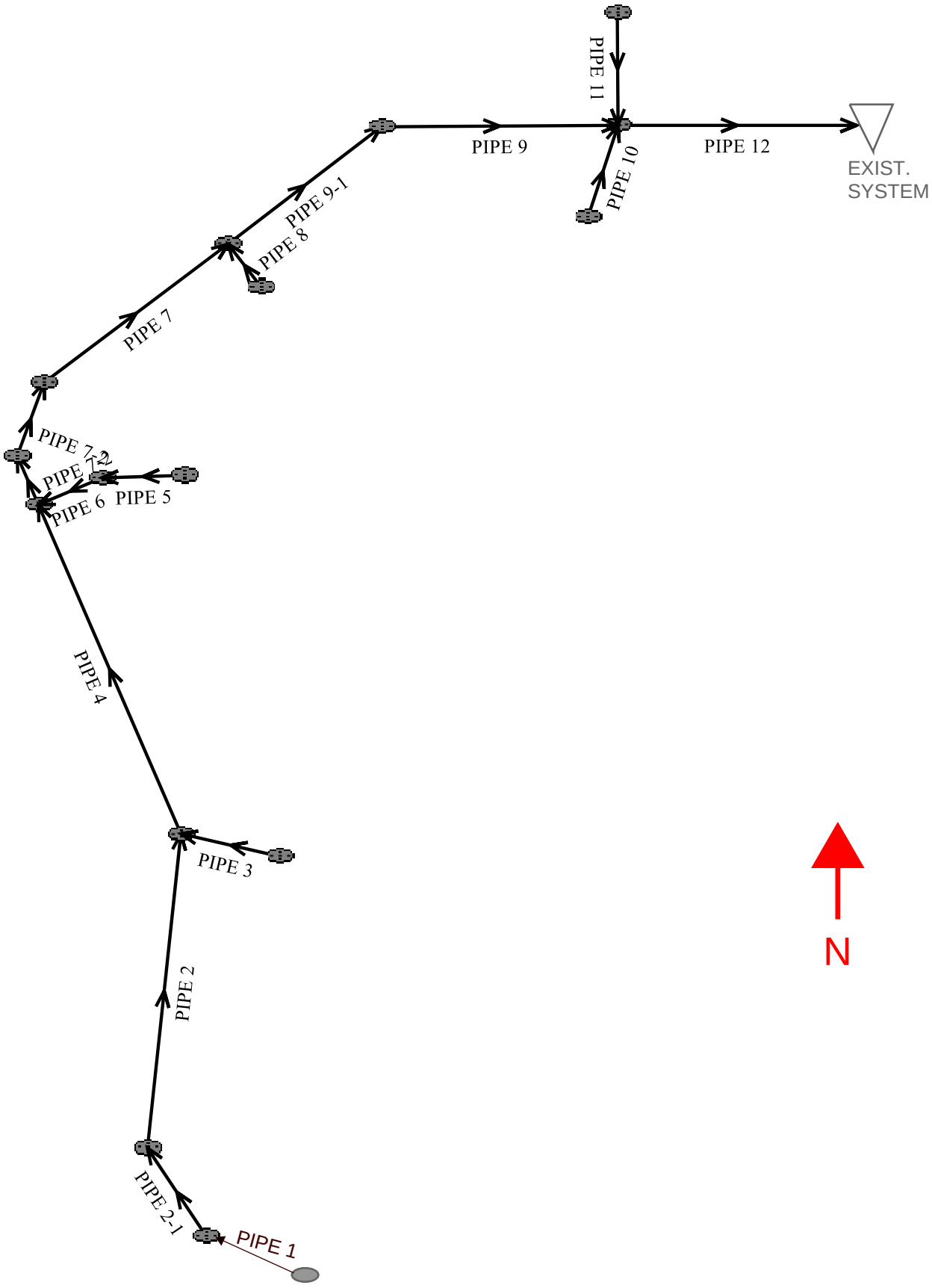
Total Site Imperviousness:	**88.1%**
Total Site Effective Imperviousness for WQCV Event:	**88.1%**
Total Site Effective Imperviousness for 5-Year Event:	**88.1%**
Total Site Effective Imperviousness for 100-Year Event:	**88.1%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed


PIPE 11
PIPE 9
PIPE 12
EXIST.
SYSTEM
PIPE 10
PIPE 9-1
PIPE 8
PIPE 7
PIPE 7-2
PIPE 7-1
PIPE 6
PIPE 5
PIPE 4
PIPE 3
PIPE 2
PIPE 2-1
PIPE 1
N

System Input Summary - FILING 4 HGL – 100 YR

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 500
Maximum Urban Overland Len. (ft): 300
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	**Ground Elevation (ft)**	**Total Known Flow (cfs)**	**Local Contribution (cfs)**	**Drainage Area (Ac.)**	**Runoff Coefficient**	**5yr Coefficient**	**Overland Length (ft)**	**Overland Slope (%)**	**Gutter Length (ft)**	**Gutter Velocity (fps)**
OUTFALL 1	5880.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 12	5891.92	28.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9	5893.23	20.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9-1	5894.41	20.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7	5896.00	19.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7-1	5896.00	19.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7-2	5896.68	19.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 6	5896.84	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 5	5897.50	5.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 4	5899.19	13.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 3	5900.00	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 2	5901.00	7.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 2-1	5901.63	7.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 1	5902.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 8	5894.80	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 10	5894.00	7.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 11	5891.79	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PIPE 12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.80	Surface Water Present (Downstream)
PIPE 9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.70	
PIPE 9-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.70	
PIPE 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.90	
PIPE 7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.90	
PIPE 7-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.90	
PIPE 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
PIPE 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.30	
PIPE 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.40	
PIPE 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.50	
PIPE 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80	
PIPE 2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80	
PIPE 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.50	
PIPE 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	
PIPE 10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	
PIPE 11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
PIPE 12	98.50	5880.19	1.0	5881.17	0.013	0.03	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 9	113.45	5881.47	0.5	5882.04	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 9-1	76.79	5882.34	0.5	5882.72	0.013	0.25	0.53	CIRCULAR	30.00 in	30.00 in
PIPE 7	110.00	5883.02	0.5	5883.57	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 7-1	21.99	5883.57	0.5	5883.68	0.013	0.20	0.58	CIRCULAR	30.00 in	30.00 in
PIPE 7-2	10.00	5883.68	0.5	5883.73	0.013	0.20	0.58	CIRCULAR	30.00 in	30.00 in
PIPE 6	10.00	5884.73	0.5	5884.78	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 5	16.00	5885.08	0.5	5885.16	0.013	0.05	0.84	CIRCULAR	18.00 in	18.00 in
PIPE 4	150.32	5884.23	0.5	5884.98	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 3	25.00	5885.49	0.5	5885.61	0.013	0.31	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 2	133.22	5885.48	0.6	5886.28	0.013	0.13	0.68	CIRCULAR	18.00 in	18.00 in
PIPE 2-1	27.37	5886.29	0.6	5886.45	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 1	20.00	5886.75	0.6	5886.87	0.013	0.05	0.84	CIRCULAR	18.00 in	18.00 in
PIPE 8	5.36	5883.72	10.1	5884.26	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 10	24.00	5881.67	0.5	5881.79	0.013	1.19	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 11	20.99	5882.17	0.5	5882.27	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
PIPE 12	41.13	8.38	21.96	7.48	18.50	9.07	1.40	Supercritical	28.80	0.00	
PIPE 9	29.08	5.92	18.54	6.50	18.70	6.43	0.98	Subcritical	20.70	0.00	
PIPE 9-1	29.08	5.92	18.54	6.50	18.70	6.43	0.98	Subcritical	20.70	0.00	
PIPE 7	29.08	5.92	18.17	6.40	18.22	6.38	0.99	Subcritical	19.90	0.00	
PIPE 7-1	29.08	5.92	18.17	6.40	18.22	6.38	0.99	Subcritical	19.90	0.00	
PIPE 7-2	29.08	5.92	18.17	6.40	18.22	6.38	0.99	Subcritical	19.90	0.00	
PIPE 6	7.45	4.21	12.29	5.45	13.87	4.79	0.78	Subcritical	7.00	0.00	
PIPE 5	7.45	4.21	10.64	4.87	11.22	4.58	0.90	Subcritical	5.30	0.00	
PIPE 4	16.04	5.11	15.81	6.10	16.77	5.72	0.89	Subcritical	13.40	0.00	
PIPE 3	7.45	4.21	9.77	4.59	10.09	4.41	0.94	Subcritical	4.50	0.00	
PIPE 2	8.16	4.62	12.98	5.72	14.09	5.26	0.85	Subcritical	7.80	0.00	
PIPE 2-1	8.16	4.62	12.98	5.72	14.09	5.26	0.85	Pressurized	7.80	27.37	
PIPE 1	8.16	4.62	11.83	5.28	12.14	5.13	0.95	Subcritical Surcharged	6.50	9.39	
PIPE 8	33.47	18.94	4.70	3.00	2.24	8.71	4.30	Supercritical	1.10	0.00	
PIPE 10	16.05	5.11	11.76	4.96	11.63	5.04	1.02	Pressurized	7.60	24.00	
PIPE 11	7.45	4.21	5.32	3.21	5.29	3.23	1.01	Pressurized	1.40	20.99	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PIPE 12	28.80	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
PIPE 9	20.70	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
PIPE 9-1	20.70	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
PIPE 7	19.90	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
PIPE 7-1	19.90	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
PIPE 7-2	19.90	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
PIPE 6	7.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 5	5.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 4	13.40	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 3	4.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 2	7.80	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 2-1	7.80	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 1	6.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 8	1.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 10	7.60	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
PIPE 11	1.40	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.

- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 0.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
PIPE 12	5880.19	5881.17	0.00	0.00	5881.73	5883.00	5883.00	0.87	5883.87
PIPE 9	5881.47	5882.04	0.01	0.26	5883.86	5884.04	5884.14	0.27	5884.42
PIPE 9-1	5882.34	5882.72	0.07	0.13	5884.24	5884.36	5884.65	0.28	5884.93
PIPE 7	5883.02	5883.57	0.01	0.02	5884.53	5885.09	5885.17	0.55	5885.72
PIPE 7-1	5883.57	5883.68	0.05	0.11	5885.51	5885.54	5885.88	0.06	5885.94
PIPE 7-2	5883.68	5883.73	0.05	0.11	5885.78	5885.79	5886.10	0.02	5886.12
PIPE 6	5884.73	5884.78	0.32	0.00	5886.19	5886.23	5886.44	0.04	5886.48
PIPE 5	5885.08	5885.16	0.01	0.13	5886.46	5886.49	5886.61	0.04	5886.65
PIPE 4	5884.23	5884.98	0.01	0.00	5885.81	5886.35	5886.20	0.68	5886.88
PIPE 3	5885.49	5885.61	0.03	0.00	5886.79	5886.82	5886.91	0.04	5886.96
PIPE 2	5885.48	5886.28	0.04	0.08	5886.56	5887.53	5887.07	0.84	5887.91
PIPE 2-1	5886.29	5886.45	0.11	0.17	5887.89	5888.04	5888.19	0.15	5888.34
PIPE 1	5886.75	5886.87	0.01	0.13	5888.27	5888.34	5888.48	0.07	5888.55
PIPE 8	5883.72	5884.26	0.01	0.00	5884.37	5885.06	5885.08	0.00	5885.08

PIPE 10	5881.67	5881.79	0.11	0.00	5883.89	5883.91	5883.98	0.03	5884.00
PIPE 11	5882.17	5882.27	0.01	0.00	5883.87	5883.88	5883.88	0.00	5883.89

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 12	98.50	3.50	6.00	6.08	0.00	0.79	0.00	20.00	11.54	7.96	225.12	Sewer Too Shallow
PIPE 9	113.45	3.50	6.00	6.08	19.39	11.24	7.66	20.88	11.98	8.40	504.83	
PIPE 9-1	76.79	3.50	6.00	6.08	20.29	11.69	8.10	21.88	12.48	8.90	369.51	
PIPE 7	110.00	3.50	6.00	6.08	21.28	12.18	8.60	23.36	13.22	9.64	584.41	
PIPE 7-1	21.99	3.50	6.00	6.08	23.36	13.22	9.64	23.14	13.11	9.53	125.24	
PIPE 7-2	10.00	3.50	6.00	6.08	23.14	13.11	9.53	24.40	13.74	10.16	59.25	
PIPE 6	10.00	2.50	4.00	4.92	23.40	12.49	10.24	23.62	12.60	10.35	54.86	
PIPE 5	16.00	2.50	4.00	4.92	23.02	12.30	10.05	24.18	12.88	10.63	88.45	

PIPE 4	150.32	3.00	4.00	5.50	23.90	13.03	10.20	27.42	14.79	11.96	996.14	
PIPE 3	25.00	2.50	4.00	4.92	26.91	14.25	12.00	28.28	14.93	12.68	185.58	
PIPE 2	133.22	2.50	4.00	4.92	26.92	14.25	12.00	28.94	15.26	13.01	1012.49	
PIPE 2-1	27.37	2.50	4.00	4.92	28.93	15.26	13.01	29.86	15.72	13.47	229.09	
PIPE 1	20.00	2.50	4.00	4.92	29.26	15.42	13.17	29.76	15.67	13.42	168.64	
PIPE 8	5.36	2.50	4.00	4.92	20.88	11.23	8.98	20.58	11.08	8.83	23.30	
PIPE 10	24.00	3.00	4.00	5.50	19.50	10.83	8.00	23.42	12.79	9.96	115.21	
PIPE 11	20.99	2.50	4.00	4.92	19.01	10.30	8.05	18.54	10.06	7.81	76.24	

Total earth volume for sewer trenches = 4818 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
    - Four inches for pipes less than 33 inches.
    - Six inches for pipes less than 60 inches.
    - Eight inches for all larger sizes.

System Input Summary

5 – YEAR HGL CALCS

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 500
Maximum Urban Overland Len. (ft): 300
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	**Ground Elevation (ft)**	**Total Known Flow (cfs)**	**Local Contribution (cfs)**	**Drainage Area (Ac.)**	**Runoff Coefficient**	**5yr Coefficient**	**Overland Length (ft)**	**Overland Slope (%)**	**Gutter Length (ft)**	**Gutter Velocity (fps)**
OUTFALL 1	5880.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 12	5891.92	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9	5893.23	10.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9-1	5894.41	10.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7	5896.00	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7-1	5896.00	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7-2	5896.68	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 6	5896.84	3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 5	5897.50	2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 4	5899.19	6.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 3	5900.00	2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 2	5901.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 2-1	5901.63	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 1	5902.00	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 8	5894.80	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 10	5894.00	3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 11	5891.79	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PIPE 12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.00	Surface Water Present (Downstream)
PIPE 9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.60	
PIPE 9-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.60	
PIPE 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.20	
PIPE 7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.20	
PIPE 7-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.20	
PIPE 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.60	
PIPE 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70	
PIPE 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.90	
PIPE 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	
PIPE 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	
PIPE 2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	
PIPE 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30	
PIPE 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	
PIPE 10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.90	
PIPE 11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
PIPE 12	98.50	5880.19	1.0	5881.17	0.013	0.03	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 9	113.45	5881.47	0.5	5882.04	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 9-1	76.79	5882.34	0.5	5882.72	0.013	0.25	0.53	CIRCULAR	30.00 in	30.00 in
PIPE 7	110.00	5883.02	0.5	5883.57	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 7-1	21.99	5883.57	0.5	5883.68	0.013	0.20	0.58	CIRCULAR	30.00 in	30.00 in
PIPE 7-2	10.00	5883.68	0.5	5883.73	0.013	0.20	0.58	CIRCULAR	30.00 in	30.00 in
PIPE 6	10.00	5884.73	0.5	5884.78	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 5	16.00	5885.08	0.5	5885.16	0.013	0.05	0.84	CIRCULAR	18.00 in	18.00 in
PIPE 4	150.32	5884.23	0.5	5884.98	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 3	25.00	5885.49	0.5	5885.61	0.013	0.31	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 2	133.22	5885.48	0.6	5886.28	0.013	0.13	0.68	CIRCULAR	18.00 in	18.00 in
PIPE 2-1	27.37	5886.29	0.6	5886.45	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 1	20.00	5886.75	0.6	5886.87	0.013	0.05	0.84	CIRCULAR	18.00 in	18.00 in
PIPE 8	5.36	5883.72	10.1	5884.26	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 10	24.00	5881.67	0.5	5881.79	0.013	1.19	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 11	20.99	5882.17	0.5	5882.27	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
PIPE 12	41.13	8.38	16.21	5.91	12.99	7.85	1.53	Supercritical	16.00	0.00	
PIPE 9	29.08	5.92	13.07	5.16	12.53	5.46	1.08	Supercritical	10.60	0.00	
PIPE 9-1	29.08	5.92	13.07	5.16	12.53	5.46	1.08	Supercritical	10.60	0.00	
PIPE 7	29.08	5.92	12.81	5.10	12.27	5.40	1.09	Supercritical	10.20	0.00	
PIPE 7-1	29.08	5.92	12.81	5.10	12.27	5.40	1.09	Supercritical	10.20	0.00	
PIPE 7-2	29.08	5.92	12.81	5.10	12.27	5.40	1.09	Supercritical	10.20	0.00	
PIPE 6	7.45	4.21	8.69	4.26	8.82	4.18	0.97	Subcritical	3.60	0.00	
PIPE 5	7.45	4.21	7.48	3.89	7.50	3.88	1.00	Subcritical	2.70	0.00	
PIPE 4	16.04	5.11	11.18	4.81	11.00	4.91	1.03	Supercritical	6.90	0.00	
PIPE 3	7.45	4.21	6.88	3.70	6.87	3.71	1.00	Supercritical	2.30	0.00	
PIPE 2	8.16	4.62	9.18	4.41	8.90	4.59	1.06	Supercritical	4.00	0.00	
PIPE 2-1	8.16	4.62	9.18	4.41	8.90	4.59	1.06	Supercritical	4.00	0.00	
PIPE 1	8.16	4.62	8.30	4.14	7.97	4.37	1.08	Supercritical	3.30	0.00	
PIPE 8	33.47	18.94	3.14	2.42	1.54	6.87	4.11	Supercritical	0.50	0.00	
PIPE 10	16.05	5.11	8.31	4.04	8.06	4.21	1.06	Supercritical	3.90	0.00	
PIPE 11	7.45	4.21	3.73	2.65	3.73	2.65	1.00	Subcritical	0.70	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PIPE 12	16.00	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
PIPE 9	10.60	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
PIPE 9-1	10.60	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
PIPE 7	10.20	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
PIPE 7-1	10.20	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
PIPE 7-2	10.20	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
PIPE 6	3.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 5	2.70	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 4	6.90	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 3	2.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 2	4.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 2-1	4.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 1	3.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 8	0.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 10	3.90	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 11	0.70	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.

- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 0.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
PIPE 12	5880.19	5881.17	0.00	0.00	5881.27	5882.52	5882.23	0.84	5883.06
PIPE 9	5881.47	5882.04	0.00	0.09	5882.98	5883.13	5883.16	0.38	5883.54
PIPE 9-1	5882.34	5882.72	0.02	0.03	5883.38	5883.81	5883.84	0.38	5884.22
PIPE 7	5883.02	5883.57	0.00	0.01	5884.04	5884.64	5884.50	0.55	5885.04
PIPE 7-1	5883.57	5883.68	0.01	0.03	5884.81	5884.81	5885.08	0.07	5885.16
PIPE 7-2	5883.68	5883.73	0.01	0.03	5884.93	5884.93	5885.20	0.03	5885.23
PIPE 6	5884.73	5884.78	0.09	0.00	5885.45	5885.52	5885.74	0.05	5885.79
PIPE 5	5885.08	5885.16	0.00	0.03	5885.70	5885.79	5885.94	0.08	5886.02
PIPE 4	5884.23	5884.98	0.00	0.00	5885.15	5885.91	5885.52	0.75	5886.27
PIPE 3	5885.49	5885.61	0.01	0.00	5886.01	5886.18	5886.28	0.12	5886.40
PIPE 2	5885.48	5886.28	0.01	0.02	5886.22	5887.05	5886.55	0.80	5887.35
PIPE 2-1	5886.29	5886.45	0.03	0.04	5887.25	5887.25	5887.42	0.10	5887.52
PIPE 1	5886.75	5886.87	0.00	0.03	5887.41	5887.56	5887.71	0.12	5887.83
PIPE 8	5883.72	5884.26	0.00	0.00	5883.85	5884.52	5884.58	0.03	5884.61

PIPE 10	5881.67	5881.79	0.03	0.00	5883.05	5883.05	5883.09	0.01	5883.10
PIPE 11	5882.17	5882.27	0.00	0.00	5883.06	5883.06	5883.07	0.00	5883.07

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

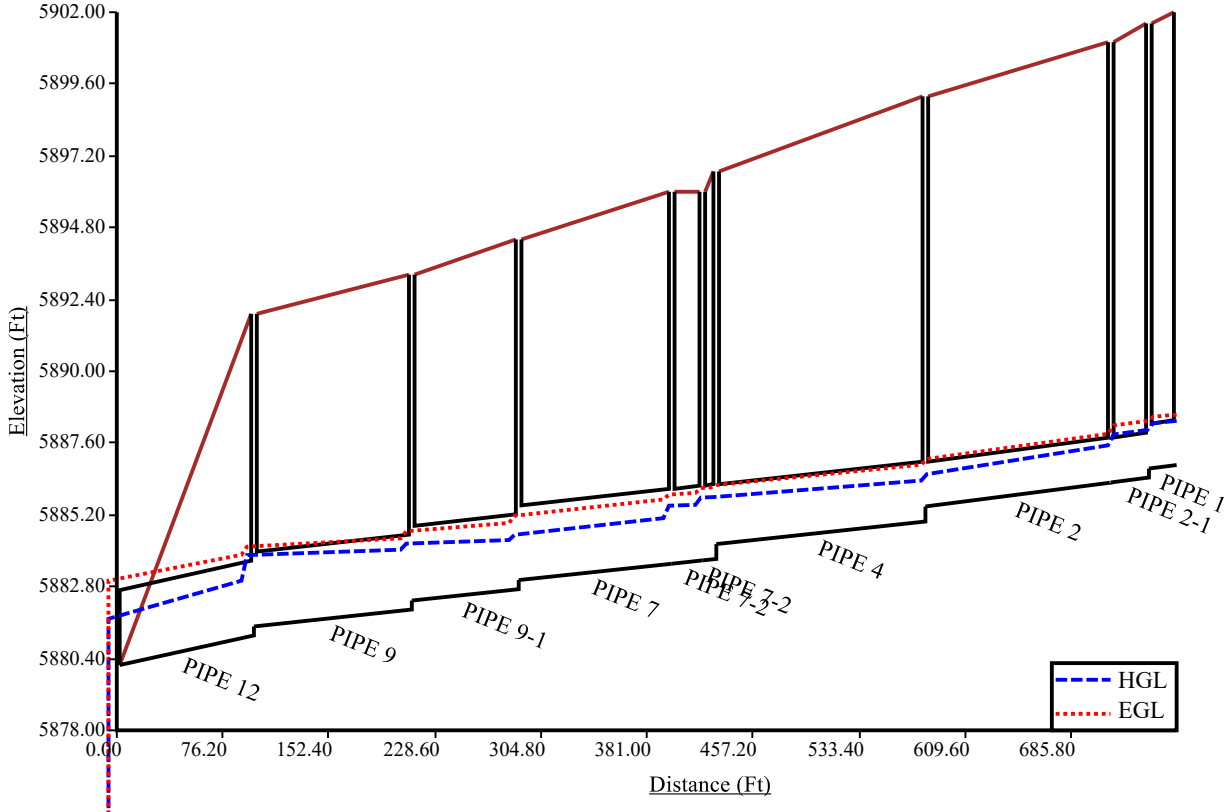
					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 12	98.50	3.50	6.00	6.08	0.00	0.79	0.00	20.00	11.54	7.96	225.12	Sewer Too Shallow
PIPE 9	113.45	3.50	6.00	6.08	19.39	11.24	7.66	20.88	11.98	8.40	504.83	
PIPE 9-1	76.79	3.50	6.00	6.08	20.29	11.69	8.10	21.88	12.48	8.90	369.51	
PIPE 7	110.00	3.50	6.00	6.08	21.28	12.18	8.60	23.36	13.22	9.64	584.41	
PIPE 7-1	21.99	3.50	6.00	6.08	23.36	13.22	9.64	23.14	13.11	9.53	125.24	
PIPE 7-2	10.00	3.50	6.00	6.08	23.14	13.11	9.53	24.40	13.74	10.16	59.25	
PIPE 6	10.00	2.50	4.00	4.92	23.40	12.49	10.24	23.62	12.60	10.35	54.86	
PIPE 5	16.00	2.50	4.00	4.92	23.02	12.30	10.05	24.18	12.88	10.63	88.45	

PIPE 4	150.32	3.00	4.00	5.50	23.90	13.03	10.20	27.42	14.79	11.96	996.14	
PIPE 3	25.00	2.50	4.00	4.92	26.91	14.25	12.00	28.28	14.93	12.68	185.58	
PIPE 2	133.22	2.50	4.00	4.92	26.92	14.25	12.00	28.94	15.26	13.01	1012.49	
PIPE 2-1	27.37	2.50	4.00	4.92	28.93	15.26	13.01	29.86	15.72	13.47	229.09	
PIPE 1	20.00	2.50	4.00	4.92	29.26	15.42	13.17	29.76	15.67	13.42	168.64	
PIPE 8	5.36	2.50	4.00	4.92	20.88	11.23	8.98	20.58	11.08	8.83	23.30	
PIPE 10	24.00	3.00	4.00	5.50	19.50	10.83	8.00	23.42	12.79	9.96	115.21	
PIPE 11	20.99	2.50	4.00	4.92	19.01	10.30	8.05	18.54	10.06	7.81	76.24	

Total earth volume for sewer trenches = 4818 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
    - Four inches for pipes less than 33 inches.
    - Six inches for pipes less than 60 inches.
    - Eight inches for all larger sizes.

MAIN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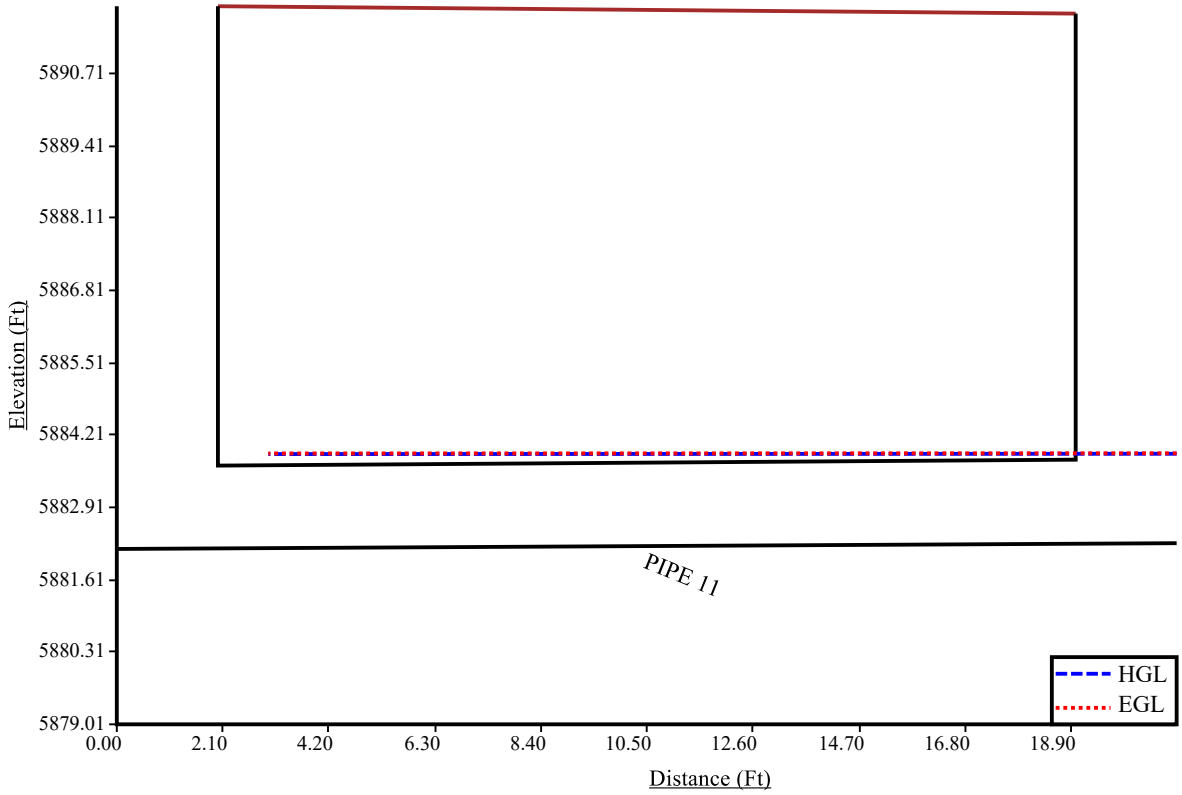
5878.00
Elevation (Ft)
0.00
76.20
152.40
228.60
304.80
381.00
457.20
533.40
609.60
685.80
Distance (Ft)
PIPE 12
PIPE 9
PIPE 9-1
PIPE 7
PIPE 7-1
PIPE 7-2
PIPE 4
PIPE 2
PIPE 2-1
PIPE 1
HGL
EGL

LAT B-1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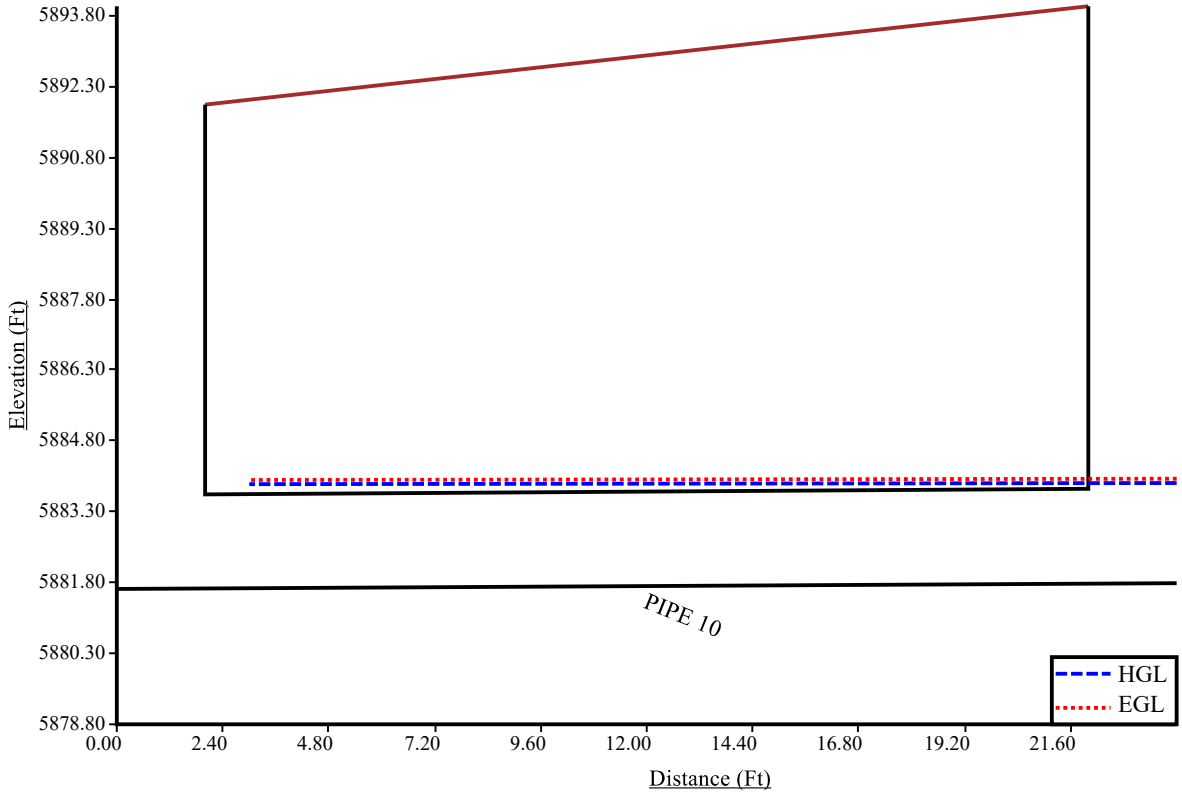
Elevation (Ft)
PIPE 11
HGL
EGL
0.00
2.10
4.20
6.30
8.40
10.50
12.60
14.70
16.80
18.90
Distance (Ft)

LATB-2-100YR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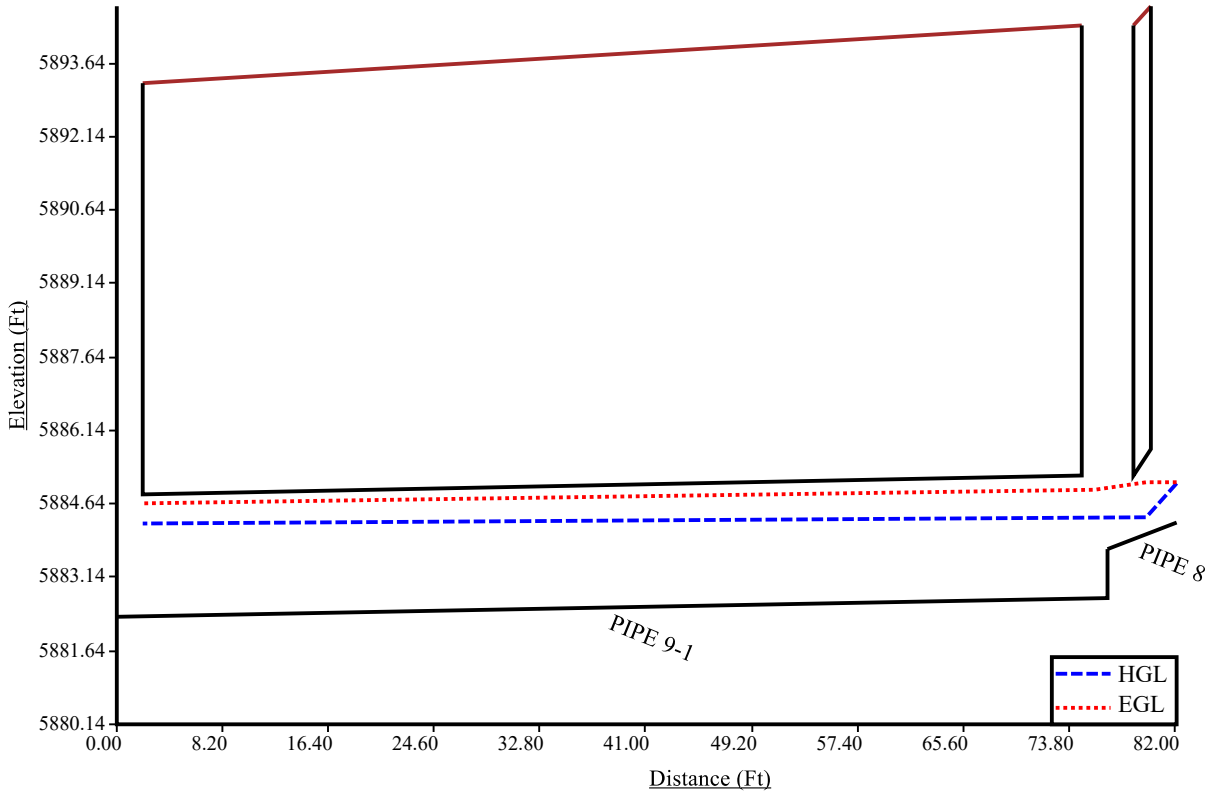
5887.80
5886.30
5884.80
5883.30
5881.80
5880.30
5878.80
Elevation (Ft)
PIPE 10
HGL
EGL
0.00
2.40
4.80
7.20
9.60
12.00
14.40
16.80
19.20
21.60
Distance (Ft)

LAT C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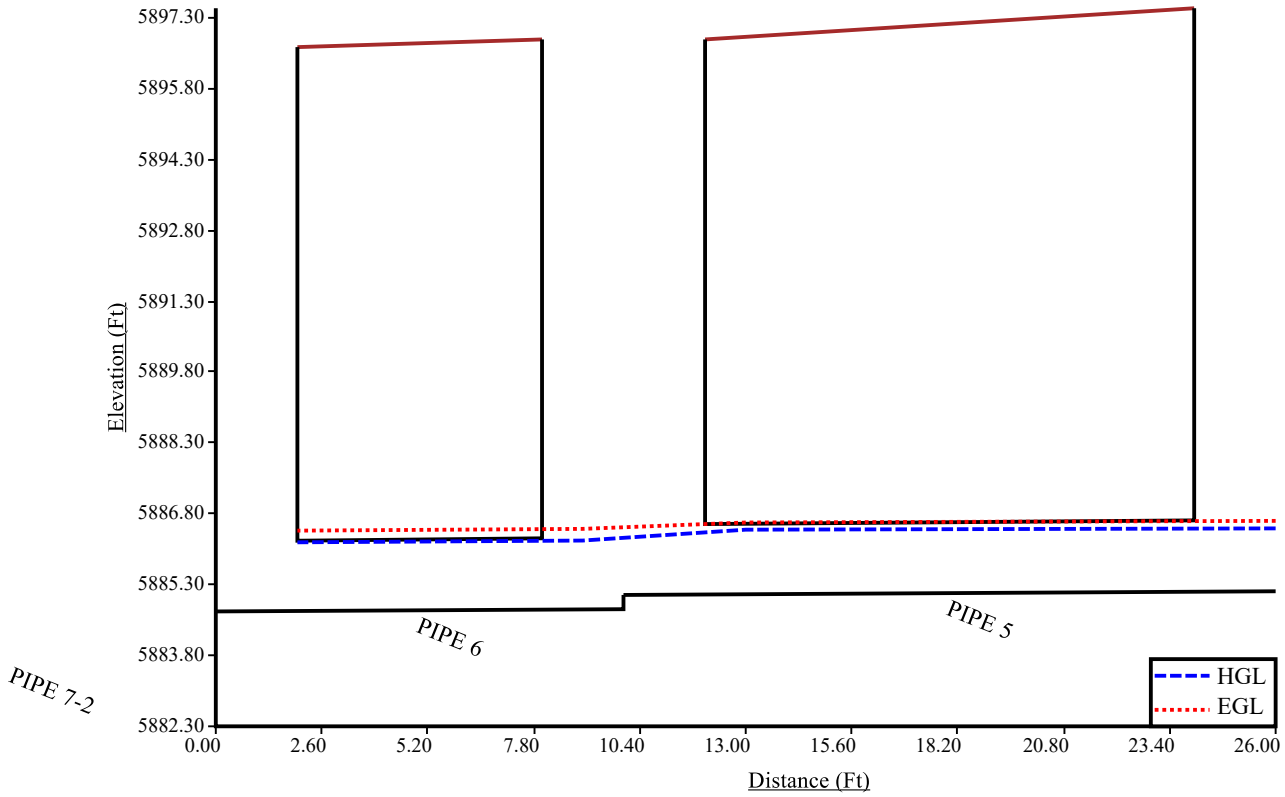
0.00
8.20
16.40
24.60
32.80
41.00
49.20
57.40
65.60
73.80
82.00
Distance (Ft)
PIPE 8
PIPE 9-1
HGL
EGL

LAT D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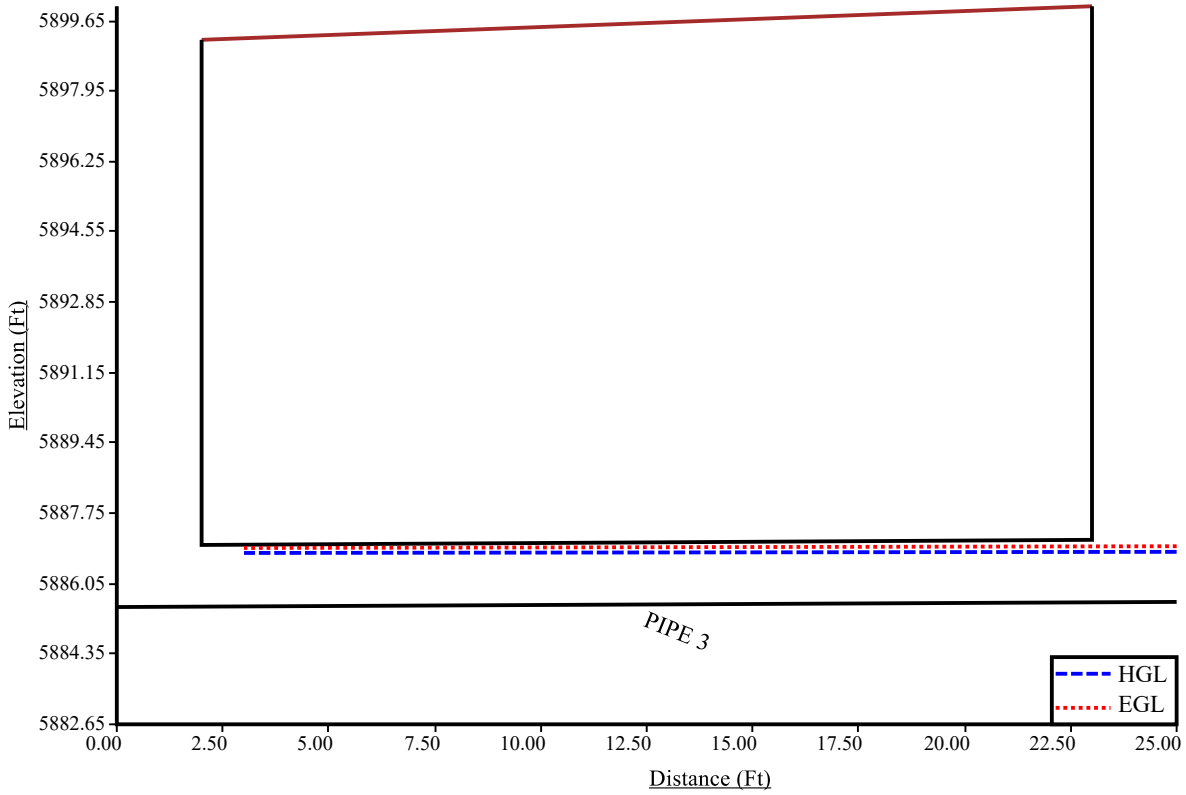
Elevation (Ft)
0.00
2.60
5.20
7.80
10.40
13.00
15.60
18.20
20.80
23.40
26.00
Distance (Ft)
PIPE 7-2
PIPE 6
PIPE 5
HGL
EGL

LAT E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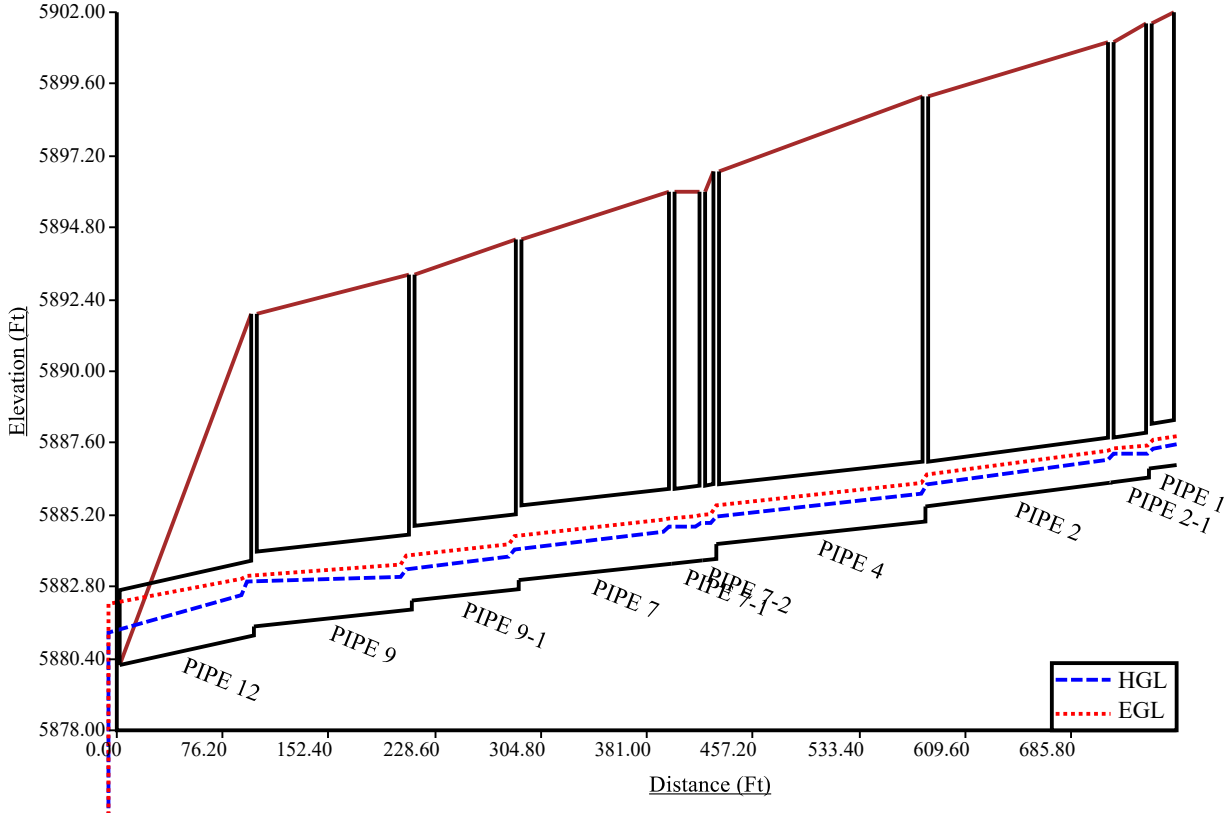
Elevation (Ft)
PIPE 3
HGL
EGL
0.00
2.50
5.00
7.50
10.00
12.50
15.00
17.50
20.00
22.50
25.00
Distance (Ft)

MAIN-5YR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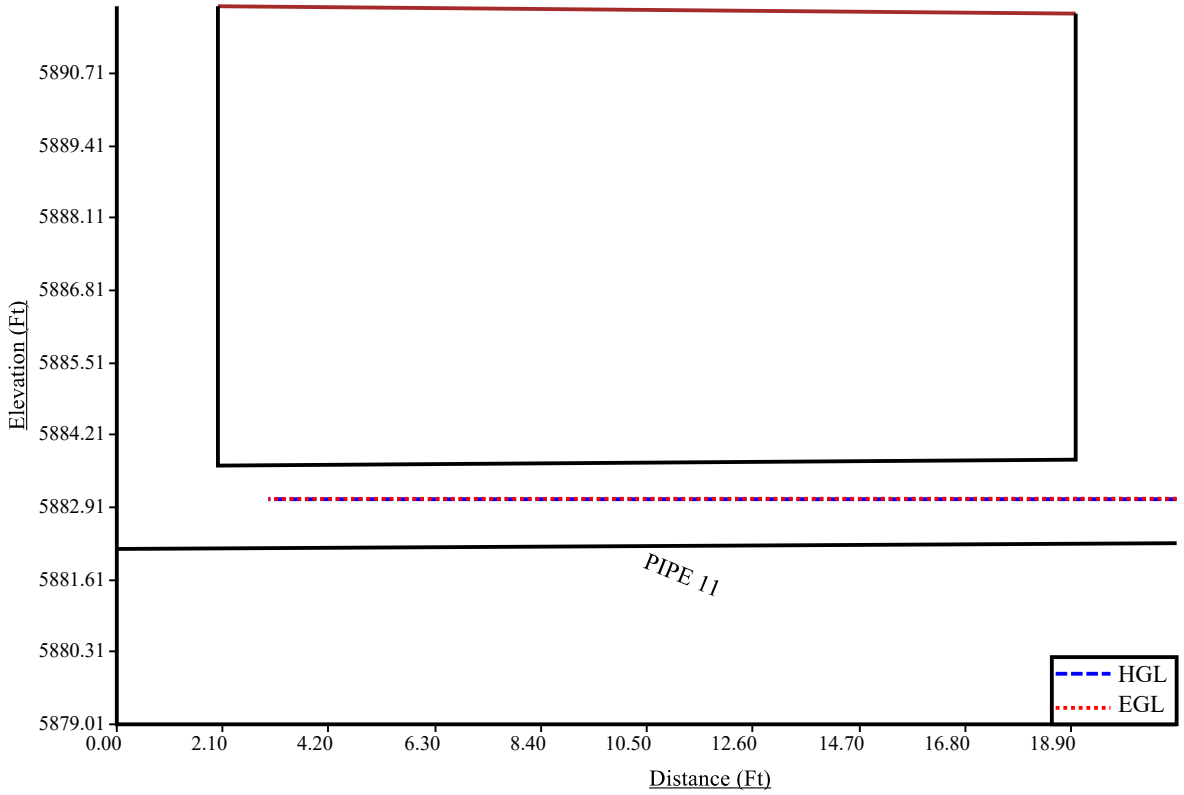
5878.00
Elevation (Ft)
0.00
76.20
152.40
228.60
304.80
381.00
457.20
533.40
609.60
685.80
Distance (Ft)
PIPE 12
PIPE 9
PIPE 9-1
PIPE 7
PIPE 7-1
PIPE 7-2
PIPE 4
PIPE 2
PIPE 2-1
PIPE 1
HGL
EGL

B-1-5YR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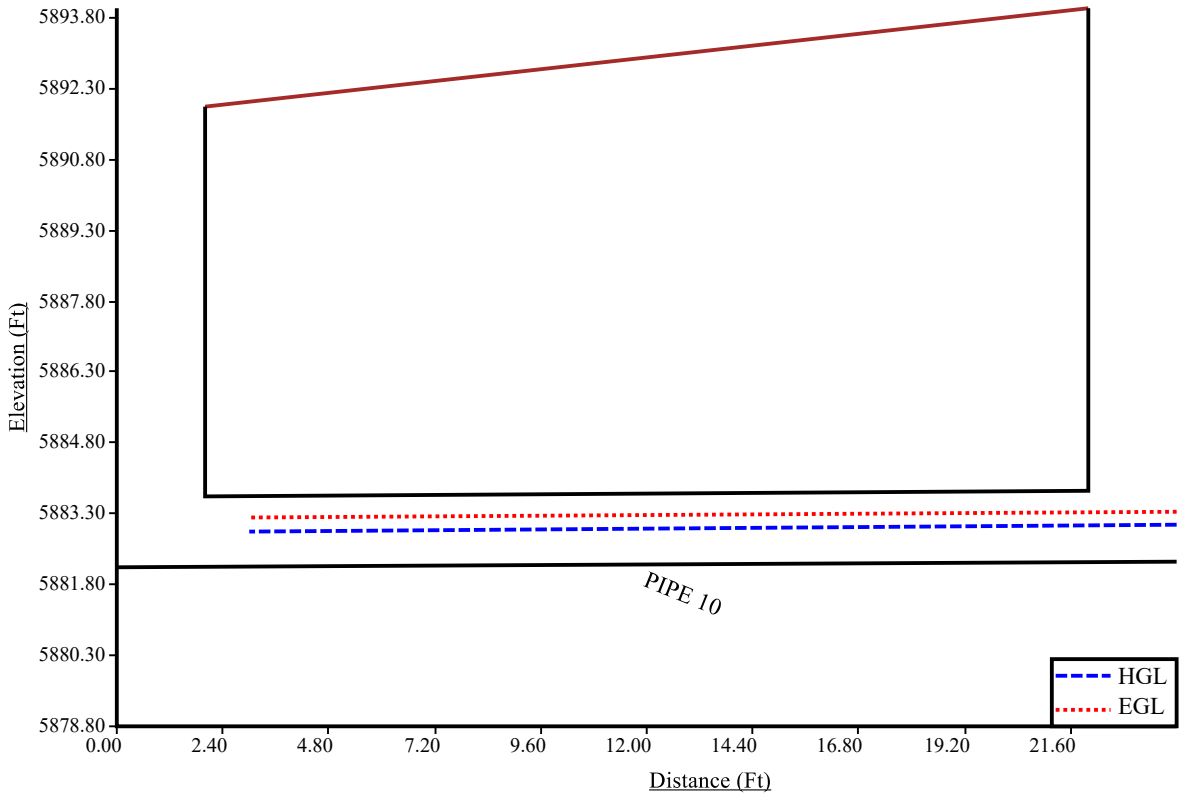
5879.01
Elevation (Ft)
PIPE 11
HGL
EGL
0.00
2.10
4.20
6.30
8.40
10.50
12.60
14.70
16.80
18.90
Distance (Ft)

B-2-5YR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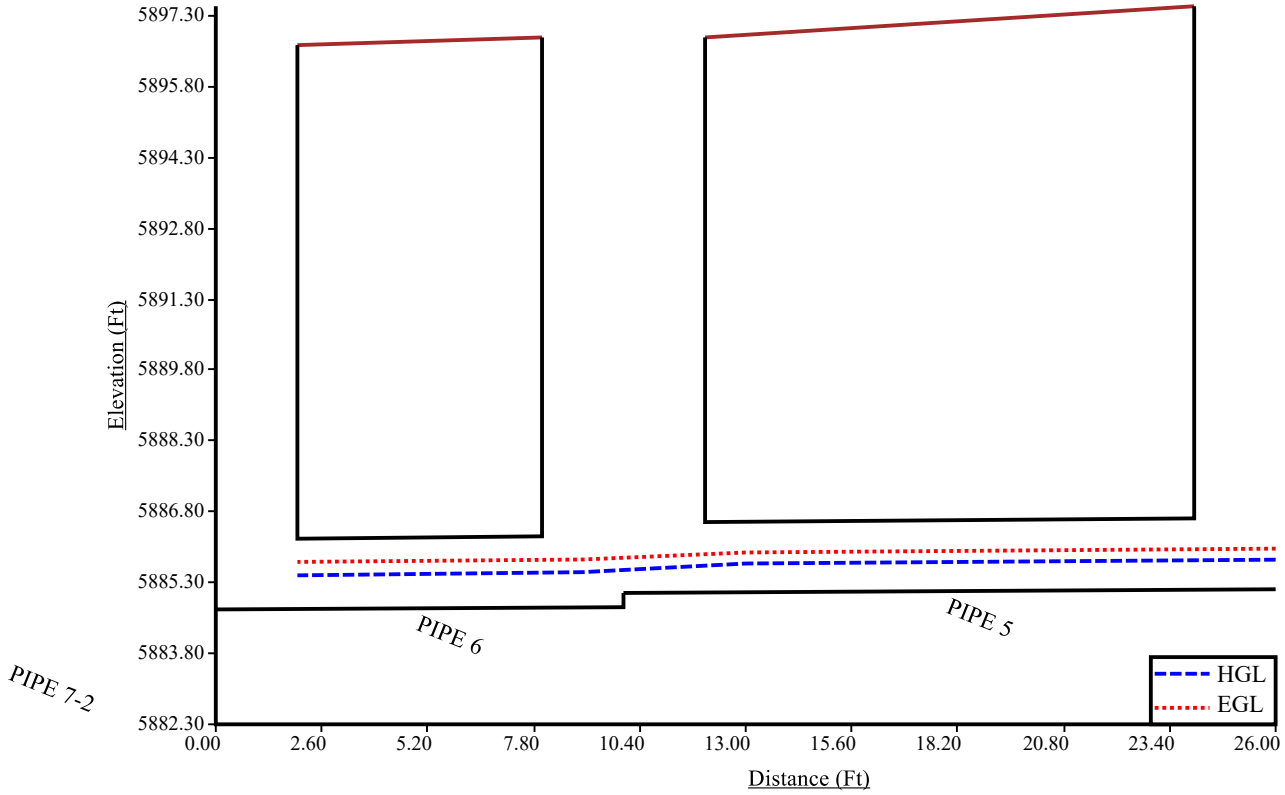
5878.80
Elevation (Ft)
PIPE 10
HGL
EGL
0.00
2.40
4.80
7.20
9.60
12.00
14.40
16.80
19.20
21.60
Distance (Ft)

D-5YR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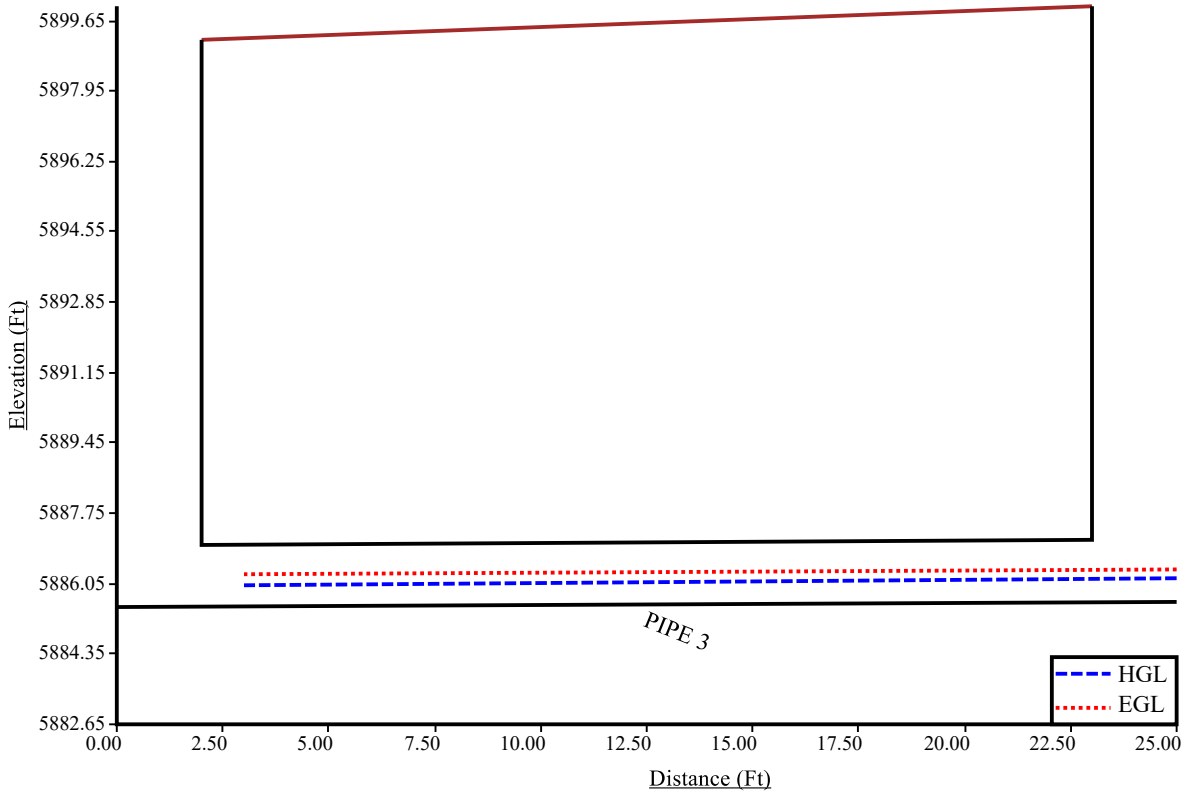
Elevation (Ft)
0.00
2.60
5.20
7.80
10.40
13.00
15.60
18.20
20.80
23.40
26.00
Distance (Ft)
PIPE 7-2
PIPE 6
PIPE 5
HGL
EGL

E-5YR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Elevation (Ft)
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2.50
5.00
7.50
10.00
12.50
15.00
17.50
20.00
22.50
25.00
Distance (Ft)
PIPE 3
HGL
EGL

DRAINAGE MAPS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

DESIGN POINT SUMMARY			
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	INLET SIZE
A	9.2	19.0	EXIST. 24" RCP
1	11.9	25.0	24" FES
B	33.8	69.9	EXIST. 24" RCP
2	40.4	86.5	36" FES
3	6.7	16.8	5' X 3' TYPE C
4	91.0	196.2	WESTERN TRIBUTARY CHANNEL
5	98.9	214.1	WESTERN TRIBUTARY CHANNEL
6	4.9	9.2	5' TYPE R SUMP INLET
7	2.0	3.8	5' TYPE R SUMP INLET
8	4.1	10.8	FUTURE STORM SYSTEM
9	11.0	27.5	FUTURE STORM SYSTEM
10	5.7	10.6	DUAL 5' SUMP INLETS
11	4.7	8.8	10' AT–GRADE INLET
12	5.7	15.2	FUTURE STORM SYSTEM
13	3.4	6.3	DUAL 5' SUMP INLETS
14	31.2	58.8	FUTURE STORM SYSTEM
15	7.8	20.8	FUTURE STORM SYSTEM
16	42.0	82.8	FUTURE STORM SYSTEM
17	23.1	43.5	FUTURE STORM SYSTEM
18	30.7	57.7	FUTURE STORM SYSTEM
19	21.8	58.2	TEMP. SEDIMENT BASIN 'H'
20	122.4	285.1	TEMP. PUBLIC POND 'T'
21	6.9	59.6	OVERALL SITE RUNOFF
22	4.2	11.0	5' TYPE R SUMP INLET
24a	3.1	7.0	EXISTING GRATED INLET
24b	5.6	12.4	15' TYPE R SUMP INLET

PIPE ROUTING (FIL. NO. 1)		
PIPE/SIZE	Q5 (CFS)	Q100 (CFS)
1 ~ 24"	11.9	25.0
2A ~ 42"	50.1	106.8
2B ~ 42"	54.4	117.6
4 ~ 18"	4.9	9.2
5 ~ 24"	6.9	13.0
6 ~ 36"	11.0	27.5
7 ~ 36"	16.4	37.5
8 ~ 30"	4.1	10.8
9 ~ 48"	20.7	47.1
10 ~ 18"	3.4	5.5
11 ~ 48"	22.2	48.9
12 ~ 36"	5.7	15.2
13 ~ 60"	76.8	151.9
14 ~ 24"	3.4	6.3
15 ~ 60"	98.9	193.2
16 ~ 36"	31.2	58.8
17 ~ 60"	99.5	194.1
18 ~ 36"	7.8	20.8
19 ~ 48"	49.1	101.8
20 ~ 36"	23.1	43.5
21 ~ 54"	62.2	125.4
22 ~ 36"	30.7	57.7
23 ~ 66"	122.9	251.0
24 ~ 24"	9.0	19.9
25 ~ 36"	30.7	57.7
26 ~ 48"	2.7	48.3

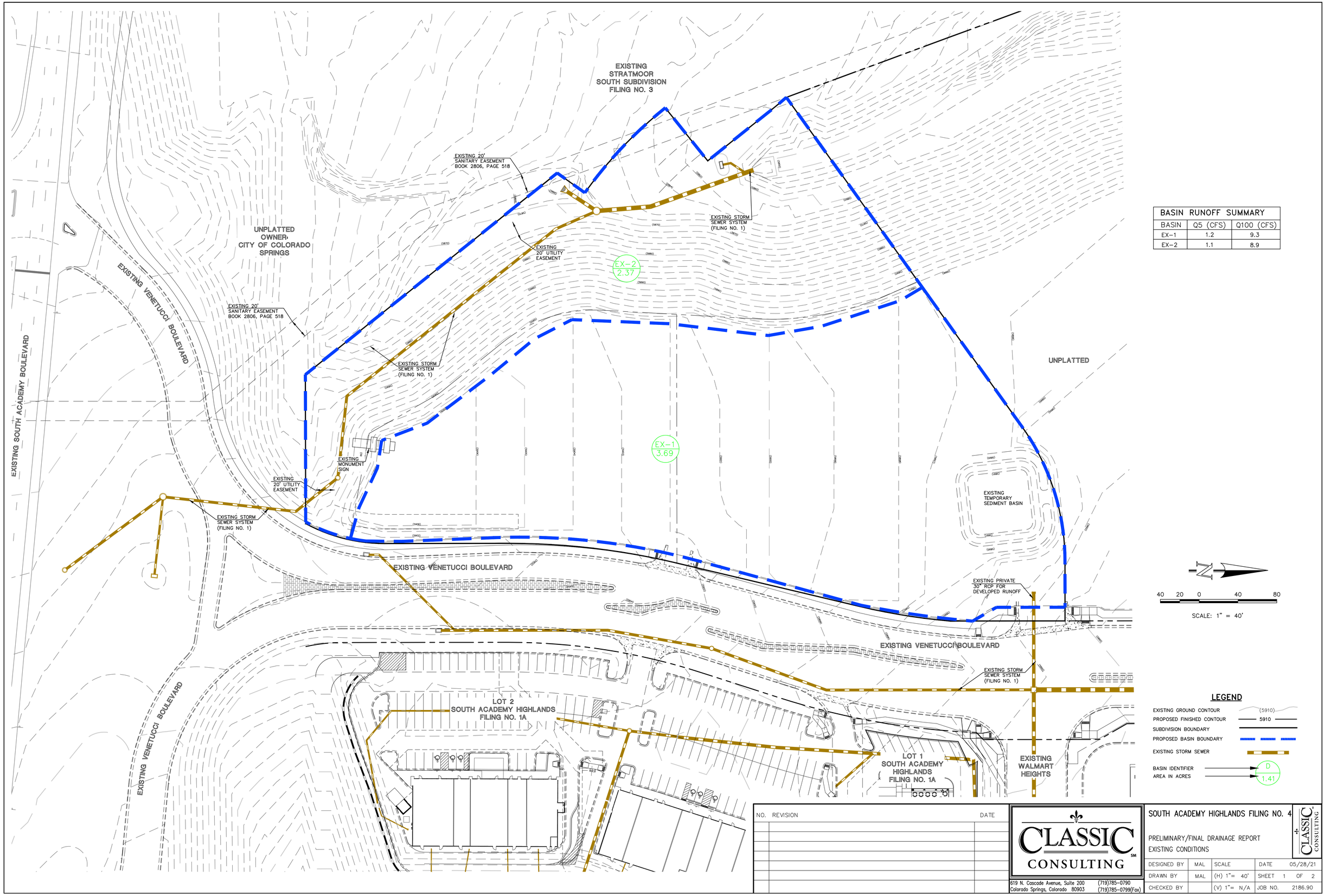
BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
A	6.7	16.8
B	4.3	11.6
C	5.7	15.2
D	7.8	20.8
E	40.7	76.6
F	30.7	57.7
G	11.0	27.5
H	31.2	58.8
I	4.1	10.8
J	5.4	14.4
K	2.9	7.8
L	7.9	21.1
M	5.9	15.6
N	8.6	22.9
P	5.3	14.1
Q	5.4	14.3
R–1	5.6	12.4
R–2	2.0	3.8
R–3	5.7	10.6

BASIN RUNOFF SUMMARY (CONT'D)		
BASIN	Q5 (CFS)	Q100 (CFS)
R–4	3.4	6.3
R–7	4.9	9.2
R–8	4.7	8.8
S	3.1	7.0
T	4.0	9.1
U	4.8	12.9
V	23.1	43.5
W	12.9	34.4
Y	9.7	25.9
OS–1A	9.2	19.0
OS–1B	33.8	69.9
OS–2	10.8	27.3
OS–3	40.3	86.3
OS–4	9.4	19.6
OS–5	6.7	14.0
OS–6	22.1	45.9
OS–7	29.1	60.8
OS–8	1.3	3.4
FC7	22.3	53.5

CLASSIC CONSULTING ENGINEERS & SURVEYORS
6385 Corporate Drive, Suite 101
Colorado Springs, Colorado 80919
(719)785-0790
(719)785-0799 (Fax)

SOUTH ACADEMY HIGHLANDS
FILING NO. 1
PHASE 1 DEVELOPMENT
PROPOSED CONDITIONS

DESIGNED BY	MAL	SCALE	DATE 7/22/13
DRAWN BY	MAL	(H) 1"= 100'	SHEET 1 OF 1
CHECKED BY		(V) 1"= N/A	JOB NO. 2184.90



BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
EX-1	1.2	9.3
EX-2	1.1	8.9

40 20 0 40 80

SCALE: 1" = 40'

LEGEND

- EXISTING GROUND CONTOUR (5910)
- PROPOSED FINISHED CONTOUR 5910
- SUBDIVISION BOUNDARY
- PROPOSED BASIN BOUNDARY
- EXISTING STORM SEWER
- BASIN IDENTIFIER D
- AREA IN ACRES 1.41

NO.	REVISION	DATE

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

SOUTH ACADEMY HIGHLANDS FILING NO. 4

PRELIMINARY/FINAL DRAINAGE REPORT
EXISTING CONDITIONS

CLASSIC CONSULTING

DESIGNED BY	MAL	SCALE		DATE	05/28/21
DRAWN BY	MAL	(H) 1"= 40'		SHEET	1 OF 2
CHECKED BY		(V) 1"= N/A		JOB NO.	2186.90

STORM SYSTEM NOTES:

ALL PROPOSED STORM SEWER IS REINFORCED CONCRETE PIPE (RCP) AND PRIVATE WITH A CONNECTION TO THE PRIVATE STORM MAIN IN VENETUCCI BLVD

FULL SPECTRUM DETENTION AND STORM WATER QUALITY FOR THE PROPOSED SITE IS PROVIDED AT THE DOWNSTREAM PRIVATE FACILITY REFERRED TO AS SOUTH ACADEMY HIGHLANDS FILING NO. 1 FACILITY 'I'.

ALL INLETS ARE PRIVATE CDOT TYPE R CURB INLETS.

BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
A	0.2	0.5
B	0.7	1.4
C	3.9	7.6
D	0.6	1.1
E	0.8	1.6
F	2.7	5.3
G	0.7	1.3
H	0.7	1.3
J	2.3	4.5
K	3.3	6.5
Q	0.8	6.2

DESIGN POINT SUMMARY			
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	OUTFALL
1	3.3	6.5	18" STUB
2	0.7	1.3	10' TYPE R (A-G)
3	2.3	4.5	18" STUB
4	0.6	1.3	5' TYPE R (A-G)
5	2.7	5.3	18" STUB
6	0.9	1.7	10' TYPE R (A-G)
7	0.5	1.1	5' TYPE R (A-G)
8	3.9	7.6	18" STUB
9	0.7	1.4	10' TYPE R (A-G)
10	0.2	0.5	SURFACE

PIPE RUN SUMMARY			
PIPE	Q5 (CFS)	Q100 (CFS)	SIZE
1	3.3	6.5	18"
2	4.0	7.8	18"
3	2.3	4.5	18"
4	6.9	13.4	24"
5	2.7	5.3	18"
6	3.6	7.0	18"
7	10.2	19.9	30"
8	0.5	1.1	18"
9	10.6	20.7	30"
10	3.9	7.6	24"
11	0.7	1.4	18"
12	14.8	28.8	30"

EXISTING STRATMOOR SOUTH SUBDIVISION FILING NO. 3

EXISTING 20' SANITARY EASEMENT BOOK 2806, PAGE 518

EXISTING STORM SEWER SYSTEM (FILING NO. 1)

UNPLATTED OWNER: CITY OF COLORADO SPRINGS

NO BUILD AREA (OPEN SPACE)

EXISTING VENETUCCI BOULEVARD

EXISTING SOUTH ACADEMY BOULEVARD

LOT 4 1.970 AC

LOT 3 1.303 AC

LOT 2 1.549 AC

LOT 1 1.341 AC

EXISTING MONUMENT SIGN

EXISTING TEMPORARY SEDIMENT BASIN TO BE REMOVED AND INDIVIDUAL SEDIMENT BASINS INSTALLED FOR EACH LOT AS SHOWN

Δ=35°30'48" R=238.00' L=147.52'

N89°56'03"E 62.20'

Δ=6°00'33" L=77.98'

Δ=7°24'02" L=96.03'

131.06'

49.75'

EXISTING PRIVATE 30" RCP FOR DEVELOPED RUNOFF

LOT 2 SOUTH ACADEMY HIGHLANDS FILING NO. 1A

LOT 1 SOUTH ACADEMY HIGHLANDS FILING NO. 1A

EXISTING WALMART HEIGHTS

40 20 0 40 80

SCALE: 1" = 40'

LEGEND

- EXISTING GROUND CONTOUR (5910)
- PROPOSED FINISHED CONTOUR 5910
- SUBDIVISION BOUNDARY
- PROPOSED BASIN BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- BASIN IDENTIFIER / AREA IN ACRES: D / 1.41
- DESIGN POINT: 10
- PIPE RUN: 1

NO.	REVISION	DATE

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

SOUTH ACADEMY HIGHLANDS FILING NO. 4

PRELIMINARY/FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS

DESIGNED BY	MAL	SCALE	DATE 01/30/22
DRAWN BY	MAL	(H) 1"= 40'	SHEET 2 OF 2
CHECKED BY		(V) 1"= N/A	JOB NO. 2186.90

N:\2186\DRAWINGS\DEVELOPMENT\2186DR-PDR-MAP.dwg, 4/6/2022 2:08:44 PM, 1:1